DRAINAGE REPORT

For

C.R. Klewin, LLC

PROPOSED

"Multi-Family Residential"

19, 29 & 39 Military Highway
Gales Ferry/Ledyard, Connecticut

Prepared by:

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May 23rd, 2024
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I. EXECUTIVE SUMMARY

This report examines the changes in drainage that can be expected as the result of the proposed development at 23, 29 & 29 Military Highway, Gales Ferry, CT and provides calculations documenting the design of the proposed stormwater management system illustrated within the accompanying Proposed Site Plan Documents prepared by Bohler.

The stormwater management system for this site has been designed utilizing Best Management Practices (BMPs) to meet or exceed the stormwater management standards in accordance with Connecticut Department of Energy & Environmental Protection (CT DEEP) 2024 Connecticut Stormwater Quality Manual and the Ledyard Zoning Regulations. The proposed project will provide; pollutant reduction by providing via treatment of the water quality volume and water quality flows through stormwater BMPs; peak runoff attenuation through use of stormwater BMPs; and conveyance protection through structural stormwater BMPs. The project will also provide erosion and sedimentation controls in accordance with the Connecticut Guidelines for Soil Erosion and Sediment Control during the demolition and construction periods, as well as long term stabilization of the site.

A summary of the pre- and pos-development conditions peak runoff rates for the 2-, 10-,25- and 100-year storms can be found in **Table 1.1** below.

Table 1.1: Design Point Peak Runoff Rate Summary

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DP1	16.47	7.45	**-9.02**	24.48	11.45	**-13.03**	29.45	14.03	**-15.42**	37.15	18.10	**-19.05**
DP2	2.92	2.24	**-0.68**	4.34	3.34	**-1**	5.22	4.01	**-1.21**	6.59	5.06	**-1.53**

**Flows are represented in cubic feet per second (cfs)*

II. EXISTING SITE CONDITIONS

Existing Site Description

The site consists of approximately 18.95 acres of land historically used agriculturally. The site is located on the eastern side of Military Highway and bounded by commercial properties to the

east/north, and vacant and residential properties to the south. The site is partially wooded in fair condition and the majority of the site has been cleared for agricultural purposes. The site is located in a FEMA floodplain Zone AE with an associated flood elevation of 28 feet.

On-Site Soil Information

The site includes soils classified by the Natural Resource Conservation Service (NRCS) as Hydrologic Soil Group (HSG) "B", and "D". The "D" type soils are associated with the on-site wetland body located at the southeast corner of the property. Reading of test pits, infiltration tests and permeability sampling were completed by Whitestone Associates, Inc. in June 2022 Refer to **Appendix B** for additional information.

Existing Collection and Conveyance

There is no existing drainage infrastructure on site.

Existing Watersheds and Design Point Information

The entirety of the site drains westerly toward the property line and ultimately drains to Thames River within the Thames River subregional basin – Thames Main Stem Regional Basin - Thames Major Basin. The site has varying slopes ranging from <1% - 60% and elevations ranging from 82 at the road to 26 at the wetland boundary. The site was analyzed at two (2) design points to analyze pre-development condition flow rates. DP-1 is wetland body located at the southeast corner of the site. DP-2 is the portion of the site that drains to the Military Highway. Pre-development land use coverages within the analysis area include areas of Forest, drives & walks, lawns, roofs and impervious area.

Refer to **Table 1.1,** for the calculated pre-development conditions peak rates of runoff. For additional hydrologic information and graphical representation of the existing drainage areas, refer to **Appendix C** and the Drainage Area Maps in the appendices of this report.

III. PROPOSED SITE CONDITIONS

Proposed Development Description

The proposed project consists of the construction of four (4) new buildings and includes associated paved parking areas, landscaping, utilities, and stormwater management. The site will be served

by public water and subsurface sewage disposal systems. The project will also provide erosion and sedimentation controls during the demolition and construction periods, as well as long term stabilization of the site. In addition, a Stormwater Operation and Maintenance (O&M) Plan, attached in **Appendix F**, has been developed which includes scheduled maintenance and periodic inspections of stormwater management structures.

Proposed Development Collection and Conveyance

The site has been designed with a conventional drainage system. Catch basins will capture and convey stormwater runoff, via an underground pipe system, to above ground detention and retention basins. Additionally, the proposed drainage allows for stormwater to sheet flow over paved parking areas, through an infiltration trench with level lip spreader, into a vegetated filter strip prior to entering the main retention basin. All rooftop runoff will be directed to stormwater basins as well. Pretreatment of stormwater runoff will be provided by a proposed above ground infiltration basin and proprietary treatment devices.

Proposed Watersheds and Design Point Information

The project has been designed to maintain existing drainage watersheds to the greatest extent possible, with the same design points described in **Section II** above. The site was subdivided into eight (8) separate sub catchment areas for the post-development conditions. Post-development land use coverages within the analysis area include areas of forest, lawns, roofs and impervious.

Refer to **Table 1.1** for the calculated post-development conditions peak rates of runoff. For additional hydrologic information and graphical representation of the proposed drainage areas, refer to **Appendix D** and the Drainage Area Maps in the appendices of this report.

IV. STORMWATER MANAGEMENT STANDARDS

In accordance with the 2024 Connecticut Stormwater Quality Manual and the Ledyard Zoning Regulations, the following stormwater management standards are provided.

Standard #1: Runoff Volume Pollutant Reduction

The runoff volume and pollutant reduction criterion are designed to preserve pre-development hydrology and pollutant loads to protect water quality and maintain groundwater recharge. This

standard is achieved by treating a prescribed water quality volume (WQV) or associated peak flow, referred to as the water quality flow (WQF). The WQV is the volume of stormwater runoff from a given storm event that must be retained and/or treated to remove most of the post-development stormwater pollutant load on an average annual basis and to help maintain pre-development site hydrology in terms of duration, rate and volume of stormwater flows including groundwater recharge. The water quality volume (WQV) is the amount of stormwater runoff from any given storm that should be captured and treated in order to remove most stormwater pollutants on an average annual basis. The recommended WQV, which results in the capture and treatment of the entire runoff volume for 90 percent of the average annual storm events, is equivalent to the runoff associated with the first 1.3 inches of rainfall. As calculated, the WQV required for this development in subcatchment area PD-1B is 6,922 cf, and subcatchment area PD-1C is 3,625 CF, whereas 13,200 CF of WQV is provided within Infiltration Basin P-1. The WQF required for this development in subcatchment areas PD-1.D, PD-1E and PD-1.F are 1.93 cfs, 0.52 cfs and 0.73 cfs, respectively, where 2.20 cfs is provided in area PD-1.D, 0.89 cfs is provided in area PD-1E and 0.89 cfs is provided in area PD-1.F. Refer to **Appendix E** of this report for calculations documenting required and provided water quality.

Required Retention Volume

The required retention volume (RRV) criterion is intended to maintain pre-development annual groundwater recharge volumes by capturing and infiltrating stormwater runoff. The RRV is equal to 100% or 50% of the site's WQV depending on the type of project or activity (new development, redevelopment, or retrofit) and the existing Directly Connected impervious Area (DCIA) of the site. 100% of the site's WQV is required to be retained on site for: all new developments, redevelopment or retrofit of sites that are currently developed with existing DCIA of less than 40%, and any new stormwater discharges located within 500 feet of tidal wetlands. 50% of the site's WQV required for redevelopment or retrofit of sites that are currently developed with existing DCIA of 40% or more. If the post-development stormwater runoff volume retained on-site does not meet the RRV for the site, provide stormwater treatment without retention to the maximum extent achievable for the volume above that which can be retained, up to 100% of the site's WQV. The RRV is considered part of the total WQV and therefore if the WQV is met through infiltration, the RRV is met. It is also important to note that if the full RRV is met, then it

is assumed pollutant reduction is also achieved and individual pollutant calculations are not necessary. For subcatchment Areas PD-1B and PD-1C, the required RRV is met, therefore pollutant reduction calculations are not required.

For subcathment areas PD-1D, PD-1E, and PD-1F, the individual volumes retained do not meet their respective RRV calculated values. The provided treatment trains of the stormwater management system meets or exceeds the minimum required average annual pollutant load reductions listed in **Table 1.2**. Refer to **Appendix E** for pollutant reduction calculations.

Table 1.2: Minimum Average Annual Pollutant Reductions

Water Quality Parameter	New Development	Redevelopment/Retrofits
Total Suspended Solids (TSS)	90%	80%
Total Phosphorous (TP)	60%	50%
Total Nitrogen (TN)	40%	30%

Standard #2: Stormwater Runoff Quantity Control

The objective of the stormwater runoff quantity control criterion is to maintain pre-development peak runoff rates and manage the volume and timing of runoff to prevent downstream flooding, channel erosion, and other adverse impacts. As outlined in **Table 1.1**, the development of the site, and the proposed stormwater management system, have been designed so that post-development peak rates of runoff meet or are below pre-development conditions for the 2-, 10-, 25- and potentially 100-year storm events at all design points.

Peak Runoff Attenuation

Peak runoff attenuation requirements are achieved for site development/redevelopment by the following conditions. Controlling the 2-year, 24-hour post-development peak flow rate to 50% of the 2-year, 24-hour pre-development peak flow rate for each point at which stormwater discharges from a site using structural stormwater BMPs. Control the 10-year, 24-hour post-development peak flow rate to the 10-year, 24-hour pre-development peak flow rate for each point at which stormwater discharges from a site using structural stormwater BMPs. Control the 100-year, 24-hour post-development peak flow rate to the 100-year, 24-hour pre-development peak flow rate for each point at which stormwater discharges from a site using structural stormwater BMPs, as

required by the review authority. Demonstrate that any increased volume or change in timing of stormwater runoff will not result in adverse effects such as increased flooding downstream of the site or at other off-site locations, as required by the review authority. The Rational Method was utilized for calculating the peak runoff rates and generating hydrographs for the pre- and post-development conditions as defined in the computer watershed software HydroCAD, version 10.00-24. The hydrographs were generated based on the precipitation intensities dictated by NOAA Atlas 14, Volume 10, Version 3. The computer model predicts the amount of runoff as a function of time, with the ability to include the attenuation effect due to dams, lakes, large wetlands, floodplains, and stormwater management basins. Land use for the site under pre- and post-development conditions were determined from field survey, town topographic maps, and aerial imagery. The input data for precipitation intensities of 2-, 10-, 25- and 100- years are based on NOAA Atlas 14, Volume 10, Version 3 and are listed in **Appendix E.** The proposed stormwater management as designed will provide a decrease in peak rates of runoff for the 2-, 10-, 25- and 100-year design storm events in accordance with the 2024 Connecticut Stormwater Quality Manual and the Ledyard Zoning Regulations. The pre-development versus post-development stormwater discharge comparisons are contained in **Table 1.1**. Refer to **Appendix C and D** for the Existing and Proposed Hydrologic analysis.

Conveyance Protection

Conveyance protection requirements are achieved for on-line structural BMP's when the conveyance system is designed leading to, from, and through structural stormwater BMPs based on the post-development peak flow rate associated with the 25-year, 24-hour or larger magnitude design storm. Pipes have been designed to safely convey the 25-year storm using the Hydraflow Storm Sewers Extension for Autodesk Civil 3D. This program utilizes the rational method. Final discharge pipes were modeled with 'normal' starting tailwater conditions as determined by Manning's Equation. In situations where the pipe discharges into a stormwater basin, the tail water is set at the water surface elevation of that stormwater basin for the design storm event. In situations where the normal depth is less than the critical depth, Hydraflow Storm Sewers Extension changes the starting tailwater to critical depth (min. specific energy) of the line.

The input data for rainfalls, regarding storm conveyance, with statistical precipitation intensities of 25-years are based on NOAA Atlas 14, Volume 10, Version 3 and provided in **Appendix E**. Refer to **Appendix E** for more information and pipe sizing calculations.

Emergency Outlet Sizing

The emergency outlets of stormwater management facilities shall be designed to safely pass the peak discharge rate associated with the 100-year storm. The emergency outlets are sized to pass the 100-year peak runoff rate, in a controlled manner, without eroding outfalls or downstream conveyances. The peak discharges from the basins are managed via outlet control structures that feed into respective HDPE drainage pipes and empty to a suitably designed outlet protection measure. Refer to **Appendix E** for more information.

Standard #3: Construction Soil Erosion and Sediment Control

The proposed project will provide construction period erosion and sedimentation controls as indicated within the Soil Erosion and Sediment Control (SESC) plan(s) provided for this project in the site plan documents. This includes a proposed construction exit, protection for stormwater inlets, protection around temporary material stock piles and various other techniques as outlined on the erosion and sediment control sheets.

Standard #4: Post Construction Operation and Maintenance

An Operation and Maintenance (O&M) Plan for this site has been prepared and is included in **Appendix F** of this report. The O&M Plan outlines procedures and time tables for the long term operation and maintenance of the proposed site stormwater management system, including initial inspections upon completion of construction, and periodic monitoring of the system components, in accordance with established practices and the manufacturer's recommendations. The O&M Plan includes a list of responsible parties.

Standard #5: Stormwater Management Plan

This report and supporting documentation are intended to satisfy the requirements outlined in the 2024 Connecticut Stormwater Quality Manual.

V. SUMMARY

In summary, the proposed stormwater management system illustrated on the drawings prepared by Bohler, meets, or exceeds the standards set forth in the 2024 Connecticut Stormwater Quality Manual and the Ledyard Zoning Regulations. The proposed development results in an improvement from the historic use, improves water quality, and reduces peak rates of stormwater runoff from the subject site when compared to pre-development conditions for the analyzed storm events. The pre-development versus post-development stormwater discharge comparisons are contained in **Table 1.1** above. Supporting documentation and stormwater-related computations are contained in the appendices of this report.

APPENDIX A: PROJECT LOCATION MAPS

- *USGS MAP*
- *FEMA FIRMETTE*

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

UNCASVILLE QUADRANGLE
CONNECTICUT - NEW LONDON COUNTY
7.5-MINUTE SERIES

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 18T

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery....................NAIP, July 2016 - September 2016
Roads.................... U.S. Census Bureau, 2016
Names....................GNIS, 1979 - 2018
Hydrography....................National Hydrography Dataset, 2004 - 2017
Contours....................National Elevation Dataset, 2012
Boundaries.............Multiple sources; see metadata file 2016 - 2017

Wetlands................FWS National Wetlands Inventory 2010

UTM GRID AND 2019 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

U.S. National Grid	
100,000 - m Square ID	
YL	BF
72°W	
Grid Zone Designation	
18T	19T
72°W	

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the
National Geospatial Program US Topo Product Standard.

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 Fitchville
2 Norwich
3 Jewett City
4 Palmertown
5 Old Mystic
6 Niantic
7 New London
8 Mystic

ADJOINING QUADRANGLES

ROAD CLASSIFICATION

Expressway	▬	Local Connector	▬
Secondary Hwy	▬	Local Road	▬
Ramp	▬	4WD	- - -

Interstate Route US Route ○ State Route

UNCASVILLE, CT
2021

7643016360172
NSN. 7643016360172
NGA REF NO. USGSX24K46298

1DWLRQDO)ORRG ,QVXUDQFH 3URJUDP

FEMA

)HHW

/HJHQG

6(( )/22' ,16(5$1&(5$7(0$3)25 ,1)250$7,21$/ 385326(6 21/<

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2WKHU)ORRG $UHDV	$QQXDO &KDQFH)ORRG +D]DUG $UHDV 5HGXFHG)ORRG +D]DUG $UHDV GXH WR /HYHH DUHDV RI 0LQLPDO)ORRG +D]DUG)XWXUH &RQGLWLRQV $QQXDO &KDQFH)ORRG +D]DUG =RQH; $UHDV :LWK 5HGXFHG)ORRG 5LVN GXH WR /HYHH 6HH 1RWHV =RQH; $UHDV :LWK)ORRG 5LVN GXH WR /HYHH =RQH'
2WKHU $UHDV	$UHDV 1RW ,QFOXGHG)ORRG +D]DUG =RQH; 8QGHVLJQDWHG $UHDV 6XEMHFW WR)ORRG +D]DUG =RQH'
&RDVWDO %DUULHU 5HVRXUFHV 6\VWHP	&RDVWDO %DUULHU -XULVGLFWLRQ %RXQGDU\
&URVV 6HFWLRQV ZLWK $QQXDO &KDQFH DWHU 6XUIDFH (OHYDWLRQ &RDVWDO 7UDQVHFW %DVH)ORRG (OHYDWLRQ /LQH %)(/LPLW RI 6WXG\ -XULVGLFWLRQ %RXQGDU\ &RDVWDO 7UDQVHFW %DVHOLQH 3URILOH %DVHOLQH +GURJUDSKLF)HDWXUH	
/LJKWDOWDO $UHDV	/LJKWDOWDO $UHDV 5HVLJKWDOWDO $UHDV &RPPXQLW\

7KH SLQ OHYHO VKRZQ RQ WKH EHOLHYH SRLQW RI HVWLPDWHG EDVH IORRG HOHYDWLRQ DW WKH JLYHQ ORFDWLRQ

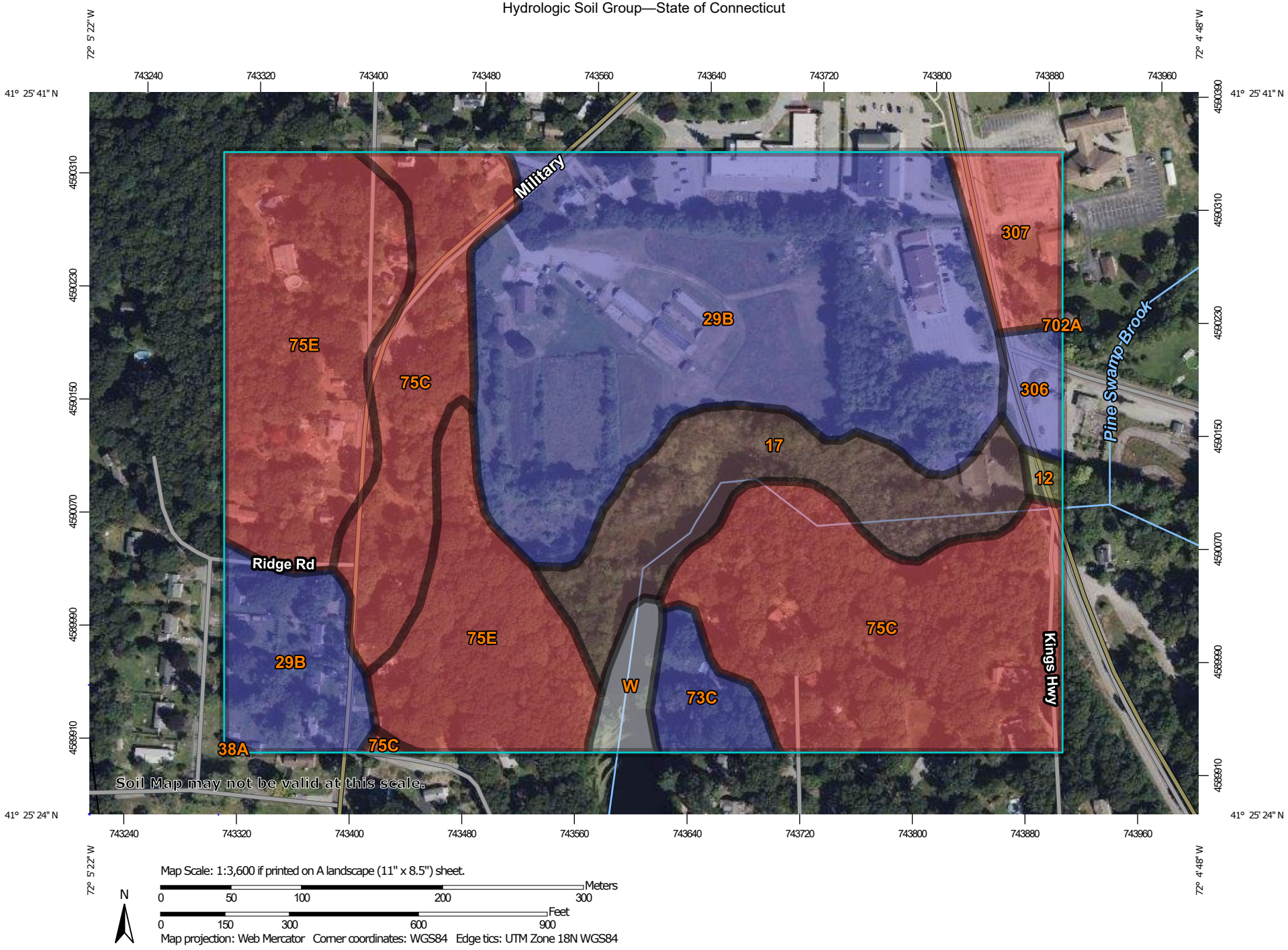
7KLV PSFRPROLHV ZLWK WKH VWDQGDUGV IRU WKH XVH R GLJLWDO IORRG PS/LI LW LV QRW YRLGV GHVFULEHG HORZ 7KHEDVH PS VKRZQ FRPROLHV ZLWK WKH EDVH DFFXUDF\ VWDQGDUGV

7KH IORRG KD]DUG LQIRUPDWLRQ LV GHULYHG LUHFWO\ IURP WKH DWWKRULWDWLYH 1DWLRQDO)ORRG ,QVXUDQFH 3URJUDP)3 7KLV PS ZDV SURGXFHG DW DQ HTXLYDOHQW VFDOH RI DSSUR[LPDWHO\ WR WKLV PS 7KH)ORRG +D]DUG ,QIRUPDWLRQ LV RUJDQL]HG DWDRYHU WLFH 7KH)ORRG +D]DUG %RXQGDU\ LV RUJDQL]HG DWDRYHU WLFH

7KLV PS LQFRUSRUDWHV RUWKRLPDJHU\ DQG EDVH PS LQIRUPDWLRQ VKRZQ GR QRW GSSHDU H[DFWO\ WKH VDPH DV WKH\ DSSHDU RQ WKH RUWKRLPDJHU\ 7KH)ORRG +D]DUG %RXQGDU\ LV RUJDQL]HG DWDRYHU WLFH

APPENDIX B: SOIL AND WETLAND INFORMATION

- *NCRS CUSTOM SOIL RESOURCE REPORT*
- *GEOTECHNICAL REPORT*
- *SOIL TESTING RESULTS*


72° 5' 22" W
72° 4' 48" W
41° 25' 41" N
41° 25' 24" N
743240
743320
743400
743480
743560
743640
743720
743800
743880
743960
4590390
4590310
4590230
4590150
4590070
4589990
4589910
Military
Ridge Rd
Pine Swamp Brook
Kings Hwy
307
29B
702A
75E
75C
306
17
12
75E
75C
29B
W
73C
38A
75C
Soil Map may not be valid at this scale.
Map Scale: 1:3,600 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 50 100 200 300
Feet
0 150 300 600 900
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil 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 1:12,000.

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

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

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

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

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

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 22, Sep 12, 2022

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

Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
12	Raypol silt loam	C/D	0.2	0.3%
17	Timakwa and Natchaug soils, 0 to 2 percent slopes	B/D	5.9	9.3%
29B	Agawam fine sandy loam, 3 to 8 percent slopes	B	22.7	36.2%
38A	Hinckley loamy sand, 0 to 3 percent slopes	A	0.0	0.0%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	B	1.4	2.3%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	D	15.5	24.7%
75E	Hollis-Chatfield-Rock outcrop complex, 15 to 45 percent slopes	D	13.2	21.1%
306	Udorthents-Urban land complex	B	0.9	1.4%
307	Urban land	D	2.0	3.2%
702A	Tisbury silt loam, 0 to 3 percent slopes	C	0.0	0.0%
W	Water		0.9	1.5%
Totals for Area of Interest			**62.8**	**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

WHITESTONE
An Employee-Owned Company

16 OLD FORGE ROAD
SUITE A
ROCKY HILL, CT 06067
860.726.7889
whitestoneassoc.com

June 28, 2023

via email

C.R. KLEWIN, INC.
Three Johnny Cake Hill Road
Old Lyme, Connecticut 06371

Attention: Mr. Maurice Gawendo
President

Regarding: LIMITED GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
27 - 29 MILITARY HIGHWAY
MAP 91, BLOCK 1590, LOTS 29 & 39
VILLAGE OF GALES FERRY, TOWN OF LEDYARD
NEW LONDON COUNTY, CONNECTICUT
WHITESTONE PROJECT NO.: GM2320566.000

Dear Mr. Gawendo:

Whitestone Associates, Inc. (Whitestone) has completed a limited geotechnical investigation at the above-referenced site. The results of the investigation and preliminary recommendations presented below are based on the soil conditions disclosed from a limited number of soil explorations conducted during Whitestone's field investigation. The purpose of the investigation was to assess subsurface conditions within and adjacent to the proposed development area accessible to a truck-mounted drill rig and tracked excavator. Preliminary recommendations for support of the proposed structures and pavements and anticipated earthwork requirements are included herein. Subsurface conditions vary significantly at the western edge of the site and as such, further structure-specific drilling is recommended.

1.0 PROJECT DESCRIPTION

1.1 Site Location & Existing Conditions

The site is located at 27 - 29 Military Highway in the Village of Gales Ferry, Town of Ledyard, New London County, Connecticut. The 18.8-acre property is further identified as Map 91, Block 1590, Lots 29 and 39. The site is developed with *Sweet Hill Farm*, which has a residence and several light structures for a farm store and weddings/private events. Most of the site slopes down to the south from approximately 40 feet above North American Vertical Datum of 1988 (NAVD) to 30 feet above NAVD. However, the western side slopes down steeply to the east from approximately 70 feet above NAVD to 30 feet above NAVD.

1.2 Site Geology

Based on a review of the *Surficial Materials Map of Connecticut (1992)*, the natural site soils consist of a glaciofluvial deposit (sand over sand and gravel). A Connecticut Department of Transportation (CTDOT) boring in the vicinity of the site indicates 56 feet of sand over 29 feet of sand and gravel. Glacial till is mapped on the western edge of the site. The *Bedrock Geologic Map of Connecticut (1985)* indicates that the subject property is primarily underlain by the Proterozoic Z-age Plainfield Formation, consisting of quartzite with minor schist and gneiss and incidental calc-silicate rock and amphibolite. The western

edge of the site is underlain by Proterozoic Z-age Potter Hill Granite Gneiss, consisting of gneiss. Both are part of the Eastern Uplands; Avalonian (Continental) Terrane; Avalonian Anticlinorium. Bedrock outcrops along the western side of the site.

1.3 Proposed Construction

Based on a March 30, 2023 *Conceptual Layout Plan* prepared by Bohler Engineering MA, LLC of West Hartford, Connecticut, the proposed development includes demolition of the existing structures and construction of four five-story residential buildings (Buildings 1 through 4) with associated paved parking, utilities, and landscaped areas. The location is shown on attached Figure 1 - *Test Location Plan*. Stormwater management and septic system areas are planned south of the structures. Retaining walls will likely be required as part of site grading.

Structural information was not available at the time of this report, however, based on experience with similar facilities, Whitestone anticipates that maximum column, wall, and floor loads will be less than about 250 kips, 3.0 kips per lineal foot, and 150 pounds per square foot, respectively.

2.0 FIELD EXPLORATION & TESTING

2.1 Field Exploration

Field exploration at the project site consisted of advancing nine soil borings (identified as B-1 through B-9) within accessible portions of the site. The explorations subsequently were backfilled to the surface with excavated soils from the investigation. The locations of the borings are shown on the accompanying *Test Location Plan* included as Figure 1. *Records of Subsurface Exploration* for the borings are provided in Appendix A.

Field exploration also consisted of excavating six test pits (identified as TP-1 through TP-6). The test pits were backfilled to the surface with excavated soils. The locations of the test pits are shown on the accompanying *Test Location Plan* included as Figure 1. *Records of Subsurface Exploration* for the test pits are provided in Appendix A.

The subsurface tests were conducted in the presence of a Whitestone engineer, who conducted field tests, recorded visual classifications, and collected samples of the various strata encountered. The tests were located in the field using phone-based GPS. These locations are presumed to be accurate to the degree implied by the method used.

Soil borings and Standard Penetration Tests (SPTs) were conducted in general accordance with ASTM International (ASTM) designation D1586. The SPT resistance value (N) can be used as an indicator of the consistency of fine-grained soils and the relative density of coarse-grained soils. The N-value for various soil types can be correlated with the engineering behavior of earthworks and foundations.

Groundwater level observations, where encountered, were recorded during and immediately after the completion of field operations prior to backfilling the tests. Seasonal variations, temperature effects, man-made effects, and recent rainfall conditions may influence the levels of the groundwater, and the observed levels will depend on the permeability of the soils. Groundwater elevations derived from sources other than seasonally observed groundwater monitor wells may not be representative of true groundwater levels.

2.2 Infiltration Testing

Test pits were completed to evaluate soil conditions prior to infiltration testing. Test pits TP-1, TP-2, TP-3, and TP-6 were advanced to depths of 5.5 feet below ground surface (fbgs) to eight fbgs. Infiltration tests I-1 through I-4 were conducted as falling head tests in cased holes at the locations shown on the *Test Location Plan*. PVC casing, four inches in diameter, was installed depths of 1.5 fbgs or three fbgs. A thin layer of clean sand was placed at the bottom of the casing. The soil was pre-soaked for approximately one hour. Following testing, the casings were removed. The results are tabulated below.

SUMMARY OF INFILTRATION TESTING				
Location	**Approximate Ground Elevation (ft NAVD)**	**Test Depth (fbgs)**	**Approximate Test Elevation (ft NAVD)**	**Infiltration Rate (in/hr)**
I-1 (TP-1)	28	1.5	26.5	>15
I-2 (TP-2)	27	1.5	25.5	>15
I-3 (TP-3)	32	3.0	29	>15
I-4 (TP-6)	32	3.0	29	>15

The infiltration testing was conducted within the glaciofluvial deposit. Typically, a Factor of Safety (FoS) is applied to measured infiltration rates to account for siltation and consolidation of soil below the systems over time. Safety factors used should consider how critical the systems are to the development and the available storage. If the system is critical or storage limited, a higher FoS should be applied. Infiltration rates are variable and dependent on test depth and stratification. Whitestone recommends that the unfactored infiltration rate not exceed eight inches per hour and that a FoS of at least 2.5 be applied to the rate for design purposes.

2.3 Percolation Testing

Test pits were completed to evaluate soil conditions prior to percolation testing. Test pits TP-4 and TP-5 were advanced to depths of six fbgs and 7.5 fbgs, respectively. There were indications of estimated seasonal high groundwater (ESHGW) on the sidewalls of test pit TP-5 at a depth of 5.8 fbgs. There were no indications of ESHGW on the sidewalls of test pit TP-4. Percolation test P-1 adjacent to TP-4 and P-2 adjacent to TP-5 were attempted in the glaciofluvial deposit at depths of four fbgs and 3.5 fbgs, respectively, in hand-dug holes that were approximately 12 inches in diameter and 12 inches deep. The percolation test holes were pre-soaked but could not hold water. Percolation testing was abandoned. Whitestone estimates of percolation rate are tabulated below.

SUMMARY OF PERCOLATION TESTING		
Location	**Percolation Rate (minutes per inch)**	**Approximate Test Elevation (ft NAVD)**
P-1 (TP-4)	< 1 [1]	28
P-2 (TP-5)	< 1 [1]	28.5

Note 1: Percolation rates estimated based on observations during pre-soaking.

2.4 Laboratory Testing

Laboratory testing was conducted to determine additional, pertinent engineering characteristics of representative samples of on-site soils. The laboratory testing was conducted in general accordance with applicable ASTM standard test methods and included physical/textural testing of representative samples.

The results of the laboratory testing are presented in this section in a general manner and qualitatively interpreted. The results are incorporated into the findings and recommendations discussed throughout this report. Quantitative test results are provided in Appendix B.

Physical and Textural Analysis: Representative samples of selected strata were subjected to laboratory testing that included moisture content determination (ASTM D2216) and washed gradation analysis (ASTM D422) in order to conduct supplementary engineering soil classifications in general accordance with ASTM D2487. The soil stratum tested was classified by the Unified Soil Classification System (USCS). The results of the laboratory testing are summarized in the following table:

PHYSICAL/TEXTURAL ANALYSES SUMMARY					
Boring	**Sample**	**Depth (fbgs)**	**Moisture Content (%)**	**Passing No. 200 Sieve (%)**	**USCS Classification**
B-1	S-3	5.0 - 7.0	27.8	8.1	SP-SM
B-3	S-2	2.0 - 4.0	1.8	7.4	SW-SM
B-5	S-3	5.0 - 7.0	26.3	25.7	SM
B-7	S-2	2.0 - 4.0	3.6	2.6	SP

Based on the results of the gradation testing, the United States Department of Agriculture (USDA) textural analysis classifies the glaciofluvial deposit as “sand”.

3.0 SUBSURFACE CONDITIONS

The subsurface soil conditions encountered within the subsurface tests conducted by Whitestone consisted of the following generalized strata in order of increasing depth. *Records of Subsurface Exploration* are provided in Appendix A.

Surface Cover Materials: The explorations, except borings B-5, encountered four inches to 12 inches of topsoil at the ground surface, underlain in places by four inches to 12 inches of subsoil with roots.

Existing Fill (intermittent): Existing fill was encountered in B-3 to a depth of nine fbgs. Although existing fill was not encountered within other borings, considering the wide spacing of the explorations and the existing development at the site fill should be expected, especially around existing structures. In addition, bury holes and other pockets of fill may be encountered during redevelopment.

Glaciofluvial Deposit: Beneath the surface cover materials or at the ground surface, the explorations encountered a glaciofluvial deposit, consisting of brown to gray, loose to medium dense (occasionally

dense), poorly graded sand with silt (USCS: SP-SM) to silty sand (USCS: SM) to well-graded sand with silt (USCS: SW-SM) to poorly graded sand (USCS: SP), occasional gravel and cobbles. The SPT N-values within the glaciofluvial deposit were variable, ranging from four blows per foot (bpf) to 49 bpf. Borings B-3 through B-8 terminated in the glaciofluvial deposit at depths of 22 fbgs to 32 fbgs. The test pits terminated in the glaciofluvial deposit at depths of 5.5 fbgs to eight fbgs.

Glacial Till: Beneath the glaciofluvial deposit, borings B-1, B-2, and B-9 encountered glacial till, consisting of gray-brown to brown, dense to very dense, silty sand with gravel (USCS: SM). The SPT N-values within the glacial till ranged from 31 bpf to 66 bpf. Boring B-1 terminated in the glacial till at a depth of 24 fbgs.

Apparent Bedrock: Borings B-2 and B-9 encountered auger refusal on apparent bedrock at depths of five fbgs and 8.7 fbgs, respectively. Bedrock was not sampled through rock coring efforts, but was inferred by auger refusal. Rock coring techniques would be required to further characterize the nature and extent of the refusal materials. Additional explorations should evaluate the bedrock, the surface of which likely undulates and is relatively close to anticipated excavation depths.

Groundwater: Groundwater was encountered in the soil explorations during the investigation at depths ranging from 2.7 fbgs to 14 fbgs, though typically from five fbgs to 10 fbgs. The shallower groundwater is likely perched. Indications of ESHGW were observed in test pits TP-1, TP-2, TP-3, and TP-5 at depths of 2.3 fbgs to 5.8 fbgs. Groundwater levels should be expected to fluctuate seasonally and following periods of precipitation.

4.0 CONCLUSIONS & RECOMMENDATIONS

Contingent upon construction phase evaluation, Whitestone's findings indicate that the proposed buildings may be supported on conventional shallow foundations bearing on a layer of compacted structural fill placed over thoroughly compacted glaciofluvial deposit. Shallow foundations may also bear directly on glacial till, which is likely to be encountered within a portion of the footprint of Building 4. Although only encountered in a limited number of explorations, existing fill associated with the buildings to be demolished should be expected during construction. In addition, bury holes and other pockets of fill may be encountered during redevelopment. Any existing fill should be overexcavated beneath footings and replaced with structural fill. Ground-supported floor slabs may derive support from the inspected and approved glaciofluvial deposit (or existing fill if encountered) and/or controlled structural fill materials. Additionally, the site conditions support the use of typical pavement sections using standard CTDOT specified materials. The recommendations for support of the proposed structures and pavements included herein should be considered preliminary until additional structure-specific drilling has been completed.

The following recommendations have been developed on the basis of subsurface conditions encountered within the limited exploration conducted and without a site development plan. Additional borings for each planned structure are recommended. Whitestone should review the preliminary recommendations in this report following completion of this drilling.

4.1 Site Preparation & Earthwork

Surface Cover Stripping and Demolition: Prior to stripping operations, utilities should be identified and secured. The surface cover materials to be stripped should be removed from within and at least five feet beyond the limits of the proposed building, slab, and pavement areas. Given the size of the site and the configuration of the proposed and existing buildings, existing structural elements, such as foundation

walls, and concrete foundations, walls, or slabs encountered during excavations, should be removed entirely. Topsoil, subsoil, vegetation, trees, shrubs, and other organic matter should also be removed from within and at least five feet beyond the limits of the proposed building footprints and other site structures, as well as any other area that will require controlled structural fill placement. Tree/shrub removal should include the removal of stumps and root material. Root structures will require removal in excess of the few inches of topsoil typically encountered at the ground surface. The demolition contractor should be required to conduct earthwork in accordance with the recommendations in this report, including backfilling the basement area and other excavation, etc. with structural fill. Fill or backfill placed within areas requiring structural support, such as the proposed building areas, should be placed as structural fill in accordance with Section 4.2 of this report.

Surface Preparation/Proofrolling: Exposed soils should be compacted to a firm and unyielding surface with several passes in two perpendicular directions of a minimum 10-ton vibratory compactor. The surface should then be proofrolled with a loaded tandem axle truck in the presence of the geotechnical engineer to help identify soft or loose pockets that may require removal and replacement, or further evaluation. Proofrolling should be conducted after a suitable period of dry and non-freezing weather to reduce the likelihood of degrading an otherwise stable subgrade. Should construction be started during the winter months, Whitestone should be contacted for alternate surface preparation procedures. Fill and backfill should be placed and compacted in accordance with Section 4.2.

Ground Improvement - Heavy Compaction: The glaciofluvial deposit varies in relative density, with many loose zones. Whitestone recommends heavy compaction of the glaciofluvial deposit to provide more uniform support for the proposed shallow foundations. The glaciofluvial deposit beneath footings should be overexcavated by up to 24 inches and the exposed subgrade thoroughly compacted. The footing excavations should be made sufficiently wide to allow several passes of a full-size 10-ton (static weight), vibratory roller compactor. The underside of footing level should be re-established by placing and compacting structural fill, which should consist of a well-graded mixture of sand and gravel. To some extent, the groundwater level at each building will govern the amount of overexcavation and the compactive energy that may be applied. In this regard, monitoring wells are proposed to further evaluate site groundwater levels.

Weather Performance Criteria: Because the glaciofluvial deposit is typically well drained, achieving compaction and maintaining surface compaction of this material during dry weather may be difficult. These soils may need to be wetted on a regular basis to achieve compaction and will be easily disturbed at the surface by construction activities. Routine grading, wetting, and proofrolling may be required to maintain exposed subgrades.

Groundwater Control: Groundwater was encountered during the exploration at depths as shallow as 2.7 fbgs. Shallow perched water may be encountered elsewhere on the site during construction above any impermeable material. Construction phase dewatering will likely consist of removing surface water runoff, infiltrating water, or trapped water at this site. Whitestone anticipates that such construction phase dewatering would typically include installing temporary sump pits and filtered pumps within trenches and excavations. Whitestone recommends that foundation construction occur during periods of relatively dry weather. Every effort should be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of foundation areas to precipitation.

4.2 Structural Fill & Backfill

Imported Fill Material: Any imported material placed as structural fill or backfill to restore design grades should consist of clean, relatively well graded sand or gravel with a maximum particle size of three inches and up to 15 percent of material finer than a #200 sieve. The material should be free of clay

lumps, organics, and deleterious material. Any imported structural fill material should be approved by a qualified geotechnical engineer prior to delivery to the site.

Soil Reuse: Whitestone anticipates that the site soils will be structurally suitable for selective reuse as fill/backfill material, provided that soil moisture contents are controlled within three percent of optimum moisture level, particles larger than three inches in diameter are either removed or crushed, and objectionable portions, such as any organics, are segregated. Reuse of the site soils will be contingent on careful review in the field by visual observation by the owner's geotechnical engineer during construction as recommended herein.

Compaction and Placement Requirements: Fill and backfill should be placed in maximum 12-inch thick loose lifts when compacted using a vibratory drum roller with a minimum weight of one ton, and in maximum eight-inch thick loose lifts when compacted with a plate compactor. Structural fill and backfill should be compacted to at least 95 percent of the maximum dry density within three percent of the optimum moisture content, as determined by ASTM D1557 (Modified Proctor).

4.3 Foundation Design Criteria

Foundations: Contingent upon construction phase evaluation, Whitestone's findings indicate that the proposed buildings may be supported on conventional shallow foundations deriving support from the thoroughly compacted glaciofluvial deposit or from the glacial till. Where the footings will derive support from the glaciofluvial deposit, the footing subgrade should be overexcavated by 24 inches and replaced with compacted structural fill. Prior to placing the structural fill, the exposed subgrade should be compacted with a full size vibratory roller compactor, as discussed in Section 4.1. The amount of overexcavation and degree of compaction will depend on the groundwater level at each building. Monitoring wells are proposed to further evaluate site groundwater levels. Although only encountered in a limited number of explorations, existing fill associated with the buildings to be demolished should be expected during construction. Any existing fill should be overexcavated beneath footings and replaced with structural fill. Foundations bearing within these materials may be designed using a maximum net allowable bearing pressure of 3,000 pounds per square foot.

Foundation subgrades should be reviewed by the geotechnical engineer. Regardless of loading conditions, new foundations should be sized no less than minimum dimensions of 24 inches for continuous wall footings and 36 inches for isolated column footings.

Footings subject to lateral loads and/or overturning should be designed so that the maximum toe pressure due to the combined effect of vertical loads and overturning moment does not exceed the recommended maximum allowable net bearing pressure. In addition, positive contact pressure should be maintained throughout the base of the footings such that no uplift or tension exists between the base of the footings and the supporting soil. Uplift loads should be resisted by the weight of the concrete. Side friction should be neglected when proportioning the footings so that lateral resistance should be provided by friction resistance at the base of the footings. An allowable coefficient of friction against sliding of 0.4 is recommended for use in the design of the foundations bearing within the existing site soils or imported structural fill soils.

Seismic Site Class: Based on a review of the subsurface conditions relevant to the *Connecticut State Building Code*, the subject site has been assigned a Site Class D. Based on the seismic zone and soil profile, liquefaction considerations are not expected to have a substantial impact on design.

Inspection/Overexcavation Criteria: Whitestone recommends that the suitability of the bearing soils at the footing bottoms be reviewed by a geotechnical engineer immediately prior to placing concrete for the

footings. In the event that areas of unsuitable materials are encountered, additional overexcavation and replacement of the materials may be necessary to provide a suitable footing subgrade. Any overexcavation to be restored with structural fill will need to extend at least one foot laterally beyond footing edges for each vertical foot of overexcavation. Lateral overexcavation may be eliminated if grades are restored with lean concrete.

Frost Coverage: Footings subject to frost action should be placed at least 42 inches below adjacent exterior grades, in accordance with the *Connecticut State Building Code*, to provide protection from frost penetration. Interior footings not subject to frost action may be placed at a minimum depth of 18 inches below the floor slab subgrade.

Settlement: Whitestone estimates post construction settlements of proposed foundations of less than one inch, if the recommendations outlined in this report are properly implemented. Differential settlement of spread foundations should be less than one half inch.

4.4 Floor Slabs

Whitestone anticipates that the properly inspected, approved, and improved glaciofluvial deposit (and existing fill if encountered) and/or compacted structural fill will be suitable for support of the proposed floor slabs, provided these materials are properly evaluated, compacted, and proofrolled in accordance with the recommendations of this report during favorable weather conditions. Areas that are, or become, softened or disturbed as a result of wetting and/or repeated exposure to construction traffic should be removed and replaced with compacted structural fill. The properly prepared on-site soils are expected to yield a minimum subgrade modulus (k) of 150 psi/in.

A minimum 12-inch layer of CTDOT *M.05.01 Processed Aggregate Base* (or approved equivalent) should be placed below the floor slabs to provide a uniform granular base. A moisture vapor barrier should also be installed beneath the floor slabs in accordance with flooring manufacturer's recommendations.

4.5 Pavement Design

Whitestone anticipates that the properly inspected, approved, and improved glaciofluvial deposit (and existing fill if encountered) and/or compacted structural fill and/or backfill placed to raise or restore design elevations will be suitable for support of the proposed pavements, provided these materials are properly evaluated, compacted, and proofrolled in accordance with the recommendations in this report during favorable weather conditions.

A California Bearing Ratio value of 8.0 has been assigned to the properly prepared subgrade soils for pavement design purposes. This value was correlated with pertinent soil support values and assumed traffic loads to a prepare flexible pavement design per the AASHTO *Guide for the Design of Pavement Structures*.

Design traffic loads were assumed based on typical volumes for similar facilities and correlated with 18-kip equivalent single axle loads (ESAL) for a 20-year life. Estimated maximum pavement loads of 30,000 ESALs and 75,000 ESALs were used for the standard-duty and heavy-duty pavement areas, respectively. These values assume the pavements primarily will accommodate both automobile and limited heavier truck traffic, with the heavier truck traffic designated to the main drive lanes. Actual loading experienced is anticipated to be less than these values.

Pavement components should meet material specifications from CTDOT *Standard Specifications* specified below. The recommended flexible pavement sections are tabulated below:

FLEXIBLE PAVEMENT SECTION			
Layer	**Material**	**Standard-Duty Thickness (inches)**	**Heavy-Duty Thickness (inches)**
Asphalt Wearing Course	CTDOT HMA S0.375 (Superpave); PG 64S-22	1.5	1.5
Asphalt Binder Course	CTDOT HMA S0.5 (Superpave); PG 64S-22	1.5	2.5
Granular Base	CTDOT M.05.01 Processed Aggregate Base	6.0	6.0
Granular Subbase	CTDOT M.02.02 Subbase; M.02.06 Gradation A	6.0	6.0

Rigid concrete pavement should be used to provide suitable support at areas of high traffic or severe turns, such as at ingress/egress locations and the trash enclosure. The recommended rigid pavement is tabulated below:

RIGID PAVEMENT SECTION		
Layer	**Material**	**Thickness (inches)**
Surface	4,000 psi Air-Entrained Concrete	6.0 [1]
Granular Base	CTDOT M.05.01 Processed Aggregate Base	6.0
Granular Subbase	CTDOT M.02.02 Subbase; M.02.06 Gradation A	6.0

[1] The outer edges of concrete pavements are susceptible to damage as trucks move from rigid pavement to adjacent flexible pavement. Therefore, the thickness at the outer two feet of the rigid concrete pavement should be 12 inches. The concrete should be reinforced with at least one layer of six-inch by six-inch W5.4/W5.4 welded wire fabric (ASTM A185).

The pavement section thickness designs presented in this report are based on the design parameters detailed herein and are contingent on proper construction, inspection, and maintenance. Additional pavement thickness may be required by local code. The designs are contingent on achieving the minimum soil support value in the field. To accomplish this requirement, subgrade soil and supporting fill or backfill should be placed, compacted, and evaluated in accordance with the recommendations of this report. Proper drainage should be provided for the pavement structure, including appropriate grading and surface water control.

The performance of the pavement also will depend on the quality of materials and workmanship. Whitestone recommends that CTDOT standards for materials, workmanship, and maintenance be applied to this site. Project specifications should include verifying that the installed asphaltic concrete material composition is within tolerance for the specified materials and that the percentage of air voids of the installed pavement is within specified ranges for the respective materials. Rigid concrete pavements should be suitably air-entrained, jointed, and reinforced in general accordance with ACI 330R-08 *Guide for the Design and Construction of Concrete Parking Lots*.

4.6 Retaining Walls/Lateral Earth Pressures

The following parameters may be used for design of any retaining walls, below-grade walls, and other structures reliant on granular materials to provide adequate drainage. However, the parameters are not

directly applicable to the design of mechanically stabilized earth (MSE) retaining walls, which require proprietary design methods for the selected earth retention system.

Retaining/below-grade walls should be capable of withstanding active and at-rest earth pressures. With an active earth pressure coefficient (K_a) of 0.33, a level backfill, and an assumed maximum backfill soil unit weight of 140 pounds per cubic foot (pcf), an equivalent fluid pressure of 46 psf per foot of wall height should be used in design of retaining/below-grade walls which are free to rotate.

Retaining/below-grade walls and wall corners that are restrained from lateral movement should be designed using at-rest earth pressures. A coefficient of at-rest earth pressure (K_o) of 0.5, for a level backfill, is recommended for retaining/below-grade walls designed to resist at-rest earth pressures, which assume no lateral movement. With an assumed maximum total unit weight of backfill of approximately 140 pcf, an equivalent fluid pressure of 70 pounds per square foot per foot of wall height should be used in design of restrained retaining/below-grade wall and wall corners. A coefficient of friction of 0.4 against sliding can be used for concrete on the existing site soils. Additional lateral earth pressures from a sloped backfill or any temporary or long-term surcharge loads also should be included in the design. Retaining wall design should include a global stability analysis.

Whitestone recommends that granular soils be used to backfill behind retaining walls. The granular backfill materials should consist of clean, relatively well graded sand or gravel.

Whitestone recommends that backfill directly behind any walls be compacted with light, hand-held compactors. Heavy compactors and grading equipment should not be allowed to operate within a zone of influence measured at a 45-degree angle from the base of the walls during backfilling to avoid developing excessive temporary or long-term lateral soil pressures.

Positive drainage should be provided at the base of the below-grade walls. Where wall drainage is not provided, the wall should be designed to withstand full hydrostatic pressure.

Whitestone should be notified if any other retaining structures or design considerations requiring lateral earth pressure estimations are proposed. Specific recommendations for temporary retaining structures are beyond Whitestone's scope of work.

4.7 Excavations

The site soils encountered during this investigation typically are, at a minimum, consistent with Type C Soil Conditions as defined by 29 CFR Part 1926 (OSHA), which require a maximum unbraced excavation angle of 1.5:1 (horizontal:vertical). Actual conditions encountered during construction should be evaluated by a competent person (as defined by OSHA), so that safe excavation methods and/or shoring and bracing requirements are implemented. Competent bedrock may be excavated at an angle of 1:6 (horizontal:vertical). A steeper temporary excavation angle in the bedrock may be feasible, if the exposed bedrock is reviewed by a professional engineer or geologist.

4.8 Slopes

Whitestone's exploration did not include a detailed analysis of slope stability for any temporary or permanent condition. Based upon common local practice and Whitestone's experience with stable soil slopes, permanent soil slopes no steeper than 3:1 (horizontal:vertical) are recommended. For slopes steeper than 3:1 (horizontal:vertical), riprap covering would likely be required for long-term stability and erosion control.

Temporary slopes should be regularly evaluated for signs of movement or unsafe conditions. The site soils are prone to erosion by precipitation and runoff. Soil slopes should be covered for protection from rain. Surface runoff should be diverted away from the slopes. For erosion protection, a protective cover of grass or other vegetation should be established on permanent soil slopes as soon as possible. Erosion control matting would provide protection until vegetation is fully established.

5.0 SUPPLEMENTAL POST INVESTIGATION SERVICES

Additional Structure-Specific Drilling: Additional borings should be advanced to further evaluate soil conditions for foundation support, including the relative density of the glaciofluvial deposit, the extent of glacial till, and the presence of shallow bedrock within the western portion of the site. Groundwater monitoring wells should be installed in selected borings to allow assessment of proposed overexcavation beneath the footings. The scope of the additional drilling should be reviewed when the site grading plan is available.

Demolition and Construction Inspection and Monitoring: The owner's geotechnical engineer with specific knowledge of the site subsurface conditions and design intent should conduct inspection, testing, and consultation during construction as described in previous sections of this report. Monitoring and testing should also be conducted to confirm that the existing structures are properly demolished, any encountered underground structures, such as the existing building foundations, are properly backfilled, the existing surface cover materials are properly removed, and suitable materials, used for controlled fill, are properly placed and compacted over suitable subgrade soils. The proofrolling of all subgrades prior to foundation, floor slab, and pavement support should be witnessed and documented by the owner's geotechnical engineer.

6.0 CLOSING

Whitestone's Geotechnical Division appreciates the opportunity to be of service to C.R. Klewin, Inc. Please note that Whitestone has the capability to conduct the additional geotechnical engineering services recommended herein. Please contact us with any questions regarding this report.

Sincerely,

WHITESTONE ASSOCIATES, INC.

Richard W.M. McLaren, P.E.
Senior Consultant

Ryan R. Roy, P.E.
Vice President

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Enclosures

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FIGURE 1
Test Location Plan

LEGEND

- B-1 — BORING LOCATION
- TP-1 — TEST PIT LOCATION
- SUBJECT PROPERTY BOUNDARY

NOTE: ALL LOCATIONS ARE APPROXIMATE.

REFERENCE

THIS PLAN IS BASED ON A 3/30/23 CONCEPTUAL LAYOUT PLAN PREPARED BY BOHLER.

WHITESTONE
An Employee-Owned Company
16 OLD FORGE ROAD, SUITE A, ROCKY HILL, CT 06067
860.726.7889 WHITESTONEASSOC.COM

DRAWING TITLE: **TEST LOCATION PLAN**

CLIENT: **C.R. KLEWIN LLC**

PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT
27 - 29 MILITARY HIGHWAY
GALES FERRY, NEW LONDON COUNTY, CONNECTICUT

PROJECT #: GM2320566.000	
DESIGNED BY: MR	PROJ. MGR.: RR
DATE: 6/19/23	FIGURE: 1
SCALE: 1" = 100'	

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APPENDIX A
Records of Subsurface Exploration

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RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-1

Page 1 of 1

Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

				Water Depth | Elevation (feet bgs) | (ft NAVD88)	Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)
Surface Elevation:	± 30.0 feet Above NAVD88	**Date Started:**	5/24/2023		
Termination Depth:	22.0 feet bgs	**Date Completed:**	5/24/2023		
Proposed Location:	Building 4	**Logged By:**	OR	**During:** 5.0 | 25.0	
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	MS	**At Completion:** -- | --	**At Completion:** -- | --
		Equipment:	Mobile B-53	**24 Hours:** -- | --	**24 Hours:** -- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1	X	2 - 3 - 3 - 3	14	6		TS		12" Topsoil	
									Brown, Loose, Poorly Graded Sand with Silt (SP-SM)	
2 - 4	S-2	X	4 - 4 - 3 - 4	16	7				As Above (SP-SM)	
						5.0 ▼				
5 - 7	S-3	X	2 - 3 - 4 - 5	15	7				As Above (SP-SM)	
7 - 9	S-4	X	5 - 5 - 5 - 6	22	10				As Above, Loose to Medium Dense (SP-SM)	
						10.0	GLACIO-FLUVIAL DEPOSIT			
10 - 12	S-5	X	2 - 3 - 4 - 4	18	7				As Above, Loose (SP-SM)	
						15.0				
15 -17	S-6	X	1 - 1 - 4 - 5	22	5				As Above (SP-SM)	
						20.0				
20 - 22	S-7	X	7 - 12 - 24 - 25	22	36		GLACIAL TILL		Gray-Brown, Dense, Silty Sand with Gravel (SM)	
									Boring Log B-1 Terminated at Depth of 22 feet below ground surface.	
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-2

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Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

				Water Depth | Elevation (feet bgs) | (ft NAVD88)	Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)
Surface Elevation:	± 35.0 feet Above NAVD88	**Date Started:**	5/24/2023		
Termination Depth:	5.0 feet bgs	**Date Completed:**	5/24/2023		
Proposed Location:	Building 4	**Logged By:**	OR	**During:** -- | --	
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	MS	**At Completion:** -- | --	**At Completion:** -- | --
		Equipment:	Mobile B-53	**24 Hours:** -- | --	**24 Hours:** -- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1	X	3 - 2 - 1 - 2	12	3		TS		9" Topsoil	
							GLACIO-FLUVIAL DEPOSIT		Brown, Very Loose, Silty Sand (SM)	
						2.5			As Above, Loose (SM)	
2 - 4	S-2	X	4 - 10 - 21 - 62	16	31		GLACIAL TILL		Gray-Brown, Dense, Silty Sand with Gravel (SM)	
						5.0				Auger Grinding 4 to 5 fbgs
									Boring Log B-1 Terminated upon Auger Refusal at Depth of 5 fbgs.	
						10.0				
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-3

Page 1 of 1

Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

				Water Depth | Elevation (feet bgs) | (ft NAVD88)	Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)
Surface Elevation:	± 39.0 feet Above NAVD88	**Date Started:**	5/24/2023		
Termination Depth:	22.0 feet bgs	**Date Completed:**	5/24/2023		
Proposed Location:	Building 3	**Logged By:**	OR	**During:** 14.0 | 25.0	
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	MS	**At Completion:** -- | --	**At Completion:** -- | --
		Equipment:	Mobile B-53	**24 Hours:** -- | --	**24 Hours:** -- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							TS		6" Topsoil	
0 - 2	S-1	X	9 - 16 - 13 - 23	10	29		EXISTING FILL		Gray-Brown, Medium Dense, Well-Graded Sand with Silt and Gravel (FILL)	Cobbles
2 - 4	S-2	X	23 - 29 - 20 - 15	11	49				As Above, Dense (FILL)	
						5.0				
5 - 7	S-3	X	23 - 24 - 22 - 13	6	46				As Above, Brown (FILL)	Cobbles
7 - 9	S-4	X	14 - 12 - 13 - 11	4	25				Gray-Brown, Medium Dense, Poorly Graded Sand with Silt and Gravel (FILL)	
						10.0				
10 - 12	S-5	X	5 - 6 - 6 - 9	15	12				As Above, Brown (SP-SM)	
						15.0				
15 -17	S-6	X	6 - 8 - 5 - 5	12	13		GLACIO-FLUVIAL DEPOSIT		As Above (SP-SM)	
						20.0				
20 - 22	S-7	X	6 - 5 - 7 - 14	11	12				As Above (SP-SM)	
									Boring Log B-3 Terminated at Depth of 22 feet below ground surface.	
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-4

Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

				Water Depth | Elevation (feet bgs) | (ft NAVD88)	Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)
Surface Elevation:	± 36.0 feet Above NAVD88	**Date Started:**	5/24/2023		
Termination Depth:	22.0 feet bgs	**Date Completed:**	5/24/2023		
Proposed Location:	Building 3	**Logged By:**	OR	**During:** 10.0 | 26.0	
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	MS	**At Completion:** -- | --	**At Completion:** -- | --
		Equipment:	Mobile B-53	**24 Hours:** -- | --	**24 Hours:** -- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1	X	7 - 7 - 7 - 11	5	14		TS		12" Topsoil	
									Brown, Medium Dense, Poorly Graded Sand with Silt and Gravel (SP-SM)	
2 - 4	S-2	X	10 - 11 - 12 - 14	16	23				As Above (SP-SM)	
						5.0				
5 - 7	S-3	X	33 - 19 - 14 - 13	13	33				As Above, Dense (SP-SM)	Cobbles
7 - 9	S-4	X	8 - 12 - 12 - 12	22	24				As Above, Medium Dense (SP-SM)	Cobbles
						10.0 ▽				
10 - 12	S-5	X	10 - 9 - 9 - 9	17	18		GLACIO-FLUVIAL DEPOSIT		Brown, Medium Dense, Poorly Graded Sand with Silt (SP-SM)	
						15.0				
15 -17	S-6	X	7 - 7 - 4 - 6	16	11				As Above (SP-SM)	
						20.0				
20 - 22	S-7	X	9 - 11 - 14 - 24	16	25				Brown, Medium Dense, Poorly Graded Sand with Silt and Gravel (SP-SM)	
						25.0			Boring Log B-4 Terminated at Depth of 22 feet below ground surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-5

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Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

				Water Depth | Elevation (feet bgs) | (ft NAVD88)	Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)
Surface Elevation:	± 33.0 feet Above NAVD88	**Date Started:**	5/23/2023		
Termination Depth:	22.0 feet bgs	**Date Completed:**	5/23/2023		
Proposed Location:	Building 2	**Logged By:**	OR	**During:** 6.0 | 27.0	
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	MS	**At Completion:** -- | --	**At Completion:** -- | --
		Equipment:	Mobile B-53	**24 Hours:** -- | --	**24 Hours:** -- | --

SAMPLE INFORMATION						DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)			
						0.0			
0 - 2	S-1		3 - 5 - 5 - 6	10	10			Brown, Loose to Medium Dense, Poorly Graded Sand with Silt (SP-SM)	
2 - 4	S-2		7 - 10 - 10 - 9	12	20			Gray-Brown, Medium Dense, Silty Sand (SM)	
						5.0			
5 - 7	S-3		3 - 4 - 6 - 6	16	10			As Above, Loose to Medium Dense (SM)	
7 - 9	S-4		4 - 3 - 4 - 6	15	7			As Above, Loose (SM)	
						10.0			
10 - 12	S-5		2 - 4 - 5 - 6	18	9		GLACIO-FLUVIAL DEPOSIT	As Above (SM)	
						15.0			
15 -17	S-6		2 - 2 - 2 - 3	20	4			As Above, Very Loose to Loose (SM)	
						20.0			
20 - 22	S-7		7 - 7 - 9 - 12	18	16			As Above, Medium Dense (SM)	
						25.0		Boring Log B-5 Terminated at Depth of 22 feet below ground surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-6

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Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

				Water Depth | Elevation (feet bgs) | (ft NAVD88)	Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)
Surface Elevation:	± 34.0 feet Above NAVD88	**Date Started:**	5/23/2023		
Termination Depth:	32.0 feet bgs	**Date Completed:**	5/23/2023		
Proposed Location:	Building 2	**Logged By:**	OR	**During:** 7.0 | 27.0	
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	MS	**At Completion:** -- | --	**At Completion:** -- | --
		Equipment:	Mobile B-53	**24 Hours:** -- | --	**24 Hours:** -- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							TS		4" Topsoil	
0 - 2	S-1	X	3 - 6 - 9 - 8	16	15				Brown, Medium Dense, Poorly Graded Sand with Silt (SP-SM)	
2 - 4	S-2	X	7 - 11 - 10 - 8	15	21				As Above, Gray-Brown (SP-SM)	
						5.0				
5 - 7	S-3	X	3 - 4 - 4 - 6	14	8				As Above, Loose (SP-SM)	
7 - 9	S-4	X	5 - 6 - 6 - 6	10	12				As Above, Medium Dense (SP-SM0	
						10.0				
10 - 12	S-5	X	2 - 3 - 3 - 6	20	6		GLACIO-FLUVIAL DEPOSIT		As Above, Loose (SP-SM)	
						15.0				
15 -17	S-6	X	4 - 4 - 5 - 5	16	9				As Above (SP-SM)	
						20.0				
20 - 22	S-7	X	4 - 5 - 5 - 7	18	10				Brown, Loose to Medium Dense, Silty Sand (SM)	
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-6

Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

				Water Depth | Elevation (feet bgs) | (ft NAVD88)	Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)
Surface Elevation:	± 34.0 feet Above NAVD88	**Date Started:**	5/23/2023		
Termination Depth:	32.0 feet bgs	**Date Completed:**	5/23/2023		
Proposed Location:	Building 2	**Logged By:**	OR	**During:** 7.0 | 27.0	
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	MS	**At Completion:** -- | --	**At Completion:** -- | --
		Equipment:	Mobile B-53	**24 Hours:** -- | --	**24 Hours:** -- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						25.0				
25 - 27	S-8	X	3 - 5 - 8 - 10	18	13		GLACIO-FLUVIAL DEPOSIT		Gray-Brown, Medium Dense, Poorly Graded Sand with Silt (SP-SM)	
						30.0				
30 -32	S-9	X	9 - 9 - 13 - 15	20	22				As Above, Brown (SP-SM)	
						35.0			Boring Log B-6 Terminated at Depth of 32 feet below ground surface.	
						40.0				
						45.0				
						50.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-7

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Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

Surface Elevation:	± 34.0 feet Above NAVD88	**Date Started:**	5/23/2023		**Water Depth | Elevation** (feet bgs) | (ft NAVD88)		**Cave-In Depth | Elevation** (feet bgs) | (ft NAVD88)
Termination Depth:	22.0 feet bgs	**Date Completed:**	5/23/2023				
Proposed Location:	Building 1	**Logged By:**	OR	**During:**	8.0 | 26.0		
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	MS	**At Completion:**	-- | --	**At Completion:**	-- | --
		Equipment:	Mobile B-53	**24 Hours:**	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							TS		4" Topsoil	
0 - 2	S-1	X	3 - 7 - 7 - 5	15	14				Brown, Medium Dense, Poorly Graded Sand (SP)	
2 - 4	S-2	X	3 - 5 - 8 - 7	16	13				As Above, Gray-Brown (SP)	
						5.0				
5 - 7	S-3	X	6 - 4 - 3 - 6	14	7				As Above, Loose, Brown (SP)	
7 - 9	S-4	X	4 - 4 - 5 - 4	14	9				As Above (SP)	
						10.0				
10 - 12	S-5	X	3 - 3 - 3 - 3	13	6		GLACIO-FLUVIAL DEPOSIT		As Above (SP)	
						15.0				
15 -17	S-6	X	6 - 7 - 6 - 6	14	13				As Above, Medium Dense (SP)	
						20.0				
20 - 22	S-7	X	2 - 2 - 3 - 4	11	5				As Above, Loose (SP)	
						25.0			Boring Log B-7 Terminated at Depth of 22 feet below ground surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-8

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Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

Surface Elevation:	± 38.0 feet Above NAVD88	**Date Started:**	5/23/2023		**Water Depth | Elevation** (feet bgs) | (ft NAVD88)		**Cave-In Depth | Elevation** (feet bgs) | (ft NAVD88)
Termination Depth:	22.0 feet bgs	**Date Completed:**	5/23/2023				
Proposed Location:	Building 1	**Logged By:**	OR	**During:**	10.0 | 28.0		
Drill / Test Method:	HSA / SPT	**Contractor:**	MS	**At Completion:**	-- | --	**At Completion:**	-- | --
	(No Auto Hammer)	**Equipment:**	Mobile B-53	**24 Hours:**	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							TS		6" Topsoil	
0 - 2	S-1	X	3 - 3 - 5 - 7	14	8				Brown, Loose, Poorly Graded Sand (SP)	
2 - 4	S-2	X	9 - 11 - 12 - 11	12	23				As Above, Medium Dense (SP)	
						5.0				
5 - 7	S-3	X	7 - 7 - 7 - 8	12	14				As Above (SP)	
7 - 9	S-4	X	10 - 8 - 8 - 8	18	16				As Above, Gray-Brown (SP)	
						10.0 ▼				
10 - 12	S-5	X	7 - 9 - 10 - 10	13	9		GLACIO-FLUVIAL DEPOSIT		As Above, Loose (SP)	
						15.0				
15 -17	S-6	X	4 - 5 - 5 - 5	11	10				As Above, Loose to Medium Dense (SP)	
						20.0				
20 - 22	S-7	X	5 - 4 - 5 - 7	11	9				As Above, Loose (SP)	
						25.0			Boring Log B-8 Terminated at Depth of 22 feet below ground surface.	

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-9

Page 1 of 1

Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

Surface Elevation:	± 34.0 feet Above NAVD88	**Date Started:**	5/24/2023		**Water Depth | Elevation** (feet bgs) | (ft NAVD88)		**Cave-In Depth | Elevation** (feet bgs) | (ft NAVD88)
Termination Depth:	8.7 feet bgs	**Date Completed:**	5/24/2023				
Proposed Location:	Building 4	**Logged By:**	OR	**During:**	7.0 | 27.0		
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	MS	**At Completion:**	-- | --	**At Completion:**	-- | --
		Equipment:	Mobile B-53	**24 Hours:**	-- | --	**24 Hours:**	-- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
							TS		4" Topsoil	
0 - 2	S-1	X	4 - 5 - 6 - 5	7	11		GLACIO-FLUVIAL DEPOSIT		Brown, Medium Dense, Poorly Graded Sand with Silt (SP-SM)	
						2.0				
2 - 4	S-2	X	7 - 10 - 23 - 26	13	33				Brown, Dense, Silty Sand with Gravel (SM)	
						5.0				Auger Grinding 4 to 5 fbgs
5 - 7	S-3	X	25 - 22 - 24 - 25	16	46		GLACIAL TILL		As Above (SM)	
7 - 8.7	S-4	X	41 - 31 - 35 - 40/2"	18	66				As Above, Very Dense (SM)	Cobbles
						10.0			Boring Log B-9 Terminated upon Auger Refusal at Depth of 8.7 fbgs	
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-9

Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

				Water Depth | Elevation (feet bgs) | (ft NAVD88)	Cave-In Depth | Elevation (feet bgs) | (ft NAVD88)
Surface Elevation:	± 34.0 feet Above NAVD88	**Date Started:**	5/24/2023		
Termination Depth:	8.7 feet bgs	**Date Completed:**	5/24/2023		
Proposed Location:	Building 4	**Logged By:**	OR	**During:** 7.0 | 27.0	
Drill / Test Method:	HSA / SPT (Autohammer)	**Contractor:**	MS	**At Completion:** -- | --	**At Completion:** -- | --
		Equipment:	Mobile B-53	**24 Hours:** -- | --	**24 Hours:** -- | --

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0				
0 - 2	S-1		4 - 5 - 6 - 5	7	11		TS		4" Topsoil	
							GLACIO-FLUVIAL DEPOSIT		Brown, Medium Dense, Poorly Graded Sand with Silt (SP-SM)	
						2.0				
2 - 4	S-2		7 - 10 - 23 - 26	13	33				Brown, Dense, Silty Sand with Gravel (SM)	
						5.0				Auger Grinding 4 to 5 fbgs
5 - 7	S-3		25 - 22 - 24 - 25	16	46		GLACIAL TILL		As Above (SM)	
7 - 8.7	S-4		41 - 31 - 35 - 40/2"	18	66				As Above, Very Dense (SM)	Cobbles
									Boring Log B-9 Terminated upon Auger Refusal at Depth of 8.7 fbgs	
						10.0				
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-1

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Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

Surface Elevation:	± 28.0 feet NAVD88	**Date Started:**	5/22/2023		**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**
Termination Depth:	7.0 feet bgs	**Date Completed:**	5/22/2023			
Proposed Location:	SWM Area	**Logged By:**	RK	**During:**	3.7 | 24.3	
Excavating Method:	Compact Excavator	**Contractor:**	MM	**At Completion:**	-- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB290	**24 Hours:**	-- | --	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		5" Topsoil	
				SUBSOIL		4" Subsoil, Roots	
				GLACIO-FLUVIAL DEPOSIT		Brown, Poorly Graded Sand with Silt (SP-SM)	Infiltration Test @ 1.5 fbgs ESHGW 2.3 fbgs
			5.0				
			10.0			Test Pit TP-1 Terminated at Depth of 7 Feet Below Ground Surface.	
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-2

Page 1 of 1

Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

					Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
Surface Elevation:	± 27.0 feet NAVD88	**Date Started:**	5/22/2023	**During:**	2.7	24.3		
Termination Depth:	5.5 feet bgs	**Date Completed:**	5/22/2023	**At Completion:**	--	--	**At Completion:**	-- / --
Proposed Location:	SWM Area	**Logged By:**	RK	**24 Hours:**	--	--		
Excavating Method:	Compact Excavator	**Contractor:**	MM					
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB290					

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		6" Topsoil	
				SUBSOIL		14" Subsoil, Roots	Infiltration Test @ 1.5 fbgs
				GLACIO-FLUVIAL DEPOSIT		Brown, Poorly Graded Sand with Silt (SP-SM)	ESHGW 2.3 fbgs
			5.0				
						Test Pit TP-2 Terminated at Depth of 5.5 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-3

Page 1 of 1

Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

				Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
Surface Elevation:	± 32.0 feet NAVD88	**Date Started:**	5/22/2023				
Termination Depth:	7.5 feet bgs	**Date Completed:**	5/22/2023				
Proposed Location:	SWM Area	**Logged By:**	RK	**During:**	6.0 | 26.0		
Excavating Method:	Compact Excavator	**Contractor:**	MM	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB290	**24 Hours:**	-- | --		

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		9" Topsoil	
				GLACIO-FLUVIAL DEPOSIT		Brown to Gray, Poorly Graded Sand with Silt (SP-SM)	Infiltration Test @ 3 fbgs
			5.0				ESHGW 5.5 fbgs
						Gray, Silty Sand (SM)	
						Test Pit TP-3 Terminated at Depth of 7.5 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-4

Page 1 of 1

Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

Surface Elevation:	± 32.0 feet NAVD88	**Date Started:**	5/22/2023		**Water Depth (feet bgs) | Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs) | Elevation (ft NAVD88)**	
Termination Depth:	6.0 feet bgs	**Date Completed:**	5/22/2023				
Proposed Location:	SWM Area	**Logged By:**	RK	**During:**	-- | --		
Excavating Method:	Compact Excavator	**Contractor:**	MM	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB290	**24 Hours:**	-- | --		

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		5" Topsoil	No indications of ESHGW
				SUBSOIL		12" Subsoil, Roots	
				GLACIO-FLUVIAL DEPOSIT		Brown, Poorly Graded Sand (SP)	5" Silty Sand layer @ 3.4 fbgs Percolation Test @ 4 fbgs
			5.0				
						Test Pit TP-4 Terminated at Depth of 6 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-5

Page 1 of 1

Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

Surface Elevation:	± 32.0 feet NAVD88	**Date Started:**	5/22/2023		**Water Depth (feet bgs)** | **Elevation (ft NAVD88)**	**Cave-In Depth (feet bgs)** | **Elevation (ft NAVD88)**
Termination Depth:	7.5 feet bgs	**Date Completed:**	5/22/2023			
Proposed Location:	SWM Area	**Logged By:**	RK	**During:**	7.0 | 25.0	
Excavating Method:	Compact Excavator	**Contractor:**	MM	**At Completion:**	-- | --	**At Completion:** -- | --
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB290	**24 Hours:**	-- | --	

SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		4" Topsoil	
				SUBSOIL		12" Subsoil, Roots	
				GLACIO-FLUVIAL DEPOSIT		Brown, Poorly Graded Sand with Silt (SP-SM)	Percolation Test @ 3.5 fbgs
			5.0				ESHGW 5.8 fbgs
						Test Pit TP-5 Terminated at Depth of 7.5 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Test Pit No.: TP-6

Page 1 of 1

Project:	Proposed Residential Development	**WAI Project No.:**	GM2320566.000
Location:	27 - 29 Military Highway, Gales Ferry, New London County, Connecticut	**Client:**	C.R. Klewin LLC

				Water Depth (feet bgs)	Elevation (ft NAVD88)	Cave-In Depth (feet bgs)	Elevation (ft NAVD88)
Surface Elevation:	± 32.0 feet NAVD88	**Date Started:**	5/22/2023				
Termination Depth:	8.0 feet bgs	**Date Completed:**	5/22/2023				
Proposed Location:	SWM Area	**Logged By:**	RK	**During:**	7.1 | 24.9		
Excavating Method:	Compact Excavator	**Contractor:**	MM	**At Completion:**	-- | --	**At Completion:**	-- | --
Test Method:	Visual Observation	**Rig Type:**	Takeuchi TB290	**24 Hours:**	-- | --		

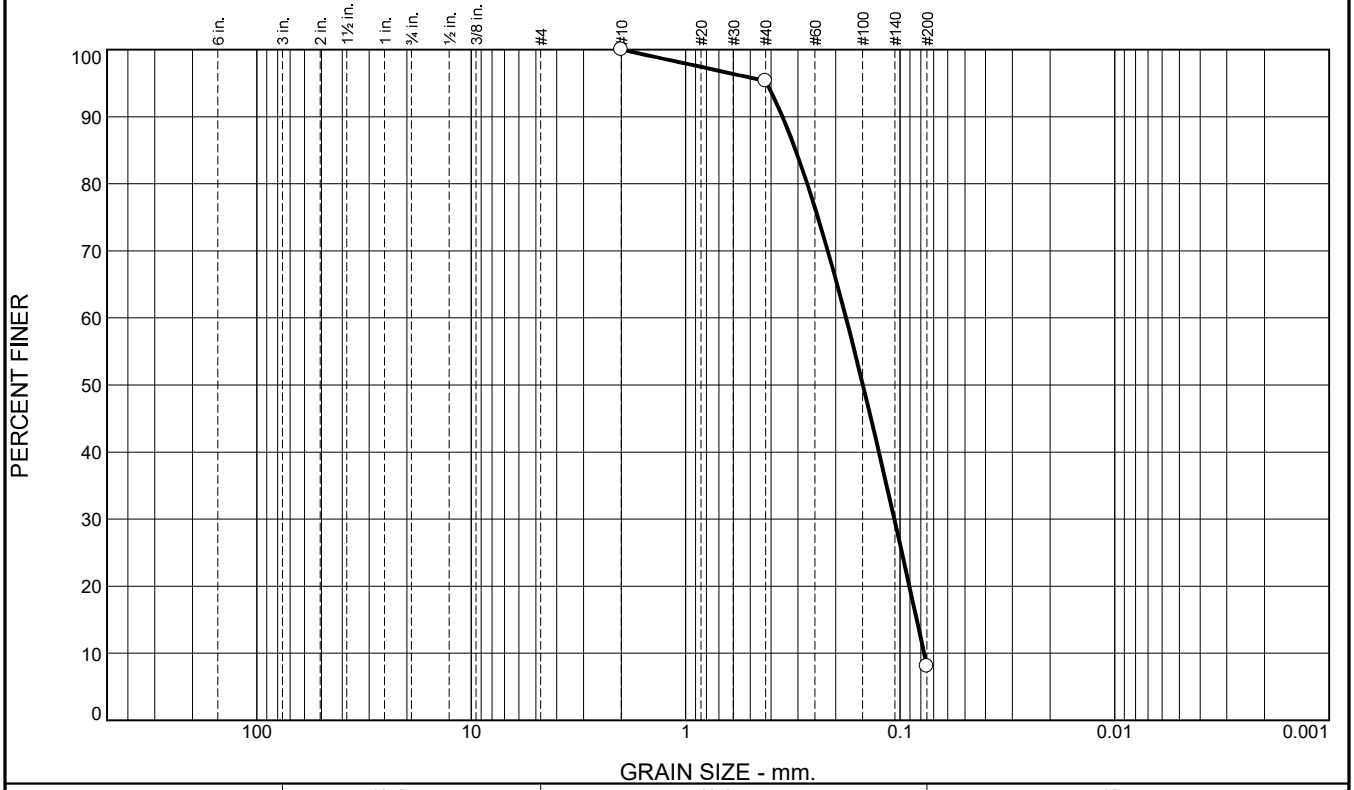
SAMPLE INFORMATION			DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (ft.)	Number	Type	(feet)				
			0.0				
				TOPSOIL		4" Topsoil	No indications of ESHGW
				SUBSOIL		11" Subsoil, Roots	
				GLACIO-FLUVIAL DEPOSIT		Brown to Gray, Silty Sand (SM)	
						Brown, Poorly Graded Sand with Silt and Gravel (SP-SM)	Infiltration Test @ 3 fbgs
			5.0			Brown, Poorly Graded Sand (SP)	
						Test Pit TP-6 Terminated at Depth of 8 Feet Below Ground Surface.	
			10.0				
			15.0				

NOTES: bgs = below ground surface, msl = mean sea level, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

APPENDIX B
Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	4.7	87.2	8.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	95.3		
#200	8.1		

* (no specification provided)

Material Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3539 D_{85}= 0.3074 D_{60}= 0.1791
D_{50}= 0.1494 D_{30}= 0.1067 D_{15}= 0.0838
D_{10}= 0.0773 C_u= 2.32 C_c= 0.82

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Moisture Content: 27.8%

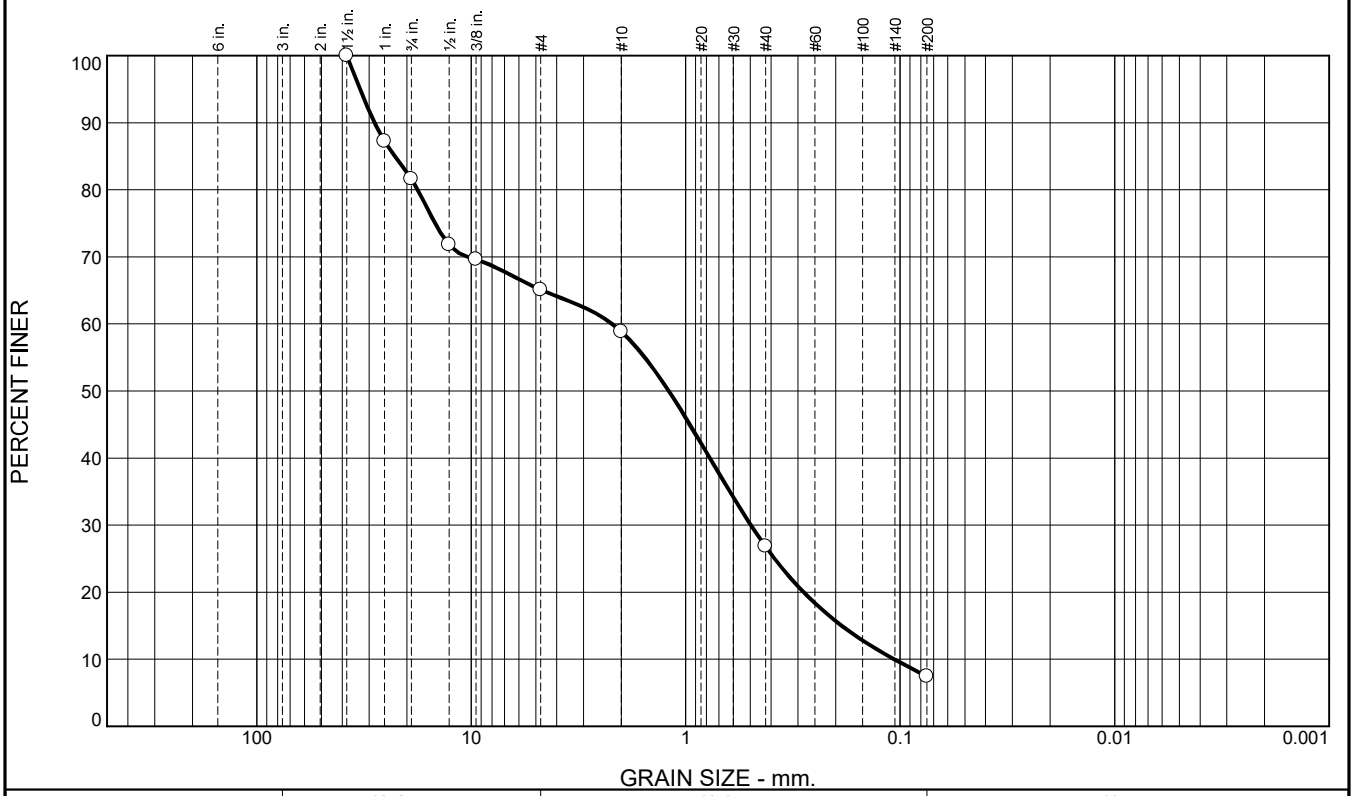
Location: B-1
Sample Number: S-3 **Depth:** 5' - 7' **Date:** 5/31/23

WHITESTONE

Client: C.R. Klewin, LLC
Project: Proposed Residential Development
27-29 Military Highway, Gales Ferry, New London County, CT
Project No: GM2320566.000 **Figure** S-1

Tested By: MM **Checked By:** RWM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	18.4	16.5	6.3	32.0	19.4	7.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	87.2		
3/4"	81.6		
1/2"	71.8		
3/8"	69.6		
#4	65.1		
#10	58.8		
#40	26.8		
#200	7.4		

* (no specification provided)

Material Description

Well-Graded Sand with Silt and Gravel

Atterberg Limits

PL= NP LL= NV PI= NV

Coefficients

D_{90}= 28.2689 D_{85}= 22.7486 D_{60}= 2.2112
D_{50}= 1.2020 D_{30}= 0.4972 D_{15}= 0.1876
D_{10}= 0.1067 C_u= 20.72 C_c= 1.05

Classification

USCS= SW-SM AASHTO= A-1-b

Remarks

Moisture Content: 1.8%

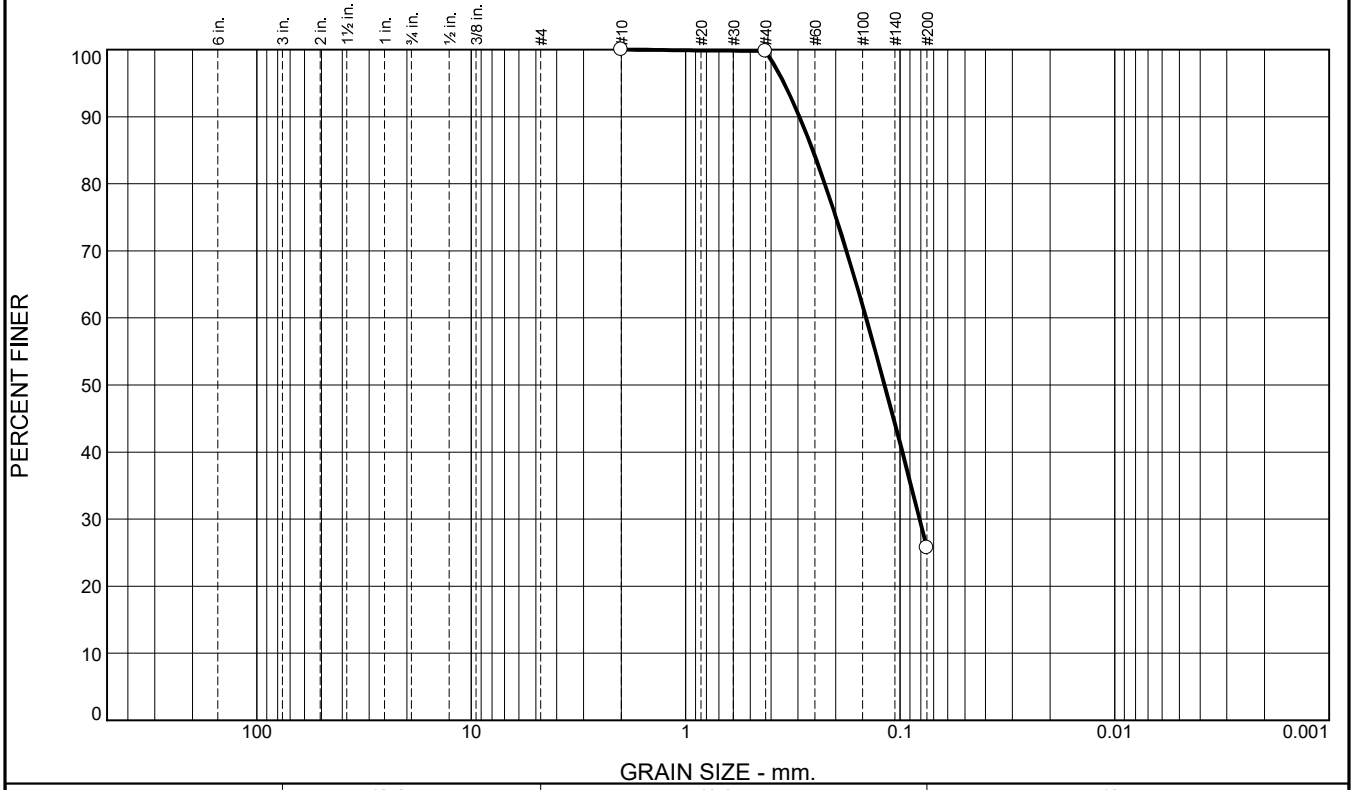
Location: B-3
Sample Number: S-2 **Depth:** 2' - 4' **Date:** 5/31/23

WHITESTONE

Client: C.R. Klewin, LLC
Project: Proposed Residential Development
27-29 Military Highway, Gales Ferry, New London County, CT
Project No: GM2320566.000 **Figure** S-2

Tested By: MM **Checked By:** RWM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	74.1	25.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	99.8		
#200	25.7		

* (no specification provided)

Material Description

Silty Sand

Atterberg Limits

PL= NP LL= NV PI= NV

Coefficients

D_{90}= 0.2952 D_{85}= 0.2559 D_{60}= 0.1444
D_{50}= 0.1184 D_{30}= 0.0812 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Moisture Content: 26.3%

Location: B-5
Sample Number: S-3 **Depth:** 5' - 7' **Date:** 5/31/23

WHITESTONE

Client: C.R. Klewin, LLC
Project: Proposed Residential Development
27-29 Military Highway, Gales Ferry, New London County, CT
Project No: GM2320566.000 **Figure** S-3

Tested By: MM **Checked By:** RWM

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	10.1	87.3	2.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#40	89.9		
#200	2.6		

* (no specification provided)

Material Description

Poorly Graded Sand

Atterberg Limits

PL= NP LL= NV PI= NV

Coefficients

D_{90}= 0.4307 D_{85}= 0.3614 D_{60}= 0.2012
D_{50}= 0.1664 D_{30}= 0.1174 D_{15}= 0.0917
D_{10}= 0.0845 C_u= 2.38 C_c= 0.81

Classification

USCS= SP AASHTO= A-3

Remarks

Moisture Content: 3.6%

Location: B-7
Sample Number: S-2 **Depth:** 2' - 4' **Date:** 5/31/23

WHITESTONE

Client: C.R. Klewin, LLC
Project: Proposed Residential Development
27-29 Military Highway, Gales Ferry, New London County, CT
Project No: GM2320566.000 **Figure** S-4

Tested By: MM **Checked By:** RWM

WHITESTONE

APPENDIX C
Supplemental Information (USCS, Terms & Symbols)

WHITESTONE
An Employee-Owned Company

16 Old Forge Road
Suite A
Rocky Hill, CT 06067
860.726.7889
whitestoneassoc.com

UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMITS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMITS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

GRADATION*

% FINER BY WEIGHT

TRACE..... 1% TO 10%
LITTLE..... 10% TO 20%
SOME..... 20% TO 35%
AND..... 35% TO 50%

COMPACTNESS*
Sand and/or Gravel

RELATIVE DENSITY

LOOSE. ..... 0% TO 40%
MEDIUM DENSE.... 40% TO 70%
DENSE..... 70% TO 90%
VERY DENSE..... 90% TO 100%

CONSISTENCY*
Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

VERY SOFT..... LESS THAN 250
SOFT..... ..... 250 TO 500
MEDIUM..... 500 TO 1000
STIFF..... 1000 TO 2000
VERY STIFF..... 2000 TO 4000
HARD..... GREATER THAN 4000

** VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.*

L:\Geotechnical Forms and References\Reports\USCSTRMSSYM CT.docx

WHITESTONE
An Employee-Owned Company

16 OLD FORGE ROAD
SUITE A
ROCKY HILL, CT 06067
860.726.7889
whitestoneassoc.com

GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Moisture content, %.
LL: Liquid limit, %.
PI: Plasticity index, %.
δd: Natural dry density, PCF.
▼: Apparent groundwater level at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

NE: Not Encountered (Groundwater was not encountered).
SS: Split-Spoon - 1 ⅜" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
OB: Diamond Bit.
CB: Carbide Bit
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

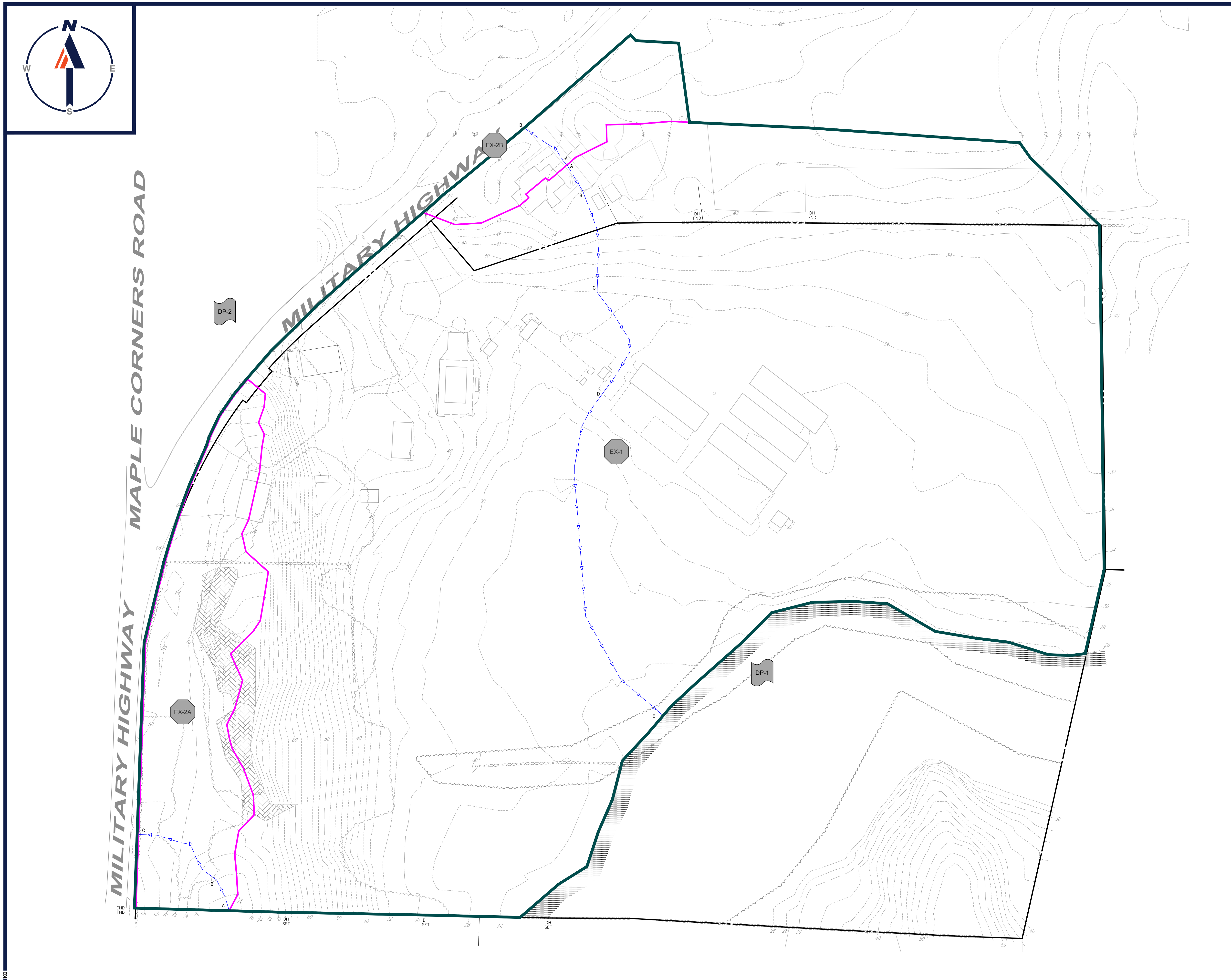
Term (Cohesive Soils)	Qu (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

APPENDIX C: EXISTING CONDITIONS HYDROLOGIC ANALYSIS

- *EXISTING CONDITIONS DRAINAGE MAP*
- *EXISTING CONDITIONS HYDROCAD COMPUTATIONS*



LEGEND

- DP# DESIGN POINT
- EX-# EXISTING SUBCATCHMENT
- OVERALL ANALYSIS BOUNDARY
- SUBCATCHMENT BOUNDARY
- TIME OF CONCENTRATION

BOHLER

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY
1	05/24/2024	REVISED DRIVEWAY	KMB / JGB

ALWAYS CALL 811
It's fast. It's free. It's the law.

PERMIT SET

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	CTA220061.00
DRAWN BY:	BTJ
CHECKED BY:	JGB
DATE:	03/08/2024
CAD I.D.:	CTA220061.00-EDAM-0A

PROJECT:

PROPOSED SITE PLAN DOCUMENTS

FOR

C.R. KLEWIN LLC

PROPOSED
RESIDENTIAL DEVELOPMENT

19, 29 & 39 MILITARY HIGHWAY,
GALES FERRY,
LEDYARD,
NEW LONDON COUNTY,
CONNECTICUT

BOHLER
65 LaSALLE ROAD, SUITE 401
WEST HARTFORD, CT 06107
Phone: (860) 333-8900
www.BohlerEngineering.com

J.G. BORD
PROFESSIONAL ENGINEER

SHEET TITLE:
EXISTING CONDITIONS DRAINAGE AREA MAP

SHEET NUMBER:
EXDAM

50 25 12.5 0 50
1"= 50'

REVISION 1 - 05/24/2024

Runoff Calculations C Worksheet

Project: **CR Klewin**

Description: **Existing Conditions**

Drainage Area	Land Use Description	C	Area (Acres)	Total Area (Acres)	Weighted C
ED-1	Forest	0.20	3.35	**15.26**	**0.34**
	Drives and Walks	0.80	1.04		
	Lawns	0.30	10.15		
	Roofs	0.85	0.41		
	Impervious	0.95	0.31		
ED-2A	Forest	0.20	0.49	**1.40**	**0.39**
	Lawns	0.30	0.64		
	Roofs	0.85	0.02		
	Impervious	0.95	0.25		
ED-2B	Lawns	0.30	0.19	**0.24**	**0.43**
	Roofs	0.85	0.02		
	Impervious	0.95	0.03		

Time of Concentration (Tc) or (Tt) Calculations

Project: **CTA220061.00 - Gales Ferry**

Description: **EDA-1**

Note: Space for as many as three segments per flow type can be used for each worksheet.

Sheet Flow *(Applicable to Tc only)*		**Segment ID**	**AB**		**BC**				
1. Surface Description *(table 3-1)*			Smooth surfaces		Bluegrass Sod				
2. Manning's roughness coeff., n *(table 3-1)*			0.011		0.35				
3. Flow length, L *(total L ≤ 150 ft)*	ft		38		12				
4. Two-yr 24-hr rainfall, P_2	in		3.46		3.46				
5. Land slope, s*	ft/ft		0.0400		0.0367				
6. Tt =0.007(nL)$^{0.8}$ / $P_2^{0.5}$s$^{0.4}$		**Compute Tt hr**	**0.0067**	+	**0.0445**	+		=	**0.0512**
**S is averaged*									

Shallow Concentrated Flow		**Segment ID**	**CD**		**DE**		**EF**		
7. Surface Description (paved or unpaved)			Unpaved		Paved		Unpaved		
8. Flow length, L	ft		188.8		61.82		526.72		
9. Watercourse slope, s*	ft/ft		0.0260		0.0186		0.0206		
10. Average velocity, V	ft/sec		2.60		2.79		2.31		
11. Tt = L / 3600V			**0.0202**	+	**0.0062**	+	**0.0634**	=	**0.0898**

Channel Flow		**Segment ID**							
12. Cross sectional flow area, a	ft^2								
13. Wetted perimeter, p	ft								
14. Hydraulic radius, r = a/wp	ft								
15. Channel Slope, s	ft/ft								
16. Manning's roughness coeff., n									
17. V=1.49r$^{2/3}$s$^{1/2}$ / n									
18. Flow length, L	ft								
19. Tt = L / 3600V				+		+		=	
20. Watershed or subarea T_c or T_t (add T_t in steps 6,11, and 19)									**0.1410**

Tc = **8.46** **minutes**

Time of Concentration (Tc) or (Tt) Calculations

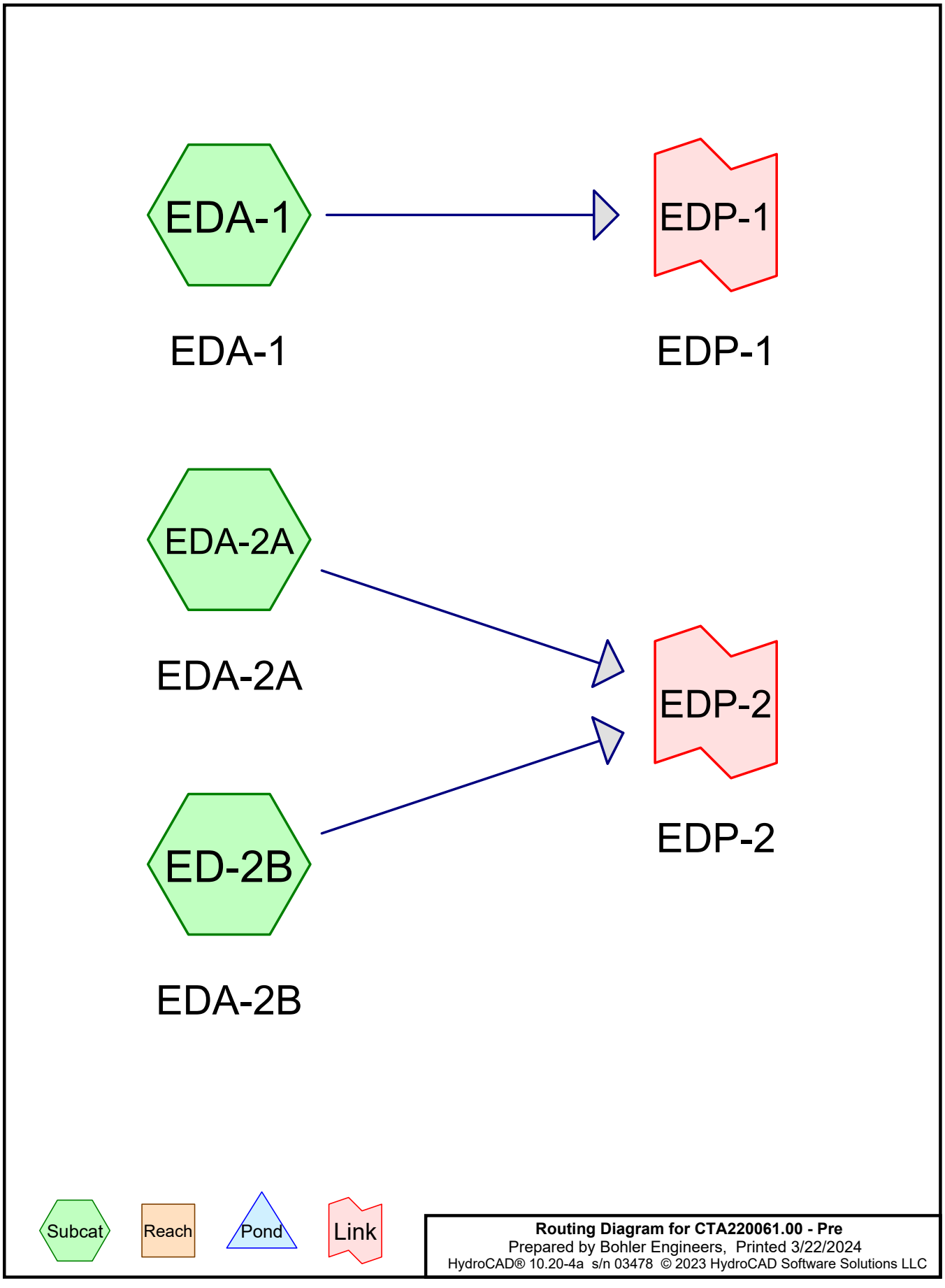
Project: **CTA220061.00 - Gales Ferry**

Description: **EDA-2**

Note: Space for as many as three segments per flow type can be used for each worksheet.

Sheet Flow *(Applicable to Tc only)*		**Segment ID**	**AB**					
1. Surface Description *(table 3-1)*			Dense grasses					
2. Manning's roughness coeff., n *(table 3-1)*			0.240					
3. Flow length, L *(total L ≤ 150 ft)*	ft		45					
4. Two-yr 24-hr rainfall, P_2	in		3.46					
5. Land slope, s*	ft/ft		0.0614					
6. Tt =0.007(nL)$^{0.8}$ / $P_2^{0.5}$s$^{0.4}$	**Compute Tt**	**hr**	**0.0771**	+		+		= **0.0771**
Shallow Concentrated Flow		**Segment ID**	**BC**					
7. Surface Description (paved or unpaved)			Unpaved					
8. Flow length, L	ft		108.58					
9. Watercourse slope, s*	ft/ft		0.0824					
10. Average velocity, V	ft/sec		4.64					
11. Tt = L / 3600V			**0.0065**	+		+		= **0.0065**
Channel Flow		**Segment ID**						
12. Cross sectional flow area, a	ft^2							
13. Wetted perimeter, p	ft							
14. Hydraulic radius, r = a/wp	ft							
15. Channel Slope, s	ft/ft							
16. Manning's roughness coeff., n								
17. V=1.49r$^{2/3}$s$^{1/2}$ / n								
18. Flow length, L	ft							
19. Tt = L / 3600V				+		+		=
20. Watershed or subarea T_c or T_t (add T_t in steps 6,11, and 19)								**0.0836**

Tc = **5.01** **minutes**



Routing Diagram for CTA220061.00 - Pre
Prepared by Bohler Engineers, Printed 3/22/2024

Area Listing (all nodes)

Area (acres)	C	Description (subcatchment-numbers)
0.240	0.43	See C Worksheet in Appendix C (ED-2B)
15.260	0.34	See C Worksheet in Appendix C (EDA-1)
1.400	0.39	See C Worksheet in Appendix C (EDA-2A)
16.900	**0.35**	**TOTAL AREA**

Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-2B: EDA-2B Runoff Area=0.240 ac 0.00% Impervious Runoff Depth=0.19"
Tc=6.0 min C=0.43 Runoff=0.46 cfs 0.004 af

Subcatchment EDA-1: EDA-1 Runoff Area=15.260 ac 0.00% Impervious Runoff Depth=0.11"
Tc=8.5 min C=0.34 Runoff=16.47 cfs 0.136 af

Subcatchment EDA-2A: EDA-2A Runoff Area=1.400 ac 0.00% Impervious Runoff Depth=0.17"
Tc=6.0 min C=0.39 Runoff=2.46 cfs 0.020 af

Link EDP-1: EDP-1 Inflow=16.47 cfs 0.136 af
Primary=16.47 cfs 0.136 af

Link EDP-2: EDP-2 Inflow=2.92 cfs 0.024 af
Primary=2.92 cfs 0.024 af

Total Runoff Area = 16.900 ac Runoff Volume = 0.160 af Average Runoff Depth = 0.11"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment ED-2B: EDA-2B

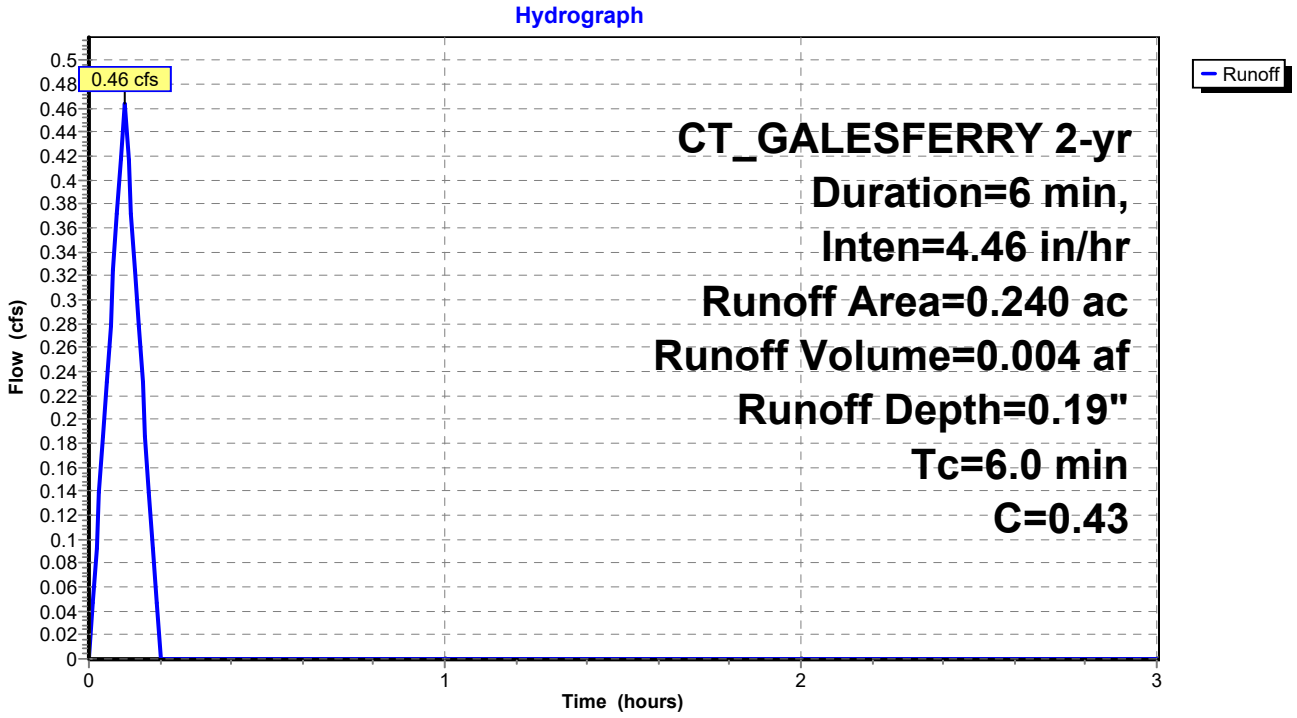
Runoff = 0.46 cfs @ 0.10 hrs, Volume= 0.004 af, Depth= 0.19"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 2-yr Duration=6 min, Inten=4.46 in/hr

Area (ac)	C	Description
0.240	0.43	See C Worksheet in Appendix C
0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment ED-2B: EDA-2B



Summary for Subcatchment EDA-1: EDA-1

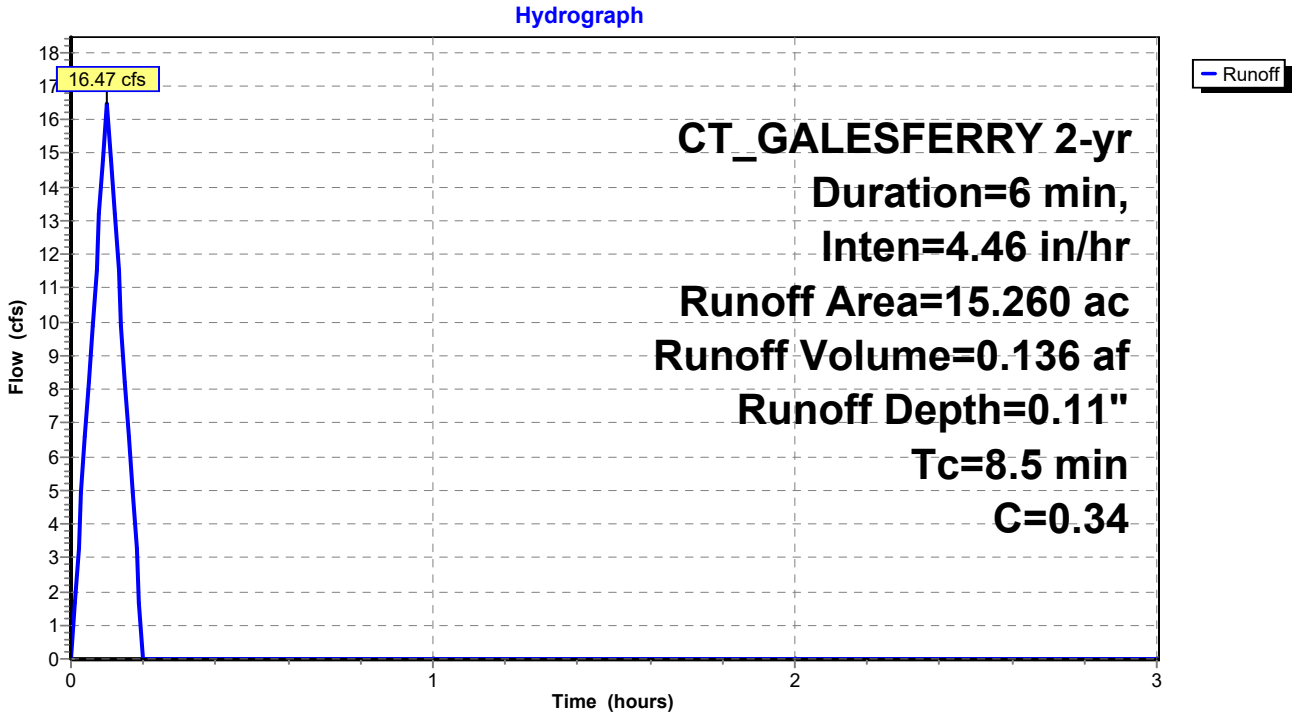
Runoff = 16.47 cfs @ 0.10 hrs, Volume= 0.136 af, Depth= 0.11"
Routed to Link EDP-1 : EDP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 2-yr Duration=6 min, Inten=4.46 in/hr

Area (ac)	C	Description
15.260	0.34	See C Worksheet in Appendix C
15.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5					**Direct Entry, Direct**

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2A: EDA-2A

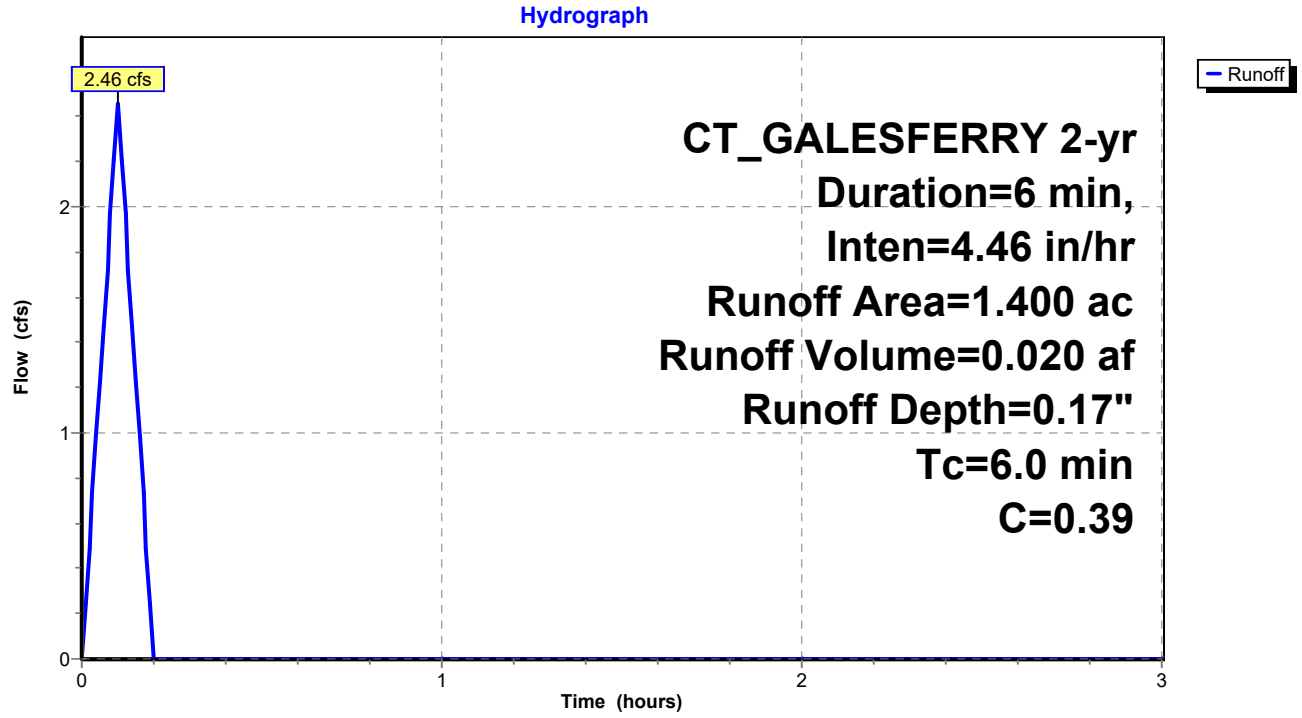
Runoff = 2.46 cfs @ 0.10 hrs, Volume= 0.020 af, Depth= 0.17"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 2-yr Duration=6 min, Inten=4.46 in/hr

Area (ac)	C	Description
1.400	0.39	See C Worksheet in Appendix C
1.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment EDA-2A: EDA-2A

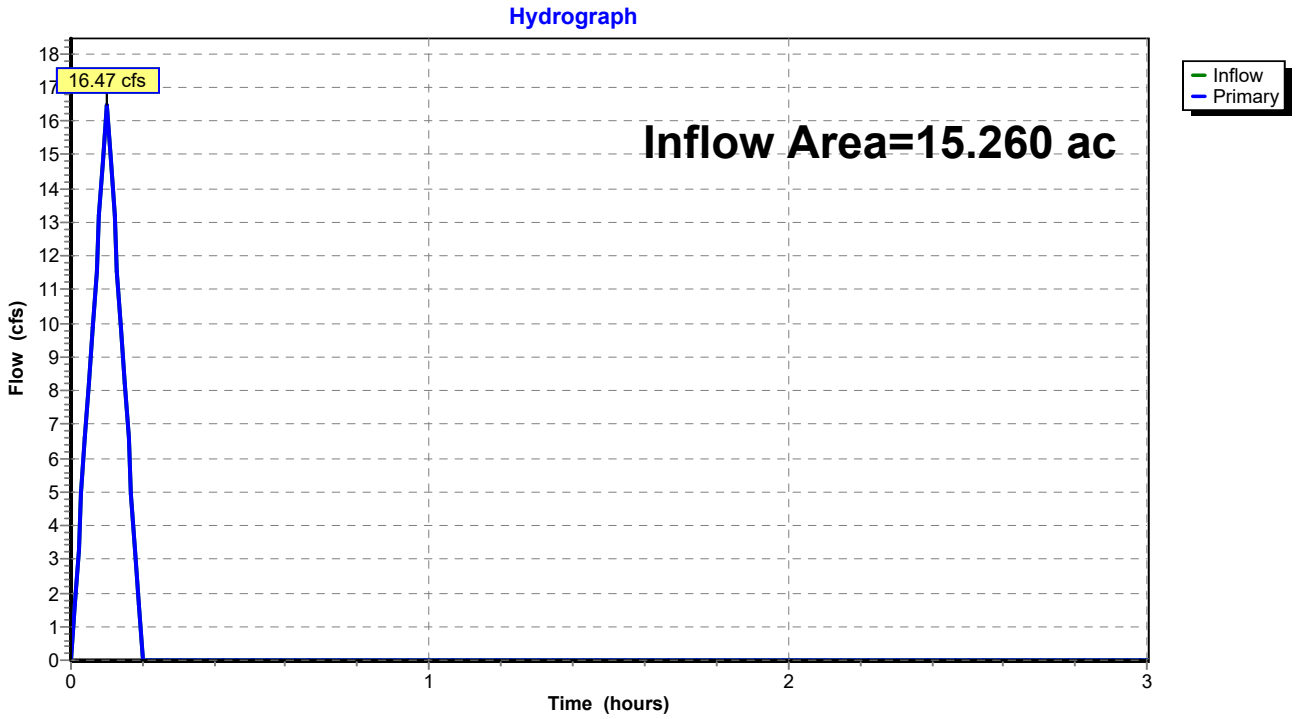


Summary for Link EDP-1: EDP-1

Inflow Area = 15.260 ac, 0.00% Impervious, Inflow Depth = 0.11" for 2-yr event
Inflow = 16.47 cfs @ 0.10 hrs, Volume= 0.136 af
Primary = 16.47 cfs @ 0.10 hrs, Volume= 0.136 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-1: EDP-1

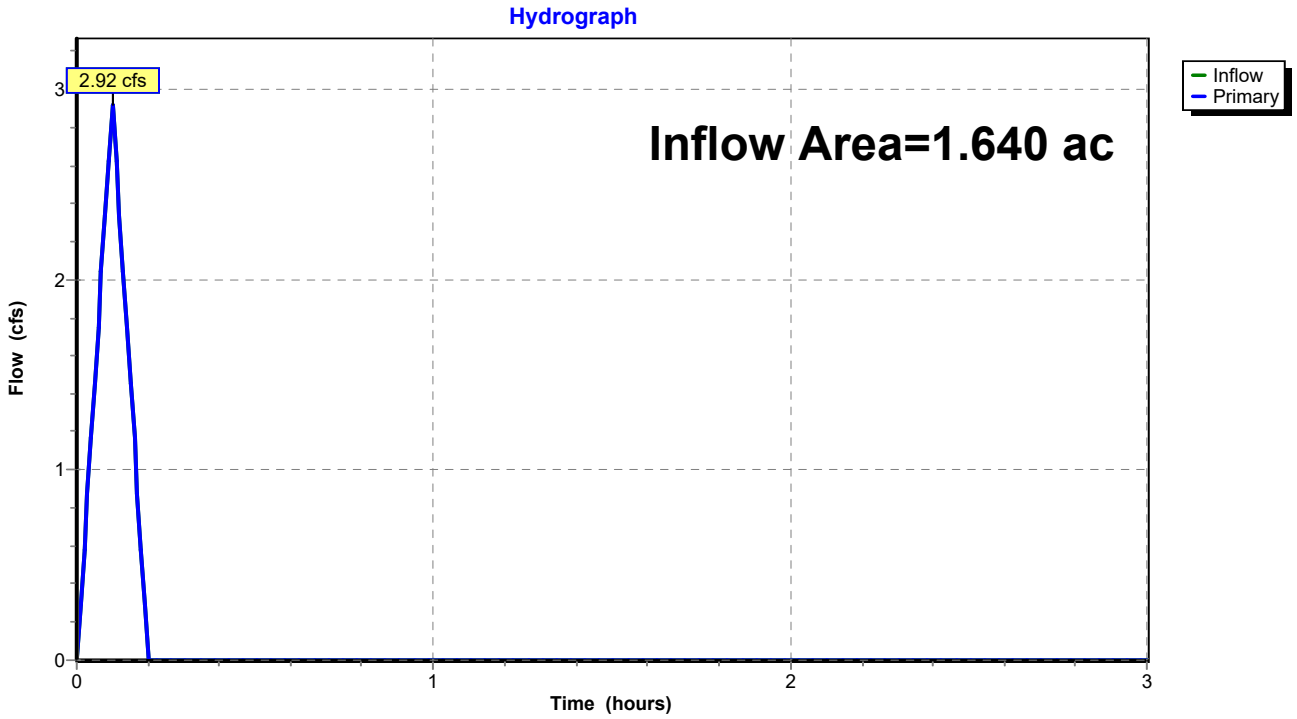


Summary for Link EDP-2: EDP-2

Inflow Area = 1.640 ac, 0.00% Impervious, Inflow Depth = 0.18" for 2-yr event
Inflow = 2.92 cfs @ 0.10 hrs, Volume= 0.024 af
Primary = 2.92 cfs @ 0.10 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-2: EDP-2



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-2B: EDA-2B Runoff Area=0.240 ac 0.00% Impervious Runoff Depth=0.29"
Tc=6.0 min C=0.43 Runoff=0.69 cfs 0.006 af

Subcatchment EDA-1: EDA-1 Runoff Area=15.260 ac 0.00% Impervious Runoff Depth=0.16"
Tc=8.5 min C=0.34 Runoff=24.48 cfs 0.202 af

Subcatchment EDA-2A: EDA-2A Runoff Area=1.400 ac 0.00% Impervious Runoff Depth=0.26"
Tc=6.0 min C=0.39 Runoff=3.65 cfs 0.030 af

Link EDP-1: EDP-1 Inflow=24.48 cfs 0.202 af
Primary=24.48 cfs 0.202 af

Link EDP-2: EDP-2 Inflow=4.34 cfs 0.036 af
Primary=4.34 cfs 0.036 af

Total Runoff Area = 16.900 ac Runoff Volume = 0.238 af Average Runoff Depth = 0.17"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment ED-2B: EDA-2B

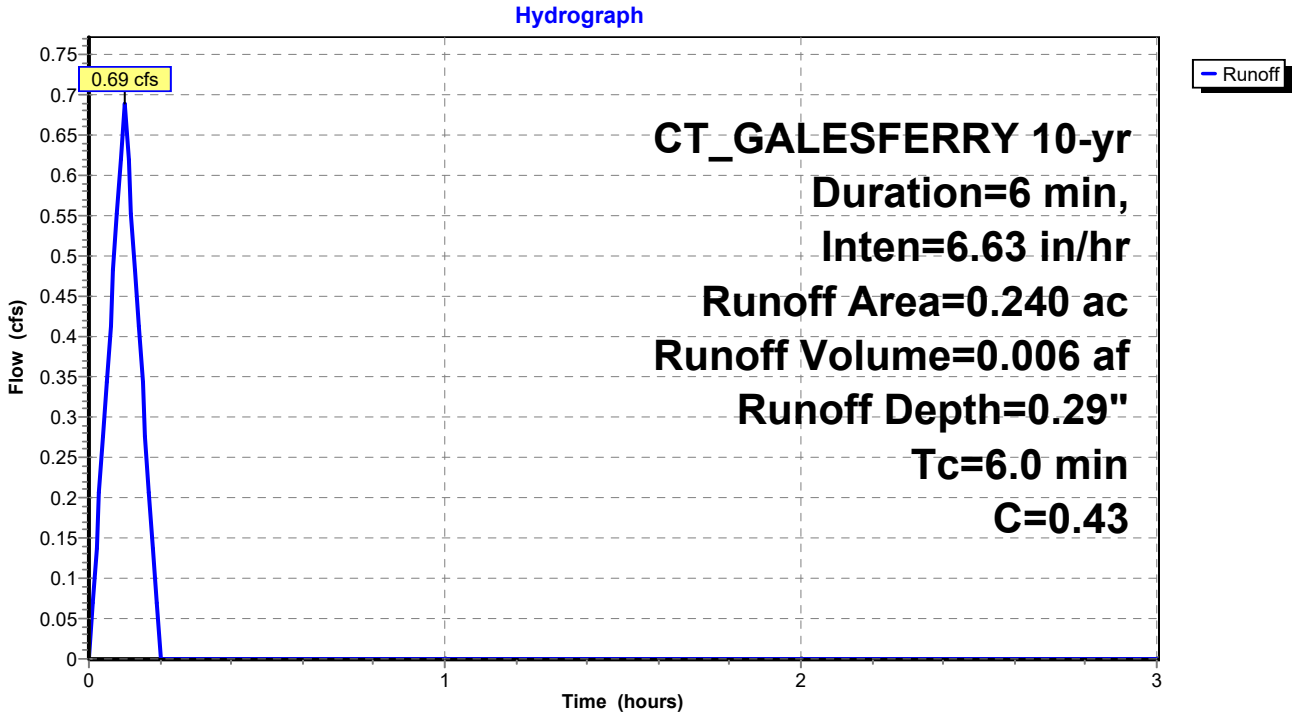
Runoff = 0.69 cfs @ 0.10 hrs, Volume= 0.006 af, Depth= 0.29"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 10-yr Duration=6 min, Inten=6.63 in/hr

Area (ac)	C	Description
0.240	0.43	See C Worksheet in Appendix C
0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment ED-2B: EDA-2B



Summary for Subcatchment EDA-1: EDA-1

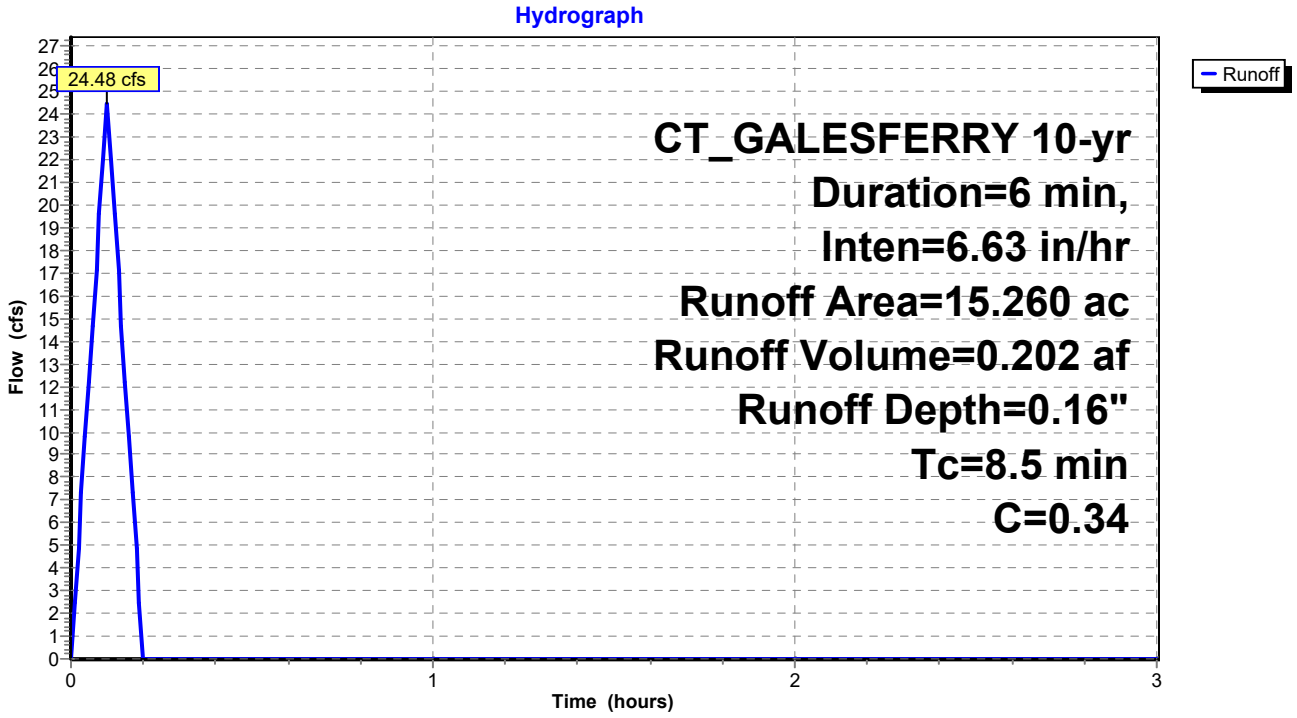
Runoff = 24.48 cfs @ 0.10 hrs, Volume= 0.202 af, Depth= 0.16"
Routed to Link EDP-1 : EDP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 10-yr Duration=6 min, Inten=6.63 in/hr

Area (ac)	C	Description
15.260	0.34	See C Worksheet in Appendix C
15.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5					**Direct Entry, Direct**

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2A: EDA-2A

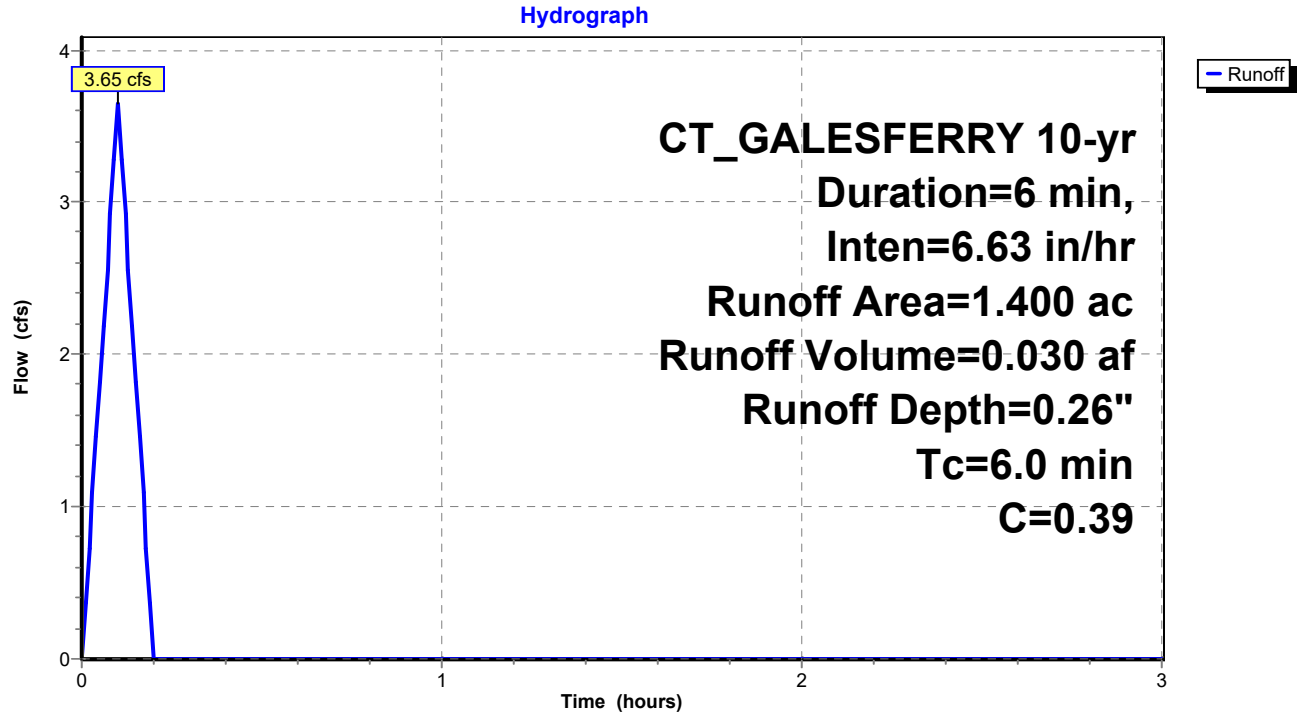
Runoff = 3.65 cfs @ 0.10 hrs, Volume= 0.030 af, Depth= 0.26"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 10-yr Duration=6 min, Inten=6.63 in/hr

Area (ac)	C	Description
1.400	0.39	See C Worksheet in Appendix C
1.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment EDA-2A: EDA-2A

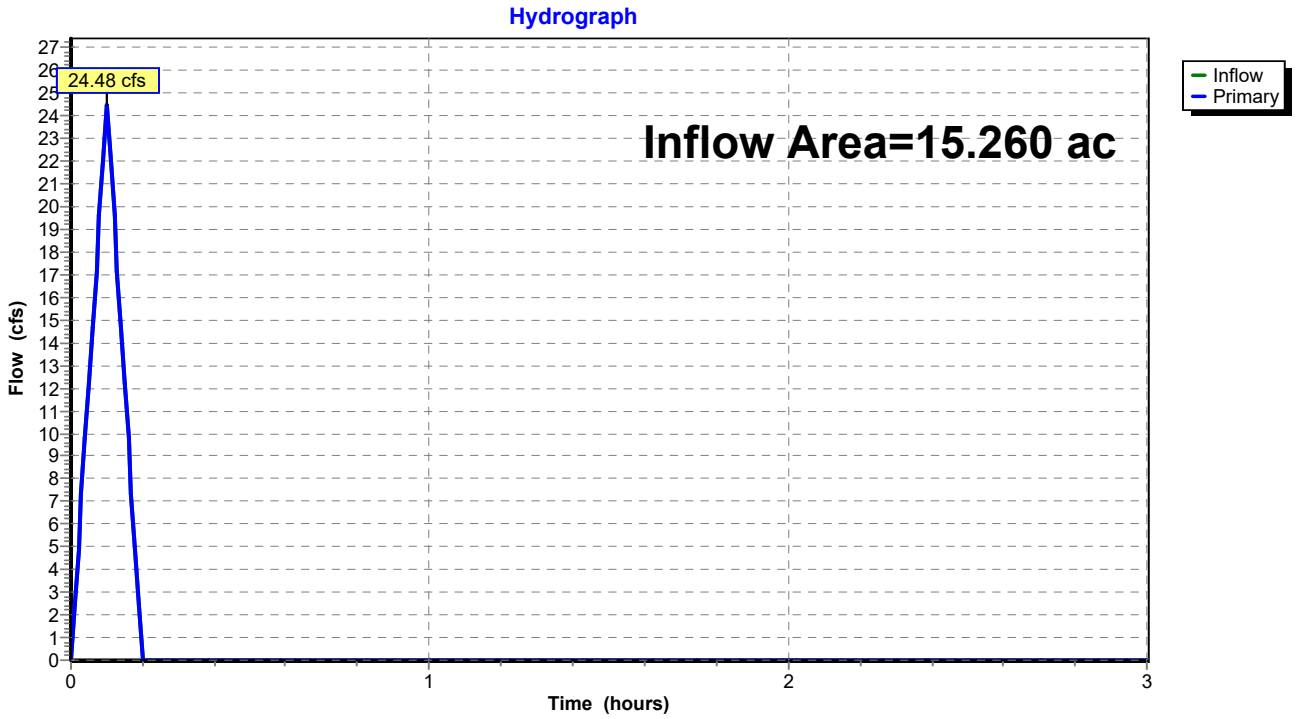


Summary for Link EDP-1: EDP-1

Inflow Area = 15.260 ac, 0.00% Impervious, Inflow Depth = 0.16" for 10-yr event
Inflow = 24.48 cfs @ 0.10 hrs, Volume= 0.202 af
Primary = 24.48 cfs @ 0.10 hrs, Volume= 0.202 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-1: EDP-1

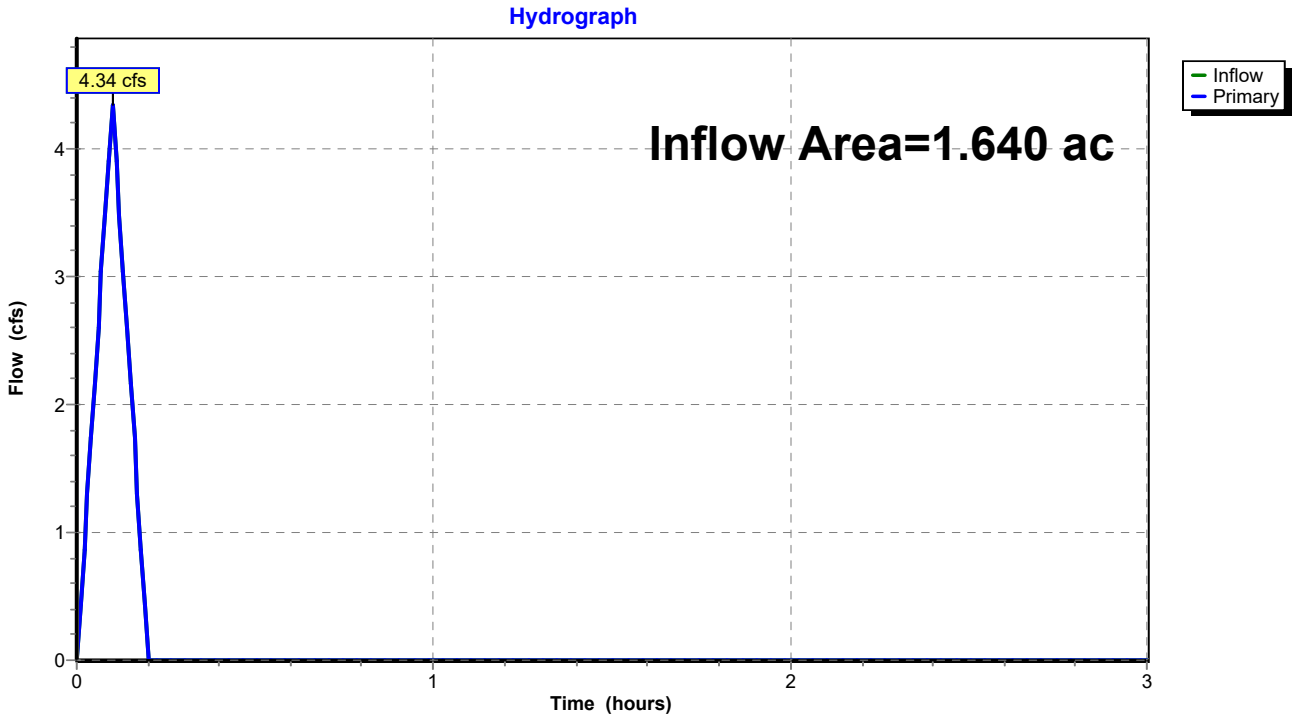


Summary for Link EDP-2: EDP-2

Inflow Area = 1.640 ac, 0.00% Impervious, Inflow Depth = 0.26" for 10-yr event
Inflow = 4.34 cfs @ 0.10 hrs, Volume= 0.036 af
Primary = 4.34 cfs @ 0.10 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-2: EDP-2



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-2B: EDA-2B Runoff Area=0.240 ac 0.00% Impervious Runoff Depth=0.34"
Tc=6.0 min C=0.43 Runoff=0.83 cfs 0.007 af

Subcatchment EDA-1: EDA-1 Runoff Area=15.260 ac 0.00% Impervious Runoff Depth=0.19"
Tc=8.5 min C=0.34 Runoff=29.45 cfs 0.243 af

Subcatchment EDA-2A: EDA-2A Runoff Area=1.400 ac 0.00% Impervious Runoff Depth=0.31"
Tc=6.0 min C=0.39 Runoff=4.39 cfs 0.036 af

Link EDP-1: EDP-1 Inflow=29.45 cfs 0.243 af
Primary=29.45 cfs 0.243 af

Link EDP-2: EDP-2 Inflow=5.22 cfs 0.043 af
Primary=5.22 cfs 0.043 af

Total Runoff Area = 16.900 ac Runoff Volume = 0.287 af Average Runoff Depth = 0.20"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment ED-2B: EDA-2B

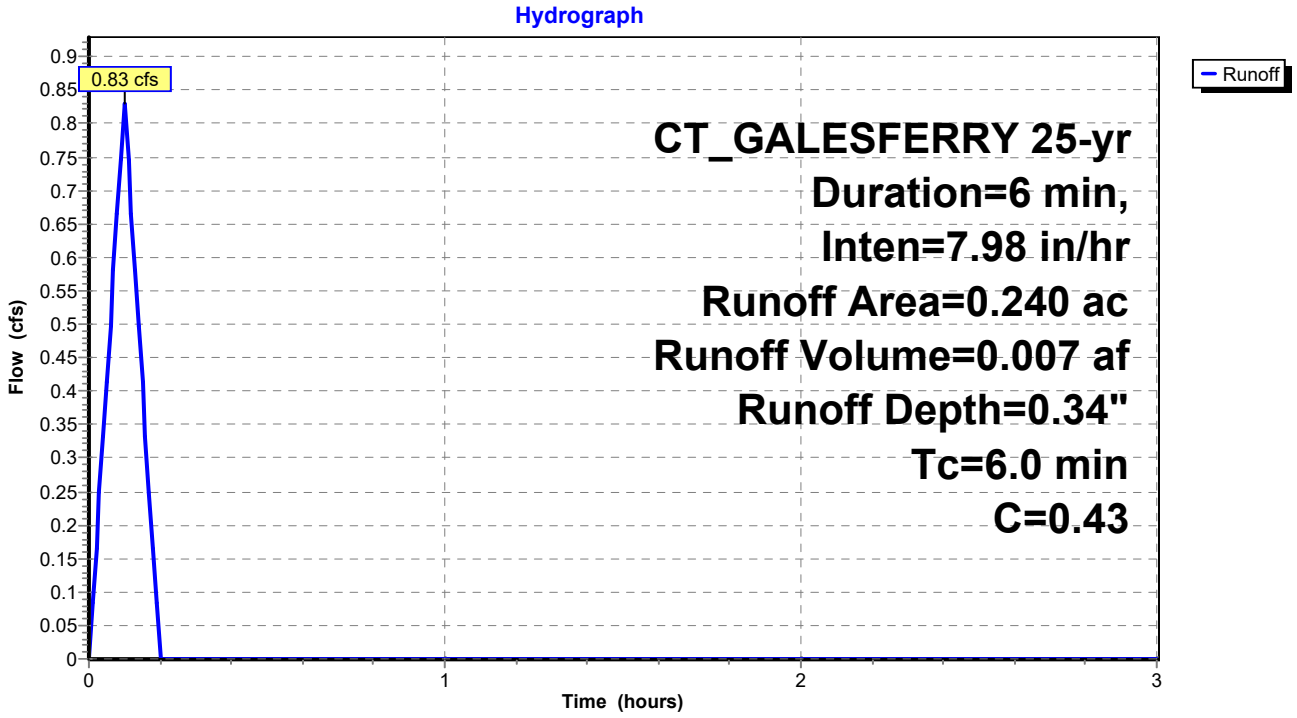
Runoff = 0.83 cfs @ 0.10 hrs, Volume= 0.007 af, Depth= 0.34"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 25-yr Duration=6 min, Inten=7.98 in/hr

Area (ac)	C	Description
0.240	0.43	See C Worksheet in Appendix C
0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment ED-2B: EDA-2B



Summary for Subcatchment EDA-1: EDA-1

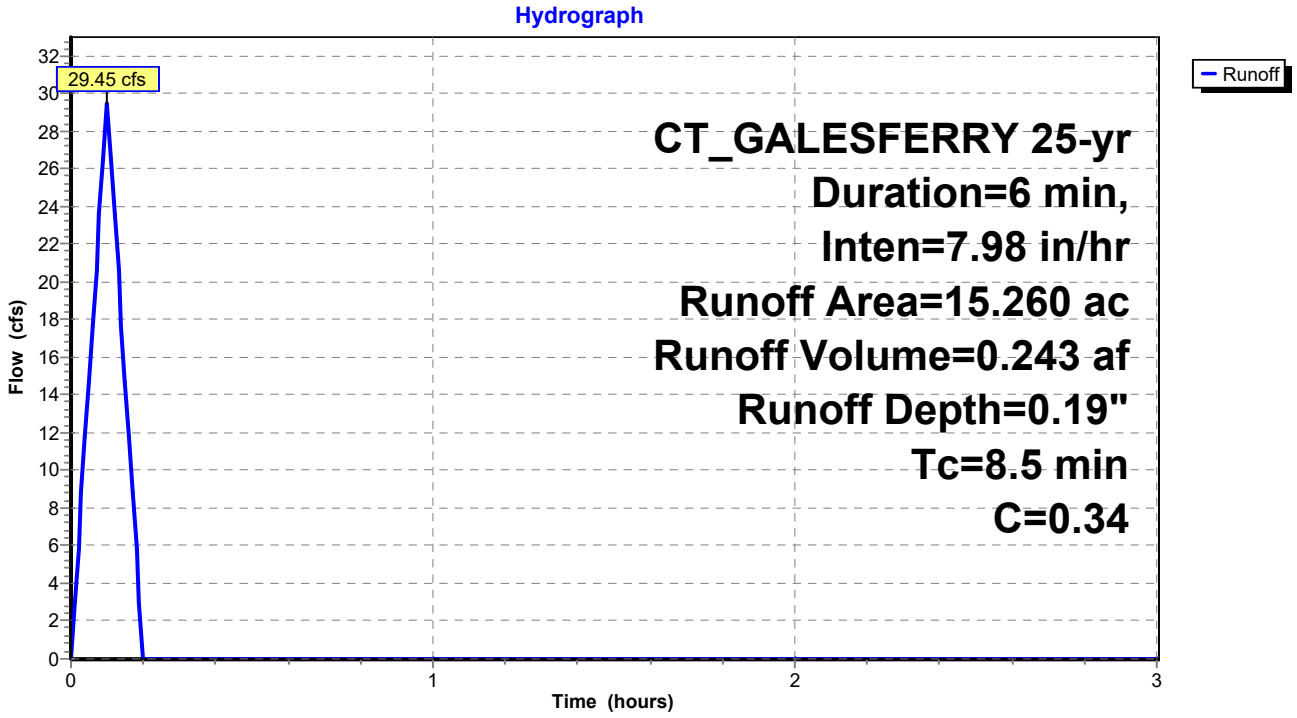
Runoff = 29.45 cfs @ 0.10 hrs, Volume= 0.243 af, Depth= 0.19"
Routed to Link EDP-1 : EDP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 25-yr Duration=6 min, Inten=7.98 in/hr

Area (ac)	C	Description
15.260	0.34	See C Worksheet in Appendix C
15.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5					**Direct Entry, Direct**

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2A: EDA-2A

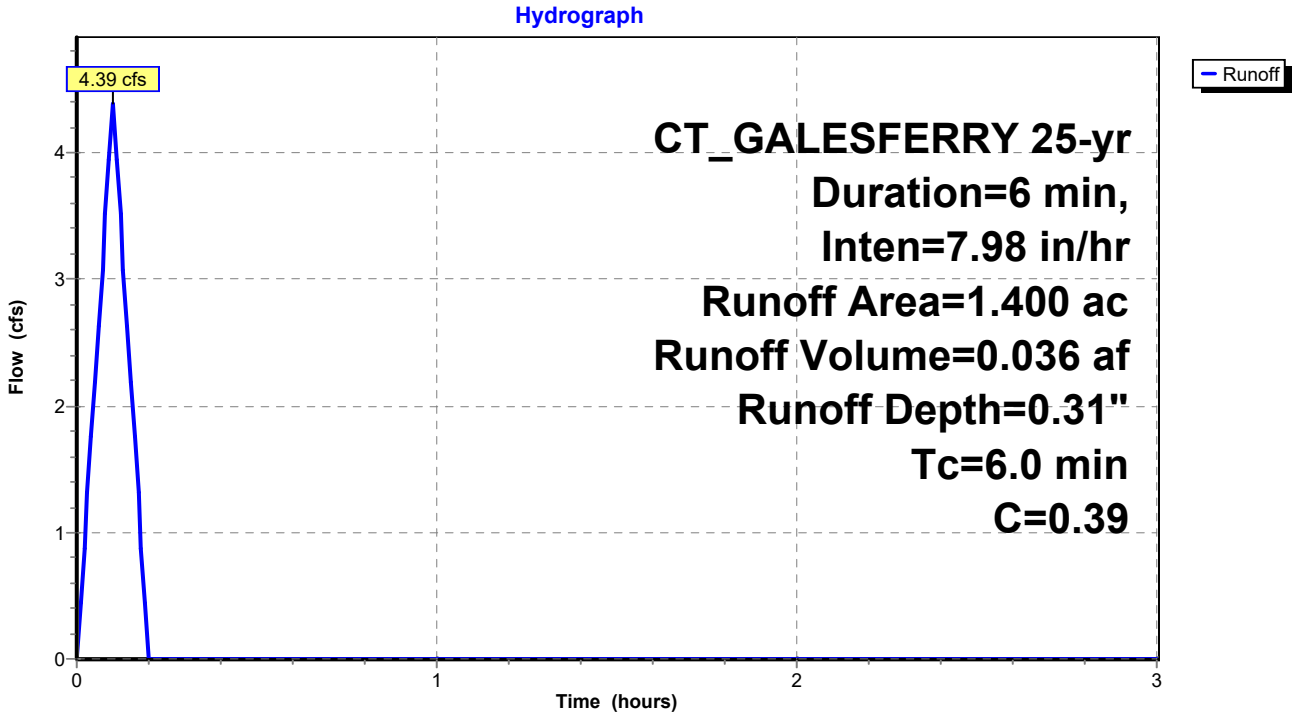
Runoff = 4.39 cfs @ 0.10 hrs, Volume= 0.036 af, Depth= 0.31"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 25-yr Duration=6 min, Inten=7.98 in/hr

Area (ac)	C	Description
1.400	0.39	See C Worksheet in Appendix C
1.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment EDA-2A: EDA-2A

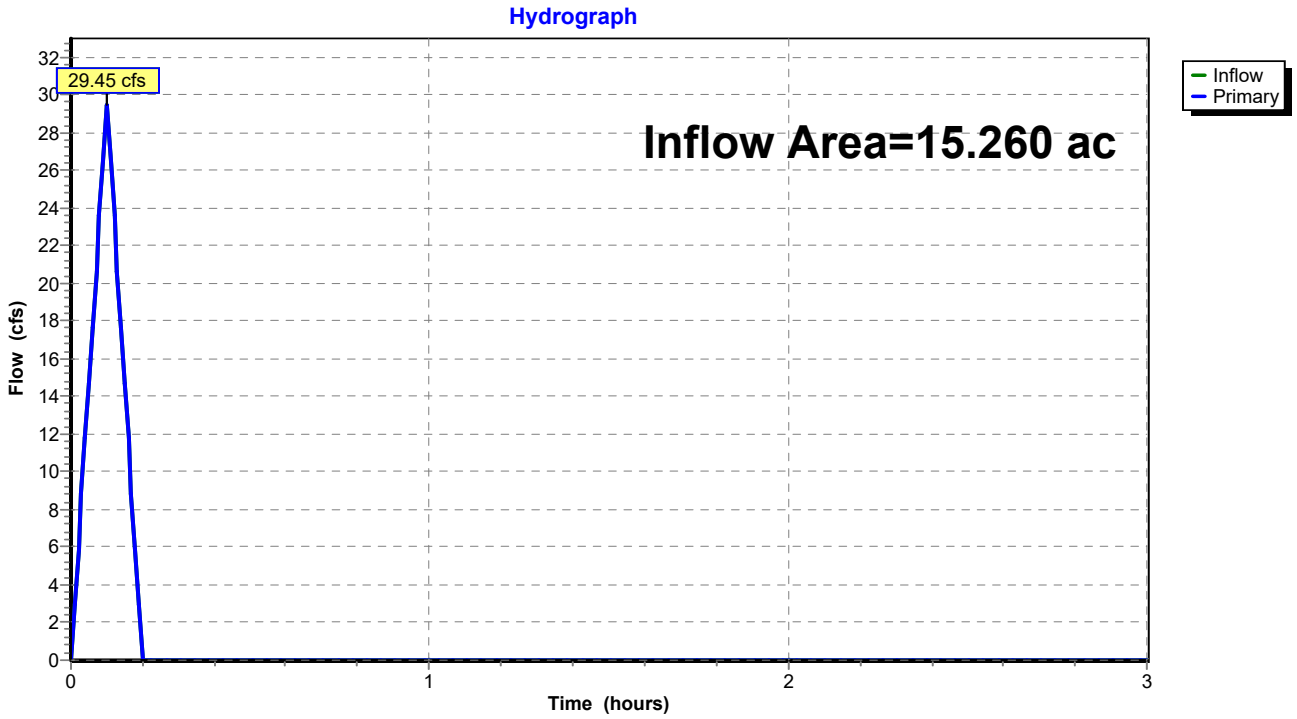


Summary for Link EDP-1: EDP-1

Inflow Area = 15.260 ac, 0.00% Impervious, Inflow Depth = 0.19" for 25-yr event
Inflow = 29.45 cfs @ 0.10 hrs, Volume= 0.243 af
Primary = 29.45 cfs @ 0.10 hrs, Volume= 0.243 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-1: EDP-1

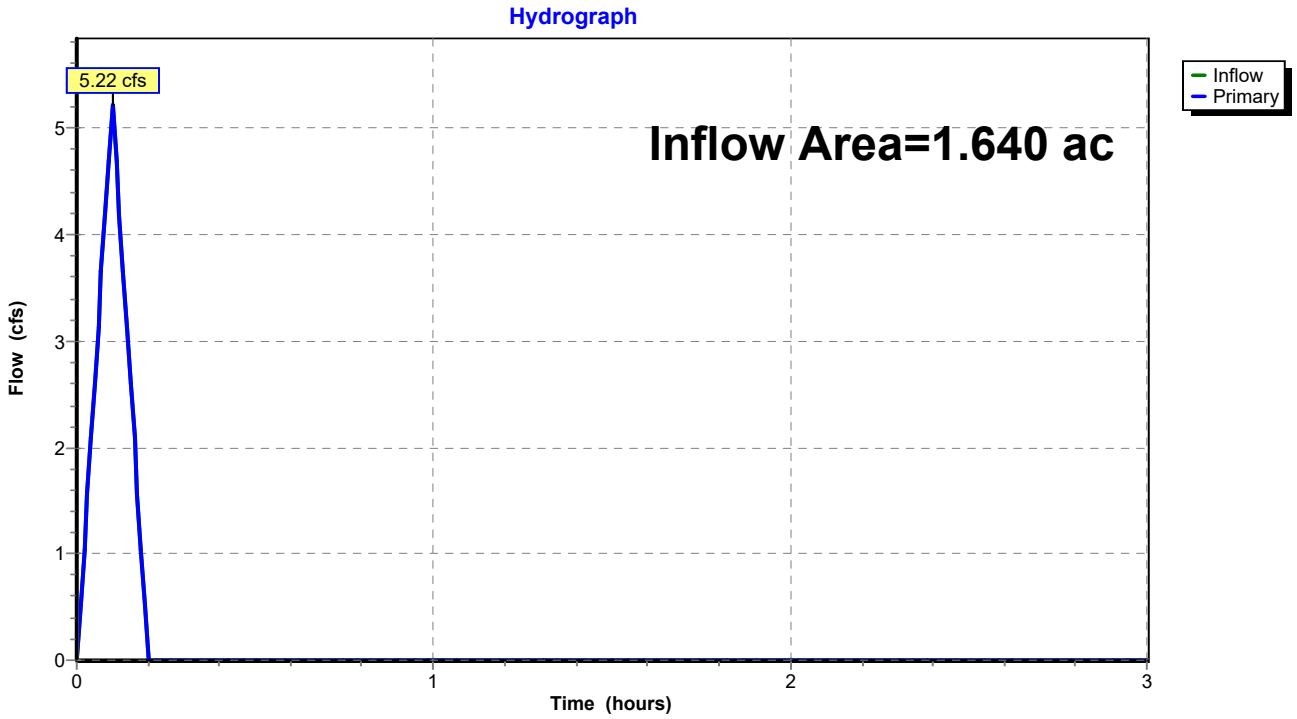


Summary for Link EDP-2: EDP-2

Inflow Area = 1.640 ac, 0.00% Impervious, Inflow Depth = 0.32" for 25-yr event
Inflow = 5.22 cfs @ 0.10 hrs, Volume= 0.043 af
Primary = 5.22 cfs @ 0.10 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-2: EDP-2



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-2B: EDA-2B Runoff Area=0.240 ac 0.00% Impervious Runoff Depth=0.43"
Tc=6.0 min C=0.43 Runoff=1.05 cfs 0.009 af

Subcatchment EDA-1: EDA-1 Runoff Area=15.260 ac 0.00% Impervious Runoff Depth=0.24"
Tc=8.5 min C=0.34 Runoff=37.15 cfs 0.307 af

Subcatchment EDA-2A: EDA-2A Runoff Area=1.400 ac 0.00% Impervious Runoff Depth=0.39"
Tc=6.0 min C=0.39 Runoff=5.54 cfs 0.046 af

Link EDP-1: EDP-1 Inflow=37.15 cfs 0.307 af
Primary=37.15 cfs 0.307 af

Link EDP-2: EDP-2 Inflow=6.59 cfs 0.054 af
Primary=6.59 cfs 0.054 af

Total Runoff Area = 16.900 ac Runoff Volume = 0.361 af Average Runoff Depth = 0.26"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment ED-2B: EDA-2B

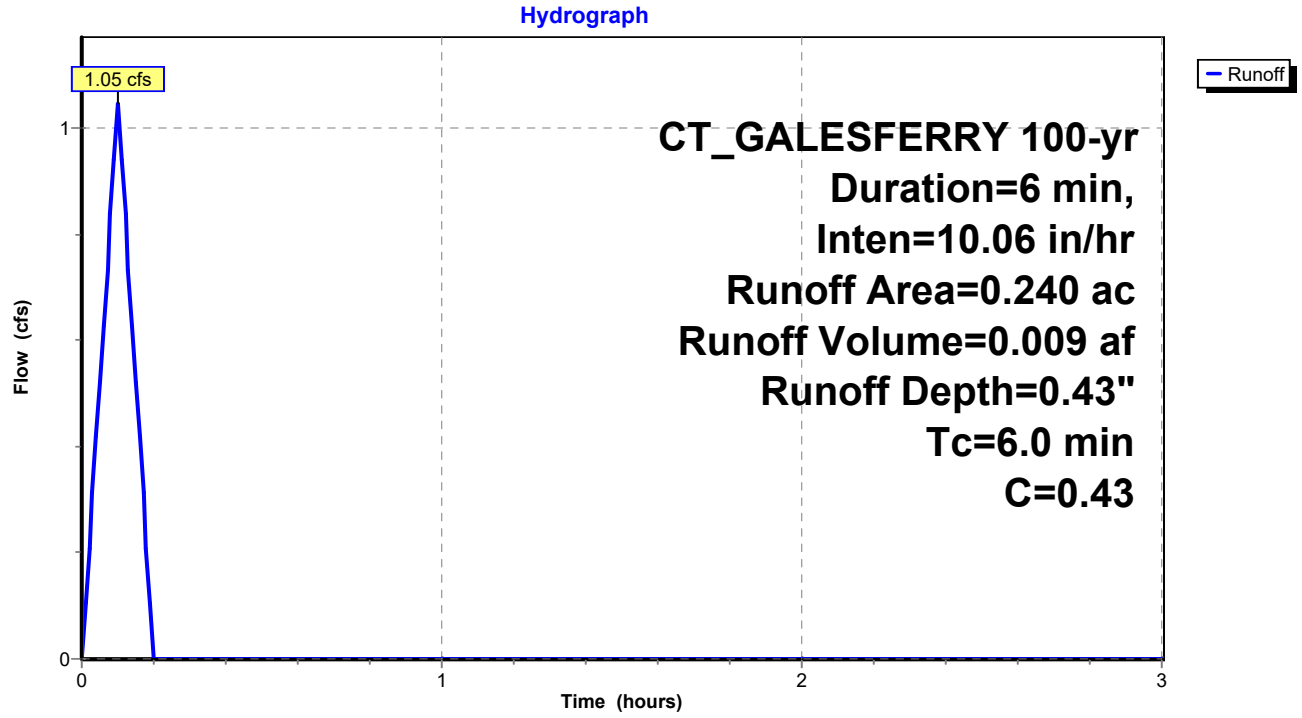
Runoff = 1.05 cfs @ 0.10 hrs, Volume= 0.009 af, Depth= 0.43"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 100-yr Duration=6 min, Inten=10.06 in/hr

Area (ac)	C	Description
0.240	0.43	See C Worksheet in Appendix C
0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment ED-2B: EDA-2B



Summary for Subcatchment EDA-1: EDA-1

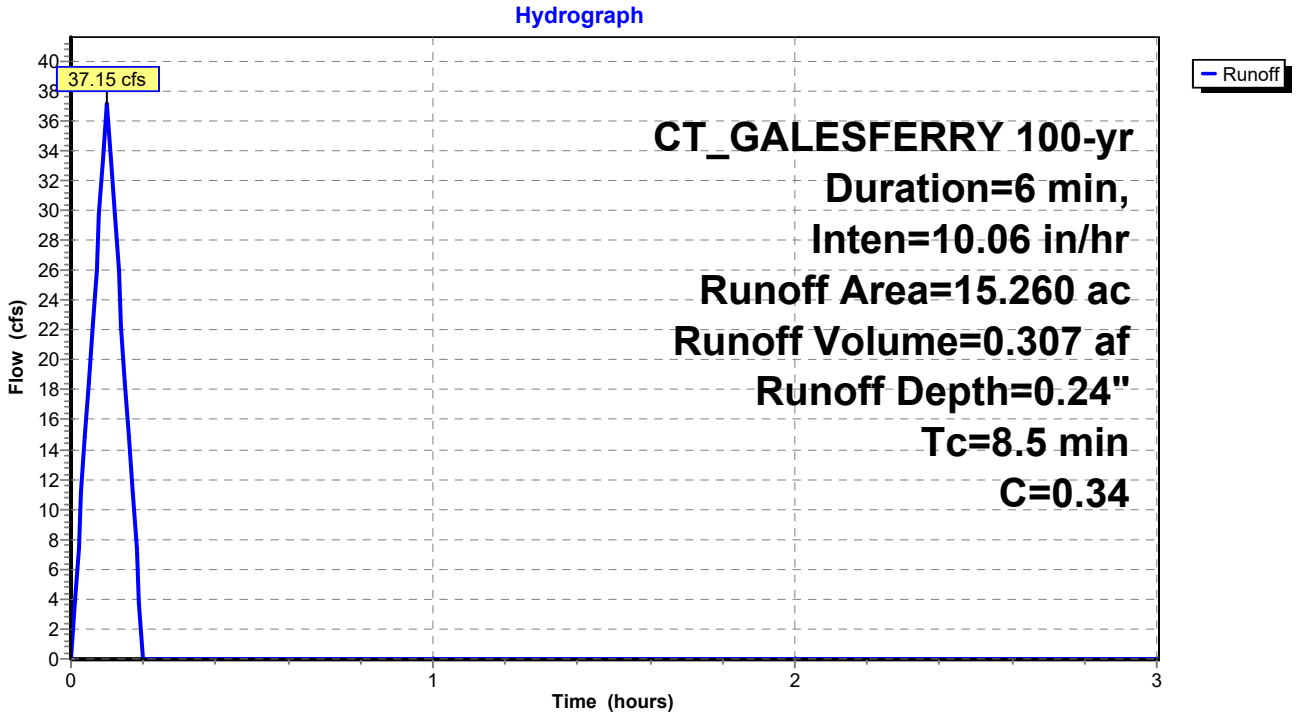
Runoff = 37.15 cfs @ 0.10 hrs, Volume= 0.307 af, Depth= 0.24"
Routed to Link EDP-1 : EDP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 100-yr Duration=6 min, Inten=10.06 in/hr

Area (ac)	C	Description
15.260	0.34	See C Worksheet in Appendix C
15.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5					**Direct Entry, Direct**

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2A: EDA-2A

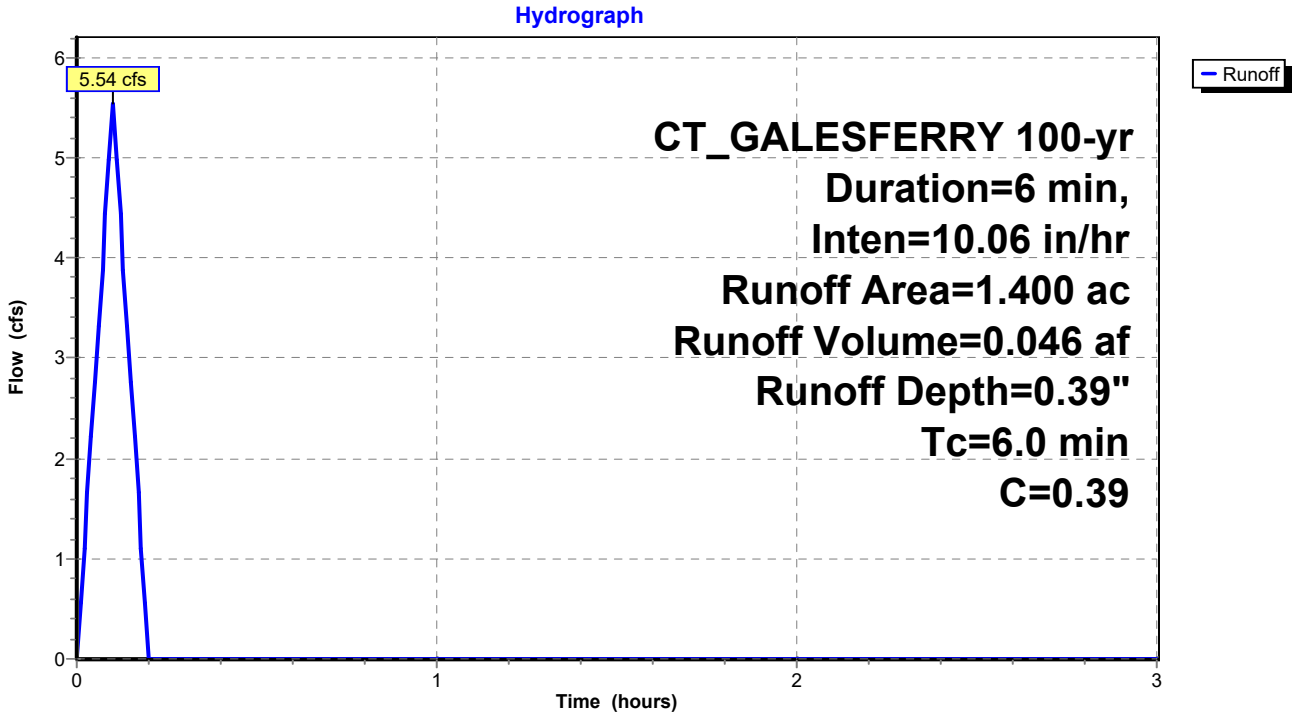
Runoff = 5.54 cfs @ 0.10 hrs, Volume= 0.046 af, Depth= 0.39"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 100-yr Duration=6 min, Inten=10.06 in/hr

Area (ac)	C	Description
1.400	0.39	See C Worksheet in Appendix C
1.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment EDA-2A: EDA-2A

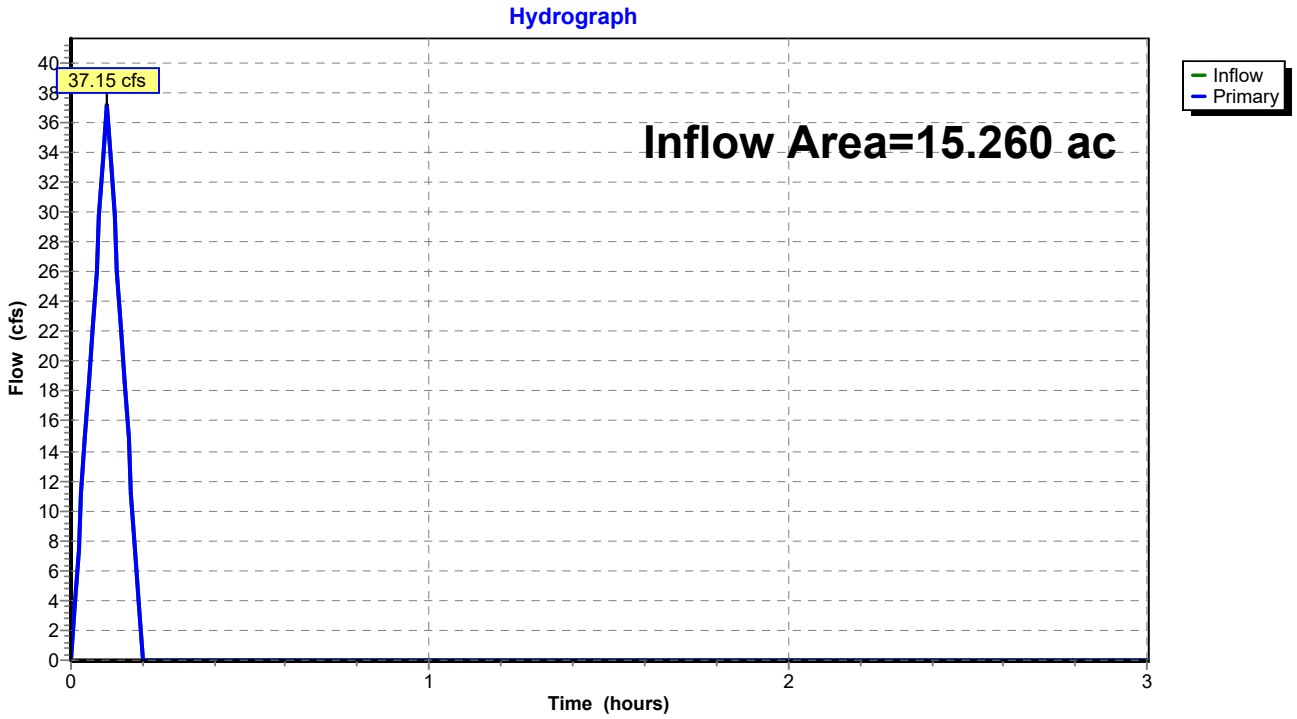


Summary for Link EDP-1: EDP-1

Inflow Area = 15.260 ac, 0.00% Impervious, Inflow Depth = 0.24" for 100-yr event
Inflow = 37.15 cfs @ 0.10 hrs, Volume= 0.307 af
Primary = 37.15 cfs @ 0.10 hrs, Volume= 0.307 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-1: EDP-1

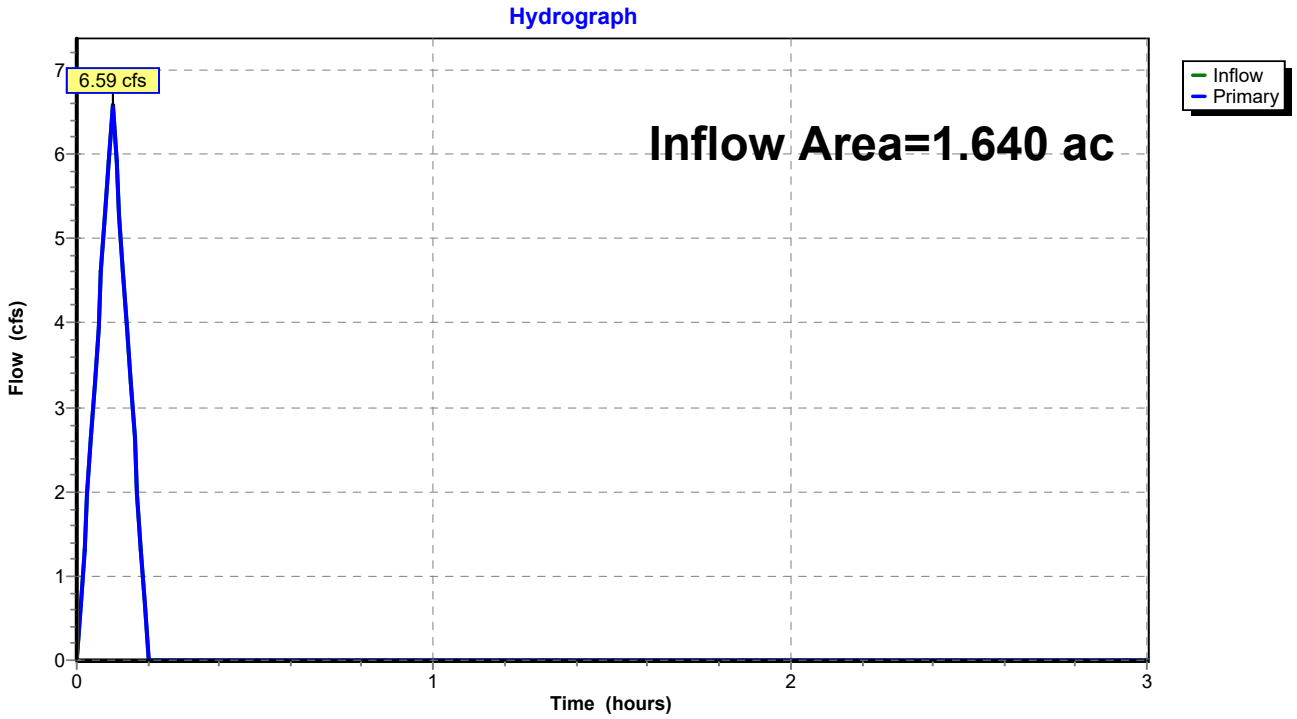


Summary for Link EDP-2: EDP-2

Inflow Area = 1.640 ac, 0.00% Impervious, Inflow Depth = 0.40" for 100-yr event
Inflow = 6.59 cfs @ 0.10 hrs, Volume= 0.054 af
Primary = 6.59 cfs @ 0.10 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-2: EDP-2



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-2B: EDA-2B Runoff Area=0.240 ac 0.00% Impervious Runoff Depth=0.49"
Tc=6.0 min C=0.43 Runoff=1.17 cfs 0.010 af

Subcatchment EDA-1: EDA-1 Runoff Area=15.260 ac 0.00% Impervious Runoff Depth=0.27"
Tc=8.5 min C=0.34 Runoff=41.69 cfs 0.345 af

Subcatchment EDA-2A: EDA-2A Runoff Area=1.400 ac 0.00% Impervious Runoff Depth=0.44"
Tc=6.0 min C=0.39 Runoff=6.22 cfs 0.051 af

Link EDP-1: EDP-1 Inflow=41.69 cfs 0.345 af
Primary=41.69 cfs 0.345 af

Link EDP-2: EDP-2 Inflow=7.39 cfs 0.061 af
Primary=7.39 cfs 0.061 af

Total Runoff Area = 16.900 ac Runoff Volume = 0.406 af Average Runoff Depth = 0.29"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment ED-2B: EDA-2B

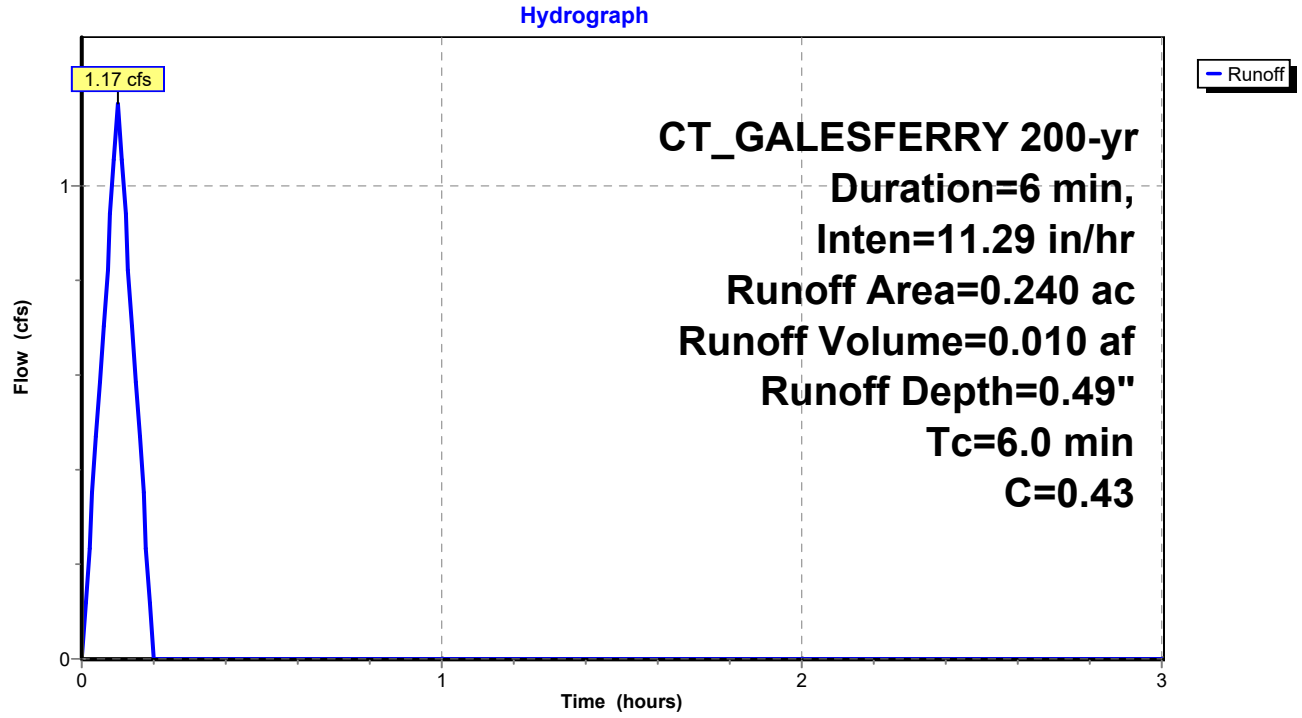
Runoff = 1.17 cfs @ 0.10 hrs, Volume= 0.010 af, Depth= 0.49"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 200-yr Duration=6 min, Inten=11.29 in/hr

Area (ac)	C	Description
0.240	0.43	See C Worksheet in Appendix C
0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment ED-2B: EDA-2B



Summary for Subcatchment EDA-1: EDA-1

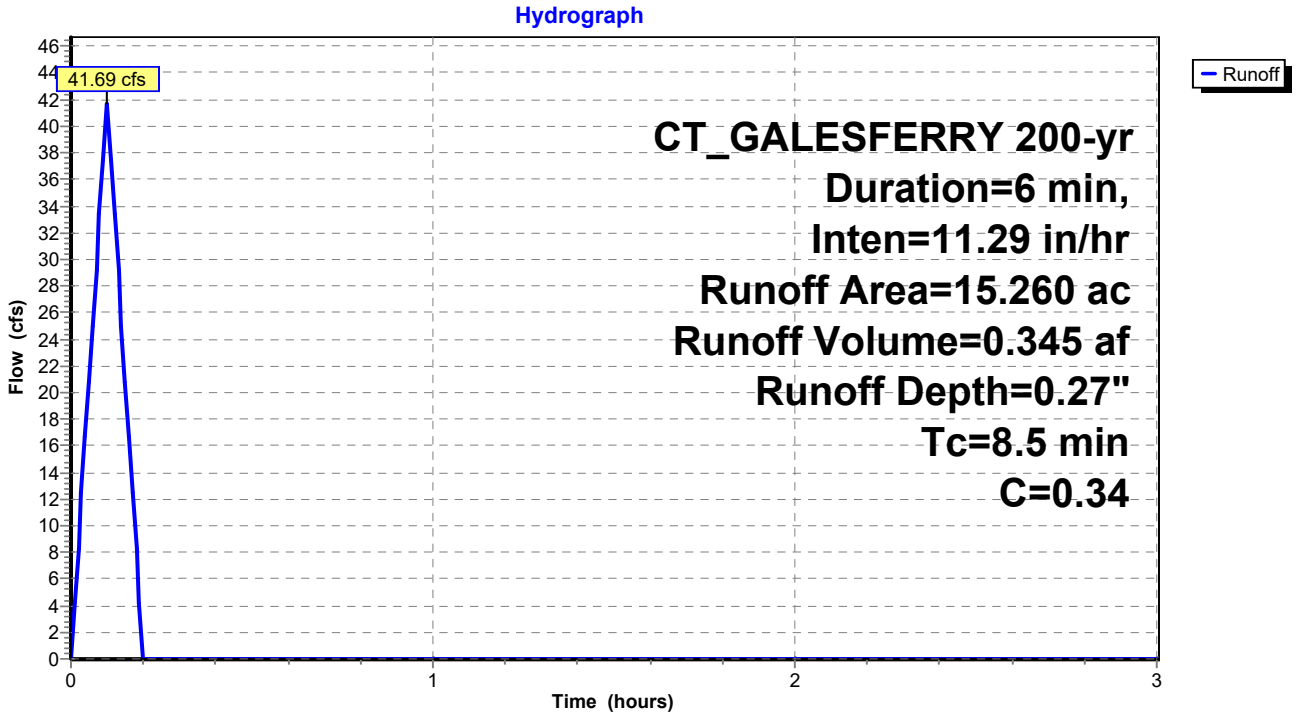
Runoff = 41.69 cfs @ 0.10 hrs, Volume= 0.345 af, Depth= 0.27"
Routed to Link EDP-1 : EDP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 200-yr Duration=6 min, Inten=11.29 in/hr

Area (ac)	C	Description
15.260	0.34	See C Worksheet in Appendix C
15.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5					**Direct Entry, Direct**

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2A: EDA-2A

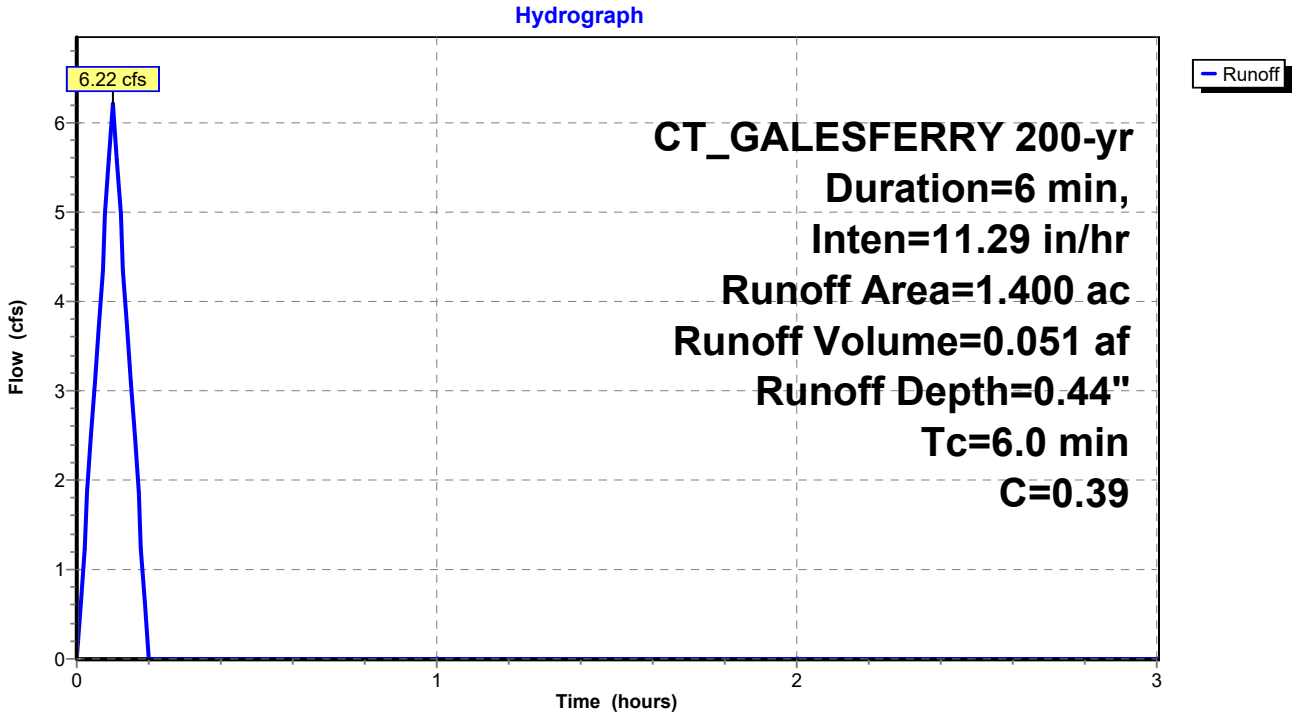
Runoff = 6.22 cfs @ 0.10 hrs, Volume= 0.051 af, Depth= 0.44"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 200-yr Duration=6 min, Inten=11.29 in/hr

Area (ac)	C	Description
1.400	0.39	See C Worksheet in Appendix C
1.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment EDA-2A: EDA-2A

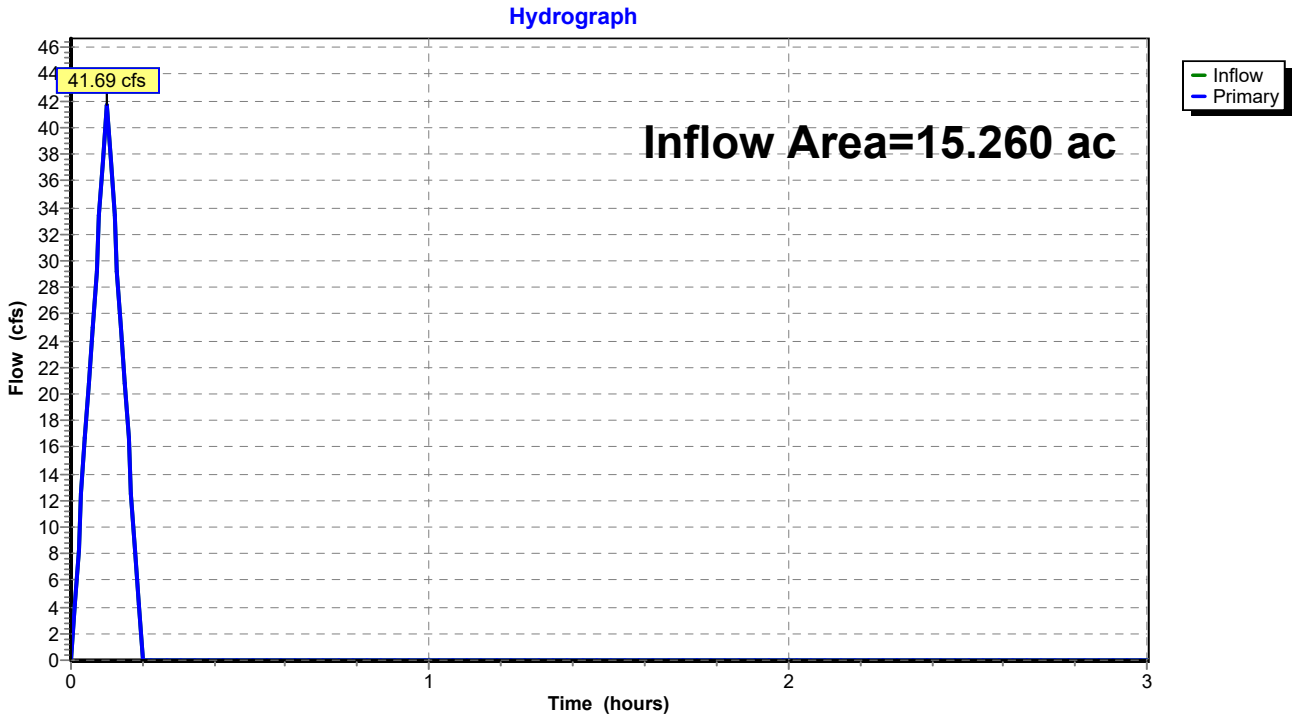


Summary for Link EDP-1: EDP-1

Inflow Area = 15.260 ac, 0.00% Impervious, Inflow Depth = 0.27" for 200-yr event
Inflow = 41.69 cfs @ 0.10 hrs, Volume= 0.345 af
Primary = 41.69 cfs @ 0.10 hrs, Volume= 0.345 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-1: EDP-1

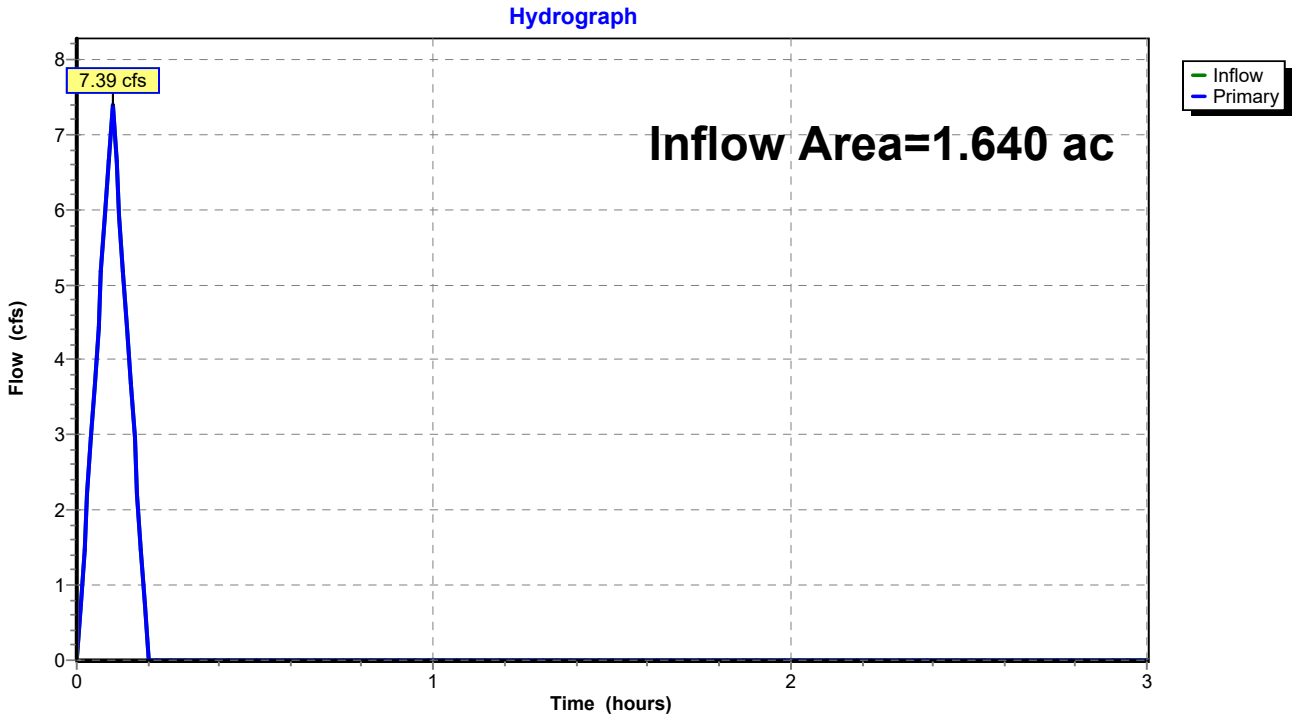


Summary for Link EDP-2: EDP-2

Inflow Area = 1.640 ac, 0.00% Impervious, Inflow Depth = 0.45" for 200-yr event
Inflow = 7.39 cfs @ 0.10 hrs, Volume= 0.061 af
Primary = 7.39 cfs @ 0.10 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-2: EDP-2



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-2B: EDA-2B Runoff Area=0.240 ac 0.00% Impervious Runoff Depth=0.56"
Tc=6.0 min C=0.43 Runoff=1.36 cfs 0.011 af

Subcatchment EDA-1: EDA-1 Runoff Area=15.260 ac 0.00% Impervious Runoff Depth=0.31"
Tc=8.5 min C=0.34 Runoff=48.19 cfs 0.398 af

Subcatchment EDA-2A: EDA-2A Runoff Area=1.400 ac 0.00% Impervious Runoff Depth=0.51"
Tc=6.0 min C=0.39 Runoff=7.18 cfs 0.059 af

Link EDP-1: EDP-1 Inflow=48.19 cfs 0.398 af
Primary=48.19 cfs 0.398 af

Link EDP-2: EDP-2 Inflow=8.54 cfs 0.071 af
Primary=8.54 cfs 0.071 af

Total Runoff Area = 16.900 ac Runoff Volume = 0.469 af Average Runoff Depth = 0.33"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment ED-2B: EDA-2B

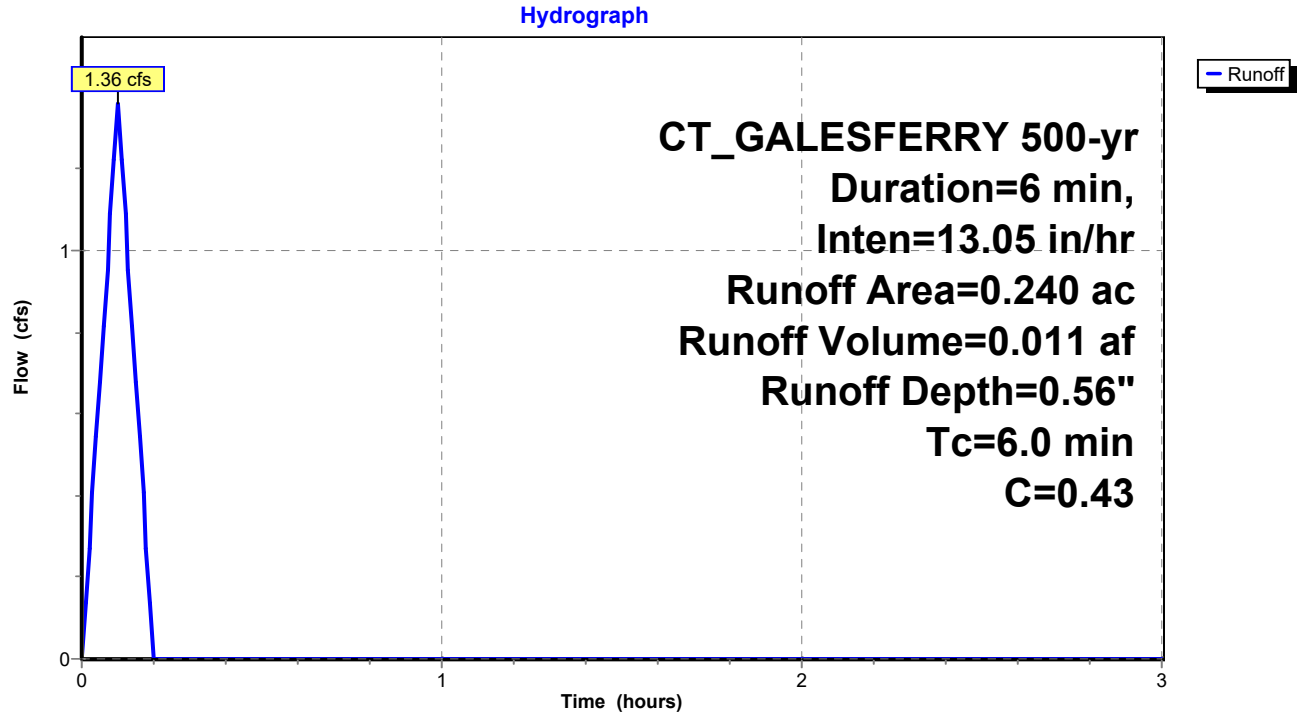
Runoff = 1.36 cfs @ 0.10 hrs, Volume= 0.011 af, Depth= 0.56"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 500-yr Duration=6 min, Inten=13.05 in/hr

Area (ac)	C	Description
0.240	0.43	See C Worksheet in Appendix C
0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment ED-2B: EDA-2B



Summary for Subcatchment EDA-1: EDA-1

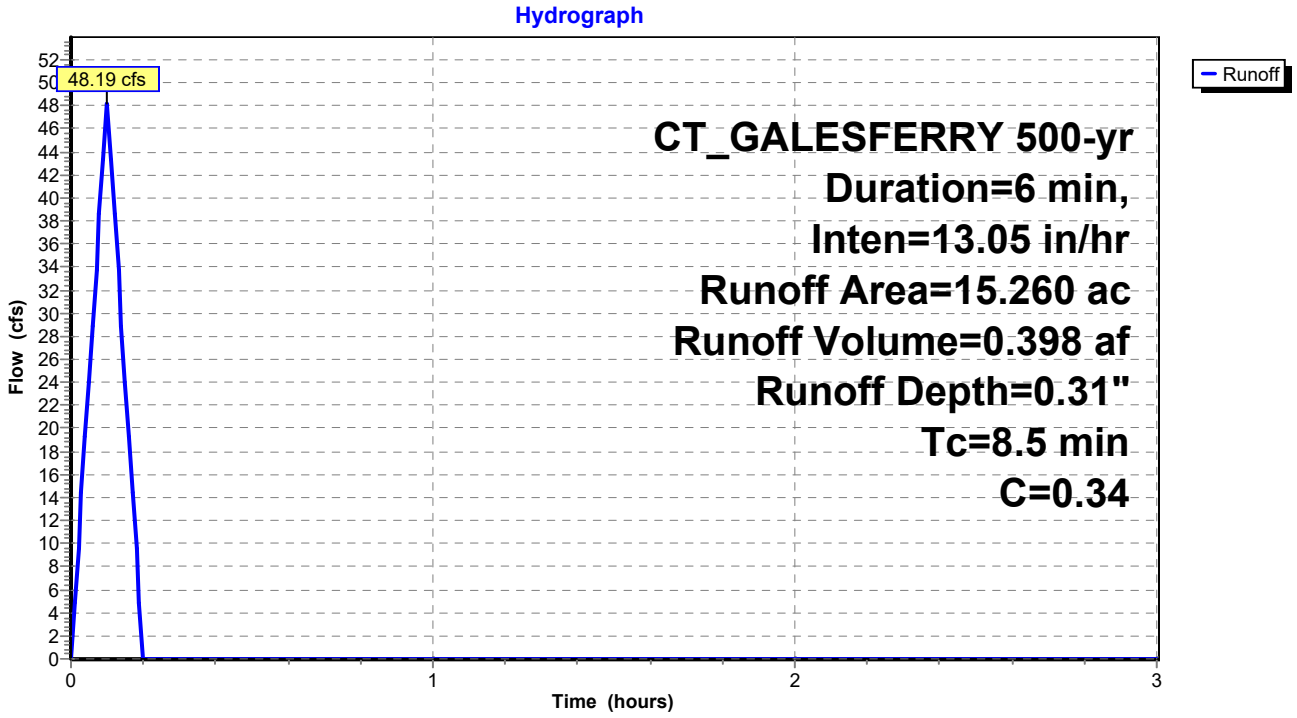
Runoff = 48.19 cfs @ 0.10 hrs, Volume= 0.398 af, Depth= 0.31"
Routed to Link EDP-1 : EDP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 500-yr Duration=6 min, Inten=13.05 in/hr

Area (ac)	C	Description
15.260	0.34	See C Worksheet in Appendix C
15.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5					**Direct Entry, Direct**

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2A: EDA-2A

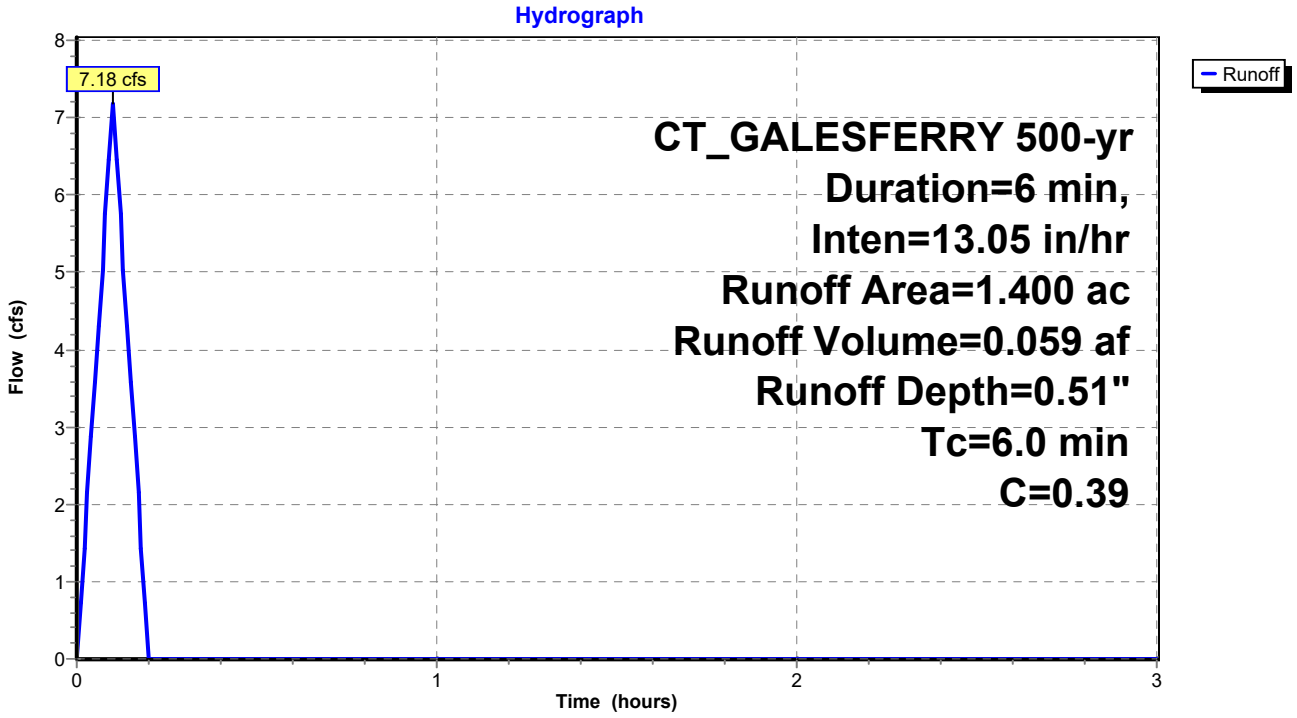
Runoff = 7.18 cfs @ 0.10 hrs, Volume= 0.059 af, Depth= 0.51"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 500-yr Duration=6 min, Inten=13.05 in/hr

Area (ac)	C	Description
1.400	0.39	See C Worksheet in Appendix C
1.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment EDA-2A: EDA-2A

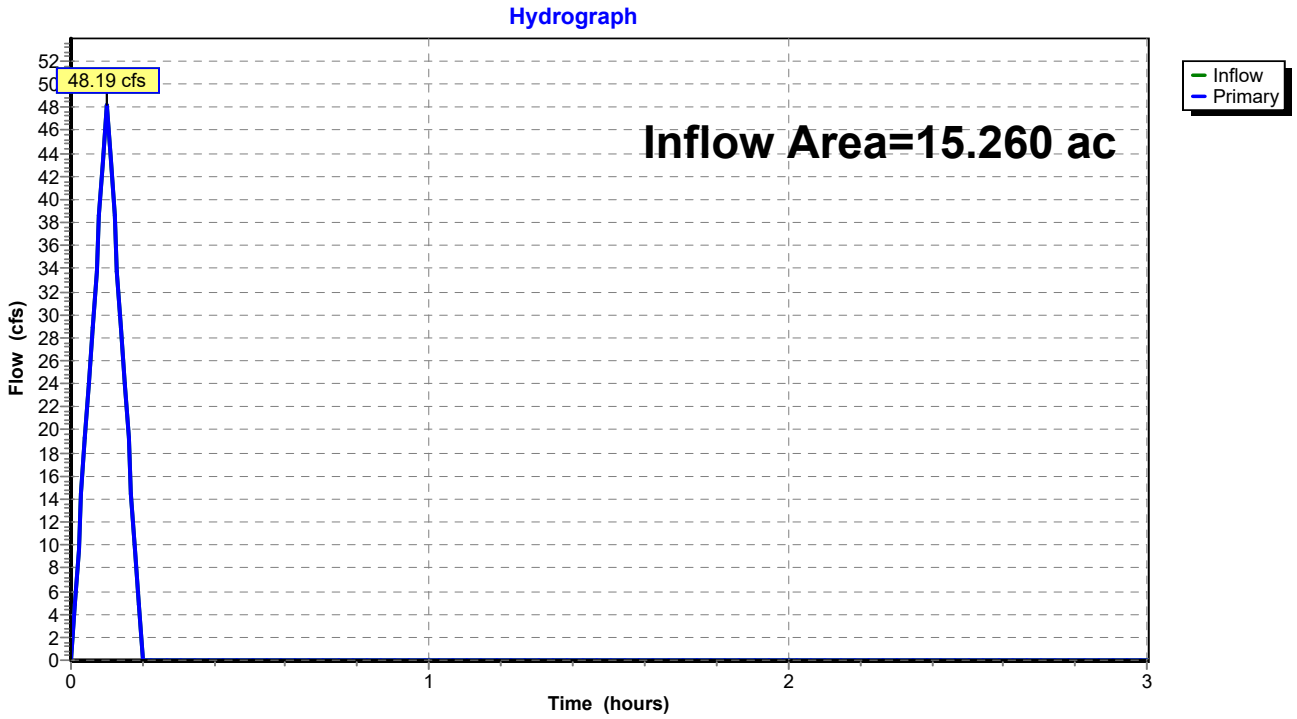


Summary for Link EDP-1: EDP-1

Inflow Area = 15.260 ac, 0.00% Impervious, Inflow Depth = 0.31" for 500-yr event
Inflow = 48.19 cfs @ 0.10 hrs, Volume= 0.398 af
Primary = 48.19 cfs @ 0.10 hrs, Volume= 0.398 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-1: EDP-1

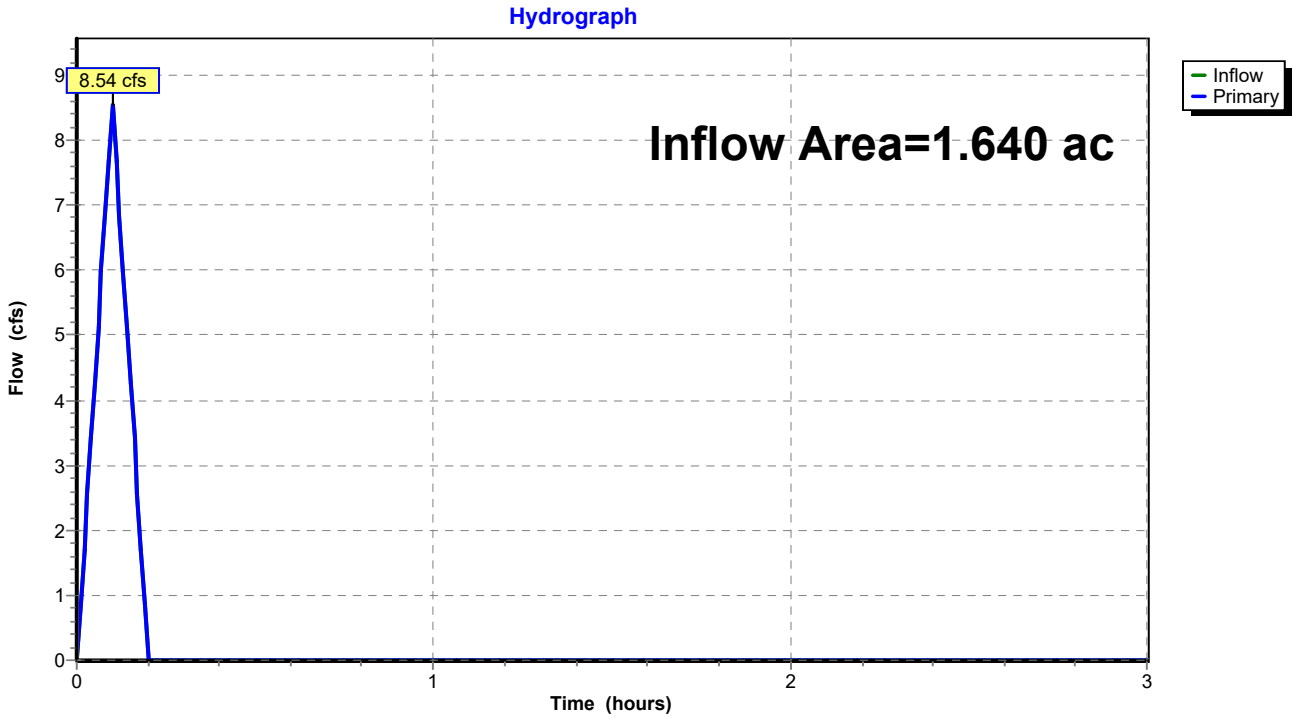


Summary for Link EDP-2: EDP-2

Inflow Area = 1.640 ac, 0.00% Impervious, Inflow Depth = 0.52" for 500-yr event
Inflow = 8.54 cfs @ 0.10 hrs, Volume= 0.071 af
Primary = 8.54 cfs @ 0.10 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-2: EDP-2



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED-2B: EDA-2B Runoff Area=0.240 ac 0.00% Impervious Runoff Depth=0.62"
Tc=6.0 min C=0.43 Runoff=1.51 cfs 0.012 af

Subcatchment EDA-1: EDA-1 Runoff Area=15.260 ac 0.00% Impervious Runoff Depth=0.35"
Tc=8.5 min C=0.34 Runoff=53.42 cfs 0.442 af

Subcatchment EDA-2A: EDA-2A Runoff Area=1.400 ac 0.00% Impervious Runoff Depth=0.56"
Tc=6.0 min C=0.39 Runoff=7.96 cfs 0.066 af

Link EDP-1: EDP-1 Inflow=53.42 cfs 0.442 af
Primary=53.42 cfs 0.442 af

Link EDP-2: EDP-2 Inflow=9.47 cfs 0.078 af
Primary=9.47 cfs 0.078 af

Total Runoff Area = 16.900 ac Runoff Volume = 0.520 af Average Runoff Depth = 0.37"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment ED-2B: EDA-2B

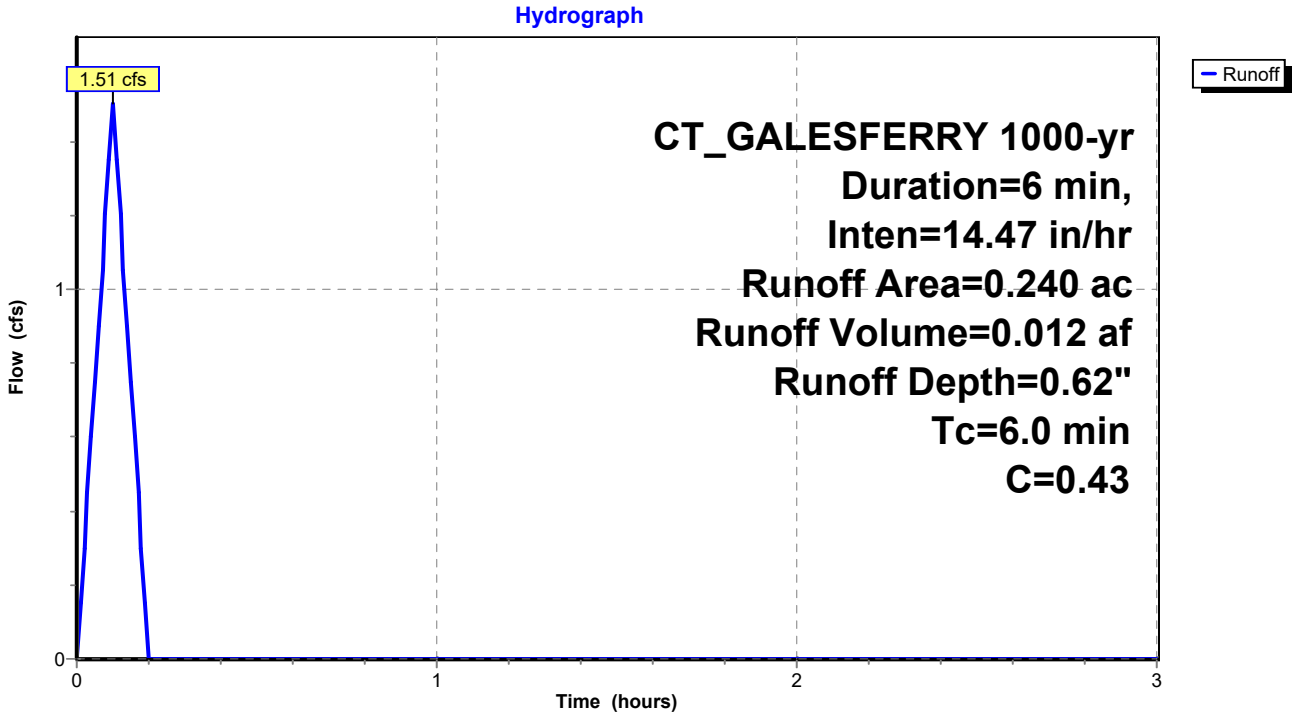
Runoff = 1.51 cfs @ 0.10 hrs, Volume= 0.012 af, Depth= 0.62"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 1000-yr Duration=6 min, Inten=14.47 in/hr

Area (ac)	C	Description
0.240	0.43	See C Worksheet in Appendix C
0.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment ED-2B: EDA-2B



Summary for Subcatchment EDA-1: EDA-1

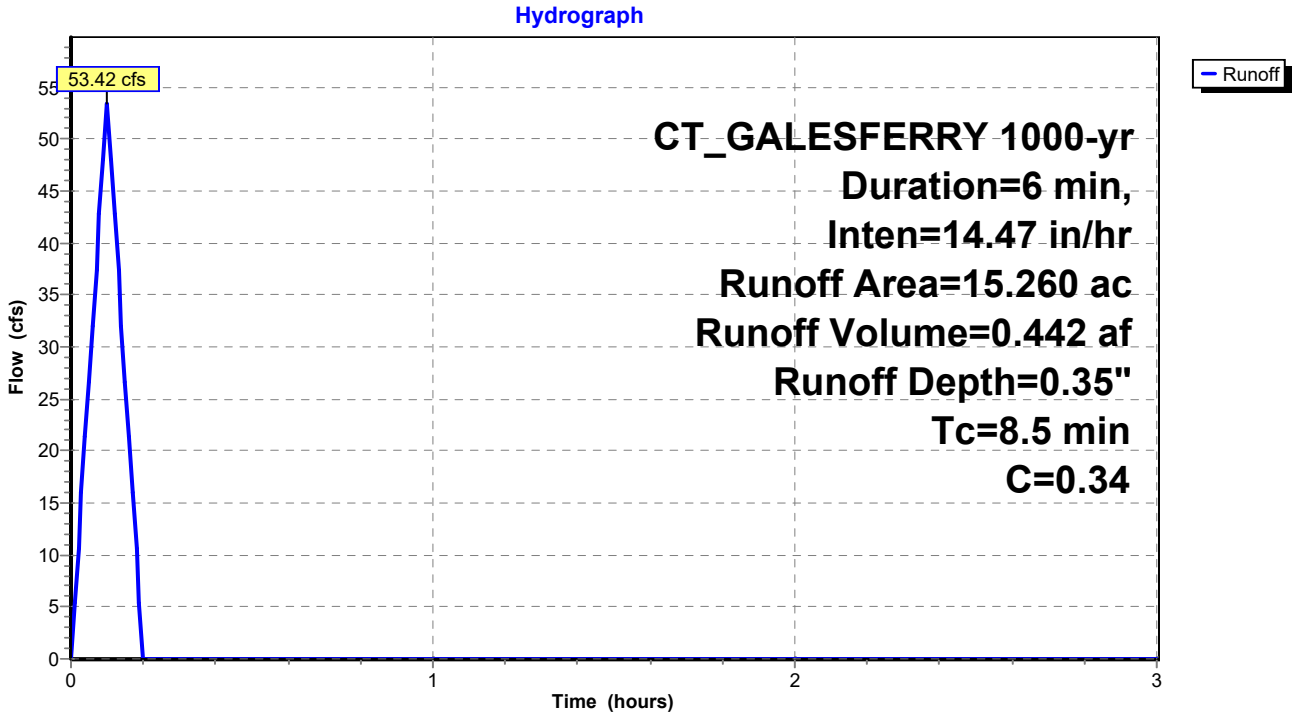
Runoff = 53.42 cfs @ 0.10 hrs, Volume= 0.442 af, Depth= 0.35"
Routed to Link EDP-1 : EDP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 1000-yr Duration=6 min, Inten=14.47 in/hr

Area (ac)	C	Description
15.260	0.34	See C Worksheet in Appendix C
15.260		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5					**Direct Entry, Direct**

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2A: EDA-2A

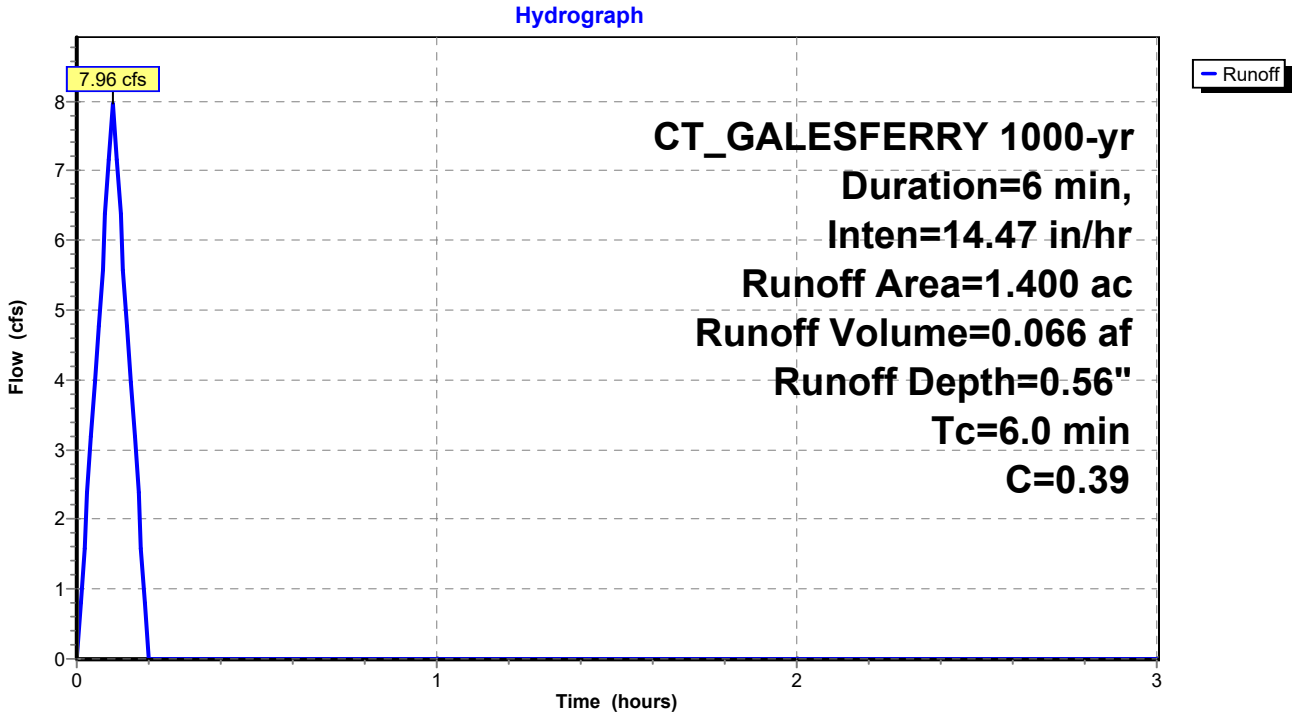
Runoff = 7.96 cfs @ 0.10 hrs, Volume= 0.066 af, Depth= 0.56"
Routed to Link EDP-2 : EDP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 1000-yr Duration=6 min, Inten=14.47 in/hr

Area (ac)	C	Description
1.400	0.39	See C Worksheet in Appendix C
1.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment EDA-2A: EDA-2A

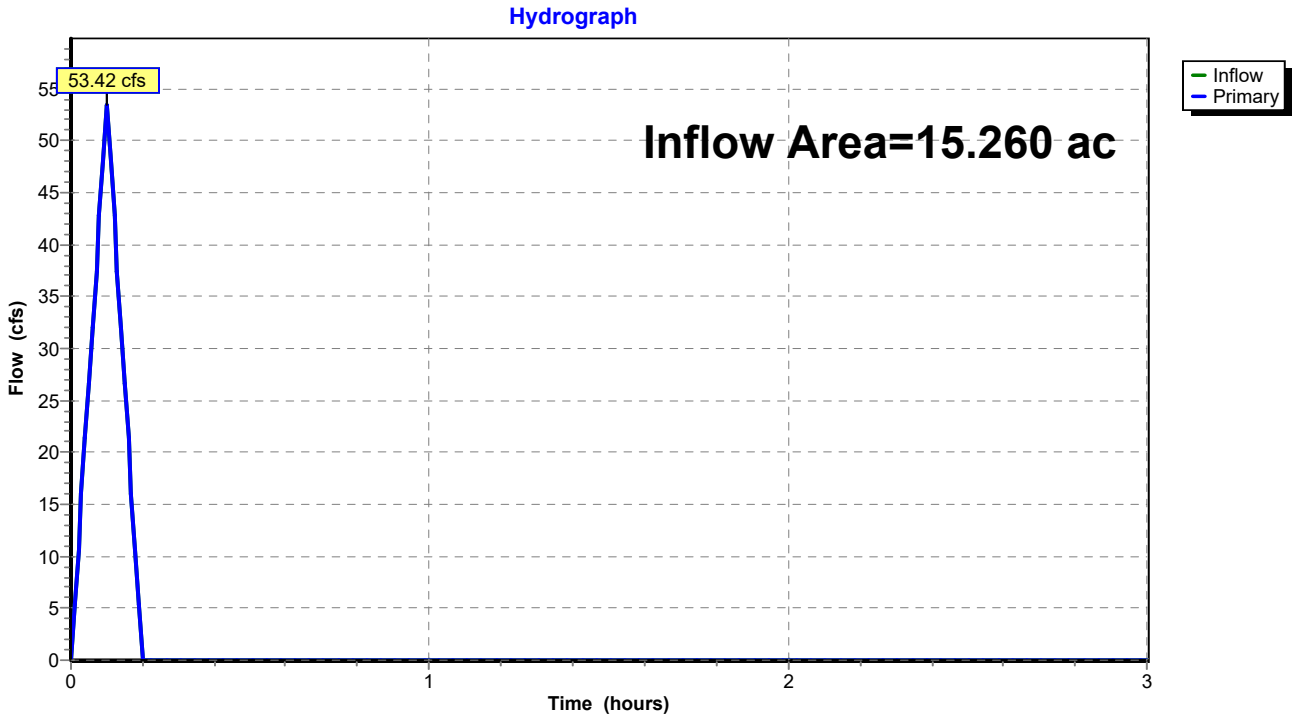


Summary for Link EDP-1: EDP-1

Inflow Area = 15.260 ac, 0.00% Impervious, Inflow Depth = 0.35" for 1000-yr event
Inflow = 53.42 cfs @ 0.10 hrs, Volume= 0.442 af
Primary = 53.42 cfs @ 0.10 hrs, Volume= 0.442 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-1: EDP-1

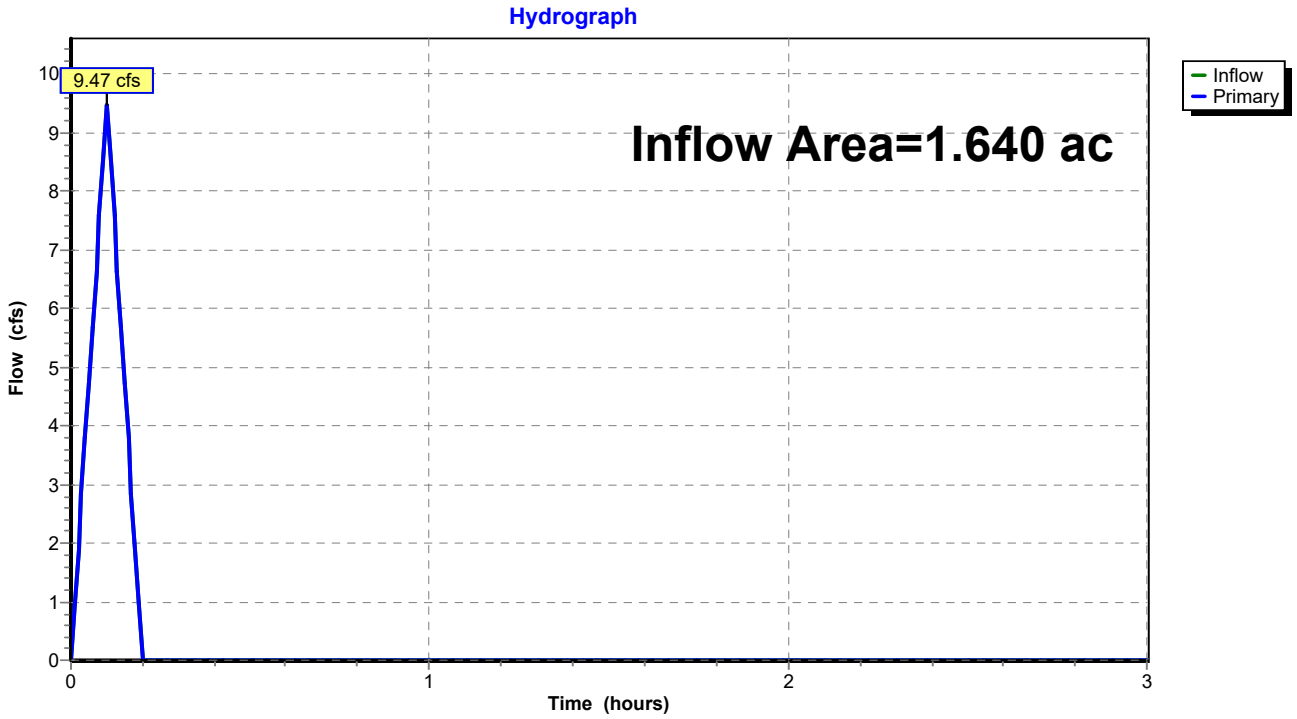


Summary for Link EDP-2: EDP-2

Inflow Area = 1.640 ac, 0.00% Impervious, Inflow Depth = 0.57" for 1000-yr event
Inflow = 9.47 cfs @ 0.10 hrs, Volume= 0.078 af
Primary = 9.47 cfs @ 0.10 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link EDP-2: EDP-2



APPENDIX D: PROPOSED CONDITIONS HYDROLOGIC ANALYSIS

- *PROPOSED CONDITIONS DRAINAGE MAP*
- *PROPOSED CONDITIONS HYDROCAD CALCULATIONS*

LEGEND

DP#	DESIGN POINT
PR-#	PROPOSED SUBCATCHMENT
	OVERALL ANALYSIS BOUNDARY
	SUBCATCHMENT BOUNDARY
	TIME OF CONCENTRATION

50 25 12.5 0 50
1"= 50'

BOHLER//

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY
1	05/24/2024	REVISED DRIVEWAY	KMB / JGB

811 Know what's below. Call before you dig.
ALWAYS CALL 811
It's fast. It's free. It's the law.

PERMIT SET

THIS DRAWING IS INTENDED FOR MUNICIPAL AND/OR AGENCY REVIEW AND APPROVAL. IT IS NOT INTENDED AS A CONSTRUCTION DOCUMENT UNLESS INDICATED OTHERWISE.

PROJECT No.:	CTA220061.00
DRAWN BY:	BTJ
CHECKED BY:	JGB
DATE:	03/08/2024
CAD I.D.:	CTA220061.00-PDAM-1A

PROJECT:

PROPOSED SITE PLAN DOCUMENTS

FOR

C.R. KLEWIN LLC

PROPOSED RESIDENTIAL DEVELOPMENT

19, 29 & 39 MILITARY HIGHWAY, GALES FERRY, LEDYARD, NEW LONDON COUNTY, CONNECTICUT

BOHLER//
65 LaSALLE ROAD, SUITE 401
WEST HARTFORD, CT 06107
Phone: (860) 333-8900
www.BohlerEngineering.com

J.G. BORD
PROFESSIONAL ENGINEER
CONNECTICUT LICENSE No. 30414

SHEET TITLE:

PROPOSED CONDITIONS DRAINAGE AREA MAP

SHEET NUMBER:

PRDAM

REVISION 1 - 05/24/2024

Runoff Calculations C Worksheet

Project: **CR Klewin**

Description: **Proposed Conditions**

Drainage Area	Land Use Description	C	Area (Acres)	Total Area (Acres)	Weighted C
PD-1A	Forest	0.20	0.50	**3.99**	**0.38**
	Lawns	0.30	2.94		
	Impervious	0.95	0.55		
	Roofs	0.85	0.01		
PD-1B	Forest	0.20	0.00	**3.87**	**0.69**
	Lawns	0.30	1.39		
	Roofs	0.85	1.06		
	Impervious	0.95	1.41		
	Drives and Walks	0.80	0.00		
PD-1C				**1.37**	**0.67**
	Lawns	0.30	0.59		
	Impervious	0.95	0.78		
PD-1D	Forest	0.20	0.43	**3.94**	**0.62**
	Lawns	0.30	1.36		
	Roofs	0.85	0.74		
	Impervious	0.95	1.41		
PD-1E				**1.04**	**0.54**
	Lawns	0.30	0.66		
	Impervious	0.95	0.38		
PD-1F	Forest	0.20	0.40	**1.16**	**0.55**
	Lawns	0.30	0.21		
	Roofs	0.85	0.25		
	Impervious	0.95	0.30		

Time of Concentration (Tc) or (Tt) Calculations

Project: **CTA220061.00 - Gales Ferry**

Description: **PR-1A**

Note: Space for as many as three segments per flow type can be used for each worksheet.

Sheet Flow *(Applicable to Tc only)*		**Segment ID**	**AB**			
1. Surface Description *(table 3-1)*			Woods (light underbrush)			
2. Manning's roughness coeff., n *(table 3-1)*			0.400			
3. Flow length, L *(total L ≤ 150 ft)*		ft	100			
4. Two-yr 24-hr rainfall, P_2		in	3.46			
5. Land slope, s*		ft/ft	0.0147			
6. Tt =0.007(nL)$^{0.8}$ / $P_2^{0.5}$s$^{0.4}$	**Compute Tt**	**hr**	**0.3893**	+	+	= **0.3893**
**S is averaged*						

Shallow Concentrated Flow		**Segment ID**	**BC**			
7. Surface Description (paved or unpaved)			Unpaved			
8. Flow length, L		ft	409.86			
9. Watercourse slope, s*		ft/ft	0.0354			
10. Average velocity, V		ft/sec	3.03			
11. Tt = L / 3600V			**0.0375**	+	+	= **0.0375**

Channel Flow		**Segment ID**				
12. Cross sectional flow area, a		ft^2				
13. Wetted perimeter, p		ft				
14. Hydraulic radius, r = a/wp		ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V=1.49r$^{2/3}$s$^{1/2}$ / n						
18. Flow length, L		ft				
19. Tt = L / 3600V				+	+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6,11, and 19)						**0.4268**

Tc = **25.61** **minutes**

Time of Concentration (Tc) or (Tt) Calculations

Project: **CTA220061.00 - Gales Ferry**

Description: **PR-1B**

Note: Space for as many as three segments per flow type can be used for each worksheet.

Sheet Flow ***(Applicable to Tc only)***		**Segment ID**						
		AB						
1. Surface Description *(table 3-1)*		Smooth surfaces						
2. Manning's roughness coeff., n *(table 3-1)*		0.011						
3. Flow length, L *(total L ≤ 150 ft)*	ft	71						
4. Two-yr 24-hr rainfall, P_2	in	3.46						
5. Land slope, s*	ft/ft	0.0248						
6. Tt =0.007(nL)$^{0.8}$ / $P_2^{0.5}$s$^{0.4}$	**Compute Tt hr**	**0.0136**	+		+		=	**0.0136**
**S is averaged*								

Shallow Concentrated Flow		**Segment ID**						
		BC						
7. Surface Description (paved or unpaved)		Paved						
8. Flow length, L	ft	468.95						
9. Watercourse slope, s*	ft/ft	0.0256						
10. Average velocity, V	ft/sec	3.27						
11. Tt = L / 3600V		**0.0398**	+		+		=	**0.0398**

Channel Flow		**Segment ID**						
12. Cross sectional flow area, a	ft^2							
13. Wetted perimeter, p	ft							
14. Hydraulic radius, r = a/wp	ft							
15. Channel Slope, s	ft/ft							
16. Manning's roughness coeff., n								
17. V=1.49r$^{2/3}$s$^{1/2}$ / n								
18. Flow length, L	ft							
19. Tt = L / 3600V			+		+		=	
20. Watershed or subarea T_c or T_t (add T_t in steps 6,11, and 19)								**0.0533**

Tc = **3.20** **minutes**

Time of Concentration (Tc) or (Tt) Calculations

Project: **CTA220061.00 - Gales Ferry**

Description: **PR-1C**

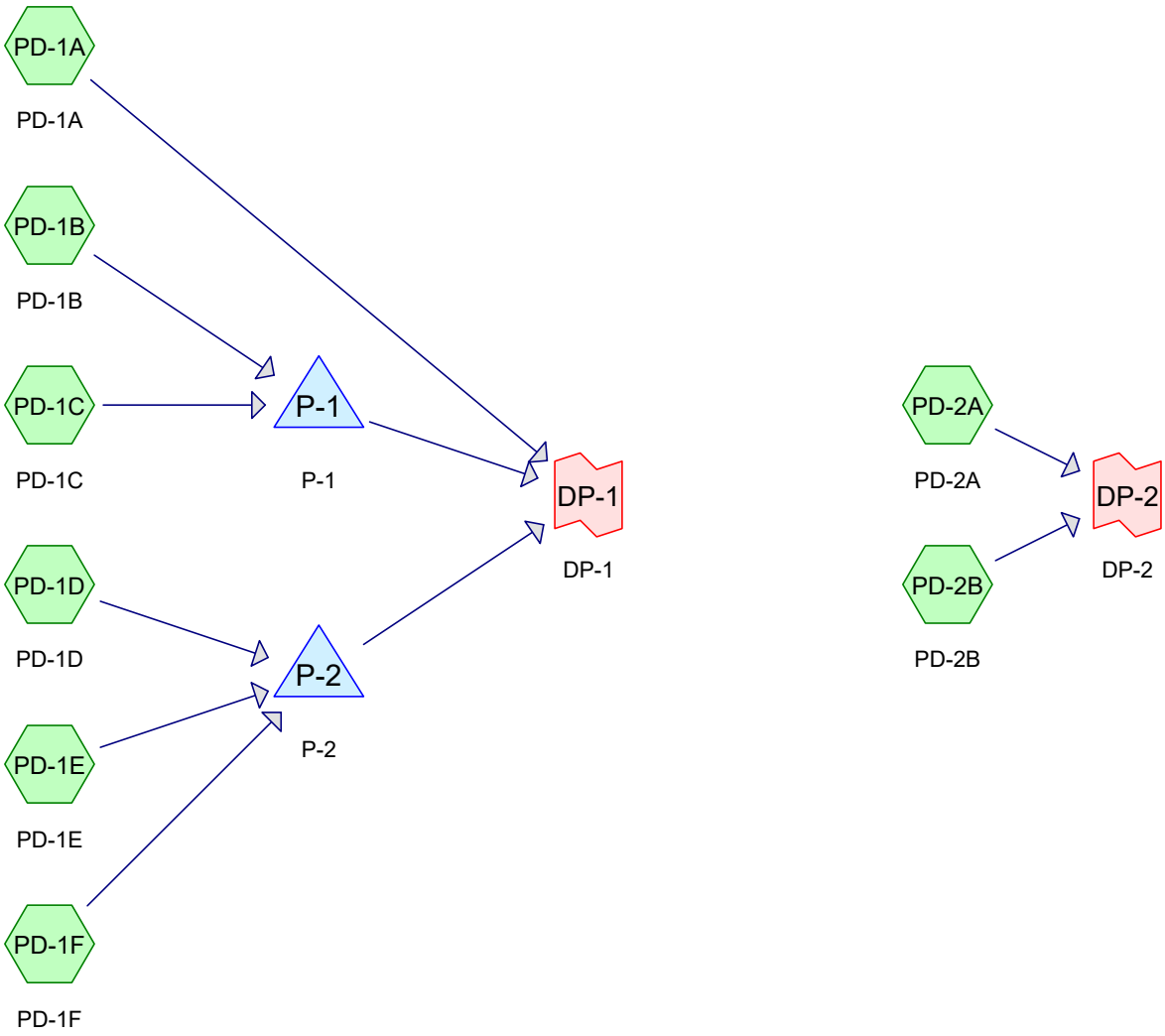
Note: Space for as many as three segments per flow type can be used for each worksheet.

Sheet Flow *(Applicable to Tc only)*		**Segment ID**	**AB**						
1. Surface Description *(table 3-1)*			Range (natural)						
2. Manning's roughness coeff., n *(table 3-1)*			0.130						
3. Flow length, L *(total L ≤ 150 ft)*	ft		75						
4. Two-yr 24-hr rainfall, P_2	in		3.46						
5. Land slope, s*	ft/ft		0.0133						
6. Tt =0.007(nL)$^{0.8}$ / $P_2^{0.5}$s$^{0.4}$		**Compute Tt hr**	**0.1310**	+		+		=	**0.1310**
**S is averaged*									

Shallow Concentrated Flow		**Segment ID**	**BC**						
7. Surface Description (paved or unpaved)			Paved						
8. Flow length, L	ft		100						
9. Watercourse slope, s*	ft/ft		0.0196						
10. Average velocity, V	ft/sec		2.87						
11. Tt = L / 3600V			**0.0097**	+		+		=	**0.0097**

Channel Flow		**Segment ID**	**CD**		**DE**		**EF**		
12. Cross sectional flow area, a	ft^2		1.77		1.77		1.77		
13. Wetted perimeter, p	ft		4.71		4.71		4.71		
14. Hydraulic radius, r = a/wp	ft		0.3750		0.3750		0.3750		
15. Channel Slope, s	ft/ft		0.0280		0.0434		0.0050		
16. Manning's roughness coeff., n			0.010		0.010		0.010		
17. V=1.49r$^{2/3}$s$^{1/2}$ / n			12.9654		16.1418		5.4789		
18. Flow length, L	ft		99		107		30		
19. Tt = L / 3600V			**0.0021**	+	**0.0018**	+	**0.0015**	=	**0.0142**
20. Watershed or subarea T_c or T_t (add T_t in steps 6,11, and 19)									**0.1548**

Tc = **9.29** **minutes**



Subcat Reach Pond Link

Routing Diagram for CTA220061.00 - Post
Prepared by Bohler Engineers, Printed 3/22/2024

Area Listing (all nodes)

Area (acres)	C	Description (subcatchment-numbers)
4.150	0.38	See C Worksheet in Appendix C (PD-1A, PD-2B)
3.870	0.69	See C Worksheet in Appendix C (PD-1B)
1.370	0.67	See C Worksheet in Appendix C (PD-1C)
3.940	0.62	See C Worksheet in Appendix C (PD-1D)
1.040	0.54	See C Worksheet in Appendix C (PD-1E)
1.160	0.55	See C Worksheet in Appendix C (PD-1F)
1.370	0.32	See C Worksheet in Appendix C (PD-2A)
16.900	**0.55**	**TOTAL AREA**

Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPD-1A: PD-1A Runoff Area=3.990 ac 0.00% Impervious Runoff Depth=0.17"
Tc=6.0 min C=0.38 Runoff=6.82 cfs 0.056 af

SubcatchmentPD-1B: PD-1B Runoff Area=3.870 ac 0.00% Impervious Runoff Depth=0.31"
Tc=6.0 min C=0.69 Runoff=12.01 cfs 0.099 af

SubcatchmentPD-1C: PD-1C Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.30"
Tc=6.0 min C=0.67 Runoff=4.13 cfs 0.034 af

SubcatchmentPD-1D: PD-1D Runoff Area=3.940 ac 0.00% Impervious Runoff Depth=0.28"
Tc=6.0 min C=0.62 Runoff=10.98 cfs 0.091 af

SubcatchmentPD-1E: PD-1E Runoff Area=1.040 ac 0.00% Impervious Runoff Depth=0.24"
Tc=6.0 min C=0.54 Runoff=2.53 cfs 0.021 af

SubcatchmentPD-1F: PD-1F Runoff Area=1.160 ac 0.00% Impervious Runoff Depth=0.25"
Tc=6.0 min C=0.55 Runoff=2.87 cfs 0.024 af

SubcatchmentPD-2A: PD-2A Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.14"
Tc=6.0 min C=0.32 Runoff=1.97 cfs 0.016 af

SubcatchmentPD-2B: PD-2B Runoff Area=0.160 ac 0.00% Impervious Runoff Depth=0.17"
Tc=6.0 min C=0.38 Runoff=0.27 cfs 0.002 af

Pond P-1: P-1 Peak Elev=30.41' Storage=5,786 cf Inflow=16.13 cfs 0.133 af
Discarded=0.04 cfs 0.011 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.011 af

Pond P-2: P-2 Peak Elev=26.67' Storage=5,374 cf Inflow=16.38 cfs 0.135 af
Outflow=1.82 cfs 0.110 af

Link DP-1: DP-1 Inflow=7.43 cfs 0.166 af
Primary=7.43 cfs 0.166 af

Link DP-2: DP-2 Inflow=2.24 cfs 0.019 af
Primary=2.24 cfs 0.019 af

Total Runoff Area = 16.900 ac Runoff Volume = 0.344 af Average Runoff Depth = 0.24"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment PD-1A: PD-1A

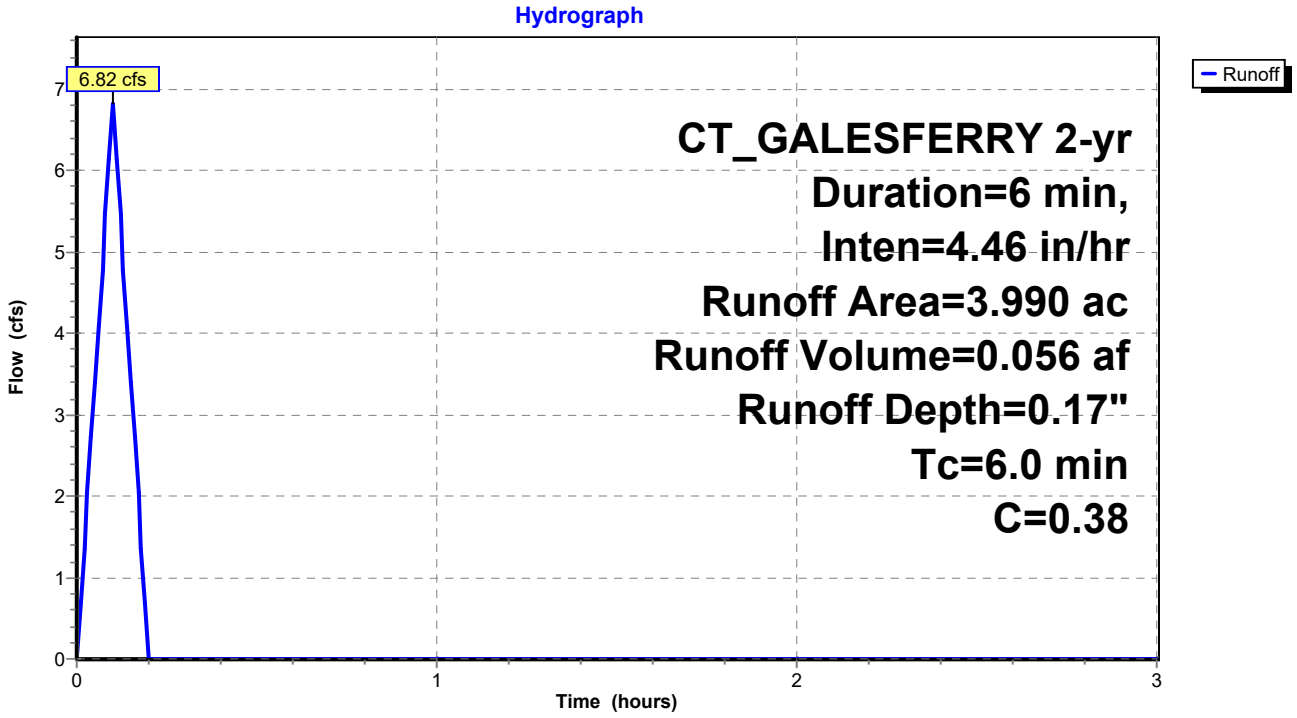
Runoff = 6.82 cfs @ 0.10 hrs, Volume= 0.056 af, Depth= 0.17"
Routed to Link DP-1 : DP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 2-yr Duration=6 min, Inten=4.46 in/hr

Area (ac)	C	Description
3.990	0.38	See C Worksheet in Appendix C
3.990		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 25.61**

Subcatchment PD-1A: PD-1A



Summary for Subcatchment PD-1B: PD-1B

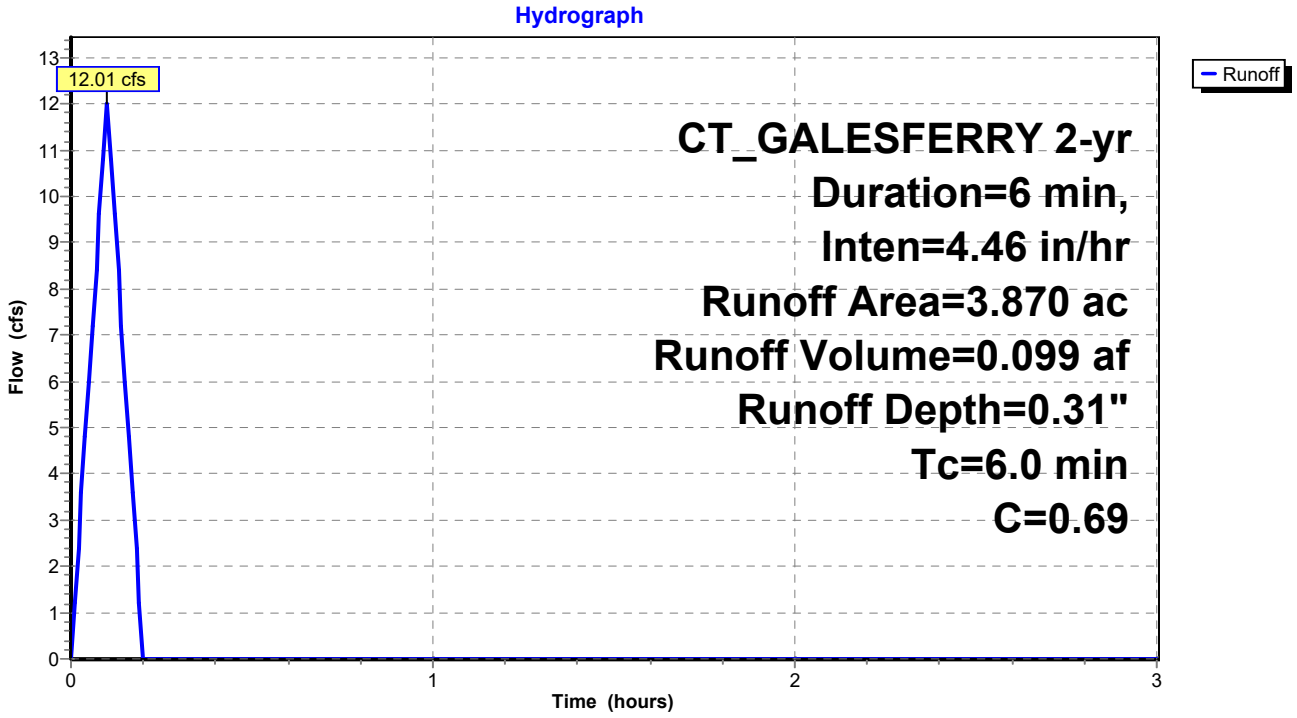
Runoff = 12.01 cfs @ 0.10 hrs, Volume= 0.099 af, Depth= 0.31"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 2-yr Duration=6 min, Inten=4.46 in/hr

Area (ac)	C	Description
3.870	0.69	See C Worksheet in Appendix C
3.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1B: PD-1B



Summary for Subcatchment PD-1C: PD-1C

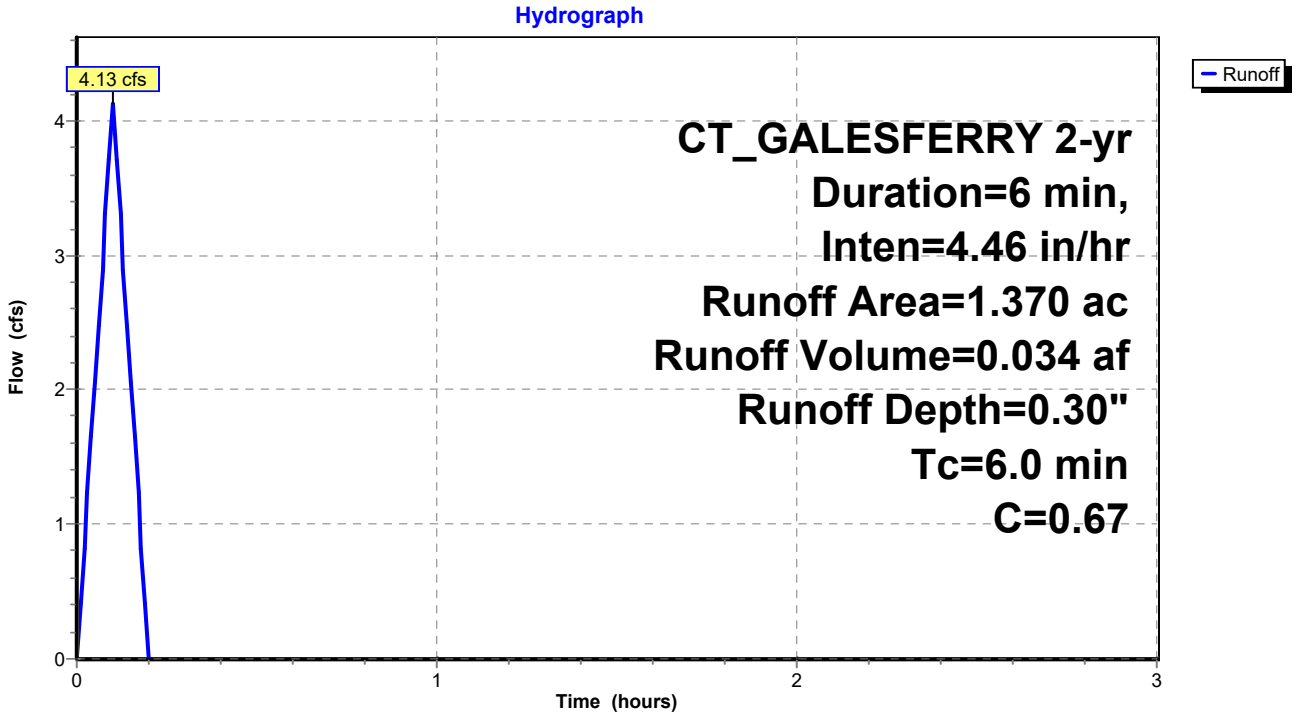
Runoff = 4.13 cfs @ 0.10 hrs, Volume= 0.034 af, Depth= 0.30"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 2-yr Duration=6 min, Inten=4.46 in/hr

Area (ac)	C	Description
1.370	0.67	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1C: PD-1C



Summary for Subcatchment PD-1D: PD-1D

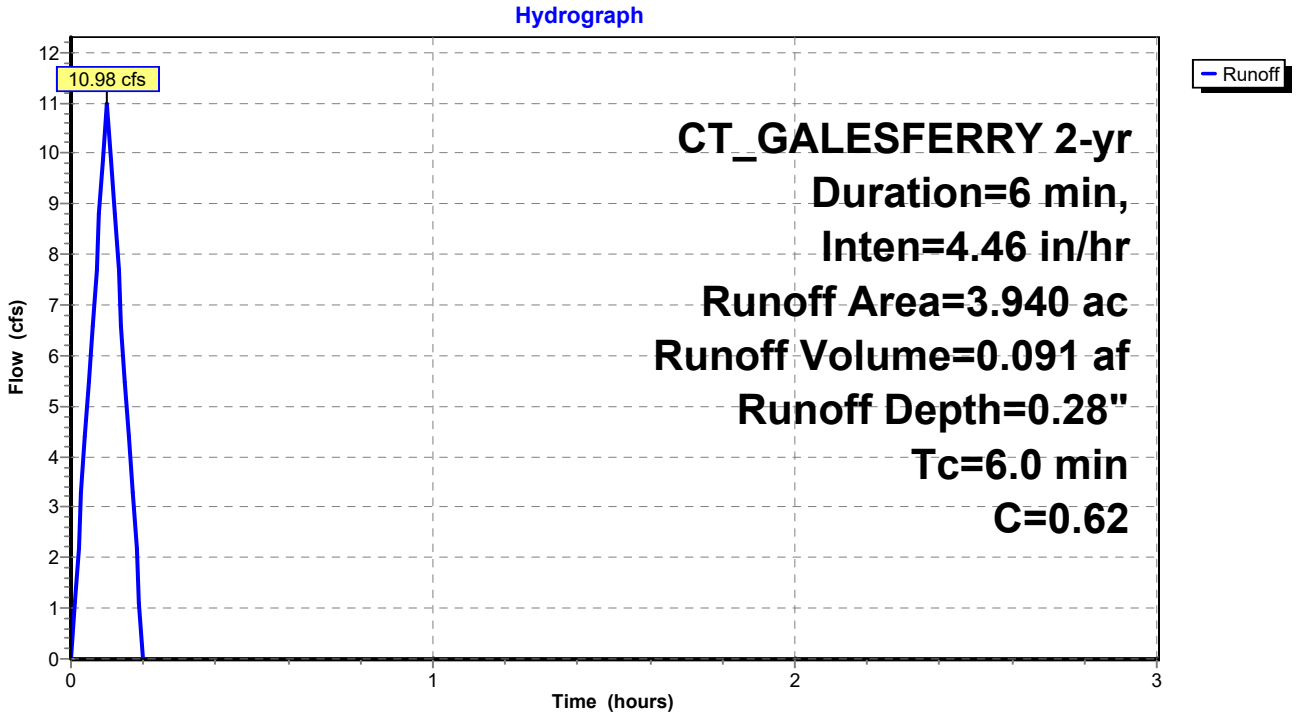
Runoff = 10.98 cfs @ 0.10 hrs, Volume= 0.091 af, Depth= 0.28"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 2-yr Duration=6 min, Inten=4.46 in/hr

Area (ac)	C	Description
3.940	0.62	See C Worksheet in Appendix C
3.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1D: PD-1D



Summary for Subcatchment PD-1E: PD-1E

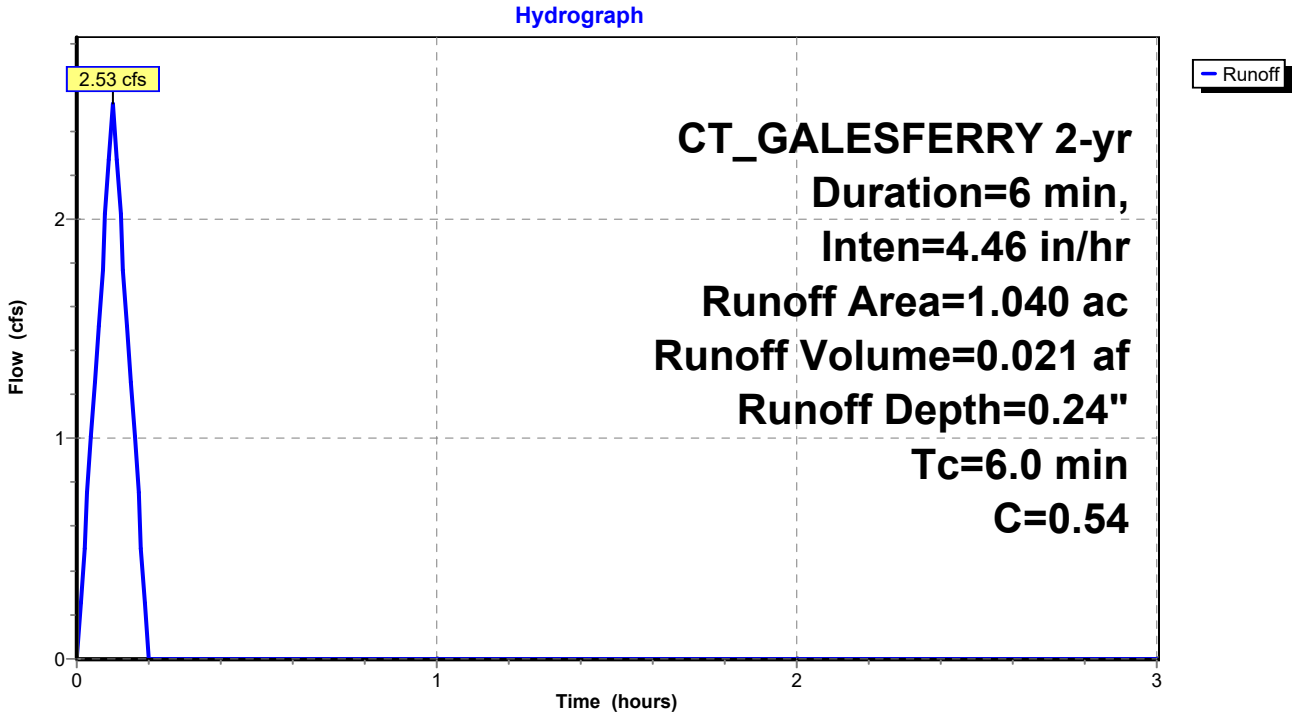
Runoff = 2.53 cfs @ 0.10 hrs, Volume= 0.021 af, Depth= 0.24"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 2-yr Duration=6 min, Inten=4.46 in/hr

Area (ac)	C	Description
1.040	0.54	See C Worksheet in Appendix C
1.040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1E: PD-1E



Summary for Subcatchment PD-1F: PD-1F

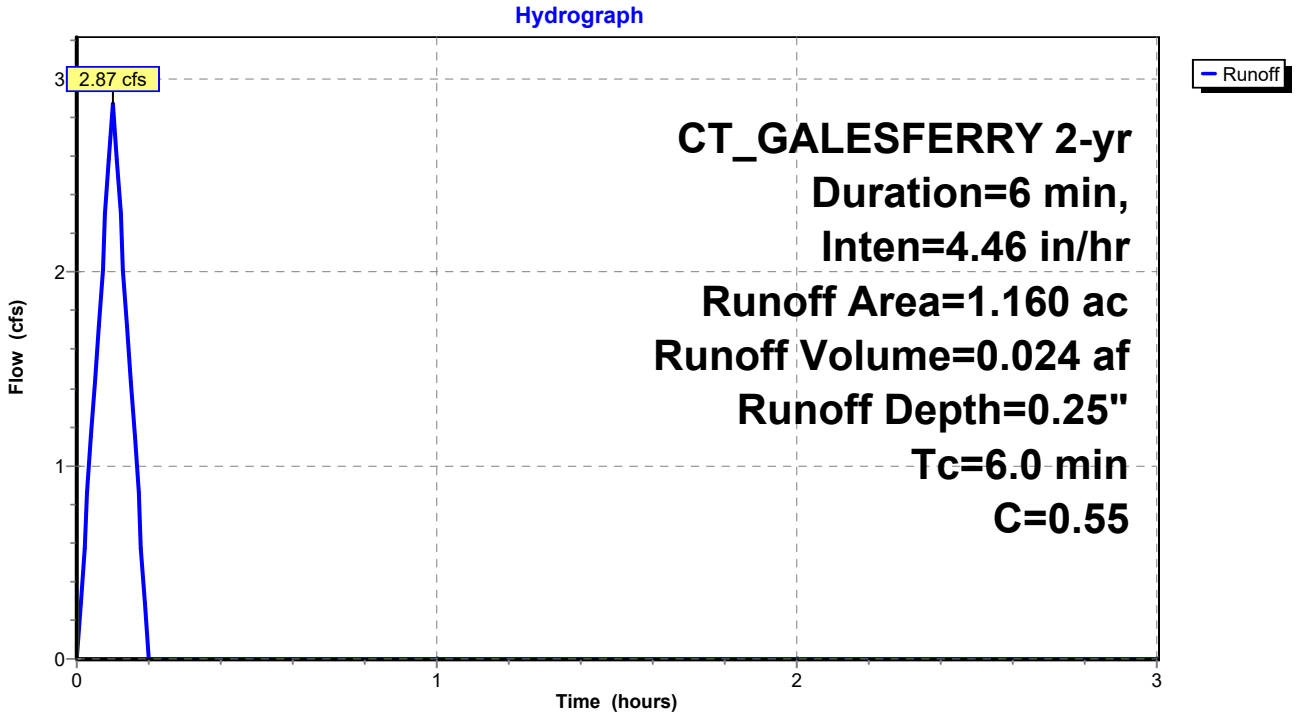
Runoff = 2.87 cfs @ 0.10 hrs, Volume= 0.024 af, Depth= 0.25"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 2-yr Duration=6 min, Inten=4.46 in/hr

Area (ac)	C	Description
1.160	0.55	See C Worksheet in Appendix C
1.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1F: PD-1F



Summary for Subcatchment PD-2A: PD-2A

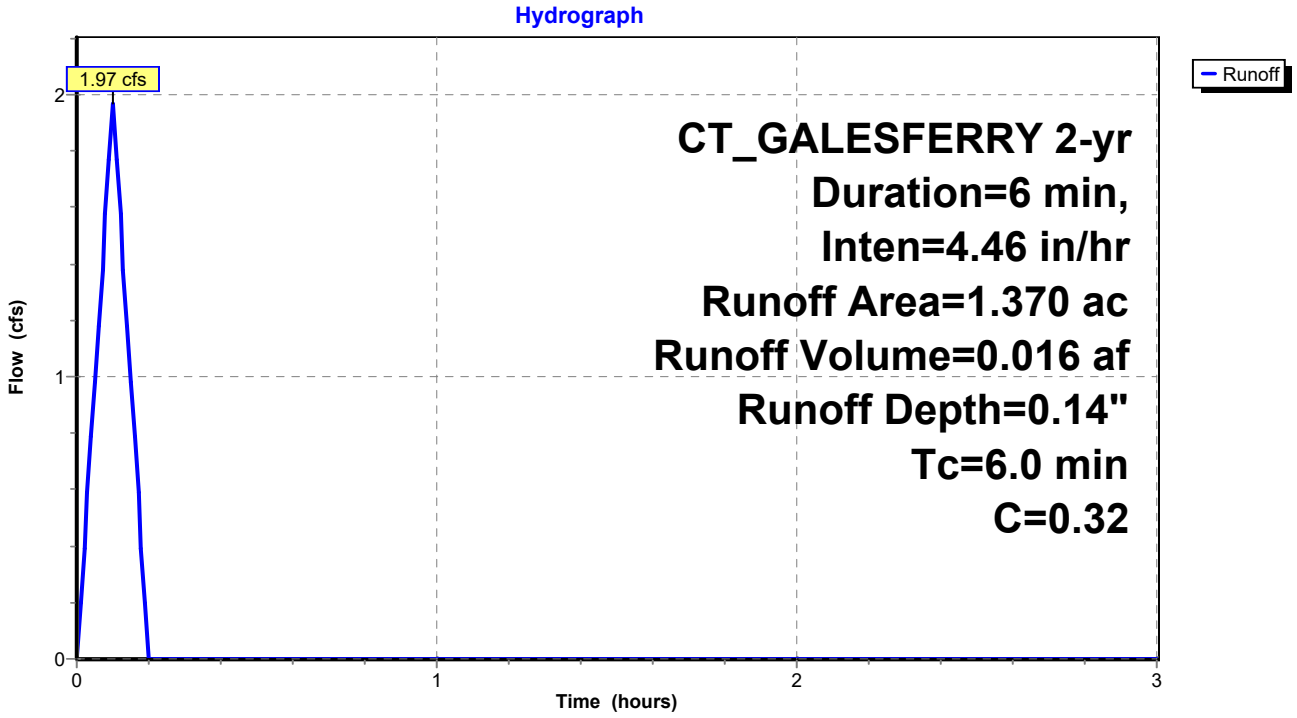
Runoff = 1.97 cfs @ 0.10 hrs, Volume= 0.016 af, Depth= 0.14"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 2-yr Duration=6 min, Inten=4.46 in/hr

Area (ac)	C	Description
1.370	0.32	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2A: PD-2A



Summary for Subcatchment PD-2B: PD-2B

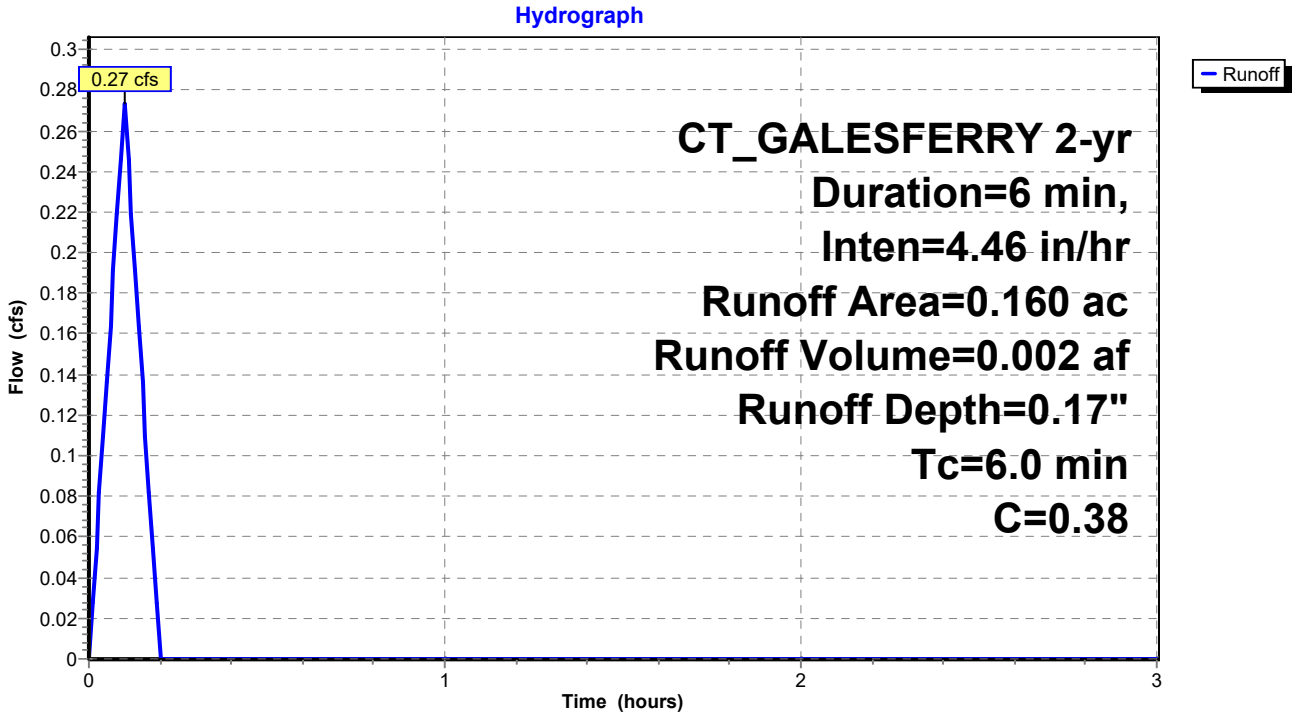
Runoff = 0.27 cfs @ 0.10 hrs, Volume= 0.002 af, Depth= 0.17"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 2-yr Duration=6 min, Inten=4.46 in/hr

Area (ac)	C	Description
0.160	0.38	See C Worksheet in Appendix C
0.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2B: PD-2B



Summary for Pond P-1: P-1

Inflow Area = 5.240 ac, 0.00% Impervious, Inflow Depth = 0.31" for 2-yr event
Inflow = 16.13 cfs @ 0.10 hrs, Volume= 0.133 af
Outflow = 0.04 cfs @ 0.20 hrs, Volume= 0.011 af, Atten= 100%, Lag= 6.0 min
Discarded = 0.04 cfs @ 0.20 hrs, Volume= 0.011 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 30.41' @ 0.20 hrs Surf.Area= 5,632 sf Storage= 5,786 cf

Plug-Flow detention time= 89.5 min calculated for 0.011 af (8% of inflow)
Center-of-Mass det. time= 85.4 min (91.4 - 6.0)

Volume	Invert	Avail.Storage	Storage Description
#1	29.00'	17,554 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

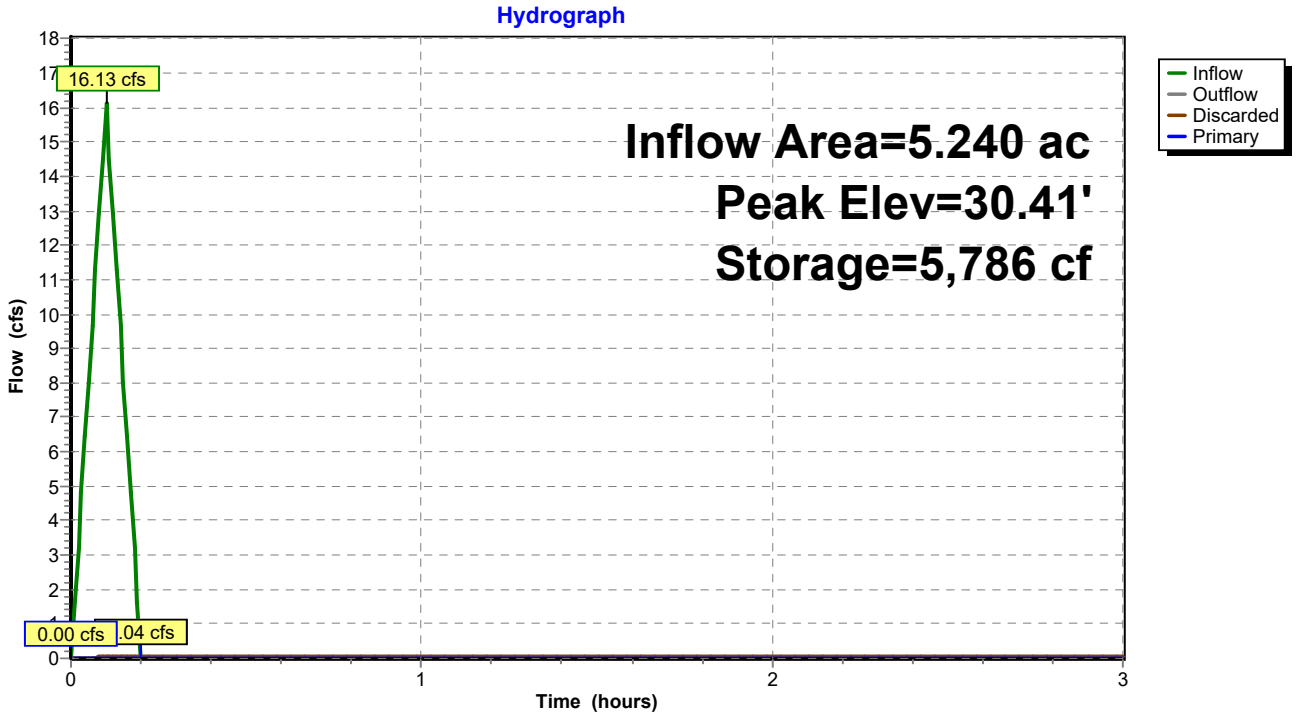
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
29.00	2,602	0	0
30.00	4,737	3,670	3,670
31.00	6,928	5,833	9,502
32.00	9,176	8,052	17,554

Device	Routing	Invert	Outlet Devices
#1	Primary	31.44'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	29.00'	**0.260 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 26.00' Phase-In= 0.01'

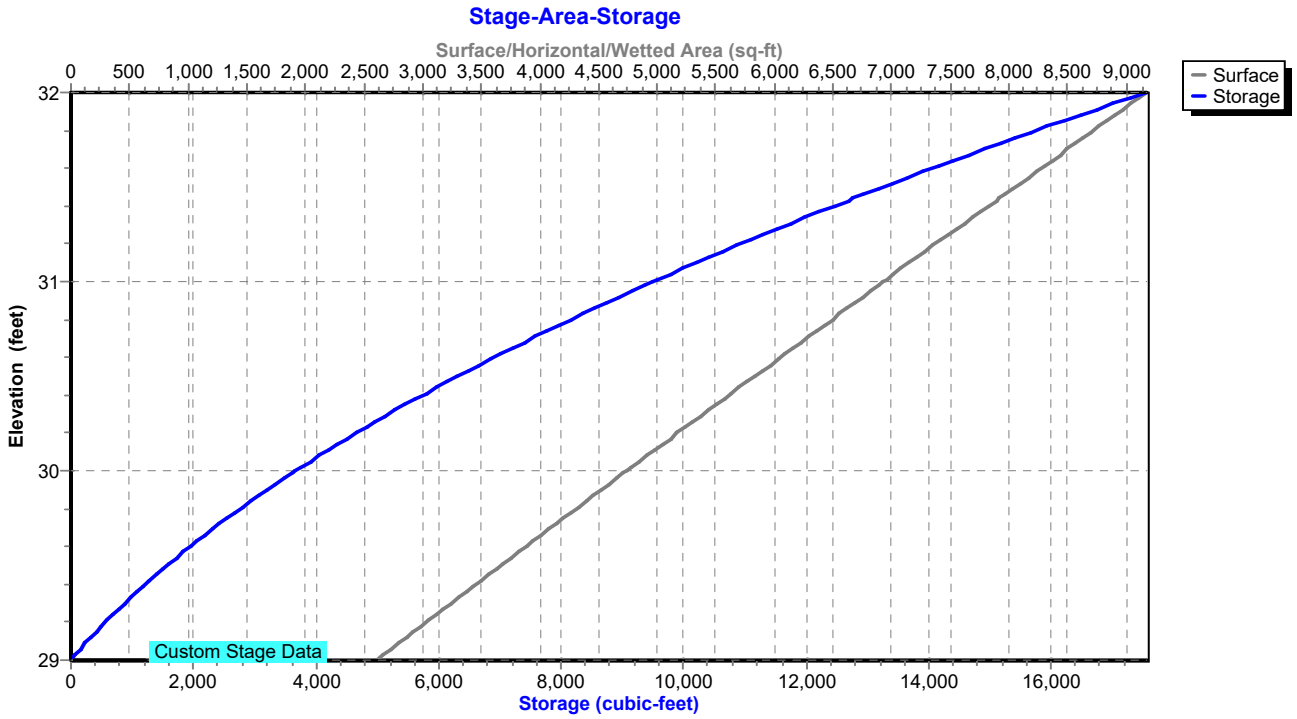
Discarded OutFlow Max=0.04 cfs @ 0.20 hrs HW=30.41' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=29.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P-1: P-1



Pond P-1: P-1



Stage-Area-Storage for Pond P-1: P-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
29.00	2,602	0
29.05	2,709	133
29.10	2,816	271
29.15	2,922	414
29.20	3,029	563
29.25	3,136	717
29.30	3,243	877
29.35	3,349	1,041
29.40	3,456	1,212
29.45	3,563	1,387
29.50	3,670	1,568
29.55	3,776	1,754
29.60	3,883	1,946
29.65	3,990	2,142
29.70	4,096	2,344
29.75	4,203	2,552
29.80	4,310	2,765
29.85	4,417	2,983
29.90	4,523	3,206
29.95	4,630	3,435
30.00	4,737	3,670
30.05	4,847	3,909
30.10	4,956	4,154
30.15	5,066	4,405
30.20	5,175	4,661
30.25	5,285	4,922
30.30	5,394	5,189
30.35	5,504	5,462
30.40	5,613	5,740
30.45	5,723	6,023
30.50	5,833	6,312
30.55	5,942	6,606
30.60	6,052	6,906
30.65	6,161	7,211
30.70	6,271	7,522
30.75	6,380	7,838
30.80	6,490	8,160
30.85	6,599	8,487
30.90	6,709	8,820
30.95	6,818	9,158
31.00	6,928	9,502
31.05	7,040	9,851
31.10	7,153	10,206
31.15	7,265	10,566
31.20	7,378	10,933
31.25	7,490	11,304
31.30	7,602	11,682
31.35	7,715	12,064
31.40	7,827	12,453
31.45	7,940	12,847
31.50	8,052	13,247
31.55	8,164	13,652
31.60	8,277	14,063
31.65	8,389	14,480
31.70	8,502	14,902
31.75	8,614	15,330
31.80	8,726	15,764
31.85	8,839	16,203
31.90	8,951	16,648
31.95	9,064	17,098
32.00	**9,176**	**17,554**

Summary for Pond P-2: P-2

Inflow Area = 6.140 ac, 0.00% Impervious, Inflow Depth = 0.26" for 2-yr event
Inflow = 16.38 cfs @ 0.10 hrs, Volume= 0.135 af
Outflow = 1.82 cfs @ 0.19 hrs, Volume= 0.110 af, Atten= 89%, Lag= 5.3 min
Primary = 1.82 cfs @ 0.19 hrs, Volume= 0.110 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 26.67' @ 0.19 hrs Surf.Area= 8,505 sf Storage= 5,374 cf

Plug-Flow detention time= 45.6 min calculated for 0.110 af (81% of inflow)
Center-of-Mass det. time= 45.2 min (51.2 - 6.0)

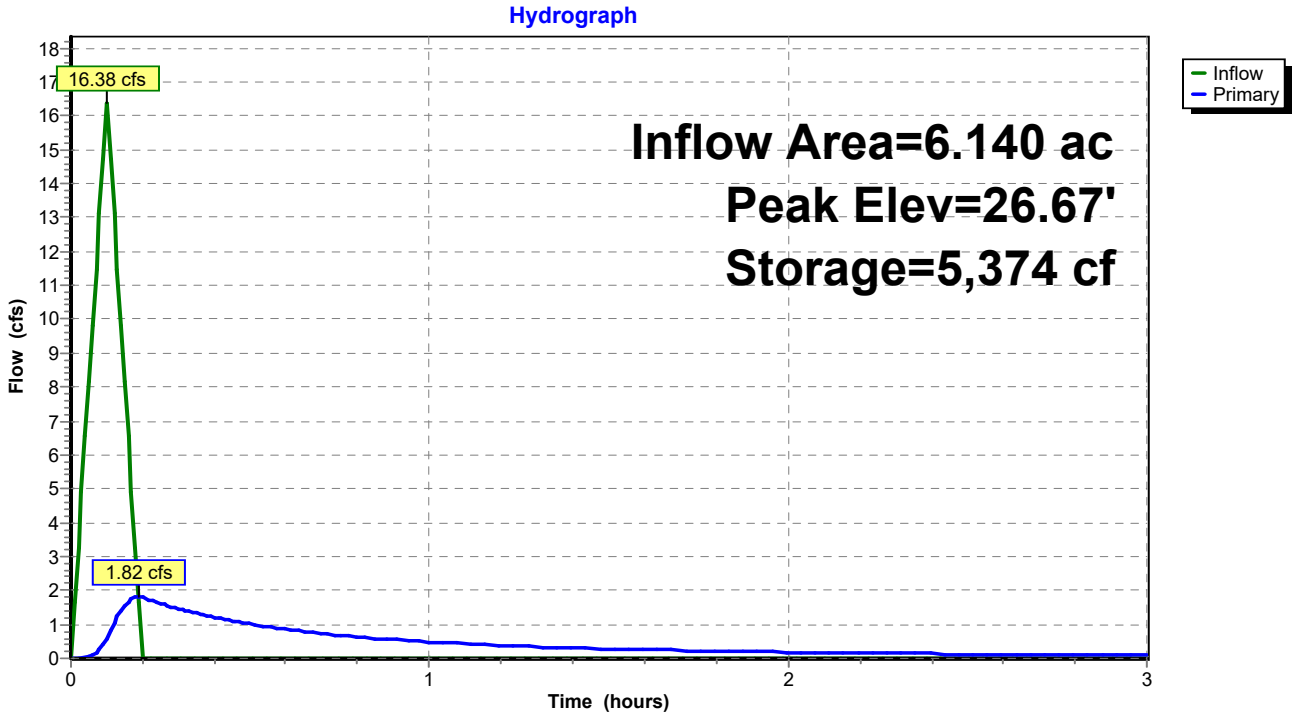
Volume	Invert	Avail.Storage	Storage Description
#1	26.00'	17,993 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
26.00	7,521	0	0
27.00	8,988	8,255	8,255
28.00	10,489	9,739	17,993

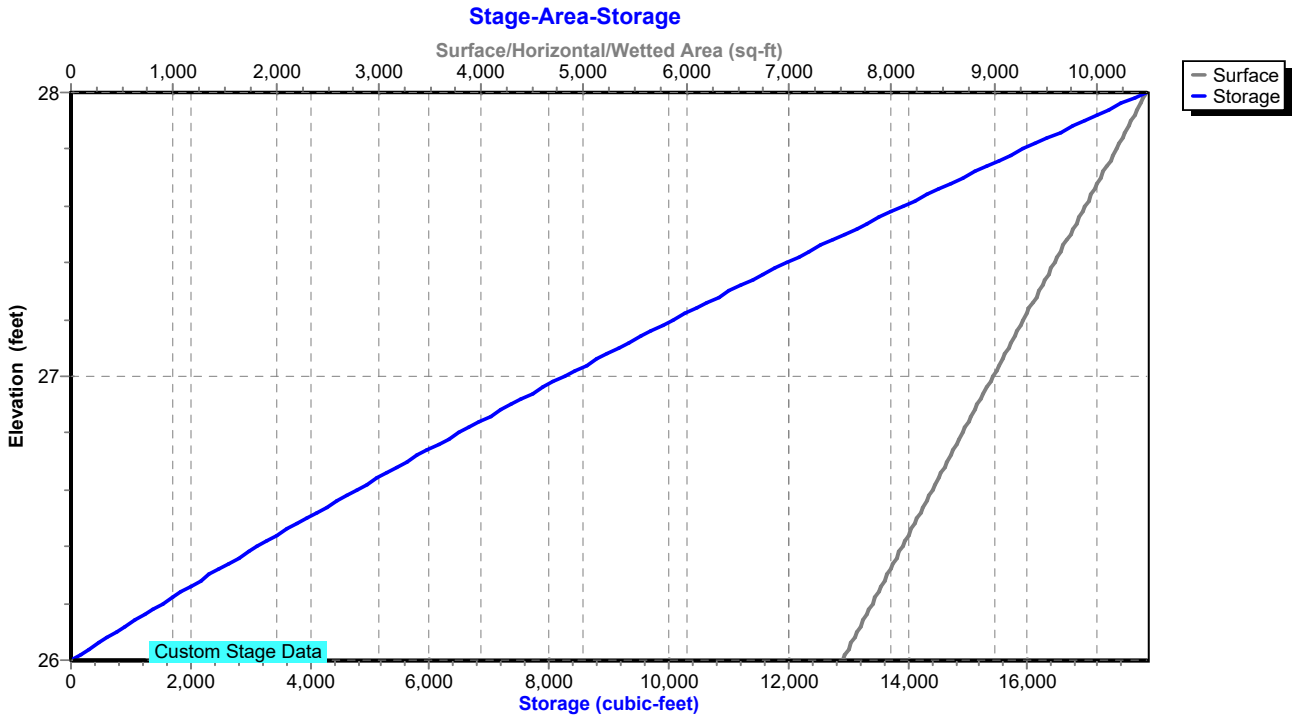
Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	26.00'	**24.0" Round Culvert** L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.00' / 25.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=1.81 cfs @ 0.19 hrs HW=26.67' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Culvert (Barrel Controls 1.81 cfs @ 2.93 fps)

Pond P-2: P-2



Pond P-2: P-2



Stage-Area-Storage for Pond P-2: P-2

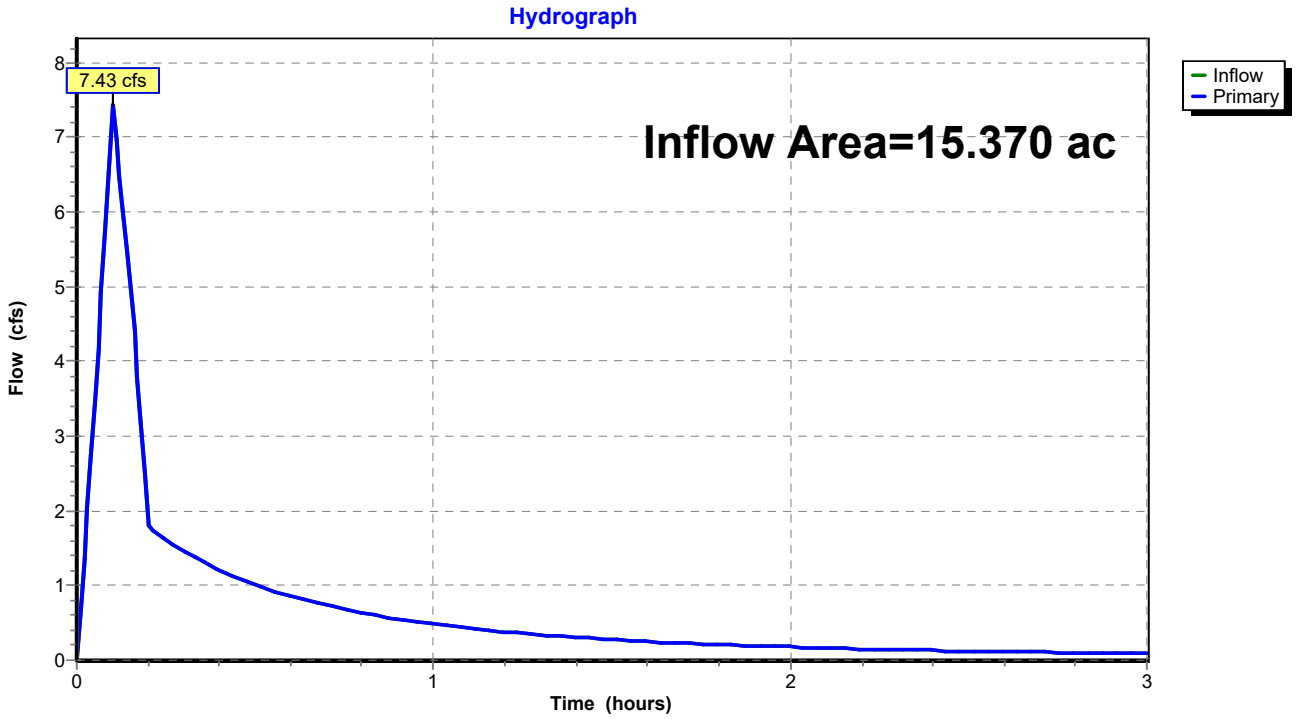
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
26.00	7,521	0
26.02	7,550	151
26.04	7,580	302
26.06	7,609	454
26.08	7,638	606
26.10	7,668	759
26.12	7,697	913
26.14	7,726	1,067
26.16	7,756	1,222
26.18	7,785	1,378
26.20	7,814	1,534
26.22	7,844	1,690
26.24	7,873	1,847
26.26	7,902	2,005
26.28	7,932	2,163
26.30	7,961	2,322
26.32	7,990	2,482
26.34	8,020	2,642
26.36	8,049	2,803
26.38	8,078	2,964
26.40	8,108	3,126
26.42	8,137	3,288
26.44	8,166	3,451
26.46	8,196	3,615
26.48	8,225	3,779
26.50	8,255	3,944
26.52	8,284	4,109
26.54	8,313	4,275
26.56	8,343	4,442
26.58	8,372	4,609
26.60	8,401	4,777
26.62	8,431	4,945
26.64	8,460	5,114
26.66	8,489	5,283
26.68	8,519	5,453
26.70	8,548	5,624
26.72	8,577	5,795
26.74	8,607	5,967
26.76	8,636	6,140
26.78	8,665	6,313
26.80	8,695	6,486
26.82	8,724	6,660
26.84	8,753	6,835
26.86	8,783	7,011
26.88	8,812	7,187
26.90	8,841	7,363
26.92	8,871	7,540
26.94	8,900	7,718
26.96	8,929	7,896
26.98	8,959	8,075
27.00	8,988	8,255
27.02	9,018	8,435
27.04	9,048	8,615
27.06	9,078	8,796
27.08	9,108	8,978
27.10	9,138	9,161
27.12	9,168	9,344
27.14	9,198	9,528
27.16	9,228	9,712
27.18	9,258	9,897
27.20	9,288	10,082
27.22	9,318	10,268
27.24	9,348	10,455
27.26	9,378	10,642
27.28	9,408	10,830
27.30	9,438	11,018
27.32	9,468	11,208
27.34	9,498	11,397
27.36	9,528	11,587
27.38	9,558	11,778
27.40	9,588	11,970
27.42	9,618	12,162
27.44	9,648	12,355
27.46	9,678	12,548
27.48	9,708	12,742
27.50	9,739	12,936
27.52	9,769	13,131
27.54	9,799	13,327
27.56	9,829	13,523
27.58	9,859	13,720
27.60	9,889	13,917
27.62	9,919	14,116
27.64	9,949	14,314
27.66	9,979	14,513
27.68	10,009	14,713
27.70	10,039	14,914
27.72	10,069	15,115
27.74	10,099	15,317
27.76	10,129	15,519
27.78	10,159	15,722
27.80	10,189	15,925
27.82	10,219	16,129
27.84	10,249	16,334
27.86	10,279	16,539
27.88	10,309	16,745
27.90	10,339	16,952
27.92	10,369	17,159
27.94	10,399	17,366
27.96	10,429	17,575
27.98	10,459	17,784
28.00	**10,489**	**17,993**

Summary for Link DP-1: DP-1

Inflow Area = 15.370 ac, 0.00% Impervious, Inflow Depth > 0.13" for 2-yr event
Inflow = 7.43 cfs @ 0.10 hrs, Volume= 0.166 af
Primary = 7.43 cfs @ 0.10 hrs, Volume= 0.166 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1

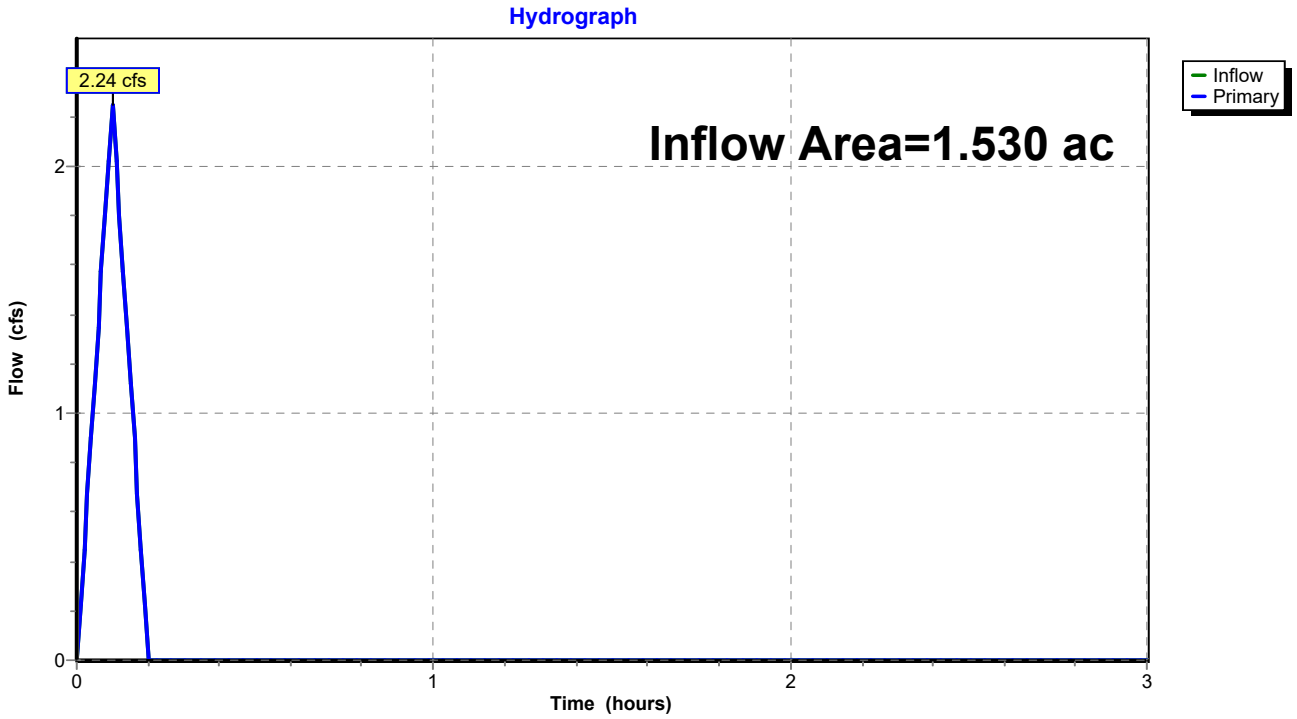


Summary for Link DP-2: DP-2

Inflow Area = 1.530 ac, 0.00% Impervious, Inflow Depth = 0.15" for 2-yr event
Inflow = 2.24 cfs @ 0.10 hrs, Volume= 0.019 af
Primary = 2.24 cfs @ 0.10 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-2: DP-2



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPD-1A: PD-1A Runoff Area=3.990 ac 0.00% Impervious Runoff Depth=0.25"
Tc=6.0 min C=0.38 Runoff=10.13 cfs 0.084 af

SubcatchmentPD-1B: PD-1B Runoff Area=3.870 ac 0.00% Impervious Runoff Depth=0.46"
Tc=6.0 min C=0.69 Runoff=17.85 cfs 0.147 af

SubcatchmentPD-1C: PD-1C Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.44"
Tc=6.0 min C=0.67 Runoff=6.13 cfs 0.051 af

SubcatchmentPD-1D: PD-1D Runoff Area=3.940 ac 0.00% Impervious Runoff Depth=0.41"
Tc=6.0 min C=0.62 Runoff=16.33 cfs 0.135 af

SubcatchmentPD-1E: PD-1E Runoff Area=1.040 ac 0.00% Impervious Runoff Depth=0.36"
Tc=6.0 min C=0.54 Runoff=3.75 cfs 0.031 af

SubcatchmentPD-1F: PD-1F Runoff Area=1.160 ac 0.00% Impervious Runoff Depth=0.36"
Tc=6.0 min C=0.55 Runoff=4.26 cfs 0.035 af

SubcatchmentPD-2A: PD-2A Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.21"
Tc=6.0 min C=0.32 Runoff=2.93 cfs 0.024 af

SubcatchmentPD-2B: PD-2B Runoff Area=0.160 ac 0.00% Impervious Runoff Depth=0.25"
Tc=6.0 min C=0.38 Runoff=0.41 cfs 0.003 af

Pond P-1: P-1 Peak Elev=30.87' Storage=8,607 cf Inflow=23.98 cfs 0.198 af
Discarded=0.06 cfs 0.013 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.013 af

Pond P-2: P-2 Peak Elev=26.95' Storage=7,766 cf Inflow=24.34 cfs 0.201 af
Outflow=3.42 cfs 0.174 af

Link DP-1: DP-1 Inflow=11.39 cfs 0.258 af
Primary=11.39 cfs 0.258 af

Link DP-2: DP-2 Inflow=3.34 cfs 0.028 af
Primary=3.34 cfs 0.028 af

Total Runoff Area = 16.900 ac Runoff Volume = 0.511 af Average Runoff Depth = 0.36"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment PD-1A: PD-1A

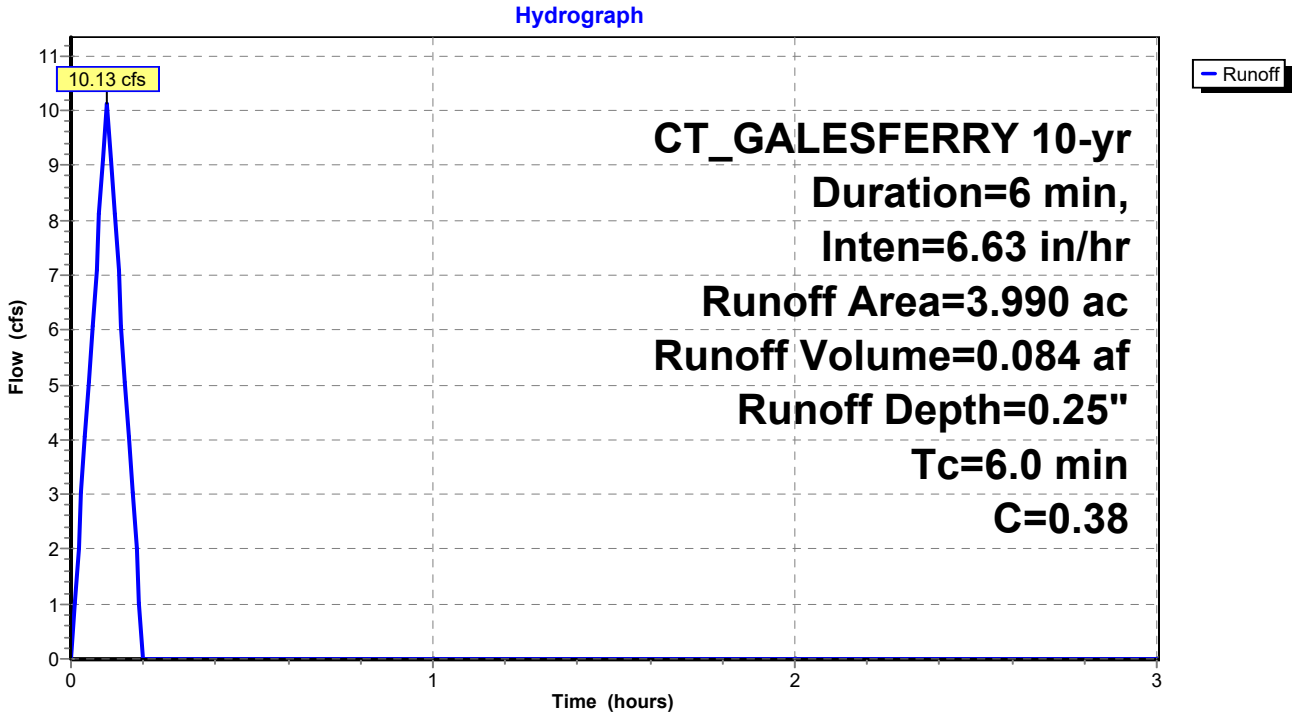
Runoff = 10.13 cfs @ 0.10 hrs, Volume= 0.084 af, Depth= 0.25"
Routed to Link DP-1 : DP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 10-yr Duration=6 min, Inten=6.63 in/hr

Area (ac)	C	Description
3.990	0.38	See C Worksheet in Appendix C
3.990		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 25.61**

Subcatchment PD-1A: PD-1A



Summary for Subcatchment PD-1B: PD-1B

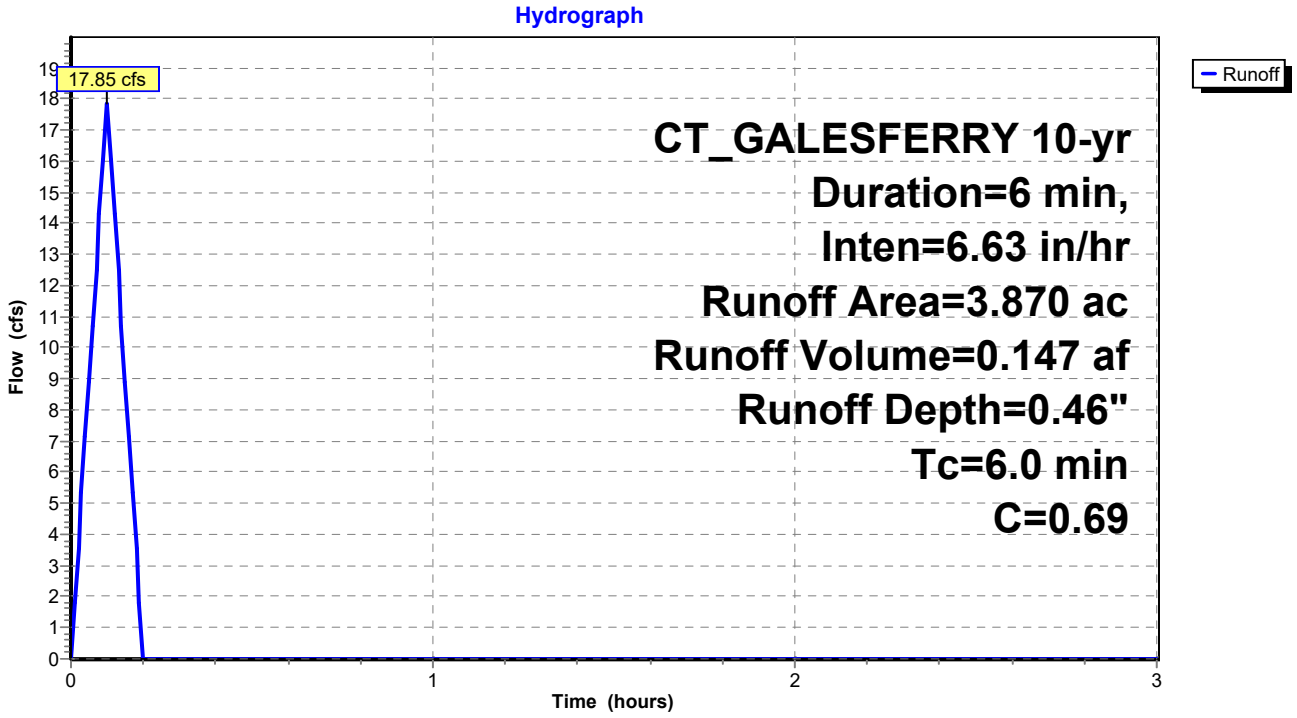
Runoff = 17.85 cfs @ 0.10 hrs, Volume= 0.147 af, Depth= 0.46"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 10-yr Duration=6 min, Inten=6.63 in/hr

Area (ac)	C	Description
3.870	0.69	See C Worksheet in Appendix C
3.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1B: PD-1B



Summary for Subcatchment PD-1C: PD-1C

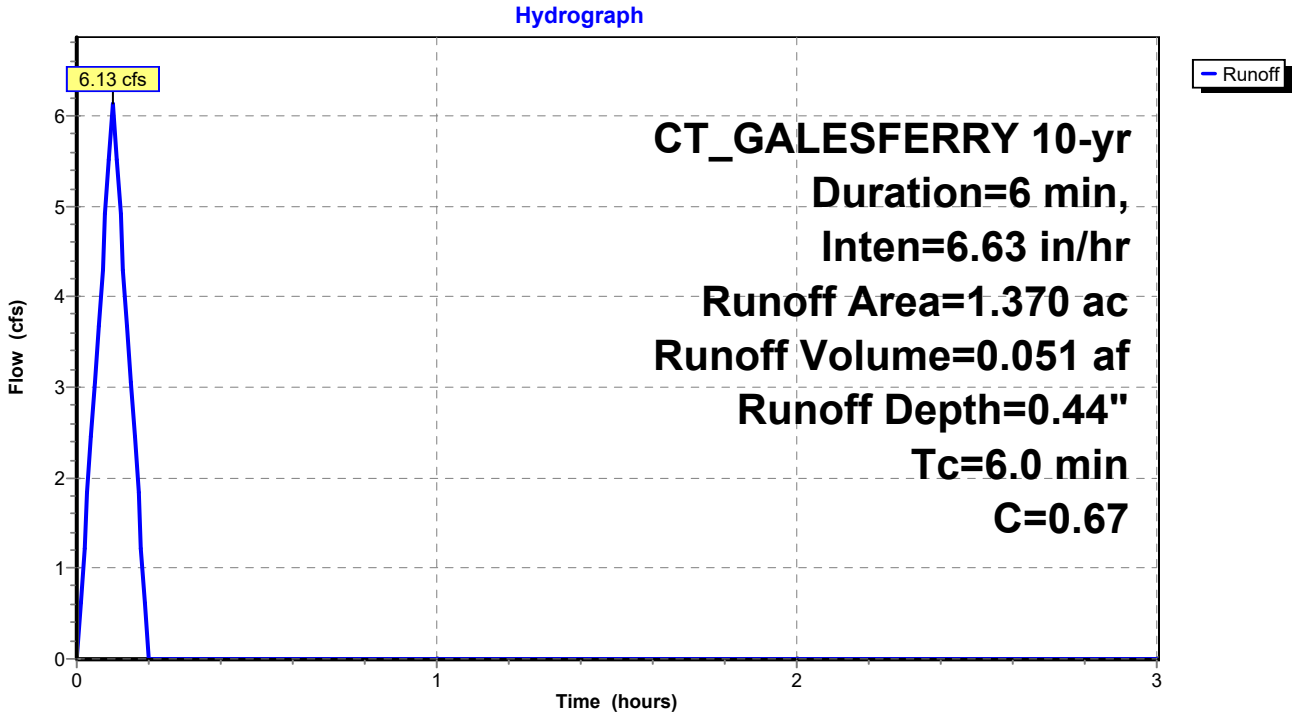
Runoff = 6.13 cfs @ 0.10 hrs, Volume= 0.051 af, Depth= 0.44"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 10-yr Duration=6 min, Inten=6.63 in/hr

Area (ac)	C	Description
1.370	0.67	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1C: PD-1C



Summary for Subcatchment PD-1D: PD-1D

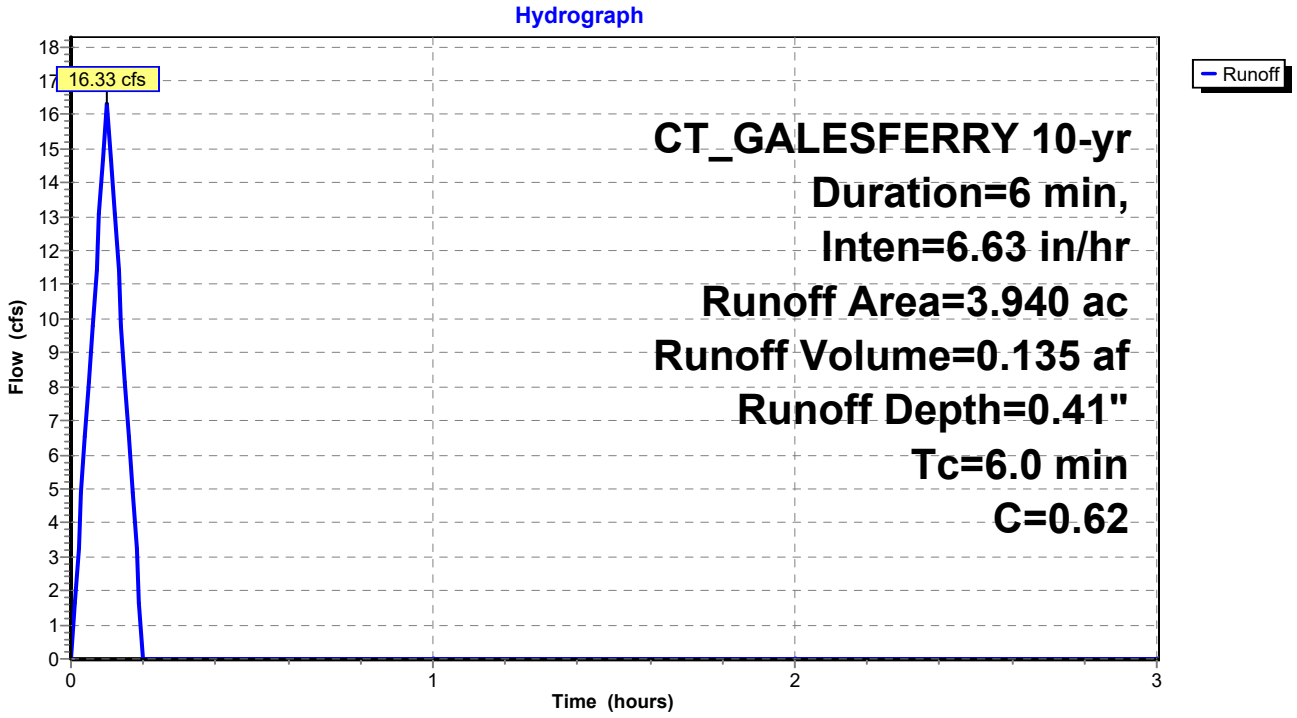
Runoff = 16.33 cfs @ 0.10 hrs, Volume= 0.135 af, Depth= 0.41"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 10-yr Duration=6 min, Inten=6.63 in/hr

Area (ac)	C	Description
3.940	0.62	See C Worksheet in Appendix C
3.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1D: PD-1D



Summary for Subcatchment PD-1E: PD-1E

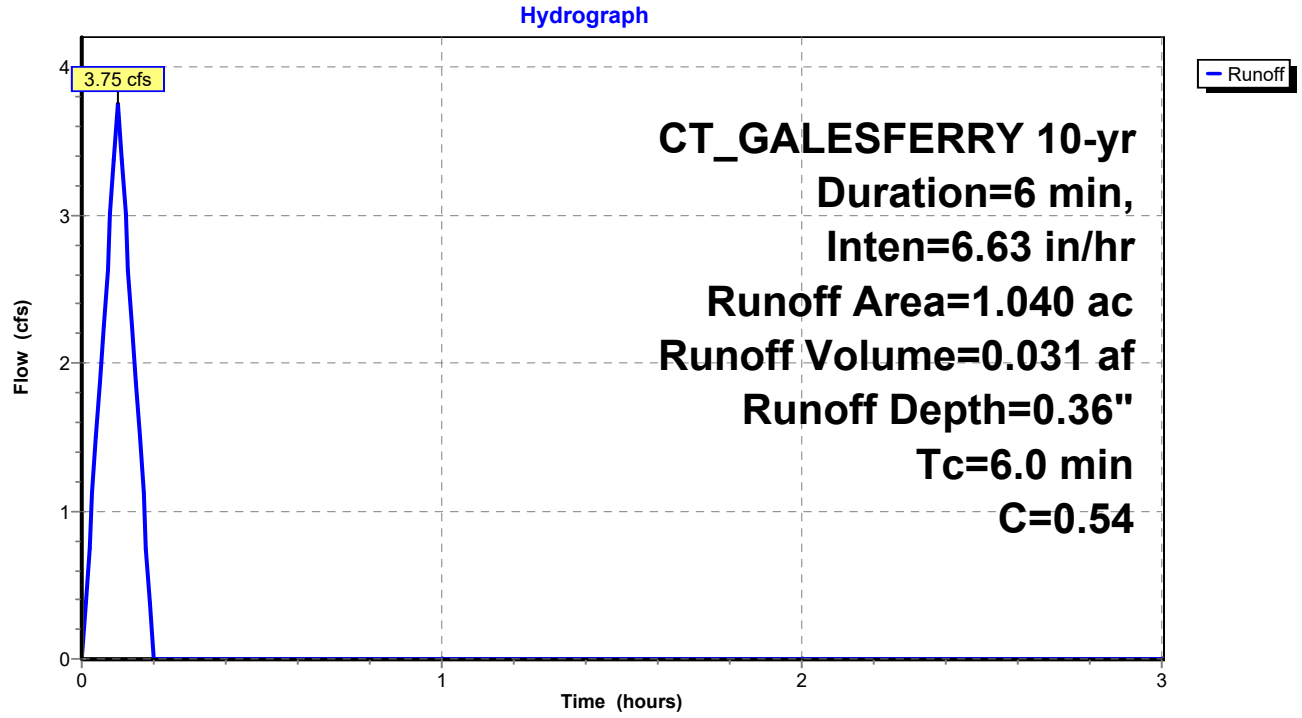
Runoff = 3.75 cfs @ 0.10 hrs, Volume= 0.031 af, Depth= 0.36"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 10-yr Duration=6 min, Inten=6.63 in/hr

Area (ac)	C	Description
1.040	0.54	See C Worksheet in Appendix C
1.040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1E: PD-1E



Summary for Subcatchment PD-1F: PD-1F

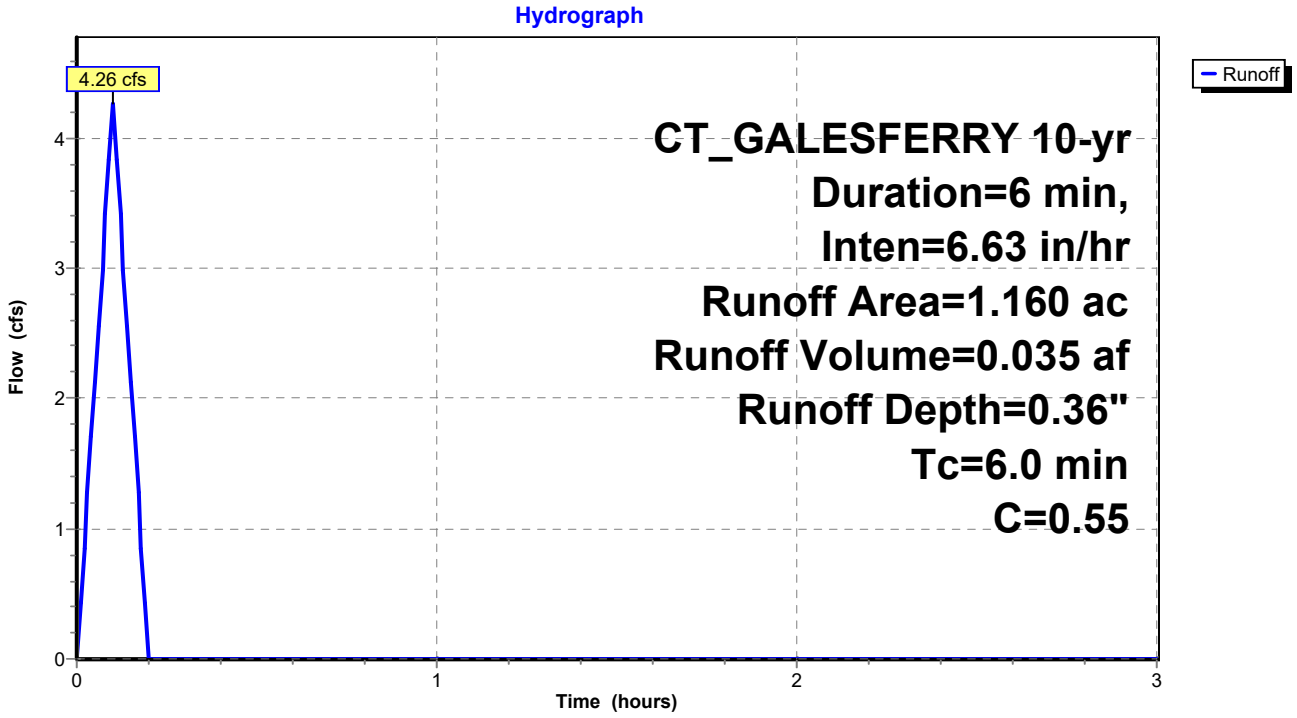
Runoff = 4.26 cfs @ 0.10 hrs, Volume= 0.035 af, Depth= 0.36"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 10-yr Duration=6 min, Inten=6.63 in/hr

Area (ac)	C	Description
1.160	0.55	See C Worksheet in Appendix C
1.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1F: PD-1F



Summary for Subcatchment PD-2A: PD-2A

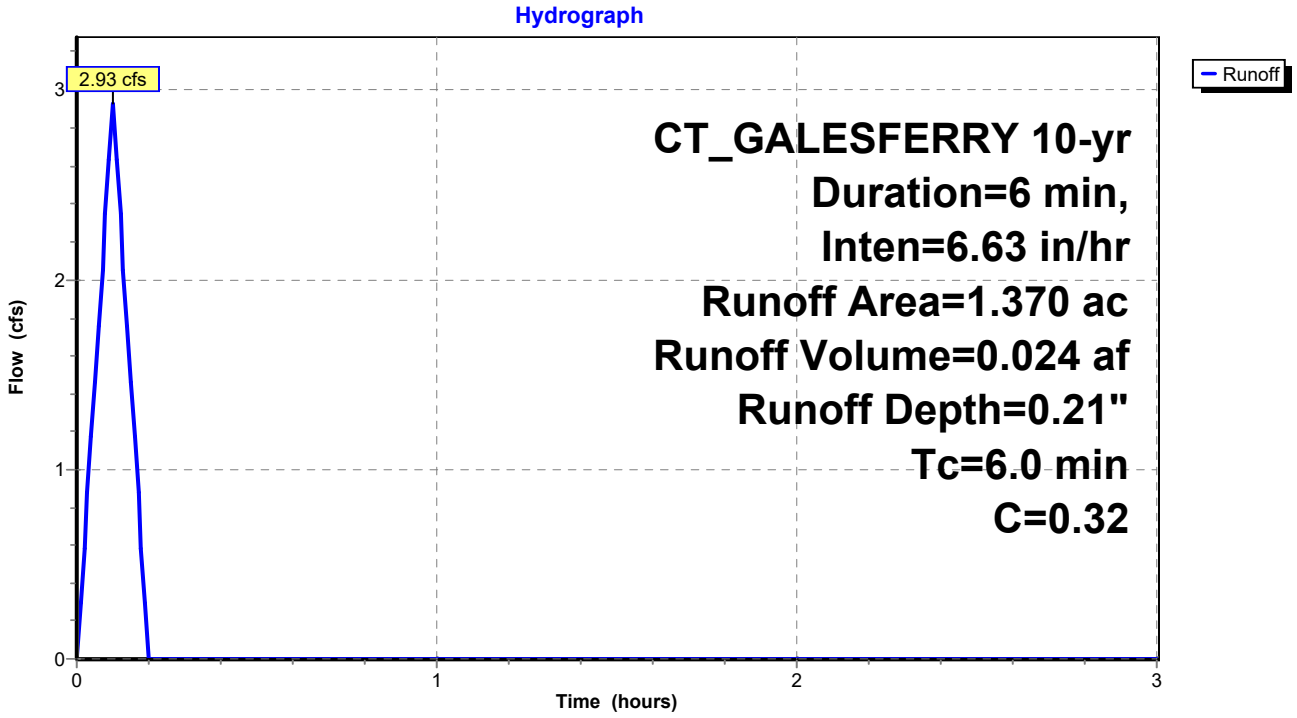
Runoff = 2.93 cfs @ 0.10 hrs, Volume= 0.024 af, Depth= 0.21"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 10-yr Duration=6 min, Inten=6.63 in/hr

Area (ac)	C	Description
1.370	0.32	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2A: PD-2A



Summary for Subcatchment PD-2B: PD-2B

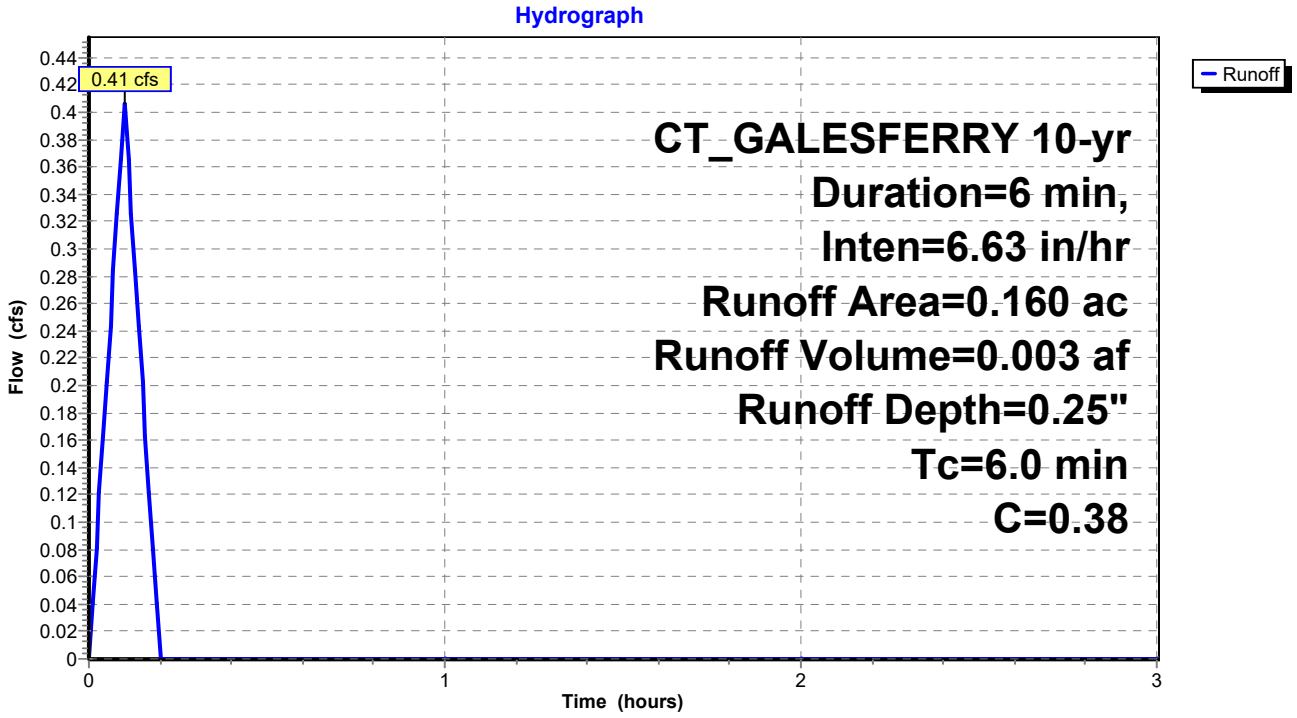
Runoff = 0.41 cfs @ 0.10 hrs, Volume= 0.003 af, Depth= 0.25"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 10-yr Duration=6 min, Inten=6.63 in/hr

Area (ac)	C	Description
0.160	0.38	See C Worksheet in Appendix C
0.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2B: PD-2B



Summary for Pond P-1: P-1

Inflow Area = 5.240 ac, 0.00% Impervious, Inflow Depth = 0.45" for 10-yr event
Inflow = 23.98 cfs @ 0.10 hrs, Volume= 0.198 af
Outflow = 0.06 cfs @ 0.20 hrs, Volume= 0.013 af, Atten= 100%, Lag= 6.0 min
Discarded = 0.06 cfs @ 0.20 hrs, Volume= 0.013 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 30.87' @ 0.20 hrs Surf.Area= 6,639 sf Storage= 8,607 cf

Plug-Flow detention time= 89.8 min calculated for 0.013 af (7% of inflow)
Center-of-Mass det. time= 85.6 min (91.6 - 6.0)

Volume	Invert	Avail.Storage	Storage Description
#1	29.00'	17,554 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

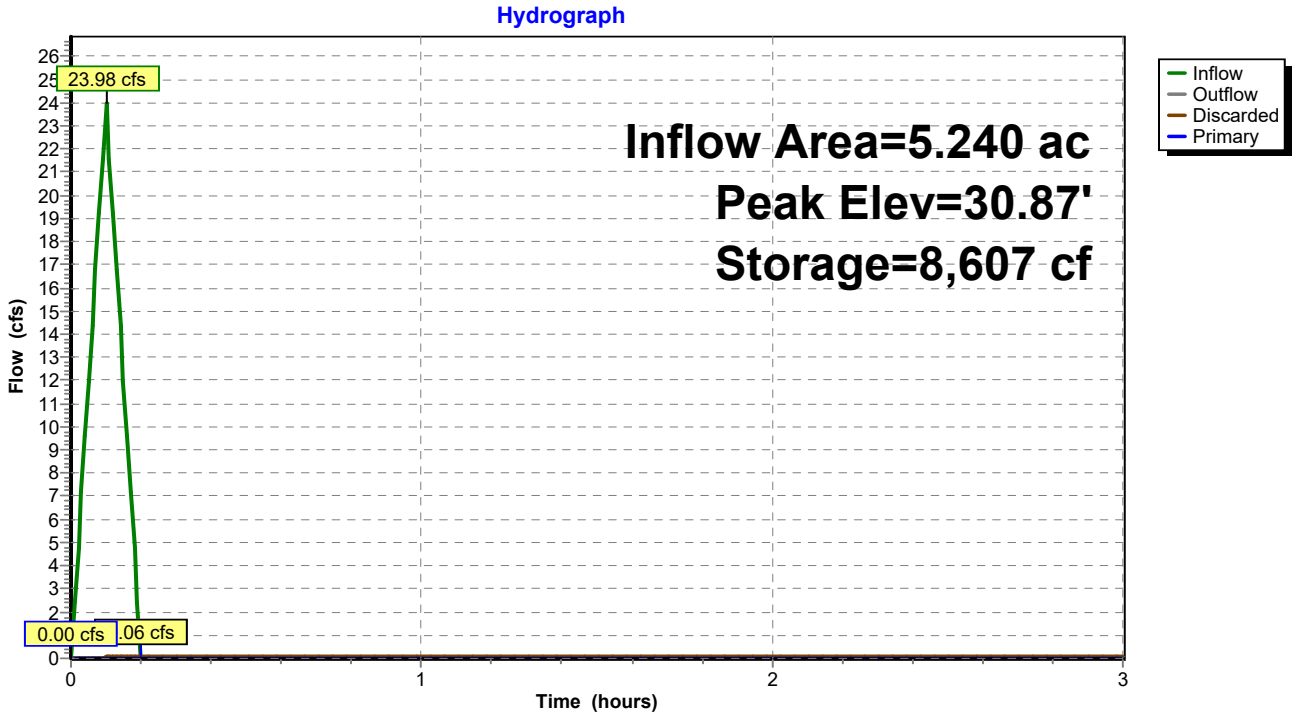
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
29.00	2,602	0	0
30.00	4,737	3,670	3,670
31.00	6,928	5,833	9,502
32.00	9,176	8,052	17,554

Device	Routing	Invert	Outlet Devices
#1	Primary	31.44'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	29.00'	**0.260 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 26.00' Phase-In= 0.01'

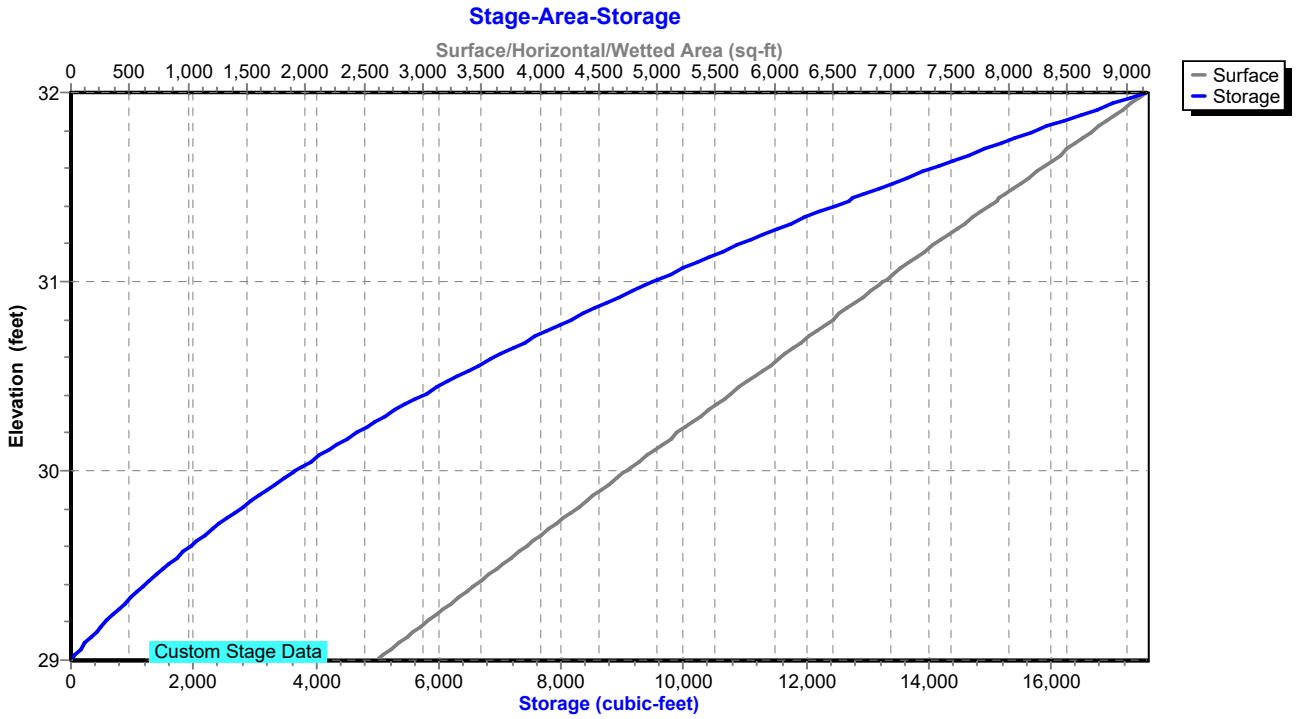
Discarded OutFlow Max=0.06 cfs @ 0.20 hrs HW=30.87' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=29.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P-1: P-1



Pond P-1: P-1



Stage-Area-Storage for Pond P-1: P-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
29.00	2,602	0
29.05	2,709	133
29.10	2,816	271
29.15	2,922	414
29.20	3,029	563
29.25	3,136	717
29.30	3,243	877
29.35	3,349	1,041
29.40	3,456	1,212
29.45	3,563	1,387
29.50	3,670	1,568
29.55	3,776	1,754
29.60	3,883	1,946
29.65	3,990	2,142
29.70	4,096	2,344
29.75	4,203	2,552
29.80	4,310	2,765
29.85	4,417	2,983
29.90	4,523	3,206
29.95	4,630	3,435
30.00	4,737	3,670
30.05	4,847	3,909
30.10	4,956	4,154
30.15	5,066	4,405
30.20	5,175	4,661
30.25	5,285	4,922
30.30	5,394	5,189
30.35	5,504	5,462
30.40	5,613	5,740
30.45	5,723	6,023
30.50	5,833	6,312
30.55	5,942	6,606
30.60	6,052	6,906
30.65	6,161	7,211
30.70	6,271	7,522
30.75	6,380	7,838
30.80	6,490	8,160
30.85	6,599	8,487
30.90	6,709	8,820
30.95	6,818	9,158
31.00	6,928	9,502
31.05	7,040	9,851
31.10	7,153	10,206
31.15	7,265	10,566
31.20	7,378	10,933
31.25	7,490	11,304
31.30	7,602	11,682
31.35	7,715	12,064
31.40	7,827	12,453
31.45	7,940	12,847
31.50	8,052	13,247
31.55	8,164	13,652
31.60	8,277	14,063
31.65	8,389	14,480
31.70	8,502	14,902
31.75	8,614	15,330
31.80	8,726	15,764
31.85	8,839	16,203
31.90	8,951	16,648
31.95	9,064	17,098
32.00	**9,176**	**17,554**

Summary for Pond P-2: P-2

Inflow Area = 6.140 ac, 0.00% Impervious, Inflow Depth = 0.39" for 10-yr event
Inflow = 24.34 cfs @ 0.10 hrs, Volume= 0.201 af
Outflow = 3.42 cfs @ 0.19 hrs, Volume= 0.174 af, Atten= 86%, Lag= 5.2 min
Primary = 3.42 cfs @ 0.19 hrs, Volume= 0.174 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 26.95' @ 0.19 hrs Surf.Area= 8,908 sf Storage= 7,766 cf

Plug-Flow detention time= 40.2 min calculated for 0.174 af (86% of inflow)
Center-of-Mass det. time= 39.5 min (45.5 - 6.0)

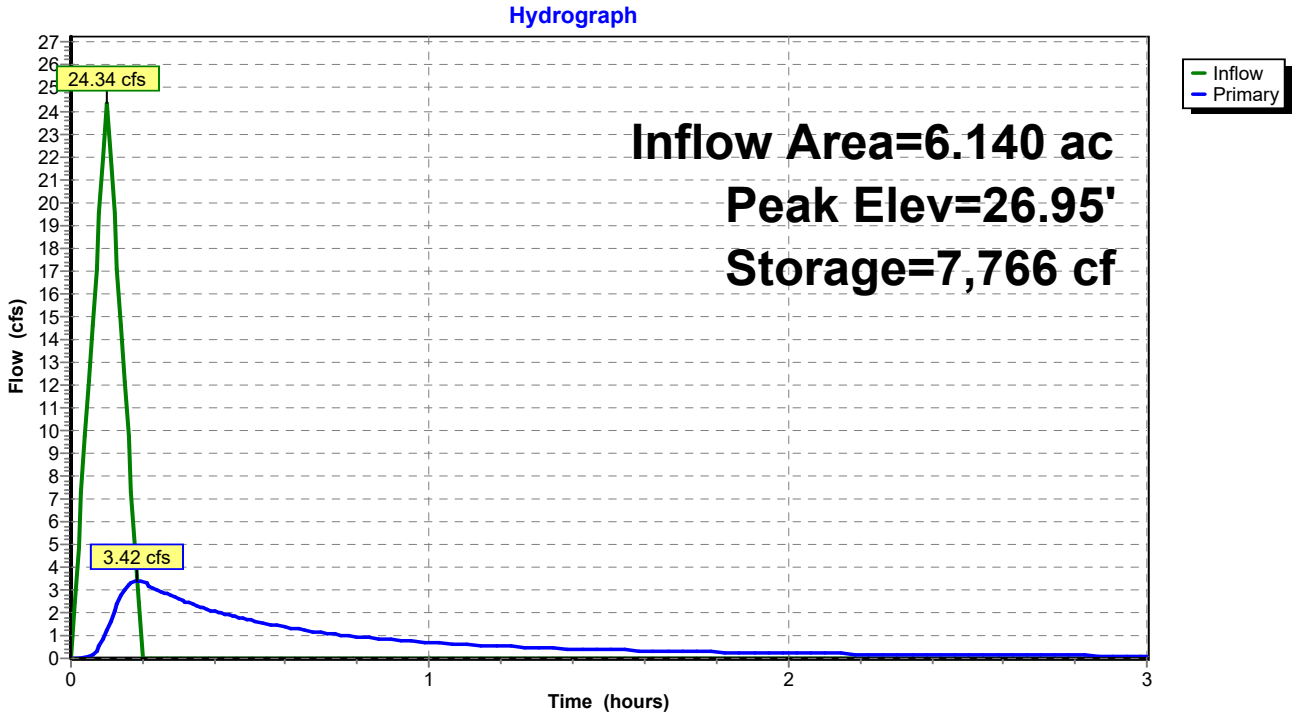
Volume	Invert	Avail.Storage	Storage Description
#1	26.00'	17,993 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
26.00	7,521	0	0
27.00	8,988	8,255	8,255
28.00	10,489	9,739	17,993

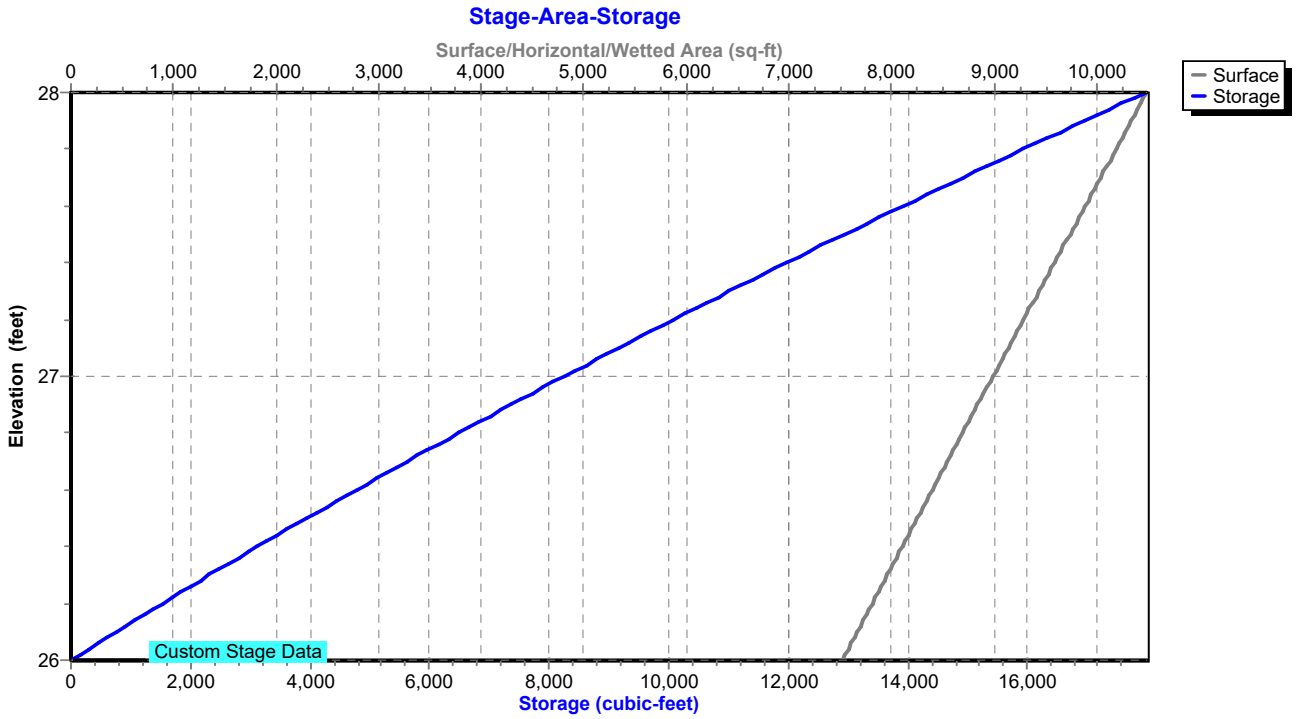
Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	26.00'	**24.0" Round Culvert** L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.00' / 25.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=3.41 cfs @ 0.19 hrs HW=26.94' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Culvert (Barrel Controls 3.41 cfs @ 3.42 fps)

Pond P-2: P-2



Pond P-2: P-2



Stage-Area-Storage for Pond P-2: P-2

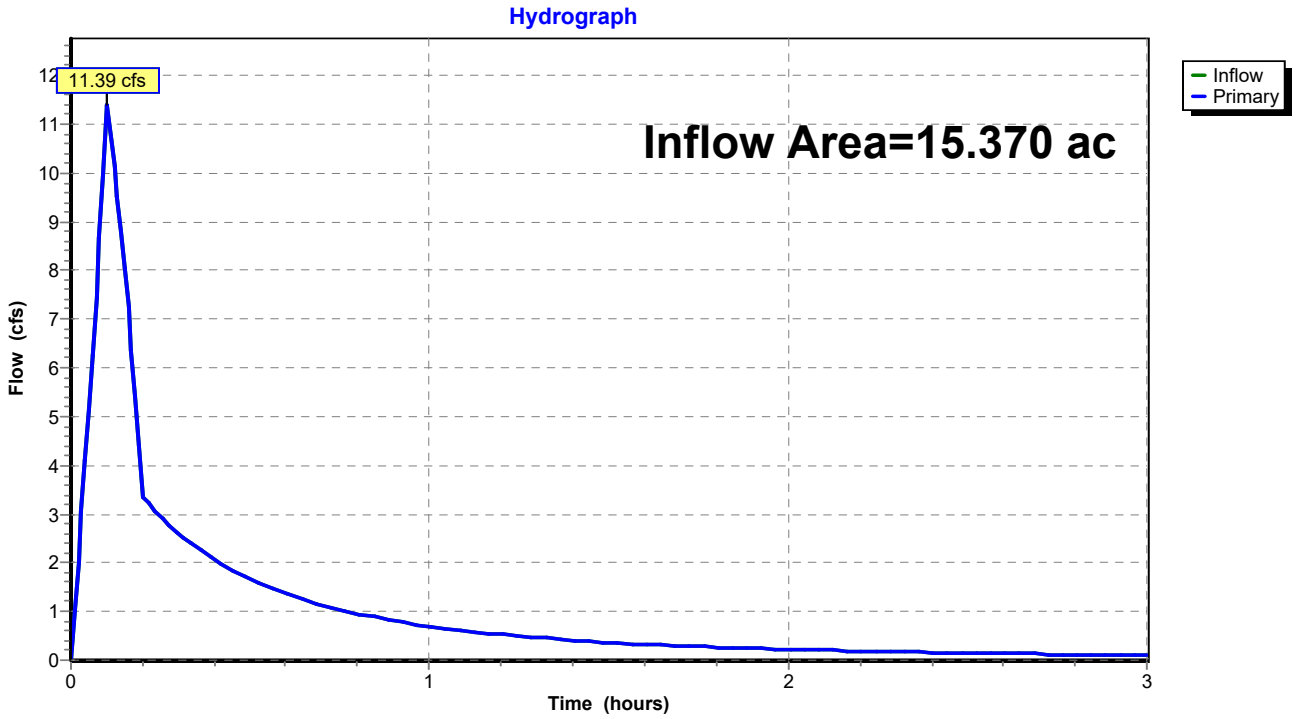
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
26.00	7,521	0
26.02	7,550	151
26.04	7,580	302
26.06	7,609	454
26.08	7,638	606
26.10	7,668	759
26.12	7,697	913
26.14	7,726	1,067
26.16	7,756	1,222
26.18	7,785	1,378
26.20	7,814	1,534
26.22	7,844	1,690
26.24	7,873	1,847
26.26	7,902	2,005
26.28	7,932	2,163
26.30	7,961	2,322
26.32	7,990	2,482
26.34	8,020	2,642
26.36	8,049	2,803
26.38	8,078	2,964
26.40	8,108	3,126
26.42	8,137	3,288
26.44	8,166	3,451
26.46	8,196	3,615
26.48	8,225	3,779
26.50	8,255	3,944
26.52	8,284	4,109
26.54	8,313	4,275
26.56	8,343	4,442
26.58	8,372	4,609
26.60	8,401	4,777
26.62	8,431	4,945
26.64	8,460	5,114
26.66	8,489	5,283
26.68	8,519	5,453
26.70	8,548	5,624
26.72	8,577	5,795
26.74	8,607	5,967
26.76	8,636	6,140
26.78	8,665	6,313
26.80	8,695	6,486
26.82	8,724	6,660
26.84	8,753	6,835
26.86	8,783	7,011
26.88	8,812	7,187
26.90	8,841	7,363
26.92	8,871	7,540
26.94	8,900	7,718
26.96	8,929	7,896
26.98	8,959	8,075
27.00	8,988	8,255
27.02	9,018	8,435
27.04	9,048	8,615
27.06	9,078	8,796
27.08	9,108	8,978
27.10	9,138	9,161
27.12	9,168	9,344
27.14	9,198	9,528
27.16	9,228	9,712
27.18	9,258	9,897
27.20	9,288	10,082
27.22	9,318	10,268
27.24	9,348	10,455
27.26	9,378	10,642
27.28	9,408	10,830
27.30	9,438	11,018
27.32	9,468	11,208
27.34	9,498	11,397
27.36	9,528	11,587
27.38	9,558	11,778
27.40	9,588	11,970
27.42	9,618	12,162
27.44	9,648	12,355
27.46	9,678	12,548
27.48	9,708	12,742
27.50	9,739	12,936
27.52	9,769	13,131
27.54	9,799	13,327
27.56	9,829	13,523
27.58	9,859	13,720
27.60	9,889	13,917
27.62	9,919	14,116
27.64	9,949	14,314
27.66	9,979	14,513
27.68	10,009	14,713
27.70	10,039	14,914
27.72	10,069	15,115
27.74	10,099	15,317
27.76	10,129	15,519
27.78	10,159	15,722
27.80	10,189	15,925
27.82	10,219	16,129
27.84	10,249	16,334
27.86	10,279	16,539
27.88	10,309	16,745
27.90	10,339	16,952
27.92	10,369	17,159
27.94	10,399	17,366
27.96	10,429	17,575
27.98	10,459	17,784
28.00	**10,489**	**17,993**

Summary for Link DP-1: DP-1

Inflow Area = 15.370 ac, 0.00% Impervious, Inflow Depth > 0.20" for 10-yr event
Inflow = 11.39 cfs @ 0.10 hrs, Volume= 0.258 af
Primary = 11.39 cfs @ 0.10 hrs, Volume= 0.258 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1

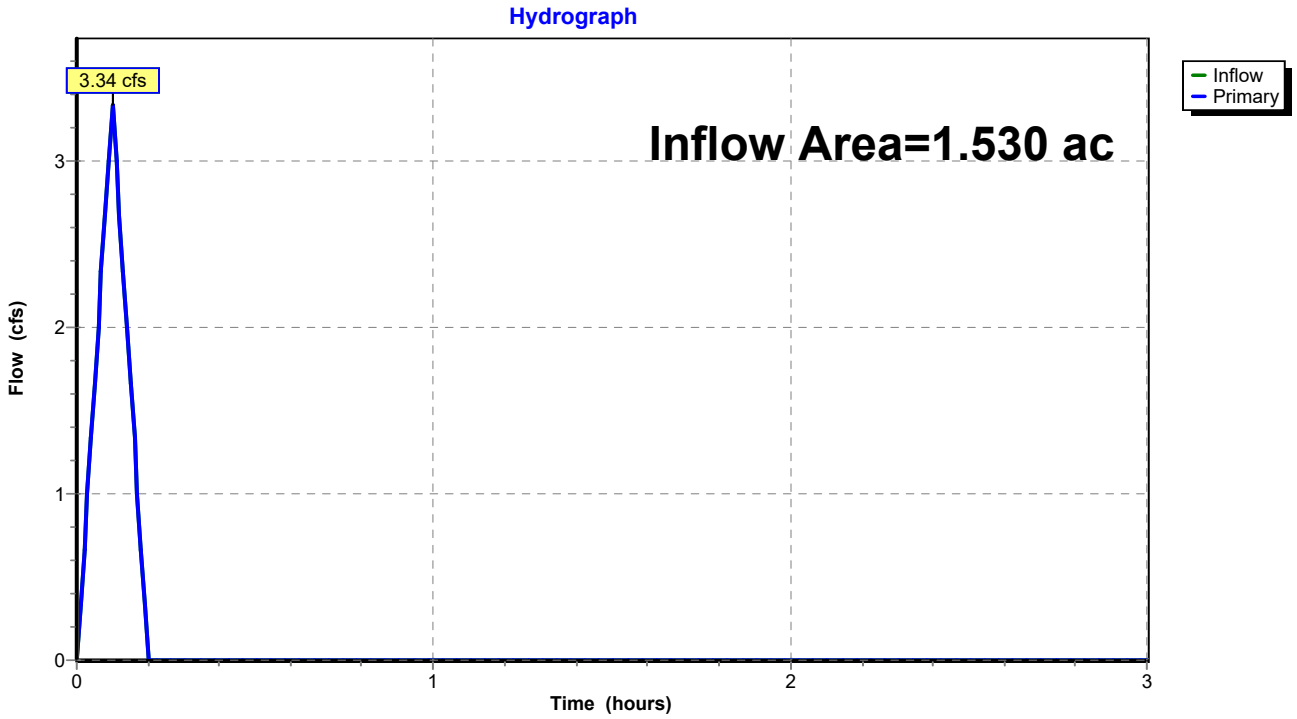


Summary for Link DP-2: DP-2

Inflow Area = 1.530 ac, 0.00% Impervious, Inflow Depth = 0.22" for 10-yr event
Inflow = 3.34 cfs @ 0.10 hrs, Volume= 0.028 af
Primary = 3.34 cfs @ 0.10 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-2: DP-2



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPD-1A: PD-1A Runoff Area=3.990 ac 0.00% Impervious Runoff Depth=0.30"
Tc=6.0 min C=0.38 Runoff=12.19 cfs 0.101 af

SubcatchmentPD-1B: PD-1B Runoff Area=3.870 ac 0.00% Impervious Runoff Depth=0.55"
Tc=6.0 min C=0.69 Runoff=21.48 cfs 0.177 af

SubcatchmentPD-1C: PD-1C Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.53"
Tc=6.0 min C=0.67 Runoff=7.38 cfs 0.061 af

SubcatchmentPD-1D: PD-1D Runoff Area=3.940 ac 0.00% Impervious Runoff Depth=0.49"
Tc=6.0 min C=0.62 Runoff=19.65 cfs 0.162 af

SubcatchmentPD-1E: PD-1E Runoff Area=1.040 ac 0.00% Impervious Runoff Depth=0.43"
Tc=6.0 min C=0.54 Runoff=4.52 cfs 0.037 af

SubcatchmentPD-1F: PD-1F Runoff Area=1.160 ac 0.00% Impervious Runoff Depth=0.44"
Tc=6.0 min C=0.55 Runoff=5.13 cfs 0.042 af

SubcatchmentPD-2A: PD-2A Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.26"
Tc=6.0 min C=0.32 Runoff=3.53 cfs 0.029 af

SubcatchmentPD-2B: PD-2B Runoff Area=0.160 ac 0.00% Impervious Runoff Depth=0.30"
Tc=6.0 min C=0.38 Runoff=0.49 cfs 0.004 af

Pond P-1: P-1 Peak Elev=31.12' Storage=10,360 cf Inflow=28.86 cfs 0.238 af
Discarded=0.06 cfs 0.015 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.015 af

Pond P-2: P-2 Peak Elev=27.11' Storage=9,213 cf Inflow=29.29 cfs 0.242 af
Outflow=4.52 cfs 0.214 af

Link DP-1: DP-1 Inflow=13.93 cfs 0.315 af
Primary=13.93 cfs 0.315 af

Link DP-2: DP-2 Inflow=4.01 cfs 0.033 af
Primary=4.01 cfs 0.033 af

Total Runoff Area = 16.900 ac Runoff Volume = 0.615 af Average Runoff Depth = 0.44"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment PD-1A: PD-1A

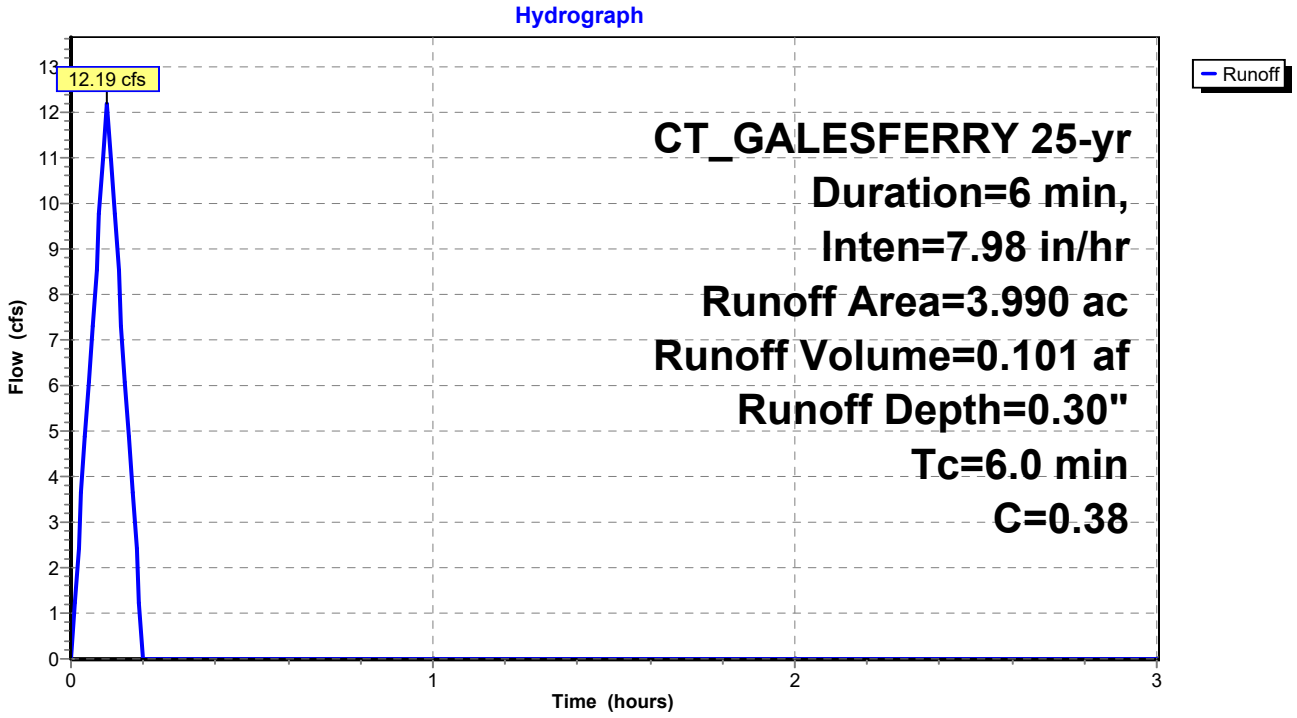
Runoff = 12.19 cfs @ 0.10 hrs, Volume= 0.101 af, Depth= 0.30"
Routed to Link DP-1 : DP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 25-yr Duration=6 min, Inten=7.98 in/hr

Area (ac)	C	Description
3.990	0.38	See C Worksheet in Appendix C
3.990		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 25.61**

Subcatchment PD-1A: PD-1A



Summary for Subcatchment PD-1B: PD-1B

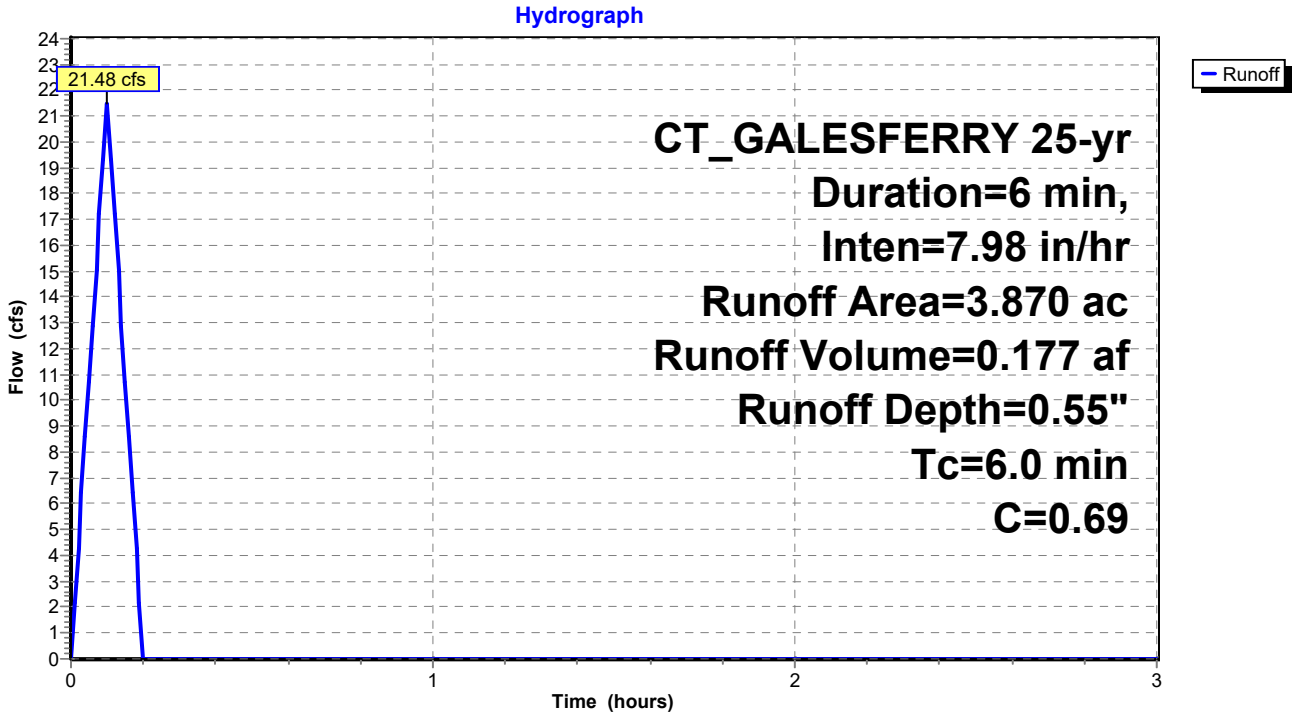
Runoff = 21.48 cfs @ 0.10 hrs, Volume= 0.177 af, Depth= 0.55"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 25-yr Duration=6 min, Inten=7.98 in/hr

Area (ac)	C	Description
3.870	0.69	See C Worksheet in Appendix C
3.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1B: PD-1B



Summary for Subcatchment PD-1C: PD-1C

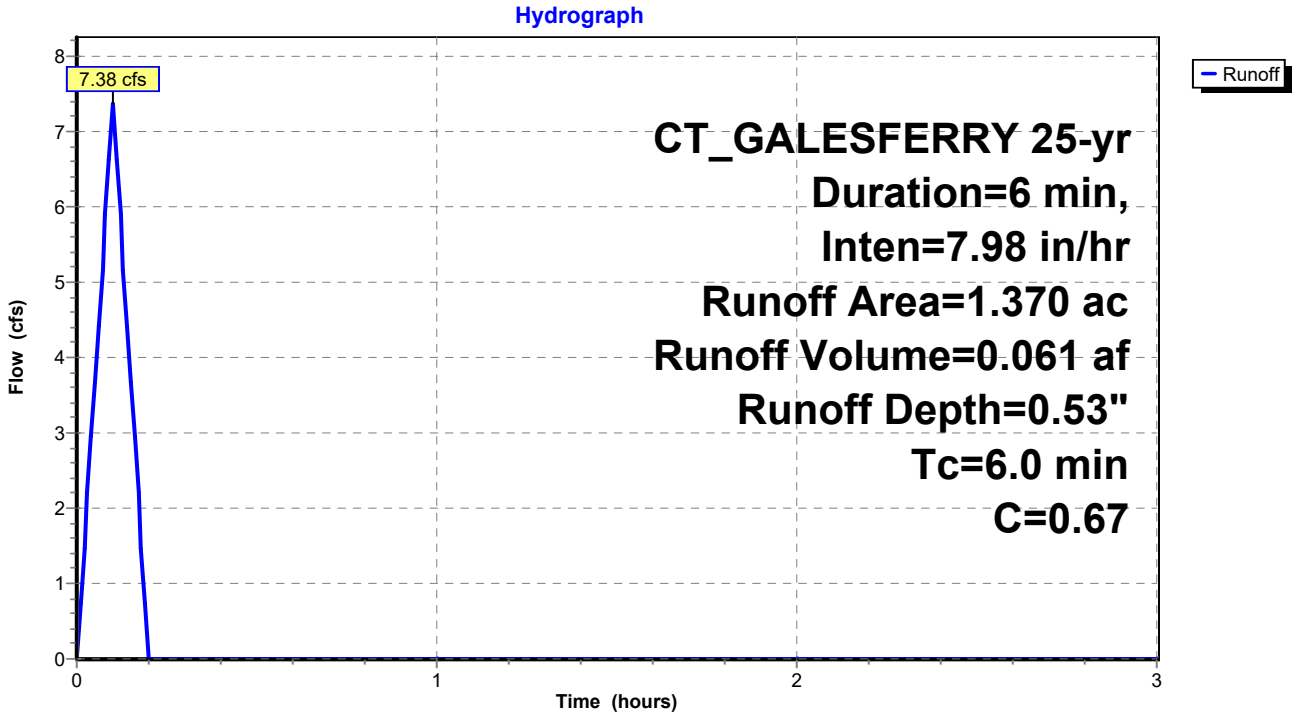
Runoff = 7.38 cfs @ 0.10 hrs, Volume= 0.061 af, Depth= 0.53"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 25-yr Duration=6 min, Inten=7.98 in/hr

Area (ac)	C	Description
1.370	0.67	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1C: PD-1C



Summary for Subcatchment PD-1D: PD-1D

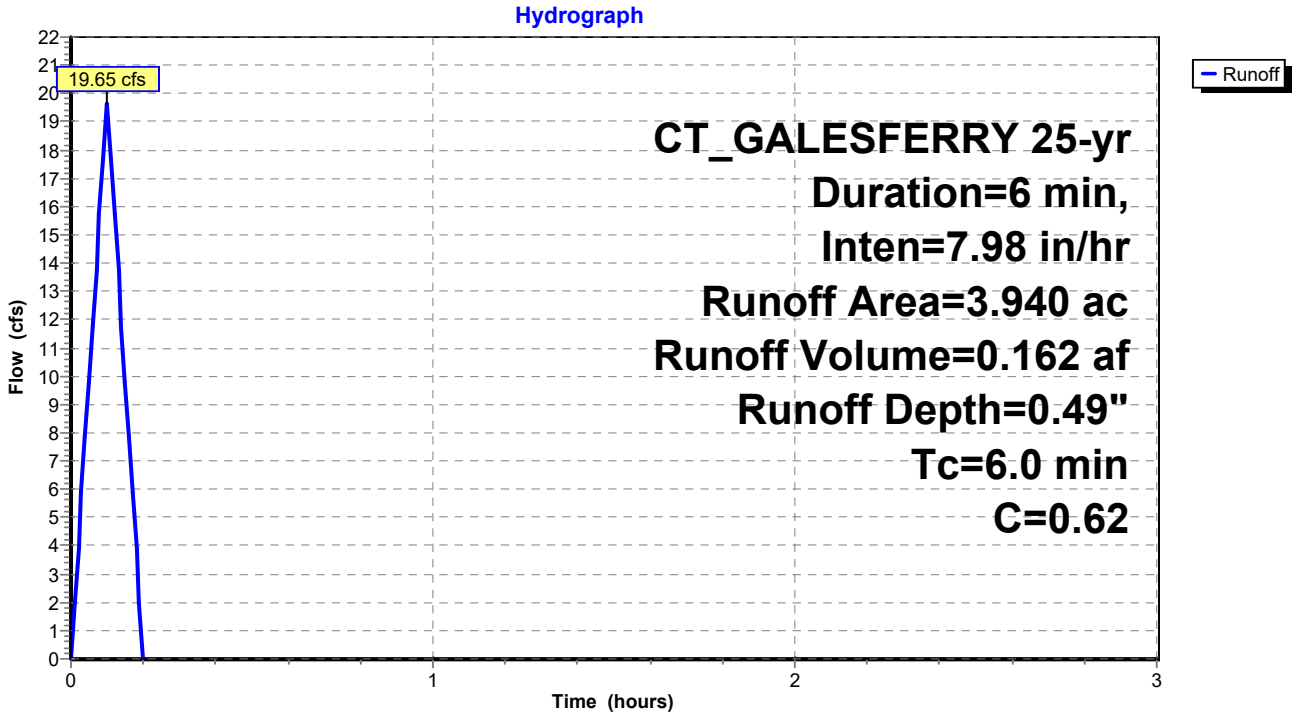
Runoff = 19.65 cfs @ 0.10 hrs, Volume= 0.162 af, Depth= 0.49"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 25-yr Duration=6 min, Inten=7.98 in/hr

Area (ac)	C	Description
3.940	0.62	See C Worksheet in Appendix C
3.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1D: PD-1D



Summary for Subcatchment PD-1E: PD-1E

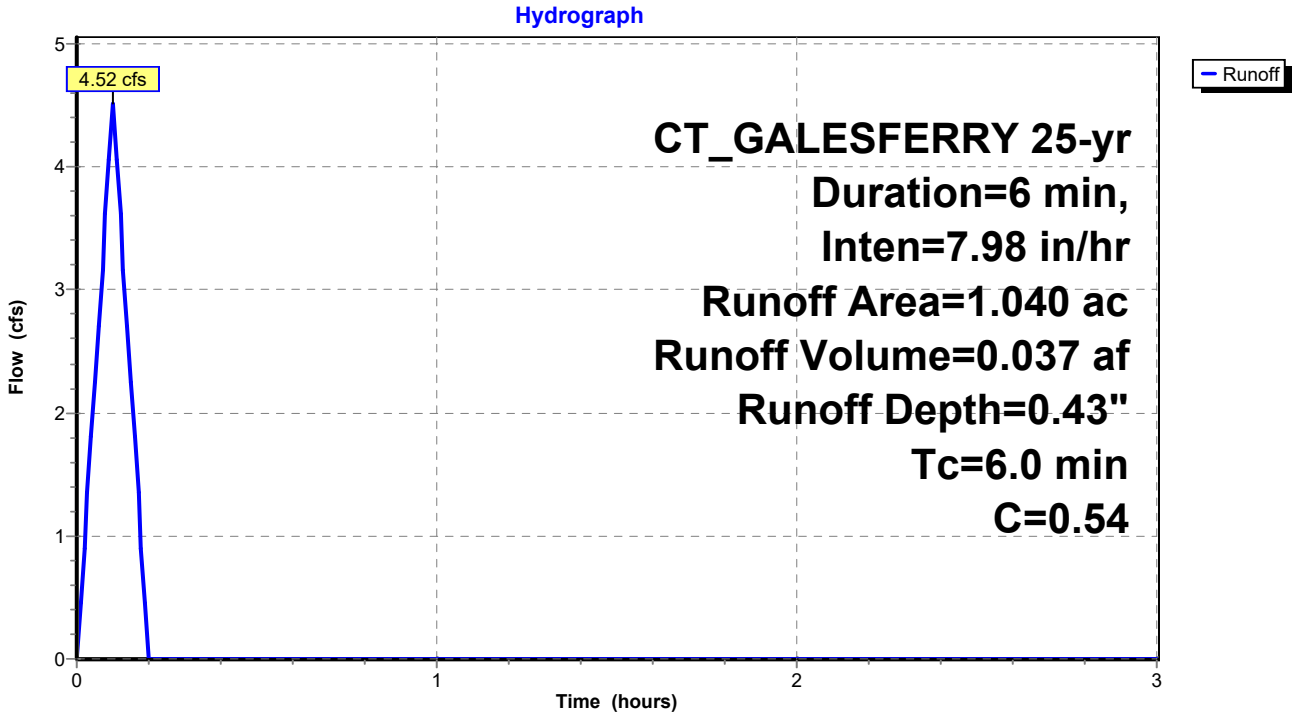
Runoff = 4.52 cfs @ 0.10 hrs, Volume= 0.037 af, Depth= 0.43"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 25-yr Duration=6 min, Inten=7.98 in/hr

Area (ac)	C	Description
1.040	0.54	See C Worksheet in Appendix C
1.040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1E: PD-1E



Summary for Subcatchment PD-1F: PD-1F

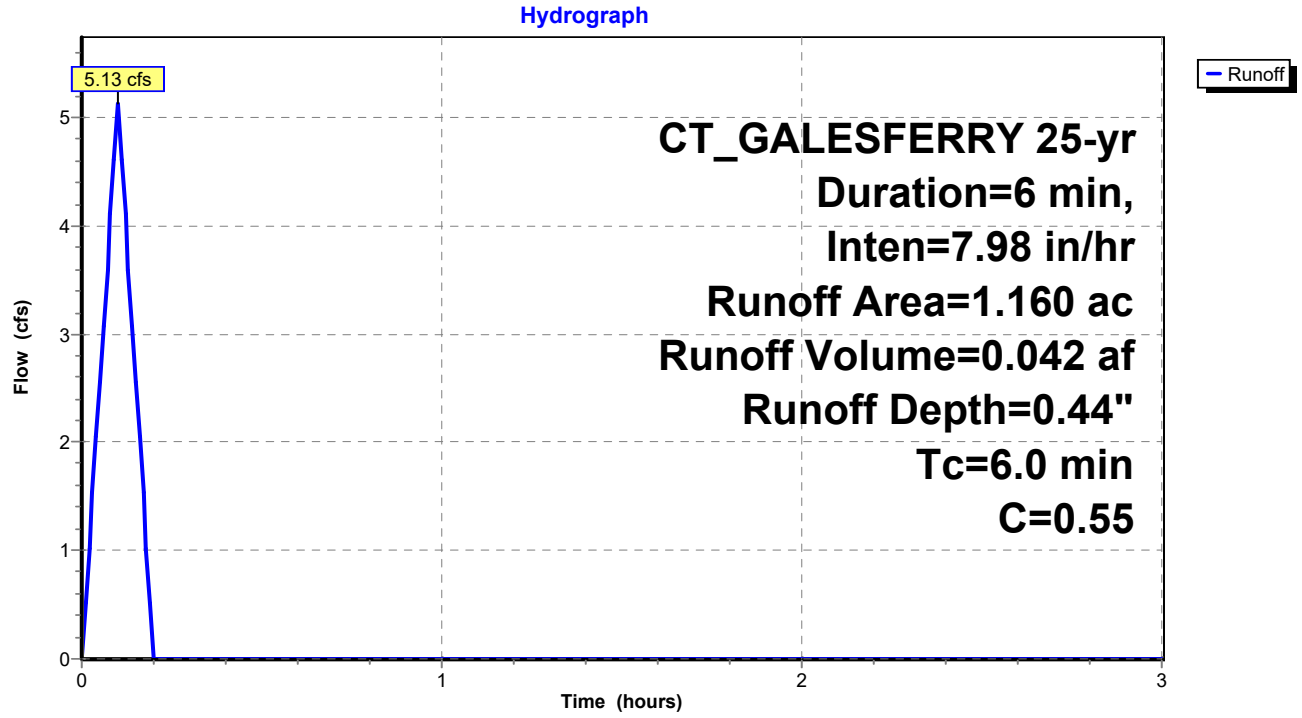
Runoff = 5.13 cfs @ 0.10 hrs, Volume= 0.042 af, Depth= 0.44"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 25-yr Duration=6 min, Inten=7.98 in/hr

Area (ac)	C	Description
1.160	0.55	See C Worksheet in Appendix C
1.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1F: PD-1F



Summary for Subcatchment PD-2A: PD-2A

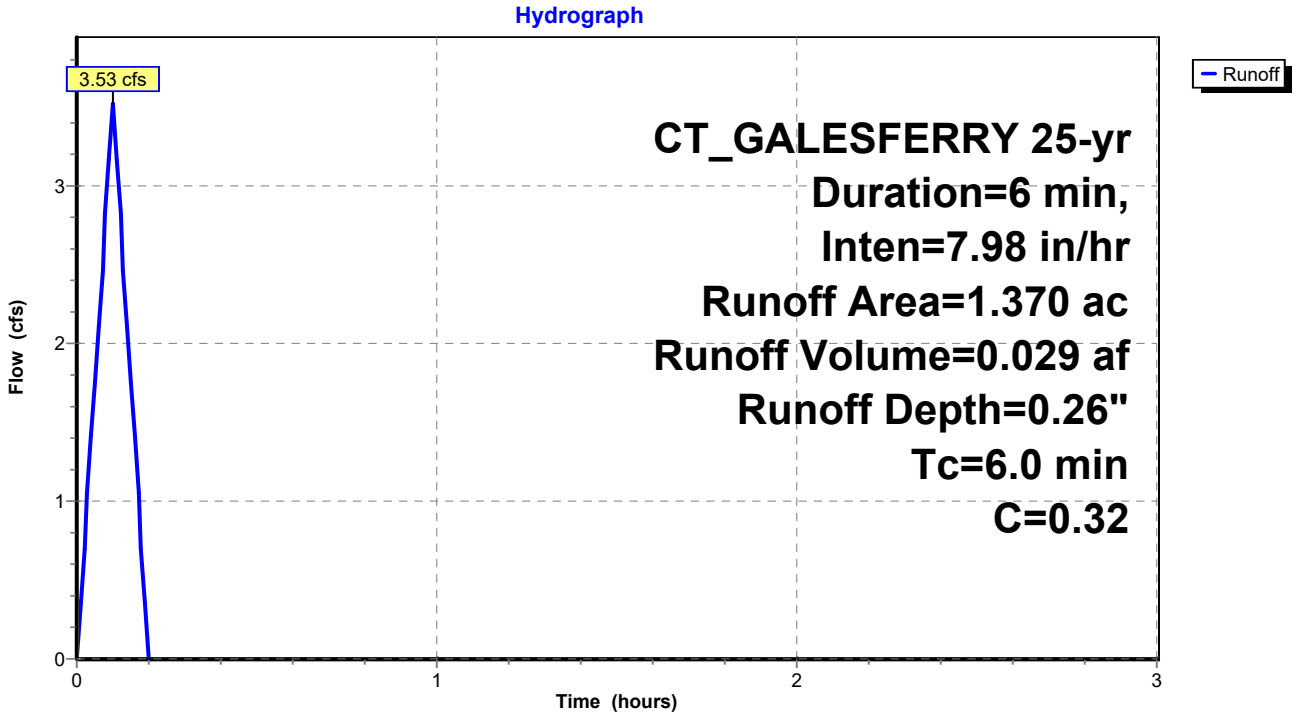
Runoff = 3.53 cfs @ 0.10 hrs, Volume= 0.029 af, Depth= 0.26"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 25-yr Duration=6 min, Inten=7.98 in/hr

Area (ac)	C	Description
1.370	0.32	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2A: PD-2A



Summary for Subcatchment PD-2B: PD-2B

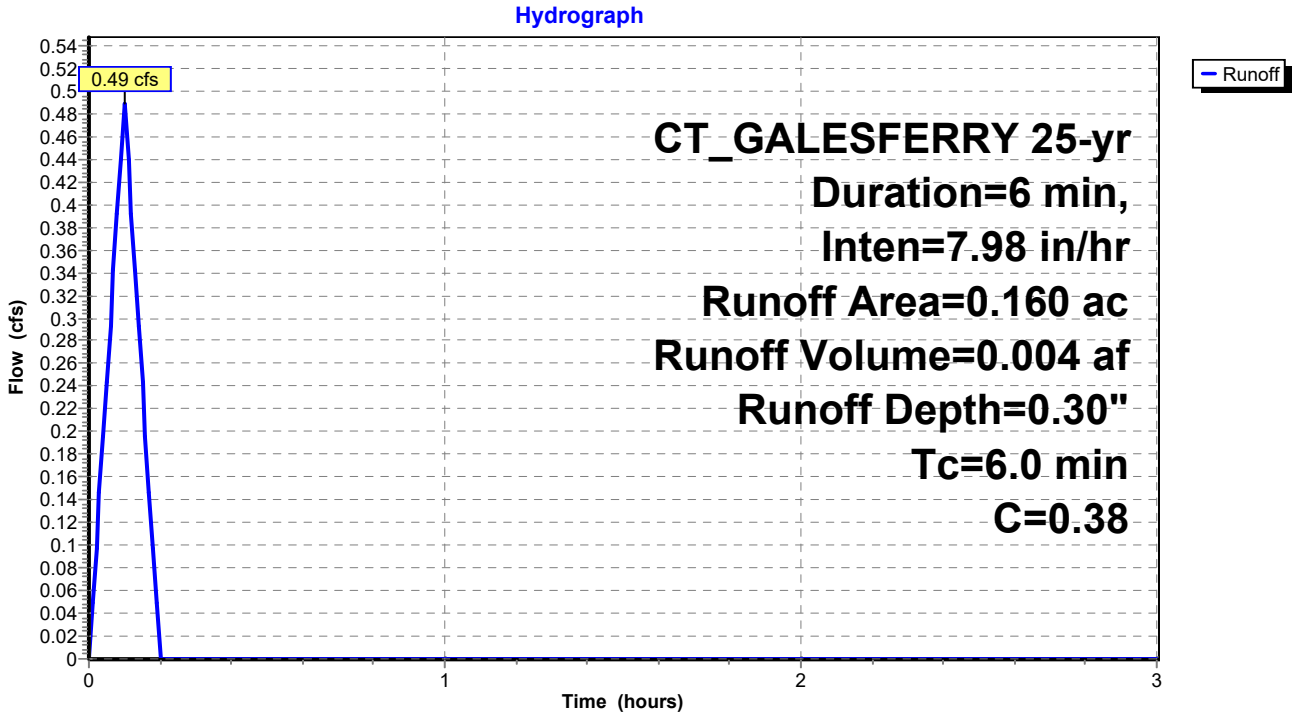
Runoff = 0.49 cfs @ 0.10 hrs, Volume= 0.004 af, Depth= 0.30"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 25-yr Duration=6 min, Inten=7.98 in/hr

Area (ac)	C	Description
0.160	0.38	See C Worksheet in Appendix C
0.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2B: PD-2B



Summary for Pond P-1: P-1

Inflow Area = 5.240 ac, 0.00% Impervious, Inflow Depth = 0.55" for 25-yr event
Inflow = 28.86 cfs @ 0.10 hrs, Volume= 0.238 af
Outflow = 0.06 cfs @ 0.20 hrs, Volume= 0.015 af, Atten= 100%, Lag= 6.0 min
Discarded = 0.06 cfs @ 0.20 hrs, Volume= 0.015 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 31.12' @ 0.20 hrs Surf.Area= 7,201 sf Storage= 10,360 cf

Plug-Flow detention time= 90.3 min calculated for 0.015 af (6% of inflow)
Center-of-Mass det. time= 85.7 min (91.7 - 6.0)

Volume	Invert	Avail.Storage	Storage Description
#1	29.00'	17,554 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

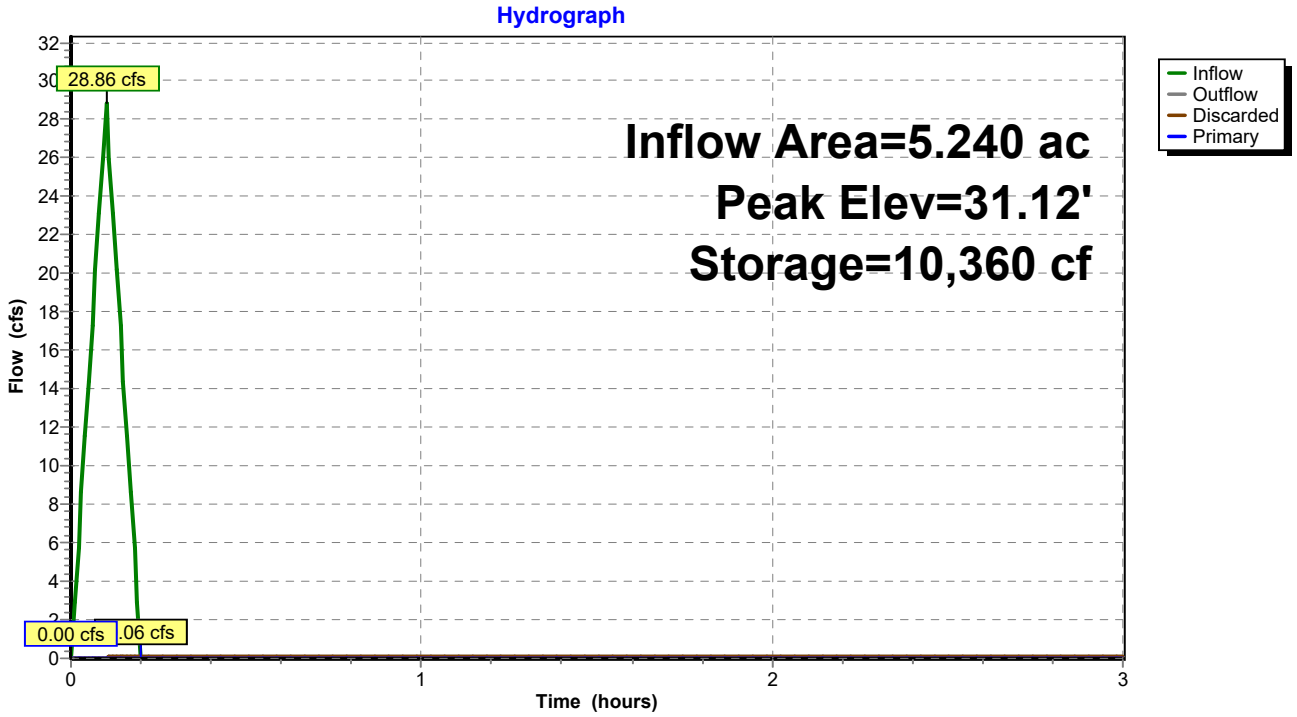
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
29.00	2,602	0	0
30.00	4,737	3,670	3,670
31.00	6,928	5,833	9,502
32.00	9,176	8,052	17,554

Device	Routing	Invert	Outlet Devices
#1	Primary	31.44'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	29.00'	**0.260 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 26.00' Phase-In= 0.01'

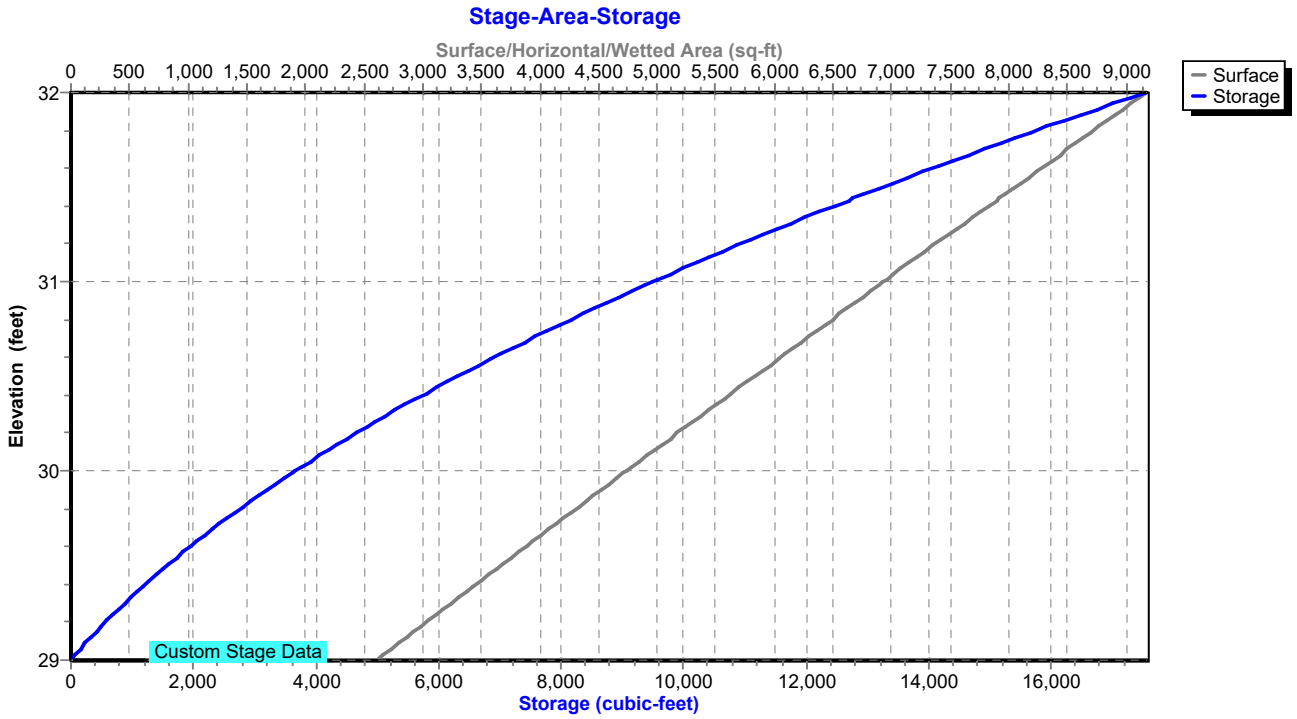
Discarded OutFlow Max=0.06 cfs @ 0.20 hrs HW=31.12' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=29.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P-1: P-1



Pond P-1: P-1



Stage-Area-Storage for Pond P-1: P-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
29.00	2,602	0
29.05	2,709	133
29.10	2,816	271
29.15	2,922	414
29.20	3,029	563
29.25	3,136	717
29.30	3,243	877
29.35	3,349	1,041
29.40	3,456	1,212
29.45	3,563	1,387
29.50	3,670	1,568
29.55	3,776	1,754
29.60	3,883	1,946
29.65	3,990	2,142
29.70	4,096	2,344
29.75	4,203	2,552
29.80	4,310	2,765
29.85	4,417	2,983
29.90	4,523	3,206
29.95	4,630	3,435
30.00	4,737	3,670
30.05	4,847	3,909
30.10	4,956	4,154
30.15	5,066	4,405
30.20	5,175	4,661
30.25	5,285	4,922
30.30	5,394	5,189
30.35	5,504	5,462
30.40	5,613	5,740
30.45	5,723	6,023
30.50	5,833	6,312
30.55	5,942	6,606
30.60	6,052	6,906
30.65	6,161	7,211
30.70	6,271	7,522
30.75	6,380	7,838
30.80	6,490	8,160
30.85	6,599	8,487
30.90	6,709	8,820
30.95	6,818	9,158
31.00	6,928	9,502
31.05	7,040	9,851
31.10	7,153	10,206
31.15	7,265	10,566
31.20	7,378	10,933
31.25	7,490	11,304
31.30	7,602	11,682
31.35	7,715	12,064
31.40	7,827	12,453
31.45	7,940	12,847
31.50	8,052	13,247
31.55	8,164	13,652
31.60	8,277	14,063
31.65	8,389	14,480
31.70	8,502	14,902
31.75	8,614	15,330
31.80	8,726	15,764
31.85	8,839	16,203
31.90	8,951	16,648
31.95	9,064	17,098
32.00	**9,176**	**17,554**

Summary for Pond P-2: P-2

Inflow Area = 6.140 ac, 0.00% Impervious, Inflow Depth = 0.47" for 25-yr event
Inflow = 29.29 cfs @ 0.10 hrs, Volume= 0.242 af
Outflow = 4.52 cfs @ 0.18 hrs, Volume= 0.214 af, Atten= 85%, Lag= 5.1 min
Primary = 4.52 cfs @ 0.18 hrs, Volume= 0.214 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 27.11' @ 0.18 hrs Surf.Area= 9,147 sf Storage= 9,213 cf

Plug-Flow detention time= 37.6 min calculated for 0.214 af (88% of inflow)
Center-of-Mass det. time= 37.1 min (43.1 - 6.0)

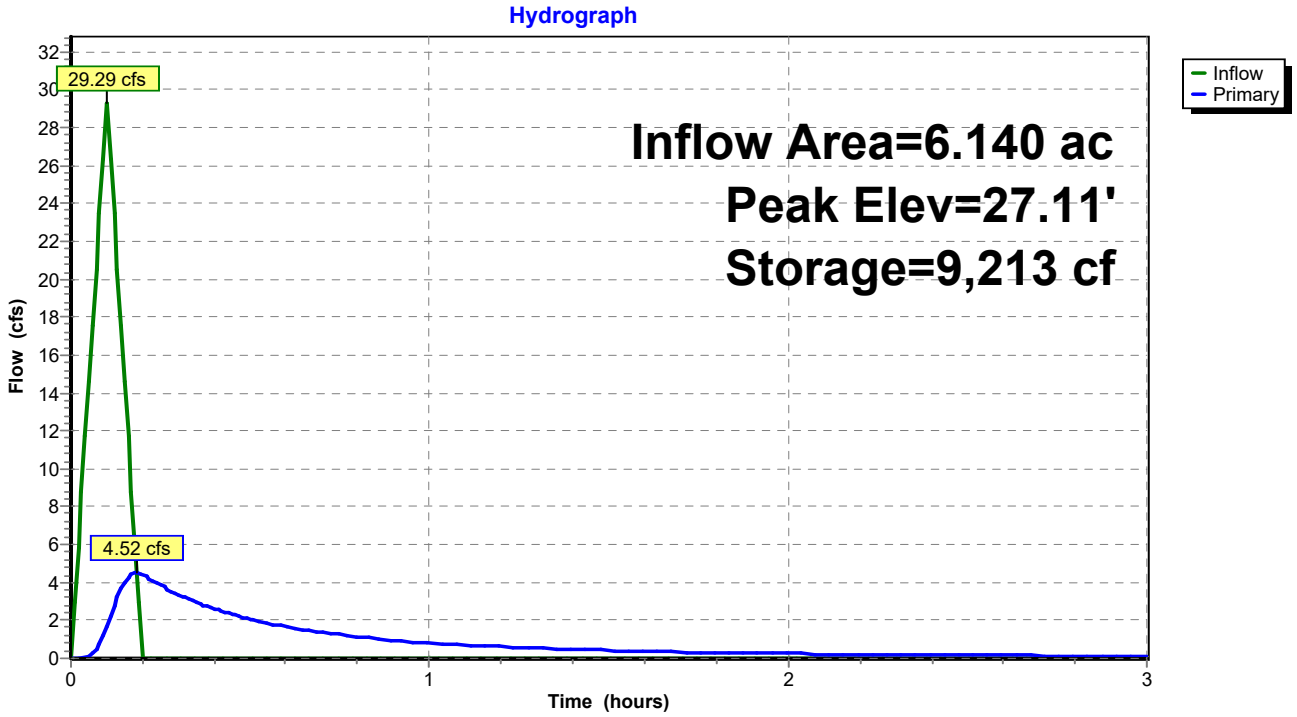
Volume	Invert	Avail.Storage	Storage Description
#1	26.00'	17,993 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
26.00	7,521	0	0
27.00	8,988	8,255	8,255
28.00	10,489	9,739	17,993

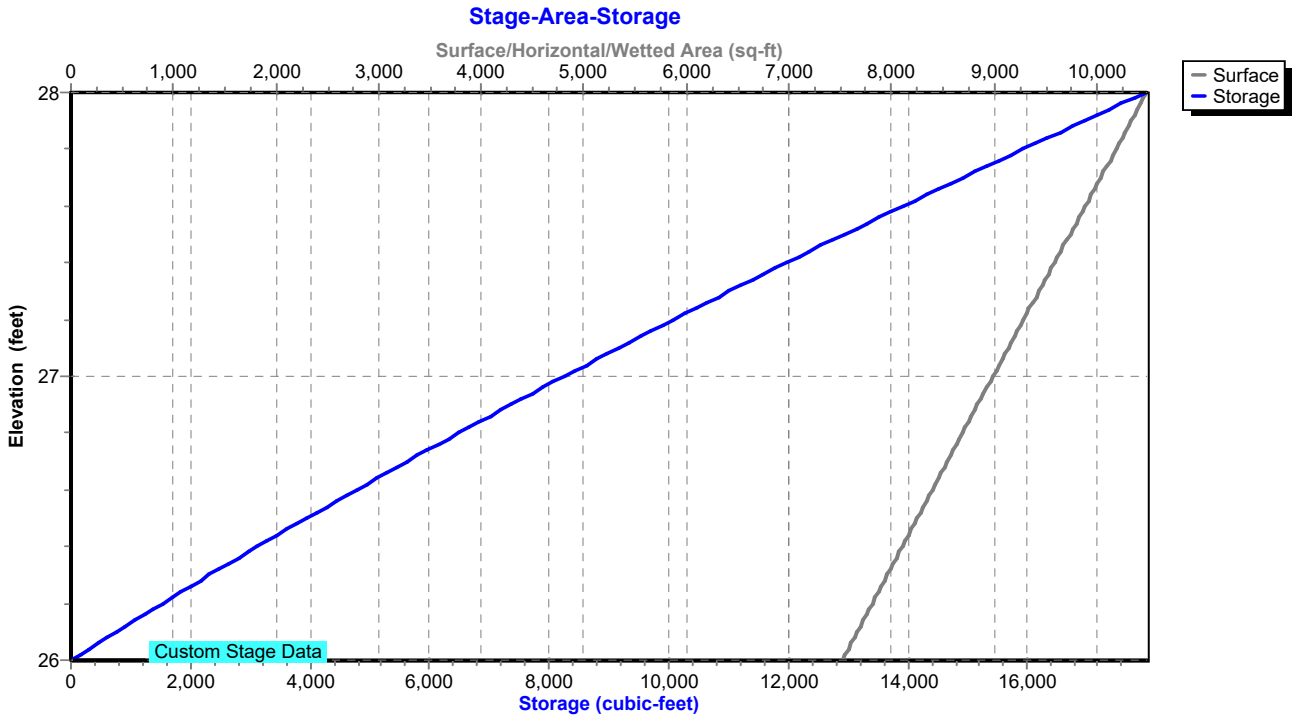
Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	26.00'	**24.0" Round Culvert** L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.00' / 25.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=4.51 cfs @ 0.18 hrs HW=27.10' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Culvert (Barrel Controls 4.51 cfs @ 3.67 fps)

Pond P-2: P-2



Pond P-2: P-2



Stage-Area-Storage for Pond P-2: P-2

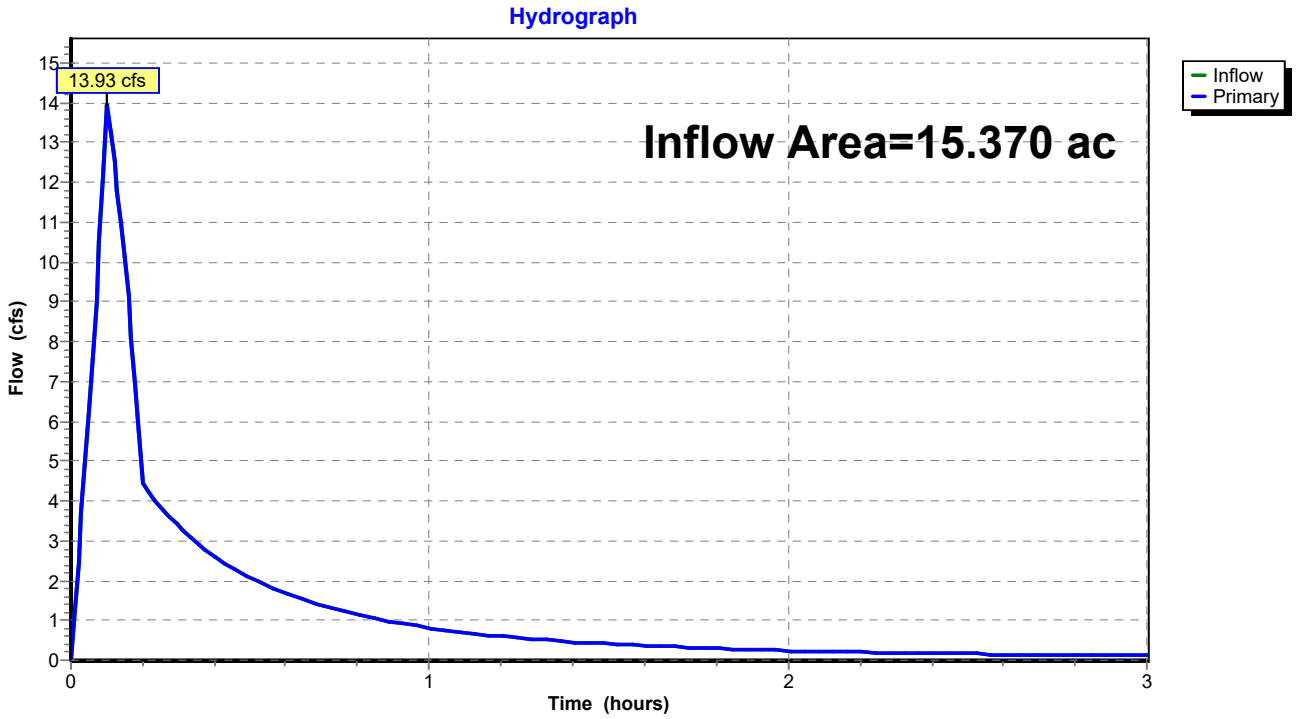
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
26.00	7,521	0
26.02	7,550	151
26.04	7,580	302
26.06	7,609	454
26.08	7,638	606
26.10	7,668	759
26.12	7,697	913
26.14	7,726	1,067
26.16	7,756	1,222
26.18	7,785	1,378
26.20	7,814	1,534
26.22	7,844	1,690
26.24	7,873	1,847
26.26	7,902	2,005
26.28	7,932	2,163
26.30	7,961	2,322
26.32	7,990	2,482
26.34	8,020	2,642
26.36	8,049	2,803
26.38	8,078	2,964
26.40	8,108	3,126
26.42	8,137	3,288
26.44	8,166	3,451
26.46	8,196	3,615
26.48	8,225	3,779
26.50	8,255	3,944
26.52	8,284	4,109
26.54	8,313	4,275
26.56	8,343	4,442
26.58	8,372	4,609
26.60	8,401	4,777
26.62	8,431	4,945
26.64	8,460	5,114
26.66	8,489	5,283
26.68	8,519	5,453
26.70	8,548	5,624
26.72	8,577	5,795
26.74	8,607	5,967
26.76	8,636	6,140
26.78	8,665	6,313
26.80	8,695	6,486
26.82	8,724	6,660
26.84	8,753	6,835
26.86	8,783	7,011
26.88	8,812	7,187
26.90	8,841	7,363
26.92	8,871	7,540
26.94	8,900	7,718
26.96	8,929	7,896
26.98	8,959	8,075
27.00	8,988	8,255
27.02	9,018	8,435
27.04	9,048	8,615
27.06	9,078	8,796
27.08	9,108	8,978
27.10	9,138	9,161
27.12	9,168	9,344
27.14	9,198	9,528
27.16	9,228	9,712
27.18	9,258	9,897
27.20	9,288	10,082
27.22	9,318	10,268
27.24	9,348	10,455
27.26	9,378	10,642
27.28	9,408	10,830
27.30	9,438	11,018
27.32	9,468	11,208
27.34	9,498	11,397
27.36	9,528	11,587
27.38	9,558	11,778
27.40	9,588	11,970
27.42	9,618	12,162
27.44	9,648	12,355
27.46	9,678	12,548
27.48	9,708	12,742
27.50	9,739	12,936
27.52	9,769	13,131
27.54	9,799	13,327
27.56	9,829	13,523
27.58	9,859	13,720
27.60	9,889	13,917
27.62	9,919	14,116
27.64	9,949	14,314
27.66	9,979	14,513
27.68	10,009	14,713
27.70	10,039	14,914
27.72	10,069	15,115
27.74	10,099	15,317
27.76	10,129	15,519
27.78	10,159	15,722
27.80	10,189	15,925
27.82	10,219	16,129
27.84	10,249	16,334
27.86	10,279	16,539
27.88	10,309	16,745
27.90	10,339	16,952
27.92	10,369	17,159
27.94	10,399	17,366
27.96	10,429	17,575
27.98	10,459	17,784
28.00	**10,489**	**17,993**

Summary for Link DP-1: DP-1

Inflow Area = 15.370 ac, 0.00% Impervious, Inflow Depth > 0.25" for 25-yr event
Inflow = 13.93 cfs @ 0.10 hrs, Volume= 0.315 af
Primary = 13.93 cfs @ 0.10 hrs, Volume= 0.315 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1

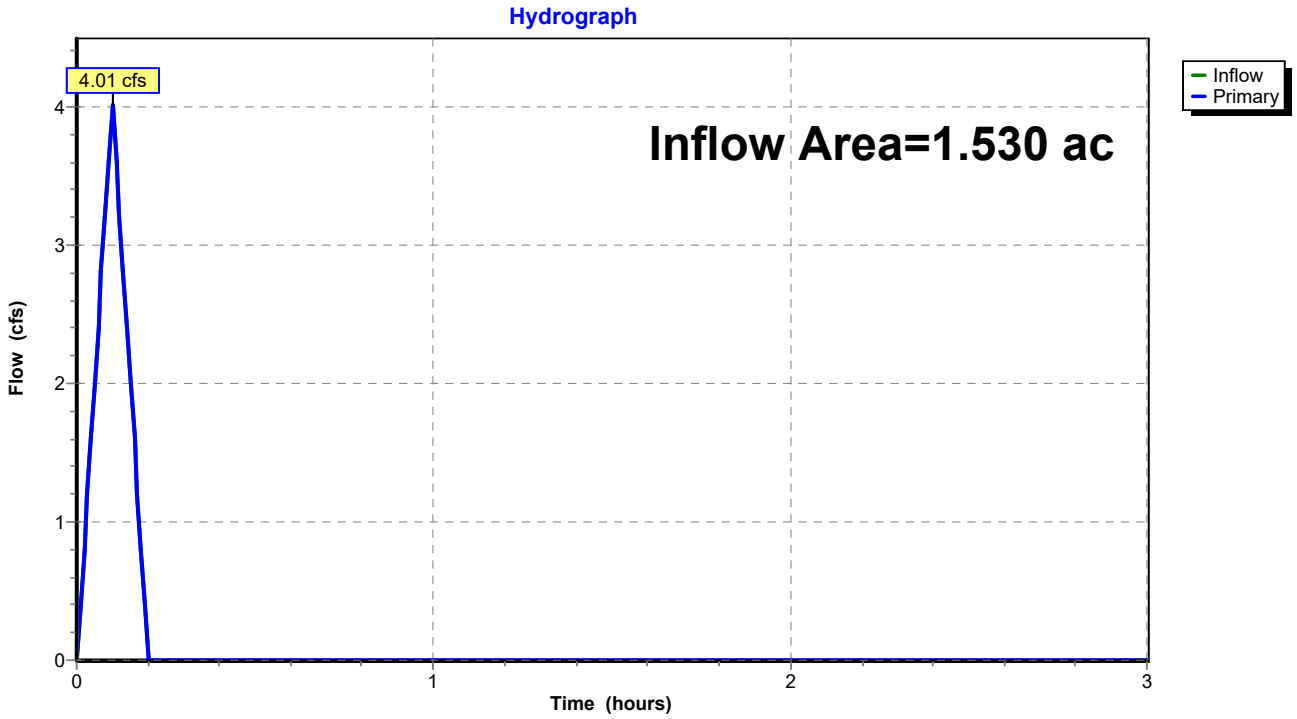


Summary for Link DP-2: DP-2

Inflow Area = 1.530 ac, 0.00% Impervious, Inflow Depth = 0.26" for 25-yr event
Inflow = 4.01 cfs @ 0.10 hrs, Volume= 0.033 af
Primary = 4.01 cfs @ 0.10 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-2: DP-2



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PD-1A: PD-1A Runoff Area=3.990 ac 0.00% Impervious Runoff Depth=0.38"
Tc=6.0 min C=0.38 Runoff=15.38 cfs 0.127 af

Subcatchment PD-1B: PD-1B Runoff Area=3.870 ac 0.00% Impervious Runoff Depth=0.69"
Tc=6.0 min C=0.69 Runoff=27.09 cfs 0.224 af

Subcatchment PD-1C: PD-1C Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.67"
Tc=6.0 min C=0.67 Runoff=9.31 cfs 0.077 af

Subcatchment PD-1D: PD-1D Runoff Area=3.940 ac 0.00% Impervious Runoff Depth=0.62"
Tc=6.0 min C=0.62 Runoff=24.78 cfs 0.205 af

Subcatchment PD-1E: PD-1E Runoff Area=1.040 ac 0.00% Impervious Runoff Depth=0.54"
Tc=6.0 min C=0.54 Runoff=5.70 cfs 0.047 af

Subcatchment PD-1F: PD-1F Runoff Area=1.160 ac 0.00% Impervious Runoff Depth=0.55"
Tc=6.0 min C=0.55 Runoff=6.47 cfs 0.053 af

Subcatchment PD-2A: PD-2A Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.32"
Tc=6.0 min C=0.32 Runoff=4.45 cfs 0.037 af

Subcatchment PD-2B: PD-2B Runoff Area=0.160 ac 0.00% Impervious Runoff Depth=0.38"
Tc=6.0 min C=0.38 Runoff=0.62 cfs 0.005 af

Pond P-1: P-1 Peak Elev=31.47' Storage=13,041 cf Inflow=36.40 cfs 0.301 af
Discarded=0.07 cfs 0.017 af Primary=0.62 cfs 0.005 af Outflow=0.69 cfs 0.022 af

Pond P-2: P-2 Peak Elev=27.34' Storage=11,409 cf Inflow=36.95 cfs 0.305 af
Outflow=6.34 cfs 0.276 af

Link DP-1: DP-1 Inflow=17.97 cfs 0.408 af
Primary=17.97 cfs 0.408 af

Link DP-2: DP-2 Inflow=5.06 cfs 0.042 af
Primary=5.06 cfs 0.042 af

Total Runoff Area = 16.900 ac Runoff Volume = 0.775 af Average Runoff Depth = 0.55"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment PD-1A: PD-1A

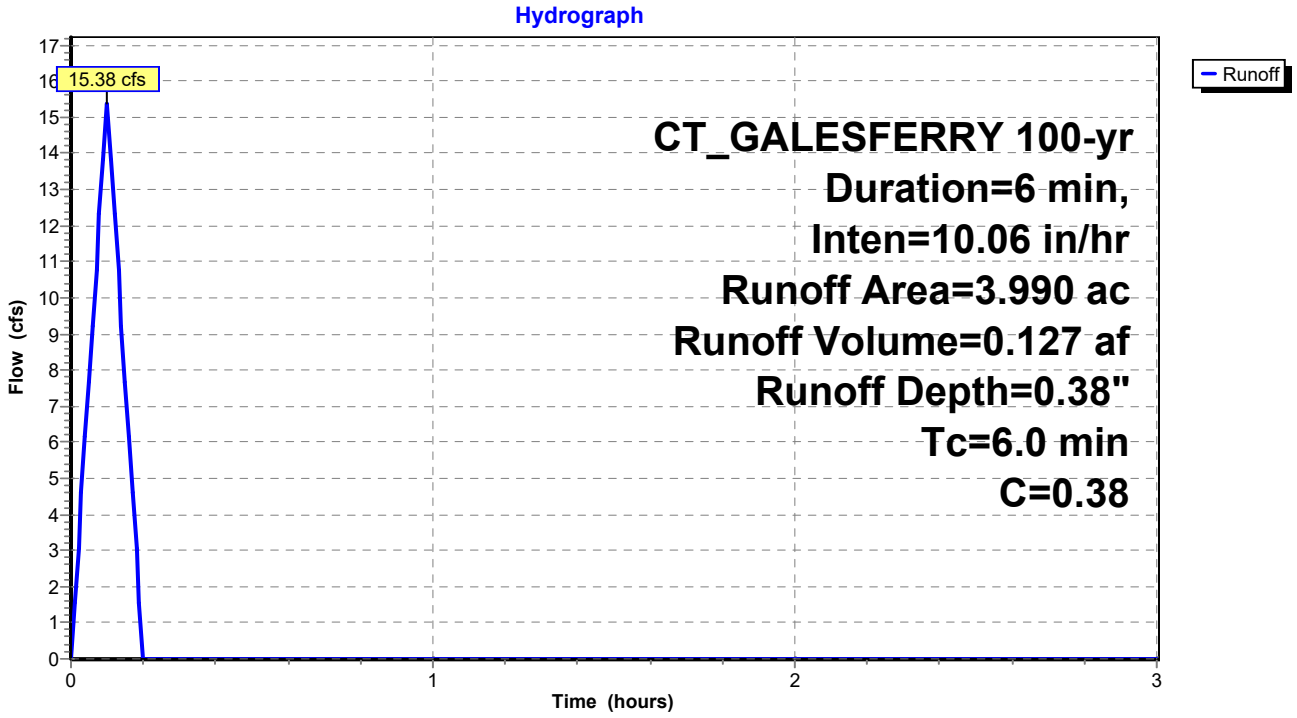
Runoff = 15.38 cfs @ 0.10 hrs, Volume= 0.127 af, Depth= 0.38"
Routed to Link DP-1 : DP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 100-yr Duration=6 min, Inten=10.06 in/hr

Area (ac)	C	Description
3.990	0.38	See C Worksheet in Appendix C
3.990		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 25.61**

Subcatchment PD-1A: PD-1A



Summary for Subcatchment PD-1B: PD-1B

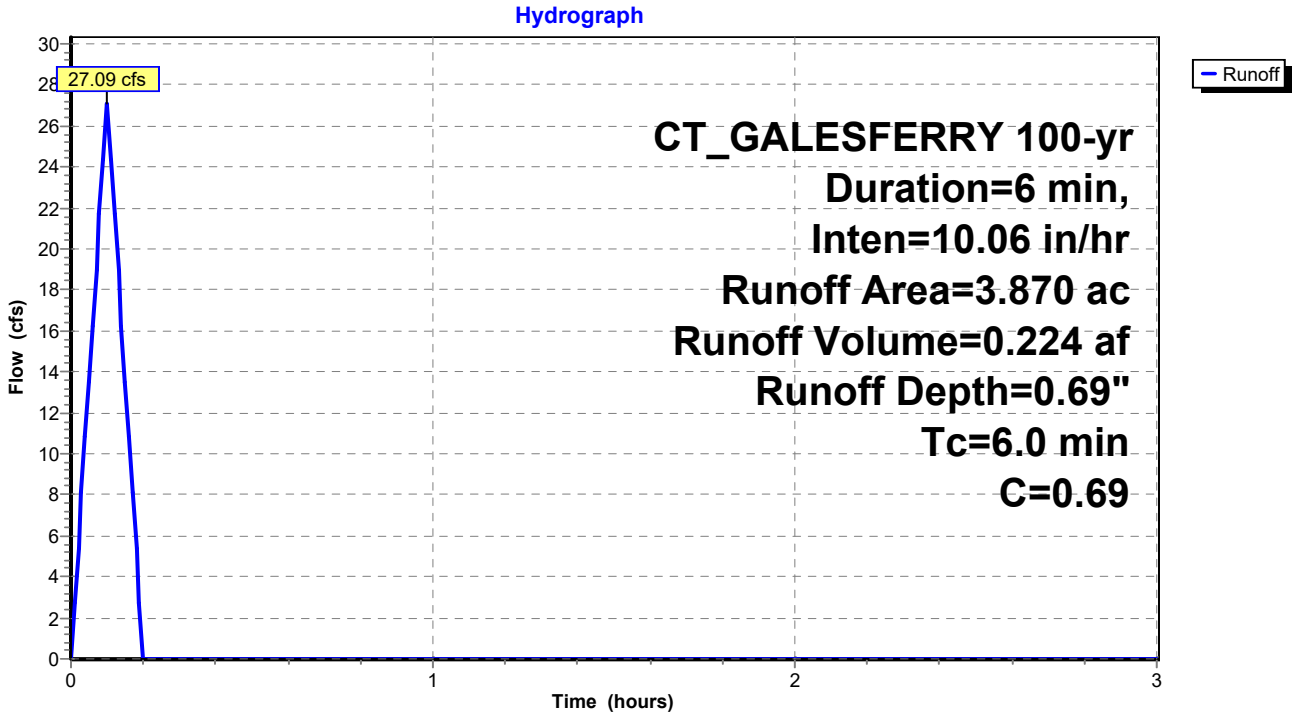
Runoff = 27.09 cfs @ 0.10 hrs, Volume= 0.224 af, Depth= 0.69"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 100-yr Duration=6 min, Inten=10.06 in/hr

Area (ac)	C	Description
3.870	0.69	See C Worksheet in Appendix C
3.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1B: PD-1B



Summary for Subcatchment PD-1C: PD-1C

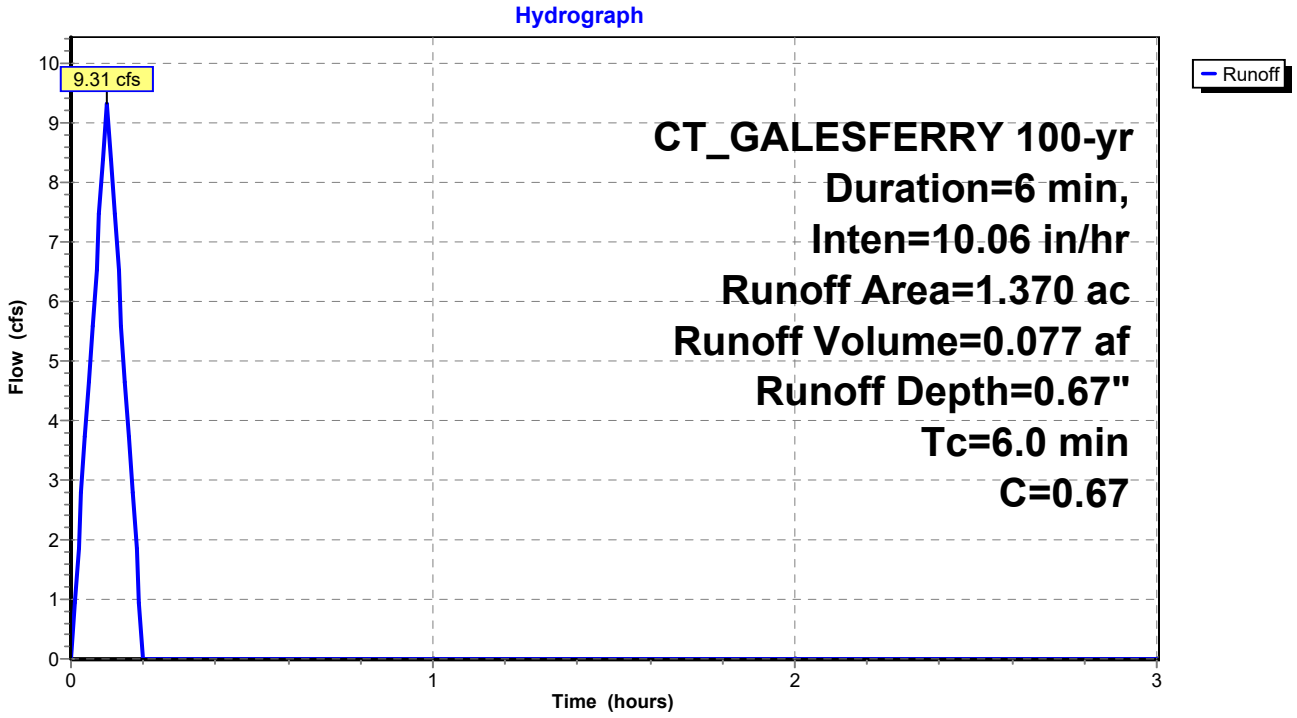
Runoff = 9.31 cfs @ 0.10 hrs, Volume= 0.077 af, Depth= 0.67"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 100-yr Duration=6 min, Inten=10.06 in/hr

Area (ac)	C	Description
1.370	0.67	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1C: PD-1C



Summary for Subcatchment PD-1D: PD-1D

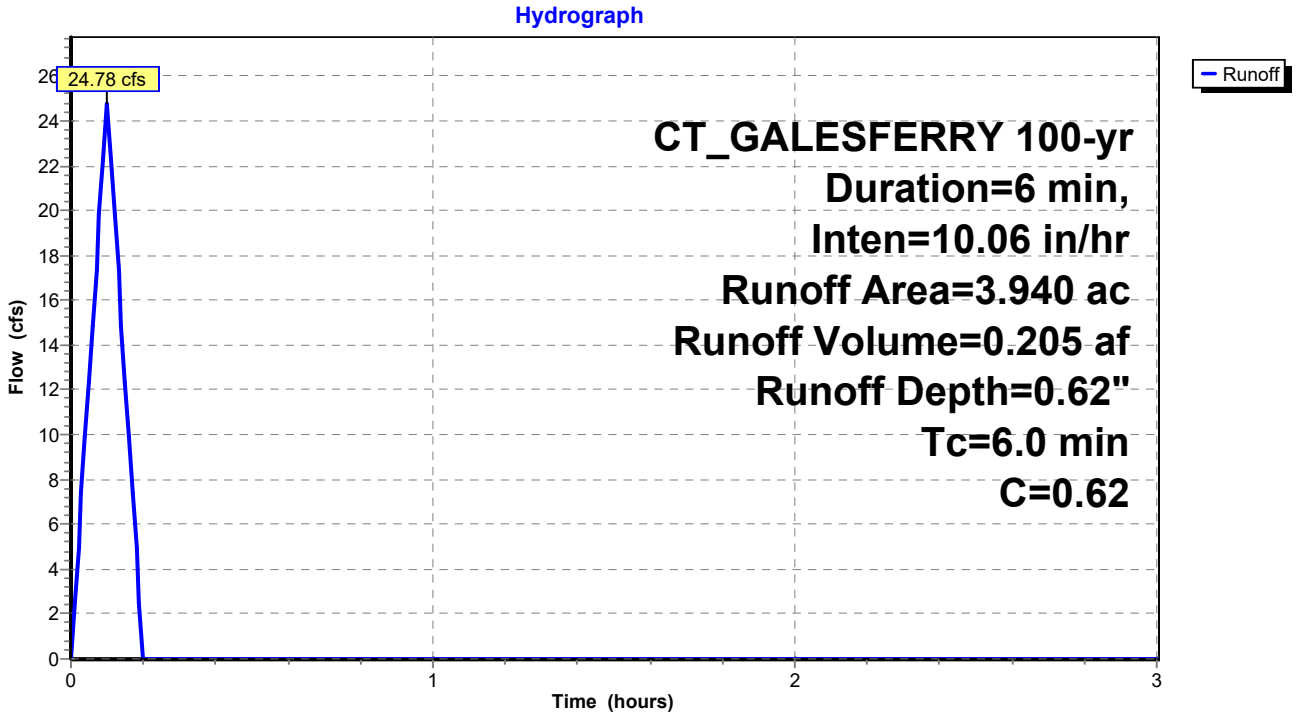
Runoff = 24.78 cfs @ 0.10 hrs, Volume= 0.205 af, Depth= 0.62"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 100-yr Duration=6 min, Inten=10.06 in/hr

Area (ac)	C	Description
3.940	0.62	See C Worksheet in Appendix C
3.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1D: PD-1D



Summary for Subcatchment PD-1E: PD-1E

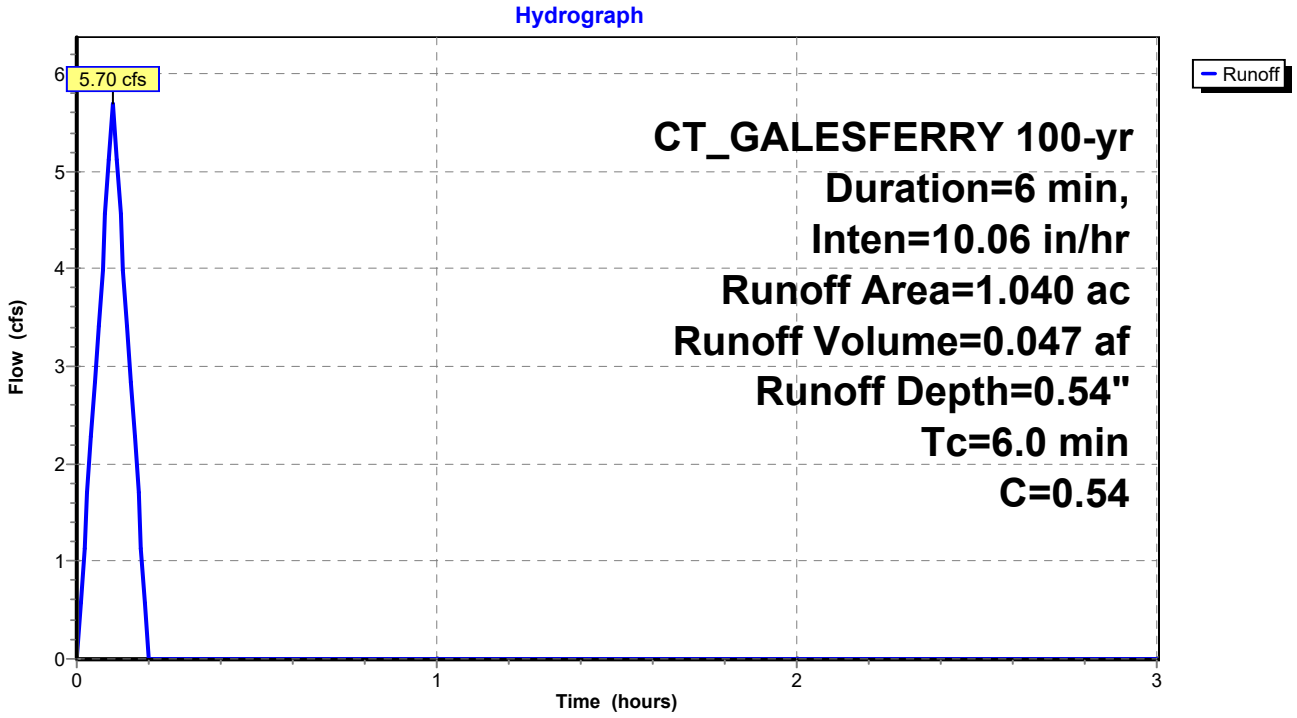
Runoff = 5.70 cfs @ 0.10 hrs, Volume= 0.047 af, Depth= 0.54"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 100-yr Duration=6 min, Inten=10.06 in/hr

Area (ac)	C	Description
1.040	0.54	See C Worksheet in Appendix C
1.040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1E: PD-1E



Summary for Subcatchment PD-1F: PD-1F

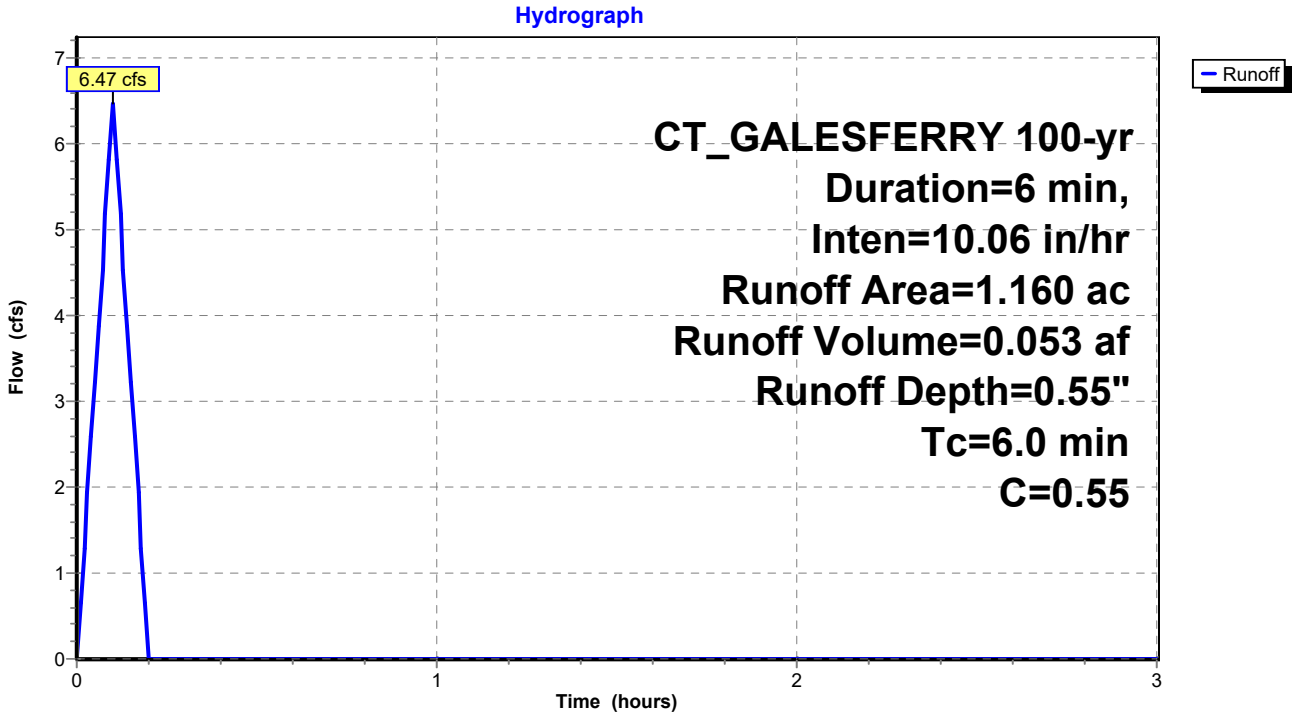
Runoff = 6.47 cfs @ 0.10 hrs, Volume= 0.053 af, Depth= 0.55"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 100-yr Duration=6 min, Inten=10.06 in/hr

Area (ac)	C	Description
1.160	0.55	See C Worksheet in Appendix C
1.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1F: PD-1F



Summary for Subcatchment PD-2A: PD-2A

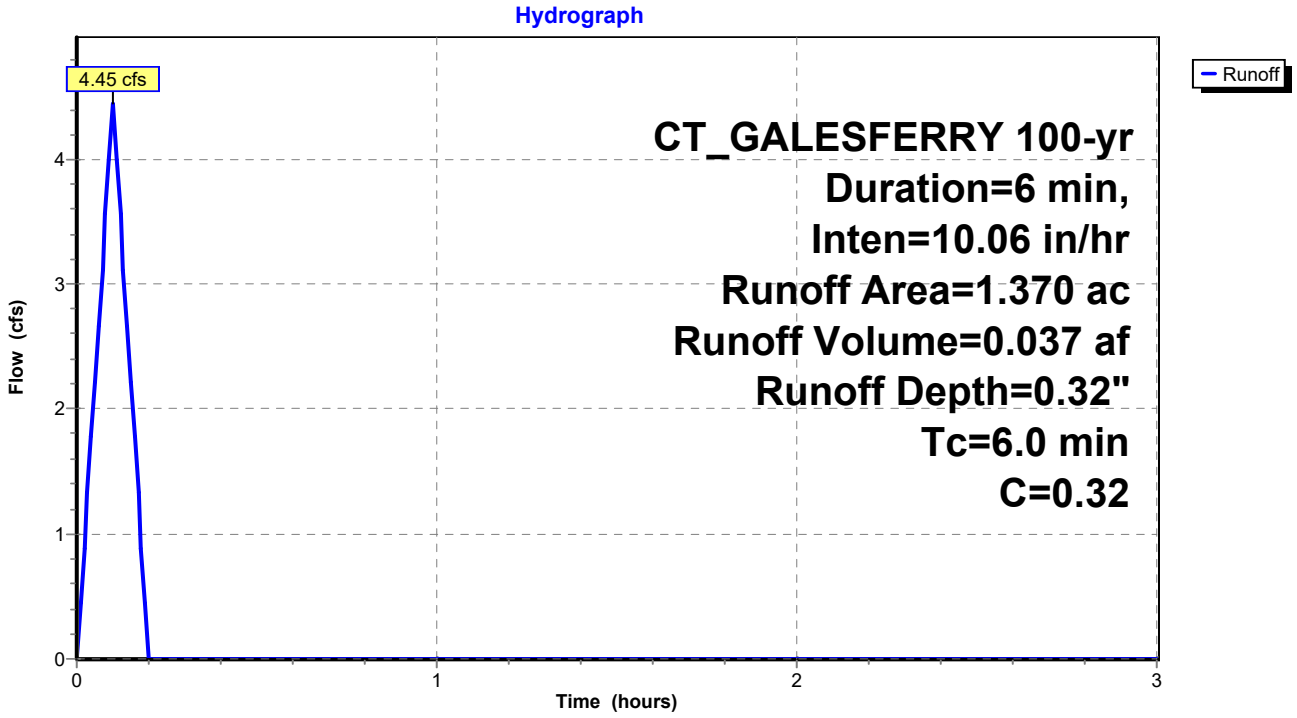
Runoff = 4.45 cfs @ 0.10 hrs, Volume= 0.037 af, Depth= 0.32"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 100-yr Duration=6 min, Inten=10.06 in/hr

Area (ac)	C	Description
1.370	0.32	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2A: PD-2A



Summary for Subcatchment PD-2B: PD-2B

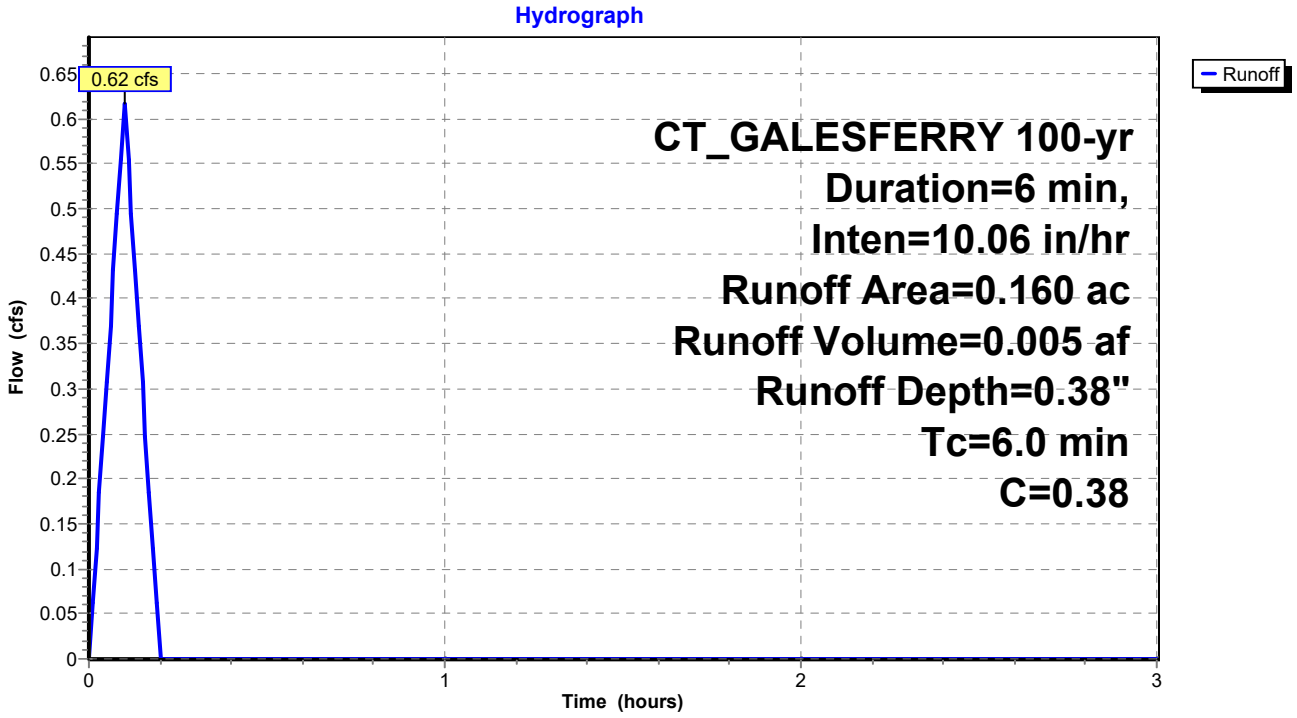
Runoff = 0.62 cfs @ 0.10 hrs, Volume= 0.005 af, Depth= 0.38"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 100-yr Duration=6 min, Inten=10.06 in/hr

Area (ac)	C	Description
0.160	0.38	See C Worksheet in Appendix C
0.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2B: PD-2B



Summary for Pond P-1: P-1

Inflow Area = 5.240 ac, 0.00% Impervious, Inflow Depth = 0.69" for 100-yr event
Inflow = 36.40 cfs @ 0.10 hrs, Volume= 0.301 af
Outflow = 0.69 cfs @ 0.20 hrs, Volume= 0.022 af, Atten= 98%, Lag= 6.1 min
Discarded = 0.07 cfs @ 0.20 hrs, Volume= 0.017 af
Primary = 0.62 cfs @ 0.20 hrs, Volume= 0.005 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 31.47' @ 0.20 hrs Surf.Area= 7,994 sf Storage= 13,041 cf

Plug-Flow detention time= 73.5 min calculated for 0.022 af (7% of inflow)
Center-of-Mass det. time= 69.1 min (75.1 - 6.0)

Volume	Invert	Avail.Storage	Storage Description
#1	29.00'	17,554 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

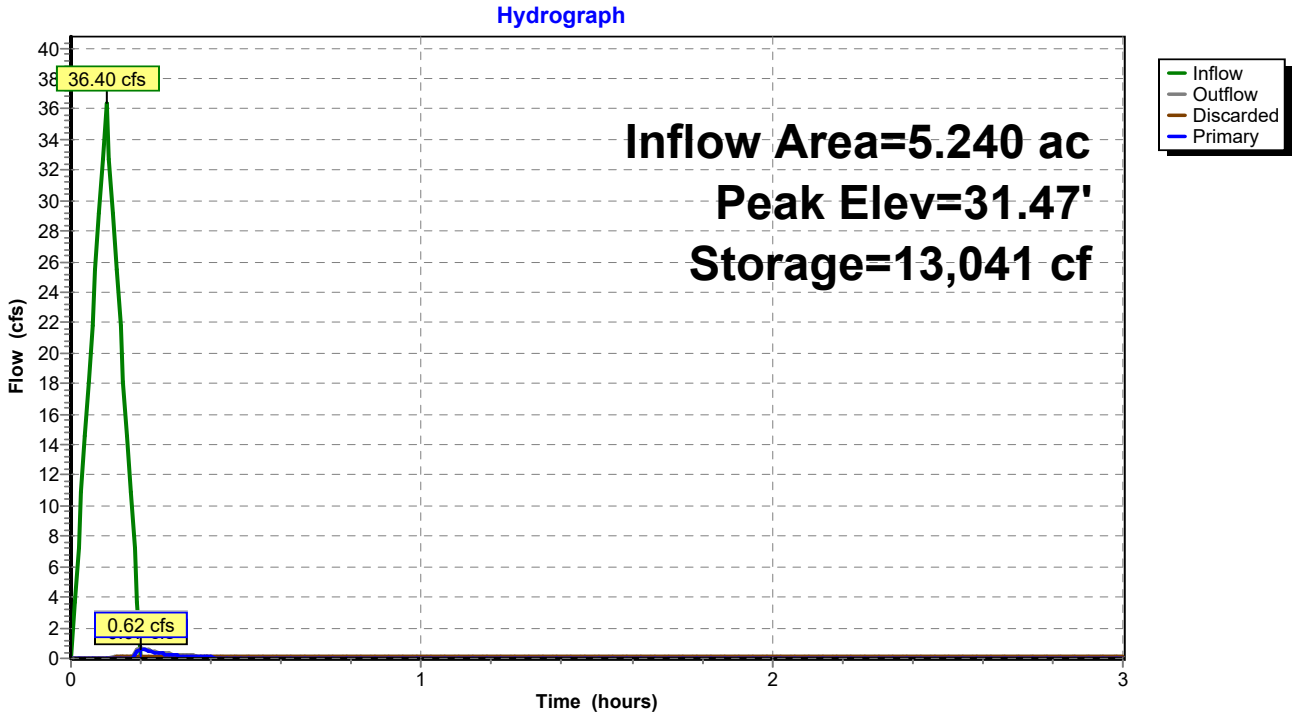
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
29.00	2,602	0	0
30.00	4,737	3,670	3,670
31.00	6,928	5,833	9,502
32.00	9,176	8,052	17,554

Device	Routing	Invert	Outlet Devices
#1	Primary	31.44'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	29.00'	**0.260 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 26.00' Phase-In= 0.01'

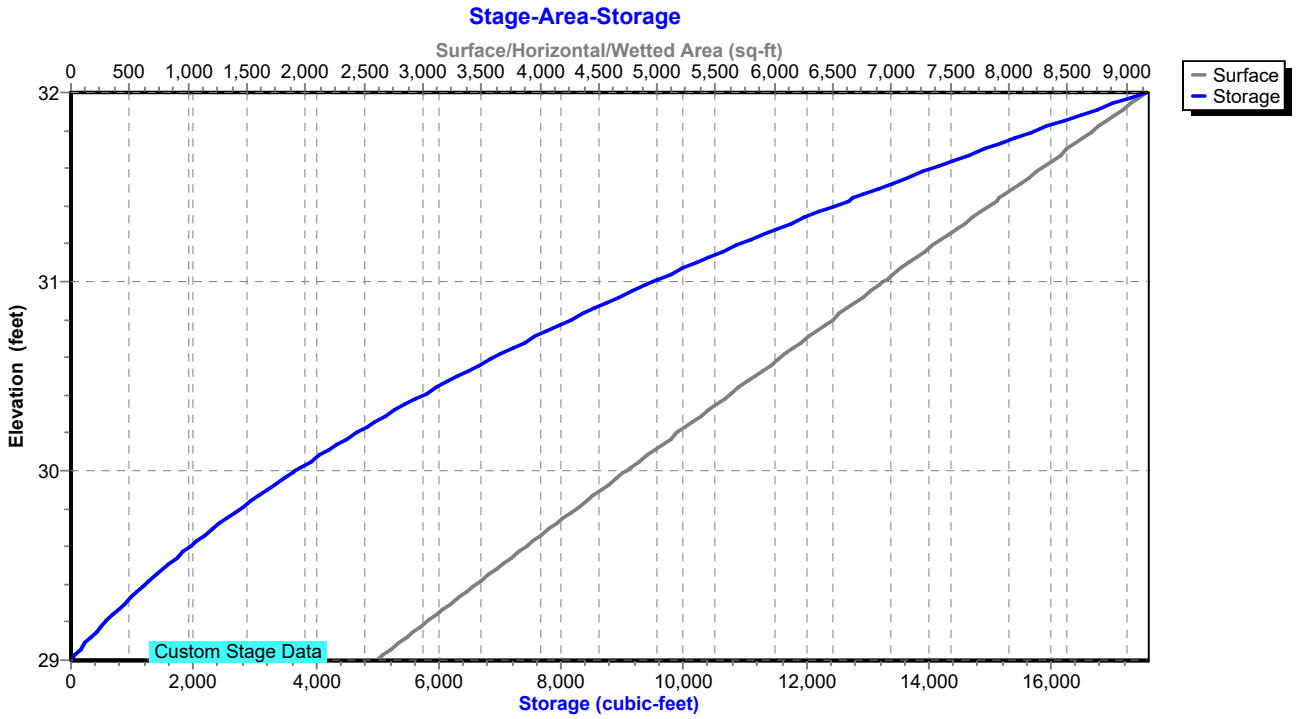
Discarded OutFlow Max=0.07 cfs @ 0.20 hrs HW=31.47' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=0.61 cfs @ 0.20 hrs HW=31.47' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.61 cfs @ 0.45 fps)

Pond P-1: P-1



Pond P-1: P-1



Stage-Area-Storage for Pond P-1: P-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
29.00	2,602	0
29.05	2,709	133
29.10	2,816	271
29.15	2,922	414
29.20	3,029	563
29.25	3,136	717
29.30	3,243	877
29.35	3,349	1,041
29.40	3,456	1,212
29.45	3,563	1,387
29.50	3,670	1,568
29.55	3,776	1,754
29.60	3,883	1,946
29.65	3,990	2,142
29.70	4,096	2,344
29.75	4,203	2,552
29.80	4,310	2,765
29.85	4,417	2,983
29.90	4,523	3,206
29.95	4,630	3,435
30.00	4,737	3,670
30.05	4,847	3,909
30.10	4,956	4,154
30.15	5,066	4,405
30.20	5,175	4,661
30.25	5,285	4,922
30.30	5,394	5,189
30.35	5,504	5,462
30.40	5,613	5,740
30.45	5,723	6,023
30.50	5,833	6,312
30.55	5,942	6,606
30.60	6,052	6,906
30.65	6,161	7,211
30.70	6,271	7,522
30.75	6,380	7,838
30.80	6,490	8,160
30.85	6,599	8,487
30.90	6,709	8,820
30.95	6,818	9,158
31.00	6,928	9,502
31.05	7,040	9,851
31.10	7,153	10,206
31.15	7,265	10,566
31.20	7,378	10,933
31.25	7,490	11,304
31.30	7,602	11,682
31.35	7,715	12,064
31.40	7,827	12,453
31.45	7,940	12,847
31.50	8,052	13,247
31.55	8,164	13,652
31.60	8,277	14,063
31.65	8,389	14,480
31.70	8,502	14,902
31.75	8,614	15,330
31.80	8,726	15,764
31.85	8,839	16,203
31.90	8,951	16,648
31.95	9,064	17,098
32.00	**9,176**	**17,554**

Summary for Pond P-2: P-2

Inflow Area = 6.140 ac, 0.00% Impervious, Inflow Depth = 0.60" for 100-yr event
Inflow = 36.95 cfs @ 0.10 hrs, Volume= 0.305 af
Outflow = 6.34 cfs @ 0.18 hrs, Volume= 0.276 af, Atten= 83%, Lag= 5.0 min
Primary = 6.34 cfs @ 0.18 hrs, Volume= 0.276 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 27.34' @ 0.18 hrs Surf.Area= 9,500 sf Storage= 11,409 cf

Plug-Flow detention time= 34.7 min calculated for 0.276 af (90% of inflow)
Center-of-Mass det. time= 34.2 min (40.2 - 6.0)

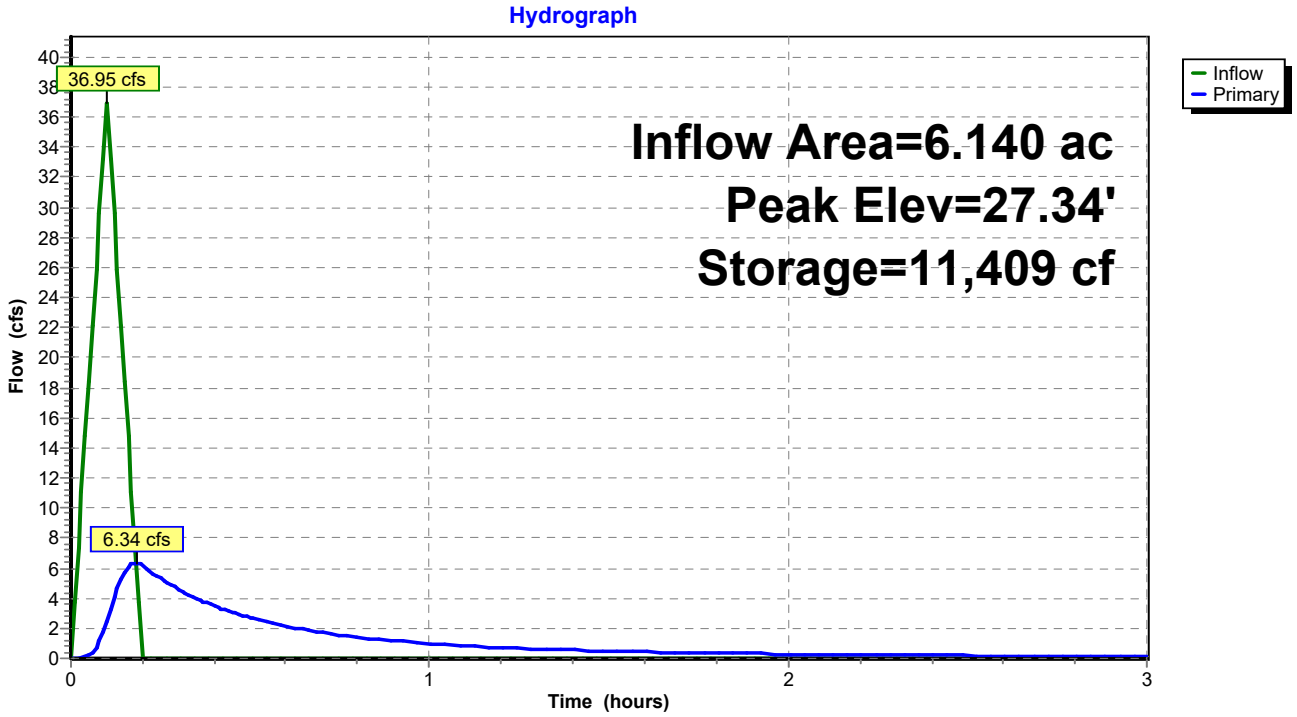
Volume	Invert	Avail.Storage	Storage Description
#1	26.00'	17,993 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
26.00	7,521	0	0
27.00	8,988	8,255	8,255
28.00	10,489	9,739	17,993

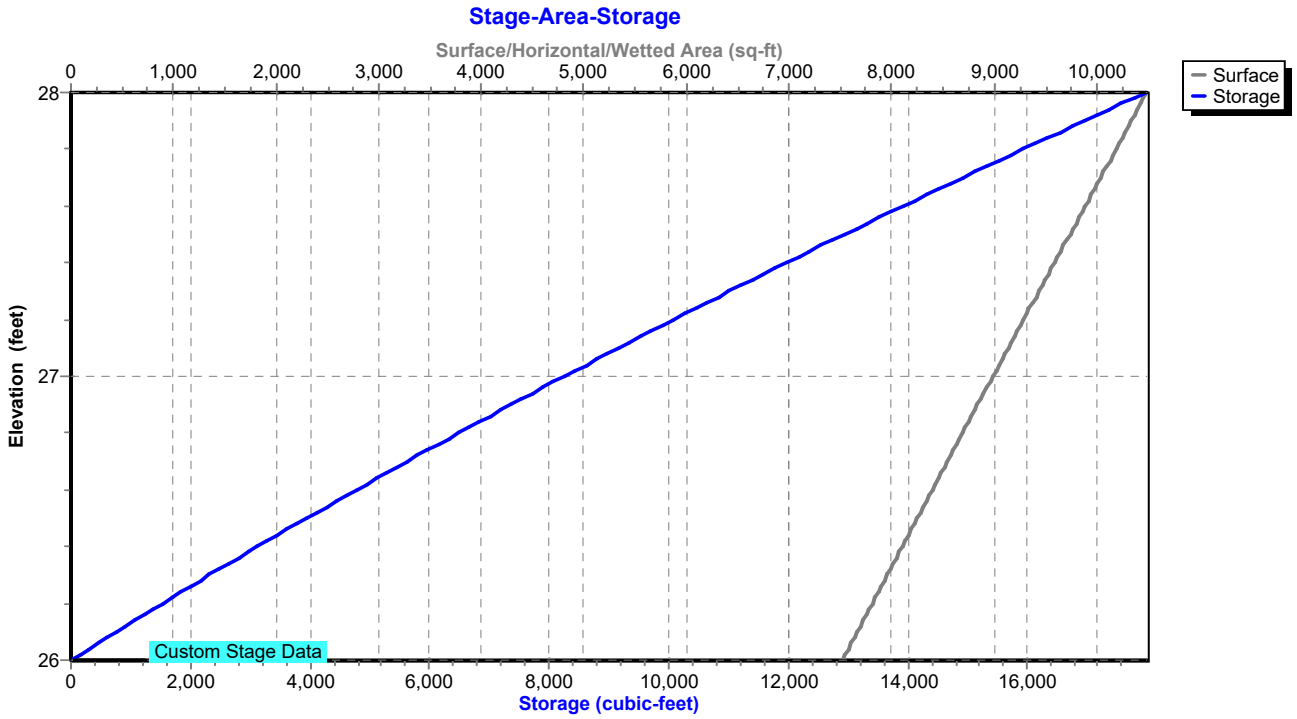
Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	26.00'	**24.0" Round Culvert** L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.00' / 25.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.33 cfs @ 0.18 hrs HW=27.34' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Culvert (Barrel Controls 6.33 cfs @ 4.00 fps)

Pond P-2: P-2



Pond P-2: P-2



Stage-Area-Storage for Pond P-2: P-2

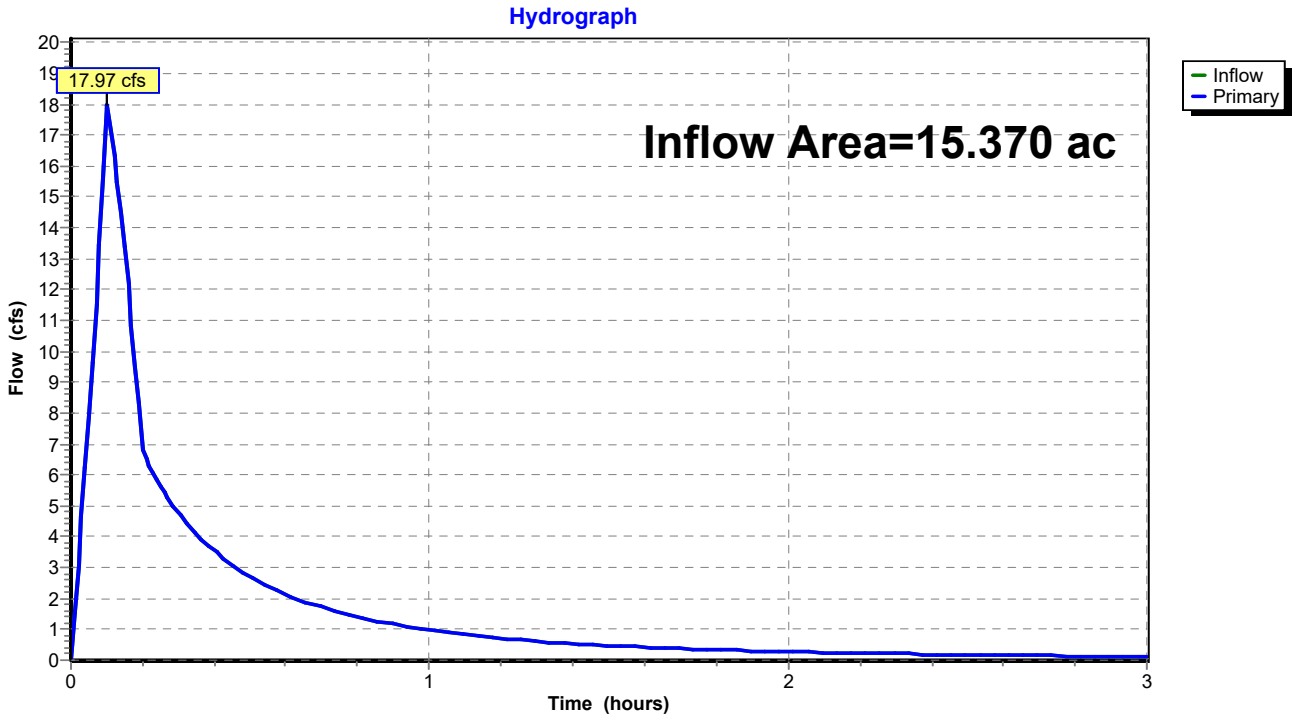
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
26.00	7,521	0
26.02	7,550	151
26.04	7,580	302
26.06	7,609	454
26.08	7,638	606
26.10	7,668	759
26.12	7,697	913
26.14	7,726	1,067
26.16	7,756	1,222
26.18	7,785	1,378
26.20	7,814	1,534
26.22	7,844	1,690
26.24	7,873	1,847
26.26	7,902	2,005
26.28	7,932	2,163
26.30	7,961	2,322
26.32	7,990	2,482
26.34	8,020	2,642
26.36	8,049	2,803
26.38	8,078	2,964
26.40	8,108	3,126
26.42	8,137	3,288
26.44	8,166	3,451
26.46	8,196	3,615
26.48	8,225	3,779
26.50	8,255	3,944
26.52	8,284	4,109
26.54	8,313	4,275
26.56	8,343	4,442
26.58	8,372	4,609
26.60	8,401	4,777
26.62	8,431	4,945
26.64	8,460	5,114
26.66	8,489	5,283
26.68	8,519	5,453
26.70	8,548	5,624
26.72	8,577	5,795
26.74	8,607	5,967
26.76	8,636	6,140
26.78	8,665	6,313
26.80	8,695	6,486
26.82	8,724	6,660
26.84	8,753	6,835
26.86	8,783	7,011
26.88	8,812	7,187
26.90	8,841	7,363
26.92	8,871	7,540
26.94	8,900	7,718
26.96	8,929	7,896
26.98	8,959	8,075
27.00	8,988	8,255
27.02	9,018	8,435
27.04	9,048	8,615
27.06	9,078	8,796
27.08	9,108	8,978
27.10	9,138	9,161
27.12	9,168	9,344
27.14	9,198	9,528
27.16	9,228	9,712
27.18	9,258	9,897
27.20	9,288	10,082
27.22	9,318	10,268
27.24	9,348	10,455
27.26	9,378	10,642
27.28	9,408	10,830
27.30	9,438	11,018
27.32	9,468	11,208
27.34	9,498	11,397
27.36	9,528	11,587
27.38	9,558	11,778
27.40	9,588	11,970
27.42	9,618	12,162
27.44	9,648	12,355
27.46	9,678	12,548
27.48	9,708	12,742
27.50	9,739	12,936
27.52	9,769	13,131
27.54	9,799	13,327
27.56	9,829	13,523
27.58	9,859	13,720
27.60	9,889	13,917
27.62	9,919	14,116
27.64	9,949	14,314
27.66	9,979	14,513
27.68	10,009	14,713
27.70	10,039	14,914
27.72	10,069	15,115
27.74	10,099	15,317
27.76	10,129	15,519
27.78	10,159	15,722
27.80	10,189	15,925
27.82	10,219	16,129
27.84	10,249	16,334
27.86	10,279	16,539
27.88	10,309	16,745
27.90	10,339	16,952
27.92	10,369	17,159
27.94	10,399	17,366
27.96	10,429	17,575
27.98	10,459	17,784
28.00	**10,489**	**17,993**

Summary for Link DP-1: DP-1

Inflow Area = 15.370 ac, 0.00% Impervious, Inflow Depth > 0.32" for 100-yr event
Inflow = 17.97 cfs @ 0.10 hrs, Volume= 0.408 af
Primary = 17.97 cfs @ 0.10 hrs, Volume= 0.408 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1

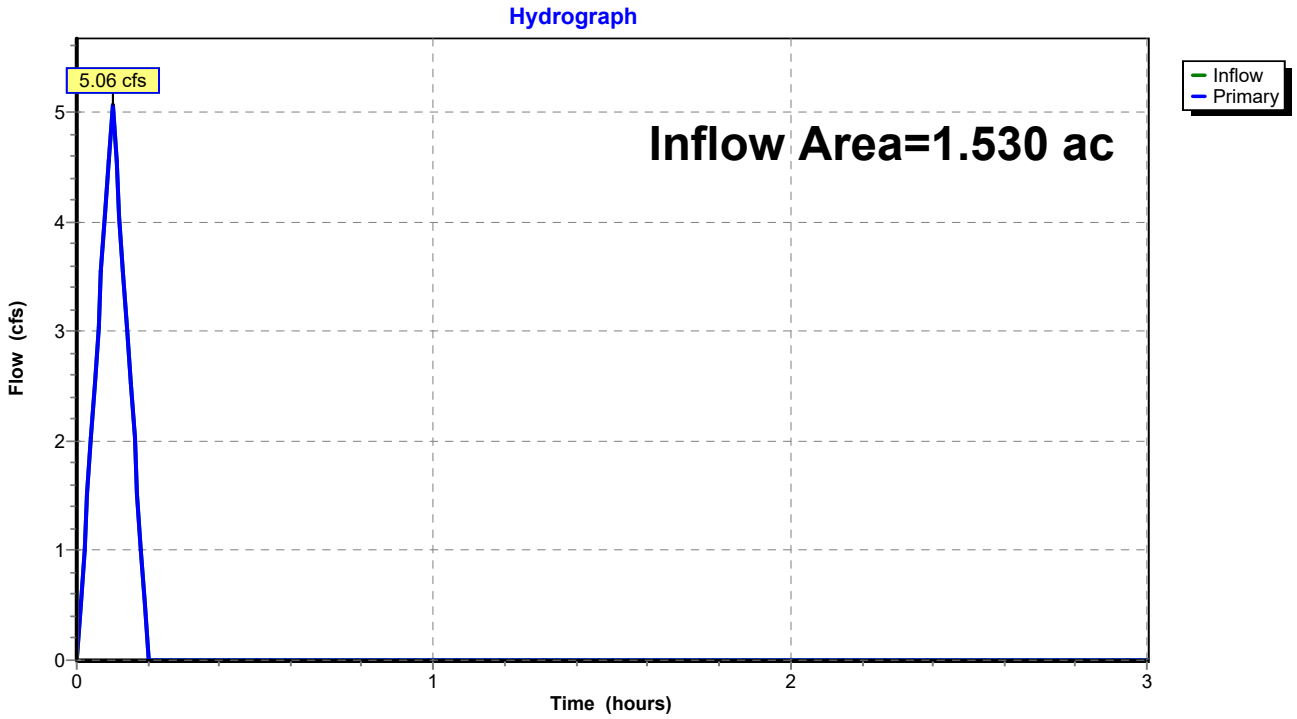


Summary for Link DP-2: DP-2

Inflow Area = 1.530 ac, 0.00% Impervious, Inflow Depth = 0.33" for 100-yr event
Inflow = 5.06 cfs @ 0.10 hrs, Volume= 0.042 af
Primary = 5.06 cfs @ 0.10 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-2: DP-2



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PD-1A: PD-1A Runoff Area=3.990 ac 0.00% Impervious Runoff Depth=0.43"
Tc=6.0 min C=0.38 Runoff=17.26 cfs 0.143 af

Subcatchment PD-1B: PD-1B Runoff Area=3.870 ac 0.00% Impervious Runoff Depth=0.78"
Tc=6.0 min C=0.69 Runoff=30.40 cfs 0.251 af

Subcatchment PD-1C: PD-1C Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.76"
Tc=6.0 min C=0.67 Runoff=10.45 cfs 0.086 af

Subcatchment PD-1D: PD-1D Runoff Area=3.940 ac 0.00% Impervious Runoff Depth=0.70"
Tc=6.0 min C=0.62 Runoff=27.81 cfs 0.230 af

Subcatchment PD-1E: PD-1E Runoff Area=1.040 ac 0.00% Impervious Runoff Depth=0.61"
Tc=6.0 min C=0.54 Runoff=6.39 cfs 0.053 af

Subcatchment PD-1F: PD-1F Runoff Area=1.160 ac 0.00% Impervious Runoff Depth=0.62"
Tc=6.0 min C=0.55 Runoff=7.26 cfs 0.060 af

Subcatchment PD-2A: PD-2A Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.36"
Tc=6.0 min C=0.32 Runoff=4.99 cfs 0.041 af

Subcatchment PD-2B: PD-2B Runoff Area=0.160 ac 0.00% Impervious Runoff Depth=0.43"
Tc=6.0 min C=0.38 Runoff=0.69 cfs 0.006 af

Pond P-1: P-1 Peak Elev=31.60' Storage=14,034 cf Inflow=40.85 cfs 0.338 af
Discarded=0.07 cfs 0.017 af Primary=6.01 cfs 0.041 af Outflow=6.09 cfs 0.058 af

Pond P-2: P-2 Peak Elev=27.47' Storage=12,689 cf Inflow=41.47 cfs 0.343 af
Outflow=7.44 cfs 0.313 af

Link DP-1: DP-1 Inflow=20.41 cfs 0.496 af
Primary=20.41 cfs 0.496 af

Link DP-2: DP-2 Inflow=5.68 cfs 0.047 af
Primary=5.68 cfs 0.047 af

Total Runoff Area = 16.900 ac Runoff Volume = 0.870 af Average Runoff Depth = 0.62"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment PD-1A: PD-1A

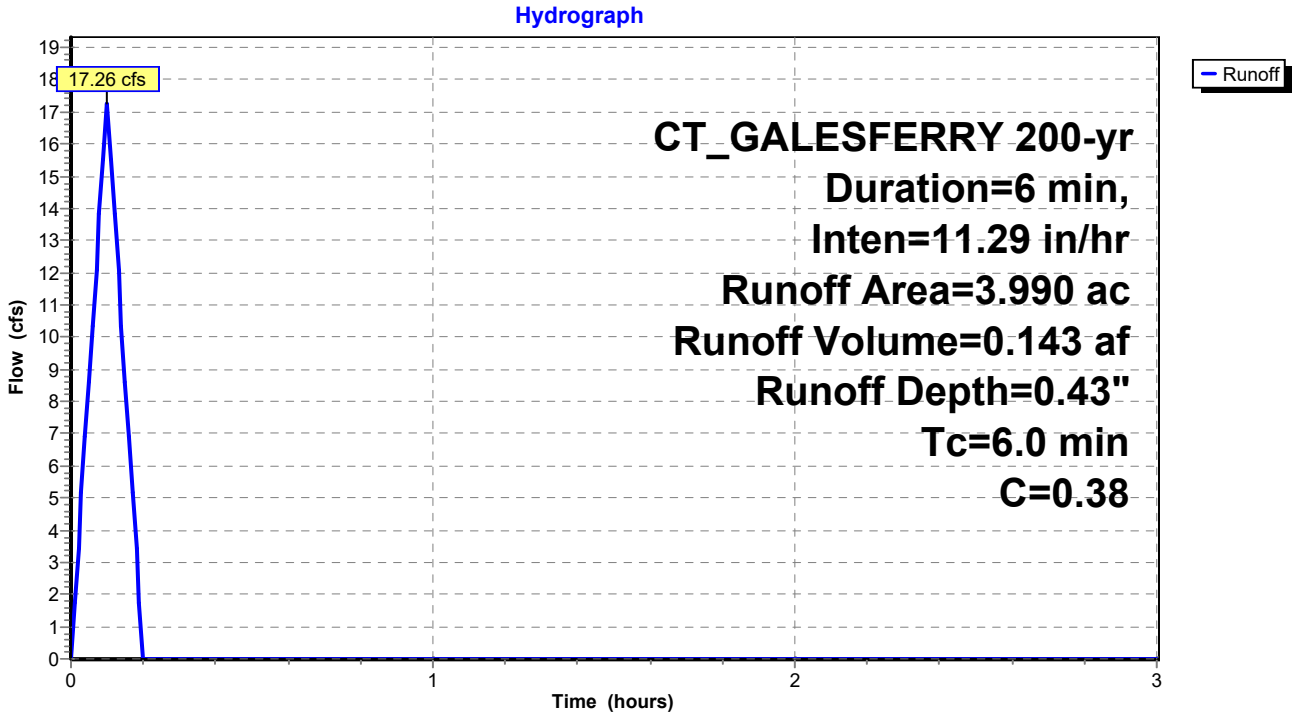
Runoff = 17.26 cfs @ 0.10 hrs, Volume= 0.143 af, Depth= 0.43"
Routed to Link DP-1 : DP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 200-yr Duration=6 min, Inten=11.29 in/hr

Area (ac)	C	Description
3.990	0.38	See C Worksheet in Appendix C
3.990		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 25.61**

Subcatchment PD-1A: PD-1A



Summary for Subcatchment PD-1B: PD-1B

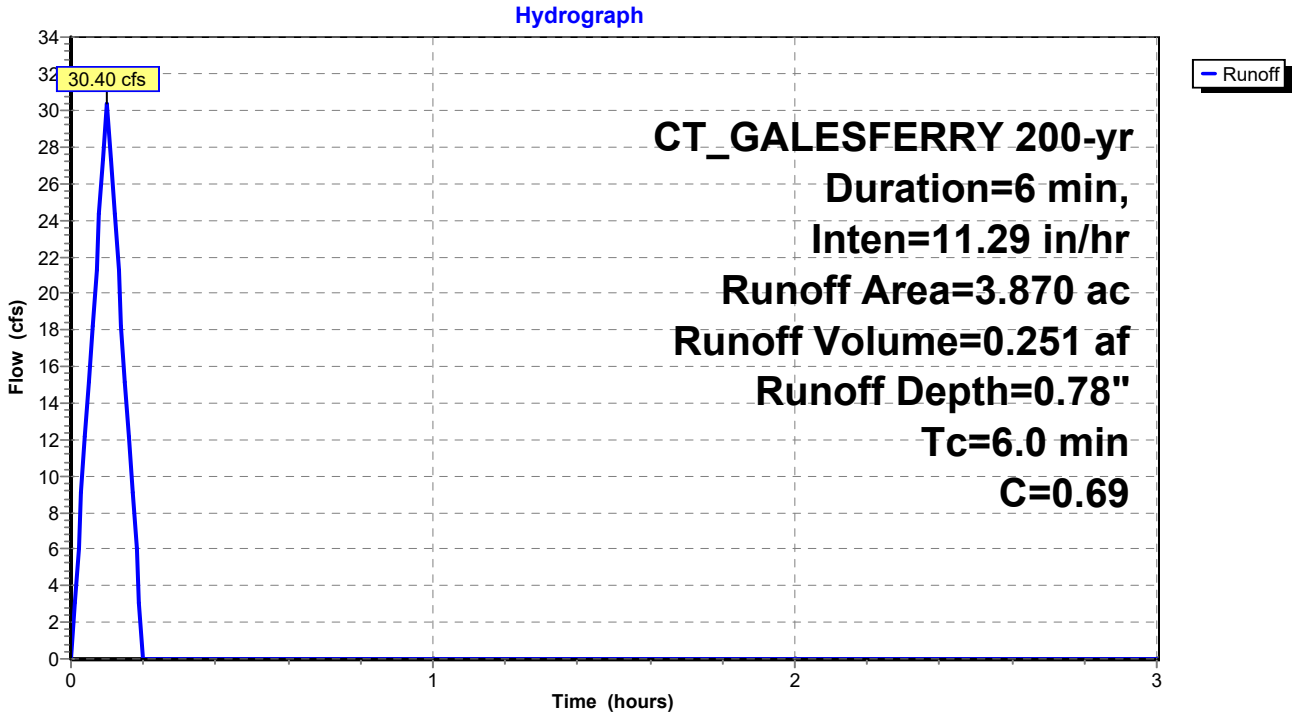
Runoff = 30.40 cfs @ 0.10 hrs, Volume= 0.251 af, Depth= 0.78"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 200-yr Duration=6 min, Inten=11.29 in/hr

Area (ac)	C	Description
3.870	0.69	See C Worksheet in Appendix C
3.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1B: PD-1B



Summary for Subcatchment PD-1C: PD-1C

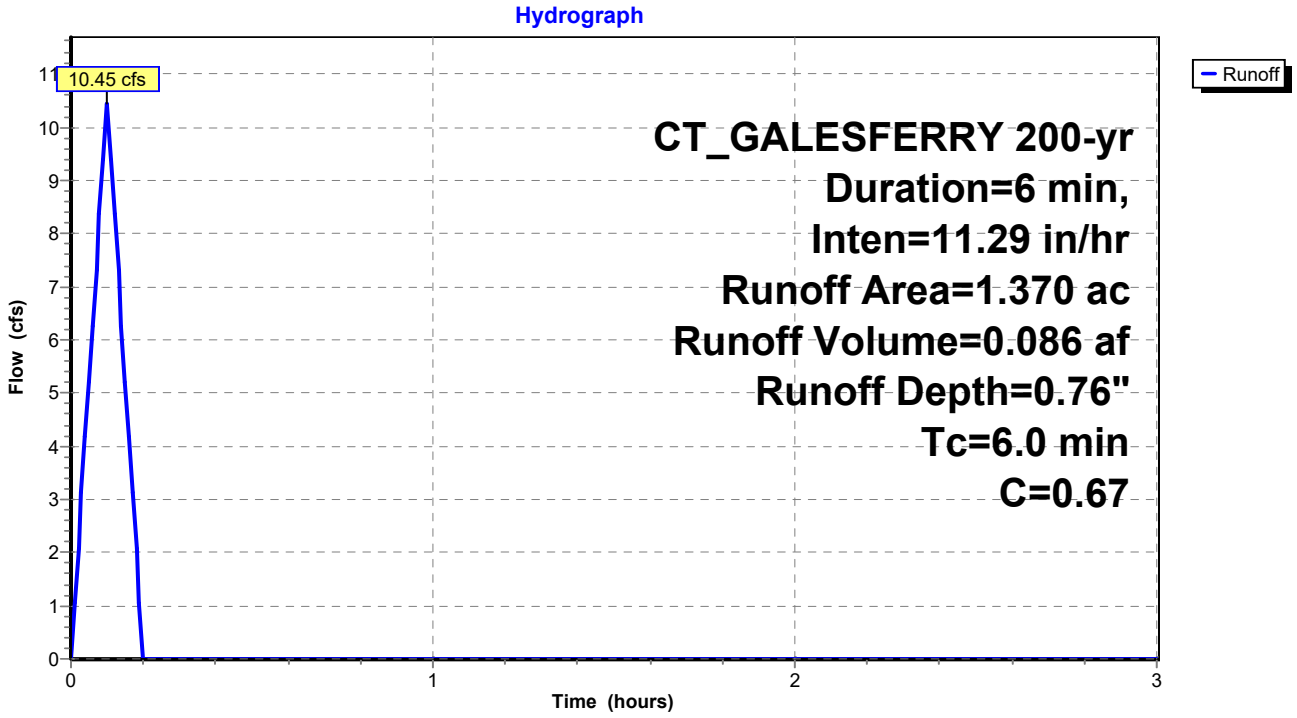
Runoff = 10.45 cfs @ 0.10 hrs, Volume= 0.086 af, Depth= 0.76"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 200-yr Duration=6 min, Inten=11.29 in/hr

Area (ac)	C	Description
1.370	0.67	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1C: PD-1C



Summary for Subcatchment PD-1D: PD-1D

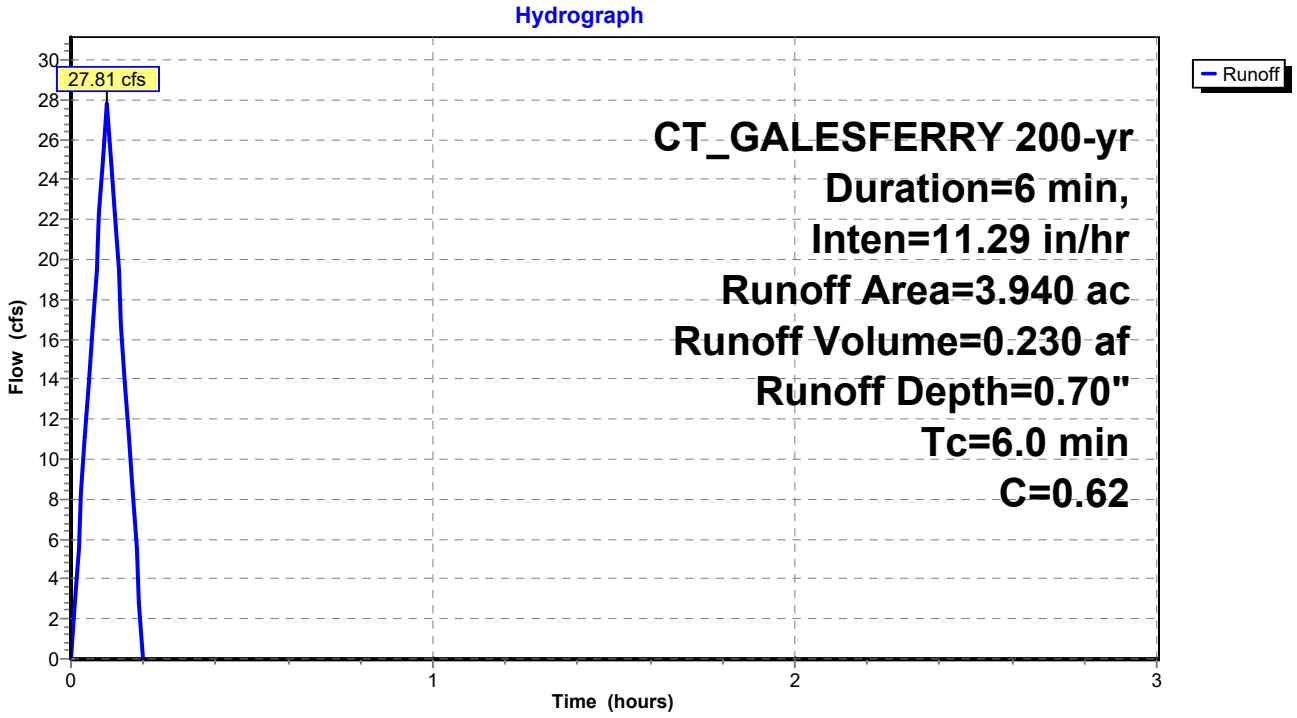
Runoff = 27.81 cfs @ 0.10 hrs, Volume= 0.230 af, Depth= 0.70"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 200-yr Duration=6 min, Inten=11.29 in/hr

Area (ac)	C	Description
3.940	0.62	See C Worksheet in Appendix C
3.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1D: PD-1D



Summary for Subcatchment PD-1E: PD-1E

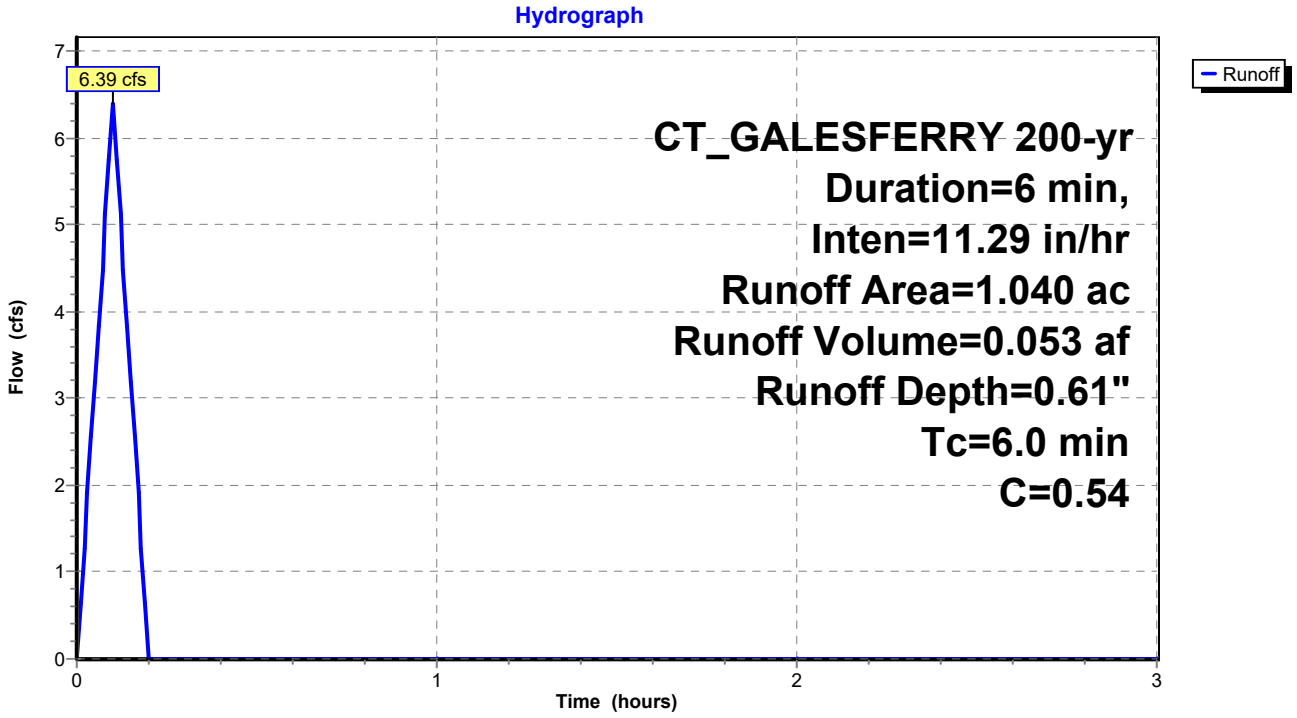
Runoff = 6.39 cfs @ 0.10 hrs, Volume= 0.053 af, Depth= 0.61"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 200-yr Duration=6 min, Inten=11.29 in/hr

Area (ac)	C	Description
1.040	0.54	See C Worksheet in Appendix C
1.040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1E: PD-1E



Summary for Subcatchment PD-1F: PD-1F

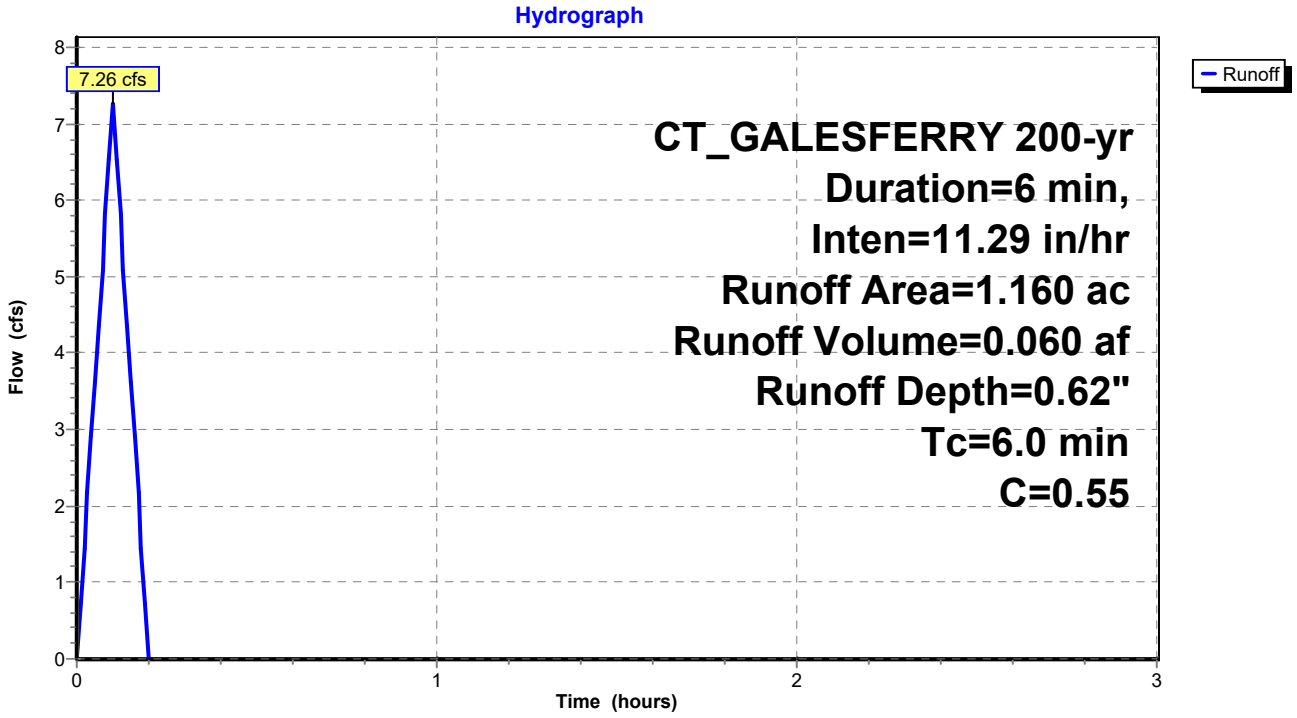
Runoff = 7.26 cfs @ 0.10 hrs, Volume= 0.060 af, Depth= 0.62"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 200-yr Duration=6 min, Inten=11.29 in/hr

Area (ac)	C	Description
1.160	0.55	See C Worksheet in Appendix C
1.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1F: PD-1F



Summary for Subcatchment PD-2A: PD-2A

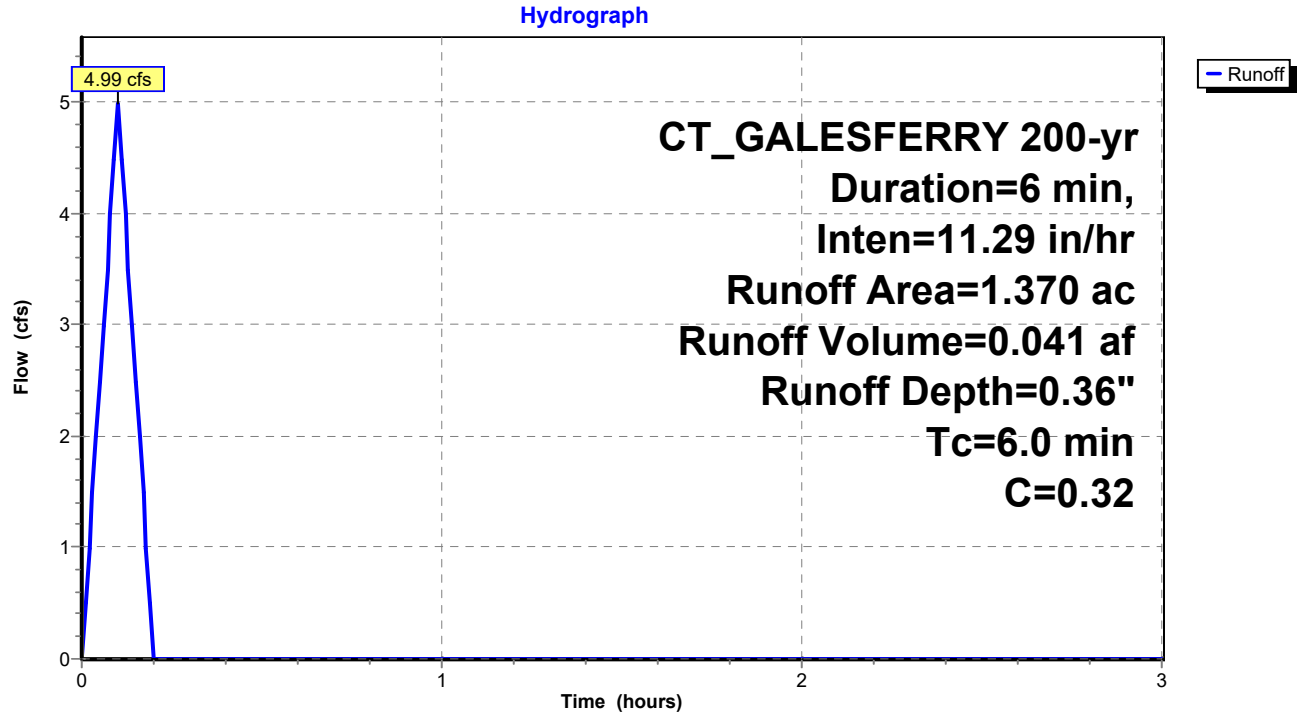
Runoff = 4.99 cfs @ 0.10 hrs, Volume= 0.041 af, Depth= 0.36"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 200-yr Duration=6 min, Inten=11.29 in/hr

Area (ac)	C	Description
1.370	0.32	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2A: PD-2A



Summary for Subcatchment PD-2B: PD-2B

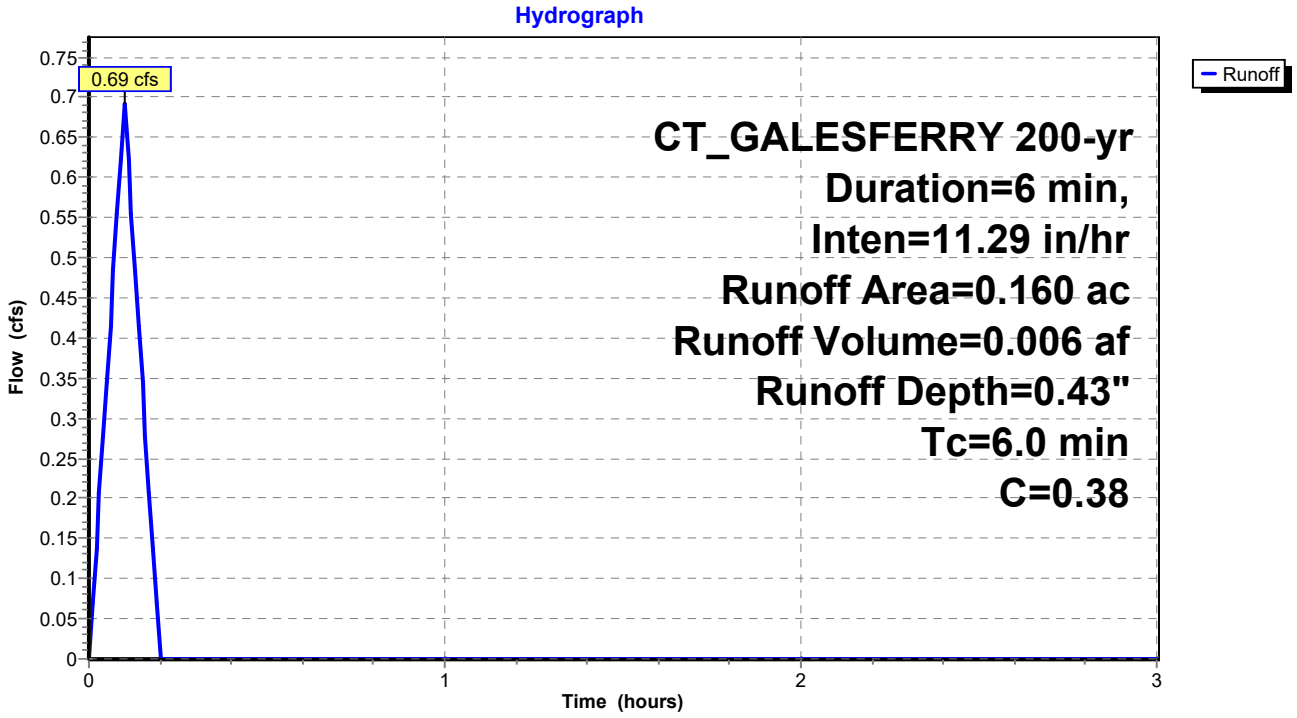
Runoff = 0.69 cfs @ 0.10 hrs, Volume= 0.006 af, Depth= 0.43"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 200-yr Duration=6 min, Inten=11.29 in/hr

Area (ac)	C	Description
0.160	0.38	See C Worksheet in Appendix C
0.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2B: PD-2B



Summary for Pond P-1: P-1

Inflow Area = 5.240 ac, 0.00% Impervious, Inflow Depth = 0.77" for 200-yr event
Inflow = 40.85 cfs @ 0.10 hrs, Volume= 0.338 af
Outflow = 6.09 cfs @ 0.19 hrs, Volume= 0.058 af, Atten= 85%, Lag= 5.1 min
Discarded = 0.07 cfs @ 0.19 hrs, Volume= 0.017 af
Primary = 6.01 cfs @ 0.19 hrs, Volume= 0.041 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 31.60' @ 0.19 hrs Surf.Area= 8,269 sf Storage= 14,034 cf

Plug-Flow detention time= 34.3 min calculated for 0.058 af (17% of inflow)
Center-of-Mass det. time= 30.6 min (36.6 - 6.0)

Volume	Invert	Avail.Storage	Storage Description
#1	29.00'	17,554 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

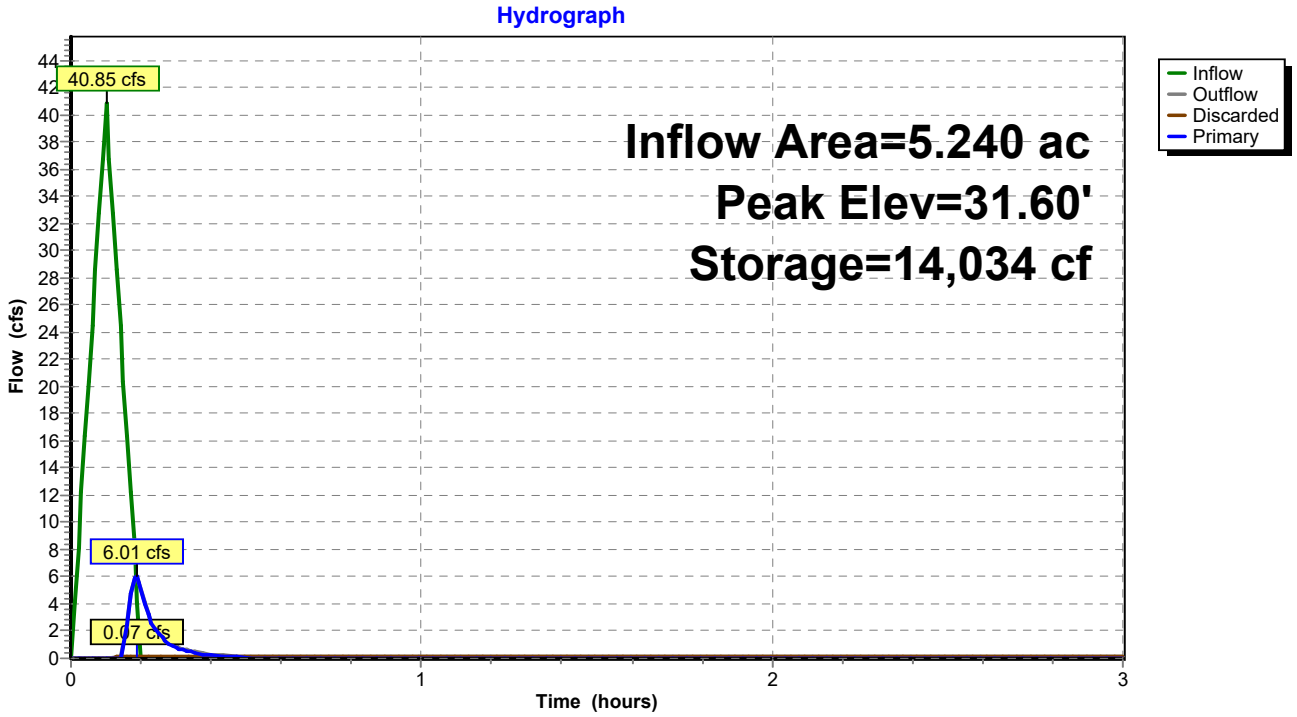
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
29.00	2,602	0	0
30.00	4,737	3,670	3,670
31.00	6,928	5,833	9,502
32.00	9,176	8,052	17,554

Device	Routing	Invert	Outlet Devices
#1	Primary	31.44'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	29.00'	**0.260 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 26.00' Phase-In= 0.01'

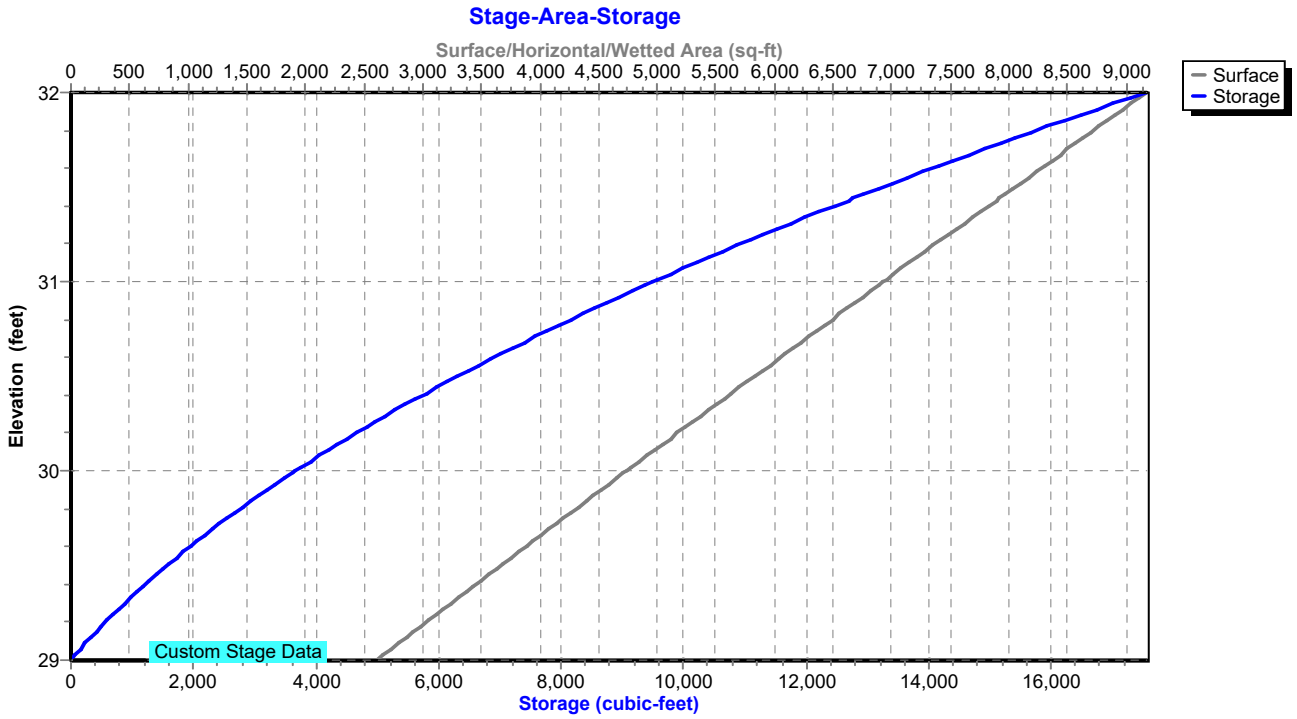
Discarded OutFlow Max=0.07 cfs @ 0.19 hrs HW=31.59' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.07 cfs)

Primary OutFlow Max=5.90 cfs @ 0.19 hrs HW=31.59' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 5.90 cfs @ 0.96 fps)

Pond P-1: P-1



Pond P-1: P-1



Stage-Area-Storage for Pond P-1: P-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
29.00	2,602	0
29.05	2,709	133
29.10	2,816	271
29.15	2,922	414
29.20	3,029	563
29.25	3,136	717
29.30	3,243	877
29.35	3,349	1,041
29.40	3,456	1,212
29.45	3,563	1,387
29.50	3,670	1,568
29.55	3,776	1,754
29.60	3,883	1,946
29.65	3,990	2,142
29.70	4,096	2,344
29.75	4,203	2,552
29.80	4,310	2,765
29.85	4,417	2,983
29.90	4,523	3,206
29.95	4,630	3,435
30.00	4,737	3,670
30.05	4,847	3,909
30.10	4,956	4,154
30.15	5,066	4,405
30.20	5,175	4,661
30.25	5,285	4,922
30.30	5,394	5,189
30.35	5,504	5,462
30.40	5,613	5,740
30.45	5,723	6,023
30.50	5,833	6,312
30.55	5,942	6,606
30.60	6,052	6,906
30.65	6,161	7,211
30.70	6,271	7,522
30.75	6,380	7,838
30.80	6,490	8,160
30.85	6,599	8,487
30.90	6,709	8,820
30.95	6,818	9,158
31.00	6,928	9,502
31.05	7,040	9,851
31.10	7,153	10,206
31.15	7,265	10,566
31.20	7,378	10,933
31.25	7,490	11,304
31.30	7,602	11,682
31.35	7,715	12,064
31.40	7,827	12,453
31.45	7,940	12,847
31.50	8,052	13,247
31.55	8,164	13,652
31.60	8,277	14,063
31.65	8,389	14,480
31.70	8,502	14,902
31.75	8,614	15,330
31.80	8,726	15,764
31.85	8,839	16,203
31.90	8,951	16,648
31.95	9,064	17,098
32.00	**9,176**	**17,554**

Summary for Pond P-2: P-2

Inflow Area = 6.140 ac, 0.00% Impervious, Inflow Depth = 0.67" for 200-yr event
Inflow = 41.47 cfs @ 0.10 hrs, Volume= 0.343 af
Outflow = 7.44 cfs @ 0.18 hrs, Volume= 0.313 af, Atten= 82%, Lag= 4.9 min
Primary = 7.44 cfs @ 0.18 hrs, Volume= 0.313 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 27.47' @ 0.18 hrs Surf.Area= 9,700 sf Storage= 12,689 cf

Plug-Flow detention time= 32.9 min calculated for 0.312 af (91% of inflow)
Center-of-Mass det. time= 32.9 min (38.9 - 6.0)

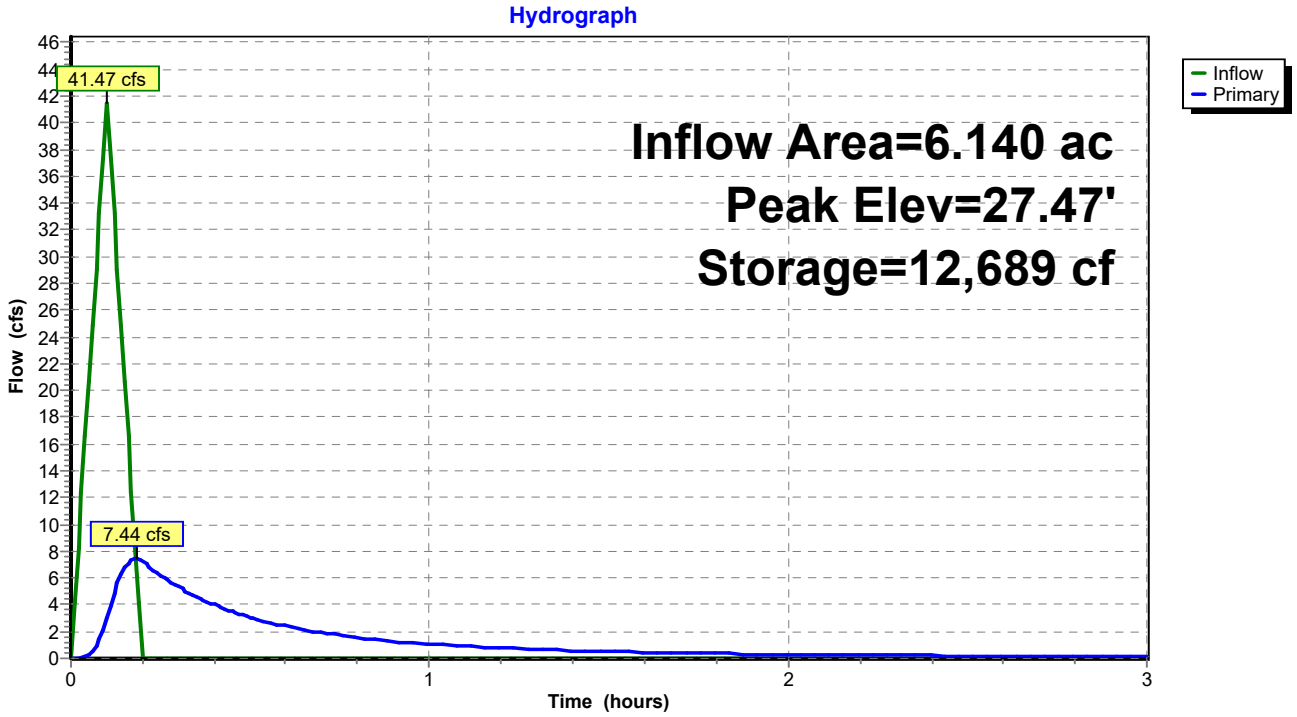
Volume	Invert	Avail.Storage	Storage Description
#1	26.00'	17,993 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
26.00	7,521	0	0
27.00	8,988	8,255	8,255
28.00	10,489	9,739	17,993

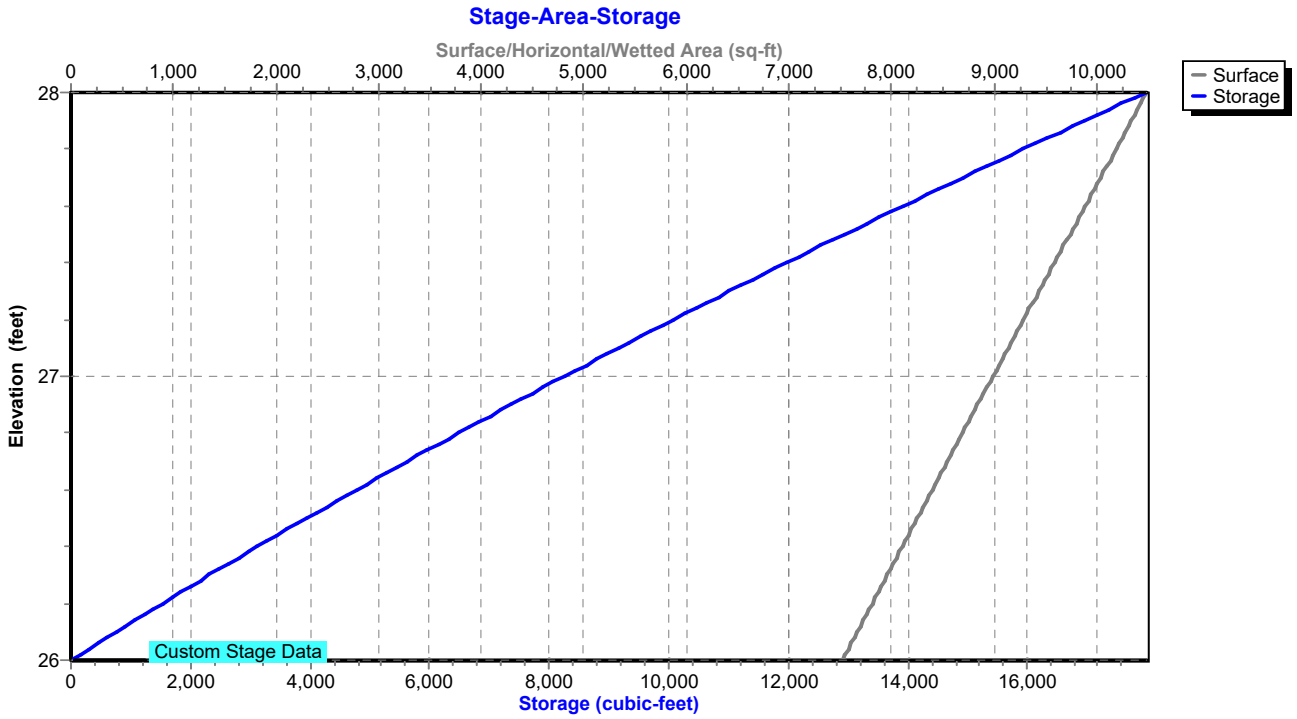
Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	26.00'	**24.0" Round Culvert** L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.00' / 25.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=7.43 cfs @ 0.18 hrs HW=27.47' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Culvert (Barrel Controls 7.43 cfs @ 4.18 fps)

Pond P-2: P-2



Pond P-2: P-2



Stage-Area-Storage for Pond P-2: P-2

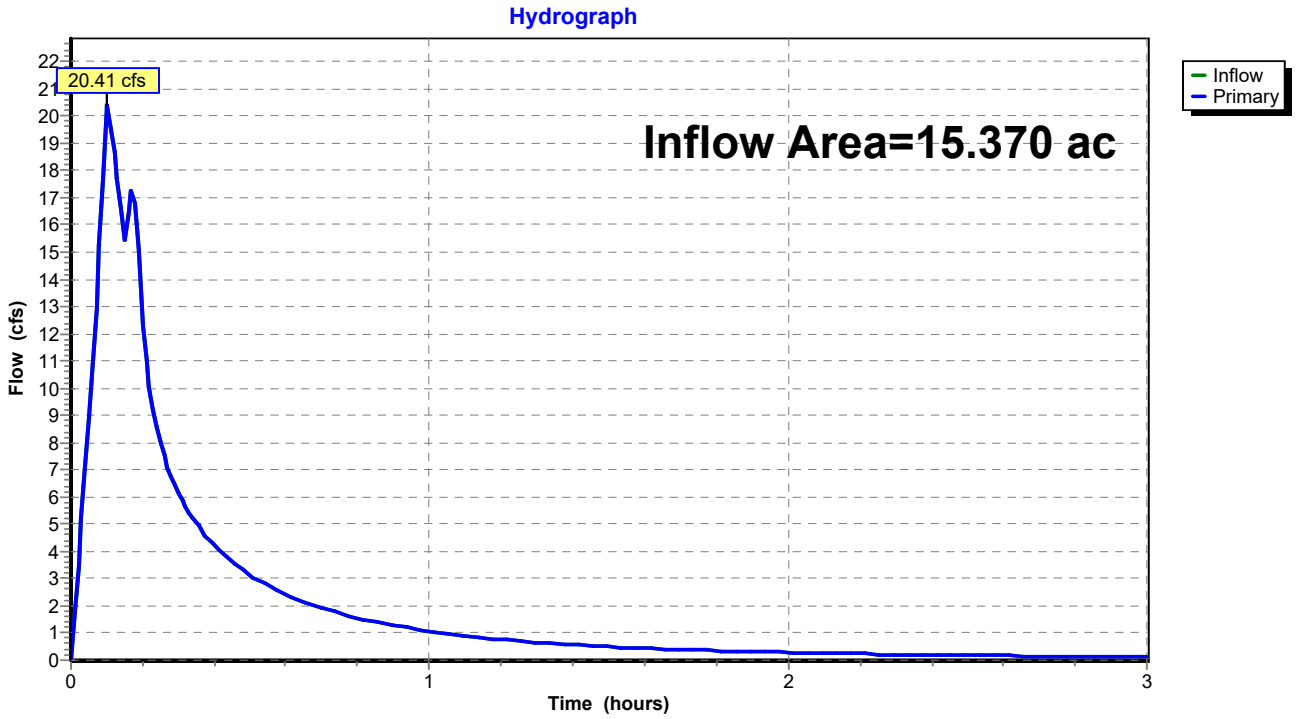
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
26.00	7,521	0
26.02	7,550	151
26.04	7,580	302
26.06	7,609	454
26.08	7,638	606
26.10	7,668	759
26.12	7,697	913
26.14	7,726	1,067
26.16	7,756	1,222
26.18	7,785	1,378
26.20	7,814	1,534
26.22	7,844	1,690
26.24	7,873	1,847
26.26	7,902	2,005
26.28	7,932	2,163
26.30	7,961	2,322
26.32	7,990	2,482
26.34	8,020	2,642
26.36	8,049	2,803
26.38	8,078	2,964
26.40	8,108	3,126
26.42	8,137	3,288
26.44	8,166	3,451
26.46	8,196	3,615
26.48	8,225	3,779
26.50	8,255	3,944
26.52	8,284	4,109
26.54	8,313	4,275
26.56	8,343	4,442
26.58	8,372	4,609
26.60	8,401	4,777
26.62	8,431	4,945
26.64	8,460	5,114
26.66	8,489	5,283
26.68	8,519	5,453
26.70	8,548	5,624
26.72	8,577	5,795
26.74	8,607	5,967
26.76	8,636	6,140
26.78	8,665	6,313
26.80	8,695	6,486
26.82	8,724	6,660
26.84	8,753	6,835
26.86	8,783	7,011
26.88	8,812	7,187
26.90	8,841	7,363
26.92	8,871	7,540
26.94	8,900	7,718
26.96	8,929	7,896
26.98	8,959	8,075
27.00	8,988	8,255
27.02	9,018	8,435
27.04	9,048	8,615
27.06	9,078	8,796
27.08	9,108	8,978
27.10	9,138	9,161
27.12	9,168	9,344
27.14	9,198	9,528
27.16	9,228	9,712
27.18	9,258	9,897
27.20	9,288	10,082
27.22	9,318	10,268
27.24	9,348	10,455
27.26	9,378	10,642
27.28	9,408	10,830
27.30	9,438	11,018
27.32	9,468	11,208
27.34	9,498	11,397
27.36	9,528	11,587
27.38	9,558	11,778
27.40	9,588	11,970
27.42	9,618	12,162
27.44	9,648	12,355
27.46	9,678	12,548
27.48	9,708	12,742
27.50	9,739	12,936
27.52	9,769	13,131
27.54	9,799	13,327
27.56	9,829	13,523
27.58	9,859	13,720
27.60	9,889	13,917
27.62	9,919	14,116
27.64	9,949	14,314
27.66	9,979	14,513
27.68	10,009	14,713
27.70	10,039	14,914
27.72	10,069	15,115
27.74	10,099	15,317
27.76	10,129	15,519
27.78	10,159	15,722
27.80	10,189	15,925
27.82	10,219	16,129
27.84	10,249	16,334
27.86	10,279	16,539
27.88	10,309	16,745
27.90	10,339	16,952
27.92	10,369	17,159
27.94	10,399	17,366
27.96	10,429	17,575
27.98	10,459	17,784
28.00	**10,489**	**17,993**

Summary for Link DP-1: DP-1

Inflow Area = 15.370 ac, 0.00% Impervious, Inflow Depth > 0.39" for 200-yr event
Inflow = 20.41 cfs @ 0.10 hrs, Volume= 0.496 af
Primary = 20.41 cfs @ 0.10 hrs, Volume= 0.496 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1

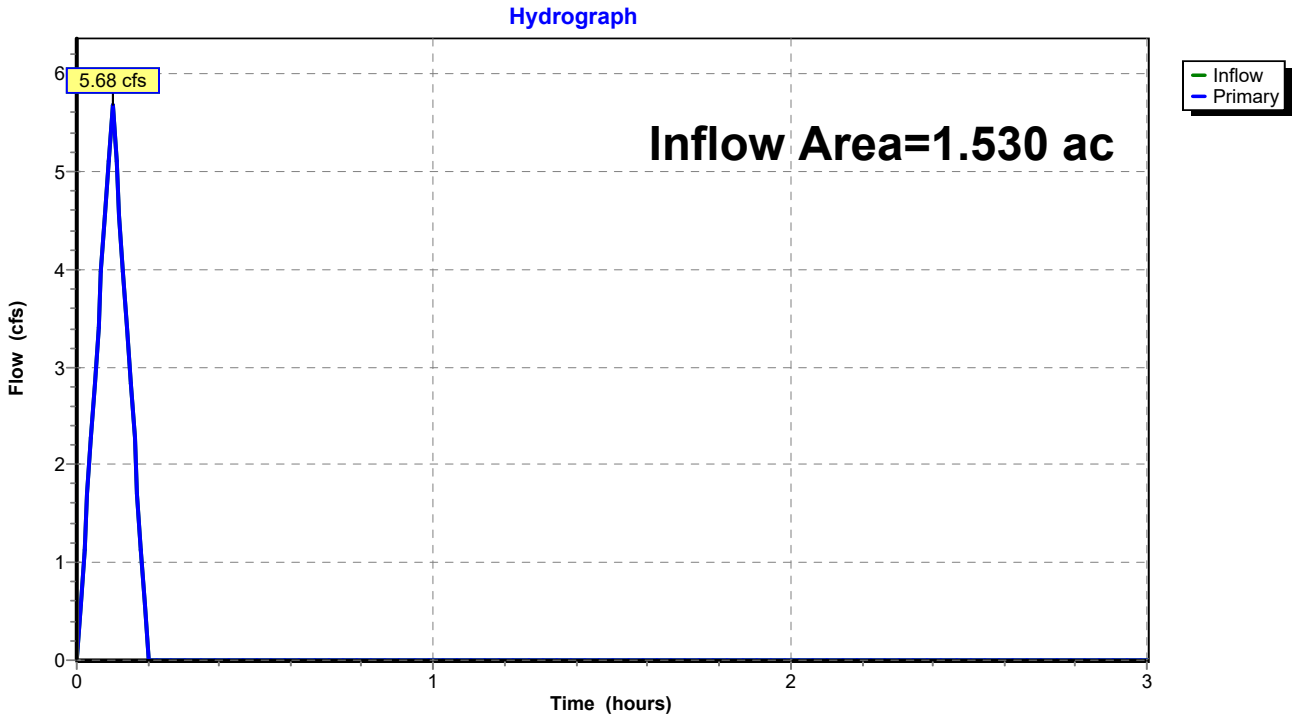


Summary for Link DP-2: DP-2

Inflow Area = 1.530 ac, 0.00% Impervious, Inflow Depth = 0.37" for 200-yr event
Inflow = 5.68 cfs @ 0.10 hrs, Volume= 0.047 af
Primary = 5.68 cfs @ 0.10 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-2: DP-2



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPD-1A: PD-1A Runoff Area=3.990 ac 0.00% Impervious Runoff Depth=0.50"
Tc=6.0 min C=0.38 Runoff=19.95 cfs 0.165 af

SubcatchmentPD-1B: PD-1B Runoff Area=3.870 ac 0.00% Impervious Runoff Depth=0.90"
Tc=6.0 min C=0.69 Runoff=35.14 cfs 0.290 af

SubcatchmentPD-1C: PD-1C Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.87"
Tc=6.0 min C=0.67 Runoff=12.08 cfs 0.100 af

SubcatchmentPD-1D: PD-1D Runoff Area=3.940 ac 0.00% Impervious Runoff Depth=0.81"
Tc=6.0 min C=0.62 Runoff=32.14 cfs 0.266 af

SubcatchmentPD-1E: PD-1E Runoff Area=1.040 ac 0.00% Impervious Runoff Depth=0.70"
Tc=6.0 min C=0.54 Runoff=7.39 cfs 0.061 af

SubcatchmentPD-1F: PD-1F Runoff Area=1.160 ac 0.00% Impervious Runoff Depth=0.72"
Tc=6.0 min C=0.55 Runoff=8.40 cfs 0.069 af

SubcatchmentPD-2A: PD-2A Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.42"
Tc=6.0 min C=0.32 Runoff=5.77 cfs 0.048 af

SubcatchmentPD-2B: PD-2B Runoff Area=0.160 ac 0.00% Impervious Runoff Depth=0.50"
Tc=6.0 min C=0.38 Runoff=0.80 cfs 0.007 af

Pond P-1: P-1 Peak Elev=31.71' Storage=14,984 cf Inflow=47.22 cfs 0.390 af
Discarded=0.08 cfs 0.017 af Primary=13.82 cfs 0.093 af Outflow=13.90 cfs 0.110 af

Pond P-2: P-2 Peak Elev=27.62' Storage=14,154 cf Inflow=47.93 cfs 0.396 af
Outflow=12.97 cfs 0.366 af

Link DP-1: DP-1 Inflow=33.10 cfs 0.624 af
Primary=33.10 cfs 0.624 af

Link DP-2: DP-2 Inflow=6.57 cfs 0.054 af
Primary=6.57 cfs 0.054 af

Total Runoff Area = 16.900 ac Runoff Volume = 1.006 af Average Runoff Depth = 0.71"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment PD-1A: PD-1A

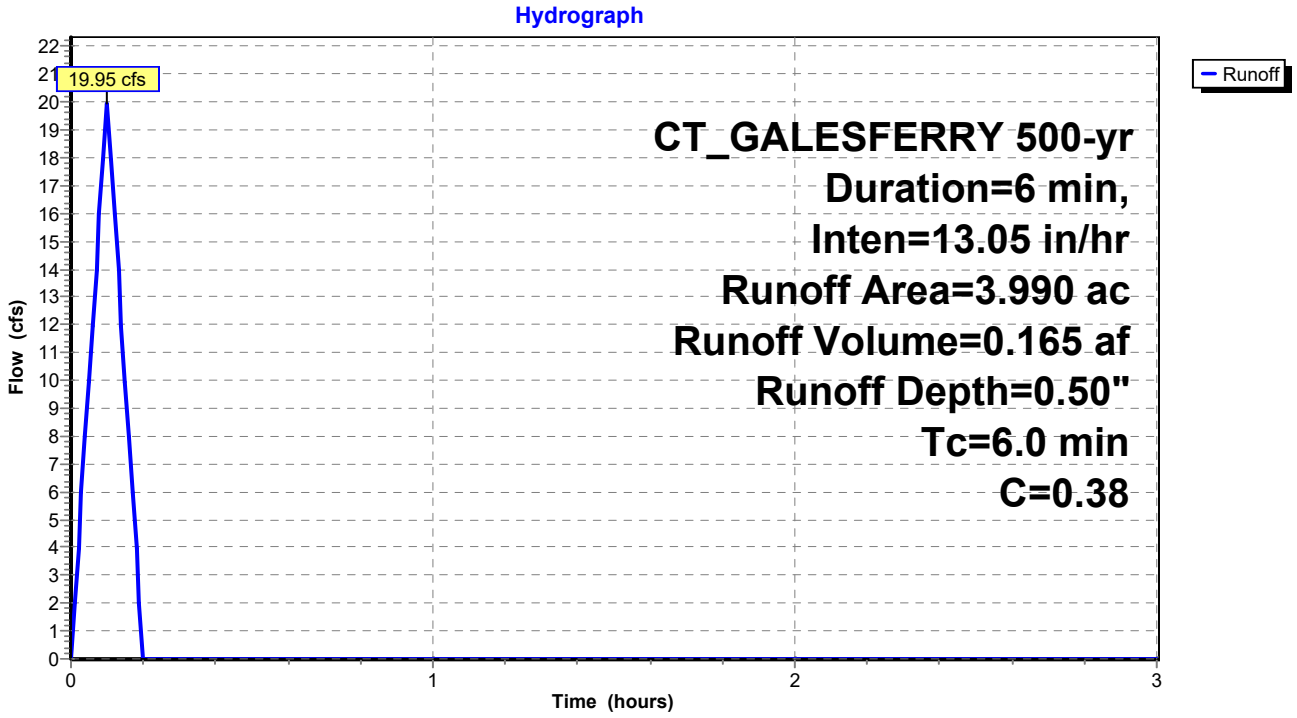
Runoff = 19.95 cfs @ 0.10 hrs, Volume= 0.165 af, Depth= 0.50"
Routed to Link DP-1 : DP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 500-yr Duration=6 min, Inten=13.05 in/hr

Area (ac)	C	Description
3.990	0.38	See C Worksheet in Appendix C
3.990		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 25.61**

Subcatchment PD-1A: PD-1A



Summary for Subcatchment PD-1B: PD-1B

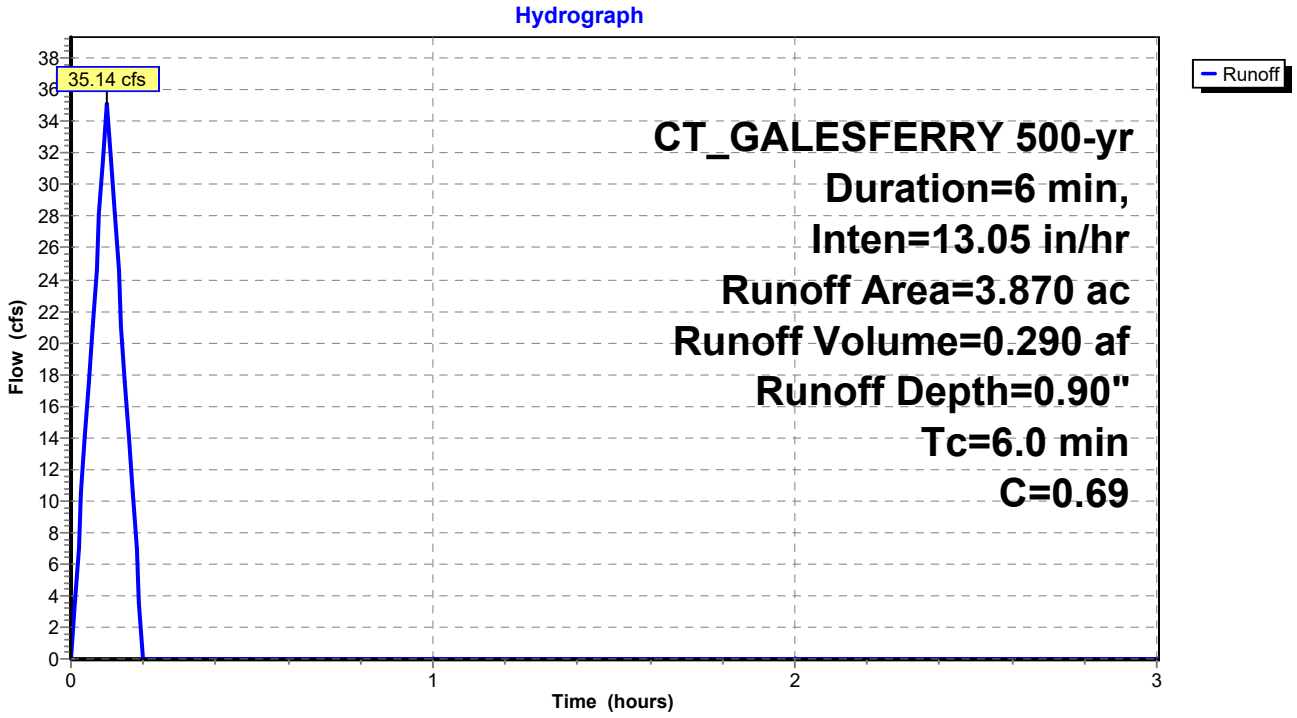
Runoff = 35.14 cfs @ 0.10 hrs, Volume= 0.290 af, Depth= 0.90"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 500-yr Duration=6 min, Inten=13.05 in/hr

Area (ac)	C	Description
3.870	0.69	See C Worksheet in Appendix C
3.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1B: PD-1B



Summary for Subcatchment PD-1C: PD-1C

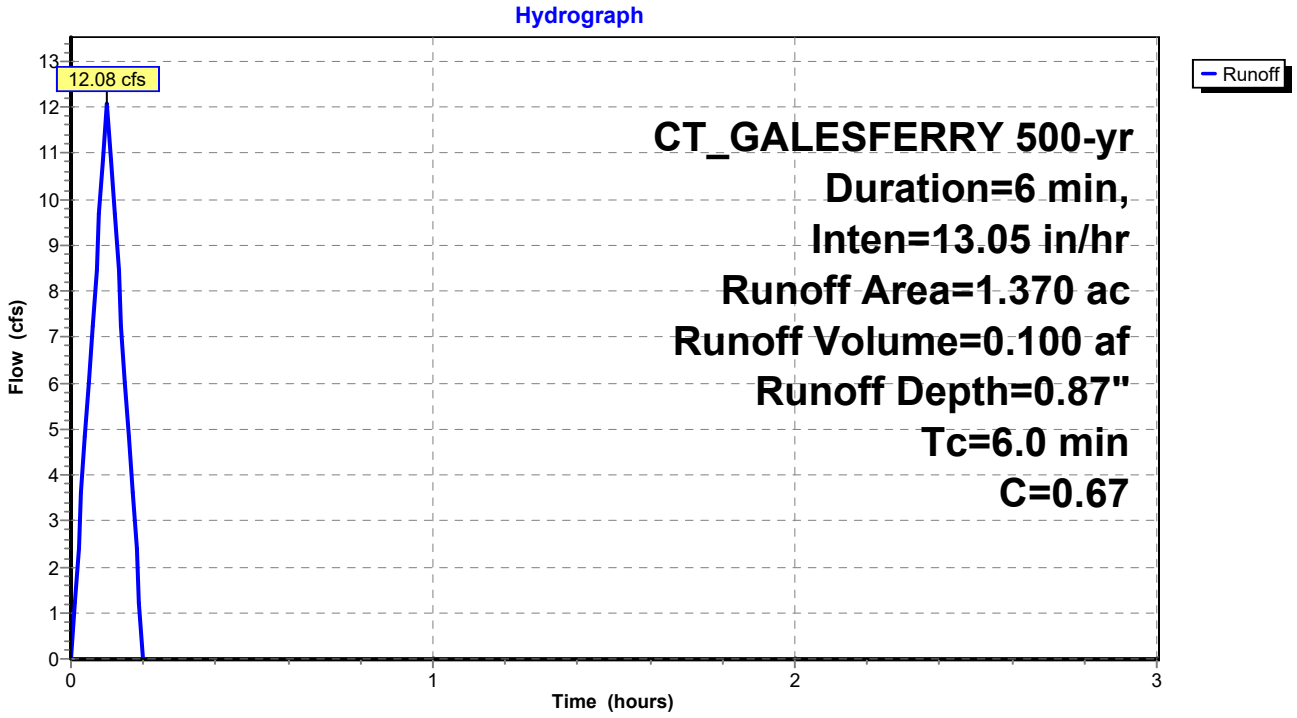
Runoff = 12.08 cfs @ 0.10 hrs, Volume= 0.100 af, Depth= 0.87"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 500-yr Duration=6 min, Inten=13.05 in/hr

Area (ac)	C	Description
1.370	0.67	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1C: PD-1C



Summary for Subcatchment PD-1D: PD-1D

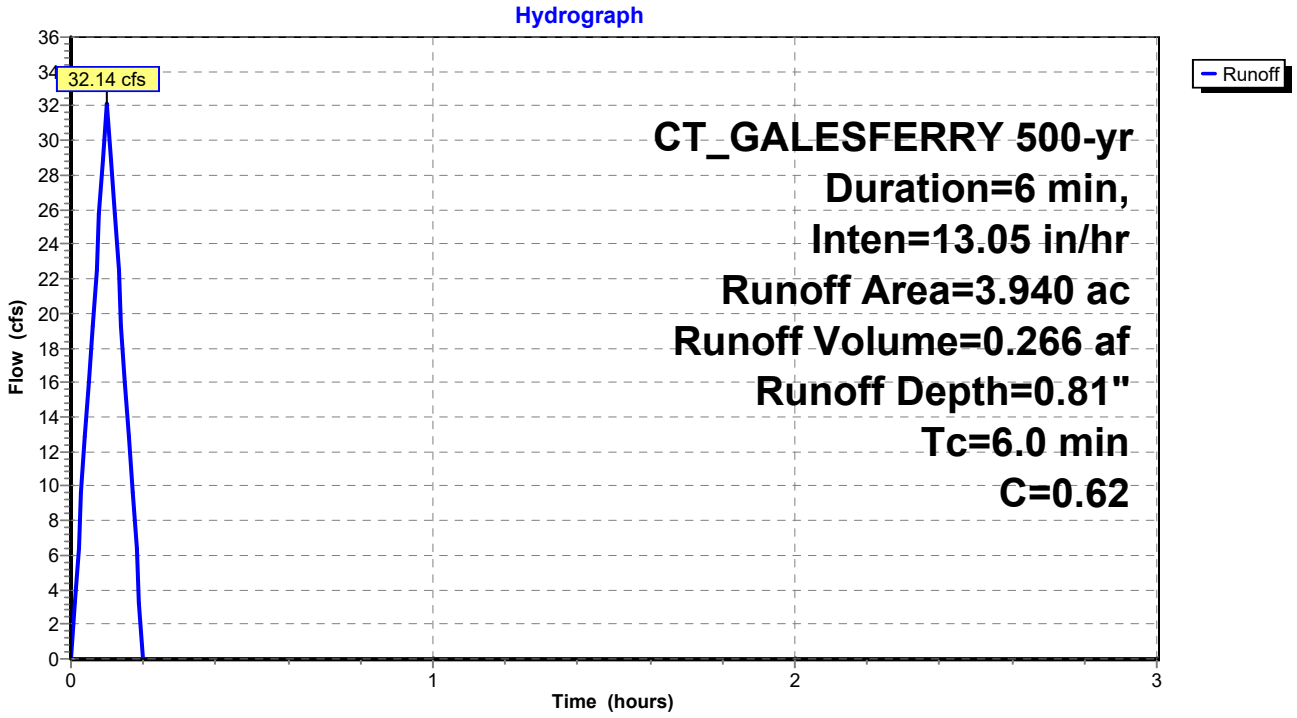
Runoff = 32.14 cfs @ 0.10 hrs, Volume= 0.266 af, Depth= 0.81"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 500-yr Duration=6 min, Inten=13.05 in/hr

Area (ac)	C	Description
3.940	0.62	See C Worksheet in Appendix C
3.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1D: PD-1D



Summary for Subcatchment PD-1E: PD-1E

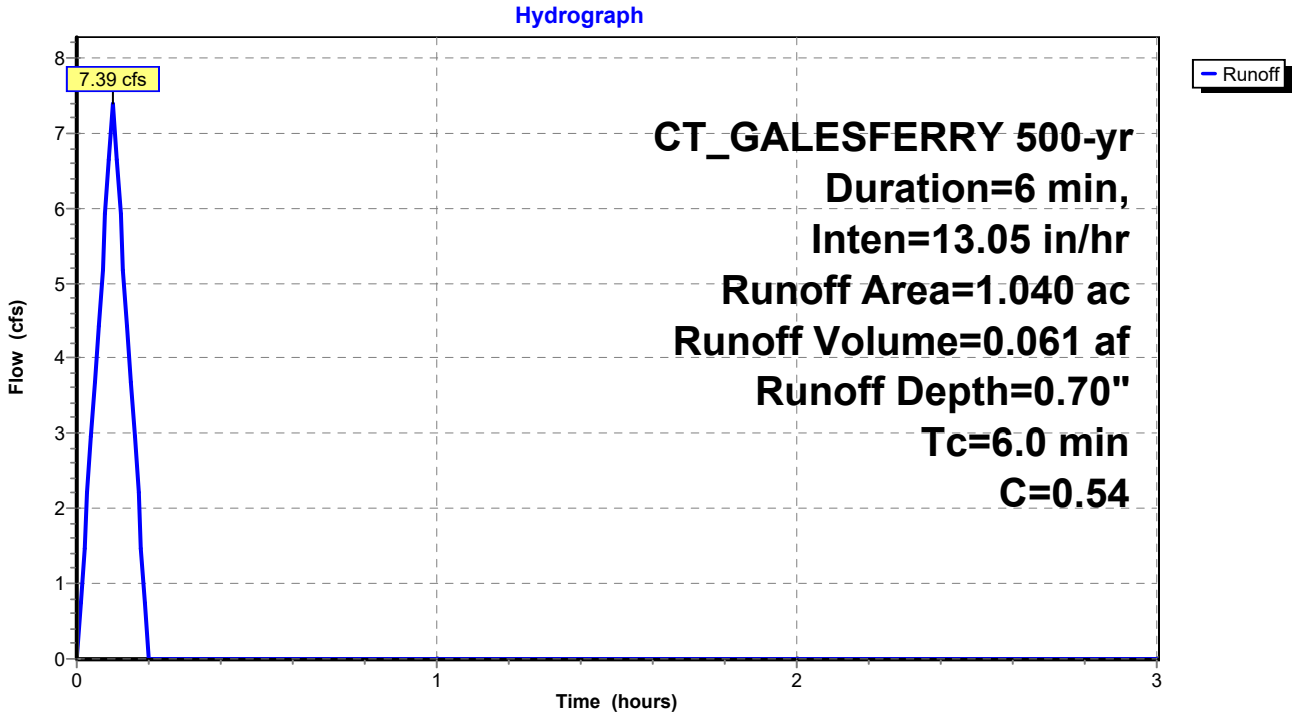
Runoff = 7.39 cfs @ 0.10 hrs, Volume= 0.061 af, Depth= 0.70"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 500-yr Duration=6 min, Inten=13.05 in/hr

Area (ac)	C	Description
1.040	0.54	See C Worksheet in Appendix C
1.040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1E: PD-1E



Summary for Subcatchment PD-1F: PD-1F

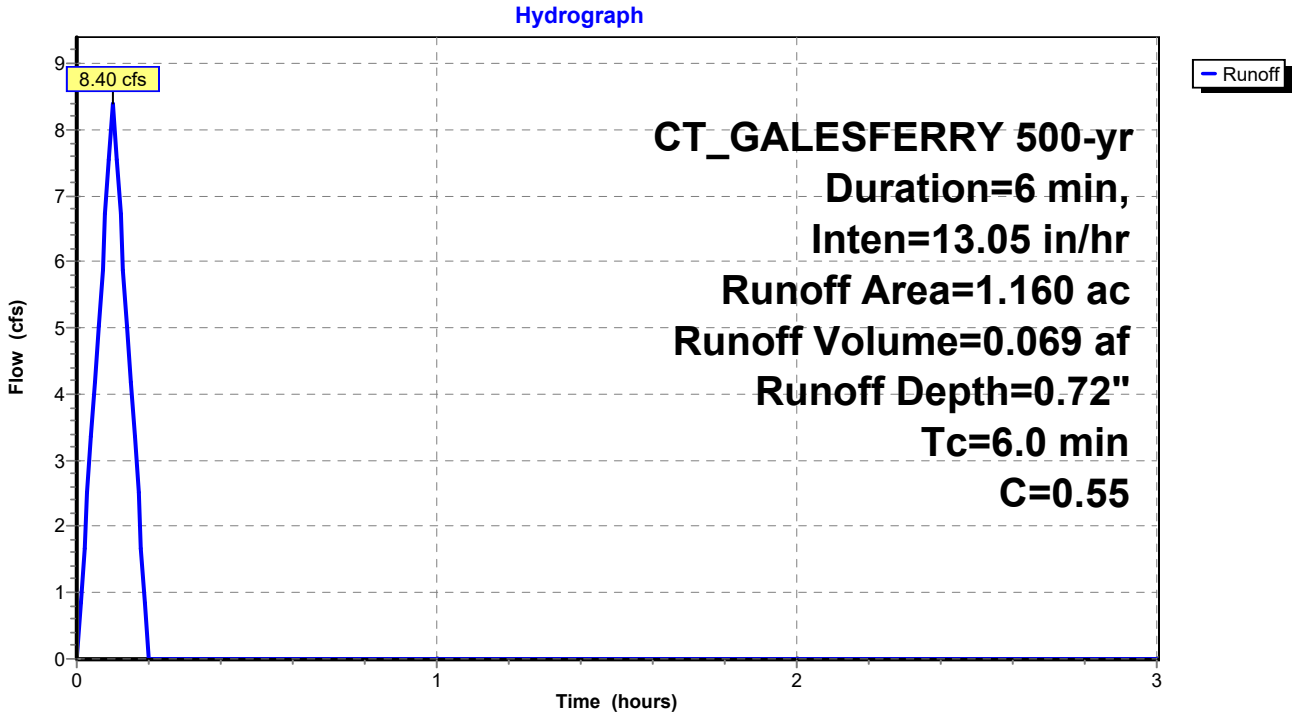
Runoff = 8.40 cfs @ 0.10 hrs, Volume= 0.069 af, Depth= 0.72"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 500-yr Duration=6 min, Inten=13.05 in/hr

Area (ac)	C	Description
1.160	0.55	See C Worksheet in Appendix C
1.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1F: PD-1F



Summary for Subcatchment PD-2A: PD-2A

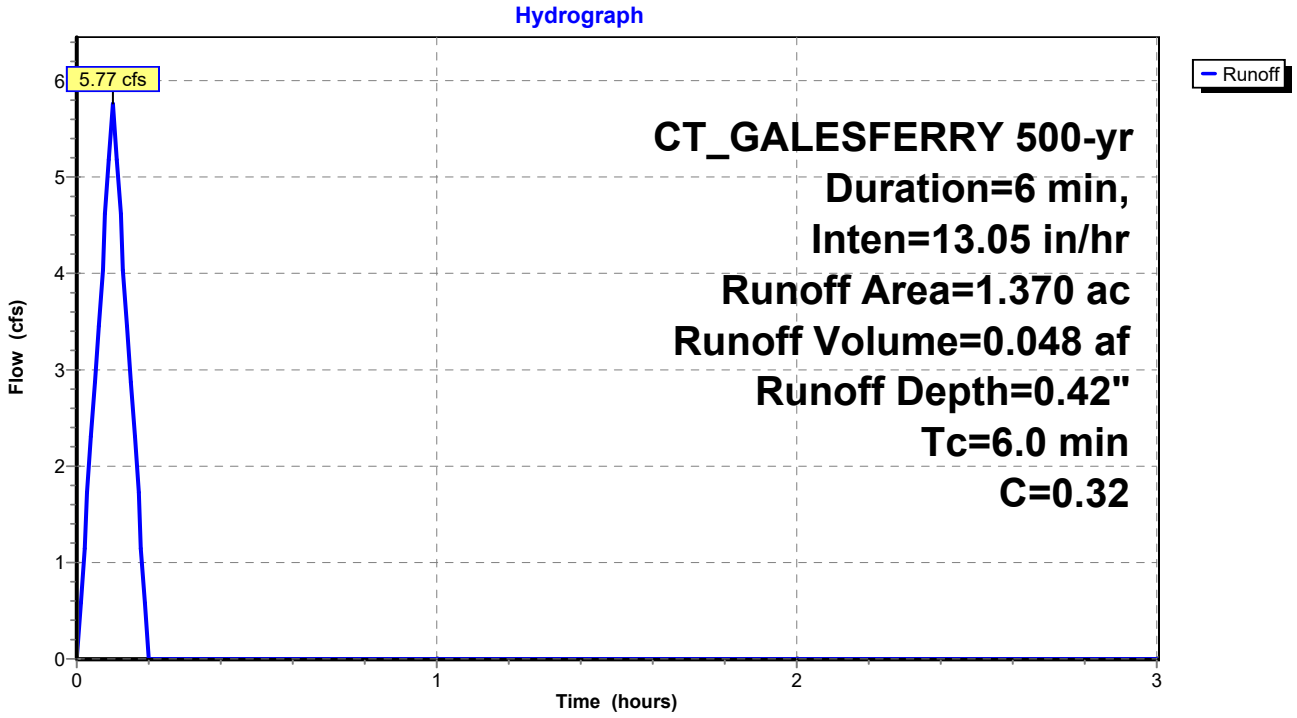
Runoff = 5.77 cfs @ 0.10 hrs, Volume= 0.048 af, Depth= 0.42"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 500-yr Duration=6 min, Inten=13.05 in/hr

Area (ac)	C	Description
1.370	0.32	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2A: PD-2A



Summary for Subcatchment PD-2B: PD-2B

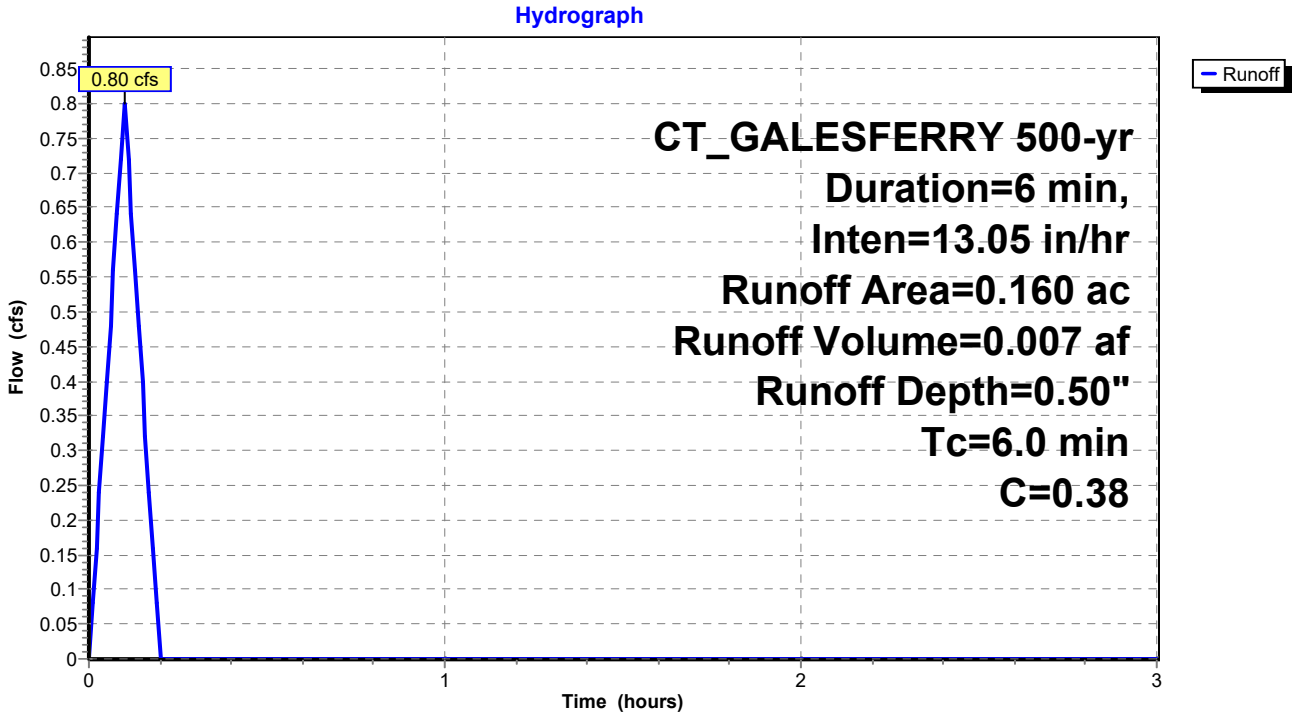
Runoff = 0.80 cfs @ 0.10 hrs, Volume= 0.007 af, Depth= 0.50"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 500-yr Duration=6 min, Inten=13.05 in/hr

Area (ac)	C	Description
0.160	0.38	See C Worksheet in Appendix C
0.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2B: PD-2B



Summary for Pond P-1: P-1

Inflow Area = 5.240 ac, 0.00% Impervious, Inflow Depth = 0.89" for 500-yr event
Inflow = 47.22 cfs @ 0.10 hrs, Volume= 0.390 af
Outflow = 13.90 cfs @ 0.17 hrs, Volume= 0.110 af, Atten= 71%, Lag= 4.3 min
Discarded = 0.08 cfs @ 0.17 hrs, Volume= 0.017 af
Primary = 13.82 cfs @ 0.17 hrs, Volume= 0.093 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 31.71' @ 0.17 hrs Surf.Area= 8,523 sf Storage= 14,984 cf

Plug-Flow detention time= 21.5 min calculated for 0.110 af (28% of inflow)
Center-of-Mass det. time= 18.5 min (24.5 - 6.0)

Volume	Invert	Avail.Storage	Storage Description
#1	29.00'	17,554 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

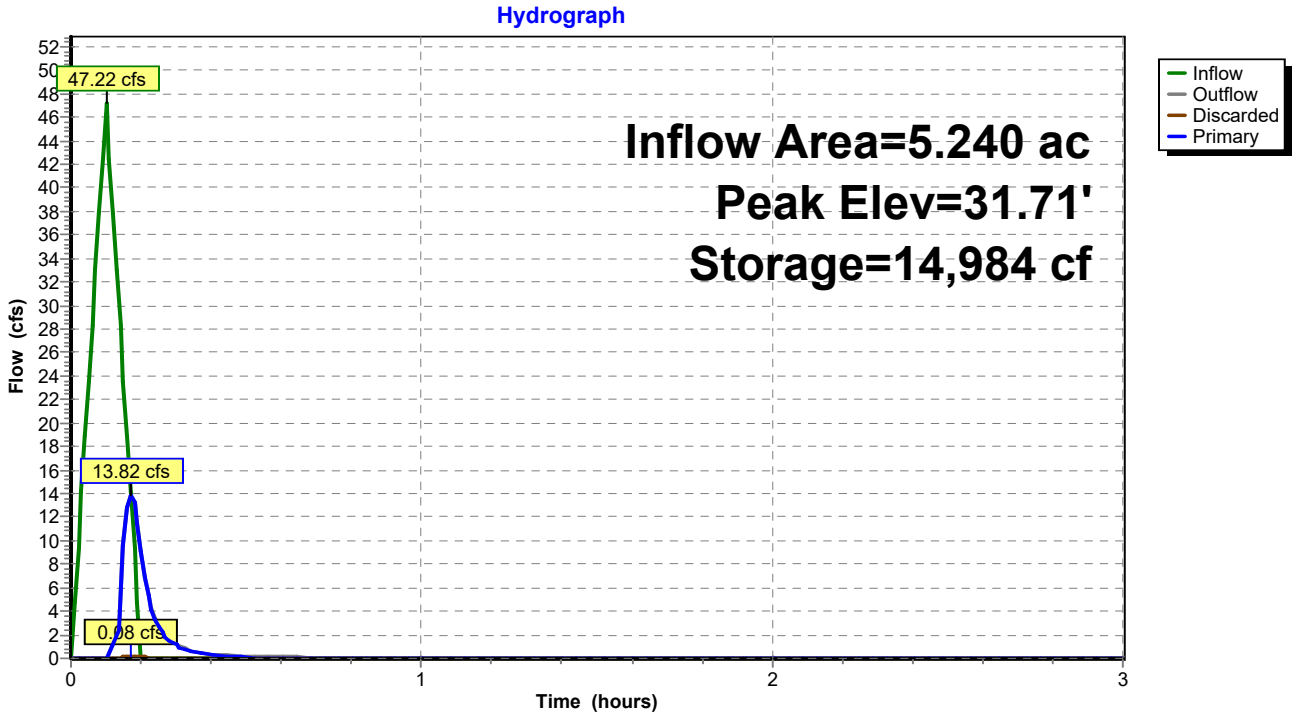
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
29.00	2,602	0	0
30.00	4,737	3,670	3,670
31.00	6,928	5,833	9,502
32.00	9,176	8,052	17,554

Device	Routing	Invert	Outlet Devices
#1	Primary	31.44'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	29.00'	**0.260 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 26.00' Phase-In= 0.01'

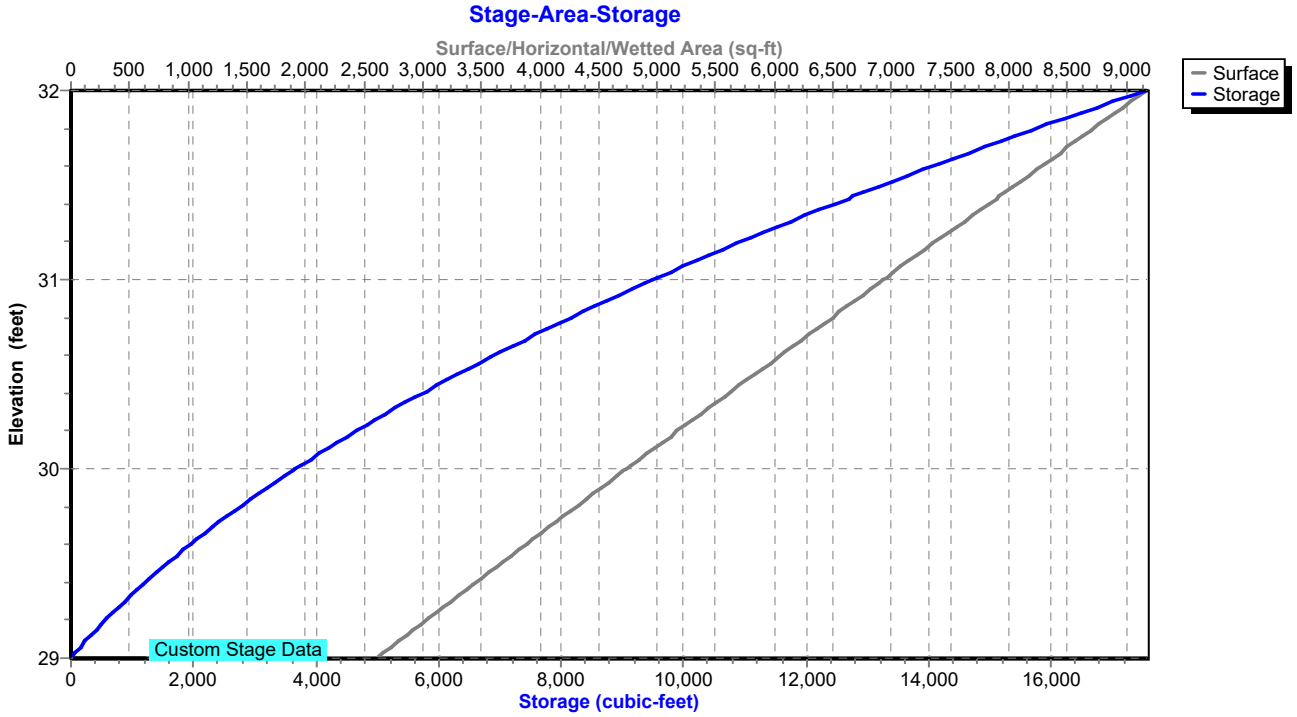
Discarded OutFlow Max=0.08 cfs @ 0.17 hrs HW=31.71' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=13.72 cfs @ 0.17 hrs HW=31.71' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 13.72 cfs @ 1.28 fps)

Pond P-1: P-1



Pond P-1: P-1



Stage-Area-Storage for Pond P-1: P-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
29.00	2,602	0
29.05	2,709	133
29.10	2,816	271
29.15	2,922	414
29.20	3,029	563
29.25	3,136	717
29.30	3,243	877
29.35	3,349	1,041
29.40	3,456	1,212
29.45	3,563	1,387
29.50	3,670	1,568
29.55	3,776	1,754
29.60	3,883	1,946
29.65	3,990	2,142
29.70	4,096	2,344
29.75	4,203	2,552
29.80	4,310	2,765
29.85	4,417	2,983
29.90	4,523	3,206
29.95	4,630	3,435
30.00	4,737	3,670
30.05	4,847	3,909
30.10	4,956	4,154
30.15	5,066	4,405
30.20	5,175	4,661
30.25	5,285	4,922
30.30	5,394	5,189
30.35	5,504	5,462
30.40	5,613	5,740
30.45	5,723	6,023
30.50	5,833	6,312
30.55	5,942	6,606
30.60	6,052	6,906
30.65	6,161	7,211
30.70	6,271	7,522
30.75	6,380	7,838
30.80	6,490	8,160
30.85	6,599	8,487
30.90	6,709	8,820
30.95	6,818	9,158
31.00	6,928	9,502
31.05	7,040	9,851
31.10	7,153	10,206
31.15	7,265	10,566
31.20	7,378	10,933
31.25	7,490	11,304
31.30	7,602	11,682
31.35	7,715	12,064
31.40	7,827	12,453
31.45	7,940	12,847
31.50	8,052	13,247
31.55	8,164	13,652
31.60	8,277	14,063
31.65	8,389	14,480
31.70	8,502	14,902
31.75	8,614	15,330
31.80	8,726	15,764
31.85	8,839	16,203
31.90	8,951	16,648
31.95	9,064	17,098
32.00	**9,176**	**17,554**

Summary for Pond P-2: P-2

Inflow Area = 6.140 ac, 0.00% Impervious, Inflow Depth = 0.77" for 500-yr event
Inflow = 47.93 cfs @ 0.10 hrs, Volume= 0.396 af
Outflow = 12.97 cfs @ 0.17 hrs, Volume= 0.366 af, Atten= 73%, Lag= 4.4 min
Primary = 12.97 cfs @ 0.17 hrs, Volume= 0.366 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 27.62' @ 0.17 hrs Surf.Area= 9,924 sf Storage= 14,154 cf

Plug-Flow detention time= 30.8 min calculated for 0.366 af (92% of inflow)
Center-of-Mass det. time= 30.4 min (36.4 - 6.0)

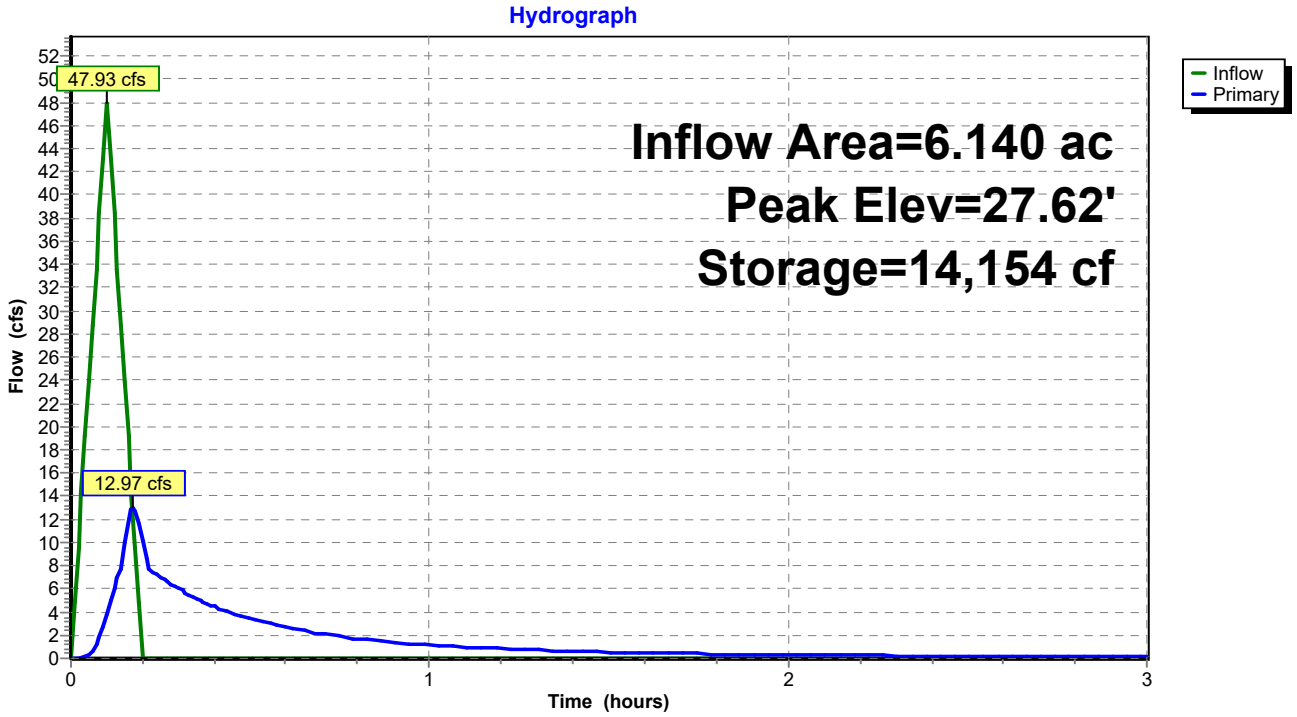
Volume	Invert	Avail.Storage	Storage Description
#1	26.00'	17,993 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
26.00	7,521	0	0
27.00	8,988	8,255	8,255
28.00	10,489	9,739	17,993

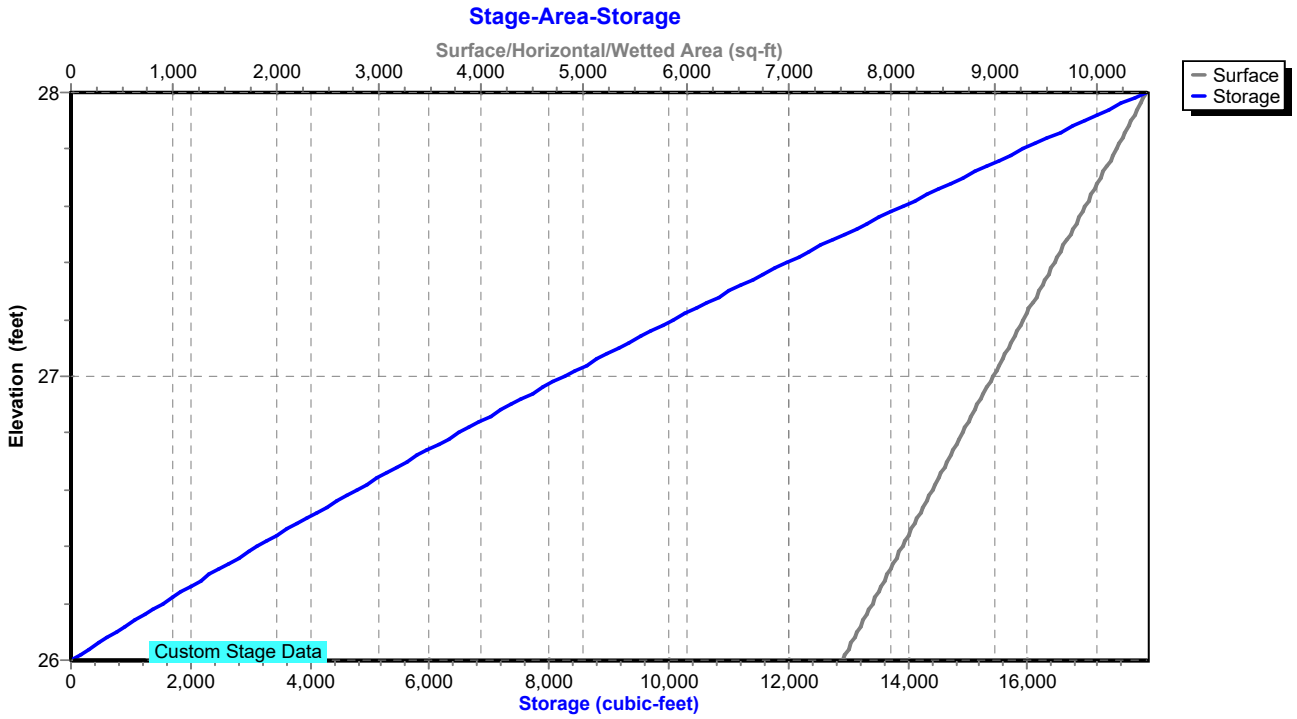
Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	26.00'	**24.0" Round Culvert** L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.00' / 25.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=12.85 cfs @ 0.17 hrs HW=27.62' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 4.13 cfs @ 0.85 fps)
2=Culvert (Barrel Controls 8.71 cfs @ 4.36 fps)

Pond P-2: P-2



Pond P-2: P-2



Stage-Area-Storage for Pond P-2: P-2

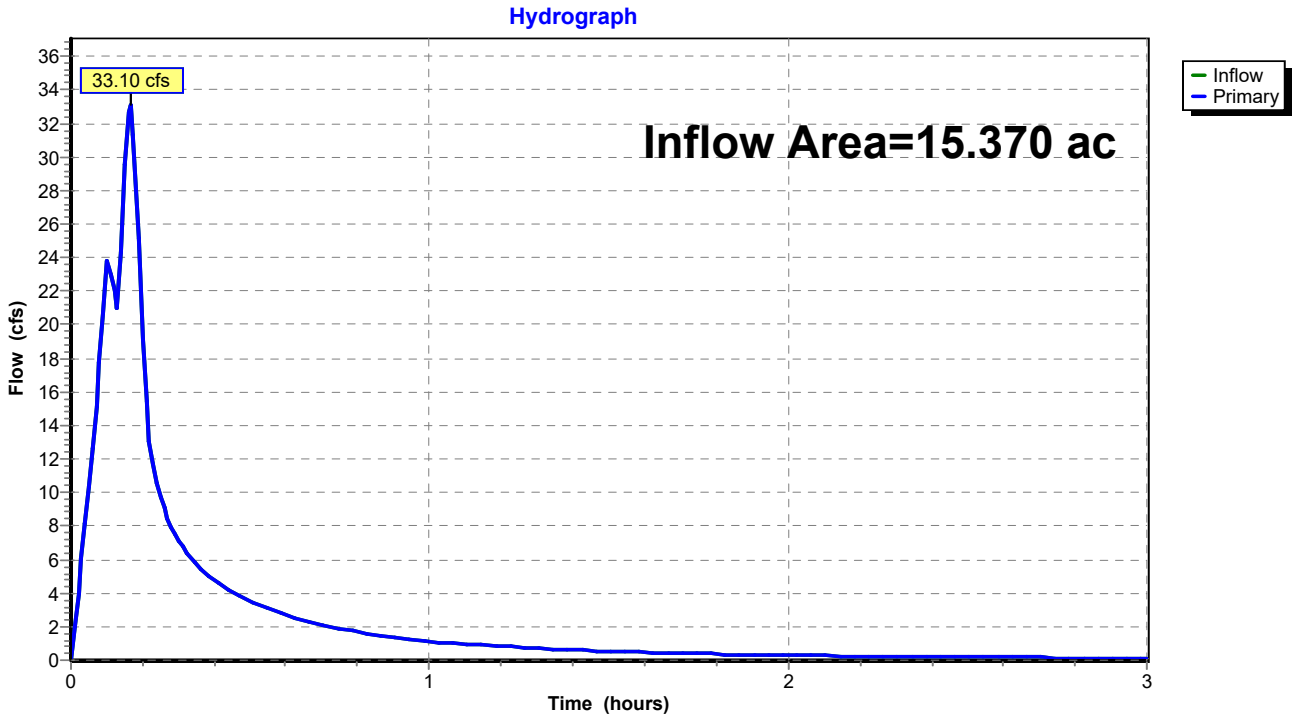
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
26.00	7,521	0
26.02	7,550	151
26.04	7,580	302
26.06	7,609	454
26.08	7,638	606
26.10	7,668	759
26.12	7,697	913
26.14	7,726	1,067
26.16	7,756	1,222
26.18	7,785	1,378
26.20	7,814	1,534
26.22	7,844	1,690
26.24	7,873	1,847
26.26	7,902	2,005
26.28	7,932	2,163
26.30	7,961	2,322
26.32	7,990	2,482
26.34	8,020	2,642
26.36	8,049	2,803
26.38	8,078	2,964
26.40	8,108	3,126
26.42	8,137	3,288
26.44	8,166	3,451
26.46	8,196	3,615
26.48	8,225	3,779
26.50	8,255	3,944
26.52	8,284	4,109
26.54	8,313	4,275
26.56	8,343	4,442
26.58	8,372	4,609
26.60	8,401	4,777
26.62	8,431	4,945
26.64	8,460	5,114
26.66	8,489	5,283
26.68	8,519	5,453
26.70	8,548	5,624
26.72	8,577	5,795
26.74	8,607	5,967
26.76	8,636	6,140
26.78	8,665	6,313
26.80	8,695	6,486
26.82	8,724	6,660
26.84	8,753	6,835
26.86	8,783	7,011
26.88	8,812	7,187
26.90	8,841	7,363
26.92	8,871	7,540
26.94	8,900	7,718
26.96	8,929	7,896
26.98	8,959	8,075
27.00	8,988	8,255
27.02	9,018	8,435
27.04	9,048	8,615
27.06	9,078	8,796
27.08	9,108	8,978
27.10	9,138	9,161
27.12	9,168	9,344
27.14	9,198	9,528
27.16	9,228	9,712
27.18	9,258	9,897
27.20	9,288	10,082
27.22	9,318	10,268
27.24	9,348	10,455
27.26	9,378	10,642
27.28	9,408	10,830
27.30	9,438	11,018
27.32	9,468	11,208
27.34	9,498	11,397
27.36	9,528	11,587
27.38	9,558	11,778
27.40	9,588	11,970
27.42	9,618	12,162
27.44	9,648	12,355
27.46	9,678	12,548
27.48	9,708	12,742
27.50	9,739	12,936
27.52	9,769	13,131
27.54	9,799	13,327
27.56	9,829	13,523
27.58	9,859	13,720
27.60	9,889	13,917
27.62	9,919	14,116
27.64	9,949	14,314
27.66	9,979	14,513
27.68	10,009	14,713
27.70	10,039	14,914
27.72	10,069	15,115
27.74	10,099	15,317
27.76	10,129	15,519
27.78	10,159	15,722
27.80	10,189	15,925
27.82	10,219	16,129
27.84	10,249	16,334
27.86	10,279	16,539
27.88	10,309	16,745
27.90	10,339	16,952
27.92	10,369	17,159
27.94	10,399	17,366
27.96	10,429	17,575
27.98	10,459	17,784
28.00	**10,489**	**17,993**

Summary for Link DP-1: DP-1

Inflow Area = 15.370 ac, 0.00% Impervious, Inflow Depth > 0.49" for 500-yr event
Inflow = 33.10 cfs @ 0.16 hrs, Volume= 0.624 af
Primary = 33.10 cfs @ 0.16 hrs, Volume= 0.624 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1

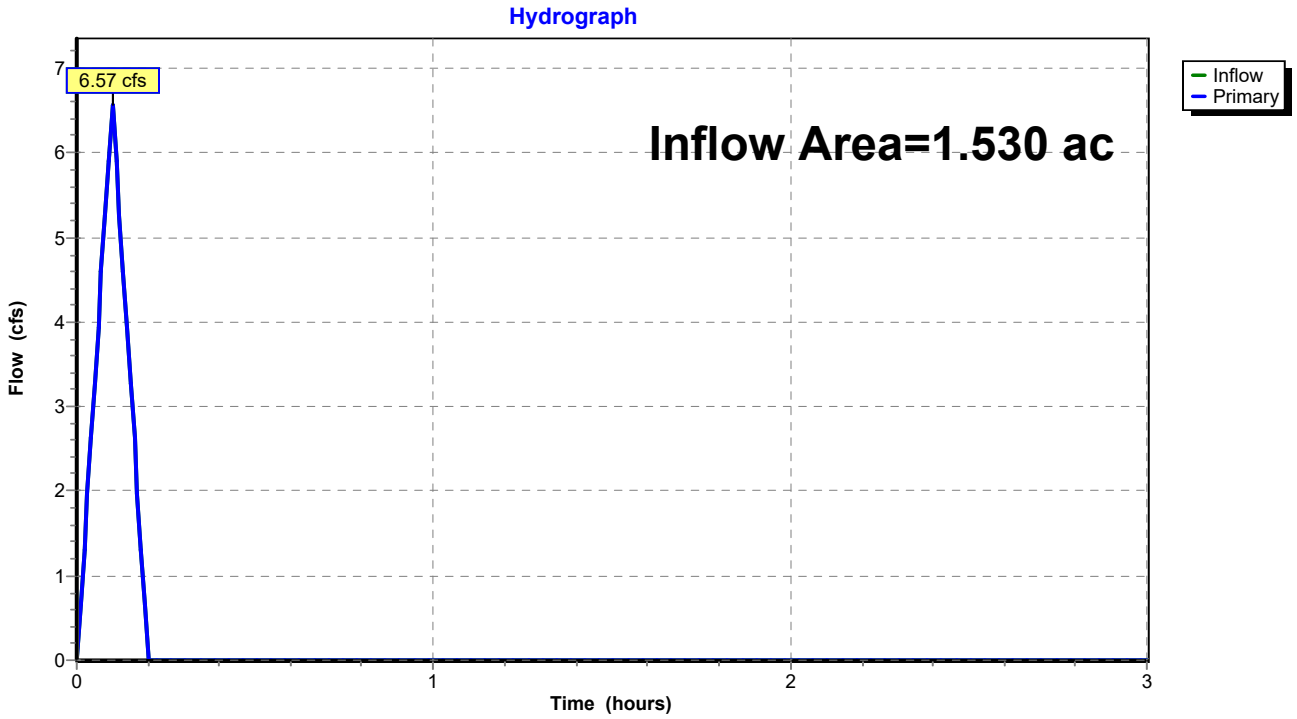


Summary for Link DP-2: DP-2

Inflow Area = 1.530 ac, 0.00% Impervious, Inflow Depth = 0.43" for 500-yr event
Inflow = 6.57 cfs @ 0.10 hrs, Volume= 0.054 af
Primary = 6.57 cfs @ 0.10 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-2: DP-2



Time span=0.00-3.00 hrs, dt=0.01 hrs, 301 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

SubcatchmentPD-1A: PD-1A Runoff Area=3.990 ac 0.00% Impervious Runoff Depth=0.55"
Tc=6.0 min C=0.38 Runoff=22.12 cfs 0.183 af

SubcatchmentPD-1B: PD-1B Runoff Area=3.870 ac 0.00% Impervious Runoff Depth=1.00"
Tc=6.0 min C=0.69 Runoff=38.95 cfs 0.322 af

SubcatchmentPD-1C: PD-1C Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.97"
Tc=6.0 min C=0.67 Runoff=13.39 cfs 0.111 af

SubcatchmentPD-1D: PD-1D Runoff Area=3.940 ac 0.00% Impervious Runoff Depth=0.90"
Tc=6.0 min C=0.62 Runoff=35.63 cfs 0.294 af

SubcatchmentPD-1E: PD-1E Runoff Area=1.040 ac 0.00% Impervious Runoff Depth=0.78"
Tc=6.0 min C=0.54 Runoff=8.19 cfs 0.068 af

SubcatchmentPD-1F: PD-1F Runoff Area=1.160 ac 0.00% Impervious Runoff Depth=0.80"
Tc=6.0 min C=0.55 Runoff=9.31 cfs 0.077 af

SubcatchmentPD-2A: PD-2A Runoff Area=1.370 ac 0.00% Impervious Runoff Depth=0.46"
Tc=6.0 min C=0.32 Runoff=6.39 cfs 0.053 af

SubcatchmentPD-2B: PD-2B Runoff Area=0.160 ac 0.00% Impervious Runoff Depth=0.55"
Tc=6.0 min C=0.38 Runoff=0.89 cfs 0.007 af

Pond P-1: P-1 Peak Elev=31.78' Storage=15,590 cf Inflow=52.34 cfs 0.433 af
Discarded=0.08 cfs 0.017 af Primary=19.88 cfs 0.136 af Outflow=19.96 cfs 0.153 af

Pond P-2: P-2 Peak Elev=27.71' Storage=14,972 cf Inflow=53.13 cfs 0.439 af
Outflow=18.54 cfs 0.409 af

Link DP-1: DP-1 Inflow=47.06 cfs 0.727 af
Primary=47.06 cfs 0.727 af

Link DP-2: DP-2 Inflow=7.28 cfs 0.060 af
Primary=7.28 cfs 0.060 af

Total Runoff Area = 16.900 ac Runoff Volume = 1.115 af Average Runoff Depth = 0.79"
100.00% Pervious = 16.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment PD-1A: PD-1A

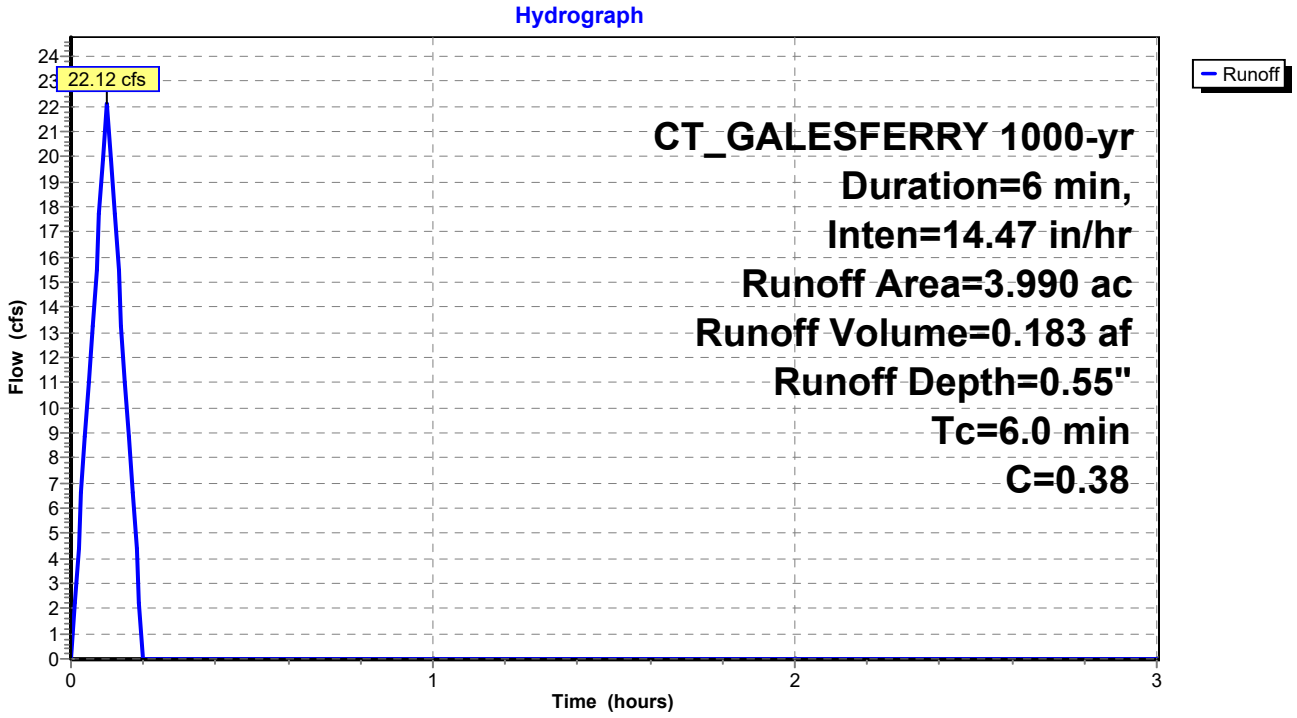
Runoff = 22.12 cfs @ 0.10 hrs, Volume= 0.183 af, Depth= 0.55"
Routed to Link DP-1 : DP-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 1000-yr Duration=6 min, Inten=14.47 in/hr

Area (ac)	C	Description
3.990	0.38	See C Worksheet in Appendix C
3.990		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, 25.61**

Subcatchment PD-1A: PD-1A



Summary for Subcatchment PD-1B: PD-1B

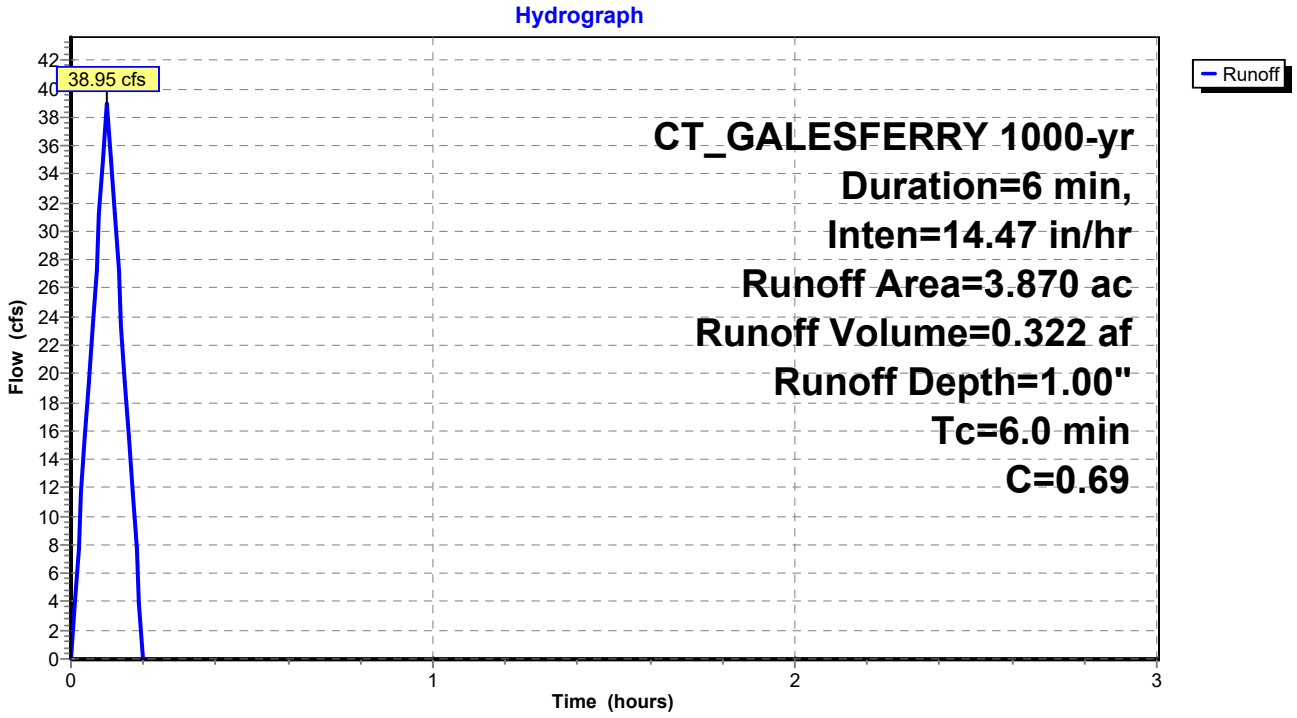
Runoff = 38.95 cfs @ 0.10 hrs, Volume= 0.322 af, Depth= 1.00"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 1000-yr Duration=6 min, Inten=14.47 in/hr

Area (ac)	C	Description
3.870	0.69	See C Worksheet in Appendix C
3.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1B: PD-1B



Summary for Subcatchment PD-1C: PD-1C

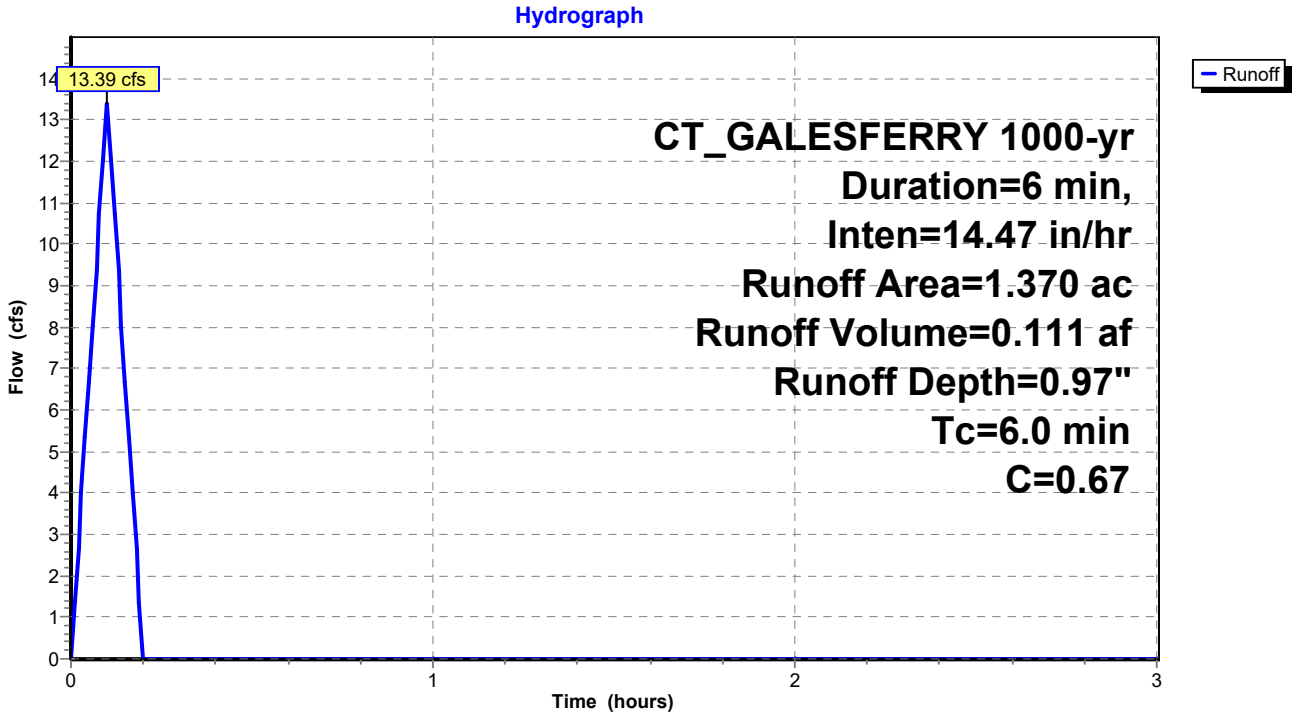
Runoff = 13.39 cfs @ 0.10 hrs, Volume= 0.111 af, Depth= 0.97"
Routed to Pond P-1 : P-1

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 1000-yr Duration=6 min, Inten=14.47 in/hr

Area (ac)	C	Description
1.370	0.67	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1C: PD-1C



Summary for Subcatchment PD-1D: PD-1D

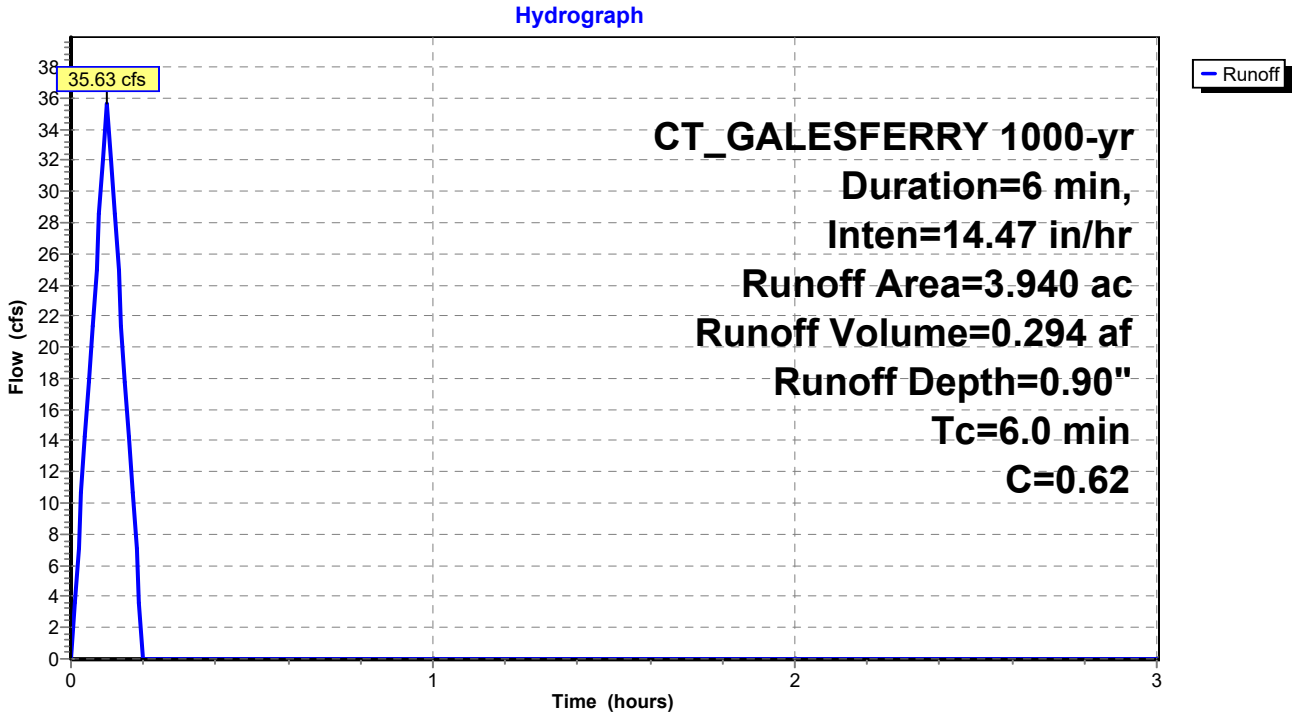
Runoff = 35.63 cfs @ 0.10 hrs, Volume= 0.294 af, Depth= 0.90"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 1000-yr Duration=6 min, Inten=14.47 in/hr

Area (ac)	C	Description
3.940	0.62	See C Worksheet in Appendix C
3.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1D: PD-1D



Summary for Subcatchment PD-1E: PD-1E

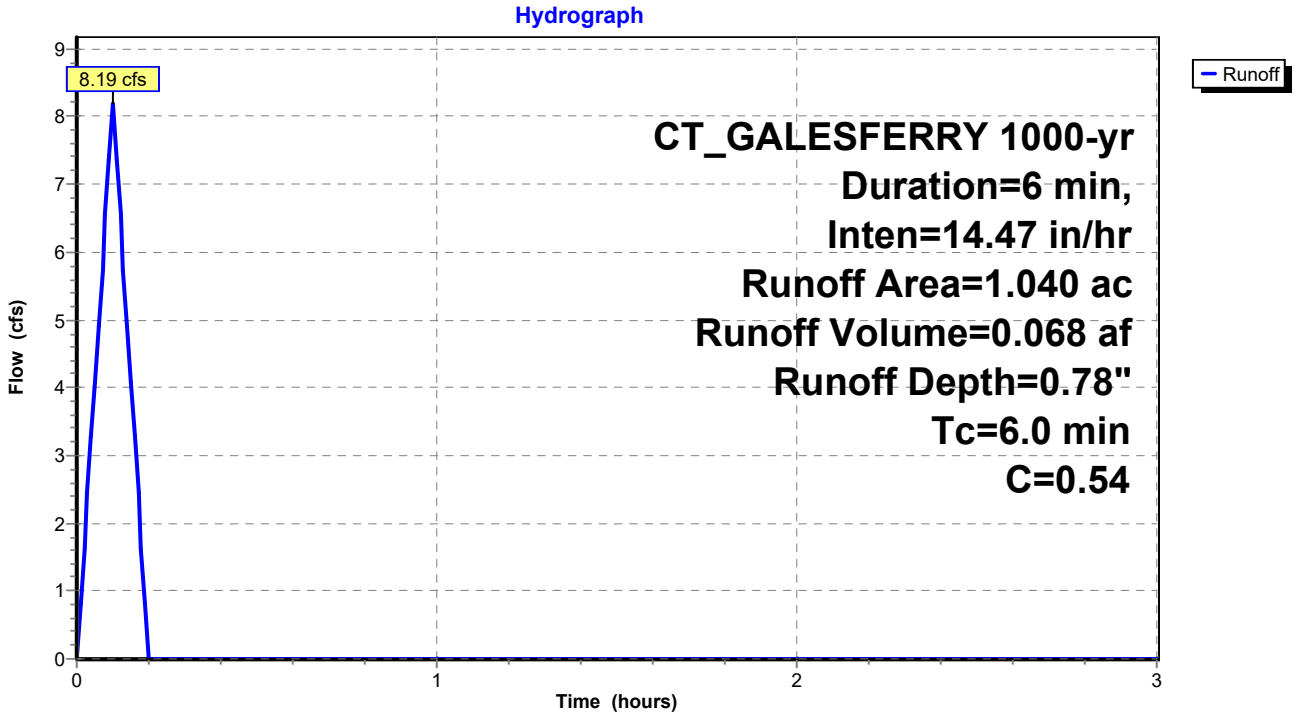
Runoff = 8.19 cfs @ 0.10 hrs, Volume= 0.068 af, Depth= 0.78"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 1000-yr Duration=6 min, Inten=14.47 in/hr

Area (ac)	C	Description
1.040	0.54	See C Worksheet in Appendix C
1.040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1E: PD-1E



Summary for Subcatchment PD-1F: PD-1F

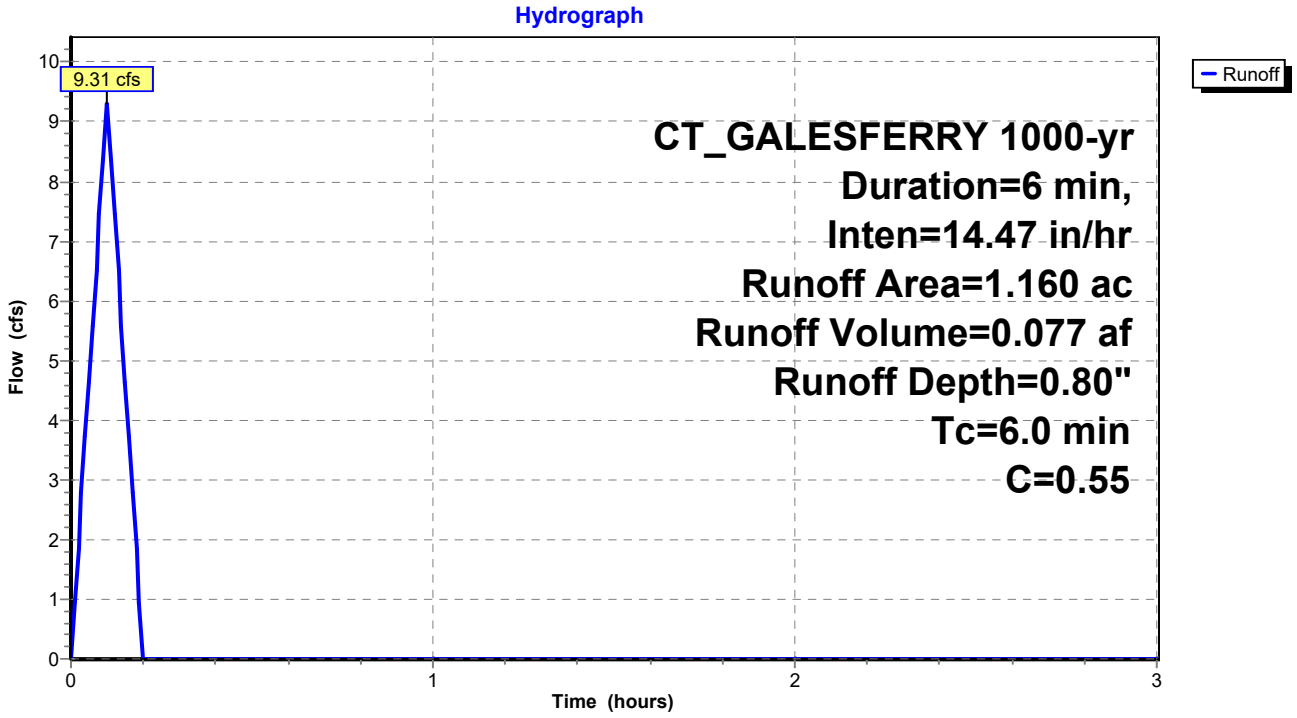
Runoff = 9.31 cfs @ 0.10 hrs, Volume= 0.077 af, Depth= 0.80"
Routed to Pond P-2 : P-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 1000-yr Duration=6 min, Inten=14.47 in/hr

Area (ac)	C	Description
1.160	0.55	See C Worksheet in Appendix C
1.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-1F: PD-1F



Summary for Subcatchment PD-2A: PD-2A

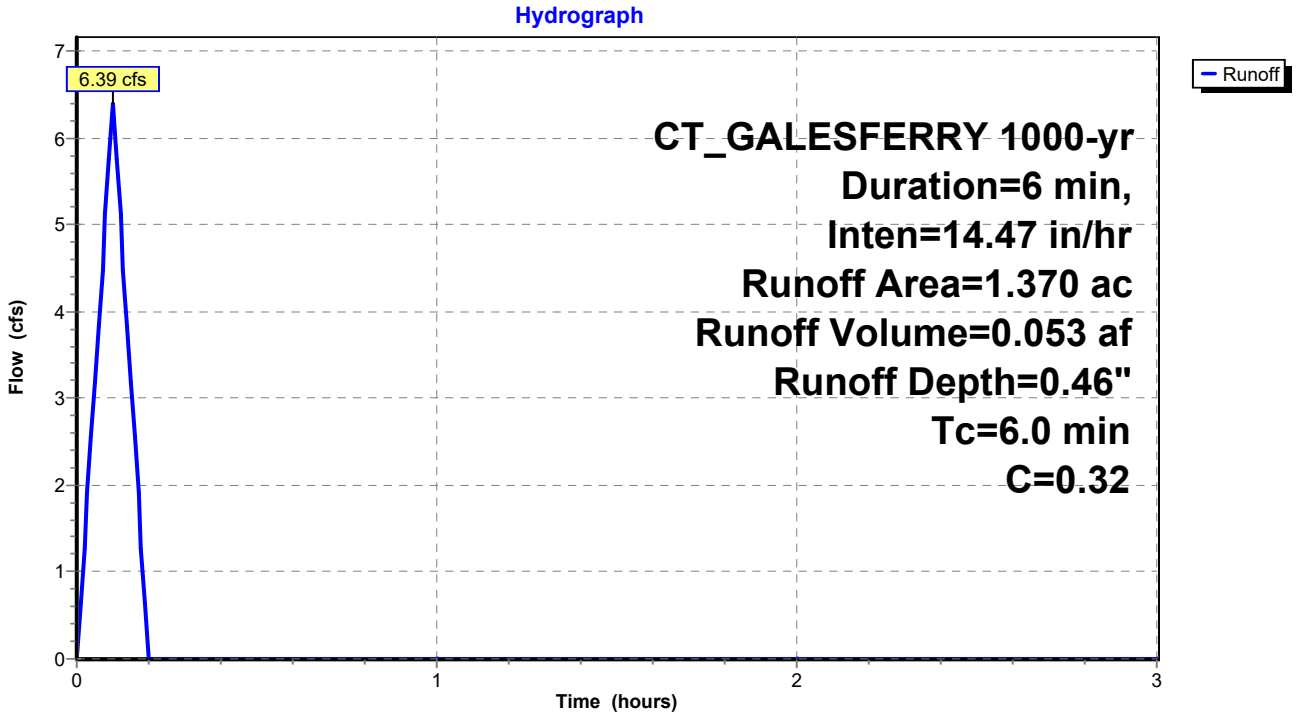
Runoff = 6.39 cfs @ 0.10 hrs, Volume= 0.053 af, Depth= 0.46"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 1000-yr Duration=6 min, Inten=14.47 in/hr

Area (ac)	C	Description
1.370	0.32	See C Worksheet in Appendix C
1.370		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2A: PD-2A



Summary for Subcatchment PD-2B: PD-2B

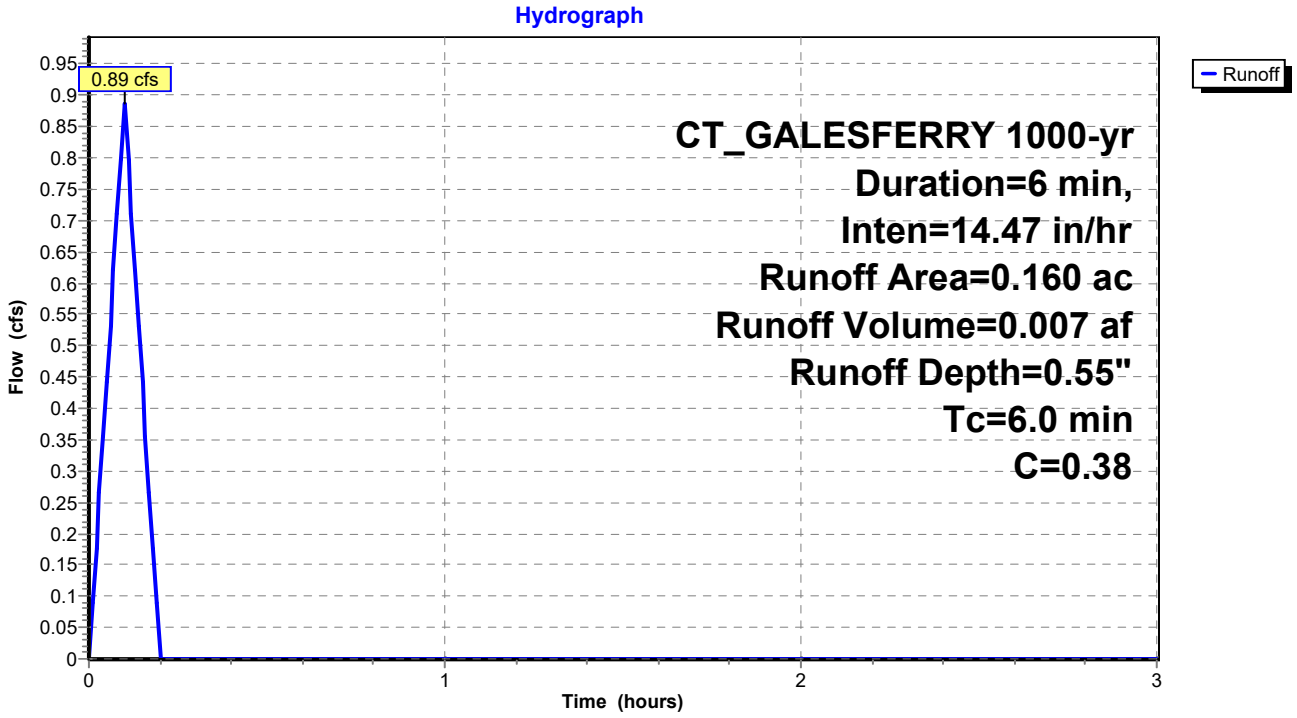
Runoff = 0.89 cfs @ 0.10 hrs, Volume= 0.007 af, Depth= 0.55"
Routed to Link DP-2 : DP-2

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
CT_GALESFERRY 1000-yr Duration=6 min, Inten=14.47 in/hr

Area (ac)	C	Description
0.160	0.38	See C Worksheet in Appendix C
0.160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment PD-2B: PD-2B



Summary for Pond P-1: P-1

Inflow Area = 5.240 ac, 0.00% Impervious, Inflow Depth = 0.99" for 1000-yr event
Inflow = 52.34 cfs @ 0.10 hrs, Volume= 0.433 af
Outflow = 19.96 cfs @ 0.16 hrs, Volume= 0.153 af, Atten= 62%, Lag= 3.8 min
Discarded = 0.08 cfs @ 0.16 hrs, Volume= 0.017 af
Primary = 19.88 cfs @ 0.16 hrs, Volume= 0.136 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 31.78' @ 0.16 hrs Surf.Area= 8,681 sf Storage= 15,590 cf

Plug-Flow detention time= 17.1 min calculated for 0.153 af (35% of inflow)
Center-of-Mass det. time= 14.5 min (20.5 - 6.0)

Volume	Invert	Avail.Storage	Storage Description
#1	29.00'	17,554 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

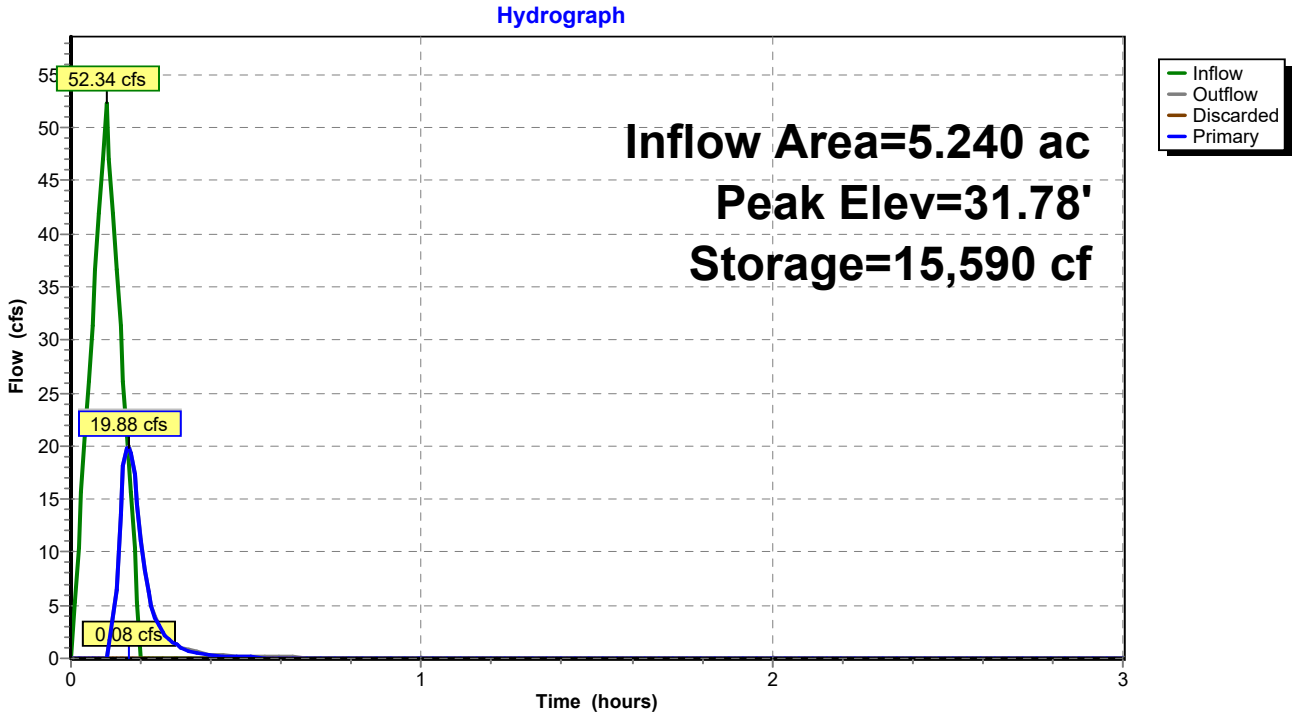
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
29.00	2,602	0	0
30.00	4,737	3,670	3,670
31.00	6,928	5,833	9,502
32.00	9,176	8,052	17,554

Device	Routing	Invert	Outlet Devices
#1	Primary	31.44'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Discarded	29.00'	**0.260 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 26.00' Phase-In= 0.01'

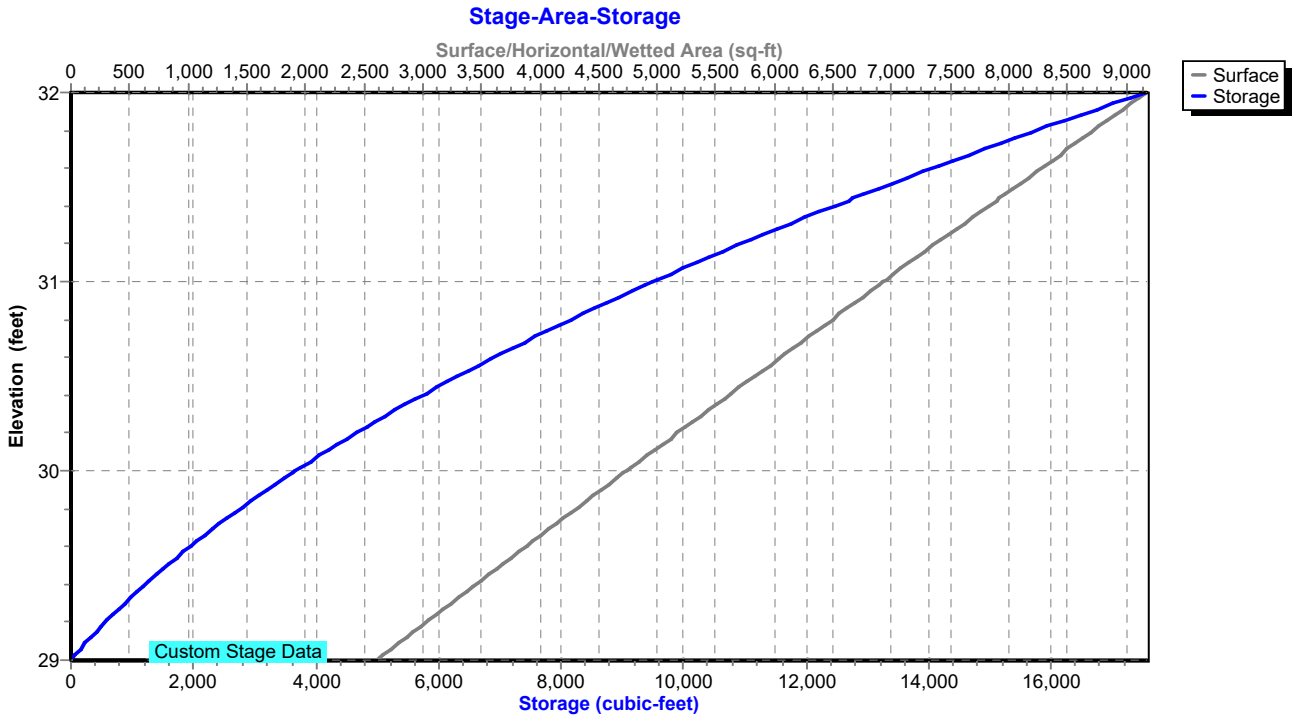
Discarded OutFlow Max=0.08 cfs @ 0.16 hrs HW=31.78' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.08 cfs)

Primary OutFlow Max=19.66 cfs @ 0.16 hrs HW=31.78' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 19.66 cfs @ 1.46 fps)

Pond P-1: P-1



Pond P-1: P-1



Stage-Area-Storage for Pond P-1: P-1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
29.00	2,602	0
29.05	2,709	133
29.10	2,816	271
29.15	2,922	414
29.20	3,029	563
29.25	3,136	717
29.30	3,243	877
29.35	3,349	1,041
29.40	3,456	1,212
29.45	3,563	1,387
29.50	3,670	1,568
29.55	3,776	1,754
29.60	3,883	1,946
29.65	3,990	2,142
29.70	4,096	2,344
29.75	4,203	2,552
29.80	4,310	2,765
29.85	4,417	2,983
29.90	4,523	3,206
29.95	4,630	3,435
30.00	4,737	3,670
30.05	4,847	3,909
30.10	4,956	4,154
30.15	5,066	4,405
30.20	5,175	4,661
30.25	5,285	4,922
30.30	5,394	5,189
30.35	5,504	5,462
30.40	5,613	5,740
30.45	5,723	6,023
30.50	5,833	6,312
30.55	5,942	6,606
30.60	6,052	6,906
30.65	6,161	7,211
30.70	6,271	7,522
30.75	6,380	7,838
30.80	6,490	8,160
30.85	6,599	8,487
30.90	6,709	8,820
30.95	6,818	9,158
31.00	6,928	9,502
31.05	7,040	9,851
31.10	7,153	10,206
31.15	7,265	10,566
31.20	7,378	10,933
31.25	7,490	11,304
31.30	7,602	11,682
31.35	7,715	12,064
31.40	7,827	12,453
31.45	7,940	12,847
31.50	8,052	13,247
31.55	8,164	13,652
31.60	8,277	14,063
31.65	8,389	14,480
31.70	8,502	14,902
31.75	8,614	15,330
31.80	8,726	15,764
31.85	8,839	16,203
31.90	8,951	16,648
31.95	9,064	17,098
32.00	**9,176**	**17,554**

Summary for Pond P-2: P-2

Inflow Area = 6.140 ac, 0.00% Impervious, Inflow Depth = 0.86" for 1000-yr event
Inflow = 53.13 cfs @ 0.10 hrs, Volume= 0.439 af
Outflow = 18.54 cfs @ 0.17 hrs, Volume= 0.409 af, Atten= 65%, Lag= 3.9 min
Primary = 18.54 cfs @ 0.17 hrs, Volume= 0.409 af
Routed to Link DP-1 : DP-1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
Peak Elev= 27.71' @ 0.17 hrs Surf.Area= 10,047 sf Storage= 14,972 cf

Plug-Flow detention time= 28.4 min calculated for 0.409 af (93% of inflow)
Center-of-Mass det. time= 28.1 min (34.1 - 6.0)

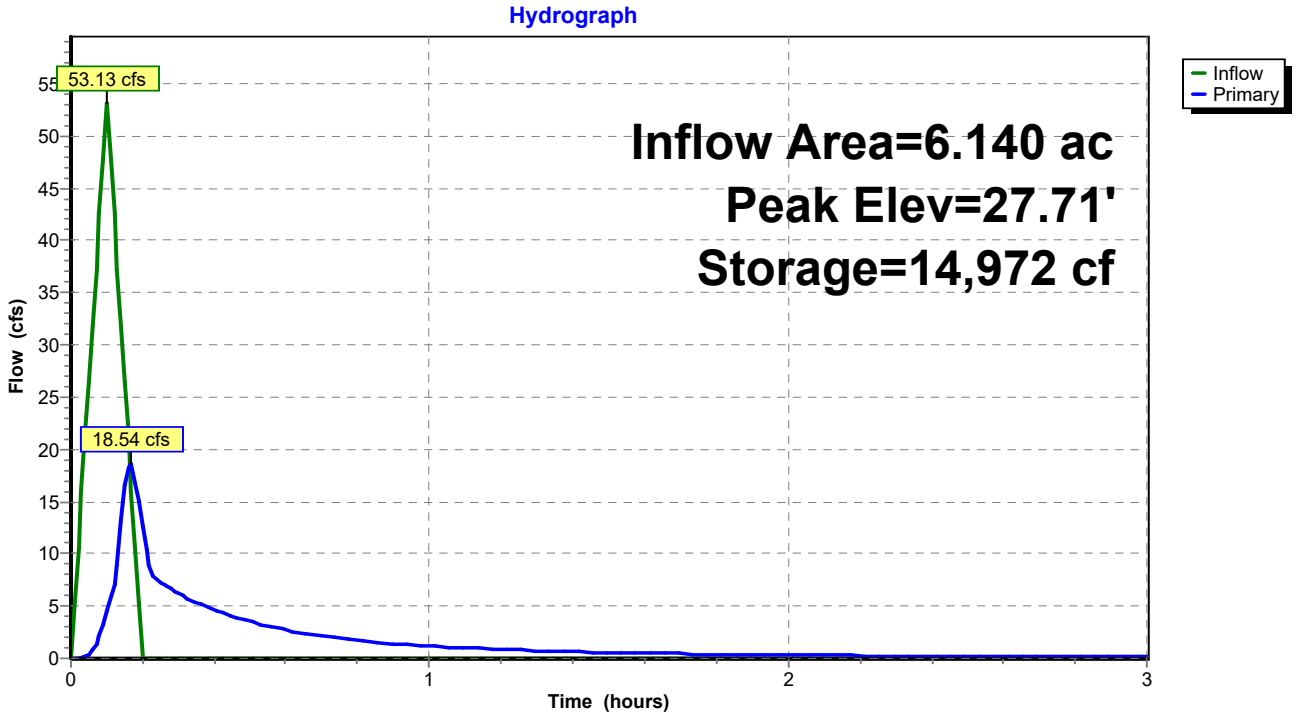
Volume	Invert	Avail.Storage	Storage Description
#1	26.00'	17,993 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
26.00	7,521	0	0
27.00	8,988	8,255	8,255
28.00	10,489	9,739	17,993

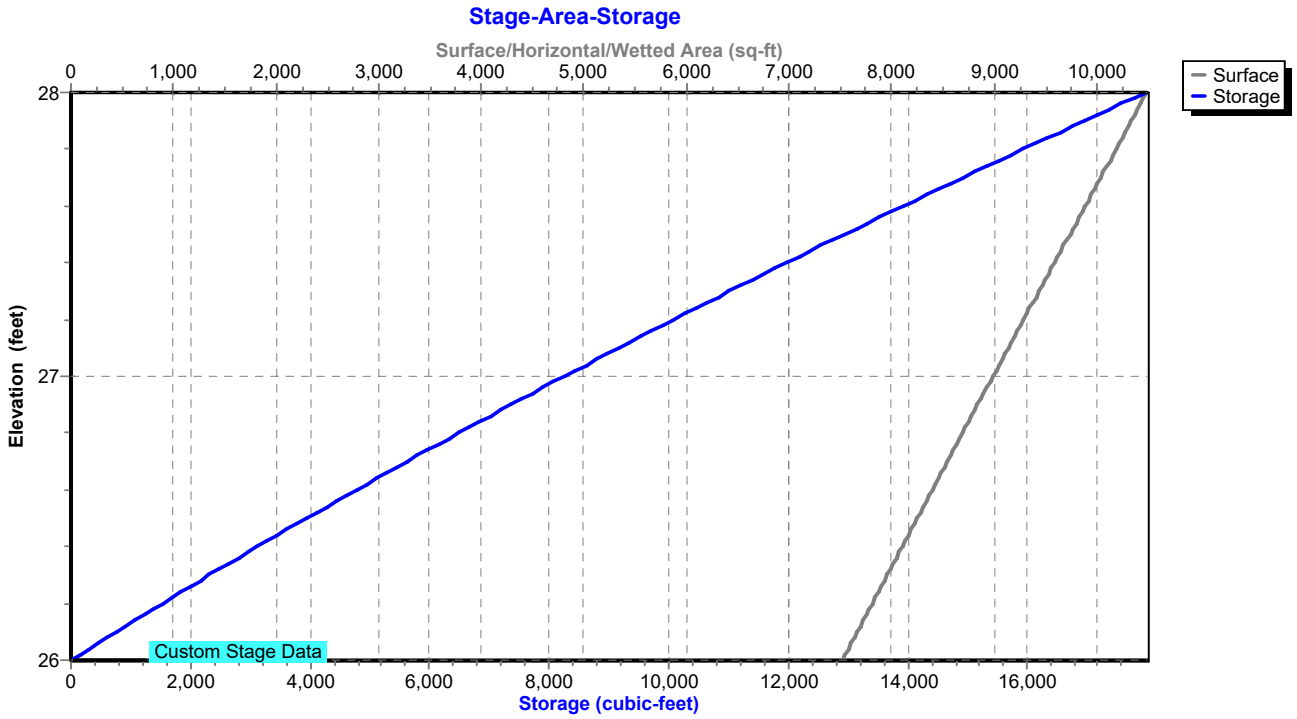
Device	Routing	Invert	Outlet Devices
#1	Primary	27.50'	**40.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74
#2	Primary	26.00'	**24.0" Round Culvert** L= 20.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 26.00' / 25.90' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=18.38 cfs @ 0.17 hrs HW=27.70' TW=0.00' (Dynamic Tailwater)
1=Broad-Crested Rectangular Weir (Weir Controls 8.94 cfs @ 1.10 fps)
2=Culvert (Barrel Controls 9.44 cfs @ 4.45 fps)

Pond P-2: P-2



Pond P-2: P-2



Stage-Area-Storage for Pond P-2: P-2

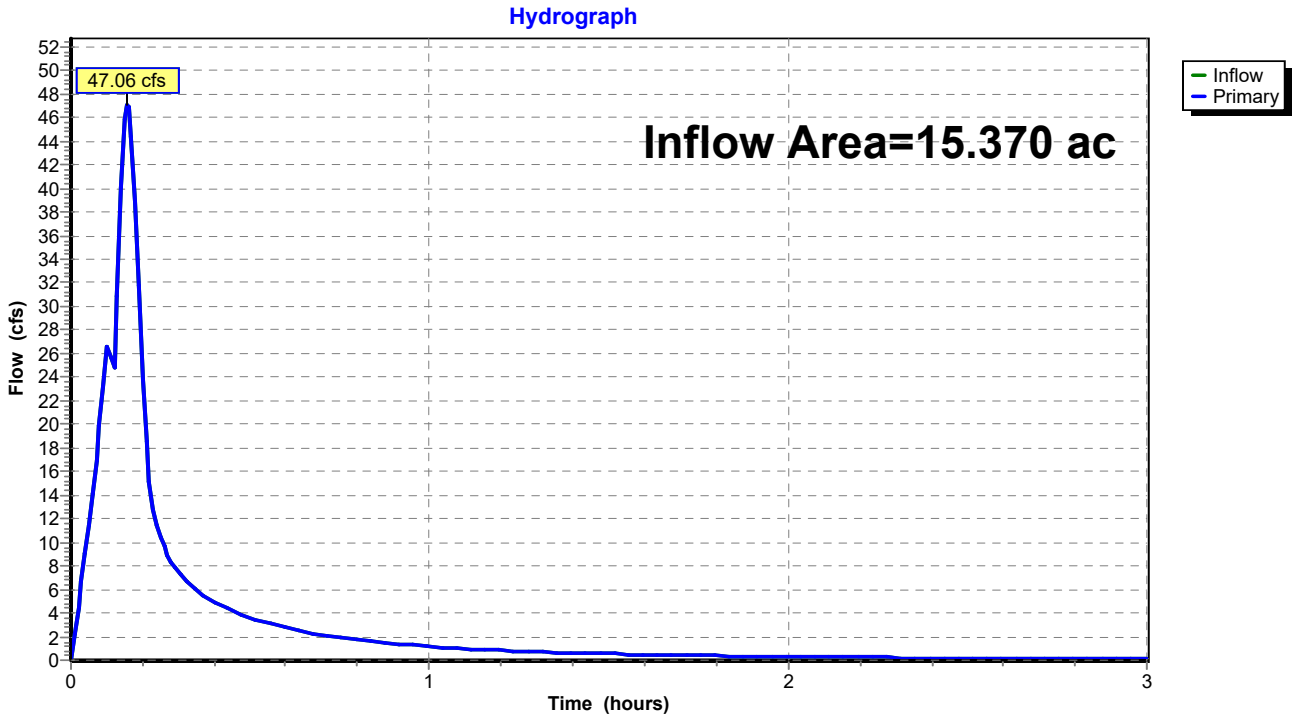
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
26.00	7,521	0
26.02	7,550	151
26.04	7,580	302
26.06	7,609	454
26.08	7,638	606
26.10	7,668	759
26.12	7,697	913
26.14	7,726	1,067
26.16	7,756	1,222
26.18	7,785	1,378
26.20	7,814	1,534
26.22	7,844	1,690
26.24	7,873	1,847
26.26	7,902	2,005
26.28	7,932	2,163
26.30	7,961	2,322
26.32	7,990	2,482
26.34	8,020	2,642
26.36	8,049	2,803
26.38	8,078	2,964
26.40	8,108	3,126
26.42	8,137	3,288
26.44	8,166	3,451
26.46	8,196	3,615
26.48	8,225	3,779
26.50	8,255	3,944
26.52	8,284	4,109
26.54	8,313	4,275
26.56	8,343	4,442
26.58	8,372	4,609
26.60	8,401	4,777
26.62	8,431	4,945
26.64	8,460	5,114
26.66	8,489	5,283
26.68	8,519	5,453
26.70	8,548	5,624
26.72	8,577	5,795
26.74	8,607	5,967
26.76	8,636	6,140
26.78	8,665	6,313
26.80	8,695	6,486
26.82	8,724	6,660
26.84	8,753	6,835
26.86	8,783	7,011
26.88	8,812	7,187
26.90	8,841	7,363
26.92	8,871	7,540
26.94	8,900	7,718
26.96	8,929	7,896
26.98	8,959	8,075
27.00	8,988	8,255
27.02	9,018	8,435
27.04	9,048	8,615
27.06	9,078	8,796
27.08	9,108	8,978
27.10	9,138	9,161
27.12	9,168	9,344
27.14	9,198	9,528
27.16	9,228	9,712
27.18	9,258	9,897
27.20	9,288	10,082
27.22	9,318	10,268
27.24	9,348	10,455
27.26	9,378	10,642
27.28	9,408	10,830
27.30	9,438	11,018
27.32	9,468	11,208
27.34	9,498	11,397
27.36	9,528	11,587
27.38	9,558	11,778
27.40	9,588	11,970
27.42	9,618	12,162
27.44	9,648	12,355
27.46	9,678	12,548
27.48	9,708	12,742
27.50	9,739	12,936
27.52	9,769	13,131
27.54	9,799	13,327
27.56	9,829	13,523
27.58	9,859	13,720
27.60	9,889	13,917
27.62	9,919	14,116
27.64	9,949	14,314
27.66	9,979	14,513
27.68	10,009	14,713
27.70	10,039	14,914
27.72	10,069	15,115
27.74	10,099	15,317
27.76	10,129	15,519
27.78	10,159	15,722
27.80	10,189	15,925
27.82	10,219	16,129
27.84	10,249	16,334
27.86	10,279	16,539
27.88	10,309	16,745
27.90	10,339	16,952
27.92	10,369	17,159
27.94	10,399	17,366
27.96	10,429	17,575
27.98	10,459	17,784
28.00	**10,489**	**17,993**

Summary for Link DP-1: DP-1

Inflow Area = 15.370 ac, 0.00% Impervious, Inflow Depth > 0.57" for 1000-yr event
Inflow = 47.06 cfs @ 0.16 hrs, Volume= 0.727 af
Primary = 47.06 cfs @ 0.16 hrs, Volume= 0.727 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-1: DP-1

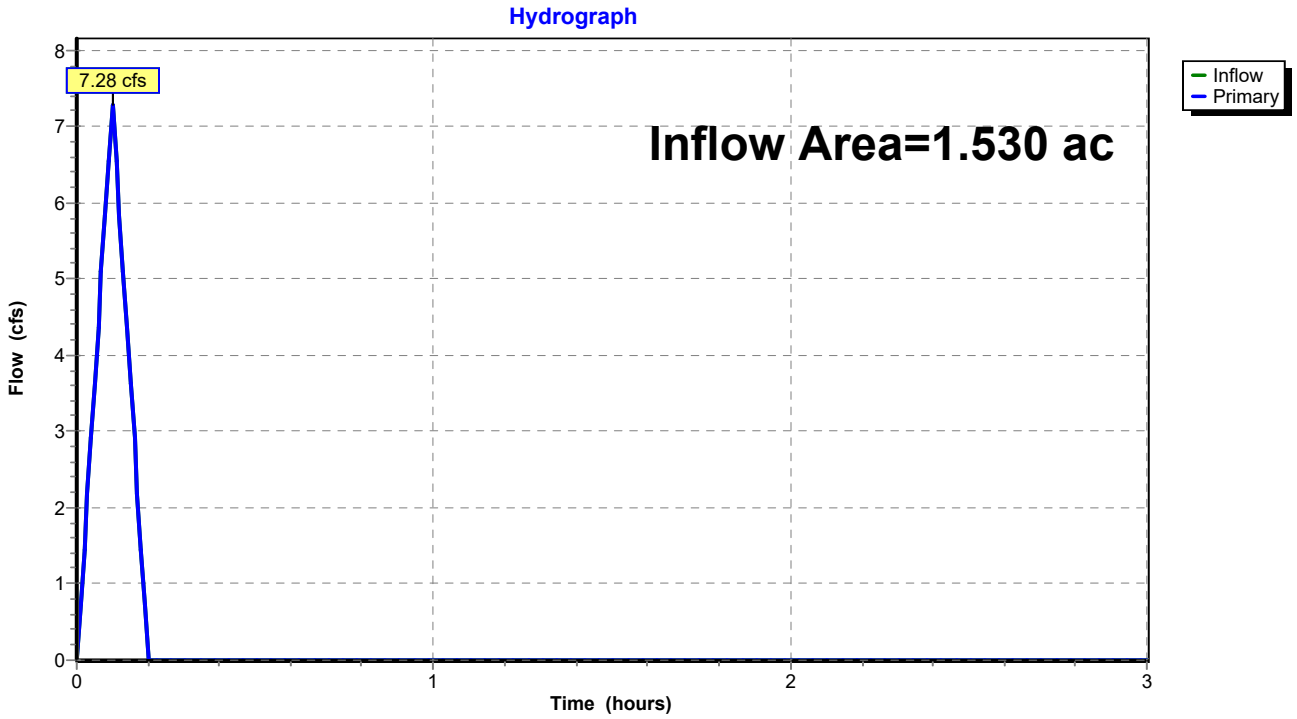


Summary for Link DP-2: DP-2

Inflow Area = 1.530 ac, 0.00% Impervious, Inflow Depth = 0.47" for 1000-yr event
Inflow = 7.28 cfs @ 0.10 hrs, Volume= 0.060 af
Primary = 7.28 cfs @ 0.10 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs

Link DP-2: DP-2



APPENDIX E: STORMWATER CALCULATIONS

- *NOAA RAINFALL DATA*
- *POLLUTANT REDUCTION*
- *CONVEYANCE PROTECTION CALCULATIONS*

NOAA Atlas 14, Volume 10, Version 3
Location name: Gales Ferry, Connecticut, USA*
Latitude: 41.4265°, Longitude: -72.0865°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.341** (0.265-0.431)	**0.407** (0.316-0.516)	**0.515** (0.399-0.654)	**0.605** (0.466-0.771)	**0.728** (0.544-0.960)	**0.821** (0.600-1.10)	**0.918** (0.653-1.26)	**1.03** (0.693-1.43)	**1.19** (0.771-1.70)	**1.32** (0.837-1.92)
10-min	**0.482** (0.376-0.611)	**0.576** (0.448-0.730)	**0.729** (0.565-0.927)	**0.856** (0.660-1.09)	**1.03** (0.770-1.36)	**1.16** (0.850-1.56)	**1.30** (0.925-1.79)	**1.46** (0.982-2.03)	**1.69** (1.09-2.41)	**1.87** (1.19-2.72)
15-min	**0.568** (0.442-0.719)	**0.678** (0.527-0.859)	**0.858** (0.665-1.09)	**1.01** (0.775-1.28)	**1.21** (0.906-1.60)	**1.37** (1.00-1.83)	**1.53** (1.09-2.11)	**1.72** (1.16-2.39)	**1.98** (1.28-2.83)	**2.20** (1.39-3.20)
30-min	**0.805** (0.626-1.02)	**0.960** (0.746-1.22)	**1.21** (0.940-1.54)	**1.42** (1.10-1.82)	**1.71** (1.28-2.26)	**1.93** (1.41-2.59)	**2.16** (1.54-2.98)	**2.42** (1.63-3.37)	**2.80** (1.81-4.00)	**3.11** (1.97-4.51)
60-min	**1.04** (0.811-1.32)	**1.24** (0.965-1.57)	**1.57** (1.22-1.99)	**1.84** (1.42-2.35)	**2.21** (1.65-2.92)	**2.49** (1.82-3.34)	**2.79** (1.98-3.84)	**3.12** (2.10-4.35)	**3.61** (2.34-5.16)	**4.01** (2.54-5.82)
2-hr	**1.37** (1.08-1.72)	**1.63** (1.28-2.05)	**2.06** (1.61-2.59)	**2.42** (1.88-3.05)	**2.90** (2.19-3.80)	**3.27** (2.41-4.34)	**3.66** (2.62-5.00)	**4.10** (2.78-5.67)	**4.75** (3.09-6.73)	**5.28** (3.36-7.60)
3-hr	**1.59** (1.25-1.98)	**1.89** (1.49-2.36)	**2.39** (1.88-2.99)	**2.80** (2.19-3.52)	**3.36** (2.54-4.37)	**3.79** (2.81-5.00)	**4.23** (3.05-5.76)	**4.75** (3.23-6.52)	**5.49** (3.59-7.75)	**6.12** (3.90-8.75)
6-hr	**2.01** (1.61-2.49)	**2.39** (1.90-2.96)	**3.01** (2.39-3.73)	**3.52** (2.78-4.39)	**4.23** (3.23-5.45)	**4.76** (3.55-6.23)	**5.32** (3.86-7.17)	**5.96** (4.08-8.12)	**6.89** (4.53-9.63)	**7.67** (4.91-10.9)
12-hr	**2.48** (2.00-3.04)	**2.94** (2.37-3.61)	**3.69** (2.96-4.54)	**4.32** (3.44-5.33)	**5.18** (3.99-6.61)	**5.82** (4.39-7.55)	**6.50** (4.75-8.69)	**7.28** (5.01-9.84)	**8.42** (5.56-11.7)	**9.37** (6.03-13.2)
24-hr	**2.90** (2.36-3.52)	**3.46** (2.81-4.20)	**4.36** (3.53-5.31)	**5.12** (4.11-6.26)	**6.15** (4.78-7.79)	**6.92** (5.26-8.92)	**7.75** (5.71-10.3)	**8.71** (6.03-11.7)	**10.1** (6.72-13.9)	**11.3** (7.32-15.8)
2-day	**3.24** (2.66-3.90)	**3.90** (3.20-4.69)	**4.98** (4.06-6.00)	**5.87** (4.76-7.11)	**7.10** (5.57-8.93)	**8.02** (6.15-10.3)	**9.00** (6.71-11.9)	**10.2** (7.09-13.5)	**11.9** (7.97-16.3)	**13.5** (8.75-18.6)
3-day	**3.51** (2.90-4.20)	**4.22** (3.48-5.05)	**5.38** (4.42-6.46)	**6.35** (5.18-7.65)	**7.68** (6.05-9.60)	**8.66** (6.68-11.0)	**9.72** (7.28-12.8)	**11.0** (7.69-14.5)	**12.9** (8.65-17.5)	**14.6** (9.50-20.0)
4-day	**3.77** (3.12-4.49)	**4.51** (3.74-5.38)	**5.73** (4.73-6.85)	**6.74** (5.52-8.09)	**8.13** (6.44-10.1)	**9.17** (7.10-11.6)	**10.3** (7.72-13.5)	**11.6** (8.14-15.3)	**13.6** (9.13-18.4)	**15.3** (10.0-21.0)
7-day	**4.49** (3.75-5.30)	**5.30** (4.42-6.27)	**6.62** (5.51-7.86)	**7.73** (6.38-9.20)	**9.24** (7.36-11.4)	**10.4** (8.07-13.0)	**11.6** (8.72-15.0)	**13.0** (9.16-17.0)	**15.1** (10.2-20.2)	**16.9** (11.1-22.9)
10-day	**5.20** (4.37-6.11)	**6.05** (5.07-7.12)	**7.43** (6.21-8.78)	**8.59** (7.13-10.2)	**10.2** (8.13-12.5)	**11.4** (8.87-14.1)	**12.6** (9.51-16.2)	**14.1** (9.95-18.2)	**16.1** (10.9-21.5)	**17.9** (11.8-24.2)
20-day	**7.38** (6.26-8.60)	**8.29** (7.02-9.66)	**9.77** (8.25-11.4)	**11.0** (9.22-12.9)	**12.7** (10.2-15.3)	**14.0** (11.0-17.1)	**15.3** (11.5-19.2)	**16.7** (11.9-21.4)	**18.5** (12.6-24.4)	**20.0** (13.2-26.8)
30-day	**9.20** (7.85-10.7)	**10.1** (8.65-11.8)	**11.7** (9.93-13.6)	**13.0** (10.9-15.1)	**14.7** (11.9-17.6)	**16.1** (12.7-19.5)	**17.5** (13.1-21.6)	**18.8** (13.5-24.0)	**20.4** (14.0-26.8)	**21.6** (14.3-28.8)
45-day	**11.4** (9.83-13.2)	**12.4** (10.7-14.3)	**14.1** (12.0-16.3)	**15.4** (13.1-17.9)	**17.3** (14.1-20.5)	**18.8** (14.8-22.6)	**20.2** (15.2-24.7)	**21.4** (15.5-27.2)	**22.9** (15.8-29.9)	**23.9** (15.9-31.7)
60-day	**13.3** (11.5-15.3)	**14.4** (12.4-16.5)	**16.1** (13.8-18.5)	**17.5** (14.9-20.2)	**19.5** (15.9-23.0)	**21.1** (16.7-25.2)	**22.5** (17.0-27.4)	**23.8** (17.2-30.0)	**25.2** (17.4-32.7)	**26.0** (17.5-34.4)

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

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

Please refer to NOAA Atlas 14 document for more information.

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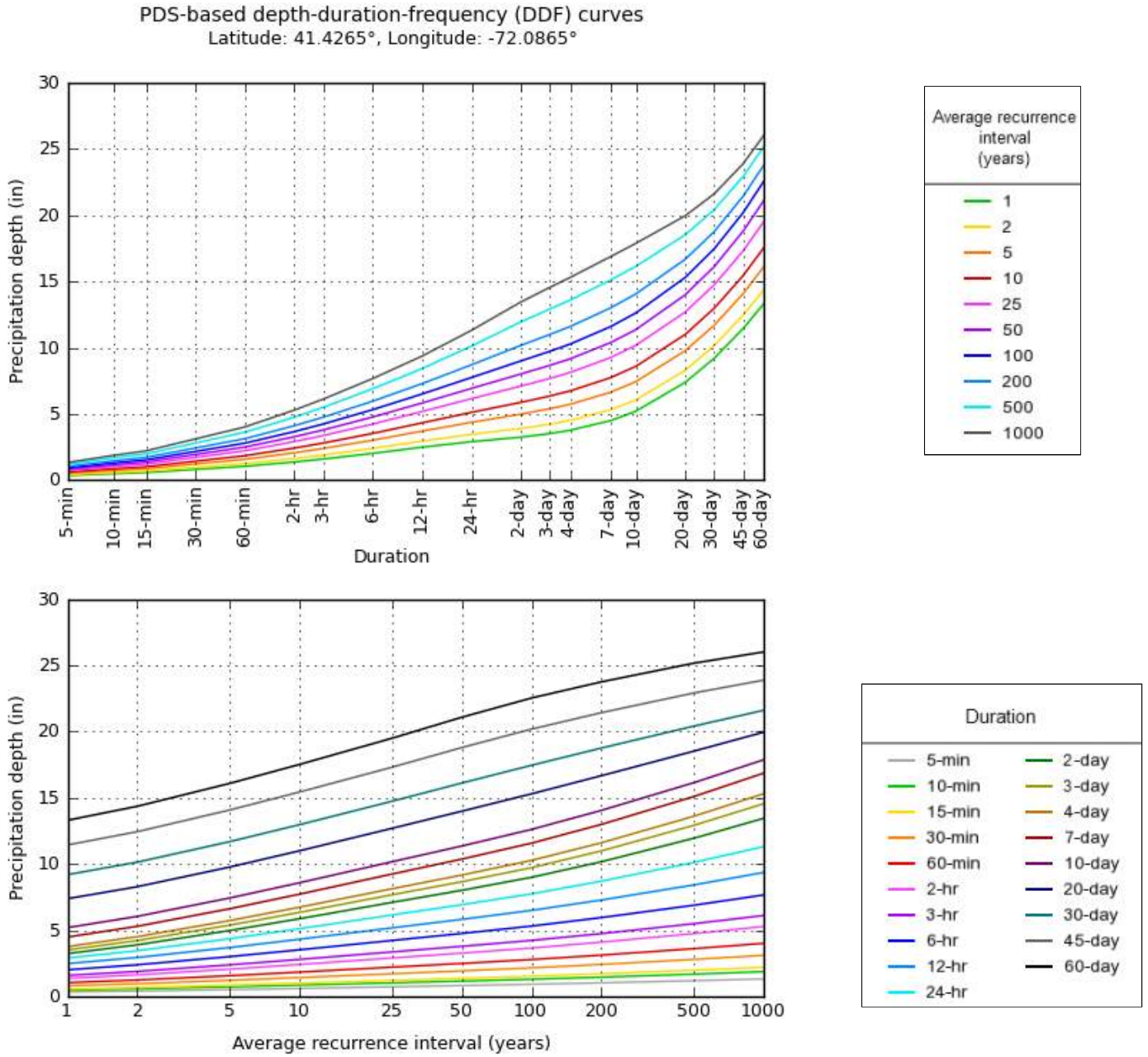
PF graphical



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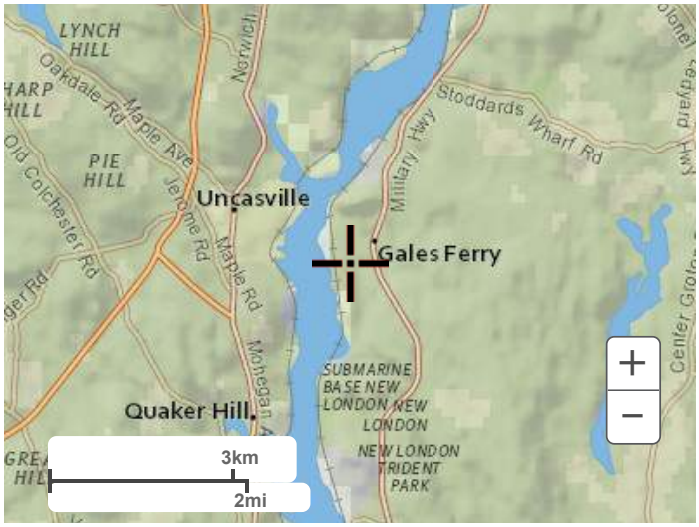
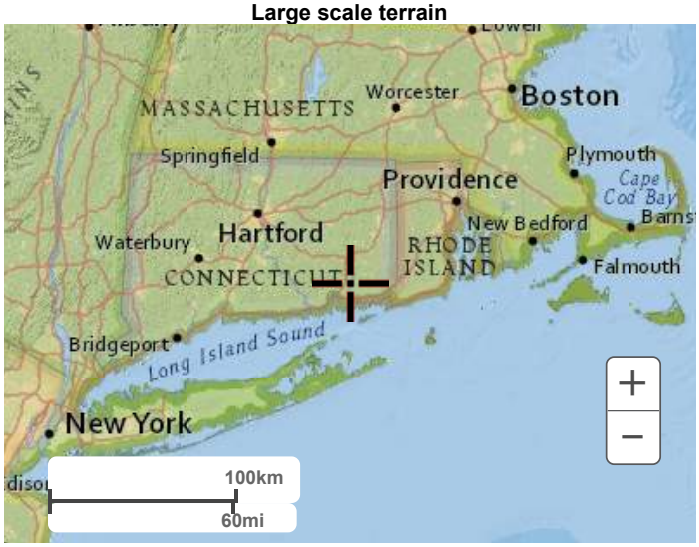
Maps & aerials

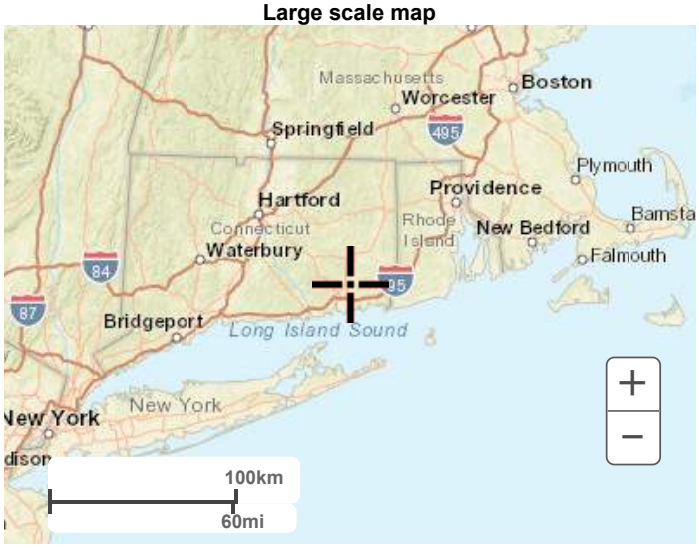
Small scale terrain



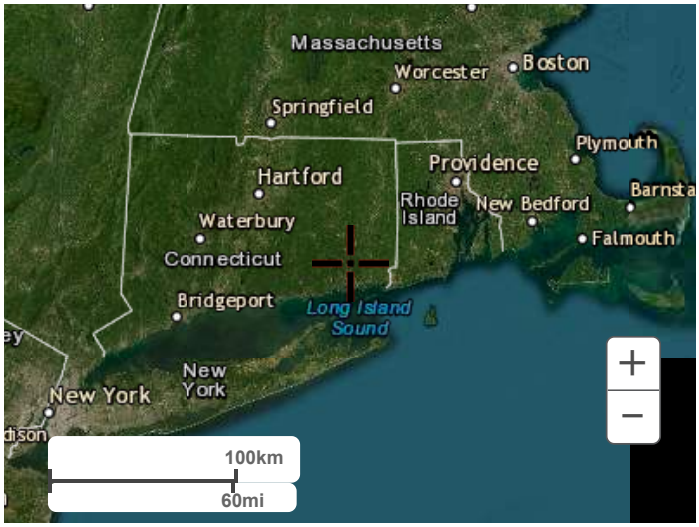
Large scale terrain



Large scale map



Large scale aerial



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NOAA Atlas 14, Volume 10, Version 3
Location name: Gales Ferry, Connecticut, USA*
Latitude: 41.4265°, Longitude: -72.0865°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.09** (3.18-5.17)	**4.88** (3.79-6.19)	**6.18** (4.79-7.85)	**7.26** (5.59-9.25)	**8.74** (6.53-11.5)	**9.85** (7.20-13.2)	**11.0** (7.84-15.2)	**12.3** (8.32-17.2)	**14.3** (9.25-20.4)	**15.9** (10.0-23.0)
10-min	**2.89** (2.26-3.67)	**3.46** (2.69-4.38)	**4.37** (3.39-5.56)	**5.14** (3.96-6.56)	**6.19** (4.62-8.16)	**6.97** (5.10-9.34)	**7.81** (5.55-10.8)	**8.75** (5.89-12.2)	**10.1** (6.55-14.4)	**11.2** (7.11-16.3)
15-min	**2.27** (1.77-2.88)	**2.71** (2.11-3.44)	**3.43** (2.66-4.36)	**4.03** (3.10-5.14)	**4.85** (3.62-6.40)	**5.47** (4.00-7.32)	**6.12** (4.36-8.44)	**6.86** (4.62-9.56)	**7.93** (5.14-11.3)	**8.81** (5.58-12.8)
30-min	**1.61** (1.25-2.04)	**1.92** (1.49-2.43)	**2.43** (1.88-3.08)	**2.85** (2.20-3.63)	**3.43** (2.56-4.52)	**3.86** (2.83-5.17)	**4.32** (3.07-5.95)	**4.84** (3.26-6.74)	**5.59** (3.63-8.00)	**6.22** (3.93-9.02)
60-min	**1.04** (0.811-1.32)	**1.24** (0.965-1.57)	**1.57** (1.22-1.99)	**1.84** (1.42-2.35)	**2.21** (1.65-2.92)	**2.49** (1.82-3.34)	**2.79** (1.98-3.84)	**3.12** (2.10-4.35)	**3.61** (2.34-5.16)	**4.01** (2.54-5.82)
2-hr	**0.684** (0.538-0.859)	**0.816** (0.640-1.02)	**1.03** (0.806-1.30)	**1.21** (0.938-1.53)	**1.45** (1.09-1.90)	**1.64** (1.21-2.17)	**1.83** (1.31-2.50)	**2.05** (1.39-2.83)	**2.37** (1.55-3.36)	**2.64** (1.68-3.80)
3-hr	**0.529** (0.418-0.660)	**0.630** (0.497-0.787)	**0.795** (0.625-0.995)	**0.931** (0.728-1.17)	**1.12** (0.847-1.46)	**1.26** (0.934-1.67)	**1.41** (1.01-1.92)	**1.58** (1.07-2.17)	**1.83** (1.20-2.58)	**2.04** (1.30-2.91)
6-hr	**0.336** (0.268-0.416)	**0.399** (0.318-0.494)	**0.503** (0.399-0.624)	**0.588** (0.464-0.733)	**0.706** (0.539-0.910)	**0.794** (0.594-1.04)	**0.888** (0.644-1.20)	**0.995** (0.681-1.36)	**1.15** (0.756-1.61)	**1.28** (0.820-1.82)
12-hr	**0.206** (0.166-0.252)	**0.244** (0.196-0.300)	**0.307** (0.246-0.377)	**0.358** (0.286-0.443)	**0.430** (0.331-0.549)	**0.483** (0.364-0.627)	**0.540** (0.394-0.721)	**0.604** (0.416-0.816)	**0.699** (0.462-0.969)	**0.777** (0.501-1.09)
24-hr	**0.121** (0.098-0.147)	**0.144** (0.117-0.175)	**0.182** (0.147-0.221)	**0.213** (0.171-0.261)	**0.256** (0.199-0.325)	**0.289** (0.219-0.372)	**0.323** (0.238-0.429)	**0.363** (0.251-0.486)	**0.422** (0.280-0.580)	**0.471** (0.305-0.657)
2-day	**0.067** (0.055-0.081)	**0.081** (0.067-0.098)	**0.104** (0.085-0.125)	**0.122** (0.099-0.148)	**0.148** (0.116-0.186)	**0.167** (0.128-0.214)	**0.187** (0.140-0.248)	**0.212** (0.148-0.281)	**0.249** (0.166-0.339)	**0.280** (0.182-0.387)
3-day	**0.049** (0.040-0.058)	**0.059** (0.048-0.070)	**0.075** (0.061-0.090)	**0.088** (0.072-0.106)	**0.107** (0.084-0.133)	**0.120** (0.093-0.153)	**0.135** (0.101-0.178)	**0.153** (0.107-0.202)	**0.179** (0.120-0.243)	**0.202** (0.132-0.278)
4-day	**0.039** (0.033-0.047)	**0.047** (0.039-0.056)	**0.060** (0.049-0.071)	**0.070** (0.058-0.084)	**0.085** (0.067-0.105)	**0.095** (0.074-0.121)	**0.107** (0.080-0.140)	**0.121** (0.085-0.159)	**0.142** (0.095-0.191)	**0.160** (0.104-0.219)
7-day	**0.027** (0.022-0.032)	**0.032** (0.026-0.037)	**0.039** (0.033-0.047)	**0.046** (0.038-0.055)	**0.055** (0.044-0.068)	**0.062** (0.048-0.077)	**0.069** (0.052-0.089)	**0.077** (0.055-0.101)	**0.090** (0.061-0.120)	**0.100** (0.066-0.137)
10-day	**0.022** (0.018-0.025)	**0.025** (0.021-0.030)	**0.031** (0.026-0.037)	**0.036** (0.030-0.042)	**0.042** (0.034-0.052)	**0.047** (0.037-0.059)	**0.053** (0.040-0.067)	**0.059** (0.041-0.076)	**0.067** (0.046-0.090)	**0.074** (0.049-0.101)
20-day	**0.015** (0.013-0.018)	**0.017** (0.015-0.020)	**0.020** (0.017-0.024)	**0.023** (0.019-0.027)	**0.026** (0.021-0.032)	**0.029** (0.023-0.036)	**0.032** (0.024-0.040)	**0.035** (0.025-0.045)	**0.039** (0.026-0.051)	**0.042** (0.028-0.056)
30-day	**0.013** (0.011-0.015)	**0.014** (0.012-0.016)	**0.016** (0.014-0.019)	**0.018** (0.015-0.021)	**0.020** (0.017-0.024)	**0.022** (0.018-0.027)	**0.024** (0.018-0.030)	**0.026** (0.019-0.033)	**0.028** (0.019-0.037)	**0.030** (0.020-0.040)
45-day	**0.011** (0.009-0.012)	**0.012** (0.010-0.013)	**0.013** (0.011-0.015)	**0.014** (0.012-0.017)	**0.016** (0.013-0.019)	**0.017** (0.014-0.021)	**0.019** (0.014-0.023)	**0.020** (0.014-0.025)	**0.021** (0.015-0.028)	**0.022** (0.015-0.029)
60-day	**0.009** (0.008-0.011)	**0.010** (0.009-0.011)	**0.011** (0.010-0.013)	**0.012** (0.010-0.014)	**0.014** (0.011-0.016)	**0.015** (0.012-0.017)	**0.016** (0.012-0.019)	**0.016** (0.012-0.021)	**0.017** (0.012-0.023)	**0.018** (0.012-0.024)

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

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

Please refer to NOAA Atlas 14 document for more information.

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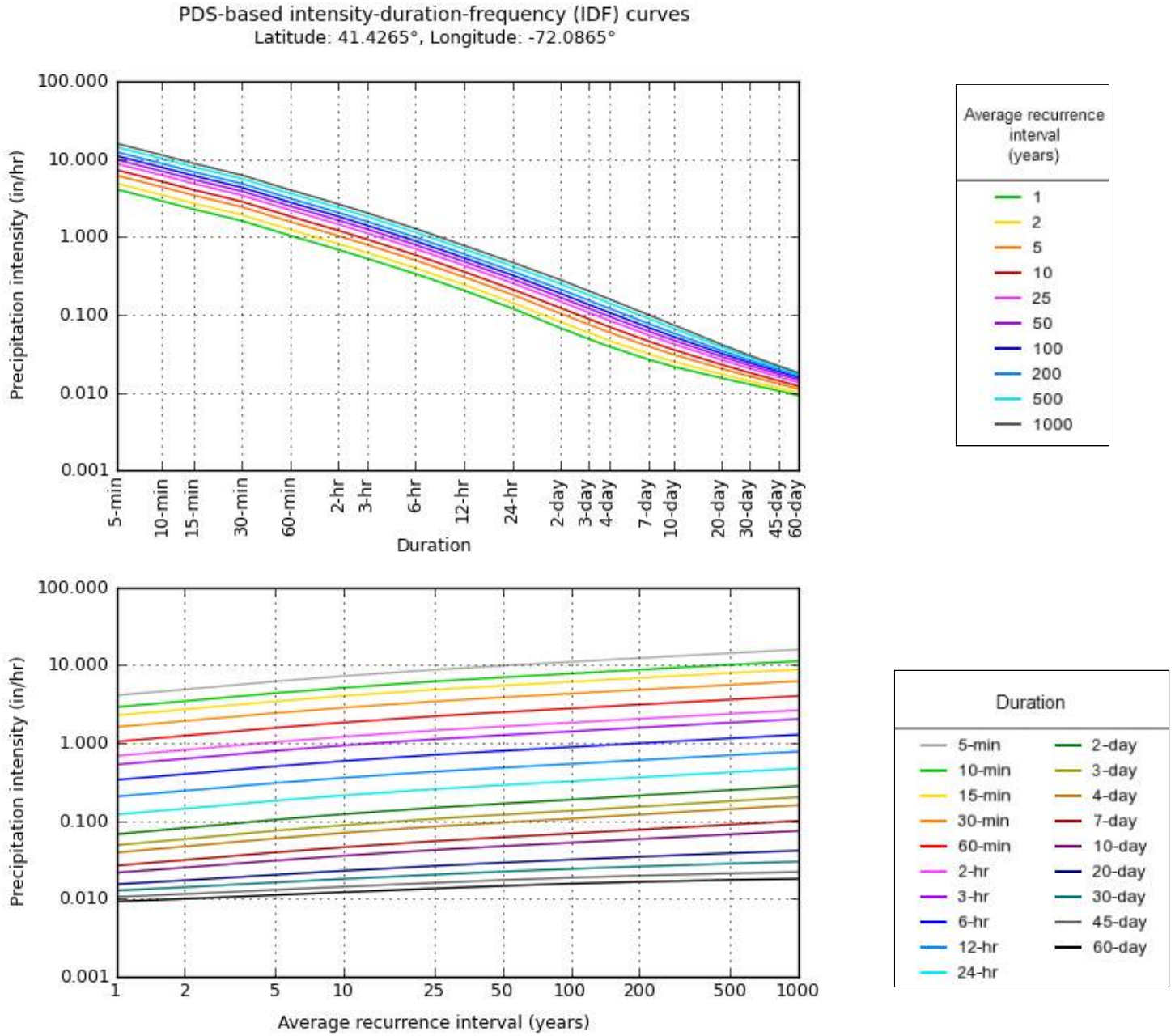
PF graphical



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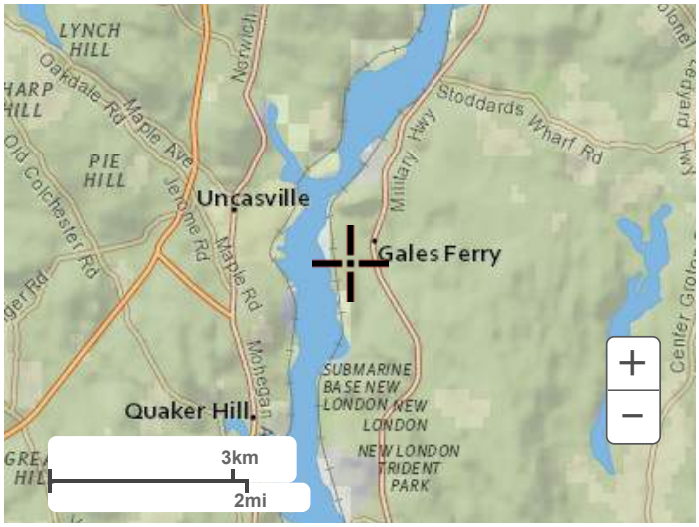
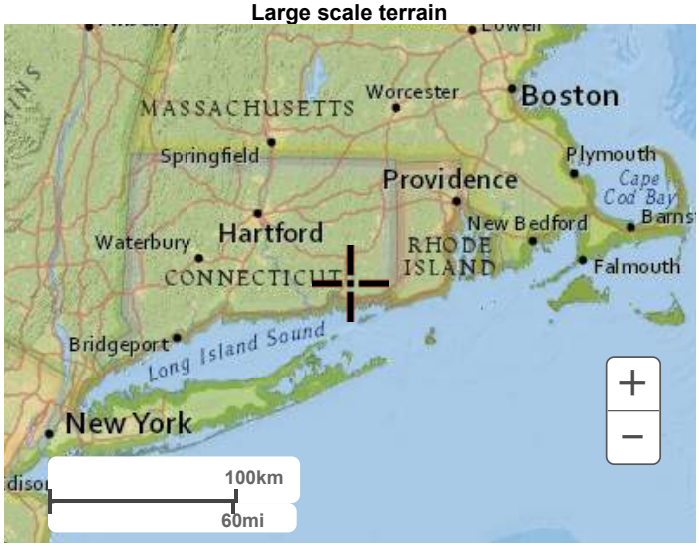
Maps & aerials

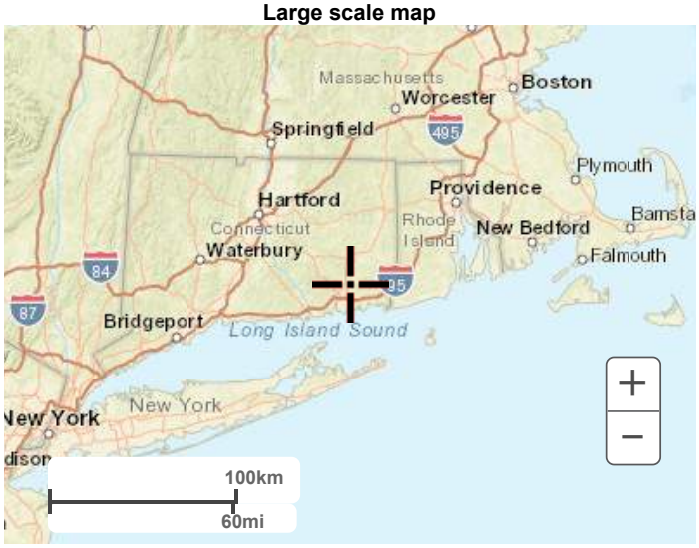
Small scale terrain



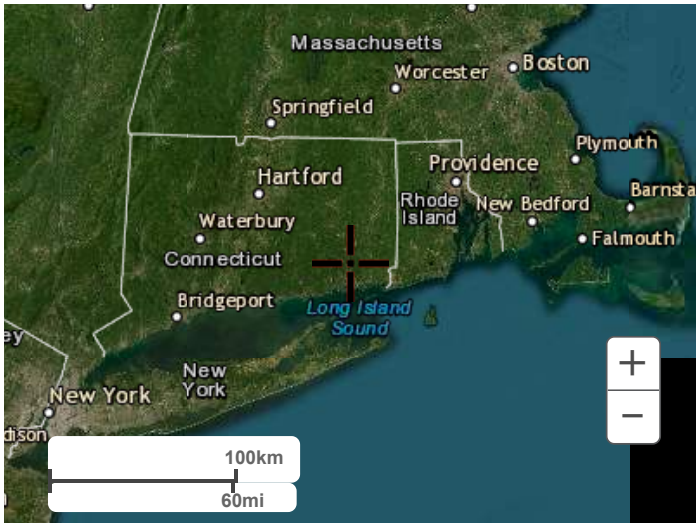
Large scale terrain



Large scale map



Large scale aerial



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C.R. Klewin
23, 29 & 39 Military Highway
Gales Ferry/Ledyard, CT
Bohler Job Number: CTA220061.00
March 22, 2024

Water Quality Calculations - Water Quality Volume

From CT 2024 Stormwater Quality Manual:

$$WQV = \frac{(1.3")(R)(A)}{12}$$

$$R = 0.05 + 0.009(I)$$

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

Watershed Area		Total Area		Impervious Area		Impervious Cover	Volumetric Runoff Coefficient	Water Quality Volume (WQV)		Pretreatment Volume Required[1]	Pretreatment Volume Provided	WQV provided	Notes
ID		ac	ft^2	ac	ft^2	%	R	acre-feet	ft^3	ft^3	ft^3	ft^3	
PD-1B		3.867	168,448	1.415	61,636	36.59	0.379	0.159	6,922	1,730	1,730	13,200 (1)	Spillway @31.44
PD-1C		1.369	59,639	0.777	33,867	56.79	0.561	0.083	3,625	906	906	13,200 (1)	Spillway @31.44
TOTALS			228,086		95,503	41.87%			10,547			13,200 (1)	

(1) - WQV for PD-1B & PD-1C is provided in Infiltration Basin P-1 with a total WQV of 13,200 cf

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23, 29 & 39 Military Highway
Gales Ferry/Ledyard, CT
Bohler Job Number: CTA220061.00
March 22, 2024

Water Quality Calculations - Water Quality Flow

From CT 2024 Stormwater Quality Manual:

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

$$Q = \frac{[WQV(acre-feet) \times [12(inches/foot)]]}{DrainageArea(acres)}$$

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

WQF = water quality flow (cfs)
q_u = unit peak discharge,
A = Area (sq. miles)
Q = runoff depth (in watershed inches)
CN = Runoff Curve Number
P = design preciptation, inches, (1" for water quality storm)
T_c = time of concentration
I_a = Initial abstraction, inches, from Table 4-1, Chapter 4, TR-55

$$WQV = \frac{(1.3")(R)(A)}{12}$$

$$R = 0.05 + 0.009(I)$$

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

Watershed Area	Structure ID	Proprietary Structure	Total Area			Imp Area		Imp Cover	R	WQV	Q	P	CN	T_c		I_a	I_a/P	q_u [1]	WQF Req.	WQF Provided
			ft^2	ac	mi^2	ft^2	ac	%	-	acre-feet	in	in	-	mins	hours	in	-	$cfs/mi^2/in$	cfs	cfs
PD-1D	HDS-201	CDS-2020-5	171,474	3.937	0.0062	61,250	1.406	35.72	0.371	0.158	0.48	1.00	94	6.0	0.1	0.128	0.128	650	**1.93**	**2.20**
PD-1E	HDS-401	STC 900	45,380	1.042	0.0016	16,657	0.382	36.70	0.380	0.043	0.49	1.00	94	6.0	0.1	0.128	0.128	650	**0.52**	**0.89**
PD-1F	HDS-301	STC 900	50,626	1.162	0.0018	24,079	0.553	47.56	0.478	0.060	0.62	1.00	96	6.0	0.1	0.083	0.083	650	**0.73**	**0.89**

1- From Exhibit 4-III: Unit peak discharge (q_u) for SCS type III rainfall distribution, Urban Hydrology for Small Watersheds (TR-55), USDS< SCS, June 1986.

Exhibit 4-III Unit peal discharge (q_u) for NRCS (SCS) type III rainfall distribution

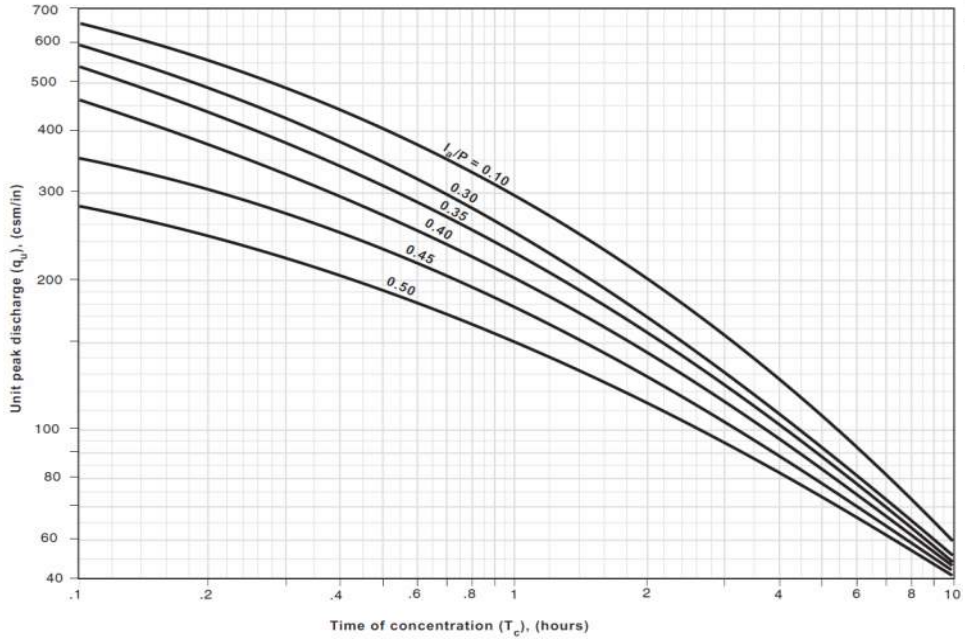

Table 4-1 I_a values for runoff curve numbers

Curve number	I_a (in)	Curve number	I_a (in)
40	3.000	70	0.857
41	2.878	71	0.817
42	2.762	72	0.778
43	2.651	73	0.740
44	2.545	74	0.703
45	2.444	75	0.667
46	2.348	76	0.632
47	2.255	77	0.597
48	2.167	78	0.564
49	2.082	79	0.532
50	2.000	80	0.500
51	1.922	81	0.469
52	1.846	82	0.439
53	1.774	83	0.410
54	1.704	84	0.381
55	1.636	85	0.353
56	1.571	86	0.326
57	1.509	87	0.299
58	1.448	88	0.273
59	1.390	89	0.247
60	1.333	90	0.222
61	1.279	91	0.198
62	1.226	92	0.174
63	1.175	93	0.151
64	1.125	94	0.128
65	1.077	95	0.105
66	1.030	96	0.083
67	0.985	97	0.062
68	0.941	98	0.041
69	0.899		

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Bohler Job Number: CTA220061.00
March 22, 2024

Drawdown Time Calculations

Drawdown Time - Infiltration Basin P-1	
Volume below outlet pipe (cf)	13,000
Soil Type	Sandy Loam - B
Infiltration rate (K)*	1.25
Bottom Area (sf)	2,602
Drawdown time (Hours)**	**48.0**

*Factored Infiltration Rates to Max allowed per CT stormwater manual
**Drawdown time = Rv / (K) x (bottom area)

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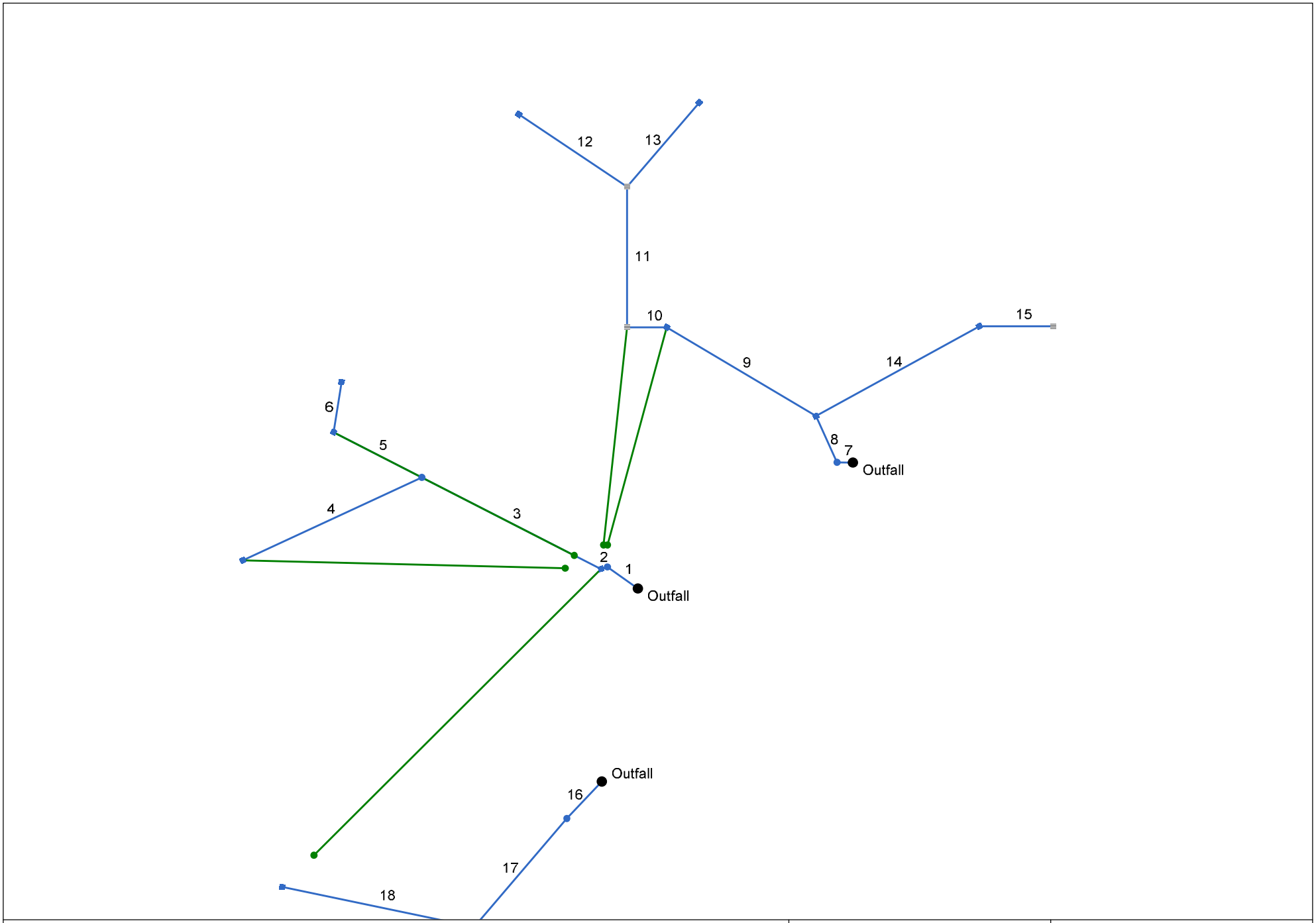
Proposed Rational Method Runoff Coefficients Summary

$Q = C * I * A$

	Land Use									
	Woods (sf)	Grassed (sf)	Impervious (sf)	Other (sf)						
Rational Runoff Coefficient	0.15	0.3	0.9	0	Total Drainage Area (sf)	Total Drainage Area (A, ac)	Composite Runoff Coefficient	Time of Conc. (tc, min)	Rainfall Intensity* (I, in/hr)	Peak Rational Flow (Q, cfs)
Structure ID										
System 100										
CB 102	0	2,911	4,918	0	7,829	0.18	0.68	6	8.74	1.06
CB 103	0	5,100	6,694	0	11,794	0.27	0.64	6	8.74	1.52
CB 104	0	6,956	2,146	0	9,102	0.21	0.44	6	8.74	0.81
CB-105	0	0	4,449	0	4,449	0.10	0.90	6	8.74	0.80
CB-106	0	13,716	7,265	0	20,981	0.48	0.51	6	8.74	2.14
CB-107	0	0	13,312	0	13,312	0.31	0.90	6	8.74	2.40
CB-108	0	1,204	6,017	0	7,221	0.17	0.80	6	8.74	1.16
CB-109	0	1,204	6,017	0	7,221	0.17	0.80	6	8.74	1.16
System 200										
CB 202	4,416	28,271	46,910	0	79,597	1.83	0.65	6	8.74	10.31
CB 204	1,462	1,815	1,907	0	5,184	0.12	0.48	6	8.74	0.50
CB 205	9,710	15,312	11,066	0	36,088	0.83	0.44	6	8.74	3.21
CB 206	4,202	15,590	104	0	19,896	0.46	0.27	6	8.74	1.08
System 300										
CB 302	9,080	5,355	11,064	0	25,499	0.59	0.51	6	8.74	2.59
CB 303	8,526	3,585	1,940	0	14,051	0.32	0.29	6	8.74	0.82
System 400										
IF Trench 400	0	28,723	16,656	0	45,379	1.04	0.52	6	8.74	4.74

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



Project File: CTA220061.00 - Storm Sewers.stm	Number of lines: 18	Date: 3/22/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	28	-145	MH	0.00	0.00	0.00	6.0	26.00	0.49	26.14	24	Cir	0.012	0.84	30.00	FES-200 - HDS-201
2	1	5	-54	Comb	0.00	1.83	0.65	6.0	26.14	0.58	26.17	24	Cir	0.012	1.14	29.50	HDS-201 - CB-202
3	2	153	46	MH	0.00	0.00	0.00	6.0	26.17	0.82	27.42	18	Cir	0.012	0.82	32.84	CB-202 - MH-203
4	3	150	-52	Grate	0.00	0.46	0.27	6.0	27.42	5.46	35.59	18	Cir	0.012	1.00	39.21	MH-203 - CB-206
5	3	75	0	Comb	0.00	0.12	0.48	6.0	29.14	4.95	32.87	18	Cir	0.012	1.44	36.58	MH-203 - CB-204
6	5	39	72	Comb	0.00	0.83	0.44	6.0	33.03	4.38	34.73	18	Cir	0.012	1.00	38.28	CB-204 - CB-205
7	End	12	-179	MH	0.00	0.00	0.00	6.0	29.00	0.50	29.06	24	Cir	0.012	0.92	32.25	FES-100 - HDS-101
8	7	39	65	Comb	0.00	0.18	0.68	6.0	29.06	0.49	29.25	24	Cir	0.012	1.50	32.32	HDS-101 - CB-102
9	8	132	-35	Comb	0.00	0.27	0.64	6.0	29.25	0.50	29.91	18	Cir	0.012	0.85	33.30	CB-102 - CB-103
10	9	30	-31	Comb	0.00	0.21	0.44	6.0	29.91	0.50	30.06	18	Cir	0.012	1.50	33.30	CB-103 - CB-104
11	10	107	90	Comb	0.00	0.10	0.90	6.0	30.06	4.34	34.71	18	Cir	0.012	1.57	38.26	CB-104 - CB-105
12	11	99	-56	Comb	0.00	0.48	0.51	6.0	34.71	2.81	37.49	18	Cir	0.012	1.00	41.04	CB-105 - CB-106
13	11	84	40	Comb	0.00	0.31	0.90	6.0	34.71	4.79	38.74	18	Cir	0.012	1.00	42.29	CB-105 - CB-107
14	8	142	86	Comb	0.00	0.17	0.80	6.0	29.25	0.50	29.96	18	Cir	0.012	0.81	34.22	CB-102 - CB-108
15	14	56	29	Comb	0.00	0.17	0.80	6.0	29.96	0.50	30.24	18	Cir	0.012	1.00	34.22	CB-108 - CB-109
16	End	39	133	MH	0.00	0.00	0.00	6.0	26.00	0.49	26.19	18	Cir	0.012	0.15	32.00	FES-300 - HDS - 30
17	16	108	-3	Comb	0.00	0.59	0.51	6.0	26.19	0.51	26.74	18	Cir	0.012	1.35	29.77	HDS-301- CB-302
18	17	149	61	Grate	0.00	0.32	0.29	6.0	26.74	1.22	28.56	18	Cir	0.012	1.00	32.63	CB-302 - CB-303

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	28	0.00	3.24	0.00	0.00	1.74	6.0	8.0	7.0	12.07	17.23	5.72	24	0.49	26.00	26.14	27.30	27.39	23.58	30.00	FES-200 - HDS-2
2	1	5	1.83	3.24	0.65	1.19	1.74	6.0	8.0	7.0	12.08	18.67	5.86	24	0.58	26.14	26.17	27.39	27.42	30.00	29.50	HDS-201 - CB-20
3	2	153	0.00	1.41	0.00	0.00	0.55	6.0	7.2	7.3	3.99	10.29	3.47	18	0.82	26.17	27.42	27.42	28.18	29.50	32.84	CB-202 - MH-203
4	3	150	0.46	0.46	0.27	0.12	0.12	6.0	6.0	7.9	0.99	26.57	2.00	18	5.46	27.42	35.59	28.18	35.96	32.84	39.21	MH-203 - CB-206
5	3	75	0.12	0.95	0.48	0.06	0.42	6.0	6.1	7.9	3.33	25.32	7.03	18	4.95	29.14	32.87	29.51	33.56	32.84	36.58	MH-203 - CB-204
6	5	39	0.83	0.83	0.44	0.37	0.37	6.0	6.0	7.9	2.90	23.82	4.56	18	4.38	33.03	34.73	33.56	35.38	36.58	38.28	CB-204 - CB-205
7	End	12	0.00	1.89	0.00	0.00	1.27	6.0	7.8	7.0	8.96	17.32	5.07	24	0.50	29.00	29.06	30.13	30.13	27.21	32.25	FES-100 - HDS-1
8	7	39	0.18	1.89	0.68	0.12	1.27	6.0	7.7	7.1	9.02	17.16	5.28	24	0.49	29.06	29.25	30.13	30.32	32.25	32.32	HDS-101 - CB-10
9	8	132	0.27	1.37	0.64	0.17	0.88	6.0	7.2	7.3	6.41	8.05	4.99	18	0.50	29.25	29.91	30.32	30.89	32.32	33.30	CB-102 - CB-103
10	9	30	0.21	1.10	0.44	0.09	0.71	6.0	7.1	7.4	5.20	8.04	3.24	18	0.50	29.91	30.06	31.25	31.29	33.30	33.30	CB-103 - CB-104
11	10	107	0.10	0.89	0.90	0.09	0.61	6.0	6.6	7.6	4.67	23.71	3.65	18	4.34	30.06	34.71	31.55	35.54	33.30	38.26	CB-104 - CB-105
12	11	99	0.48	0.48	0.51	0.24	0.24	6.0	6.0	7.9	1.95	19.05	2.73	18	2.81	34.71	37.49	35.54	38.02	38.26	41.04	CB-105 - CB-106
13	11	84	0.31	0.31	0.90	0.28	0.28	6.0	6.0	7.9	2.22	24.89	2.94	18	4.79	34.71	38.74	35.54	39.30	38.26	42.29	CB-105 - CB-107
14	8	142	0.17	0.34	0.80	0.14	0.27	6.0	6.4	7.7	2.10	8.06	2.58	18	0.50	29.25	29.96	30.32	30.51	32.32	34.22	CB-102 - CB-108
15	14	56	0.17	0.17	0.80	0.14	0.14	6.0	6.0	7.9	1.08	8.04	2.42	18	0.50	29.96	30.24	30.51	30.63	34.22	34.22	CB-108 - CB-109
16	End	39	0.00	0.91	0.00	0.00	0.39	6.0	7.8	7.0	2.77	7.98	3.93	18	0.49	26.00	26.19	26.63	26.82	27.64	32.00	FES-300 - HDS -
17	16	108	0.59	0.91	0.51	0.30	0.39	6.0	7.3	7.2	2.85	8.10	4.00	18	0.51	26.19	26.74	26.82	27.38	32.00	29.77	HDS-301- CB-302
18	17	149	0.32	0.32	0.29	0.09	0.09	6.0	6.0	7.9	0.74	12.57	1.85	18	1.22	26.74	28.56	27.38	28.88	29.77	32.63	CB-302 - CB-303

Project File: CTA220061.00 - Storm Sewers.stm

Number of lines: 18

Run Date: 3/22/2024

NOTES:Intensity = 39.52 / (Inlet time + 3.60) ^ 0.71; Return period =Yrs. 25 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	HDS-201	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2	CB-202	9.46	1.83	2.96	8.33	Comb	4.0	2.73	0.00	2.31	1.35	0.013	2.53	0.020	0.020	0.013	0.32	15.75	0.28	14.05	0.0	18
3	MH-203	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
4	CB-206	0.99	0.00	0.39	0.59	Grate	0.0	0.00	0.00	1.23	1.23	0.020	2.53	0.020	0.020	0.030	0.16	7.98	0.13	6.59	0.0	2
5	CB-204	0.46	0.00	0.31	0.15	Comb	4.0	2.73	0.00	2.31	1.35	0.050	2.53	0.020	0.020	0.013	0.07	3.68	0.05	2.40	0.0	2
6	CB-205	2.90	0.00	2.90	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.34	17.00	0.34	17.00	0.0	Off
7	HDS-101	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
8	CB-102	0.97	0.00	0.97	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.18	8.81	0.18	8.81	0.0	Off
9	CB-103	1.37	0.00	0.72	0.65	Comb	4.0	2.73	0.00	2.31	1.35	0.045	2.53	0.020	0.020	0.013	0.11	5.67	0.09	4.29	0.0	2
10	CB-104	0.73	0.27	0.57	0.44	Comb	4.0	2.73	0.00	2.31	1.35	0.045	2.53	0.020	0.020	0.013	0.10	5.05	0.07	3.69	0.0	2
11	CB-105	0.72	0.00	0.44	0.27	Comb	4.0	2.73	0.00	2.31	1.35	0.045	2.53	0.020	0.020	0.013	0.09	4.44	0.06	3.10	0.0	10
12	CB-106	1.95	0.00	1.95	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.27	13.30	0.27	13.30	0.0	Off
13	CB-107	2.22	0.00	2.22	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.29	14.40	0.29	14.40	0.0	Off
14	CB-108	1.08	0.00	1.08	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.19	9.36	0.19	9.36	0.0	Off
15	CB-109	1.08	0.00	1.08	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.19	9.36	0.19	9.36	0.0	Off
16	HDS-301	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
17	CB-302	2.39	0.00	2.39	0.00	Comb	4.0	2.73	3.12	2.31	1.35	Sag	2.53	0.020	0.020	0.000	0.30	15.09	0.30	15.09	0.0	Off
18	CB-303	0.74	8.33	9.06	0.00	Grate	0.0	0.00	1.51	1.23	1.23	Sag	2.53	0.020	0.020	0.000	1.26	62.77	1.26	62.77	0.0	Off

Project File: CTA220061.00 - Storm Sewers.stm | Number of lines: 18 | Run Date: 3/22/2024

NOTES: Inlet N-Values = 0.016; Intensity = 39.52 / (Inlet time + 3.60) ^ 0.71; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	24	12.07	26.00	27.30	1.30	2.06	5.59	0.53	27.83	0.000	28	26.14	27.39	1.25**	2.06	5.86	0.53	27.92	0.000	0.000	n/a	0.84	0.45
2	24	12.08	26.14	27.39	1.25	2.06	5.86	0.53	27.92	0.000	5	26.17	27.42	1.25**	2.06	5.86	0.53	27.95	0.000	0.000	n/a	1.14	n/a
3	18	3.99	26.17	27.42	1.25	0.90	2.54	0.30	27.72	0.000	153	27.42	28.18 j	0.76**	0.90	4.41	0.30	28.49	0.000	0.000	n/a	0.82	n/a
4	18	0.99	27.42	28.18	0.76	0.34	1.09	0.13	28.32	0.000	150	35.59	35.96 j	0.37**	0.34	2.91	0.13	36.09	0.000	0.000	n/a	1.00	0.13
5	18	3.33	29.14	29.51	0.37*	0.34	9.91	0.27	29.78	0.000	75	32.87	33.56	0.69**	0.80	4.16	0.27	33.83	0.000	0.000	n/a	1.44	0.39
6	18	2.90	33.03	33.56	0.53	0.56	5.14	0.25	33.81	0.000	39	34.73	35.38	0.65**	0.73	3.98	0.25	35.62	0.000	0.000	n/a	1.00	n/a
7	24	8.96	29.00	30.13	1.13	1.70	4.89	0.43	30.56	0.000	12	29.06	30.13	1.07**	1.70	5.25	0.43	30.56	0.000	0.000	n/a	0.92	n/a
8	24	9.02	29.06	30.13	1.07	1.70	5.29	0.43	30.56	0.000	39	29.25	30.32	1.07**	1.71	5.27	0.43	30.75	0.000	0.000	n/a	1.50	n/a
9	18	6.41	29.25	30.32	1.07	1.22	4.74	0.35	30.67	0.429	132	29.91	30.89	0.98**	1.23	5.23	0.43	31.32	0.544	0.487	0.642	0.85	0.36
10	18	5.20	29.91	31.25	1.34	1.67	3.12	0.15	31.40	0.185	30	30.06	31.29	1.23	1.55	3.36	0.18	31.46	0.209	0.197	0.059	1.50	0.26
11	18	4.67	30.06	31.55	1.49	1.00	2.65	0.34	31.89	0.000	107	34.71	35.54 j	0.83**	1.00	4.66	0.34	35.88	0.000	0.000	n/a	1.57	n/a
12	18	1.95	34.71	35.54	0.83	0.55	1.94	0.19	35.73	0.000	99	37.49	38.02 j	0.53**	0.55	3.53	0.19	38.21	0.000	0.000	n/a	1.00	0.19
13	18	2.22	34.71	35.54	0.83	0.60	2.21	0.21	35.75	0.000	84	38.74	39.30 j	0.56**	0.60	3.67	0.21	39.51	0.000	0.000	n/a	1.00	0.21
14	18	2.10	29.25	30.32	1.07	0.58	1.56	0.20	30.52	0.000	142	29.96	30.51	0.55**	0.58	3.61	0.20	30.71	0.000	0.000	n/a	0.81	0.16
15	18	1.08	29.96	30.51	0.55	0.36	1.86	0.14	30.65	0.000	56	30.24	30.63 j	0.39**	0.36	2.98	0.14	30.77	0.000	0.000	n/a	1.00	n/a
16	18	2.77	26.00	26.63	0.63	0.70	3.94	0.24	26.87	0.000	39	26.19	26.82	0.63**	0.71	3.92	0.24	27.06	0.000	0.000	n/a	0.15	n/a
17	18	2.85	26.19	26.82	0.63	0.71	4.04	0.24	27.07	0.000	108	26.74	27.38	0.64**	0.72	3.96	0.24	27.62	0.000	0.000	n/a	1.35	0.33
18	18	0.74	26.74	27.38	0.64	0.27	1.02	0.11	27.49	0.000	149	28.56	28.88 j	0.32**	0.27	2.69	0.11	28.99	0.000	0.000	n/a	1.00	n/a

Project File: CTA220061.00 - Storm Sewers.stm | Number of lines: 18 | Run Date: 3/22/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

C.R. Klewin
23, 29 & 39 Military Highway
Gales Ferry/Ledyard, CT
Bohler Job Number: CTA220061.00
March 22, 2024

Rip Rap Sizing Calculations

Design Period Storm: 25 Year

Rip Rap Apron Sizing Calculations

Location	Pipe Size (in.)	Pipe Size (ft.)	Q (cfs)	TW (ft.)	V (fps)	W1 (ft.)	La (ft.)	W2 (ft.)	W3 (ft.)	Apron Type	Rip Rap Type
FES 100	24	2.0	8.96	1.13	4.89	6.00	10	10	NA	B	Modified
FES 200	24	2.0	12.07	1.30	5.59	6.00	10	10	NA	B	Modified
FES 300	18	1.5	2.85	0.63	4.04	NA	12.5	NA	14	C	Modified
FES 500	24	2.0	6.34	0.00	5.00	NA	13.5	NA	12	C	Modified

Based ConnDOT Drainage Manual - Type A, B, and C Riprap Aprons

Outlet Velocity (fps)
0-8 - Modified
8-10 - Intermediate

C.R. Klewin
23, 29 & 39 Military Highway
Gales Ferry/Ledyard, CT
Bohler Job Number: CTA220061.00
March 22, 2024

Weighted Total Phosphorus Removal Rate

Phosphorus Loading Calculation -Proposed Conditions

Subcatchment	Design Point	Impervious Area (sf)	Land Use Category	Pervious Area (sf)	Land Use Category	Phosphorus Load (lbs/year)
PD-1D	DP1	61,250	Multi-Family Residential	77,960	Developed Land - HSG B	3.48
PD-1E	DP1	16,656	Multi-Family Residential	28,723	Developed Land - HSG B	0.97
PD-1F	DP1	13,004	Multi-Family Residential	26,546	Developed Land - HSG B	0.77
Total	**-**	**90,910**		**133,229**		**5.21**

Table 1: Phosphorus Loading Export by Land Use

Land Use	Phosphorus Load Export (lbs/acre/year)
Commercial	1.78
Industrial	1.78
Multi-Family Residential	2.32
High-Density Residential	2.32
Medium-Density Residential	1.96
Low-Density Residential	1.52
Highway	1.34
Forest - Impervious	1.52
Forest - Pervious	0.13
Open Land	1.52
Agriculture - Impervious	1.52
Agriculture - Pervious	0.45
Developed Land - HSG A	0.03
Developed Land - HSG B	0.12
Developed Land - HSG C	0.21
Developed Land - HSG C/D	0.29
Developed Land - HSG D	0.37

DP Summary Table - Proposed Conditions

Design Point	Phosphorus Load Export (lbs/year)
DP1	5.21
Total	**5.21**

Subcatchment Summary Table - Proposed Conditions

Subcatchment	Phosphorus Load Export (lbs/year)
PD-1D	3.48
PD-1E	0.97
PD-1F	0.77
0	0.00
0	0.00
0	0.00
Total	**5.21**

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Subcatchments: PD-1D

Treatment Train PD-1D

Total Phosphorus Removal Calculation Worksheet

A BMP[1]	B TP Removal Rate[1]	C Starting TP Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Trench	**0.40**	**1.00**	**0.40**	**0.60**
Hydrodynamic Seperator	**0.12**	**0.60**	**0.07**	**0.53**
Detention Basin	**0.10**	**0.53**	**0.05**	**0.48**

Total Phosphorus Removal = **53%**

Project: **23, 29 & 39 Military Highway**
Prepared By: **Bohler**
Date: **3/22/2024**

*Equals remaining load from previous BMP (E) which enters the BMP

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Subcatchments: PD-1E

Treatment Train PD-1E

Total Phosphorus Removal Calculation Worksheet

A BMP[1]	B TP Removal Rate[1]	C Starting TP Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Trench	**0.40**	**1.00**	**0.40**	**0.60**
Detention Basin	**0.10**	**0.60**	**0.06**	**0.54**

Total Phosphorus Removal = **46%**

Project: **23, 29 & 39 Military Highway**
Prepared By: **Bohler**
Date: **3/22/2024**

*Equals remaining load from previous BMP (E) which enters the BMP

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Subcatchments: PD-1F

Treatment Train PD-1F

Total Phosphorus Removal Calculation Worksheet

A BMP[1]	B TP Removal Rate[1]	C Starting TP Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Trench	**0.40**	**1.00**	**0.40**	**0.60**
Hydrodynamic Seperator	**0.12**	**0.60**	**0.07**	**0.53**
Detention Basin	**0.10**	**0.53**	**0.05**	**0.48**

Total Phosphorus Removal = **53%**

Project: **23, 29 & 39 Military Highway**
Prepared By: **Bohler**
Date: **3/22/2024**

*Equals remaining load from previous BMP (E) which enters the BMP

Prepared By:
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Phosphorus Reduction Credits for Selected Enhanced Non-Structural BMPs in the Watershed

Credit #1: Enhanced Sweeping Program

Credit (Sweeping) = $IA_{sweeping} * PLE * PRF_{sweeping} * AF$

$Credit_{sweeping}$ =	Amount of phosphorus load removed by enhanced sweeping (lb/yr)
$IA_{sweeping}$ =	Impervious Area swept (acres)
PLE =	PLE/R from Table 2-1 based on land use (lb/acre/yr)
$PRF_{sweeping}$ =	Phosphorus reduction factor (PRF) for sweeping base on sweeping frequency as seen in Table 2-3
AF =	Annual frequency of sweeping or months per year streets are swept (Ex: 3 mo./12 mo. = 0.25)

$IA_{sweeping}$ =	1.00	(Subcatchments PR-X, PR-Y, PR-Z)
PLE =	2.32	(Multi-family Residential)
$PRF_{sweeping}$ =	0.03	(Mechanical Broom, Monthly)
AF =	0.75	(9 Months - March through December)

$Credit_{sweeping}$ =	0.05	lb/yr phosphorus removed

Credit #2: Catch Basin Cleaning

Credit $_{CB} = IA_{CB} * PLE * PRF_{CB}$

$Credit_{CB}$ =	Amount of phosphorus load removed by catch basin cleaning (lb/yr)
IA_{CB} =	Impervious area to catch basins (acres)
PLE =	PLER from Table 2-1 based on land use (lb/acre/yr)
PRF_{CB} =	Phosphorus reduction factor (PRF) for catch basin cleaning as seen in Table 2-4

IA_{CB} =	1.00	(Subcatchments PR-X, PR-Y, PR-Z)
PLE =	2.32	(Multi-family Residential)
PRF_{CB} =	0.02	(Semi-annual CB Cleaning)

$Credit_{CB}$ =	0.05	lb/yr phosphorus removed

Credit #3: Enhanced Organic Waste and Leaf Litter Collection Program

Credit $_{leaf\ litter} = IA_{swept} * PLE * PRF_{sweeping}$

$Credit_{leaf\ litter}$ =	Amount of phosphorus load removed by collection of organic waste and leaf little collection (lb/yr)
$IA_{sweeping}$ =	Impervious Area swept (acres)
PLE =	PLER from Table 2-1 based on land use (lb/acre/yr)
$PRF_{sweeping}$ =	Phosphorus reduction factor (PRF) for sweeping base on sweeping frequency as seen in Table 2-3

$IA_{sweeping}$ =	1.00	(Subcatchments PR-X, PR-Y, PR-Z)
PLE =	2.32	(Multi-family Residential)
$PRF_{sweeping}$ =	0.03	(Mechanical Broom, Monthly)

$Credit_{leaf\ litter}$ =	0.07	lb/yr phosphorus removed

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23, 29 & 39 Military Highway
Gales ferry/Ledyard, CT
Bohler Job Number: CTA220061.00
March 22, 2024

Weighted Total Phosphorus Removal Rate

Structural BMPs/Proprietary Devices

Subcatchment	Design Point	Phosphorus Loading (lbs/year)	Treatment Train	TP Removal (%)	TP Removal (lbs/year)
PD-1D	DP1	3.48	Treatment Train PD-1D	53%	1.83
PD-1E	DP1	0.97	Treatment Train PD-1E	46%	0.44
PD-1F	DP1	0.77	Treatment Train PD-1F	53%	0.40
Total	**-**	**5.21**	**-**	**-**	**2.67**

Non-Structural BMPs

Credit	TP Removal (lbs/year)
Credit #1: Enhanced Sweeping Program	0.05
Credit #2: Catch Basin Cleaning	0.05
Credit #3: Enhanced Organic Waste and Leaf Litter Collection Program	0.07
Total	**0.17**

Weighted Total Phosphorus Removal Rate	**55%**

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Subcatchments: PD-1D

Treatment Train PD-1D

Total Nitrogen Removal Calculation Worksheet

A BMP[1]	B TN Removal Rate[1]	C Starting TN Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Trench	**0.40**	**1.00**	**0.40**	**0.60**
Detention Basin	**0.15**	**0.60**	**0.09**	**0.51**

Total Nitrogen Removal = **49%**

Project: **23, 29 & 39 Military Highway**
Prepared By: **Bohler**
Date: **3/22/2024**

*Equals remaining load from previous BMP (E) which enters the BMP

Prepared By:
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West Hartford, CT 06107
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Subcatchments: PD-1E

Treatment Train PD-1E

Total Nitrogen Removal Calculation Worksheet

A BMP[1]	B TN Removal Rate[1]	C Starting TN Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Trench	**0.40**	**1.00**	**0.40**	**0.60**
Detention Basin	**0.15**	**0.60**	**0.09**	**0.51**

Total Nitrogen Removal = **49%**

Project: **23, 29 & 39 Military Highway**
Prepared By: **Bohler**
Date: **3/22/2024**

*Equals remaining load from previous BMP (E) which enters the BMP

Prepared By:
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Subcatchments: PD-1F

Treatment Train PD-1F

Total Nitrogen Removal Calculation Worksheet

A BMP[1]	B TN Removal Rate[1]	C Starting TN Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Trench	**0.40**	**1.00**	**0.40**	**0.60**
Detention Basin	**0.15**	**0.60**	**0.09**	**0.51**

Total Nitrogen Removal = **49%**

Project: **23, 29 & 39 Military Highway**
Prepared By: **Bohler**
Date: **3/22/2024**

*Equals remaining load from previous BMP (E) which enters the BMP

Prepared By:
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C.R. Klewin
23, 29 & 39 Military Highway
Gales Ferry/Ledyard, CT
Bohler Job Number: CTA220061.00
March 22, 2024
TSS Removal Calculation Worksheet

PD-1B TSS Removal

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Vegetated Filter Strip	**0.10**	**0.75**	**0.08**	**0.68**
Hydrodynamic Seperator	**0.70**	**0.68**	**0.47**	**0.20**
Infiltration basin	**0.80**	**0.20**	**0.16**	**0.04**
		Total TSS Removal =	**96%**	

*Equals remaining load from previous BMP (E) which enters BMP

C.R. Klewin
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Gales Ferry/Ledyard, CT
Bohler Job Number: CTA220061.00
March 22, 2024
TSS Removal Calculation Worksheet

PD-1C TSS Removal

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Hydrodynamic Seperator	**0.70**	**0.75**	**0.53**	**0.23**
Infiltration Basin	**0.80**	**0.23**	**0.18**	**0.05**
		Total TSS Removal =	**96%**	

*Equals remaining load from previous BMP (E) which enters BMP

C.R. Klewin
23, 29 & 39 Military Highway
Gales Ferry/Ledyard, CT
Bohler Job Number: CTA220061.00
March 22, 2024
TSS Removal Calculation Worksheet

PD-1D TSS Removal

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Trench	**0.80**	**1.00**	**0.80**	**0.20**
Deep Sump Catch Basin	**0.25**	**0.20**	**0.05**	**0.15**
Hydrodynamic Seperator	**0.70**	**0.15**	**0.11**	**0.05**
Detention Basin	**0.50**	**0.05**	**0.02**	**0.02**
		Total TSS Removal =	**98%**	

*Equals remaining load from previous BMP (E) which enters BMP

C.R. Klewin
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Gales Ferry/Ledyard, CT
Bohler Job Number: CTA220061.00
March 22, 2024
TSS Removal Calculation Worksheet

PD-1E TSS Removal

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Trench	**0.80**	**1.00**	**0.80**	**0.20**
Hydrodynamic Seperator	**0.70**	**0.20**	**0.14**	**0.06**
Detention Basin	**0.50**	**0.06**	**0.03**	**0.03**
		Total TSS Removal =	**97%**	

*Equals remaining load from previous BMP (E) which enters BMP

C.R. Klewin
23, 29 & 39 Military Highway
Gales Ferry/Ledyard, CT
Bohler Job Number: CTA220061.00
March 22, 2024
TSS Removal Calculation Worksheet

PD-1F TSS Removal

A BMP	B TSS Removal Rate	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Trench	**0.80**	**1.00**	**0.80**	**0.20**
Deep Sump Catch Basin	**0.25**	**0.20**	**0.05**	**0.15**
Hydrodynamic Seperator	**0.70**	**0.15**	**0.11**	**0.05**
		Total TSS Removal =	**96%**	

*Equals remaining load from previous BMP (E) which enters BMP

APPENDIX F: STORMWATER OPERATION & MAINTENANCE PLAN

- *O & M PLAN*

STORMWATER OPERATION AND MAINTENANCE PLAN

C.R. Klewin
23, 29 & 39 Military Highway
Gales Ferry/Ledyard, CT

RESPONSIBLE PARTY DURING CONSTRUCTION:

Contractor – TBD

RESPONSIBLE PARTY POST CONSTRUCTION:

TBD

Construction Phase

During the construction phase, all erosion control devices and measures shall be maintained in accordance with the final record plans, local/state approvals and conditions, and the CT General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, if applicable. Additionally, the maintenance of all erosion / siltation control measures during construction shall be the responsibility of the general contractor. Upon proper notice to the property owner, the Town/City or its authorized designee shall be allowed to enter the property at a reasonable time and in a reasonable manner for the purposes of inspection.

Post Development Controls

Once construction is completed, the post development stormwater controls are to be operated and maintained in compliance with the following permanent procedures (note that the continued implementation of these procedures shall be the responsibility of the Owner or its assignee):

1. **Litter and Debris Removal**: Litter/Debris to be removed and disposed of weekly.

2. **Parking lots and on-site driveways:** Sweep at least four (4) times per year and on a more frequent basis depending on sanding operations. All resulting sweepings shall be collected and properly disposed of offsite in accordance with local, state, federal, and other applicable requirements.

3. **Catch basins, yard drains, trench drains, manholes and piping:** Inspect four (4) times per year and at the end of foliage and snow-removal seasons. These features shall be cleaned four (4) times per year. or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the catch basin or underground system. Accumulated sediment and hydrocarbons present must be removed and properly disposed of off-site in accordance with local, state, federal, and other applicable requirements.

4. **Riprap apron / Scour Hole:** Riprap and scour holes should be checked at least annually and after every major storm event (generally equal or greater to 3.0 inches in 24 hours) for displaced stones, slumping, and erosion at edges, especially downstream or downslope. If the riprap is damaged, it should be repaired before further damage can take place. Note and

repair any erosion, stone displacement or low spots in the areas. Woody vegetation should be removed from the riprap annually.

5. **Water Quality Unit (Proprietary Separator):** Follow manufacturer's recommendations (attached).

6. **Infiltration Basin**: Preventative maintenance after every major storm event during the first three (3) months of operation and at least twice per year thereafter. Inspect structure and pretreatment BMP to ensure proper operation after every major storm event (generally equal or greater to 3.0 inches in 24 hours) for the first three months. Mow the buffer area, side slopes and basin bottom if grassed floor, rake if stone or sand bottom, remove trash and debris, remove grass clippings and accumulated organic matter. Any sediment removed shall be disposed of in accordance with local, state, federal, and other applicable requirements.

7. **Extended Dry Detention Basin**: Inspect the extended dry detention basin at least twice a year, including inspection of the outlet structure for evidence of clogging or outflow release velocities greater than the design flow. Mow the upper-stage, side slopes, embankment, and emergency spillway at least twice a year, and remove trash and debris twice a year. Remove sediment from the basin at least once every five (5) years. Any sediment removed shall be disposed of in accordance with local, state, federal, and other applicable requirements.

8. **Landscape Replacement/ restoration of Eroded Areas**: Landscaped areas shall be monitored, maintained and mulched as necessary, but at a minimum of four per year. Plants shall be replaced as needed.

All components of the stormwater system will be accessible by the owner or their assignee.

STORMWATER MANAGEMENT SYSTEM

POST-CONSTRUCTION INSPECTION REPORT

LOCATION:

C.R. Klewin
23, 29 & 39 Military Highway
Gales Ferry/Ledyard, CT

RESPONSIBLE PARTY:

TBD

NAME OF INSPECTOR:	INSPECTION DATE:
Note Condition of the Following (sediment depth, debris, standing water, damage, etc.):	
Catch Basins:	
Discharge Points/ Flared End Sections / Rip Rap:	
Infiltration Basin:	
Water Quality Units:	
Other:	

Note Recommended Actions to be taken on the Following (sediment and/or debris removal, repairs, etc.):
Catch Basins:
Discharge Points / Flared End Sections / Rip Rap:
Infiltration Basin:
Water Quality Units:
Other:
Comments:

STORMWATER INSPECTION AND MAINTENANCE LOG FORM

23, 29 & 39 Military Highway
Gales Ferry/Ledyard, CT

Stormwater Management Practice	Responsible Party	Date	Maintenance Activity Performed