STORMWATER REPORT

FULLER FIELD
TRACK & FIELD INMPROVEMENTS
PHASE TWO

NEWBURYPORT, MASSACHUSETTS

Prepared For:
HUNTRESS ASSOCIATES, INC.

Prepared By:
Marchionda & Associates, LP

February 10, 2020
Rev. 3/6/20

FULLER FIELD IMPROVEMENTS – PHASE 2
STORMWATER REPORT

February 10, 2020
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TABLE OF CONTENTS

STORMWATER REPORT NARRATIVE

FULLER FIELD
TRACK & FIELD IMPROVEMENTS
PHASE TWO

February 10, 2020
Rev. 3/6/20

Introduction:

Marchionda & Associates, L.P. has completed a storm water analysis for the *Track & Field Improvement* project proposed at the Bradley Fuller Field in Newburyport, Massachusetts. The purpose of this report is to offer information on the stormwater characteristics of the site in its existing and post construction condition.

For additional information regarding the site's existing conditions and the stormwater management system reference is made to the following plans and report;

- ***Fuller Field***
  Track & Field Improvements – Phase Two
  Owner: Town of Newburyport, MA
  Prepared by; Huntress Associates, Inc.
  Dated; 1/20/20, Rev. 2/28/20

Existing Conditions:

The project site is located at the track and field facility within the Bradley Fuller field complex located off of Low Street. The existing running track was recently constructed to replace and reconfigure an older track. The site also includes existing multi-purpose natural grass fields, a parking area, and supporting structures such as a bathroom and storage buildings.

The site is surrounded by the frontage on Low Street to the south, residential homes to the north and west, and a senior living facility to the east. A portion of the site is located within a buffer zone to a wetland resource area. The site is not located in a designated flood hazard area.

Stormwater from the site presently flows in two main directions. Stormwater generated from the track and field area flows into existing catch basins and a closed drainage system that runs through the site and eventually into the municipal drainage system in Low St . Stormwater from the existing parking area flows to a

bordering vegetated wetland located along the western boundary of the site. This wetland drains to a drainage way that runs parallel with Low Street and eventually into the municipal system. Refer to the existing conditions plan in project site plan set for specific information on the existing topography and features of the site.

Soils on the site have been mapped as those typically found in the Maybid, Scantic, and Buxton Silt Loam soil series. These soils are typically made up of poorly drained silts and clays. These soils fall in the Hydrologic soil groups C & D. An on-site investigation also found layers of sands located above these soils. Information on the site's soils has been included in appendix of the report.

Project Description:

The project consists of the removal of the existing bituminous parking area and the construction of a new gravel parking area, grandstand, and concrete sidewalks.

This construction will result in approximately 9450 +/- s.f. of new impervious surfaces. The construction will require shallow excavation and surface preparation and will take place in areas of the site has been previously disturbed. The remaining open space will be made up of manicured grass and landscape areas.

A comprehensive stormwater management system will be constructed to mitigate the stormwater run-off generated from the new impervious surfaces. This system will be made up of stone infiltration trenches and a stormwater management area (sediment trap). To also help reduce run-off to the wetland, portions of the proposed parking area will be constructed of pervious pavement surfaces. These surfaces will make up the accessible parking area and the entrance driveway apron at the access to Low Street. Detailed information on the components of the system are included in the project's site plans.

Project Type:

The project will take place in areas previously disturbed. However, for purposes of stormwater management standards the project has not been considered a redevelopment project.

LID Measures:

When possible environmental sensitive site design and LID techniques have been used in the planning of the project. All of the proposed construction will be located in areas previously disturbed by the existing facility.

Stormwater Management Standards Compliance:

A description of how this project meets the DEP and City of Newburyport stormwater standards, along with supporting documentation, is provided herein:

Standard 1: *No New Untreated Stormwater Discharges*

No new point source discharges will be created. The project has been designed to recharge and contain the majority of the storm water flows within the project area.

Standard 2: *No Increase in the Post-Development Peak Discharge Rate*

Peak flow rates were analyzed to determine the performance of the proposed BMP's. The 2-year, 10-year, and 100-year, 24-hour Type III storm events were considered in the analysis. The contributing area of each BMP is shown in Figure 2 and described below.

AREA "A" represents the impervious area of the new grandstand and walkway that drains to the infiltration trench "BMP A".

AREA "B" represents the impervious area of the new walkway and storage building that drains to the underground infiltration trench "BMP B".

AREA "C" represents the impervious area of the new walkway that drains to the underground infiltration trench "BMP C".

AREA "D" represents the impervious area of the new walkways that drain to the stone trenches and stormwater management area (sediment trap) "BMP D".

In terms of the modeling methodology, Technical Release 55 (TR-55) was utilized to obtain weighted curve numbers (CNs) for each of the BMP subcatchment areas. Inputs for obtaining the weighted CNs were based on ground cover type and hydrologic soil groups (HSGs). For this analysis only the new impervious surfaces covering the existing grass areas were considered. TR-55 was also utilized to obtain times of concentration (TCs) for each of the subcatchment areas. Flow paths were generally broken into segments of sheet flow and shallow concentrated flow. Because of the small contributing areas and short flow path the minimum 5 minute time was used for each analysis.

CNs and TCs obtained from TR-55 were input into the *Hydraflow*® Hydrographs software package, which utilizes the National Resources Conservation Service (NRCS) method to generate and route hydrographs.

As shown in the attached modeling output and as summarized in Table 1 (below), each of the proposed BMP's will have the capacity to accept the stormwater generated by the additional impervious for of the 2, 10, & 100 year design storms:

TABLE 1: "Peak Flows"

BMP AREA	2-yr storm event (3.1"/24-hr)		10-yr storm event (4.7"/24-hr)		25-yr storm event (5.8"/24-hr)		100-yr storm event (8.3"/24-hr)	
	Pre-Dev (cfs)	Post Dev (cfs)	Pre-Dev (cfs)	Post Dev (cfs)	Pre-Dev (cfs)	Post Dev (cfs)	Pre-Dev (cfs)	Post Dev (cfs)
A	***0.18***	***0.0***	***0.41***	***0.21***	***0.59***	***0.51***	***1.00***	***1.21***
B	***0.07***	***0.0***	***0.15***	***0.0***	***0.22***	***0.0***	***0.38***	***0.0***
C	***0.03***	***0.0***	***0.08***	***0.0***	***0.11***	***0.0***	***0.19***	***0.0***
D	***0.08***	***0.0***	***0.18***	***0.0***	***0.26***	***0.0***	***0.44***	***0.16***

The analysis shows that there will be a slight increase from BMP Area "A" in the 100 year event. will overtop in the 100 year event. However, with the reduction of flows from the other areas the post construction condition will not cause any off site impacts in a 100 year event.

Standard 3: *Loss of Annual Recharge*

DEP's *Stormwater Management Handbook* prescribes an infiltration volume based on the hydrologic soil group over which impervious area will be constructed as follows:

- HSG A – 0.60 inches of runoff
- HSG B – 0.35 inches of runoff
- HSG C – 0.25 inches of runoff
- HSG D – 0.10 inches of runoff

The proposed construction will include both the creation and removal of impervious surfaces. It appears from soil mapping and on-site soil observation that the entire project area is made up of soils that are considered to be in the hydrologic soil group "C & D". Due to the poorly drained soils that presently exist at the site, the project will infiltrate stormwater volumes to the extent possible.

Standard 4: *Water Quality*

The new impervious surfaces created will be walkways and roof tops. Since these surfaces will not generate pollutant laden suspended solids there will no increase in Total Suspended Solids as a result of the project.

A *Long-Term Stormwater Operation and Maintenance Plan & Pollution Prevention Plan* (Appendix 4) has been developed for the project to comply with this requirement and the requirements of Standard 9.

Standard 5: *Land Uses with Higher Potential Pollutant Loads*

Not applicable – this project does not propose a land use with a higher potential pollutant load.

Standard 6: *Discharges within a Zone II or Interim Wellhead Protection Area*

Based on a review of Mass GIS data. The project does not lie within a Zone II or Interim Wellhead Protection Area.

Standard 7: *Redevelopment*

This project is not considered a redevelopment project as defined in the DEP *Stormwater Management Handbook*.

Standard 8: *Construction-Related Impacts*

A *Site Preparation Plan* has been developed for the project and is included as part of the Site Plans. In addition to this plan, the project is subject to the National Pollutant Discharge Elimination System (NPDES) program of the United States Environmental Protection Agency, as it will involve greater than one acre of land disturbance. As such, coverage under the NPDES *General Permit for Stormwater Discharges from Construction Activities* will be required along with a Stormwater Pollution Prevention Plan (SWPPP) prior to land disturbance.

Standard 9: *Long-Term Operation and Maintenance*

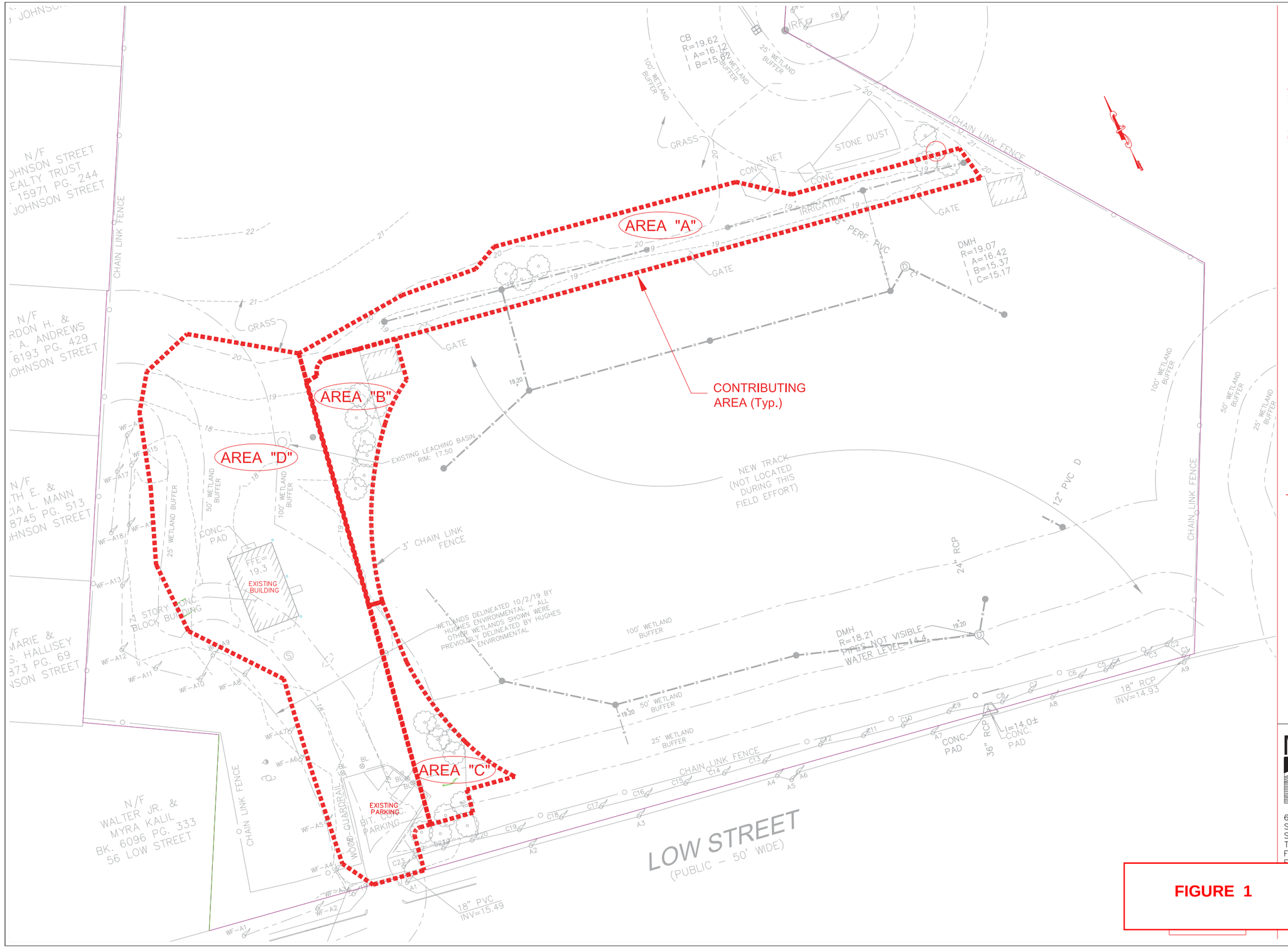
A *Long-Term Stormwater Operation and Maintenance Plan & Pollution Prevention Plan* has been developed for the project to comply with this requirement and the requirements of Standard 4. A copy of this plan has been included in the appendix of the report.

Standard 10: *Illicit Discharges*

DEP does not permit illicit discharges, defined by 310 CMR 10.04 as follows, to the stormwater management system:

"Illicit discharge means a discharge that is not entirely comprised of stormwater. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated ground water, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean buildings without detergents."

Prior to the discharge of stormwater runoff to the post-construction stormwater system it shall be the project owner's responsibility to prepare an Illicit Discharge Compliance Statement in accordance with Standard 10 certifying that no illicit discharges exist on the site.



Huntress Associates, Inc.

Landscape Architecture & Land Planning

17 Tewksbury Street
Andover, Massachusetts 01810
978 470 8882 FAX 978 470 8890

Project:

FULLER FIELD
Track & Field
Phase Two

Newburyport, Massachusetts

Drawing Title:

EXISTING CONDITIONS PLAN

0' 15' 30' 60'

Marchionda & Associates, L.P.

Engineering and Planning Consultants

62 Montvale Avenue
Suite I
Stoneham, MA 02180
TEL: (781) 438-6121
FAX: (781) 438-9654
Email: engineering@marchionda.com
Website: www.marchionda.com

FIGURE 1

DATE: 2/28/20	
...\670-32 B-F Field Newburyport\HA-Fuller-CD Marchionda.DWG	
J. & A. NO.: 670-32	SCALE: 1"=30'

SHEET 1 OF 1

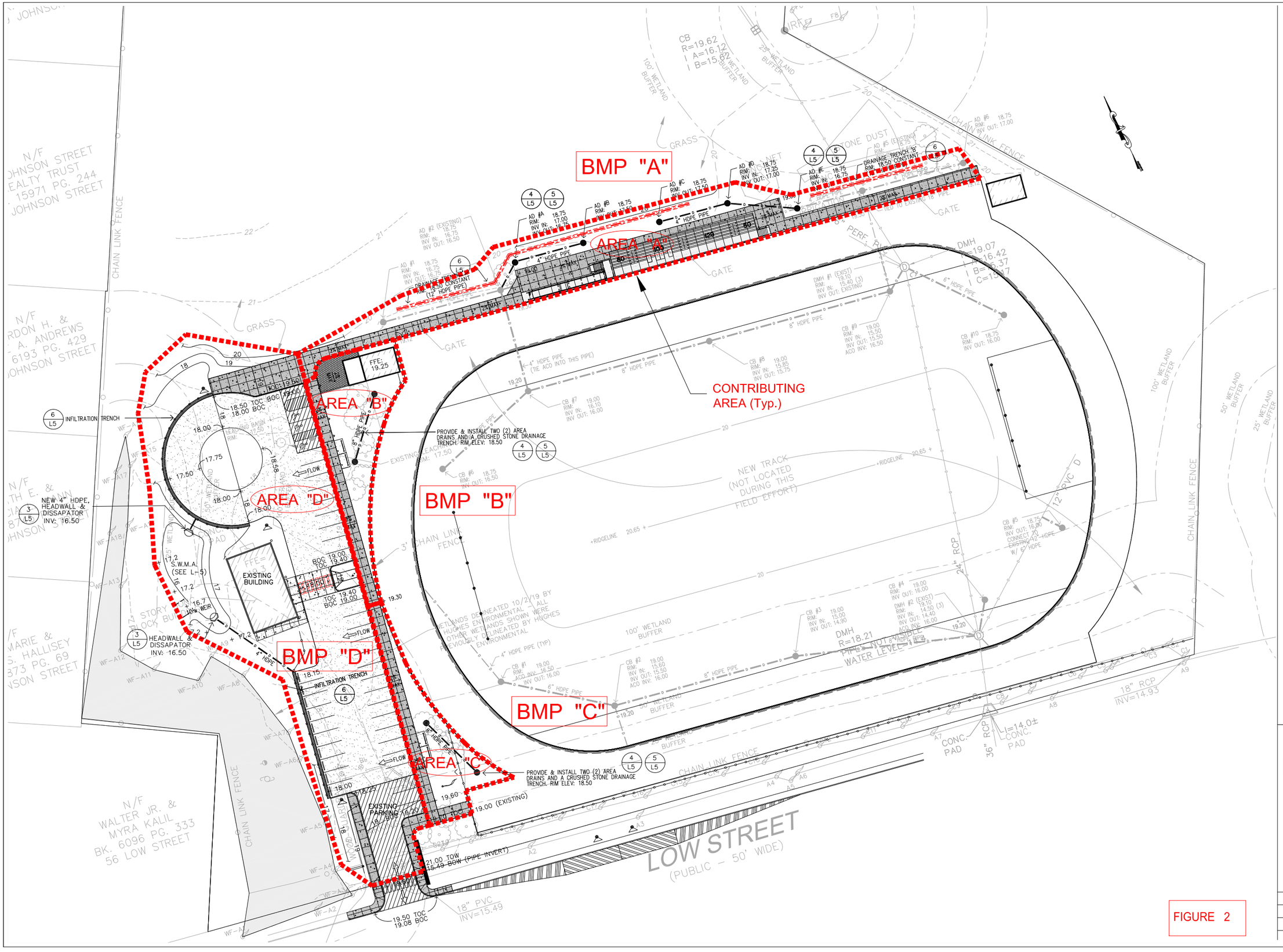


FIGURE 2

Huntress Associates, Inc.

Landscape Architecture & Land Planning

17 Tewksbury Street
Andover, Massachusetts 01810
978 470 8882 FAX 978 470 8890

Project:

FULLER FIELD
Track & Field
Phase Two

Newburyport, Massachusetts

Drawing Title:

Grading & Drainage

BMP PLAN

0' 15' 30' 60'

Marchionda & Associates, L.P.

Engineering and Planning Consultants

62 Montvale Avenue
Suite I
Stoneham, MA 02180
TEL: (781) 438-6121
FAX: (781) 438-9654
Email: engineering@marchionda.com
Website: www.marchionda.com

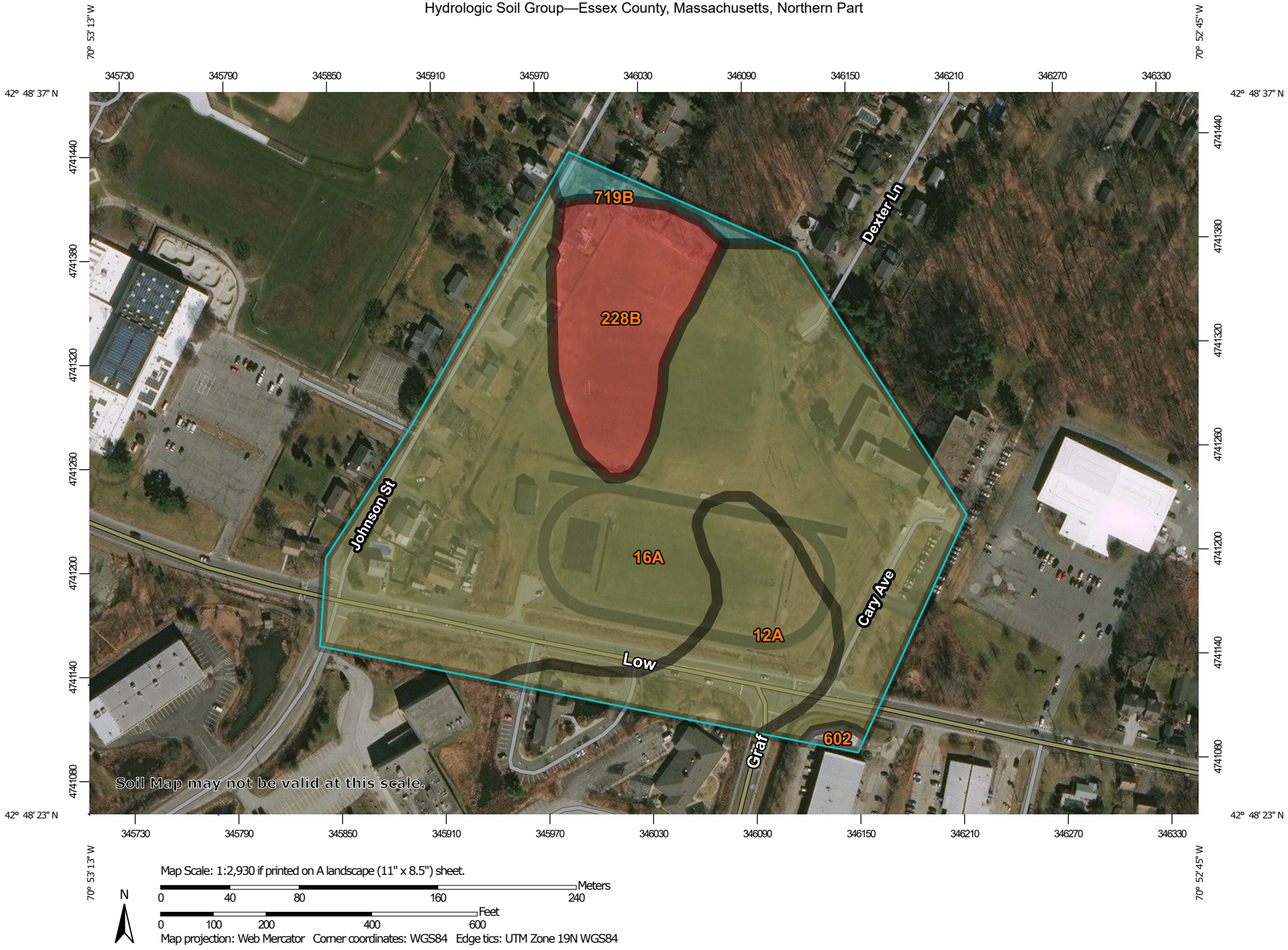
DATE: 2/28/20	
...670-32 B-F Field Newburyport HAI-Fuller-CD Marchionda.DWG	
M. & A. NO.: 670-32	SCALE: 1"=30'
SHEET 1 OF 1	

LIST OF APPENDICES

APPENDIX 1

Standard 2 (Peak Flow)

SOILS INFORMATION



Map Scale: 1:2,930 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

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 1:15,800.

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, Massachusetts, Northern Part
Survey Area Data: Version 15, Sep 12, 2019

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

Date(s) aerial images were photographed: Dec 31, 2009—Sep 12, 2016

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
12A	Maybid silt loam, 0 to 3 percent slopes	C/D	2.6	13.1%
16A	Scantic silt loam, 0 to 3 percent slopes	C/D	14.3	71.3%
228B	Buxton silt loam, 3 to 8 percent slopes	D	2.7	13.3%
602	Urban land		0.1	0.4%
719B	Suffield silt loam, 3 to 8 percent slopes	C	0.4	1.9%
Totals for Area of Interest			**20.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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

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

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

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Essex County, Massachusetts, Northern Part

12A—Maybid silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: vjhj
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Maybid

Setting

Landform: Depressions, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Soft silty and clayey glaciolacustrine deposits and/or firm silty marine deposits

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 19 inches: silty clay
H3 - 19 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water storage in profile: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Scantic

Percent of map unit: 12 percent
Landform: Depressions
Hydric soil rating: Yes

Swansea

Percent of map unit: 3 percent
Landform: Bogs
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 15, Sep 12, 2019

Essex County, Massachusetts, Northern Part

16A—Scantic silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: vjrl
Elevation: 10 to 900 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Scantic

Setting

Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Soft fine-silty glaciolacustrine deposits and/or soft fine-silty glaciomarine deposits over hard fine-silty glaciolacustrine deposits and/or hard fine-silty glaciomarine deposits

Typical profile

H1 - 0 to 11 inches: silt loam
H2 - 11 to 26 inches: silty clay loam
H3 - 26 to 60 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Maybid

Percent of map unit: 10 percent
Landform: Depressions
Hydric soil rating: Yes

Buxton

Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 15, Sep 12, 2019

Essex County, Massachusetts, Northern Part

228B—Buxton silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: vj37
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Buxton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Buxton

Setting

Landform: Valleys, valleys
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Soft fine-loamy glaciolacustrine deposits derived from mica schist over hard fine-loamy glaciolacustrine deposits derived from mica schist

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 30 inches: silt loam
H3 - 30 to 60 inches: silty clay

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.7 inches)

Interpretive groups

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

Minor Components

Suffield

Percent of map unit: 15 percent
Hydric soil rating: No

Scantic

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 15, Sep 12, 2019

GEOTECHNICAL REPORT

BRADLEY FULLER FIELD

NEWBURYPORT, MASSACHUSETTS

January 5, 2016

GSI Project No. 215300

Prepared for:

Mr. Chris Huntress
Huntress Associates, Inc.
17 Tewksbury Street
Andover, MA 01810

Prepared by:

Geotechnical Services, Inc.
55 North Stark Highway
Weare, NH 03281

Geotechnical Services Inc.
Geotechnical Engineering ◣ Environmental Studies ◣ Materials Testing ◣ Construction Monitoring

GEOTECHNICAL SERVICES INC.
Geotechnical Engineering ◢ Environmental Studies ◢ Materials Testing ◢ Construction Monitoring

January 5, 2016

Mr. Chris Huntress
Huntress Associates, Inc.
17 Tewksbury Street
Andover, MA 01810

Advanced via Email: chris@huntressassociates.com

RE: Geotechnical Investigation Report
Bradley Fuller Field
Newburyport, Massachusetts
GSI Project No. 215300

Dear Mr. Huntress:

Geotechnical Services, Inc. (GSI) is pleased to submit this report on the proposed design-redevelopment of the track and grass turf athletic field at the Bradley Fuller Field off of Low Street in Newburyport, MA. The report consists of the subsurface data obtained through implementation of an exploration program, evaluation of the subsurface data, a summary of our understanding of the proposed development, and the results of an assessment for earthwork design options. The content of this report is subject to the **Limitations** stated in Appendix A.

PROJECT UNDERSTANDING

The project site is located at 89 to 107 Low Street in Newburyport, MA (See Figure 1, Project Locus). We understand that the planned redevelopment will include the renovation of both the existing grass turf field located within the limits of the track and replace and reconfigure the existing track.

SUBSURFACE INVESTIGATION

Thirteen (13) soil probes, designated as GP-1 to GP-13, were performed at the site on December 14, 2015 by New England Boring Contractors, Inc. located in Derry, NH. The probes were conducted using a Geoprobe soil probing machine which collects continuous 5-ft long soil samples. Soil samples were collected to depths ranging from 5 to 10-ft below the existing grade. The Geoprobes were observed by the GSI engineer and the soils encountered were classified in accordance with the Burmister Classification system. The approximate locations of the Geoprobes are shown on Figures 2, Exploration Location Plan. The finalized logs for the Geoprobes are included in Appendix B. Representative portions of each sample retrieved were saved in plastic bags with identification, and delivered to the GSI Soils Laboratory. The samples were re-examined and field classifications were reviewed.

SUBSURFACE CONDITIONS

The subsurface conditions encountered in the investigation indicate that the site is underlain by the following soil units/deposits, described in order of increasing depth:

Topsoil: All of the probes encountered the Topsoil layer at the ground surface. The Topsoil layer generally consists of organic silty soils. The thickness of this soil unit varies from less than 6-in in proximity to the existing track to 8 to 18-in. within the limits of the grass turf field.

Sand Fill: The Sand Fill was encountered with all the geoprobes immediately beneath the topsoil layer. The Sand Fill generally consists of brown fine to medium SAND with varying amounts of gravel and coarse sand. The thickness of the Filter Sand layer varies from about 12-in. (GP-6) to 38-in. (GP-13) and was about 24-in. (on average) in thickness across the project site.

Fill: Fill soils, consisting of gray, CLAY and fine to coarse SAND with little gravel, was encountered in GP-6 between 1.8 to 5.5-ft below the existing grade.

Silt Deposits: An isolated pocket of Silt was encountered in GP-9 from 2.5 to 5.5-ft below the existing grade which generally consists of brown Silt.

Marine Deposits: Marine Deposits were encountered in all of the geoprobes beneath the Sand Fill, Fill and Silt Deposits. The Marine Deposits generally consist of gray, CLAY with varying amounts of silt or fine to medium sand. All the geoprobes were terminated within this soil unit at depth of 5 to 10-ft below the existing grade.

Groundwater: Groundwater was not encountered upon completion of the probes. Groundwater levels should be expected to vary with season, precipitation, snowmelt, and other factors. As a result, groundwater levels encountered during construction may differ from those encountered in the explorations. It should be anticipated that perched groundwater above the Marine Deposits should be anticipated during construction due to seasonal groundwater conditions and weather.

GEOTECHNICAL DESIGN RECOMMENDATIONS

General

As a general guideline, foundation design and construction must conform to the applicable provisions of the Massachusetts Building Code, 8th Edition (Building Code).

Track and Grass Field Subgrades

We anticipate that the construction of the new track and renovation of the existing grass field will involve the following; stripping off the track pavement, stripping off or amending the existing Topsoil, removing/relocating any existing utilities (irrigation, drainage pipes, electric utilities and any other utilities), grading the field to the planned rough grade, proof-rolling the subgrade and reconstructing the turf system, and construction of the re track to the planned configuration. The existing Sand Fill, Fill, Silt and Marine Deposit soils are suitable for support of the grass turf field and track provided the subgrade is prepared using the recommendation provided herein. It should be anticipated that the new track configuration will require some additional engineered fill beneath the track where the footprint of the track extends beyond the area where the geoprobe investigation was conducted where Sand Fill may not be present.

CONSTRUCTION CONSIDERATIONS

General

In general, all excavation work, any construction dewatering, and other construction activities should conform to the requirements of OSHA and all other applicable regulations. The site soils would typically be classified as Type C based on OSHA 29 CFR 1926.

Excavation

Construction will involve clearing and grubbing of vegetation, stripping off the Topsoil and Track Asphalt, adding or cutting fill to achieve design grades (if needed), and constructing the planned turf field and track improvements. We anticipate that most of the site grading can be accomplished with conventional earth-moving equipment.

Construction Dewatering

Based on the available subsurface data it is anticipated that during the general site work, no significant dewatering measures will be necessary to conduct the construction "in-the-dry." The Contractor should take measures to prevent stormwater from entering into excavated areas, and be prepared to remove ponded surface water by means of localized sumps and pumps. The Contractor should select whichever dewatering procedures may be effective to maintain dry, stable excavation bottoms.

Existing Utilities and Foundations of Former Structures

Unknown and/or undocumented subsurface features, structures, and utilities may be present within the project site. The unknown structures and piping, should be anticipated during excavation work, and will need to be carefully removed to limit disturbance to underlying soil deposits and backfilled with compacted Granular Fill prior to construction of the planned field and track.

Preparation and Protection of Bearing Surfaces

Final excavation should be conducted in a manner that minimizes disturbance to the subgrade soils when excavating for bearing surfaces. All final excavation and footing construction should be conducted in-the-dry. We recommend that the exposed subgrade soils be observed in the field by a geotechnical engineer to confirm the projected soil

bearing conditions. It may be necessary to over-excavate and replace weak, disturbed or otherwise unacceptable foundation bearing materials.

Following excavation to bearing grades, exposed soil surfaces should be re-compacted (proof-rolled) prior to placing engineered fill, or constructing foundations, with a minimum of four passes with a heavy vibratory roller or other heavy vibratory compaction equipment.

If subgrade protection difficulties are encountered due to surface or groundwater, various methods can be utilized:

- Leave subgrades high until immediately before forming and concreting to minimize the time the subgrade is exposed.
- Over excavate footings by 8 in. using a smooth edged bucket and backfill to the design bearing elevation using compacted Granular Fill.

Each such encounter is probably best resolved individually in the field upon observation of the subgrade conditions.

Compaction

Minimum compaction requirements refer to percentages of the maximum dry density determined in accordance with ASTM D1557. Recommended compaction requirements are as follows:

Location	Minimum Compaction Requirements
Beneath the track & field	95 %
Landscaped areas	90 % nominal compaction

Filling and Backfilling

Placement of compacted soil fills should not be conducted when air temperatures are low enough (approximately 30 degrees F, or below) to cause freezing of the moisture in the fill during or before placement. Fill materials should not be placed on snow, ice or uncompacted frozen soil. Compacted fill should not be placed on frozen soil. No fill should be allowed to freeze prior to compaction. At the end of each day's operations, the last lift of fill, after compaction, should be rolled by a smooth-wheeled roller to eliminate ridges of uncompacted soil.

CONSTRUCTION MONITORING

It is recommended that a geotechnical engineer or technician qualified by training and experience be present during construction to:

- Confirm that soils used as fill and backfill are in accordance with the contract requirements.
- Observe and test placement and compaction of Granular Fill and other compacted fills.
- Observe preparation of field and pavement bearing surfaces.

Monitoring by experienced personnel will be important to the efficiency and integrity of the geotechnical aspects of the project construction. It is recommended that GSI be retained to provide the recommended monitoring services during construction. This will enable us to observe compliance with the design concepts, help resolve construction problems and to facilitate design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

PLAN REVIEW

It is recommended that GSI be provided the opportunity to review the final plans in order to confirm that the recommendations made in this report were interpreted and implemented as intended.

CLOSURE

GSI appreciates the opportunity for participating in this early phase of the project, and looks forward to our continuing association during its subsequent phases towards its successful completion. In the mean time, please do not hesitate to contact us, if you have any questions on the content of this report.

Very truly yours,

GEOTECHNICAL SERVICES, INC.

Glen V. Zoladz, P.E.
Project Manager

Harry K. Wetherbee, P.E.
Principal Engineer

Figure 1. Project Locus
Figure 2. Exploration Location Plan

Appendix A. Limitations
Appendix B. Geoprobe Logs

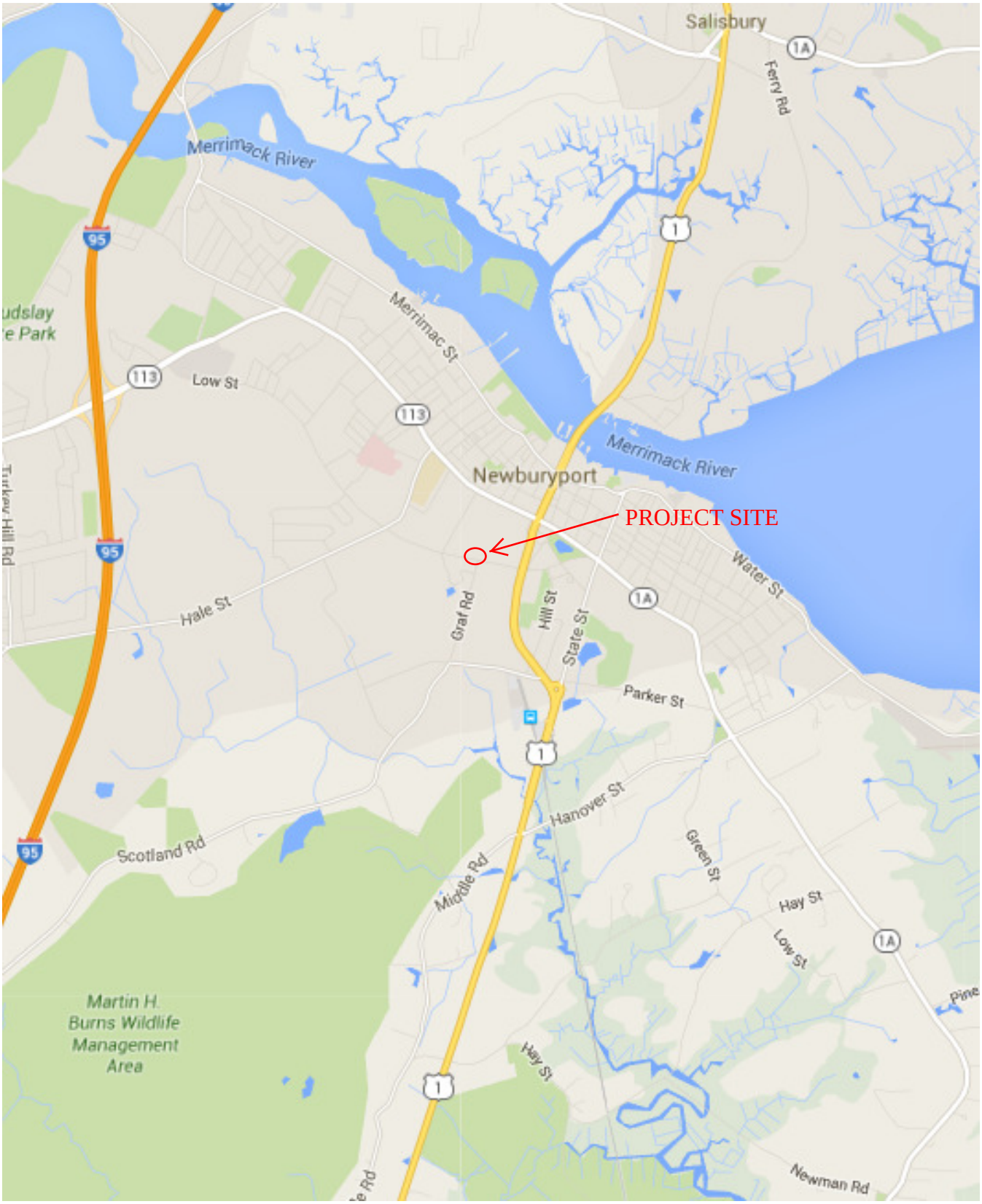
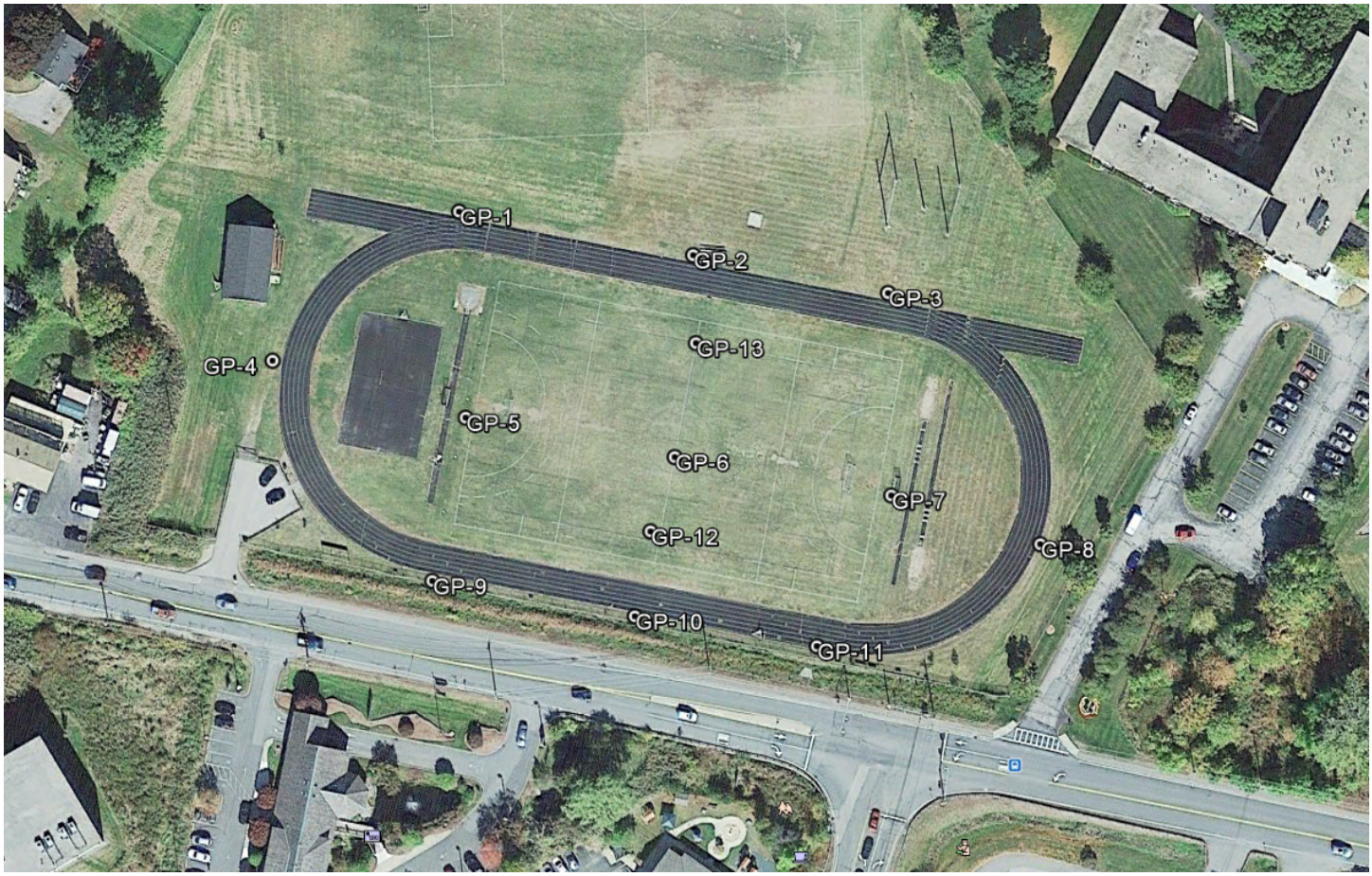


	FIGURE 1–PROJECT LOCUS
	BRADLEY FULLER FIELD **NEWBURYPORT, MA** **GSI PROJECT NO. 215300**

N



NOT TO SCALE

LEGEND:

○ GP-1 GEOPROBE I.D. AND APPROXIMATE LOCATION

FIGURE 2–EXPLORATION LOCATION PLAN

BRADLEY FULLER FIELD
NEWBURYPORT, MA
GSI PROJECT NO. 215300

APPENDIX A

LIMITATIONS

LIMITATIONS

Explorations

1. The analyses, recommendations and designs submitted in this report are based in part upon the data obtained from preliminary subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretation of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the individual test pit and/or boring logs.

3. Water level readings have been made in the test pits and/or test borings under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from the time the measurements were made.

Review

4. It is recommended that this firm be given the opportunity to review final design drawings and specifications to evaluate the appropriate implementation of the recommendations provided herein.

5. In the event that any changes in the nature, design, or location of the proposed areas are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of the report modified or verified in writing by Geotechnical Services, Inc.

Construction

6. It is recommended that this firm be retained to provide geotechnical engineering services during the earthwork phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

Use of Report

7. This report has been prepared for the exclusive use of Huntress Associates, Inc. in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

8. This report has been prepared for this project by Geotechnical Services, Inc. This report was completed for preliminary design purposes and may be limited in its scope to complete an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to evaluation considerations only.

APPENDIX B

GEOPROBE LOGS

TEST BORING LOG

Boring No. GP-1

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/14/2015
Contractor	NEBC	Checked By		Finish	12/14/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample Data No.	Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	43				0.4	Topsoil
								1.7	Brown, f/c SAND (wet) **-SAND FILL-**
									Gray CLAY **-MARINE DEPOSITS-**
5		G2	5-10	51					Gray, CLAY with occasional seams of silt
10									Bottom of Exploration at 10-ft. No groundwater encountered.
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

GP-1

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TEST BORING LOG

Boring No. GP-2

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/14/2015
Contractor	NEBC	Checked By		Finish	12/14/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample Data: No.	Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	37				0.2	Topsoil Brown, f/m SAND, tr. c-sand
								3	**-SAND FILL-**
5									**-MARINE DEPOSITS-**
									Bottom of Exploration at 5-ft. No groundwater encountered.
10									
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

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TEST BORING LOG

Boring No. GP-3

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/13/2015
Contractor	NEBC	Checked By		Finish	12/13/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample No.	Sample Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	41				0.3	Topsoil
									Brown, f/m SAND, some c-sand, tr. gravel
									-SAND FILL-
								2	Gray CLAY
									-MARINE DEPOSITS-
5		G2	5-10	60					Gray, CLAY (6-in seam of br., f/c SAND from 5 to 5.5-ft.)
10									Bottom of Exploration at 10-ft.
									No groundwater encountered.
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

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TEST BORING LOG

Boring No. GP-4

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/14/2015
Contractor	NEBC	Checked By		Finish	12/14/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample Data: No.	Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	42				0.2	Topsoil
									Brown, f/m SAND, trace gravel, c-sand, silt
									-SAND FILL-
								2.8	
									Gray, CLAY
5									**-MARINE DEPOSITS-**
									Bottom of Exploration at 5-ft.
									No groundwater encountered.
10									
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

GP-4

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TEST BORING LOG

Boring No. GP-5

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/14/2015
Contractor	NEBC	Checked By		Finish	12/14/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample Data: No.	Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	48					Topsoil
								1.5	Brown, f/m SAND, little c-sand **-SAND FILL-**
								3.5	Gray, CLAY **-MARINE DEPOSITS-**
5									Bottom of Exploration at 5-ft. No groundwater encountered.
10									
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

GP-5

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TEST BORING LOG

Boring No. GP-6

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/14/2015
Contractor	NEBC	Checked By		Finish	12/14/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample Data No.	Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	47				0.8	Topsoil
								1.8	Brown, fine SAND **-SAND FILL-**
									Gray, CLAY and f/c SAND, little gravel **-FILL-**
5		G2	5-10	51				5.5	Gray, CLAY **-MARINE DEPOSITS-**
10									Bottom of Exploration at 10-ft. No groundwater encountered.
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

GP-6

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TEST BORING LOG

Boring No. GP-7

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/14/2015
Contractor	NEBC	Checked By		Finish	12/14/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample Data: No.	Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	39				0.8	Topsoil Brown, f/m SAND, little gravel, c-sand, tr. silt
								3	**-SAND FILL-**
5									**-MARINE DEPOSITS-**
									Bottom of Exploration at 5-ft. No groundwater encountered.
10									
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

GP-7

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TEST BORING LOG

Boring No. GP-8

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/14/2015
Contractor	NEBC	Checked By		Finish	12/14/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample Data No.	Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	36				0.4	Topsoil Brown, f/m SAND, some c-sand, tr. gravel **-SAND FILL-**
								2.2	Gray, CLAY little to trace f/m sand
5		G2	5-10	58					**-MARINE DEPOSITS-** Gray, CLAY little to trace f/m sand
10									Bottom of Exploration at 10-ft. No groundwater encountered.
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

GP-8

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TEST BORING LOG

Boring No. GP-9

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/14/2015
Contractor	NEBC	Checked By		Finish	12/14/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample Data No.	Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	39				0.3	Topsoil Brown, f/m SAND, tr. gravel, coarse sand **-SAND FILL-**
								2.5	Brown, SILT **-SILT DEPOSITS-**
5		G2	5-10	58				5.5	Gray, CLAY **-MARINE DEPOSITS-**
10									Bottom of Exploration at 10-ft. No groundwater encountered.
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

GP-9

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TEST BORING LOG

Boring No. GP-10

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/14/2015
Contractor	NEBC	Checked By		Finish	12/14/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample Data: No.	Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	40				0.3	Topsoil
									Brown, f/m SAND, little c-sand
									-SAND FILL-
								3.1	
									Gray CLAY
5									**-MARINE DEPOSITS-**
									Bottom of Exploration at 5-ft.
									No groundwater encountered.
10									
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

GP-10

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TEST BORING LOG

Boring No. GP-11

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/14/2015
Contractor	NEBC	Checked By		Finish	12/14/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample Data No.	Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	34				0.3	Topsoil Brown, f/m SAND, little coarse sand, tr. gravel **-SAND FILL-**
								2.8	Gray CLAY **-MARINE DEPOSITS-**
5		G2	5-10	53					Gray, CLAY with seams of silt (wet from 5 to 6-ft below grade)
10									Bottom of Exploration at 10-ft. No groundwater encountered.
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

GP-11

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TEST BORING LOG

Boring No. GP-12

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/14/2015
Contractor	NEBC	Checked By		Finish	12/14/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample Data No.	Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	46				0.7	Topsoil Brown, f/m SAND **-SAND FILL-**
								3.8	Gray CLAY **-MARINE DEPOSITS-**
5									Bottom of Exploration at 5-ft. No groundwater encountered.
10									
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

GP-12

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TEST BORING LOG

Boring No. GP-13

Page 1 of 1

Project	Bradley Fuller Field	Project No.	215300	Elevation	N/A
Location	Newburyport, MA	Inspector	G. Zoladz	Datum	See Plan
Client	Huntress Associates	Project Manager	G. Zoladz	Start	12/14/2015
Contractor	NEBC	Checked By		Finish	12/14/2015
Driller	C. Downing	Drill Rig	Geoprobe	Model	

Item:	Auger	Casing	Sampler	Core Barrel
Type	-	-	-	-
Inside Diameter (in.)	-	-	-	-
Hammer Weight (lb)	-	-	-	
Hammer Fall (in.)	-	-	-	

☐ Truck ☐ Skid
☑ Track ☐ ATV
☐ Bomb. ☐ Geophone
☐ Tripod ☐ Other

Hammer Type:
☐ Safety Hammer
☐ Doughnut
☐ Automatic

☐ Winch ☐ Cat Head ☐ Roller Bit ☐ Cutting Head

Depth (ft)	Casing (Blows/ft)	Sample Data: No.	Depth (ft)	Rec. (in.)	SPT (Blows/ 6-in.)	Rock RQD (%)	PID Rdg. (ppm)	Stratum Change (ft)	Soil-Rock Visual Classification and Description (Soils - Burmister System) (Rock - U.S. Corps of Engineers System)
0		G1	0-5	47				0.7	Topsoil Brown, f/m SAND **-SAND FILL-**
								3.9	Gray CLAY **-MARINE DEPOSITS-**
5									Bottom of Exploration at 5-ft. No groundwater encountered.
10									
15									
20									
25									

Water Level Data

Date	Time	Depth (ft) to: Bott. of Casing	Bott. of Hole	Water

Sample Identification
O = Open Ended
U = Undisturbed
S = Split Spoon
C = Rock Core
GP = Geoprobe

Cohesive Soils N-Value
0 to 2: Very Soft
2 to 4: Soft
4 to 8: Medium Stiff
8 to 15: Stiff
15 to 30 Very Stiff
Over 30: Hard

Granular Soils N- Value
0 to 4: Very Loose
4 to 10: Loose
11 to 30: Medium Dense
31 to 50: Dense
Over 50: Very Dense

Trace (0 to 5%), Little (10 to 20%), Some (20 to 35%), And (35 to 50%)

Notes:

GP-13

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CURVE NUMBER COMPUTATIONS

Worksheet 2: Runoff curve number and runoff

Project	FULLER FIELD (PHASE 2)	By	JTB.	Date	2/10/20
Location	NEWBURYPORT, MA	Checked		Date	

Check one: ☐ Present ☑ Developed AREA "A"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi^2 ☐ %	Product of CN x area
	IMPERVIOUS	98			0.16	

1/ Use only one CN source per line

Totals ➡ 0.16

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ = _____ ; Use CN ➡ 98

2. Runoff

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

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
FULLER FIELD (PHASE 2)	JTB.	2/10/20
Location	**Checked**	**Date**
NEWBURYPORT, MA		

Check one: ☐ Present ☑ Developed AREA "B"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi^2 ☐ %	Product of CN x area
	IMPERVIOUS	98			0.06	

1/ Use only one CN source per line

Totals ➡ 0.06

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ = _____ ; **Use CN** ➡ ☐

2. Runoff

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

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
FULLER FIELD (PHASE 2)	JB.	2/10/20
Location	**Checked**	**Date**
NEWBURYPORT, MA		

Check one: ☐ Present ☑ Developed AREA "C"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
	IMPERVIOUS	98			.03	

1/ Use only one CN source per line

Totals ➡ 0.03

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ = _____ ; **Use CN** ➡ 98

2. Runoff

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

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
FULLER FIELD (PHASE 2)	JTB.	2/10/20
Location	**Checked**	**Date**
NEWBURYPORT, MA		

Check one: ☐ Present ☑ Developed AREA "D"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi^2 ☐ %	Product of CN x area
	IMPERVIOUS	98			0.07	

1/ Use only one CN source per line

Totals ➡ .07

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ = _____ ; Use CN ➡ 98

2. Runoff

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

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
FULLER FIELD (PHASE 2)	JTB.	2/10/20
Location	**Checked**	**Date**
NEWBURYPORT, MA		

Check one: ☐ Present ☐ Developed

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☐ acres ☐ mi² ☐ %	Product of CN x area

1/ Use only one CN source per line

Totals ➡

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ = _____ ; **Use CN** ➡ ☐

2. Runoff

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

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
FULLER FIELD (PHASE 2)	JTB	2/10/20
Location	**Checked**	**Date**
NEWBURYPORT, MA		3/6/20

Check one: ☑ Present ☐ Developed AREA "A"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
C	OPEN SPACE (GOOD)	74			0.16	

1/ Use only one CN source per line

Totals ➡ 0.16

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ = _____ ; Use CN ➡ 74

2. Runoff

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

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
FULLER FIELD (PHASE 2)	JTB	2/10/20
Location	**Checked**	**Date**
NEWBURYPORT, MA		3/6/20

Check one: ☑ Present ☐ Developed "AREA B"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
C	OPEN SPACE	74			0.06	

[1] Use only one CN source per line

Totals ➡ 0.06

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ = _____ ; Use CN ➡ 74

2. Runoff

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

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
FULLER FIELD (PHASE 2)	JTB	2/10/20
Location	**Checked**	**Date**
NEWBURYPORT, MA		3/6/20

Check one: ☑ Present ☐ Developed "AREA C"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious, unconnected/connected impervious area ratio)	CN [1] Table 2-2	CN [1] Figure 2-3	CN [1] Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
C	OPEN SPACE	74			0.03	

[1] Use only one CN source per line

Totals ➡ 0.03

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ = _____ ; Use CN ➡ 74

2. Runoff

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

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

Worksheet 2: Runoff curve number and runoff

Project	By	Date
FULLER FIELD (PHASE 2)	JTB.	2/10/20
Location	**Checked**	**Date**
NEWBURYPORT, MA		3/6/20

Check one: ☑ Present ☐ Developed "AREA D"

1. Runoff curve number

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area ☑ acres ☐ mi² ☐ %	Product of CN x area
C	OPEN SPACE	74			0.07	

1/ Use only one CN source per line

Totals ➡ 0.07

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = _____ = _____ : **Use CN** ➡ 74

2. Runoff

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

(Use P and CN with table 2-1, figure 2-1, or equation 2-3 and 2-4)

HYDROGRAPHS

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	0.179	-------	-------	0.411	0.587	-------	1.004	AREA A (Pre)
2	SCS Runoff	-------	-------	0.498	-------	-------	0.761	0.941	-------	1.349	AREA A (Post)
3	SCS Runoff	-------	-------	0.067	-------	-------	0.154	0.220	-------	0.377	AREA B (Pre)
4	SCS Runoff	-------	-------	0.187	-------	-------	0.285	0.353	-------	0.506	AREA B (Post)
5	SCS Runoff	-------	-------	0.034	-------	-------	0.077	0.110	-------	0.188	AREA C (Pre)
6	SCS Runoff	-------	-------	0.093	-------	-------	0.143	0.176	-------	0.253	AREA C (Post)
7	SCS Runoff	-------	-------	0.078	-------	-------	0.180	0.257	-------	0.439	AREA D (Pre)
8	SCS Runoff	-------	-------	0.218	-------	-------	0.333	0.412	-------	0.590	AREA D (Post)
9	Reservoir	2	-------	0.000	-------	-------	0.207	0.512	-------	1.205	BMP - A (Outflow)
10	Reservoir	4	-------	0.000	-------	-------	0.000	0.000	-------	0.000	BMP - B (Outflow)
11	Reservoir	6	-------	0.000	-------	-------	0.000	0.000	-------	0.000	BMP - C (Outflow)
12	Reservoir	8	-------	0.000	-------	-------	0.000	0.000	-------	0.161	BMP - D (Outflow)

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.179	1	725	582	----	------	------	AREA A (Pre)
2	SCS Runoff	0.498	1	724	1,718	----	------	------	AREA A (Post)
3	SCS Runoff	0.067	1	725	218	----	------	------	AREA B (Pre)
4	SCS Runoff	0.187	1	724	644	----	------	------	AREA B (Post)
5	SCS Runoff	0.034	1	725	109	----	------	------	AREA C (Pre)
6	SCS Runoff	0.093	1	724	322	----	------	------	AREA C (Post)
7	SCS Runoff	0.078	1	725	255	----	------	------	AREA D (Pre)
8	SCS Runoff	0.218	1	724	751	----	------	------	AREA D (Post)
9	Reservoir	0.000	1	345	0	2	18.75	1,465	BMP - A (Outflow)
10	Reservoir	0.000	1	n/a	0	4	18.31	644	BMP - B (Outflow)
11	Reservoir	0.000	1	n/a	0	6	18.14	322	BMP - C (Outflow)
12	Reservoir	0.000	1	735	0	8	16.35	536	BMP - D (Outflow)

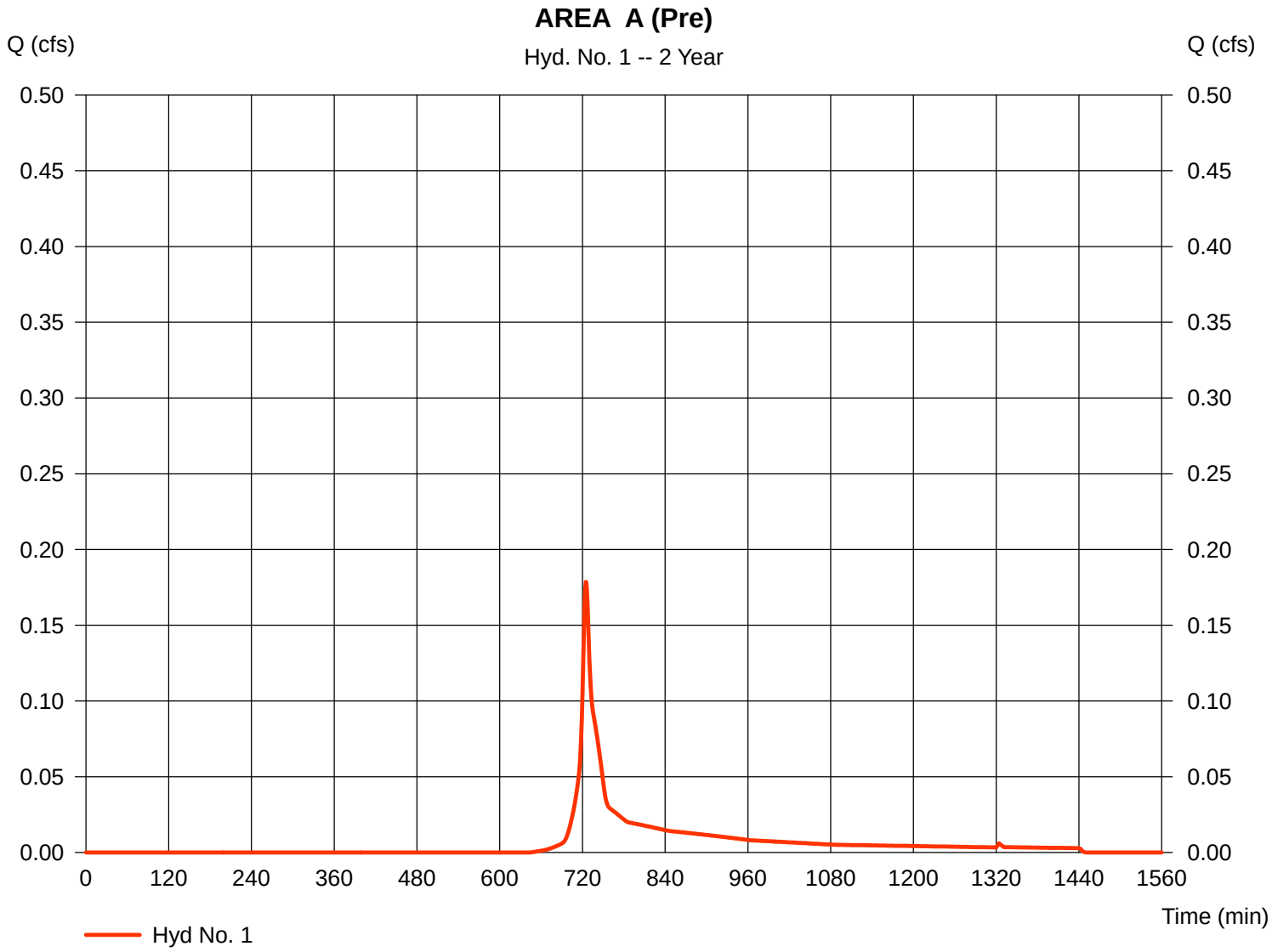
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 1

AREA A (Pre)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.179 cfs
Storm frequency	=	2 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	582 cuft
Drainage area	=	0.160 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.10 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



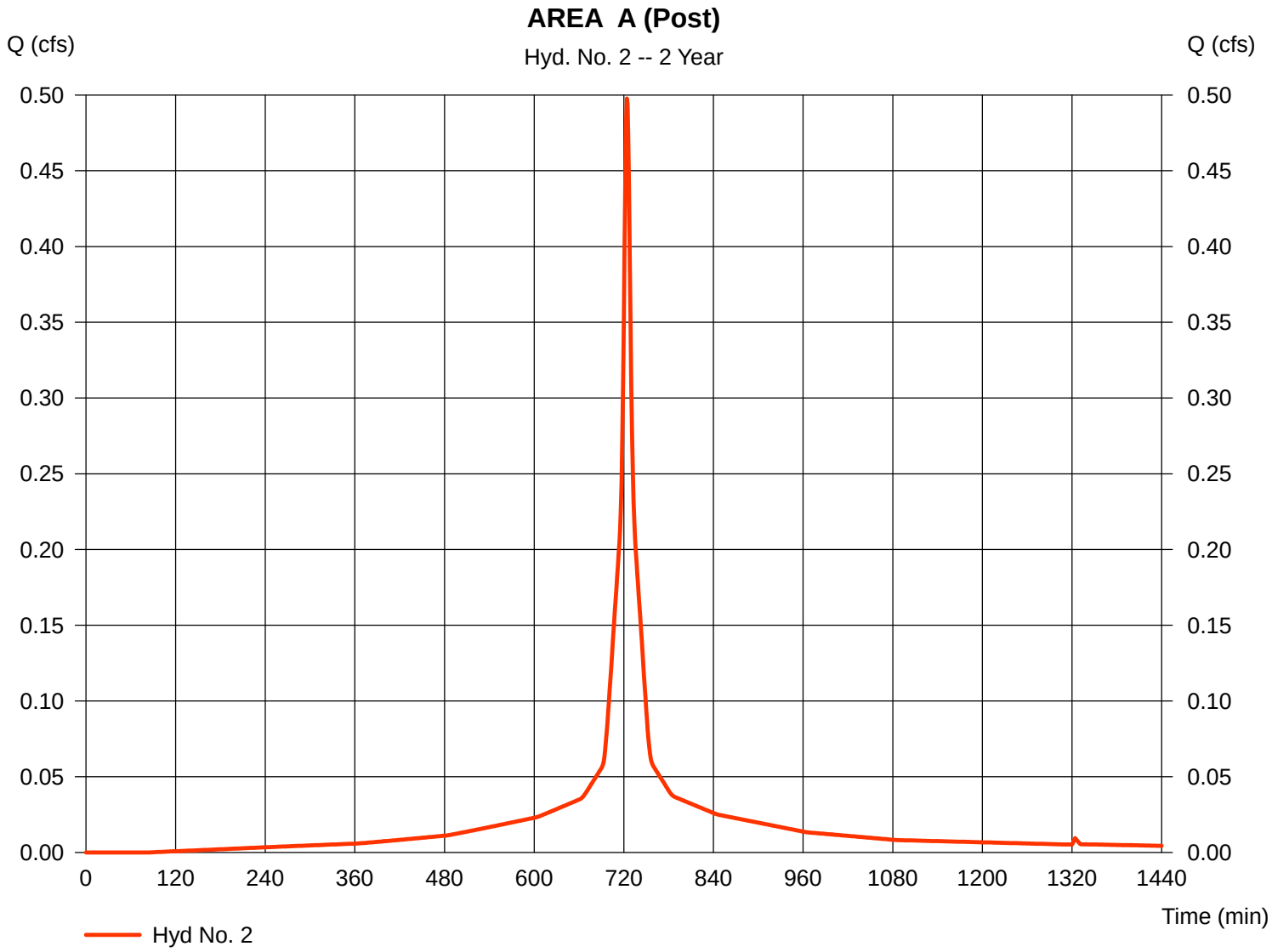
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 2

AREA A (Post)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.498 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	1,718 cuft
Drainage area	=	0.160 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.10 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



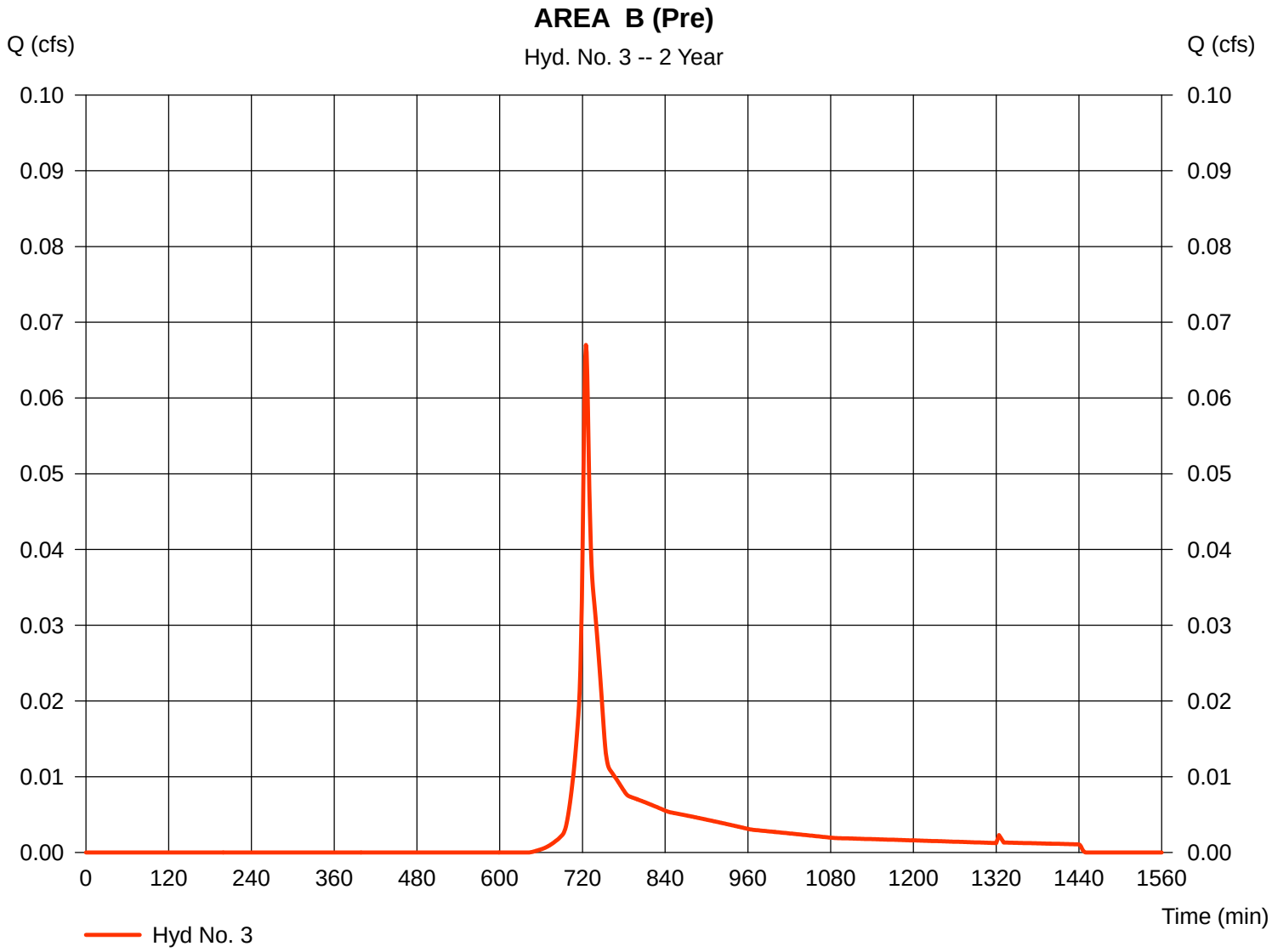
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 3

AREA B (Pre)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.067 cfs
Storm frequency	=	2 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	218 cuft
Drainage area	=	0.060 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.10 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

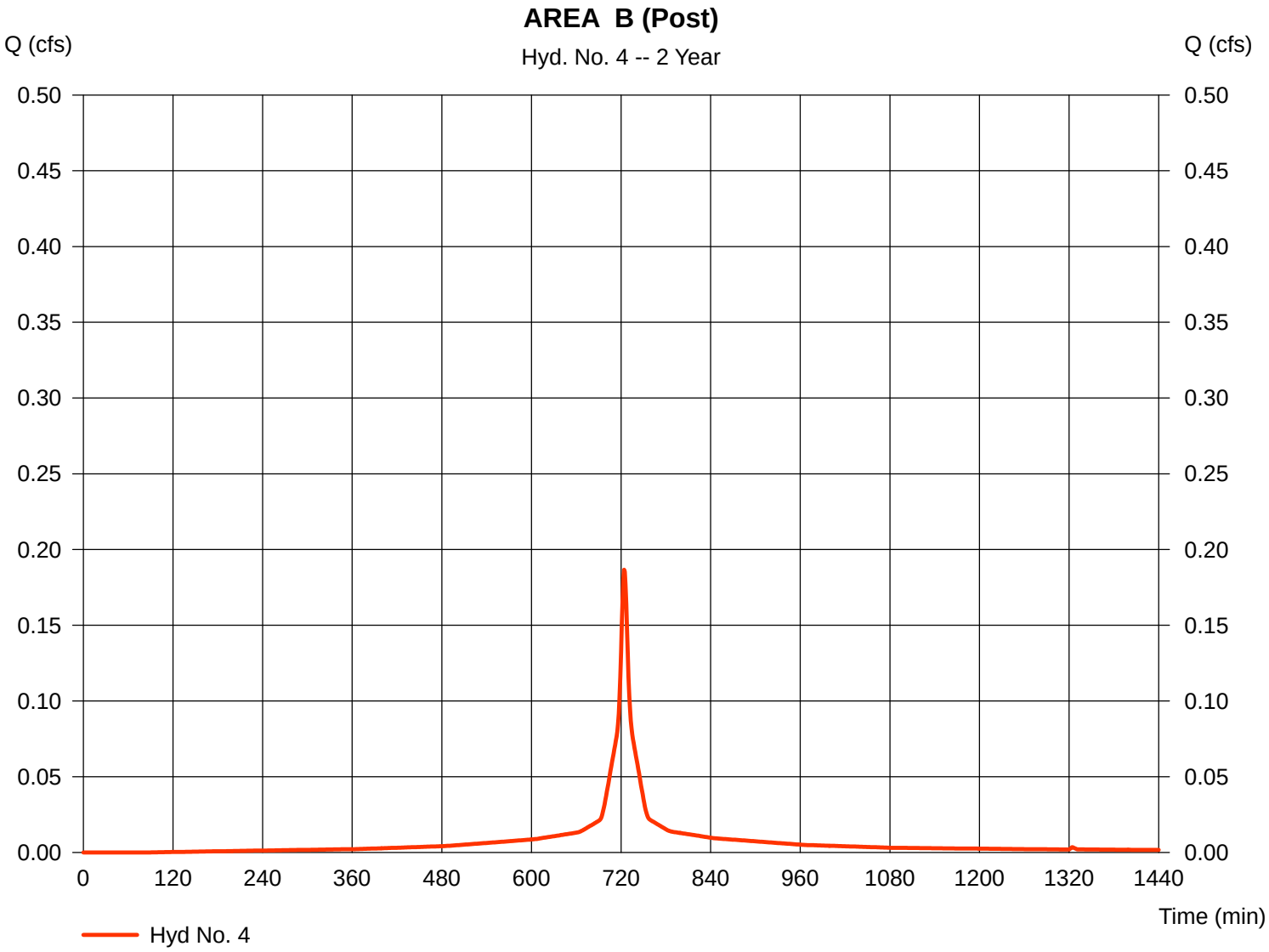


Hydrograph Report

Hyd. No. 4

AREA B (Post)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.187 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	644 cuft
Drainage area	=	0.060 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.10 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



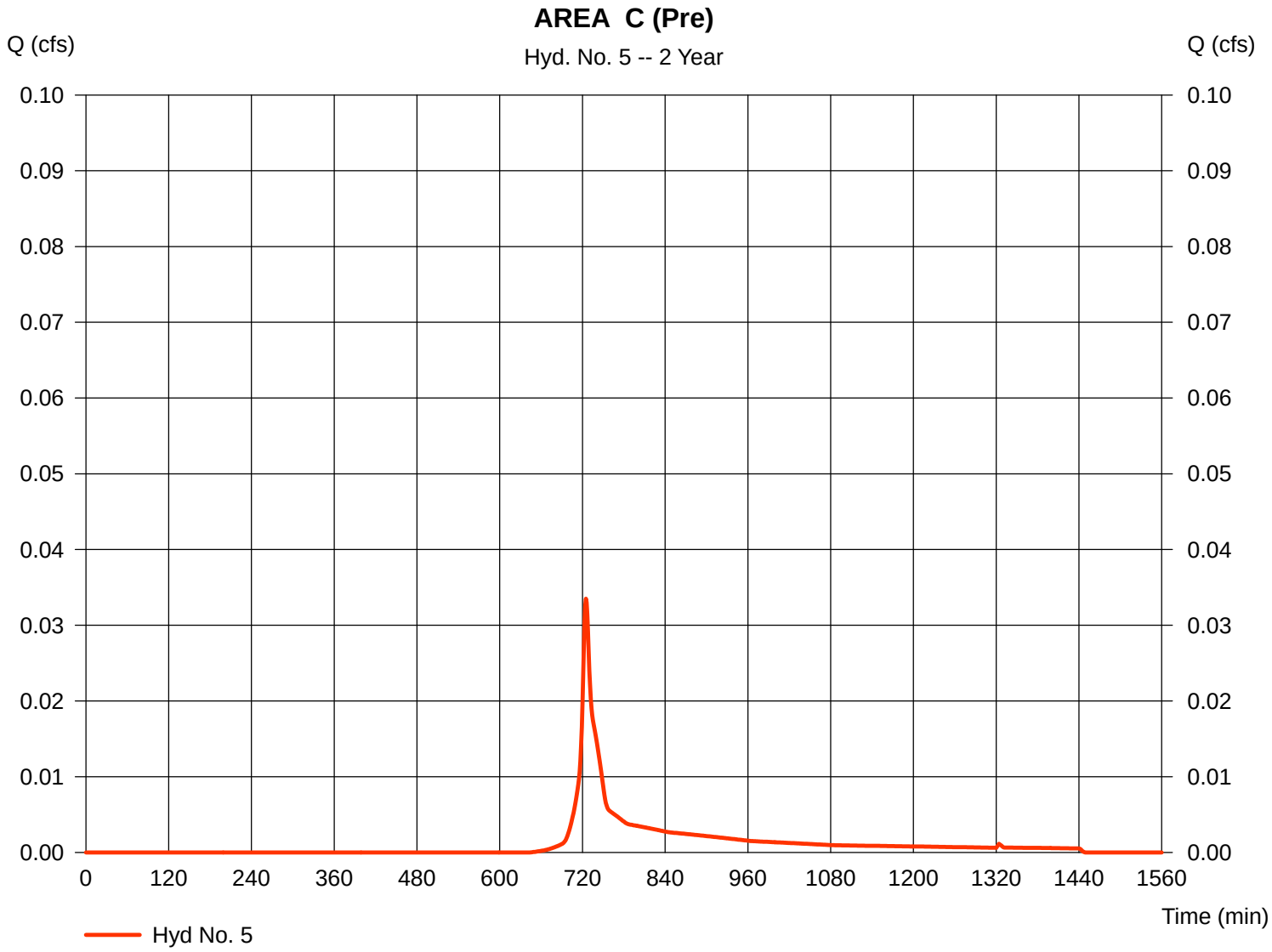
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 5

AREA C (Pre)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.034 cfs
Storm frequency	=	2 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	109 cuft
Drainage area	=	0.030 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.10 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



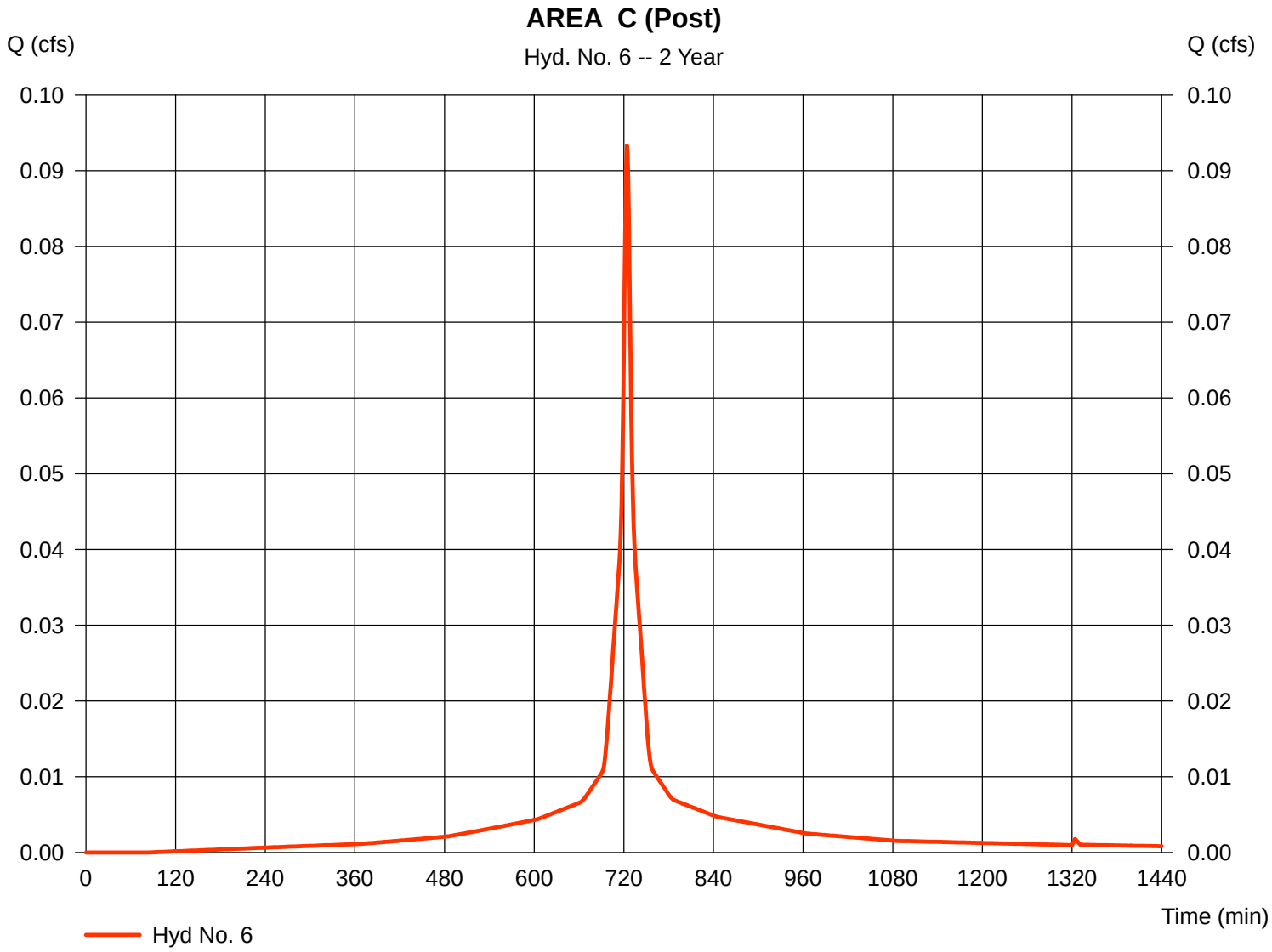
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 6

AREA C (Post)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.093 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	322 cuft
Drainage area	=	0.030 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.10 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



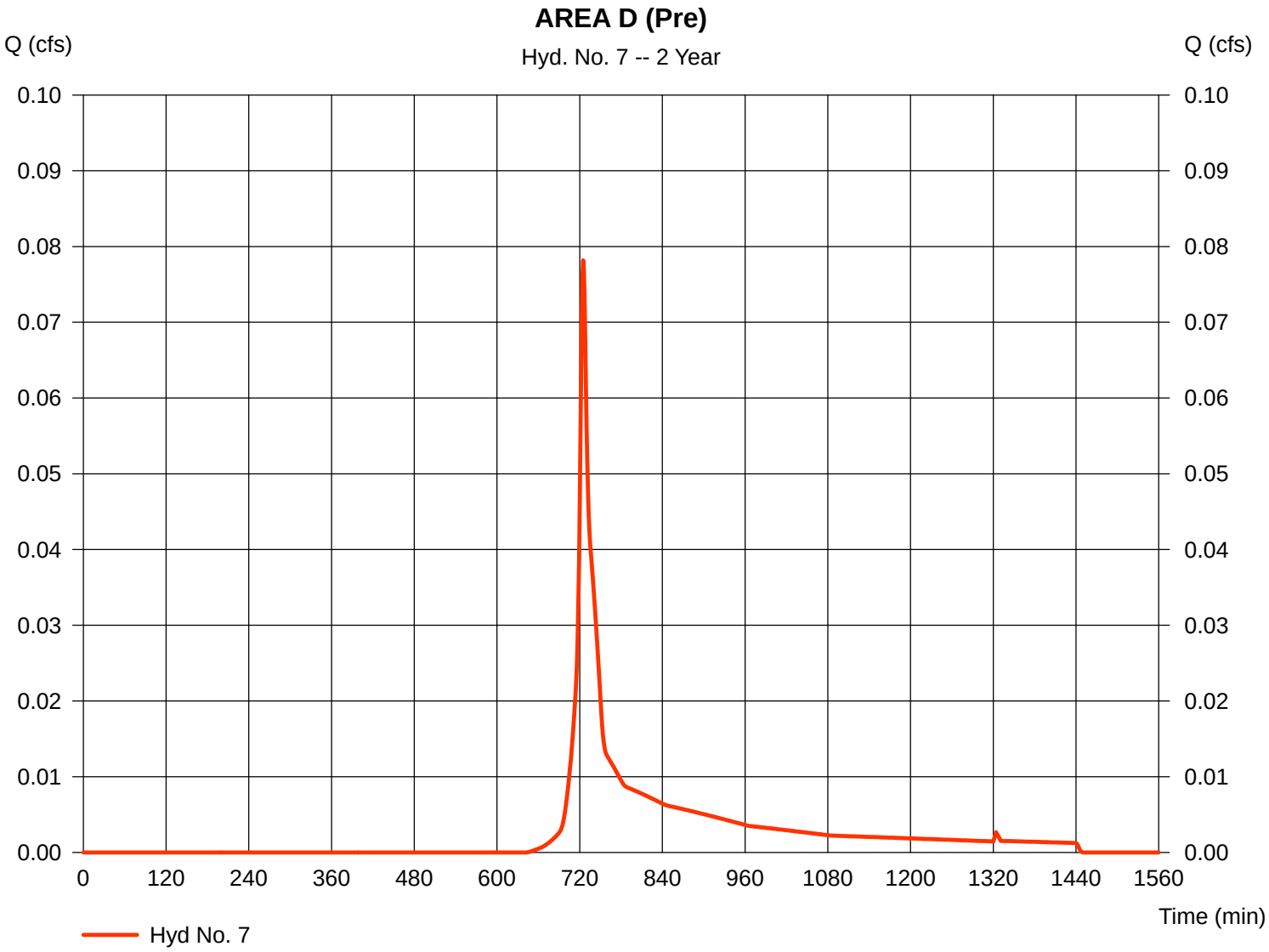
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 7

AREA D (Pre)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.078 cfs
Storm frequency	=	2 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	255 cuft
Drainage area	=	0.070 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.10 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



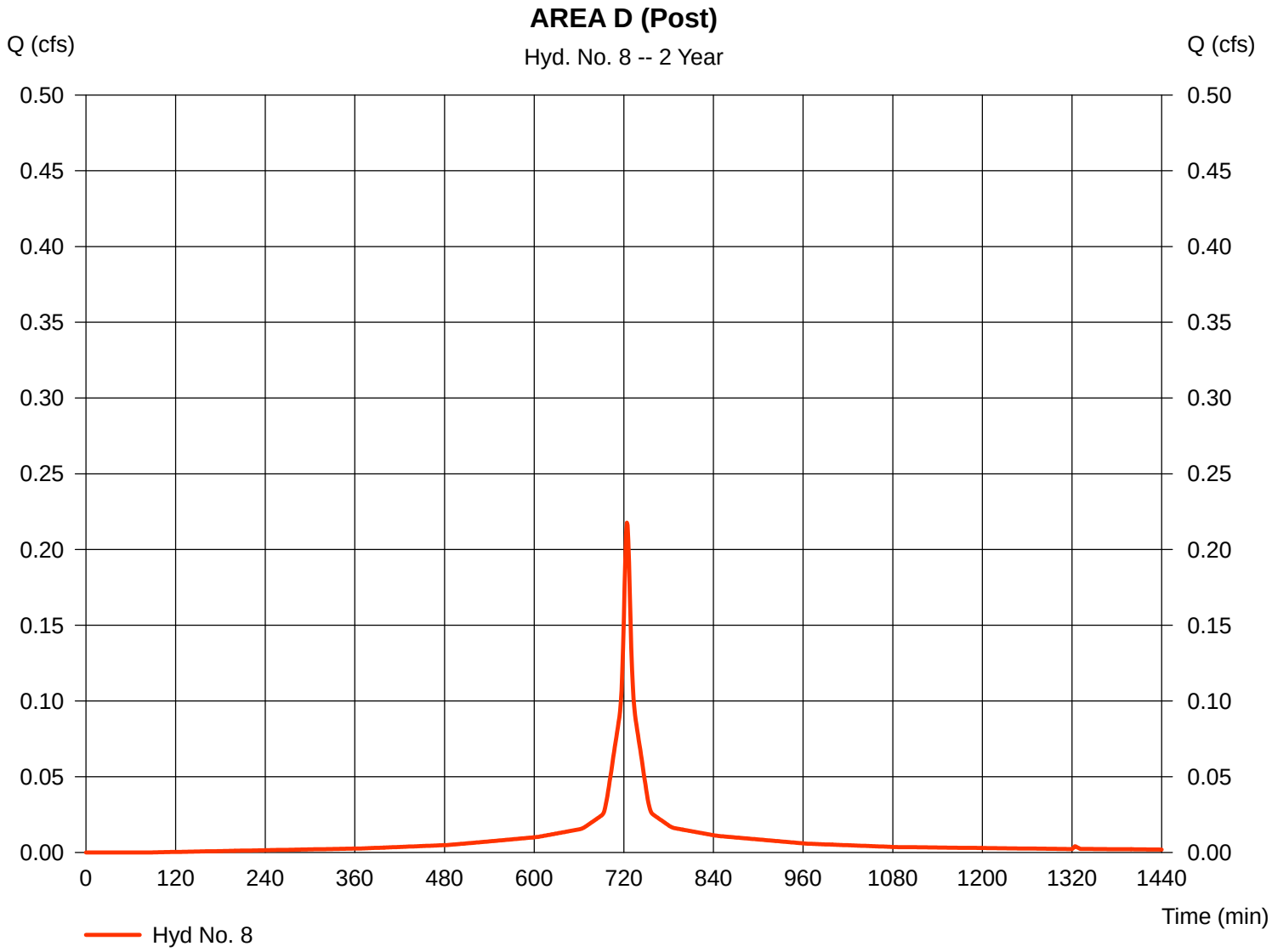
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 8

AREA D (Post)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.218 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	751 cuft
Drainage area	=	0.070 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.10 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

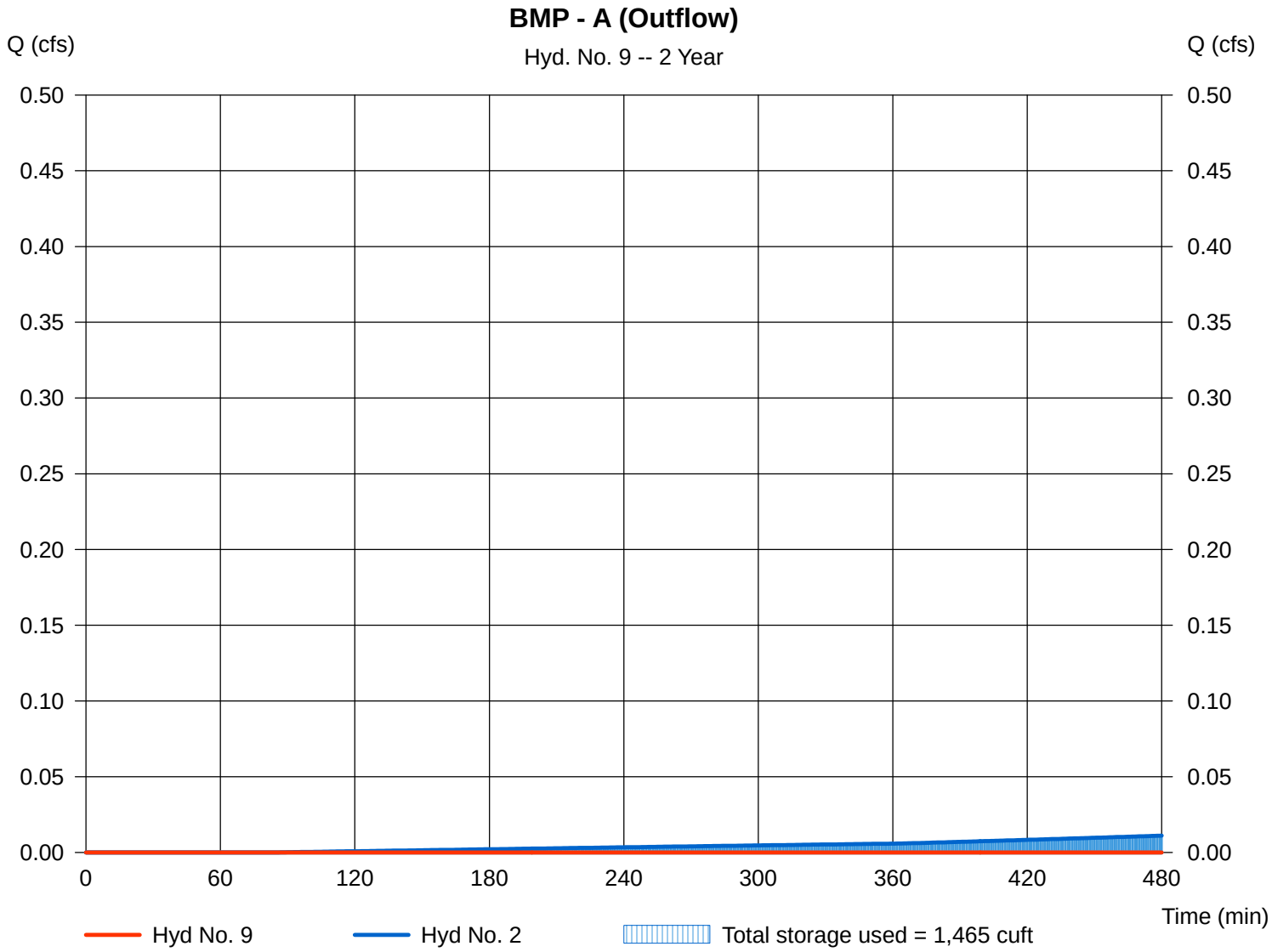
Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 9

BMP - A (Outflow)

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	345 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	2 - AREA A (Post)	Max. Elevation	=	18.75 ft
Reservoir name	=	BMP - A (Trench)	Max. Storage	=	1,465 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

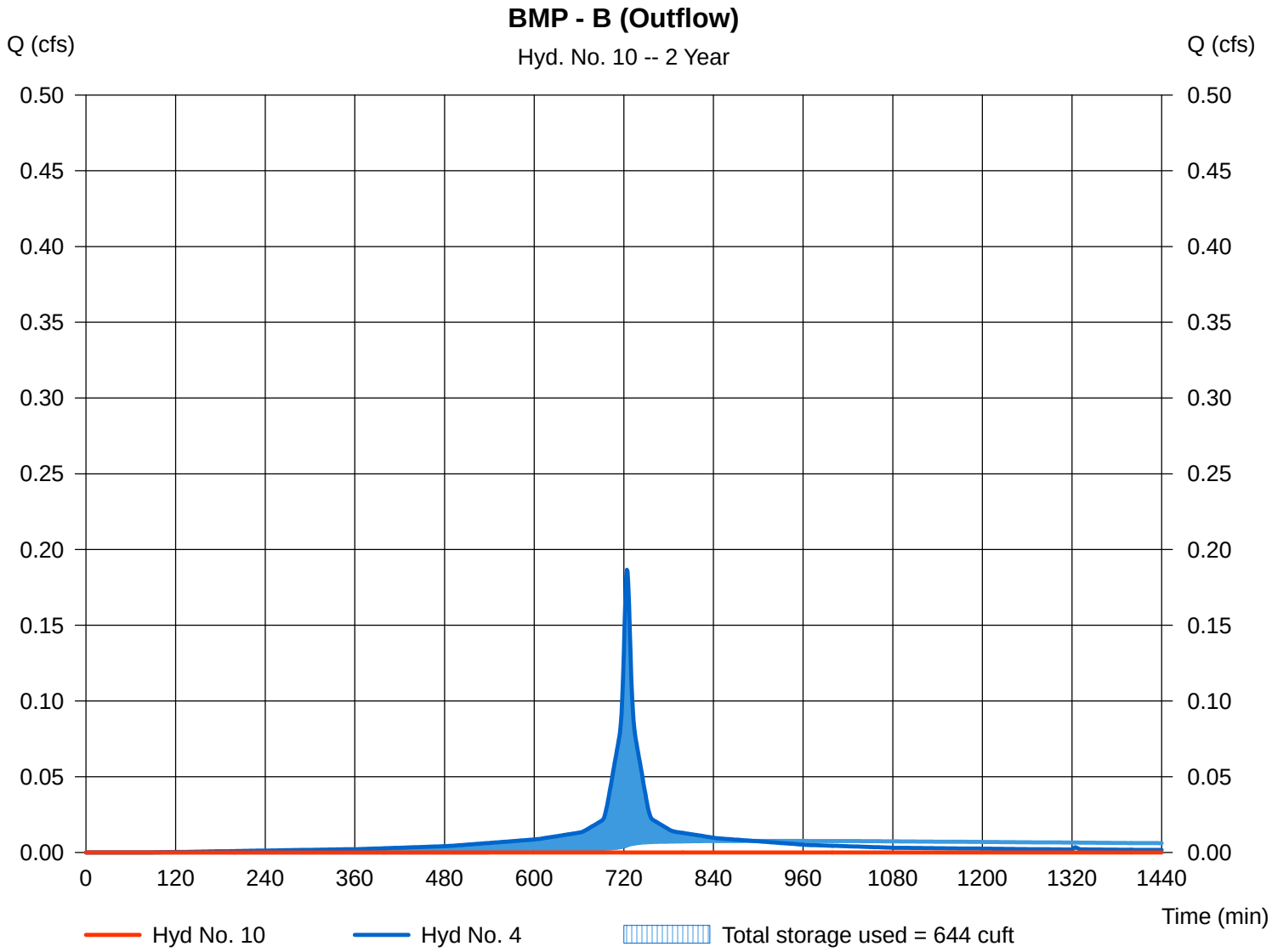
Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 10

BMP - B (Outflow)

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	n/a
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	4 - AREA B (Post)	Max. Elevation	=	18.31 ft
Reservoir name	=	BMP - B (Trench)	Max. Storage	=	644 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

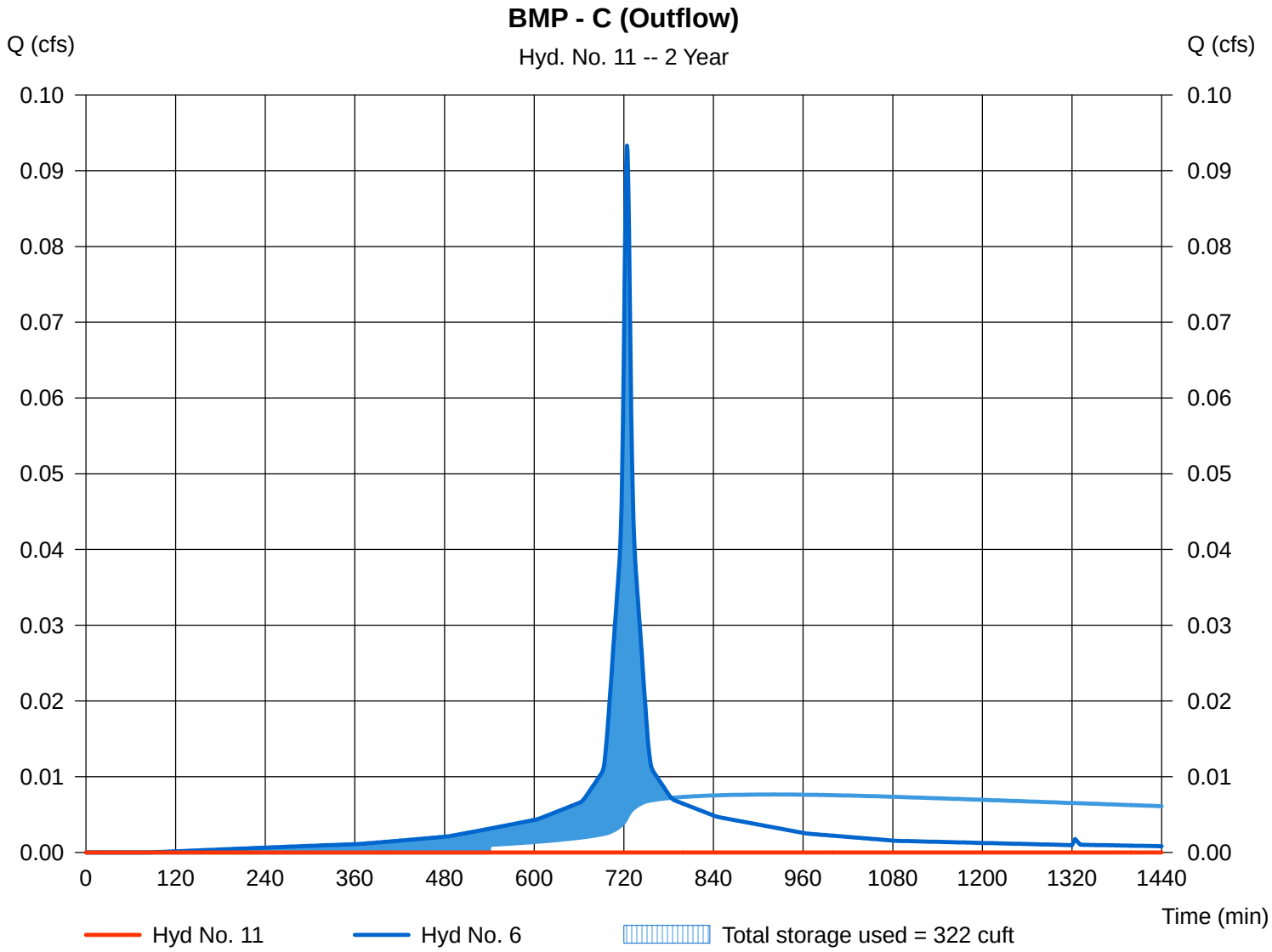
Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 11

BMP - C (Outflow)

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	n/a
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	6 - AREA C (Post)	Max. Elevation	=	18.14 ft
Reservoir name	=	BMP - C (Trench)	Max. Storage	=	322 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

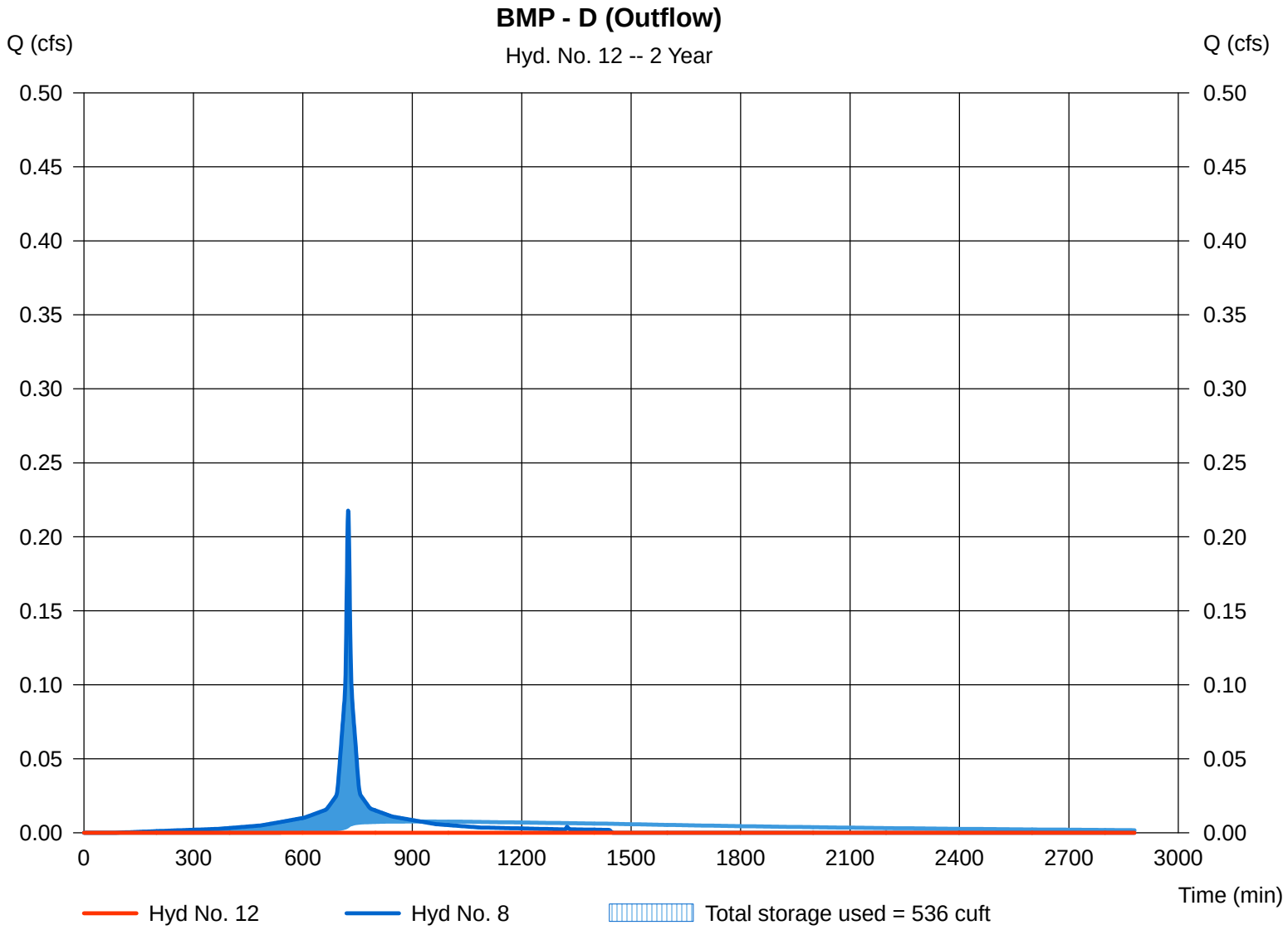
Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 12

BMP - D (Outflow)

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	735 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	8 - AREA D (Post)	Max. Elevation	=	16.35 ft
Reservoir name	=	BMP - D (SWMA)	Max. Storage	=	536 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.411	1	725	1,274	----	------	------	AREA A (Pre)
2	SCS Runoff	0.761	1	724	2,674	----	------	------	AREA A (Post)
3	SCS Runoff	0.154	1	725	478	----	------	------	AREA B (Pre)
4	SCS Runoff	0.285	1	724	1,003	----	------	------	AREA B (Post)
5	SCS Runoff	0.077	1	725	239	----	------	------	AREA C (Pre)
6	SCS Runoff	0.143	1	724	501	----	------	------	AREA C (Post)
7	SCS Runoff	0.180	1	725	557	----	------	------	AREA D (Pre)
8	SCS Runoff	0.333	1	724	1,170	----	------	------	AREA D (Post)
9	Reservoir	0.207	1	744	921	2	18.76	1,541	BMP - A (Outflow)
10	Reservoir	0.000	1	n/a	0	4	18.50	1,003	BMP - B (Outflow)
11	Reservoir	0.000	1	n/a	0	6	18.23	501	BMP - C (Outflow)
12	Reservoir	0.000	1	718	0	8	16.53	834	BMP - D (Outflow)

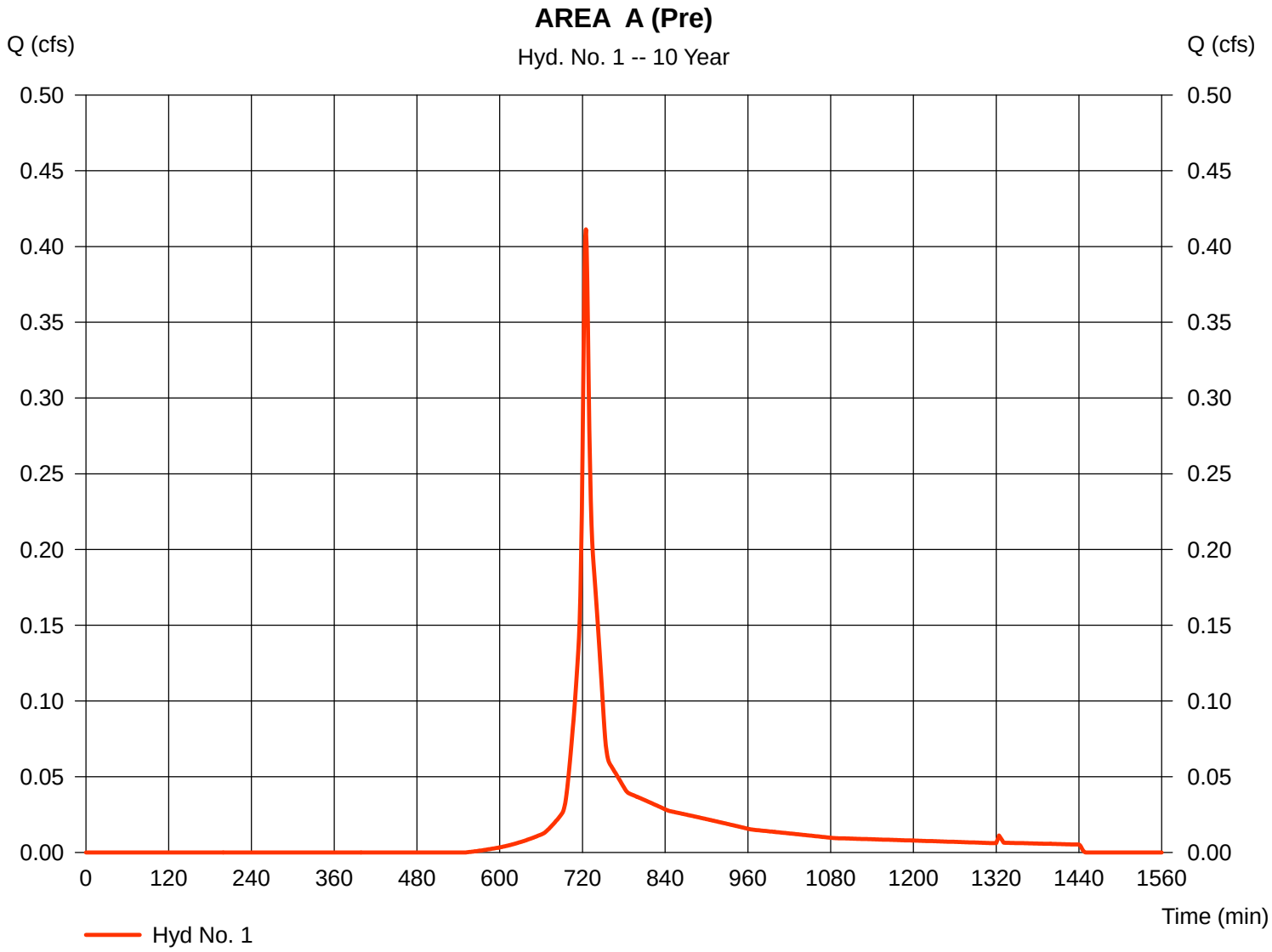
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 1

AREA A (Pre)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.411 cfs
Storm frequency	=	10 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	1,274 cuft
Drainage area	=	0.160 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	4.70 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



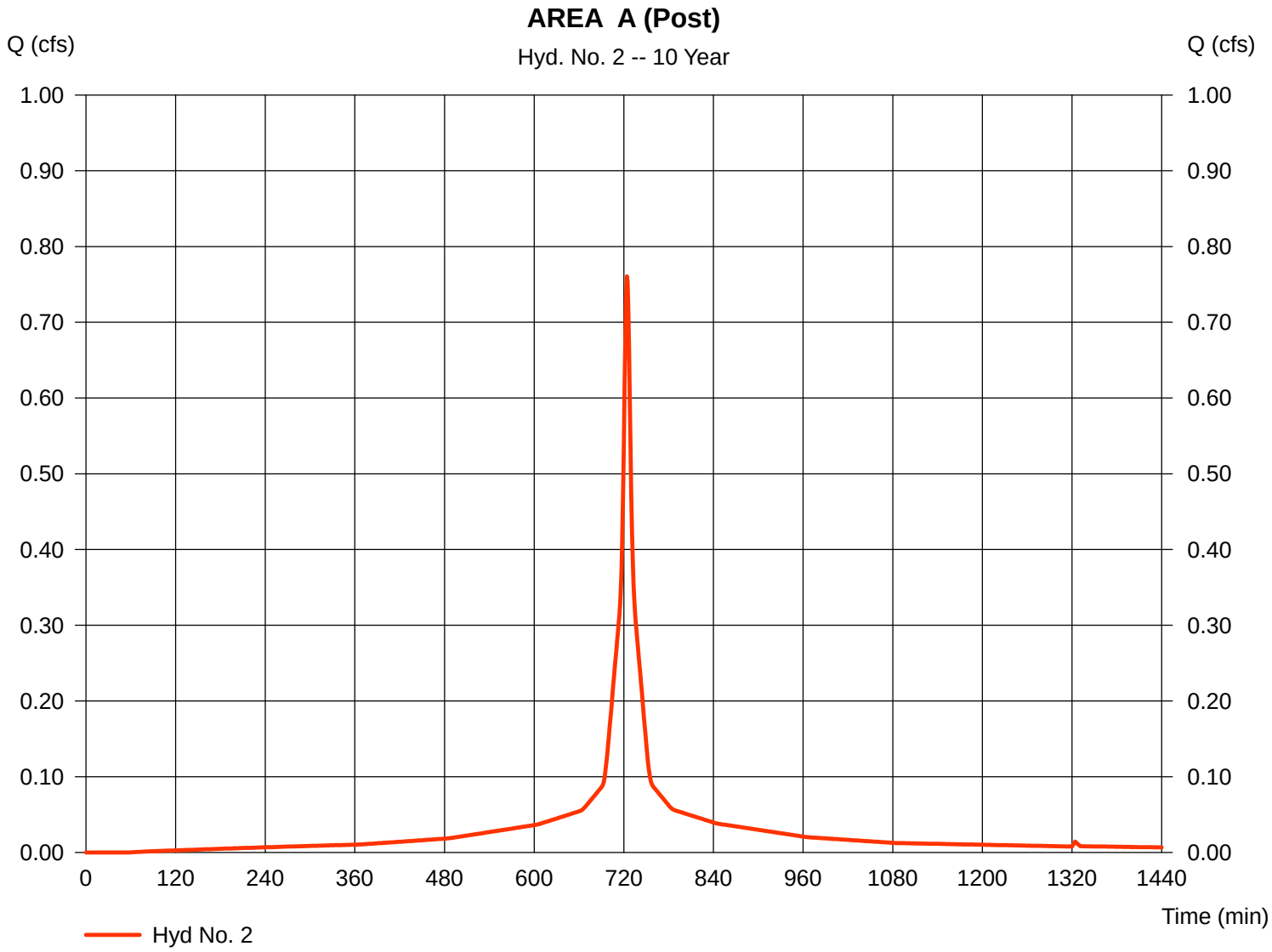
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 2

AREA A (Post)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.761 cfs
Storm frequency	=	10 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	2,674 cuft
Drainage area	=	0.160 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	4.70 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



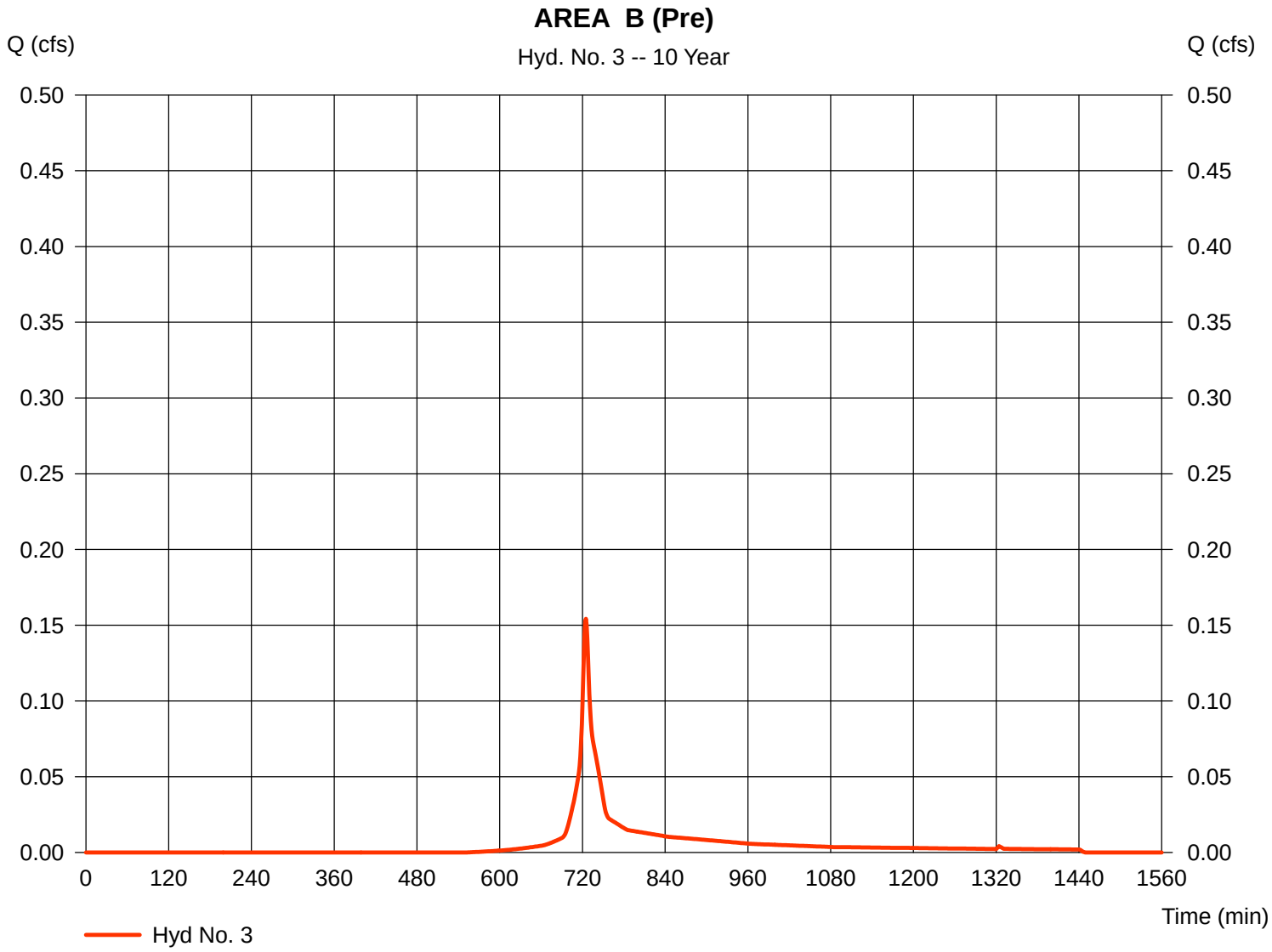
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 3

AREA B (Pre)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.154 cfs
Storm frequency	=	10 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	478 cuft
Drainage area	=	0.060 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	4.70 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



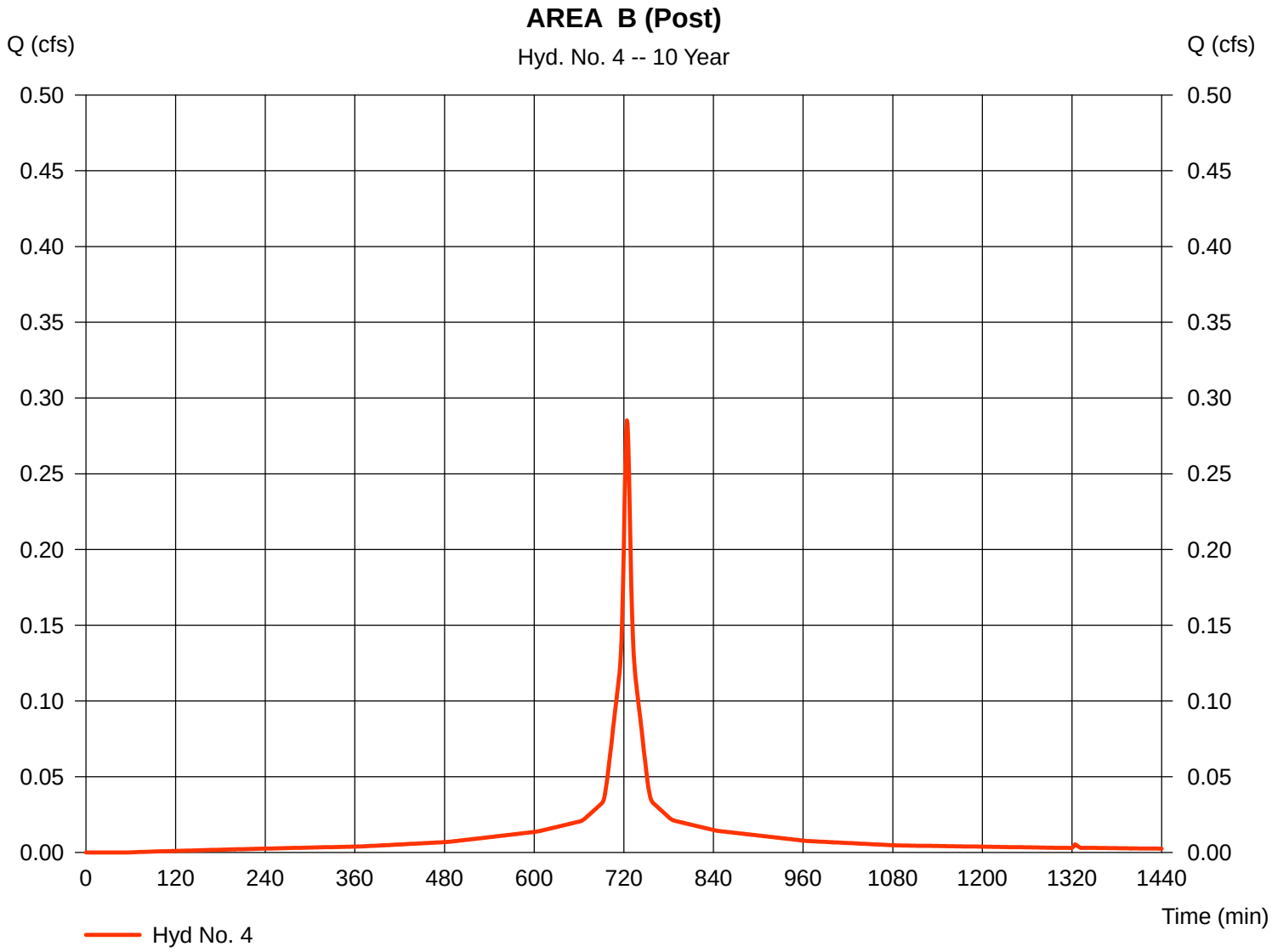
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 4

AREA B (Post)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.285 cfs
Storm frequency	=	10 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	1,003 cuft
Drainage area	=	0.060 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	4.70 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



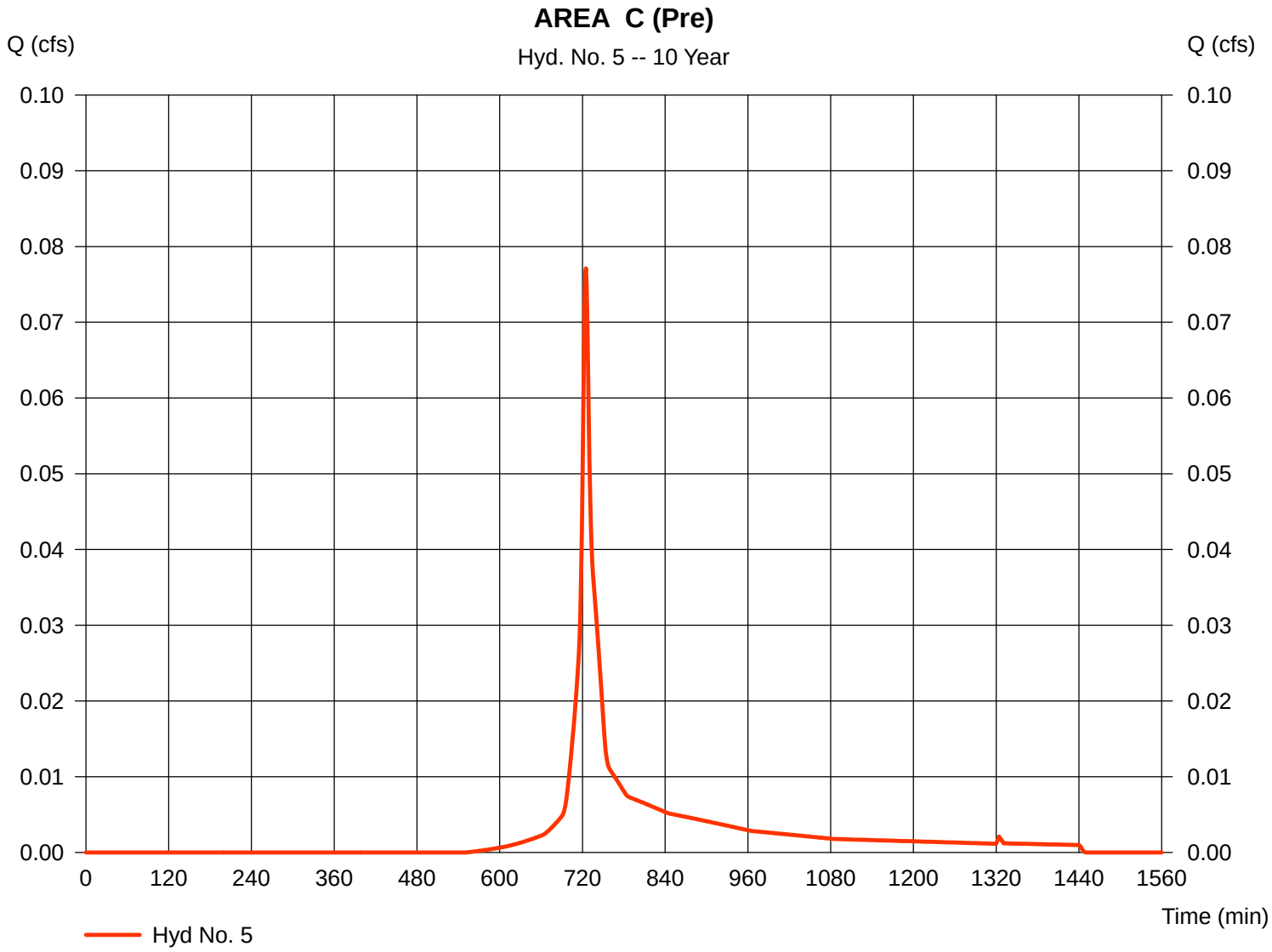
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 5

AREA C (Pre)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.077 cfs
Storm frequency	=	10 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	239 cuft
Drainage area	=	0.030 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	4.70 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



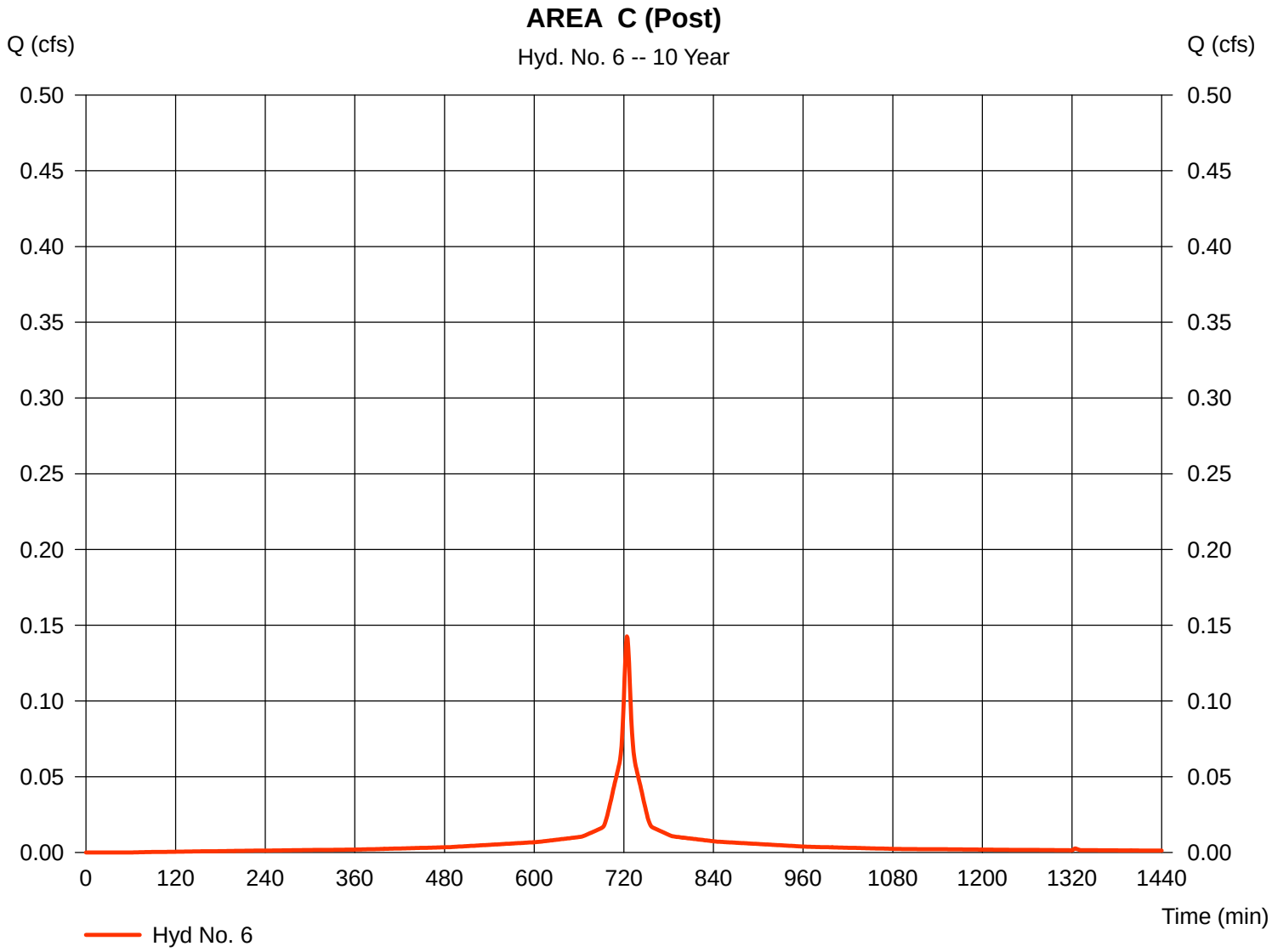
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 6

AREA C (Post)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.143 cfs
Storm frequency	=	10 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	501 cuft
Drainage area	=	0.030 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	4.70 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



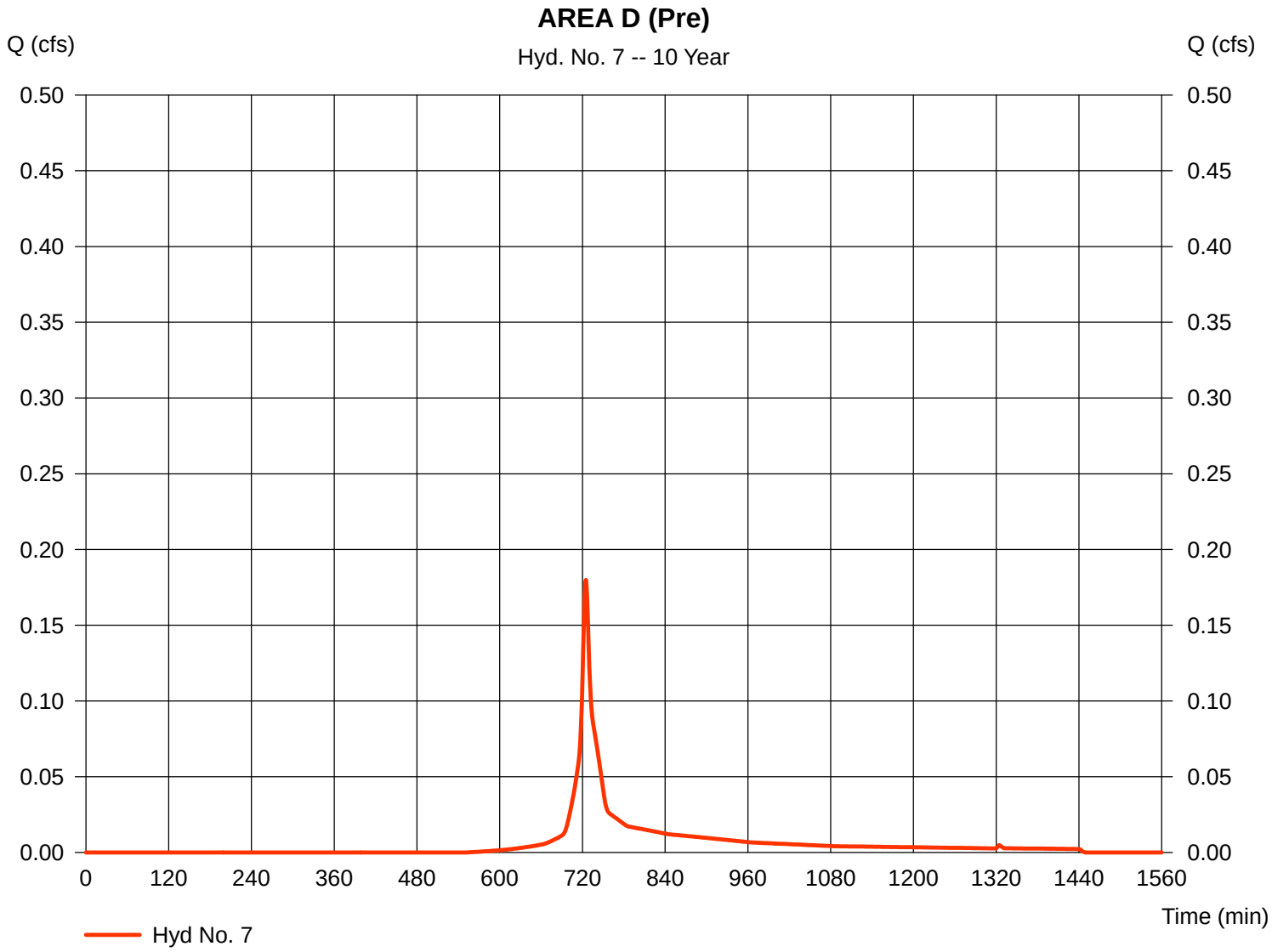
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 7

AREA D (Pre)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.180 cfs
Storm frequency	=	10 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	557 cuft
Drainage area	=	0.070 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	4.70 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



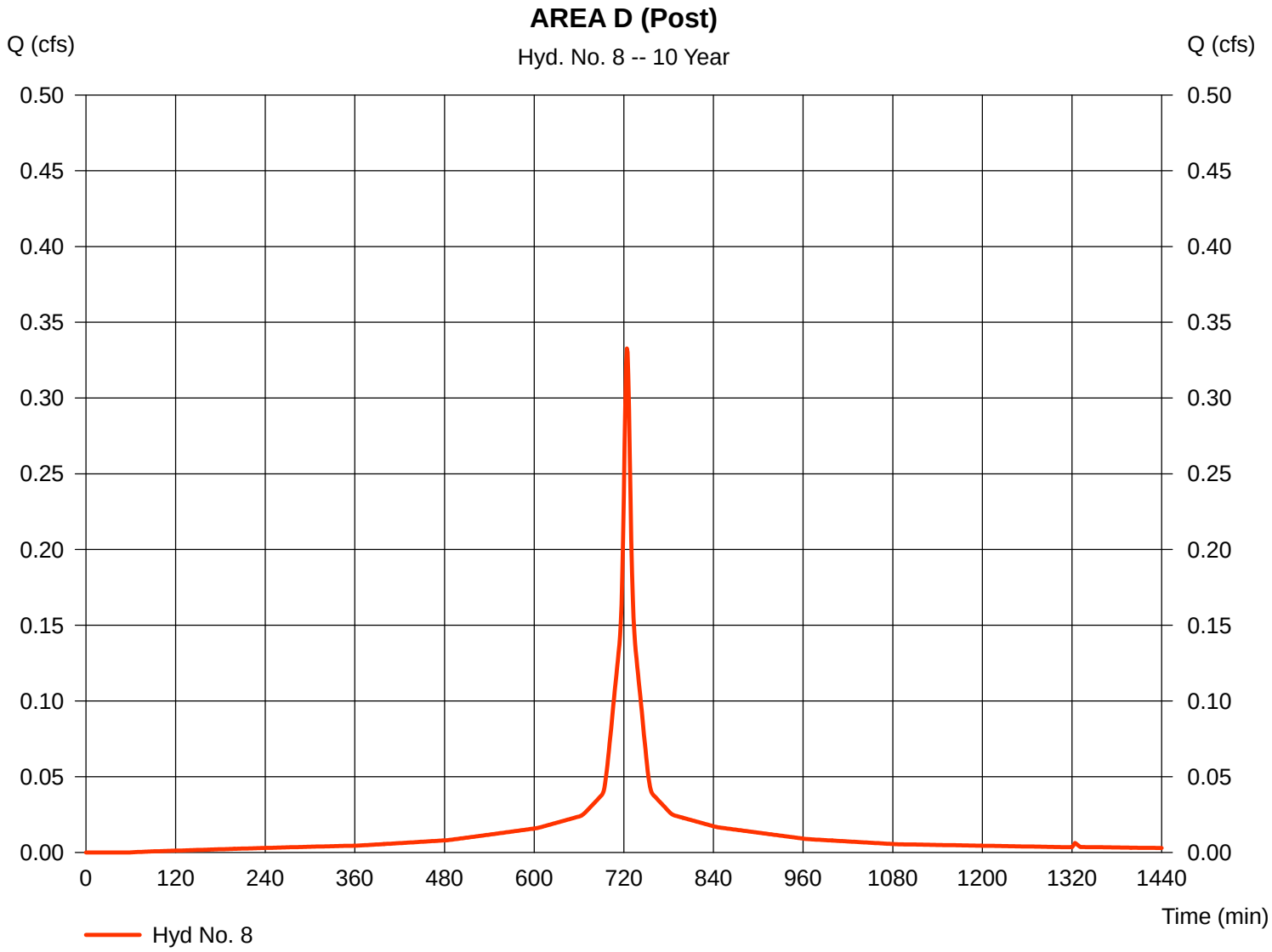
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 8

AREA D (Post)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.333 cfs
Storm frequency	=	10 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	1,170 cuft
Drainage area	=	0.070 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	4.70 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

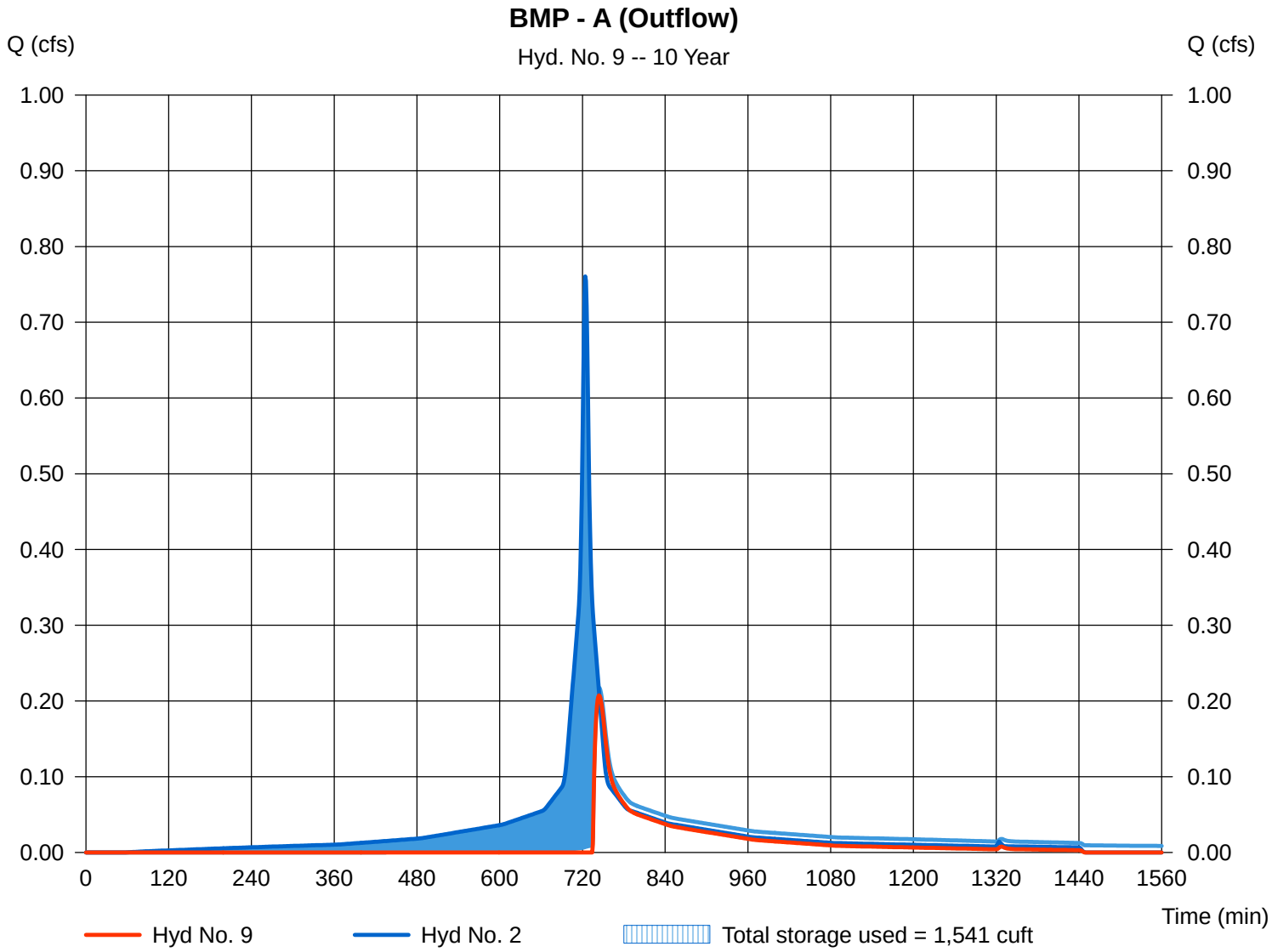
Hydraflow Hydrographs by Intelisolve v9.2 Monday, Mar 9, 2020

Hyd. No. 9

BMP - A (Outflow)

Hydrograph type	=	Reservoir	Peak discharge	=	0.207 cfs
Storm frequency	=	10 yrs	Time to peak	=	744 min
Time interval	=	1 min	Hyd. volume	=	921 cuft
Inflow hyd. No.	=	2 - AREA A (Post)	Max. Elevation	=	18.76 ft
Reservoir name	=	BMP - A (Trench)	Max. Storage	=	1,541 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

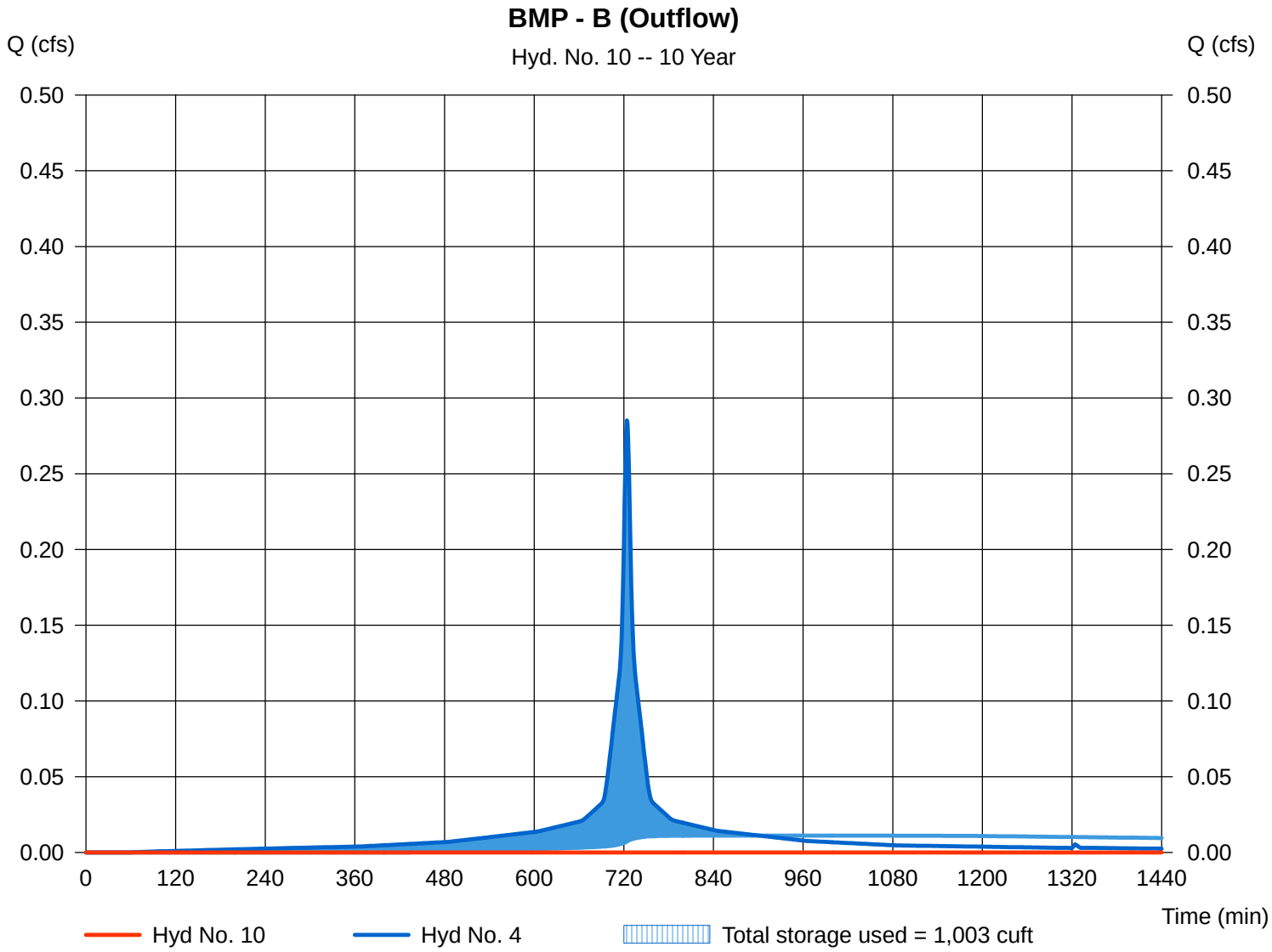
Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 10

BMP - B (Outflow)

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	10 yrs	Time to peak	=	n/a
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	4 - AREA B (Post)	Max. Elevation	=	18.50 ft
Reservoir name	=	BMP - B (Trench)	Max. Storage	=	1,003 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

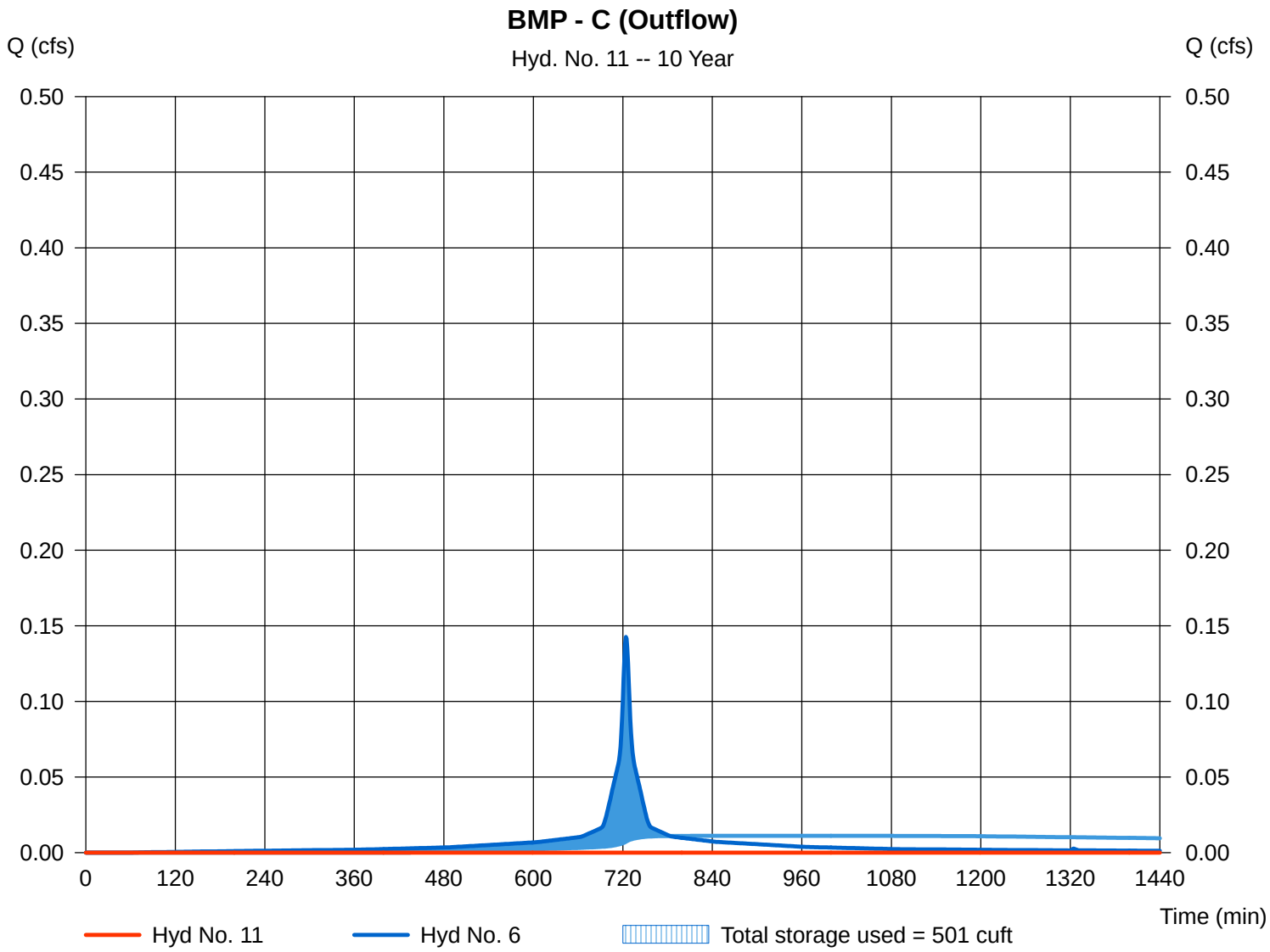
Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 11

BMP - C (Outflow)

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	10 yrs	Time to peak	=	n/a
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	6 - AREA C (Post)	Max. Elevation	=	18.23 ft
Reservoir name	=	BMP - C (Trench)	Max. Storage	=	501 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

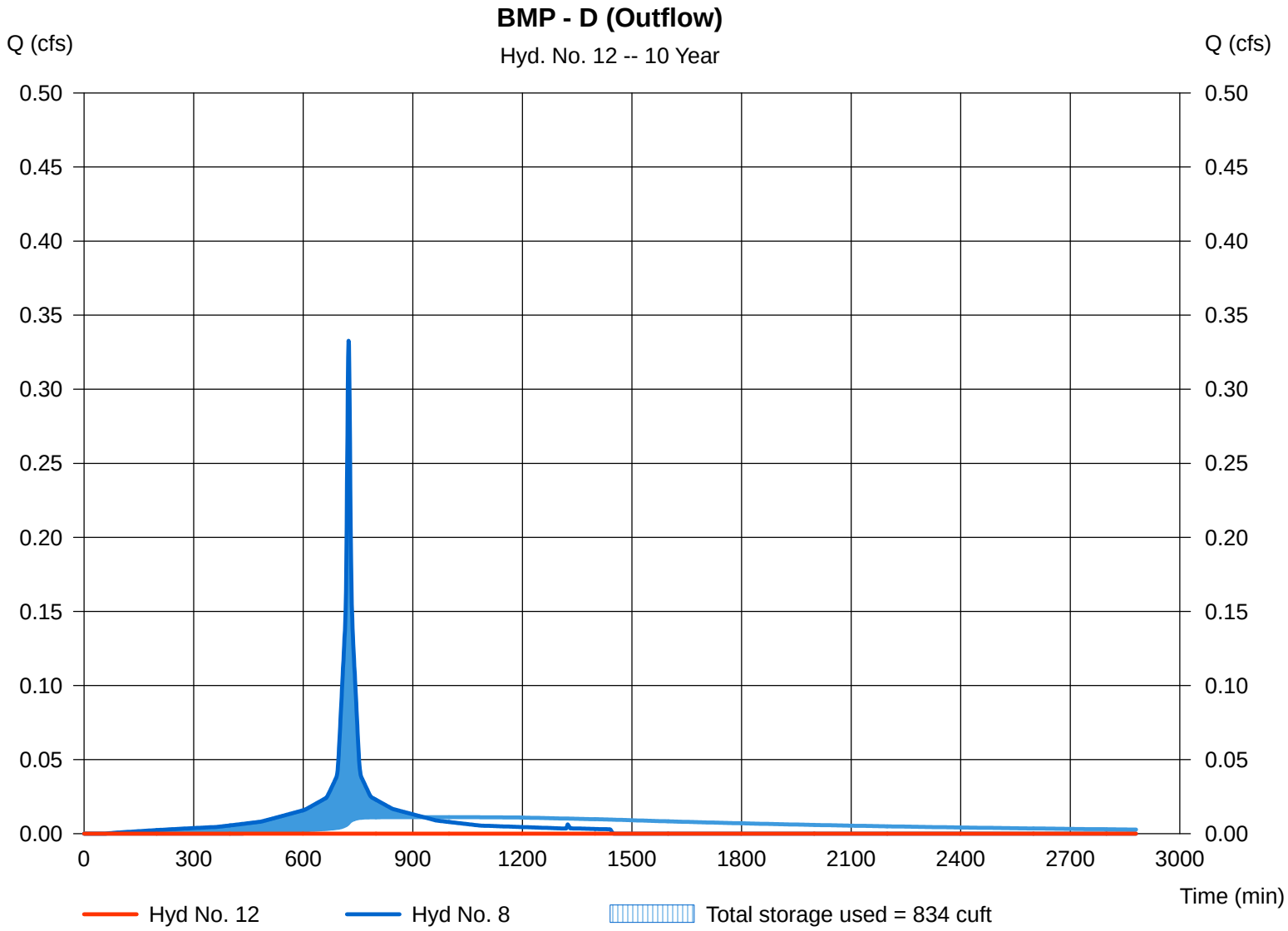
Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 12

BMP - D (Outflow)

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	8 - AREA D (Post)	Max. Elevation	=	16.53 ft
Reservoir name	=	BMP - D (SWMA)	Max. Storage	=	834 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.587	1	725	1,807	----	------	------	AREA A (Pre)
2	SCS Runoff	0.941	1	724	3,331	----	------	------	AREA A (Post)
3	SCS Runoff	0.220	1	725	678	----	------	------	AREA B (Pre)
4	SCS Runoff	0.353	1	724	1,249	----	------	------	AREA B (Post)
5	SCS Runoff	0.110	1	725	339	----	------	------	AREA C (Pre)
6	SCS Runoff	0.176	1	724	625	----	------	------	AREA C (Post)
7	SCS Runoff	0.257	1	725	791	----	------	------	AREA D (Pre)
8	SCS Runoff	0.412	1	724	1,457	----	------	------	AREA D (Post)
9	Reservoir	0.512	1	731	1,569	2	18.77	1,632	BMP - A (Outflow)
10	Reservoir	0.000	1	n/a	0	4	18.64	1,249	BMP - B (Outflow)
11	Reservoir	0.000	1	n/a	0	6	18.30	625	BMP - C (Outflow)
12	Reservoir	0.000	1	706	0	8	16.65	1,060	BMP - D (Outflow)

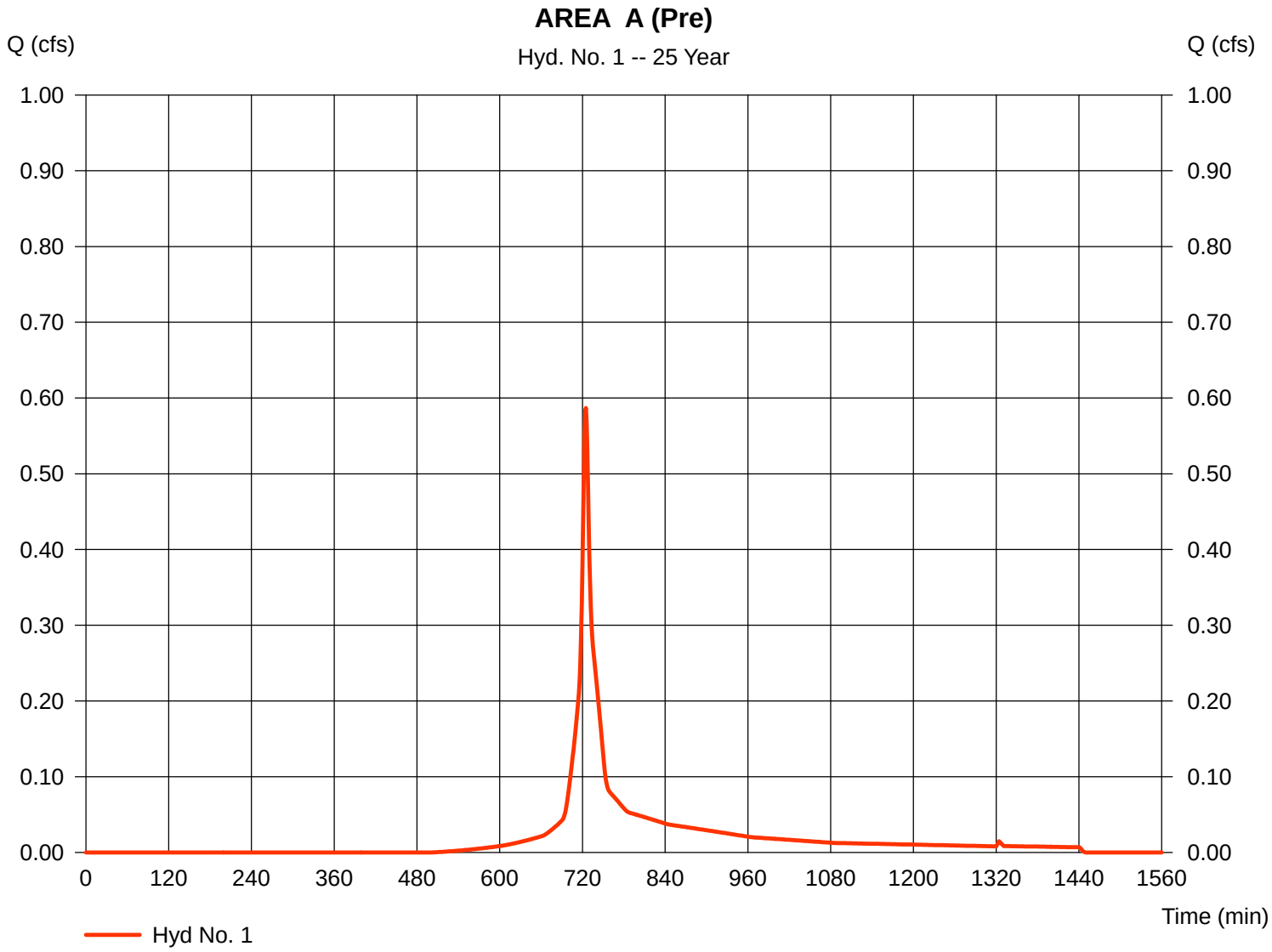
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Monday, Mar 9, 2020

Hyd. No. 1

AREA A (Pre)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.587 cfs
Storm frequency	=	25 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	1,807 cuft
Drainage area	=	0.160 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.80 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



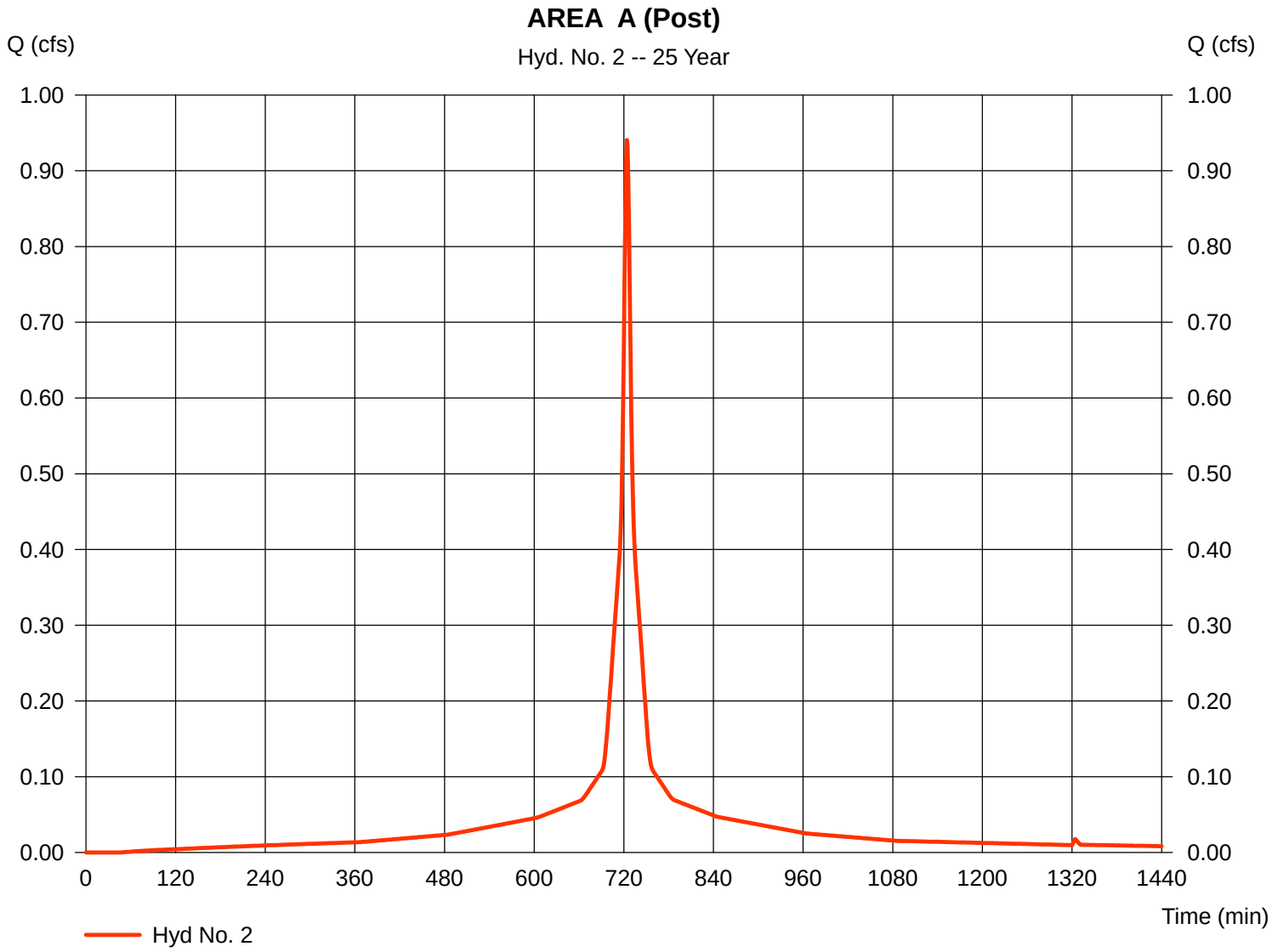
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 2

AREA A (Post)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.941 cfs
Storm frequency	=	25 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	3,331 cuft
Drainage area	=	0.160 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.80 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



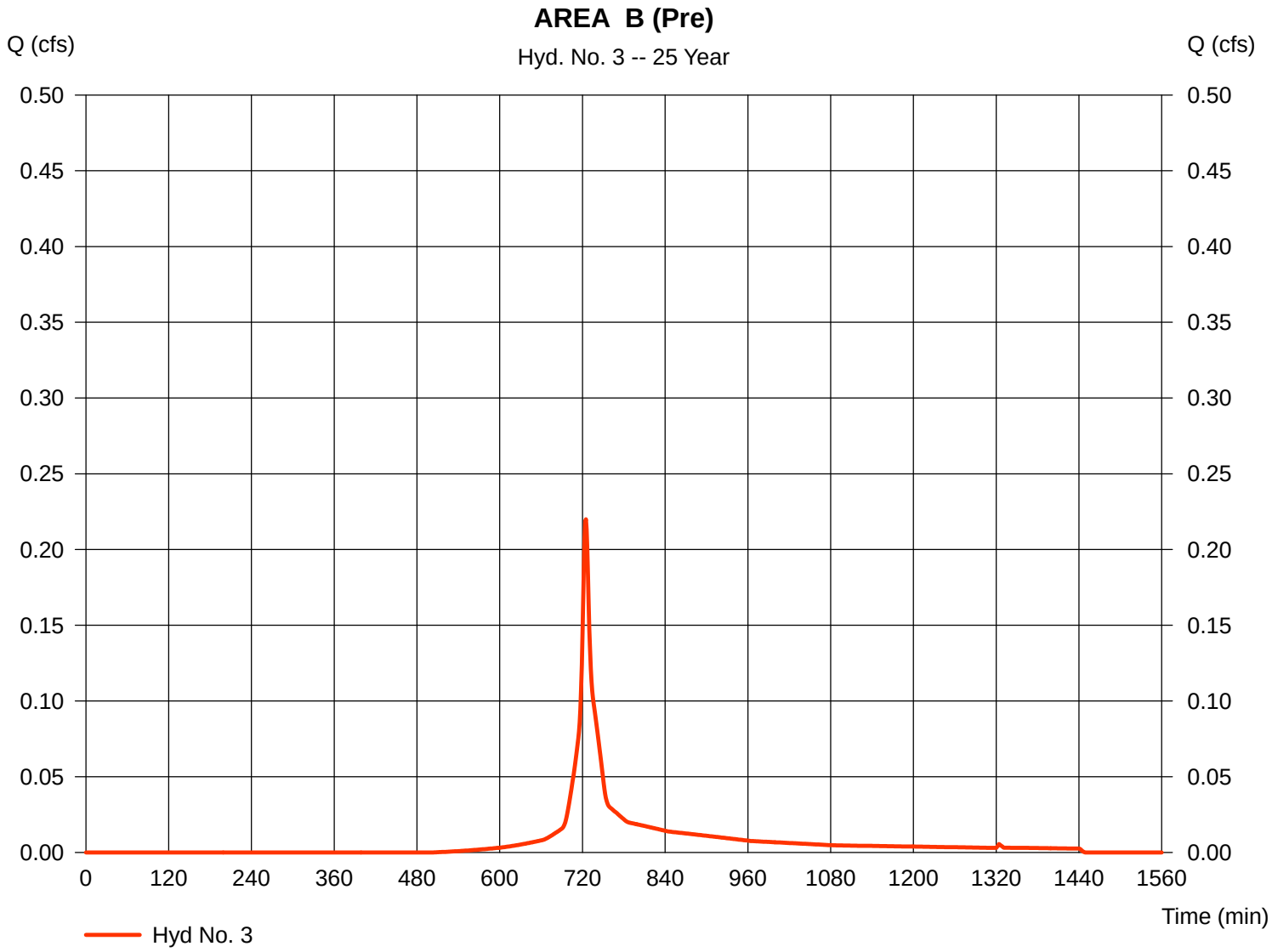
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 3

AREA B (Pre)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.220 cfs
Storm frequency	=	25 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	678 cuft
Drainage area	=	0.060 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.80 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



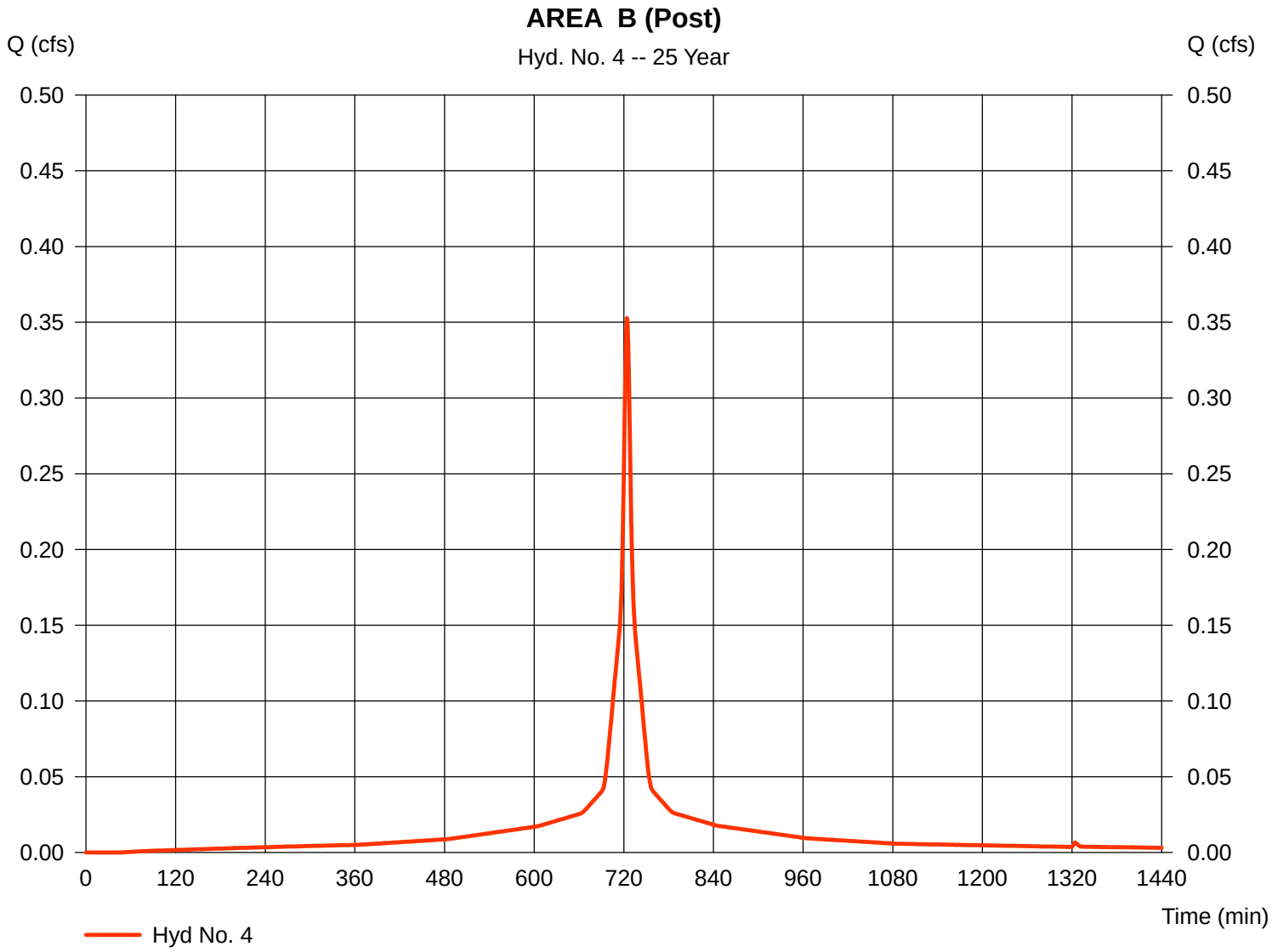
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 4

AREA B (Post)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.353 cfs
Storm frequency	=	25 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	1,249 cuft
Drainage area	=	0.060 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.80 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



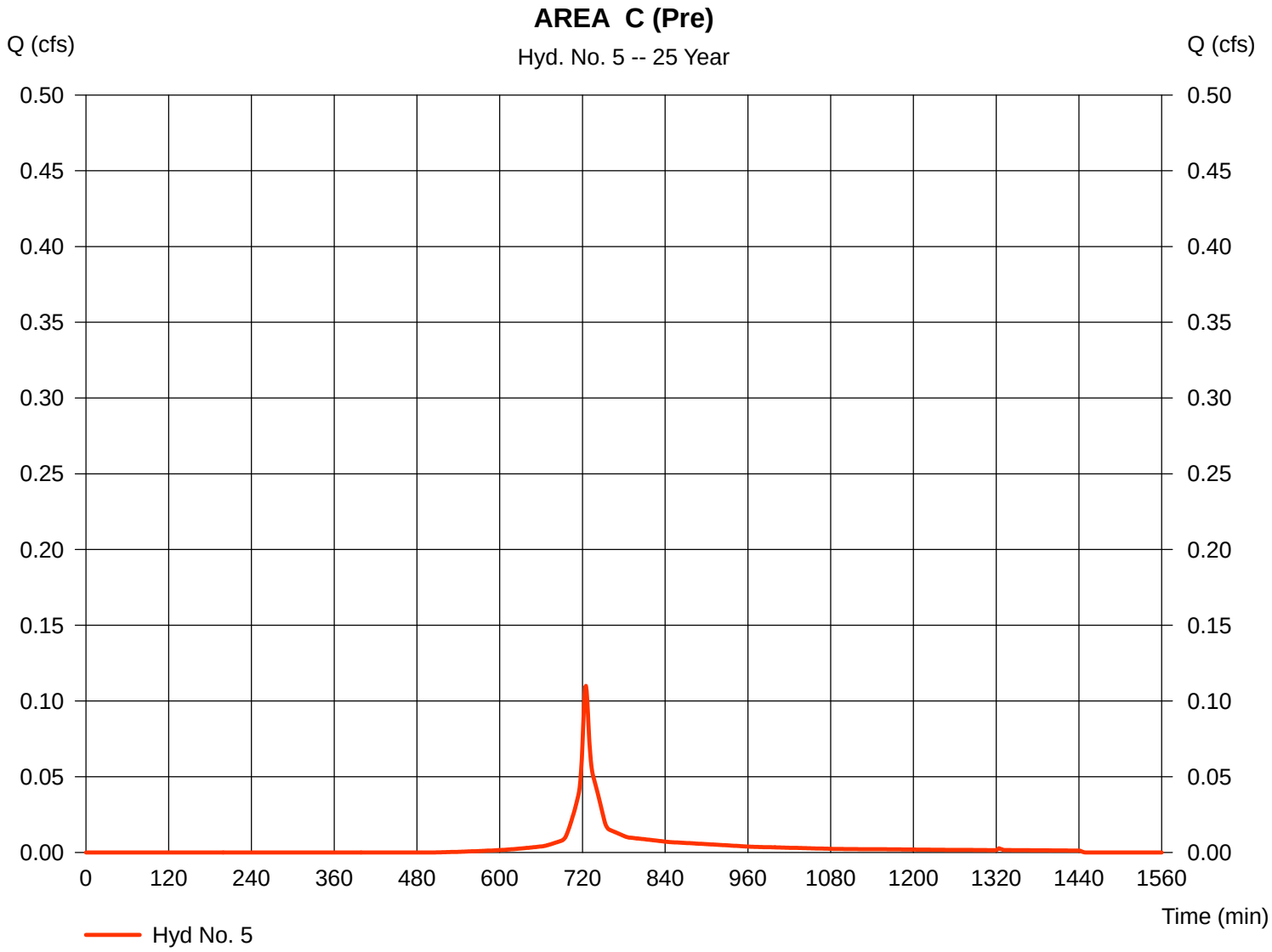
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 5

AREA C (Pre)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.110 cfs
Storm frequency	=	25 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	339 cuft
Drainage area	=	0.030 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.80 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



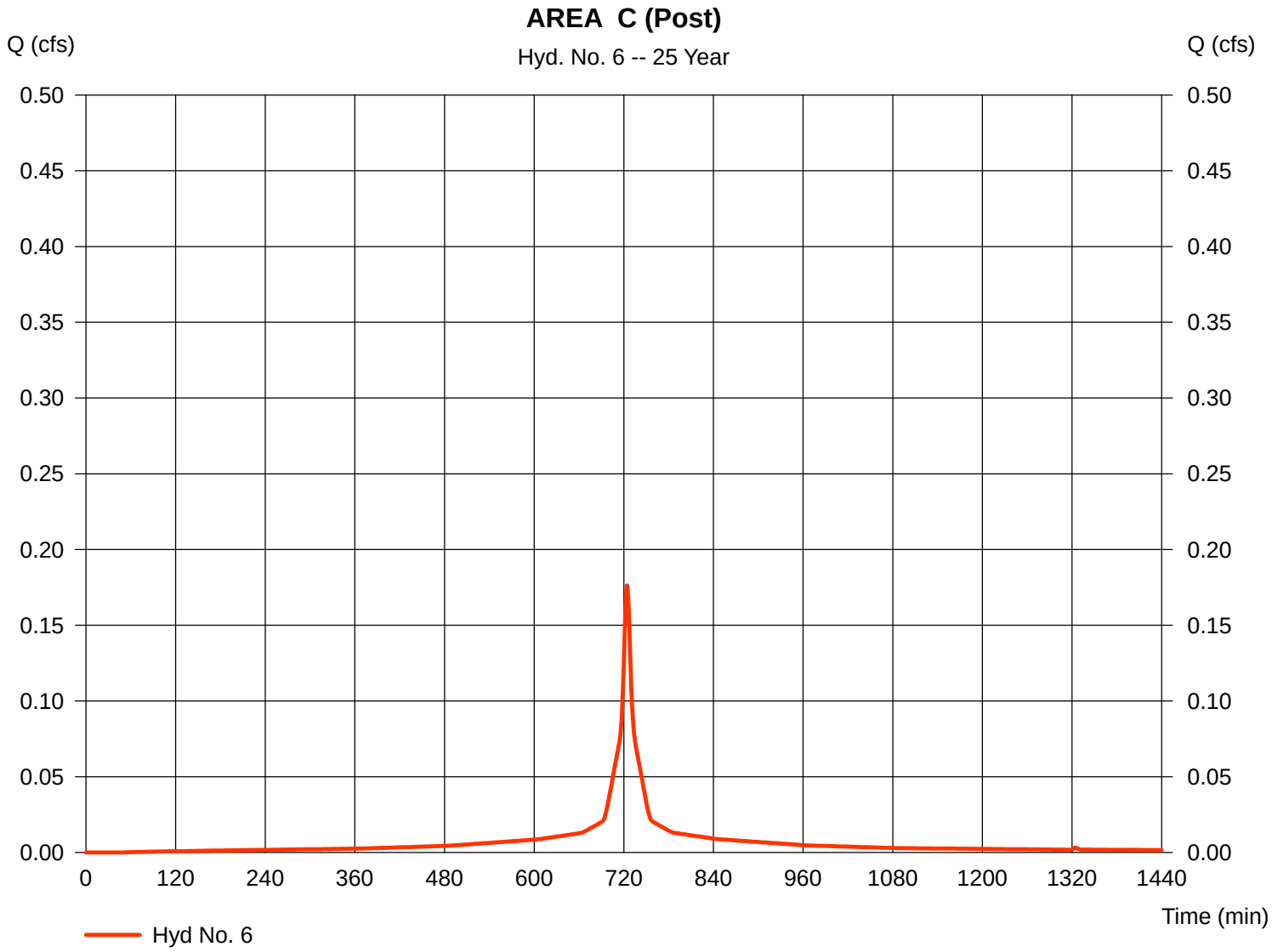
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Monday, Mar 9, 2020

Hyd. No. 6

AREA C (Post)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.176 cfs
Storm frequency	=	25 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	625 cuft
Drainage area	=	0.030 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.80 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



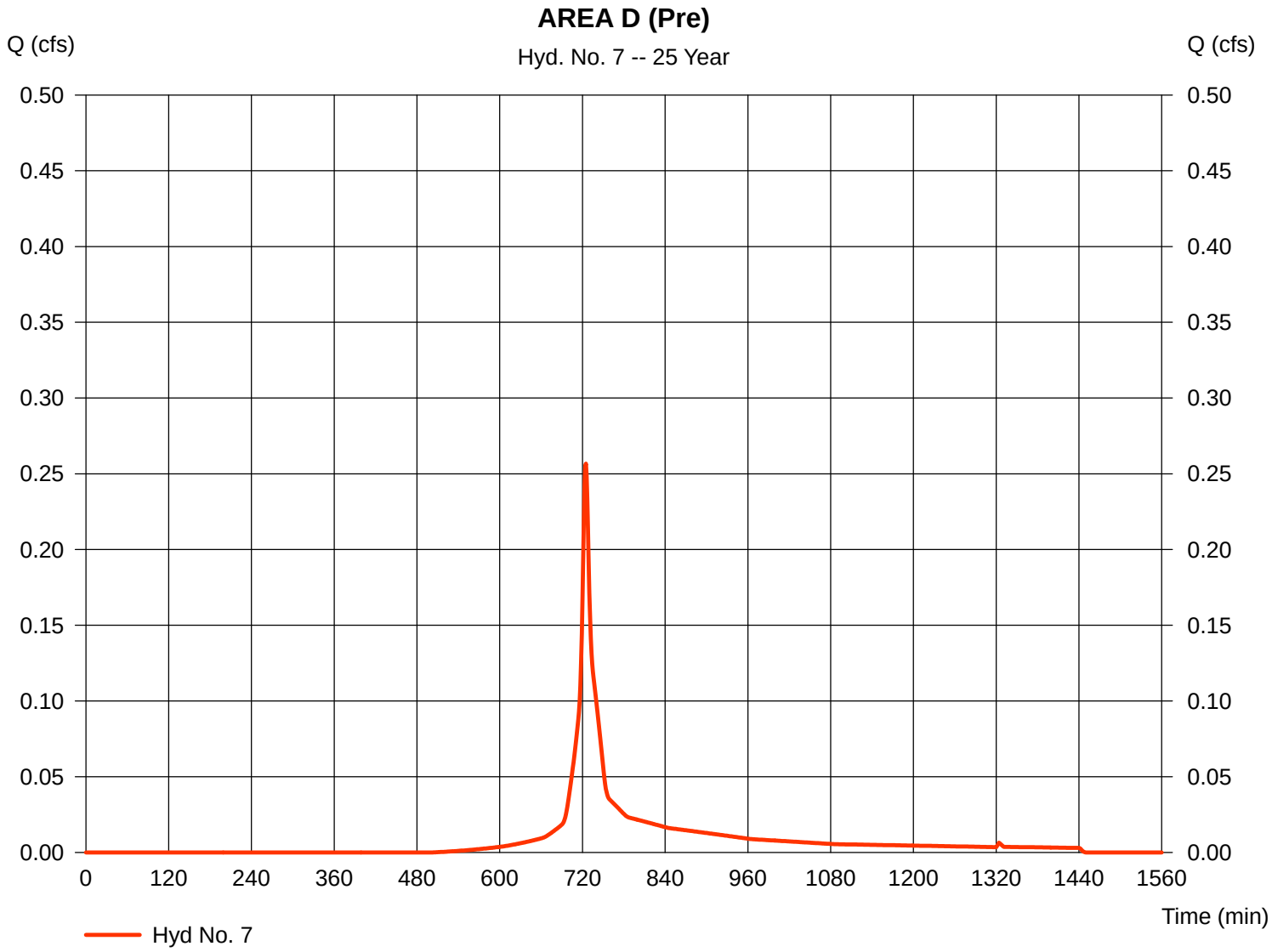
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 7

AREA D (Pre)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.257 cfs
Storm frequency	=	25 yrs	Time to peak	=	725 min
Time interval	=	1 min	Hyd. volume	=	791 cuft
Drainage area	=	0.070 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.80 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



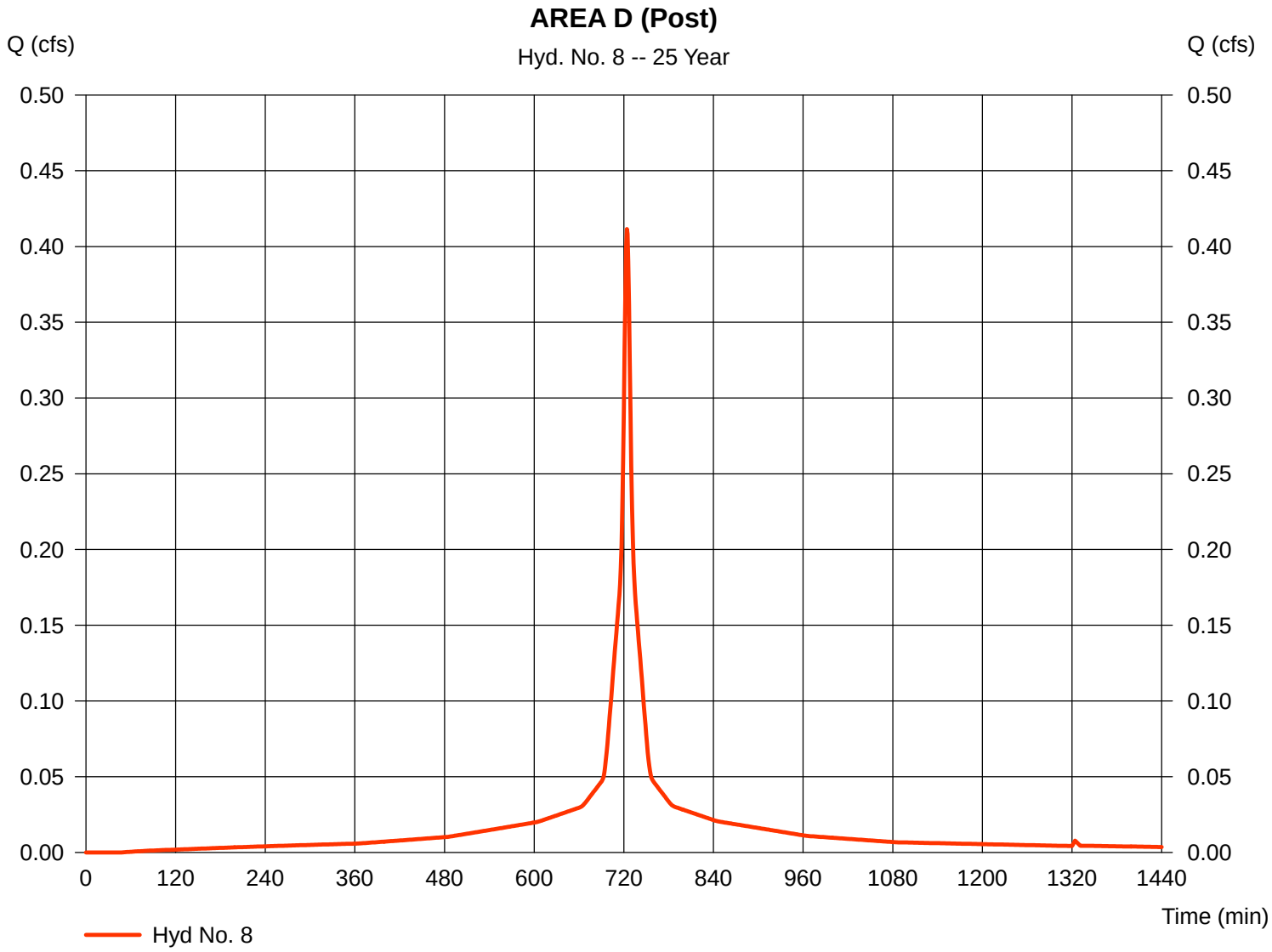
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 8

AREA D (Post)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.412 cfs
Storm frequency	=	25 yrs	Time to peak	=	724 min
Time interval	=	1 min	Hyd. volume	=	1,457 cuft
Drainage area	=	0.070 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.80 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

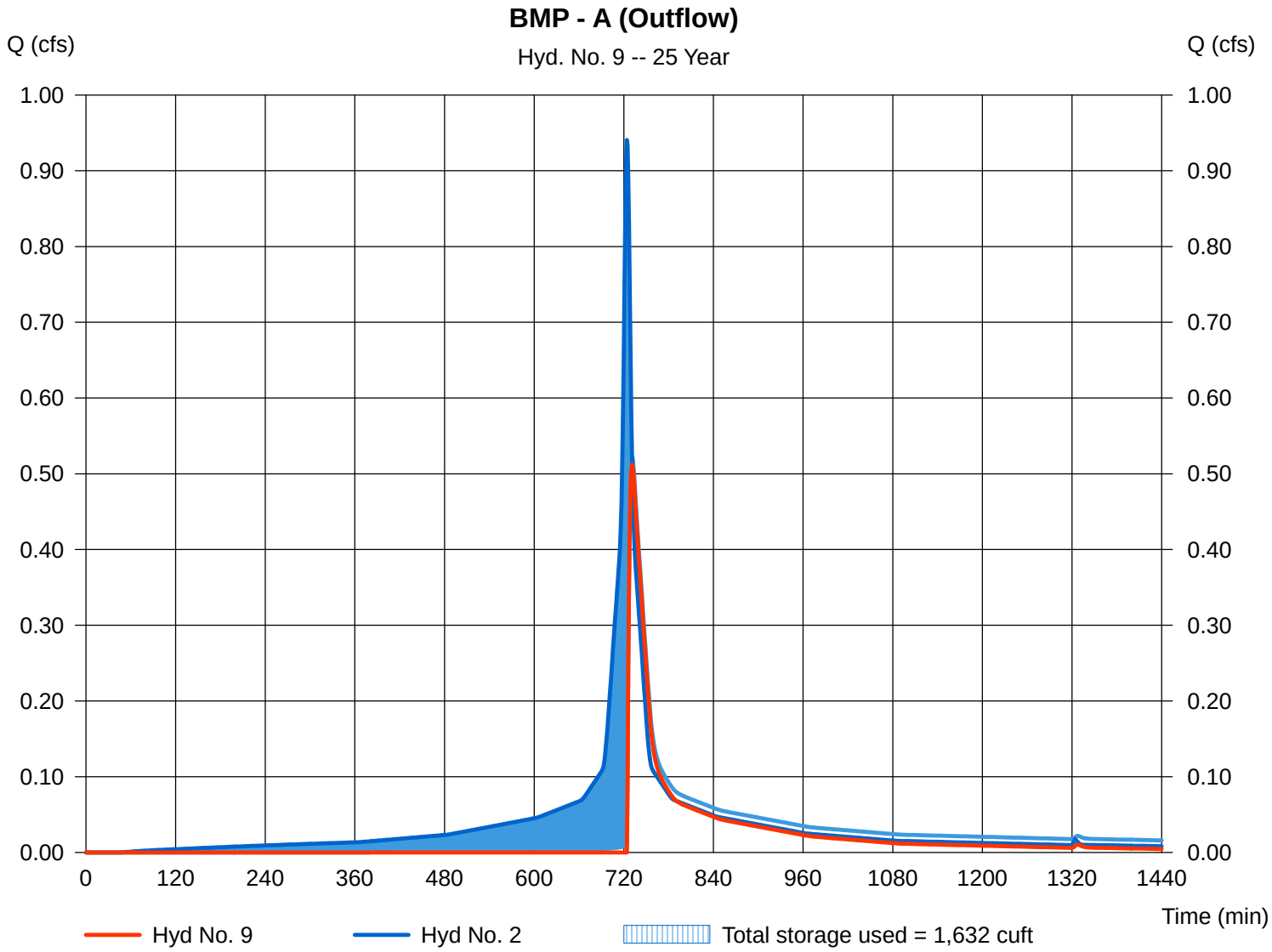
Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Hyd. No. 9

BMP - A (Outflow)

Hydrograph type	=	Reservoir	Peak discharge	=	0.512 cfs
Storm frequency	=	25 yrs	Time to peak	=	731 min
Time interval	=	1 min	Hyd. volume	=	1,569 cuft
Inflow hyd. No.	=	2 - AREA A (Post)	Max. Elevation	=	18.77 ft
Reservoir name	=	BMP - A (Trench)	Max. Storage	=	1,632 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



BMP

CHARACTERISTICS

Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Pond No. 1 - BMP - A (Trench)

Pond Data

UG Chambers - Invert elev. = 17.00 ft, Rise x Span = 1.00 x 1.00 ft, Barrel Len = 300.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 16.00 ft, Width = 2.00 ft, Height = 2.50 ft, Voids = 40.00%
Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 18.51 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	16.00	n/a	0	0
0.25	16.25	n/a	60	60
0.50	16.50	n/a	60	120
0.75	16.75	n/a	60	180
1.00	17.00	n/a	60	240
1.25	17.25	n/a	88	328
1.50	17.50	n/a	103	431
1.75	17.75	n/a	103	534
2.00	18.00	n/a	88	621
2.25	18.25	n/a	60	682
2.50	18.50	n/a	60	742
2.51	18.51	600	2	744
2.75	18.75	6,600	735	1,479
3.00	19.00	11,300	2,211	3,690

Culvert / Orifice Structures

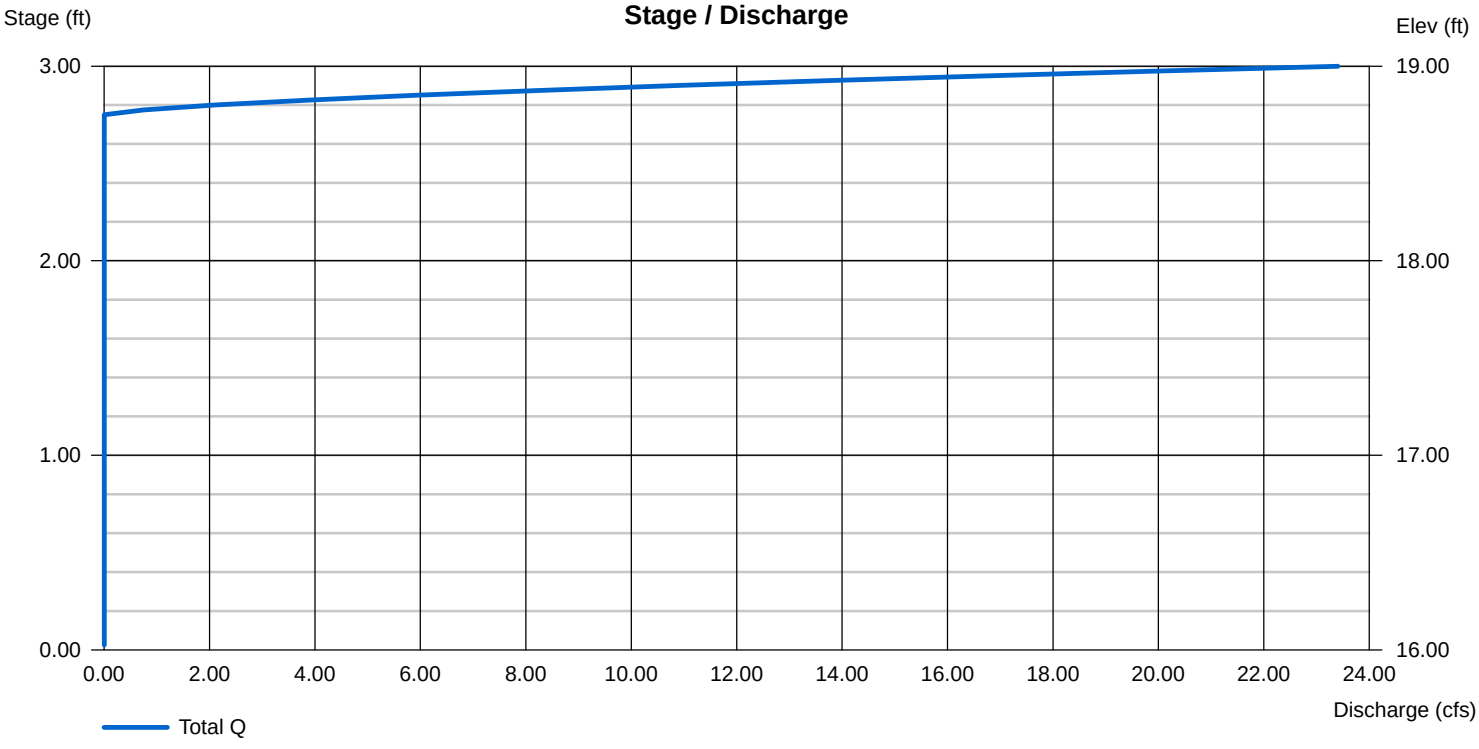
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	Inactive	Inactive
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage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

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 72.00	0.00	0.00	0.00
Crest El. (ft)	= 18.75	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.270 (by Contour)
TW Elev. (ft) = 0.00

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



Pond Report

Pond No. 2 - BMP - B (Trench)

Pond Data

UG Chambers - Invert elev. = 17.00 ft, Rise x Span = 0.67 x 0.67 ft, Barrel Len = 45.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 16.50 ft, Width = 2.50 ft, Height = 1.50 ft, Voids = 40.00%
Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 18.01 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	16.50	n/a	0	0
0.15	16.65	n/a	7	7
0.30	16.80	n/a	7	14
0.45	16.95	n/a	7	20
0.60	17.10	n/a	8	28
0.75	17.25	n/a	9	37
0.90	17.40	n/a	9	46
1.05	17.55	n/a	9	56
1.20	17.70	n/a	8	64
1.35	17.85	n/a	7	70
1.50	18.00	n/a	7	77
1.51	18.01	1,300	4	81
2.50	19.00	2,500	1,849	1,930
2.80	19.30	2,900	809	2,739

Culvert / Orifice Structures

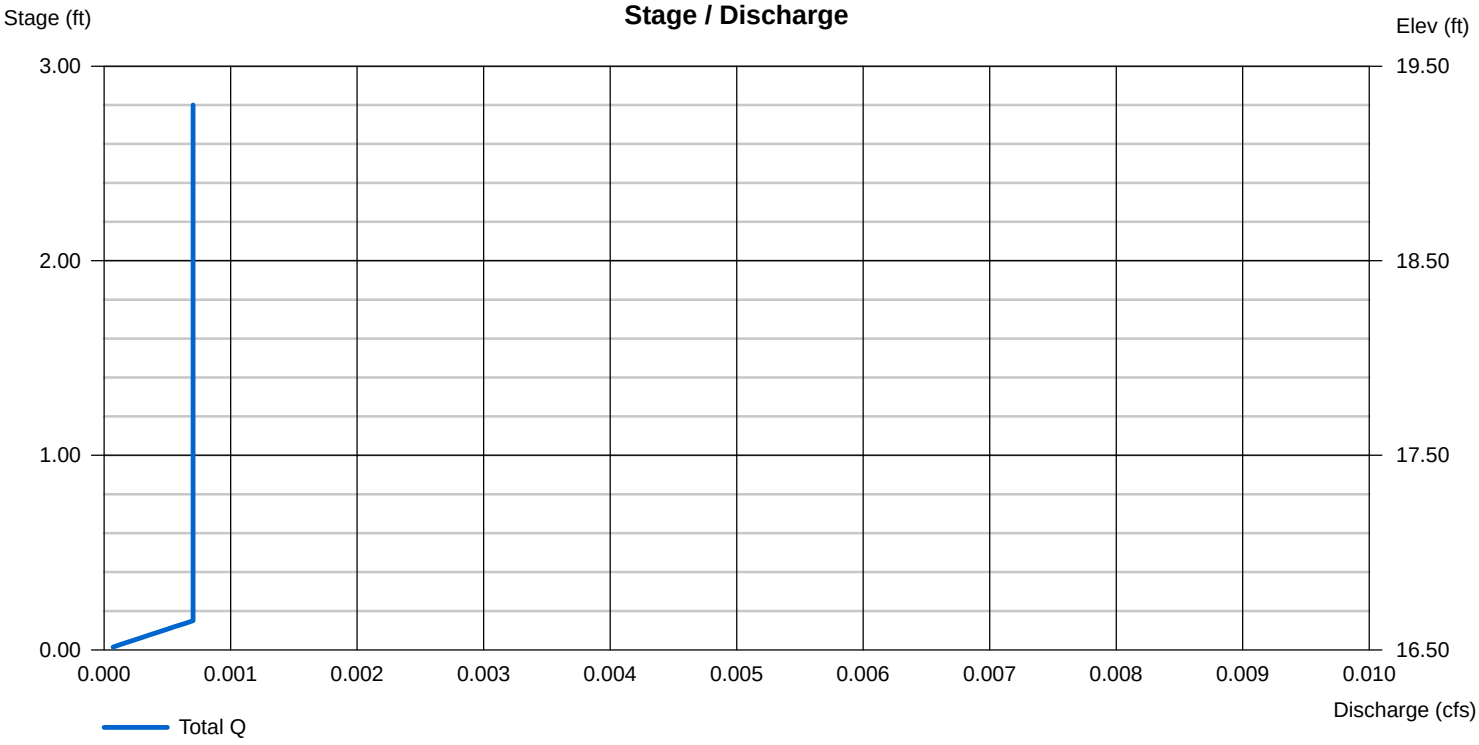
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 100.22	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.270 (by Contour)
TW Elev. (ft) = 0.00

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



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Pond No. 3 - BMP - C (Trench)

Pond Data

UG Chambers - Invert elev. = 17.00 ft, Rise x Span = 0.67 x 0.67 ft, Barrel Len = 45.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 16.50 ft, Width = 2.50 ft, Height = 1.50 ft, Voids = 40.00%
Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 18.01 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	16.50	n/a	0	0
0.15	16.65	n/a	7	7
0.30	16.80	n/a	7	14
0.45	16.95	n/a	7	20
0.60	17.10	n/a	8	28
0.75	17.25	n/a	9	37
0.90	17.40	n/a	9	46
1.05	17.55	n/a	9	56
1.20	17.70	n/a	8	64
1.35	17.85	n/a	7	70
1.50	18.00	n/a	7	77
1.51	18.01	1,300	4	81
2.50	19.00	2,500	1,849	1,930
2.80	19.30	2,900	809	2,739

Culvert / Orifice Structures

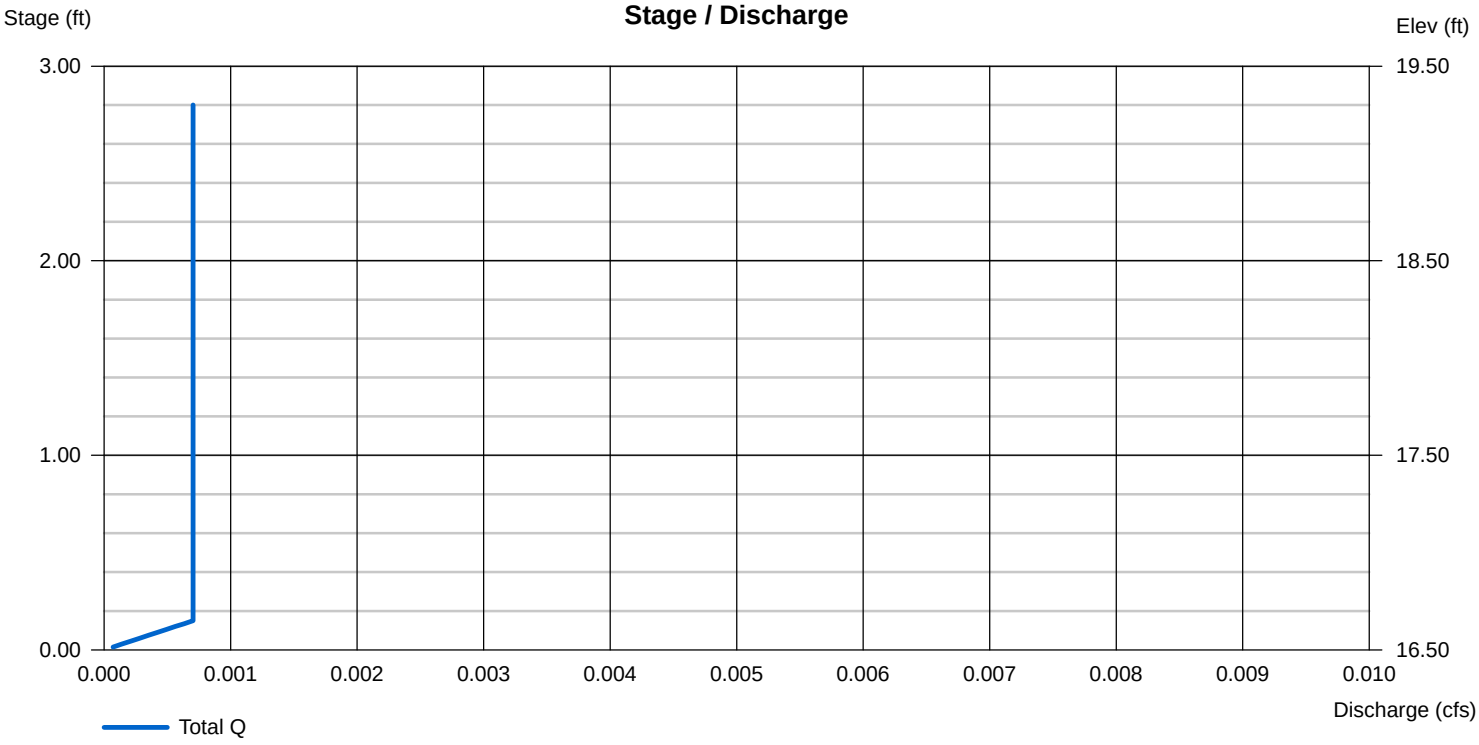
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 100.22	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.270 (by Contour)
TW Elev. (ft) = 0.00

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



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Monday, Mar 9, 2020

Pond No. 4 - BMP - D (SWMA)

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 16.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	16.00	1,320	0	0
0.50	16.50	1,750	765	765
1.00	17.00	2,300	1,009	1,774
1.20	17.20	2,600	490	2,264

Culvert / Orifice Structures

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

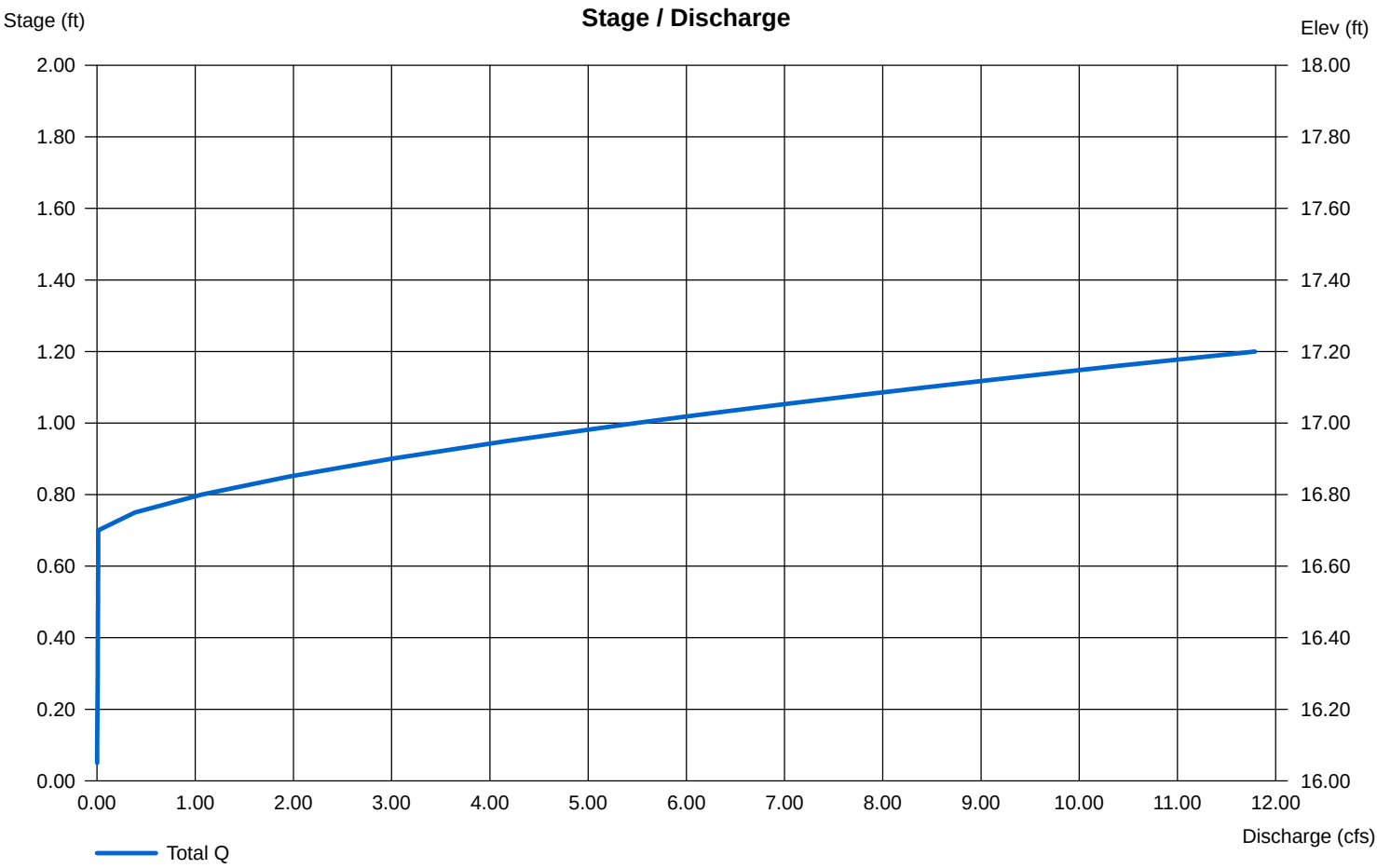
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 16.70	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.270 (by Contour)

TW Elev. (ft) = 0.00

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



APPENDIX 2

Standard 3 (Recharge)

Marchionda & Associates, LP
62 Montvale Ave, Suite I
Stoneham, MA 02180
781-438-6121 Fax 781-438-9654

JOB 670-32, FULLER FIELD
SHEET NO. 1 OF 3
CALCULATED BY JB DATE 2/10/20
CHECKED BY DATE Rev. 2/28/20
SCALE

STANDARD #3

- IMPERVIOUS COVER TO BE ADDED TO THE SITE:

NEW IMPERVIOUS = 12,067 SF

EXISTING IMPERVIOUS TO BE REMOVED = 2,623 SF

9,444 SF

- REQUIRED VOLUME TO RECHARGE:

NOTE: BASED ON D.E.P. TARGET DEPTH FOR "C" SOILS (0.25"/S.F.)

REQ. = 0.25"/12 x 9,444 SF = 197 CF

VOLUME PROVIDED:

BMP "A" = 1,479
BMP "B" = 2,739
BMP "C" = 2,789
BMP "D" = 1,774

TOTAL = 8,731 CF

8,731 CF > 197 CF ∴ STANDARD MET

Marchionda & Associates, LP
62 Montvale Ave, Suite I
Stoneham, MA 02180
781-438-6121 Fax 781-438-9654

JOB 670-32 FULLERFIELD
SHEET NO. 2 OF 3
CALCULATED BY JB DATE 2/10/20
CHECKED BY _____ DATE Rev. 2/28/20
SCALE _____

STANDARD #3 (CONT.)

RECHARGE BMP DRAWDOWN CALCULATIONS

BMP "A" (TRENCH)

NOTE: ASSUME SILT LOAM RAWLS RATE = 0.27 IN/HR

$$\text{TIME} = \frac{\text{VOLUME}}{\text{RAWLS RATE} \times \text{BASIN AREA}}$$

$$= \frac{1,479 \text{ CF}}{0.27 \text{ IN/HR} \times 1/12 \times 6,600 \text{ SF}}$$

$$= 10.0 \text{ HR} < 72 \text{ HOURS} \therefore \text{OK}$$

BMP "B" (DRYWELL)

NOTE: ASSUME SILT LOAM RAWLS RATE = 0.27 IN/HR

$$= \frac{2,739 \text{ CF}}{0.27 \text{ IN/HR} \times 1/12 \times 2,900 \text{ SF}}$$

$$= 42.0 \text{ HRS} < 72 \text{ HOURS} \therefore \text{OK}$$

Marchionda & Associates, LP
62 Montvale Ave, Suite I
Stoneham, MA 02180
781-438-6121 Fax 781-438-9654

JOB 670-32 FULLER FIELD
SHEET NO. 3 OF 3
CALCULATED BY JB DATE 2/10/20
CHECKED BY _____ DATE Rev. 2/28/20
SCALE _____

STANDARD #3 (CONT.)

BMP "C" (DRYWELL)

NOTE: ASSUME SILT LOAM RAWLS RATE = 0.27 IN/HR

$$= \frac{2,739 \text{ CF}}{0.27 \text{ IN/HR} \times 1/12 \times 2,900 \text{ SF}}$$

$$= 42.0 \text{ HRS} < 72 \text{ HRS} \therefore \text{OK}$$

BMP "D" (S.W.M.A.)

NOTE: ASSUME SILT LOAM RAWLS RATE = 0.27 IN/HR

$$= \frac{1,774 \text{ CF}}{0.27 \text{ IN/HR} \times 1/12 \times 2,300 \text{ SF}}$$

$$= 34.3 \text{ HRS} < 72 \text{ HR} \therefore \text{OK}$$

APPENDIX 3

Operation & Maintenance Plan

OPERATION AND MAINTENANCE
&
LONG TERM POLLUTION PREVENTION PLAN
FOR POST-CONSTRUCTION STORM WATER CONTROLS

FULLER FIELD IMPROVEMENTS (PHASE 2)
NEWBURYPORT, MASSACHUSETTS
February 10, 2020
Rev. 3/6/20

GENERAL

The Best Management Practices (BMPs) used in the design of the Fuller Field project were chosen for their effectiveness at reducing peak discharge, treating the required Water Quality Volume for total suspended solids (TSS), and infiltrating groundwater. Routine maintenance is required for the BMPs, as proper maintenance is essential in achieving the desired result of improved water quality. This Operations and Maintenance (O&M) and Long Term Pollution Prevention Plan (LTPPP) is intended to cover the post-construction maintenance of the permanent BMPs[1] and site specific pollution prevention.

MAINTENANCE REQUIREMENTS

Qualified personnel shall inspect all components of the stormwater management system as outlined below. To be considered "qualified", personnel should have a working knowledge of the maintenance requirements of storm water BMP's and must be approved by the Newburyport DPW. Qualified personnel shall be responsible for overseeing the required inspections and shall file annual reports with the town of Newburyport officials. Additionally, a copy of the Inspection/Maintenance Log, as further described herein, shall be provided to City of Newburyport officials on an annual basis.

SUMMARY OF MAINTENANCE REQUIREMENTS

BMP	MIN. FREQUENCY	RESPONSIBLE PARTY
Trash Removal	Inspect once/month Clean as necessary	TOWN OF NEWBURYPORT
Catch Basins	Inspect 4x/year Clean once/year	TOWN OF NEWBURYPORT
Infiltration Trenches	Inspect 4x/year Clean once/year	TOWN OF NEWBURYPORT
S.W.M. Area (Sediment Trap)	Inspect 4x/year Clean once/year	TOWN OF NEWBURYPORT

[1] Operations and maintenance of temporary erosion and sedimentation controls utilized during construction will be covered by a *Stormwater Pollution Prevention Plan* as required by the National Pollutant Discharge Elimination System program of the Environmental Protection Agency, and is not part of this O&M Plan.

RESPONSIBILITY TO ADMINISTER O&M PLAN

During construction, the general contractor will be responsible for maintaining the stormwater management system in accordance with this O&M Plan until such time that ownership of the project or phases thereof are turned over to the owner. The owner is then responsible for maintaining the portions of the stormwater management system under their ownership in accordance with this O&M Plan. This section below (names and signatures) shall be updated with every change in ownership and/or person(s) responsible for administering/financing the O&M of the system.

Owner(s) of the stormwater management system:

Name: _____ Name: _____

Signature: _____ Signature: _____

Person(s) responsible for financing maintenance and emergency repairs:

_____

_____

INSPECTION AND MAINTENANCE LOG

A sample inspection and maintenance log to be used is attached to the end of this O&M Plan. At a minimum, any inspection and maintenance log used shall include the following items:

- Date activity performed
- Specific inspection/maintenance task
- Structural components inspected/maintained
- Staff person or contractor performing activity
- Supervisor verification of maintenance activity
- Recommended additional maintenance tasks

An Annual Report shall be submitted to the City of Newburyport to meet the requirements of the town's Stormwater Management and Erosion Control Regulations.

PROPOSED BMPS AND CORRESPONDING O&M REQUIREMENTS:

TRASH REMOVAL:

The parking areas shall be inspected for litter and trash monthly as part of overall site maintenance. Any accumulated trash, litter and discarded materials in these areas shall be removed.

No disposal of materials will be permitted within the landscaped areas or wooded areas on the Site. This prohibition applies to trash, fill material, construction debris, grass clippings, collected leaves and cut branches.

CATCH BASINS:

The catch basins shall be inspected four times per year for build-up of sediment, oil, and/or other debris which could decrease the effectiveness of the sumps. A qualified company specializing in the cleaning of catch basins shall perform the inspection of catch basins.

Typically a dipstick tube equipped with a ball valve, such as a Sludge Judge®, is used to measure the approximate oil and sediment depth, and a vacuum truck is used to clean out the catch basin. Catch basins shall be cleaned once per year, or sooner if the depth of sediment is found to reach 12 inches. If visual inspection observes any evidence of hydrocarbons, the material shall be immediately cleaned and disposed in accordance with all applicable local, state and federal guidelines and regulations.

Frames and grates should be inspected and repaired or replaced as necessary to ensure proper operation.

INFILTRATION TRENCHES:

The project includes four (6) subsurface infiltration trenches. The trenches consist of a perforated pipe encased in crushed stone. Each trench should be inspected four times per year. It is important to inspect the surface stone and basins to ensure that they remain clear of any debris and sediment, which will help to ensure that trenches will continue to function efficiently for the long term.

If the inspection determines that the trench fails to fully drain within 72 hours of a storm event, the responsible party shall retain a qualified engineer to assess the reason for infiltration failure and to recommend corrective action for restoring infiltration function.

STORMWATER MANAGEMENT AREA (SEDIMENT TRAP):

The stormwater management system includes an above-ground stormwater sediment trap. This area shall be inspected four times per year for erosion, accumulated sediment, and debris that could affect the capacity of the pipes. Any concerns shall be addressed as soon as practicable to ensure free flow. Sediment shall be removed once it has accumulated to a depth of six (6) inches in the trap or within three (3) inches of the lowest outlet. Sediment shall be disposed in accordance with all applicable local, state and federal guidelines and regulations.

LONG TERM POLLUTION PREVENTION:

MAINTENANCE OF LANDSCAPED AREAS:

Fertilizers used for landscaping and lawn areas shall be slow release, low-nitrogen types (<5%) and shall not be used within 25 feet of a wetland resource area, and pesticides/herbicides shall not be used within 100 feet of a wetland resource area. Furthermore, the use of any fertilizers, pesticides, and herbicides shall be in accordance with the manufacturer's recommendations.

WINTER MAINTENANCE OF WALKS AND DRIVES:

Snow storage shall take place on pervious surfaces to the extent practicable to allow the snowmelt to filter through the soil, leaving behind sand and debris that can be removed in the springtime. Snow shall not be stockpiled in drainage collection areas or conveyance channels as this may block the system causing flooding. Furthermore, snow shall not be stored in or within 25 feet of a wetland resource area. No road salt, sodium chloride, or other deicing chemicals shall be used on paved surfaces within 25 feet of a wetland resource area.

STORAGE OF WASTE PRODUCTS:

Any outdoor storage of waste products shall be covered to prevent rainfall from picking up contaminants from the waste. This requirement shall include any dumpster(s) which shall have the lid(s) closed when not being loaded or unloaded.

ILLICIT DISCHARGES:

There shall be no illicit discharges to the stormwater management system. Illicit discharges are defined by 310 CMR 10.04 as follows:

"Illicit discharge means a discharge that is not entirely comprised of stormwater. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated ground water, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents."

Prior to the discharge of stormwater runoff to the post-construction stormwater best management practices, an Illicit Discharge Compliance Statement shall be submitted to the Newburyport Planning Board verifying that no illicit discharges exist on the site.

EMERGENCY SPILLS

The owner shall provide personnel with a list of emergency contact phone numbers to use to report a spill. At a minimum the list should include the DEP Emergency Response Section, an environmental cleanup contractor such as Clean Harbors, Inc., the Newburyport Fire Department, and a contact person/phone number for the owner:

- DEP Emergency Response **(888)304-1133**
- Clean Harbors, Inc. **(800)645-8265**
- Newburyport Fire Department **911 or (978)-465-4427**
- Owner (Town of Newburyport) **978-465-4464 ext. 1701**

While the above-listed phone numbers are current as of the writing of this O&M Plan, the owner shall be responsible for verifying these numbers prior to distribution to the homeowners. Additionally, the owner shall update and redistribute a list of emergency contact phone numbers to the homeowners every other year, or sooner should any changes occur.