STORMWATER MANAGEMENT REPORT

FOR THE

PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT
78 LOCUST AVENUE

BLOCK 129 – LOT 70

TOWNSHIP OF BLOOMFIELD
ESSEX COUNTY, NEW JERSEY

OCTOBER 13, 2023
Last Revised: February 8, 2024

NEA PROJECT No.: BLFDPRV22.010

NEGLIA

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INTRODUCTION

The 78 Locust Avenue project proposes to construct a new multi-family residential building with a pervious pavement parking lot exfiltration system and landscaping improvements located at 78 Locust Avenue in the Township of Bloomfield.

As per FEMA Flood Insurance Rate Map No. 34013C0112G, effective date April 03, 2020, the subject property is located within a flood hazard area with a flood hazard elevation of 121.9. See Appendix G – Design References for additional information.

This report addresses the engineering design of the stormwater conveyance and stormwater management for the site.

Summary of Disturbance and Proposed Impervious

This project proposes to disturb the entire 0.96 AC of the existing lot as well as 0.05 AC of the surrounding right of way and adjacent parking easement in order to construct the proposed multi-family residential building and associated site improvements. The total project disturbance area is 1.01 AC. The site under existing conditions is vacant and consists of primarily lawn and gravel areas. Under proposed conditions, the site will consist of a multi-family building, parking lot, internal concrete walkways, concrete retaining walls, lighting and landscaping improvements. The proposed regulated impervious coverage increase for the site is 0.645 AC. The proposed regulated motor vehicle surface coverage increase is 0.28 AC.

As per NJAC 7:8, this project classifies as a Major Development because the project disturbance area exceeds one acre, the creation of more than one-quarter acre of regulated impervious surface, and the creation of more than one-quarter acre of regulated motor vehicle surface.

DESIGN METHODOLOGY

Stormwater Management Design

This study was prepared using the SCS Method and methods contained in the USDA Soil Conservation Service Publication TR-55 "Urban Hydrology for Small Watersheds." Each method outlines procedures for calculating peak rates of runoff resulting from precipitation events. TR-55 outlines additional procedures for developing runoff hydrographs.

The TR-55 procedure simulates a watershed as a series of overland flows, channel flows, and inflow and outflow structures for its contribution to runoff. A value for area, curve number (CN) and time of concentration was calculated for each watershed. The curve number is a land sensitive coefficient that dictates the relationship between total rainfall depth and direct storm runoff.

Using the NRCS Web Soil Survey for the subject property provided within Appendix A, the soils within the watershed were divided into Hydrologic Soil Groups (A, B, C and 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. However, no Hydrologic Soil Group rating is assigned to the subject property as it is classified as Urban Land. Therefore, in accordance with Chapter 12 of the NJDEP BMP and as per the *Report of Stormwater Management Investigation* and the *Report of Geotechnical*

Investigation both prepared by JZN Engineering, PC. and dated November 3, 2022, included within Appendix B and C respectively, the soil has been classified as Hydrologic Soil Group B.

Table 1 – Runoff CN by Surface Coverage (HSG 'B')	
Surface Coverage	**CN (HSG 'B')**
Impervious Area	98
Gravel	85
Lawn (Fair Condition)	69
Lawn (Good Condition)	61

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. Values of the time of concentration were determined for existing and proposed conditions based on land cover and slope of the flow path using methods described in TR-55. Time of concentration has been calculated for both the existing and proposed drainage areas and can be found within the watershed calculations within Appendix D and Appendix E with the associated flow paths illustrated on the attached drainage area figures.

The design storm used for the TR-55 study is the 24-hour NOAA Type D rainfall distribution storm event. Twenty-four (24) hour rainfall depths for the 2-, 10-, and 100-year storms were utilized and the adjustment factors for the current and projected storms listed for Essex County within the NJ BMP were applied, as per NJDEP requirements. Rainfall hydrographs were developed from TR-55 methods for the site under both existing and proposed conditions for both the current storm and projected storm. The Twenty-four (24) hour rainfall depth and Type D rainfall distribution data is provided in Appendix G – Design References. The following tables show the resulting rainfall depths for the current and projected design storms:

Table 2 – Current Storm Rainfall Data			
Event	**Factor**	**NOAA Rainfall Depth**	**Design Rainfall Depth**
2-year	1.01	3.37	3.40
10-year	1.03	5.13	5.28
100-year	1.06	8.60	9.12

Table 3 – Projected Storm Rainfall Data			
Event	**Factor**	**NOAA Rainfall Depth**	**Design Rainfall Depth**
2-year	1.19	3.37	4.01
10-year	1.22	5.13	6.26
100-year	1.33	8.60	11.44

Stormwater Conveyance Design

The storm sewer conveyance systems were designed and analyzed using the software AutoCAD Civil 3D 2020 Hydraflow Storm Sewers Extension for the 25-year design storm. Storm drainage pipes were then sized based on calculated flows using Manning's Equation and were verified by solving for the hydraulic grade line (refer to Appendix F – Conveyance Systems Calculations).

EXISTING CONDITIONS

Pre-Developed Watershed Areas

The existing project site encompasses 0.96 acres consisting of gravel, lawn area and various impervious surfaces.

A detailed breakdown of the Existing Watershed based upon the surface cover and hydrologic soil groups is included in Table 2 below. It is noted that the existing conditions analysis was performed utilizing hydrologic soil groups ("HSG") B. Further information with respect to this analysis is included below.

Table 4 – Existing Watershed Summary (Acres)			
Impervious	**Lawn (Fair Condition)**	**Gravel**	**Totals**
0.02	0.56	0.38	**0.96**

The table above summarizes the area breakdown of the various existing surface coverage types within the existing watershed area (refer to Appendix D and Appendix E for additional information). The existing watersheds were hydraulically combined and routed to calculate the peak flow rates and discharge volumes for the current and projected 2-, 10-, and 100-year design storms; refer to the tables below.

Table 5 – Current Design Storm Existing Peak Flow Rates (Q, cfs)			
Existing	**Q_2**	**Q_{10}**	**Q_{100}**
Total	1.578	3.299	7.117
Reduce to	50%	75%	80%
Allowable Flows	0.789	2.474	5.693

Note: Refer to Appendix D for supporting calculations and information regarding the existing watersheds.

Table 6 – Projected Design Storm Existing Peak Flow Rates (Q, cfs)			
Existing	**Q_2**	**Q_{10}**	**Q_{100}**
Total	2.114	4.252	9.474
Reduce to	50%	75%	80%
Allowable Flows	1.057	3.189	7.579

Note: Refer to Appendix E for supporting calculations and information regarding the existing watersheds.

The tables above indicate the existing peak flow rates for the current and projected 2-, 10-, and 100-year design storm events. Per NJAC 7:8-5.4(a)3iii, the allowable flow rates are 50%, 75%, and 80% of the existing storm flows for the 2-, 10-, and 100-year storms, respectively.

PROPOSED CONDITIONS

Post-Developed Watershed Areas

The project proposes to construct a multi-family building with a pervious pavement parking lot exfiltration system, landscaping and various site improvements. The proposed pervious pavement system has been designed to capture and store the runoff generated by the proposed building area, a portion of the landscaping area and the parking lot itself. The collected runoff will be released at the required rates to address the site drainage for the project. It shall be noted the water quality design storm is designed to be fully retained within the proposed system. The proposed improvements result in two watersheds. One that discharges to an existing inlet on Willow Street and one that discharges to an inlet on Locust Avenue. It shall be noted and emphasized that both inlets connect to an existing culvert that traverses through the subject property. Therefore, both watersheds essentially discharge to the same place, however the watersheds have been modeled as discharging to the two respective inlets to better evaluate any potential impact to the existing municipal stormwater infrastructure.

A detailed breakdown of the Proposed Watersheds consisting of a combination of impervious surface (i.e. pavement, sidewalk, porous asphalt etc.), pervious surface (i.e. lawn, landscaping, etc.), and/ or proposed Riverstone (modeled as gravel). It is noted that the proposed conditions analysis was performed utilizing hydrologic soil group ("HSG") B. Further information with respect to this analysis is included below:

Table 7 – Proposed Watershed Summary (Acres)			
Impervious	**Gravel**	**Pervious Area (Good Condition)**	**Totals**
Watershed #1A			
0.075	0.011	0.086	**0.172**
Watershed #2A			
0.529	0	0.005	**0.534**
Watershed #2B			
0.057	0	0.197	**0.254**

The table on the previous page summarizes the area breakdown of the various proposed surface coverage types within the proposed watershed area (refer to Appendix D and Appendix E for additional information). The proposed watersheds were hydraulically combined and routed to calculate the peak flow rates and discharge volumes for the current and projected 2-, 10-, and 100-year design storms.

Pervious Paving System

The pervious paving system has been designed in accordance with the NJDEP BMP Manual Chapter 9.6 and has an area of 7,770.27 square feet (0.178 acres). The total storage volume of the system is 7,770 cubic feet. The system will consist of a 30" stone trench beneath the pavement section and is designed for exfiltration. Therefore, the system will not have underdrains and filter fabric at the bottom of the system. Additionally, the *Report of Stormwater Management Investigation* and the *Report of Geotechnical Investigation* both prepared by JZN Engineering, PC. and dated November 3, 2022, included within Appendix B and C respectively, the most restrictive tested permeability rate within the proposed asphalt pavement section area is 1.84 in/hr which means the design permeability rate is half of the same as required by the NJDEP BMP. As such, the proposed pervious paving system was designed with a permeability rate of 0.92 in/hr and is reflected in Appendix D and Appendix E of this report.

The table below combines the proposed peak runoff rates for the proposed watersheds and compares them to the required reductions:

Table 8 – Comparison of Existing, Allowable & Proposed Peak Flows (cfs)			
Current Storm	**2-Year**	**10-Year**	**100-Year**
Existing	1.578	3.299	7.117
Allowable	0.789	2.474	5.693
Proposed	0.758	1.493	4.590
Reduced to	48.03% (≤ 50%)	45.26% (≤ 75%)	64.49% (≤ 80%)
Reduced by	-0.82	-1.806	-2.527

Table 9 – Comparison of Existing, Allowable & Proposed Peak Flows (cfs)			
Projected Storm	**2-Year**	**10-Year**	**100-Year**
Existing	2.114	4.252	9.474
Allowable	1.057	3.189	7.579
Proposed	0.991	1.897	6.158
Reduced to	46.88% (≤ 50%)	44.61% (≤ 75%)	64.99% (≤ 80%)
Reduced by	-1.123	-2.355	-3.316

Notes:
(1). Refer to Appendix D and Appendix E for the proposed peak flow rate calculations.

(2). The value for 'Reduced By' was calculated by comparing the proposed peak flow rate (post basin) with the existing peak flow rate for the corresponding design storm.

As per the attached runoff calculations and above tables, the project will reduce runoff to the required rates and will have no adverse impact with respect to stormwater. The proposed pervious pavement system calculations and analysis provides confirmation that the proposed project stormwater management systems have been satisfactorily designed to discharge post-construction peak runoff rates below allowable flow rates, in accordance with NJAC 7:8.

Proposed Conveyance Systems

The proposed stormwater conveyance system will consist of a network of manholes, inlets, distribution pipes and piping which will collect and convey stormwater runoff from the overall project area to the adjacent Municipal conveyance system located within Locust Avenue and Willow Street respectively. The proposed conveyance system has been designed to safely and efficiently convey runoff generated by the 25-year design storm event. The conveyance system was designed and analyzed using the software AutoCAD Civil 3D 2023 Hydraflow Storm Sewers Extension, which utilizes the Rational Method, and Manning's Equation.

Values for the runoff coefficient, 'C', were obtained from the New Jersey Department of Transportation's Roadway Drainage Design Manual, and are included in Appendix G – Design References. Intensity-Duration-Frequency (IDF) data was obtained from the NOAA website for the 25-year design storm for East Rutherford, New Jersey, which is also included in Appendix I. A minimum time of concentration of 1.6 minutes was used when calculated T_c values resulted in times of less than 1.6 minutes, as was the case for some sub-drainage areas for this project under the proposed conditions. Manning's equation was then used by the aforementioned software to verify that pipes were sized and designed correctly.

Conveyance system design calculations and analyses are included in Appendix F – Conveyance System Calculations.

PROPOSED STORMWATER MANAGEMENT DESIGN REQUIREMENTS

Water Quantity Design

Per NJAC 7:8, this project classifies as a "Major Development" because of the project disturbance area being greater than one acre, the creation of more than one-quarter acre of regulated impervious surface and the creation of more than one-quarter acre of regulated motor vehicle surface. As such, the project is required to comply with the stormwater quantity requirements cited in NJAC 7:8. The proposed stormwater management and conveyance systems have been designed to comply with NJAC 7:8-5.6(b)3: allowable flow rates are 50%, 75%, and 80% of the existing storm flows for the 2-, 10-, and 100-year storms, respectively. These peak runoff rate reductions are achieved by means of attenuating stormwater runoff within the 30-inch-thick drainage stone layer beneath the porous asphalt exfiltration system. As is evident from Table 8 and 9, above, the proposed stormwater management improvements have been designed to reduce peak flows at or below the allowable peak flow rates.

Water Quality Design

Per NJAC 7:8, stormwater management measures shall be designed to reduce the post-construction load of total suspended solid (TSS) in stormwater runoff generated from the water quality design storm by 80% of the anticipated load from the developed site for developments that increase the impervious coverage by one-quarter acre. The proposed development does result in an increase of regulated motor vehicle surface coverage by one-quarter acre or more. As such, the project has designed the asphalt porous pavement exfiltration system to fully retain the water quality design storm as required by the NJDEP BMP Chapter 9.6. Additionally, porous asphalt provides the required 80% total suspended solids removal rate for the NJDEP Water Quality storm event. Therefore, this project complies with the Water Quality requirements of NJAC 7:8.

Groundwater Recharge Design

As per NJAC 7:8-5.4 (b)(2), 100 percent of the site's average annual pre-developed groundwater recharge volume must be maintained after development. As per the State of New Jersey Smart Growth Area Plan, the project area, which is situated in an urban area in the Township of Bloomfield, is designated as a Metropolitan Planning Area. The project is therefore exempt from groundwater recharge requirements as per NJAC 7:8-5.4 (b)(2).

Green Infrastructure Design

As per NJAC 7:8-5.2(a)(2), the minimum design and performance standards for groundwater recharge, stormwater runoff quality, and stormwater runoff quantity at NJAC 7:8-5.4, 5.5, and 5.6 shall be met by incorporating green infrastructure in accordance with NJAC 7:8-5.3. The proposed asphalt paving system meets the requirements of a pervious paving system, as per NJBMP 9.6 Pervious Paving Systems, the system consists of a durable, permeable surface course, which allows stormwater to move through it; this surface course is placed over a transition layer and a storage bed of open-graded, meaning devoid of fine particles, aggregate. There are two types: underdrained systems and systems design to infiltrate into the subsoil. As such, the proposed porous asphalt system consists of a 4-inch permeable asphalt surface course, 1-inch choker course transition layer and 30-inch stone layer with no underdrains as the system is designed for exfiltration. Additionally, the proposed system has a designed inflow area of 23,288.43 square feet where 23,310.81 (3 times 7,770.27) square feet is permitted. Therefore, the proposed porous asphalt system is a green infrastructure measure and satisfies the requirements set forth in NJAC 7:8-5.3(b)(3).

OFF-SITE STABILITY ANALYSIS

In accordance with the "Standards for Soil Erosion and Sediment Control in New Jersey," there are two critical areas at which offsite stability must be satisfied: (1) at the point of discharge (inlets located on Willow Street and Locust Avenue, and (2) downstream (culvert that traverses through the subject property).

Point of Discharge Analysis

The proposed stormwater conveyance systems will all discharge into the existing drainage conveyance systems within Willow Street and Locust Avenue by way of conveyance pipes (i.e., a defined waterway). As such, the point of discharge would be considered “stable”.

Downstream Stability Analysis

The proposed site development, inclusive of the subsurface detention basin, results in peak stormwater rates for the 2-, 10-, and 100-year design storm events reduced to values below the maximum allowable 50%, 75%, and 80%, respectively. As such, the downstream (municipal drainage system) would also be considered stable.

Therefore, this project has satisfactorily demonstrated that stability will be provided at both critical locations, thereby satisfying the requirements for off-site stability, as set forth in the *Standards for Soil Erosion and Sediment Control in New Jersey*, latest edition.

CONCLUSION

Per NJAC 7:8 and applicable NJDEP regulations, the peak runoff flow rates from the proposed site are reduced below the allowable (reduced) peak from rates for the existing 2-, 10-, and 100- year storm events. The project provides 80% TSS removal for water quality treatment with the proposed porous asphalt system In addition, due to the project’s location in a Metropolitan Planning Area, the NJDEP groundwater recharge requirements are not applicable to the project. The stormwater conveyance systems have been designed to safely and effectively convey runoff generated by the site for the 25-year design storm event. As such, the proposed site’s stormwater management and conveyance systems have been designed to comply with all applicable NJDEP stormwater regulations.

A Stormwater Maintenance Manual has been prepared under a separate cover.

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APPENDIX A

Soil Data Report

NEGLIA
ENGINEERING ASSOCIATES

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for

Essex County, New Jersey

78 Locust Avenue

October 12, 2023

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,130 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Essex County, New Jersey
Survey Area Data: Version 19, Aug 29, 2023

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

Date(s) aerial images were photographed: Oct 10, 2022—Oct 16, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BowrB	Boonton - Urban land, Boonton substratum complex, red sandstone lowland, 0 to 8 percent slopes	0.3	4.2%
DunB	Dunellen sandy loam, 3 to 8 percent slopes	1.0	15.1%
DuuB	Dunellen - Urban land, Dunellen substratum complex, 0 to 8 percent slopes	1.3	20.0%
URBOOB	Urban land, Boonton substratum, 0 to 8 percent slopes, red sandstone lowland	3.9	60.8%
Totals for Area of Interest		**6.4**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Essex County, New Jersey

BowrB—Boonton - Urban land, Boonton substratum complex, red sandstone lowland, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: w8p8
Elevation: 20 to 560 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Boonton, red sandstone lowland, and similar soils: 50 percent
Urban land, boonton red sandstone lowland substratum: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton, Red Sandstone Lowland

Setting

Landform: Ground moraines
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy till derived from sandstone and shale

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 3 inches: silt loam
BE - 3 to 10 inches: loam
Bw - 10 to 27 inches: gravelly loam
Bx1 - 27 to 40 inches: gravelly fine sandy loam
Bx2 - 40 to 67 inches: gravelly fine sandy loam
BCx - 67 to 83 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Description of Urban Land, Boonton Red Sandstone Lowland Substratum

Setting

Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material
H2 - 12 to 67 inches: gravelly loam
2CB - 67 to 83 inches: gravelly sandy loam

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents, boonton red sandstone lowland substratum

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

DunB—Dunellen sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: njzd
Elevation: 50 to 2,000 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Dunellen

Setting

Landform: Outwash plains

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy outwash derived from sandstone

Typical profile

A1 - 0 to 8 inches: sandy loam
A2 - 8 to 14 inches: sandy loam
BA - 14 to 20 inches: sandy loam
Bt - 20 to 31 inches: sandy loam
C - 31 to 42 inches: sandy loam
2C - 42 to 70 inches: loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

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

Minor Components

Tunkhannock

Percent of map unit: 10 percent
Landform: Deltas, kames, outwash terraces
Landform position (three-dimensional): Riser, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Udorthents, dunellen substratum

Percent of map unit: 5 percent
Landform: Outwash plains
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

DuuB—Dunellen - Urban land, Dunellen substratum complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: njzf
Elevation: 50 to 150 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Dunellen and similar soils: 60 percent
Urban land, dunellen substratum: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dunellen

Setting

Landform: Outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy outwash derived from sandstone

Typical profile

A1 - 0 to 8 inches: sandy loam
A2 - 8 to 14 inches: sandy loam
BA - 14 to 20 inches: sandy loam
Bt - 20 to 31 inches: sandy loam
C - 31 to 42 inches: sandy loam
2C - 42 to 70 inches: stratified gravelly sand to sand to loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY023CT - Well Drained Outwash

Hydric soil rating: No

Description of Urban Land, Dunellen Substratum

Setting

Landform: Outwash plains
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material
H2 - 12 to 31 inches: sandy loam
2C - 31 to 42 inches: sandy loam
3C - 42 to 70 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents, dunellen substratum

Percent of map unit: 10 percent
Landform: Outwash plains
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

URBOOB—Urban land, Boonton substratum, 0 to 8 percent slopes, red sandstone lowland

Map Unit Setting

National map unit symbol: w9d3
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land, boonton red sandstone lowland substratum: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land, Boonton Red Sandstone Lowland Substratum

Setting

Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material
H2 - 12 to 67 inches: gravelly loam
2CB - 67 to 83 inches: gravelly sandy loam

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Boonton, red sandstone lowland

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

Udorthents, boonton red sandstone lowland substratum

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

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APPENDIX B

Geotechnical Investigation Report

NEGLIA
ENGINEERING ASSOCIATES

REPORT OF GEOTECHNICAL INVESTIGATION

PROPOSED 44-UNIT RESIDENTIAL BUILDING
78-88 LOCUST AVENUE
BLOCK 129; LOT 70
TOWNSHIP OF BLOOMFIELD, ESSEX COUNTY, NEW JERSEY

BY

JZN ENGINEERING, PC.
SPRINGFIELD, NEW JERSEY

PREPARED FOR

VERNON CONSTRUCTION & DEVELOPMENT
NEW YORK, NEW YORK

File No. 23117-000 **November 2022**
Revised October 6, 2023

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Revised October 6, 2023
November 3, 2022
File No. 23117-000

VERNON CONSTRUCTION & DEVELOPMENT
21 West 86th Street
New York, NY 10024

Attention: Mr. Adrian A. Nowak
Vice President

REGARDING: REPORT OF GEOTECHNICAL INVESTIGATION
Proposed 44-Unit Residential Building
78-88 Locust Avenue
Block 129; Lot 70
Township of Bloomfield, Essex County, New Jersey

Dear Mr. Nowak:

The enclosed report summarizes the results of our geotechnical investigation and recommendations conducted on behalf of Vernon Construction & Development. for the Proposed 44-Unit Residential Building to be located at 78-88 Locust Avenue, Block 129; Lot 70 in the Township of Bloomfield, Essex County, New Jersey. Our services were undertaken in accordance with our proposal dated September 22, 2022 (last revised September 27, 2022) and your subsequent authorization on October 17, 2022, and this report was updated in accordance with our proposal dated October 2, 2023 and your subsequent authorization on October 2, 2023.

This report has been revised to include additional recommendations for driven deep foundation elements.

We appreciate the opportunity to work with you on this project. Please contact us if you wish to discuss this report or any aspect of the project.

Sincerely,
JZN ENGINEERING, PC.

Nejm E. Jundi, P.E.
President

Enclosures

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EXECUTIVE SUMMARY

This report summarizes our geotechnical study and provides our geotechnical engineering recommendations for the Proposed 44-Unit Residential to be located at 78-88 Locust Avenue, Block 129; Lot 70, in the Township of Bloomfield, Essex County, New Jersey.

The study included the performance of 16 subsurface soil exploration borings (identified as B-1 through B-16) performed within the proposed building footprint area and parking lot to depths ranging between approximately nine feet and 26.8 feet below the existing ground surface (corresponding with elevations approximately between +/-Elev. +86.7 feet and +/-Elev. +114.5 feet). Engineering analyses were performed to evaluate the building foundation and to develop recommendations for foundation design, construction, utility support and earthwork. A description of site conditions and our evaluation is presented in the following report. The principal conclusions are described below:

- The results of the subsurface investigation revealed a subsurface profile generally consisting of a surface cover of either up to six (6)-inches of topsoil or exposed fill materials. Following the surface cover materials, existing fill materials were encountered and extended to depths of up to approximately 13 feet below the existing ground surface (corresponding with approximate elevation +/-Elev. +110 feet). Underlying the fill materials, generally medium dense to very dense glacial deposits were encountered to the soil exploration termination depths between approximately nine (9) feet and 26.8 feet below the existing ground surface (corresponding with elevations approximately between +/-Elev. +86.7 feet and +/-Elev. +114.5 feet). Natural soils were not encountered at boring locations B-6 and B-7, due to the borings refusing on obstructions within the fill materials (possible remanent foundations elements). Groundwater conditions were encountered at depths that ranged between approximately six (6) feet and 15 feet below the existing ground surface, corresponding to elevations of between approximately +/-Elev. +97.5 feet. and +/-Elev. +110 feet. Please refer to Section 2 of this report for more information regarding this investigation.

- Based on our understanding of the proposed development and the soil conditions encountered during this investigation. We recommend that the building be supported on shallow footings bearing directly on the medium dense sand deposits of Stratum II, or on compacted granular fill (CGF) following the removal of all existing fill materials and any loose glacial deposits within Stratum II. Additionally, the lowest building slab may be supported on a conventional soil supported slab-on-grade following the removal of any unsuitable materials and the preparation of the bearing subgrade as recommended within this report.

- *If overexcavation of the existing fill materials at the site is ultimately not economical, the use of deep foundations such as driven piles to support the building columns and would be required. Additionally, if the building columns and walls are ultimately supported on deep foundation system, we recommend that the lowest building slab be designed and constructed as a pile supported structural slab.*

- Deep existing fill materials and remnant foundation elements were encountered during this investigation, which will require removal and replacement in controlled manner to allow for the use of shallow foundation options. Excavation at the site deeper than five feet may require the use of temporary support of excavation system (SOE). The design of SOE system is beyond the scope of this report and should be designed by a professional engineer licensed in the State of New Jersey.

- Due to the proximity of existing structures, including public roadways, neighboring developments, existing utilities, every effort to protect these structures during and after construction should be taken. We recommend that a pre/post construction conditions survey, optical monitoring, and vibration-monitoring program be undertaken to document possible effects of the proposed construction.

Detailed recommendations are presented in the following report.

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APPENDICES

1. Introduction

1.1 General

This report summarizes our geotechnical study and provides our geotechnical engineering recommendations for the Proposed 44-Unit Residential to be located at 78-88 Locust Avenue, Block 129; Lot 70, in the Township of Bloomfield, Essex County, New Jersey. This report was prepared based on the information provided to us by the project design team including the following documents:

- An April 11, 2022 Boundary & Topographic Survey prepared by Neglia Engineering Associates; and
- September 15, 2023 Site of Architectural Zoning Plans- Sheets Z-5, Z-6, Z-6A Z-7 prepared by AB Design Studio, Inc.
-

1.2 Scope of Services

This geotechnical investigation was undertaken to obtain information on subsurface soil and groundwater conditions, and to provide recommendations for the proposed building's foundation design and related earthwork. The scope of geotechnical engineering services included:

- Explore the subsurface conditions at the site by means of conducting 16 exploration borings;
- Review available referenced project information;
- Estimate the engineering characteristics of the proposed foundation bearing and subgrade materials;
- Provide geotechnical criteria for use by the design engineers in preparing the foundations & slab design;
- Provide recommendations for earthwork and construction.

1.3 Existing Site Conditions

Presently the site consists of a gravel covered lot (previously demolished building area) and landscape areas which can be accessed through a fence gate located on Willow Street. The project site is bounded by Locust Avenue to the North; by a three (3)-story self-storage building to the East; by Willow Street to the South; and by a paved asphalt parking lot and a three (3)-story residential building with a partial basement to the West. The location of the project site is shown on the *Project Locus Map* included as Figure 1.

1.4 Report Datum

Topographic information for the site was obtained from the referenced April 11, 2022 *Boundary and Topographic Survey* prepared by Neglia Engineering Associates. Elevations contained in this report are in feet and refer to the North American Vertical Datum of 1988 (NAVD 88). Surface elevations for explorations are provided on the individual logs of test borings. All depths in the report are referenced from top of the existing ground surface elevation at the time of the field investigation.

1.5 Proposed Development

Based on our review of the September 15, 2023 Site of Architectural Zoning Plans- Sheets Z-5, Z-6, Z-6A Z-7 prepared by AB Design Studio, Inc. The proposed development at the site has changed to include the construction of a 44-Units Residential Building and associated on grade parking. The proposed building will consist of three-story building with no below grade level.

2. Geotechnical Investigation

2.1 Regional Geology Review

The subject property is situated within a section of the Piedmont Physiographic Province known as the Newark Basin. Specifically, the subject site is underlain by the Lower Jurassic and Upper Triassic Sandstone and Siltstone facies of the Passaic Formation, which is part of the Newark supergoup and Brunswick Group. The Sandstone generally consists of interbedded grayish-red to brownish-red medium-grained to fine-grained, medium-bedded to thick-bedded sandstone, and brownish-to purplish-red, coarse-grained siltstone. The overburden materials at the site include glacial deposits associated with a Wisconsinan Glacier which reached its most southerly advance approximately 20,000 years ago. The glacial deposits are expected to overlay weathered rock. Glacial till in the area typically contains a heterogeneous mixture of sand, silt, clay and gravel mixed with variable amounts of boulders and cobbles. Overlying materials also include manmade fill.

The information presented above was based on the review of published geological data as reported in the Surficial Geologic Map of New Jersey prepared by United States Geological Survey (USGS).

2.2 Field Exploration

Field exploration for this project was conducted by means of drilling 16 soil exploration borings (identified as B-1 through B-16). The exploration borings were drilled within the proposed building footprint to depths ranging approximately between 9 feet and 26.8 below the existing ground surface (corresponding with elevations approximately between +/-Elev. +86.7 feet and +/-Elev. +114.5 feet). The locations of the exploration borings are shown on the accompanying *Boring Location Plan* included as Figure 2, and records of the exploration logs are provided in Appendix A.

The soil exploration borings were drilled with a standard truck-mounted drill rig utilizing 4.00-inch inside diameter flush jointed casing and mud-rotary drilling techniques (ASTM D5783). Soil samples were obtained by the Standard Penetration Test (SPT) method, (ASTM D1586) with a 1-3/8-inch inside diameter (I.D.) split spoon sampler driven by a 140-pound hammer free-falling 30 inches. Blows for each six-inches of penetration were recorded on the exploration boring logs. Depth to groundwater and/or perched water was estimated from visual observation of moisture content of split spoon soil samples

The field exploration program was monitored, planned, and logged by a JZN Engineer. The soil exploration locations were determined in the field by a JZN Engineer using normal taping procedures and estimated right angles from existing site features and are presumed to be accurate within in few feet.

The soil exploration borings were drilled by Diamond Drilling, Inc. of Port Jervis, New York in the presence of a JZN Engineer between October 24, 2022 and October 27, 2022.

The soil exploration logs and related information depict subsurface conditions only at the specific exploration locations and at the particular time designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at the soil exploration locations. Also, the passage of time may result in a change in the subsurface conditions at these soil exploration locations.

2.2.1 Subsurface Conditions

Details of the subsurface materials encountered are presented in the Exploration Records presented in Appendix A of this report. The stratification lines designating the interface between soil types on the boring log represent approximate boundaries. The transition between materials may be gradual, and one or more strata may be absent at specific locations. In general, the subsurface soil conditions are consistent with the regional geology of the area. The exploration borings revealed the following generalized strata in order of increasing depth below ground surface.

Surface Cover: The soil exploration borings encountered surface cover materials consisting of either approximately up to six (6) inches of top soil or exposed fill materials.

Stratum I – Existing Fill Materials: Following the surface cover materials, or directly on the surface, existing fill materials were encountered and extended to depths ranging between approximately four (4) feet and 13 feet below the existing ground surface (corresponding with elevations approximately between +/-Elev. +106.5 feet and +/-Elev. +118.5 feet). The fill materials were generally comprised of medium to fine sand with varying amounts of silt, gravel, and debris (brick, concrete, asphalt, ceramic). Boring location B-6 and B-7 were terminated within this stratum due to split spoon sampler and roller bit refusals on possible remanent foundation elements.

Stratum II – Glacial Deposits (USCS:SM & GM): Underlying the existing fill materials, glacial sand and gravel deposits generally consisting of medium dense to very dense, medium to fine grained sand with varying amounts of silt, and gravel were encountered. The glacial deposits extended to the soil exploration termination depths ranging between approximately 12.5 feet and 26.8 feet below the existing ground surface (corresponding with elevations approximately between +/-Elev. +86.7 feet and +/-Elev. +114.5 feet). It should be noted that natural soils were not encountered at boring locations B-6 and B-7 due to the borings being terminated upon refusing on an obstruction within the fill materials.

2.2.2 Groundwater Conditions

Groundwater conditions were encountered at depths that ranged between approximately six (6) feet and 15 feet below the existing ground surface, corresponding with elevations of between approximately +/-Elev. +97.5 feet. and +/-Elev. +110 feet.

Groundwater observations in completed test borings do not necessarily represent the true, stabilized groundwater conditions. It should be noted that fluctuations in the level of groundwater may occur due to variations in season, rainfall, snow melt, surface infiltration, temperature, construction activities, pumping of dewatering systems, leakage from utilities and other factors not evident at the time measurements were made and reported herein. As a result, water levels observed during and after construction may vary from those observed in the test borings during drilling.

3. Site Preparation, Earthwork, And Construction Consideration

3.1 General

The following Sections of the report include comments on items related to excavation, dewatering, earthwork and related geotechnical engineering aspects of the proposed construction. This Section is written primarily for the engineer responsible for preparation of plans and specifications. Since this Section identifies potential construction problems related to foundations and earthwork, it will also aid personnel who monitor the construction activity and contractors performing the earthwork.

The results of the subsurface investigation revealed a subsurface profile generally consisting of a surface cover of either up to six (6)-inches of topsoil or exposed fill materials. Following the surface cover materials, existing fill materials were encountered and extended to depths of up to approximately 13 feet below the existing ground surface (corresponding with approximate elevation +/-Elev. +110 feet). Underlying the fill materials, generally medium dense to very dense glacial deposits were encountered to the soil exploration termination depths between approximately nine (9) feet and 26.8 feet below the existing ground surface (corresponding with elevations approximately between +/-Elev. +86.7 feet and +/-Elev. +114.5 feet). Natural soils were not encountered at boring locations B-6 and B-7, due to the borings refusing on obstructions within the fill materials (possible remanent foundations elements). Groundwater conditions were encountered at depths that ranged between approximately six (6) feet and 15 feet below the existing ground surface, corresponding to elevations of between approximately +/-Elev. +97.5 feet. and +/-Elev. +110 feet. Please refer to Section 2 of this report for more information regarding this investigation.

Based on our understanding of the proposed development and the soil conditions encountered during this investigation. We recommend that the building be supported on shallow footings bearing directly on the medium dense sand deposits of Stratum II, or on compacted granular fill (CGF) following the removal of all existing fill materials and any loose glacial deposits within Stratum II. Additionally, the lowest building slab may be supported on a conventional soil supported slab-on-grade following the removal of any unsuitable materials and the preparation of the bearing subgrade as recommended within this report.

If overexcavation of the existing fill materials at the site is ultimately not economical, the use of deep foundations such as driven piles to support the building columns and would be required. Additionally, if the building columns and walls are ultimately supported on deep foundation system, we recommend that the lowest building slab be designed and constructed as a pile supported structural slab.

Deep existing fill materials and remnant foundation elements were encountered during this investigation, which will require removal and replacement in controlled manner to allow for the use of shallow foundation options. Excavation at the site deeper than five feet may require the use of temporary support of excavation system (SOE). The design of SOE system is beyond the scope of this report and should be designed by a professional engineer licensed in the State of New Jersey.

Due to the proximity of existing structures, including public roadways, neighboring developments, existing utilities, every effort to protect these structures during and after construction should be taken. We recommend that a pre/post construction conditions survey, optical monitoring, and vibration-monitoring program be undertaken to document possible effects of the proposed construction.

3.2 Earthwork

The subsurface materials that will be encountered during construction will include: existing fill materials, remnant foundation elements, and glacial deposits. As such, we anticipate that soil excavation can be accomplished using conventional earth-moving equipment. Remnant foundation elements may be encountered during earthwork operations. If encountered, these concrete elements may require crushing prior to off-site disposal. Temporary excavation slopes should be constructed to comply with all OSHA and other applicable regulations.

Care must be exercised during excavations within 15 feet next to adjacent existing developments (roads, building, and utilities) and neighboring buildings foundations zone of influence (ZOI). These excavations must be conducted in such a manner not to undermine these existing buildings foundation elements and disturb the bearing services and under the direction and system design of a professional engineer licensed in the State of New Jersey.

The site should be sealed on a daily basis using a smooth drum roller at the completion of each workday or if rainfall is imminent, work areas should be graded & smooth-wheel rolled to permit runoff of rainfall.

3.3 Earthwork During Freezing Weather

The moisture within the soil matrix may freeze when temperatures fall below freezing. Frozen soil or soil containing snow or ice should not be used as fill. Placement of fills should not be conducted when air temperatures are low enough to cause freezing of the moisture in the fill during or before placement.

Fill materials should not be placed on water, snow, ice or frozen soil. No fill should be allowed to freeze prior to compaction. At the end of each work day, the last lift of fill, after compaction, should be rolled by a smooth-wheeled roller to eliminate ridges of un-compacted soil. Soils with high fines content (silts or clays) or with high moisture content are susceptible to disturbance by freezing, especially in the presence of water and construction traffic.

Soil bearing surfaces below completed foundations and slab and behind walls must be protected against freezing before and after foundation construction. Placement and compaction of fill materials should be conducted only when ambient air temperatures are above 30 degrees Fahrenheit.

3.4 Bearing Surfaces Preparation

3.4.1 Shallow Foundations

All unsuitable materials including existing fill materials, remnant structural elements, and topsoil should be removed and replaced with Compacted Granular Fill in a controlled manner entirely from within the proposed foundation zone of influence (ZOI) down to medium dense to very dense glacial deposits of Stratum II. The exposed subgrades should be observed in the field by the Geotechnical Engineer's representative to confirm the assumed foundation bearing conditions. Use of the allowable bearing pressures recommended in this report is contingent upon such observation and documentation that the field conditions are consistent with the assumptions made within this report.

It is necessary to overexcavate and replace disturbed or otherwise unacceptable foundation bearing materials, if encountered. Following overexcavation to the natural glacial deposits, the exposed surfaces should be re-compacted prior to placing Compacted Granular Fill (CGF) or constructing foundations with a minimum of two passes with a heavy vibratory plate compactor or vibratory roller.

Care should be taken to prevent surface water from collecting on exposed soil bearing surfaces. Worker and equipment traffic over bearing surfaces should be minimized. When exposed, it may be difficult to prepare soil subgrades in cold and wet weather.

Soil bearing surfaces below completed foundations must be protected against freezing before and after foundation construction. If construction is performed during freezing weather, footings should be backfilled to a sufficient depth (up to three feet) as soon as possible after they are constructed. Alternatively, insulating blankets, heating or other means may be used for protection against freezing.

3.4.2 Slab-On-Grade

Following the removal of the existing fill materials and existing remnant foundation down to the natural glacial deposits layer within the proposed building footprint areas, the resulting excavation or exposed surface should be compacted to an unyielding surface. Compacted Granular Fill (CGF) should be used to restore grades or backfill any excavation within the proposed slab-on-grade areas.

3.4.3 Pavement Areas

Site preparation for new pavement areas should include removal of unsuitable materials. The upper two feet, below the pavement subgrade, of the existing fill materials should be overexcavated and recompacted in-place. The remainder of the existing fill could be proof-rolled and left in-place below the pavements provided some risk of settlement, future sealing, patching, or more frequent re-paving is tolerable. If the risk of increased maintenance is not acceptable, more extensive subgrade preparation recommendations can be developed. However, based on the available subsurface data, we anticipate this risk to be small, particularly in the proposed new pavement areas.

Existing utilities located a minimum of three feet below the finished pavement grade elevation may be abandoned cut-off, capped and left in place. Existing utilities located within three feet of the finished pavement grade elevation should be removed.

In fill areas, unsuitable materials should be removed as noted above. Following proof-rolling, CGF or Common Fill may then be placed in compacted layers to the proposed base course subgrade elevation.

If a cut is necessary to reach the subbase subgrade elevation, the exposed subgrade should be proof-rolled with at least four passes of a heavy drum minimum 10-ton vibratory roller or a fully loaded 10-wheel dump truck under the observation of the Geotechnical Engineer's representative. Soft or weaving areas exposed by the proof-rolling should be excavated to firm material or to a maximum depth of two feet below the pavement subbase elevation, and replaced with compacted layers of Common Fill.

Care should be taken to prevent surface water from collecting on exposed soil bearing surfaces. Worker and equipment traffic over bearing surfaces should be minimized. When exposed, it may be difficult to prepare soil subgrades in cold and wet weather.

If subgrade protection difficulties are encountered due to water, various methods can be utilized such as overexcavate the area by six to eight inches using a smooth-edged bucket, place woven filter fabric on the exposed stable soil subgrade and top of the stone, and backfill to the design bearing elevation using ¾-in. size crushed stone.

3.5 Backfilling

Compacted Granular Fill (CGF) should be used for filling within the building and all structural areas. Fill materials should be placed in lifts not to exceed 12 inches in loose thickness. Compaction equipment in open areas should consist of self-propelled 10-ton vibratory drum rollers. In confined areas, hand-guided equipment such as a trench compactor imparting a dynamic force of at least 5,000 lbs. should be used and the loose lift thickness should not exceed nine inches. Lift thickness should be reduced to a maximum of six inches where lighter compaction equipment is used. In areas with soil with high fines content and/or where shallow groundwater (approximately three feet below the grade to be compacted) is encountered, the compaction equipment should be operated in non-vibratory mode. A minimum of four perpendicular passes of the compaction equipment should be used to compact each lift. Cobbles or boulders having a size exceeding three inches in size should be removed prior to compaction. The minimum recommended compaction requirements are summarized in Table 1.

Table 1: Minimum Recommended Compaction Requirements

Location	Compaction Requirement[1]
Building Area and Structural Elements	95%
Landscape and Non-Structural Areas	92%

Notes:
1- As determined in accordance with ASTM D1557

3.6 Backfill Materials

3.6.1 Compacted Granular Fill (CGF)

Compacted Granular Fill (CGF) should consist of clean, well-graded sand and gravel, free of organic material, clay clumps, snow, ice, or other deleterious materials and should meet the criteria in Table 2.

Table 2: Compacted Granular Fill Gradation

Sieve Size	Percent Finer by Weight
3-in.	100
No. 4	30 – 90
No. 40	10 – 50
No. 200	0 – 5

3.6.2 Common Fill

Common Fill may be used to raise grades in sidewalk and landscape areas, subject to design and drainage requirements and is suitable for general landscape grading. Common Fill should be granular soil free from organic material, clay clumps, snow, ice, or other deleterious materials. Common Fill should not contain stones larger than 3-in, and have a maximum of 80 percent passing the No. 40 sieve and a maximum of five percent passing the No. 200 sieve.

3.6.3 Onsite Soil

Granular portions of the on-site soils may be suitable for reuse as CGF and/or Common Fill contingent on any weather-related compaction limitations and removal of over-sized particles and deleterious materials, and on the Geotechnical Engineer visual observation during construction. These materials may be used as fill materials beneath the slab-on-grade, and other areas subject to the Geotechnical Engineer's approval. Existing fill materials containing deleterious materials or excessive amounts of debris are not suitable for use and if excavated should be stockpiled for offsite disposal.

Soils containing high fines content will be difficult to be re-use as backfill materials and will degrade rapidly during periods of precipitation and when subjected to repeated construction traffic. These materials, if excavated, should be stockpiled for off-site disposal.

Final determination of suitability of onsite soils for reuse as CGF and/or Common Fill will have to be made during construction when the materials are exposed during excavation. Reuse of onsite materials should be observed and documented in the field by the Geotechnical Engineer.

Moisture conditioning (drying), particularly during periods of wet weather, and removal of any oversized and deleterious materials may be required to permit placement in lifts to the required compaction. If the fill materials or natural soils are to be used below slabs, it is recommended that the placement and compaction of the material be observed and documented in the field by a Geotechnical Engineer.

We recommend the following be considered when evaluating the use of the on-site soils in lieu of CGF:

- Soil moisture content, weather conditions and placement procedures are very important to the successful use of on-site soils as engineered fill.
- Generally, the use of the fine-grained natural soils in lieu of CGF may be difficult or impossible during the period between late September through mid-July due to difficulties of moisture control and/or freezing temperatures. Precipitation and/or lack of dry weather may inhibit its use during other periods also. Even if the natural soils can be used, careful control of moisture content will be required to achieve the necessary compaction. Moisture conditioning by drying or adding water may be necessary.
- Placement and compaction of the on-site soils should be conducted only when ambient air temperatures are above 30 degrees Fahrenheit.
- Place fill should be fully compacted and smooth-rolled at the end of the work day.
- Any soils used in lieu of CGF which freeze overnight should be removed from the construction areas prior to placing additional fill, or recompacted after thawing.

Rainfall or melting snow can readily saturate stockpiled natural soils. Providing drainage from or covering a stockpile can help limit this potential problem. However, it has been our experience that these soils will probably require considerable drying if left in an unprotected stockpile for an extended period of time, especially over winter and spring seasons.

3.6.4 Submerged Fill Material

If any excavation at the site extends below the groundwater table, submerged fill will be required during excavation below any groundwater. The initial 15 inches to 24 inches of backfill in excavations may be filled with an open graded, crushed stone placed in the wet to assist with dewatering (if required) and to establish a firm base on which to place subsequent lifts of backfill. Prior to placing the stone, free water and disturbed materials should be removed from the excavation to the extent directed by the Geotechnical Engineer. A fines barrier geotextile fabric (as specified in Section 3.6.6) should be placed at the base of the excavation and between submerged fill and surrounding soils (i.e., all sides).

3.6.5 Crushed Stone Fill

Crushed stone is recommended below the proposed slabs and foundation drainage systems and as the first lift of submerged fill. It should consist of 3/4-inch size crushed stone in accordance to AASHTO No. 57.

3.6.6 Geotextile Fabric

A filtration-type geotextile is recommended between submerged fill and surrounding soil. It should consist of Mirafi 140N (utilized for separation and filtration) on non-structural areas, Mirafi RS280i (utilized for separation, filtration, and reinforcement) for structural areas, or equivalent. The filtration fabric should be placed on all sides (top, bottom, and side) of all excavation, or any fill areas being backfilled with submerged fill and/or wherever groundwater is present to help reduce the amount of fines infiltrating into the submerged fill due to groundwater fluctuation/ movement.

3.6.7 Geogrid

If the soil softens due to construction traffic, a reinforcing geogrid (such as Tensar TX130S, or engineering equivalent) may be used to distribute load and reinforce the soil / backfill matrix subject to further design and construction considerations. If the contractor elects to use geogrid to stabilize disturbed site soils, we request notification to provide further recommendations.

3.7 Fill and Backfill Testing

A sample of any material scheduled for use as backfill, Compacted Granular Fill (CGF), and/or Common Fill should be submitted to the geotechnical laboratory for testing and analysis and approval prior to its use.

The placement of all fill and backfill should be monitored by a qualified Geotechnical Engineer to ensure that the specified material and lift thicknesses are properly installed.

The samples should be tested to determine the maximum dry density and optimum moisture content (ASTM D1557), natural moisture content (ASTM D2216), gradation (ASTM D422), organic content (ASTM D2974), and plasticity of the soil (ASTM D4318) prior to construction in order to avoid construction delays. These tests are needed for quality control during compaction and also to determine if the fill material is acceptable as CGF or Common Fill. The minimum frequency of in-place density tests indicated in Table 3 should be performed to ensure that the specified compaction is achieved throughout the height of the fill or backfill:

Table 3: Compaction Frequency Testing	
Building and Structural Elements	One test per 500 square feet per lift (minimum six tests per lift)
Non-Structural Areas	One test per each 2,500 square feet per lift (minimum five tests per lift)

3.8 Groundwater Control/ Dewatering

Groundwater conditions were encountered at depths that ranged between approximately six (6) feet and 15 feet below the existing ground surface, corresponding to elevations of between approximately +/-Elev. +97.5 feet. and +/-Elev. +110 feet. Based on a review of the regional geology and topography, a stream at approximately elevation 110 feet is present to the north of Locust Avenue. As such, we recommend that a groundwater elevation of 110 feet be utilized for construction and design purposes.

Construction dewatering requirements are anticipated to be moderate, consisting primarily of control of surface water runoff and water seepage into excavations especially when removing unsuitable materials which may extend to up to 13 feet below the existing ground surface. It is anticipated that dewatering can typically be accomplished by open pumping from sumps, temporary ditches, and trenches within and around excavations.

Dewatering systems, should be designed and operated as not to undermine the neighbor's structures (i.e. drawdown the water table below adjacent structures) and wash soil fines out. The design of such system is beyond our scope of this report and should be designed by a New Jersey State licensed professional engineer.

Surface water runoff during construction should be controlled and directed away from excavations, as on-site soils are highly erodible and susceptible to disturbance due to water and frost action. When exposed, it may be difficult to prepare and maintain soil subgrades in cold and wet weather.

3.9 Excavation and Shoring

Although we do not anticipate the need for temporary excavation support at the site, excavations performed near the property boundaries may require excavation support (SOE) to protect adjacent properties. In addition, excavation to remove the deep existing fill materials and remnant foundation elements may require the use of an SOE system. Care must be exercised during excavations in areas next to adjacent existing developments (roads, neighboring buildings, and utilities). Excavations must be conducted in such a manner not to undermine these existing buildings foundation elements or disturb the bearing surfaces. All excavation, excavation support, and backfilling must be performed in accordance with OSHA and all other applicable local, state, and federal regulatory requirements.

Generally, the site near surface soils encountered during the investigation are consistent with Type C Soil Conditions as defined by 29 CFR Part 1926 (OSHA) which require a maximum unbraced excavation angle of 34 degrees (1.5H:1V). Excavation extending below groundwater should be maintained a minimum slope of (3H:1V). These unbraced excavation angles assume that there is no surcharge load at the top of the excavation slope (such as, neighboring building footings and slabs, construction equipment and materials, etc.) if such loads exist, then the unbraced excavation angle should be specifically evaluated for these conditions a professional engineer licensed in the State of New Jersey. Actual conditions encountered during construction should be evaluated by a competent person (as defined by OSHA) to ensure that safe excavation methods and/or shoring and bracing requirements are implemented.

Some sloughing and raveling should be anticipated in temporary earth slopes. Sloughing should be monitored to confirm that bearing soils within the zone of influence (ZOI) of adjacent structures or utilities are not compromised. The ZOI is defined as the area below the footings and below imaginary lines that extend two feet laterally beyond the footing outer bottom edges and down on a one horizontal to one vertical (1H:1V) slope to the naturally deposited bearing soils.

Excavations directly adjacent to existing buildings/properties or public utilities will require temporary excavation support. Any excavation support installed will need to accomplish the following objectives:

- Retain the excavation and minimize the effects of excavation movements beyond the limits of the site;
- Allow for the excavation the at the site; and

- Permit foundation construction to proceed in the "dry", given groundwater conditions may be encountered during unsuitable materials removal activities.

Care must be exercised during excavations within 15 feet next to adjacent existing developments (roads, building, and utilities) and neighboring buildings foundations zone of influence (ZOI). These excavations must be conducted in such a manner not to undermine these existing buildings foundation elements and disturb the bearing services and under the direction and system design of a professional engineer licensed in the State of New Jersey.

3.10 Excavated Soil Management

We expect excavations to construct the building may generate excess soils that will require handling and possible off-site disposal by the Contractor. Off-site disposal of soils may require testing in accordance with applicable New Jersey Department of Environmental Protection (NJDEP) regulations and disposal facility acceptance criteria. Balancing the amount of cut and fills required for the project could preclude the need for such testing that could be required by disposal facilities. We recommend that this issue be addressed in advance of construction or preparation of contract documents.

3.11 Adjacent Structures

Due to the proximity of existing structures, including roadways and neighboring buildings, every effort to protect these structures during and after construction should be taken. The design of such protection systems is beyond the scope of this report. If support of excavation systems are required, they should be design by a professional engineer licensed in the State of New Jersey to protect the neighboring properties by employing such measures during design and taking into account the subsurface soils and groundwater information and the neighbors building foundation setting and conditions. The SOE contractor should demonstrate to the owner the completion of five recent successful similar SOE projects and have comprehensive experience with SOE and construction. Buried utilities and other structures observed at the site may need to be moved or supported so as not to interfere or be damaged by the new construction.

4. Geotechnical Design Recommendations

4.1 General

Based on our understanding of the proposed development and the subsurface conditions encountered during our investigation, we recommend that the building be supported on shallow footings bearing directly on the medium dense to very dense sand deposits of Stratum II, or on compacted granular fill (CGF), following the removal of all unsuitable materials. Additionally, the lowest building slab should be supported on a conventional soil supported slab-on-grade following the removal of any unsuitable materials and the preparation of the bearing subgrade as discussed in Section 3.4. *If overexcavation of the existing fill materials at the site is ultimately not economical, the use of deep foundations such as driven piles to support the building columns and walls would be required. Additionally, if the building columns and walls are ultimately supported on deep foundation system, we recommend that the lowest building slab be designed and constructed as a pile supported structural slab.*

This foundation investigation has been prepared for the Proposed 44-Unit Residential taking into consideration the property limits, assumed site grading, and assumed column loadings as understood at the time this report was prepared. When and if further information is developed by the project team concerning final design column loadings, building configuration, etc., for the structure, the recommendations and design criteria presented herein should be reviewed by JZN. If any changes to our recommendations should result from this review, we will confirm these changes in writing.

4.2 Suggested Soil Parameters for Analysis and Design

Soil properties for engineering evaluation have been developed based on visual soil classification, penetration test data, published data, laboratory test results, and our experience with similar formations in the area of the project. The suggested soil properties listed in the order of depth are provided in Table 4. These properties have been used to develop the evaluation and recommendations contained in this report.

Table 4: Suggested Density and Strength Parameters for Design

Soil Stratum	Unit Weight (pcf[1])		Strength Parameters			
	Total	Submerged	Drained Strength		Undrained Strength	
			c (psf)[2]	ϕ^o	S_u (psf)	ϕ^o
Compacted Granular Fill[3]	125	63	0	34	0	34
Existing Fill Materials	115	53	0	29	0	29
Glacial Deposits (SM, GM)	125	63	0	34	0	34

Notes:
1- Pounds per cubic feet (pcf)
2- Pounds per square foot (psf)
3- Based on attaining the minimum required compaction as recommended in Section 3.5

4.3 Suggested Soil Parameters for Seismic Load Evaluation

The subject site area is considered to be an area of low to moderate seismic risk. The applicable design standard selected for seismic load evaluation is based on the NJBC-2021 Section 1613. Published data for the USGS Seismic Hazard Website provides seismic acceleration criteria for Site Class "B" or soft rock with shear wave velocities between 2,500 and 5,000 feet per second. The seismic site characteristics are based on average blow counts and undrained shear strength in the upper 100 feet of the profile and under. In our opinion, the conditions at the site subsurface profile indicate that the site characteristics correspond to Site Class "D". The parameters have been modified for Site Class "D" characteristics which are representative of the appropriate design class using procedures contained in the NJBC–2018 as indicated in Table 5 below. Code loadings are generally based on the two percent probability of exceedance event with modifying factors.

Table 5: Seismic Response Criteria for Site Class "D" Based on the NJBC-2021	
Spectral Response Acceleration at 0.2 Sec. Period	Spectral Response Acceleration at 1.0 Sec. Period
S_s= 0.288g	S_1= 0.06g
F_a= 1.57	F_v= 2.4

Based on the site soil profile, groundwater, and soil relative densities, the potential for liquefication is considered low.

4.4 Foundations

4.4.1 General Discussion

Based on our understanding of the proposed development and the subsurface conditions encountered during our investigation, we recommend that the building be supported on shallow footings bearing directly on the medium dense to very dense sand deposits of Stratum II, or on compacted granular fill (CGF), following the removal of all unsuitable materials. Additionally, the lowest building slab should be supported on a conventional soil supported slab-on-grade following the removal of any unsuitable materials and the preparation of the bearing subgrade as discussed in Section 3.4. If overexcavation of the existing fill materials at the site is ultimately not economical, the use of deep foundations such as driven piles to support the building columns and walls would be required. Additionally, if the building columns and walls are ultimately supported on deep foundation system, we recommend that the lowest building slab be designed and constructed as a pile supported structural slab.

4.4.2 Shallow Foundations

Following the preparation of the foundation subgrade as recommended in Section 3.4 of this report, the proposed building columns and walls can be supported on conventional shallow footings as discussed herein.

The proposed shallow foundation subgrades should bear on the medium dense to very dense natural sand deposits of stratum II, or Compacted Granular Fill following the removal of the existing fill materials and any unsuitable materials encountered during foundation preparation activities and replacement with CGF in a controlled manner. Disturbance to the foundation subgrades should be minimized. We recommend that the exposed subgrades be compacted to an unyielding surface prior to the construction of the footings. Areas of "soft-spots" as determined in the field by a Geotechnical Engineer should be over-excavated and replaced with CGF.

We recommend that foundations bearing on the natural sand deposits or CGF be designed using an allowable bearing pressure of six (6) kips per square foot (ksf) for axial loading conditions. A maximum footing contact pressure of eight (8) ksf is acceptable for eccentric loading conditions as long as the maximum contact pressure acts over less than 33 percent of the footing contact area and the average contact pressure over the entire footing does not exceed six (6) ksf. We recommend that continuous wall footings should be sized no less than min. dimensions of 24 inches and isolated foundations be sized no less than 36 inches.

Any footings to be constructed adjacent to an existing building foundation should be lowered to bear at the same elevation as the existing building's existing foundation, or the existing building foundations should be underpinned as designed by others. The zone of influence of new foundation should fall below the existing neighboring building foundations.

Lateral loads can be resisted by a combination of friction along the base of the footings and passive pressure on the vertical faces of footings. Frictional resistance should be computed using an ultimate base friction coefficient (tan δ) between the footing concrete & naturally deposited soils or CGF equal to 0.35.

The passive resisting pressure of the soil between the top of the footing to the bottom of the footing should be ignored unless it is confined by concrete slab. If the horizontal distance between adjacent footings or walls is less than twice the height of the subject structural element (measured from bottom of element to bottom of slab/ground surface), the passive pressure must be discounted proportionately to the distance (full pressure at twice the height away) to accommodate for interaction of the elements.

At the recommended allowable bearing pressure, we anticipate that the maximum post construction settlement of isolated shallow foundations under static loading conditions, constructed as recommended herein, will not exceed one inch, and differential settlement between adjacent foundation elements will be less than 1/2-inch. Our settlement estimate is based on the design column loads for similar structures. Most of the settlement should occur during construction, shortly after structure dead loads are placed on the foundations and during the initial snow loading of the roof.

Bottoms of exterior footings should be founded a minimum of three feet (36 inches) below the lowest adjacent ground surface exposed to freezing. Interior footings not subject to frost action could be placed at a minimum depth of 24 inches below the slab subgrade.

4.4.3 Deep Foundations – Driven Steel H-Piles

As previously noted, if overexcavation of the existing fill materials at the site is ultimately not economical, the use of deep foundations such as driven piles to support the building columns and walls would be required. We preliminarily recommend that the proposed building be supported on driven steel H-piles. Due to sudden refusal materials potentially resulting in broken piles and limited axial load capacities (maximum 30 tons) we do not recommend the use of driven timber piles. Additionally, due to the presence of cobbles and boulders potentially causing buckling of the pile and the potential for increase vibrations due to soil displacement in the upper fill materials, we do not recommend the use of driven steel pipe piles. However, these alternate piles may be viable pending contractor and structural engineer recommendations and review. Drilled piles are also viable for this project, but typically have an increased expense and project schedule and, as such, are not recommended at this time.

The proposed building columns and bearing walls may be supported on a deep foundation system consisting of driven steel H-piles. The H-piles flanges projections shall not exceed 14 times the minimum thickness of steel in either the flange or the web and the flange widths shall not be less than 80 percent of the depth of the section. The H-pile should be driven to capacity within the very dense glacial deposits. We estimate that the pile will achieve driven capacity at approximately 35 feet below the existing ground surface. However, it should be anticipated that, based on the soil exploration borings refusals, the driven piles may achieve capacity shallower at varying locations across the site. Due to the presence of potential cobbles and boulders, the H-piles should all be installed with a cutting/driving shoe to minimize pile damage and increase penetration.

Allowable structural pile capacities were estimated in accordance with section 1810.3.2.6 of the NJBC-2021. For purposes of evaluating the steel piles, an allowable stress of 50% of the piles yield stress was utilized to determine the allowable structural capacity. Upon determining the axial capacity, 1/16 inches reduction in the pile wall thickness was taken into account for corrosion consideration.

Higher allowable capacities may be used if load test is carried out in accordance to Section 1810.3.2.6 of the NJBC-2021. The maximum allowable axial compressive load can be achieved with a factor of safety of at least 2.0 as summarized in Table 6. The design capacity selected by the structural engineer should be equal to or less than the allowable capacity; however, we should be contacted to revise the recommendations of this section if the structural engineer selects a design capacity other than recommended herein.

Table 6: Driven Steel H-Piles Axial Capacities		
Pile Size[1,2]	**Yield Strength of Steel (ksi)**	**Allowable Axial Load (F.S. = 2)**
HP 10x42	50 ksi	55 tons
HP12x53	50 ksi	75 tons

Notes:
1. Steel Grade minimum meet ASTM A252 Grade 50 steel
2. Allowable axial capacity larger than 40-tons require wave equation analysis & load test NJBC-2021 Sec. 1810.3.3.1.2.

Pile uplift capacities are calculated based on the combination of the weight of the pile and pile skin friction ignoring the upper 5 feet of the pile and using a factor of safety of three. The following uplift capacities summarized in Table 7 may be used for design:

Table 7: Driven Steel H-Piles Uplift Capacities		
Pile Size	**Yield Strength of Steel (ksi)**	**Allowable Uplift Load (F.S. = 3)**
HP 10x42	50 ksi	10 tons
HP 12x53	50 ksi	13 tons

Notes:
1. Steel Grade minimum meet ASTM A252 Grade 50 steel

In accordance to NJBC-2021 Section 1810.3.3.1.5, the factor of safety associated with Allowable Uplift Capacity can be reduced from FS = 3, to FS = 1.5 provided that an uplift load on the pile is due to wind or seismic loading conditions.

Splicing may be by a combination of mechanical splices, groove welds and butt welds in the case of piles subjected to axial compressive and uplift loads, as approved by the project engineer. The splice welds should be continuous and designed to carry the design uplift load of the pile. The contractor should submit the calculations for the weld design for the engineer of record if splicing is proposed for this project. Pile splices and welds should be designed and constructed in accordance to NJBC-2021 Section 1810.3.6.

Pile lateral capacities are calculated based on the maximum lateral load that produces a maximum deflection of one-inch at the pile top with a minimum factor of safety of 2.0 as per NJBC-2021 Section 1810.3.3.2. The lateral capacities of the individual piles vary depending on the pile head condition (i.e. pinned head or fixed head). The following lateral pile capacities summarized in Table 8 may be used for design and utilize a minimum factor of safety of 2 and a maximum allowable pile head deflection of one (1) inch at ultimate load.

Table 8: Driven Steel H-Piles Lateral Load Capacities

Pile Size[1,2,]	**Yield Strength of Steel (ksi)**	**Allowable Lateral Load on Strong Axis (F.S. = 2)**	**Allowable Lateral Load on Weak Axis (F.S. = 2)**
HP 10x42	50 ksi	4.0 tons	2.5 tons
HP 12x53	50 ksi	5.0 tons	3.5 tons

Notes:
1- All Pile Casing at minimum meet ASTM A252 Grade 3 steel
2- Maximum allowable deflection under ultimate load is one inch.

Pile group efficiency for the above-stated axial compression capacities is 1.0, provided that the pile spacing within groups is at least three pile diameters, center-to center. Closer pile spacing within a pile cap will result in smaller pile efficiency thus reduce pile group capacity. If closer pile spacing resulted during the design, we request notification to reanalyze the pile group capacity based on the selected pile spacing.

Bottom of pile caps exposed to freezing temperatures (frost action) should be placed at least 36 inches below adjacent exterior grades to provide protection from frost penetration. The bottom of interior pile caps not subject to frost action may be placed at a minimum depth of 18 inches below the slab subgrade.

Static load tests will not be required for such capacity piles. However, pile dynamic load tests should be conducted and allotted for during construction to verify the design axial capacity and establish the driving criteria which depends on the pile/hammer driving energy selected by the contractor. In addition, WEAP analysis should be carried out and the results should be submitted to the geotechnical engineer for review prior to the commencement of the pile driving operation. The purpose of the WEAP analysis is to evaluate the stresses acting on the pile during pile driving to maintain the pile integrity and ensure that the driving stress does not exceed the pipe allowable stress.

In order to allow for the use of the higher allowable axial capacities, we recommend that 5% of the number of piles, or a minimum of three piles be installed and dynamically load tested using the Pile Driving Analyzer (PDA) under the inspection of a professional engineer to determine pile driving criteria and confirm the wave equation analyses for steel piles. The analyses should be performed on the first pile driven at the site and submitted for review before commencing the remainder of the driving operations. Static load tests are not required based on the recommendations provided in this report.

Inspection should be maintained by a professional engineer during pile installations to record driving resistance, elevations, and to confirm that the required installation criteria are achieved. Tips of the production piles must reach the proposed bearing stratum regardless of blow counts recorded in the overlying strata.

4.5 Lowest Building Slab

4.5.1 Lowest Building Slab- Slab-on-Grade

Following the preparation of the slab subgrade as recommended in Section 3.4 of this report, the proposed lowest building slab should be designed as concrete slab-on-grade in accordance with the following:

The lowest floor slab should be designed as a soil-supported, concrete slab-on-grade. It is recommended that the lowest building slab be placed on a minimum six (6) inches thick layer of compacted crushed stone. We recommend that a vapor barrier in accordance to ACI 302 with a minimum thickness of 10 mils be used. The vapor barrier should be placed on top of the crushed stone below the bottom of the slab. If more durability is needed to protect against the barrier tears during construction, we recommend that a thicker or more puncture resistant product, confirming to ASTM E 2856 Class A, be used if heavy construction equipment may be operated directly on the vapor barrier. Slab subgrade conditions should consist of crushed stone placed over medium dense to very dense sand deposits, or compacted granular fill following the removal of all unsuitable materials.

Slab design typically requires a modulus of subgrade reaction (Winkler spring) or a similar elastic analysis method to determine thickness and reinforcing requirements for the concrete slab-on-grade. We recommend that a modulus of subgrade reaction (ks) of 200 pounds per square inch per inch (psi/in) be used for slab-on-grade constructed on medium dense to very dense sand deposits of stratum II on or compacted granular fill. The recommended modulus value provided is for a one-foot square plate and must be corrected for slab size.

Post-construction settlements of slab-on-grade designed and installed in accordance with the recommendations outlined in this report are estimated to be on the order of 1/2-inch.

4.5.2 Structural Slab

Where a deep foundation system is utilized, the lowest building floor slab can be designed and constructed to be supported on a deep foundation system as recommended in Section 4.4. Typically, this can be achieved either directly by thickening and structurally reinforcing the slab at deep foundation element locations, or indirectly by supporting a structurally reinforced slab on a network of deep foundation element supported grade beams.

4.6 Hydrostatic Pressure

While groundwater conditions were encountered below the proposed finished floor elevation, any sections of the building such as elevator shaft, etc., designed to be below the groundwater table should be designed to resist the relative hydrostatic pressure. A value of 63 pounds per square feet per foot below the groundwater table (psf/ft.) and 1.2 factor should be applied to the final acting uplift force. For evaluating flood conditions, use the Base Flood Elevation (BFE) for the project area.

4.7 Underslab & Foundation Drainage and Waterproofing

We recommend that building walls, lowest building slabs, elevator pits and ejector pits and any other elements extending below the adjacent ground surface should be waterproofed. To help to reduce the potential for minor infiltration into building areas, joints in concrete walls are typically sealed with waterstops and the walls backed by waterproofing.

If the water proofing product selected for the slab does not act as a vapor barrier, of if waterproofing will not ultimately be utilized for this building, we recommend that a vapor barrier in accordance to ACI 302 with a minimum thickness of 10 mils be place below the building lowest floor slab. The vapor barrier should be placed on top of the crushed stone below the bottom of the slab. If more durability is needed to protect against the barrier tears during construction, we recommend that a thicker or more puncture resistant product, confirming to ASTM E 2856 Class A, be used if heavy construction equipment may be operated directly on the vapor barrier.

4.8 Lateral Earth Pressures

Design below-grade walls using recommendations for restrained or unrestrained walls as appropriate. Earth pressures for restrained walls should be computed considering at rest conditions, and unrestrained walls should be designed considering active conditions. Typically, restrained walls are braced at the top, and unrestrained below-grade walls are not braced at the top. The following recommendations assume grades are level to a distance equal to the wall height behind the wall, the walls are backfilled with Compacted Granular Fill (CGF). Hydrostatic pressures are not considered if the walls will be drained. If the drainage system is not installed, hydrostatic pressures should be included in the design with a design groundwater depth at existing ground surface elevation.

The effect of surcharge pressure should be included in earth pressure calculations, including the loads imposed by adjacent foundations, structures, and traffic. The following recommendations assume grades are level to a distance equal to the wall height behind the wall. The parameter values presented in Table 9 can be used to calculate earth pressures.

Table 9: Lateral Earth Pressure Parameters

Material	Internal Friction Angle (deg)	Moist Unit Weight (pcf)[1]	Active Earth Pressure Coefficient K_a	Passive Earth Pressure Coefficient K_p	At-Rest Earth Pressure Coefficient K_o	Earthquake Induced Active Pressure Coefficient K_{AE}
Compacted Granular Fill (CGF)[2]	34	125	0.283	3.537	0.441	0.440
Existing Fill Materials	29	115	0.347	2.882	0.515	0.490
Sand Deposits (SM, GM)	34	125	0.283	3.537	0.441	0.440

Notes:
1- Pounds per cubic feet (pcf)
2- Based on attaining the minimum required compaction as recommended in Section 3.5

For seismic loading conditions, walls should be designed to resist static plus seismic earth pressures. Surcharge loading does not need to be considered for seismic design unless the surcharge will be applied over an extended time. It is recommended that the lateral loads and base shear forces developed by the structure during a seismic event be resisted by earth pressures against foundation walls. During an earthquake occurrence, additional transient pressures will develop against the exterior retaining structures such below ground walls of the structure due to the inertia effect of the surrounding soil strata. Top and bottom braced walls are relatively rigid and non-yielding. This condition should be taken into account in determining the seismically induced component of the lateral earth pressure. Retaining structures should be designed for a minimum factor of safety against sliding and overturning of 1.5.

5. ADDITIONAL CONSIDERATIONS

5.1 Specification and Plan Review

It is recommended that JZN be provided the opportunity for a general review of final plans and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

The recommendations presented herein are based on assumed grading and foundation layouts. We request notification upon completion of final plans.

5.2 Construction Testing and Monitoring

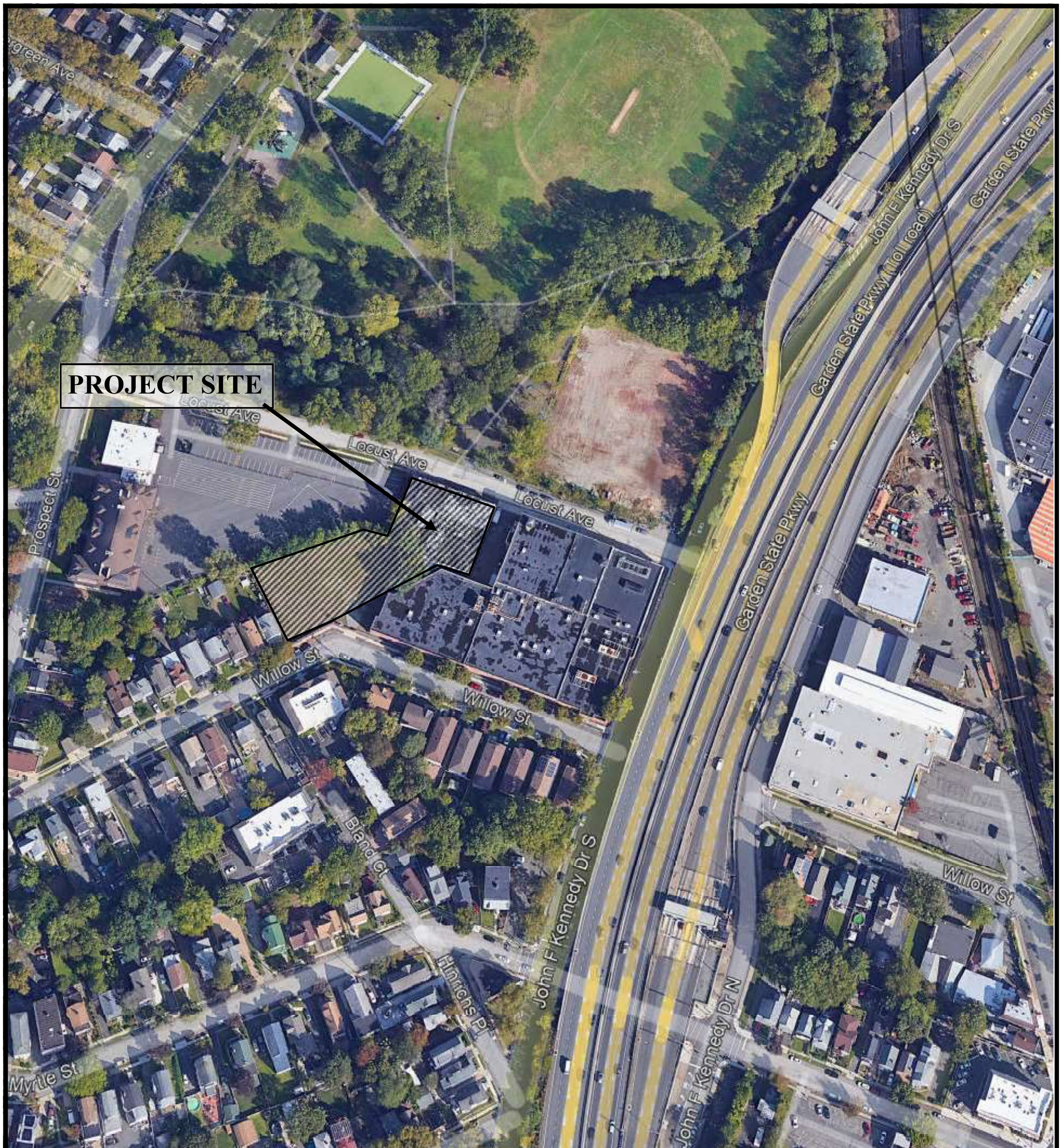
The recommendations contained in this report are based on known and reasonably predictable behavior of properly engineered and constructed foundations and other facilities. A Geotechnical Engineer should perform quality control, testing, and consultation during construction as described in previous Sections of this report. Monitoring and testing also should be performed to verify that the recommendations contained in this report are implemented. Geotechnical construction monitoring should include:

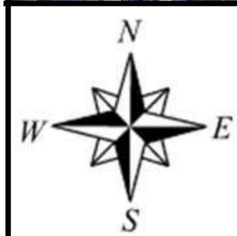
- Removal of unsuitable soil materials;
- Preparation of slab, footing, and fill subgrades prior to concrete placement;
- Installation of temporary excavation support systems, if one is used;
- Construction of footings and building slab-on-grade
- Pile driving and testing; and
- Testing and placement of backfill materials.

6. Limitation

The recommendations contained in this report represent our best professional judgment based on soils conditions encountered in the test borings performed for this study, and the structural and grading design criteria described in the report. Variations in the types of structures and design grading may change from the criteria assumed in preparation of the report. JZN should be advised of changes in the design criteria so that an evaluation can be made to determine if design recommendations should be revised. The nature and extent of variations in subsurface conditions between explorations may not become evident until construction. If variations appear, it may be necessary to reevaluate the information presented in this report. Conditions may be encountered during construction beyond and between borings that vary from the conditions reported herein. We recommend that foundation construction, earthwork and subgrade preparation be observed by a qualified Geotechnical Engineer familiar with the anticipated conditions and the basis of the foundation design recommendations. Any variations encountered should be brought to our attention so that their effect on the recommendations presented herein can be reevaluated and modified if necessary. Our work has been performed in accordance with current standards of practice for geotechnical engineering for buildings based on the conditions encountered in the explorations. No other warranty is made, either expressed or implied.

FIGURES





GOOGLE EARTH 2022

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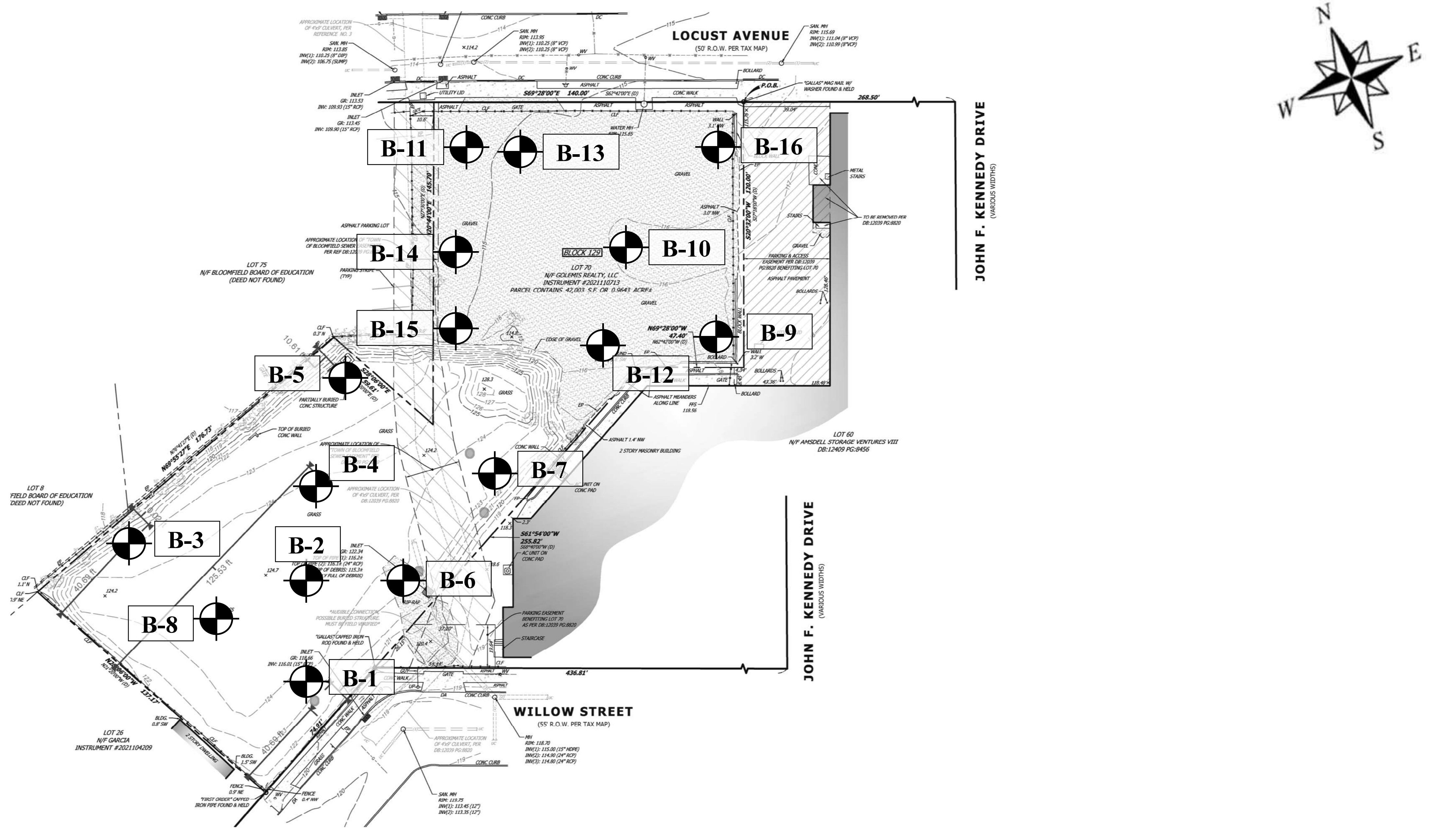
PROPOSED 44-UNIT RESDIDENTIAL BUILDING
78-88 LOCUST AVENUE, BLOCK 129; LOT 70
CITY OF BLOOMFIELD, ESSEX COUNTY, NEW JERSEY
23117-000

PROJECT SITE LOCUS

FIGURE 1



LEGEND

B-1: APPROXIMATE SOIL EXPLORATION BORING LOCATION

NOTES

BASE PLAN OBTAINED FROM AN APRIL 11, 2022 *BOUNDARY AND TOPOGRAPHIC SURVEY* PREPARED BY NEGLIA ENGINEERING ASSOCIATES.

SOIL EXPLORATIONS WERE LOCATED IN THE FIELD BY A REPRESENTATIVE OF JZN ENGINEERING, PC. USING NORMAL TAPING PROCEDURES AND ESTIMATED RIGHT ANGLES FROM EXISTING SITE FEATURES AND ARE PRESUMED ACCURATE WITHIN FEW FEET.

THE SOIL EXPLORATION BORINGS WERE DRILLED BY DIAMOND DRILLING, INC. OF PORT JERVIS, NEW YORK IN THE PRESENCE OF A JZN ENGINEER BETWEEN OCTOBER 24, 2022 AND OCTOBER 27, 2022.

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PROPOSED 44-UNIT RESIDENTIAL BUILDING
78-88 LOCUST AVENUE, BLOCK 129; LOT 70
TOWNSHIP OF BLOOMFIELD, ESSEX COUNTY, NEW JERSEY
23117-000

BORING LOCATION PLAN

SCALE: NOT TO SCALE

FIGURE 2

APPENDIX A

EXPLORATION RECORDS

SOIL EXPLORATION BORINGS: B-1 THROUGH B-16

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-1 Page 1 of 2

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/24/2022
Ground Surface Elev.	+/- 122.5 ft. **Datum** NAVD '88	**Date Finished**	10/24/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/24/22	2:00 PM	5.0	17.0	15.0	7.0
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0	S-1 7 in.	0- 2 ft	2 2 2 3	T.S. Fill	Cover: +/- 6 inches of top soil Reddish brown medium to fine sand, some silt, some gravel, little debris, dry Debris: Brick	
	S-2 3 in.	2- 4 ft	6 7 8 8	Fill	Reddish brown medium to fine sand and gravel, some silt, trace debris, dry Debris: Brick and concrete	
5	S-3 2 in.	4- 4.2 ft	50/2"	Fill	Reddish brown medium to fine sand and gravel, some silt, trace debris, dry Debris: Brick and concrete +/- 6.0'	-Installed casing to 5 feet after S-3 -Hard and slow drilling from 5 to 6 feet
10	S-4 16 in.	10- 12 ft	19 21 30 14	SM	Reddish brown fine SAND, some Silt, little Gravel, very dense, mosit	
15	S-5 10 in.	15- 17 ft	37 13 16 16	SM	Reddish brown fine SAND, some Gravel, some Silt, medium dense, wet	
20	S-6 15 in.	20- 22 ft	34 28 26 29	SM	Reddish brown fine SAND, some Silt, trace Gravel, very dense, wet	-Rig chattering at 21 and 23 feet
25						

Summary	Overburden (Linear ft)	25.8	Rock Cored (Linear ft)	--	No. of Samples 7

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-1 Page 2 of 2
Project Name Proposed 44-Unit Residential Building		**Project No.** 23117-000

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
25						
	S-7 7 in.	25- 25.8 ft	50 50/3"	SM	Reddish brown medium to fine SAND, some Gravel, some Silt, very dense, wet +/- 25.8'	
					Exploration Boring B-1 Terminated Approximately 25.8 Feet Below the Existing Ground Surface	
30						

Summary	Overburden (Linear ft)	25.8	Rock Cored (Linear ft)	--	No. of Samples	7

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-2 Page 1 of 2

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/24/2022
Ground Surface Elev.	+/- 124.7 ft. **Datum** NAVD '88	**Date Finished**	10/24/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/25/22	8:10 AM	8.0	17.0	15.0	16.0
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0	S-1 6 in.	0- 2 ft	3 5 7 8	T.S. Fill	Cover: +/- 6-inches of top soil Fill: Brown medium to fine sand, some sillt, trace debris, moist Debris: Concrete	
	S-2 10 in.	2- 4 ft	9 6 5 3	Fill	Fill: Reddish brown medium to fine sand, little silt, little gravel, moist	
5	S-3 7 in.	4- 6 ft	2 5 7 7	Fill	Fill: Reddish brown medium to fine sand, little silt, little gravel, moist	
	S-4 10 in.	6- 8 ft	7 9 7 6	Fill SM	Fill: Reddish brown medium to fine sand, some silt, little gravel, trace debris, moist Debris: Brick +/- 7.0' Reddish brown medium to fine SAND, some Silt, little Gravel, medium dense, moist	
	S-5 4 in.	8- 10 ft	3 3 12 17	SM	Reddish brown medium to fine SAND, little Silt, little Gravel, medium dense, moist	
10	S-6 11 in.	10- 12 ft	25 28 33 30	SM	Reddish brown medium to fine SAND, some Gravel, little Silt, very dense, moist	-Installed casing to 10 feet after S-6
15	S-7 15 in.	15- 17 ft	13 12 18 20	SM	Reddish brown fine SAND, some Silt, dense, wet	
20	S-8 12 in.	20- 22 ft	23 26 27 27	SM	Reddish brown fine SAND, some Silt, very dense, wet	
25						

Summary	Overburden (Linear ft)	26.8	Rock Cored (Linear ft)	--	No. of Samples	9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-2 Page 2 of 2
Project Name Proposed 44-Unit Residential Building		**Project No.** 23117-000

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
25	S-9 6 in.	25- 26.8 ft	22 49 44 50/4"	SM	Reddish brown fine SAND, some Silt, some Gravel, very dense, wet	
					Exploration Boring B-2 Terminated Approximately 26.8 Feet Below the Existing Ground Surface	
30						
Summary	Overburden (Linear ft)	26.8			Rock Cored (Linear ft) --	No. of Samples 9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-3 Page 1 of 2

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/24/2022
Ground Surface Elev.	+/- 123.0 ft. **Datum** NAVD '88	**Date Finished**	10/24/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/25/22	8:00 AM	3.0	17.0	15.0	22.0
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0				T.S.	Cover: +/- 3-inches of top soil	
	S-1 2 in.	0- 2 ft	9 6 9 7	Fill	Fill: Brown medium to fine sand, some silt, moist	
	S-2 4 in.	2- 4 ft	5 6 6 6	Fill	Fill: Brown medium to fine sand, some silt, some gravel, dry	
5	S-3 6 in.	4- 6 ft	6 7 8 10	Fill	Fill: Reddish brown medium to fine sand, some gravel, little silt, dry	
	S-4 7 in.	6- 8 ft	12 7 6 5	Fill	Fill: Brown medium to fine sand, some gravel, trace debris, dry Debris: Concrete +/- 8.0'	
	S-5 10 in.	8- 10 ft	5 5 11 15	SM	Reddish brwon fine SAND, some Gravel, little Silt, medium dense, dry	
10	S-6 10 in.	10- 12 ft	22 23 36 34	SM	Reddish brwon fine SAND, some Gravel, little Silt, very dense, dry	-Installed 5 feet of casing after S-6
15	S-7 12 in.	15- 17 ft	5 5 7 6	SM	Reddish brown medium to fine SAND, some Gravel, little Silt, medium dense, wet	
20	S-8 10 in.	20- 22 ft	19 25 26 46	GM	Reddish brown GRAVEL, some medium to fine Sand, some Silt, very dense, wet	-Rig chattering at 21 feet
						-Rig chattering and slow drilling at 23 feet
25						

Summary	Overburden (Linear ft)	27	Rock Cored (Linear ft)	--	No. of Samples	9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-3 Page 2 of 2
Project Name Proposed 44-Unit Residential Building		**Project No.** 23117-000

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
25	S-9 16 in.	25- 27 ft	28 20 24 36	SM	Reddish brown medium to fine SAND, some Gravel, some Silt, dense, wet +/- 27.0'	
					Exploration Boring B-3 Terminated Approximately 27 Feet Below the Existing Ground Surface	
30						

Summary	Overburden (Linear ft) 27	Rock Cored (Linear ft) --	No. of Samples 9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-4 Page 1 of 2

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/24/2022
Ground Surface Elev.	+/- 124.5 ft. **Datum** NAVD '88	**Date Finished**	10/25/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/25/22	8:30 AM	8.0	17.0	15.0	20.0
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0	S-1 6 in.	0- 2 ft	2 13 8 8	T.S. Fill	Cover: +/- 2-inches of top soil Fill: Reddish brown medium to fine sand, some gravel, little silt, trace debris, moist Debris: Asphalt	
	S-2 6 in.	2- 4 ft	4 5 5 5	Fill	Fill: Reddish brown medium to fine sand, some gravel, little silt, trace debris, moist Debris: Asphalt	
5	S-3 8 in.	4- 6 ft	6 19 6 4	Fill	Fill: Reddish brown medium to fine sand, some gravel, little silt, little debris, moist Debris: Concrete +/- 6.0'	
	S-4 2 in.	6- 8 ft	3 3 4 5	SM	Reddish brown medium to fine SAND, some Silt, little Gravel, loose, moist	
	S-5 12 in.	8- 10 ft	9 5 7 11	SM	Reddish brown medium to fine SAND, some Silt, little Gravel, medium dense, moist	
10	S-6 11 in.	10- 12 ft	5 20 26 37	SM	Reddish brown medium to fine SAND, some Silt, little Gravel, dense, moist	-Installed 10 feet of casing after S-6
15	S-7 16 in.	15- 17 ft	16 15 16 20	SM	Reddish brown fine SAND, some Silt, dense	
20	S-8 18 in.	20- 22 ft	16 18 23 19	SM	Reddish brown fine SAND, little Silt, trace Gravel, dense, wet	
25						
Summary	Overburden (Linear ft)		25.3	Rock Cored (Linear ft)	--	No. of Samples 9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-4 Page 2 of 2
Project Name Proposed 44-Unit Residential Building		**Project No.** 23117-000

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
25						
	S-9 4 in.	25- 25.3 ft	50/4"	GM	Reddish brown GRAVEL, some medium to fine Sand, little Silt, very dense, wet +/- 25.3'	
					Exploration Boring B-4 Terminated Approximately 25.3 Feet Below the Existing Ground Surface	
30						
Summary		Overburden (Linear ft)		25.3	Rock Cored (Linear ft) --	No. of Samples 9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-5 Page 1 of 2

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/25/2022
Ground Surface Elev.	+/- 122.5 ft. **Datum** NAVD '88	**Date Finished**	10/25/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/25/22	10:30 AM	8.0	17.0	15.0	15.0
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0	S-1 12 in.	0- 2 ft	4 4 4 4	T.S. Fill	Cover: +/- 6 inches of top soil Fill: Reddish brown medium to fine sand, some gravel, little silt, trace debris, moist Debris: Brick	
	S-2 4 in.	2- 2.6 ft	6 50/1"	Fill	Fill: Reddish brown medium to fine sand, some gravel, little silt, trace debris, moist Debris: Brick	
5					+/- 6.0'	-Obstruction from 2.6 to 4.5 feet -Water circulation lost at 5 feet -Installed 5 feet of casing after S-2
	S-3 7 in.	6- 8 ft	6 7 8 13	SM	Reddish brown medium to fine SAND, some Gravel, little Silt, medium dense, dry	-Advanced casing to 8 feet after S-3
10	S-4 12 in.	10- 12 ft	8 8 17 24	SM	Reddish brown medium to fine SAND, little Silt, little Gravel, mediumd dense, moist	
15	S-5 16 in.	15- 17 ft	15 14 22 21	SM	Reddish brown fine SAND, some Silt, dense, wet	
20	S-6 10 in.	20- 22 ft	15 23 50/1"	SM	Reddish brown fine SAND, some Silt, very dense, wet	-Rig chattering at 21 feet
25						

Summary	Overburden (Linear ft)	25.8	Rock Cored (Linear ft)	--	No. of Samples	7

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-5 Page 2 of 2
Project Name Proposed 44-Unit Residential Building		**Project No.** 23117-000

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
25						
	S-7 7 in.	25- 25.8 ft	33 50/4"	SM	Reddish brown medium to fine SAND, some Gravel, some Silt, very dense, moist +/- 25.8'	
					Exploration Boring B-5 Terminated Approximately 25.8 Feet Below the Existing Ground Surface	
30						

Summary	Overburden (Linear ft)	25.8	Rock Cored (Linear ft)	--	No. of Samples	7

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-6 Page 1 of 1

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/25/2022
Ground Surface Elev.	+/- 123.5 ft. **Datum** NAVD '88	**Date Finished**	10/25/2022

Item	**Casing**	**Sampler**	**Core Barrel**	**Rig Type**	**Water Level Data**					
					Date	**Time**	**Bottom of Casing (ft)**	**Bottom of Boring (ft)**	**Water (ft)**	**Cave In (ft)**
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb.)	--	140		**Drill Mud**	Not Encountered					
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	**Sample No. & Rec. (in)**	**Sample Depth (ft)**	**Sampler Blows per 6 inches**	**USCS Symbol**	**Visual Classification**	**Remarks**
0						
	S-1 12 in.	0- 2 ft	5 7 24 18	T.S. Fill	Cover: +/- 3-inches of top soil Fill: Reddish brown medium to fine sand, some gravel, little silt, moist	
	S-2 6 in.	2- 4 ft	28 22 30 22	Fill	Fill: Reddish brown medium to fine sand, some gravel, little silt, dry	
5	S-3 0 in.	4- 6 ft	15 23 20 17	N.R.	No Recovery	-Installed 5 feet of casing after S-3 -Rig chattering and hard drilling at 9 feet -Obstruction at 9 feet
	S-4 12 in.	6- 8 ft	29 26 22 17	Fill	Fill: Brown medium to fine sand and gray gravel, little silt, trace debris, moist Debris: Concrete	
	S-5 0 in.	8- 8.1 ft	50/1"	N.R.	No Recovery +/- 9.0'	
10					Exploration Boring B-6 Terminated Approximately 9.0 Feet Below the Existing Ground Surface Due to Split Spoon and Roller Bit Refusal on Possible Remanent Foundations	

Summary	Overburden (Linear ft)	9	Rock Cored (Linear ft)	--	No. of Samples	5

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-7 Page 1 of 1

Project Name	Proposed Self-Storage Facility	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/25/2022
Ground Surface Elev.	+/- 123.0 **Datum** NAVD '88	**Date Finished**	10/25/2022

Item	Casing	Sampler	Core Barrel	Rig Type
Type	F.J.	S.S.	--	Truck Mounted
Inside Diameter (in)	4.00	1.4	--	CME 75
Hammer Weight (lb)	--	140		**Drill Mud**
Hammer Fall (in)	--	30		Water
Hammer Type	--	Safety		EZ Mud

Water Level Data

Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Not Encountered					

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0	S-1 6in.	0- 2 ft	5 5 6 3	T.S. / Fill	Cover: +/- 6-inches of top soil Fill: Brown medium to fine sand, some silt, little debris, moist Debris: Asphalt and concrete	
	S-2 10 in.	2- 4 ft	5 5 8 10	Fill	Fill: Brown medium to fine sand, little silt, little gravel, moist	
5	S-3 7 in.	4- 6 ft	11 13 17 19	Fill	Fill: Brown medium to fine sand, little silt, little gravel, moist	
	S-4 10 in.	6- 8 ft	10 8 9 7	Fill	Reddish brown medium to fine sand, little silt, little debris, moist Debris: Concrete	
	S-5 12 in.	8- 10 ft	5 4 10 17	Fill	Reddish brown medium to fine sand, little silt, little debris, moist Debris: Concrete	
10	S-6 5 in.	10- 12 ft	16 12 13 15	Fill	Reddish brown medium to fine sand, little silt, little debris, moist Debris: Concrete	
					+/- 13.0'	-Obstruction at 13 feet
					Exploration Boring B-7 Terminated Approximately 13 Feet Below the Existing Ground Surface Due to Split Spoon and Roller Bit Refusal on Possible	
15						

Summary	Overburden (Linear ft)	13	Rock Cored (Linear ft)	--	No. of Samples	6

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-8 Page 1 of 2

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/25/2022
Ground Surface Elev.	+/- 124.7 ft. **Datum** NAVD '88	**Date Finished**	10/25/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/25/22	2:00 PM	8.0	17.0	15.0	--
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0				T.S.	Cover: +/- 2-inches of to soil	
	S-1 7 in.	0- 2 ft	3 6 7 7	Fill	Fill: Brown medium to fine sand, little gravel, little silt, trace debris, moist Debris: Concrete	
	S-2 11 in.	2- 4 ft	10 8 7 9	Fill	Fill: Brown medium to fine sand, little gravel, little silt, trace debris, moist Debris: Ceramic	
5	S-3 12 in.	4- 6 ft	9 7 8 7	Fill	Fill: Brown medium to fine sand, little gravel, little silt, trace debris, moist Debris: Concrete	
	S-4 3 in.	6- 8 ft	7 7 10 7	Fill	Fill: Brown medium to fine sand, little gravel, little silt, trace debris, moist Debris: Concrete +/- 8.0'	
	S-5 15 in.	8- 10 ft	7 12 23 20	SM	Reddish brown medium to fine SAND, some gravel, little Silt, dense, moist	
10	S-6 10 in.	10- 12 ft	21 22 50/5"	SM	Reddish brown medium to fine SAND, little Silt, little Gravel, very dense, moist	-Installed 10 feet of casing after S-6
15	S-7 10 in.	15- 17 ft	14 12 15 14	SM	Reddish brown medium to fine SAND, some Gravel, little Silt, medium dense,	
20	S-8 12 in.	20- 22 ft	22 27 37 38	SM	Reddish brown fine SAND, little Silt, very dense, wet	
25						

Summary	Overburden (Linear ft)	26.3	Rock Cored (Linear ft)	--	No. of Samples 9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-8 Page 2 of 2
Project Name Proposed 44-Unit Residential Building		**Project No.** 23117-000

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
25						
	S-9 7 in.	25- 26.3 ft	22 49 50/4"	SM	Reddish brown medium to fine SAND, some Silt, some gray Gravel, very dense, wet +/- 26.3'	
					Exploration Boring B-8 Terminated Approximately 26.3 Feet Below the Existing Ground Surface	
30						

Summary	Overburden (Linear ft)	26.3	Rock Cored (Linear ft)	--	No. of Samples	9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-9 Page 1 of 1

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/26/2022
Ground Surface Elev.	+/- 116.0 ft. **Datum** NAVD '88	**Date Finished**	10/26/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/26/22	10:00 AM	3.0	10.0	9.0	--
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0					Cover: Exposed fill	
	S-1 6 in.	0- 2 ft	4 6 8 9	Fill	Fill: Brown medium to fine sand, some gravel, little silt, some debris, moist Debris: Asphalt	
	S-2 10 in.	2- 4 ft	3 5 6 7	Fill	Fill: Tan medium to fine sand, some silt, little clay, moist +/- 4.0'	
5	S-3 6 in.	4- 6 ft	26 31 34 30	SM	Reddish brown medium to fine SAND, some Gravel, little Silt, very dense, moist	
	S-4 6 in.	6- 6.8 ft	34 50/3"	SM	Reddish brown medium to fine SAND, little Silt, very dense, moist	-Installed 5 feet of casing after S-4
10	S-5 13 in.	8- 10 ft	17 22 35 35	SM	Reddish brown and tan medium to fine SAND, some Silt, some Gravel, little Clay, very dense, wet	
15	S-6 13 in.	13- 15 ft	20 25 28 40	SM	Reddish brown and tan medium to fine SAND, some Silt, some Gravel, little Clay, very dense, wet	
20	S-7 3 in.	18- 19.4 ft	30 40 50/5"	SM	Reddish brown medium to fine SAND, some Gravel, some Silt, very dense, wet	
	S-8 0 in.	23- 23.1 ft	50/1"	N.R.	No Recovery +/- 23.1'	
25					Exploration Boring B-9 Terminated Approximately 23.1 Feet Below the Existing Ground Surface	

Summary	Overburden (Linear ft)	23.1	Rock Cored (Linear ft)	--	No. of Samples	8

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-10 Page 1 of 1

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/26/2022
Ground Surface Elev.	+/- 116.0 ft. **Datum** NAVD '88	**Date Finished**	10/26/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/26/22	8:10 AM	--	8.0	6.0	--
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0					Cover: Exposed fill	
	S-1 12 in.	0- 2 ft	3 4 11 8	Fill	Fill: Brown medium to fine sand, little gravel, little silt, little debris, moist Debris: Concrete, brick, and asphalt	
	S-2 6 in.	2- 4 ft	5 6 7 8	Fill	Fill: Reddish brown medium to fine sand, some silt, little gravel, moist	
5	S-3 7 in.	4- 6 ft	3 2 13 19	Fill	Fill: Gray medium to fine sand, some gravel, little silt, moist +/- 6.0'	
	S-4 10 in.	6- 8 ft	22 15 12 9	SM	Reddish brown medium to fine SAND, some Silt, trace Gravel, medium dense, wet	
	S-5 7 in.	8- 10 ft	7 10 12 13	SM	Reddish brown medium to fine SAND, some Silt, medium dense, wet	
10	S-6 10 in.	10- 12 ft	15 16 15 14	SM	Reddish brown medium to fine SAND, some Gravel, little Silt, dense, wet	-Installed 10 feet of casing after S-6
15	S-7 in.	15- 17 ft	7 10 9 22	SM	Reddish brown medium to fine SAND, some Gravel, some Silt, medium dense, wet +/- 17.3'	-Slow drilling from 17 to 17.3 feet
					Exploration Boring B-10 Terminated Approximately 17.3 Feet Below the Existing Ground Surface Due to Roller Bit Refusal	
20						
25						

Summary	Overburden (Linear ft)	17.3	Rock Cored (Linear ft)	--	No. of Samples	7

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-11 Page 1 of 2

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/26/2022
Ground Surface Elev.	+/- 115.0 ft. **Datum** NAVD '88	**Date Finished**	10/26/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/26/22	10:30 AM	--	8.0	6.0	--
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0					Cover: Exposed Fill	
	S-1 3 in.	0- 2 ft	6 5 4 3	Fill	Fill: Brown to black medium to fine sand, little silt, some debris, moist Debris: Asphalt	
	S-2 113 in.	2- 4 ft	6 3 5 3	Fill	Fill: Reddish brown medium to fine sand, little gravel, little silt, moist	
5	S-3 15 in.	4- 6 ft	2 3 6 7	Fill	Fill: Brown medium to fine sand, some silt, some clay, wet +/- 6.0'	
	S-4 12 in.	6- 8 ft	4 10 8 6	SM	Reddish brown fine SAND, some Silt, little Gravel, medium dense, wet	
	S-5 11 in.	8- 10 ft	3 6 8 10	SM	Reddish brown fine SAND, some Silt, medium dense, wet	
10	S-6 10 in.	10- 12 ft	13 14 25 24	SM	Reddish brown fine SAND, some Silt, dense, wet	-Installed 10 feet of casing after S-6
15	S-7 15 in.	15- 17 ft	18 23 25 22	SM	Reddish brown medium to fine SAND, some Silt, little Gravel, dense, wet	
20	S-8 13 in.	20- 22 ft	37 37 31 40	SM	Reddish brown medium to fine SAND, some Gravel, some Silt, very dense, wet	-Rig chattering at 20 feet -Rig chattering at 22 feet
25						

Summary	Overburden (Linear ft) 25.8	Rock Cored (Linear ft) --	No. of Samples 9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-11 Page 2 of 2
Project Name: Proposed 44-Unit Residential Building		Project No. 23117-000

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
25	S-9 6 in.	25- 25.8 ft	44 50/4"	GM	Reddish brown GRAVEL, some medium to fine Sand, some Silt, very dense, wet	
					Exploration Boring B-11 Terminated Approximately 25.8 Feet Below the Existing Ground Surface	
30						

Summary	Overburden (Linear ft)	25.8	Rock Cored (Linear ft)	--	No. of Samples	9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-12 Page 1 of 1

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/26/2022
Ground Surface Elev.	+/- 116.0 ft. **Datum** NAVD '88	**Date Finished**	10/26/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/26/22	10:45 AM	--	8.0	6.0	--
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0					Cover: Exposed Fill	
	S-1 7 in.	0- 2 ft	9 11 14 13	Fill	Fill: Black and dark brown medium to fine sand, some debris, little silt, moist Debris: Asphalt and brick	
	S-2 10 in.	2- 4 ft	6 6 15 11	Fill	Fill: Reddish brown medium to fine sand, little gravel, little silt, moist	
5	S-3 11 in.	4- 6 ft	6 15 19 17	Fill	Fill: Brown medium to fine sand, some silt, little gravel, moist +/- 6.0'	
	S-4 12 in.	6- 8 ft	20 21 20 23	SM	Reddish brown medium to fine SAND, some Silt, little Gravel, dense, wet	
	S-5 10 in.	8- 10 ft	19 50/3"	SM	Reddish brown medium to fine SAND, some Silt, little Gravel, very dense, wet	-Installed 5 feet of casing after S-5
10						
	S-6 14 in.	10- 12 ft	24 39 30 50	SM	Tan and reddish brown medium to fine SAND, some Silt, some Gravel, little Clay, very dense, wet	-Advanced casing to 8 feet after S-8
	S-7 0 in.	12.5- 12.51 ft	50/0"	N.R.	No Recovery +/- 12.5'	
					Exploration Boring B-12 Terminated Approximately 12.5 Feet Below the Existing Ground Surface Due to Split Spoon and Roller Bit Refusal	
15						
20						
25						

Summary	Overburden (Linear ft)	12.5	Rock Cored (Linear ft)	--	No. of Samples	7

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-13 Page 1 of 1

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/26/2022
Ground Surface Elev.	+/- 115.0 ft. **Datum** NAVD '88	**Date Finished**	10/26/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/26/22	2:00 PM	--	8.0	7.0	--
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0					Cover: Exposed fill	
	S-1 13 in.	0- 2 ft	4 7 12 12	Fill	Fill: Brown medium to fine sand, little silt, some debris, moist Debris: Asphalt and concrete	
	S-2 3 in.	2- 4 ft	20 18 14 7	Fill	Fill: Brown medium to fine sand, little silt, some debris, moist Debris: Concrete and brick	
5	S-3 10 in.	4- 6 ft	4 5 4 6	N.R.	No recovery +/- 6.0'	
	S-4 10 in.	6- 8 ft	5 17 23 15	SM	Reddish brown medium to fine SAND, some Gravel, little Silt, dense, wet	
	S-5 12 in.	8- 10 ft	5 8 15 14	SM	Reddish brown fine SAND, some Silt, medium dense, wet	
10	S-6 10 in.	10- 12 ft	10 20 15 18	SM	Reddish brown fine SAND, some Silt, dense, wet	-Installed 5 feet of casing after S-6
						-Rig chattering at 14.5 feet and slow drilling to 15 feet
15	S-7 2 in.	15- 15.8 ft	50 50/3"	GM	Reddish brown GRAVEL, some medium to fine Sand, some Silt, very dense, wet	
						-Rig chattering at 17 feet and slow drilling to 18 feet -Slow drilling from 19 to 19.5 feet
	S-8 0 in.	19.50- 19.51 ft	50/0"	N.R.	No recovery +/- 19.51'	
20					Exploration Boring B-13 Terminated Approximately 19.51 Feet Below the Existing Ground Surface Due to Split Spoon and Roller Bit Refusal	
25						

Summary	Overburden (Linear ft)	19.51	Rock Cored (Linear ft)	--	No. of Samples	8

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-14 Page 1 of 2

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/27/2022
Ground Surface Elev.	+/- 115.0 ft. **Datum** NAVD '88	**Date Finished**	10/27/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	Time	Bottom of Casing (ft)	Bottom of Boring (ft)	Water (ft)	Cave In (ft)
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/27/22	7:55 AM	--	8.0	6.0	--
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0					Cover: Exposed Fill	
	S-1 8 in.	0- 2 ft	2 5 18 8	Fill	Fill: Dark gray medium to fine sand, some debris, moist Debris: Asphalt, concrete, and brick	
	S-2 0 in.	2- 4 ft	10 8 8 7	N.R.	No recovery	
5	S-3 5 in.	4- 6 ft	5 8 18 14	Fill	Fill: Brown medium to fine sand, little silt, some debris, moist Debris: Concrete +/- 6.0'	
	S-4 12 in.	6- 8 ft	15 21 22 20	SM	Reddish brown fine SAND, some Silt, dense, wet	
	S-5 7 in.	8- 10 ft	23 27 31 26	SM	Reddish brown fine SAND, some Silt, very dense, wet	
10	S-6 10 in.	10- 12 ft	13 18 22 25	SM	Reddish brown fine SAND, some Silt, dense, wet	-Installed 5 feet of casing after S-6
15	S-7 6 in.	15- 15.8 ft	22 50/3"	SM	Reddish brown medium to fine SAND, some Gravel, some Silt, very dense, wet	
20	S-8 11 in.	20- 22 ft	19 35 25 23	SM	Reddish brown medium to fine SAND, some Gravel, some Silt, very dense, wet	
25						

Summary	Overburden (Linear ft)	26.8	Rock Cored (Linear ft)	--	No. of Samples 9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-14 Page 2 of 2
Project Name Proposed 44-Unit Residential Building		**Project No.** 23117-000

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
25	S-9 13 in.	25- 26.8 ft	31 44 50 50/3"	SM	Reddish brown medium to fine SAND, some Gravel, some Silt, very dense, wet +/- 26.8'	
					Exploration Boring B-14 Terminated Approximately 26.8 Feet Below the Existing Ground Surface	
30						

Summary	Overburden (Linear ft) 26.8	Rock Cored (Linear ft) --	No. of Samples 9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-15 Page 1 of 2

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/27/2022
Ground Surface Elev.	+/- 115.0 ft. **Datum** NAVD '88	**Date Finished**	10/27/2022

Item	Casing	Sampler	Core Barrel	Rig Type	Water Level Data					
					Date	**Time**	**Bottom of Casing (ft)**	**Bottom of Boring (ft)**	**Water (ft)**	**Cave In (ft)**
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/27/22	9:40 AM	--	8.0	6.0	--
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
0					Cover: Exposed Fill	
	S-1 6 in.	0- 2 ft	3 5 5 3	Fill	Fill: Black medium to fine sand, some debris, dry Debris: Asphalt and brick	
	S-2 12 in.	2- 4 ft	3 3 3 3	Fill	Fill: Brown medium to fine sand, some gravel, some silt, little clay, moist	
5	S-3 18 in.	4- 6 ft	4 5 18 13	Fill	Fill: Brown medium to fine sand, some gravel, little silt, moist +/- 6.0'	
	S-4 12 in.	6- 8 ft	6 14 13 12	SM	Reddish brown fine SAND, some Silt, medium dense, wet	
	S-5 13 in.	8- 10 ft	10 15 12 24	SM	Reddish brown fine SAND, some Silt, medium dense, wet	
10	S-6 15 in.	10- 12 ft	14 17 20 25	SM	Reddish brown fine SAND, some Silt, dense, wet	-Installed 5 feet of casing after S-5
15	S-7 2 in.	15- 15.7 ft	48 50/2"	SM	Reddish brown medium to fine SAND, some Gravel, some Silt, very dense, wet	
20	S-8 6 in.	20- 21.1 ft	23 38 50/1"	SM	Reddish brown medium to fine SAND, some Gravel, very dense, wet	-Rig chatter at 21 feet
25						

Summary	Overburden (Linear ft) 25.9	Rock Cored (Linear ft)	--	No. of Samples 9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-15 Page 2 of 2
Project Name Proposed 44-Unit Residential Building		**Project No.** 23117-000

Depth (ft)	Sample No. & Rec. (in)	Sample Depth (ft)	Sampler Blows per 6 inches	USCS Symbol	Visual Classification	Remarks
25						
	S-9 5 in.	15- 25.9 ft	50 50/5"	GM	Reddish brown GRAVEL, some medium to fine Sand, some Silt, very dense, wet +/- 25.9'	
					Exploration Boring B-15 Terminated Approximately 25.9 Feet Below the Existing Ground Surface	
30						

Summary	Overburden (Linear ft) 25.9	Rock Cored (Linear ft) --	No. of Samples 9

JZN Engineering, PC.	TEST BORING LOG	Boring No. B-16 Page 1 of 1

Project Name	Proposed 44-Unit Residential Building	**Project No.**	23117-000
Client	Vernon Construction & Development	**Representative**	T. Robinski
Project Location	78-88 Locust Avenue, Block 129; Lot 70	**Contractor**	Diamond Drilling, Inc.
	Township of Bloomfield, Essex County, New Jersey	**Driller**	F. Navarro
Boring Location	See Plan	**Date Started**	10/27/2022
Ground Surface Elev.	+/- 116.0 ft. **Datum** NAVD '88	**Date Finished**	10/27/2022

Item	**Casing**	**Sampler**	**Core Barrel**	**Rig Type**	**Water Level Data**					
					Date	**Time**	**Bottom of Casing (ft)**	**Bottom of Boring (ft)**	**Water (ft)**	**Cave In (ft)**
Type	F.J.	S.S.	--	Truck Mounted						
Inside Diameter (in)	4.00	1.4	--	CME 75						
Hammer Weight (lb)	--	140		**Drill Mud**	10/27/22	1:45 PM	--	8.0	7.0	--
Hammer Fall (in)	--	30		Water						
Hammer Type	--	Safety		EZ Mud						

Depth (ft)	**Sample No. & Rec. (in)**	**Sample Depth (ft)**	**Sampler Blows per 6 inches**	**USCS Symbol**	**Visual Classification**	**Remarks**
0					Cover: Exposed fill	
	S-1 6 in.	0- 2 ft	3 4 4 5	Fill	Fill: Dark gray medium to fine sand, some debris, dry Debris: Asphalt	
	S-2 10 in.	2- 4 ft	4 3 3 5	Fill	Fill: Brown silty clay, some fine sand, moist	
5	S-3 12 in.	4- 6 ft	5 10 13 13	Fill	Fill: Brown medium to fine sand, some silt, trace debris, moist Debris: Brick +/- 6.0'	
	S-4 12 in.	6- 8 ft	6 10 7 6	SM	Reddish brown medium to fine SAND, some Silt, little Gravel, medium dense, wet	
	S-5 7 in.	8- 10 ft	9 12 7 13	SM	Reddish brown medium to fine SAND, some Silt, some Gravel, medium dense, wet	
10	S-6 10 in.	10- 12 ft	12 7 7 20	SM	Reddish brown medium to fine SAND, some Silt, little Gravel, medium dense, wet	
15	S-7 5 in.	15- 16.9 ft	10 11 11 50/5"	SM	Reddish brown medium to fine SAND, some Silt, some Gravel, medium dense, wet	
	S-8 0 in.	18- 18.01 ft	50/0"	N.R.	No Recovery	
20					Exploration Boring B-16 Terminated Approximately 18.01 Feet Below the Existing Ground Surface Due to Split Spoon and Roller Bit Refusal	
25						

Summary	Overburden (Linear ft)	18.01	Rock Cored (Linear ft)	--	No. of Samples	8

APPENDIX C

Stormwater Management Investigation Report

NEGLIA
ENGINEERING ASSOCIATES

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Office Address
One Evertrust Plaza
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Jersey City, NJ 07302

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JZNengineering.com

November 3, 2022
File No. 23117-000

VERNON CONSTRUCTION & DEVELOPMENT
21 West 86th Street
New York, NY 10024

Attention: Mr. Adrian A. Nowak
Vice President

REGARDING: REPORT OF STORMWATER MANAGEMENT INVESTIGATION
Proposed Self-Storage Facility
78 Locust Avenue
Block 129; Lot 70
City of Bloomfield, Essex County, New Jersey

Dear Mr. Nowak:

JZN Engineering, PC. (JZN) is pleased to submit this letter report summarizing the results of our stormwater management investigation in support of the Proposed Self-Storage Facility to be located at 78 Locust Avenue in the City of Bloomfield, Essex County, New Jersey. Our services were undertaken in accordance with our proposal dated September 22, 2022 (last revised September 27, 2022) and your subsequent authorization on October 17, 2022.

SCOPE OF SERVICES

Our scope of services included the following:

- Accumulate and evaluate readily available data on subsurface soil conditions and groundwater levels at and near the site, from geological maps and in-house data;
- Review project plans and available project data;
- Prepare a program of subsurface explorations consisting of four (4) soil profile pit explorations;
- Perform laboratory soil tube permeability tests on up to eight (8) tube samples collected during the field investigation; and,
- Prepare this letter report.

PROJECT BACKGROUND

This report was prepared based on the information provided to us by your office and the project design team including the following documents:

- An April 11, 2022 *Boundary & Topographic Survey* prepared by Neglia Engineering Associates;
- An August 19, 2022 (last revised September 14, 2022) *Site Plan Schemes A & B* prepared by Frank G. Relf Architect, P.C.; and,
- An undated and untitled proposed test pit location plan prepared by Neglia Engineering Associates.

Presently the site consists of a gravel covered lot (previously demolished building area) and landscape areas which can be accessed through a Fence gate located on Willow Street. The project site is bounded by Locust Avenue to the north; by a three (3)-story self-storage building to the east; by Willow Street to the south; and by a paved asphalt parking lot and a three (3)-story residential building with a partial basement to the west. The location of the project site is shown on the *Project Site Locus* included as Figure 1.

We understand that the proposed development will include the construction of a five-story self-storage facility with no below grade cellar/basement levels. The proposed building maximum floor area will vary between approximately 29,143 square feet and 26,911 square feet.

REPORT DATUM

Topographic information for the site was obtained from the referenced April 11, 2022 *Boundary and Topographic Survey* prepared by Neglia Engineering Associates. Elevations contained in this report are in feet and refer to the North American Vertical Datum of 1988 (NAVD 88). Surface elevations for explorations are provided on the individual logs of test borings. All depths in the report are referenced from top of the existing ground surface elevation at the time of the field investigation.

STORMWATER INVESTIGATION

Regional Geology: The subject property is situated within a section of the Piedmont Physiographic Province known as the Newark Basin. Specifically, the subject site is underlain by the Lower Jurassic and Upper Triassic Sandstone and Siltstone facies of the Passaic Formation, which is part of the Newark supergoup and Brunswick Group. The Sandstone generally consists of interbedded grayish-red to brownish-red medium-grained to fine-grained, medium-bedded to thick-bedded sandstone, and brownish-to purplish-red, coarse-grained siltstone. The overburden materials at the site include glacial deposits associated with a Wisconsinan Glacier which reached its most southerly advance approximately 20,000 years ago. The glacial deposits are expected to overlay weathered rock. Glacial till in the area typically contains a heterogeneous mixture of sand, silt, clay and gravel mixed with variable amounts of boulders and cobbles. Overlying materials also include manmade fill.

The information presented above was based on the review of published geological data as reported in the Surficial Geologic Map of New Jersey prepared by United States Geological Survey (USGS).

Surficial Soil Survey Review: The Soil Survey of Essex County presented by the USDA Natural Resources Conservation Services (NRCS) maps two (2) type of soil within the subject site: the Urban Land, Dunellen substratum (DuuB) and the Urban Land, Booton substratum (URBOOB). A *Custom Soil Resource Report* of the subject site has been prepared and is presented as Appendix B of this report.

Field Investigation

Field exploration for this project was conducted by means of excavating six (6) soil profile pits (identified as SPP-1 through SPP-6) which were excavated using a rubber tire backhoe. Soil profile pits SPP-5 and SPP-6 were performed due to shallow refusal encountered within soil profile pits SPP-3 and SPP-4. The soil profile pits were excavated to depths ranging between approximately 6 feet and 12 feet below the existing ground surface. The locations of the soil profile pits are shown on the accompanying *Soil Profile Pit Location Plan* included as Figure 2, and records of the soil profile exploration logs are provided in Appendix A.

The field exploration was planned and logged by a representative of JZN Engineering. The soil profile pit explorations were located in the field by a representative of JZN using normal taping procedures and estimated right angles from existing site features and are presumed to be accurate within a few feet. The soil profile pit explorations were excavated using a rubber tire backhoe operated by Pennyweight & Co. of Eatontown, New Jersey in the presence of a JZN representative on October 27, 2022.

In general, the methods used in determining the seasonal high groundwater level consist of evaluating the soil morphology within a test excavation and identifying irregular spots or blotches of different colors or minerals unlike that of the surrounding soil (mottles). Mottling in soil may indicate poor aeration and impeded drainage or also can be the result of natural variable mineralogy and geological processes.

Discussion of Subsurface Conditions Encountered

Stratum I – Surficial Cover: The surface cover at the site consisted of approximately two (2) inches of gravel at SPP-1 and SPP-2, and grass cover at SPP-3 through SPP-6. It should be noted that a loamy sand topsoil was encountered to depths ranging between six (6) inches and 2.5 feet below the existing ground surface at soil profile pit locations SPP-3 through SPP-6.

Stratum II – Existing Fill Materials (USDA – S, SL, LS, G): Underlying the surficial cover, existing fill materials were encountered to depths ranging between approximately two (2) feet and nine (9) feet below the existing ground surface. Fill materials generally consisted of sand with varying amounts of loam, gravel, and debris (brick, concrete, wood, asphalt, and steel). It should be noted that backhoe refusal was encountered within this stratum at depths of approximately six (6) feet to seven (7) feet below the existing ground surface at soil profile pit locations SPP-3 and SPP-4 on a probable concrete obstruction.

Stratum III – Glacial Deposits (USDA – LS, SL): Underlying the existing fill materials, glacial deposits were encountered to the soil profile pit termination depths ranging between approximately 9.5 feet and 12 feet below the existing ground surface. Glacial deposits generally consisted of loamy sand or sandy loam. It should be noted that weathered shale fragments were encountered within this stratum at soil profile pit locations SPP-5 and SPP-6.

Groundwater conditions were encountered within SPP-1 and SPP-2 pits at depths ranging between five (5) feet and 6.5 feet below the existing ground surface, corresponding to an approximate elevations of Elev. +110.0 feet. Groundwater conditions were not encountered within soil profile pits SPP-3 through SPP-6 to depths of up to 12 feet below the existing ground surface, corresponding to an approximate elevation of Elev. +112.0 feet. It should also be noted that perched water was encountered within SPP-6 at a depth of approximately five (5) feet below the existing ground surface. No mottling was observed in the soil profile pits during our field investigation.

The soil profile pit exploration logs and related information depict subsurface conditions only at the specific exploration locations and at the particular time designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at the soil exploration locations. Also, the passage of time may result in a change in the subsurface conditions at these soil exploration locations. Soil profile pit logs and photos are included in Appendix A.

Laboratory Permeability Test Results

Up to two (2) soil sample tubes were recovered from SPP-1, SPP-2, SPP-5, and SPP-6 at depths specified by the project team during our field investigation. Each sample was subjected to a tube permeameter test as detailed in *"Procedures for Permeability Testing"* under *Chapter 12* of *The New Jersey Stormwater Best Management Practices Manual* which meets the requirements of NJDEP's Stormwater Management Rules *(N.J.A.C. 7:8)*. The results of these tests are included in Table 1 below.

Table 1: Soil Profile Pit and Permeability Tests Summary

Soil Profile Pit #	Tube Permeameter Test No.	Percolation Test				Permeability	
		Approx. Ground Surface Elevation (ft.)	Test Depth (ft.)	Test Elevation (ft.)	Stratum	Class	Rate (in/hr.)
SPP-1	A	115.0	7.0	108.0	Loamy Sand	K1	0.29
SPP-1	B	115.0	7.0	108.0	Loamy Sand	K1	0.28
SPP-2	A	116.5	8.0	108.5	Loamy Sand	K3	2.30
SPP-2	B	116.5	8.0	108.5	Loamy Sand	K2	1.62
SPP-5	A	124.0	9.0	115.0	Sandy Loam	K2	1.97
SPP-5	B	124.0	9.0	115.0	Sandy Loam	K2	1.84
SPP-6	A	122.5	9.0	113.5	Loamy Sand	K3	2.66
SPP-6	B	122.5	9.0	113.5	Loamy Sand	K3	3.32

Notes: Permeability class based on March 2021 NJ Stormwater BMP Manual

Hydrologic Soil Group

Per the NRCS Soil Survey, no Hydrologic Soil Group is provided for the Urban Land substrata. As such, based on the recommendations contained in Chapter 12 of the NJ Stormwater BMP Manual, we recommend a Hydrologic Soil Group of B be utilized for design purposes.

Limitation

The recommendations contained in this report represent our best professional judgment based on available project data provided to us in the referenced documents. Variations in the types of structures and design grading may change from the criteria assumed in preparation of the report. JZN should be advised of changes in the design criteria so that an evaluation can be made to determine if design recommendations should be revised. Conditions may be encountered during construction that may vary from the conditions reported herein. Our services have been performed in accordance with current standards of practice for geotechnical engineering for buildings based on the available project data. No other warranty is made, either expressed or implied.

We appreciate the opportunity to assist you on this project. Please contact us if you wish to discuss this letter report or any aspect of the project.

Sincerely,
JZN Engineering, PC.

Nejm E. Jundi, P.E.
President

Enclosures

FIGURES

GOOGLE EARTH 2022

JZN ENGINEERING

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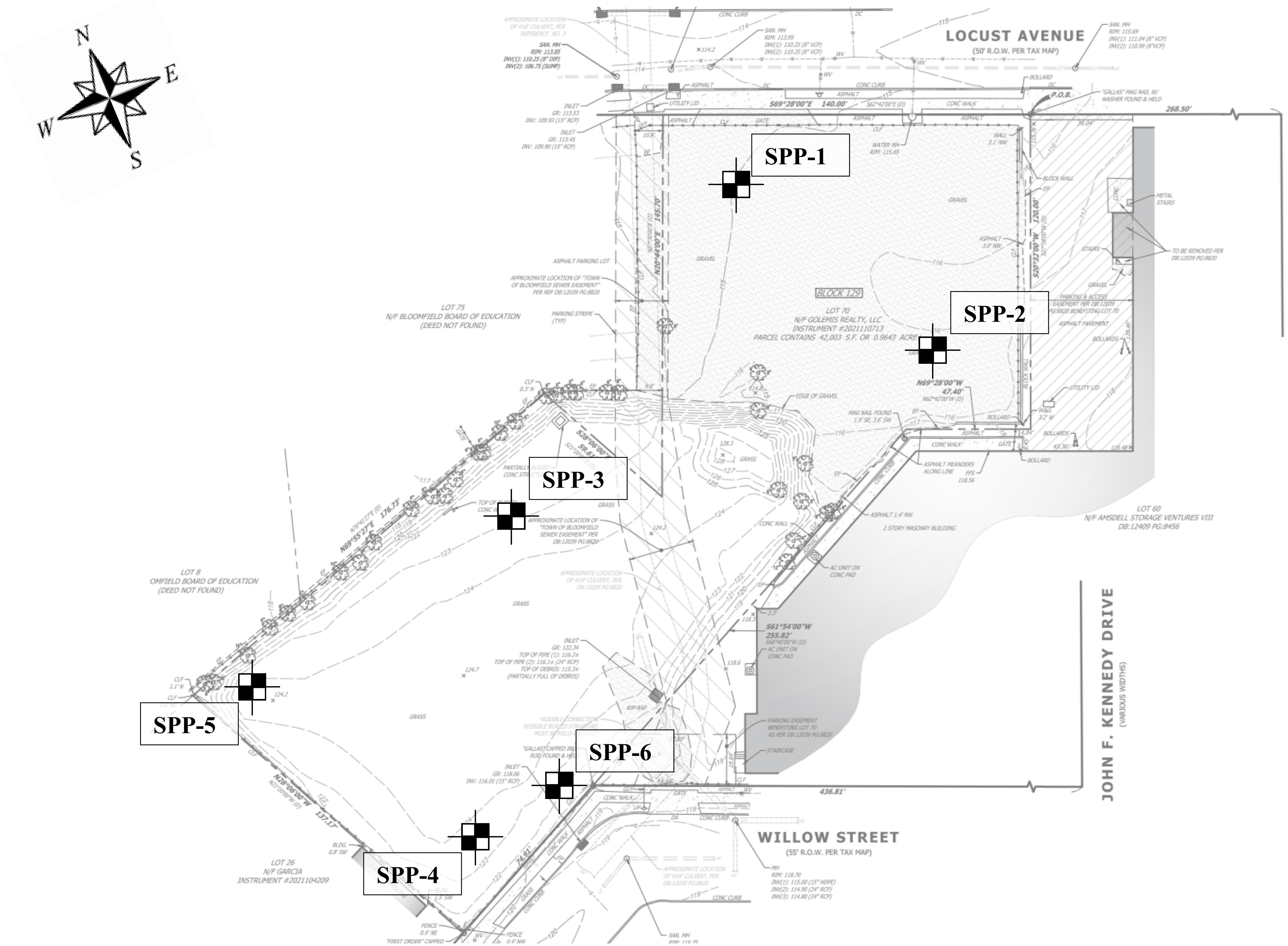
PROPOSED SELF-STORAGE FACILITY
78 LOCUST AVENUE, BLOCK 129; LOT 70
CITY OF BLOOMFIELD, ESSEX COUNTY, NEW JERSEY
23117-000

PROJECT SITE LOCUS

FIGURE 1



LEGEND

SPP-1: APPROXIMATE SOIL PROFILE PIT LOCATION

NOTES

BASE PLAN OBTAINED FROM AN APRIL 11, 2022 *BOUNDARY & TOPOGRAPHIC SURVEY* PREPARED BY NEGLIA ENGINEERING ASSOCIATES.

SOIL PROFILE PITS WERE LOCATED IN THE FIELD BY A REPRESENTATIVE OF JZN ENGINEERING, PC. USING NORMAL TAPING PROCEDURES AND ESTIMATED RIGHT ANGLES FROM EXISTING SITE FEATURES AND ARE PRESUMED ACCURATE WITHIN A FEW FEET.

THE SOIL PROFILE PITS WERE EXCAVATED BY PENNYWEIGHT CO. OF EATONTOWN, NEW JERSEY IN THE PRESENCE OF A JZN ENGINEER ON OCTOBER 27, 2022.

JZN ENGINEERING

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PROPOSED SELD-STORAGE FACILITY
78 LOCUST AVENUE; BLOCK 129, LOT 70
CITY OF BLOOMFIELD, ESSEX COUNTY, NEW JERSEY
23117-000

SOIL PROFILE PIT LOCATION PLAN

SCALE: NOT TO SCALE

FIGURE 2

APPENDIX A

SOIL PROFILE PIT EXPLORATION LOGS
SPP-1 THROUGH SPP-6

JZN Engineering, PC.	SOIL PROFILE PIT LOG	SPP No. SPP-1 Page 1 of 1

		Project No.	23117-000
Project Name	Proposed Self-Storage Facility	**Field Rep.**	T. Robinski
Client	Vernon Construction & Development	**Contractor**	Pennyweight, LLC
Project Location	78 Locust Avenue, Block 129; Lot 70	**Operator**	R. Raymond
	City of Bloomfield, Essex County, New Jersey	**Date Started**	10/27/22
SPP Location	See Plan **Weather Condition** Sunny 66°F	**Date Finished**	10/27/22

Ground Surface Elev. +/-115 feet **Datum** NAVD 88

Excavation Equipment		**Mottling**					**Water Level Data**					
☑ Backhoe	☑ Rubber Tires	☐ Yes	Depth (ft)		Elevation (ft)		Date	Time	Bottom of SPP (ft)	Water (ft)	Cave In (ft)	Est. Seasonal High Groundwater (ft)
☐ Excavator	☐ Track		From		From		10/27	12:40	01/12/00	5.0	6.0	5.0
☐ Hand Excavated		☑ No	To		To			PM				

Depth (ft)	Sample Depth (ft)	Sample Number	USDA Symbol	Visual Classification	Remarks
0	0- 0.2 ft	S-1	G	GLEY 1 7/N Light gray GRAVEL, granular structure, weak grade, dry loose consistency, 75% coarse fragments	
	0.2- 2 ft	S-2	S	2.5Y2.5/1 Black SAND, single grained to granular structure, weak grade, moist loose consistency, 20% coarse fragments	-S-2 likely fill materials
5	2- 6 ft	S-3	SL	5YR4/4 Reddish brown SANDY LOAM, subangular structure, weak grade, wet nonsticky consistency, 10% to 25% coarse fragments +/-6.0'	-Water observed at +/-5 feet
10	6- 12 ft	S-4	LS	5YR4/4 Reddish brown LOAMY SAND, angular blocky structure, weak grade, wet sticky consistency, 5% coarse fragments +/-12.0'	-Soil caved in from to 6 feet after sampling S-4
				Soil Profile Pit SPP-1 Terminated Approximately 12 Feet Below Existing Ground Surface	

Summary	Overburden (Linear ft) 12	Rock Depth (ft) --	Number of Samples 4

JZN Engineering, PC.	SOIL PROFILE PIT LOG	SPP No. SPP-2 Page 1 of 1

Project Name	Proposed Self-Storage Facility	**Project No.**	23117-000
Client	Vernon Construction & Development	**Field Rep.**	T. Robinski
Project Location	78 Locust Avenue, Block 129; Lot 70	**Contractor**	Pennyweight, LLC
	City of Bloomfield, Essex County, New Jersey	**Operator**	R. Raymond
		Date Started	10/27/22
SPP Location	See Plan — **Weather Condition** Sunny 66°F	**Date Finished**	10/27/22

Ground Surface Elev. +/-116.5 feet **Datum** NAVD 88

Excavation Equipment	Mottling					Water Level Data					
		Depth (ft)		Elevation (ft)		Date	Time	Bottom of SPP (ft)	Water (ft)	Cave In (ft)	Est. Seasonal High Groundwater (ft)
☑ Backhoe ☑ Rubber Tires	☐ Yes	From		From		10/27	11:00	9.5	6.5	8.0	6.5
☐ Excavator ☐ Track		To		To			AM				
☐ Hand Excavated	☑ No										

Depth (ft)	Sample Depth (ft)	Sample Number	USDA Symbol	Visual Classification	Remarks
0	0- 0.2 ft	S-1	G	GLEY 1 7/N Light gray GRAVEL, granular structure, weak grade, dry loose consistency, 75% coarse fragments	
	0.2- 2.5 ft	S-2	SL	Fill: 2.5Y2.5/1 Black SANDY LOAM, subangular blocky structure, weak grade, moist loose consistency, 20% coarse fragments +/-2.5'	-S-2 likely fill materials
5	2.5- 6 ft	S-3	SL	2.5Y5/3 Light olive brown SANDY LOAM, angular blocky structure, moist friable to moist very friable consistency, moist, 2% coarse fragments +/-6.0'	-Perched water observed +/-3 feet
	6- 9.5 ft	S-4	LS	5YR4/4 Reddish brown LOAMY SAND, subangular blocky structure, weak grade, wet nonsticky to wet sticky consistency, 35% to 60% coarse fragments +/-9.5'	-Water observed at +/-6.5 feet -Refusal to advance excavation due to very dense material
10				Soil Profile Pit SPP-2 Terminated Approximately 9.5 Feet Below Existing Ground Surface	-Shale weathered rock observed

Summary	Overburden (Linear ft) 9.5	Rock Depth (ft) --	Number of Samples 4

JZN Engineering, PC.	SOIL PROFILE PIT LOG	SPP No. SPP-3 Page 1 of 1

		Project No.	23117-000
Project Name	Proposed Self-Storage Facility	**Field Rep.**	T. Robinski
Client	Vernon Construction & Development	**Contractor**	Pennyweight, LLC
Project Location	78 Locust Avenue, Block 129; Lot 70	**Operator**	R. Raymond
	City of Bloomfield, Essex County, New Jersey	**Date Started**	10/27/22
SPP Location	See Plan **Weather Condition** Sunny 66°F	**Date Finished**	10/27/22

Ground Surface Elev. +/-123 feet **Datum** NAVD 88

Excavation Equipment		**Mottling**					**Water Level Data**					
☑ Backhoe	☑ Rubber Tires	☐ Yes	Depth (ft)		Elevation (ft)		Date	Time	Bottom of SPP (ft)	Water (ft)	Cave In (ft)	Est. Seasonal High Groundwater (ft)
☐ Excavator	☐ Track		From		From		10/27	1:40	7	N.E.	--	--
☐ Hand Excavated		☑ No	To		To			PM				

Depth (ft)	Sample Depth (ft)	Sample Number	USDA Symbol	Visual Classification	Remarks
0	0- 1 ft	S-1	LS	2.5Y2.5/3 Dark reddish brown LOAMY SAND, subangular blocky structure, weak grade, moist loose consistency, 20% coarse fragments	-Grass cover
5	1- 7 ft	S-2	LS	5YR4/4 Reddish brown LOAMY SAND and GRAVEL (Debris), subangular blocky to granular structure, weak grade, soft to slightly hard, dry, 35% coarse fragments +/-7.0'	-S-2 consists of fill materials -Debris: Brick, concrete, asphalt, rebar, roots
10				Soil Profile Pit SPP-3 Terminated Approximately 7 Feet Below Existing Ground Surface Due to Backhoe Refusal	-Refusal to advance excavation at 7 feet due to obstruction (probable slab)

Summary	Overburden (Linear ft) 7	Rock Depth (ft) --	Number of Samples 2

JZN Engineering, PC.	# SOIL PROFILE PIT LOG	SPP No. SPP-4 Page 1 of 1

		Project No.	23117-000
Project Name	Proposed Self-Storage Facility	Field Rep.	T. Robinski
Client	Vernon Construction & Development	Contractor	Pennyweight, LLC
Project Location	78 Locust Avenue, Block 129; Lot 70	Operator	R. Raymond
	City of Bloomfield, Essex County, New Jersey	Date Started	10/27/22
SPP Location	See Plan — Weather Condition: Sunny 66°F	Date Finished	10/27/22

Ground Surface Elev. +/-124 feet — Datum NAVD 88

Excavation Equipment

- [x] Backhoe
- [x] Rubber Tires
- [ ] Excavator
- [ ] Track
- [ ] Hand Excavated

Mottling

- [ ] Yes
- [x] No

Depth (ft) From	Depth (ft) To	Elevation (ft) From	Elevation (ft) To

Water Level Data

Date	Time	Bottom of SPP (ft)	Water (ft)	Cave In (ft)	Est. Seasonal High Groundwater (ft)
10/27	1:20 PM	6	N.E.	--	--

Depth (ft)	Sample Depth (ft)	Sample Number	USDA Symbol	Visual Classification	Remarks
0	0- 0.5 ft	S-1	LS	2.5Y2.5/3 Dark reddish brown LOAMY SAND, subangular blocky structure, weak grade, dry loose consistency, 15% coarse fragments	-Grass Cover
5	0.5- 6 ft	S-2	S-G	5YR4/4 Reddish brown SAND and GRAVEL (Debris), subangular blocky to granular structure, weak grade, dry loose consistency, 50% coarse fragments +/-6.0'	-S-2 consists of fill materials -Debris: Brick, concrete, pipes, wood
10				Soil Profile Pit SPP-4 Terminated Approximately 6 Feet Below Existing Ground Surface Due to Backhoe Refusal	-Refusal to advance excavation at 6 feet due to obstruction (probable slab)

Summary	Overburden (Linear ft) 6	Rock Depth (ft) --	Number of Samples 2

JZN Engineering, PC.	SOIL PROFILE PIT LOG	SPP No. SPP-5 Page 1 of 1

Project Name	Proposed Self-Storage Facility	Project No.	23117-000
Client	Vernon Construction & Development	Field Rep.	T. Robinski
Project Location	78 Locust Avenue, Block 129; Lot 70	Contractor	Pennyweight, LLC
	City of Bloomfield, Essex County, New Jersey	Operator	R. Raymond
		Date Started	10/27/22
SPP Location	See Plan; Weather Condition: Sunny 66°F	Date Finished	10/27/22

Ground Surface Elev. +/-124 feet | Datum NAVD 88

Excavation Equipment		Mottling			Water Level Data					
☑ Backhoe	☑ Rubber Tires	☐ Yes	Depth (ft)	Elevation (ft)	Date	Time	Bottom of SPP (ft)	Water (ft)	Cave In (ft)	Est. Seasonal High Groundwater (ft)
☐ Excavator	☐ Track		From	From	10/27	2:30	01/12/00	N.E.	--	--
☐ Hand Excavated		☑ No	To	To		PM				

Depth (ft)	Sample Depth (ft)	Sample Number	USDA Symbol	Visual Classification	Remarks
0	0- 2.5 ft	S-1	LS	2.5Y2.5/3 Dark reddish brown LOAMY SAND, subangular blocky structure, weak grade, dry loose consistency, 10% coarse fragments +/-2.5'	-Grass Cover
5	2.5- 9 ft	S-2	SL	2.5Y3/2 Dark reddish brown SANDY LOAM, subangular blocky to granular structure, weak grade, dry soft consistency, 15% to 35% coarse fragments +/-9.0'	-Debris: Brick, concrete, pipes -S-2 consists of fill materials -Abandoned pipe observed at +/-7 feet
10	9- 12 ft	S-3	LS	5YR4/3 Reddish brown LOAMY SAND, subangular blocky structure, moderate grade, hard, dry, 35% coarse fragments +/-12.0'	-Weathered shale fragments observed
				Soil Profile Pit SPP-5 Terminated Approximately 12 Feet Below Existing Ground Surface	

Summary	Overburden (Linear ft) 12	Rock Depth (ft) --	Number of Samples 3

JZN Engineering, PC.	SOIL PROFILE PIT LOG	SPP No. SPP-6 Page 1 of 1

		Project No.	23117-000
Project Name	Proposed Self-Storage Facility	**Field Rep.**	T. Robinski
Client	Vernon Construction & Development	**Contractor**	Pennyweight, LLC
Project Location	78 Locust Avenue, Block 129; Lot 70	**Operator**	R. Raymond
	City of Bloomfield, Essex County, New Jersey	**Date Started**	10/27/22
SPP Location	See Plan — **Weather Condition** Sunny 66°F	**Date Finished**	10/27/22

Ground Surface Elev. +/-122.5 feet **Datum** NAVD 88

Excavation Equipment		Mottling			
☑ Backhoe	☑ Rubber Tires	☐ Yes	Depth (ft)	Elevation (ft)	
☐ Excavator	☐ Track		From	From	
☐ Hand Excavated		☑ No	To	To	

Water Level Data

Date	Time	Bottom of SPP (ft)	Water (ft)	Cave In (ft)	Est. Seasonal High Groundwater (ft)
10/27	2:50 PM	9.5	5.0 Perched	--	--

Depth (ft)	Sample Depth (ft)	Sample Number	USDA Symbol	Visual Classification	Remarks
0	0- 2.5 ft	S-1	LS	2.5Y2.5/3 Dark reddish brown LOAMY SAND, subangular blocky structure, weak grade, dry loose consistency, 10% coarse fragments +/-2.5'	-Grass Cover
5	2.5- 6 ft	S-2	S	2.5Y3/2 Dark Reddish brown SAND, subangular blocky structure, weak grade, wet nonsticky consistency, 30% coarse fragments +/-6.0'	-Debris: Brick, concrete -S-2 consists of fill materials -Perched water observed +/-5 feet
	6- 9.5 ft	S-3	LS	5YR4/4 Reddish brown LOAMY SAND, angular blocky structure, weak grade, moist friably consistency, 35% coarse fragments +/-9.5'	
10				Soil Profile Pit SPP-6 Terminated Approximately 9.5 Feet Below Existing Ground Surface	-Weathered shale fragments observed

Summary	Overburden (Linear ft) 9.5	Rock Depth (ft) --	Number of Samples 3

APPENDIX B

USDA NRCS CUSTOM SOIL RESOURCE REPORT

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for

Essex County, New Jersey

November 3, 2022

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Soil Map

Map Scale: 1:657 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Essex County, New Jersey
Survey Area Data: Version 18, Aug 29, 2022

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

Date(s) aerial images were photographed: May 9, 2020—Oct 15, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DuuB	Dunellen - Urban land, Dunellen substratum complex, 0 to 8 percent slopes	0.0	1.8%
URBOOB	Urban land, Boonton substratum, 0 to 8 percent slopes, red sandstone lowland	0.9	98.2%
Totals for Area of Interest		**0.9**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

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

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

Essex County, New Jersey

DuuB—Dunellen - Urban land, Dunellen substratum complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: njzf
Elevation: 50 to 150 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Dunellen and similar soils: 60 percent
Urban land, dunellen substratum: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dunellen

Setting

Landform: Outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy outwash derived from sandstone

Typical profile

A1 - 0 to 8 inches: sandy loam
A2 - 8 to 14 inches: sandy loam
BA - 14 to 20 inches: sandy loam
Bt - 20 to 31 inches: sandy loam
C - 31 to 42 inches: sandy loam
2C - 42 to 70 inches: stratified gravelly sand to sand to loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY023CT - Well Drained Outwash
Hydric soil rating: No

Description of Urban Land, Dunellen Substratum

Setting

Landform: Outwash plains
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material
H2 - 12 to 31 inches: sandy loam
2C - 31 to 42 inches: sandy loam
3C - 42 to 70 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents, dunellen substratum

Percent of map unit: 10 percent
Landform: Outwash plains
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

URBOOB—Urban land, Boonton substratum, 0 to 8 percent slopes, red sandstone lowland

Map Unit Setting

National map unit symbol: w9d3
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land, boonton red sandstone lowland substratum: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land, Boonton Red Sandstone Lowland Substratum

Setting

Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material
H2 - 12 to 67 inches: gravelly loam
2CB - 67 to 83 inches: gravelly sandy loam

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Boonton, red sandstone lowland

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

Udorthents, boonton red sandstone lowland substratum

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

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APPENDIX D

Existing and Proposed *Current Storm* Watershed Calculations

NEGLIA
ENGINEERING ASSOCIATES

Hydraflow Table of Contents

Contents continued...

Contents continued...

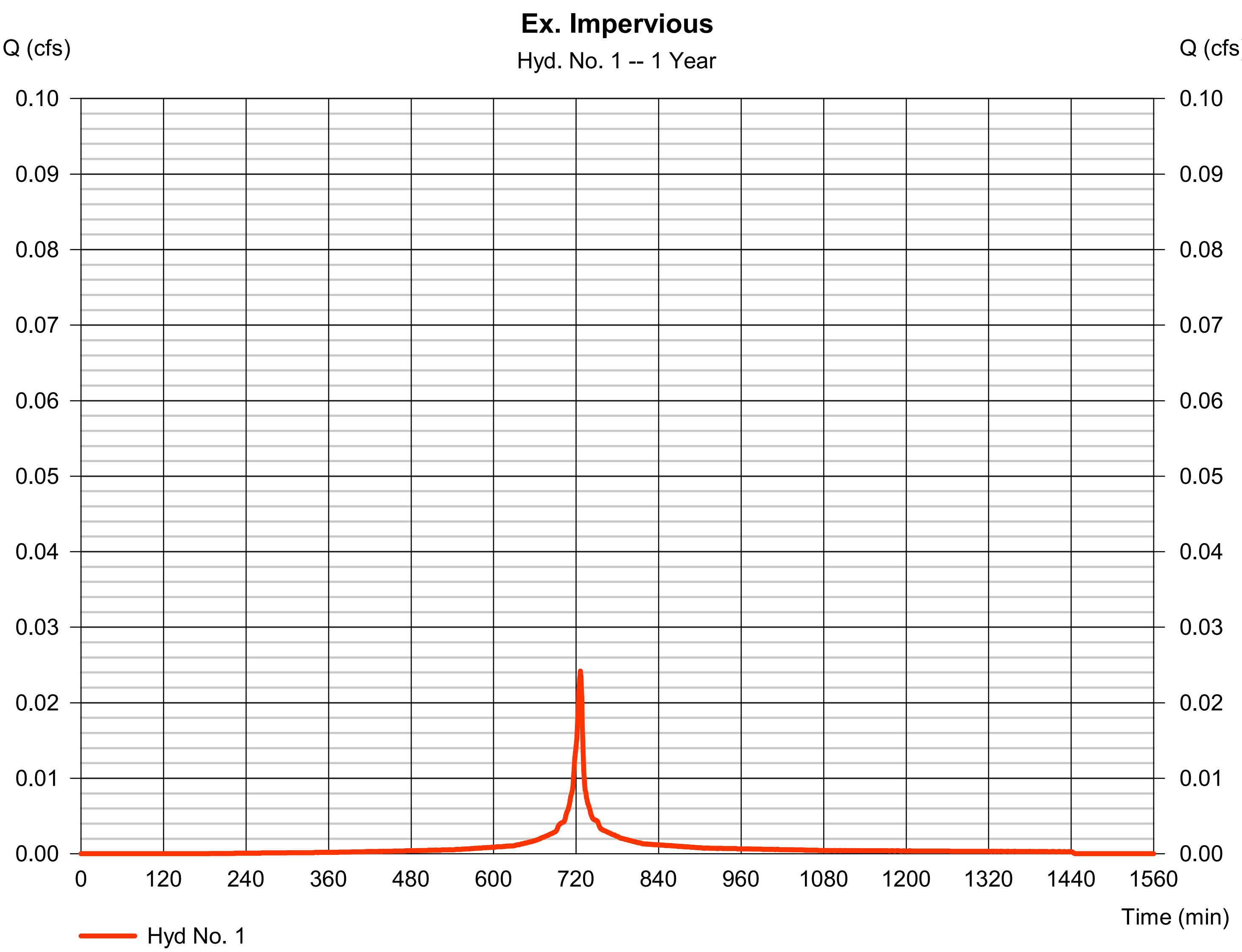
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Wednesday, 02 / 7 / 2024

Hyd. No. 1

Ex. Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.024 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 75 cuft
Drainage area	= 0.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.20 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 1

Ex. Impervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.025		0.011		
Flow length (ft)	=	4.7		95.3		0.0		
Two-year 24-hr precip. (in)	=	3.40		3.40		3.40		
Land slope (%)	=	22.50		0.75		0.00		
Travel Time (min)	**=**	**0.04**	**+**	**3.23**	**+**	**0.00**	**=**	**3.27**
Shallow Concentrated Flow								
Flow length (ft)	=	110.75		0.00		0.00		
Watercourse slope (%)	=	1.40		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.91		0.00		0.00		
Travel Time (min)	**=**	**0.97**	**+**	**0.00**	**+**	**0.00**	**=**	**0.97**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)		({0})0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 4.20 min

Hydrograph Report

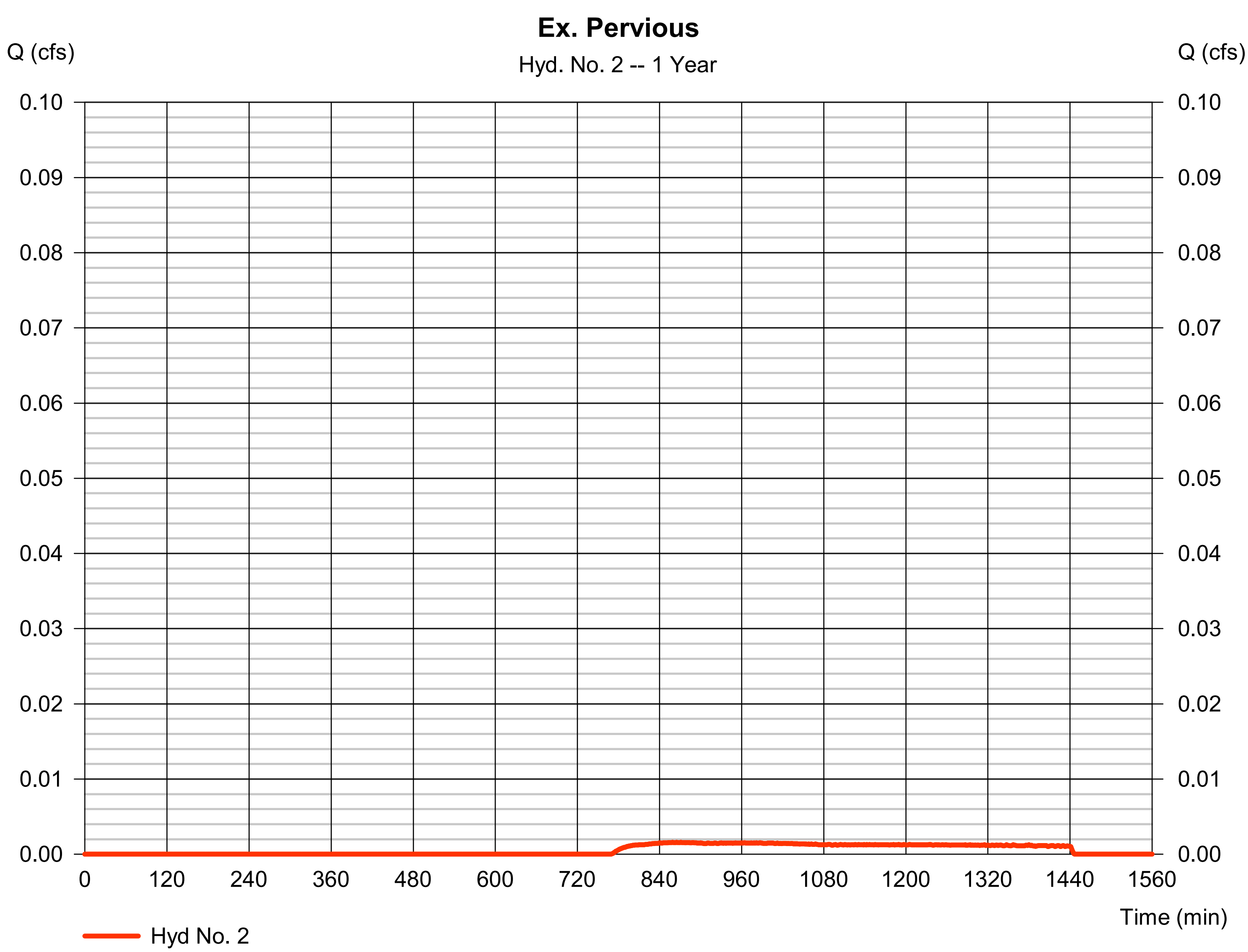
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 2

Ex. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.002 cfs
Storm frequency	= 1 yrs	Time to peak	= 865 min
Time interval	= 1 min	Hyd. volume	= 52 cuft
Drainage area	= 0.560 ac	Curve number	= 69*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.20 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 85) + (0.560 x 69)] / 0.560



TR55 Tc Worksheet

Hyd. No. 2

Ex. Pervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.150		0.025		0.011		
Flow length (ft)	=	35.8		64.2		0.0		
Two-year 24-hr precip. (in)	=	3.40		3.40		3.40		
Land slope (%)	=	31.39		2.00		0.00		
Travel Time (min)	**=**	**1.39**	**+**	**1.59**	**+**	**0.00**	**=**	**2.98**
Shallow Concentrated Flow								
Flow length (ft)	=	116.59		19.23		0.00		
Watercourse slope (%)	=	1.30		1.30		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.84			2.32		0.00		
Travel Time (min)	**=**	**1.06**	**+**	**0.14**	**+**	**0.00**	**=**	**1.19**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00							
				0.00				
						0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... **4.20 min**

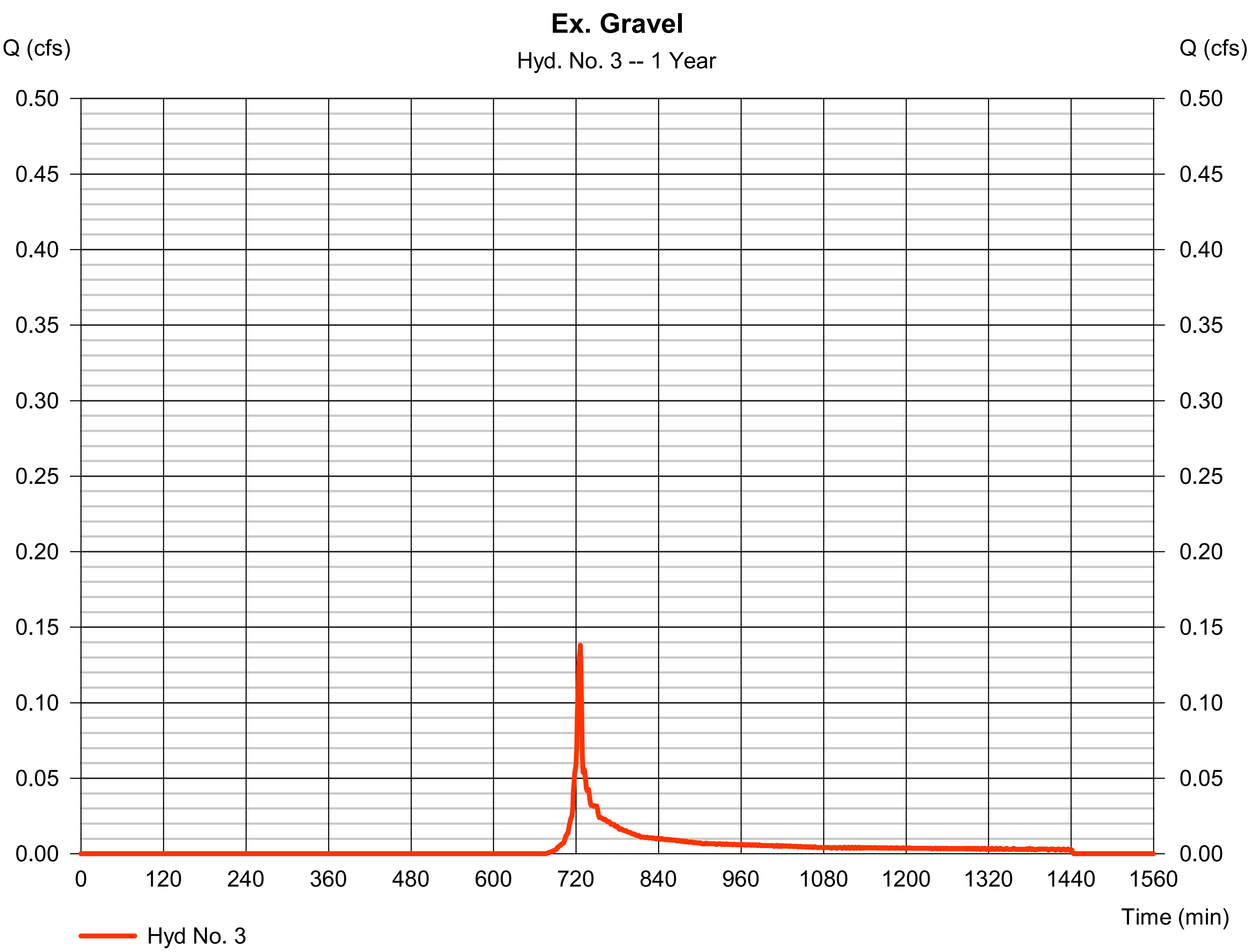
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 3

Ex. Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.138 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 391 cuft
Drainage area	= 0.380 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.80 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 3

Ex. Gravel

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.40		3.40		0.00		
Land slope (%)	=	0.71		0.00		0.00		
Travel Time (min)	**=**	**1.78**	**+**	**0.00**	**+**	**0.00**	**=**	**1.78**
Shallow Concentrated Flow								
Flow length (ft)	=	102.00		19.23		0.00		
Watercourse slope (%)	=	1.34		4.78		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.87		4.44		0.00		
Travel Time (min)	**=**	**0.91**	**+**	**0.07**	**+**	**0.00**	**=**	**0.98**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	({0})	0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 2.80 min

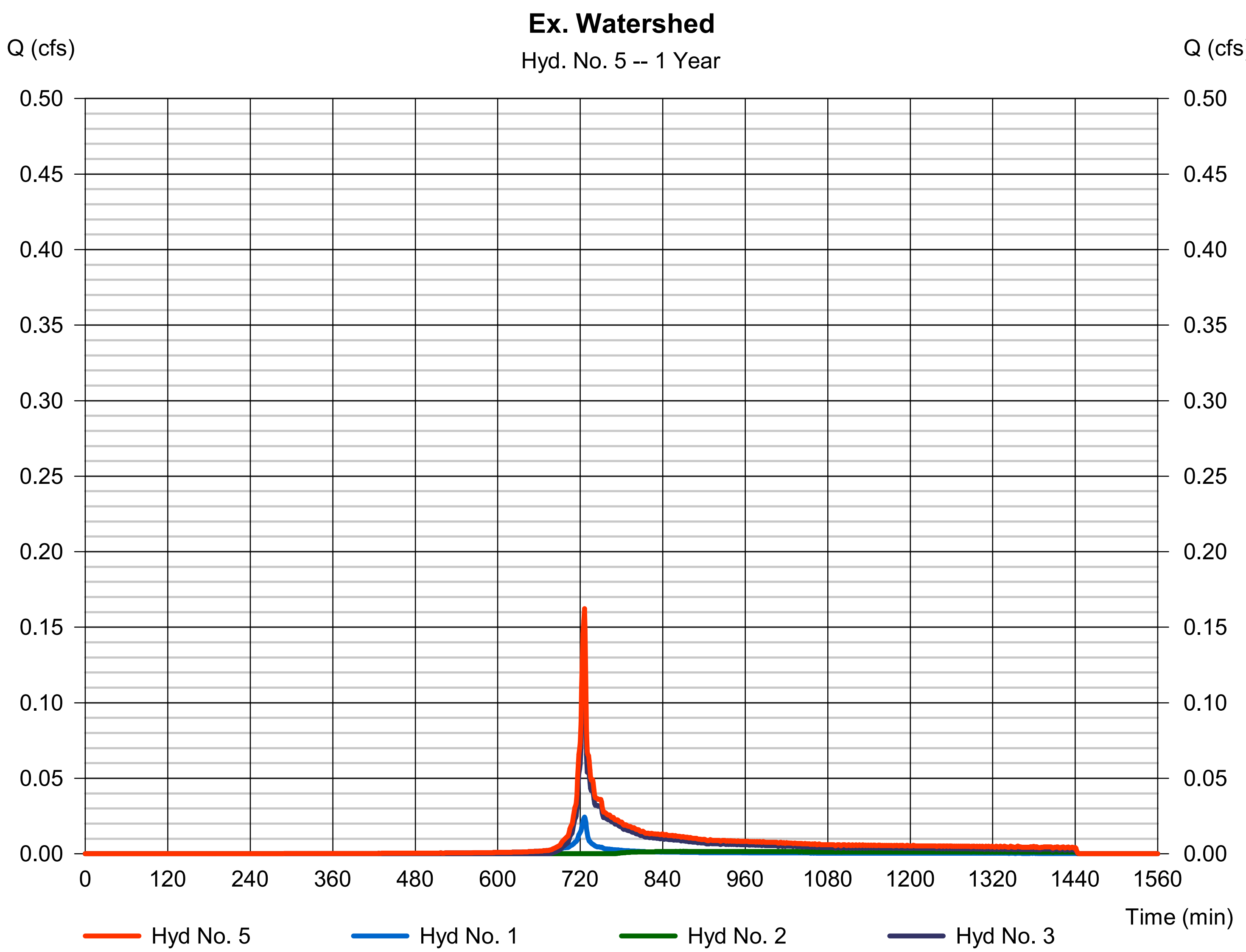
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 5

Ex. Watershed

Hydrograph type	= Combine	Peak discharge	= 0.162 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 518 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 0.960 ac



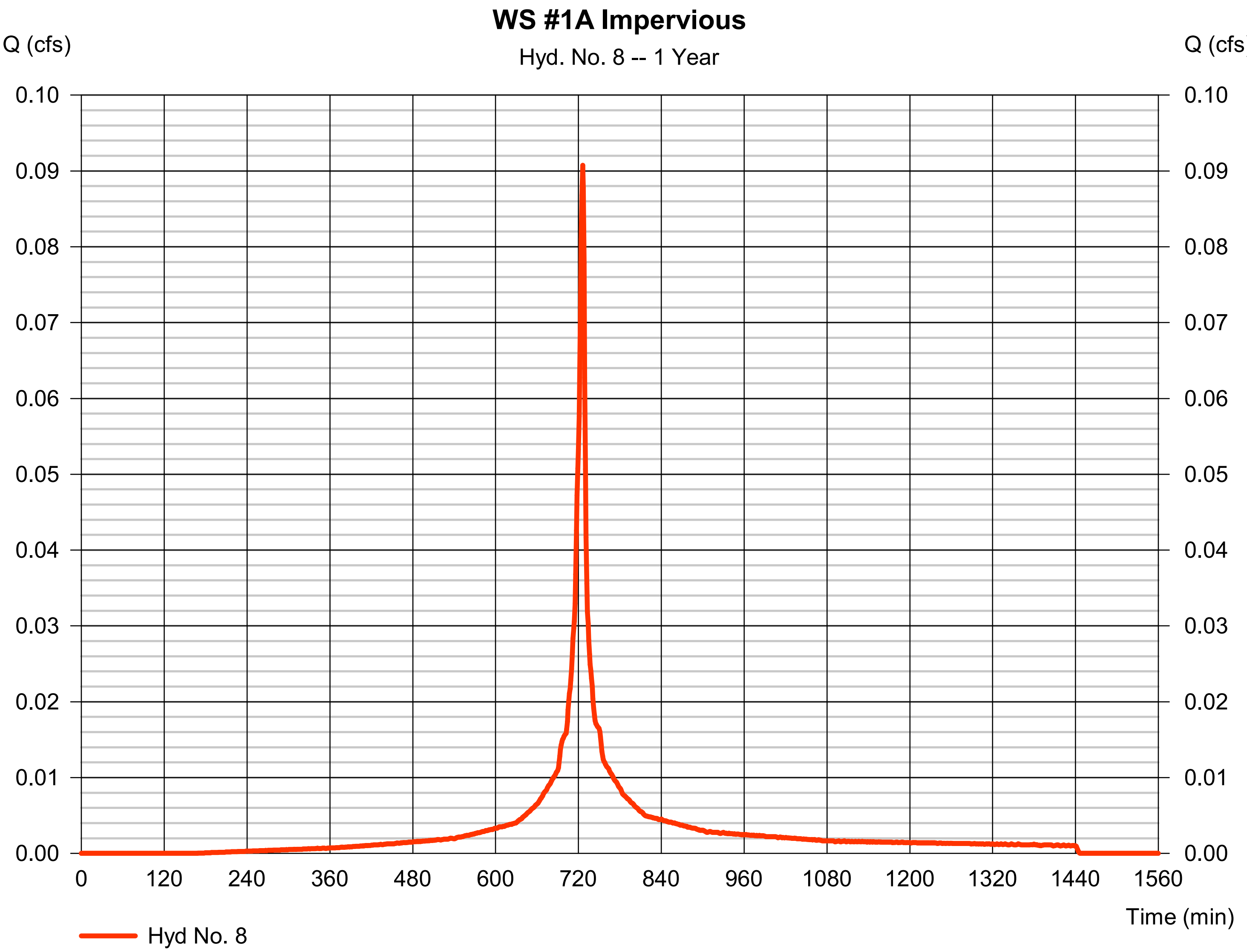
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 8

WS #1A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.091 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 282 cuft
Drainage area	= 0.075 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.60 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 8

WS #1A Impervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.150		0.011		
Flow length (ft)	=	32.5		17.0		0.0		
Two-year 24-hr precip. (in)	=	3.40		3.40		3.40		
Land slope (%)	=	1.54		2.35		0.00		
Travel Time (min)	**=**	**0.53**	**+**	**2.16**	**+**	**0.00**	**=**	**2.69**
Shallow Concentrated Flow								
Flow length (ft)	=	0.00		0.00		0.00		
Watercourse slope (%)	=	0.00		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	0.00		0.00		0.00		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow								
X sectional flow area (sqft)	=	0.20		0.79		0.00		
Wetted perimeter (ft)	=	1.57		3.14		0.00		
Channel slope (%)	=	1.00		1.00		0.00		
Manning's n-value	=	0.012		0.013		0.015		
Velocity (ft/s)	=	3.08		4.53		0.00		
Flow length (ft)	({0})	72.0		127.0		0.0		
Travel Time (min)	**=**	**0.39**	**+**	**0.47**	**+**	**0.00**	**=**	**0.86**

Total Travel Time, Tc .... 3.60 min

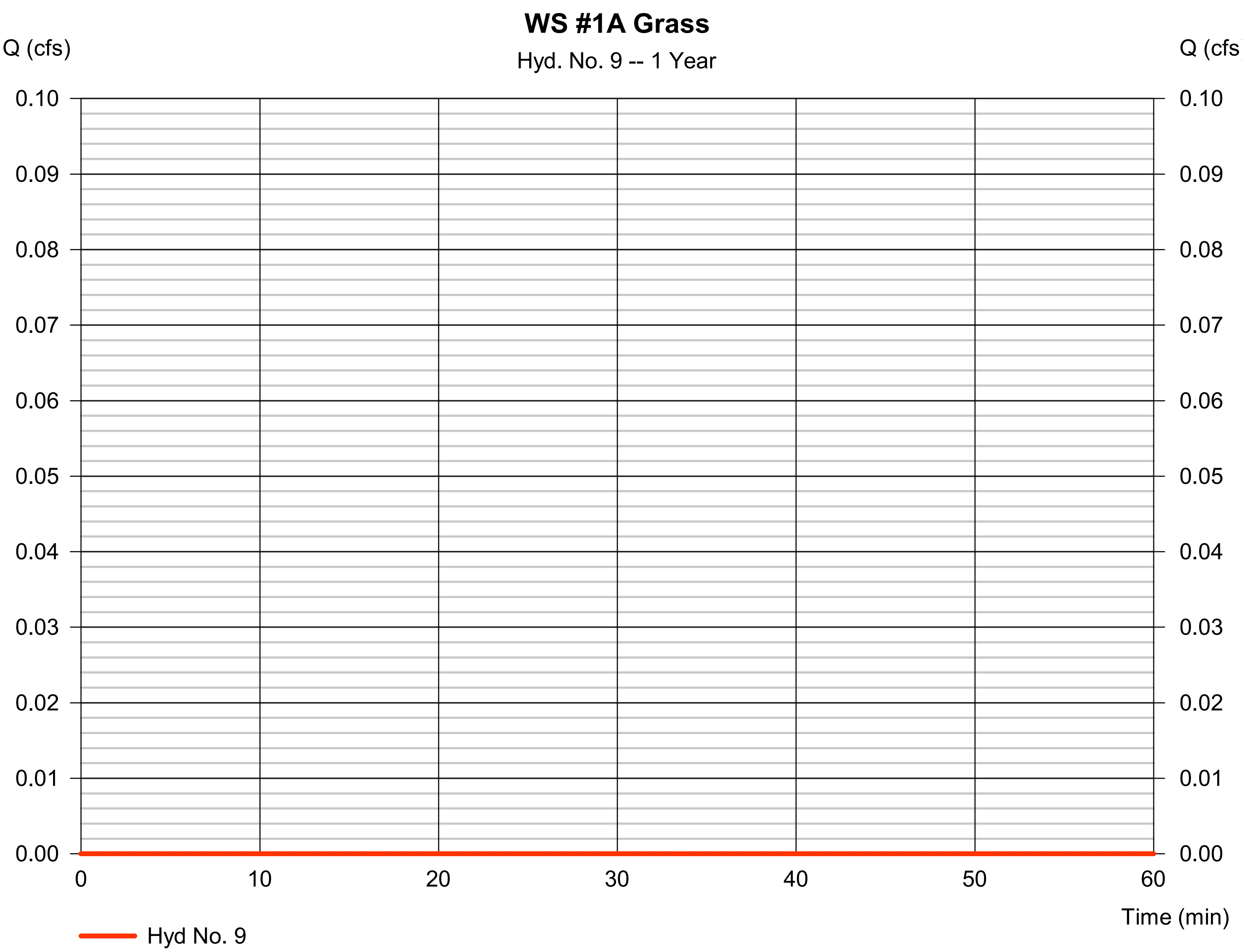
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 9

WS #1A Grass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 0.086 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.30 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 9

WS #1A Grass

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.150		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.40		0.00		0.00		
Land slope (%)	=	2.69		0.00		0.00		
Travel Time (min)	**=**	**8.44**	**+**	**0.00**	**+**	**0.00**	**=**	**8.44**
Shallow Concentrated Flow								
Flow length (ft)	=	5.43		0.00		0.00		
Watercourse slope (%)	=	2.03		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.30			0.00		0.00		
Travel Time (min)	**=**	**0.04**	**+**	**0.00**	**+**	**0.00**	**=**	**0.04**
Channel Flow								
X sectional flow area (sqft)	=	0.20		0.79		0.00		
Wetted perimeter (ft)	=	1.57		3.14		0.00		
Channel slope (%)	=	1.00		1.00		0.00		
Manning's n-value	=	0.012		0.013		0.015		
Velocity (ft/s)	=3.08							
				4.53				
						0.00		
Flow length (ft)	({0})72.0			127.0		0.0		
Travel Time (min)	**=**	**0.39**	**+**	**0.47**	**+**	**0.00**	**=**	**0.86**

Total Travel Time, Tc .... **9.30 min**

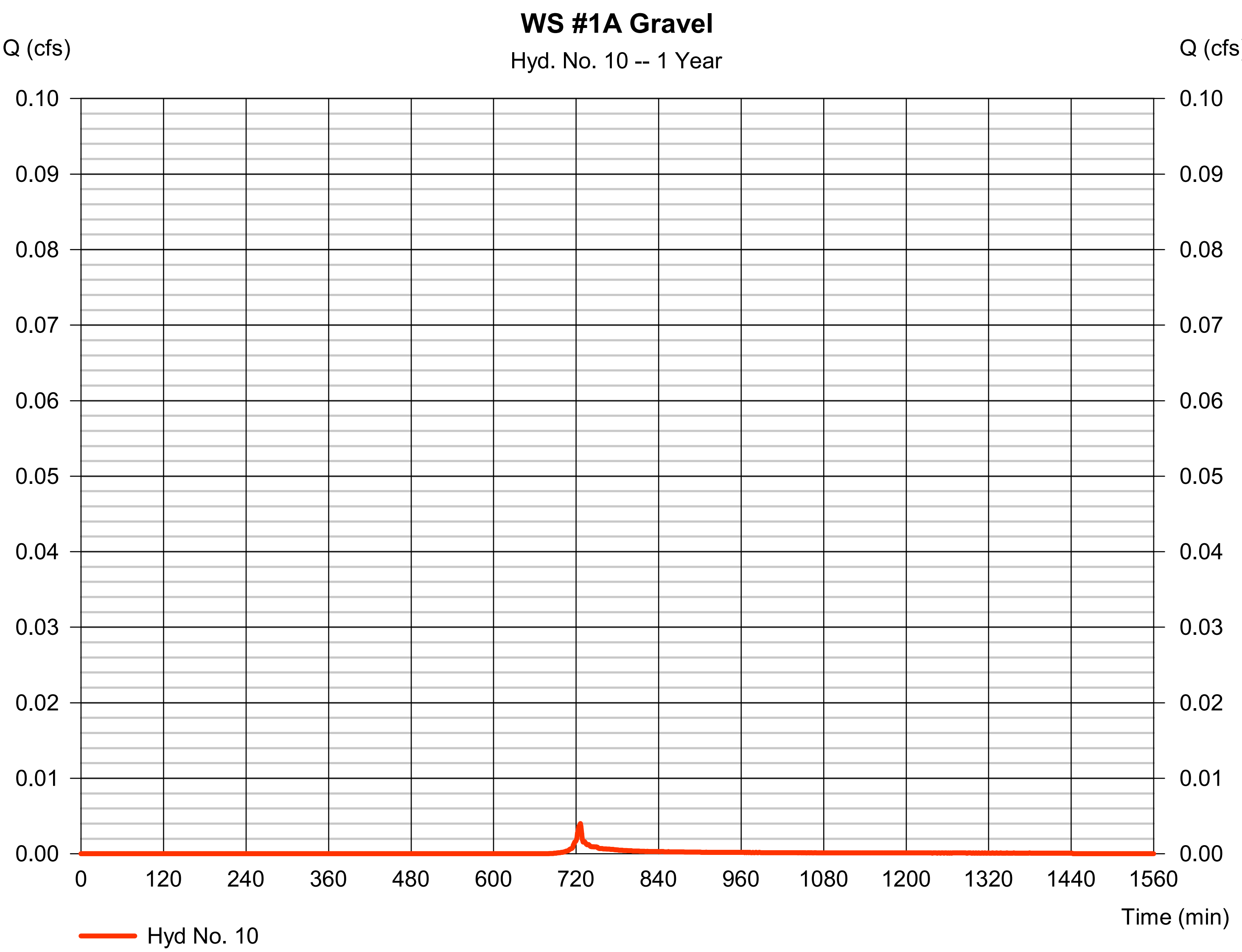
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 10

WS #1A Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.004 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 11 cuft
Drainage area	= 0.011 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



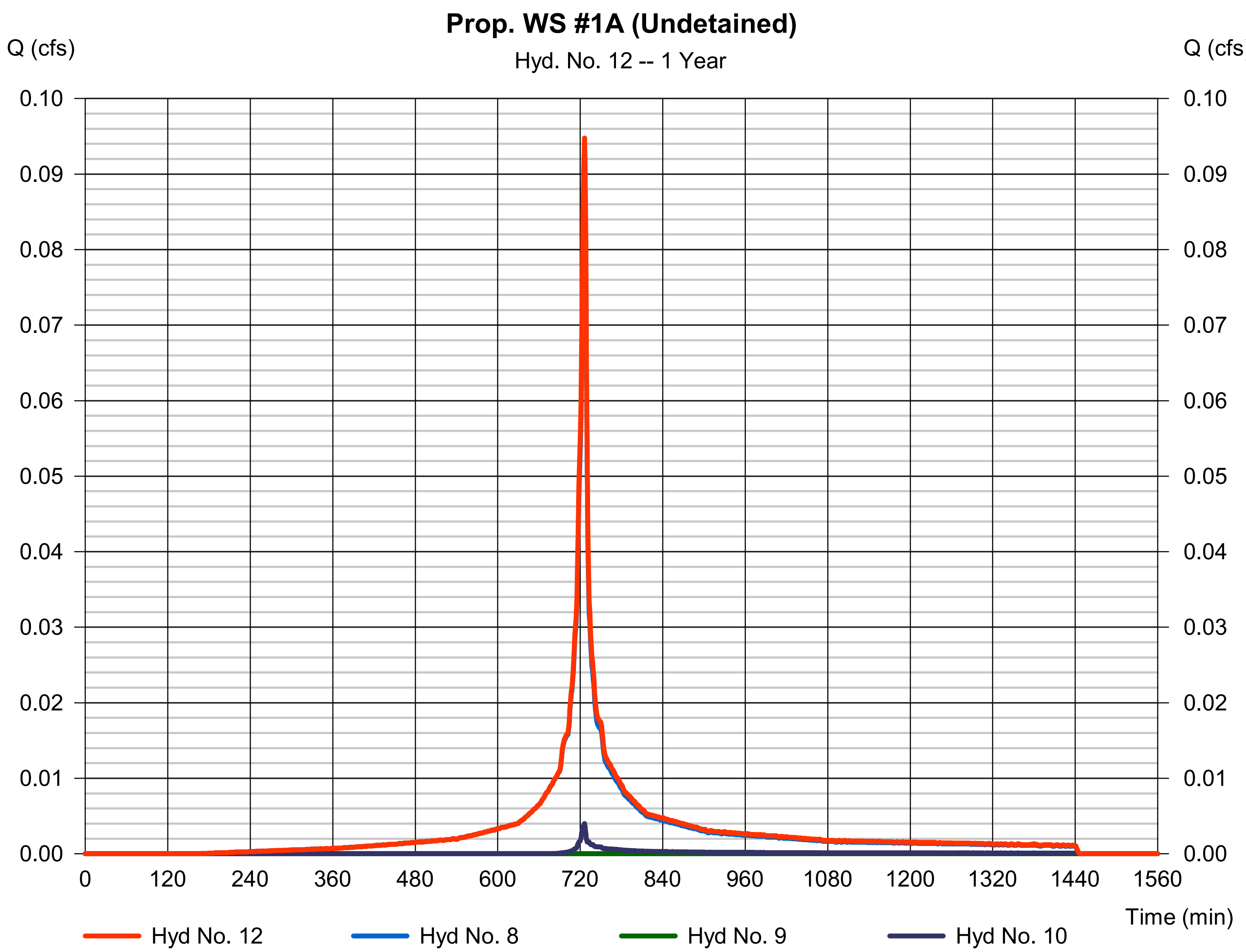
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 12

Prop. WS #1A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.095 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 293 cuft
Inflow hyds.	= 8, 9, 10	Contrib. drain. area	= 0.172 ac



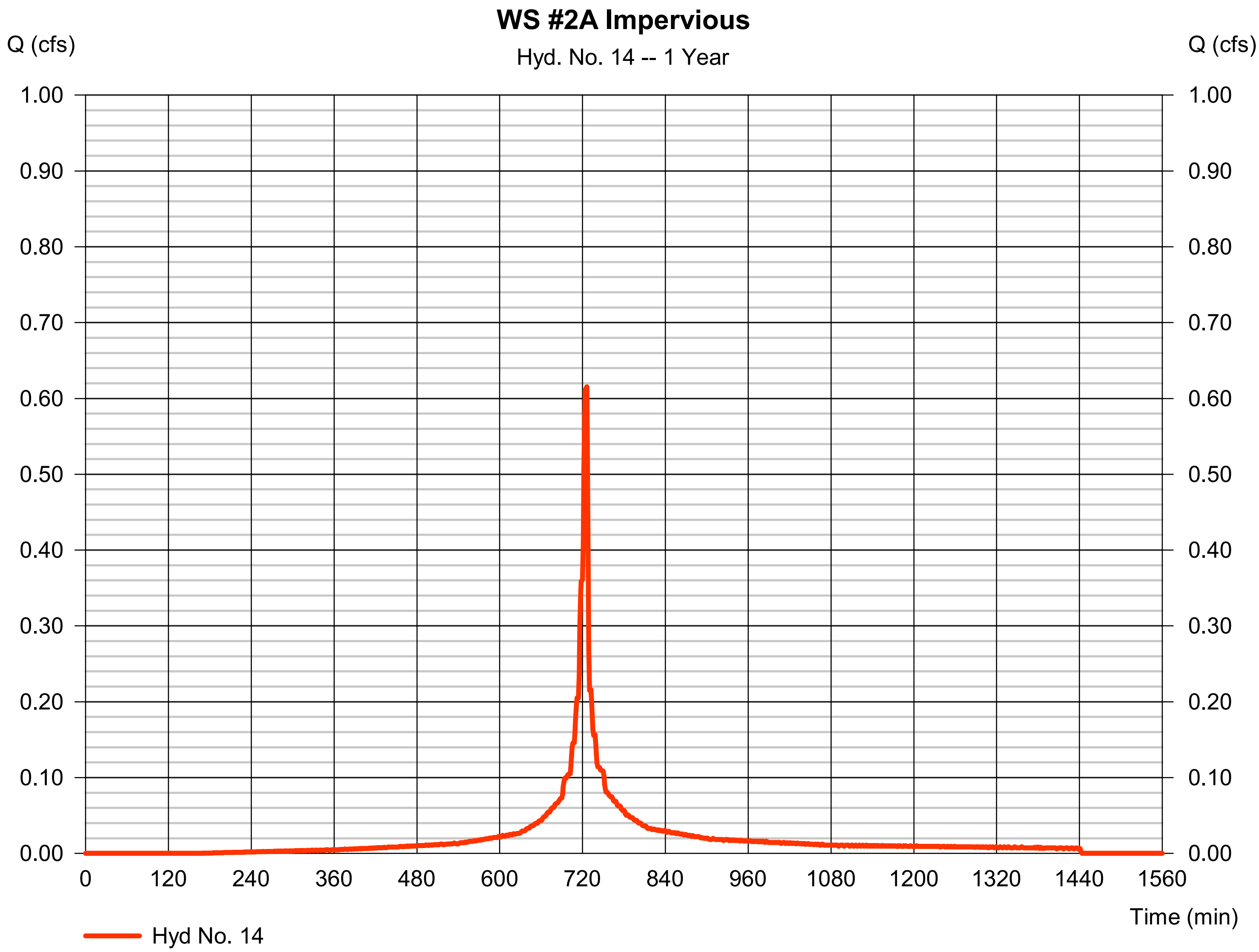
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 14

WS #2A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.615 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 1,862 cuft
Drainage area	= 0.529 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 14

WS #2A Impervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.150		0.011		
Flow length (ft)	=	14.3		12.4		73.3		
Two-year 24-hr precip. (in)	=	3.40		3.40		3.40		
Land slope (%)	=	3.78		7.49		1.68		
Travel Time (min)	**=**	**0.19**	**+**	**1.06**	**+**	**0.98**	**=**	**2.23**
Shallow Concentrated Flow								
Flow length (ft)	=	65.00		0.00		0.00		
Watercourse slope (%)	=	0.45		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=1.36			0.00		0.00		
Travel Time (min)	**=**	**0.79**	**+**	**0.00**	**+**	**0.00**	**=**	**0.79**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00			0.00		0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... **3.00 min**

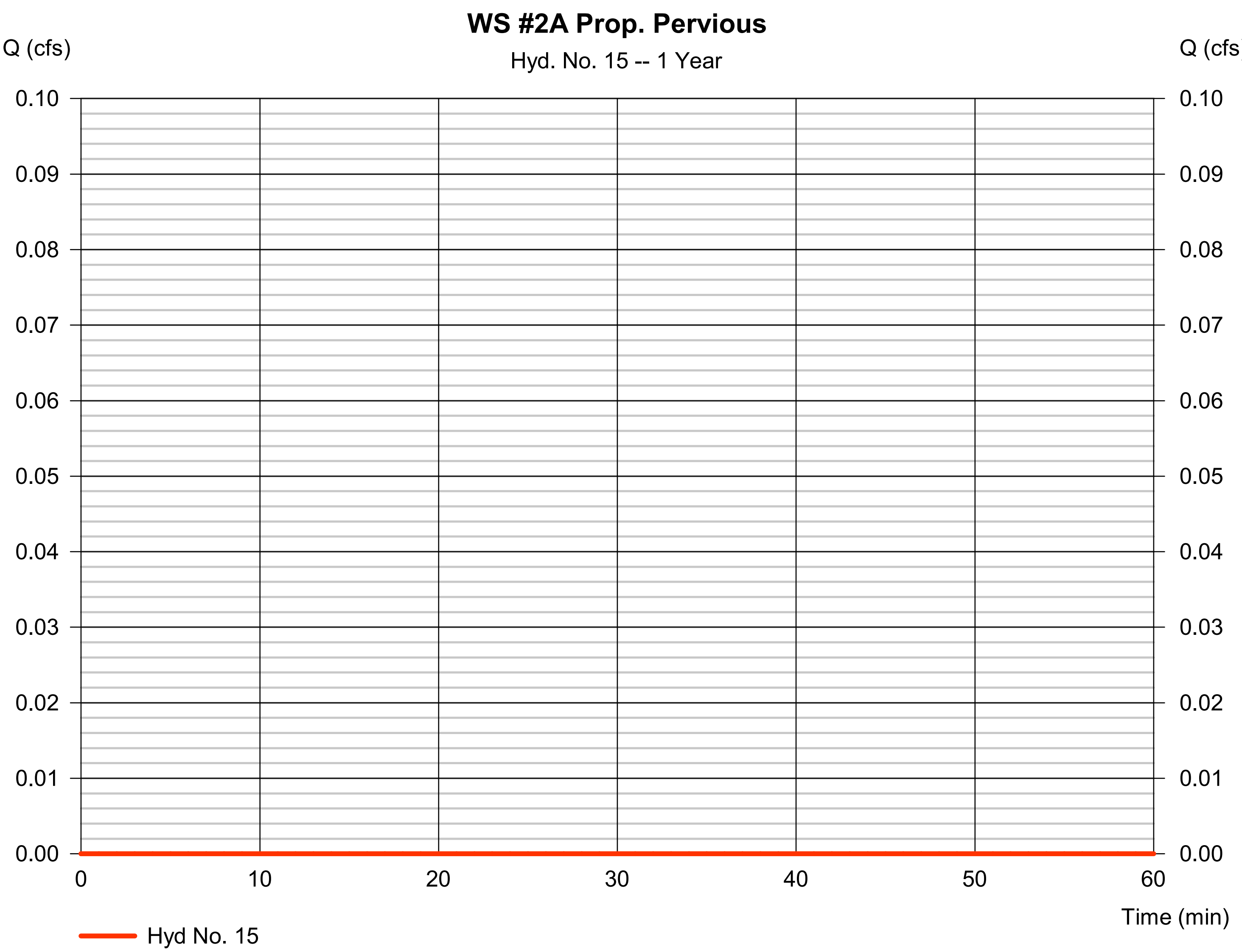
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Wednesday, 02 / 7 / 2024

Hyd. No. 15

WS #2A Prop. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 0.005 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.90 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 15

WS #2A Prop. Pervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.150		0.011		0.011		
Flow length (ft)	=	12.4		87.6		0.0		
Two-year 24-hr precip. (in)	=	3.40		3.40		0.00		
Land slope (%)	=	7.57		1.48		0.00		
Travel Time (min)	**=**	**1.05**	**+**	**1.19**	**+**	**0.00**	**=**	**2.24**
Shallow Concentrated Flow								
Flow length (ft)	=	50.70		0.00		0.00		
Watercourse slope (%)	=	0.43		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=1.33			0.00		0.00		
Travel Time (min)	**=**	**0.63**	**+**	**0.00**	**+**	**0.00**	**=**	**0.63**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00			0.00		0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... **2.90 min**

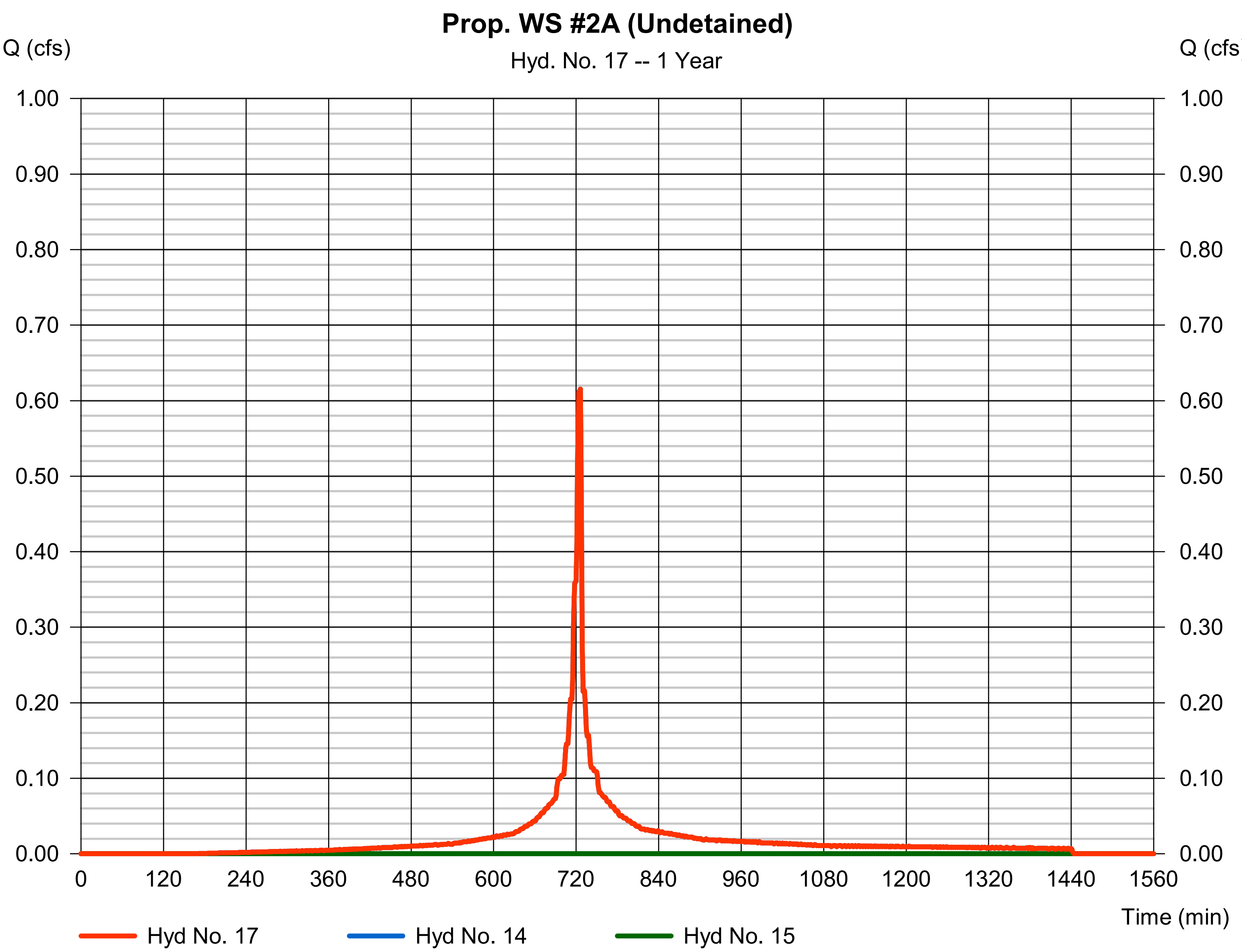
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 17

Prop. WS #2A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.615 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 1,862 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 0.534 ac



Hydrograph Report

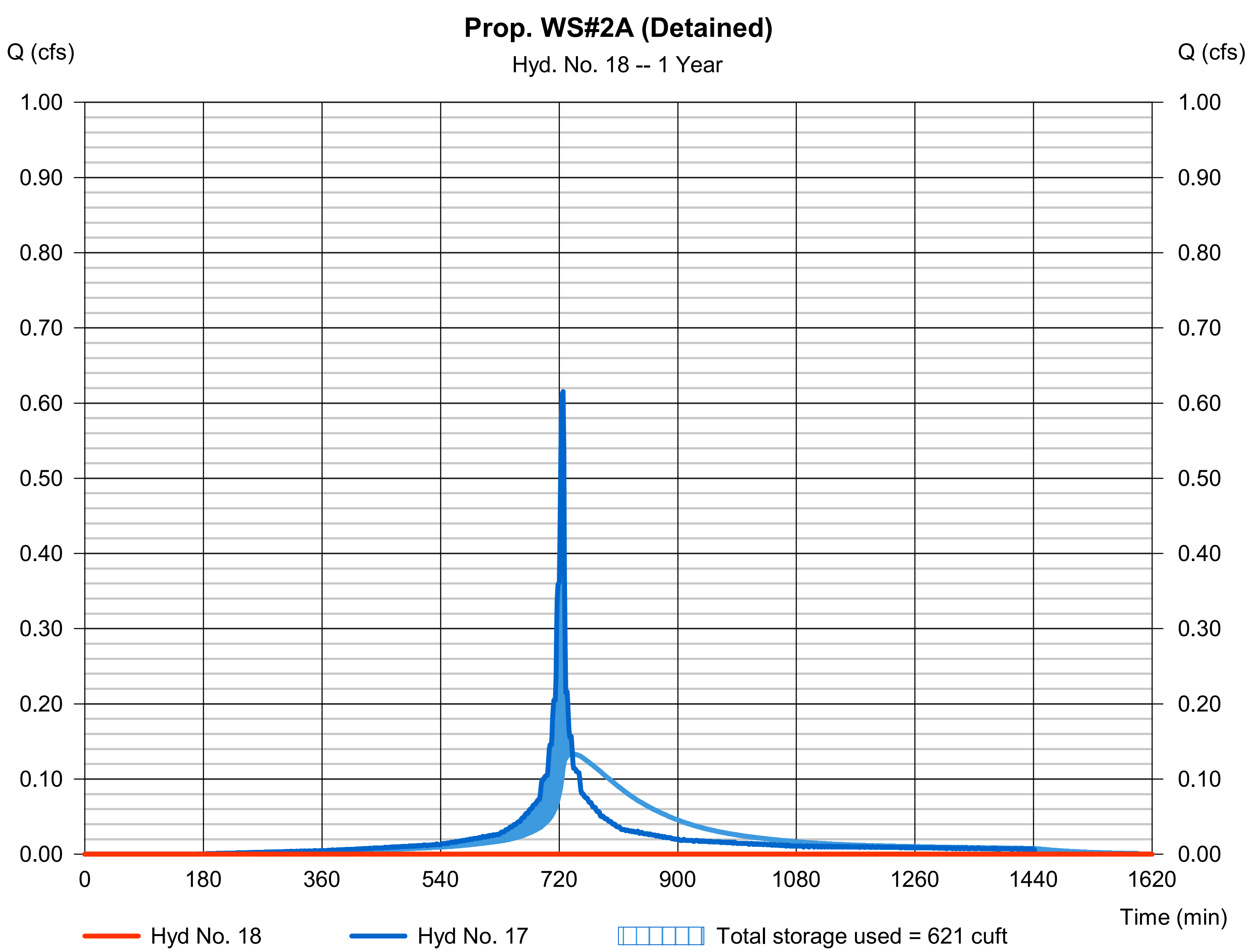
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 18

Prop. WS#2A (Detained)

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 685 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 17 - Prop. WS #2A (Undetained)	Max. Elevation	= 122.60 ft
Reservoir name	= Pervious Paving System	Max. Storage	= 621 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Pond No. 3 - Pervious Paving System

Pond Data

Trapezoid -Bottom L x W = 88.2 x 88.2 ft, Side slope = 0.00:1, Bottom elev. = 122.40 ft, Depth = 2.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	122.40	7,770	0	0
0.25	122.65	7,770	777	777
0.50	122.90	7,770	777	1,554
0.75	123.15	7,770	777	2,331
1.00	123.40	7,770	777	3,108
1.25	123.65	7,770	777	3,885
1.50	123.90	7,770	777	4,662
1.75	124.15	7,770	777	5,439
2.00	124.40	7,770	777	6,216
2.25	124.65	7,770	777	6,993
2.50	124.90	7,770	777	7,770

Culvert / Orifice Structures

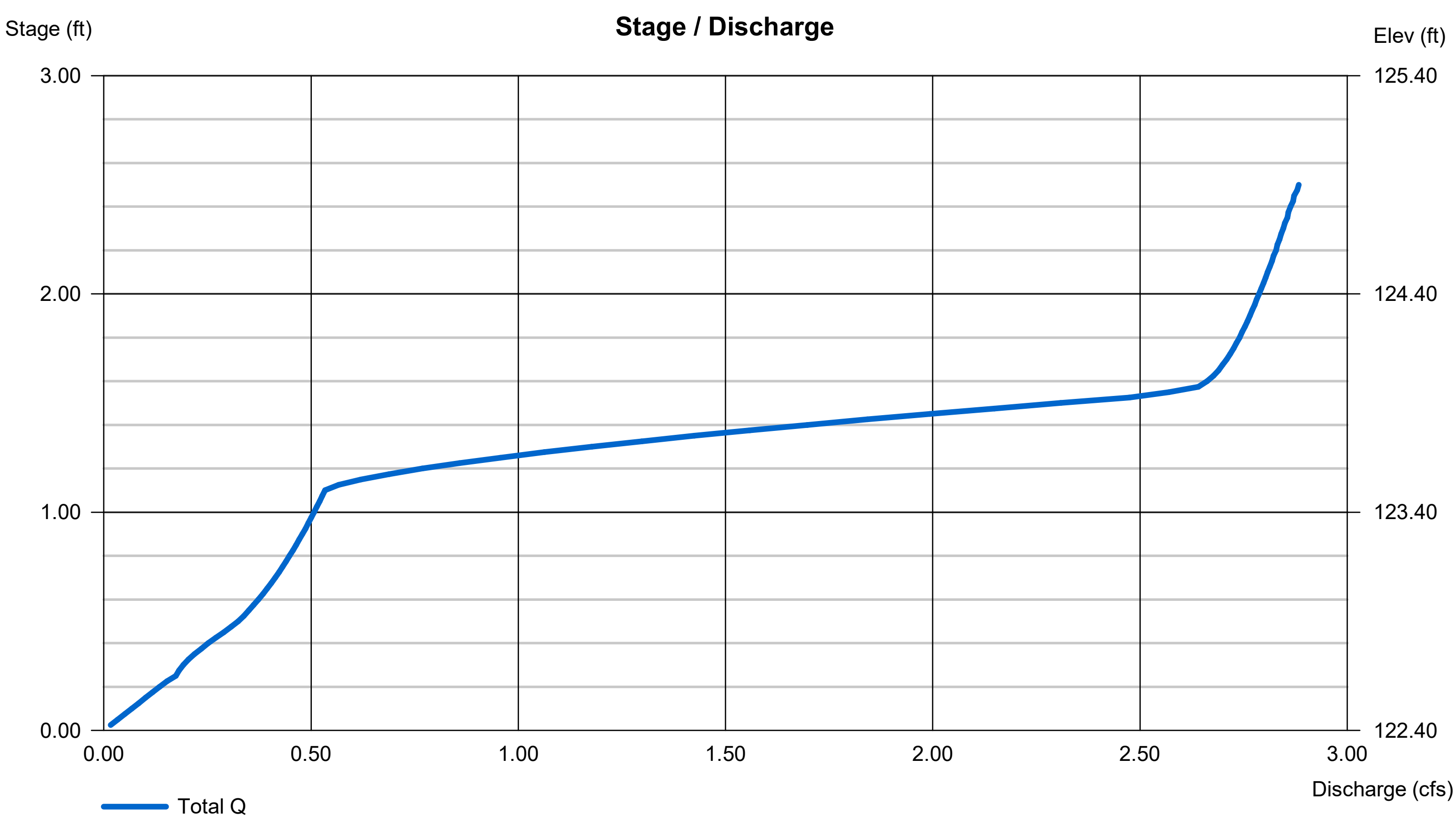
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	4.00	Inactive	0.00
Span (in)	= 6.00	4.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 116.47	122.60	0.00	0.00
Length (ft)	= 11.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.00	0.00	0.00	0.00
Crest El. (ft)	= 123.50	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) = 0.920 (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).



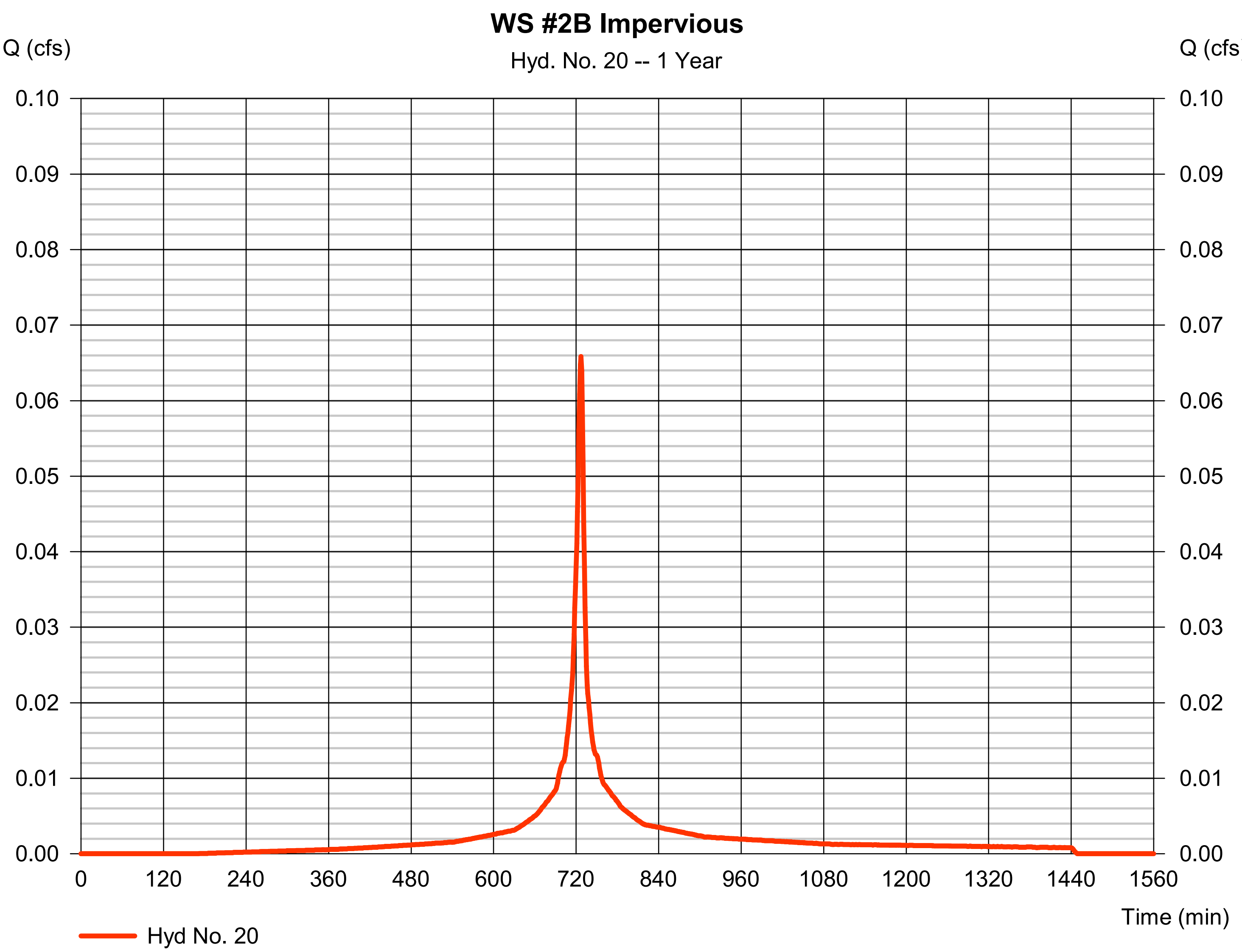
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 20

WS #2B Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.066 cfs
Storm frequency	= 1 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 221 cuft
Drainage area	= 0.057 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.90 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 20

WS #2B Impervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.150		0.011		
Flow length (ft)	=	3.8		65.4		0.0		
Two-year 24-hr precip. (in)	=	3.40		3.40		0.00		
Land slope (%)	=	3.97		4.85		0.00		
Travel Time (min)	**=**	**0.07**	**+**	**4.75**	**+**	**0.00**	**=**	**4.81**
Shallow Concentrated Flow								
Flow length (ft)	=	0.00		0.00		0.00		
Watercourse slope (%)	=	0.00		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	0.00		0.00		0.00		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow								
X sectional flow area (sqft)	=	0.35		0.00		0.00		
Wetted perimeter (ft)	=	2.09		0.00		0.00		
Channel slope (%)	=	0.36		0.00		0.00		
Manning's n-value	=	0.012		0.015		0.015		
Velocity (ft/s)	=	2.24		0.00		0.00		
Flow length (ft)		({0})147.9		0.0		0.0		
Travel Time (min)	**=**	**1.10**	**+**	**0.00**	**+**	**0.00**	**=**	**1.10**

Total Travel Time, Tc .... **5.90 min**

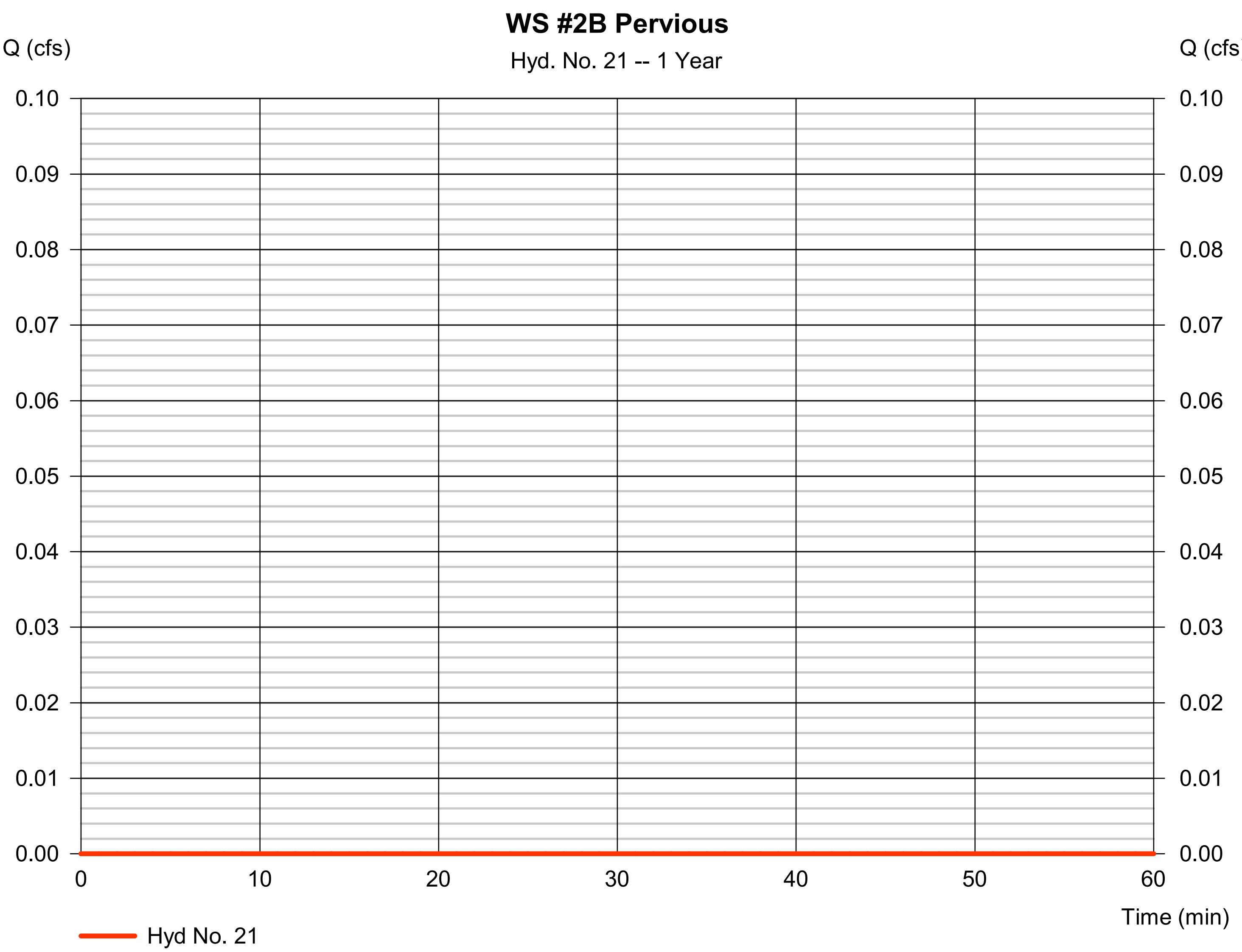
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 21

WS #2B Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Drainage area	= 0.197 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.10 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 21

WS #2B Pervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.150		0.011		0.011		
Flow length (ft)	=	75.5		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.40		0.00		0.00		
Land slope (%)	=	5.55		0.00		0.00		
Travel Time (min)	**=**	**5.05**	**+**	**0.00**	**+**	**0.00**	**=**	**5.05**
Shallow Concentrated Flow								
Flow length (ft)	=	0.00		0.00		0.00		
Watercourse slope (%)	=	0.00		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=0.00			0.00		0.00		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow								
X sectional flow area (sqft)	=	0.35		0.00		0.00		
Wetted perimeter (ft)	=	2.09		0.00		0.00		
Channel slope (%)	=	0.36		0.00		0.00		
Manning's n-value	=	0.012		0.015		0.015		
Velocity (ft/s)	=2.24							
				0.00				
						0.00		
Flow length (ft)	({0})147.9			0.0		0.0		
Travel Time (min)	**=**	**1.10**	**+**	**0.00**	**+**	**0.00**	**=**	**1.10**

Total Travel Time, Tc .... **6.10 min**

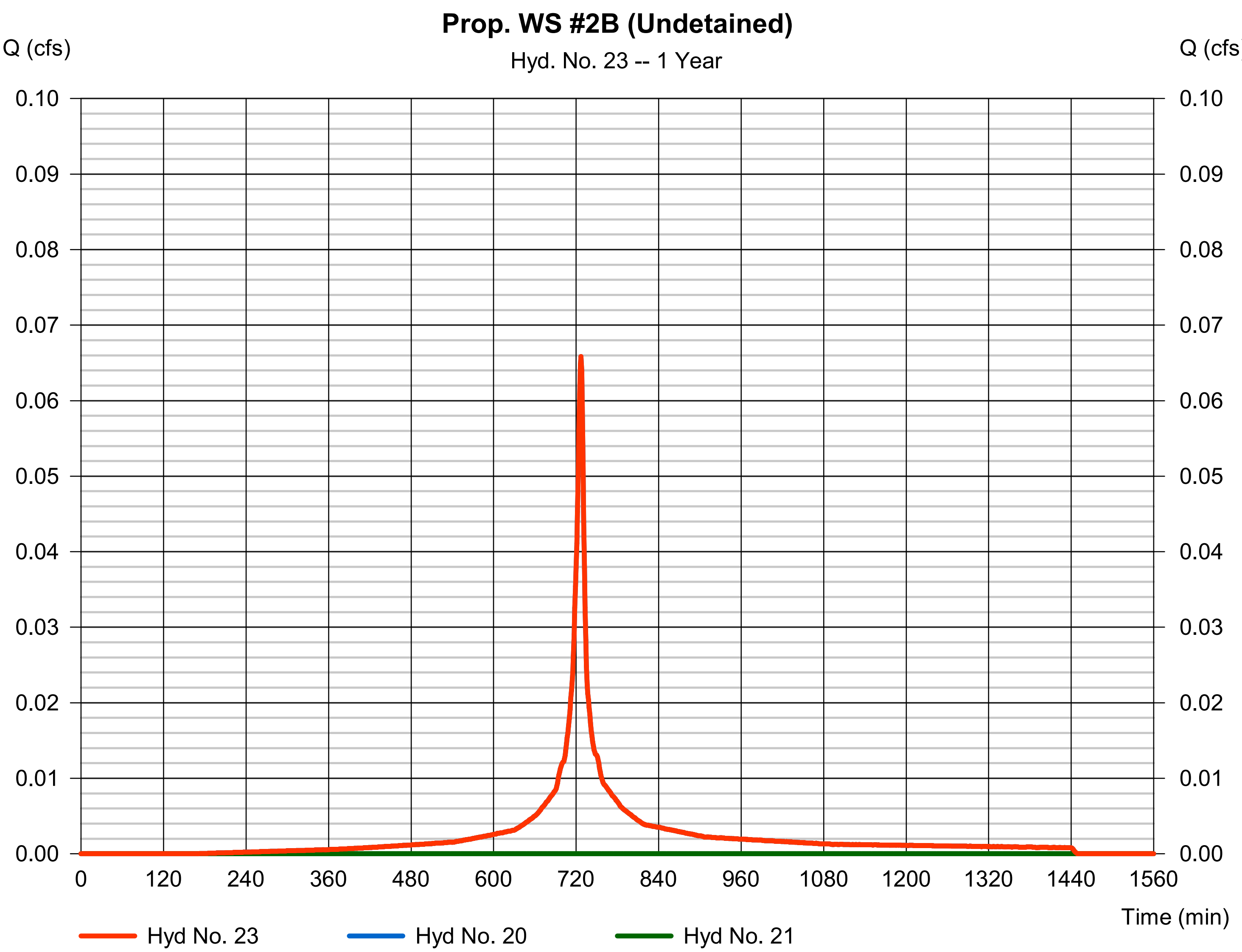
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 23

Prop. WS #2B (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.066 cfs
Storm frequency	= 1 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 221 cuft
Inflow hyds.	= 20, 21	Contrib. drain. area	= 0.254 ac



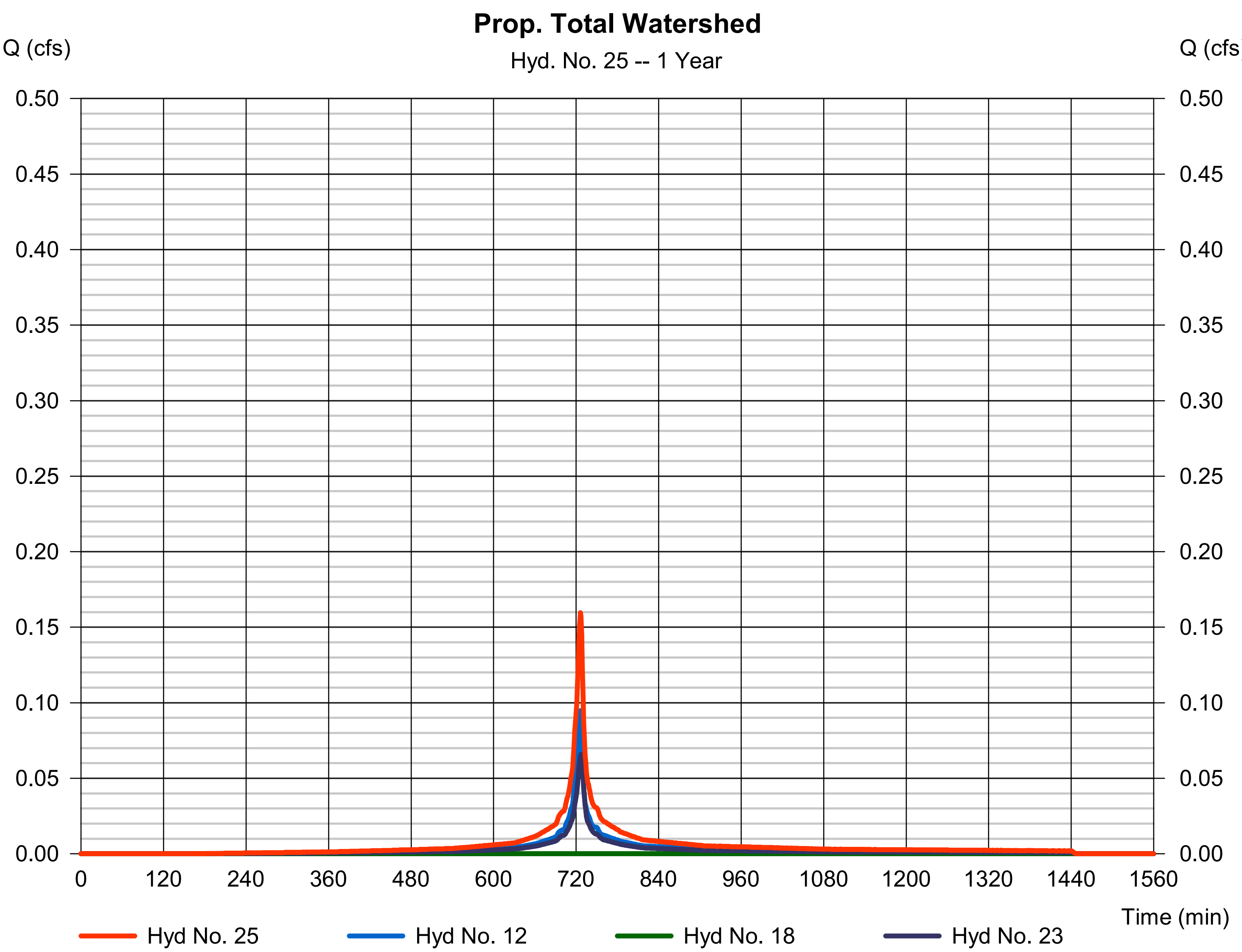
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 25

Prop. Total Watershed

Hydrograph type	= Combine	Peak discharge	= 0.160 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 514 cuft
Inflow hyds.	= 12, 18, 23	Contrib. drain. area	= 0.000 ac



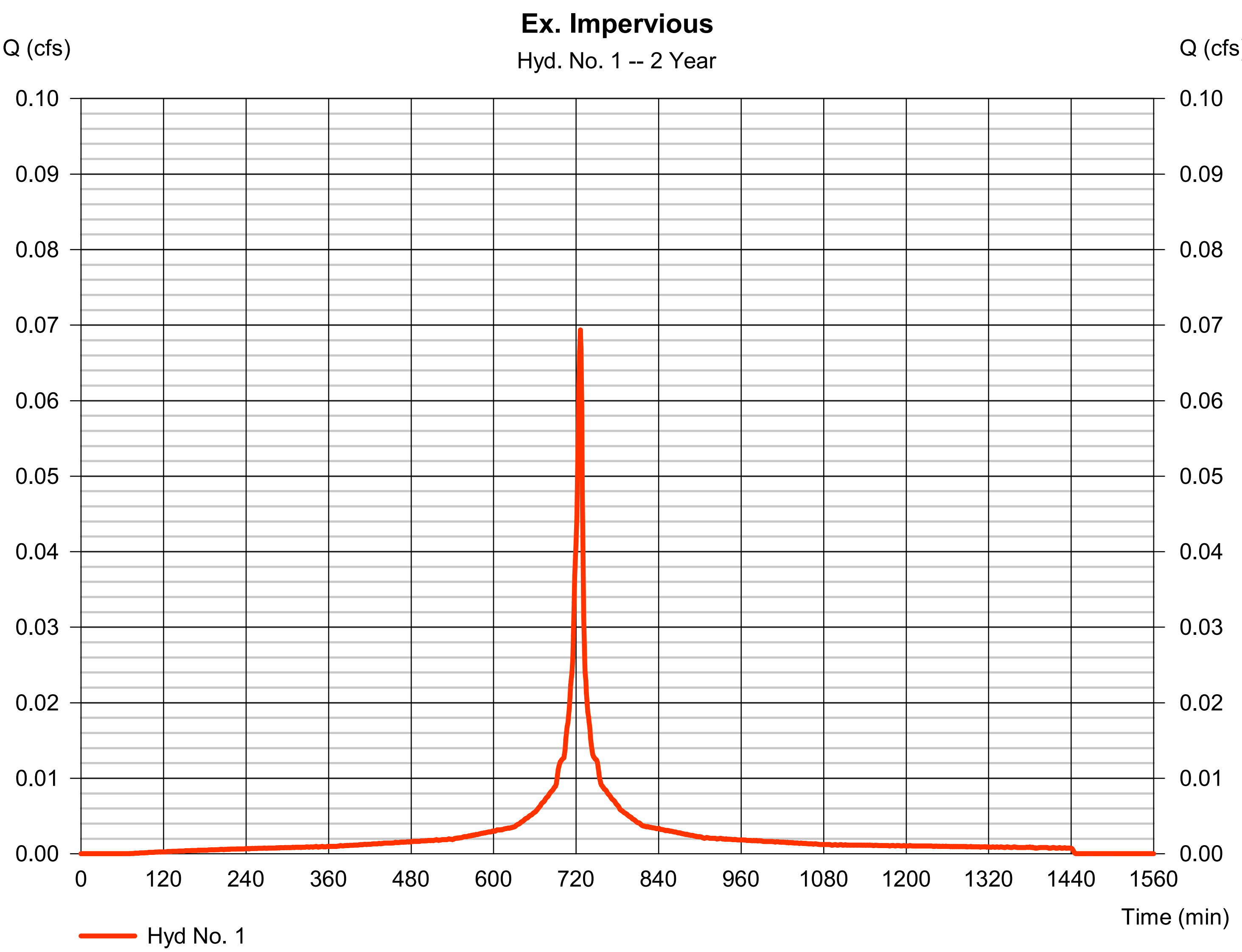
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 1

Ex. Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.069 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 230 cuft
Drainage area	= 0.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.20 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



Hydrograph Report

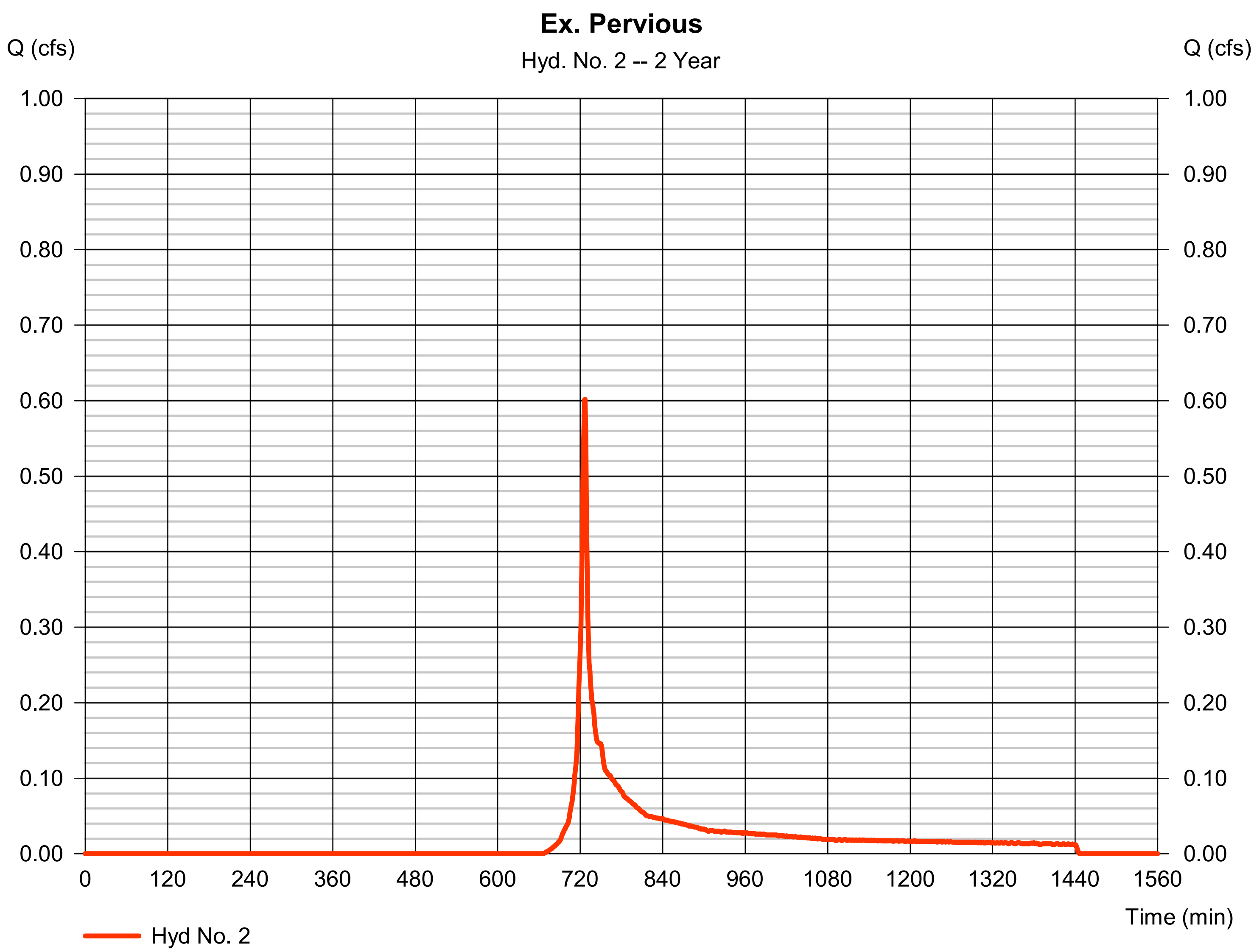
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 2

Ex. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.601 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,819 cuft
Drainage area	= 0.560 ac	Curve number	= 69*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.20 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stor	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 85) + (0.560 x 69)] / 0.560



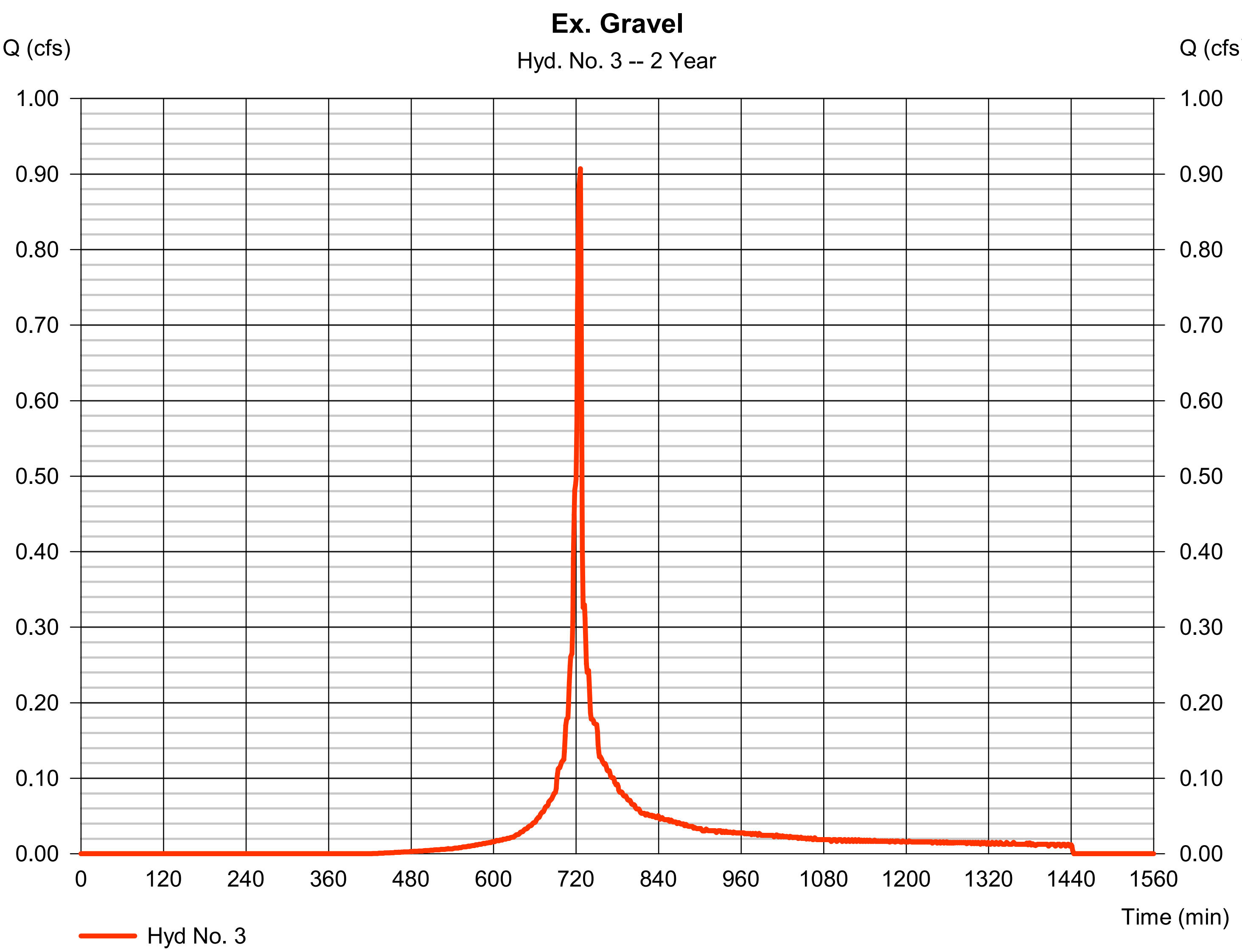
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 3

Ex. Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.907 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 2,495 cuft
Drainage area	= 0.380 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.80 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



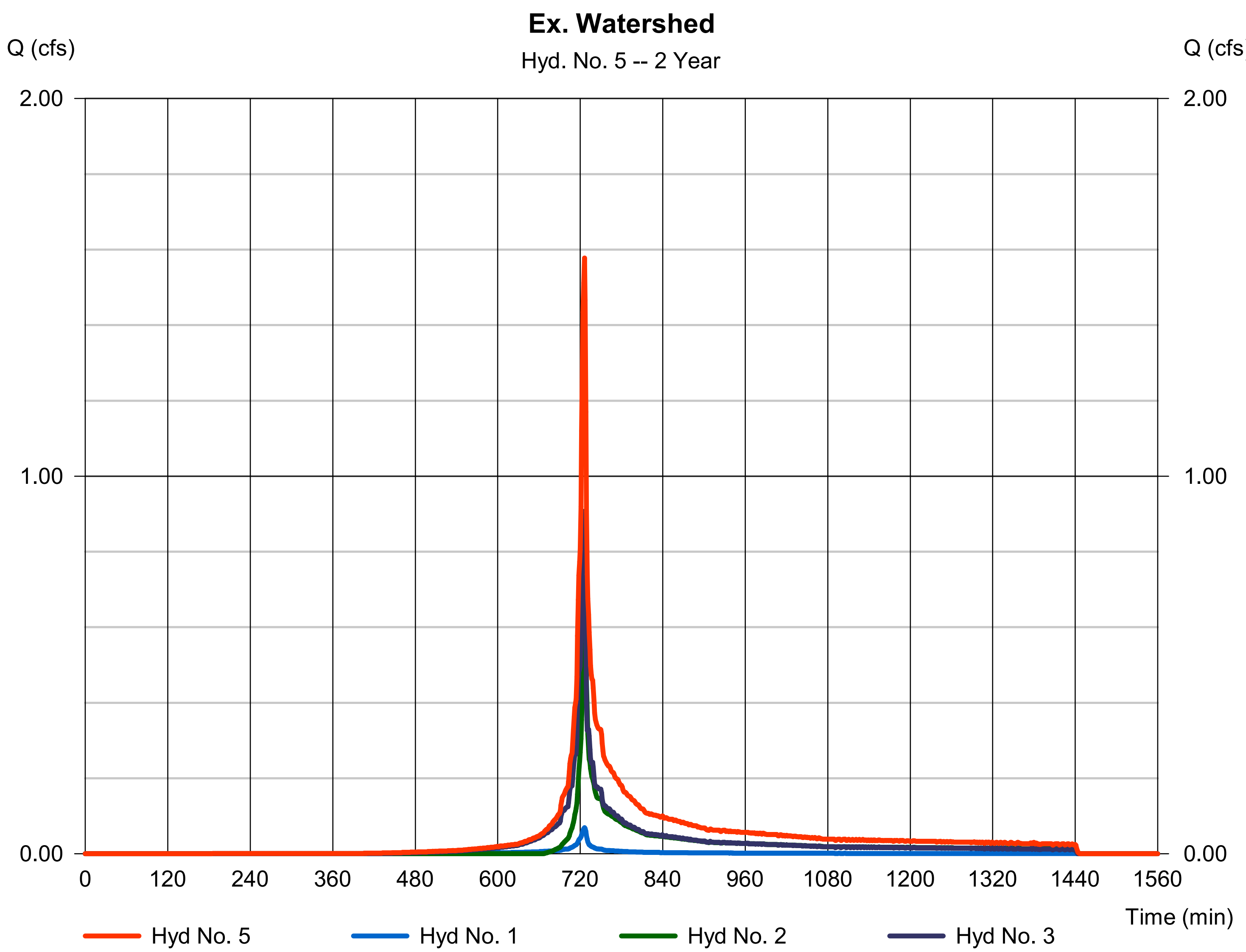
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 5

Ex. Watershed

Hydrograph type	= Combine	Peak discharge	= 1.578 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 4,544 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 0.960 ac



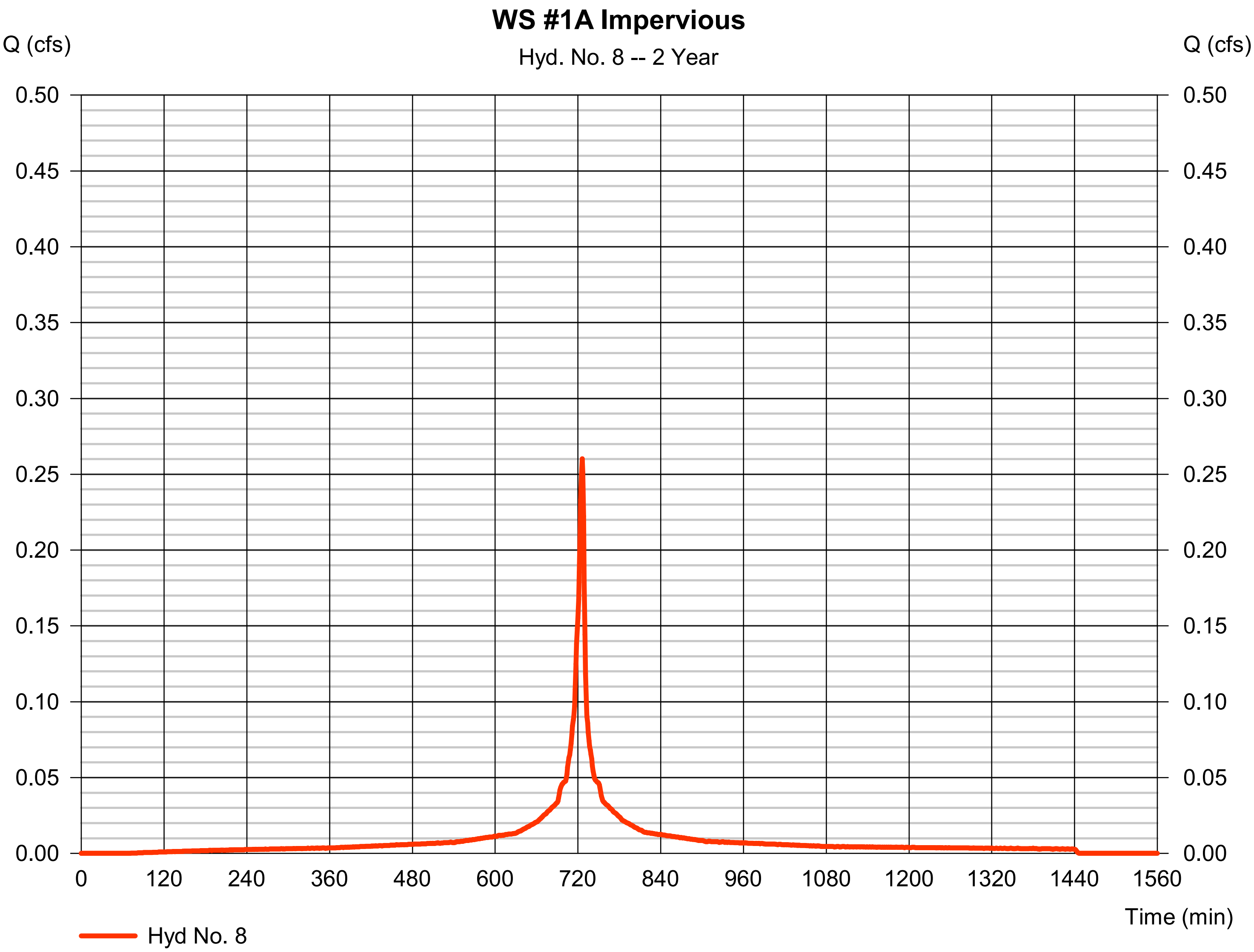
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 8

WS #1A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.260 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 862 cuft
Drainage area	= 0.075 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.60 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



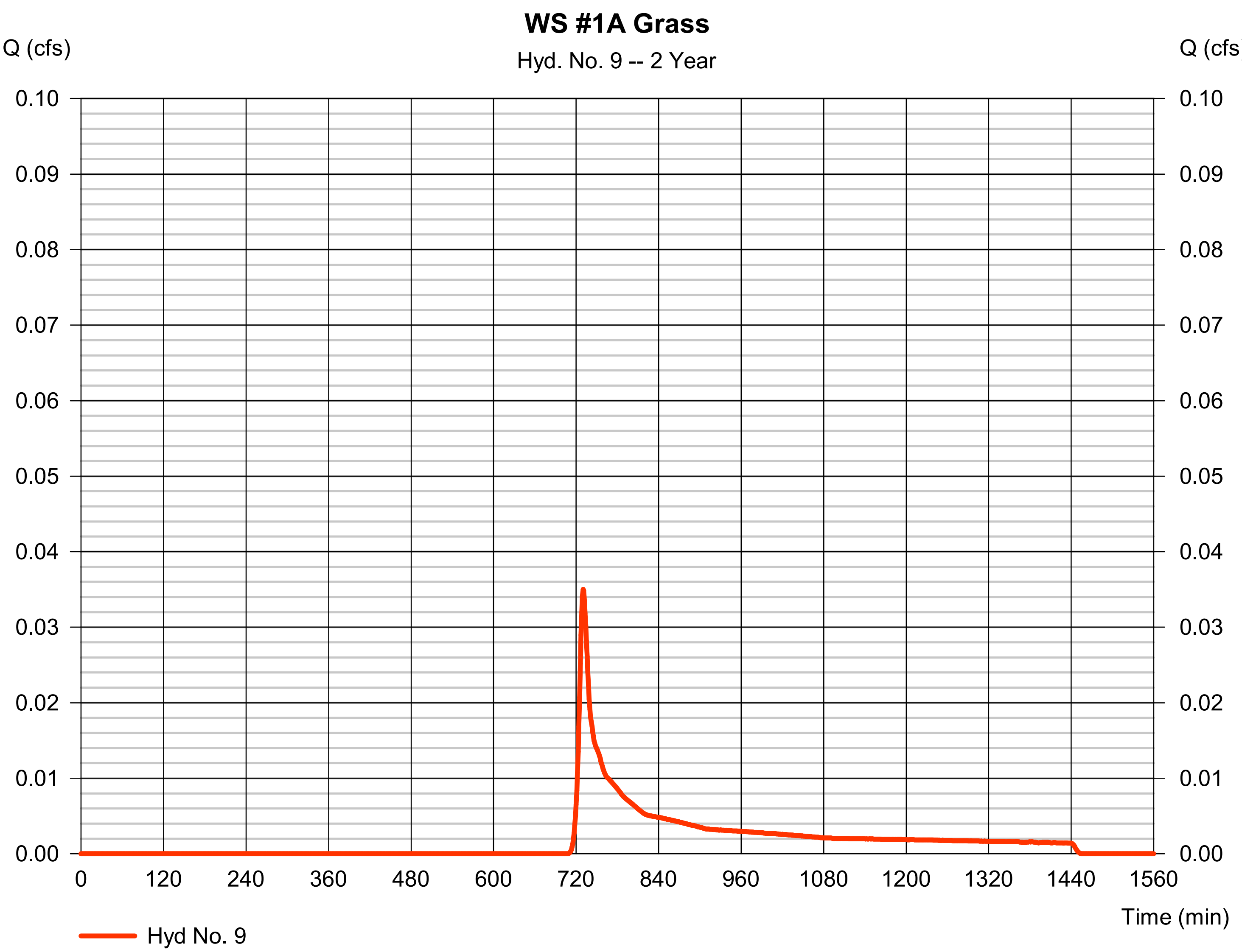
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 9

WS #1A Grass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.035 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 165 cuft
Drainage area	= 0.086 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.30 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



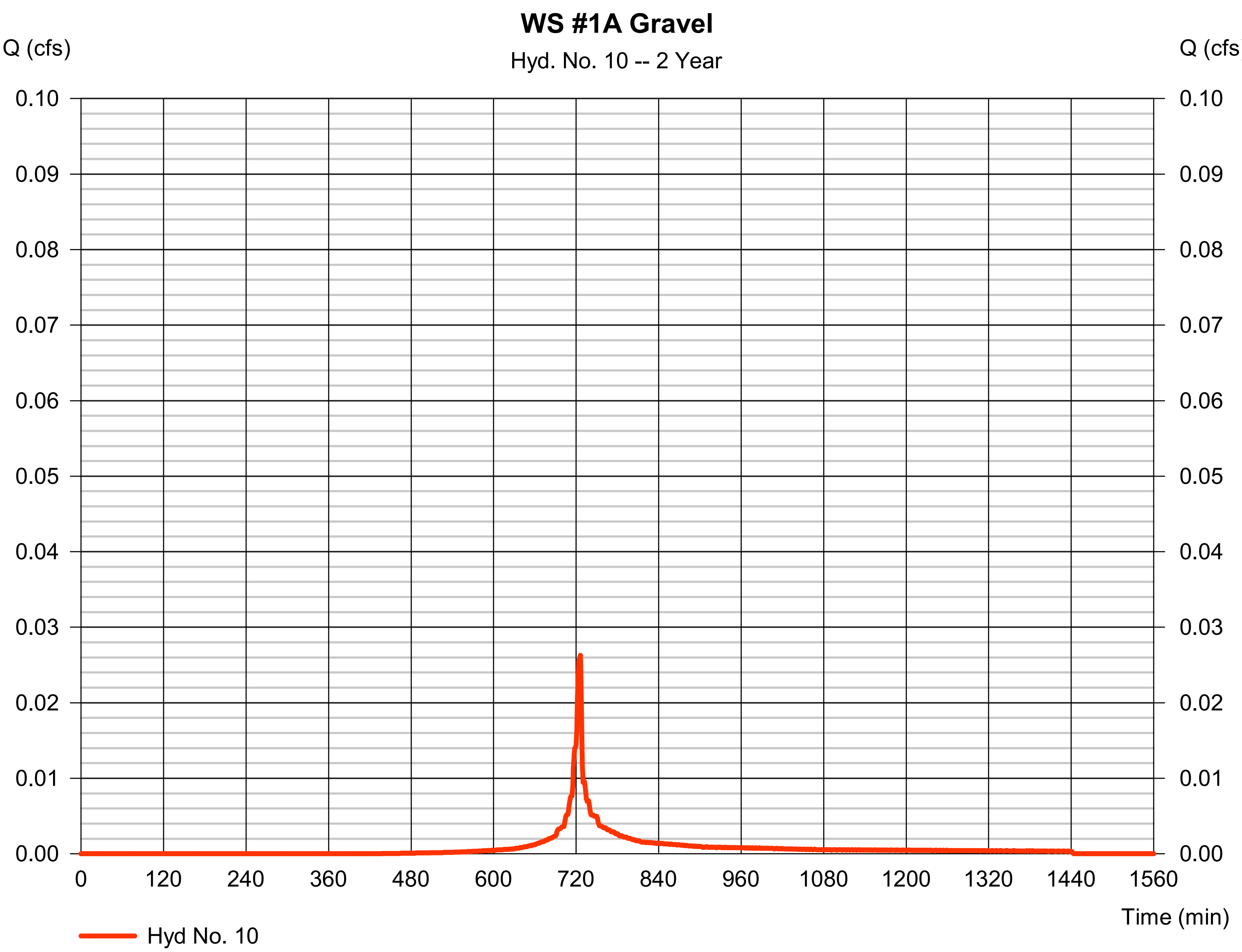
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 10

WS #1A Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.026 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 72 cuft
Drainage area	= 0.011 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



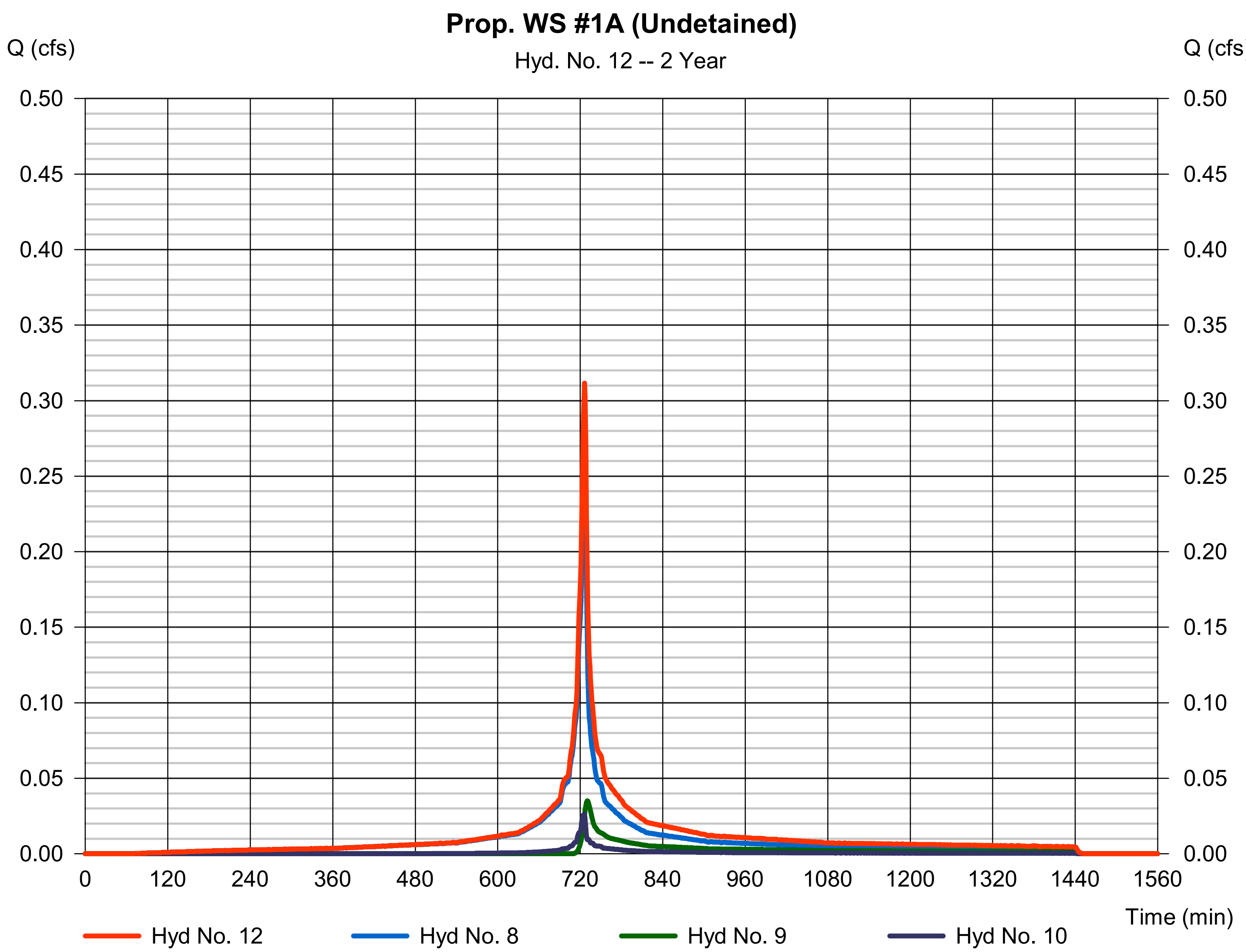
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 12

Prop. WS #1A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.312 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 1,099 cuft
Inflow hyds.	= 8, 9, 10	Contrib. drain. area	= 0.172 ac



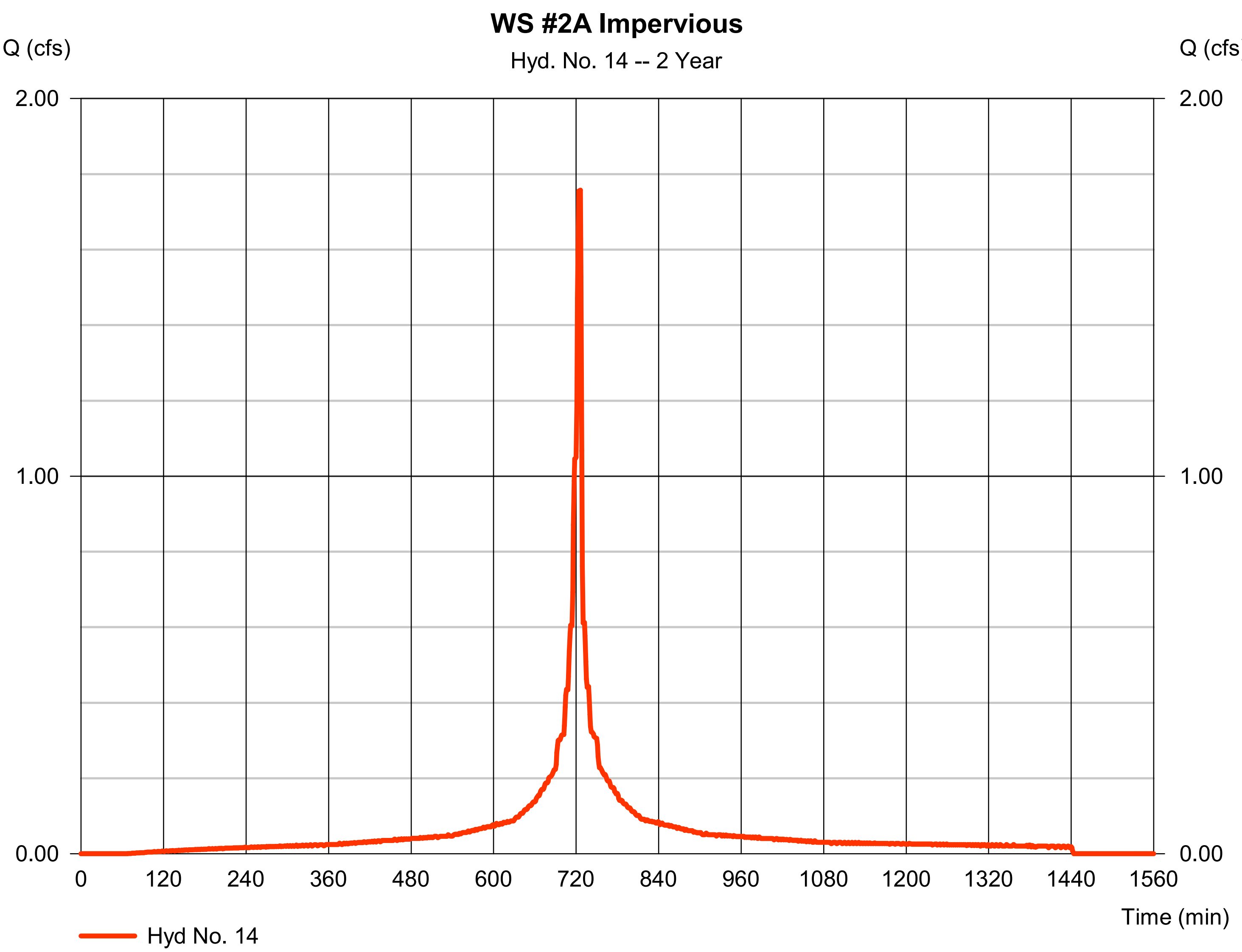
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 14

WS #2A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 1.757 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 5,701 cuft
Drainage area	= 0.529 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.00 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



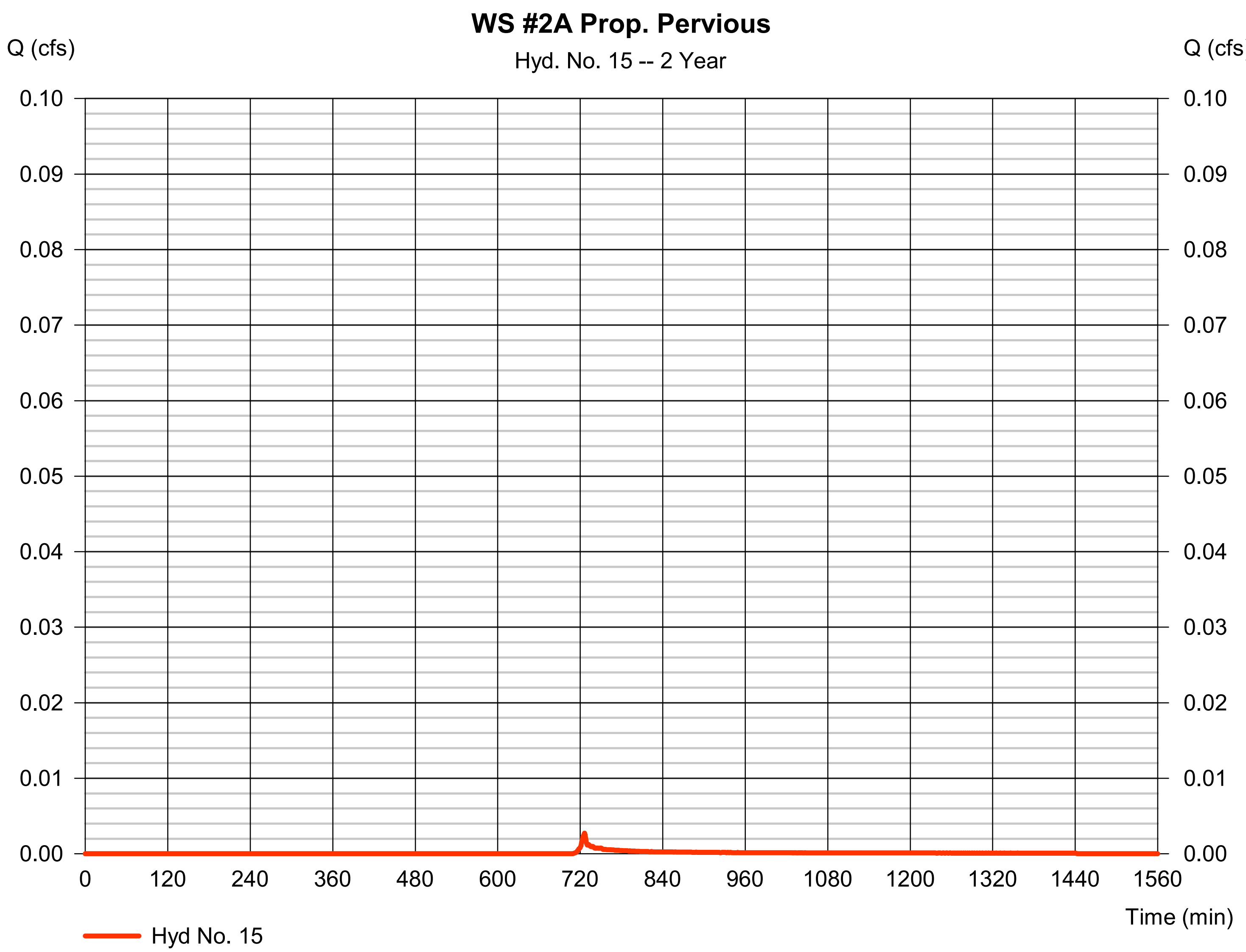
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 15

WS #2A Prop. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.003 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 9 cuft
Drainage area	= 0.005 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.90 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



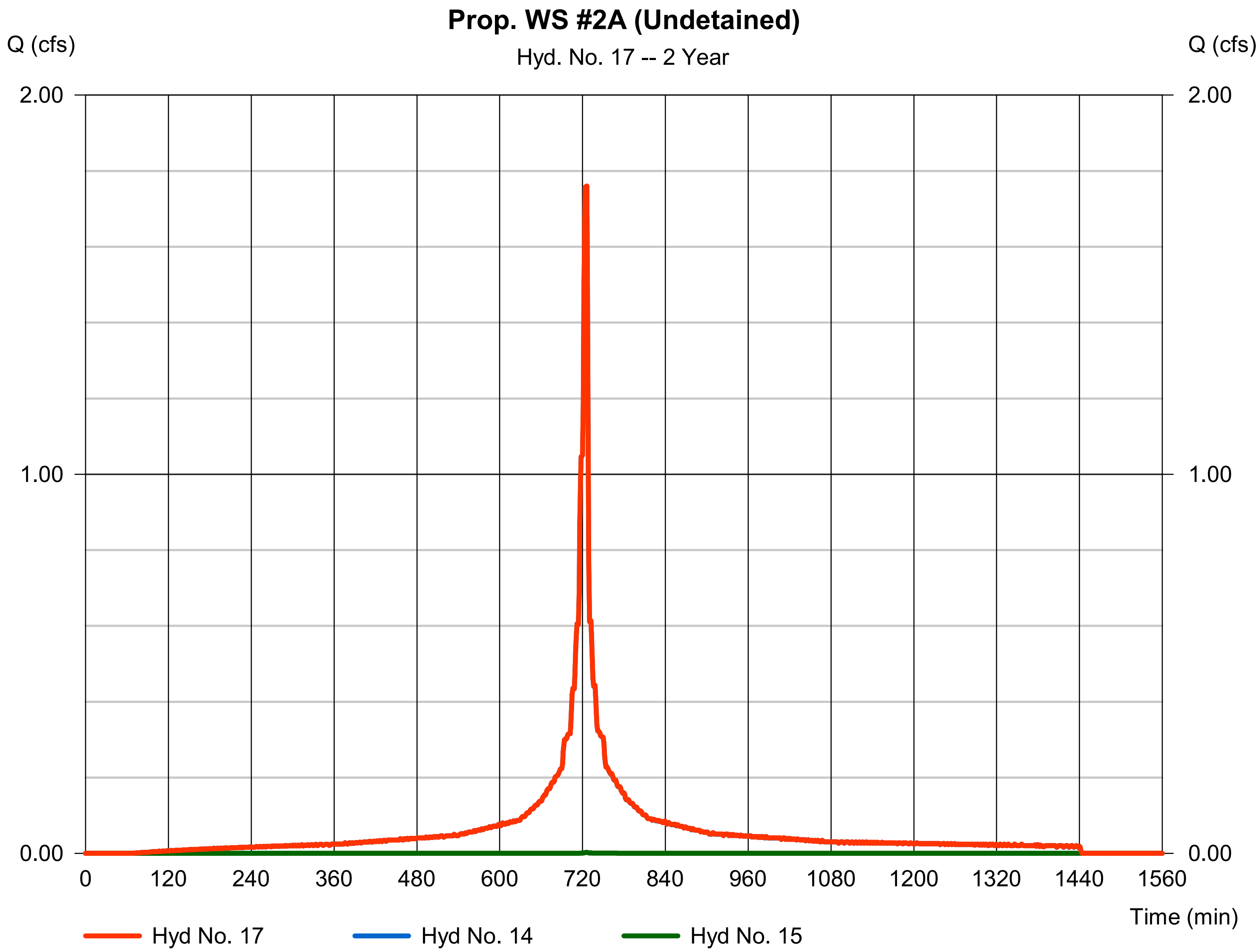
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 17

Prop. WS #2A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 1.760 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 5,710 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 0.534 ac



Hydrograph Report

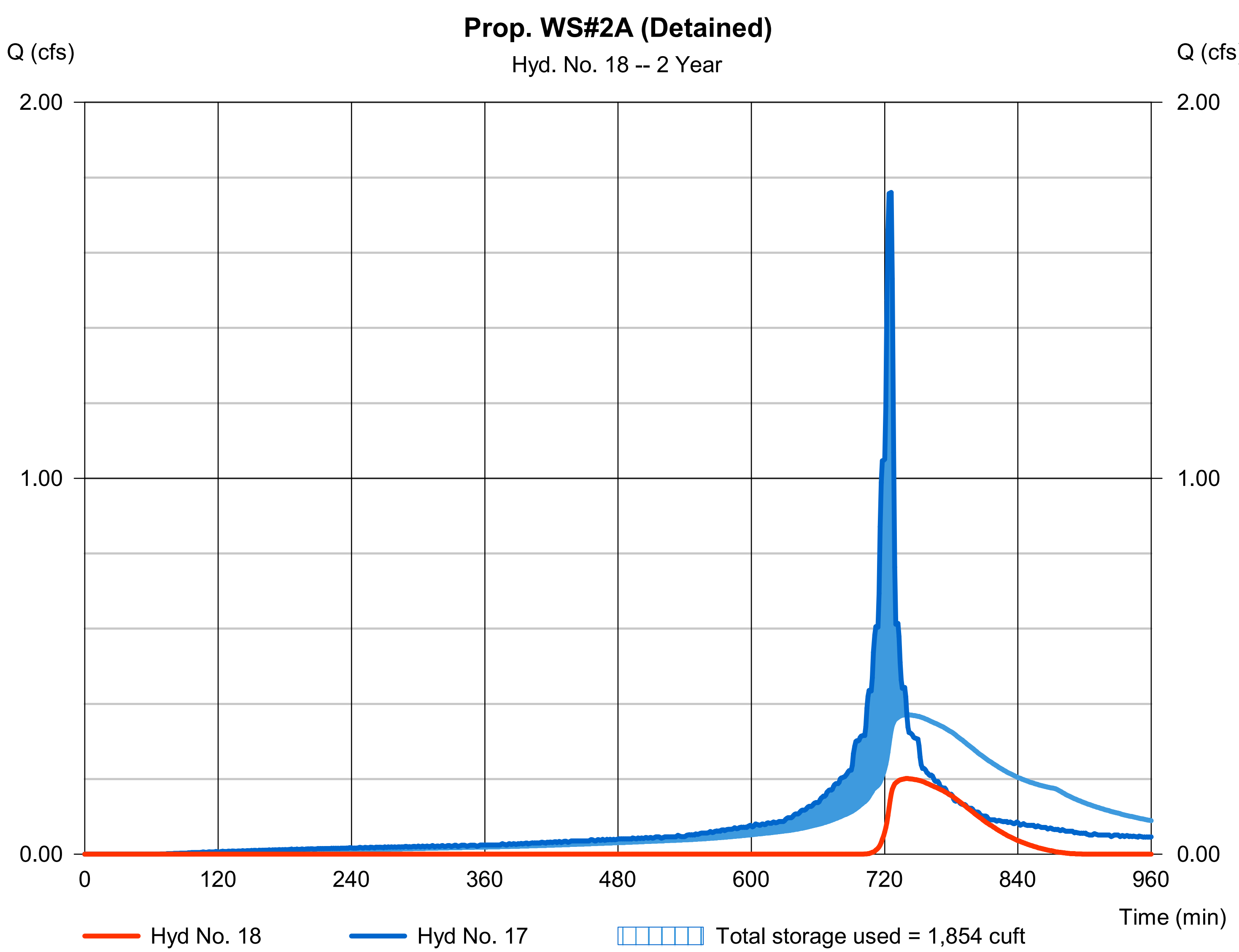
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Wednesday, 02 / 7 / 2024

Hyd. No. 18

Prop. WS#2A (Detained)

Hydrograph type	= Reservoir	Peak discharge	= 0.201 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 1 min	Hyd. volume	= 1,029 cuft
Inflow hyd. No.	= 17 - Prop. WS #2A (Undetained)	Max. Elevation	= 123.00 ft
Reservoir name	= Pervious Paving System	Max. Storage	= 1,854 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



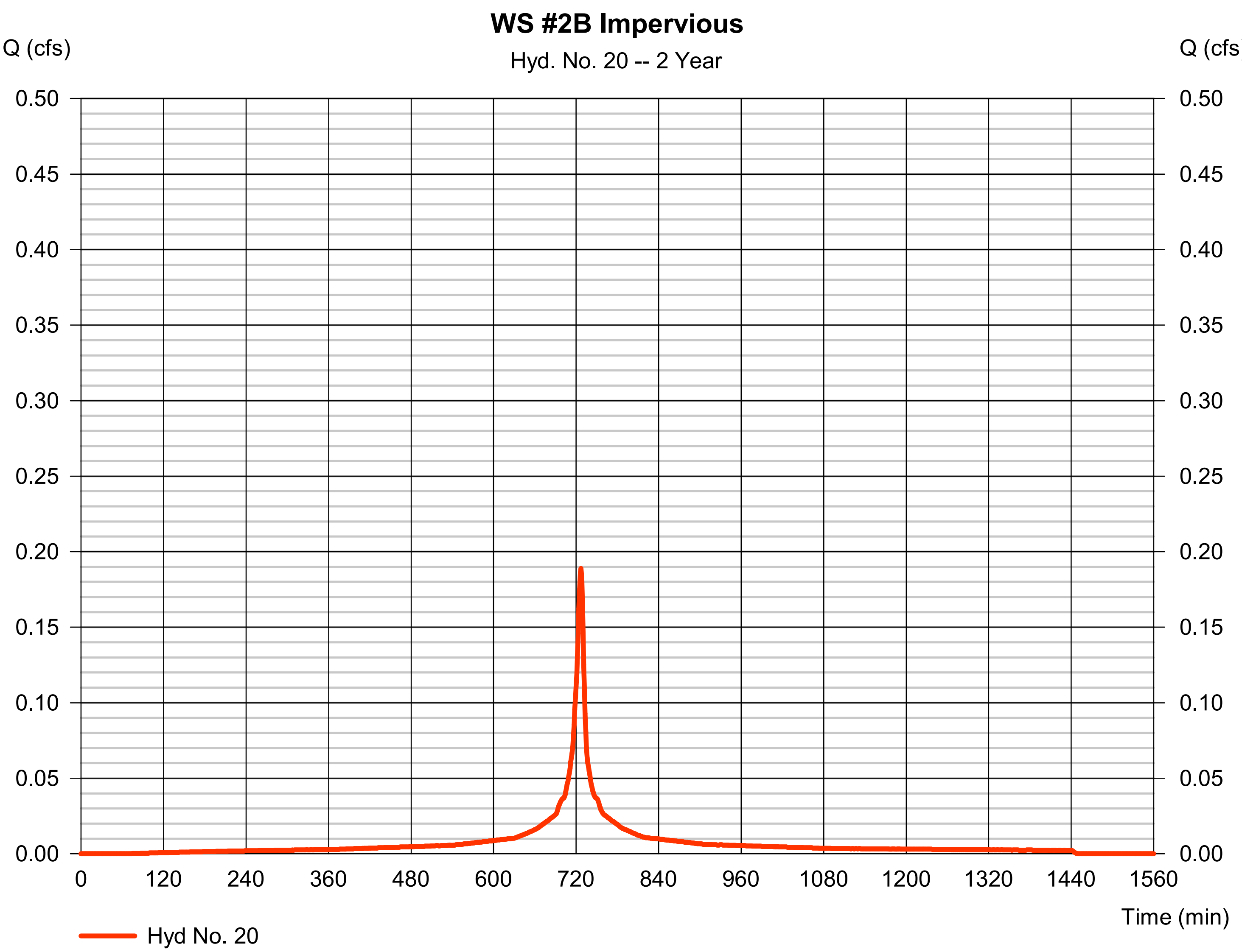
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 20

WS #2B Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.189 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 676 cuft
Drainage area	= 0.057 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.90 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



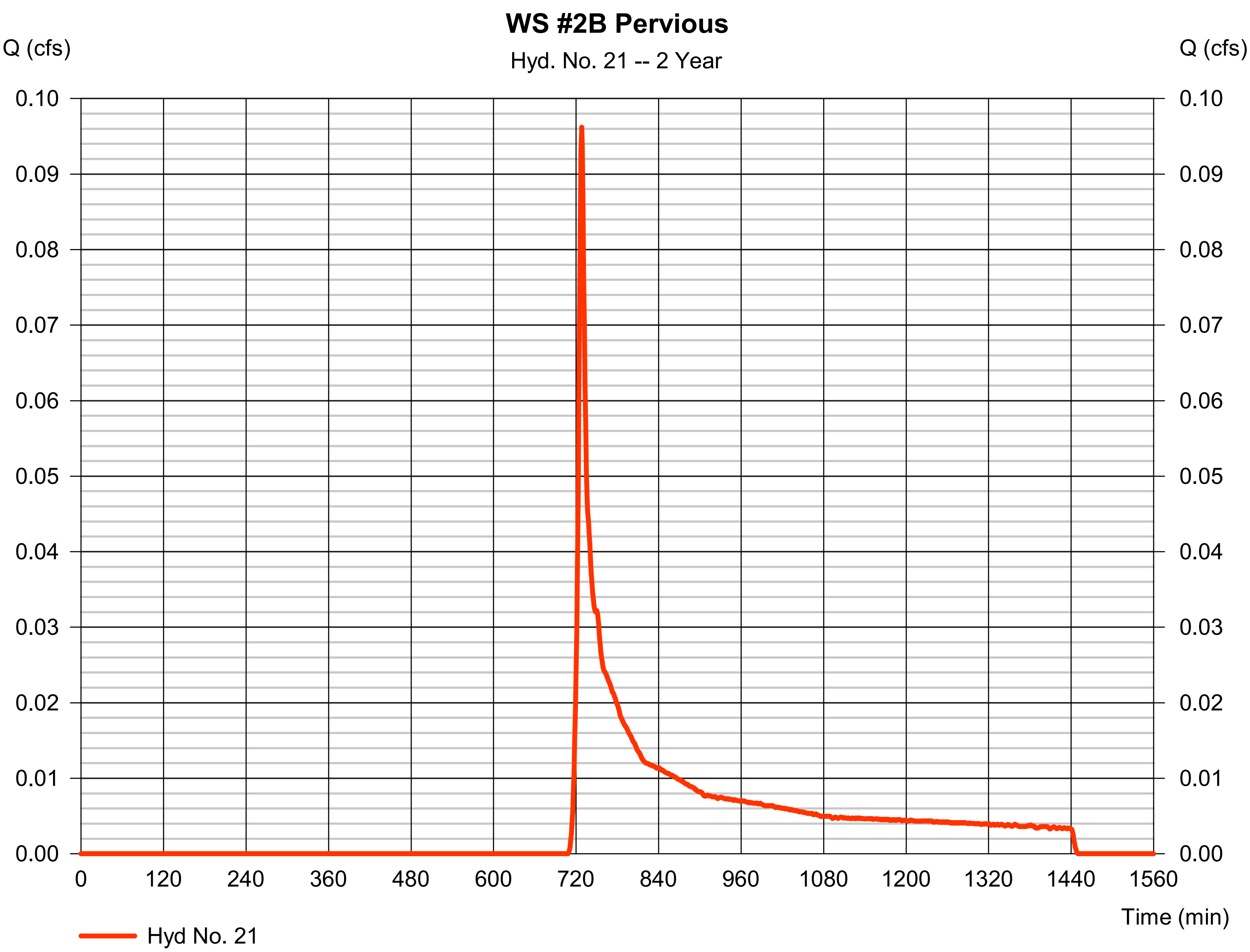
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 21

WS #2B Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.096 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 390 cuft
Drainage area	= 0.197 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.10 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



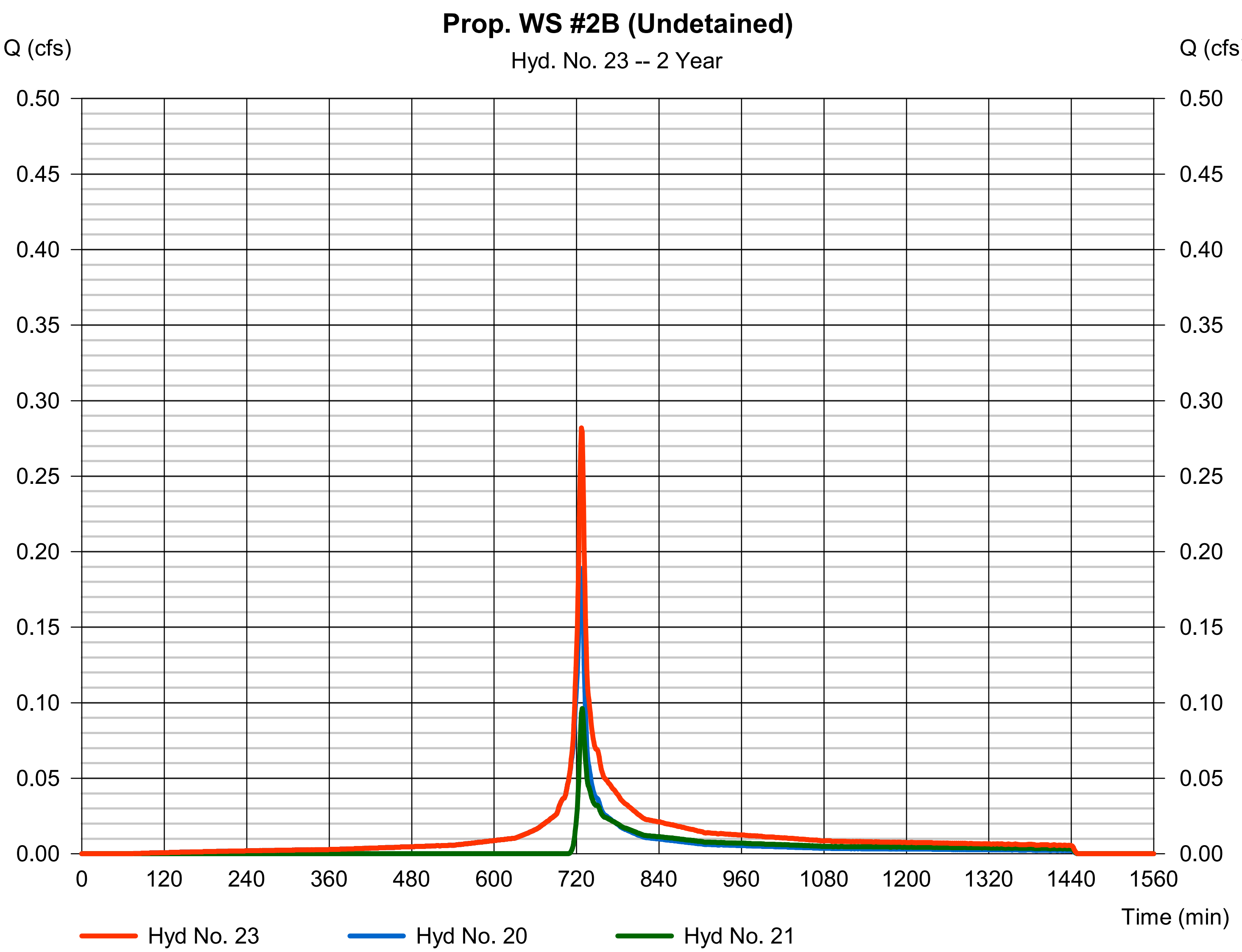
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 23

Prop. WS #2B (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.282 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,065 cuft
Inflow hyds.	= 20, 21	Contrib. drain. area	= 0.254 ac



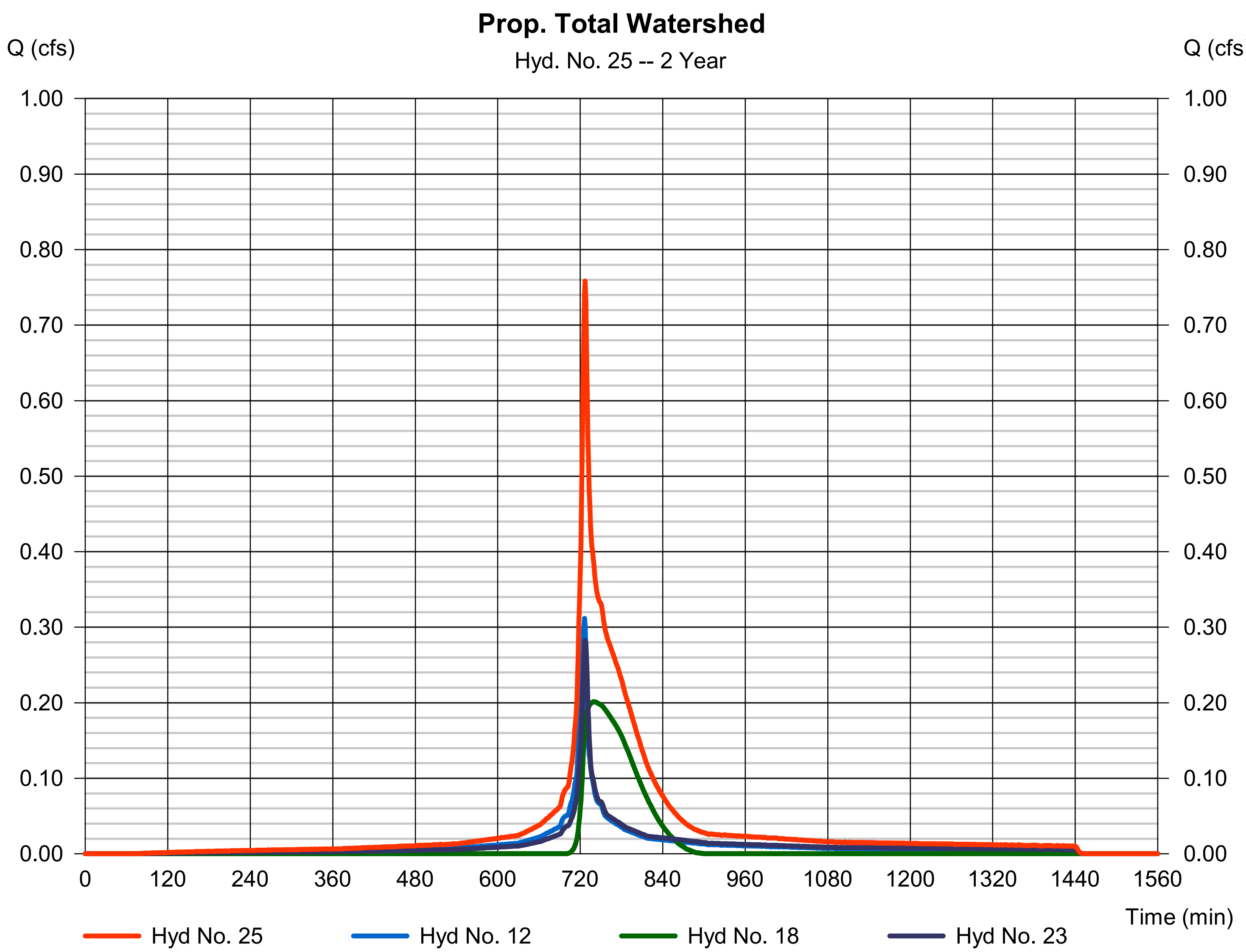
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 25

Prop. Total Watershed

Hydrograph type	= Combine	Peak discharge	= 0.758 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 3,194 cuft
Inflow hyds.	= 12, 18, 23	Contrib. drain. area	= 0.000 ac



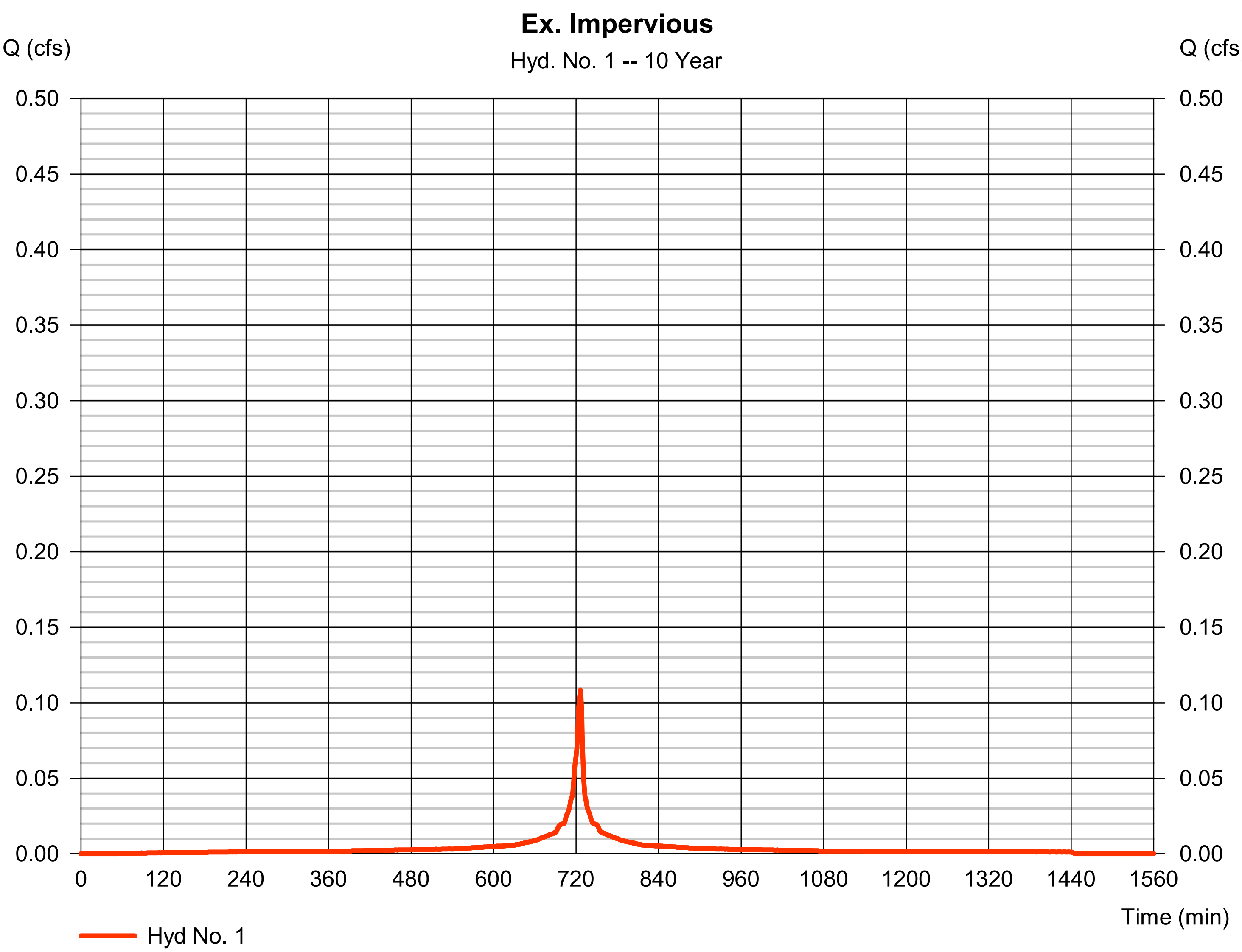
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 1

Ex. Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.108 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 366 cuft
Drainage area	= 0.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.20 min
Total precip.	= 5.28 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



Hydrograph Report

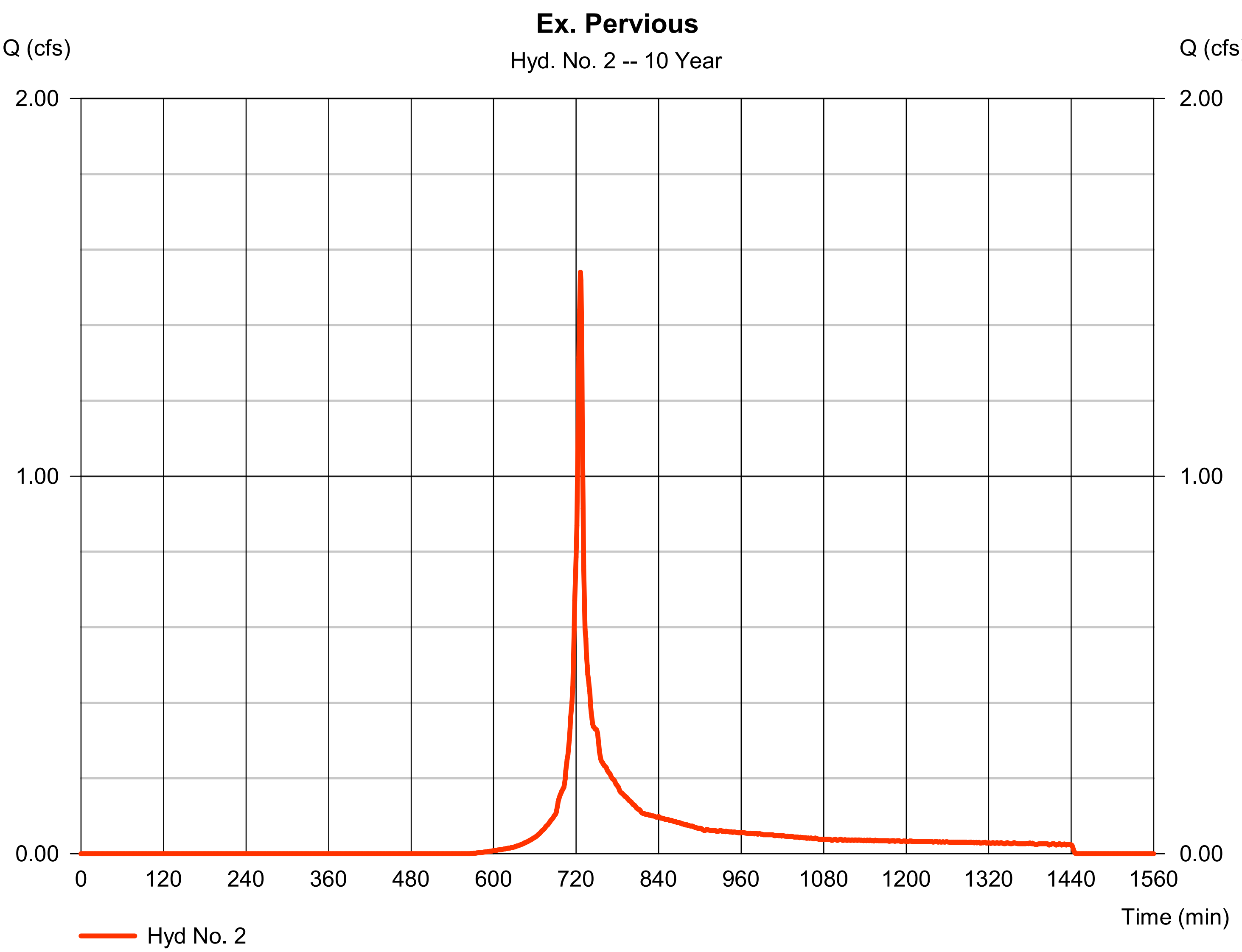
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 2

Ex. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 1.540 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 4,397 cuft
Drainage area	= 0.560 ac	Curve number	= 69*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.20 min
Total precip.	= 5.28 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 85) + (0.560 x 69)] / 0.560

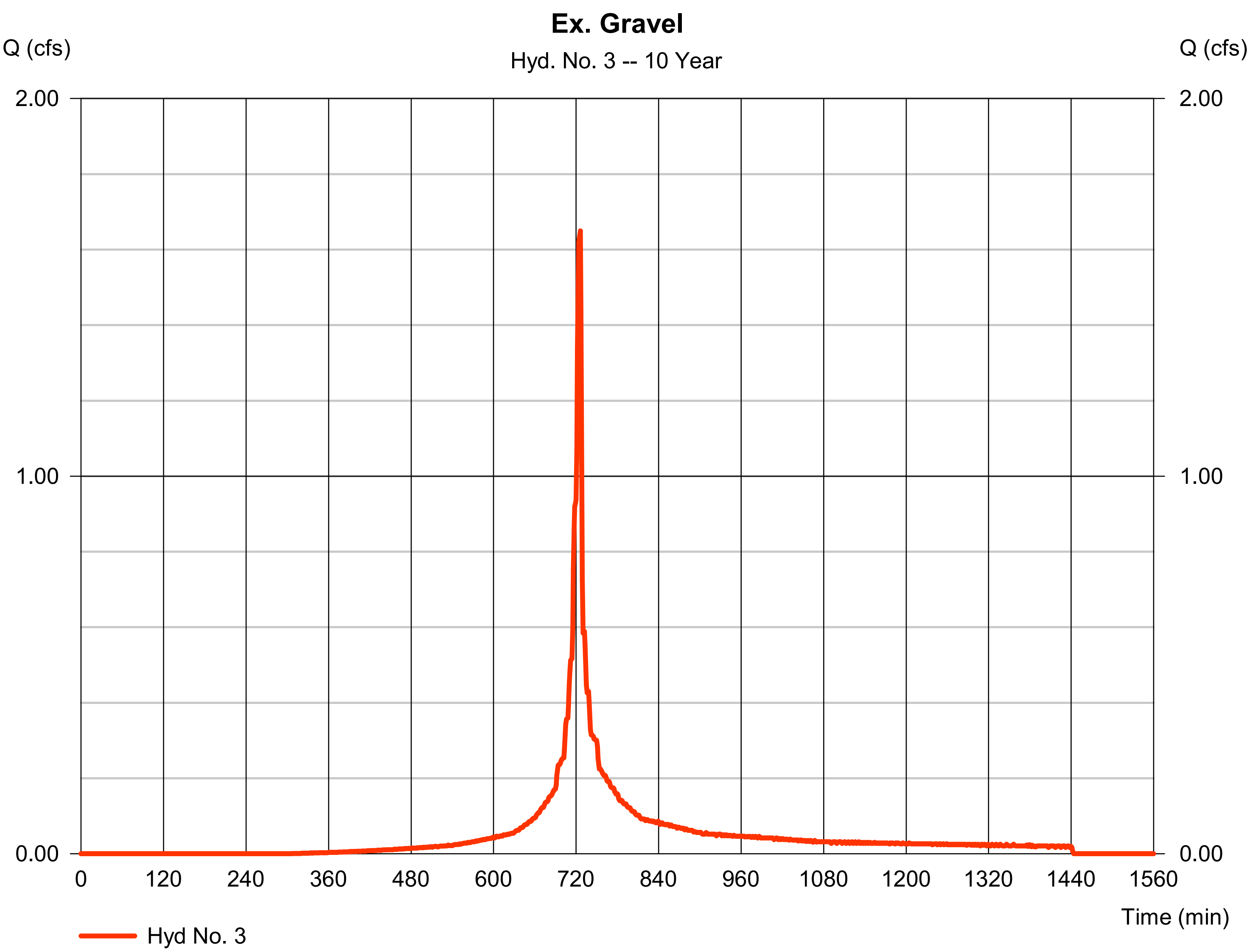


Hydrograph Report

Hyd. No. 3

Ex. Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 1.650 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 4,691 cuft
Drainage area	= 0.380 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.80 min
Total precip.	= 5.28 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



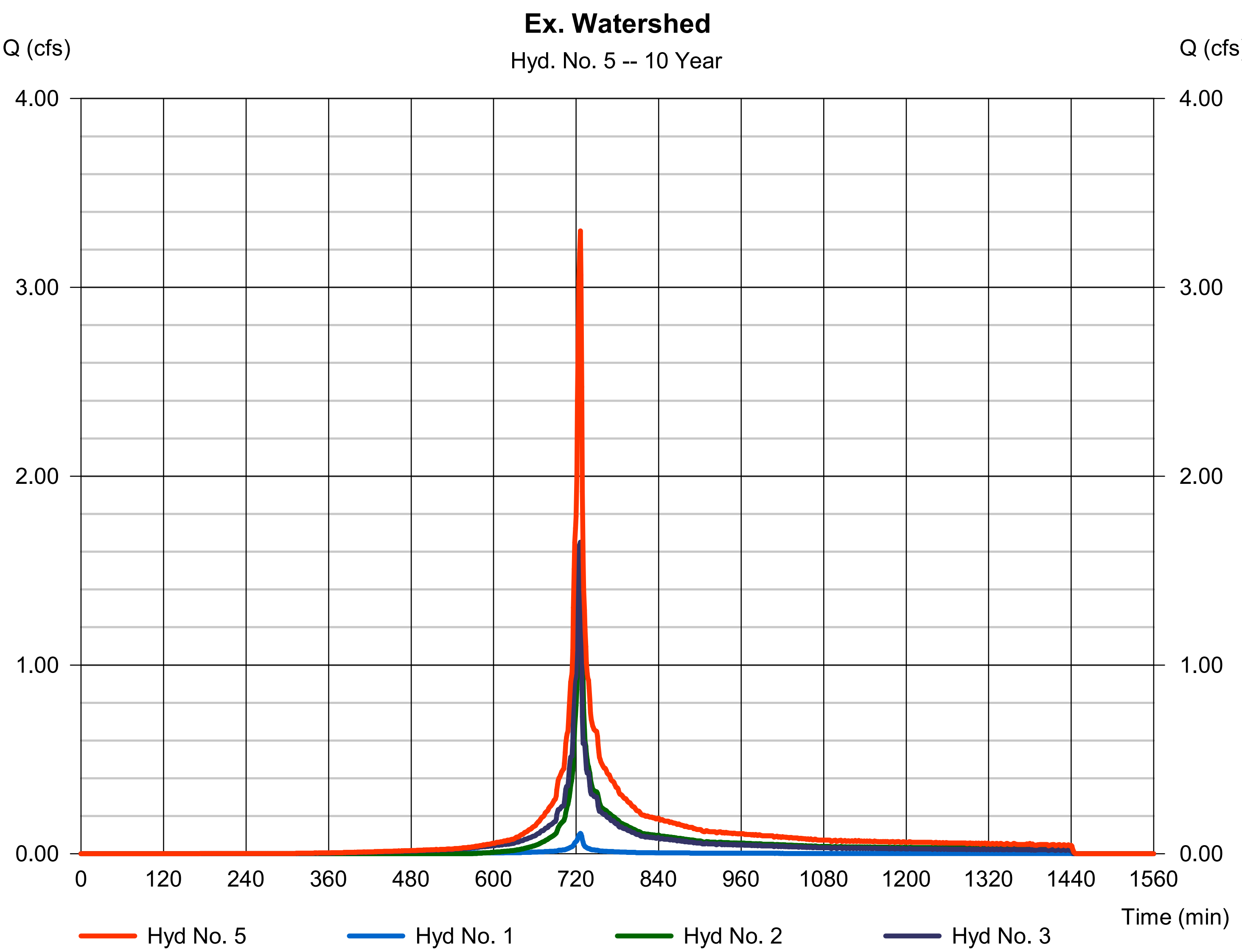
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 5

Ex. Watershed

Hydrograph type	= Combine	Peak discharge	= 3.299 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 9,455 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 0.960 ac



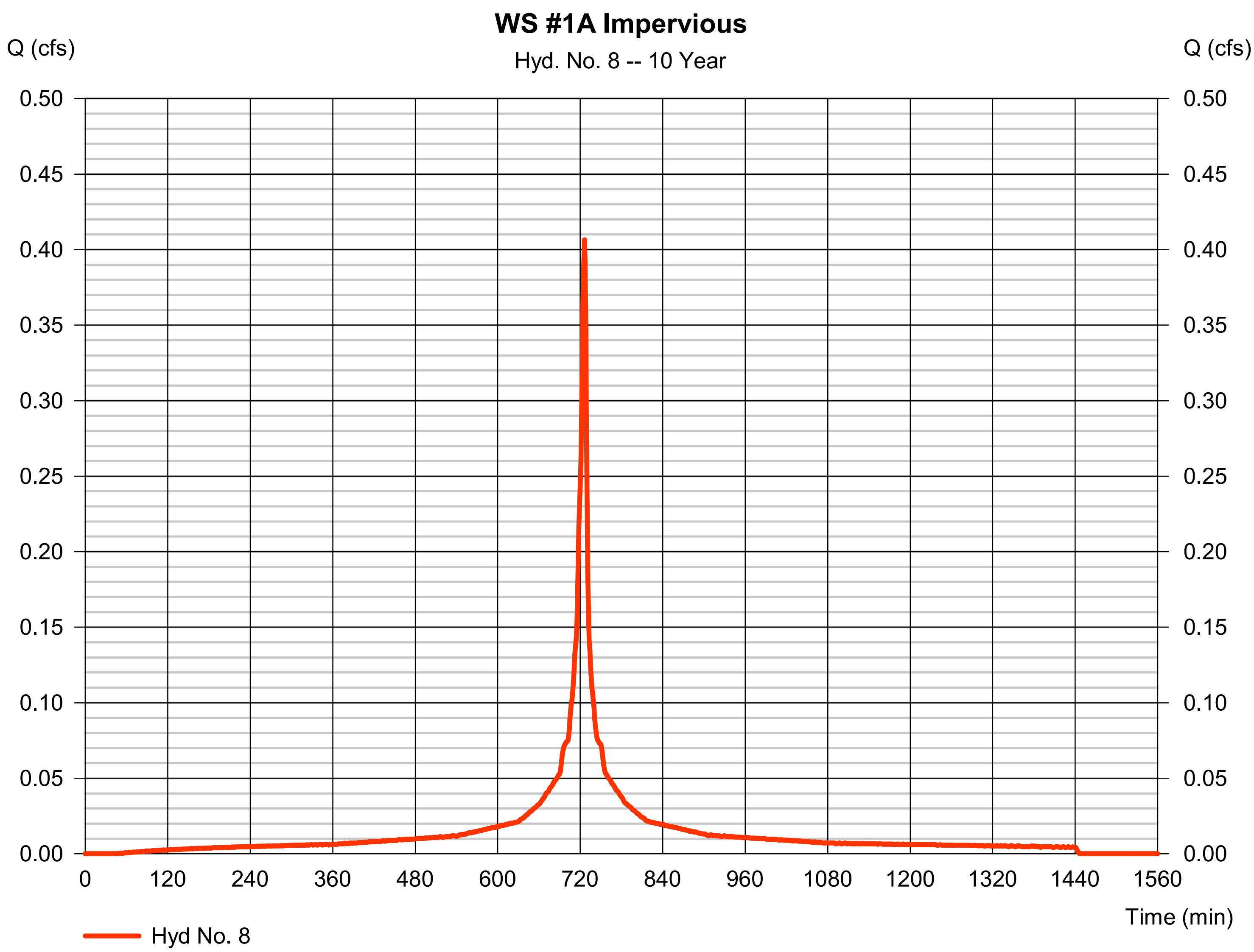
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 8

WS #1A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.407 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 1,373 cuft
Drainage area	= 0.075 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.60 min
Total precip.	= 5.28 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



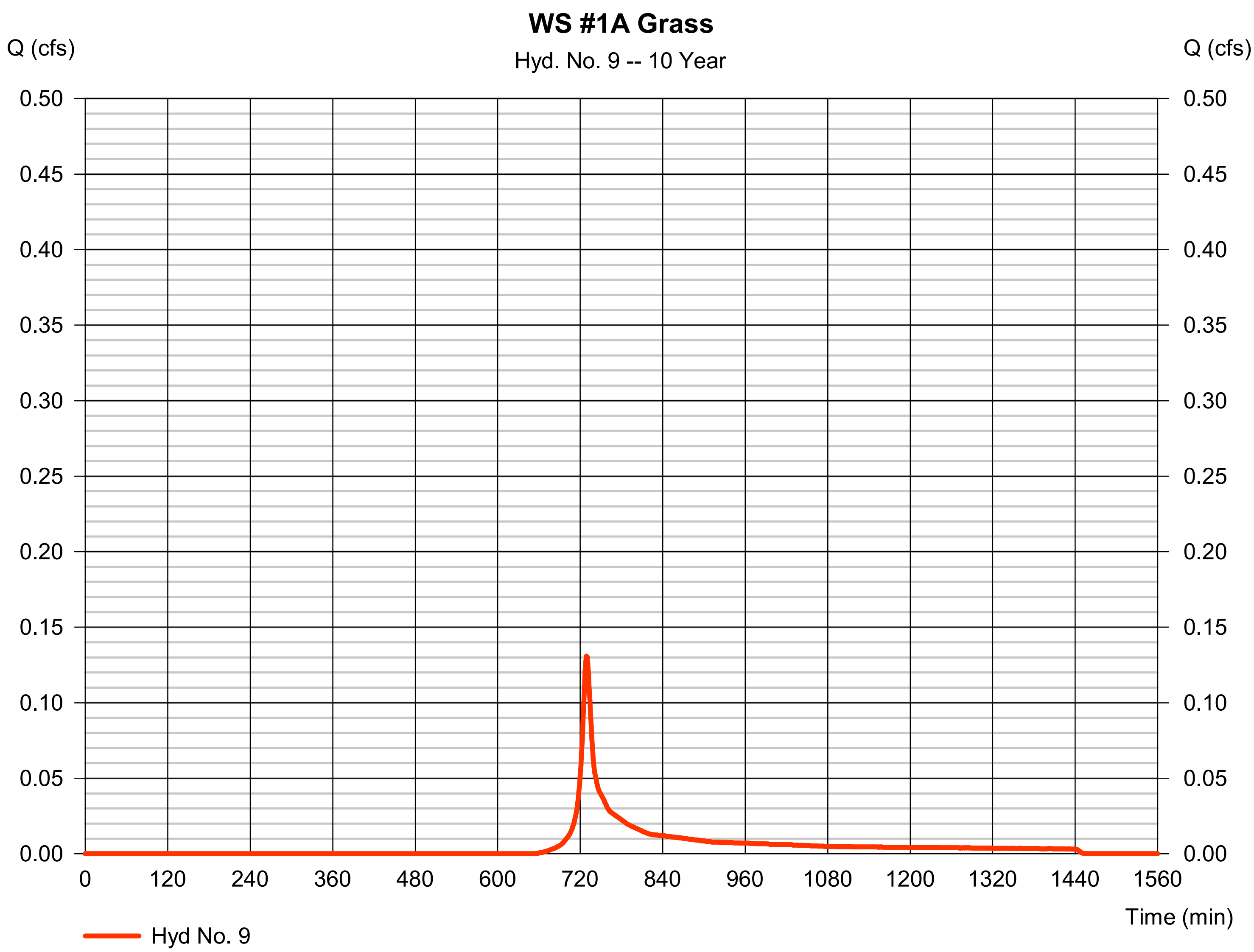
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 9

WS #1A Grass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.131 cfs
Storm frequency	= 10 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 481 cuft
Drainage area	= 0.086 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.30 min
Total precip.	= 5.28 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

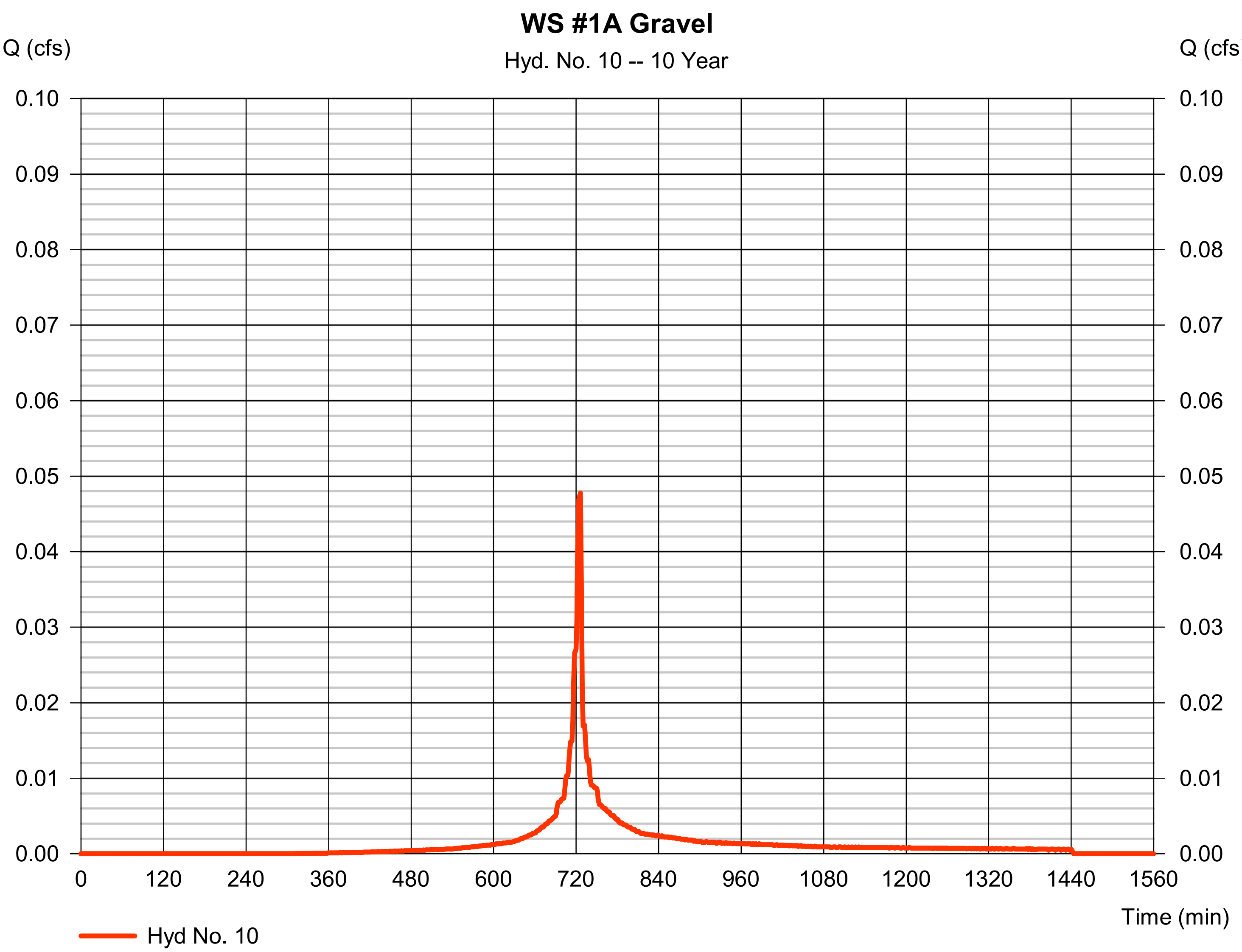


Hydrograph Report

Hyd. No. 10

WS #1A Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.048 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 136 cuft
Drainage area	= 0.011 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 5.28 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



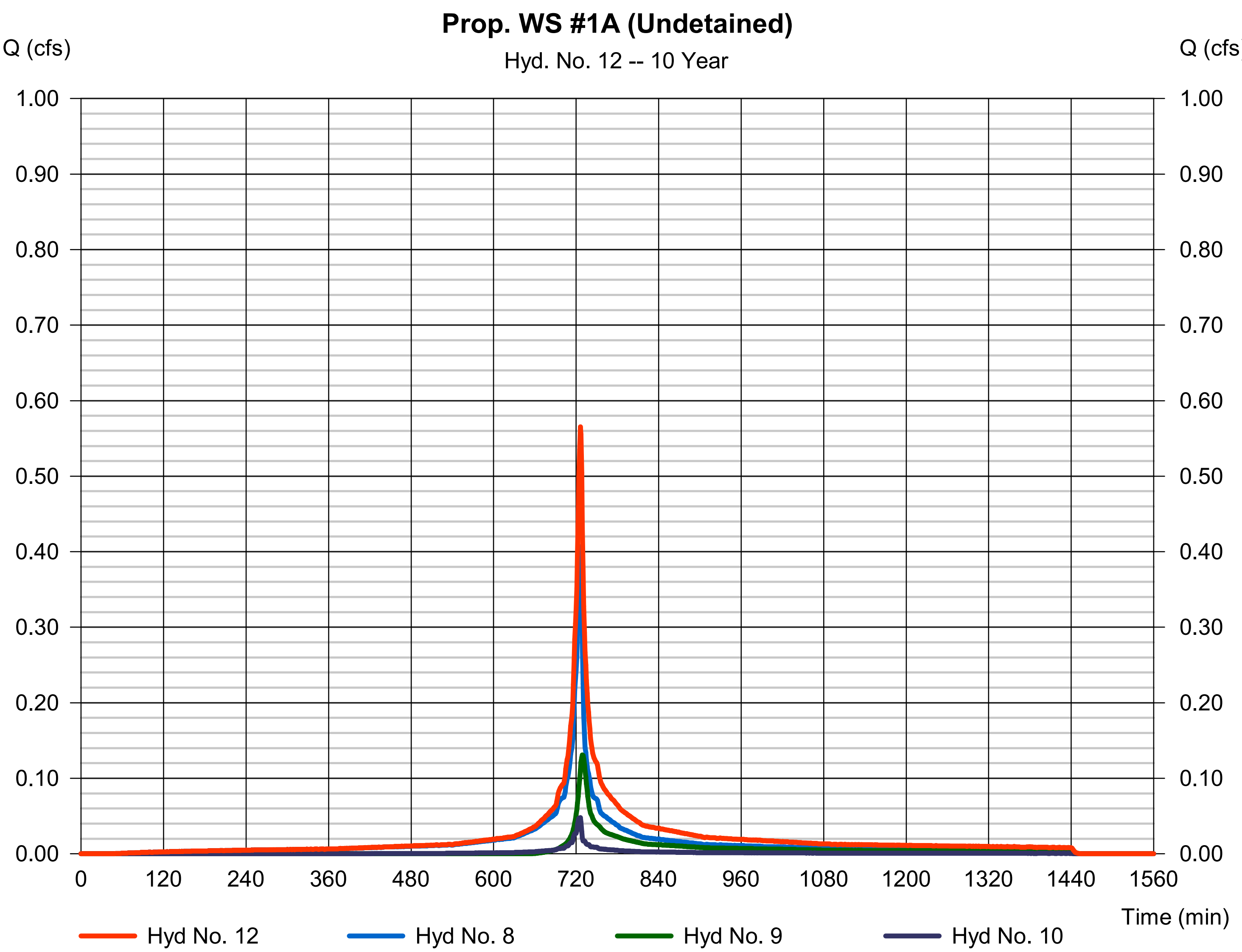
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Wednesday, 02 / 7 / 2024

Hyd. No. 12

Prop. WS #1A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.565 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 1,990 cuft
Inflow hyds.	= 8, 9, 10	Contrib. drain. area	= 0.172 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

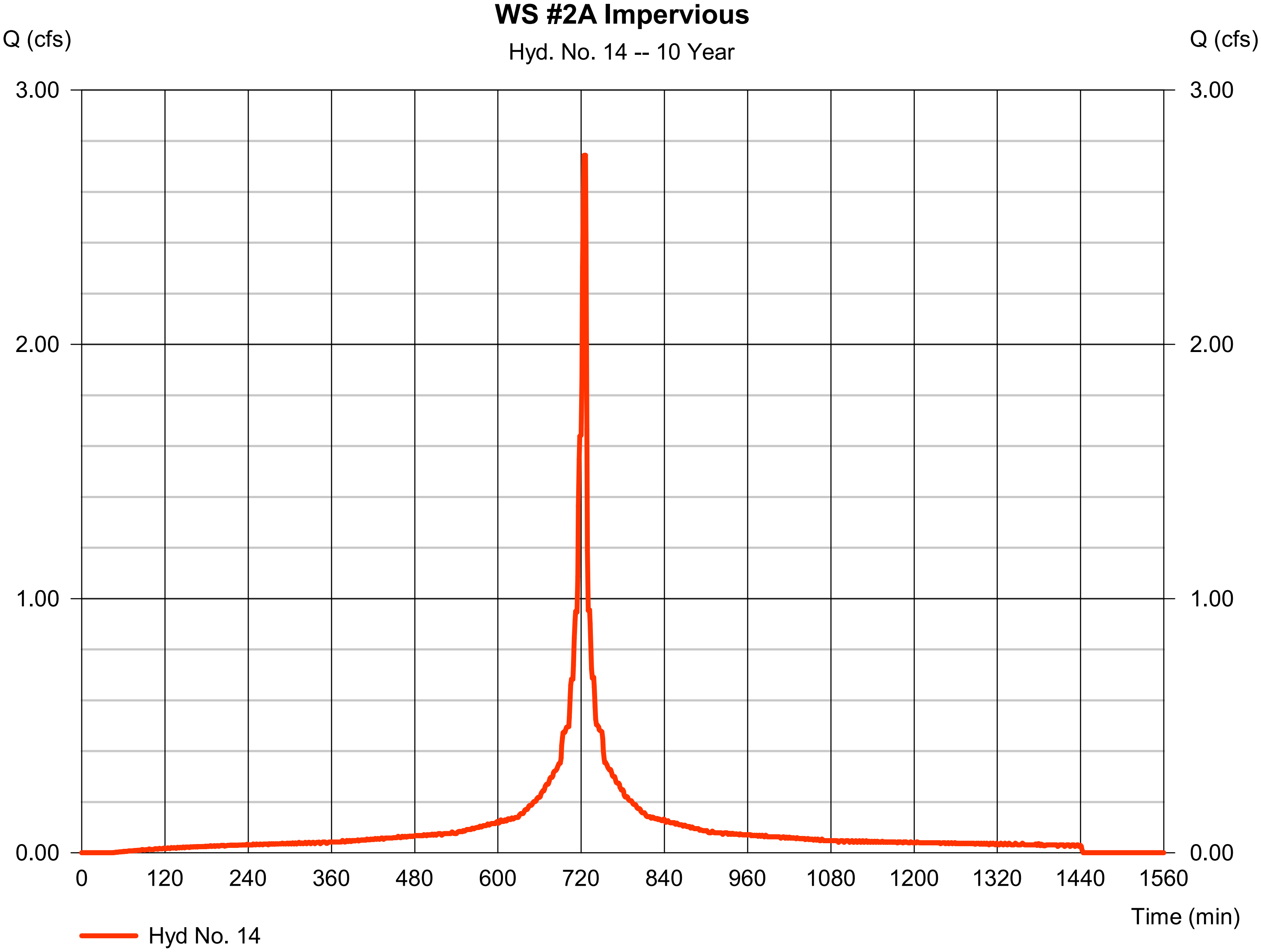
Hyd. No. 14

WS #2A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 2.744 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 9,078 cuft
Drainage area	= 0.529 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.00 min
Total precip.	= 5.28 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

WS #2A Impervious

Hyd. No. 14 -- 10 Year



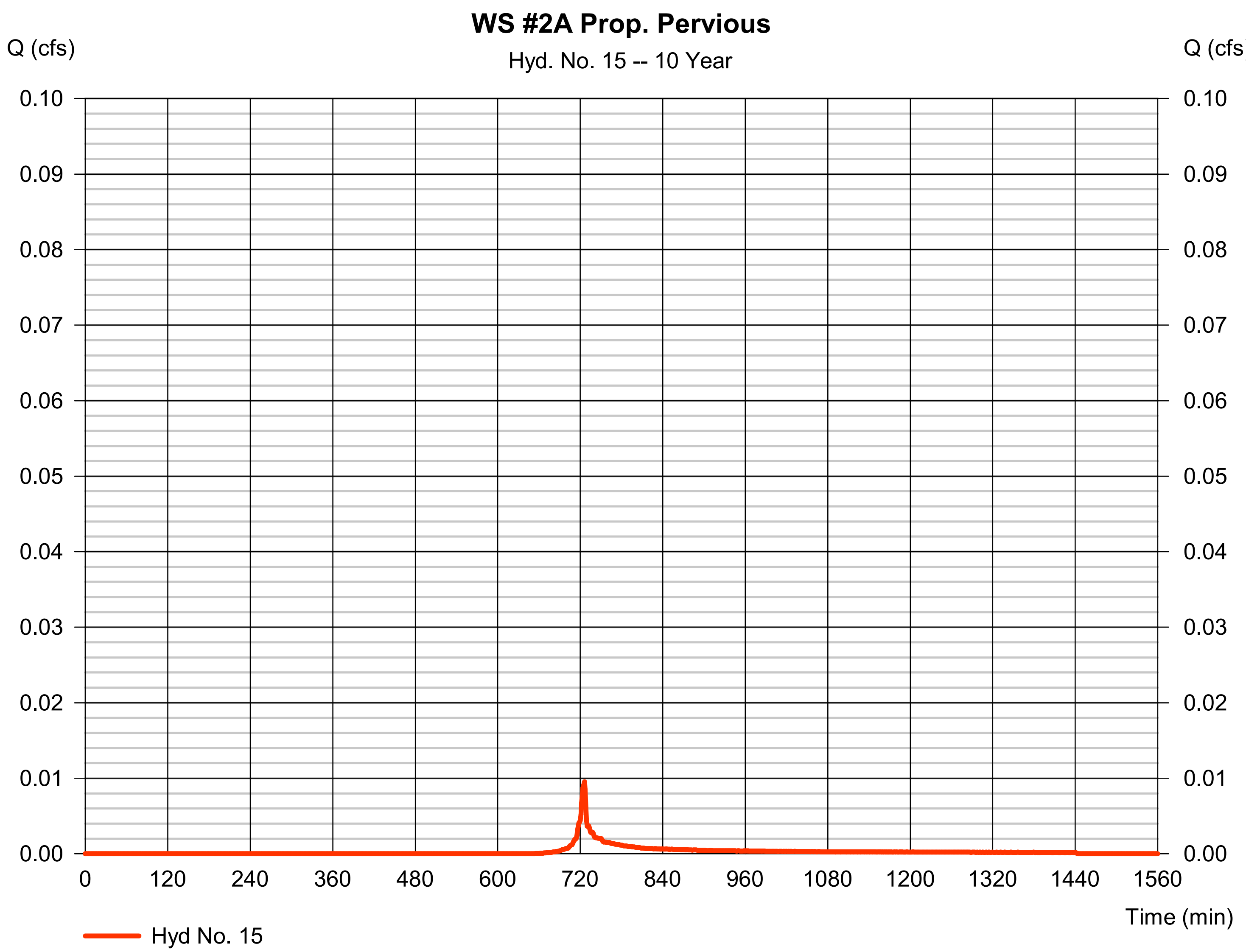
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 15

WS #2A Prop. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.010 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 26 cuft
Drainage area	= 0.005 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.90 min
Total precip.	= 5.28 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



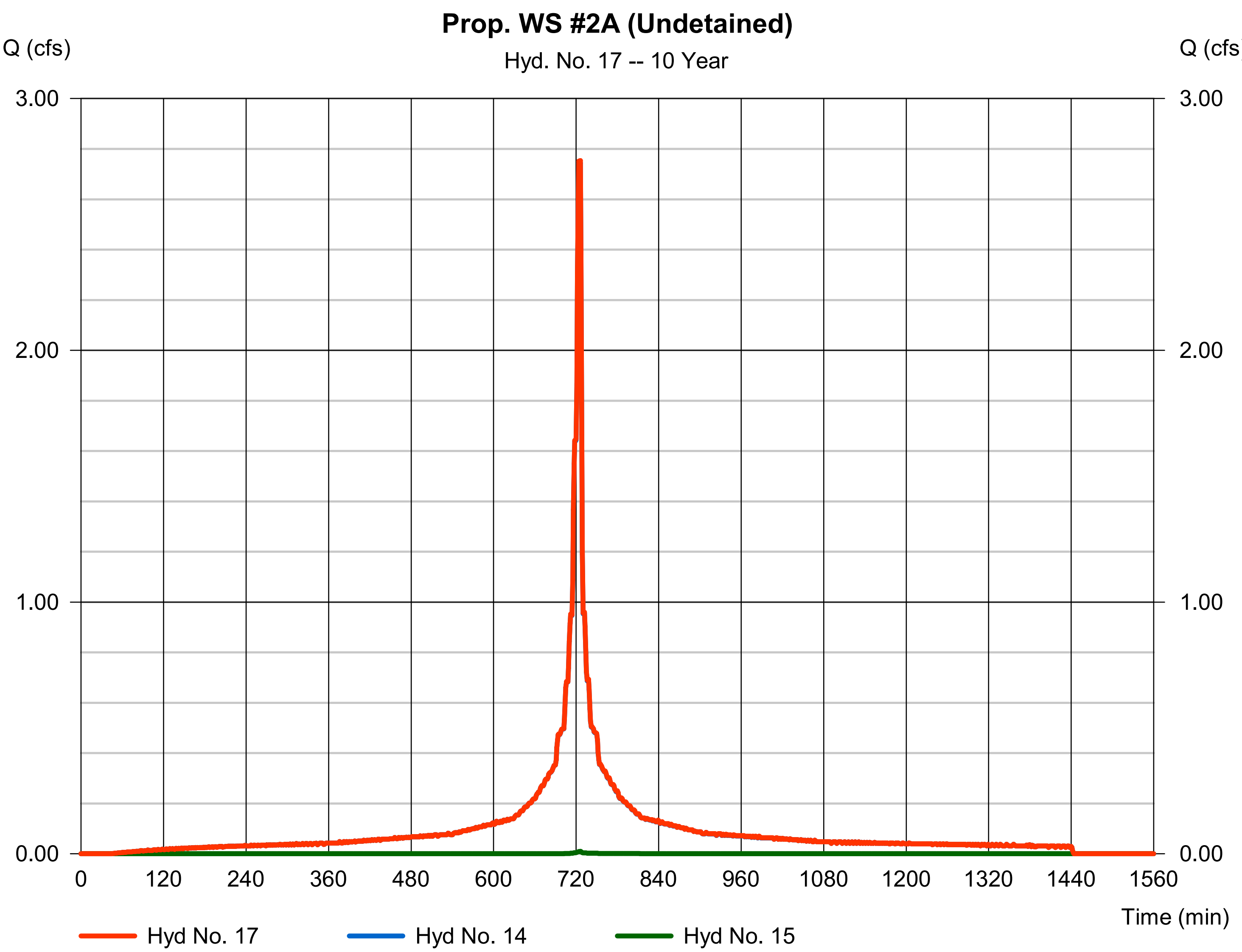
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 17

Prop. WS #2A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 2.754 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 9,104 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 0.534 ac



Hydrograph Report

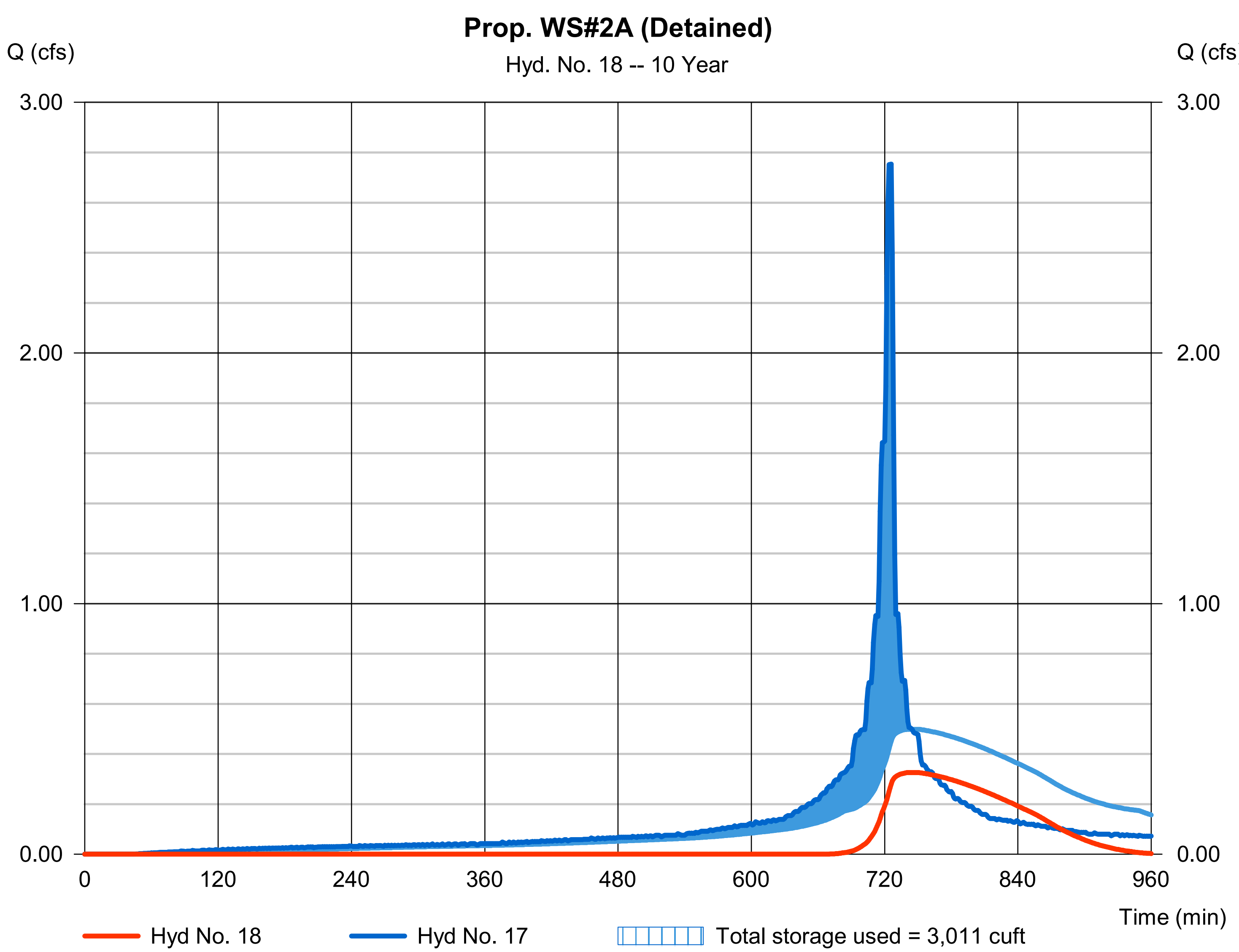
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 18

Prop. WS#2A (Detained)

Hydrograph type	= Reservoir	Peak discharge	= 0.326 cfs
Storm frequency	= 10 yrs	Time to peak	= 745 min
Time interval	= 1 min	Hyd. volume	= 2,662 cuft
Inflow hyd. No.	= 17 - Prop. WS #2A (Undetained)	Max. Elevation	= 123.37 ft
Reservoir name	= Pervious Paving System	Max. Storage	= 3,011 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

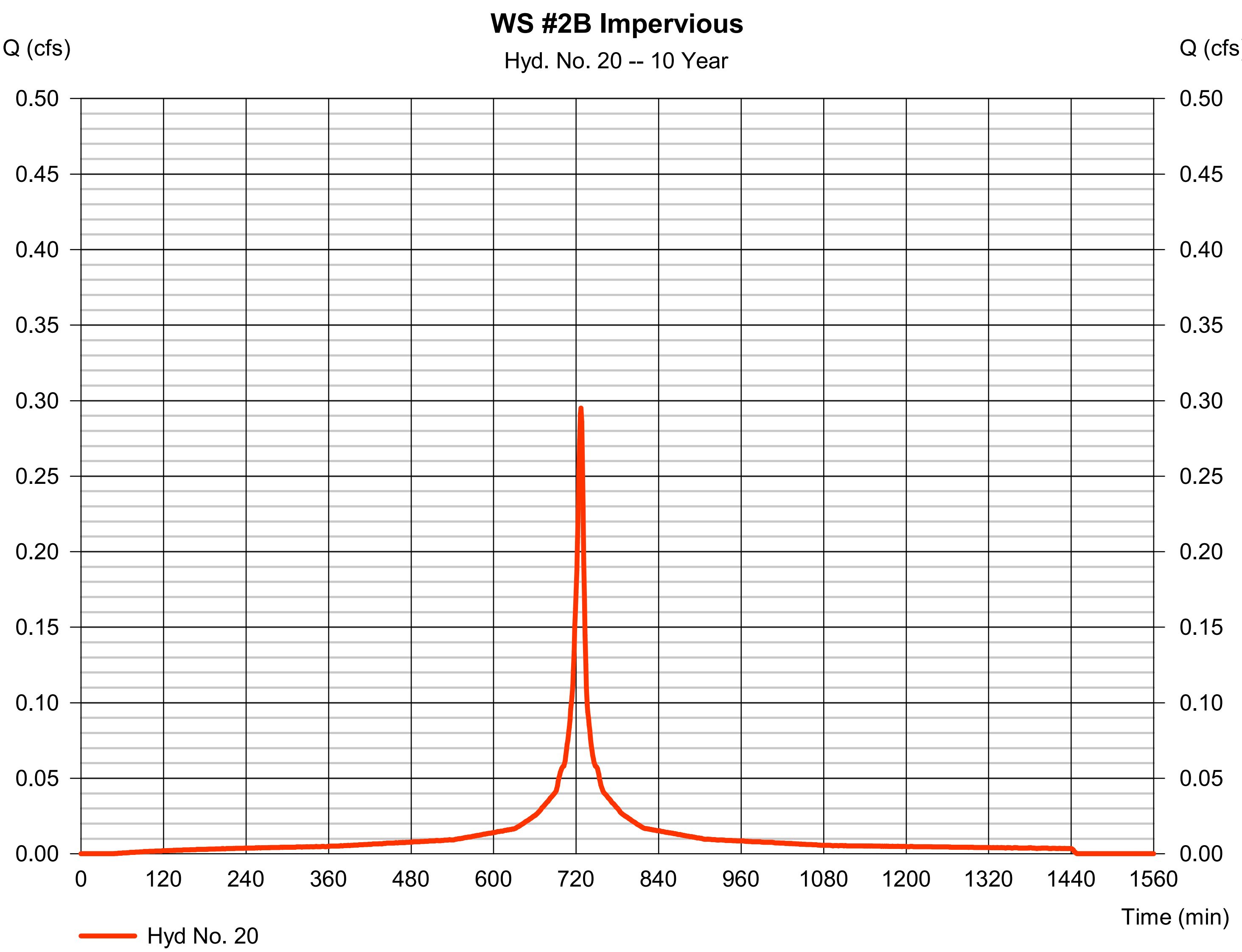


Hydrograph Report

Hyd. No. 20

WS #2B Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.295 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,076 cuft
Drainage area	= 0.057 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.90 min
Total precip.	= 5.28 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



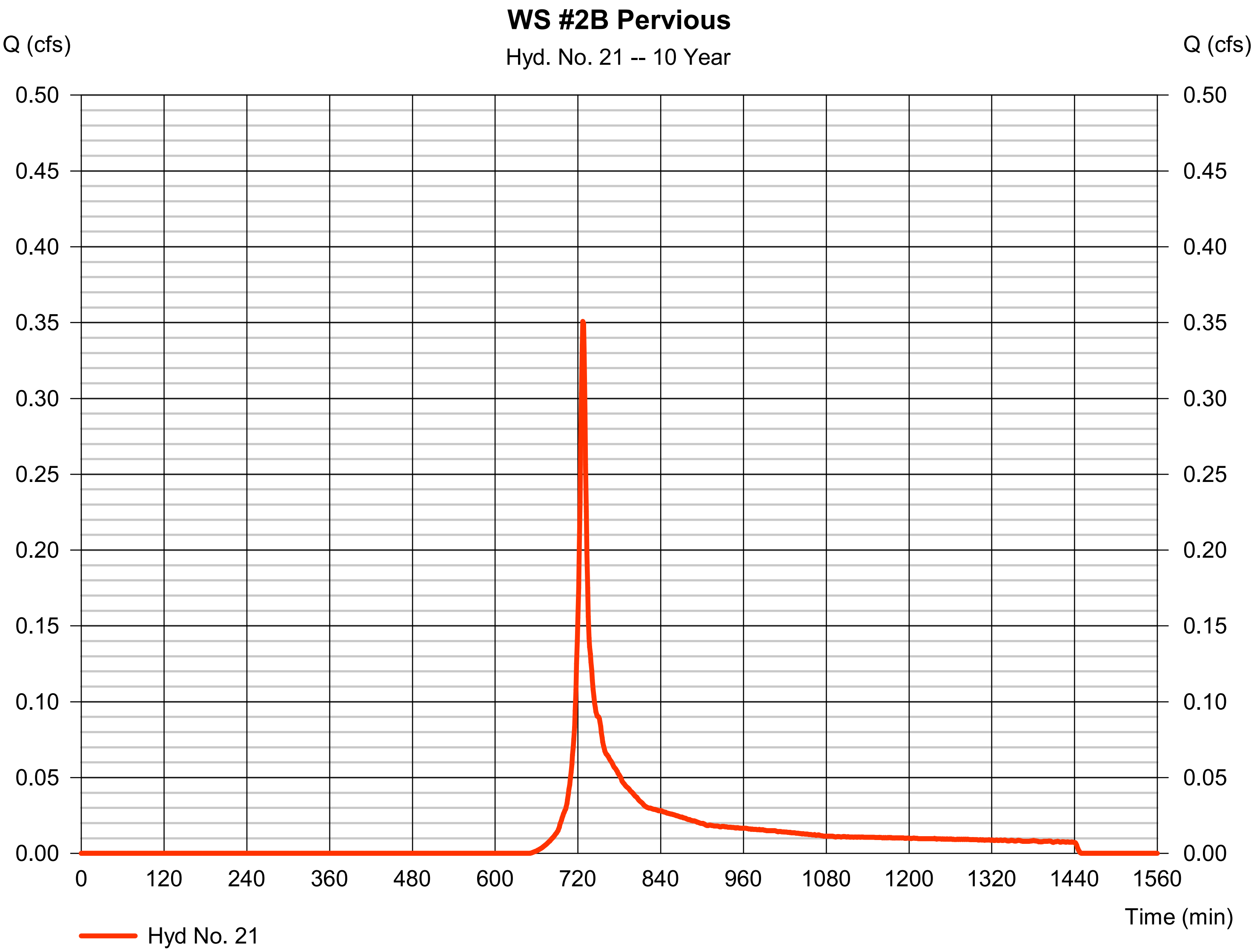
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 21

WS #2B Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.351 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,136 cuft
Drainage area	= 0.197 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.10 min
Total precip.	= 5.28 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stor	Shape factor	= 484



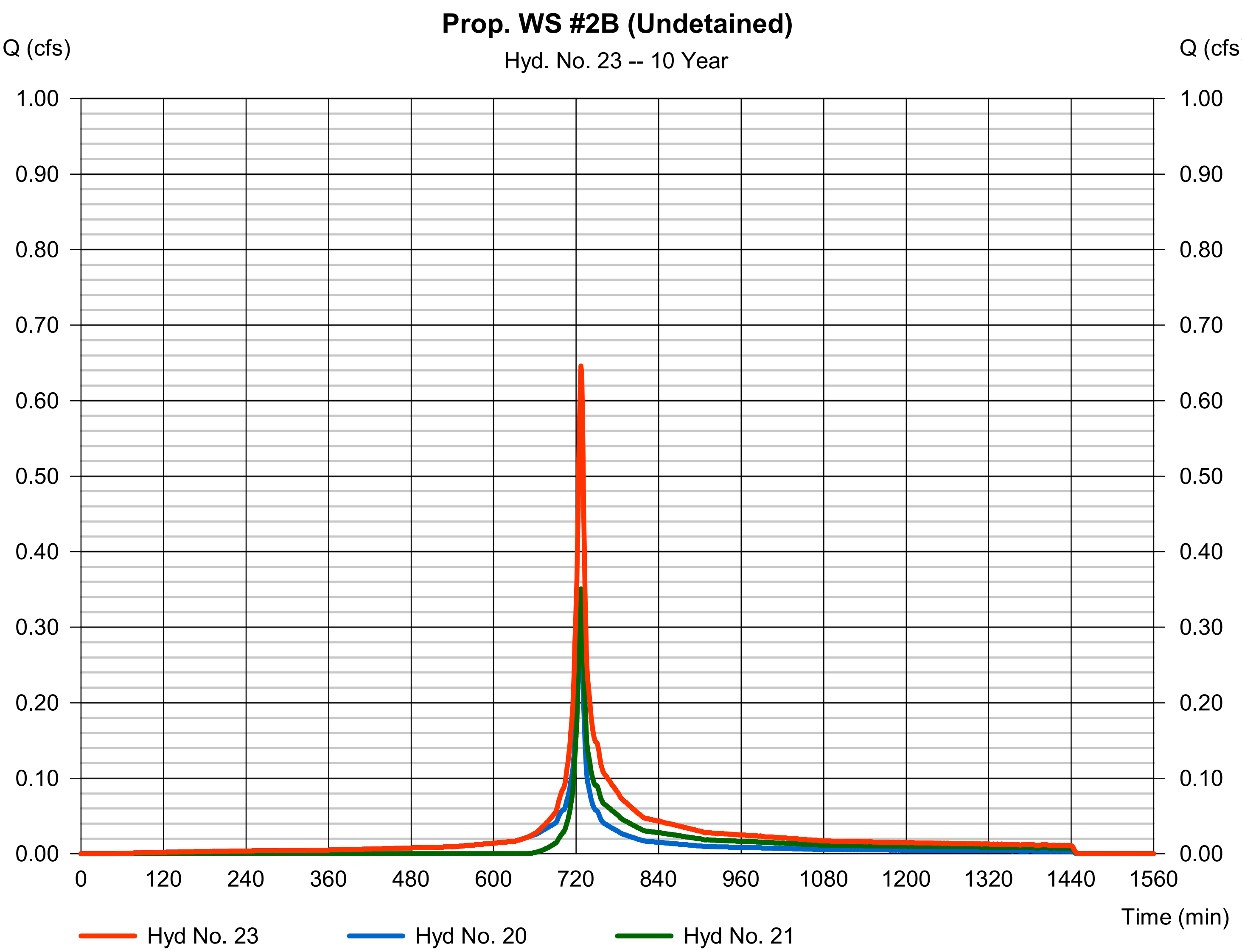
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Wednesday, 02 / 7 / 2024

Hyd. No. 23

Prop. WS #2B (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.646 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 2,212 cuft
Inflow hyds.	= 20, 21	Contrib. drain. area	= 0.254 ac

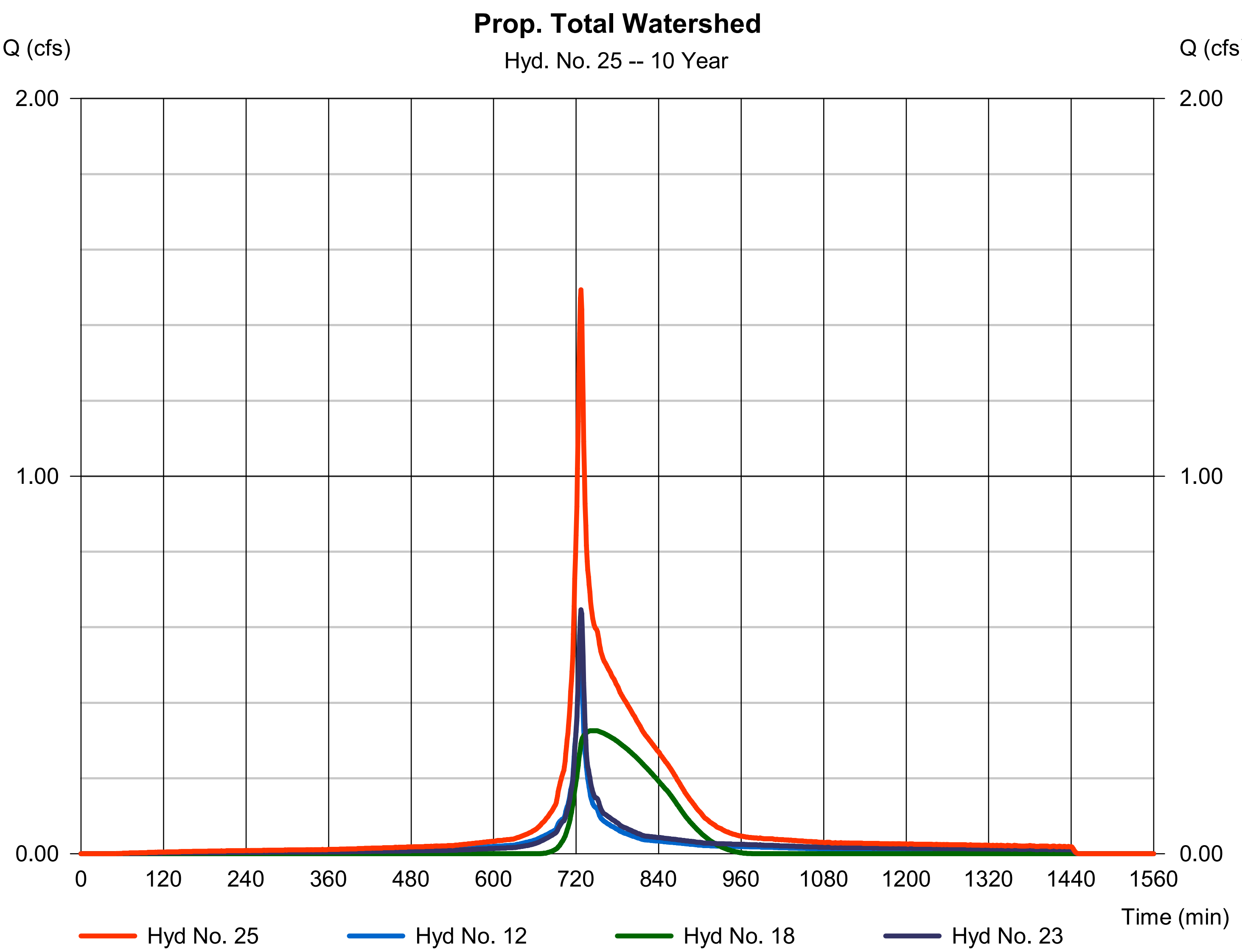


Hydrograph Report

Hyd. No. 25

Prop. Total Watershed

Hydrograph type	= Combine	Peak discharge	= 1.493 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 6,863 cuft
Inflow hyds.	= 12, 18, 23	Contrib. drain. area	= 0.000 ac



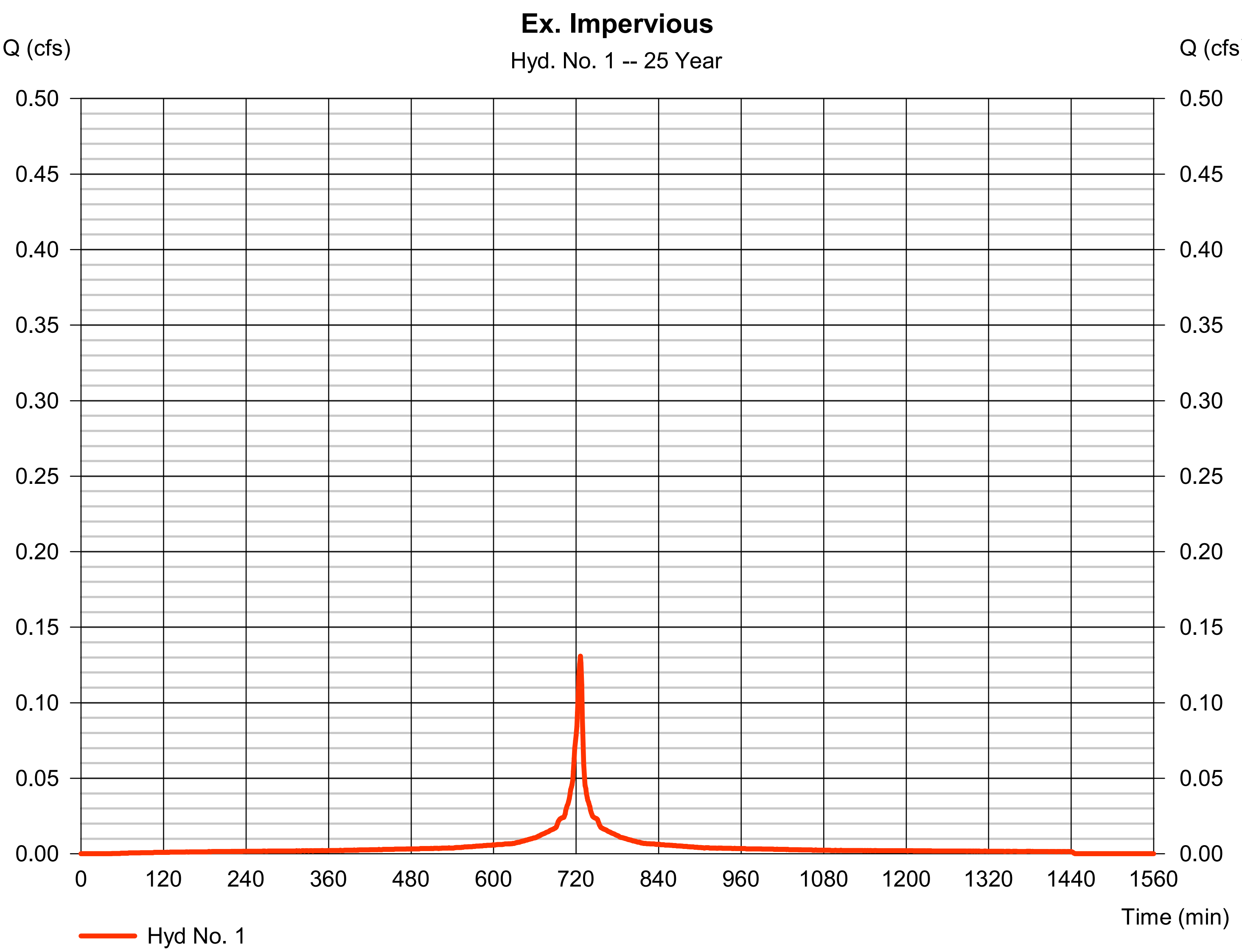
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 1

Ex. Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.131 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 444 cuft
Drainage area	= 0.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.20 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



Hydrograph Report

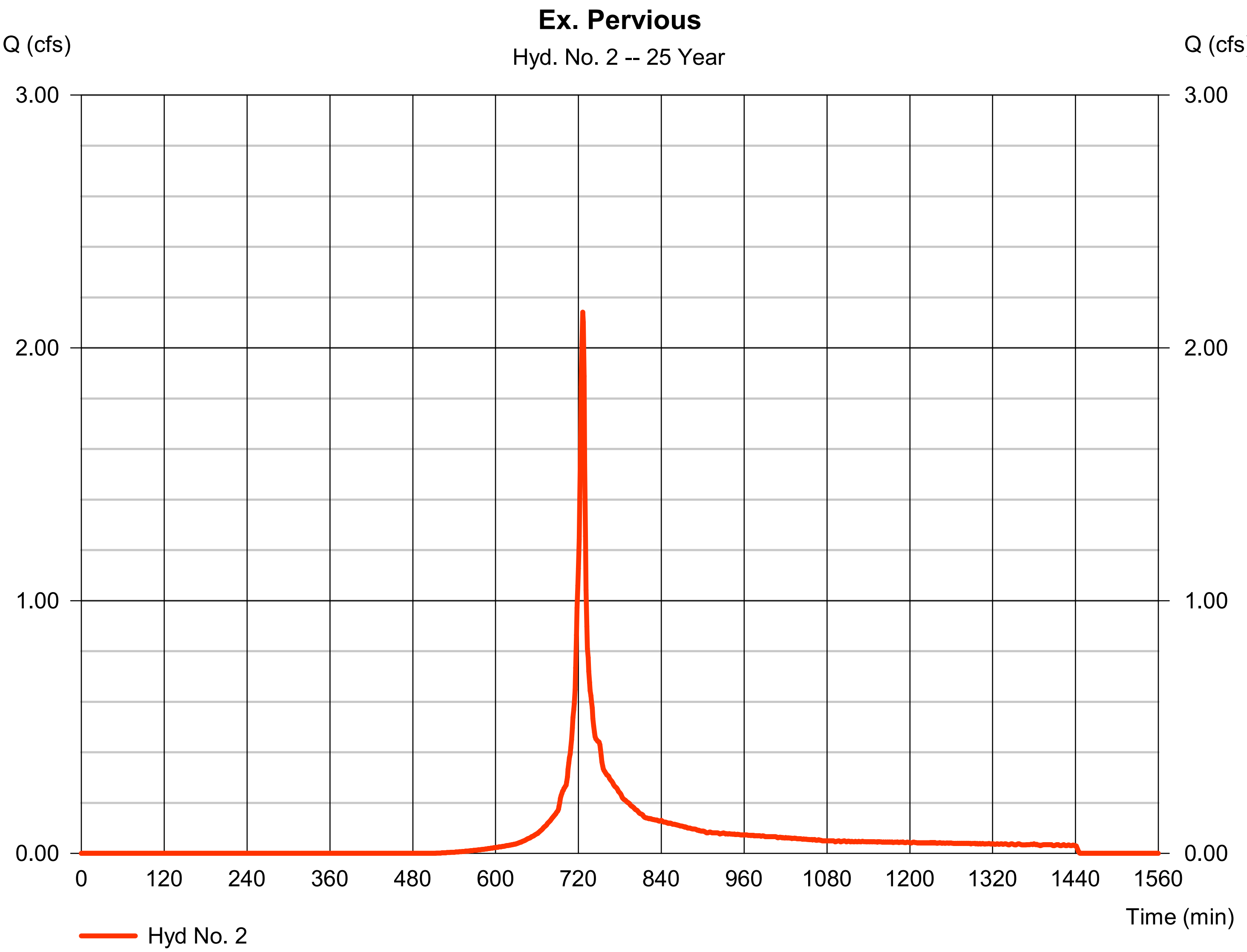
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 2

Ex. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 2.142 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 6,091 cuft
Drainage area	= 0.560 ac	Curve number	= 69*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.20 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 85) + (0.560 x 69)] / 0.560



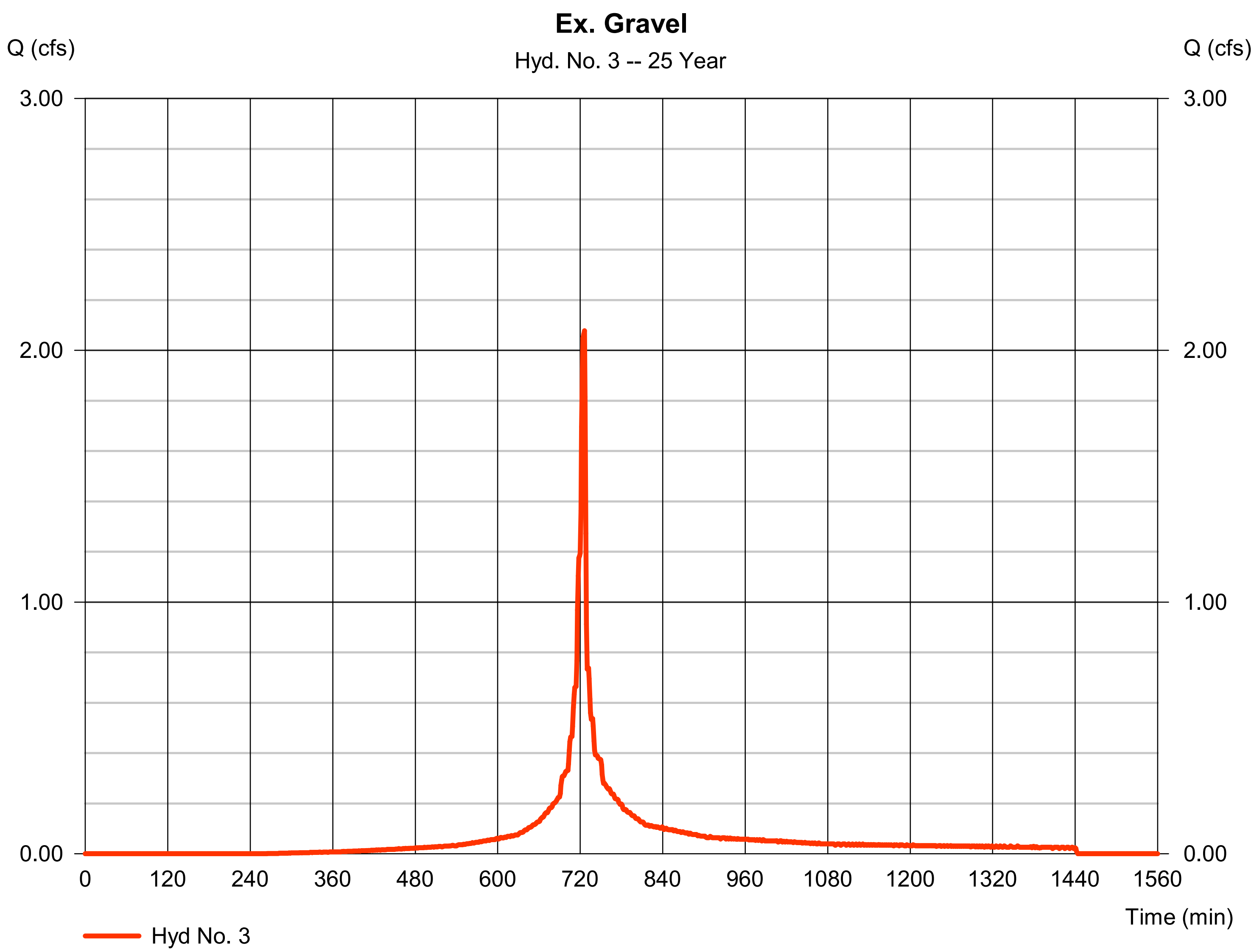
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 3

Ex. Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 2.078 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 6,004 cuft
Drainage area	= 0.380 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.80 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



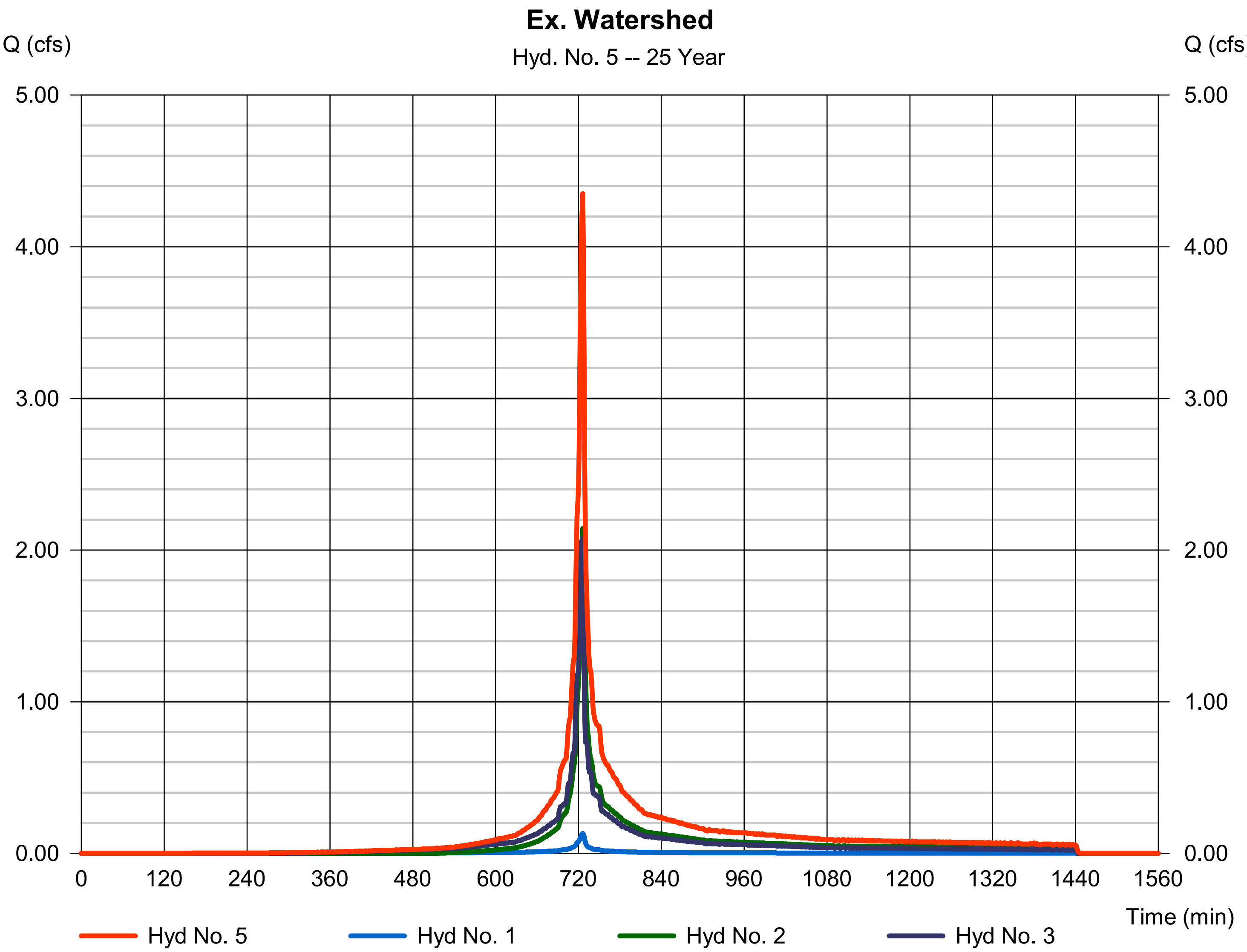
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 5

Ex. Watershed

Hydrograph type	= Combine	Peak discharge	= 4.350 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 12,540 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 0.960 ac

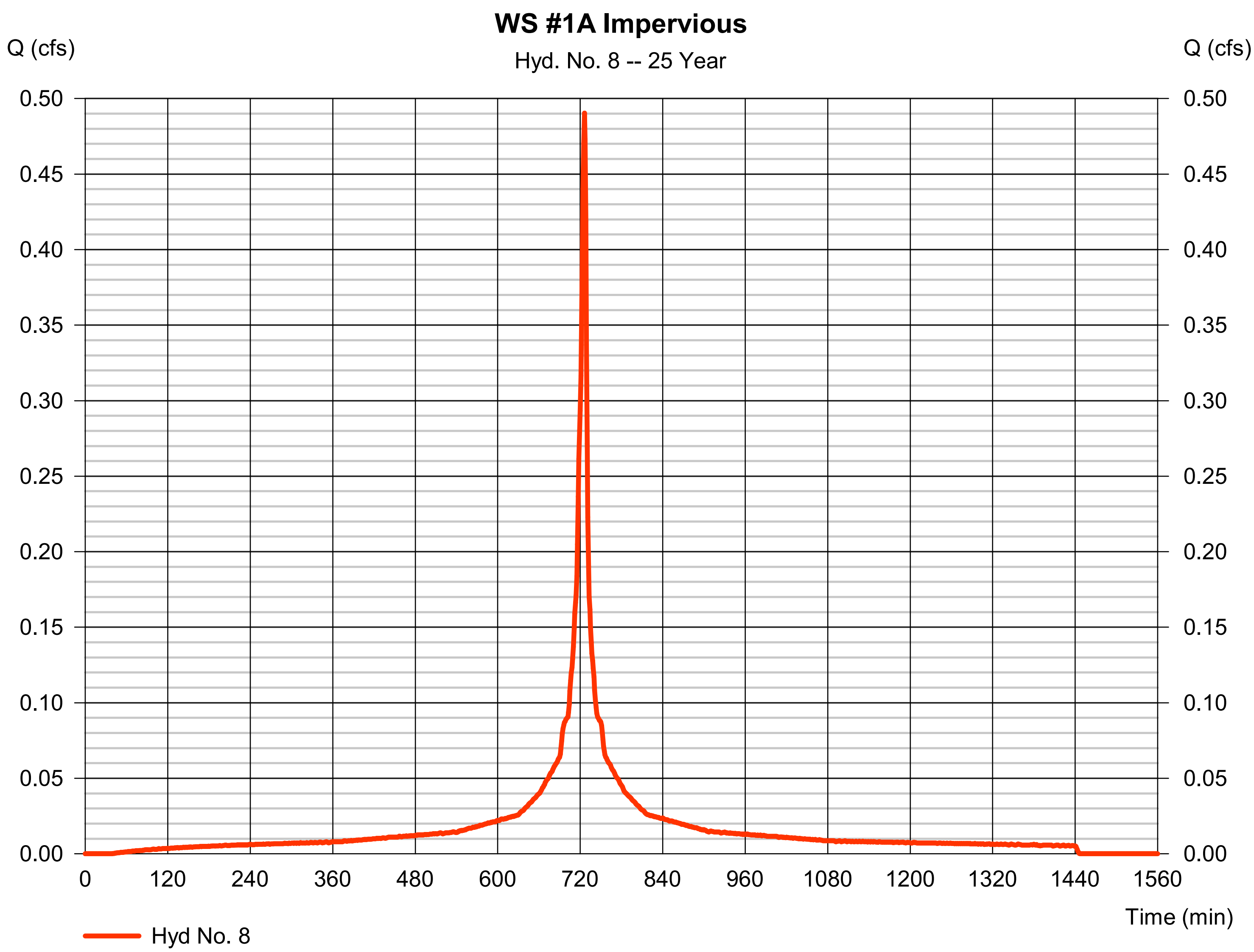


Hydrograph Report

Hyd. No. 8

WS #1A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.490 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 1,667 cuft
Drainage area	= 0.075 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.60 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



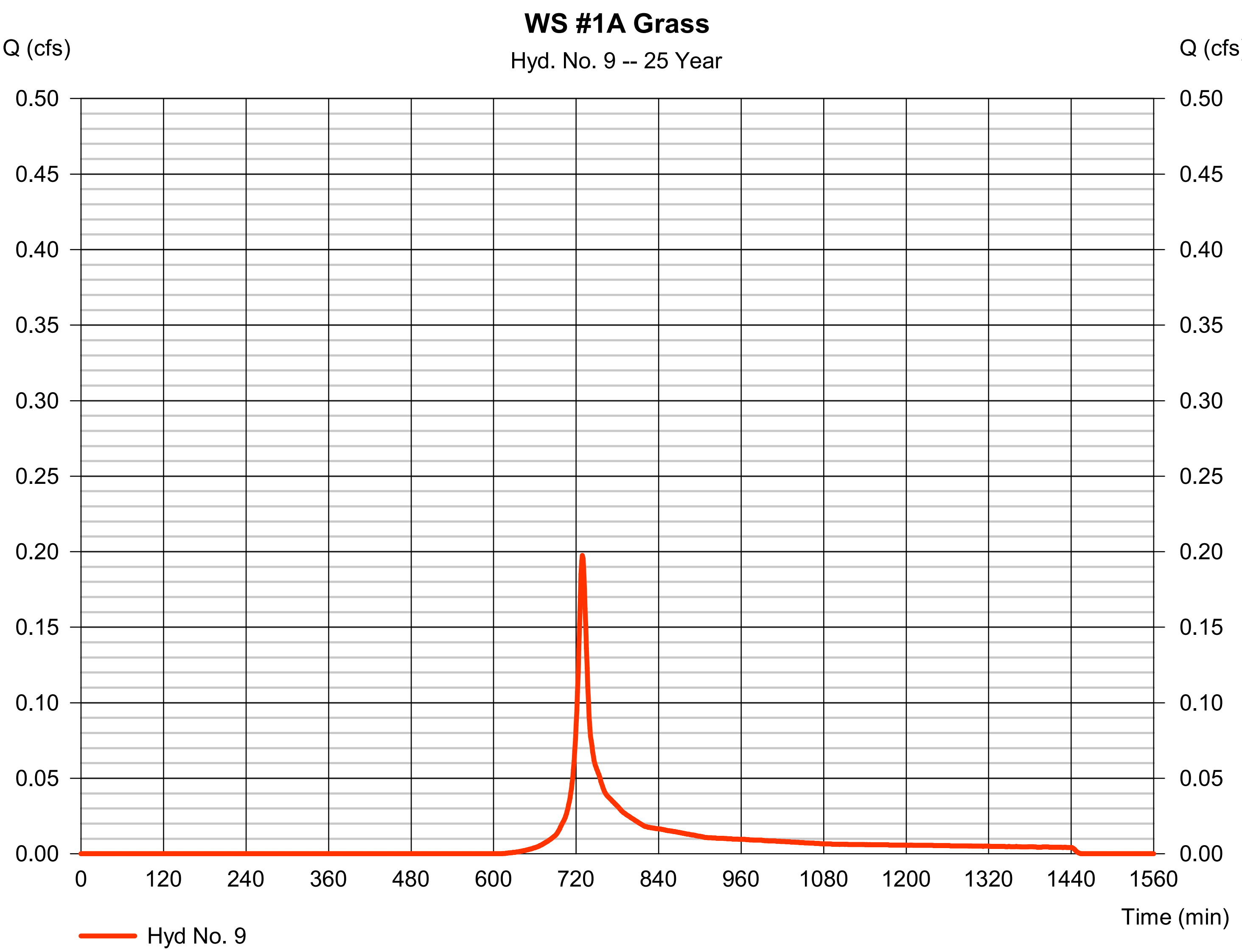
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 9

WS #1A Grass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.198 cfs
Storm frequency	= 25 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 702 cuft
Drainage area	= 0.086 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.30 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



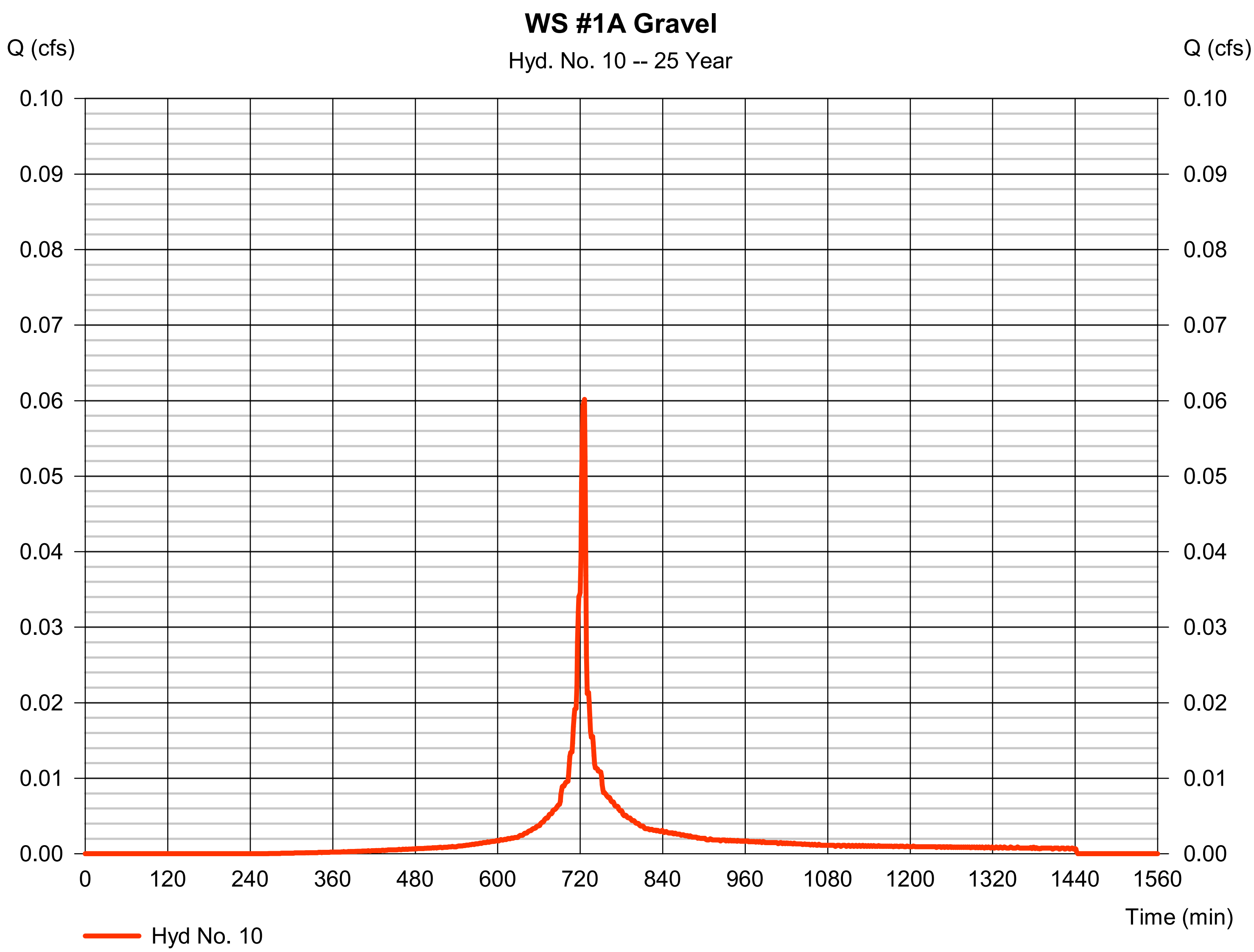
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 10

WS #1A Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.060 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 174 cuft
Drainage area	= 0.011 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



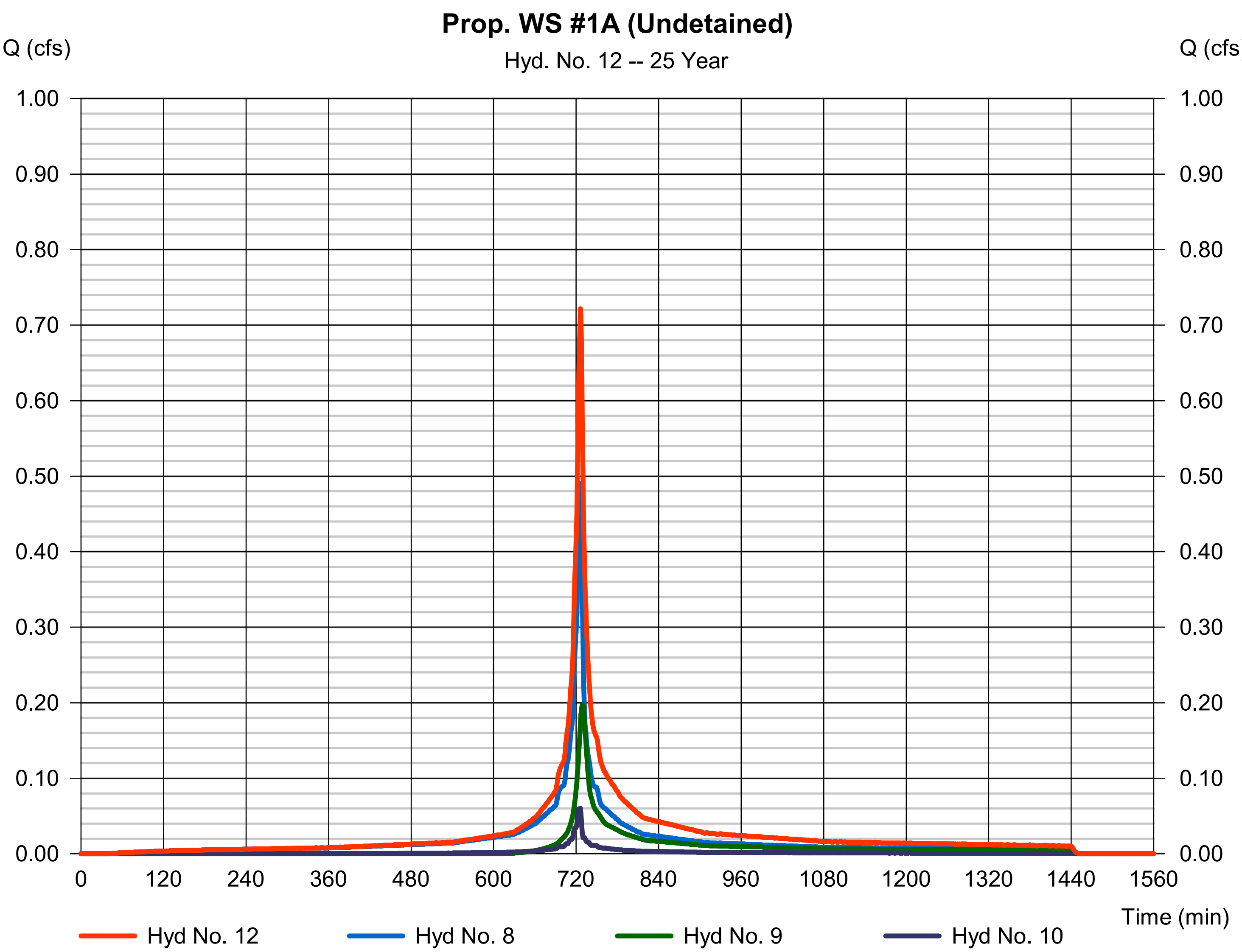
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 12

Prop. WS #1A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.722 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 2,543 cuft
Inflow hyds.	= 8, 9, 10	Contrib. drain. area	= 0.172 ac



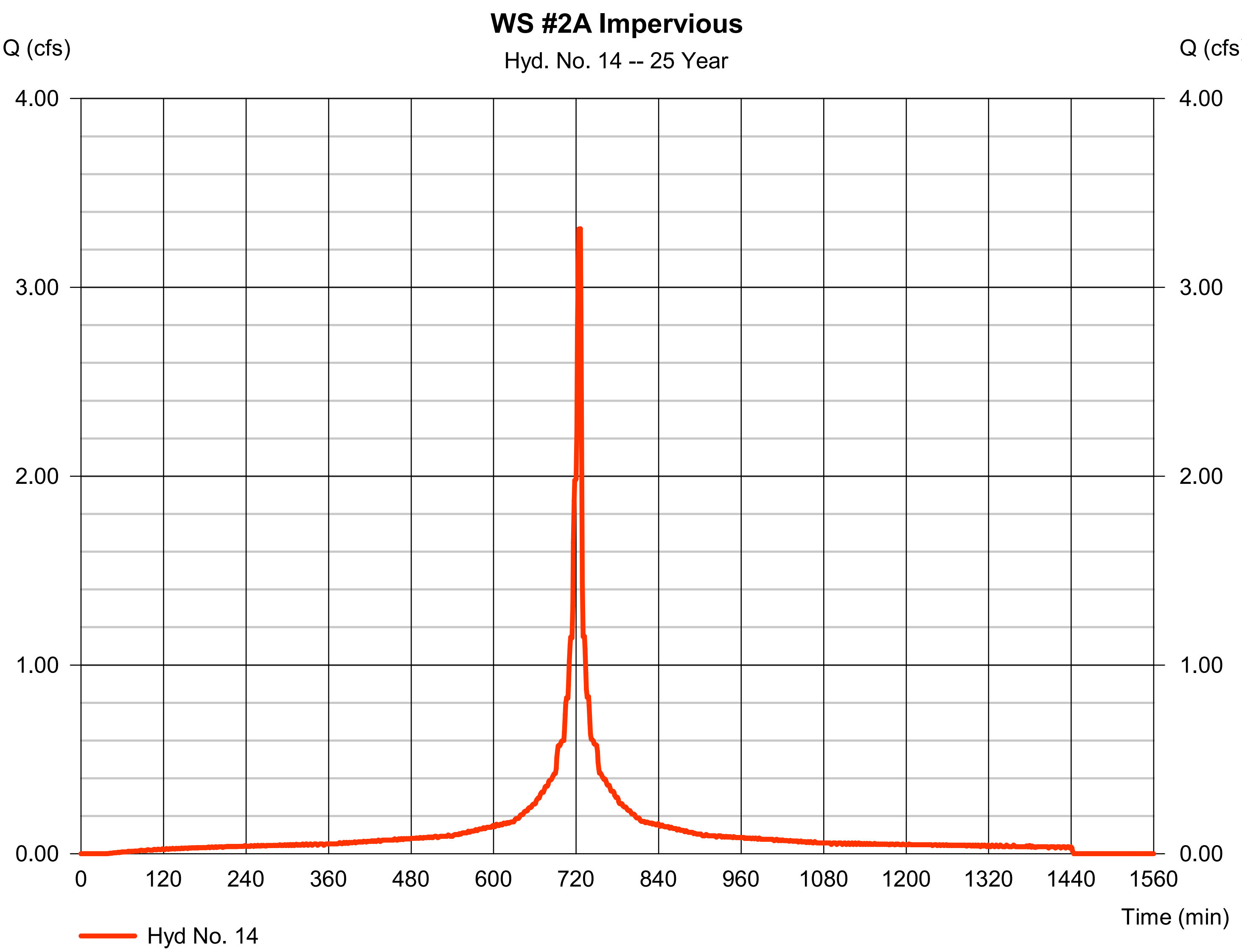
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 14

WS #2A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 3.310 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 11,020 cuft
Drainage area	= 0.529 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.00 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



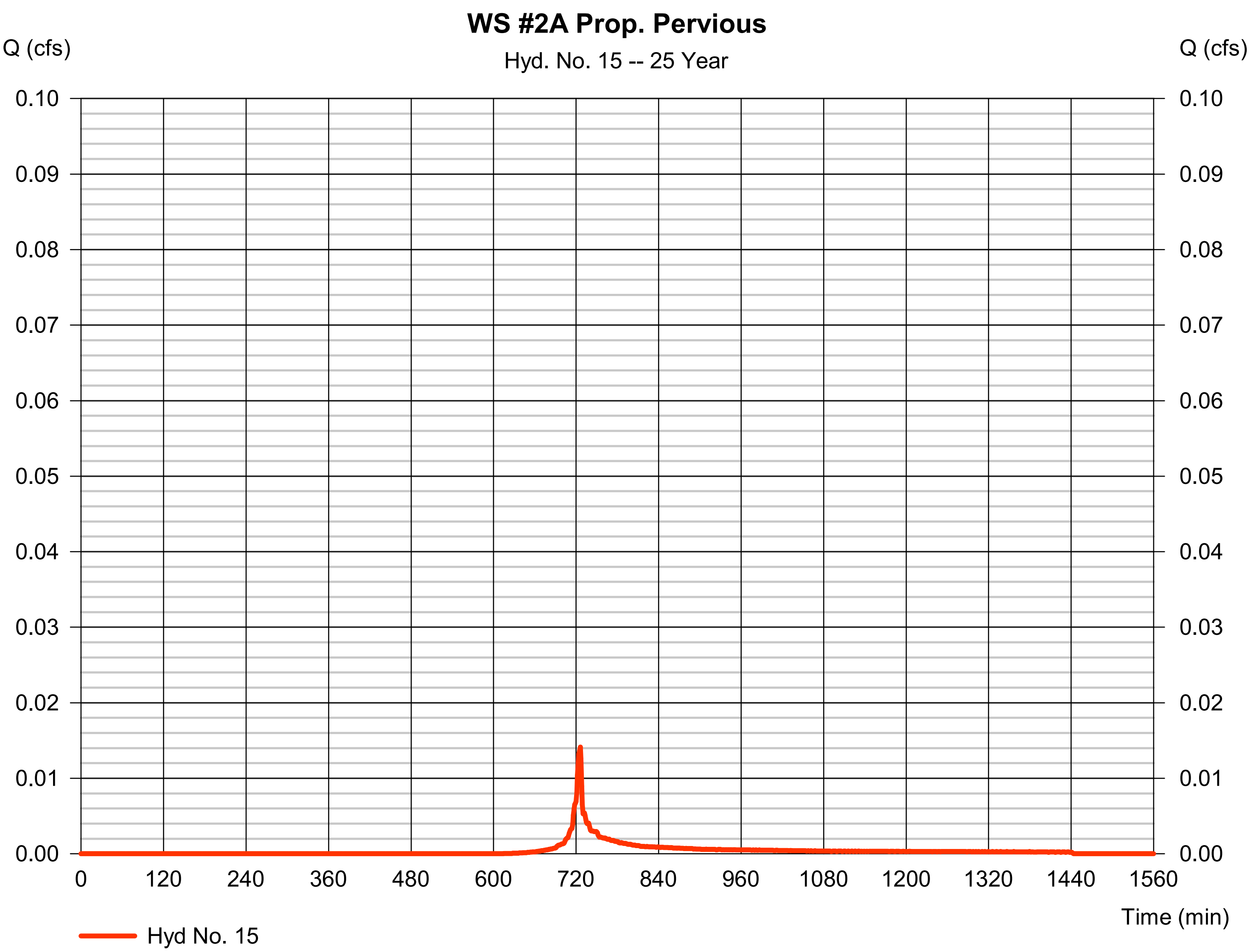
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 15

WS #2A Prop. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.014 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 38 cuft
Drainage area	= 0.005 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.90 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



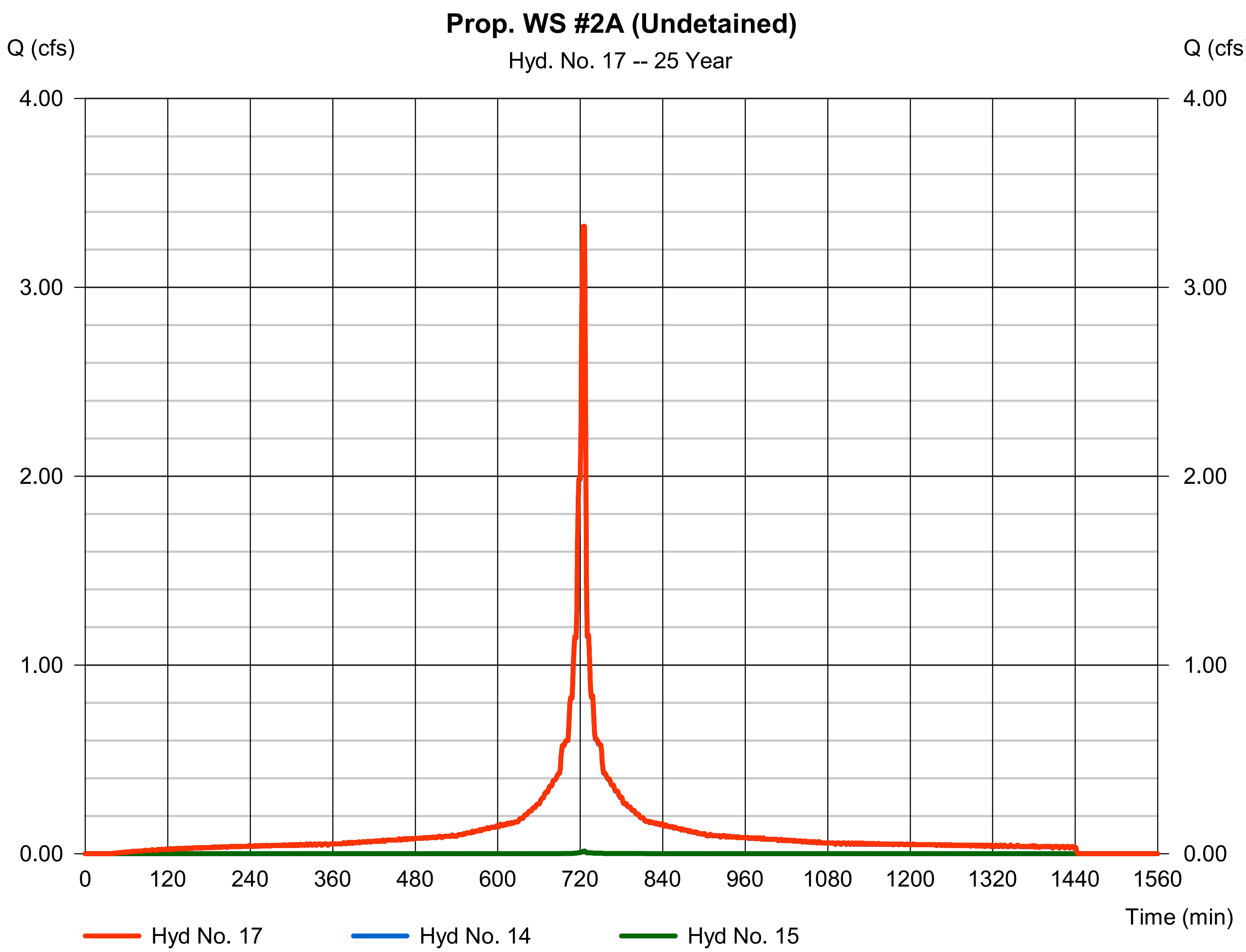
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 17

Prop. WS #2A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 3.324 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 11,059 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 0.534 ac



Hydrograph Report

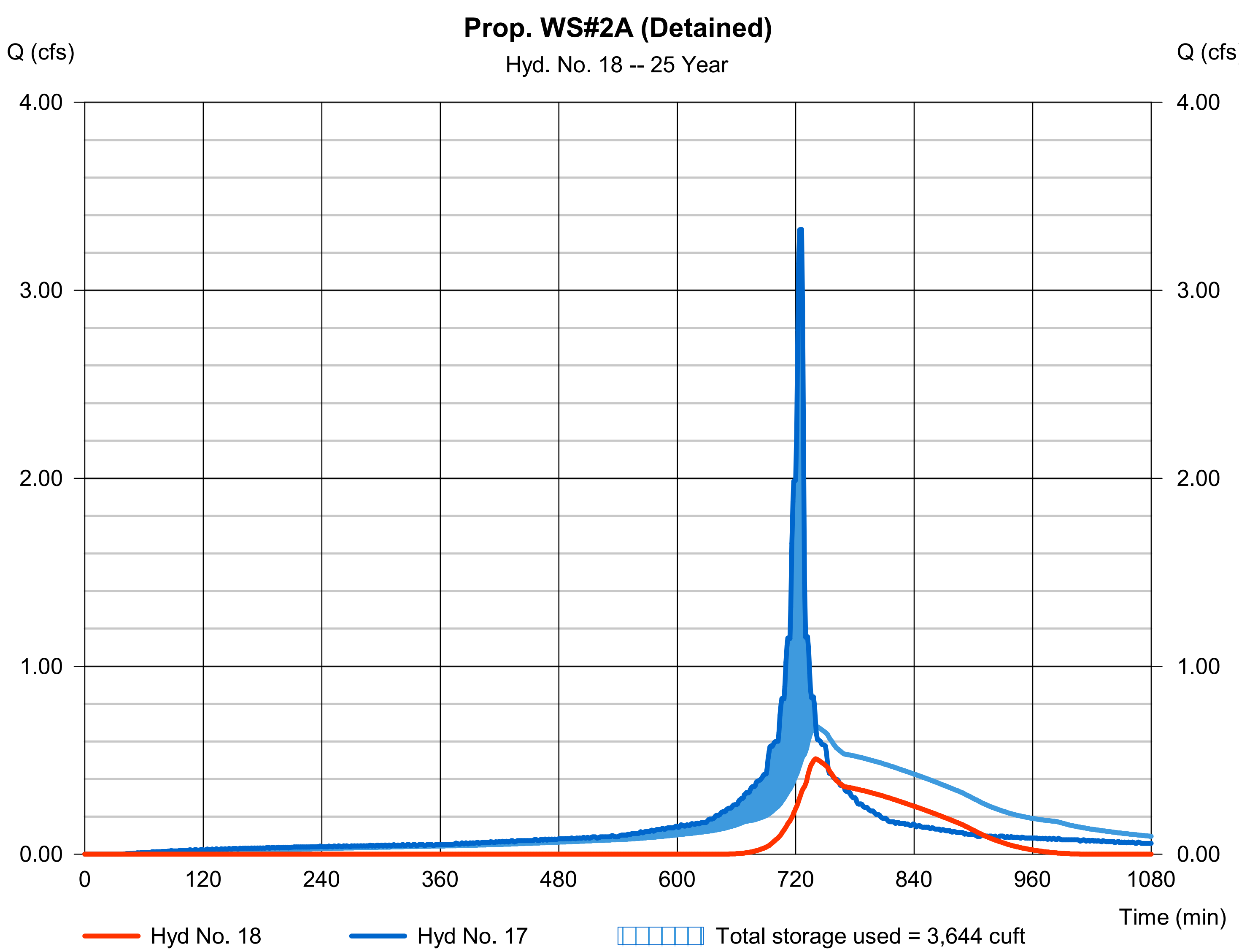
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 18

Prop. WS#2A (Detained)

Hydrograph type	= Reservoir	Peak discharge	= 0.507 cfs
Storm frequency	= 25 yrs	Time to peak	= 740 min
Time interval	= 1 min	Hyd. volume	= 3,759 cuft
Inflow hyd. No.	= 17 - Prop. WS #2A (Undetained)	Max. Elevation	= 123.57 ft
Reservoir name	= Pervious Paving System	Max. Storage	= 3,644 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



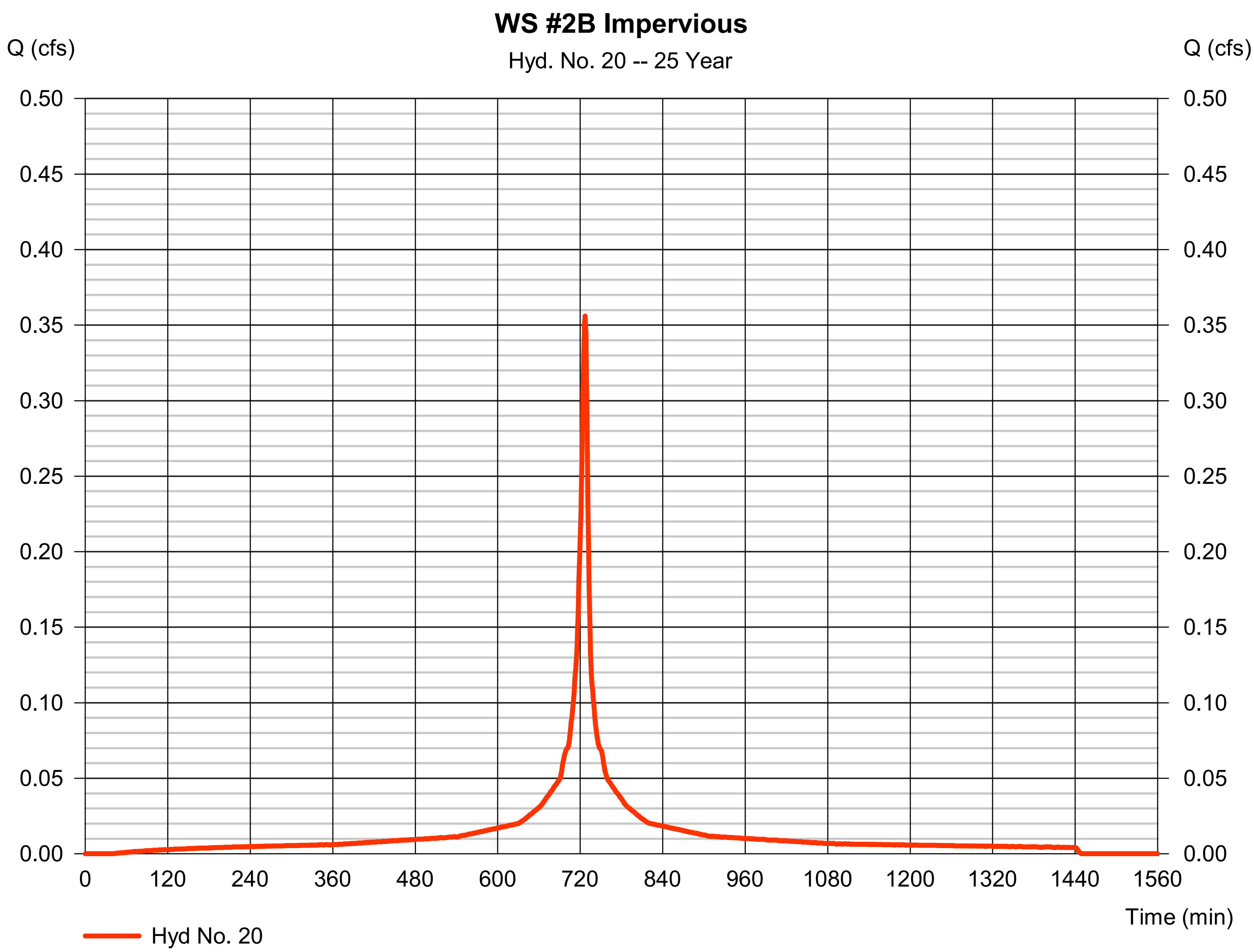
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 20

WS #2B Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.356 cfs
Storm frequency	= 25 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,306 cuft
Drainage area	= 0.057 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.90 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



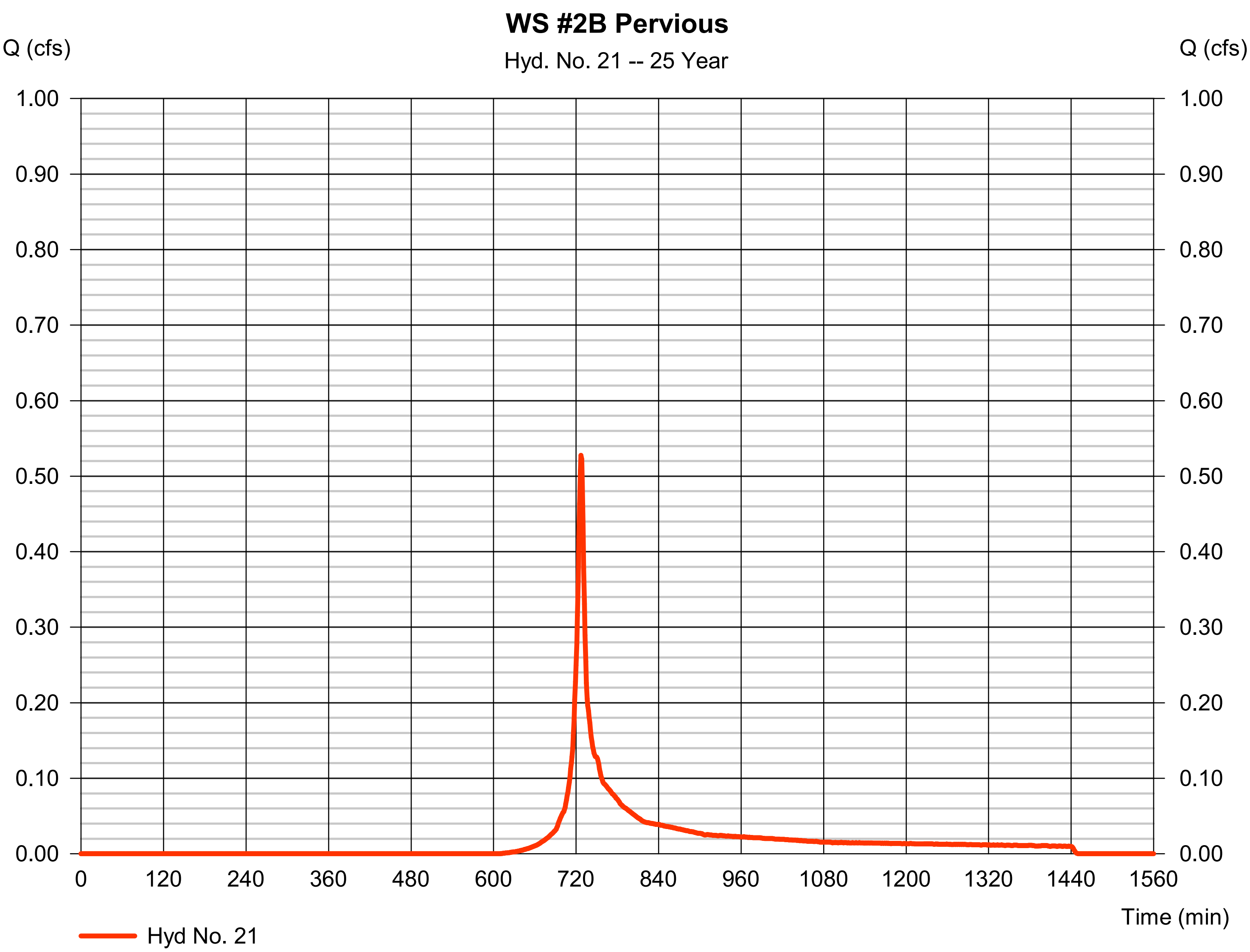
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 21

WS #2B Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.528 cfs
Storm frequency	= 25 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,659 cuft
Drainage area	= 0.197 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.10 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



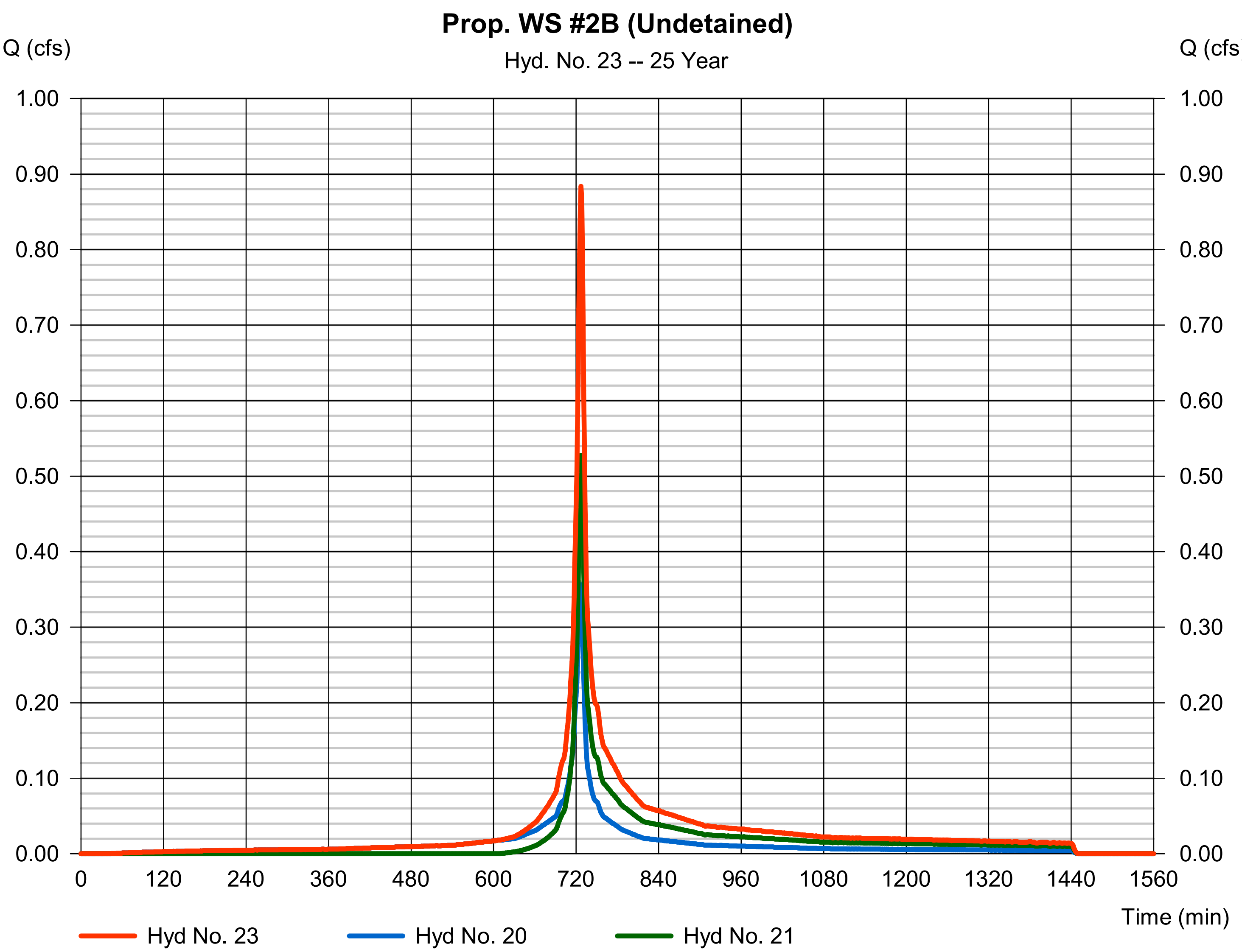
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 23

Prop. WS #2B (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.884 cfs
Storm frequency	= 25 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 2,966 cuft
Inflow hyds.	= 20, 21	Contrib. drain. area	= 0.254 ac



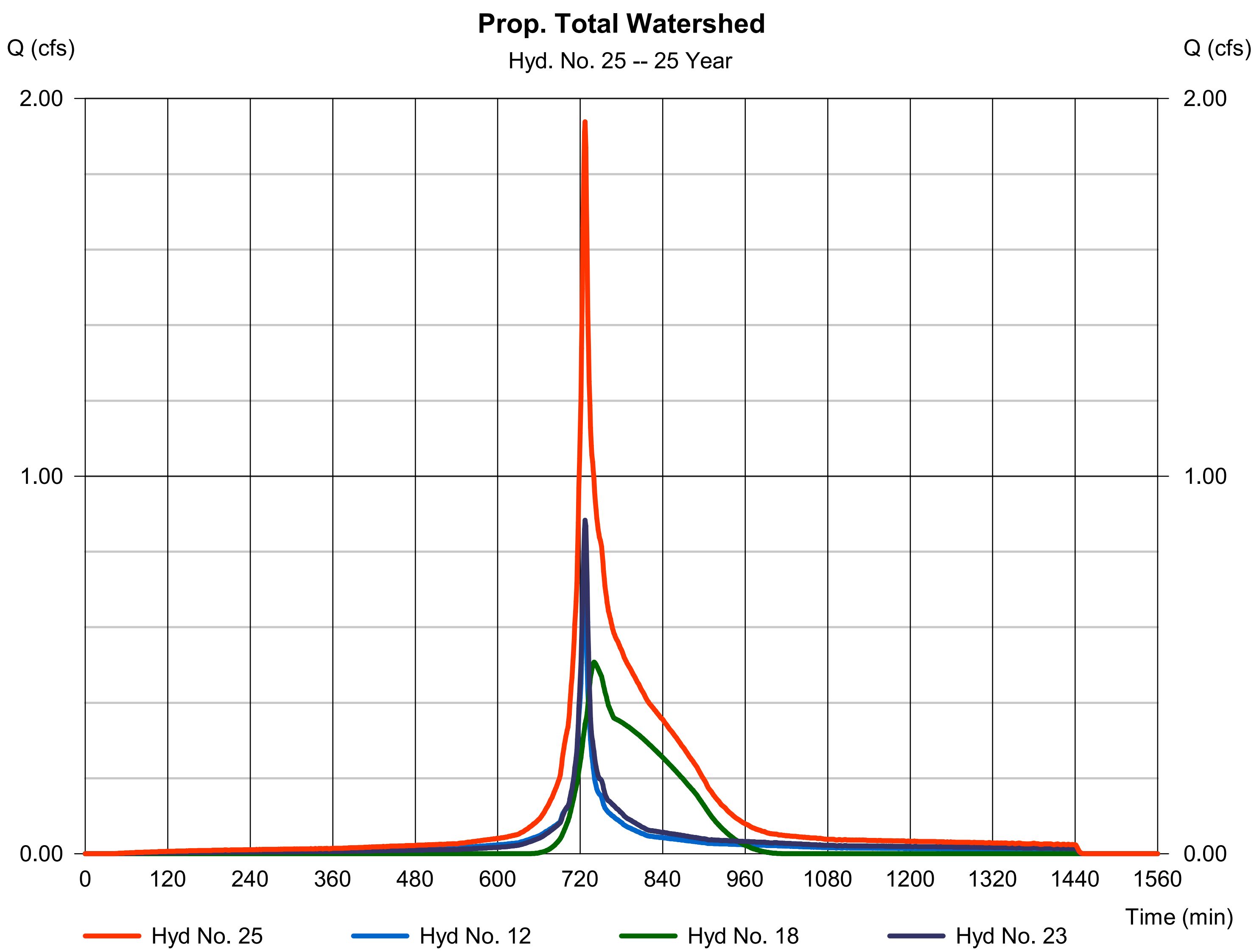
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 25

Prop. Total Watershed

Hydrograph type	= Combine	Peak discharge	= 1.938 cfs
Storm frequency	= 25 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 9,268 cuft
Inflow hyds.	= 12, 18, 23	Contrib. drain. area	= 0.000 ac

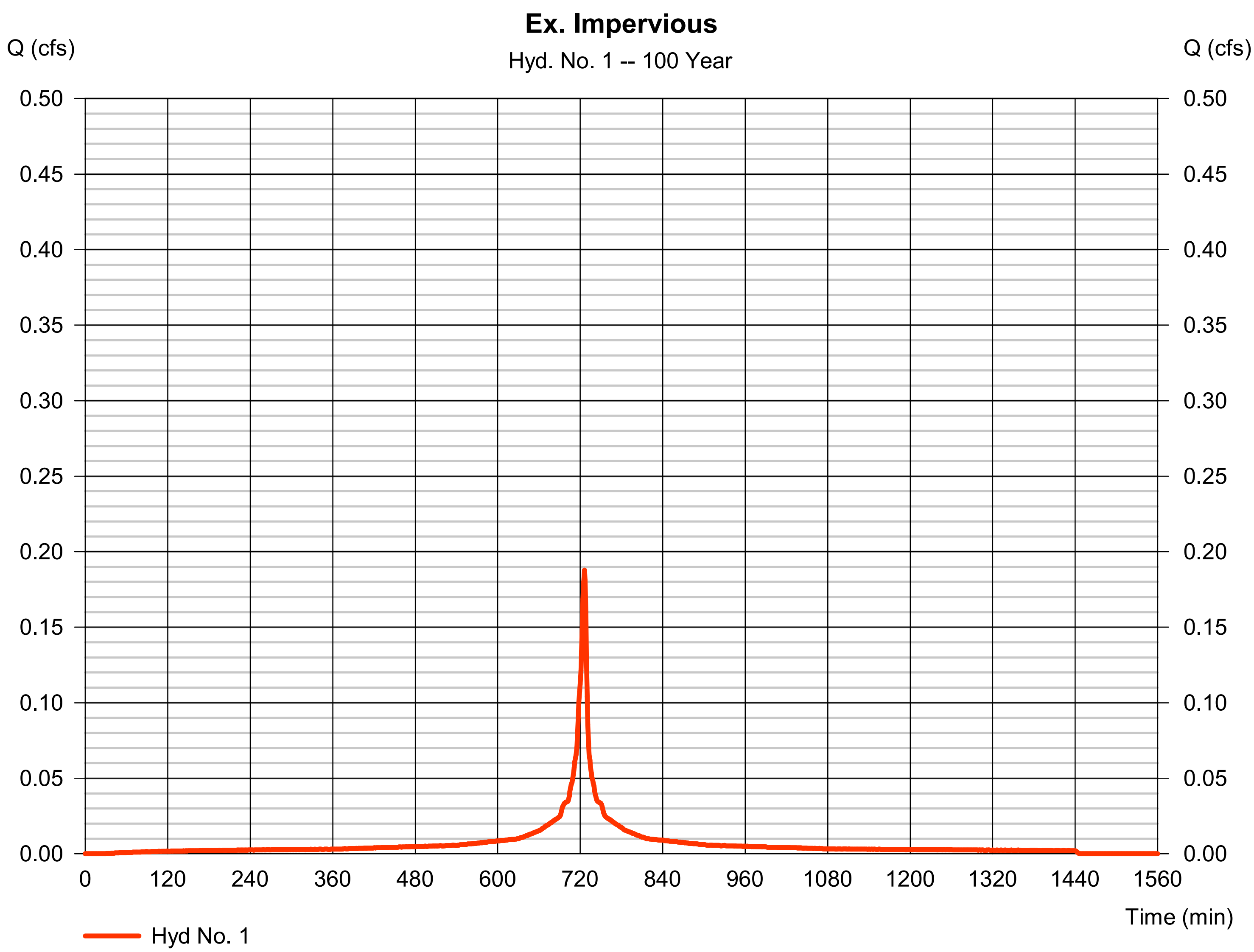


Hydrograph Report

Hyd. No. 1

Ex. Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.188 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 645 cuft
Drainage area	= 0.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.20 min
Total precip.	= 9.12 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



Hydrograph Report

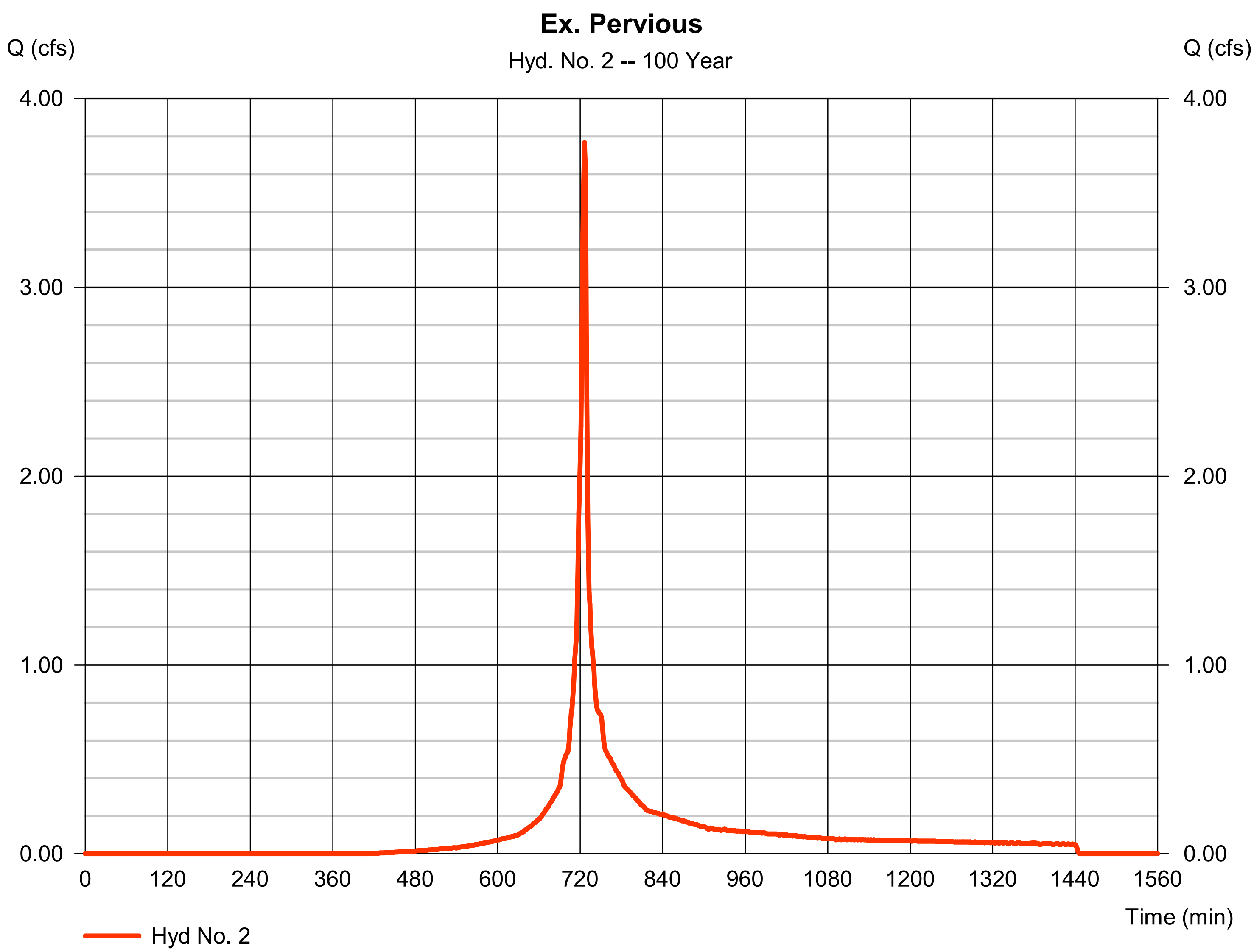
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 2

Ex. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 3.766 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 10,807 cuft
Drainage area	= 0.560 ac	Curve number	= 69*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.20 min
Total precip.	= 9.12 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 85) + (0.560 x 69)] / 0.560



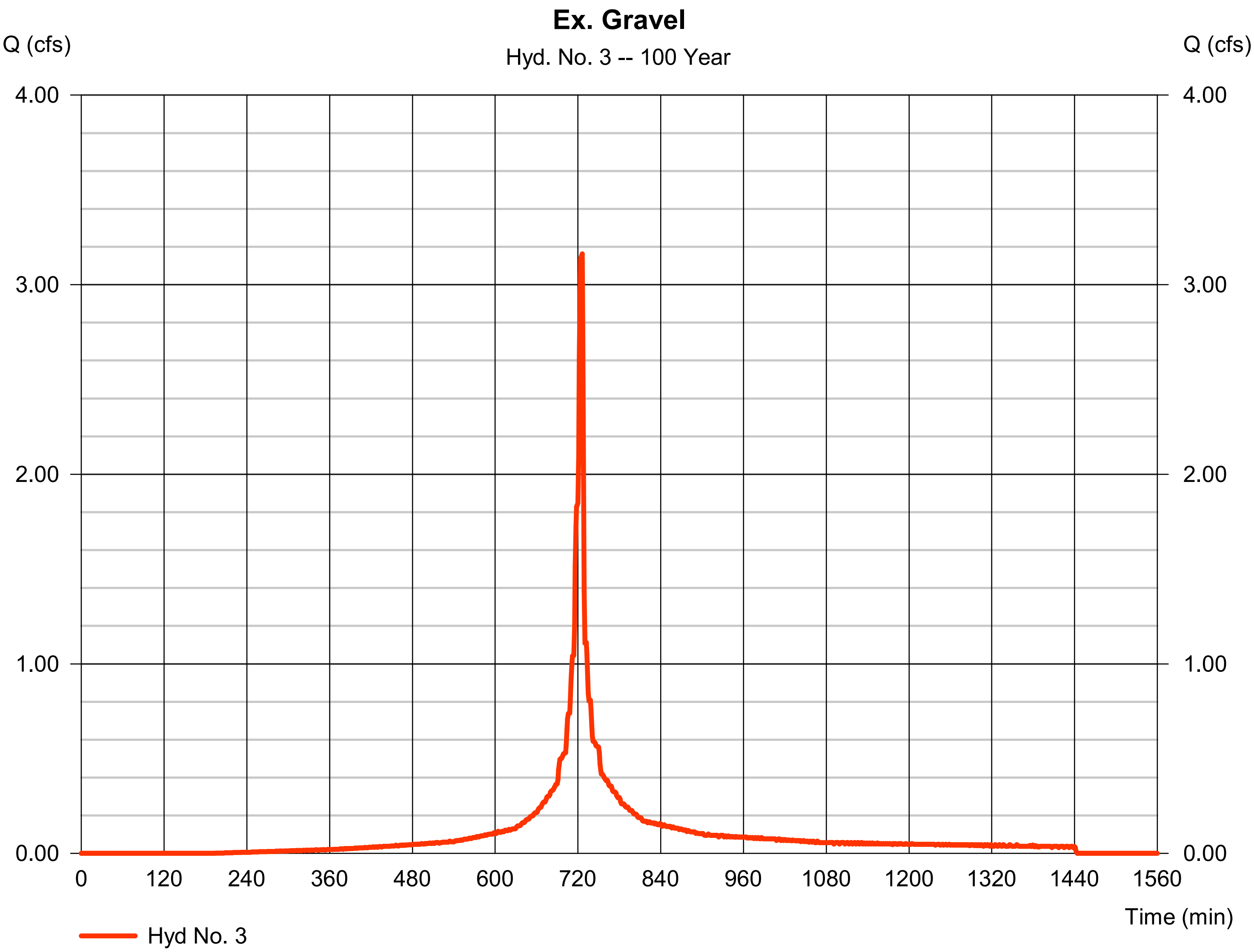
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 3

Ex. Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 3.163 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 9,438 cuft
Drainage area	= 0.380 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.80 min
Total precip.	= 9.12 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



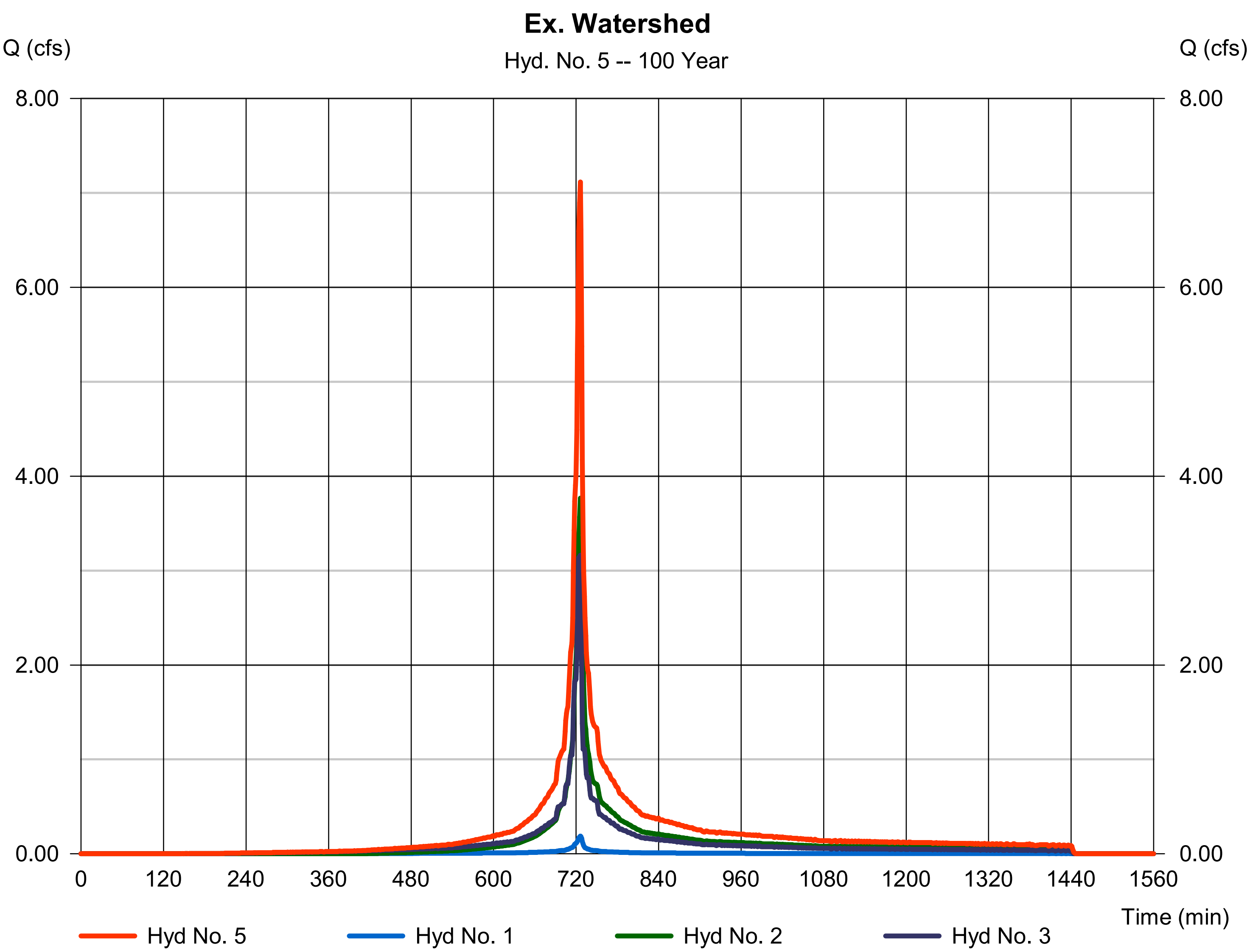
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Wednesday, 02 / 7 / 2024

Hyd. No. 5

Ex. Watershed

Hydrograph type	= Combine	Peak discharge	= 7.117 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 20,889 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 0.960 ac



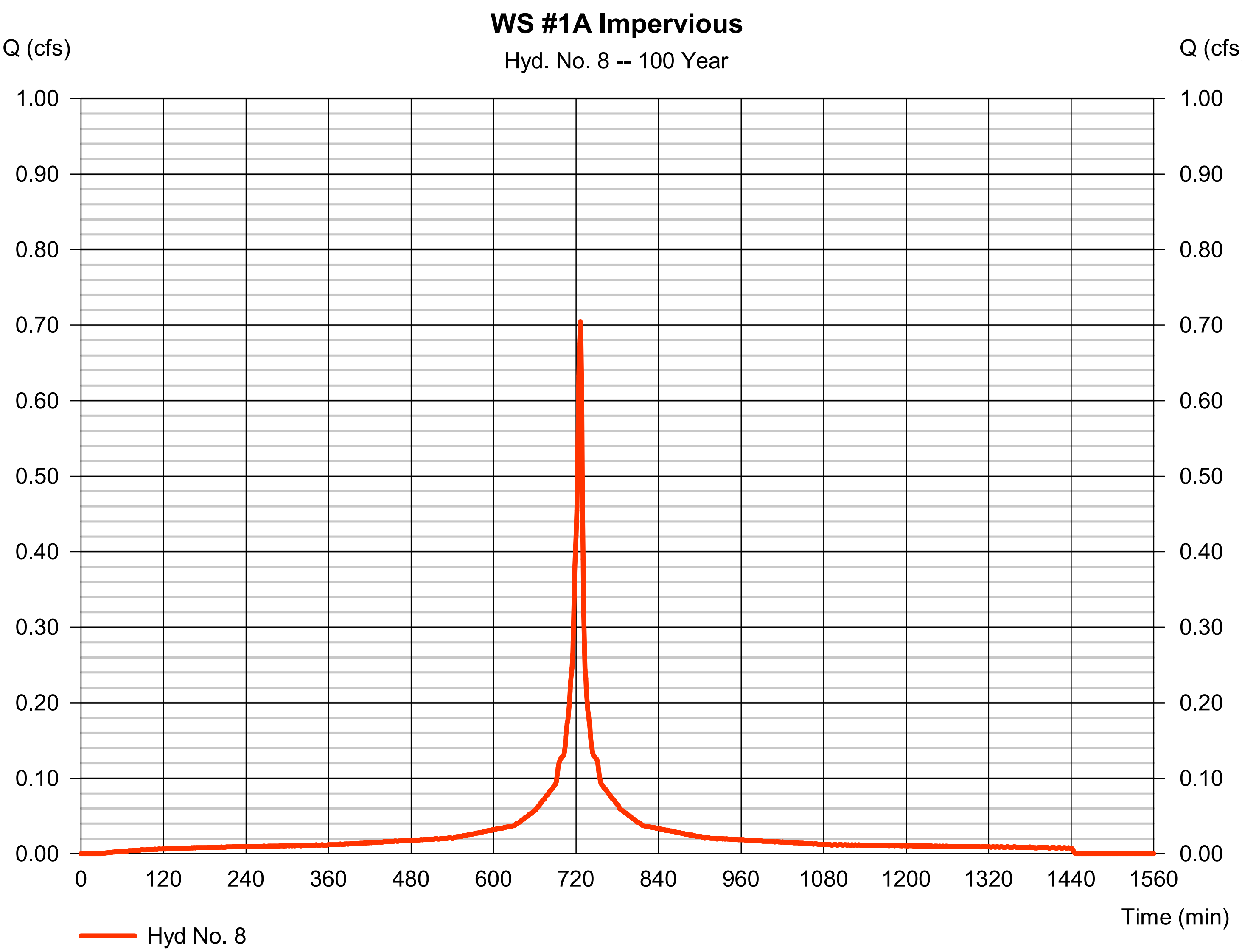
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 8

WS #1A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.704 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 2,417 cuft
Drainage area	= 0.075 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.60 min
Total precip.	= 9.12 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.01\(78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



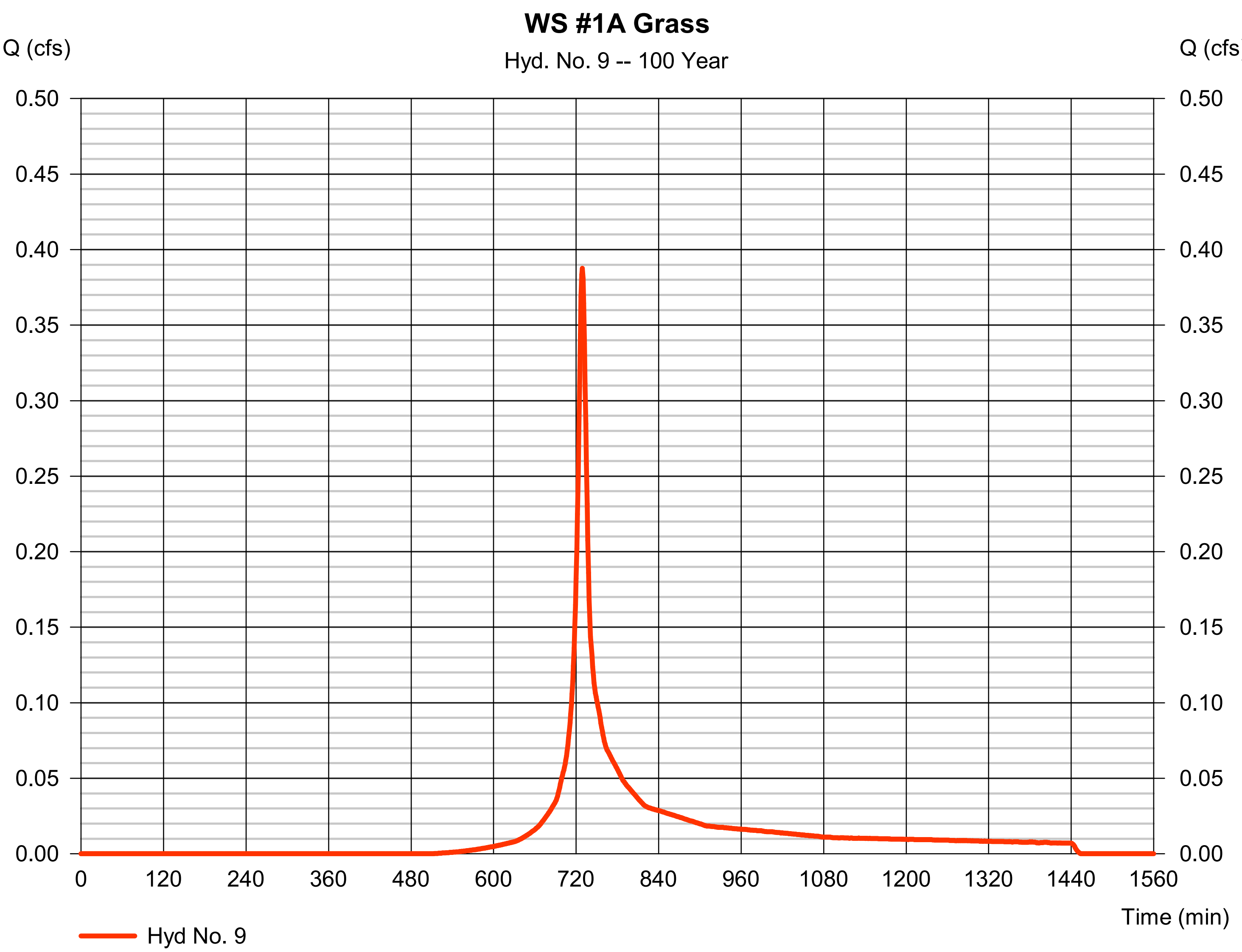
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 9

WS #1A Grass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.388 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 1,348 cuft
Drainage area	= 0.086 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.30 min
Total precip.	= 9.12 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



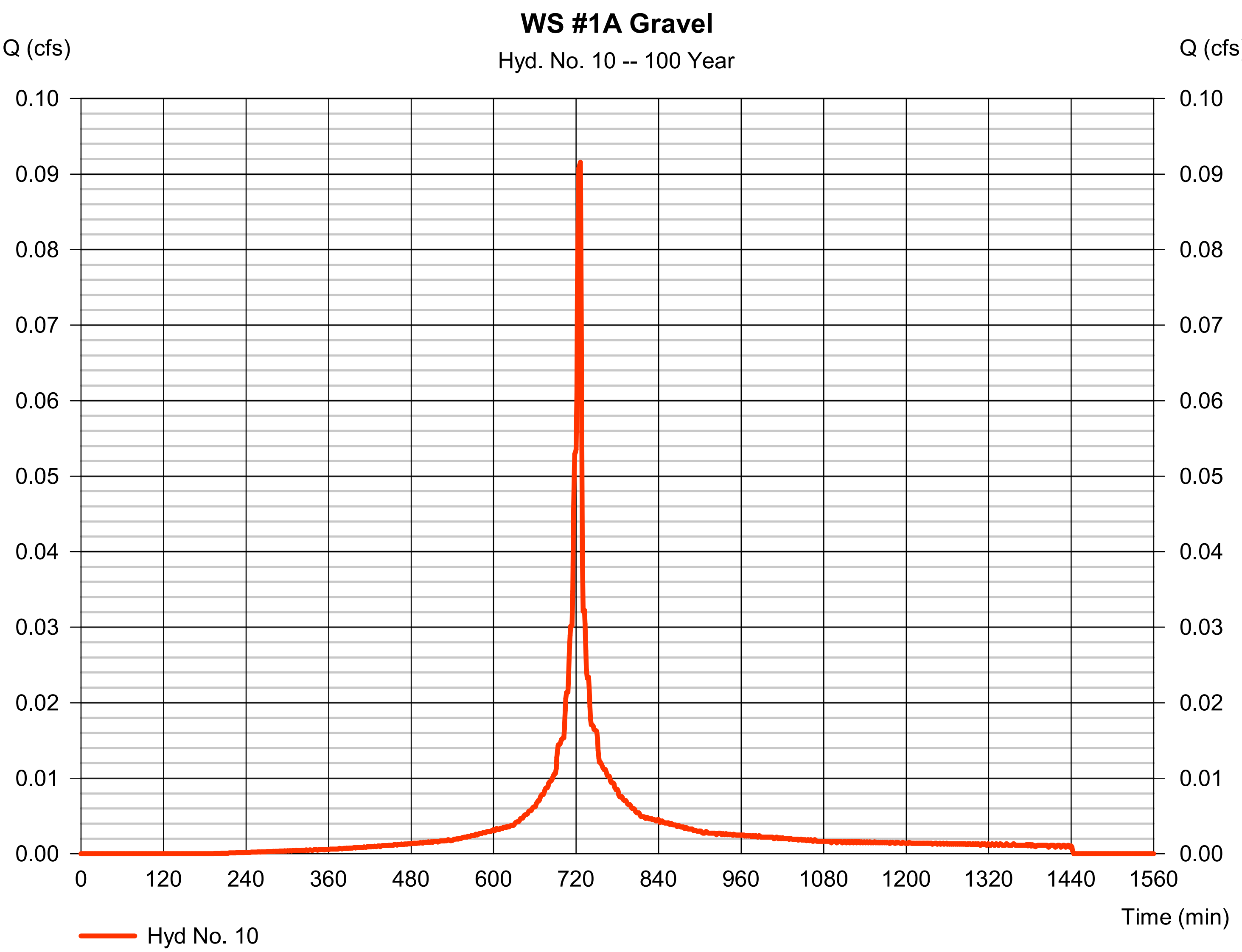
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Wednesday, 02 / 7 / 2024

Hyd. No. 10

WS #1A Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.092 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 273 cuft
Drainage area	= 0.011 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 9.12 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.01\(78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

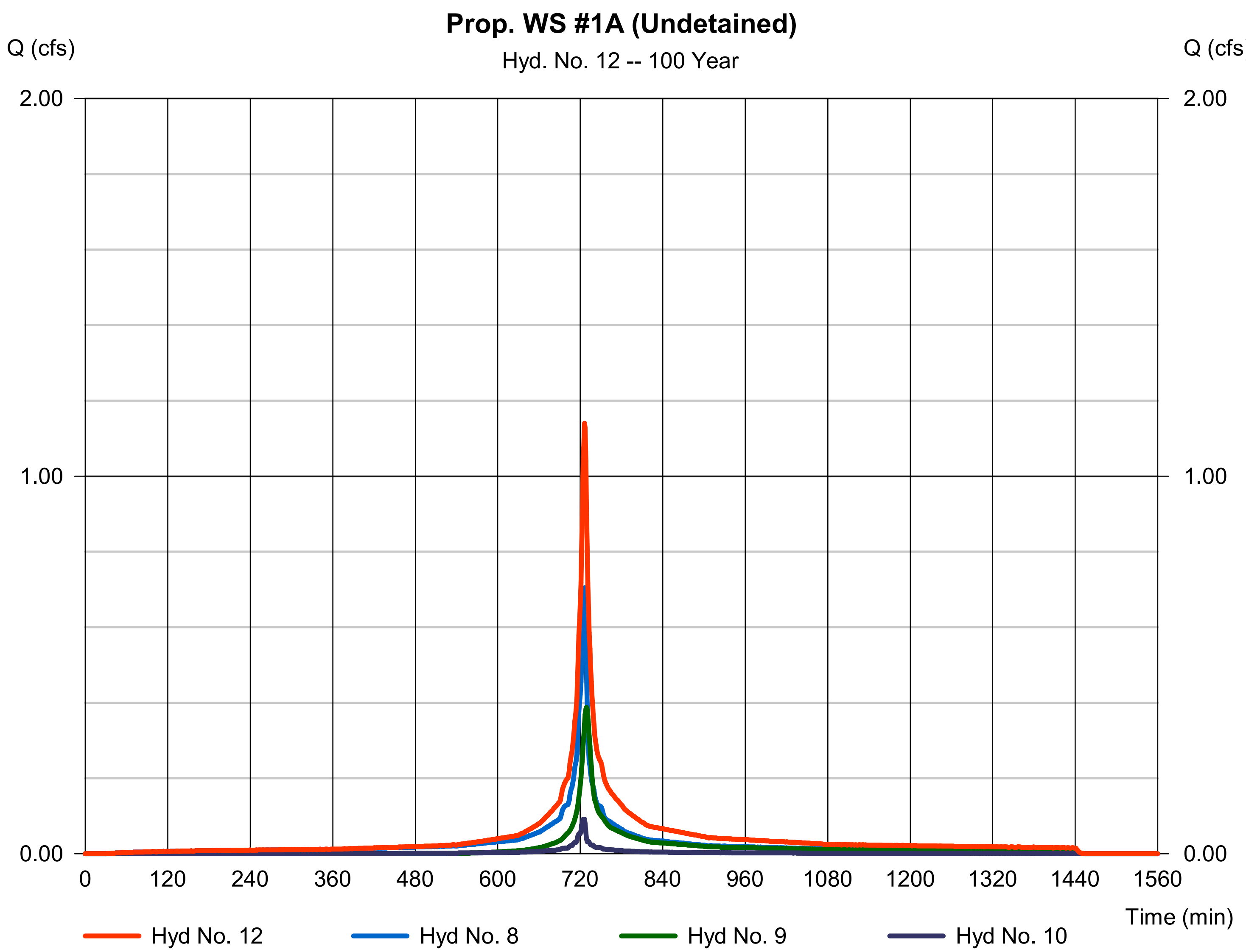


Hydrograph Report

Hyd. No. 12

Prop. WS #1A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 1.140 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 4,039 cuft
Inflow hyds.	= 8, 9, 10	Contrib. drain. area	= 0.172 ac



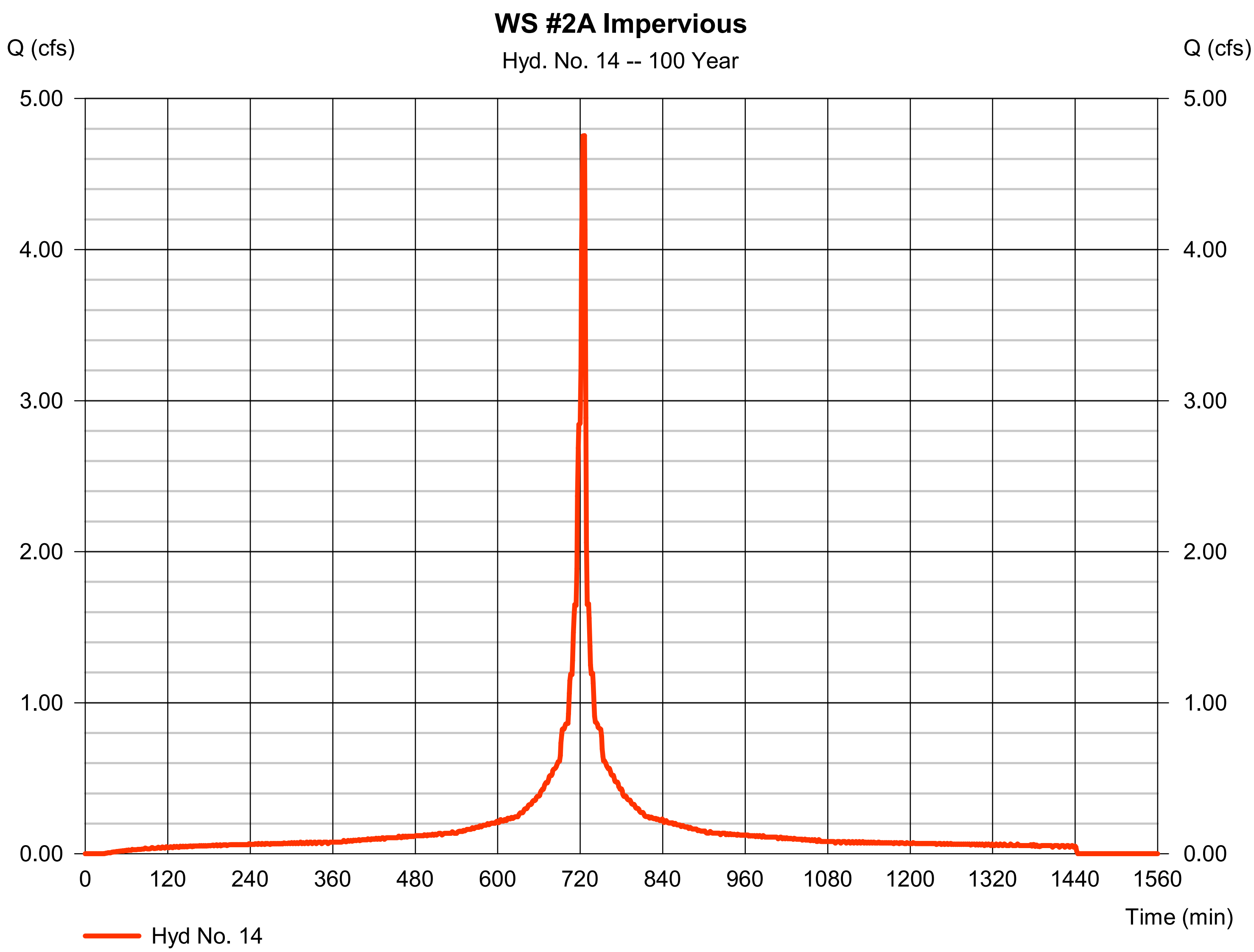
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 14

WS #2A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 4.754 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 15,986 cuft
Drainage area	= 0.529 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.00 min
Total precip.	= 9.12 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



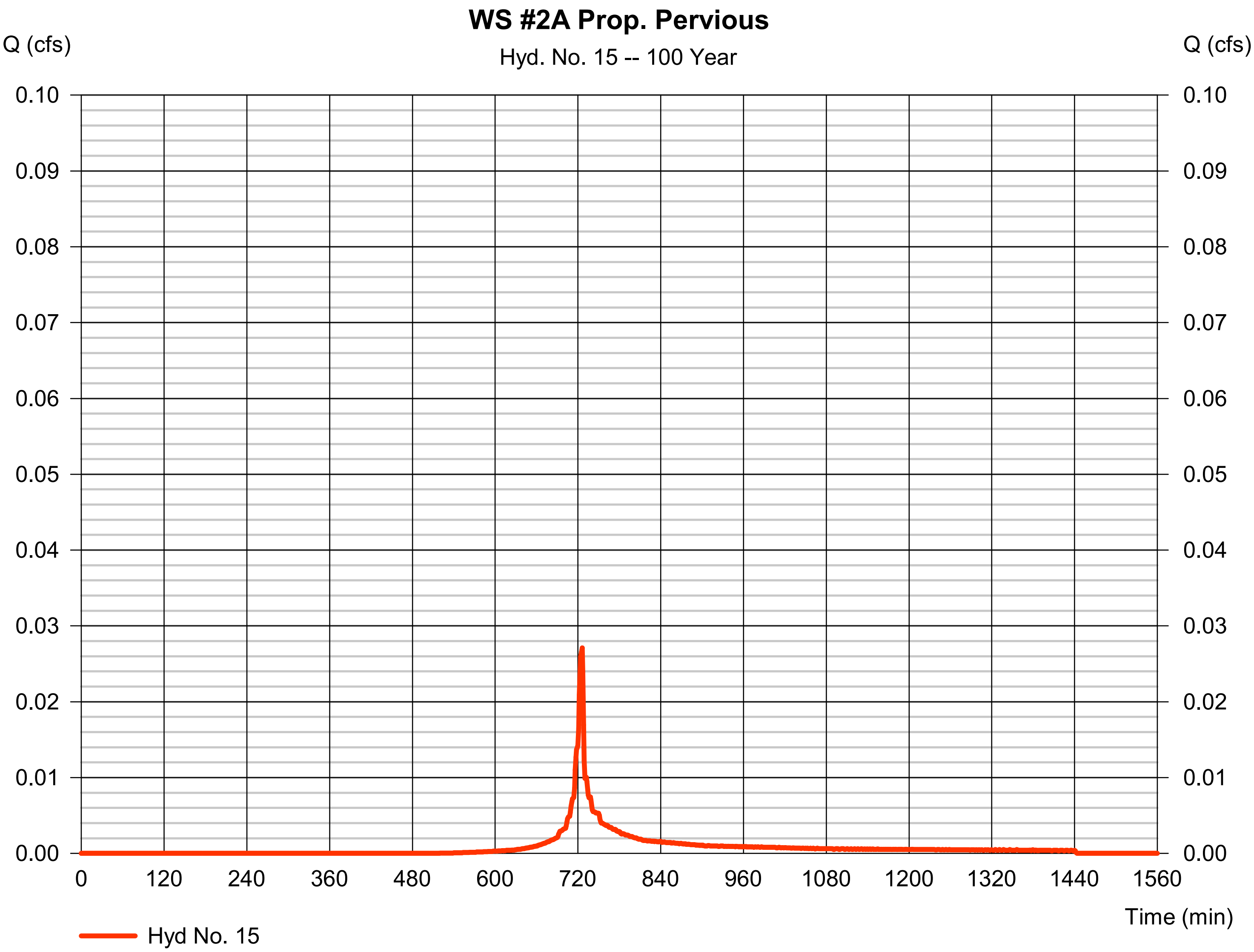
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 15

WS #2A Prop. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.027 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 73 cuft
Drainage area	= 0.005 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.90 min
Total precip.	= 9.12 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



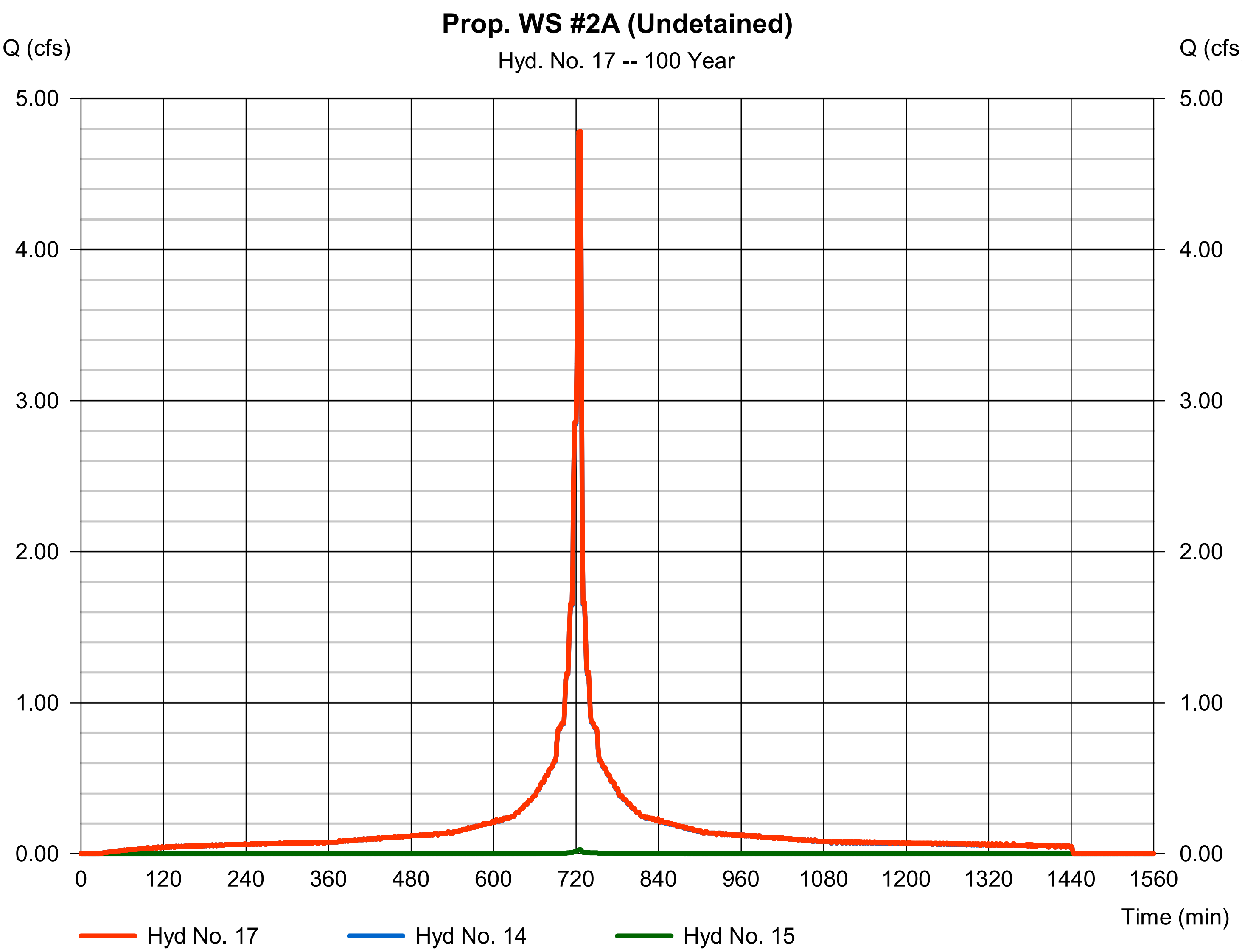
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 17

Prop. WS #2A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 4.781 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 16,059 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 0.534 ac



Hydrograph Report

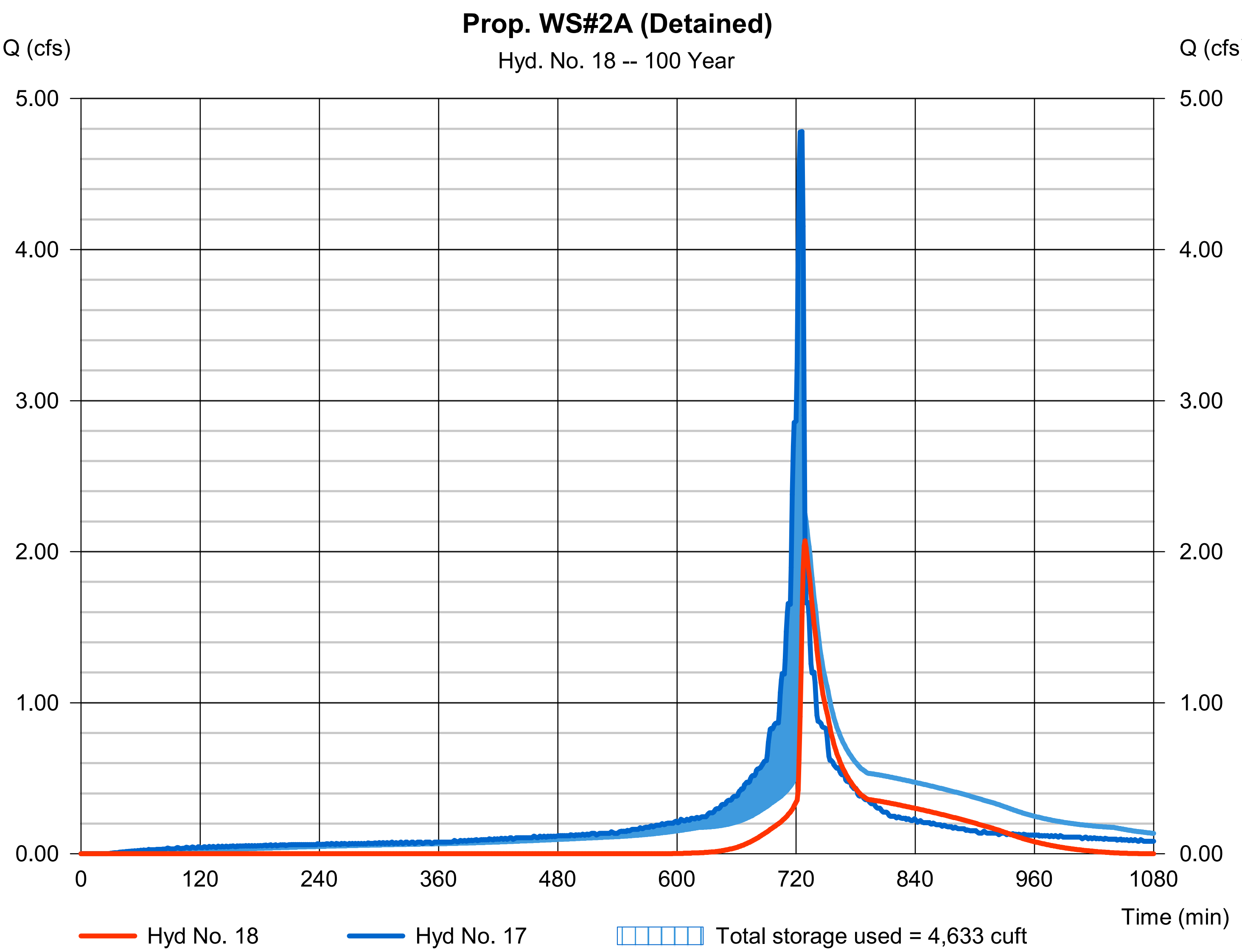
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 18

Prop. WS#2A (Detained)

Hydrograph type	= Reservoir	Peak discharge	= 2.072 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 7,034 cuft
Inflow hyd. No.	= 17 - Prop. WS #2A (Undetained)	Max. Elevation	= 123.89 ft
Reservoir name	= Pervious Paving System	Max. Storage	= 4,633 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



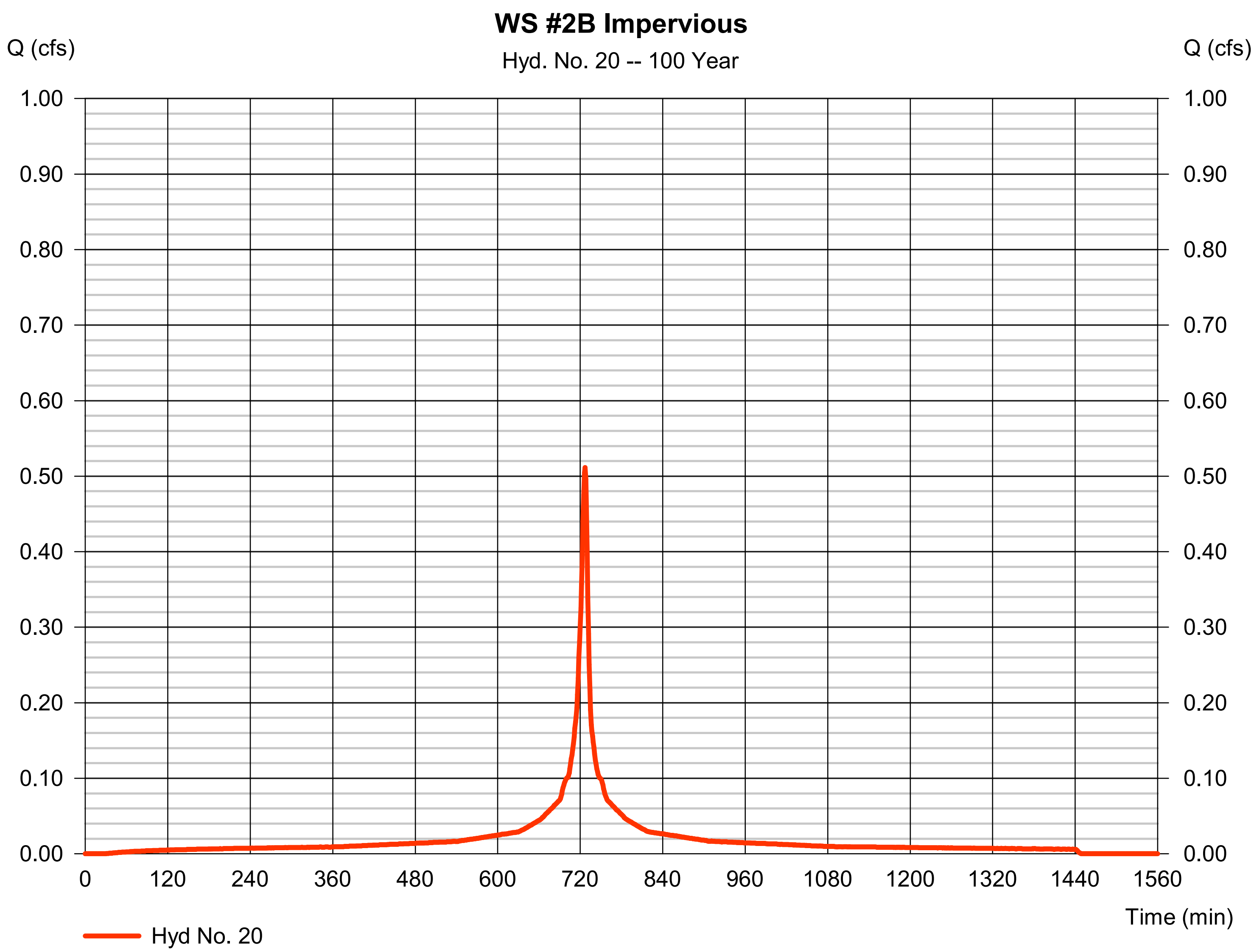
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 20

WS #2B Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.511 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,895 cuft
Drainage area	= 0.057 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.90 min
Total precip.	= 9.12 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



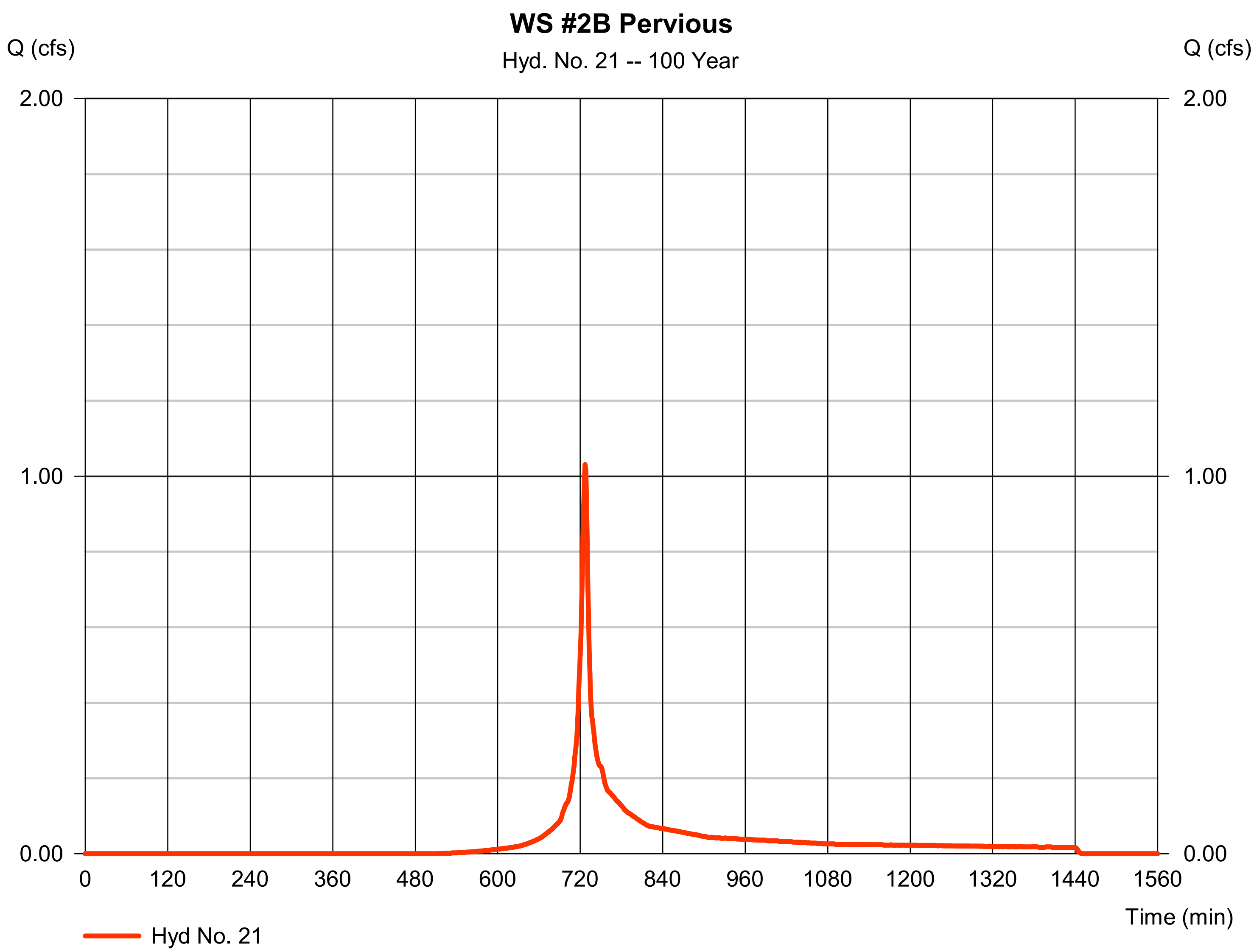
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 21

WS #2B Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 1.031 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 3,185 cuft
Drainage area	= 0.197 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.10 min
Total precip.	= 9.12 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

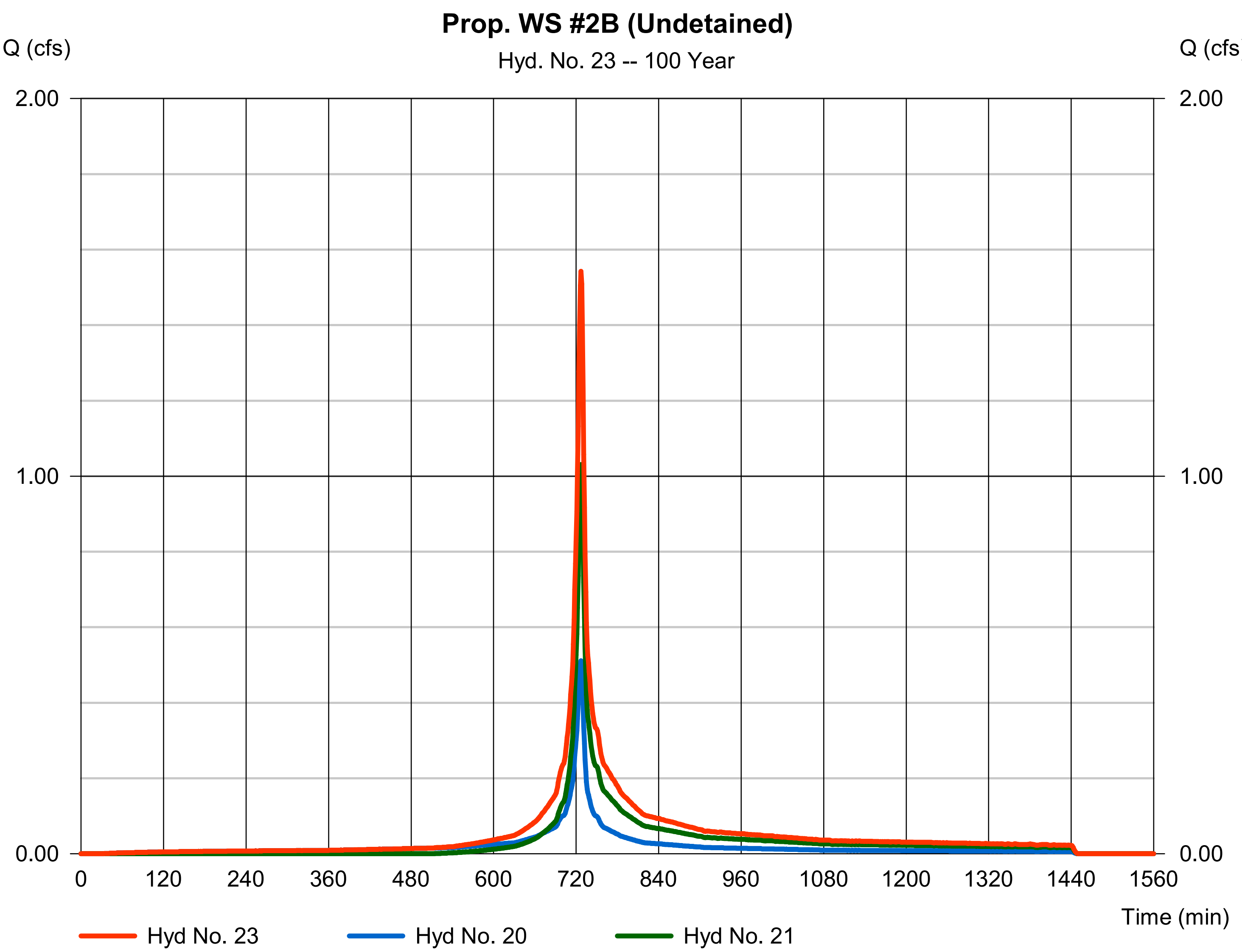


Hydrograph Report

Hyd. No. 23

Prop. WS #2B (Undetained)

Hydrograph type	= Combine	Peak discharge	= 1.543 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 5,080 cuft
Inflow hyds.	= 20, 21	Contrib. drain. area	= 0.254 ac



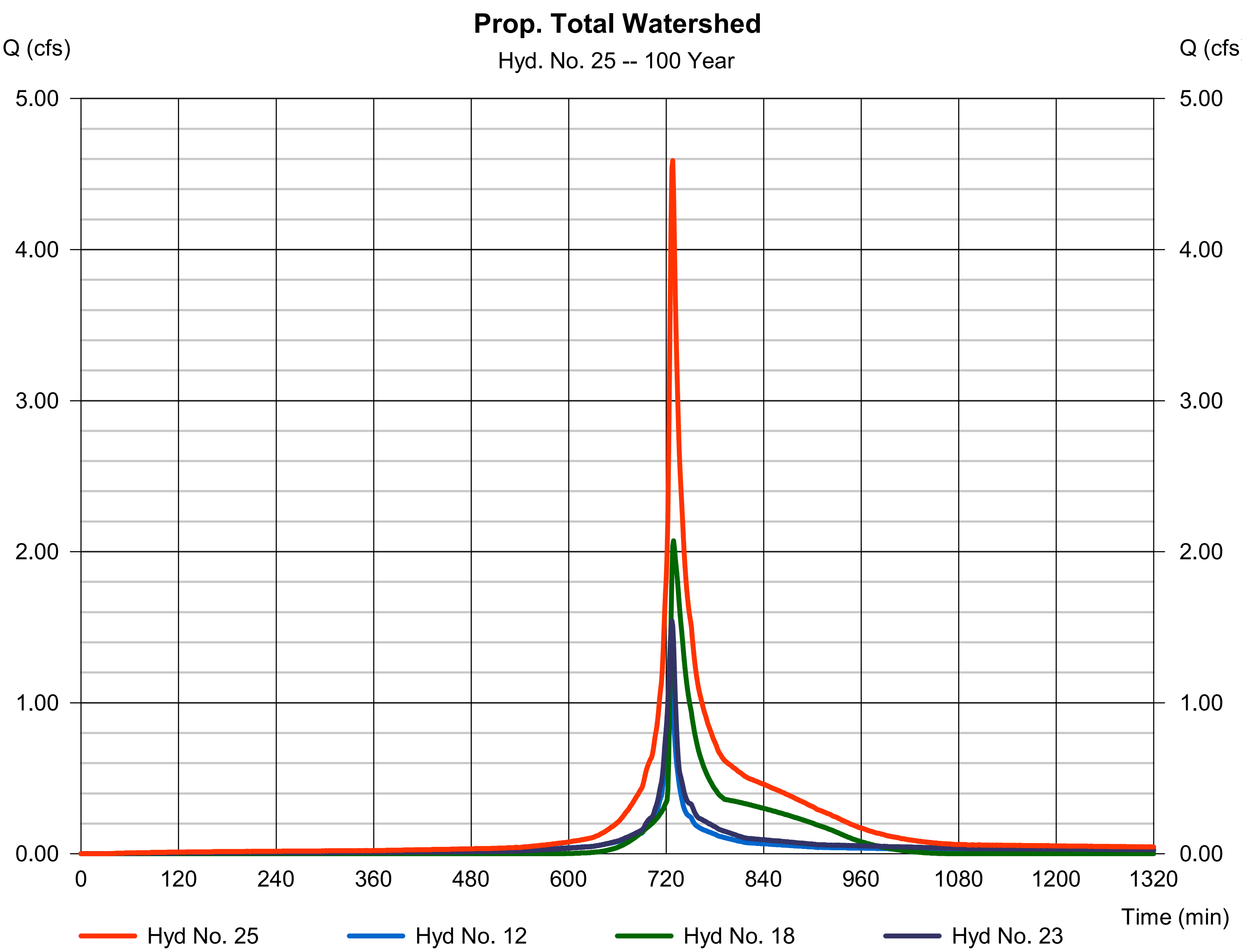
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 25

Prop. Total Watershed

Hydrograph type	= Combine	Peak discharge	= 4.590 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 16,153 cuft
Inflow hyds.	= 12, 18, 23	Contrib. drain. area	= 0.000 ac



APPENDIX E

Existing and Proposed *Projected Storm* Watershed Calculations

NEGLIA
ENGINEERING ASSOCIATES

2 - Year

10 - Year

100 - Year

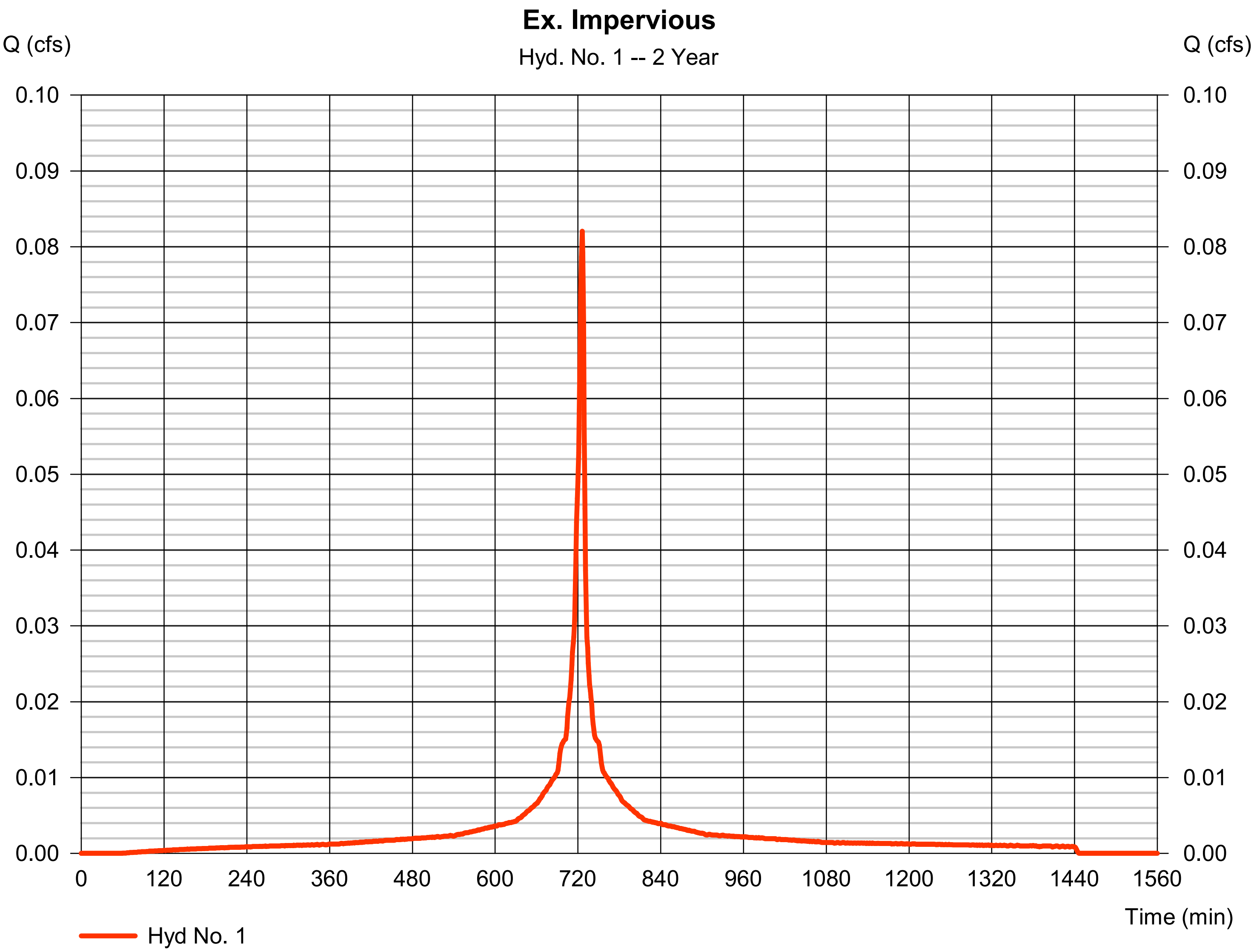
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 1

Ex. Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.082 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 274 cuft
Drainage area	= 0.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.00 min
Total precip.	= 4.01 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 1

Ex. Impervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.025		0.011		
Flow length (ft)	=	4.7		95.3		0.0		
Two-year 24-hr precip. (in)	=	4.01		4.01		4.01		
Land slope (%)	=	22.50		0.75		0.00		
Travel Time (min)	**=**	**0.04**	**+**	**2.97**	**+**	**0.00**	**=**	**3.01**
Shallow Concentrated Flow								
Flow length (ft)	=	110.75		0.00		0.00		
Watercourse slope (%)	=	1.40		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.91		0.00		0.00		
Travel Time (min)	**=**	**0.97**	**+**	**0.00**	**+**	**0.00**	**=**	**0.97**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)		({0})0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 4.00 min

Hydrograph Report

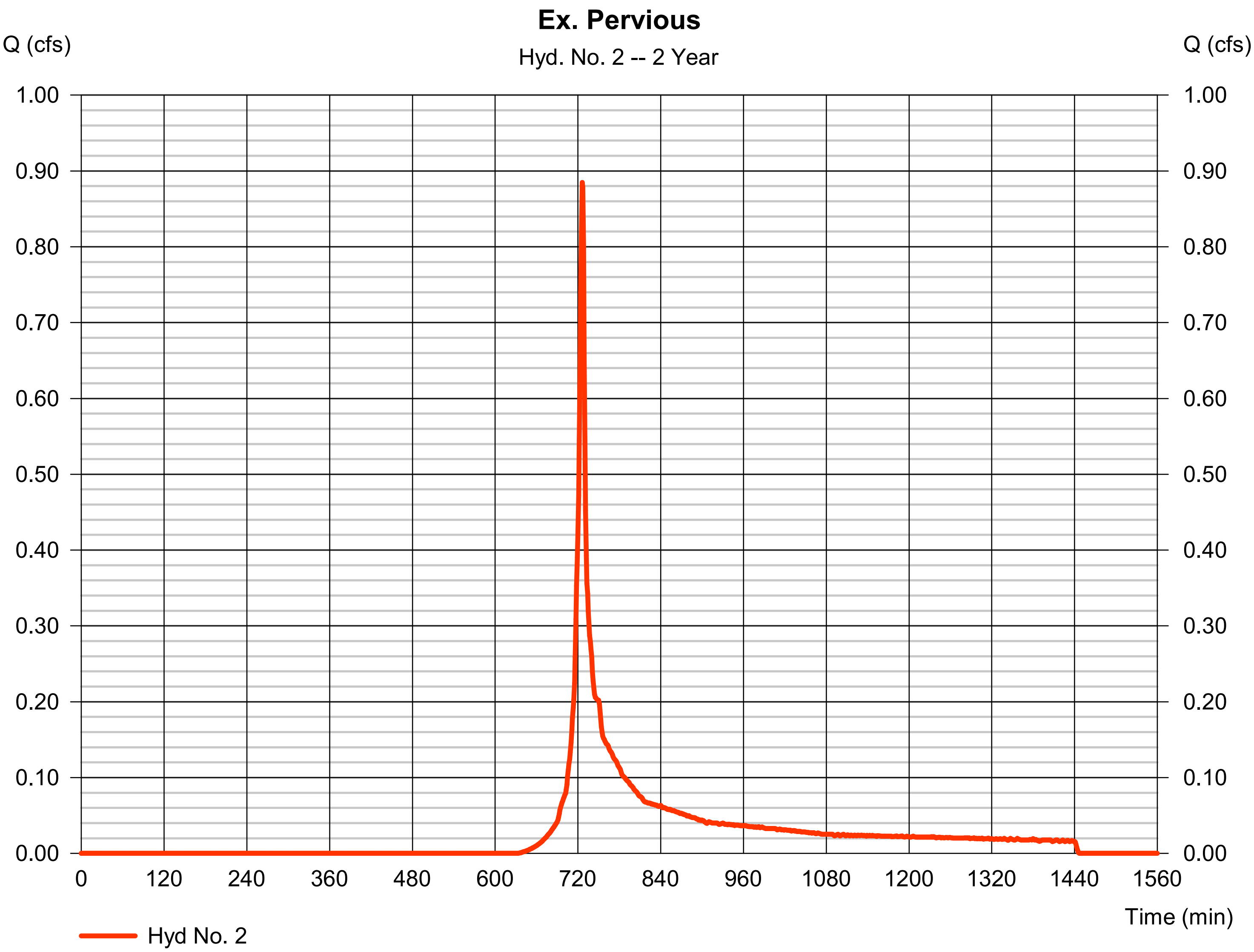
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 2

Ex. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.885 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 2,588 cuft
Drainage area	= 0.560 ac	Curve number	= 69*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.90 min
Total precip.	= 4.01 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 85) + (0.560 x 69)] / 0.560



TR55 Tc Worksheet

Hyd. No. 2

Ex. Pervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.150		0.025		0.011		
Flow length (ft)	=	35.8		64.2		0.0		
Two-year 24-hr precip. (in)	=	4.01		4.01		3.40		
Land slope (%)	=	31.39		2.00		0.00		
Travel Time (min)	**=**	**1.28**	**+**	**1.46**	**+**	**0.00**	**=**	**2.74**
Shallow Concentrated Flow								
Flow length (ft)	=	116.59		19.23		0.00		
Watercourse slope (%)	=	1.30		1.30		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.84			2.32		0.00		
Travel Time (min)	**=**	**1.06**	**+**	**0.14**	**+**	**0.00**	**=**	**1.19**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00							
				0.00				
						0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

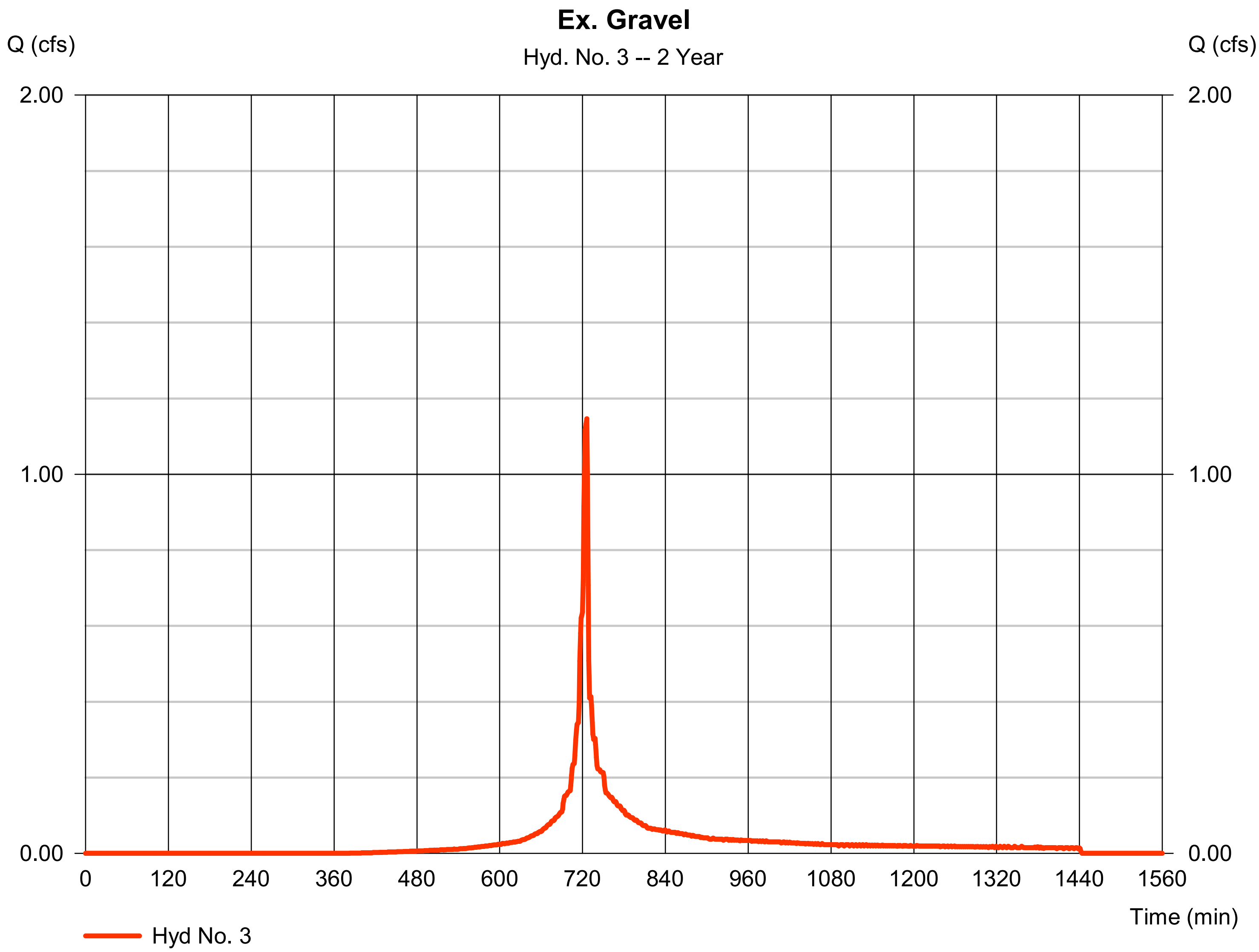
Total Travel Time, Tc .... 3.90 min

Hydrograph Report

Hyd. No. 3

Ex. Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 1.147 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 3,190 cuft
Drainage area	= 0.380 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.60 min
Total precip.	= 4.01 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 3

Ex. Gravel

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	4.01		4.01		0.00		
Land slope (%)	=	0.71		0.00		0.00		
Travel Time (min)	**=**	**1.64**	**+**	**0.00**	**+**	**0.00**	**=**	**1.64**
Shallow Concentrated Flow								
Flow length (ft)	=	102.00		19.23		0.00		
Watercourse slope (%)	=	1.34		4.78		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	1.87		4.44		0.00		
Travel Time (min)	**=**	**0.91**	**+**	**0.07**	**+**	**0.00**	**=**	**0.98**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	({0})	0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 2.60 min

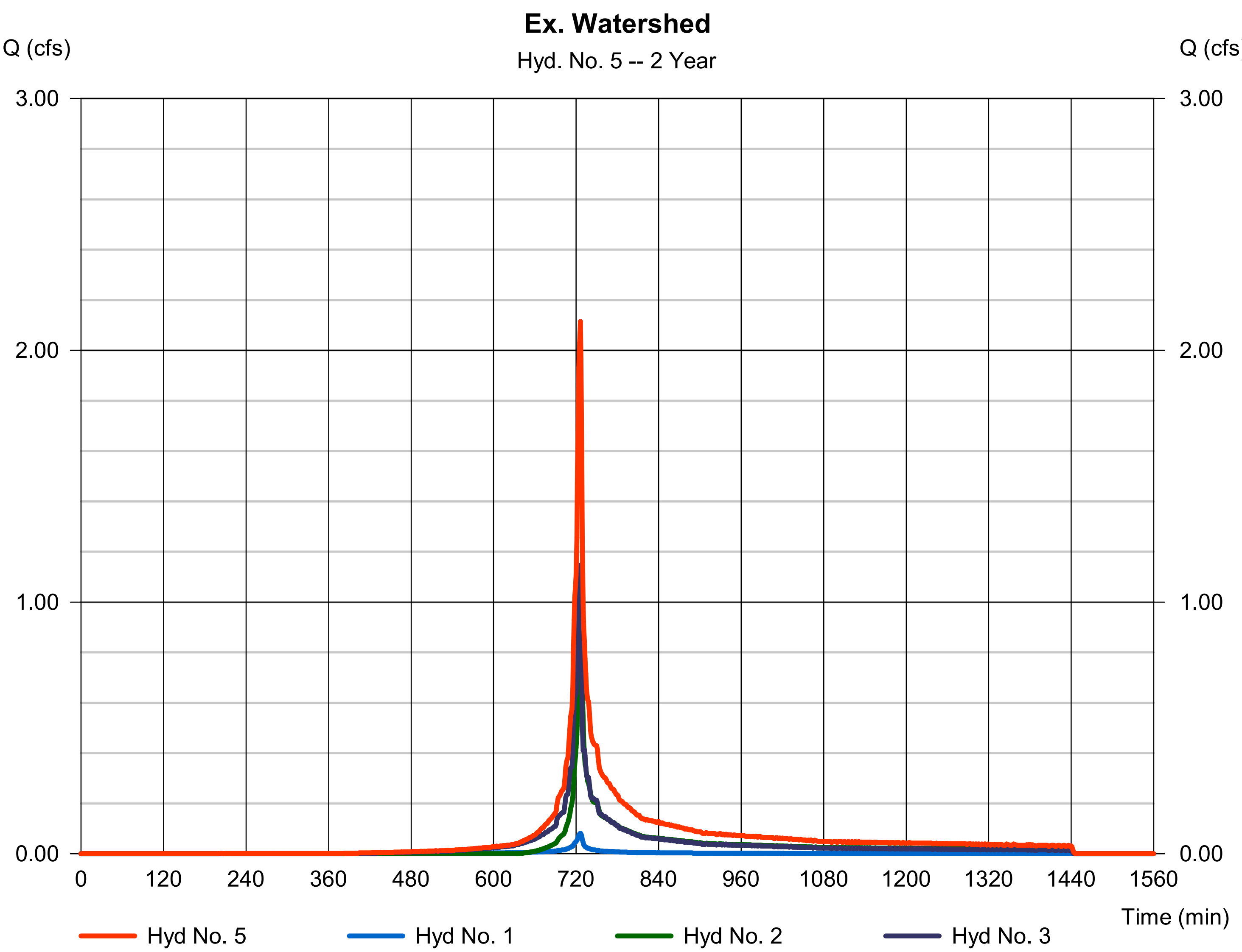
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 5

Ex. Watershed

Hydrograph type	= Combine	Peak discharge	= 2.114 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 6,052 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 0.960 ac



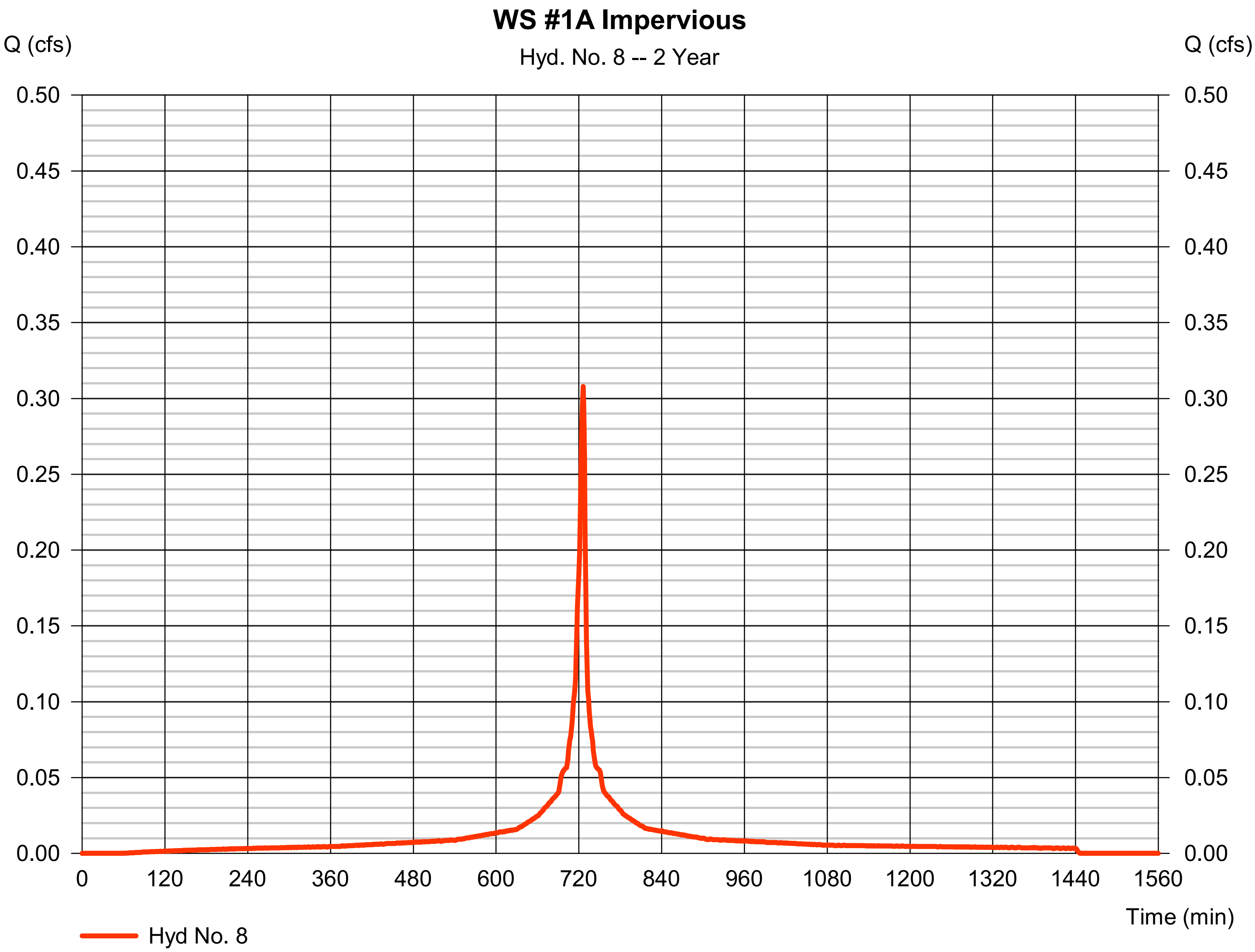
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 8

WS #1A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.308 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 1,028 cuft
Drainage area	= 0.075 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.30 min
Total precip.	= 4.01 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 8

WS #1A Impervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.150		0.011		
Flow length (ft)	=	32.5		17.0		0.0		
Two-year 24-hr precip. (in)	=	4.01		4.01		0.00		
Land slope (%)	=	1.54		2.35		0.00		
Travel Time (min)	**=**	**0.49**	**+**	**1.99**	**+**	**0.00**	**=**	**2.48**
Shallow Concentrated Flow								
Flow length (ft)	=	0.00		0.00		0.00		
Watercourse slope (%)	=	0.00		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=0.00			0.00		0.00		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow								
X sectional flow area (sqft)	=	0.20		0.79		0.00		
Wetted perimeter (ft)	=	1.57		3.14		0.00		
Channel slope (%)	=	1.00		1.00		0.00		
Manning's n-value	=	0.012		0.013		0.015		
Velocity (ft/s)	=3.08							
				4.53				
						0.00		
Flow length (ft)	({0})72.0			127.0		0.0		
Travel Time (min)	**=**	**0.39**	**+**	**0.47**	**+**	**0.00**	**=**	**0.86**

Total Travel Time, Tc .... **3.30 min**

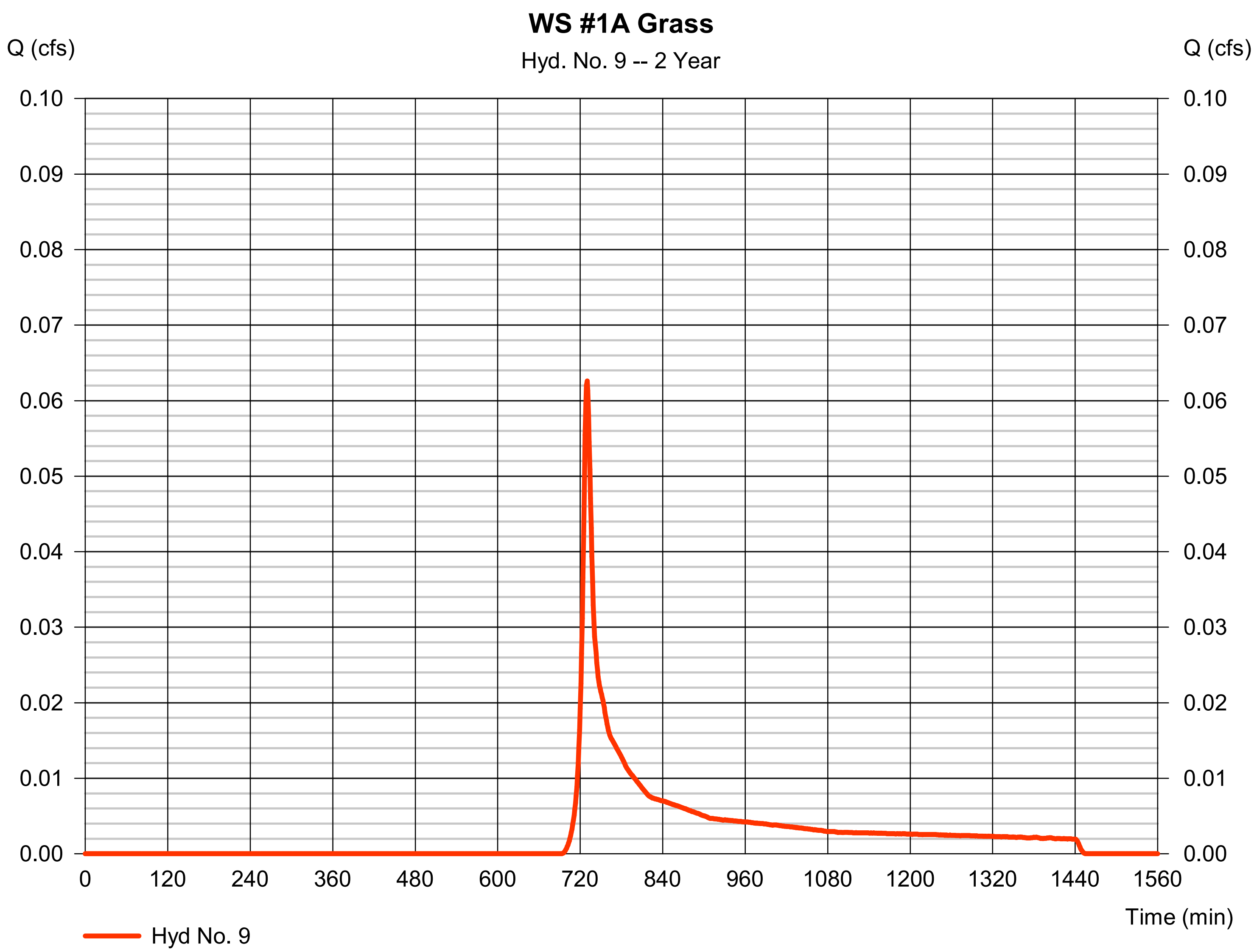
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 9

WS #1A Grass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.063 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	1 min	Hyd. volume	=	255 cuft
Drainage area	=	0.086 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.70 min
Total precip.	=	4.01 in	Distribution	=	Custom
Storm duration	=	M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 9

WS #1A Grass

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.150		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	4.01		4.01		0.00		
Land slope (%)	=	2.69		0.00		0.00		
Travel Time (min)	**=**	**7.77**	**+**	**0.00**	**+**	**0.00**	**=**	**7.77**
Shallow Concentrated Flow								
Flow length (ft)	=	5.43		0.00		0.00		
Watercourse slope (%)	=	2.03		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	2.30		0.00		0.00		
Travel Time (min)	**=**	**0.04**	**+**	**0.00**	**+**	**0.00**	**=**	**0.04**
Channel Flow								
X sectional flow area (sqft)	=	0.20		0.79		0.00		
Wetted perimeter (ft)	=	1.57		3.14		0.00		
Channel slope (%)	=	1.00		1.00		0.00		
Manning's n-value	=	0.012		0.013		0.015		
Velocity (ft/s)	=	3.08		4.53		0.00		
Flow length (ft)		({0})72.0		127.0		0.0		
Travel Time (min)	**=**	**0.39**	**+**	**0.47**	**+**	**0.00**	**=**	**0.86**

Total Travel Time, Tc .... **8.70 min**

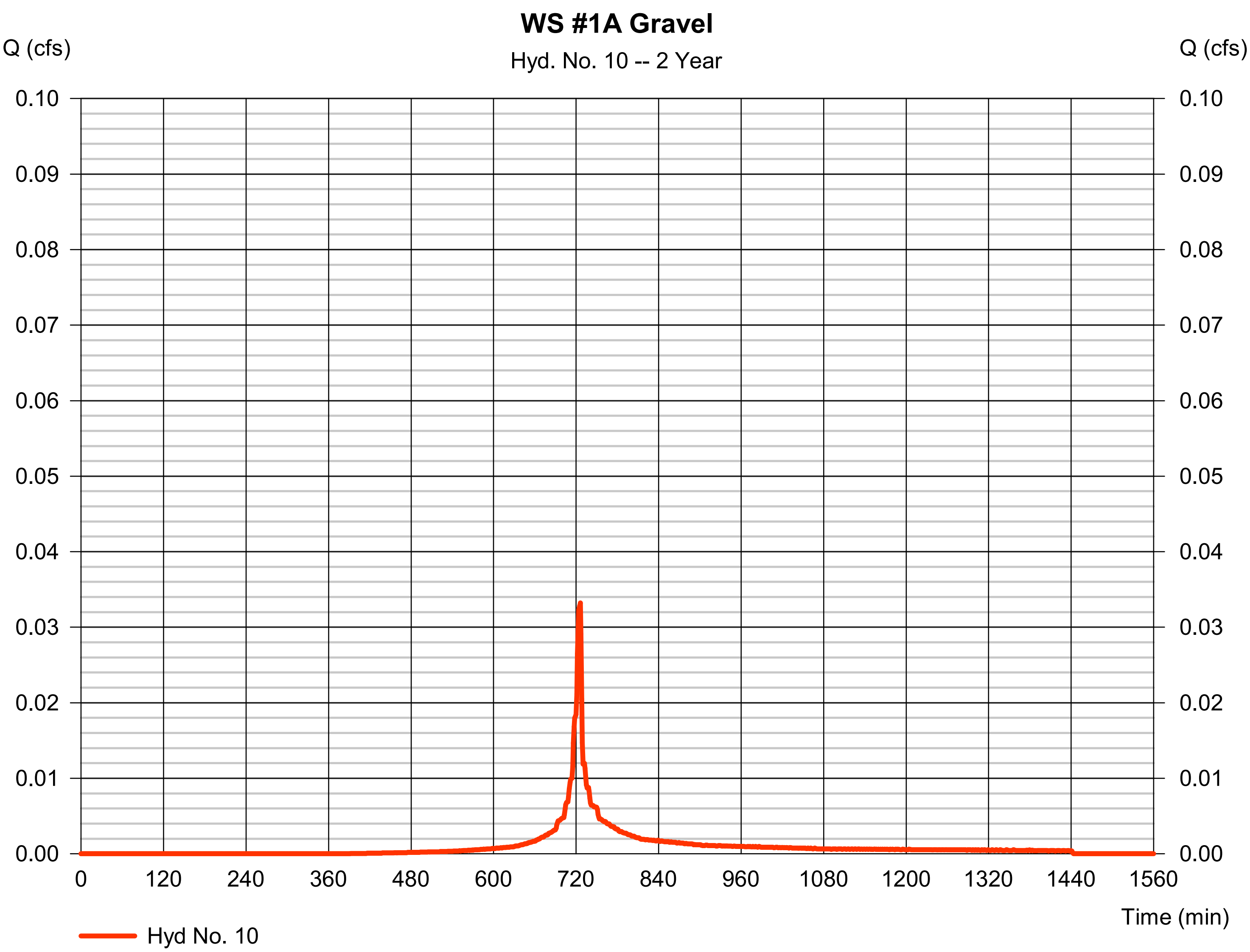
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 10

WS #1A Gravel

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.033 cfs
Storm frequency	=	2 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	92 cuft
Drainage area	=	0.011 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	1.60 min
Total precip.	=	4.01 in	Distribution	=	Custom
Storm duration	=	M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	=	484



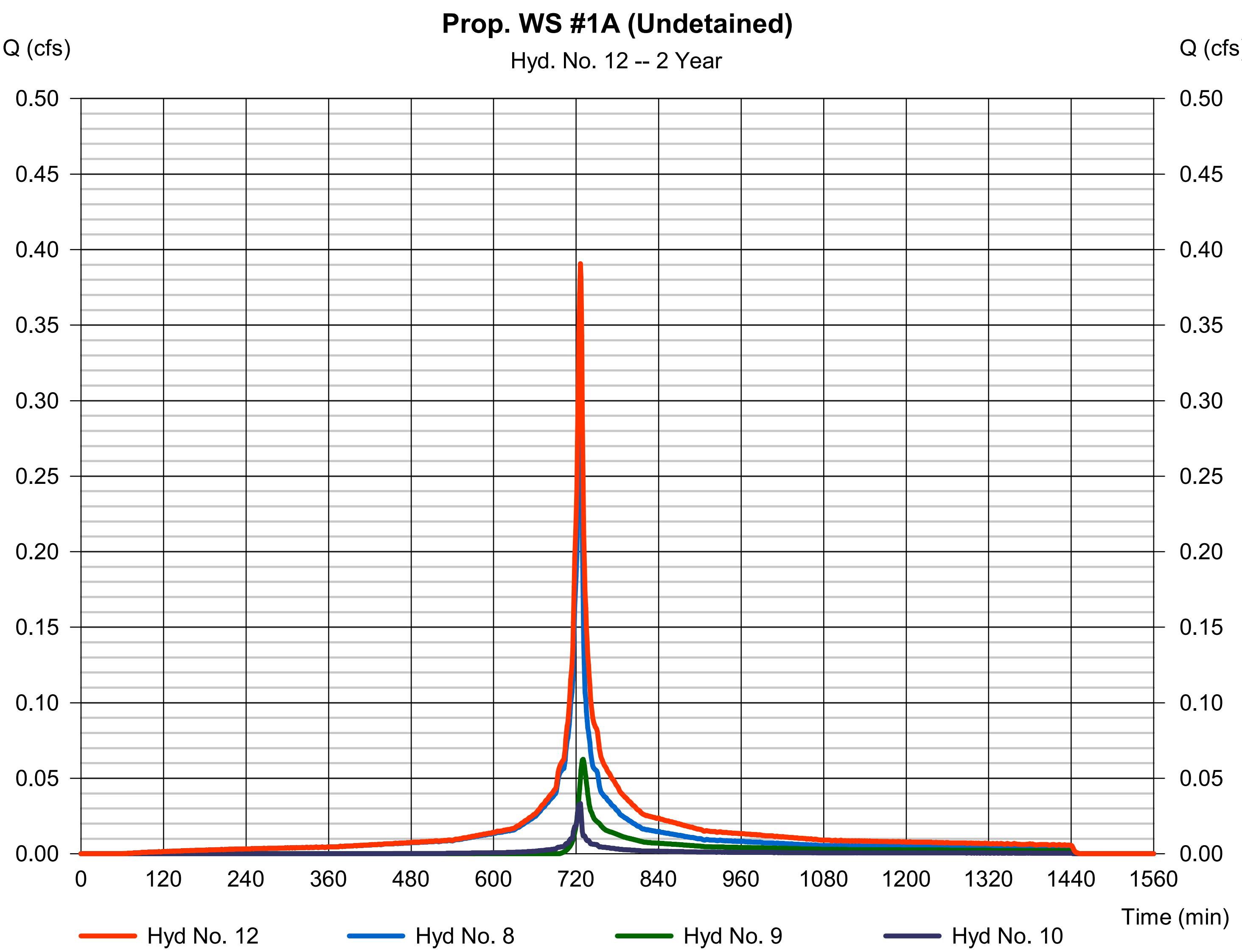
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 12

Prop. WS #1A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.391 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 1,375 cuft
Inflow hyds.	= 8, 9, 10	Contrib. drain. area	= 0.172 ac



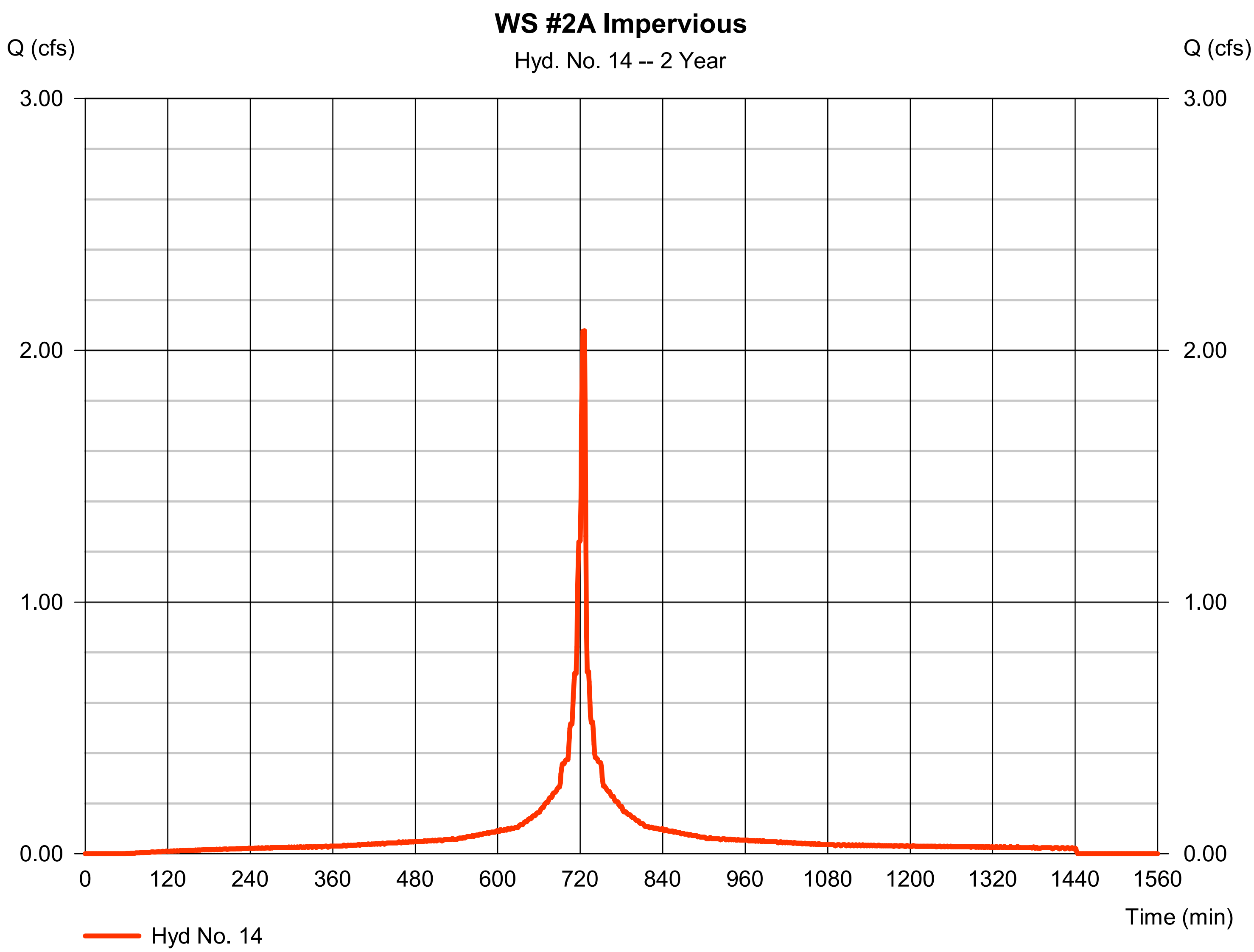
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 14

WS #2A Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.078 cfs
Storm frequency	=	2 yrs	Time to peak	=	726 min
Time interval	=	1 min	Hyd. volume	=	6,796 cuft
Drainage area	=	0.529 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	2.80 min
Total precip.	=	4.01 in	Distribution	=	Custom
Storm duration	=	M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 14

WS #2A Impervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.150		0.011		
Flow length (ft)	=	14.3		12.4		73.3		
Two-year 24-hr precip. (in)	=	4.01		4.01		4.01		
Land slope (%)	=	3.78		7.49		1.68		
Travel Time (min)	**=**	**0.18**	**+**	**0.97**	**+**	**0.91**	**=**	**2.05**
Shallow Concentrated Flow								
Flow length (ft)	=	65.00		0.00		0.00		
Watercourse slope (%)	=	0.45		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=1.36			0.00		0.00		
Travel Time (min)	**=**	**0.79**	**+**	**0.00**	**+**	**0.00**	**=**	**0.79**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00							
				0.00				
						0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 2.80 min

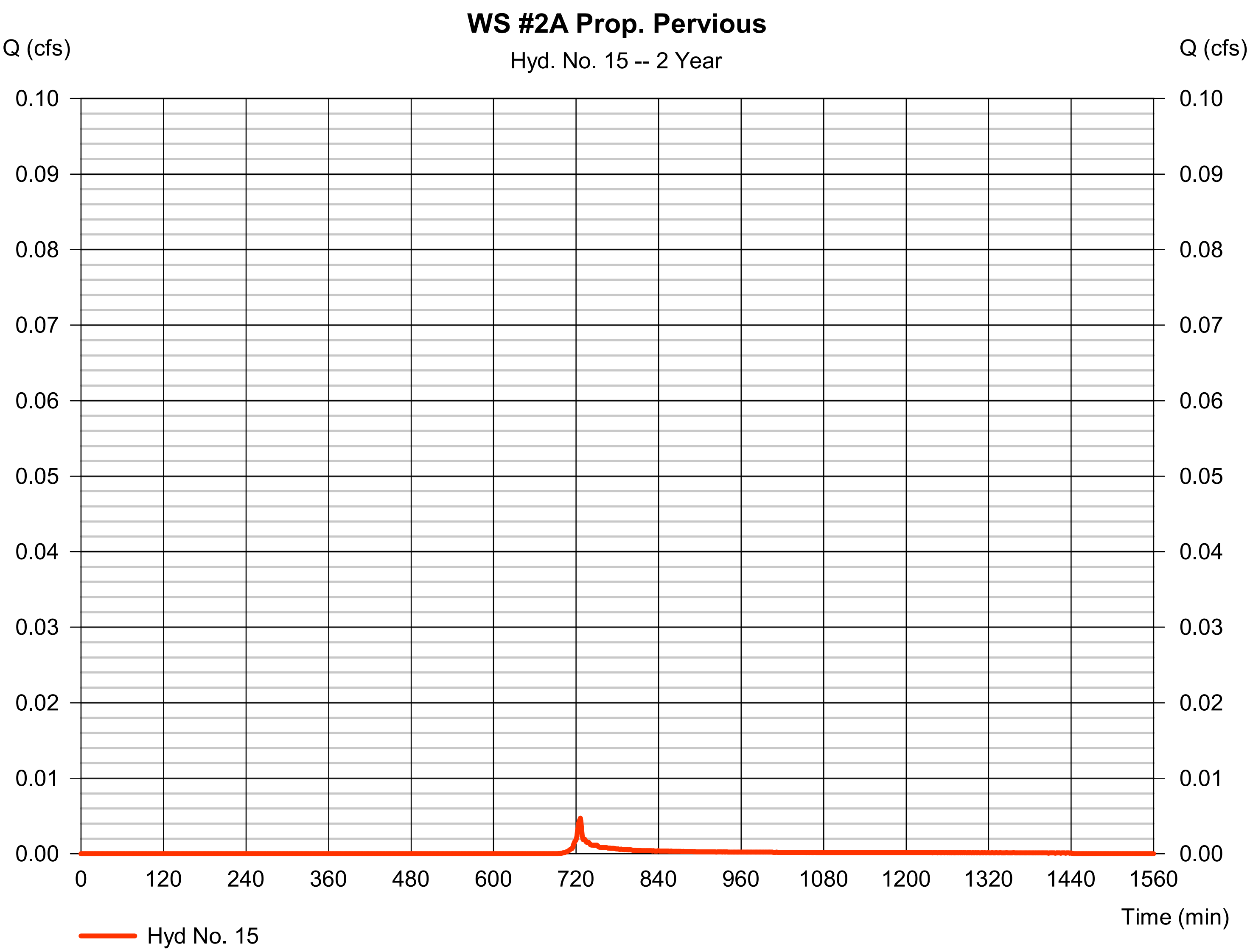
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 15

WS #2A Prop. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.005 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 14 cuft
Drainage area	= 0.005 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.70 min
Total precip.	= 4.01 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 15

WS #2A Prop. Pervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.150		0.011		0.011		
Flow length (ft)	=	12.4		87.6		0.0		
Two-year 24-hr precip. (in)	=	4.01		4.01		0.00		
Land slope (%)	=	7.57		1.48		0.00		
Travel Time (min)	**=**	**0.97**	**+**	**1.10**	**+**	**0.00**	**=**	**2.07**
Shallow Concentrated Flow								
Flow length (ft)	=	50.70		0.00		0.00		
Watercourse slope (%)	=	0.43		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=1.33			0.00		0.00		
Travel Time (min)	**=**	**0.63**	**+**	**0.00**	**+**	**0.00**	**=**	**0.63**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00			0.00		0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 2.70 min

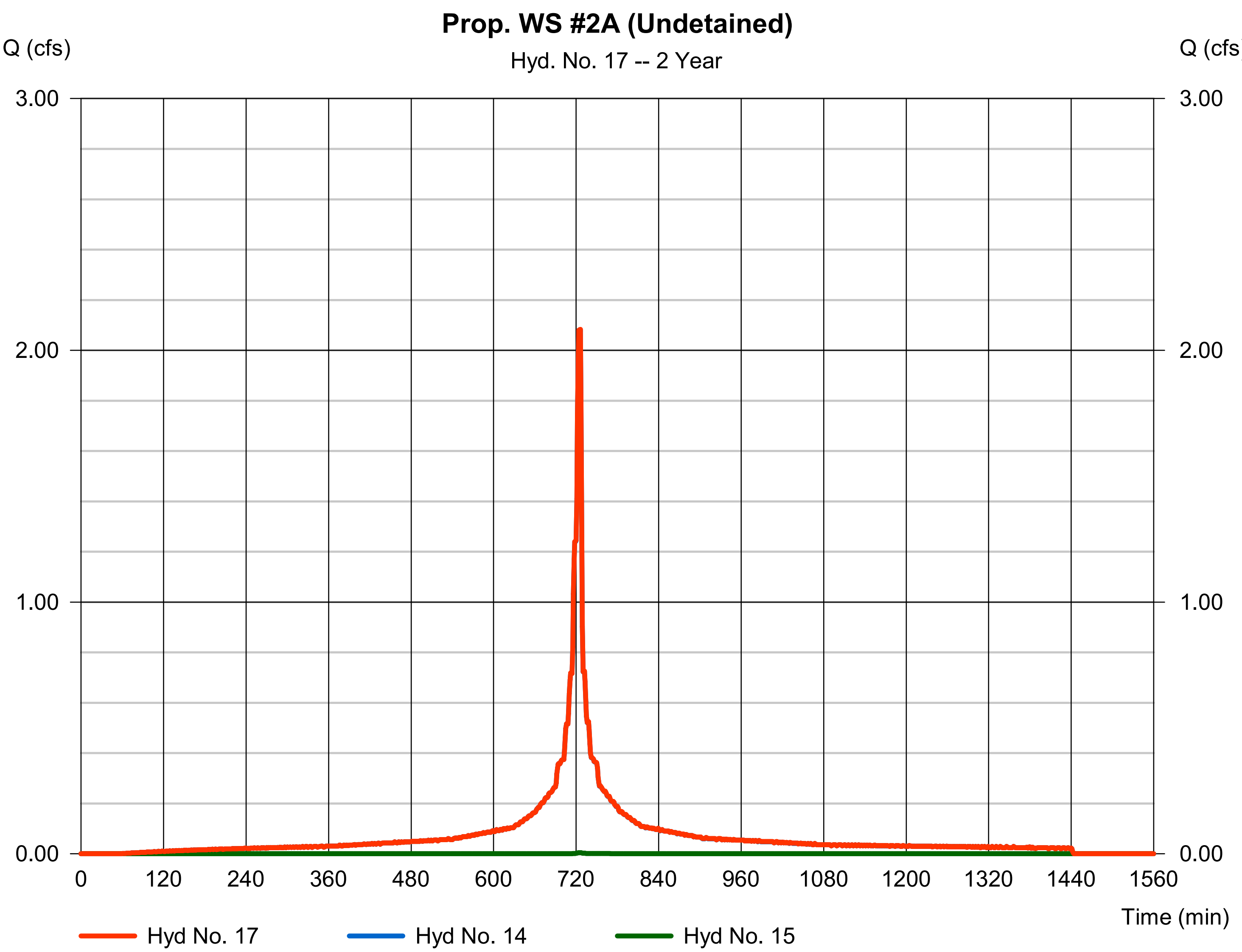
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 17

Prop. WS #2A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 2.083 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 6,810 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 0.534 ac



Hydrograph Report

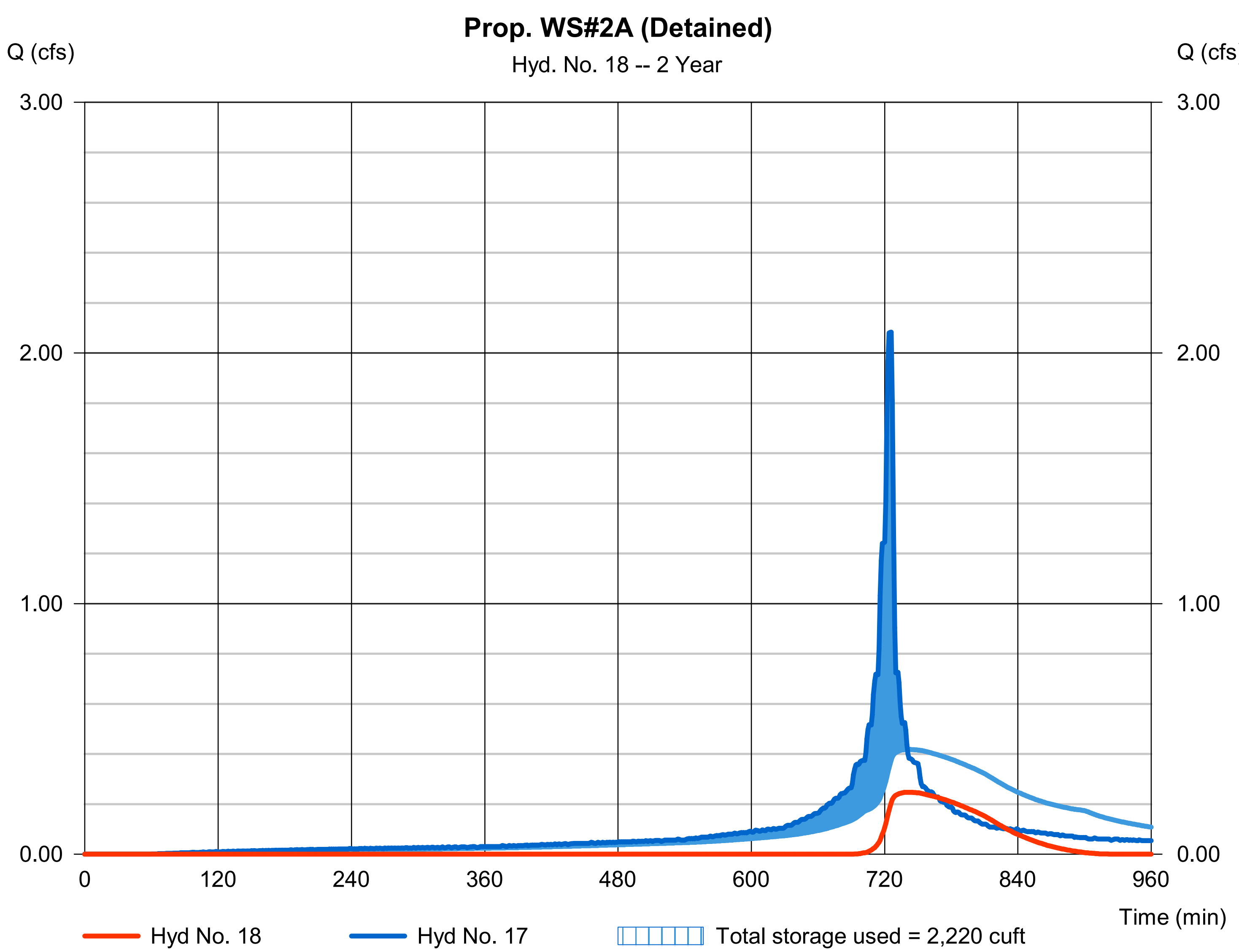
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 18

Prop. WS#2A (Detained)

Hydrograph type	= Reservoir	Peak discharge	= 0.248 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 1 min	Hyd. volume	= 1,521 cuft
Inflow hyd. No.	= 17 - Prop. WS #2A (Undetained)	Max. Elevation	= 123.11 ft
Reservoir name	= Pervious Paving System	Max. Storage	= 2,220 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Pond No. 3 - Pervious Paving System

Pond Data

Trapezoid -Bottom L x W = 88.2 x 88.2 ft, Side slope = 0.00:1, Bottom elev. = 122.40 ft, Depth = 2.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	122.40	7,770	0	0
0.25	122.65	7,770	777	777
0.50	122.90	7,770	777	1,554
0.75	123.15	7,770	777	2,331
1.00	123.40	7,770	777	3,108
1.25	123.65	7,770	777	3,885
1.50	123.90	7,770	777	4,662
1.75	124.15	7,770	777	5,439
2.00	124.40	7,770	777	6,216
2.25	124.65	7,770	777	6,993
2.50	124.90	7,770	777	7,770

Culvert / Orifice Structures

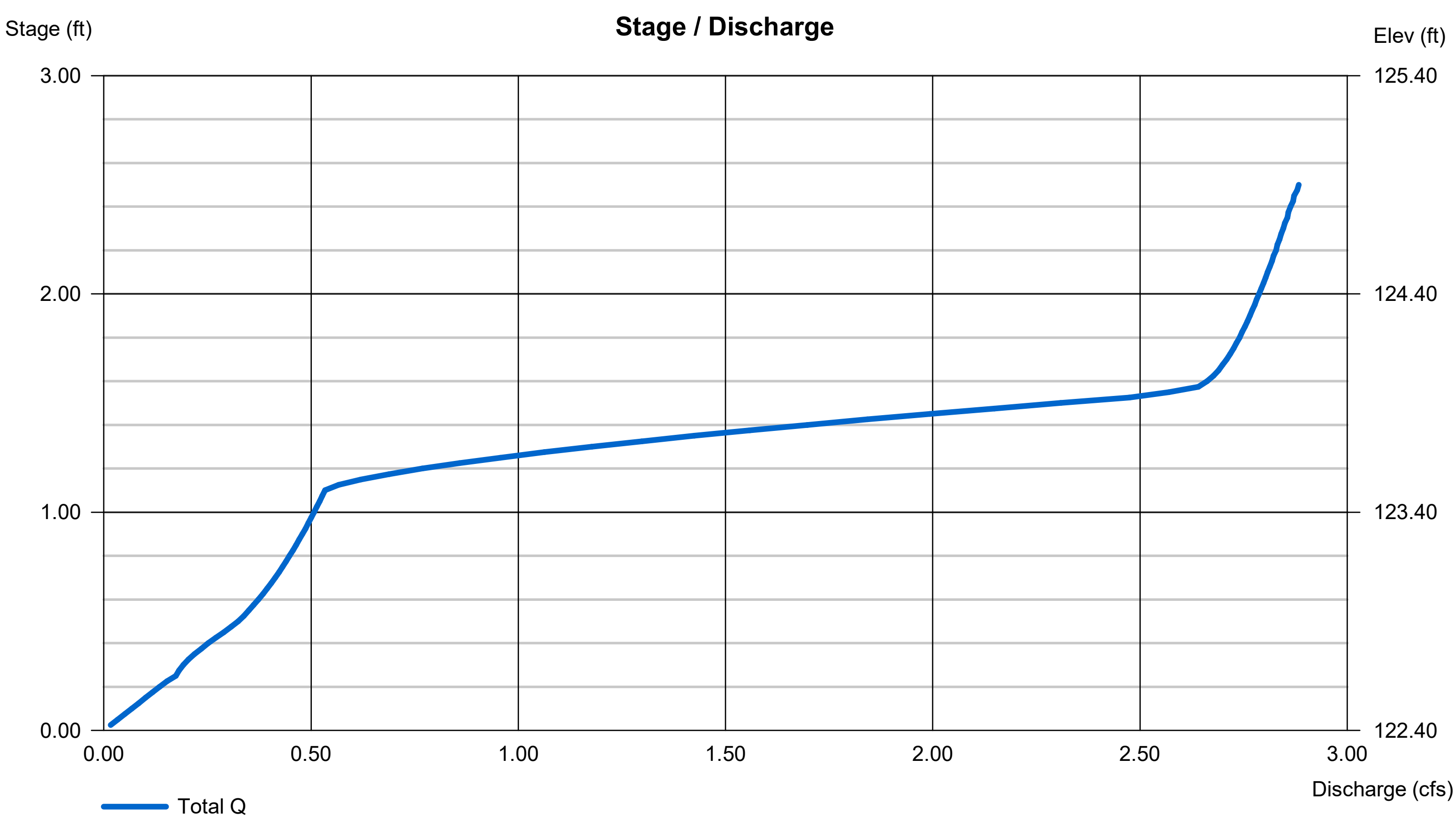
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	4.00	Inactive	0.00
Span (in)	= 6.00	4.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 116.47	122.60	0.00	0.00
Length (ft)	= 11.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.00	0.00	0.00	0.00
Crest El. (ft)	= 123.50	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) = 0.920 (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).



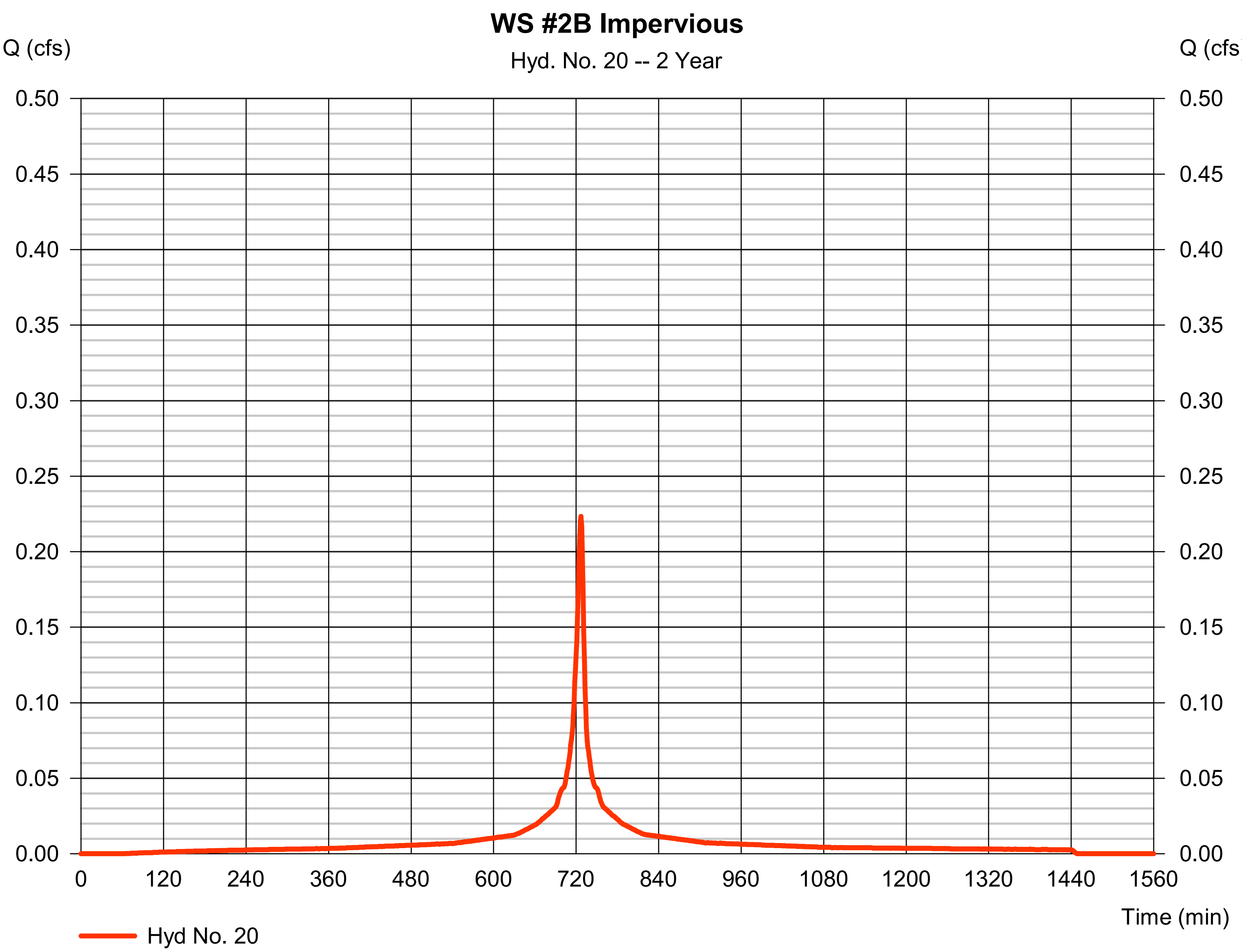
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 20

WS #2B Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.223 cfs
Storm frequency	=	2 yrs	Time to peak	=	727 min
Time interval	=	1 min	Hyd. volume	=	806 cuft
Drainage area	=	0.057 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.50 min
Total precip.	=	4.01 in	Distribution	=	Custom
Storm duration	=	M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 20

WS #2B Impervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.150		0.011		
Flow length (ft)	=	3.8		65.4		0.0		
Two-year 24-hr precip. (in)	=	4.01		4.01		0.00		
Land slope (%)	=	3.97		4.85		0.00		
Travel Time (min)	**=**	**0.06**	**+**	**4.37**	**+**	**0.00**	**=**	**4.43**
Shallow Concentrated Flow								
Flow length (ft)	=	0.00		0.00		0.00		
Watercourse slope (%)	=	0.00		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	0.00		0.00		0.00		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow								
X sectional flow area (sqft)	=	0.35		0.00		0.00		
Wetted perimeter (ft)	=	2.09		0.00		0.00		
Channel slope (%)	=	0.36		0.00		0.00		
Manning's n-value	=	0.012		0.015		0.015		
Velocity (ft/s)	=	2.24		0.00		0.00		
Flow length (ft)	({0})	147.9		0.0		0.0		
Travel Time (min)	**=**	**1.10**	**+**	**0.00**	**+**	**0.00**	**=**	**1.10**

Total Travel Time, Tc .... 5.50 min

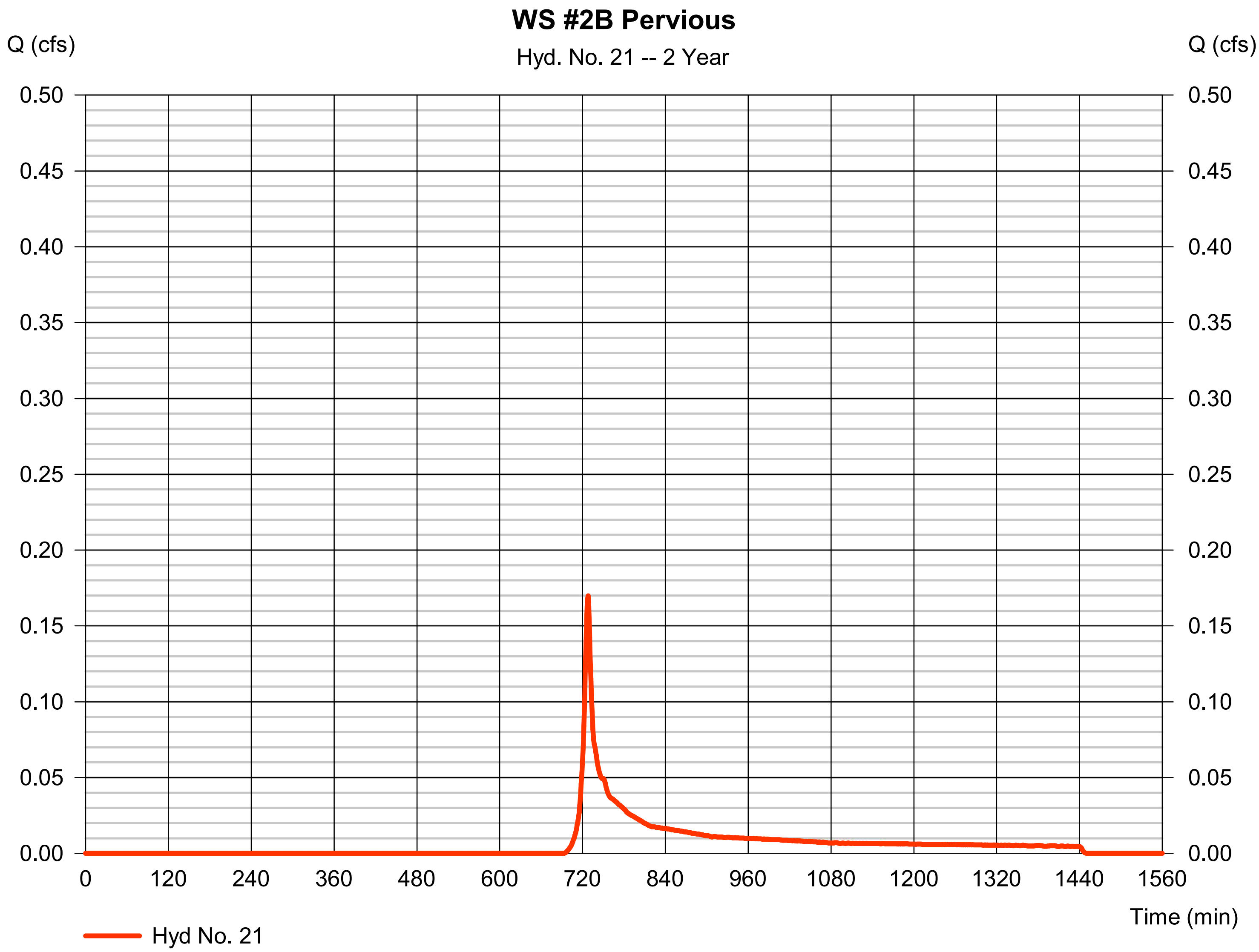
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 21

WS #2B Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.170 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 603 cuft
Drainage area	= 0.197 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.70 min
Total precip.	= 4.01 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 21

WS #2B Pervious

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.150		0.011		0.011		
Flow length (ft)	=	75.5		0.0		0.0		
Two-year 24-hr precip. (in)	=	4.01		4.01		0.00		
Land slope (%)	=	5.55		0.00		0.00		
Travel Time (min)	**=**	**4.65**	**+**	**0.00**	**+**	**0.00**	**=**	**4.65**
Shallow Concentrated Flow								
Flow length (ft)	=	0.00		0.00		0.00		
Watercourse slope (%)	=	0.00		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=0.00			0.00		0.00		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow								
X sectional flow area (sqft)	=	0.35		0.00		0.00		
Wetted perimeter (ft)	=	2.09		0.00		0.00		
Channel slope (%)	=	0.36		0.00		0.00		
Manning's n-value	=	0.012		0.015		0.015		
Velocity (ft/s)	=2.24							
				0.00				
						0.00		
Flow length (ft)	({0})147.9			0.0		0.0		
Travel Time (min)	**=**	**1.10**	**+**	**0.00**	**+**	**0.00**	**=**	**1.10**

Total Travel Time, Tc .... **5.70 min**

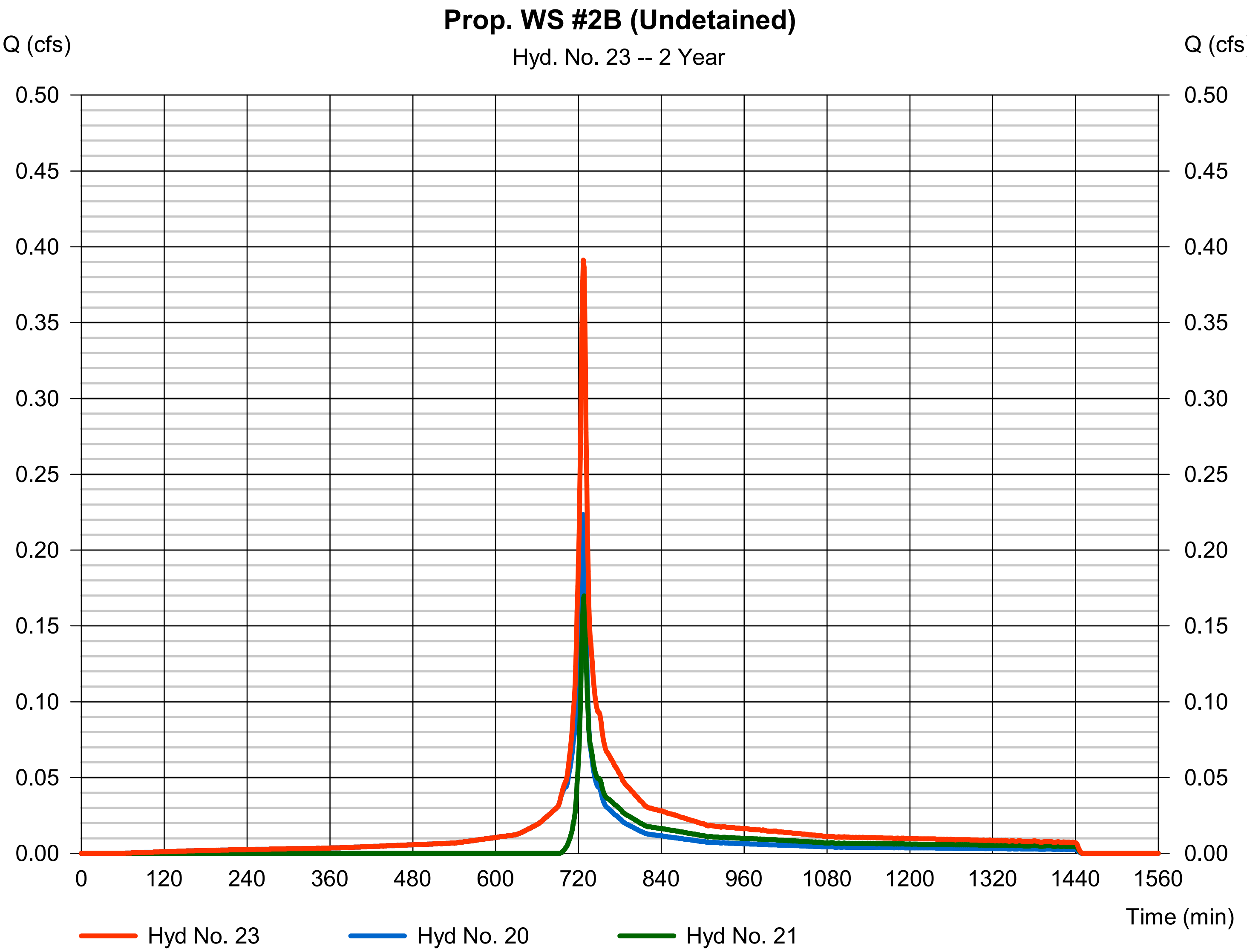
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 23

Prop. WS #2B (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.391 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,408 cuft
Inflow hyds.	= 20, 21	Contrib. drain. area	= 0.254 ac



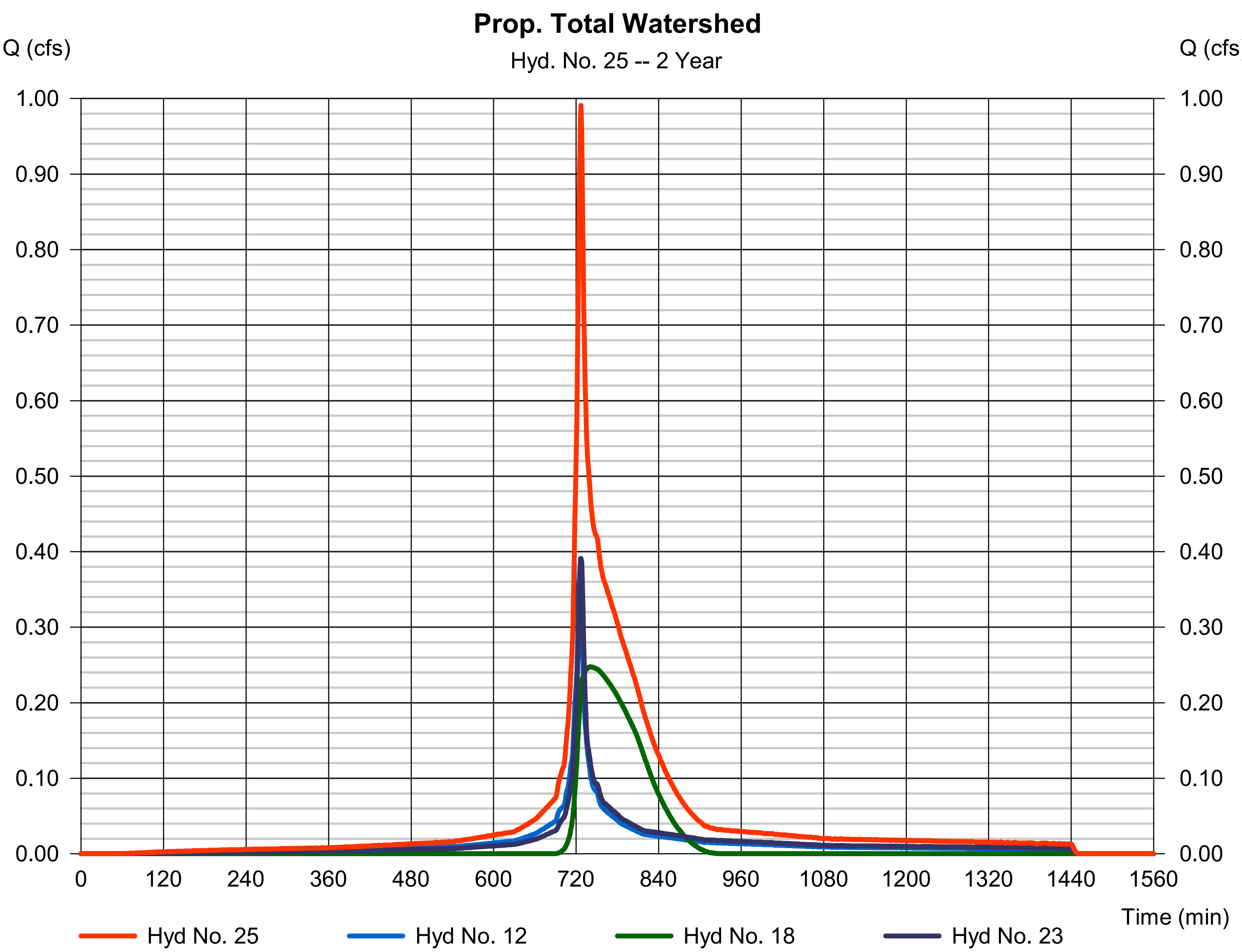
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 25

Prop. Total Watershed

Hydrograph type	= Combine	Peak discharge	= 0.991 cfs
Storm frequency	= 2 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 4,304 cuft
Inflow hyds.	= 12, 18, 23	Contrib. drain. area	= 0.000 ac



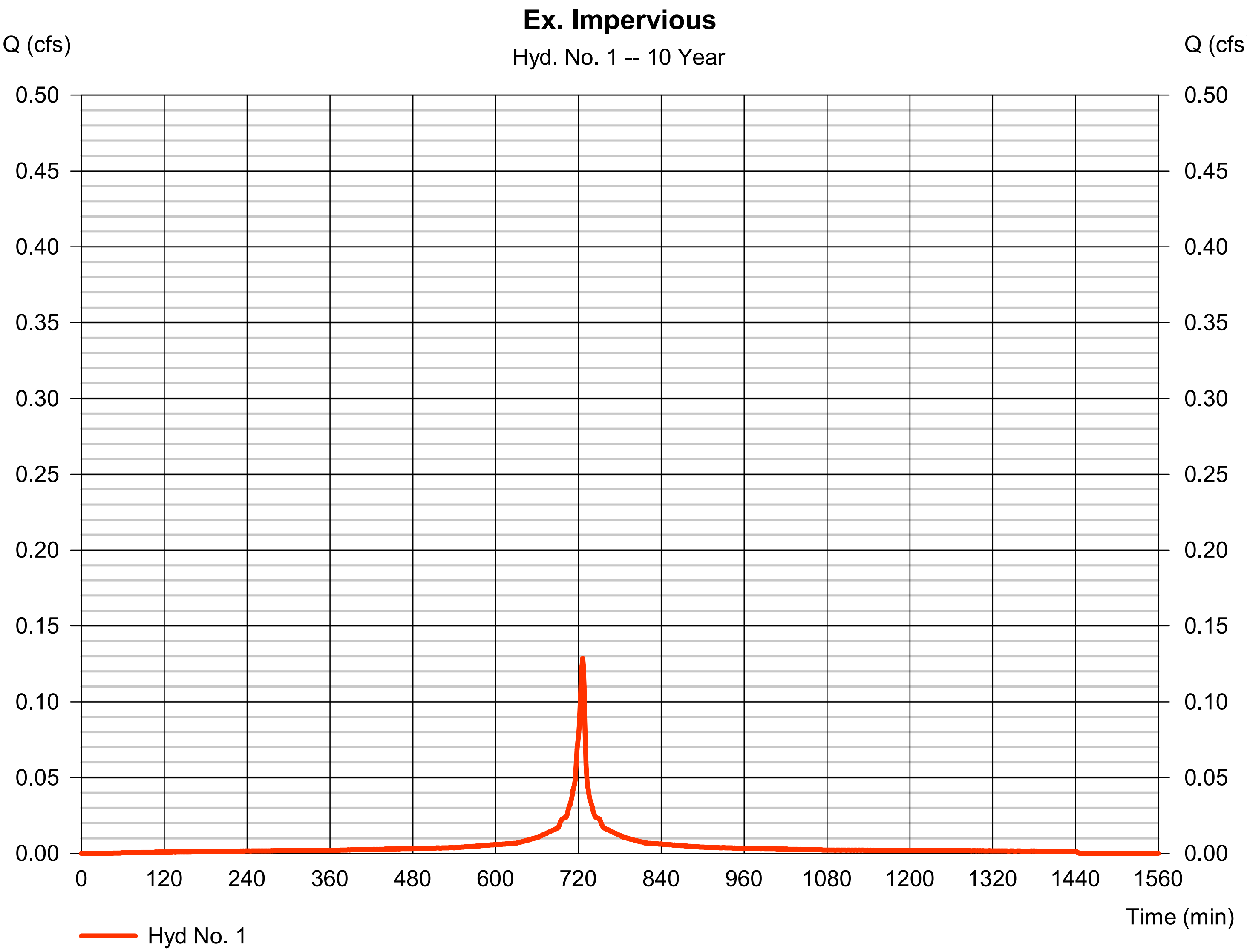
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 1

Ex. Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.129 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 437 cuft
Drainage area	= 0.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.00 min
Total precip.	= 6.26 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



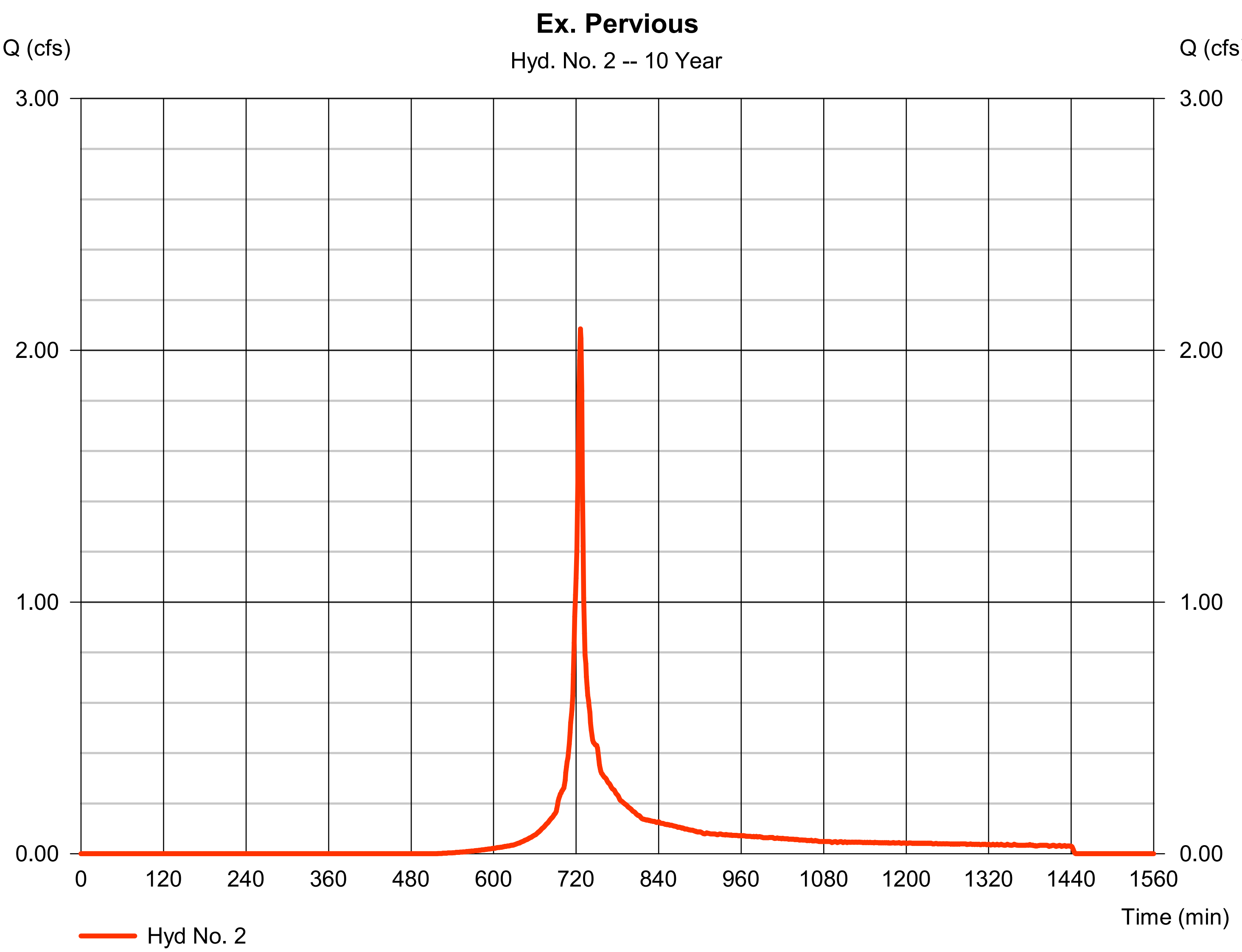
Hydrograph Report

Hyd. No. 2

Ex. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 2.085 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 5,930 cuft
Drainage area	= 0.560 ac	Curve number	= 69*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.90 min
Total precip.	= 6.26 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 85) + (0.560 x 69)] / 0.560



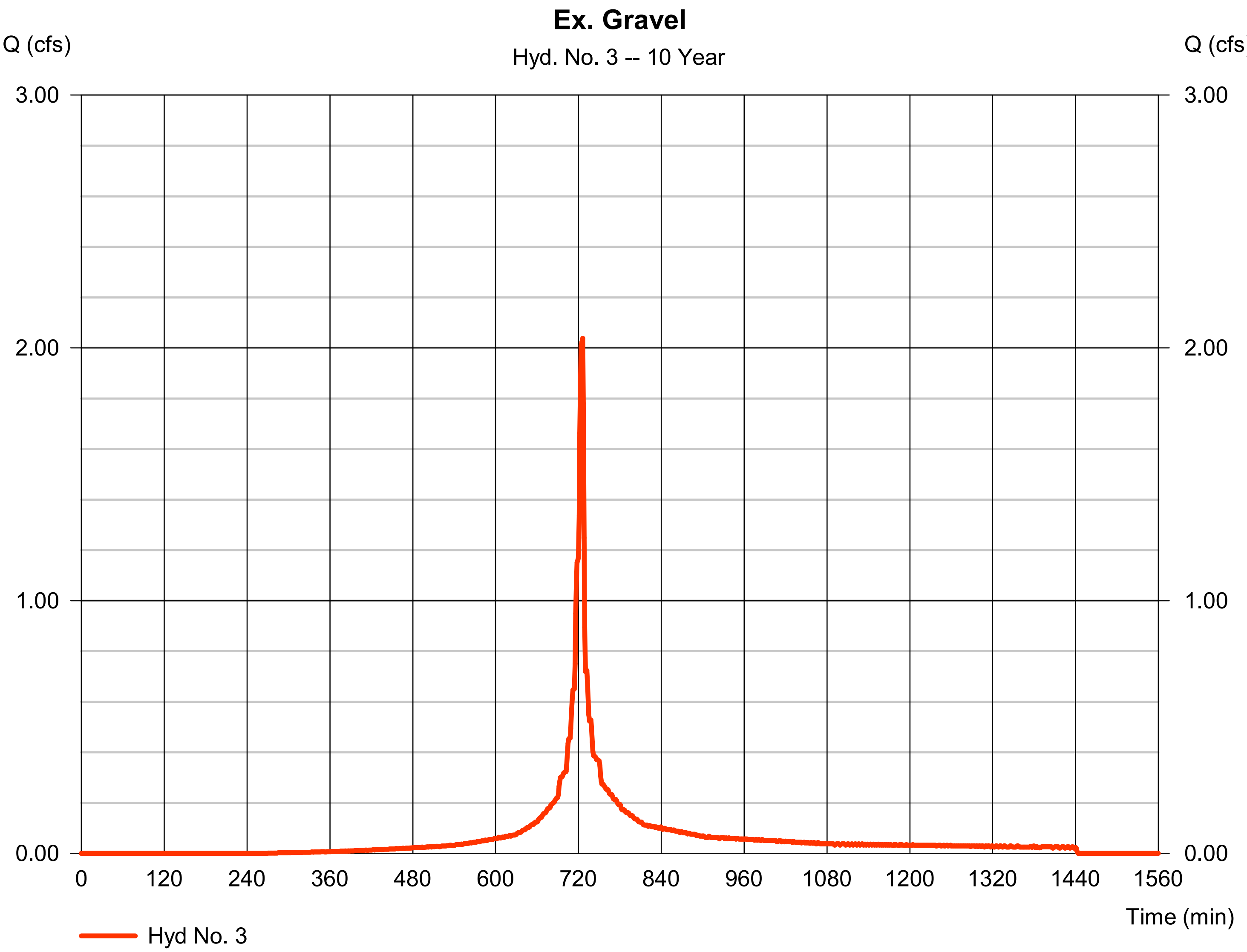
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 3

Ex. Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 2.038 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 5,882 cuft
Drainage area	= 0.380 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.60 min
Total precip.	= 6.26 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



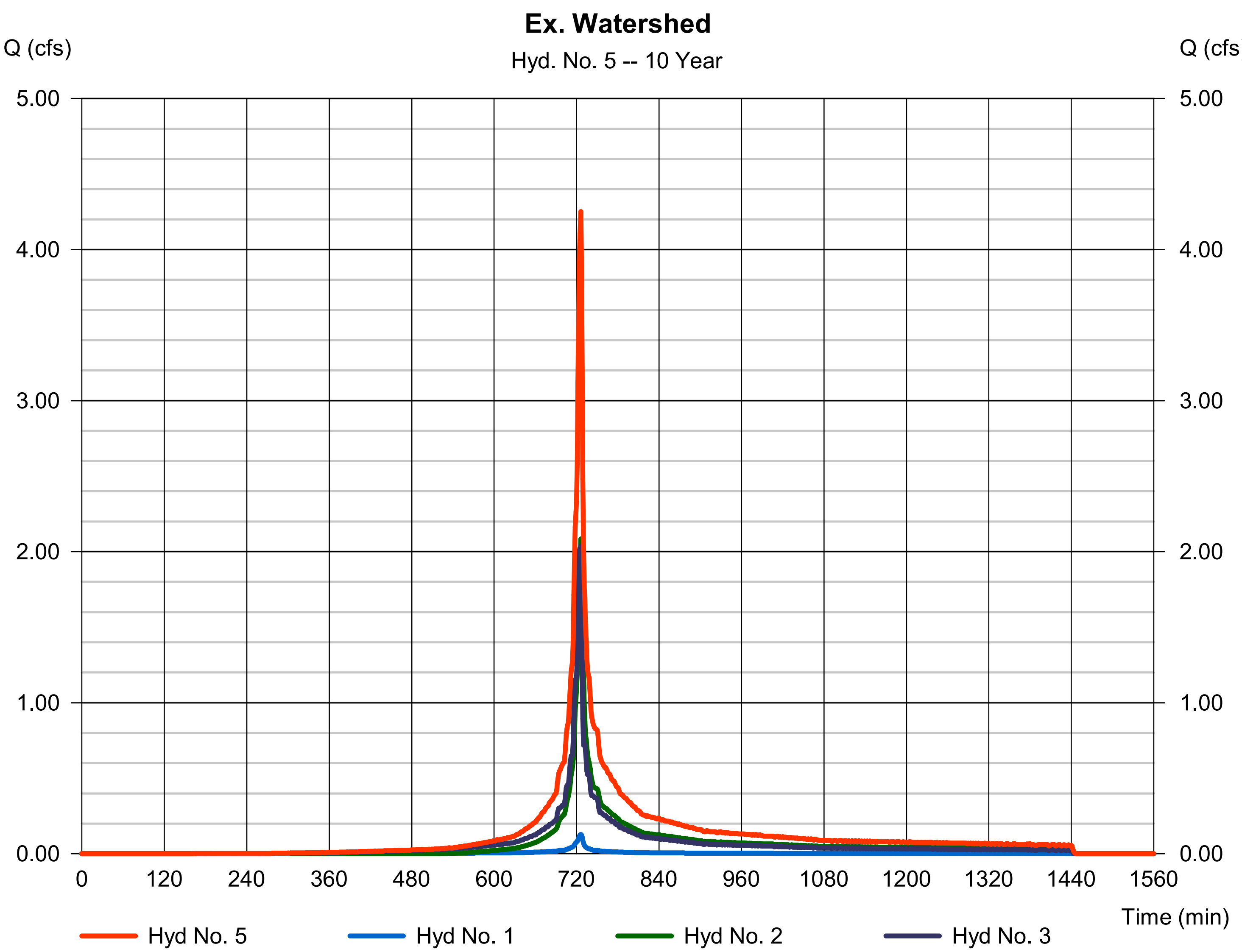
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 5

Ex. Watershed

Hydrograph type	= Combine	Peak discharge	= 4.252 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 12,249 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 0.960 ac



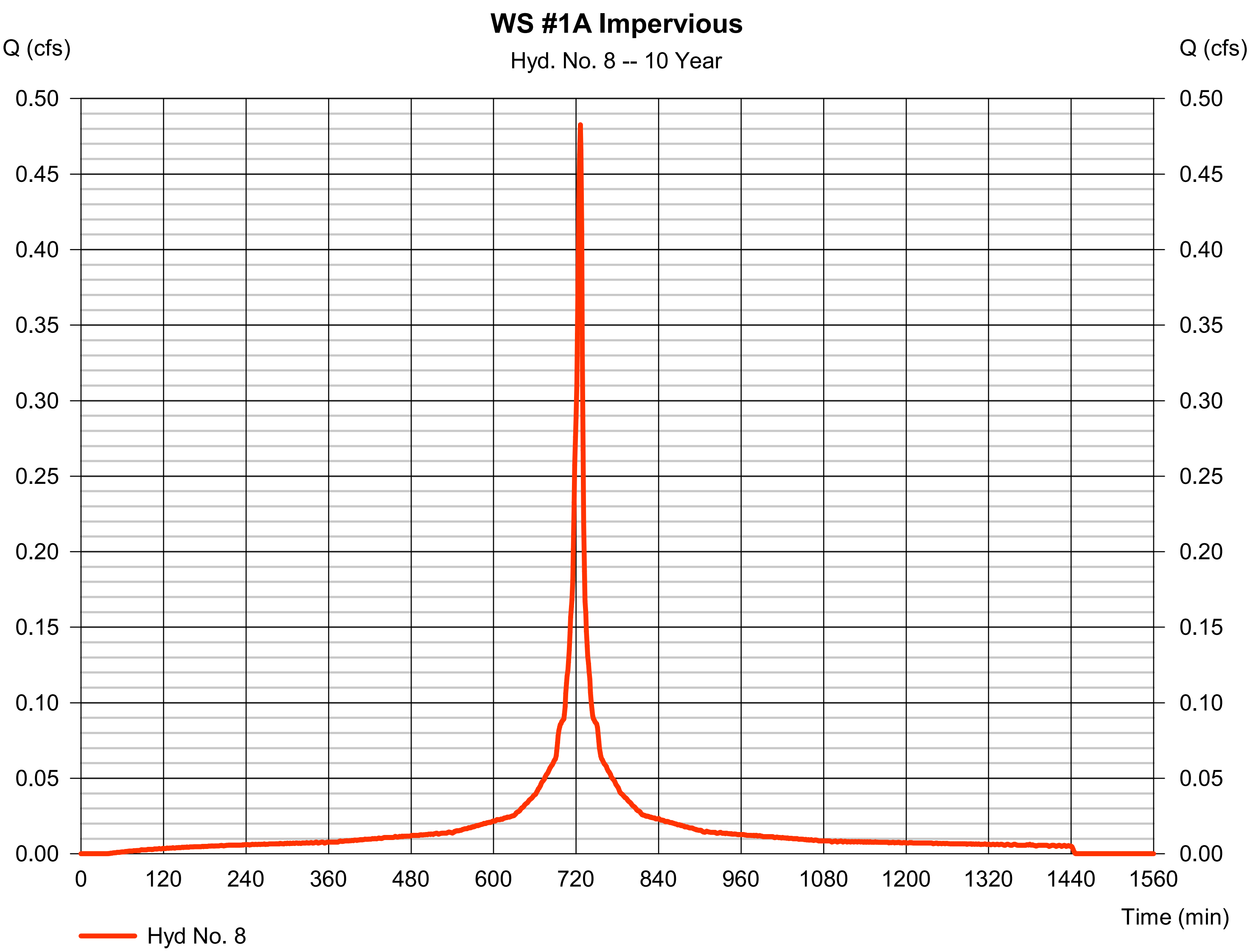
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 8

WS #1A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.483 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 1,639 cuft
Drainage area	= 0.075 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.30 min
Total precip.	= 6.26 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



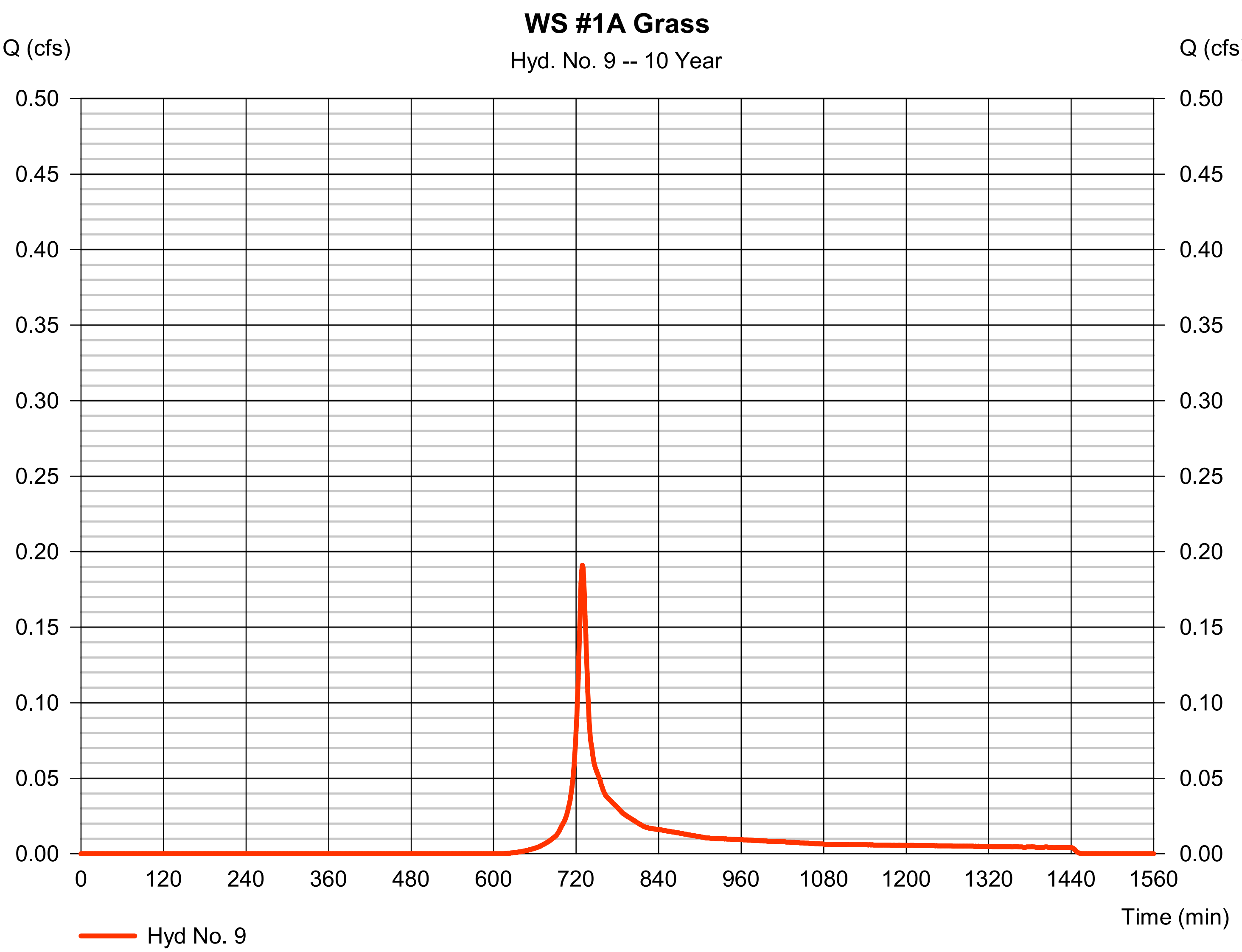
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 9

WS #1A Grass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.191 cfs
Storm frequency	= 10 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 681 cuft
Drainage area	= 0.086 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 8.70 min
Total precip.	= 6.26 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

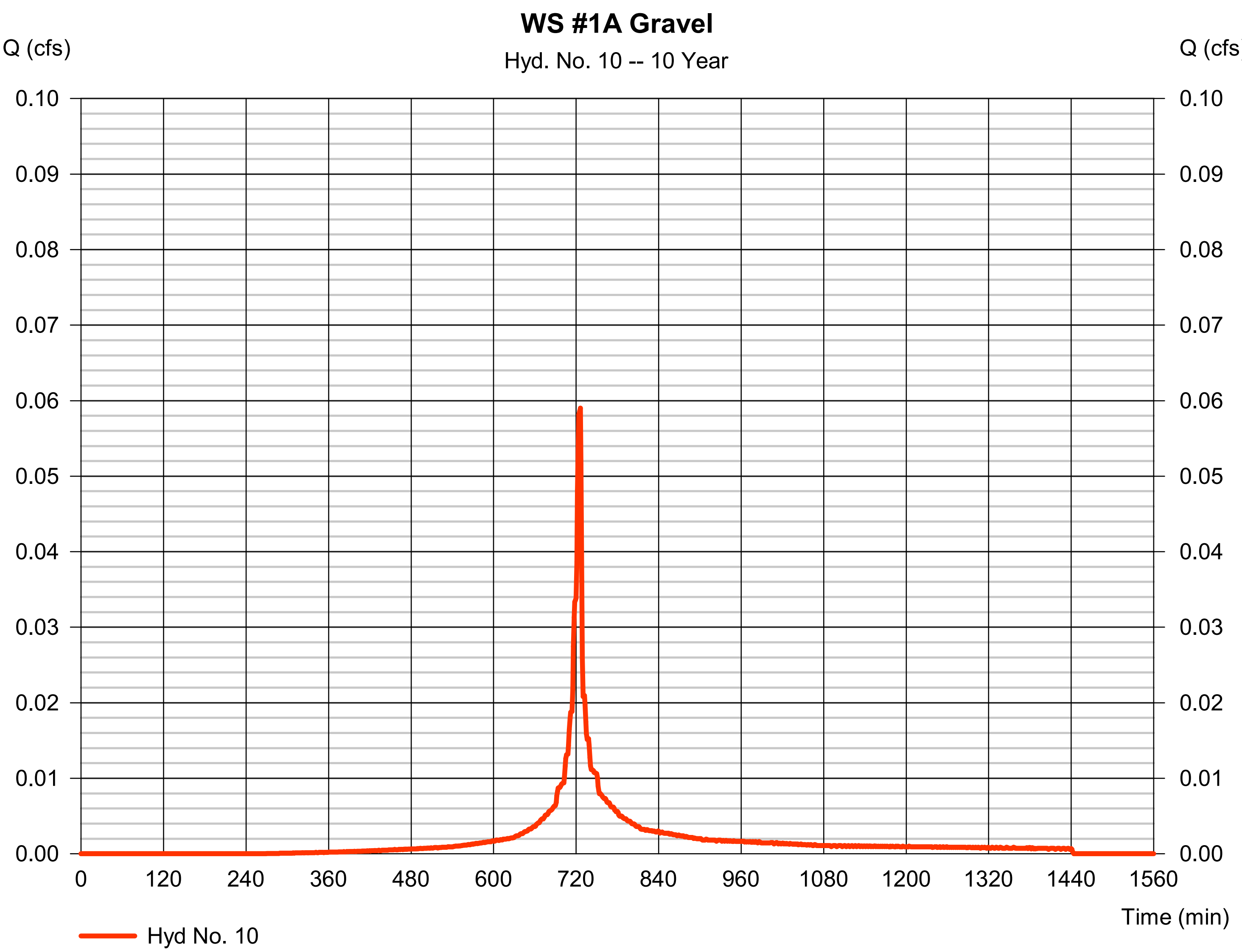


Hydrograph Report

Hyd. No. 10

WS #1A Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.059 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 170 cuft
Drainage area	= 0.011 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 6.26 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

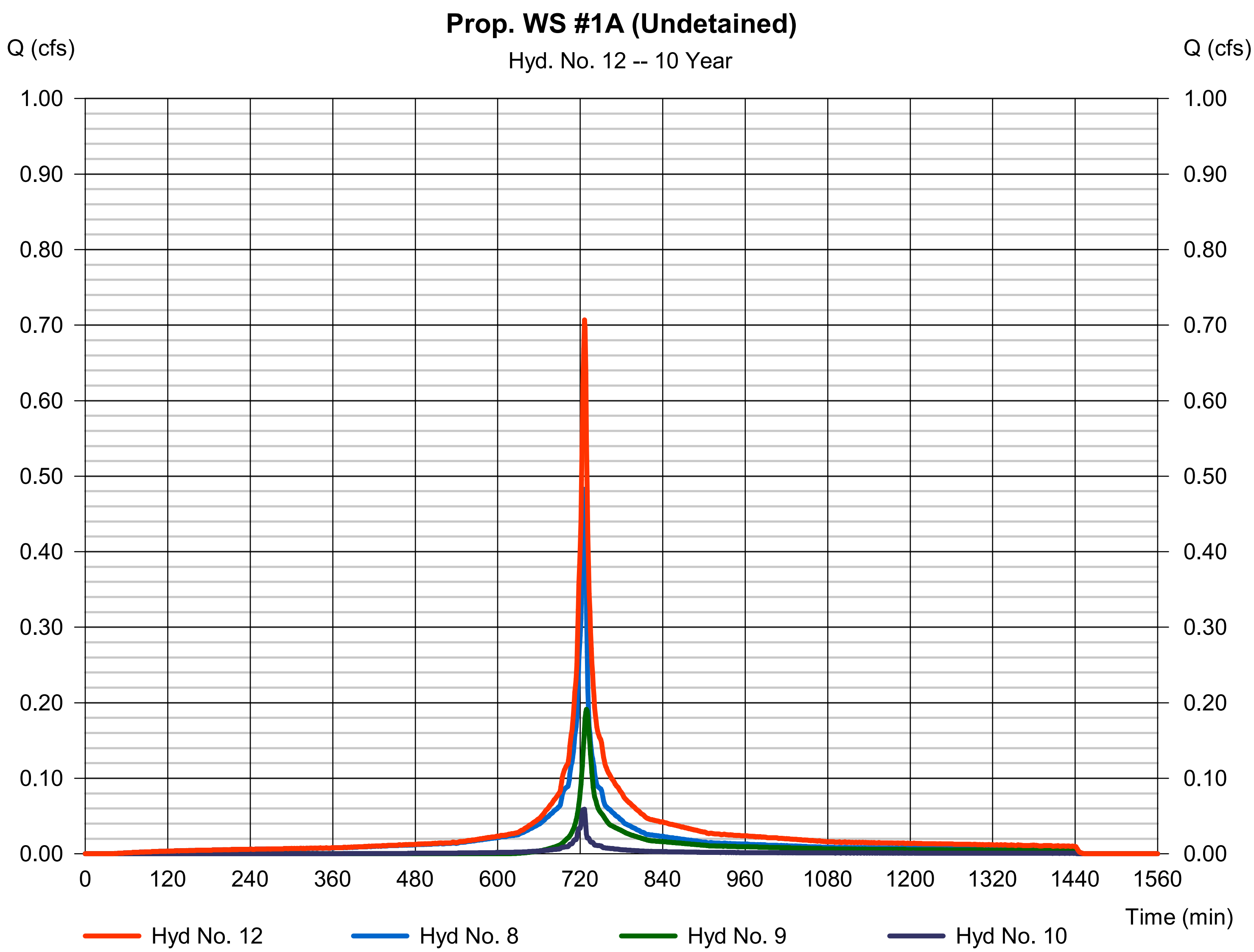


Hydrograph Report

Hyd. No. 12

Prop. WS #1A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.707 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 2,491 cuft
Inflow hyds.	= 8, 9, 10	Contrib. drain. area	= 0.172 ac



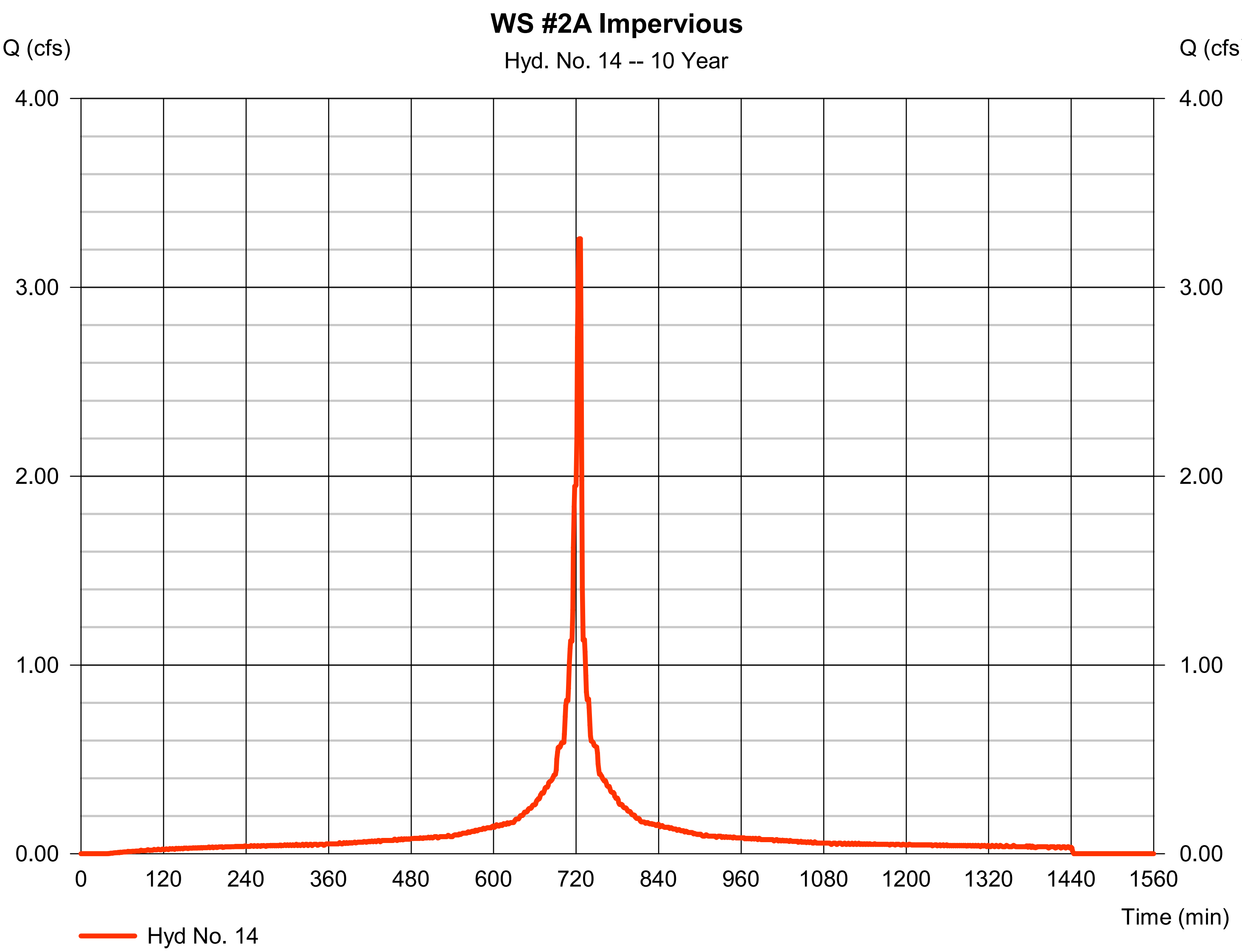
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 14

WS #2A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 3.258 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 10,840 cuft
Drainage area	= 0.529 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.80 min
Total precip.	= 6.26 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



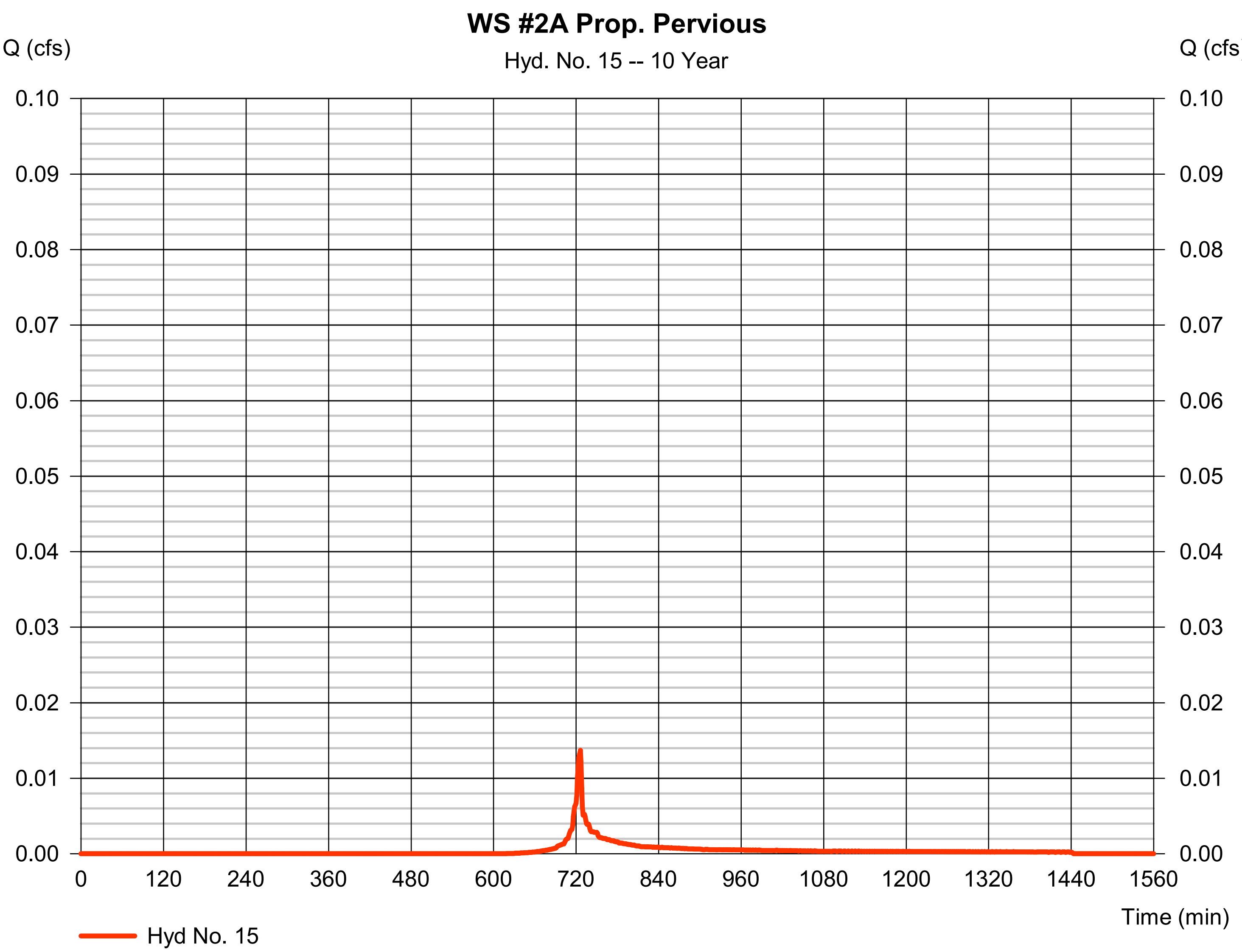
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 15

WS #2A Prop. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.014 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 37 cuft
Drainage area	= 0.005 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.70 min
Total precip.	= 6.26 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



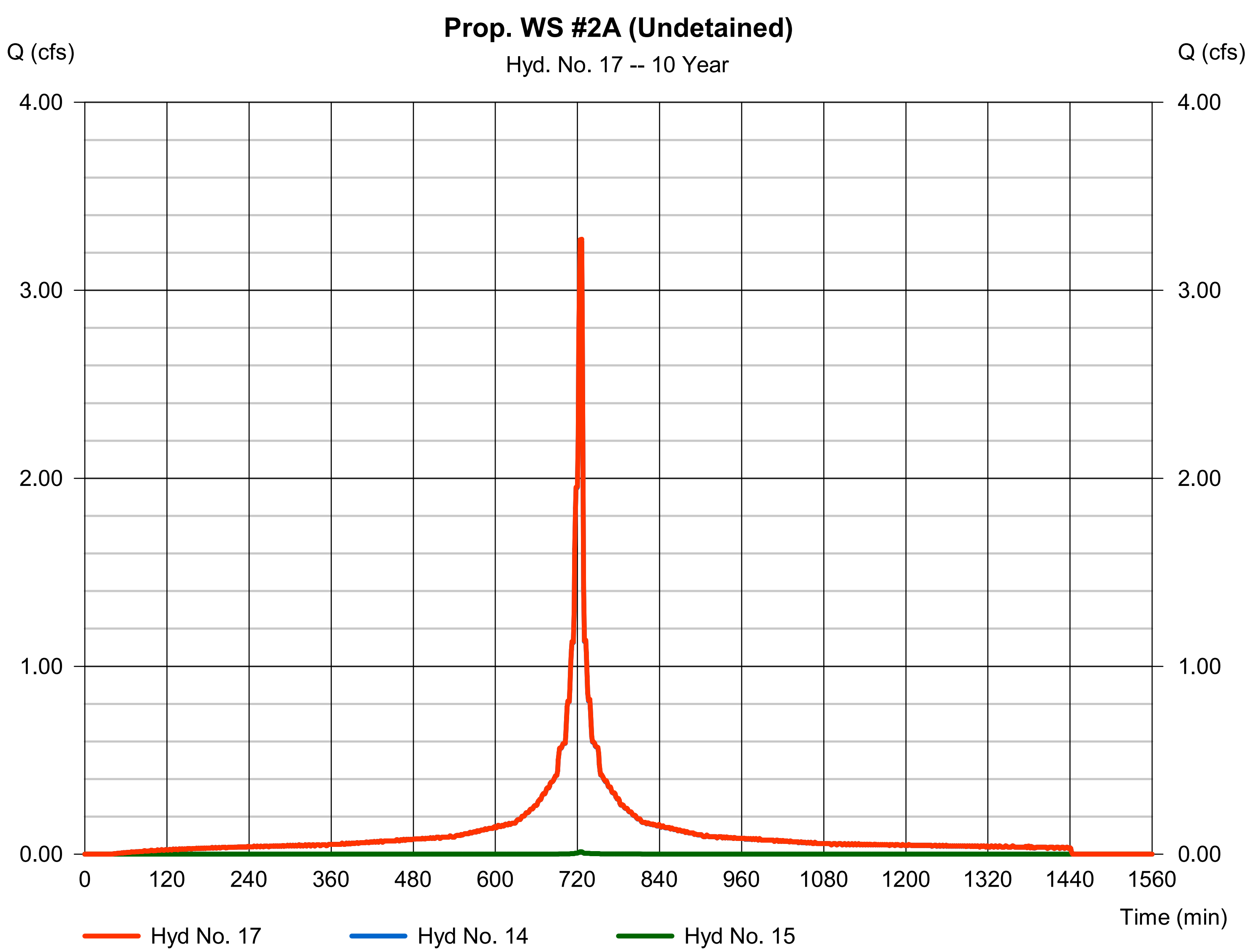
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Wednesday, 02 / 7 / 2024

Hyd. No. 17

Prop. WS #2A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 3.271 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 10,877 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 0.534 ac



Hydrograph Report

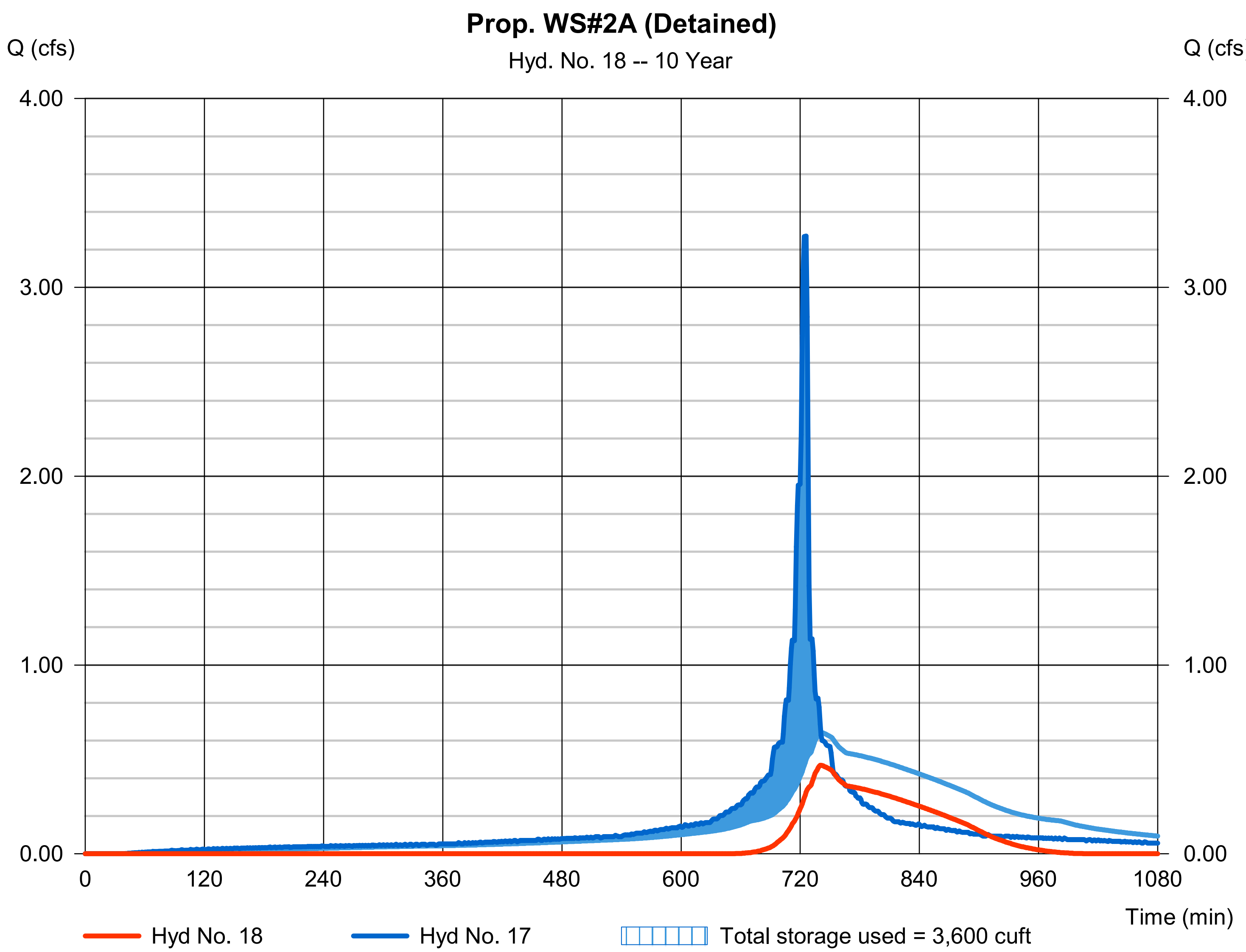
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 18

Prop. WS#2A (Detained)

Hydrograph type	= Reservoir	Peak discharge	= 0.469 cfs
Storm frequency	= 10 yrs	Time to peak	= 741 min
Time interval	= 1 min	Hyd. volume	= 3,649 cuft
Inflow hyd. No.	= 17 - Prop. WS #2A (Undetained)	Max. Elevation	= 123.56 ft
Reservoir name	= Pervious Paving System	Max. Storage	= 3,600 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



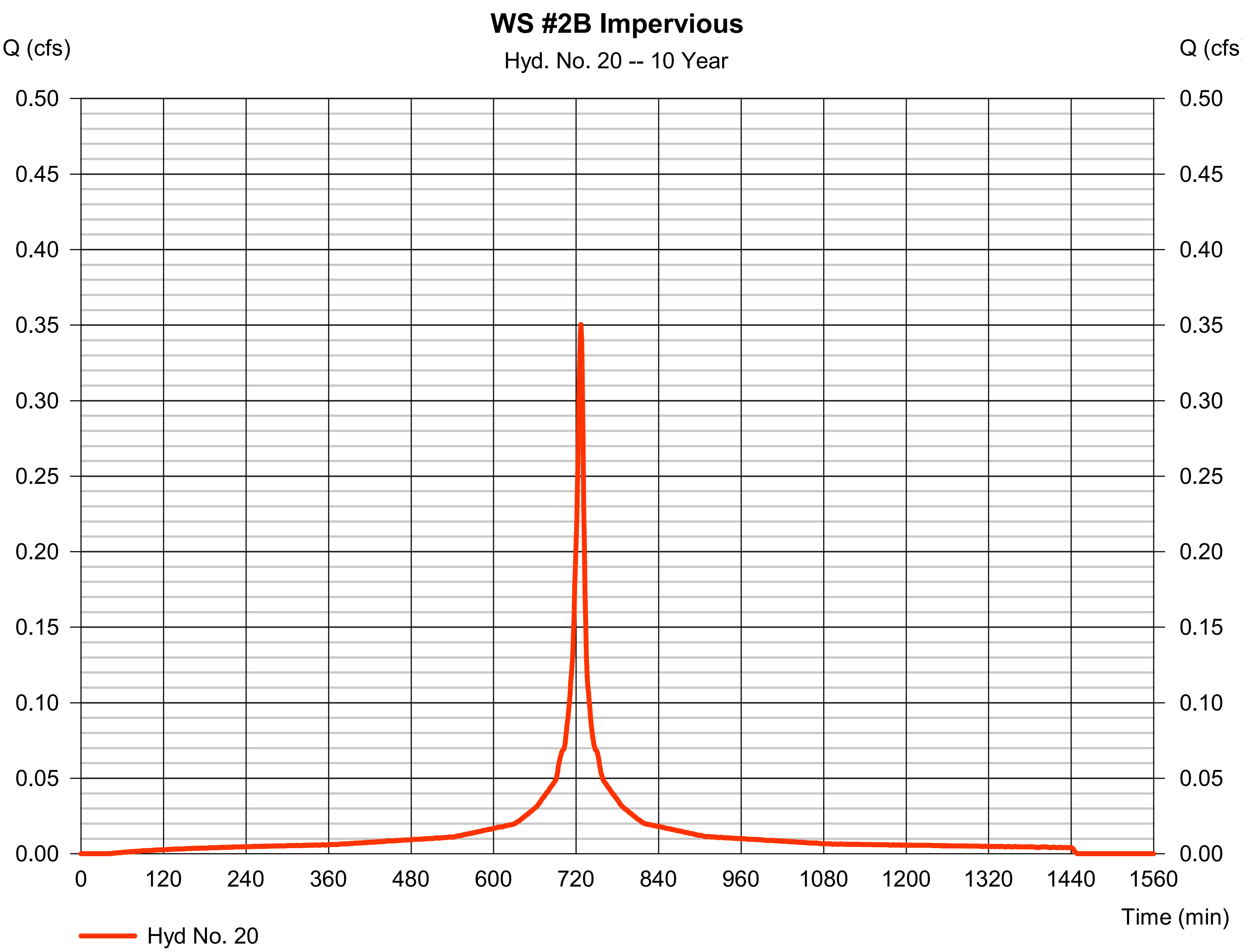
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 20

WS #2B Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.350 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,285 cuft
Drainage area	= 0.057 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.50 min
Total precip.	= 6.26 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



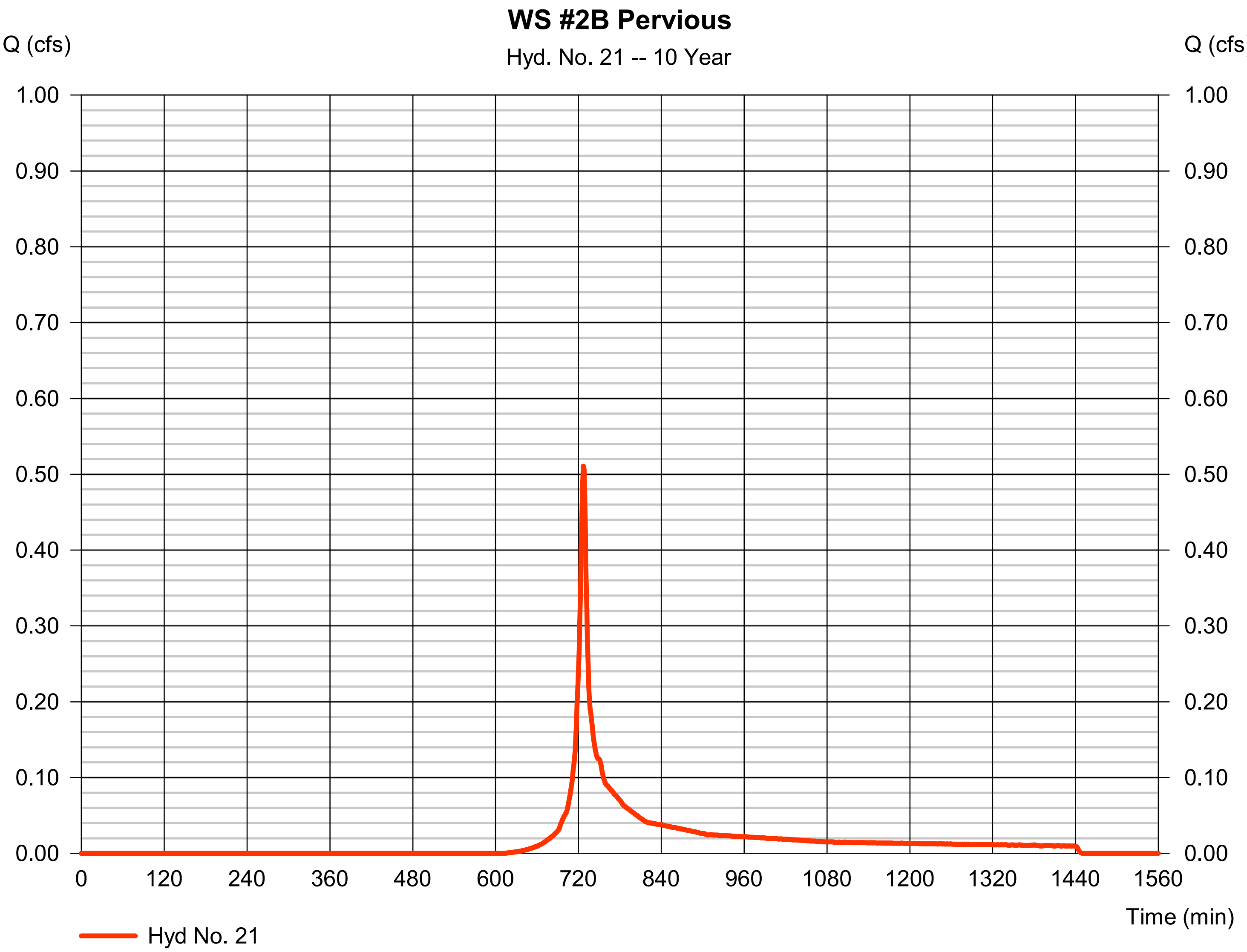
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 21

WS #2B Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.511 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 1,609 cuft
Drainage area	= 0.197 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.70 min
Total precip.	= 6.26 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

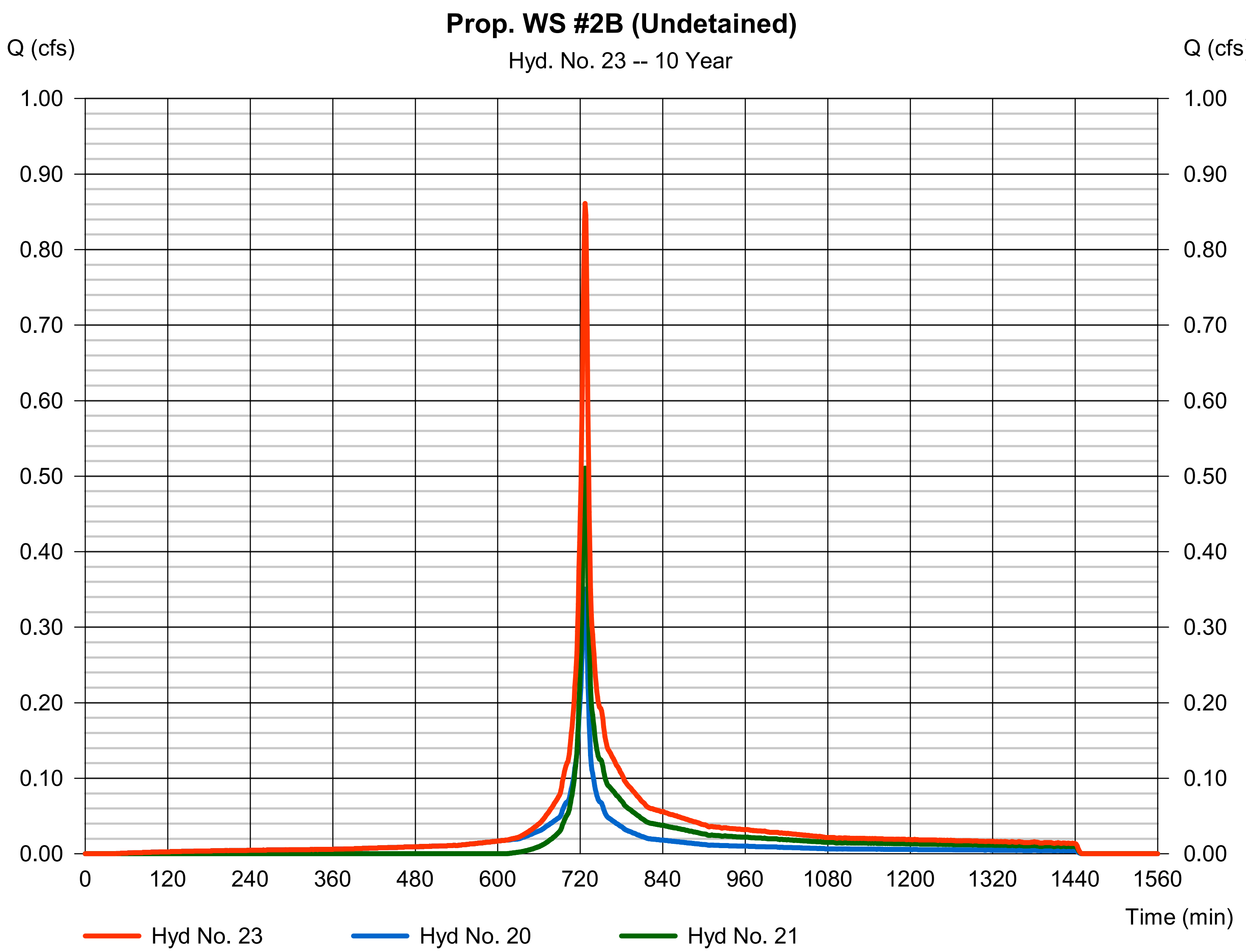


Hydrograph Report

Hyd. No. 23

Prop. WS #2B (Undetained)

Hydrograph type	= Combine	Peak discharge	= 0.861 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 2,894 cuft
Inflow hyds.	= 20, 21	Contrib. drain. area	= 0.254 ac



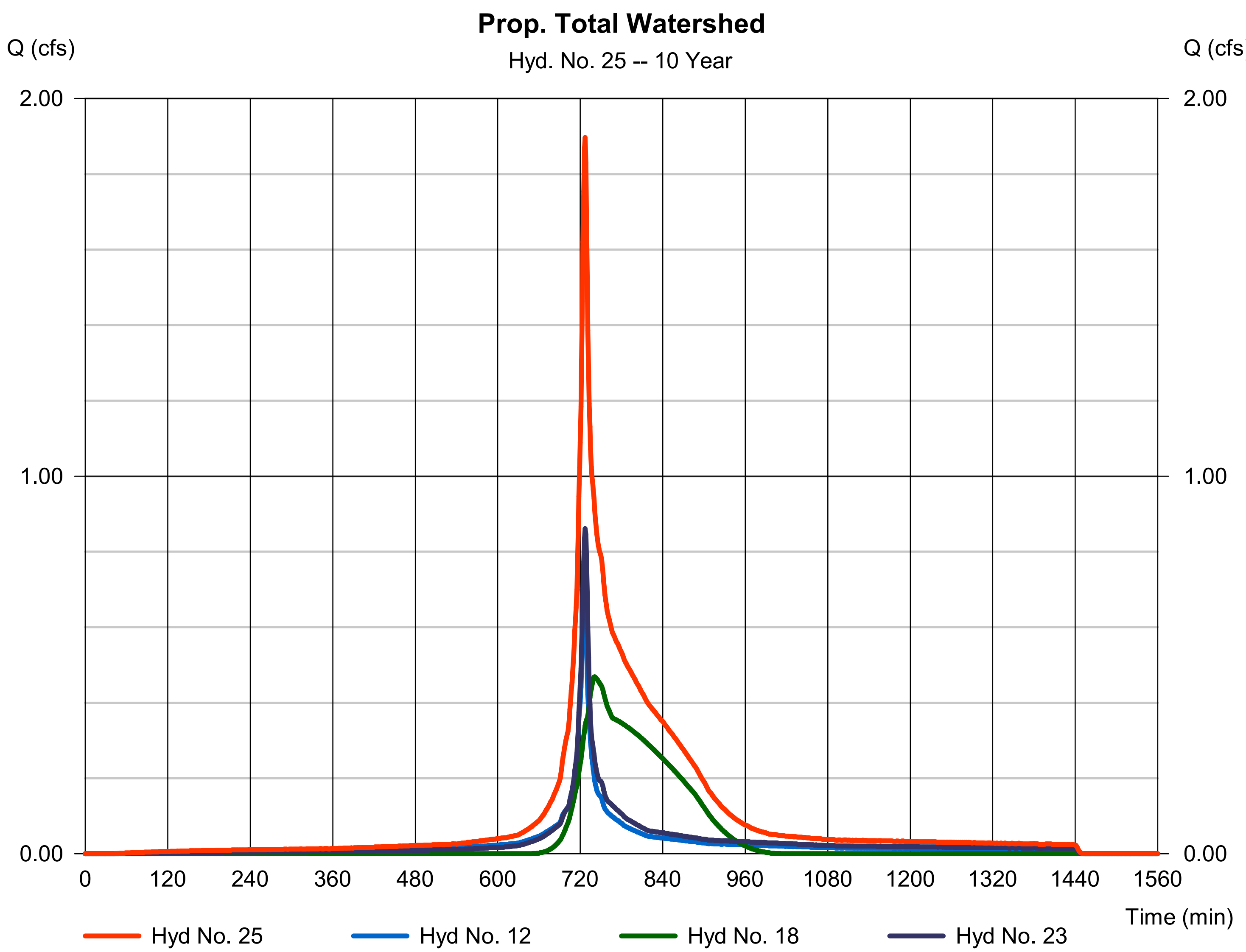
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 25

Prop. Total Watershed

Hydrograph type	= Combine	Peak discharge	= 1.897 cfs
Storm frequency	= 10 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 9,033 cuft
Inflow hyds.	= 12, 18, 23	Contrib. drain. area	= 0.000 ac

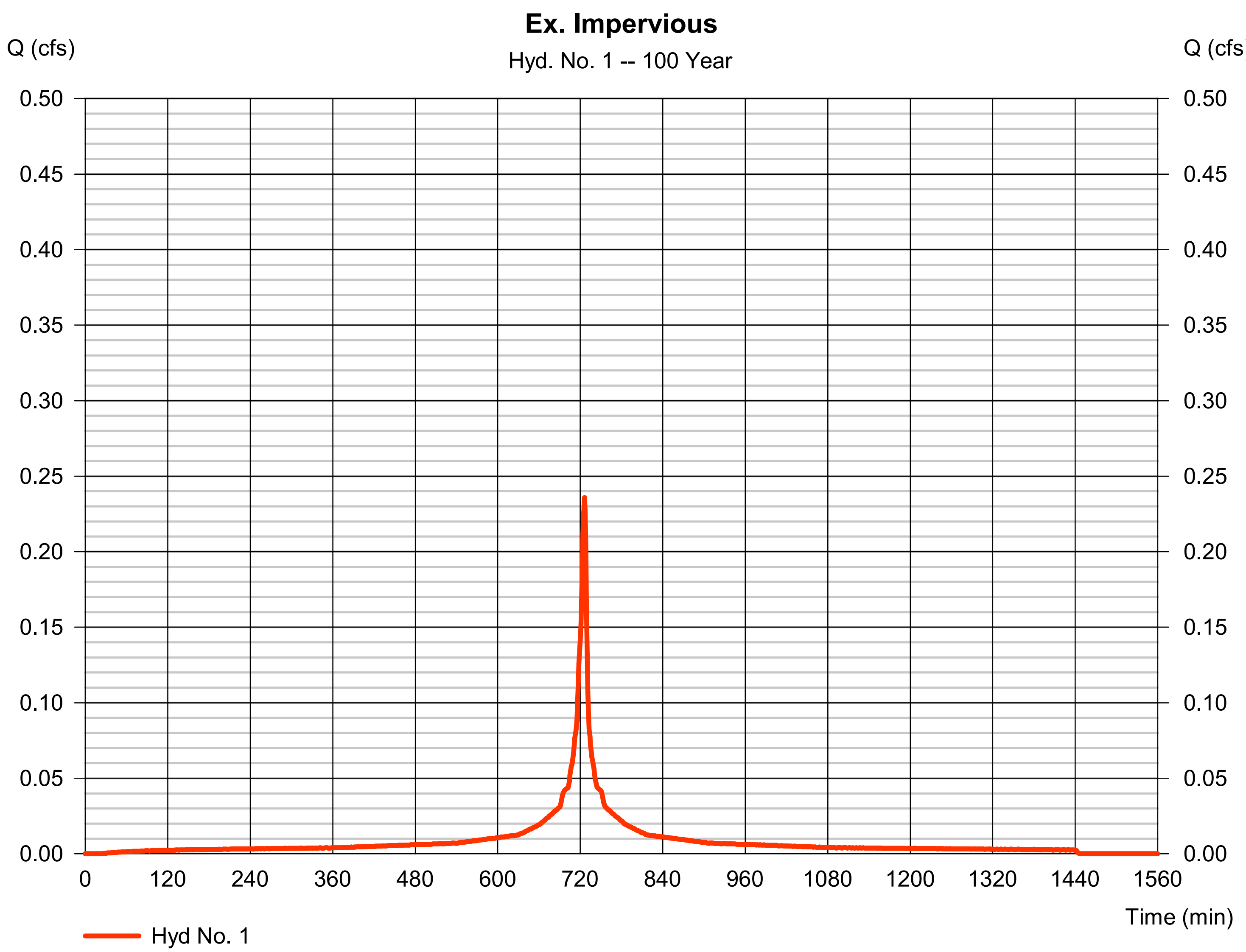


Hydrograph Report

Hyd. No. 1

Ex. Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.236 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 813 cuft
Drainage area	= 0.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 4.00 min
Total precip.	= 11.44 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



Hydrograph Report

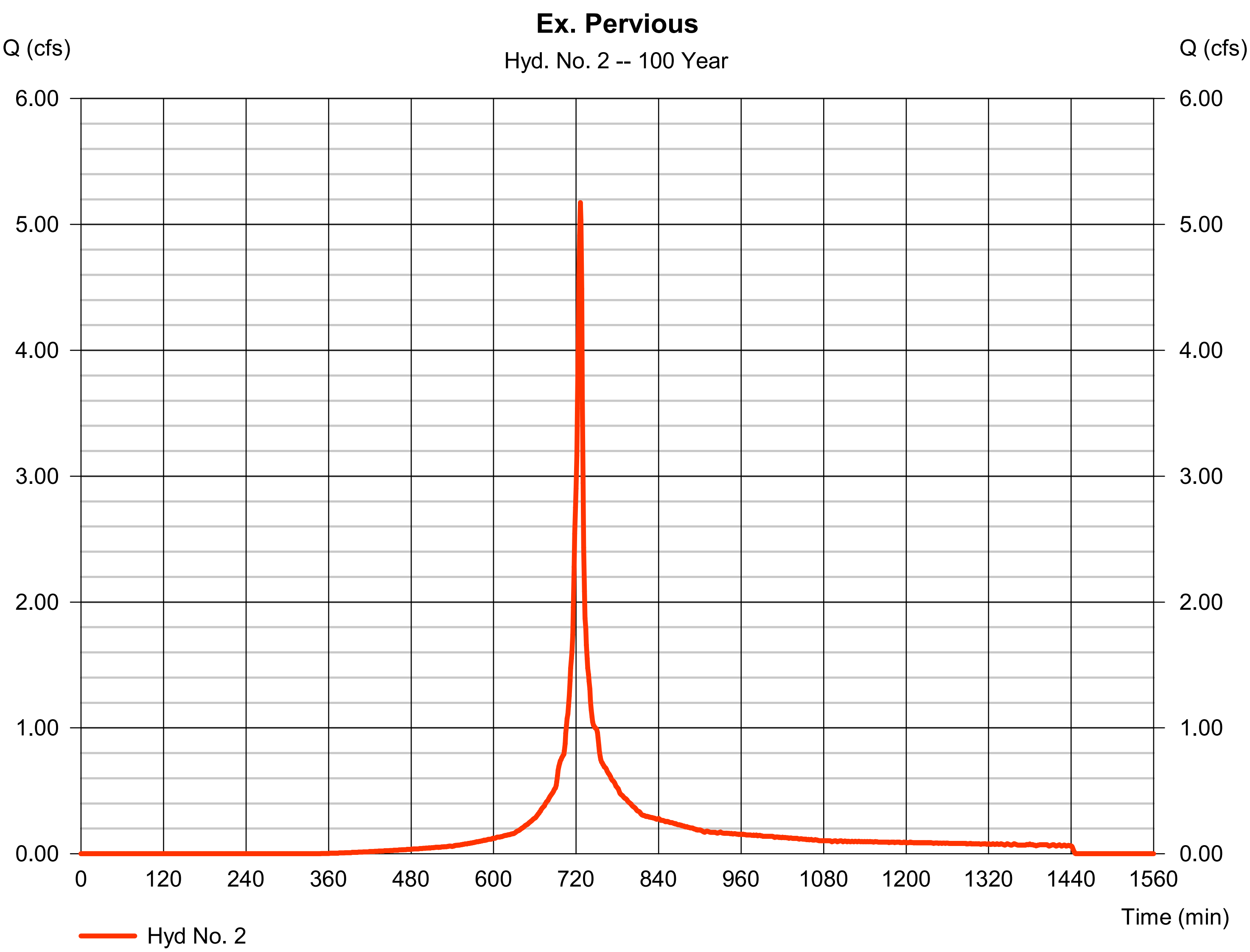
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 2

Ex. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 5.173 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 15,025 cuft
Drainage area	= 0.560 ac	Curve number	= 69*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.90 min
Total precip.	= 11.44 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 85) + (0.560 x 69)] / 0.560



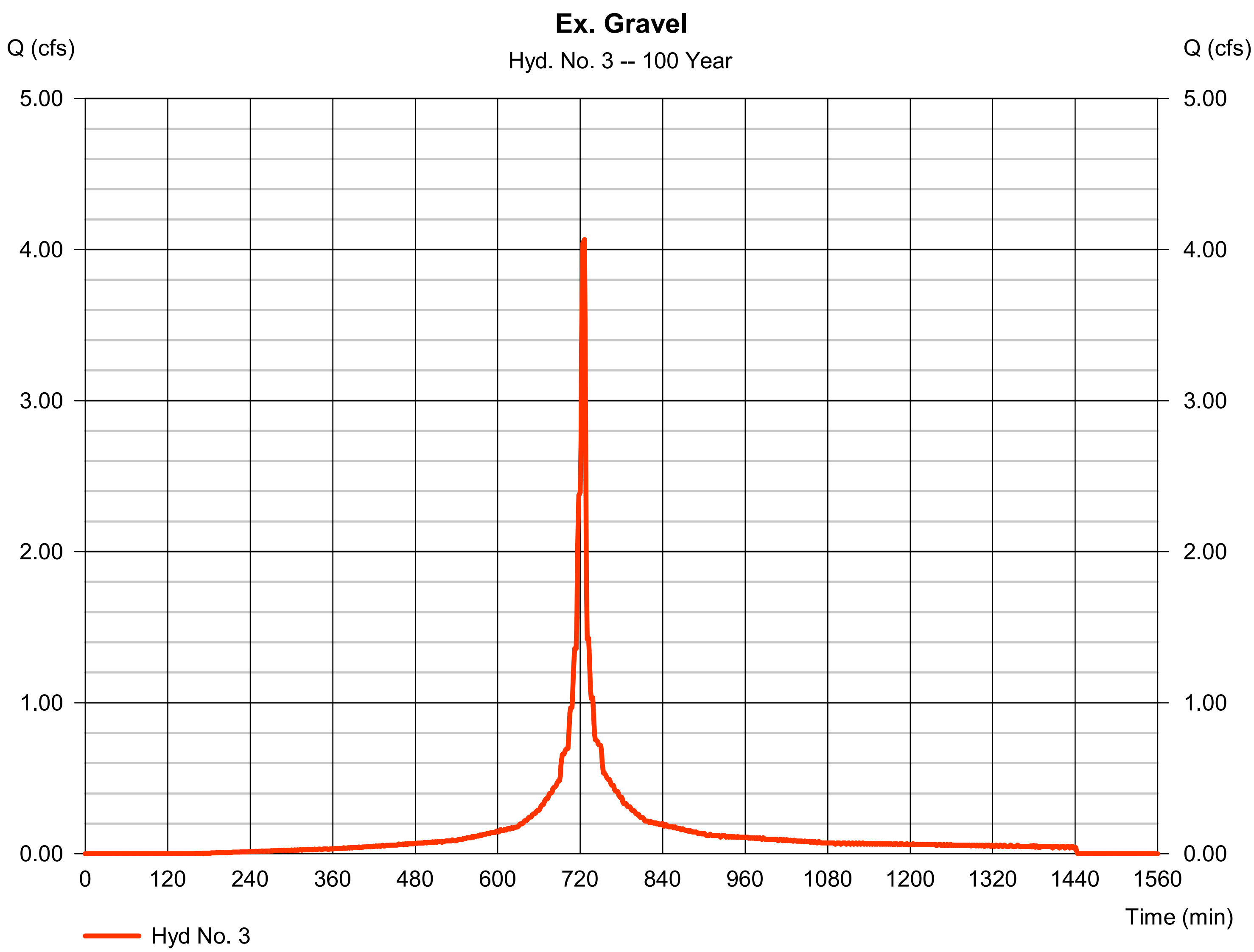
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 3

Ex. Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 4.066 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 12,369 cuft
Drainage area	= 0.380 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.60 min
Total precip.	= 11.44 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.01 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



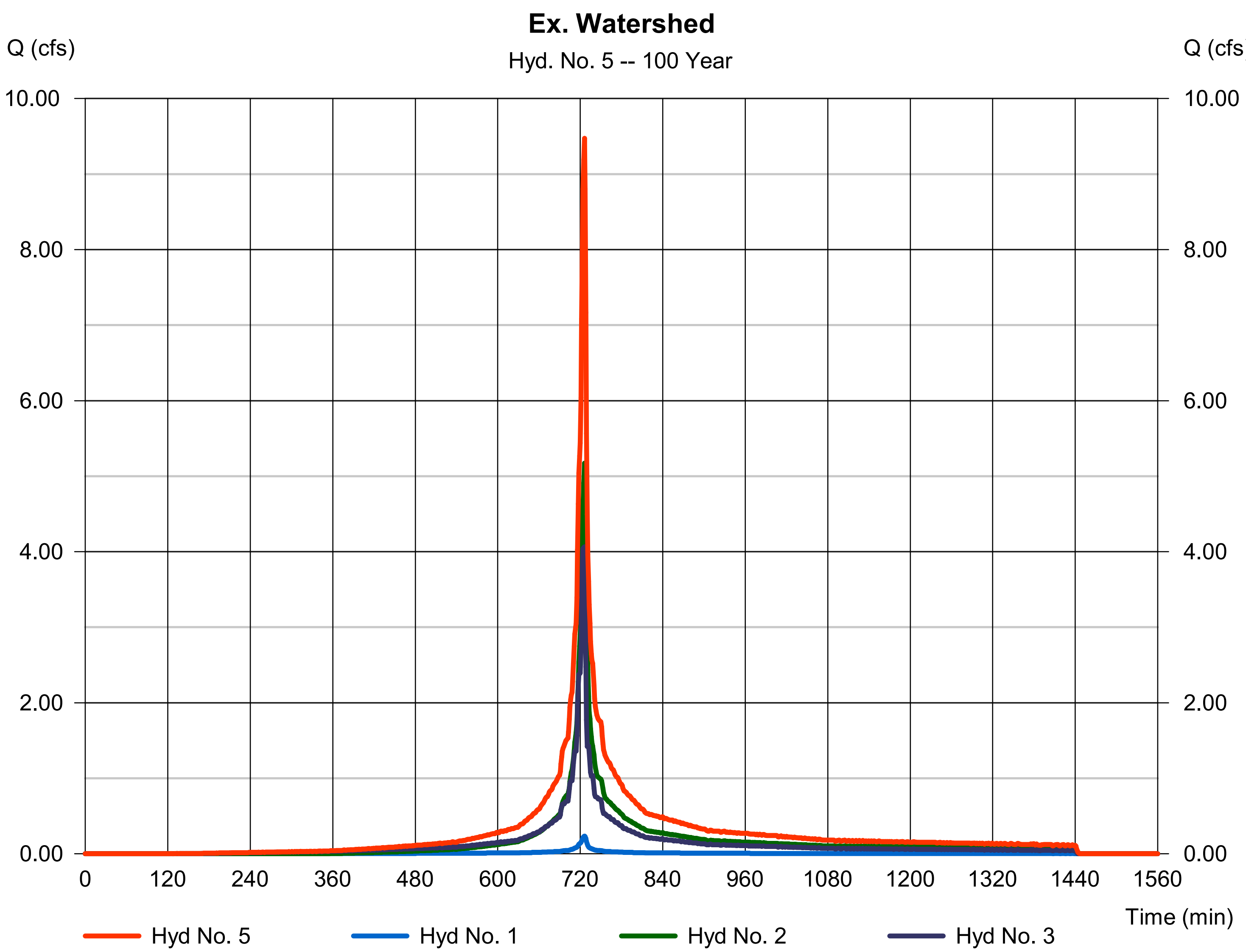
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 5

Ex. Watershed

Hydrograph type	= Combine	Peak discharge	= 9.474 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 28,207 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 0.960 ac



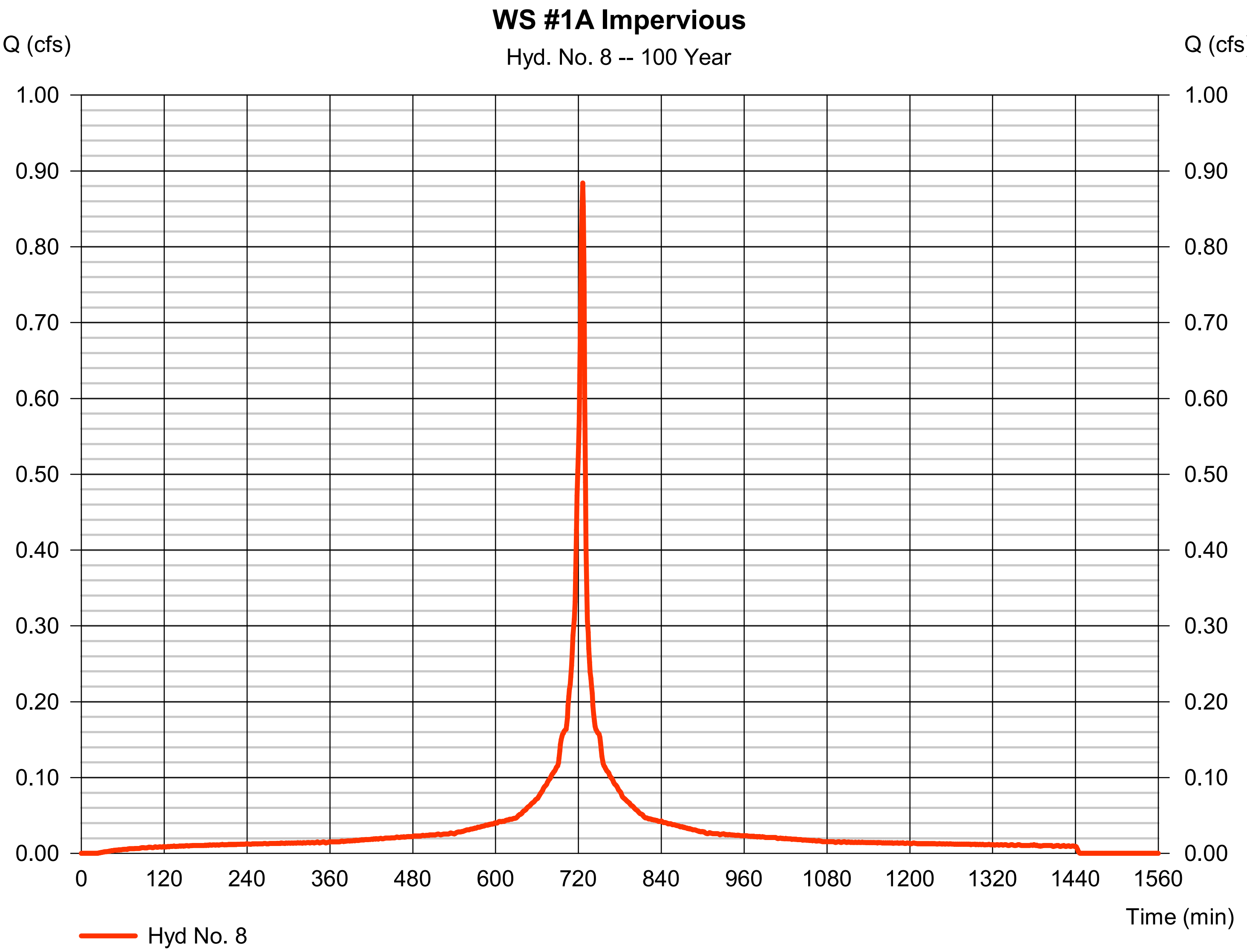
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 8

WS #1A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.884 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 3,049 cuft
Drainage area	= 0.075 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.30 min
Total precip.	= 11.44 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

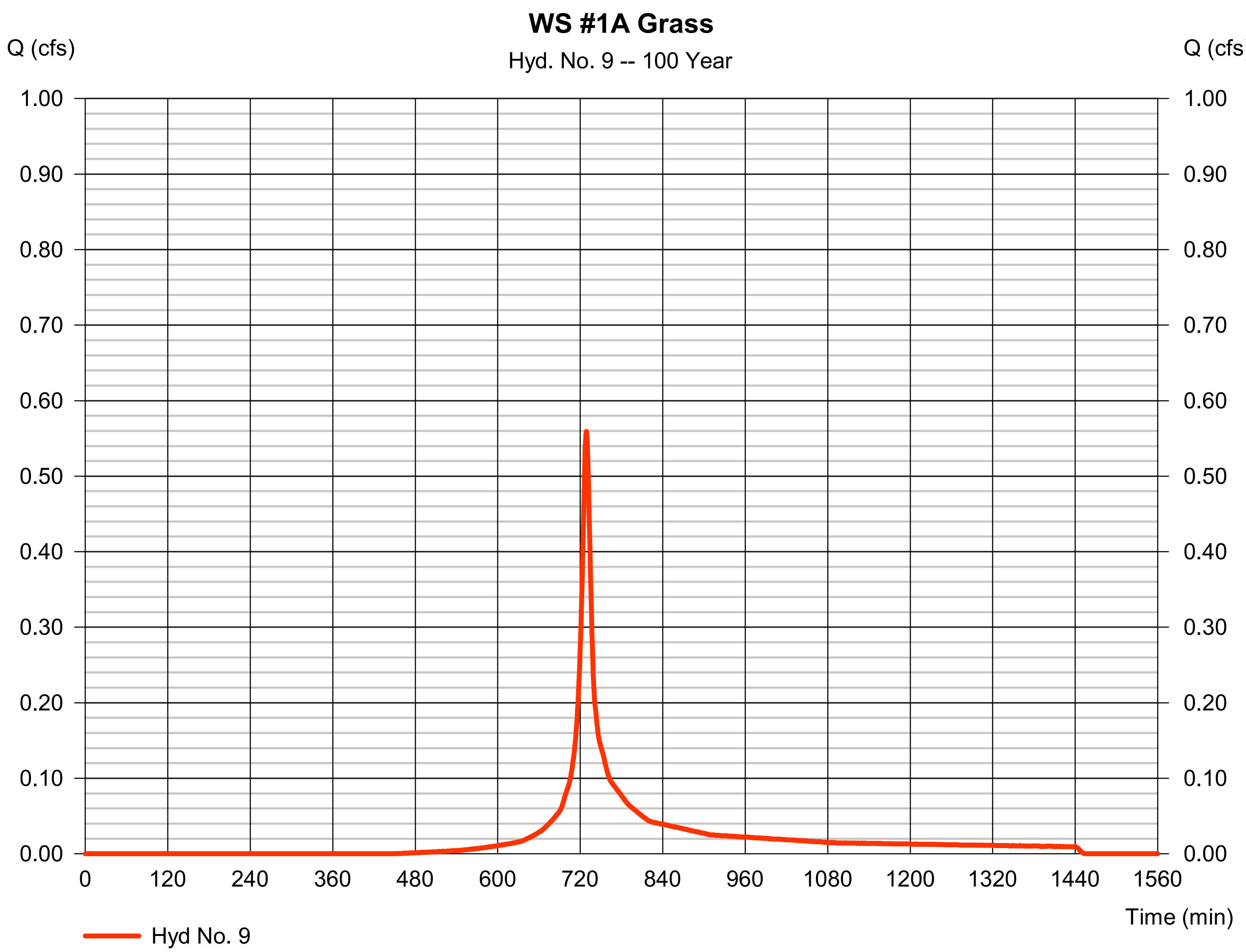


Hydrograph Report

Hyd. No. 9

WS #1A Grass

Hydrograph type	= SCS Runoff	Peak discharge	= 0.559 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 1,947 cuft
Drainage area	= 0.086 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 8.70 min
Total precip.	= 11.44 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



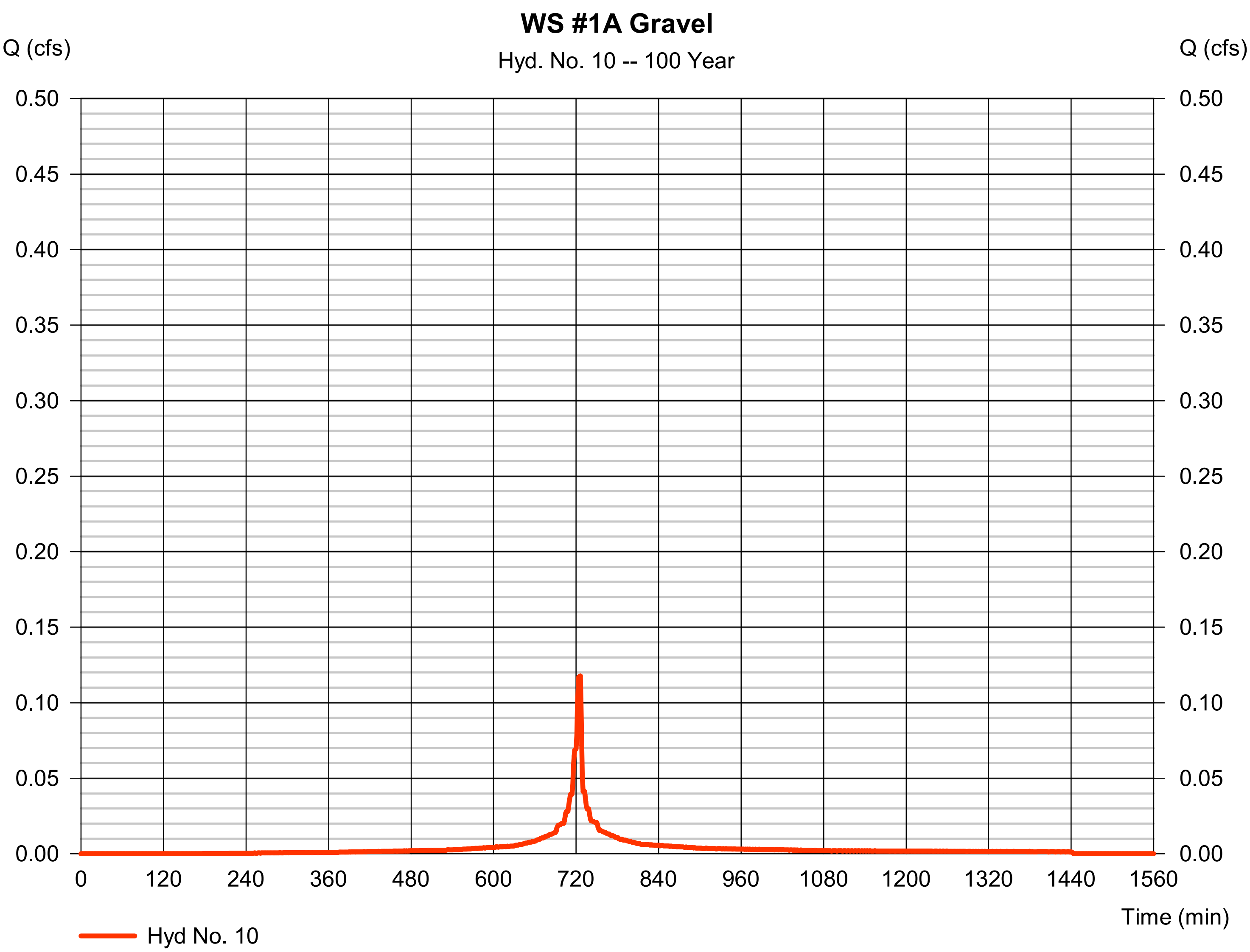
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 10

WS #1A Gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.118 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 358 cuft
Drainage area	= 0.011 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 11.44 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



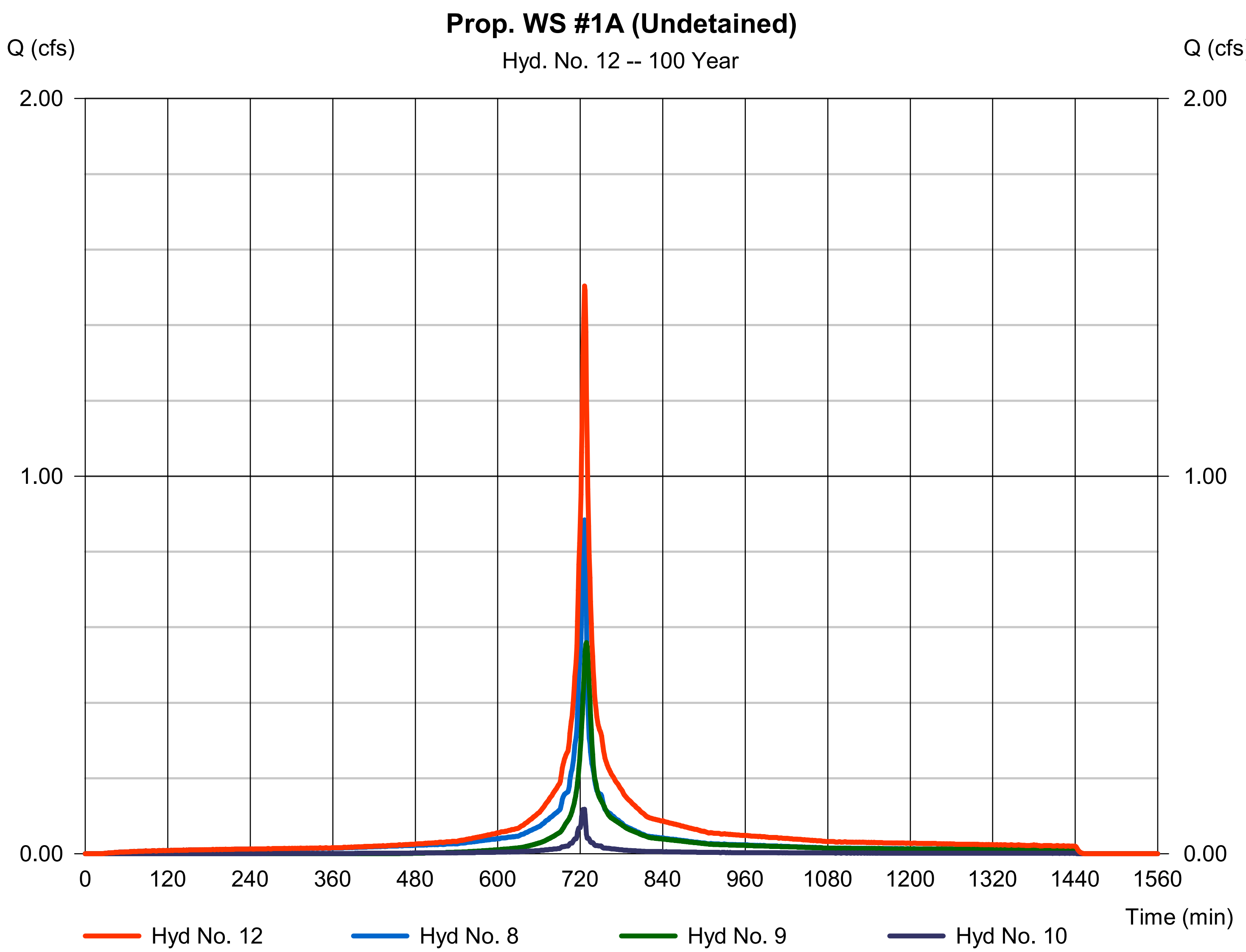
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 12

Prop. WS #1A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 1.503 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 5,354 cuft
Inflow hyds.	= 8, 9, 10	Contrib. drain. area	= 0.172 ac

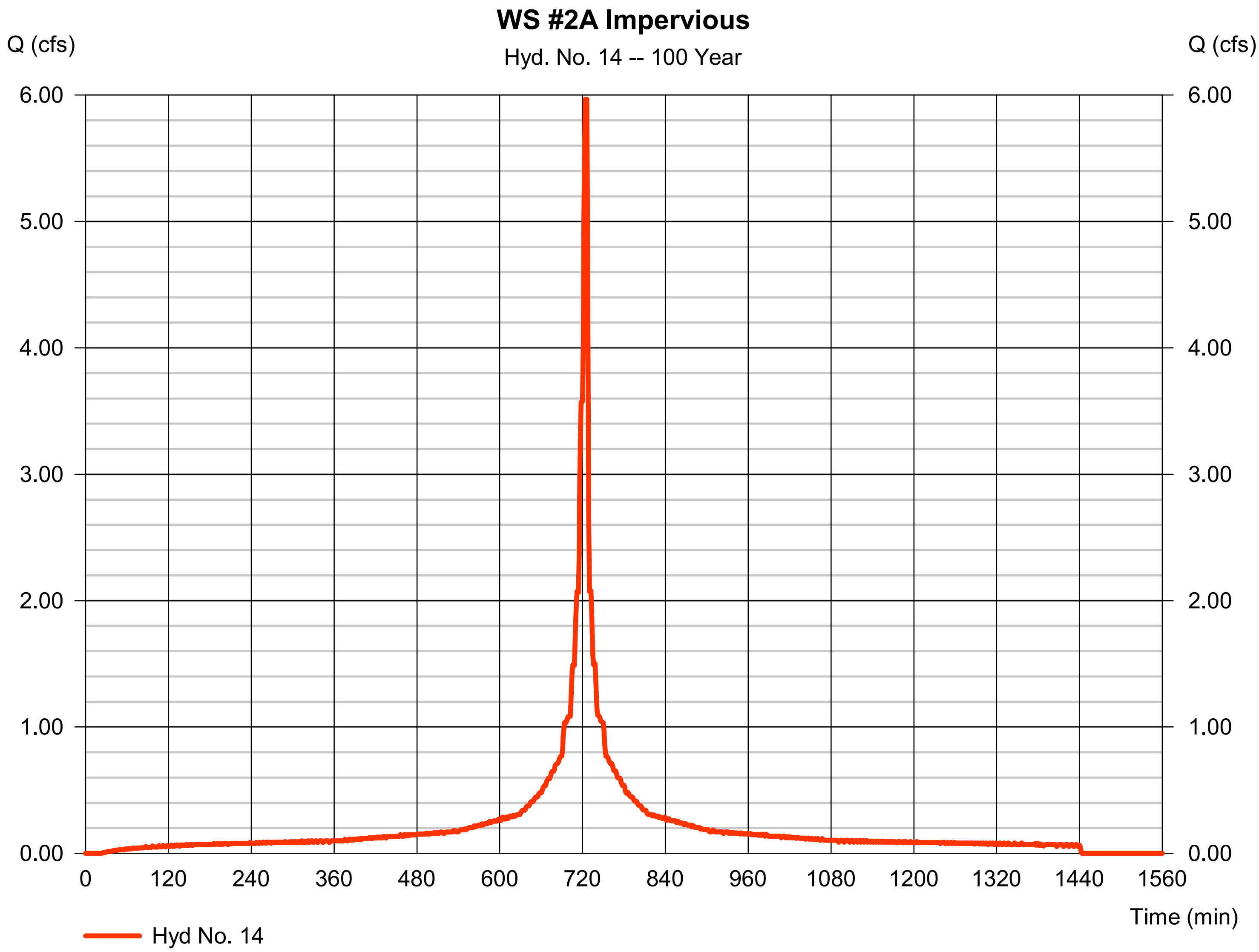


Hydrograph Report

Hyd. No. 14

WS #2A Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 5.967 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 20,160 cuft
Drainage area	= 0.529 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.80 min
Total precip.	= 11.44 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



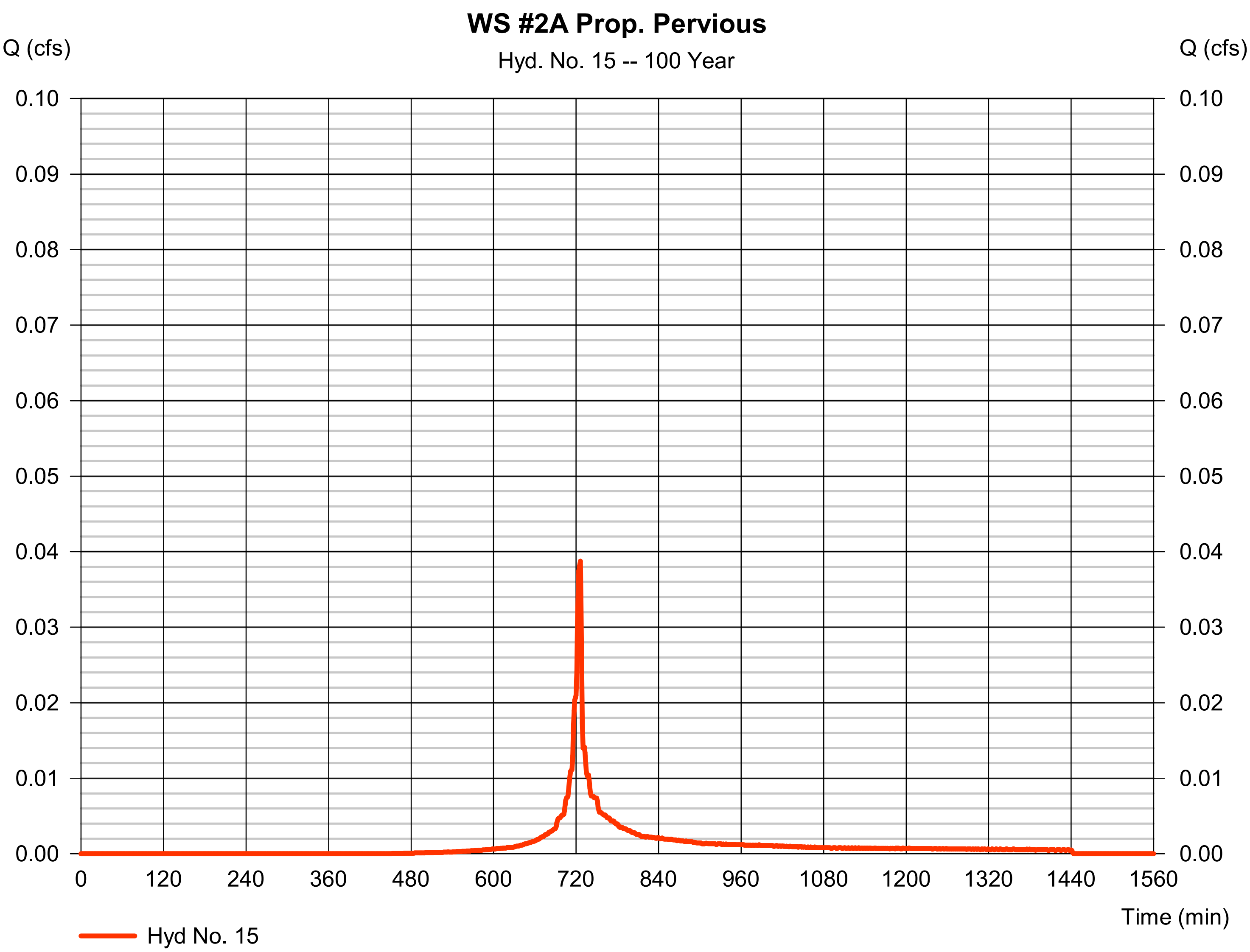
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 15

WS #2A Prop. Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.039 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 106 cuft
Drainage area	= 0.005 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.70 min
Total precip.	= 11.44 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



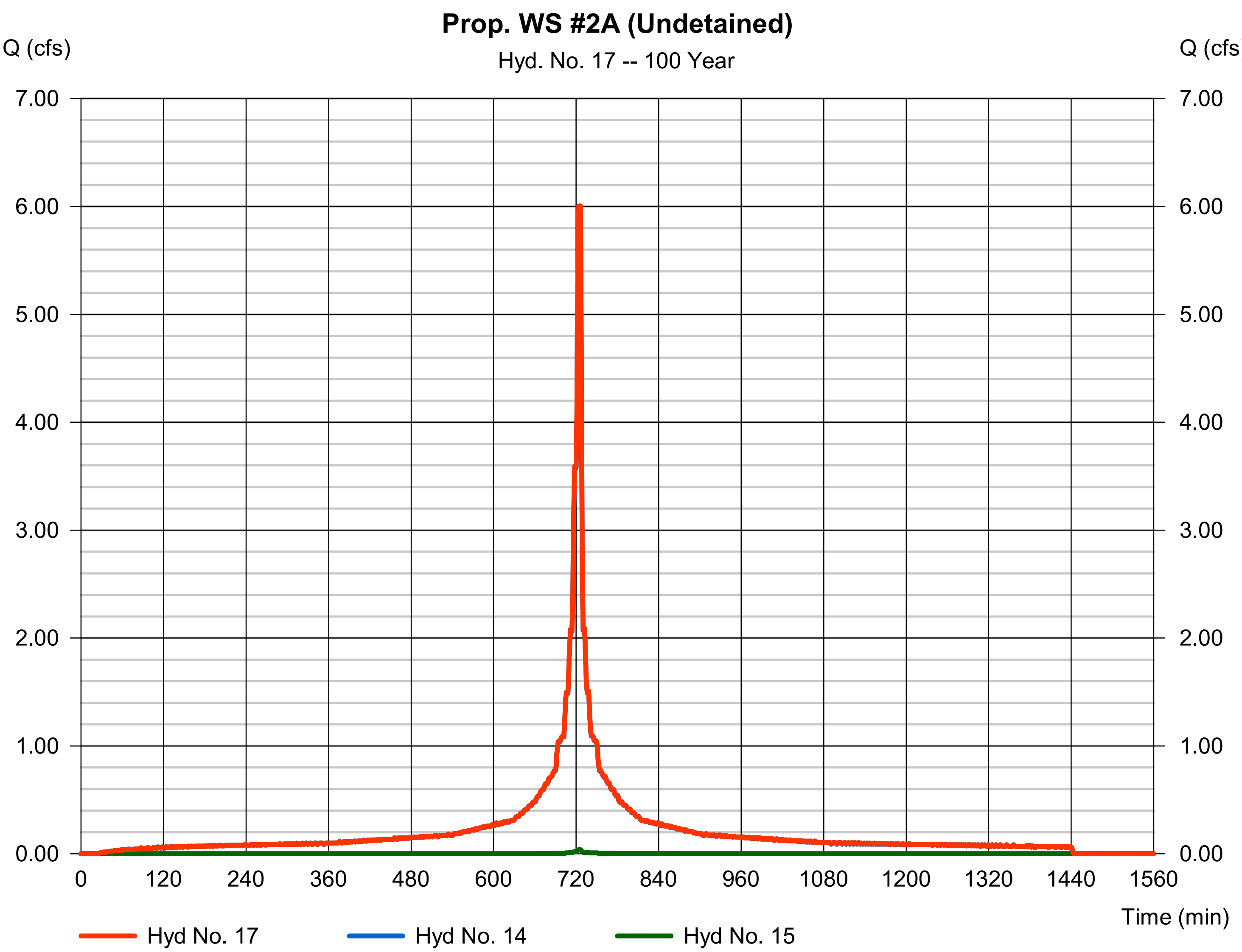
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 17

Prop. WS #2A (Undetained)

Hydrograph type	= Combine	Peak discharge	= 6.005 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 20,267 cuft
Inflow hyds.	= 14, 15	Contrib. drain. area	= 0.534 ac



Hydrograph Report

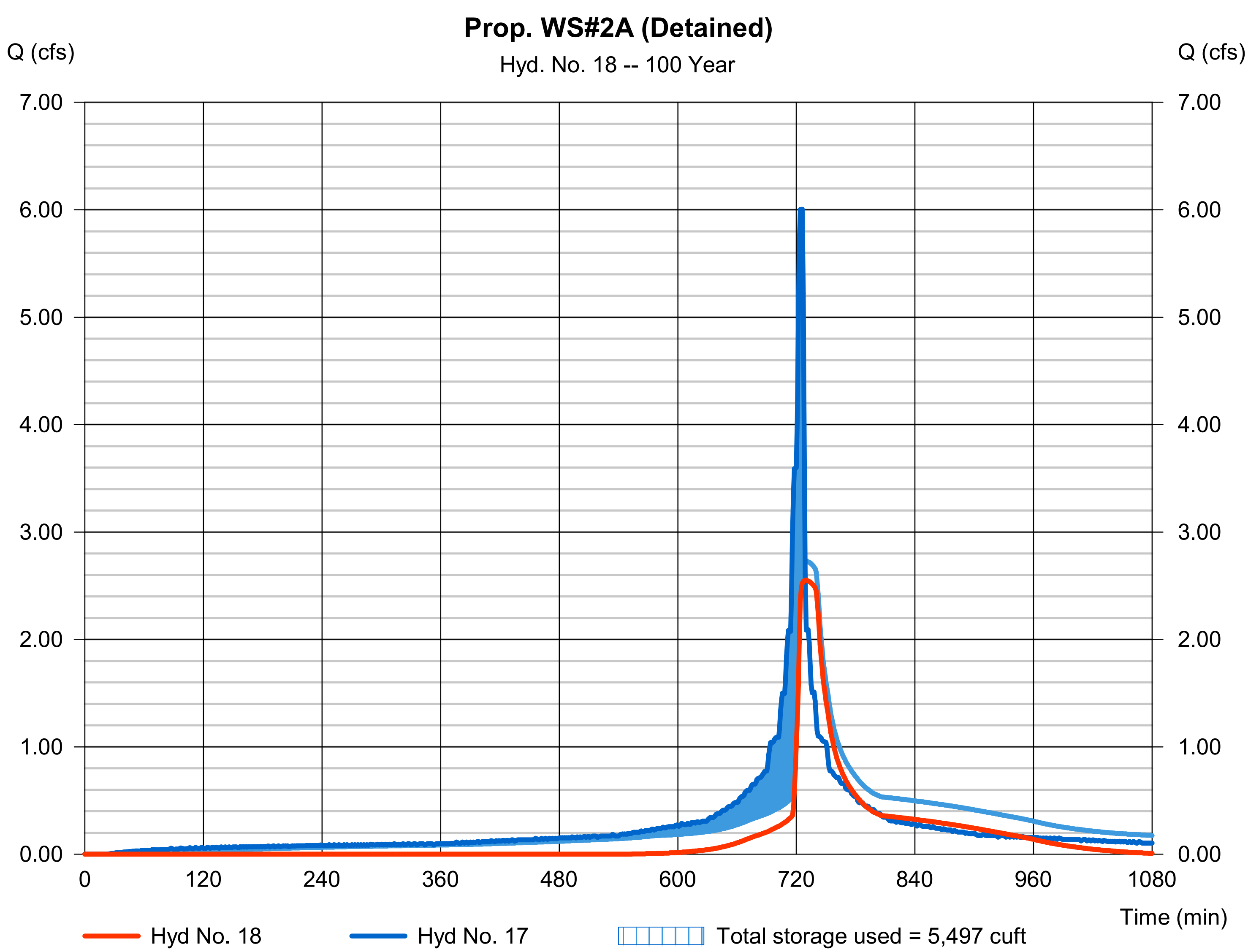
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 18

Prop. WS#2A (Detained)

Hydrograph type	= Reservoir	Peak discharge	= 2.552 cfs
Storm frequency	= 100 yrs	Time to peak	= 729 min
Time interval	= 1 min	Hyd. volume	= 10,030 cuft
Inflow hyd. No.	= 17 - Prop. WS #2A (Undetained)	Max. Elevation	= 124.17 ft
Reservoir name	= Pervious Paving System	Max. Storage	= 5,497 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



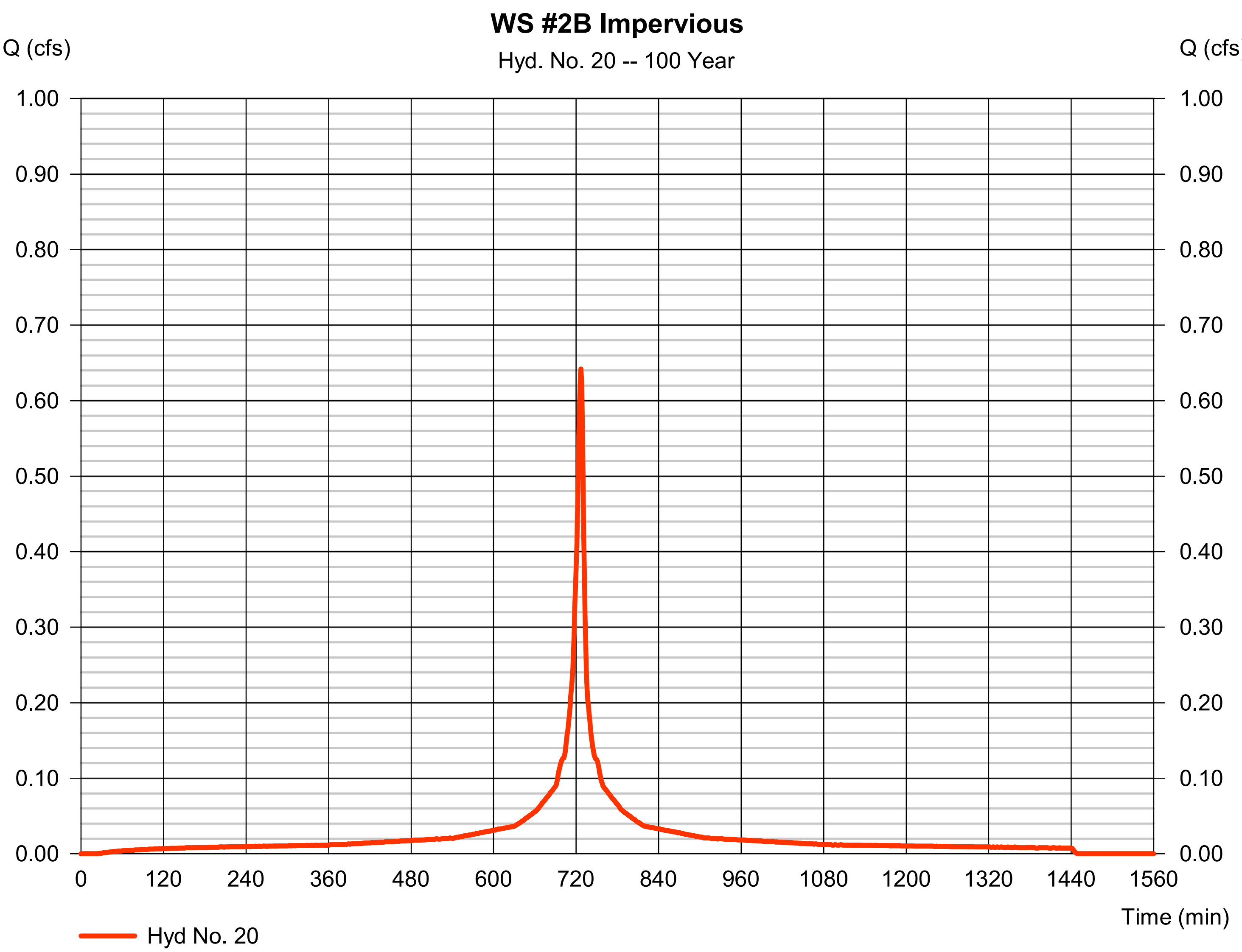
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Wednesday, 02 / 7 / 2024

Hyd. No. 20

WS #2B Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.642 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 2,390 cuft
Drainage area	= 0.057 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.50 min
Total precip.	= 11.44 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484

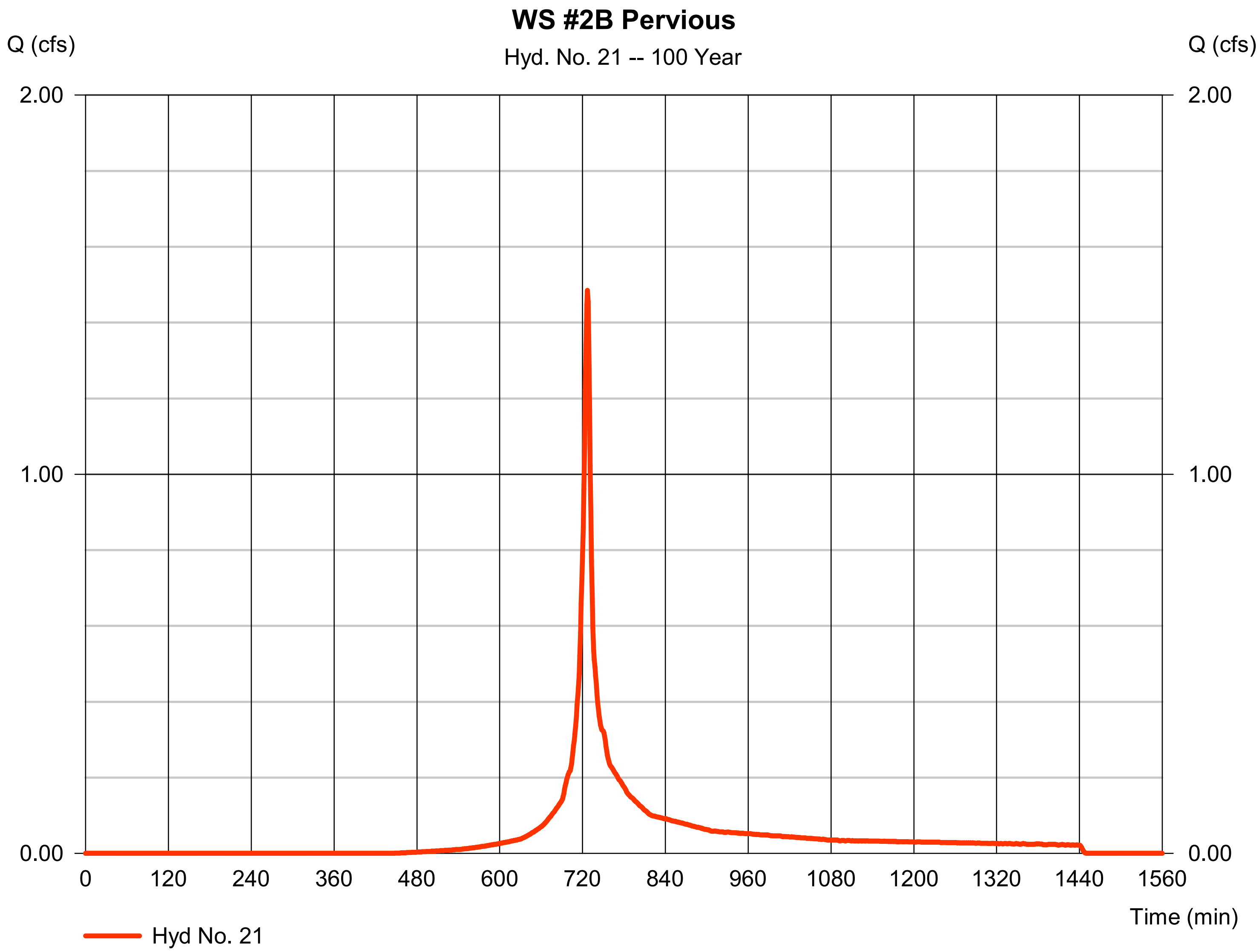


Hydrograph Report

Hyd. No. 21

WS #2B Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 1.485 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 4,600 cuft
Drainage area	= 0.197 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.70 min
Total precip.	= 11.44 in	Distribution	= Custom
Storm duration	= M:\Bloomfield\BLFDPRV22.010 (78-88 Locust Ave)\Engineering\Stormwater\Stor	Shape factor	= 484



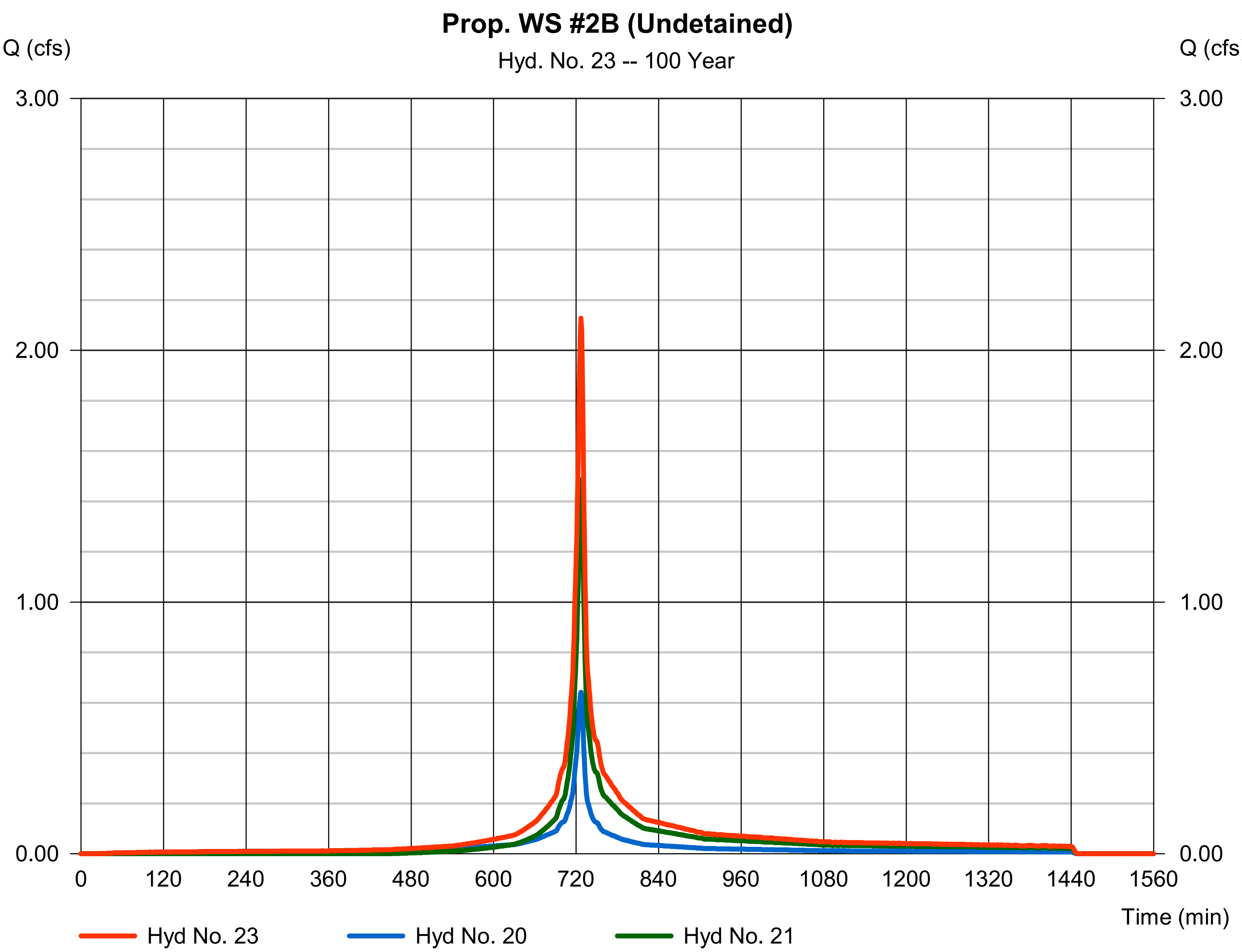
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Wednesday, 02 / 7 / 2024

Hyd. No. 23

Prop. WS #2B (Undetained)

Hydrograph type	= Combine	Peak discharge	= 2.127 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 6,989 cuft
Inflow hyds.	= 20, 21	Contrib. drain. area	= 0.254 ac



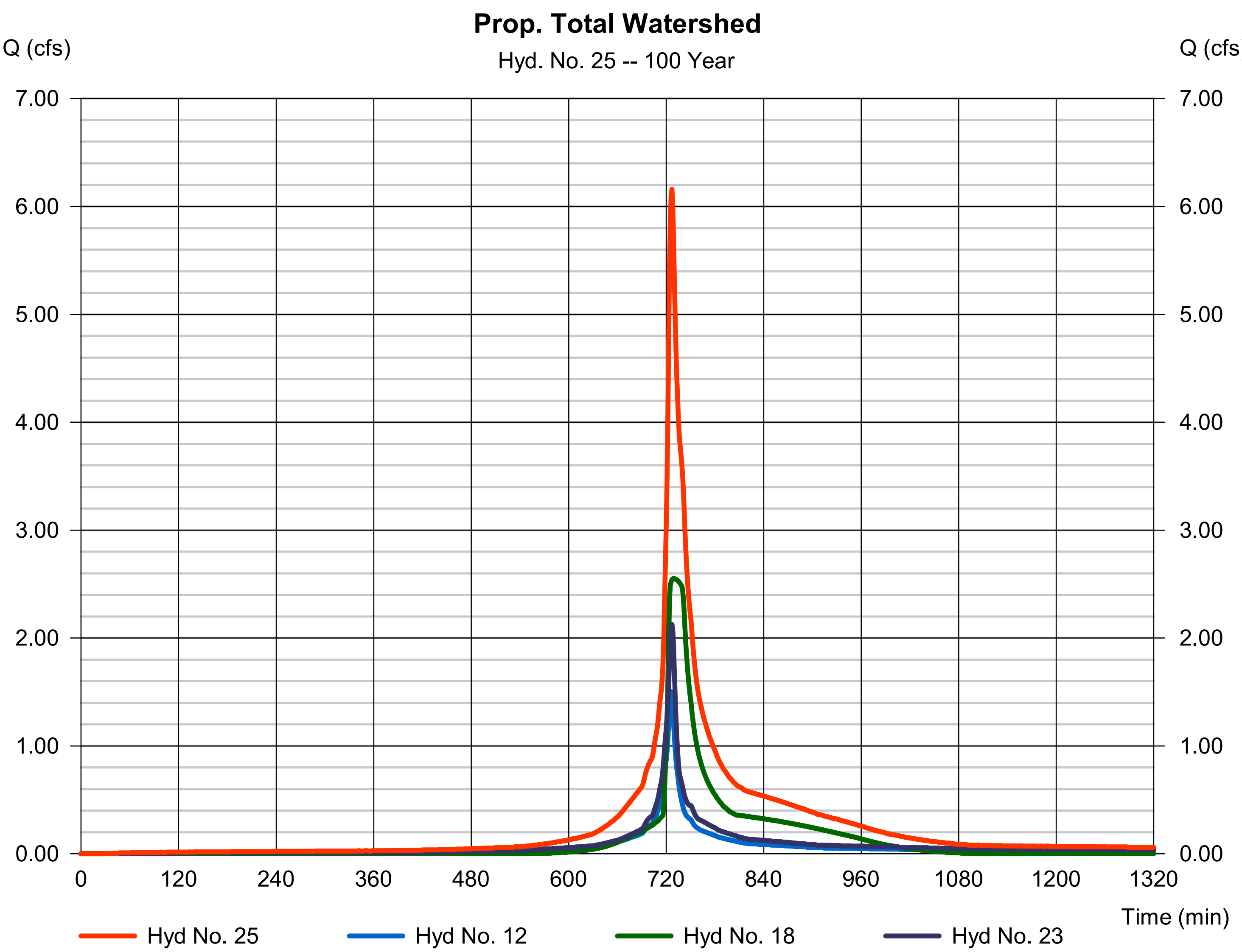
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Wednesday, 02 / 7 / 2024

Hyd. No. 25

Prop. Total Watershed

Hydrograph type	= Combine	Peak discharge	= 6.158 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 22,373 cuft
Inflow hyds.	= 12, 18, 23	Contrib. drain. area	= 0.000 ac



APPENDIX F

Conveyance System Calculations

NEGLIA
ENGINEERING ASSOCIATES

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	25.000	0.01	0.11	0.84	0.01	0.08	1.6	13.7	5.1	0.93	5.04	3.05	15	0.52	116.01	116.14	116.37	116.52	118.66	119.98	IN.8-OF2
2	1	44.000	0.00	0.06	0.00	0.00	0.04	0.0	12.5	5.3	0.71	4.95	2.51	15	0.50	116.14	116.36	116.52	116.69	119.98	123.87	MH4-IN8
3	2	72.000	0.00	0.06	0.00	0.00	0.04	0.0	10.8	5.6	0.21	0.93	1.72	8	0.50	116.36	116.72	116.69	116.93	123.87	118.28	IN.6-MH4
4	3	65.000	0.03	0.06	0.63	0.02	0.04	6.2	9.3	5.9	0.22	0.93	2.19	8	0.51	116.72	117.05	116.94	117.27	118.28	118.80	IN.5-IN.6
5	4	68.000	0.03	0.03	0.62	0.02	0.02	6.1	6.1	6.7	0.13	1.85	1.46	8	2.00	117.05	118.41	117.31	118.57	118.80	122.10	IN.4-In.5
6	2	11.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.51	0.61	3.40	6	1.00	116.36	116.47	116.71	116.83	123.87	124.90	OCS-MH4
7	1	19.000	0.04	0.04	0.90	0.04	0.04	1.6	1.6	7.1	0.26	1.31	1.80	8	1.00	116.14	116.33	116.52	116.56	119.98	120.25	IN7-IN8
8	End	36.000	0.00	0.31	0.00	0.00	0.31	0.0	2.2	7.1	2.16	3.86	4.61	12	1.00	123.41	123.77	123.95	124.40	125.50	126.06	MH.3-IP.1
9	8	45.000	0.15	0.15	0.98	0.15	0.15	1.6	1.6	7.1	1.04	5.14	2.62	12	1.78	123.77	124.57	124.40	125.00	126.06	127.04	CO1-MH3
10	8	43.000	0.01	0.16	0.82	0.01	0.16	1.6	1.6	7.1	1.12	5.06	2.74	12	1.72	123.77	124.51	124.40	124.96	126.06	126.90	IN.3-MH.3
11	10	3.000	0.15	0.15	0.98	0.15	0.15	1.6	1.6	7.1	1.06	3.86	3.20	12	1.00	124.51	124.54	124.96	124.97	126.90	127.90	RL1-IN.3
12	End	22.000	0.00	0.10	0.00	0.00	0.08	0.0	6.5	6.6	0.52	3.86	3.02	12	1.00	109.90	110.12	110.15	110.42	113.45	114.07	MH1-OF1
13	12	69.000	0.03	0.10	0.98	0.03	0.08	1.6	6.1	6.7	0.52	3.86	2.66	12	1.00	110.12	110.81	110.42	111.11	114.07	116.76	MH2-MH1
14	13	22.000	0.00	0.07	0.00	0.00	0.05	0.0	5.3	7.0	0.36	3.86	2.10	12	1.00	110.81	111.03	111.11	111.28	116.76	115.59	BIN-MH2
15	14	61.000	0.00	0.07	0.00	0.00	0.05	0.0	4.8	7.1	0.37	0.61	3.07	6	1.00	111.03	111.64	111.31	111.95	115.59	117.20	TCON-IN1
16	15	67.000	0.01	0.01	0.98	0.01	0.01	1.6	1.6	7.1	0.07	0.61	1.14	6	1.00	111.64	112.31	111.95	112.44	117.20	117.44	IN1-TCON
17	15	7.000	0.06	0.06	0.70	0.04	0.04	3.6	3.6	7.1	0.30	0.61	2.52	6	1.00	111.64	111.71	111.95	111.99	117.20	117.00	IN2-TCON

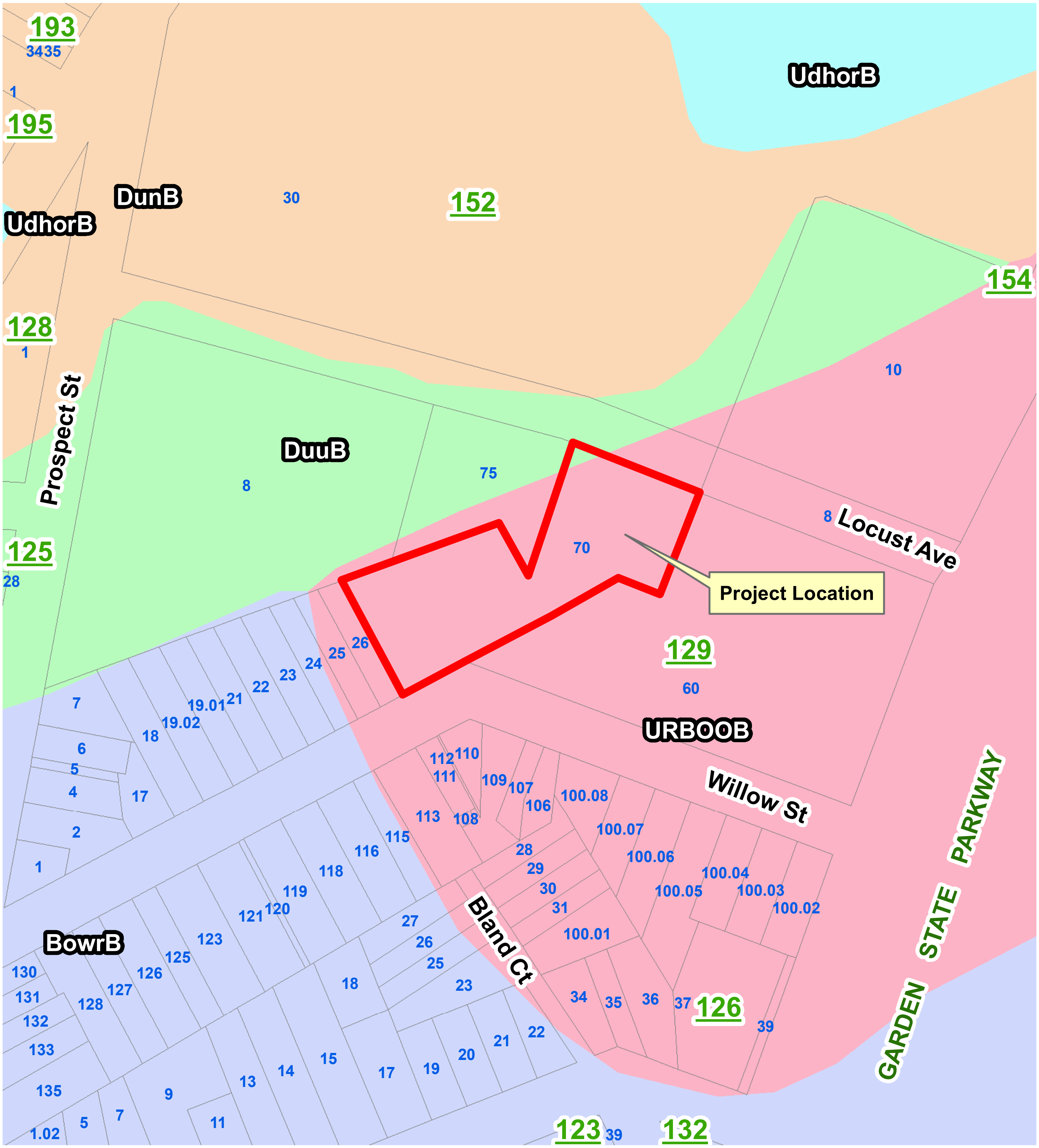
Project File: Site Conveyance Analysis.stm | Number of lines: 17 | Run Date: 2/7/2024

NOTES:Intensity = 56.46 / (Inlet time + 10.90) ^ 0.75; Return period =Yrs. 25 ; c = cir e = ellip b = box

APPENDIX G

Design References

NEGLIA
ENGINEERING ASSOCIATES



CERTIFICATE OF AUTHORIZATION (N.J.S.A. 45:8-56) 24GA27927000

0 75 150 300 Feet

1 inch = 150 feet

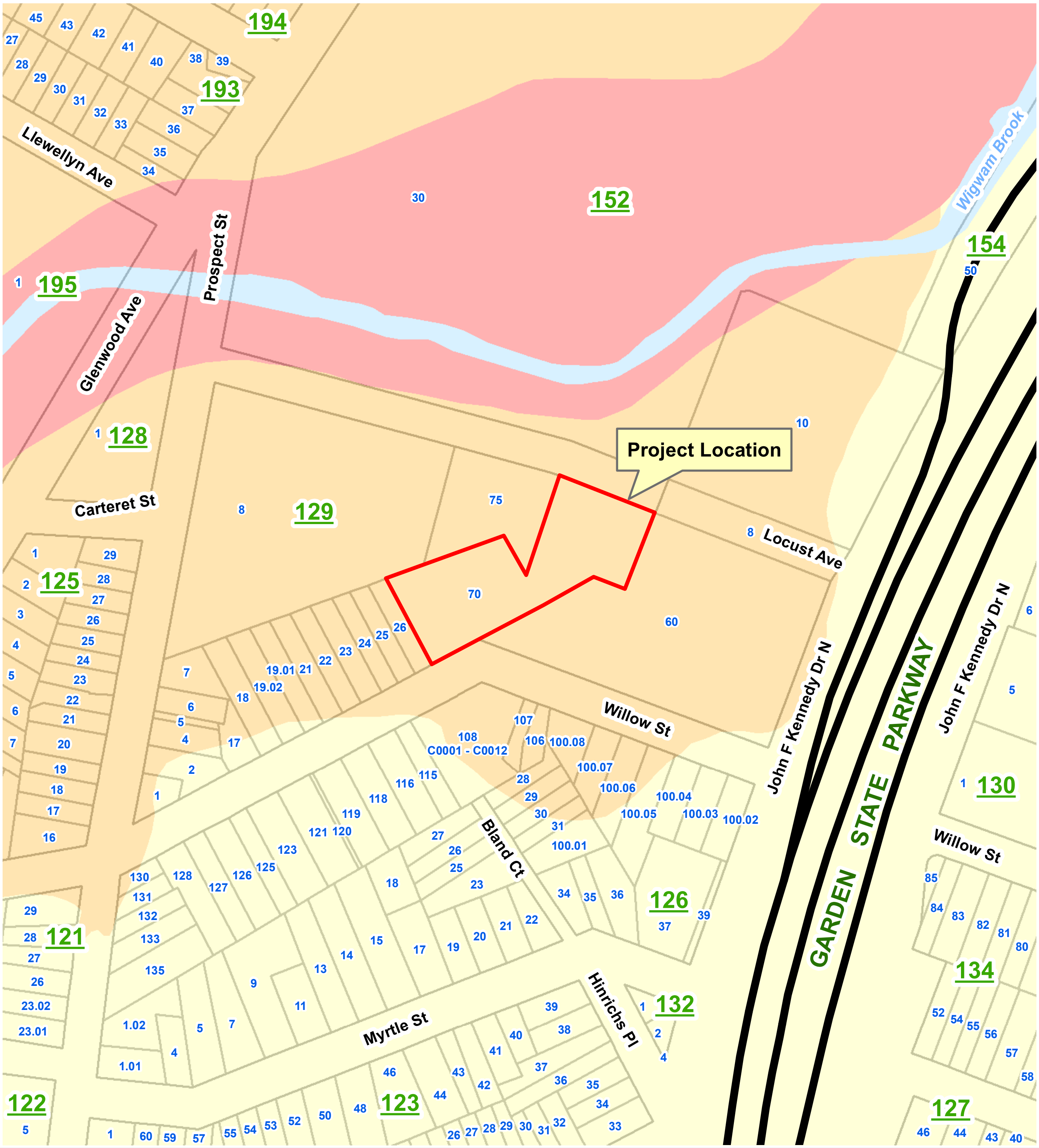
Soils Map
78-88 Locust Ave
Township of Bloomfield
Essex County, NJ

Subject Property

Soil Type
- BowrB
- DunB
- DuuB
- URBOOB
- UdhorB

NEGLIA

Drawn By: R.K.C	Checked By: D.J.	Project No:	Sheet No:	Map References:
Designed By:	Page:	BLFDPRV22.010	Figure 06	NJOGIS, NJDEP, USDA NRCS Web Soil Survey for Essex County 08/30/2021
Field Book No:	Date: March 2022			



CERTIFICATE OF AUTHORIZATION (N.J.S.A. 45:8-56) 24GA27927000

0 100 200 400 Feet

FEMA Flood Hazard Area Map
78-88 Locust Ave
Block 129 Lot 70
Township of Bloomfield
Essex County, NJ

N

NEGLIA

Legend

Subject Property

FEMA Flood Hazard 2020 Effective Data

Zone AE, Special Flood Hazard Area Floodway

Zone AE, Special Flood Hazard Area

Zone X, 0.2% Annual Chance Flood Hazard Area

Drawn By: R.K.C	Checked By: D.J.	Project No: BLFDPRV22.010	Sheet No: Figure 04	Map References: NJOGIS, NJDEP, Boundary Survey made by Neglia Group on 2022/03/24, FEMA NFHL Effective Data Essex County, 2020
Designed By:	Page:			
Field Book No:	Date: October 2023			

Table 10-4

Recommended Coefficient of Runoff Values for Various Selected Land Uses

Land Use	Description	Hydrologic Soils Group			
		A	B	C	D
Cultivated Land	without conservation treatment with conservation treatment	0.49 0.27	0.67 0.43	0.81 0.67	0.88 0.67
Pasture or Range Land Meadow	poor condition good condition good condition	0.38 --- ---	0.63 0.25 ---	0.78 0.51 0.41	0.84 0.65 0.61
Wood or Forest Land	thin stand, poor cover, no mulch good cover	--- ---	0.34 ---	0.59 0.45	0.70 0.59
Open Spaces, Lawns, Parks, Golf Courses, Cemeteries Good Condition Fair Condition	 grass cover on 75% or more grass cover on 50% to 75%	 --- ---	 0.25 0.45	 0.51 0.63	 0.65 0.74
Commercial and Business Area	85% impervious	0.84	0.90	0.93	0.96
Industrial Districts	72% impervious	0.67	0.81	0.88	0.92
Residential Average Lot Size (acres) 1/8 1/4 1/3 1/2 1	average % impervious 65 38 30 25 20	 0.59 0.29 --- --- ---	 0.76 0.55 0.49 0.45 0.41	 0.86 0.70 0.67 0.65 0.63	 0.90 0.80 0.78 0.76 0.74
Paved Areas	parking lots, roofs, driveways, etc.	0.99	0.99	0.99	0.99
Streets and Roads	paved with curbs & storm sewers gravel dirt	0.99 0.57 0.49	0.99 0.76 0.69	0.99 0.84 0.80	0.99 0.88 0.84

NOTE: Values are based on NRCS (formerly SCS) definitions and are average values.
Source: Technical Manual for Land Use Regulation Program, Bureau of Inland and Coastal Regulations, NJDEP Flood Hazard Area Permits, New Jersey Department of Environmental Protection

D. Determination of Rainfall Intensity Rate (I): Determine the Time of Concentration (Tc) in minutes for the drainage basin. Refer to Subpart 10.3.5 for additional information.

Determine the value for rainfall intensity for the selected recurrence interval with a duration equal to the Time of Concentration from Figures 10-B through 10-D. Rainfall Intensity "I" curves are presented in Figures 10-B through 10-D. The curves provide for variation in rainfall intensity according to location, storm frequency, and Time of Concentration. Select the curve of a particular region

NEW JERSEY 24 HOUR RAINFALL FREQUENCY DATA

Rainfall amounts in Inches

County	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Atlantic	2.72	3.31	4.30	5.16	6.46	7.61	8.90
Bergen	2.75	3.34	4.27	5.07	6.28	7.32	8.47
Burlington	2.77	3.36	4.34	5.18	6.45	7.56	8.81
Camden	2.73	3.31	4.25	5.06	6.28	7.34	8.52
Cape May	2.67	3.25	4.22	5.07	6.34	7.47	8.73
Cumberland	2.69	3.27	4.25	5.09	6.37	7.49	8.76
Essex	2.85	3.44	4.40	5.22	6.44	7.49	8.66
Gloucester	2.71	3.29	4.24	5.05	6.29	7.36	8.55
Hudson	2.73	3.31	4.23	5.02	6.19	7.20	8.31
Hunterdon	2.80	3.38	4.26	5.00	6.09	7.02	8.03
Mercer	2.74	3.31	4.23	5.01	6.19	7.20	8.33
Middlesex	2.76	3.35	4.30	5.12	6.36	7.43	8.63
Monmouth	2.79	3.38	4.38	5.23	6.53	7.66	8.94
Morris	2.94	3.54	4.47	5.24	6.37	7.32	8.35
Ocean	2.81	3.42	4.45	5.33	6.68	7.87	9.20
Passaic	2.87	3.47	4.42	5.23	6.43	7.47	8.62
Salem	2.69	3.26	4.20	5.00	6.22	7.28	8.45
Somerset	2.76	3.34	4.25	5.01	6.15	7.13	8.21
Sussex	2.68	3.22	4.02	4.70	5.72	6.60	7.58
Union	2.80	3.39	4.35	5.17	6.42	7.49	8.69
Warren	2.78	3.34	4.18	4.89	5.93	6.83	7.82

Notes: The average point rainfall amounts listed above were developed from data contained in NOAA Atlas 14 Volume 2.

Point rainfall estimates for specific locations may be obtained from the Precipitation Frequency Data Server located at http://www.nws.noaa.gov/ohd/hdsc/

For most hydrologic design procedures, the rainfall amounts listed above may be rounded to the nearest tenth of an inch.

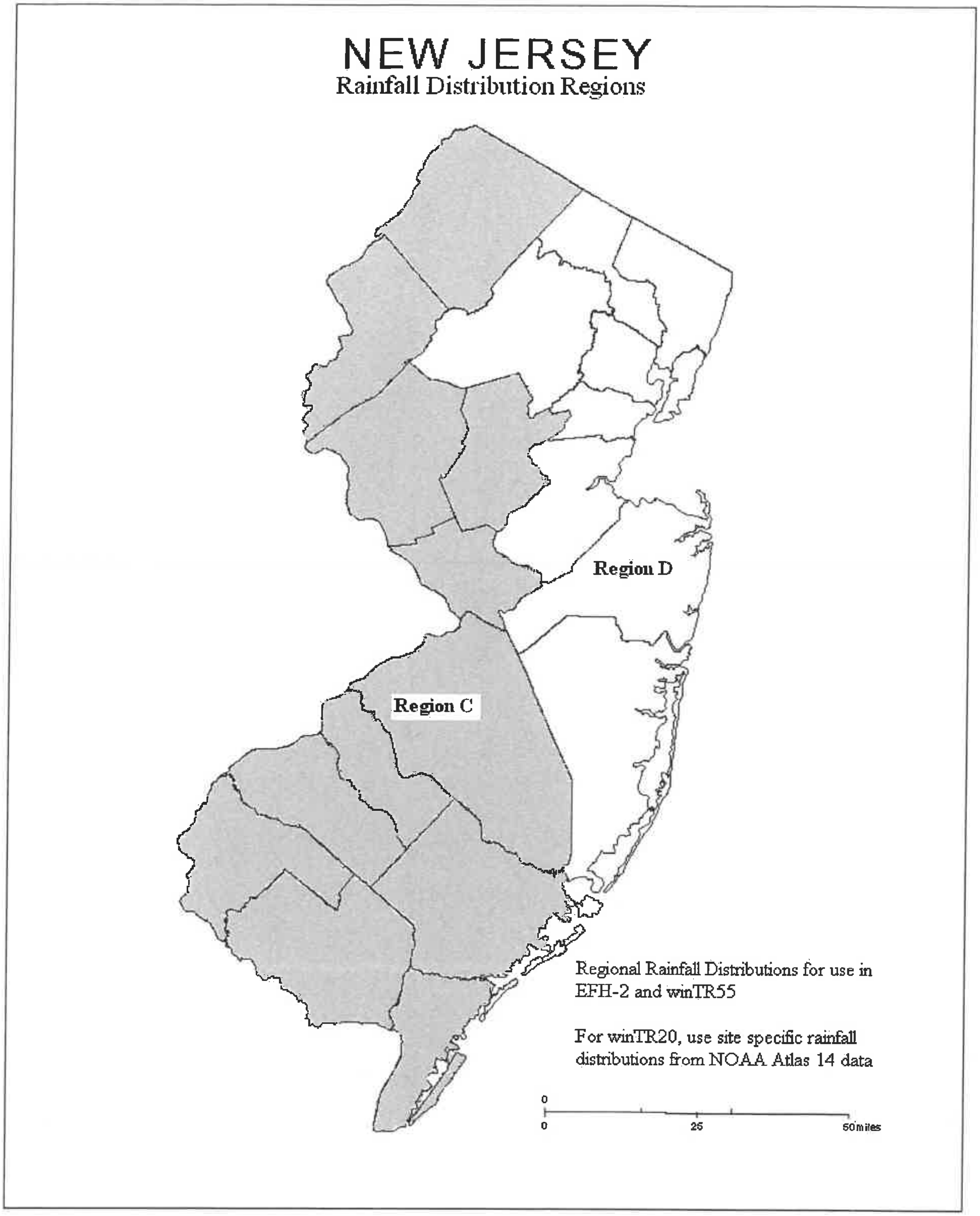

NEW JERSEY
Rainfall Distribution Regions
Region D
Region C
Regional Rainfall Distributions for use in EFH-2 and winTR55
For winTR20, use site specific rainfall distributions from NOAA Atlas 14 data
0
0
25
50 miles

Table 10-4

Recommended Coefficient of Runoff Values for Various Selected Land Uses

Land Use	Description	Hydrologic Soils Group			
		A	B	C	D
Cultivated Land	without conservation treatment with conservation treatment	0.49 0.27	0.67 0.43	0.81 0.67	0.88 0.67
Pasture or Range Land Meadow	poor condition good condition good condition	0.38 --- ---	0.63 0.25 ---	0.78 0.51 0.41	0.84 0.65 0.61
Wood or Forest Land	thin stand, poor cover, no mulch good cover	--- ---	0.34 ---	0.59 0.45	0.70 0.59
Open Spaces, Lawns, Parks, Golf Courses, Cemeteries Good Condition Fair Condition	 grass cover on 75% or more grass cover on 50% to 75%	 --- ---	 0.25 0.45	 0.51 0.63	 0.65 0.74
Commercial and Business Area	85% impervious	0.84	0.90	0.93	0.96
Industrial Districts	72% impervious	0.67	0.81	0.88	0.92
Residential Average Lot Size (acres) 1/8 1/4 1/3 1/2 1	average % impervious 65 38 30 25 20	 0.59 0.29 --- --- ---	 0.76 0.55 0.49 0.45 0.41	 0.86 0.70 0.67 0.65 0.63	 0.90 0.80 0.78 0.76 0.74
Paved Areas	parking lots, roofs, driveways, etc.	0.99	0.99	0.99	0.99
Streets and Roads	paved with curbs & storm sewers gravel dirt	0.99 0.57 0.49	0.99 0.76 0.69	0.99 0.84 0.80	0.99 0.88 0.84

NOTE: Values are based on NRCS (formerly SCS) definitions and are average values.

Source: Technical Manual for Land Use Regulation Program, Bureau of Inland and Coastal Regulations, NJDEP Flood Hazard Area Permits, New Jersey Department of Environmental Protection

D. Determination of Rainfall Intensity Rate (I): Determine the Time of Concentration (Tc) in minutes for the drainage basin. Refer to Subpart 10.3.5 for additional information.

Determine the value for rainfall intensity for the selected recurrence interval with a duration equal to the Time of Concentration from Figures 10-B through 10-D. Rainfall Intensity "I" curves are presented in Figures 10-B through 10-D. The curves provide for variation in rainfall intensity according to location, storm frequency, and Time of Concentration. Select the curve of a particular region

NOAA Atlas 14, Volume 2, Version 3
Location name: Bloomfield, New Jersey, USA*
Latitude: 40.7856°, Longitude: -74.202°
Elevation: 116 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** (0.306-0.366)	**0.399** (0.365-0.437)	**0.474** (0.432-0.520)	**0.527** (0.480-0.577)	**0.592** (0.537-0.649)	**0.638** (0.577-0.699)	**0.684** (0.615-0.749)	**0.729** (0.651-0.799)	**0.781** (0.690-0.858)	**0.818** (0.718-0.902)
10-min	**0.532** (0.487-0.584)	**0.636** (0.582-0.697)	**0.753** (0.687-0.827)	**0.836** (0.762-0.916)	**0.939** (0.852-1.03)	**1.01** (0.914-1.11)	**1.08** (0.972-1.18)	**1.14** (1.02-1.25)	**1.22** (1.08-1.34)	**1.28** (1.12-1.41)
15-min	**0.664** (0.607-0.728)	**0.796** (0.729-0.873)	**0.949** (0.866-1.04)	**1.06** (0.961-1.16)	**1.18** (1.08-1.30)	**1.27** (1.15-1.40)	**1.36** (1.22-1.49)	**1.44** (1.28-1.58)	**1.54** (1.36-1.69)	**1.60** (1.40-1.76)
30-min	**0.905** (0.827-0.992)	**1.10** (1.00-1.20)	**1.34** (1.22-1.47)	**1.52** (1.38-1.66)	**1.74** (1.58-1.91)	**1.91** (1.72-2.09)	**2.07** (1.86-2.27)	**2.22** (1.98-2.43)	**2.42** (2.14-2.66)	**2.56** (2.25-2.83)
60-min	**1.12** (1.03-1.23)	**1.37** (1.25-1.50)	**1.72** (1.57-1.88)	**1.97** (1.80-2.16)	**2.31** (2.10-2.54)	**2.57** (2.32-2.82)	**2.84** (2.55-3.11)	**3.10** (2.77-3.40)	**3.45** (3.05-3.80)	**3.72** (3.26-4.10)
2-hr	**1.38** (1.26-1.52)	**1.68** (1.53-1.85)	**2.13** (1.94-2.34)	**2.48** (2.25-2.72)	**2.96** (2.67-3.25)	**3.36** (3.01-3.68)	**3.76** (3.35-4.13)	**4.19** (3.70-4.60)	**4.79** (4.18-5.26)	**5.26** (4.55-5.79)
3-hr	**1.54** (1.41-1.69)	**1.87** (1.71-2.06)	**2.38** (2.17-2.62)	**2.77** (2.52-3.04)	**3.31** (3.00-3.64)	**3.76** (3.38-4.12)	**4.22** (3.77-4.62)	**4.70** (4.16-5.15)	**5.36** (4.69-5.89)	**5.90** (5.11-6.48)
6-hr	**1.99** (1.82-2.18)	**2.42** (2.21-2.65)	**3.05** (2.79-3.34)	**3.57** (3.25-3.90)	**4.31** (3.89-4.70)	**4.92** (4.42-5.36)	**5.58** (4.96-6.07)	**6.28** (5.53-6.83)	**7.28** (6.32-7.94)	**8.11** (6.96-8.86)
12-hr	**2.46** (2.25-2.71)	**2.99** (2.74-3.29)	**3.80** (3.47-4.18)	**4.48** (4.07-4.91)	**5.47** (4.93-5.97)	**6.33** (5.65-6.89)	**7.25** (6.40-7.88)	**8.26** (7.21-8.99)	**9.76** (8.35-10.6)	**11.0** (9.29-12.0)
24-hr	**2.78** (2.58-3.02)	**3.37** (3.12-3.66)	**4.32** (3.99-4.69)	**5.13** (4.73-5.57)	**6.36** (5.82-6.88)	**7.42** (6.74-8.02)	**8.60** (7.73-9.30)	**9.91** (8.81-10.7)	**11.9** (10.4-12.9)	**13.6** (11.7-14.8)
2-day	**3.28** (3.02-3.56)	**3.96** (3.66-4.32)	**5.06** (4.67-5.51)	**5.99** (5.50-6.51)	**7.34** (6.71-7.98)	**8.50** (7.71-9.24)	**9.76** (8.78-10.6)	**11.1** (9.93-12.2)	**13.2** (11.6-14.5)	**14.9** (12.9-16.5)
3-day	**3.45** (3.19-3.74)	**4.18** (3.86-4.54)	**5.31** (4.91-5.77)	**6.26** (5.76-6.79)	**7.63** (6.99-8.27)	**8.79** (8.00-9.54)	**10.0** (9.06-10.9)	**11.4** (10.2-12.4)	**13.4** (11.8-14.7)	**15.1** (13.1-16.6)
4-day	**3.62** (3.36-3.92)	**4.39** (4.07-4.75)	**5.56** (5.14-6.02)	**6.52** (6.02-7.07)	**7.92** (7.27-8.57)	**9.08** (8.28-9.83)	**10.3** (9.35-11.2)	**11.7** (10.5-12.7)	**13.6** (12.1-14.9)	**15.3** (13.3-16.8)
7-day	**4.28** (3.98-4.61)	**5.14** (4.79-5.54)	**6.39** (5.94-6.88)	**7.42** (6.88-7.99)	**8.90** (8.20-9.58)	**10.1** (9.28-10.9)	**11.4** (10.4-12.4)	**12.8** (11.6-13.9)	**14.8** (13.2-16.2)	**16.5** (14.5-18.1)
10-day	**4.90** (4.58-5.26)	**5.85** (5.47-6.28)	**7.16** (6.69-7.69)	**8.24** (7.67-8.84)	**9.77** (9.05-10.5)	**11.0** (10.2-11.8)	**12.3** (11.3-13.3)	**13.7** (12.5-14.8)	**15.7** (14.1-17.1)	**17.3** (15.3-18.9)
20-day	**6.61** (6.21-7.04)	**7.85** (7.37-8.36)	**9.37** (8.79-9.98)	**10.6** (9.90-11.2)	**12.2** (11.4-13.0)	**13.4** (12.5-14.3)	**14.7** (13.6-15.7)	**16.0** (14.7-17.1)	**17.7** (16.2-19.1)	**19.1** (17.3-20.6)
30-day	**8.25** (7.80-8.72)	**9.74** (9.20-10.3)	**11.4** (10.8-12.0)	**12.6** (11.9-13.4)	**14.3** (13.4-15.1)	**15.5** (14.6-16.5)	**16.7** (15.7-17.8)	**17.9** (16.7-19.1)	**19.4** (18.0-20.8)	**20.6** (18.9-22.1)
45-day	**10.5** (9.94-11.0)	**12.3** (11.7-13.0)	**14.2** (13.5-15.0)	**15.7** (14.8-16.5)	**17.5** (16.5-18.4)	**18.9** (17.8-19.9)	**20.2** (19.0-21.3)	**21.5** (20.1-22.7)	**23.1** (21.5-24.5)	**24.2** (22.5-25.8)
60-day	**12.6** (11.9-13.2)	**14.7** (14.0-15.5)	**16.8** (16.0-17.7)	**18.4** (17.5-19.4)	**20.4** (19.3-21.4)	**21.8** (20.6-23.0)	**23.1** (21.8-24.4)	**24.4** (23.0-25.7)	**25.9** (24.3-27.4)	**27.0** (25.2-28.6)

[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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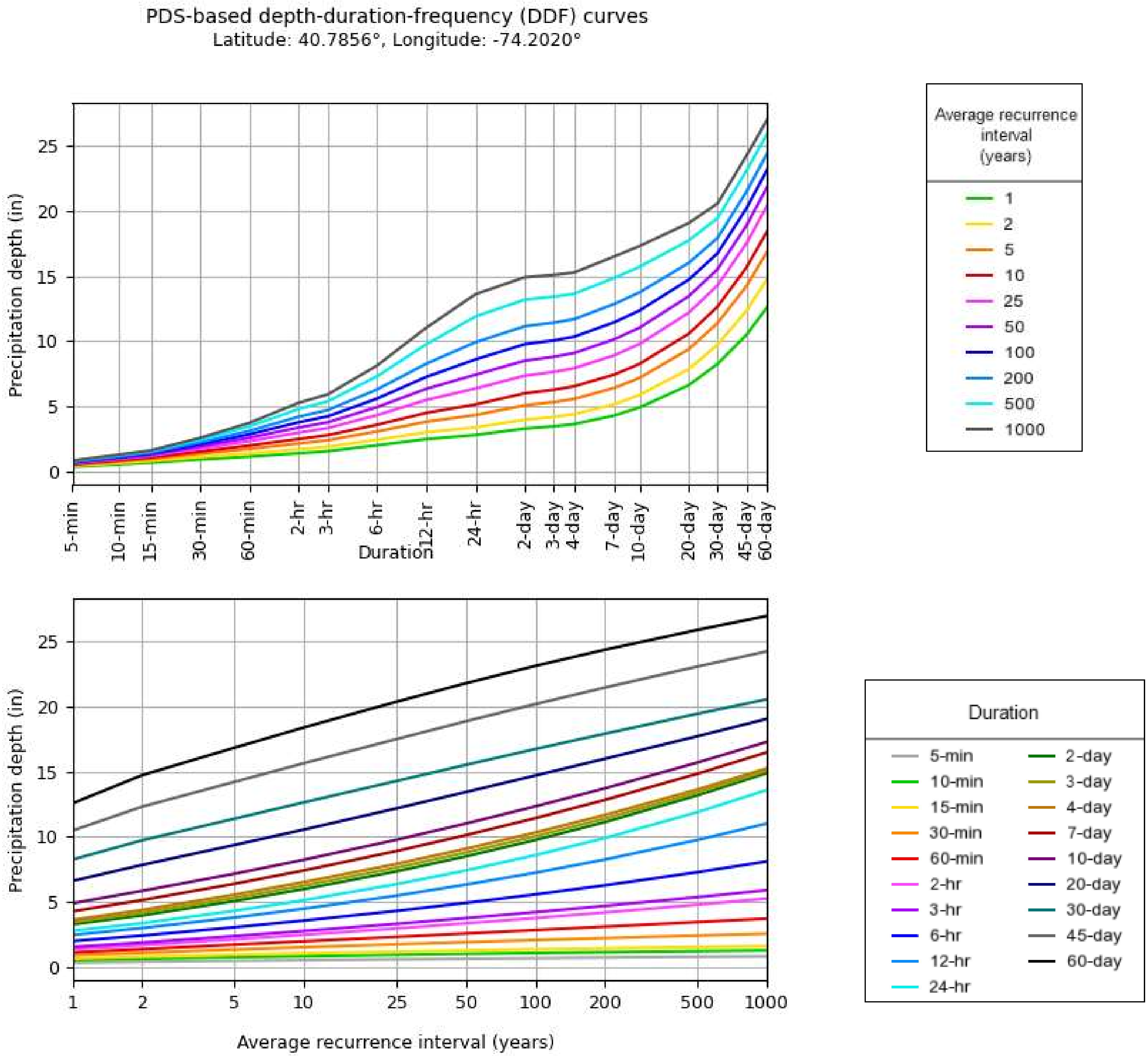
PF graphical



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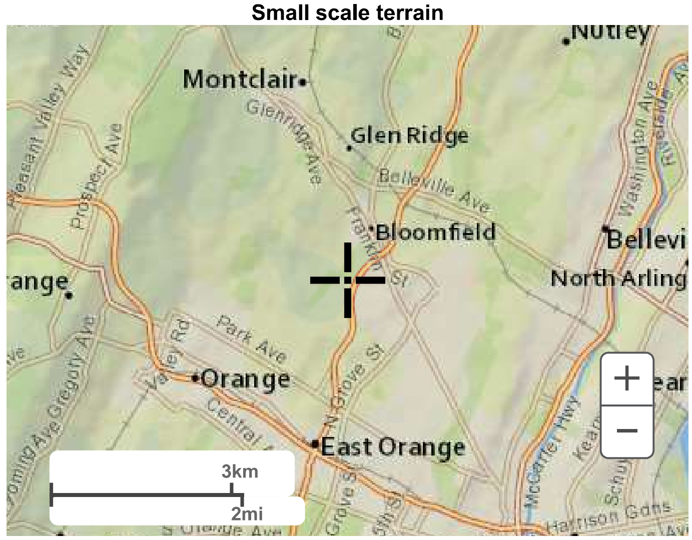
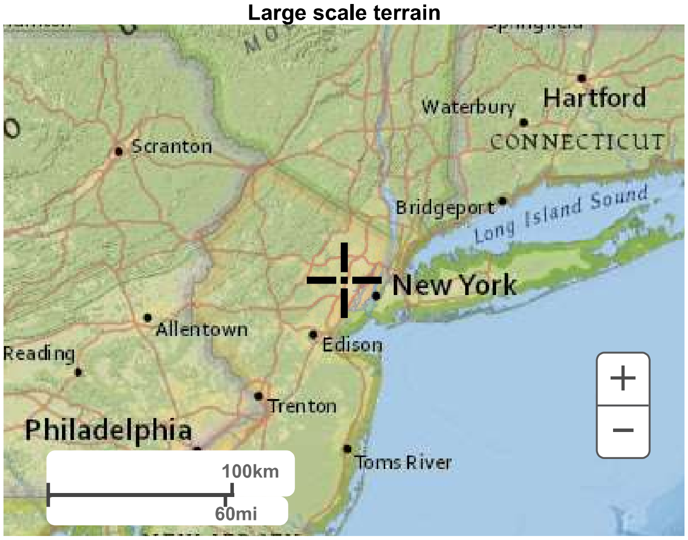
Maps & aerials

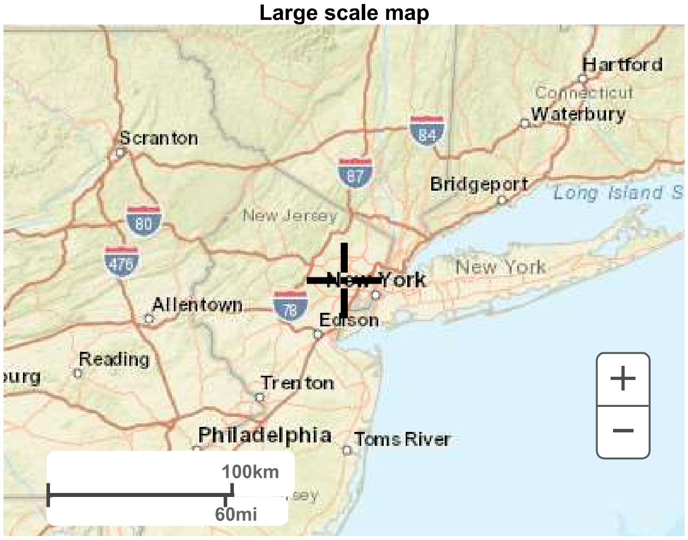
Small scale terrain



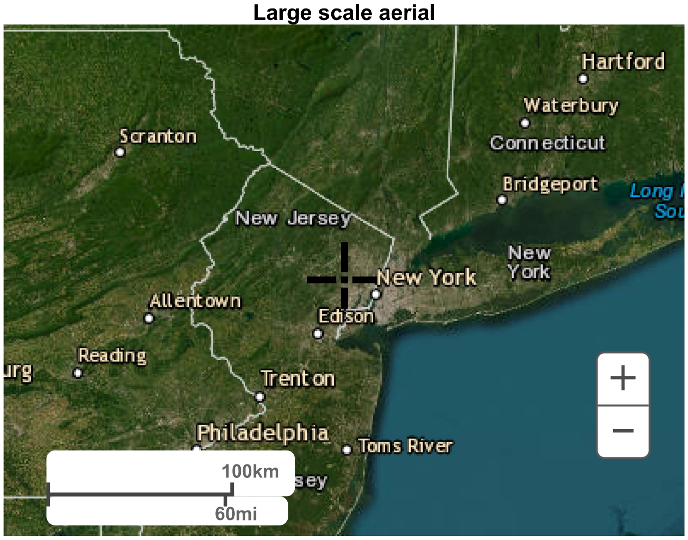
Large scale terrain



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

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NOAA Atlas 14, Volume 2, Version 3
Location name: Bloomfield, New Jersey, USA*
Latitude: 40.7856°, Longitude: -74.202°
Elevation: 116 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** (3.67-4.39)	**4.79** (4.38-5.24)	**5.69** (5.18-6.24)	**6.32** (5.76-6.92)	**7.10** (6.44-7.79)	**7.66** (6.92-8.39)	**8.21** (7.38-8.99)	**8.75** (7.81-9.59)	**9.37** (8.28-10.3)	**9.82** (8.62-10.8)
10-min	**3.19** (2.92-3.50)	**3.82** (3.49-4.18)	**4.52** (4.12-4.96)	**5.02** (4.57-5.50)	**5.63** (5.11-6.17)	**6.07** (5.48-6.65)	**6.49** (5.83-7.11)	**6.86** (6.13-7.52)	**7.34** (6.49-8.06)	**7.66** (6.72-8.44)
15-min	**2.66** (2.43-2.91)	**3.18** (2.92-3.49)	**3.80** (3.46-4.16)	**4.22** (3.84-4.62)	**4.74** (4.30-5.19)	**5.10** (4.60-5.58)	**5.45** (4.90-5.97)	**5.75** (5.14-6.31)	**6.15** (5.44-6.76)	**6.40** (5.62-7.06)
30-min	**1.81** (1.65-1.98)	**2.19** (2.00-2.40)	**2.68** (2.45-2.95)	**3.04** (2.77-3.33)	**3.49** (3.17-3.82)	**3.81** (3.45-4.18)	**4.14** (3.72-4.53)	**4.44** (3.97-4.87)	**4.84** (4.28-5.32)	**5.12** (4.50-5.65)
60-min	**1.12** (1.03-1.23)	**1.37** (1.25-1.50)	**1.72** (1.57-1.88)	**1.97** (1.80-2.16)	**2.31** (2.10-2.54)	**2.57** (2.32-2.82)	**2.84** (2.55-3.11)	**3.10** (2.77-3.40)	**3.45** (3.05-3.80)	**3.72** (3.26-4.10)
2-hr	**0.689** (0.629-0.758)	**0.839** (0.766-0.924)	**1.06** (0.969-1.17)	**1.24** (1.12-1.36)	**1.48** (1.34-1.62)	**1.68** (1.51-1.84)	**1.88** (1.68-2.06)	**2.10** (1.85-2.30)	**2.39** (2.09-2.63)	**2.63** (2.27-2.90)
3-hr	**0.512** (0.469-0.563)	**0.624** (0.570-0.686)	**0.791** (0.722-0.870)	**0.922** (0.839-1.01)	**1.10** (0.997-1.21)	**1.25** (1.12-1.37)	**1.40** (1.25-1.54)	**1.56** (1.38-1.71)	**1.79** (1.56-1.96)	**1.96** (1.70-2.16)
6-hr	**0.332** (0.304-0.364)	**0.403** (0.369-0.442)	**0.509** (0.465-0.557)	**0.596** (0.542-0.650)	**0.719** (0.650-0.784)	**0.822** (0.737-0.895)	**0.931** (0.828-1.01)	**1.05** (0.923-1.14)	**1.22** (1.06-1.33)	**1.36** (1.16-1.48)
12-hr	**0.204** (0.186-0.225)	**0.248** (0.227-0.273)	**0.315** (0.287-0.346)	**0.372** (0.338-0.407)	**0.454** (0.409-0.495)	**0.525** (0.468-0.571)	**0.601** (0.531-0.654)	**0.685** (0.598-0.746)	**0.809** (0.693-0.881)	**0.915** (0.771-0.997)
24-hr	**0.115** (0.107-0.125)	**0.140** (0.130-0.152)	**0.179** (0.166-0.195)	**0.213** (0.197-0.232)	**0.264** (0.242-0.286)	**0.309** (0.280-0.334)	**0.358** (0.321-0.387)	**0.412** (0.367-0.447)	**0.495** (0.432-0.538)	**0.566** (0.487-0.618)
2-day	**0.068** (0.062-0.074)	**0.082** (0.076-0.089)	**0.105** (0.097-0.114)	**0.124** (0.114-0.135)	**0.152** (0.139-0.166)	**0.176** (0.160-0.192)	**0.203** (0.182-0.221)	**0.232** (0.206-0.253)	**0.274** (0.240-0.301)	**0.310** (0.268-0.342)
3-day	**0.047** (0.044-0.052)	**0.057** (0.053-0.062)	**0.073** (0.068-0.080)	**0.086** (0.080-0.094)	**0.105** (0.097-0.114)	**0.122** (0.111-0.132)	**0.139** (0.125-0.151)	**0.158** (0.141-0.172)	**0.186** (0.163-0.203)	**0.209** (0.181-0.230)
4-day	**0.037** (0.035-0.040)	**0.045** (0.042-0.049)	**0.057** (0.053-0.062)	**0.067** (0.062-0.073)	**0.082** (0.075-0.089)	**0.094** (0.086-0.102)	**0.107** (0.097-0.116)	**0.121** (0.109-0.132)	**0.142** (0.125-0.155)	**0.159** (0.138-0.174)
7-day	**0.025** (0.023-0.027)	**0.030** (0.028-0.032)	**0.038** (0.035-0.040)	**0.044** (0.040-0.047)	**0.052** (0.048-0.057)	**0.060** (0.055-0.064)	**0.068** (0.061-0.073)	**0.076** (0.068-0.082)	**0.088** (0.078-0.096)	**0.098** (0.086-0.107)
10-day	**0.020** (0.019-0.021)	**0.024** (0.022-0.026)	**0.029** (0.027-0.032)	**0.034** (0.031-0.036)	**0.040** (0.037-0.043)	**0.045** (0.042-0.049)	**0.051** (0.047-0.055)	**0.057** (0.051-0.061)	**0.065** (0.058-0.071)	**0.072** (0.063-0.078)
20-day	**0.013** (0.012-0.014)	**0.016** (0.015-0.017)	**0.019** (0.018-0.020)	**0.022** (0.020-0.023)	**0.025** (0.023-0.027)	**0.027** (0.026-0.029)	**0.030** (0.028-0.032)	**0.033** (0.030-0.035)	**0.036** (0.033-0.039)	**0.039** (0.035-0.042)
30-day	**0.011** (0.010-0.012)	**0.013** (0.012-0.014)	**0.015** (0.014-0.016)	**0.017** (0.016-0.018)	**0.019** (0.018-0.020)	**0.021** (0.020-0.022)	**0.023** (0.021-0.024)	**0.024** (0.023-0.026)	**0.026** (0.024-0.028)	**0.028** (0.026-0.030)
45-day	**0.009** (0.009-0.010)	**0.011** (0.010-0.012)	**0.013** (0.012-0.013)	**0.014** (0.013-0.015)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)	**0.019** (0.018-0.021)	**0.021** (0.019-0.022)	**0.022** (0.020-0.023)
60-day	**0.008** (0.008-0.009)	**0.010** (0.009-0.010)	**0.011** (0.011-0.012)	**0.012** (0.012-0.013)	**0.014** (0.013-0.014)	**0.015** (0.014-0.015)	**0.016** (0.015-0.016)	**0.016** (0.015-0.017)	**0.017** (0.016-0.019)	**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.

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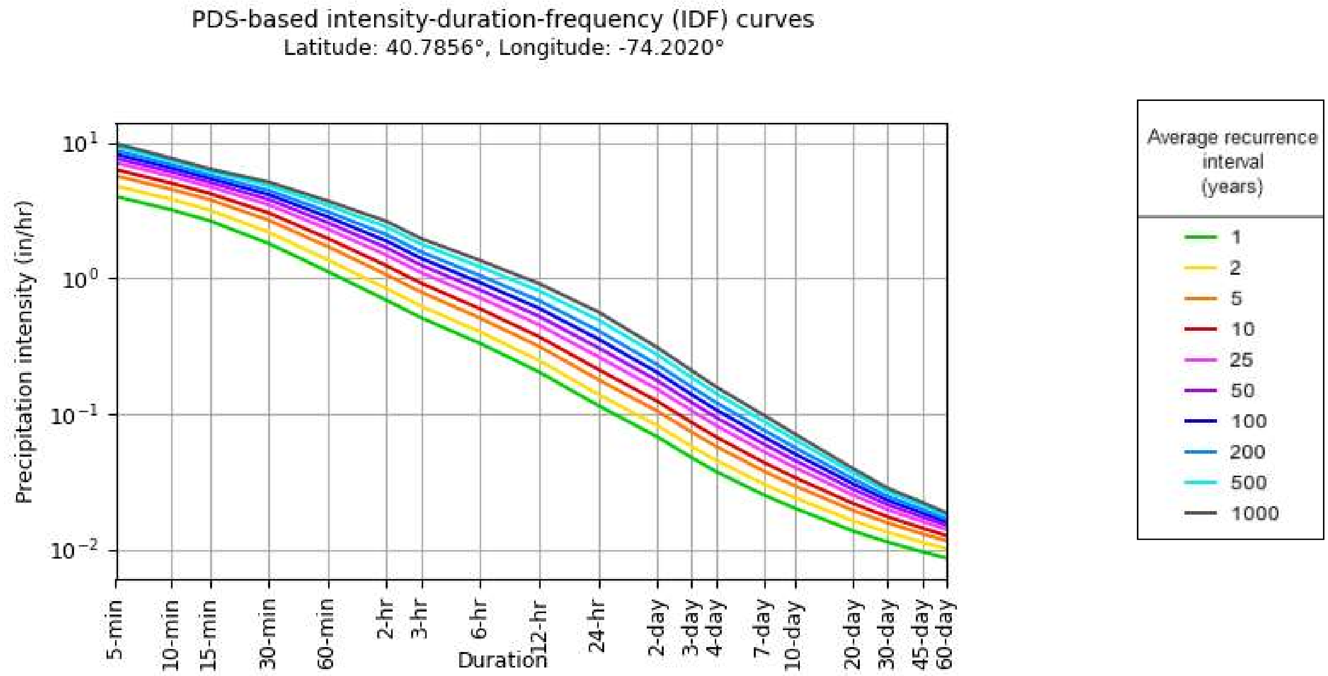
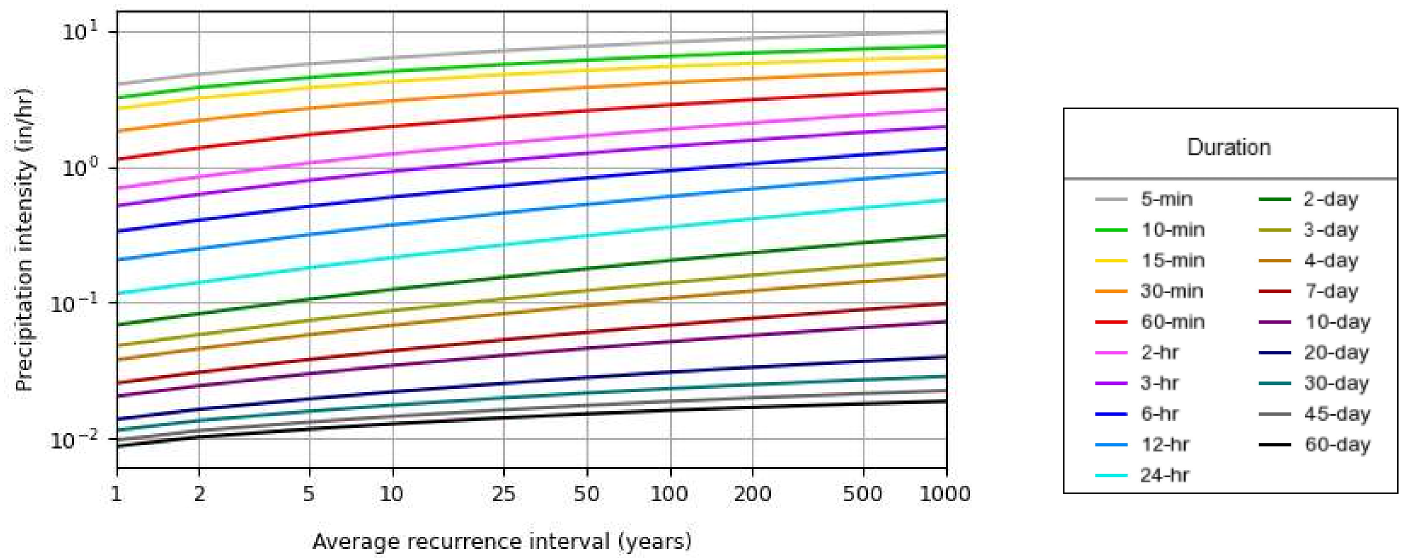
PF graphical





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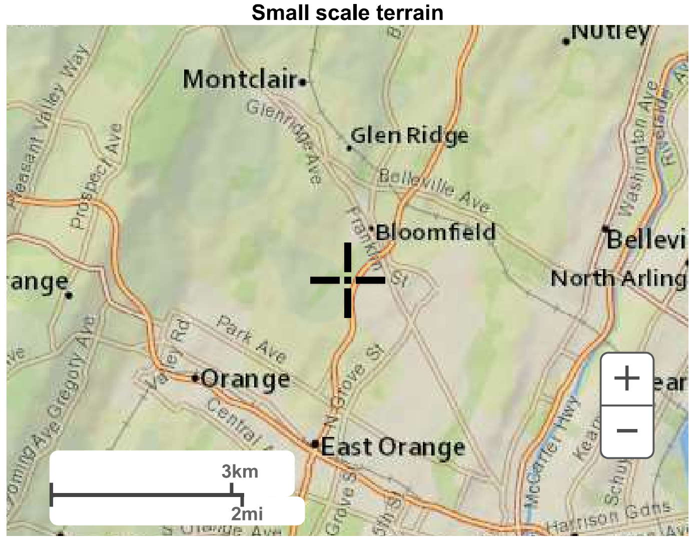
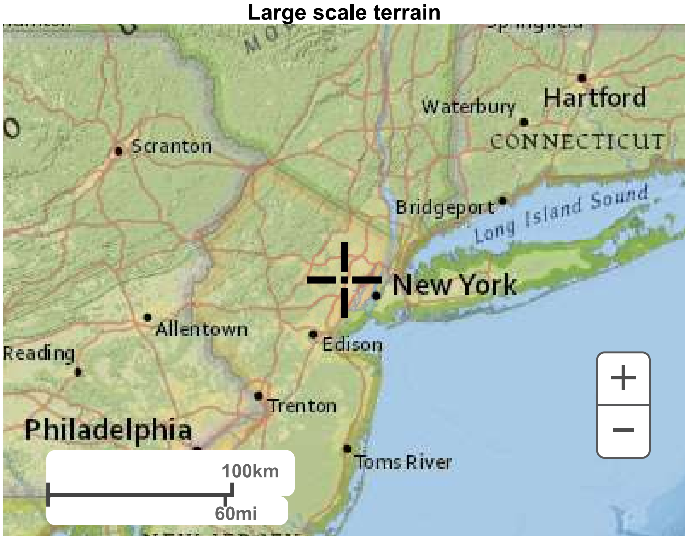
Maps & aerials

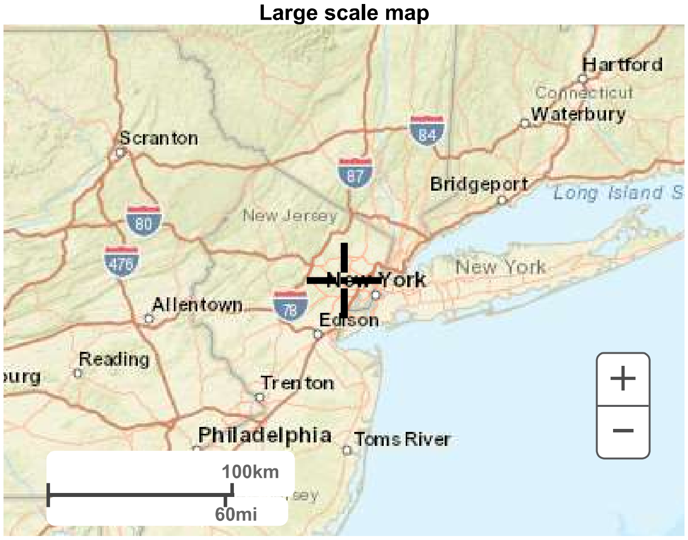
Small scale terrain



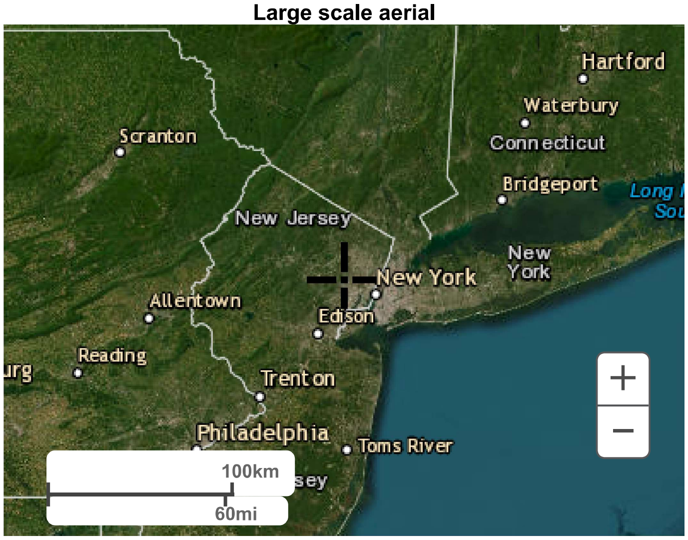
Large scale terrain



Large scale map



Large scale aerial



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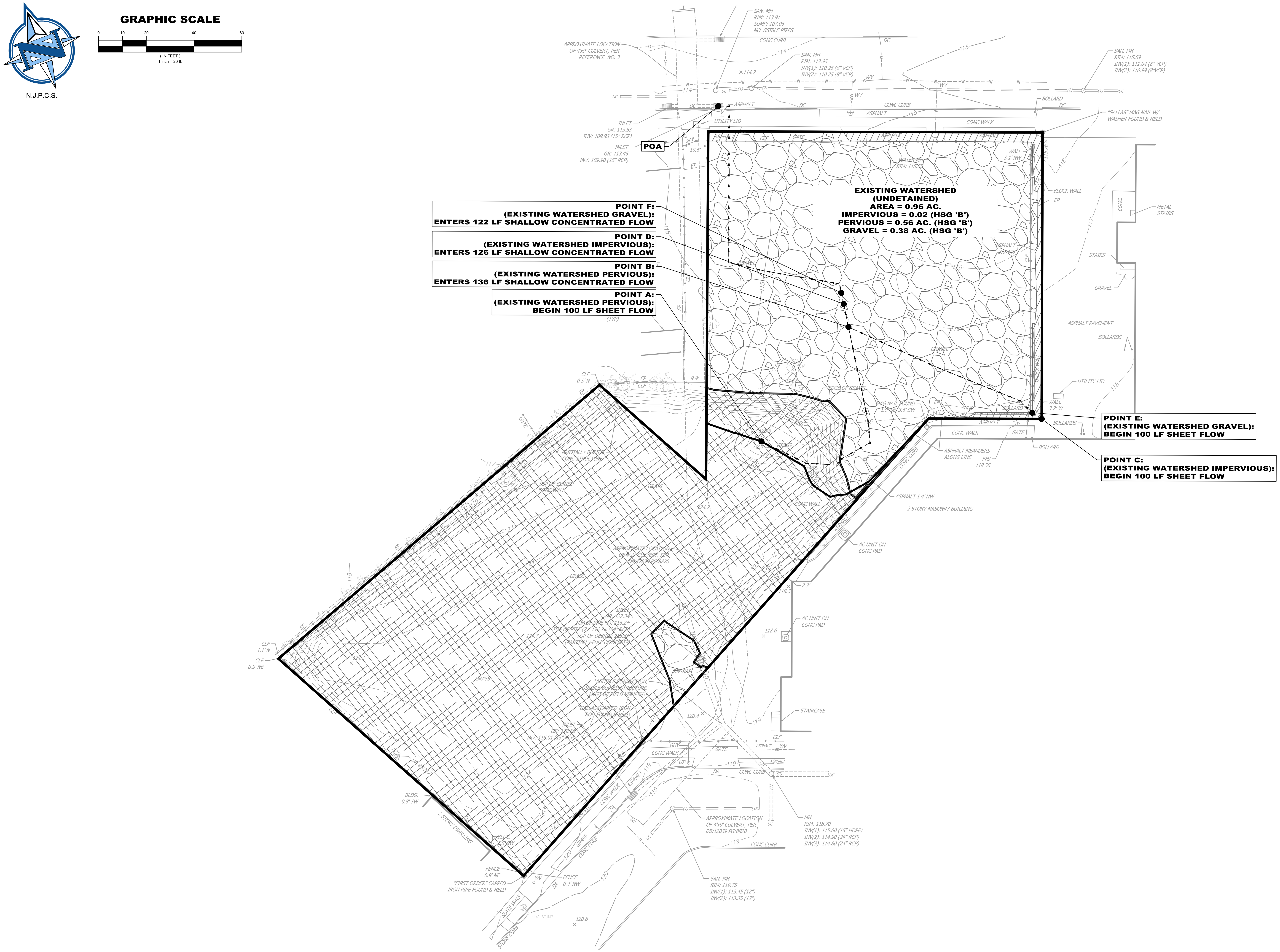


DRAINAGE AREA PLAN LEGEND

- IMPERVIOUS AREA
- PERVIOUS (LAWN, FAIR CONDITION)
- GRAVEL
- TIME OF CONCENTRATION PATH

COVERAGE CALCULATIONS

EXISTING MOTOR VEHICLE AREA:
0 SF
PROPOSED MOTOR VEHICLE AREA:
12,202.62 SF

APPLICANT	OWNER
IOANNIS GOLEMIS 8701 CHURCHILL ROAD, APT. 1501 NORTH BERGEN, NJ 07047	GOLEMIS REALTY LLC 500 PASSAIC AVENUE EAST NEWARK, NJ 07029

CERTIFICATE OF AUTHORIZATION (N.J.S.A. 45:8-56) 24GA27927000

REVISIONS					
NO.	DATE	DESCRIPTION	DRAWN	DESIGNED	CHECKED

DAVID JUZMESKI, P.E., P.P.
PROFESSIONAL ENGINEER
N.J. LICENSE NO. 46751
PROFESSIONAL PLANNER
N.J. LICENSE NO. 6154

JOHN J. DUNLEA, P.E.
PROFESSIONAL ENGINEER
N.J. LICENSE NO. 56308

A PROJECT OF
NEGLIA ENGINEERING ASSOCIATES
34 PARK AVENUE, LYNDHURST, NEW JERSEY
TEL: 201-939-8805 FAX: 201-939-0846 E-MAIL: NEA@NEGLIAENGINEERING.COM

MICHAEL J. NEGLIA, P.E., P.L.S., P.P.
PROFESSIONAL ENGINEER N.J. LICENSE NO. 38604
PROFESSIONAL LAND SURVEYOR N.J. LICENSE NO. 38604
PROFESSIONAL PLANNER N.J. LICENSE NO. 33LI00569800

EXISTING DRAINAGE AREA PLAN
PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT
78 LOCUST AVENUE (BLOCK 129, LOT 70)
TOWNSHIP OF BLOOMFIELD
ESSEX COUNTY NEW JERSEY

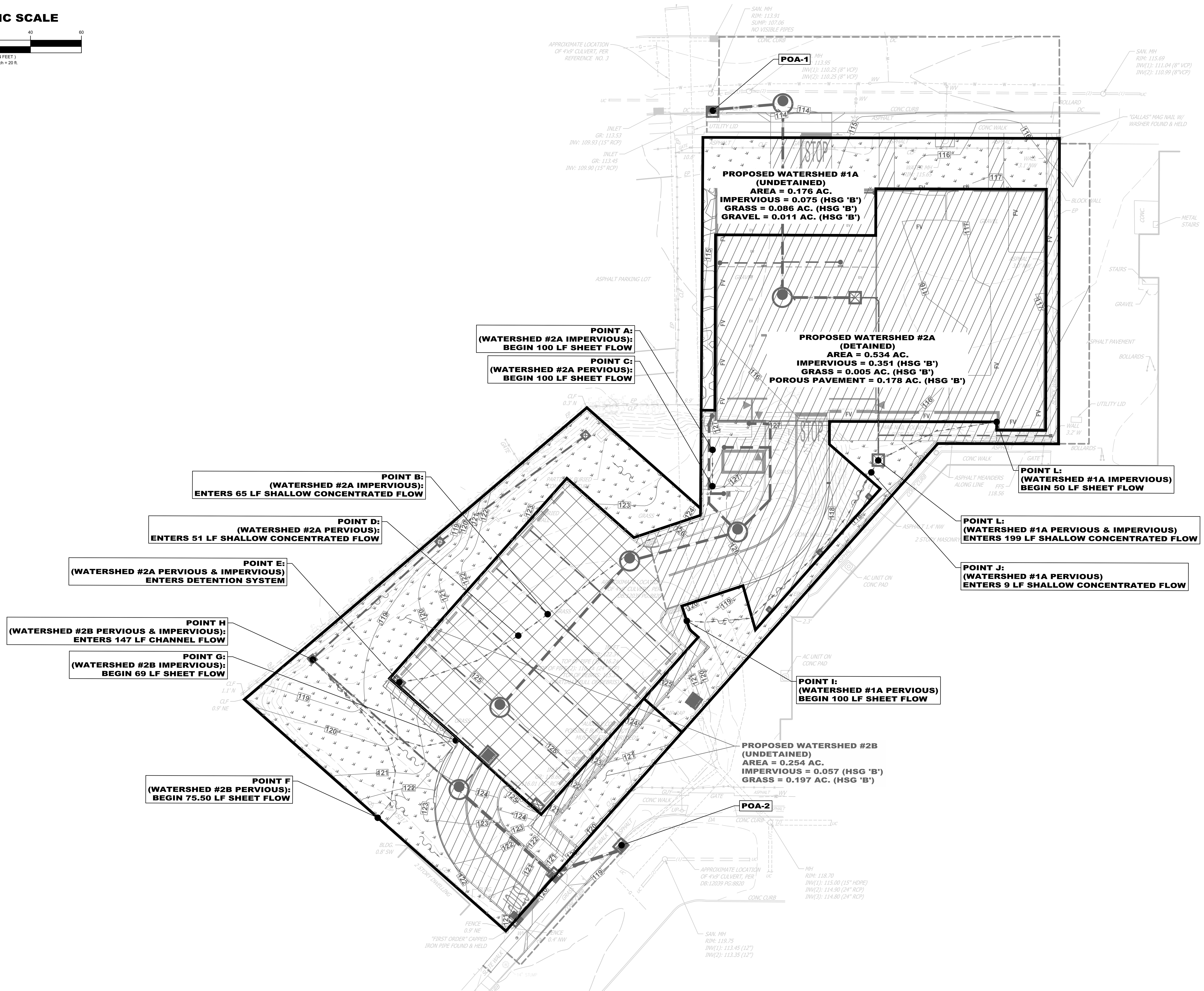
DRAWN BY: J.J.L. / L.A.R.	CHECKED BY: D.J. / J.J.D.	PROJECT NO.: BLFDPRV22.010	SHEET NO.: FIGURE 1
DESIGNED BY: J.J.D. / J.J.L. / L.A.R.	SCALE: 1"=20'		DATE: FEBRUARY 8, 2024
FIELD BOOK NO.:	PAGE:		

GRAPHIC SCALE

0 10 20 40 60

(IN FEET)
1 inch = 20 ft.

N.J.P.C.S.



DRAINAGE AREA PLAN LEGEND

- IMPERVIOUS AREA
- POROUS PAVEMENT
- PERVIOUS AREA (LAWN, GOOD CONDITION)
- GRAVEL
- TIME OF CONCENTRATION PATH

COVERAGE CALCULATIONS

EXISTING MOTOR VEHICLE AREA:
0 SF
PROPOSED MOTOR VEHICLE AREA:
12,202.62 SF

APPLICANT	OWNER
IOANNIS GOLEMIS 8701 CHURCHILL ROAD, APT. 1501 NORTH BERGEN, NJ 07047	GOLEMIS REALTY LLC 500 PASSAIC AVENUE EAST NEWARK, NJ 07029

CERTIFICATE OF AUTHORIZATION (N.J.S.A. 45:8-56) 24GA27927000

REVISIONS					
NO.	DATE	DESCRIPTION	DRAWN	DESIGNED	CHECKED

DAVID JUZMESKI, P.E., P.P.
PROFESSIONAL ENGINEER
N.J. LICENSE NO. 46751
PROFESSIONAL PLANNER
N.J. LICENSE NO. 6154

JOHN J. DUNLEA, P.E.
PROFESSIONAL ENGINEER
N.J. LICENSE NO. 56308

A PROJECT OF
NEGLIA ENGINEERING ASSOCIATES
34 PARK AVENUE LYNDHURST NEW JERSEY
TEL: 201-939-8805 FAX: 201-939-0846 E-MAIL: NEA@NEGLIAENGINEERING.COM

MICHAEL J. NEGLIA, P.E., P.L.S., P.P.
PROFESSIONAL ENGINEER N.J. LICENSE NO. 38604
PROFESSIONAL LAND SURVEYOR N.J. LICENSE NO. 38604
PROFESSIONAL PLANNER N.J. LICENSE NO. 33LI00569800

PROPOSED DRAINAGE AREA PLAN
PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT
78 LOCUST AVENUE (BLOCK 129, LOT 70)
TOWNSHIP OF BLOOMFIELD
ESSEX COUNTY NEW JERSEY

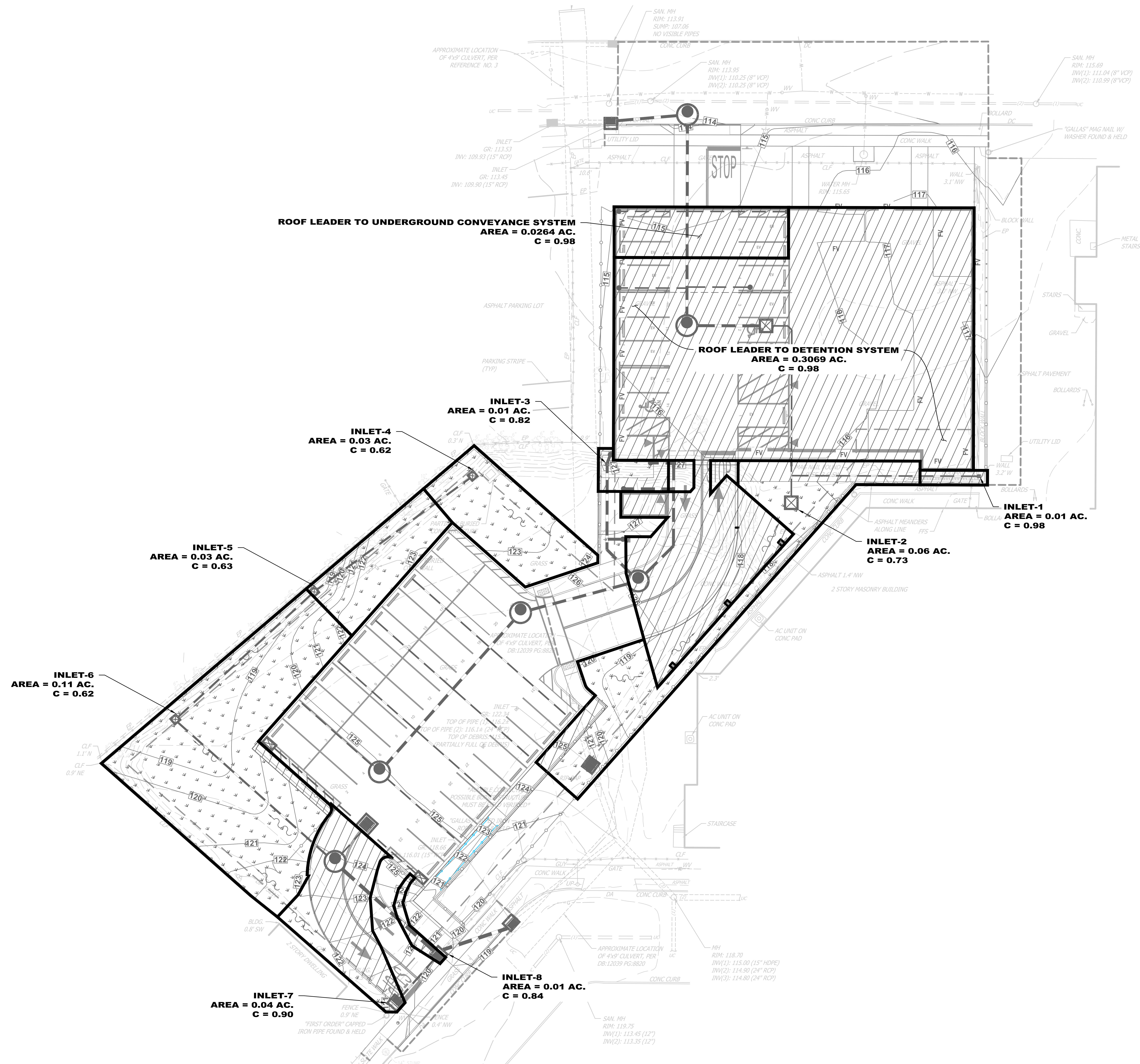
DRAWN BY: J.J.L. / L.A.R. | CHECKED BY: D.J. / J.J.D. | PROJECT NO.: BLFDPRV22.010 | SHEET NO.: FIGURE 2
DESIGNED BY: J.J.D. / J.J.L. / L.A.R. | SCALE: 1"=20' | DATE: FEBRUARY 6, 2024
FIELD BOOK NO.: | PAGE:

N.J.P.C.S.

GRAPHIC SCALE

0 10 20 40 60

(IN FEET)
1 inch = 20 ft.



CATCHMENT AREA PLAN LEGEND
CATCHMENT AREA BOUNDARY LINE

APPLICANT	OWNER
IOANNIS GOLEMIS 8701 CHURCHILL ROAD, APT. 1501 NORTH BERGEN, NJ 07047	GOLEMIS REALTY LLC 500 PASSAIC AVENUE EAST NEWARK, NJ 07029

CERTIFICATE OF AUTHORIZATION (N.J.S.A. 45:8-56) 24GA27927000

REVISIONS					
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DRAWN BY: J.J.L. / L.A.R.	CHECKED BY: D.J. / J.J.D.	PROJECT NO.: BLFDPRV22.010	SHEET NO.: FIGURE 3
DESIGNED BY: J.J.D. / J.J.L. / L.A.R.	SCALE: 1"=20'		
FIELD BOOK NO.:	PAGE:	DATE: FEBRUARY 8, 2024	