STORMWATER MANAGEMENT REPORT

for

King Arthur Court Warehouse

2 King Arthur Ct
Block 252, Lot 5.03
North Brunswick, Middlesex County

Prepared For:

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APPENDICES

1.0 INTRODUCTION

1.1 Scope and Executive Summary

This report presents the results of the storm water management analysis for the proposed warehouse development at 2 King Arthur Ct, North Brunswick, New Jersey.

As explained in detail below, the project will meet the regulatory requirements set forth in N.J.A.C. 7:8; Stormwater Control for non-Residential Major Development Ordinance of North Brunswick; and the Standards for Soil Erosion and Sediment Control in New Jersey.

1.2 Existing Site Description

The site is located at 2 King Arthur Ct in North Brunswick, New Jersey, in the I-2 Industrial zone. Identified by the Township's tax maps as Block 252, Lot 18, the site has an area of approximately 15.56 acres. The site contains a 2-story office building and three small maintenance garages, with associated driveways and parking lots. A small pump house building with a deck exists on the Westons Mill Pond within the northeastern corner of the site. The site is generally bound by light industrial development to the north and west, a residential community in the neighboring Borough of Milltown to the south, forested uplands and wetlands border the site to the northeast and south, and Weston Mills Pond to the east. A tributary to the Lawrence Brook is also present in the northern portion of the site. The southern lot line also is the municipal boundary with the Borough of Milltown.

The current stormwater facilities onsite consist of conveyance pipes that carry the site's runoff to the east directly into Weston Mills Pond and Lawrence Brook.

1.3 Proposed Development

The project will redevelop the site to an approximately 164,000 SF footprint warehouse. The building finished floor elevation will be approximately elevation 61.0 (NAVD 88). The development proposes 33 loading docks, 19 trailer parking spaces, and 98 car parking spaces. Additionally, site driveways, gates and fences, utility improvements and other pertinent site improvements are proposed. Landscaping and lighting will also be incorporated into the proposed site improvements.

1.4 Environmental Site Analysis

The wetlands on-site were delineated by Langan Engineering and Environmental Services, Inc. in March 2021. The wetlands delineated on-site were forested wetlands (Wetland A), an isolated drainage depression (Wetland B) and State Open Waters.

Wetland A is located on the north, east and south sides of the site in heavily forested areas. Wetland B is located around an existing stormwater outfall on the east side of the site that experiences ponding. The State Open Water wetlands are located along the portions of Weston Mills Pond and Lawrence Brook that border the property.

Pursuant to NJDEP Landscape Project Mapping, Wetland A is mapped as potential nesting and foraging habitat for bald eagles (rank 4). As such, it is anticipated that this wetland will be regulated as an exceptional resource value wetland with a transition area of 150 feet in width. A transition area averaging plan waiver is being prepared and will be submitted for NJDEP Division of Land Resource Protection (DLRP) approval.

Westons Mill Pond is classified as a FW2-NT (Freshwater 2 – Non-Trout) water body, pursuant to the Surface Water Quality Standards at N.J.A.C. 7:9B.

A portion of the project site also falls within the Flood Hazard Area of the Lawrence Brook and Weston Mill Pond. The Flood Hazard Area, as determined by Federal Emergency Management Agency (FEMA) on site is 26.0 (NAVD88) – refer to Figures 4 through 6. Using the proposed 2023 Flood Hazard Area Control Act Rule Amendment at N.J.A.C. 7:13 FEMA fluvial method, (26.0 + 3-feet), the Flood Hazard Area is depicted on the site at 29 (1988 NAVD).

2.0 REGULATORY REQUIREMENTS AND COMPLIANCE

Because the project proposes to disturb more than one acre and increase the amount of regulated impervious surface by more than a quarter-acre, it meets the definition of a "major development" under N.J.A.C. 7:8-1.2 and the Stormwater Control for non-Residential Major Development Ordinance of North Brunswick. Therefore, the following items must be addressed.

2.1 Runoff Quantity

NJAC 7:8-5.4(a)(3) requires control of stormwater runoff quantity control impacts. Currently, the proposed 2023 Stormwater Management Rule Proposal Amendment at N.J.A.C. 7:8 has not been formally published and adopted. In anticipation that the project will not be grandfathered into the 2020 N.J.A.C. 7:8 Stormwater Management rules, the stormwater management runoff quantity design was done in accordance with the proposed rules.

Pursuant to the 2023 amendment to NJAC 7:8, one way to address this requirement is to design stormwater management measurements such that the peak runoff rates for the current and future 2-, 10-, and 100-year storm events are less than or equal to 50, 75 and 80 percent, respectively, of the pre-construction stomwater runoff that is attributable to the portion of the site on which the proposed development is to be constructed. Hydrologic analyses have been prepared to demonstrate this methodology. Those analyses are discussed further in sections 4 and 5 of this report.

2.2 Runoff Quality

NJAC 7:8-5.5 requires that stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality design storm by 80 percent of the anticipated load from the developed site, expressed as an annual average. Quality standards in NJAC 7:8-5.5 are applicable to any major development that results in an increase of one-quarter acre or more of regulated motor vehicle surface. Therefore, since the proposed development results in an increase of regulated motor vehicle surface exceeding the 0.25-acre threshold, quality standards must be met.

The stormwater quality analysis used the NJDEP stormwater quality design storm consisting of 1.25 inches of rainfall in two hours with a distribution defined in Table 5-2 of the New Jersey Stormwater Best Management Practices Manual.

2.3 Groundwater Recharge

NJAC 7:8-5.4 requires groundwater recharge to be maintained at 100% of the average annual pre-construction groundwater recharge volume. To demonstrate that there will be no post-development annual recharge deficit, the New Jersey Groundwater Recharge Spreadsheet (NJGRS) was completed. This analysis is discussed further in section 5 of this report.

3.0 DESIGN METHODOLOGIES

Below is a summary of the methodologies of the major elements of the design of the storm water management system.

3.1 Hydrologic Methodology

Stormwater runoff calculations associated with this report were prepared using the SCS Method as contained in the USDA Soil Conservation Service Publication TR-55, "Urban Hydrology for Small Watersheds". TR-55 outlines procedures for calculating peak rates of runoff resulting from precipitation events and procedures for developing hydrographs. The TR-55 procedure simulates a watershed using the drainage area, curve number (CN), and time of concentration (Tc) for each watershed. The design storm used for the TR-55 analysis is the NOAA Atlas 14 NJ Region D cumulative 24-hour rainfall distribution. Rainfall data was based on depths described in the "Precipitation-Frequency Atlas of the United States" National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 2, Version 3.

The depths for the 2-, 10-, and 100-year storms in Middlesex County are 3.34, 5.10, and 8.58 inches, respectively.

The precipitation depths for the current and future 2-, 10- and 100-year storm events are determined by multiplying the precipitation depth obtained from NOAA by the adjustment factors and change factors for the current and future precipitation depths, respectively. The adjustment and change factors are specific to the county, or counties, in which the drainage area(s) of the site are located. Where a drainage area lies in more than one county, the precipitation values can be adjusted according to the percentage of drainage area in each county, or separate rainfall totals can be developed for each county using the values provided in the proposed 2023 Stormwater Management Rule Proposal Amendment at N.J.A.C. 7:8, tables 5-5 and 5-6.

Table 3.1 below demonstrates the current and future precipitation depth calculations:

Table 3.1 – Precipitation Depths

Design Storm	NOAA Atlas 14 Point Precipitation Frequency Estimate (in)	Current Precipitation Adjustment Factor *	Current Precipitation (in)	Future Precipitation Change Factor *	Future Precipitation (in)
2-Yr	3.34	1	3.34	1.19	3.97
10-Yr	5.1	1.01	5.15	1.21	6.17
100-Yr	8.58	1.03	8.84	1.33	11.41

***Adjustment and Change factors are specific to Middlesex County**

The curve number is a land-sensitive coefficient that dictates the relationship between total rainfall depth and direct storm runoff. Based on the coverage of soil groups and land use in the area, CN values were determined for each watershed for the existing and proposed conditions. Separate hydrographs were prepared for pervious and impervious areas as well as combined hydrographs for both pervious and impervious areas.

The soils within the watersheds analyzed were classified as hydrologic soil group D. The SCS classification system evaluates the runoff potential of a soil according to its infiltration and transmission rates. “A” soils have the lowest runoff potential and “D” soils have the greatest runoff potential.

The following curve numbers, associated with hydrologic soil group “D”, were used:

Table 3.2 – Project Curve Numbers

Land Cover	**CN**
Open Space/Landscaped	80
Brush	77
Gravel	91
Impervious	98

The time of concentration is defined as the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest/analysis. Values of the time of concentration calculated for each watershed based on land cover and slope of the flow path using methods described in TR-55.

3.2 Conveyance Methodology

Runoff was calculated using the rational method and pipe capacities were analyzed using hydraulic grade line analysis in Hydrology Studio’s Stormwater Studio Software. Rainfall data was based on intensities described in the “Precipitation-Frequency Atlas of the United States” National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 2, Version 3. The storm sewer conveyance system was analyzed using the Rational Method for estimating runoff from a 25-year design storm. The site was divided into sub-areas, each contributing runoff to an individual catch basin inlet or roof drain as depicted on the "Proposed Subwatershed Plan," included as drawing WB103 herein. A weighted average runoff coefficient was chosen based on the percentage of each type of land cover using the following coefficients:

Table 3.3 – Project Runoff Coefficients

Land Cover	**C**
Landscaped	0.65
Brush	0.59
Gravel	0.84
Impervious	0.99

4.0 PRE-DEVELOPMENT CONDITIONS

4.1 Existing Land Use

The site is commercially developed, consisting a 2-story office building and three small maintenance garages, with associated driveways, parking lots and landscaping. The site is generally bound by light industrial development to the north and west, a residential community in the neighboring Borough of Milltown to the south, forested uplands and wetlands border the site to the northeast and south, and Weston Mills Pond to the east. A tributary to the Lawrence Brook is also present in the northern portion of the site. The topography of the developed portion of the site is relatively flat. Landscaped areas immediately surround the existing development and are covered mostly with grass with some trees and vegetation. The undeveloped portion of the site slopes towards Weston Mills Pond and Lawrence Brook.

4.2 Soils

According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil survey map for Middlesex County, New Jersey, the site is classified as mostly Keyport-Urban Land Complex (KeuC), with portions of the site classified as Keyport Loam (KeoB), Klinesville Channery loam (KkoE), and Humaquepts (HumAt); see Figure 8 – Soils Map. Each aforementioned soil is classified as a hydrologic soil group (HSG) D or HSG A/D soil. Therefore, for the purpose of the hydrology analysis, the site was considered to be entirely HSG D.

In accordance with chapter 12 of the NJ BMP Manual, a preliminary geotechnical stormwater investigation was performed onsite in December of 2022 and a supplemental geotechnical stormwater field investigation in January of 2023. The investigations consisted of test pits, single ring infiltration tests at select test pit locations and lab testing, including laboratory permeability tests. The findings from both investigations were used in the design of the proposed stormwater facilities.

The investigation is summarized in the Soils Investigation for Stormwater Management Memo, prepared by Langan Engineering, dated 05 May 2023, and provided in Appendix G.

4.3 Existing Watersheds

The existing watershed analysis consists of two points of analysis, with tributary runoff from five watersheds as shown on Watersheds Plan, sheet WB101, and described below. The existing watershed data and hydrographs are provided in Appendix A.

Point of Analysis A is Weston Mills Pond on the east side of the site.

Watershed A-1 consists of 2.15 acres of forested area, landscaped area, and parking lot area that will be disturbed and is conveyed both overland and via storm pipes into Weston Mills Pond on the east and south side of the site.

Watershed A-2 consists of 3.39 acres of landscaped, parking lot and driveway area that will be disturbed and is conveyed solely via storm pipe into Weston Mills Pond on the east side of the site.

Watershed A-3 consists of 0.44 acres of mostly landscaped area that will be disturbed and is conveyed overland into Weston Mills Pond on the east side of the site.

Watershed A-4 consists of 2.96 acres of forested area, landscaped area, driveway and parking lot area that will be disturbed and is conveyed to a yard inlet and ultimately via pipe to Weston Mills Pond on the north side of the site.

Point of Analysis B is at an existing yard inlet beside the Conrail-owned railroad.

Watershed B consists of stormwater surface runoff that is collected overland to an existing yard inlet from the immediate area in the vicinity of the railroad.

The peak discharges for the site are summarized in the following table. Watershed data and hydrographs are provided in Appendix A.

Table 4.1 - Summary of Existing Peak Discharges

Storm Frequency (year)	Current Precipitation		Future Precipitation	
	Watershed A (cfs)	Watershed B (cfs)	Watershed A (cfs)	Watershed B (cfs)
2	15.24	3.69	19.18	4.54
10	26.76	6.14	33.42	7.54
100	50.99	11.2	67.92	14.71

5.0 POST-DEVELOPMENT CONDITIONS

5.1 Proposed Development

The proposed development consists of an approximately 164,000 SF footprint warehouse with on-site parking for passenger vehicles and trailer parking spaces. In addition, associated site improvements including utilities, landscaping, and lighting will be incorporated into the proposed development. The project will disturb approximately 9.85 aces and will result in a total impervious area of 7.93 acres, which is an increase of 3.5 acres in comparison to the existing condition. The total vehicular use area is increased by 0.54 acres in comparison to the existing condition.

5.2 Proposed Watersheds and Water Quantity Analysis

The proposed development consists of seven watersheds, with two points of analysis, as shown on the Proposed Watersheds Plan, sheet WB102, and described below.

Watershed A-1 comprises 2.13 acres of stormwater runoff from landscaped and vehicular surface areas on the northwest side of the site. The runoff is collected via overland flow to catch basins, conveyed via a system of storm pipes to Basin A-1 for quality and quantity management. Basin A-1 discharges to a headwall on the northeast side of the site and ultimately to Point of Analysis A, Weston Mills Pond.

Watershed A-2 comprises 2.38 acres of stormwater runoff from landscaped and vehicular surface areas on the south, east, and north sides of the site. The runoff is collected via overland flow to catch basins, conveyed via a system of storm pipes to Basin A-2 for quality and quantity management. Basin A-2 discharges to a headwall on the east side of the site and ultimately to Point of Analysis A, Weston Mills Pond.

Watershed A-3 comprises 2.20 acres of stormwater runoff from the northern portion of the building roof area. The runoff is conveyed via a system of storm pipes to underground infiltration Basin A-3 for quantity management. Basin A-3 discharges to a headwall on the east side of the site and ultimately to Point of Analysis A, Weston Mills Pond.

Watershed A-4 comprises 1.57 acres of stormwater runoff from the southern portion of the building roof area. The runoff is conveyed via a system of storm pipes to underground infiltration Basin A-4 for quantity management. Basin A-4 discharges to a headwall on the east side of the site and ultimately to Point of Analysis A, Weston Mills Pond.

Watershed A-5 comprises 1.01 acres of stormwater runoff from landscaped and vehicular surfaces areas that is conveyed through a green-infrastructure manufactured treatment device to a headwall on the south side of the site and ultimately to Point of Analysis A, Weston Mills Pond.

Watershed A-6 0.81 acres of surface runoff is from open space that flows overland to Point of Analysis A, Weston Mills Pond.

Watershed A and Watershed B have been designed to provide the required peak reductions, as described in section 2.1 of this report. Peak reductions have been applied to the disturbed portions of the development. Since the analysis area consisted of only the parts of the site that will be disturbed, this applies to the Watersheds A and B.

The proposed watershed data and hydrographs are provided in Appendix B. The results are summarized below.

Peak flow reductions of 50%, 75% and 80% have been applied to the existing flows from Watersheds A and B for the current and future 2-, 10-, and 100-year storm events, respectively.

Table 5.2 – Watershed A - Summary of Allowable Flows and Proposed Discharges

Current Precipitation				
Storm Event	**Existing Flow**	**Allowable % of Flow**	**Allowable Flow**	**Proposed Flow**
2	15.24 cfs	50%	7.62 cfs	4.01 cfs
10	26.76 cfs	75%	20.07 cfs	9.55 cfs
100	50.99 cfs	80%	40.79 cfs	35.26 cfs
Future Precipitation				
Storm Event	**Existing Flow**	**Allowable % of Flow**	**Allowable Flow**	**Proposed Flow**
2	19.18 cfs	50%	9.59 cfs	5.59 cfs
10	33.42 cfs	75%	25.07 cfs	16.50 cfs
100	67.92 cfs	80%	54.34 cfs	50.72 cfs

Table 5.3 – Watershed B - Summary of Allowable Flows and Proposed Discharges

Current Precipitation				
Storm Event	**Existing Flow**	**Allowable % of Flow**	**Allowable Flow**	**Proposed Flow**
2	3.69 cfs	50%	1.85 cfs	1.23 cfs
10	6.14 cfs	75%	4.61 cfs	2.25 cfs
100	11.2 cfs	80%	8.96 cfs	4.70 cfs
Current Precipitation				
Storm Event	**Existing Flow**	**Allowable % of Flow**	**Allowable Flow**	**Proposed Flow**
2	4.54 cfs	50%	2.27 cfs	1.61 cfs
10	7.54 cfs	75%	5.66 cfs	3.00 cfs
100	14.71 cfs	80%	11.77 cfs	6.33 cfs

5.3 Proposed Water Quality Analysis

The proposed development water quality measures includes two small-scale underdrained bioretention basins, two small-scale subsurface infiltration basins, and three green-infrastructure (GI) manufactured treatment devices. Each BMP provides a minimum of 80% TSS removal and are designed in accordance with the NJ BMP manual. A 3.5 acre increase in regulated impervious area and 0.54 acre increase in regulated motor vehicular surface is proposed.

A majority of the onsite landscaped and vehicular surface runoff will be conveyed to one of two small-scale underdrained bioretention basins (Basins A-1 and A-2). Pursuant to chapter 9.7 of the NJ BMP Manual, pretreatment is required for small-scale bioretention systems designed to infiltrate into the subsoil that include exfiltration in the stormwater routing calculations. However, Basins A-1 and A-2 are underdrained and not designed to infiltrate into the subsoil, and therefore do not include exfiltration in the routing calculations. Therefore, pretreatment is not required.

The remaining 1.01 acre of onsite landscaped and vehicular surface runoff is conveyed through one of three Contech Filterra Bioscape Vaults before discharging into Weston Mills Pond. Sizing calculations for each unit are provided in Appendix C.

Roof runoff will be sent to one of the two subsurface infiltration basins (Basins A-3 and A-4). The proposed building’s roofline will be higher than the surrounding trees and therefore there is no potential for debris or vegetative material to be present in the roof runoff. Additionally the proposed development does not have air discharge or other situations where contaminants could deposit on the roof. Therefore, pretreatment is not proposed for the subsurface infiltration basins.

Pursuant to the New Jersey Stormwater Best Management Practice Manual, the performance and characteristics of each bioretention basin are shown in Table 5-2.

Table 5.2 –Basin Water Quality Performance and Characteristics

Basin ID	BMP Type	Basin Bottom Elevation (NAVD 88)	Ground Water Elevation (NAVD 88)	Ground Water Mounding Height (ft)	W.Q. Storm Runoff Depth (ft)	Infiltration Rate (In/hr)	Soil Bed Depth (In)	Sand Layer Depth (In)	Gravel Bed Depth (In)
A-1	Small-Scale Bioretention (Underdrained)	47	41.5	N/A	0.91	N/A	18.0	6.0	17.5
A-2	Small-Scale Bioretention (Underdrained)	47	42.6	N/A	1.00	N/A	18.0	6.0	17.0
A-3	Small-Scale Subsurface Infiltration	49.5	42.6	5.40	0.67	0.75	N/A	N/A	6
A-4	Small-Scale Subsurface Infiltration	51.5	45.6	5.24	0.47	1.0	N/A	N/A	6

The small-scale bioretention and subsurface infiltration basins have been designed in accordance with the NJ BMP Manual chapters 9.7 and 9.8, respectively.

The underdrained small-scale bioretention basins have water quality storm runoff depths of no more than 1-ft, have soil beds with a minimum depth of 18-in to achieve 80% TSS removal, and have proper separation from the seasonal high water table (SHWT).

The subsurface infiltration basins have water quality storm runoffs depths below the maximum of 2-ft, have been analyzed for groundwater mounding conflicts, and have been designed with subsoil infiltration rates that have been tested in accordance with chapter 12 of the NJ BMP Manual.

Water quality calculations are provided in Appendix C.

5.3 Proposed Ground Water Recharge Analysis

The proposed development increases the amount of impervious coverage by 3.5 acres and reduces the amount of wooded coverage and open space, resulting in a post-development annual recharge deficit volume of 163,705 cubic feet. The two small-scale subsurface infiltration basins are designed to compensate for the loss of annual recharge. To demonstrate this, a completed New Jersey Groundwater Recharge Spreadsheet (NJGRS) has been provided in Appendix D.

Pursuant to the New Jersey Stormwater Best Management Practice Manual, the inputs into the NJGRS BMP Calculations Tab and results for each basin are summarized below in Table 5.3.

Table 5.3 –Subsurface Infiltration Basin Characteristics

Basin ID	BMP Infiltration Area (SF)	Bottom Elevation (NAVD 88)	First Orifice Elevation (NAVD 88)	Effective Depth with 0.4 Void Ratio (IN)	Impervious Area to Basin (AC)	Annual BMP Recharge Volume (CuFt)
A-3	9,117	49	50	4.80	2.20	179,145
A-4	10,599	51	51.5	2.40	1.57	113,494
					Total Recharge:	**292,639**

5.4 Conveyance

The proposed stormwater conveyance system was sized to convey the runoff from the 25-yr storm. Pipes that discharge into basins were designed with a tailwater matching the 2-year peak basin water surface elevation.

All pipes are able to convey flow from the 25-year storm without overtopping catch basin grates or manhole rims. The results of the hydraulic calculations are provided in Appendix E.

The underdrains for the proposed small-scale bioretention basins were checked to confirm capacity for at least twice the infiltration rate of the sand layer, when the sand layer infiltration rate is twice the infiltration rate of the soil bed. Therefore, calculations for the hydraulic capacity of the underdrains must be at least four times of the infiltration rate provided by the soil bed.

These calculations are shown in Appendix E.

5.5 Conduit Outlet Protection

The soil filter bed material will have similar properties to a silty loam, which can withstand velocities of up to 3.0 feet per second without eroding, per the Standards for Soil Erosion and Sediment Control in New Jersey.

Rip-rap outlet protection is provided for the outlets into Basins A-1 and A2, and scour holes are proposed at the outfalls to Weston Mills Pond. Calculations are provided in Appendix E.

5.6 Berm and Dam Analysis

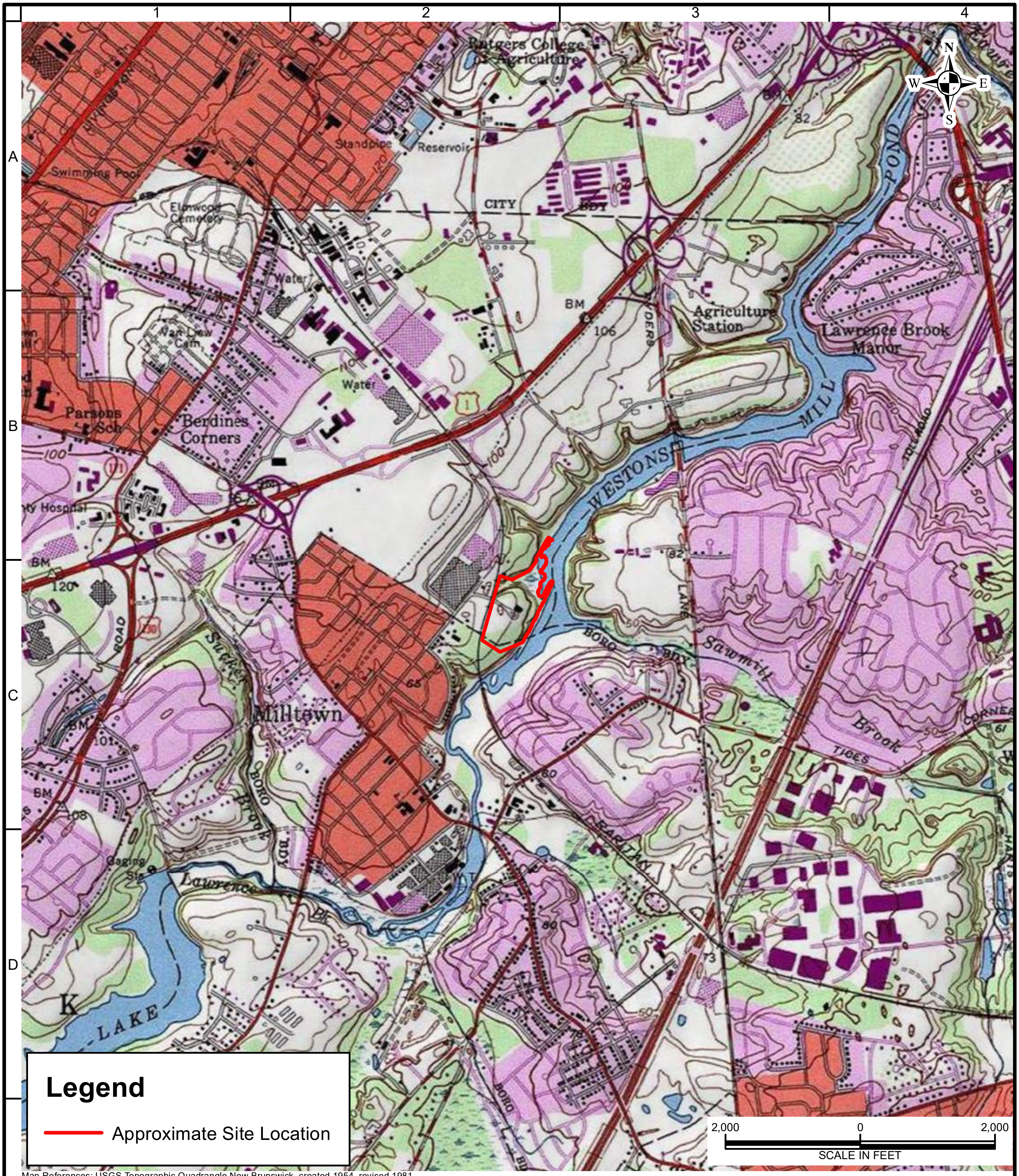
The bioretention basins are constructed entirely in cut and do not impound water on a temporary basis that is more than 5 feet in height. Therefore they do not meet the definition of a dam in NJAC 7:20. No further analysis is required.

6.0 CONCLUSION

The results of this study indicate that the regulatory requirements have been met for the project. The design is in accordance with:

1. N.J.A.C. 7:8 – New Jersey Department of Environmental Protection (NJDEP) Stormwater Management Rules;
2. Stormwater Control for non-Residential Major Development Ordinance of North Brunswick; and
3. Standards for Soil Erosion and Sediment Control in New Jersey.

FIGURES



Map References: USGS Topographic Quadrangle New Brunswick, created 1954, revised 1981

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Project

SILVER LINE DRIVE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY NEW JERSEY

Drawing Title

USGS SITE LOCATION MAP

Project No.
100851001

Date
01/30/2020

Scale
1" = 2,000'

Drawn By
SEP

Figure
1

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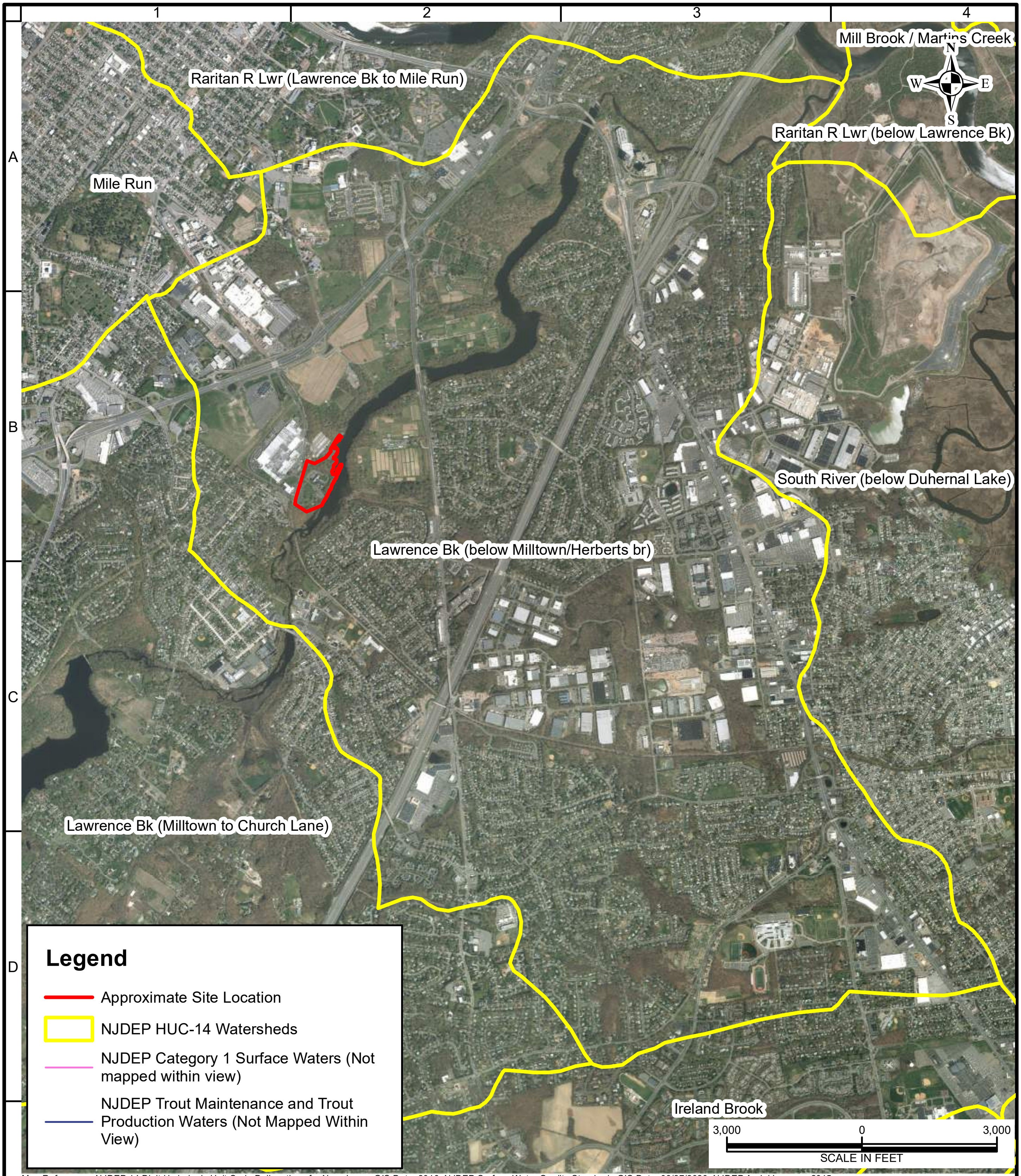

Map References: NJDEP 14 Digit Hydrologic Unit Code Delineations for New Jersey GIS Data, 2016; NJDEP Surface Water Quality Standards GIS Data, 03/27/2020; NJDEP Aerial Imagery, 2015

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SILVER LINE DRIVE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY NEW JERSEY

Drawing Title

NJDEP HUC-14 WATERSHED MAP

Project No.
100851001

Date
03/29/2021

Scale
1" = 3,000'

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Figure
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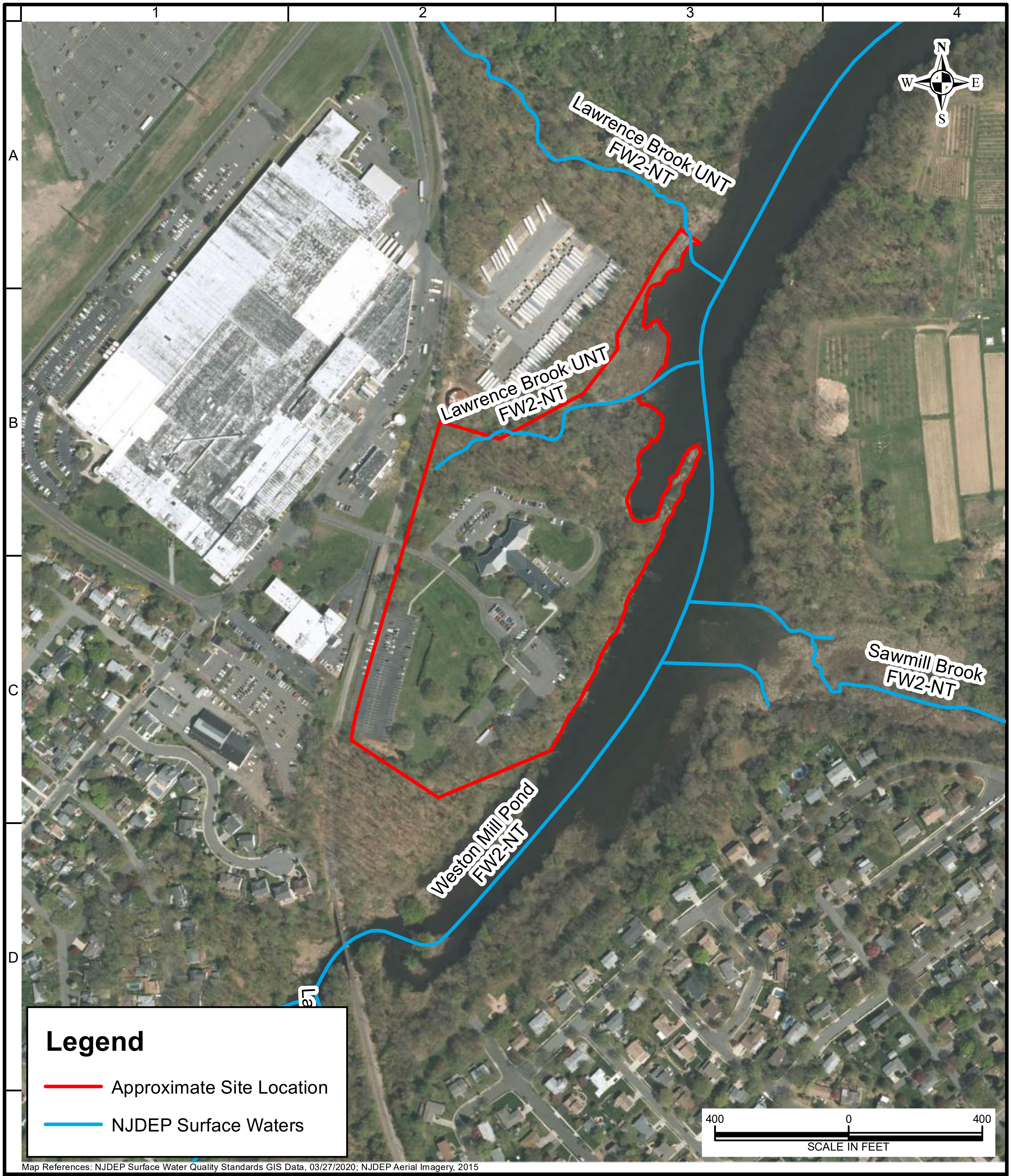

Map References: NJDEP Surface Water Quality Standards GIS Data, 03/27/2020; NJDEP Aerial Imagery, 2015

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Project

SILVER LINE DRIVE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY NEW JERSEY

Drawing Title

NJDEP SURFACE WATERS MAP

Project No.	100851001
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Figure

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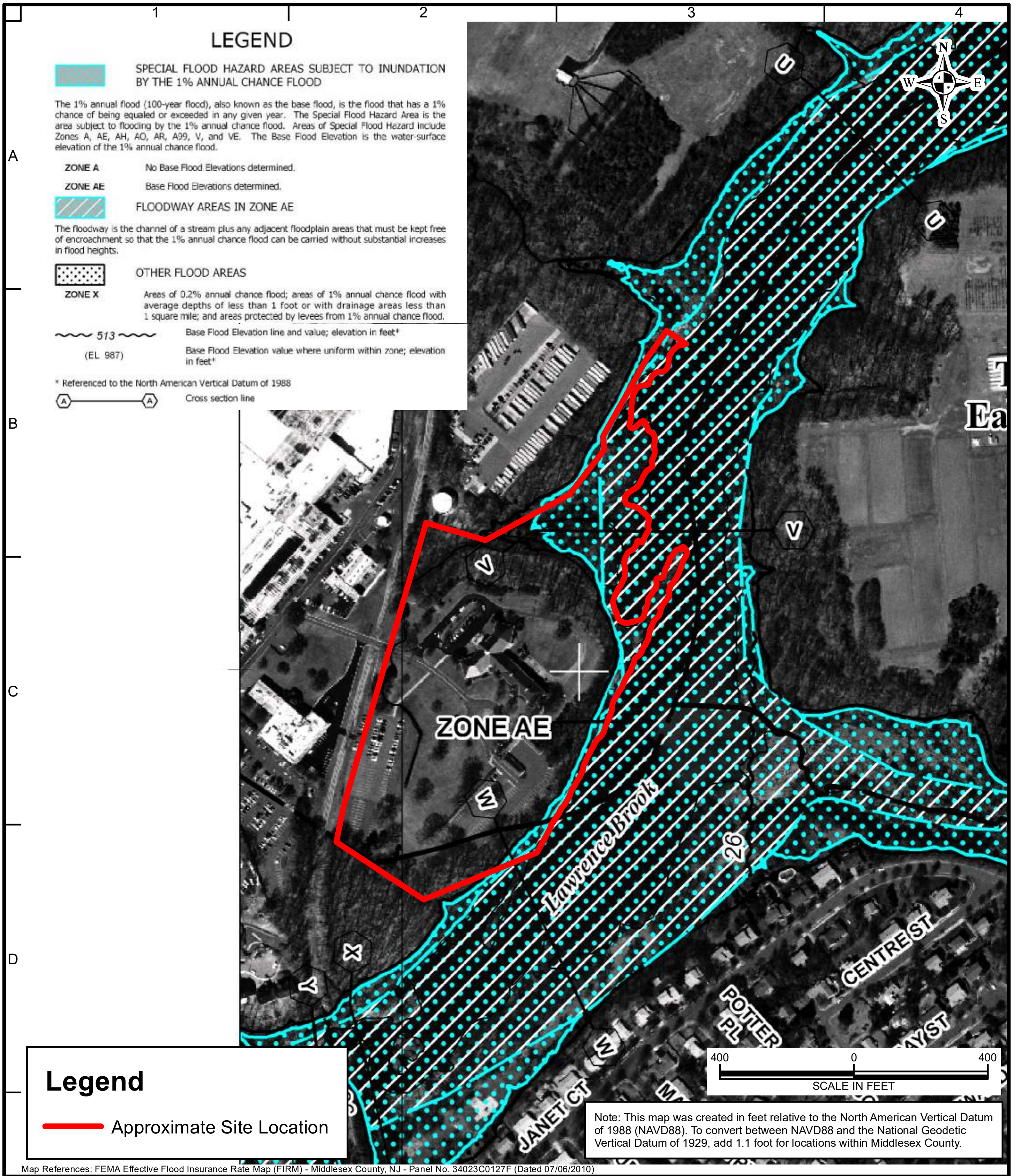

LEGEND

▨ SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.

▨ FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

▨ OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
~~ 513 ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

Ⓐ——Ⓐ	Cross section line

Legend

🟥 Approximate Site Location

Note: This map was created in feet relative to the North American Vertical Datum of 1988 (NAVD88). To convert between NAVD88 and the National Geodetic Vertical Datum of 1929, add 1.1 foot for locations within Middlesex County.

Map References: FEMA Effective Flood Insurance Rate Map (FIRM) - Middlesex County, NJ - Panel No. 34023C0127F (Dated 07/06/2010)

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Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

SILVER LINE DRIVE

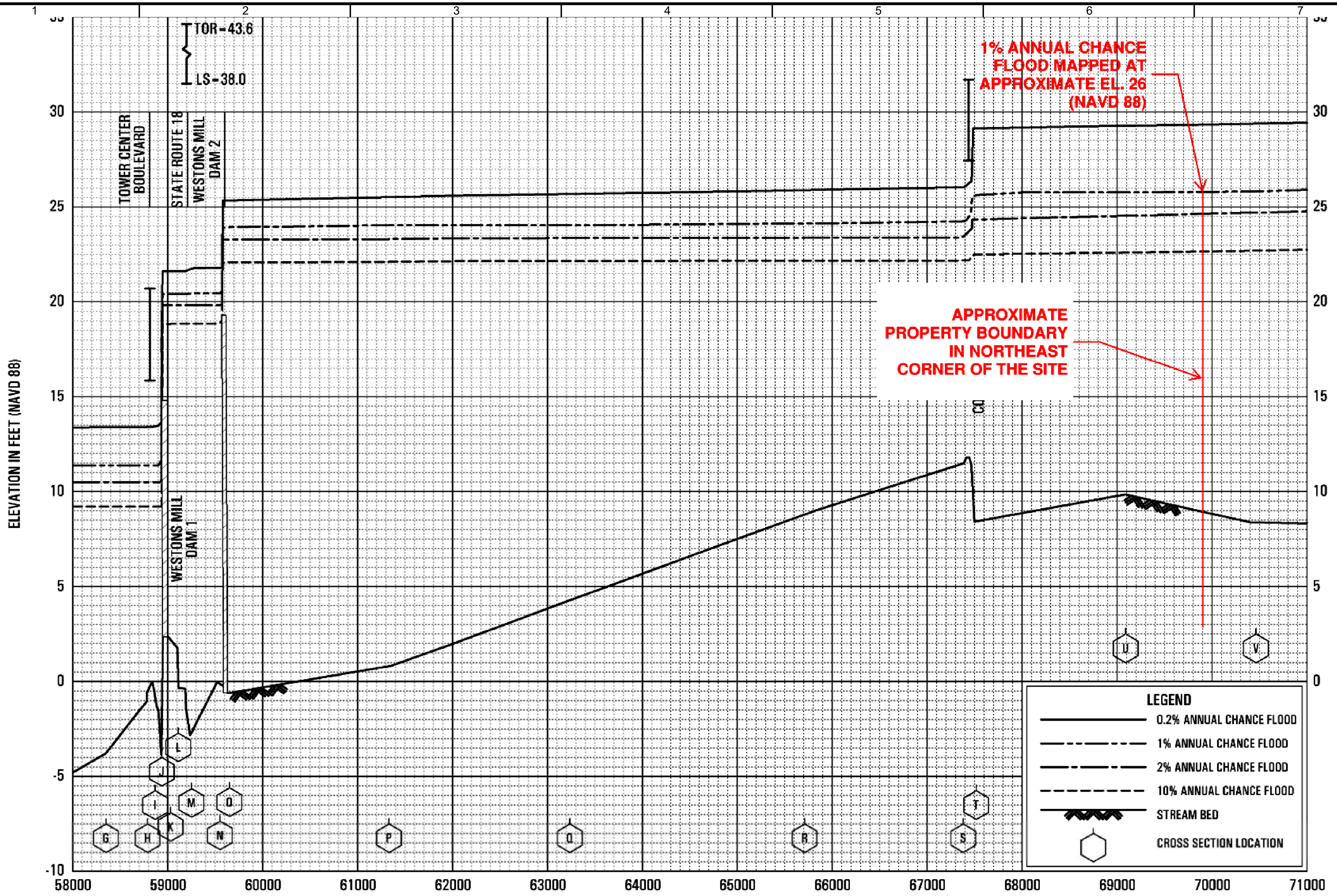
BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY NEW JERSEY

Drawing Title

FEMA EFFECTIVE FIRM MAP

Project No.	100851001
Date	01/30/2020
Scale	1" = 400'
Drawn By	SEP
Figure	4

Path: \\langan.com\data\PAR\data0\100851001\Project Data\ArcGIS\MXD\Natural_Resource_Figures\Figure 7A - FEMA Effective.mxd



FLOOD PROFILES

LAWRENCE BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MIDDLESEX COUNTY, NJ

(ALL JURISDICTIONS)

Map References: FEMA Effective Flood Insurance Study 34023CV001A, Panel 116P, 07/06/2010

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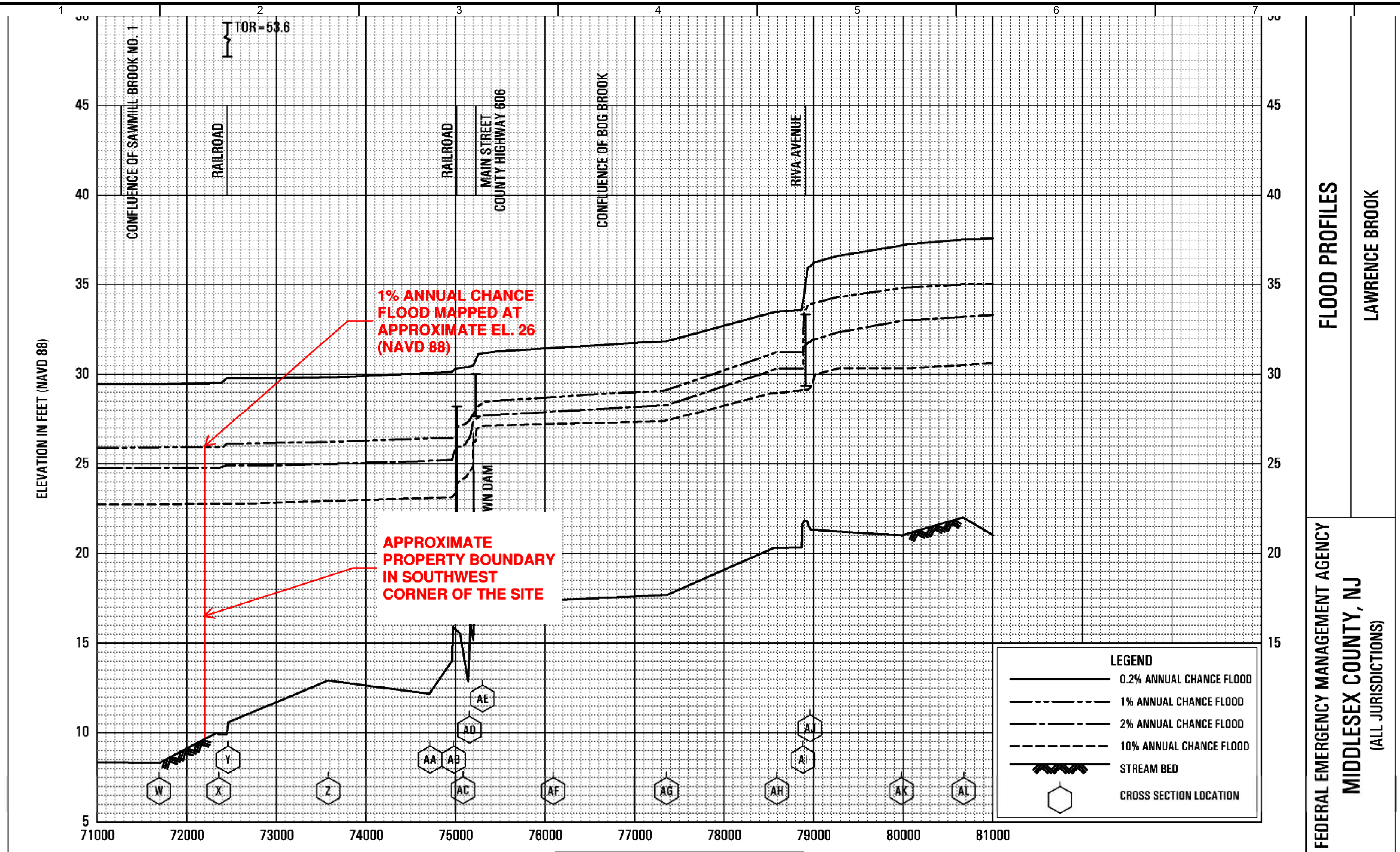
Project
SILVER LINE DRIVE
BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY NEW JERSEY

Drawing Title
FEMA EFFECTIVE FLOOD PROFILE 1

Project No. 100851001
Date 03/29/2021
Scale N.T.S.
Drawn By SEP
Figure 5

Path: \\langan.com\data\PAR\data0\100851001\Project Data\ArcGIS\MXD\Natural_Resource_Figures\Figure 7B - FEMA Effective Profile.mxd



Map References: FEMA Effective Flood Insurance Study 34023CV001A, Panel 117P, 07/06/2010

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Project

SILVER LINE DRIVE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY NEW JERSEY

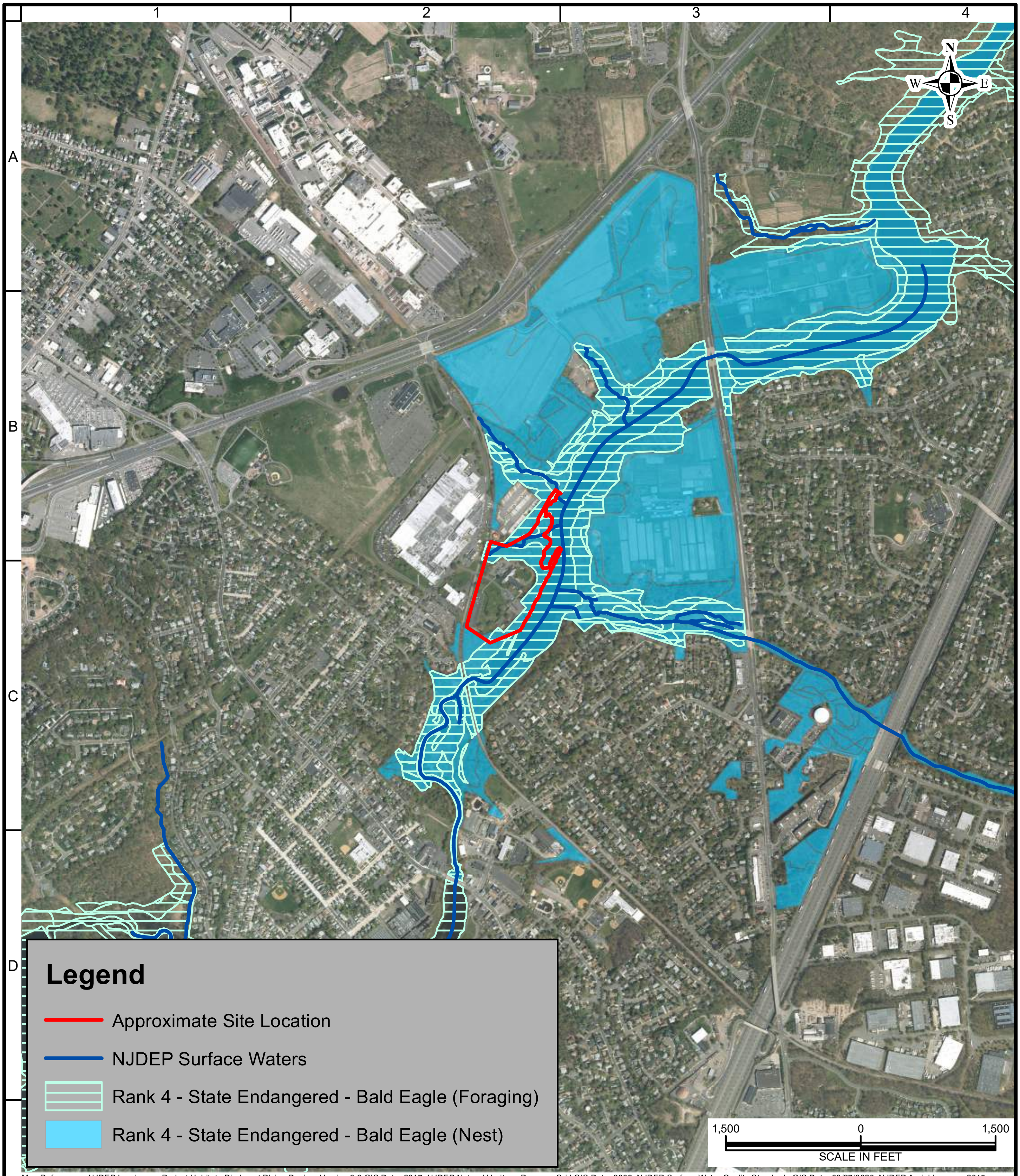
Drawing Title

FEMA EFFECTIVE FLOOD PROFILE 2

Project No. 100851001
Date 03/29/2021
Scale N.T.S.
Drawn By SEP

Figure 6

Path: \\langan.com\data\PAR\data0\100851001\Project Data\ArcGIS\MXD\Natural_Resource_Figures\Figure 7C - FEMA Effective Profile2.mxd



Map References: NJDEP Landscape Project Habitat - Piedmont Plains Region, Version 3.3 GIS Data, 2017; NJDEP Natural Heritage Program Grid GIS Data, 2009; NJDEP Surface Water Quality Standards GIS Data, 03/27/2020; NJDEP Aerial Imagery, 2015

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NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

SILVER LINE DRIVE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY   NEW JERSEY

Drawing Title

NJDEP THREATENED AND ENDANGERED SPECIES HABITAT MAP

Project No.
100851001
Date
03/30/2021
Scale
1" = 1,500'
Drawn By
SEP

Figure
7

Path: \\langan.com\data\PAR\data0\100851001\Project Data\ArcGIS\MXD\Natural_Resource_Figures\Figure 10 - T&E.mxd

Map References: NRCS Web Soil Survey SSURGO GIS Data, Survey Area: 2020, Tabular: 2020; Spatial: 2019; NJDEP Aerial Imagery 2015

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Project

SILVER LINE DRIVE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK TOWNSHIP
MIDDLESEX COUNTY NEW JERSEY

Drawing Title

NRCS
SOILS MAP

Project No.
100851001

Date
03/30/2021

Scale
1" = 300'

Drawn By
SEP

Figure
8

Path: \\langan.com\data\PAR\data0\100851001\Project Data\ArcGIS\MXD\Natural_Resource_Figures\Figure 12 - Soils.mxd

DRAWINGS

NOTES:

1. LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, INC, WETLAND SCIENTISTS DELINEATED WETLANDS AND THE TOP OF BANK ONSITE ON 03/30/2020 AND 03/24/2021.
2. WETLANDS, TOP OF BANK AND RIPARIAN ZONES DEPICTED ON THIS PLAN HAVE NOT YET BEEN VERIFIED BY THE THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION (NJDEP) DIVISION OF LAND RESOURCE PROTECTION (DLRP).
3. TOPOGRAPHIC AND UTILITY INFORMATION SHOWN HEREON IS BASED ON "BOUNDARY AND PARTIAL SURVEY" BY LANGAN ENGINEERING, DATED 15 DECEMBER 2022. THIS INFORMATION IS NOT GUARANTEED AS TO ACCURACY OR COMPLETENESS. ALL EXISTING CONDITIONS SHALL BE VERIFIED PRIOR TO THE COMMENCING OF WORK. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER OF RECORD.
4. ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
5. THE MERIDIAN SHOWN IS REFERENCED TO THE NEW JERSEY STATE PLANE COORDINATE SYSTEM NAD 83.
6. REGULATORY NEW JERSEY FLOOD HAZARD AREA DESIGN FLOOD ELEVATION (NJFHADFE) IS BASED ON N.J.A.C. 7:13–3.4–FEMA FLUVIAL METHOD (FEMA 100–YEAR ELEVATION (EL. 26) + 3–FT)) = ELEVATION 29.0.
7. IN PAVED AREAS, SPOT ELEVATIONS REFER TO TOP OF PAVEMENT/BOTTOM OF CURB, UNLESS OTHERWISE NOTED. REFER TO CS501 FOR CURB DETAIL.

Date	Description	No.

REVISIONS

MAY 0 5 2023
SIGNATURE DANIEL MIOLA DATE SIGNED
PROFESSIONAL ENGINEER NJ Lic. No.
24GE04676300

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Project

KING ARTHUR
COURT WAREHOUSE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK
MIDDLESEX COUNTY NEW JERSEY

Drawing Title

GRADING PLAN

Project No. 100851001
Date FEBRUARY 27, 2023
Drawn By JPNR
Checked By PM
Drawing No. CG101
Sheet 5 of 22

NOTES:

1. LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, INC, WETLAND SCIENTISTS DELINEATED WETLANDS AND THE TOP OF BANK ONSITE ON 03/30/2020 AND 03/24/2021.
2. WETLANDS, TOP OF BANK AND RIPARIAN ZONES DEPICTED ON THIS PLAN HAVE NOT YET BEEN VERIFIED BY THE THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION (NJDEP) DIVISION OF LAND RESOURCE PROTECTION (DLRP).
3. TOPOGRAPHIC AND UTILITY INFORMATION SHOWN HEREON IS BASED ON "BOUNDARY AND PARTIAL SURVEY" BY LANGAN ENGINEERING, DATED 23 SEPTEMBER 2020. THIS INFORMATION IS NOT GUARANTEED AS TO ACCURACY OR COMPLETENESS. ALL EXISTING CONDITIONS SHALL BE VERIFIED PRIOR TO THE COMMENCING OF WORK. ANY DISCREPANCIES SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER OF RECORD.
4. ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
5. THE MERIDIAN SHOWN IS REFERENCED TO THE NEW JERSEY STATE PLANE COORDINATE SYSTEM NAD 83.
6. REGULATORY NEW JERSEY FLOOD HAZARD AREA DESIGN FLOOD ELEVATION (NJFHADFE) IS BASED ON N.J.A.C. 7:13-3.4-FEMA FLUVIAL METHOD (FEMA 100-YEAR ELEVATION (EL. 26) + 3-FT)) = ELEVATION 29.0.
7. STORMWATER CONVEYANCE SHALL BE WATERTIGHT.
8. ALL REINFORCED CONCRETE PIPE IS CLASS III, UNLESS STATED OTHERWISE.

Date	Description	No.

REVISIONS

MAY 0 5 2023
SIGNATURE DANIEL MIOLA DATE SIGNED
PROFESSIONAL ENGINEER NJ Lic. No.
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Project

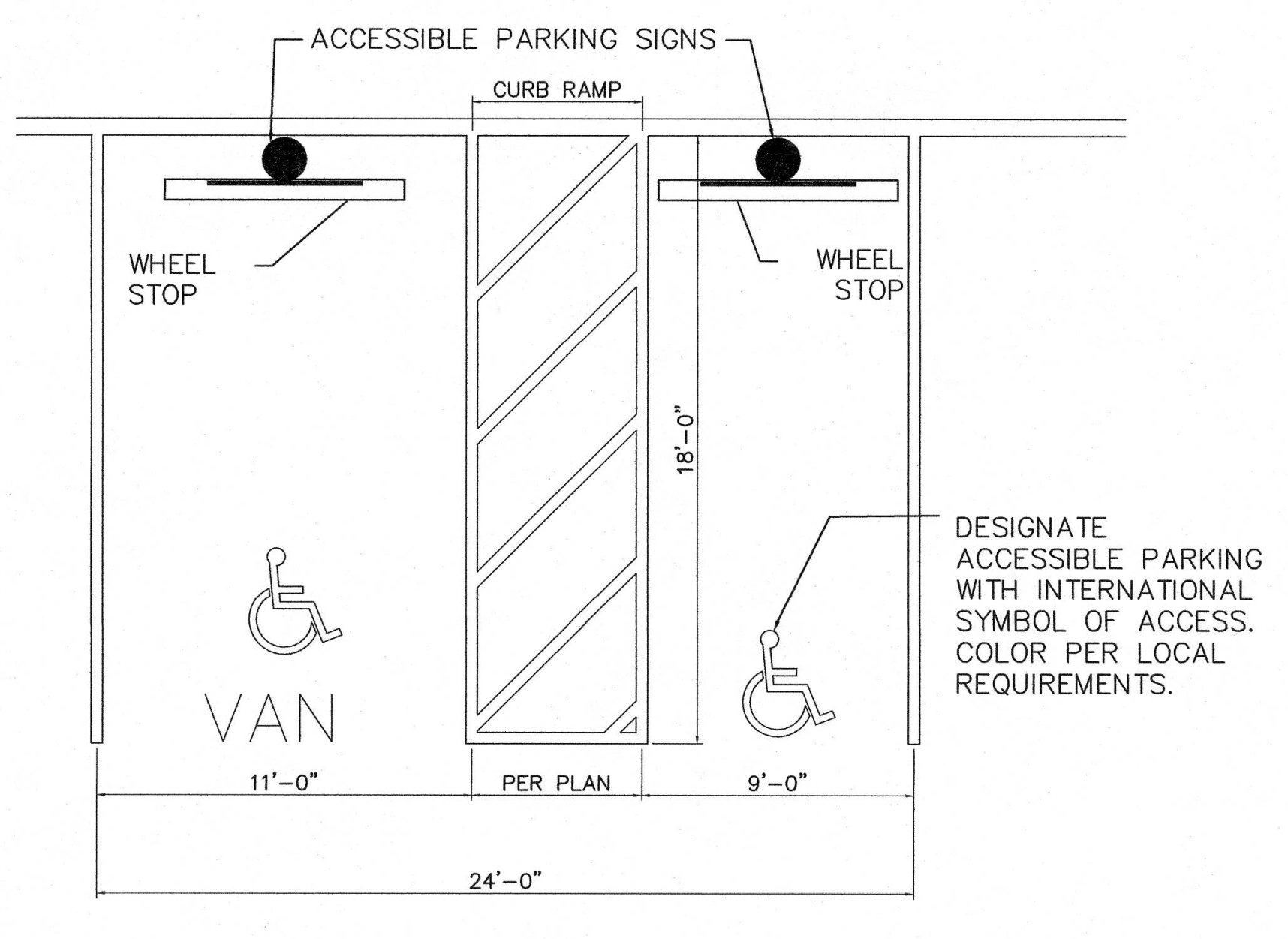
KING ARTHUR COURT WAREHOUSE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK
MIDDLESEX COUNTY NEW JERSEY

Drawing Title

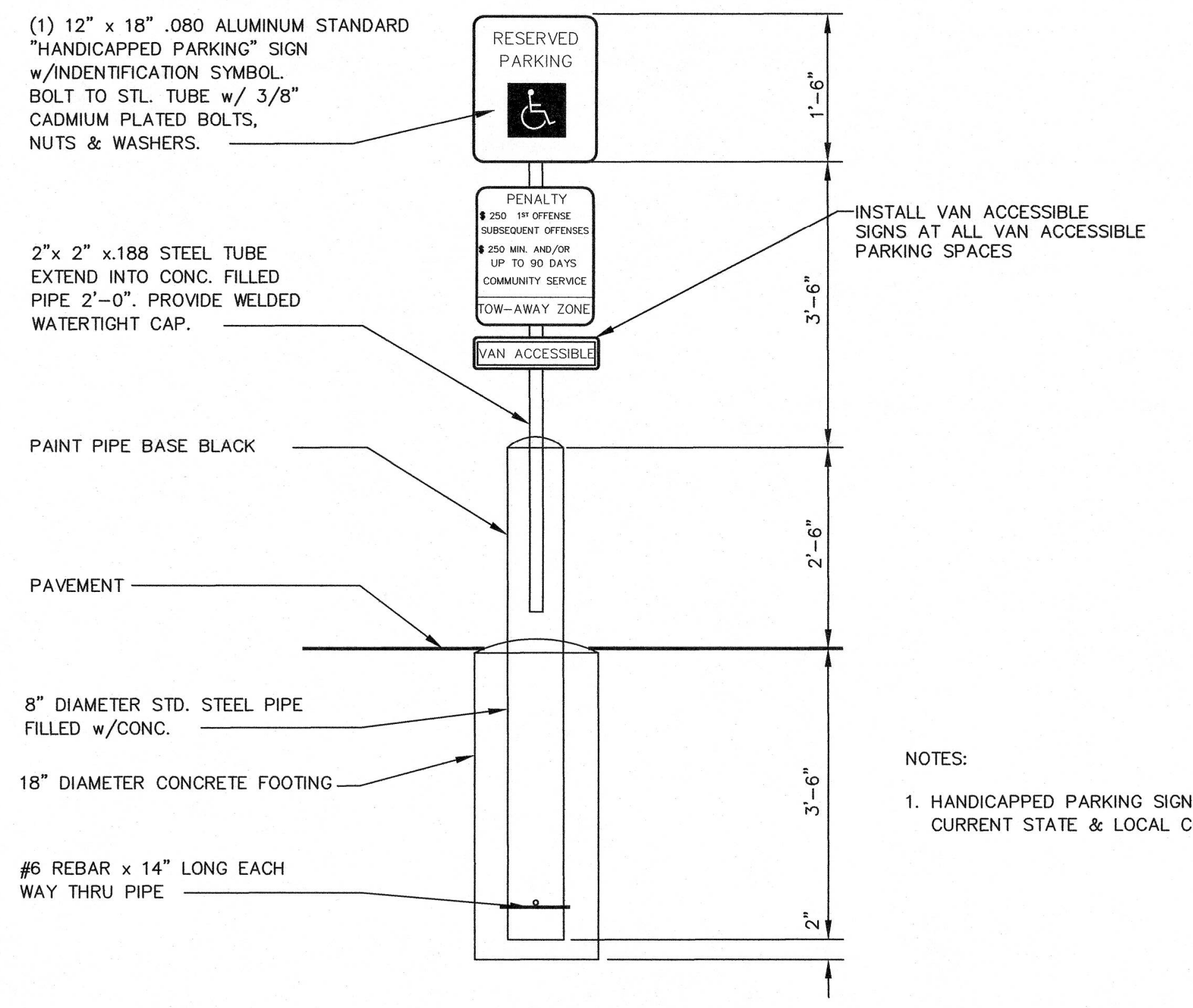
DRAINAGE PLAN

Project No. 100851001
Date FEBRUARY 17, 2023
Drawn By JPNR
Checked By PM
Drawing No. CG102
Sheet 6 of 22



NOTE: REFER TO ACCESSIBLE RAMP DETAIL FOR SIGN LOCATIONS

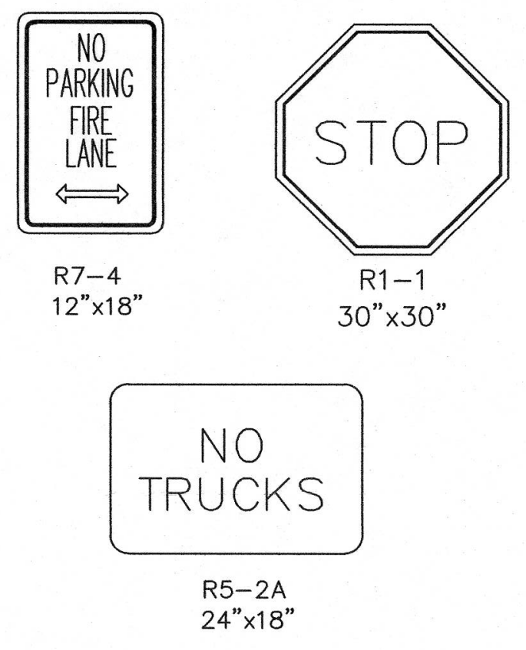
ACCESSIBLE PARKING DETAIL

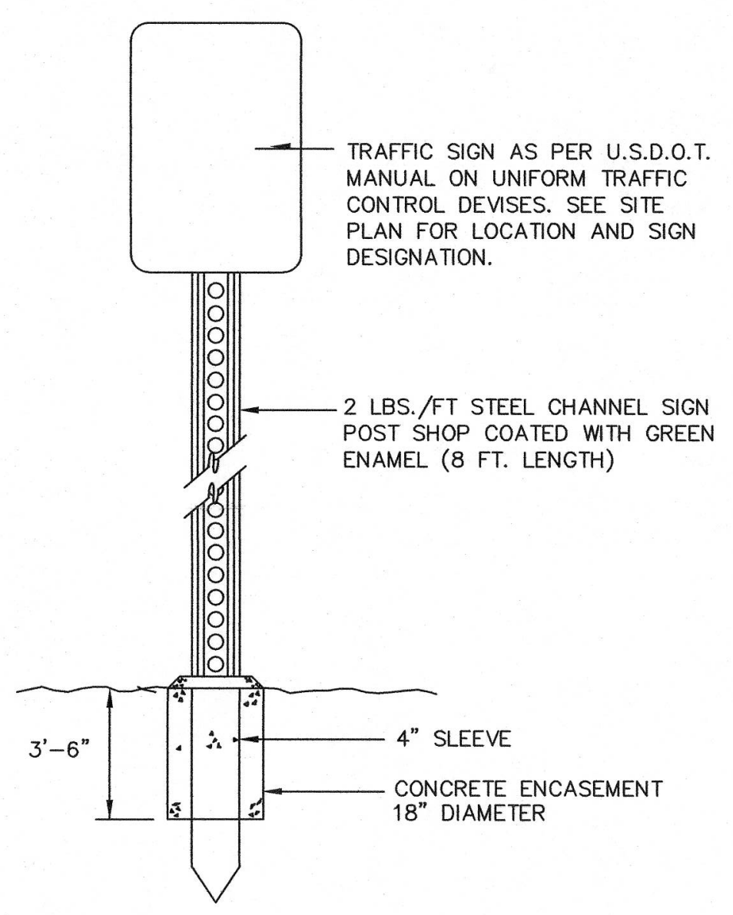


NOTES:

1. HANDICAPPED PARKING SIGN SHALL CONFORM WITH CURRENT STATE & LOCAL CODES AND REGULATIONS.

ACCESSIBLE PARKING SIGN

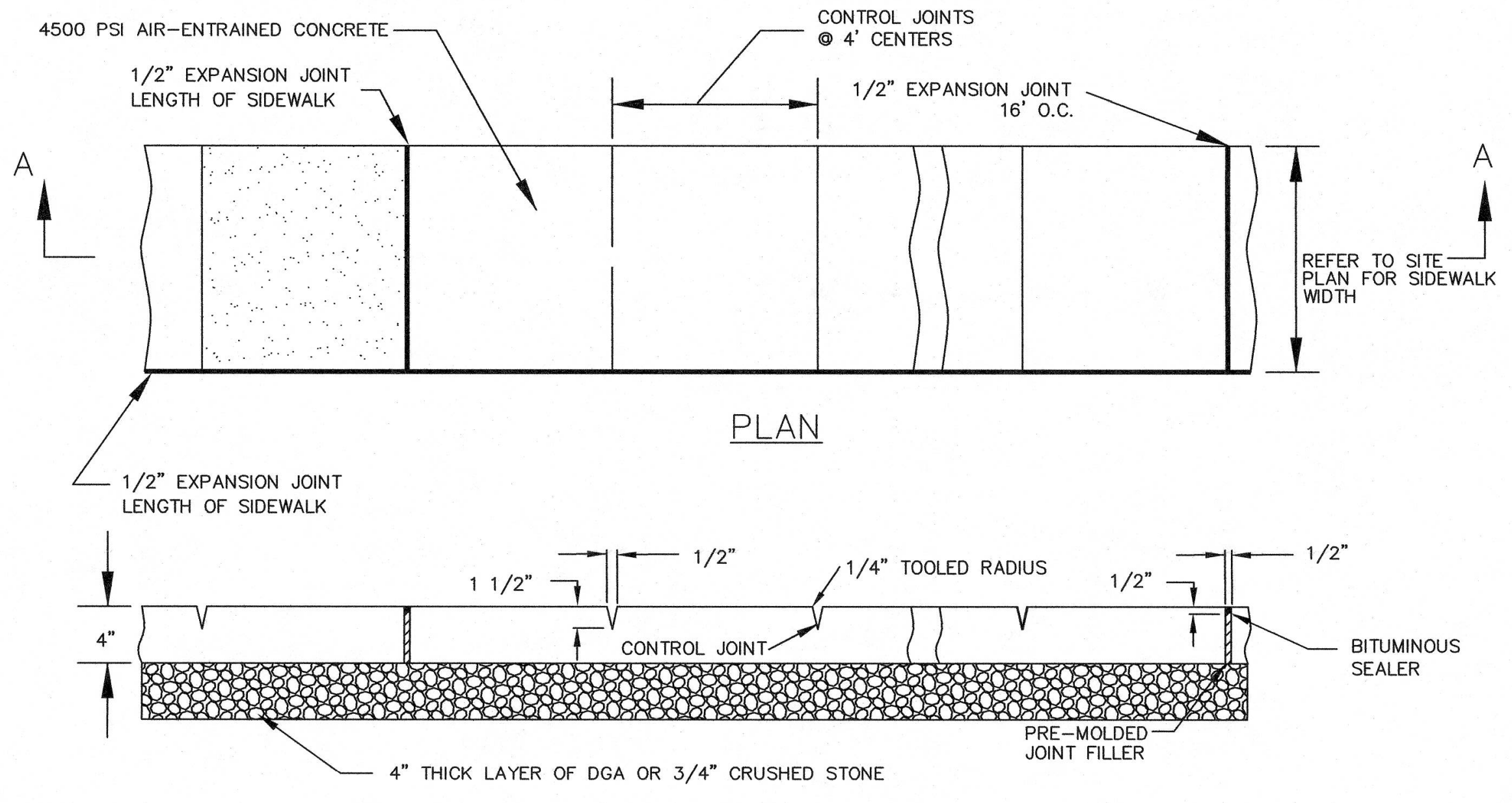




GENERAL NOTES:

1. ALL SIGNS SHALL BE ERECTED WITH THE BOTTOM OF THE SIGN NOT LESS THAN 6 FEET ABOVE THE PAVEMENT OR GROUND.
2. ALL POSTS SHALL BE OF ADEQUATE LENGTH TO MEET THE REQUIREMENTS FOR ERECTION AS STATED IN THE CURRENT "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
3. ALL TRAFFIC CONTROL DEVICES SHALL CONFORM WITH THE CURRENT "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

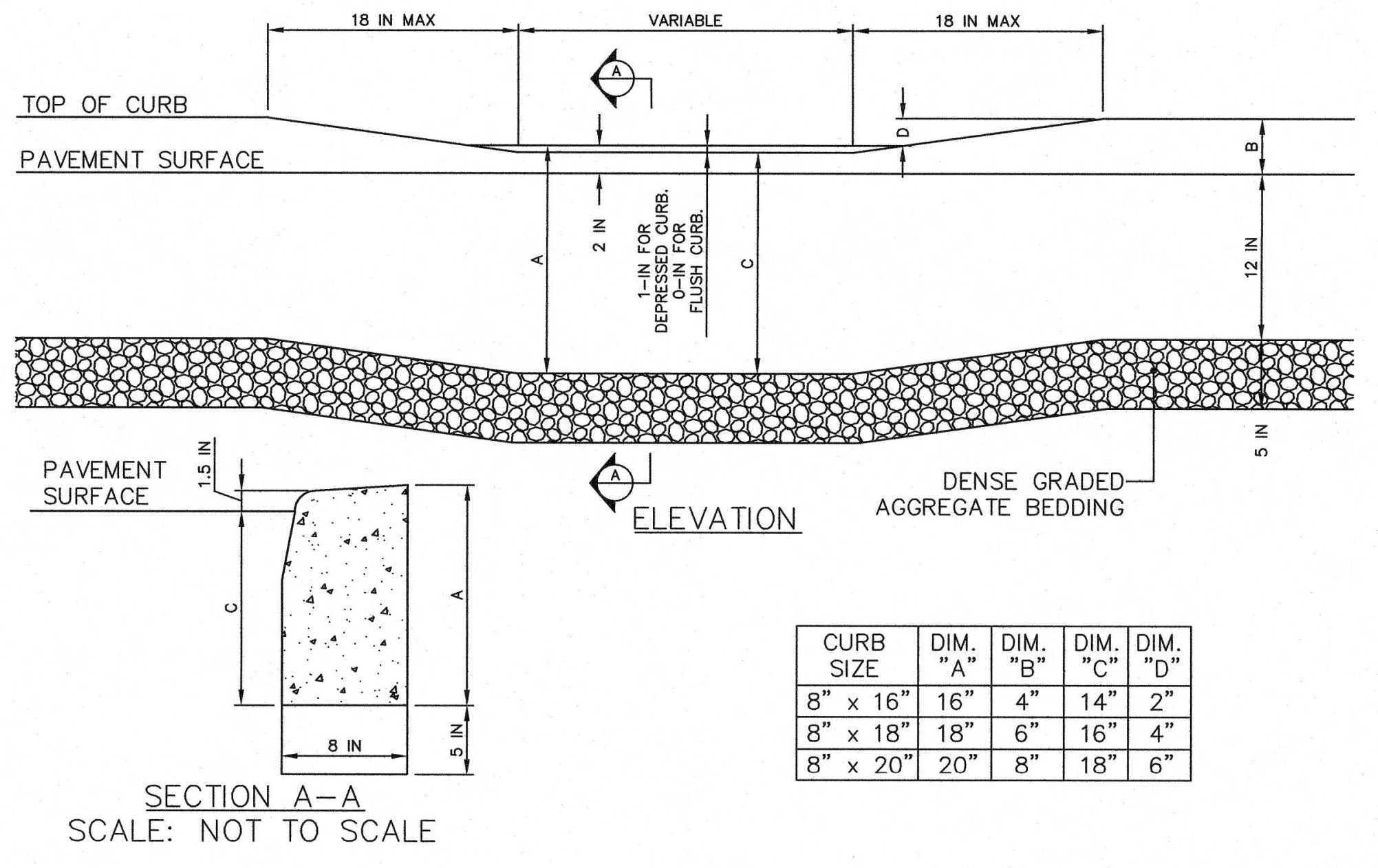
SIGNS



NOTES:

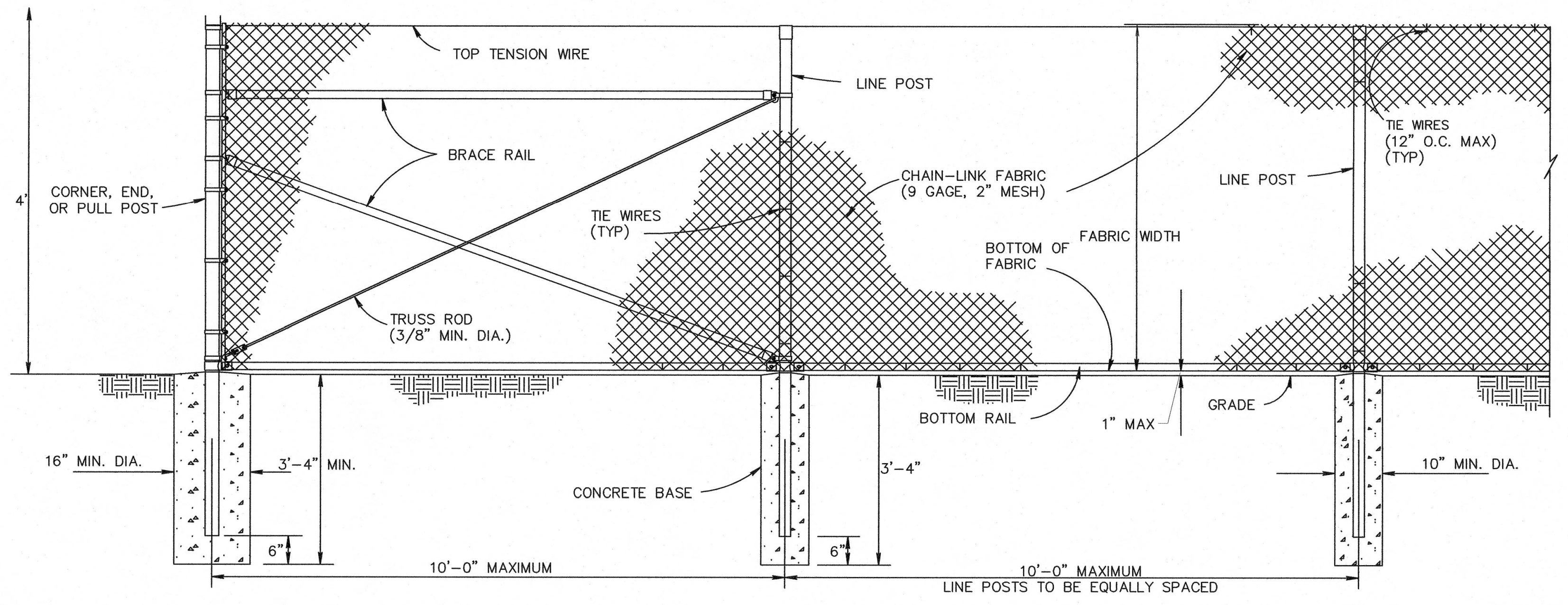
1) ALL SIDEWALKS SHALL BE FLOATED, TOOLED, ROUNDED TO 1/4" AND AND MEDIUM-BROOM BRUSHED.
2) SIDEWALK SUBBASE LAYER SHALL BE PLACED ABOVE AN APPROVED, COMPACT SOIL SUBGRADE. THE SUBBASE SHALL ALSO BE COMPACTED PRIOR TO PLACEMENT OF CONCRETE SIDEWALK.
3) SIDEWALK SHALL BE REINFORCED WITH WWF 6x6 D4/D4 AND PLACED IN THE CENTER OF THE CONCRETE SLAB SECTION.

CONCRETE SIDEWALK



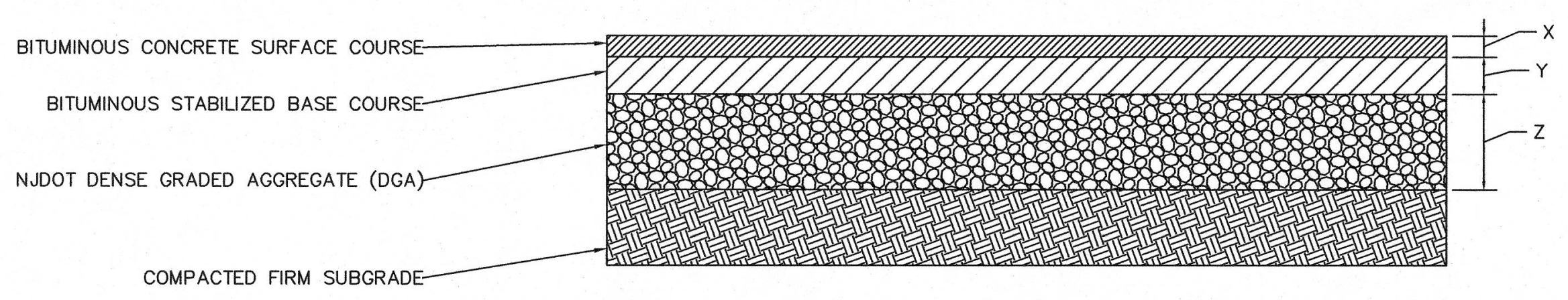
CURB SIZE	DIM. "A"	DIM. "B"	DIM. "C"	DIM. "D"
8" x 16"	16"	4"	14"	2"
8" x 18"	18"	6"	16"	4"
8" x 20"	20"	8"	18"	6"

FLUSH/DEPRESSED CURB



CHAIN-LINK SECURITY FENCE

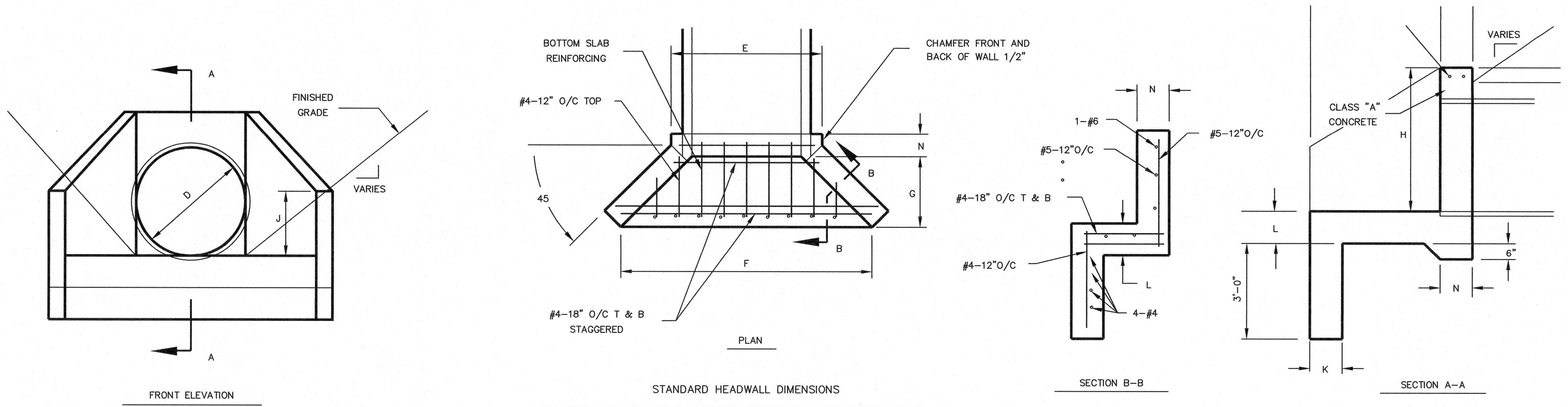
	Surface Course		Binder Course		DGA Base Course	
	Thickness, X	Paving Material	Thickness, Y	Paving Material	Thickness, Z	Paving Material
Heavy Duty	2	12.5M64	4	25M64	10	-



NOTES:

1) PRIOR TO ANY PAVING ACTIVITIES, THE SUBGRADE OR SUBBASE SHALL BE PROOF ROLLED AND WITNESSED BY THE GEOTECHNICAL ENGINEER.
2) PAVING BASECOURSE SHALL BE CONSTRUCTED IN LAYERS NOT LESS THAN 3 INCHES AND NOT MORE THAN 5 INCHES THICK PER LIFT.
3) ALL AREAS TO BE PAVED SHALL BE PROOFROLLED WITH AT LEAST 3 PASSES OF EITHER A SMOOTHER ROLLER HAVING A MINIMUM STATIC DRUM WEIGHT OF 5-TONS OR A FULLY LOADED TANDEM DUMP TRUCK. ANY SOFT AREAS SHALL BE REMOVED AND REPLACED WITH CLEAN, GRANULAR, FREE-DRAINING SOIL. FILL SHALL BE PLACED IN LOOSE LIFTS NOT TO EXCEED 12-INCHES AND SHALL BE COMPACTED TO AT LEAST 95% OF ITS MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-1557.

HEAVY DUTY ASPHALT PAVEMENT SECTION



FRONT ELEVATION

PLAN

SECTION B-B

SECTION A-A

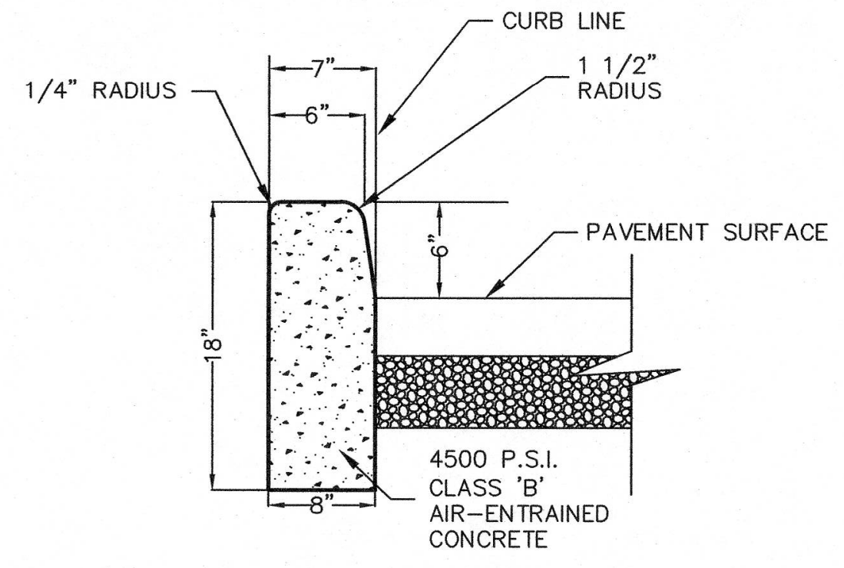
NOTES:

1. HEAD WALLS MAY BE PRECAST OR CAST IN PLACE PER SITE REQUIREMENTS.
2. HEAD WALLS MUST BE ANCHORED AT LEAST 3 FT BELOW CRADE AT POINT OF OUTFALL.
3. HEADWALL TO BE SIZED BASED ON PIPE OUTLET AND SURROUNDING GRADES. REFER TO SHEET CG101. SHOP DRAWING TO BE PROVIDED.
4. STANDARD HEADWALL DIMENSIONS ARE AS SHOWN ON THE TABLE.
5. PROVIDE SHOP DRAWINGS FOR REVIEW.
6. SIGNED AND SEALED STABILITY CALCULATIONS SHALL BE PROVIDED BY A NEW JERSEY LICENSED PROFESSIONAL ENGINEER.

STANDARD HEADWALL DIMENSIONS

D	E	F	G	H	J	K	L	N	R
18" 21"	3'-0" 3'-4"	7'-6" 7'-9"	3'-0"	3'-0" 3'-3"	2'-0" 2'-0"	8"	8"	8"	#5-12"o/c
24" 27"	3'-8" 3'-11"	8'-0" 8'-3"	3'-0"	3'-6" 3'-9"	2'-0" 2'-0"	8"	8"	8"	#5-12"o/c
30"	4'-2"	8'-6"	3'-0"	4'-0"	2'-1"	8"	8"	10"	#5-12"o/c
36"	4'-8"	10'-0"	3'-6"	4'-6"	2'-3"	8"	10"	10"	#5-12"o/c
42"	5'-3"	11'-6"	4'-0"	5'-0"	2'-9"	8"	10"	10"	#5-12"o/c
48"	5'-10"	13'-0"	4'-6"	5'-6"	3'-0"	8"	10"	12"	#5-12"o/c
54"	6'-5"	14'-6"	5'-0"	6'-0"	3'-3"	9"	12"	12"	#6-8"o/c
60"	7'-0"	16'-0"	5'-6"	6'-6"	3'-6"	9"	12"	12"	#6-8"o/c
66"	7'-7"	17'-6"	6'-0"	7'-0"	3'-9"	9"	12"	14"	#6-8"o/c
72"	8'-2"	19'-0"	6'-6"	7'-6"	4'-3"	9"	12"	14"	#6-8"o/c

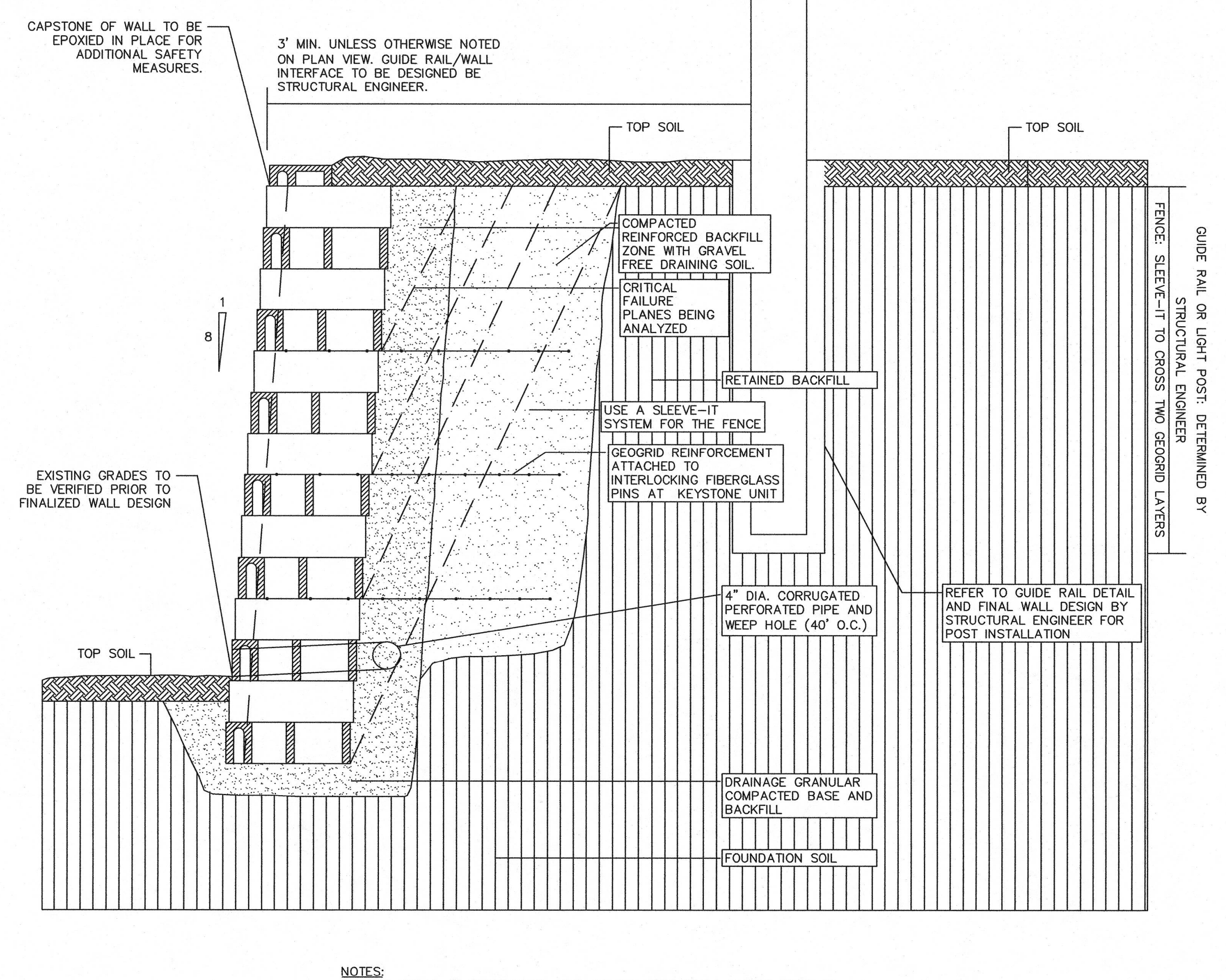
HEADWALL



NOTES:

1. CONCRETE SHALL BE 4,500 PSI CLASS 'B' AIR-ENTRAINED CONCRETE.
2. TRANSVERSE JOINTS 1/2" WIDE SHALL BE INSTALLED IN THE CURB AT 20 FOOT INTERVALS AND SHALL BE FILLED WITH PREFORMED BITUMINOUS JOINT FILLER.
3. ALL CURBS SHALL BE INSTALLED ON AN APPROVED, COMPACTED SUBGRADE. WHERE DIRECTED BY THE ENGINEER, A MINIMUM OF FOUR INCHES OF NJDOT DGA OR 3/4" CRUSHED STONE SHALL BE INSTALLED AS THE SUBBASE.

SITE CURB



NOTES:

1. THIS DETAIL IS CONCEPTUAL. THE CONTRACTOR SHALL SUBMIT DETAILED SITE SPECIFIC DRAWINGS, ENGINEERING CALCULATIONS, AND STABILITY CALCULATIONS TO THE ENGINEERS OF RECORD AND AGENCIES HAVING JURISDICTION FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
2. SHOP DRAWINGS AND CALCULATIONS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER.
3. COLOR OF MODULAR BLOCKS SHALL INCORPORATE EARTHY TONES AND MEET THE STANDARDS OF THE TOWNSHIP AND SITE OWNER.

MODULAR BLOCK RETAINING WALL

LANGAN

Project No. 100851001

Date	Description	No.

REVISIONS

MAY 0 5 2023
SIGNATURE DANIEL MIOLA DATE SIGNED
PROFESSIONAL ENGINEER NJ Lic. No.
24GE04676300

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300 Kimball Drive
Parsippany, NJ 07054

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NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

Project

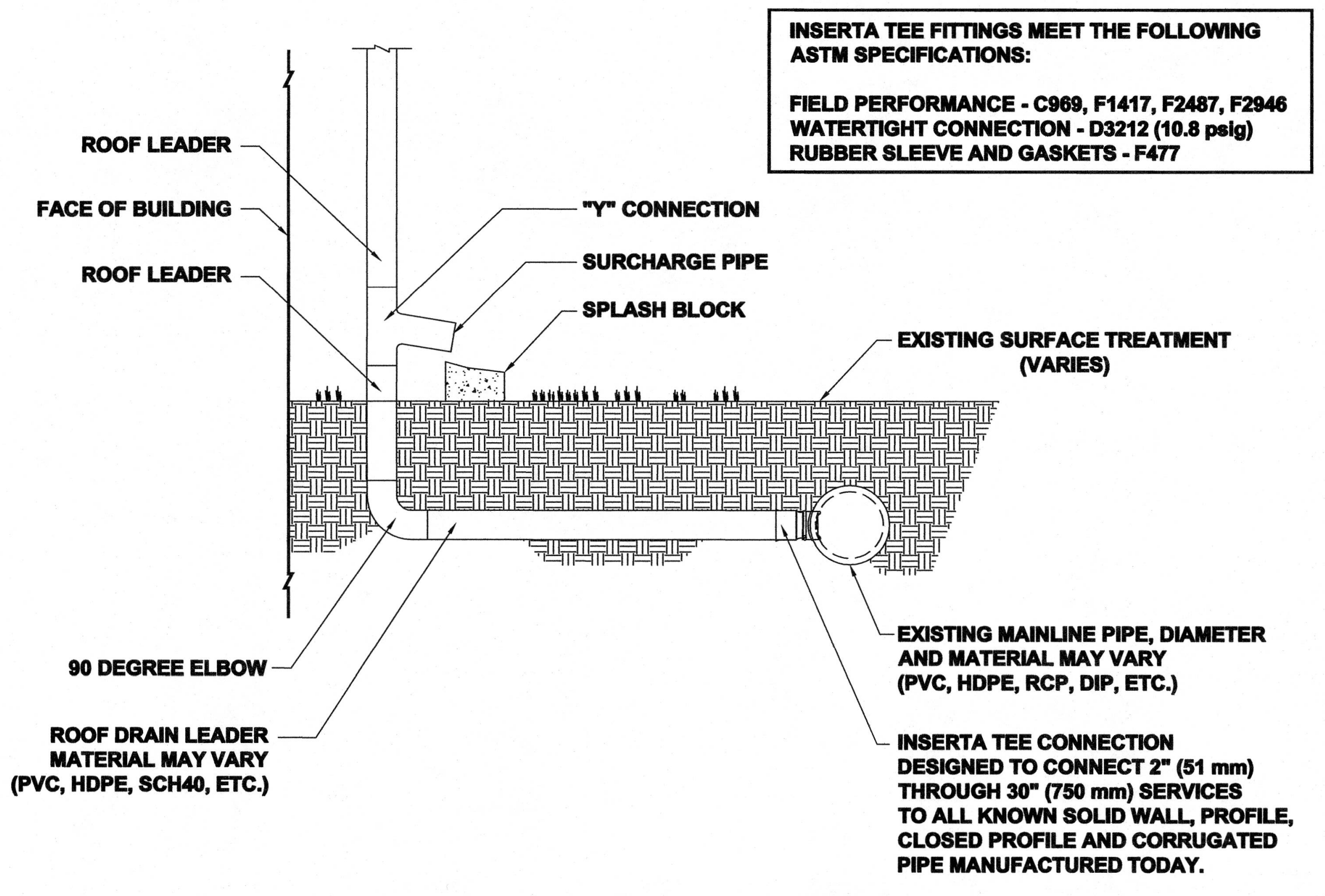
KING ARTHUR
COURT WAREHOUSE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK
MIDDLESEX COUNTY NEW JERSEY

Drawing Title

SITE PLAN
DETAILS 1

Project No. 100851001
Date FEBRUARY 27, 2023
Drawn By JPNR
Checked By PM
Drawing No. CS501
Sheet 19 of 22



INSERTA TEE FITTINGS MEET THE FOLLOWING ASTM SPECIFICATIONS:

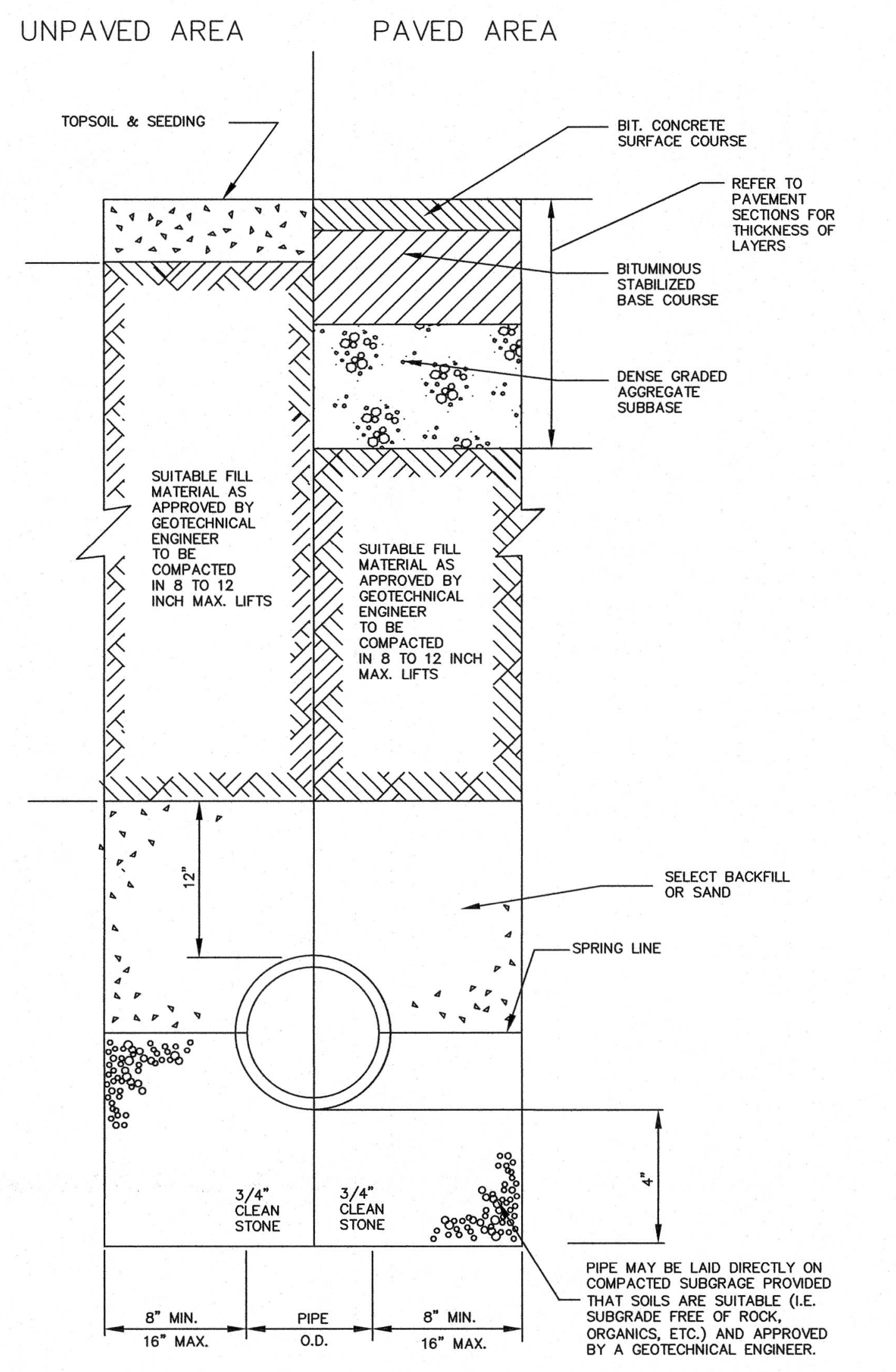
FIELD PERFORMANCE - C969, F1417, F2487, F2946
WATERTIGHT CONNECTION - D3212 (10.8 psig)
RUBBER SLEEVE AND GASKETS - F477

INSERTA TEE | PO BOX 714
CORNELIUS, OR 97116
PH:(503) 357-2110 FAX:(503) 359-5417
SALES@INSERTATEE.COM

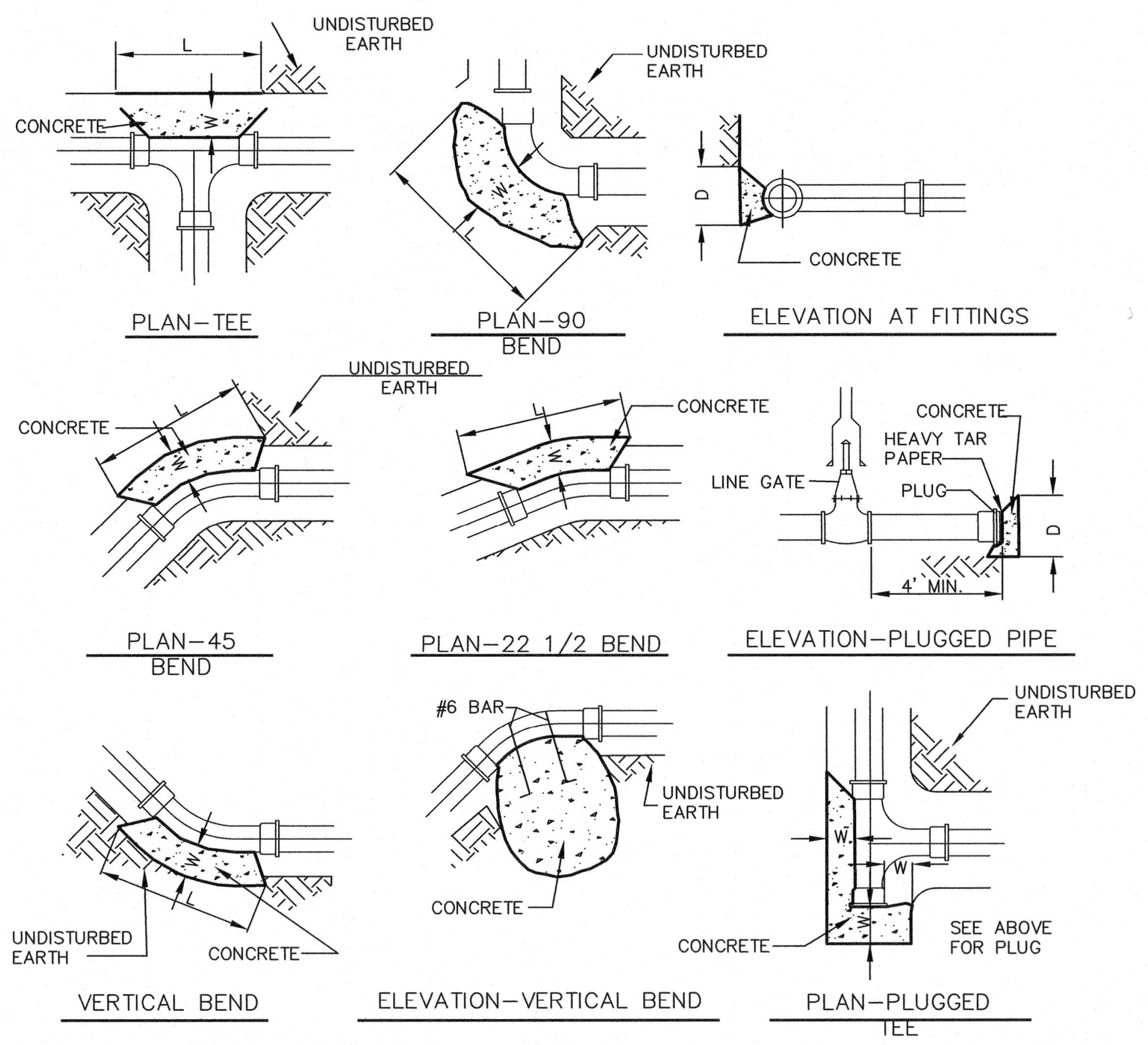
INSERTA TEE - ROOF DRAIN LEADER

SCALE: NTS
DATE: 7/30/13
DRAWN BY: JJC

INSERTA TEE CONNECTION



SITE TRENCH AND BEDDING



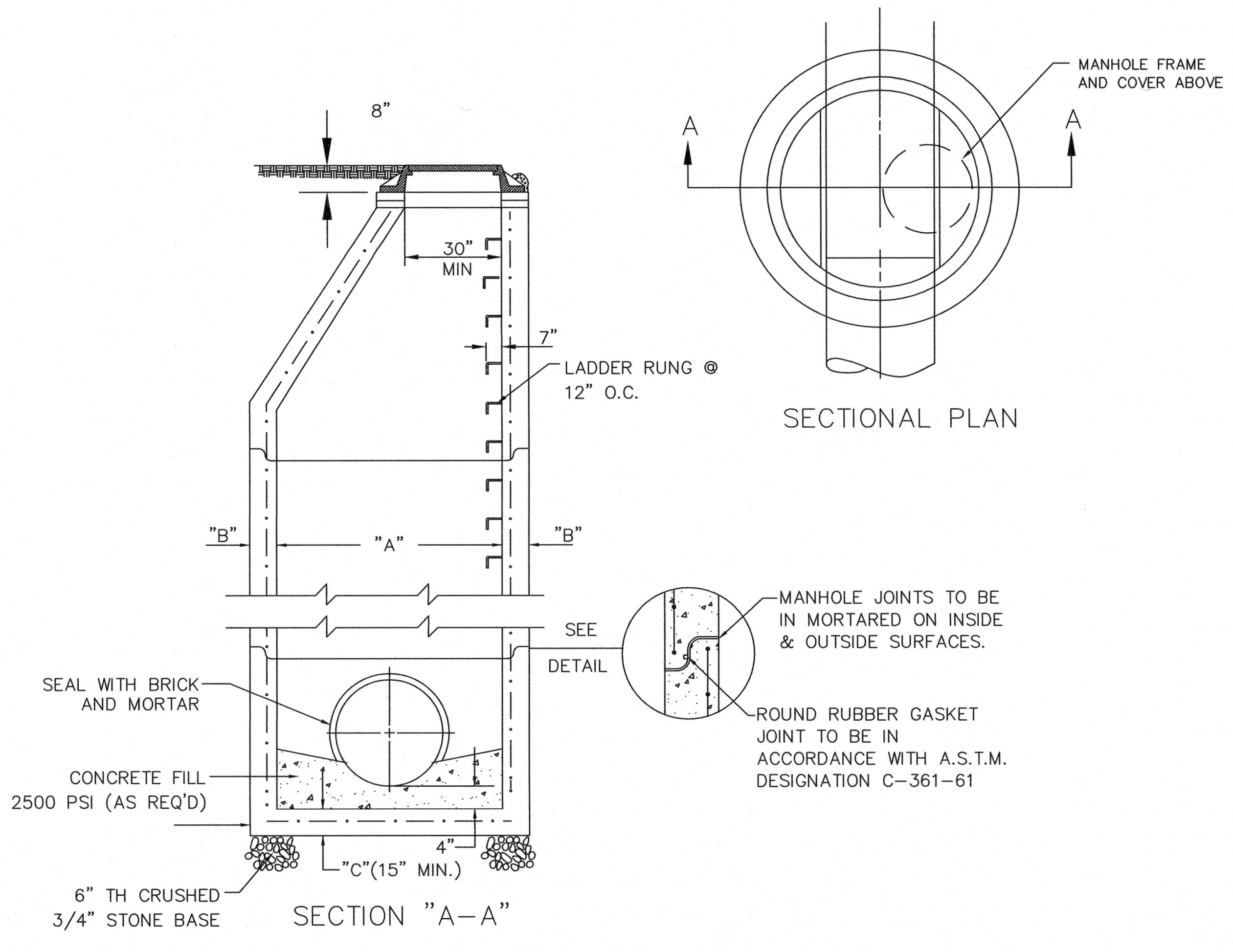
THRUST BLOCK SCHEDULE									
PIPE SIZE	TEE		22 1/2		45		90		W
	L	D	L	D	L	D	L	D	
4"	18"	15"	15"	12"	15"	12"	15"	15"	21"
6"	18"	15"	15"	12"	15"	12"	15"	15"	21"
8"	2'	18"	18"	12"	18"	12"	2'	18"	2'
12"	3'	2'	2'	12"	2'	12"	3'	2'	28"
16"	4'	2.5'	2'	12"	2.33'	15"	4'	2.5'	31"
20"	5.25'	3'	2'	18"	3'	2'	5.25'	3'	33"
24"	7.5'	3'	3'	18"	4'	2.5'	7.5'	3'	3'

BASIS:
2,000 LB/SQ.FT. SOIL RESISTANCE 250 PSI WATER PRESSURE CORRECTION FACTORS FOR OTHER SOILS:

SOFT CLAY	4
SAND	2
SAND & GRAVEL	1.33
SHALE	0.4

NOTE:
1. IF SOFT MATERIALS ARE ENCOUNTERED, THE THRUST BLOCKS SIZES SHALL BE ADJUSTED ACCORDINGLY.
2. CONCRETE TO BE 3000 PSI.

THRUST BLOCKS FOR WATER OR SEWER



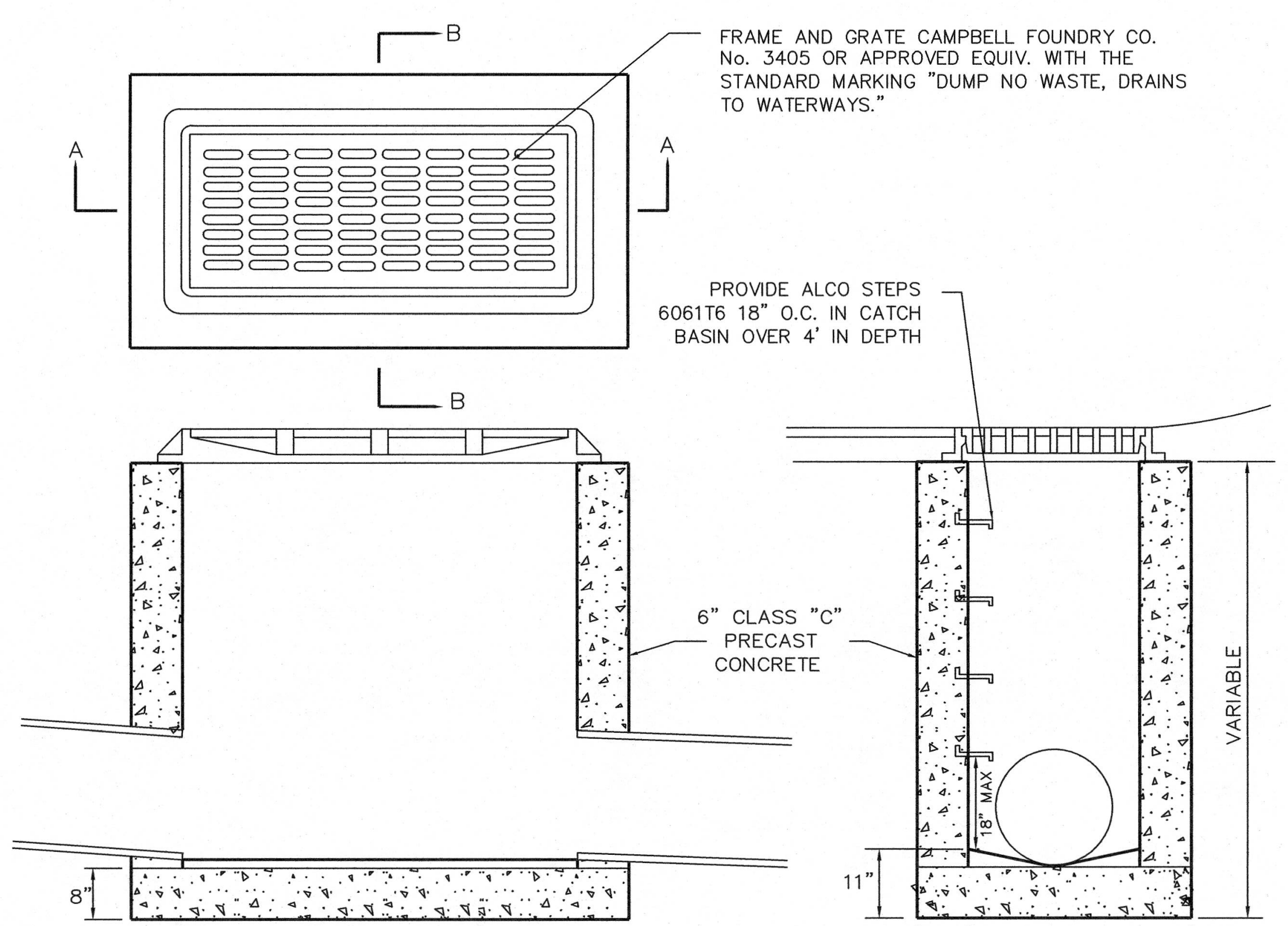
GENERAL NOTES:

1. PROVIDE POLYPROPYLENE STEPS 12" O.C.
2. CONCRETE STRUCTURE TO BE DESIGNED TO AASHTO HS–20 LOADING.
3. CONCRETE TO TEST TO 4,000 PSI @ 28 DAYS.
4. CONCRETE STRUCTURE REINFORCING AS PER ASTM A–185.
5. FIRST STEP NOT TO EXCEED 12 INCHES FROM TOP OF RIM.
6. PROVIDE SHOP DRAWINGS FOR REVIEW.

MANHOLE SCHEDULE		
PIPE I.D.	"A" (DIA)	"B"
15"–27"	4'–0" (STD)	5"
27"–33"	5'–0"	6"
33"–42"	6'–0"	8"

*PROVIDE SHOP DRAWINGS FOR APPROVAL FOR PIPES LARGER THAN 42–INCH.

STORM MANHOLE

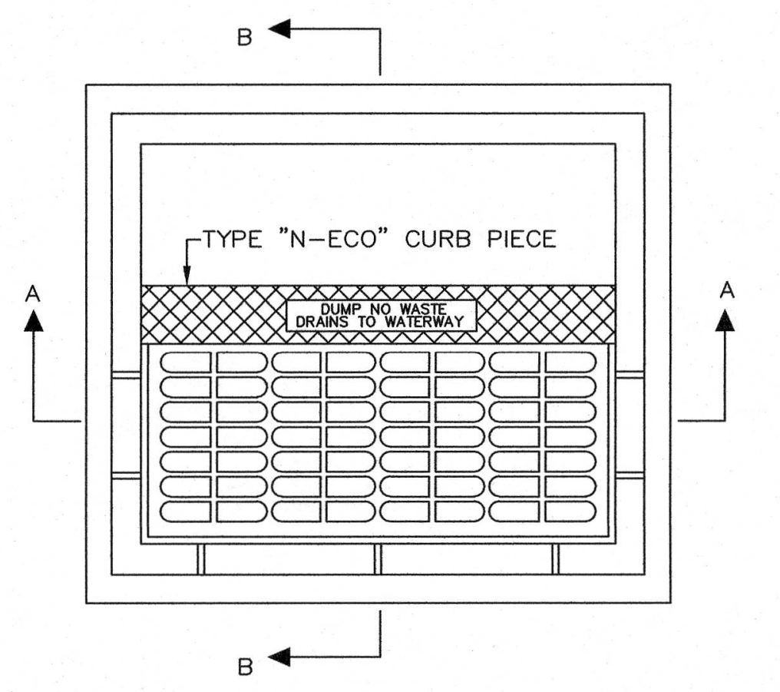


CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR ENGINEER'S APPROVAL.

GENERAL NOTES:

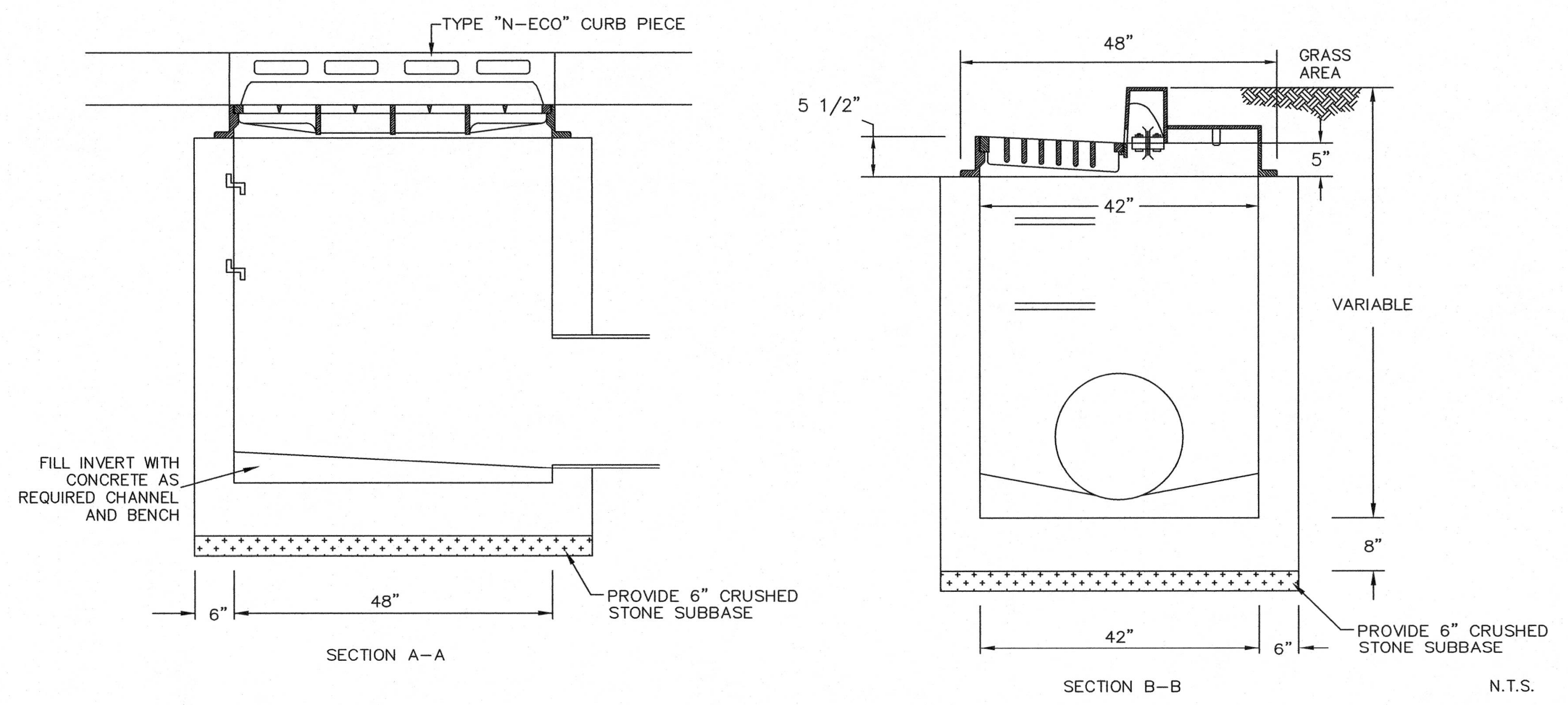
1. FRAME AND GRATE TO BE CAMPBELL FOUNDRY NO. 3405 (TYPE 'A') OR APPROVED EQUAL. PROVIDE BICYCLE GRATE.
2. FOOTER AND INVERT TO BE NJDOT CLASS "C" CONCRETE.
3. PROVIDE POLYPROPYLENE STEPS 12" O.C.
4. CONCRETE STRUCTURE TO BE DESIGNED TO AASHTO HS–20 LOADING.
5. CONCRETE TO TEST TO 4,000 PSI @ 28 DAYS.
6. CONCRETE STRUCTURE REINFORCING AS PER ASTM A–185.
7. BRING FRAME AND GRATE TO GRADE WITH BRICK AND MORTAR.
8. FIRST STEP NOT TO EXCEED 12 INCHES FROM TOP OF GRATE.
9. PROVIDE SHOP DRAWINGS FOR REVIEW.
10. DETAIL INDICATES MINIMUM STRUCTURE DIMENSIONS. LARGER DIMENSIONS MAY BE REQUIRED FOR LARGER PIPES.

CATCH BASIN TYPE 'A'

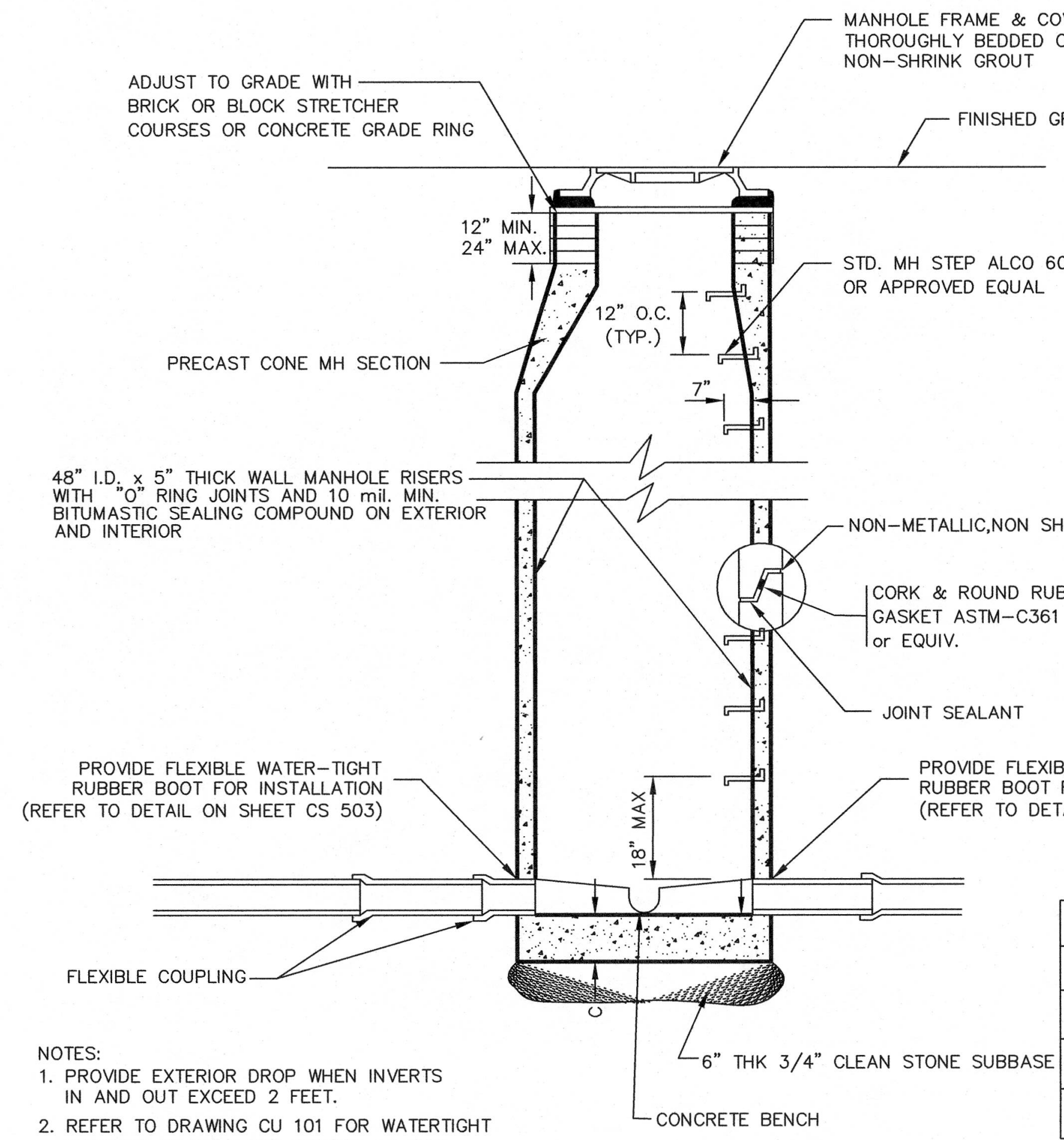


GENERAL NOTES:

1. FRAME AND GRATE TO BE CAMPBELL FOUNDRY NO. 2618 (WITH TYPE "N–ECO" CURB PIECE) OR APPROVED EQUAL. PROVIDE BICYCLE GRATE.
2. FOOTER AND INVERT TO BE NJDOT CLASS "B" CONCRETE.
3. PROVIDE POLYPROPYLENE STEPS 12" O.C.
4. FIRST STEP NOT TO EXCEED 12 INCHES FROM TOP OF GRATE.
5. CONCRETE STRUCTURE TO BE DESIGNED TO AASHTO HS–20 LOADING.
6. CONCRETE STRUCTURE REINFORCING AS PER ASTM A–185.
7. BRING FRAME AND GRATE TO GRADE WITH BRICK AND MORTAR.
9. PROVIDE SHOP DRAWINGS FOR REVIEW.
10. USE TYPE "N–ECO" CURB PIECE FOR 6–INCH CURB.
11. FOR TYPE B INLETS ON A 12–INCH CURB, USE 10–INCH COR–TEN STEEL CURB MANUFACTURED BY CAMPBELL FOUNDRY COMPANY. TAPER CURB TO 10 INCHES.
12. DETAIL INDICATES MINIMUM STRUCTURE DIMENSIONS. LARGER DIMENSIONS MAY BE REQUIRED FOR LARGER PIPES.



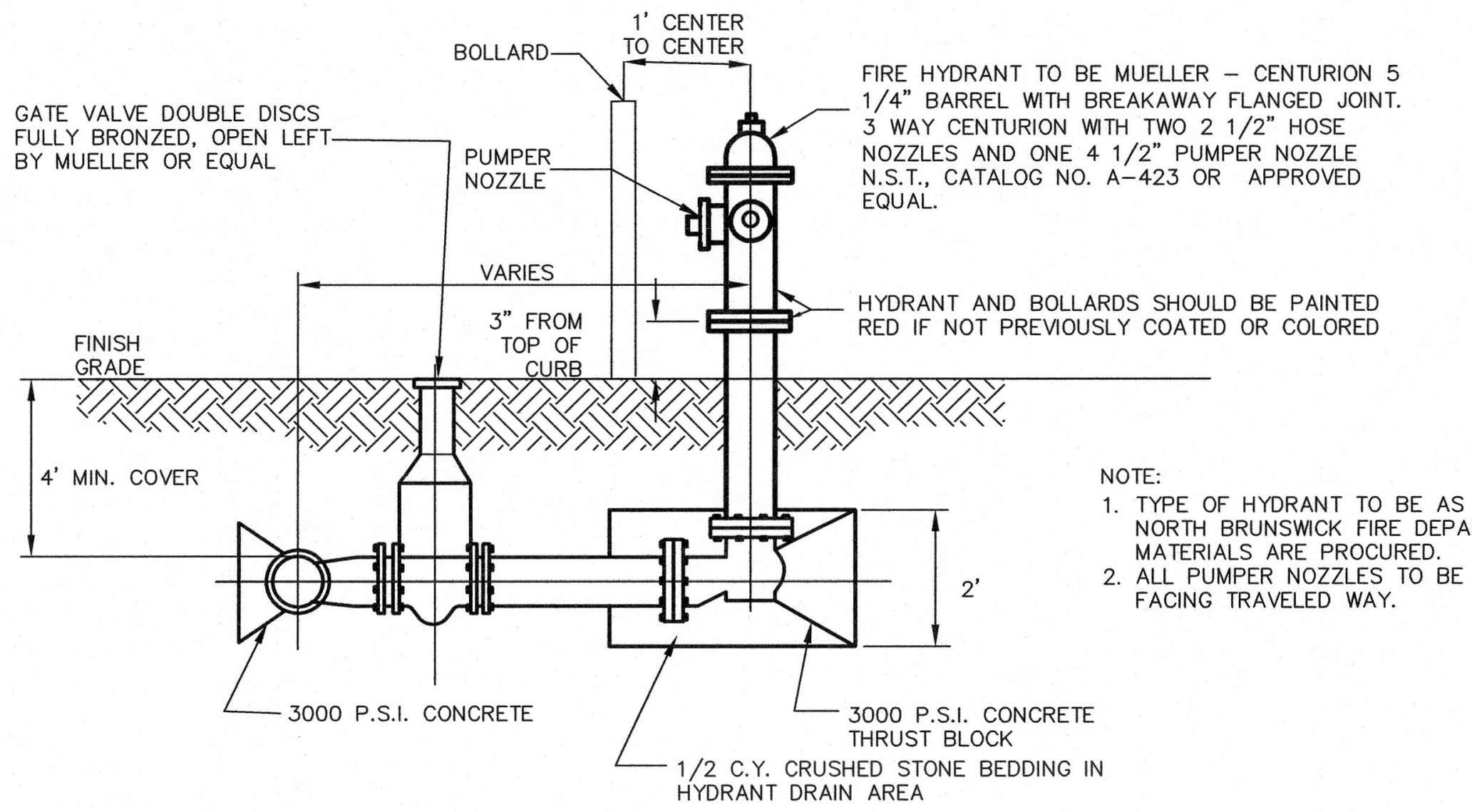
CATCH BASIN 'B'



NOTES:
1. PROVIDE EXTERIOR DROP WHEN INVERTS IN AND OUT EXCEED 2 FEET.
2. REFER TO DRAWING CU 101 FOR WATERTIGHT MANHOLE FRAMES AND COVERS AS PER N.J.A.C. 7:14A–23.8(F).

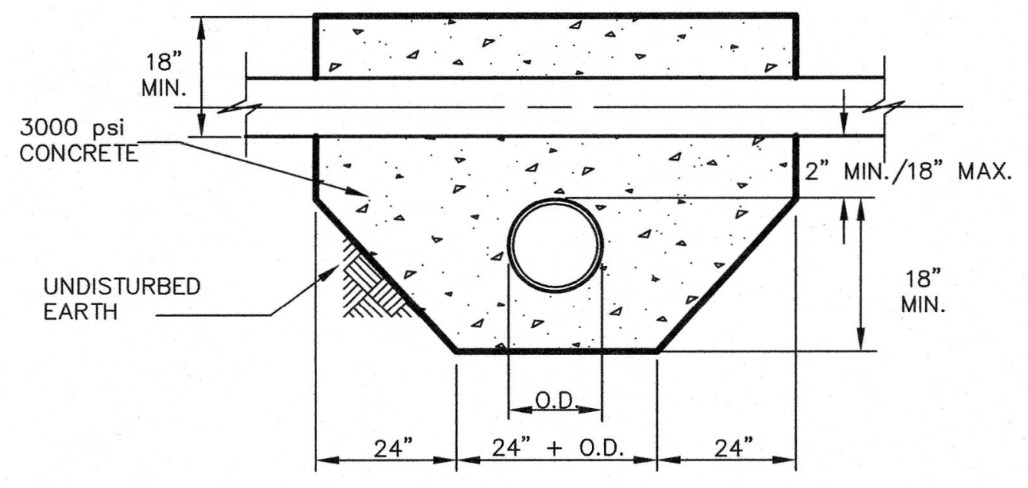
MANHOLE SCHEDULE		
"A" (DIA)	"B"	"C"
4'–0" (STD)	5"	5"
5'–0"	6"	6"
6'–0"	8"	8"

SANITARY MANHOLE



NOTE:
1. TYPE OF HYDRANT TO BE AS APPROVED BY NORTH BRUNSWICK FIRE DEPARTMENT BEFORE MATERIALS ARE PROCURED.
2. ALL PUMPER NOZZLES TO BE INSTALLED FACING TRAVELED WAY.

FIRE HYDRANT



NOTES:
1. ENCASEMENT OF LOWER PIPE TO BE CARRIED 24" IN EACH DIRECTION BEYOND THE WALLS OF THE UPPER CONDUIT.
2. CONCRETE ENCASEMENT NOT NEEDED WHEN CLEARANCE EXCEEDS 4" EXCEPT WHERE SANITARY SEWER AND WATER MAINS OR STORM SEWER CONFLICT, THEN ENCASEMENT NOT NEEDED WHEN CLEARANCE EXCEEDS 18".

UTILITY CROSSING

Date	Description	No.

REVISIONS

MAY 0 5 2023

SIGNATURE DANIEL MIOLA DATE SIGNED
PROFESSIONAL ENGINEER NJ Lic. No.
24GE04676300

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NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

Project

KING ARTHUR
COURT WAREHOUSE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK
MIDDLESEX COUNTY **NEW JERSEY**

Drawing Title

SITE PLAN
DETAILS 2

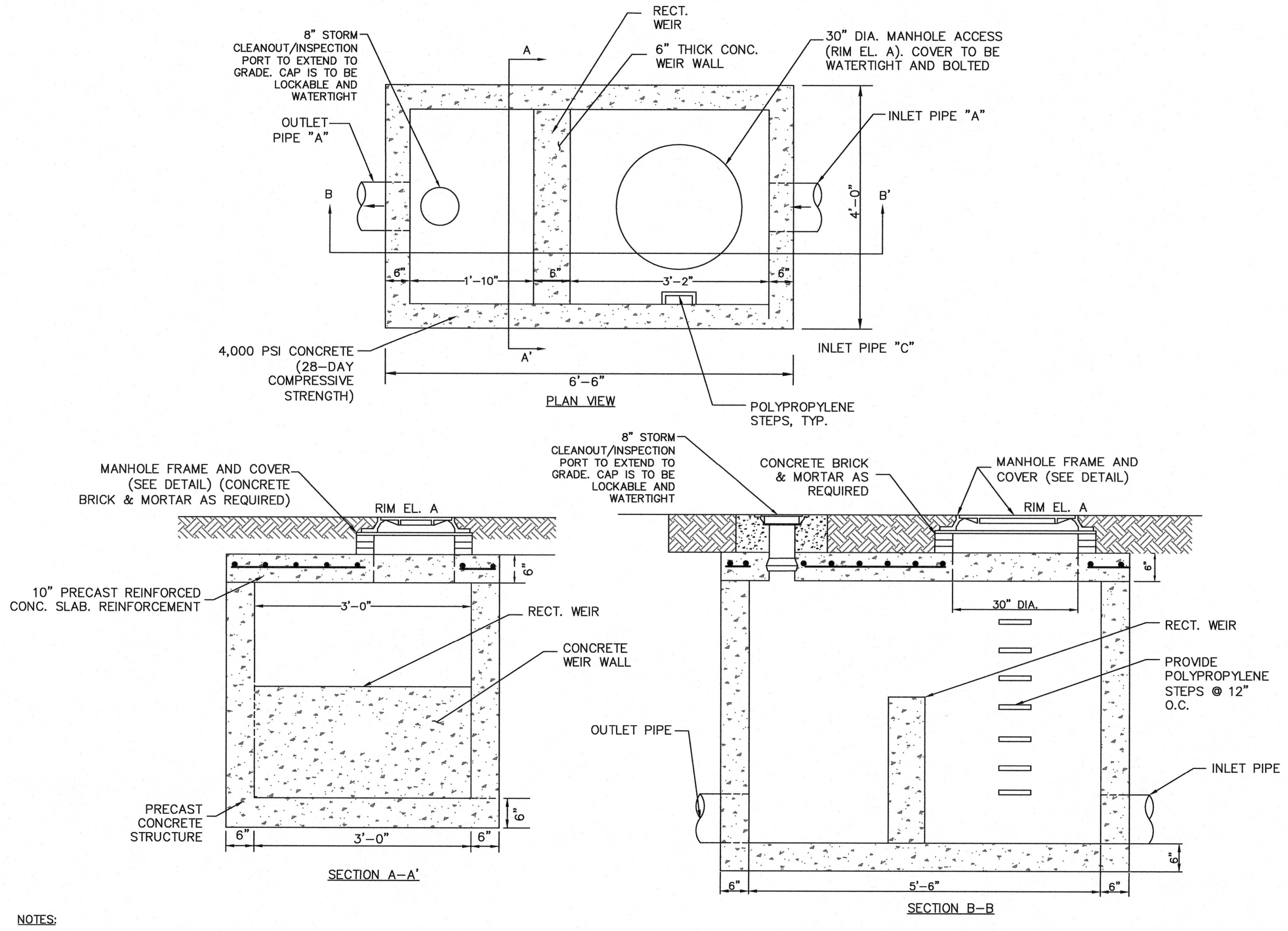
Project No.
100851001

Date
FEBRUARY 27, 2023

Drawn By
JPNR

Drawing No.
CS502

Langan

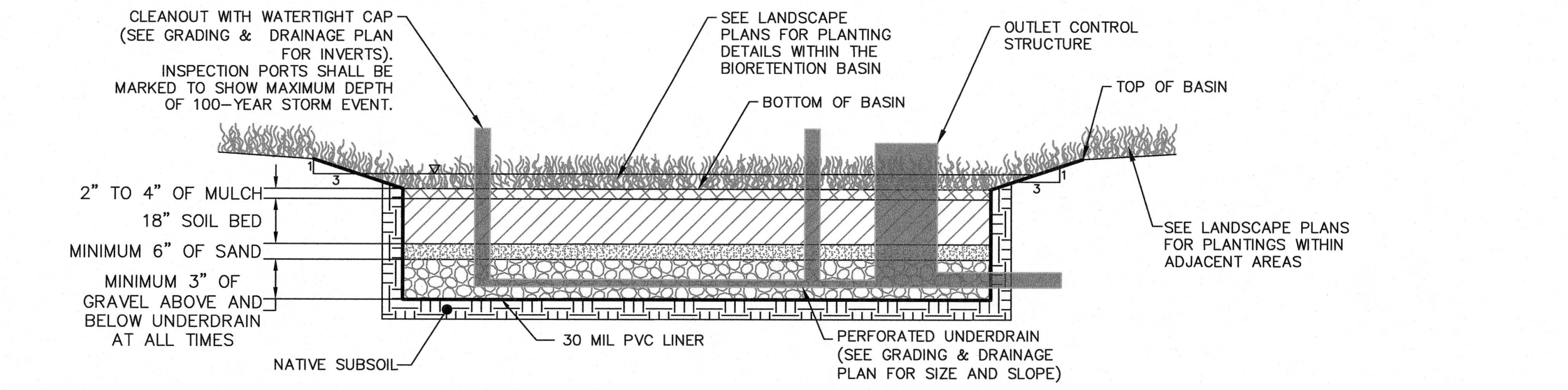


NOTES:

1. STRUCTURAL REINFORCEMENT TO BE DESIGNED BY PRECAST MANUFACTURER.
2. CONTRACTOR SHALL PROVIDE SHOP DRAWING SUBMITTAL FOR OUTLET CONTROL STRUCTURE TO DESIGN ENGINEER FOR REVIEW.

	INLET PIPE		OUTLET PIPE		RECT. WEIR		RIM EL. A
	SIZE	INVERT	SIZE	INVERT	LENGTH	INVERT	
OCS–300	24" HDPE	EL. 49.50	24" HDPE	EL. 49.00	3 FT	EL. 50.00	EL. 56.86
OCS–400	24" HDPE	EL. 51.50	24" HDPE	EL. 51.00	3 FT	EL. 52.00	EL. 55.47

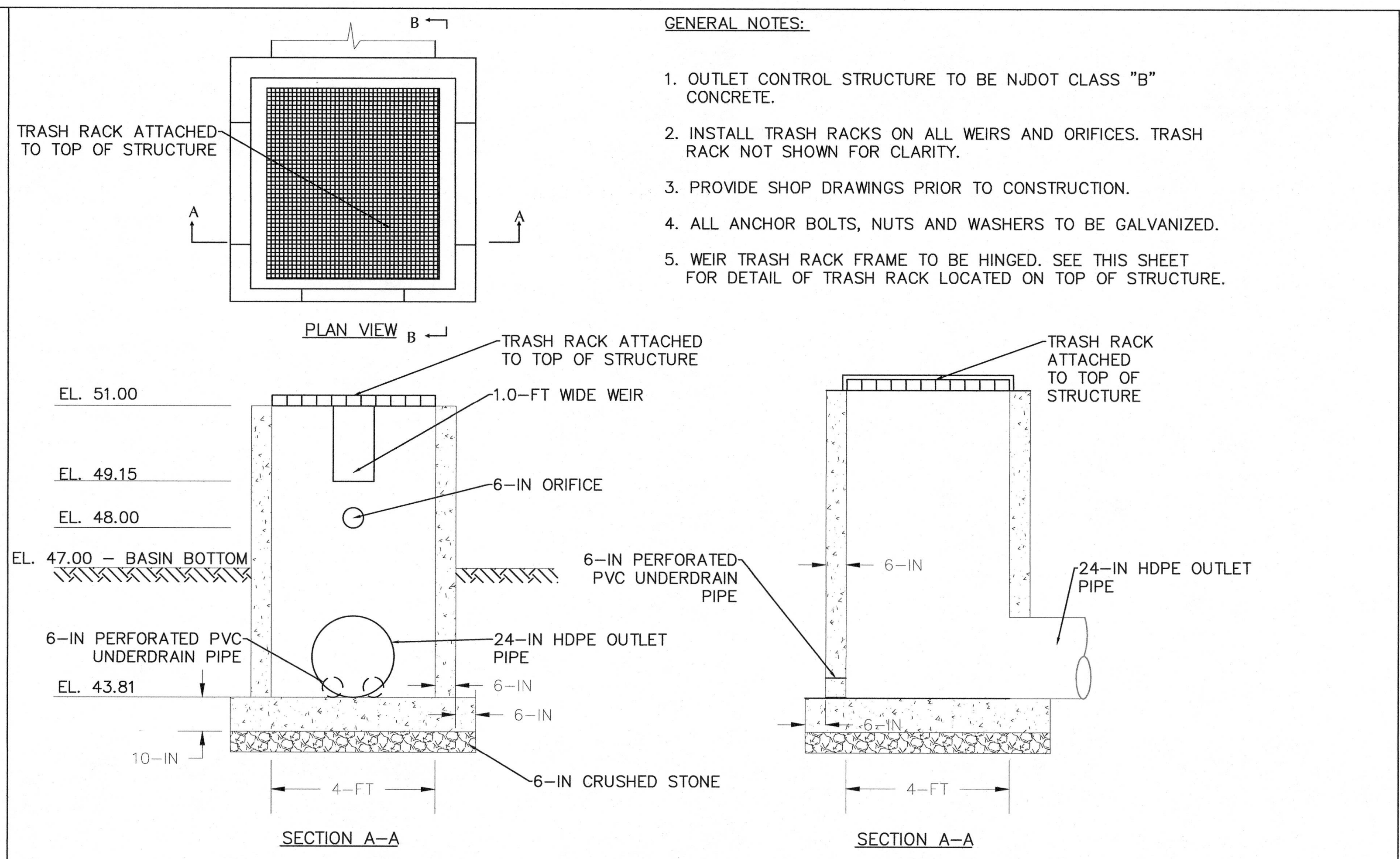
OCS STRUCTURES 300 & 400



NOTES:

1. BIORETENTION BASINS (INCLUDING THE MULCH, SOIL BED, SAND AND GRAVEL LAYER) SHALL BE CONSTRUCTED IN CONFORMANCE WITH NEW JERSEY STORMWATER BEST MANAGEMENT PRACTICES MANUAL SECTION 9.7 FOR SMALL-SCALE BIORETENTION SYSTEMS AND SECTION 10.1 FOR LARGE-SCALE BIORETENTION SYSTEMS.
2. LINER SHALL BE INSTALLED DURING TIME OF LOW GROUNDWATER. DEWATERING MAY BE NECESSARY TO INSTALL LINER.
3. LINER SHALL BE A MINIMUM 30 MIL GEOMEMBRANE OR 60 MIL HDPE WITH A MAXIMUM PERMEABILITY OF 1X10^-7 CM/SEC AND A MINIMUM 30-YEAR DESIGN LIFE.
4. LINER SHALL BE INSTALLED WHOLLY BELOW THE AVERAGE DEPTH OF FROST PENETRATION IN THE AREA AS DETERMINED BY UNITED STATES DEPARTMENT OF AGRICULTURE.
5. AT LEAST ONE (1) INSPECTION PORT, WITH A REMOVABLE CAP, MUST BE PROVIDED AT THE UPSTREAM AND DOWNSTREAM ENDS OF THE PERFORATED SECTION OF THE NETWORK OF PIPES. INSPECTION PORTS SHALL BE MARKED TO SHOW MAXIMUM DEPTH OF 100-YEAR STORM EVENT – SEE CROSS SECTION DETAILS THIS SHEET.

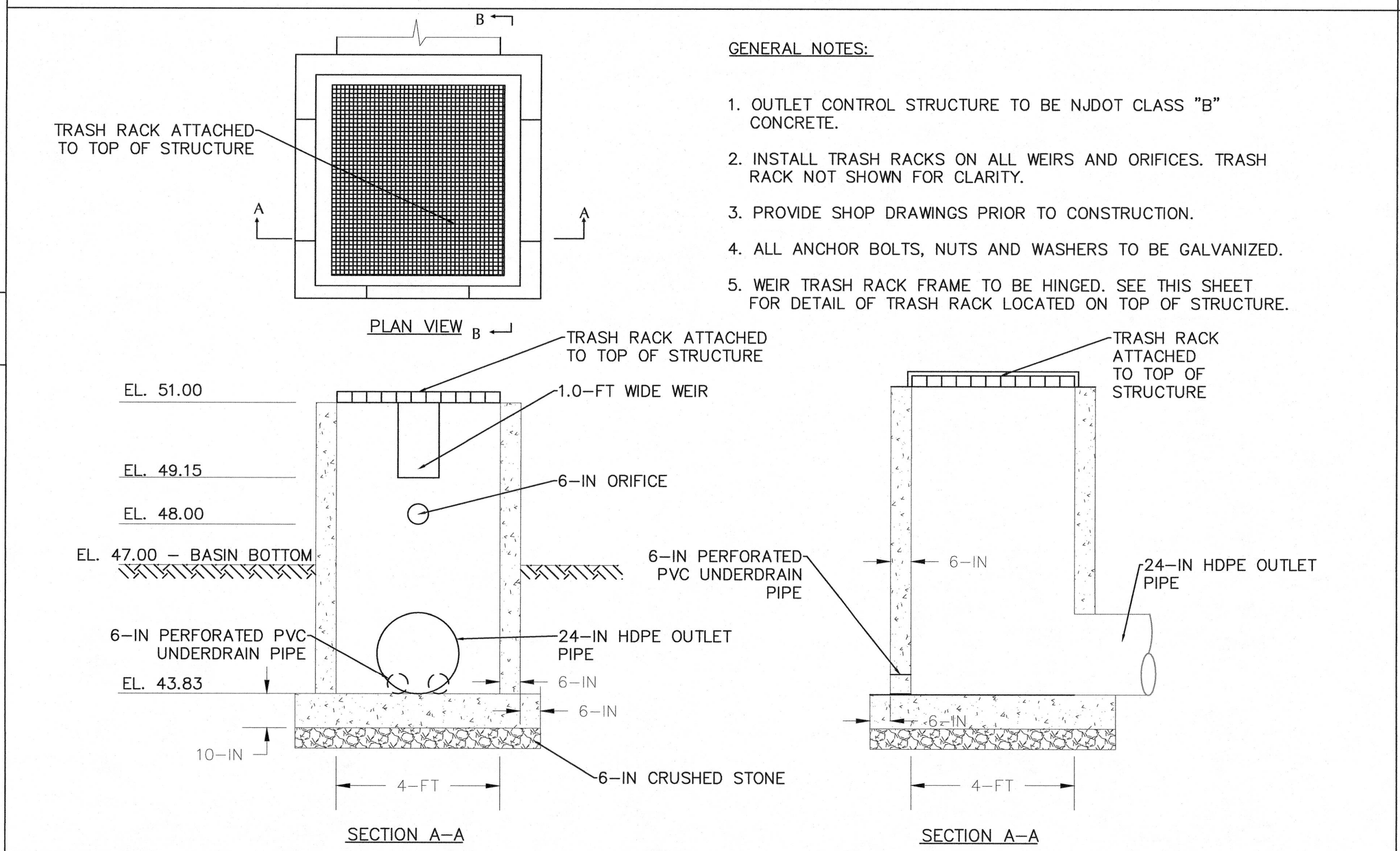
BIORETENTION BASIN TYPICAL CROSS SECTION



GENERAL NOTES:

1. OUTLET CONTROL STRUCTURE TO BE NJDOT CLASS "B" CONCRETE.
2. INSTALL TRASH RACKS ON ALL WEIRS AND ORIFICES. TRASH RACK NOT SHOWN FOR CLARITY.
3. PROVIDE SHOP DRAWINGS PRIOR TO CONSTRUCTION.
4. ALL ANCHOR BOLTS, NUTS AND WASHERS TO BE GALVANIZED.
5. WEIR TRASH RACK FRAME TO BE HINGED. SEE THIS SHEET FOR DETAIL OF TRASH RACK LOCATED ON TOP OF STRUCTURE.

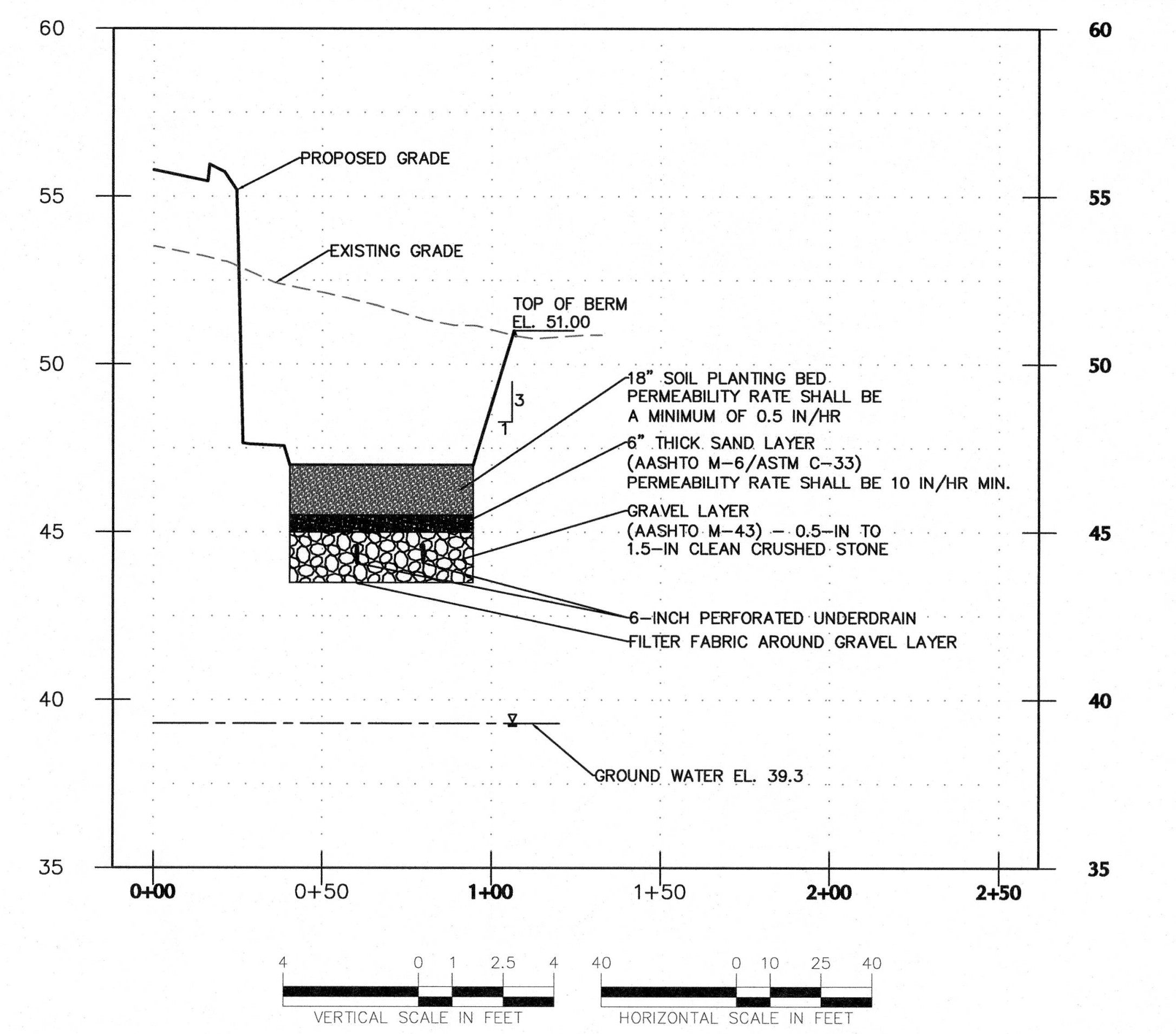
OCS STRUCTURE 100



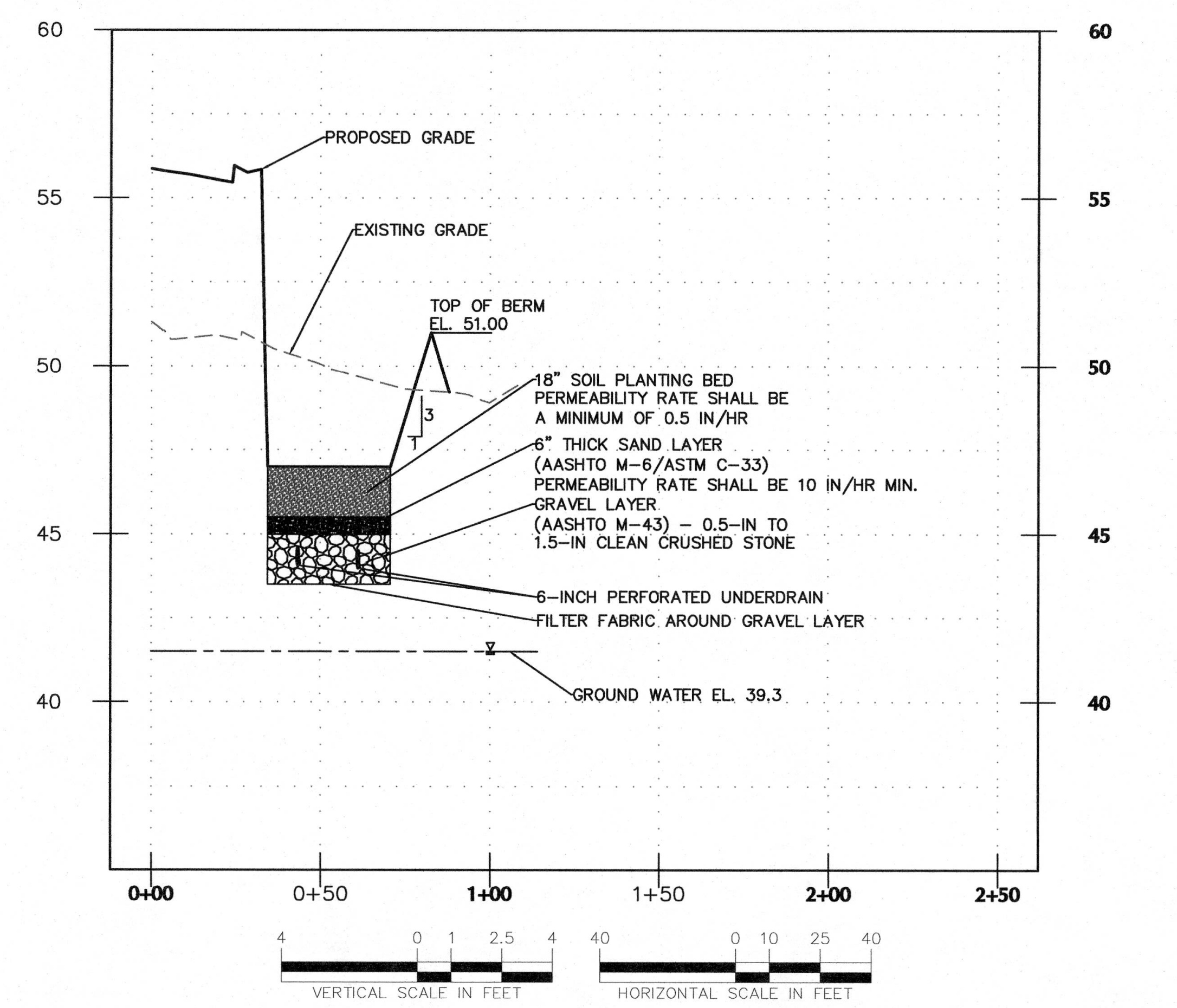
GENERAL NOTES:

1. OUTLET CONTROL STRUCTURE TO BE NJDOT CLASS "B" CONCRETE.
2. INSTALL TRASH RACKS ON ALL WEIRS AND ORIFICES. TRASH RACK NOT SHOWN FOR CLARITY.
3. PROVIDE SHOP DRAWINGS PRIOR TO CONSTRUCTION.
4. ALL ANCHOR BOLTS, NUTS AND WASHERS TO BE GALVANIZED.
5. WEIR TRASH RACK FRAME TO BE HINGED. SEE THIS SHEET FOR DETAIL OF TRASH RACK LOCATED ON TOP OF STRUCTURE.

OCS STRUCTURE 200



BIORETENTION BASIN CROSS SECTION A-A′



BIORETENTION BASIN CROSS SECTION B-B′

Date	Description	No.

REVISIONS

MAY 0 5 2023
SIGNATURE DANIEL MIOLA DATE SIGNED
PROFESSIONAL ENGINEER NJ Lic. No.
24GE04676300

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NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

Project

KING ARTHUR
COURT WAREHOUSE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK
MIDDLESEX COUNTY NEW JERSEY

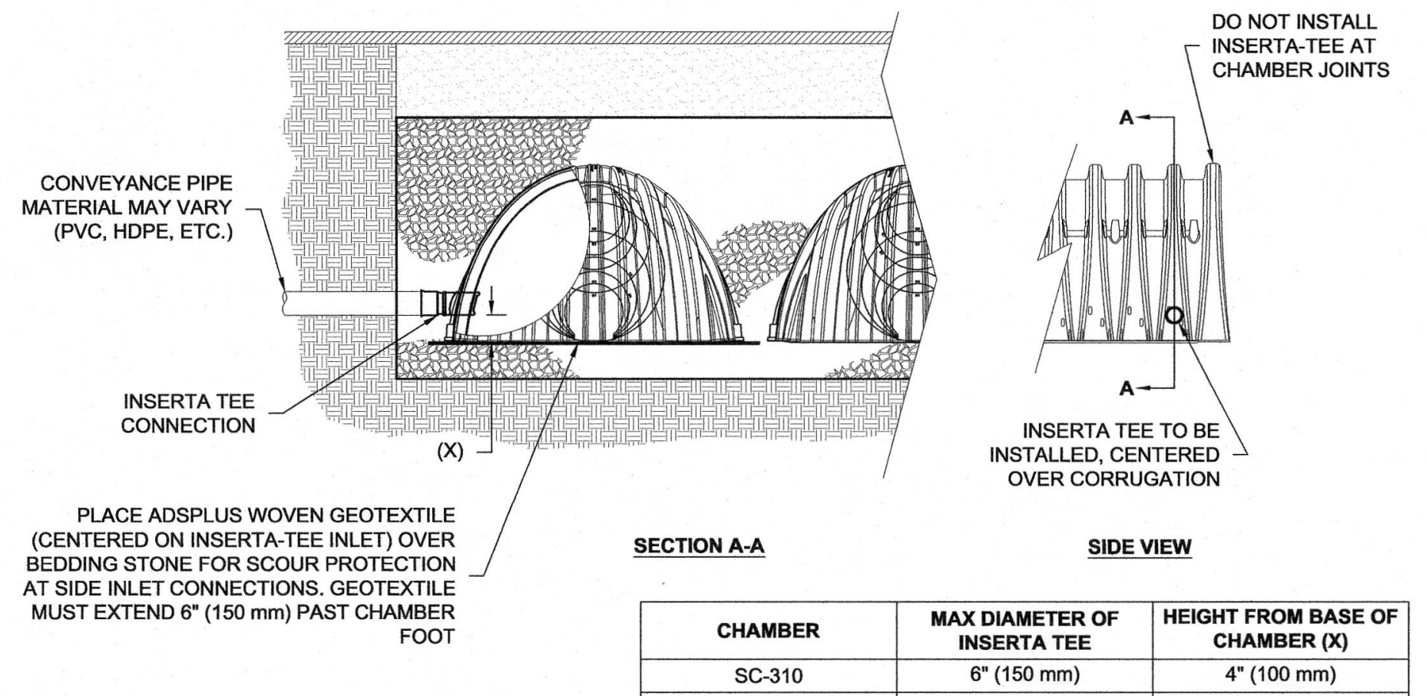
Drawing Title

SITE PLAN
DETAILS 3

Project No.
100851001
Date
FEBRUARY 27, 2023
Drawn By
JPNR
Checked By
PM

Drawing No.
CS503

Sheet 21 of 22



SECTION A-A

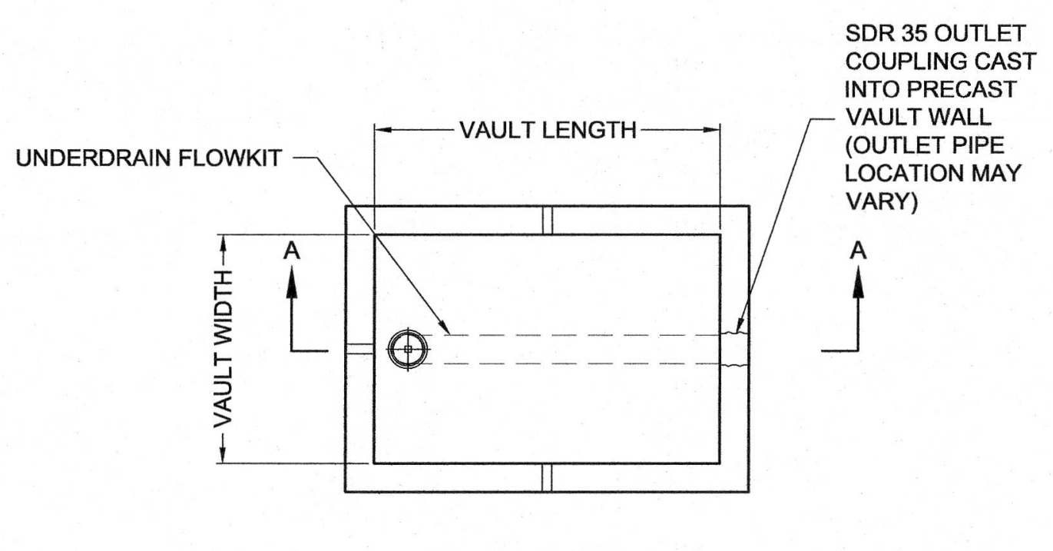
SIDE VIEW

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
MC-7200	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

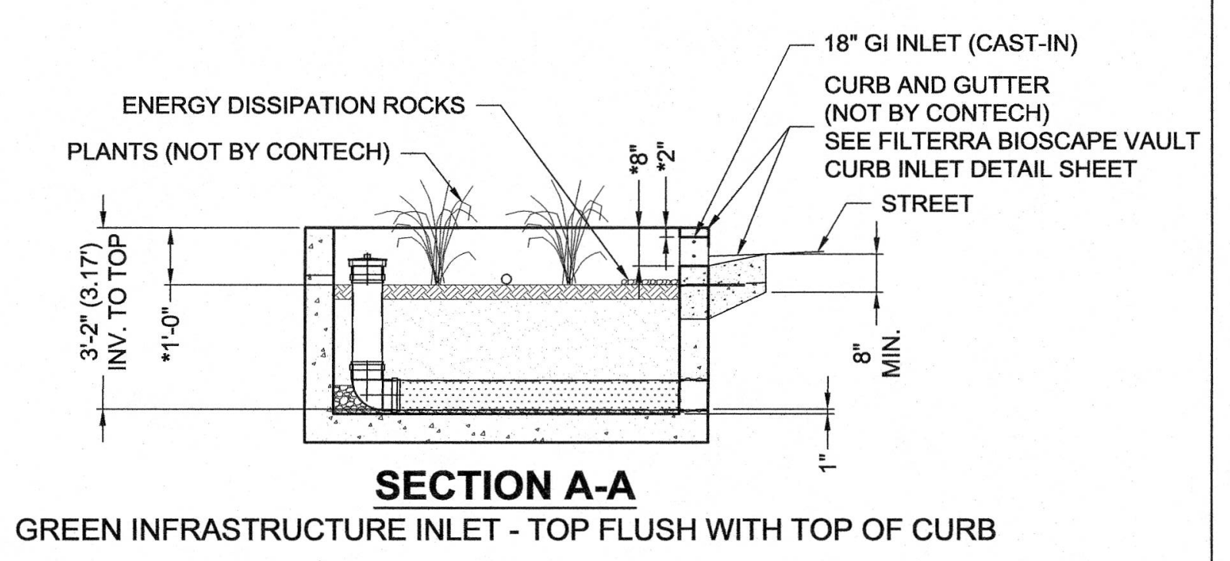
NOTES:

- PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.
- CONTACT ADS ENGINEERING SERVICES IF INSERTA TEE INLET MUST BE RAISED AS NOT ALL INVERTS ARE POSSIBLE.

ADS STORMTECH INSERTA-TEE SIDE INLET



PLAN VIEW



SECTION A-A

GREEN INFRASTRUCTURE INLET - TOP FLUSH WITH TOP OF CURB

AS WITH ALL OPEN TOP BIORETENTION SYSTEMS, FILTERRA IS OPEN TO THE ATMOSPHERE WITH A MEDIA SURFACE RECESSED BELOW FINISHED GRADE. CONTRACTOR OR OWNER IS RESPONSIBLE FOR PROVIDING ANY REQUIRED SAFETY MEASURES AROUND SYSTEM PERIMETER. TO MAINTAIN AESTHETICS, REMOVAL OF HEAVY STORMWATER DEBRIS MAY BE NECESSARY BETWEEN REGULAR FILTERRA SYSTEM MAINTENANCE EVENTS.

NOTES:

1. THE CONTECH FILTERRA HC BIOSCAPE VAULT STANDARD OFFLINE (FTBSV–HC) WITH A MEDIA BAY SIZE OF 10' x 6' HAS A MAXIMUM TREATMENT FLOW RATE OF 0.417 CFS.
2. REFER TO MANUFACTURER FOR INSTALLATION REQUIREMENTS AND RECOMMENDATIONS.

CONTECH OFFLINE HC BIOSCAPE VAULT

SC-310 STORMTECH CHAMBER SPECIFICATIONS

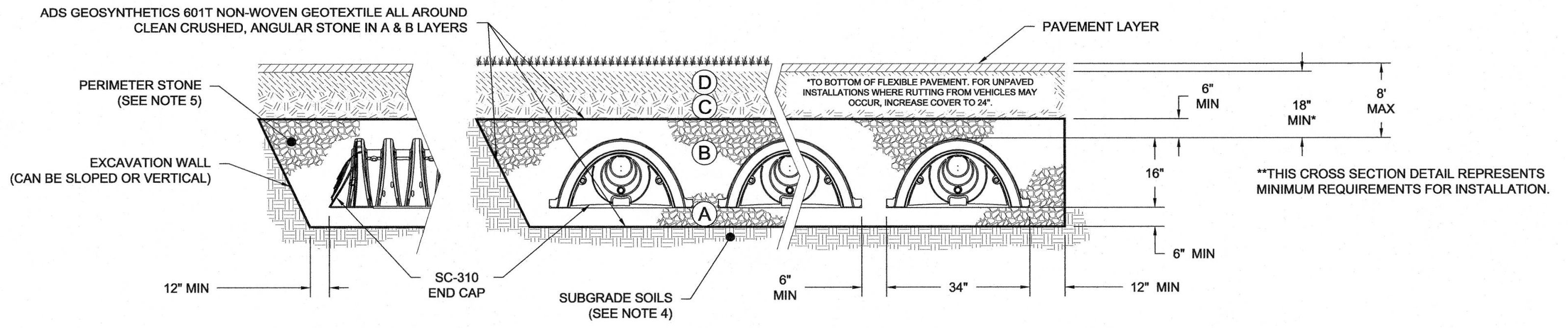
1. CHAMBERS SHALL BE STORMTECH SC-310.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE OR POLYETHYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2922 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

NOTES FOR CONSTRUCTION EQUIPMENT:

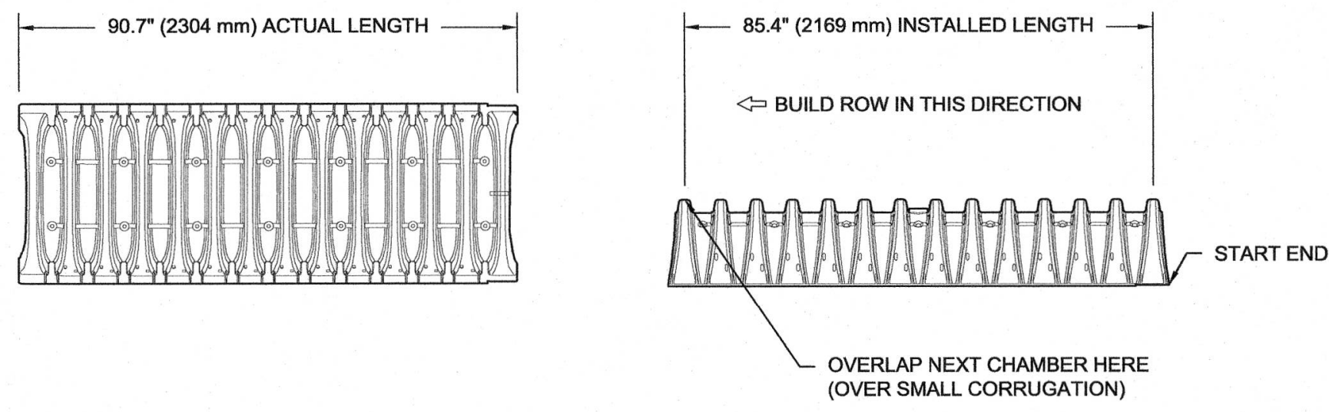
1. STORMTECH SC-310 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-310 & SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

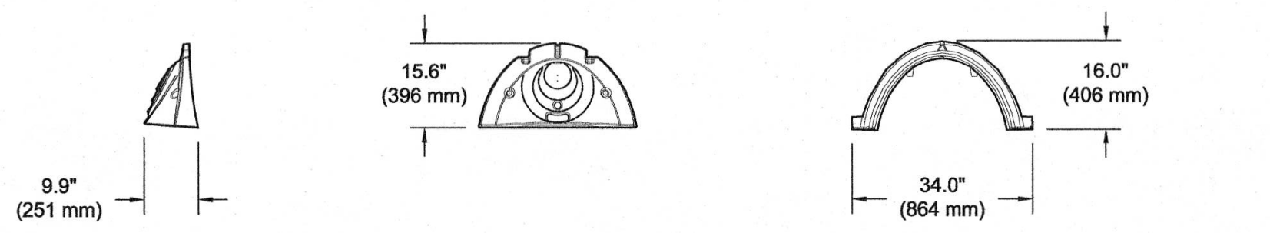


**THIS CROSS SECTION DETAIL REPRESENTS MINIMUM REQUIREMENTS FOR INSTALLATION.



FILL REQUIREMENTS

MATERIAL LOCATION		TYPE OF FILL	COMPACTION /DENSITY REQUIREMENT
D	**FINAL FILL**: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ENVIRONMENTALLY CLEAN FILL	-
C	**INITIAL FILL**: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	SUITABLE STRUCTURAL FILL	BEGIN COMPACTIONS AFTER 12" OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs. DYNAMIC FORCE NOT TO EXCEED 20,000 lbs.
B	**EMBEDMENT STONE**: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	NJDOT COARSE AGGREGATE SIZE #57 STONE	NO COMPCATION REQUIRED
A	**FOUNDATION STONE**: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	NJDOT COARSE AGGREGATE SIZE #57 STONE	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	34.0" X 16.0" X 85.4"	(864 mm X 406 mm X 2169 mm)
CHAMBER STORAGE	14.7 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	31.0 CUBIC FEET	(0.88 m³)
WEIGHT	35.0 lbs.	(16.8 kg)

*ASSUMES 6" (152 mm) ABOVE, BELOW, AND BETWEEN CHAMBERS

NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2922 (POLETHYLENE) OR ASTM F2418 (POLYPROPYLENE), "STANDARD SPECIFICATION FOR CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-310 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2922 SHALL BE GREATER THAN OR EQUAL TO 400 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

ADS STORMTECH SC-310 CHAMBERS

SC-740 STORMTECH CHAMBER SPECIFICATIONS

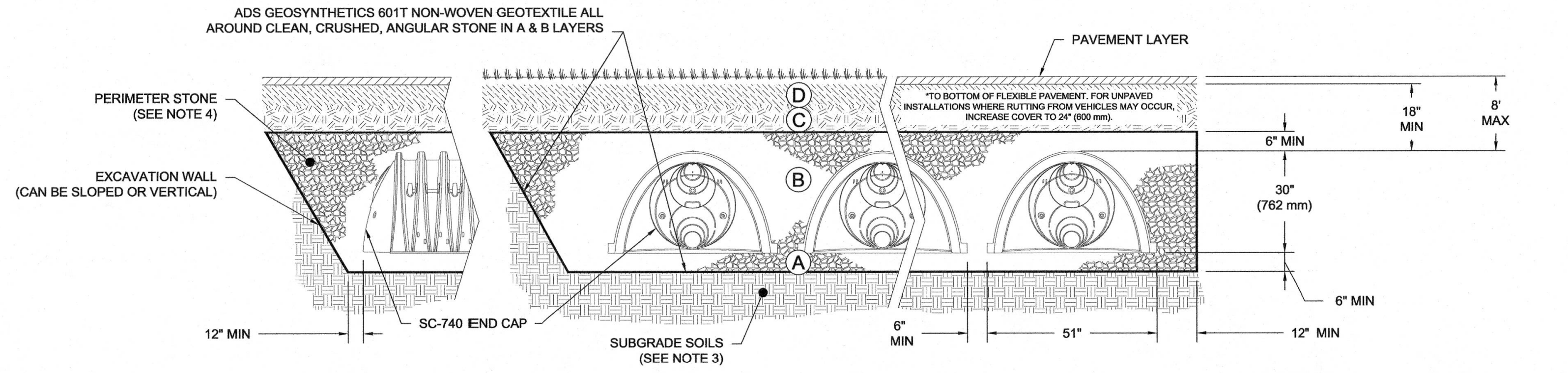
1. CHAMBERS SHALL BE STORMTECH SC-740.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

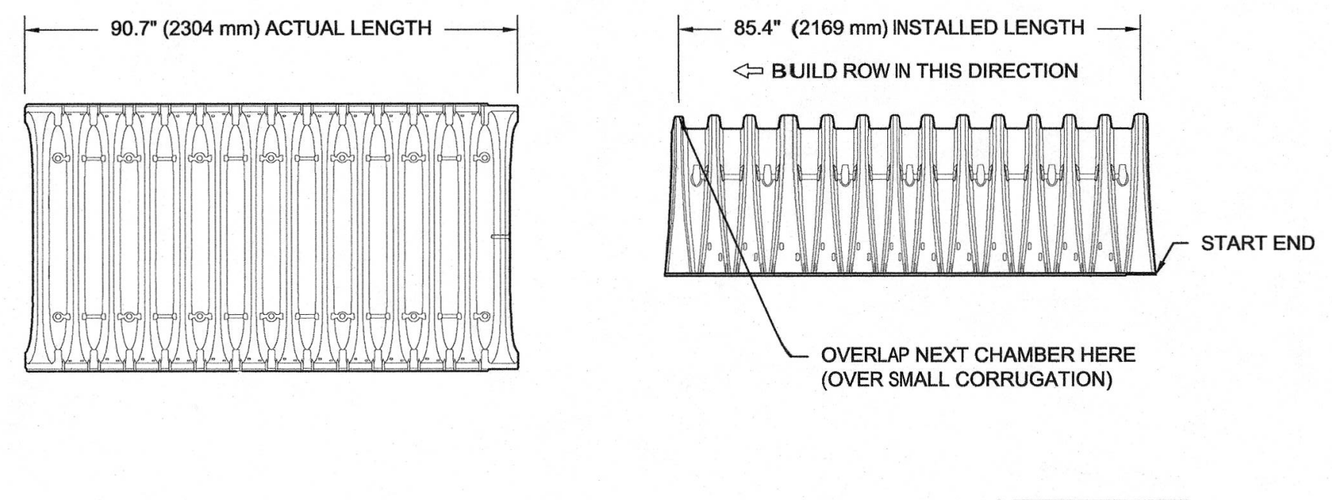
NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

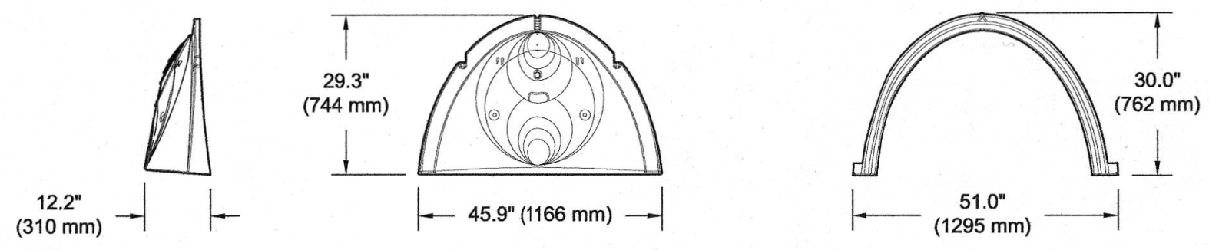
CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.





FILL REQUIREMENTS

MATERIAL LOCATION		TYPE OF FILL	COMPACTION /DENSITY REQUIREMENT
D	**FINAL FILL**: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ENVIRONMENTALLY CLEAN FILL	-
C	**INITIAL FILL**: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	SUITABLE STRUCTURAL FILL	BEGIN COMPACTIONS AFTER 12" OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs. DYNAMIC FORCE NOT TO EXCEED 20,000 lbs.
B	**EMBEDMENT STONE**: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	NJDOT COARSE AGGREGATE SIZE #57 STONE	NO COMPCATION REQUIRED
A	**FOUNDATION STONE**: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	NJDOT COARSE AGGREGATE SIZE #57 STONE	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS

NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

ADS STORMTECH SC-740 CHAMBERS

Date	Description	No.

REVISIONS

MAY 0 5 2023
SIGNATURE DATE SIGNED
DANIEL MIOLA
PROFESSIONAL ENGINEER NJ Lic. No.
24GE04676300

LANGAN
Langan Engineering and
Environmental Services, Inc.
300 Kimball Drive
Parsippany, NJ 07054
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NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

Project
KING ARTHUR
COURT WAREHOUSE
BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK
MIDDLESEX COUNTY NEW JERSEY

Drawing Title
SITE PLAN
DETAILS 4

Project No. 100851001
Date FEBRUARY 27, 2023
Drawn By JPNR
Checked By PM
Drawing No. CS504
Sheet 22 of 22

50 0 25 50
SCALE: 1 INCH = 50 FEET

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NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

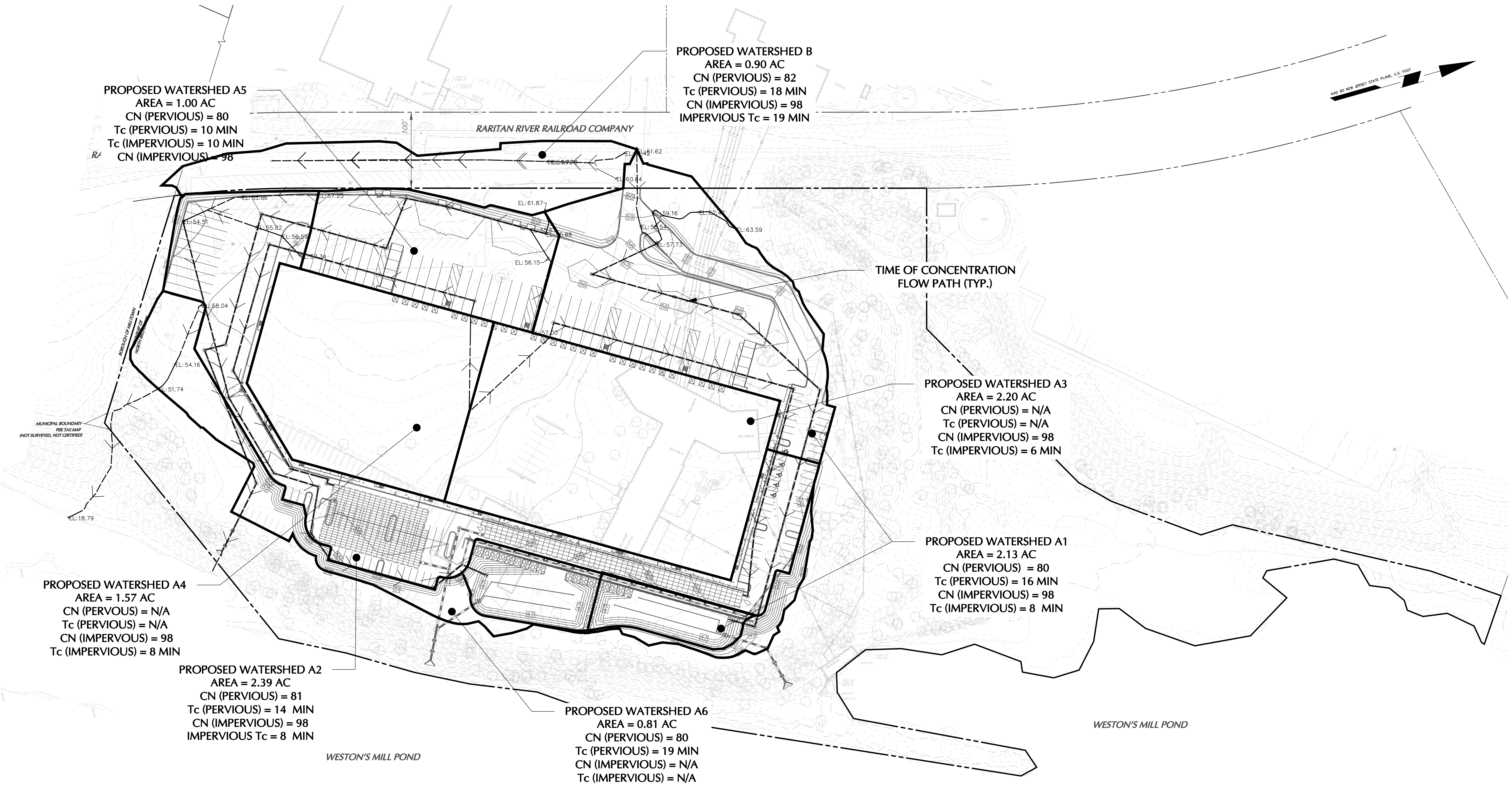
SILVER LINE DRIVE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK
MIDDLESEX COUNTY **NEW JERSEY**

Drawing Title

EXISTING WATERSHED PLAN

Project No. **100851001**	Figure No. WB101
Date **May 5, 2023**	
Drawn By **AM**	
Checked By **DM**	



PROPOSED WATERSHED B
AREA = 0.90 AC
CN (PERVIOUS) = 82
Tc (PERVIOUS) = 18 MIN
CN (IMPERVIOUS) = 98
IMPERVIOUS Tc = 19 MIN

PROPOSED WATERSHED A5
AREA = 1.00 AC
CN (PERVIOUS) = 80
Tc (PERVIOUS) = 10 MIN
Tc (IMPERVIOUS) = 10 MIN
CN (IMPERVIOUS) = 98

TIME OF CONCENTRATION
FLOW PATH (TYP.)

PROPOSED WATERSHED A3
AREA = 2.20 AC
CN (PERVIOUS) = N/A
Tc (PERVIOUS) = N/A
CN (IMPERVIOUS) = 98
Tc (IMPERVIOUS) = 6 MIN

PROPOSED WATERSHED A1
AREA = 2.13 AC
CN (PERVIOUS) = 80
Tc (PERVIOUS) = 16 MIN
CN (IMPERVIOUS) = 98
Tc (IMPERVIOUS) = 8 MIN

PROPOSED WATERSHED A4
AREA = 1.57 AC
CN (PERVOUS) = N/A
Tc (PERVIOUS) = N/A
CN (IMPERVOUS) = 98
Tc (IMPERVIOUS) = 8 MIN

PROPOSED WATERSHED A2
AREA = 2.39 AC
CN (PERVIOUS) = 81
Tc (PERVIOUS) = 14 MIN
CN (IMPERVIOUS) = 98
IMPERVIOUS Tc = 8 MIN

PROPOSED WATERSHED A6
AREA = 0.81 AC
CN (PERVIOUS) = 80
Tc (PERVIOUS) = 19 MIN
CN (IMPERVIOUS) = N/A
Tc (IMPERVIOUS) = N/A

50 0 25 50
SCALE: 1 INCH = 50 FEET

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Project

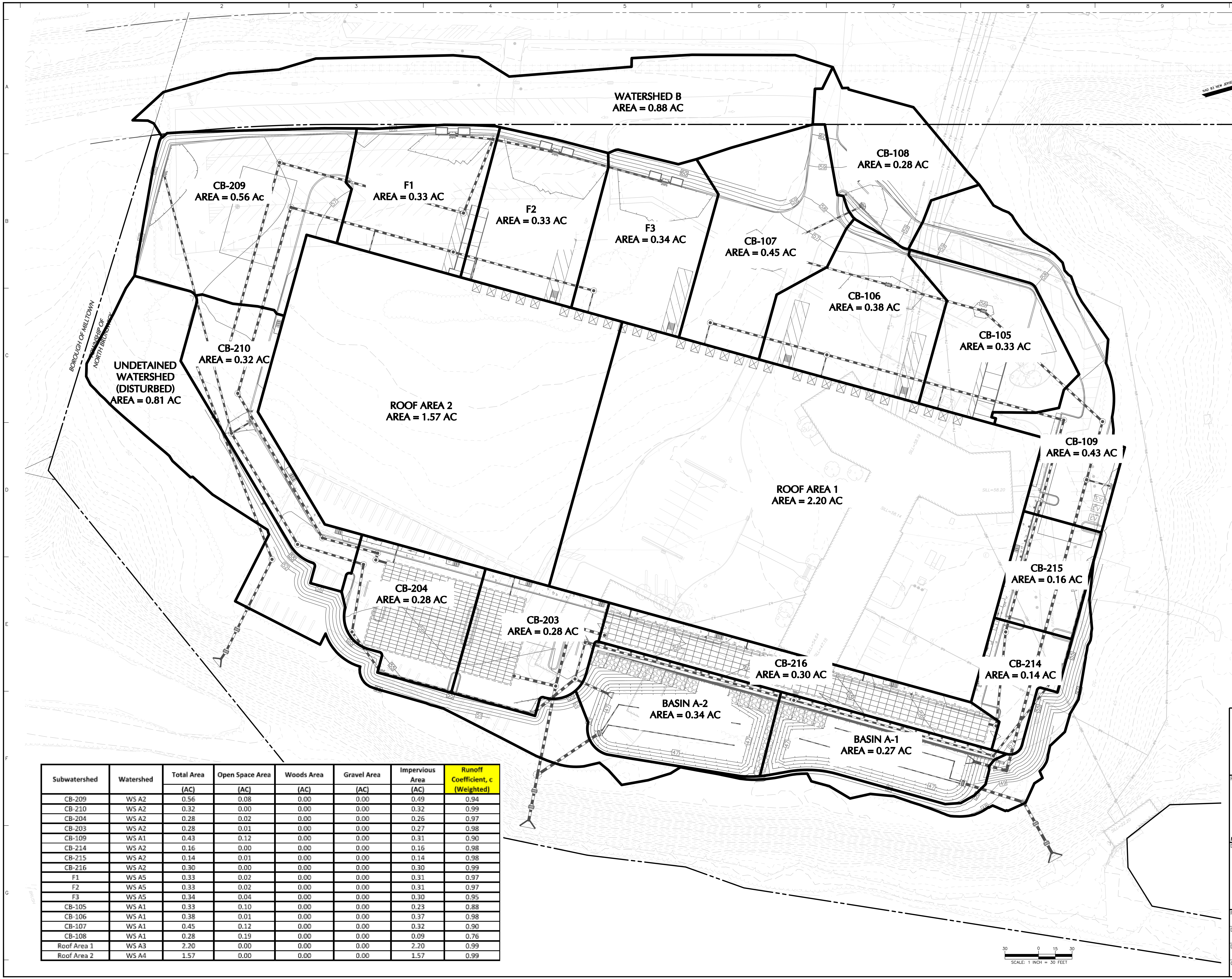
SILVER LINE DRIVE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK
MIDDLESEX COUNTY **NEW JERSEY**

Drawing Title

PROPOSED WATERSHED PLAN

Project No. **100851001**	Figure No. WB102
Date **May 5, 2023**	
Drawn By **AM**	
Checked By **DM**	



Subwatershed	Watershed	Total Area	Open Space Area	Woods Area	Gravel Area	Impervious Area	Runoff Coefficient, c
		(AC)	(AC)	(AC)	(AC)	(AC)	(Weighted)
CB-209	WS A2	0.56	0.08	0.00	0.00	0.49	0.94
CB-210	WS A2	0.32	0.00	0.00	0.00	0.32	0.99
CB-204	WS A2	0.28	0.02	0.00	0.00	0.26	0.97
CB-203	WS A2	0.28	0.01	0.00	0.00	0.27	0.98
CB-109	WS A1	0.43	0.12	0.00	0.00	0.31	0.90
CB-214	WS A2	0.16	0.00	0.00	0.00	0.16	0.98
CB-215	WS A2	0.14	0.01	0.00	0.00	0.14	0.98
CB-216	WS A2	0.30	0.00	0.00	0.00	0.30	0.99
F1	WS A5	0.33	0.02	0.00	0.00	0.31	0.97
F2	WS A5	0.33	0.02	0.00	0.00	0.31	0.97
F3	WS A5	0.34	0.04	0.00	0.00	0.30	0.95
CB-105	WS A1	0.33	0.10	0.00	0.00	0.23	0.88
CB-106	WS A1	0.38	0.01	0.00	0.00	0.37	0.98
CB-107	WS A1	0.45	0.12	0.00	0.00	0.32	0.90
CB-108	WS A1	0.28	0.19	0.00	0.00	0.09	0.76
Roof Area 1	WS A3	2.20	0.00	0.00	0.00	2.20	0.99
Roof Area 2	WS A4	1.57	0.00	0.00	0.00	1.57	0.99

LANGAN

PROJECT NO. 100851001

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Project

SILVER LINE DRIVE

BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK
MIDDLESEX COUNTY NEW JERSEY

Drawing Title

PROPOSED SUB-WATERSHED PLAN

Project No.
100851001

Date
May 5, 2023

Drawn By
AM

Checked By
DM

Figure No.
WB103

APPENDIX A

Pre-Construction Hydrologic Analysis

NOAA Atlas 14, Volume 2, Version 3
Location name: North Brunswick, New Jersey, USA*
Latitude: 40.4621°, Longitude: -74.4375°
Elevation: 76 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.334** (0.303-0.369)	**0.398** (0.360-0.440)	**0.472** (0.426-0.521)	**0.526** (0.474-0.580)	**0.591** (0.531-0.652)	**0.638** (0.569-0.702)	**0.684** (0.608-0.754)	**0.726** (0.642-0.802)	**0.778** (0.681-0.861)	**0.817** (0.710-0.907)
10-min	**0.534** (0.483-0.590)	**0.637** (0.576-0.703)	**0.756** (0.682-0.835)	**0.841** (0.758-0.928)	**0.942** (0.846-1.04)	**1.01** (0.906-1.12)	**1.09** (0.966-1.20)	**1.15** (1.02-1.27)	**1.23** (1.08-1.36)	**1.29** (1.12-1.43)
15-min	**0.667** (0.604-0.738)	**0.800** (0.724-0.884)	**0.956** (0.863-1.06)	**1.06** (0.959-1.17)	**1.19** (1.07-1.32)	**1.29** (1.15-1.42)	**1.37** (1.22-1.52)	**1.45** (1.28-1.60)	**1.55** (1.36-1.72)	**1.62** (1.40-1.79)
30-min	**0.915** (0.828-1.01)	**1.11** (1.00-1.22)	**1.36** (1.23-1.50)	**1.54** (1.39-1.70)	**1.77** (1.59-1.95)	**1.94** (1.73-2.13)	**2.10** (1.87-2.32)	**2.26** (2.00-2.50)	**2.47** (2.16-2.73)	**2.62** (2.27-2.90)
60-min	**1.14** (1.03-1.26)	**1.39** (1.25-1.53)	**1.74** (1.57-1.92)	**2.01** (1.81-2.22)	**2.36** (2.11-2.60)	**2.62** (2.34-2.89)	**2.90** (2.58-3.20)	**3.17** (2.80-3.50)	**3.54** (3.10-3.92)	**3.82** (3.32-4.24)
2-hr	**1.40** (1.25-1.55)	**1.70** (1.53-1.89)	**2.16** (1.94-2.40)	**2.51** (2.25-2.79)	**3.00** (2.68-3.32)	**3.41** (3.02-3.77)	**3.82** (3.36-4.22)	**4.25** (3.71-4.71)	**4.85** (4.19-5.40)	**5.33** (4.56-5.94)
3-hr	**1.55** (1.39-1.73)	**1.89** (1.70-2.11)	**2.40** (2.16-2.67)	**2.80** (2.51-3.11)	**3.35** (2.99-3.72)	**3.81** (3.37-4.22)	**4.27** (3.76-4.74)	**4.76** (4.16-5.29)	**5.45** (4.69-6.06)	**5.99** (5.11-6.70)
6-hr	**1.98** (1.78-2.22)	**2.41** (2.17-2.69)	**3.06** (2.74-3.40)	**3.58** (3.20-3.97)	**4.34** (3.84-4.80)	**4.97** (4.37-5.49)	**5.65** (4.92-6.24)	**6.38** (5.50-7.04)	**7.43** (6.31-8.22)	**8.31** (6.97-9.20)
12-hr	**2.41** (2.16-2.72)	**2.93** (2.61-3.29)	**3.73** (3.32-4.19)	**4.41** (3.91-4.94)	**5.42** (4.77-6.05)	**6.30** (5.50-7.02)	**7.25** (6.26-8.07)	**8.30** (7.08-9.26)	**9.87** (8.26-11.0)	**11.2** (9.24-12.5)
24-hr	**2.75** (2.53-3.02)	**3.34** (3.06-3.67)	**4.28** (3.92-4.70)	**5.10** (4.65-5.59)	**6.33** (5.73-6.92)	**7.39** (6.65-8.08)	**8.58** (7.65-9.38)	**9.91** (8.73-10.9)	**11.9** (10.3-13.1)	**13.6** (11.6-15.0)
2-day	**3.20** (2.92-3.53)	**3.87** (3.54-4.28)	**4.96** (4.52-5.48)	**5.87** (5.33-6.48)	**7.21** (6.51-7.95)	**8.37** (7.50-9.21)	**9.62** (8.56-10.6)	**11.0** (9.67-12.2)	**13.0** (11.3-14.5)	**14.8** (12.6-16.4)
3-day	**3.39** (3.10-3.73)	**4.10** (3.76-4.52)	**5.23** (4.78-5.76)	**6.17** (5.61-6.78)	**7.53** (6.82-8.27)	**8.69** (7.81-9.54)	**9.94** (8.87-10.9)	**11.3** (9.99-12.4)	**13.3** (11.6-14.7)	**15.0** (12.9-16.6)
4-day	**3.58** (3.28-3.93)	**4.34** (3.98-4.76)	**5.50** (5.03-6.03)	**6.46** (5.89-7.08)	**7.85** (7.13-8.59)	**9.01** (8.13-9.87)	**10.3** (9.19-11.2)	**11.6** (10.3-12.7)	**13.6** (11.9-14.9)	**15.2** (13.1-16.8)
7-day	**4.21** (3.90-4.56)	**5.05** (4.68-5.48)	**6.29** (5.81-6.83)	**7.31** (6.75-7.93)	**8.78** (8.05-9.52)	**10.0** (9.11-10.8)	**11.3** (10.2-12.3)	**12.7** (11.4-13.8)	**14.7** (13.0-16.1)	**16.4** (14.3-18.0)
10-day	**4.79** (4.47-5.16)	**5.73** (5.34-6.17)	**7.02** (6.53-7.56)	**8.08** (7.50-8.70)	**9.58** (8.84-10.3)	**10.8** (9.92-11.6)	**12.1** (11.0-13.1)	**13.5** (12.2-14.6)	**15.4** (13.8-16.8)	**17.0** (15.0-18.6)
20-day	**6.47** (6.10-6.87)	**7.68** (7.24-8.16)	**9.17** (8.63-9.74)	**10.4** (9.73-11.0)	**12.0** (11.2-12.7)	**13.2** (12.3-14.0)	**14.5** (13.4-15.4)	**15.8** (14.5-16.8)	**17.5** (16.0-18.7)	**18.8** (17.1-20.2)
30-day	**8.06** (7.65-8.49)	**9.52** (9.04-10.0)	**11.1** (10.6-11.7)	**12.4** (11.7-13.0)	**14.0** (13.2-14.8)	**15.3** (14.4-16.1)	**16.5** (15.5-17.4)	**17.7** (16.5-18.7)	**19.2** (17.8-20.4)	**20.3** (18.8-21.7)
45-day	**10.3** (9.77-10.8)	**12.1** (11.5-12.6)	**13.9** (13.3-14.6)	**15.3** (14.6-16.1)	**17.2** (16.3-18.0)	**18.5** (17.5-19.4)	**19.8** (18.7-20.8)	**21.1** (19.8-22.2)	**22.7** (21.2-23.9)	**23.8** (22.2-25.2)
60-day	**12.3** (11.7-12.8)	**14.4** (13.8-15.1)	**16.5** (15.8-17.2)	**18.0** (17.2-18.8)	**19.9** (19.0-20.8)	**21.4** (20.3-22.3)	**22.7** (21.5-23.7)	**23.9** (22.6-25.0)	**25.4** (23.9-26.7)	**26.4** (24.8-27.9)

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

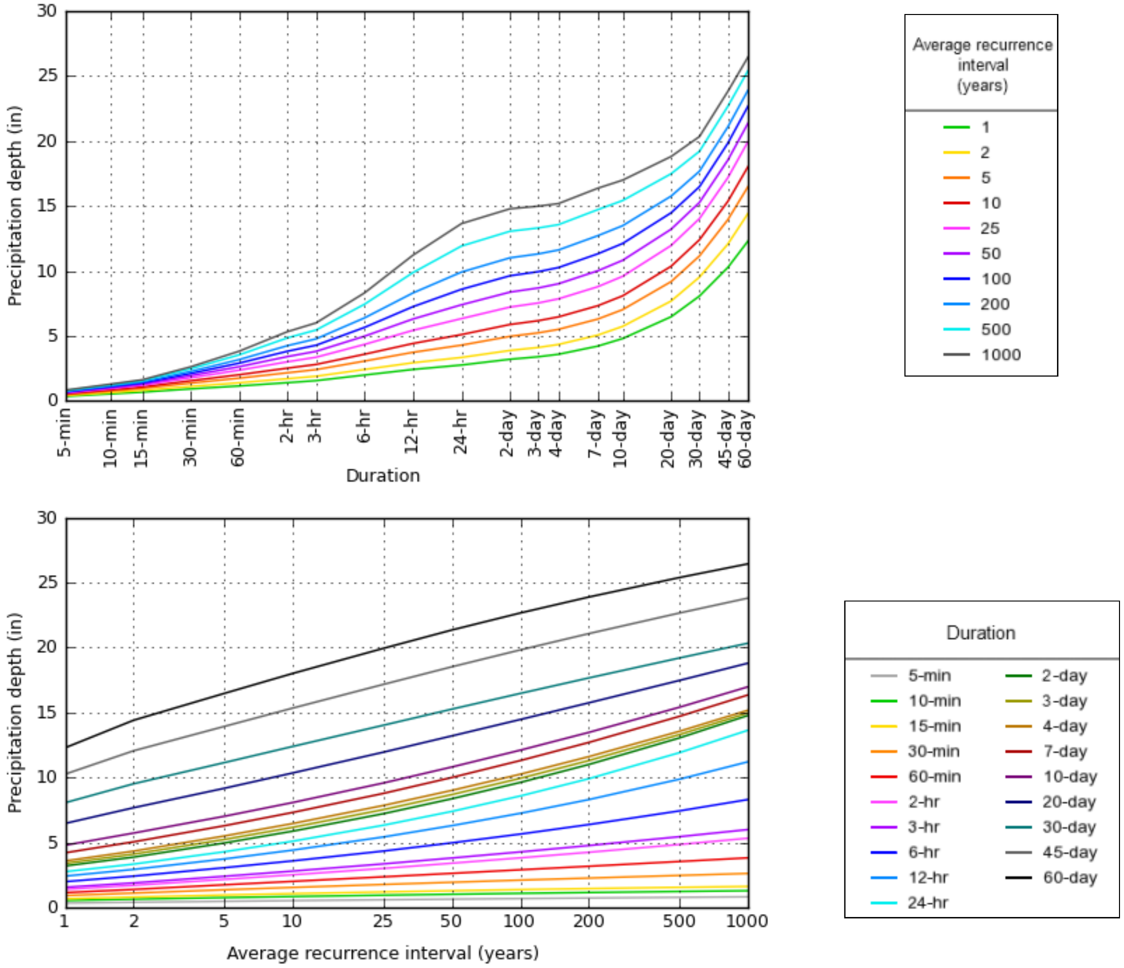
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 40.4621°, Longitude: -74.4375°



NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Mon Feb 13 17:40:13 2023

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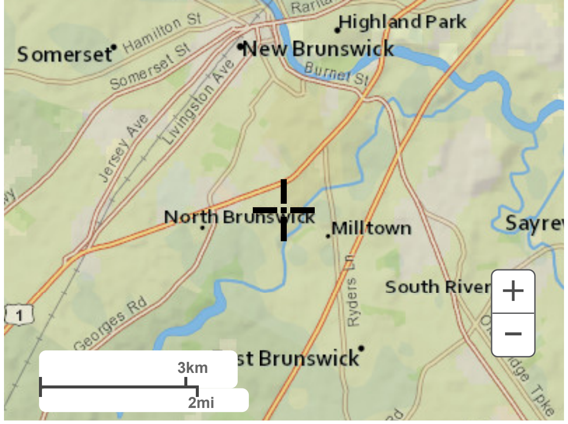
Maps & aerials

Small scale terrain



Large scale terrain

Large scale map

Large scale aerial

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

Disclaimer

EXISTING WATERSHED CALCULATIONS

Project King Arthur

North Brunswick, NJ
100851001

Watershed	Total Area	Landscaped Area	Woods Area	Gravel Area	Impervious Area	Curve Number, CN (Weighted)
	(AC)	(AC)	(AC)	(AC)	(AC)	
WS A1	2.15	1.16	0.48	0.00	0.51	84
WS A2	3.39	1.85	0.17	0.00	1.37	87
WS A3	0.44	0.30	0.08	0.00	0.06	82
WS A4	3.01	1.47	0.24	0.00	1.30	88
WS B	2.00	0.64	0.02	0.15	1.19	92
Total	10.99	5.42	0.99	0.15	4.43	83

CN-Values	
CN-Values	**80**
Woods Area	**77**
Gravel Area	**91**
Gravel Area	**98**

*CN Values from Table 2-2, TR-55 Manual - Urban Hydrology for Small Watersheds

Project: Project King Arthur **By:** AM **Date:** 2/21/2023
Location: North Brunswick, NJ **Checked By:** PM **Date Checked:** 2/21/2023
Circle One: [✓ Present] Developed Existing Watershed A1 - Pervious
Circle One: [✓ T_c] T_t **through subarea**
Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1		
1. Surface Description (NEH table 15-1)			Woods Light Underbrush		
2. Manning's Roughness Coeff., n (NEH table 15-1)			0.40		
3. Flow Length, L (total L < 100 ft)		ft	100		
4. Two-year 24-hr rainfall, P_2		in	3.36		
5. Land Slope, s		ft/ft	0.029		
6. Compute T_t	$T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.301	+	+

Sheet Flow Sub-Total **0.301 hours**

Shallow Concentrated Flow

		Segment ID	2		
7. Surface Description			Heavy Ground Litter		
8. Flow Length, L		ft	354		
9. Watercourse Slope, s		ft/ft	0.105		
10. Average Velocity, V (NEH table 15-3)		ft/s	0.82		
11. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.120	+	+

Shallow Conc. Flow Sub-Total **0.120 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.422 hours**
Total Tc (minutes) = **25 minutes**

Project: Project King Arthur **By:** AM **Date:** 2/21/2023

Location: North Brunswick, NJ **Checked By:** PM **Date Checked:** 2/21/2023

Circle One: [✓ Present] Developed **Existing Watershed A2 - Impervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1		2		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		0.40		
3.	Flow Length, L (total L < 100 ft)	ft	30		70		
4.	Two-year 24-hr rainfall, P_2	in	3.36		3.36		
5.	Land Slope, s	ft/ft	0.027		0.036		
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.007	+	0.208	+	

Sheet Flow Sub-Total **0.215 hours**

Shallow Concentrated Flow

		Segment ID	3				
7.	Surface Description		Heavy Ground Litter				
8.	Flow Length, L	ft	364				
9.	Watercourse Slope, s	ft/ft	0.106				
10.	Average Velocity, V (NEH table 15-3)	ft/s	0.82				
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.124	+		+	

Shallow Conc. Flow Sub-Total **0.124 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.339 hours**

Total Tc (minutes) = **20 minutes**

Project: Project King Arthur
By: AM
Date: 2/21/2023
Location: North Brunswick, NJ
Checked By: PM
Date Checked: 2/21/2023
Circle One: [✓ Present] Developed
Existing Watershed A2 - Pervious
Circle One: [✓ T_c] T_t **through subarea**
Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1			
1.	Surface Description (NEH table 15-1)		Woods Light Underbrush			
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.40			
3.	Flow Length, L (total L < 100 ft)	ft	100			
4.	Two-year 24-hr rainfall, P_2	in	3.36			
5.	Land Slope, s	ft/ft	0.031			
6.	Compute T_t $\quad T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.293	+	+	

Sheet Flow Sub-Total **0.293 hours**

Shallow Concentrated Flow

		Segment ID	2			
7.	Surface Description		Heavy Ground Litter			
8.	Flow Length, L	ft	354			
9.	Watercourse Slope, s	ft/ft	0.105			
10.	Average Velocity, V (NEH table 15-3)	ft/s	0.81			
11.	Compute T_t $\quad T_t = \frac{L}{3600\,V}$	hr	0.121	+	+	

Shallow Conc. Flow Sub-Total **0.121 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.414 hours**
Total Tc (minutes) = **25 minutes**

Project: Project King Arthur **By:** AM **Date:** 2/21/2023

Location: North Brunswick, NJ **Checked By:** PM **Date Checked:** 2/21/2023

Circle One: [✓ Present] Developed Existing Watershed A3 - Impervious

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1			
1.	Surface Description (NEH table 15-1)		Smooth Surfaces			
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011			
3.	Flow Length, L (total L < 100 ft)	ft	100			
4.	Two-year 24-hr rainfall, P_2	in	3.34			
5.	Land Slope, s	ft/ft	0.020			
6.	Compute T_t	hr	0.020	+	+	

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

Sheet Flow Sub-Total **0.020 hours**

Shallow Concentrated Flow

		Segment ID	2			
7.	Surface Description		Pavement			
8.	Flow Length, L	ft	75			
9.	Watercourse Slope, s	ft/ft	0.024			
10.	Average Velocity, V (NEH table 15-3)	ft/s	3.12			
11.	Compute T_t	hr	0.007	+	+	

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

Shallow Conc. Flow Sub-Total **0.007 hours**

Channel Flow

		Segment ID	3			
12.	Flow Length, L	ft	566			
13.	Average Velocity, V	ft/s	2.00			
14.	Compute T_t	hr	0.079	+	+	

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

Channel Flow Sub-Total **0.079 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.105 hours**
Total Tc (minutes) = **6 minutes**

Project: Project King Arthur **By:** AM **Date:** 2/21/2023

Location: North Brunswick, NJ **Checked By:** PM **Date Checked:** 2/21/2023

Circle One: [✓ Present] Developed Existing Watershed A3 - Pervious

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Short Grass Prairie		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.15		
3.	Flow Length, L (total L < 100 ft)	ft	100		
4.	Two-year 24-hr rainfall, P_2	in	3.34		
5.	Land Slope, s	ft/ft	0.026		
6.	Compute T_t $\quad T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.144	+	+

Sheet Flow Sub-Total **0.144 hours**

Shallow Concentrated Flow

		Segment ID	2	3	
7.	Surface Description		Grassed Waterways	Pavement	
8.	Flow Length, L	ft	122	89	
9.	Watercourse Slope, s	ft/ft	0.048	0.024	
10.	Average Velocity, V (NEH table 15-3)	ft/s	3.52	3.12	
11.	Compute T_t $\quad T_t = \frac{L}{3600\,V}$	hr	0.010	+ 0.008	+

Shallow Conc. Flow Sub-Total **0.018 hours**

Channel Flow

		Segment ID	4		
12.	Flow Length, L	ft	150		
13.	Average Velocity, V	ft/s	2.00		
14.	Compute T_t $\quad T_t = \frac{L}{3600\,V}$	hr	0.021	+	+

Channel Flow Sub-Total **0.021 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.182 hours**
Total Tc (minutes) =	**11 minutes**

Project: Project King Arthur **By:** AM **Date:** 2/21/2023

Location: North Brunswick, NJ **Checked By:** PM **Date Checked:** 2/21/2023

Circle One: [✓ Present] Developed **Existing Watershed A4 - Impervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1	2	
1.	Surface Description (NEH table 15-1)		Smooth Surfaces	Short Grass Prairie	
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011	0.15	
3.	Flow Length, L (total L < 100 ft)	ft	25	75	
4.	Two-year 24-hr rainfall, P_2	in	3.34	3.34	
5.	Land Slope, s	ft/ft	0.029	0.030	
6.	Compute T_t	hr	0.006 +	0.108 +	

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

Sheet Flow Sub-Total **0.113 hours**

Shallow Concentrated Flow

		Segment ID	3		
7.	Surface Description		Heavy Ground Litter		
8.	Flow Length, L	ft	127		
9.	Watercourse Slope, s	ft/ft	0.256		
10.	Average Velocity, V (NEH table 15-3)	ft/s	1.27		
11.	Compute T_t	hr	0.028 +	+	

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

Shallow Conc. Flow Sub-Total **0.028 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.141 hours**
Total Tc (minutes) = **8 minutes**

Project: Project King Arthur **By:** AM **Date:** 2/21/2023

Location: North Brunswick, NJ **Checked By:** PM **Date Checked:** 2/21/2023

Circle One: [✓ Present] Developed **Existing Watershed A4 - Pervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1		2		3
1.	Surface Description (NEH table 15-1)		**Short Grass Prairie**		**Smooth Surfaces**		**Short Grass Prairie**
2.	Manning's Roughness Coeff., n (NEH table 15-1)		**0.15**		**0.011**		**0.15**
3.	Flow Length, L (total L < 100 ft)	ft	**17**		**9**		**74**
4.	Two-year 24-hr rainfall, P_2	in	**3.34**		**3.34**		**3.34**
5.	Land Slope, s	ft/ft	**0.008**		**0.017**		**0.025**
6.	Compute T_t $\quad T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	**0.055**	+	**0.003**	+	**0.115**

Sheet Flow Sub-Total **0.173 hours**

Shallow Concentrated Flow

		Segment ID	4		5		
7.	Surface Description		**Grassed Waterways**		**Heavy Ground Litter**		
8.	Flow Length, L	ft	**87**		**133**		
9.	Watercourse Slope, s	ft/ft	**0.005**		**0.017**		
10.	Average Velocity, V (NEH table 15-3)	ft/s	**1.11**		**0.33**		
11.	Compute T_t $\quad T_t = \frac{L}{3600\ V}$	hr	**0.022**	+	**0.113**	+	

Shallow Conc. Flow Sub-Total **0.134 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.308 hours**

Total Tc (minutes) = **18 minutes**

Project: Project King Arthur **By:** AM **Date:** 2/21/2023

Location: North Brunswick, NJ **Checked By:** PM **Date Checked:** 2/21/2023

Circle One: [✓ Present] Developed Existing Watershed A5 - Impervious

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

	Segment ID	**1**				
1. Surface Description (NEH table 15-1)		**Smooth Surfaces**				
2. Manning's Roughness Coeff., n (NEH table 15-1)		**0.011**				
3. Flow Length, L (total L < 100 ft)	ft	**100**				
4. Two-year 24-hr rainfall, P_2	in	**3.34**				
5. Land Slope, s	ft/ft	**0.019**				
6. Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	**0.020**	+		+	

Sheet Flow Sub-Total **0.020 hours**

Shallow Concentrated Flow

	Segment ID	**2**		**4**		
7. Surface Description		**Pavement**		**Heavy Ground Litter**		
8. Flow Length, L	ft	**150**		**91**		
9. Watercourse Slope, s	ft/ft	**0.016**		**0.079**		
10. Average Velocity, V (NEH table 15-3)	ft/s	**2.57**		**0.71**		
11. Compute T_t $T_t = \frac{L}{3600\,V}$	hr	**0.016**	+	**0.036**	+	

Shallow Conc. Flow Sub-Total **0.052 hours**

Channel Flow

	Segment ID	**3**				
12. Flow Length, L	ft	**378**				
13. Average Velocity, V	ft/s	**2.00**				
14. Compute T_t $T_t = \frac{L}{3600\,V}$	hr	**0.053**	+		+	

Channel Flow Sub-Total **0.053 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.125 hours**

Total Tc (minutes) = **7 minutes**

Project: Project King Arthur **By:** AM **Date:** 2/21/2023
Location: North Brunswick, NJ **Checked By:** PM **Date Checked:** 2/21/2023
Circle One: [✓ Present] Developed **Existing Watershed A5 - Pervious**
Circle One: [✓ T_c] T_t **through subarea**
Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Short Grass Prairie		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.15		
3.	Flow Length, L (total L < 100 ft)	ft	100		
4.	Two-year 24-hr rainfall, P_2	in	3.34		
5.	Land Slope, s	ft/ft	0.024		
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.149	+	+

Sheet Flow Sub-Total **0.149 hours**

Shallow Concentrated Flow

		Segment ID	2	3	5
7.	Surface Description		Grassed Waterways	Pavement	Heavy Ground Litter
8.	Flow Length, L	ft	20	138	91
9.	Watercourse Slope, s	ft/ft	0.045	0.012	0.079
10.	Average Velocity, V (NEH table 15-3)	ft/s	3.42	2.24	0.71
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.002	+ 0.017	+ 0.036

Shallow Conc. Flow Sub-Total **0.055 hours**

Channel Flow

		Segment ID	4		
12.	Flow Length, L	ft	615		
13.	Average Velocity, V	ft/s	2.00		
14.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.085	+	+

Channel Flow Sub-Total **0.085 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.289 hours**
Total Tc (minutes) = **17 minutes**

Project:	**Project King Arthur**	**By:**	AM	**Date:**	**2/21/2023**
Location:	**North Brunswick, NJ**	**Checked By:**	PM	**Date Checked:**	**2/21/2023**

Circle One: [✓ **Present**] Developed   **Existing Watershed B - Impervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1	2	
1.	Surface Description (NEH table 15-1)		Smooth Surfaces	Dense Grasses	
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011	0.24	
3.	Flow Length, L (total L < 100 ft)	ft	29	71	
4.	Two-year 24-hr rainfall, P_2	in	3.36	3.36	
5.	Land Slope, s	ft/ft	0.011	0.008	
6.	Compute T_t $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.009 +	0.249 +	

Sheet Flow Sub-Total **0.258 hours**

Shallow Concentrated Flow

		Segment ID	3		
7.	Surface Description		Grassed Waterways		
8.	Flow Length, L	ft	78		
9.	Watercourse Slope, s	ft/ft	0.009		
10.	Average Velocity, V (NEH table 15-3)	ft/s	1.57		
11.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.014 +	+	

Shallow Conc. Flow Sub-Total **0.014 hours**

Channel Flow

		Segment ID	4		
12.	Flow Length, L	ft	282		
13.	Average Velocity, V	ft/s	2.00		
14.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.039 +	+	

Channel Flow Sub-Total **0.039 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.311 hours**
Total Tc (minutes) = **19 minutes**

Project: Project King Arthur
By: AM
Date: 2/21/2023
Location: North Brunswick, NJ
Checked By: PM
Date Checked: 2/21/2023
Circle One: [✓ Present] Developed
Existing Watershed B - Pervious
Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)	Segment ID	1				
1. Surface Description (NEH table 15-1)		Dense Grasses				
2. Manning's Roughness Coeff., n (NEH table 15-1)		0.24				
3. Flow Length, L (total L < 100 ft)	ft	100				
4. Two-year 24-hr rainfall, P_2	in	3.34				
5. Land Slope, s	ft/ft	0.016				
6. Compute T_t $\quad T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.252	+		+	

Sheet Flow Sub-Total **0.252 hours**

Shallow Concentrated Flow	Segment ID	2				
7. Surface Description		Pavement				
8. Flow Length, L	ft	84				
9. Watercourse Slope, s	ft/ft	0.010				
10. Average Velocity, V (NEH table 15-3)	ft/s	1.98				
11. Compute T_t $\quad T_t = \frac{L}{3600\,V}$	hr	0.012	+		+	

Shallow Conc. Flow Sub-Total **0.012 hours**

Channel Flow	Segment ID	3				
12. Flow Length, L	ft	282				
13. Average Velocity, V	ft/s	2.00				
14. Compute T_t $\quad T_t = \frac{L}{3600\,V}$	hr	0.039	+		+	

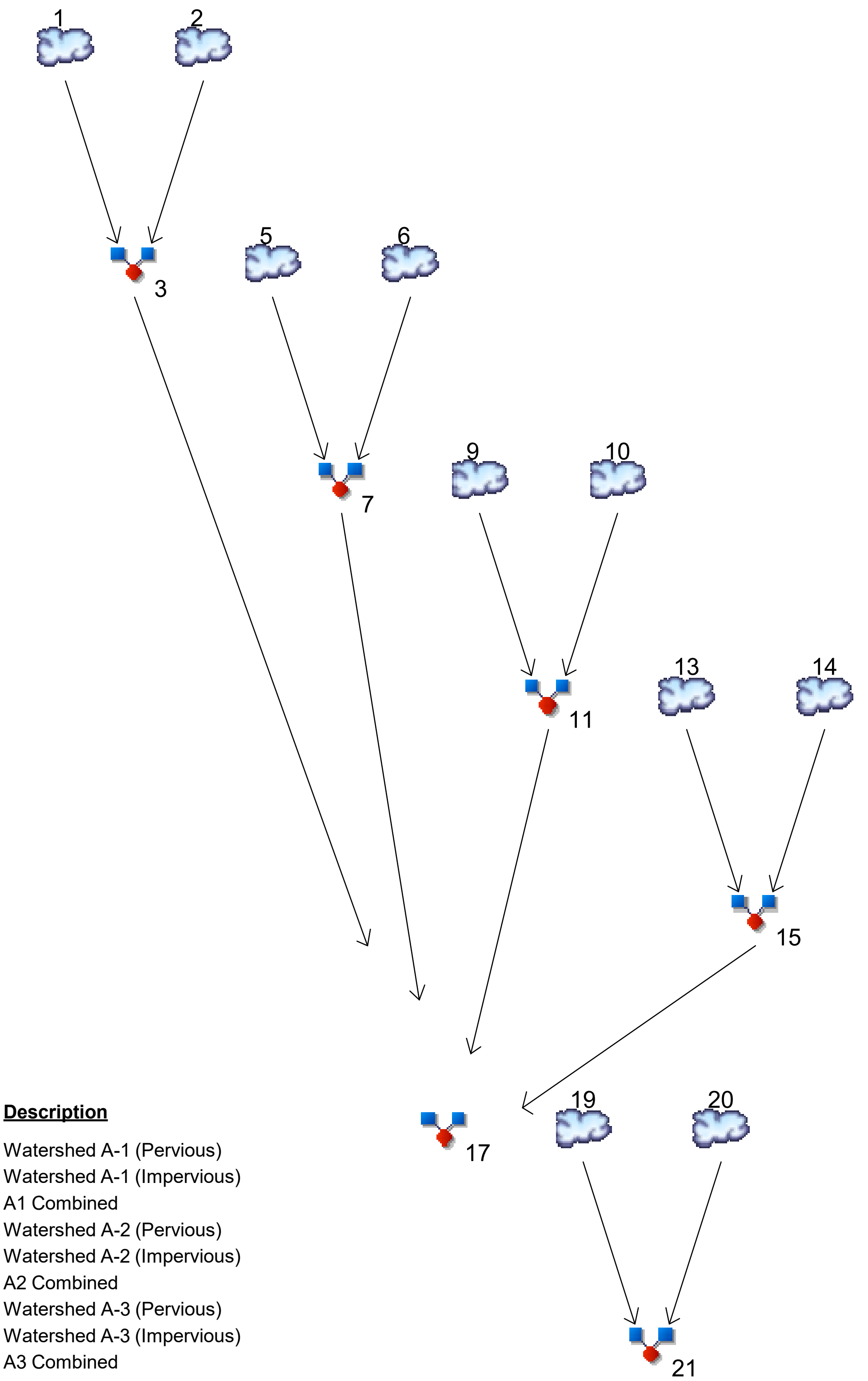
Channel Flow Sub-Total **0.039 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.303 hours**
Total Tc (minutes) = **18 minutes**

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022



Legend

Hyd.	Origin	Description
1	SCS Runoff	Watershed A-1 (Pervious)
2	SCS Runoff	Watershed A-1 (Impervious)
3	Combine	A1 Combined
5	SCS Runoff	Watershed A-2 (Pervious)
6	SCS Runoff	Watershed A-2 (Impervious)
7	Combine	A2 Combined
9	SCS Runoff	Watershed A-3 (Pervious)
10	SCS Runoff	Watershed A-3 (Impervious)
11	Combine	A3 Combined
13	SCS Runoff	Watershed A-4 (Pervious)
14	SCS Runoff	Watershed A-4 (Impervious)
15	Combine	A4 Combined
17	Combine	POA A
19	SCS Runoff	Watershed B (Impervious)
20	SCS Runoff	Watershed B (Pervious)
21	Combine	Watershed B Combined

Project: Existing Hydrographs_Current Precipitation.gpw

Tuesday, 02 / 21 / 2023

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

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Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

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	1.669	1	739	8,589	------	------	------	Watershed A-1 (Pervious)
2	SCS Runoff	1.112	1	734	5,752	------	------	------	Watershed A-1 (Impervious)
3	Combine	2.725	1	737	14,341	1, 2	------	------	A1 Combined
5	SCS Runoff	3.040	1	730	11,273	------	------	------	Watershed A-2 (Pervious)
6	SCS Runoff	4.458	1	727	15,934	------	------	------	Watershed A-2 (Impervious)
7	Combine	7.224	1	728	27,207	5, 6	------	------	A2 Combined
9	SCS Runoff	0.444	1	734	1,967	------	------	------	Watershed A-3 (Pervious)
10	SCS Runoff	0.176	1	727	660	------	------	------	Watershed A-3 (Impervious)
11	Combine	0.556	1	731	2,627	9, 10	------	------	A3 Combined
13	SCS Runoff	2.101	1	734	9,269	------	------	------	Watershed A-4 (Pervious)
14	SCS Runoff	3.806	1	727	14,295	------	------	------	Watershed A-4 (Impervious)
15	Combine	5.471	1	728	23,564	13, 14	------	------	A4 Combined
17	Combine	15.24	1	728	67,740	3, 7, 11, 15,	------	------	POA A
19	SCS Runoff	2.594	1	734	13,421	------	------	------	Watershed B (Impervious)
20	SCS Runoff	1.093	1	734	4,800	------	------	------	Watershed B (Pervious)
21	Combine	3.686	1	734	18,222	19, 20	------	------	Watershed B Combined

Hydrograph Report

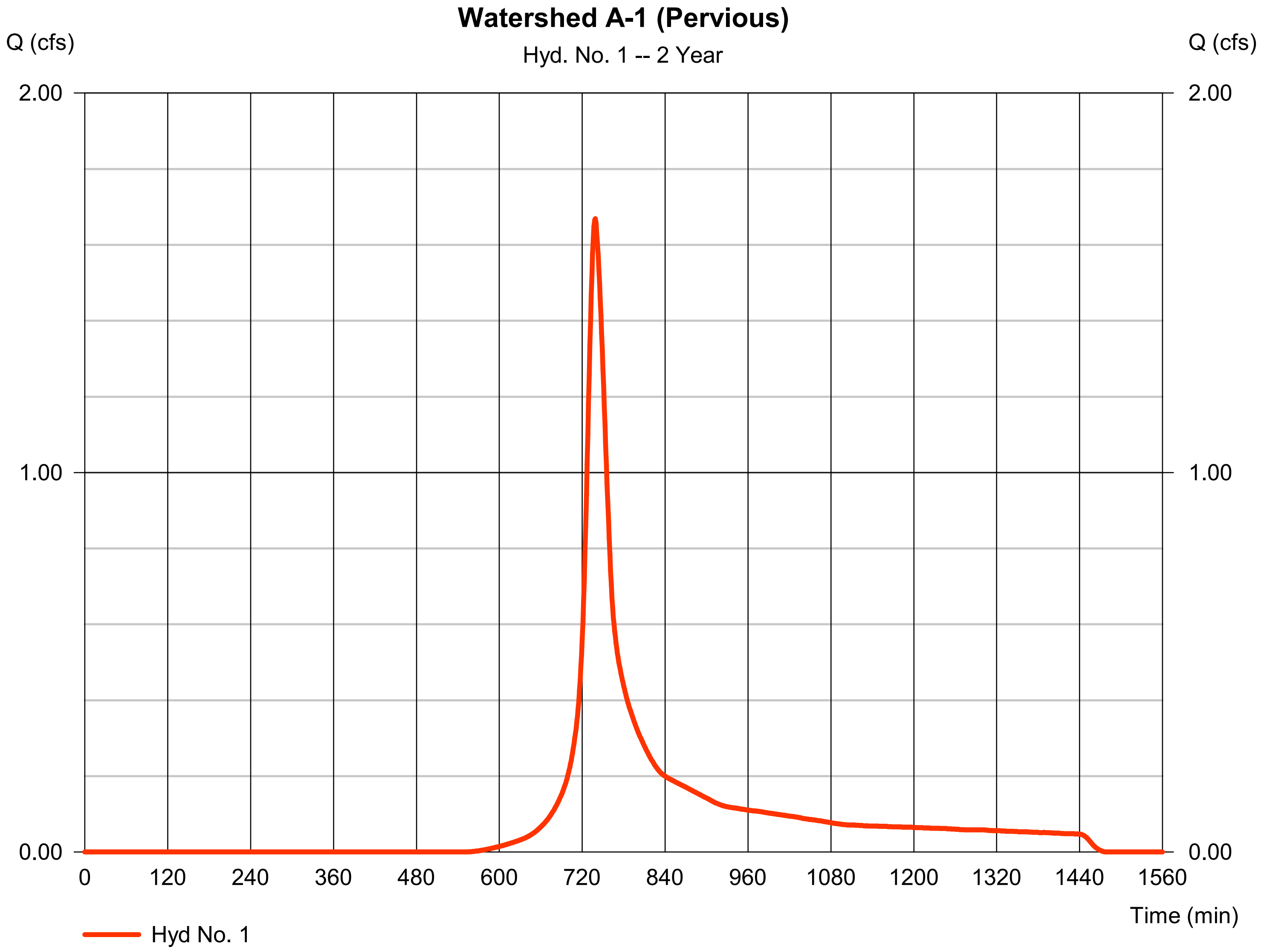
Hyd. No. 1

Watershed A-1 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.640 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 1.669 cfs
Time to peak = 739 min
Hyd. volume = 8,589 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 25.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(1.160 x 80) + (0.480 x 77)] / 1.640



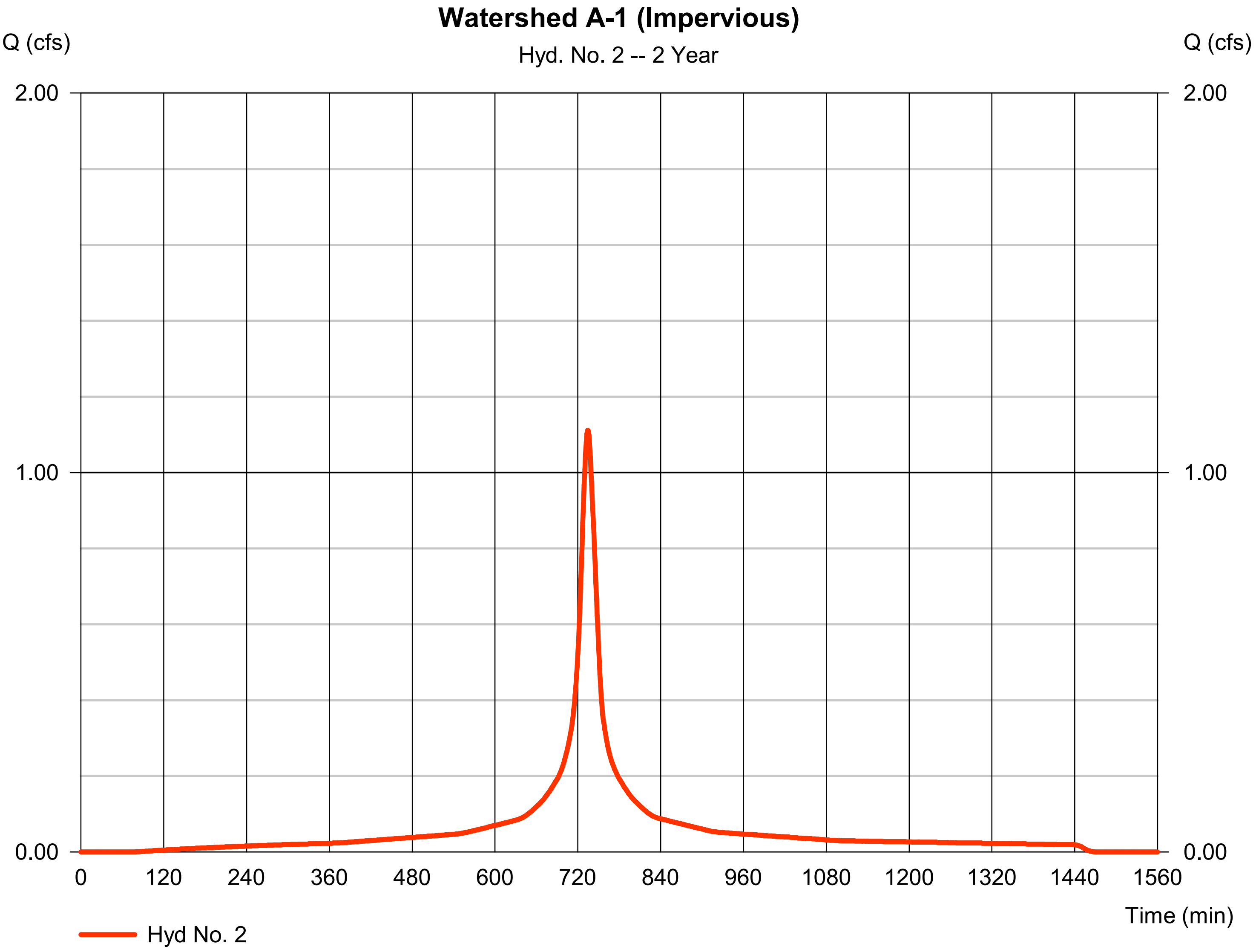
Hydrograph Report

Hyd. No. 2

Watershed A-1 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.510 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 1.112 cfs
Time to peak = 734 min
Hyd. volume = 5,752 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 20.00 min
Distribution = Custom
Shape factor = 484

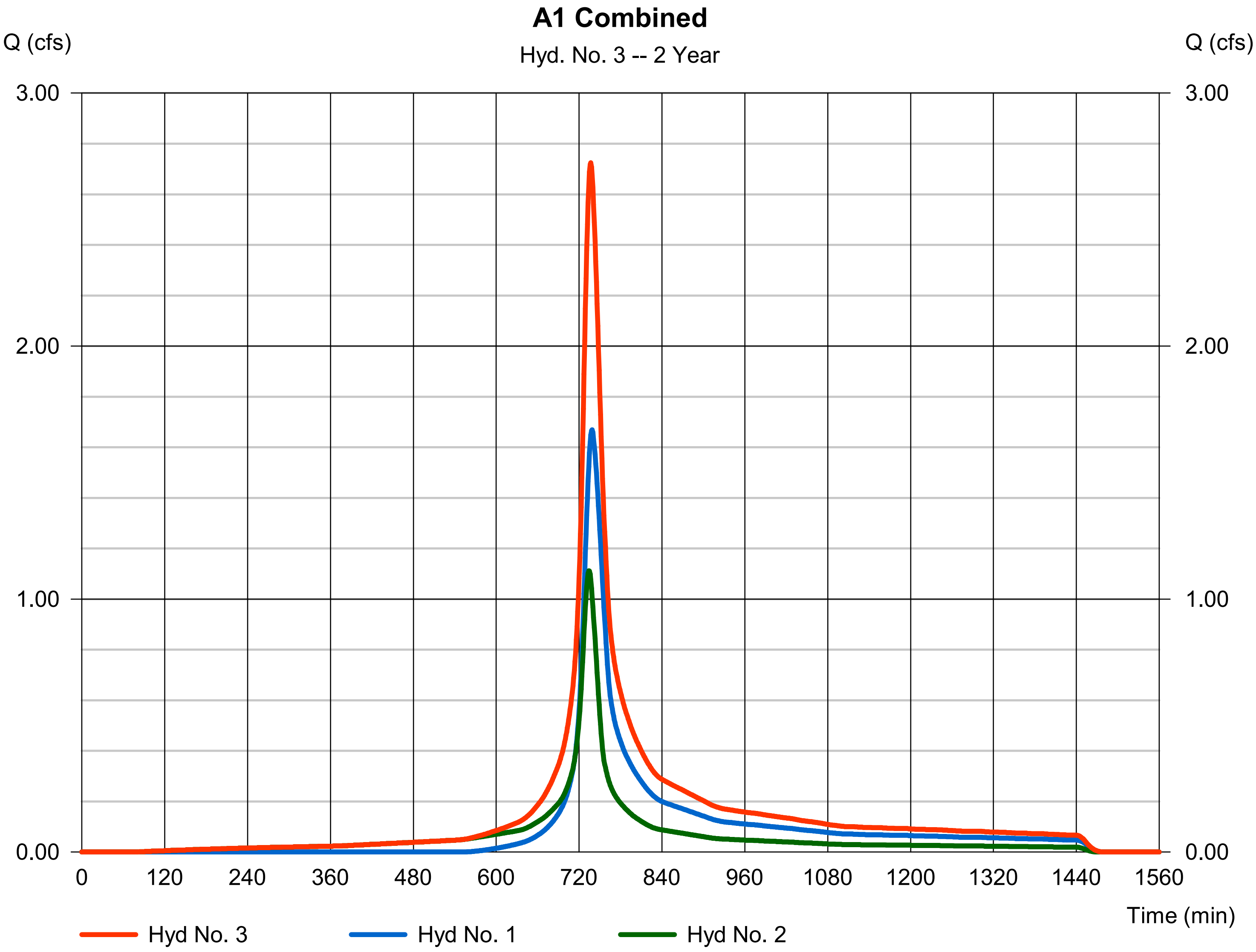


Hydrograph Report

Hyd. No. 3

A1 Combined

Hydrograph type	= Combine	Peak discharge	= 2.725 cfs
Storm frequency	= 2 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 14,341 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.150 ac



Hydrograph Report

Hyd. No. 5

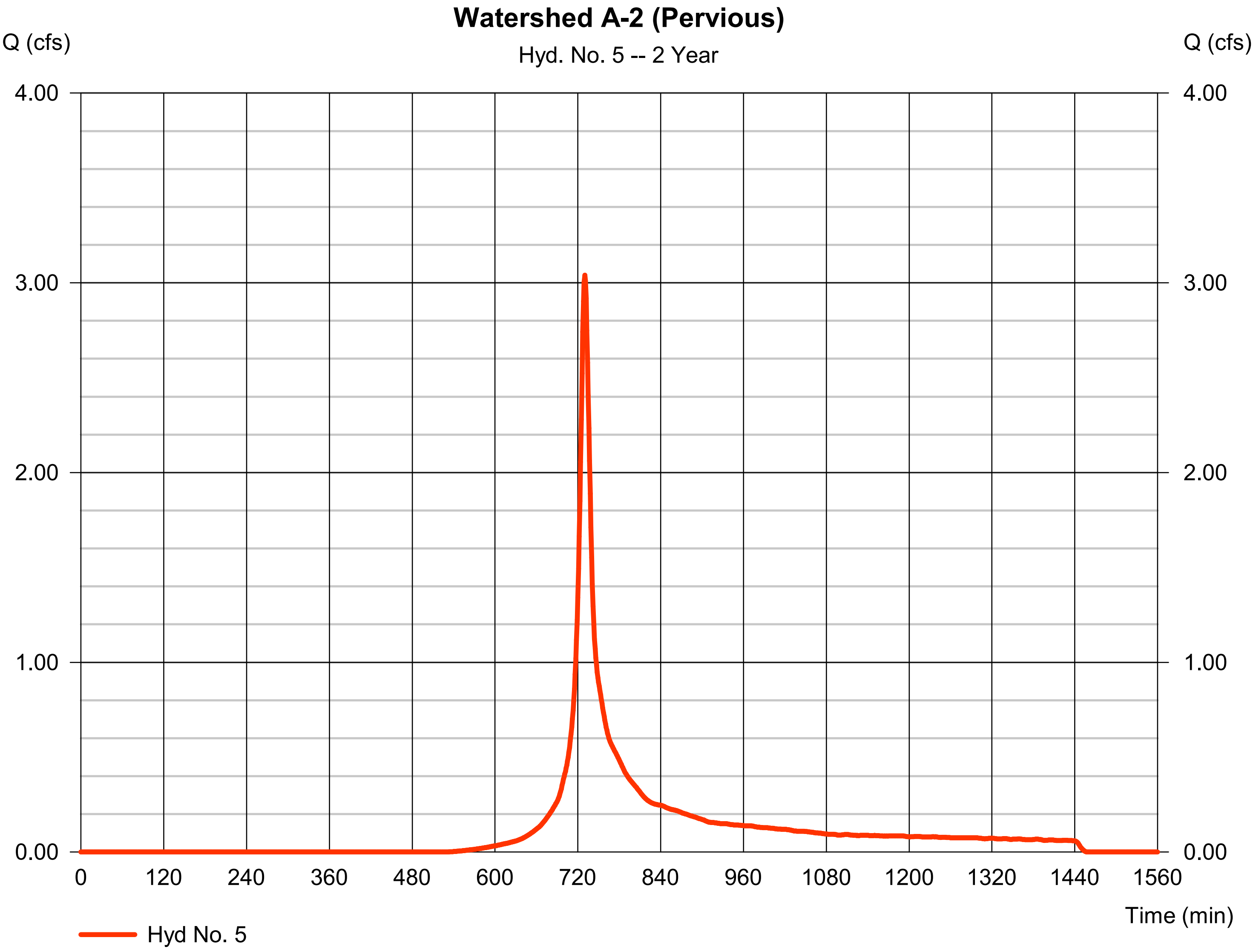
Watershed A-2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 2.020 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 3.040 cfs
Time to peak = 730 min
Hyd. volume = 11,273 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 11.00 min
Distribution = Custom
Shape factor = 484

---

* Composite (Area/CN) = [(1.850 x 80) + (0.170 x 77)] / 2.020

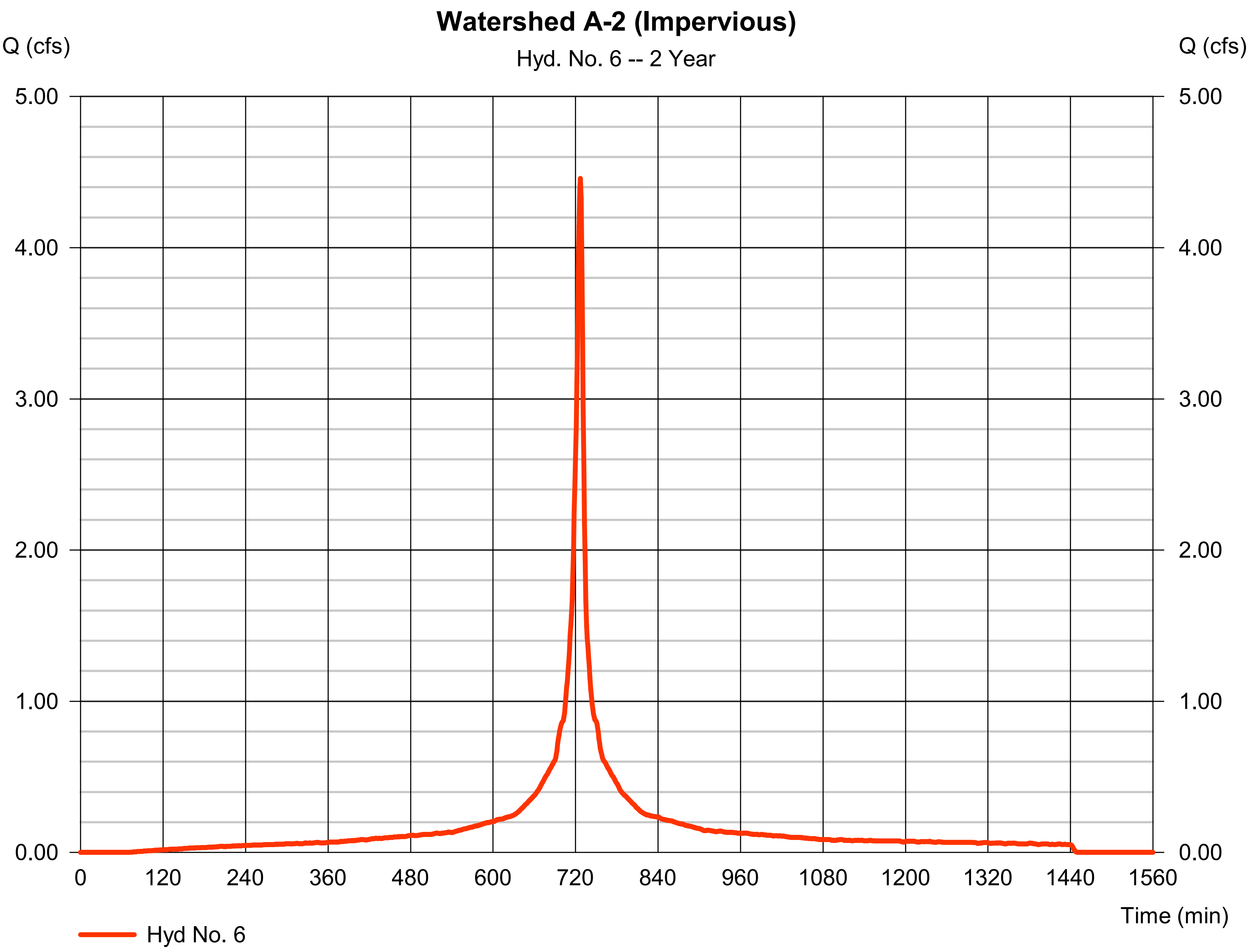


Hydrograph Report

Hyd. No. 6

Watershed A-2 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.458 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 15,934 cuft
Drainage area	= 1.370 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor	Shape factor	= 484

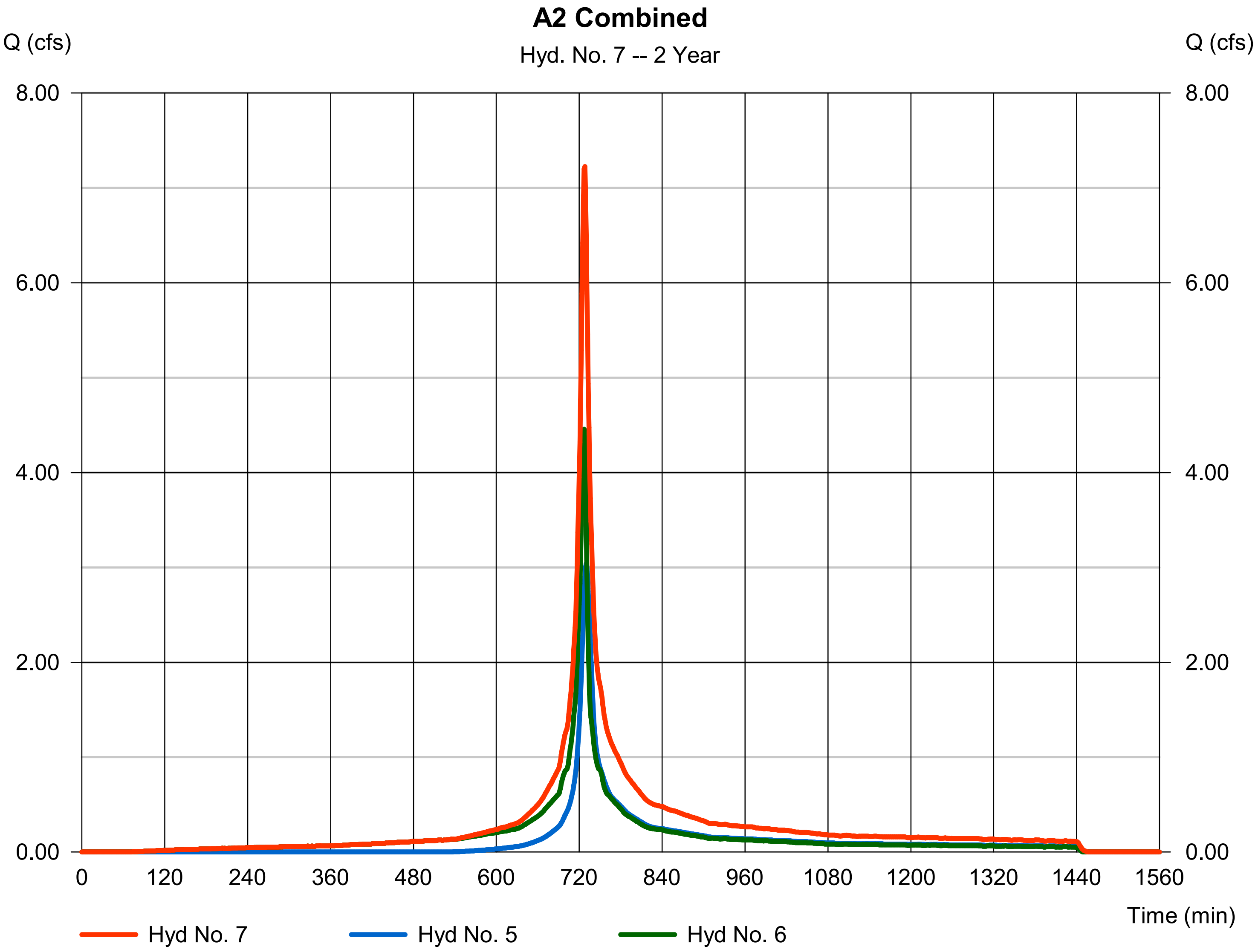


Hydrograph Report

Hyd. No. 7

A2 Combined

Hydrograph type	= Combine	Peak discharge	= 7.224 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 27,207 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 3.390 ac



Hydrograph Report

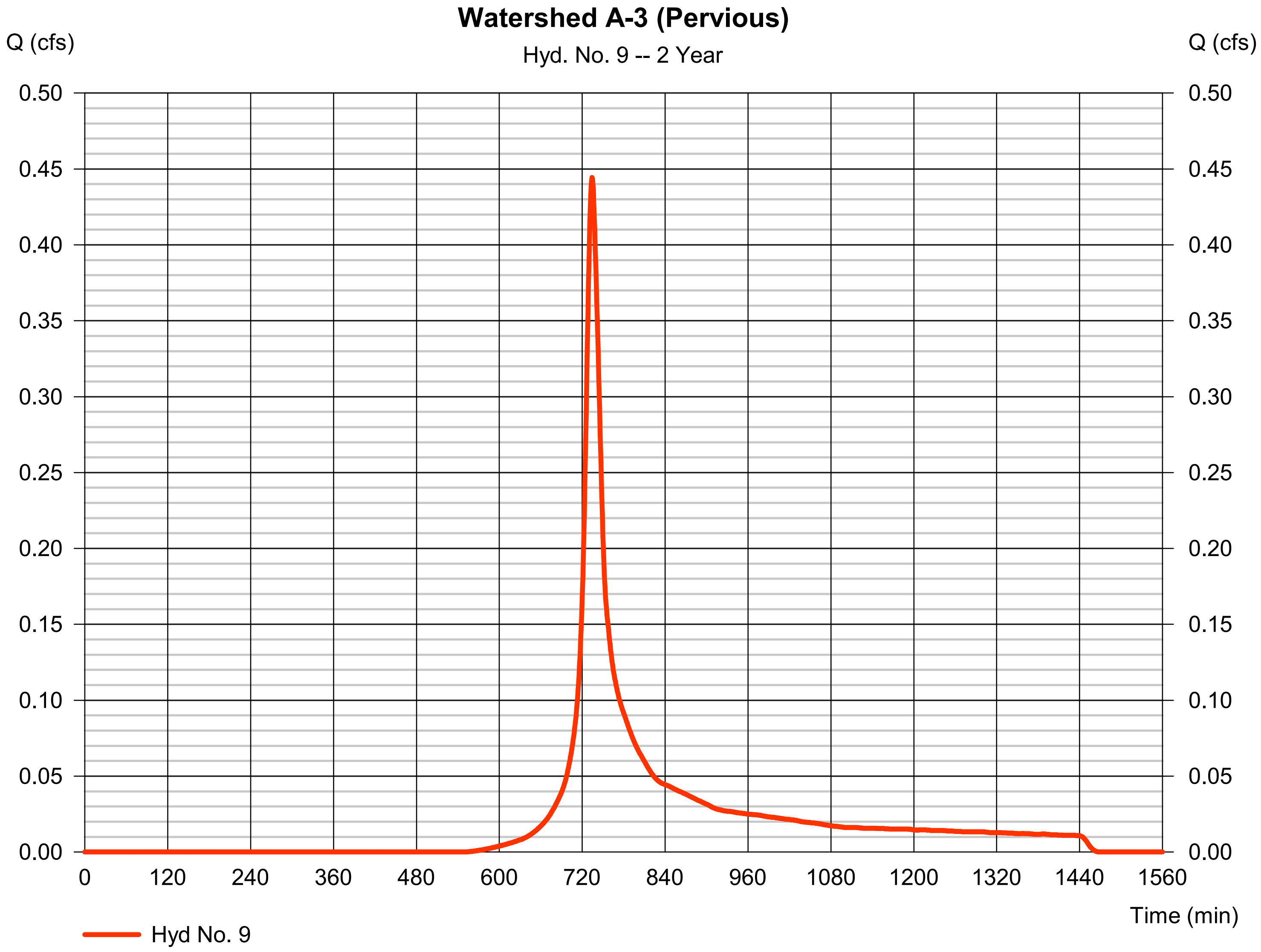
Hyd. No. 9

Watershed A-3 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.380 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.444 cfs
Time to peak = 734 min
Hyd. volume = 1,967 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.300 x 80) + (0.080 x 77)] / 0.380



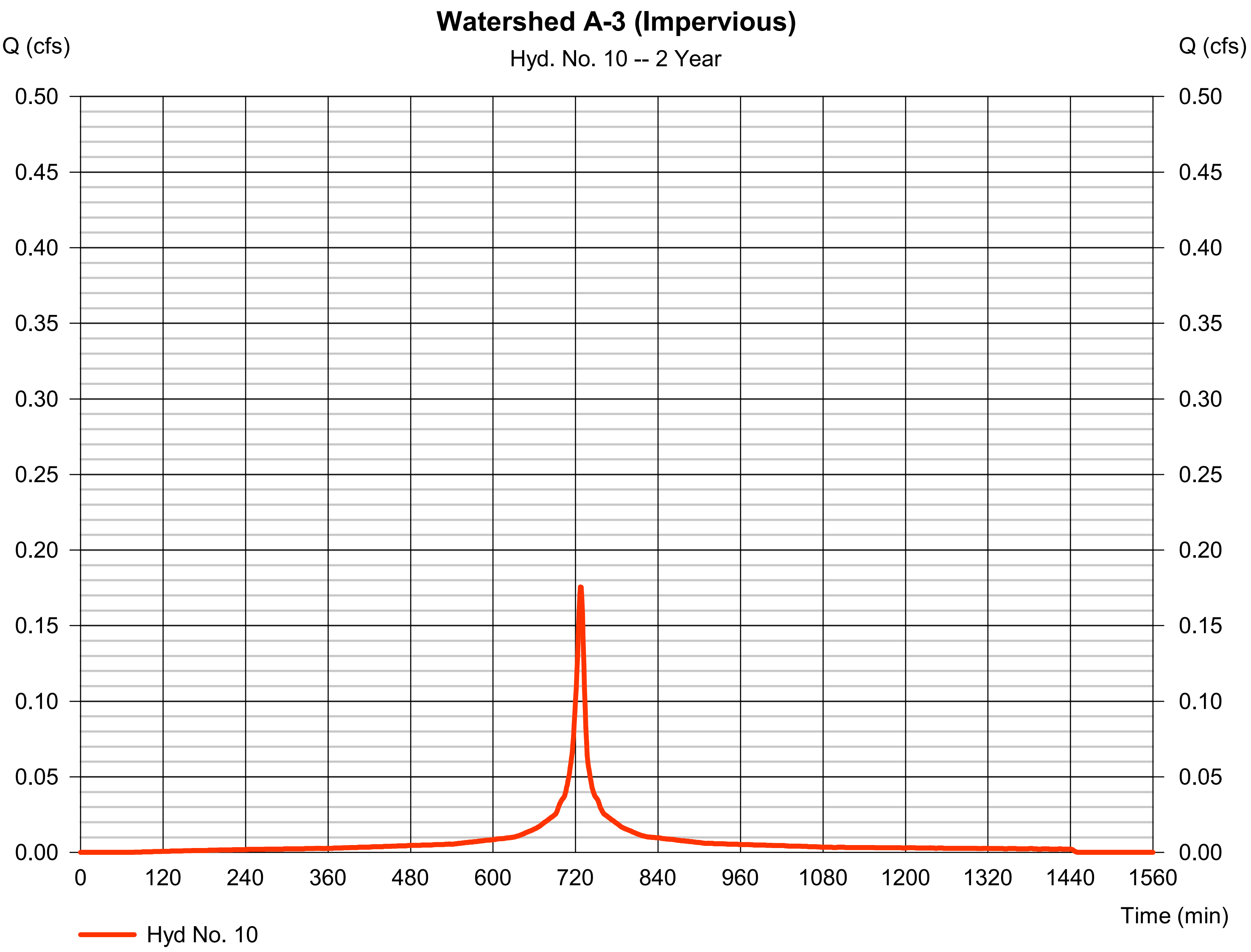
Hydrograph Report

Hyd. No. 10

Watershed A-3 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.060 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.176 cfs
Time to peak = 727 min
Hyd. volume = 660 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



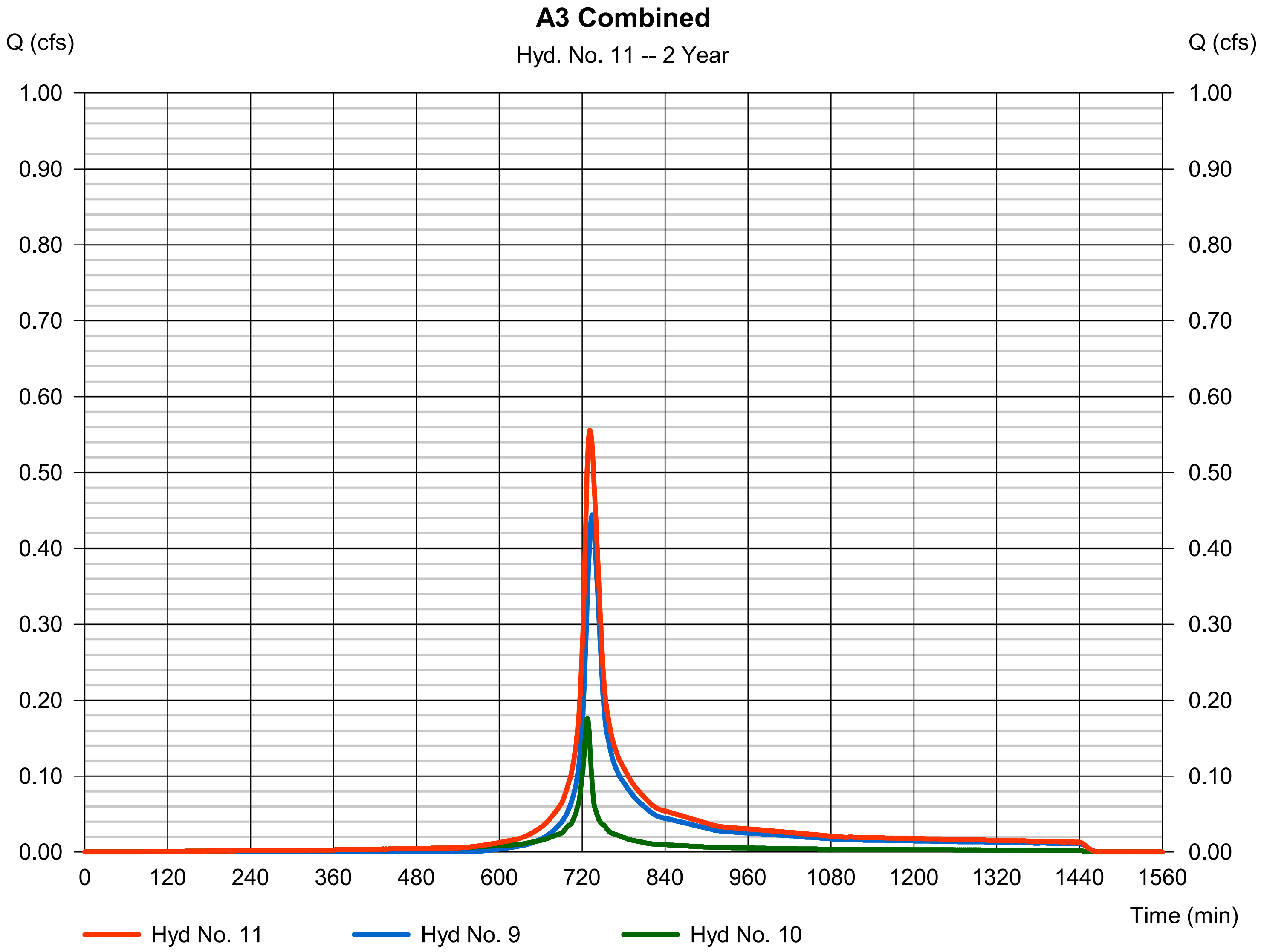
Hydrograph Report

Hyd. No. 11

A3 Combined

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 9, 10

Peak discharge = 0.556 cfs
Time to peak = 731 min
Hyd. volume = 2,627 cuft
Contrib. drain. area = 0.440 ac



Hydrograph Report

Hyd. No. 13

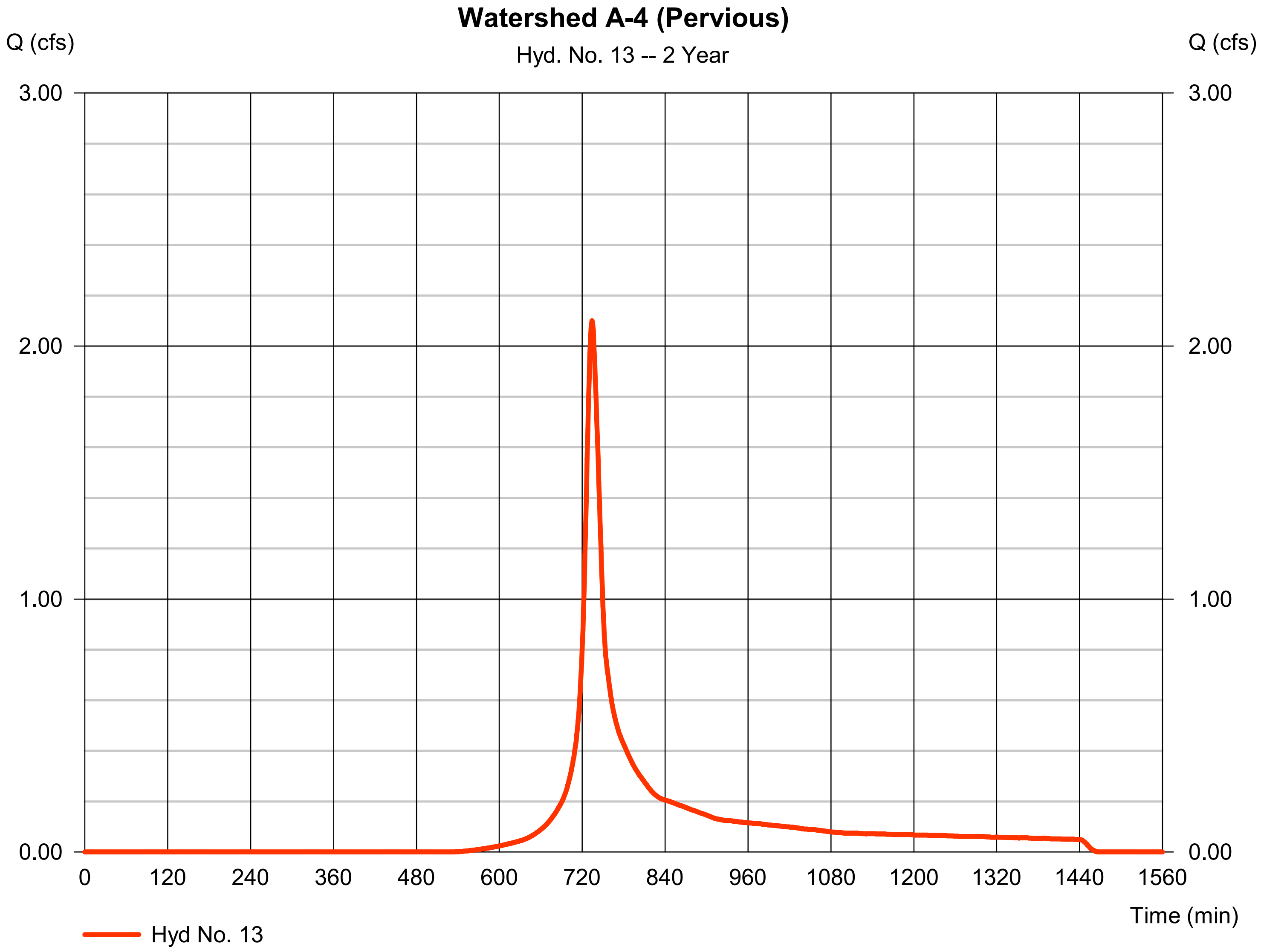
Watershed A-4 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.710 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 2.101 cfs
Time to peak = 734 min
Hyd. volume = 9,269 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 17.00 min
Distribution = Custom
Shape factor = 484

---

* Composite (Area/CN) = [(1.470 x 80) + (0.240 x 77)] / 1.710



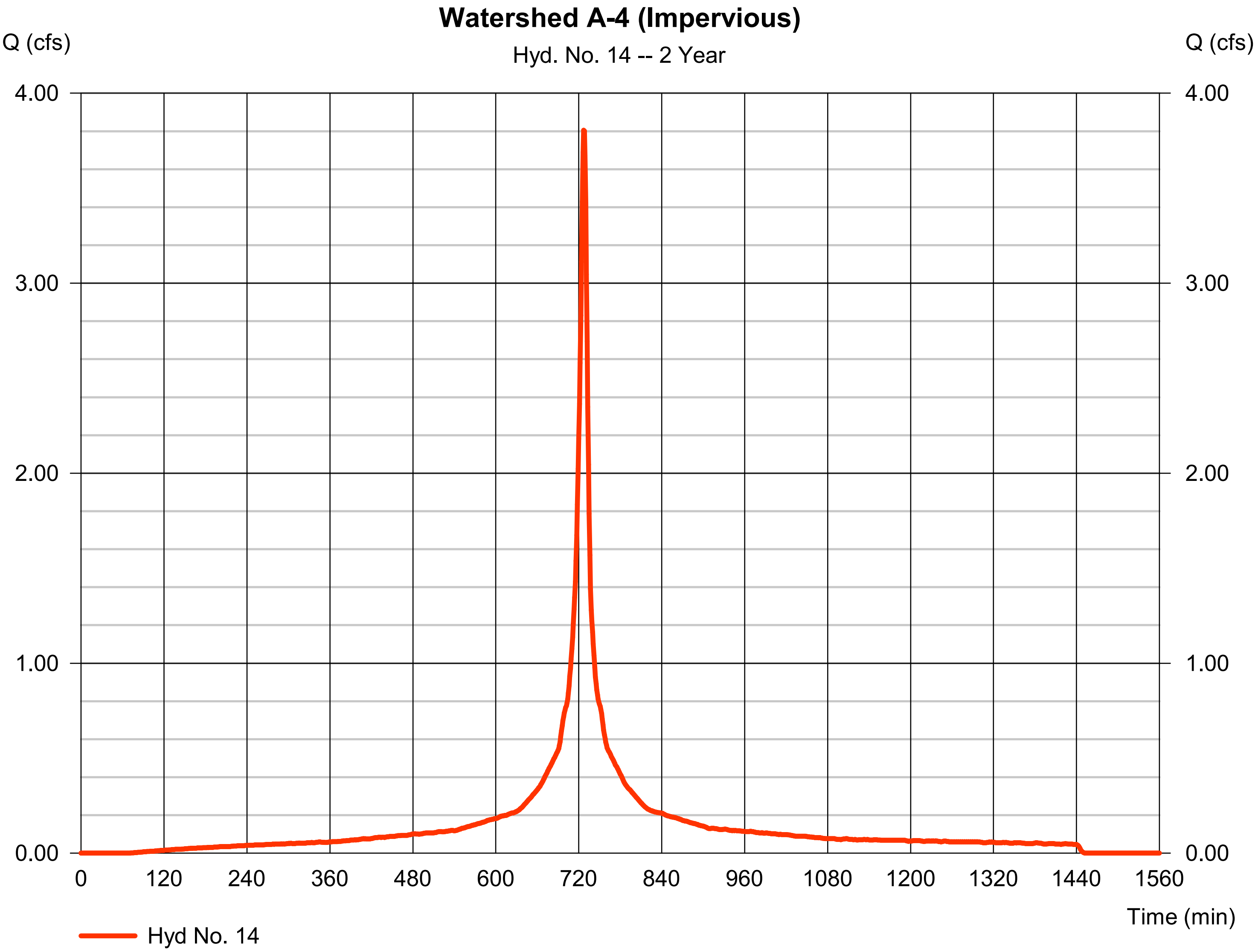
Hydrograph Report

Hyd. No. 14

Watershed A-4 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.300 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 3.806 cfs
Time to peak = 727 min
Hyd. volume = 14,295 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 7.00 min
Distribution = Custom
Shape factor = 484



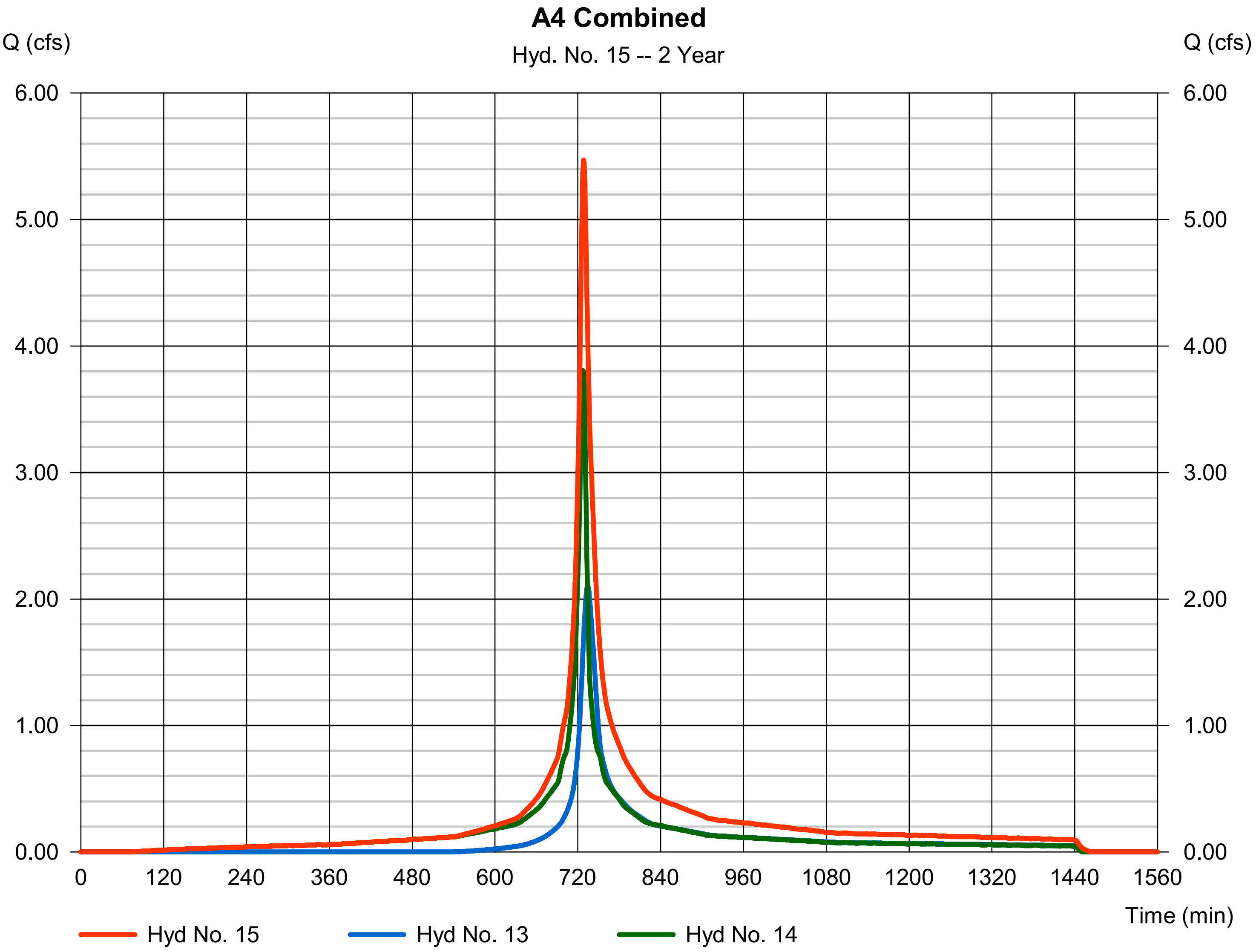
Hydrograph Report

Hyd. No. 15

A4 Combined

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 13, 14

Peak discharge = 5.471 cfs
Time to peak = 728 min
Hyd. volume = 23,564 cuft
Contrib. drain. area = 3.010 ac



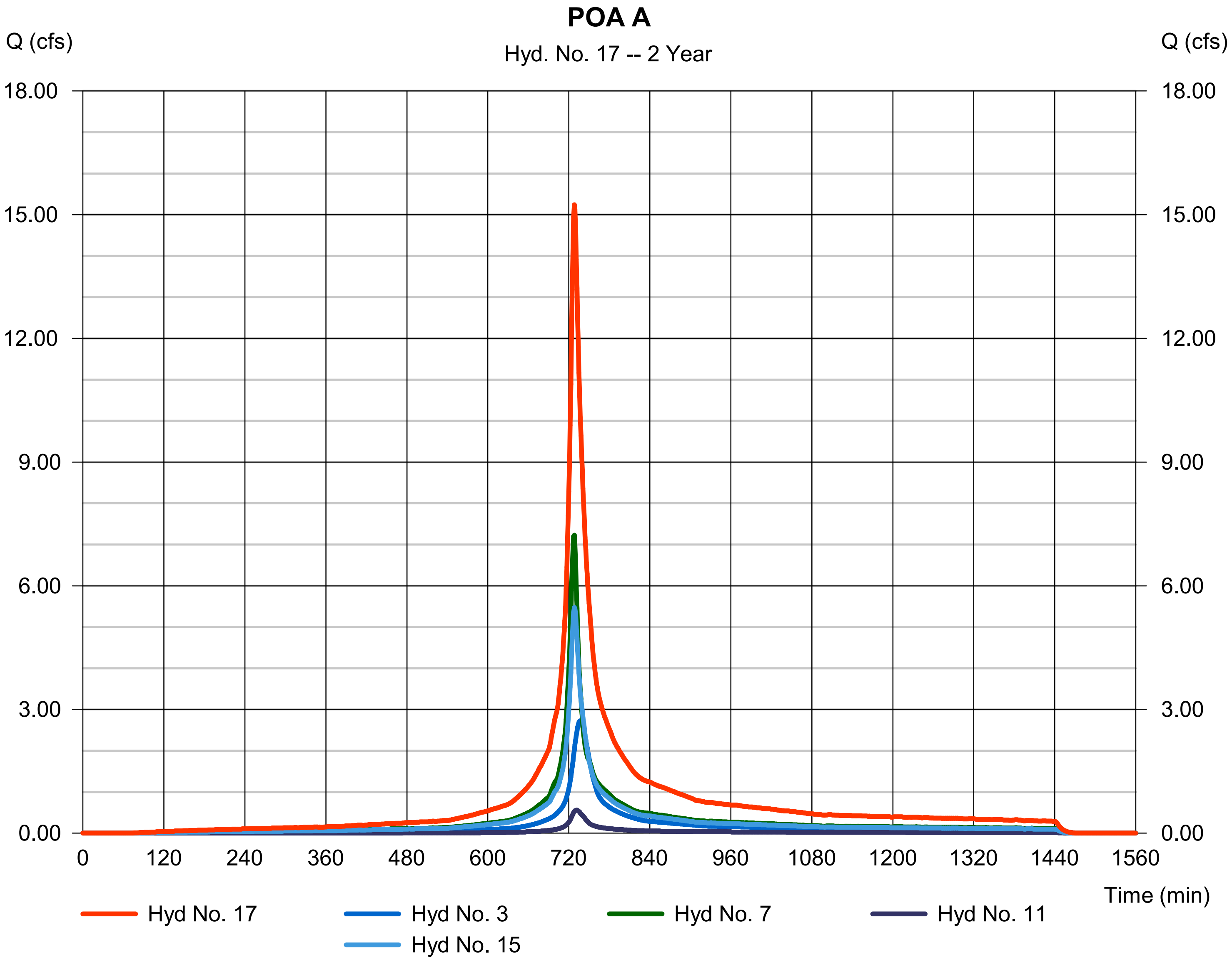
Hydrograph Report

Hyd. No. 17

POA A

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 3, 7, 11, 15

Peak discharge = 15.24 cfs
Time to peak = 728 min
Hyd. volume = 67,740 cuft
Contrib. drain. area = 0.000 ac



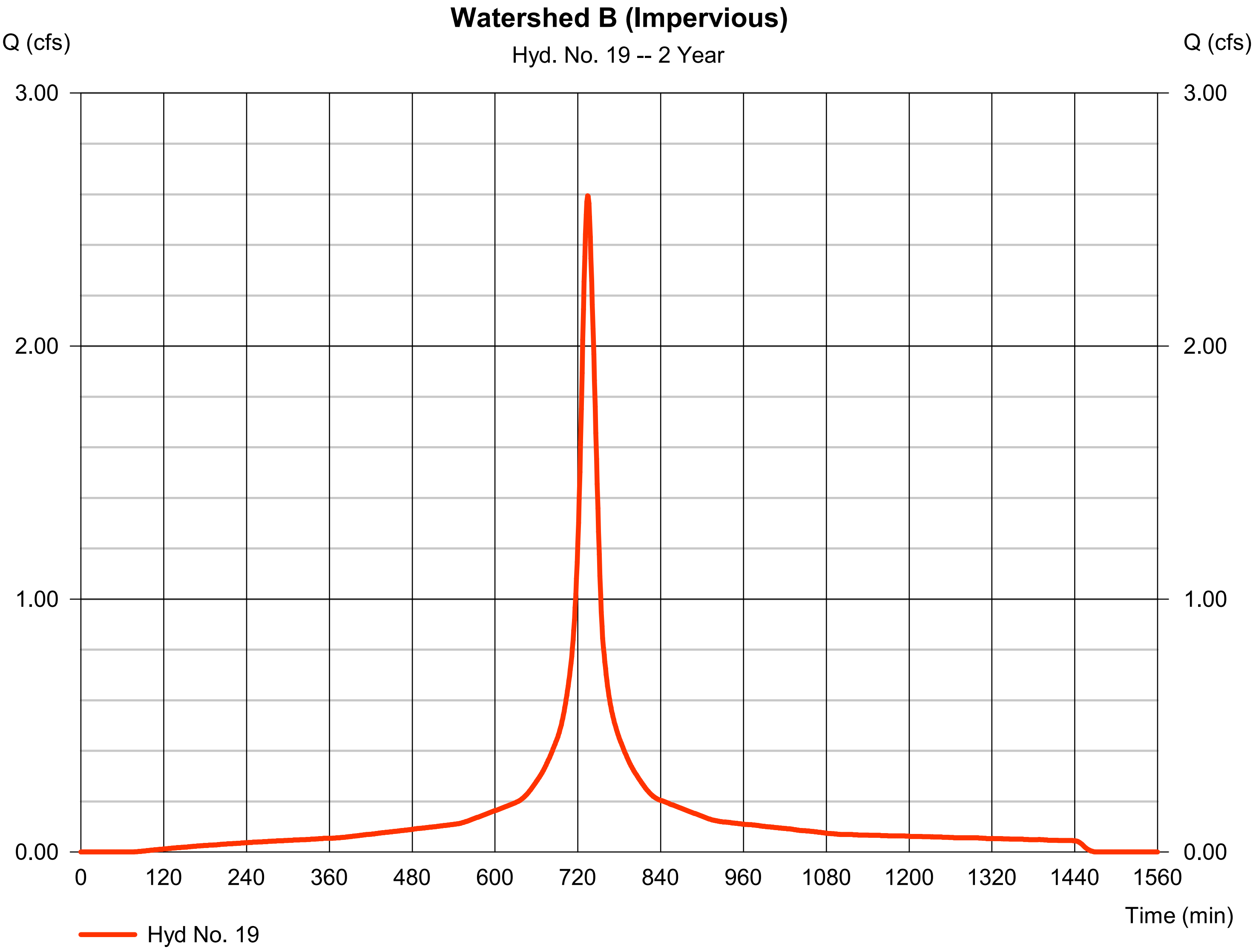
Hydrograph Report

Hyd. No. 19

Watershed B (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.190 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 2.594 cfs
Time to peak = 734 min
Hyd. volume = 13,421 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Custom
Shape factor = 484

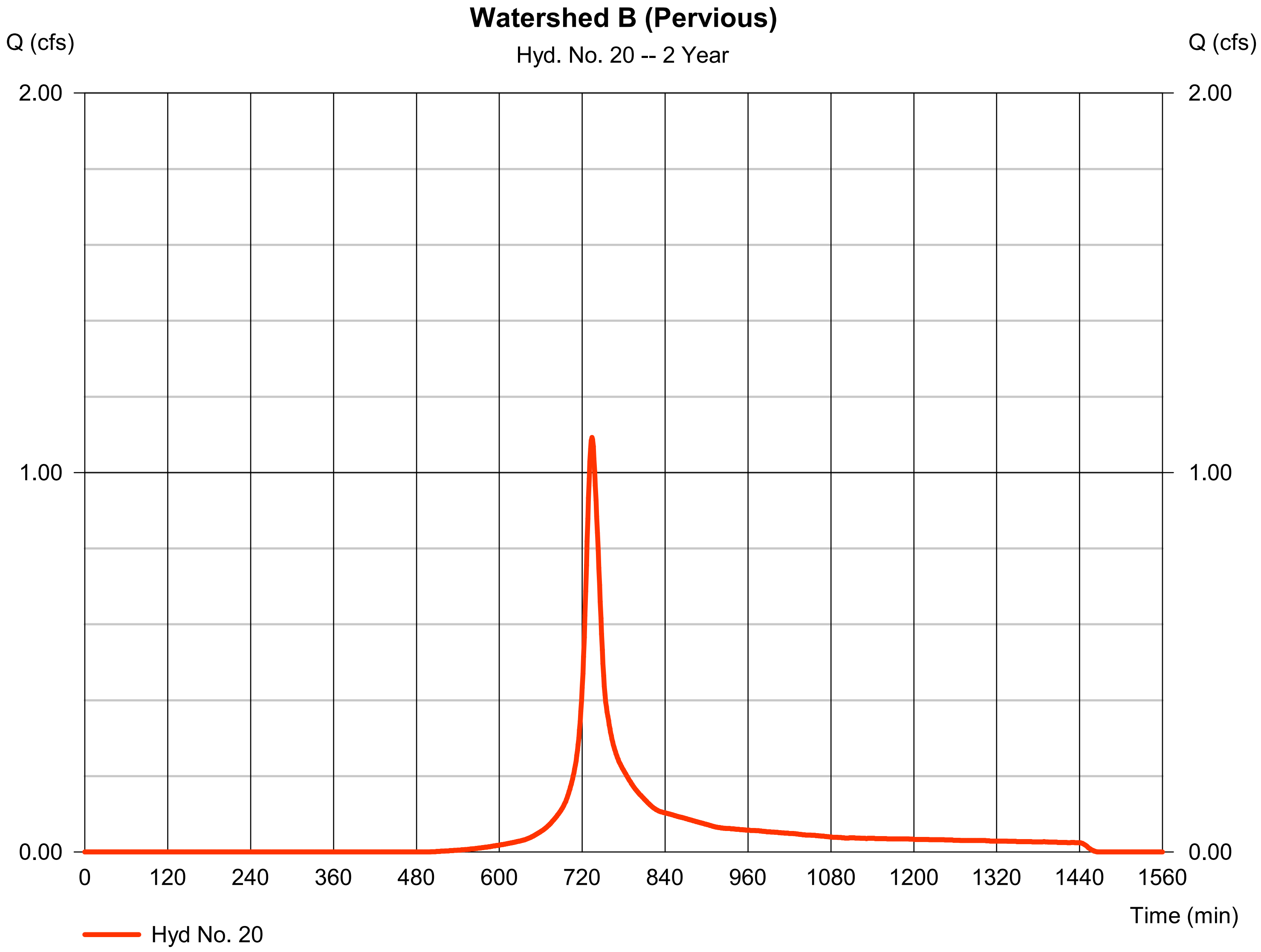


Hydrograph Report

Hyd. No. 20

Watershed B (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.093 cfs
Storm frequency	= 2 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 4,800 cuft
Drainage area	= 0.810 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	= 484



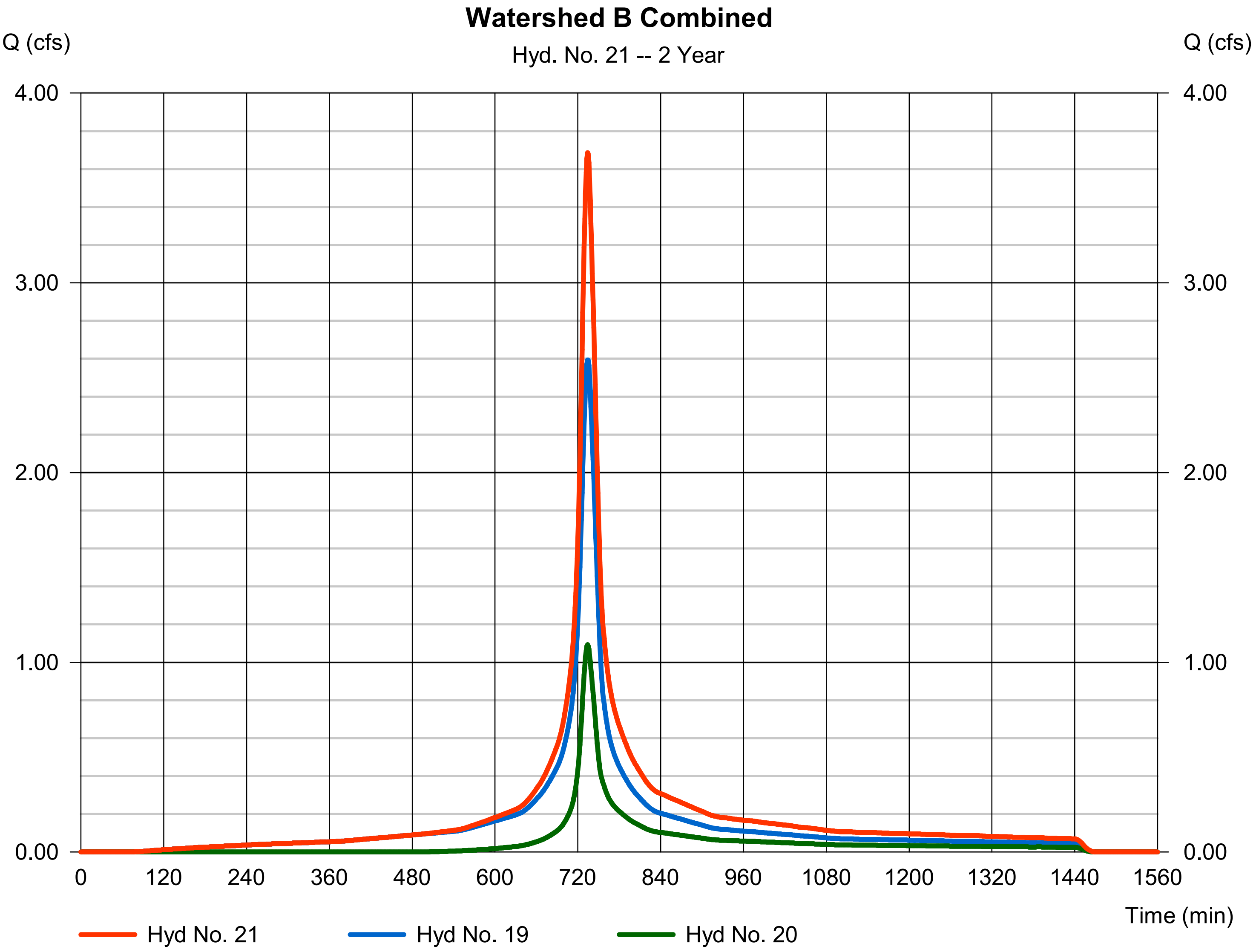
Hydrograph Report

Hyd. No. 21

Watershed B Combined

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 19, 20

Peak discharge = 3.686 cfs
Time to peak = 734 min
Hyd. volume = 18,222 cuft
Contrib. drain. area = 2.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.426	1	738	17,450	------	------	------	Watershed A-1 (Pervious)
2	SCS Runoff	1.726	1	734	9,095	------	------	------	Watershed A-1 (Impervious)
3	Combine	5.074	1	737	26,545	1, 2	------	------	A1 Combined
5	SCS Runoff	6.081	1	730	22,571	------	------	------	Watershed A-2 (Pervious)
6	SCS Runoff	6.918	1	727	25,196	------	------	------	Watershed A-2 (Impervious)
7	Combine	12.58	1	728	47,767	5, 6	------	------	A2 Combined
9	SCS Runoff	0.910	1	734	3,997	------	------	------	Watershed A-3 (Pervious)
10	SCS Runoff	0.273	1	727	1,043	------	------	------	Watershed A-3 (Impervious)
11	Combine	1.082	1	732	5,041	9, 10	------	------	A3 Combined
13	SCS Runoff	4.220	1	734	18,558	------	------	------	Watershed A-4 (Pervious)
14	SCS Runoff	5.908	1	727	22,605	------	------	------	Watershed A-4 (Impervious)
15	Combine	9.358	1	729	41,163	13, 14	------	------	A4 Combined
17	Combine	26.76	1	728	120,516	3, 7, 11, 15,	------	------	POA A
19	SCS Runoff	4.028	1	734	21,222	------	------	------	Watershed B (Impervious)
20	SCS Runoff	2.116	1	734	9,342	------	------	------	Watershed B (Pervious)
21	Combine	6.144	1	734	30,564	19, 20	------	------	Watershed B Combined

Hydrograph Report

Hyd. No. 1

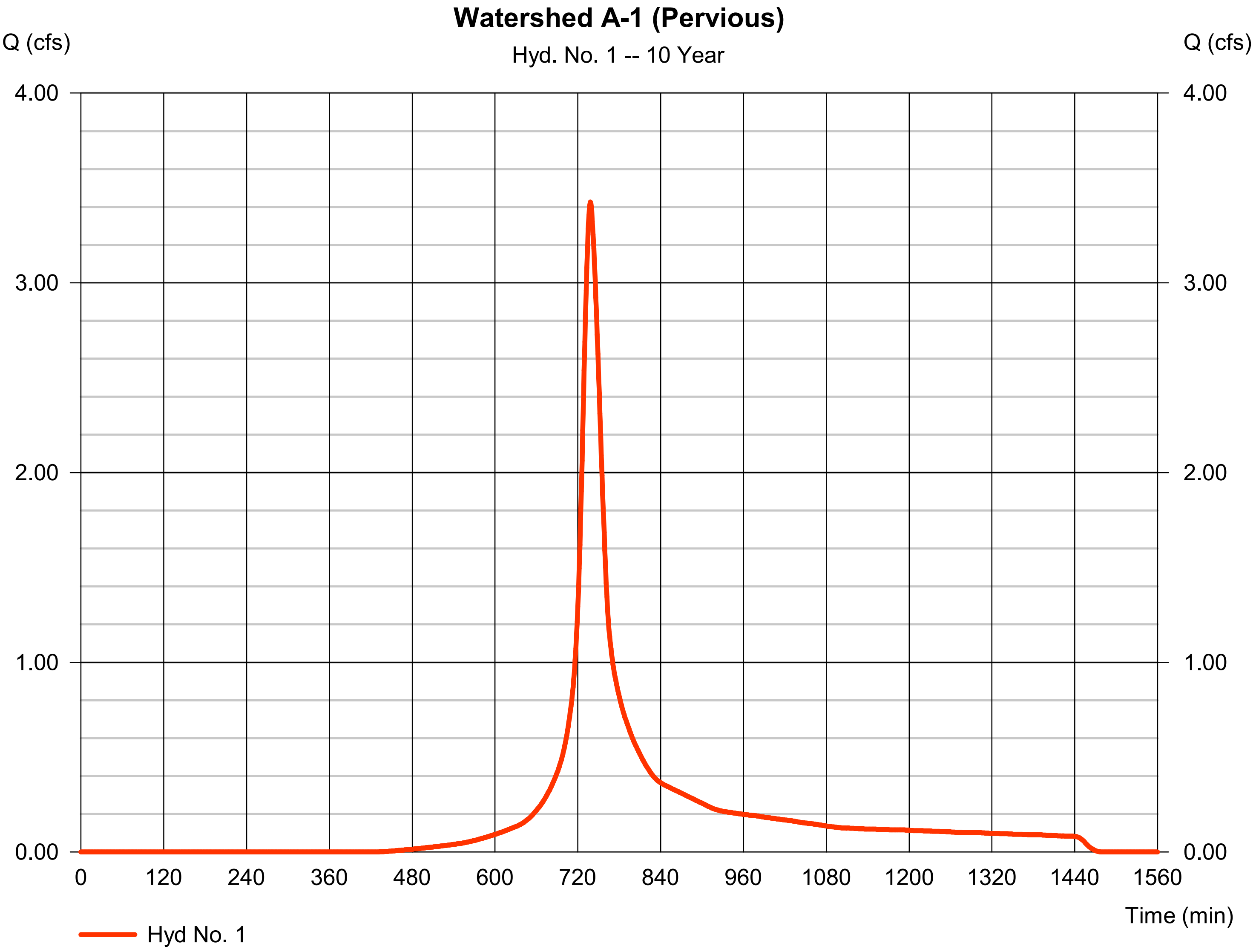
Watershed A-1 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.640 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 3.426 cfs
Time to peak = 738 min
Hyd. volume = 17,450 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 25.00 min
Distribution = Custom
Shape factor = 484

---

* Composite (Area/CN) = [(1.160 x 80) + (0.480 x 77)] / 1.640



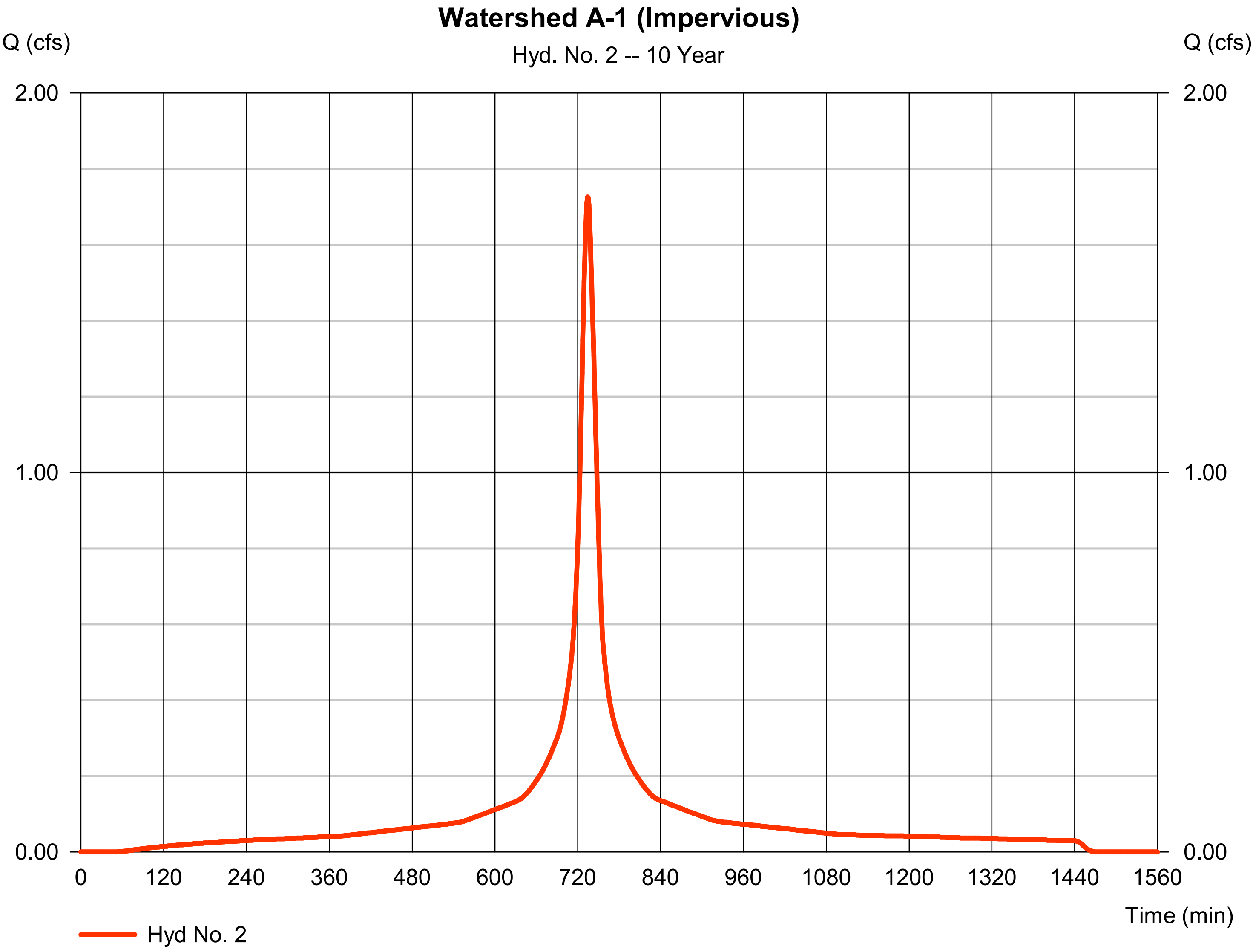
Hydrograph Report

Hyd. No. 2

Watershed A-1 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.510 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 1.726 cfs
Time to peak = 734 min
Hyd. volume = 9,095 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 20.00 min
Distribution = Custom
Shape factor = 484



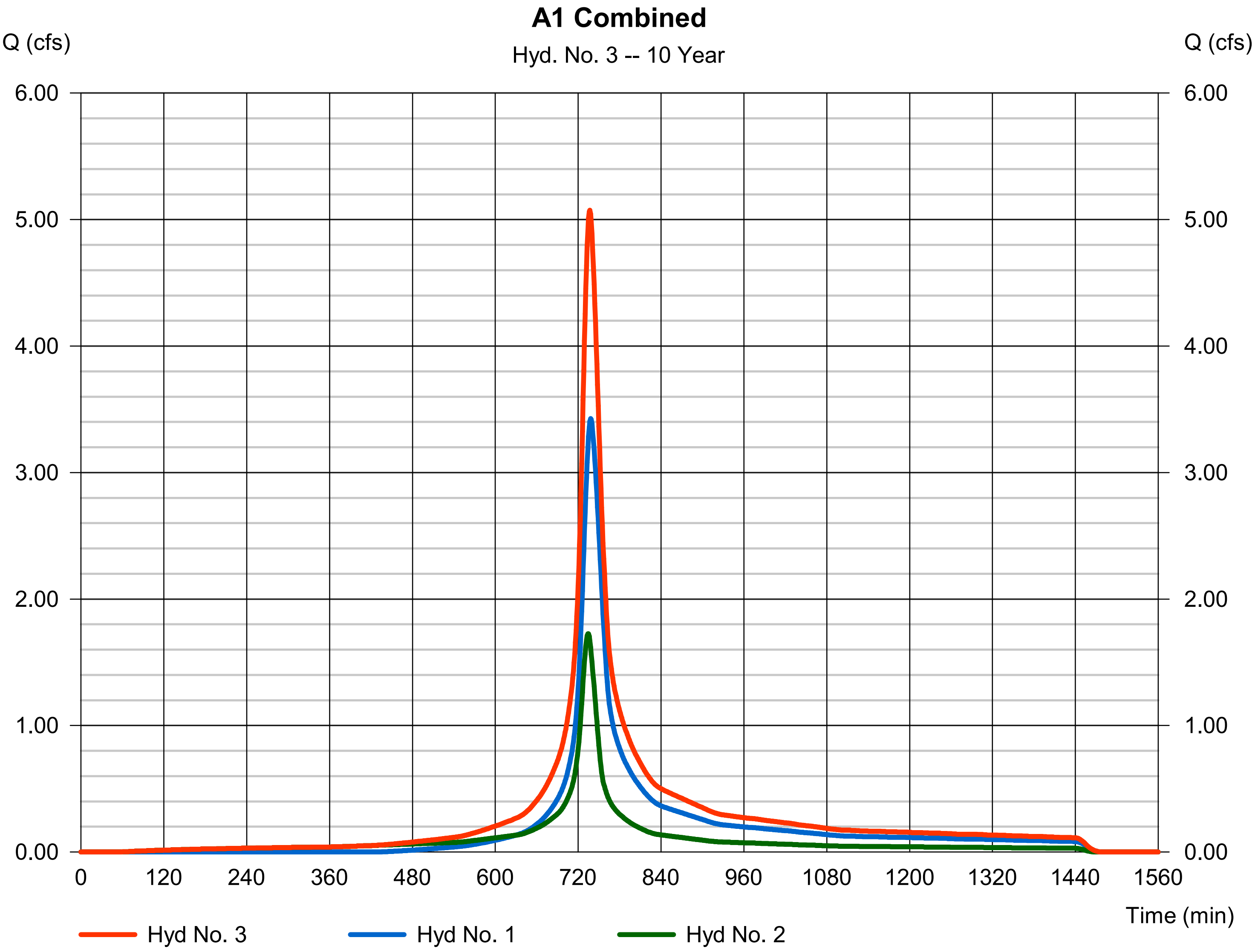
Hydrograph Report

Hyd. No. 3

A1 Combined

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 1, 2

Peak discharge = 5.074 cfs
Time to peak = 737 min
Hyd. volume = 26,545 cuft
Contrib. drain. area = 2.150 ac



Hydrograph Report

Hyd. No. 5

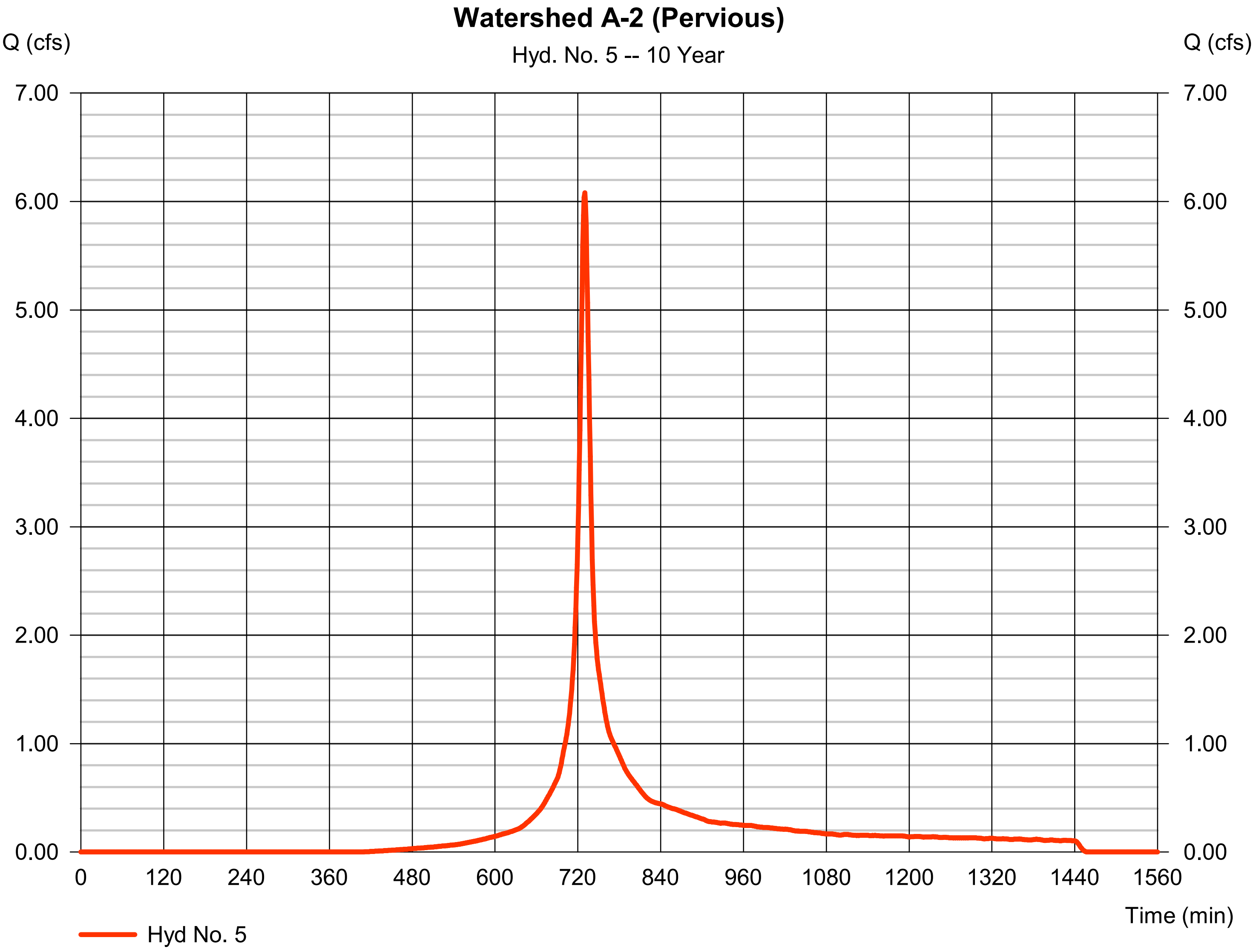
Watershed A-2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 2.020 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 6.081 cfs
Time to peak = 730 min
Hyd. volume = 22,571 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 11.00 min
Distribution = Custom
Shape factor = 484

---

* Composite (Area/CN) = [(1.850 x 80) + (0.170 x 77)] / 2.020



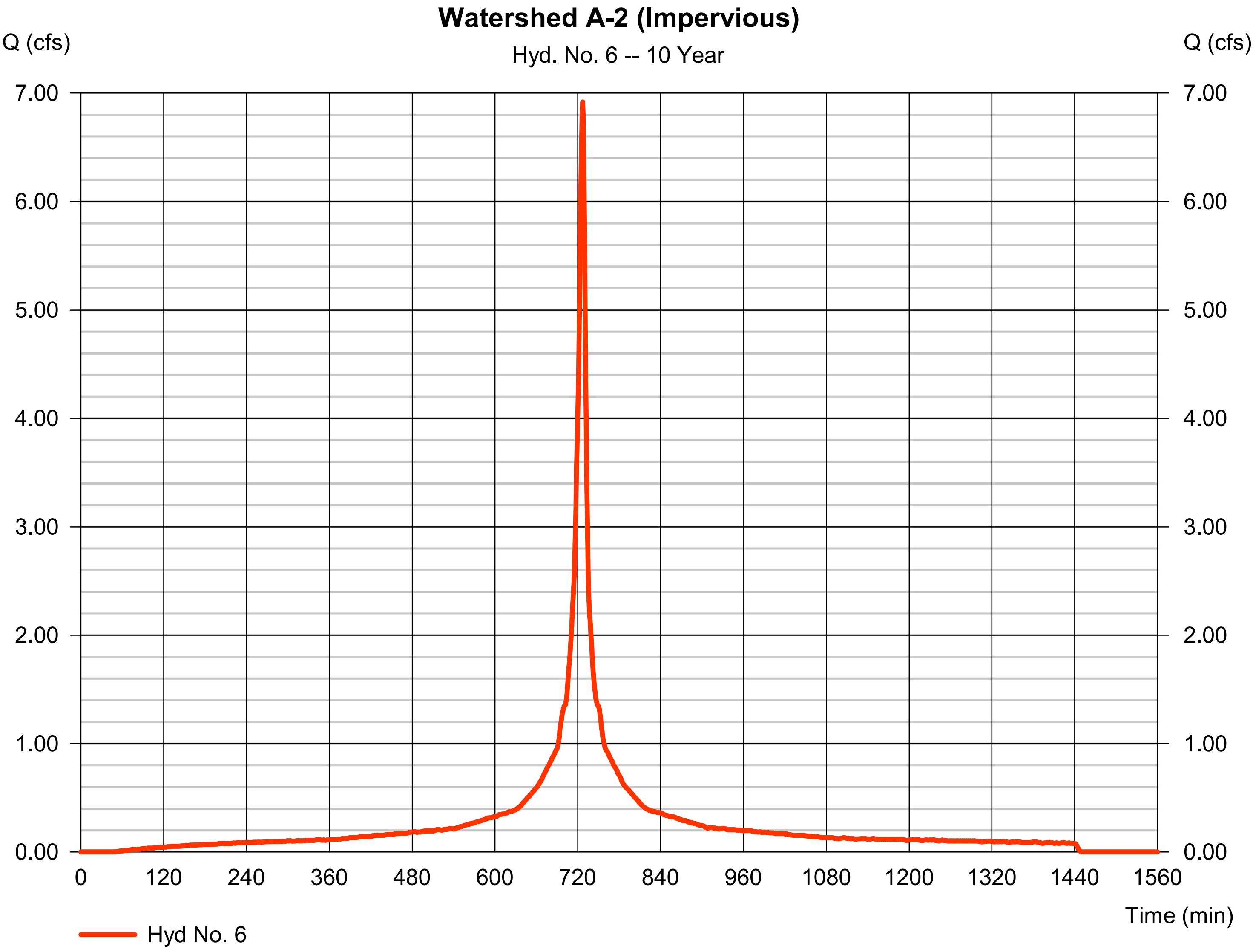
Hydrograph Report

Hyd. No. 6

Watershed A-2 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.370 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 6.918 cfs
Time to peak = 727 min
Hyd. volume = 25,196 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 6.00 min
Distribution = Custom
Shape factor = 484

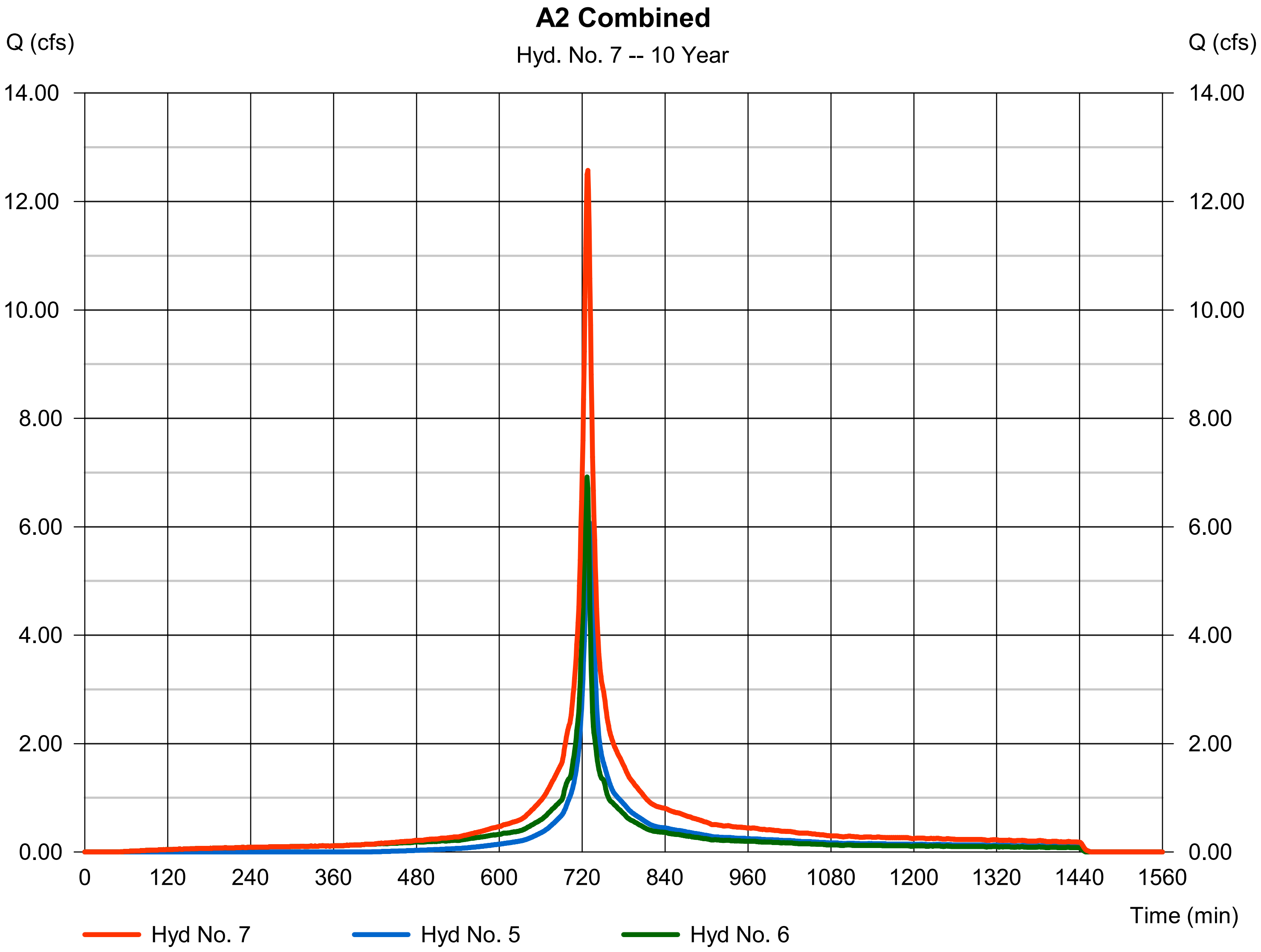


Hydrograph Report

Hyd. No. 7

A2 Combined

Hydrograph type	= Combine	Peak discharge	= 12.58 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 47,767 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 3.390 ac



Hydrograph Report

Hyd. No. 9

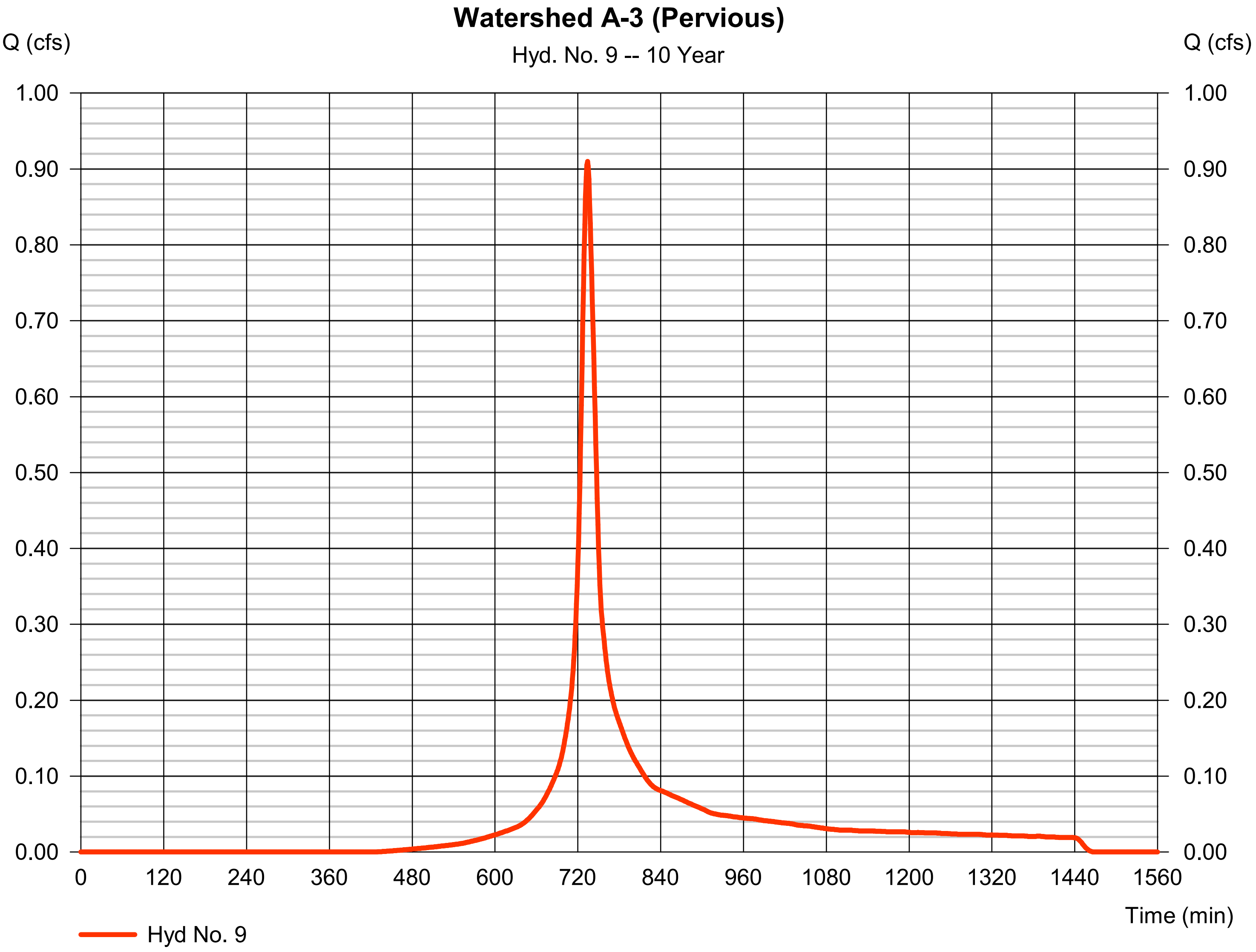
Watershed A-3 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.380 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851301\Project Data_Discipline\Site Civil\Storr

Peak discharge = 0.910 cfs
Time to peak = 734 min
Hyd. volume = 3,997 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Custom
Shape factor = 484

---

* Composite (Area/CN) = [(0.300 x 80) + (0.080 x 77)] / 0.380



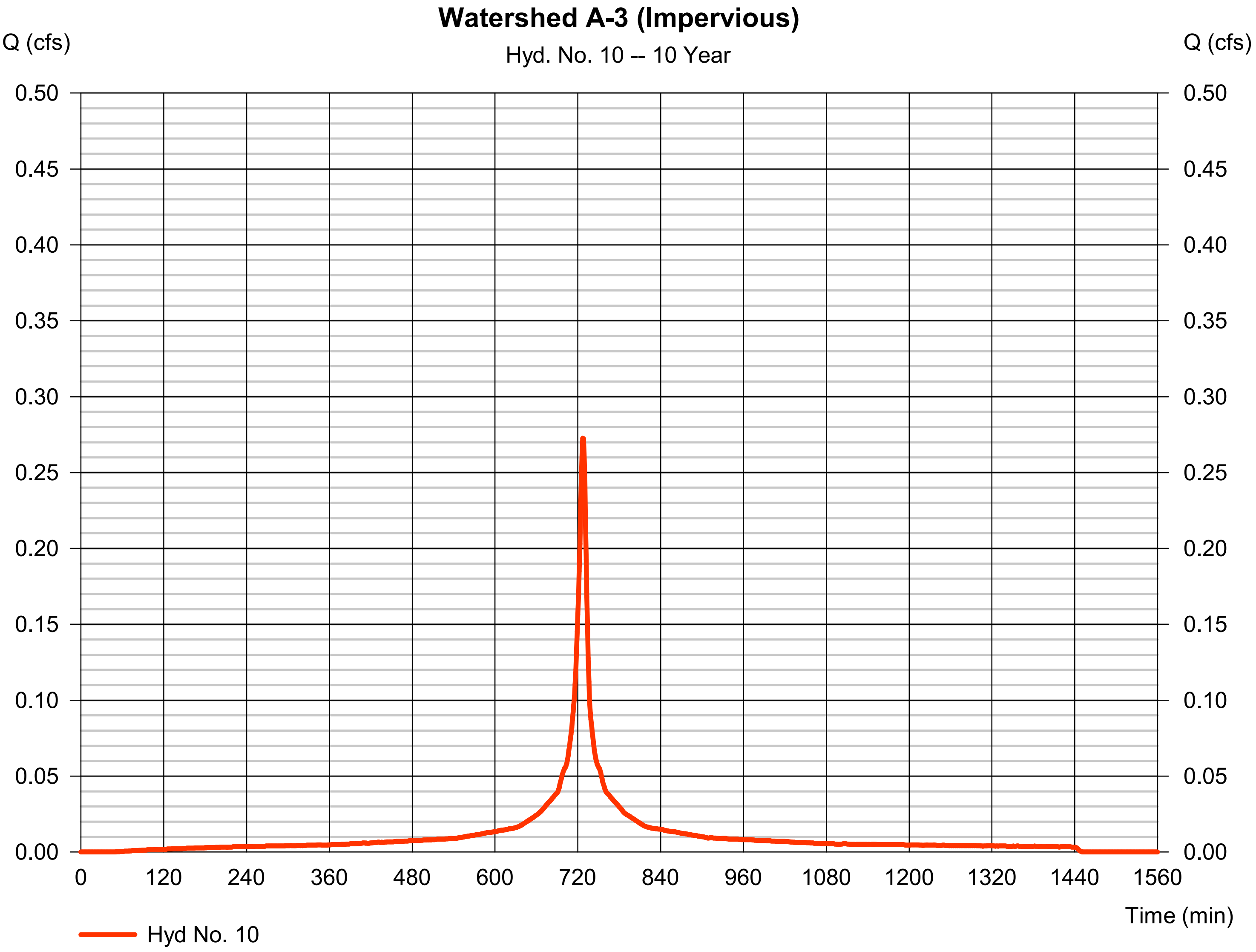
Hydrograph Report

Hyd. No. 10

Watershed A-3 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.060 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.273 cfs
Time to peak = 727 min
Hyd. volume = 1,043 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484

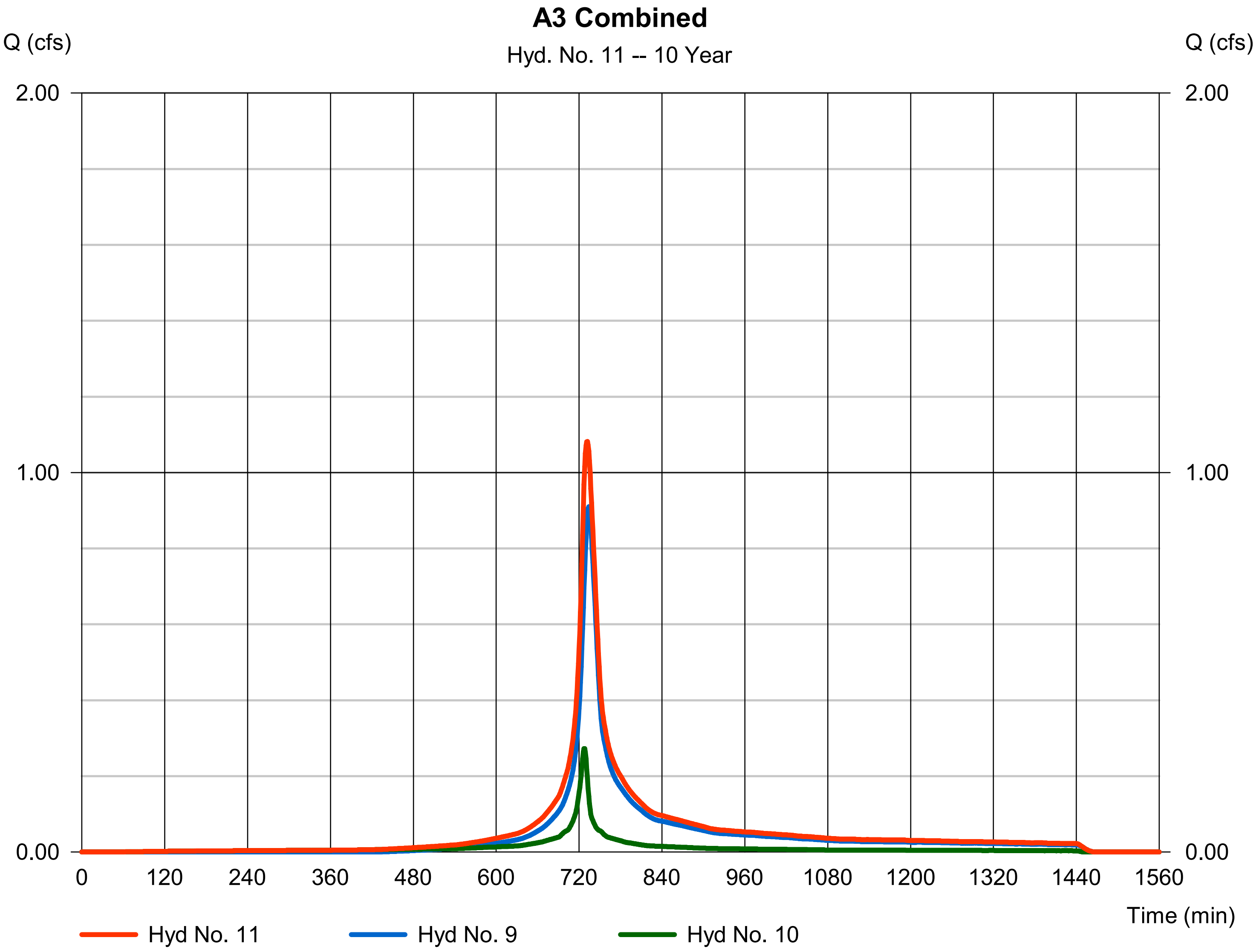


Hydrograph Report

Hyd. No. 11

A3 Combined

Hydrograph type	= Combine	Peak discharge	= 1.082 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 5,041 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 0.440 ac



Hydrograph Report

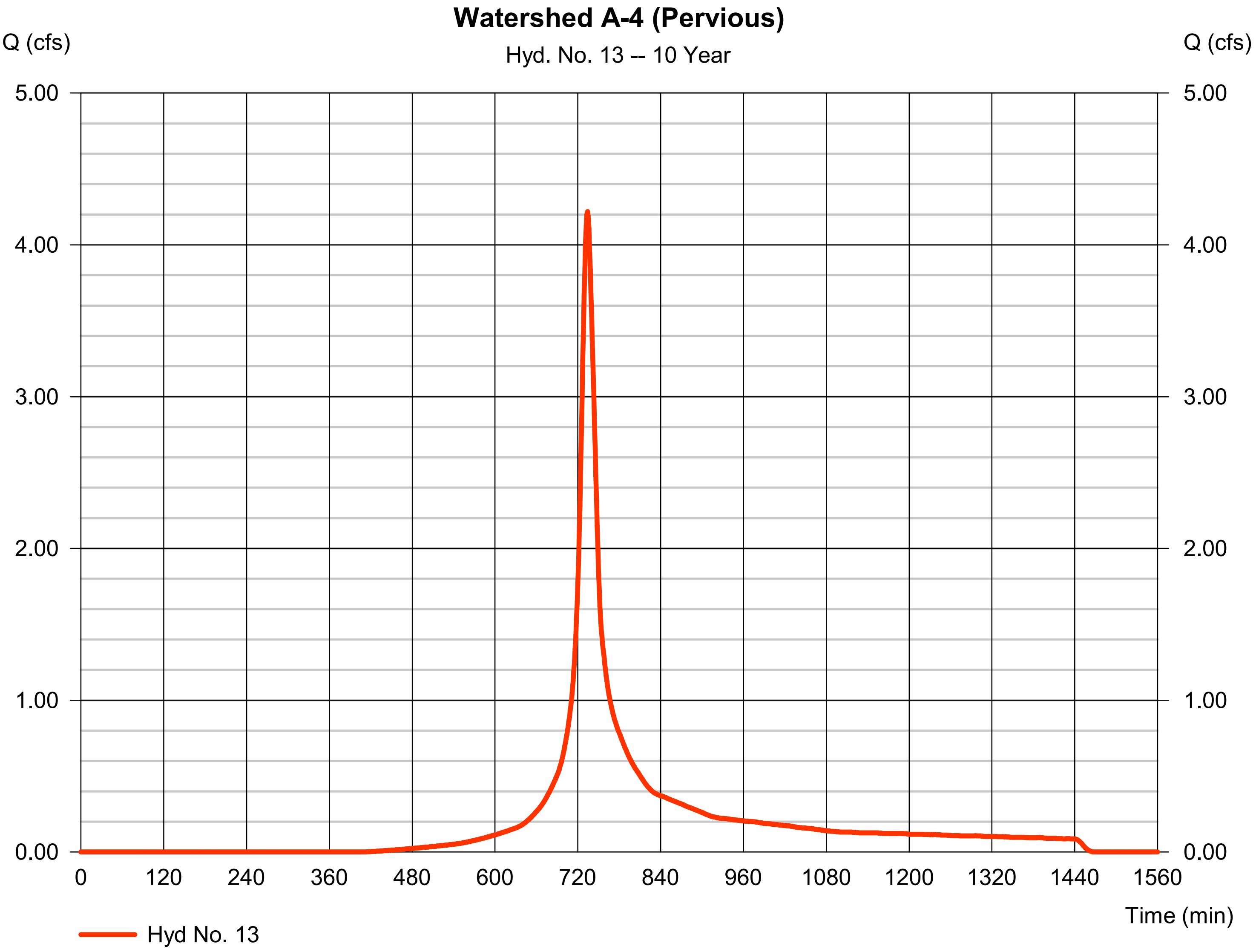
Hyd. No. 13

Watershed A-4 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.710 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 4.220 cfs
Time to peak = 734 min
Hyd. volume = 18,558 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 17.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(1.470 x 80) + (0.240 x 77)] / 1.710

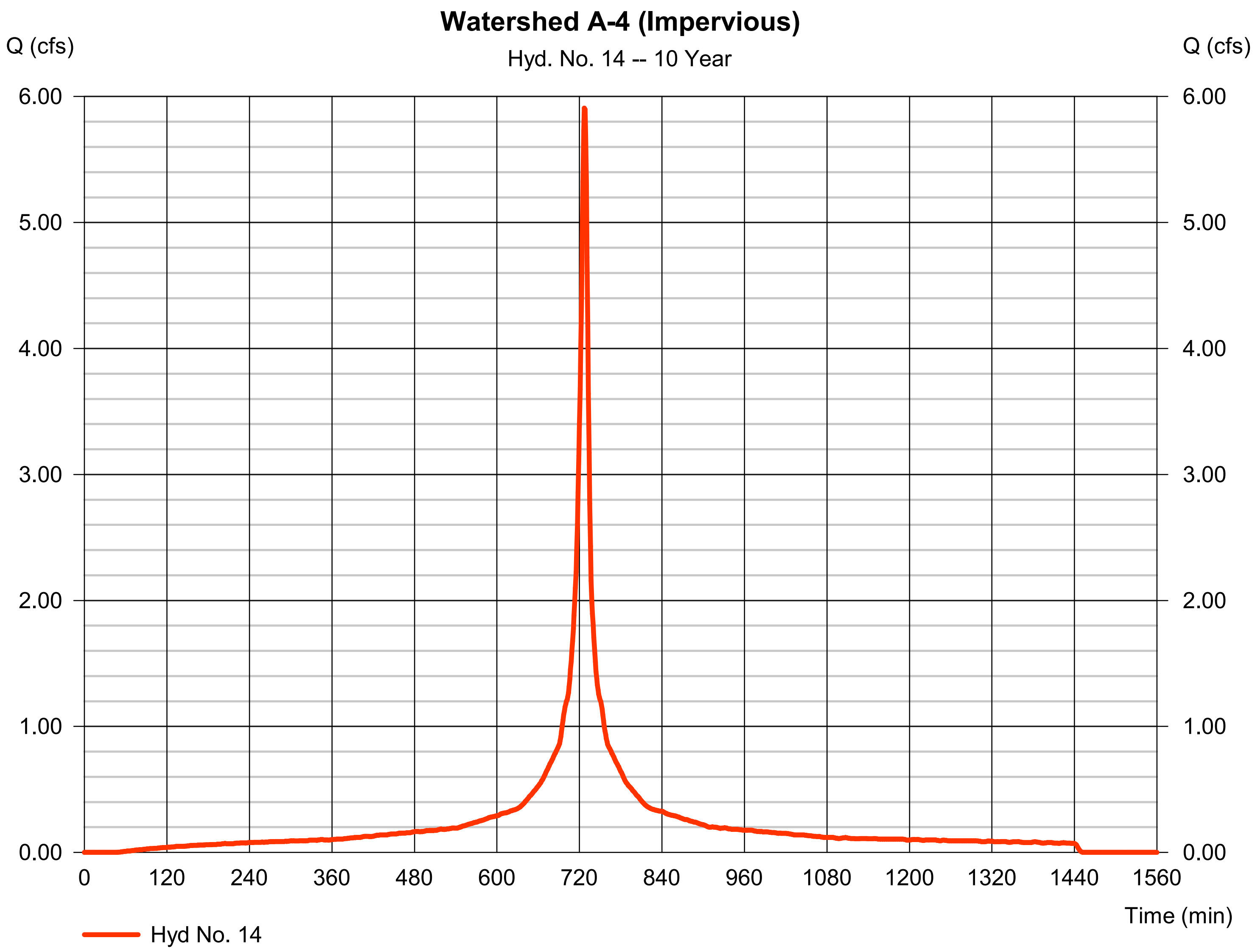


Hydrograph Report

Hyd. No. 14

Watershed A-4 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 5.908 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 22,605 cuft
Drainage area	= 1.300 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.00 min
Total precip.	= 5.15 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr	Shape factor	= 484



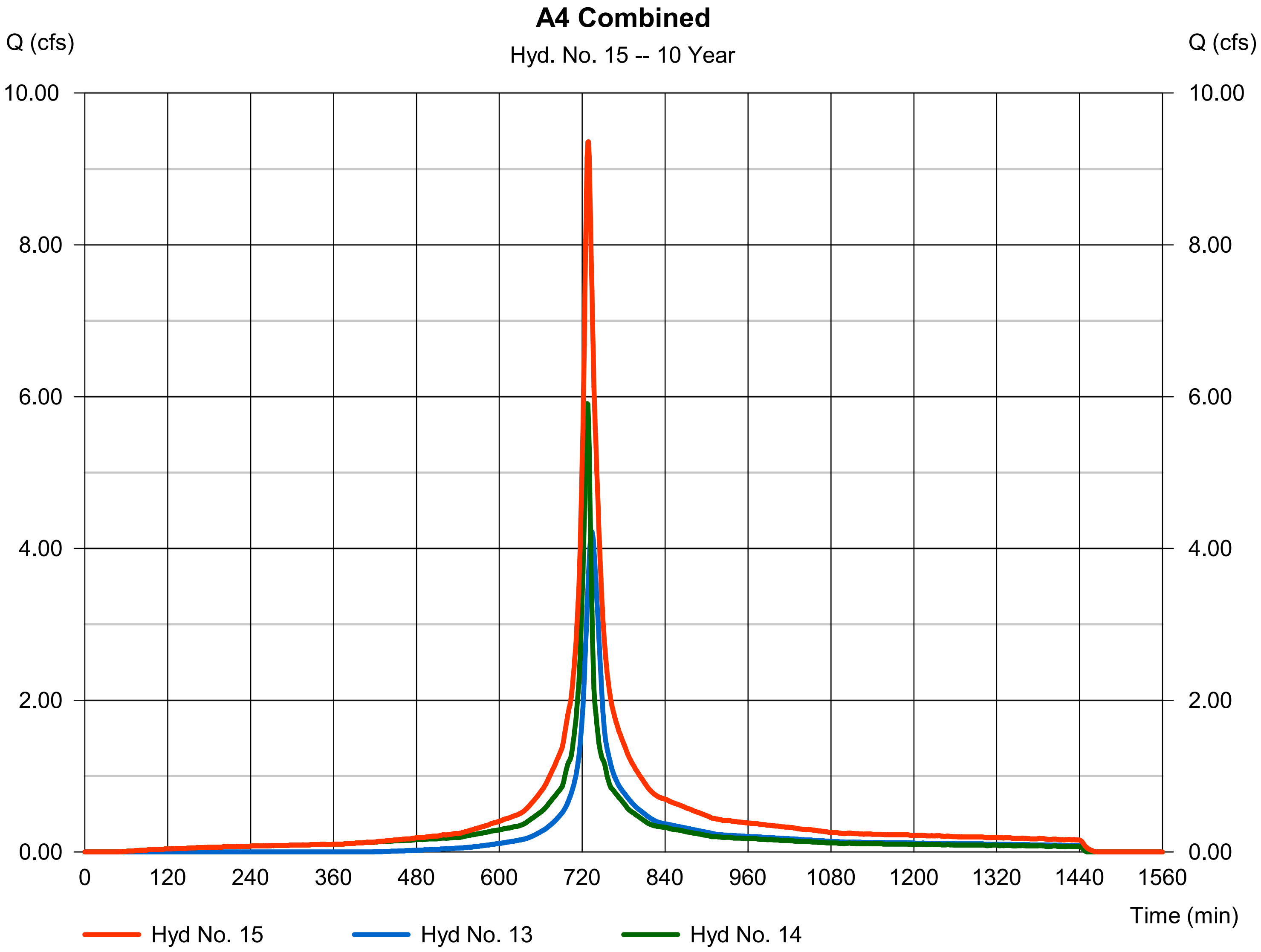
Hydrograph Report

Hyd. No. 15

A4 Combined

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 13, 14

Peak discharge = 9.358 cfs
Time to peak = 729 min
Hyd. volume = 41,163 cuft
Contrib. drain. area = 3.010 ac



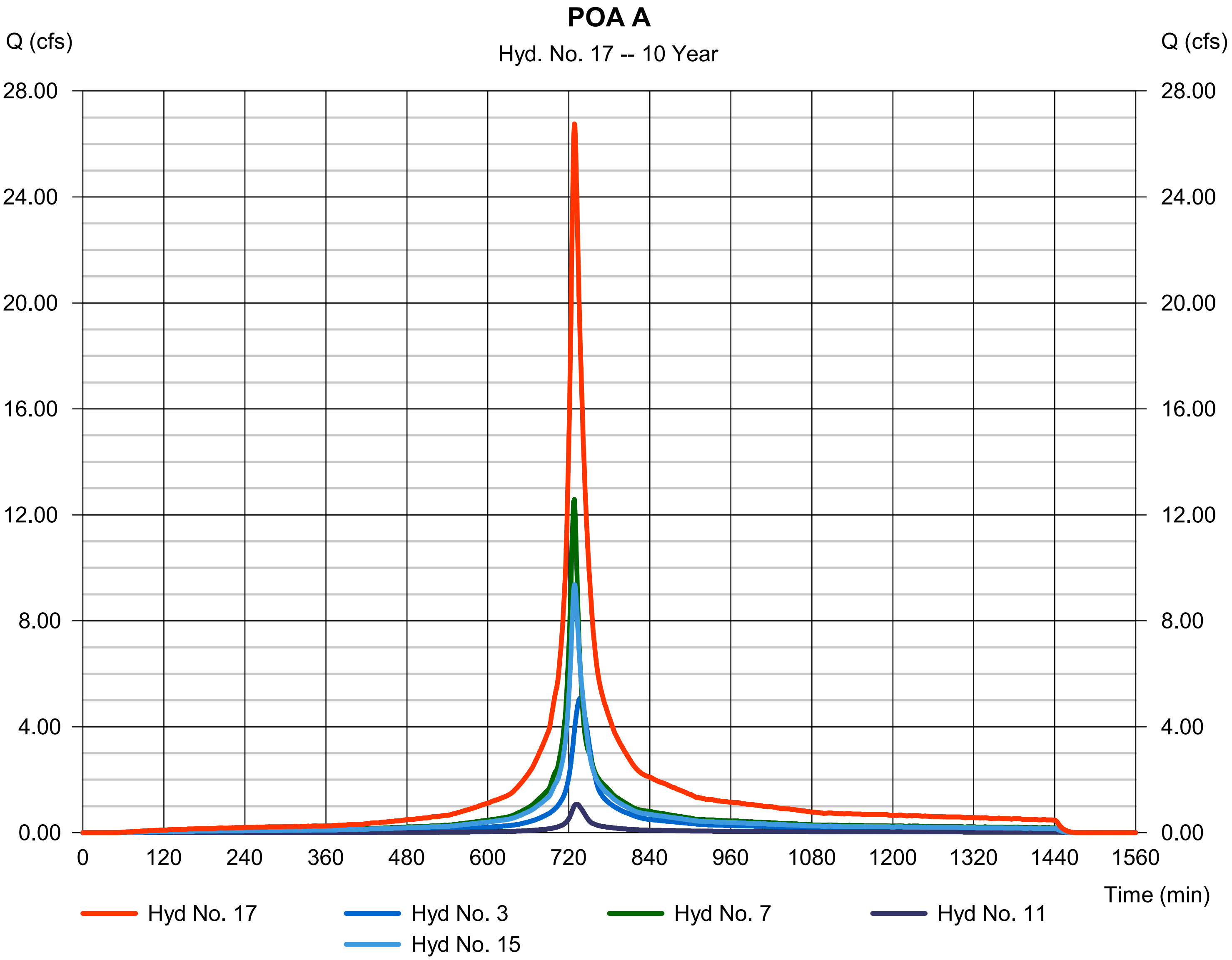
Hydrograph Report

Hyd. No. 17

POA A

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 3, 7, 11, 15

Peak discharge = 26.76 cfs
Time to peak = 728 min
Hyd. volume = 120,516 cuft
Contrib. drain. area = 0.000 ac



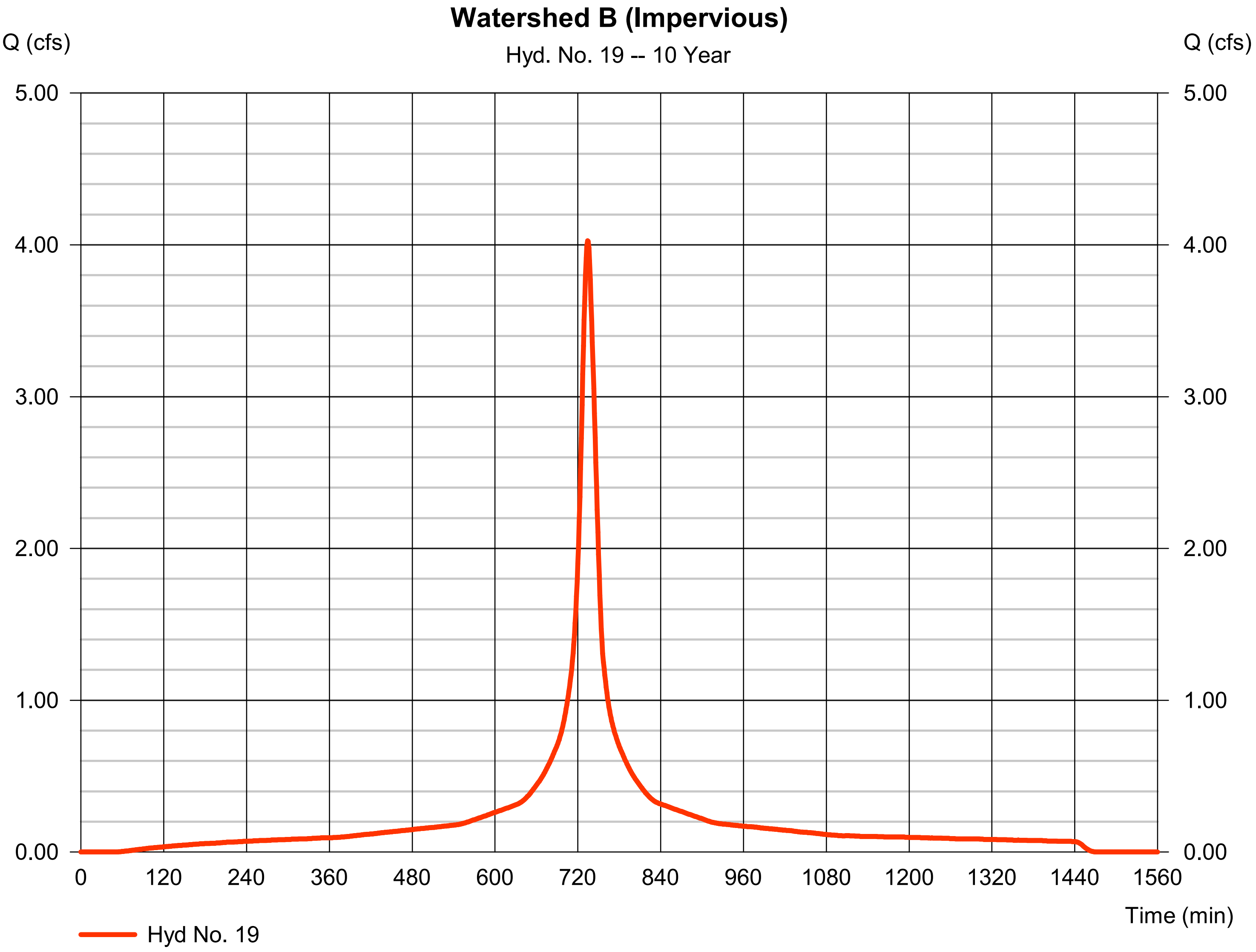
Hydrograph Report

Hyd. No. 19

Watershed B (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.190 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 4.028 cfs
Time to peak = 734 min
Hyd. volume = 21,222 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Custom
Shape factor = 484



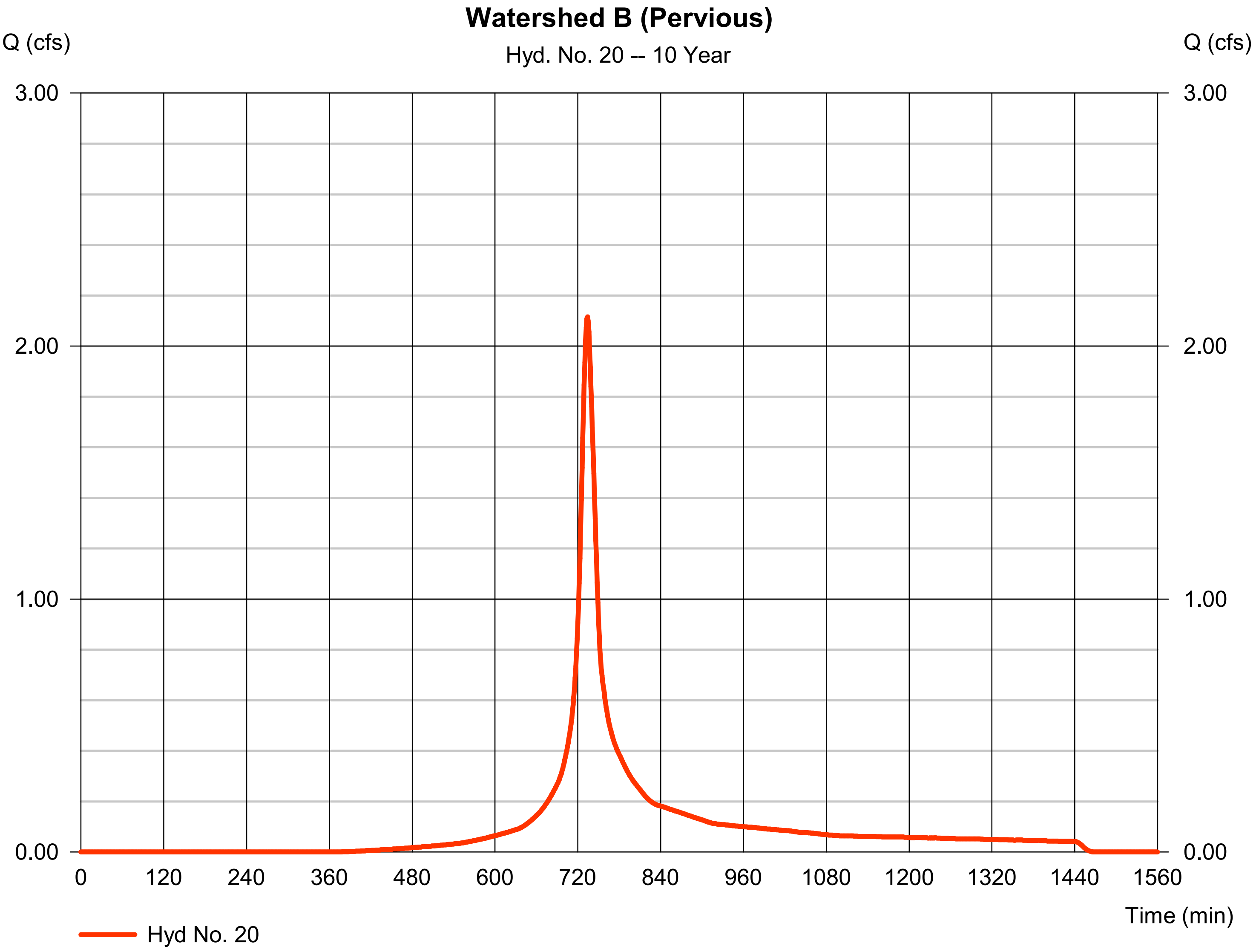
Hydrograph Report

Hyd. No. 20

Watershed B (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 2.116 cfs
Time to peak = 734 min
Hyd. volume = 9,342 cuft
Curve number = 82
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Custom
Shape factor = 484

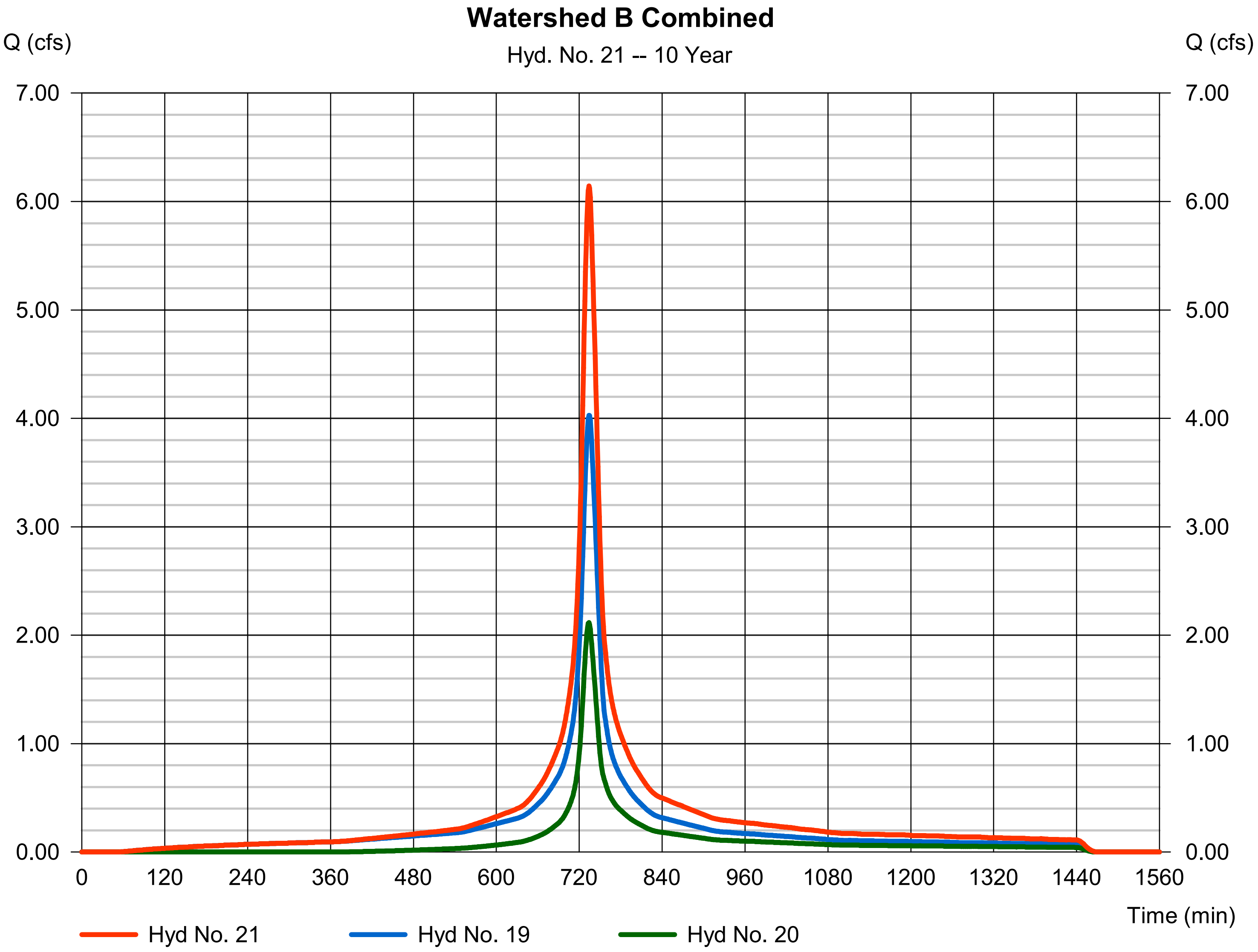


Hydrograph Report

Hyd. No. 21

Watershed B Combined

Hydrograph type	= Combine	Peak discharge	= 6.144 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 30,564 cuft
Inflow hyds.	= 19, 20	Contrib. drain. area	= 2.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	7.223	1	738	37,472	------	------	------	Watershed A-1 (Pervious)
2	SCS Runoff	2.974	1	734	15,921	------	------	------	Watershed A-1 (Impervious)
3	Combine	10.07	1	737	53,393	1, 2	------	------	A1 Combined
5	SCS Runoff	12.55	1	730	47,890	------	------	------	Watershed A-2 (Pervious)
6	SCS Runoff	11.91	1	727	44,104	------	------	------	Watershed A-2 (Impervious)
7	Combine	23.76	1	728	91,994	5, 6	------	------	A2 Combined
9	SCS Runoff	1.912	1	734	8,584	------	------	------	Watershed A-3 (Pervious)
10	SCS Runoff	0.470	1	727	1,826	------	------	------	Watershed A-3 (Impervious)
11	Combine	2.213	1	732	10,410	9, 10	------	------	A3 Combined
13	SCS Runoff	8.737	1	734	39,377	------	------	------	Watershed A-4 (Pervious)
14	SCS Runoff	10.18	1	727	39,568	------	------	------	Watershed A-4 (Impervious)
15	Combine	17.53	1	729	78,944	13, 14	------	------	A4 Combined
17	Combine	50.99	1	728	234,742	3, 7, 11, 15,	------	------	POA A
19	SCS Runoff	6.939	1	734	37,148	------	------	------	Watershed B (Impervious)
20	SCS Runoff	4.261	1	734	19,362	------	------	------	Watershed B (Pervious)
21	Combine	11.20	1	734	56,510	19, 20	------	------	Watershed B Combined

Existing Hydrographs_Current Precipitation.gpw

Return Period: 100 Year

Tuesday, 02 / 21 / 2023

Hydrograph Report

Hyd. No. 1

Watershed A-1 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.640 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 7.223 cfs
Time to peak = 738 min
Hyd. volume = 37,472 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 25.00 min
Distribution = Custom
Shape factor = 484

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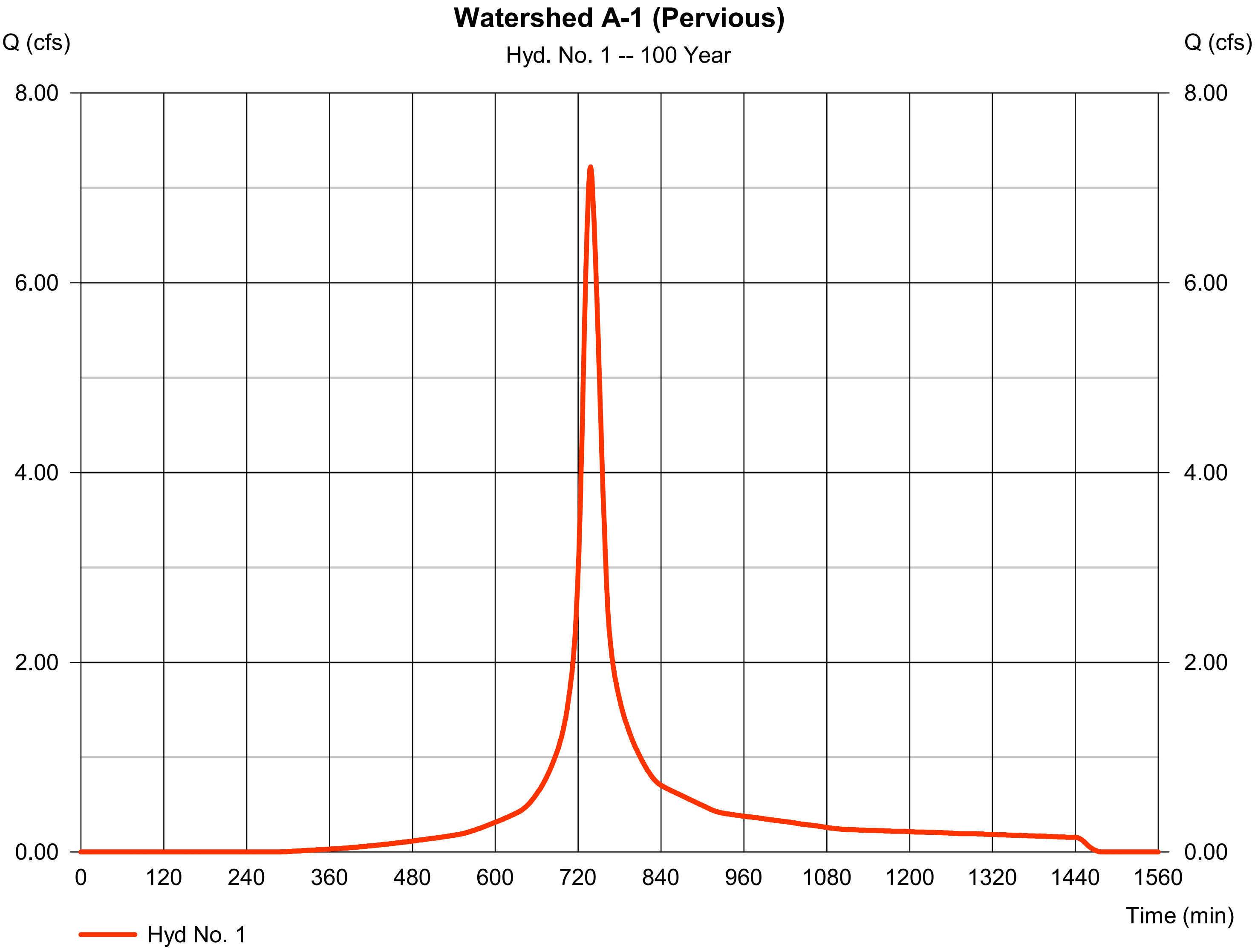
* Composite (Area/CN) = [(1.160 x 80) + (0.480 x 77)] / 1.640

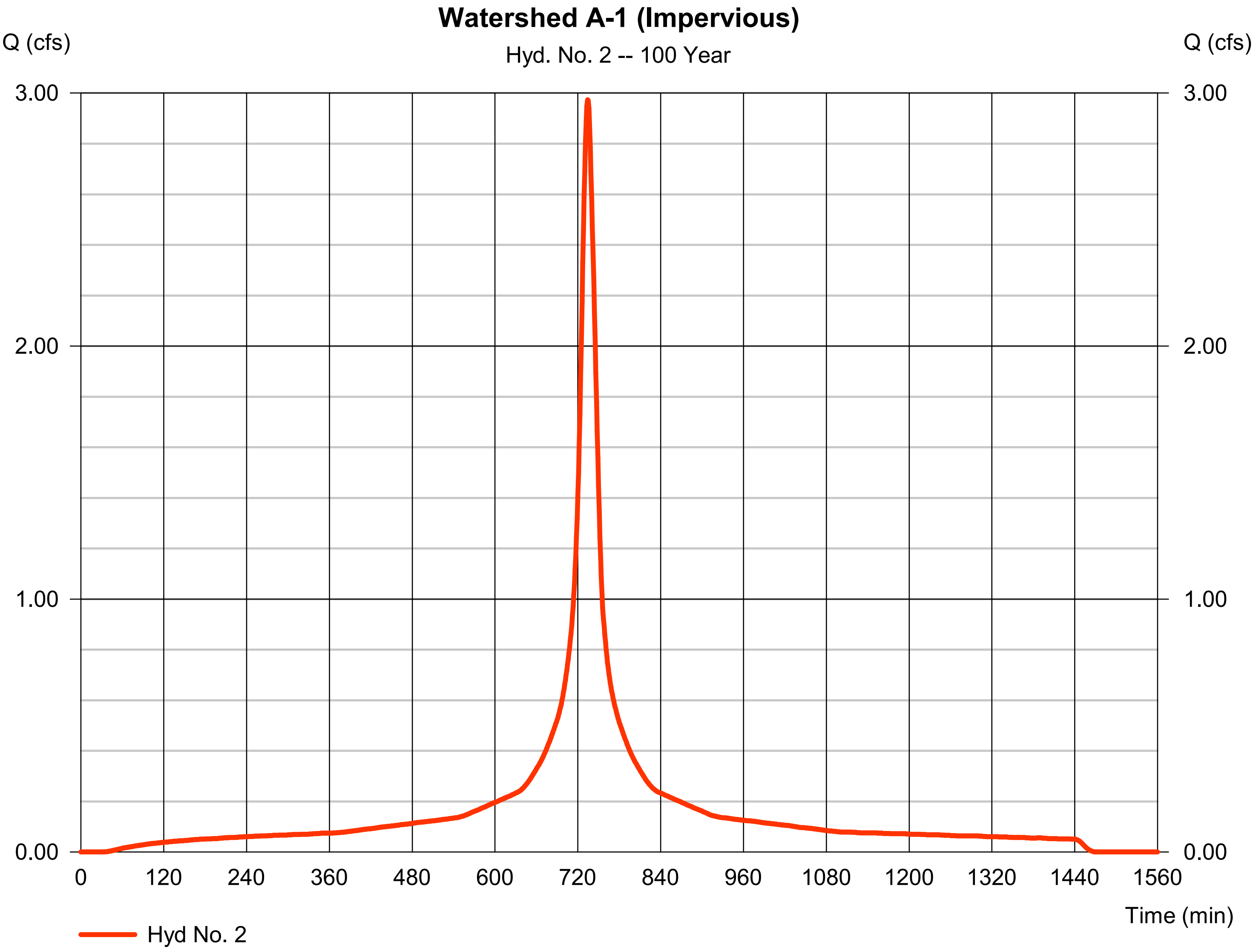


Hydrograph Report

Hyd. No. 2

Watershed A-1 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.974 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 15,921 cuft
Drainage area	= 0.510 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.00 min
Total precip.	= 8.84 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr	Shape factor	= 484



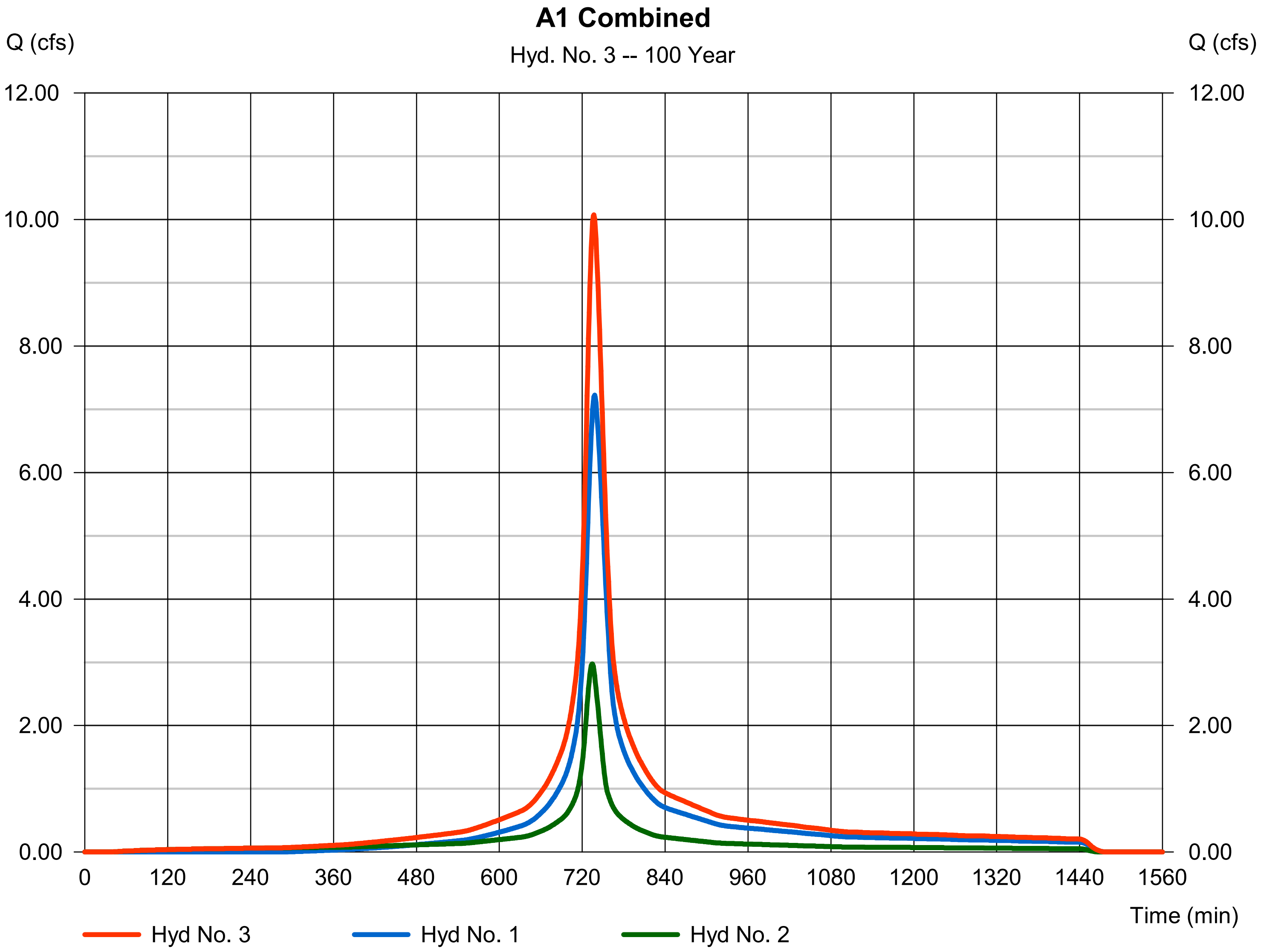
Hydrograph Report

Hyd. No. 3

A1 Combined

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 1, 2

Peak discharge = 10.07 cfs
Time to peak = 737 min
Hyd. volume = 53,393 cuft
Contrib. drain. area = 2.150 ac



Hydrograph Report

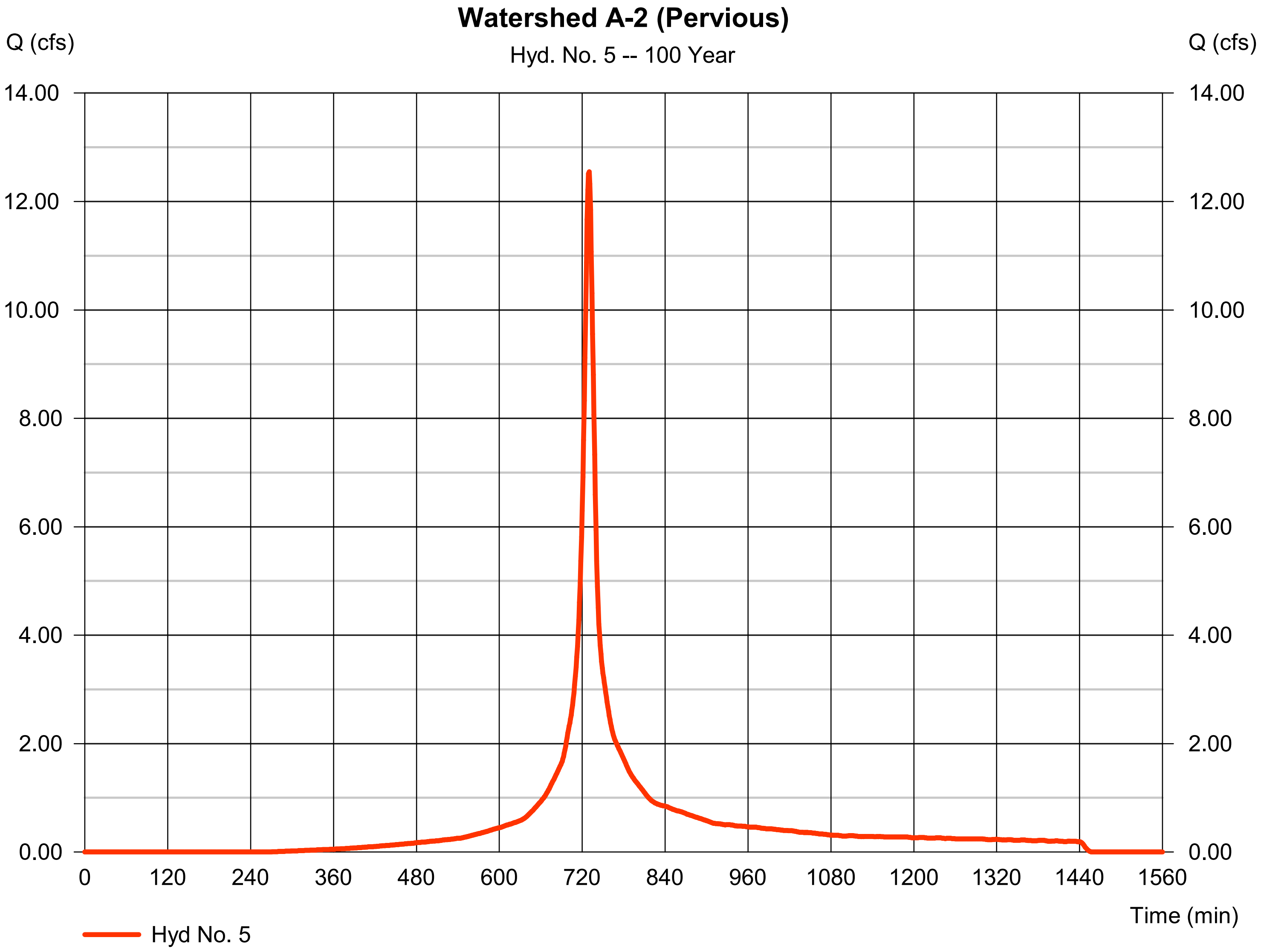
Hyd. No. 5

Watershed A-2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 2.020 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 12.55 cfs
Time to peak = 730 min
Hyd. volume = 47,890 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 11.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(1.850 x 80) + (0.170 x 77)] / 2.020



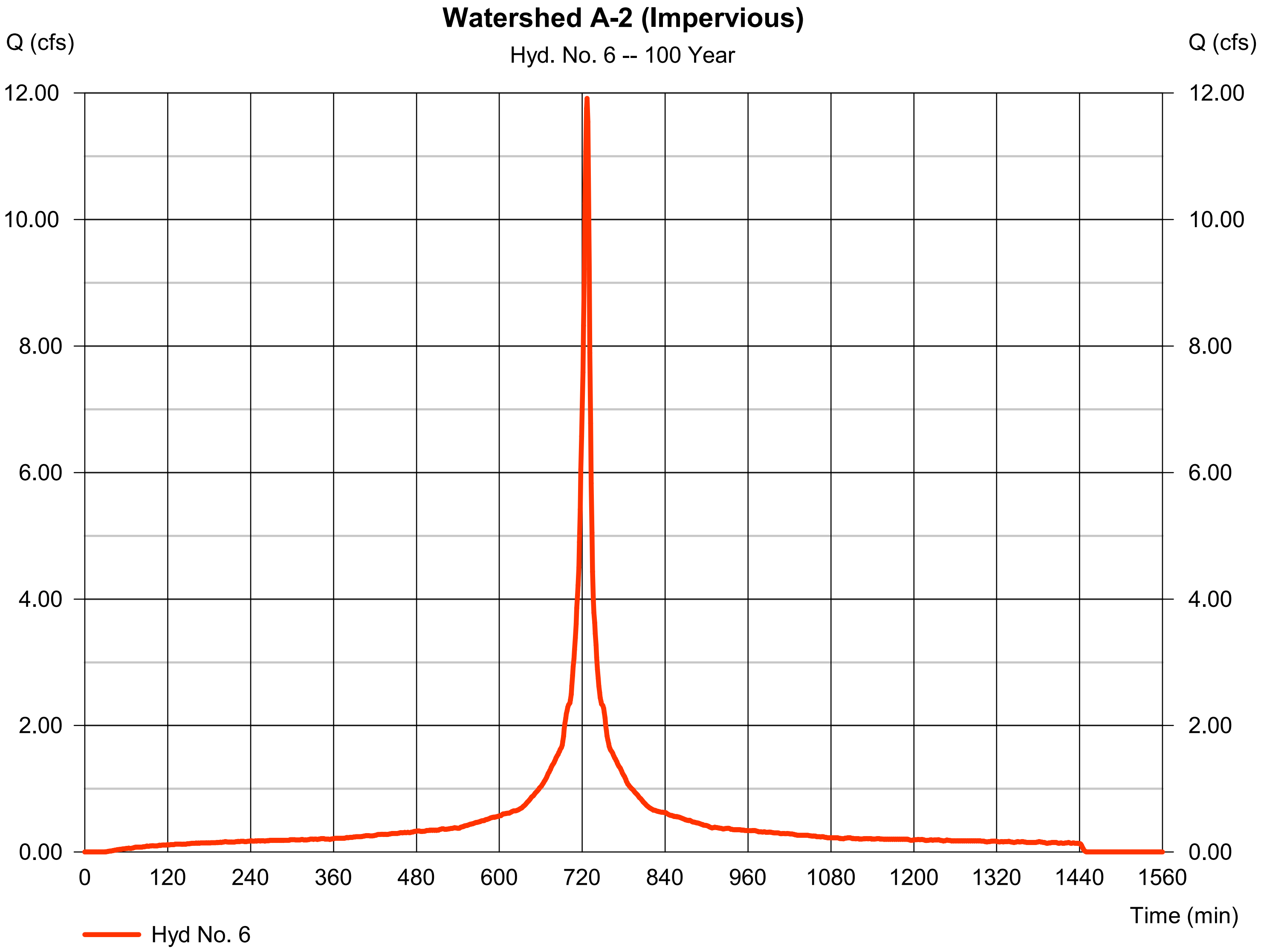
Hydrograph Report

Hyd. No. 6

Watershed A-2 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.370 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 11.91 cfs
Time to peak = 727 min
Hyd. volume = 44,104 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 6.00 min
Distribution = Custom
Shape factor = 484

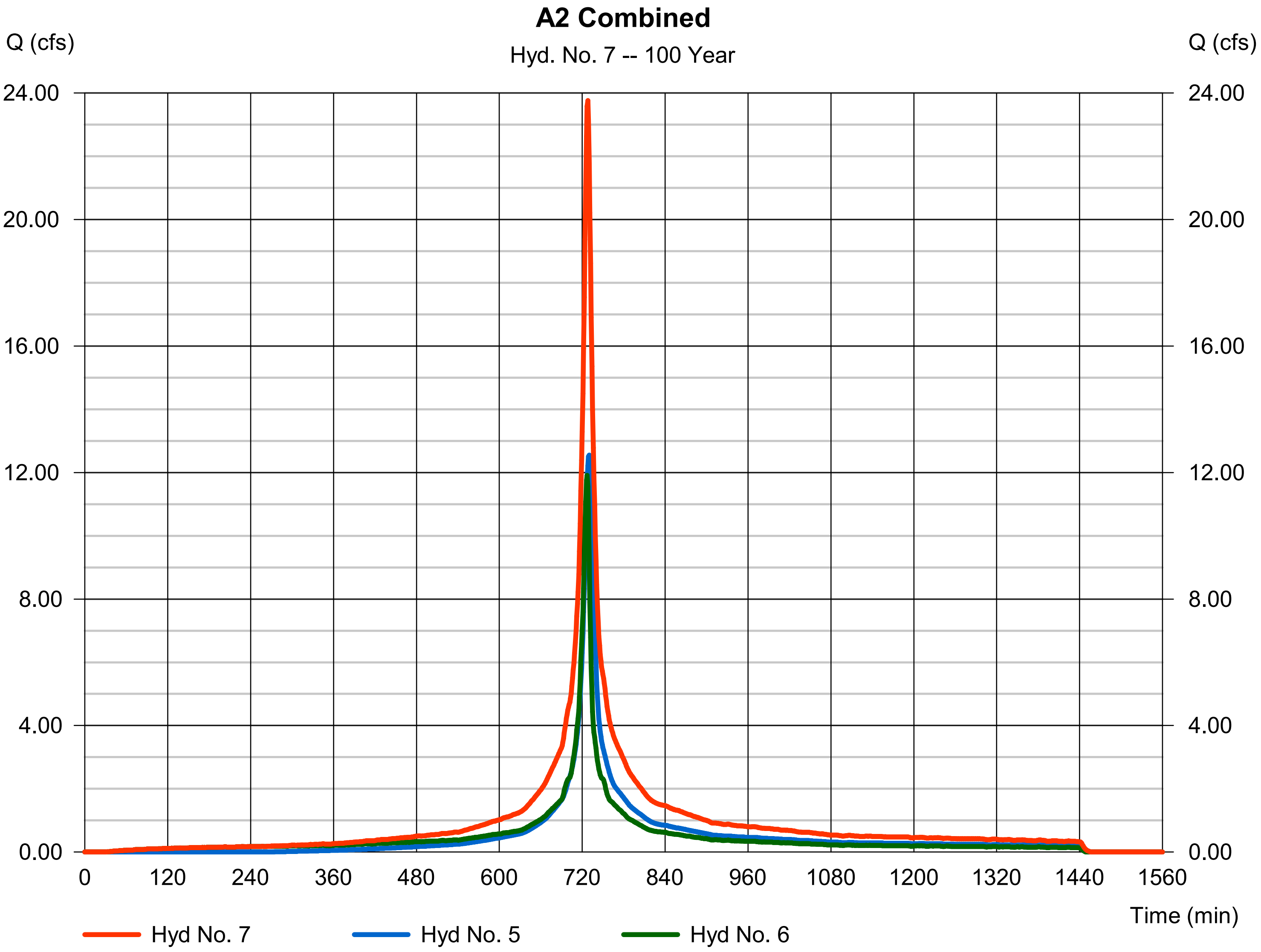


Hydrograph Report

Hyd. No. 7

A2 Combined

Hydrograph type	= Combine	Peak discharge	= 23.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 91,994 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 3.390 ac

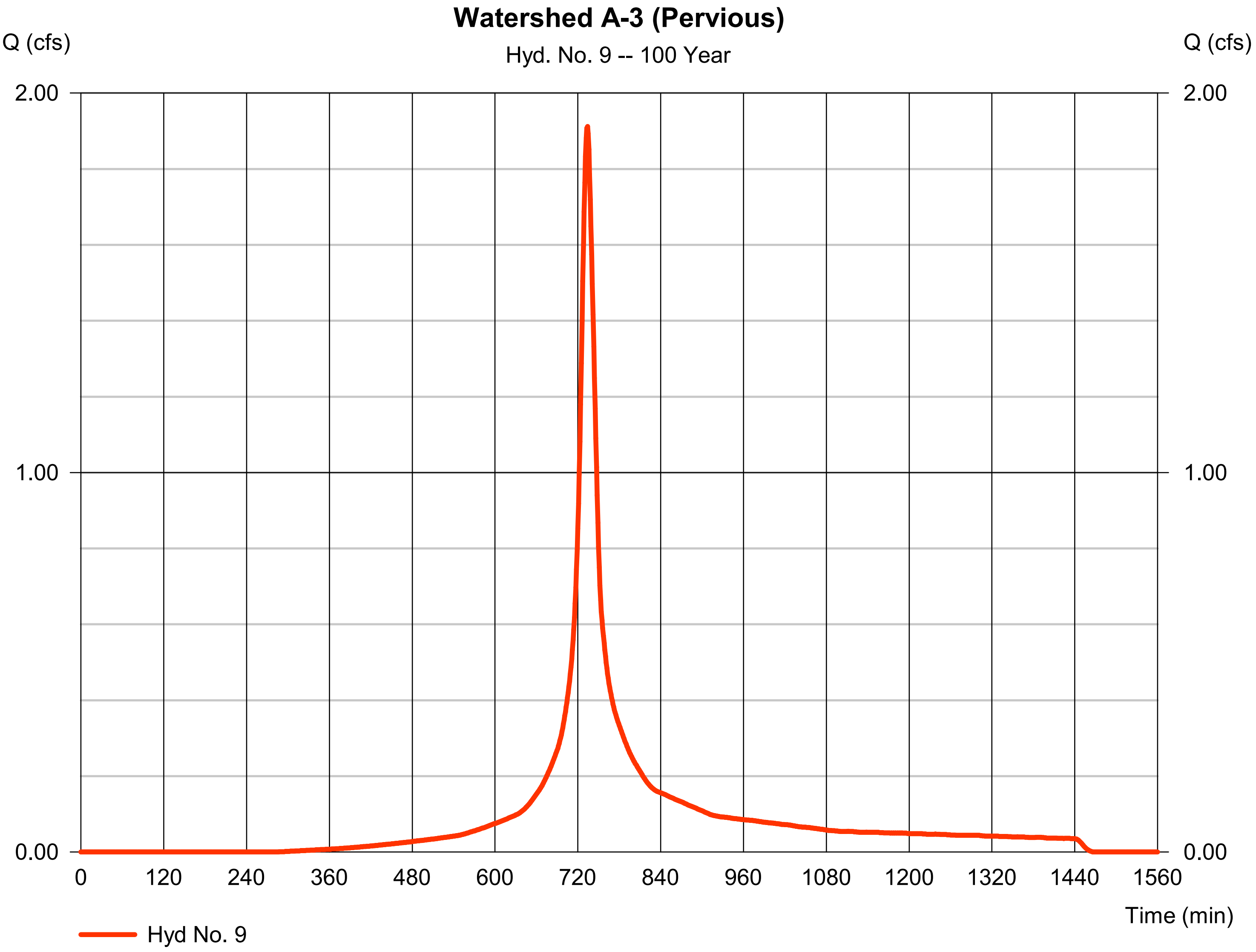


Hyd. No. 9

Watershed A-3 (Pervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.912 cfs
Storm frequency	=	100 yrs	Time to peak	=	734 min
Time interval	=	1 min	Hyd. volume	=	8,584 cuft
Drainage area	=	0.380 ac	Curve number	=	79*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	8.84 in	Distribution	=	Custom
Storm duration	=	\\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor	Shape factor	=	484

* Composite (Area/CN) = [(0.300 x 80) + (0.080 x 77)] / 0.380



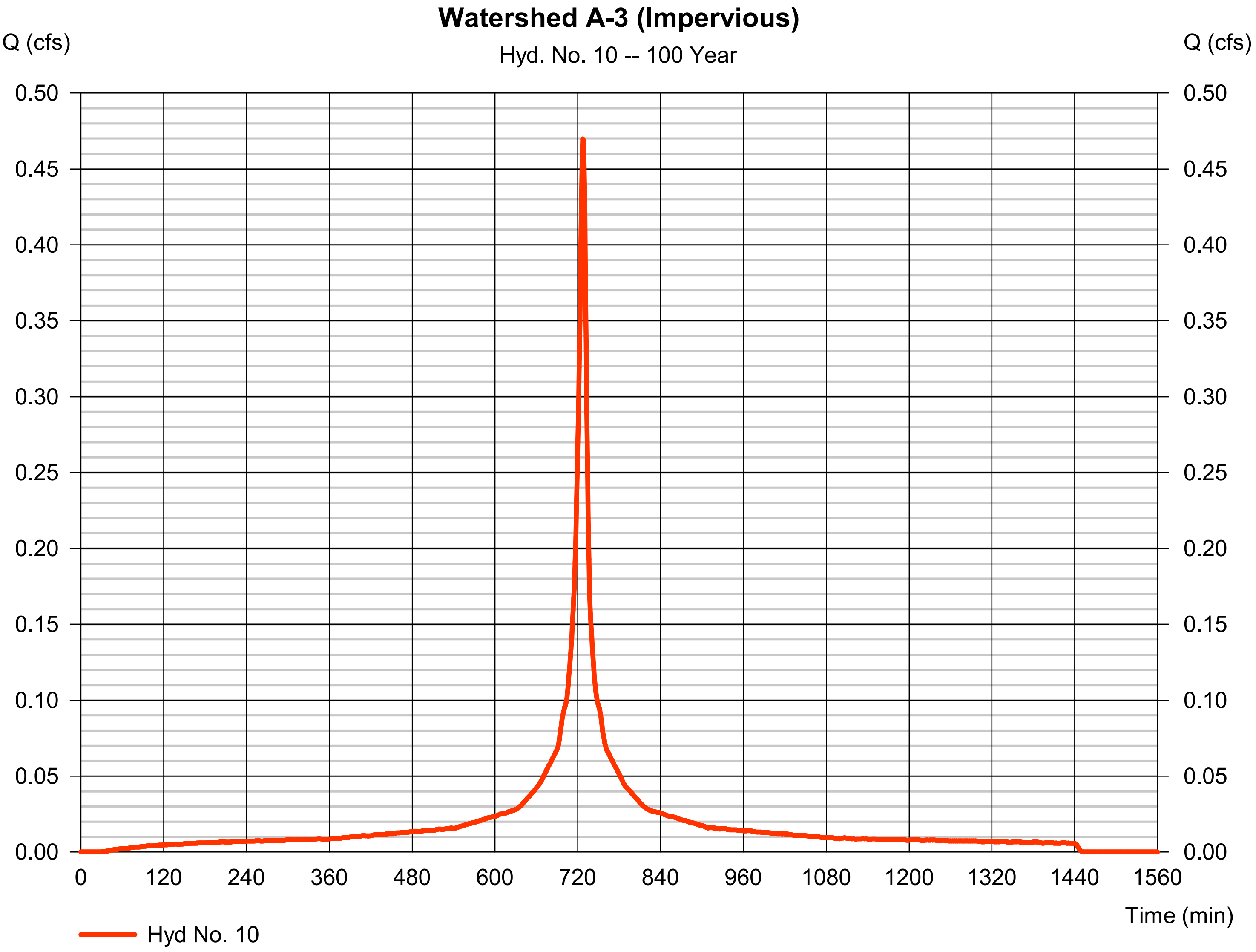
Hydrograph Report

Hyd. No. 10

Watershed A-3 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.060 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.470 cfs
Time to peak = 727 min
Hyd. volume = 1,826 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484

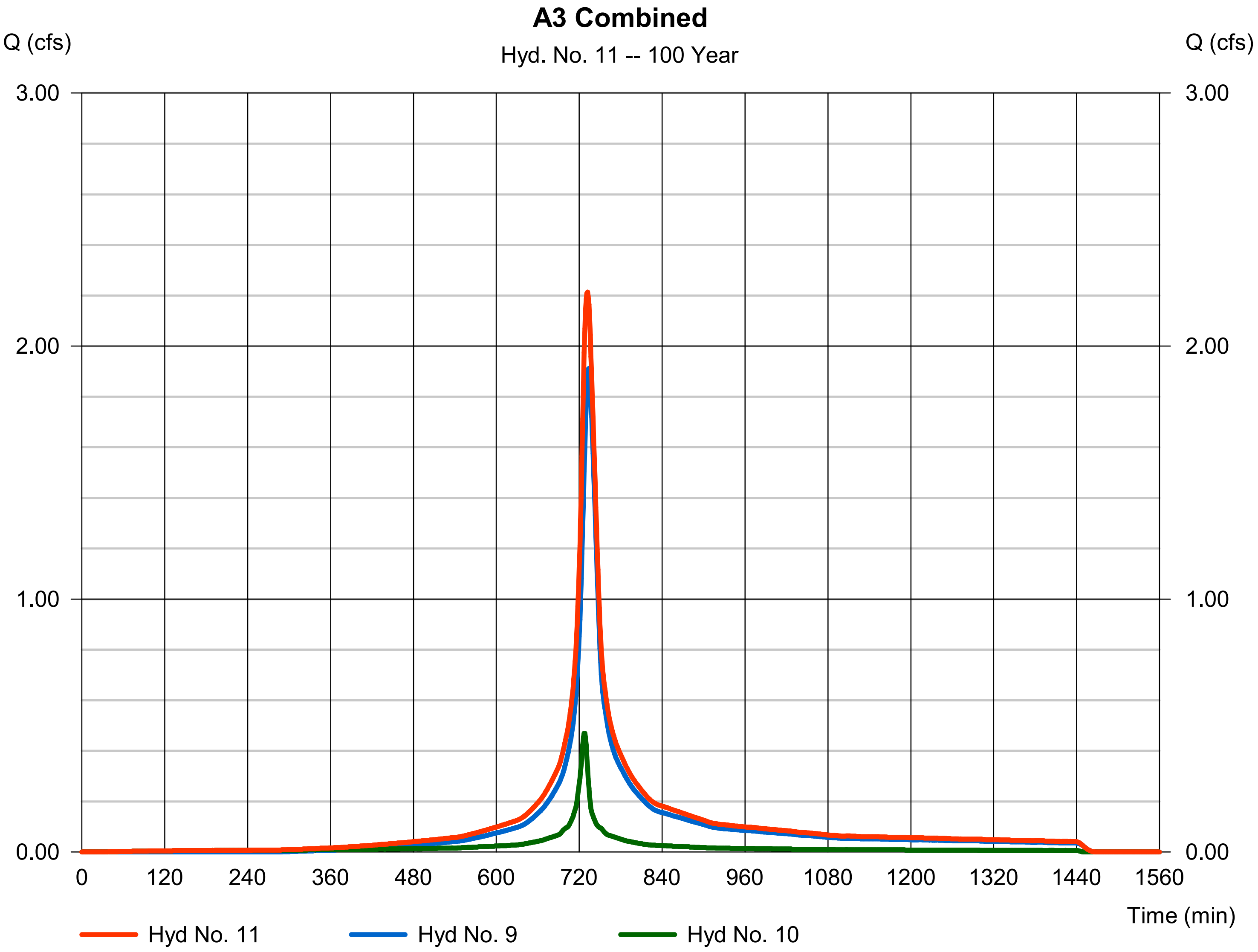


Hydrograph Report

Hyd. No. 11

A3 Combined

Hydrograph type	= Combine	Peak discharge	= 2.213 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 10,410 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 0.440 ac



Hydrograph Report

Hyd. No. 13

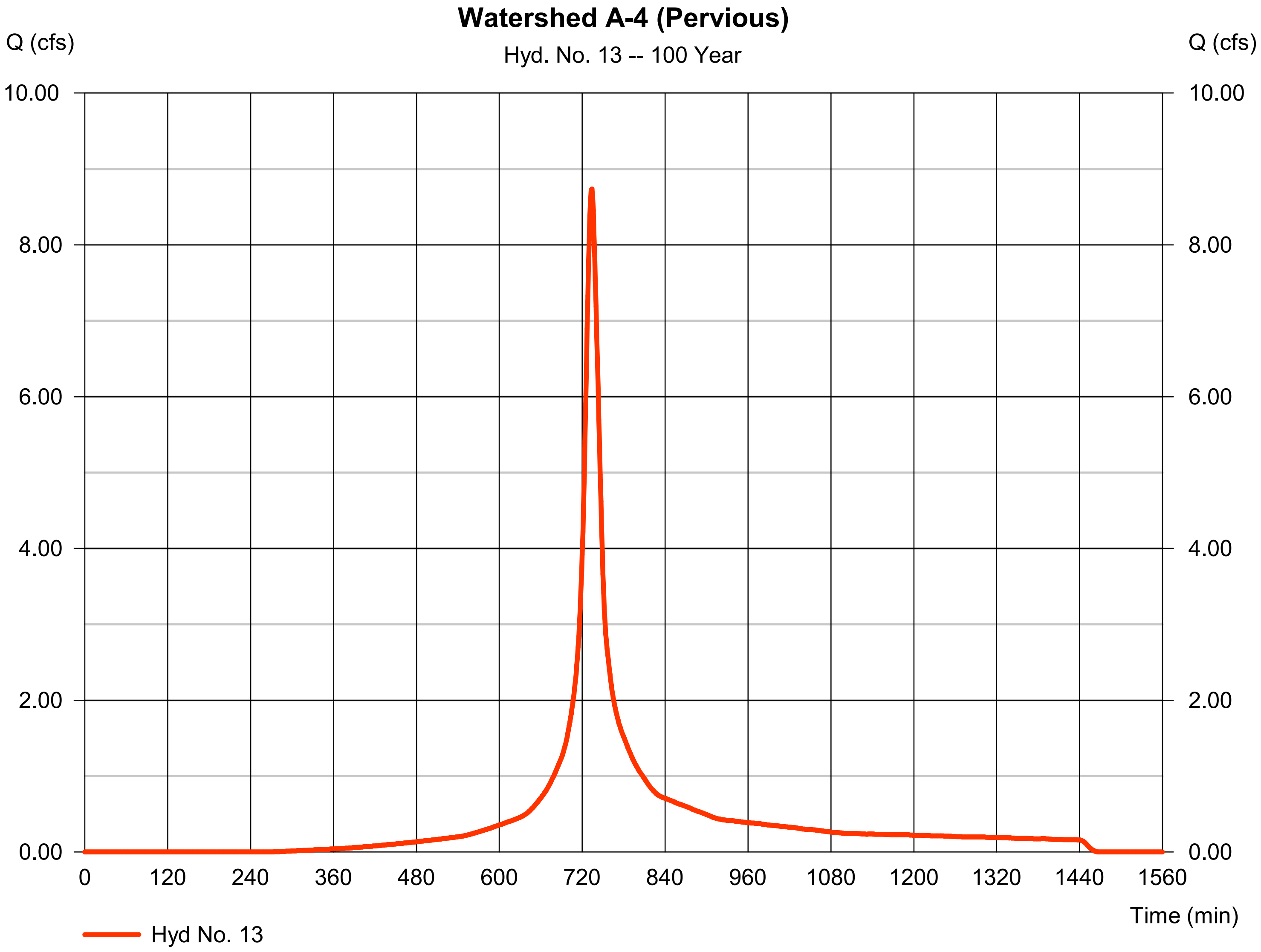
Watershed A-4 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.710 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 8.737 cfs
Time to peak = 734 min
Hyd. volume = 39,377 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 17.00 min
Distribution = Custom
Shape factor = 484

---

* Composite (Area/CN) = [(1.470 x 80) + (0.240 x 77)] / 1.710



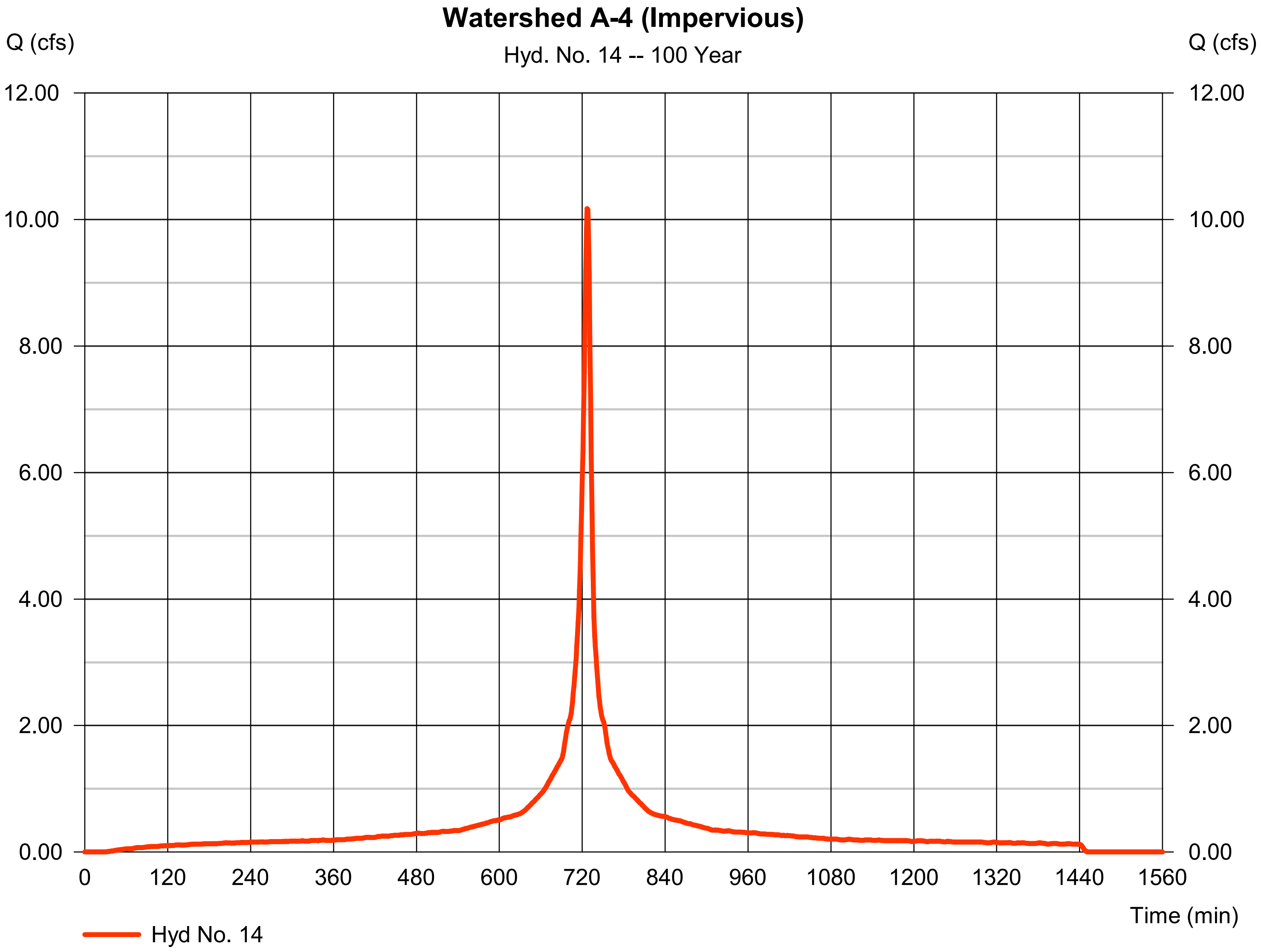
Hydrograph Report

Hyd. No. 14

Watershed A-4 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.300 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 10.18 cfs
Time to peak = 727 min
Hyd. volume = 39,568 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 7.00 min
Distribution = Custom
Shape factor = 484

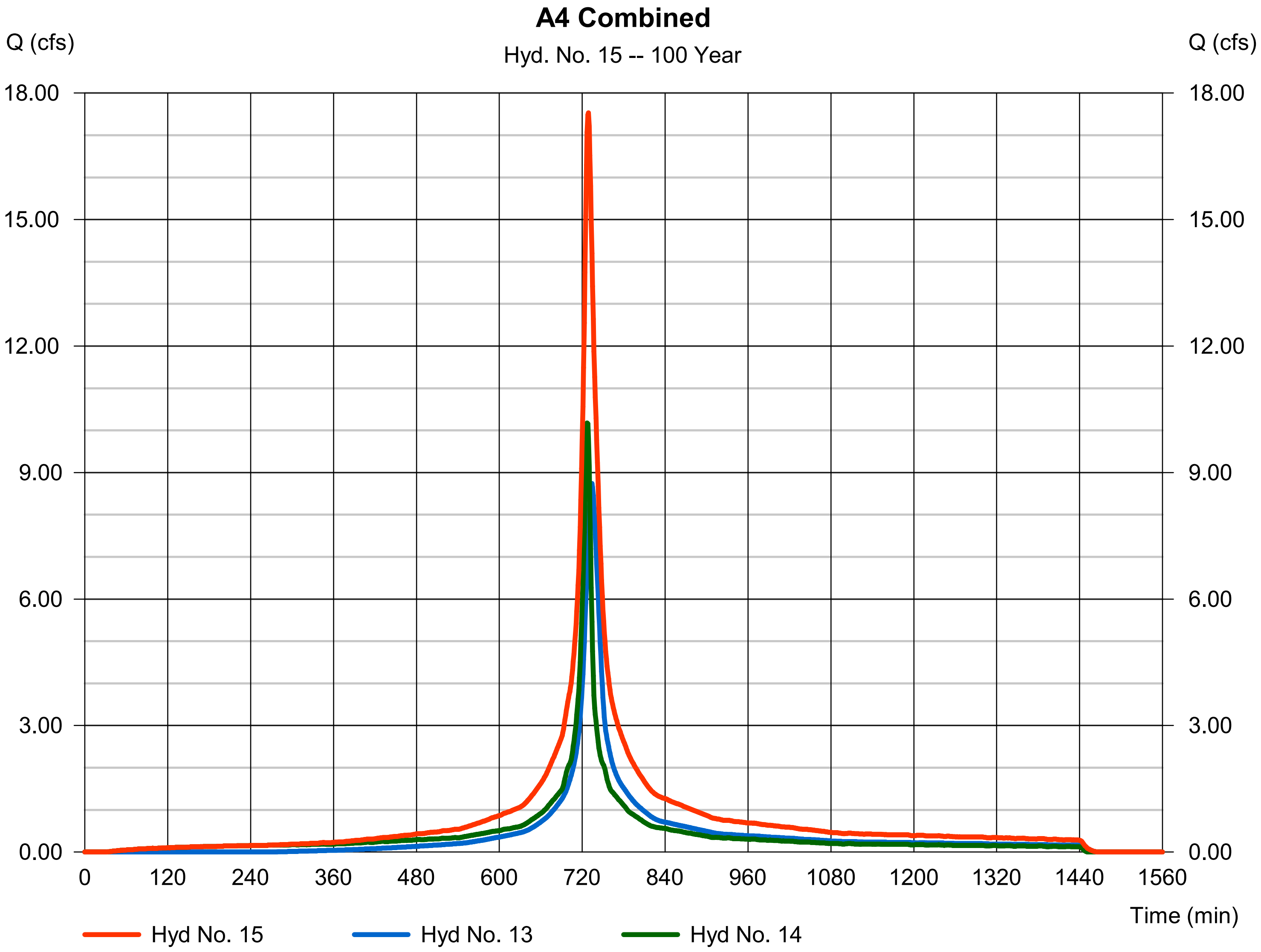


Hydrograph Report

Hyd. No. 15

A4 Combined

Hydrograph type	= Combine	Peak discharge	= 17.53 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 78,944 cuft
Inflow hyds.	= 13, 14	Contrib. drain. area	= 3.010 ac

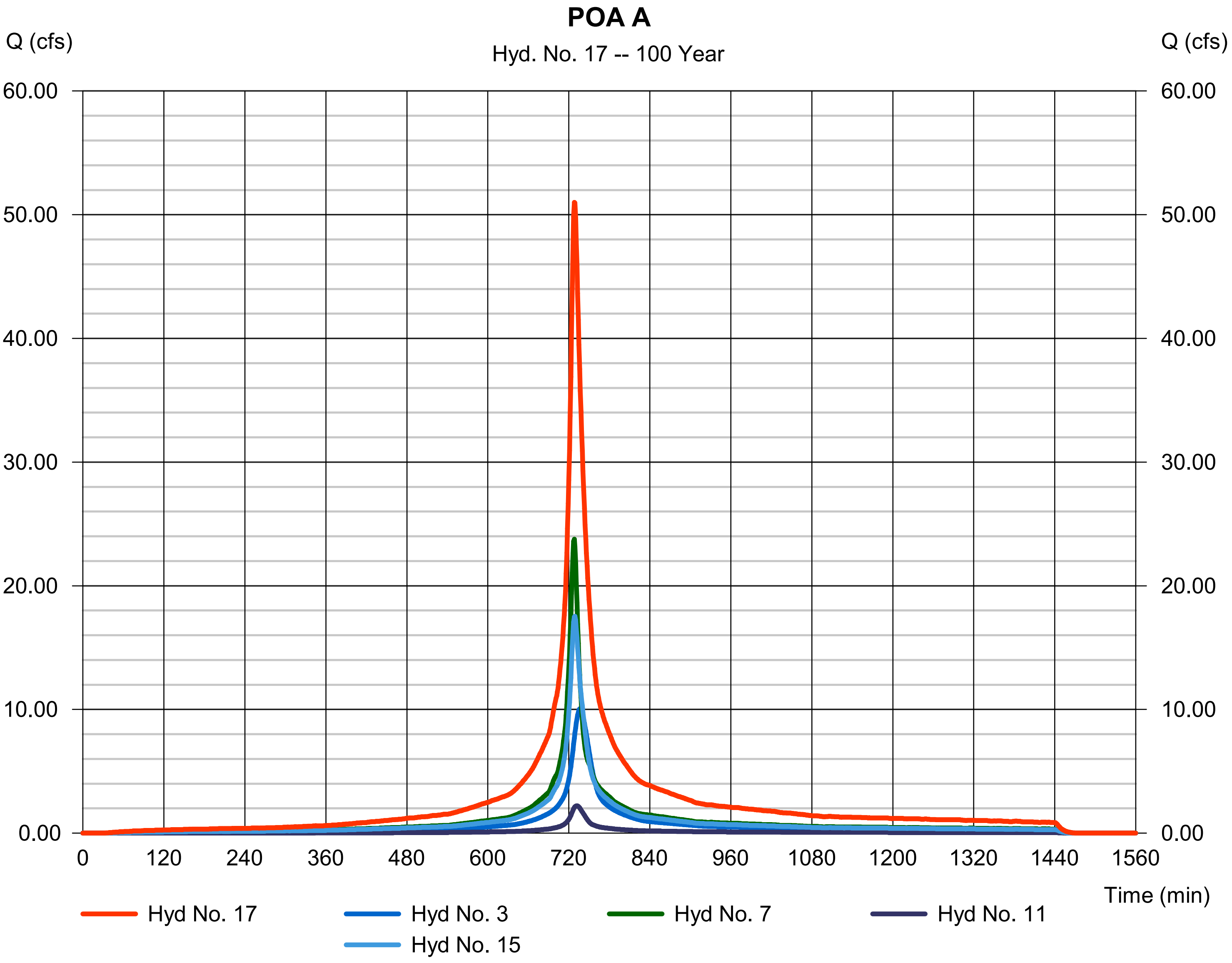


Hydrograph Report

Hyd. No. 17

POA A

Hydrograph type	= Combine	Peak discharge	= 50.99 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 234,742 cuft
Inflow hyds.	= 3, 7, 11, 15	Contrib. drain. area	= 0.000 ac



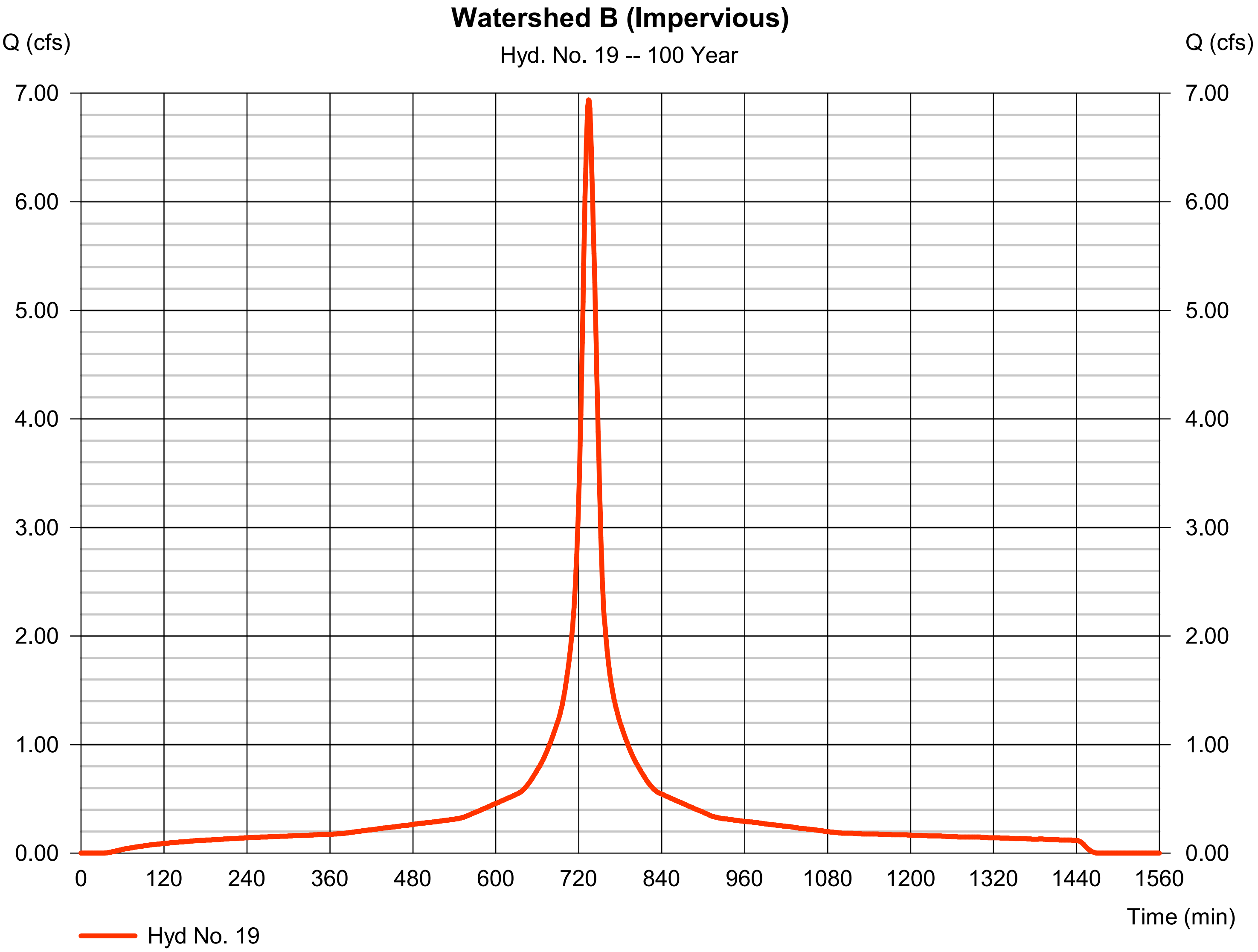
Hydrograph Report

Hyd. No. 19

Watershed B (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.190 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 6.939 cfs
Time to peak = 734 min
Hyd. volume = 37,148 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Custom
Shape factor = 484



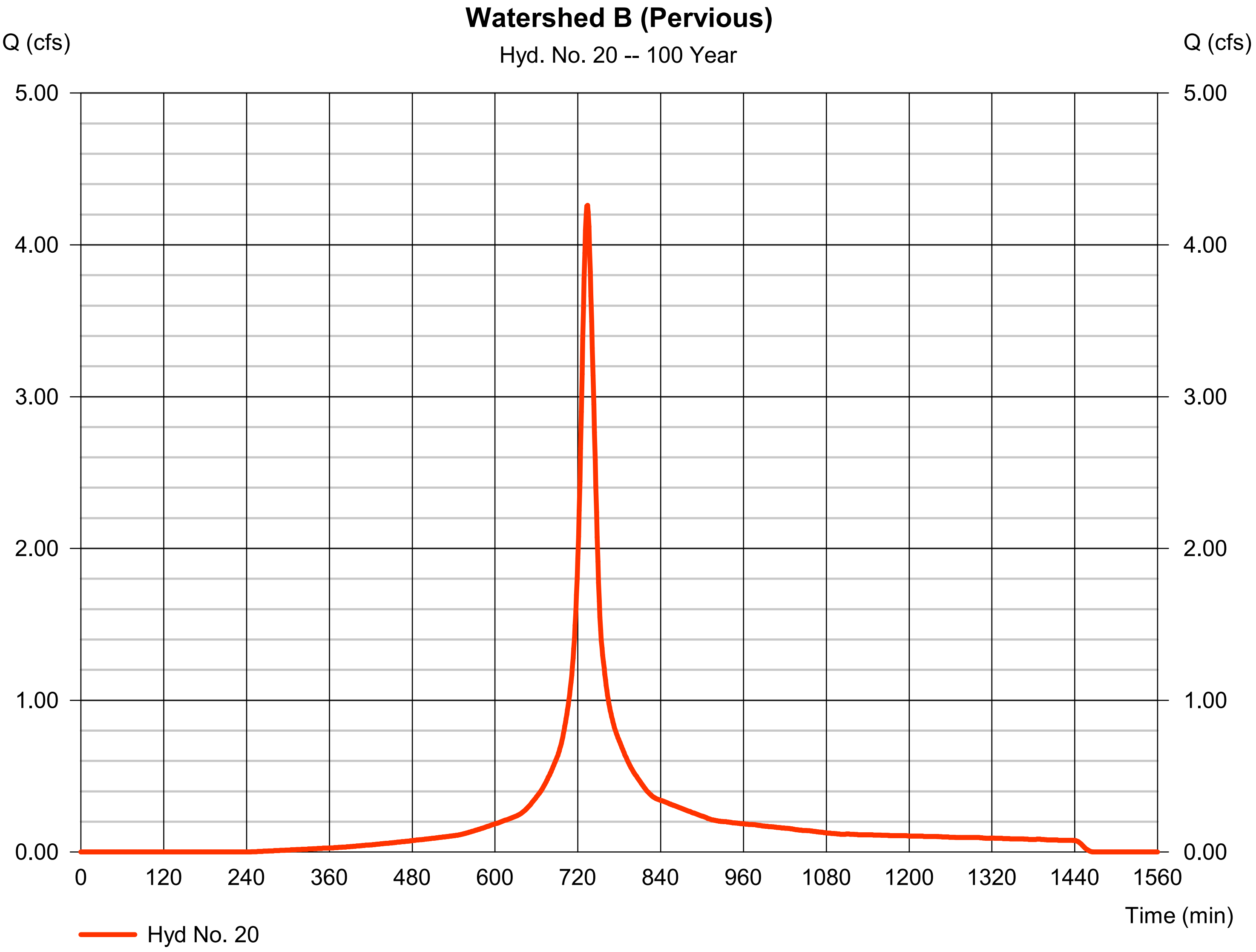
Hydrograph Report

Hyd. No. 20

Watershed B (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 4.261 cfs
Time to peak = 734 min
Hyd. volume = 19,362 cuft
Curve number = 82
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Custom
Shape factor = 484

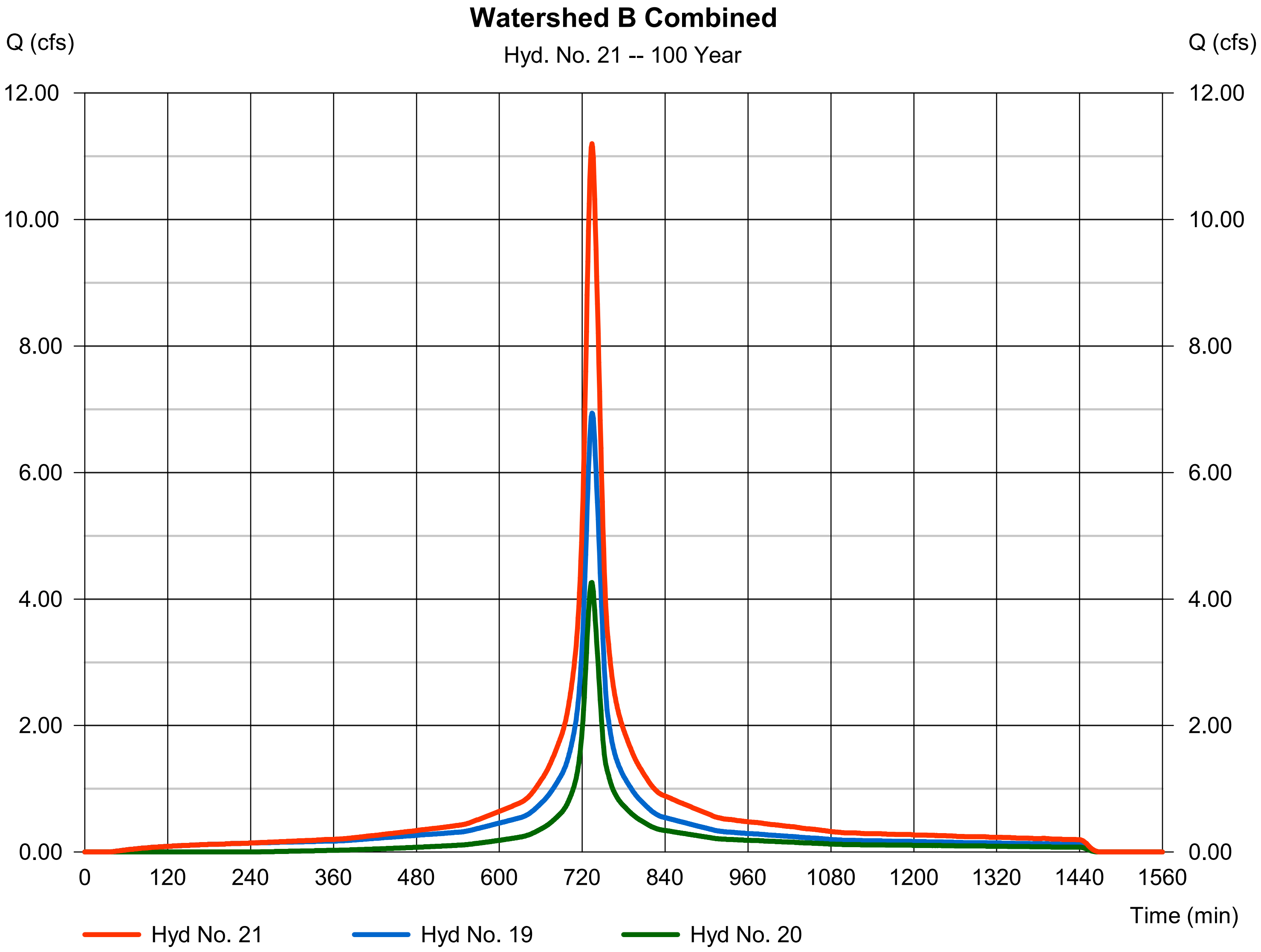


Hydrograph Report

Hyd. No. 21

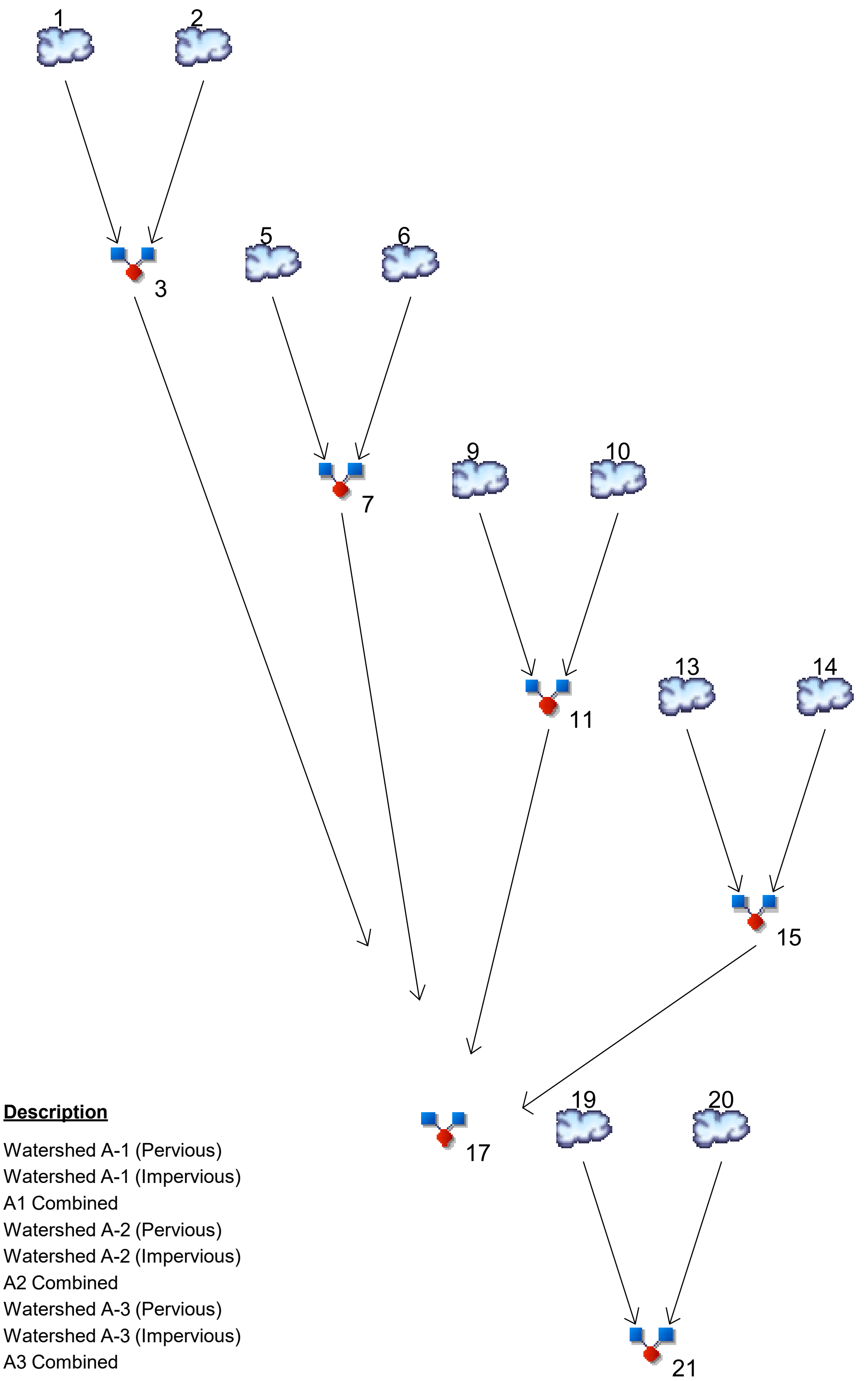
Watershed B Combined

Hydrograph type	= Combine	Peak discharge	= 11.20 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 56,510 cuft
Inflow hyds.	= 19, 20	Contrib. drain. area	= 2.000 ac



Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022



Legend

Hyd.	Origin	Description
1	SCS Runoff	Watershed A-1 (Pervious)
2	SCS Runoff	Watershed A-1 (Impervious)
3	Combine	A1 Combined
5	SCS Runoff	Watershed A-2 (Pervious)
6	SCS Runoff	Watershed A-2 (Impervious)
7	Combine	A2 Combined
9	SCS Runoff	Watershed A-3 (Pervious)
10	SCS Runoff	Watershed A-3 (Impervious)
11	Combine	A3 Combined
13	SCS Runoff	Watershed A-4 (Pervious)
14	SCS Runoff	Watershed A-4 (Impervious)
15	Combine	A4 Combined
17	Combine	POA A
19	SCS Runoff	Watershed B (Impervious)
20	SCS Runoff	Watershed B (Pervious)
21	Combine	Watershed B Combined

Project: Existing Hydrographs_Future Precipitation.gpw

Tuesday, 02 / 21 / 2023

Hydraflow Table of Contents

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

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	2.260	1	739	11,544	------	------	------	Watershed A-1 (Pervious)
2	SCS Runoff	1.326	1	734	6,915	------	------	------	Watershed A-1 (Impervious)
3	Combine	3.524	1	737	18,459	1, 2	------	------	A1 Combined
5	SCS Runoff	4.072	1	730	15,053	------	------	------	Watershed A-2 (Pervious)
6	SCS Runoff	5.316	1	727	19,156	------	------	------	Watershed A-2 (Impervious)
7	Combine	9.060	1	728	34,209	5, 6	------	------	A2 Combined
9	SCS Runoff	0.602	1	734	2,644	------	------	------	Watershed A-3 (Pervious)
10	SCS Runoff	0.209	1	727	793	------	------	------	Watershed A-3 (Impervious)
11	Combine	0.734	1	731	3,438	9, 10	------	------	A3 Combined
13	SCS Runoff	2.819	1	734	12,377	------	------	------	Watershed A-4 (Pervious)
14	SCS Runoff	4.539	1	727	17,186	------	------	------	Watershed A-4 (Impervious)
15	Combine	6.804	1	728	29,563	13, 14	------	------	A4 Combined
17	Combine	19.18	1	728	85,669	3, 7, 11, 15,	------	------	POA A
19	SCS Runoff	3.094	1	734	16,135	------	------	------	Watershed B (Impervious)
20	SCS Runoff	1.442	1	734	6,329	------	------	------	Watershed B (Pervious)
21	Combine	4.536	1	734	22,464	19, 20	------	------	Watershed B Combined

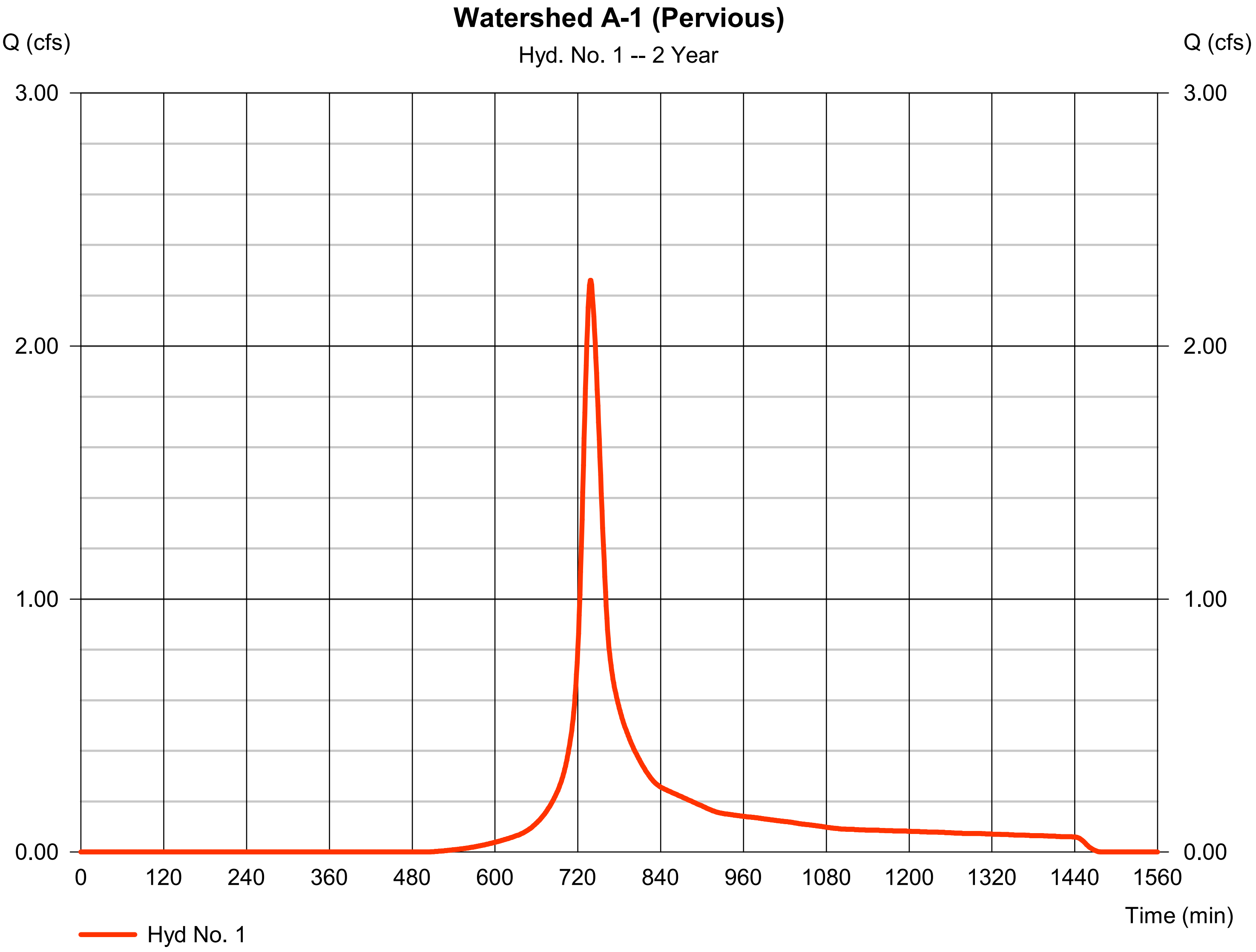
Hydrograph Report

Hyd. No. 1

Watershed A-1 (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.260 cfs
Storm frequency	= 2 yrs	Time to peak	= 739 min
Time interval	= 1 min	Hyd. volume	= 11,544 cuft
Drainage area	= 1.640 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 25.00 min
Total precip.	= 3.97 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor	Shape factor	= 484

* Composite (Area/CN) = [(1.160 x 80) + (0.480 x 77)] / 1.640



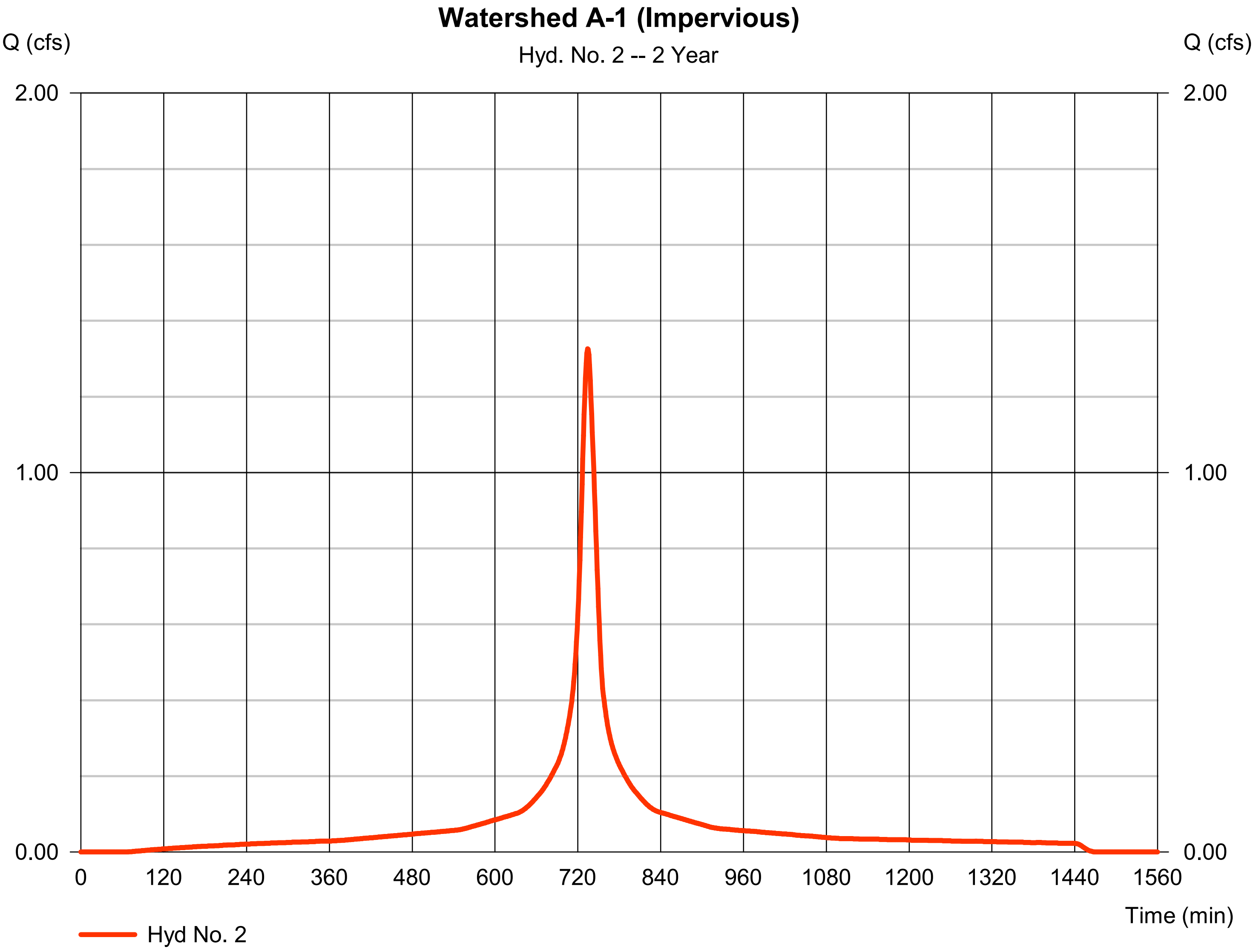
Hydrograph Report

Hyd. No. 2

Watershed A-1 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.510 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 1.326 cfs
Time to peak = 734 min
Hyd. volume = 6,915 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 20.00 min
Distribution = Custom
Shape factor = 484

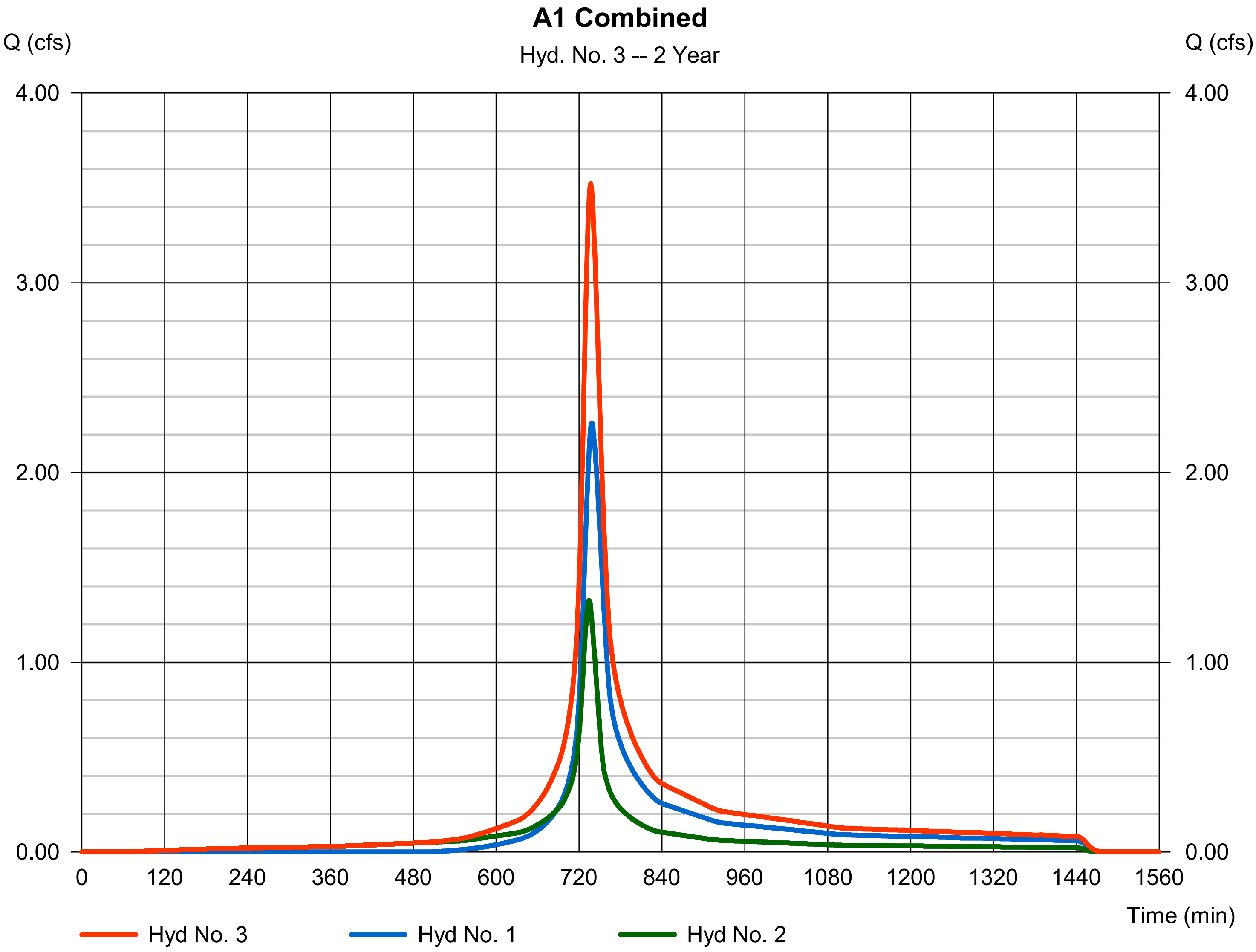


Hydrograph Report

Hyd. No. 3

A1 Combined

Hydrograph type	= Combine	Peak discharge	= 3.524 cfs
Storm frequency	= 2 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 18,459 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.150 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 02 / 21 / 2023

Hyd. No. 5

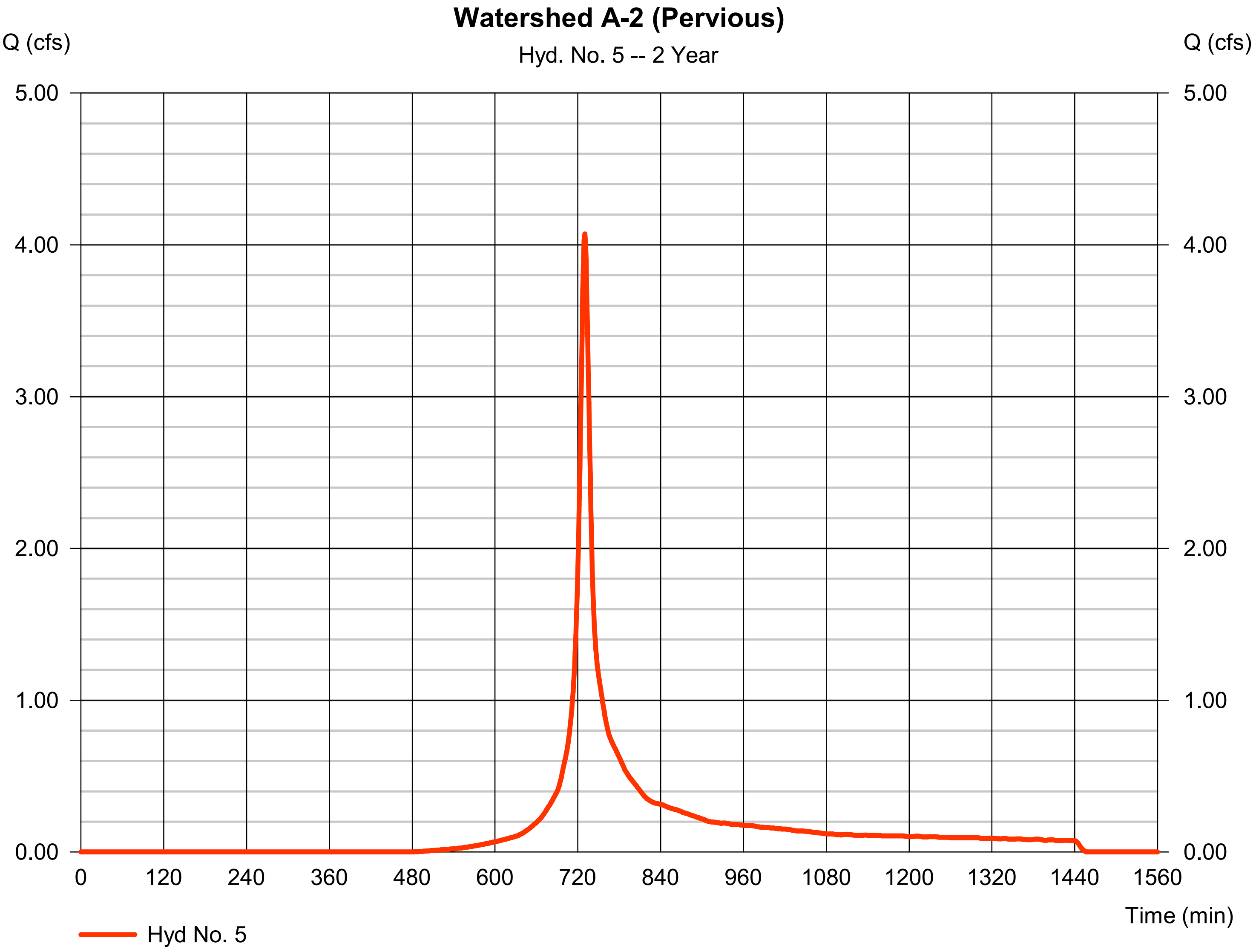
Watershed A-2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 2.020 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 4.072 cfs
Time to peak = 730 min
Hyd. volume = 15,053 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 11.00 min
Distribution = Custom
Shape factor = 484

---

* Composite (Area/CN) = [(1.850 x 80) + (0.170 x 77)] / 2.020



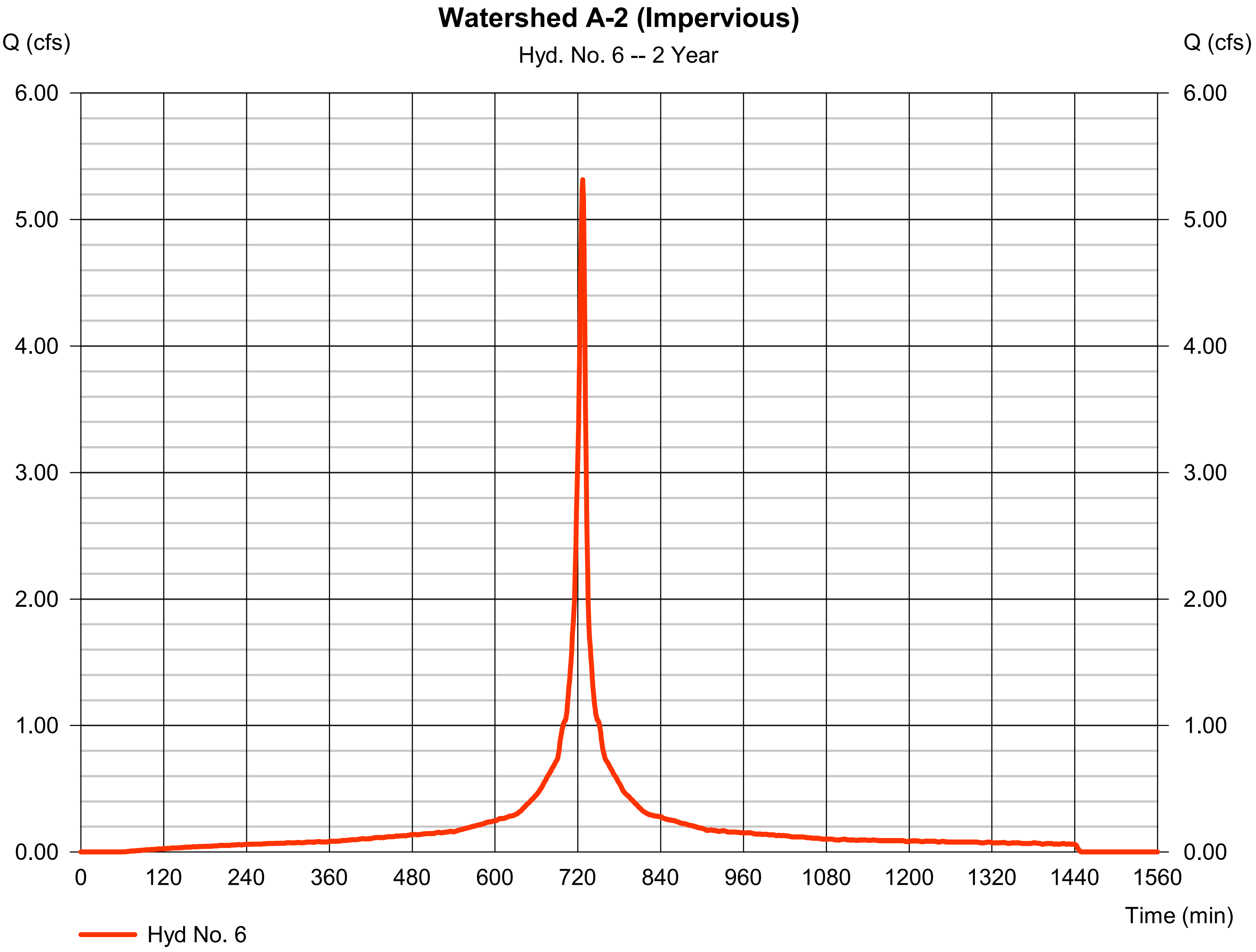
Hydrograph Report

Hyd. No. 6

Watershed A-2 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.370 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 5.316 cfs
Time to peak = 727 min
Hyd. volume = 19,156 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 6.00 min
Distribution = Custom
Shape factor = 484



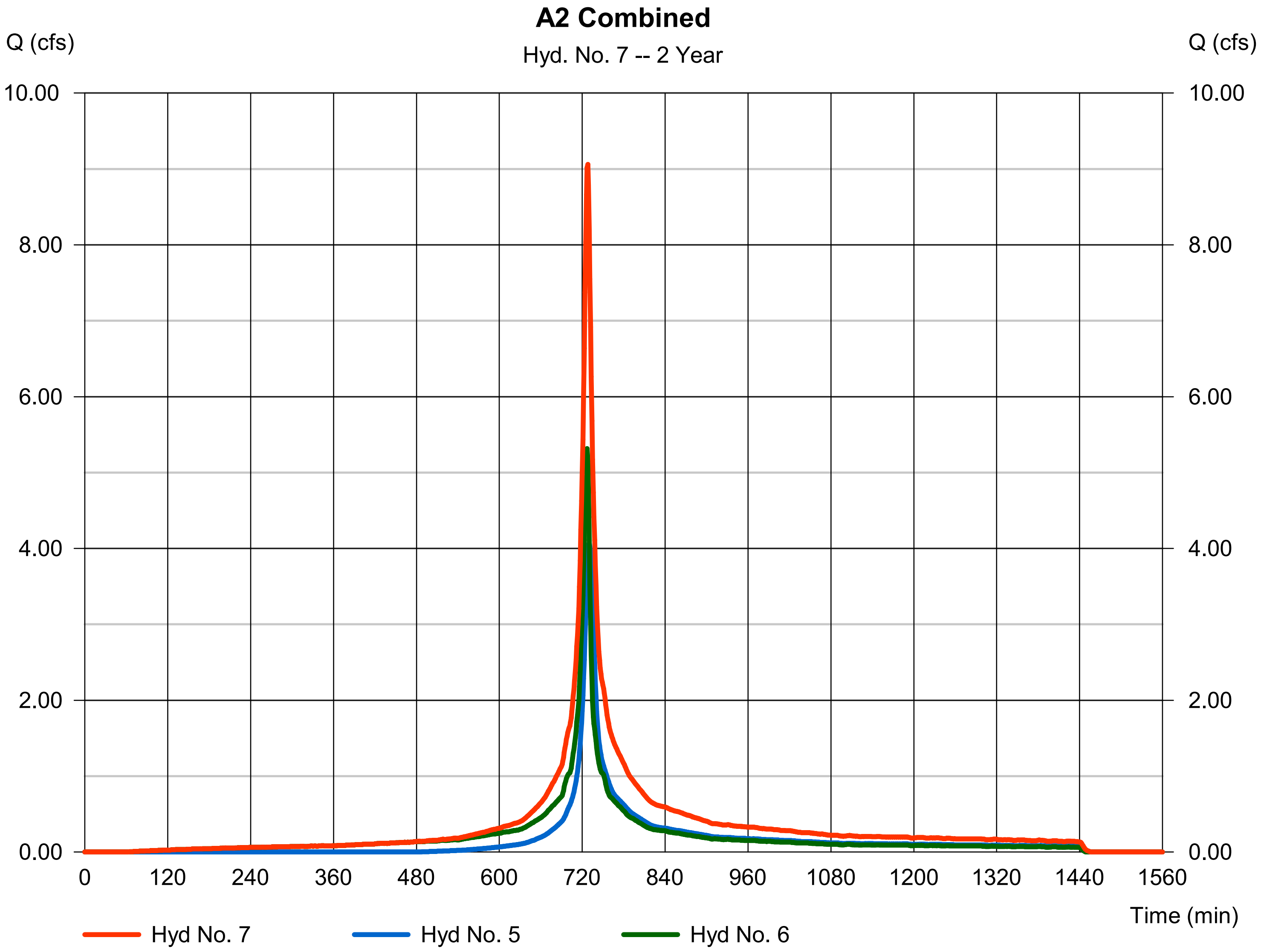
Hydrograph Report

Hyd. No. 7

A2 Combined

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 5, 6

Peak discharge = 9.060 cfs
Time to peak = 728 min
Hyd. volume = 34,209 cuft
Contrib. drain. area = 3.390 ac



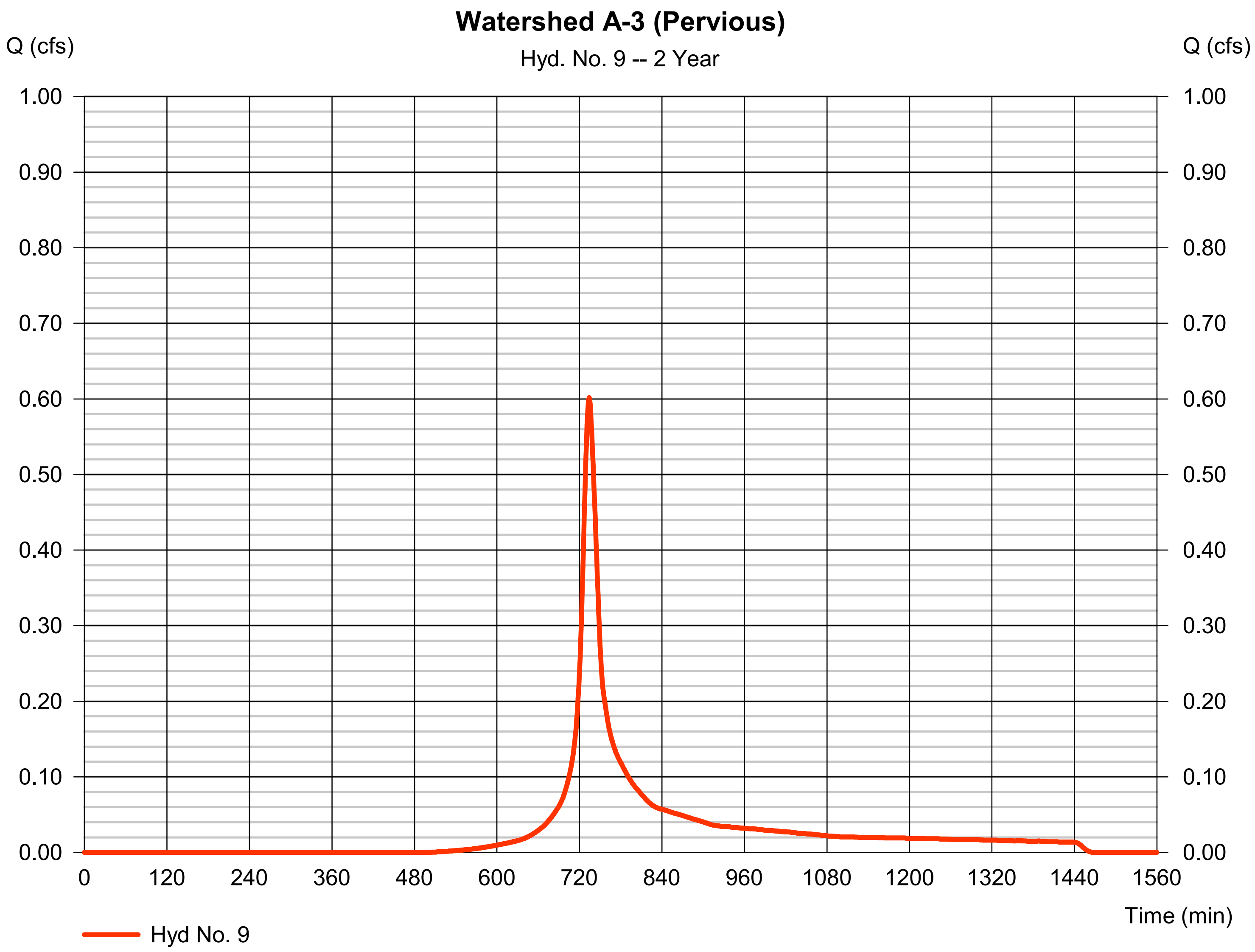
Hydrograph Report

Hyd. No. 9

Watershed A-3 (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.602 cfs
Storm frequency	= 2 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 2,644 cuft
Drainage area	= 0.380 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 3.97 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 80) + (0.080 x 77)] / 0.380

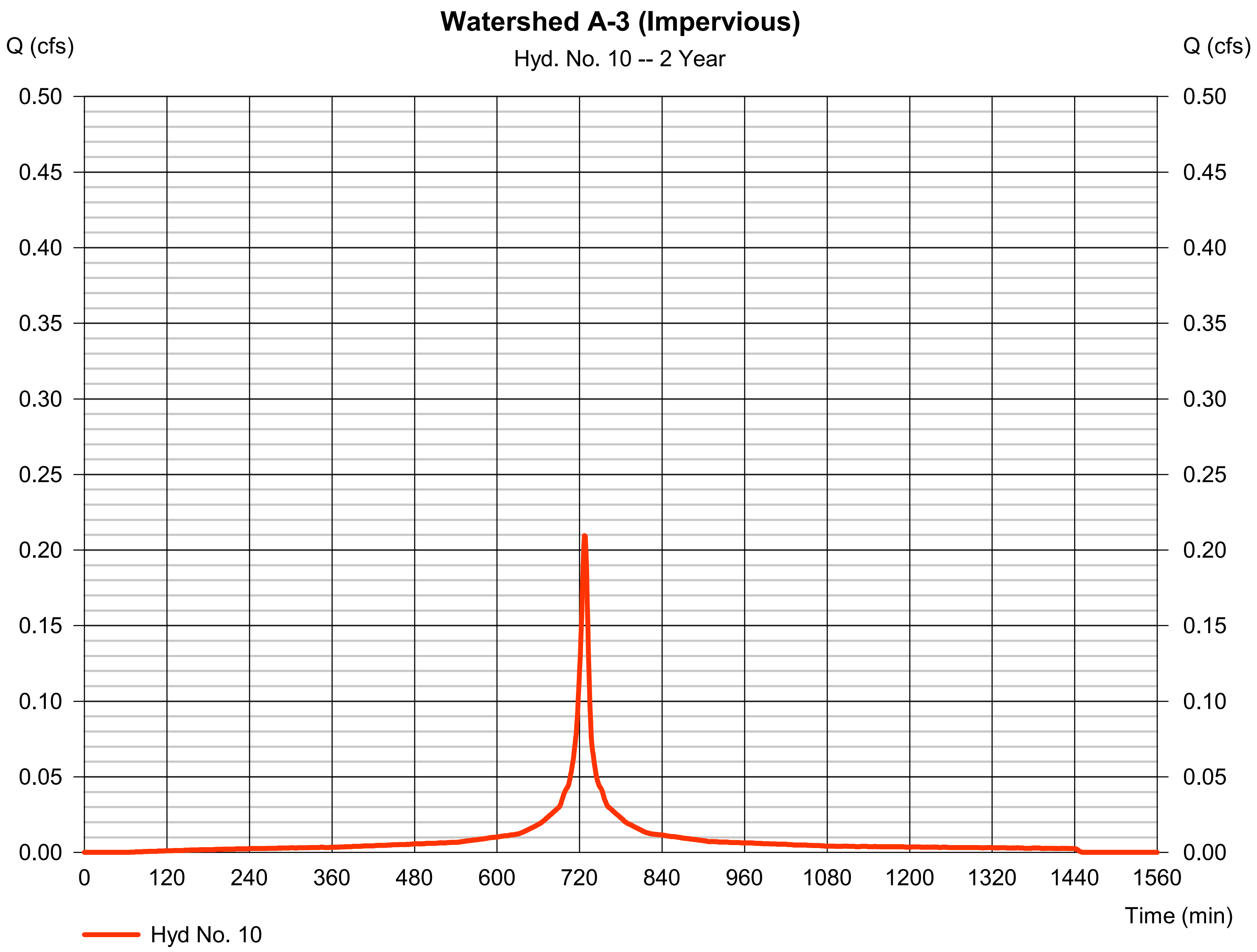


Hydrograph Report

Hyd. No. 10

Watershed A-3 (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.209 cfs
Storm frequency	=	2 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	793 cuft
Drainage area	=	0.060 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	8.00 min
Total precip.	=	3.97 in	Distribution	=	Custom
Storm duration	=	\\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	=	484

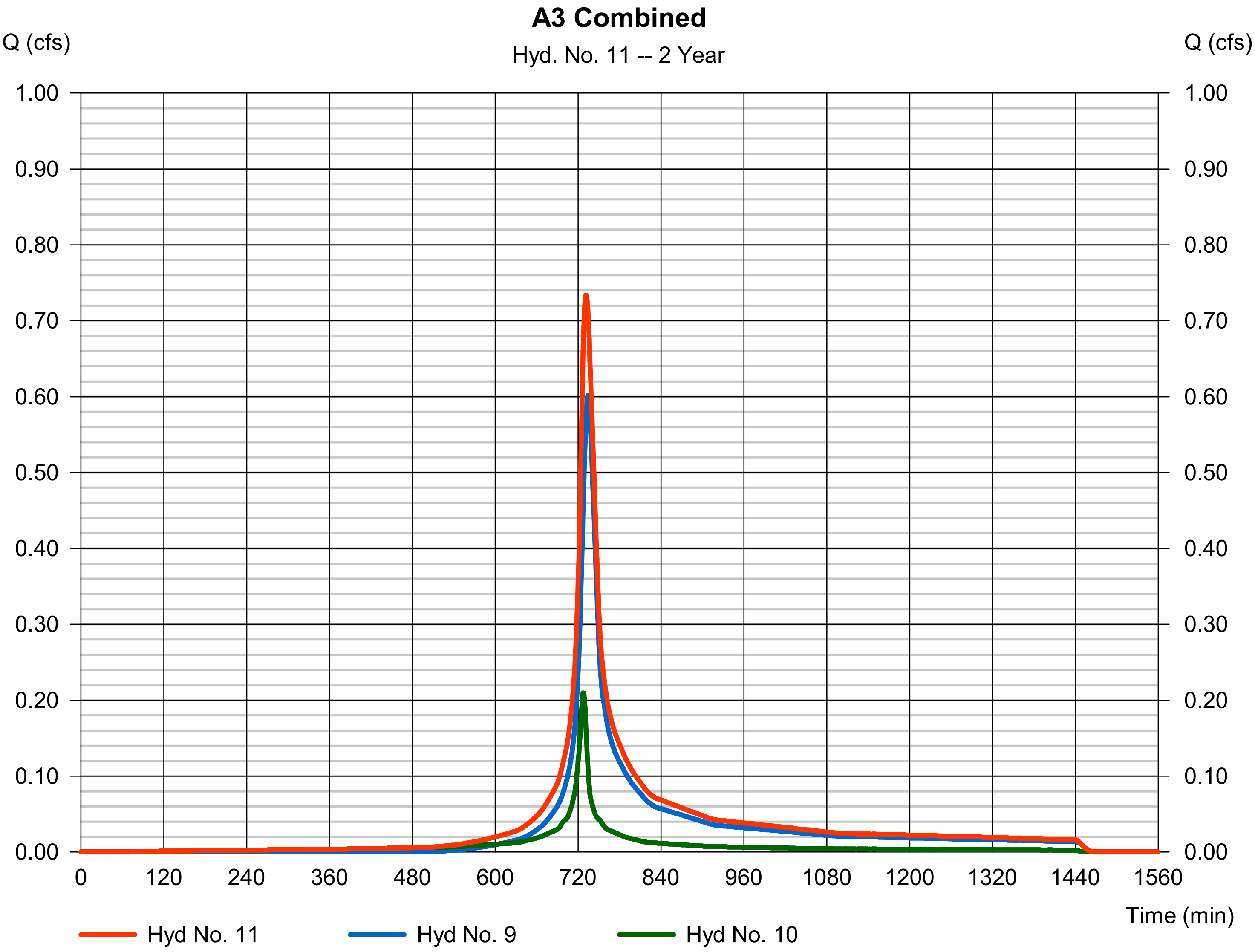


Hydrograph Report

Hyd. No. 11

A3 Combined

Hydrograph type	= Combine	Peak discharge	= 0.734 cfs
Storm frequency	= 2 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 3,438 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 0.440 ac



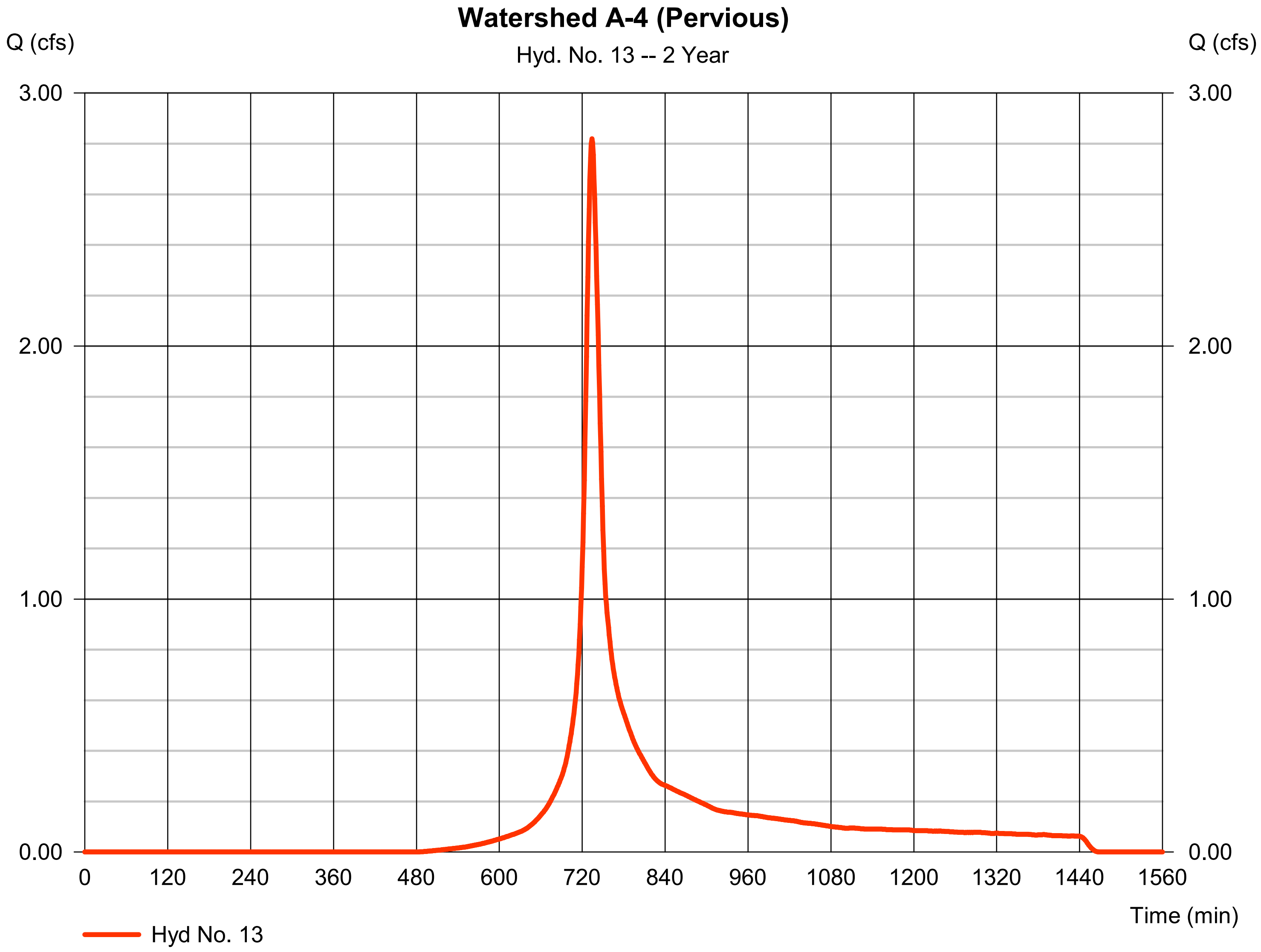
Hydrograph Report

Hyd. No. 13

Watershed A-4 (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.819 cfs
Storm frequency	= 2 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 12,377 cuft
Drainage area	= 1.710 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 17.00 min
Total precip.	= 3.97 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor	Shape factor	= 484

* Composite (Area/CN) = [(1.470 x 80) + (0.240 x 77)] / 1.710

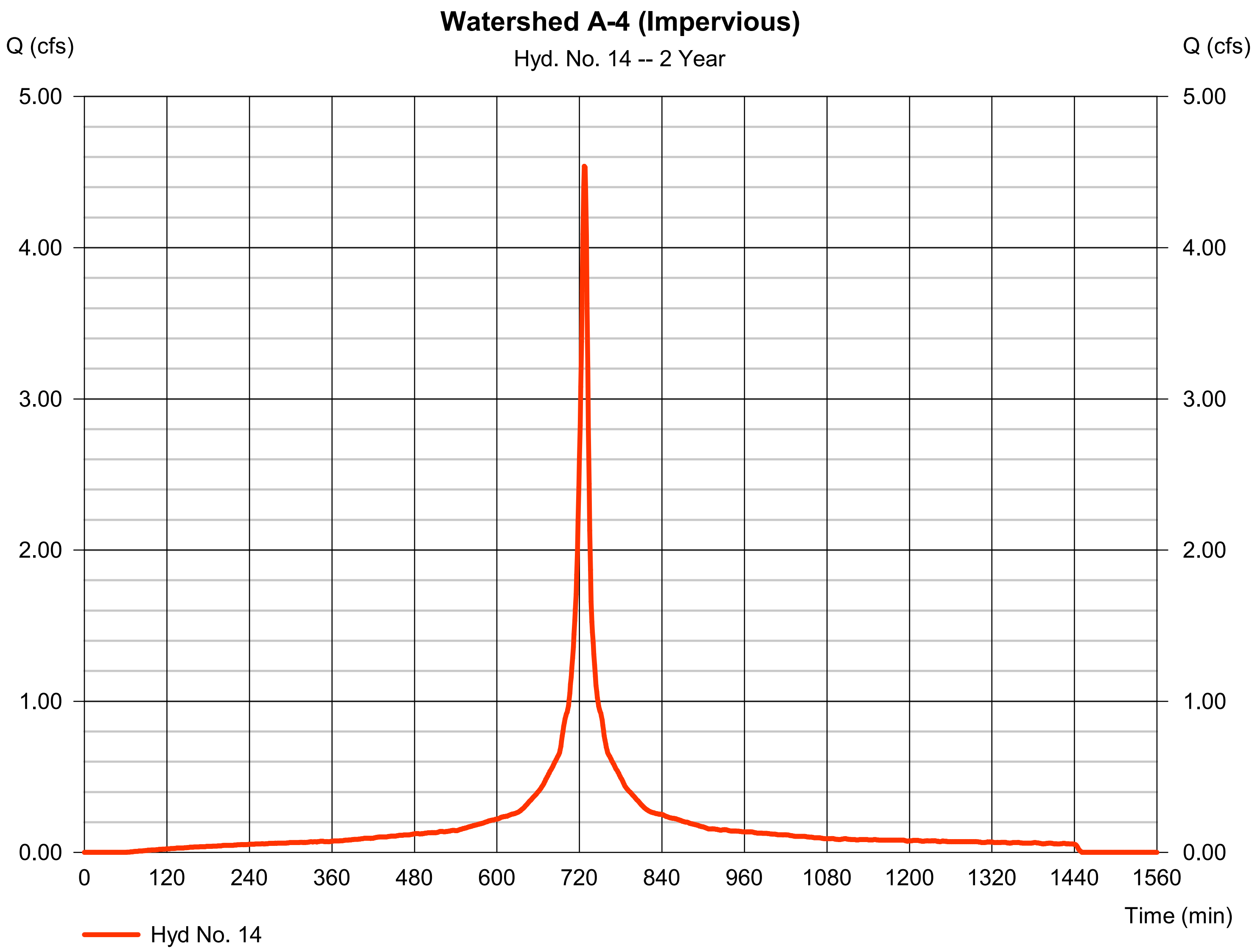


Hyd. No. 14

Watershed A-4 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.300 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 4.539 cfs
Time to peak = 727 min
Hyd. volume = 17,186 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 7.00 min
Distribution = Custom
Shape factor = 484

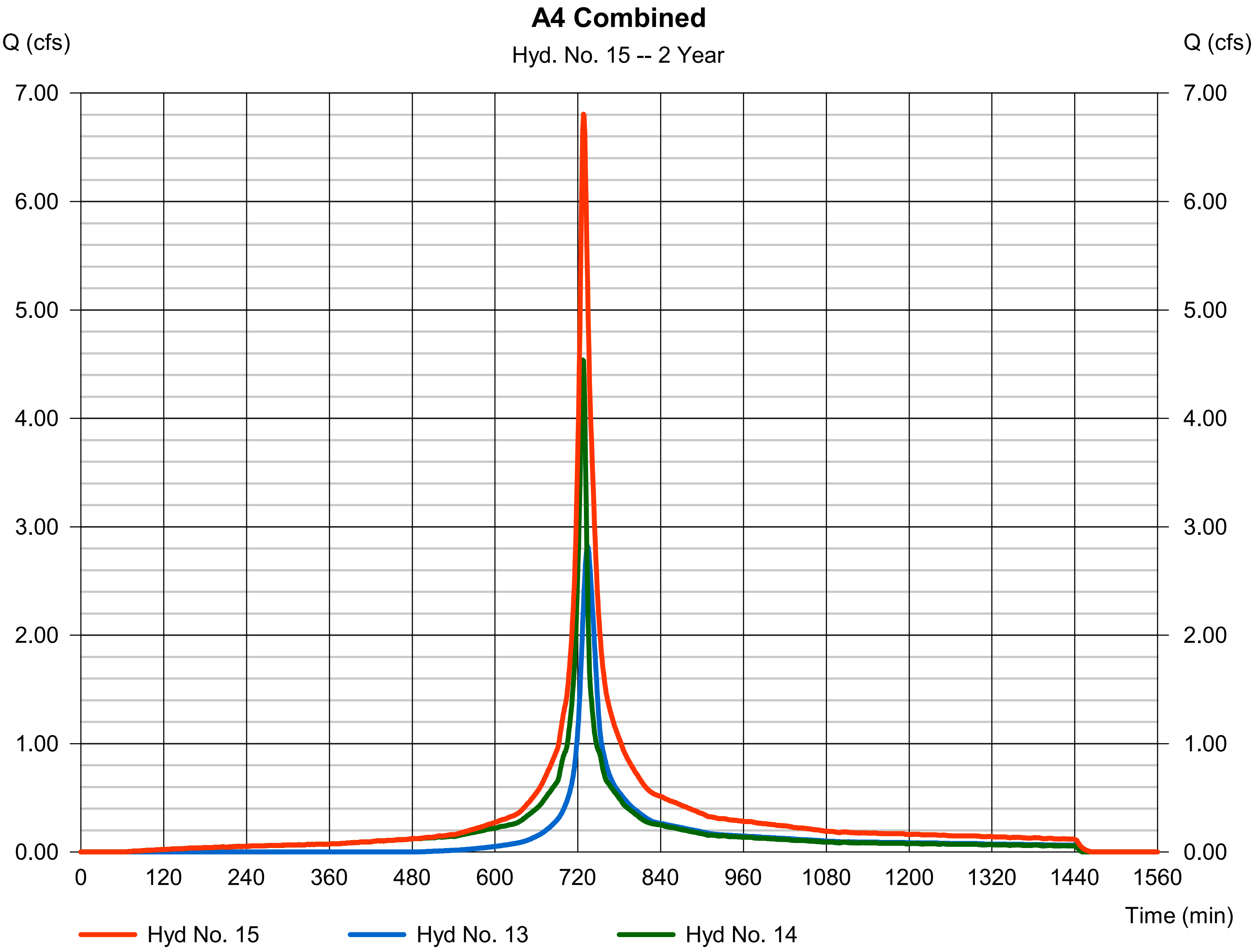


Hydrograph Report

Hyd. No. 15

A4 Combined

Hydrograph type	= Combine	Peak discharge	= 6.804 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 29,563 cuft
Inflow hyds.	= 13, 14	Contrib. drain. area	= 3.010 ac



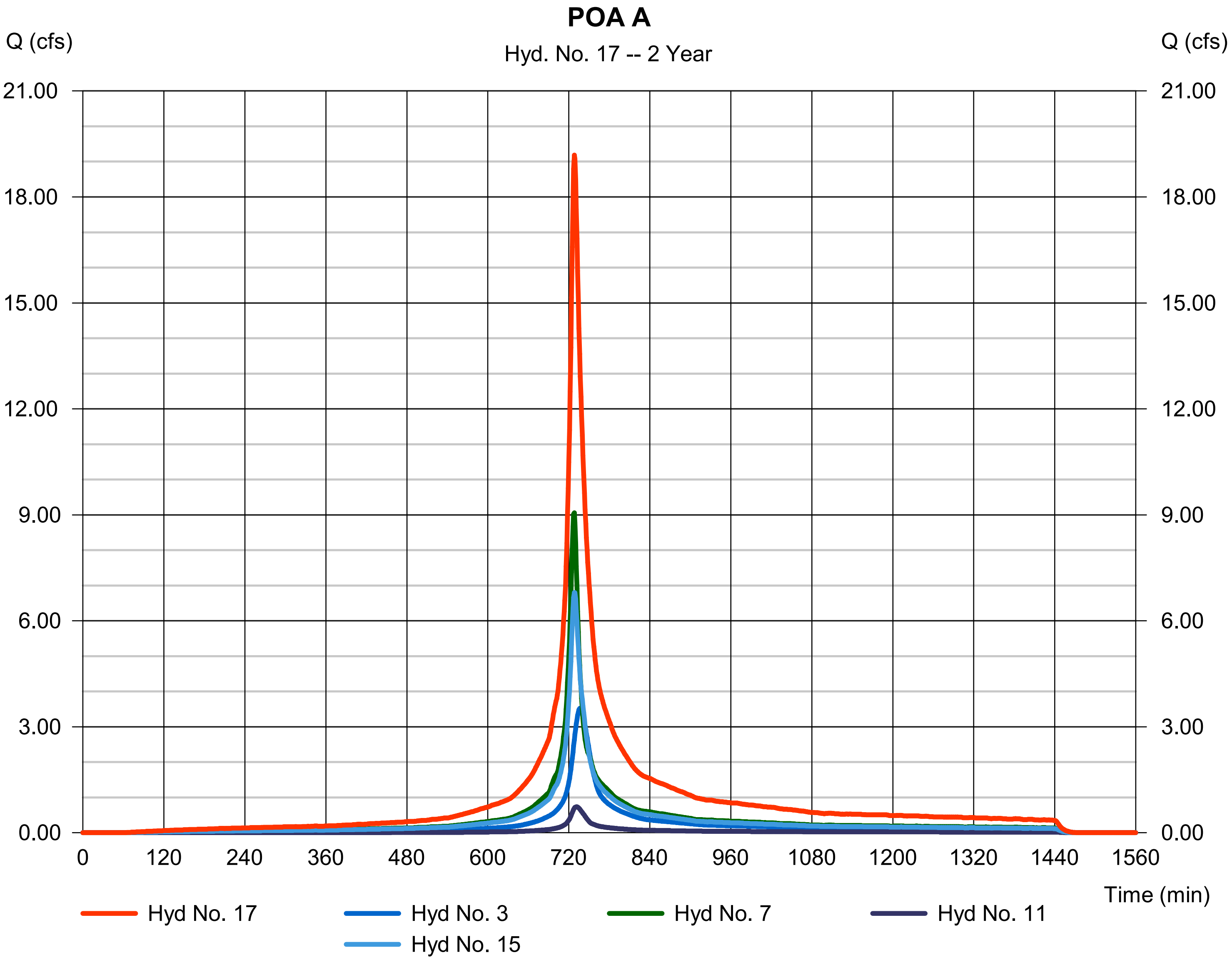
Hydrograph Report

Hyd. No. 17

POA A

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 3, 7, 11, 15

Peak discharge = 19.18 cfs
Time to peak = 728 min
Hyd. volume = 85,669 cuft
Contrib. drain. area = 0.000 ac

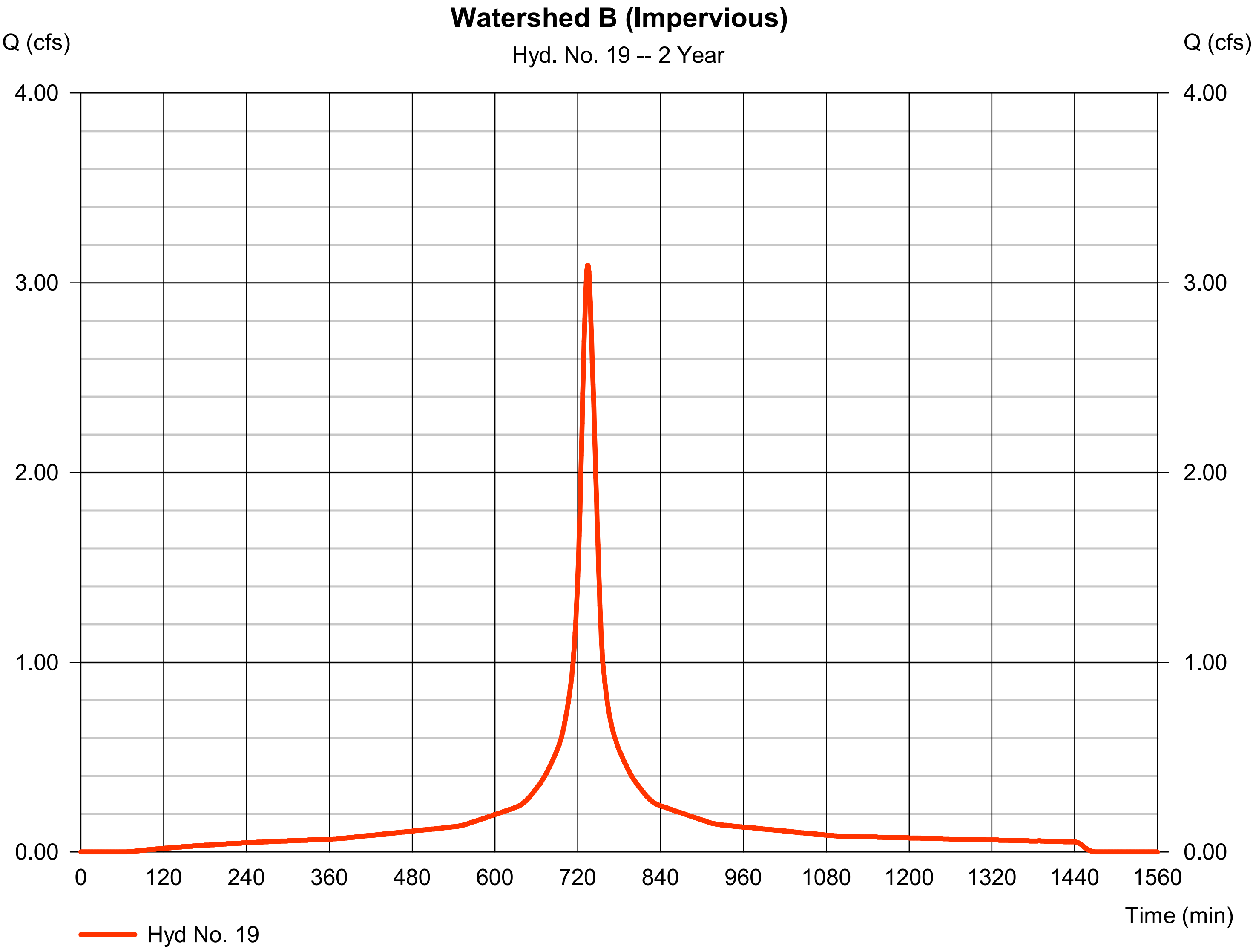


Hydrograph Report

Hyd. No. 19

Watershed B (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.094 cfs
Storm frequency	= 2 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 16,135 cuft
Drainage area	= 1.190 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.00 min
Total precip.	= 3.97 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	= 484



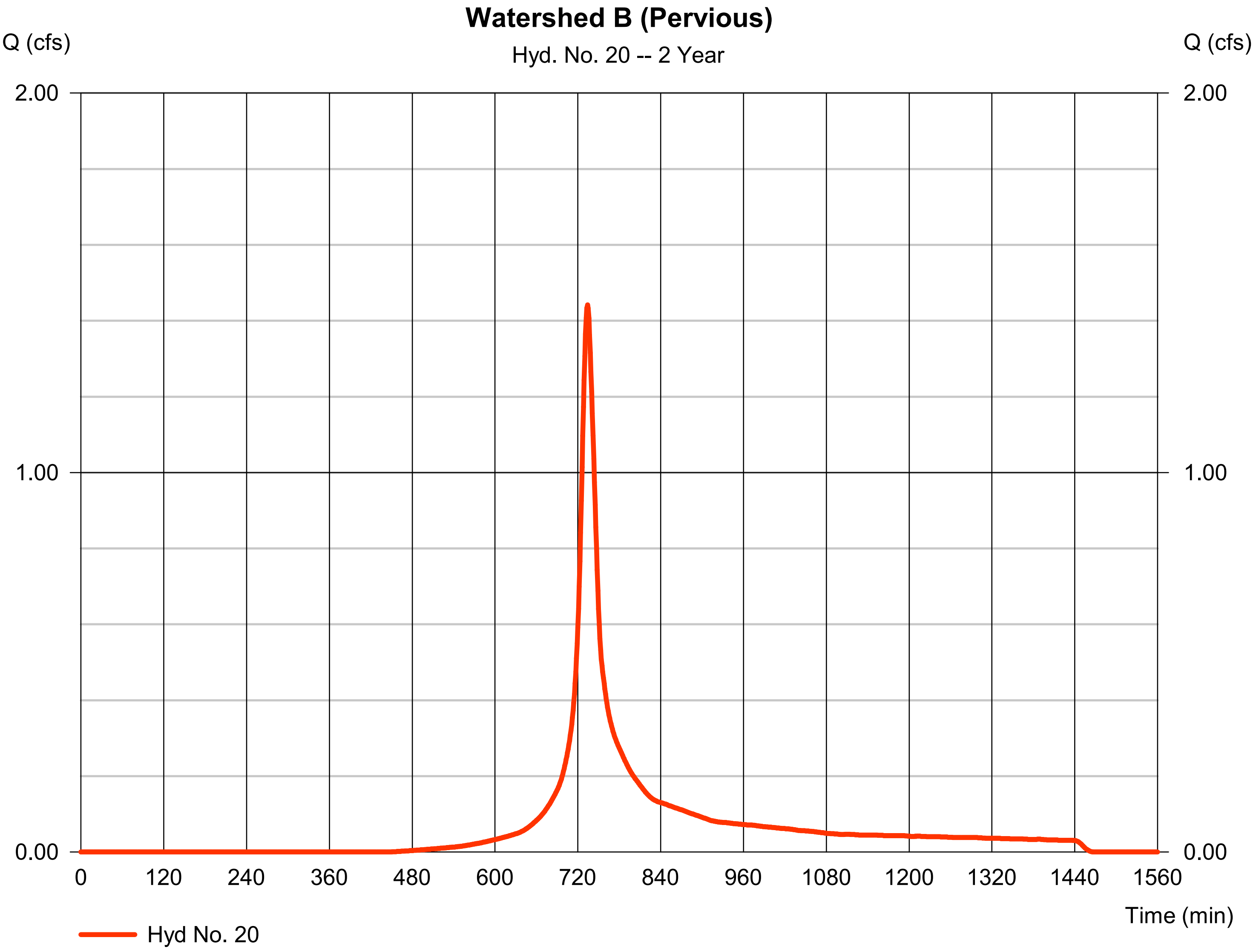
Hydrograph Report

Hyd. No. 20

Watershed B (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 1.442 cfs
Time to peak = 734 min
Hyd. volume = 6,329 cuft
Curve number = 82
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Custom
Shape factor = 484



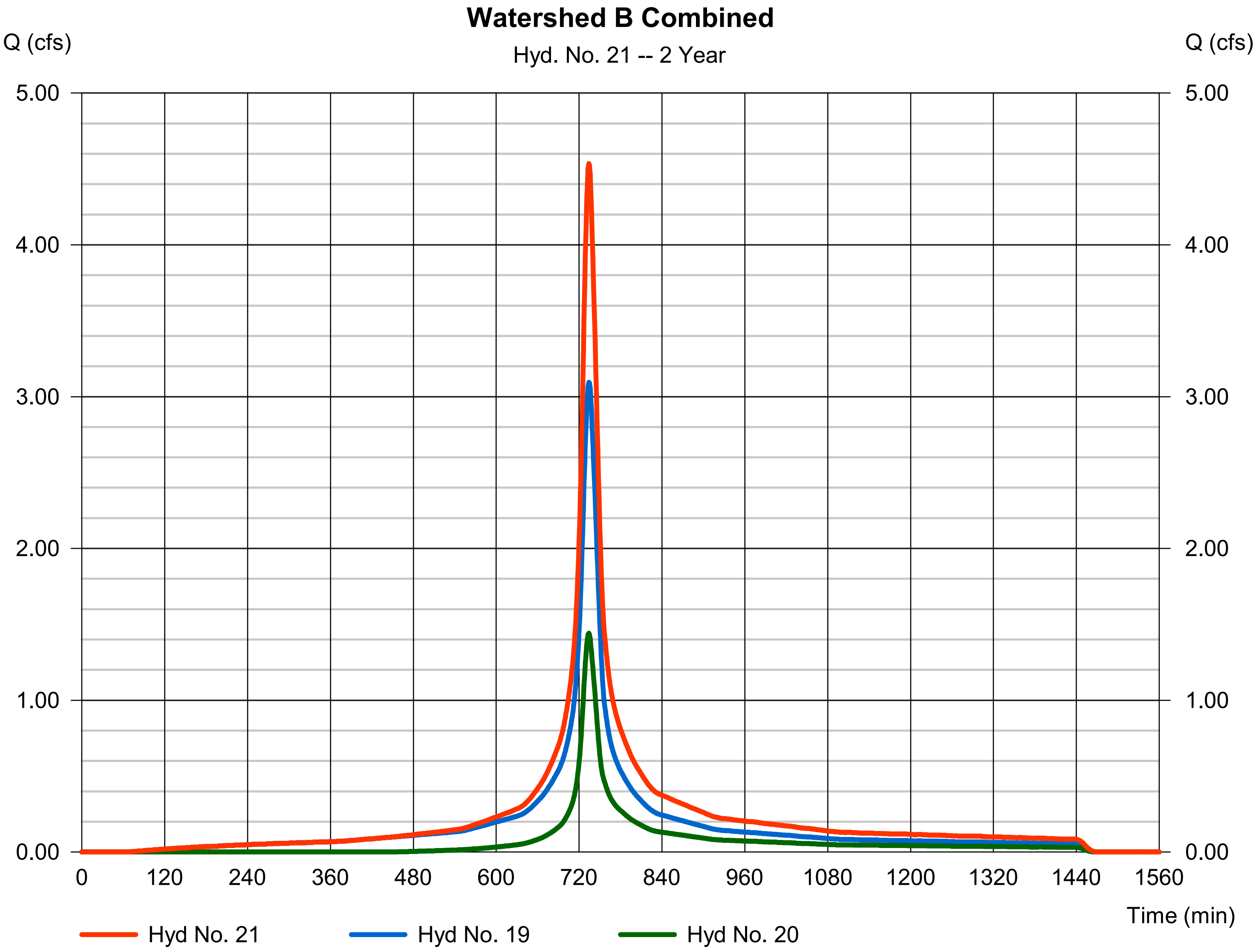
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 02 / 21 / 2023

Hyd. No. 21

Watershed B Combined

Hydrograph type	= Combine	Peak discharge	= 4.536 cfs
Storm frequency	= 2 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 22,464 cuft
Inflow hyds.	= 19, 20	Contrib. drain. area	= 2.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

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	4.464	1	738	22,812	------	------	------	Watershed A-1 (Pervious)
2	SCS Runoff	2.072	1	734	10,981	------	------	------	Watershed A-1 (Impervious)
3	Combine	6.445	1	737	33,793	1, 2	------	------	A1 Combined
5	SCS Runoff	7.856	1	730	29,369	------	------	------	Watershed A-2 (Pervious)
6	SCS Runoff	8.300	1	727	30,421	------	------	------	Watershed A-2 (Impervious)
7	Combine	15.66	1	728	59,790	5, 6	------	------	A2 Combined
9	SCS Runoff	1.184	1	734	5,226	------	------	------	Watershed A-3 (Pervious)
10	SCS Runoff	0.327	1	727	1,260	------	------	------	Watershed A-3 (Impervious)
11	Combine	1.392	1	732	6,485	9, 10	------	------	A3 Combined
13	SCS Runoff	5.459	1	734	24,148	------	------	------	Watershed A-4 (Pervious)
14	SCS Runoff	7.089	1	727	27,292	------	------	------	Watershed A-4 (Impervious)
15	Combine	11.61	1	729	51,440	13, 14	------	------	A4 Combined
17	Combine	33.42	1	728	151,508	3, 7, 11, 15,	------	------	POA A
19	SCS Runoff	4.834	1	734	25,623	------	------	------	Watershed B (Impervious)
20	SCS Runoff	2.707	1	734	12,046	------	------	------	Watershed B (Pervious)
21	Combine	7.541	1	734	37,669	19, 20	------	------	Watershed B Combined

Hydrograph Report

Hyd. No. 1

Watershed A-1 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.640 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 4.464 cfs
Time to peak = 738 min
Hyd. volume = 22,812 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 25.00 min
Distribution = Custom
Shape factor = 484

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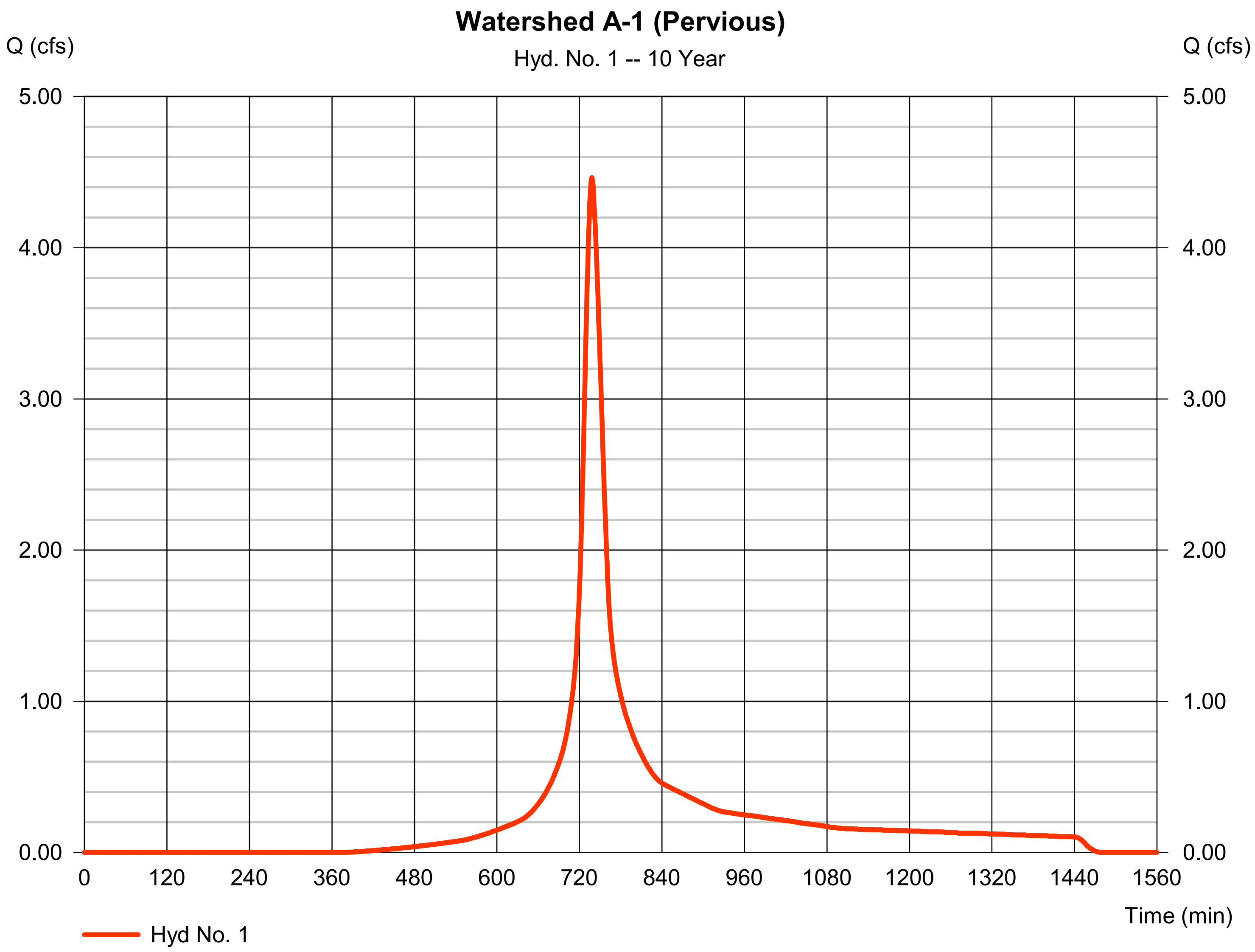
* Composite (Area/CN) = [(1.160 x 80) + (0.480 x 77)] / 1.640



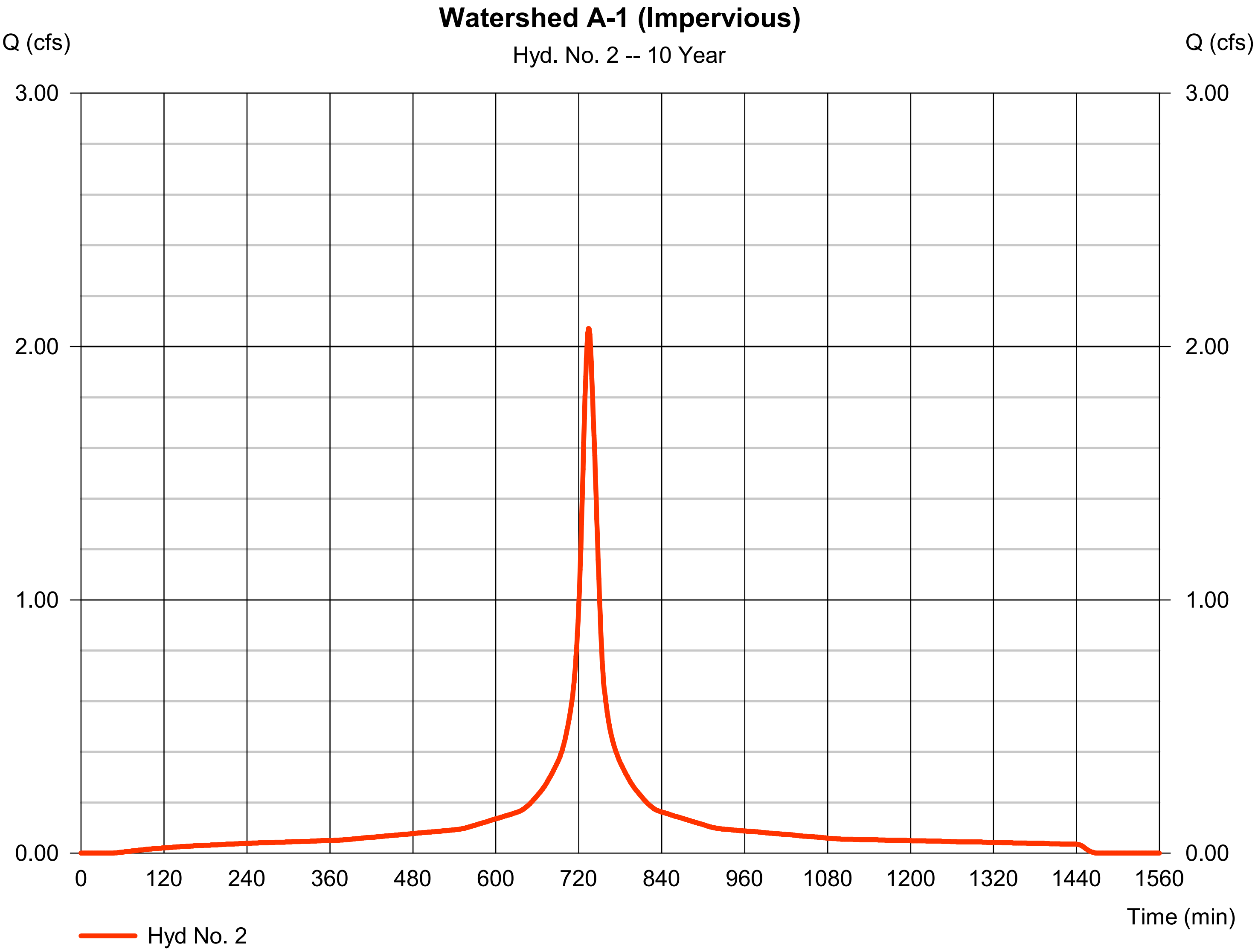
Hydrograph Report

Hyd. No. 2

Watershed A-1 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.510 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 2.072 cfs
Time to peak = 734 min
Hyd. volume = 10,981 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 20.00 min
Distribution = Custom
Shape factor = 484



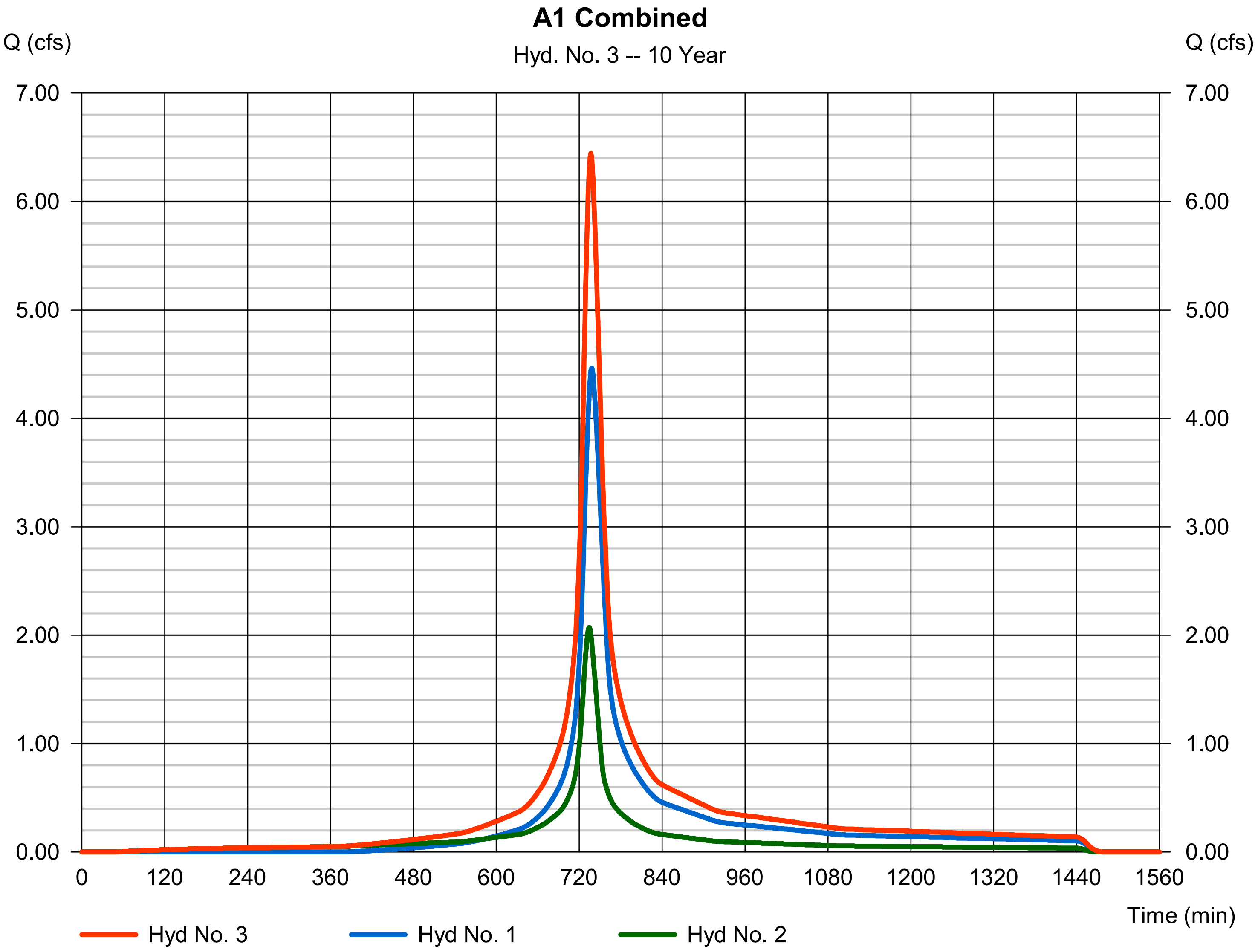
Hydrograph Report

Hyd. No. 3

A1 Combined

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 1, 2

Peak discharge = 6.445 cfs
Time to peak = 737 min
Hyd. volume = 33,793 cuft
Contrib. drain. area = 2.150 ac



Hydrograph Report

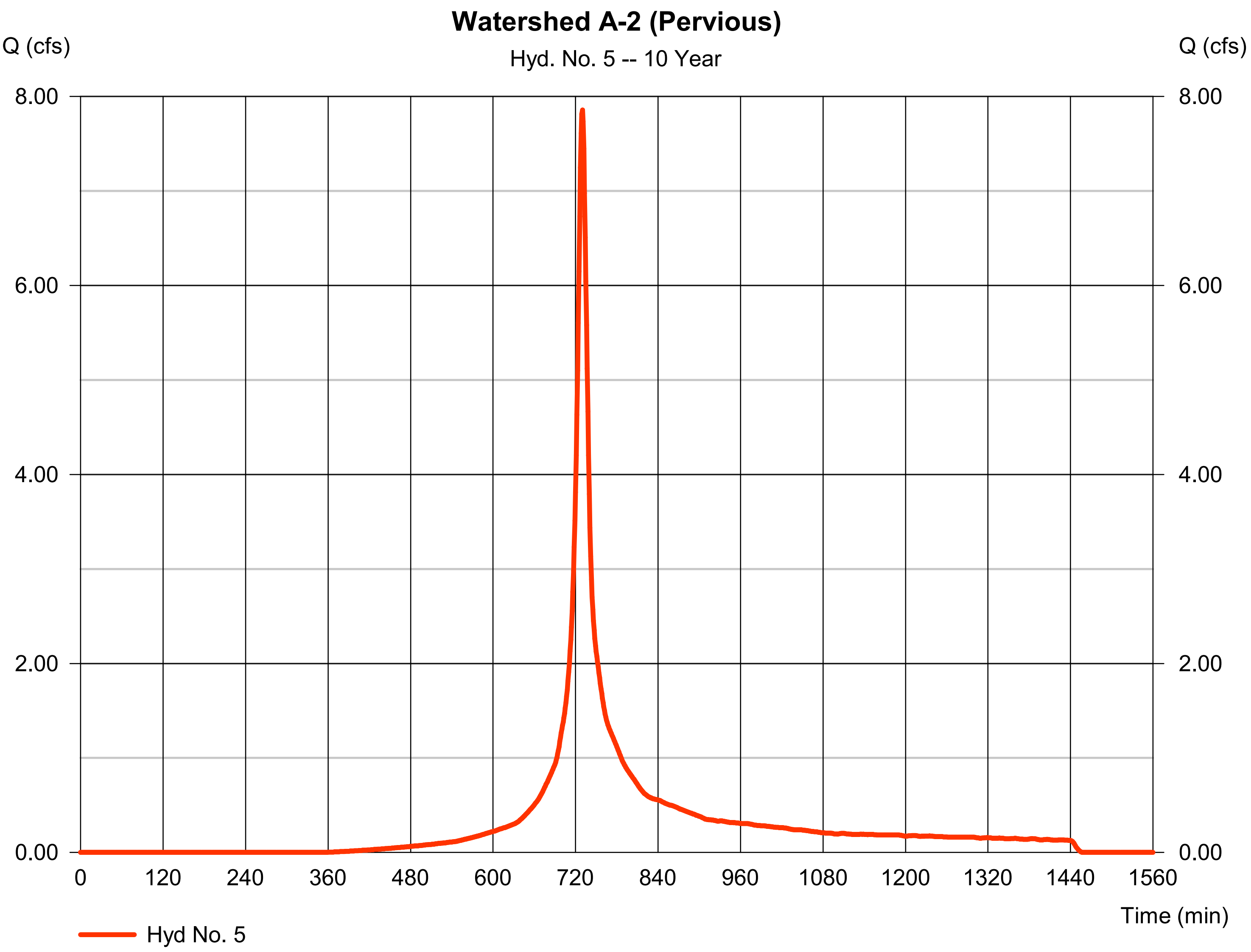
Hyd. No. 5

Watershed A-2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 2.020 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 7.856 cfs
Time to peak = 730 min
Hyd. volume = 29,369 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 11.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(1.850 x 80) + (0.170 x 77)] / 2.020



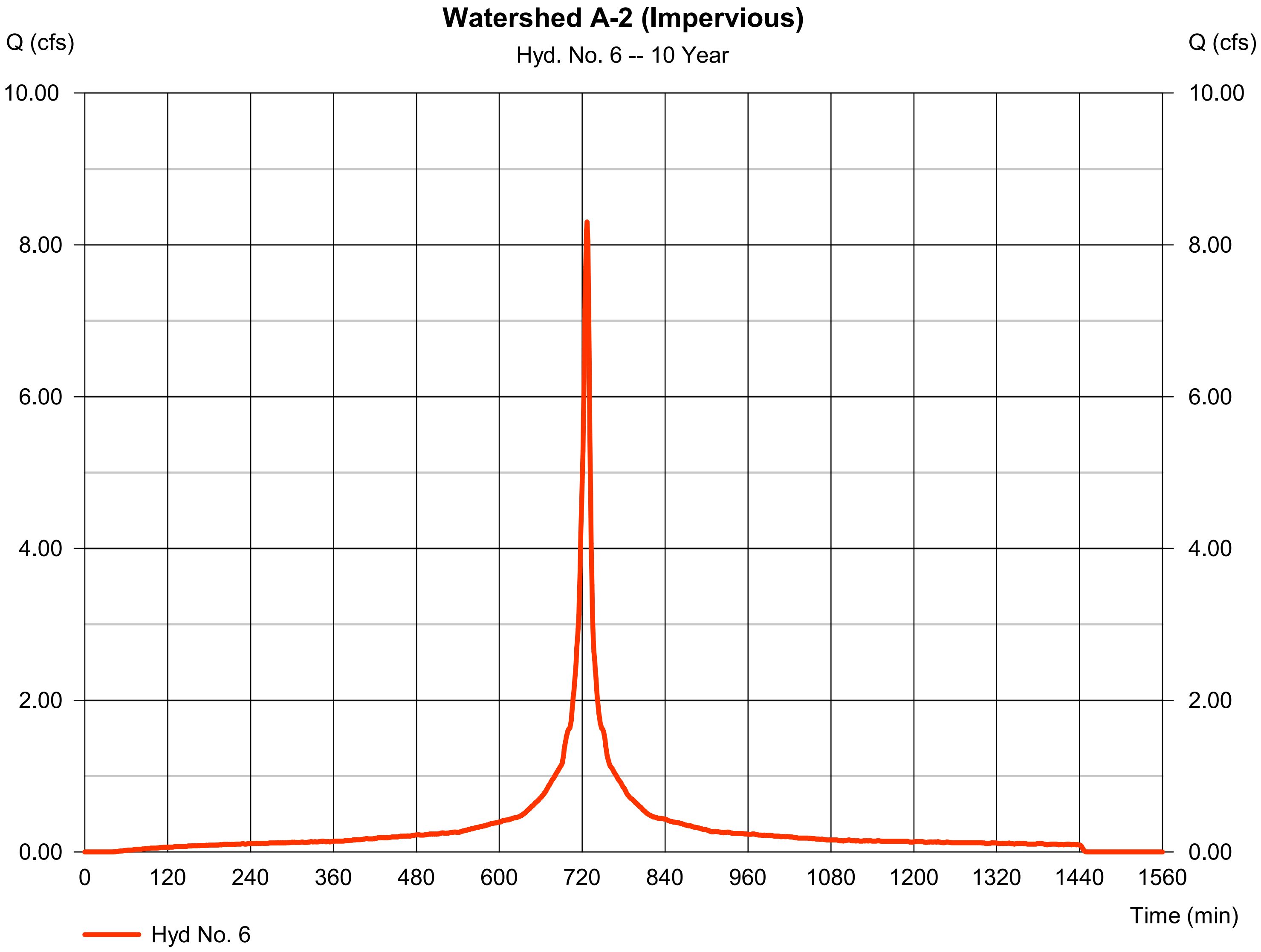
Hydrograph Report

Hyd. No. 6

Watershed A-2 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.370 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 8.300 cfs
Time to peak = 727 min
Hyd. volume = 30,421 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 6.00 min
Distribution = Custom
Shape factor = 484

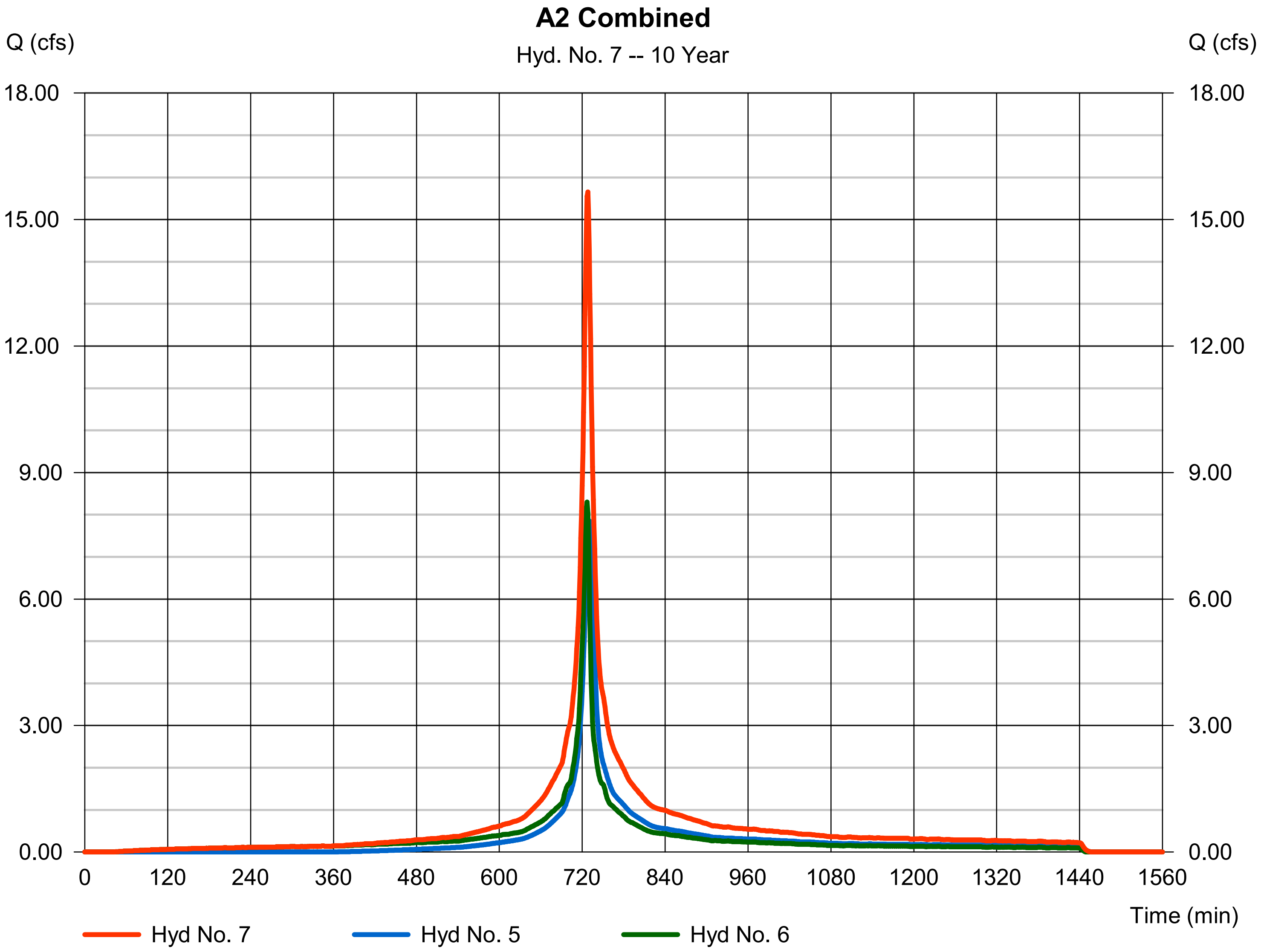


Hydrograph Report

Hyd. No. 7

A2 Combined

Hydrograph type	= Combine	Peak discharge	= 15.66 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 59,790 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 3.390 ac



Hydrograph Report

Hyd. No. 9

Watershed A-3 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.380 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 1.184 cfs
Time to peak = 734 min
Hyd. volume = 5,226 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Custom
Shape factor = 484

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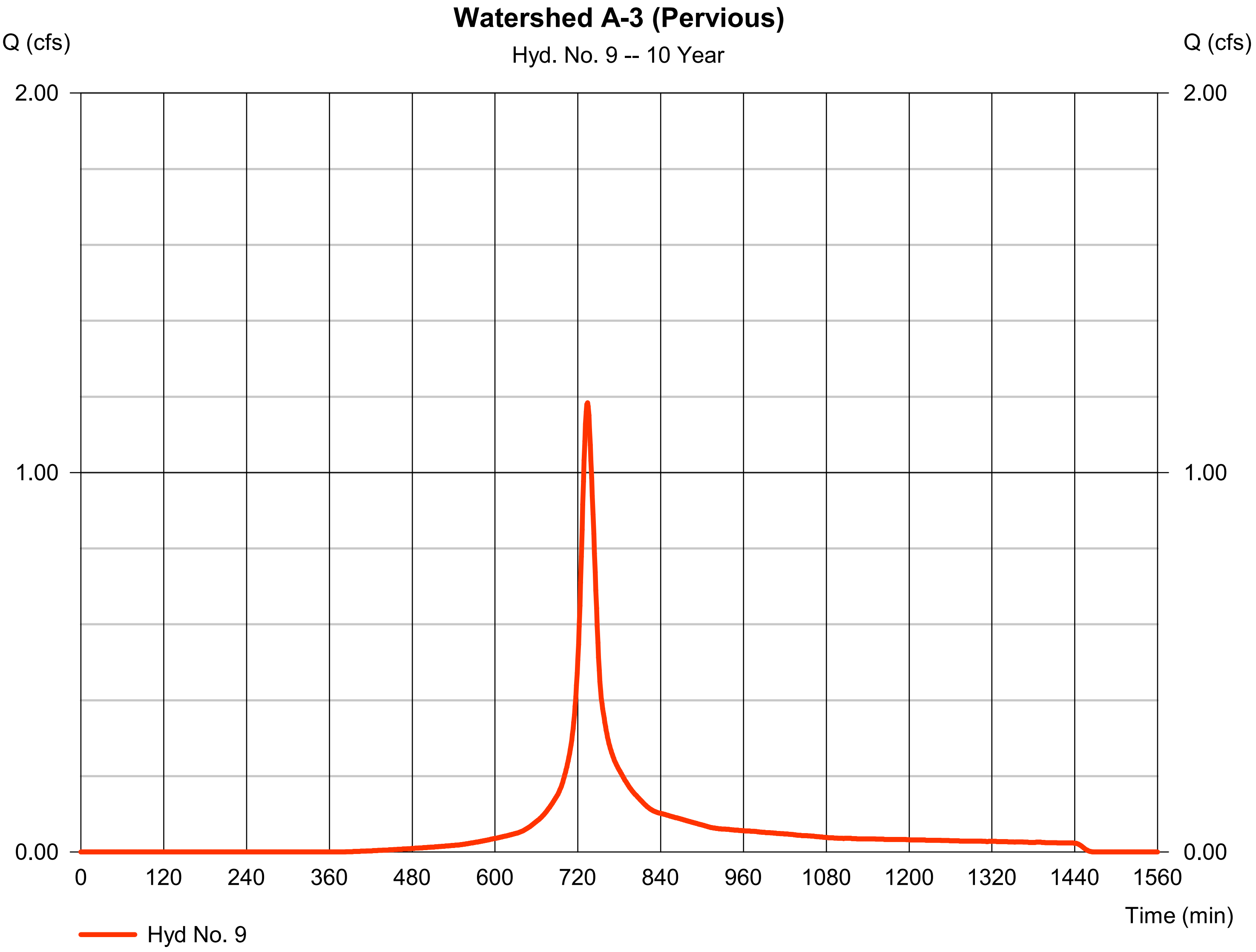
* Composite (Area/CN) = [(0.300 x 80) + (0.080 x 77)] / 0.380

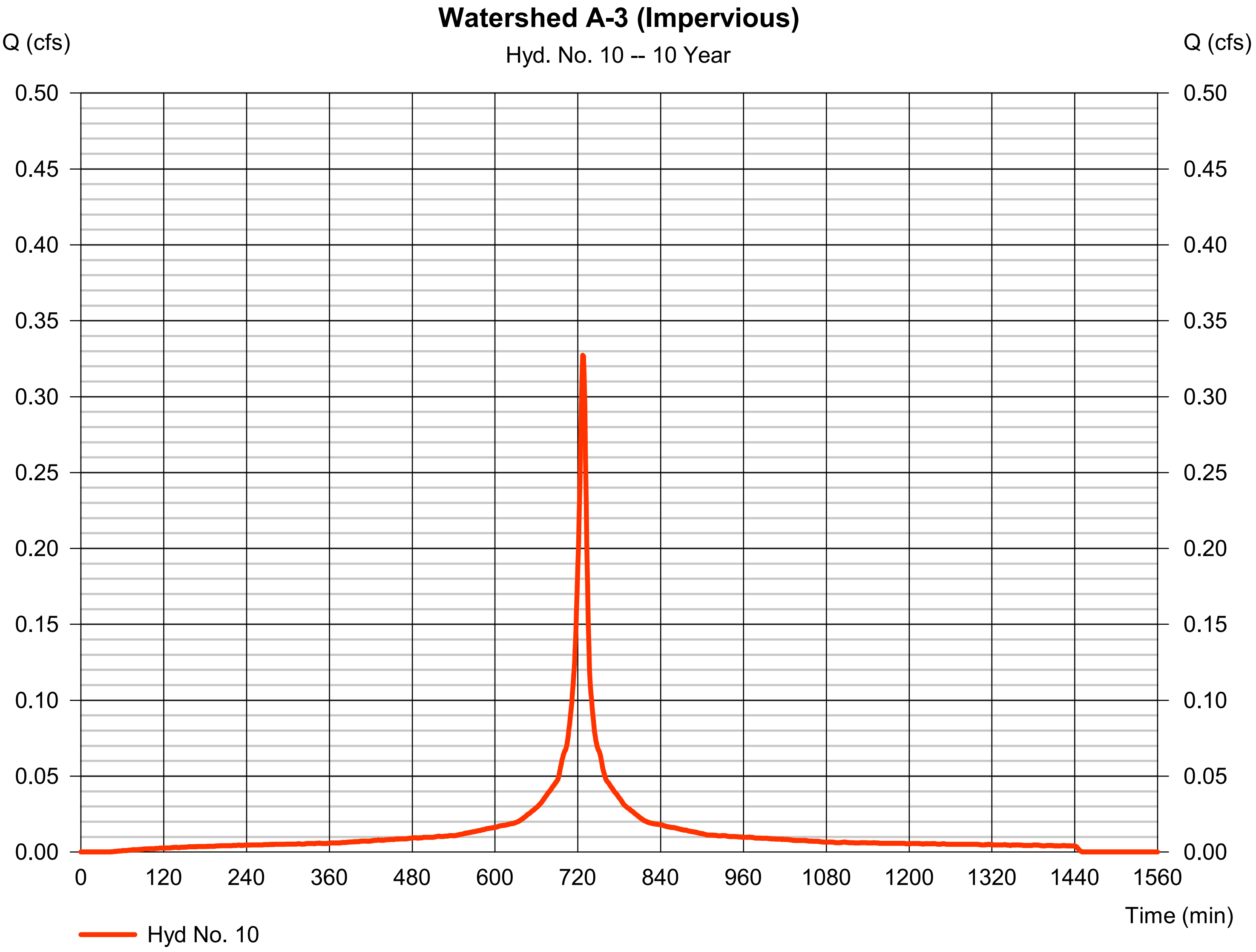


Hyd. No. 10

Watershed A-3 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.060 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.327 cfs
Time to peak = 727 min
Hyd. volume = 1,260 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484

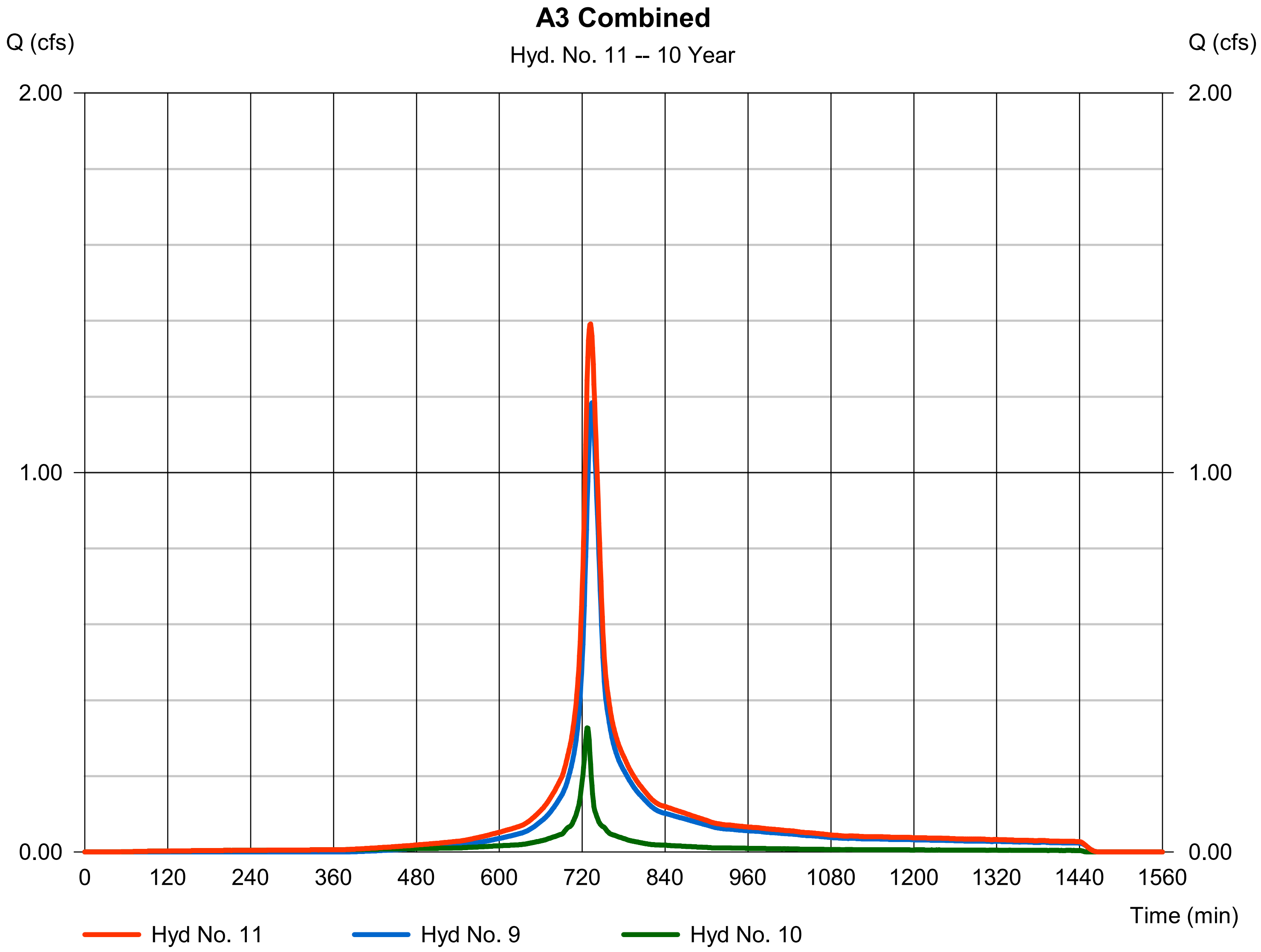


Hydrograph Report

Hyd. No. 11

A3 Combined

Hydrograph type	= Combine	Peak discharge	= 1.392 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 6,485 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 0.440 ac



Hydrograph Report

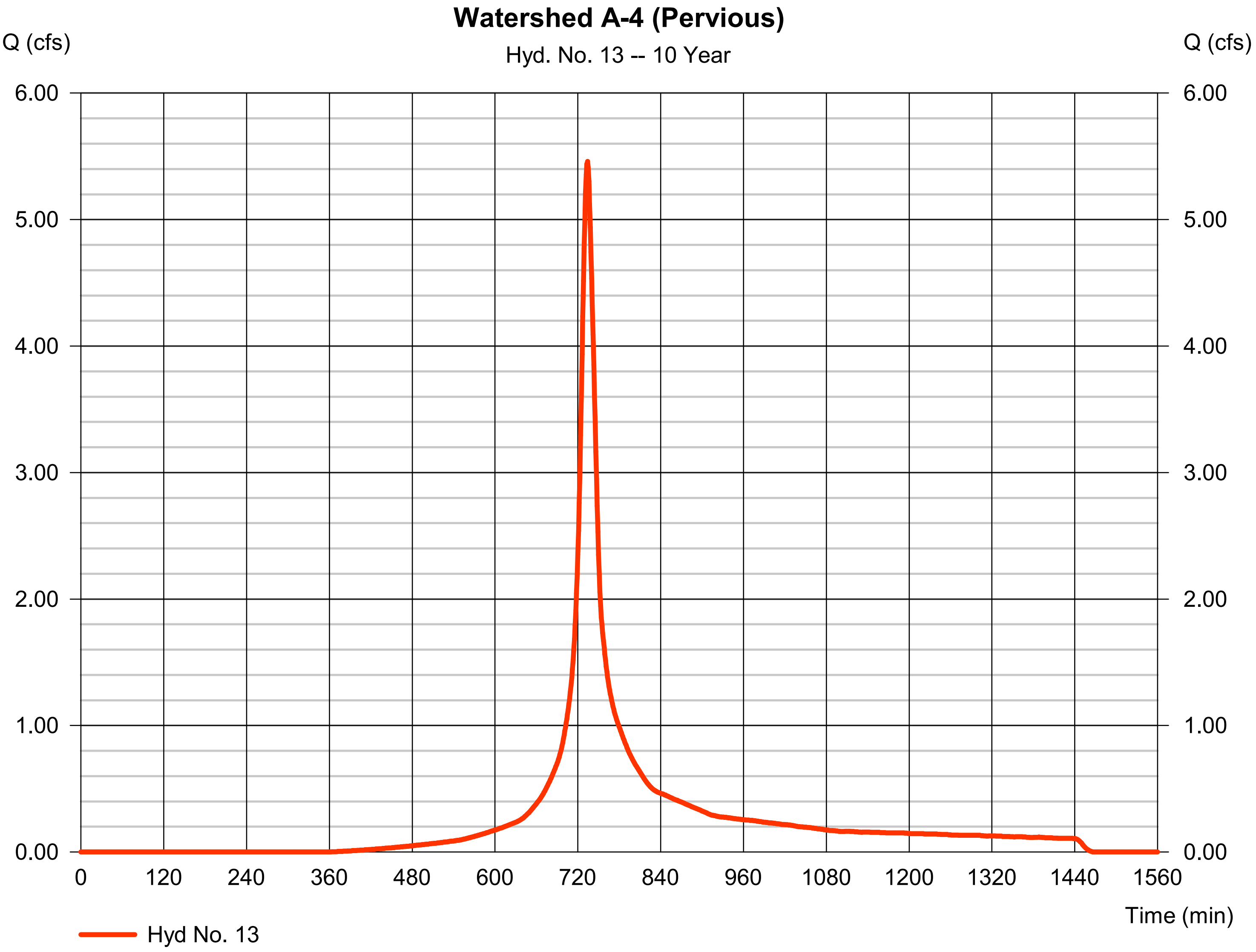
Hyd. No. 13

Watershed A-4 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.710 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 5.459 cfs
Time to peak = 734 min
Hyd. volume = 24,148 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 17.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(1.470 x 80) + (0.240 x 77)] / 1.710



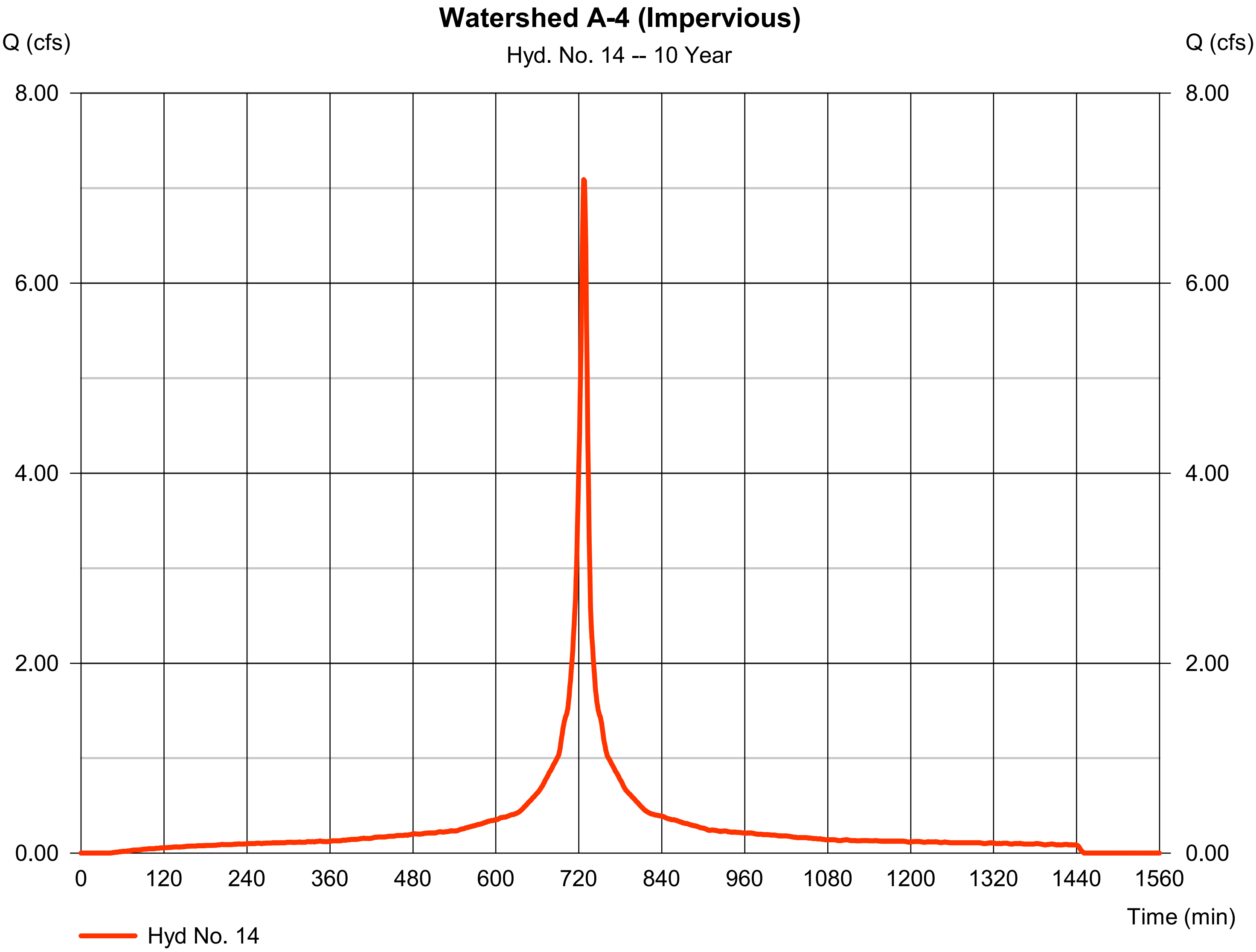
Hydrograph Report

Hyd. No. 14

Watershed A-4 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.300 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 7.089 cfs
Time to peak = 727 min
Hyd. volume = 27,292 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 7.00 min
Distribution = Custom
Shape factor = 484

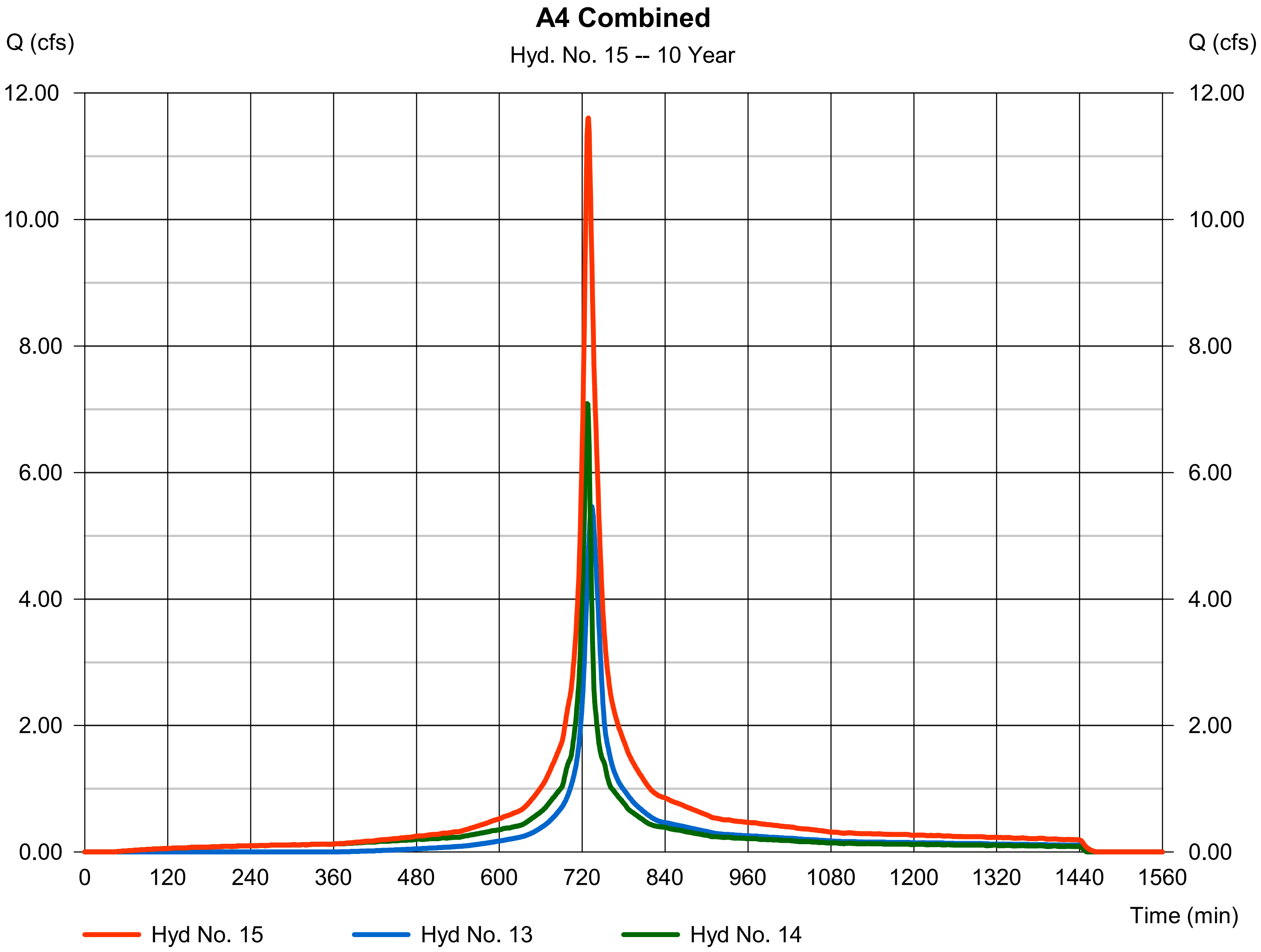


Hydrograph Report

Hyd. No. 15

A4 Combined

Hydrograph type	= Combine	Peak discharge	= 11.61 cfs
Storm frequency	= 10 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 51,440 cuft
Inflow hyds.	= 13, 14	Contrib. drain. area	= 3.010 ac

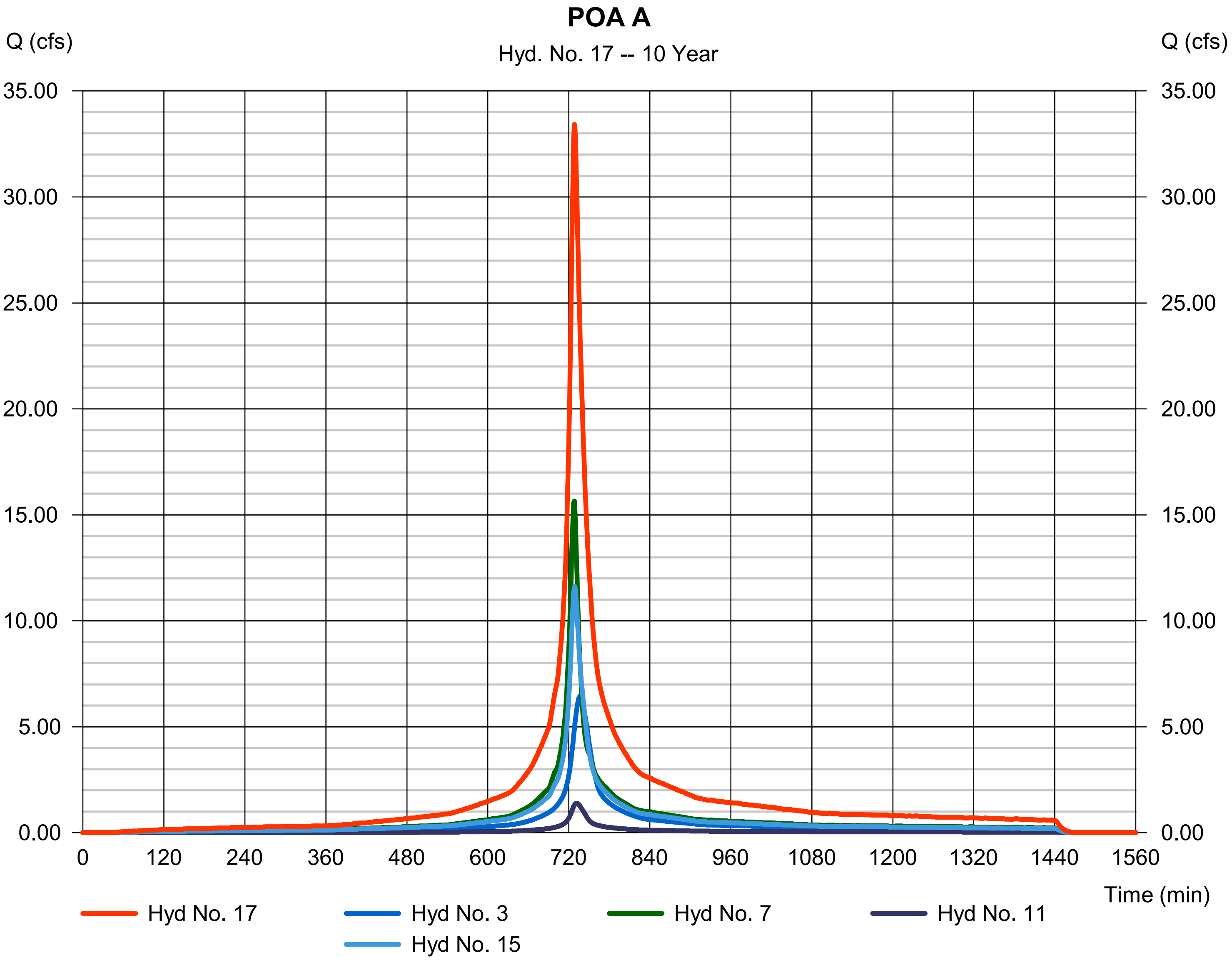


Hydrograph Report

Hyd. No. 17

POA A

Hydrograph type	= Combine	Peak discharge	= 33.42 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 151,508 cuft
Inflow hyds.	= 3, 7, 11, 15	Contrib. drain. area	= 0.000 ac

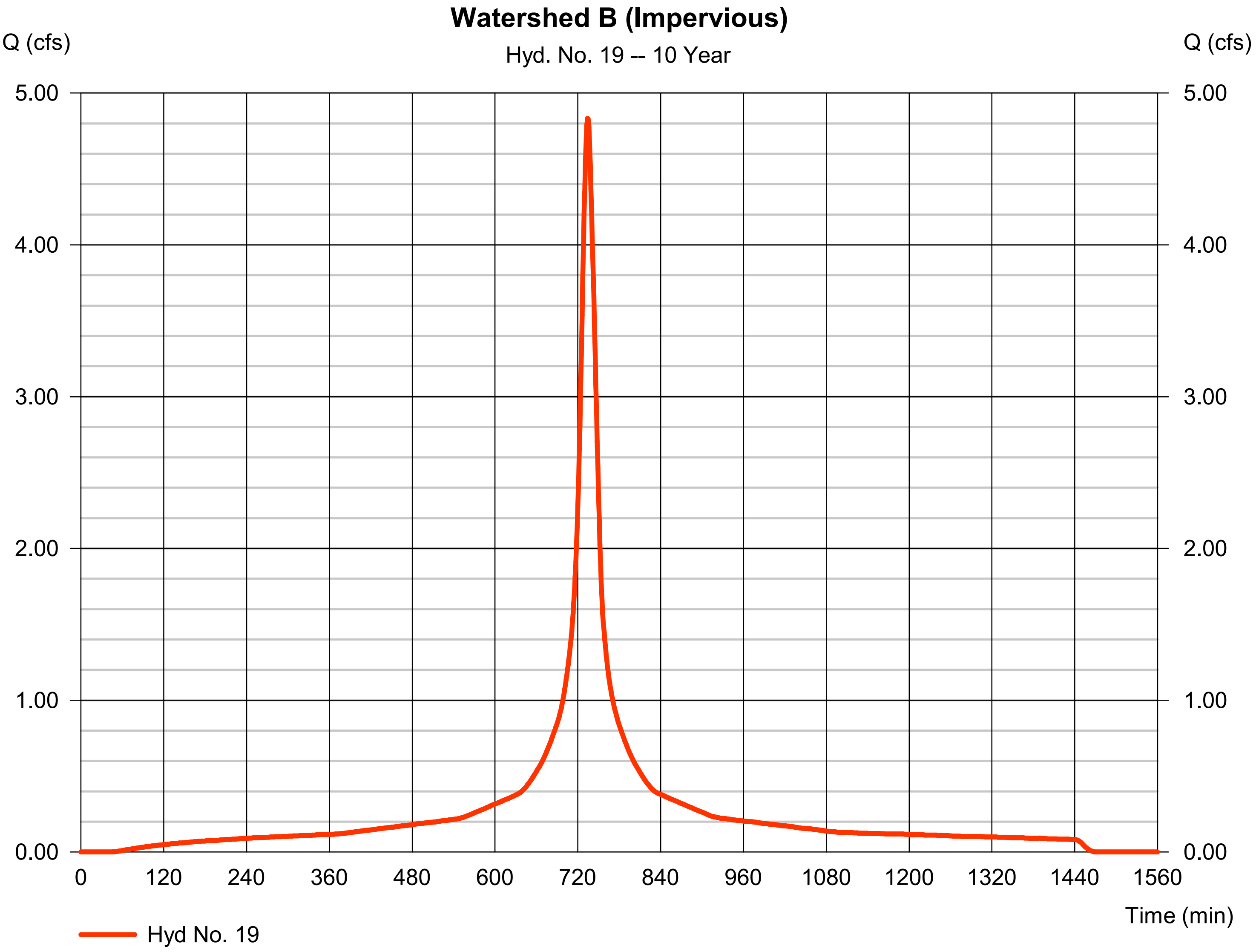


Hydrograph Report

Hyd. No. 19

Watershed B (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.834 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 25,623 cuft
Drainage area	= 1.190 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.00 min
Total precip.	= 6.17 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	= 484



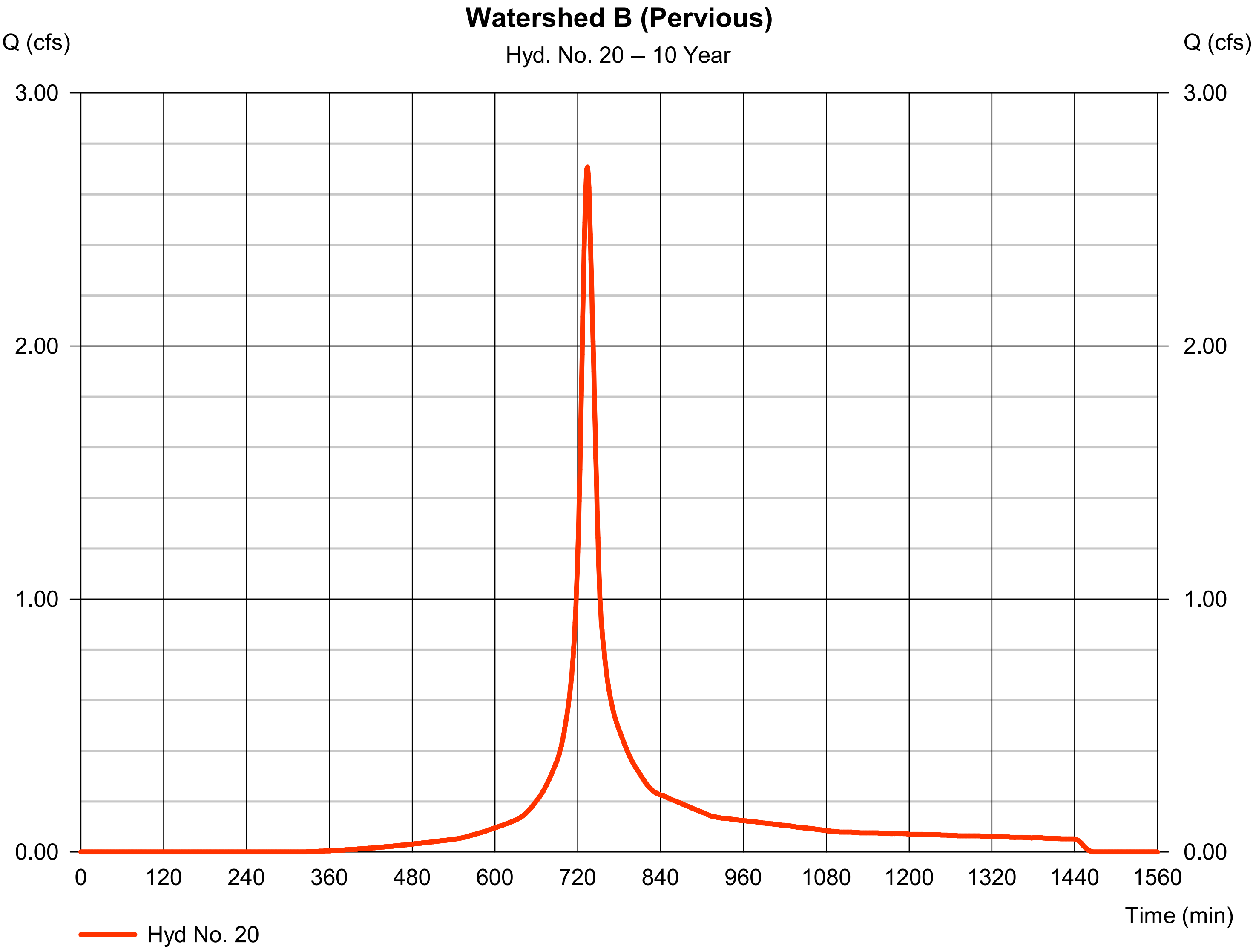
Hydrograph Report

Hyd. No. 20

Watershed B (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 2.707 cfs
Time to peak = 734 min
Hyd. volume = 12,046 cuft
Curve number = 82
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Custom
Shape factor = 484

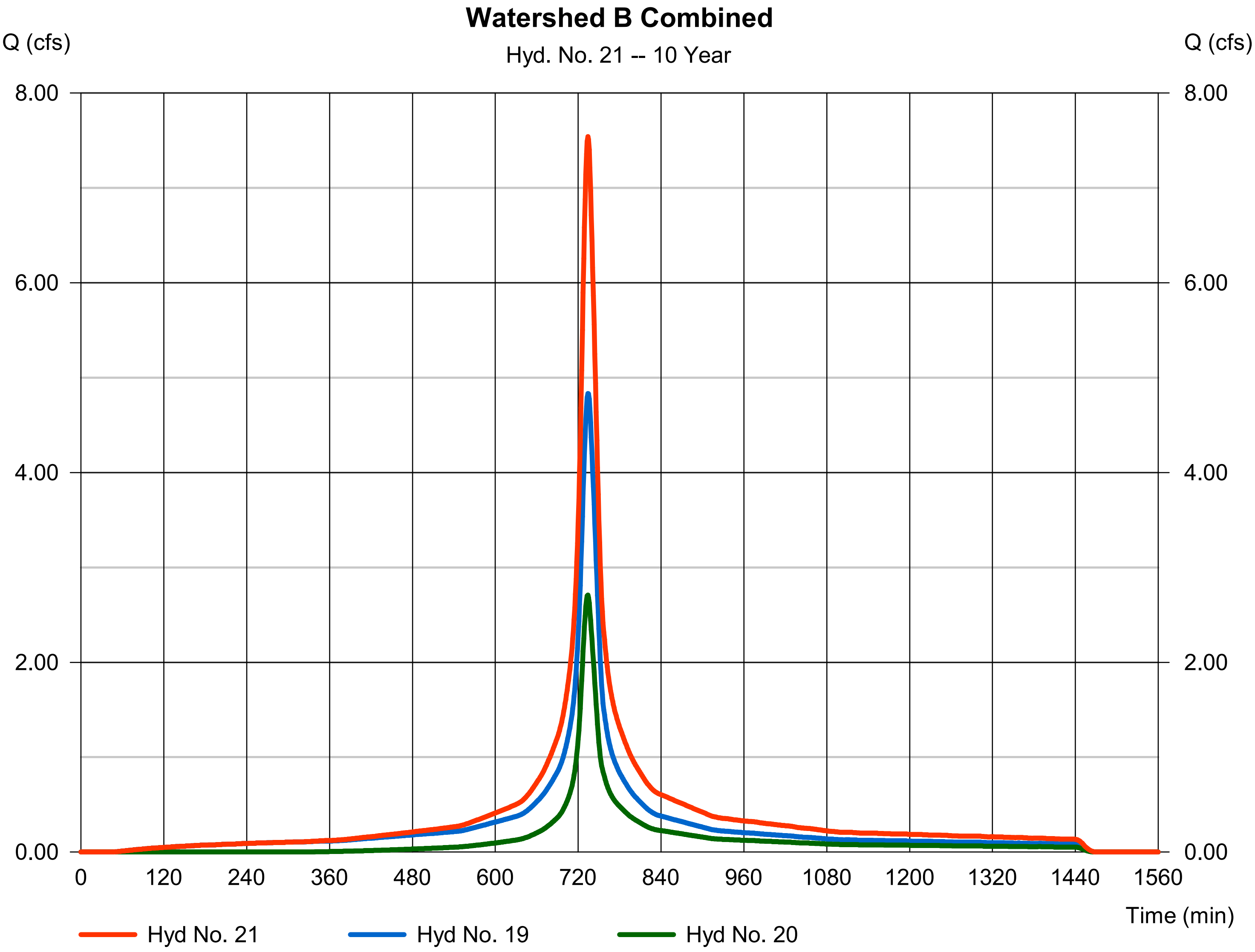


Hydrograph Report

Hyd. No. 21

Watershed B Combined

Hydrograph type	= Combine	Peak discharge	= 7.541 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 37,669 cuft
Inflow hyds.	= 19, 20	Contrib. drain. area	= 2.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

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	9.882	1	738	52,044	------	------	------	Watershed A-1 (Pervious)
2	SCS Runoff	3.842	1	734	20,677	------	------	------	Watershed A-1 (Impervious)
3	Combine	13.57	1	737	72,720	1, 2	------	------	A1 Combined
5	SCS Runoff	17.05	1	730	66,247	------	------	------	Watershed A-2 (Pervious)
6	SCS Runoff	15.39	1	727	57,279	------	------	------	Watershed A-2 (Impervious)
7	Combine	31.56	1	728	123,526	5, 6	------	------	A2 Combined
9	SCS Runoff	2.612	1	734	11,922	------	------	------	Watershed A-3 (Pervious)
10	SCS Runoff	0.607	1	727	2,372	------	------	------	Watershed A-3 (Impervious)
11	Combine	3.006	1	732	14,294	9, 10	------	------	A3 Combined
13	SCS Runoff	11.89	1	734	54,470	------	------	------	Watershed A-4 (Pervious)
14	SCS Runoff	13.14	1	727	51,387	------	------	------	Watershed A-4 (Impervious)
15	Combine	23.24	1	729	105,858	13, 14	------	------	A4 Combined
17	Combine	67.92	1	728	316,397	3, 7, 11, 15,	------	------	POA A
19	SCS Runoff	8.964	1	734	48,245	------	------	------	Watershed B (Impervious)
20	SCS Runoff	5.747	1	734	26,574	------	------	------	Watershed B (Pervious)
21	Combine	14.71	1	734	74,820	19, 20	------	------	Watershed B Combined

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 02 / 21 / 2023

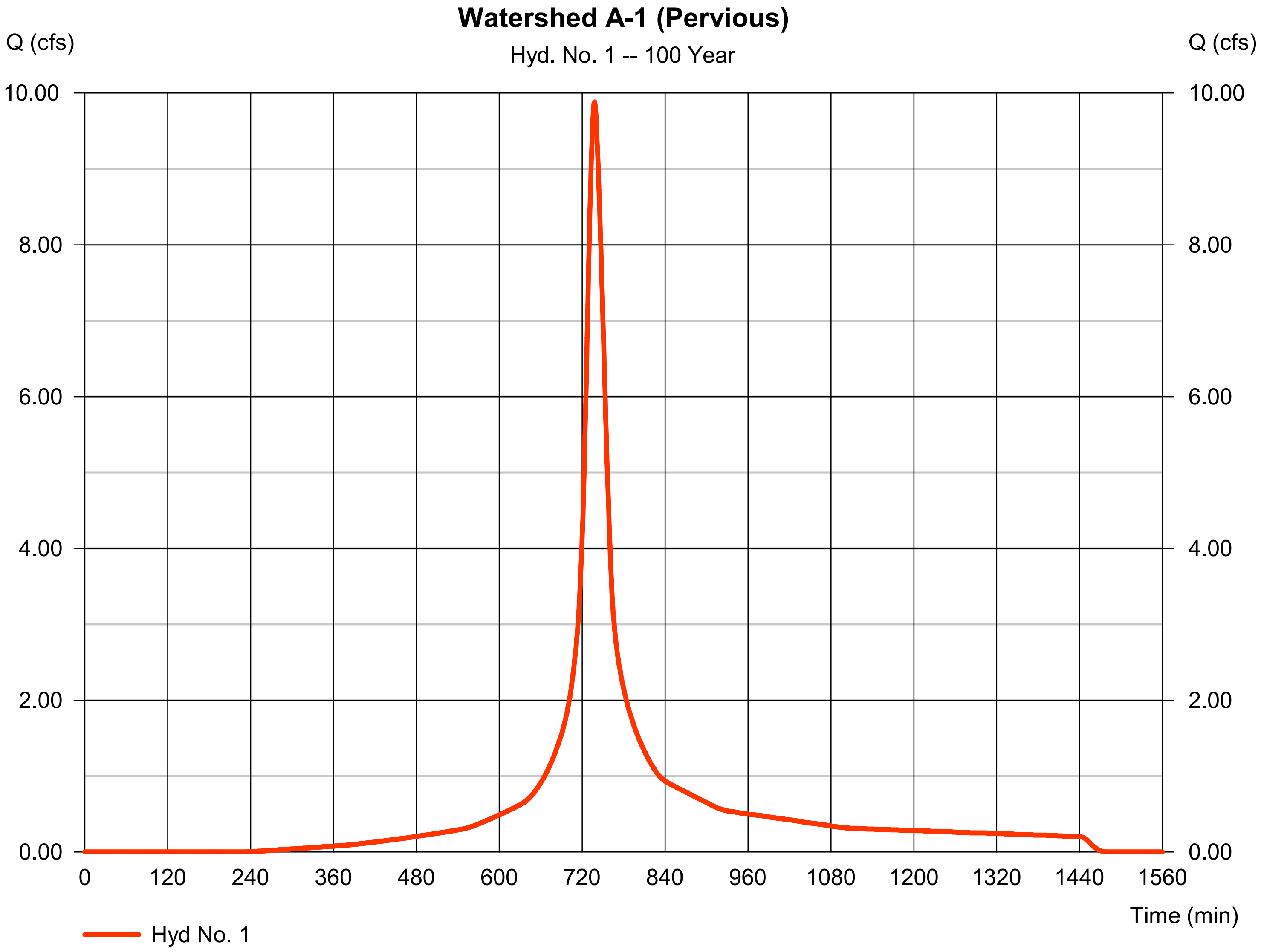
Hyd. No. 1

Watershed A-1 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.640 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 11.41 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 9.882 cfs
Time to peak = 738 min
Hyd. volume = 52,044 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 25.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(1.160 x 80) + (0.480 x 77)] / 1.640



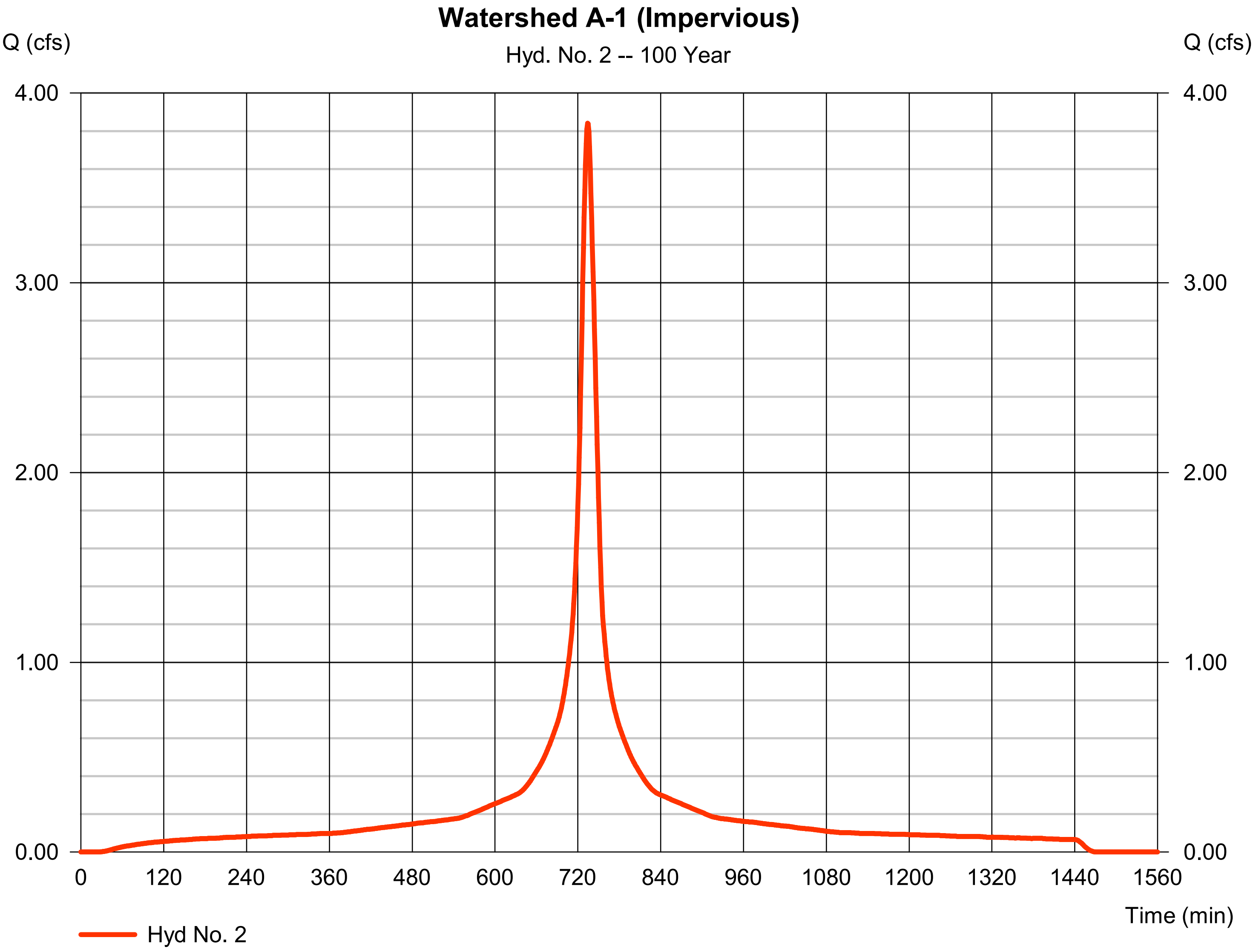
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Tuesday, 02 / 21 / 2023

Hyd. No. 2

Watershed A-1 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.842 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 20,677 cuft
Drainage area	= 0.510 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.00 min
Total precip.	= 11.41 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	= 484



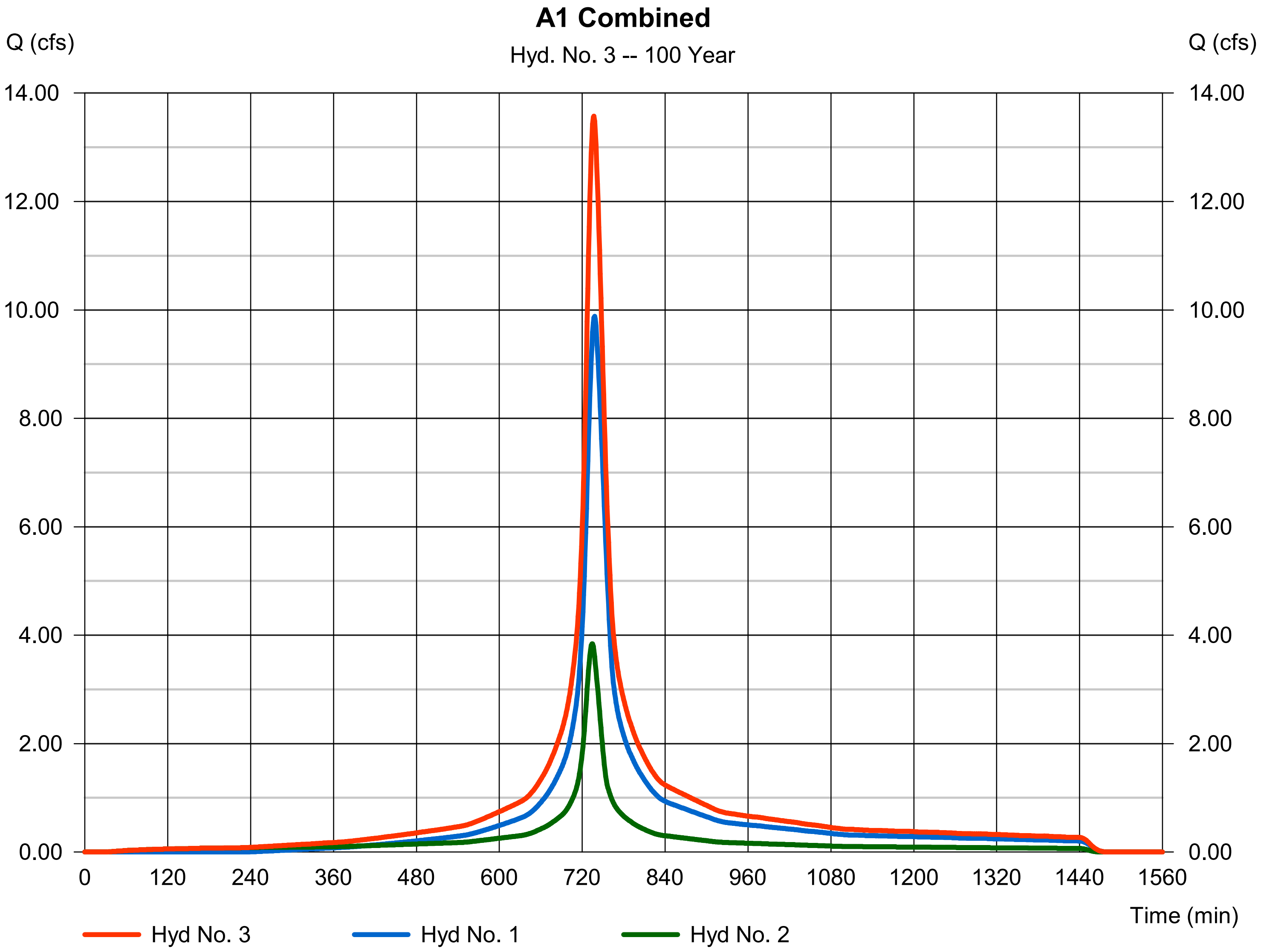
Hydrograph Report

Hyd. No. 3

A1 Combined

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 1, 2

Peak discharge = 13.57 cfs
Time to peak = 737 min
Hyd. volume = 72,720 cuft
Contrib. drain. area = 2.150 ac



Hydrograph Report

Hyd. No. 5

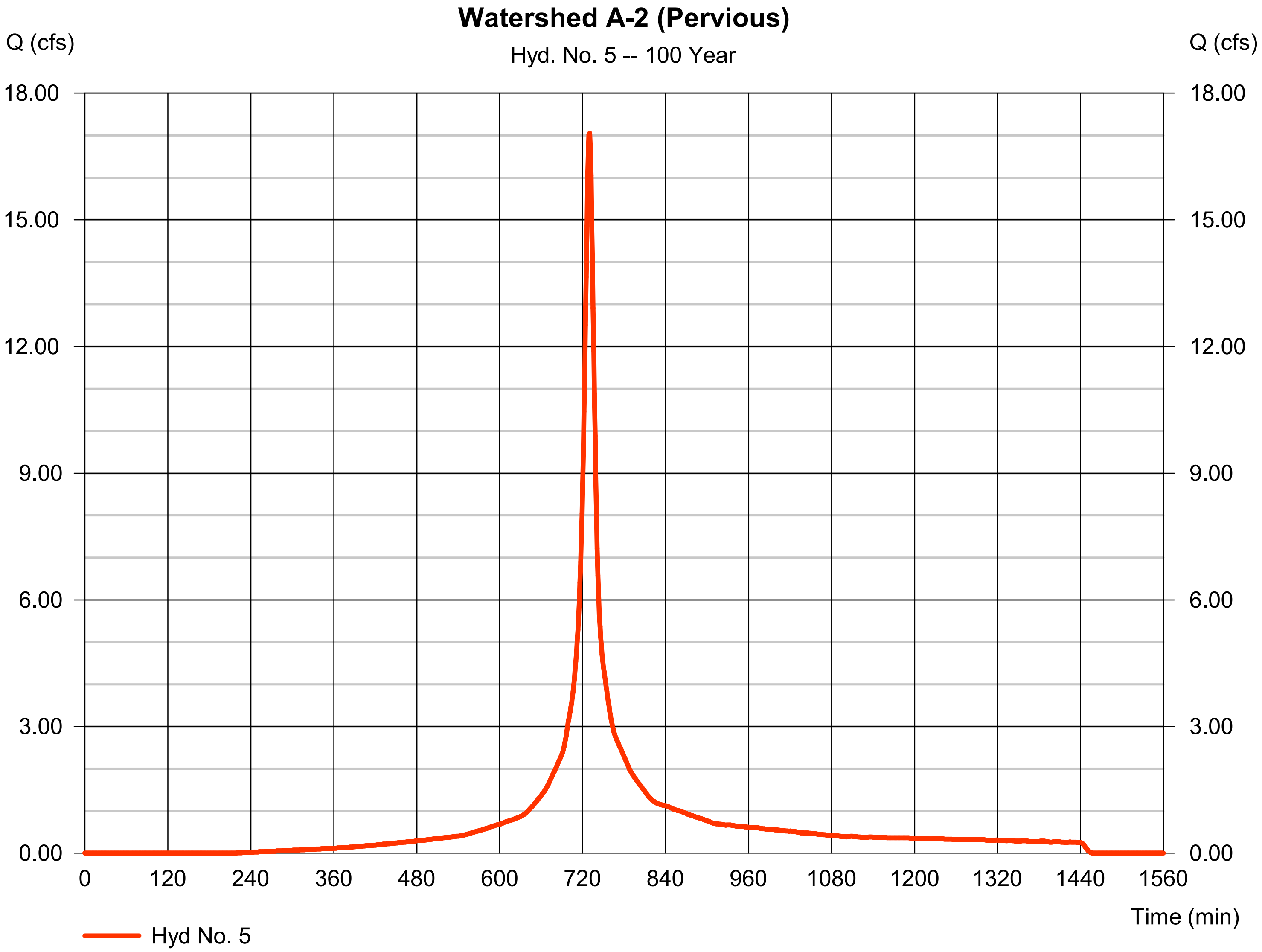
Watershed A-2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 2.020 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 11.41 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 17.05 cfs
Time to peak = 730 min
Hyd. volume = 66,247 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 11.00 min
Distribution = Custom
Shape factor = 484

---

* Composite (Area/CN) = [(1.850 x 80) + (0.170 x 77)] / 2.020

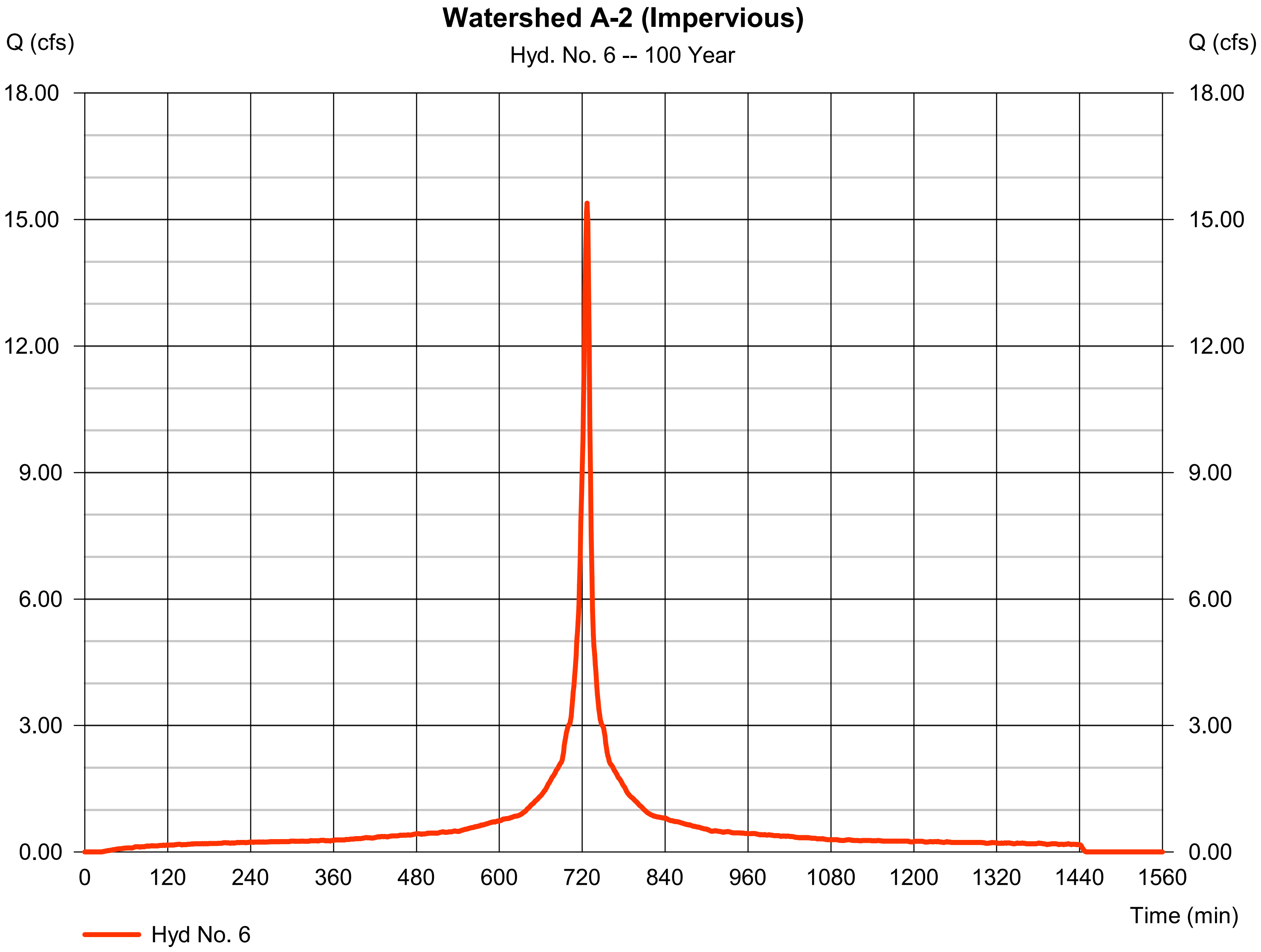


Hydrograph Report

Hyd. No. 6

Watershed A-2 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 15.39 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 57,279 cuft
Drainage area	= 1.370 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 11.41 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor	Shape factor	= 484



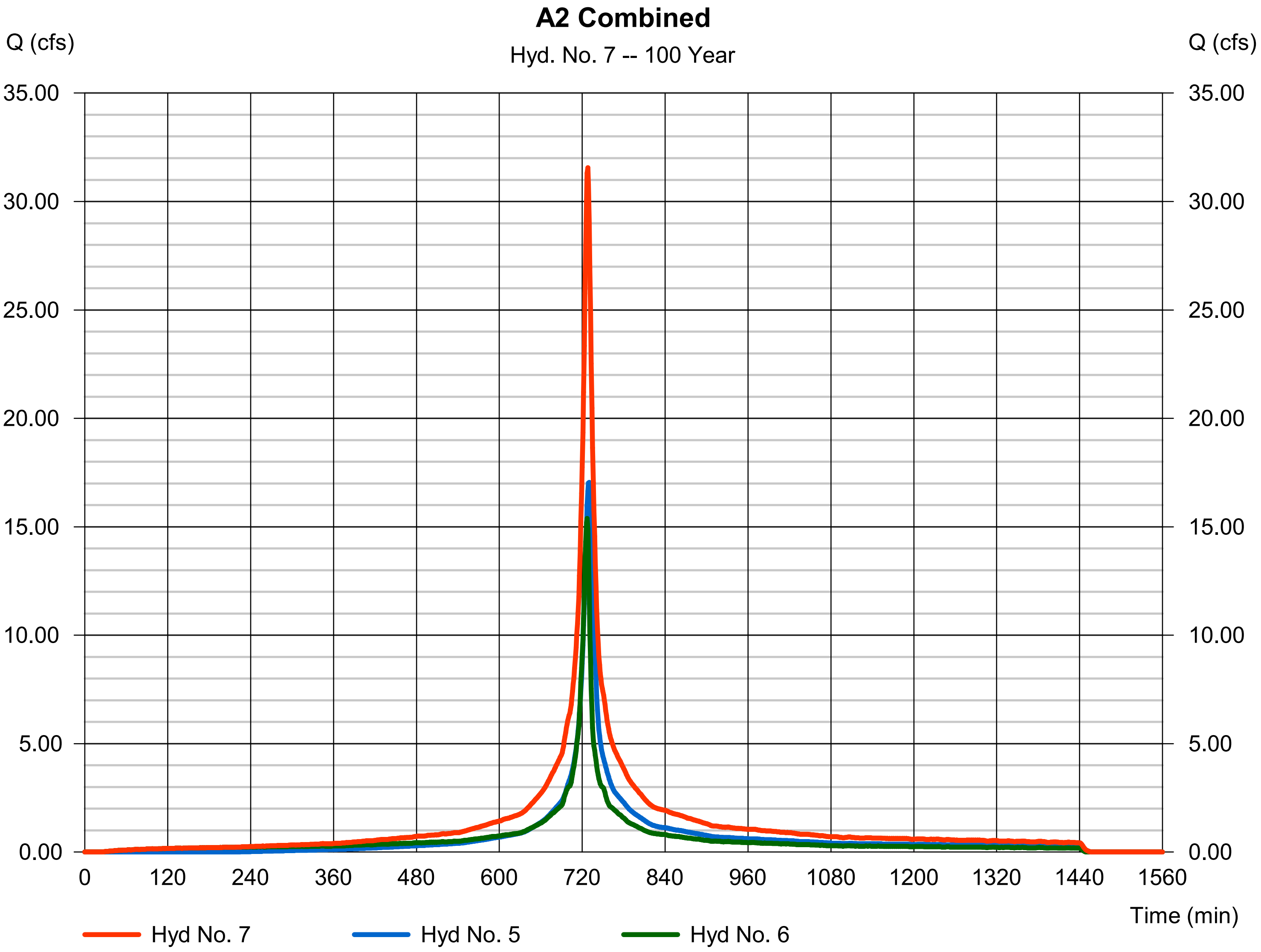
Hydrograph Report

Hyd. No. 7

A2 Combined

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 5, 6

Peak discharge = 31.56 cfs
Time to peak = 728 min
Hyd. volume = 123,526 cuft
Contrib. drain. area = 3.390 ac



Hydrograph Report

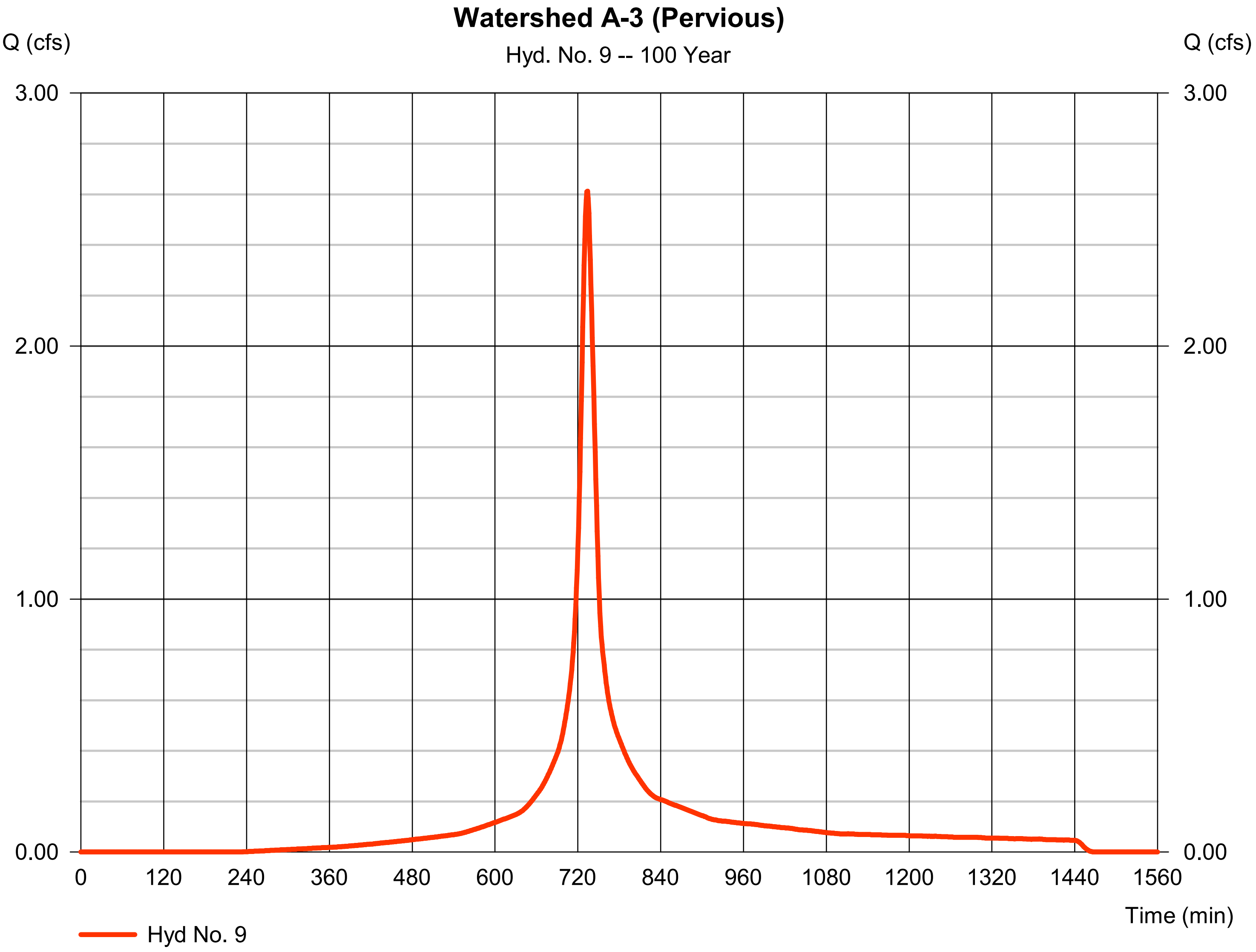
Hyd. No. 9

Watershed A-3 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.380 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 11.41 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 2.612 cfs
Time to peak = 734 min
Hyd. volume = 11,922 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.300 x 80) + (0.080 x 77)] / 0.380



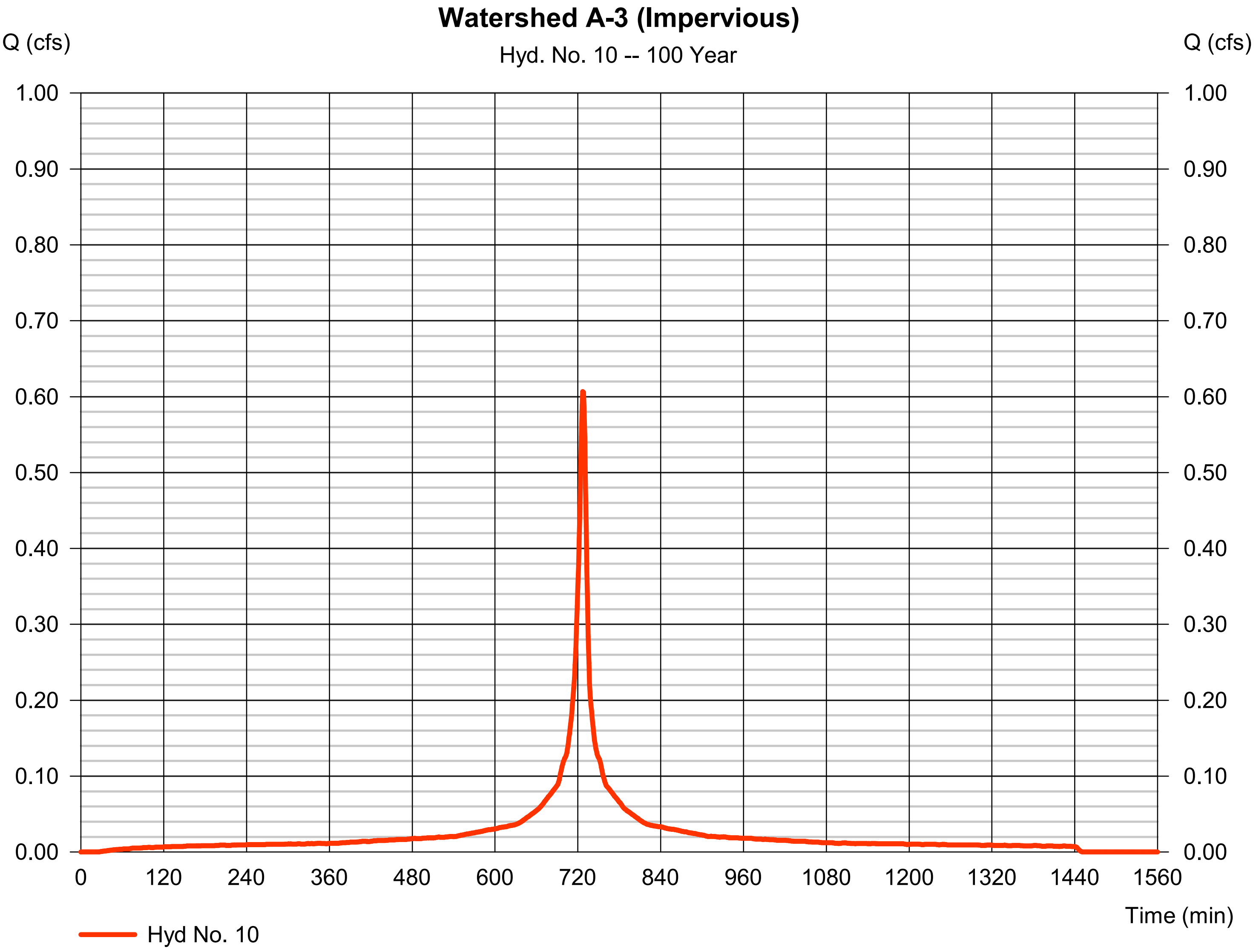
Hydrograph Report

Hyd. No. 10

Watershed A-3 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.060 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 11.41 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.607 cfs
Time to peak = 727 min
Hyd. volume = 2,372 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



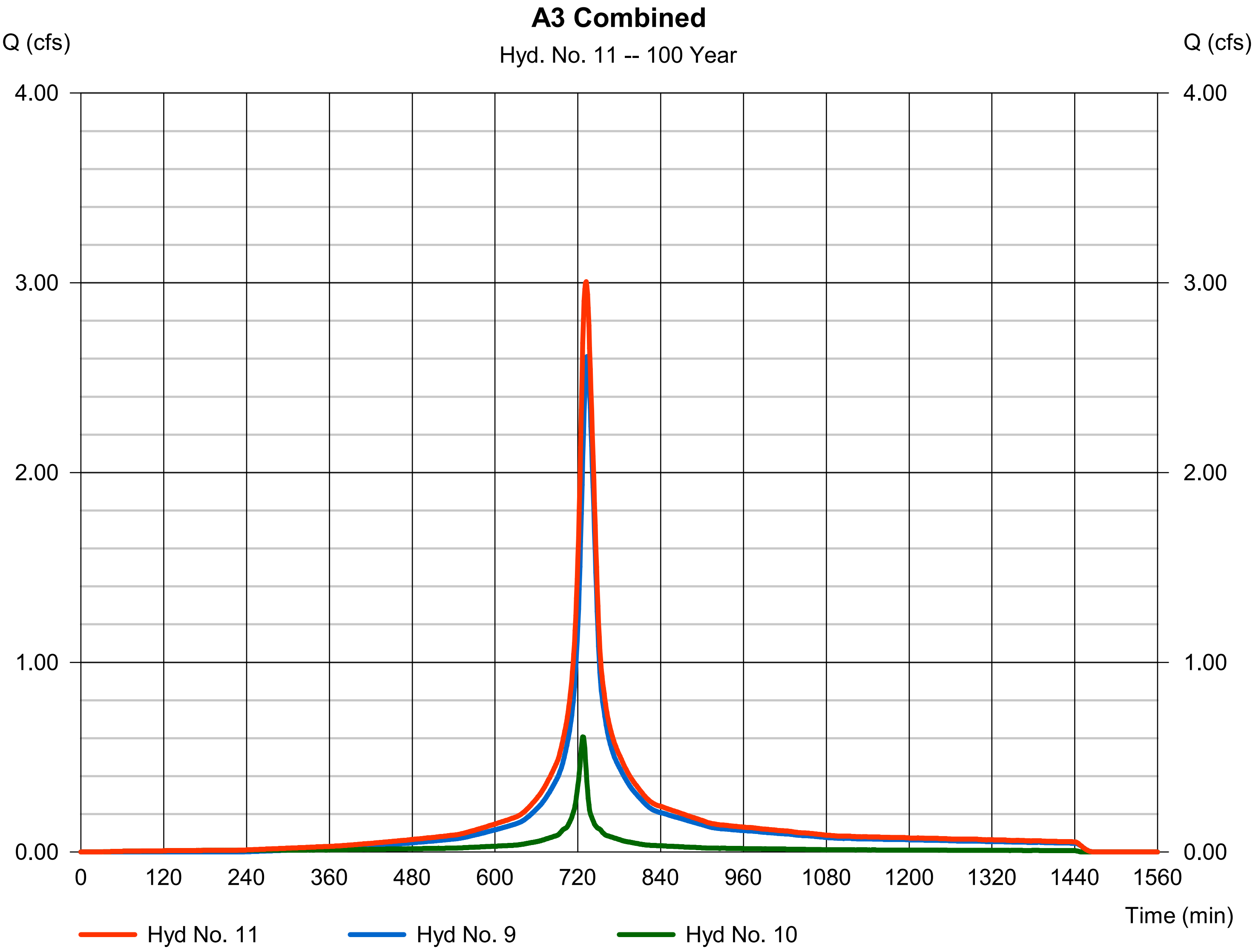
Hydrograph Report

Hyd. No. 11

A3 Combined

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 9, 10

Peak discharge = 3.006 cfs
Time to peak = 732 min
Hyd. volume = 14,294 cuft
Contrib. drain. area = 0.440 ac



Hyd. No. 13

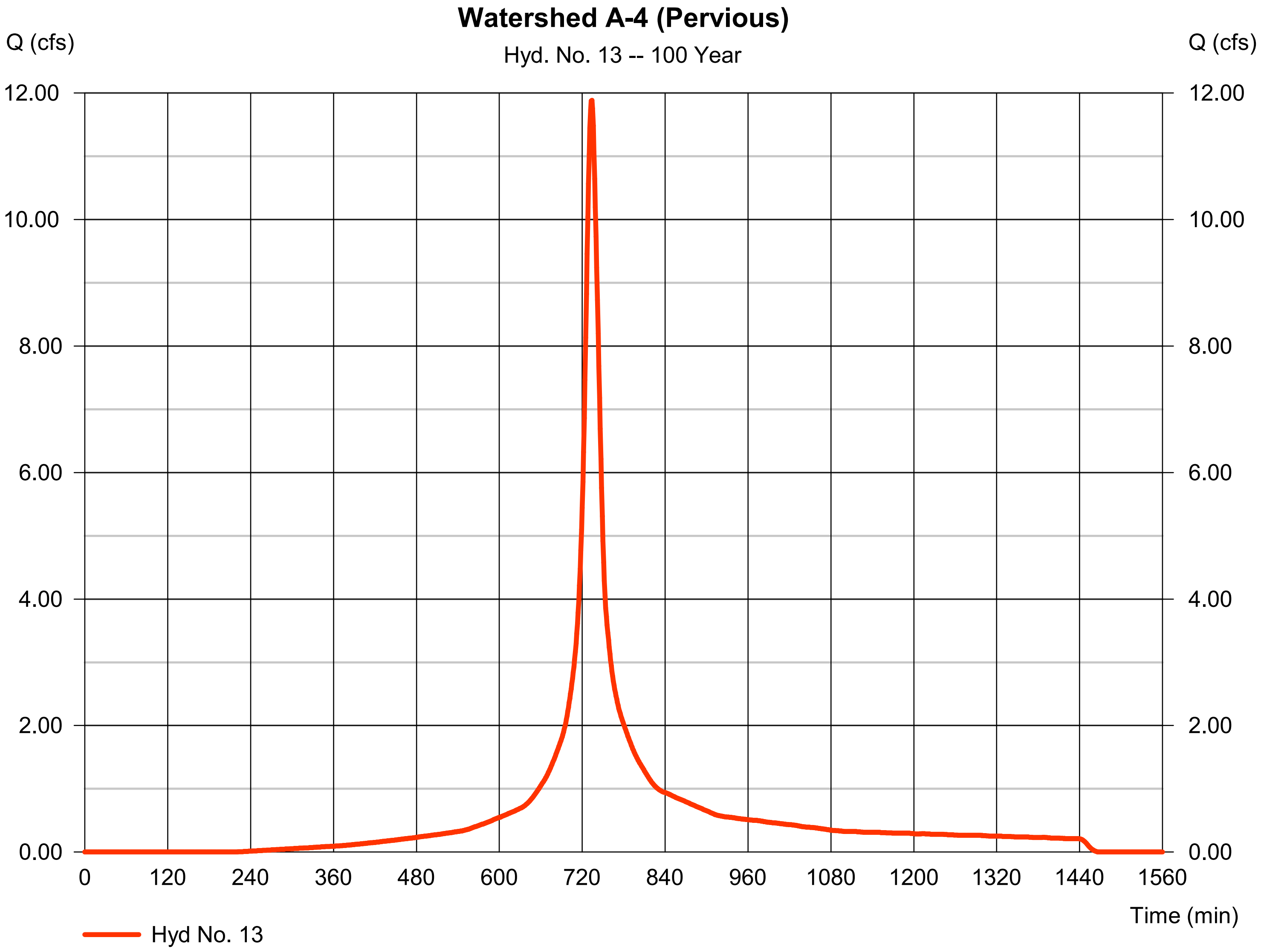
Watershed A-4 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.710 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 11.41 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 11.89 cfs
Time to peak = 734 min
Hyd. volume = 54,470 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 17.00 min
Distribution = Custom
Shape factor = 484

---

* Composite (Area/CN) = [(1.470 x 80) + (0.240 x 77)] / 1.710

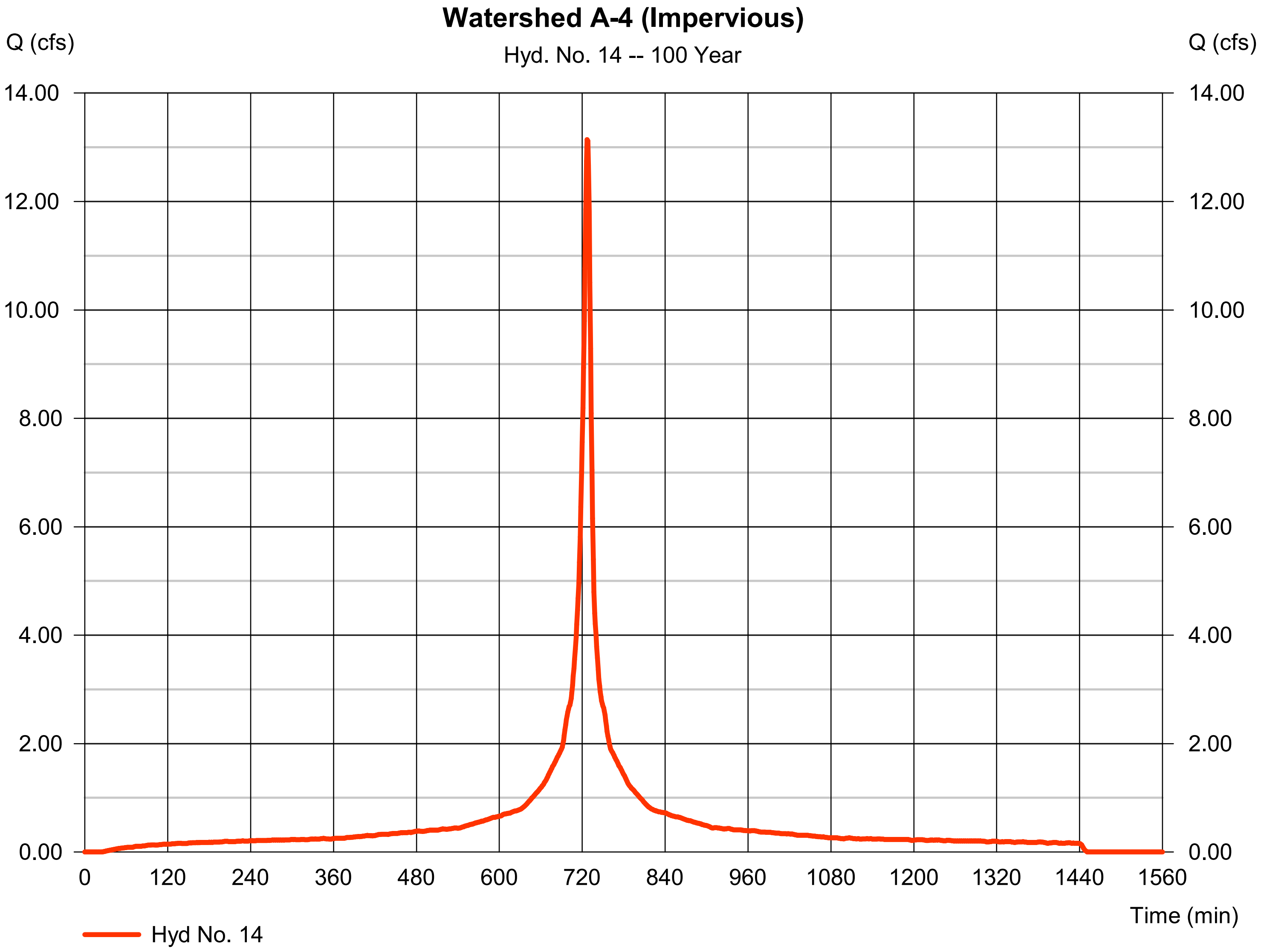


Hydrograph Report

Hyd. No. 14

Watershed A-4 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 13.14 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 51,387 cuft
Drainage area	= 1.300 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.00 min
Total precip.	= 11.41 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	= 484

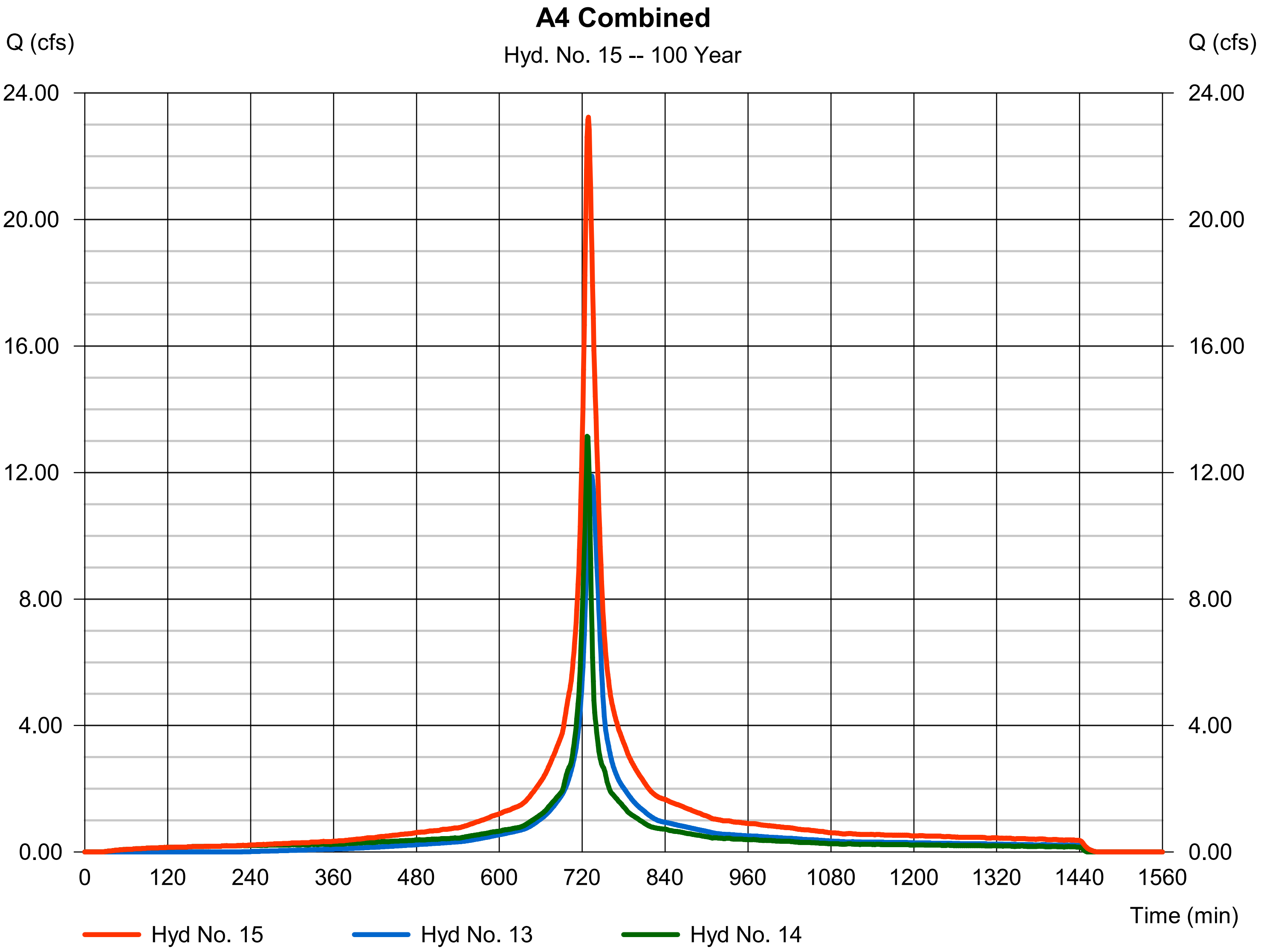


Hydrograph Report

Hyd. No. 15

A4 Combined

Hydrograph type	= Combine	Peak discharge	= 23.24 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 105,858 cuft
Inflow hyds.	= 13, 14	Contrib. drain. area	= 3.010 ac



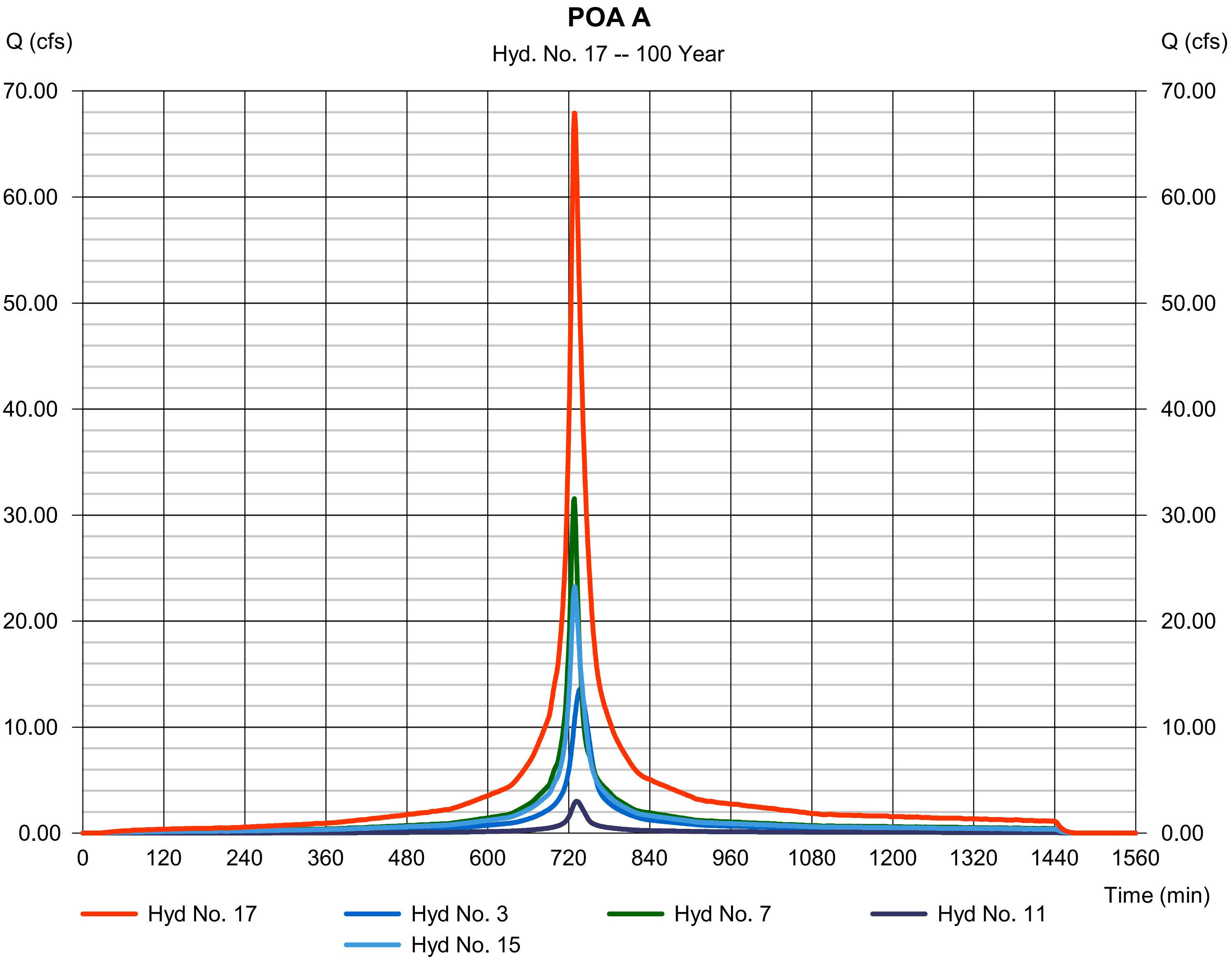
Hydrograph Report

Hyd. No. 17

POA A

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 3, 7, 11, 15

Peak discharge = 67.92 cfs
Time to peak = 728 min
Hyd. volume = 316,397 cuft
Contrib. drain. area = 0.000 ac

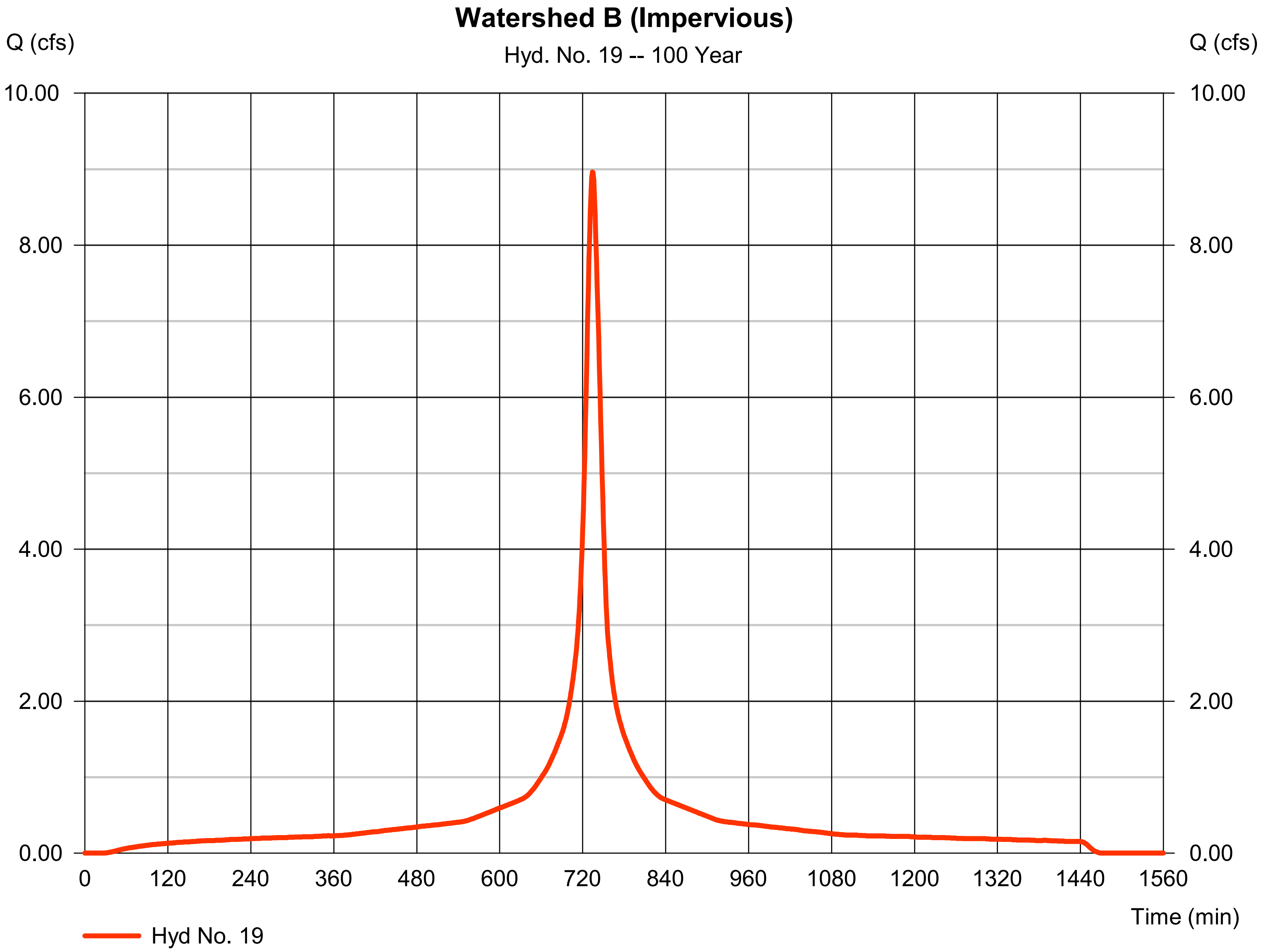


Hyd. No. 19

Watershed B (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.190 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 11.41 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 8.964 cfs
Time to peak = 734 min
Hyd. volume = 48,245 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Custom
Shape factor = 484



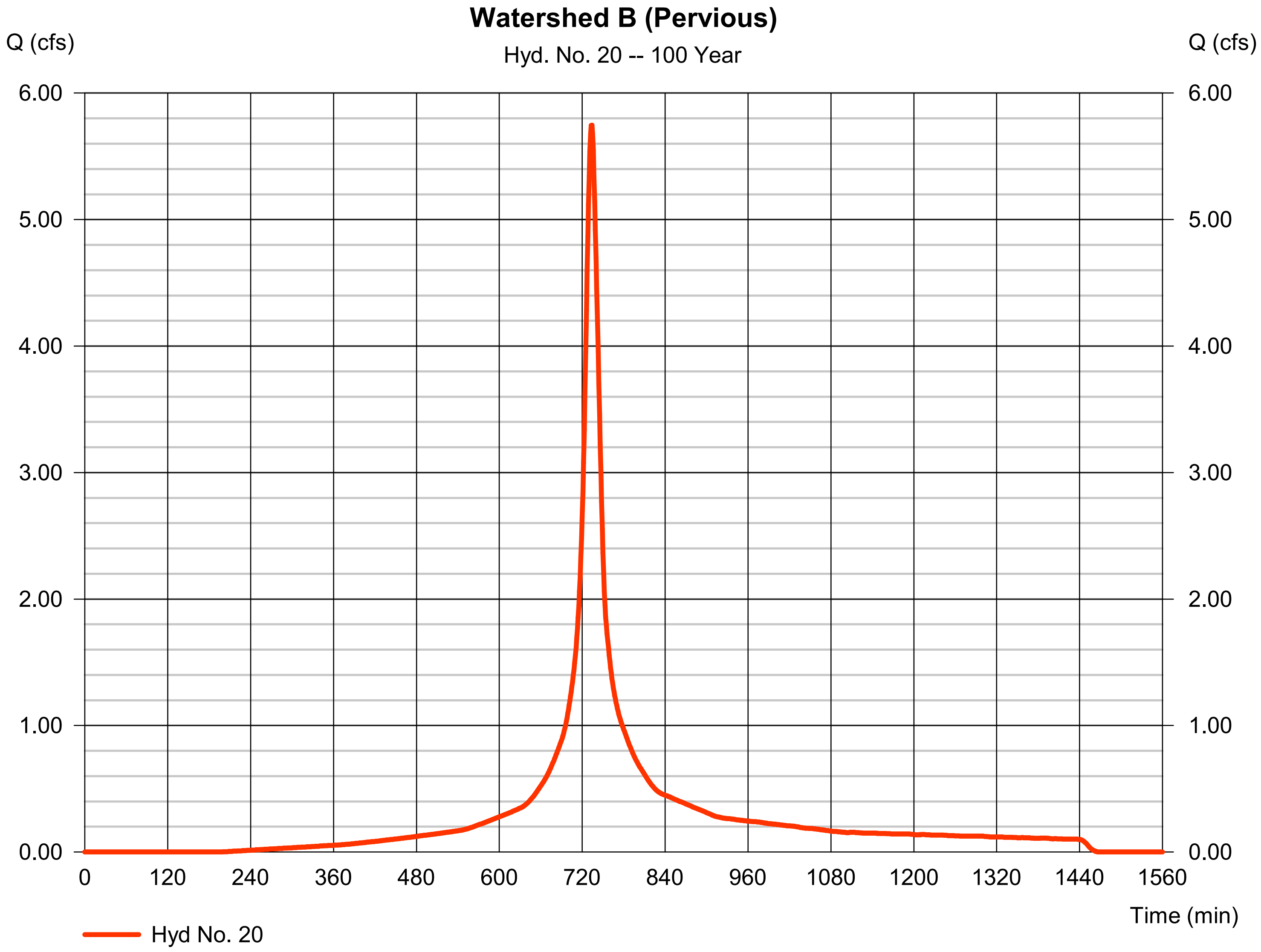
Hydrograph Report

Hyd. No. 20

Watershed B (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 11.41 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 5.747 cfs
Time to peak = 734 min
Hyd. volume = 26,574 cuft
Curve number = 82
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Custom
Shape factor = 484

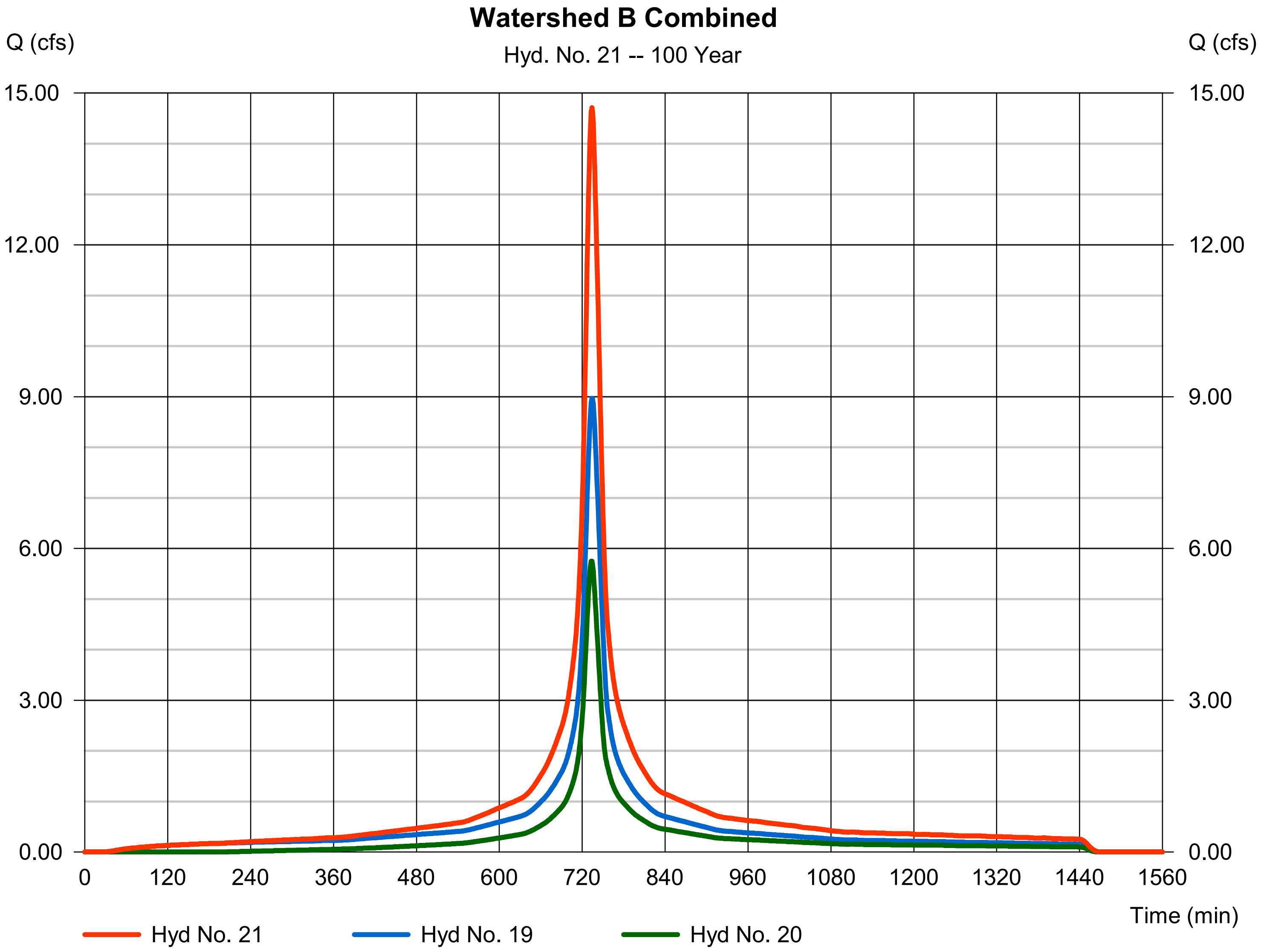


Hydrograph Report

Hyd. No. 21

Watershed B Combined

Hydrograph type	= Combine	Peak discharge	= 14.71 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 74,820 cuft
Inflow hyds.	= 19, 20	Contrib. drain. area	= 2.000 ac



APPENDIX B

Post-Construction Hydrologic Analysis

NOAA Atlas 14, Volume 2, Version 3
Location name: North Brunswick, New Jersey, USA*
Latitude: 40.4621°, Longitude: -74.4375°
Elevation: 76 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	**Average recurrence interval (years)**									
	1	**2**	**5**	**10**	**25**	**50**	**100**	**200**	**500**	**1000**
5-min	**0.334** (0.303-0.369)	**0.398** (0.360-0.440)	**0.472** (0.426-0.521)	**0.526** (0.474-0.580)	**0.591** (0.531-0.652)	**0.638** (0.569-0.702)	**0.684** (0.608-0.754)	**0.726** (0.642-0.802)	**0.778** (0.681-0.861)	**0.817** (0.710-0.907)
10-min	**0.534** (0.483-0.590)	**0.637** (0.576-0.703)	**0.756** (0.682-0.835)	**0.841** (0.758-0.928)	**0.942** (0.846-1.04)	**1.01** (0.906-1.12)	**1.09** (0.966-1.20)	**1.15** (1.02-1.27)	**1.23** (1.08-1.36)	**1.29** (1.12-1.43)
15-min	**0.667** (0.604-0.738)	**0.800** (0.724-0.884)	**0.956** (0.863-1.06)	**1.06** (0.959-1.17)	**1.19** (1.07-1.32)	**1.29** (1.15-1.42)	**1.37** (1.22-1.52)	**1.45** (1.28-1.60)	**1.55** (1.36-1.72)	**1.62** (1.40-1.79)
30-min	**0.915** (0.828-1.01)	**1.11** (1.00-1.22)	**1.36** (1.23-1.50)	**1.54** (1.39-1.70)	**1.77** (1.59-1.95)	**1.94** (1.73-2.13)	**2.10** (1.87-2.32)	**2.26** (2.00-2.50)	**2.47** (2.16-2.73)	**2.62** (2.27-2.90)
60-min	**1.14** (1.03-1.26)	**1.39** (1.25-1.53)	**1.74** (1.57-1.92)	**2.01** (1.81-2.22)	**2.36** (2.11-2.60)	**2.62** (2.34-2.89)	**2.90** (2.58-3.20)	**3.17** (2.80-3.50)	**3.54** (3.10-3.92)	**3.82** (3.32-4.24)
2-hr	**1.40** (1.25-1.55)	**1.70** (1.53-1.89)	**2.16** (1.94-2.40)	**2.51** (2.25-2.79)	**3.00** (2.68-3.32)	**3.41** (3.02-3.77)	**3.82** (3.36-4.22)	**4.25** (3.71-4.71)	**4.85** (4.19-5.40)	**5.33** (4.56-5.94)
3-hr	**1.55** (1.39-1.73)	**1.89** (1.70-2.11)	**2.40** (2.16-2.67)	**2.80** (2.51-3.11)	**3.35** (2.99-3.72)	**3.81** (3.37-4.22)	**4.27** (3.76-4.74)	**4.76** (4.16-5.29)	**5.45** (4.69-6.06)	**5.99** (5.11-6.70)
6-hr	**1.98** (1.78-2.22)	**2.41** (2.17-2.69)	**3.06** (2.74-3.40)	**3.58** (3.20-3.97)	**4.34** (3.84-4.80)	**4.97** (4.37-5.49)	**5.65** (4.92-6.24)	**6.38** (5.50-7.04)	**7.43** (6.31-8.22)	**8.31** (6.97-9.20)
12-hr	**2.41** (2.16-2.72)	**2.93** (2.61-3.29)	**3.73** (3.32-4.19)	**4.41** (3.91-4.94)	**5.42** (4.77-6.05)	**6.30** (5.50-7.02)	**7.25** (6.26-8.07)	**8.30** (7.08-9.26)	**9.87** (8.26-11.0)	**11.2** (9.24-12.5)
24-hr	**2.75** (2.53-3.02)	**3.34** (3.06-3.67)	**4.28** (3.92-4.70)	**5.10** (4.65-5.59)	**6.33** (5.73-6.92)	**7.39** (6.65-8.08)	**8.58** (7.65-9.38)	**9.91** (8.73-10.9)	**11.9** (10.3-13.1)	**13.6** (11.6-15.0)
2-day	**3.20** (2.92-3.53)	**3.87** (3.54-4.28)	**4.96** (4.52-5.48)	**5.87** (5.33-6.48)	**7.21** (6.51-7.95)	**8.37** (7.50-9.21)	**9.62** (8.56-10.6)	**11.0** (9.67-12.2)	**13.0** (11.3-14.5)	**14.8** (12.6-16.4)
3-day	**3.39** (3.10-3.73)	**4.10** (3.76-4.52)	**5.23** (4.78-5.76)	**6.17** (5.61-6.78)	**7.53** (6.82-8.27)	**8.69** (7.81-9.54)	**9.94** (8.87-10.9)	**11.3** (9.99-12.4)	**13.3** (11.6-14.7)	**15.0** (12.9-16.6)
4-day	**3.58** (3.28-3.93)	**4.34** (3.98-4.76)	**5.50** (5.03-6.03)	**6.46** (5.89-7.08)	**7.85** (7.13-8.59)	**9.01** (8.13-9.87)	**10.3** (9.19-11.2)	**11.6** (10.3-12.7)	**13.6** (11.9-14.9)	**15.2** (13.1-16.8)
7-day	**4.21** (3.90-4.56)	**5.05** (4.68-5.48)	**6.29** (5.81-6.83)	**7.31** (6.75-7.93)	**8.78** (8.05-9.52)	**10.0** (9.11-10.8)	**11.3** (10.2-12.3)	**12.7** (11.4-13.8)	**14.7** (13.0-16.1)	**16.4** (14.3-18.0)
10-day	**4.79** (4.47-5.16)	**5.73** (5.34-6.17)	**7.02** (6.53-7.56)	**8.08** (7.50-8.70)	**9.58** (8.84-10.3)	**10.8** (9.92-11.6)	**12.1** (11.0-13.1)	**13.5** (12.2-14.6)	**15.4** (13.8-16.8)	**17.0** (15.0-18.6)
20-day	**6.47** (6.10-6.87)	**7.68** (7.24-8.16)	**9.17** (8.63-9.74)	**10.4** (9.73-11.0)	**12.0** (11.2-12.7)	**13.2** (12.3-14.0)	**14.5** (13.4-15.4)	**15.8** (14.5-16.8)	**17.5** (16.0-18.7)	**18.8** (17.1-20.2)
30-day	**8.06** (7.65-8.49)	**9.52** (9.04-10.0)	**11.1** (10.6-11.7)	**12.4** (11.7-13.0)	**14.0** (13.2-14.8)	**15.3** (14.4-16.1)	**16.5** (15.5-17.4)	**17.7** (16.5-18.7)	**19.2** (17.8-20.4)	**20.3** (18.8-21.7)
45-day	**10.3** (9.77-10.8)	**12.1** (11.5-12.6)	**13.9** (13.3-14.6)	**15.3** (14.6-16.1)	**17.2** (16.3-18.0)	**18.5** (17.5-19.4)	**19.8** (18.7-20.8)	**21.1** (19.8-22.2)	**22.7** (21.2-23.9)	**23.8** (22.2-25.2)
60-day	**12.3** (11.7-12.8)	**14.4** (13.8-15.1)	**16.5** (15.8-17.2)	**18.0** (17.2-18.8)	**19.9** (19.0-20.8)	**21.4** (20.3-22.3)	**22.7** (21.5-23.7)	**23.9** (22.6-25.0)	**25.4** (23.9-26.7)	**26.4** (24.8-27.9)

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

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

Please refer to NOAA Atlas 14 document for more information.

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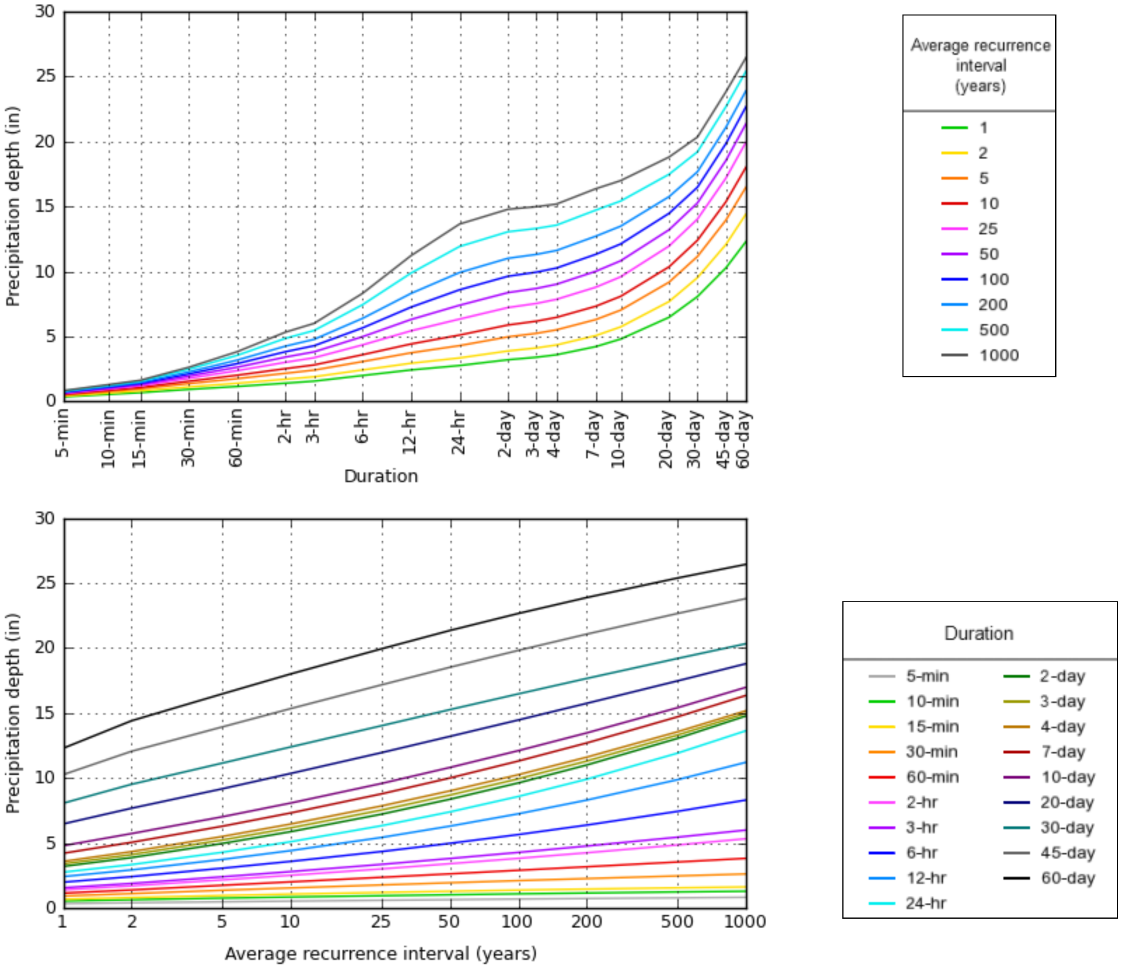
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 40.4621°, Longitude: -74.4375°



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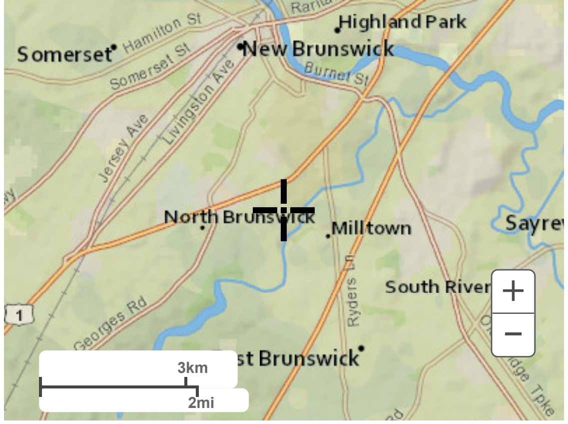
Maps & aerials

Small scale terrain



Large scale terrain

Large scale map

Large scale aerial

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

PROPOSED WATERSHED CALCULATIONS

King Arthur Ct Warehouse

North Brunswick, NJ
100851001

Watershed	Watershed Description	Total Area (AC)	Landscaped Area (AC)	Woods Area (AC)	Gravel Area (AC)	Impervious Area (AC)	Curve Number, CN (Weighted)
WS A1	North Walled Basin	2.13	0.79	0.00	0.02	1.32	91
WS A2	South Walled Basin	2.38	0.41	0.00	0.05	1.92	95
WS A3	Underground Basin (North)	2.20	0.00	0.00	0.00	2.20	98
WS A4	Underground Basin (Sotuh)	1.57	0.00	0.00	0.00	1.57	98
WS A5	Filterra directly to outfall	1.01	0.08	0.00	0.00	0.92	97
WS A6	Undetained to Creek	0.81	0.81	0.00	0.00	0.00	80
WS B	Drainage area to Railroad	0.88	0.70	0.02	0.14	0.03	82
Total		10.97	2.79	0.02	0.21	7.96	86

CN-Values	
Open Space Area	**80**
Woods Area	**77**
Gravel Area	**91**
Impervious Area	**98**

*CN Values from Table 2-2, TR-55 Manual - Urban Hydrology for Small Watershed

Project: Project King Arthur **By:** AM **Date:** 4/26/2023

Location: North Brunswick **Checked By:** PM **Date Checked:** 4/26/2023

Circle One: Present [✓ Developed] Proposed Watershed A1- Impervious

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

	Segment ID	**1**				
1. Surface Description (NEH table 15-1)		**Smooth Surfaces**				
2. Manning's Roughness Coeff., n (NEH table 15-1)		**0.011**				
3. Flow Length, L (Total L < 100 ft)	ft	**100**				
4. Two-year 24-hr rainfall, P_2	in	**3.36**				
5. Land Slope, s	ft/ft	**0.028**				
6. McCuen-Spiess Limit, L (max. 100ft) **$L = (100 s^{0.5})/n$**	ft	**100**				
7. Compute T_t **$T_t = \frac{0.007 (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$**	hr	**0.017**	+		+	

Sheet Flow Sub-Total **0.017 hours**

Shallow Concentrated Flow

	Segment ID	**2**				
8. Surface Description		**Pavement**				
9. Flow Length, L	ft	**34**				
10. Watercourse Slope, s	ft/ft	**0.033**				
11. Average Velocity, V (NEH table 15-3)	ft/s	**3.67**				
12. Compute T_t **$T_t = \frac{L}{3600 V}$**	hr	**0.003**	+		+	

Shallow Conc. Flow Sub-Total **0.003 hours**

Channel Flow

	Segment ID	**3**				
13. Flow Length, L	ft	**793**				
14. Average Velocity, V	ft/s	**2.00**				
15. Compute T_t **$T_t = \frac{L}{3600 V}$**	hr	**0.110**	+		+	

Channel Flow Sub-Total **0.110 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.130 hours**

Total Tc (minutes) = **8 minutes**

Project: Project King Arthur **By:** AM **Date:** 4/26/2023

Location: North Brunswick **Checked By:** PM **Date Checked:** 4/26/2023

Circle One: Present [✓ Developed] **Proposed Watershed A1 - Pervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1		
1. Surface Description (NEH table 15-1)			Dense Grasses		
2. Manning's Roughness Coeff., n (NEH table 15-1)			0.24		
3. Flow Length, L (Total L < 100 ft)		ft	57		
4. Two-year 24-hr rainfall, P_2		in	3.36		
5. Land Slope, s		ft/ft	0.020		
6. McCuen-Spiess Limit, L (max. 100ft)	$L = (100\ s^{0.5})/n$	ft	58		
7. Compute T_t	$T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.149	+	+

Sheet Flow Sub-Total **0.149 hours**

Shallow Concentrated Flow

		Segment ID	2	3	
8. Surface Description			Grassed Waterways	Pavement	
9. Flow Length, L		ft	68	47	
10. Watercourse Slope, s		ft/ft	0.049	0.030	
11. Average Velocity, V (NEH table 15-3)		ft/s	3.56	3.55	
12. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.005	+ 0.004	+

Shallow Conc. Flow Sub-Total **0.009 hours**

Channel Flow

		Segment ID	4		
13. Flow Length, L		ft	793		
14. Average Velocity, V		ft/s	2.00		
15. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.110	+	+

Channel Flow Sub-Total **0.110 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.268 hours**

Total Tc (minutes) = **16 minutes**

Project: Project King Arthur **By:** AM **Date:** 4/26/2023

Location: North Brunswick **Checked By:** PM **Date Checked:** 4/26/2023

Circle One: Present [✓ Developed] **Proposed Watershed A2 - Impervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

	Segment ID		**1**				
1. Surface Description (NEH table 15-1)			**Smooth Surfaces**				
2. Manning's Roughness Coeff., n (NEH table 15-1)			**0.011**				
3. Flow Length, L (Total L < 100 ft)		ft	**100**				
4. Two-year 24-hr rainfall, P_2		in	**3.36**				
5. Land Slope, s		ft/ft	**0.014**				
6. McCuen-Spiess Limit, L (max. 100ft)	$L = (100\ s^{0.5})/n$	ft	**100**				
7. Compute T_t	$T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	**0.023**	+		+	

Sheet Flow Sub-Total **0.023 hours**

Shallow Concentrated Flow

	Segment ID		**2**				
8. Surface Description			**Pavement**				
9. Flow Length, L		ft	**84**				
10. Watercourse Slope, s		ft/ft	**0.016**				
11. Average Velocity, V (NEH table 15-3)		ft/s	**2.58**				
12. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	**0.009**	+		+	

Shallow Conc. Flow Sub-Total **0.009 hours**

Channel Flow

	Segment ID		**3**				
13. Flow Length, L		ft	**748**				
14. Average Velocity, V		ft/s	**2.00**				
15. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	**0.104**	+		+	

Channel Flow Sub-Total **0.104 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.136 hours**
Total Tc (minutes) =	**8 minutes**

Project: Project King Arthur **By:** AM **Date:** 4/26/2023

Location: North Brunswick **Checked By:** PM **Date Checked:** 4/26/2023

Circle One: Present [✓ Developed] **Proposed Watershed A2 - Pervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1	2	
1. Surface Description (NEH table 15-1)			Dense Grasses	Smooth Surfaces	
2. Manning's Roughness Coeff., n (NEH table 15-1)			0.24	0.011	
3. Flow Length, L (Total L < 100 ft)		ft	36	36	
4. Two-year 24-hr rainfall, P_2		in	3.36	3.36	
5. Land Slope, s		ft/ft	0.021	0.021	
6. McCuen-Spiess Limit, L (max. 100ft)	$L = (100\ s^{0.5})/n$	ft	60	100	
7. Compute T_t	$T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.101 +	0.008 +	

Sheet Flow Sub-Total **0.109 hours**

Shallow Concentrated Flow

		Segment ID	3		
8. Surface Description			Pavement		
9. Flow Length, L		ft	103		
10. Watercourse Slope, s		ft/ft	0.013		
11. Average Velocity, V (NEH table 15-3)		ft/s	2.29		
12. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.012 +	+	

Shallow Conc. Flow Sub-Total **0.012 hours**

Channel Flow

		Segment ID	4		
13. Flow Length, L		ft	748		
14. Average Velocity, V		ft/s	2.00		
15. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.104 +	+	

Channel Flow Sub-Total **0.104 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.226 hours**

Total Tc (minutes) = **14 minutes**

Project: Project King Arthur **By:** AM **Date:** 4/26/2023

Location: North Brunswick **Checked By:** PM **Date Checked:** 4/26/2023

Circle One: Present [✓ Developed] Proposed Watershed A3 - Impervious

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		
3.	Flow Length, L (Total L < 100 ft)	ft	100		
4.	Two-year 24-hr rainfall, P_2	in	3.36		
5.	Land Slope, s	ft/ft	0.010		
6.	McCuen-Spiess Limit, L (max. 100ft) $L = (100\ s^{0.5})/n$	ft	100		
7.	Compute T_t $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.026	+	+

Sheet Flow Sub-Total **0.026 hours**

Shallow Concentrated Flow

		Segment ID	2		
8.	Surface Description		Pavement		
9.	Flow Length, L	ft	44		
10.	Watercourse Slope, s	ft/ft	0.010		
11.	Average Velocity, V (NEH table 15-3)	ft/s	2.08		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.006	+	+

Shallow Conc. Flow Sub-Total **0.006 hours**

Channel Flow

		Segment ID	3		
13.	Flow Length, L	ft	737		
14.	Average Velocity, V	ft/s	2.00		
15.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.102	+	+

Channel Flow Sub-Total **0.102 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.134 hours**

Total Tc (minutes) = **8 minutes**

Project: Project King Arthur **By:** AM **Date:** 4/26/2023

Location: North Brunswick **Checked By:** PM **Date Checked:** 4/26/2023

Circle One: Present [✓ Developed] **Proposed Watershed A4 - Impervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

	Segment ID	1				
1. Surface Description (NEH table 15-1)		Smooth Surfaces				
2. Manning's Roughness Coeff., n (NEH table 15-1)		0.011				
3. Flow Length, L (Total L < 100 ft)	ft	100				
4. Two-year 24-hr rainfall, P_2	in	3.36				
5. Land Slope, s	ft/ft	0.010				
6. McCuen-Spiess Limit, L (max. 100ft) $L = (100\, s^{0.5})/n$	ft	100				
7. Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.026	+		+	

Sheet Flow Sub-Total **0.026 hours**

Shallow Concentrated Flow

	Segment ID	2				
8. Surface Description		Pavement				
9. Flow Length, L	ft	26				
10. Watercourse Slope, s	ft/ft	0.010				
11. Average Velocity, V (NEH table 15-3)	ft/s	2.07				
12. Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.003	+		+	

Shallow Conc. Flow Sub-Total **0.003 hours**

Channel Flow

	Segment ID	3				
13. Flow Length, L	ft	722				
14. Average Velocity, V	ft/s	2.00				
15. Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.100	+		+	

Channel Flow Sub-Total **0.100 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.129 hours**

Total Tc (minutes) = **8 minutes**

Project: Project King Arthur **By:** AM **Date:** 4/26/2023

Location: North Brunswick **Checked By:** PM **Date Checked:** 4/26/2023

Circle One: Present [✓ Developed] **Proposed Watershed A5 - Impervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		
3.	Flow Length, L (Total L < 100 ft)	ft	100		
4.	Two-year 24-hr rainfall, P_2	in	3.36		
5.	Land Slope, s	ft/ft	0.009		
6.	McCuen-Spiess Limit, L (max. 100ft) **$L = (100\ s^{0.5})/n$**	ft	100		
7.	Compute T_t $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.028	+	+

Sheet Flow Sub-Total **0.028 hours**

Shallow Concentrated Flow

		Segment ID	2		
8.	Surface Description		Pavement		
9.	Flow Length, L	ft	55		
10.	Watercourse Slope, s	ft/ft	0.009		
11.	Average Velocity, V (NEH table 15-3)	ft/s	1.90		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.008	+	+

Shallow Conc. Flow Sub-Total **0.008 hours**

Channel Flow

		Segment ID	3		
13.	Flow Length, L	ft	943		
14.	Average Velocity, V	ft/s	2.00		
15.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.131	+	+

Channel Flow Sub-Total **0.131 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.167 hours**

Total Tc (minutes) = **10 minutes**

Project: Project King Arthur **By:** AM **Date:** 4/26/2023

Location: North Brunswick **Checked By:** PM **Date Checked:** 4/26/2023

Circle One: Present [✓ Developed] **Proposed Watershed A5 - Pervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

	Segment ID		**1**		**2**		
1. Surface Description (NEH table 15-1)			**Dense Grasses**		**Smooth Surfaces**		
2. Manning's Roughness Coeff., n (NEH table 15-1)			**0.24**		**0.011**		
3. Flow Length, L (Total L < 100 ft)		ft	**29**		**3**		
4. Two-year 24-hr rainfall, P_2		in	**3.36**		**3.36**		
5. Land Slope, s		ft/ft	**0.207**		**0.070**		
6. McCuen-Spiess Limit, L (max. 100ft)	$L = (100\ s^{0.5})/n$	ft	**100**		**100**		
7. Compute T_t	$T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	**0.034**	+	**0.001**	+	

Sheet Flow Sub-Total **0.035 hours**

Channel Flow

	Segment ID		**3**				
13. Flow Length, L		ft	**943**				
14. Average Velocity, V		ft/s	**2.00**				
15. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	**0.131**	+		+	

Channel Flow Sub-Total **0.131 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.166 hours**

Total Tc (minutes) = **10 minutes**

Project: Project King Arthur **By:** AM **Date:** 4/26/2023

Location: North Brunswick **Checked By:** PM **Date Checked:** 4/26/2023

Circle One: Present [✓ Developed] **Proposed Watershed A6 - Pervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	**1**		
1. Surface Description (NEH table 15-1)			**Dense Grasses**		
2. Manning's Roughness Coeff., n (NEH table 15-1)			**0.24**		
3. Flow Length, L (Total L < 100 ft)		ft	**87**		
4. Two-year 24-hr rainfall, P_2		in	**3.36**		
5. Land Slope, s		ft/ft	**0.045**		
6. McCuen-Spiess Limit, L (max. 100ft)	$L = (100\ s^{0.5})/n$	ft	**88**		
7. Compute T_t	$T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	**0.151** +	+	

Sheet Flow Sub-Total **0.151 hours**

Shallow Concentrated Flow

		Segment ID	**2**	**3**	
8. Surface Description			**Grassed Waterways**	**Woodlands**	
9. Flow Length, L		ft	**40**	**230**	
10. Watercourse Slope, s		ft/ft	**0.060**	**0.143**	
11. Average Velocity, V (NEH table 15-3)		ft/s	**3.97**	**1.90**	
12. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	**0.003** +	**0.034** +	

Shallow Conc. Flow Sub-Total **0.036 hours**

Channel Flow

		Segment ID	**4**		
13. Flow Length, L		ft	**930**		
14. Average Velocity, V		ft/s	**2.00**		
15. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	**0.129** +	+	

Channel Flow Sub-Total **0.129 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.316 hours**

Total Tc (minutes) = **19 minutes**

Project: Project King Arthur **By:** AM **Date:** 4/26/2023

Location: North Brunswick, NJ **Checked By:** PM **Date Checked:** 4/26/2023

Circle One: [✓ Present] Developed **Proposed Watershed B - Impervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

	Segment ID	**1**		**2**		
1. Surface Description (NEH table 15-1)		**Smooth Surfaces**		**Dense Grasses**		
2. Manning's Roughness Coeff., n (NEH table 15-1)		**0.011**		**0.24**		
3. Flow Length, L (total L < 100 ft)	ft	**29**		**71**		
4. Two-year 24-hr rainfall, P_2	in	**3.36**		**3.36**		
5. Land Slope, s	ft/ft	**0.011**		**0.008**		
6. Compute T_t	hr	**0.009**	+	**0.249**	+	

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

Sheet Flow Sub-Total **0.258 hours**

Shallow Concentrated Flow

	Segment ID	**3**				
7. Surface Description		**Grassed Waterways**				
8. Flow Length, L	ft	**78**				
9. Watercourse Slope, s	ft/ft	**0.009**				
10. Average Velocity, V (NEH table 15-3)	ft/s	**1.57**				
11. Compute T_t	hr	**0.014**	+		+	

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

Shallow Conc. Flow Sub-Total **0.014 hours**

Channel Flow

	Segment ID	**4**				
12. Flow Length, L	ft	**282**				
13. Average Velocity, V	ft/s	**2.00**				
14. Compute T_t	hr	**0.039**	+		+	

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

Channel Flow Sub-Total **0.039 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.311 hours**
Total Tc (minutes) = **19 minutes**

Project: Project King Arthur **By:** AM **Date:** 4/26/2023

Location: North Brunswick, NJ **Checked By:** PM **Date Checked:** 4/26/2023

Circle One: [✓ Present] Developed **Existing Watershed B - Pervious**

Circle One: [✓ T_c] T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		
3.	Flow Length, L (total L < 100 ft)	ft	100		
4.	Two-year 24-hr rainfall, P_2	in	3.36		
5.	Land Slope, s	ft/ft	0.016		
6.	Compute T_t $\quad T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.251 +	+	

Sheet Flow Sub-Total **0.251 hours**

Shallow Concentrated Flow

		Segment ID	2		
7.	Surface Description		Pavement		
8.	Flow Length, L	ft	84		
9.	Watercourse Slope, s	ft/ft	0.010		
10.	Average Velocity, V (NEH table 15-3)	ft/s	1.98		
11.	Compute T_t $\quad T_t = \frac{L}{3600\ V}$	hr	0.012 +	+	

Shallow Conc. Flow Sub-Total **0.012 hours**

Channel Flow

		Segment ID	3		
12.	Flow Length, L	ft	282		
13.	Average Velocity, V	ft/s	2.00		
14.	Compute T_t $\quad T_t = \frac{L}{3600\ V}$	hr	0.039 +	+	

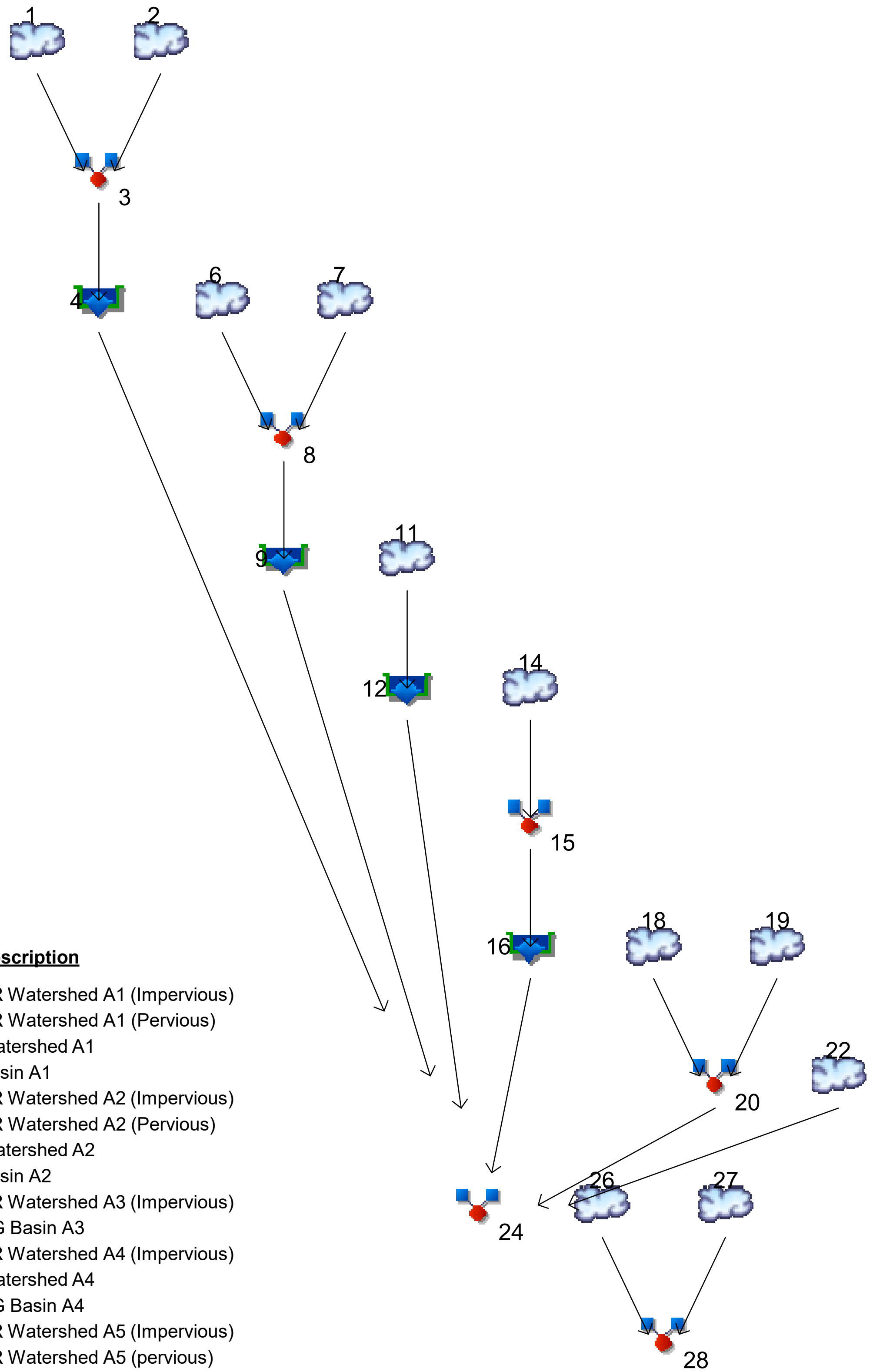
Channel Flow Sub-Total **0.039 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.302 hours**
Total Tc (minutes) =	**18 minutes**

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022



Legend

Hyd.	Origin	Description
1	SCS Runoff	PR Watershed A1 (Impervious)
2	SCS Runoff	PR Watershed A1 (Pervious)
3	Combine	Watershed A1
4	Reservoir	Basin A1
6	SCS Runoff	PR Watershed A2 (Impervious)
7	SCS Runoff	PR Watershed A2 (Pervious)
8	Combine	Watershed A2
9	Reservoir	Basin A2
11	SCS Runoff	PR Watershed A3 (Impervious)
12	Reservoir	UG Basin A3
14	SCS Runoff	PR Watershed A4 (Impervious)
15	Combine	Watershed A4
16	Reservoir	UG Basin A4
18	SCS Runoff	PR Watershed A5 (Impervious)
19	SCS Runoff	PR Watershed A5 (pervious)
20	Combine	PR Watershed A5
22	SCS Runoff	PR Watershed A6
24	Combine	Watershed A POA
26	SCS Runoff	PR Watershed B (Impervious)
27	SCS Runoff	PR Watershed B (Pervious)
28	Combine	Watershed B

Project: Proposed Hydrographs_Current Precipitation.gpw

Friday, 05 / 5 / 2023

Hydraflow Table of Contents

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.864	1	727	14,515	------	------	------	PR Watershed A1 (Impervious)
2	SCS Runoff	1.051	1	733	4,497	------	------	------	PR Watershed A1 (Pervious)
3	Combine	4.731	1	728	19,012	1, 2	------	------	Watershed A1
4	Reservoir	0.668	1	776	9,725	3	48.75	10,985	Basin A1
6	SCS Runoff	5.621	1	727	21,113	------	------	------	PR Watershed A2 (Impervious)
7	SCS Runoff	0.650	1	732	2,638	------	------	------	PR Watershed A2 (Pervious)
8	Combine	6.181	1	728	23,751	6, 7	------	------	Watershed A2
9	Reservoir	0.722	1	781	12,190	8	48.84	14,405	Basin A2
11	SCS Runoff	6.441	1	727	24,192	------	------	------	PR Watershed A3 (Impervious)
12	Reservoir	0.000	1	858	0	11	49.98	11,787	UG Basin A3
14	SCS Runoff	4.596	1	727	17,264	------	------	------	PR Watershed A4 (Impervious)
15	Combine	4.596	1	727	17,264	14	------	------	Watershed A4
16	Reservoir	0.006	1	796	9	15	52.01	6,746	UG Basin A4
18	SCS Runoff	2.607	1	728	10,376	------	------	------	PR Watershed A5 (Impervious)
19	SCS Runoff	0.126	1	729	439	------	------	------	PR Watershed A5 (pervious)
20	Combine	2.731	1	728	10,815	18, 19	------	------	PR Watershed A5
22	SCS Runoff	0.962	1	735	4,441	------	------	------	PR Watershed A6
24	Combine	4.005	1	728	37,180	4, 9, 12, 16, 20, 22,	------	------	Watershed A POA
26	SCS Runoff	0.065	1	734	338	------	------	------	PR Watershed B (Impervious)
27	SCS Runoff	1.160	1	734	5,097	------	------	------	PR Watershed B (Pervious)
28	Combine	1.225	1	734	5,435	26, 27	------	------	Watershed B

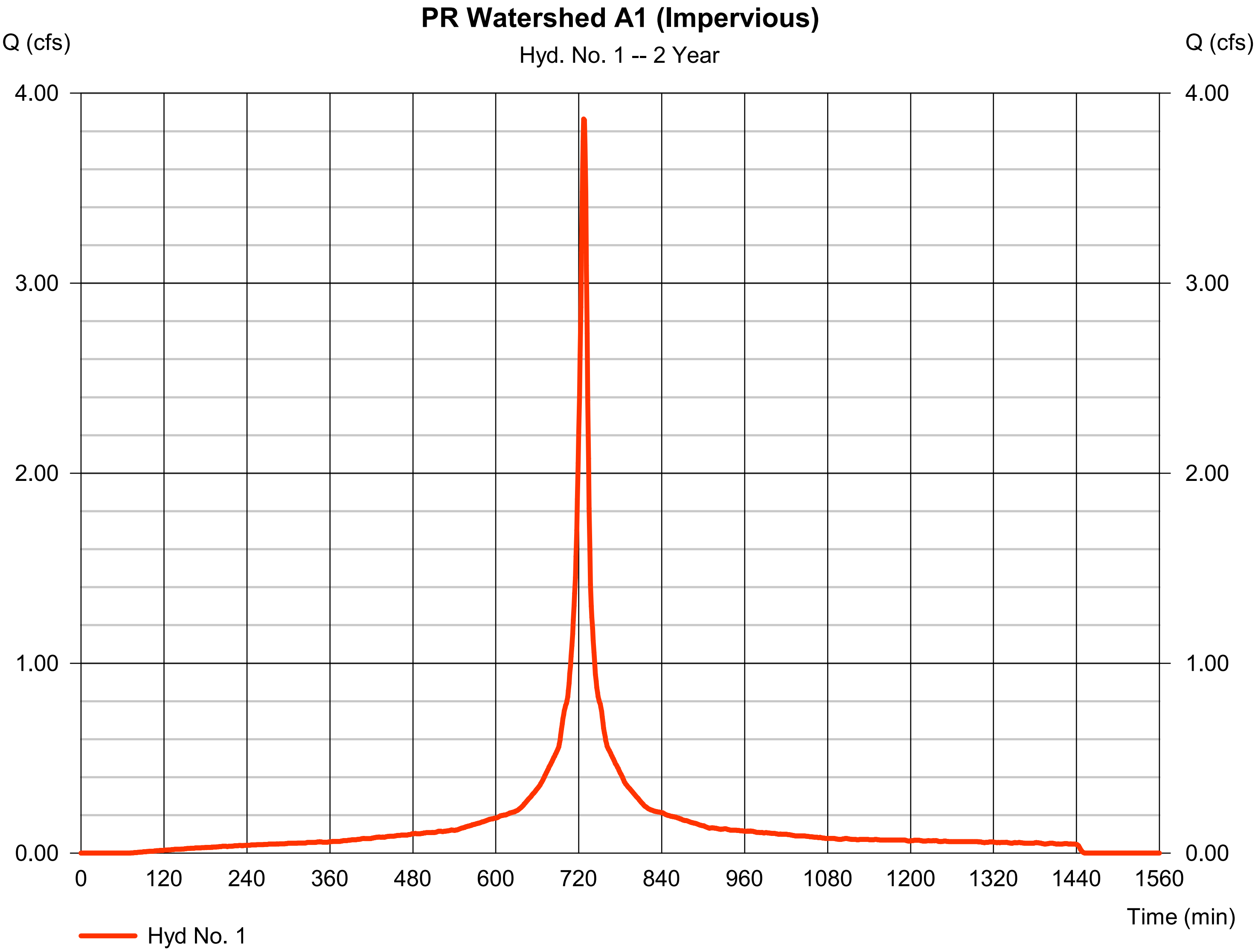
Hydrograph Report

Hyd. No. 1

PR Watershed A1 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.320 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 3.864 cfs
Time to peak = 727 min
Hyd. volume = 14,515 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

Hyd. No. 2

PR Watershed A1 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 1.051 cfs
Time to peak = 733 min
Hyd. volume = 4,497 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 16.00 min
Distribution = Custom
Shape factor = 484

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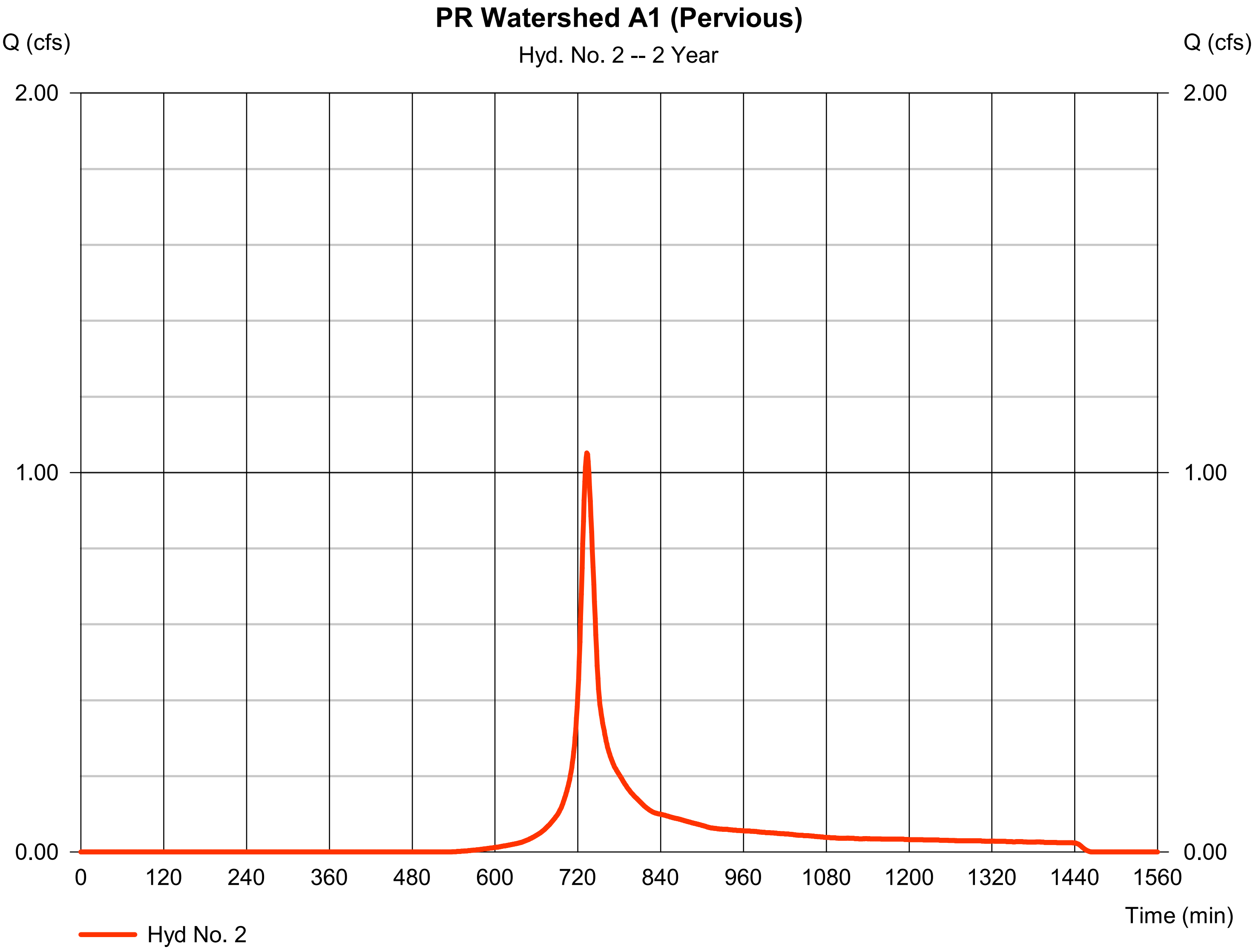
* Composite (Area/CN) = [(0.790 x 80) + (0.020 x 91)] / 0.810

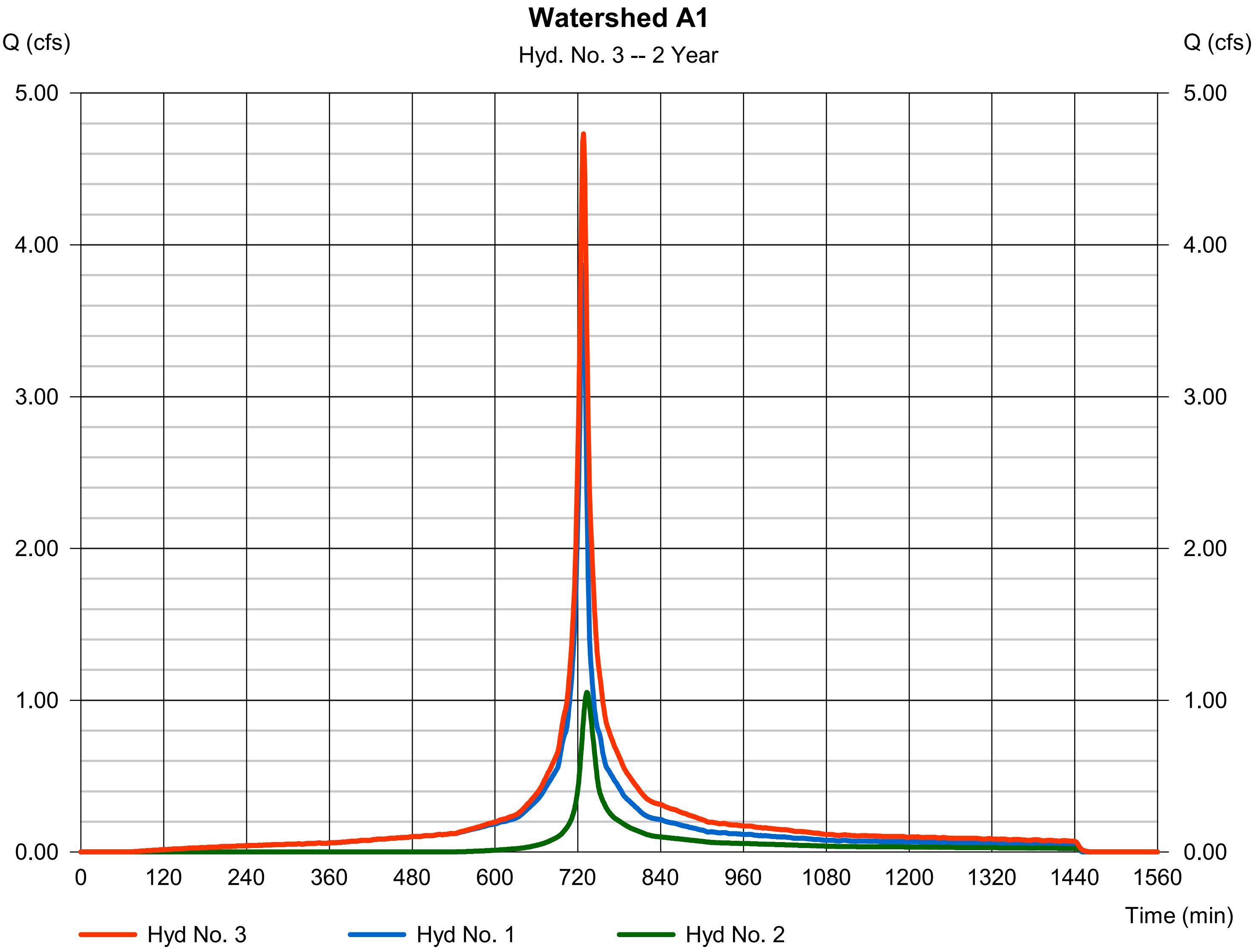


Hydrograph Report

Hyd. No. 3

Watershed A1

Hydrograph type	= Combine	Peak discharge	= 4.731 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 19,012 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.130 ac



Hydrograph Report

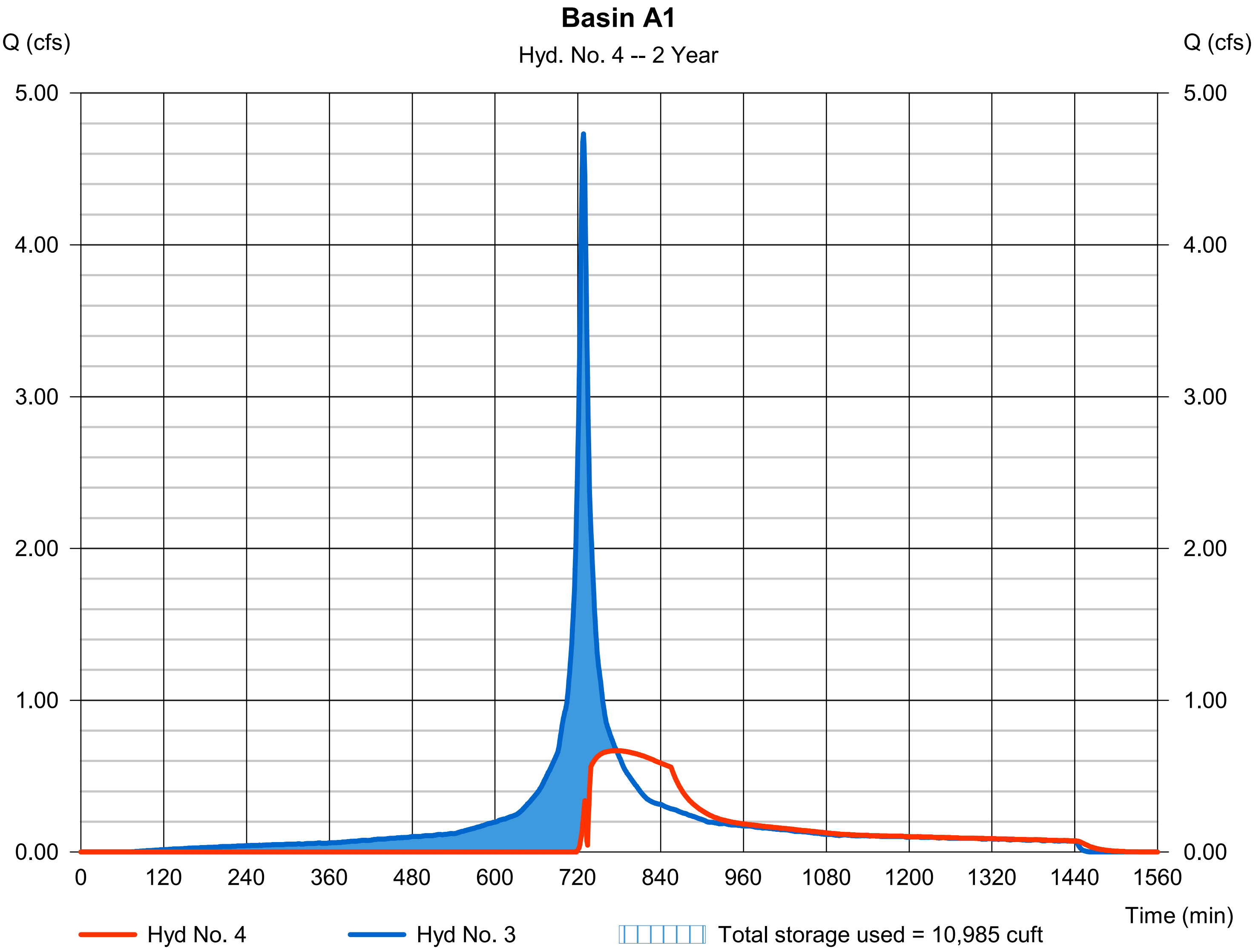
Hyd. No. 4

Basin A1

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyd. No. = 3 - Watershed A1
Reservoir name = Basin A1

Peak discharge = 0.668 cfs
Time to peak = 776 min
Hyd. volume = 9,725 cuft
Max. Elevation = 48.75 ft
Max. Storage = 10,985 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Basin A1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 47.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	47.00	5,443	0	0
1.00	48.00	6,344	5,887	5,887
2.00	49.00	7,260	6,796	12,683
3.00	50.00	8,216	7,732	20,416
4.00	51.00	9,219	8,712	29,127

Culvert / Orifice Structures

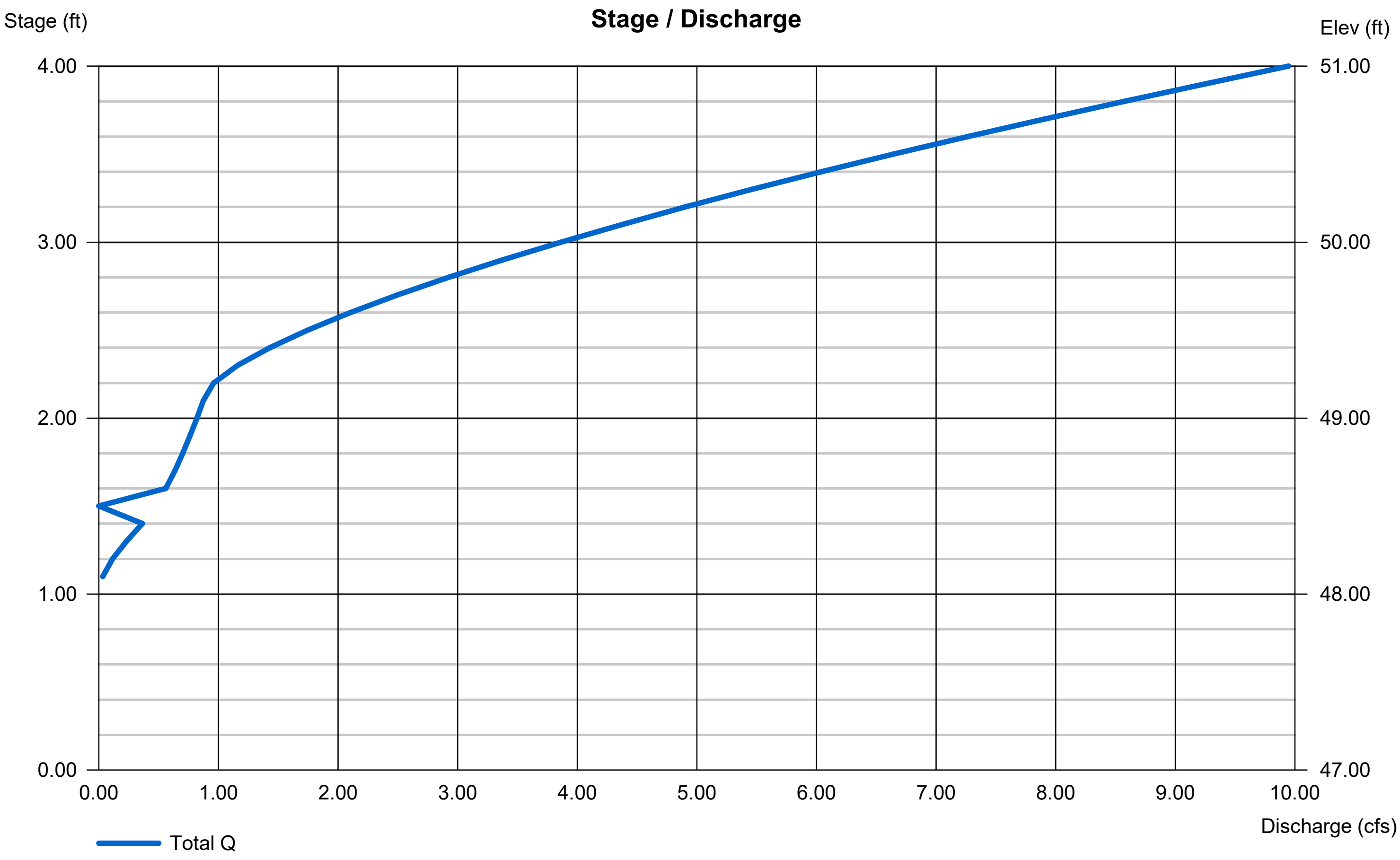
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	6.00	0.00	0.00
Span (in)	= 24.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 44.00	48.00	0.00	0.00
Length (ft)	= 5.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.00	Inactive	0.00	0.00
Crest El. (ft)	= 49.15	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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



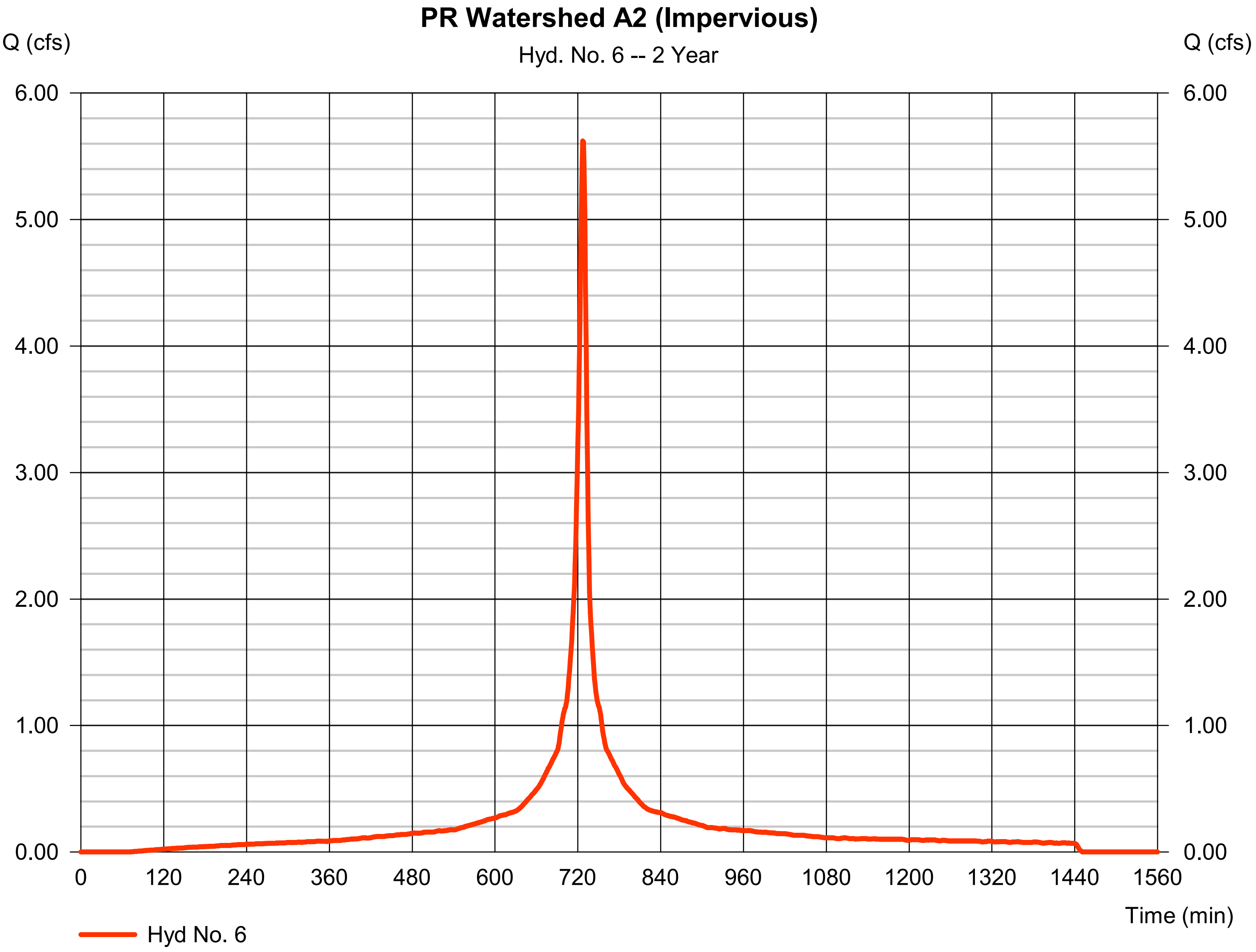
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 6

PR Watershed A2 (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.621 cfs
Storm frequency	=	2 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	21,113 cuft
Drainage area	=	1.920 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	8.00 min
Total precip.	=	3.34 in	Distribution	=	Custom
Storm duration	=	\\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor	Shape factor	=	484



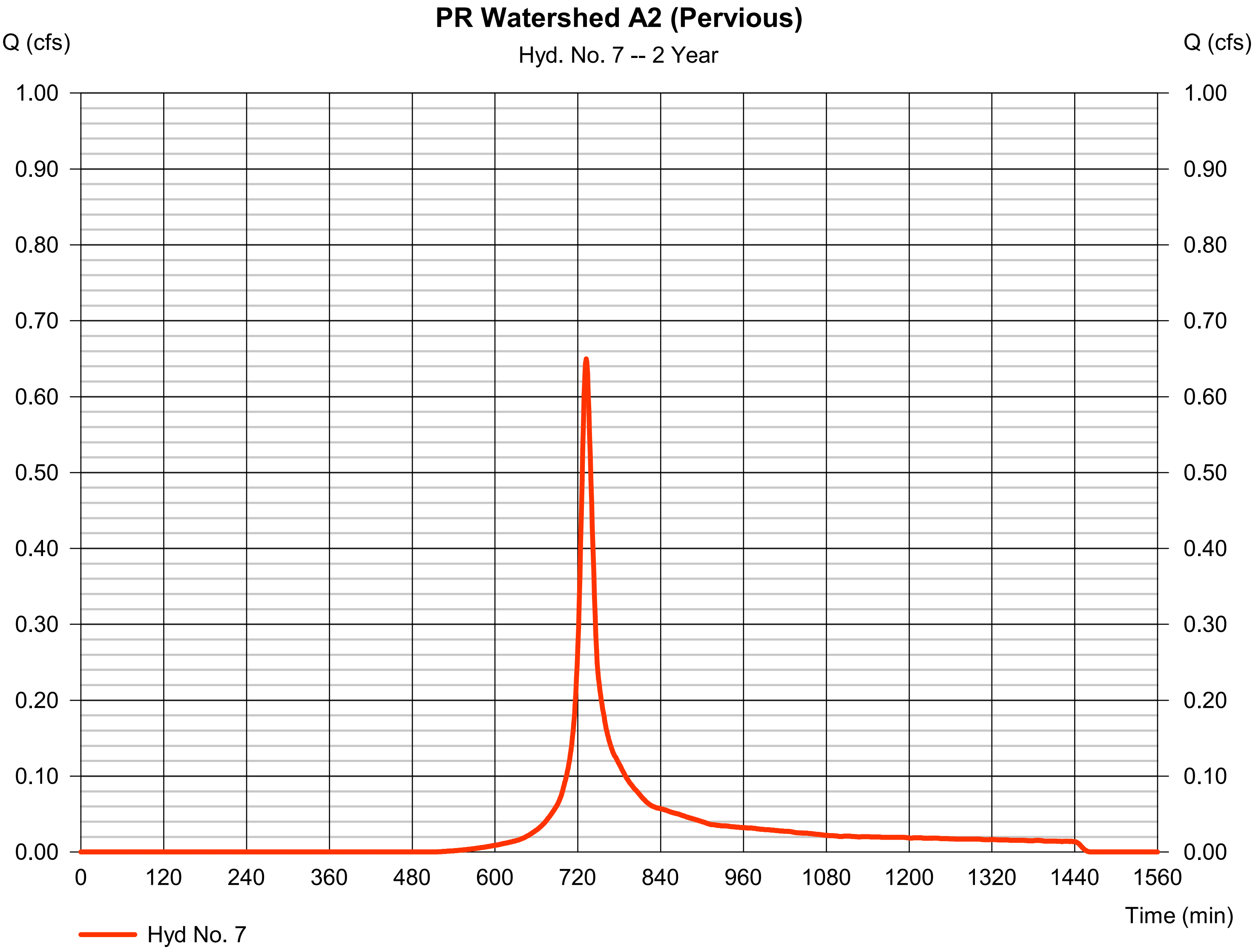
Hyd. No. 7

PR Watershed A2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.460 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.650 cfs
Time to peak = 732 min
Hyd. volume = 2,638 cuft
Curve number = 81*
Hydraulic length = 0 ft
Time of conc. (Tc) = 14.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.410 x 80) + (0.050 x 91)] / 0.460

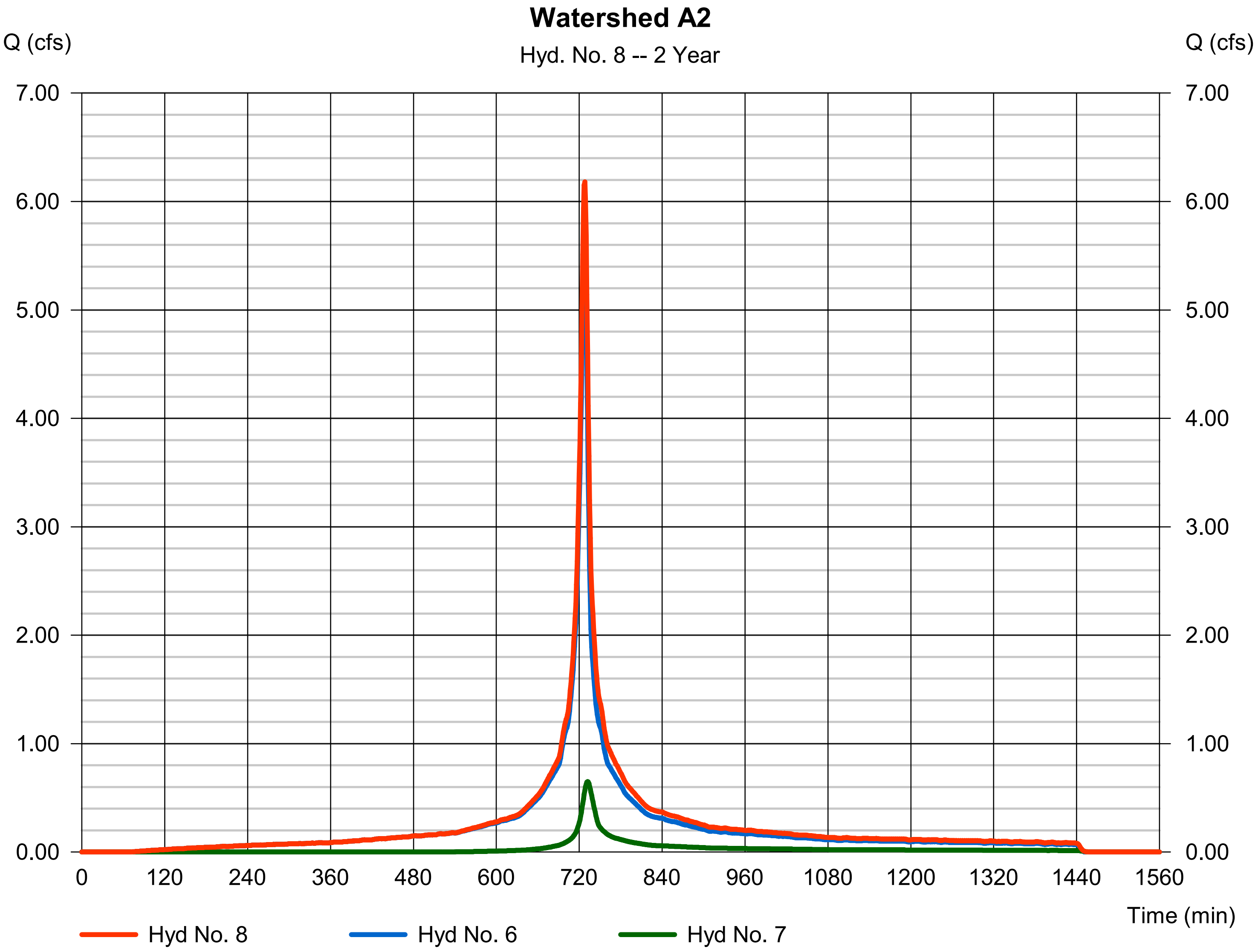


Hydrograph Report

Hyd. No. 8

Watershed A2

Hydrograph type	= Combine	Peak discharge	= 6.181 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 23,751 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 2.380 ac



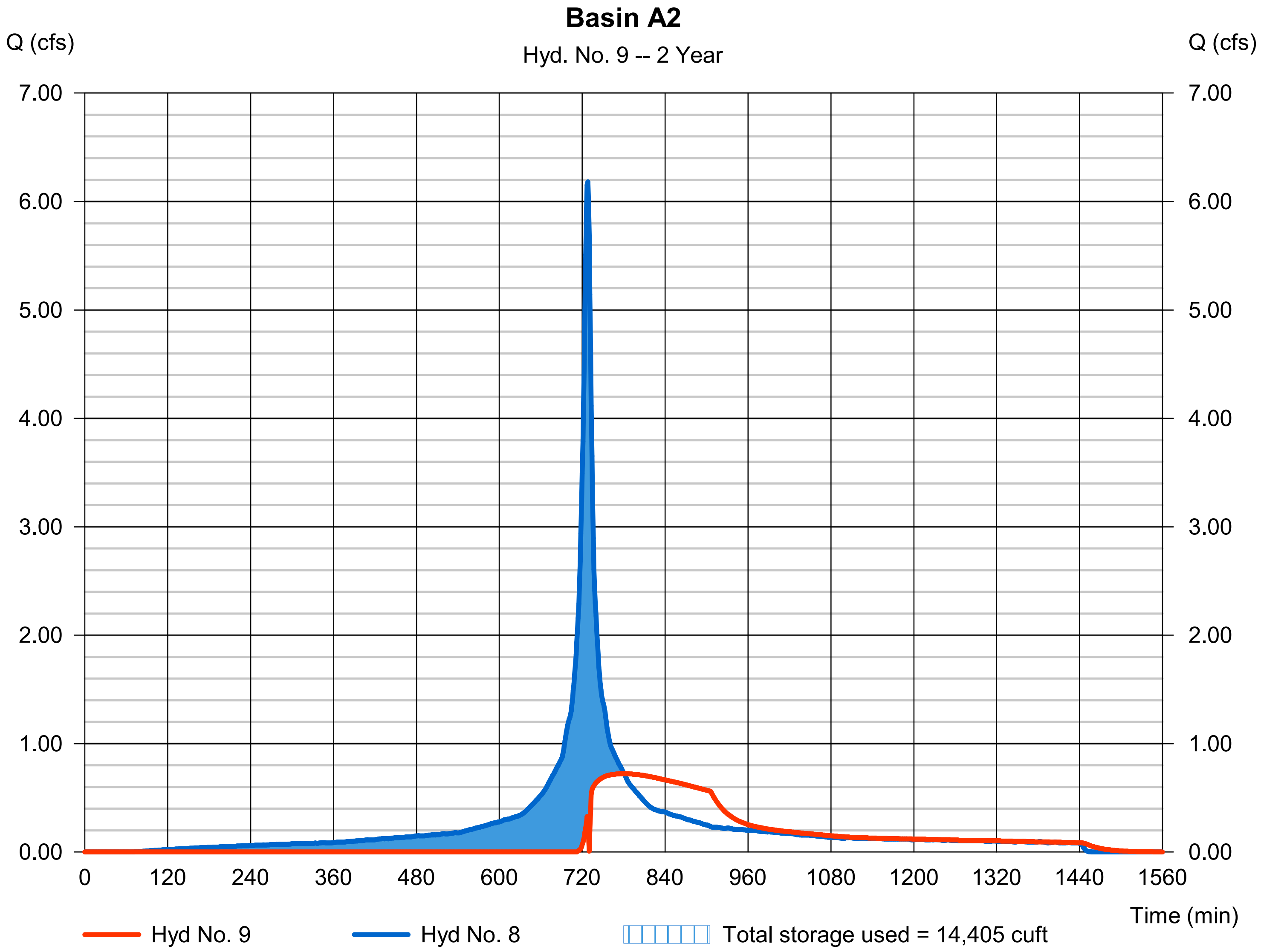
Hydrograph Report

Hyd. No. 9

Basin A2

Hydrograph type	= Reservoir	Peak discharge	= 0.722 cfs
Storm frequency	= 2 yrs	Time to peak	= 781 min
Time interval	= 1 min	Hyd. volume	= 12,190 cuft
Inflow hyd. No.	= 8 - Watershed A2	Max. Elevation	= 48.84 ft
Reservoir name	= Basin A2	Max. Storage	= 14,405 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Pond No. 5 - Basin A2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 47.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	47.00	6,733	0	0
1.00	48.00	7,912	7,314	7,314
2.00	49.00	9,088	8,492	15,806
3.00	50.00	10,268	9,671	25,477
4.00	51.00	11,468	10,861	36,339

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	6.00	0.00	0.00
Span (in)	= 24.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 44.00	48.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

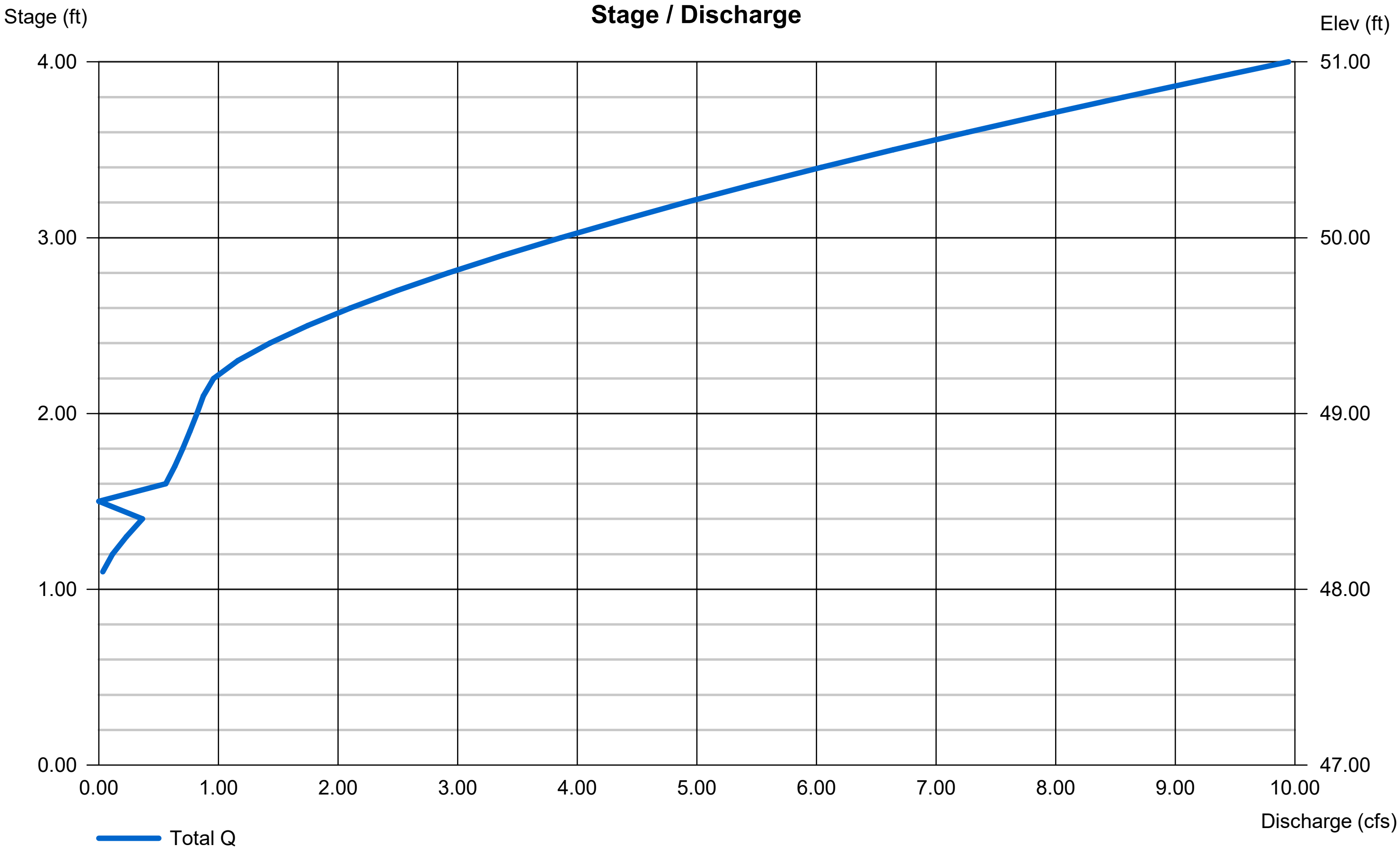
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.00	0.00	0.00	0.00
Crest El. (ft)	= 49.15	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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



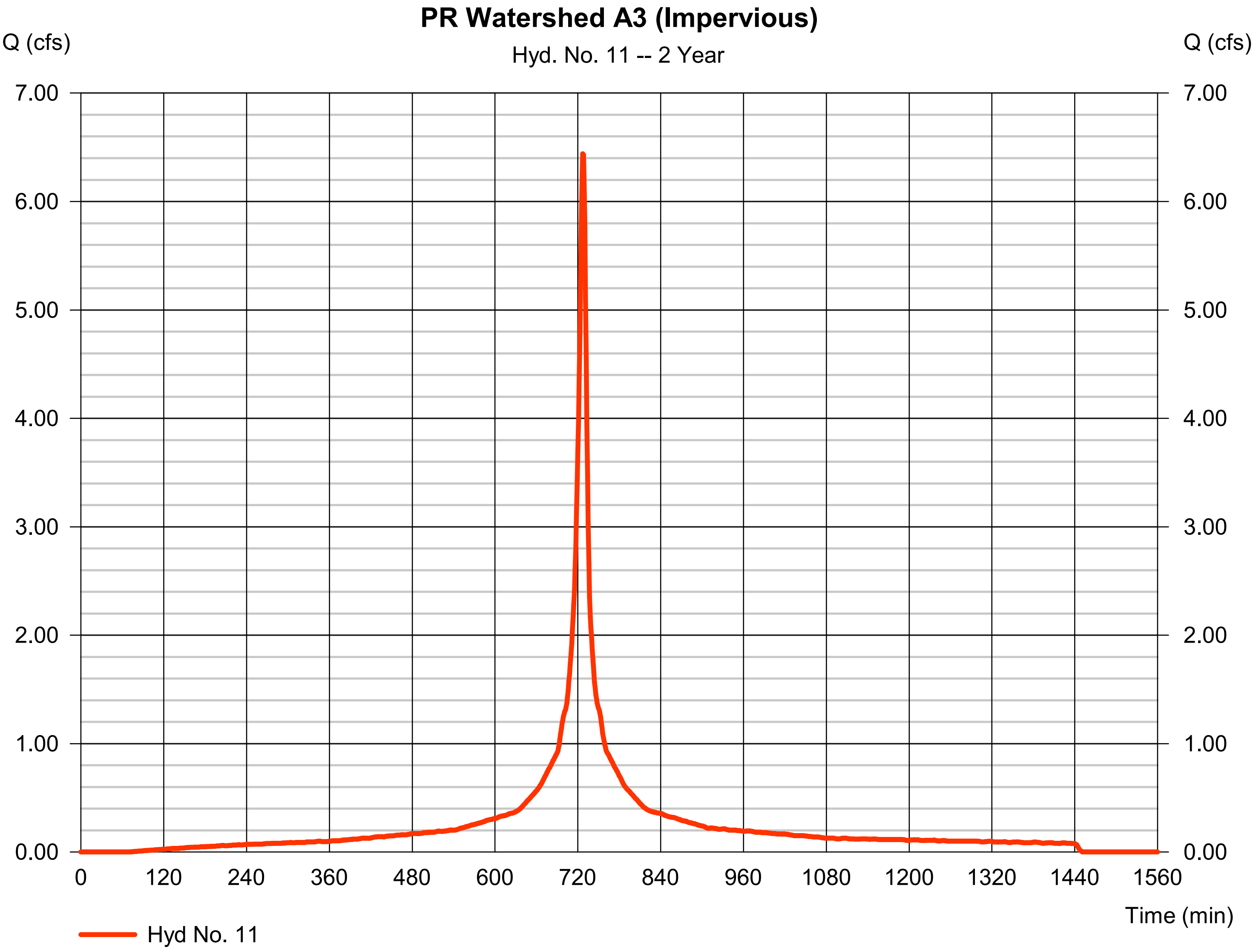
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 11

PR Watershed A3 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.441 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 24,192 cuft
Drainage area	= 2.200 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	= 484



Hydrograph Report

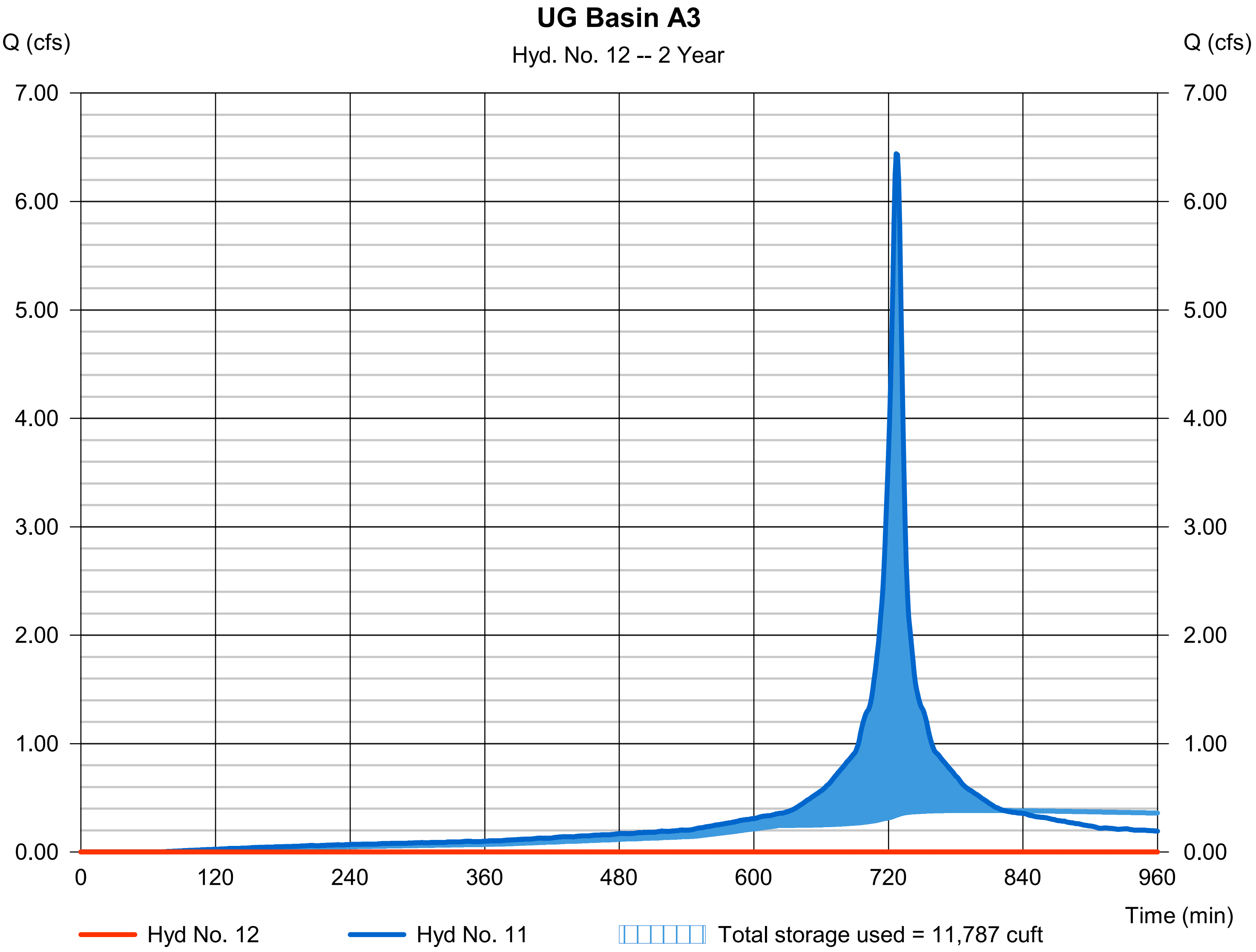
Hyd. No. 12

UG Basin A3

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyd. No. = 11 - PR Watershed A3 (Impervious)
Reservoir name = UG Detention A3

Peak discharge = 0.000 cfs
Time to peak = 858 min
Hyd. volume = 0 cuft
Max. Elevation = 49.98 ft
Max. Storage = 11,787 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Pond No. 4 - UG Detention A3

Pond Data

UG Chambers -Invert elev. = 49.50 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 7.12 ft, No. Barrels = 235, Slope = 0.00%, Headers = Yes
Encasement -Invert elev. = 49.00 ft, Width = 4.67 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	49.00	n/a	0	0
0.35	49.35	n/a	2,529	2,529
0.70	49.70	n/a	4,500	7,029
1.05	50.05	n/a	5,940	12,969
1.40	50.40	n/a	5,830	18,799
1.75	50.75	n/a	5,642	24,442
2.10	51.10	n/a	5,361	29,802
2.45	51.45	n/a	4,952	34,755
2.80	51.80	n/a	4,328	39,083
3.15	52.15	n/a	3,049	42,132
3.50	52.50	n/a	2,529	44,661

Culvert / Orifice Structures

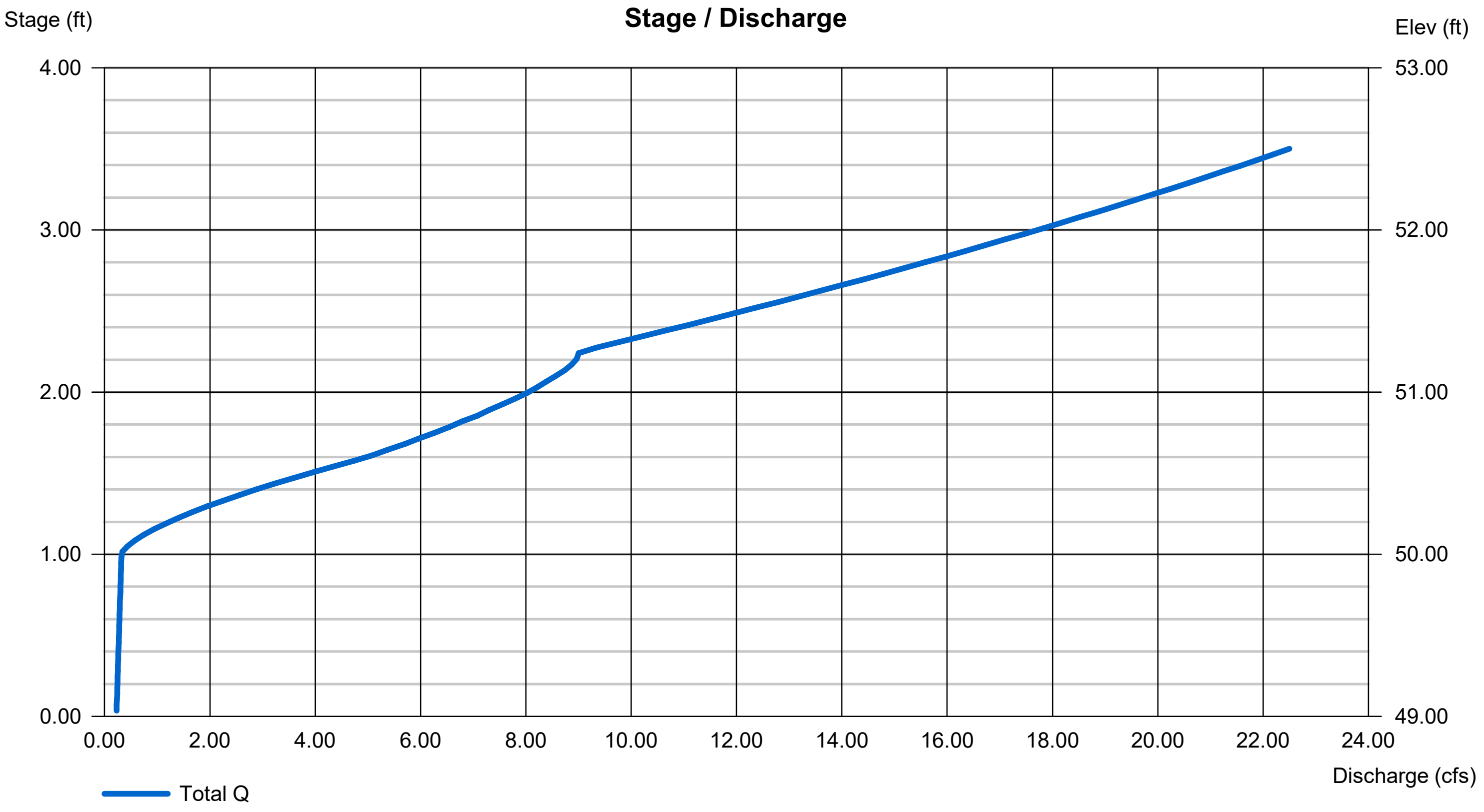
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 49.00	0.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 50.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.750 (by Wet area)
TW Elev. (ft) = 0.00

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



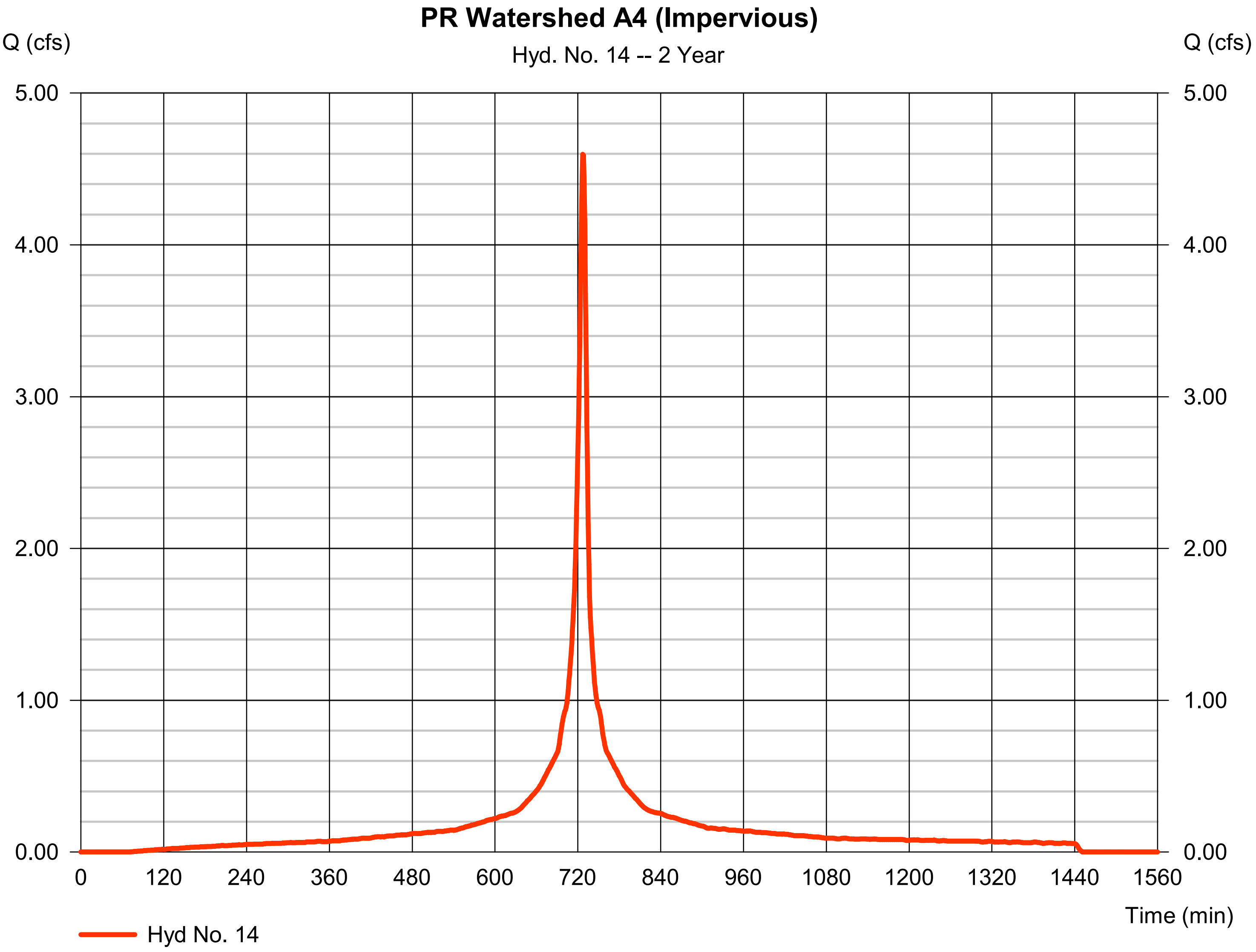
Hydrograph Report

Hyd. No. 14

PR Watershed A4 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.570 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 4.596 cfs
Time to peak = 727 min
Hyd. volume = 17,264 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



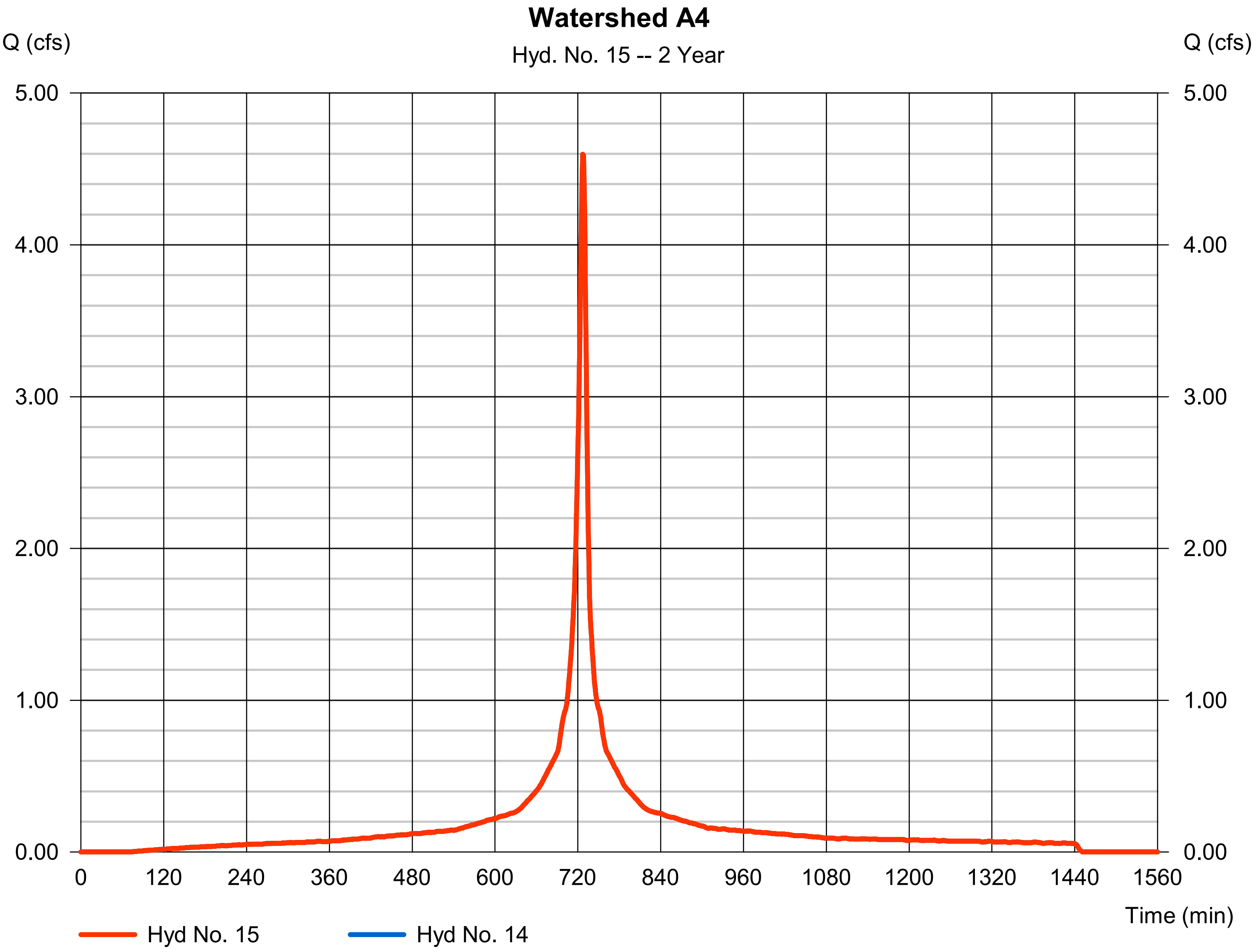
Hydrograph Report

Hyd. No. 15

Watershed A4

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 14

Peak discharge = 4.596 cfs
Time to peak = 727 min
Hyd. volume = 17,264 cuft
Contrib. drain. area = 1.570 ac



Hydrograph Report

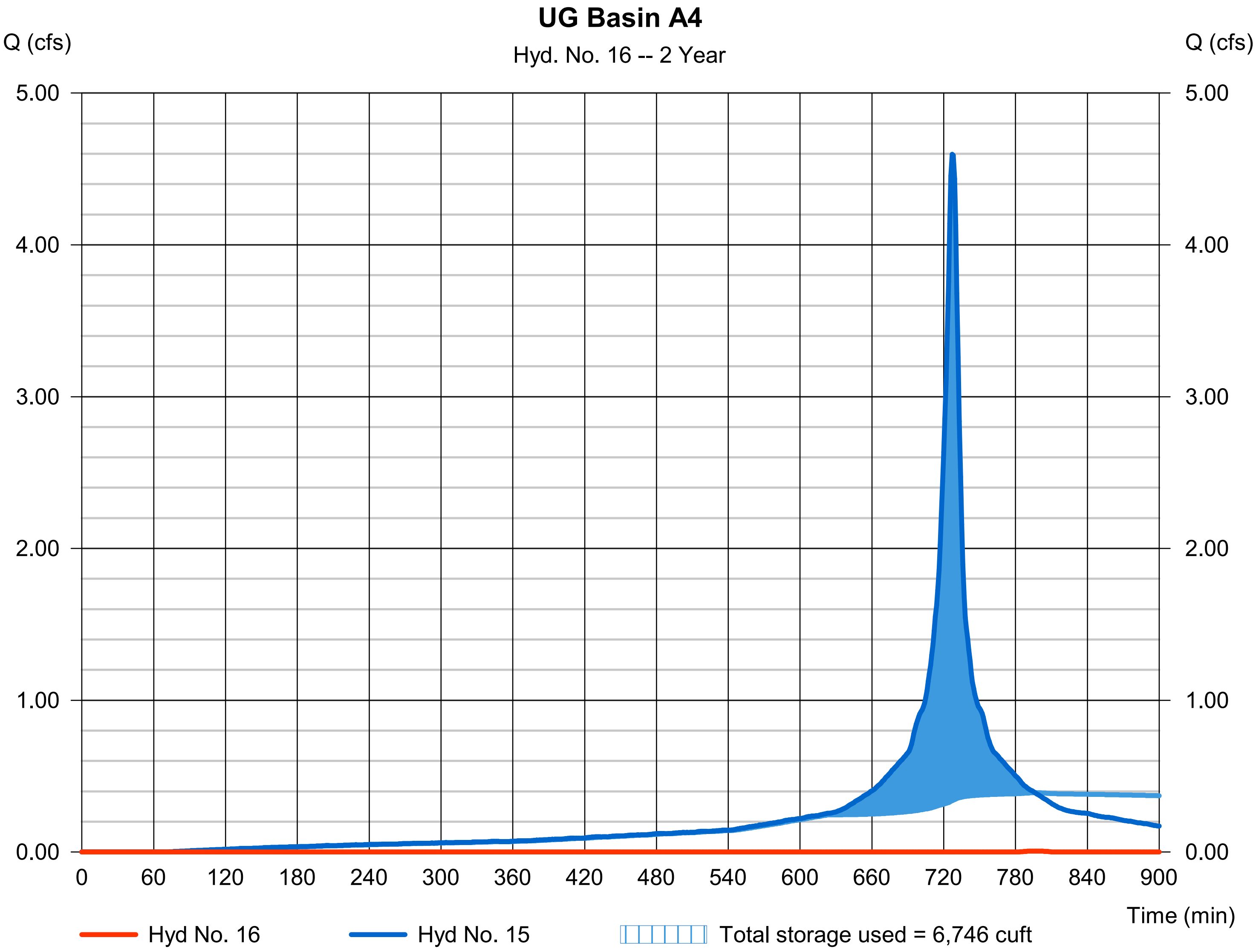
Hyd. No. 16

UG Basin A4

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyd. No. = 15 - Watershed A4
Reservoir name = UG Detention A4

Peak discharge = 0.006 cfs
Time to peak = 796 min
Hyd. volume = 9 cuft
Max. Elevation = 52.01 ft
Max. Storage = 6,746 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 3 - UG Detention A4

Pond Data

UG Chambers - Invert elev. = 51.50 ft, Rise x Span = 1.33 x 2.83 ft, Barrel Len = 7.12 ft, No. Barrels = 429, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 51.00 ft, Width = 3.42 ft, Height = 2.33 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	51.00	n/a	0	0
0.23	51.23	n/a	974	974
0.47	51.47	n/a	974	1,948
0.70	51.70	n/a	2,002	3,950
0.93	51.93	n/a	2,146	6,096
1.17	52.17	n/a	2,073	8,169
1.40	52.40	n/a	1,949	10,118
1.63	52.63	n/a	1,750	11,867
1.86	52.86	n/a	1,342	13,209
2.10	53.10	n/a	974	14,183
2.33	53.33	n/a	974	15,157

Culvert / Orifice Structures

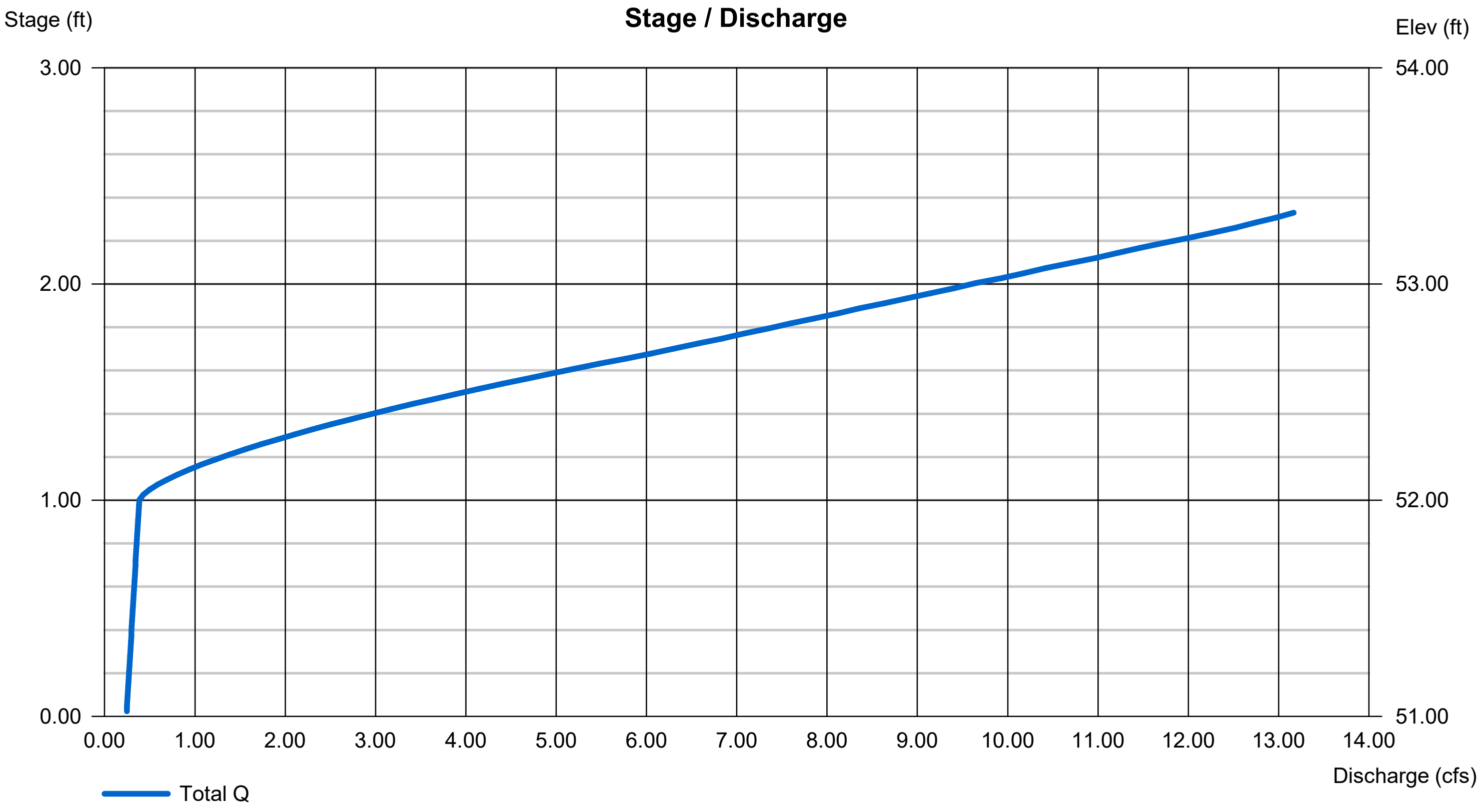
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 51.00	0.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 2.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 52.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 1.000 (by Wet area)
TW Elev. (ft) = 0.00

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



Hydrograph Report

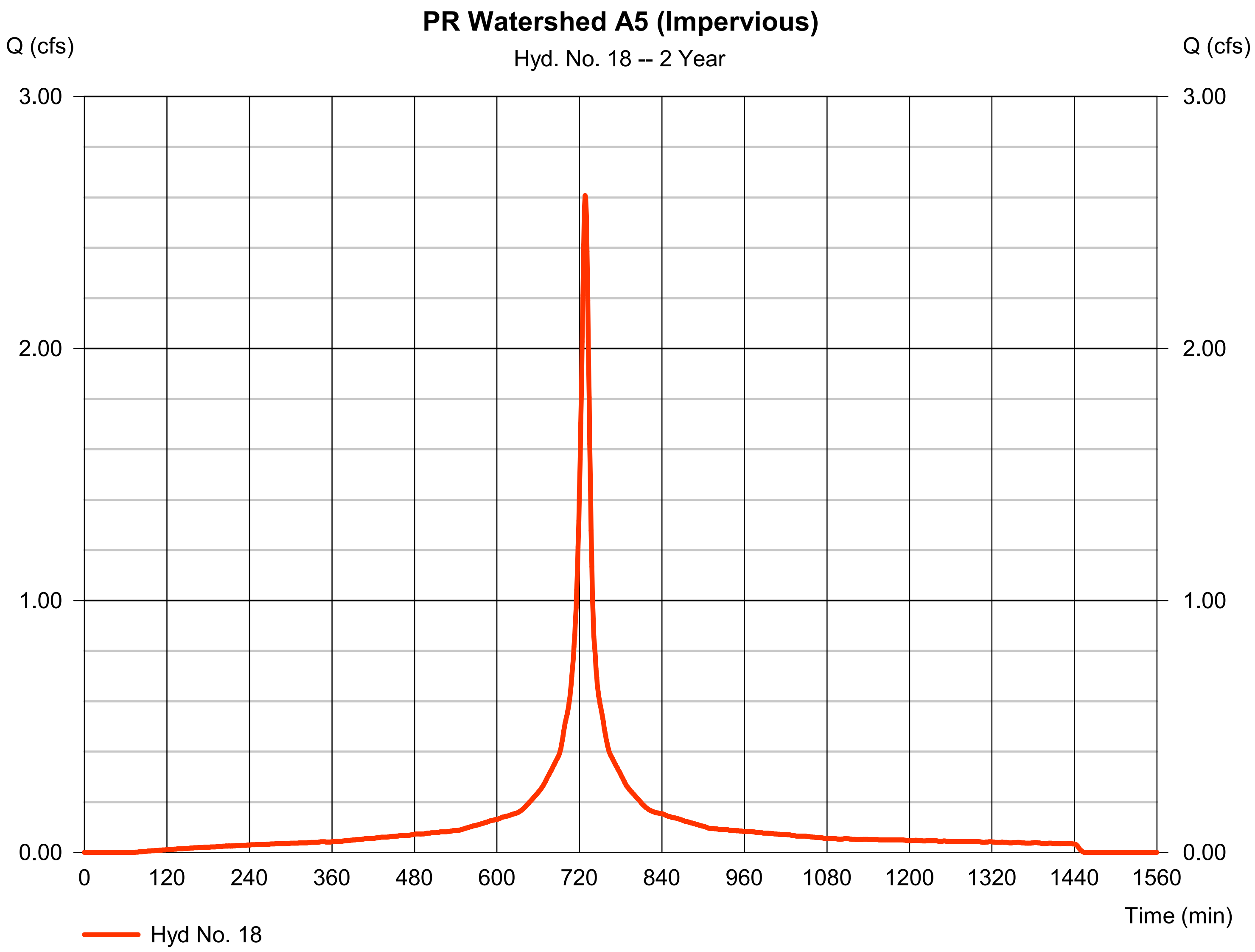
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 18

PR Watershed A5 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.920 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 2.607 cfs
Time to peak = 728 min
Hyd. volume = 10,376 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.00 min
Distribution = Custom
Shape factor = 484



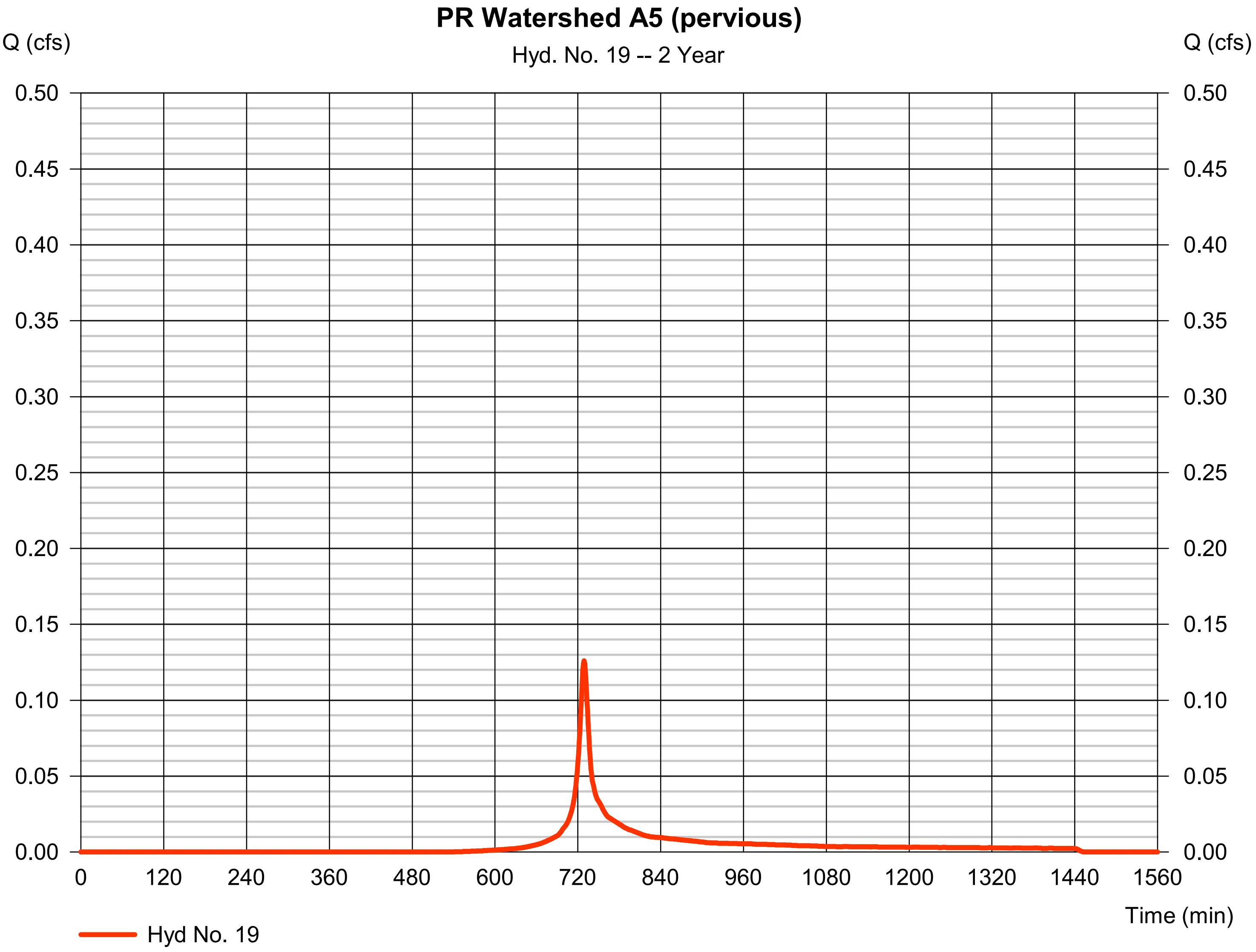
Hydrograph Report

Hyd. No. 19

PR Watershed A5 (pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.080 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 0.126 cfs
Time to peak = 729 min
Hyd. volume = 439 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.00 min
Distribution = Custom
Shape factor = 484

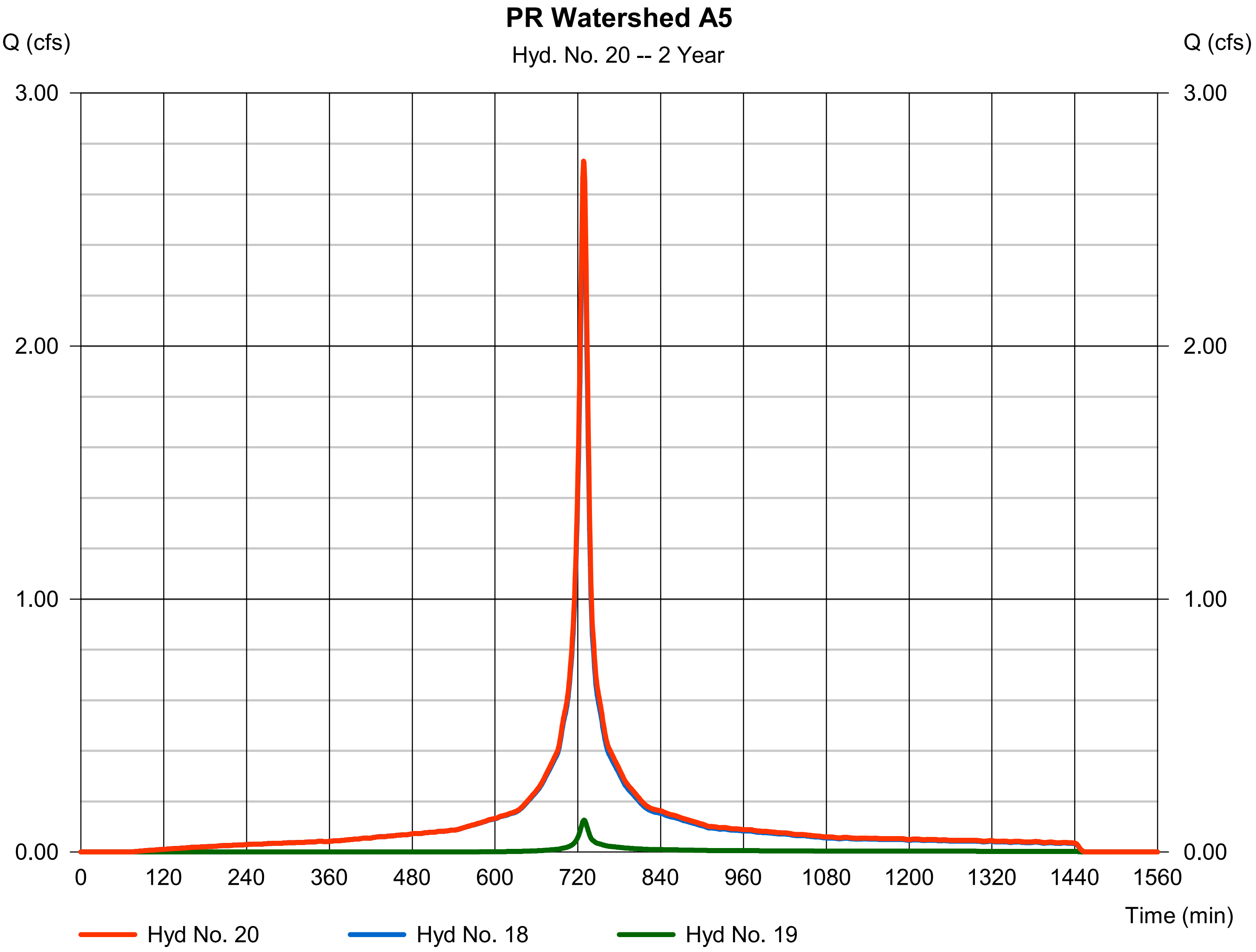


Hydrograph Report

Hyd. No. 20

PR Watershed A5

Hydrograph type	= Combine	Peak discharge	= 2.731 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 10,815 cuft
Inflow hyds.	= 18, 19	Contrib. drain. area	= 1.000 ac



Hydrograph Report

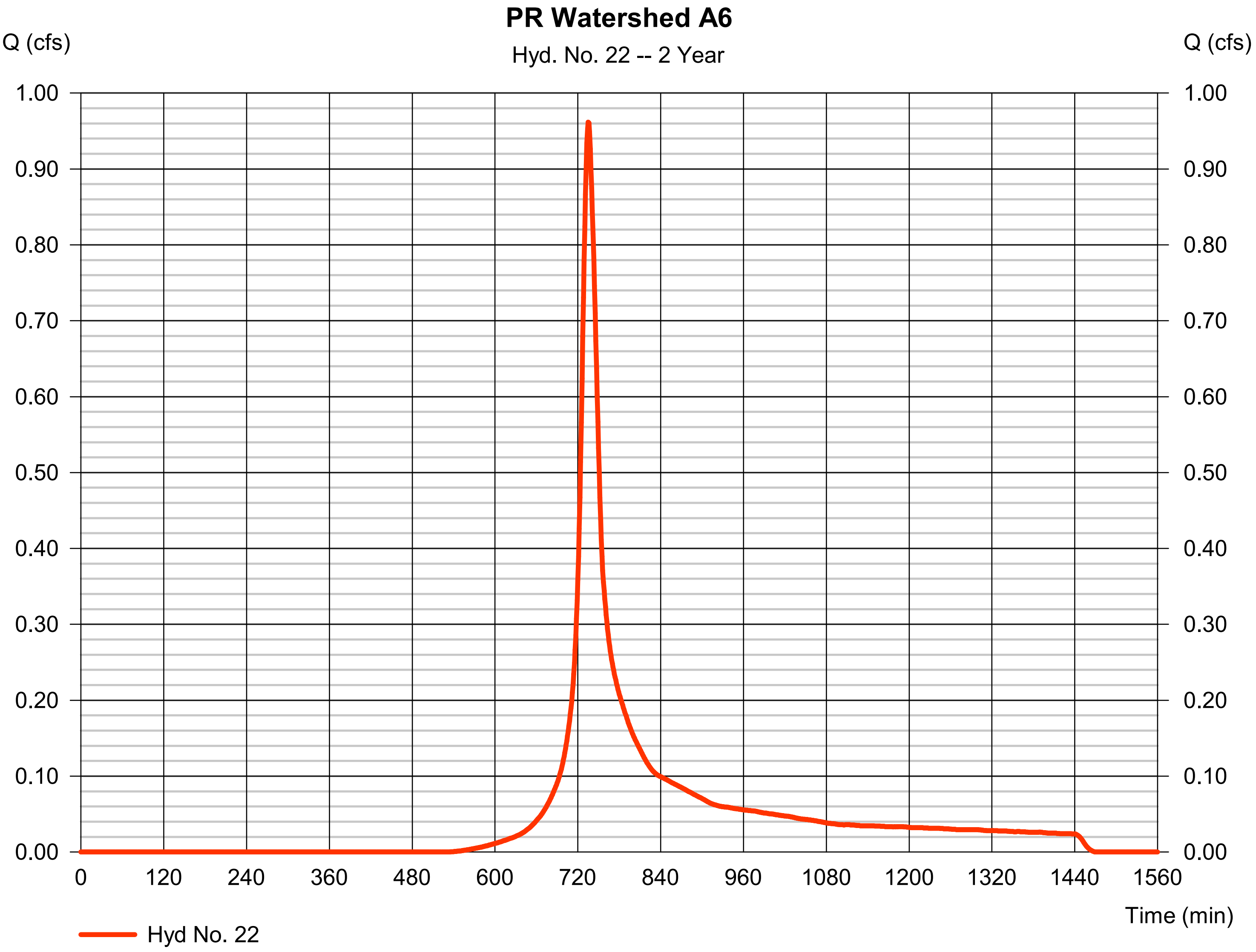
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 22

PR Watershed A6

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.962 cfs
Time to peak = 735 min
Hyd. volume = 4,441 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Custom
Shape factor = 484

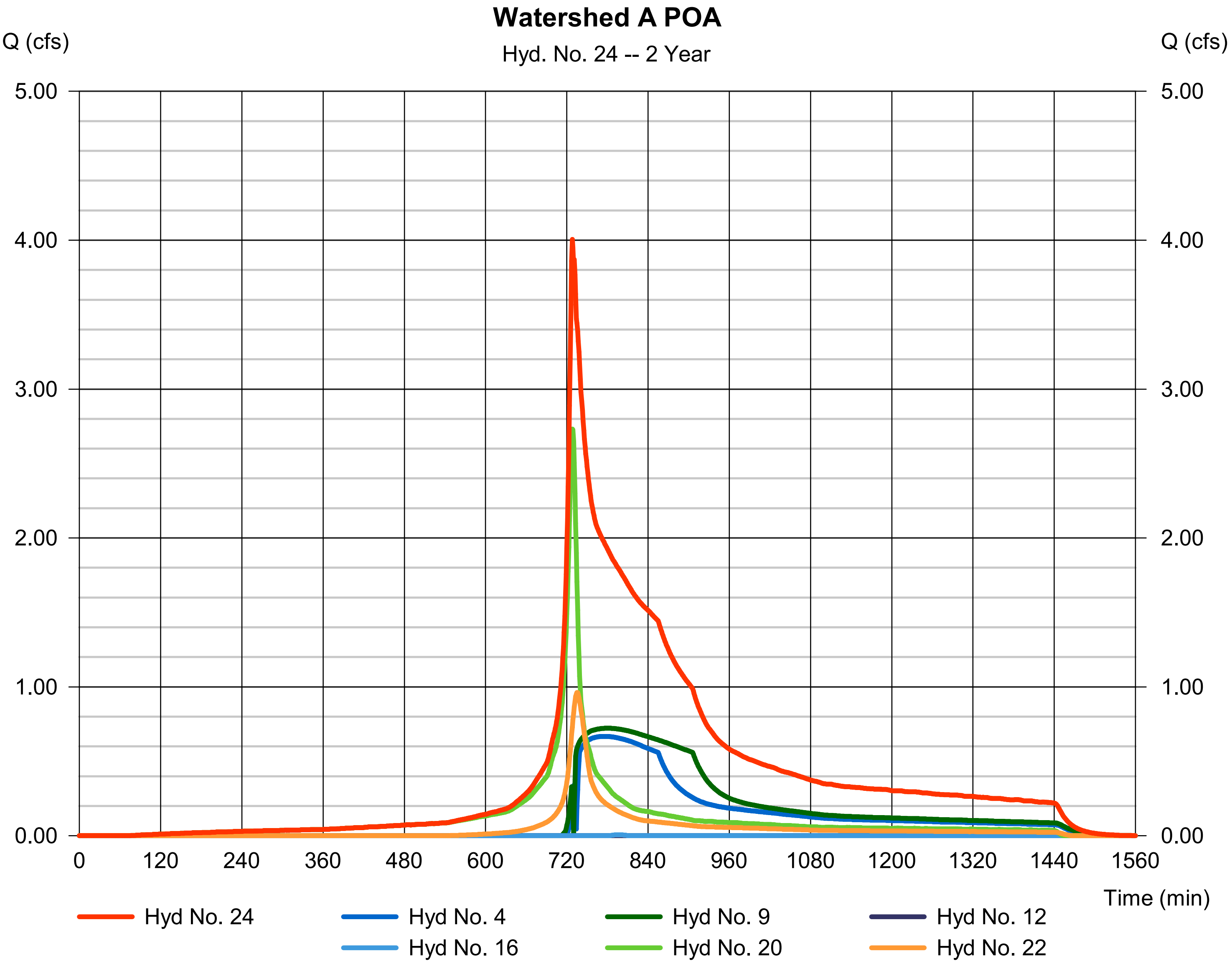


Hydrograph Report

Hyd. No. 24

Watershed A POA

Hydrograph type	= Combine	Peak discharge	= 4.005 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 37,180 cuft
Inflow hyds.	= 4, 9, 12, 16, 20, 22	Contrib. drain. area	= 0.810 ac

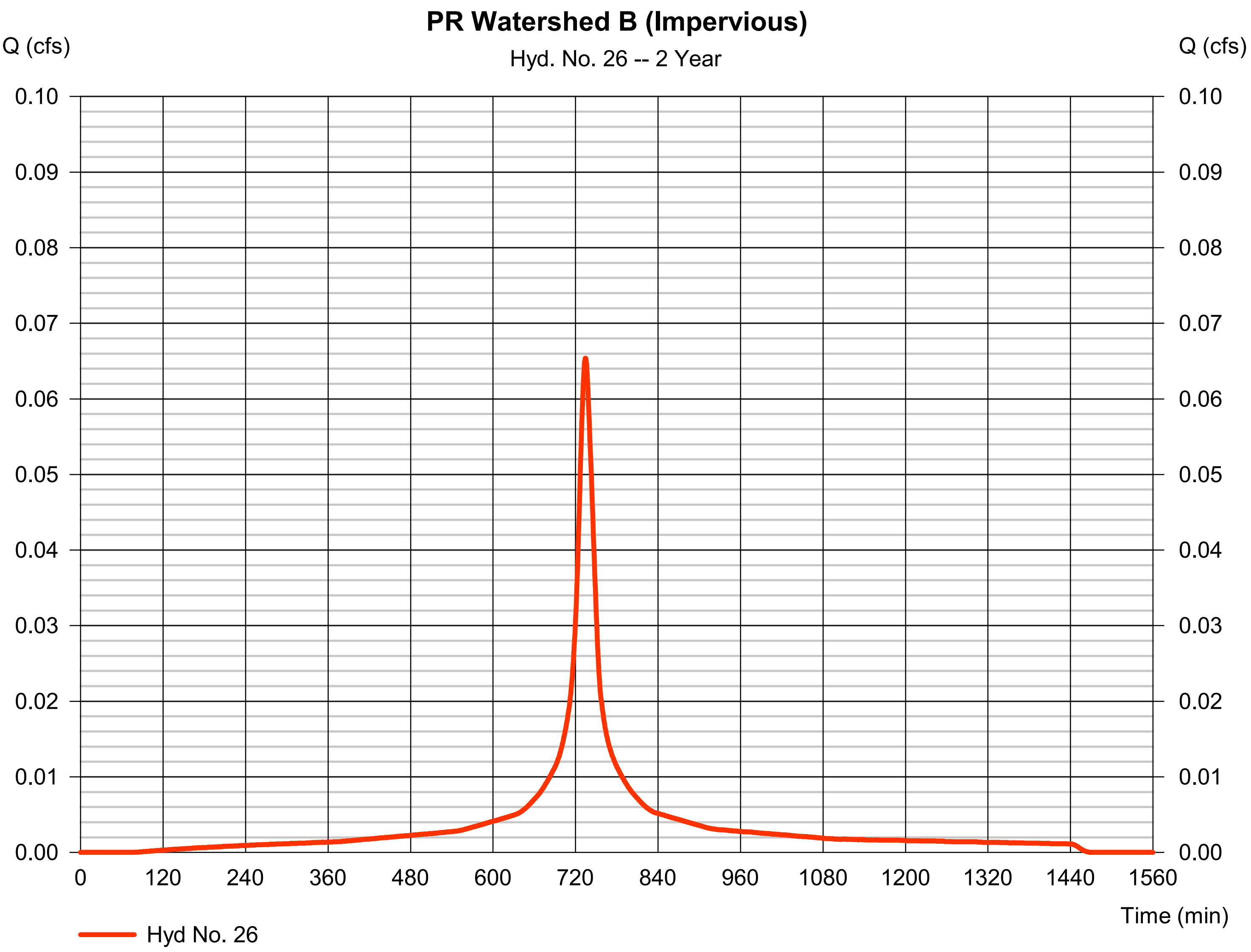


Hydrograph Report

Hyd. No. 26

PR Watershed B (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.065 cfs
Storm frequency	= 2 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 338 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr	Shape factor	= 484



Hydrograph Report

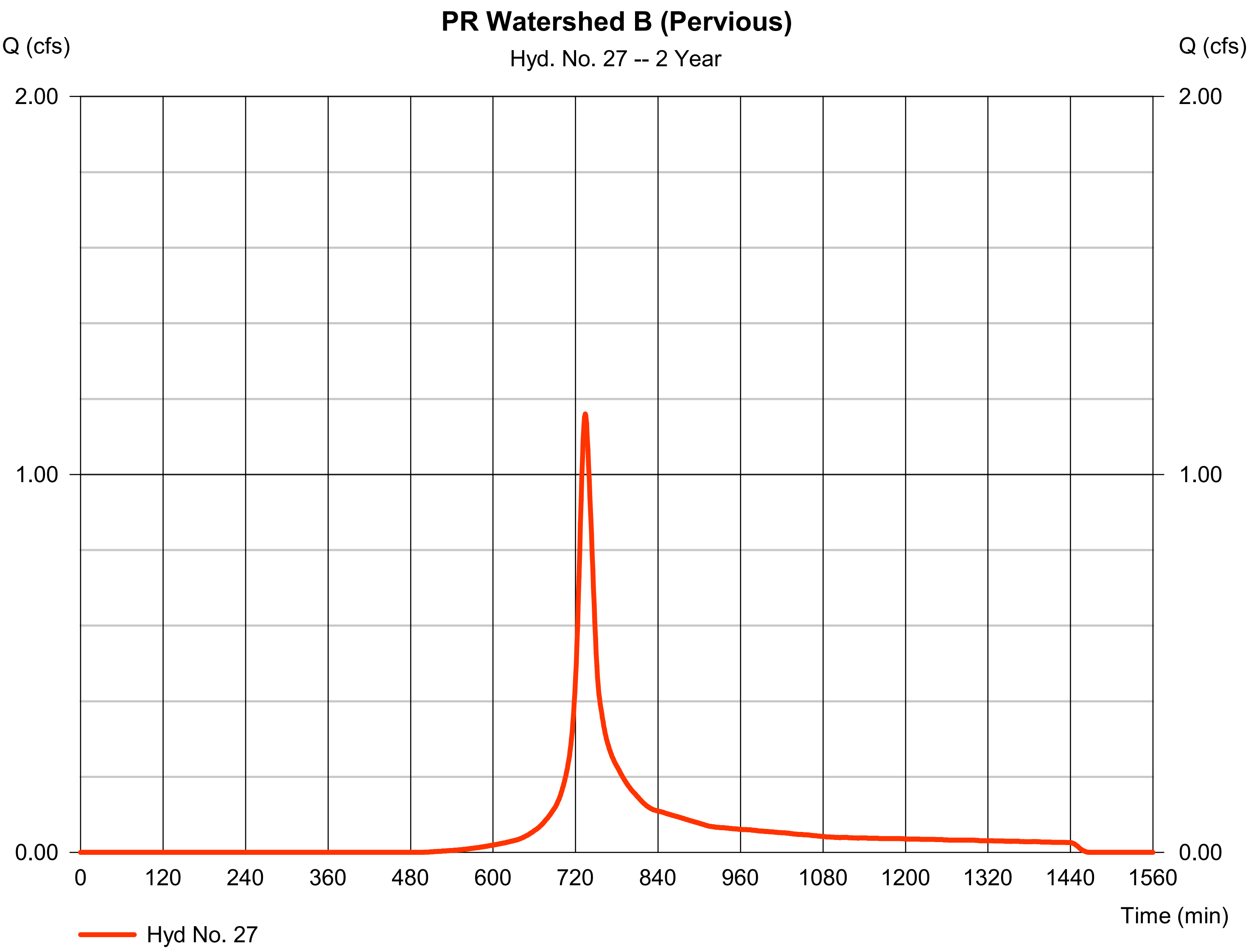
Hyd. No. 27

PR Watershed B (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.860 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.34 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 1.160 cfs
Time to peak = 734 min
Hyd. volume = 5,097 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.700 x 80) + (0.020 x 77) + (0.140 x 91)] / 0.860

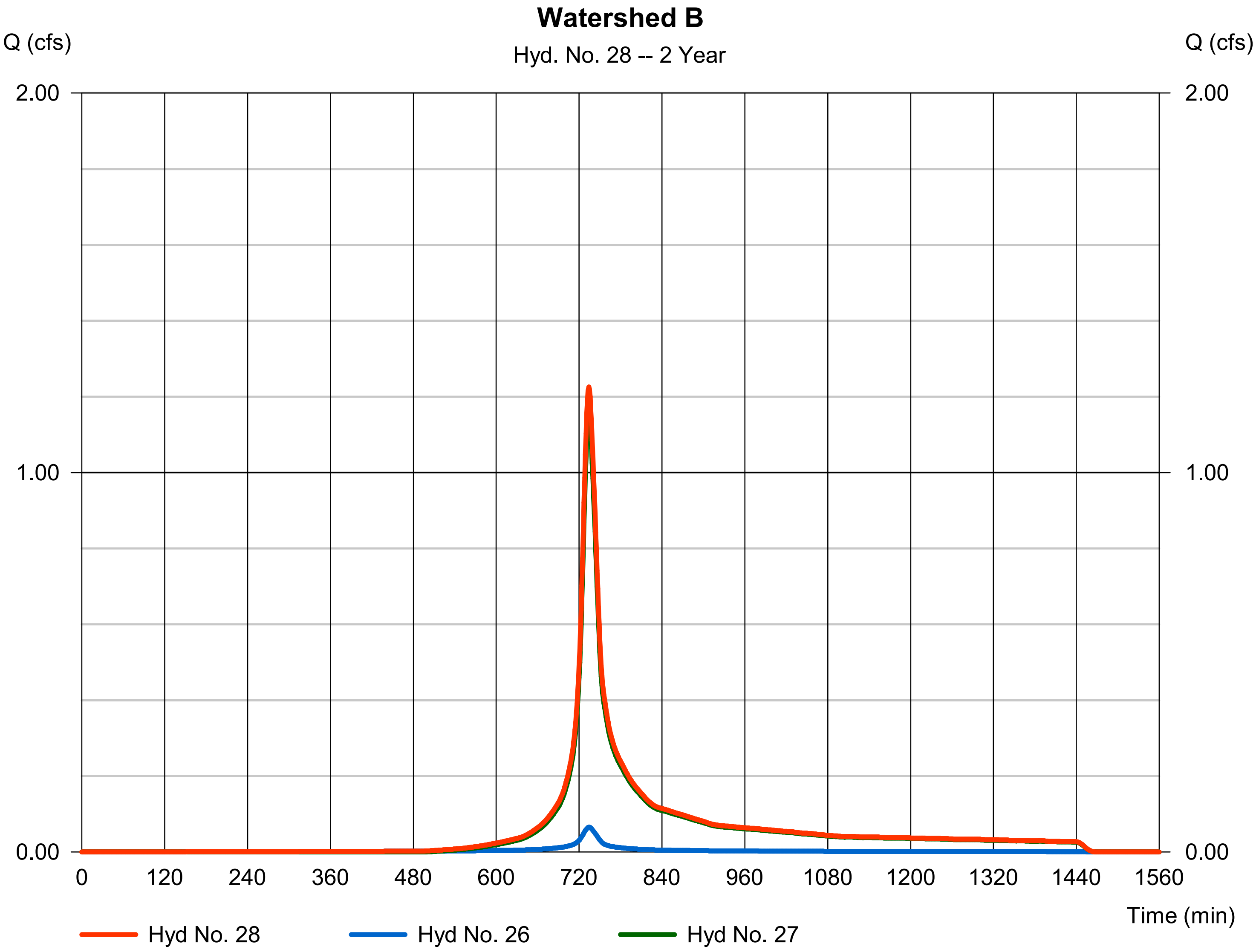


Hydrograph Report

Hyd. No. 28

Watershed B

Hydrograph type	= Combine	Peak discharge	= 1.225 cfs
Storm frequency	= 2 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 5,435 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 0.890 ac



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.999	1	727	22,952	------	------	------	PR Watershed A1 (Impervious)
2	SCS Runoff	2.111	1	733	9,003	------	------	------	PR Watershed A1 (Pervious)
3	Combine	7.785	1	728	31,955	1, 2	------	------	Watershed A1
4	Reservoir	1.811	1	754	22,669	3	49.52	16,689	Basin A1
6	SCS Runoff	8.725	1	727	33,385	------	------	------	PR Watershed A2 (Impervious)
7	SCS Runoff	1.279	1	732	5,207	------	------	------	PR Watershed A2 (Pervious)
8	Combine	9.851	1	728	38,592	6, 7	------	------	Watershed A2
9	Reservoir	1.955	1	754	27,030	8	49.56	21,207	Basin A2
11	SCS Runoff	9.998	1	727	38,254	------	------	------	PR Watershed A3 (Impervious)
12	Reservoir	1.309	1	757	8,711	11	50.26	16,433	UG Basin A3
14	SCS Runoff	7.135	1	727	27,299	------	------	------	PR Watershed A4 (Impervious)
15	Combine	7.135	1	727	27,299	14	------	------	Watershed A4
16	Reservoir	1.604	1	741	5,420	15	52.30	9,259	UG Basin A4
18	SCS Runoff	4.047	1	728	16,407	------	------	------	PR Watershed A5 (Impervious)
19	SCS Runoff	0.251	1	729	878	------	------	------	PR Watershed A5 (pervious)
20	Combine	4.297	1	728	17,285	18, 19	------	------	PR Watershed A5
22	SCS Runoff	1.935	1	735	8,892	------	------	------	PR Watershed A6
24	Combine	9.548	1	735	90,007	4, 9, 12, 16, 20, 22,	------	------	Watershed A POA
26	SCS Runoff	0.102	1	734	535	------	------	------	PR Watershed B (Impervious)
27	SCS Runoff	2.247	1	734	9,918	------	------	------	PR Watershed B (Pervious)
28	Combine	2.348	1	734	10,453	26, 27	------	------	Watershed B

Proposed Hydrographs_Current Precipitation.gpw	Return Period: 10 Year	Friday, 05 / 5 / 2023

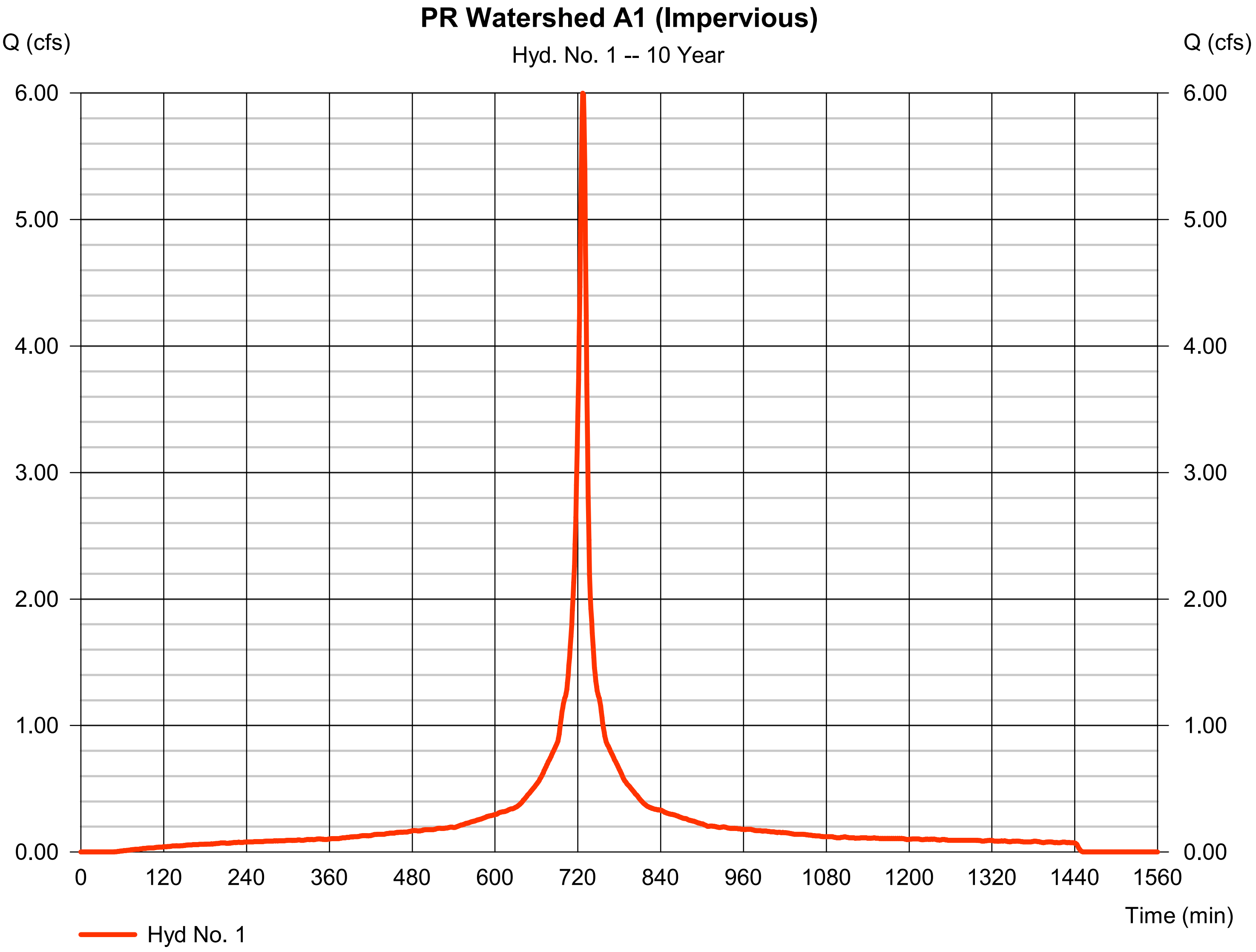
Hydrograph Report

Hyd. No. 1

PR Watershed A1 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.320 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 5.999 cfs
Time to peak = 727 min
Hyd. volume = 22,952 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

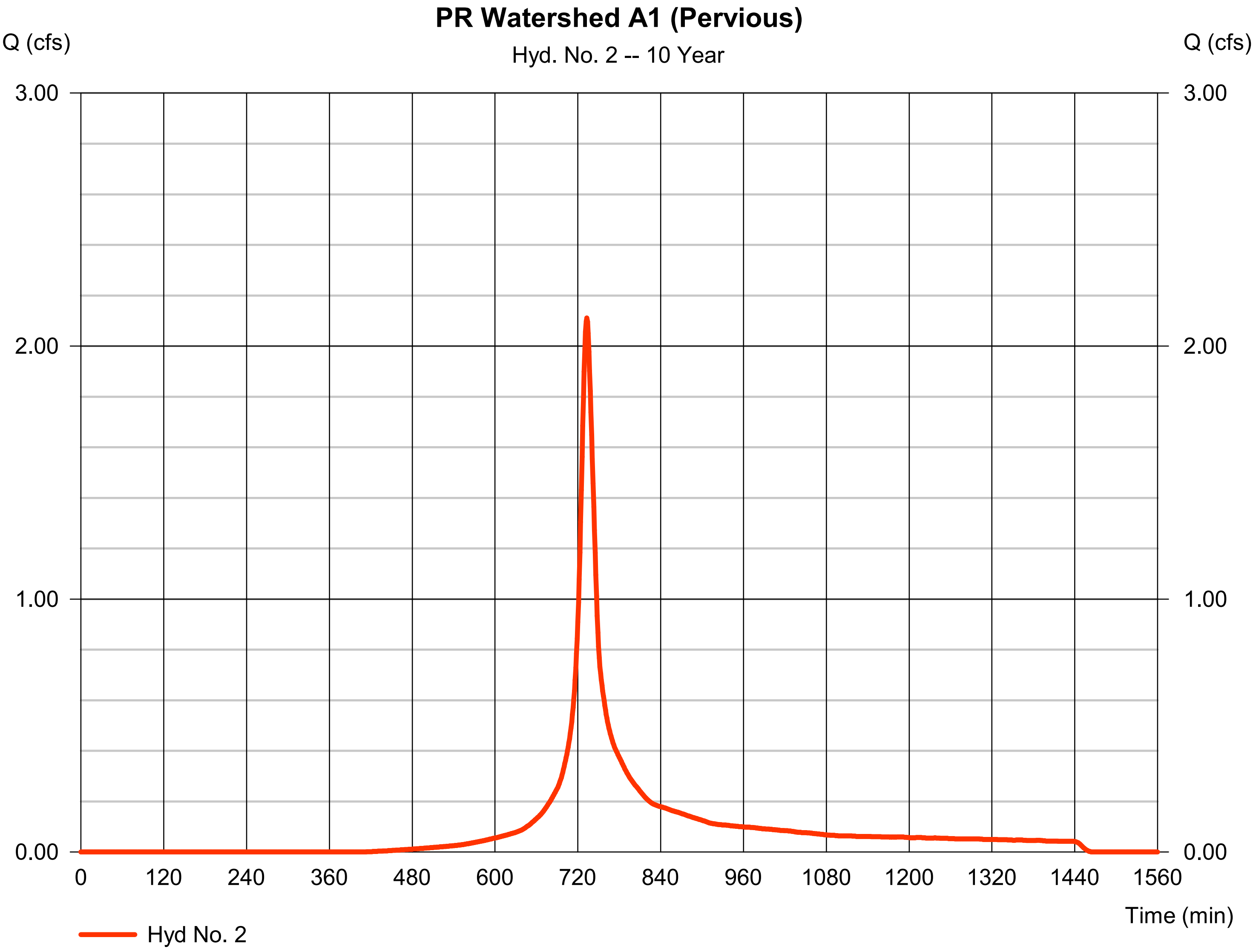
Hyd. No. 2

PR Watershed A1 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 2.111 cfs
Time to peak = 733 min
Hyd. volume = 9,003 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 16.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.790 x 80) + (0.020 x 91)] / 0.810

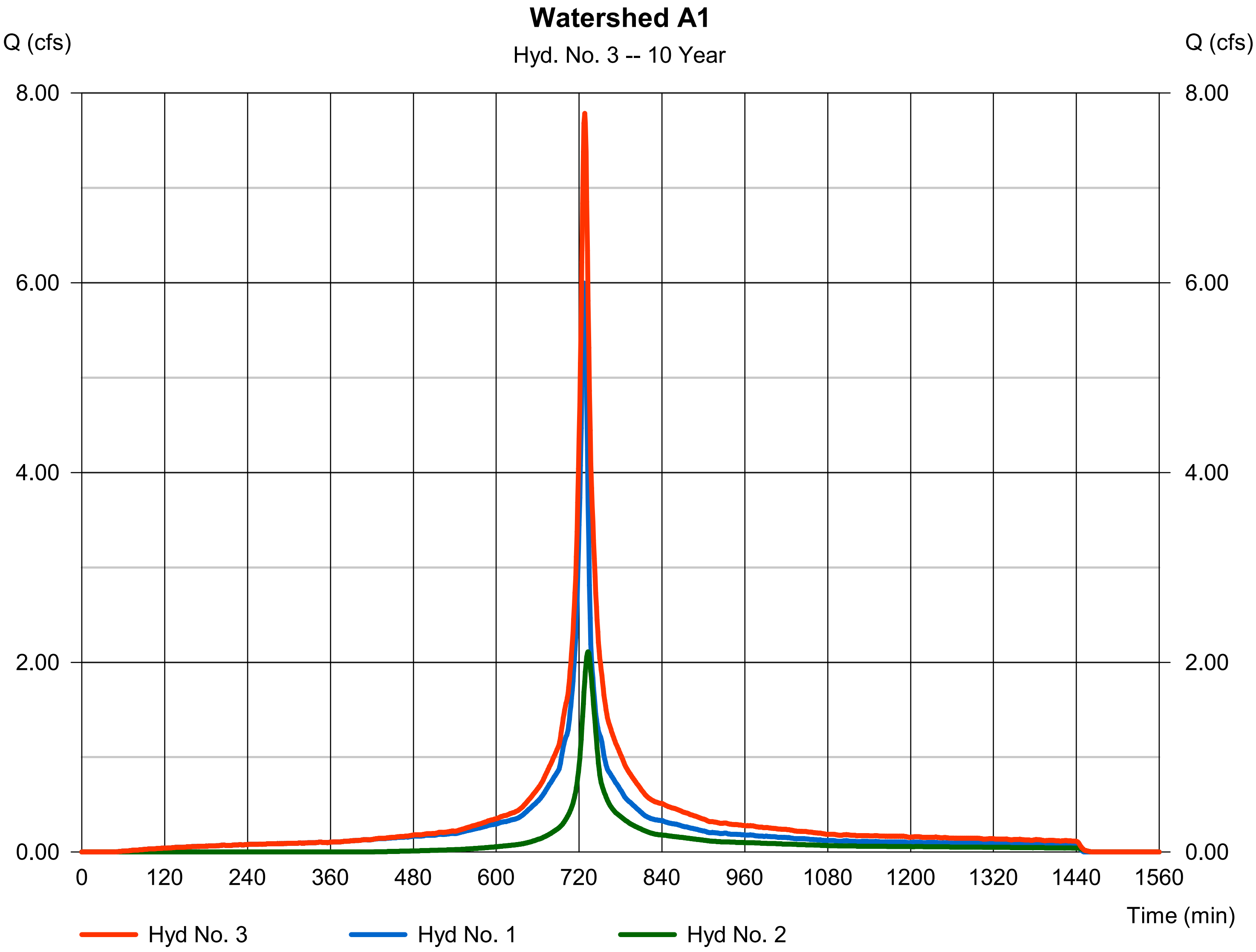


Hydrograph Report

Hyd. No. 3

Watershed A1

Hydrograph type	= Combine	Peak discharge	= 7.785 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 31,955 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.130 ac



Hydrograph Report

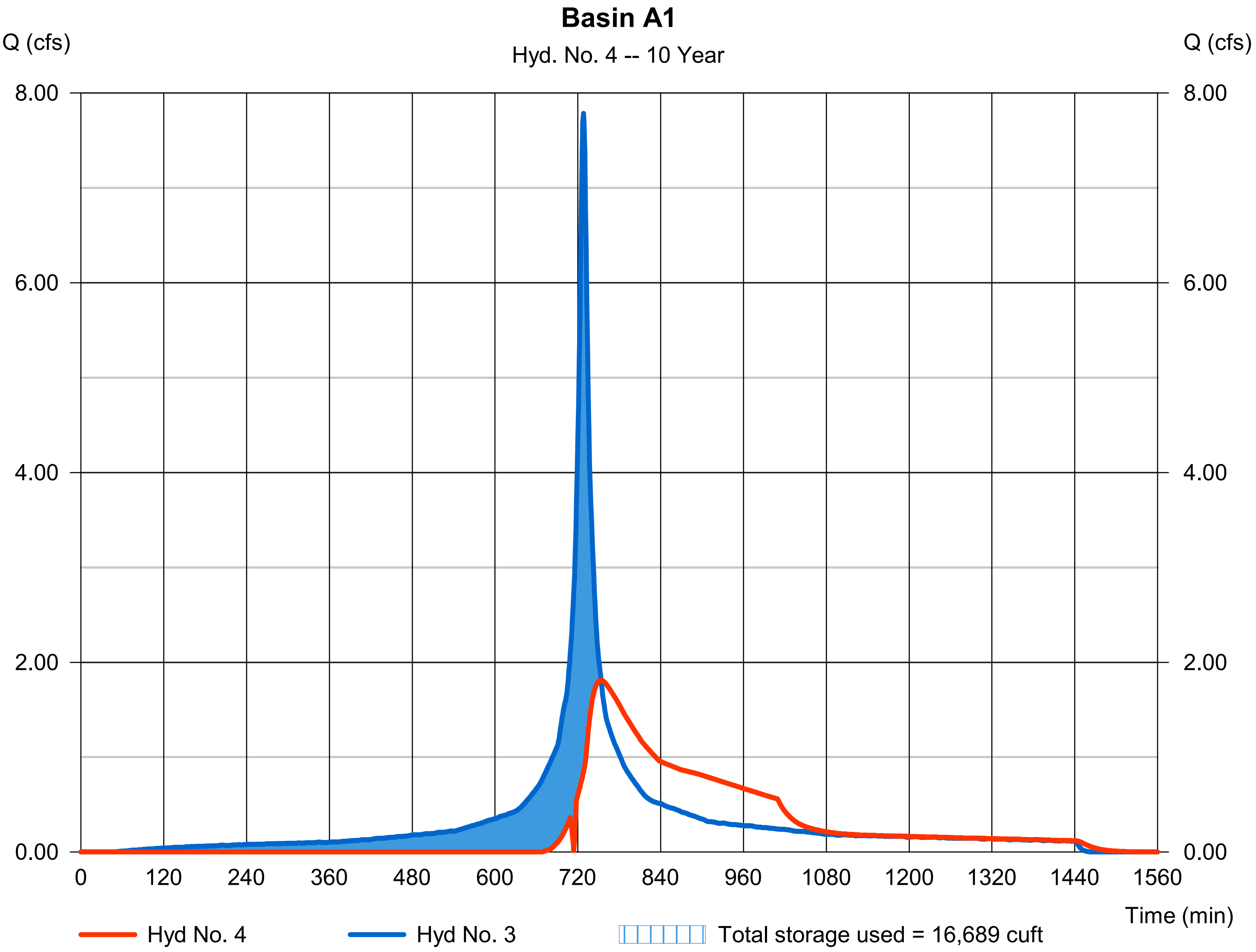
Hyd. No. 4

Basin A1

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyd. No. = 3 - Watershed A1
Reservoir name = Basin A1

Peak discharge = 1.811 cfs
Time to peak = 754 min
Hyd. volume = 22,669 cuft
Max. Elevation = 49.52 ft
Max. Storage = 16,689 cuft

Storage Indication method used.



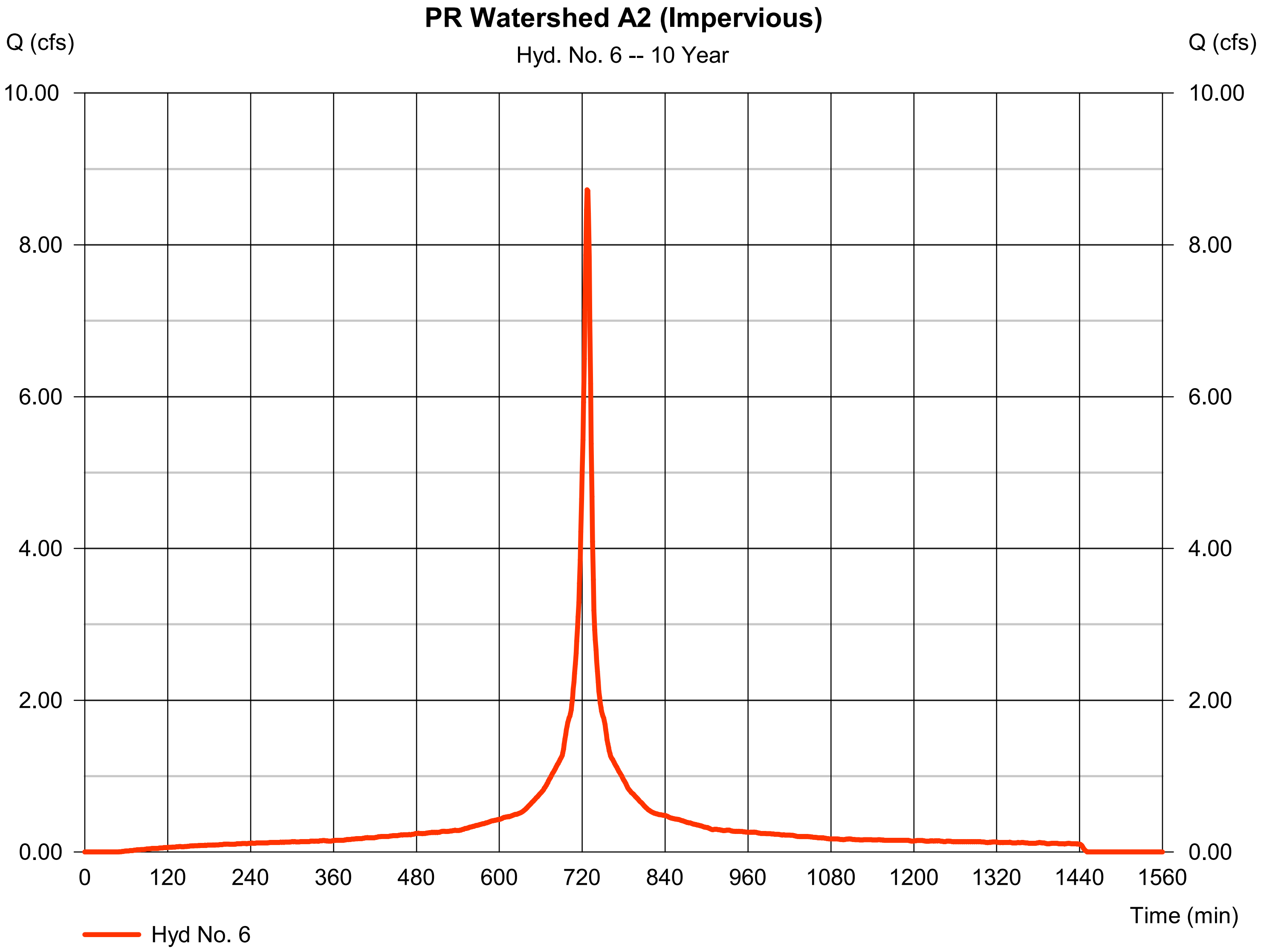
Hydrograph Report

Hyd. No. 6

PR Watershed A2 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.920 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 8.725 cfs
Time to peak = 727 min
Hyd. volume = 33,385 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

Hyd. No. 7

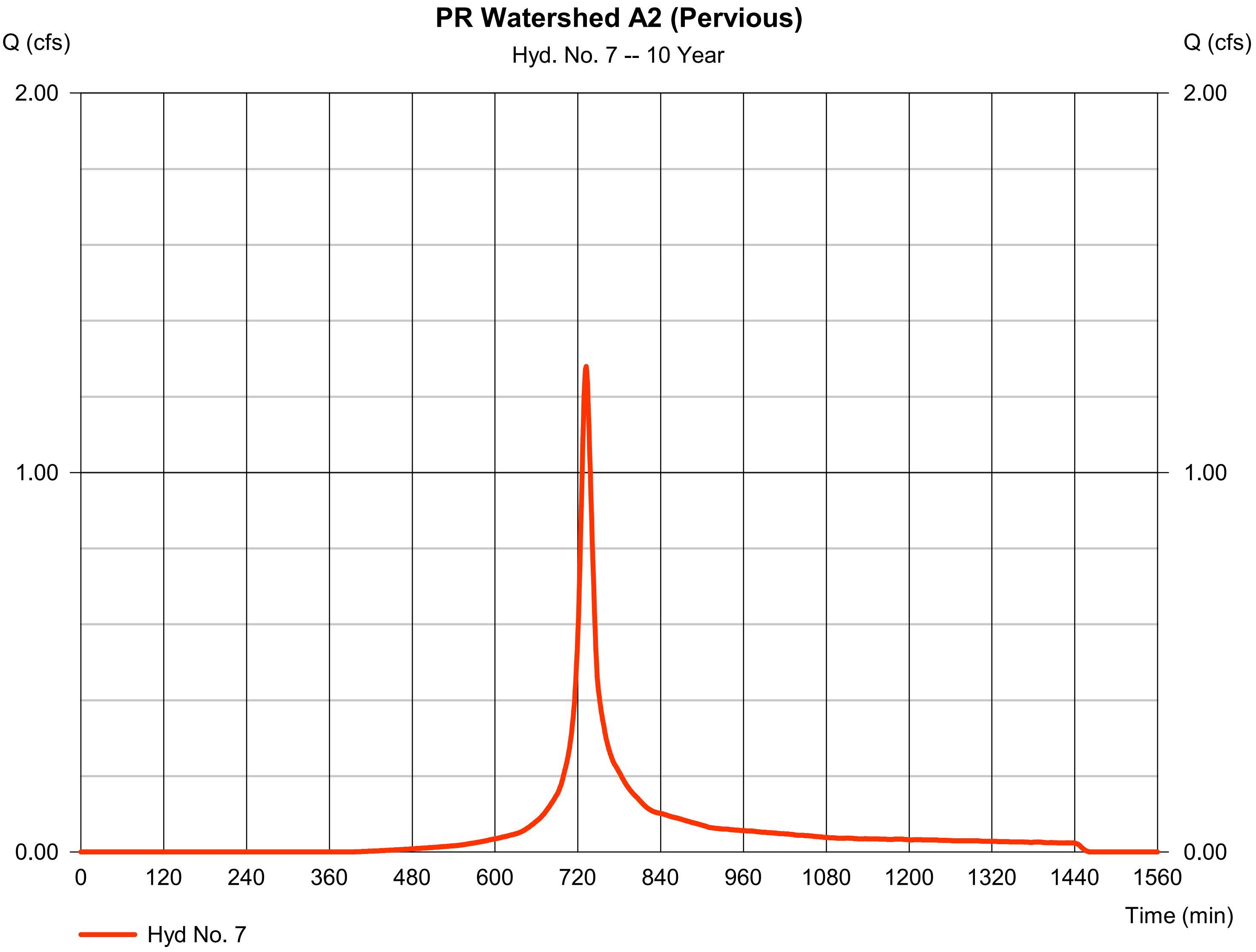
PR Watershed A2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.460 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 1.279 cfs
Time to peak = 732 min
Hyd. volume = 5,207 cuft
Curve number = 81*
Hydraulic length = 0 ft
Time of conc. (Tc) = 14.00 min
Distribution = Custom
Shape factor = 484

---

* Composite (Area/CN) = [(0.410 x 80) + (0.050 x 91)] / 0.460

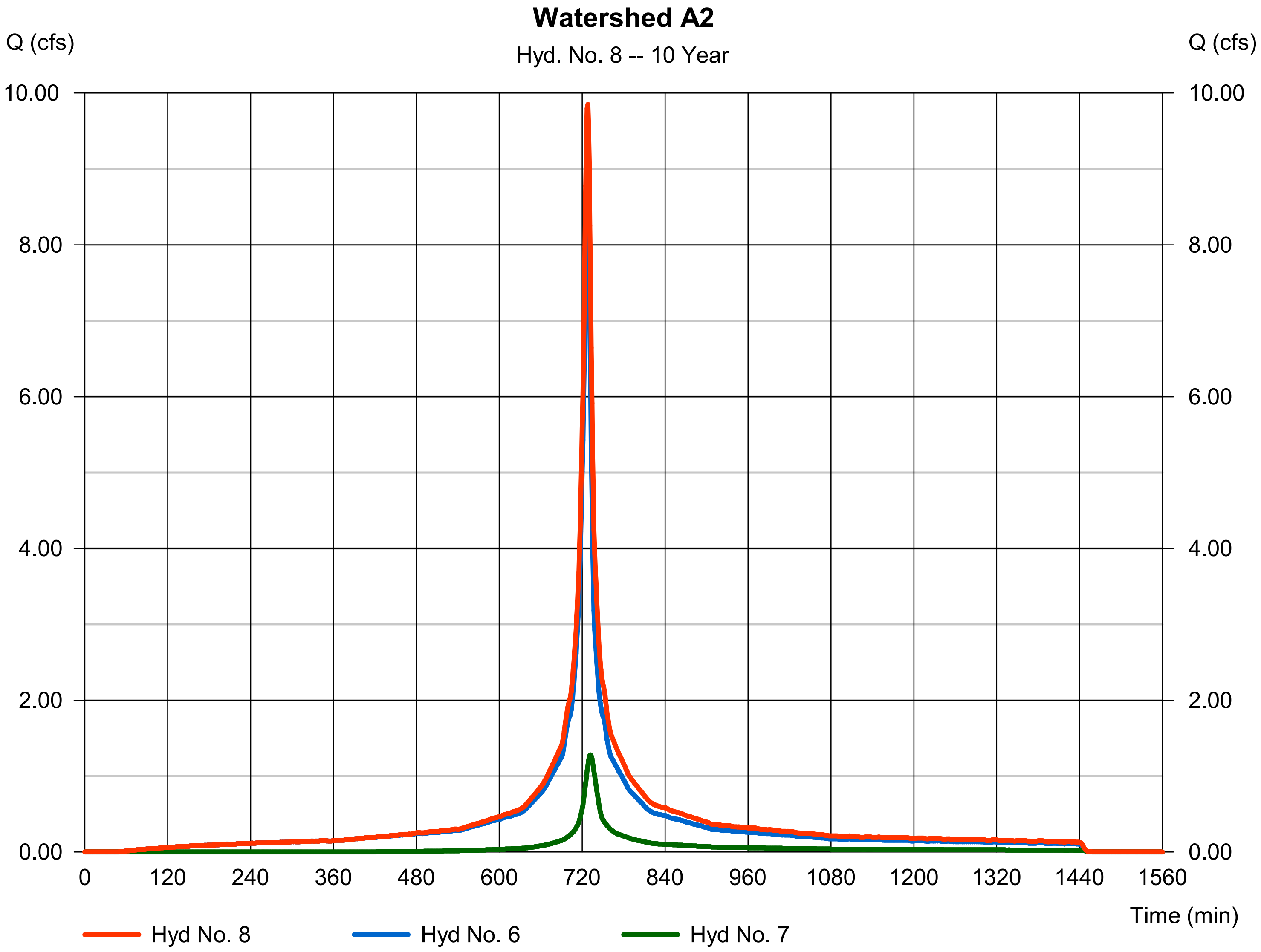


Hydrograph Report

Hyd. No. 8

Watershed A2

Hydrograph type	= Combine	Peak discharge	= 9.851 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 38,592 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 2.380 ac



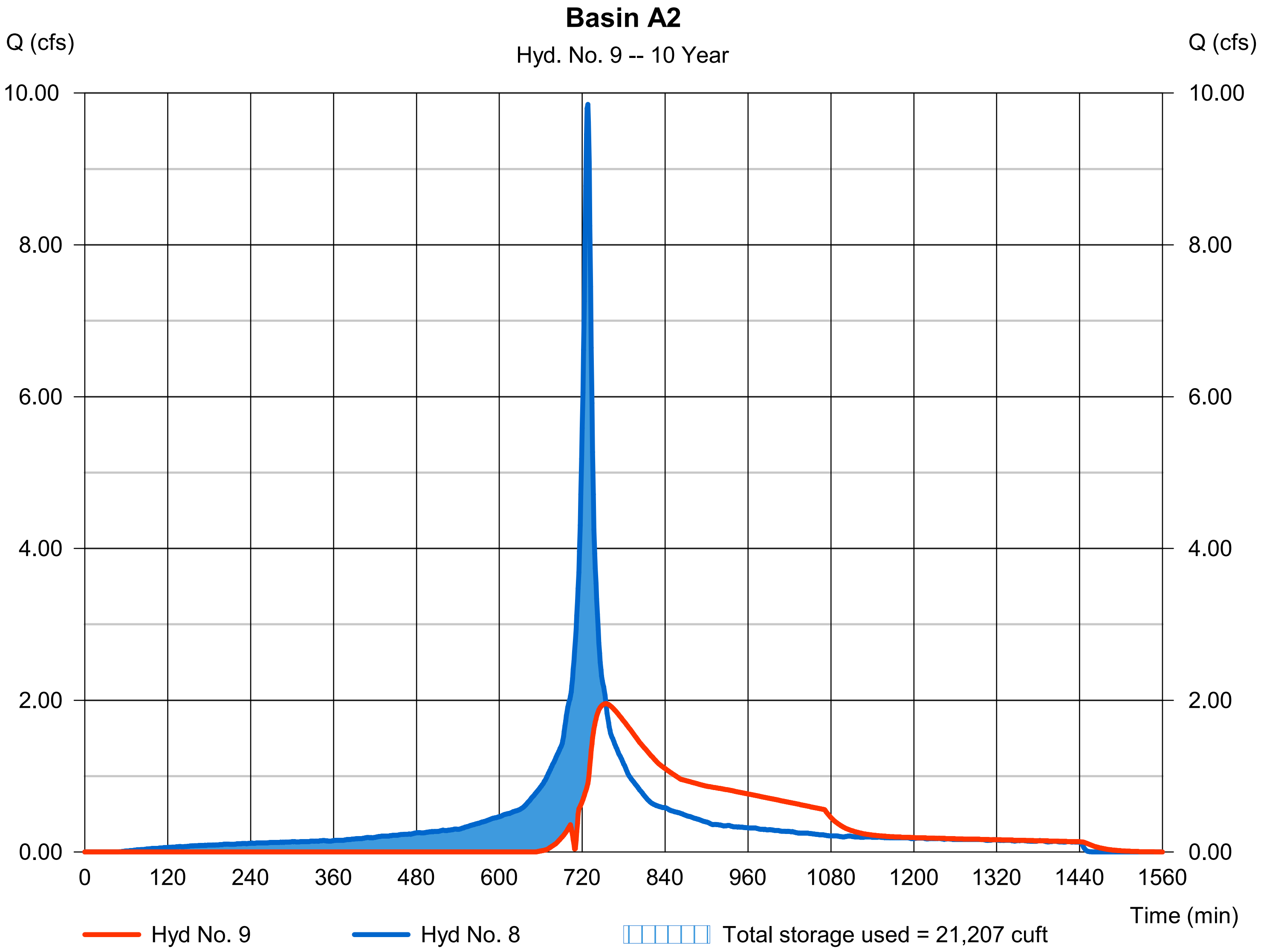
Hydrograph Report

Hyd. No. 9

Basin A2

Hydrograph type	= Reservoir	Peak discharge	= 1.955 cfs
Storm frequency	= 10 yrs	Time to peak	= 754 min
Time interval	= 1 min	Hyd. volume	= 27,030 cuft
Inflow hyd. No.	= 8 - Watershed A2	Max. Elevation	= 49.56 ft
Reservoir name	= Basin A2	Max. Storage	= 21,207 cuft

Storage Indication method used.



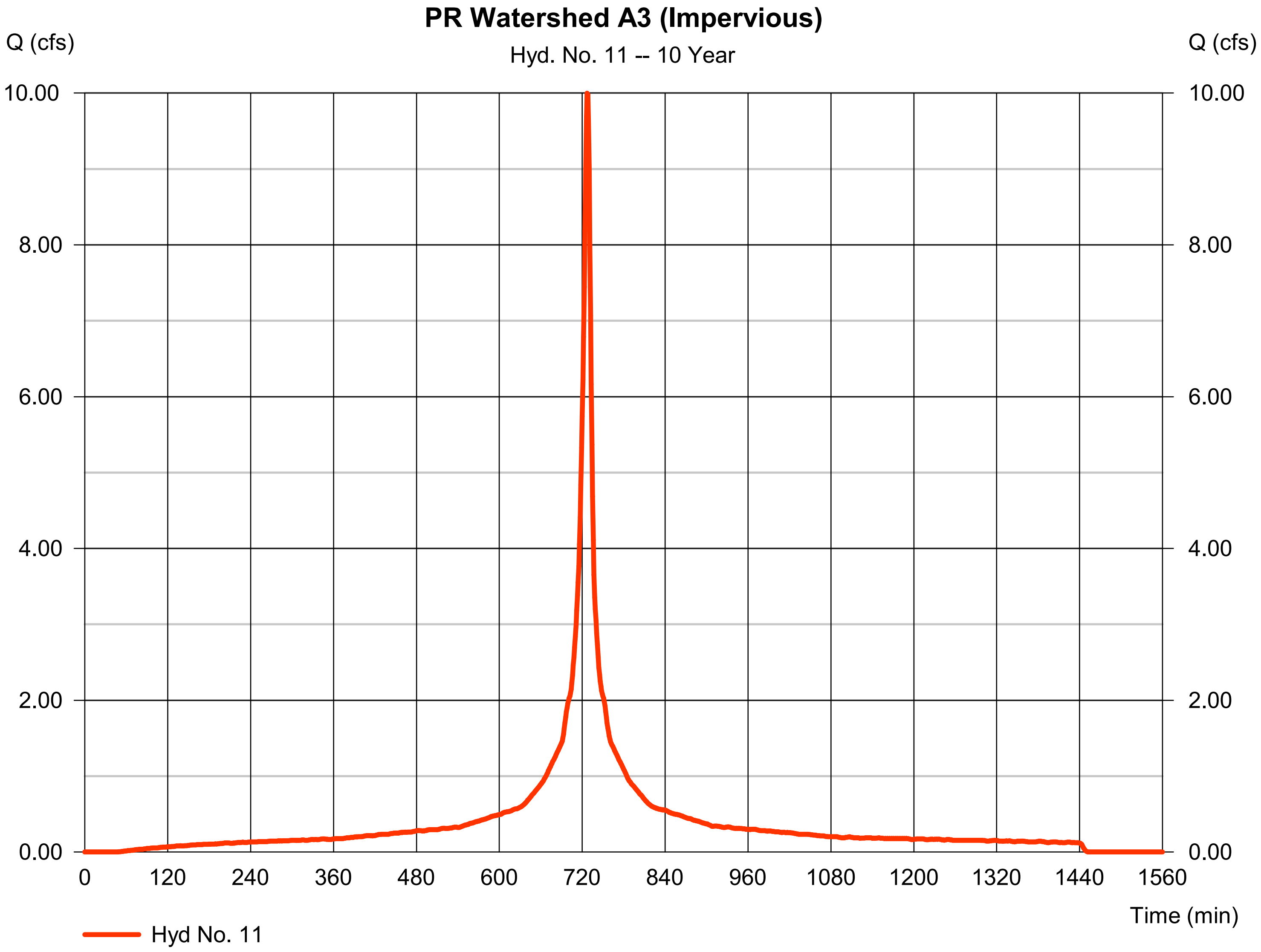
Hydrograph Report

Hyd. No. 11

PR Watershed A3 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 2.200 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 9.998 cfs
Time to peak = 727 min
Hyd. volume = 38,254 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



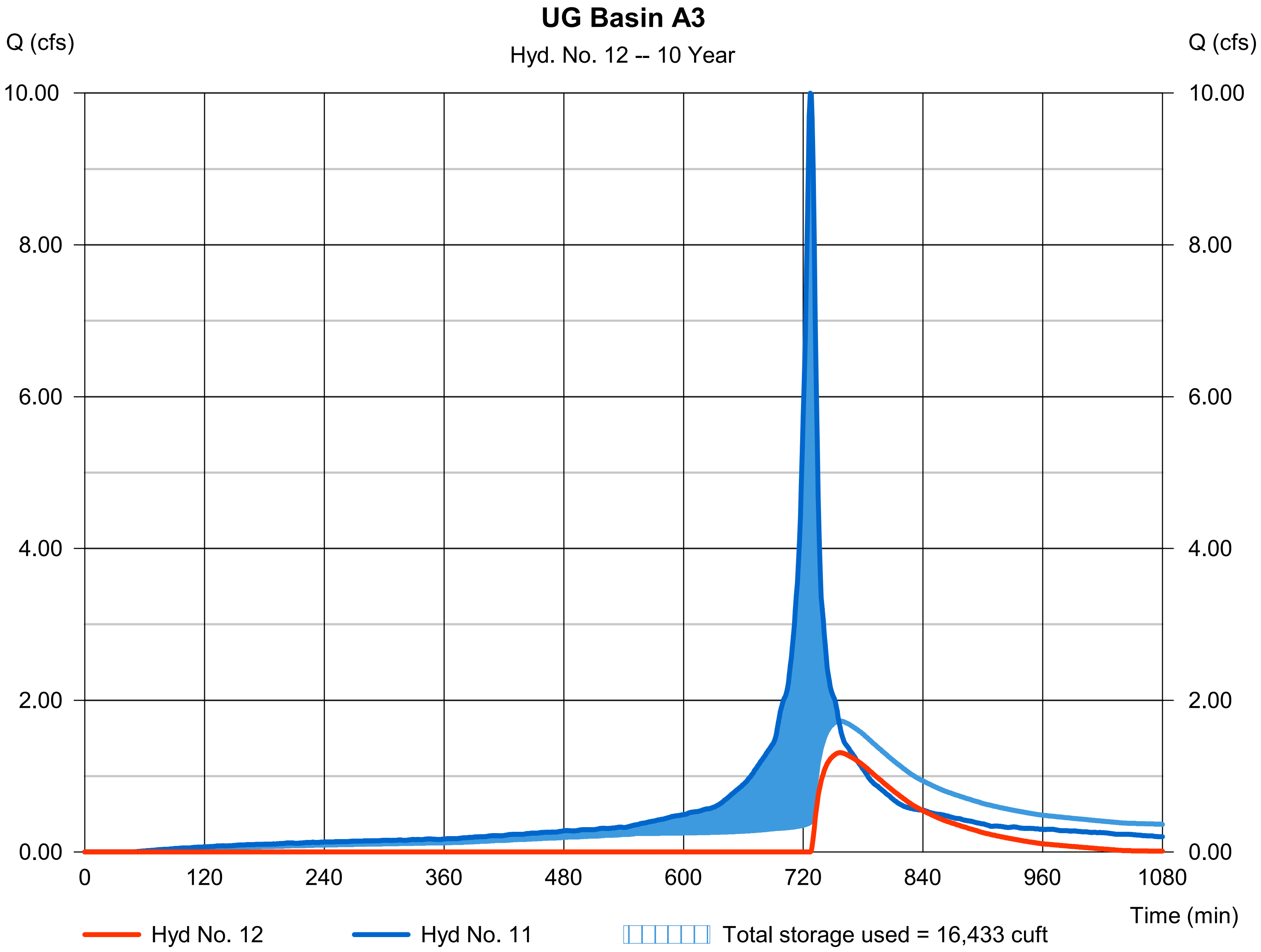
Hydrograph Report

Hyd. No. 12

UG Basin A3

Hydrograph type	= Reservoir	Peak discharge	= 1.309 cfs
Storm frequency	= 10 yrs	Time to peak	= 757 min
Time interval	= 1 min	Hyd. volume	= 8,711 cuft
Inflow hyd. No.	= 11 - PR Watershed A3 (Impervious)	Max. Elevation	= 50.26 ft
Reservoir name	= UG Detention A3	Max. Storage	= 16,433 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

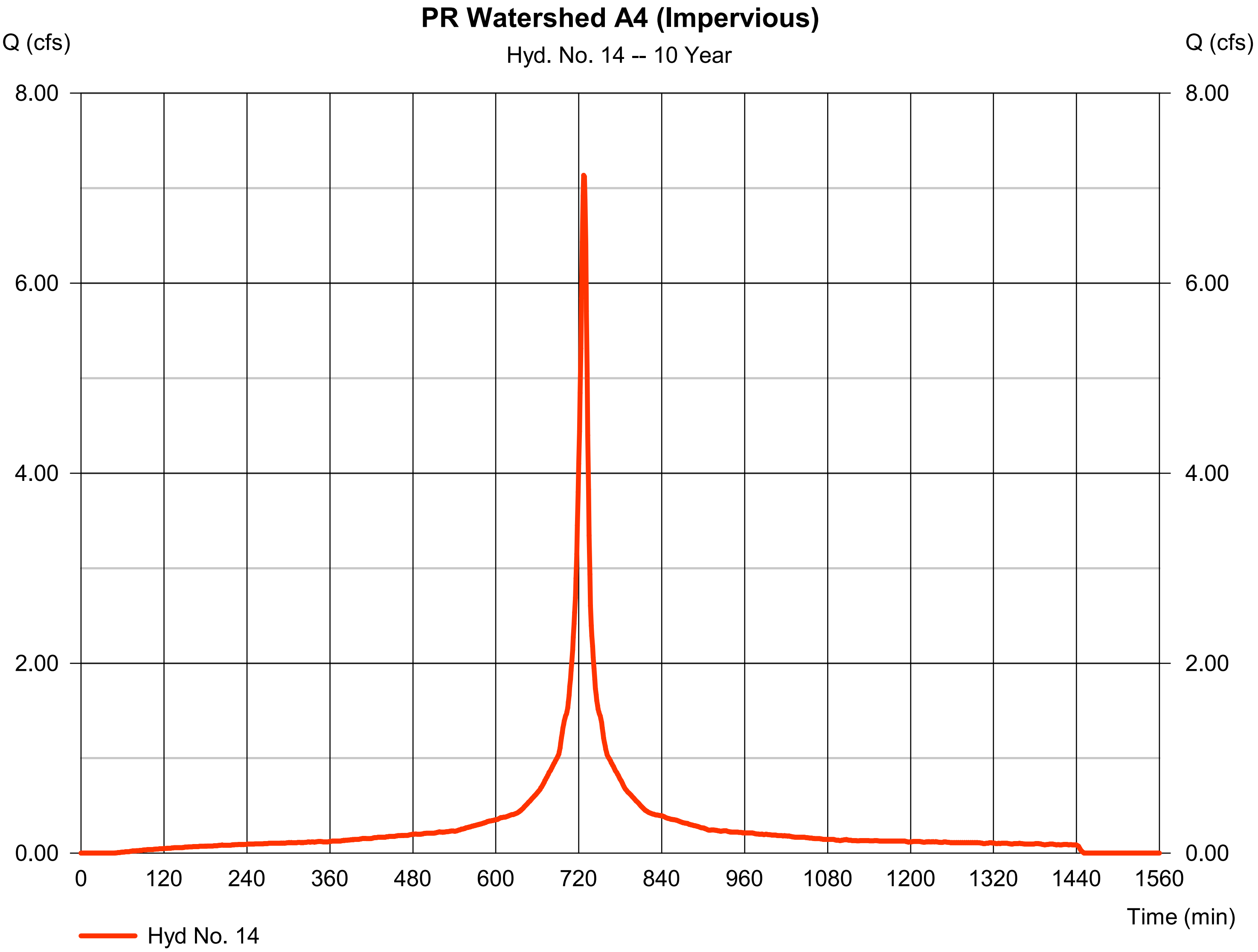


Hydrograph Report

Hyd. No. 14

PR Watershed A4 (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.135 cfs
Storm frequency	=	10 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	27,299 cuft
Drainage area	=	1.570 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	8.00 min
Total precip.	=	5.15 in	Distribution	=	Custom
Storm duration	=	\\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	=	484



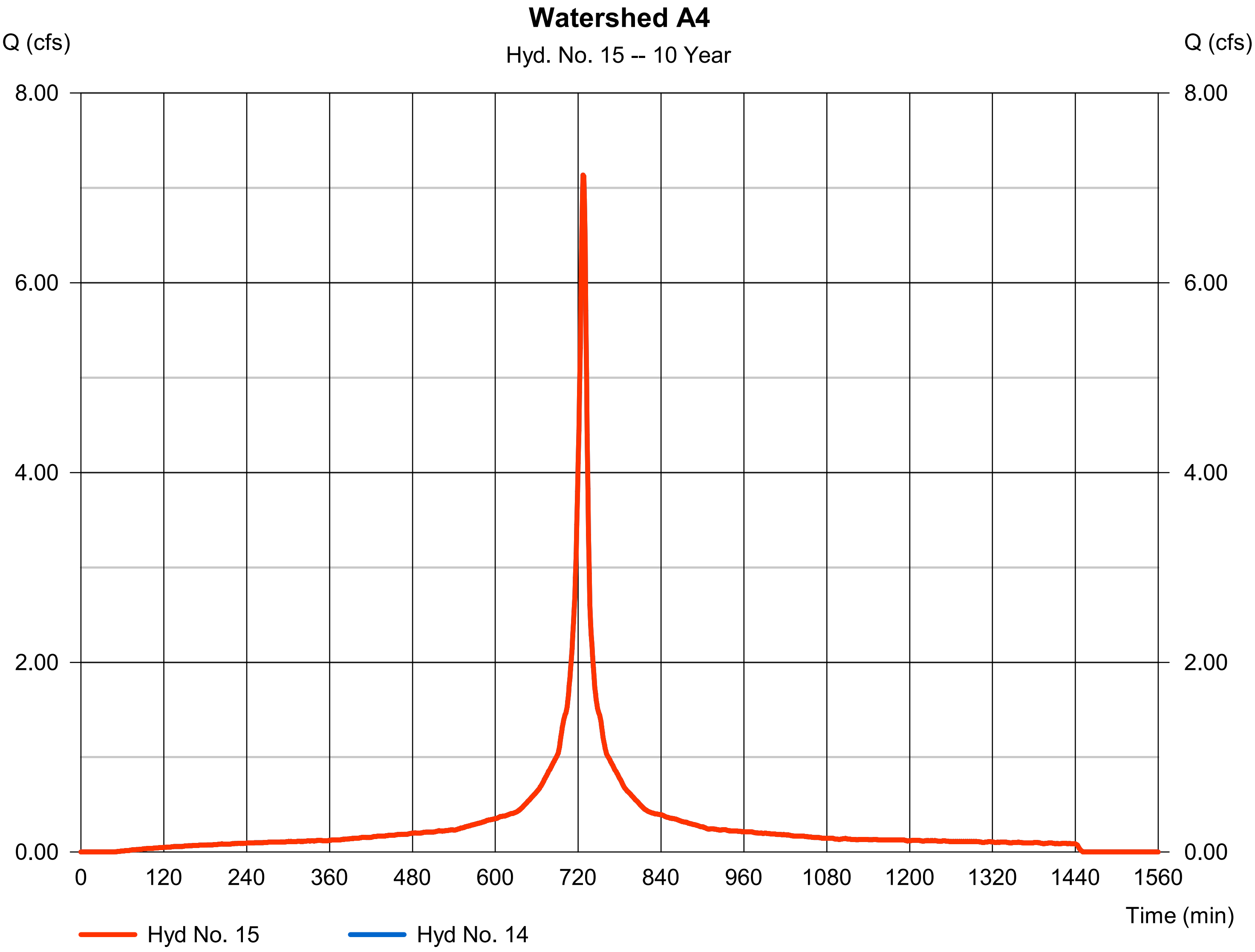
Hydrograph Report

Hyd. No. 15

Watershed A4

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 14

Peak discharge = 7.135 cfs
Time to peak = 727 min
Hyd. volume = 27,299 cuft
Contrib. drain. area = 1.570 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

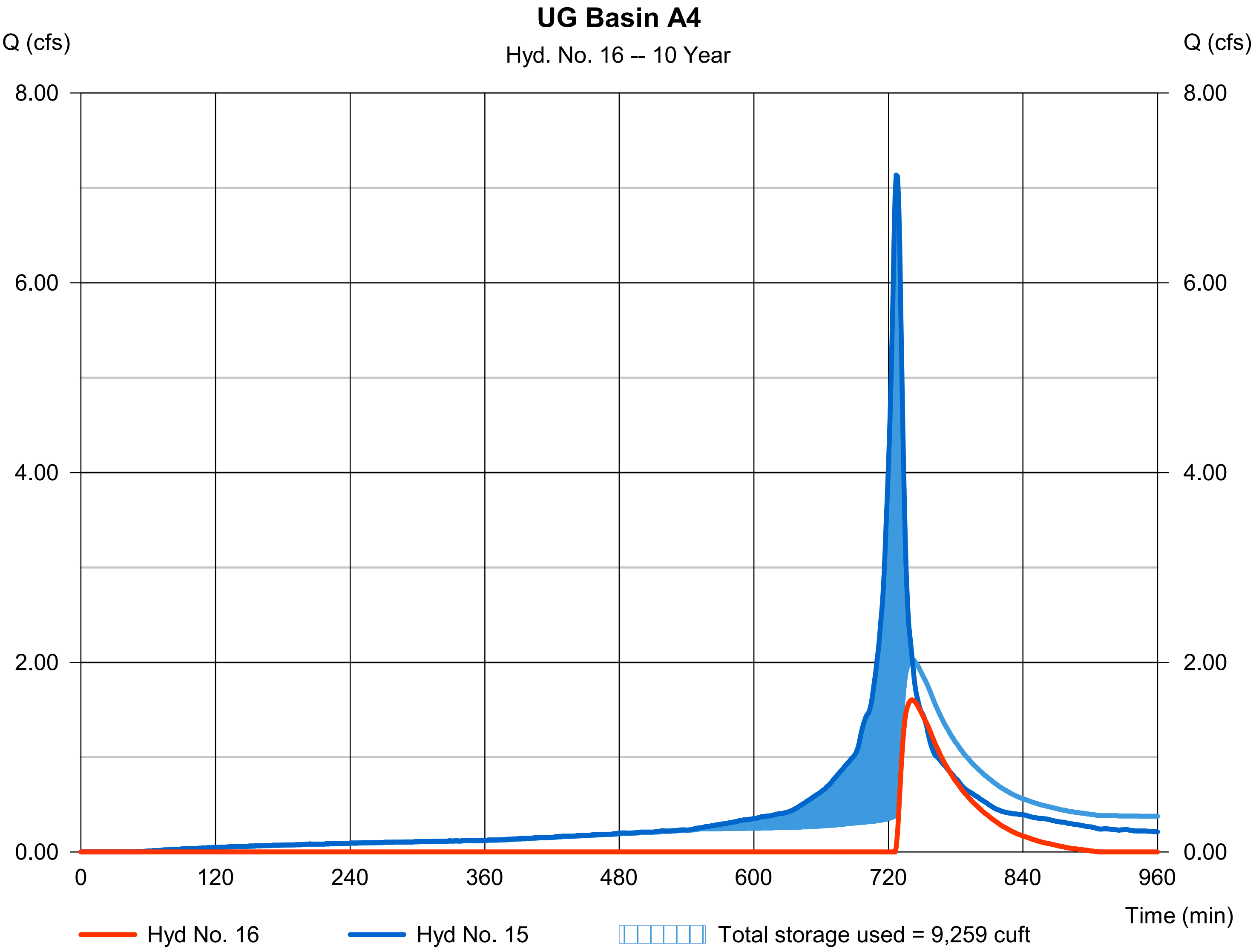
Hyd. No. 16

UG Basin A4

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyd. No. = 15 - Watershed A4
Reservoir name = UG Detention A4

Peak discharge = 1.604 cfs
Time to peak = 741 min
Hyd. volume = 5,420 cuft
Max. Elevation = 52.30 ft
Max. Storage = 9,259 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



UG Basin A4

Hyd. No. 16 -- 10 Year

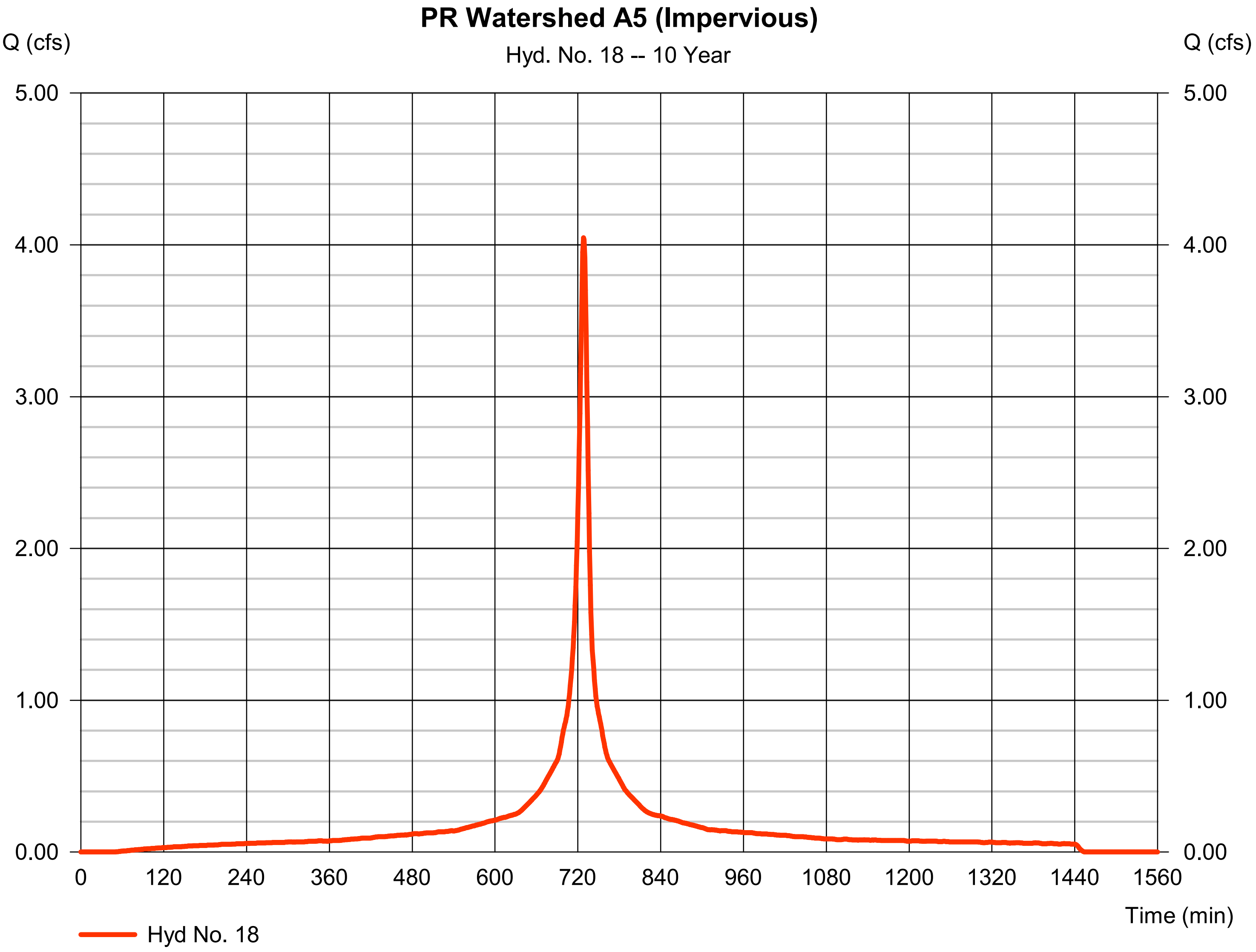
Hydrograph Report

Hyd. No. 18

PR Watershed A5 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.920 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 4.047 cfs
Time to peak = 728 min
Hyd. volume = 16,407 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.00 min
Distribution = Custom
Shape factor = 484



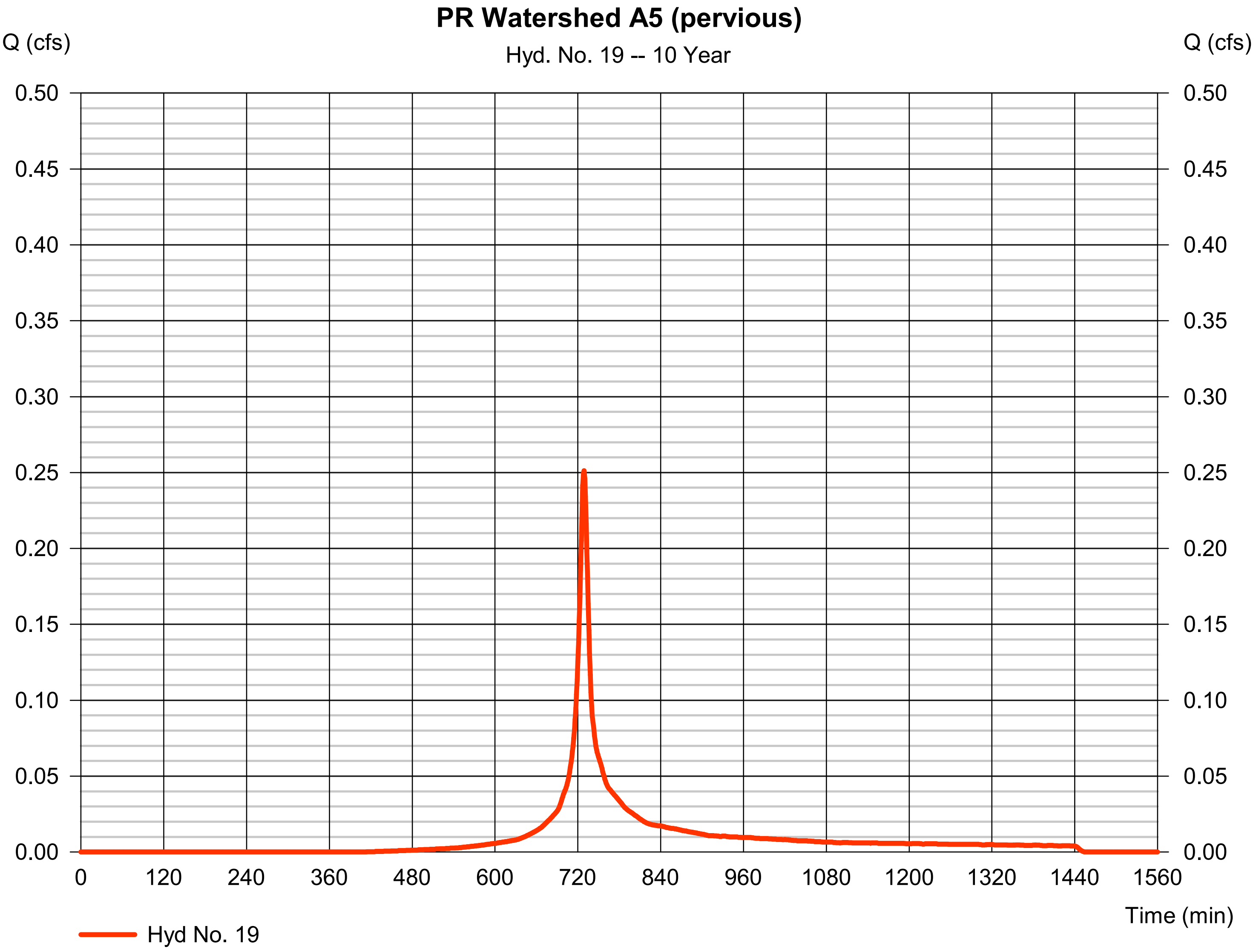
Hydrograph Report

Hyd. No. 19

PR Watershed A5 (pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.080 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 0.251 cfs
Time to peak = 729 min
Hyd. volume = 878 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.00 min
Distribution = Custom
Shape factor = 484

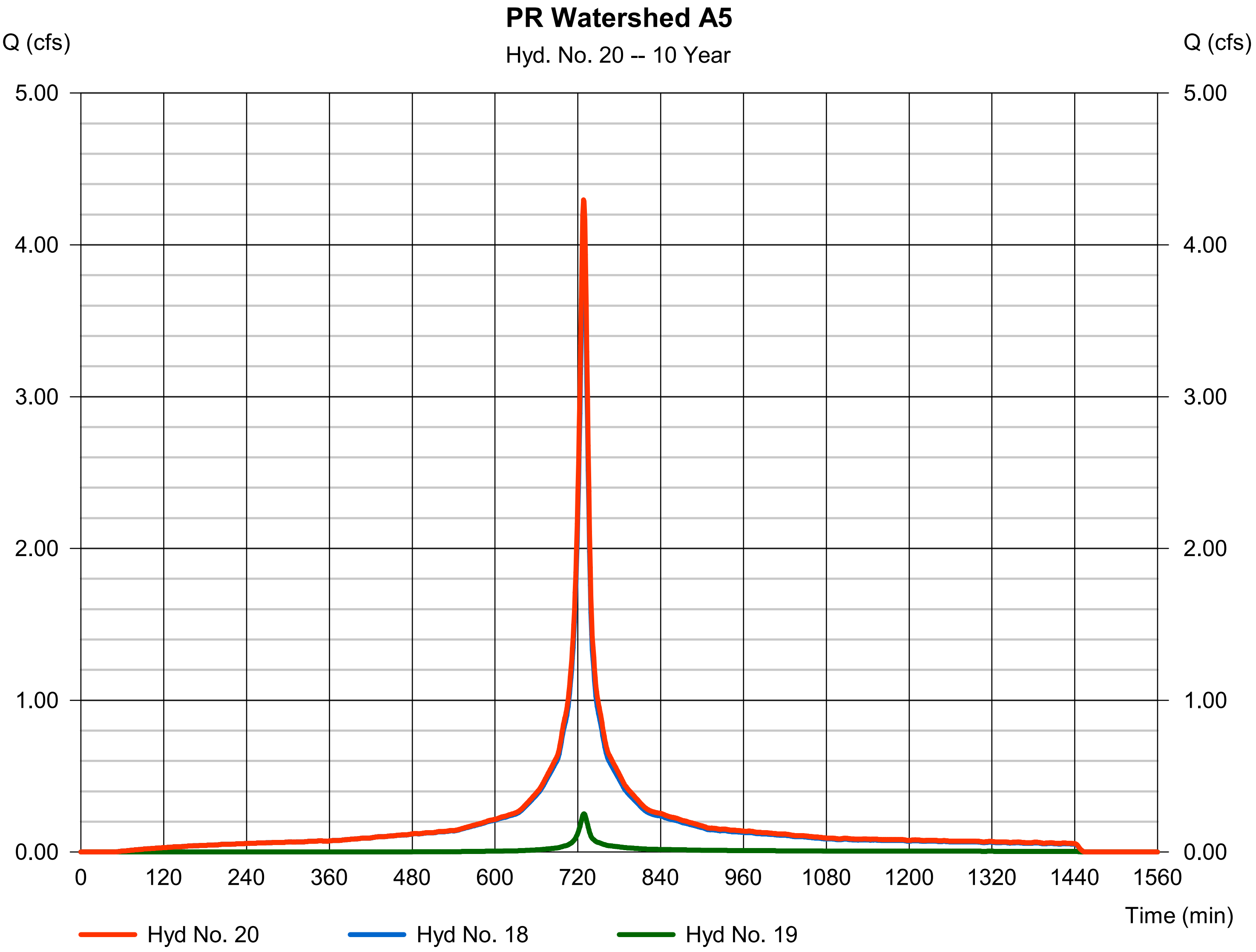


Hydrograph Report

Hyd. No. 20

PR Watershed A5

Hydrograph type	= Combine	Peak discharge	= 4.297 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 17,285 cuft
Inflow hyds.	= 18, 19	Contrib. drain. area	= 1.000 ac



Hydrograph Report

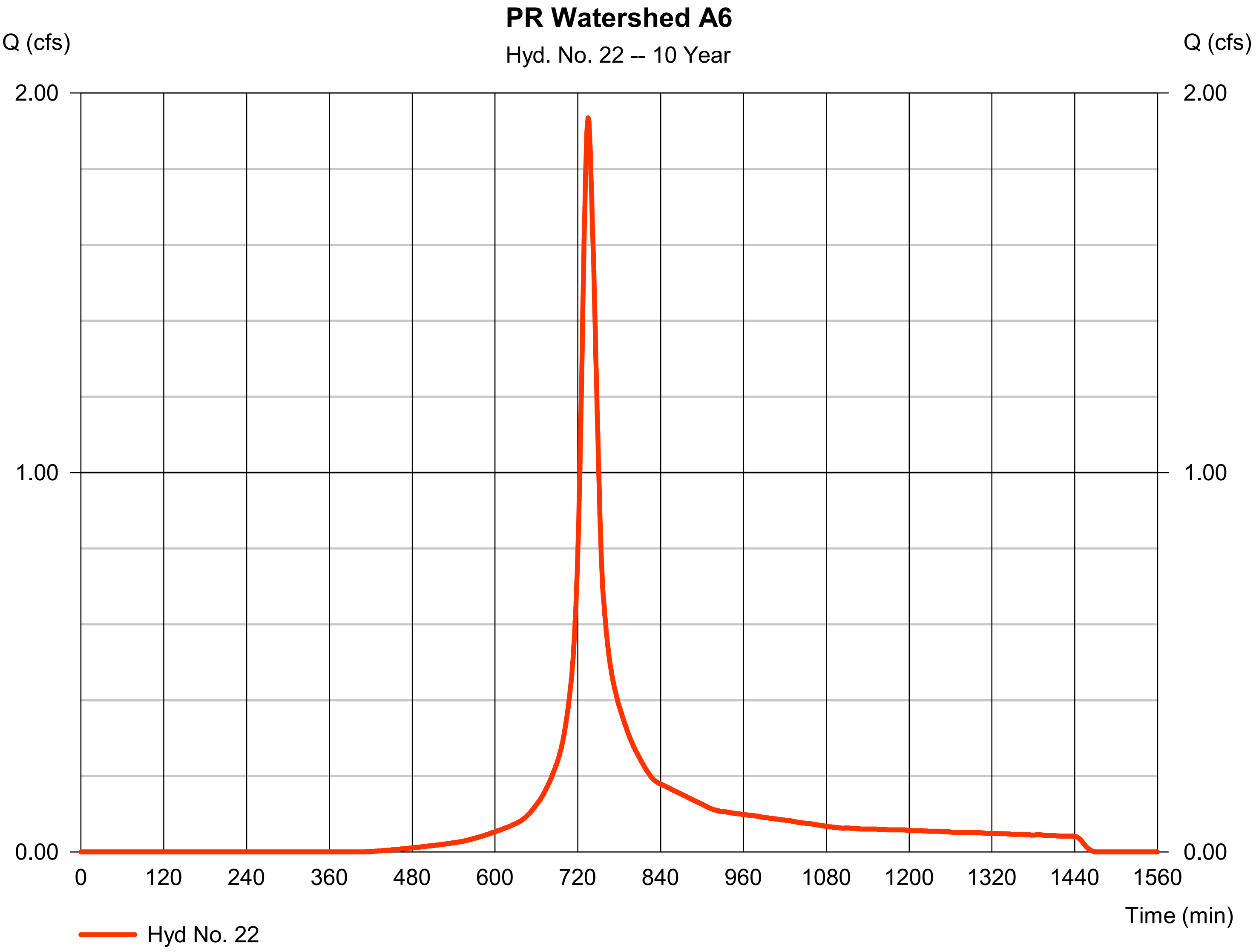
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 22

PR Watershed A6

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.15 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 1.935 cfs
Time to peak = 735 min
Hyd. volume = 8,892 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Custom
Shape factor = 484

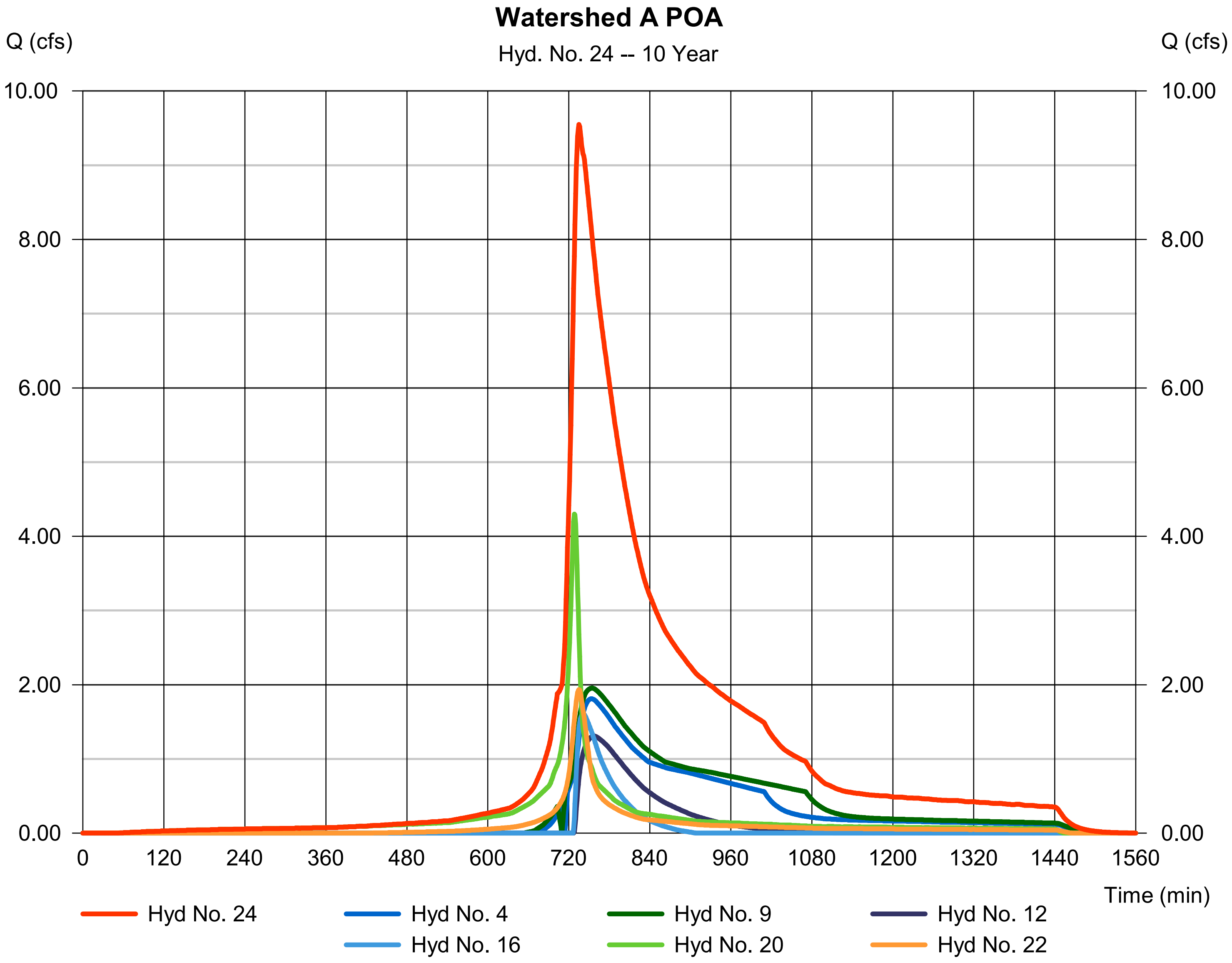


Hydrograph Report

Hyd. No. 24

Watershed A POA

Hydrograph type	= Combine	Peak discharge	= 9.548 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 1 min	Hyd. volume	= 90,007 cuft
Inflow hyds.	= 4, 9, 12, 16, 20, 22	Contrib. drain. area	= 0.810 ac

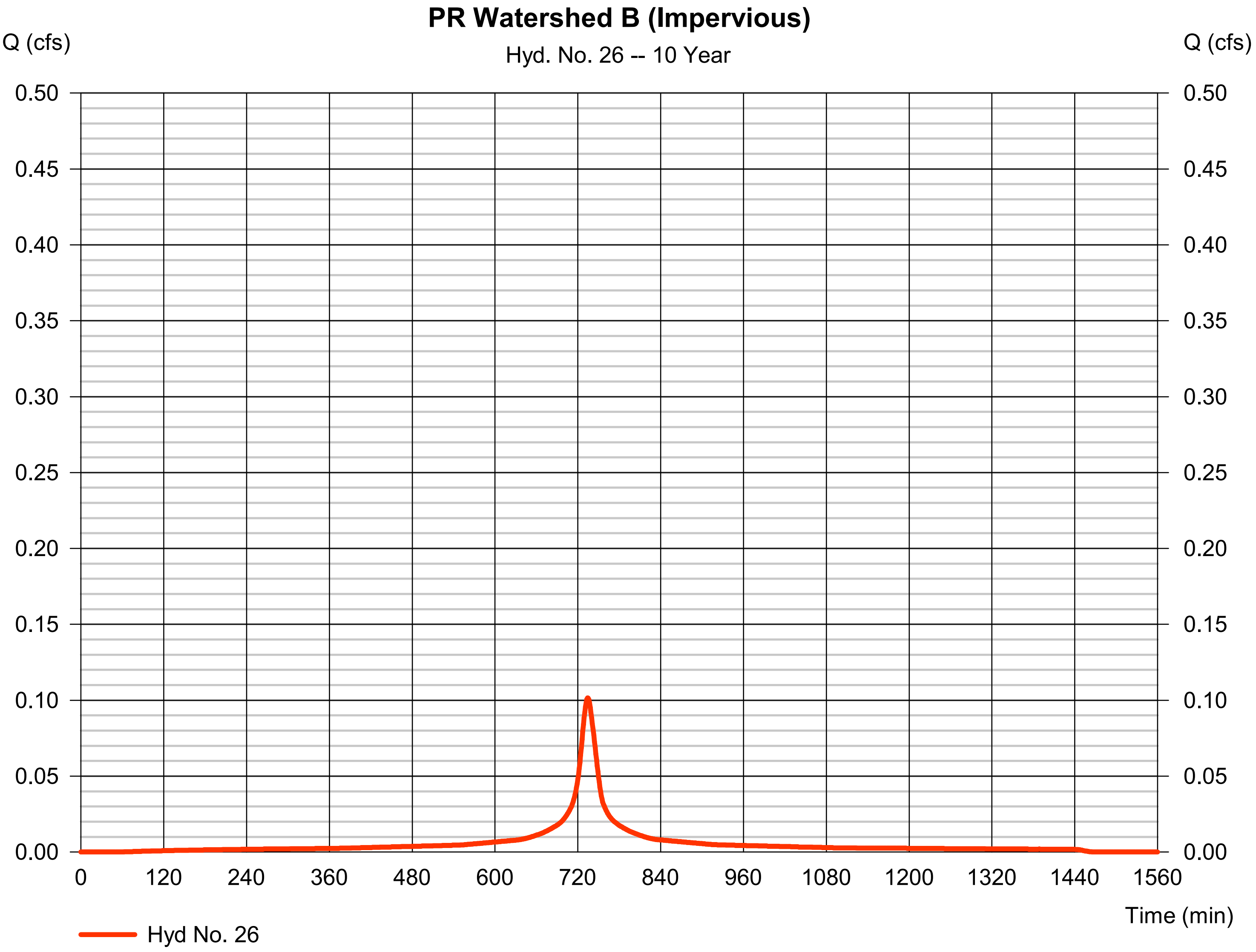


Hydrograph Report

Hyd. No. 26

PR Watershed B (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.102 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 535 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.00 min
Total precip.	= 5.15 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	= 484



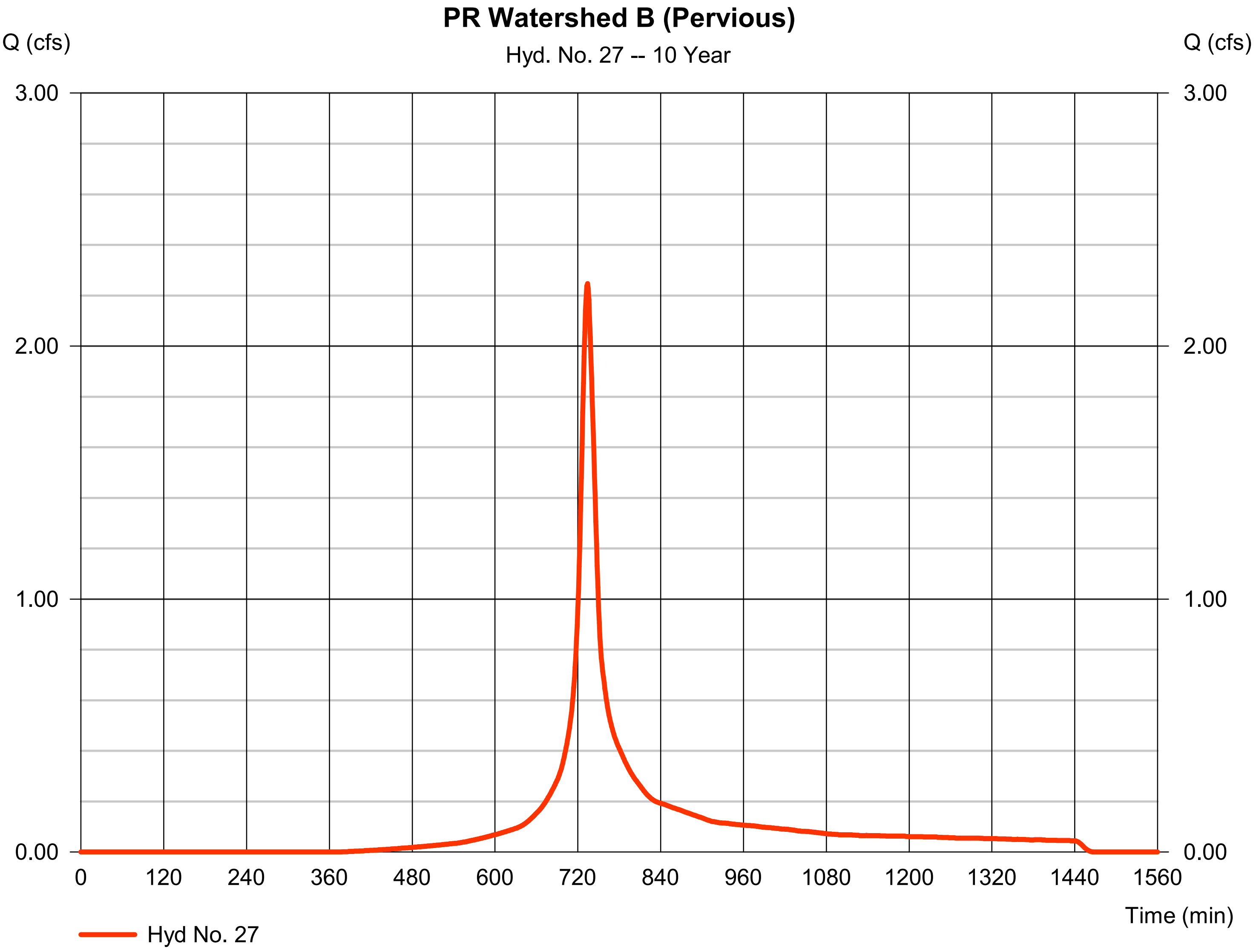
Hydrograph Report

Hyd. No. 27

PR Watershed B (Pervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.247 cfs
Storm frequency	=	10 yrs	Time to peak	=	734 min
Time interval	=	1 min	Hyd. volume	=	9,918 cuft
Drainage area	=	0.860 ac	Curve number	=	82*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.00 min
Total precip.	=	5.15 in	Distribution	=	Custom
Storm duration	=	\\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr	Shape factor	=	484

* Composite (Area/CN) = [(0.700 x 80) + (0.020 x 77) + (0.140 x 91)] / 0.860

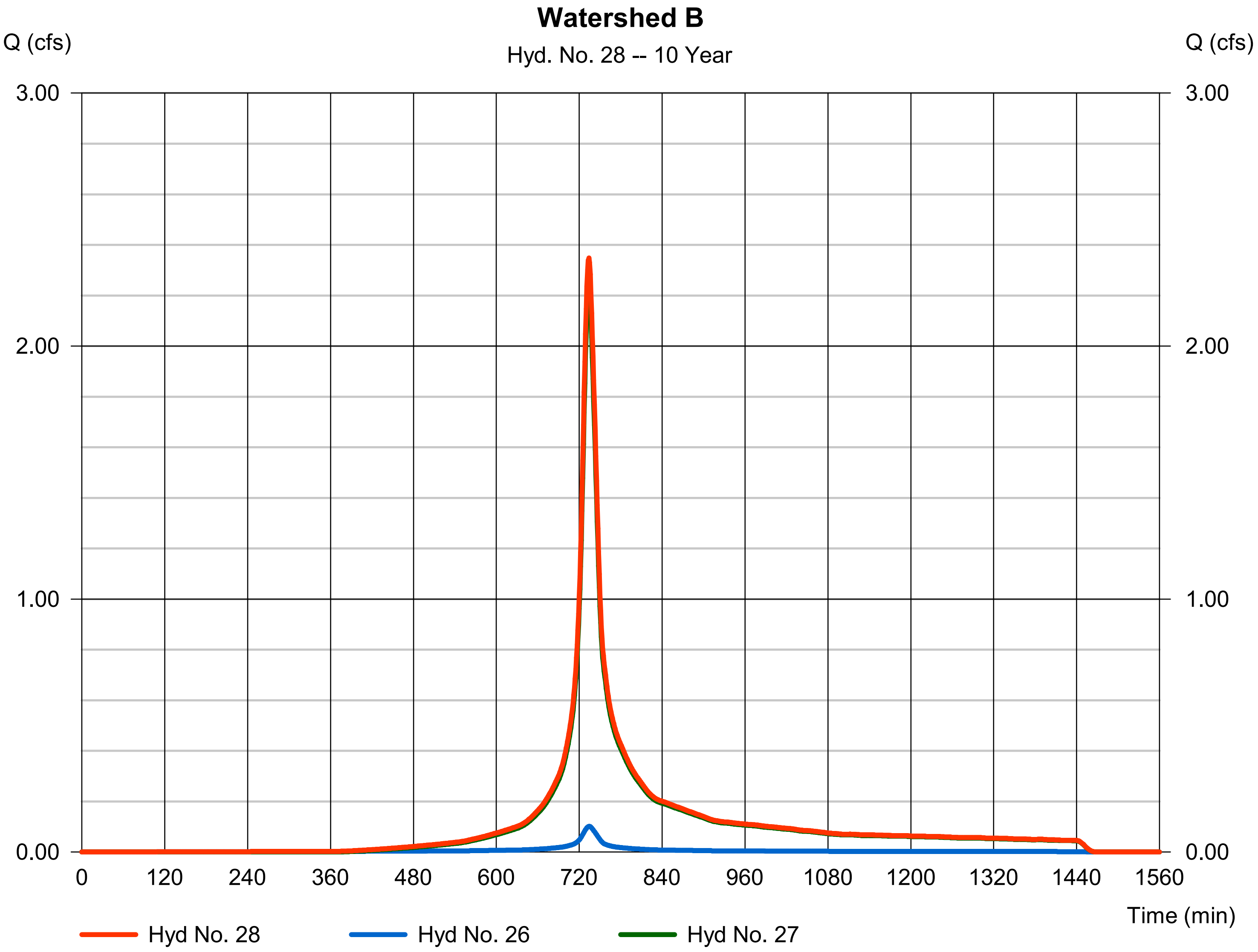


Hydrograph Report

Hyd. No. 28

Watershed B

Hydrograph type	= Combine	Peak discharge	= 2.348 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 10,453 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 0.890 ac



Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	10.33	1	727	40,176	------	------	------	PR Watershed A1 (Impervious)
2	SCS Runoff	4.371	1	733	19,102	------	------	------	PR Watershed A1 (Pervious)
3	Combine	14.11	1	728	59,279	1, 2	------	------	Watershed A1
4	Reservoir	6.245	1	741	49,992	3	50.43	24,198	Basin A1
6	SCS Runoff	15.03	1	727	58,438	------	------	------	PR Watershed A2 (Impervious)
7	SCS Runoff	2.608	1	732	10,918	------	------	------	PR Watershed A2 (Pervious)
8	Combine	17.36	1	728	69,356	6, 7	------	------	Watershed A2
9	Reservoir	6.531	1	739	57,795	8	50.48	30,708	Basin A2
11	SCS Runoff	17.22	1	727	66,961	------	------	------	PR Watershed A3 (Impervious)
12	Reservoir	6.349	1	736	31,887	11	50.81	25,407	UG Basin A3
14	SCS Runoff	12.29	1	727	47,785	------	------	------	PR Watershed A4 (Impervious)
15	Combine	12.29	1	727	47,785	14	------	------	Watershed A4
16	Reservoir	7.716	1	732	19,361	15	52.87	13,251	UG Basin A4
18	SCS Runoff	6.971	1	728	28,720	------	------	------	PR Watershed A5 (Impervious)
19	SCS Runoff	0.518	1	729	1,863	------	------	------	PR Watershed A5 (pervious)
20	Combine	7.488	1	728	30,583	18, 19	------	------	PR Watershed A5
22	SCS Runoff	4.012	1	735	18,867	------	------	------	PR Watershed A6
24	Combine	35.26	1	733	208,485	4, 9, 12, 16, 20, 22,	------	------	Watershed A POA
26	SCS Runoff	0.175	1	734	937	------	------	------	PR Watershed B (Impervious)
27	SCS Runoff	4.524	1	734	20,557	------	------	------	PR Watershed B (Pervious)
28	Combine	4.699	1	734	21,493	26, 27	------	------	Watershed B

Hydrograph Report

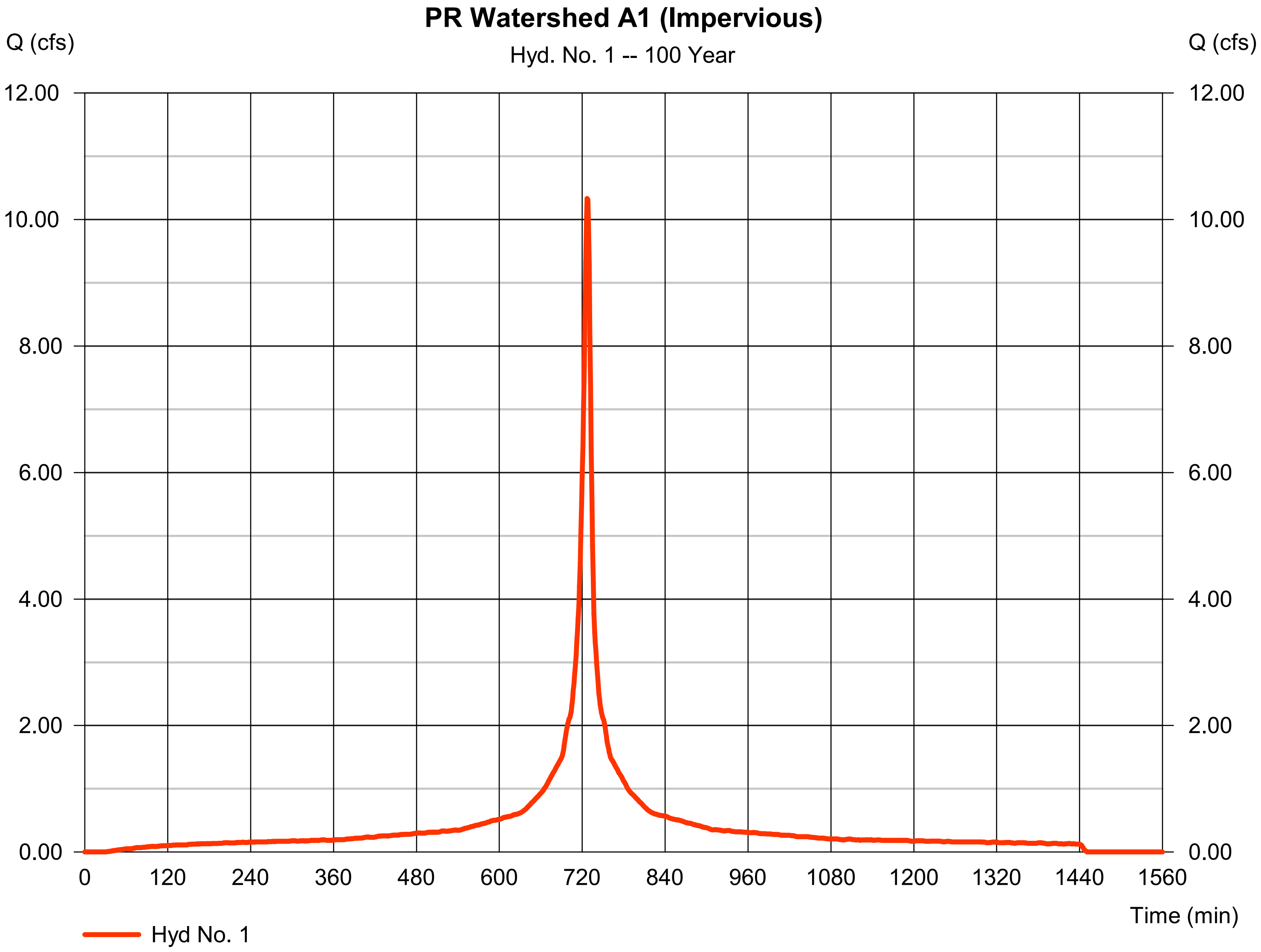
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 1

PR Watershed A1 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.320 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 10.33 cfs
Time to peak = 727 min
Hyd. volume = 40,176 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

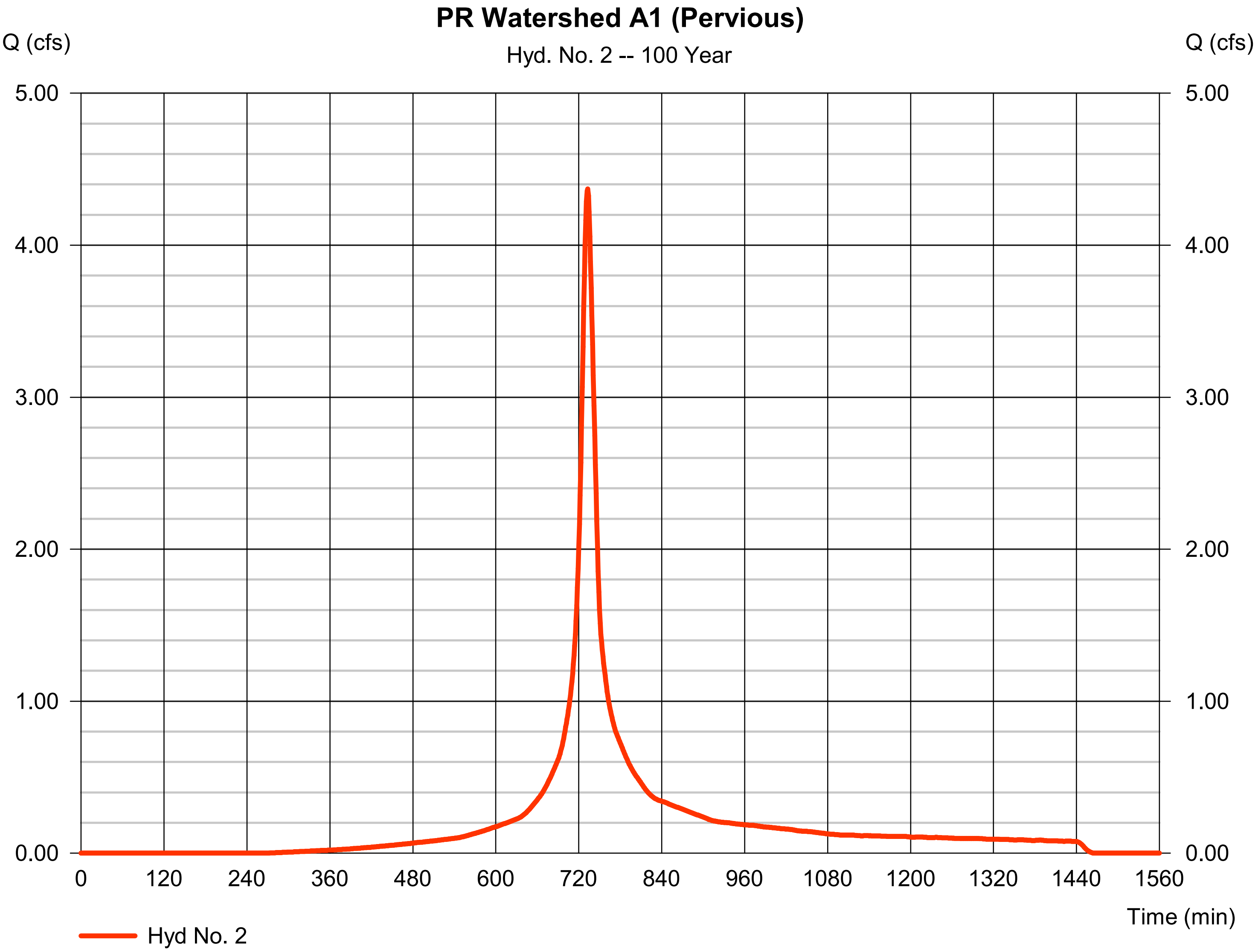
Hyd. No. 2

PR Watershed A1 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 4.371 cfs
Time to peak = 733 min
Hyd. volume = 19,102 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 16.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.790 x 80) + (0.020 x 91)] / 0.810

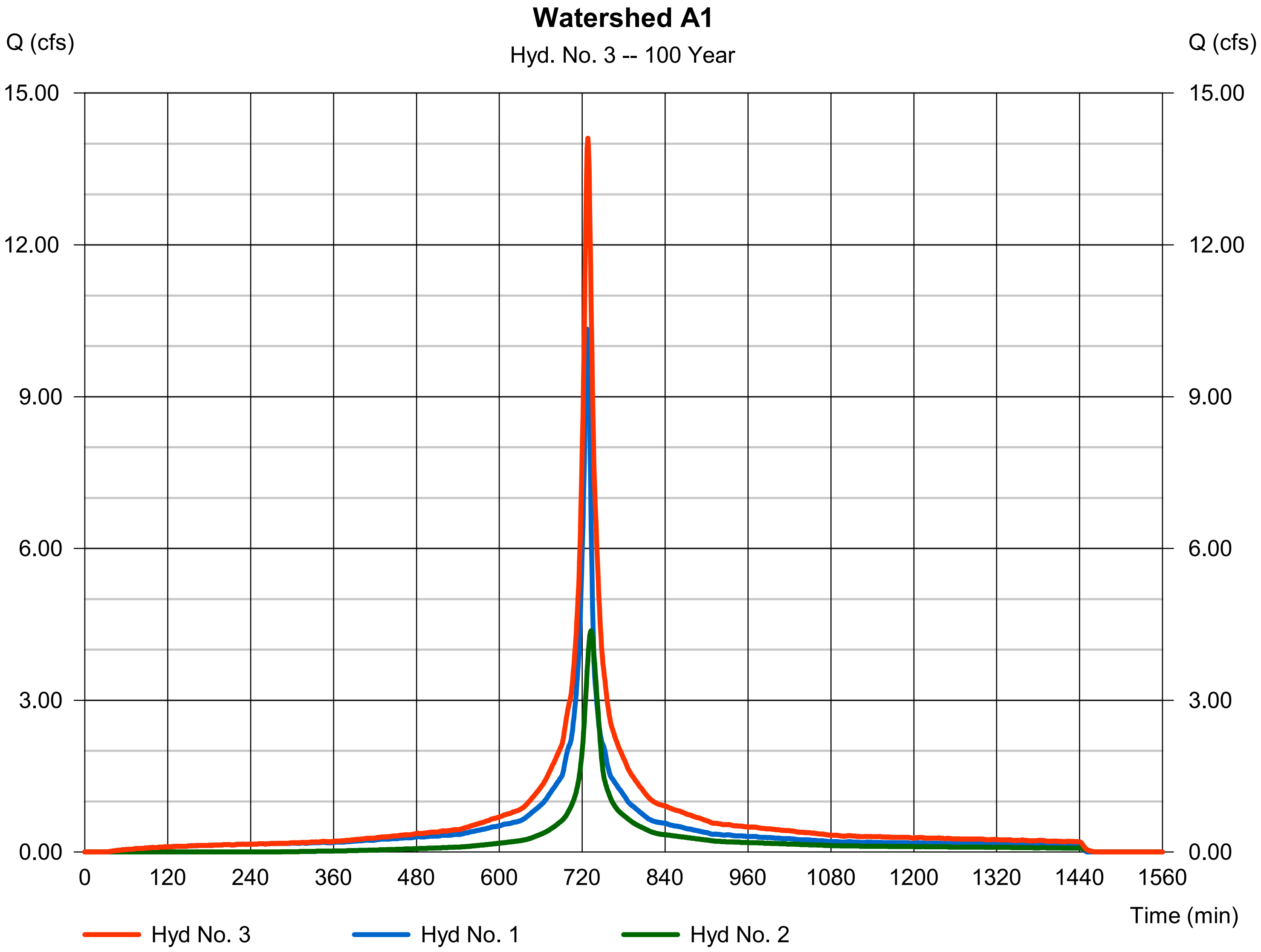


Hydrograph Report

Hyd. No. 3

Watershed A1

Hydrograph type	= Combine	Peak discharge	= 14.11 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 59,279 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.130 ac



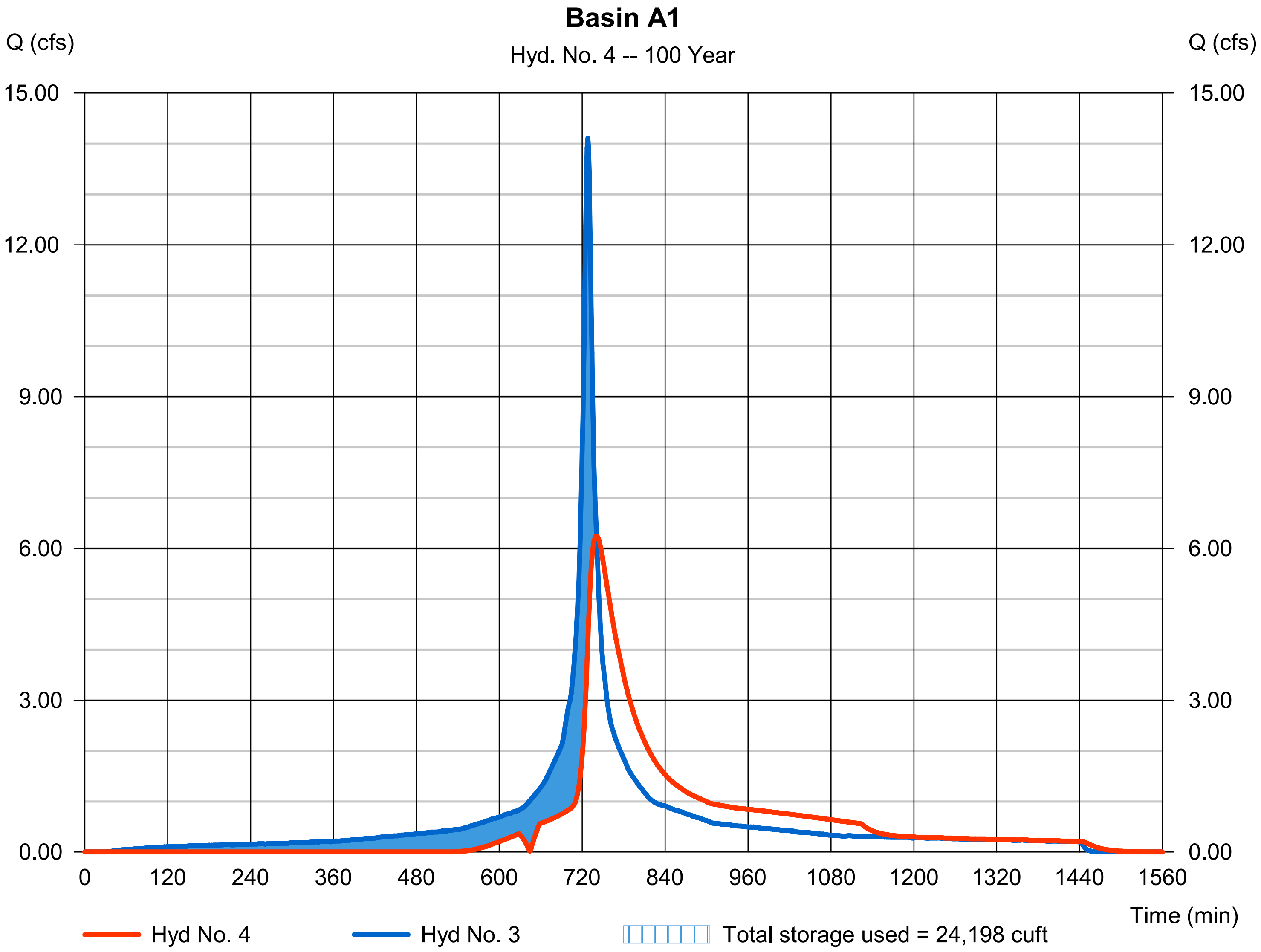
Hydrograph Report

Hyd. No. 4

Basin A1

Hydrograph type	= Reservoir	Peak discharge	= 6.245 cfs
Storm frequency	= 100 yrs	Time to peak	= 741 min
Time interval	= 1 min	Hyd. volume	= 49,992 cuft
Inflow hyd. No.	= 3 - Watershed A1	Max. Elevation	= 50.43 ft
Reservoir name	= Basin A1	Max. Storage	= 24,198 cuft

Storage Indication method used.



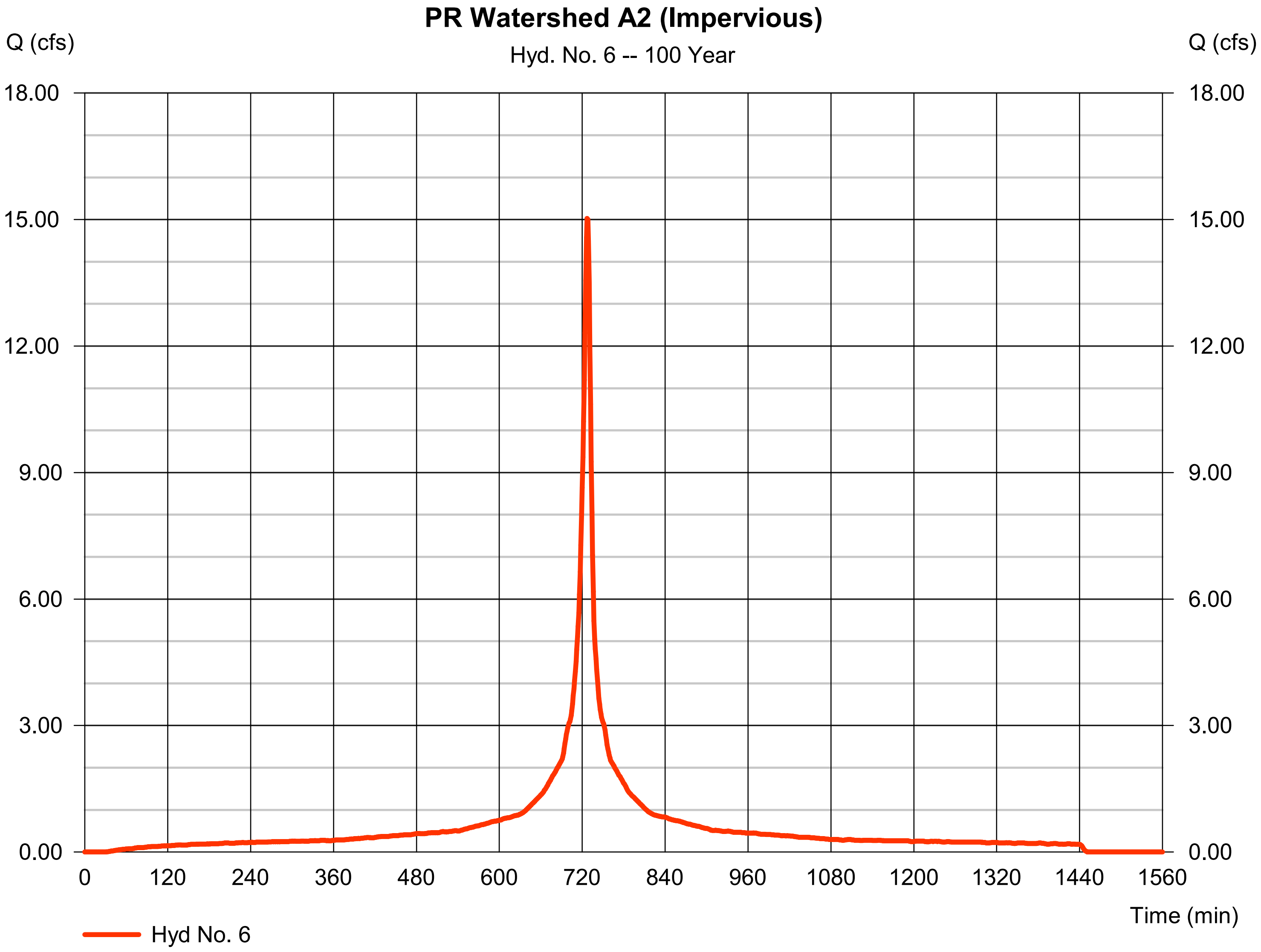
Hydrograph Report

Hyd. No. 6

PR Watershed A2 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.920 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 15.03 cfs
Time to peak = 727 min
Hyd. volume = 58,438 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

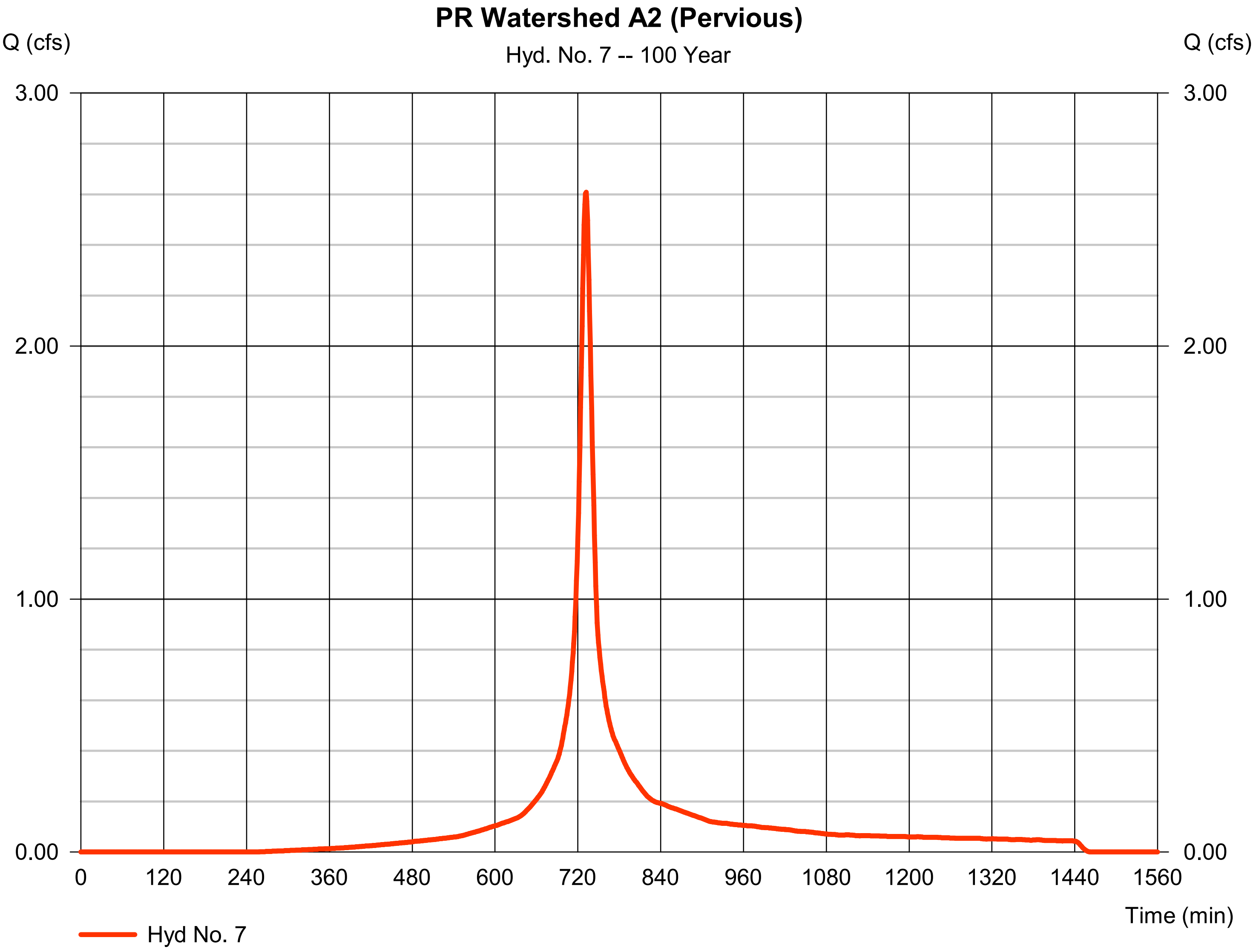
Hyd. No. 7

PR Watershed A2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.460 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 2.608 cfs
Time to peak = 732 min
Hyd. volume = 10,918 cuft
Curve number = 81*
Hydraulic length = 0 ft
Time of conc. (Tc) = 14.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.410 x 80) + (0.050 x 91)] / 0.460

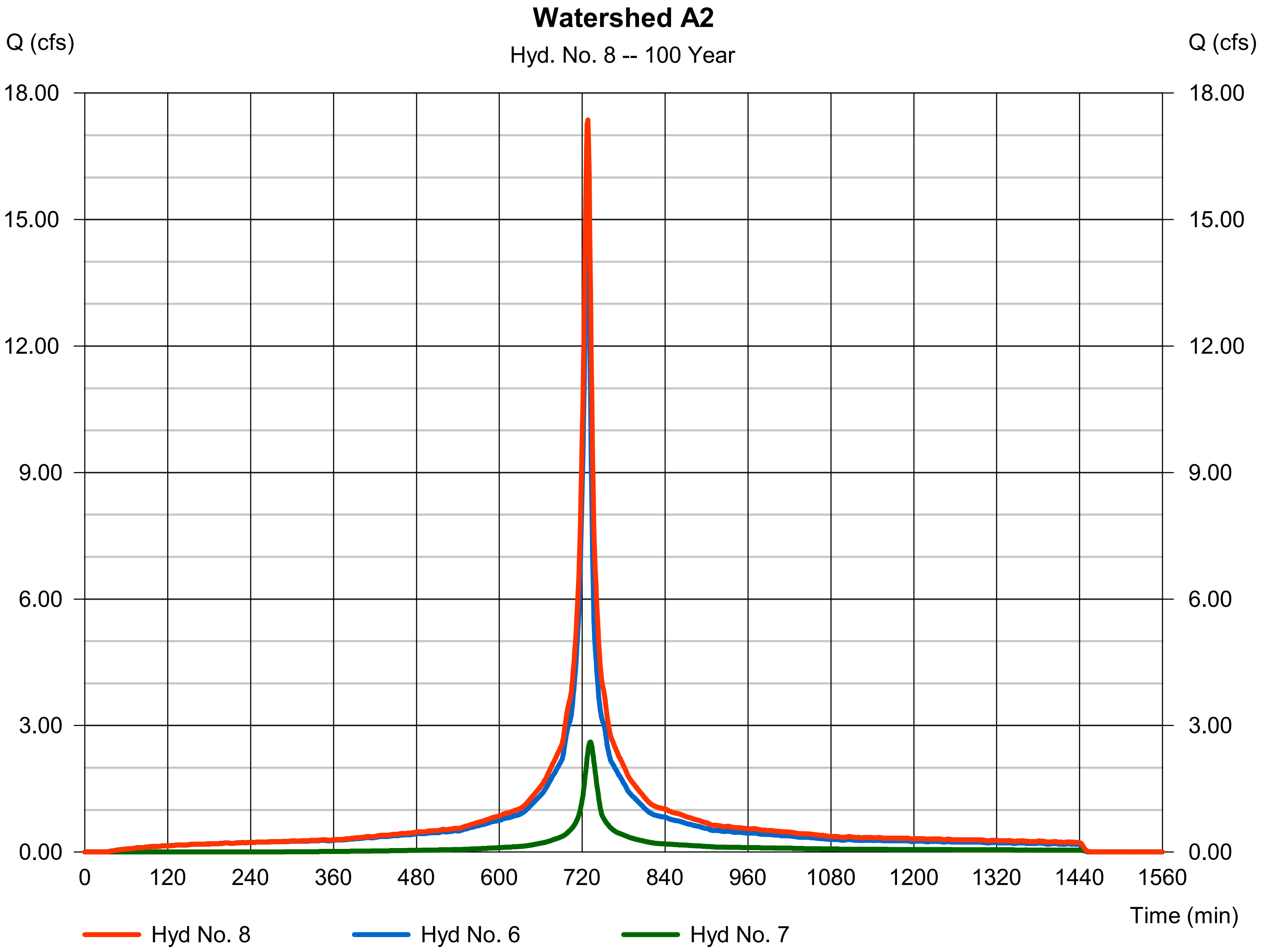


Hydrograph Report

Hyd. No. 8

Watershed A2

Hydrograph type	= Combine	Peak discharge	= 17.36 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 69,356 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 2.380 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

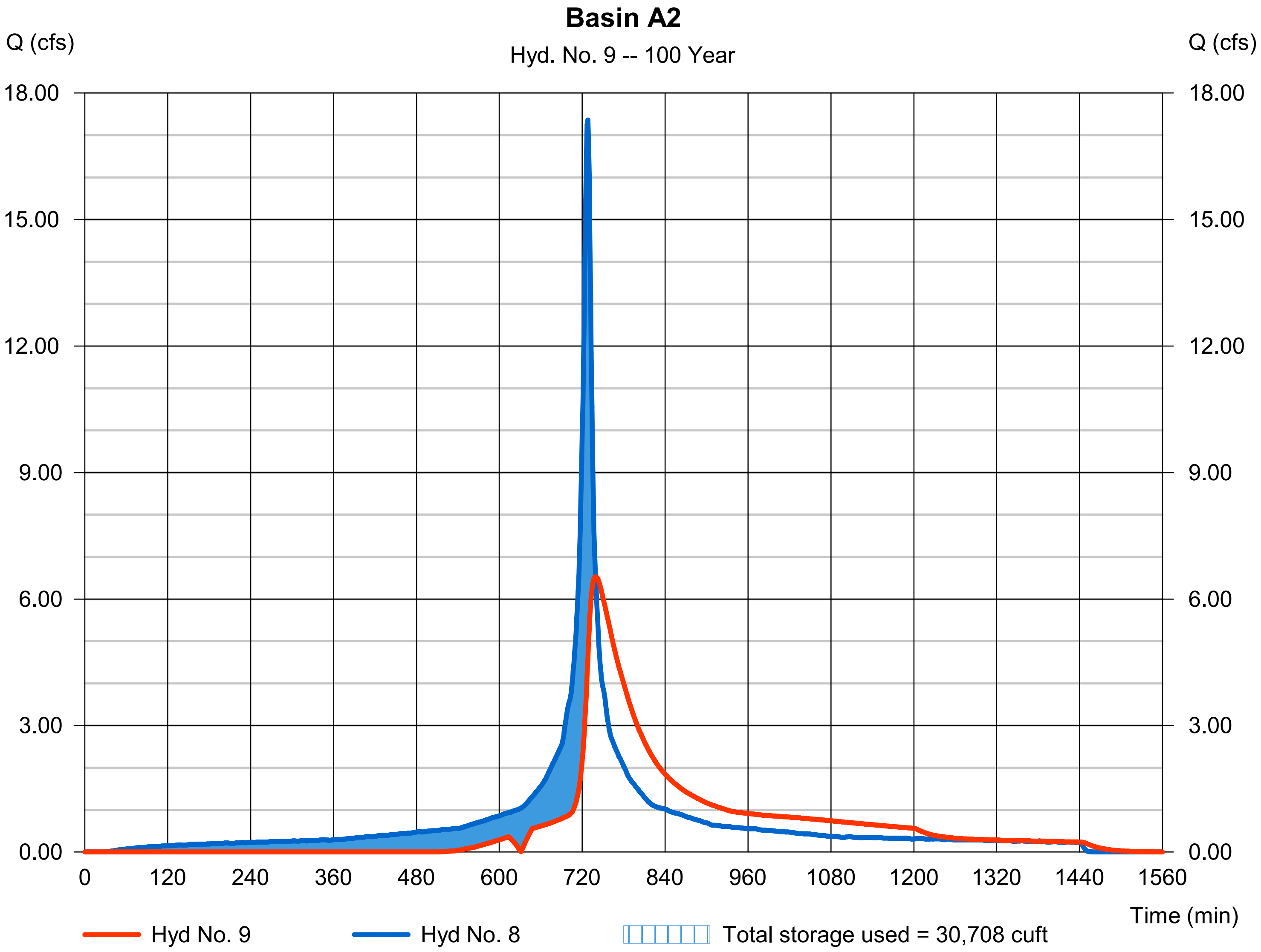
Hyd. No. 9

Basin A2

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyd. No. = 8 - Watershed A2
Reservoir name = Basin A2

Peak discharge = 6.531 cfs
Time to peak = 739 min
Hyd. volume = 57,795 cuft
Max. Elevation = 50.48 ft
Max. Storage = 30,708 cuft

Storage Indication method used.



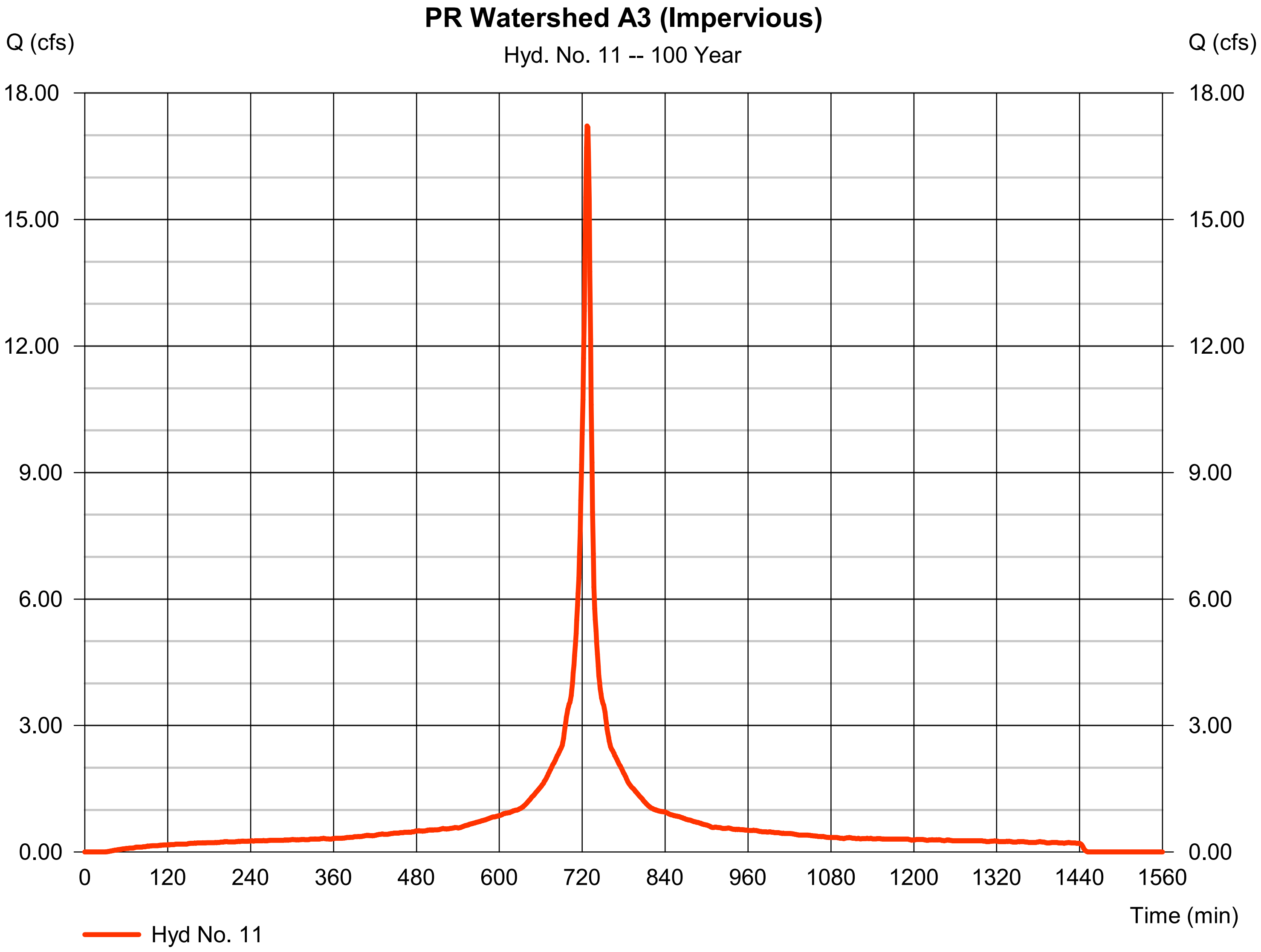
Hydrograph Report

Hyd. No. 11

PR Watershed A3 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 2.200 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 17.22 cfs
Time to peak = 727 min
Hyd. volume = 66,961 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



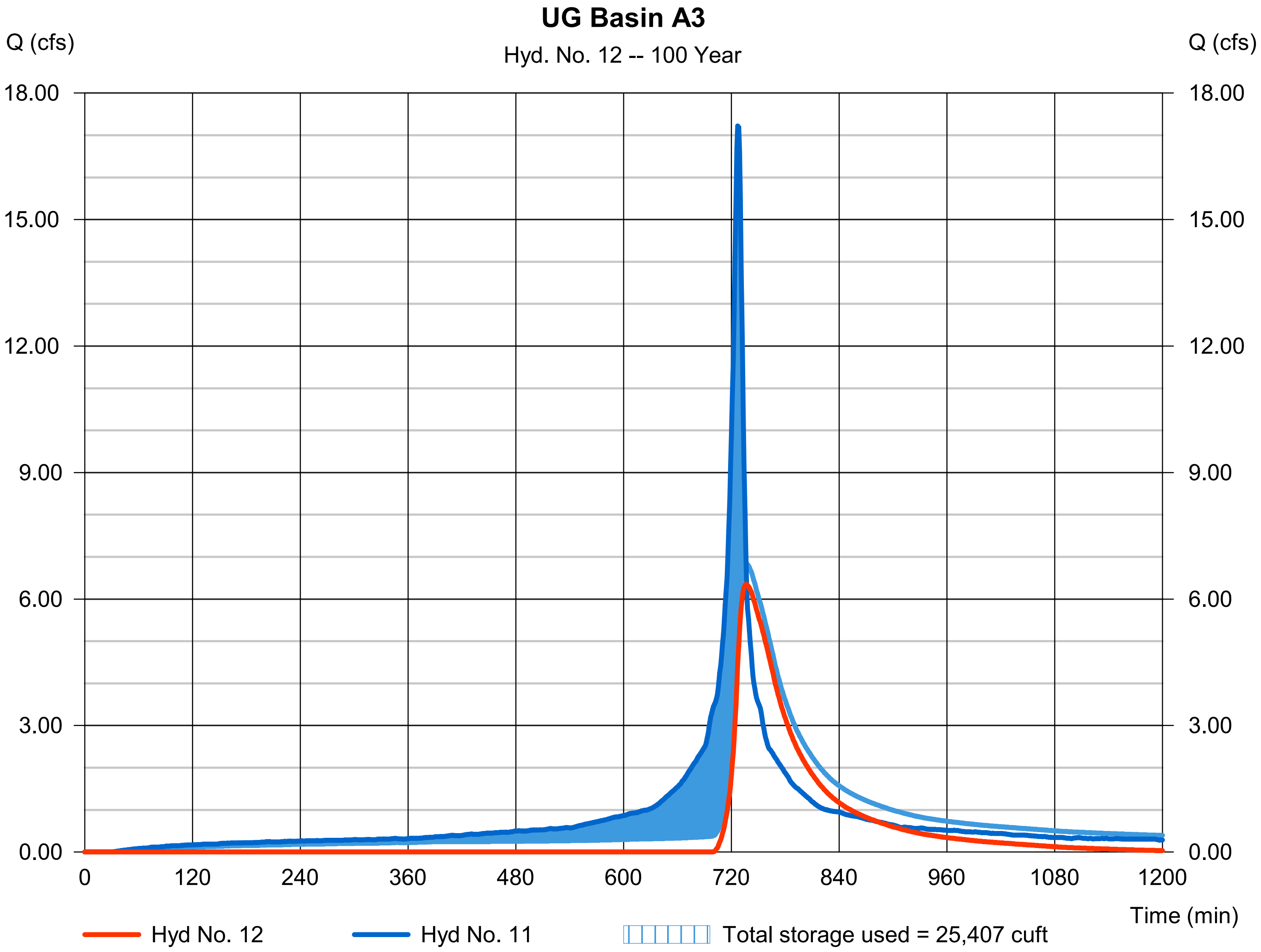
Hydrograph Report

Hyd. No. 12

UG Basin A3

Hydrograph type	= Reservoir	Peak discharge	= 6.349 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 1 min	Hyd. volume	= 31,887 cuft
Inflow hyd. No.	= 11 - PR Watershed A3 (Impervious)	Max. Elevation	= 50.81 ft
Reservoir name	= UG Detention A3	Max. Storage	= 25,407 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

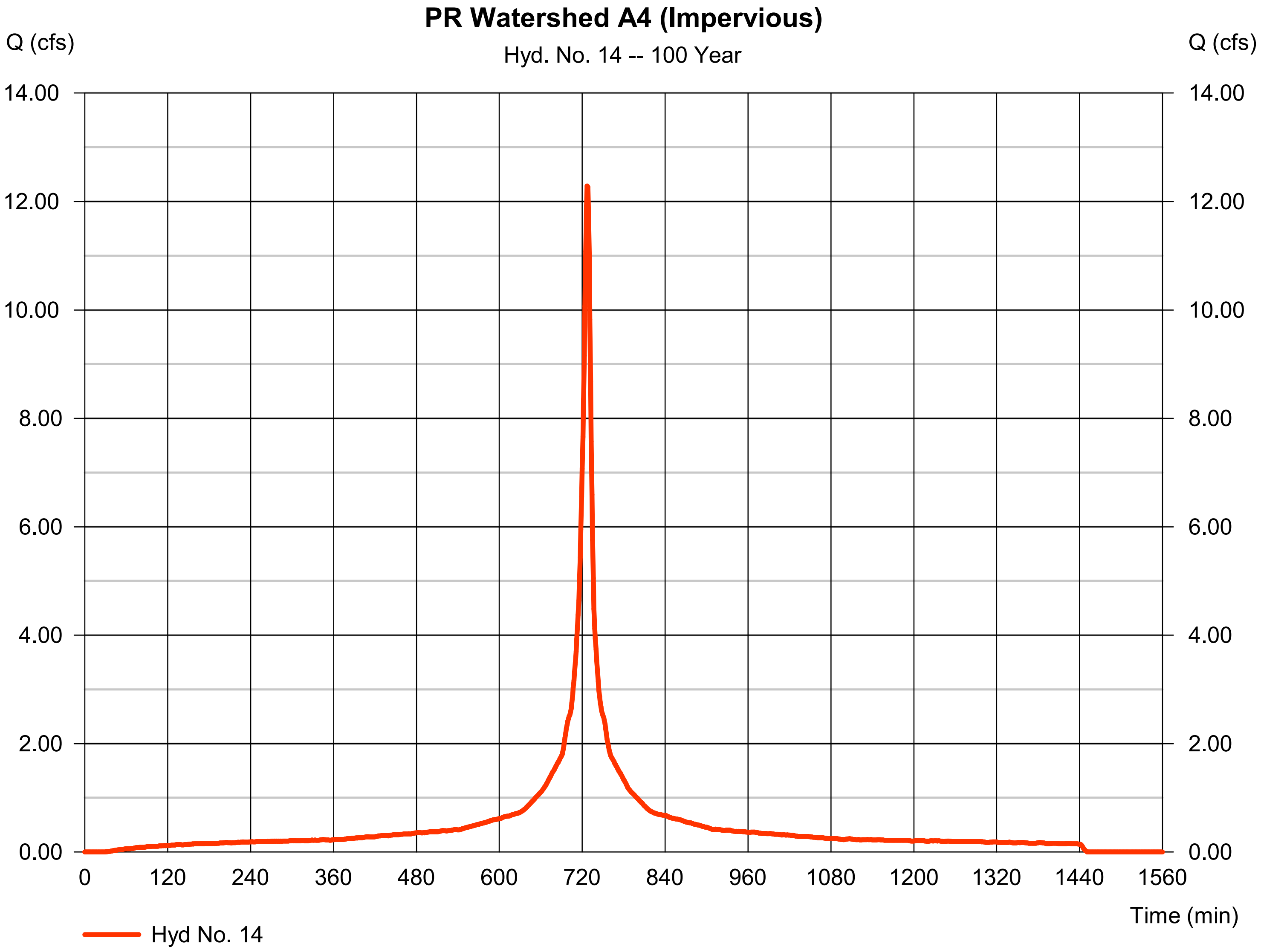


Hyd. No. 14

PR Watershed A4 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.570 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 12.29 cfs
Time to peak = 727 min
Hyd. volume = 47,785 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484

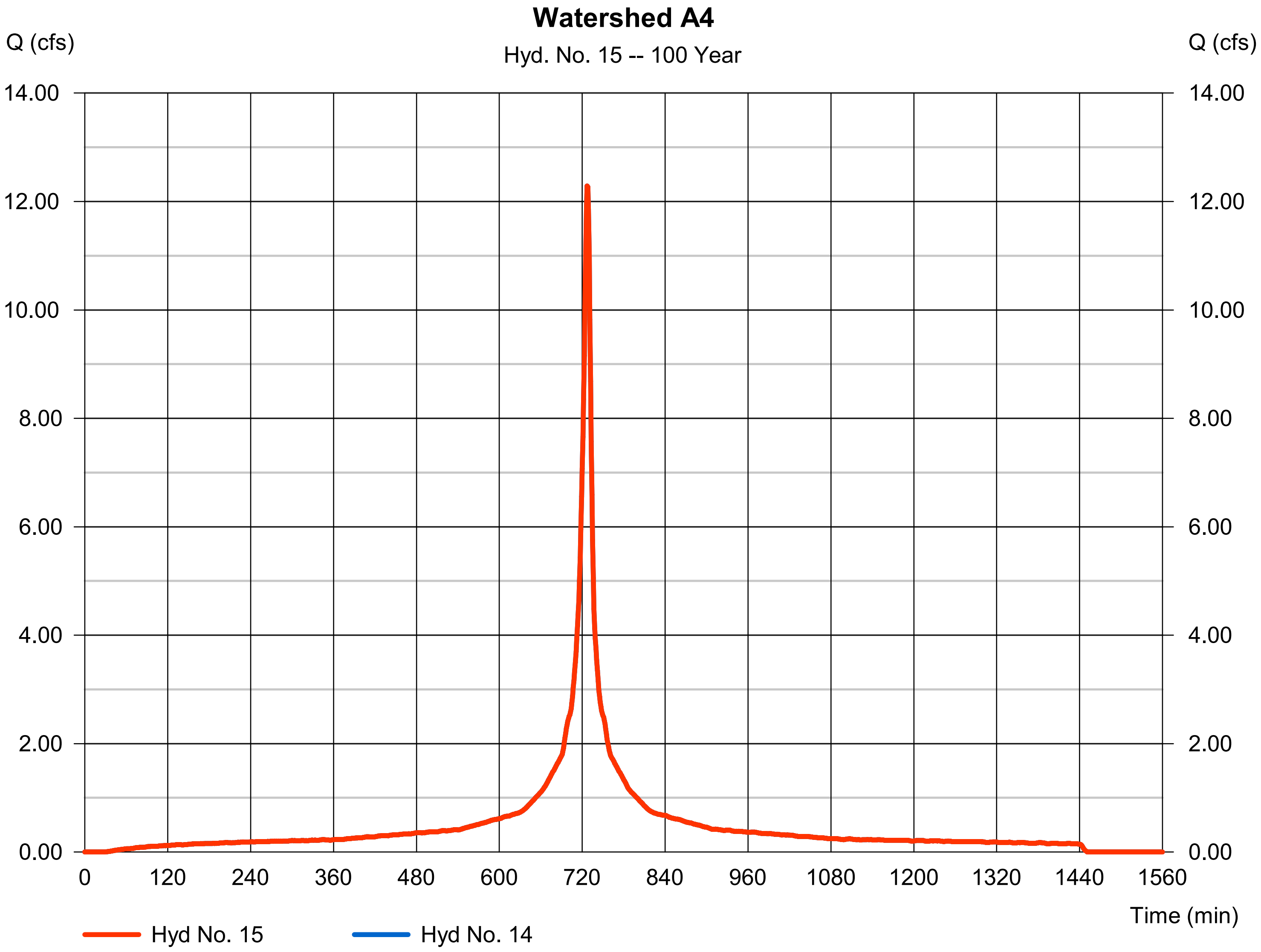


Hydrograph Report

Hyd. No. 15

Watershed A4

Hydrograph type	= Combine	Peak discharge	= 12.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 47,785 cuft
Inflow hyds.	= 14	Contrib. drain. area	= 1.570 ac

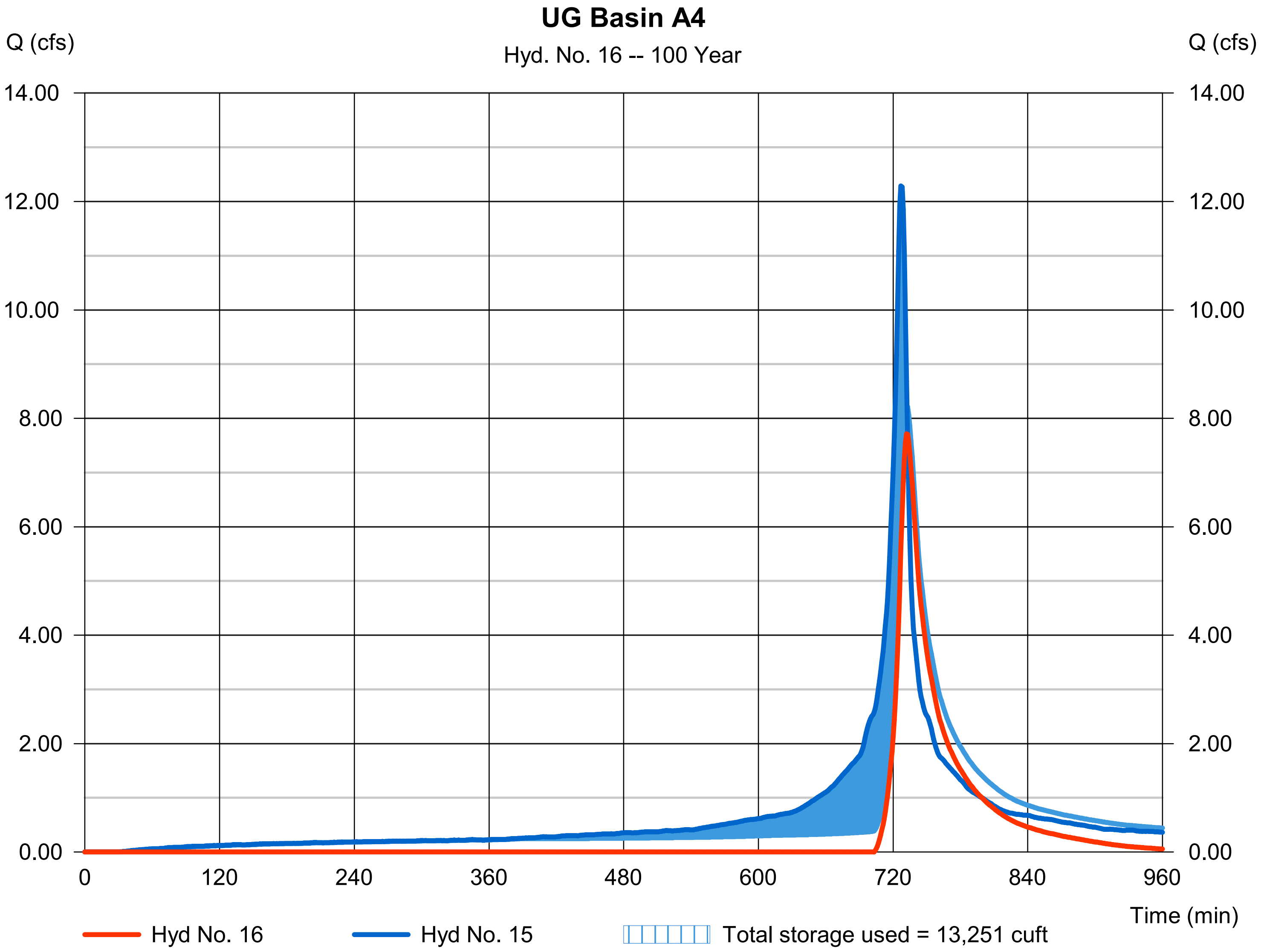


Hyd. No. 16

UG Basin A4

Hydrograph type	= Reservoir	Peak discharge	= 7.716 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 19,361 cuft
Inflow hyd. No.	= 15 - Watershed A4	Max. Elevation	= 52.87 ft
Reservoir name	= UG Detention A4	Max. Storage	= 13,251 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



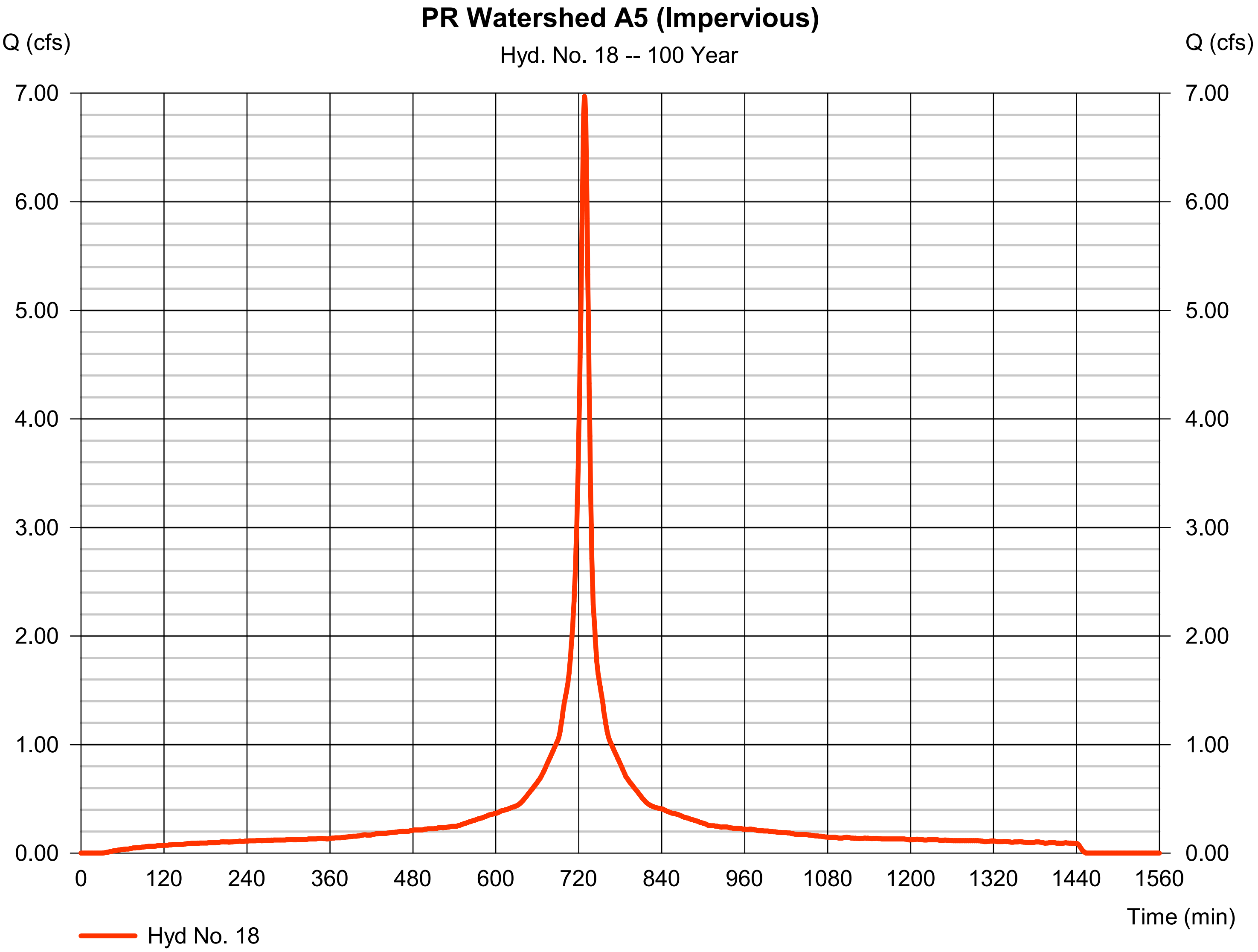
Hydrograph Report

Hyd. No. 18

PR Watershed A5 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.920 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851301\Project Data_Discipline\Site Civil\Storm

Peak discharge = 6.971 cfs
Time to peak = 728 min
Hyd. volume = 28,720 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.00 min
Distribution = Custom
Shape factor = 484



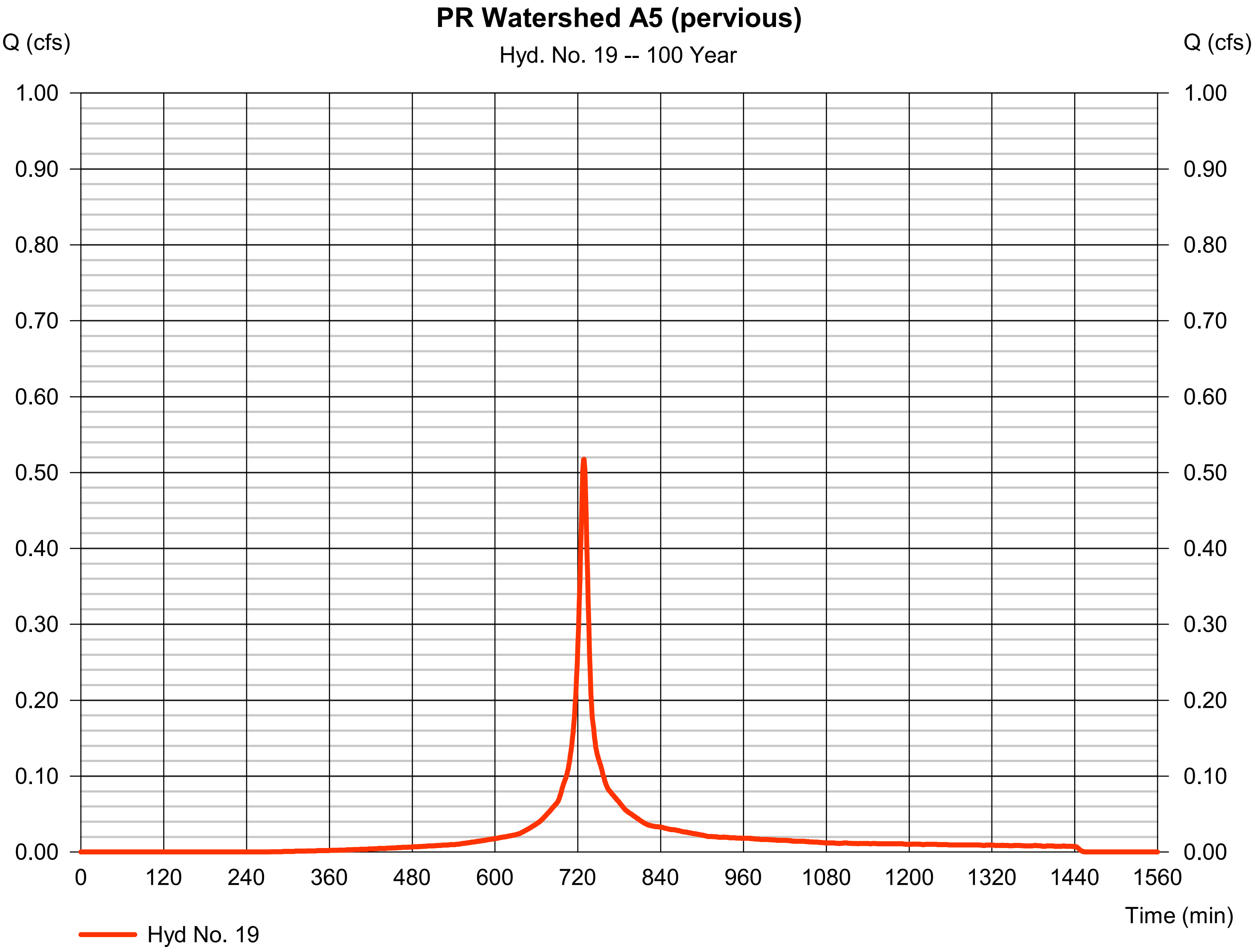
Hydrograph Report

Hyd. No. 19

PR Watershed A5 (pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.080 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.518 cfs
Time to peak = 729 min
Hyd. volume = 1,863 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.00 min
Distribution = Custom
Shape factor = 484

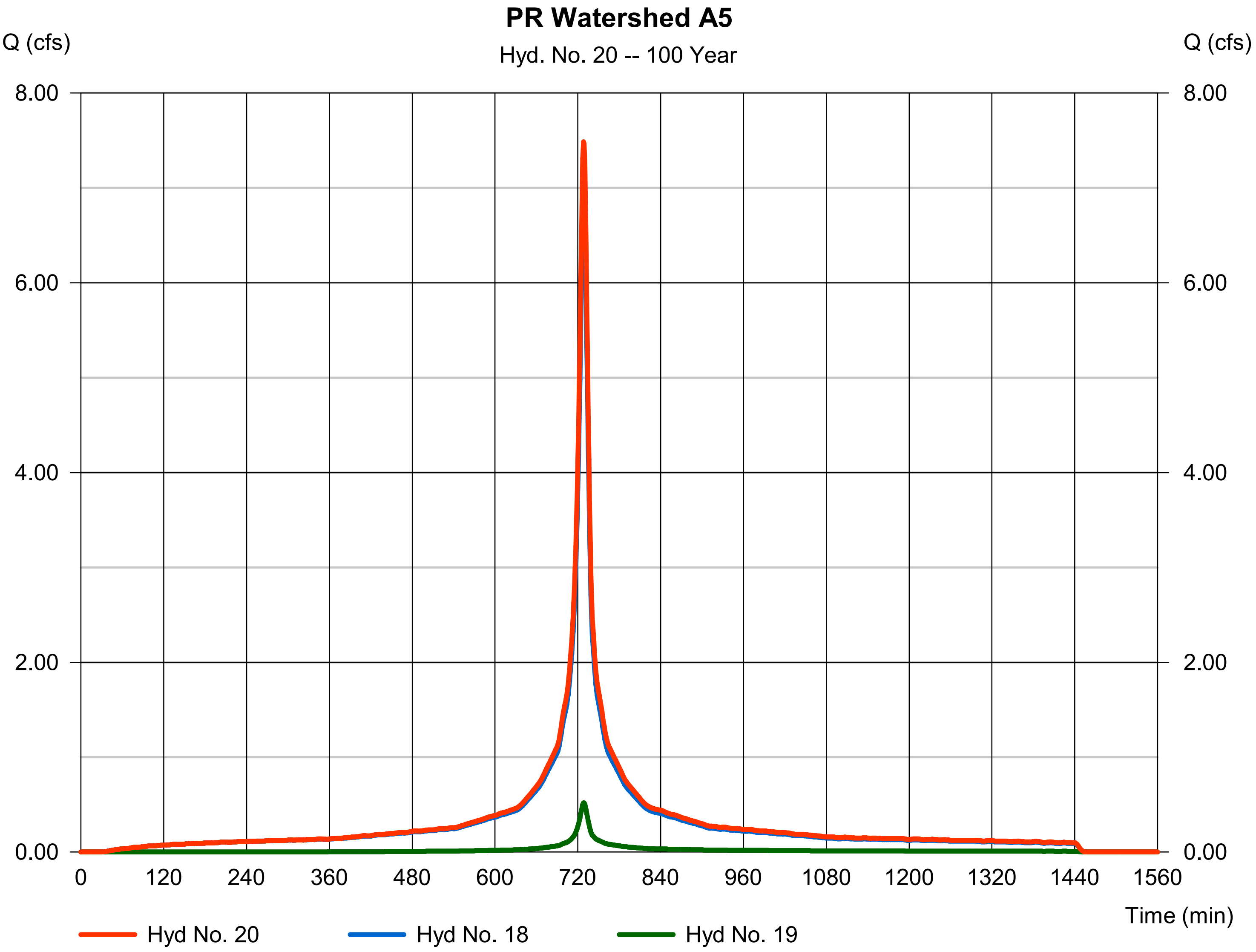


Hydrograph Report

Hyd. No. 20

PR Watershed A5

Hydrograph type	= Combine	Peak discharge	= 7.488 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 30,583 cuft
Inflow hyds.	= 18, 19	Contrib. drain. area	= 1.000 ac



Hydrograph Report

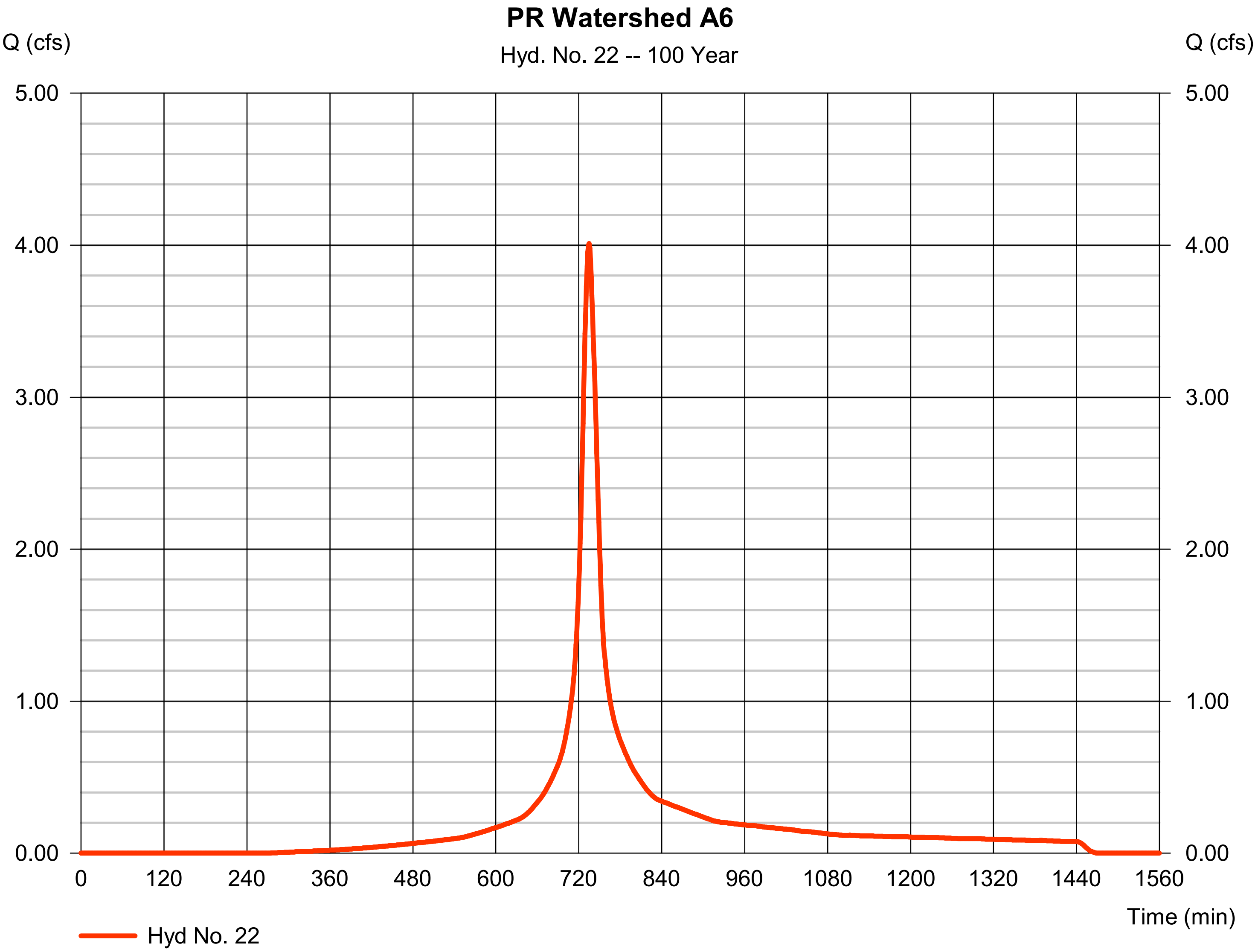
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 22

PR Watershed A6

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 4.012 cfs
Time to peak = 735 min
Hyd. volume = 18,867 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Custom
Shape factor = 484



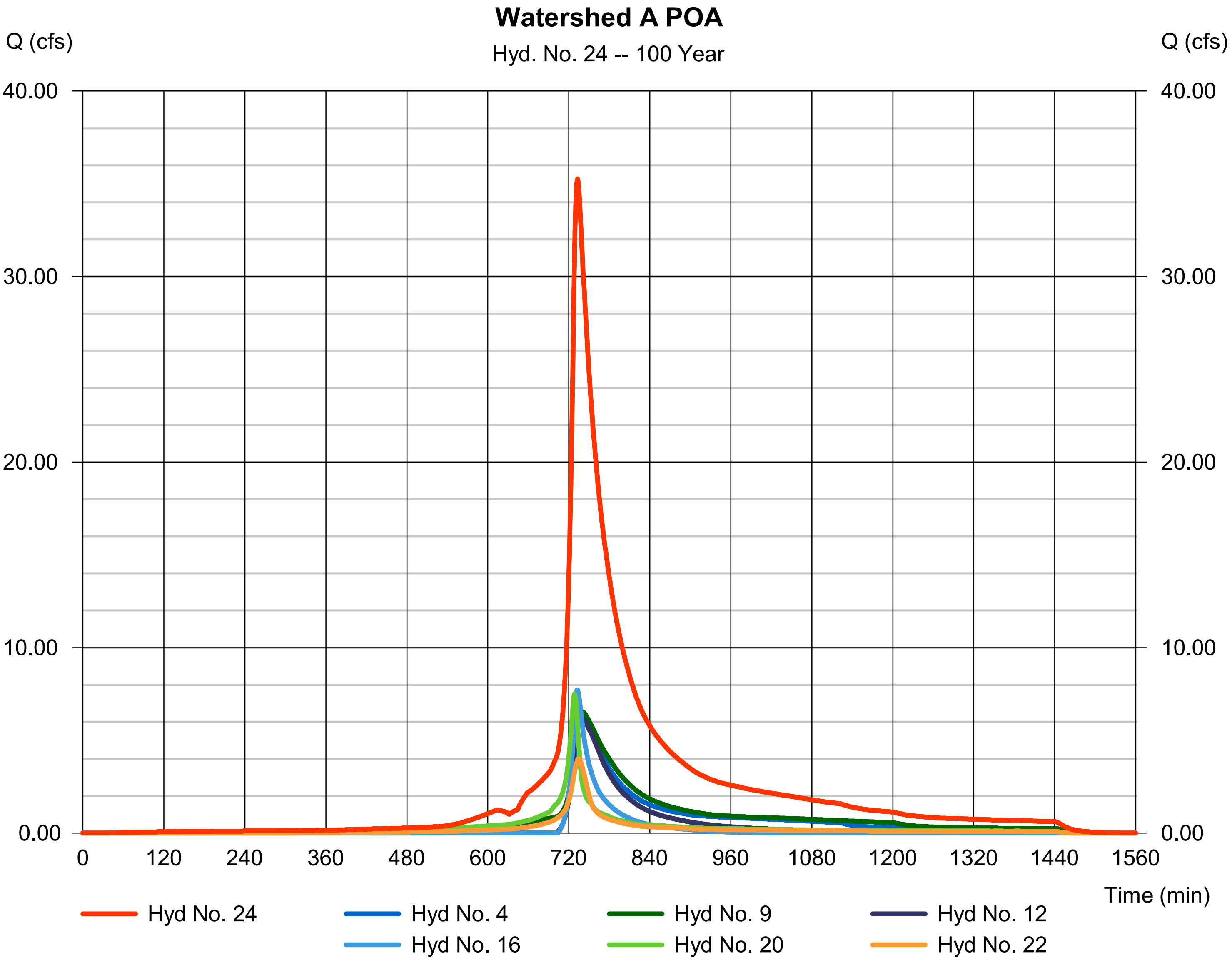
Hydrograph Report

Hyd. No. 24

Watershed A POA

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 4, 9, 12, 16, 20, 22

Peak discharge = 35.26 cfs
Time to peak = 733 min
Hyd. volume = 208,485 cuft
Contrib. drain. area = 0.810 ac



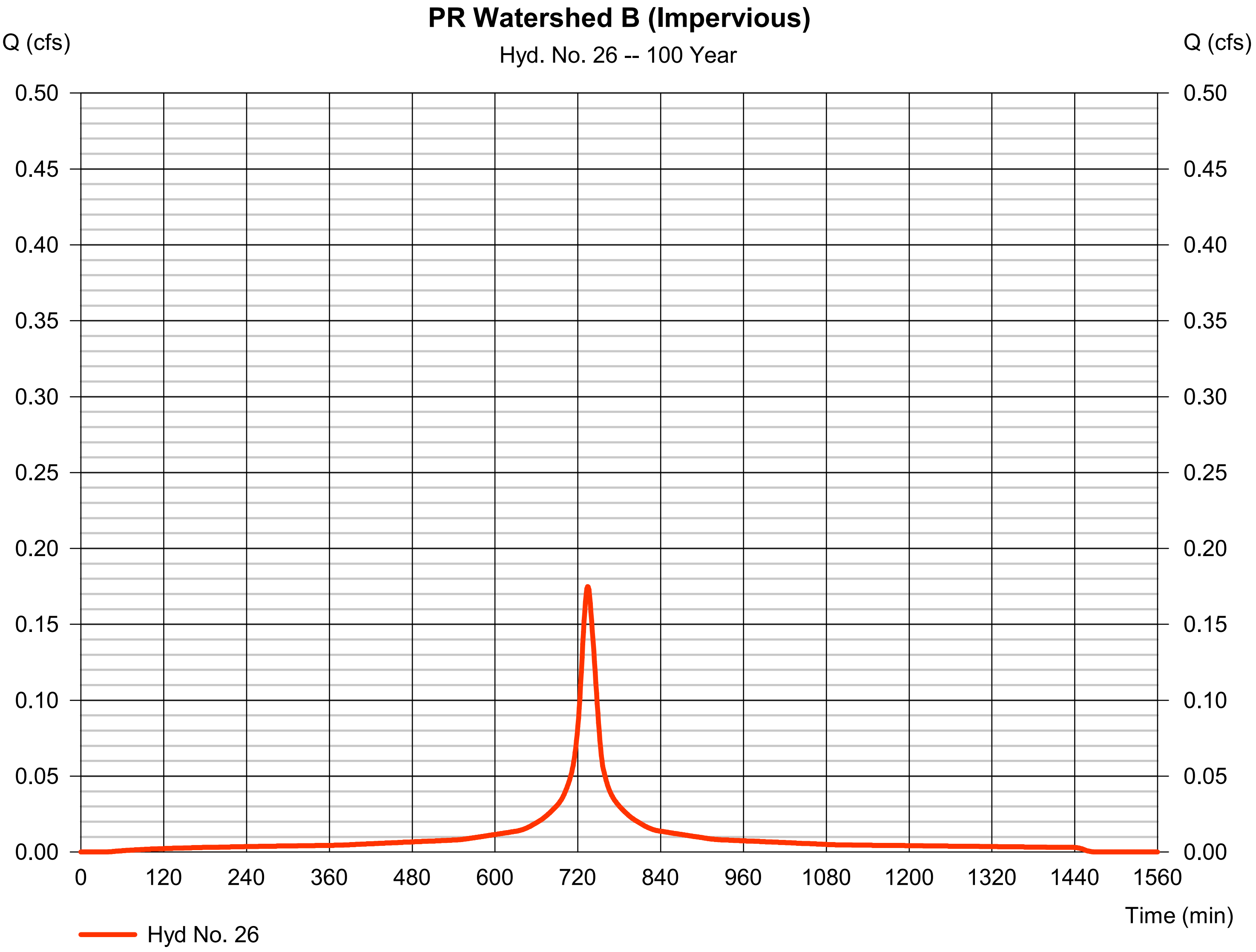
Hydrograph Report

Hyd. No. 26

PR Watershed B (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.030 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 8.84 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.175 cfs
Time to peak = 734 min
Hyd. volume = 937 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

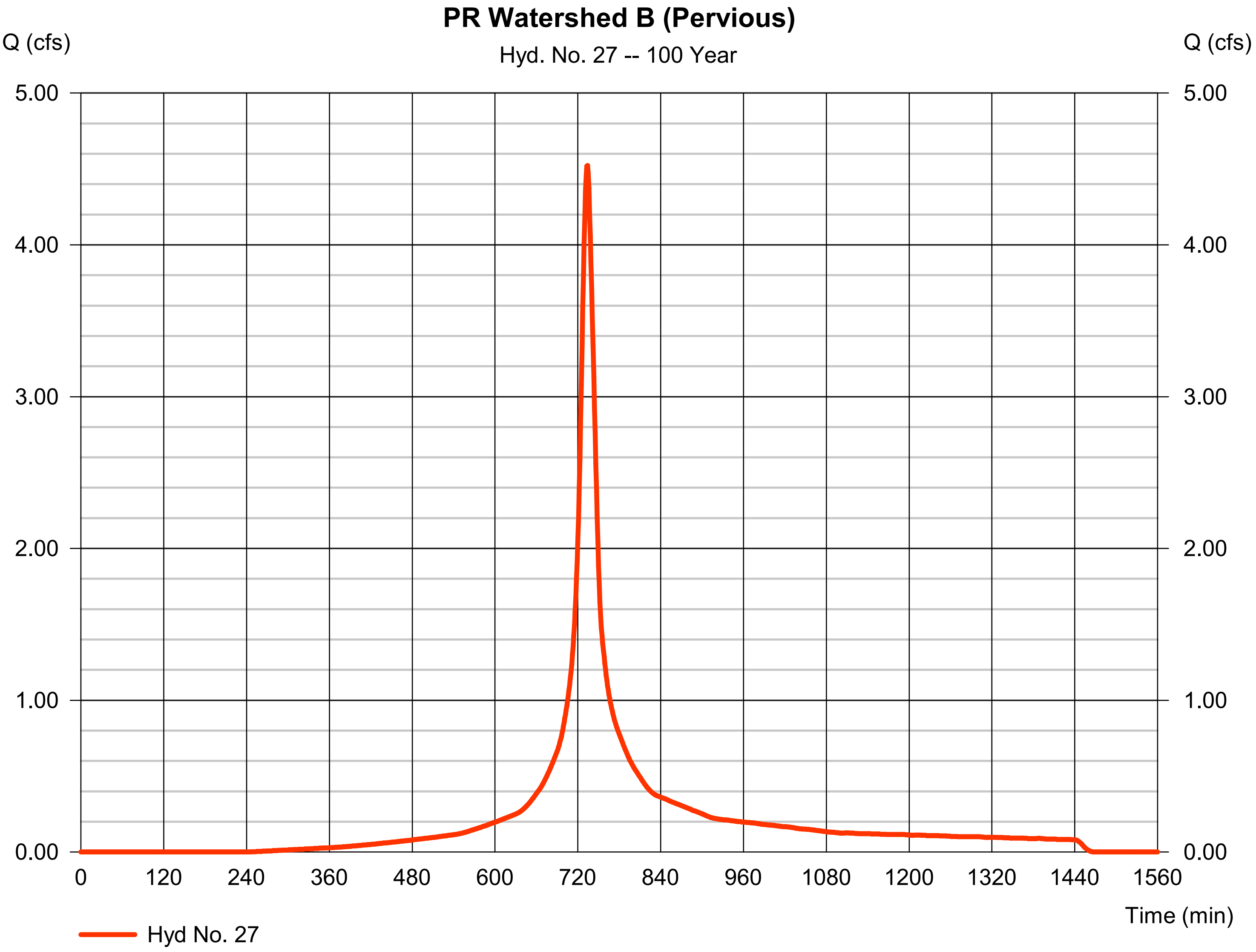
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 27

PR Watershed B (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.524 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 20,557 cuft
Drainage area	= 0.860 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 8.84 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor	Shape factor	= 484

* Composite (Area/CN) = [(0.700 x 80) + (0.020 x 77) + (0.140 x 91)] / 0.860



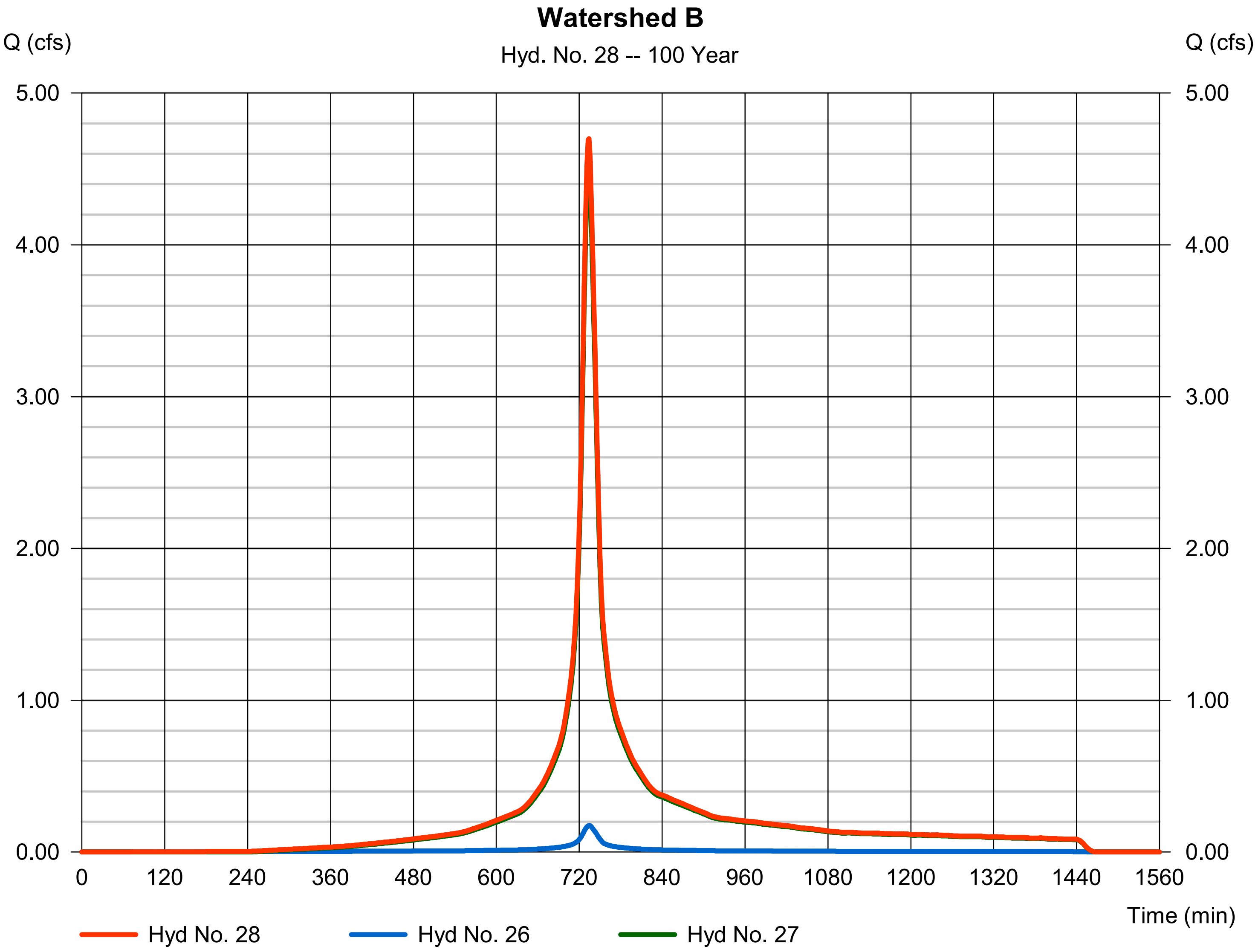
Hydrograph Report

Hyd. No. 28

Watershed B

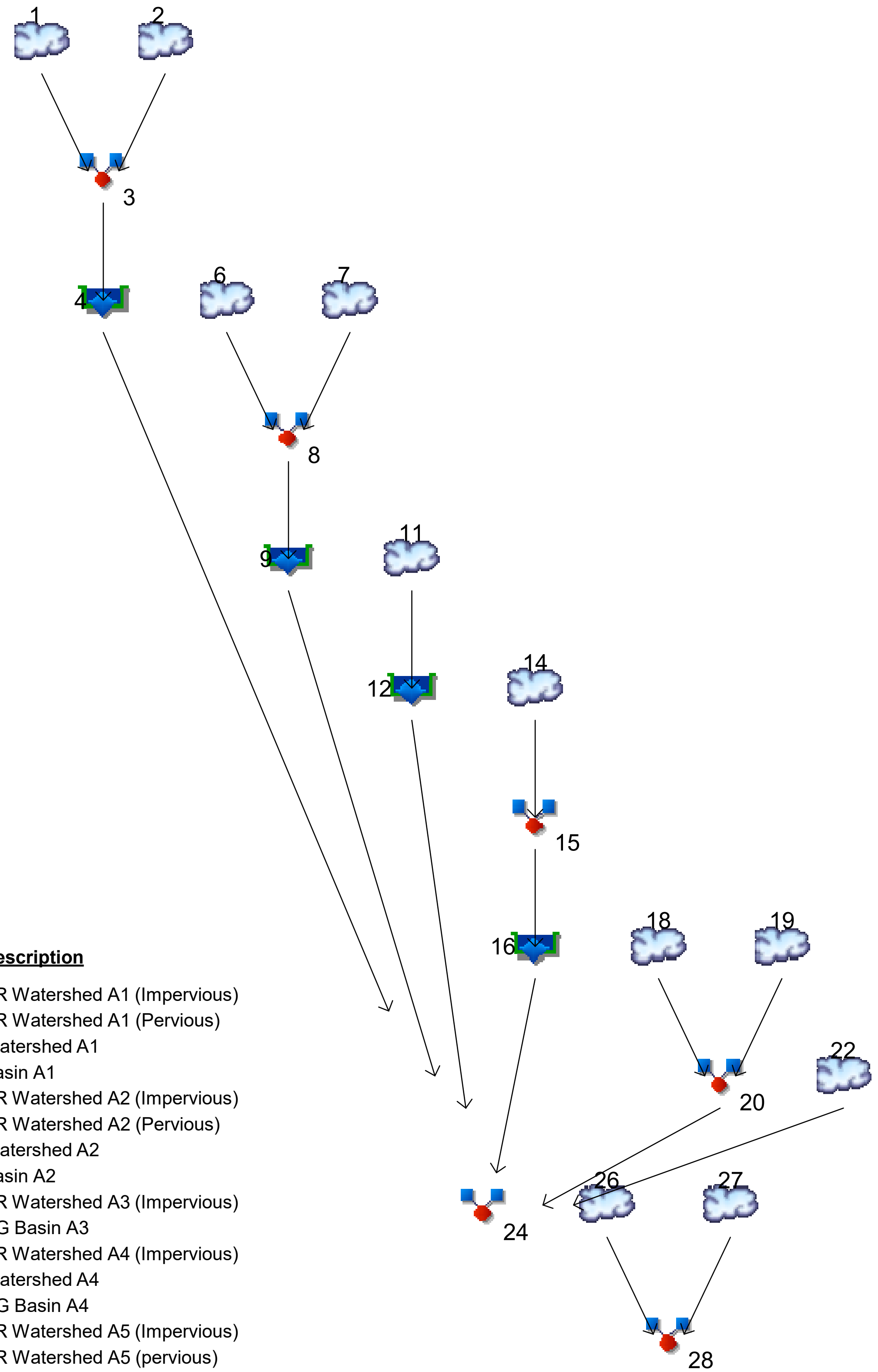
Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 26, 27

Peak discharge = 4.699 cfs
Time to peak = 734 min
Hyd. volume = 21,493 cuft
Contrib. drain. area = 0.890 ac



Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022



Legend

Hyd.	Origin	Description
1	SCS Runoff	PR Watershed A1 (Impervious)
2	SCS Runoff	PR Watershed A1 (Pervious)
3	Combine	Watershed A1
4	Reservoir	Basin A1
6	SCS Runoff	PR Watershed A2 (Impervious)
7	SCS Runoff	PR Watershed A2 (Pervious)
8	Combine	Watershed A2
9	Reservoir	Basin A2
11	SCS Runoff	PR Watershed A3 (Impervious)
12	Reservoir	UG Basin A3
14	SCS Runoff	PR Watershed A4 (Impervious)
15	Combine	Watershed A4
16	Reservoir	UG Basin A4
18	SCS Runoff	PR Watershed A5 (Impervious)
19	SCS Runoff	PR Watershed A5 (pervious)
20	Combine	PR Watershed A5
22	SCS Runoff	PR Watershed A6
24	Combine	Watershed A POA
26	SCS Runoff	PR Watershed B (Impervious)
27	SCS Runoff	PR Watershed B (Pervious)
28	Combine	Watershed B

Project: Proposed Hydrographs_Future Precipitation.gpw

Friday, 05 / 5 / 2023

Hydraflow Table of Contents

100 - Year

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

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	4.609	1	727	17,450	------	------	------	PR Watershed A1 (Impervious)
2	SCS Runoff	1.411	1	733	6,004	------	------	------	PR Watershed A1 (Pervious)
3	Combine	5.785	1	728	23,454	1, 2	------	------	Watershed A1
4	Reservoir	0.856	1	773	14,168	3	49.07	13,228	Basin A1
6	SCS Runoff	6.703	1	727	25,382	------	------	------	PR Watershed A2 (Impervious)
7	SCS Runoff	0.902	1	732	3,653	------	------	------	PR Watershed A2 (Pervious)
8	Combine	7.488	1	728	29,034	6, 7	------	------	Watershed A2
9	Reservoir	0.917	1	778	17,473	8	49.15	17,284	Basin A2
11	SCS Runoff	7.681	1	727	29,083	------	------	------	PR Watershed A3 (Impervious)
12	Reservoir	0.306	1	798	2,264	11	50.10	13,755	UG Basin A3
14	SCS Runoff	5.481	1	727	20,755	------	------	------	PR Watershed A4 (Impervious)
15	Combine	5.481	1	727	20,755	14	------	------	Watershed A4
16	Reservoir	0.393	1	761	1,571	15	52.12	7,729	UG Basin A4
18	SCS Runoff	3.109	1	728	12,474	------	------	------	PR Watershed A5 (Impervious)
19	SCS Runoff	0.168	1	729	586	------	------	------	PR Watershed A5 (pervious)
20	Combine	3.276	1	728	13,060	18, 19	------	------	PR Watershed A5
22	SCS Runoff	1.292	1	735	5,930	------	------	------	PR Watershed A6
24	Combine	5.592	1	730	54,466	4, 9, 12, 16, 20, 22,	------	------	Watershed A POA
26	SCS Runoff	0.078	1	734	407	------	------	------	PR Watershed B (Impervious)
27	SCS Runoff	1.531	1	734	6,720	------	------	------	PR Watershed B (Pervious)
28	Combine	1.609	1	734	7,127	26, 27	------	------	Watershed B

Proposed Hydrographs_Future Precipitation.gpw	Return Period: 2 Year	Friday, 05 / 5 / 2023

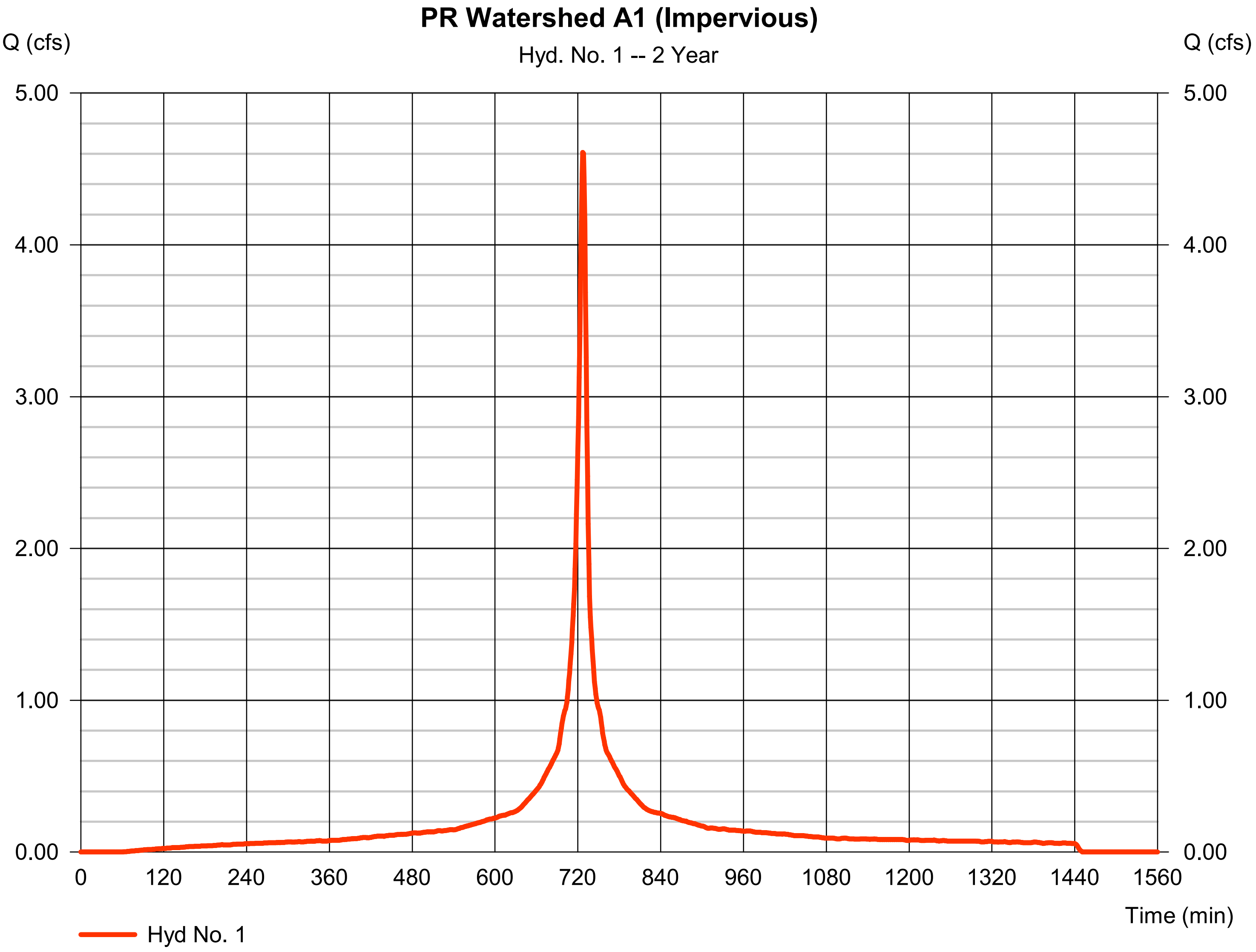
Hydrograph Report

Hyd. No. 1

PR Watershed A1 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.320 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 4.609 cfs
Time to peak = 727 min
Hyd. volume = 17,450 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

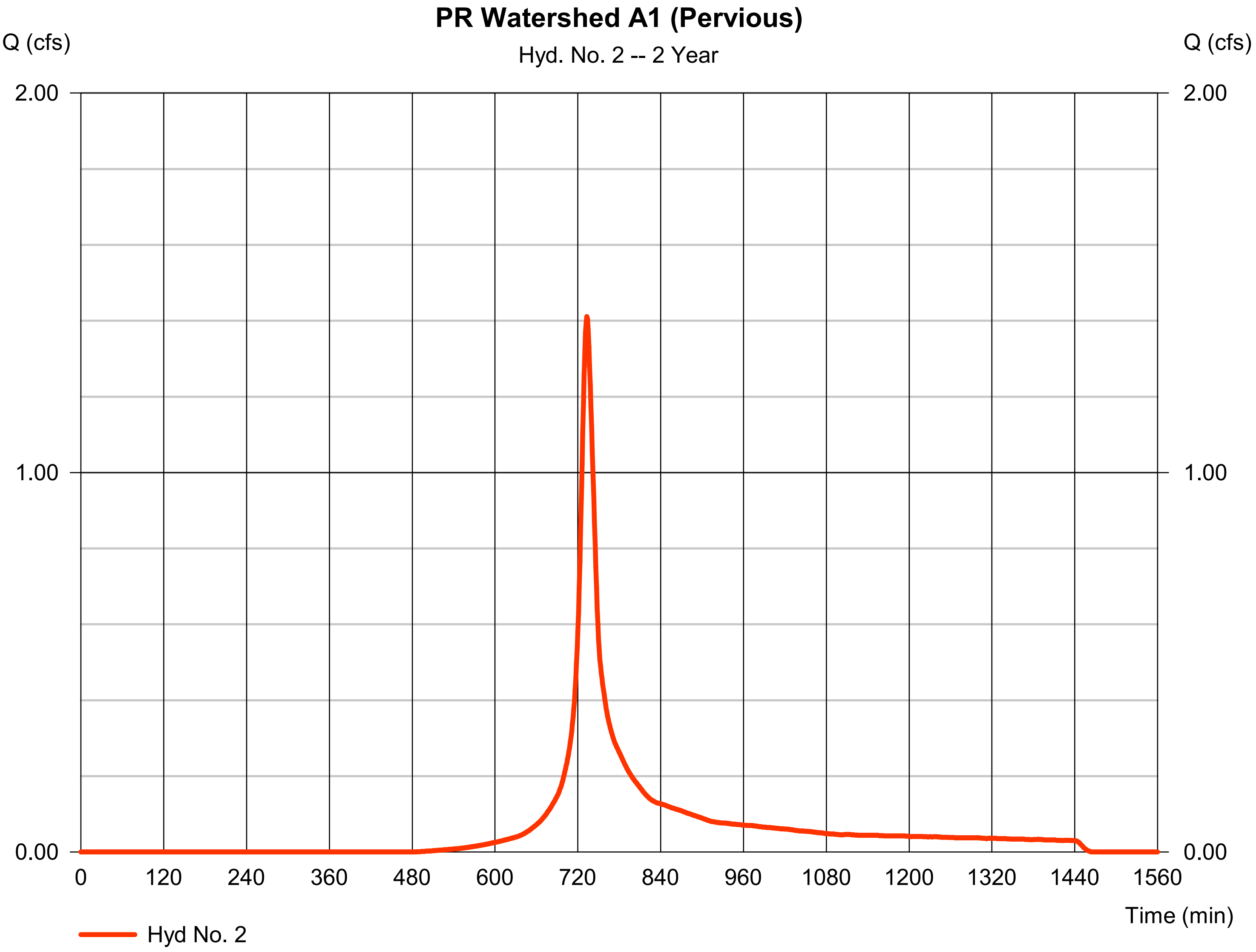
Hyd. No. 2

PR Watershed A1 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 1.411 cfs
Time to peak = 733 min
Hyd. volume = 6,004 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 16.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.790 x 80) + (0.020 x 91)] / 0.810

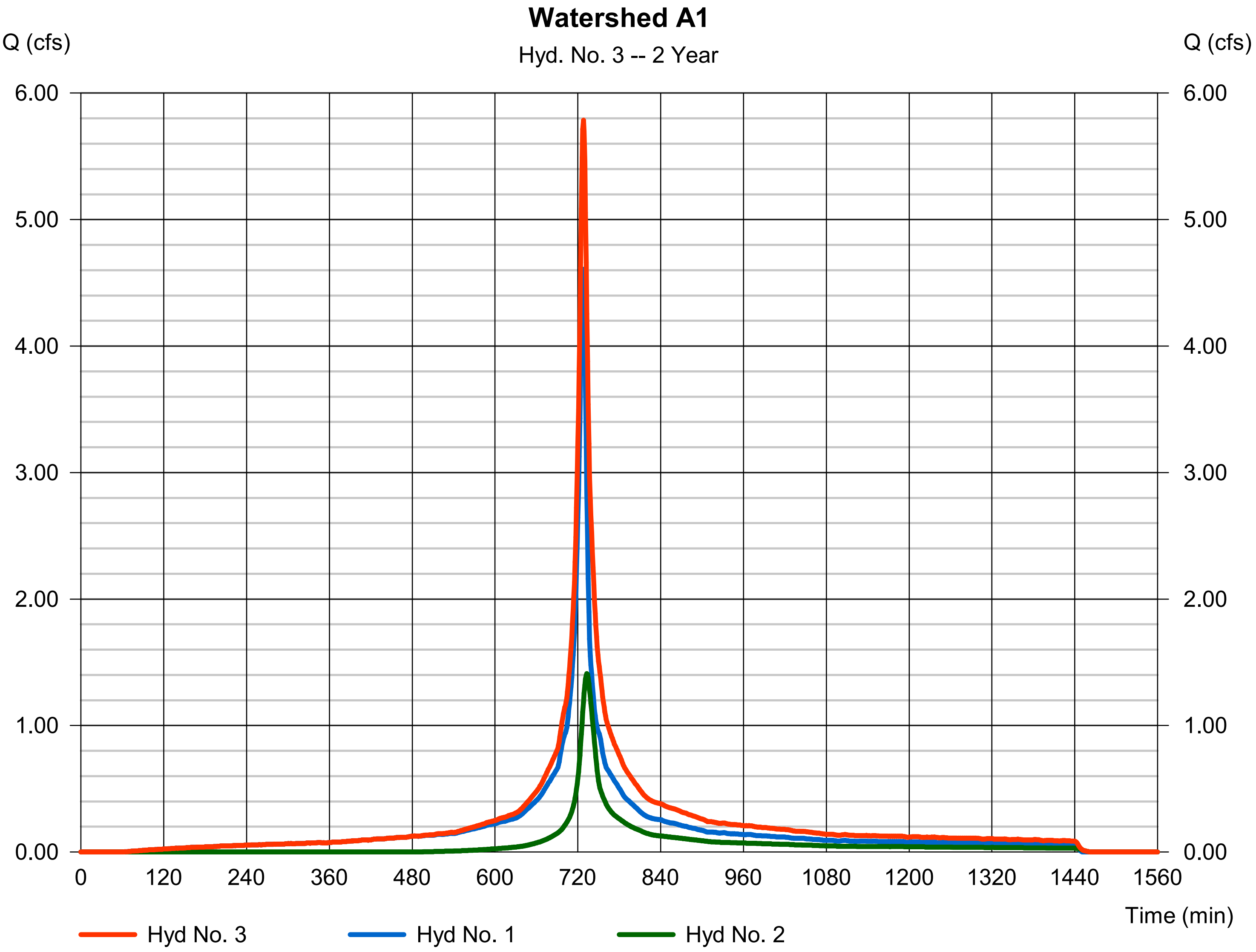


Hydrograph Report

Hyd. No. 3

Watershed A1

Hydrograph type	= Combine	Peak discharge	= 5.785 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 23,454 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.130 ac



Hydrograph Report

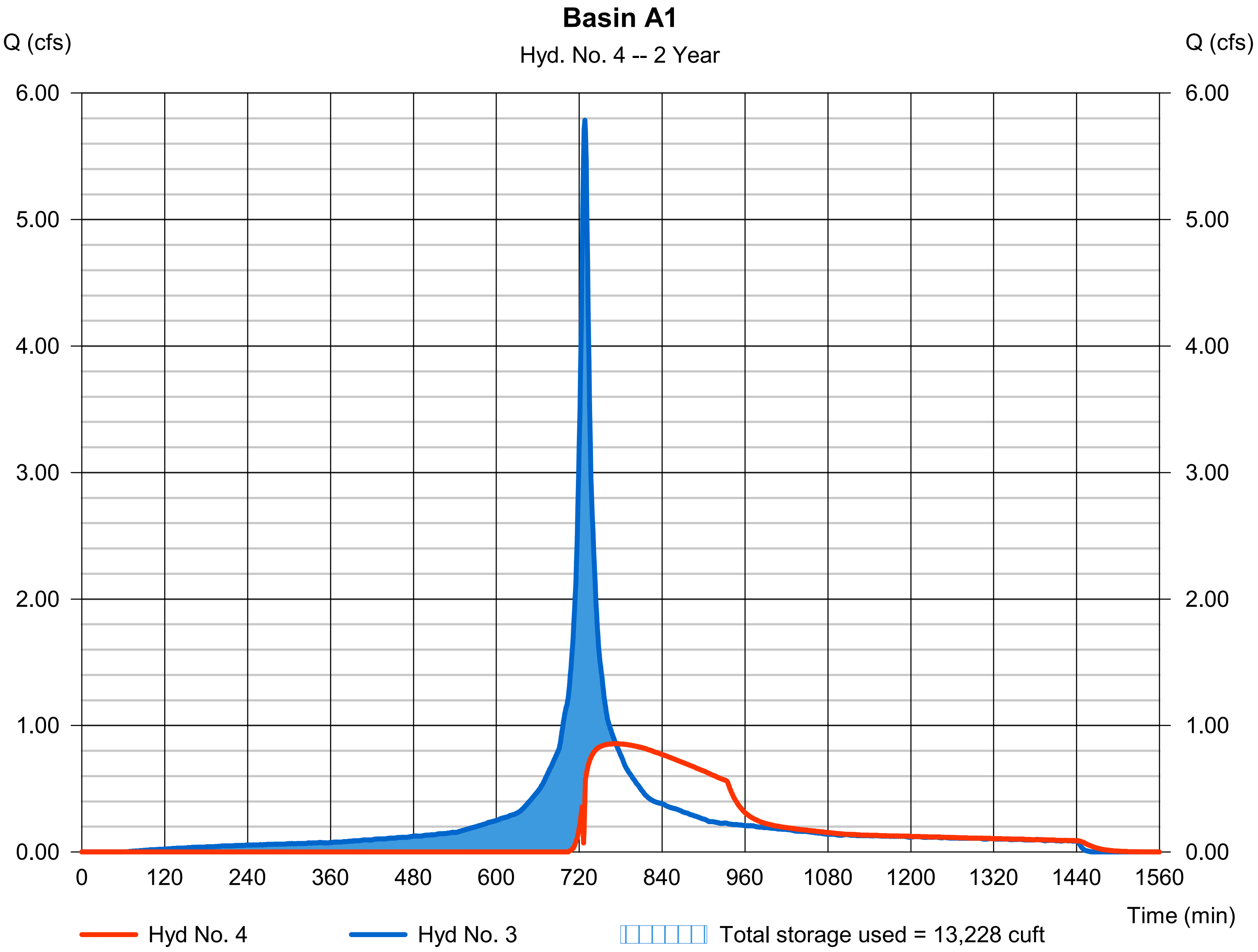
Hyd. No. 4

Basin A1

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyd. No. = 3 - Watershed A1
Reservoir name = Basin A1

Peak discharge = 0.856 cfs
Time to peak = 773 min
Hyd. volume = 14,168 cuft
Max. Elevation = 49.07 ft
Max. Storage = 13,228 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Basin A1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 47.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	47.00	5,443	0	0
1.00	48.00	6,344	5,887	5,887
2.00	49.00	7,260	6,796	12,683
3.00	50.00	8,216	7,732	20,416
4.00	51.00	9,219	8,712	29,127

Culvert / Orifice Structures

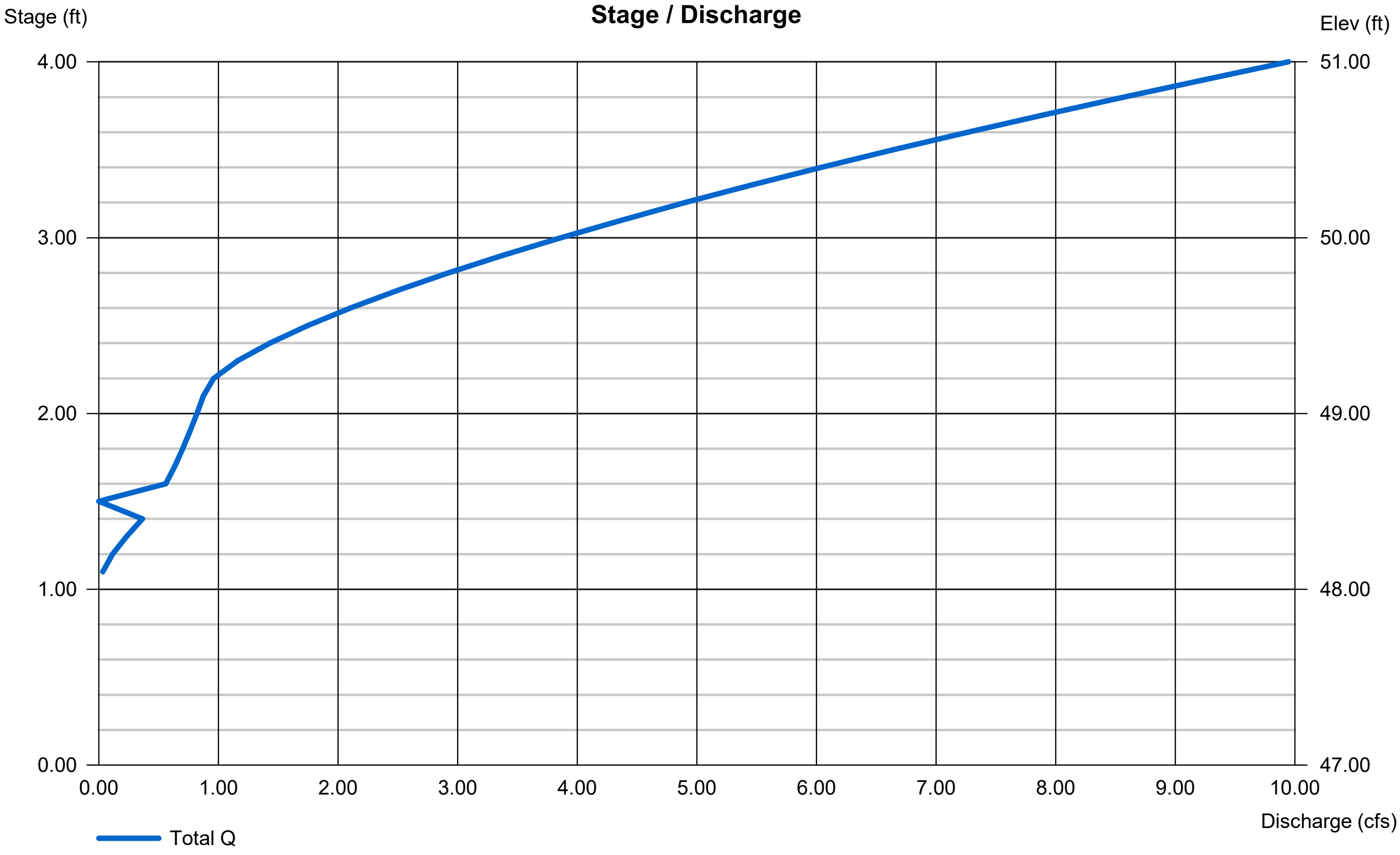
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	6.00	0.00	0.00
Span (in)	= 24.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 43.81	48.00	0.00	0.00
Length (ft)	= 5.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.00	Inactive	0.00	0.00
Crest El. (ft)	= 49.15	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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



Hydrograph Report

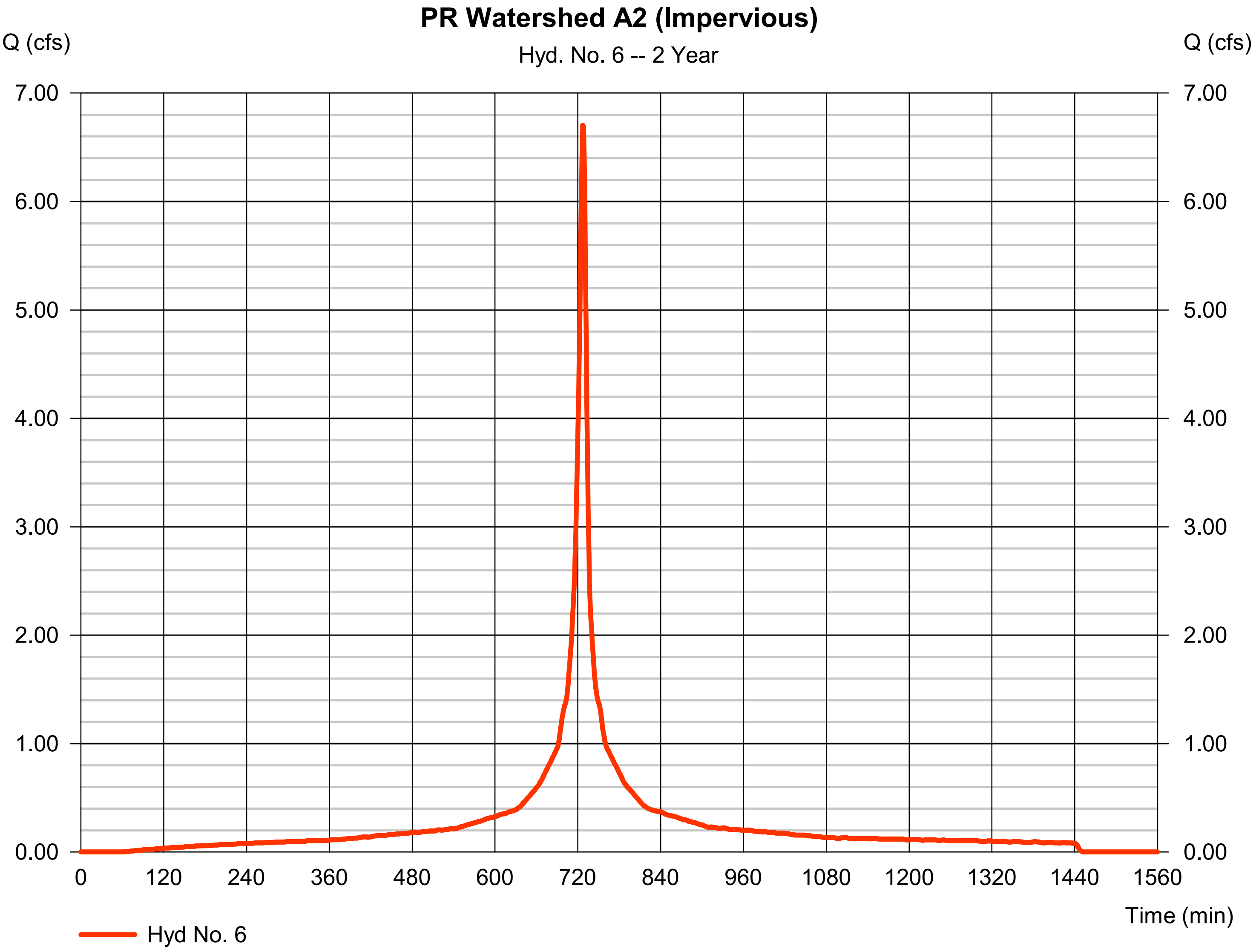
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 6

PR Watershed A2 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.920 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851301\Project Data_Discipline\Site Civil\Storr

Peak discharge = 6.703 cfs
Time to peak = 727 min
Hyd. volume = 25,382 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

Hyd. No. 7

PR Watershed A2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.480 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 0.902 cfs
Time to peak = 732 min
Hyd. volume = 3,653 cuft
Curve number = 81*
Hydraulic length = 0 ft
Time of conc. (Tc) = 14.00 min
Distribution = Custom
Shape factor = 484

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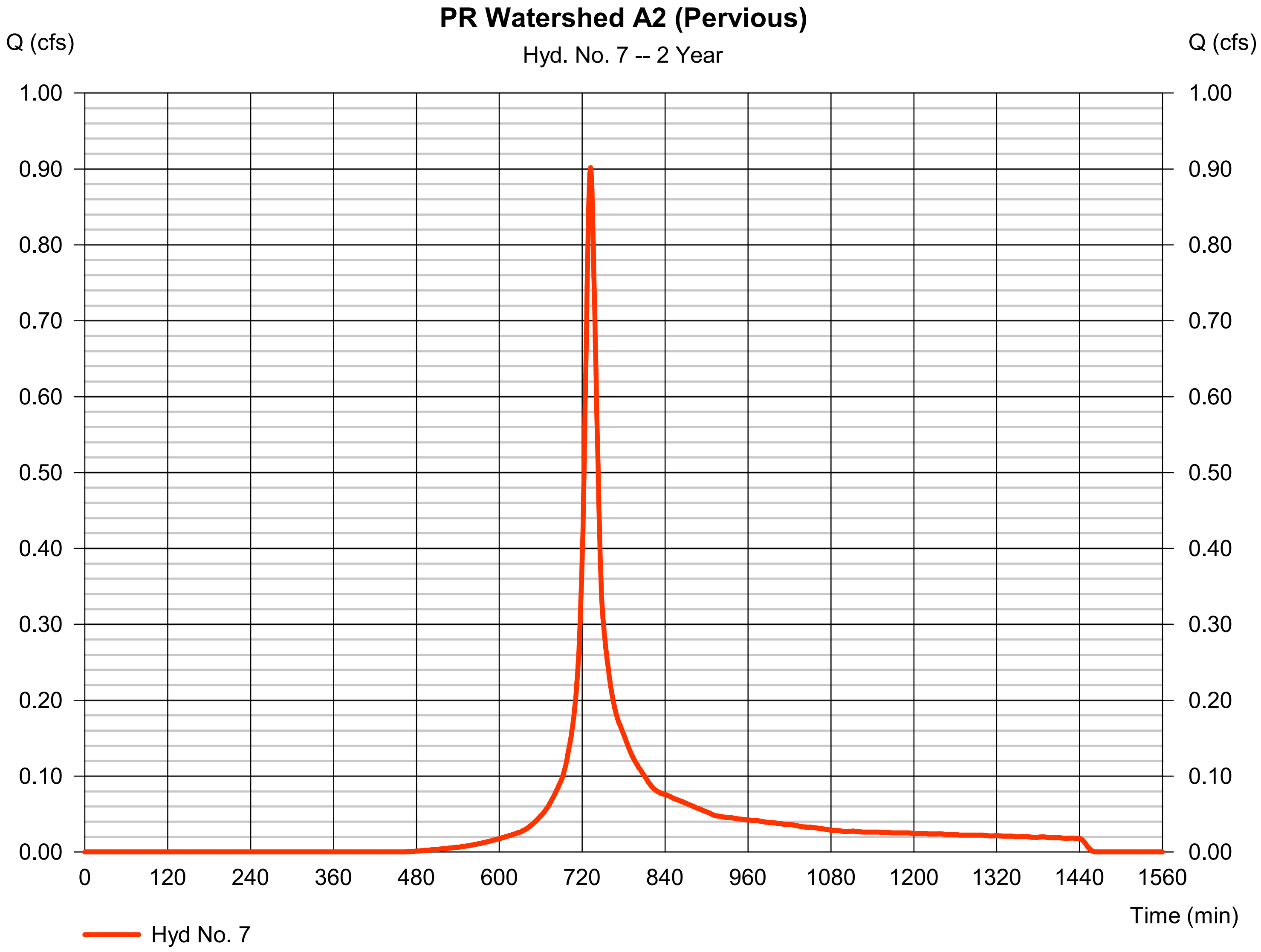
* Composite (Area/CN) = [(0.390 x 80) + (0.050 x 91)] / 0.480

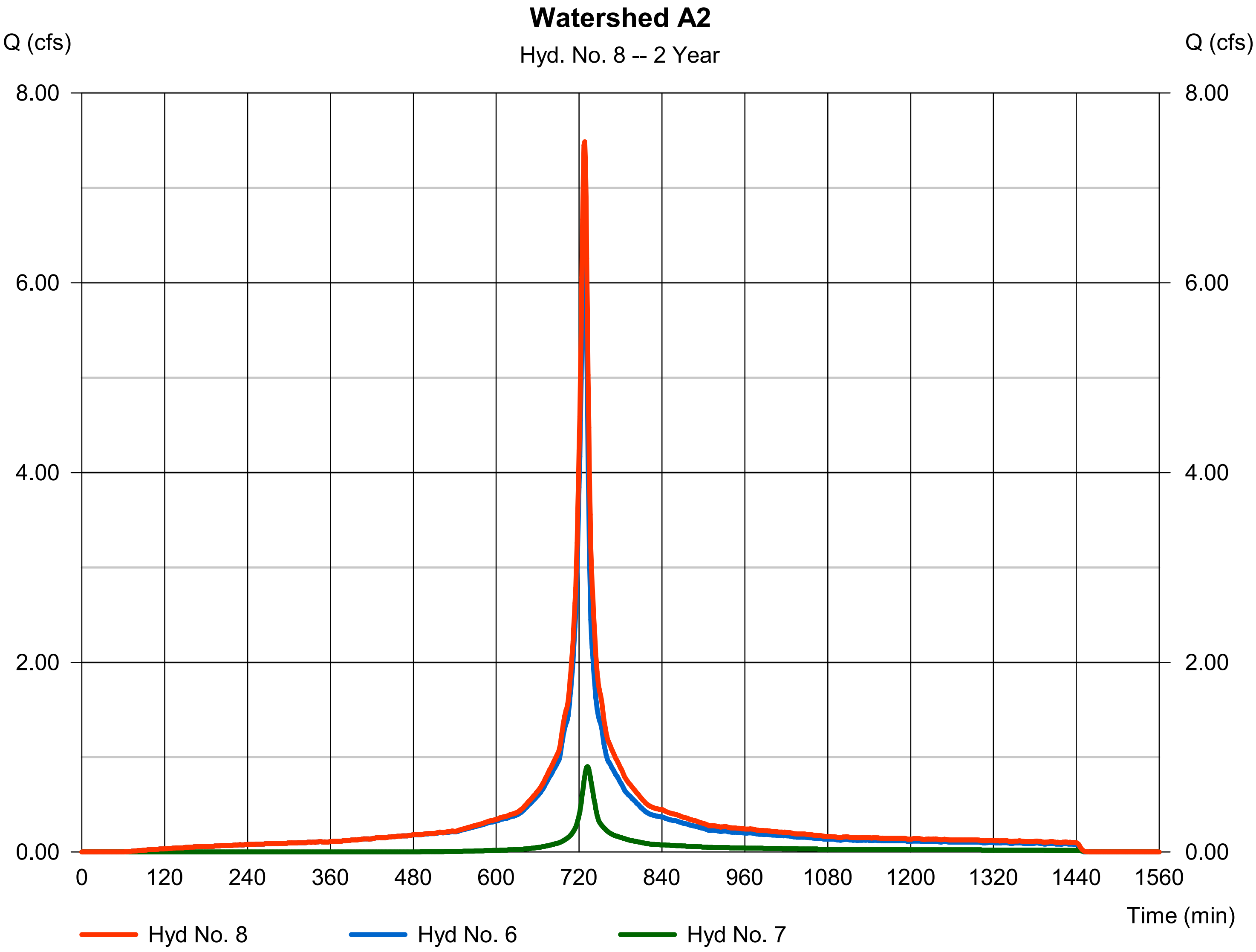


Hydrograph Report

Hyd. No. 8

Watershed A2

Hydrograph type	= Combine	Peak discharge	= 7.488 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 29,034 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 2.400 ac



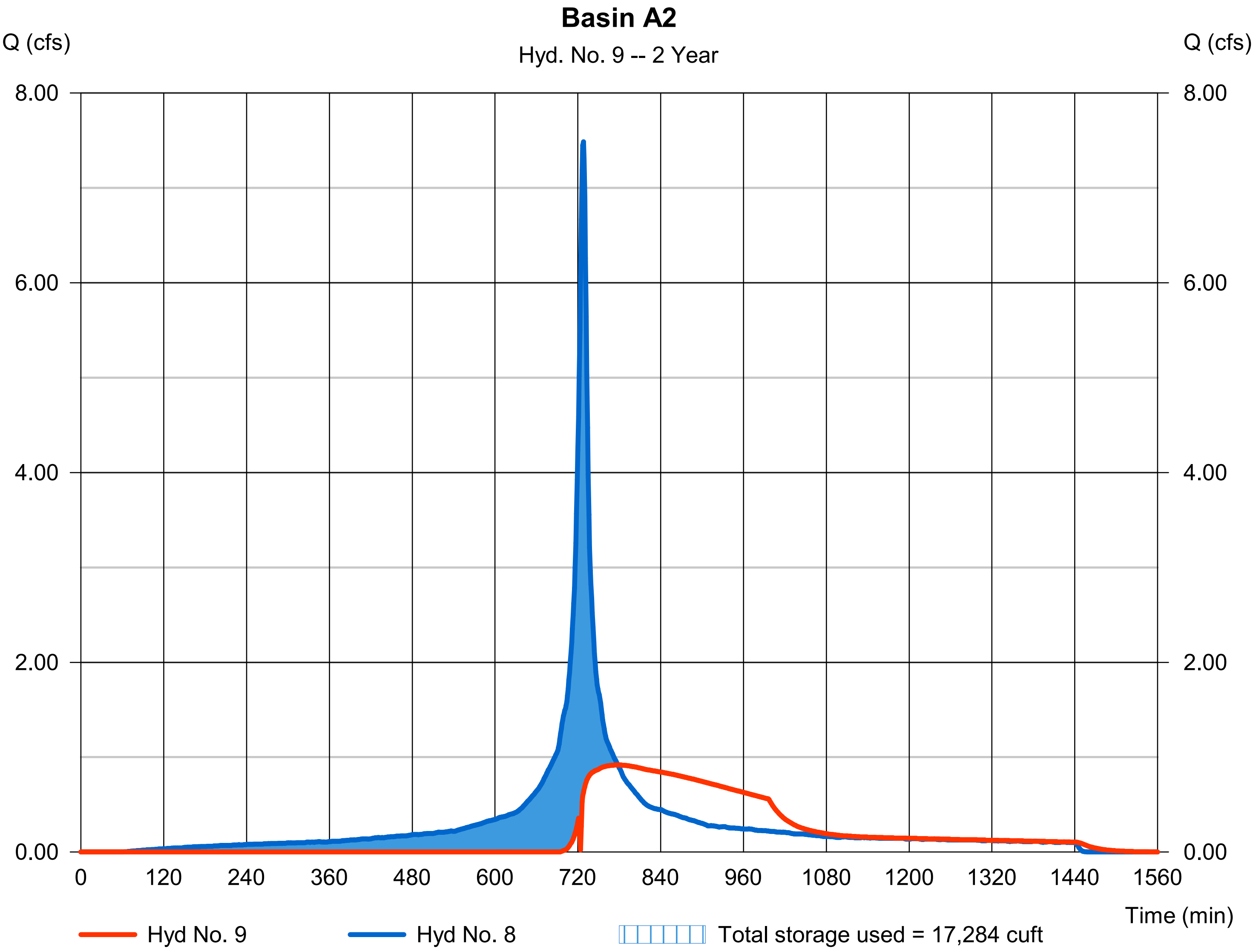
Hydrograph Report

Hyd. No. 9

Basin A2

Hydrograph type	= Reservoir	Peak discharge	= 0.917 cfs
Storm frequency	= 2 yrs	Time to peak	= 778 min
Time interval	= 1 min	Hyd. volume	= 17,473 cuft
Inflow hyd. No.	= 8 - Watershed A2	Max. Elevation	= 49.15 ft
Reservoir name	= Basin A2	Max. Storage	= 17,284 cuft

Storage Indication method used.



Pond Report

Pond No. 5 - Basin A2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 47.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	47.00	6,733	0	0
1.00	48.00	7,912	7,314	7,314
2.00	49.00	9,088	8,492	15,806
3.00	50.00	10,268	9,671	25,477
4.00	51.00	11,468	10,861	36,339

Culvert / Orifice Structures

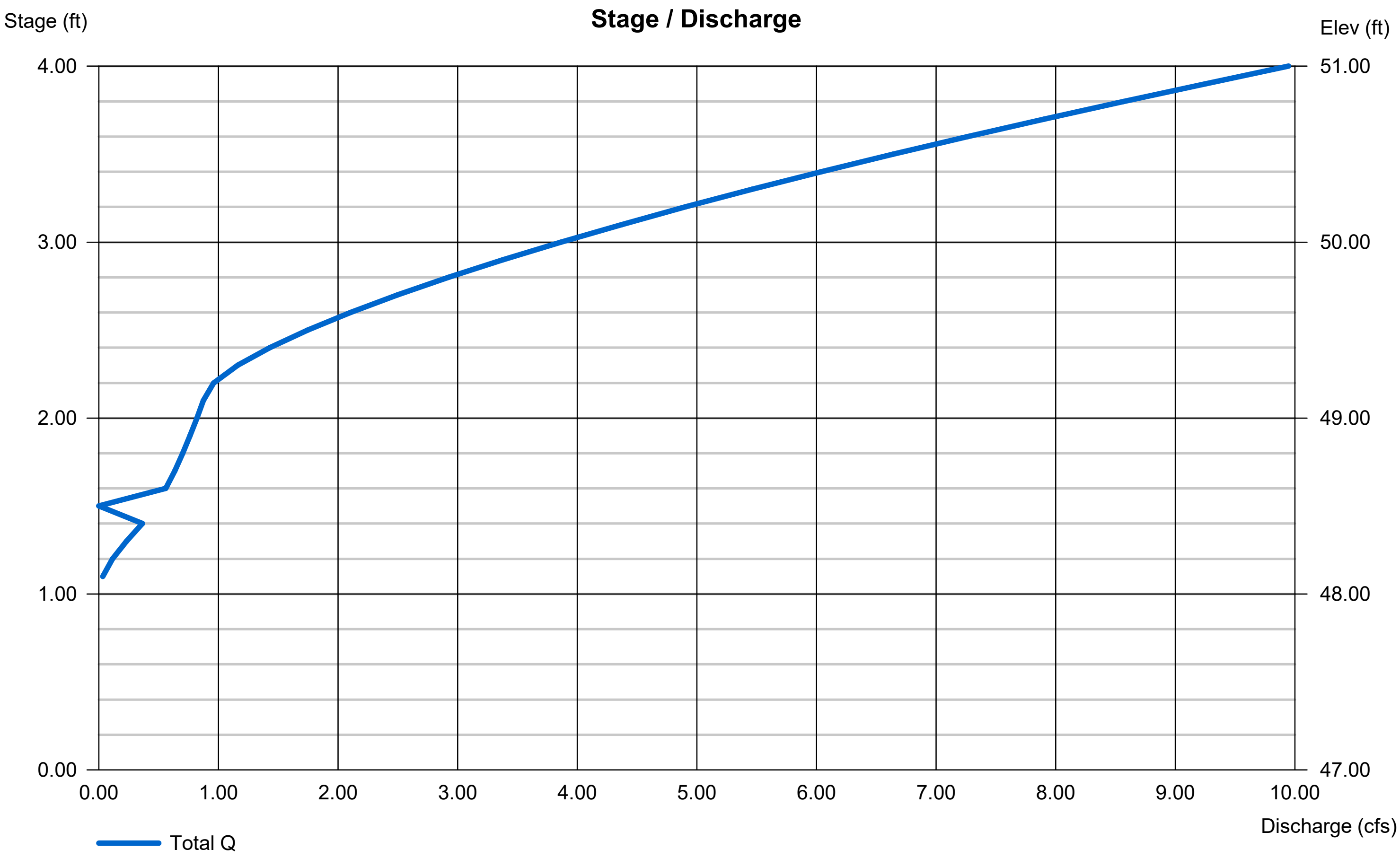
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	6.00	0.00	0.00
Span (in)	= 24.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 43.83	48.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.00	0.00	0.00	0.00
Crest El. (ft)	= 49.15	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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



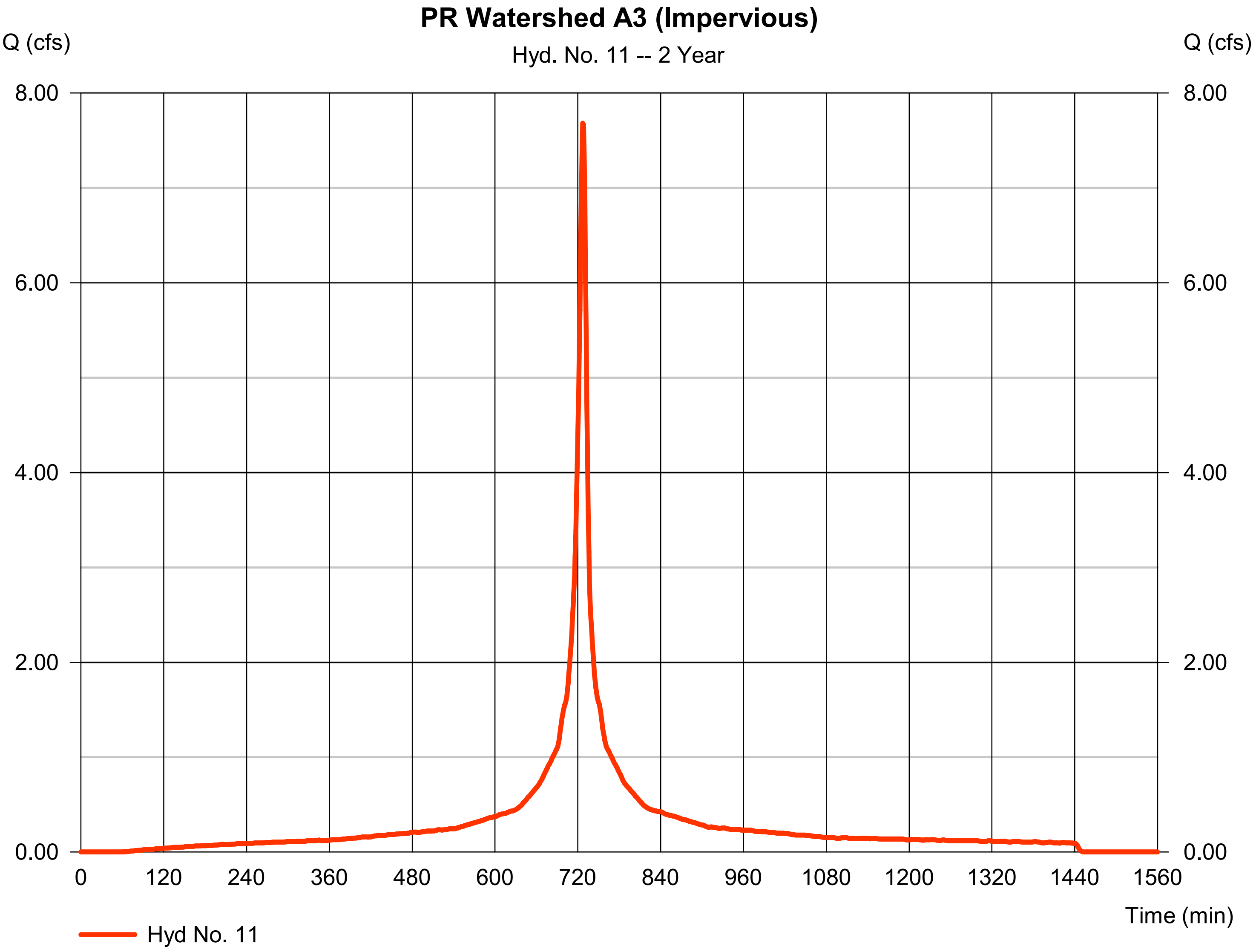
Hydrograph Report

Hyd. No. 11

PR Watershed A3 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 2.200 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 7.681 cfs
Time to peak = 727 min
Hyd. volume = 29,083 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

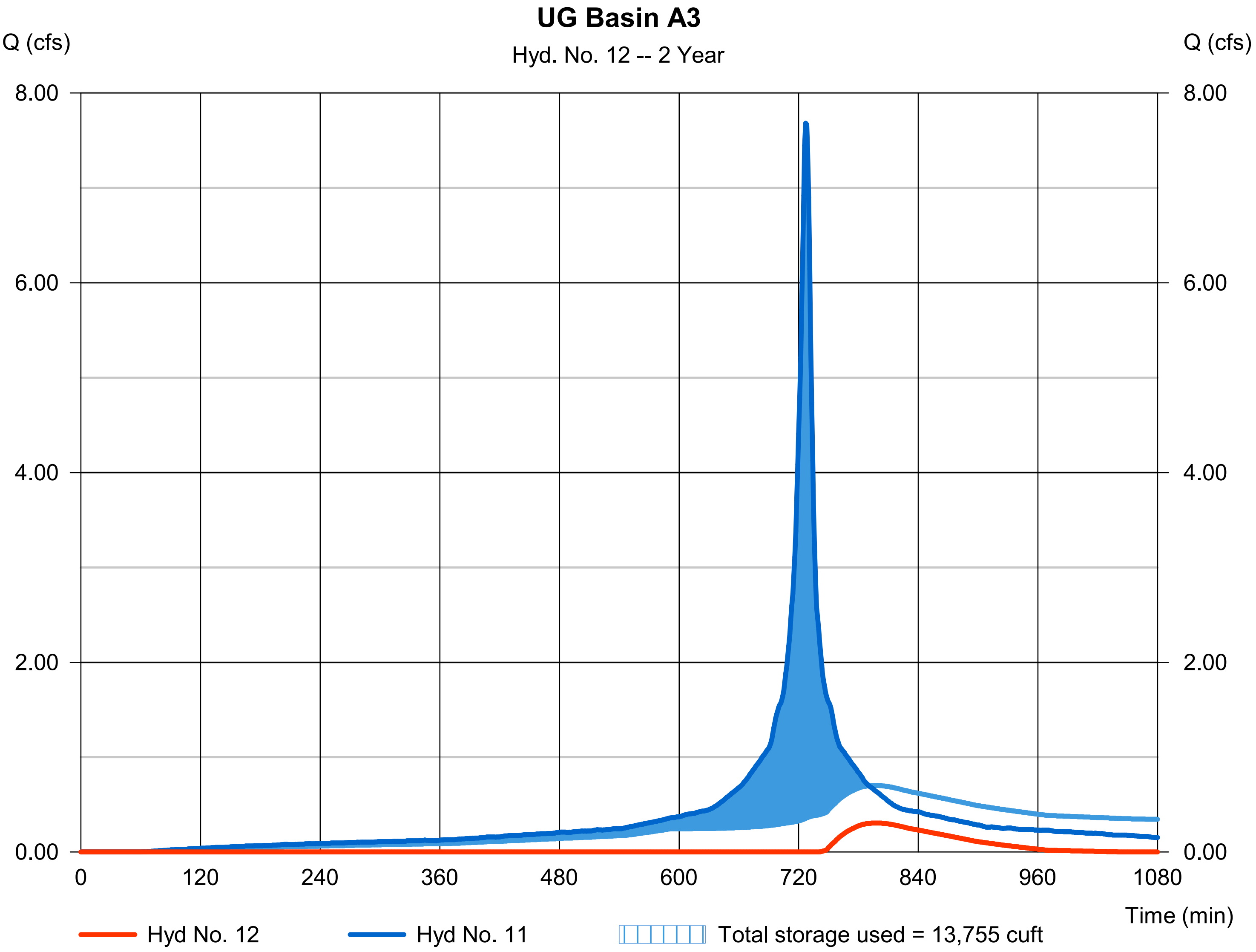
Hyd. No. 12

UG Basin A3

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyd. No. = 11 - PR Watershed A3 (Impervious)
Reservoir name = UG Detention A3

Peak discharge = 0.306 cfs
Time to peak = 798 min
Hyd. volume = 2,264 cuft
Max. Elevation = 50.10 ft
Max. Storage = 13,755 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 4 - UG Detention A3

Pond Data

UG Chambers -Invert elev. = 49.50 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 7.12 ft, No. Barrels = 235, Slope = 0.00%, Headers = Yes
Encasement -Invert elev. = 49.00 ft, Width = 4.67 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	49.00	n/a	0	0
0.35	49.35	n/a	2,529	2,529
0.70	49.70	n/a	4,500	7,029
1.05	50.05	n/a	5,940	12,969
1.40	50.40	n/a	5,830	18,799
1.75	50.75	n/a	5,642	24,442
2.10	51.10	n/a	5,361	29,802
2.45	51.45	n/a	4,952	34,755
2.80	51.80	n/a	4,328	39,083
3.15	52.15	n/a	3,049	42,132
3.50	52.50	n/a	2,529	44,661

Culvert / Orifice Structures

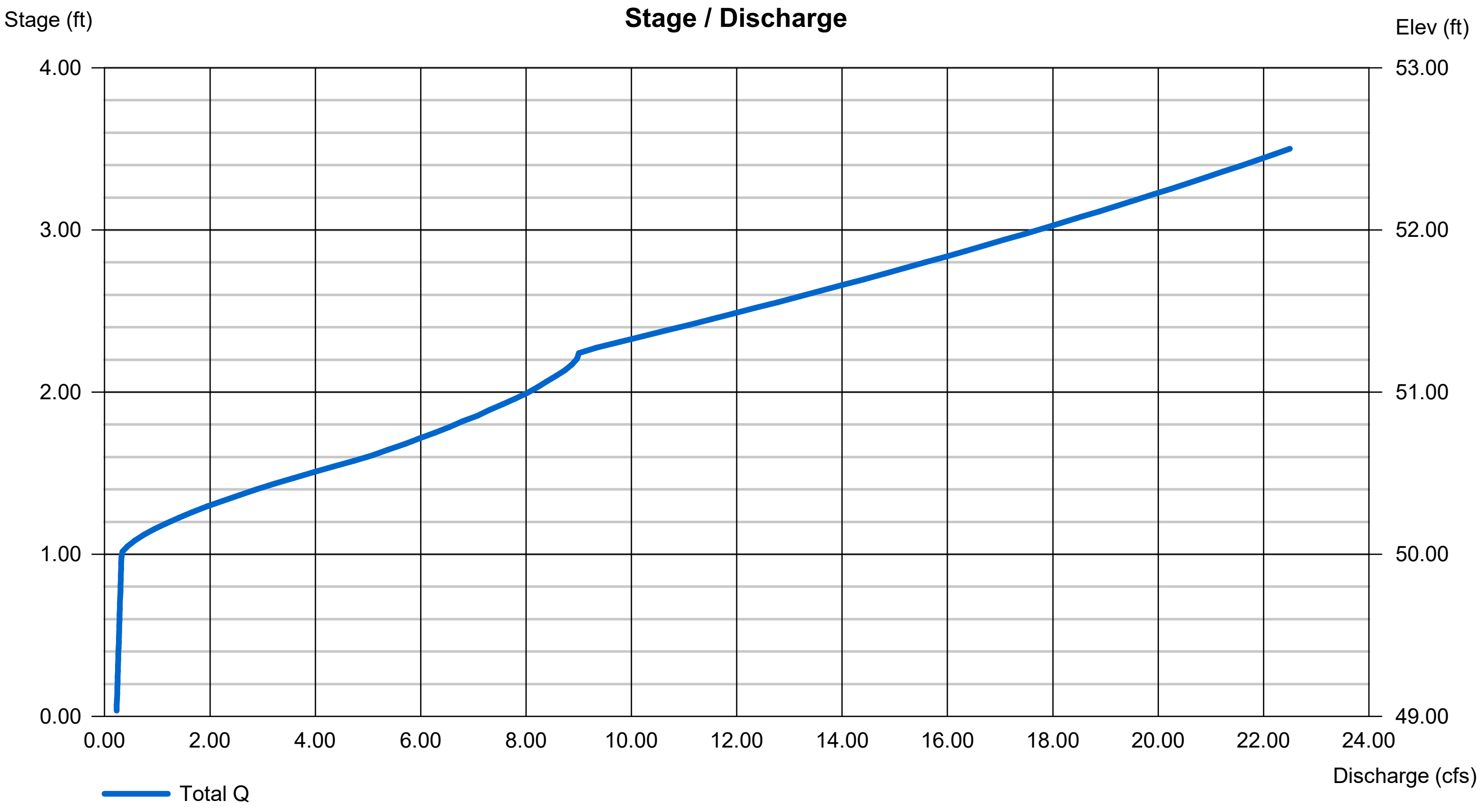
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 49.00	0.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 50.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.750 (by Wet area)
TW Elev. (ft) = 0.00

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



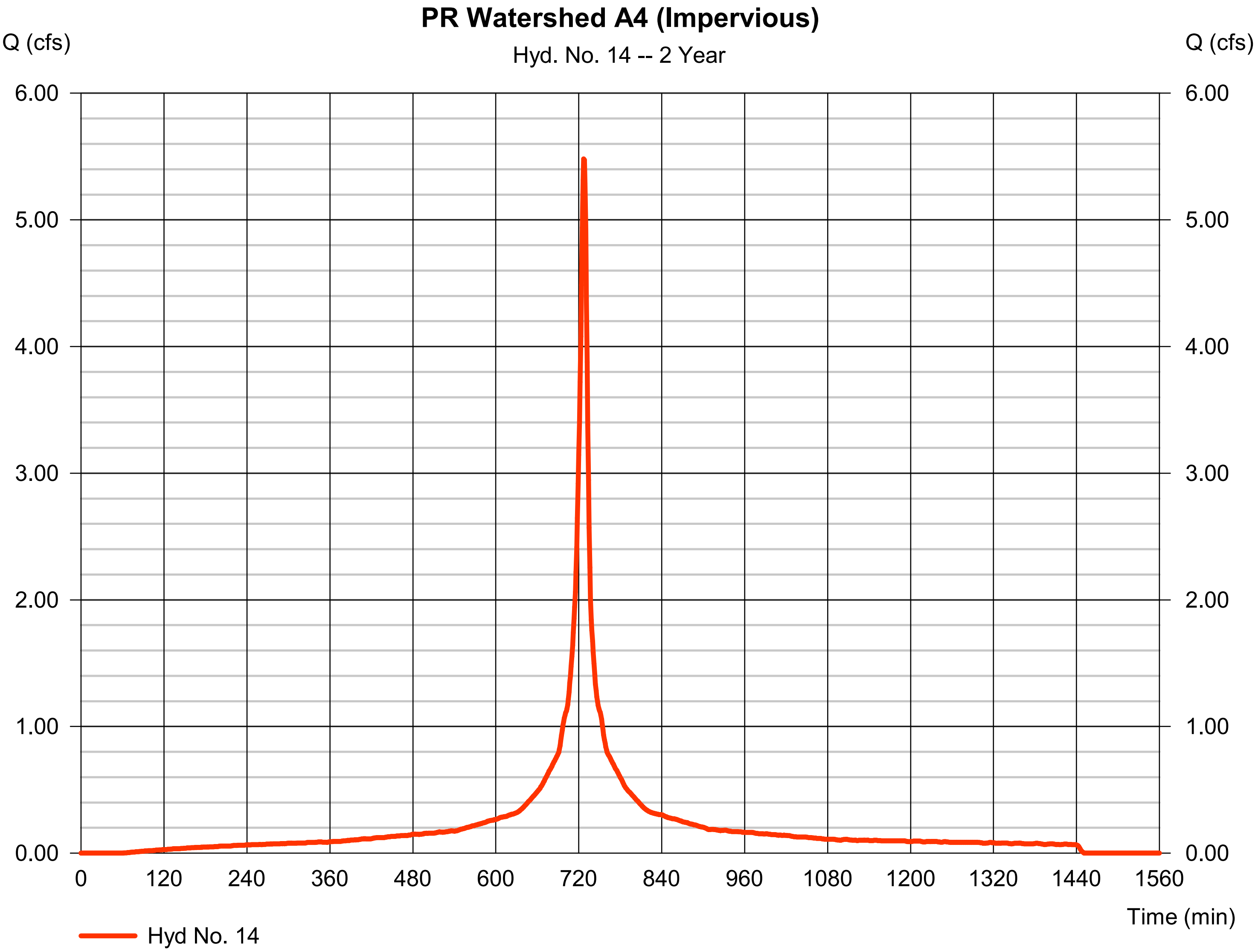
Hydrograph Report

Hyd. No. 14

PR Watershed A4 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.570 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 5.481 cfs
Time to peak = 727 min
Hyd. volume = 20,755 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484

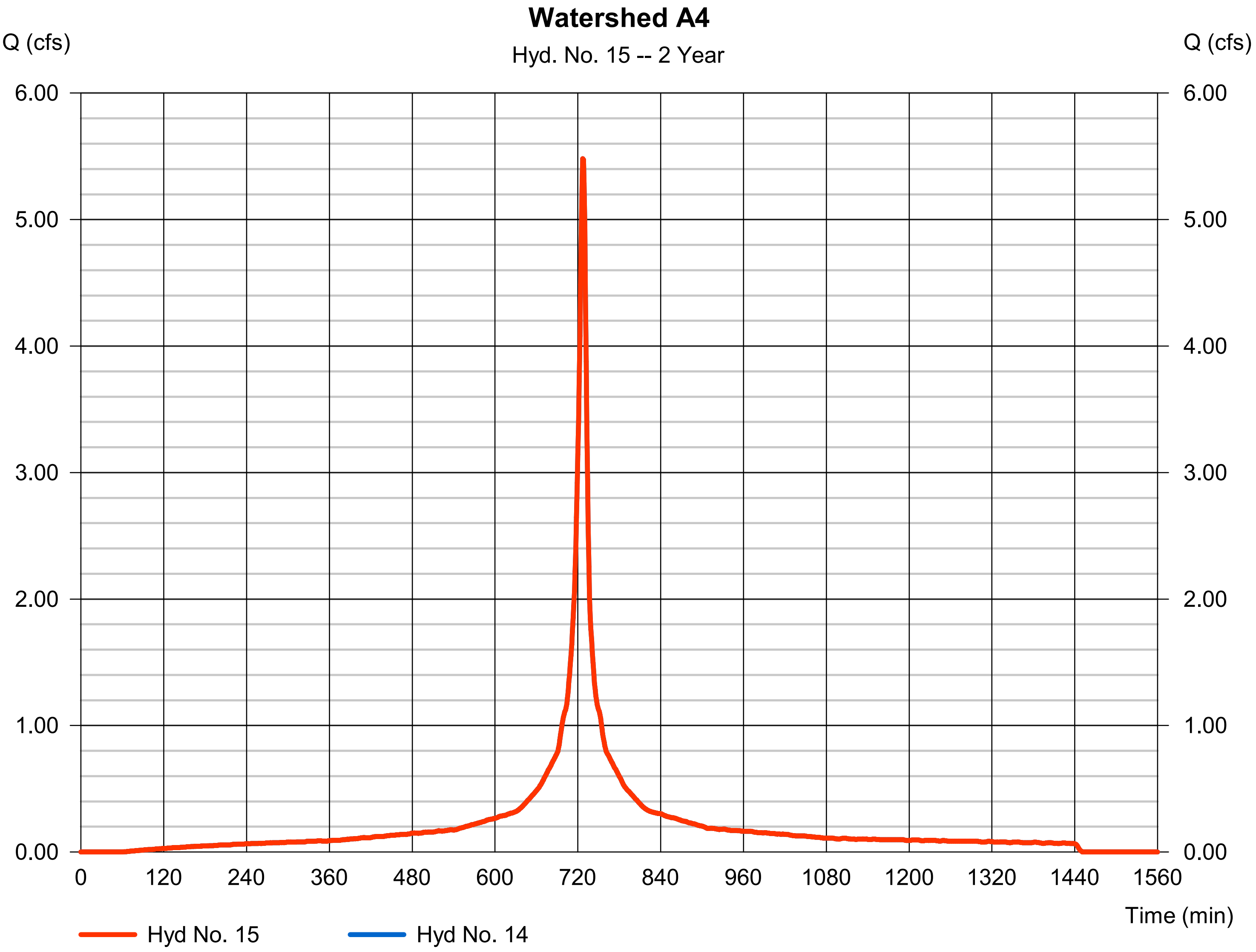


Hydrograph Report

Hyd. No. 15

Watershed A4

Hydrograph type	= Combine	Peak discharge	= 5.481 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 20,755 cuft
Inflow hyds.	= 14	Contrib. drain. area	= 1.570 ac



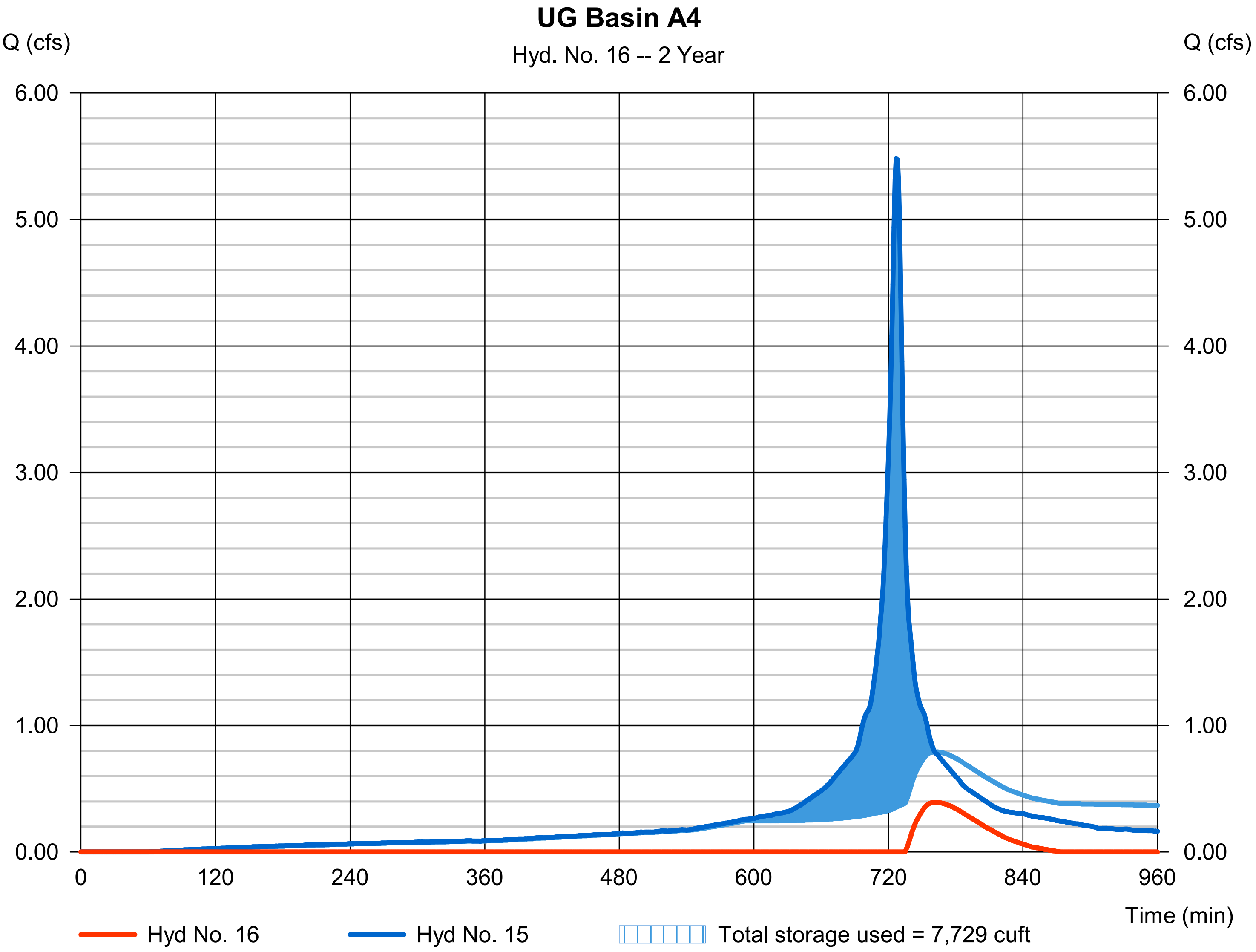
Hydrograph Report

Hyd. No. 16

UG Basin A4

Hydrograph type	= Reservoir	Peak discharge	= 0.393 cfs
Storm frequency	= 2 yrs	Time to peak	= 761 min
Time interval	= 1 min	Hyd. volume	= 1,571 cuft
Inflow hyd. No.	= 15 - Watershed A4	Max. Elevation	= 52.12 ft
Reservoir name	= UG Detention A4	Max. Storage	= 7,729 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 3 - UG Detention A4

Pond Data

UG Chambers -Invert elev. = 51.50 ft, Rise x Span = 1.33 x 2.83 ft, Barrel Len = 7.12 ft, No. Barrels = 429, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 51.00 ft, Width = 3.42 ft, Height = 2.33 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	51.00	n/a	0	0
0.23	51.23	n/a	974	974
0.47	51.47	n/a	974	1,948
0.70	51.70	n/a	2,002	3,950
0.93	51.93	n/a	2,146	6,096
1.17	52.17	n/a	2,073	8,169
1.40	52.40	n/a	1,949	10,118
1.63	52.63	n/a	1,750	11,867
1.86	52.86	n/a	1,342	13,209
2.10	53.10	n/a	974	14,183
2.33	53.33	n/a	974	15,157

Culvert / Orifice Structures

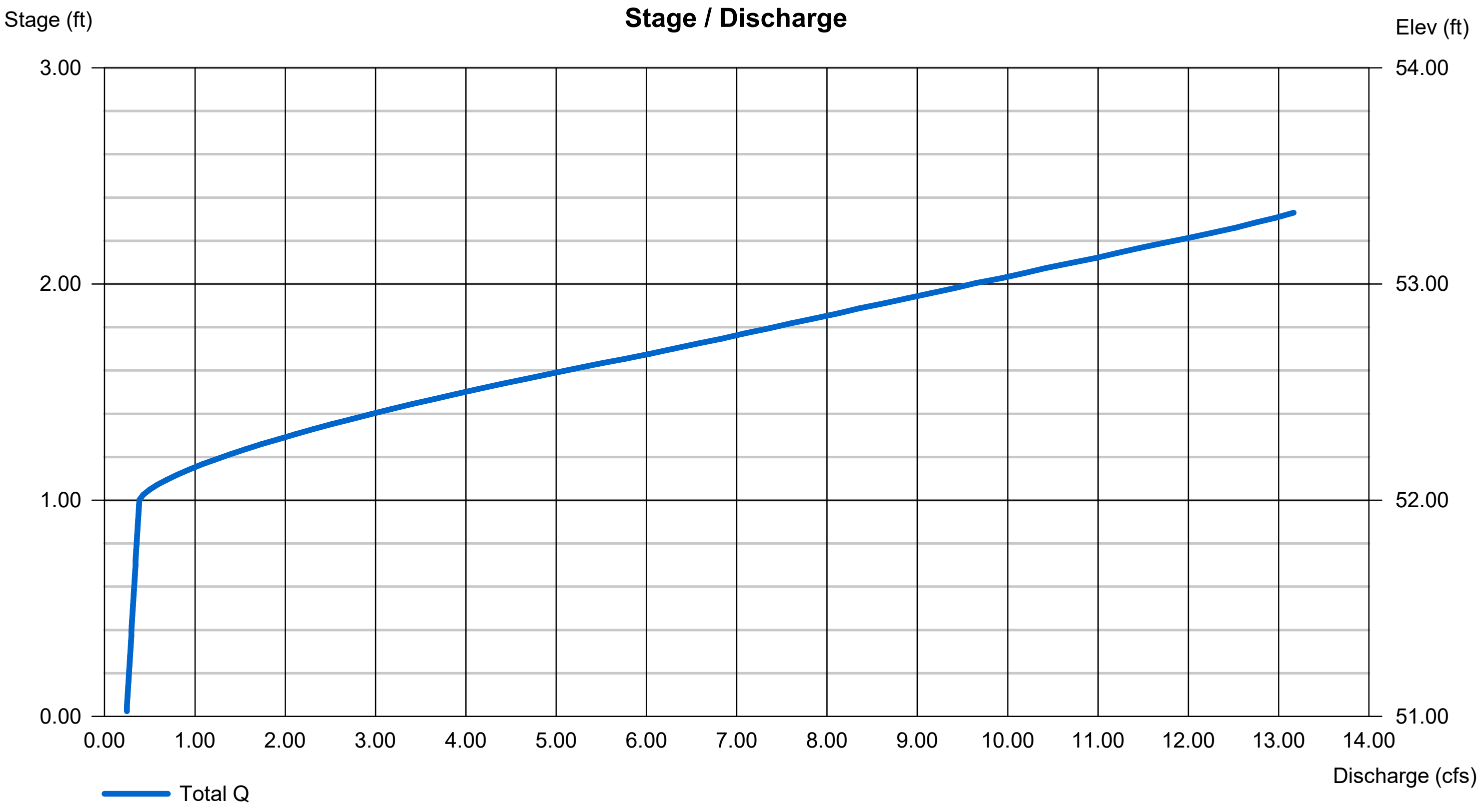
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 51.00	0.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 2.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 52.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 1.000 (by Wet area)
TW Elev. (ft) = 0.00

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



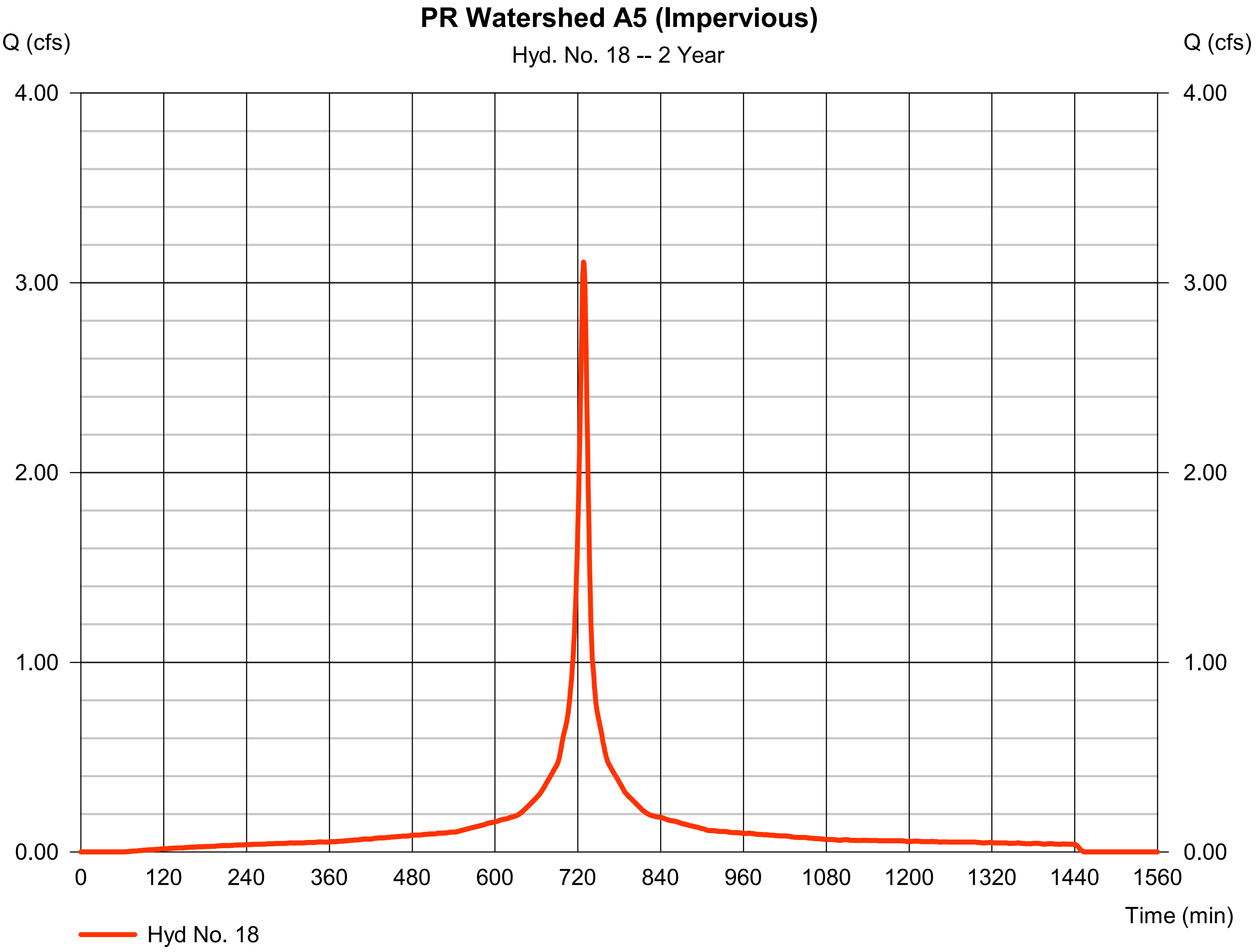
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 18

PR Watershed A5 (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.109 cfs
Storm frequency	=	2 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	12,474 cuft
Drainage area	=	0.920 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	3.97 in	Distribution	=	Custom
Storm duration	=	\\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr	Shape factor	=	484



Hydrograph Report

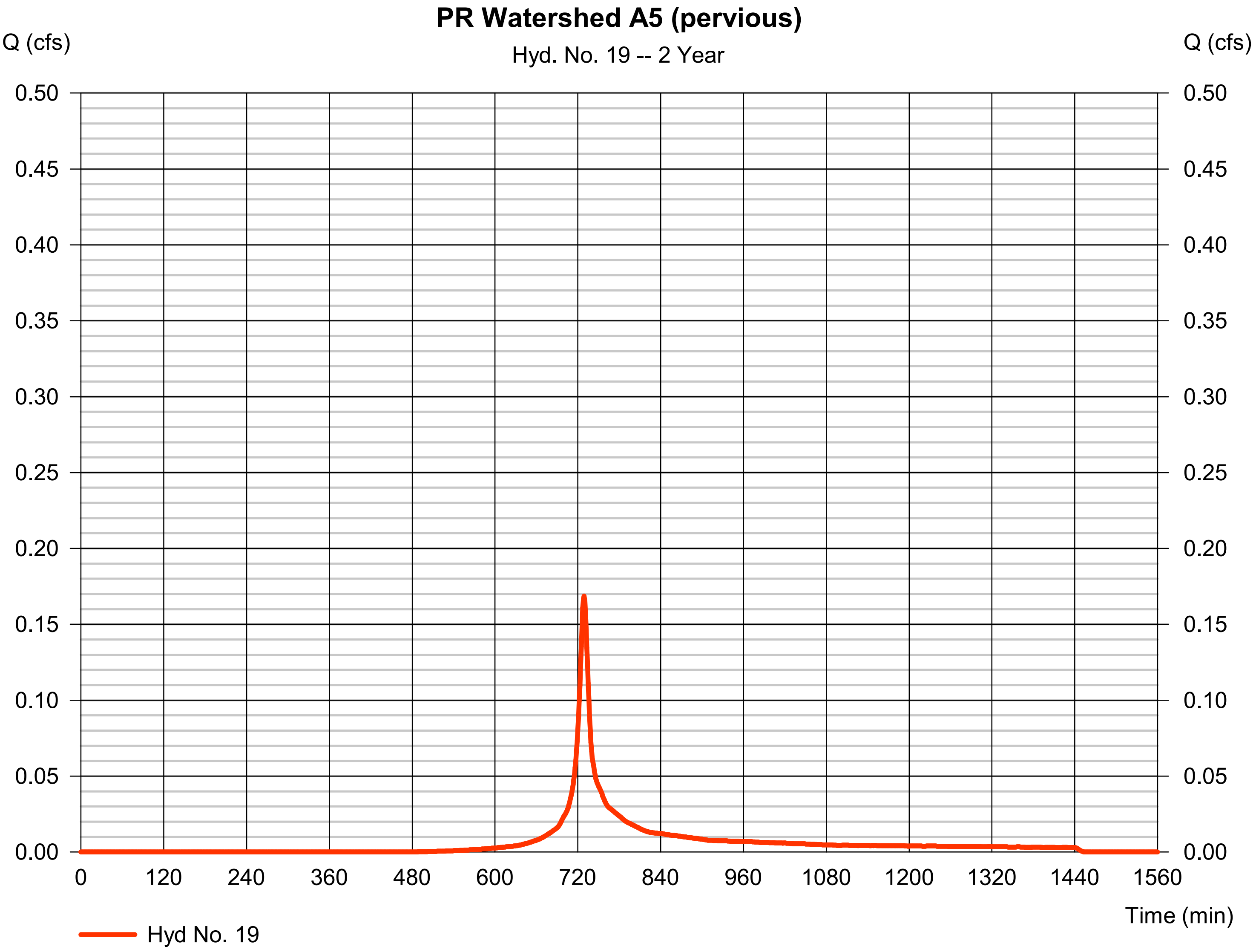
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 19

PR Watershed A5 (pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.080 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.168 cfs
Time to peak = 729 min
Hyd. volume = 586 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.00 min
Distribution = Custom
Shape factor = 484



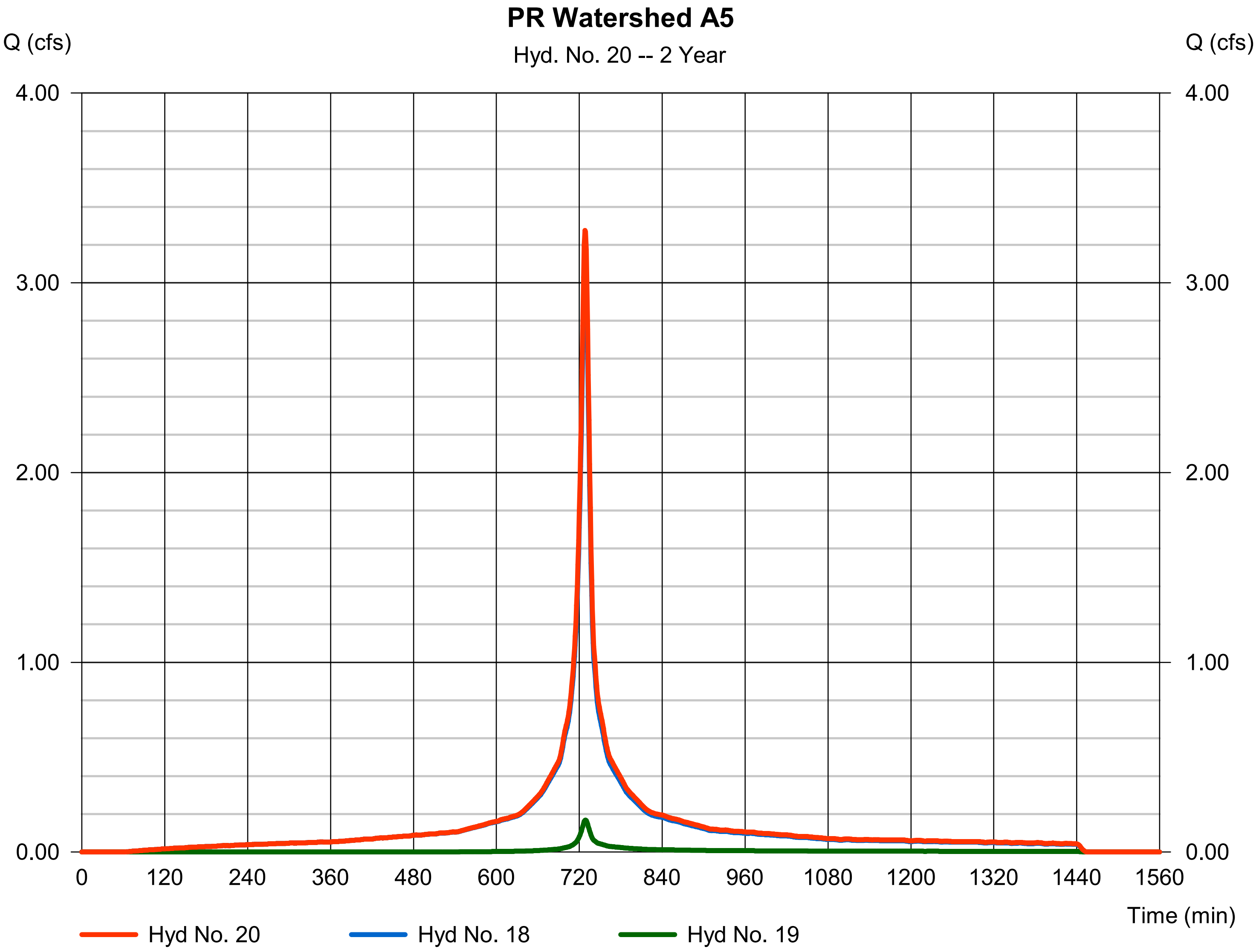
Hydrograph Report

Hyd. No. 20

PR Watershed A5

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 18, 19

Peak discharge = 3.276 cfs
Time to peak = 728 min
Hyd. volume = 13,060 cuft
Contrib. drain. area = 1.000 ac



Hydrograph Report

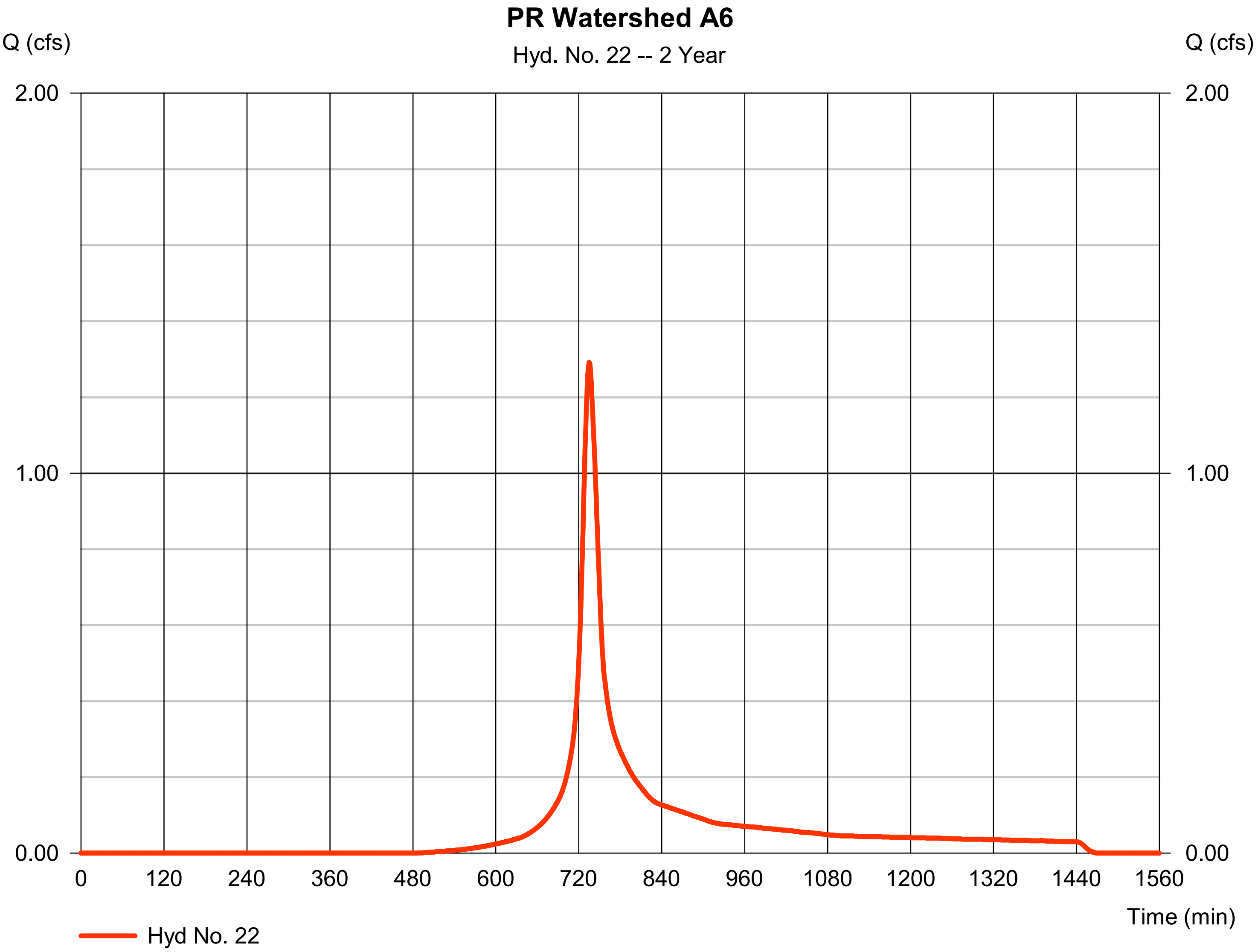
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 22

PR Watershed A6

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 1.292 cfs
Time to peak = 735 min
Hyd. volume = 5,930 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Custom
Shape factor = 484



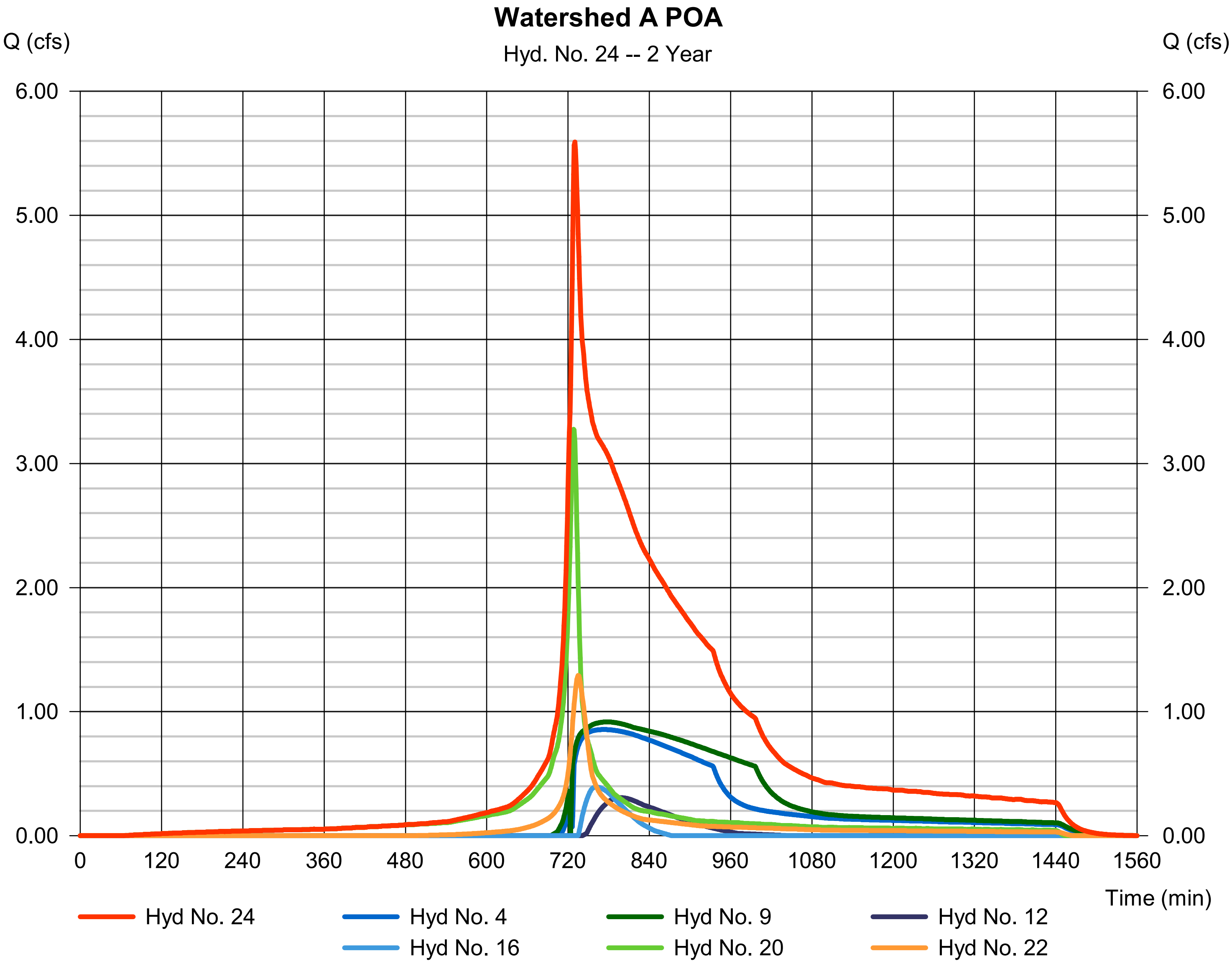
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 24

Watershed A POA

Hydrograph type	= Combine	Peak discharge	= 5.592 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 54,466 cuft
Inflow hyds.	= 4, 9, 12, 16, 20, 22	Contrib. drain. area	= 0.810 ac



Hydrograph Report

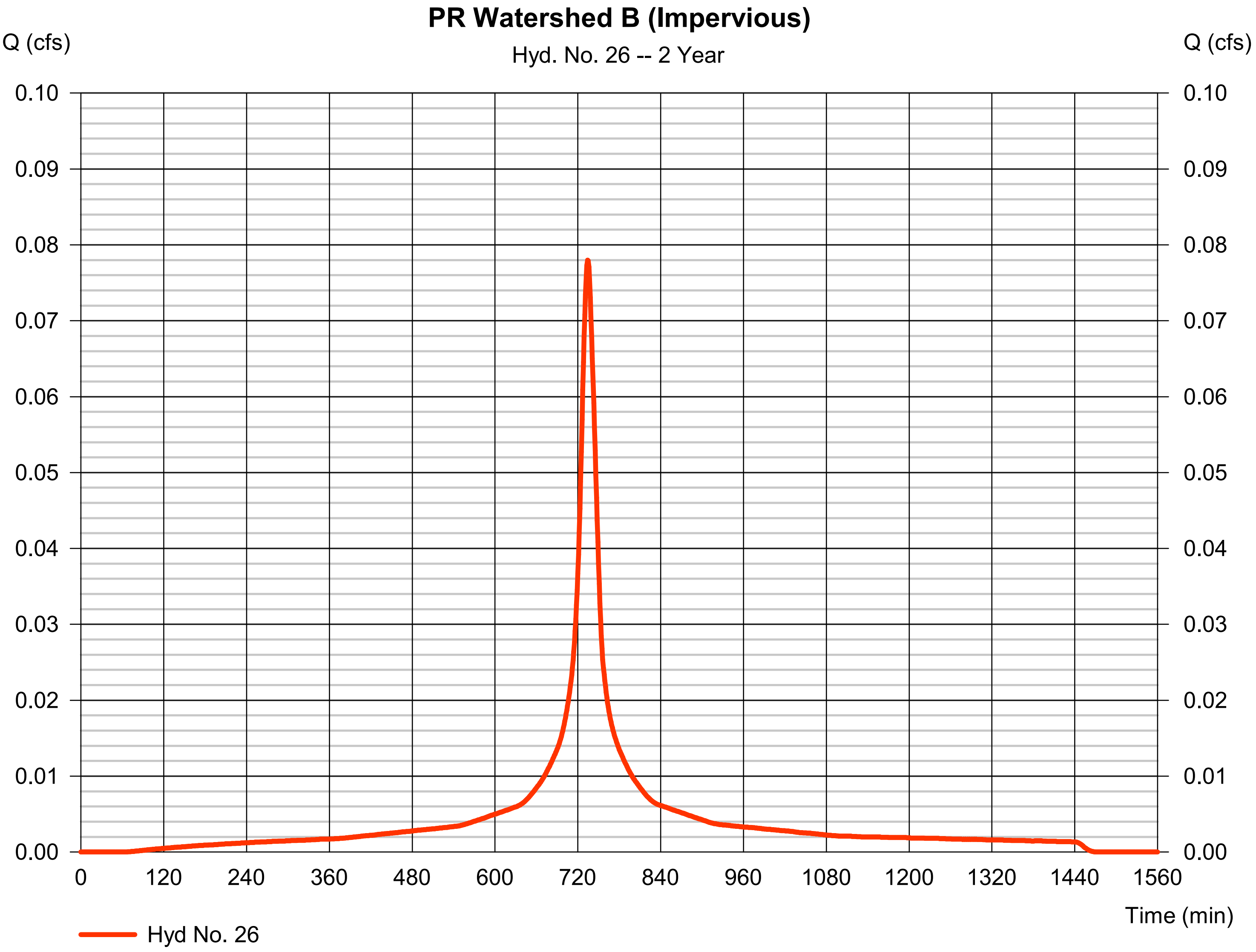
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 26

PR Watershed B (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.030 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.078 cfs
Time to peak = 734 min
Hyd. volume = 407 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

Hyd. No. 27

PR Watershed B (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.860 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 3.97 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 1.531 cfs
Time to peak = 734 min
Hyd. volume = 6,720 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Custom
Shape factor = 484

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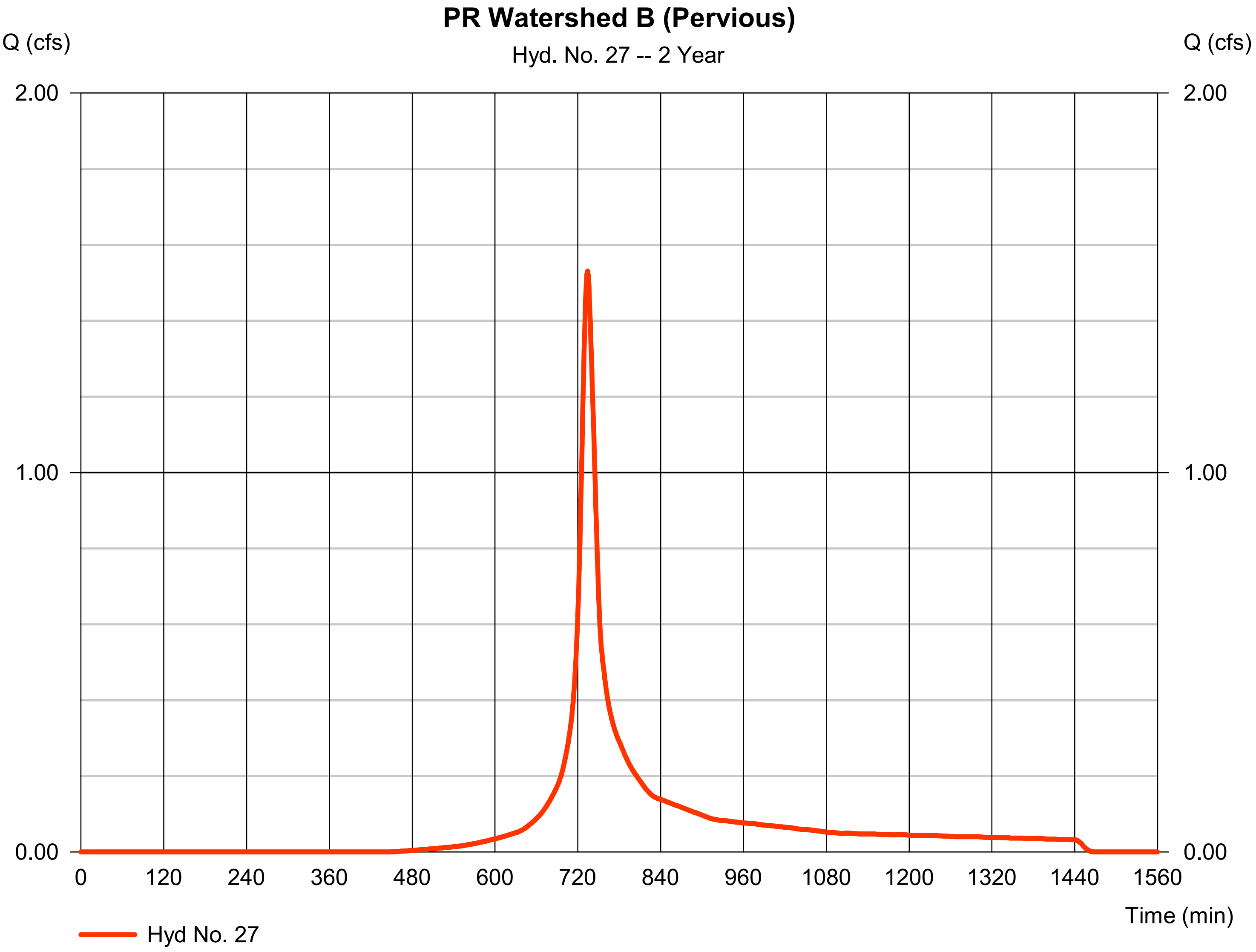
* Composite (Area/CN) = [(0.700 x 80) + (0.020 x 77) + (0.140 x 91)] / 0.860



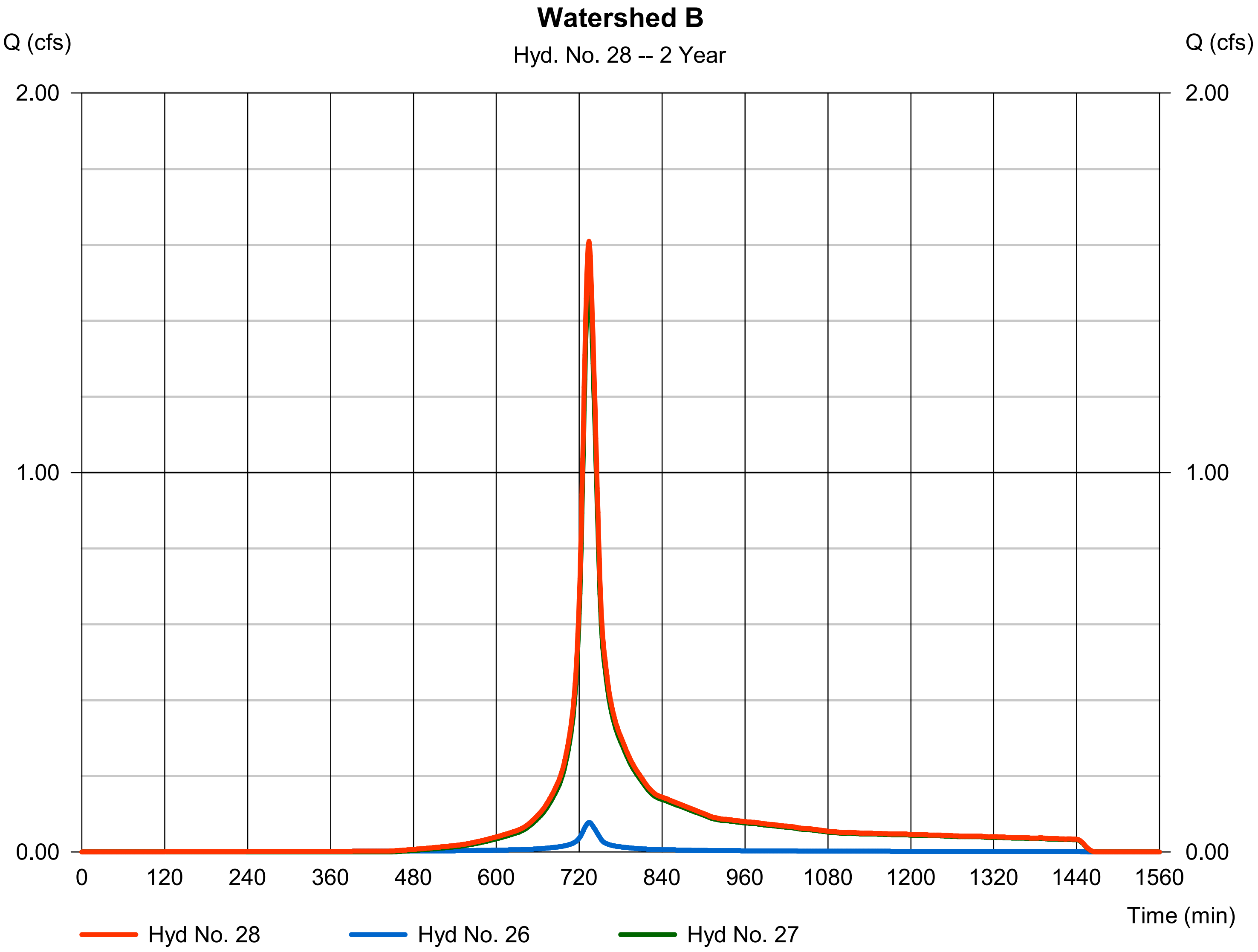
Hydrograph Report

Hyd. No. 28

Watershed B

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 26, 27

Peak discharge = 1.609 cfs
Time to peak = 734 min
Hyd. volume = 7,127 cuft
Contrib. drain. area = 0.890 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	7.198	1	727	27,712	------	------	------	PR Watershed A1 (Impervious)
2	SCS Runoff	2.731	1	733	11,715	------	------	------	PR Watershed A1 (Pervious)
3	Combine	9.527	1	728	39,426	1, 2	------	------	Watershed A1
4	Reservoir	3.013	1	746	30,140	3	49.82	19,024	Basin A1
6	SCS Runoff	10.47	1	727	40,308	------	------	------	PR Watershed A2 (Impervious)
7	SCS Runoff	1.716	1	732	7,038	------	------	------	PR Watershed A2 (Pervious)
8	Combine	11.99	1	728	47,345	6, 7	------	------	Watershed A2
9	Reservoir	3.221	1	745	35,784	8	49.87	24,178	Basin A2
11	SCS Runoff	12.00	1	727	46,186	------	------	------	PR Watershed A3 (Impervious)
12	Reservoir	2.586	1	744	14,745	11	50.41	18,897	UG Basin A3
14	SCS Runoff	8.561	1	727	32,960	------	------	------	PR Watershed A4 (Impervious)
15	Combine	8.561	1	727	32,960	14	------	------	Watershed A4
16	Reservoir	3.164	1	736	9,021	15	52.46	10,618	UG Basin A4
18	SCS Runoff	4.856	1	728	19,809	------	------	------	PR Watershed A5 (Impervious)
19	SCS Runoff	0.324	1	729	1,143	------	------	------	PR Watershed A5 (pervious)
20	Combine	5.179	1	728	20,952	18, 19	------	------	PR Watershed A5
22	SCS Runoff	2.505	1	735	11,570	------	------	------	PR Watershed A6
24	Combine	16.50	1	735	122,212	4, 9, 12, 16, 20, 22,	------	------	Watershed A POA
26	SCS Runoff	0.122	1	734	646	------	------	------	PR Watershed B (Impervious)
27	SCS Runoff	2.874	1	734	12,789	------	------	------	PR Watershed B (Pervious)
28	Combine	2.996	1	734	13,435	26, 27	------	------	Watershed B

Hydrograph Report

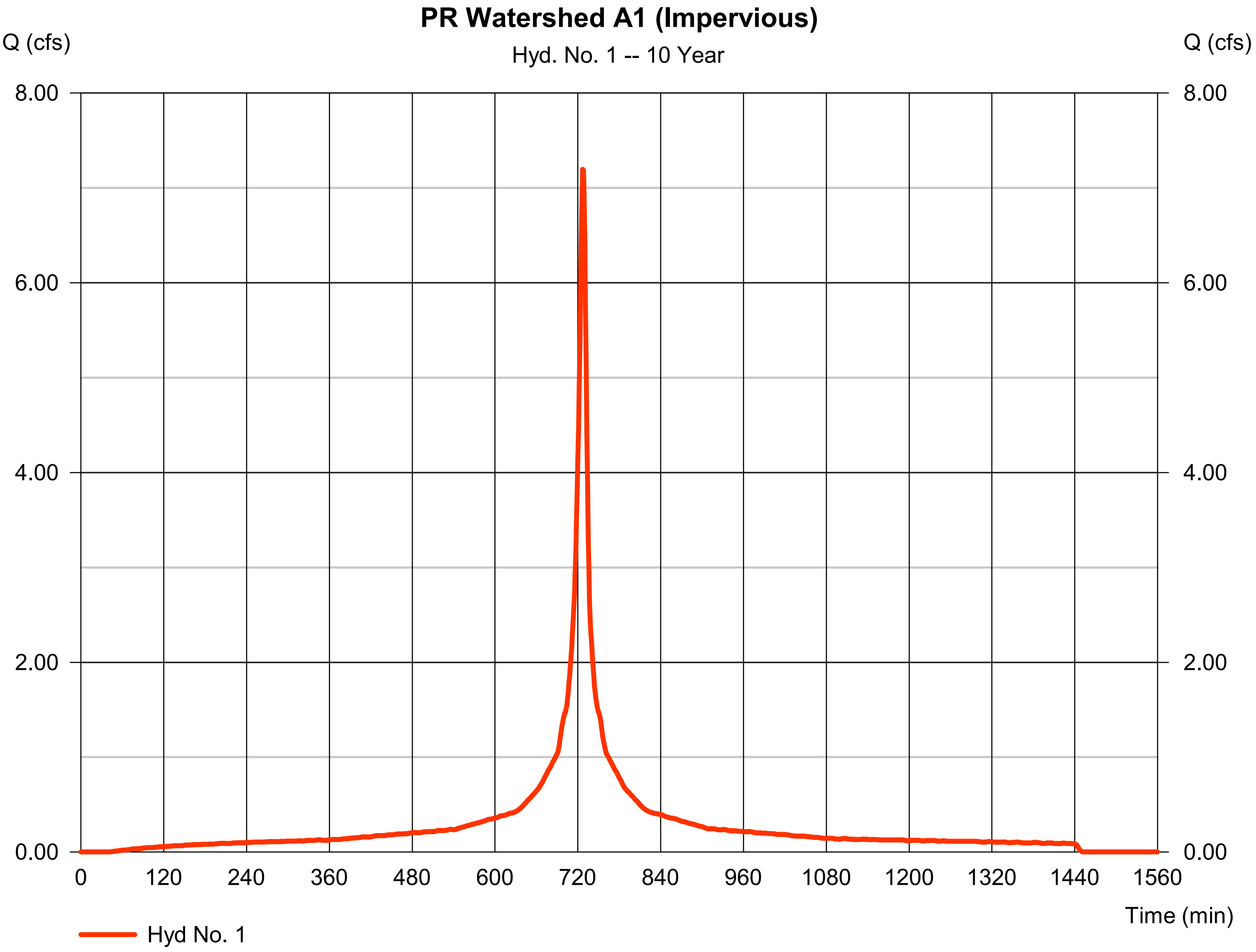
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 1

PR Watershed A1 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.320 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 7.198 cfs
Time to peak = 727 min
Hyd. volume = 27,712 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

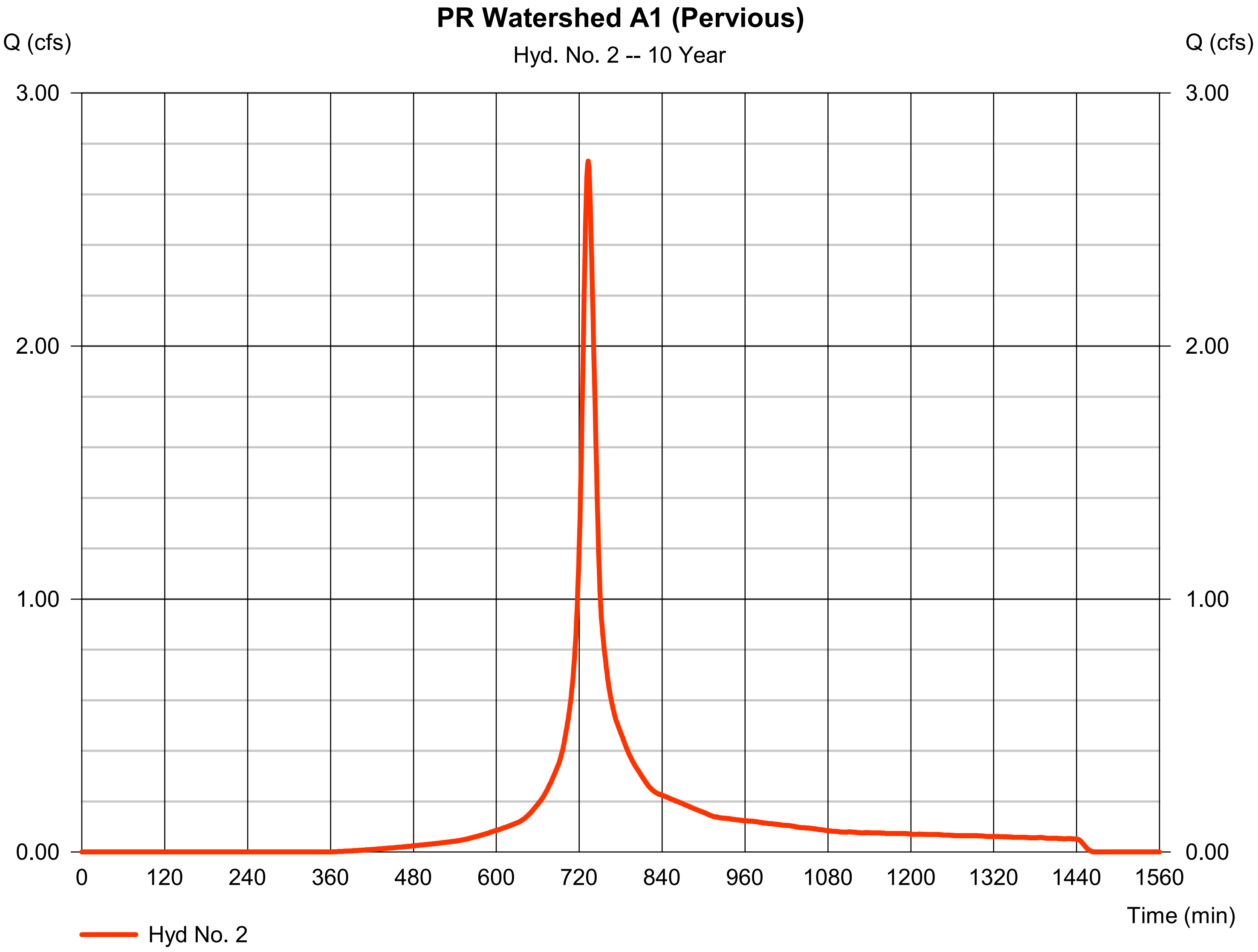
Hyd. No. 2

PR Watershed A1 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 2.731 cfs
Time to peak = 733 min
Hyd. volume = 11,715 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 16.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.790 x 80) + (0.020 x 91)] / 0.810

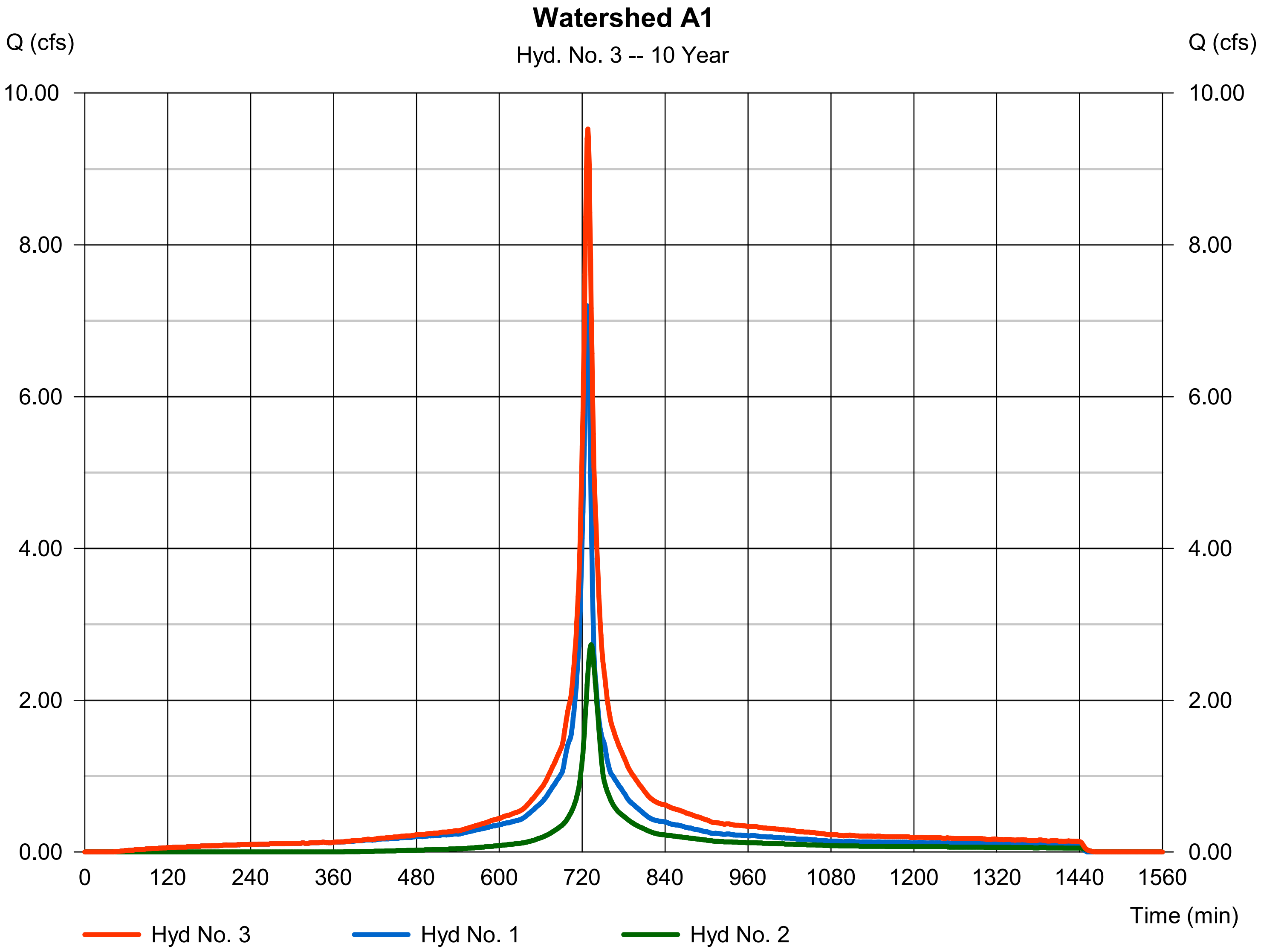


Hydrograph Report

Hyd. No. 3

Watershed A1

Hydrograph type	= Combine	Peak discharge	= 9.527 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 39,426 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.130 ac



Hydrograph Report

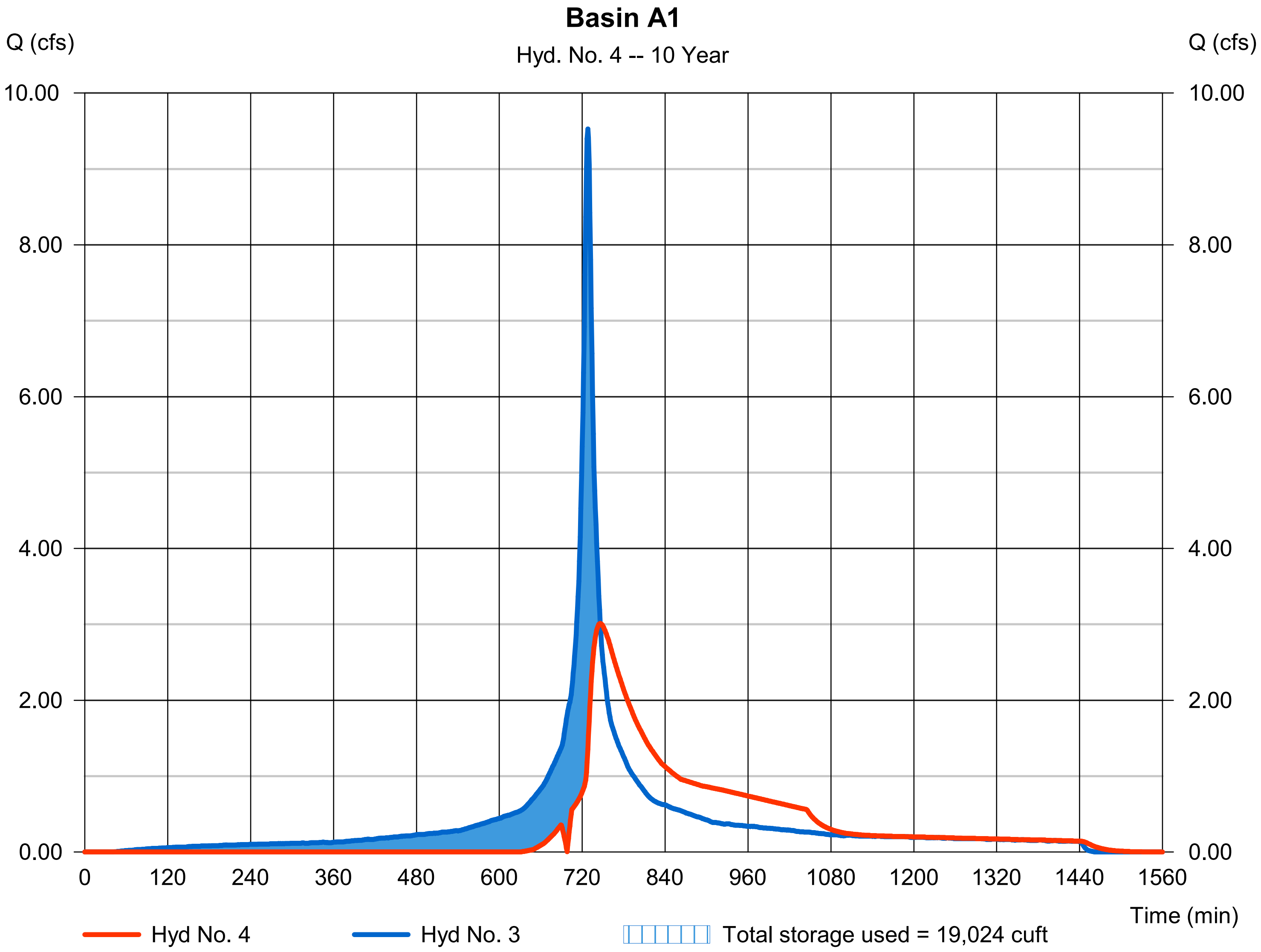
Hyd. No. 4

Basin A1

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyd. No. = 3 - Watershed A1
Reservoir name = Basin A1

Peak discharge = 3.013 cfs
Time to peak = 746 min
Hyd. volume = 30,140 cuft
Max. Elevation = 49.82 ft
Max. Storage = 19,024 cuft

Storage Indication method used.

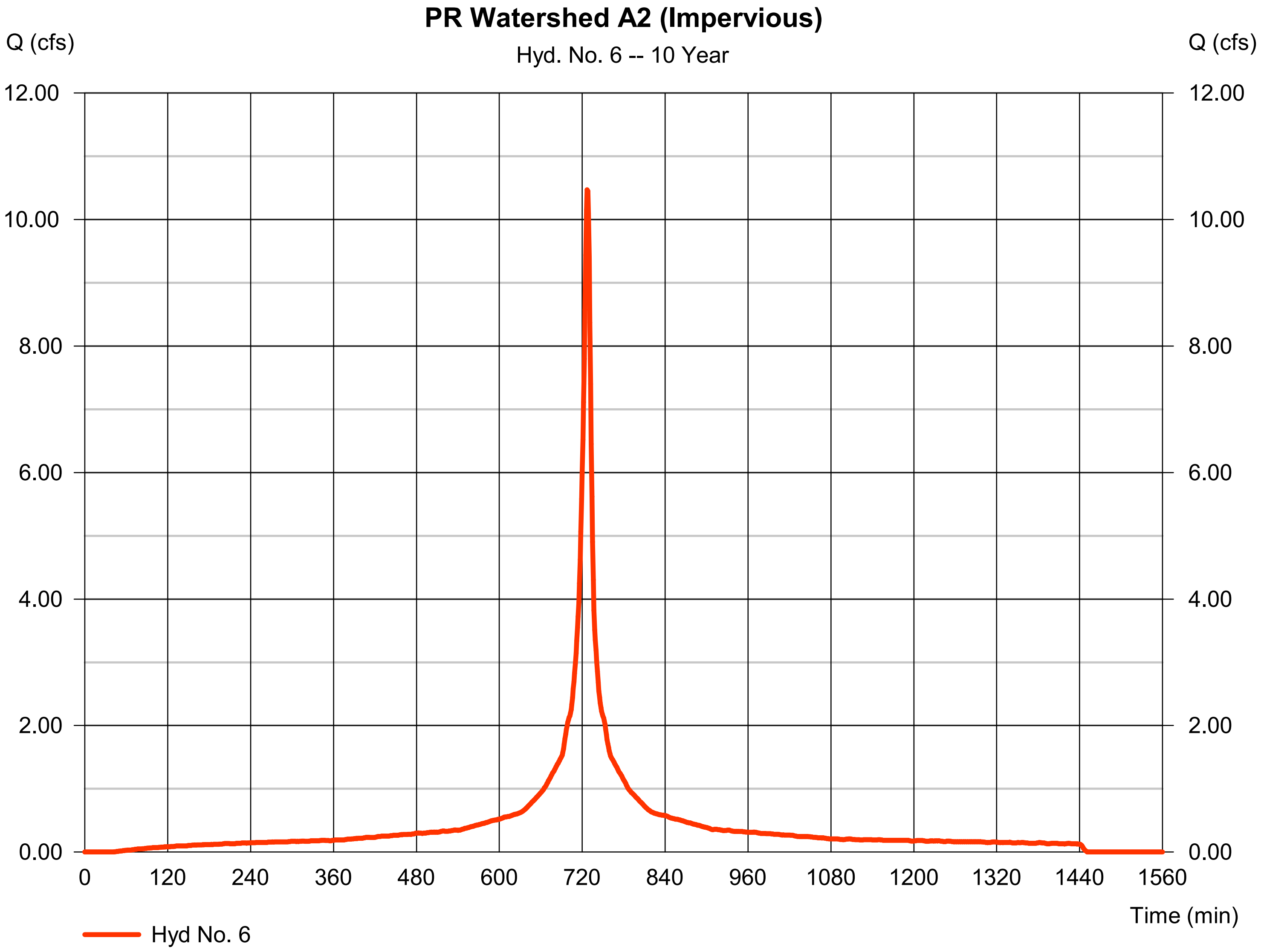


Hydrograph Report

Hyd. No. 6

PR Watershed A2 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 10.47 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 40,308 cuft
Drainage area	= 1.920 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.00 min
Total precip.	= 6.17 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	= 484



Hydrograph Report

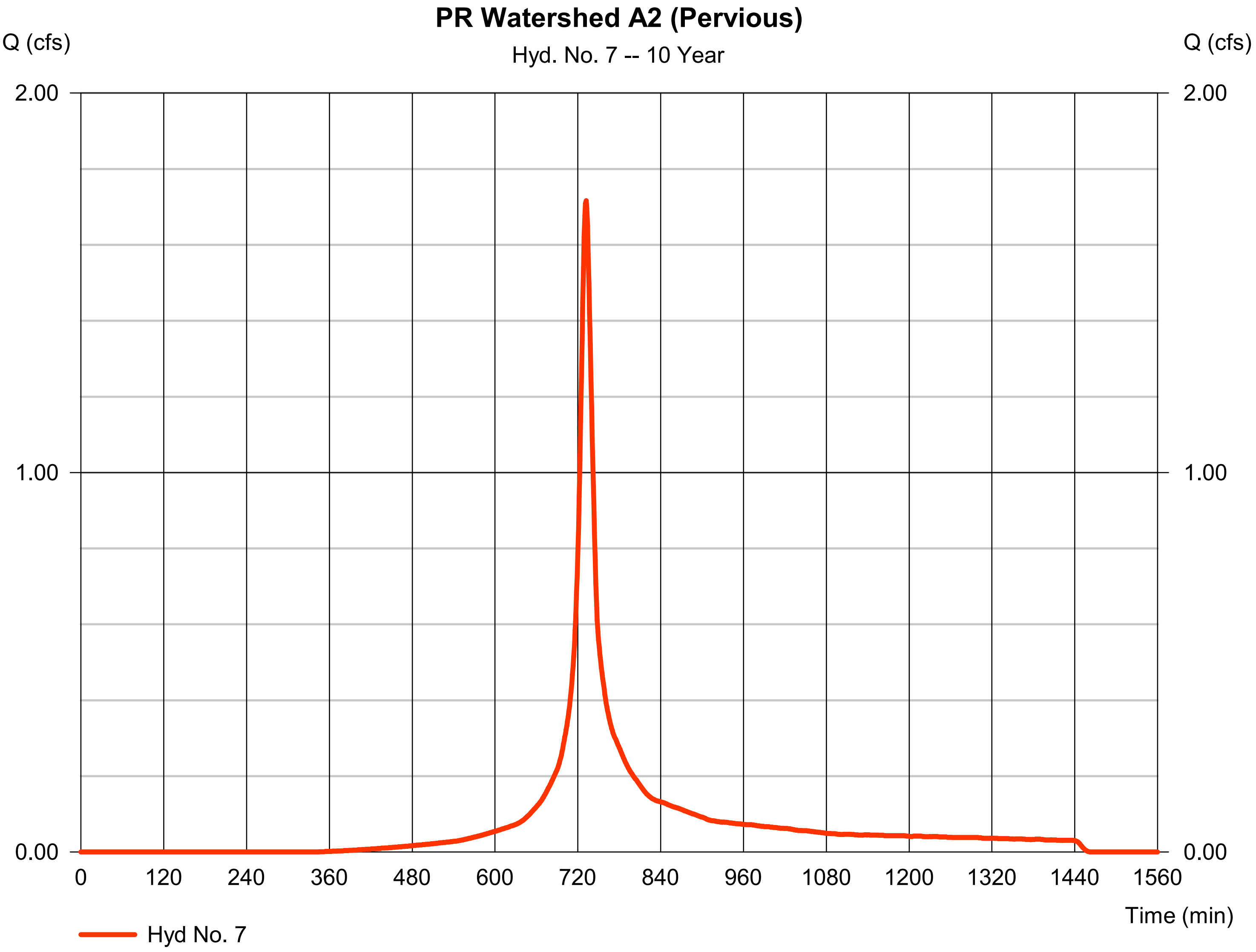
Hyd. No. 7

PR Watershed A2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.480 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 1.716 cfs
Time to peak = 732 min
Hyd. volume = 7,038 cuft
Curve number = 81*
Hydraulic length = 0 ft
Time of conc. (Tc) = 14.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.390 x 80) + (0.050 x 91)] / 0.480

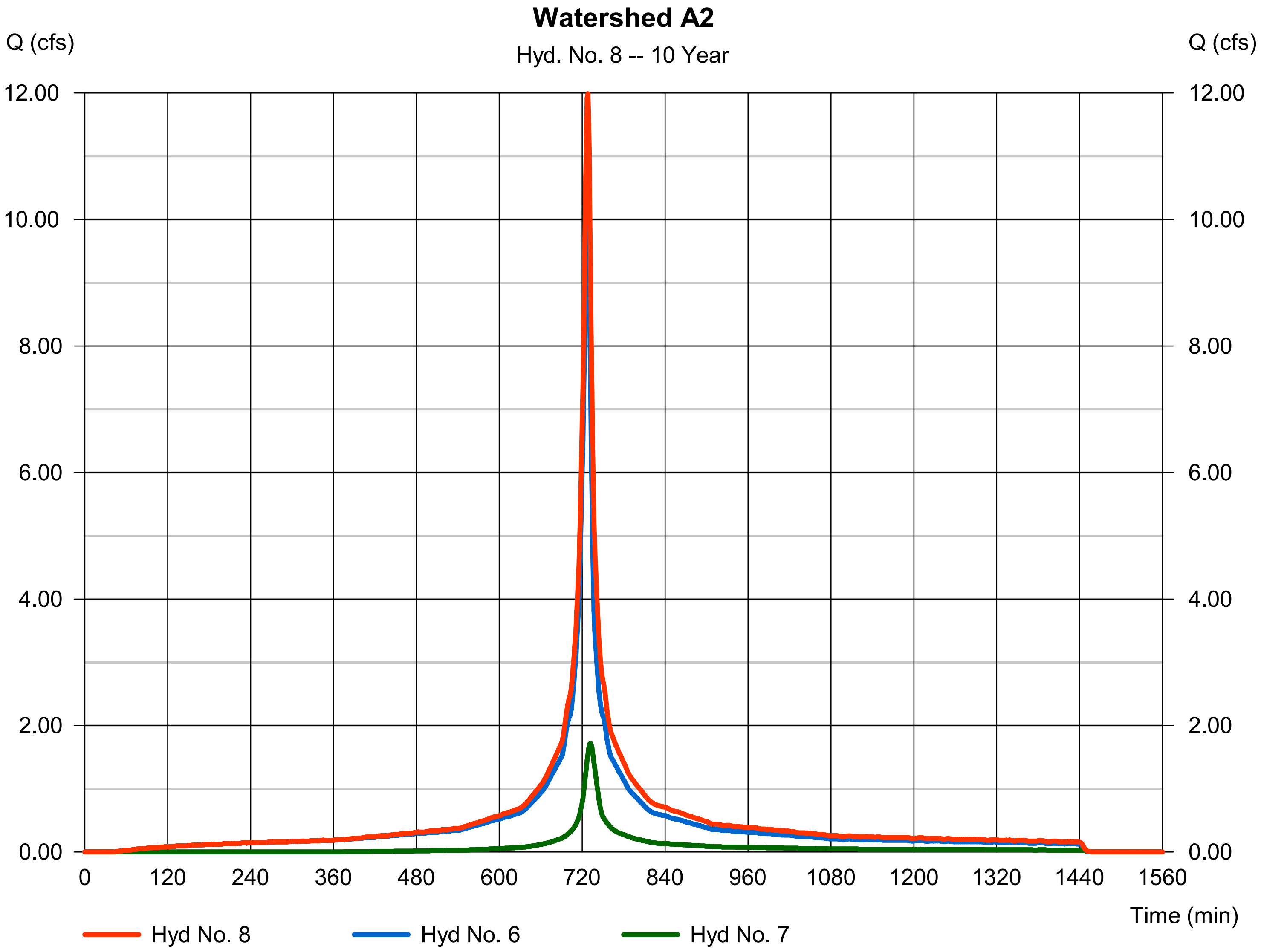


Hydrograph Report

Hyd. No. 8

Watershed A2

Hydrograph type	= Combine	Peak discharge	= 11.99 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 47,345 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 2.400 ac



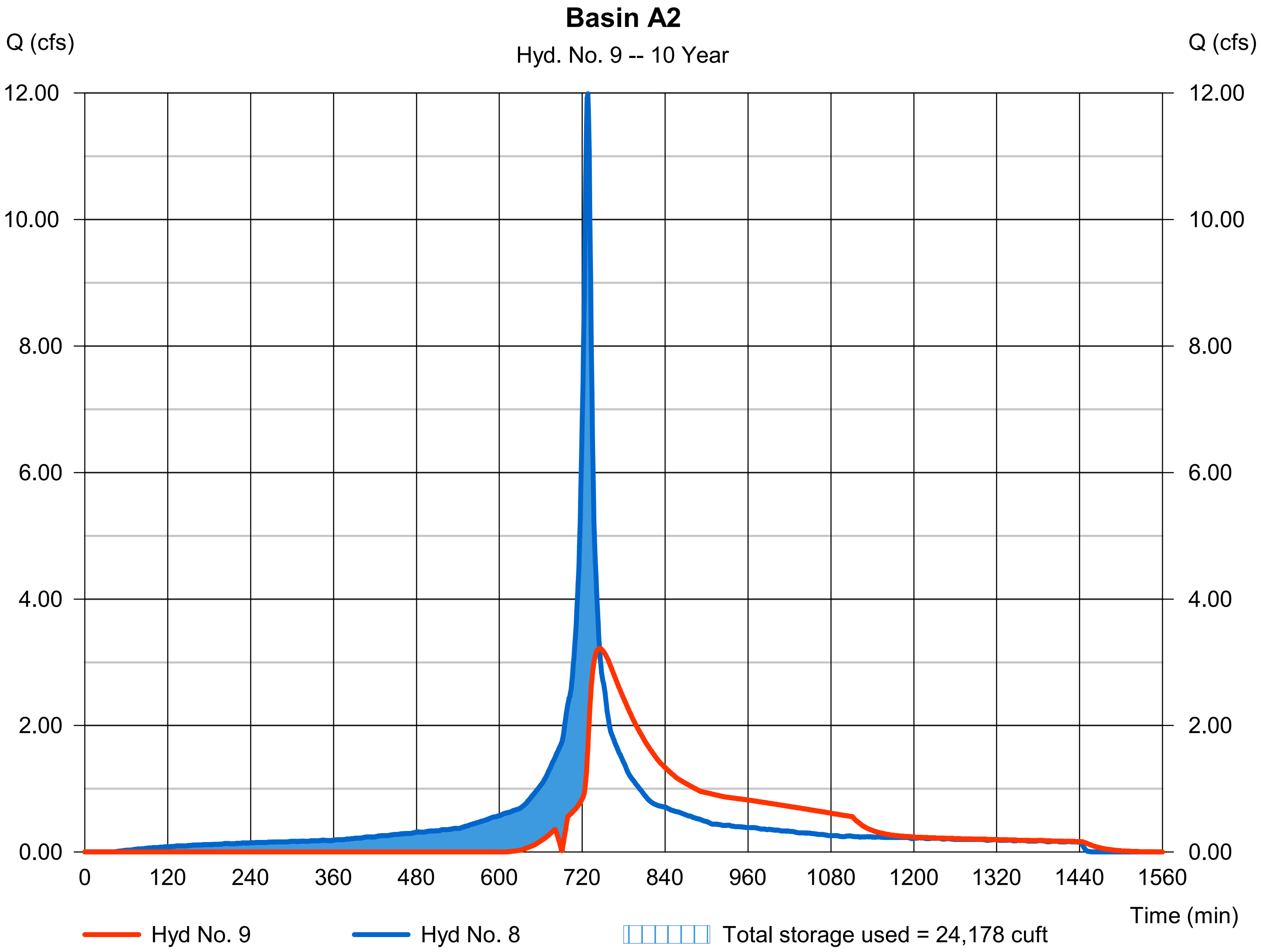
Hyd. No. 9

Basin A2

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyd. No. = 8 - Watershed A2
Reservoir name = Basin A2

Peak discharge = 3.221 cfs
Time to peak = 745 min
Hyd. volume = 35,784 cuft
Max. Elevation = 49.87 ft
Max. Storage = 24,178 cuft

Storage Indication method used.



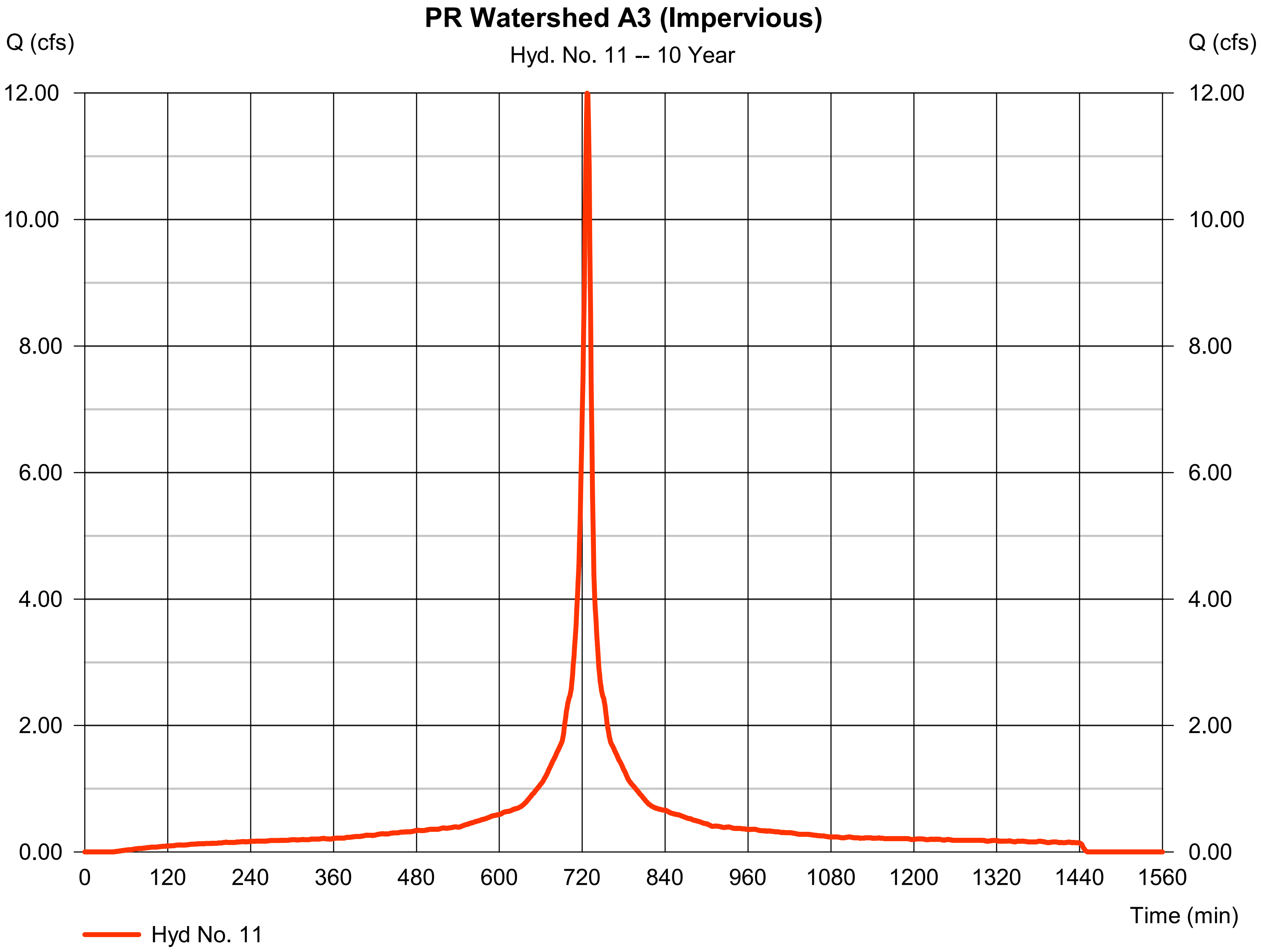
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 11

PR Watershed A3 (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.00 cfs
Storm frequency	=	10 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	46,186 cuft
Drainage area	=	2.200 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	8.00 min
Total precip.	=	6.17 in	Distribution	=	Custom
Storm duration	=	\\langan.com\data\PAR\data0\100851301\Project Data_Discipline\Site Civil\Storr	Shape factor	=	484

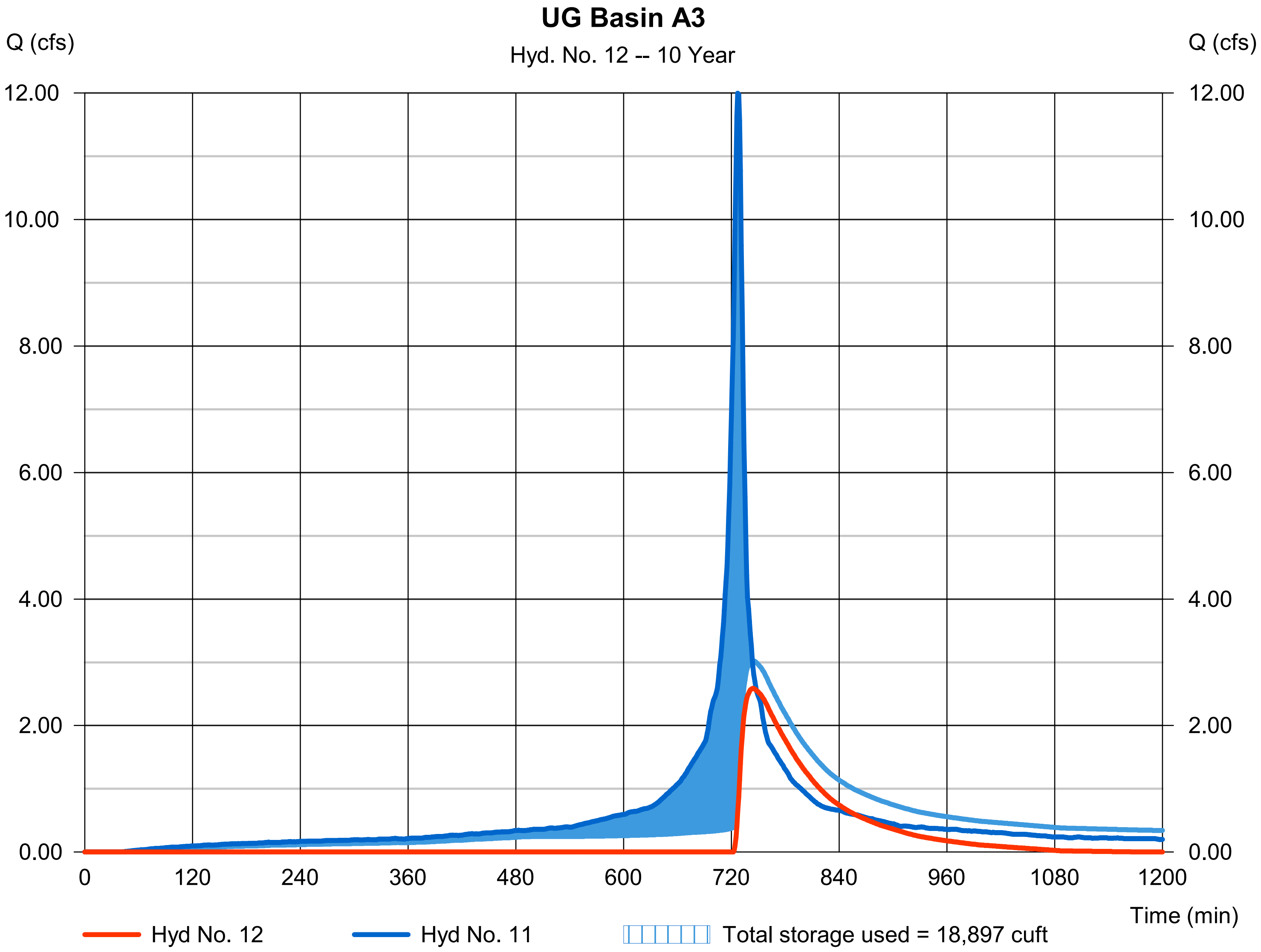


Hyd. No. 12

UG Basin A3

Hydrograph type	=	Reservoir	Peak discharge	=	2.586 cfs
Storm frequency	=	10 yrs	Time to peak	=	744 min
Time interval	=	1 min	Hyd. volume	=	14,745 cuft
Inflow hyd. No.	=	11 - PR Watershed A3 (Impervious)	Max. Elevation	=	50.41 ft
Reservoir name	=	UG Detention A3	Max. Storage	=	18,897 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



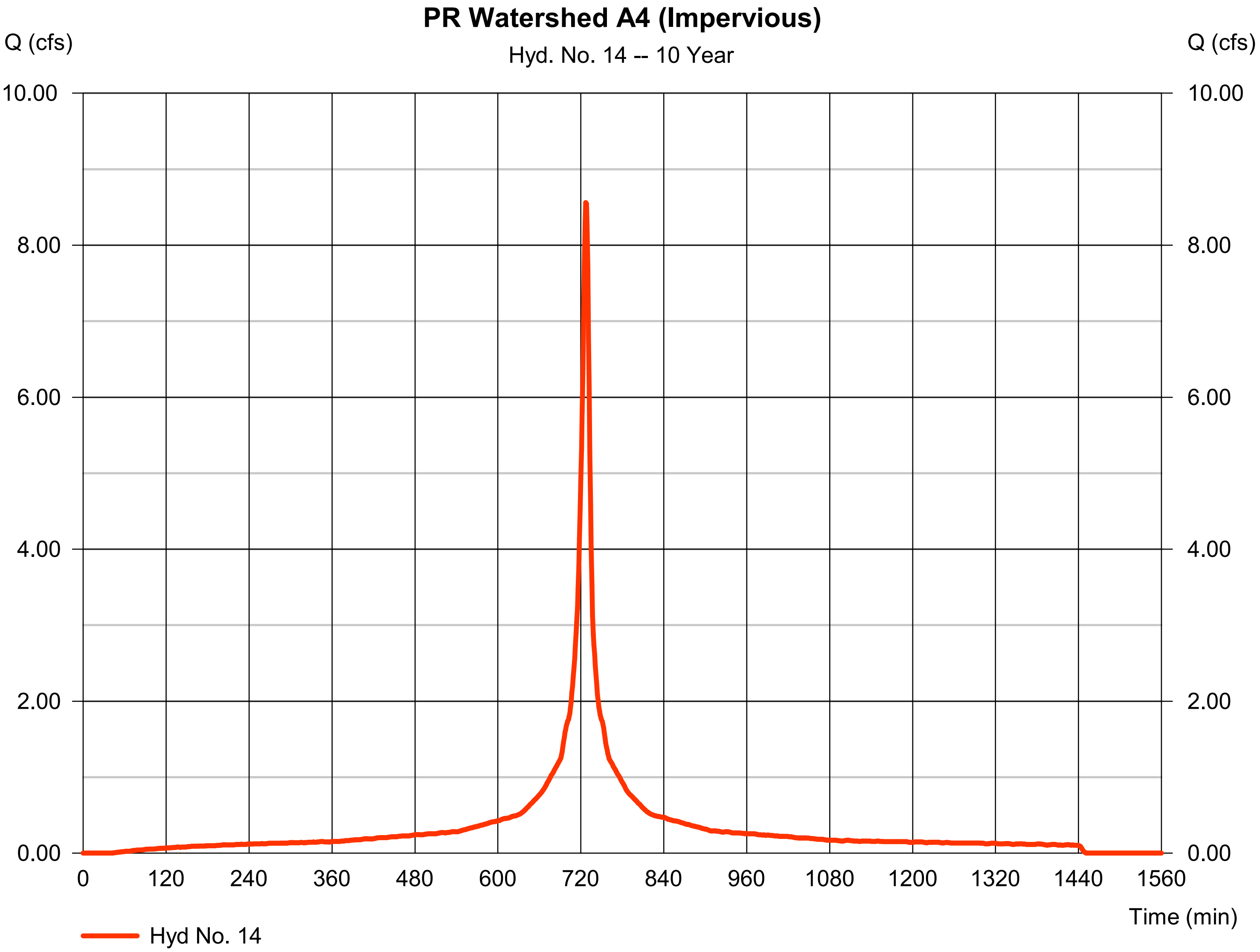
Hydrograph Report

Hyd. No. 14

PR Watershed A4 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.570 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 8.561 cfs
Time to peak = 727 min
Hyd. volume = 32,960 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484

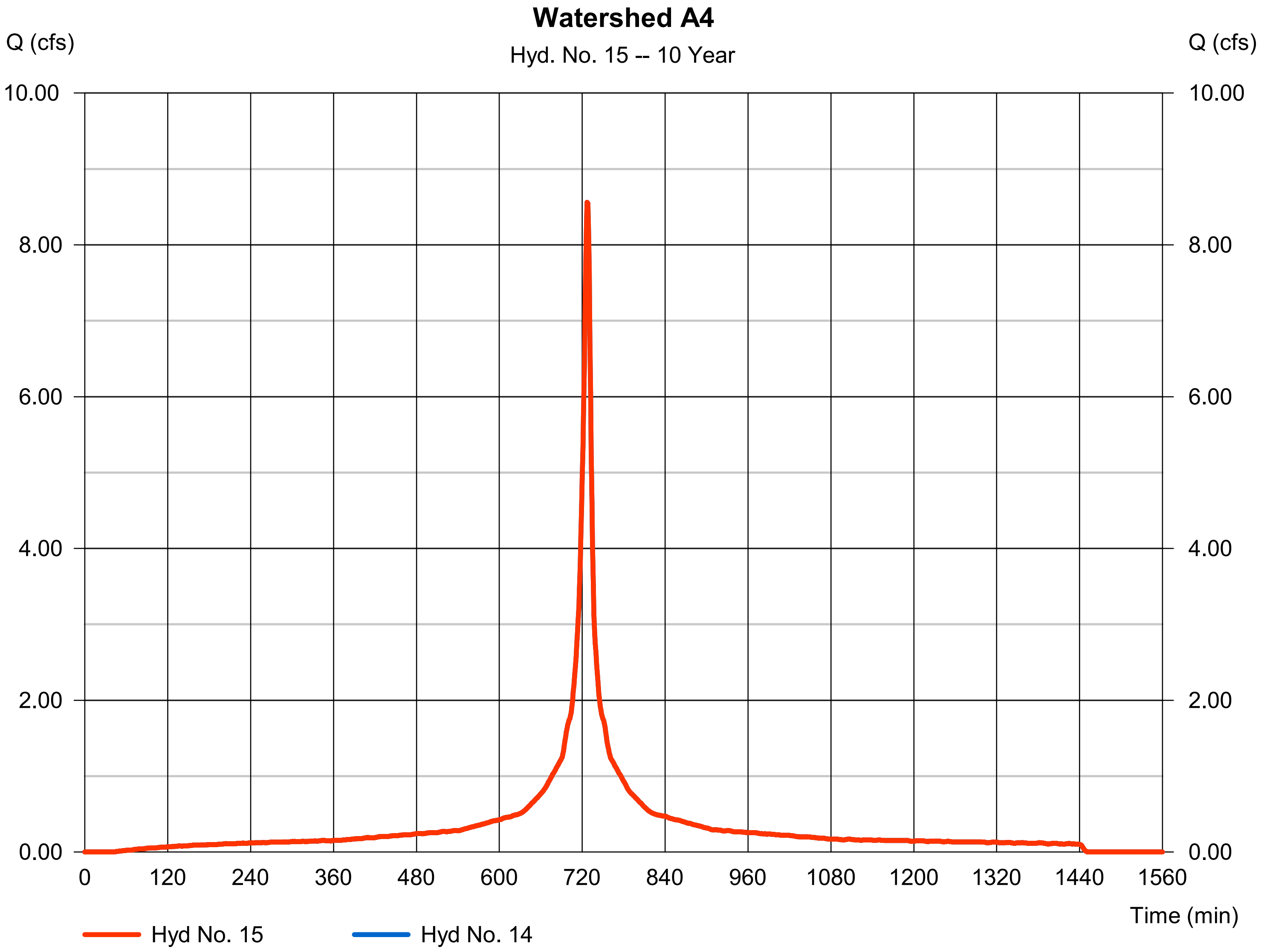


Hydrograph Report

Hyd. No. 15

Watershed A4

Hydrograph type	= Combine	Peak discharge	= 8.561 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 32,960 cuft
Inflow hyds.	= 14	Contrib. drain. area	= 1.570 ac



Hydrograph Report

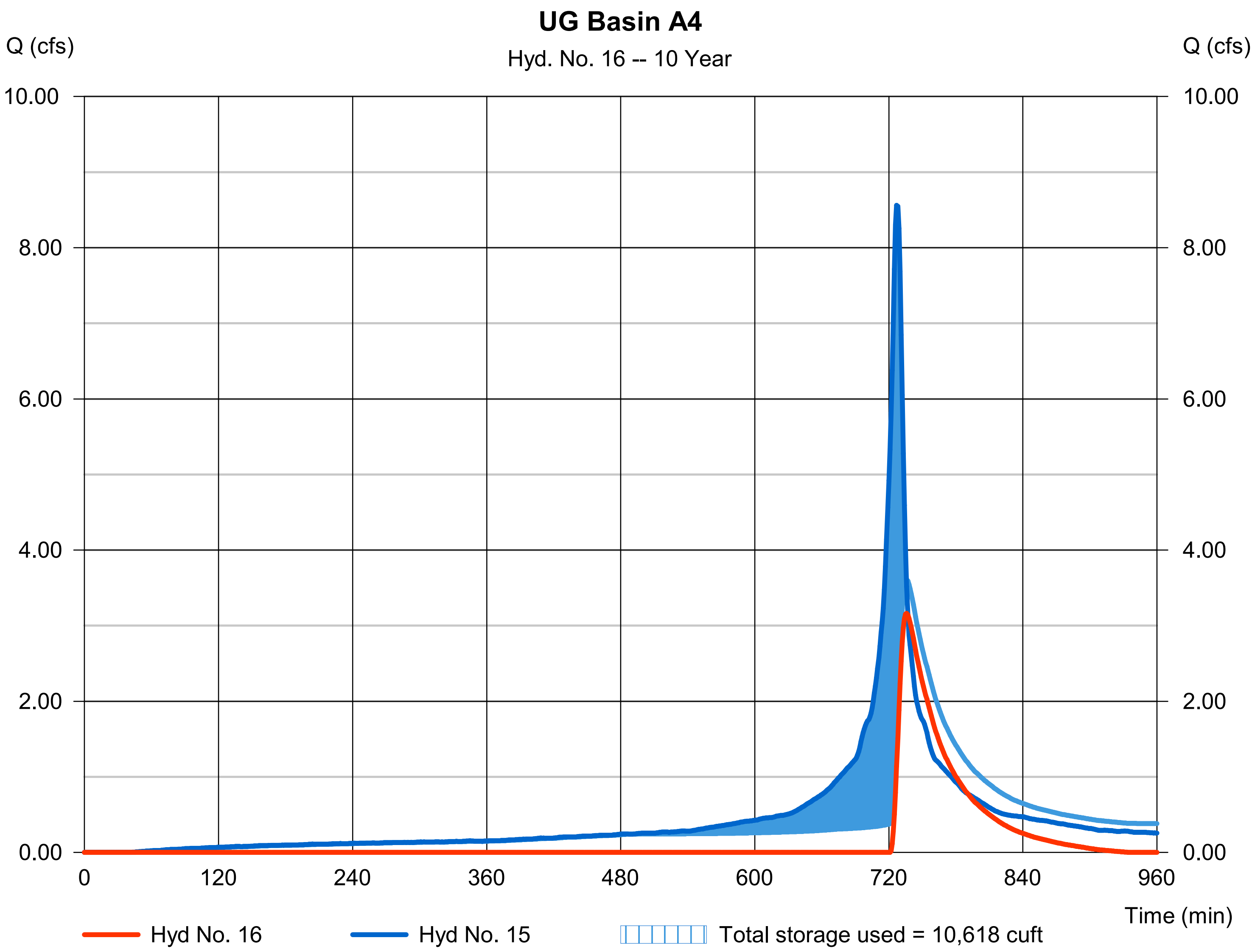
Hyd. No. 16

UG Basin A4

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyd. No. = 15 - Watershed A4
Reservoir name = UG Detention A4

Peak discharge = 3.164 cfs
Time to peak = 736 min
Hyd. volume = 9,021 cuft
Max. Elevation = 52.46 ft
Max. Storage = 10,618 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



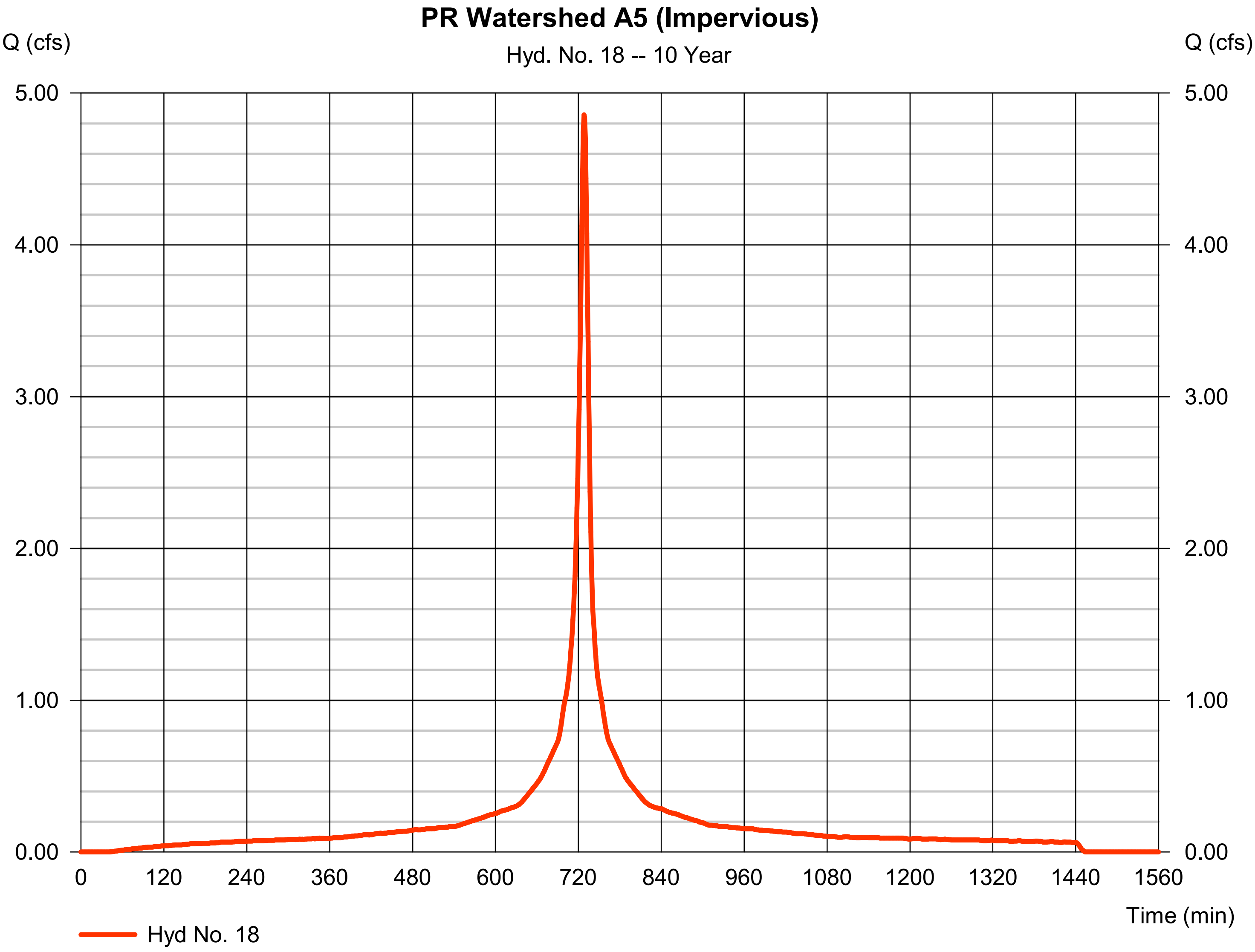
Hydrograph Report

Hyd. No. 18

PR Watershed A5 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.920 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 4.856 cfs
Time to peak = 728 min
Hyd. volume = 19,809 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.00 min
Distribution = Custom
Shape factor = 484

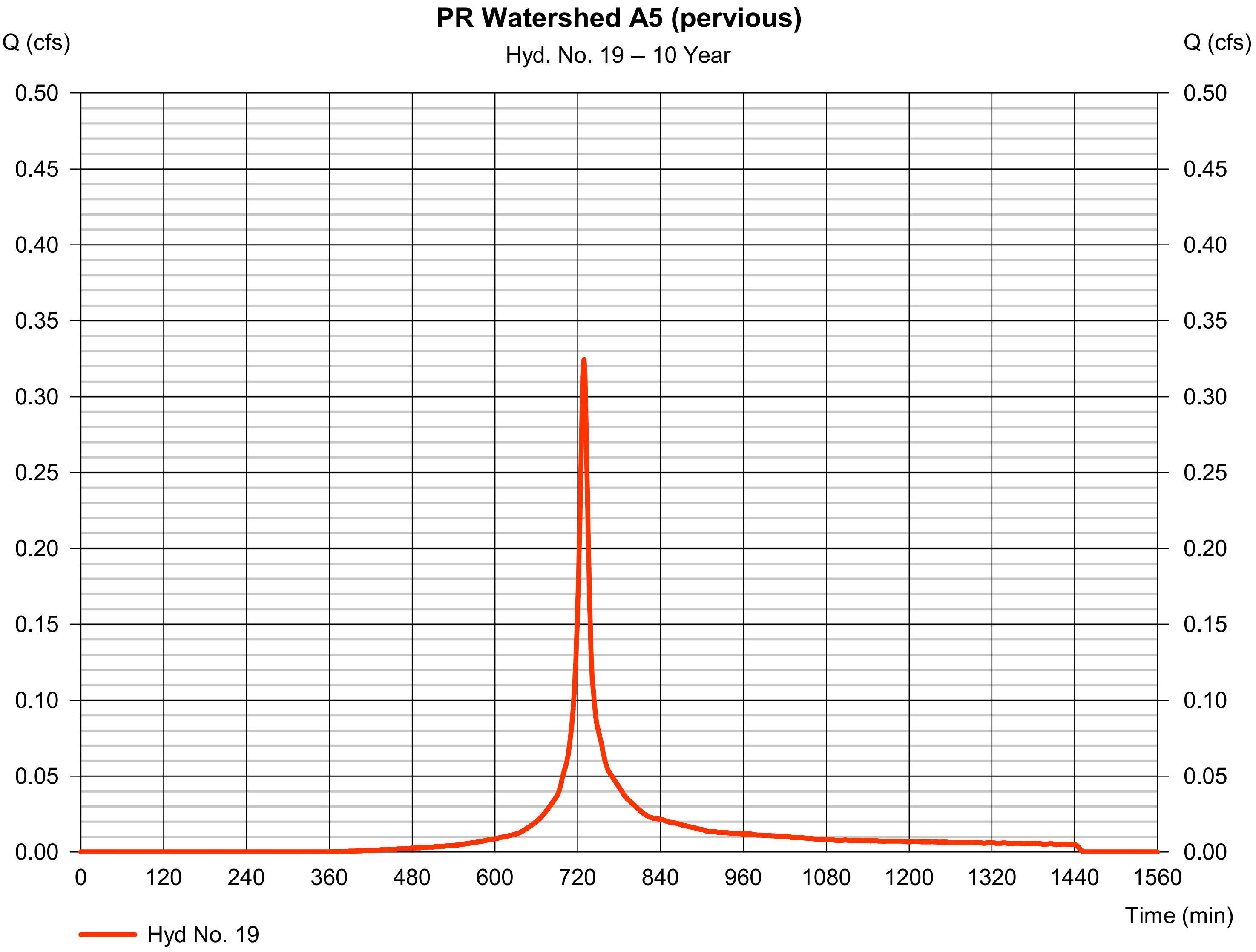


Hydrograph Report

Hyd. No. 19

PR Watershed A5 (pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.324 cfs
Storm frequency	= 10 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 1,143 cuft
Drainage area	= 0.080 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.17 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr	Shape factor	= 484

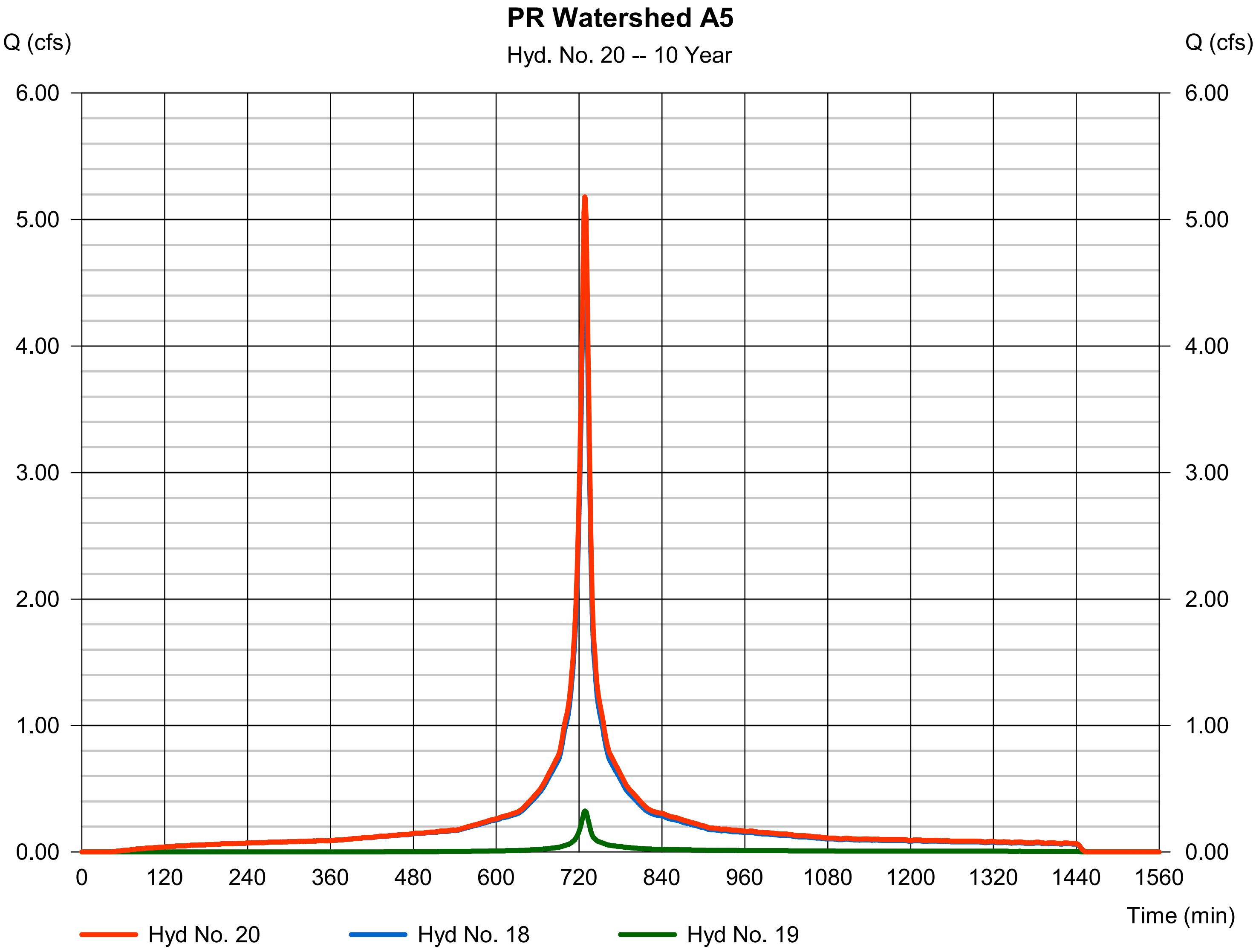


Hydrograph Report

Hyd. No. 20

PR Watershed A5

Hydrograph type	= Combine	Peak discharge	= 5.179 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 20,952 cuft
Inflow hyds.	= 18, 19	Contrib. drain. area	= 1.000 ac



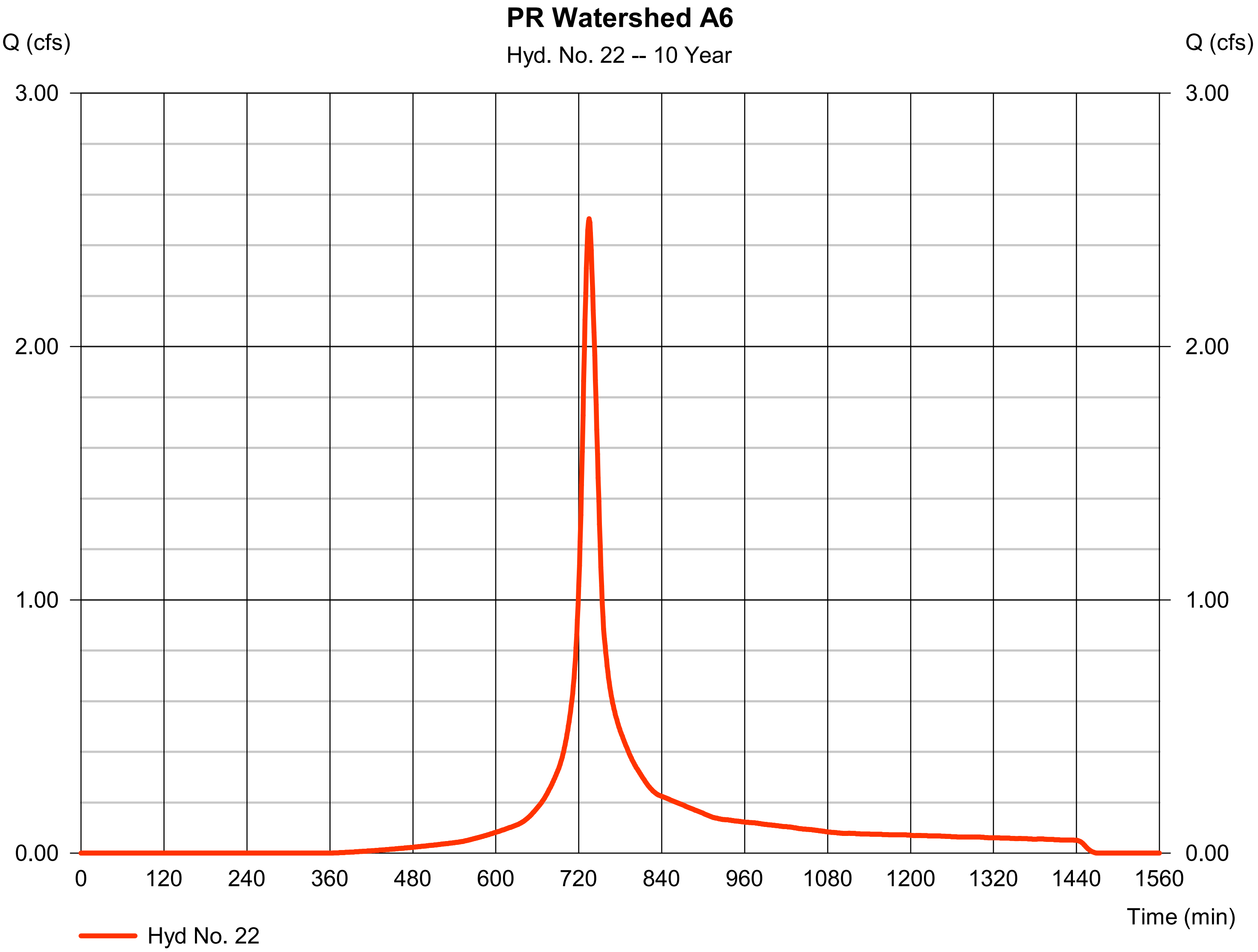
Hydrograph Report

Hyd. No. 22

PR Watershed A6

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor

Peak discharge = 2.505 cfs
Time to peak = 735 min
Hyd. volume = 11,570 cuft
Curve number = 80
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Custom
Shape factor = 484

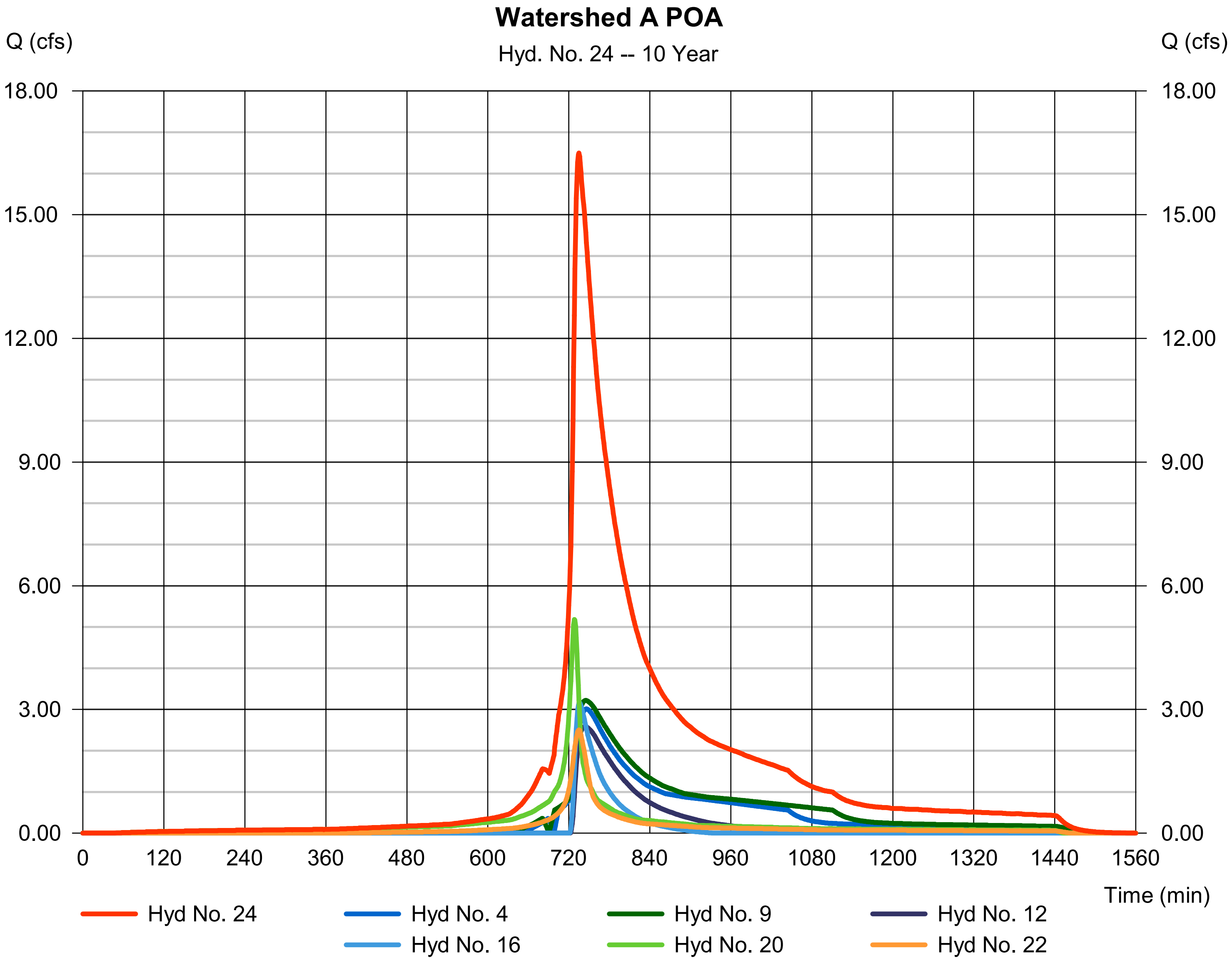


Hydrograph Report

Hyd. No. 24

Watershed A POA

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 4, 9, 12, 16, 20, 22
Peak discharge = 16.50 cfs
Time to peak = 735 min
Hyd. volume = 122,212 cuft
Contrib. drain. area = 0.810 ac

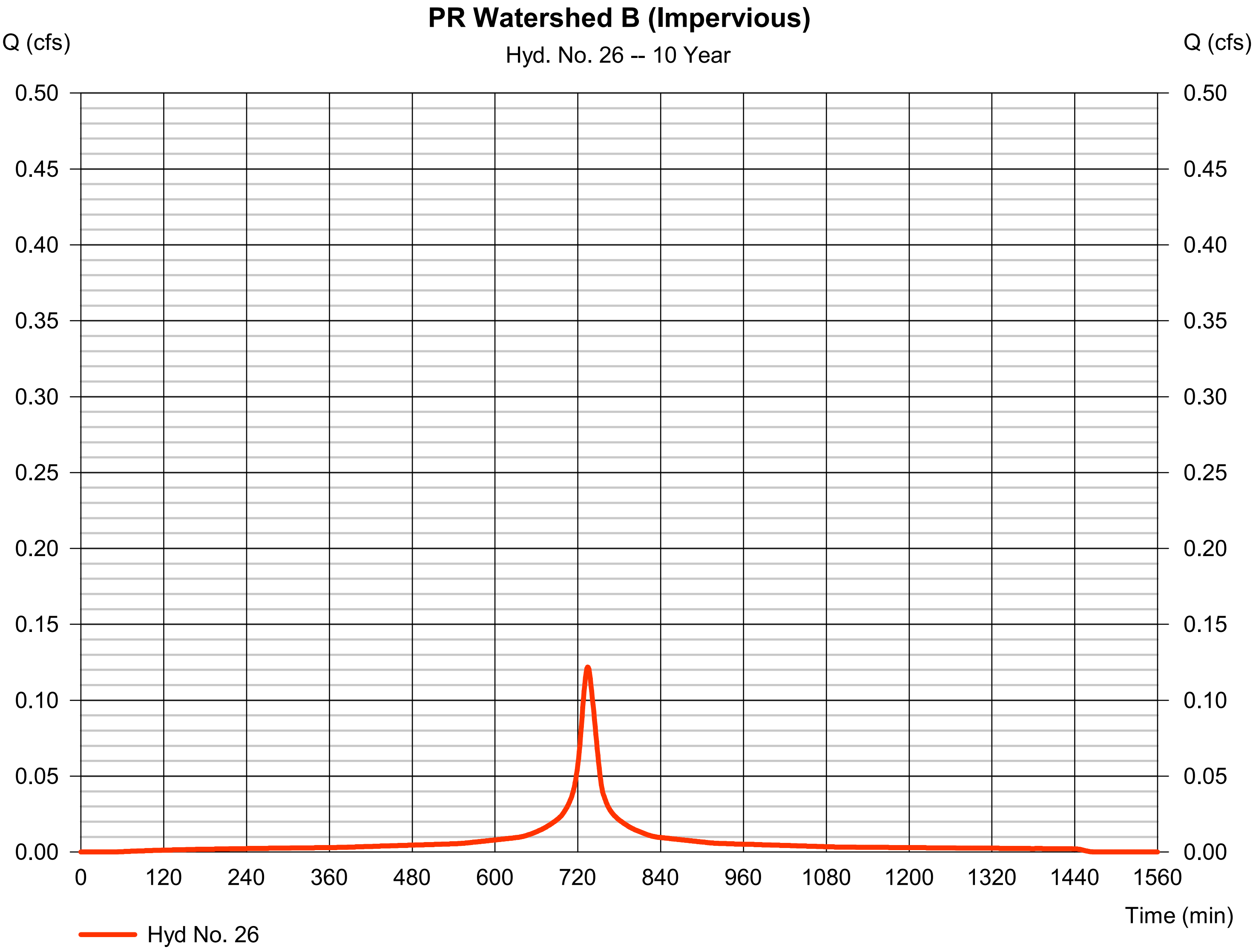


Hydrograph Report

Hyd. No. 26

PR Watershed B (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.122 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 646 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.00 min
Total precip.	= 6.17 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	= 484



Hyd. No. 27

PR Watershed B (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 0.860 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 6.17 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 2.874 cfs
Time to peak = 734 min
Hyd. volume = 12,789 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 18.00 min
Distribution = Custom
Shape factor = 484

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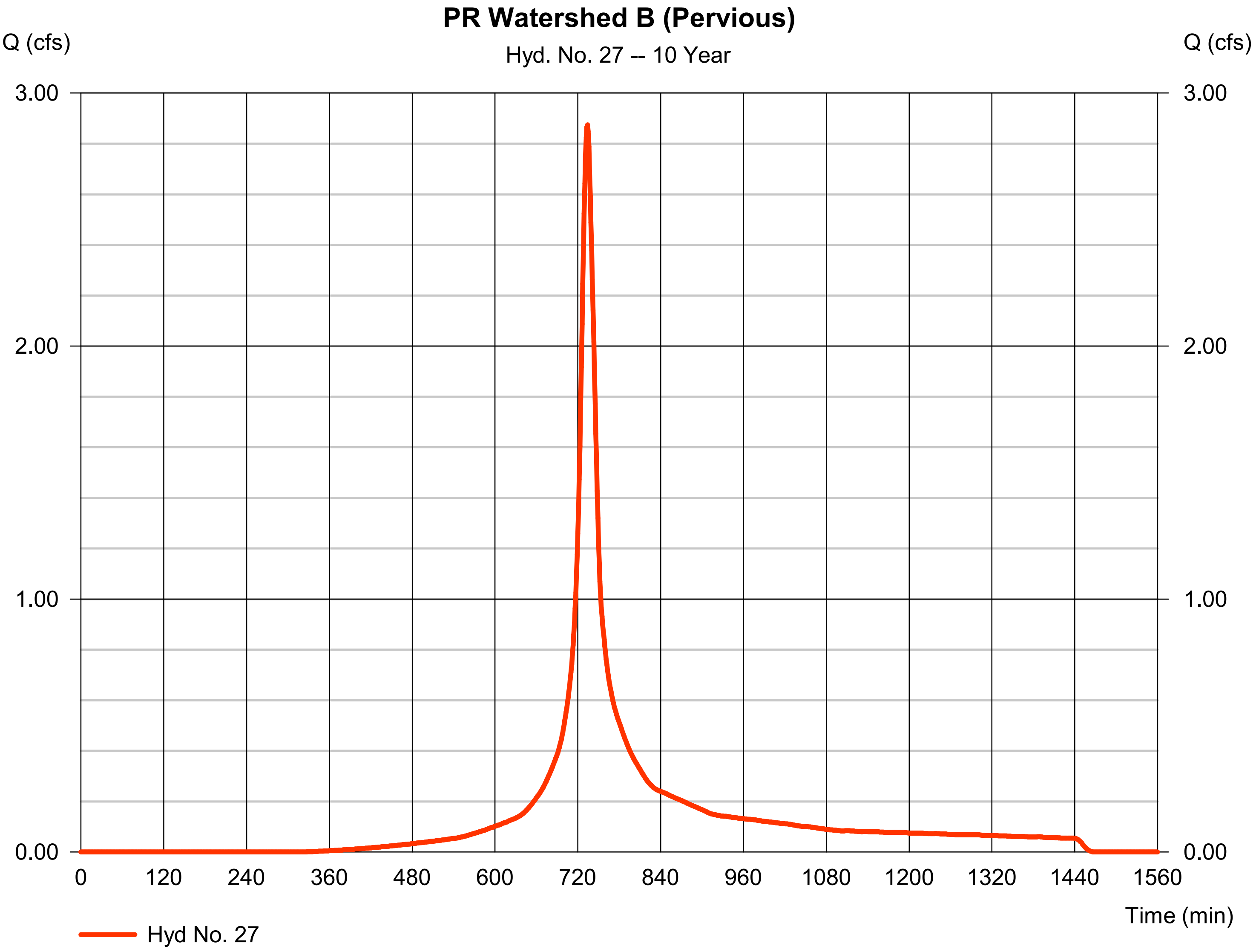
* Composite (Area/CN) = [(0.700 x 80) + (0.020 x 77) + (0.140 x 91)] / 0.860

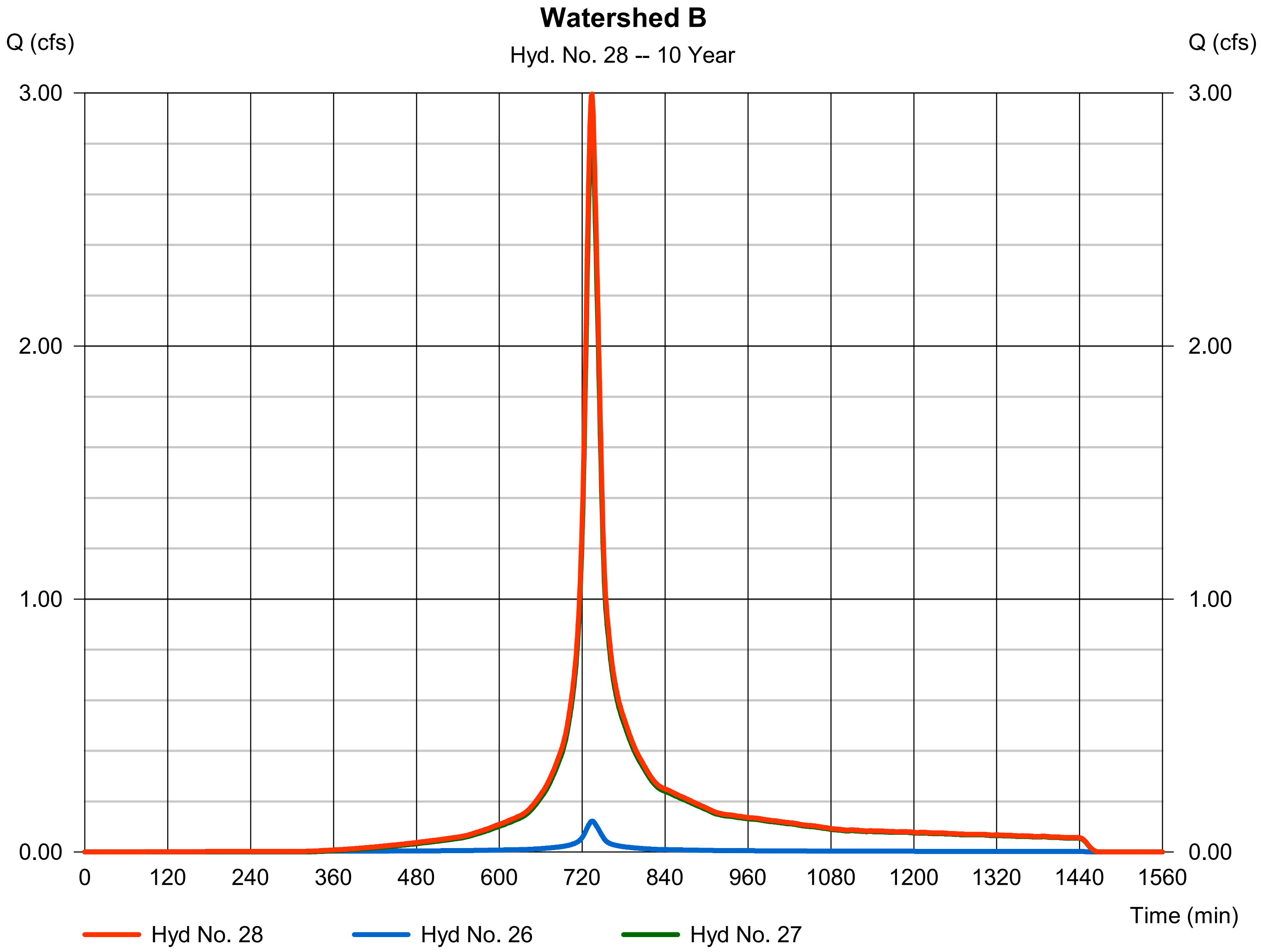


Hydrograph Report

Hyd. No. 28

Watershed B

Hydrograph type	= Combine	Peak discharge	= 2.996 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 13,435 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 0.890 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	13.35	1	727	52,178	------	------	------	PR Watershed A1 (Impervious)
2	SCS Runoff	5.945	1	733	26,425	------	------	------	PR Watershed A1 (Pervious)
3	Combine	18.51	1	728	78,603	1, 2	------	------	Watershed A1
4	Reservoir	9.274	1	739	69,316	3	50.90	28,289	Basin A1
6	SCS Runoff	19.41	1	727	75,895	------	------	------	PR Watershed A2 (Impervious)
7	SCS Runoff	3.684	1	732	15,698	------	------	------	PR Watershed A2 (Pervious)
8	Combine	22.73	1	728	91,593	6, 7	------	------	Watershed A2
9	Reservoir	9.833	1	737	80,032	8	50.98	36,162	Basin A2
11	SCS Runoff	22.24	1	727	86,963	------	------	------	PR Watershed A3 (Impervious)
12	Reservoir	8.458	1	736	49,827	11	51.18	30,902	UG Basin A3
14	SCS Runoff	15.87	1	727	62,060	------	------	------	PR Watershed A4 (Impervious)
15	Combine	15.87	1	727	62,060	14	------	------	Watershed A4
16	Reservoir	11.58	1	731	30,254	15	53.23	14,721	UG Basin A4
18	SCS Runoff	9.005	1	728	37,299	------	------	------	PR Watershed A5 (Impervious)
19	SCS Runoff	0.703	1	729	2,578	------	------	------	PR Watershed A5 (pervious)
20	Combine	9.708	1	728	39,877	18, 19	------	------	PR Watershed A5
22	SCS Runoff	5.459	1	735	26,098	------	------	------	PR Watershed A6
24	Combine	50.72	1	732	295,404	4, 9, 12, 16, 20, 22,	------	------	Watershed A POA
26	SCS Runoff	0.226	1	734	1,216	------	------	------	PR Watershed B (Impervious)
27	SCS Runoff	6.102	1	734	28,215	------	------	------	PR Watershed B (Pervious)
28	Combine	6.328	1	734	29,431	26, 27	------	------	Watershed B

Proposed Hydrographs_Future Precipitation.gpw	Return Period: 100 Year	Friday, 05 / 5 / 2023

Hydrograph Report

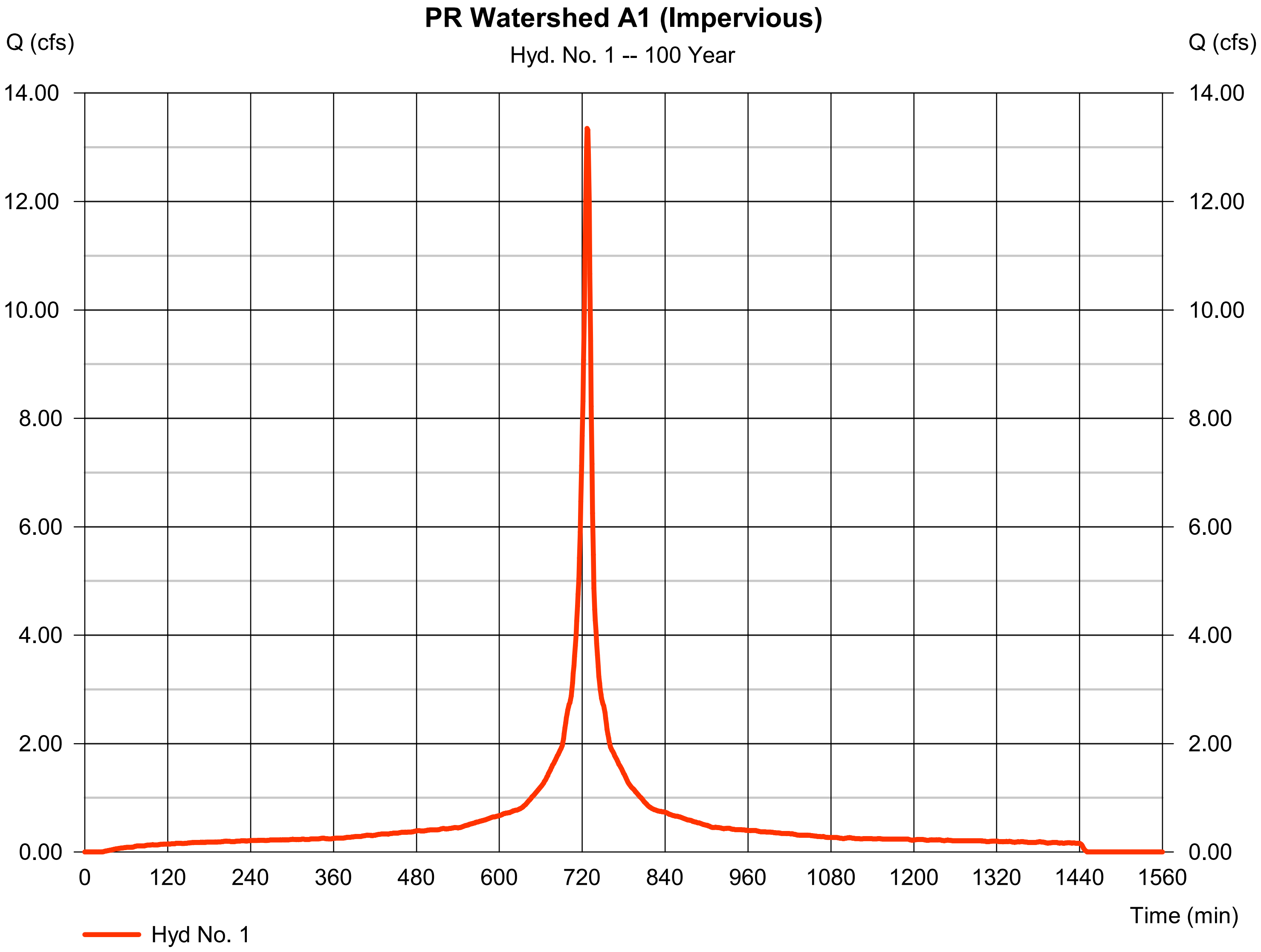
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 1

PR Watershed A1 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.320 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 11.41 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 13.35 cfs
Time to peak = 727 min
Hyd. volume = 52,178 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

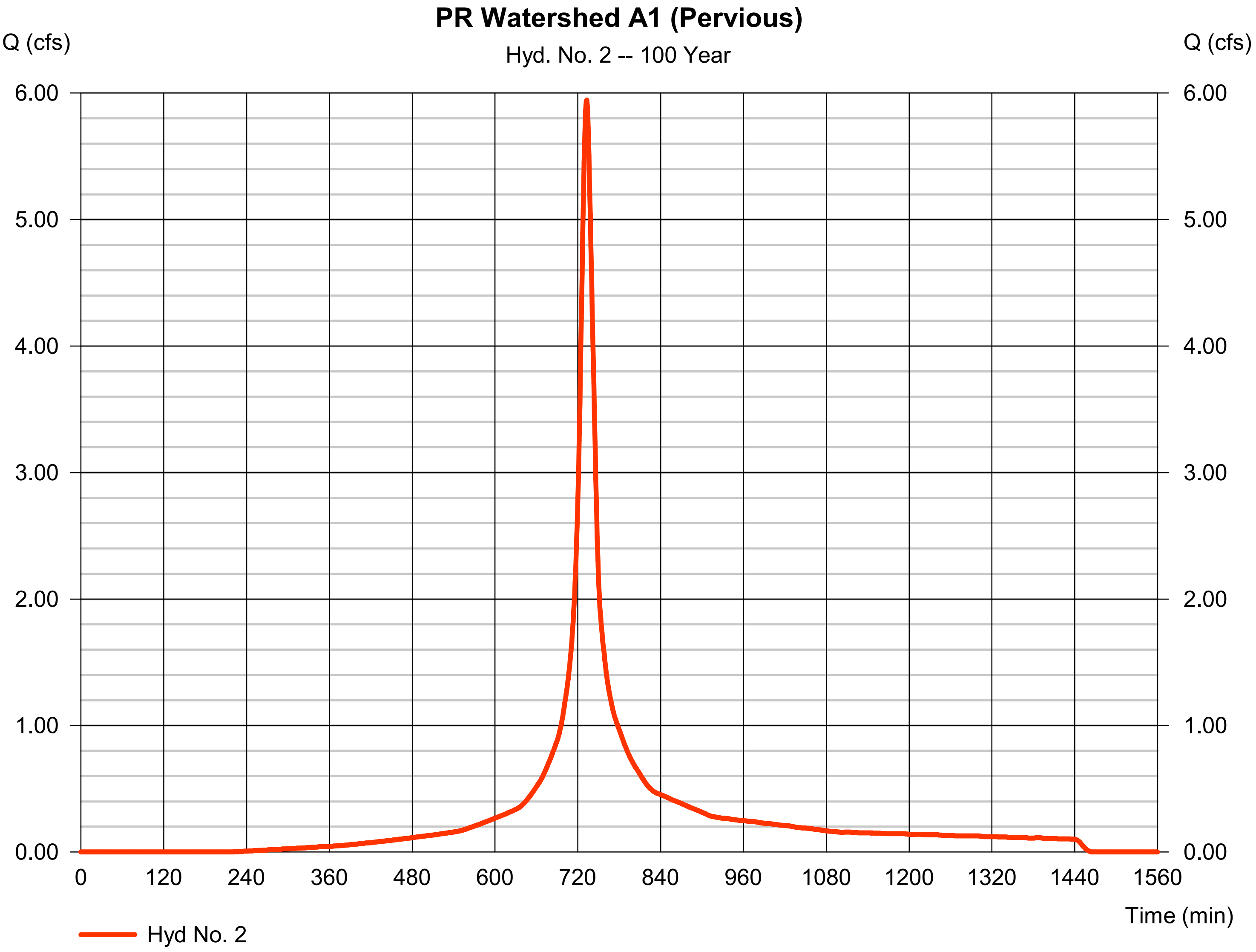
Hyd. No. 2

PR Watershed A1 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 11.41 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 5.945 cfs
Time to peak = 733 min
Hyd. volume = 26,425 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 16.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.790 x 80) + (0.020 x 91)] / 0.810

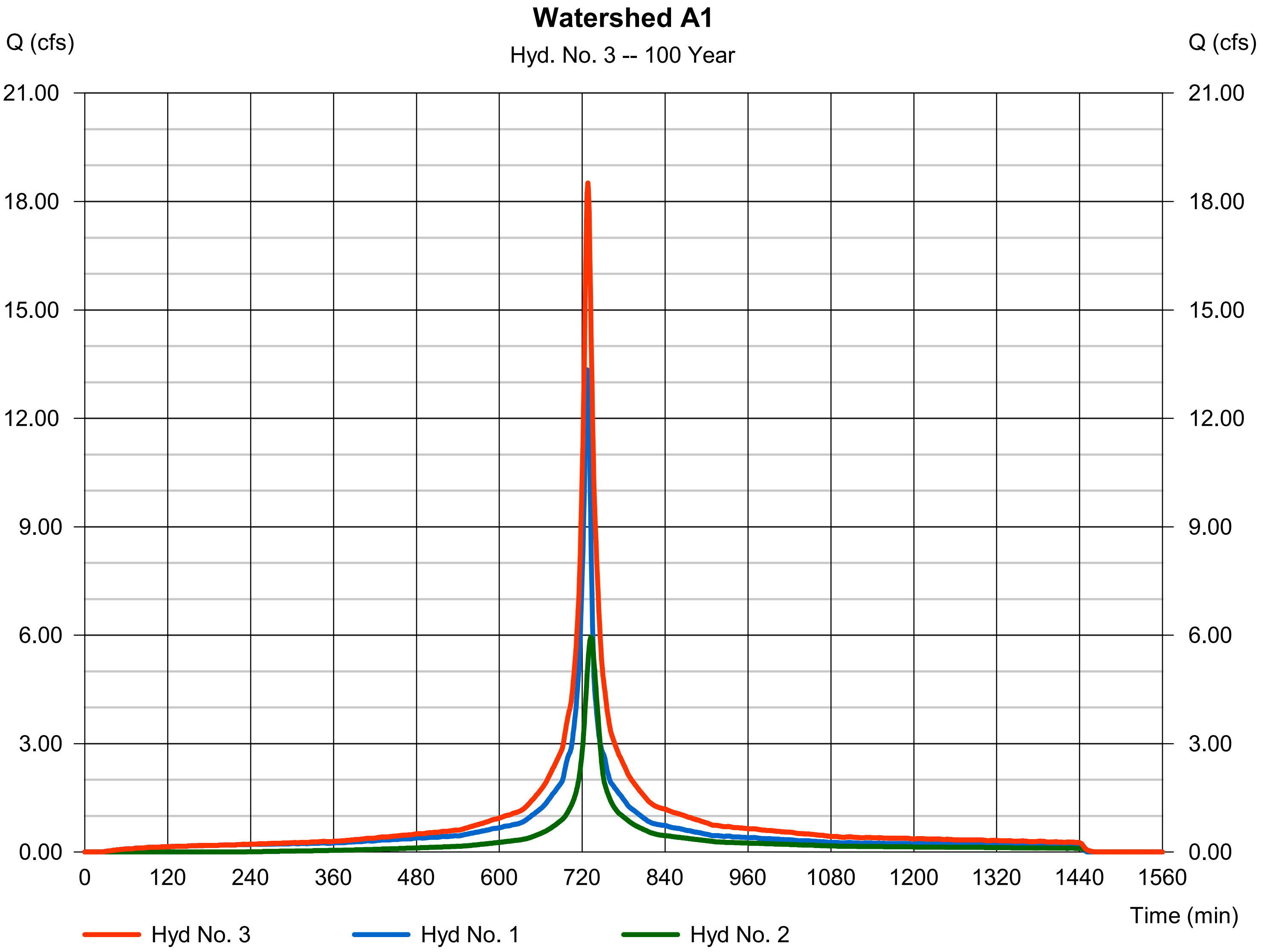


Hydrograph Report

Hyd. No. 3

Watershed A1

Hydrograph type	= Combine	Peak discharge	= 18.51 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 78,603 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.130 ac



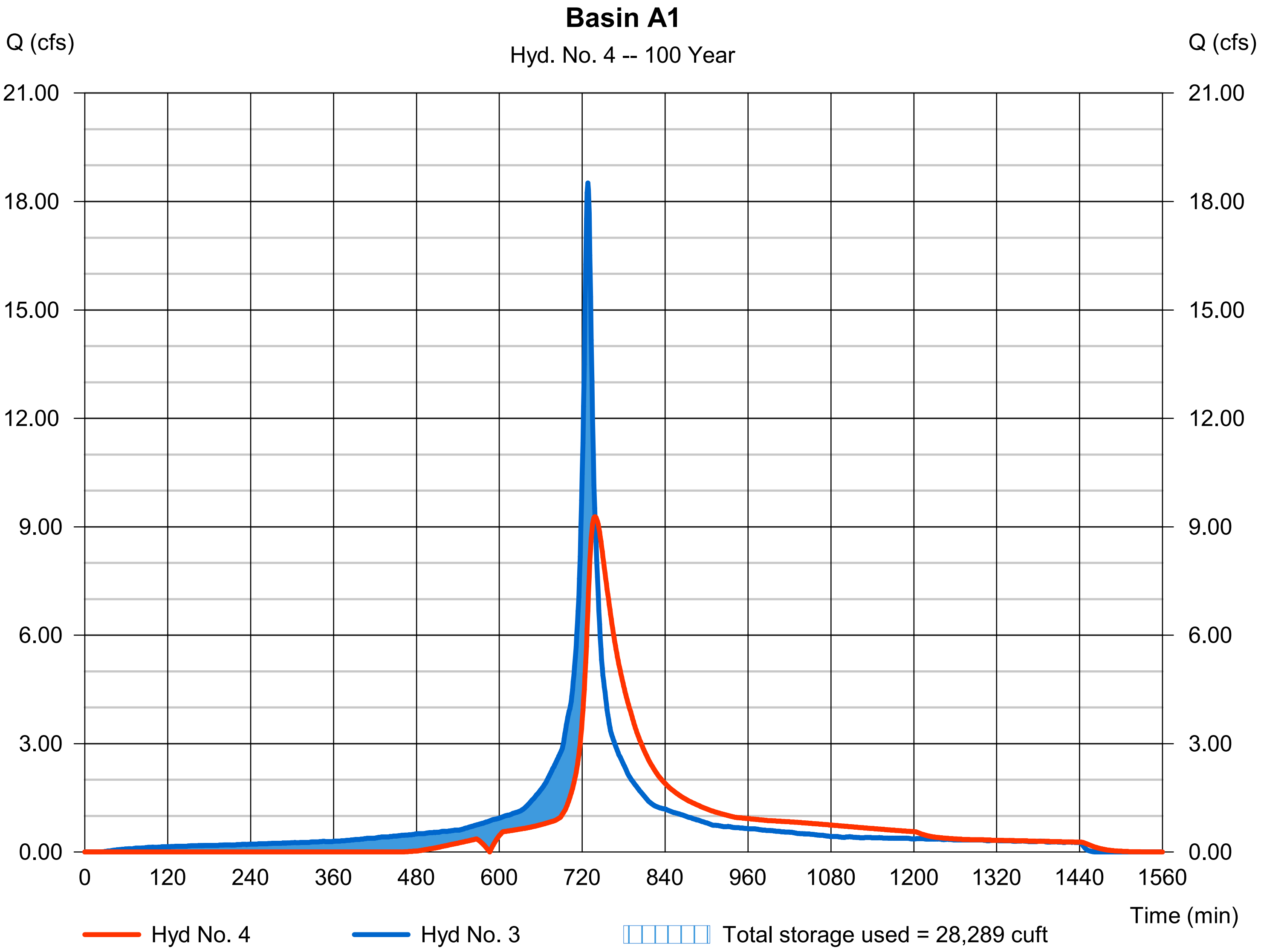
Hydrograph Report

Hyd. No. 4

Basin A1

Hydrograph type	= Reservoir	Peak discharge	= 9.274 cfs
Storm frequency	= 100 yrs	Time to peak	= 739 min
Time interval	= 1 min	Hyd. volume	= 69,316 cuft
Inflow hyd. No.	= 3 - Watershed A1	Max. Elevation	= 50.90 ft
Reservoir name	= Basin A1	Max. Storage	= 28,289 cuft

Storage Indication method used.



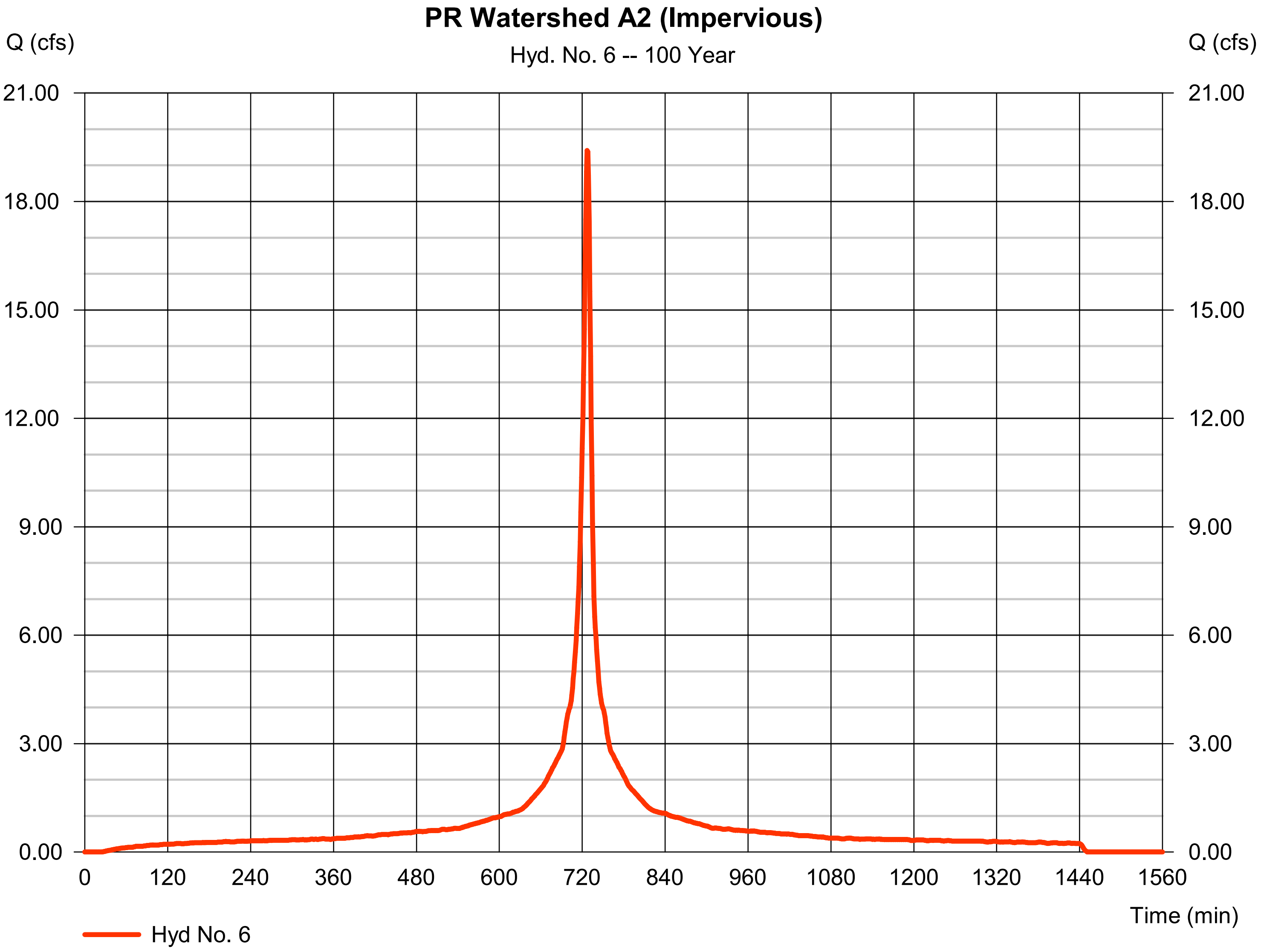
Hydrograph Report

Hyd. No. 6

PR Watershed A2 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.920 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 11.41 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 19.41 cfs
Time to peak = 727 min
Hyd. volume = 75,895 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

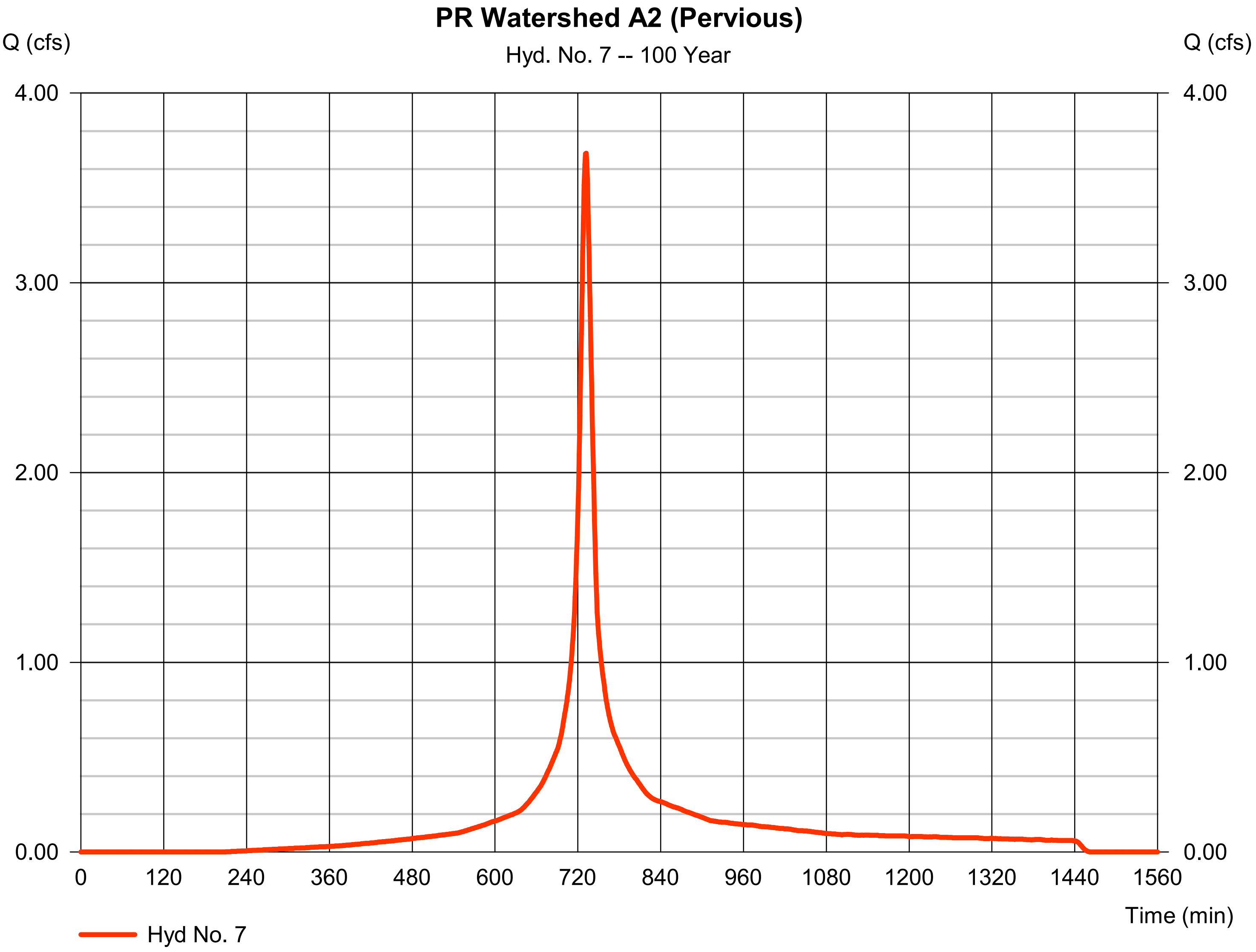
Hyd. No. 7

PR Watershed A2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 0.480 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 11.41 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 3.684 cfs
Time to peak = 732 min
Hyd. volume = 15,698 cuft
Curve number = 81*
Hydraulic length = 0 ft
Time of conc. (Tc) = 14.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.390 x 80) + (0.050 x 91)] / 0.480

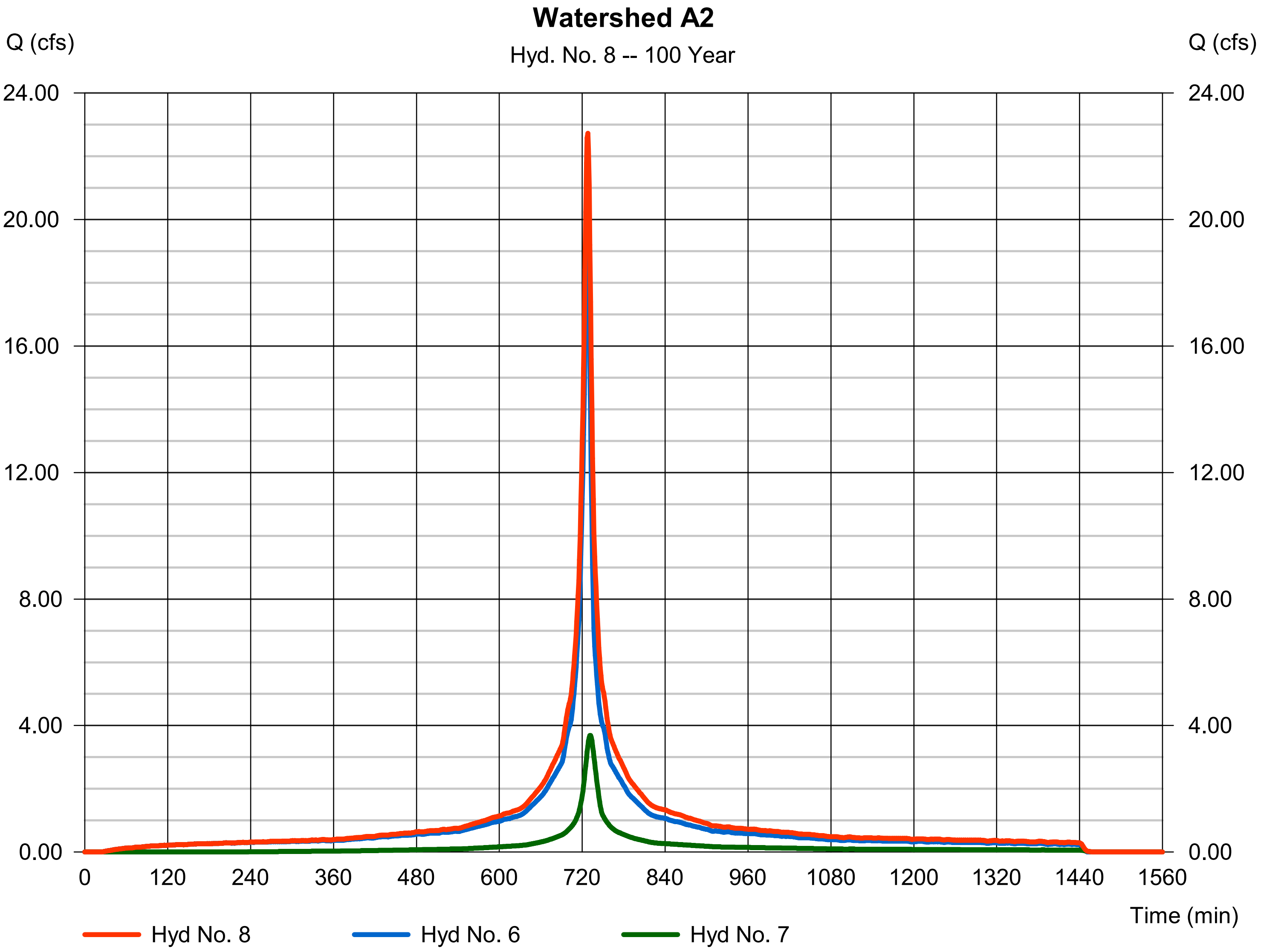


Hydrograph Report

Hyd. No. 8

Watershed A2

Hydrograph type	= Combine	Peak discharge	= 22.73 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 91,593 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 2.400 ac



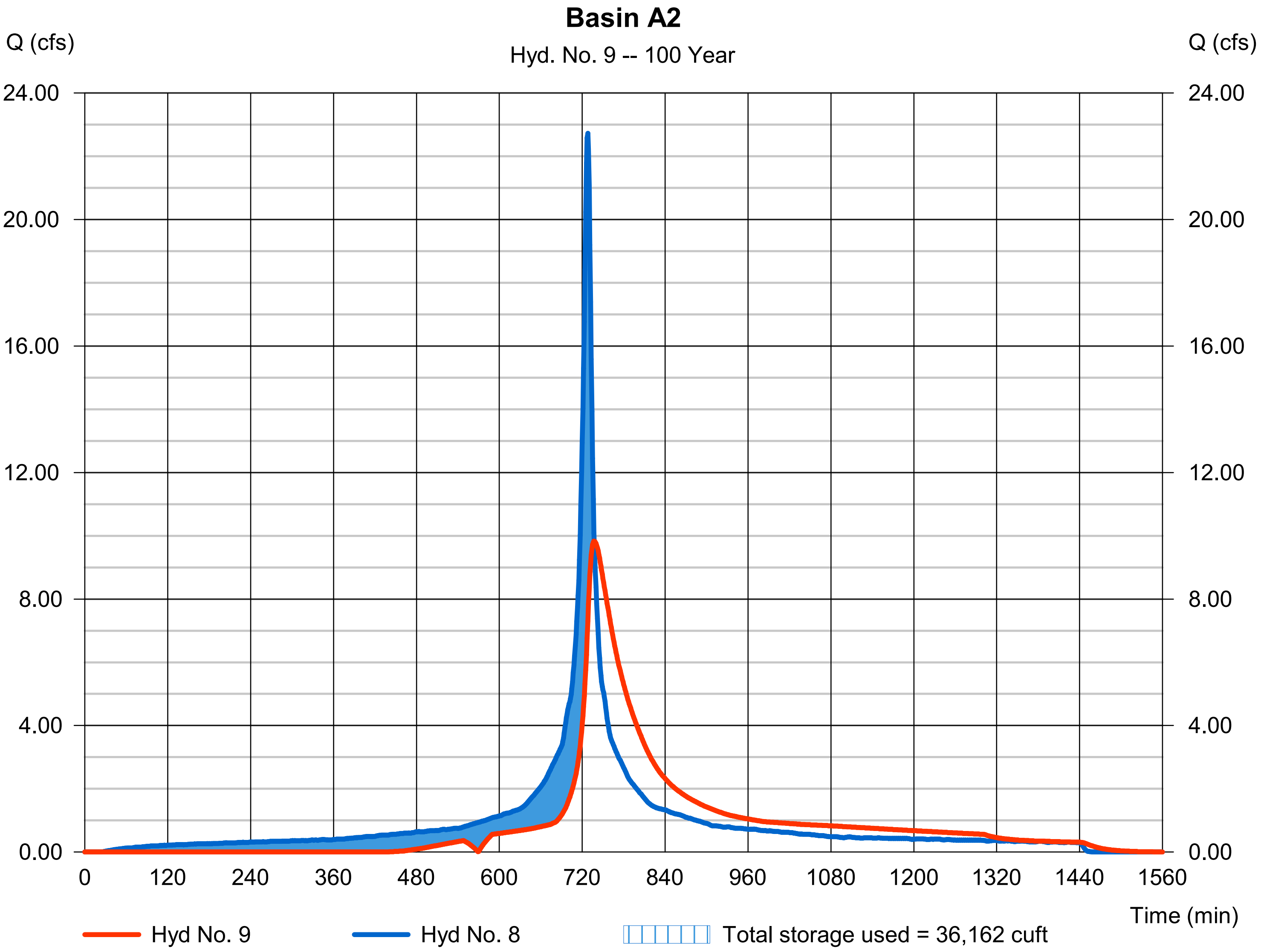
Hydrograph Report

Hyd. No. 9

Basin A2

Hydrograph type	= Reservoir	Peak discharge	= 9.833 cfs
Storm frequency	= 100 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 80,032 cuft
Inflow hyd. No.	= 8 - Watershed A2	Max. Elevation	= 50.98 ft
Reservoir name	= Basin A2	Max. Storage	= 36,162 cuft

Storage Indication method used.



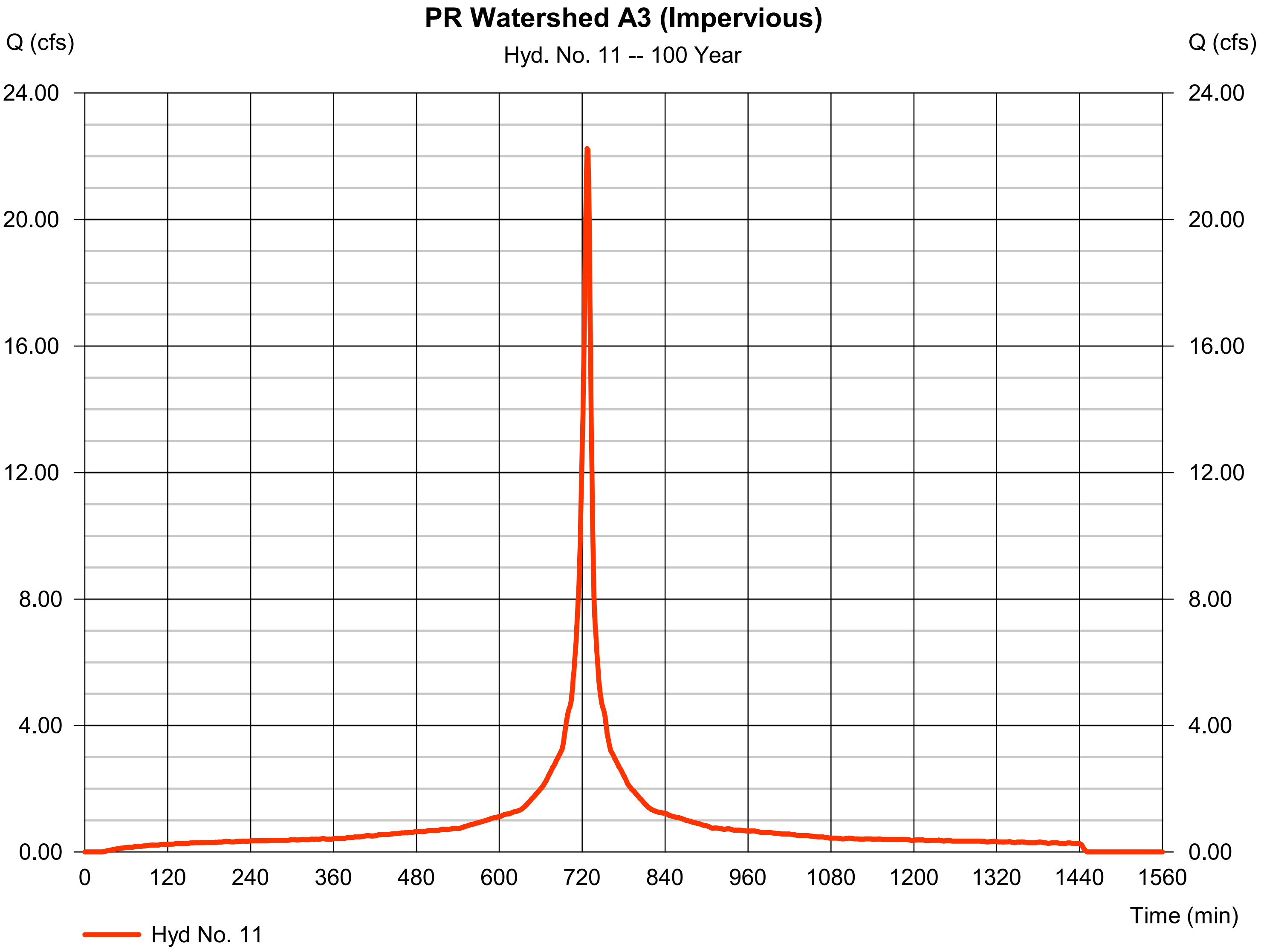
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 11

PR Watershed A3 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 22.24 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 86,963 cuft
Drainage area	= 2.200 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.00 min
Total precip.	= 11.41 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr	Shape factor	= 484



Hydrograph Report

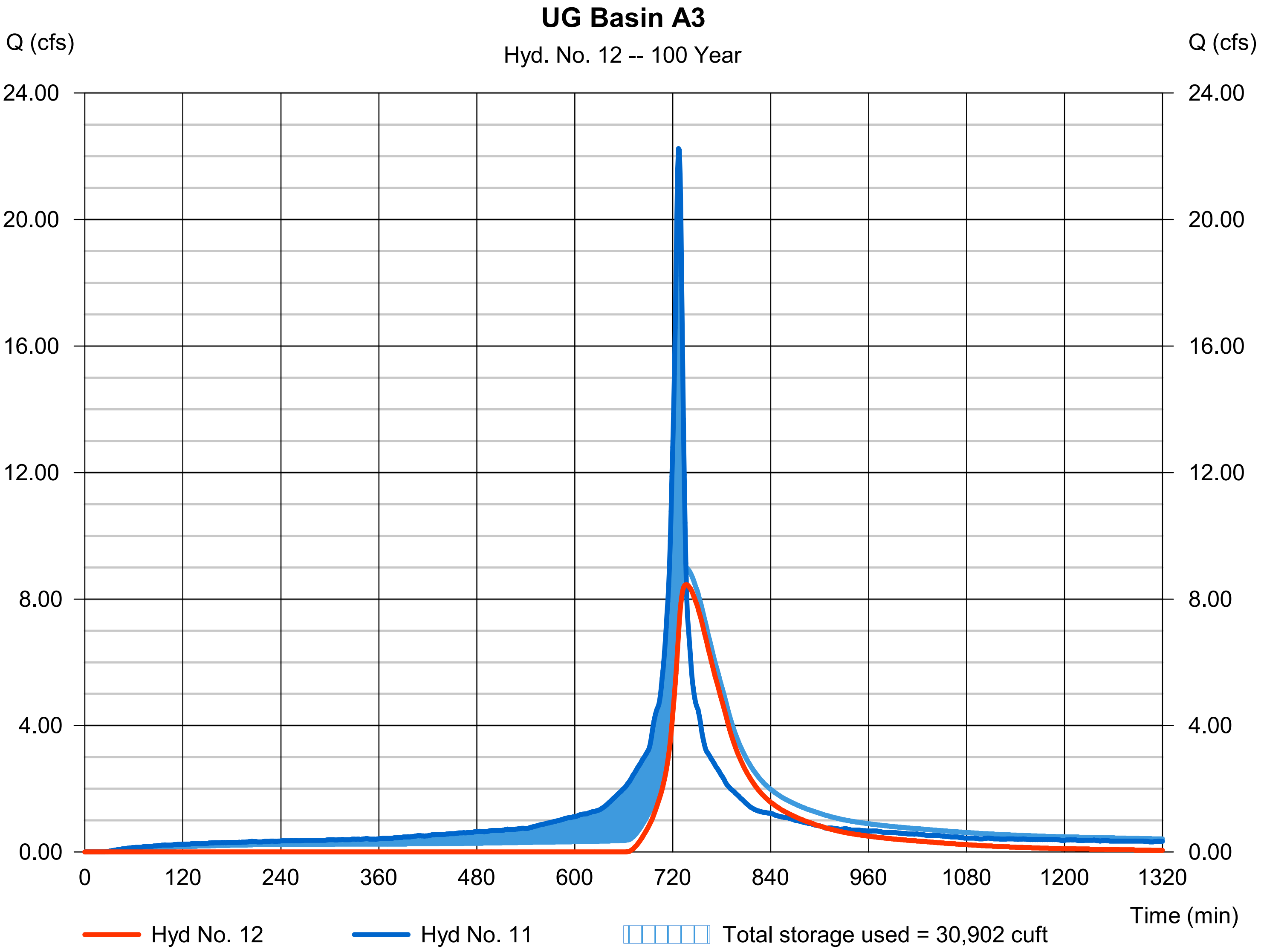
Hyd. No. 12

UG Basin A3

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyd. No. = 11 - PR Watershed A3 (Impervious)
Reservoir name = UG Detention A3

Peak discharge = 8.458 cfs
Time to peak = 736 min
Hyd. volume = 49,827 cuft
Max. Elevation = 51.18 ft
Max. Storage = 30,902 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



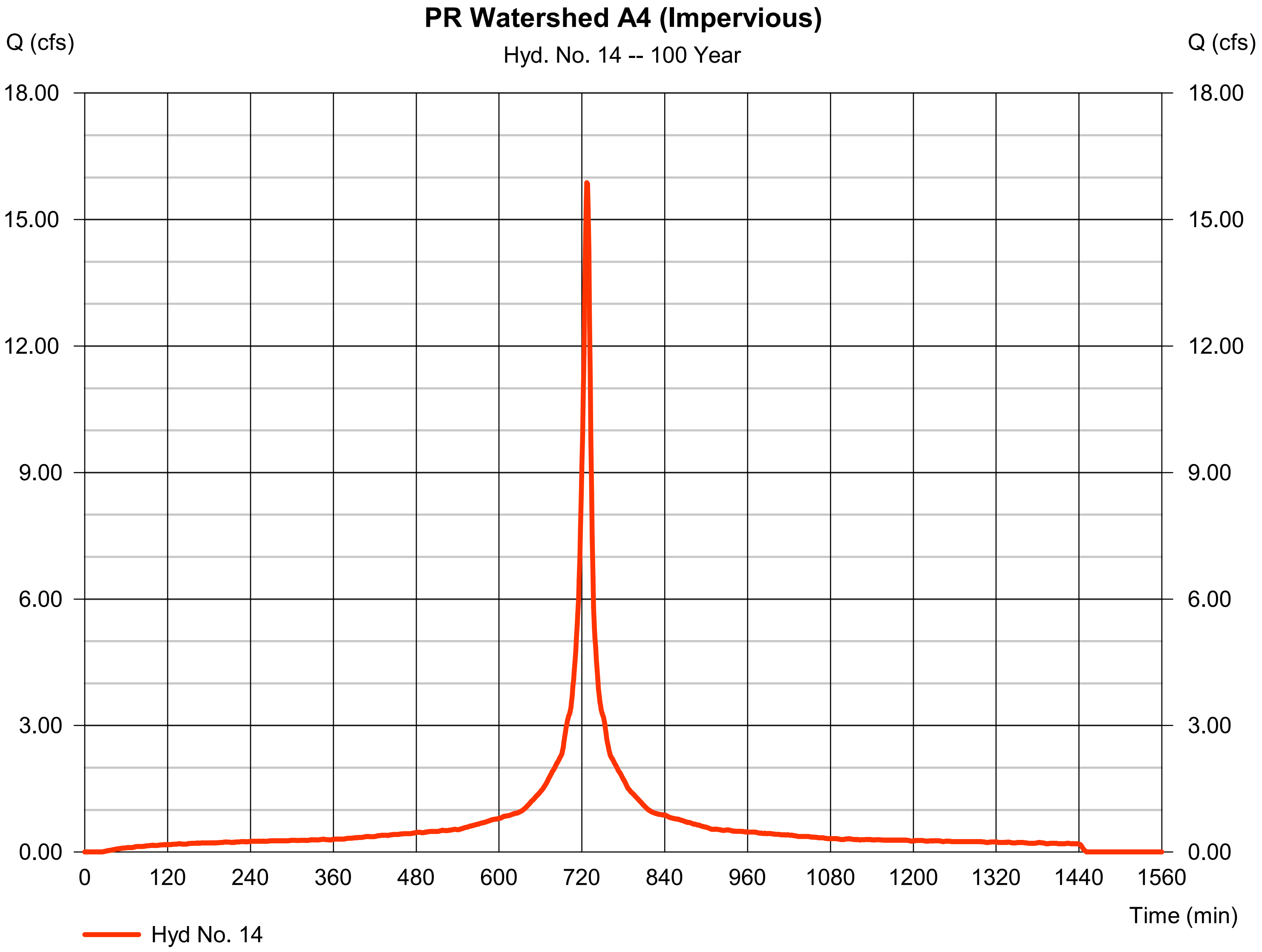
Hydrograph Report

Hyd. No. 14

PR Watershed A4 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.570 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 11.41 in
Storm duration = \\langan.com\data\PAR\data0\100851301\Project Data_Discipline\Site Civil\Storr

Peak discharge = 15.87 cfs
Time to peak = 727 min
Hyd. volume = 62,060 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484

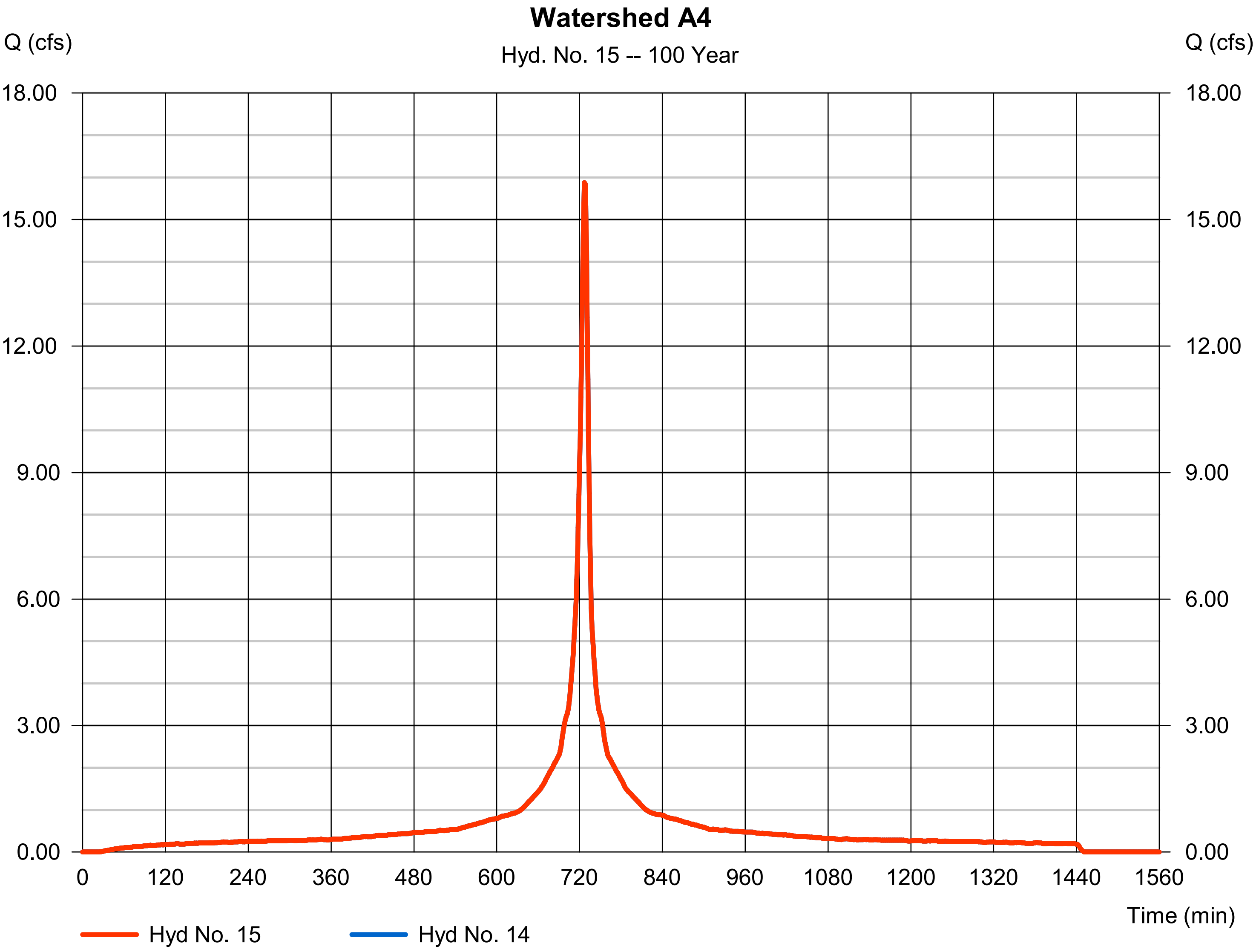


Hydrograph Report

Hyd. No. 15

Watershed A4

Hydrograph type	= Combine	Peak discharge	= 15.87 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 62,060 cuft
Inflow hyds.	= 14	Contrib. drain. area	= 1.570 ac



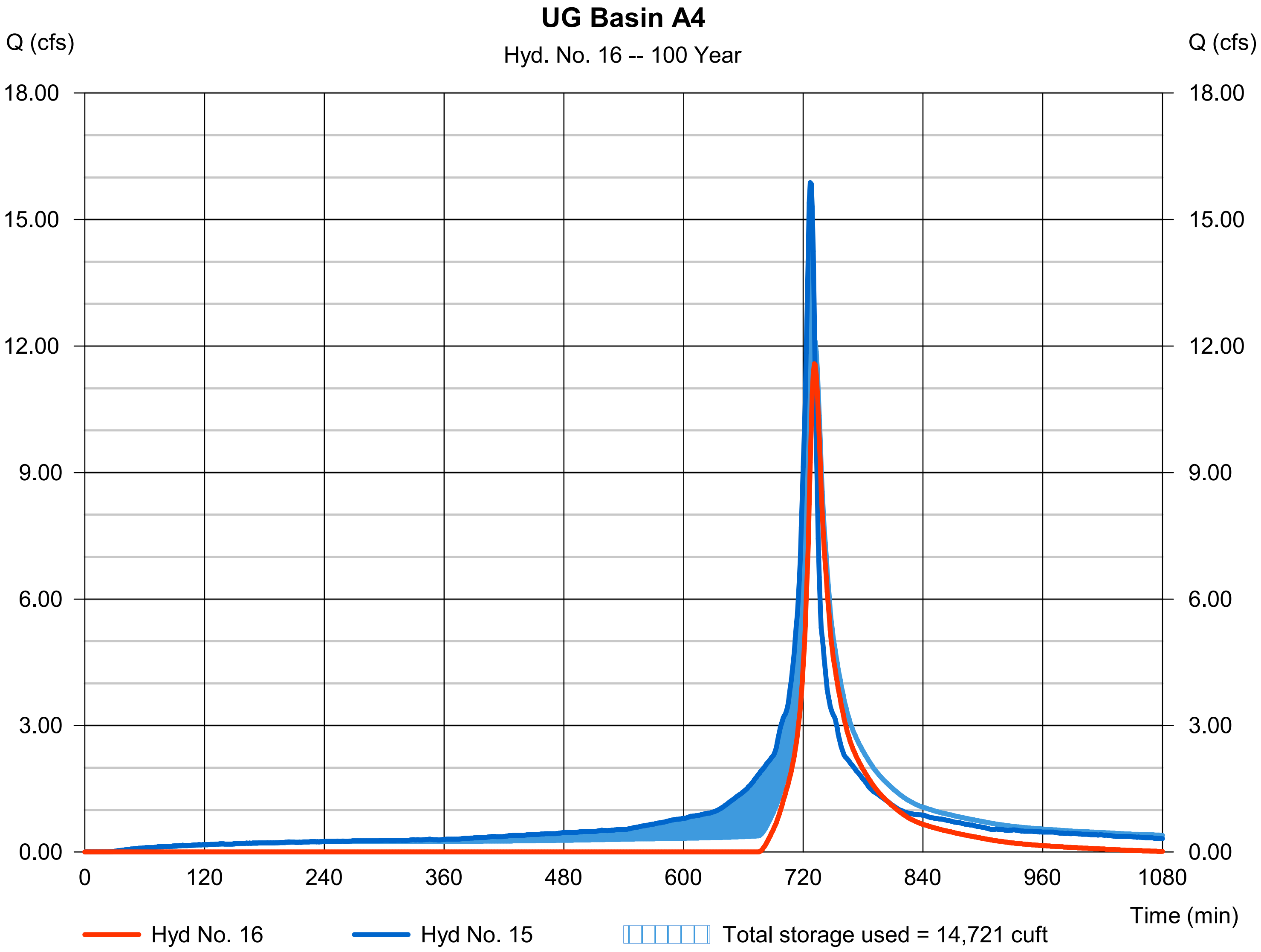
Hydrograph Report

Hyd. No. 16

UG Basin A4

Hydrograph type	= Reservoir	Peak discharge	= 11.58 cfs
Storm frequency	= 100 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 30,254 cuft
Inflow hyd. No.	= 15 - Watershed A4	Max. Elevation	= 53.23 ft
Reservoir name	= UG Detention A4	Max. Storage	= 14,721 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

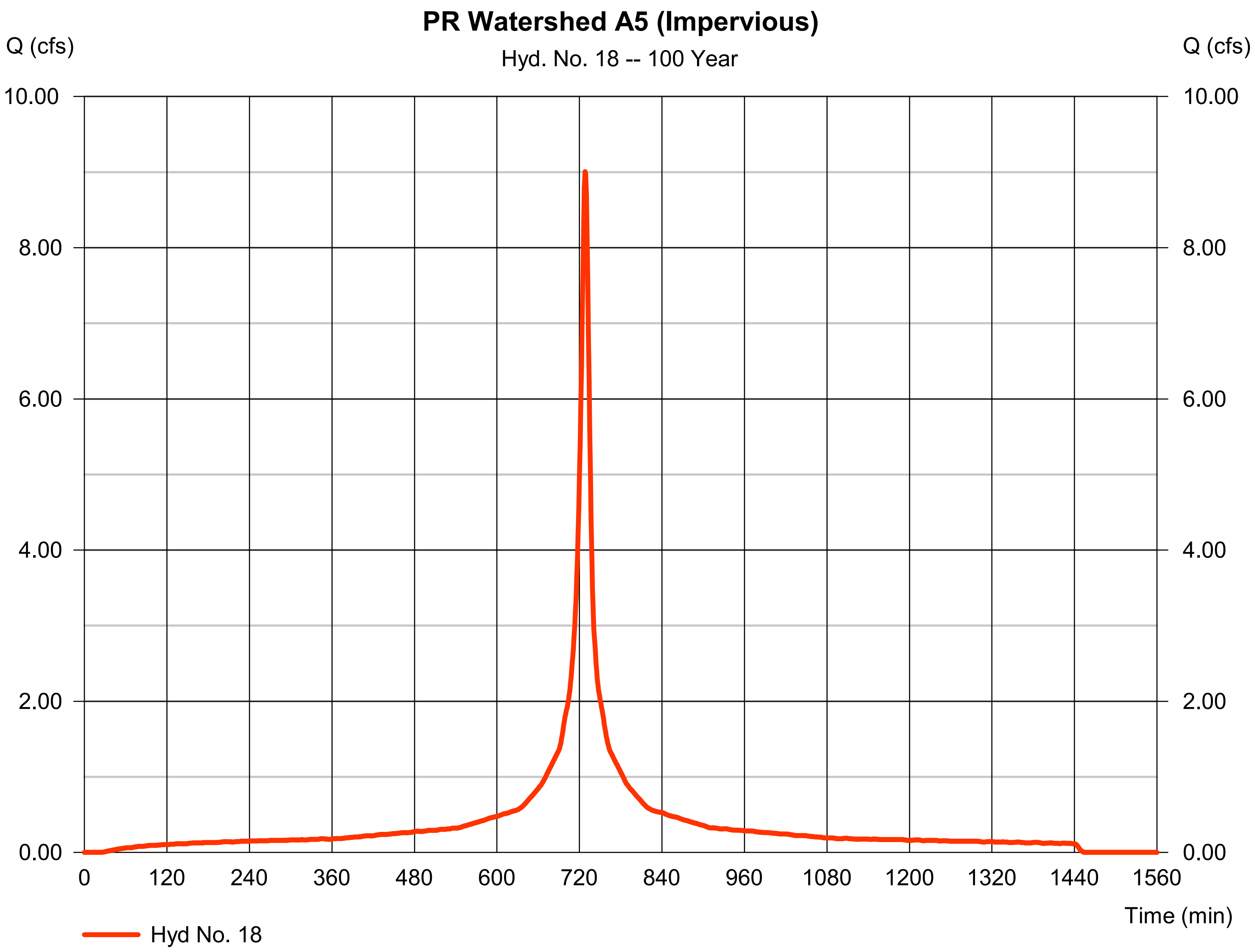


Hydrograph Report

Hyd. No. 18

PR Watershed A5 (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.005 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	1 min	Hyd. volume	=	37,299 cuft
Drainage area	=	0.920 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	11.41 in	Distribution	=	Custom
Storm duration	=	\\langan.com\data\PAR\data0\100851301\Project Data_Discipline\Site Civil\Storr	Shape factor	=	484

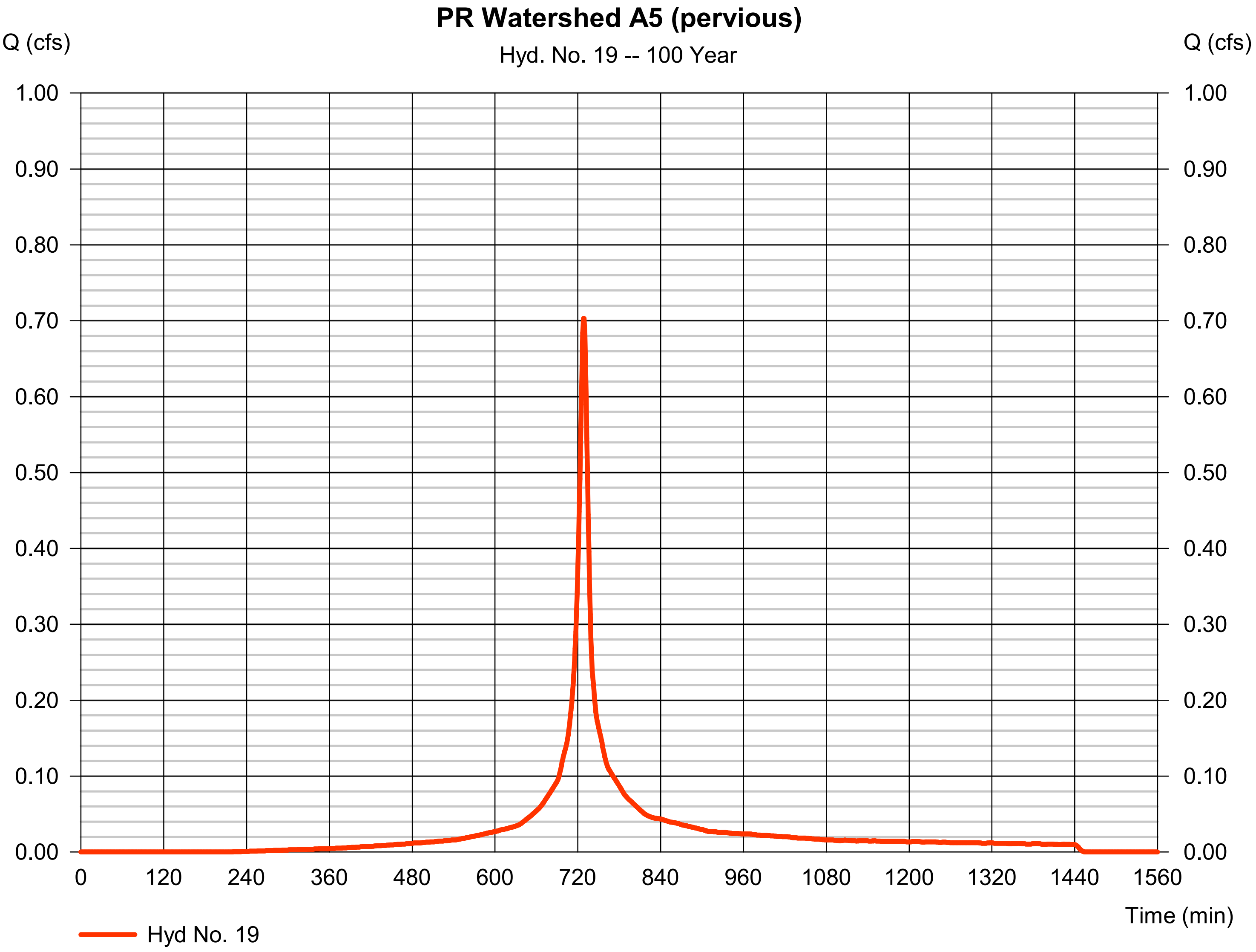


Hydrograph Report

Hyd. No. 19

PR Watershed A5 (pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.703 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 2,578 cuft
Drainage area	= 0.080 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 11.41 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor	Shape factor	= 484

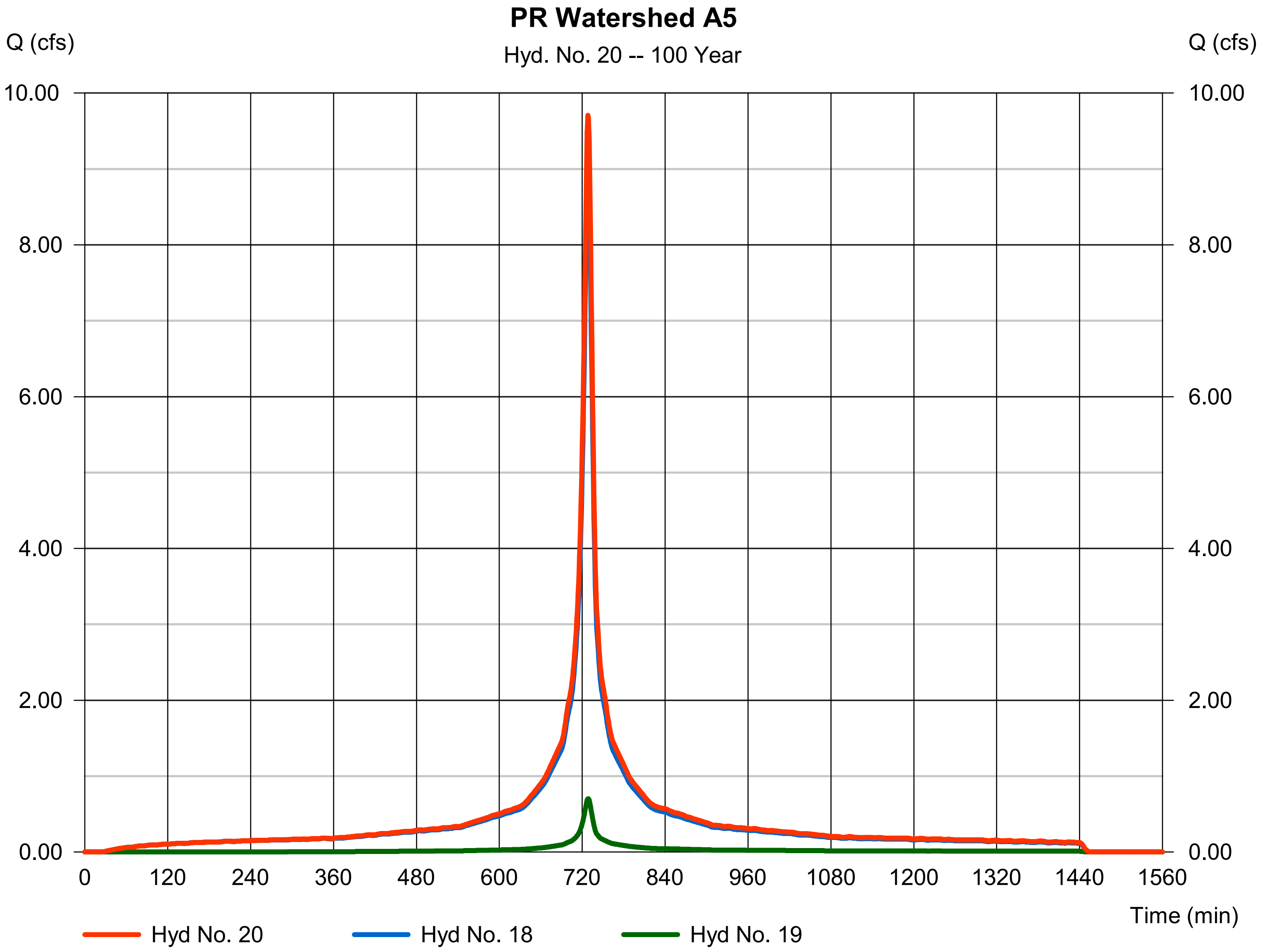


Hydrograph Report

Hyd. No. 20

PR Watershed A5

Hydrograph type	= Combine	Peak discharge	= 9.708 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 39,877 cuft
Inflow hyds.	= 18, 19	Contrib. drain. area	= 1.000 ac

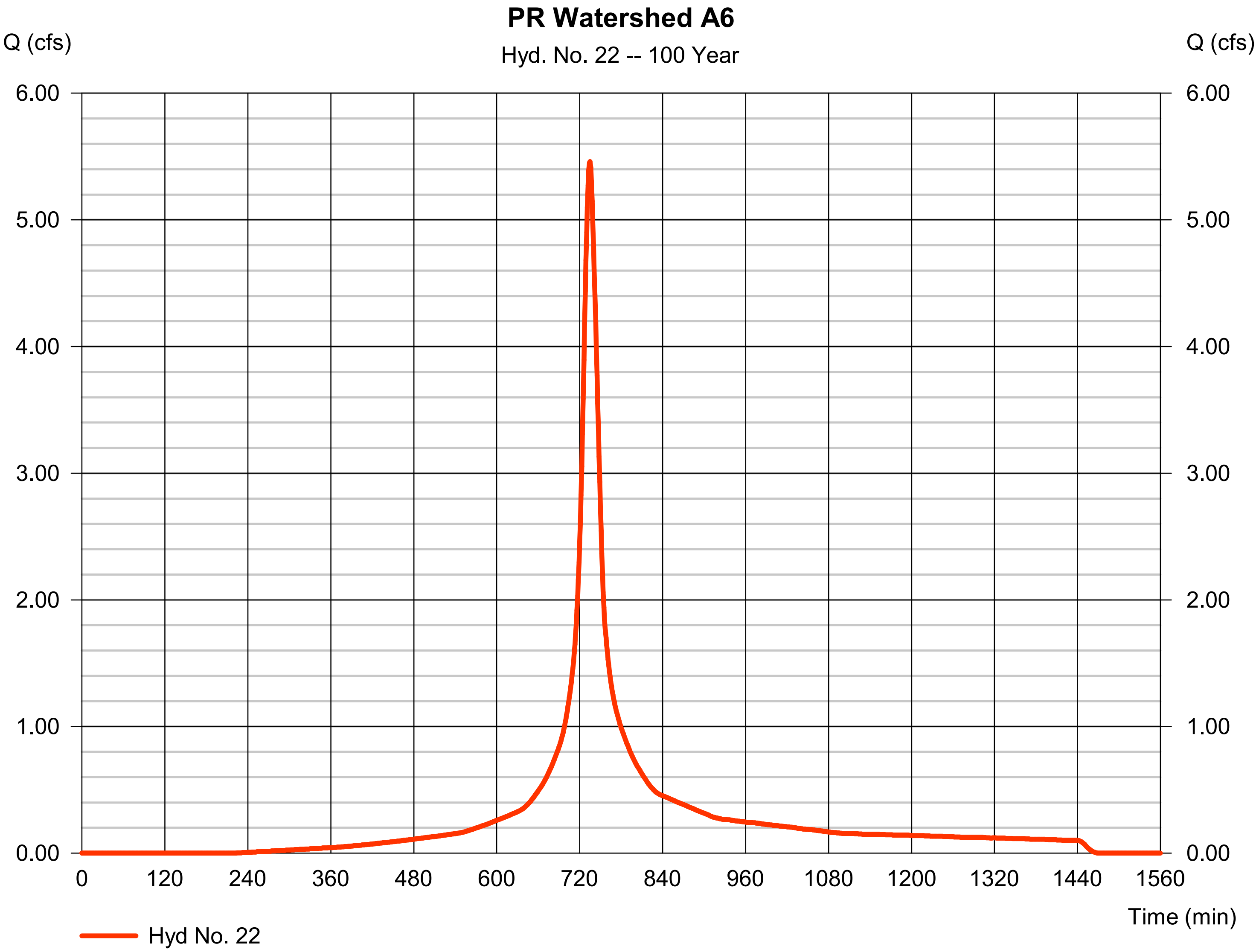


Hydrograph Report

Hyd. No. 22

PR Watershed A6

Hydrograph type	= SCS Runoff	Peak discharge	= 5.459 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 1 min	Hyd. volume	= 26,098 cuft
Drainage area	= 0.810 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.00 min
Total precip.	= 11.41 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm	Shape factor	= 484

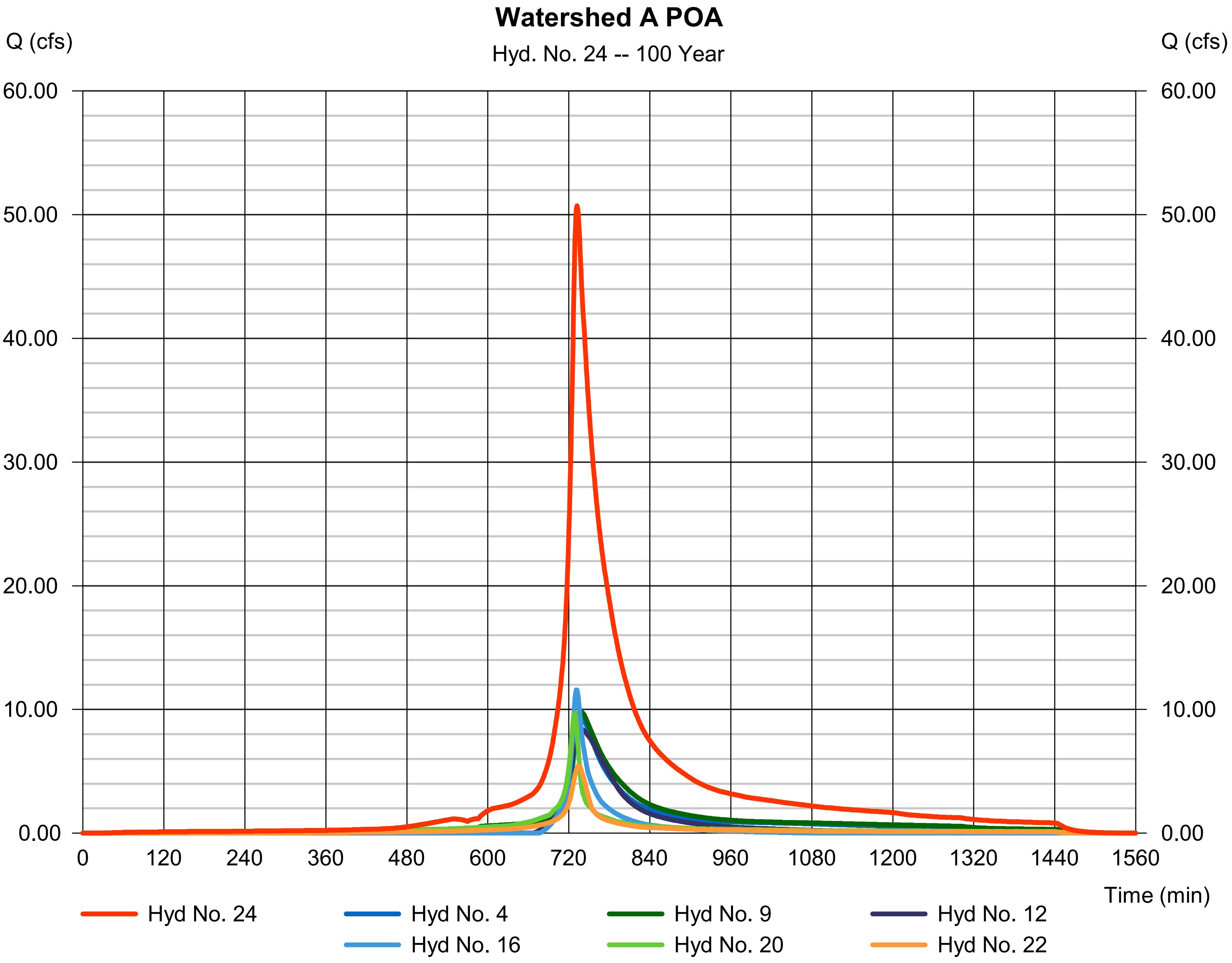


Hydrograph Report

Hyd. No. 24

Watershed A POA

Hydrograph type	= Combine	Peak discharge	= 50.72 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 1 min	Hyd. volume	= 295,404 cuft
Inflow hyds.	= 4, 9, 12, 16, 20, 22	Contrib. drain. area	= 0.810 ac

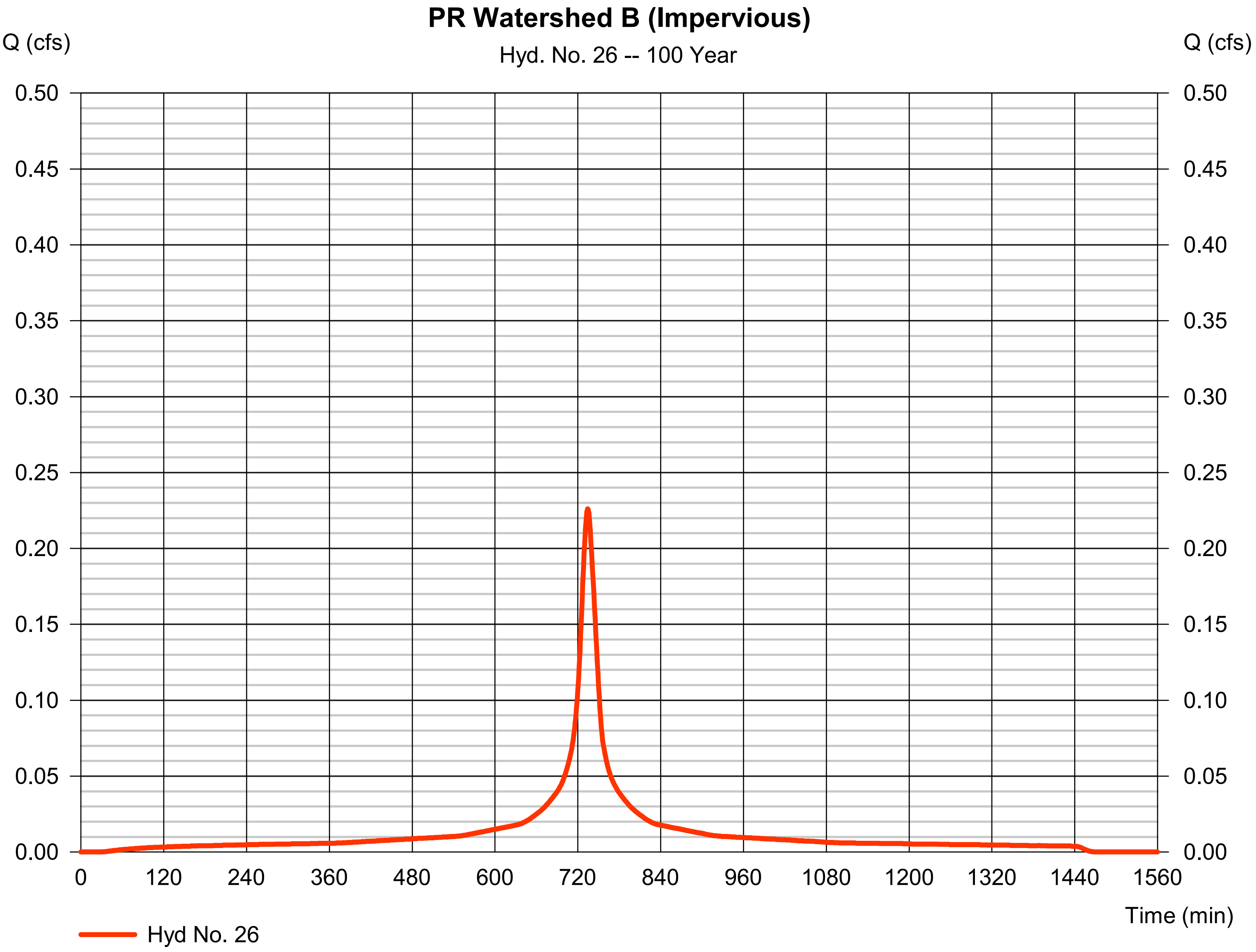


Hydrograph Report

Hyd. No. 26

PR Watershed B (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.226 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 1,216 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.00 min
Total precip.	= 11.41 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Stor	Shape factor	= 484



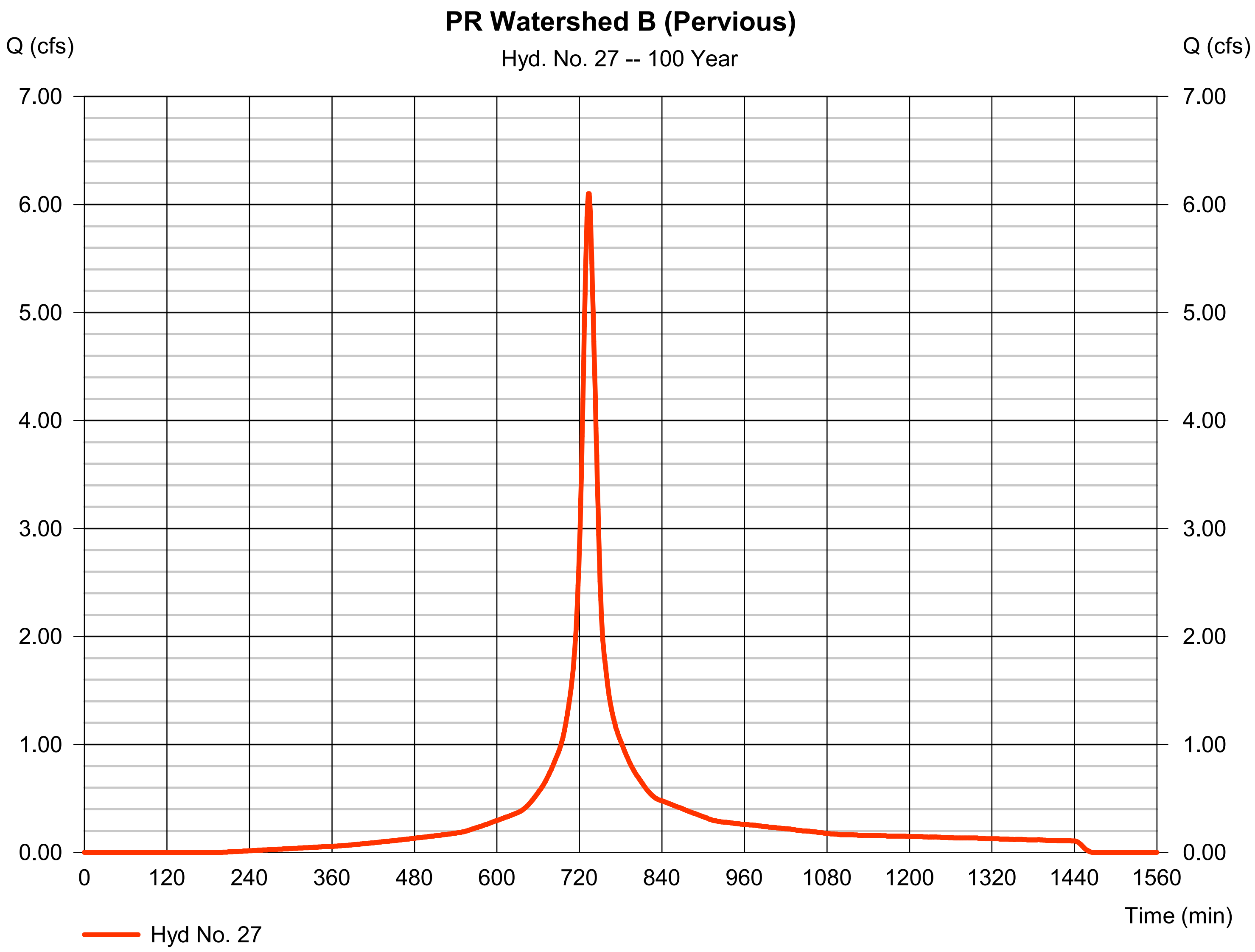
Hydrograph Report

Hyd. No. 27

PR Watershed B (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.102 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 28,215 cuft
Drainage area	= 0.860 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.00 min
Total precip.	= 11.41 in	Distribution	= Custom
Storm duration	= \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr	Shape factor	= 484

* Composite (Area/CN) = [(0.700 x 80) + (0.020 x 77) + (0.140 x 91)] / 0.860

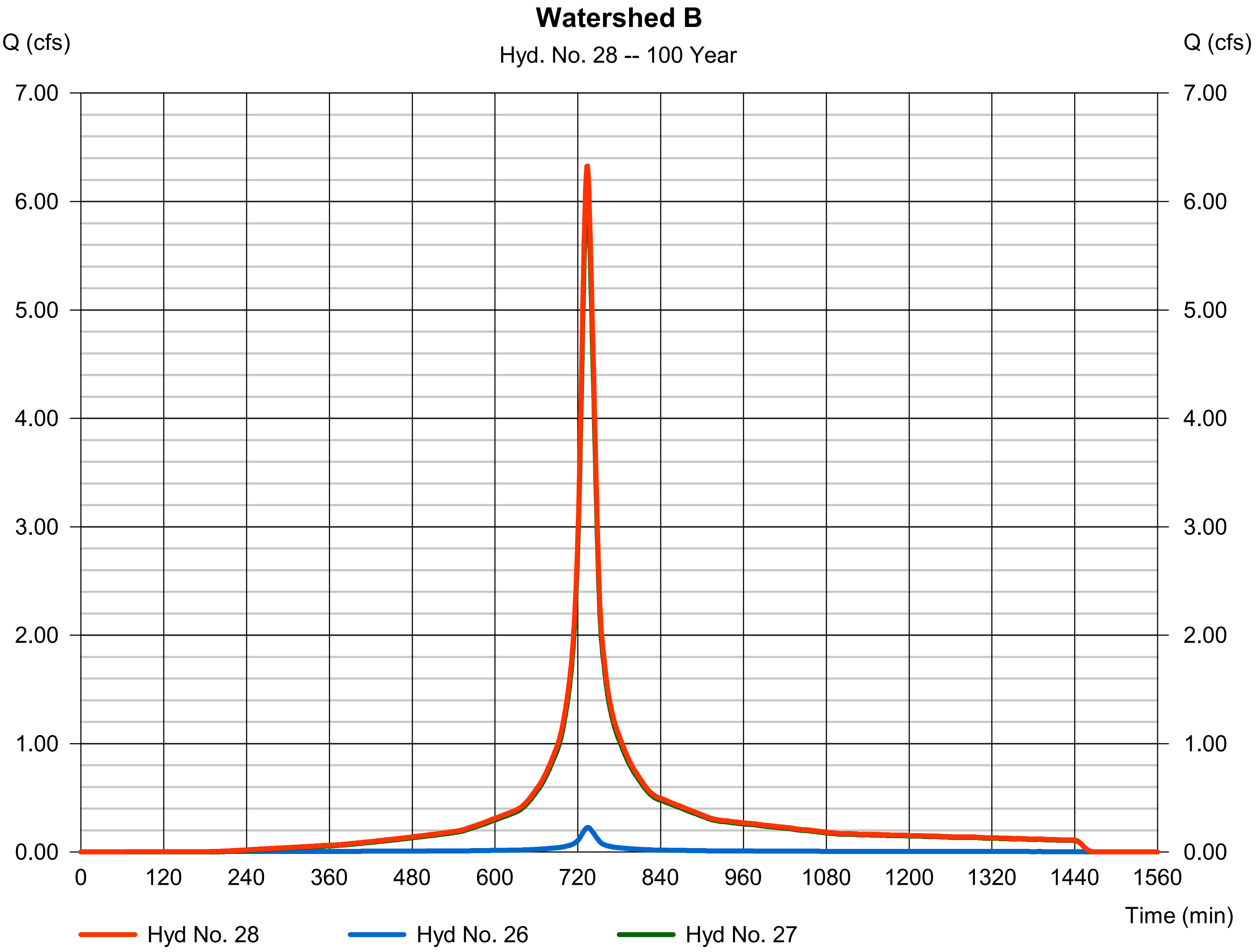


Hydrograph Report

Hyd. No. 28

Watershed B

Hydrograph type	= Combine	Peak discharge	= 6.328 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 29,431 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 0.890 ac

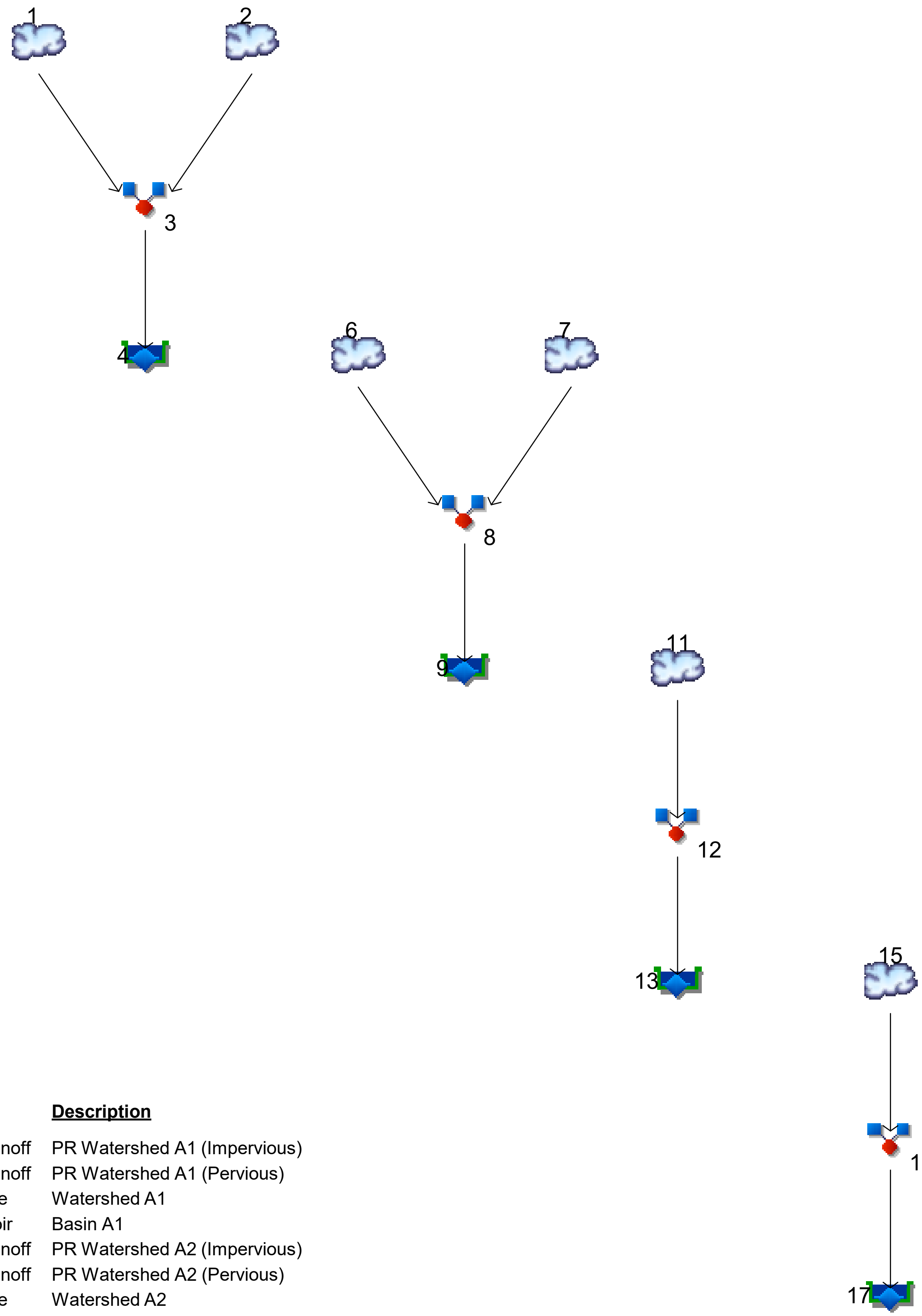


APPENDIX C

Water Quality Storm Hydrologic Analysis

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022



Legend

Hyd.	Origin	Description
1	SCS Runoff	PR Watershed A1 (Impervious)
2	SCS Runoff	PR Watershed A1 (Pervious)
3	Combine	Watershed A1
4	Reservoir	Basin A1
6	SCS Runoff	PR Watershed A2 (Impervious)
7	SCS Runoff	PR Watershed A2 (Pervious)
8	Combine	Watershed A2
9	Reservoir	Basin A2
11	SCS Runoff	PR Watershed A3 (Impervious)
12	Combine	Watershed A3
13	Reservoir	UG Basin A3
15	SCS Runoff	PR Watershed A4 (Impervious)
16	Combine	Watershed A4
17	Reservoir	UG Basin A4

Project: Water Quality.gpw

Friday, 05 / 5 / 2023

Hydraflow Table of Contents

Water Quality.gpw

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

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Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.626	1	66	4,833	------	------	------	PR Watershed A1 (Impervious)
2	SCS Runoff	0.266	1	77	515	------	------	------	PR Watershed A1 (Pervious)
3	Combine	3.704	1	66	5,348	1, 2	------	------	Watershed A1
4	Reservoir	0.000	1	n/a	0	3	47.91	5,348	Basin A1
6	SCS Runoff	5.275	1	66	7,030	------	------	------	PR Watershed A2 (Impervious)
7	SCS Runoff	0.183	1	75	326	------	------	------	PR Watershed A2 (Pervious)
8	Combine	5.345	1	66	7,356	6, 7	------	------	Watershed A2
9	Reservoir	0.000	1	n/a	0	8	48.00	7,356	Basin A2
11	SCS Runoff	6.044	1	66	8,056	------	------	------	PR Watershed A3 (Impervious)
12	Combine	6.044	1	66	8,056	11	------	------	Watershed A3
13	Reservoir	0.000	1	532	0	12	49.67	6,681	UG Basin A3
15	SCS Runoff	4.313	1	66	5,749	------	------	------	PR Watershed A4 (Impervious)
16	Combine	4.313	1	66	5,749	15	------	------	Watershed A4
17	Reservoir	0.000	1	n/a	0	16	51.47	3,840	UG Basin A4

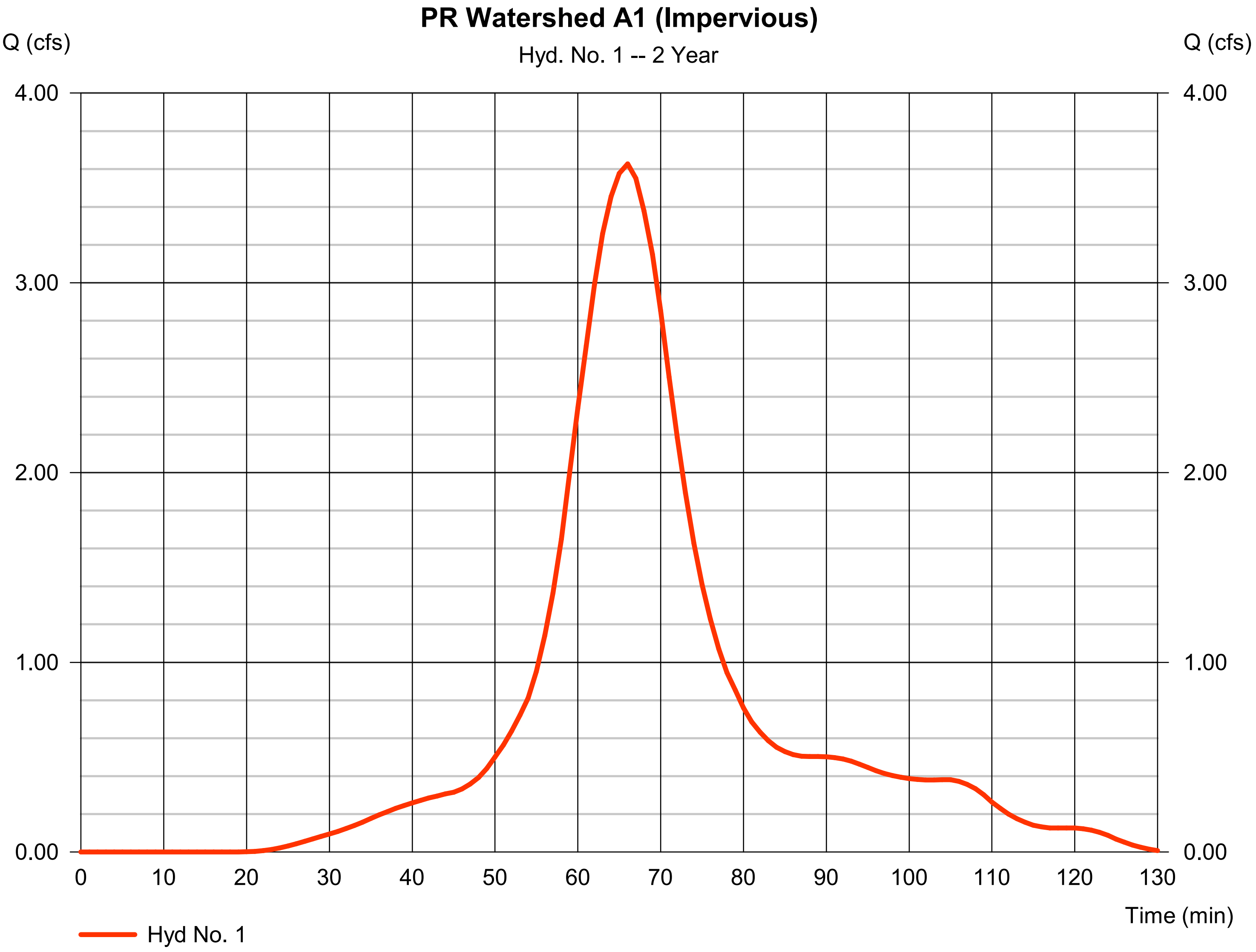
Hydrograph Report

Hyd. No. 1

PR Watershed A1 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.320 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 1.25 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 3.626 cfs
Time to peak = 66 min
Hyd. volume = 4,833 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

Hyd. No. 2

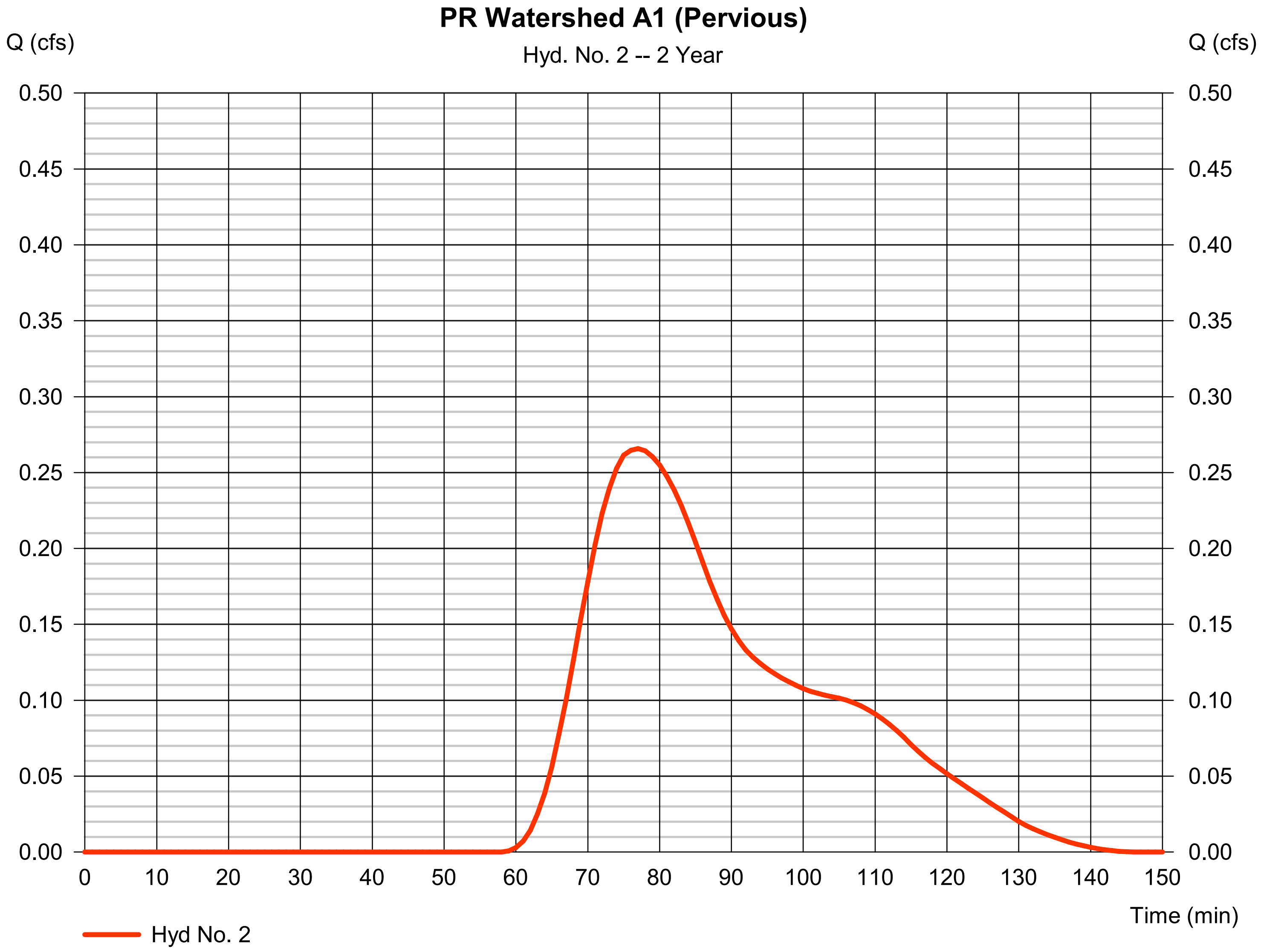
PR Watershed A1 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.810 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 1.25 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.266 cfs
Time to peak = 77 min
Hyd. volume = 515 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 16.00 min
Distribution = Custom
Shape factor = 484

---

* Composite (Area/CN) = [(0.790 x 80) + (0.020 x 91)] / 0.810

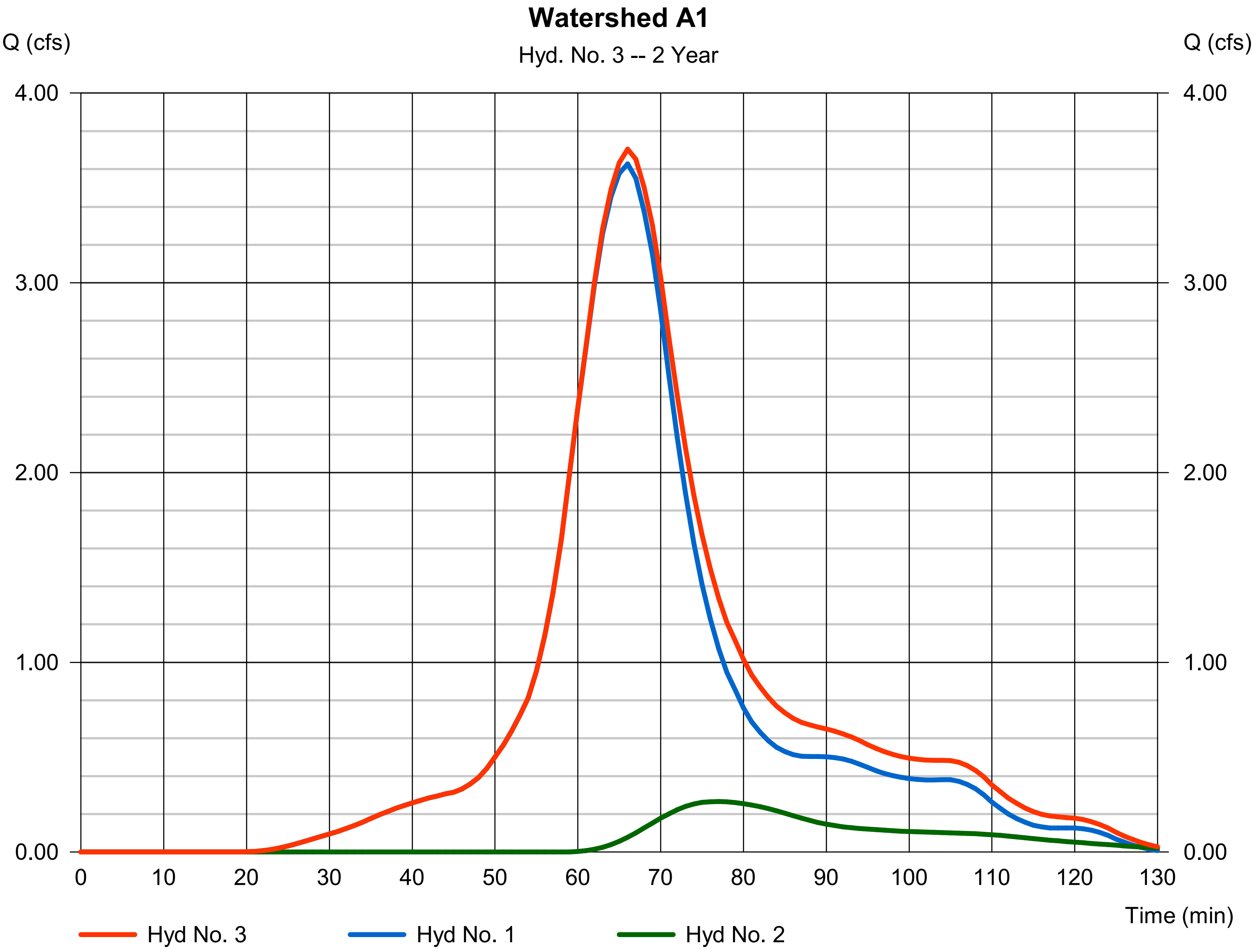


Hydrograph Report

Hyd. No. 3

Watershed A1

Hydrograph type	= Combine	Peak discharge	= 3.704 cfs
Storm frequency	= 2 yrs	Time to peak	= 66 min
Time interval	= 1 min	Hyd. volume	= 5,348 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.130 ac



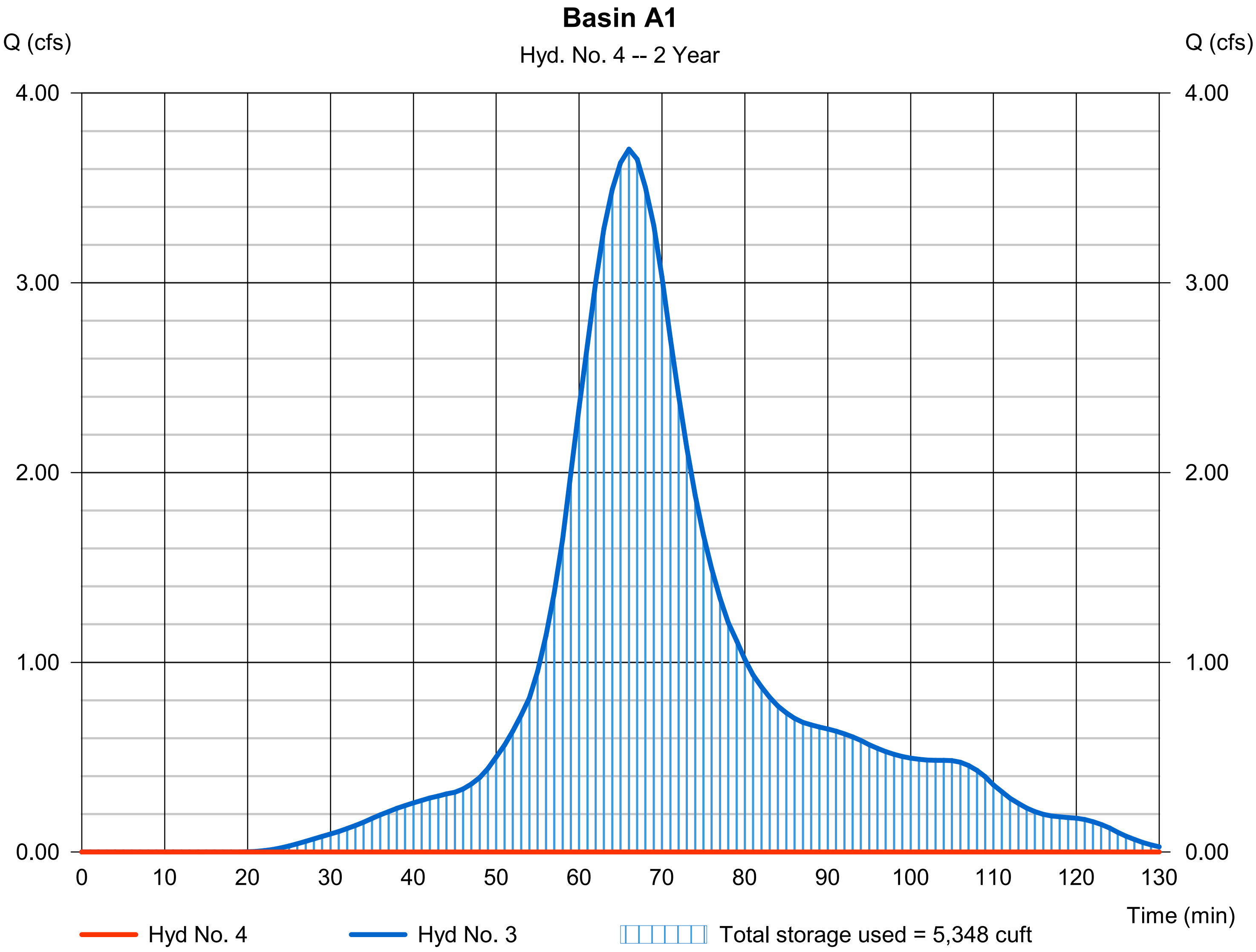
Hydrograph Report

Hyd. No. 4

Basin A1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 3 - Watershed A1	Max. Elevation	= 47.91 ft
Reservoir name	= Basin A1	Max. Storage	= 5,348 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Basin A1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 47.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	47.00	5,443	0	0
1.00	48.00	6,344	5,887	5,887
2.00	49.00	7,260	6,796	12,683
3.00	50.00	8,216	7,732	20,416
4.00	51.00	9,219	8,712	29,127

Culvert / Orifice Structures

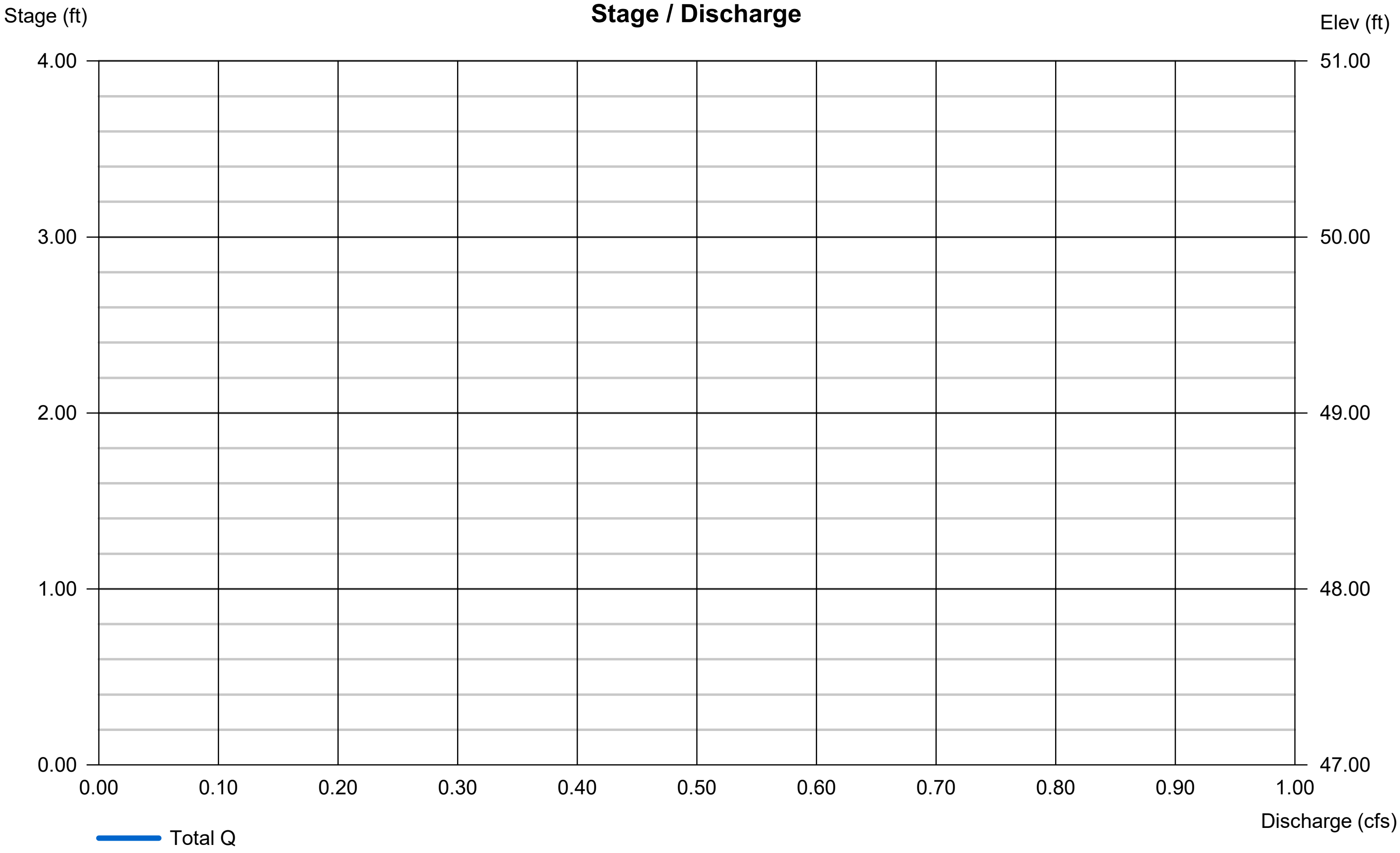
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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



Hydrograph Report

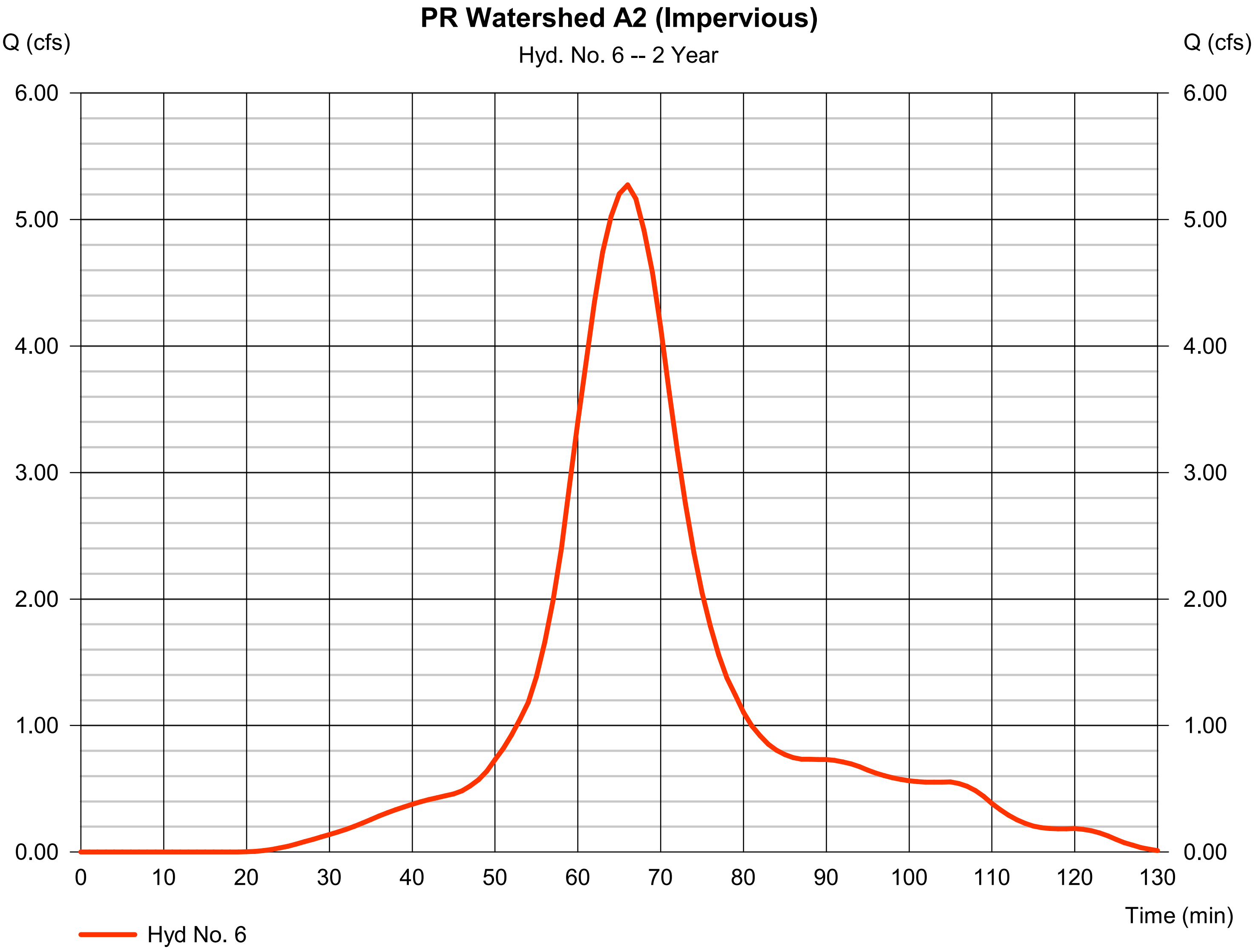
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 6

PR Watershed A2 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.920 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 1.25 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 5.275 cfs
Time to peak = 66 min
Hyd. volume = 7,030 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

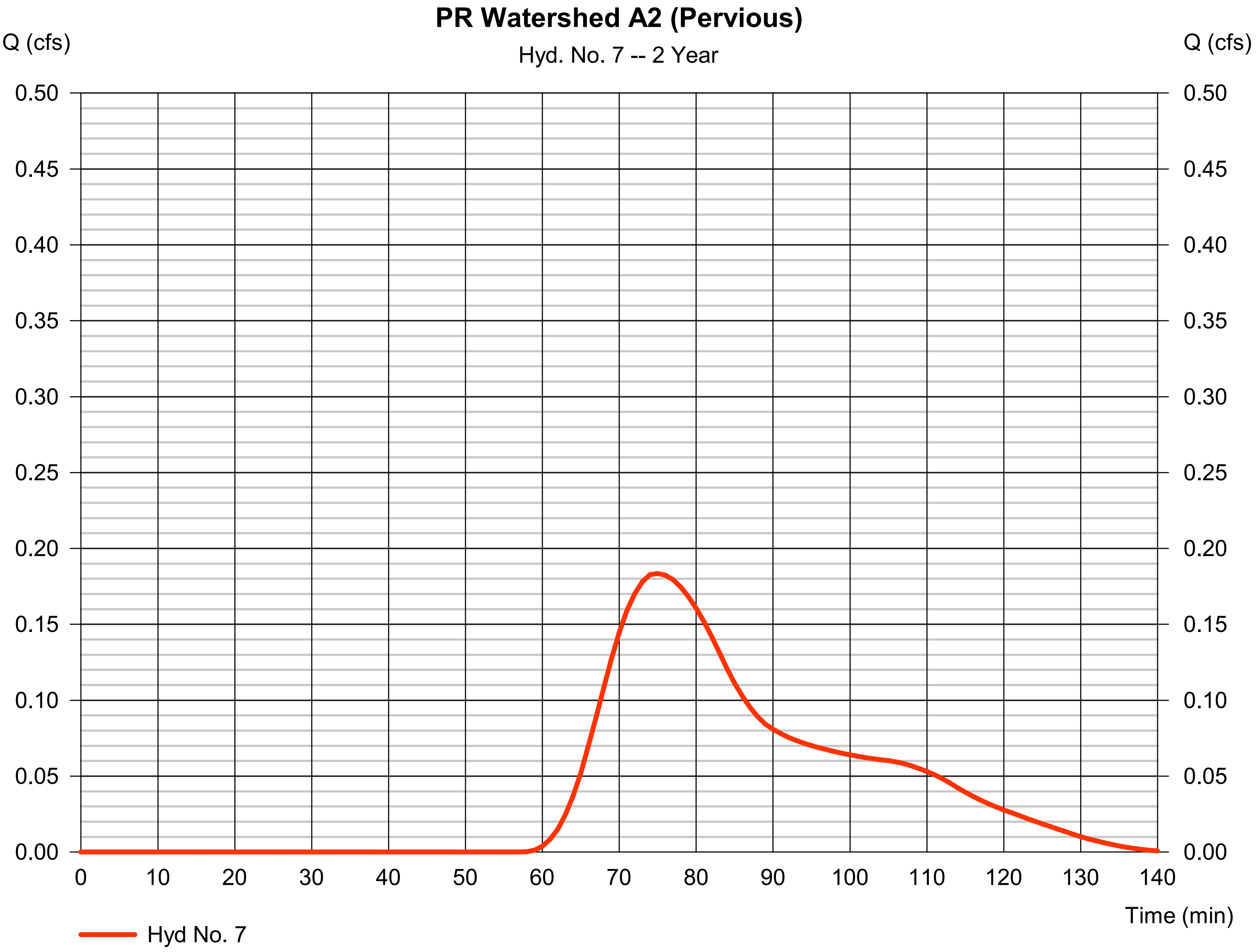
Hyd. No. 7

PR Watershed A2 (Pervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 0.460 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 1.25 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 0.183 cfs
Time to peak = 75 min
Hyd. volume = 326 cuft
Curve number = 81*
Hydraulic length = 0 ft
Time of conc. (Tc) = 14.00 min
Distribution = Custom
Shape factor = 484

* Composite (Area/CN) = [(0.410 x 80) + (0.050 x 91)] / 0.460



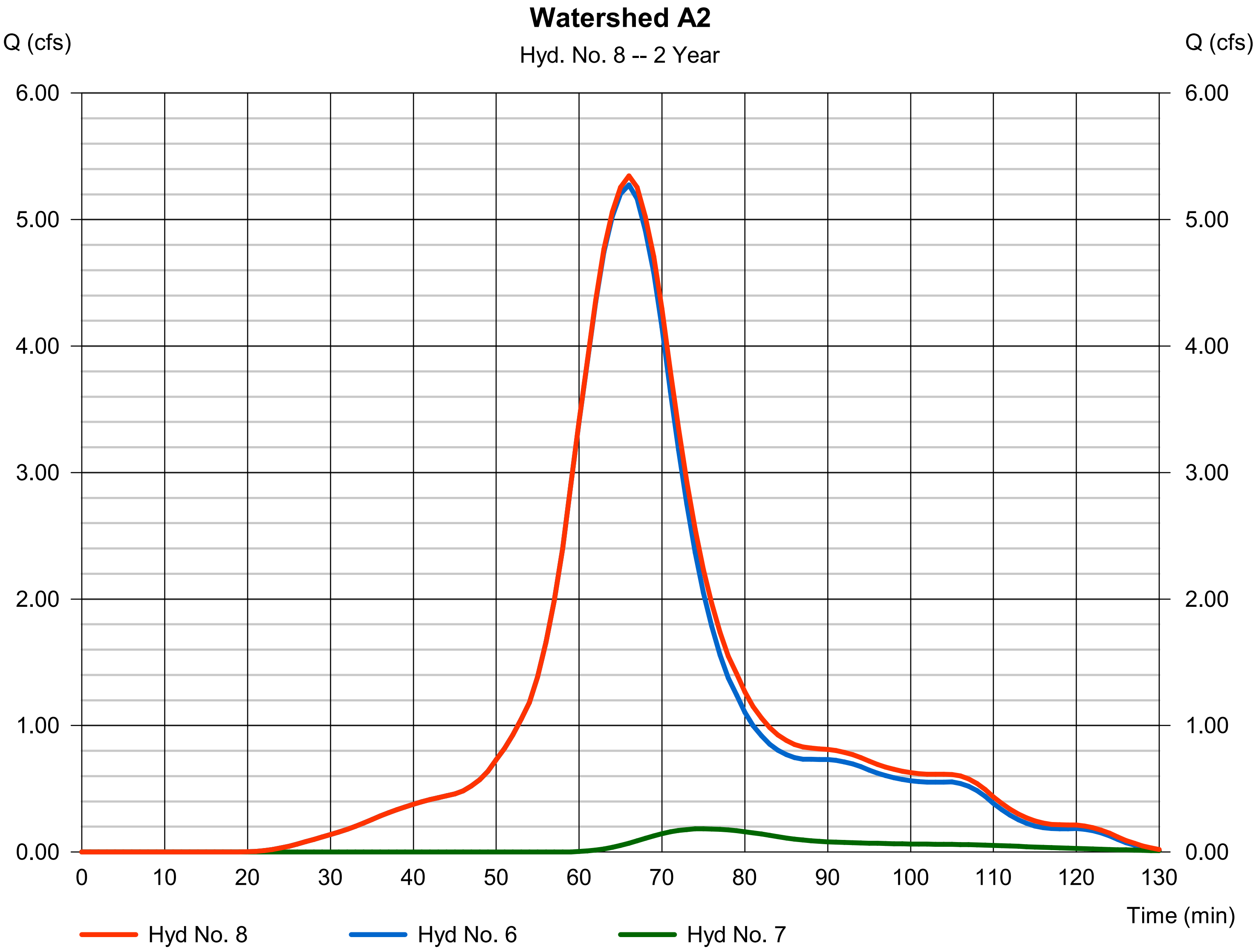
Hydrograph Report

Hyd. No. 8

Watershed A2

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 6, 7

Peak discharge = 5.345 cfs
Time to peak = 66 min
Hyd. volume = 7,356 cuft
Contrib. drain. area = 2.380 ac



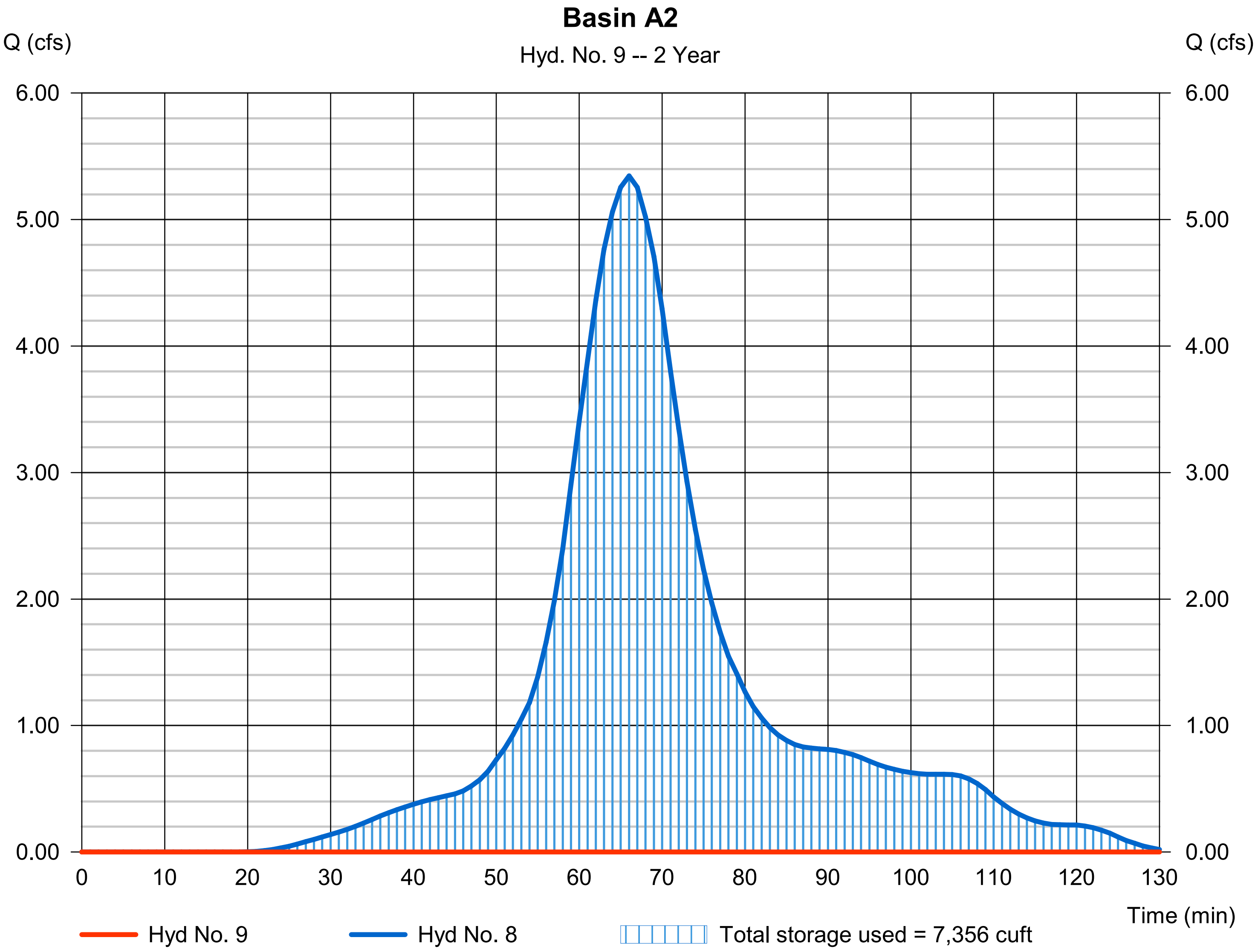
Hydrograph Report

Hyd. No. 9

Basin A2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 8 - Watershed A2	Max. Elevation	= 48.00 ft
Reservoir name	= Basin A2	Max. Storage	= 7,356 cuft

Storage Indication method used.



Pond Report

Pond No. 5 - Basin A2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 47.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	47.00	6,733	0	0
1.00	48.00	7,912	7,314	7,314
2.00	49.00	9,088	8,492	15,806
3.00	50.00	10,268	9,671	25,477
4.00	51.00	11,468	10,861	36,339

Culvert / Orifice Structures

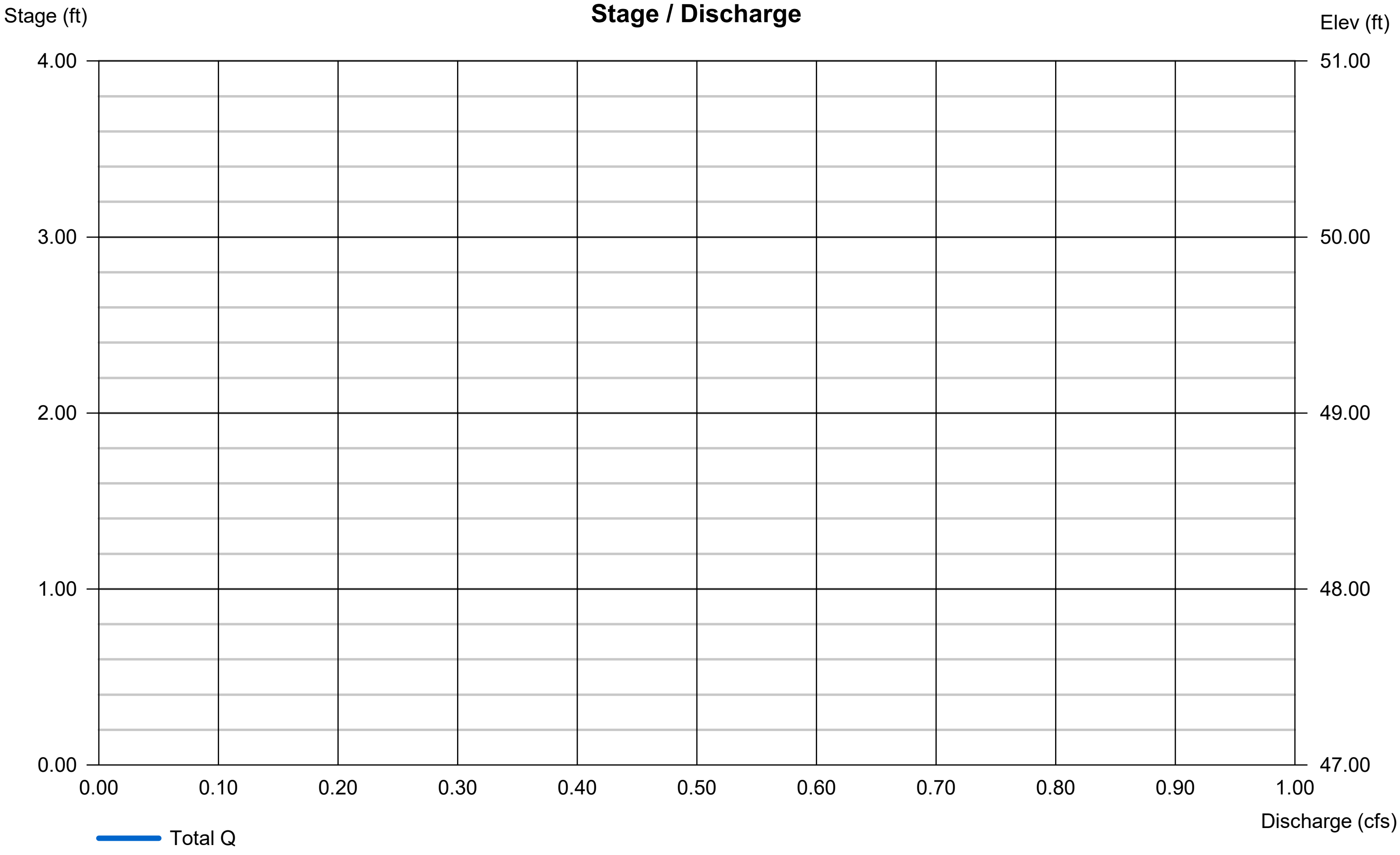
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	Inactive	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	1	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No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

Weir Structures

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

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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



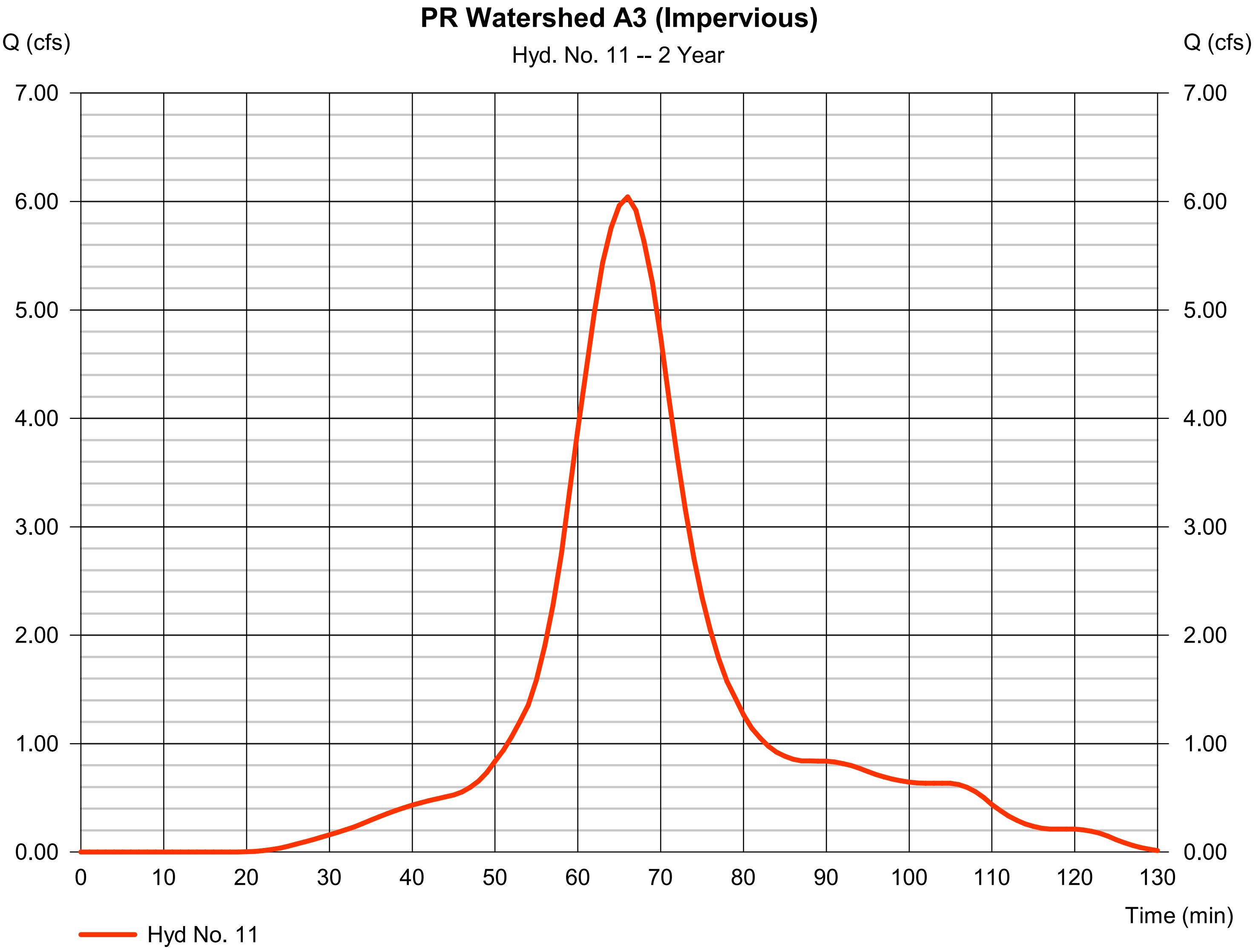
Hydrograph Report

Hyd. No. 11

PR Watershed A3 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 2.200 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 1.25 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storr

Peak discharge = 6.044 cfs
Time to peak = 66 min
Hyd. volume = 8,056 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484



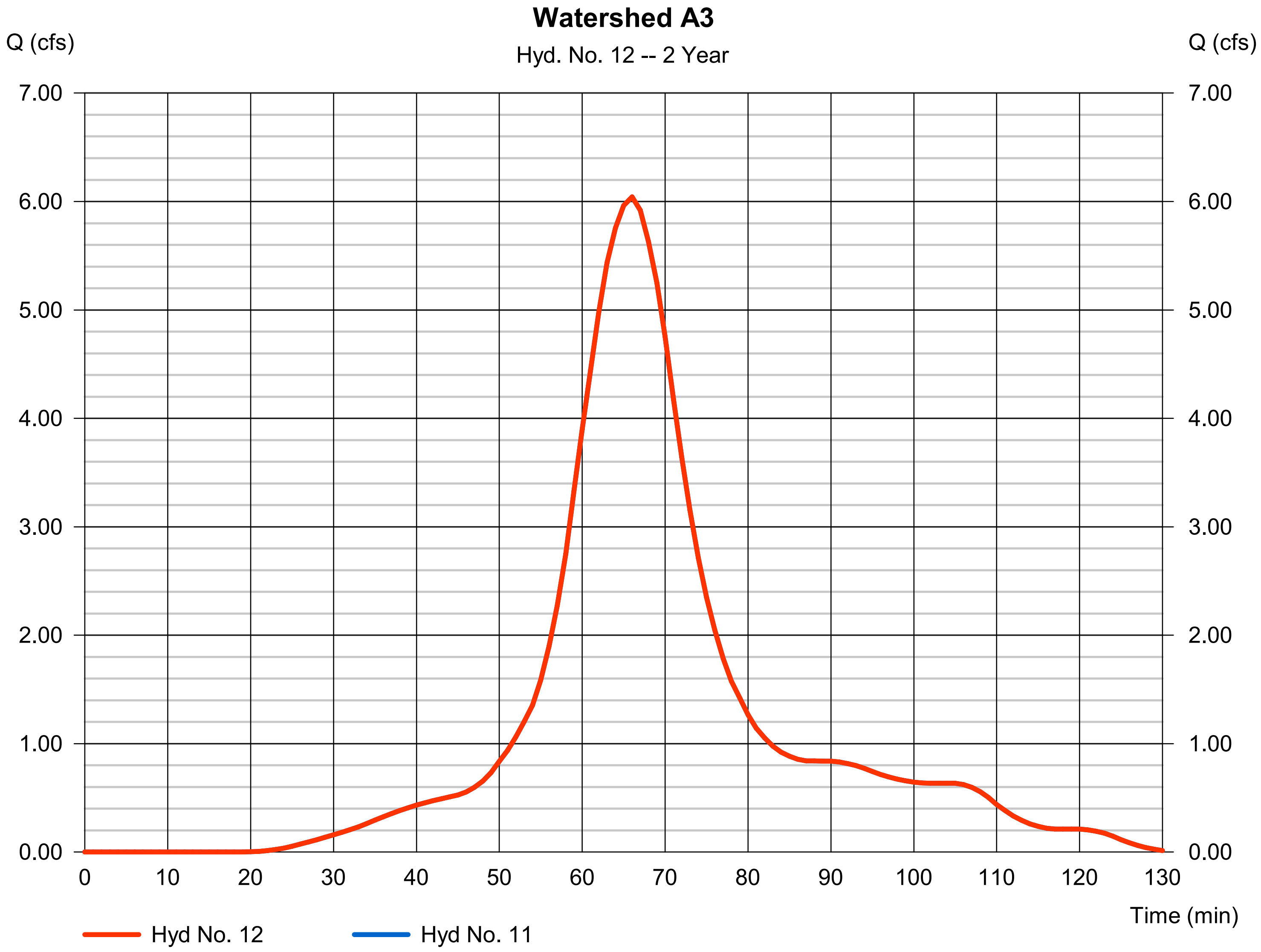
Hydrograph Report

Hyd. No. 12

Watershed A3

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 11

Peak discharge = 6.044 cfs
Time to peak = 66 min
Hyd. volume = 8,056 cuft
Contrib. drain. area = 2.200 ac



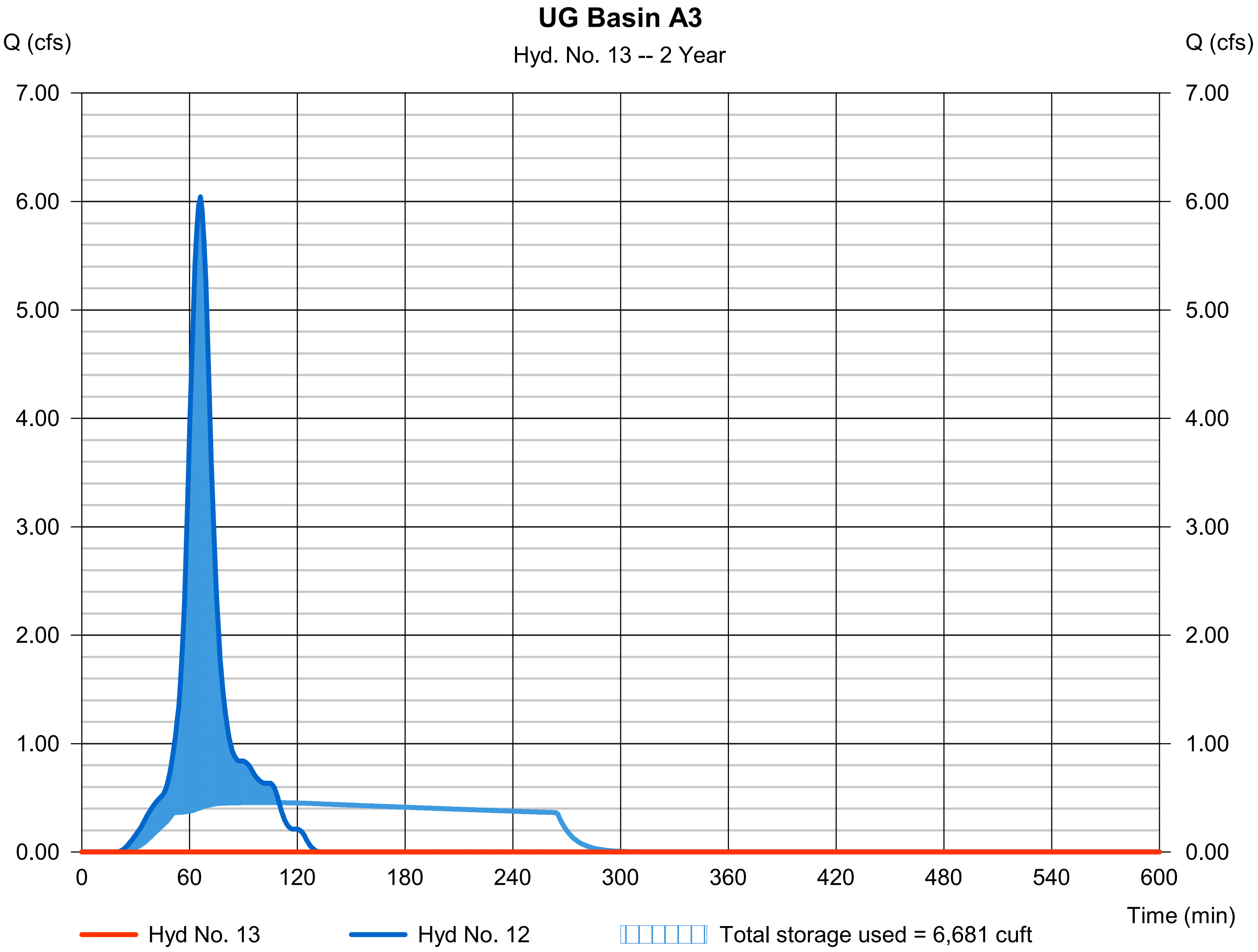
Hydrograph Report

Hyd. No. 13

UG Basin A3

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 532 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 12 - Watershed A3	Max. Elevation	= 49.67 ft
Reservoir name	= UG Detention A3	Max. Storage	= 6,681 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 4 - UG Detention A3

Pond Data

UG Chambers -Invert elev. = 49.50 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 7.12 ft, No. Barrels = 235, Slope = 0.00%, Headers = Yes
Encasement -Invert elev. = 49.00 ft, Width = 4.67 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	49.00	n/a	0	0
0.35	49.35	n/a	2,529	2,529
0.70	49.70	n/a	4,500	7,029
1.05	50.05	n/a	5,940	12,969
1.40	50.40	n/a	5,830	18,799
1.75	50.75	n/a	5,642	24,442
2.10	51.10	n/a	5,361	29,802
2.45	51.45	n/a	4,952	34,755
2.80	51.80	n/a	4,328	39,083
3.15	52.15	n/a	3,049	42,132
3.50	52.50	n/a	2,529	44,661

Culvert / Orifice Structures

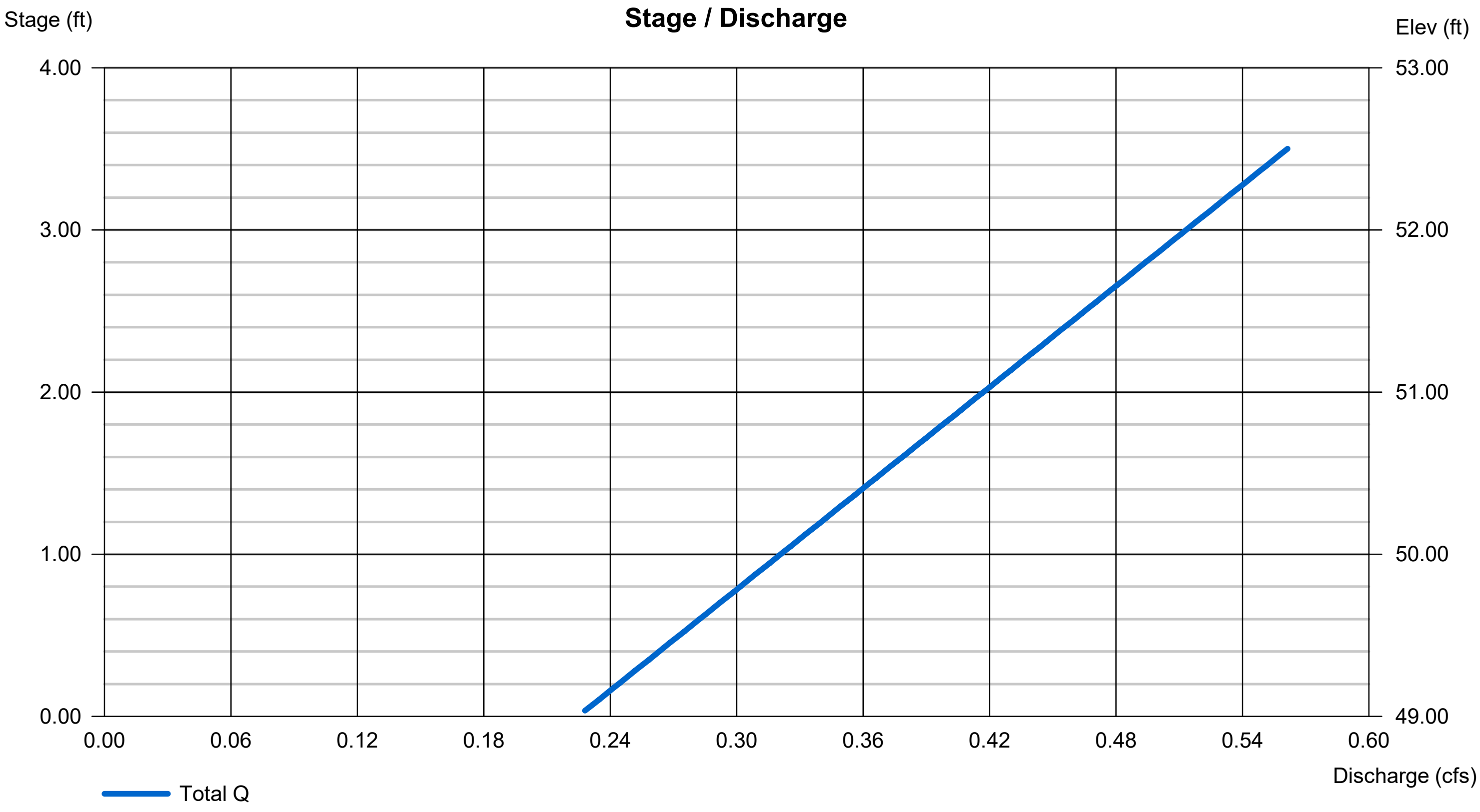
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 0.750 (by Wet area)
TW Elev. (ft) = 0.00

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



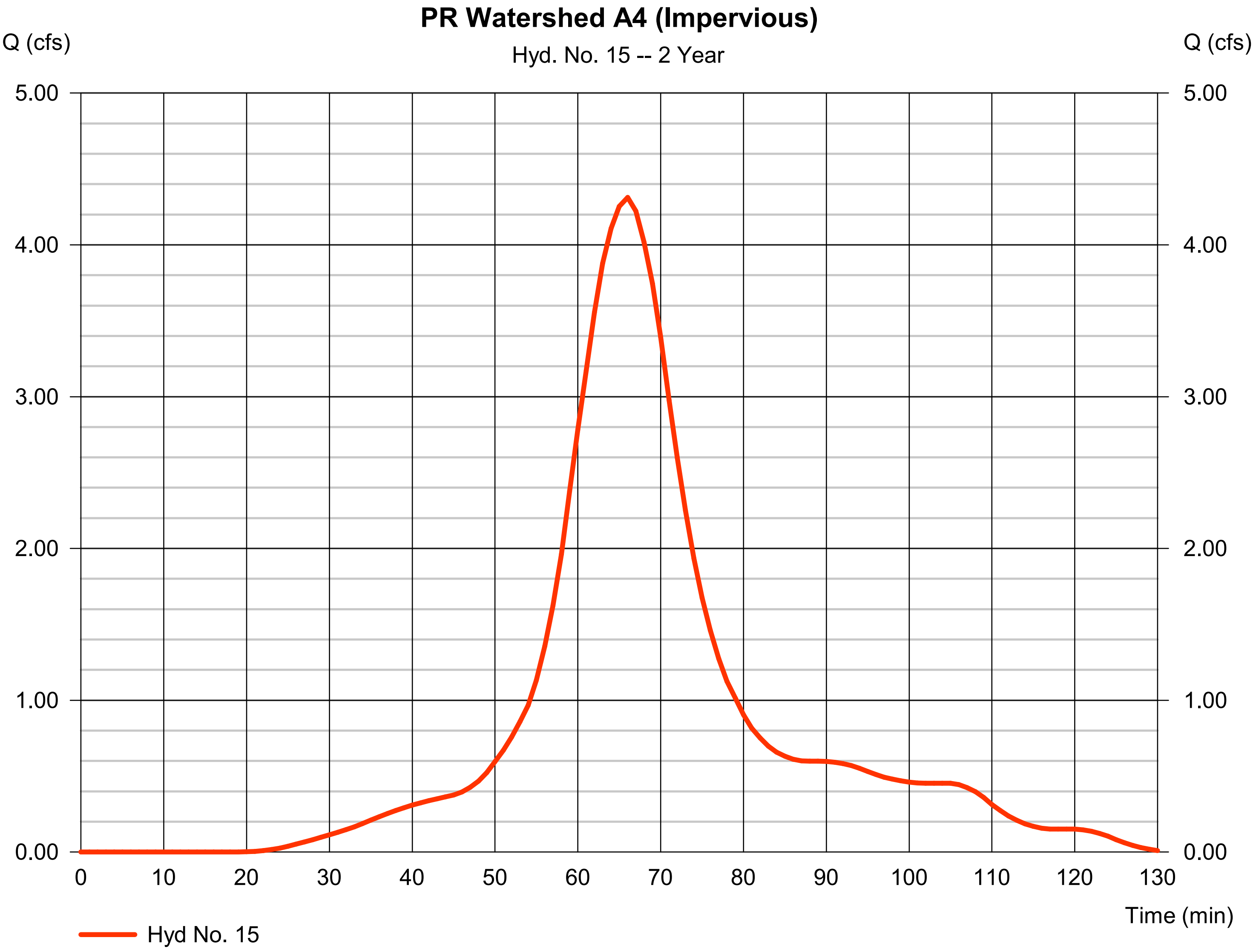
Hydrograph Report

Hyd. No. 15

PR Watershed A4 (Impervious)

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.570 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 1.25 in
Storm duration = \\langan.com\data\PAR\data0\100851001\Project Data_Discipline\Site Civil\Storm

Peak discharge = 4.313 cfs
Time to peak = 66 min
Hyd. volume = 5,749 cuft
Curve number = 98
Hydraulic length = 0 ft
Time of conc. (Tc) = 8.00 min
Distribution = Custom
Shape factor = 484

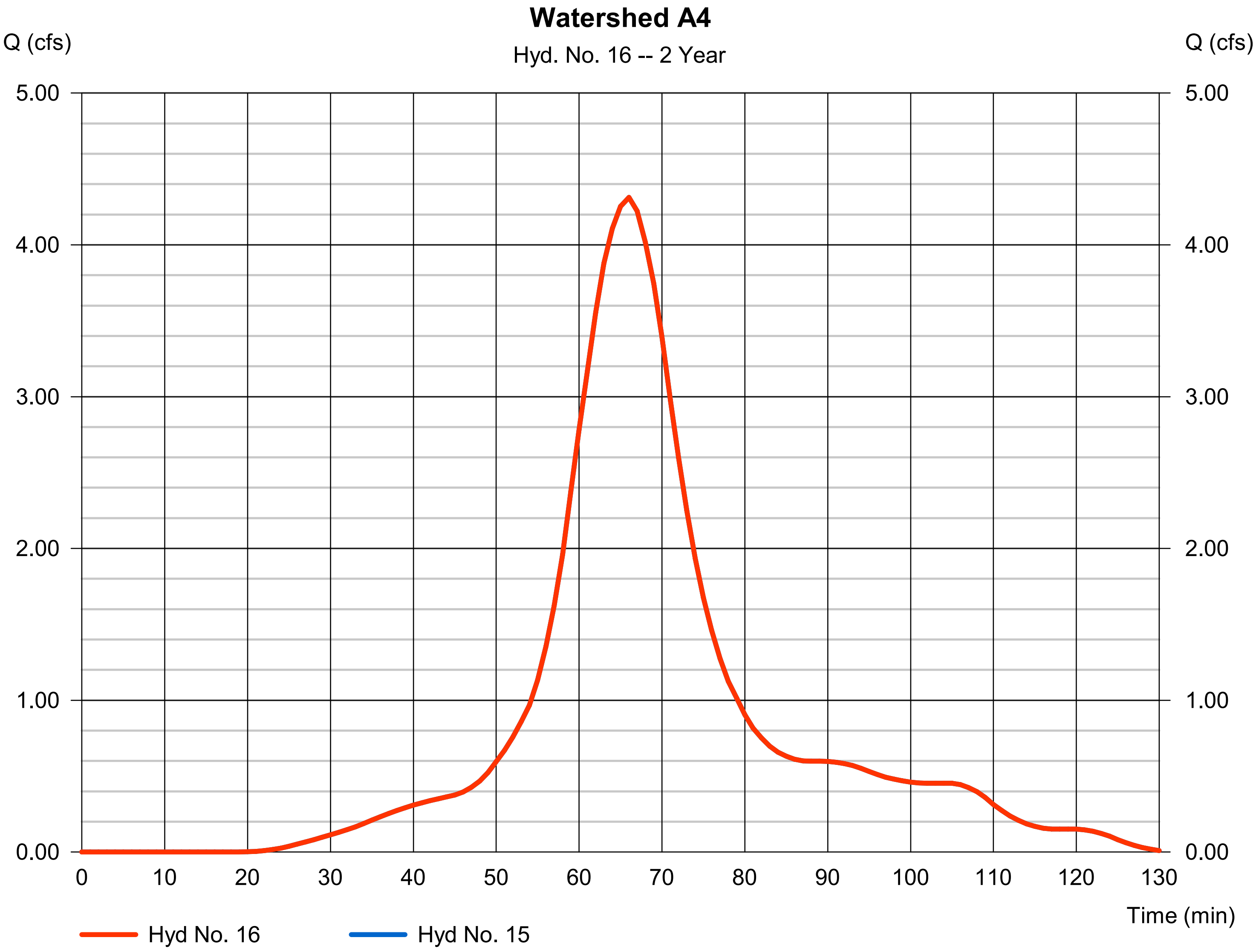


Hydrograph Report

Hyd. No. 16

Watershed A4

Hydrograph type	= Combine	Peak discharge	= 4.313 cfs
Storm frequency	= 2 yrs	Time to peak	= 66 min
Time interval	= 1 min	Hyd. volume	= 5,749 cuft
Inflow hyds.	= 15	Contrib. drain. area	= 1.570 ac



Hydrograph Report

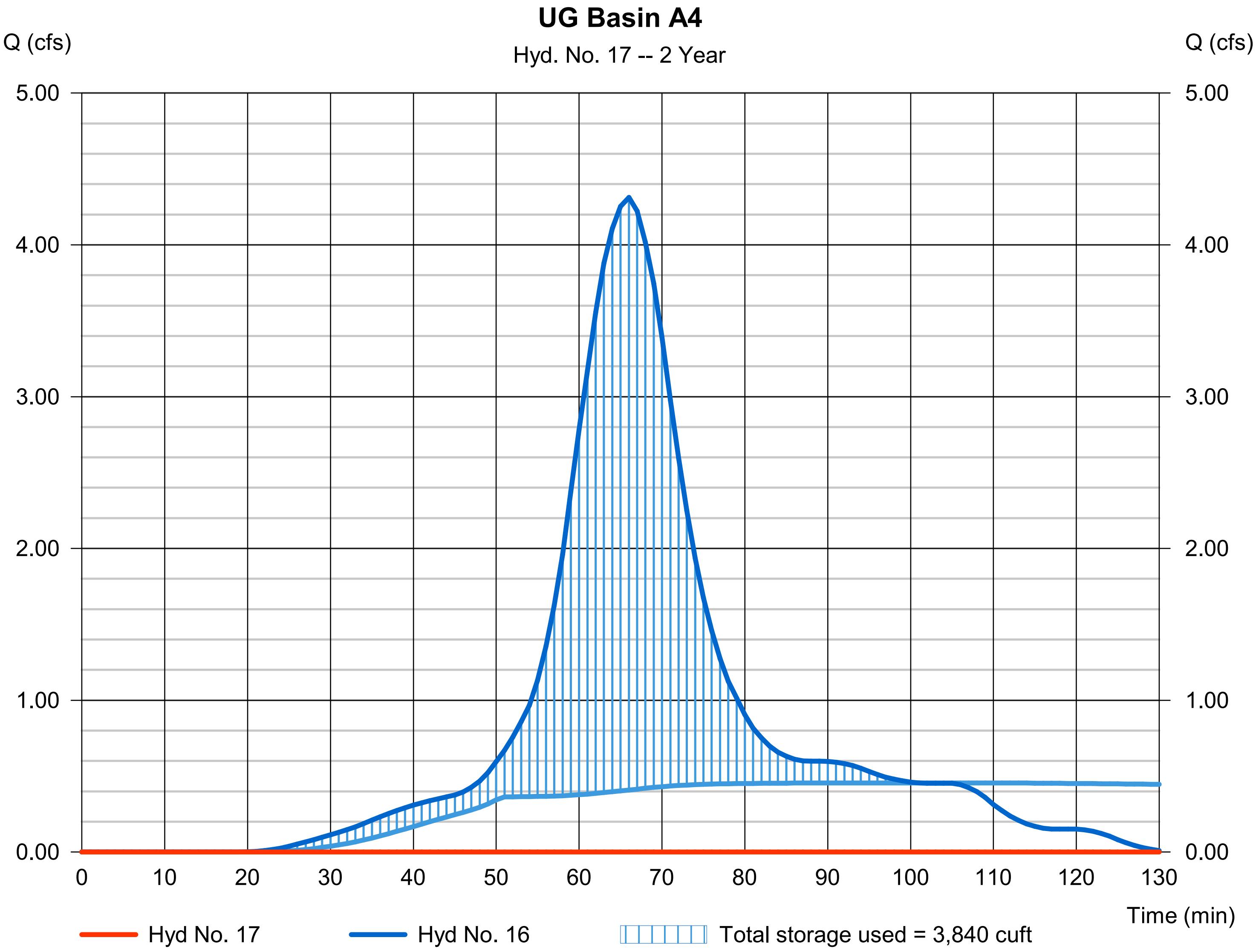
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Friday, 05 / 5 / 2023

Hyd. No. 17

UG Basin A4

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 16 - Watershed A4	Max. Elevation	= 51.47 ft
Reservoir name	= UG Detention A4	Max. Storage	= 3,840 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 3 - UG Detention A4

Pond Data

UG Chambers -Invert elev. = 51.50 ft, Rise x Span = 1.33 x 2.83 ft, Barrel Len = 7.12 ft, No. Barrels = 429, Slope = 0.00%, Headers = Yes
Encasement -Invert elev. = 51.00 ft, Width = 3.42 ft, Height = 2.33 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	51.00	n/a	0	0
0.23	51.23	n/a	1,909	1,909
0.47	51.47	n/a	1,909	3,818
0.70	51.70	n/a	3,925	7,744
0.93	51.93	n/a	4,208	11,951
1.17	52.17	n/a	4,064	16,015
1.40	52.40	n/a	3,821	19,836
1.63	52.63	n/a	3,430	23,266
1.86	52.86	n/a	2,630	25,896
2.10	53.10	n/a	1,909	27,805
2.33	53.33	n/a	1,909	29,715

Culvert / Orifice Structures

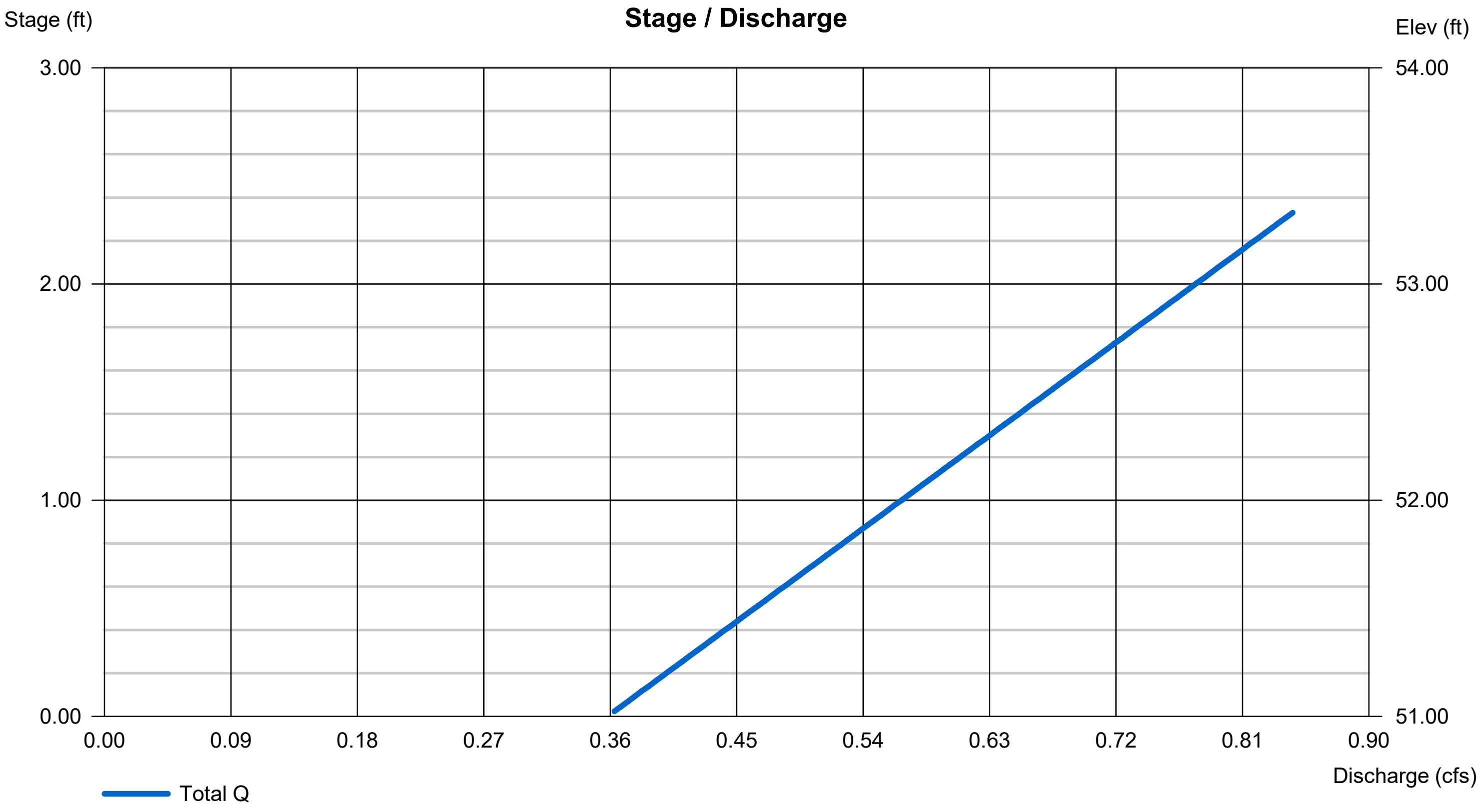
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 1.000 (by Wet area)
TW Elev. (ft) = 0.00

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



King Arthur Court Warehouse
North Brunswick, NJ
5/1/23

Sizing Basis:

Filterra High Capacity biofiltration system has received final certification from the NJDEP for 80% TSS removal. Per the NJDEP, Filterra HC is considered a Green Infrastructure (GI) MTD. The sizing for the Filterra HC system under NJDEP regulations is based on the methodology outlined in Chapter 5 of the NJDEP BMP Manual. The NRCS method is utilized to determine a water quality flow rate for the drainage area in question. To validate the sizing, the parameters below were assumed.

Design Parameters:

Design Storm =	NJDEP Water Quality Design Storm (1.25-inch/2-hour storm event)
Filterra HC Media Flow Rate =	300 inches/hour
Time of Concentration =	2 minutes
Allowable Ponding in Filterra =	9”

Design Summary:

Utilizing NRCS Method and HydroCAD software, a hydrograph can be derived to represent the design storm. As seen in the provided HydroCAD report, the WQ flow is routed to an appropriately sized Filterra unit. Since the Filterra system can provide up to 9” of ponding, some flow attenuation is possible. The Filterra system is able to accommodate a portion of the water quality volume in the head space above the media and release it at the system’s NJDEP certified maximum treatment flow rate.

Site Designation	Impervious Drainage Area (ac)	Pervious Drainage Area (ac)	Filterra HC Model Analyzed
#1	0.314	0.020	(2) 10’x6’ Offline Filterra HC Bioscape Vault
#2	0.309	0.022	(2) 10’x6’ Offline Filterra HC Bioscape Vault
#3	0.302	0.040	(2) 10’x6’ Offline Filterra HC Bioscape Vault

Thank you for the opportunity to present this to you and your client. Please do not hesitate to contact me should you have any additional questions.

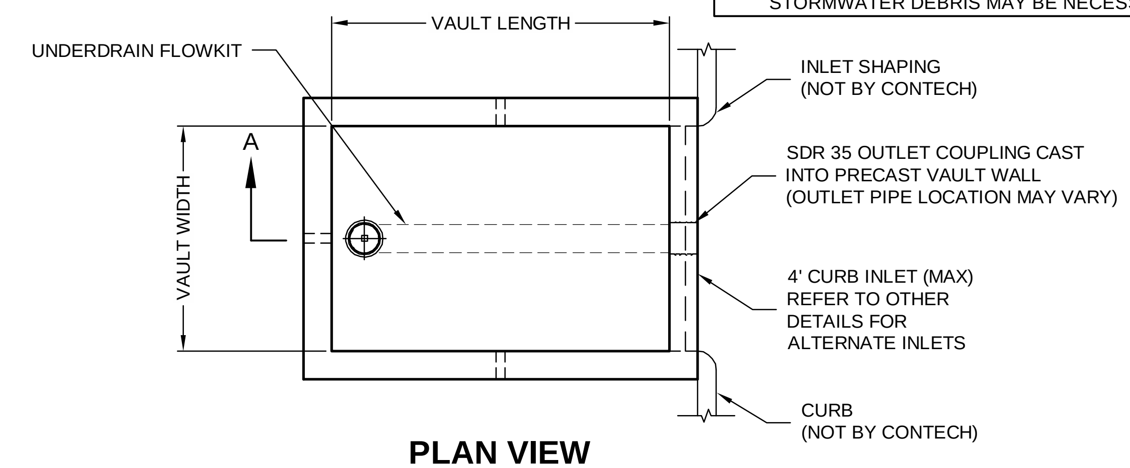
Sincerely,

Taylor Murdock
Stormwater Design Engineer
Contech Engineered Solutions, LLC.

I:\STORMWATER\COMMOPS\54 FILTERRA\40 STANDARD DRAWINGS\FT-HC - FILTERRA HC (NEW JERSEY ONLY)\FTBSV-HC - FILTERRA BIOSCAPE VAULT OFFLINE CONFIG DTL.DWG 9/8/2022 11:20 AM

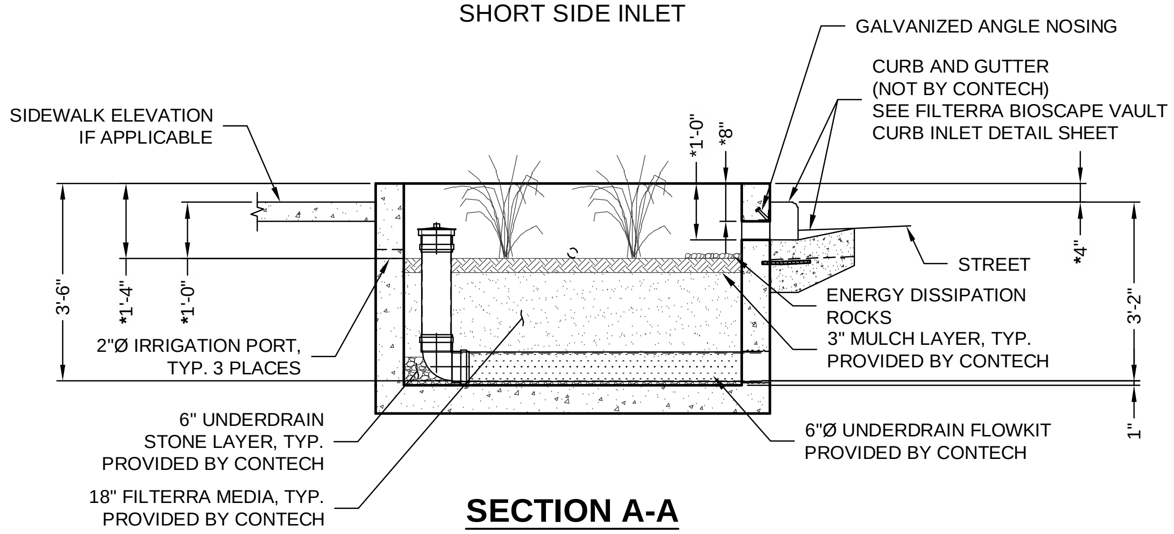
DIMENSIONS PRECEDED BY " * " ARE CRITICAL AND MAY NOT BE MODIFIED WITHOUT CONSULTING CONTECH

AS WITH ALL OPEN TOP BIORETENTION SYSTEMS, FILTERRA BIOSCAPE IS OPEN TO THE ATMOSPHERE WITH A MEDIA SURFACE RECESSED BELOW FINISHED GRADE. CONTRACTOR OR OWNER IS RESPONSIBLE FOR PROVIDING ANY REQUIRED SAFETY MEASURES AROUND SYSTEM PERIMETER. TO MAINTAIN AESTHETICS, REMOVAL OF HEAVY STORMWATER DEBRIS MAY BE NECESSARY BETWEEN REGULAR FILTERRA SYSTEM MAINTENANCE EVENTS.



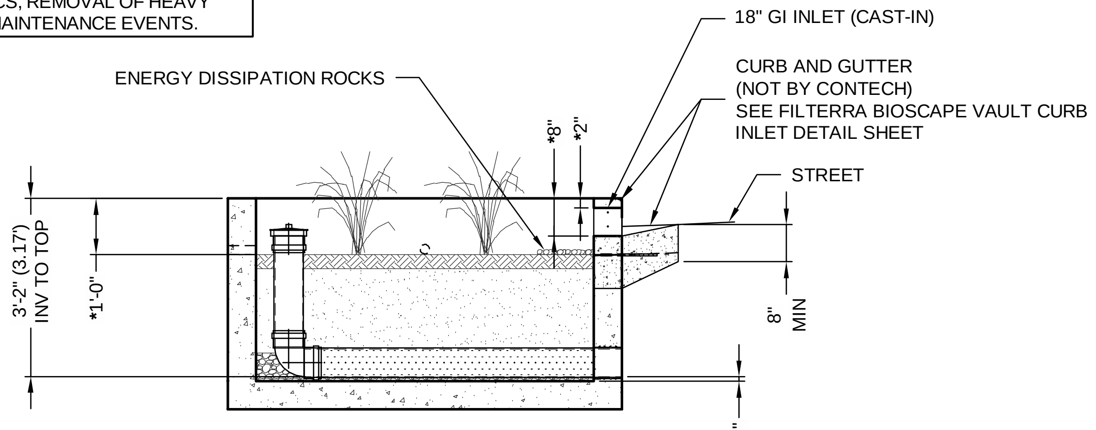
PLAN VIEW

SHORT SIDE INLET



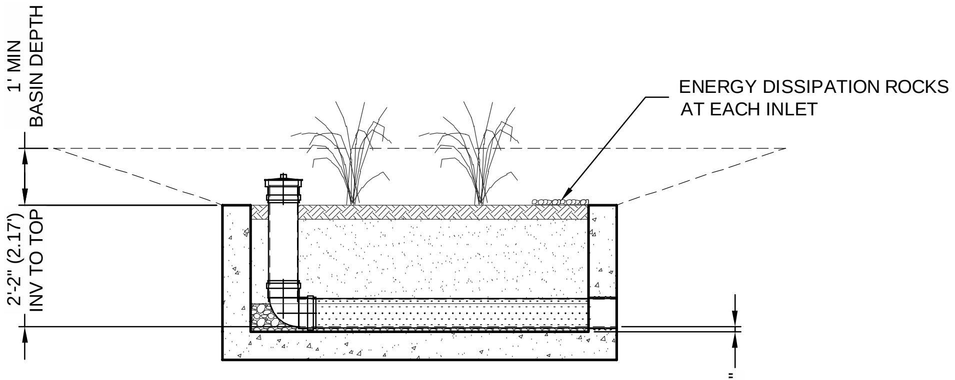
SECTION A-A

SLOTTED THROAT INLET



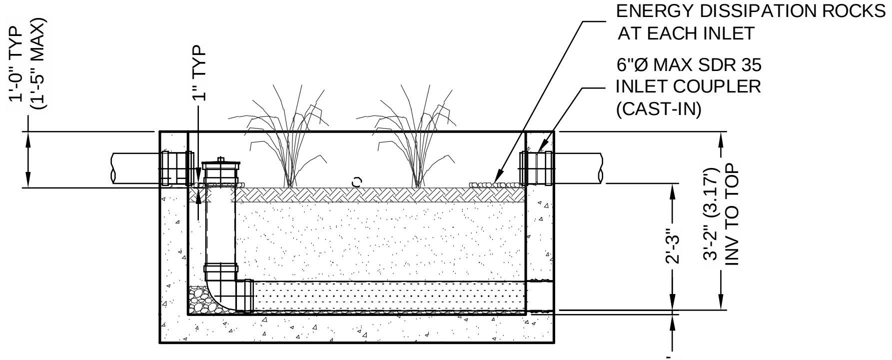
SECTION A-A

GREEN INFRASTRUCTURE INLET - TOP FLUSH WITH TOP OF CURB, NOT INTENDED FOR SIDEWALK APPLICATIONS



SECTION A-A

BASIN - CURB INLET OR PIPE INLETS OPTIONAL



SECTION A-A

PIPE INLET

INTERNAL PIPE
CONFIGURATION MAY VARY
DEPENDING ON VAULT SIZE.

FTBSV-HC CONFIGURATION

(OPTIONS: BASIN "-B", GREEN INFR. INLET "-I", PIPE INLET "-P", SLOTTED THROAT INLET "-T")

MEDIA BAY SIZE	VAULT SIZE (L x W)	LONG SIDE INLET DESIGNATION	SHORT SIDE INLET DESIGNATION	AVAILABILITY	OUTLET PIPE DIA	MIN. NO. OF INLET PIPES (-P ONLY)
4 x 4	4 x 4	FTBSV0404-HC	FTBSV0404-HC	ALL	6" SDR 35	1
6 x 4	6 x 4	FTBSV0604-HC	FTBSV0406-HC	ALL	6" SDR 35	1
7.83 x 4.5	7.83 x 4.5	FTBSV078045-HC	FTBSV045078-HC	DE,MD,NJ,PA,VA,WV ONLY	6" SDR 35	1
8 x 4	8 x 4	FTBSV0804-HC	FTBSV0408-HC	N/A DE,MD,NJ,PA,VA,WV	6" SDR 35	1
6 x 6	6 x 6	FTBSV0606-HC	FTBSV0606-HC	ALL	6" SDR 35	1
8 x 6	8 x 6	FTBSV0806-HC	FTBSV0608-HC	ALL	6" SDR 35	1
10 x 6	10 x 6	FTBSV1006-HC	FTBSV0610-HC	ALL	6" SDR 35	2
12 x 6	12 x 6	FTBSV1206-HC	FTBSV0612-HC	ALL	6" SDR 35	2
13 x 7	13 x 7	FTBSV1307-HC	FTBSV0713-HC	ALL	6" SDR 35	2
14 x 8	14 x 8	FTBSV1408-HC†	N/A	ALL	6" SDR 35	3
16 x 8	16 x 8	FTBSV1608-HC†	N/A	N/A OR,WA	6" SDR 35	3
15 x 9	15 x 9	FTBSV1509-HC†	N/A	OR,WA ONLY	6" SDR 35	3
18 x 8	18 x 8	FTBSV1808-HC†	N/A	CALL CONTECH	6" SDR 35	3
20 x 8	20 x 8	FTBSV2008-HC†	N/A	CALL CONTECH	6" SDR 35	4
22 x 8	22 x 8	FTBSV2208-HC†	N/A	CALL CONTECH	6" SDR 35	4

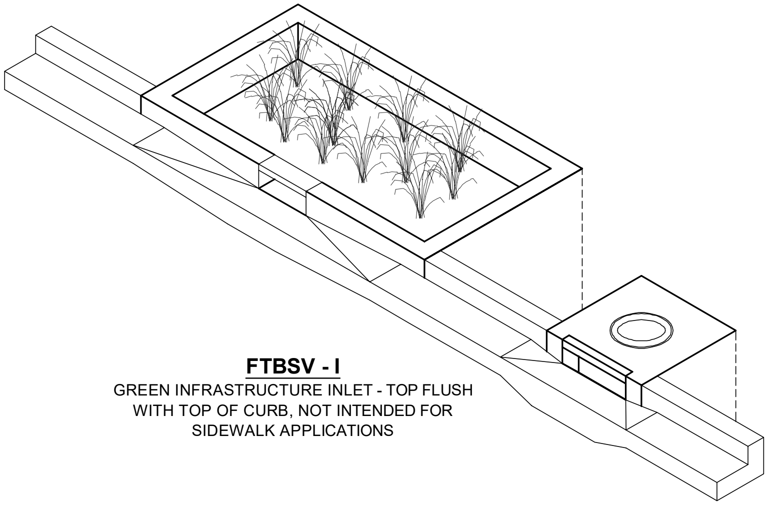
†UTILIZES (2) CURB OPENINGS WITH MIN 1' SPACING

N/A = NOT AVAILABLE

filterra®

CONTECH®
ENGINEERED SOLUTIONS LLC
www.ContechES.com
5670 Greenwood Plaza Blvd., Suite 530, Greenwood Village, CO 80111
800-526-3999 303-796-2233 303-796-2239 FAX

FILTERRA HC BIOSCAPE VAULT STANDARD OFFLINE
(FTBSV-HC)
CONFIGURATION DETAIL



FTBSV - I

GREEN INFRASTRUCTURE INLET - TOP FLUSH
WITH TOP OF CURB, NOT INTENDED FOR
SIDEWALK APPLICATIONS

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 6,277,274; 6,569,321; 7,625,485; 7,425,261; 7,833,412; RELATED FOREIGN PATENTS.

ENGINEERED SOLUTIONS LLC
www.ContechES.com
5670 Greenwood Plaza Blvd., Suite 530, Greenwood Village, CO 80111
800-526-3999 303-796-2233 303-796-2239 FAX

FILTERRA BIOSCAPE VAULT STANDARD OFFLINE (FTBSV)
SITE LAYOUT DETAIL

I:\STORMWATER\COMMOPS\54 FILTERRA\40 STANDARD DRAWINGS\FTBSV - FILTERRA BIOSCAPE VAULT OFFLINE\LAYOUT DETAILS\DWG\FTBSV - FILTERRA BIOSCAPE VAULT OFFLINE CONFIG DTL 1.DWG 9/8/2022 10:43 AM

Summary for Subcatchment 1S: MTD-1 DA

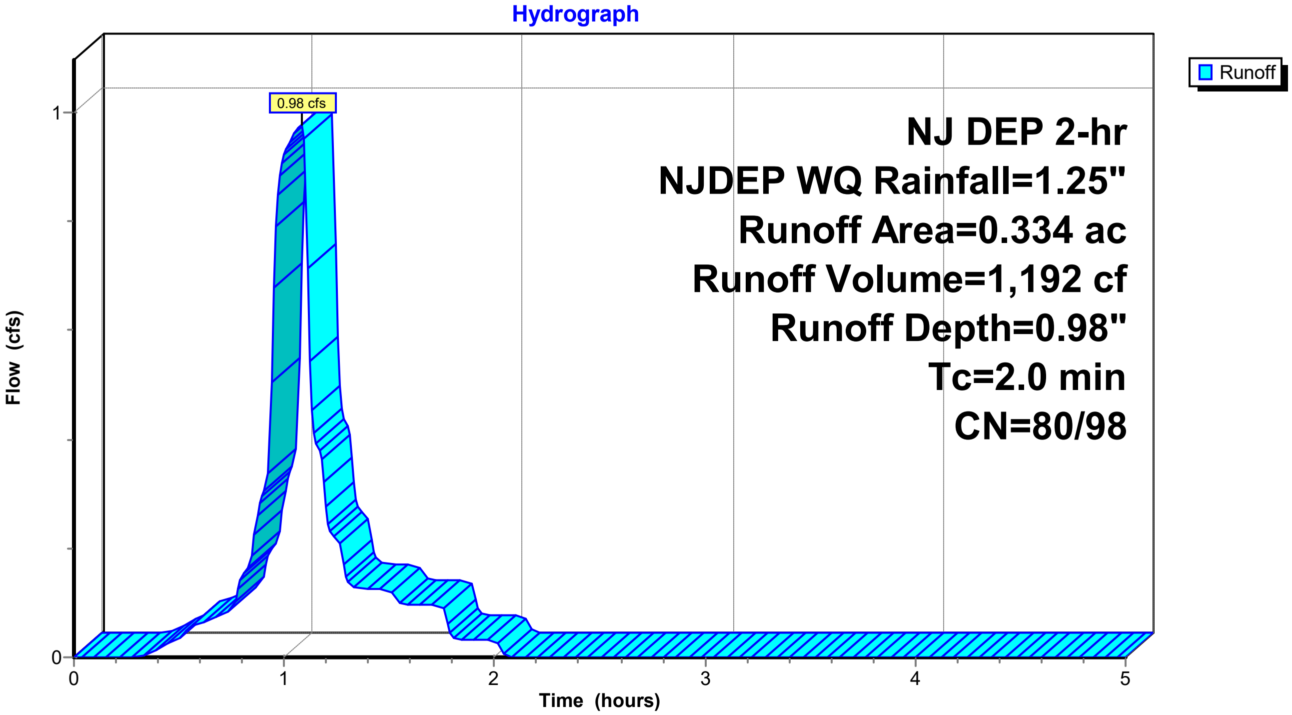
Runoff = 0.98 cfs @ 1.08 hrs, Volume= 1,192 cf, Depth= 0.98"
Routed to Pond 1P : (2) Filterra 6x10/10x6

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJDEP WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	0.314	98	
*	0.020	80	
	0.334	97	Weighted Average
	0.020	80	5.99% Pervious Area
	0.314	98	94.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry,**

Subcatchment 1S: MTD-1 DA



Summary for Pond 1P: (2) Filterra 6x10/10x6

Inflow Area = 0.334 ac, 94.01% Impervious, Inflow Depth = 0.98" for NJDEP WQ event
Inflow = 0.98 cfs @ 1.08 hrs, Volume= 1,192 cf
Outflow = 0.83 cfs @ 0.97 hrs, Volume= 1,222 cf, Atten= 15%, Lag= 0.0 min
Primary = 0.83 cfs @ 0.97 hrs, Volume= 1,222 cf

Routing by Stor-Ind method, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 0.43' @ 1.10 hrs Surf.Area= 0.003 ac Storage= 51 cf

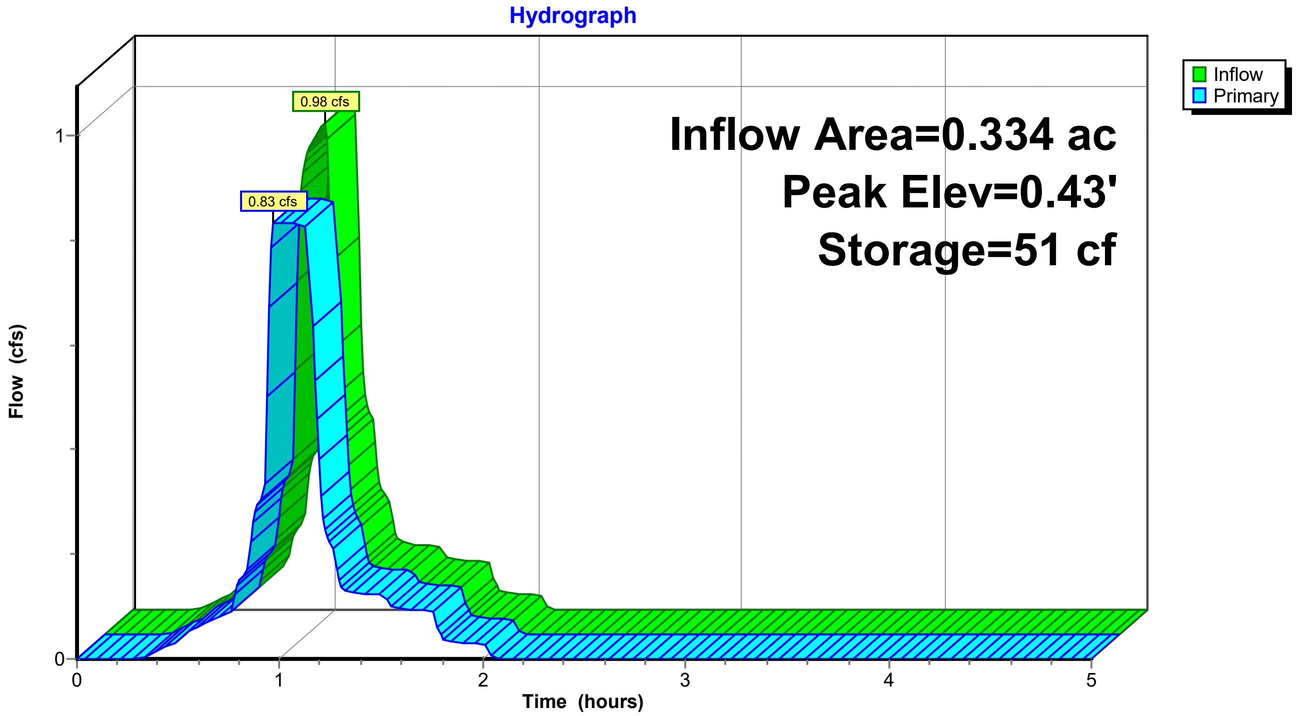
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.3 min (67.0 - 66.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	90 cf	**6.00'W x 10.00'L x 0.75'H Prismatoid** x 2

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**300.000 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.83 cfs @ 0.97 hrs HW=0.01' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.83 cfs @ 0.01 fps)

Pond 1P: (2) Filterra 6x10/10x6



Summary for Subcatchment 2S: MTD-2 DA

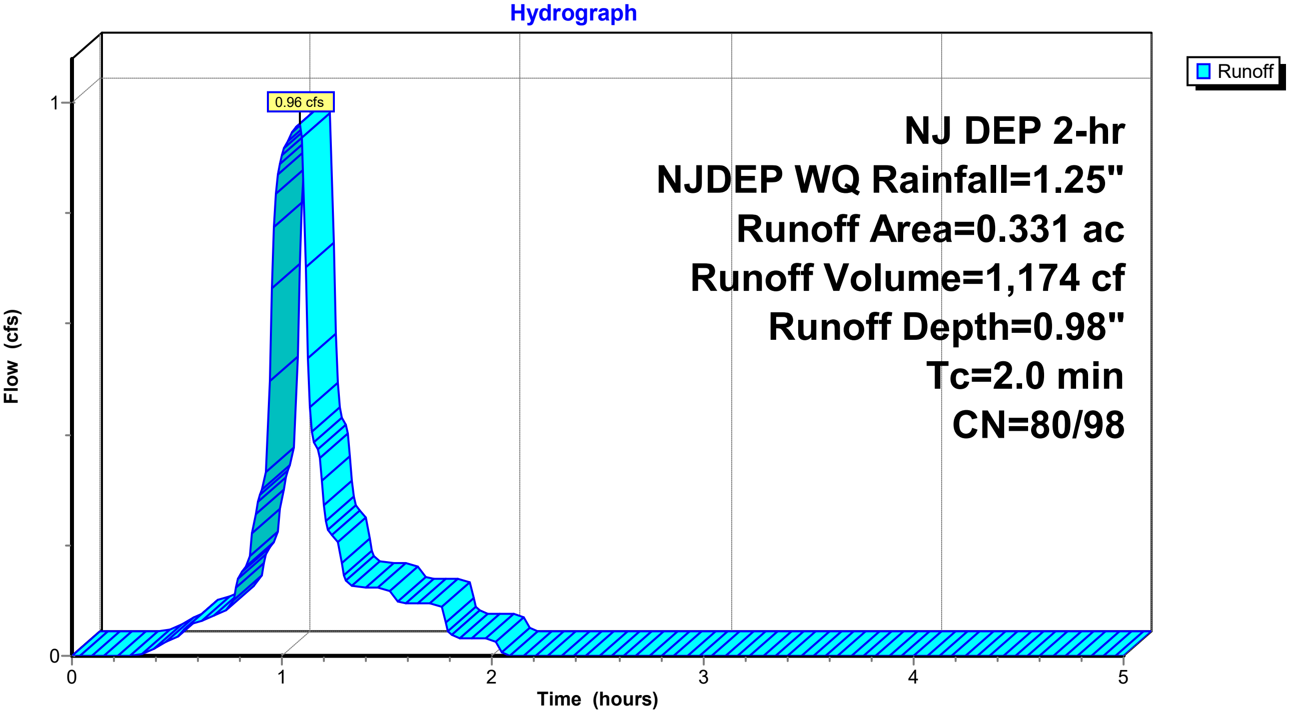
Runoff = 0.96 cfs @ 1.08 hrs, Volume= 1,174 cf, Depth= 0.98"
Routed to Pond 2P : (2) Filterra 6x10/10x6

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJDEP WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	0.309	98	
*	0.022	80	
	0.331	97	Weighted Average
	0.022	80	6.65% Pervious Area
	0.309	98	93.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry,**

Subcatchment 2S: MTD-2 DA



Summary for Pond 2P: (2) Filterra 6x10/10x6

```
Inflow Area =           0.331 ac, 93.35% Impervious, Inflow Depth =  0.98"   for  NJDEP WQ event
Inflow      =     0.96 cfs @   1.08 hrs,  Volume=          1,174 cf
Outflow     =     0.83 cfs @   0.98 hrs,  Volume=          1,146 cf,  Atten= 14%,  Lag= 0.0 min
Primary     =     0.83 cfs @   0.98 hrs,  Volume=          1,146 cf
```

Routing by Stor-Ind method, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 0.37' @ 1.10 hrs Surf.Area= 0.003 ac Storage= 44 cf

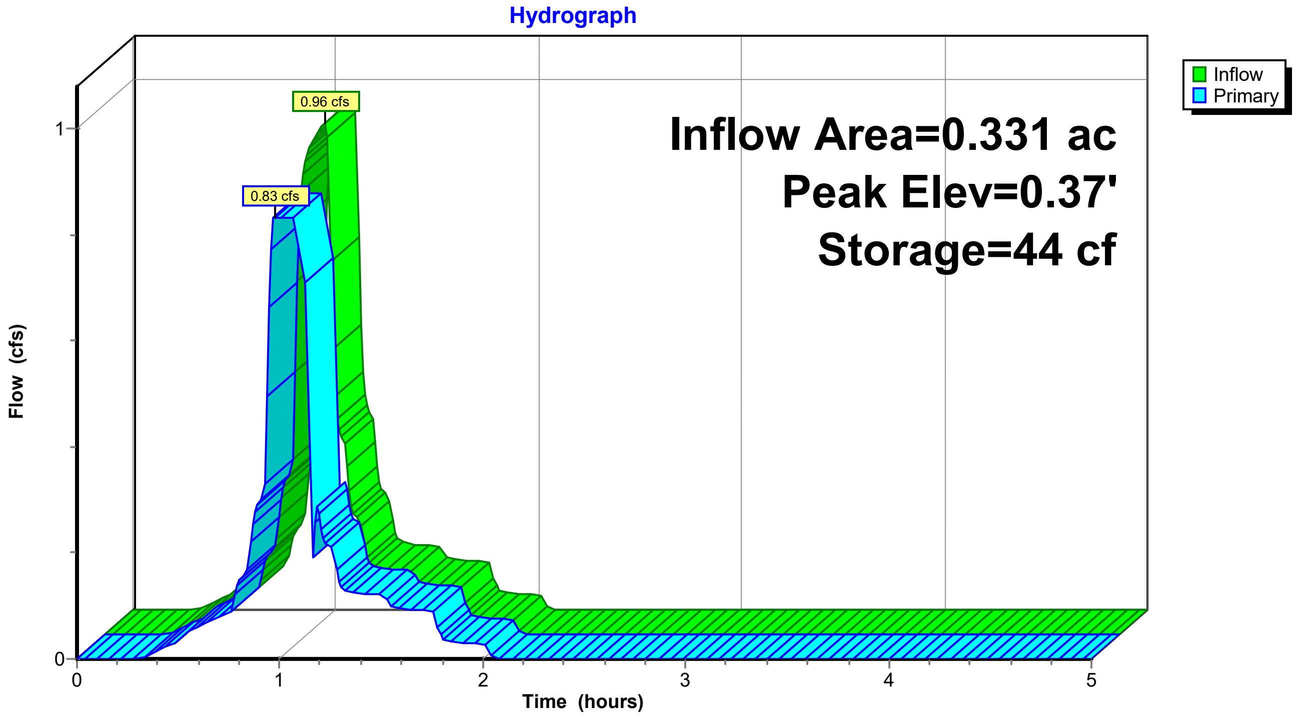
Plug-Flow detention time= 1.3 min calculated for 1,146 cf (98% of inflow)
Center-of-Mass det. time= 0.1 min (66.8 - 66.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	90 cf	**6.00'W x 10.00'L x 0.75'H Prismatoid** x 2

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**300.000 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.83 cfs @ 0.98 hrs HW=0.01' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.83 cfs @ 0.01 fps)

Pond 2P: (2) Filterra 6x10/10x6



Summary for Subcatchment 3S: MTD-3 DA

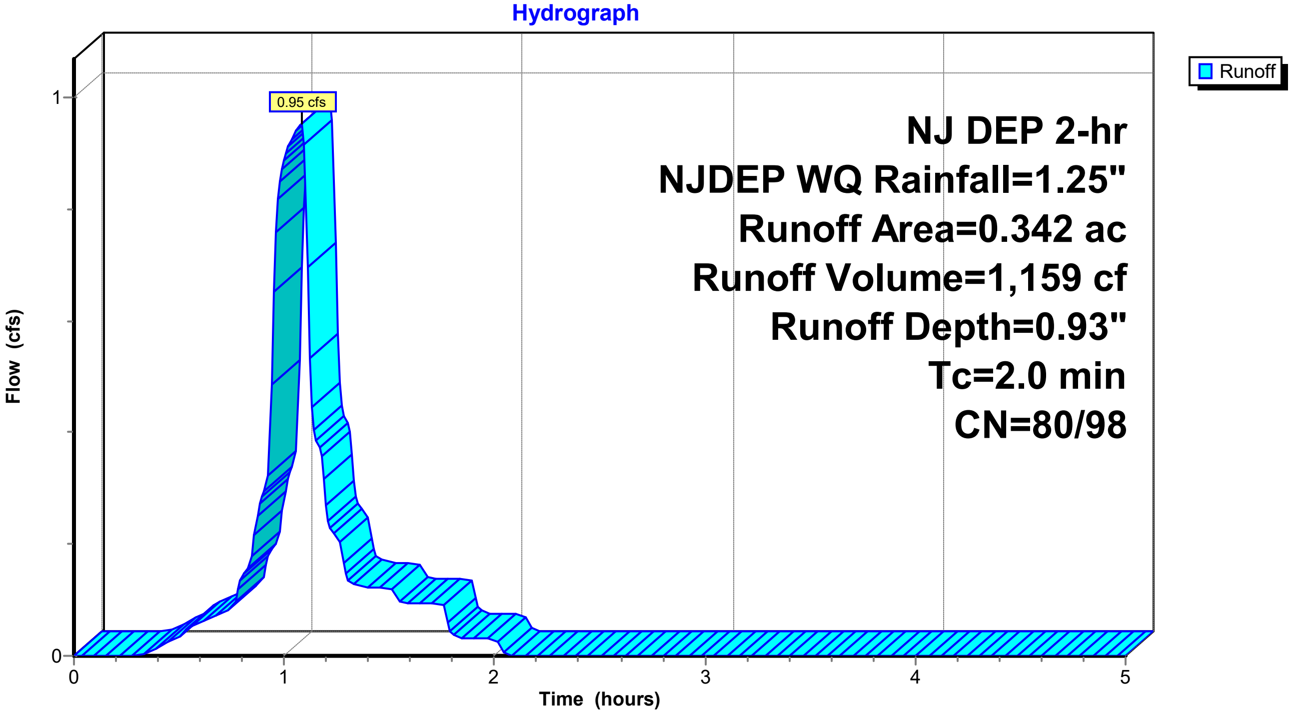
Runoff = 0.95 cfs @ 1.08 hrs, Volume= 1,159 cf, Depth= 0.93"
Routed to Pond 3P : (2) Filterra 6x10/10x6

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr NJDEP WQ Rainfall=1.25"

	Area (ac)	CN	Description
*	0.302	98	
*	0.040	80	
	0.342	96	Weighted Average
	0.040	80	11.70% Pervious Area
	0.302	98	88.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry,**

Subcatchment 3S: MTD-3 DA



Summary for Pond 3P: (2) Filterra 6x10/10x6

```
Inflow Area =          0.342 ac, 88.30% Impervious, Inflow Depth = 0.93"  for NJDEP WQ event
Inflow     =     0.95 cfs @   1.08 hrs,  Volume=         1,159 cf
Outflow    =     0.83 cfs @   0.98 hrs,  Volume=         1,189 cf,  Atten= 13%,  Lag= 0.0 min
Primary    =     0.83 cfs @   0.98 hrs,  Volume=         1,189 cf
```

Routing by Stor-Ind method, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 0.31' @ 1.10 hrs Surf.Area= 0.003 ac Storage= 37 cf

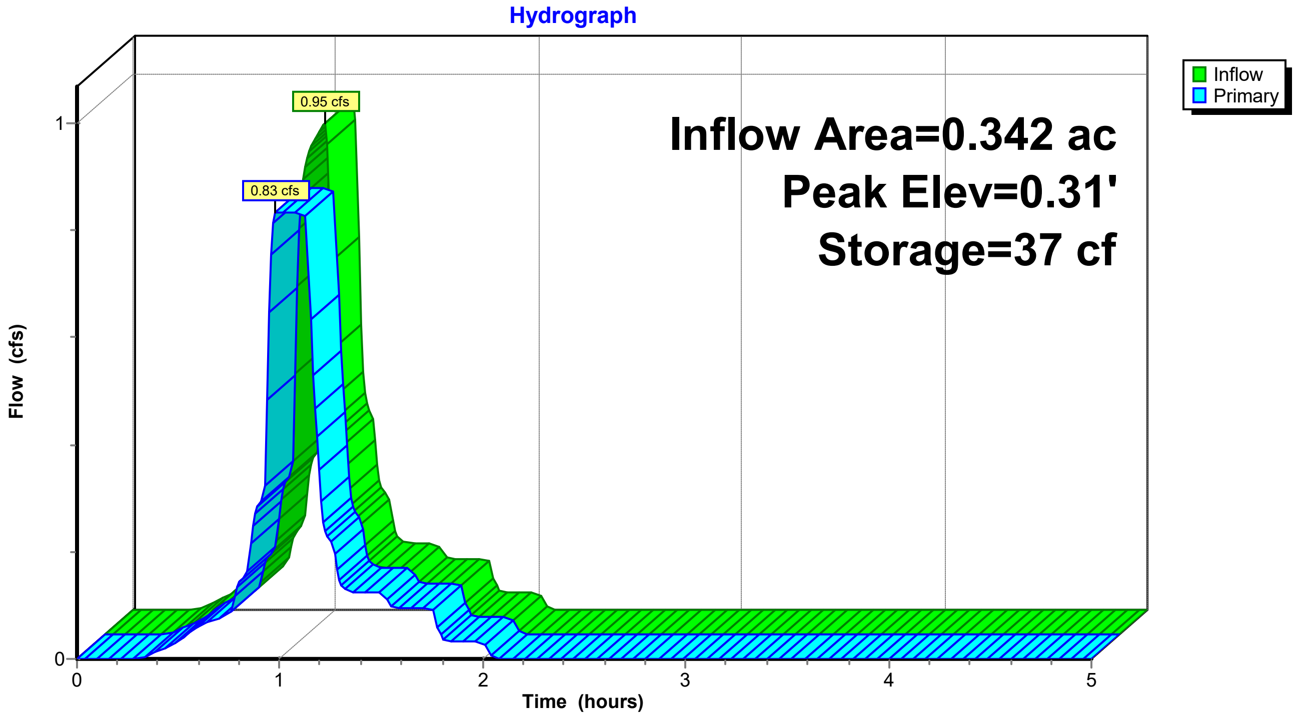
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (67.1 - 66.8)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	90 cf	**6.00'W x 10.00'L x 0.75'H Prismatoid** x 2

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**300.000 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.83 cfs @ 0.98 hrs HW=0.01' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.83 cfs @ 0.01 fps)

Pond 3P: (2) Filterra 6x10/10x6



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER QUALITY
Bureau of Stormwater Permitting
401 East State Street
P.O. Box 420 Mail Code 401-02B
Trenton, NJ 08625-0420
Tel. (609) 633-7021 • Fax (609) 777-0432
www.nj.gov/dep/dwq/bnpc_home.htm

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

SHAWN M. LATOURETTE
Acting Commissioner

February 12, 2021

Derek M. Berg
Director – Stormwater Regulatory Management - East
Contech Engineered Solutions LLC
71 US Route 1, Suite F
Scarborough, ME 04074

Re: MTD Lab Certification
Filterra® HC Bioretention System
Off-line Installation Approved

TSS Removal Rate 80%

Dear Mr. Berg:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Contech Engineered Solutions LLC has requested a Laboratory Certification for the Filterra® HC Bioretention System (Filterra® HC.)

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated January 2021) for this device is published online at http://www.njcat.org/uploads/newDocs/NJCATFilterraTechnologyVerificationReportFinal._.pdf.

The NJDEP certifies the use of the Filterra® HC stormwater treatment unit by Contech Engineered Solutions LLC at a TSS removal rate of 80% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 3.12 gpm/ft^2 of effective filtration treatment area.

2. The Filterra® HC stormwater treatment unit shall be installed using the same configuration reviewed by NJCAT, and sized in accordance with the criteria specified in item 7 below.

3. This device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Filterra® HC. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at https://www.conteches.com/Portals/0/Documents/Maintenance%20Guides/Filterra%20HC%20OM%20Packet.pdf for any changes to the maintenance requirements.

6. For an MTD to be considered "green infrastructure" (GI) in accordance with the March 2, 2020 amendments to the Stormwater Management rules at N.J.A.C. 7:8, the MTD must meet the GI definition noted at amended N.J.A.C. 7:8-1.2. Specifically, the MTD shall (1) treat stormwater runoff through infiltration into subsoil; and/or (2) treat stormwater runoff through filtration by vegetation or soil; or (3) store stormwater runoff for reuse.

   The Filterra® HC filters stormwater runoff through an engineered biofiltration soil media and, thus, meets the definition of GI. Filterra® HC can be configured with or without a precast vault. Installations that will not include a precast vault will additionally need to comply the NJDEP Stormwater BMP Manual conditions regarding separation from the seasonal high water table and, if infiltration is proposed as an outlet, minimum vertical saturated hydraulic conductivity of the subsoil. Installations without a precast vault that do not rely on infiltration are required to maintain at least a one-foot separation from the seasonal high water table measured from the lowest point of the system. Installations without a precast vault that utilize infiltration are required to have the most hydraulically restrictive soil layer below the MTD meet the minimum tested vertical saturated hydraulic conductivity of one inch per hour and have at least two feet of separation from the seasonal high water table measured from the lowest point of the system.

7. Sizing Requirement:

The example below demonstrates the sizing procedure for the Filterra® HC:

Example: A 0.25-acre impervious site is to be treated to 80% TSS removal using the Filterra® HC. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

The selection of the appropriate model of Filterra® HC is based upon both the maximum inflow drainage area and the MTFR. It is necessary to calculate the required model using both methods and to use the largest model determined by the two methods.

<u>Inflow Drainage Area Evaluation:</u>

The drainage area to the Filterra® HC in this example is 0.25 acres. Included in Table 1 below, all of the Filterra® HC models are designed with a maximum allowable drainage area greater than 0.25 acres. Specifically, the Filterra® HC with a 4’x4’ media bay and a maximum allowable drainage area of 0.40 acres would be the smallest model able to treat runoff without exceeding the maximum allowable drainage area.

<u>Maximum Treatment Flow Rate (MTFR) Evaluation:</u>

The site runoff (Q) was based on the following:

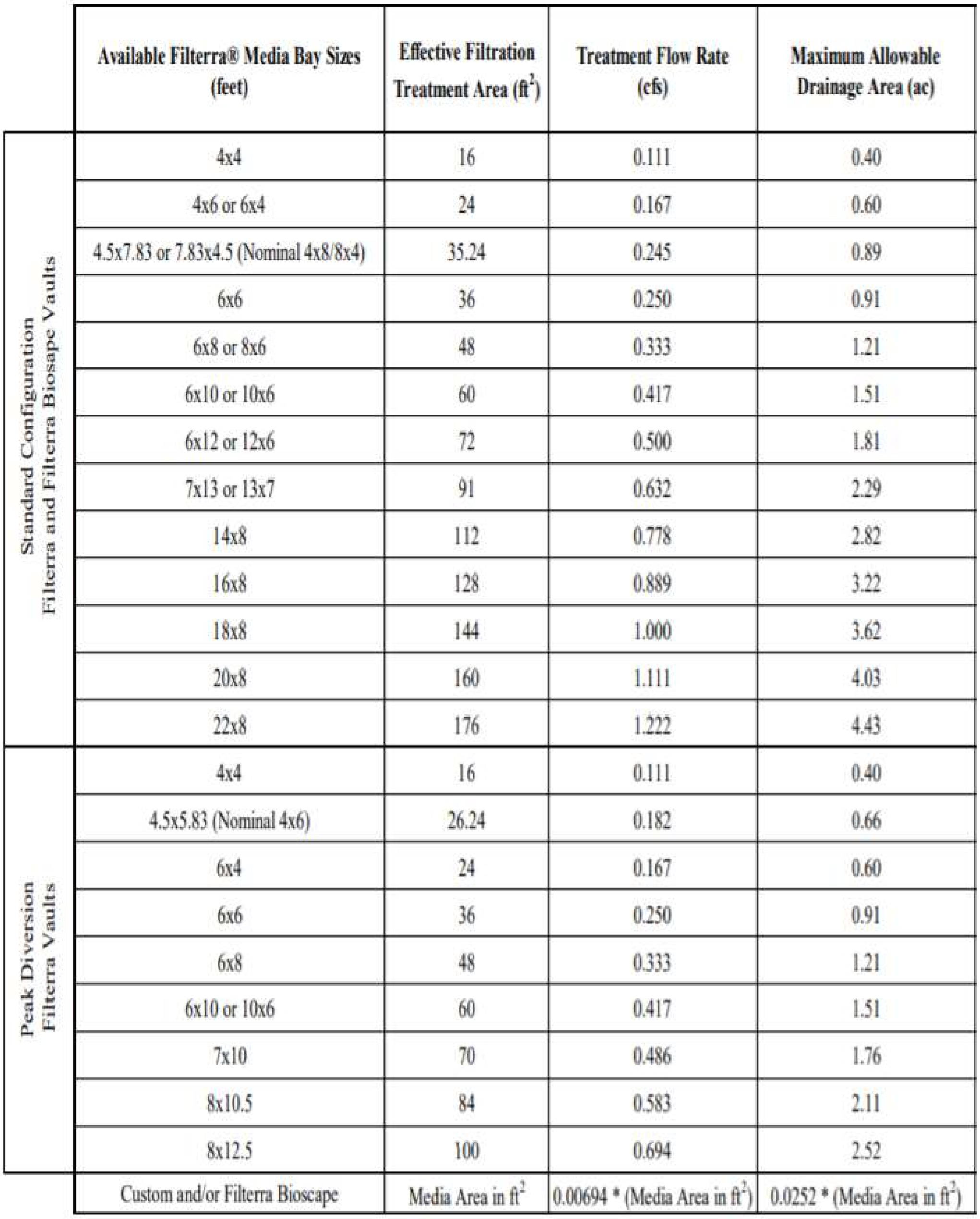
time of concentration = 10 minutes
i = 3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
c = 0.99 (runoff coefficient for impervious)
Q = ciA = 0.99 x 3.2 x 0.25 = 0.79 cfs

Given the site runoff is 0.79 cfs and based on the MTFR’s listed in Table 1 below, the Filterra® HC with a 16’x8’ media bay and an MTFR of 0.889 cfs would be the smallest model that could be used to treat the impervious area without exceeding the MTFR. If using more than one unit for treating runoff, the units should be configured such that the flowrate to each unit does not exceed the design MTFR for each unit and ensuring the entire 0.25 acre area is treated.

The MTFR evaluation results will be used since that method results in the highest minimum configuration determined by the two methods.

The sizing table corresponding to the available system models is noted below:

Table 1. Filterra® HC MTFRs and Maximum Allowable Drainage Areas



	Available Filterra® Media Bay Sizes (feet)	Effective Filtration Treatment Area (ft^2)	Treatment Flow Rate (cfs)	Maximum Allowable Drainage Area (ac)
Standard Configuration Filterra and Filterra Biosape Vaults	4x4	16	0.111	0.40
	4x6 or 6x4	24	0.167	0.60
	4.5x7.83 or 7.83x4.5 (Nominal 4x8/8x4)	35.24	0.245	0.89
	6x6	36	0.250	0.91
	6x8 or 8x6	48	0.333	1.21
	6x10 or 10x6	60	0.417	1.51
	6x12 or 12x6	72	0.500	1.81
	7x13 or 13x7	91	0.632	2.29
	14x8	112	0.778	2.82
	16x8	128	0.889	3.22
	18x8	144	1.000	3.62
	20x8	160	1.111	4.03
	22x8	176	1.222	4.43
Peak Diversion Filterra Vaults	4x4	16	0.111	0.40
	4.5x5.83 (Nominal 4x6)	26.24	0.182	0.66
	6x4	24	0.167	0.60
	6x6	36	0.250	0.91
	6x8	48	0.333	1.21
	6x10 or 10x6	60	0.417	1.51
	7x10	70	0.486	1.76
	8x10.5	84	0.583	2.11
	8x12.5	100	0.694	2.52
	Custom and/or Filterra Bioscape	Media Area in ft^2	0.00694 * (Media Area in ft^2)	0.0252 * (Media Area in ft^2)

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact me at (609) 633-7021.

Sincerely,

Gabriel Mahon

Gabriel Mahon, Chief
Bureau of Stormwater Permitting

Attachment: Maintenance Plan
cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP – Water & Land Management
Nancy Kempel, NJDEP– BSTP
Keith Stampfel, NJDEP – DLRP
Dennis Contois, NJDEP – DLRP

APPENDIX D

Groundwater Recharge Analysis

New Jersey Groundwater Recharge Spreadsheet
Version 2.0
November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
MIDDLESEX CO., NORTH BRUNSWICK TWP	45.9	1.48

Project Name:	**Project King Arthur**
Description:	
Analysis Date:	**04/26/23**

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	5.42	Open space	Keyport	12.7	250,237
2	4.43	Impervious areas	Keyport	0.0	-
3	0.94	Woods	Keyport	12.5	42,777
4	0.05	Woods	Klinesville	14.6	2,657
5	0.15	Gravel, dirt	Keyport	7.2	3,921
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	11.0			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				7.5	299,591

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	2.76	Open space	Keyport	12.7	127,427
2	7.96	Impervious areas	Keyport	0.0	-
3	0.02	Woods	Keyport	12.5	910
4	0.04	Open space	Klinesville	14.2	2,060
5	0.21	Gravel, dirt	Keyport	7.2	5,489
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	11.0			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				3.4	135,886

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	346,738
Post-Development Annual Recharge Deficit=	***163,705***	(cubic feet)	

Recharge Efficiency Parameters Calculations (area averages)

RWC=	2.95	(in)	DRWC=	0.01	(in)
ERWC =	0.77	(in)	EDRWC=	0.00	(in)

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

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

Project Name	Description	Analysis Date	BMP or LID Type
Project King Arthur	**0**	**04/26/23**	

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	**9117.0**	sq.ft
BMP Effective Depth, this is the design variable	dBMP	**4.8**	in
Upper level of the BMP surface (negative if above ground)	dBMPu	**18.0**	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	**60.0**	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	**1**	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	**1.20**	in
ERWC Modified to consider dEXC	EDRWC	**0.00**	in
Empty Portion of RWC under Infilt. BMP	RERWC	**0.00**	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	**0.46**	in
Inches of Rainfall to capture	Pdesign	**0.58**	in
Recharge Provided Avg. over Imp. Area		**22.5**	in
Runoff Captured Avg. over imp. Area		**22.5**	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	**0.10**	unitless
BMP Volume	VBMP	**3,647**	cu.ft

CALCULATION CHECK MESSAGES

Volume Balance-> **Solve Problem to satisfy Annual Recharge**

dBMP Check---> **OK**

dEXC Check---> **OK**

BMP Location---> **OK**

Parameters from Annual Recharge Worksheet

Parameter	Symbol	Value	Unit
Post-D Deficit Recharge (or desired recharge volume)	Vdef		cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	**95,728**	sq.ft
Root Zone Water Capacity	RWC	**4.62**	in
RWC Modified to consider dEXC	DRWC	**0.00**	in
Climatic Factor	C-factor	**1.48**	no units
Average Annual P	Pavg	**45.9**	in
Recharge Requirement over Imp. Area	dr	**0.0**	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		**179,145**	cu.ft
Avg BMP Recharge Efficiency		**100.0%**	Represents % Infiltration Recharged
%Rainfall became Runoff		**77.9%**	%
%Runoff Infiltrated		**62.8%**	%
%Runoff Recharged		**17.3%**	%
%Rainfall Recharged		**13.5%**	%

OTHER NOTES

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

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

Project Name	Description	Analysis Date	BMP or LID Type
Project King Arthur	**0**	**02/21/23**	

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	**10599.0**	sq.ft
BMP Effective Depth, this is the design variable	dBMP	**2.4**	in
Upper level of the BMP surface (negative if above ground)	dBMPu	**18.0**	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	**60.0**	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	**1**	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	**1.20**	in
ERWC Modified to consider dEXC	EDRWC	**0.00**	in
Empty Portion of RWC under Infilt. BMP	RERWC	**0.00**	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	**0.39**	in
Inches of Rainfall to capture	Pdesign	**0.49**	in
Recharge Provided Avg. over Imp. Area		**20.0**	in
Runoff Captured Avg. over imp. Area		**20.0**	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	**0.16**	unitless
BMP Volume	VBMP	**2,120**	cu.ft

CALCULATION CHECK MESSAGES

Volume Balance-> **Solve Problem to satisfy Annual Recharge**
dBMP Check---> **OK**
dEXC Check---> **OK**

BMP Location---> **OK**

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef		cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	**68,189**	sq.ft
Root Zone Water Capacity	RWC	**4.62**	in
RWC Modified to consider dEXC	DRWC	**0.00**	in
Climatic Factor	C-factor	**1.48**	no units
Average Annual P	Pavg	**45.9**	in
Recharge Requirement over Imp. Area	dr	**0.0**	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		**113,494**	cu.ft
Avg BMP Recharge Efficiency		**100.0%**	Represents % Infiltration Recharged
%Rainfall became Runoff		**77.9%**	%
%Runoff Infiltrated		**55.8%**	%
%Runoff Recharged		**11.0%**	%
%Rainfall Recharged		**8.6%**	%

OTHER NOTES

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

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

UG BASIN A3 (LONG WAY)

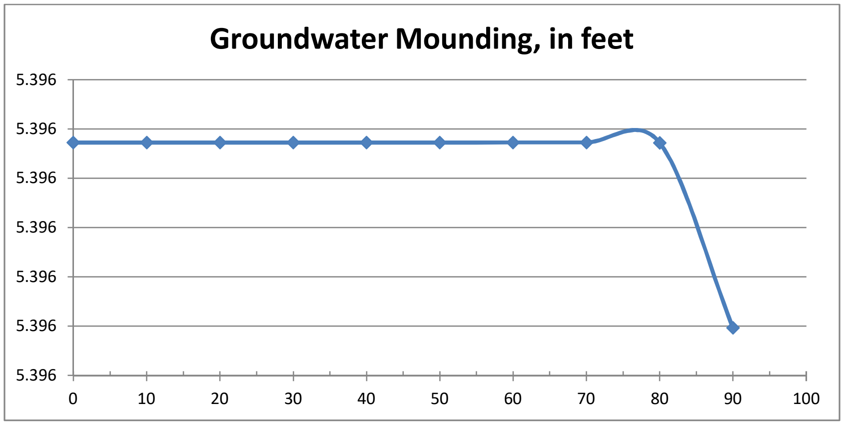
Input Values

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

15.396	**h(max)**	**Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
5.396	**Δh(max)**	**Maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
5.396	**0**
5.396	**10**
5.396	**20**
5.396	**30**
5.396	**40**
5.396	**50**
5.396	**60**
5.396	**70**
5.396	**80**
5.396	**90**

Re-Calculate Now



Disclaimer

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

UG BASIN A3 (SHORT WAY)

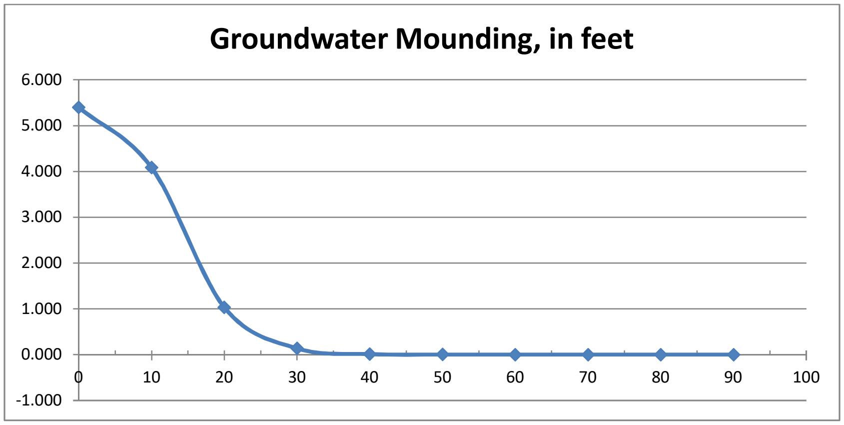
Input Values

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

15.396	**h(max)**	**Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
5.396	**Δh(max)**	**Maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
5.396	**0**
4.082	**10**
1.034	**20**
0.137	**30**
0.012	**40**
0.003	**50**
0.002	**60**
0.002	**70**
0.002	**80**
0.002	**90**

Re-Calculate Now



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UG BASIN A4 (LONG WAY)

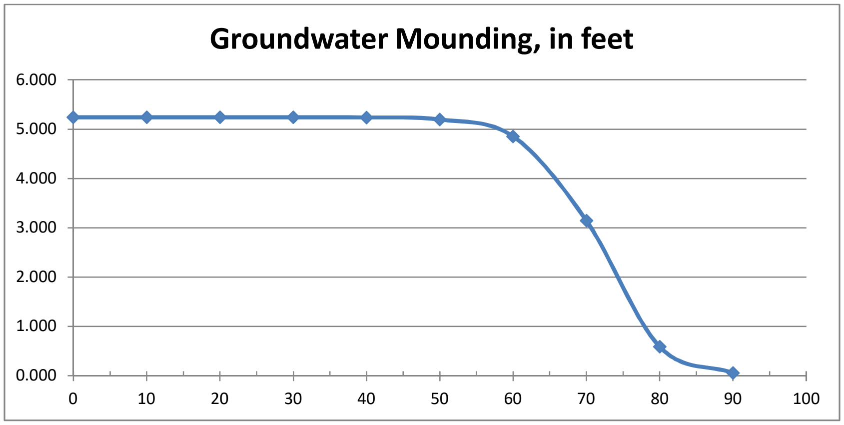
Input Values

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

15.238	**h(max)**	**Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
5.238	**Δh(max)**	**Maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
5.238	**0**
5.238	**10**
5.238	**20**
5.238	**30**
5.235	**40**
5.194	**50**
4.851	**60**
3.142	**70**
0.585	**80**
0.055	**90**

Re-Calculate Now



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UG BASIN A4 (SHORT WAY)

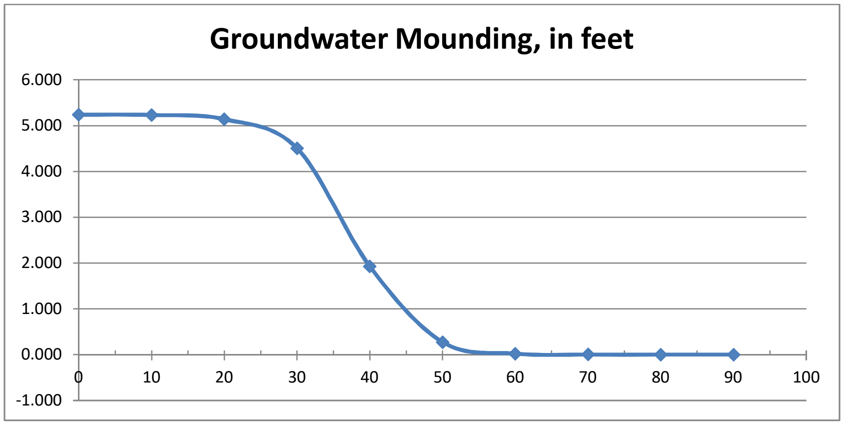
Input Values

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

15.238	**h(max)**	**Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
5.238	**Δh(max)**	**Maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
5.238	**0**
5.231	**10**
5.139	**20**
4.504	**30**
1.928	**40**
0.274	**50**
0.021	**60**
0.002	**70**
0.002	**80**
0.002	**90**

Re-Calculate Now



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APPENDIX E

Proposed Stormwater Conveyance System Calculations

NOAA Atlas 14, Volume 2, Version 3
Location name: North Brunswick, New Jersey, USA*
Latitude: 40.4621°, Longitude: -74.4375°
Elevation: 76 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.01** (3.64-4.43)	**4.78** (4.32-5.28)	**5.66** (5.11-6.25)	**6.31** (5.69-6.96)	**7.09** (6.37-7.82)	**7.66** (6.83-8.42)	**8.21** (7.30-9.05)	**8.71** (7.70-9.62)	**9.34** (8.17-10.3)	**9.80** (8.52-10.9)
10-min	**3.20** (2.90-3.54)	**3.82** (3.46-4.22)	**4.54** (4.09-5.01)	**5.05** (4.55-5.57)	**5.65** (5.08-6.23)	**6.09** (5.44-6.71)	**6.52** (5.80-7.19)	**6.91** (6.10-7.63)	**7.39** (6.46-8.17)	**7.72** (6.71-8.57)
15-min	**2.67** (2.42-2.95)	**3.20** (2.90-3.54)	**3.82** (3.45-4.22)	**4.26** (3.84-4.70)	**4.78** (4.29-5.26)	**5.14** (4.59-5.66)	**5.50** (4.88-6.06)	**5.81** (5.13-6.41)	**6.20** (5.42-6.86)	**6.46** (5.62-7.18)
30-min	**1.83** (1.66-2.02)	**2.21** (2.00-2.44)	**2.72** (2.45-3.00)	**3.08** (2.78-3.40)	**3.54** (3.18-3.90)	**3.87** (3.46-4.26)	**4.21** (3.74-4.64)	**4.52** (4.00-4.99)	**4.93** (4.31-5.46)	**5.23** (4.55-5.81)
60-min	**1.14** (1.03-1.26)	**1.39** (1.25-1.53)	**1.74** (1.57-1.92)	**2.01** (1.81-2.22)	**2.36** (2.11-2.60)	**2.62** (2.34-2.89)	**2.90** (2.58-3.20)	**3.17** (2.80-3.50)	**3.54** (3.10-3.92)	**3.82** (3.32-4.24)
2-hr	**0.698** (0.626-0.775)	**0.850** (0.764-0.944)	**1.08** (0.969-1.20)	**1.26** (1.13-1.39)	**1.50** (1.34-1.66)	**1.70** (1.51-1.88)	**1.91** (1.68-2.11)	**2.12** (1.86-2.35)	**2.42** (2.09-2.70)	**2.66** (2.28-2.97)
3-hr	**0.516** (0.464-0.575)	**0.628** (0.566-0.701)	**0.799** (0.718-0.890)	**0.931** (0.835-1.04)	**1.12** (0.994-1.24)	**1.27** (1.12-1.41)	**1.42** (1.25-1.58)	**1.59** (1.39-1.76)	**1.81** (1.56-2.02)	**2.00** (1.70-2.23)
6-hr	**0.331** (0.298-0.370)	**0.402** (0.362-0.449)	**0.510** (0.457-0.568)	**0.599** (0.534-0.664)	**0.725** (0.640-0.802)	**0.830** (0.729-0.917)	**0.943** (0.821-1.04)	**1.07** (0.918-1.18)	**1.24** (1.05-1.37)	**1.39** (1.16-1.54)
12-hr	**0.200** (0.179-0.226)	**0.243** (0.217-0.273)	**0.310** (0.276-0.348)	**0.366** (0.325-0.410)	**0.450** (0.396-0.502)	**0.523** (0.456-0.583)	**0.601** (0.519-0.670)	**0.689** (0.587-0.768)	**0.819** (0.686-0.915)	**0.931** (0.767-1.04)
24-hr	**0.115** (0.105-0.126)	**0.139** (0.128-0.153)	**0.178** (0.164-0.196)	**0.212** (0.194-0.233)	**0.264** (0.239-0.288)	**0.308** (0.277-0.337)	**0.358** (0.319-0.391)	**0.413** (0.364-0.452)	**0.496** (0.430-0.545)	**0.568** (0.485-0.626)
2-day	**0.067** (0.061-0.074)	**0.081** (0.074-0.089)	**0.103** (0.094-0.114)	**0.122** (0.111-0.135)	**0.150** (0.136-0.166)	**0.174** (0.156-0.192)	**0.200** (0.178-0.221)	**0.229** (0.202-0.253)	**0.272** (0.235-0.301)	**0.308** (0.263-0.342)
3-day	**0.047** (0.043-0.052)	**0.057** (0.052-0.063)	**0.073** (0.066-0.080)	**0.086** (0.078-0.094)	**0.105** (0.095-0.115)	**0.121** (0.109-0.132)	**0.138** (0.123-0.152)	**0.157** (0.139-0.173)	**0.185** (0.161-0.204)	**0.208** (0.179-0.231)
4-day	**0.037** (0.034-0.041)	**0.045** (0.041-0.050)	**0.057** (0.052-0.063)	**0.067** (0.061-0.074)	**0.082** (0.074-0.089)	**0.094** (0.085-0.103)	**0.107** (0.096-0.117)	**0.121** (0.107-0.133)	**0.141** (0.124-0.156)	**0.158** (0.137-0.175)
7-day	**0.025** (0.023-0.027)	**0.030** (0.028-0.033)	**0.037** (0.035-0.041)	**0.044** (0.040-0.047)	**0.052** (0.048-0.057)	**0.060** (0.054-0.065)	**0.067** (0.061-0.073)	**0.076** (0.068-0.082)	**0.088** (0.077-0.096)	**0.097** (0.085-0.107)
10-day	**0.020** (0.019-0.022)	**0.024** (0.022-0.026)	**0.029** (0.027-0.031)	**0.034** (0.031-0.036)	**0.040** (0.037-0.043)	**0.045** (0.041-0.049)	**0.050** (0.046-0.054)	**0.056** (0.051-0.061)	**0.064** (0.057-0.070)	**0.071** (0.063-0.077)
20-day	**0.013** (0.013-0.014)	**0.016** (0.015-0.017)	**0.019** (0.018-0.020)	**0.022** (0.020-0.023)	**0.025** (0.023-0.026)	**0.028** (0.026-0.029)	**0.030** (0.028-0.032)	**0.033** (0.030-0.035)	**0.036** (0.033-0.039)	**0.039** (0.036-0.042)
30-day	**0.011** (0.011-0.012)	**0.013** (0.013-0.014)	**0.015** (0.015-0.016)	**0.017** (0.016-0.018)	**0.019** (0.018-0.020)	**0.021** (0.020-0.022)	**0.023** (0.021-0.024)	**0.025** (0.023-0.026)	**0.027** (0.025-0.028)	**0.028** (0.026-0.030)
45-day	**0.009** (0.009-0.010)	**0.011** (0.011-0.012)	**0.013** (0.012-0.014)	**0.014** (0.014-0.015)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)	**0.020** (0.018-0.021)	**0.021** (0.020-0.022)	**0.022** (0.021-0.023)
60-day	**0.009** (0.008-0.009)	**0.010** (0.010-0.010)	**0.011** (0.011-0.012)	**0.013** (0.012-0.013)	**0.014** (0.013-0.014)	**0.015** (0.014-0.016)	**0.016** (0.015-0.016)	**0.017** (0.016-0.017)	**0.018** (0.017-0.019)	**0.018** (0.017-0.019)

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

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

Please refer to NOAA Atlas 14 document for more information.

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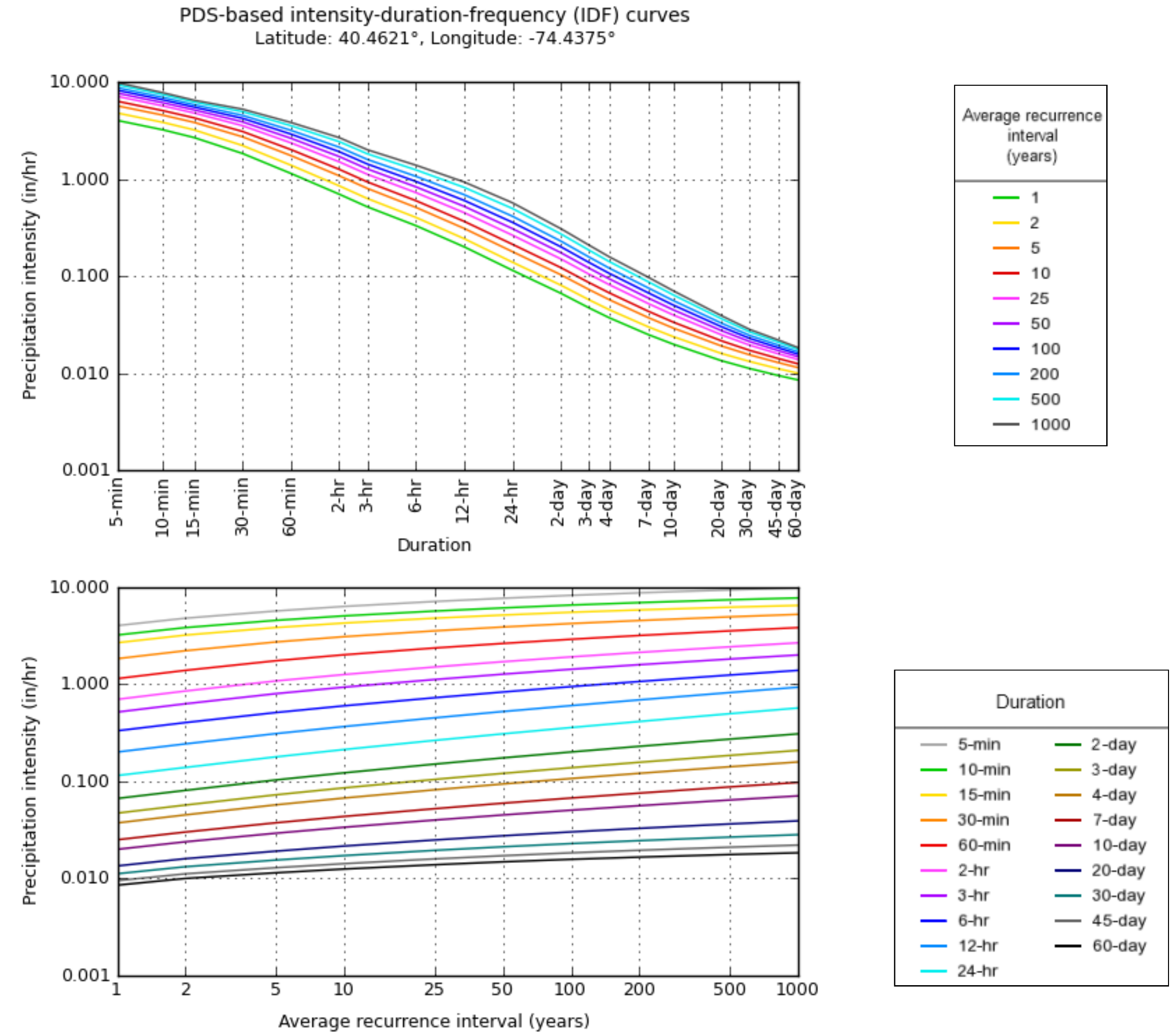
PF graphical



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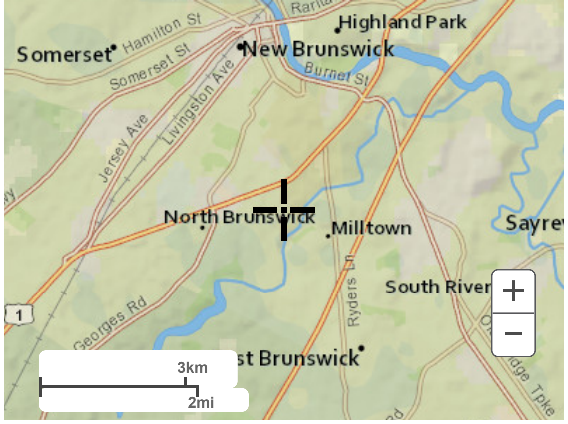
Maps & aerials

Small scale terrain



Large scale terrain

Large scale map

Large scale aerial

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

PROPOSED SUBWATERSHED CALCULATIONS
King Arthur Ct Warehouse
North Brunswick, NJ
100851001

Subwatershed	Watershed	Total Area	Open Space Area	Woods Area	Gravel Area	Impervious Area	Runoff Coefficient, c (Weighted)
		(AC)	(AC)	(AC)	(AC)	(AC)	
CB-209	WS A2	0.56	0.08	0.00	0.00	0.49	0.94
CB-210	WS A2	0.32	0.00	0.00	0.00	0.32	0.99
CB-204	WS A2	0.28	0.02	0.00	0.00	0.26	0.97
CB-203	WS A2	0.28	0.01	0.00	0.00	0.27	0.98
CB-109	WS A1	0.43	0.12	0.00	0.00	0.31	0.90
CB-214	WS A2	0.16	0.00	0.00	0.00	0.16	0.98
CB-215	WS A2	0.14	0.01	0.00	0.00	0.14	0.98
CB-216	WS A2	0.30	0.00	0.00	0.00	0.30	0.99
F1	WS A5	0.33	0.02	0.00	0.00	0.31	0.97
F2	WS A5	0.33	0.02	0.00	0.00	0.31	0.97
F3	WS A5	0.34	0.04	0.00	0.00	0.30	0.95
CB-105	WS A1	0.33	0.10	0.00	0.00	0.23	0.88
CB-106	WS A1	0.38	0.01	0.00	0.00	0.37	0.98
CB-107	WS A1	0.45	0.12	0.00	0.00	0.32	0.90
CB-108	WS A1	0.28	0.19	0.00	0.00	0.09	0.76
Roof Area 1	WS A3	2.20	0.00	0.00	0.00	2.20	0.99
Roof Area 2	WS A4	1.57	0.00	0.00	0.00	1.57	0.99

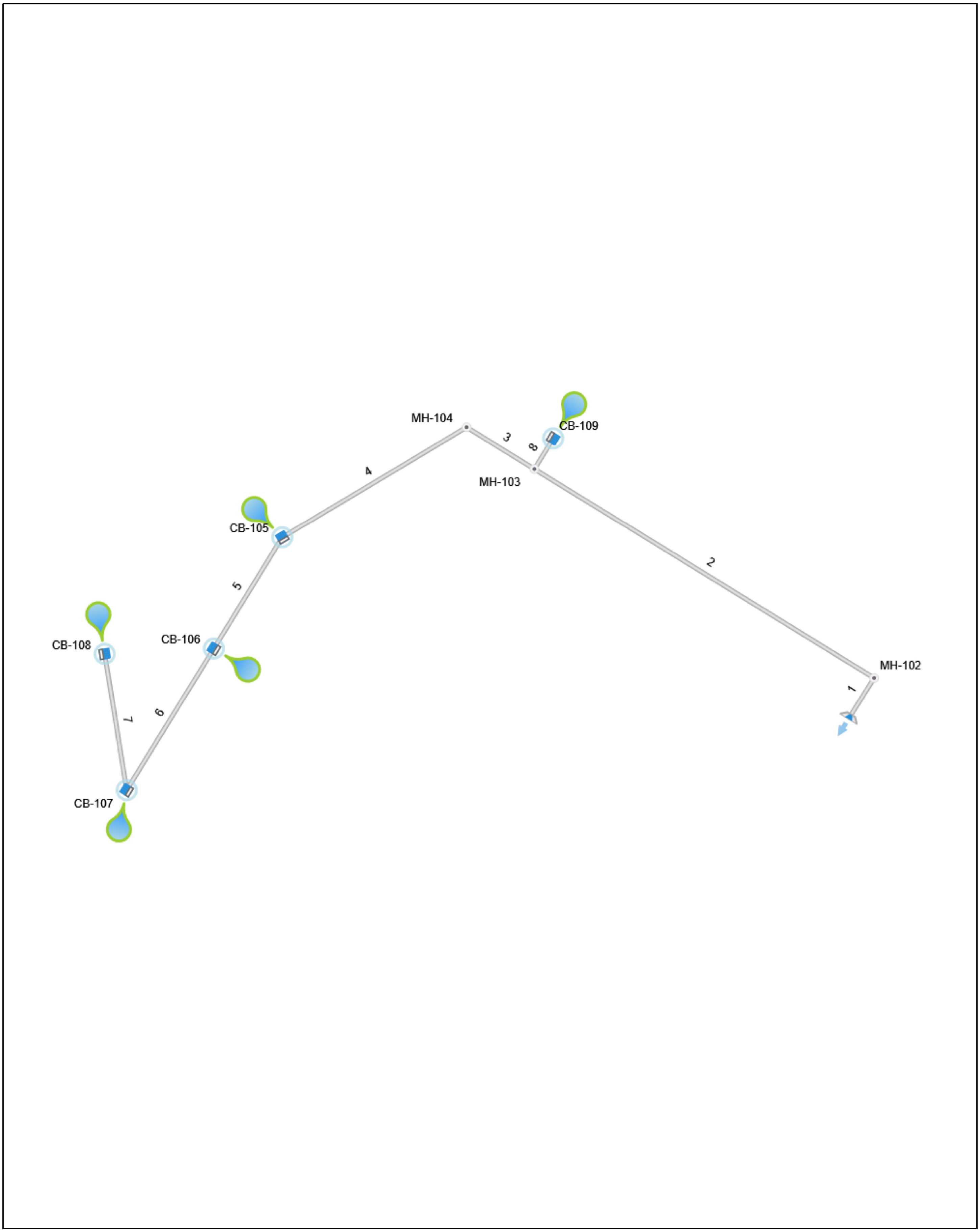
C-Values	
Open Space Area	**0.65**
Woods Area	**0.59**
Gravel Area	**0.84**
Impervious Area	**0.99**

Plan View

Stormwater Studio 2023 v 3.0.0.31

Project Name: 100851001-Proposed Storm Conveyance

05-05-2023



Project File: 100851001-Proposed Storm ConveyanceBasin A1.sws

Storm Sewer Tabulation

Stormwater Studio 2023 v 3.0.0.31

Project Name: 100851001-Proposed Storm Conveyance

05-05-2023

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
MH-102 TO OF-101	28.97	0.000	1.864	0.00	0.00	1.66	0.0	8.59	5.75	9.54	24.50	3.11	24	1.00	47.29	47.00	49.10	49.07	54.17	47.00	1
MH-103 TO MH-102	269.62	0.000	1.864	0.00	0.00	1.66	0.0	7.80	5.97	9.90	17.33	4.21	24	0.50	48.64	47.29	49.79	49.30	56.33	54.17	2
MH-104 TO MH-103	53.80	0.000	1.462	0.00	0.00	1.30	0.0	7.62	6.02	7.81	8.04	5.19	18	0.50	51.27	51.00	52.46	52.19	56.30	56.33	3
CB-105 TO MH-104	145.13	0.355	1.462	0.87	0.31	1.30	6.0	7.16	6.17	8.00	8.08	4.53	18	0.50	52.00	51.27	53.69	52.97	55.90	56.30	4
CB-106 TO CB-105	88.24	0.385	1.106	0.98	0.38	0.99	6.0	6.87	6.27	6.19	8.04	3.51	18	0.50	52.44	52.00	54.35	54.09	55.67	55.90	5
CB-107 TO CB-106	112.41	0.446	0.722	0.90	0.40	0.61	6.0	6.45	6.42	3.93	4.95	3.20	15	0.50	53.00	52.44	54.87	54.52	55.67	55.67	6
CB-108 TO CB-107	93.35	0.276	0.276	0.76	0.21	0.21	6.0	6.00	6.61	1.38	2.73	1.76	12	0.50	53.47	53.00	55.22	55.10	56.80	55.67	7
CB-109 TO MH-103	24.25	0.402	0.402	0.90	0.36	0.36	6.0	6.00	6.61	2.39	2.73	3.92	12	0.50	52.17	52.05	52.90	52.78	55.83	56.33	8

Notes: IDF File = 100851001-NOAA RAINFALL IDF.idf, Return Period = 25-yrs.

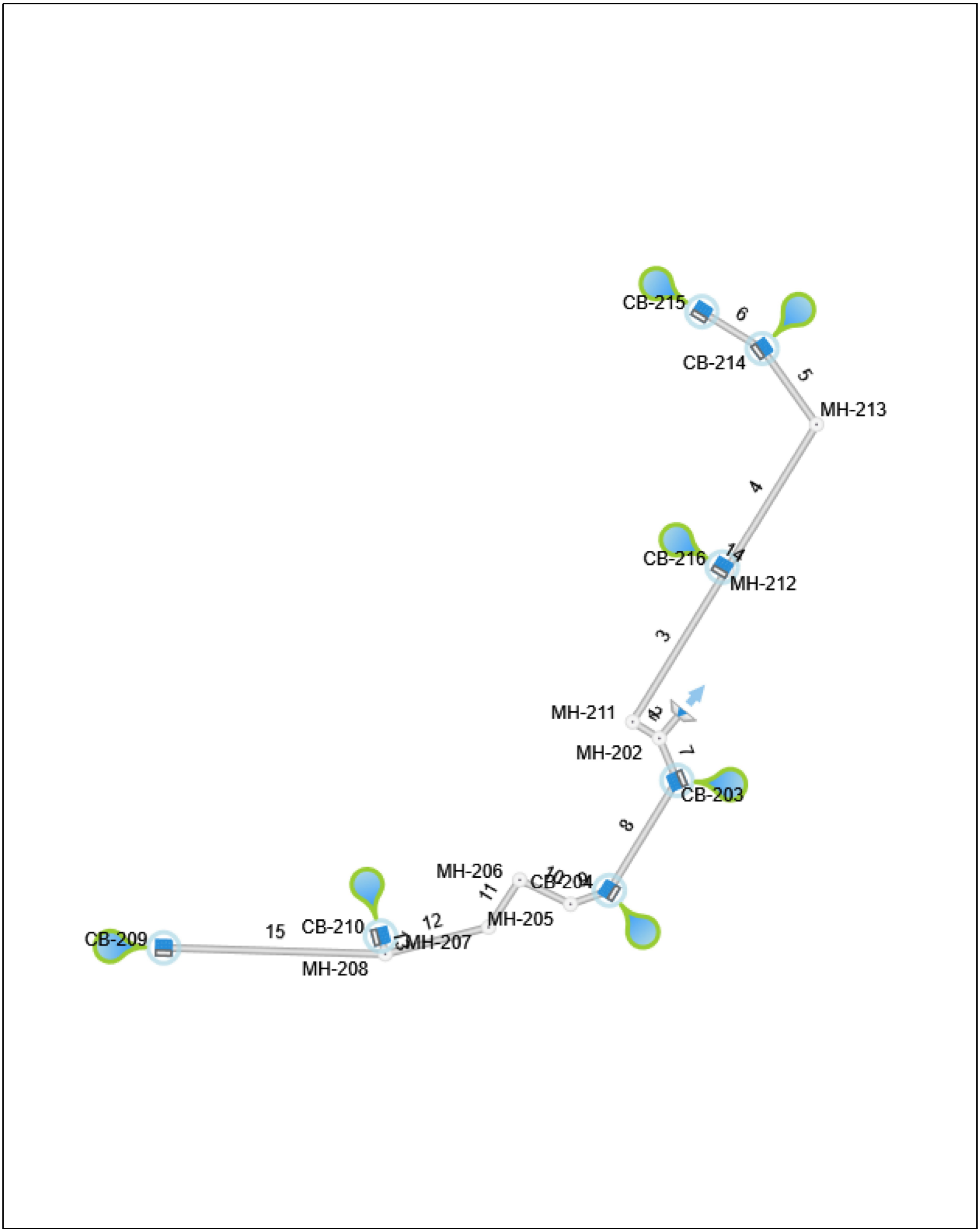
Project File: 100851001-Proposed Storm ConveyanceBasin A1.sws

Plan View

Stormwater Studio 2023 v 3.0.0.31

Project Name: 100851001-Proposed Storm Conveyance

05-05-2023



Storm Sewer Tabulation

Stormwater Studio 2023 v 3.0.0.31

Project Name: 100851001-Proposed Storm Conveyance

05-05-2023

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
MH-202 TO OF-201	30.89	0.000	2.035	0.00	0.00	1.97	0.0	8.55	5.76	11.35	11.38	6.42	18	1.00	47.31	47.00	49.46	49.15	55.80	47.00	1
MH-211 TO MH-202	33.88	0.000	0.600	0.00	0.00	0.59	0.0	8.42	5.79	3.41	4.95	4.35	15	0.50	49.99	49.82	50.75	50.58	56.50	55.80	2
MH-212 TO MH-211	193.40	0.000	0.600	0.00	0.00	0.59	0.0	7.69	6.00	3.54	8.04	3.16	18	0.50	50.96	49.99	51.68	51.34	54.63	56.50	3
MH-213 TO MH-212	185.05	0.000	0.300	0.00	0.00	0.29	0.0	6.86	6.27	1.83	4.95	3.64	15	0.50	51.88	50.96	52.43	51.48	57.06	54.63	4
MH-214 TO MH-213	101.18	0.160	0.300	0.97	0.16	0.29	6.0	6.41	6.44	1.88	4.95	2.70	15	0.50	52.39	51.88	52.95	52.83	55.97	57.06	5
CB-214 TO CB-215	76.50	0.140	0.140	0.98	0.14	0.14	6.0	6.00	6.61	0.91	2.73	1.58	12	0.50	52.77	52.39	53.34	53.30	55.74	55.97	6
CB-203 TO MH-202	49.39	0.276	1.435	0.97	0.27	1.38	6.0	8.36	5.81	8.03	17.33	2.55	24	0.50	48.18	47.94	50.57	50.52	54.77	55.80	7
CB-204 TO CB-203	139.72	0.278	1.158	0.97	0.27	1.11	6.0	7.90	5.94	6.61	8.05	3.74	18	0.50	48.88	48.18	51.22	50.75	54.72	54.77	8
MH-205 TO CB-204	44.35	0.000	0.880	0.00	0.00	0.84	0.0	7.74	5.99	5.05	8.04	2.86	18	0.50	49.11	48.88	51.60	51.51	55.72	54.72	9
MH-206 TO MH-205	61.14	0.000	0.880	0.00	0.00	0.84	0.0	7.53	6.05	5.10	8.08	2.89	18	0.51	49.41	49.11	51.86	51.74	56.84	55.72	10
MH-207 TO MH-206	61.53	0.000	0.880	0.00	0.00	0.84	0.0	7.31	6.12	5.16	8.04	2.92	18	0.50	49.72	49.41	52.15	52.03	56.27	56.84	11
MH-208 TO MH-207	115.51	0.000	0.880	0.00	0.00	0.84	0.0	6.92	6.25	5.27	8.04	2.98	18	0.50	50.30	49.72	52.55	52.30	55.01	56.27	12
CB-210 TO MH-208	20.00	0.320	0.320	0.99	0.32	0.32	6.0	6.00	6.61	2.09	2.73	2.66	12	0.50	51.40	51.30	52.79	52.73	54.90	55.01	13
CB-216 TO MH-212	5.56	0.300	0.300	0.99	0.30	0.30	6.0	6.00	6.61	1.96	2.73	2.50	12	0.50	50.98	50.96	52.08	52.06	54.03	54.63	14
CB-209 TO MH-208	239.74	0.560	0.560	0.94	0.53	0.53	6.0	6.00	6.61	3.48	4.95	2.83	15	0.50	51.50	50.30	53.31	52.72	54.51	55.01	15

Notes: IDF File = 100851001-NOAA RAINFALL IDF.idf, Return Period = 25-yrs.

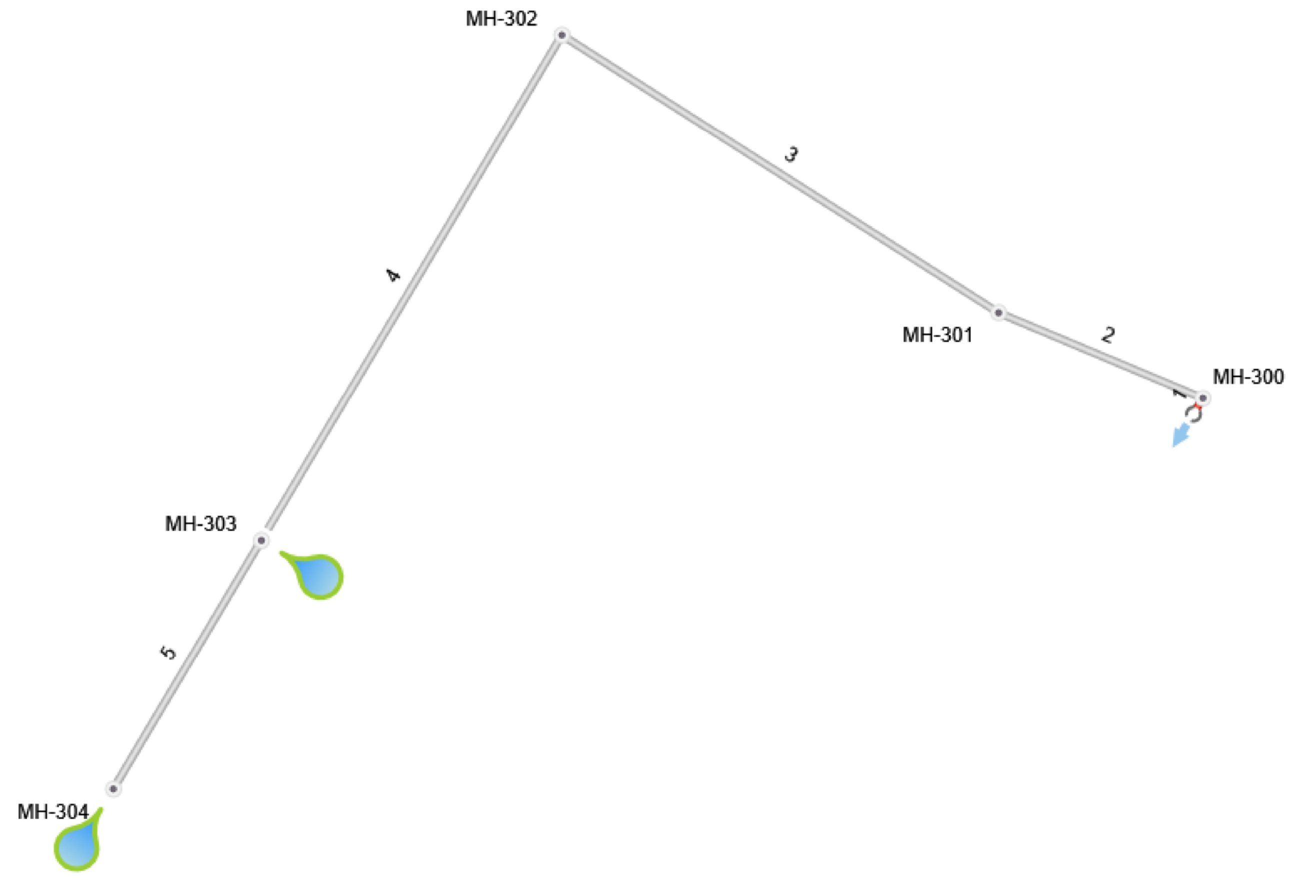
Project File: a2.sws

Plan View

Stormwater Studio 2023 v 3.0.0.31

Project Name: 100851001-Proposed Storm Conveyance

05-05-2023



Storm Sewer Tabulation

Stormwater Studio 2023 v 3.0.0.31

Project Name: 100851001-Proposed Storm Conveyance

05-05-2023

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
MH-300 TO UG BASIN A3	7.00	0.000	1.080	0.00	0.00	1.07	0.0	8.31	5.82	6.23	11.38	3.54	18	1.00	49.99	49.92	51.44	51.42	56.88	0.00	1
MH-301 TO MH-300	84.40	0.000	1.080	0.00	0.00	1.07	0.0	8.00	5.91	6.32	7.19	4.59	18	0.40	51.81	51.47	52.90	52.56	56.77	56.88	2
MH-302 TO MH-301	196.17	0.000	1.080	0.00	0.00	1.07	0.0	7.29	6.13	6.55	7.19	4.19	18	0.40	52.59	51.81	53.74	53.17	56.77	56.77	3
MH-303 TO MH-302	219.50	0.730	1.080	0.99	0.72	1.07	6.0	6.50	6.41	6.85	7.19	3.93	18	0.40	53.47	52.59	54.88	54.15	56.80	56.77	4
MH-304 TO MH-303	108.00	0.350	0.350	0.99	0.35	0.35	6.0	6.00	6.61	2.29	7.20	1.35	18	0.40	53.90	53.47	55.20	55.17	56.80	56.80	5

Notes: IDF File = 100851001-NOAA RAINFALL IDF.idf, Return Period = 25-yrs.

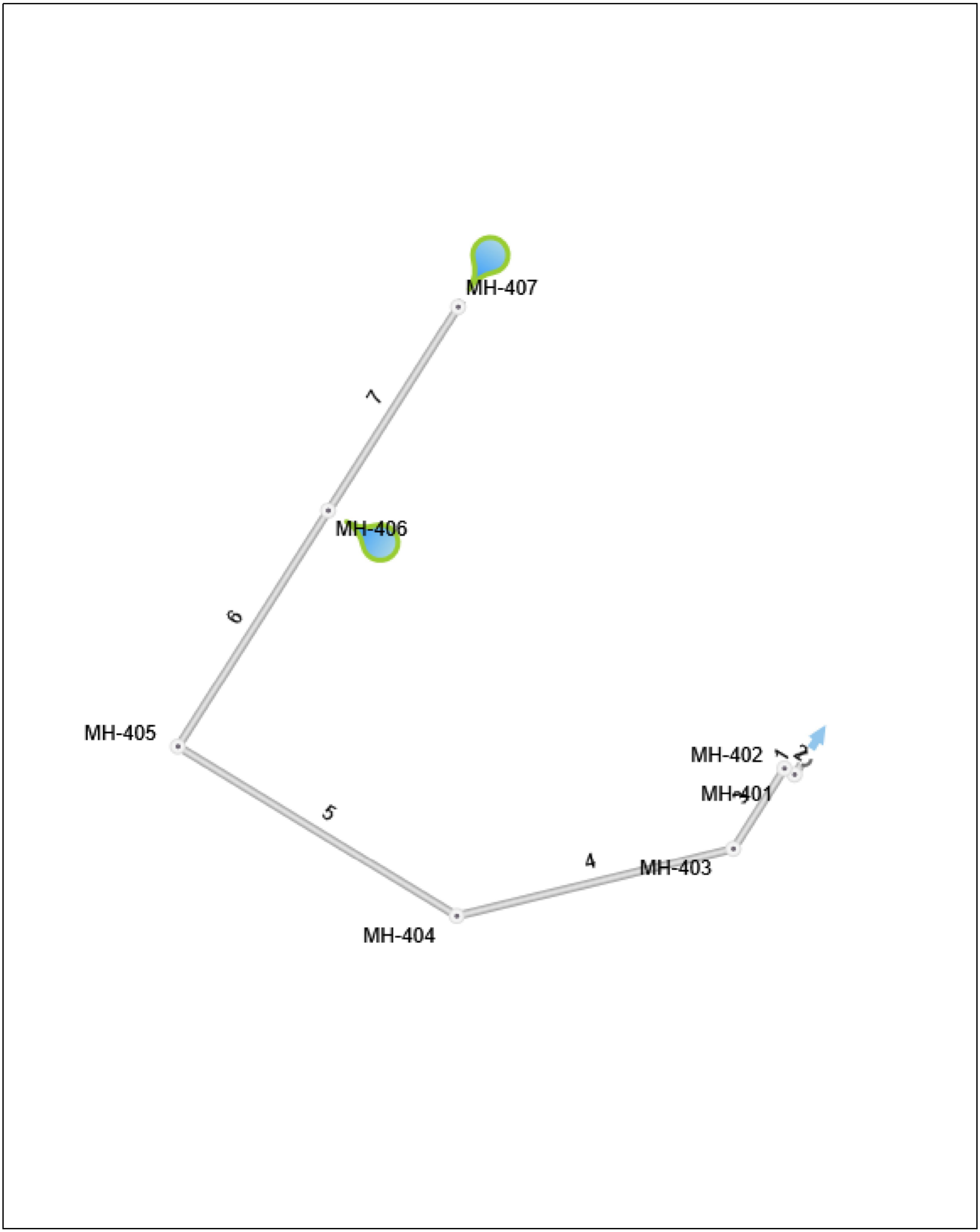
Project File: 100851001-Proposed Storm ConveyanceUG Basin A3.sws

Plan View

Stormwater Studio 2023 v 3.0.0.31

Project Name: 100851001-Proposed Storm Conveyance

05-05-2023



Project File: 100851001-Proposed Storm ConveyanceUG Basin A4.sws

Storm Sewer Tabulation

Stormwater Studio 2023 v 3.0.0.31

Project Name: 100851001-Proposed Storm Conveyance

05-05-2023

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
MH-401 TO UG A4	10.00	0.000	0.821	0.00	0.00	0.81	0.0	9.26	5.58	4.54	11.38	2.60	18	1.00	52.02	51.92	53.43	53.42	56.87	0.00	1
MH-402 TO MH-401	6.27	0.000	0.821	0.00	0.00	0.81	0.0	9.24	5.59	4.54	6.23	2.57	18	0.30	52.04	52.02	53.58	53.57	56.82	56.87	2
MH-403 TO MH-402	51.13	0.000	0.821	0.00	0.00	0.81	0.0	9.02	5.64	4.59	6.23	2.60	18	0.30	52.19	52.04	53.80	53.71	56.20	56.82	3
MH-404 TO MH-403	149.65	0.000	0.821	0.00	0.00	0.81	0.0	8.24	5.84	4.75	4.98	2.69	18	0.30	52.64	52.19	54.32	53.91	55.32	56.20	4
MH-405 TO MH-404	172.87	0.000	0.821	0.00	0.00	0.81	0.0	7.34	6.11	4.97	4.98	2.81	18	0.30	53.16	52.64	54.95	54.44	56.07	55.32	5
MH-406 TO MH-405	150.39	0.295	0.821	0.99	0.29	0.81	6.0	6.66	6.34	5.16	5.75	2.92	18	0.30	53.61	53.16	55.48	55.11	56.80	56.07	6
MH-407 TO MH-406	130.07	0.526	0.526	0.99	0.52	0.52	6.0	6.00	6.61	3.44	3.54	2.80	15	0.30	54.00	53.61	55.94	55.57	56.80	56.80	7

Notes: IDF File = 100851001-NOAA RAINFALL IDF.idf, Return Period = 25-yrs.

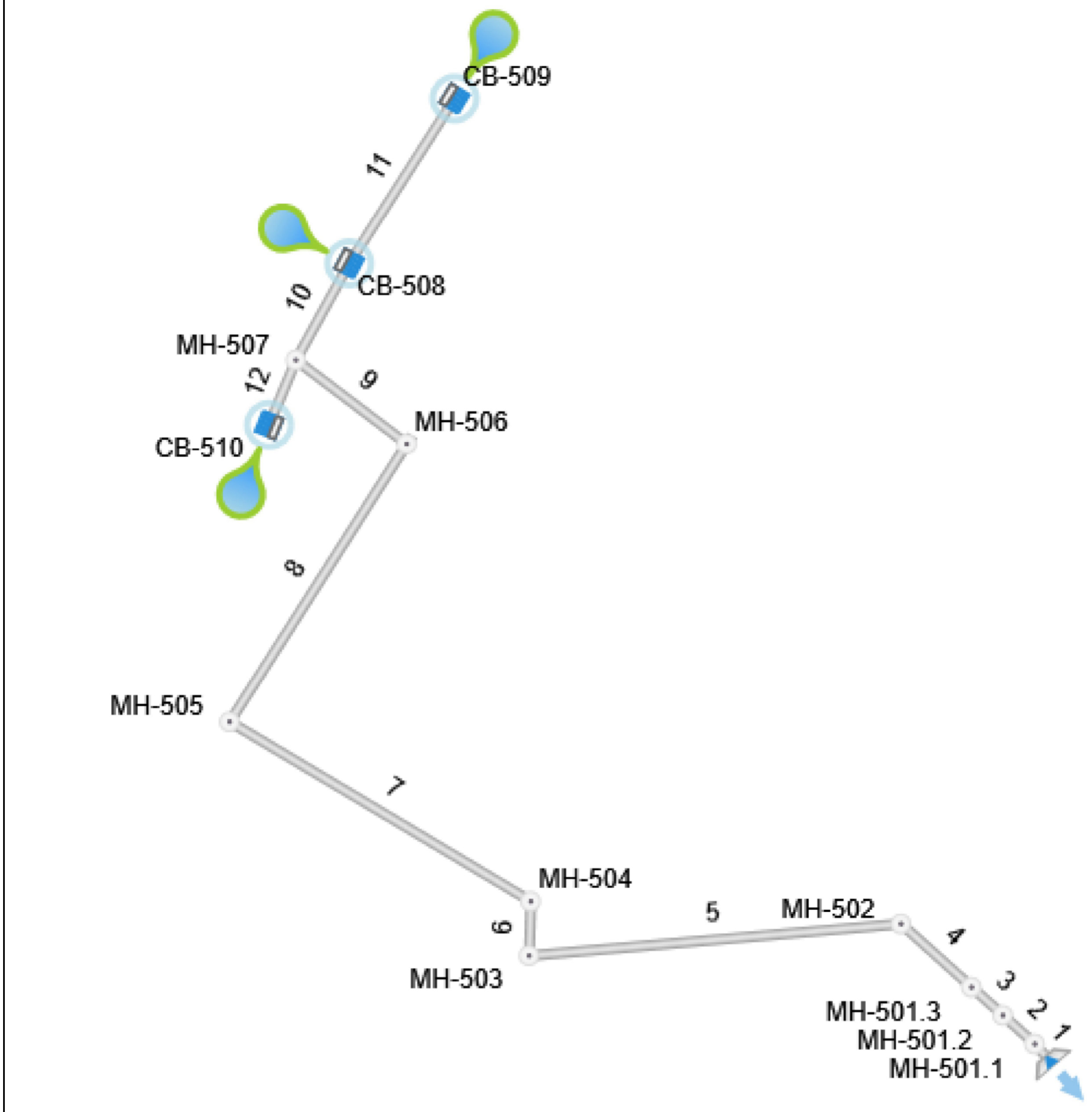
Project File: 100851001-Proposed Storm ConveyanceUG Basin A4.sws

Plan View

Stormwater Studio 2023 v 3.0.0.31

Project Name: 100851001-Proposed Storm Conveyance

05-05-2023



Project File: 100851001-Proposed Storm ConveyanceFilterras to HW-501.sws

Storm Sewer Tabulation

Stormwater Studio 2023 v 3.0.0.31

Project Name: 100851001-Proposed Storm Conveyance

05-05-2023

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
MH-501.1 TO HW-500	8.16	0.000	1.000	0.00	0.00	0.96	0.0	9.12	5.62	5.41	16.09	3.16	18	2.00	21.07	20.91	22.41	22.41	37.20	33.10	1
MH-501.2 TO MH-501.1	21.93	0.000	1.000	0.00	0.00	0.96	0.0	9.10	5.62	5.41	44.06	8.42	18	15.00	29.36	26.07	30.25	26.53	49.19	37.20	2
MH-501.3 TO MH-501.2	21.55	0.000	1.000	0.00	0.00	0.96	0.0	9.08	5.63	5.42	44.06	8.37	18	15.00	37.59	34.36	38.48	34.82	50.30	49.19	3
MH-502 TO MH-501.3	48.47	0.000	1.000	0.00	0.00	0.96	0.0	8.99	5.65	5.44	18.35	6.26	18	2.60	43.85	42.59	44.74	43.23	51.76	50.30	4
MH-503 TO MH-502	188.25	0.000	1.000	0.00	0.00	0.96	0.0	8.60	5.75	5.53	16.09	4.18	18	2.00	47.61	43.85	48.51	45.18	55.46	51.76	5
MH-504 TO MH-503	28.55	0.000	1.000	0.00	0.00	0.96	0.0	8.48	5.78	5.56	6.23	3.31	18	0.30	47.70	47.61	49.04	48.98	55.67	55.46	6
MH-505 TO MH-504	178.31	0.000	1.000	0.00	0.00	0.96	0.0	7.73	5.99	5.77	6.20	3.99	18	0.30	51.20	50.67	52.34	51.81	56.02	55.67	7
MH-506 TO MH-505	170.39	0.000	1.000	0.00	0.00	0.96	0.0	7.05	6.21	5.98	6.46	3.54	18	0.32	51.75	51.20	53.05	52.66	56.44	56.02	8
MH-507 TO MH-506	71.00	0.000	1.000	0.00	0.00	0.96	6.0	6.78	6.30	6.07	6.87	3.43	18	0.36	52.01	51.75	53.51	53.32	56.60	56.44	9
MH-508 TO MH-507	57.00	0.330	0.670	0.97	0.32	0.64	6.0	6.53	6.39	4.11	6.19	2.33	18	0.30	52.27	52.10	53.77	53.74	55.56	56.60	10
MH-509 TO MH-508	101.26	0.340	0.340	0.95	0.32	0.32	6.0	6.00	6.61	2.13	3.83	1.74	15	0.30	52.58	52.27	53.95	53.86	55.56	55.56	11
FILTERRA TO MH-507	36.46	0.330	0.330	0.97	0.32	0.32	6.0	6.00	6.61	2.11	3.82	1.72	15	0.30	52.21	52.10	53.81	53.78	55.74	56.60	12

Notes: IDF File = 100851001-NOAA RAINFALL IDF.idf, Return Period = 25-yrs.

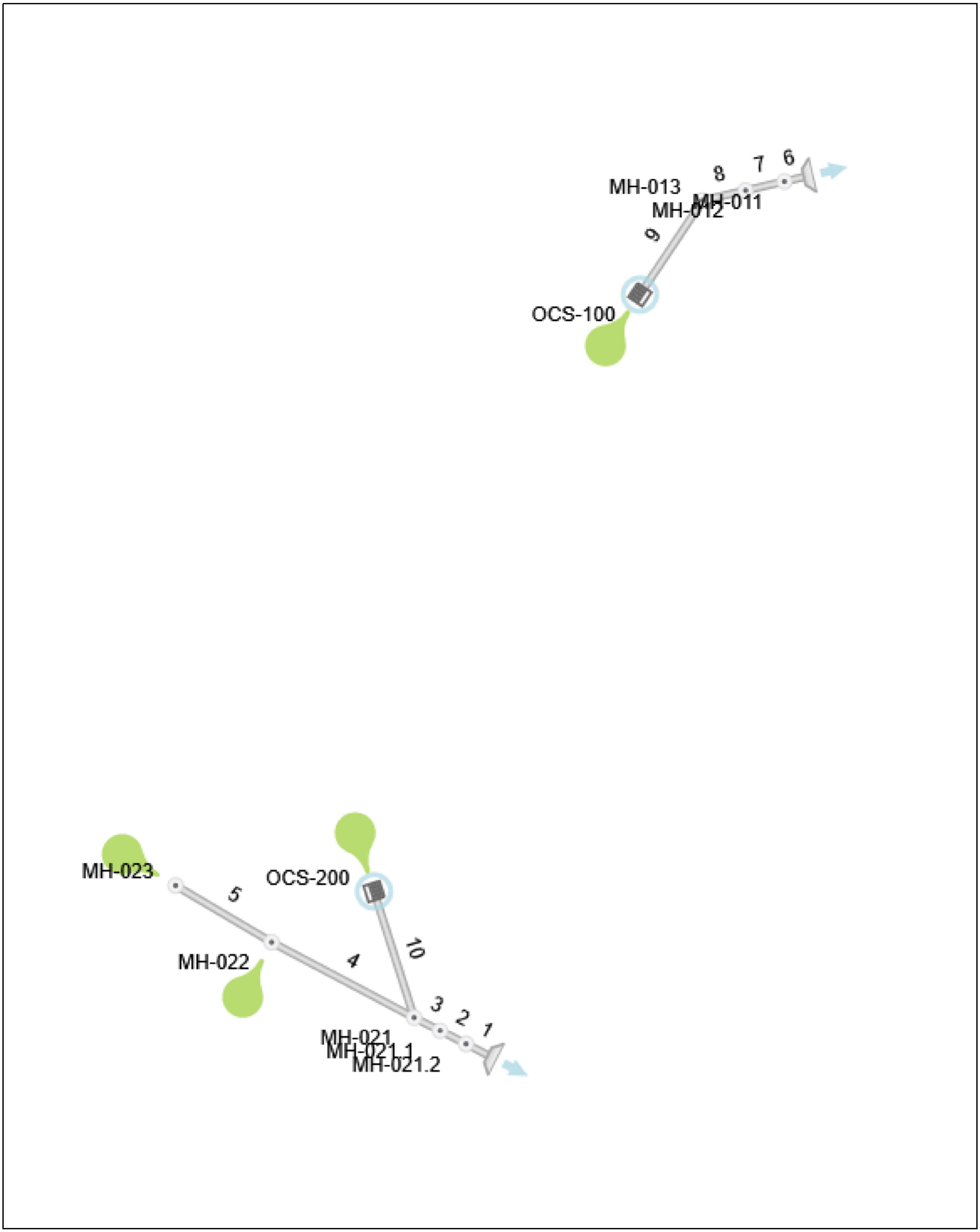
Project File: 100851001-Proposed Storm ConveyanceFilterras to HW-501.sws

Plan View

Stormwater Studio 2023 v 3.0.0.31

Project Name: 100851001-Proposed Storm Conveyance

05-05-2023



Project File: 100851001-Proposed Storm ConveyanceBasin Discharge Conveyance.sws

Storm Sewer Tabulation

Stormwater Studio 2023 v 3.0.0.31

Project Name: 100851001-Proposed Storm Conveyance

05-05-2023

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
MH-021 TO HW-020	12.06	0.000	0.000	0.00	0.00	0.00	0.0	0.31	7.09	15.82	34.65	5.25	24	2.00	23.33	23.08	25.06	25.08	35.36	25.75	1
MH-021 TO MH-021.2	14.63	0.000	0.000	0.00	0.00	0.00	0.0	0.30	7.09	15.82	94.90	9.71	24	15.00	30.52	28.33	31.93	29.16	45.65	35.36	2
MH-021 TO MH-021.1	14.61	0.000	0.000	0.00	0.00	0.00	0.0	0.29	7.09	15.82	94.90	9.71	24	15.00	37.71	35.52	39.12	36.35	51.93	45.65	3
MH-022 TO MH-021	80.84	0.000	0.000	0.00	0.00	0.00	0.0	0.15	7.09	10.72	34.65	6.99	24	2.00	44.19	42.57	45.35	43.43	55.87	51.93	4
MH-023 TO MH-022	55.90	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.09	4.90	24.91	4.82	24	1.03	48.77	48.19	49.55	48.85	56.52	55.87	5
YD-011 TO HW-010	9.70	0.000	0.000	0.00	0.00	0.00	0.0	0.17	7.09	4.83	34.65	1.58	24	2.00	26.37	26.18	28.18	28.18	31.73	29.18	6
YD-012 TO YD-011	20.00	0.000	0.000	0.00	0.00	0.00	0.0	0.15	7.09	4.83	94.90	2.94	24	15.00	29.37	26.37	30.15	28.20	40.49	31.73	7
YD-013 TO YD-012	22.00	0.000	0.000	0.00	0.00	0.00	0.0	0.12	7.09	4.83	94.90	7.42	24	15.00	37.67	34.37	38.45	34.78	46.65	40.49	8
OCS-100 TO YD-013	56.91	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.09	4.83	34.65	5.34	24	2.00	43.81	42.67	44.58	43.25	51.00	46.65	9
OCS-200 TO MH-021	66.26	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.09	5.11	34.65	5.50	24	2.00	43.83	42.50	44.63	43.09	51.00	51.93	10

Notes: IDF File = 100851001-NOAA RAINFALL IDF.idf, Return Period = 25-yrs.

Project File: 100851001-Proposed Storm ConveyanceBasin Discharge Conveyance.sws

Underdrain Analysis

Underdrain Sizing Calculations

- **Underdrain pipes must have atleast twice the conveyance rate as the design infiltration rate of the sand layer, which is also twice the infiltration rate of the soil bed. Therefore, calculations for the hydraulic capacity of the underdrains must be at least four times of the infiltration rate provided by the soil bed. (Per New Jersey Stormwater Management Best Management Practices Manual, Chaper 9.7)**

1. Requiered Basin Underdrain Flowrate Analysis

Bioretention Basin #	Soil Bed Design Permeability Rate (in/hr)	K (in/hr)	Δh (in)	L (in)	A (ft^2)	A (in^2)	Q (in^3/hr)	REQUIRED BASIN UNDERDRAIN(S) CAPACITY Q (cfs)
A1	0.5	2.0	30.0	18.0	5,443	783,792	2,612,640	**0.42**
A2	0.5	2.0	30.0	18.0	6,733	969,552	3,231,840	**0.52**

K	design permeability rate of the soil bed, multipled by 4
Δh	height of the soil bed plus the maximum height of the water
L	height of the soil bed that the water will flow through
A	maximum area of soil that the water will flow through - basin bottom area

2. Underdrain Sizing - Pipe Capacity Calculation (Mannings Equation)

Bioretention Basin #	Pipe Size - Inside Diameter (ft)	Manning's Coefficient (PVC), n	Cross Sectional Area, A	Hydraulic Radius, R	Slope, S	Flow Capacity, Q
A1	0.50	0.009	0.20	0.125	0.003	0.44
A2	0.50	0.009	0.20	0.125	0.003	0.44

Manning's Equation:

$$Q = \frac{1.486}{n} R^{2/3} S^{1/2} (A)$$

SELECT 6-IN UNDERDRAIN FOR BASIN A1 & 6-IN UNDERDRAIN FOR BASIN A2

3. Minimum # of Underdrain Trunk Lines Required and Capacity Check

Bioretention Basin #	Required Flowrate, Q (cfs)	Minimum # of Underdrains*	Underdrain Capacity (cfs)
A1	0.42	1	0.42
A2	0.52	2	1.04

*Required # of underdrains indicates the # of individual trunklines required to convey the anticiapted basin underdrain flowrate. i.e. if 2 are required, the basin shall have 2 underdrains, evenly distributed, each conveying approximately half of the anticipated basin underdrain flows.

UNDERDRAIN CAPACITY MEETS OR EXCEEEDS BASIN UNDERDRAIN FLOWRATE, THEREFORE UNDERDRAINS PASS CAPACITY CHECK

4. Underdrain Invert Analysis

Bioretention Basin #	Bottom of Basin Elevation	Underdrain Size (inches)	Underdrain Invert Upstream (feet)	Underdrain Length of Longest leg (feet)	Underdrain Slope (%)	Underdrain Invert Downstream (feet)	Thickness of Gravel at Upstream (inches)	Thickness of Gravel at Downstream (inches)	Average Thickness of Gravel (inches)
A1	47	6	44.25	151	0.30%	43.79	12.00	17.52	14.76
A2	47	6	44.25	138	0.30%	43.83	12.00	17.04	14.52

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Project:
UNDERDRAIN ANALYSIS
PROJECT KING ARTHUR
NORTH BRUNSIWCK,MIDDLESEX COUNTY, NEW JERSEY

Project No.	Date:	By:	Ckd:
100851001	05/05/23	AM	PM

APPENDIX F

Conduit Outlet Protection Calculations

Based on "The Standards for Soil Erosion and Sediment Control in New Jersey," 7th ed., dated January 2014, Revised July 2017

TABLE 12-1 ALLOWABLE VELOCITIES FOR VARIOUS SOILS

	SOIL TEXTURE	ALLOWABLE VELOCITY (ft./sec.)
1	Sand	1.8
2	Sandy Loam	2.5
3	Silt loam (also high lime clay), loam	3.0
4	Sandy clay loam	3.5
5	Clay loam	4.0
6	Clay, fine gravel, gradded loam to gravel	5.0
7	Cobbles	5.5
8	Shale (non-weathered)	6.0

Soil type where outfall is located = 3 (Note: Select number designating soil texture above)

allowable velocity = 3.0 ft/sec

*v (velocity) = 3.11 ft/sec

Rip Rap Apron required? Yes

Given:

D_o (max inside height) = 2 feet

W_o (max inside width) = 2 feet

Q (discharge) = 9.54 cfs (25-year Storm)

*q (unit discharge, = Q/W_o) = 4.8 cfs / foot

** T_w (tail water) = 2.07 feet

* for the conduit design storm or the 25 year storm, whichever is greater

** for areas where T_w cannot be computed, use $T_w = 0.2\ D_o$. For discharge into detention basins, Tw shall equal the 2 year storm elevation in the basin.

Riprap Apron Dimensions

I. The length of the apron, L (in feet), shall be determined from the formula:

$$\boxed{L_a = (1.8\frac{q}{D_o^{1/2}}) + 7D_o}$$

$T_w < ½\ D_o$ L_a = 0 feet

$$\boxed{L_a = 3\frac{q}{D_o^{½}}}$$

$T_w > ½\ D_o$ L_a = 11 feet

II. Where there is no well-defined channel immediately downstream of the apron, the width, W, of the outlet end of the apron shall be as follows:

For tailwater elevation less than the elevation of the center of the pipe,

$$\boxed{W = 3W_o + L_a}$$

W = 0 feet

For tailwater elevation greater than or equal to the elevation of the center of the pipe,

$$\boxed{W = 3W_o + 0.4L_a}$$

W = 11 feet

Where L_a is the length of the apron determined from the formula and W_o is the culvert width.

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Project:

RIP-RAP APRON DESIGN CALCULATIONS- OF-101
Project King Arthur
North Brunswick, MIDDLESEX COUNTY, NEW JERSEY

Project No.	Date:	By:	Ckd:	Sheet. No.
100851001	02/21/23	AM	CE	1 of 2

Riprap Median Stone Diameter

The median stone diameter, D_{50}, in feet, shall be determined from the formula:

For Horizontal Apron: $$\boxed{D_{50} = \frac{0.020}{T_w} q^{1.33}}$$ Where $q = Q/W_o$

D_{50} = 0.50 feet *OR* **D_{50} =** **6.0 inches**

Note: For discharge into Detention Basins, analyze the hydraulic characteristics of the basin for the design storm to determine the combination of conduit discharge and tailwater that results in the largest required D50 stone size.

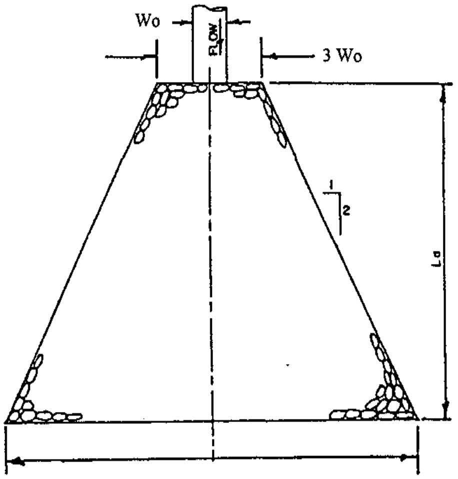
Note: Minimum median stone diameter, $D_{50,}$ is 6 inches.

Riprap Lining Thickness

Will a filter layer be used? yes

The thickness of riprap lining shall meet at least one of the following criteria:

1. A thickness of at least three times the D_{50} size if a filter layer is not used. t = 18.0 inches
2. A thickness of at least two times the D_{50} size if a filter layer is used. **t = 12.0 inches**



= 6 ft

D_{50} = 6.0 inches

t = 12.0 inches with filter fabric

La = 11 ft

W= 11 ft

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Project:

RIP-RAP APRON DESIGN CALCULATIONS- OF-101

Project King Arthur

North Brunswick, MIDDLESEX COUNTY, NEW JERSEY

Project No.	Date:	By:	Ckd:	Sheet. No.
100851001	02/21/23	AM	PM	2 of 2

Based on "The Standards for Soil Erosion and Sediment Control in New Jersey," 7th ed., dated January 2014, Revised July 2017

TABLE 12-1 ALLOWABLE VELOCITIES FOR VARIOUS SOILS

SOIL TEXTURE		ALLOWABLE VELOCITY (ft./sec.)
1	Sand	1.8
2	Sandy Loam	2.5
3	Silt loam (also high lime clay), loam	3.0
4	Sandy clay loam	3.5
5	Clay loam	4.0
6	Clay, fine gravel, gradded loam to gravel	5.0
7	Cobbles	5.5
8	Shale (non-weathered)	6.0

Soil type where outfall is located = 3 (Note: Select number designating soil texture above)
allowable velocity = 3.0 ft/sec
*v (velocity) = 6.42 ft/sec
Rip Rap Apron required? Yes

Given:

D_o (max inside height) = 2 feet
W_o (max inside width) = 2 feet
Q (discharge) = 11.38 cfs (25-year Storm)
*q (unit discharge, = Q/W_o) = 5.7 cfs / foot
** T_w (tail water) = 2.14 feet

* for the conduit design storm or the 25 year storm, whichever is greater

** for areas where T_w cannot be computed, use $T_w = 0.2\ D_o$. For discharge into detention basins, Tw shall equal the 2 year storm elevation in the basin.

Riprap Apron Dimensions

I. The length of the apron, L (in feet), shall be determined from the formula:

$$\boxed{L_a = (1.8\frac{q}{D_o^{1/2}}) + 7D_o}$$

$T_w < ½\ D_o$ $L_a =$ 0 feet

$$\boxed{L_a = 3\frac{q}{D_o^{1/2}}}$$

$T_w > ½\ D_o$ **$L_a =$** **13 feet**

II. Where there is no well-defined channel immediately downstream of the apron, the width, W, of the outlet end of the apron shall be as follows:

For tailwater elevation less than the elevation of the center of the pipe,

$$\boxed{W = 3W_o + L_a}$$

W = 0 feet

For tailwater elevation greater than or equal to the elevation of the center of the pipe,

$$\boxed{W = 3W_o + 0.4L_a}$$

W = 12 feet

Where L_a is the length of the apron determined from the formula and W_o is the culvert width.

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Project:

RIP-RAP APRON DESIGN CALCULATIONS- OF-201
Project King Arthur
North Brunswick, MIDDLESEX COUNTY, NEW JERSEY

Project No.	Date:	By:	Ckd:	Sheet. No.
100851001	05/05/23	AM	PM	1 of 2

Riprap Median Stone Diameter

The median stone diameter, D_{50}, in feet, shall be determined from the formula:

For Horizontal Apron: $$\boxed{D_{50} = \frac{0.020}{T_w} q^{1.33}}$$ Where $q = Q/W_o$

D_{50} = 0.50 feet *OR* **D_{50} = 6.0 inches**

Note: For discharge into Detention Basins, analyze the hydraulic characteristics of the basin for the design storm to determine the combination of conduit discharge and tailwater that results in the largest required D50 stone size.

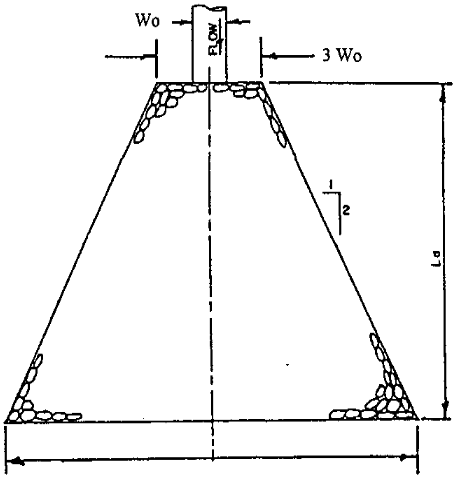
Note: Minimum median stone diameter, $D_{50,}$ is 6 inches.

Riprap Lining Thickness

Will a filter layer be used? yes

The thickness of riprap lining shall meet at least one of the following criteria:

1. A thickness of at least three times the D_{50} size if a filter layer is not used. t = 18.0 inches
2. A thickness of at least two times the D_{50} size if a filter layer is used. **t = 12.0 inches**



= 6 ft

La = 13 ft

W= 12 ft

D_{50} = 6.0 inches
t = 12.0 inches with filter fabric

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Project:
RIP-RAP APRON DESIGN CALCULATIONS- OF-201
Project King Arthur
North Brunswick, MIDDLESEX COUNTY, NEW JERSEY

Project No.	Date:	By:	Ckd:	Sheet. No.
100851001	05/05/23	AM	PM	2 of 2

Based on "The Standards for Soil Erosion and Sediment Control in New Jersey," 7th ed., dated January 2014, Revised July 2017

TABLE 12-1 ALLOWABLE VELOCITIES FOR VARIOUS SOILS

SOIL TEXTURE		ALLOWABLE VELOCITY (ft./sec.)
1	Sand	1.8
2	Sandy Loam	2.5
3	Silt loam (also high lime clay), loam	3.0
4	Sandy clay loam	3.5
5	Clay loam	4.0
6	Clay, fine gravel, gradded loam to gravel	5.0
7	Cobbles	5.5
8	Shale (non-weathered)	6.0

Soil type where outfall is located = 3 (Note: Select number designating soil texture above)
allowable velocity = 3.0 ft/sec
*v (velocity) = 3.16 ft/sec
Conduit Outlet Protection required? Yes

Given:

D_o (max inside height) = 1.5 feet
W_o (max inside width) = 1.5 feet
Q (discharge) = 5.4 cfs (10-year Storm)
*q (unit discharge, = Q/W_o) = 3.6 cfs / foot
** T_w (tail water) = 0.30 feet

* for the conduit design storm or the 25 year storm, whichever is greater

** for areas where T_w cannot be computed, use $T_w = 0.2\ D_o$. For discharge into detention basins, Tw shall equal the 2 year storm elevation in the basin.

Scour Hole Criteria

Y (depth of scour hole) = 0.75 feet

Riprap Median Stone Diameter

The median stone diameter, D_{50}, in feet, shall be determined from the formula:

$$d_{50} = \frac{0.0125}{Tw} q^{1.33}$$

$Y = ½ D_o$ D_{50} = 0.229 feet

$$d_{50} = \frac{0.0082}{Tw} q^{1.33}$$

$Y = D_o$ D_{50} = 0.000 feet

D_{50} = 0.500 feet *OR* **D_{50} = 6.0 inches**

Note: For discharge into Detention Basins, analyze the hydraulic characteristics of the basin for the design storm to determine the combination of conduit discharge and tailwater that results in the largest required D50 stone size.
Note: Minimum median stone diameter, D_{50}, is 6 inches.

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Project:
SCOUR HOLE CALCULATIONS-HW-501
Project King Arthur
North Brunswick, MIDDLESEX COUNTY, NEW JERSEY

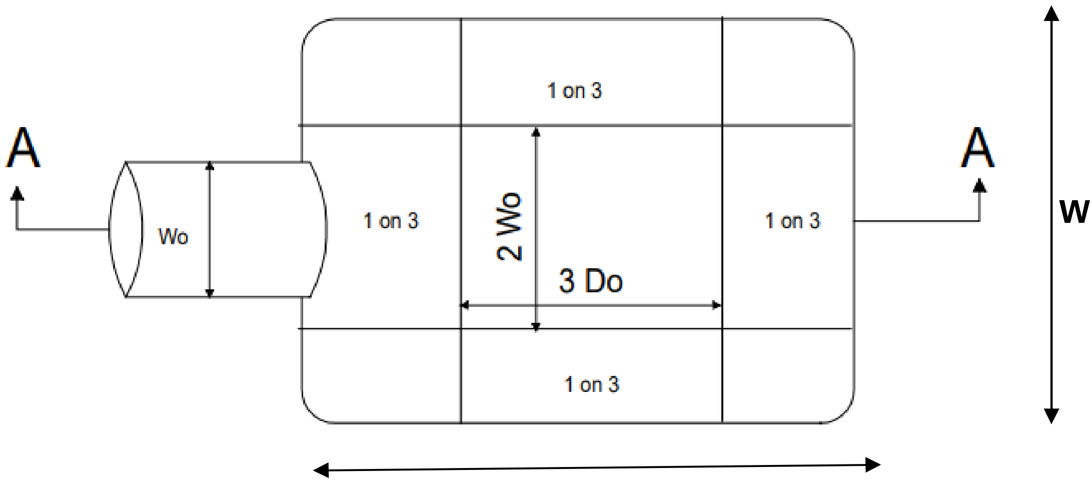
Project No.	Date:	By:	Ckd:	Sheet. No.
100851001	04/26/23	AM	PM	1 of 2

Riprap Lining Thickness

Will a filter layer be used? Yes

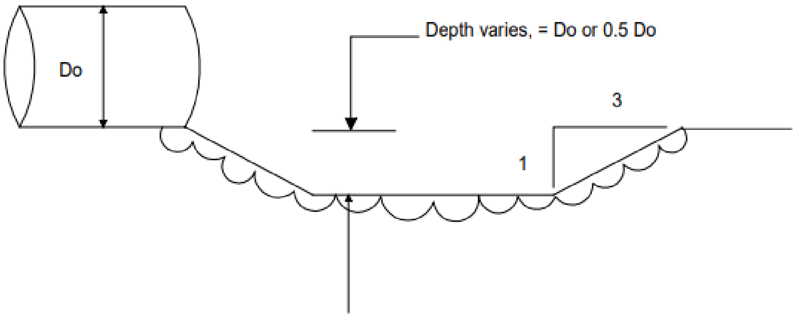
The thickness of riprap lining shall meet at least one of the following criteria:

1. A thickness of at least three times the D_{50} size if a filter layer is not used. t = 18.0 inches
2. A thickness of at least two times the D_{50} size if a filter layer is used. **t = 12.0 inches**



Width = 7.5 ft

Length = 9 ft



Section A - A

$Y=$ 0.75 ft

$D_{50}=$ 6.0 inches

$t=$ 12.0 inches

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Project:

SCOUR HOLE CALCULATIONS-HW-501
Project King Arthur
North Brunswick, MIDDLESEX COUNTY, NEW JERSEY

Project No.	Date:	By:	Ckd:	Sheet. No.
100851001	04/26/23	AM	PM	2 of 2

Based on "The Standards for Soil Erosion and Sediment Control in New Jersey," 7th ed., dated January 2014, Revised July 2017

TABLE 12-1 ALLOWABLE VELOCITIES FOR VARIOUS SOILS

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3	Silt loam (also high lime clay), loam	3.0
4	Sandy clay loam	3.5
5	Clay loam	4.0
6	Clay, fine gravel, gradded loam to gravel	5.0
7	Cobbles	5.5
8	Shale (non-weathered)	6.0

Soil type where outfall is located = 3 (Note: Select number designating soil texture above)

allowable velocity = 3.0 ft/sec

*v (velocity) = 1.58 ft/sec

Conduit Outlet Protection required? No

Given:

D_o (max inside height) = 2 feet

W_o (max inside width) = 2 feet

Q (discharge) = 4.8 cfs (10-year Storm)

*q (unit discharge, = Q/W_o) = 2.4 cfs / foot

** T_w (tail water) = 0.40 feet

* for the conduit design storm or the 25 year storm, whichever is greater

** for areas where T_w cannot be computed, use T_w = 0.2 D_o. For discharge into detention basins, Tw shall equal the 2 year storm elevation in the basin.

Scour Hole Criteria

Y (depth of scour hole) = 1 feet

Riprap Median Stone Diameter

The median stone diameter, D_{50}, in feet, shall be determined from the formula:

$$\boxed{d_{50} = \frac{0.0125}{Tw} q^{1.33}}$$

Y = ½ D_o D_{50} = 0.101 feet

$$\boxed{d_{50} = \frac{0.0082}{Tw} q^{1.33}}$$

Y = D_o D_{50} = 0.000 feet

D_{50} = 0.500 feet *OR* **D_{50} = 6.0 inches**

Note: For discharge into Detention Basins, analyze the hydraulic characteristics of the basin for the design storm to determine the combination of conduit discharge and tailwater that results in the largest required D50 stone size.

Note: Minimum median stone diameter, $D_{50,}$ is 6 inches.

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Project:

SCOUR HOLE CALCULATIONS-HW-010
Project King Arthur
North Brunswick, MIDDLESEX COUNTY, NEW JERSEY

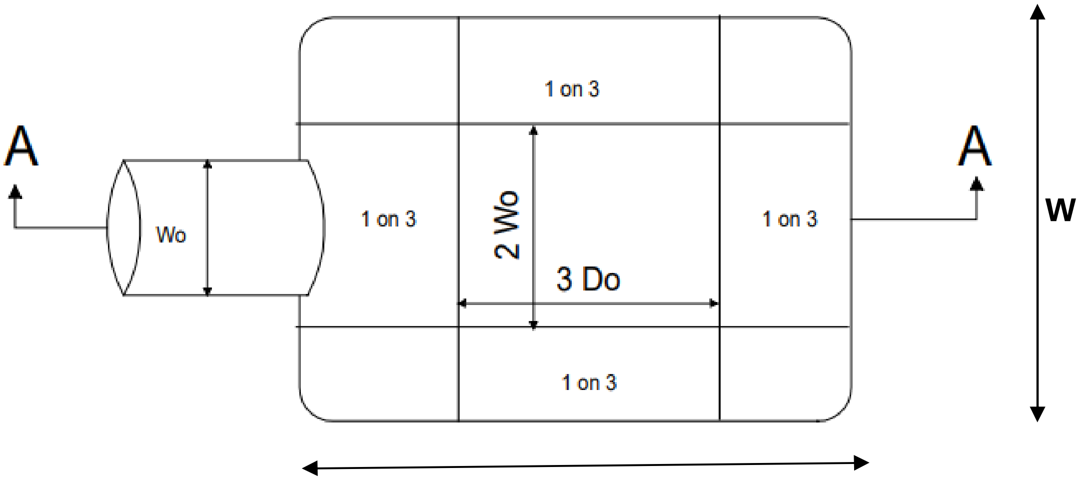
Project No.	Date:	By:	Ckd:	Sheet. No.
100851001	04/26/23	AM	PM	1 of 2

Riprap Lining Thickness

Will a filter layer be used? Yes

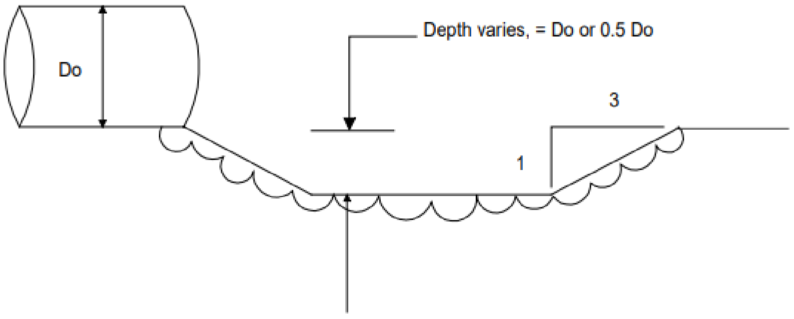
The thickness of riprap lining shall meet at least one of the following criteria:

1. A thickness of at least three times the D_{50} size if a filter layer is not used. t = 18.0 inches
2. A thickness of at least two times the D_{50} size if a filter layer is used. **t = 12.0 inches**



Width = 10 ft

Length = 12 ft



Section A - A

Y= 1 ft
D_{50} = 6.0 inches
t = 12.0 inches

LANGAN

300 Kimball Drive Parsippany, NJ
P: 973.560.4900 F: 973.560.4901
NJ Certificate of Authorization No: 24GA27996400

Project:

SCOUR HOLE CALCULATIONS-HW-010
Project King Arthur
North Brunswick, MIDDLESEX COUNTY, NEW JERSEY

Project No.	Date:	By:	Ckd:	Sheet. No.
100851001	04/26/23	AM	PM	2 of 2

Based on "The Standards for Soil Erosion and Sediment Control in New Jersey," 7th ed., dated January 2014, Revised July 2017

TABLE 12-1 ALLOWABLE VELOCITIES FOR VARIOUS SOILS

SOIL TEXTURE		ALLOWABLE VELOCITY (ft./sec.)
1	Sand	1.8
2	Sandy Loam	2.5
3	Silt loam (also high lime clay), loam	3.0
4	Sandy clay loam	3.5
5	Clay loam	4.0
6	Clay, fine gravel, gradded loam to gravel	5.0
7	Cobbles	5.5
8	Shale (non-weathered)	6.0

Soil type where outfall is located = 3 (Note: Select number designating soil texture above)
allowable velocity = 3.0 ft/sec
*v (velocity) = 5.25 ft/sec
Conduit Outlet Protection required? Yes

Given:

D_o (max inside height) = 2 feet
W_o (max inside width) = 2 feet
Q (discharge) = 15.8 cfs (10-year Storm)
*q (unit discharge, = Q/W_o) = 7.9 cfs / foot
** T_w (tail water) = 0.40 feet

* for the conduit design storm or the 25 year storm, whichever is greater
** for areas where T_w cannot be computed, use $T_w = 0.2\ D_o$. For discharge into detention basins, Tw shall equal the 2 year storm elevation in the basin.

Scour Hole Criteria

Y (depth of scour hole) = 1 feet

Riprap Median Stone Diameter

The median stone diameter, D_{50}, in feet, shall be determined from the formula:

$$\boxed{d_{50} = \frac{0.0125}{Tw} q^{1.33}}$$

$Y = ½\ D_o$ $D_{50} =$ 0.489 feet

$$\boxed{d_{50} = \frac{0.0082}{Tw} q^{1.33}}$$

$Y = D_o$ $D_{50} =$ 0.000 feet

$D_{50} =$ 0.500 feet *OR* **D_{50} = 6.0 inches**

Note: For discharge into Detention Basins, analyze the hydraulic characteristics of the basin for the design storm to determine the combination of conduit discharge and tailwater that results in the largest required D50 stone size.
Note: Minimum median stone diameter, $D_{50,}$ is 6 inches.

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NJ Certificate of Authorization No: 24GA27996400

Project:
SCOUR HOLE CALCULATIONS-HW-020
Project King Arthur
North Brunswick, MIDDLESEX COUNTY, NEW JERSEY

Project No.	Date:	By:	Ckd:	Sheet. No.
100851001	04/26/23	AM	PM	1 of 2

Riprap Lining Thickness

Will a filter layer be used? Yes

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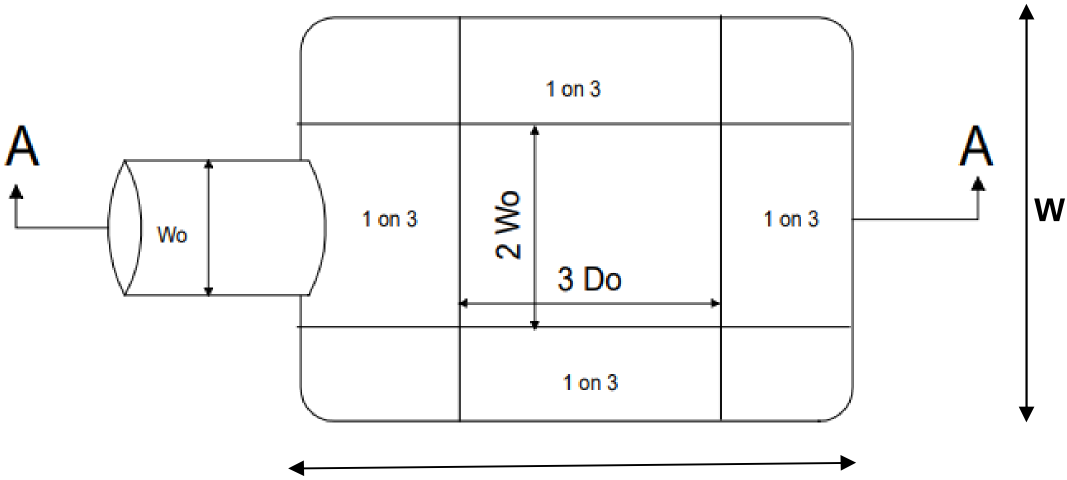
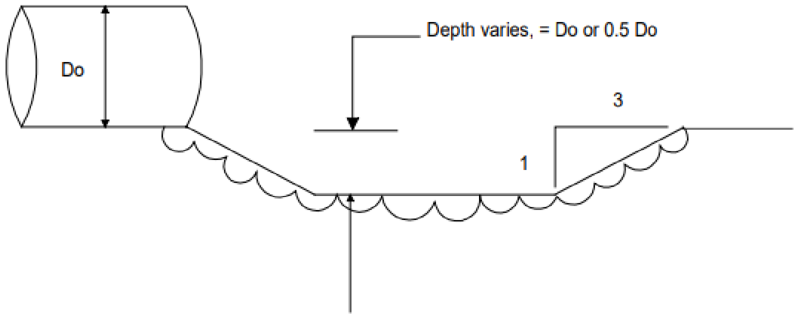


Width = 10 ft

Length = 12 ft



Section A - A

Y= 1 ft

D_{50} = 6.0 inches

t = 12.0 inches

LANGAN

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Project:

SCOUR HOLE CALCULATIONS-HW-020
Project King Arthur
North Brunswick, MIDDLESEX COUNTY, NEW JERSEY

Project No.	Date:	By:	Ckd:	Sheet. No.
100851001	04/26/23	AM	PM	2 of 2

APPENDIX G

Geotechnical Stormwater Investigation Report

LANGAN

Memorandum

300 Kimball Drive Parsippany, NJ 07054 T: 973.560.4900 F: 973.560.4901

To: Holden Sabato / The Silverman Group

From: Kristen Shetler, P.E.
Arthur Roesler, P.E.

Info: Peter McCabe / Langan

Date: 5 May 2023

Re: Soils Investigation for Stormwater Management
Proposed King Arthur Court Warehouse Development
Block 252, Lot 5.03
North Brunswick, Middlesex County, New Jersey
Langan Project No.: 100851001

This memorandum provides a summary of the findings from our Soils Investigation for Stormwater Management for the proposed King Arthur Court warehouse development located in the Township of North Brunswick, Middlesex County, New Jersey.

The purpose of this study was to assist the Site/Civil Engineers with their design of the stormwater management system. As part of our investigation, we performed the following work: 1) reviewed available information; 2) obtained subsurface information by excavating test pits; 3) performed in-situ infiltration testing; and 4) performed laboratory testing.

All elevations given in this report are referenced to the North American Vertical Datum of 1988 (NAVD 88), unless otherwise noted.

EXISTING CONDITIONS

The approximate 18-acre project site is located at 1 Silver Line Drive in the Township of North Brunswick, New Jersey (designated as Block 252, Lot 5.03); see Figures 1 and 2. The site is bounded by the following:

- Woods and a trailer parking lot to the north.
- Weston's Mill Pond to the east.
- Woods and a residential development to the south.
- Raritan River Railroad and industrial development to the west. Route 1 is located further to the west.

The project site is currently occupied by a 2-story office building within the northern portion of the site and three small garages within the eastern portion of the site. Asphalt paved roadways and parking lots also exist throughout the site.

Landscaped areas immediately surrounding the existing development are covered mostly with a lawn and sparse trees. However, the majority of the site outside of the currently developed area are covered with dense vegetation and trees.

According to the 23 September 2020 Boundary and Partial Survey prepared by Langan, existing grades at the site generally range from approximate el 19 to el 64. Existing grades are lowest along Weston's Mill Pond at the east side of the site and highest along the railroad at the west side of the site.

PROPOSED CONSTRUCTION

Based on the 5 May 2023 Site Plans prepared by our firm, we understand that the current development plan will consist of the following:

- Demolition of existing structures and associated site features.
- Construction of a one-story warehouse with a building footprint of approximately 163,610 ft^2 and a finished floor elevation (FFE) of el 61.
- Construction of associated access drives, car parking lots, trailer parking lots, and loading dock aprons/dolly pads.
- Construction of 2 subsurface infiltration basins and 2 surface bioretention basins within the eastern portion of the site having the following bottom of basin grade elevations:
    - Surface Bioretention Basins A1 and A2 = el 47
    - Small-Scale Subsurface Infiltration Basin A3 = el 49.5
    - Small-Scale Subsurface Infiltration Basin A4 = el 51.5
- Construction of 6 Filterra Bioscape Vaults within the western portion of the site.

REVIEW OF AVAILABLE INFORMATION

We reviewed available soil survey data, regional geologic information, and the FEMA Flood Maps for the site vicinity. Pertinent information obtained from our review of available information is summarized in the following paragraphs.

Soil Survey Data

We reviewed the United States Department of Agriculture (USDA) Natural Resources Conservation Service Soil Survey Map for Morris County, New Jersey; see Figures 3 and 4. A brief description of the soil type found at the site and surrounding areas is provided below.

- *Keyport-Urban land complex (KeuC):* These areas typically consist of sandy loam to silty clay loam. The soil mapping unit is reported to be Hydrologic Soil Group D.

- *Humaquepts (HumAt):* These areas typically consist of loam to sand. The soil mapping unit is reported to be Hydrologic Soil Group A/D.
- *Keyport Loam (KeoB):* These areas typically consist of loam to silty clay loam to clay loam to silty clay. The soil mapping unit is reported to be Hydrologic Soil Group D.
- *Klinesville channery loam (KkoE):* These areas typically consist of channery loam to very channery loam to weathered bedrock. The soil mapping unit is reported to be Hydrologic Soil Group D.
- *Urban Land (UR):* These areas are typically covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material. The hydrologic soil group for this soil mapping unit is undefined.

Regional Geology

We reviewed the 1998 New Jersey Geological Survey Open File Map 23 (OFM 23) entitled "Geology of the New Brunswick Quadrangle, Middlesex and Somerset Counties, New Jersey" and geologic data provided by the New Jersey Department of Environmental Protection (NJDEP); see Figure 5. A brief description of the surficial soils at the site and surrounding areas is provided below.

- *Pensauken Formation (Tp):* These areas generally consist of reddish yellow to yellow sand, pebble gravel, and minor cobble gravel.
- *Weathered Shale, Mudstone, and Sandstone / Passaic Formation (Qws):* These areas generally consist of interbedded sequence of reddish-brown to maroon and dusky grayish-red siltstone, reddish-brown siltstone to mudstone, separated by interbedded olive-gray to dark-gray siltstone and lesser silty argillite. Portions of this formation are exposed along the Raritan River and Weston's Mill Pond.
- *Alluvium* (Qal): These areas generally consist of reddish brown to yellowish brown to dark brown to light gray sand, silt, pebble-to-cobble gravel with minor clay and peat.

Flood Map

We reviewed the current Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel Number 34023C0133F dated 6 July 2010; see Figure 6. According to this map, the majority of the proposed development area lies outside of the 100-year and 500-year floodplains.

However, the eastern portion of the site along Weston's Mill Pond is within the limits of the 100-year flood zone (Zone A and Zone AE) or between the limits of the 100-year and 500-year flood zones (Zone X) with a base flood elevation of approximate el 25.8 to el 26.

LANGAN GEOTECHNICAL INVESTIGATION FOR STORMWATER DESIGN

The December 2022 preliminary stormwater field investigation consisted of the following:

- Excavating 9 test pits, identified as SHGW-1 through SHGW-3, TP-1 through TP-4, TP-11, and TP-12. TP-5 through TP-10 were not performed as part of this investigation.
- Performing 8 single ring infiltration tests at select test pit locations.
- Performing laboratory testing, including laboratory permeability tests.

The January 2023 supplemental stormwater field investigation consisted of the following:

- Excavating 10 test pits, identified as STP-1, STP-2, and STP-4 through STP-11. STP-3 was not performed as part of this investigation.
- Performing 7 single ring infiltration tests at select test pit locations.
- Performing laboratory testing.

Refer to Figure 2 for location of work. The test pits were performed in areas that were accessible at the time of our investigations.

The test pits and infiltration tests were completed under the full-time observation of a field engineer from our office acting under the direct supervision of our project Professional Engineer. Our field engineer laid out the boring and test pit locations, maintained logs of the explorations, classified soil encountered, and obtained representative material samples. Surface elevations at the boring and test pit locations were collected using survey-grade GPS equipment and compared to existing surface grades provided on the 23 September 2020 Boundary and Partial Survey prepared by Langan.

The attached Table 1 presents the findings from our investigations.

Test Pits

The test pits were excavated by Clear Ground Development, Inc. using a SANY SY80U Track Excavator in December 2022 and January 2023. The test pits were excavated to depths ranging from approximately 8 to 15 feet below existing grades. All test pits for this study were excavated within existing landscaped areas. The test pits were backfilled with excavated material and compacted with a bucket of the excavator upon completion.

Individual test pit logs are provided in Appendix A. Select test pit photographs are provided in Appendix B.

In-Situ Infiltration Testing

In-situ single ring infiltration testing was performed at 15 locations at depths ranging from approximately 1 to 6.5 feet below existing grades, corresponding to approximate el 44.5 to el 50. The single ring infiltration testing was performed in accordance with the latest NJ Stormwater BMP Manual.

The results of the single ring infiltration testing are provided in Table 2 and Appendix C.

Laboratory Testing

Soil samples from the geotechnical investigation were visually examined in the field and classifications were confirmed by re-examination in our Parsippany, New Jersey office. Select soil samples were sent to a specialty testing laboratory where the following tests were performed:

- Grain Size Distributions
- Hydrometer Analyses
- Natural Water Contents
- Tube Permeameter Testing

Tube permeameter testing was conducted on undisturbed samples collected from test pits TP-1, TP-3, and TP-4 during the preliminary investigation at depths ranging from approximately 5 to 6 feet below existing grades, corresponding to approximate el 44.3 to el 48.5.

The results of the geotechnical laboratory testing are provided in Appendix D.

SUBSURFACE CONDITIONS

Based on the results of the test pits performed for this study, the site subsurface conditions generally consisted of topsoil overlying successive strata of fill, alluvium/fluviomarine deposits, decomposed bedrock, and weathered shale bedrock. The following sections provide a detailed description of the encountered subsurface strata and groundwater conditions.

Topsoil

Topsoil typically consisting of brown to dark brown to reddish brown silty sand or sandy silt with varying amounts of clay, gravel, and roots was encountered at the surface of all test pits. The topsoil was found to be approximately 8 to 13 inches thick.

Fill

A layer of fill was encountered beneath the topsoil in the majority of the test pits. The fill was found to consist of the following:

- Brown to reddish brown to grayish brown to orangish brown fine to coarse sand with varying amounts of clay, silt, gravel, and cobbles.
- Reddish brown to grayish brown to orangish brown silt with varying amounts of clay, sand, gravel, rock fragments, and wood.
- Orangish gray clay with varying amounts of silt, sand, and gravel.

In test pits STP-1 and STP-2 (located within the western portion of the site) a 3-inch-thick layer of buried topsoil was encountered at the bottom of the fill layer.

Laboratory testing of select samples from the fill layer resulted in fines contents ranging from approximately 25% to 62%.

The fill layer was found to be approximately 2 to 6.5 feet thick.

Alluvium/Fluviomarine Deposits

Sand

Brown to orangish brown to reddish brown fine to coarse sand with varying amounts of gravel, silt, clay, and cobbles was encountered beneath the topsoil or fill.

Laboratory testing of select samples from the sand stratum resulted in fines contents ranging from approximately 4% to 38%.

The sand stratum was found to be approximately 1.5 to 9 feet thick.

Clay

Orangish brown to reddish brown to gray clay with varying amounts of sand, silt, and cobbles was encountered beneath the topsoil or sand in test pits SHGW-2, TP-3, TP-4, and STP-11 at depths ranging from 0.5 to 8 feet below existing grades, corresponding to approximate el 44.5 to el 54.

Laboratory testing of select samples from the clay stratum resulted in fines contents ranging from approximately 34% to 72%.

The clay stratum was found to be approximately 1.5 to 4.5 feet thick.

Decomposed Rock

Decomposed rock typically consisting of dark reddish brown to gray to grayish brown to orangish brown silt and rock fragments with varying amounts of fine to coarse sand and clay was encountered beneath the topsoil or alluvium/fluviomarine deposits in all test pits. The decomposed rock was first encountered at depths ranging from approximately 2.5 to 11 feet below existing grades, corresponding to approximate el 38 to el 53.5.

The decomposed rock was found to be approximately 1 to 8.5 feet thick. Several test pits were terminated in this layer.

Weathered Bedrock

Weathered dark red shale bedrock was encountered beneath the decomposed rock in the majority of the test pits at depths ranging from approximately 5.5 to 13.5 feet below existing grades, corresponding to approximate el 35.5 to el 51.

Excavator bucket refusal on weathered or competent bedrock was encountered in many test pits at depths ranging from approximately 8 to 14 feet below existing grades, corresponding to approximate el 35 to el 49.

See Table 1 for bedrock information within the proposed basin footprints.

Groundwater

Groundwater was encountered in the majority of the test pits at depths ranging from approximately 6.5 to 13 feet below existing grades, corresponding to approximate el 36.5 to el 54. Groundwater was typically found to be at the highest elevation within the western portion of the site.

Perched groundwater seepage was encountered in test pits STP-4 and STP-6 at depths ranging from 9 to 9.5 feet below existing grades, corresponding to approximate el 41.3 to el 42.6

Soil mottling was first observed within test pits SHGW-1, SHGW-2, SHGW-3, TP-1, TP-4, TP-11, TP-12, STP-1, STP-2, STP-7, and STP-11 at depths ranging from 2 to 13 feet below existing grades, corresponding to approximate el 38 to el 54.

The groundwater level is expected to fluctuate based on weather, seasonal conditions, and construction activity.

See Table 1 for groundwater information within the proposed basin footprints.

INFILTRATION AND PERMEABILITY TESTING RESULTS

As part of this study, in-situ single ring infiltration tests and laboratory permeability tests were performed within the fill, alluvium/fluviomarine deposits, and decomposed rock.

Single Ring Infiltration Tests

In-situ single ring infiltration testing was performed in the fill, sandy alluvium/fluviomarine deposits, and decomposed rock. The following field hydraulic conductivity rates were recorded for each layer:

- **Fill:** In test pits STP-6, STP-7, and STP-8, the field hydraulic conductivity in the fill layer was found to be less than 1 inch per hour (failed pre-soak). In test pits TP-11 and TP-12, the field hydraulic conductivity in the fill layer was found to be 2 to 4.3 inches per hour.
- **Sand:** In test pits TP-1 and STP-5, the field hydraulic conductivity in the fill layer was found to be less than 1 inch per hour (failed pre-soak). In test pits TP-2, TP-11, TP-12, STP-4, STP-6, and STP-8, the field hydraulic conductivity in the sand was found to be 1.5 to 6.6 inches per hour.
- **Decomposed Rock:** In test pit TP-3, the field hydraulic conductivity in the decomposed rock was found to be 1.6 inches per hour. In test pit TP-4, the field hydraulic conductivity in the decomposed rock was found to be 49.5 inches per hour. This value is unreasonably high (likely due to voids in the decomposed rock stratum) and should not be used for design.

The individual results of the single ring infiltration tests are provided in Table 2 and Appendix C.

Laboratory Permeability Tests

Laboratory permeability testing was performed in the sandy alluvium/fluviomarine deposits and decomposed rock. The results of the laboratory permeability testing are provided in the table below.

TUBE PERMEAMETER TEST RESULTS

Location	Surface Elevation (feet)	Test Depth (feet)	Test Elevation (feet)	Soil Description	Laboratory Measured Hydraulic Conductivity, K (inches/hour)
TP-1	51.5	6	45.5	f-c SAND, some silt, some clay, trace f-c gravel, trace cobbles	0.28
TP-3	49.3	5	44.3	DECOMPOSED ROCK: Sandy ROCK FRAGMENTS, trace silt, trace clay	17
TP-4	54.5	6	48.5	DECOMPOSED ROCK: CLAY, some f-c sand, trace silt, trace rock fragments	3.56

ATTACHMENTS:

- Figure 1 – Site Location Map
- Figure 2 – Location Plan
- Figure 3 – Soil Survey Map
- Figure 4 – Location Plan with Soil Survey Overlay
- Figure 5 – Regional Geology Map
- Figure 6 – FEMA Flood Map

- Table 1 – Basin Groundwater, Soil Mottling, and Bedrock Summary
- Table 2 – Single Ring Infiltration Testing Summary

- Appendix A – Test Pit Logs
- Appendix B – Select Test Pit Photographs
- Appendix C – Single Ring Infiltration Test Results
- Appendix D – Laboratory Testing Results

NJ Certificate of Authorization No. 24GA27996400
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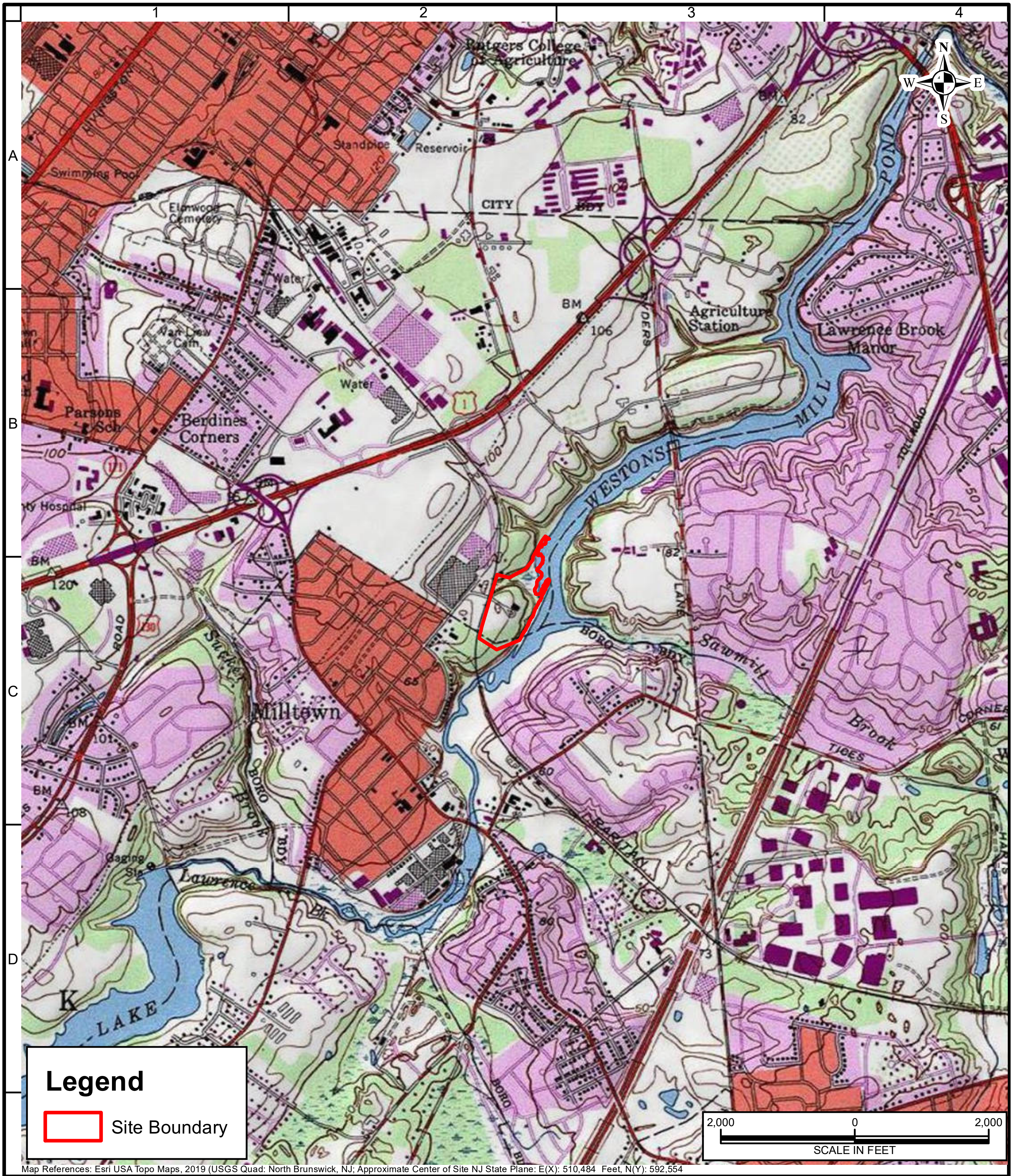
FIGURES



Map References: Esri USA Topo Maps, 2019 (USGS Quad: North Brunswick, NJ; Approximate Center of Site NJ State Plane: E(X): 510,484 Feet, N(Y): 592,554

LANGAN

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Langan Engineering & Environmental Services, Inc.
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

KING ARTHUR
COURT WAREHOUSE

NORTH BRUNSWICK

MIDDLESEX COUNTY NEW JERSEY

Drawing Title

SITE LOCATION
MAP

Project No.
100851001

Date
05/05/2023

Scale
1" = 2000'

Drawn By
IHB

Figure
1

Path: \\langan.com\data\PAR\data0\100851001\Project Data\ArcGIS\MXD\Geotech_Figures\Figure 1 - USGS Site Location Map.mxd

LEGEND:

TP-1/SHGW-1	PRELIMINARY TEST PIT LOCATION
STP-1	SUPPLEMENTAL TEST PIT LOCATION
🟪	EXISTING BUILDING TO BE DEMOLISHED
🟥	EXISTING ASPHALT PAVEMENT TO BE DEMOLISHED

NOTES:

1. ALL TEST PIT LOCATIONS ARE APPROXIMATE.
2. BACKGROUND AND BASIN INFORMATION BASED ON LATEST SITE PLAN SET PREPARED BY LANGAN.
3. PRELIMINARY TEST PITS SHGW-1 THROUGH SHGW-3, TP-1 THROUGH TP-4, TP-11, AND TP-12 WERE EXCAVATED BY CLEAR GROUND IMPROVEMENT, INC. ON 1 AND 2 DECEMBER 2022 UNDER THE DIRECT SUPERVISION OF LANGAN. PLEASE NOTE THAT TEST PITS TP-5 THROUGH TP-10 WERE NOT PERFORMED AS PART OF THIS INVESTIGATION.
4. SUPPLEMENTAL TEST PITS STP-1 THROUGH STP-11 WERE EXCAVATED BY CLEAR GROUND IMPROVEMENT INC. ON 9 AND 10 JANUARY 2023 UNDER THE DIRECT SUPERVISION OF LANGAN. PLEASE NOTE THAT TEST PIT STP-3 WAS NOT PERFORMED AS PART OF THIS INVESTIGATION.
5. SEE APPENDIX A FOR INDIVIDUAL TEST PIT LOGS.

LANGAN
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NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

KING ARTHUR COURT WAREHOUSE
BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK
MIDDLESEX COUNTY NEW JERSEY

Drawing Title

LOCATION PLAN

Project No. 100851001
Date 05/05/2023
Drawn By AC
Checked By KS
Figure No. 2

PROJECT NO. 100851001

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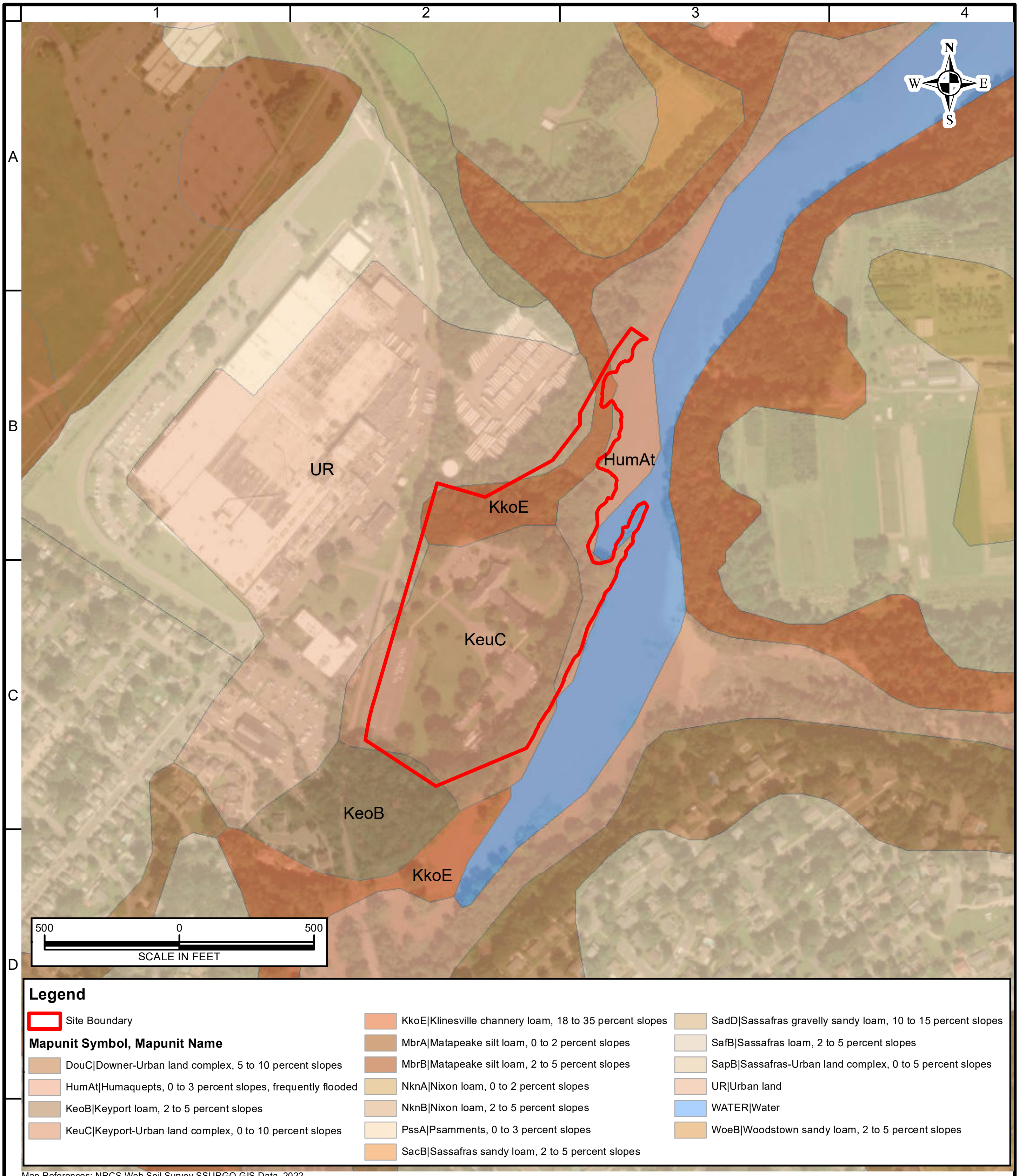

Map References: NRCS Web Soil Survey SSURGO GIS Data, 2022

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Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

KING ARTHUR
COURT WAREHOUSE

NORTH BRUNSWICK

MIDDLESEX COUNTY NEW JERSEY

Drawing Title

SOIL SURVEY
MAP

Project No.
100851001

Date
05/05/2023

Scale
1" = 500'

Drawn By
IHB

Figure

3

Path: \\langan.com\data\PAR\data0\100851001\Project Data\ArcGIS\MXD\Geotech_Figures\Figure 3 - Soil Survey Map.mxd

NOTES:

1. ALL BORING AND TEST PIT LOCATIONS ARE APPROXIMATE.
2. BACKGROUND AND BASIN INFORMATION BASED ON LATEST SITE PLAN SET PREPARED BY LANGAN.
3. SOIL SURVEY INFORMATION BASED ON USDA NATURAL RESOURCES CONSERVATION SERVICES SOIL SURVEY MAP FOR MORRIS COUNTY, NEW JERSEY.
4. PRELIMINARY TEST PITS SHGW-1 THROUGH SHGW-3, TP-1 THROUGH TP-4, TP-11, AND TP-12 WERE EXCAVATED BY CLEAR GROUND IMPROVEMENT, INC. ON 1 AND 2 DECEMBER 2022 UNDER THE DIRECT SUPERVISION OF LANGAN. PLEASE NOTE THAT TEST PITS TP-5 THROUGH TP-10 WERE NOT PERFORMED AS PART OF THIS INVESTIGATION.
5. SUPPLEMENTAL TEST PITS STP-1 THROUGH STP-11 WERE EXCAVATED BY CLEAR GROUND IMPROVEMENT INC. ON 9 AND 10 JANUARY 2023 UNDER THE DIRECT SUPERVISION OF LANGAN. PLEASE NOTE THAT TEST PIT STP-3 WAS NOT PERFORMED AS PART OF THIS INVESTIGATION.
6. SEE APPENDIX A FOR INDIVIDUAL TEST PIT LOGS.

LEGEND:

▣ TP-1/SHGW-1	PRELIMINARY TEST PIT LOCATION
▣ STP-1	SUPPLEMENTAL TEST PIT LOCATION
KeoB	SOIL SURVEY MAP UNIT

LANGAN

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NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

KING ARTHUR COURT
WAREHOUSE
BLOCK No. 252, LOT No. 5.03
NORTH BRUNSWICK
MIDDLESEX COUNTY NEW JERSEY

Drawing Title

LOCATION PLAN
WITH SOIL SURVEY
OVERLAY

Project No. 100851001
Date 05/05/2023
Drawn By AC
Checked By KS
Figure No. 4

PROJECT NO. 100851001

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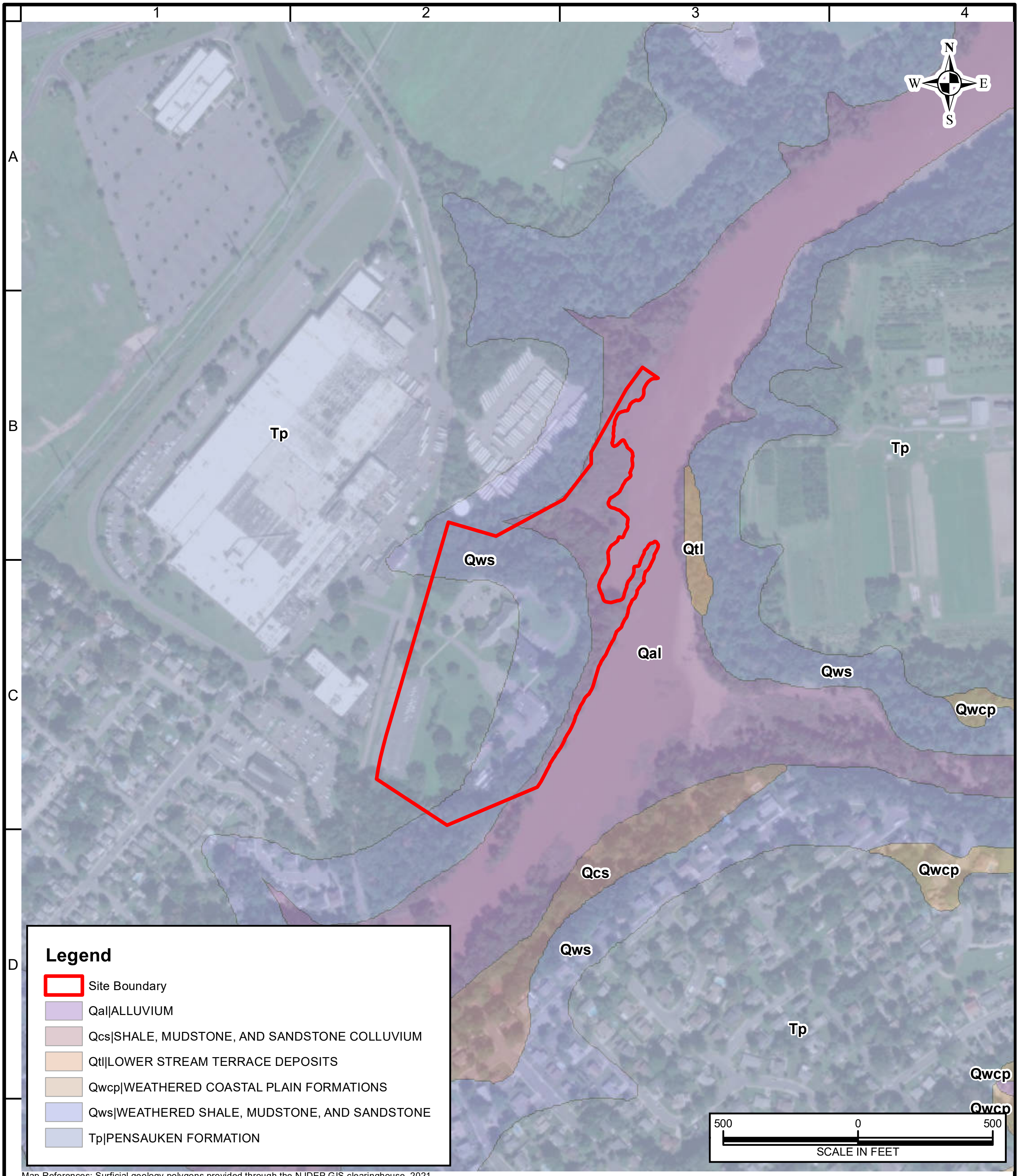

Map References: Surficial geology polygons provided through the NJDEP GIS clearinghouse, 2021

LANGAN

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Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

KING ARTHUR
COURT WAREHOUSE

NORTH BRUNSWICK

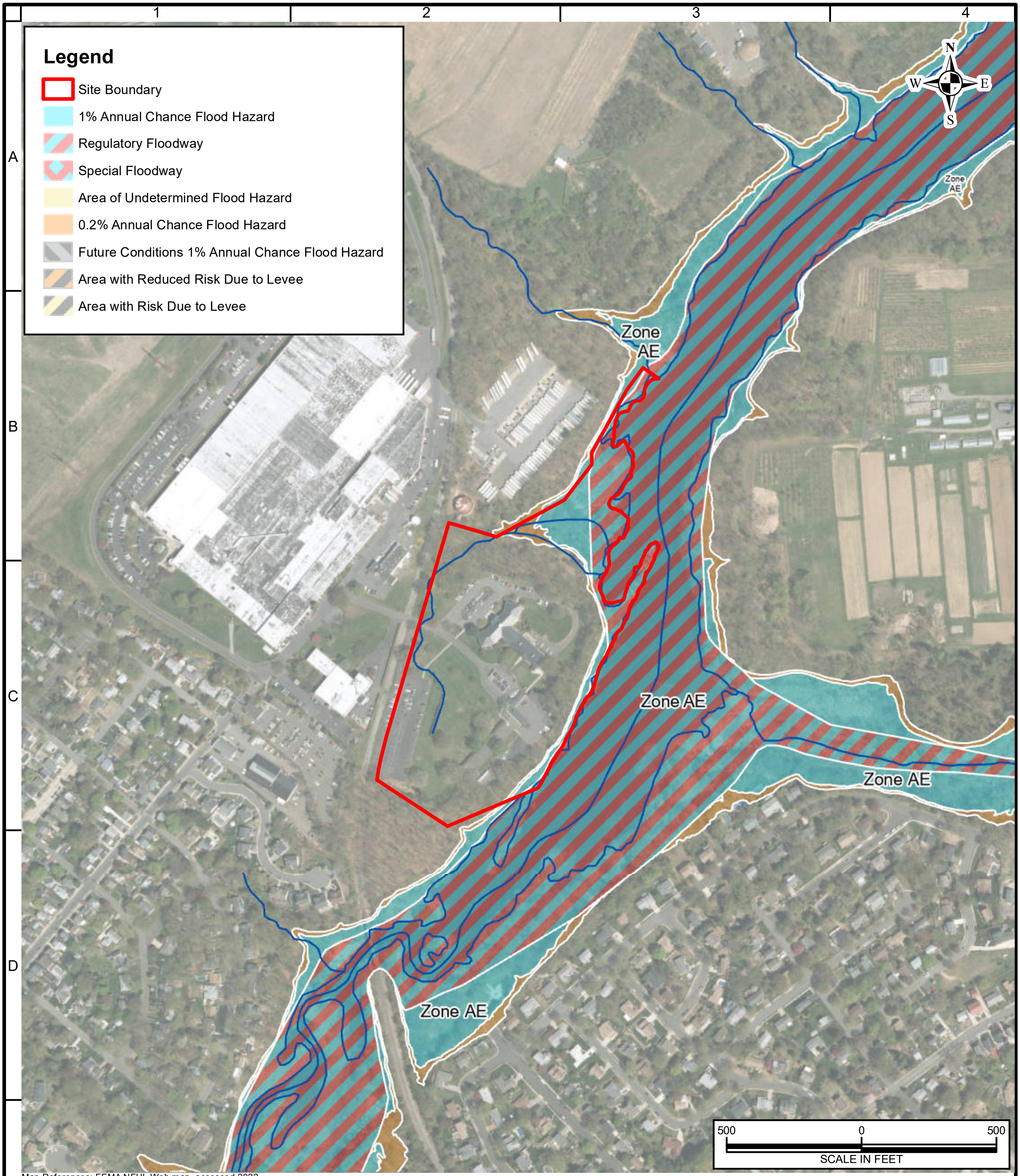
MIDDLESEX COUNTY NEW JERSEY

Drawing Title

REGIONAL
GEOLOGY MAP

Project No. 100851001	Figure 5
Date 05/05/2023	
Scale 1" = 500'	
Drawn By IHB	

Path: \\langan.com\data\PAR\data0\100851001\Project Data\ArcGIS\MXD\Geotech_Figures\Figure 4 - Surficial Geology.mxd



Map References: FEMA NFHL Web map, accessed 2022

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NORTH BRUNSWICK

MIDDLESEX COUNTY NEW JERSEY

Drawing Title

FLOOD MAP

Project No.
100851001

Date
05/05/2023

Scale
1" = 600'

Drawn By
IHB

Figure
6

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TABLES

TABLE 1: BASIN GROUNDWATER, SOIL MOTTLING, AND BEDROCK SUMMARY

Basin	Test Pit Location	Existing Grade Elevation	Bottom of Basin Grade Elevation	Bottom of Media Elevation (6" for Infiltration, 3.5' for Bioretention)	Design SHGW Elevation	Observed Mottling Elevation		Observed Groundwater Elevation		Approx. Top of Decomposed Rock		Approx. Top of Weathered Bedrock		Notes
						Dec. 2022	Jan. 2023	Dec. 2022	Jan. 2023	Depth (feet)	Elevation	Depth (feet)	Elevation	
Bioretention Basin A1	TP-2	49.3	47	43.5	41.3	N.E.	-	37.8	-	10	39.3	12	37.3	
	STP-6	50.3				-	N.E.	-	39.3	11	39.3	12	38.3	Perched water encountered at el 41.3.
	STP-7	49.2				-	38.2	-	37.5	11	38.2	13.5	35.7	
Bioretention Basin A2	TP-1	51.5	47	43.5	42.6	38.5	-	41.5	-	8	43.5	N.E.	N.E.	
	STP-4	52.1				-	N.E.	-	N.E.	9.5	42.6	11	41.1	Perched water encountered at el 42.6.
	STP-5	50.4				-	N.E.	-	39.4	8	42.4	N.E.	N.E.	
Subsurface Infiltration Basin A3	STP-4	52.1	49.5	49	42.6	-	N.E.	-	N.E.	9.5	42.6	11	41.1	Perched water encountered at el 42.6.
	STP-6	50.3				-	N.E.	-	39.3	11	39.3	12	38.3	Perched water encountered at el 41.3.
	STP-7	49.2				-	38.2	-	37.5	11	38.2	13.5	35.7	
	STP-8	49.6				-	N.E.	-	36.6	11	38.6	12	37.6	
Subsurface Infiltration Basin A4	TP-11	53.3	51.5	51	45.6	41.8	-	N.E.	-	8	45.3	N.E.	N.E.	
	TP-12	53.6				45.6	-	N.E.	-	10	43.6	N.E.	N.E.	
	STP-11	52.2				-	44.2	-	40.7	9.5	42.7	N.E.	N.E.	

TABLE 2: SINGLE RING INFILTRATION TEST RESULTS

Location	Surface Elevation (feet)	Test Depth (feet)	Test Elevation (feet)	Soil Description	Field Measured Hydraulic Conductivity, K (inches/hour)
TP-1	51.5	6	45.5	f-c SAND, some silt, some clay, trace f-c gravel, trace cobbles	< 1
TP-2	49.3	4.5	44.8	f-m SAND, trace silt, trace clay, trace fine gravel	5.9
TP-3	54.5	5	49.5	DECOMPOSED ROCK: Sandy ROCK FRAGMENTS, trace silt, trace clay	1.6
TP-4	55.9	6	49.9	DECOMPOSED ROCK: CLAY, some f-c sand, trace silt, trace rock fragments	49.5 **
TP-11	53.3	3.5	49.8	FILL: f-c SAND, some clay, trace silt	2
		5.5	47.8	Gravelly f-c SAND, trace silt, trace clay, trace cobbles	2.3
TP-12	53.6	3.5	50.1	FILL: f-c SAND, some clay, trace silt	4.3
		5.5	48.1	f-c SAND, some f-c gravel, some clay, trace silt	1.6
STP-4	52.1	6.5	45.6	f-c GRAVEL, some f-c sand, trace silt, trace clay	1.5
STP-5	50.4	5.5	44.9	f-c SAND, some silt, trace clay, trace f-c gravel, trace cobbles, trace boulders	< 1
STP-6	50.3	2.5	47.8	FILL: f-c SAND, some silt, some clay, trace f-c gravel, trace roots	< 1
		5	45.3	f-c SAND, some silt, trace clay, trace f-c gravel	6.6
STP-7	49.2	2.5	46.7	FILL: f-c SAND, some silt, some clay, trace fine gravel	< 1
STP-8	49.6	1	48.6	FILL: Sandy SILT, some clay, trace f-c gravel, trace cobbles	< 1
		5	44.6	f-c SAND, trace silt, trace f-c gravel, trace clay	4.4

** NOTE: voids in decomposed rock stratum likely caused inflated value that should not be used for design purposes

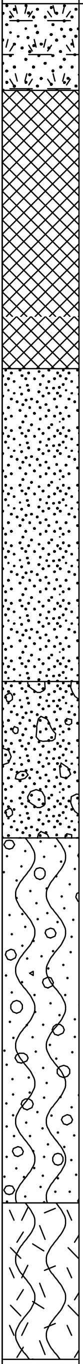
APPENDIX A

Test Pit Logs

LOG OF TEST PIT SHGW-1

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001	DATE 12/2/2022
LOCATION North Brunswick, NJ	ELEVATION Approx. el 61.4 (NAVD 88)	
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 13 ft	WATER LEVEL - First 9 ft ∇ WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz	LANGAN PERSONNEL Andrew Risser

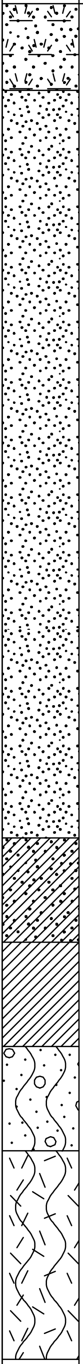


ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
+61.4	10YR 3/3 Dark brown Silty f-m SAND, trace fine gravel, trace roots (moist) [TOPSOIL]	0	S-1	GRAB	Started excavating at 8:50 AM on 12/2/2022. Fine roots observed to 10" bgs.
+60.6	2.5YR 3/2 Dark reddish brown SILT, some fine sand, some rock fragments (moist) [FILL] 2.5YR 4/6 Dark reddish brown to 7.5YR 7/1 light gray SILT, some fine sand, some f-c gravel, some clay (moist) [FILL]	1 2 3	S-2 S-2A	GRAB GRAB	
+57.9	7.5 YR 5/8 Light brown f-c SAND, trace fine gravel, trace silt (moist)	4 5 6	S-3	GRAB	Both sidewalls collapsed at 4 ft bgs.
+54.9	7.5 YR 5/8 Light brown f-c SAND, some f-c gravel, trace silt, trace cobbles, trace boulders (wet)	7	S-4	GRAB	
+53.4	2.5 YR 3/2 Dark reddish brown to 7.5 YR 7/1 light gray SILT, some f-c sand, trace rock fragments (moist to wet) [DECOMPOSED ROCK] ∇	8 9 10 11	S-5	GRAB	Orangish mottling observed from 8 to 11.5 ft bgs. Groundwater seepage observed at 9 ft bgs.
+49.9	2.5 YR 3/2 Dark reddish brown to 7.5 YR 7/11 gray WEATHERED SHALE (wet)	12	S-6	GRAB	Moderate to hard digging at 11.5 ft bgs.
+48.4	End of Test Pit at 13 ft.	13 14 15			Bucket refusal encountered at 13 ft bgs. Finished excavating at 9:40 AM on 12/2/2022. Test pit backfilled with excavated material upon completion.

LOG OF TEST PIT SHGW-2

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001	DATE 12/1/2022
LOCATION North Brunswick, NJ	ELEVATION Approx. el 62.1 (NAVD 88)	
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 13 ft	WATER LEVEL - First 10 ft ▽ WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz	LANGAN PERSONNEL Andrew Risser



Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+62.1	10YR 3/3 Dark brown Silty f-m SAND, trace roots (moist) [TOPSOIL]	0	S-1	GRAB	Started excavating at 2:10 PM on 12/1/2022. Fine roots observed to 8" bgs.
	+61.3	7.5YR 4/4 Brown f-m SAND, trace silt, trace fine gravel (moist)	1			
			2			
			3	S-2	GRAB	
			4			
			5			
		7.5YR 5/6 Light brown f-c SAND, trace silt, trace fine gravel (moist)	6			
			7	S-3	GRAB	
	+54.1	2.5YR 3/2 Dark reddish brown to 7.5 YR 7/1 light gray to orangish brown Sandy CLAY, trace fine gravel, trace cobbles, trace silt (moist)	8	S-4	GRAB	Mottling observed from 8 to 10 ft bgs.
	+53.1	5YR 5/6 Yellowish red CLAY, trace f-m sand, trace silt (moist) ▽	9	S-5	GRAB	
	+52.1	7.5 YR 7/1 Light gray to 2.5 YR 3/2 dark reddish brown CLAY, some rock fragments, trace silt (wet) [DECOMPOSED ROCK]	10	S-6	GRAB	Groundwater seepage observed at 10 ft bgs. Orangish mottling observed from 10 to 11 ft bgs.
	+51.1	2.5 YR 3/2 Dark reddish brown to 7.5YR 7/1 light gray WEATHERED SHALE (wet)	11			Moderate to hard digging at 11 ft bgs.
			12	S-7	GRAB	
	+49.1	End of Test Pit at 13 ft.	13			Bucket refusal encountered at 13 ft bgs. Finished excavating at 3:00 PM on 12/1/2022. Test pit backfilled with excavated material upon completion.
			14			
			15			

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LOG OF TEST PIT SHGW-3

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001		DATE 12/1/2022	
LOCATION North Brunswick, NJ	ELEVATION Approx. el 56.7 (NAVD 88)			
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 8 ft	WATER LEVEL - First 6.5 ft ▽		WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz		LANGAN PERSONNEL Andrew Risser	

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+56.7	7.5YR 4/4 Brown Silty f-m SAND, trace roots (moist) [TOPSOIL]	0	S-1	GRAB	Started excavating at 1:20 PM on 12/1/2022. Fine roots to 10" bgs.
	+55.7	7.5YR 5/6 Light brown f-m SAND, trace silt (moist)	1			
			2	S-2	GRAB	
		7.5YR 5/6 Light brown to 7.5YR 7/1 light gray f-m SAND, trace silt, trace clay (moist)	3			Orangish mottling observed from 3 to 5.5 ft bgs.
	+52.7	2.5YR 3/2 Dark reddish brown SILT, some f-c sand, trace rock fragments (moist) [DECOMPOSED ROCK]	4			
			5			
	+51.2	2.5YR 3/2 Dark reddish brown to 7.5YR 7/1 light gray WEATHERED SHALE (moist to wet)	6			
		▽	7			Groundwater seepage observed at 6.5 ft bgs. Hard digging at 6.5 ft bgs.
	+48.7	End of Test Pit at 8 ft.	8			Bucket refusal encountered at 8 ft bgs. Finished excavating at 2:00 PM on 12/1/2022. Test pit backfilled with excavated material upon completion.
			9			
			10			
			11			
			12			
			13			
			14			
			15			

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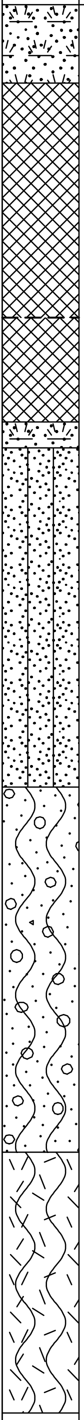
LOG OF TEST PIT STP-1

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001	DATE 1/10/2023
LOCATION North Brunswick, NJ	ELEVATION Approx. el 60.3 (NAVD 88)	
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 13.5 ft	WATER LEVEL - First 7 ft ▽ WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz	LANGAN PERSONNEL Emmanuel Carreno Guzman

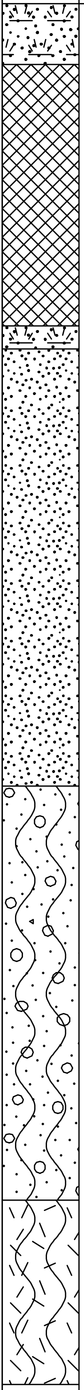


ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
+60.3	Dark brown SILT, some clay, trace f-c gravel, trace roots (moist) [TOPSOIL - 9" thick]	0	S-1	GRAB	Started excavating at 12:10 PM on 1/10/2023. Fine roots extend to 2.5' bgs.
+59.6	Dark reddish brown SILT, some clay, trace f-c sand, trace f-c gravel (moist) [FILL]	1	S-2	GRAB	
	Grayish to orangish brown SILT, some clay, trace f-c sand, trace roots (moist) [FILL]	2	S-3	GRAB	
+57.3	Dark reddish brown f-c SAND, some silt, some clay, trace f-c gravel (moist) [FILL]	3	S-4	GRAB	
+56.3	Black SILT, some organics, trace f-c sand, trace clay (moist) [BURIED TOPSOIL - 3" thick]	4	S-5	GRAB	
	Orangish brown f-c SAND, some silt, trace f-c gravel (moist)	5	S-6	GRAB	
		6			
	▽ Orangish brown f-c SAND, some silt, trace f-c gravel (wet)	7	S-7	GRAB	Fast groundwater seepage observed at 7' bgs.
+52.8	Gray to dark reddish brown ROCK FRAGMENTS, some silt, trace f-c sand, trace clay (wet) [DECOMPOSED ROCK]	8	S-8	GRAB	Gray mottling observed from 7.5' to 11' bgs. Rock fragments up to 3" in size encountered from 7.5' bgs to 11' bgs.
		9			
		10			
+49.3	Dark reddish brown ROCK FRAGMENTS, trace silt, trace f-c sand, trace clay (wet) [WEATHERED ROCK]	11	S-9	GRAB	Rock fragments up to 8" in size encountered from 11' bgs to 13.5' bgs.
		12			
		13			
+46.8	End of Test Pit at 13.5'.	14			Bucket refusal encountered at 13.5' bgs. Finished excavating at 12:50 PM on 1/10/2023. Backfilled with excavated material upon completion.
		15			

LOG OF TEST PIT STP-2

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001	DATE 1/10/2023
LOCATION North Brunswick, NJ	ELEVATION Approx. el 61.7 (NAVD 88)	
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 15 ft	WATER LEVEL - First 7.5 ft ∇ WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz	LANGAN PERSONNEL Emmanuel Carreno Guzman



ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
+61.7	Dark brown SILT, trace clay, trace f-c sand, trace roots (moist) [TOPSOIL- 8" thick]	0	S-1	GRAB	Started excavating at 12:55 PM on 1/10/2023. Fine roots extend to 1.5' bgs.
+61.0	Orangish to dark grayish brown SILT, some f-c sand, trace clay, trace f-c gravel, trace roots (moist) [FILL]	1	S-2	GRAB	
	Dark grayish brown SILT, some clay, trace f-c sand, trace f-c gravel (moist) [FILL]	2 3	S-3	GRAB	
+58.2	Black SILT, some organics, trace clay, trace f-c sand (moist) [BURIED TOPSOIL - 3" thick]	4	S-4	GRAB	
	Orangish brown f-c SAND, trace silt, trace f-c gravel, trace cobbles, trace boulder (moist)	5	S-5	GRAB	
		6 7			Boulder (approx. 1.5' diameter) encountered at 6' bgs. Sidewall collapse encountered at 6' bgs.
	∇ Orangish brown f-c SAND, trace silt, trace f-c gravel (wet)	8	S-6	GRAB	Fast groundwater seepage observed at 7.5' bgs.
+53.2	Gray to dark reddish brown ROCK FRAGMENTS, some silt, trace f-c sand, trace clay (wet) [DECOMPOSED ROCK]	9 10 11 12	S-7	GRAB	Gray mottling observed from 8.5' bgs to 13' bgs. Rock fragments up to 3" in size encountered from 8.5' bgs to 13' bgs.
+48.7	Dark reddish brown ROCK FRAGMENTS, trace silt, trace clay, trace f-c sand (wet) [WEATHERED ROCK]	13 14	S-8	GRAB	Rock fragments up to 9" in size encountered from 13' bgs to 15' bgs. Unable to break rock fragments by hand from 13' bgs to 15' bgs.
+46.7	End of Test Pit at 15'.	15 16 17			Finished excavating at 1:50 PM on 1/10/2023. Backfilled with excavated material upon completion.

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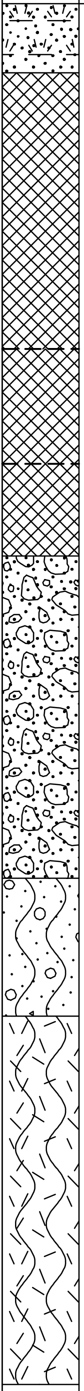
LOG OF TEST PIT STP-4

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001	DATE 1/9/2023
LOCATION North Brunswick, NJ	ELEVATION Approx. el 52.1 (NAVD 88)	
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 15 ft	WATER LEVEL - First N.E. ▽ WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz	LANGAN PERSONNEL Shannon Stewart



ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
+52.1	Dark brown SILT, some f-c sand, trace clay, trace roots (moist) [TOPSOIL - 9" thick]	0	S-1	GRAB	Started excavating at 1:00 PM on 1/9/2023. Large diameter roots up to 0.5" extend to 1' bgs. Fine roots extend to 1' bgs.
+51.4	Grayish to orangish brown f-c SAND, some silt, trace f-c gravel, trace clay (moist) [FILL]	1 2 3	S-2	GRAB	
+48.4	Grayish brown SILT, trace clay, trace f-c sand, trace f-c gravel, trace wood (moist) [FILL]	4	S-3	GRAB	Buried wood pieces up to 6" diameter observed from 3.75' bgs to 5' bgs.
+47.1	Orangish brown Clayey f-c SAND, some silt, trace boulders (moist) [FILL]	5	S-4	GRAB	Boulders (9" by 15") encountered at 5' bgs.
+46.1	Orangish brown f-c GRAVEL, some f-c sand, trace silt, trace clay (moist)	6 7 8 9	S-5	GRAB	Slow perched water seepage observed at 9.5' bgs from eastern sidewall of test pit.
+42.6	Dark reddish brown ROCK FRAGMENTS, some silt, trace f-c sand (moist to wet) [DECOMPOSED ROCK]	10	S-6	GRAB	Rock fragments up to 3" in size encountered from 9.5' bgs to 15' bgs.
+41.1	Dark orangish brown ROCK FRAGMENTS, trace silt, trace f-c sand (moist) [HIGHLY WEATHERED ROCK]	11 12 13 14	S-7	GRAB	Rock fragments up to 8" in size encountered from 11' bgs to 15' bgs.
+37.1	End of Test Pit at 15'.	15 16 17			Finished excavating at 1:44 PM on 1/9/2023. Backfilled with excavated material upon completion.

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LOG OF TEST PIT STP-5

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001	DATE 1/9/2023
LOCATION North Brunswick, NJ	ELEVATION Approx. el 50.4 (NAVD 88)	
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 15 ft	WATER LEVEL - First 11 ft ▽ WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz	LANGAN PERSONNEL Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+50.4	Dark brown SILT, some f-c sand, trace clay, trace f gravel, some roots (moist) [TOPSOIL - 12" thick]	0	S-1	GRAB	Started excavating at 1:59 PM on 1/9/2023. Fine roots extend to 2.5' bgs. Large roots up to 3" extend to 1.5' bgs.
	+49.4	Orangish brown f-c SAND, some silt, trace f-c gravel, trace roots (moist) [FILL]	1	S-2	GRAB	
			2			
	+47.2	Grayish brown f-c SAND, some silt, trace f-c gravel, trace cobbles (moist) [FILL]	3	S-3	GRAB	
			4			
	+45.2	Light brown f-c SAND, some silt, trace clay, trace f-c gravel, trace cobbles, trace boulders (moist)	5	S-4	GRAB	Buried root/wood pieces encountered from 5.25' bgs to 6' bgs.
			6			
			7			
	+42.4	Reddish brown ROCK FRAGMENTS, some silt, trace f-c gravel (moist to wet) [DECOMPOSED ROCK]	8			Rock fragments up to 2" in size encountered at 8' bgs to 15' bgs.
			9			
			10	S-5	GRAB	
		▽	11			Fast groundwater seepage observed at 11' bgs.
			12			
			13			
			14			
	+35.4	End of Test Pit at 15'.	15			Finished excavating at 2:35 PM on 1/9/2023. Backfilled with excavated material upon completion.
			16			
			17			

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LOG OF TEST PIT STP-6

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001		DATE 1/9/2023
LOCATION North Brunswick, NJ	ELEVATION Approx. el 50.3 (NAVD 88)		
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 15 ft	WATER LEVEL - First 9 ft ▽	WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz		LANGAN PERSONNEL Shannon Stewart

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+50.3	Dark brown SILT, trace f-c sand, trace clay, trace roots, trace f-c gravel (moist) [TOPSOIL - 9" thick]	0	S-1	GRAB	Started excavating at 12:00 PM on 1/9/2023. Fine roots extend to 2.5' bgs.
	+49.6	Dark grayish brown f-c SAND, some silt, some f-c gravel (moist) [FILL]	1	S-2	GRAB	
	+48.3	Orangish brown f-c SAND, some silt, some clay, trace f-c gravel, trace roots (moist)	2	S-3	GRAB	
			3			
	+46.3	Brown to orangish brown f-c SAND, some silt, trace clay, trace f-c gravel (moist)	4	S-4	GRAB	
			5			
			6			
	+43.3	Brown to orangish brown f-c SAND, some silt, trace f-c gravel (moist)	7	S-5	GRAB	
			8			
	+41.3	Brown to orangish brown f-c SAND, some silt, some f-c gravel, trace cobbles (wet)	9 ▽	S-6	GRAB	Slow perched water seepage observed at 9' bgs from west sidewall of test pit. Cobbles encountered from 9' bgs to 11' bgs.
			10			
	+39.3	Dark reddish brown ROCK FRAGMENTS, some silt, trace f-c sand, trace clay (wet) [DECOMPOSED ROCK]	11	S-7	GRAB	Rock fragments up to 3" in size encountered from 11' bgs to 12' bgs. Faster groundwater seepage observed at 11' bgs.
	+38.3	Dark reddish brown to orangish brown ROCK FRAGMENTS, some silt, trace f-c sand, trace clay (wet) [WEATHERED ROCK]	12	S-8	GRAB	
			13			
			14			
	+35.3	End of Test Pit at 15'.	15			Finished excavating at 12:49 PM on 1/9/2023. Backfilled with excavated material upon completion.
			16			
			17			

LANGAN

LOG OF TEST PIT STP-7

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001	DATE 1/9/2023
LOCATION North Brunswick, NJ	ELEVATION Approx. el 49.2 (NAVD 88)	
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 14 ft	WATER LEVEL - First 11.75 ft ∇ WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz	LANGAN PERSONNEL Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+49.2	Dark reddish brown Sandy SILT, trace roots, trace fine gravel (moist) [TOPSOIL - 8" thick]	0	S-1	GRAB	Started excavating at 11:06 AM on 1/9/2023. Fine roots extend to 1.5' bgs.
	+48.5	Grayish brown f-c SAND, some f-c gravel, some silt, trace clay, trace roots (moist) [FILL]	1	S-2	GRAB	
	+47.5	Reddish brown f-c SAND, some silt, some clay, trace fine gravel (moist) [FILL]	2 3	S-3	GRAB	
	+45.2	Reddish brown f-c SAND, some silt, trace fine gravel, trace clay (moist) [FILL]	4 5	S-4	GRAB	
	+43.2	Reddish brown f-m SAND, trace silt (moist) [FILL]	6	S-5	GRAB	
	+42.2	Reddish brown Gravelly f-c SAND, trace silt, trace cobbles, trace buried roots (moist)	7 8 9 10	S-6	GRAB	Buried roots observed from 7' bgs to 8' bgs. Cobbles encountered from 7' bgs to 12' bgs.
	+38.2	Orangish to grayish brown ROCK FRAGMENTS, some silt, some clay, trace f-c sand (wet) [DECOMPOSED ROCK] ∇	11 12 13	S-7	GRAB	Rock fragments up to 2" in size encountered from 11' bgs to 13.5' bgs. Orangish mottling observed from 11' bgs to 13.5' bgs. Fast groundwater seepage observed at 11.75' bgs.
	+35.7	Reddish brown ROCK FRAGMENTS, trace silt, trace f-c sand (wet) [WEATHERED ROCK]		S-8	GRAB	Rock fragments up to 10" in size encountered from 13.5' bgs to 14' bgs. Difficult digging observed from 13.5' bgs to 14' bgs. Bucket refusal encountered at 14' bgs. Finished excavating at 11:54 AM on 1/9/2023. Backfilled with excavated material upon completion.
	+35.2	End of Test Pit at 14'.	14 15 16 17			

LANGAN

LOG OF TEST PIT STP-8

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001	DATE 1/9/2023
LOCATION North Brunswick, NJ	ELEVATION Approx. el 49.6 (NAVD 88)	
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 14 ft	WATER LEVEL - First 13 ft ▽ WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz	LANGAN PERSONNEL Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+49.6	Reddish brown SILT, some f-c sand, trace roots (moist) [TOPSOIL - 8" thick]	0	S-1	GRAB	Started excavating at 10:10 AM on 1/9/2023. Trace roots extend to 2.5' bgs. Cobbles encountered from 8" bgs to 5' bgs.
	+48.9	Dark brown Sandy SILT, some clay, trace f-c gravel, trace cobbles (moist) [FILL]	1			
				S-2	GRAB	
			2			
			3			
			4			
	+44.6	Reddish brown f-c SAND, trace silt, trace f-c gravel, trace clay (moist)	5	S-3	GRAB	Small sidewall collapse observed from 5' bgs to 7' bgs.
			6			
			7			
			8			
			9			
			10			
	+38.6	Reddish brown ROCK FRAGMENTS, some silt, some f-c sand, trace clay (moist) [DECOMPOSED ROCK]	11	S-4	GRAB	Rock fragments up to 3" in size encountered from 11' bgs to 12' bgs. Difficult digging observed from 12' bgs to 14' bgs.
	+37.6	Reddish brown ROCK FRAGMENTS, trace silt, trace f-c sand (moist to wet) [WEATHERED ROCK] ▽	12	S-5	GRAB	Rock fragments up to 10" in size encountered from 12' bgs to 14' bgs.
			13			Very slow groundwater seepage observed at 13' bgs.
	+35.6	End of Test Pit at 14'.	14			Bucket refusal encountered at 14' bgs. Finished excavating at 10:55 AM on 1/9/2023. Backfilled with excavated material upon completion.
			15			
			16			
			17			

LANGAN

LOG OF TEST PIT STP-9

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001	DATE 1/9/2023
LOCATION North Brunswick, NJ	ELEVATION Approx. el 52.8 (NAVD 88)	
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 12 ft	WATER LEVEL - First 6.5 ft ▽ WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz	LANGAN PERSONNEL Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+52.8	Dark brown Sandy SILT, trace clay, trace roots (moist) [TOPSOIL - 8" thick]	0	S-1	GRAB	Started excavating at 7:50 AM on 1/9/2023. Fine roots extend to 1.25' bgs.
	+52.1	Orangish gray CLAY, some silt, trace f-c sand, trace roots, trace f-c gravel (moist) [FILL]	1 2	S-2	GRAB	Gray mottling observed in fill from 8" bgs to 2.5' bgs. Black 1/4-inch-dia PVC utility encountered at 1.5' bgs.
	+50.3	Dark reddish brown Sandy ROCK FRAGMENTS, trace silt, trace clay (moist) [DECOMPOSED ROCK]	3	S-3	GRAB	Rock fragments up to 3" in size encountered from 2.5' bgs to 4' bgs.
	+48.8	Dark brown ROCK FRAGMENTS, some f-c sand, trace silt, trace clay (moist) [DECOMPOSED ROCK]	4 5	S-4	GRAB	Rock fragments up to 8" in size encountered from 4' bgs to 5.5' bgs.
	+47.3	Orangish to reddish brown ROCK FRAGMENTS, trace silt, trace clay, trace f-c sand (wet) [DECOMPOSED ROCK] ▽	6 7 8 9 10	S-5	GRAB	Rock fragments up to 1' in size encountered from 5.5' bgs to 11' bgs. Slow groundwater seepage observed at 6.5' bgs from northeastern sidewall of test pit. Fast groundwater seepage observed at 7' bgs.
	+41.8	Orangish brown ROCK FRAGMENTS, trace silt, trace clay, trace f-c sand (wet) [WEATHERED ROCK]	11	S-6	GRAB	Rock fragments encountered from 11' bgs to 12' bgs.
	+40.8	End of Test Pit at 12'.	12 13 14 15			Bucket refusal encountered at 12' bgs. Finished excavating at 9:17 AM on 1/9/2023. Backfilled with excavated material upon completion.

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LOG OF TEST PIT STP-10

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001	DATE 1/9/2023
LOCATION North Brunswick, NJ	ELEVATION Approx. el 51.5 (NAVD 88)	
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 12 ft	WATER LEVEL - First 7 ft ▽ WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz	LANGAN PERSONNEL Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+51.5	Dark brown SILT, some f-c sand, trace clay, trace roots (moist) [TOPSOIL - 8" thick]	0	S-1	GRAB	Started excavating at 9:20 AM on 1/9/2023. Large roots up to 2" in diameter extend to 3' bgs. Fine roots extend to 4' bgs.
	+50.8	Reddish brown SILT, some f-c sand, trace clay, trace f-c gravel (moist)	1 2	S-2	GRAB	
	+48.5	Reddish brown ROCK FRAGMENTS, some silt, trace clay (moist) [DECOMPOSED ROCK]	3 4 5 6	S-3	GRAB	Rock fragments up to 3" in size encountered from 3' bgs to 7' bgs.
	+44.5	▽ Orangish to reddish brown ROCK FRAGMENTS, trace silt, trace f-c sand, trace clay (wet) [DECOMPOSED ROCK]	7 8 9 10	S-4	GRAB	Rock fragments up to 10" in size encountered from 7' bgs to 12' bgs. Fast groundwater seepage observed at 7' bgs.
	+40.5	Reddish brown ROCK FRAGMENTS, trace silt, trace f-c sand, trace clay (wet) [WEATHERED ROCK]	11	S-5	GRAB	Difficult digging observed from 11' bgs to 12' bgs.
	+39.5	End of Test Pit at 12'.	12 13 14 15			Bucket refusal encountered at 12' bgs. Finished excavating at 9:52 AM on 1/9/2023. Backfilled with excavated material upon completion.

LOG OF TEST PIT STP-11

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001	DATE 1/9/2023
LOCATION North Brunswick, NJ	ELEVATION Approx. el 52.22 (NAVD 88)	
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 15 ft	WATER LEVEL - First 11.5 ft ∇ WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz	LANGAN PERSONNEL Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+52.2	Dark brown SILT, some f-c sand, trace clay, trace roots (moist) [TOPSOIL - 13" thick]	0	S-1	GRAB	Started excavating at 2:39 PM on 1/9/2023. Fine roots extend to 3.25' bgs.
	+51.1	Orangish brown Silty f-c SAND, trace clay, trace roots (moist) [FILL]	1 2	S-2	GRAB	
	+49.2	Brown f-c SAND, some silt, trace clay, trace fine gravel (moist) [FILL]	3 4	S-3	GRAB	
	+47.2	Brown f-c SAND, some f-c gravel, trace silt, trace clay, trace cobbles, trace boulders (moist)	5 6 7	S-4	GRAB	
	+44.2	Orangish brown to dark gray SILT, some clay, trace f-c sand (moist)	8 9	S-5	GRAB	Slight orangish mottling observed from 8' bgs to 9.5' bgs.
	+42.7	Dark grayish brown ROCK FRAGMENTS, some silt, trace f-c sand, trace clay (moist) [DECOMPOSED ROCK]	10 11	S-6	GRAB	Rock fragments up to 2" in size encountered from 9.5' bgs to 11.5' bgs.
	+40.7	∇ Dark reddish brown ROCK FRAGMENTS, trace silt, trace clay, trace f-c sand (wet) [DECOMPOSED ROCK]	12 13 14	S-7	GRAB	Fast groundwater seepage observed at 11.5' bgs. Rock fragments up to 10" in size encountered from 11.5' bgs to 15' bgs.
	+37.2	End of Test Pit at 15'.	15 16 17			Finished excavating at 3:15 PM on 1/9/2023. Backfilled with excavated material upon completion.

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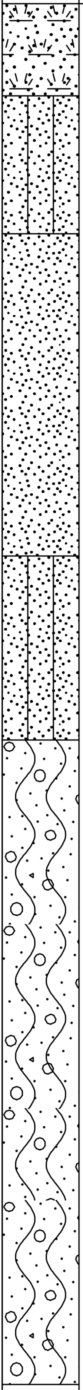
LOG OF TEST PIT TP-1

Sheet 1 of 1

PROJECT NAME: Proposed King Arthur Court Warehouse Development
PROJECT NUMBER: 100851001
DATE: 12/1/2022
LOCATION: North Brunswick, NJ
ELEVATION: Approx. el 51.5 (NAVD 88)
EXCAVATION CONTRACTOR: Clear Ground Improvement, Inc.
DEPTH: 15 ft
WATER LEVEL - First: 10 ft ▽
WATER LEVEL - Completion: - ▼
EQUIPMENT: SANY SY80U Excavator
FOREMAN: Eladio Cruz
LANGAN PERSONNEL: Andrew Risser



ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
+51.5	10YR 3/2 Dark grayish brown Silty f-m SAND, trace roots (moist) [TOPSOIL]	0	S-1	GRAB	Started excavating at 9:50 AM on 12/1/2022. Fine to large roots encountered to 12" bgs.
+50.5	5YR 5/8 Yellowish red f-m SAND, some silt, trace f-c gravel, trace cobbles, trace silt (moist)	1			
		2	S-2	GRAB	
+49.0	7.5YR 4/6 Light brown f-m SAND, trace silt (moist)	3			
		4	S-3	GRAB	
		5			
+45.5	7.5YR 4/6 Light brown f-c SAND, some silt, some clay, trace f-c gravel, trace cobbles (moist)	6	S-3A	GRAB	
		7			
+43.5	2.5YR 3/2 Dark reddish brown SILT, some f-c sand, trace rock fragments (moist) [DECOMPOSED ROCK]	8	S-4	GRAB	
		9			
	▽ 2.5YR 3/2 Dark reddish brown SILT, some f-c sand, trace rock fragments (wet) [DECOMPOSED ROCK]	10	S-5	GRAB	Sample observed to be wet.
		11			
	10YR 2/2 Dark brown SILT, some f-c sand, trace rock fragments (wet) [DECOMPOSED ROCK]	12	S-6	GRAB	Groundwater seepage observed at 12 ft bgs.
	2.5YR 6/2 Light brownish gray SILT, some f-c sand, trace rock fragments (wet) [DECOMPOSED ROCK]	13	S-7	GRAB	Orangish mottling observed from 13 ft to bottom of excavation.
		14			
+36.5	End of Test Pit at 15 ft.	15			Finished excavating at 10:45 AM on 12/1/2022. Test pit backfilled with excavated material upon completion.
		16			
		17			

LANGAN

LOG OF TEST PIT TP-2

Sheet 1 of 1

PROJECT NAME Proposed King Arthur Court Warehouse Development	PROJECT NUMBER 100851001	DATE 12/1/2022
LOCATION North Brunswick, NJ	ELEVATION Approx. el 49.3 (NAVD 88)	
EXCAVATION CONTRACTOR Clear Ground Improvement, Inc.	DEPTH 14 ft	WATER LEVEL - First 11.5 ft ▽ WATER LEVEL - Completion - ▼
EQUIPMENT SANY SY80U Excavator	FOREMAN Eladio Cruz	LANGAN PERSONNEL Andrew Risser

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+49.3	10YR 3/2 Dark grayish brown Silty f-m SAND, trace roots (moist) [TOPSOIL]	0	S-1	GRAB	Started excavating at 10:50 AM on 12/1/2022. Fine roots encountered to 12" bgs.
	+48.3	7.5YR 4/6 Light brown Silty f-m SAND (moist)	1 2 3	S-2	GRAB	
	+45.3	7.5 YR 5/6 Light brown f-m SAND, trace silt, trace clay, trace fine gravel (moist)	4 5 6 7 8 9	S-3 S-4	GRAB GRAB	
	+39.3	2.5YR 3/2 Dark reddish brown SILT, some f-c sand, trace rock fragments (moist) [DECOMPOSED ROCK] ▽	10 11	S-5	GRAB	Groundwater seepage observed at 11.5 ft bgs.
	+37.3	2.5YR 3/2 Dark reddish brown WEATHERED SHALE (wet)	12 13	S-6	GRAB	Moderate digging at 12 ft bgs.
	+35.3	End of Test Pit at 14 ft.	14 15 16 17			Bucket refusal encountered at 14 ft bgs. Finished excavating at 11:45 AM on 12/1/2022. Test pit backfilled with excavated material upon completion.

LOG OF TEST PIT TP-3

Sheet 1 of 1

PROJECT NAME	PROJECT NUMBER	DATE
Proposed King Arthur Court Warehouse Development	100851001	12/1/2022

LOCATION	ELEVATION
North Brunswick, NJ	Approx. el 54.5 (NAVD 88)

EXCAVATION CONTRACTOR	DEPTH	WATER LEVEL - First	WATER LEVEL - Completion
Clear Ground Improvement, Inc.	11.5 ft	10 ft ▽	- ▼

EQUIPMENT	FOREMAN	LANGAN PERSONNEL
SANY SY80U Excavator	Eladio Cruz	Andrew Risser

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+54.5	5YR 3/4 Dark reddish brown Silty f-m SAND, trace roots (moist) [TOPSOIL]	0	S-1	GRAB	Started excavating at 11:50 AM on 12/1/2022. Fine roots encountered to 6" bgs.
	+54.0	5YR 4/4 Reddish brown Sandy CLAY, trace silt (moist)	1			
			2	S-2	GRAB	
			3			
			4			
	+49.5	2.5YR 3/2 Dark reddish brown Sandy ROCK FRAGMENTS, trace silt, trace clay (moist) [DECOMPOSED ROCK]	5			
			6	S-3	GRAB	
			7			
			8			
	+45.5	2.5YR 3/2 Reddish brown SILT, some f-c sand, trace rock fragments (moist to wet) [DECOMPOSED ROCK]	9	S-4	GRAB	Moderate digging at 9 ft bgs.
		▽	10			Wet soil encountered at 10 ft bgs. Moderate to hard digging at 10 ft bgs. Shale fragments encountered at 11 ft bgs.
	+43.5	2.5YR 3/2 Reddish brown WEATHERED SHALE (wet)	11	S-5	GRAB	
	+43.0	End of Test Pit at 11.5 ft.	12			Bucket refusal encountered at 11.5 ft bgs. Finished excavating at 12:22 PM on 12/1/2022. Test pit backfilled with excavated material upon completion.
			13			
			14			
			15			

LOG OF TEST PIT TP-4

Sheet 1 of 1

PROJECT NAME: Proposed King Arthur Court Warehouse Development
PROJECT NUMBER: 100851001
DATE: 12/1/2022
LOCATION: North Brunswick, NJ
ELEVATION: Approx. el 55.9 (NAVD 88)
EXCAVATION CONTRACTOR: Clear Ground Improvement, Inc.
DEPTH: 11.5 ft
WATER LEVEL - First: 11.5 ft ▽
WATER LEVEL - Completion: - ▼
EQUIPMENT: SANY SY80U Excavator
FOREMAN: Eladio Cruz
LANGAN PERSONNEL: Andrew Risser

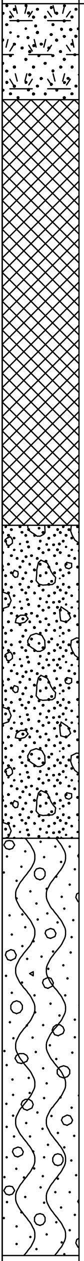
Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+55.9	10YR 3/3 Dark brown Silty f-m SAND, trace roots (moist) [TOPSOIL]	0	S-1	GRAB	Started excavating at 12:26 PM on 12/2/2022.
	+55.2	7.5YR 4/6 Light brown f-m SAND, trace silt (moist)	1	S-2	GRAB	
	+53.9	5YR 3/4 Dark reddish brown to 7.5YR 6/8 reddish yellow to 7.5YR 7/1 light gray Sandy CLAY, trace cobbles, trace silt (moist)	2			Orangish mottling observed from 2 to 5 ft bgs.
			3	S-3	GRAB	
			4			
	+50.9	2.5YR 3/2 Dark reddish brown SILT, some f-c sand, trace rock fragments (moist) [DECOMPOSED ROCK]	5	S-4	GRAB	
		2.5YR 3/2 Dark reddish brown to 7.5YR 7/1 light gray CLAY, some f-c sand, trace silt, trace rock fragments (moist) [DECOMPOSED ROCK]	6	S-5	GRAB	Orangish mottling observed from 6 to 8 ft bgs.
			7			
			8			Moderate digging at 8 ft bgs.
	+47.4	2.5YR 3/2 Dark reddish brown to 7.5YR 7/1 light gray WEATHERED SHALE (moist)	9	S-6	GRAB	
			10	S-7	GRAB	Hard digging at 10 ft bgs.
		▽	11			
	+44.4	End of Test Pit at 11.5 ft.	12			Water seepage observed at 11.5 ft bgs. Bucket refusal encountered at 11.5 ft bgs. Finished excavating at 1:10 PM on 12/2/2022. Test pit backfilled with excavated material upon completion.
			13			
			14			
			15			

LANGAN

LOG OF TEST PIT TP-11

Sheet 1 of 1

PROJECT NAME: Proposed King Arthur Court Warehouse Development
PROJECT NUMBER: 100851001
DATE: 12/1/2022
LOCATION: North Brunswick, NJ
ELEVATION: Approx. el 53.3 (NAVD 88)
EXCAVATION CONTRACTOR: Clear Ground Improvement, Inc.
DEPTH: 12 ft
WATER LEVEL - First: N.E. ▽
WATER LEVEL - Completion: - ▼
EQUIPMENT: SANY SY80U Excavator
FOREMAN: Eladio Cruz
LANGAN PERSONNEL: Andrew Risser



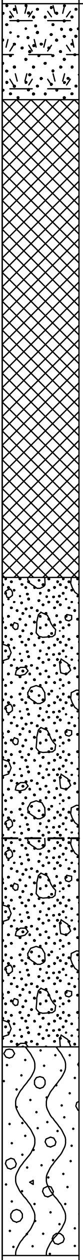
ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
+53.3	10YR 3/2 Dark grayish brown Silty f-m SAND, trace roots (moist) [TOPSOIL]	0	S-1	GRAB	Started excavating at 8:56 AM on 12/1/2022. Fine to medium roots observed to 11" bgs.
+52.4	7.5YR 4/6 Light brown f-c SAND, some clay, trace silt (moist) [FILL]	1			
		2			
		3	S-2	GRAB	
		4			
+48.3	7.5YR 4/6 Light brown Gravelly f-c SAND, trace silt, trace clay, trace cobbles (moist)	5			
		6	S-3	GRAB	
		7			
+45.3	2.5YR 3/2 Dark reddish brown SILT, some f-c sand, trace rock fragments (moist) [DECOMPOSED ROCK]	8	S-4	GRAB	
	7.5YR 5/6 Light brown to 7.5YR 5/1 gray SILT, some f-c sand, trace rock fragments (moist) [DECOMPOSED ROCK]	9	S-5	GRAB	
		10			
		11			Orangish mottling observed from 11.5 ft bgs to bottom of excavation.
+41.3	End of Test Pit at 12 ft bgs.	12			Finished excavating at 9:45 AM on 12/1/2022. Test pit backfilled with excavated material upon completion.
		13			
		14			
		15			

LANGAN

LOG OF TEST PIT TP-12

Sheet 1 of 1

PROJECT NAME: Proposed King Arthur Court Warehouse Development
PROJECT NUMBER: 100851001
DATE: 12/1/2022
LOCATION: North Brunswick, NJ
ELEVATION: Approx. el 53.6 (NAVD 88)
EXCAVATION CONTRACTOR: Clear Ground Improvement, Inc.
DEPTH: 12 ft
WATER LEVEL - First: N.E. ▽
WATER LEVEL - Completion: - ▼
EQUIPMENT: SANY SY80U Excavator
FOREMAN: Eladio Cruz
LANGAN PERSONNEL: Andrew Risser



Depth Scale	ELEV (feet)	DESCRIPTION	SAMPLE Number	SAMPLE Type	REMARKS
0	+53.6	10YR 3/2 Dark grayish brown Silty f-m SAND, trace roots (moist) [TOPSOIL]	S-1	GRAB	Started excavating at 8:15 AM on 12/1/2022. Roots encountered at 11" bgs.
1	+52.7	7.5YR 4/6 Light brown f-c SAND, some clay, trace silt (moist) [FILL]			
2			S-2	GRAB	
3					
4					
5	+48.1	7.5YR 4/6 Light brown f-c SAND, some f-c gravel, some clay, trace silt (moist)			
6			S-3	GRAB	
7					
8	+45.6	10YR 5/6 Yellowish brown to 10YR 5/2 grayish brown f-c SAND, some f-c gravel, some clay, trace silt, some roots (moist)			Mottling observed from 8 to 10 ft bgs.
9			S-4	GRAB	
10	+43.6	2.5YR 3/2 Dark reddish brown SILT, some f-c sand, trace rock fragments (moist) [DECOMPOSED ROCK]			
11			S-5	GRAB	
12	+41.6	End of Test Pit at 12 ft.			Finished excavating at 8:54 AM on 12/1/2022. Test pit backfilled with excavated material upon completion.
13					
14					
15					

LANGAN

APPENDIX B

Selected Test Pit Photographs

Photo 1: Profile of Test Pit SHGW-1.

Photo 2: Excavated material from Test Pit SHGW-1.

Photo 3: Different view of soil profile in Test Pit SHGW-1.

Photo 4: Profile of Test Pit SHGW-2.

Photo 5: Excavated material from Test Pit SHGW-2.

Photo 6: Different view of soil profile in Test Pit SHGW-2.

Photo 10: Profile of Test Pit SHGW-3.

Photo 11: Excavated material from Test Pit SHGW-3.

Photo 12: Different view of soil profile in Test Pit SHGW-3.

Photo 13: Profile of Test Pit TP-1.

Photo 14: Excavated material from Test Pit TP-1.

Photo 15: Different view of soil profile in Test Pit TP-1.

Photo 16: Profile of Test Pit TP-2.

Photo 17: Excavated material from Test Pit TP-2.

Photo 18: Different view of soil profile in Test Pit TP-2.

Photo 19: Profile of Test Pit TP-3.

Photo 20: Excavated material from Test Pit TP-3.

Photo 21: Different view of soil profile in Test Pit TP-3.

Photo 22: Profile of Test Pit TP-4.

Photo 23: Excavated material from Test Pit TP-4.

Photo 24: Different view of soil profile in Test Pit TP-4.

Photo 25: Profile of Test Pit TP-11.

Photo 26: Excavated material from Test Pit TP-11.

Photo 27: Different view of soil profile in Test Pit TP-11.

Photo 28: Profile of Test Pit TP-12.

Photo 29: Excavated material from Test Pit TP-12.

Photo 30: Different view of soil profile in Test Pit TP-12.

Photo 1: Profile of Test Pit STP-1.

Photo 2: Excavated material from Test Pit STP-1.

Photo 3: Different view of soil profile in Test Pit STP-1.

Photo 4: Profile of Test Pit STP-2.

Photo 5: Excavated material from Test Pit STP-2.

Photo 6: Different view of soil profile in Test Pit STP-2.

Photo 10: Profile of Test Pit STP-4.

Photo 11: Excavated material from Test Pit STP-4.

Photo 12: Different view of soil profile in Test Pit STP-4.

Photo 13: Profile of Test Pit STP-5.

Photo 14: Excavated material from Test Pit STP-5.

Photo 15: Different view of soil profile in Test Pit STP-5.

Photo 16: Profile of Test Pit STP-6.

Photo 17: Excavated material from Test Pit STP-6.

Photo 18: Different view of soil profile in Test Pit STP-6.

Photo 19: Profile of Test Pit STP-7.

Photo 20: Excavated material from Test Pit STP-7.

Photo 21: Different view of soil profile in Test Pit STP-7.

Photo 22: Profile of Test Pit STP-8.

Photo 23: Excavated material from Test Pit STP-8.

Photo 24: Different view of soil profile in Test Pit STP-8.

Photo 25: Profile of Test Pit STP-9.

Photo 26: Excavated material from Test Pit STP-9.

Photo 27: Different view of soil profile in Test Pit STP-9.

Photo 28: Profile of Test Pit STP-10.

Photo 29: Excavated material from Test Pit STP-10.

Photo 30: Different view of soil profile in Test Pit STP-10.

Photo 31: Profile of Test Pit STP-11.

Photo 32: Excavated material from Test Pit STP-11.

Photo 33: Different view of soil profile in Test Pit STP-11.

APPENDIX C

Single Ring Infiltration Test Results

100851001
King Arthur Court
North Brunswick, New Jersey

FIELD SINGLE RING INFILTRATION TEST

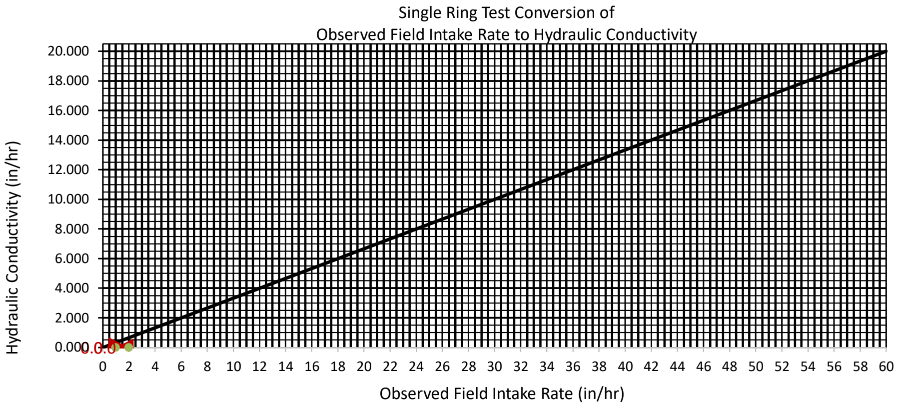
TP-1A

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	x	10:22 AM	3	-	-
		11:22 AM	2.625	0:00:00.0	86400
TEST #1	TEST FAILED PRESOAK				
	TEST TERMINATED				
	SHELBY TUBE COLLECTED				
TEST #2					
TEST #3					
TEST #4					
TEST #5					
TEST #6					
TEST #7					

Average Observed Field Intake Rate (sec/inch)	< 1
Average Observed Field Intake Rate (inch/hr)	< 1
Hydraulic Conductivity (inch/hr)	**< 1** (see graph)

COORESPONDING PROFILE PIT	**TP-1**
DATE OF INFILTRATION TEST:	**12/2/2022**
WEATHER DURING INFILTRATION TEST:	**40F Sunny**
EXISTING SURFACE ELEVATION (el):	**51.5**
TEST DEPTH:	**6** **ft**
TEST ELEVATION (el):	**45.5**
APPROXIMATE TOP OF RING (el):	**45.8**
APPROXIMATE TOP OF BOTTOM (el):	**45.3**

🟨	input
🟦	output
🟧	result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

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North Brunswick, New Jersey

FIELD SINGLE RING INFILTRATION TEST

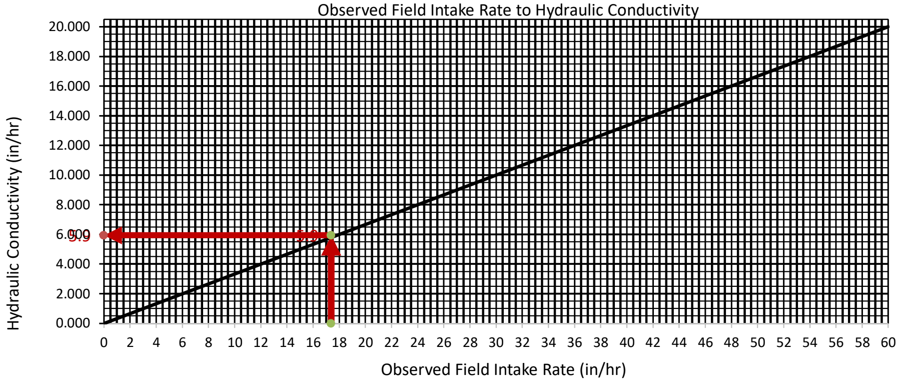
TP-2A

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	x	10:45 AM	3	-	-
		10:57 AM	2	0:02:40.0	160.0
		11:00 AM	1	0:06:11.0	371.0
		11:02 AM	0	0:07:48.0	468.0
TEST #1	x	11:03 AM	3	-	-
		11:06 AM	2	0:03:25.0	205.0
TEST #2	x	11:07 AM	3	-	-
		11:11 AM	2	0:03:28.0	208.0
TEST #3	x	11:12 AM	3	-	-
		11:15 AM	2	0:03:27.0	207.0
TEST #4	x	11:16 AM	3	-	-
		11:19 AM	2	0:03:28.0	208.0
TEST #5	x	11:20 AM	3	-	-
		11:23 AM	2	0:03:27.0	207.0
TEST #6					
TEST #7					

COORESPONDING PROFILE PIT	TP-2
DATE OF INFILTRATION TEST:	12/2/2022
WEATHER DURING INFILTRATION TEST:	42F Sunny
EXISTING SURFACE ELEVATION (el):	49.3
TEST DEPTH:	4.5 ft
TEST ELEVATION (el):	44.8
APPROXIMATE TOP OF RING (el):	45.1
APPROXIMATE TOP OF BOTTOM (el):	44.6

🟨 input
⬜ output
🟧 result

Single Ring Test Conversion of
Observed Field Intake Rate to Hydraulic Conductivity



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

Average Observed Field Intake Rate (sec/inch)	207.0
Average Observed Field Intake Rate (inch/hr)	17.4
Hydraulic Conductivity (inch/hr)	**5.9** (see graph)

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

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FIELD SINGLE RING INFILTRATION TEST

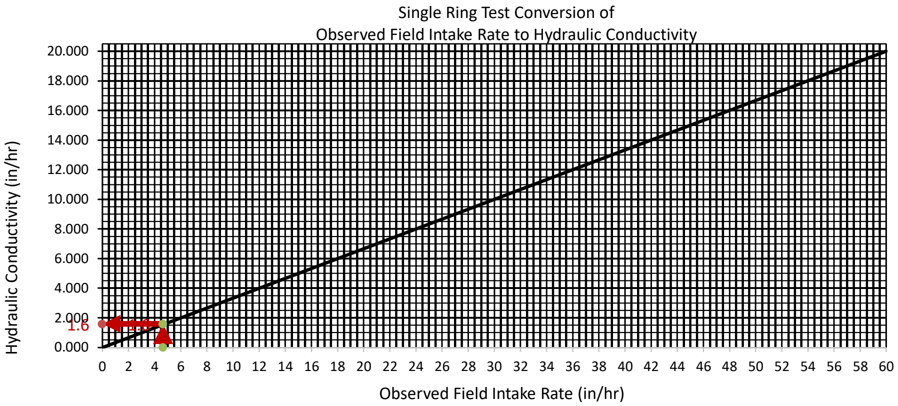
TP-3A

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	x	11:34 AM	3	-	-
		11:38 AM	2	0:03:56.0	236.0
		11:40 AM	1	0:12:34.0	754.0
		11:53 AM	0	0:19:12.0	1152.0
TEST #1	x	11:54 AM	3	-	-
		12:04 PM	2	0:09:43.0	583.0
TEST #2	x	12:05 PM	3	-	-
		12:14 PM	2	0:09:49.0	589.0
TEST #3	x	12:15 PM	3	-	-
		12:26 PM	2	0:11:07.0	667.0
TEST #4	x	12:27 PM	3	-	-
		12:38 PM	2	0:11:20.0	680.0
TEST #5	x	12:39 PM	3	-	-
		12:51 PM	2	0:12:55.0	775.0
TEST #6	x	12:52 PM	3	-	-
		1:05 PM	2	0:12:56.0	776.0
TEST #7	x	1:06 PM	3	-	-
		1:19 PM	2	0:12:55.0	775.0

Average Observed Field Intake Rate (sec/inch)	775.0	
Average Observed Field Intake Rate (inch/hr)	4.6	
Hydraulic Conductivity (inch/hr)	**1.6**	(see graph)

COORESPONDING PROFILE PIT	**TP-3**	
DATE OF INFILTRATION TEST:	**12/2/2022**	
WEATHER DURING INFILTRATION TEST:	**42F Sunny**	
EXISTING SURFACE ELEVATION (el):	**54.9**	
TEST DEPTH:	**5**	**ft**
TEST ELEVATION (el):	**49.9**	
APPROXIMATE TOP OF RING (el):	**50.2**	
APPROXIMATE TOP OF BOTTOM (el):	**49.7**	

🟨	input
🟦	output
🟧	result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

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North Brunswick, New Jersey

FIELD SINGLE RING INFILTRATION TEST

TP-4A

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	x	11:48 AM	3	-	-
		11:48 AM	2	0:00:19.2	19.2
		11:48 AM	1	0:00:38.1	38.1
		11:48 AM	0	0:00:54.2	54.2
TEST #1	x	11:51 AM	3	-	-
		11:51 AM	2	0:00:14.4	14.4
TEST #2	x	11:55 AM	3	-	-
		11:55 AM	2	0:00:23.0	23.0
TEST #3	x	11:57 AM	3	-	-
		11:57 AM	2	0:00:23.1	23.1
TEST #4	x	11:59 AM	3	-	-
		11:59 AM	2	0:00:23.7	23.7
TEST #5	x	12:00 PM	3	-	-
		12:00 PM	2	0:00:24.7	24.7
TEST #6	x	12:02 PM	3	-	-
		12:03 PM	2	0:00:24.9	24.9
TEST #7					

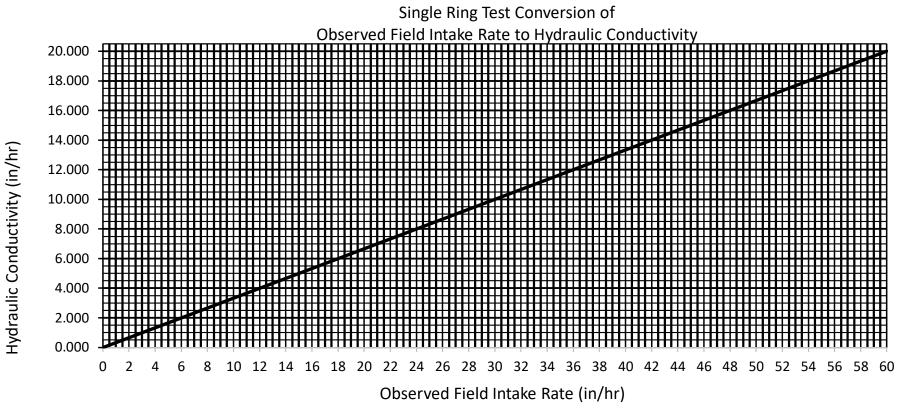
Average Observed Field Intake Rate (sec/inch)	24.9

Average Observed Field Intake Rate (inch/hr)	144.8

Hydraulic Conductivity (inch/hr)	**49.5**	(see graph)

COORESPONDING PROFILE PIT	**TP-4**	
DATE OF INFILTRATION TEST:	**12/2/2022**	
WEATHER DURING INFILTRATION TEST:	**45F Sunny**	
EXISTING SURFACE ELEVATION (el):	**55.9**	
TEST DEPTH:	**6**	**ft**
TEST ELEVATION (el):	**49.9**	
APPROXIMATE TOP OF RING (el):	**50.2**	
APPROXIMATE TOP OF BOTTOM (el):	**49.7**	

🟨	input
⬜	output
🟧	result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as “greater than 20 in/hr.” When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as “less than 1 in/hr.”

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

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FIELD SINGLE RING INFILTRATION TEST

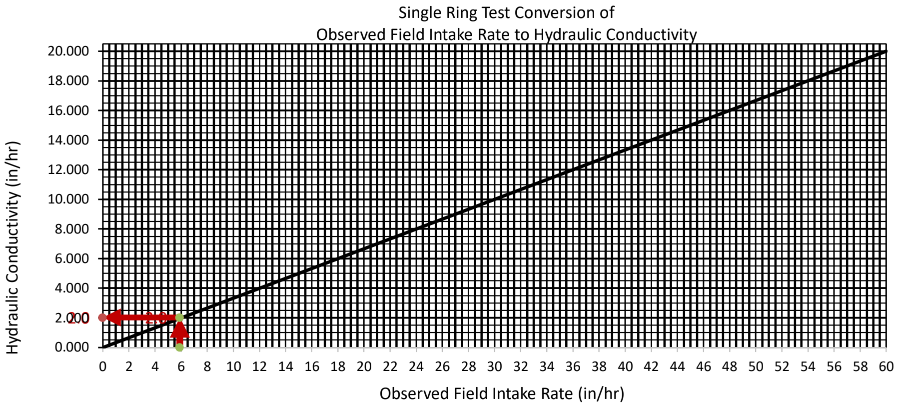
TP-11A

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	x	8:40 AM	3	-	-
		8:45 AM	2	0:04:23.0	263.0
		8:54 AM	1	0:13:26.0	806.0
		9:03 AM	0	0:23:02.0	1382.0
TEST #1	x	9:05 AM	3	-	-
		9:14 AM	2	0:09:40.0	580.0
TEST #2	x	9:15 AM	3	-	-
		9:25 AM	2	0:09:43.0	583.0
TEST #3	x	9:26 AM	3	-	-
		9:37 AM	2	0:10:09.0	609.0
TEST #4	x	9:37 AM	3	-	-
		9:47 AM	2	0:10:10.0	610.0
TEST #5	x	9:47 AM	3	-	-
		9:58 AM	2	0:10:09.0	609.0
TEST #6					
TEST #7					

Average Observed Field Intake Rate (sec/inch)	609.0
Average Observed Field Intake Rate (inch/hr)	5.9
Hydraulic Conductivity (inch/hr)	**2.0** (see graph)

COORESPONDING PROFILE PIT	**TP-11**
DATE OF INFILTRATION TEST:	**12/2/2022**
WEATHER DURING INFILTRATION TEST:	**35F Cloudy**
EXISTING SURFACE ELEVATION (el):	**53.3**
TEST DEPTH:	**3.5** **ft**
TEST ELEVATION (el):	**49.8**
APPROXIMATE TOP OF RING (el):	**50.1**
APPROXIMATE TOP OF BOTTOM (el):	**49.6**

🟨	input
🟦	output
🟧	result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as “greater than 20 in/hr.” When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as “less than 1 in/hr.”

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

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FIELD SINGLE RING INFILTRATION TEST

TP-11B

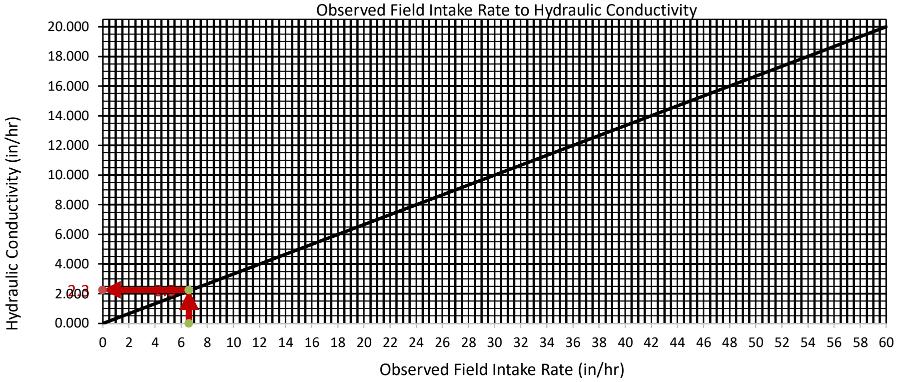
	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	x	8:58 AM	3	-	-
		9:04 AM	2	0:05:44.0	344.0
		9:14 AM	1	0:16:03.0	963.0
		9:24 AM	0	0:25:42.0	1542.0
TEST #1	x	9:25 AM	3	-	-
		9:33 AM	2	0:08:35.0	515.0
TEST #2	x	9:34 AM	3	-	-
		9:43 AM	2	0:09:05.0	545.0
TEST #3	x	9:44 AM	3	-	-
		9:53 AM	2	0:09:04.0	544.0
TEST #4	x	9:54 AM	3	-	-
		10:03 AM	2	0:09:06.0	546.0
TEST #5	x	10:04 AM	3	-	-
		10:13 AM	2	0:09:05.0	545.0
TEST #6					
TEST #7					

Average Observed Field Intake Rate (sec/inch)	545.0
Average Observed Field Intake Rate (inch/hr)	6.6
Hydraulic Conductivity (inch/hr)	**2.3** (see graph)

COORESPONDING PROFILE PIT	**TP-11**	
DATE OF INFILTRATION TEST:	**12/2/2022**	
WEATHER DURING INFILTRATION TEST:	**35F Cloudy**	
EXISTING SURFACE ELEVATION (el):	**53.3**	
TEST DEPTH:	**5.5**	**ft**
TEST ELEVATION (el):	**47.8**	
APPROXIMATE TOP OF RING (el):	**48.1**	
APPROXIMATE TOP OF BOTTOM (el):	**47.6**	

🟨	input
⬜	output
🟧	result

Single Ring Test Conversion of
Observed Field Intake Rate to Hydraulic Conductivity



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

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FIELD SINGLE RING INFILTRATION TEST

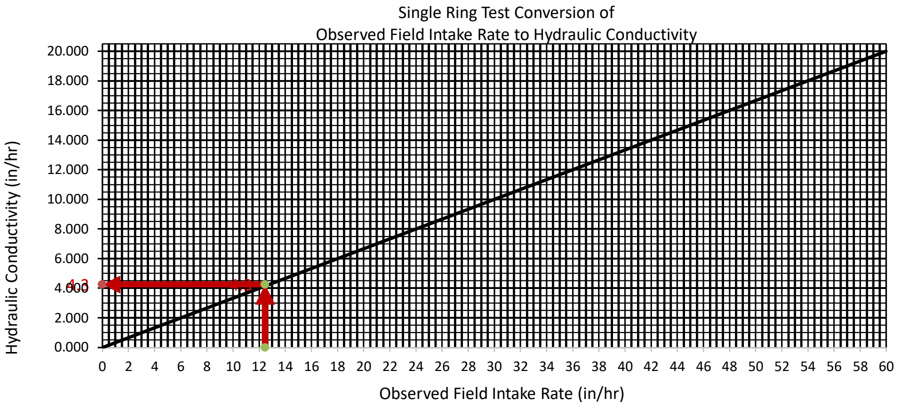
TP-12A

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	x	8:30 AM	3	-	-
		8:33 AM	2	0:02:56.0	176.0
		8:36 AM	1	0:06:08.0	368.0
		8:40 AM	0	0:09:23.0	563.0
TEST #1	x	8:43 AM	3	-	-
		8:48 AM	2	0:04:41.0	281.0
TEST #2	x	8:49 AM	3	-	-
		8:55 AM	2	0:04:43.0	283.0
TEST #3	x	8:57 AM	3	-	-
		9:02 AM	2	0:04:46.0	286.0
TEST #4	x	9:03 AM	3	-	-
		9:08 AM	2	0:04:48.0	288.0
TEST #5	x	9:09 AM	3	-	-
		9:14 AM	2	0:04:49.0	289.0
TEST #6					
TEST #7					

Average Observed Field Intake Rate (sec/inch)	289.0
Average Observed Field Intake Rate (inch/hr)	12.5
Hydraulic Conductivity (inch/hr)	**4.3** (see graph)

COORESPONDING PROFILE PIT	**TP-12**	
DATE OF INFILTRATION TEST:	**12/2/2022**	
WEATHER DURING INFILTRATION TEST:	**35F Cloudy**	
EXISTING SURFACE ELEVATION (el):	**53.6**	
TEST DEPTH:	**3.5**	**ft**
TEST ELEVATION (el):	**50.1**	
APPROXIMATE TOP OF RING (el):	**50.4**	
APPROXIMATE TOP OF BOTTOM (el):	**49.9**	

🟨	input
🟦	output
🟧	result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

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FIELD SINGLE RING INFILTRATION TEST

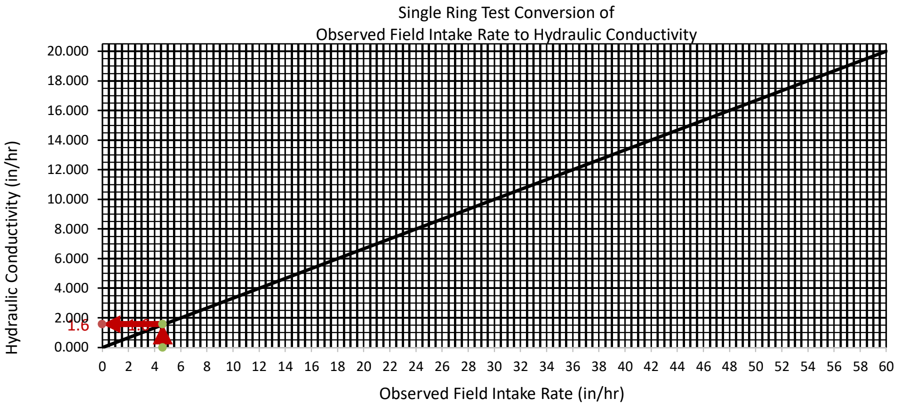
TP-12B

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	x	9:29 AM	3	-	-
		9:41 AM	2	0:11:35.4	695.4
		9:54 AM	1	0:24:51.7	1491.7
		10:04 AM	0	0:34:07.8	2047.8
TEST #1	x	10:05 AM	3	-	-
		10:18 AM	2	0:12:46.5	766.5
TEST #2	x	10:20 AM	3	-	-
		10:33 AM	2	0:12:56.2	776.2
TEST #3	x	10:34 AM	3	-	-
		10:47 AM	2	0:12:58.0	778.0
TEST #4	x	10:48 AM	3	-	-
		11:02 AM	2	0:12:58.6	778.7
TEST #5	x	11:03 AM	3	-	-
		11:15 AM	2	0:12:59.2	779.2
TEST #6					
TEST #7					

Average Observed Field Intake Rate (sec/inch)	779.2
Average Observed Field Intake Rate (inch/hr)	4.6
Hydraulic Conductivity (inch/hr)	**1.6** (see graph)

COORESPONDING PROFILE PIT	**TP-12**
DATE OF INFILTRATION TEST:	**12/2/2022**
WEATHER DURING INFILTRATION TEST:	**35F Cloudy**
EXISTING SURFACE ELEVATION (el):	**53.6**
TEST DEPTH:	**5.5** ft
TEST ELEVATION (el):	**48.1**
APPROXIMATE TOP OF RING (el):	**48.4**
APPROXIMATE TOP OF BOTTOM (el):	**47.9**

🟨	input
⬜	output
🟧	result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

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FIELD SINGLE RING INFILTRATION TEST

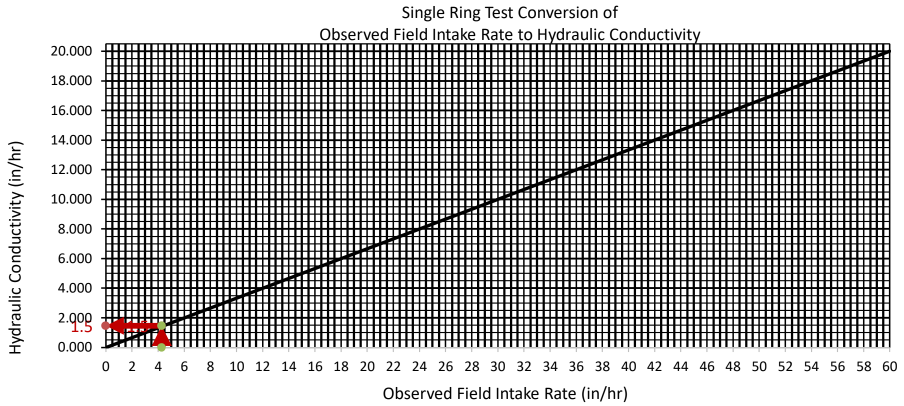
STP-4A

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	X	10:14 AM	3	-	-
		10:22 AM	2	0:08:31.2	511.2
		10:34 AM	1	0:12:03.4	723.4
		10:47 AM	0	0:12:40.5	760.5
TEST #1	X	10:50 AM	3	-	-
		11:03 AM	2	0:13:13.7	793.7
TEST #2	X	11:10 AM	3	-	-
		11:23 AM	2	0:13:14.5	794.5
TEST #3	X	11:26 AM	3	-	-
		11:40 AM	2	0:14:01.4	841.4
TEST #4	X	11:41 AM	3	-	-
		11:55 AM	2	0:14:02.3	842.3
TEST #5	X	12:09 PM	3	-	-
		12:23 PM	2	0:14:02.4	842.4
TEST #6					
TEST #7					

Average Observed Field Intake Rate (sec/inch)	841.4
Average Observed Field Intake Rate (inch/hr)	4.3
Hydraulic Conductivity (inch/hr)	**1.5** (see graph)

COORESPONDING PROFILE PIT	**STP-4**	
DATE OF INFILTRATION TEST:	**1/10/2023**	
WEATHER DURING INFILTRATION TEST:	**40F Cloudy**	
EXISTING SURFACE ELEVATION (el):	**52.1**	
TEST DEPTH:	**6.5**	**ft**
TEST ELEVATION (el):	**45.6**	
APPROXIMATE TOP OF RING (el):	**45.9**	
APPROXIMATE TOP OF BOTTOM (el):	**45.4**	

🟨	input
⬜	output
🟧	result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as “greater than 20 in/hr.” When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as “less than 1 in/hr.”

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

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FIELD SINGLE RING INFILTRATION TEST

STP-5A

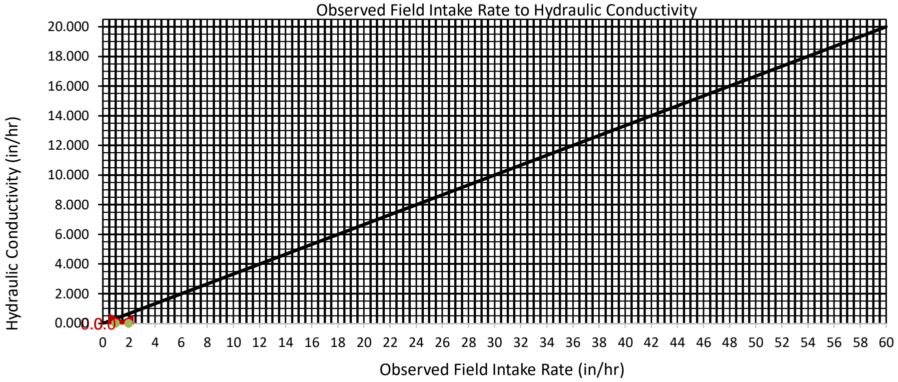
	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	X	10:10 AM	3	-	-
		11:10 AM	2.2	>1	>3600
TEST #1	TEST FAILED PRESOAK				
	TEST TERMINATED				
	SHELBY TUBE COLLECTED				
TEST #2					
TEST #3					
TEST #4					
TEST #5					
TEST #6					
TEST #7					

Average Observed Field Intake Rate (sec/inch)	N/A
Average Observed Field Intake Rate (inch/hr)	N/A
Hydraulic Conductivity (inch/hr)	**N/A** (see graph)

COORESPONDING PROFILE PIT: **STP-5**
DATE OF INFILTRATION TEST: **1/10/2023**
WEATHER DURING INFILTRATION TEST: **40F Cloudy**
EXISTING SURFACE ELEVATION (el): **50.4**
TEST DEPTH: **5.5** ft
TEST ELEVATION (el): **44.9**
APPROXIMATE TOP OF RING (el): **45.2**
APPROXIMATE TOP OF BOTTOM (el): **44.7**

🟨	input
⬜	output
🟧	result

Single Ring Test Conversion of Observed Field Intake Rate to Hydraulic Conductivity



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as “greater than 20 in/hr.” When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as “less than 1 in/hr.”

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

100851001
King Arthur Court
North Brunswick, New Jersey

FIELD SINGLE RING INFILTRATION TEST

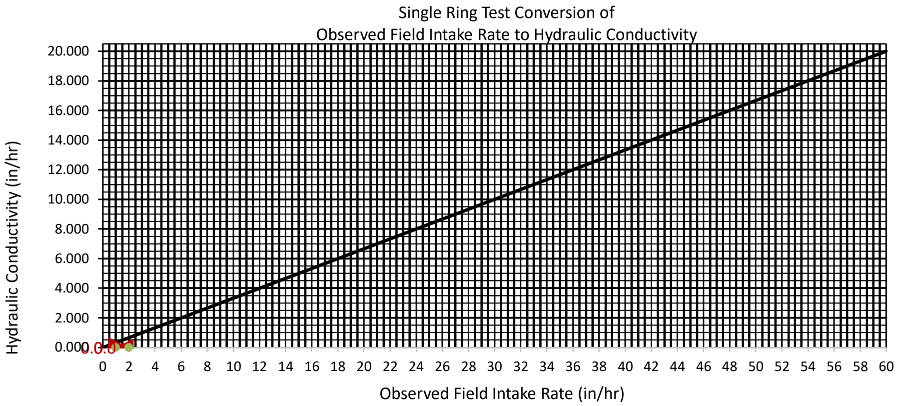
STP-6A

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	X	12:28 PM	3		-
		1:28 PM	2.75	>1	>3600
TEST #1	TEST FAILED PRESOAK				
	TEST TERMINATED				
	SHELBY TUBE COLLECTED				
TEST #2					
TEST #3					
TEST #4					
TEST #5					
TEST #6					
TEST #7					

Average Observed Field Intake Rate (sec/inch)	N/A
Average Observed Field Intake Rate (inch/hr)	N/A
Hydraulic Conductivity (inch/hr)	**N/A** (see graph)

COORESPONDING PROFILE PIT	**STP-6**	
DATE OF INFILTRATION TEST:	**1/10/2023**	
WEATHER DURING INFILTRATION TEST:	**40F Cloudy**	
EXISTING SURFACE ELEVATION (el):	**50.3**	
TEST DEPTH:	**2.5**	**ft**
TEST ELEVATION (el):	**47.8**	
APPROXIMATE TOP OF RING (el):	**48.1**	
APPROXIMATE TOP OF BOTTOM (el):	**47.6**	

🟨	input
🟦	output
🟧	result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

100851001
King Arthur Court
North Brunswick, New Jersey

FIELD SINGLE RING INFILTRATION TEST
STP-6B

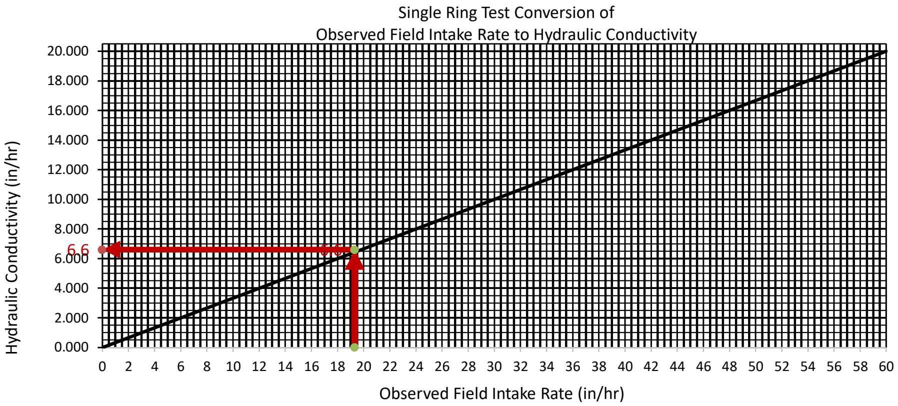
	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	X	9:35 AM	3	-	-
		9:39 AM	2	0:03:32.5	212.5
		9:42 AM	1	0:02:27.1	147.1
		9:45 AM	0	0:03:22.7	202.7
TEST #1	X	9:53 AM	3	-	-
		9:56 AM	2	0:02:50.9	170.9
TEST #2	X	9:59 AM	3	-	-
		10:03 AM	2	0:03:04.5	184.5
TEST #3	X	10:03 AM	3	-	-
		10:06 AM	2	0:03:06.3	186.3
TEST #4	X	10:08 AM	3	-	-
		10:11 AM	2	0:03:07.8	187.8
TEST #5	X	10:14 AM	3	-	-
		10:17 AM	2	0:03:07.3	187.3
TEST #6					
TEST #7					

Average Observed Field Intake Rate (sec/inch)	186.3
Average Observed Field Intake Rate (inch/hr)	19.3
Hydraulic Conductivity (inch/hr)	**6.6**

(see graph)

COORESPONDING PROFILE PIT	**STP-6**
DATE OF INFILTRATION TEST:	**1/10/2023**
WEATHER DURING INFILTRATION TEST:	**40F Cloudy**
EXISTING SURFACE ELEVATION (el):	**50.3**
TEST DEPTH:	**5** ft
TEST ELEVATION (el):	**45.3**
APPROXIMATE TOP OF RING (el):	**45.6**
APPROXIMATE TOP OF BOTTOM (el):	**45.1**

🟨	input
🟦	output
🟧	result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

100851001
King Arthur Court
North Brunswick, New Jersey

FIELD SINGLE RING INFILTRATION TEST
STP-7A

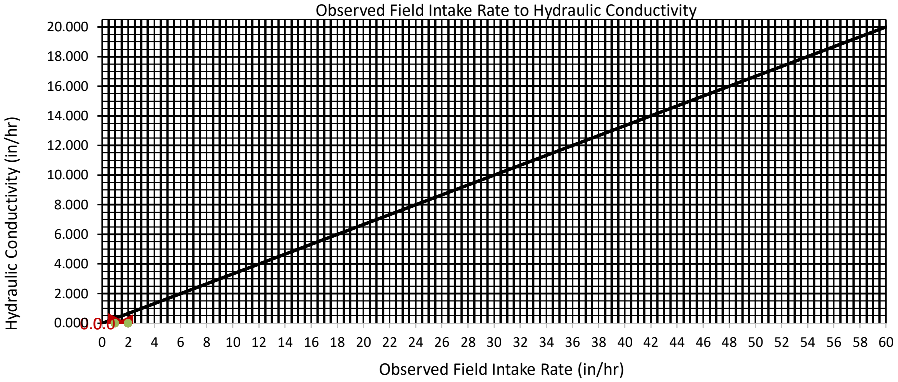
	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	X	10:47 AM	3		-
		11:47 AM	2.75	>1	>3600
TEST #1	TEST FAILED PRESOAK				
	TEST TERMINATED				
	SHELBY TUBE COLLECTED				
TEST #2					
TEST #3					
TEST #4					
TEST #5					
TEST #6					
TEST #7					

Average Observed Field Intake Rate (sec/inch)	N/A
Average Observed Field Intake Rate (inch/hr)	N/A
Hydraulic Conductivity (inch/hr)	**N/A** (see graph)

COORESPONDING PROFILE PIT	**STP-7**
DATE OF INFILTRATION TEST:	**1/10/2023**
WEATHER DURING INFILTRATION TEST:	**40F Cloudy**
EXISTING SURFACE ELEVATION (el):	**49.2**
TEST DEPTH:	**2.5** ft
TEST ELEVATION (el):	**46.7**
APPROXIMATE TOP OF RING (el):	**47.0**
APPROXIMATE TOP OF BOTTOM (el):	**46.5**

🟨	input
🟦	output
🟧	result

Single Ring Test Conversion of
Observed Field Intake Rate to Hydraulic Conductivity



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

100851001
King Arthur Court
North Brunswick, New Jersey

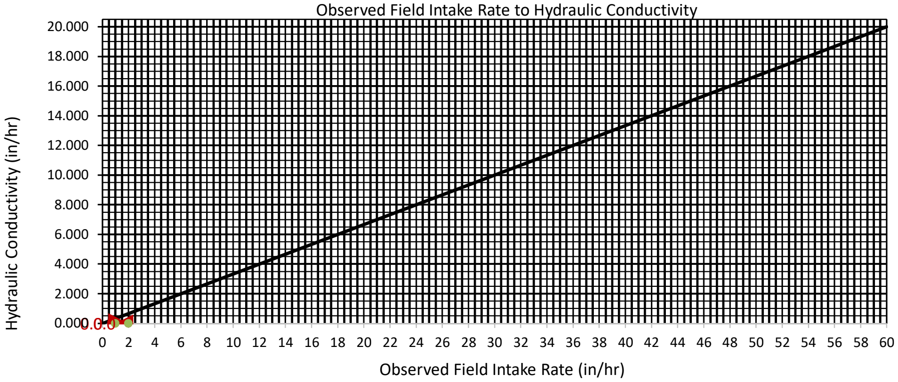
FIELD SINGLE RING INFILTRATION TEST
STP-8A

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	X	7:59 AM	3	-	-
		8:59 AM	2.25	>1	>3600
TEST #1	TEST FAILED PRESOAK				
	TEST TERMINATED				
	SHELBY TUBE COLLECTED				
TEST #2					
TEST #3					
TEST #4					
TEST #5					
TEST #6					
TEST #7					

COORESPONDING PROFILE PIT:	**STP-8**
DATE OF INFILTRATION TEST:	**1/10/2023**
WEATHER DURING INFILTRATION TEST:	**40F Cloudy**
EXISTING SURFACE ELEVATION (el):	**49.6**
TEST DEPTH:	**1** ft
TEST ELEVATION (el):	**48.6**
APPROXIMATE TOP OF RING (el):	**48.9**
APPROXIMATE TOP OF BOTTOM (el):	**48.4**

🟨 input
⬜ output
🟧 result

Single Ring Test Conversion of
Observed Field Intake Rate to Hydraulic Conductivity



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

Average Observed Field Intake Rate (sec/inch)	N/A
Average Observed Field Intake Rate (inch/hr)	N/A
Hydraulic Conductivity (inch/hr)	**N/A** (see graph)

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

100851001
King Arthur Court
North Brunswick, New Jersey

FIELD SINGLE RING INFILTRATION TEST

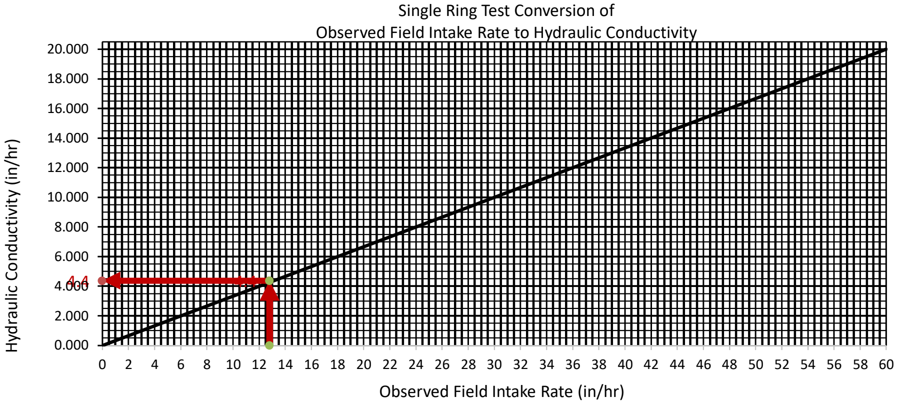
STP-8B

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	X	8:10 AM	3	-	-
		8:14 AM	2	0:03:34.9	214.9
		8:18 AM	1	0:04:23.3	263.3
		8:22 AM	0	0:04:18.7	258.7
TEST #1	X	8:22 AM	3	-	-
		8:27 AM	2	0:04:31.8	271.8
TEST #2	X	8:27 AM	3	-	-
		8:32 AM	2	0:04:39.7	279.7
TEST #3	X	8:32 AM	3	-	-
		8:37 AM	2	0:04:41.2	281.2
TEST #4	X	8:37 AM	3	-	-
		8:42 AM	2	0:04:41.4	281.4
TEST #5					
TEST #6					
TEST #7					

Average Observed Field Intake Rate (sec/inch)	281.2
Average Observed Field Intake Rate (inch/hr)	12.8
Hydraulic Conductivity (inch/hr)	**4.4** (see graph)

COORESPONDING PROFILE PIT	**STP-8**	
DATE OF INFILTRATION TEST:	**1/10/2023**	
WEATHER DURING INFILTRATION TEST:	**40F Cloudy**	
EXISTING SURFACE ELEVATION (el):	**49.6**	
TEST DEPTH:	**5**	**ft**
TEST ELEVATION (el):	**44.6**	
APPROXIMATE TOP OF RING (el):	**44.9**	
APPROXIMATE TOP OF BOTTOM (el):	**44.4**	

🟨 input
⬜ output
🟧 result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

APPENDIX D

Laboratory Testing Results

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Letter of Transmittal

Date: 12-14-22 Job No.: 869 Lab Log: 22-2147

Attention: Kristen Shetler
Langan Engineering & Environmental Services
300 Kimball Drive, 4th Floor
Parsippany, NJ 07054

CC: Arthur Roesler

Re: Silver Line Drive, North Brunswick, NJ
Proj. No. 100851001

Sample(s) ID: **TP-1 ST-1 thru TP-12 S-3** (9 samples)

Dear Ms. Shetler,

Please find attached results for the samples referenced above. The following lab testing was performed:

- ASTM D422 Sieve & Hydrometer Analysis (9 tests)
- ASTM D2216 Moisture Content (9 tests)
- Tube Permeameter (3 tests)

Regards,
RSA Geolab, LLC

Remarks: If you have any questions, please call 908-964-0786.

Signed:

Dr. Raza S. Ahmed
President RSA Geolab, LLC

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

MOISTURE CONTENT (ASTM D2216)

Project: Silver Line Drive
North Brunswick, NJ

Project #: 869

Client: Langan Eng. & Env. Svcs., Inc.
Project#100851001

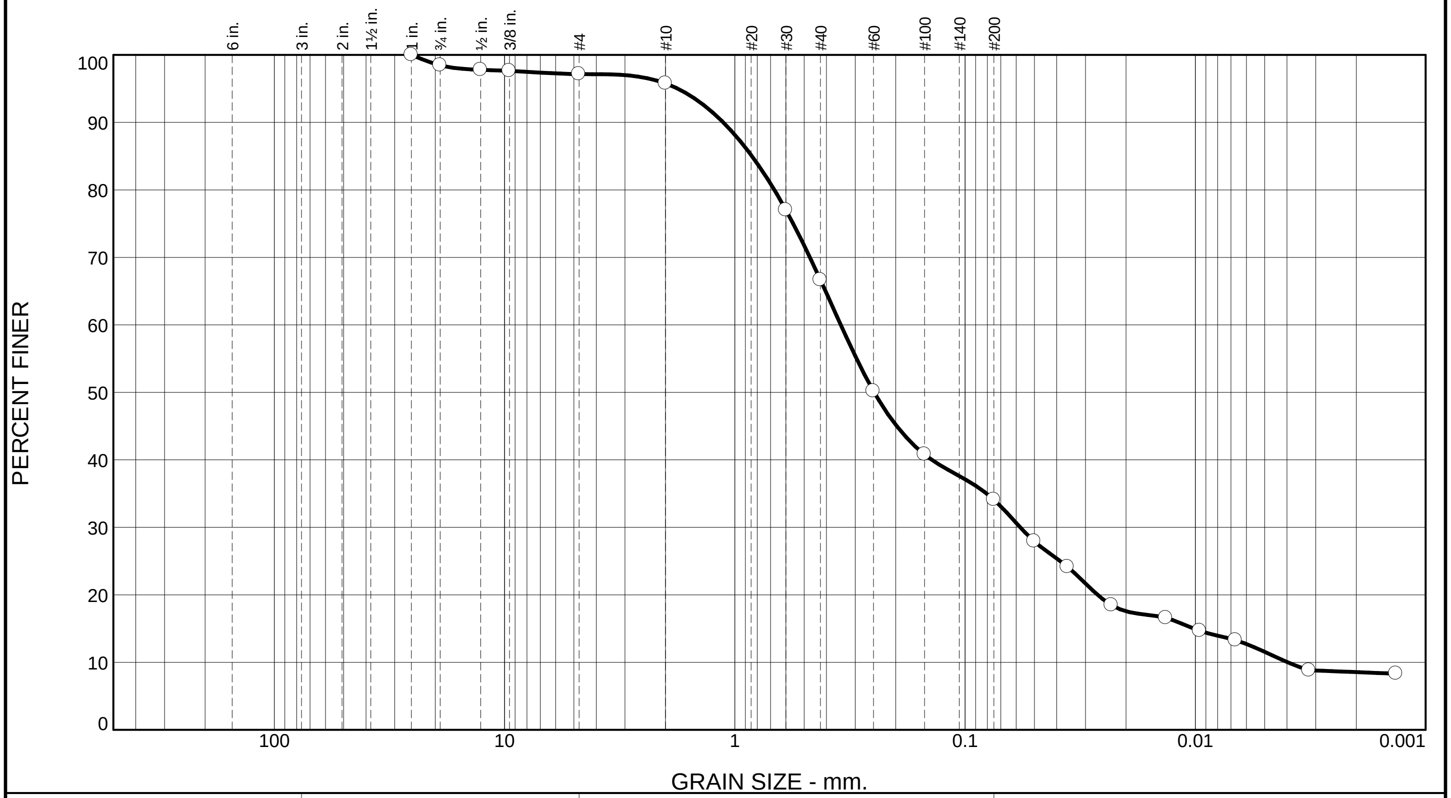
Date: 12-14-22

HOLE #/ SAMPLE #	TP-1 ST-1	TP-3 ST-1	TP-4 ST-1	TP-2 S-3	TP-11 S-2	TP-11 S-3
DEPTH	6'	5'	6'	4-5'	3-4'	5-6'
WET WGT. + TARE (gms.)	942.2	1090.2	1025.0	821.9	793.1	1084.1
DRY WGT. + TARE (gms.)	844.7	938.8	831.9	790.5	730.7	1056.2
WGT. WATER (gms.)	97.5	151.4	193.1	31.4	62.4	27.9
TARE (gms.)	98.9	98.5	98.0	87.3	86.9	87.2
DRY WGT. (gms.)	745.8	840.3	733.9	703.2	643.8	969.0
MOISTURE CONTENT (%)	**13.1**	**18.0**	**26.3**	**4.5**	**9.7**	**2.9**

HOLE #/ SAMPLE #	TP-12 S-2	TP-12 S-3 regular	TP-12 S-3 clay			
DEPTH	2-3'	6-7'	6-7'			
WET WGT. + TARE (gms.)	966.2	1046.5	895.3			
DRY WGT. + TARE (gms.)	871.8	1007.8	793.3			
WGT. WATER (gms.)	94.4	38.7	102.0			
TARE (gms.)	87.0	86.8	87.8			
DRY WGT. (gms.)	784.8	921.0	705.5			
MOISTURE CONTENT (%)	**12.0**	**4.2**	**14.5**			

Performed by: MF Entered by: KH Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.5	1.3	1.4	29.1	32.6	22.5	11.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.5		
.5	97.8		
.375	97.6		
#4	97.2		
#10	95.8		
#30	77.0		
#40	66.7		
#60	50.2		
#100	40.8		
#200	34.1		

* (no specification provided)

Material Description

Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1224	D_{85}= 0.8428	D_{60}= 0.3467
D_{50}= 0.2482	D_{30}= 0.0576	D_{15}= 0.0101
D_{10}= 0.0040	C_u= 87.31	C_c= 2.41

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-1 ST-1 6'

Date: 12-14-22

RSA Geolab

Union, New Jersey

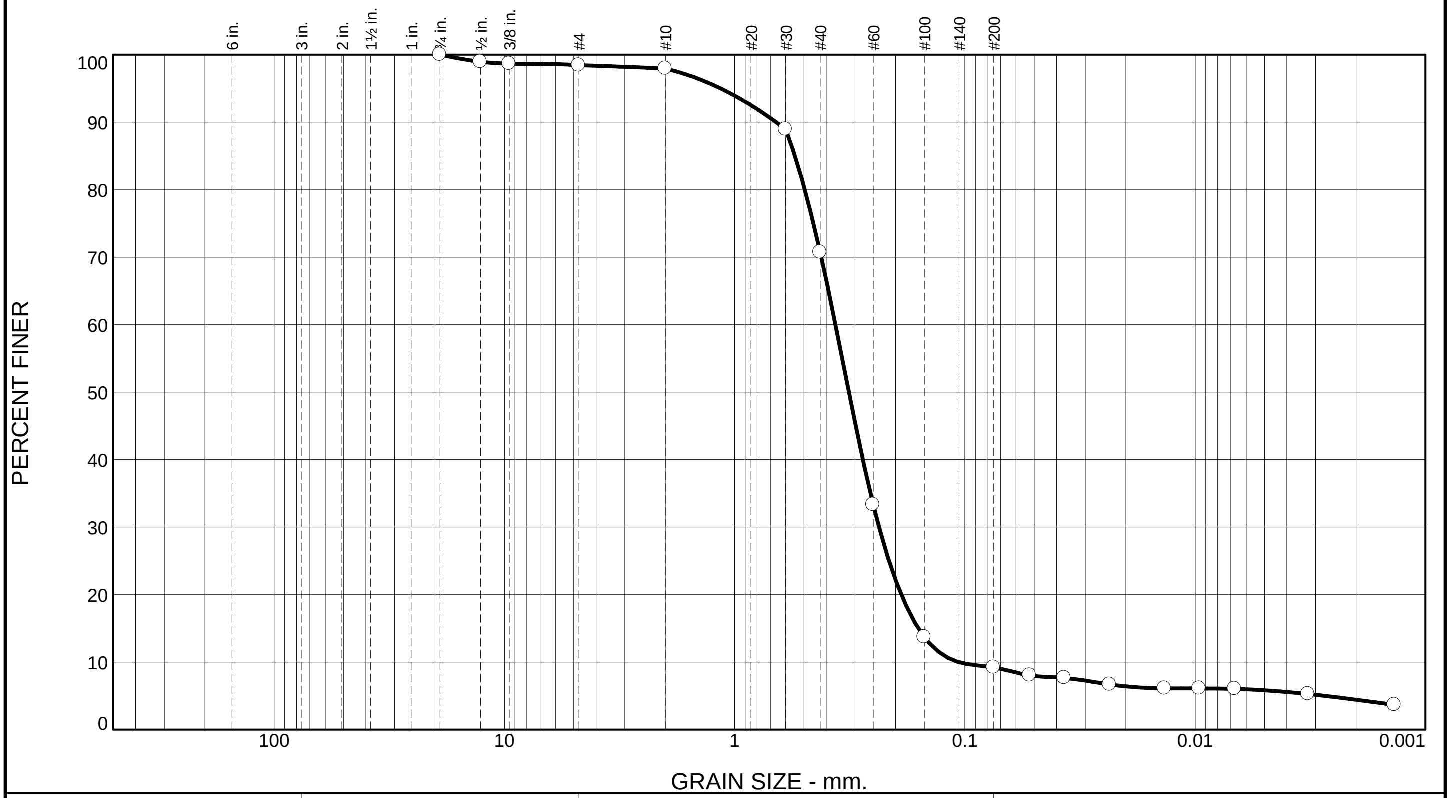
Client: Langan Engineering

Project: Silver Line Drive, North Brunswick, NJ
Project#100851001

Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.6	0.5	27.2	61.5	3.4	5.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	98.9		
.375	98.7		
#4	98.4		
#10	97.9		
#30	88.9		
#40	70.7		
#60	33.3		
#100	13.7		
#200	9.2		

* (no specification provided)

Material Description

Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6604	D_{85}= 0.5472	D_{60}= 0.3650
D_{50}= 0.3190	D_{30}= 0.2360	D_{15}= 0.1593
D_{10}= 0.1065	C_u= 3.43	C_c= 1.43

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-2 S-3 4-5'

Date: 12-14-22

RSA Geolab

Union, New Jersey

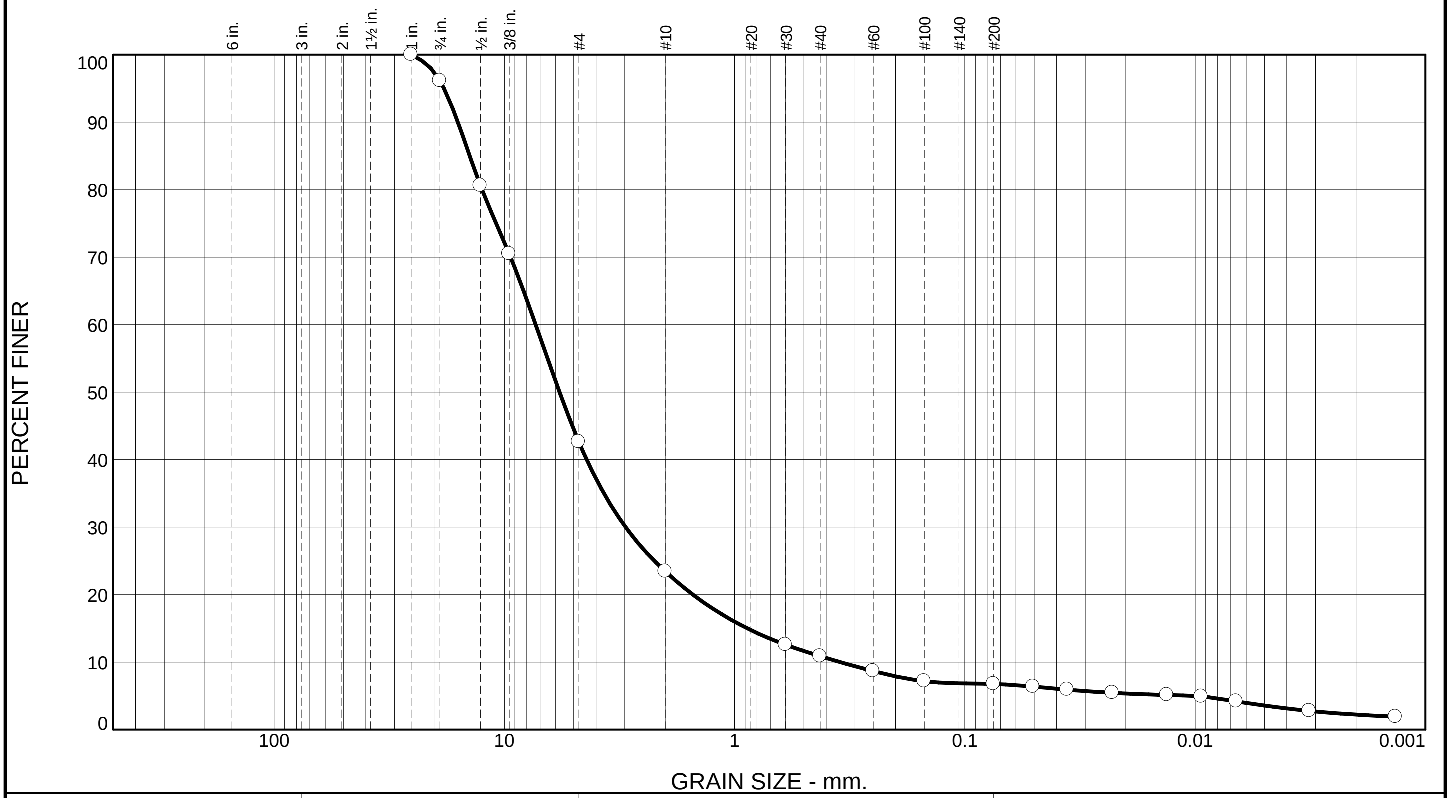
Client: Langan Engineering

Project: Silver Line Drive, North Brunswick, NJ
Project#100851001

Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.9	53.5	19.2	12.5	4.2	3.1	3.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.1		
.5	80.6		
.375	70.5		
#4	42.6		
#10	23.4		
#30	12.6		
#40	10.9		
#60	8.7		
#100	7.2		
#200	6.7		

* (no specification provided)

Material Description

Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 15.9170 D_{85}= 14.1348 D_{60}= 7.3116
D_{50}= 5.7581 D_{30}= 2.9763 D_{15}= 0.8810
D_{10}= 0.3483 C_u= 20.99 C_c= 3.48

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-3 ST-1 5'

Date: 12-14-22

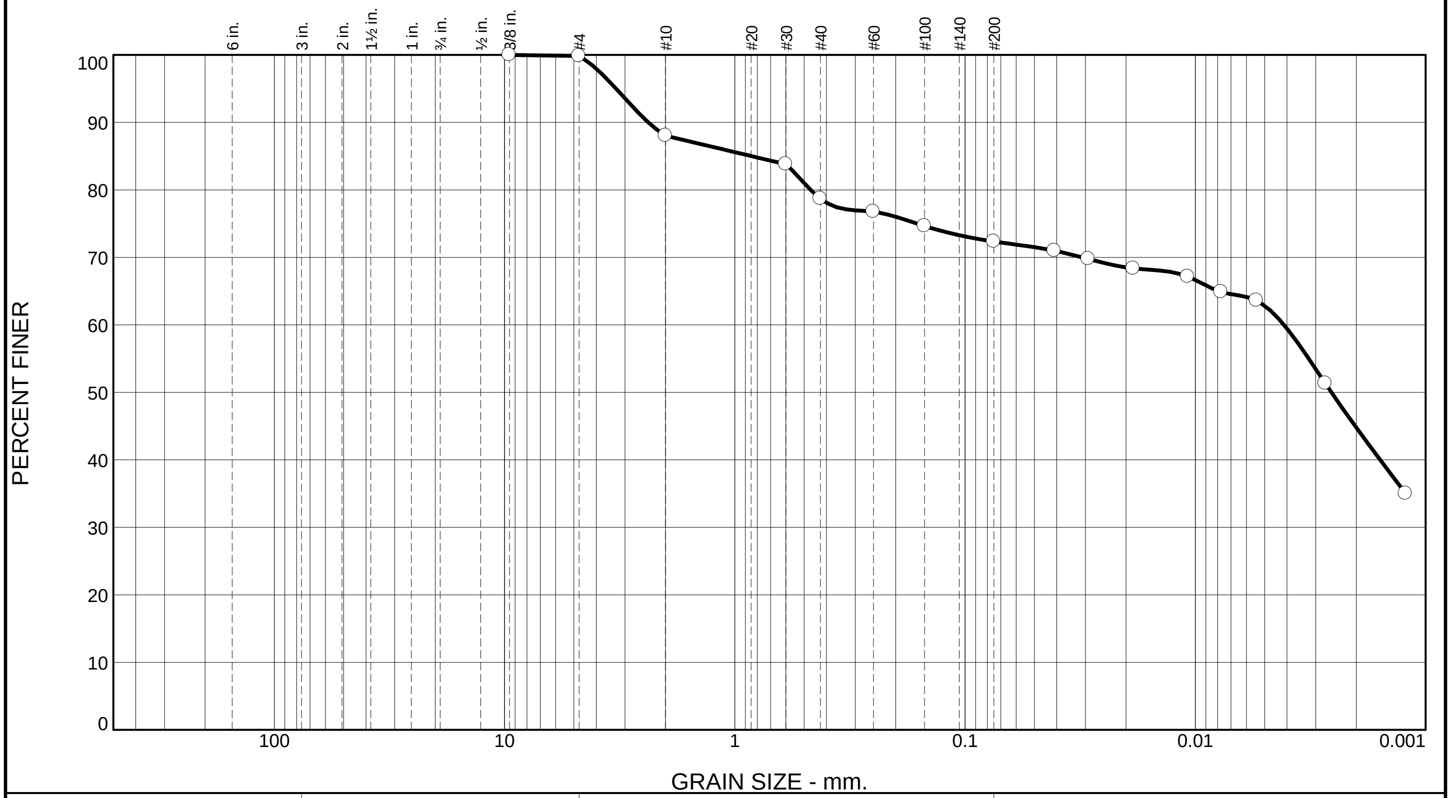
RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Silver Line Drive, North Brunswick, NJ
Project#100851001
Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	11.9	9.3	6.3	9.6	62.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	88.0		
#30	83.8		
#40	78.7		
#60	76.8		
#100	74.6		
#200	72.4		

* (no specification provided)

Material Description

Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.3755 D_{85}= 0.8451 D_{60}= 0.0041
D_{50}= 0.0026 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Shale sample - dissolves when wet

Sample Number: TP-4 ST-1 6'

Date: 12-14-22

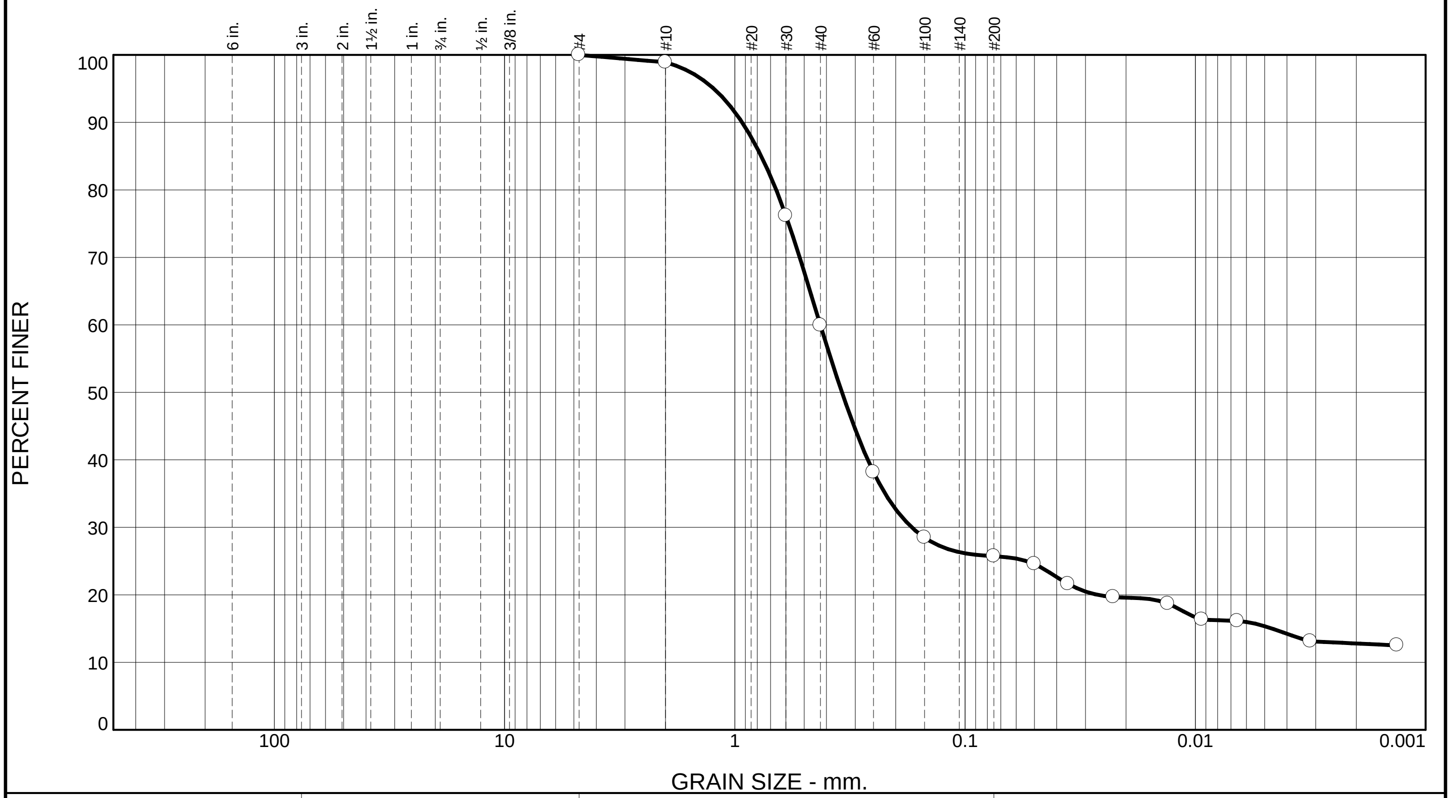
RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Silver Line Drive, North Brunswick, NJ
Project#100851001
Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.1	39.0	34.2	10.4	15.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.9		
#30	76.2		
#40	59.9		
#60	38.2		
#100	28.5		
#200	25.7		

* (no specification provided)

Material Description

Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}=	0.9297	D_{85}=	0.7679	D_{60}=	0.4255
D_{50}=	0.3427	D_{30}=	0.1705	D_{15}=	0.0046
D_{10}=		C_u=		C_c=	

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-11 S-2 3-4'

Date: 12-14-22

RSA Geolab

Union, New Jersey

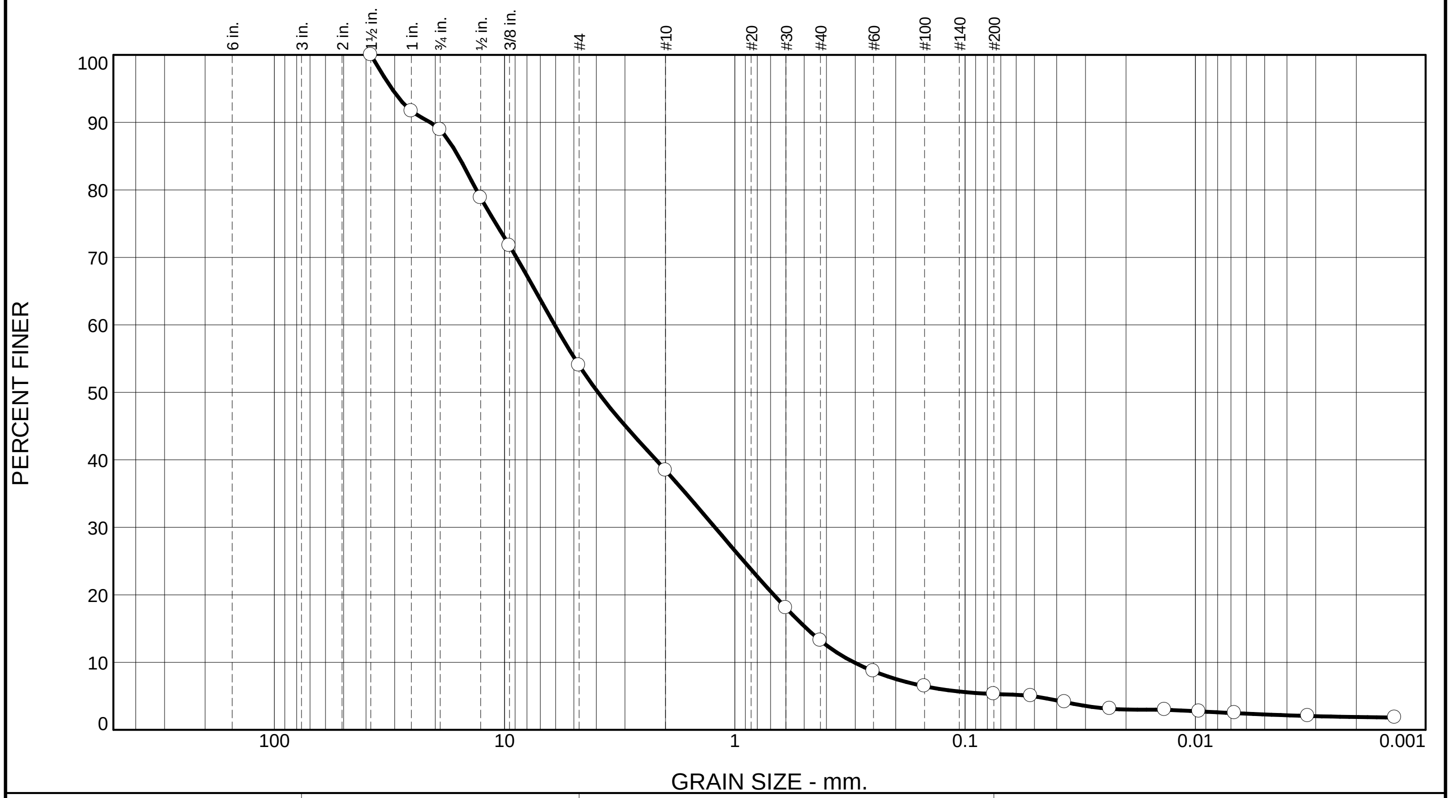
Client: Langan Engineering

Project: Silver Line Drive, North Brunswick, NJ
Project#100851001

Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.1	34.9	15.6	25.2	7.9	3.0	2.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	91.7		
.75	88.9		
.5	78.8		
.375	71.7		
#4	54.0		
#10	38.4		
#30	18.1		
#40	13.2		
#60	8.7		
#100	6.5		
#200	5.3		

* (no specification provided)

Material Description

Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 20.9787	D_{85}= 15.8780	D_{60}= 6.0624
D_{50}= 3.9291	D_{30}= 1.2204	D_{15}= 0.4876
D_{10}= 0.3039	C_u= 19.95	C_c= 0.81

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-11 S-3 5-6'

Date: 12-14-22

RSA Geolab

Union, New Jersey

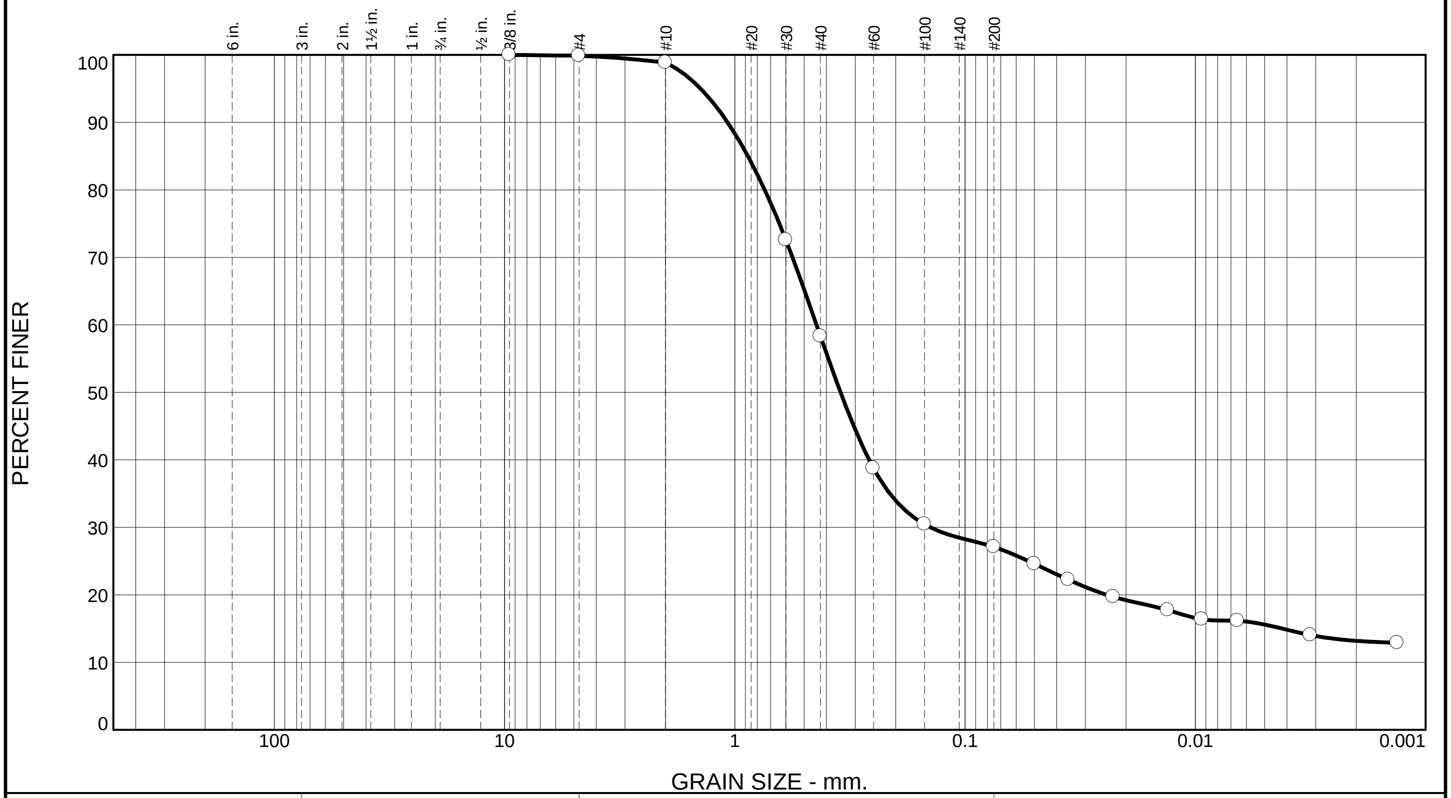
Client: Langan Engineering

Project: Silver Line Drive, North Brunswick, NJ
Project#100851001

Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	1.0	40.6	31.2	11.5	15.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	98.9		
#30	72.6		
#40	58.3		
#60	38.8		
#100	30.5		
#200	27.1		

* (no specification provided)

Material Description

Dark Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.0750 D_{85}= 0.8776 D_{60}= 0.4420
D_{50}= 0.3474 D_{30}= 0.1416 D_{15}= 0.0042
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-12 S-2 2-3'

Date: 12-14-22

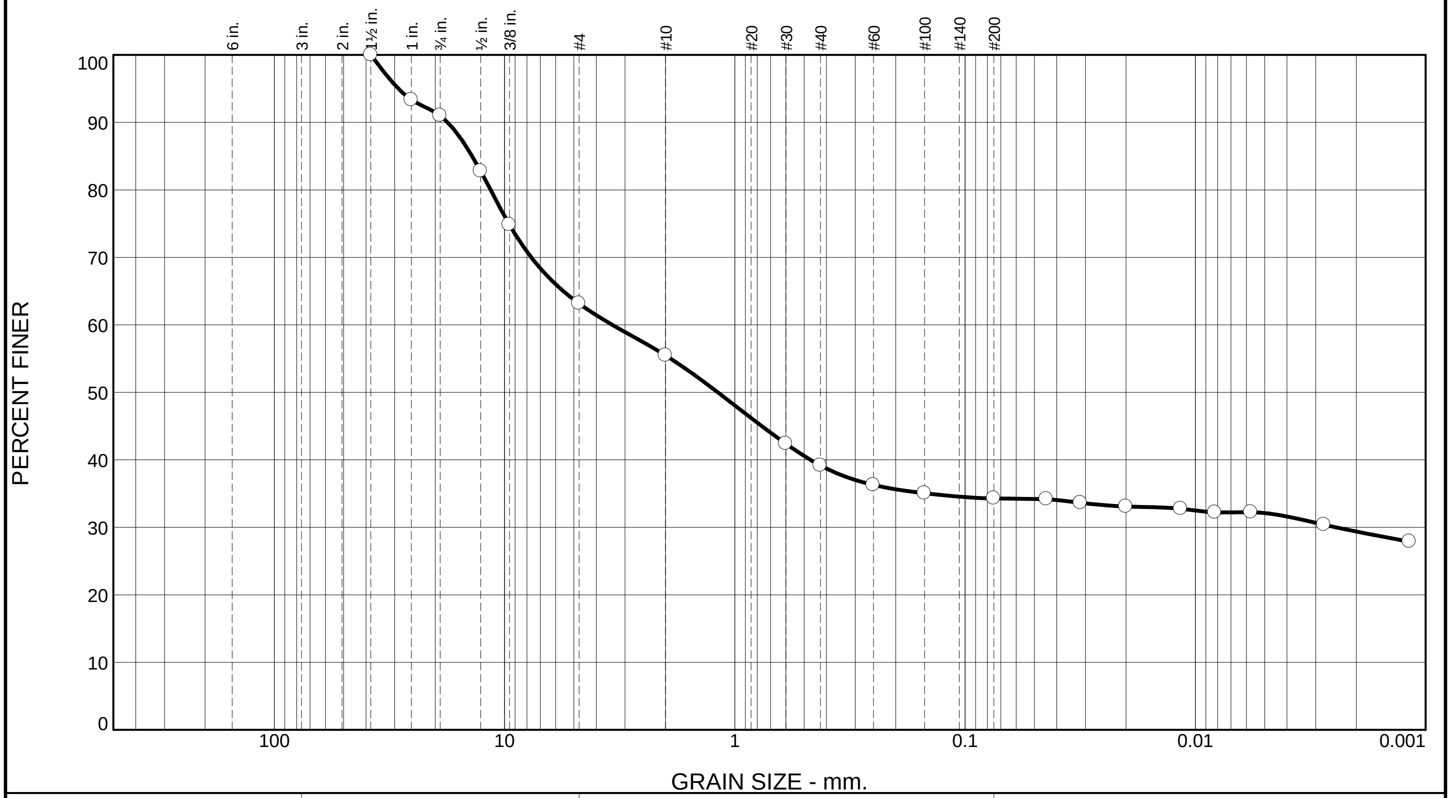
RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Silver Line Drive, North Brunswick, NJ
Project#100851001
Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.0	27.8	7.7	16.3	4.9	2.2	32.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	93.3		
.75	91.0		
.5	82.8		
.375	74.8		
#4	63.2		
#10	55.5		
#30	42.4		
#40	39.2		
#60	36.3		
#100	35.1		
#200	34.3		

* (no specification provided)

Material Description

White, Red

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 17.6522 D_{85}= 13.8377 D_{60}= 3.4055

D_{50}= 1.1852 D_{30}= 0.0024 D_{15}=

D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Location: TP-12 S-3 clay 6-7'

Date: 12-14-22

RSA Geolab

Union, New Jersey

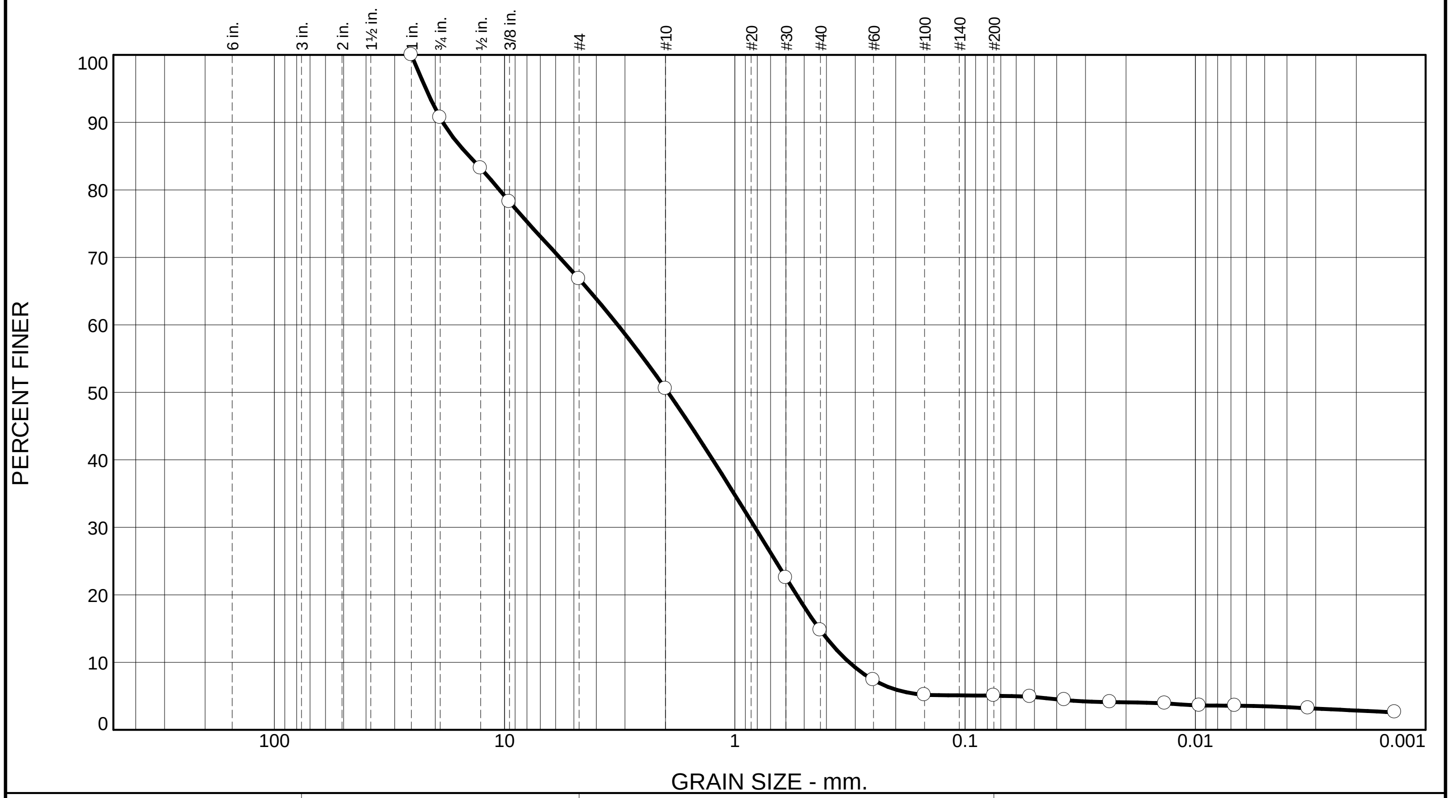
Client: Langan Engineering

Project: Silver Line Drive, North Brunswick, NJ
Project#100851001

Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.3	23.9	16.3	35.7	9.7	1.6	3.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	90.7		
.5	83.2		
.375	78.2		
#4	66.8		
#10	50.5		
#30	22.5		
#40	14.8		
#60	7.4		
#100	5.2		
#200	5.1		

* (no specification provided)

Material Description

Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 18.5260 D_{85}= 14.2362 D_{60}= 3.2269
D_{50}= 1.9504 D_{30}= 0.8179 D_{15}= 0.4302
D_{10}= 0.3187 C_u= 10.12 C_c= 0.65

Classification

USCS= AASHTO=

Remarks

Location: TP-12 S-3 regular 6-7'

Date: 12-14-22

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Silver Line Drive, North Brunswick, NJ
Project#100851001
Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Shelby Tube Hydraulic Conductivity Test
ASTM D2434 (For Calculations)

Client : Langan Environmental

Project : Silver Line Drive, North Brunswick, NJ
Proj. No. 100851001

Sample : TP-1, ST-1, 6'

Job No. : 869

Lab Log No. : L#22-2147

Date :12-14-2022

Average Length of Soil Core	4.232	in.
Diameter of Shelby Tube	2.875	in.
Diameter of Standpipe	0.250	in.

Initial Weight of Soil Core	843.3	grams
Final Weight of Soil Core	860.1	grams
Dry Weight of Soil Core	745.8	grams
Initial Moisture Content	13.07%	
Final Moisture Content	15.33%	
Wet Density, Initial	116.93	PCF
Wet Density, Final	119.27	PCF
Dry Density	103.41	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity (cm/sec)
1	39.7	22.2	17.5	220.0	2.15E-04
2	38.2	23.4	14.8	205.0	1.94E-04
3	38.6	21.5	17.1	260.0	1.83E-04

Average Hydraulic Conductivity	**1.97E-04**	**cm/sec**
	2.80E-01	**in/hr**

Remarks:

1. Test Conducted using Deaired Tap Water at Standard Temp. (72 deg F)
2. 100% Saturation Assumed

Tested By : MF/AO

Checked By : KP

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Shelby Tube Hydraulic Conductivity Test

ASTM D2434 (For Calculations)

Client : Langan Environmental
Project : Silver Line Drive, North Brunswick, NJ
Proj. No. 100851001
Sample : TP-3, ST-1, 5'

Job No. : 869
Lab Log No. : L#22-2147
Date :12-14-2022

Average Length of Soil Core	4.432	in.
Diameter of Shelby Tube	2.875	in.
Diameter of Standpipe	0.250	in.

Initial Weight of Soil Core	991.7	grams
Final Weight of Soil Core	1006.2	grams
Dry Weight of Soil Core	840.3	grams
Initial Moisture Content	18.02%	
Final Moisture Content	19.74%	
Wet Density, Initial	131.31	PCF
Wet Density, Final	133.23	PCF
Dry Density	111.26	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity (cm/sec)
1	40.6	20.1	20.5	5.0	1.20E-02
2	40.4	19.8	20.6	5.0	1.21E-02
3	40.0	19.9	20.1	5.0	1.19E-02

Average Hydraulic Conductivity	**1.20E-02**	**cm/sec**
	1.70E+01	**in/hr**

Remarks:

1. Test Conducted using Deaired Tap Water at Standard Temp. (72 deg F)
2. 100% Saturation Assumed; Contains Shale

Tested By : MF/AO
Checked By : KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Shelby Tube Hydraulic Conductivity Test
ASTM D2434 (For Calculations)

Client : Langan Environmental
Project : Silver Line Drive, North Brunswick, NJ
Proj. No. 100851001
Sample : TP-4, ST-1, 6'

Job No. : 869
Lab Log No. : L#22-2147
Date :12-14-2022

Average Length of Soil Core	4.286	in.
Diameter of Shelby Tube	2.875	in.
Diameter of Standpipe	0.250	in.

Initial Weight of Soil Core	927.0	grams
Final Weight of Soil Core	942.5	grams
Dry Weight of Soil Core	733.9	grams
Initial Moisture Content	26.31%	
Final Moisture Content	28.42%	
Wet Density, Initial	126.92	PCF
Wet Density, Final	129.05	PCF
Dry Density	100.49	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity (cm/sec)
1	40.2	21.3	18.9	20.0	2.61E-03
2	38.6	21.4	17.2	20.0	2.43E-03
3	38.1	20.8	17.3	20.0	2.49E-03

Average Hydraulic Conductivity	**2.51E-03**	**cm/sec**
	3.56E+00	**in/hr**

Remarks:

1. Test Conducted using Deaired Tap Water at Standard Temp. (72 deg F)
2. 100% Saturation Assumed; Contains Shale

Tested By : MF/AO
Checked By : KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Letter of Transmittal

Date: 1-31-23 Job No.: 869 Lab Log: 23-2266

Attention:
Arthur Roesler
Langan Engineering & Environmental Services
300 Kimball Drive, 4th Floor
Parsippany, NJ 07054

CC: Kristen Shetler

Re:
Silver Line Drive, North Brunswick, NJ
Proj. No. 100851001

Sample(s) ID: **STP-4 S-5 thru STP-8 S-3** (7 samples)

Dear Mr. Roesler,

Please find attached results for the samples referenced above. The following lab testing was performed:

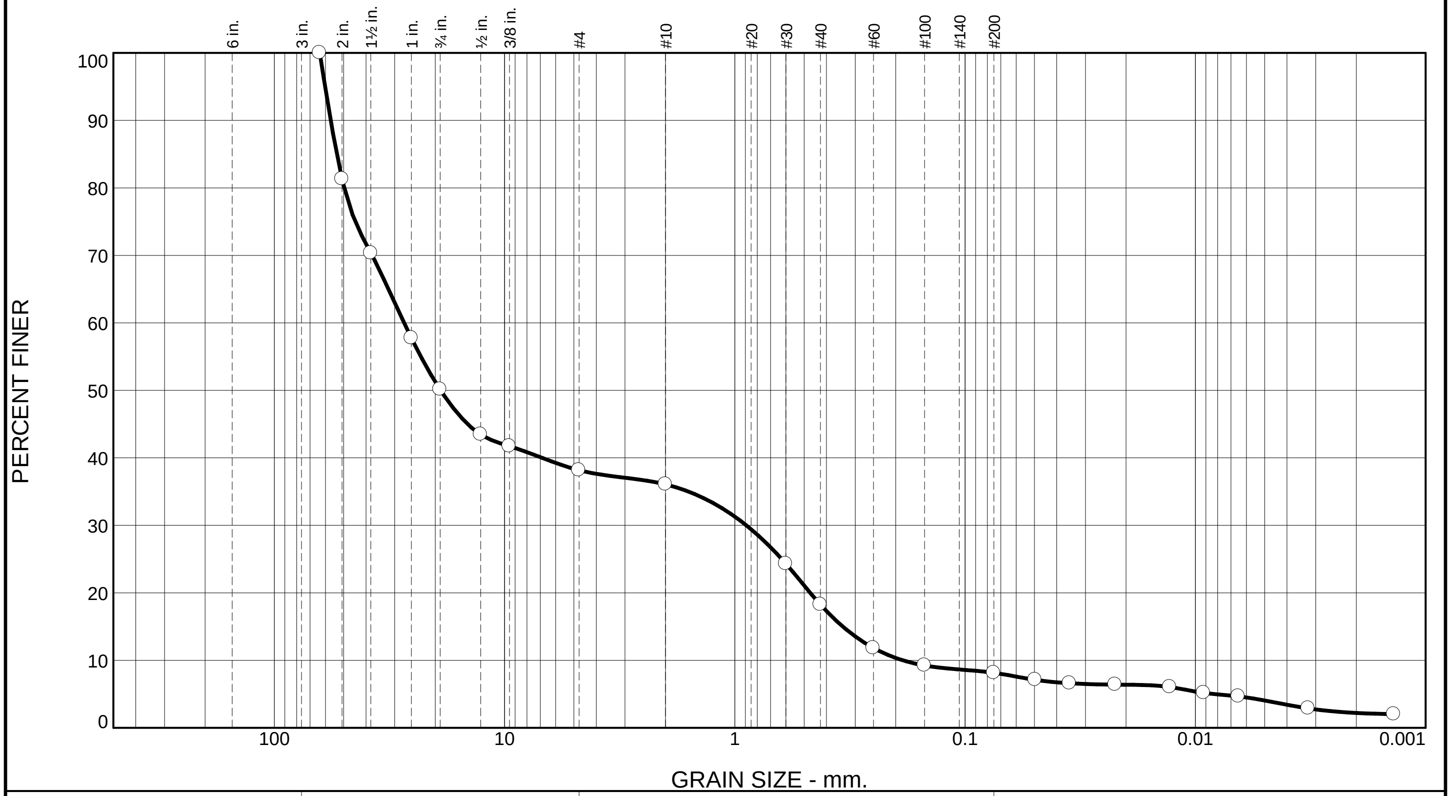
- ASTM D422 Sieve & Hydrometer Analysis

Regards,
RSA Geolab, LLC

Remarks: If you have any questions, please call 908-964-0786.

Signed: ____________________
Dr. Raza S. Ahmed
President RSA Geolab, LLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	49.9	11.9	2.1	17.9	10.0	4.2	4.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2	81.3		
1.5	70.3		
1	57.7		
.75	50.1		
.5	43.4		
.375	41.7		
#4	38.2		
#10	36.1		
#30	24.3		
#40	18.2		
#60	11.8		
#100	9.2		
#200	8.2		

* (no specification provided)

Material Description

Dark Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 56.9309	D_{85}= 53.5515	D_{60}= 27.3262
D_{50}= 18.9462	D_{30}= 0.8915	D_{15}= 0.3397
D_{10}= 0.1864	C_u= 146.57	C_c= 0.16

Classification

USCS= AASHTO=

Remarks

Sample Number: STP-4 S-5 6-7'

Date: 1-31-23

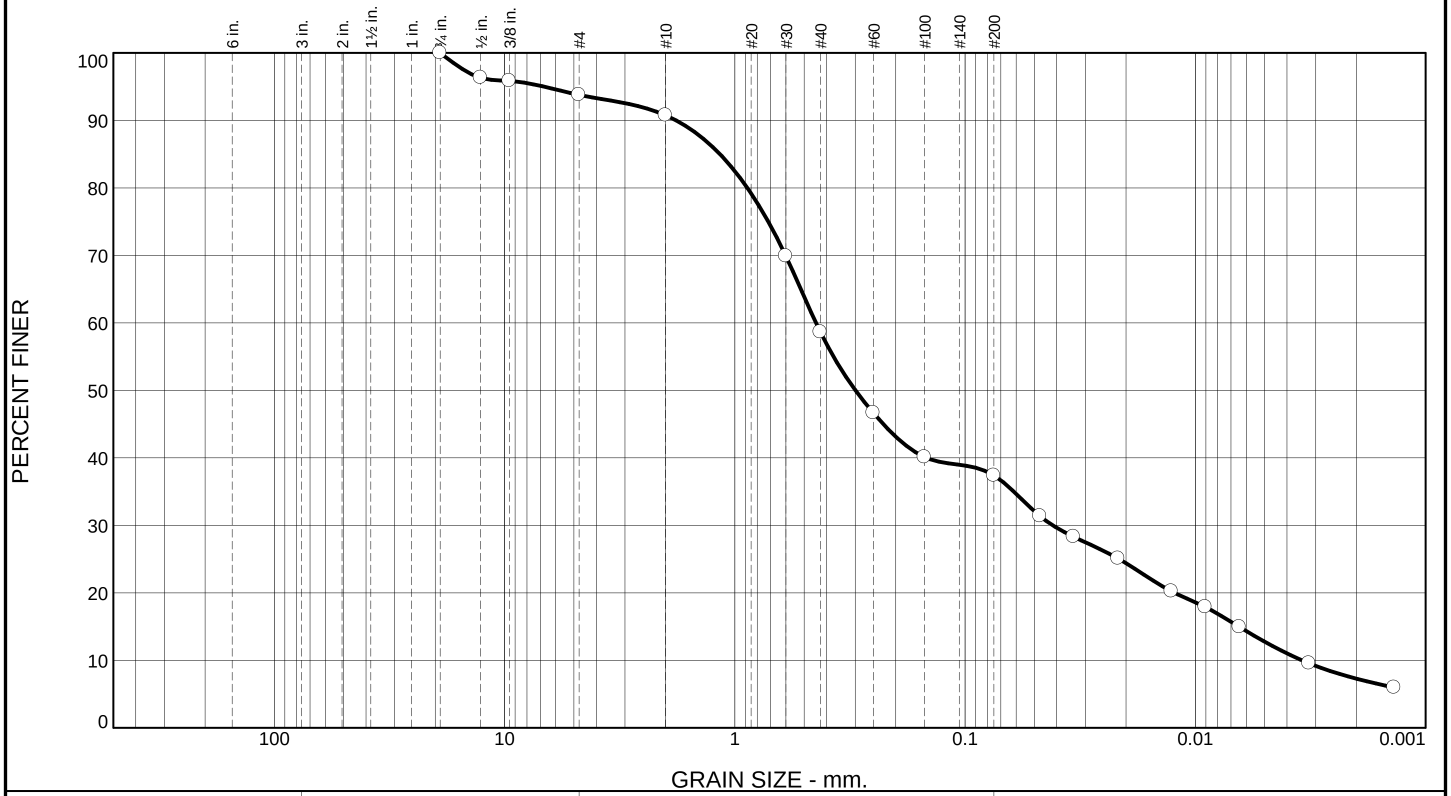
RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Silver Line Drive, North Brunswick, NJ
Proj.#100851001
Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.2	3.0	32.2	21.2	24.6	12.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	96.3		
.375	95.8		
#4	93.8		
#10	90.8		
#30	69.9		
#40	58.6		
#60	46.6		
#100	40.1		
#200	37.4		

* (no specification provided)

Material Description

Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.7989	D_{85}= 1.1604	D_{60}= 0.4443
D_{50}= 0.2993	D_{30}= 0.0416	D_{15}= 0.0065
D_{10}= 0.0034	C_u= 129.01	C_c= 1.13

Classification

USCS= AASHTO=

Remarks

Sample Number: STP-5 S-4 5.5-6.5'

Date: 1-31-23

RSA Geolab

Union, New Jersey

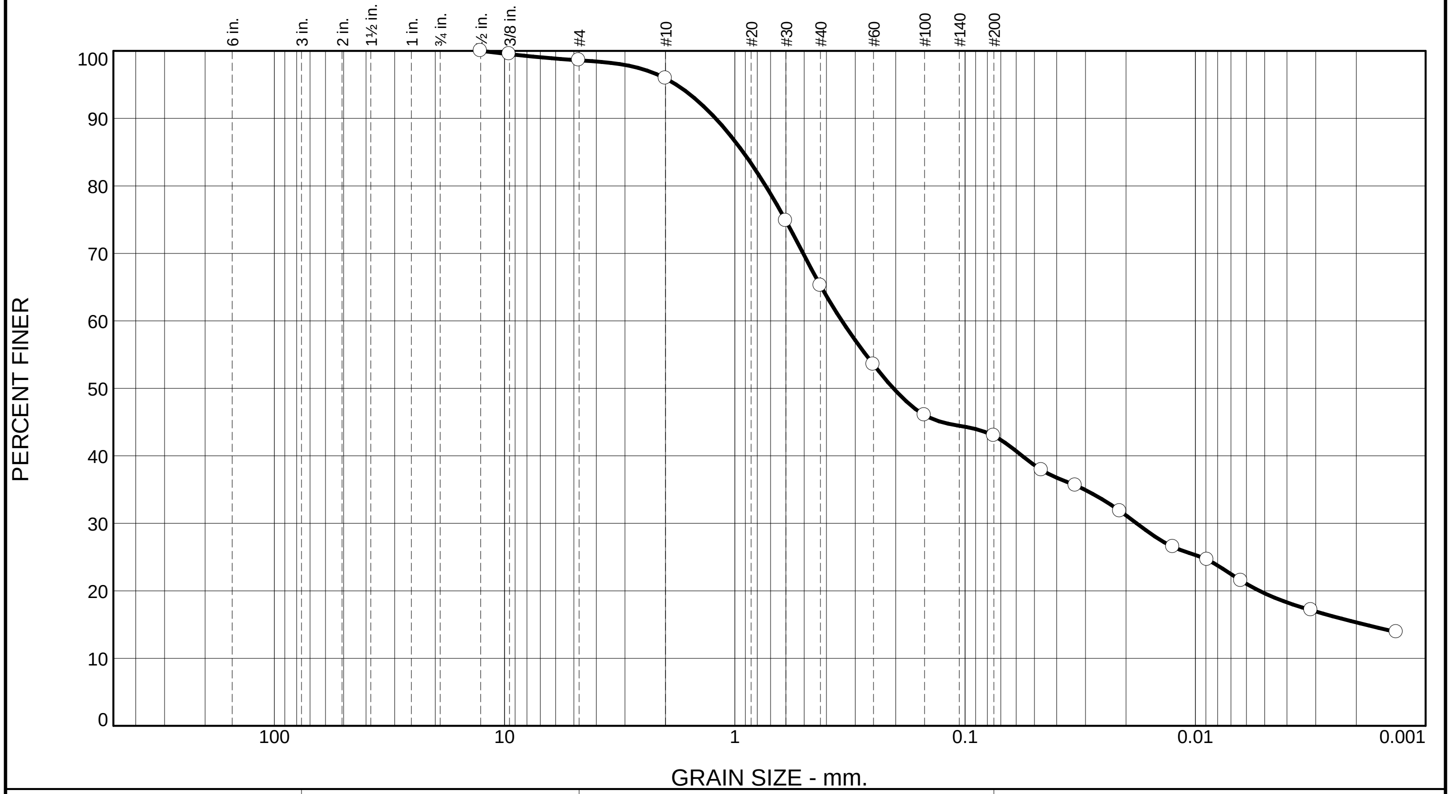
Client: Langan Engineering

Project: Silver Line Drive, North Brunswick, NJ
Proj.#100851001

Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.4	2.7	30.7	22.2	23.4	19.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	99.5		
#4	98.6		
#10	95.9		
#30	74.8		
#40	65.2		
#60	53.5		
#100	46.0		
#200	43.0		

* (no specification provided)

Material Description

Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}=	1.2119	D_{85}=	0.9202	D_{60}=	0.3429
D_{50}=	0.2047	D_{30}=	0.0180	D_{15}=	0.0018
D_{10}=		C_u=		C_c=	

Classification

USCS= AASHTO=

Remarks

Sample Number: STP-6 S-3 2-3'

Date: 1-31-23

RSA Geolab

Union, New Jersey

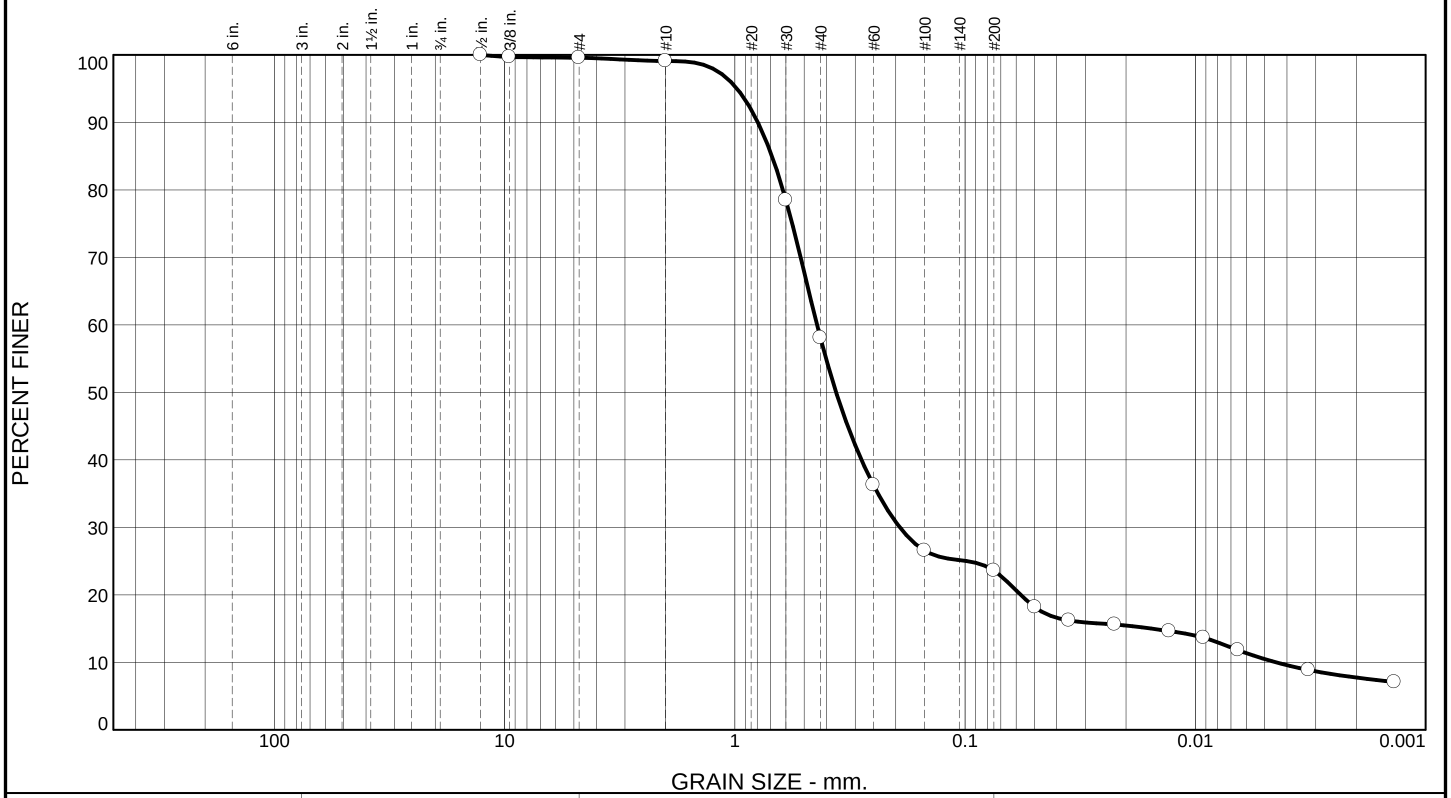
Client: Langan Engineering

Project: Silver Line Drive, North Brunswick, NJ
Proj.#100851001

Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.5	41.0	34.5	13.1	10.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	99.7		
#4	99.6		
#10	99.1		
#30	78.5		
#40	58.1		
#60	36.3		
#100	26.6		
#200	23.6		

* (no specification provided)

Material Description

Dark Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7938	D_{85}= 0.6898	D_{60}= 0.4395
D_{50}= 0.3631	D_{30}= 0.1922	D_{15}= 0.0155
D_{10}= 0.0045	C_u= 98.55	C_c= 18.84

Classification

USCS= AASHTO=

Remarks

Sample Number: STP-6 S-4 4-5'

Date: 1-31-23

RSA Geolab

Union, New Jersey

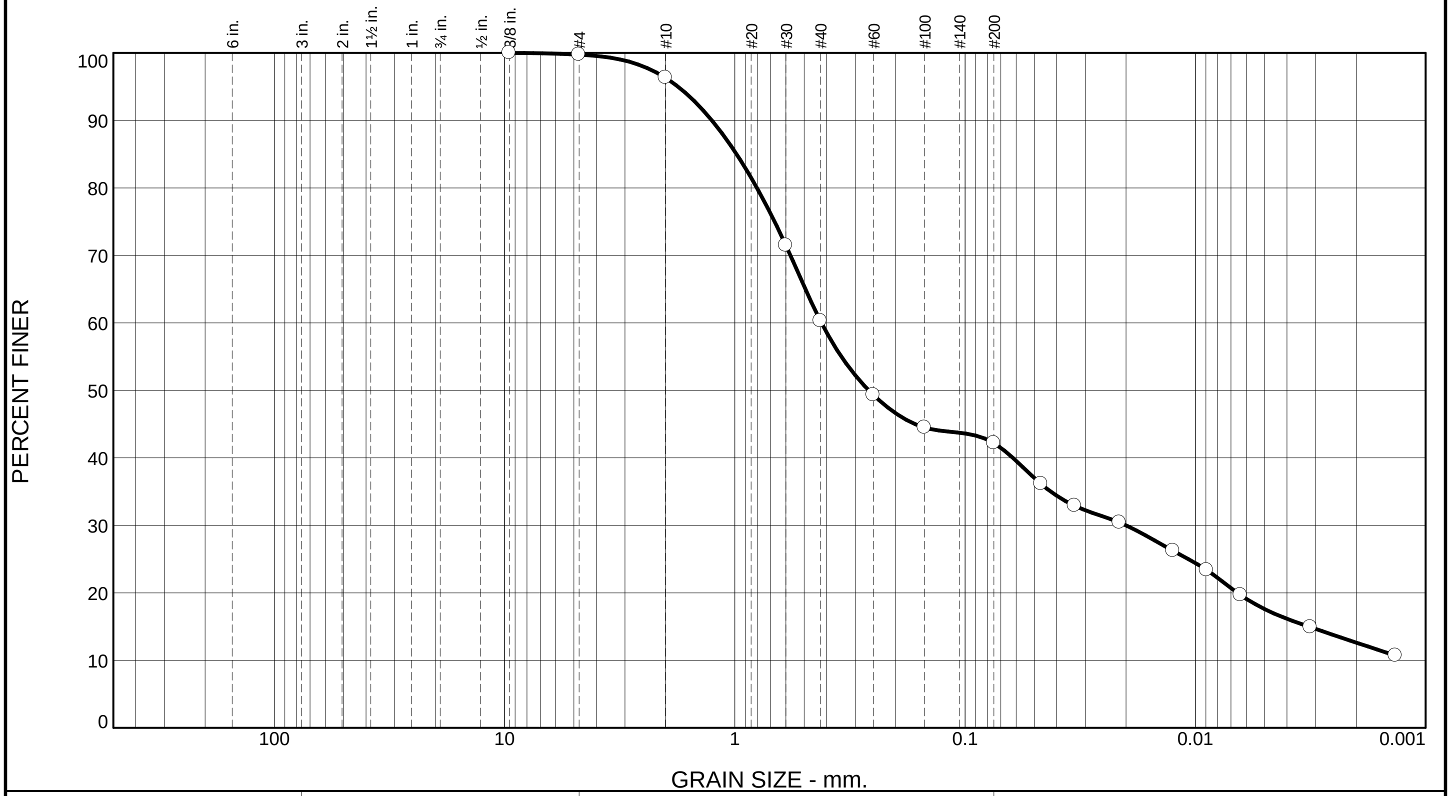
Client: Langan Engineering

Project: Silver Line Drive, North Brunswick, NJ
Proj.#100851001

Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	3.4	36.0	18.1	24.6	17.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.7		
#10	96.3		
#30	71.5		
#40	60.3		
#60	49.3		
#100	44.5		
#200	42.2		

* (no specification provided)

Material Description

Dark Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.2584 D_{85}= 0.9830 D_{60}= 0.4207
D_{50}= 0.2620 D_{30}= 0.0200 D_{15}= 0.0032
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: STP-7 S-3 2-3'

Date: 1-31-23

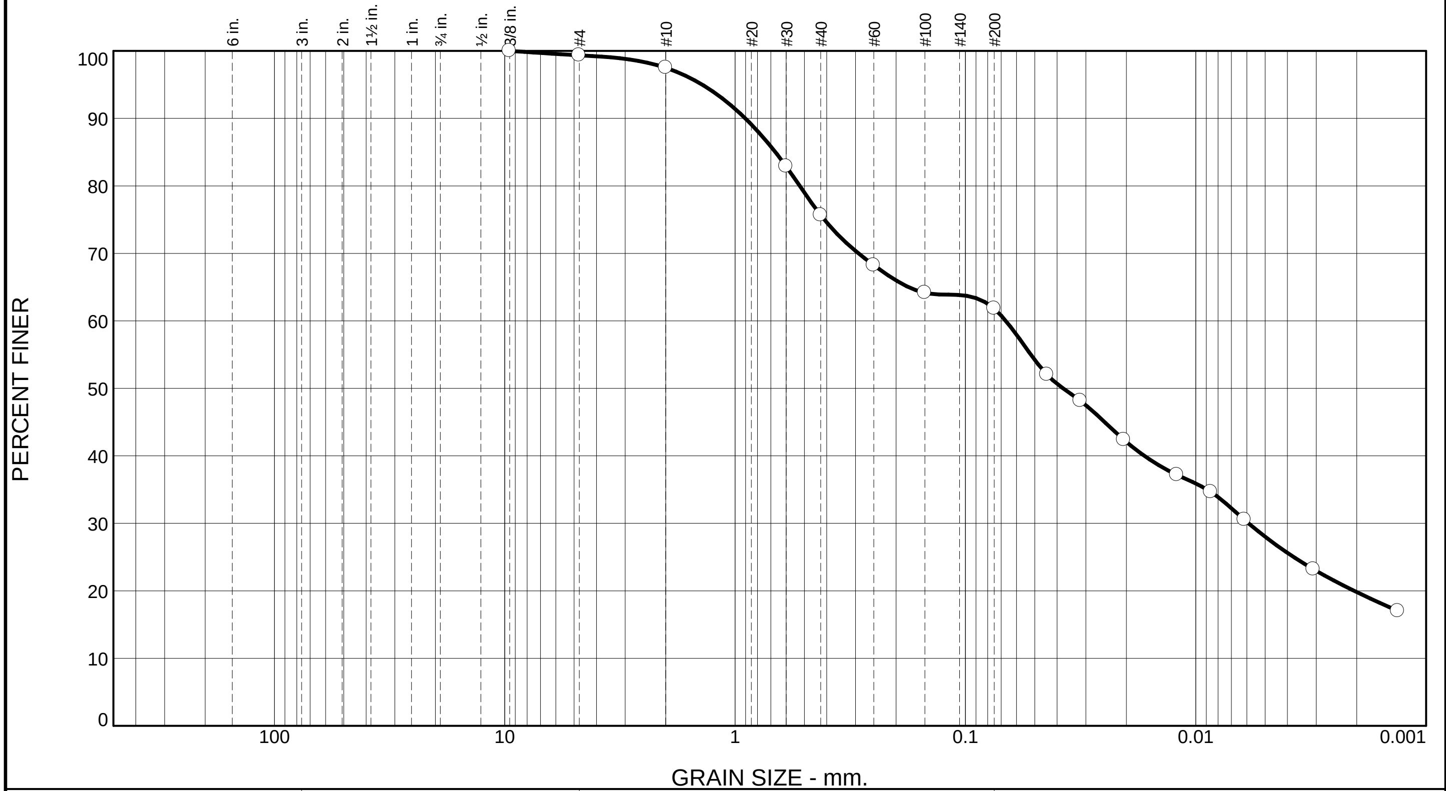
RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Silver Line Drive, North Brunswick, NJ
Proj.#100851001
Project No: 869 **Figure**

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	1.9	21.8	13.9	33.8	28.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.4		
#10	97.5		
#30	82.9		
#40	75.7		
#60	68.3		
#100	64.2		
#200	61.8		

* (no specification provided)

Material Description

Dark Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.9026 D_{85}= 0.6682 D_{60}= 0.0667
D_{50}= 0.0377 D_{30}= 0.0059 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: STP-8 S-2 0.75-1.75'

Date: 1-31-23

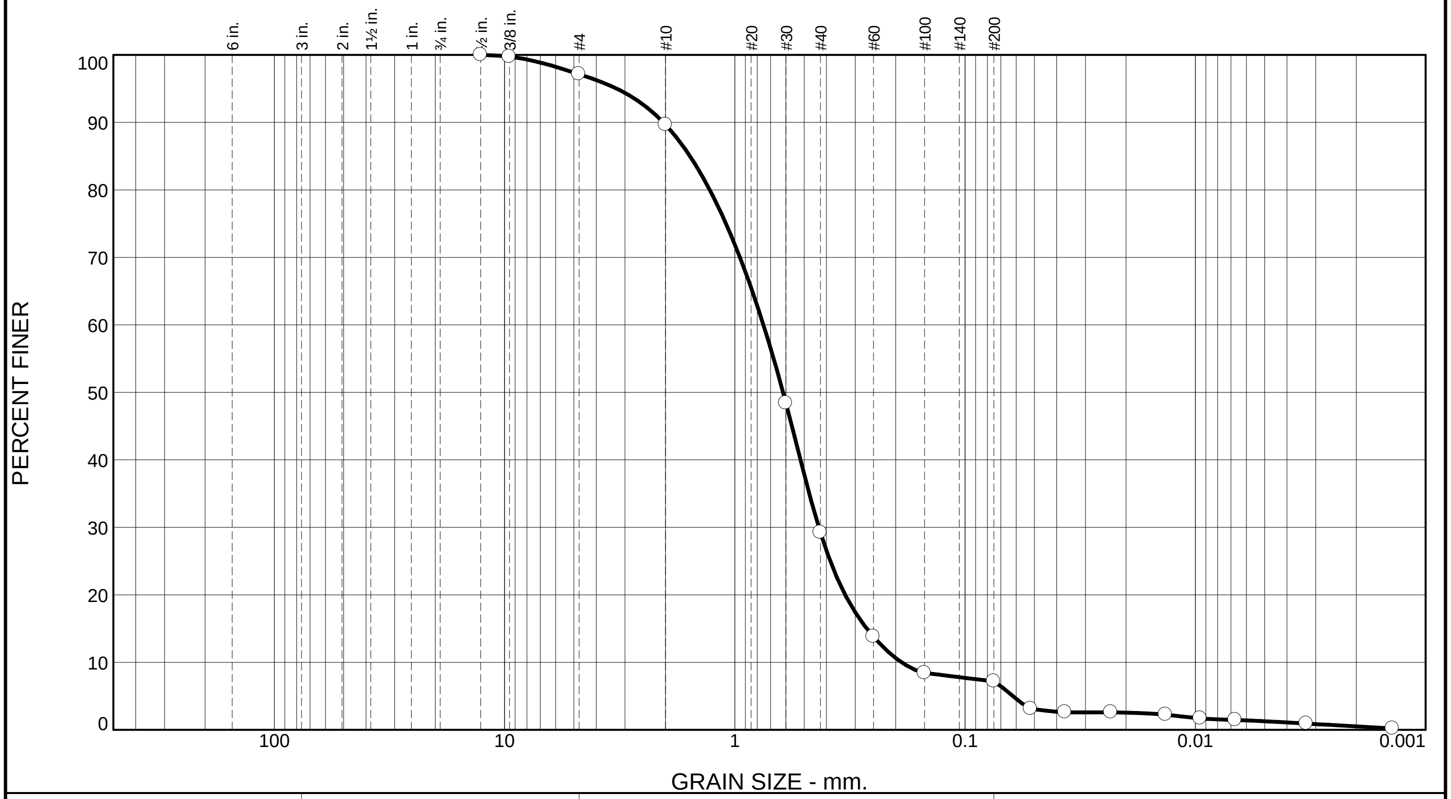
RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Silver Line Drive, North Brunswick, NJ
Proj.#100851001
Project No: 869
Figure

Tested By: ER **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.9	7.4	60.5	22.0	5.9	1.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	99.7		
#4	97.1		
#10	89.7		
#30	48.4		
#40	29.2		
#60	13.8		
#100	8.4		
#200	7.2		

* (no specification provided)

Material Description

Dark Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.0441 D_{85}= 1.5661 D_{60}= 0.7513
D_{50}= 0.6174 D_{30}= 0.4319 D_{15}= 0.2674
D_{10}= 0.1888 C_u= 3.98 C_c= 1.31

Classification

USCS= AASHTO=

Remarks

Sample Number: STP-8 S-3 5-6'

Date: 1-31-23

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Silver Line Drive, North Brunswick, NJ
Proj.#100851001
Project No: 869 **Figure**

Tested By: ER **Checked By:** KP