Bull Run TREATMENT PROJECTS | Filtration

Technical Memorandum

Subject:	Stormwater Drainage Report
PWB Project #s:	W02229
Date:	September 22, 2022
To:	David Peters, Program Director Portland Water Bureau
From:	Rafael Gaeta, PE Principal Engineer Emerio Design
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EXPIRES: 6-30-2024

Emerio Project Number: 0596-003

City of Portland Permit Numbers: TBD

I hereby certify that this Stormwater Management Report for this project has been prepared by me or under my supervision and meets minimum standards of the Multnomah County Design and Construction Manual (MCDCM) and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me.

This report was prepared in support of the City of Portland Water Bureau's Bull Run Filtration Facility Site Project land use applications in Multnomah County and reflects the current status of the project design, which is approximately 60% complete as of the date of this report. This design is subject to change and has been prepared for the specific purpose of addressing conformance of the project to the Multnomah County land use requirements as expressed in the Multnomah County Code.

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List of Abbreviations

BES	Bureau of Environmental Services
CAD	Computer-Aided Design
CN	Curve Number
COP	City of Portland
CSSWF	Columbia South Shore Wellfield
EPA	Environmental Protection Agency
GIS	Geographical Information System
MCDCM	Multnomah County Design and Construction Manual
NCRS	Natural Resources Conservation Service
NOAA	National Oceanic and Atmospheric Administration
O&M	Operations and Maintenance
OHA	Oregon Health Authority
PAC	Presumptive Approach Calculator
PDF	Portable document format
POD	Point of Discharge
PWB	Portland Water Bureau
RWP	Raw Water Pipe
SBUH	Santa Barbara Urban Hydrograph
SDFDM	City of Portland 2020 Sewer and Drainage Facilities Design Manual
SWMM	City of Portland 2020 Stormwater Management Manual
TR	Technical Report

References

Multnomah County, Design and Construction Manual

City of Portland, 2020 Stormwater Management Manual

City of Portland, 2020 Sewer and Drainage Facilities Design Manual

City of Portland, 2020 Source Control Manual

Oregon Department of Environmental Quality, Section 401 Water Quality Certification Post-Construction Stormwater Management Plan Submission Guidelines, January 2021.

Oregon 2018/2020 Integrated Report

2018/2020 Water Quality Report and List of Water Quality Limited Waters, dated April 2020 prepared by the Oregon Department of Environmental Quality.

Urban Hydrology for Small Watersheds TR-55, dated June 1986.

1.0 Introduction

1.1 Project Description

The water supply for the City of Portland includes two sources: the Bull Run Watershed and the Columbia South Shore Wellfield (CSSWF). In addition to the City of Portland, the Portland Water Bureau (PWB) provides potable water to 19 wholesale customers. The Bull Run Watershed, located east of Portland in the Mount Hood National Forest, is the primary source of water. This 102-square-mile protected watershed is managed by the U.S. Forest Service in cooperation with the PWB. Two dam structures within this watershed create two surface water reservoirs with a combined storage capacity of 16.5 billion gallons. This water is transported from the lower dam near the headworks site to the Portland Metro area via three large-diameter pipelines.

The Bull Run supply is currently an unfiltered water supply and has consistently met the filtration avoidance criteria under the Surface Water Treatment Rule for source water quality, watershed management, and disinfection. Before distribution, the supply is treated with free chlorine for primary disinfection, ammonia to form chloramines as a residual disinfectant, and sodium hydroxide for corrosion control. The PWB supplements the Bull Run source as needed with groundwater withdrawn from the CSSWF. The CSSWF is primarily used as an emergency backup. It is typically used during turbidity events in the Bull Run Watershed and for summer supply augmentation.

In 2006, the U.S. Environmental Protection Agency (EPA) required water utilities to treat for the pathogen Cryptosporidium. From 2012 to 2017, the Oregon Health Authority (OHA) issued a variance from this rule subject to a set of conditions that included exhibiting an exceptionally low concentration of Cryptosporidium in ongoing raw water sampling. However, on May 19, 2017, OHA issued an order revoking Portland's treatment variance. In August 2017, the Portland City Council voted to build the Bull Run Filtration Facility to meet the treatment requirements for Cryptosporidium. On December 18, 2017, OHA and the PWB signed a bilateral compliance agreement establishing a compliance schedule for meeting the EPA requirements.

The Bull Run Water Treatment Project was established to meet the compliance schedule and is a multi-year drinking water infrastructure program consisting of a new drinking water filtration facility and associated new raw and finished water pipelines. This report is developed for the Filtration Facility. The facility will have a capacity of 135 mgd. The facility location is a 95-acre site owned by the PWB, east of Gresham, Oregon.

1.2 Purpose of this Report

The purpose of this report is to evaluate the existing and proposed stormwater conditions for the Bull Run Filtration Facility including Carpenter Lane and the southern emergency access road. This report includes an analysis and discussion on the following:

- City of Portland's Infiltration and Discharge Hierarchy
- Site Specific Infiltration Testing and Rates
- Stormwater Quality Treatment
- Stormwater Flow Control
- Analysis of surface stormwater for both Run-On and Run-Off conditions
- Groundwater management including groundwater collected from sub-slab drainage pipes
- Stormwater management of Carpenter Lane
- Stormwater management of the emergency access road

1.3 Project Location

The proposed project is located south of SE Carpenter Lane, Multnomah County, Oregon. Currently, the existing site is a nursery crop production facility.

1.4 Property Zoning

This project area is zoned for Exclusive Farm and Forest Use.

1.5 Agency Stormwater Criteria

This project lies within two jurisdictions: Multnomah County and Clackamas County.

Multnomah County is the governing agency for the Bull Run Filtration Facility and Carpenter Lane. Both stormwater flow control and stormwater quality treatment are required and shall be designed in accordance with the Multnomah County Design and Construction Manual (MCDCM), Section 5. Drainage. The MCDCM follows the City of Portland 2020 Stormwater Management Manual (SWMM) for stormwater quality treatment (per MCDCM Section 5.1.3. Water Quality Design Standards). Stormwater flow control is designed per MCDCM Section 5.1.2. Water Quantity Design Standards which match the SWMM Section 2.5.3.2. Designing for Flow Control Requirements.

The emergency access road from the pipeline shaft south to Bluff Road is located within Clackamas County. Both stormwater treatment and stormwater quantity are required and are designed in accordance with the Stormwater Standards Clackamas County Service District No.1, July 1, 2013.

1.6 Site Specific Stormwater Design Requirements and Assumptions

Stormwater management requirements include infiltration, water quality treatment, and flow control. The following section includes design assumptions for the Bull Run Filtration Facility Improvements. Onsite stormwater management is required to the maximum extent possible depending on site-specific conditions. The following is a discussion of the site-specific parameters and design assumptions.

Hydromodification is the alteration of the natural flow of water, timing, frequency, and volume of runoff from the land surface as a result of urbanization. Hydromodification results in an increase in runoff energy and frequency in the receiving water bodies. This increase in energy leads to the degradation of the natural stream and wetland systems through incision, bank erosion, and sedimentation. The flow control requirements in this stormwater management report are designed to minimize these impacts in accordance with Section 1.3.5. Level 2 Separated Storm System Requirements of the City of Portland SWMM.

1.6.1 Infiltration and Discharge Hierarchy

The City of Portland has three Levels of hierarchy for the disposal and conveyance of stormwater. The city ranks the use of these systems for stormwater management in Section 1.3.3. Infiltration and Discharge Hierarchy and Table 1-2. Summary of Infiltration and Discharge Hierarchy Stormwater Management Requirements of the SWMM, as follows:

Level 1 – Full Onsite infiltration
Level 2 – Offsite Discharge to the Separate Stormwater System
Level 3 – Combined sewers that convey water to the wastewater treatment plant

Infiltration Rates

The Final Geotechnical Data Report Technical Memorandum Dated July 15, 2022 (prepared by McMillan Jacobs Associates), Attachment K Preliminary Geotechnical Data Report (prepared by Rhino One) discusses the field infiltration testing related to stormwater design. Per section 2.4 of the Preliminary Data Report prepared by Rhino One the infiltration rates are low, and infiltration is not feasible at this site. Table 1. Geotechnical Measured Infiltration Rates show extremely low infiltration rates. The measured infiltration rates range from 0.012 in/hr to 0.86 in/hr as noted in the boring logs and Table 4 of the Geotechnical Data Report prepared by Rhino One.

Table 1. Geotechnical Measured Infiltration Rates

Boring Number	Infiltration Rate (in/hr)	Nearest Stormwater Pond
WTP-B-06	0.3	D
WTP-B-10	0.11	D
WTP-B-11	0.31	D
WTP-B-12	0.012	D
WTP-TP-02	0.86	A
WTP-TP-04	0.29	A
WTP-TP-06	0.18	C
WTP-TP-08	0.36	C
WTP-TP-09	0.41	C
WTP-TP-10	0.13	n/a
WTP-TP-11	0.32	n/a

Discharge Hierarchy

As the onsite infiltration measured rate is extremely low, it has been deemed not practical for this project.

This project is using Hierarchy Level 2 - Offsite Discharges to the Separated Stormwater System, Johnson Creek. The project is also assuming that there is no infiltration within the stormwater facilities due to the extremely low infiltration rates shown in the geotechnical data and engineering reports. The geotechnical evaluation did not recommend the use of infiltration-based facilities and is deemed not practical for this project as a stormwater management strategy.

1.6.2 Stormwater Facility Selection, Sizing, and Design

The City of Portland allows the use of three design approaches for stormwater facilities being:

- Simplified Approach
- Presumptive Approach
- Performance Approach

This project will use both the Presumptive Approach and the Performance Approach. The Presumptive Approach is used for sizing the stormwater planters and basins, while the Performance Approach is used for sizing the flow control ponds and grassy swales.

1.6.3 Stormwater Quality Treatment

Per Table 1-2. Summary of Infiltration and Discharge Hierarchy Stormwater Management Requirements of the SWMM this project is Hierarchy Level 2 in the discharge hierarchy as discussed above in Section 1.6.1. Therefore, the following stormwater quality treatment standards apply.

Pollution reduction required:

- Achieve 70% TSS removal from the runoff resulting from 90% of the average annual rainfall.
- Treat 80% of the average annual rainfall.
- Use a pollution reduction facility that will reduce pollutants of concern in watersheds with a TMDL or on DEQ's 303(d) list of impaired waters.

Per the Oregon 2018/2020 Integrated Report and the 2018/2020 Water Quality Report and List of Water Quality Limited Waters, dated April 2020, Johnson Creek has TMDL and 303(d) listed.

TMDLs:

- Bacteria
- Temperature
- DDT 4, 4'; DDD4, 4'; DDE 4,4'

303(d):

- Dissolved Oxygen
- Iron
- Endosulfan
- Chlordane
- Polychlorinated Biphenyls (PCBs)
- Polycyclic Aromatic Hydrocarbons (PAHs)

From the City of Portland SWMM Table 2-8. Summary of How Requirements are Met, both the Presumptive and Performance Approaches are allowed to be used with Hierarchy Level 2.

This project is proposing to use multiple facilities to achieve the water quality treatment requirement by installing Planters, Basins, and Grassy Swales. These facilities are allowed per City of Portland SWMM Table 2-9. Summary of Generally Allowed Stormwater Facilities.

The proposed planters and basins are designed using the Presumptive Approach Calculator (PAC) and meet the requirements of Section 2.5.2. Presumptive Approach. Due to limited space between the buildings, paved access roads, and underground piping, these facilities will be designed for stormwater quality treatment only.

Per DEQ Section 401 Water Quality Certification Post Construction Stormwater Management Plan Section E.1.1, the water quality storm event depth is the site's 2-year, 24-hour precipitation. Per Table 3 below the rainfall depth is 2.8 inches. The water quality design storm factor is 0.5 for this site, resulting in a water quality design storm depth of 1.4 inches. This is less than the rainfall depth that is used in the City of Portland's PAC, which is 1.61 per section A.2.1 Water Quality Treatment Volume goal in the SWMM.

The grassy swales are a rate-based facility and will be designed to meet the requirements of City of Portland SWMM Table 2-12. Water Quality Storm and Section 3.2.5.5. Grassy Swales.

The proposed development will contribute runoff to Johnson Creek. As such, pollution reduction will be provided for all runoff from proposed impervious areas by routing the runoff through either basin, flow-through planter, or grassy swale facilities. The basins and flow-through planters will filter out the relevant pollutants via percolation of runoff through the vegetation, growing medium, and gravel within the facilities. The grassy swales will filter out the relevant pollutants by routing runoff through the densely vegetated surfaces of the facilities. The proposed vegetation will remove pollutants as runoff slowly flows to the downstream ends of the facilities.

1.6.4 Stormwater Flow Control

This project is proposing to use five Dry Detention Ponds, one sloped basin, and an Ecoroof to achieve the stormwater flow control requirements. These facilities are allowed per the City of Portland SWMM Table 2-9. Summary of Generally Allowed Stormwater Facilities.

The proposed ponds are designed using the Santa Barbara Urban Hydrograph Method (SBUH) with an NRCS Type IA synthetic rainfall distribution. The calculations were executed with the computer program HydroCad. This method was used to generate site runoff hydrographs, determine peak flows, and perform pond routing analysis.

The ponds are designed using the Performance Approach meeting the requirements of the City of Portland SWMM Section 2.5.3. Performance Approach and Sub-section 2.5.3.2. Designing for Flow Control Requirements, per Table 2 below:

Table 2. Flow Control Requirements*

Design Storm Event	24-hr Rainfall Depth (inches)**	Requirements by the Receiving System
2 Year	2.8	Limit 1/2 the 2-year post-development peak flow to 1/2 the 2-year pre-development peak flow
5 Year	3.4	Do not exceed pre-development peak flows
10 Year	3.8	Do not exceed pre-development peak flows
25 Year	4.5	Do not exceed pre-development peak flows

*Table 2 is a partial table taken from the SWMM Table 2-13.

**Rainfall depths are taken from Table 3 below.

Rainfall Data

The 24-hour rainfall depths used in the hydrographs to determine the peak stormwater runoff rates for this analysis were obtained from NOAA ATLAS 2, Volume X, Isopluvial Maps Figures 25 to 30 summarized in Table 3 below.

Table 3. 24-hour Rainfall Depths

Design Storm Event	24-hr Rainfall Depth (inches)
2 Year	2.8
5 Year	3.4
10 Year	3.8
25 Year	4.5
50 Year	5.0
100 Year	5.5

These rainfall depths are based on the physical location of the project. As such, they do not match the City of Portland rainfall depths listed in Table A-9. 24-Hour Rainfall Depths at Portland Airport of the SWMM.

Existing Hydrologic Soil Groups

The existing soils on-site are as follows (Per NRCS Soil Maps in Attachment B):

- Cazadero Silty Clay Loam, Hydrologic Soil Group C
- Wollent Silt Loam, Hydrologic Soil Group C/D
- Borges Silty Clay Loam, Hydrologic Soil Group D
- Haplumbrepts, Hydrologic Soil Group B

The curve numbers discussed below are based on this hydrologic soil group.

Curve Numbers

The existing site landscape character is agricultural and has served as a nursery / tree farm for decades. Tree starts are planted tightly in rows and harvested as very young (estimated at 1/2-inch caliper/6-foot height average) bare root stock. The crop rows are oriented to drain as quickly as possible that results in surface runoff to the low points of the site. Much of the site does not have developed groundcover vegetation and has a significant amount of exposed soil.

The proposed landscape will include permanent native grassland seeding with some locations being populated by trees and understory plants appropriate for the surrounding context. This area will be mown infrequently, maybe two times a year as a management strategy. Inside the secure facility, the landscape will be more of a campus style development with maintained and irrigated landscape beds integrated with the proposed buildings and parking areas to meet development codes and provide a hospitable environment. The proposed landscape outside the secure area to the west, south and east of the facility will include the same permanent native grassland seeding with scattered groupings of native oaks and pines with associated understory plants. Some portions of this area will be replanted similar to adjacent forested areas which will include large native evergreen trees and native understory plantings.

Vegetated stormwater facilities will be integrated into the landscape design inside the secure area and outside it to connect to the lowest points of the site where stormwater eventually exits. The vegetated facility types include stormwater planters and basins, flow control ponds and planted swales to convey runoff to the low points in a controlled manner. Stormwater facilities will be planted in a manner that matches the visual character of the immediate surrounding landscape while introducing more significant permanent vegetation.

Pre-developed Curve Numbers

The existing site primarily consists of hydrologic soil group (HSG) of C.

Using the TR-55 Urban Hydrology for Small Watersheds, Table 2-2b. Runoff Curve Numbers for Cultivated Agricultural Lands, cover type of Row Crops, having a treatment of straight rows and crop residue cover in good condition, a curve number of 82 has been selected for the entire site. This land coverage is consistent across the entire site. This curve number is being used in the hydrologic flow calculations to determine the existing stormwater flows that occur on the site.

Developed Curve Numbers

During construction this site will experience significant disturbance, causing the existing soil profile to be altered and consolidated. Construction activities include mass grading and compaction, utility installation, building construction and roadway construction. This consolidation will also affect the existing soils infiltration rate. As a result of this disturbance, the developed curve numbers were selected using a HSG of D. This selection is based on TR-55 Urban Hydrology for Small Watersheds, Appendix A, Disturbed Soils Profiles.

Using the TR-55 Urban Hydrology for Small Watersheds, Table 2-2a. Runoff Curve Numbers for Urban Areas, with cover type of impervious paved parking lots, roofs, driveways, etc., a curve number of 98 has been selected. This CN has been applied for all impervious areas of the site.

Using the TR-55 Urban Hydrology for Small Watersheds, Table 2-2a. Runoff Curve Numbers for Urban Areas, Open Space (lawns, parks, golf courses, cemeteries, etc.,), good condition (grass cover > 75%), a curve number of 80 was selected. This CN has been applied to the landscape areas within drainage basins A, B, C1, C2, D, E and F as well as the cross-property flows from subbasins 1A and 2A. Refer to Figure 2 Post Construction Stormwater Drainage Basin Map Cross-Property and Figure 3 Site Stormwater Drainage Basin Map Flow Control for locations.

These curve numbers are being used in the hydrologic flow calculations to determine the developed conditions stormwater flows that occur on the site.

2.0 Existing and Pre-Developed Stormwater Drainage Conditions

2.1 Description of Existing Stormwater Drainage Conditions

This site is an existing nursery crop production facility and contains no existing storm drainage infrastructure. This site is bounded by dirt access roads and several dirt access roads are located within the project's limits. This site is bisected by a ridge line where the majority of the property generally slopes to the west or southwest. There is a small portion from the ridge line that flows southeasterly. (See Figure 1 – Existing Stormwater Drainage Basin Map)

Subbasin 1 is located at the northwest corner of the property wedged between SE Carpenter Lane and a private gravel access road. The existing stormwater drains westerly across the property line at an angle onto the adjacent farmland. The flows are partially by sheet flow and partially by shallow concentrated flow. The shallow concentrated flows are collected by an existing 8" PVC culvert that crosses the gravel road at a low point. The culvert drains to the west and provides stormwater to an existing ditch as well as an unnamed tributary of Johnson Creek.

Subbasin 2 is the central basin encompassing the majority of the site. The basin extends from the east side of the property (being an existing gravel access road) to the west side of the site. The existing stormwater drains to a low point on the west property line. The flows are partially by sheet flow and partially by shallow concentrated flow. This low point is the same 8" PVC culvert described above.

Subbasin 3 is located at the southwest corner of the property wedged between the west and south property lines. The west and south property lines consist of a dirt access road. The existing stormwater drains across both the west and south property lines at an angle eventually draining to the headwaters of Johnson Creek. Johnson Creek is approximately 100 feet southwest of the basin, and flows are partially by sheet flow and partially by shallow concentrated flow.

Subbasin 4 is located on the south side of the property. The south property line consists of a dirt access road where the existing stormwater drains across the access road at an angle eventually draining to the headwaters of Johnson Creek. Johnson Creek is approximately 100 feet southwest of the basin, and flows are partially by sheet flow and partially by shallow concentrated flow.

Subbasin 5 is located at the southeast corner of the property wedged between the east and south property lines. The east and south property lines consist of a gravel access road. The existing stormwater drains easterly

to a low point on the east property line where it crosses the existing gravel road onto an adjacent property. The stormwater continues to flow east where it disperses into an existing forested area.

The cross-property stormwater flows are discussed in Section 4 Cross-Property Drainage.

2.2 Existing Stormwater Points of Discharge

The existing stormwater runoff occurs via sheet flow and shallow concentrated and/or drainage ditches. There are three points of discharge from the site, identified in Figure 1.

Existing Point of Discharge #1 is located on the west side of the site. It is a low-lying area where the shallow concentrated flows are collected by two existing 8" PVC culverts that crosses the gravel road at a low point to an existing drainage ditch. The culvert drains to the west and provides stormwater to the existing ditch as well as an unnamed tributary of Johnson Creek. These existing pipes are full of debris and need to be cleaned prior to connecting to them. Existing subbasins 1 and 2 drain to this point of discharge.

Existing Point of Discharge #2 is located along southwest portion of the site, draining southwesterly to a vegetated area being the headwaters of Johnson Creek. Existing subbasins 3 and 4 drain to this point of discharge.

Existing Point of Discharge #3 is located on the east side of the site. The existing stormwater drains easterly to a low-lying area where it crosses the existing gravel road onto an adjacent property. The stormwater continues to flow east where it disperses into an existing forested area. Existing subbasin 5 drains to this point of discharge.

SE Carpenter Lane slopes westerly to SE Cottrell Road. There are no defined drainage ditches or stormwater infrastructure within the right-of-way of SE Carpenter Lane. The existing runoff sheet flows into the adjacent farm fields.

This site consists of five existing subbasins. See Figure 1 Existing Stormwater Drainage Basin Map.

3.0 Proposed Post Construction Stormwater Drainage

3.1 Description of Proposed Stormwater Drainage Conditions

The proposed improvements include the construction of buildings, above-ground tanks, underground tanks, loading areas, and storage areas. These newly generated impervious surfaces will drain to trap-type catch basins, a piped conveyance system, grass-lined drainage ditches, and detention ponds having a flow spreader outfall system.

The mitigated portion of the site are the portions of the site that provide stormwater quality and stormwater flow control prior to discharging off-site and one of three Points of Discharge. These areas drain via surface flow to a stormwater quality facility which in turn is collected by a conveyance system and routed to one of five Dry Detention Ponds. Refer to Figure 3 Site Stormwater Drainage Basin Map Flow Control and Figure 4 Site Stormwater Drainage Map Water Quality.

The non-mitigated areas are areas where cross-property flows occur post construction, along the west property line and a portion of the south property line. These flows are not managed by flow control or a water quality facility. These areas do not contain impervious surface and consist of landscaping. See Figure 2 Post Construction Stormwater Drainage Basin Map Cross-Property, which is discussed below in section 4 Cross-Property Drainage.

The stormwater from Carpenter Road is being routed on-site to a proposed grassy swale along the west property line where it is treated for water quality. The grassy swale is collected and drains to an on-site flow splitter. This flow splitter controls the amount of stormwater that drains to the Point of Discharge #1 or Point of Discharge #2. This stormwater is not managed for flow control. See Section 3.4 Site Points of Discharge Locations discussing total flows discharging off site.

The emergency gravel access road (Road B) extends from the southeast corner of the filtration site south to SE Bluff Road. Road B is bisected by a ridge line, as can be seen in Figure 3 and 4. The north section of Road B drains north, which utilizes the interface of the shoulder and existing farmland as the channel. It eventually drains to a grassy swale along the south side of Road B where the stormwater will be treated for water quality in a grassy swale. This grassy swale is along the south side of Road B and drains southwesterly to Pond D. Pond D provides the required stormwater flow control.

The south section of Road B (south of the ridge line) to the Raw Water Pipe Shaft, drains south within a new drainage way that utilizes the interface of the shoulder and existing farmland as the channel. The stormwater drains south to a proposed grassy swale, which drains to a dry detention pond adjacent to Road E.

3.2 On-Site Stormwater Quality Treatment

Treatment of stormwater from the site's buildings and roadways is being proposed for all the site's impervious areas. The treatment will be provided by a few different facilities, specifically vegetated planters, stormwater basins, grassy swales, and an eco-roof (See Figure 4. Site Stormwater Drainage Basin Map Water Quality). These facilities are for water quality treatment only--they are not sized to provide water quantity control. The flow from these facilities will be captured and conveyed to one of the four on-site dry detention ponds, as discussed below in Section 3.5. On-Site Stormwater Flow Control. The treatment areas are divided up by areas associated with the adjacent buildings. In Figure 4, the golden lines are the catchment areas draining to a specific facility, assumed to be 100% impervious surfaces. Table 4 below is a summary of the water quality treatment facility and stormwater flows treated in each catchment area.

The stormwater runoff from the Over-Flow Basin and perimeter security roads will be managed by vegetated filter strips.

The water quality facilities have been designed using the City of Portland's Presumptive Approach Calculator. The calculations are in Attachment D: Water Quality Treatment Calculations.

Table 4. Proposed Stormwater Quality Facility Summary						
Facility #	**Contributing Impervious Area (sf)**	**Facility Type(ft)**	**Bottom Area (sf)**	**Blended Soil Depth (in)**	**Rock Storage Depth (in)**	**Over Flow Depth (in)**
1A	31,518	Basin	1,296	18	12	12
11A	17,535	Planter	1,440	18	12	12
11B	40,382	Planter	640	18	12	12
11C	8,778	Planter	728	18	12	12
12A	33,262	Planter	728	18	12	12
12B	14,687	Planter	360	18	12	12
12C	22,428	Basin	508	18	12	12
40A	93,777	Ecoroof	0	0	0	0
65A	11,832	Planter	568	18	12	12
70A	36,357	Planter	500	18	12	16
70B	15,839	Planter	270	18	12	12
81A	58,265	Planter	1,350	18	12	12
F1	17,024	Sloped Basin	3,108	36	18	12
Total	401,684					12
Grassy Swales						
Facility #	**Treatment Area (sf)**	**Treatment Flow (cfs)**	**Length (ft)**	**Slope (%)**	**Flow Depth (in)**	**Velocity (ft/sec)**
Area 51	23,459	0.09	100	1	4	0.08
Road A1	21,086	0.08	100	1	4	0.08
Road A2	19,176	0.08	100	1	4	0.08
Road B1	48,930	0.19	100	1	4	0.18
Road B2	19,160	0.08	100	1	4	0.07
Road F1	14,880	0.06	100	1	4	0.05
Road F2	23,639	0.09	100	1	4	0.08
Carpenter Lane	13,539	0.05	100	1	4	0.05
Total	183,869					
Vegetated Filter Strips						
Facility #	**Treatment Area (SF)**			**Width (ft)**		
1	11,277			20		
2	17,228			20		
Total	28,505					

3.3 On-Site Stormwater Flow Control

Hydrologic analysis of the mitigated site area in its proposed condition was performed as part of this study, see Figure 3 Site Stormwater Drainage Basin Map Flow Control for limits of the mitigated site. The mitigated site is the portion of the site that is to be managed to provide both water quality and flow control prior to being discharged off site. The mitigated site was analyzed using the SBUH hydrological model with an NRCS Type 1A synthetic rainfall distribution. The 24-hour rainfall depths used for the analysis shown in Table 1 above were used in the calculations.

This project is proposing to use five Dry Detention Ponds (being A, B, C, D and E), one sloped basin, and an Ecoroof to achieve the stormwater flow control requirements. Drainage Basins C1 and C1 drain to Pond C. These facilities are allowed per the City of Portland SWMM Table 2-9. Summary of Generally Allowed Stormwater Facilities. See Figure 3 Site Stormwater Drainage Basin Map Flow Control. Table 6 below is a summary of the dry detention ponds' performance (See Attachment F: Hydrologic Analysis of Post Developed Conditions and Pond Routing Calculations).

Within drainage basin D, there is an Ecoroof that has been deducted from the overall basin area, as it provides both water quality and flow control.

Basin F, consisting of a section of Road E and adjacent landscaping drains to a sloped basin and will manage both water quality and flow control. The sloped basin will have check dams every 20 feet. The stormwater basin was designed using the PAC.
Basin F summary:

- 3 feet wide bottom
- 3:1 side slopes
- Check dams at 20' o.c.
- 36" topsoil depth
- 18" storage rock depth, 4' wide
- 1% running slope
- 420 feet in length

There is one eco-roof proposed in this project, located on Building 40. Per City of Portland's SWMM Table 2-9. Summary of Generally Allowed Stormwater Facilities the eco-roof can provide both stormwater quality treatment and stormwater flow control. Per Table 2-10. Simplified Approach Sizing and Design the sizing factor is 1, meaning the required area of the eco-roof is 1 times the impervious (or roof) area.

Table 5. Area and Composite Curve Number Summary

Drainage Basin	Total Area (SF)	Impervious Area (SF)	Pervious Area (SF)	Ecoroof (SF)	CN	CNp	CNecoroof	Composite CN
A	358,532	168,081	190,451	n/a	98	80	n/a	88
B	293,369	145,197	148,172	n/a	98	80	n/a	89
C1	104,630	46,105	58,525	n/a	98	80	n/a	88
C2	581,701	20,053	561,648	n/a	98	80	n/a	81
D	466,271	91,123	281,371	93,777	98	80	61	81
E	600,189	19,160	581,029	n/a	98	80	n/a	83

Curve number selection is discussed in section 1.6.4.

3.3.1 Time of Concentration

Stormwater runoff travels through a watershed as sheet flow, shallow concentrated flow, open channel flow, or a combination of these flows. This project calculates the pre-developed time of concentration using sheet flow for the first 300 feet of travel and shallow concentrated flow for the remaining travel distance to one of the three existing points of discharge. The calculations are based on the methods and formulas described in TR-55-Chapter 3 Time of Concentration and Travel Time.

The minimum time of concentration for all the post development stormwater basins of 5 minutes was used in the calculations for determining the peak runoff rates, per City of Portland's SWMM Section 1.3.5 Level 2: Separated Storm System Requirements.

3.3.2 Dry Detention Ponds

This site has five dry detention ponds (A, B, C, D, and E) that are described below. The stormwater is treated for water quality by separate features and is discussed in Section 3.2. On-Site Stormwater Quality Treatment.

- Pond A is located on the north side of the site adjacent to the Maintenance Building.
- Pond B is located on the east side of the site adjacent to the Wash-Water Clarification structure.
- Pond C is located on the south side of the site, east of the Overflow Basins.
- Pond D is located on the west side of the site, west of Building 16 North Electrical Complex.
- Pond E is located at the southeast corner of the site.

The dry detention ponds are designed with 1 foot of freeboard. The flow out of each pond will be controlled by a flow control manhole. The flow control manhole will have an overflow riser for larger storm events to bypass the pond.

Table 6. Pond 'A' Performance Summary

Storm Event (year)	Pre-Developed Flow Rate (cfs)	Developed Flow Rate (cfs)	Allowable Release Rate (cfs)	Actual Release Rate (cfs)	Pond Water Elev (ft)	Pond Storage (cf)
2	1.28	3.49	0.64*	0.62	709.47	13,662
5	1.92	4.57	1.92	1.16	709.71	16,228
10	2.37	5.32	2.37	1.53	709.88	18,012
25	3.20	6.66	3.20	2.06	710.29	22,505

Lower orifice 3.4" dia, IE = 705.61

Upper orifices one 3" h X 16" w, IE= 709.47

*The allowable release rate is limited to 50 percent of the 2-year pre-Developed flow rate.

Table 7. Pond 'B' Performance Summary						
Storm Event (year)	Pre-Developed Flow (cfs)	Developed Flow (cfs)	Allowable Release Rate (cfs)	Actual Release Rate (cfs)	Pond Water Elev (ft)	Pond Storage (cf)
2	1.38	2.93	0.69*	0.69	709.30	7,689
5	2.06	3.82	2.06	1.30	709.60	9,694
10	2.54	4.43	2.54	1.62	709.81	11,146
25	3.42	5.53	3.42	2.09	710.26	14,477

Lower orifice 3.6" dia, IE = 705.50

Upper orifices one 3" h X 14" w, IE= 709.30

*The allowable release rate is limited to 50 percent of the 2-year pre-developed flow rate

		Table 8. Pond 'C' Performance Summary						
Storm Event (year)	Pre-Developed Flow (cfs)	Developed Flow (cfs)	Underdrain Pumps (cfs)	Total Inflow (cfs)	Allowable Release Rate (cfs)	Actual Release Rate (cfs)	Pond Water Elev (ft)	Pond Storage (cf)
2	3.67	3.10	0.8	3.87	1.84*	1.82	704.69	13,032
5	5.45	4.57	0.8	5.34	5.45	2.52	704.96	18,265
10	6.71	5.63	0.8	6.39	6.71	2.92	705.15	22,005
25	8.99	7.57	0.8	8.37	8.99	3.53	705.56	30,484

Lower orifice 5.25" dia, IE = 702.00

Upper orifice onw 3" h X 16" w, IE= 704.69

* The allowable release rate is limited to 50 percent of the 2-year pre-developed flow rate.

Table 9. Pond 'D' Performance Summary						
Storm Event (year)	Pre-Developed Flow (cfs)	Developed Flow (cfs)	Allowable Release Rate (cfs)	Actual Release Rate (cfs)	Pond Water Elev (ft)	Pond Storage (cf)
2	1.81	2.83	0.91*	0.88	694.08	5,373
5	2.70	3.91	2.70	1.60	694.40	7,168
10	3.33	4.66	3.33	2.00	694.66	8,673
25	4.47	6.02	4.47	2.58	695.20	12,096

Lower orifice 4.3" dia, IE = 691.00

Upper orifice one 3" h X 15" w, IE= 694.08

* The allowable release rate is limited to 50 percent of the 2-year pre-developed flow rate

Table 10. Pond 'E' Performance Summary						
Storm Event (year)	Pre-Developed Flow (cfs)	Developed Flow (cfs)	Allowable Release Rate (cfs)	Actual Release Rate (cfs)	Pond Water Elev (ft)	Pond Storage (cf)
2	2.74	3.02	1.37*	1.36	713.71	6,350
5	4.10	4.56	4.10	2.54	713.94	8,718
10	5.07	5.65	5.07	3.32	714.09	10,306
25	6.82	7.64	6.82	4.41	714.40	13,991

Lower orifice 7.75" dia, IE = 713.0

Upper orifice two 3" h X 16" w, IE= 713.71

* The allowable release rate is limited to 50 percent of the 2-year pre-developed flow rate.

3.4 Site Points of Discharge Locations

The site has three proposed Points of Discharge as described in Section 2.1 Description of Existing Stormwater Drainage Conditions above. See Figure 3 Site Stormwater Drainage Basin Map Flow Control for the following discussion.

The existing points of discharge will be maintained and utilized for this project as described below. The site's post developed stormwater flows are equal or less than the pre-developed stormwater flows, as shown in Table 11 below.

The flows that drain to the Points of Discharge #1 and #2 are controlled by a flow splitter. These flows consist of mitigated on-site flows from the flow control ponds (Ponds A, B, C, D and sloped basin F1), the intercepted cross-property flows and unmitigated cross-property flows. The flow splitter contains an internal weir to provide variable flows to the Points of Discharge #1 and #2.

Proposed Point of Discharge #1 is located on the west side of the site. There are two existing 8" PVC culverts that cross the existing access road. Only one will be used for this project. This discharge location is not the primary discharge for the site. This discharge is to maintain and provide stormwater to the existing downstream storm system within the flow capacities of the existing culverts. This Point of Discharge receives stormwater from the site conveyance system by means of a flow splitter. The flow splitter will provide variable flow in the range of 4 to 7 cfs. See Table 11 for flow summary.

The primary discharge location for this site is Proposed Point of Discharge #2, being Flow Spreader No. 1. It is located in the southwest corner of the site located between the sites Overflow Basins and the SEC Zone for water resources. The structure is a concrete channel with the downhill side lower than the uphill side. The structure has a bottom that will slope to a low point. This low point will have a drain with a 2" pipe to daylight, that will dewater the structure. The top of the facility is flat to provide uniform flow over the top of the structure, which flows to a layer of drain rock and a landscaped buffer area for erosion control. See Attachment H: Outfall Flow Spreader Calculations and Details. The structure is:

- 175 feet in long
- Structure bottom running slope is 0.25%.
- Structure top is flat
- Design flow 15 cfs
- Flow depth is 0.09 feet
- Velocity of approximately 0.9 fps

This Point of Discharge #2 is to maintain and provide stormwater equal to or less than pre-developed flow rates. The total flow is the total flow from all the on-site flow control ponds, less the flow that is being routed to the Point of Discharge #1 from the flow splitter.

The Proposed Point of Discharge #3 is located on the east side of the site adjacent to Pond E, utilizing the existing low area that exists. The pond with discharge on to the finished grade on the east side of the new emergency access road using a small bubbler consisting of a catch basin surrounded by a layer of drain rock. The mitigated stormwater runoff will continue to flow east in its current direction of travel.
Point of Discharge #1 receives stormwater from the on-site flow splitter.

Table 11. Point of Discharge Flow Summary

Flows to Flow Splitter				
Storm Event (year)	**Pond Actual Release Rate (cfs)**	**Intercepted Unmitigated Flows (cfs)**	**Cross-property Flow (cfs)**	**Total Flow at Flow Splitter (cfs)**
2	4.24	0.90	1.26	6.40
5	7.27	1.37	1.95	10.59
10	9.02	1.71	2.46	13.19
25	11.42	2.32	3.39	17.13
Point of Discharge #1				
Storm Event (year)	**Pre-Developed Flow (cfs)**	**Flow From Flow Splitter to POD (cfs)**	**Total Flow POD (cfs)**	
2	7.34	4.00	4.00	
5	11.01	4.00	4.00	
10	13.62	7.00	7.00	
25	18.41	7.00	7.00	
Point of Discharge #2				
Storm Event (year)	**Pre-Developed Flow (cfs)**	**Flow From Flow Splitter to POD (cfs)**	**Total Flow POD (cfs)**	
2	4.60	2.40	2.40	
5	6.86	6.59	6.59	
10	8.46	6.19	6.19	
25	11.38	10.13	10.13	
Point of Discharge #3				
Storm Event (year)	**Pre-Developed Flow (cfs)**	**Pond Actual Release Rate (cfs)**	**Total Flow POD #3 (cfs)**	
2	2.74	1.36	1.36	
5	4.10	2.54	2.54	
10	5.07	3.32	3.32	
25	6.82	4.41	4.41	

4.0 Cross-Property Drainage

The purpose of this section is to address how Oregon has adopted the civil law doctrine of drainage. Under this doctrine adjoining landowners are entitled to have the normal course of natural drainage maintained. The lower landowner must accept water which naturally comes to his land from above, but he is entitled not to have the normal drainage changed or substantially increased. The lower landowner may not obstruct the run-off from the upper land if the upper landowner is properly discharging the water.

4.1 Existing Surface Water Cross-Property Drainage

See Section 2.1 Description of Existing Stormwater Drainage Conditions.

4.2 Proposed Surface Water Cross-Property Drainage

Post-construction, the site will consist of four subbasins that will discharge offsite unmitigated. See Figure 2 Post Construction Stormwater Drainage Basin Map Cross-Property. This section does not discuss the discharge points, see Section 3.4 Site Discharge Locations.

The development of this site is reducing the stormwater flows crossing property lines by reducing the amount of area that crosses property lines, reducing the runoff curve number, or cutting off the drainage by installing drainage ditches along the property lines.

Subbasin 1A has been disconnected from cross-property flows due to the new drainage ditch along the west property line that extends from Carpenter Lane to the Point of Discharge No 1. These flows have been included in the point of discharge analysis in Section 3.4 Site Discharge Locations.

Subbasin 2A has been reduced in size due to the site development. It flows toward the Point of Discharge No. 1.

Subbasin 3A has been disconnected from cross-property flows due to the new drainage ditch along the west property line. The northern portion the subbasin 3 is captured by a drainage ditch, which is connected to the sites storm drainage system. The southern portion of the subbasin continues to flow across the property lines but has been significantly reduced. These flows have been included in the point of discharge analysis in Section 3.4 Site Discharge Locations.

Subbasin 4A has been reduced in size due to the site development. The subbasin continues to flow across the property lines but has been significantly reduced.

4.3 Existing and Proposed Cross-Property Hydrologic Analysis

The analysis was completed using the SBUH hydrological model with an NRCS Type 1A synthetic rainfall distribution. The 24-hour rainfall depths used for the analysis shown in Table 3 above were used in the calculations.

Table 12 below is a summary of the pre-developed flows versus the post construction flows (or unmitigated flows) from newly landscaped areas. It shows that the cross-property flows have been reduced.

The pre-developed unmitigated flows consist of the upstream farmland, (See Figure 1 – Existing Stormwater Drainage Basin Map). The post construction flows (or unmitigated flows) are flows from the newly constructed landscape areas as can be seen in Figure 2 Post Construction Stormwater Drainage Basin Map Cross-Property. A curve number of 82 was used for the pre-developed flows (with no impervious surfaces included in the

calculations) and a curve number of 80 was used for the post construction altered flows. The curve numbers are discussed above in section 1.6.4.

Table 12. Cross-Property Storm Drainage Flow Summary

Subbasin	Design Storm (year)	Drainage Area (sf)	Pre-Developed Flow Farm Use (cfs)	Post Construction Landscaped Areas (cfs)
1A	2	114,978	0.58	0.55
	5		0.87	0.84
	10		1.07	1.05
	25		1.43	1.43
2A	2	27,801	0.15	0.10
	5	-	0.22	0.15
	10	-	0.27	0.19
	25	-	0.36	0.26
3A	2	67,064	0.41	0.35
	5		0.60	0.53
	10		0.73	0.66
	25		0.98	0.89
4A	2	409,173	1.55	1.16
	5	-	2.33	1.80
	10	-	2.88	2.27
	25	-	3.89	3.13

5.0 Groundwater Management and Subdrain System

5.1 Description of Proposed Post-Construction Groundwater Discharge

This project is proposing to collect groundwater using a sub-drain system under Buildings 30 and 40. The groundwater is included in the sizing of Pond C, being 300 gpm (0.8 cfs) for managing flow control. This groundwater in combination with the site's mitigated surface stormwater flows will discharge to the site's flow spreader, Point of Discharge #2.

No known contamination exists on site, and construction site management activities and post-construction stormwater management will implement stormwater facilities conforming to SWMM stormwater facility selection, sizing, and design criteria.

Table 12 summarizes the approximate distance from the pond bottom elevation to the approximate groundwater depth as shown in the Final Geotechnical Data Report Technical Memorandum Dated July 15, 2022 (prepared by McMillan Jacobs Associates), Attachment K Preliminary Geotechnical Data Report (prepared by Rhino One). Groundwater is not anticipated to affect the ponds capacity.

Table 13. Pond Bottom to Groundwater Depth					
Pond	**Approx. Exist. Grade at Pond (ft)**	**Measured Water Level BGS (ft) and Boring # ****	**Approx. Groundwater Elev (ft)***	**Pond Bottom Elev (ft)***	**Approx. Depth to Groundwater (ft)***
A	716	55.45 WTP-B-04	661	708	47
B	718	24.66 WTP-B-01	693	708	15
C	722	45.34 WTP-B-05	677	704	27
D	698	55.45 WTP-B-04	643	693	50
E	712	7.67 WTP-B-02	704	712	8

* Elevations have been rounded to the nearest foot and are approximate. The elevations and depths were estimated based on the nearest boring.

** Final Geotechnical Data Report Technical Memorandum Dated July 15, 2022 (prepared by McMillan Jacobs Associates), Attachment K Preliminary Geotechnical Data Report (prepared by Rhino One) Table 7 Groundwater Level Observations Summary. The measured groundwater depths were measured on April 15, 2021, the shallowest measure and listed in Table 7.

6.0 Summary

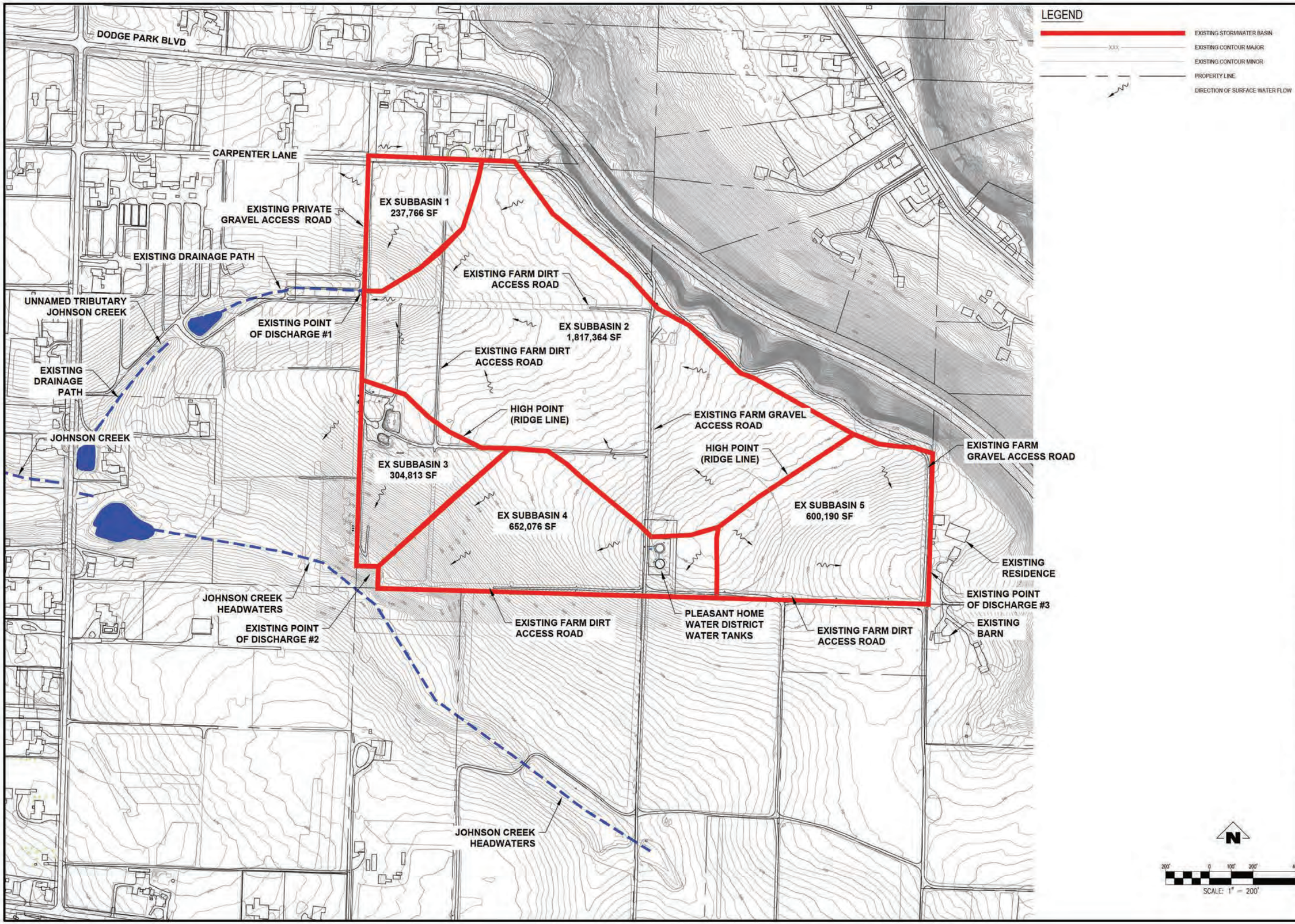
The Multnomah County Design and Construction Manual refers to the City of Portland Stormwater Management Manual for stormwater quantity and quality control design standards. The design of the proposed site satisfies both stormwater quality treatment and stormwater flow control standards as outlined in the City of Portland SWMM.

The flow control implemented in this project exceeds what is required by the SWMM, which requires the post-development runoff rates to be less than or equal to the pre-development runoff rates for the 2-year through 25-year storm events. This project is providing flow control to the extent that the 2-year storm event is being detained while releasing one-half the total flow from the pre-developed 2-year storm event.

The site's post-construction improvements meet local and state stormwater quality treatment and flow control requirements, minimizing hydromodification in accordance with Portland SWMM Section 1.3.5.

Attachment A: Stormwater Drainage Basin Maps

Figure 1 – Existing Stormwater Drainage Basin Map
Figure 2 – Post Construction Stormwater Drainage Basin Map Cross-Property
Figure 3 – Site Stormwater Drainage Basin Map Flow Control
Figure 4 – Site Stormwater Drainage Basin Map Water Quality



EXISTING STORMWATER DRAINAGE BASIN MAP

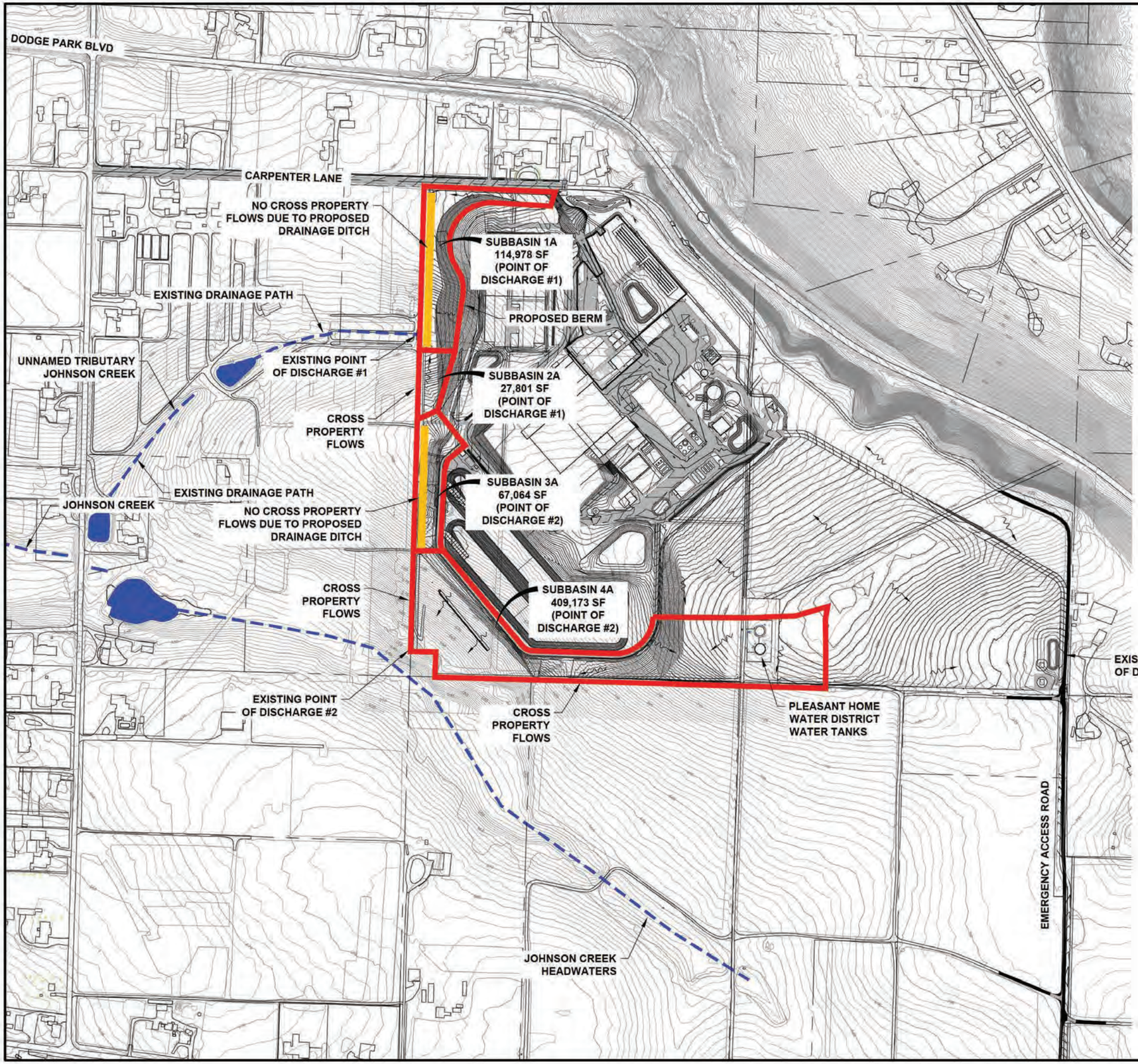
REVISIONS

NO.	DATE	DESCRIPTION

EMERIO Design
6445 SW FALLBROOK PLACE, SUITE 100
BEAVERTON, OREGON 97008
TEL: (503) 746-8812
FAX: (503) 626-0592
www.emeriodesign.com

FIGURE 1

FILE:P:\0596-003 Bull Run WTP Filtration Facility\docs\civil\Stormwater\Storm Report\Figures\0596-003 Figure 1 Existing Storm Runoff Basin Map, Layout: Figure 1, Plot Date: 9/22/2022 11:23 AM, by: Pat Tertero



LEGEND

- STORMWATER BASIN
- EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- PROPERTY LINE
- DIRECTION OF SURFACE WATER FLOW
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- PROPOSED DRAINAGE DITCH

POST CONSTRUCTION STORMWATER DRAINAGE BASIN MAP CROSS-PROPERTY

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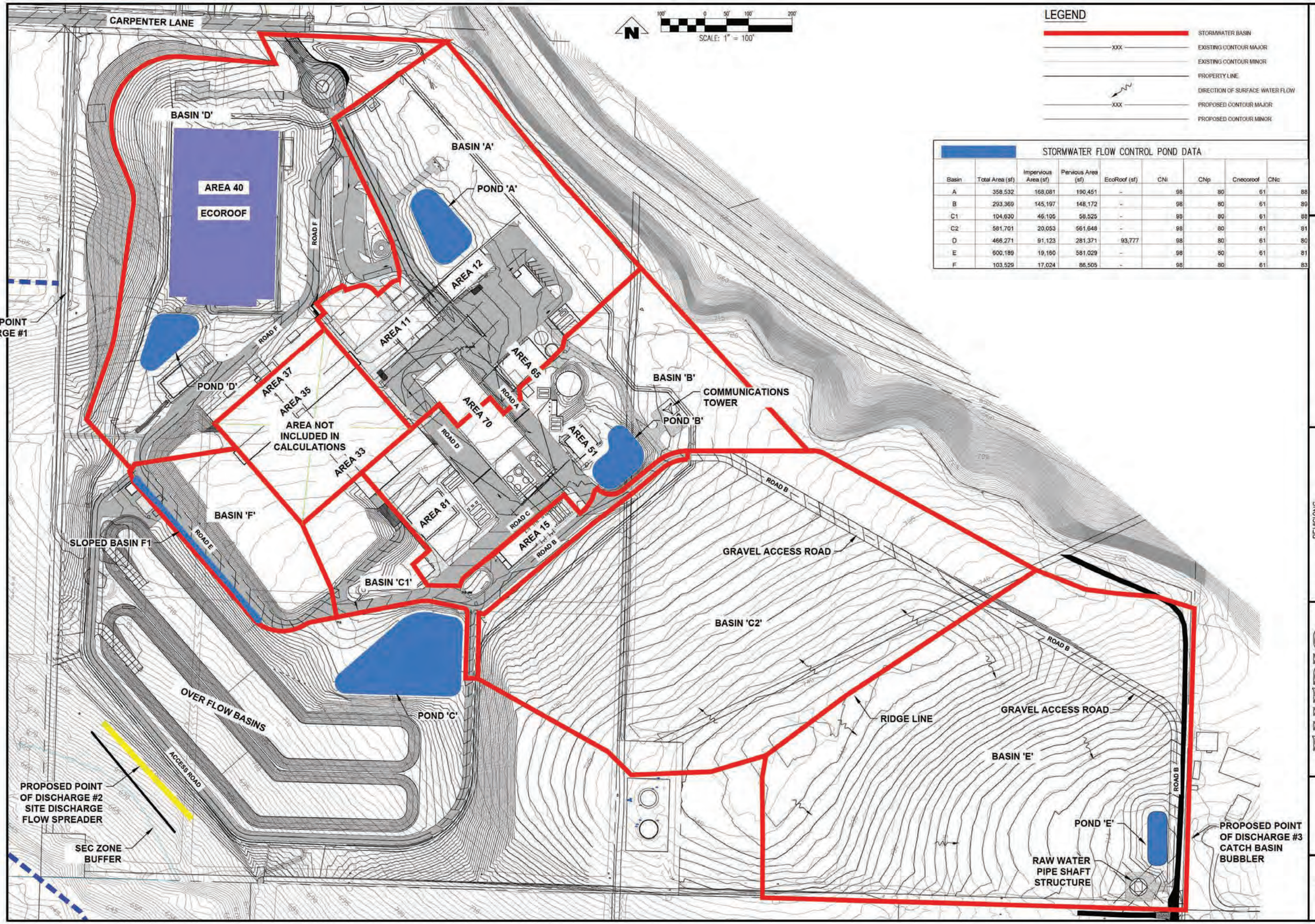
FIGURE 2

FILE:P:\0596-003 Bull Run WTP Filtration Facility\docs\civil\Stormwater\Storm Report\Figures\0596-003 Figure 2 Proposed Storm Runoff Basin Map, Layout: Figure 2, Plot Date: 9/22/2022 11:24 AM, by: Pat Tortora



LEGEND

- STORMWATER BASIN
- XXX — EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- PROPERTY LINE
- DIRECTION OF SURFACE WATER FLOW
- XXX — PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR

STORMWATER FLOW CONTROL POND DATA

Basin	Total Area (sf)	Impervious Area (sf)	Pervious Area (sf)	EcoRoof (sf)	CNi	CNp	Cnecoroof	CNc
A	358,532	168,081	190,451	-	98	80	61	88
B	293,369	145,197	148,172	-	98	80	61	89
C1	104,630	46,105	58,525	-	98	80	61	88
C2	581,701	20,053	561,648	-	98	80	61	81
D	466,271	91,123	281,371	93,777	98	80	61	80
E	600,189	19,160	581,029	-	98	80	61	81
F	103,529	17,024	86,505	-	98	80	61	83

SITE STORMWATER DRAINAGE BASIN MAP FLOW CONTROL

REVISIONS

NO.	DATE	DESCRIPTION

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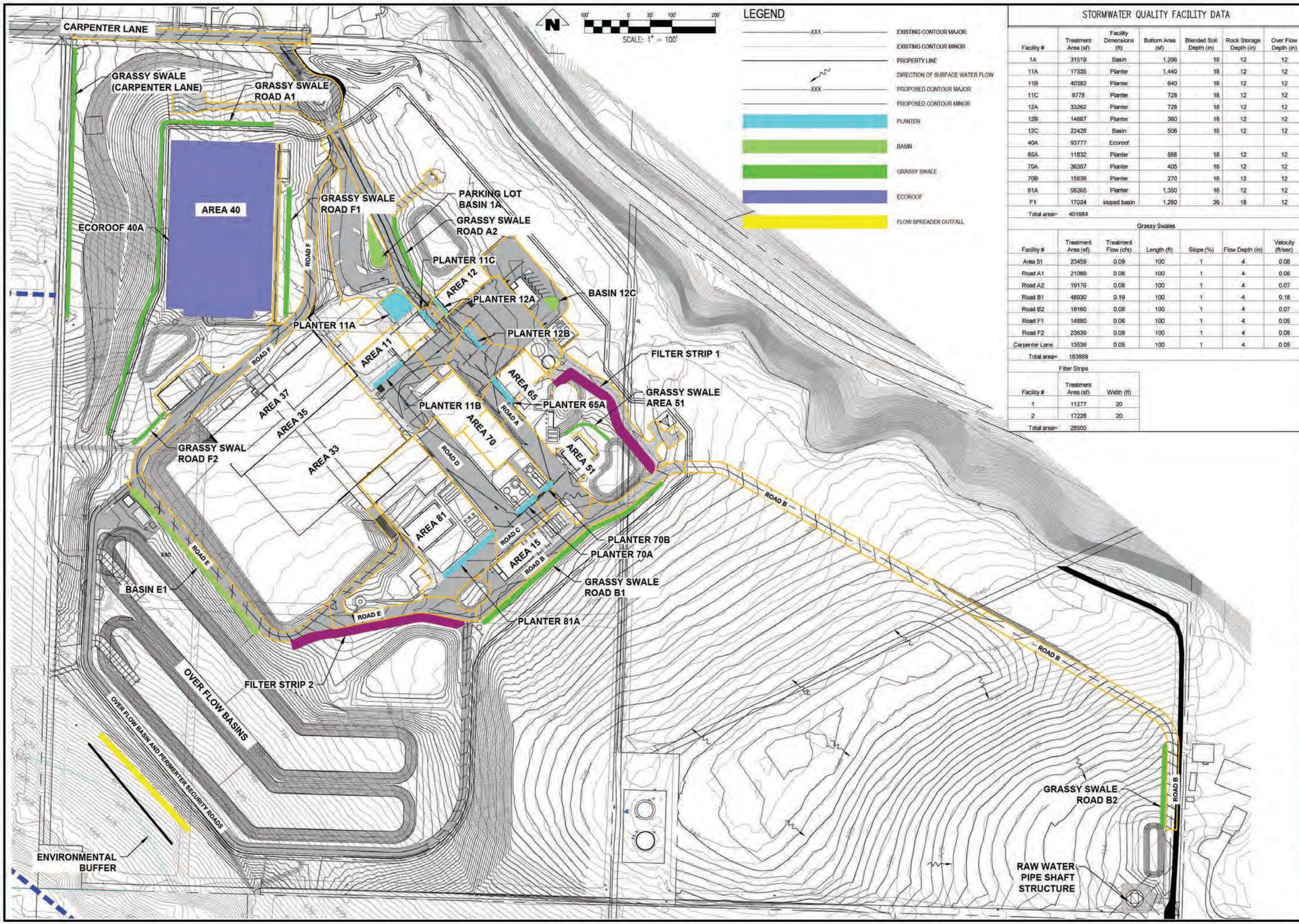
FIGURE 3

FILE:P:\0596-003 Bull Run WTP Filtration Facility\docs\civil\Stormwater\Storm Report\Figures\0596-003 Figure 3-4 Proposed Storm Basin Map, Layout: Figure 3, Plot Date: 9/22/2022 11:25 AM, by: Pat Tortora



STORMWATER QUALITY FACILITY DATA

Facility #	Treatment Area (sf)	Facility Dimensions (ft)	Bottom Area (sf)	Blended Soil Depth (in)	Rock Storage Depth (in)	Over Flow Depth (in)
1A	31518	Basin	1,296	18	12	12
11A	17535	Planter	1,440	18	12	12
11B	40382	Planter	640	18	12	12
11C	8778	Planter	728	18	12	12
12A	33262	Planter	728	18	12	12
12B	14687	Planter	360	18	12	12
12C	22426	Basin	508	18	12	12
40A	93777	Ecoroof				
65A	11832	Planter	568	18	12	12
70A	36357	Planter	405	18	12	12
70B	15839	Planter	270	18	12	12
81A	58265	Planter	1,350	18	12	12
F1	17024	sloped basin	1,260	36	18	12
Total area=	401684					

Grassy Swales

Facility #	Treatment Area (sf)	Treatment Flow (cfs)	Length (ft)	Slope (%)	Flow Depth (in)	Velocity (ft/sec)
Area 51	23459	0.09	100	1	4	0.08
Road A1	21086	0.08	100	1	4	0.08
Road A2	19176	0.08	100	1	4	0.07
Road B1	48930	0.19	100	1	4	0.18
Road B2	19160	0.08	100	1	4	0.07
Road F1	14880	0.06	100	1	4	0.05
Road F2	23639	0.09	100	1	4	0.08
Carpenter Lane	13539	0.05	100	1	4	0.05
Total area=	183869					

Filter Strips

Facility #	Treatment Area (sf)	Width (ft)
1	11277	20
2	17228	20
Total area=	28505	

SITE STORMWATER DRAINAGE BASIN MAP WATER QUALITY

REVISIONS:

NO.	DATE	DESCRIPTION

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FAX: (503) 748-8815
www.emeriodesign.com

FIGURE 4

FILE P: \0596-003 Bull Run WTP Filtration Facility\docs\civil\Stormwater\Storm Report\Figures\0596-003 Figure 3-4 Proposed Storm Basin Map, Layout: Figure 4, Plot Date: 9/22/2022 11:26 AM, by: Pat Tartero

Attachment B: NCRS Hydrologic Soil Group Information

Soil Map—Clackamas County Area, Oregon, and Multnomah County Area, Oregon
(On-Site)

Map Scale: 1:5,250 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Clackamas County Area, Oregon
Survey Area Data: Version 18, Oct 27, 2021

Soil Survey Area: Multnomah County Area, Oregon
Survey Area Data: Version 20, Oct 27, 2021

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Jul 2, 2015—Sep 21, 2016

MAP LEGEND

MAP INFORMATION

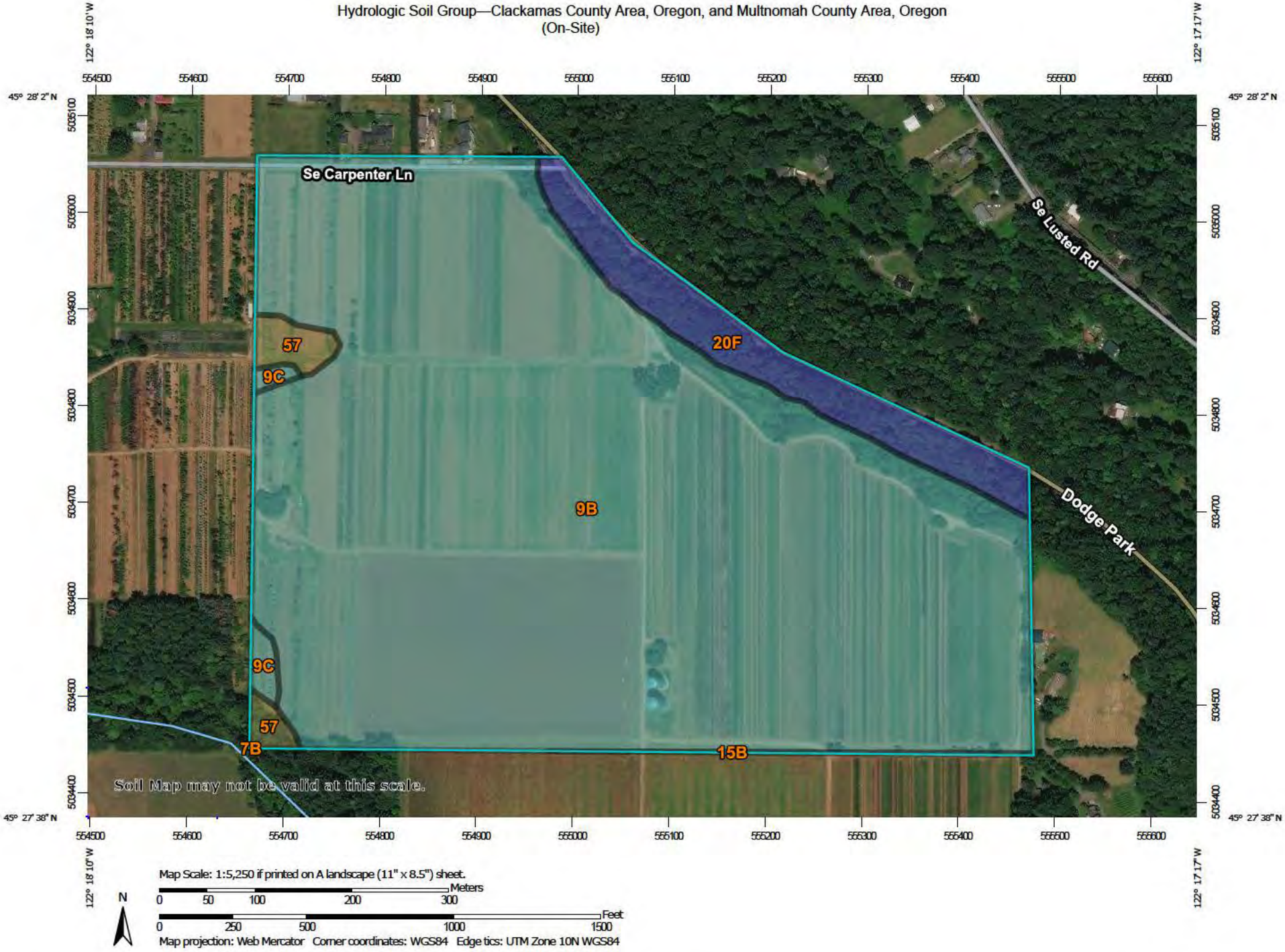
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
7B	Borges silty clay loam, 0 to 8 percent slopes	0.0	0.0%
15B	Cazadero silty clay loam, 0 to 7 percent slopes	0.1	0.1%
Subtotals for Soil Survey Area		**0.1**	**0.1%**
Totals for Area of Interest		**100.0**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
9B	Cazadero silty clay loam, 0 to 8 percent slopes	90.8	90.8%
9C	Cazadero silty clay loam, 8 to 15 percent slopes	0.7	0.7%
20F	Haplumbrepts, very steep	6.9	6.9%
57	Wollent silt loam	1.5	1.5%
Subtotals for Soil Survey Area		**99.9**	**99.9%**
Totals for Area of Interest		**100.0**	**100.0%**

Hydrologic Soil Group—Clackamas County Area, Oregon, and Multnomah County Area, Oregon
(On-Site)



Map Scale: 1:5,250 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N 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 1:20,000.

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

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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)

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

Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 18, Oct 27, 2021

Soil Survey Area: Multnomah County Area, Oregon
Survey Area Data: Version 20, Oct 27, 2021

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Jul 2, 2015—Sep 21, 2016

MAP LEGEND

MAP INFORMATION

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
7B	Borges silty clay loam, 0 to 8 percent slopes	D	0.0	0.0%
15B	Cazadero silty clay loam, 0 to 7 percent slopes	C	0.1	0.1%
Subtotals for Soil Survey Area			**0.1**	**0.1%**
Totals for Area of Interest			**100.0**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
9B	Cazadero silty clay loam, 0 to 8 percent slopes	C	90.8	90.8%
9C	Cazadero silty clay loam, 8 to 15 percent slopes	C	0.7	0.7%
20F	Haplumbrepts, very steep	B	6.9	6.9%
57	Wollent silt loam	C/D	1.5	1.5%
Subtotals for Soil Survey Area			**99.9**	**99.9%**
Totals for Area of Interest			**100.0**	**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

Soil Map—Multnomah County Area, Oregon
(Carpenter Lane)

Map Scale: 1:4,360 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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)

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Soil Survey Area: Multnomah County Area, Oregon
Survey Area Data: Version 20, Oct 27, 2021

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

Date(s) aerial images were photographed: Jul 2, 2015—Sep 21, 2016

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
9B	Cazadero silty clay loam, 0 to 8 percent slopes	13.6	97.0%
20F	Haplumbrepts, very steep	0.4	3.0%
Totals for Area of Interest		**14.0**	**100.0%**

Hydrologic Soil Group—Multnomah County Area, Oregon
(Carpenter Lane)

Map Scale: 1:4,360 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N 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 1:20,000.

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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)

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Soil Survey Area: Multnomah County Area, Oregon
Survey Area Data: Version 20, Oct 27, 2021

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Date(s) aerial images were photographed: Jul 2, 2015—Sep 21, 2016

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Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
9B	Cazadero silty clay loam, 0 to 8 percent slopes	C	13.6	97.0%
20F	Haplumbrepts, very steep	B	0.4	3.0%
Totals for Area of Interest			**14.0**	**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

Soil Map—Clackamas County Area, Oregon, and Multnomah County Area, Oregon
(South Access)

Map Scale: 1:5,030 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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Survey Area Data: Version 18, Oct 27, 2021

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Survey Area Data: Version 20, Oct 27, 2021

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

Date(s) aerial images were photographed: Jul 2, 2015—Sep 21, 2016

MAP LEGEND

MAP INFORMATION

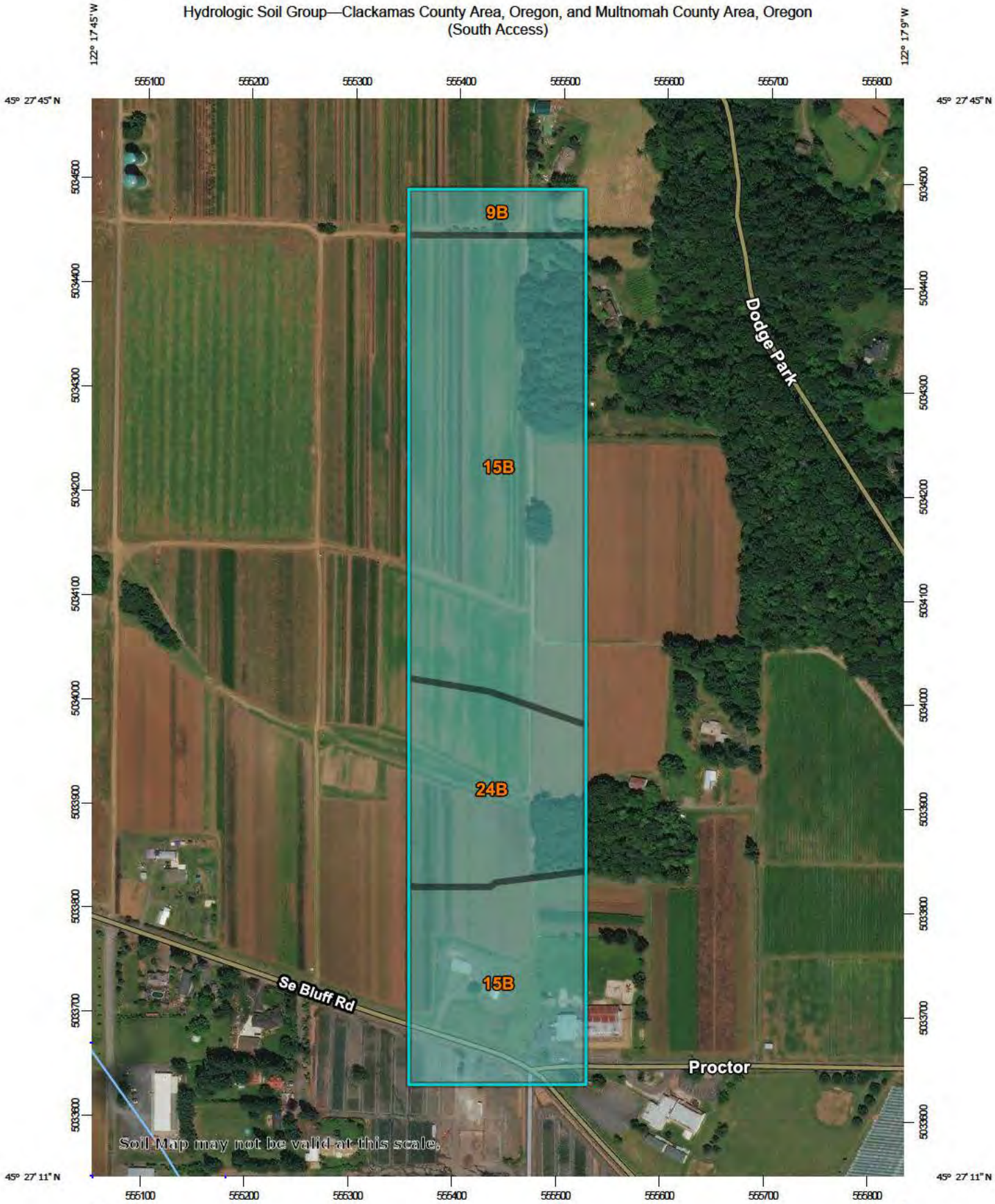
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
15B	Cazadero silty clay loam, 0 to 7 percent slopes	26.9	74.2%
24B	Cottrell silty clay loam, 2 to 8 percent slopes	7.5	20.6%
Subtotals for Soil Survey Area		**34.4**	**94.8%**
Totals for Area of Interest		**36.3**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
9B	Cazadero silty clay loam, 0 to 8 percent slopes	1.9	5.2%
Subtotals for Soil Survey Area		**1.9**	**5.2%**
Totals for Area of Interest		**36.3**	**100.0%**

Hydrologic Soil Group—Clackamas County Area, Oregon, and Multnomah County Area, Oregon
(South Access)



Map Scale: 1:5,030 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N 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 1:20,000.

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Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 18, Oct 27, 2021

Soil Survey Area: Multnomah County Area, Oregon
Survey Area Data: Version 20, Oct 27, 2021

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Date(s) aerial images were photographed: Jul 2, 2015—Sep 21, 2016

MAP LEGEND

MAP INFORMATION

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Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
15B	Cazadero silty clay loam, 0 to 7 percent slopes	C	26.9	74.2%
24B	Cottrell silty clay loam, 2 to 8 percent slopes	C	7.5	20.6%
Subtotals for Soil Survey Area			**34.4**	**94.8%**
Totals for Area of Interest			**36.3**	**100.0%**

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
9B	Cazadero silty clay loam, 0 to 8 percent slopes	C	1.9	5.2%
Subtotals for Soil Survey Area			**1.9**	**5.2%**
Totals for Area of Interest			**36.3**	**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

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.
2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands [1]

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment [2]	Hydrologic condition [3]	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

[1] Average runoff condition, and I_a=0.2S
[2] Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.
[3] Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

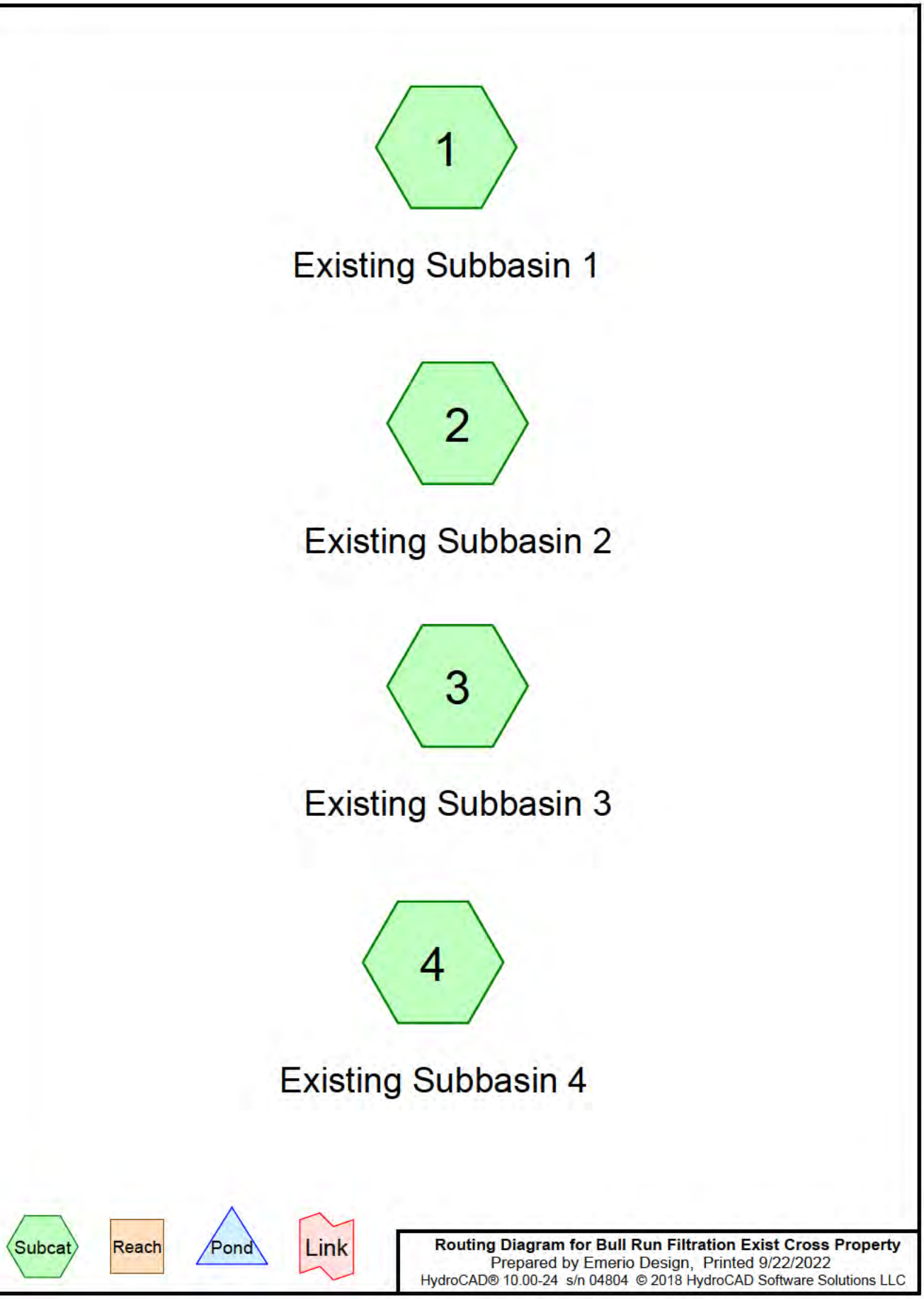
Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor*: <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Attachment C: Hydrologic Analysis of Pre- and Post Developed Conditions Cross-Property Flows



Routing Diagram for Bull Run Filtration Exist Cross Property
Prepared by Emerio Design, Printed 9/22/2022
HydroCAD® 10.00-24 s/n 04804 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
619,016	82	Row crops, SR + CR, Good, HSG C (1, 2, 3, 4)
619,016	**82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
619,016	HSG C	1, 2, 3, 4
0	HSG D	
0	Other	
619,016		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
0	0	619,016	0	0	619,016	Row crops, SR + CR, Good
0	**0**	**619,016**	**0**	**0**	**619,016**	**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1: Existing Subbasin 1 Runoff Area=114,978 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=1,396' Tc=18.0 min CN=82/0 Runoff=0.58 cfs 11,723 cf

Subcatchment2: Existing Subbasin 2 Runoff Area=27,801 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=275' Slope=0.0770 '/' Tc=15.2 min CN=82/0 Runoff=0.15 cfs 2,834 cf

Subcatchment3: Existing Subbasin 3 Runoff Area=67,064 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=552' Tc=7.4 min CN=82/0 Runoff=0.41 cfs 6,838 cf

Subcatchment4: Existing Subbasin 4 Runoff Area=409,173 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=1,585' Tc=36.9 min CN=82/0 Runoff=1.55 cfs 41,717 cf

Total Runoff Area = 619,016 sf Runoff Volume = 63,112 cf Average Runoff Depth = 1.22"
100.00% Pervious = 619,016 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1: Existing Subbasin 1

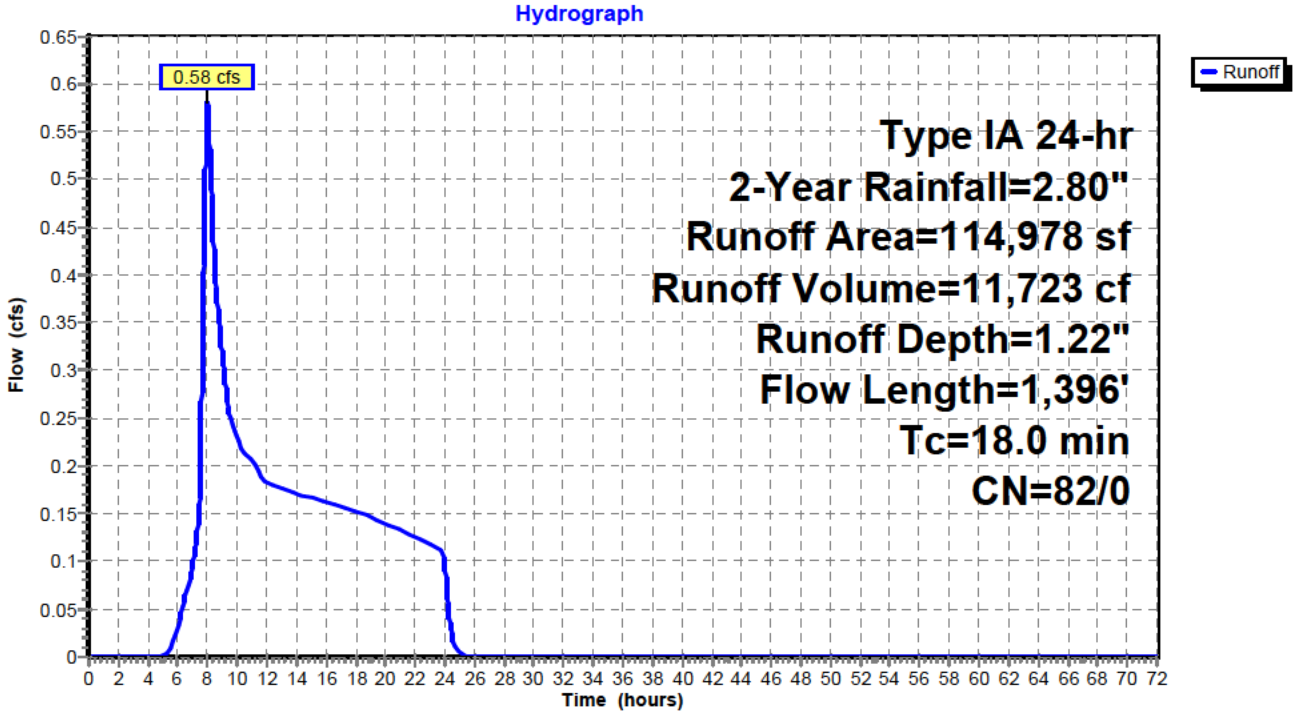
Runoff = 0.58 cfs @ 8.01 hrs, Volume= 11,723 cf, Depth= 1.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
114,978	82	Row crops, SR + CR, Good, HSG C
114,978	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	466	0.0200	1.27		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.9	930	0.0210	1.30		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
18.0	1,396	Total			

Subcatchment 1: Existing Subbasin 1



Hydrograph for Subcatchment 1: Existing Subbasin 1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.14	0.00	0.00	0.00
4.00	0.32	0.00	0.00	0.00
6.00	0.58	0.01	0.00	0.03
8.00	1.19	0.19	0.00	**0.58**
10.00	1.62	0.41	0.00	**0.23**
12.00	1.86	0.56	0.00	0.18
14.00	2.06	0.69	0.00	0.17
16.00	2.24	0.81	0.00	0.16
18.00	2.41	0.93	0.00	0.15
20.00	2.56	1.04	0.00	0.14
22.00	2.69	1.14	0.00	0.13
24.00	**2.80**	**1.22**	0.00	0.11
26.00	2.80	1.22	0.00	0.00
28.00	2.80	1.22	0.00	0.00
30.00	2.80	1.22	0.00	0.00
32.00	2.80	1.22	0.00	0.00
34.00	2.80	1.22	0.00	0.00
36.00	2.80	1.22	0.00	0.00
38.00	2.80	1.22	0.00	0.00
40.00	2.80	1.22	0.00	0.00
42.00	2.80	1.22	0.00	0.00
44.00	2.80	1.22	0.00	0.00
46.00	2.80	1.22	0.00	0.00
48.00	2.80	1.22	0.00	0.00
50.00	2.80	1.22	0.00	0.00
52.00	2.80	1.22	0.00	0.00
54.00	2.80	1.22	0.00	0.00
56.00	2.80	1.22	0.00	0.00
58.00	2.80	1.22	0.00	0.00
60.00	2.80	1.22	0.00	0.00
62.00	2.80	1.22	0.00	0.00
64.00	2.80	1.22	0.00	0.00
66.00	2.80	1.22	0.00	0.00
68.00	2.80	1.22	0.00	0.00
70.00	2.80	1.22	0.00	0.00
72.00	2.80	1.22	0.00	0.00

Summary for Subcatchment 2: Existing Subbasin 2

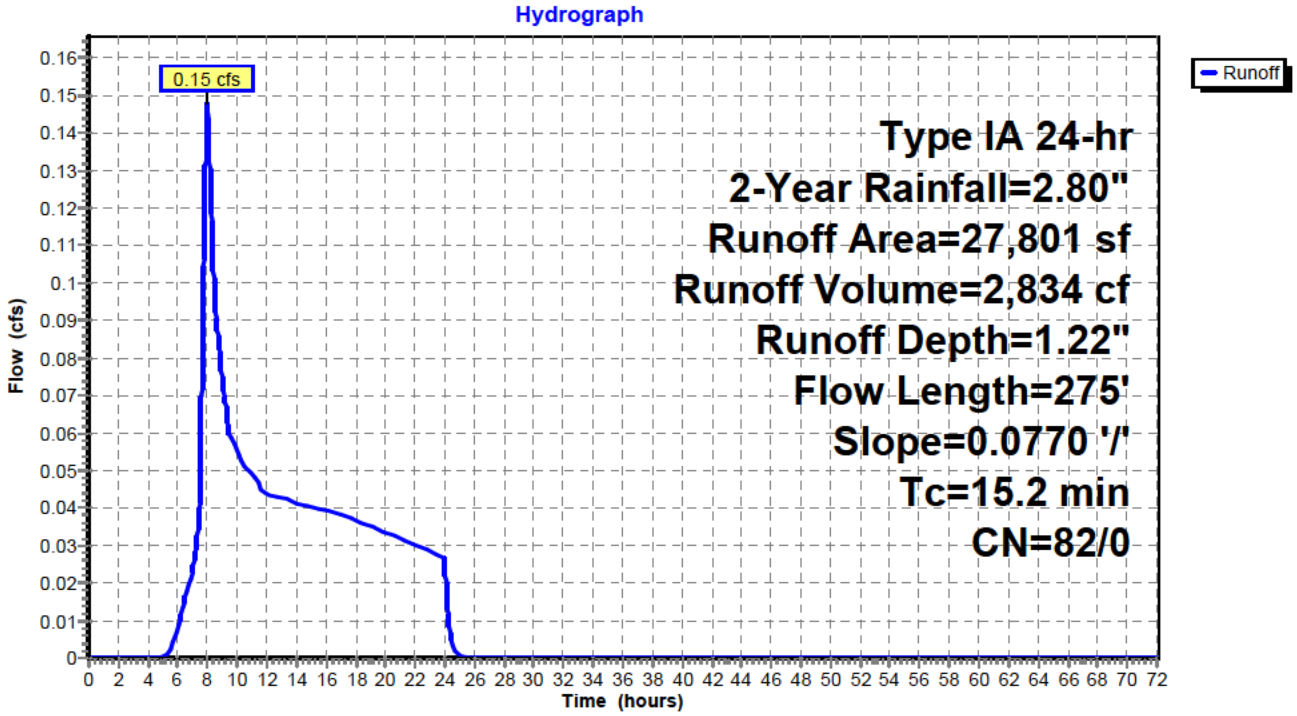
Runoff = 0.15 cfs @ 8.00 hrs, Volume= 2,834 cf, Depth= 1.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
27,801	82	Row crops, SR + CR, Good, HSG C
27,801	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	275	0.0770	0.30		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"

Subcatchment 2: Existing Subbasin 2



Hydrograph for Subcatchment 2: Existing Subbasin 2

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.14	0.00	0.00	0.00
4.00	0.32	0.00	0.00	0.00
6.00	0.58	0.01	0.00	0.01
8.00	1.19	0.19	0.00	**0.15**
10.00	1.62	0.41	0.00	0.06
12.00	1.86	0.56	0.00	0.04
14.00	2.06	0.69	0.00	0.04
16.00	2.24	0.81	0.00	0.04
18.00	2.41	0.93	0.00	0.04
20.00	2.56	1.04	0.00	0.03
22.00	2.69	1.14	0.00	0.03
24.00	**2.80**	**1.22**	0.00	0.03
26.00	2.80	1.22	0.00	0.00
28.00	2.80	1.22	0.00	0.00
30.00	2.80	1.22	0.00	0.00
32.00	2.80	1.22	0.00	0.00
34.00	2.80	1.22	0.00	0.00
36.00	2.80	1.22	0.00	0.00
38.00	2.80	1.22	0.00	0.00
40.00	2.80	1.22	0.00	0.00
42.00	2.80	1.22	0.00	0.00
44.00	2.80	1.22	0.00	0.00
46.00	2.80	1.22	0.00	0.00
48.00	2.80	1.22	0.00	0.00
50.00	2.80	1.22	0.00	0.00
52.00	2.80	1.22	0.00	0.00
54.00	2.80	1.22	0.00	0.00
56.00	2.80	1.22	0.00	0.00
58.00	2.80	1.22	0.00	0.00
60.00	2.80	1.22	0.00	0.00
62.00	2.80	1.22	0.00	0.00
64.00	2.80	1.22	0.00	0.00
66.00	2.80	1.22	0.00	0.00
68.00	2.80	1.22	0.00	0.00
70.00	2.80	1.22	0.00	0.00
72.00	2.80	1.22	0.00	0.00

Summary for Subcatchment 3: Existing Subbasin 3

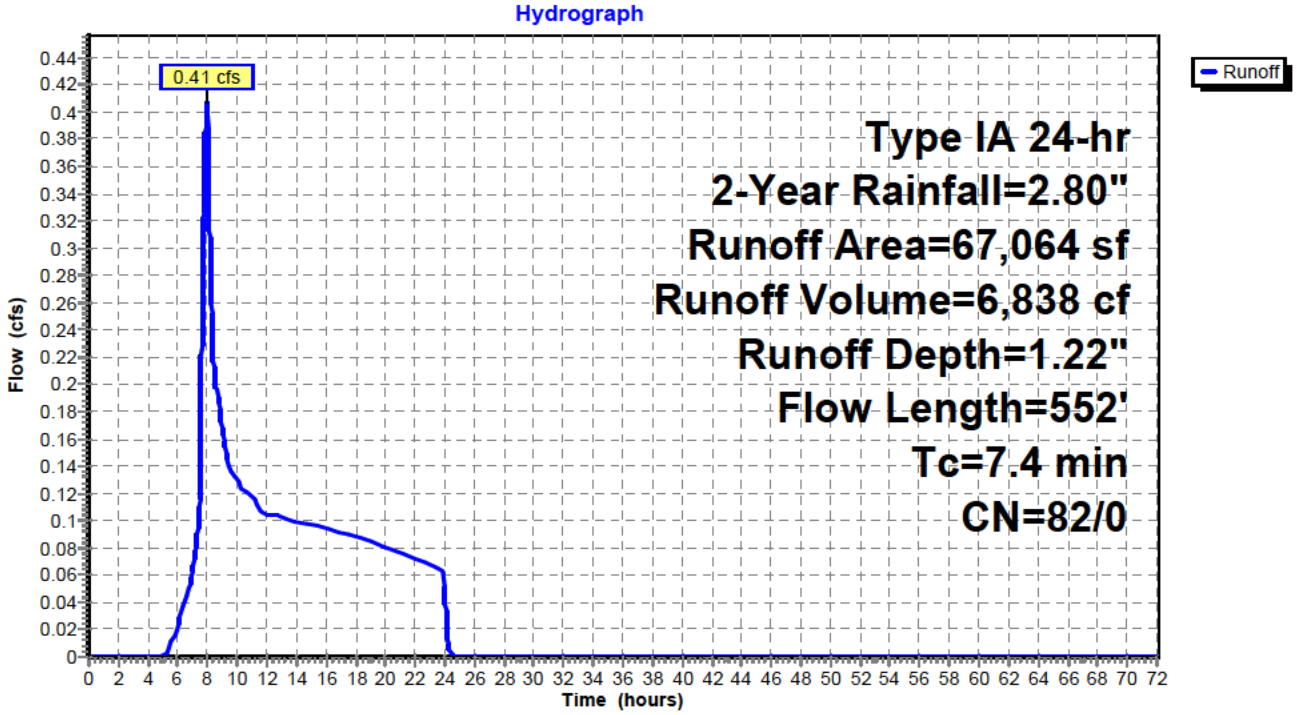
Runoff = 0.41 cfs @ 8.00 hrs, Volume= 6,838 cf, Depth= 1.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
67,064	82	Row crops, SR + CR, Good, HSG C
67,064	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	65	0.3300	0.41		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
4.7	487	0.0370	1.73		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
7.4	552	Total			

Subcatchment 3: Existing Subbasin 3



Hydrograph for Subcatchment 3: Existing Subbasin 3

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.14	0.00	0.00	0.00
4.00	0.32	0.00	0.00	0.00
6.00	0.58	0.01	0.00	0.02
8.00	1.19	0.19	0.00	**0.41**
10.00	1.62	0.41	0.00	0.13
12.00	1.86	0.56	0.00	0.10
14.00	2.06	0.69	0.00	0.10
16.00	2.24	0.81	0.00	0.09
18.00	2.41	0.93	0.00	0.09
20.00	2.56	1.04	0.00	0.08
22.00	2.69	1.14	0.00	0.07
24.00	**2.80**	**1.22**	0.00	0.06
26.00	2.80	1.22	0.00	0.00
28.00	2.80	1.22	0.00	0.00
30.00	2.80	1.22	0.00	0.00
32.00	2.80	1.22	0.00	0.00
34.00	2.80	1.22	0.00	0.00
36.00	2.80	1.22	0.00	0.00
38.00	2.80	1.22	0.00	0.00
40.00	2.80	1.22	0.00	0.00
42.00	2.80	1.22	0.00	0.00
44.00	2.80	1.22	0.00	0.00
46.00	2.80	1.22	0.00	0.00
48.00	2.80	1.22	0.00	0.00
50.00	2.80	1.22	0.00	0.00
52.00	2.80	1.22	0.00	0.00
54.00	2.80	1.22	0.00	0.00
56.00	2.80	1.22	0.00	0.00
58.00	2.80	1.22	0.00	0.00
60.00	2.80	1.22	0.00	0.00
62.00	2.80	1.22	0.00	0.00
64.00	2.80	1.22	0.00	0.00
66.00	2.80	1.22	0.00	0.00
68.00	2.80	1.22	0.00	0.00
70.00	2.80	1.22	0.00	0.00
72.00	2.80	1.22	0.00	0.00

Summary for Subcatchment 4: Existing Subbasin 4

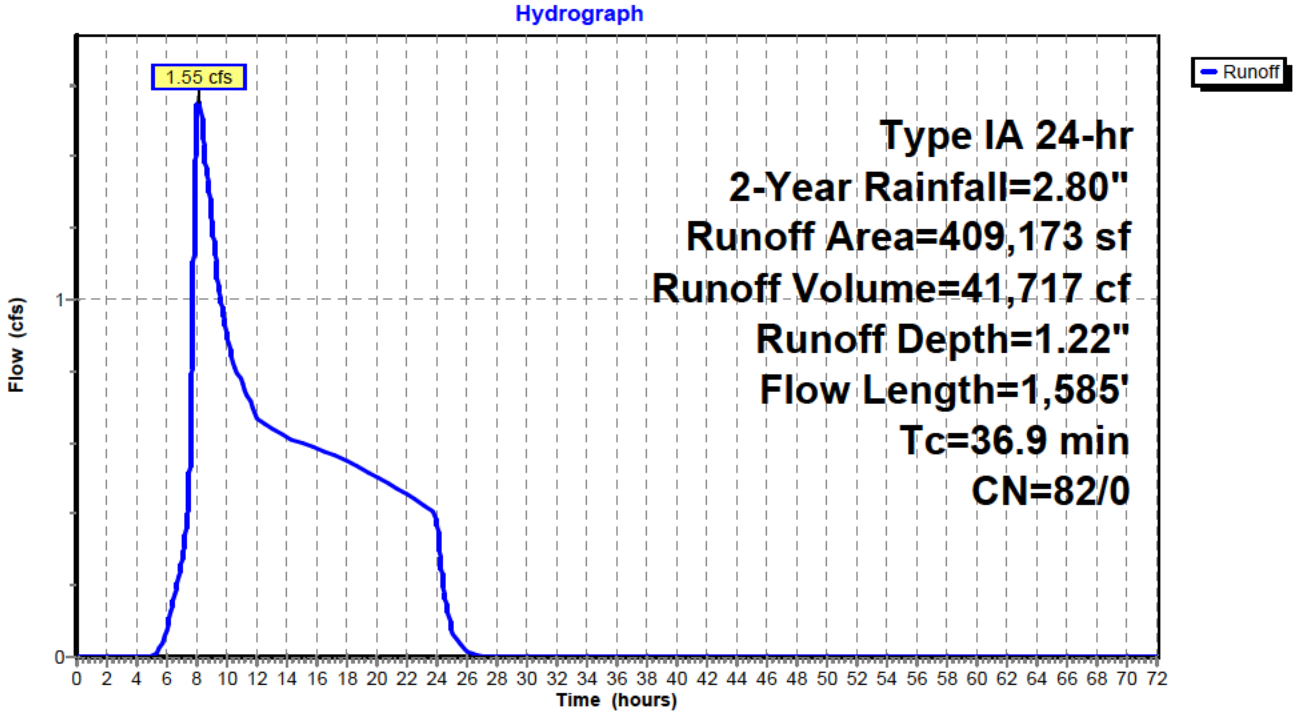
Runoff = 1.55 cfs @ 8.14 hrs, Volume= 41,717 cf, Depth= 1.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
409,173	82	Row crops, SR + CR, Good, HSG C
409,173	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	300	0.0200	0.18		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
9.0	1,285	0.0700	2.38		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
36.9	1,585	Total			

Subcatchment 4: Existing Subbasin 4



Hydrograph for Subcatchment 4: Existing Subbasin 4

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.14	0.00	0.00	0.00
4.00	0.32	0.00	0.00	0.00
6.00	0.58	0.01	0.00	0.08
8.00	1.19	0.19	0.00	**1.51**
10.00	1.62	0.41	0.00	**0.90**
12.00	1.86	0.56	0.00	0.67
14.00	2.06	0.69	0.00	0.61
16.00	2.24	0.81	0.00	0.58
18.00	2.41	0.93	0.00	0.55
20.00	2.56	1.04	0.00	0.50
22.00	2.69	1.14	0.00	0.45
24.00	**2.80**	**1.22**	0.00	0.40
26.00	2.80	1.22	0.00	0.02
28.00	2.80	1.22	0.00	0.00
30.00	2.80	1.22	0.00	0.00
32.00	2.80	1.22	0.00	0.00
34.00	2.80	1.22	0.00	0.00
36.00	2.80	1.22	0.00	0.00
38.00	2.80	1.22	0.00	0.00
40.00	2.80	1.22	0.00	0.00
42.00	2.80	1.22	0.00	0.00
44.00	2.80	1.22	0.00	0.00
46.00	2.80	1.22	0.00	0.00
48.00	2.80	1.22	0.00	0.00
50.00	2.80	1.22	0.00	0.00
52.00	2.80	1.22	0.00	0.00
54.00	2.80	1.22	0.00	0.00
56.00	2.80	1.22	0.00	0.00
58.00	2.80	1.22	0.00	0.00
60.00	2.80	1.22	0.00	0.00
62.00	2.80	1.22	0.00	0.00
64.00	2.80	1.22	0.00	0.00
66.00	2.80	1.22	0.00	0.00
68.00	2.80	1.22	0.00	0.00
70.00	2.80	1.22	0.00	0.00
72.00	2.80	1.22	0.00	0.00

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1: Existing Subbasin 1 Runoff Area=114,978 sf 0.00% Impervious Runoff Depth=1.70"
Flow Length=1,396' Tc=18.0 min CN=82/0 Runoff=0.87 cfs 16,292 cf

Subcatchment2: Existing Subbasin 2 Runoff Area=27,801 sf 0.00% Impervious Runoff Depth=1.70"
Flow Length=275' Slope=0.0770 '/' Tc=15.2 min CN=82/0 Runoff=0.22 cfs 3,939 cf

Subcatchment3: Existing Subbasin 3 Runoff Area=67,064 sf 0.00% Impervious Runoff Depth=1.70"
Flow Length=552' Tc=7.4 min CN=82/0 Runoff=0.60 cfs 9,503 cf

Subcatchment4: Existing Subbasin 4 Runoff Area=409,173 sf 0.00% Impervious Runoff Depth=1.70"
Flow Length=1,585' Tc=36.9 min CN=82/0 Runoff=2.33 cfs 57,979 cf

Total Runoff Area = 619,016 sf Runoff Volume = 87,714 cf Average Runoff Depth = 1.70"
100.00% Pervious = 619,016 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1: Existing Subbasin 1

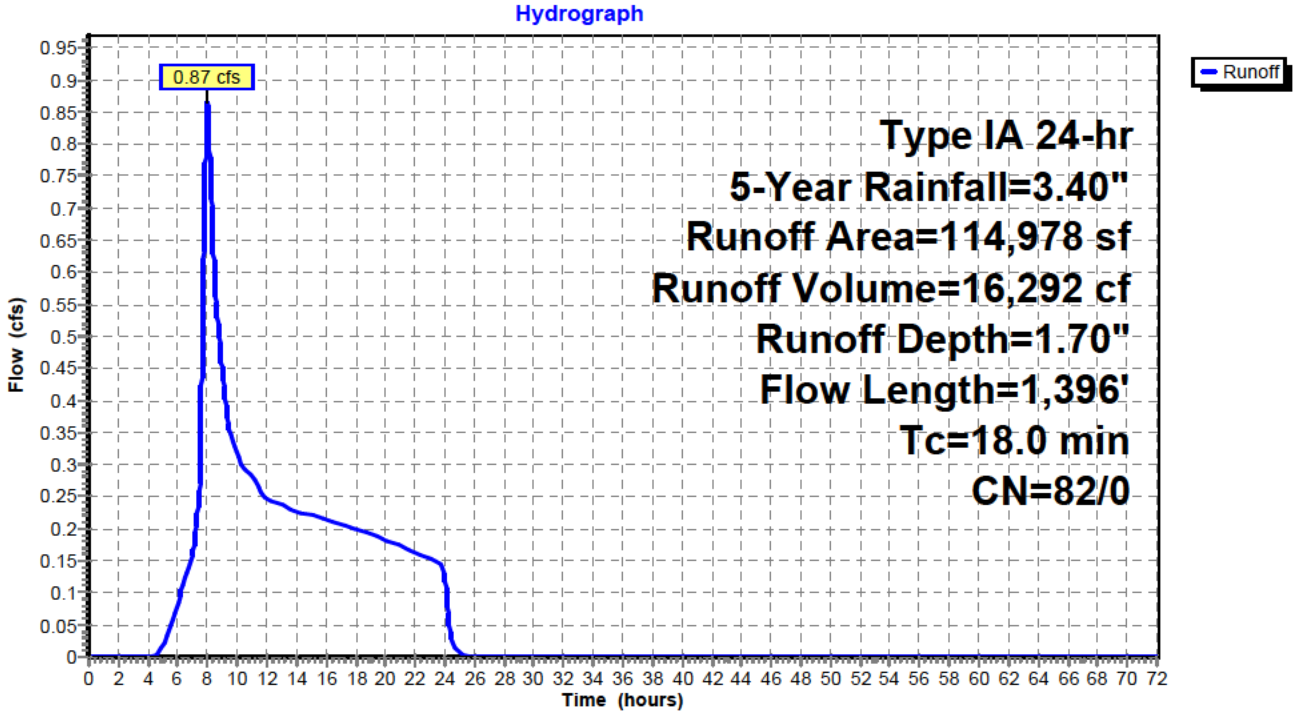
Runoff = 0.87 cfs @ 8.01 hrs, Volume= 16,292 cf, Depth= 1.70"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
114,978	82	Row crops, SR + CR, Good, HSG C
114,978	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	466	0.0200	1.27		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.9	930	0.0210	1.30		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
18.0	1,396	Total			

Subcatchment 1: Existing Subbasin 1



Hydrograph for Subcatchment 1: Existing Subbasin 1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.17	0.00	0.00	0.00
4.00	0.39	0.00	0.00	0.00
6.00	0.70	0.03	0.00	0.08
8.00	1.45	0.32	0.00	**0.86**
10.00	1.96	0.62	0.00	**0.32**
12.00	2.26	0.82	0.00	0.24
14.00	2.50	1.00	0.00	0.23
16.00	2.72	1.16	0.00	0.22
18.00	2.92	1.32	0.00	0.20
20.00	3.10	1.46	0.00	0.18
22.00	3.26	1.59	0.00	0.16
24.00	**3.40**	**1.70**	0.00	0.14
26.00	3.40	1.70	0.00	0.00
28.00	3.40	1.70	0.00	0.00
30.00	3.40	1.70	0.00	0.00
32.00	3.40	1.70	0.00	0.00
34.00	3.40	1.70	0.00	0.00
36.00	3.40	1.70	0.00	0.00
38.00	3.40	1.70	0.00	0.00
40.00	3.40	1.70	0.00	0.00
42.00	3.40	1.70	0.00	0.00
44.00	3.40	1.70	0.00	0.00
46.00	3.40	1.70	0.00	0.00
48.00	3.40	1.70	0.00	0.00
50.00	3.40	1.70	0.00	0.00
52.00	3.40	1.70	0.00	0.00
54.00	3.40	1.70	0.00	0.00
56.00	3.40	1.70	0.00	0.00
58.00	3.40	1.70	0.00	0.00
60.00	3.40	1.70	0.00	0.00
62.00	3.40	1.70	0.00	0.00
64.00	3.40	1.70	0.00	0.00
66.00	3.40	1.70	0.00	0.00
68.00	3.40	1.70	0.00	0.00
70.00	3.40	1.70	0.00	0.00
72.00	3.40	1.70	0.00	0.00

Summary for Subcatchment 2: Existing Subbasin 2

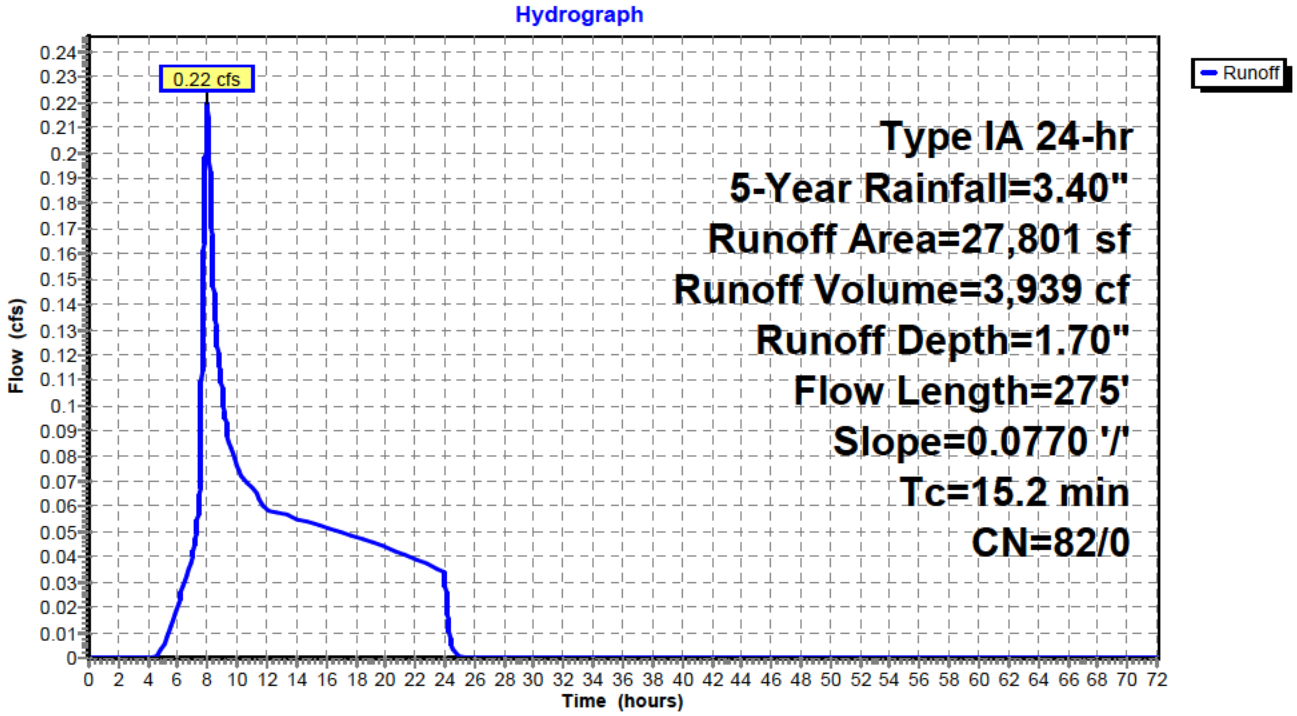
Runoff = 0.22 cfs @ 8.00 hrs, Volume= 3,939 cf, Depth= 1.70"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
27,801	82	Row crops, SR + CR, Good, HSG C
27,801	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	275	0.0770	0.30		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"

Subcatchment 2: Existing Subbasin 2



Hydrograph for Subcatchment 2: Existing Subbasin 2

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.17	0.00	0.00	0.00
4.00	0.39	0.00	0.00	0.00
6.00	0.70	0.03	0.00	0.02
8.00	1.45	0.32	0.00	**0.22**
10.00	1.96	0.62	0.00	0.08
12.00	2.26	0.82	0.00	0.06
14.00	2.50	1.00	0.00	0.05
16.00	2.72	1.16	0.00	0.05
18.00	2.92	1.32	0.00	0.05
20.00	3.10	1.46	0.00	0.04
22.00	3.26	1.59	0.00	0.04
24.00	**3.40**	**1.70**	0.00	0.03
26.00	3.40	1.70	0.00	0.00
28.00	3.40	1.70	0.00	0.00
30.00	3.40	1.70	0.00	0.00
32.00	3.40	1.70	0.00	0.00
34.00	3.40	1.70	0.00	0.00
36.00	3.40	1.70	0.00	0.00
38.00	3.40	1.70	0.00	0.00
40.00	3.40	1.70	0.00	0.00
42.00	3.40	1.70	0.00	0.00
44.00	3.40	1.70	0.00	0.00
46.00	3.40	1.70	0.00	0.00
48.00	3.40	1.70	0.00	0.00
50.00	3.40	1.70	0.00	0.00
52.00	3.40	1.70	0.00	0.00
54.00	3.40	1.70	0.00	0.00
56.00	3.40	1.70	0.00	0.00
58.00	3.40	1.70	0.00	0.00
60.00	3.40	1.70	0.00	0.00
62.00	3.40	1.70	0.00	0.00
64.00	3.40	1.70	0.00	0.00
66.00	3.40	1.70	0.00	0.00
68.00	3.40	1.70	0.00	0.00
70.00	3.40	1.70	0.00	0.00
72.00	3.40	1.70	0.00	0.00

Summary for Subcatchment 3: Existing Subbasin 3

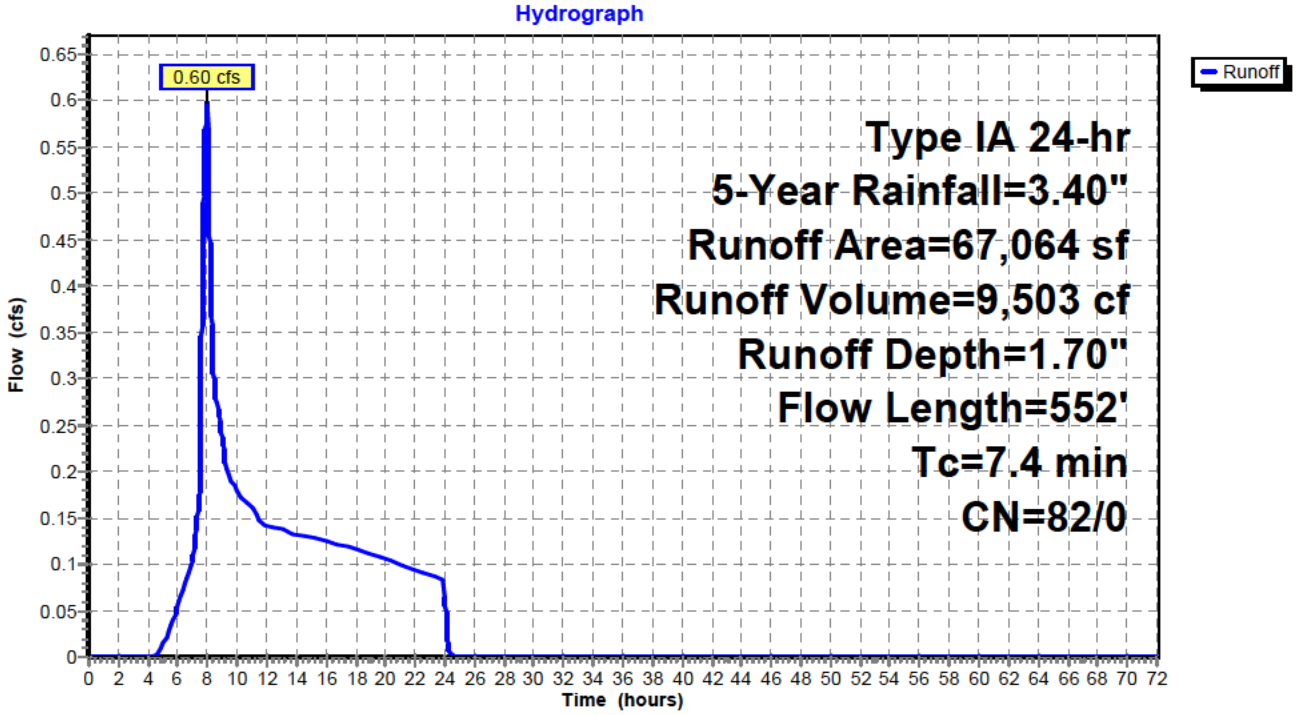
Runoff = 0.60 cfs @ 8.00 hrs, Volume= 9,503 cf, Depth= 1.70"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
67,064	82	Row crops, SR + CR, Good, HSG C
67,064	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	65	0.3300	0.41		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
4.7	487	0.0370	1.73		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
7.4	552	Total			

Subcatchment 3: Existing Subbasin 3



Hydrograph for Subcatchment 3: Existing Subbasin 3

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.17	0.00	0.00	0.00
4.00	0.39	0.00	0.00	0.00
6.00	0.70	0.03	0.00	0.05
8.00	1.45	0.32	0.00	**0.60**
10.00	1.96	0.62	0.00	0.18
12.00	2.26	0.82	0.00	0.14
14.00	2.50	1.00	0.00	0.13
16.00	2.72	1.16	0.00	0.12
18.00	2.92	1.32	0.00	0.12
20.00	3.10	1.46	0.00	0.11
22.00	3.26	1.59	0.00	0.09
24.00	**3.40**	**1.70**	0.00	0.08
26.00	3.40	1.70	0.00	0.00
28.00	3.40	1.70	0.00	0.00
30.00	3.40	1.70	0.00	0.00
32.00	3.40	1.70	0.00	0.00
34.00	3.40	1.70	0.00	0.00
36.00	3.40	1.70	0.00	0.00
38.00	3.40	1.70	0.00	0.00
40.00	3.40	1.70	0.00	0.00
42.00	3.40	1.70	0.00	0.00
44.00	3.40	1.70	0.00	0.00
46.00	3.40	1.70	0.00	0.00
48.00	3.40	1.70	0.00	0.00
50.00	3.40	1.70	0.00	0.00
52.00	3.40	1.70	0.00	0.00
54.00	3.40	1.70	0.00	0.00
56.00	3.40	1.70	0.00	0.00
58.00	3.40	1.70	0.00	0.00
60.00	3.40	1.70	0.00	0.00
62.00	3.40	1.70	0.00	0.00
64.00	3.40	1.70	0.00	0.00
66.00	3.40	1.70	0.00	0.00
68.00	3.40	1.70	0.00	0.00
70.00	3.40	1.70	0.00	0.00
72.00	3.40	1.70	0.00	0.00

Summary for Subcatchment 4: Existing Subbasin 4

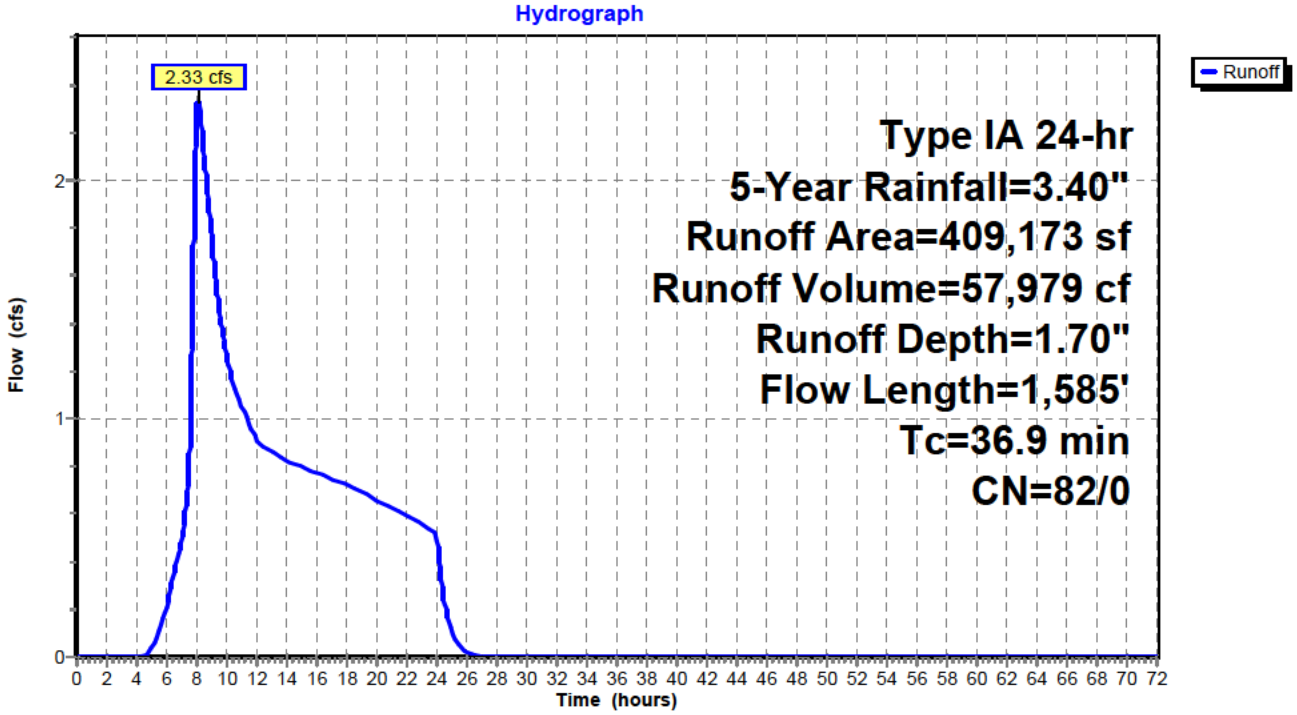
Runoff = 2.33 cfs @ 8.10 hrs, Volume= 57,979 cf, Depth= 1.70"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
409,173	82	Row crops, SR + CR, Good, HSG C
409,173	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	300	0.0200	0.18		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
9.0	1,285	0.0700	2.38		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
36.9	1,585	Total			

Subcatchment 4: Existing Subbasin 4



Hydrograph for Subcatchment 4: Existing Subbasin 4

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.17	0.00	0.00	0.00
4.00	0.39	0.00	0.00	0.00
6.00	0.70	0.03	0.00	0.22
8.00	1.45	0.32	0.00	**2.29**
10.00	1.96	0.62	0.00	**1.26**
12.00	2.26	0.82	0.00	0.91
14.00	2.50	1.00	0.00	0.82
16.00	2.72	1.16	0.00	0.77
18.00	2.92	1.32	0.00	0.72
20.00	3.10	1.46	0.00	0.66
22.00	3.26	1.59	0.00	0.59
24.00	**3.40**	**1.70**	0.00	0.52
26.00	3.40	1.70	0.00	0.02
28.00	3.40	1.70	0.00	0.00
30.00	3.40	1.70	0.00	0.00
32.00	3.40	1.70	0.00	0.00
34.00	3.40	1.70	0.00	0.00
36.00	3.40	1.70	0.00	0.00
38.00	3.40	1.70	0.00	0.00
40.00	3.40	1.70	0.00	0.00
42.00	3.40	1.70	0.00	0.00
44.00	3.40	1.70	0.00	0.00
46.00	3.40	1.70	0.00	0.00
48.00	3.40	1.70	0.00	0.00
50.00	3.40	1.70	0.00	0.00
52.00	3.40	1.70	0.00	0.00
54.00	3.40	1.70	0.00	0.00
56.00	3.40	1.70	0.00	0.00
58.00	3.40	1.70	0.00	0.00
60.00	3.40	1.70	0.00	0.00
62.00	3.40	1.70	0.00	0.00
64.00	3.40	1.70	0.00	0.00
66.00	3.40	1.70	0.00	0.00
68.00	3.40	1.70	0.00	0.00
70.00	3.40	1.70	0.00	0.00
72.00	3.40	1.70	0.00	0.00

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1: Existing Subbasin 1 Runoff Area=114,978 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=1,396' Tc=18.0 min CN=82/0 Runoff=1.07 cfs 19,480 cf

Subcatchment2: Existing Subbasin 2 Runoff Area=27,801 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=275' Slope=0.0770 '/' Tc=15.2 min CN=82/0 Runoff=0.27 cfs 4,710 cf

Subcatchment3: Existing Subbasin 3 Runoff Area=67,064 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=552' Tc=7.4 min CN=82/0 Runoff=0.73 cfs 11,362 cf

Subcatchment4: Existing Subbasin 4 Runoff Area=409,173 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=1,585' Tc=36.9 min CN=82/0 Runoff=2.88 cfs 69,324 cf

Total Runoff Area = 619,016 sf Runoff Volume = 104,877 cf Average Runoff Depth = 2.03"
100.00% Pervious = 619,016 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1: Existing Subbasin 1

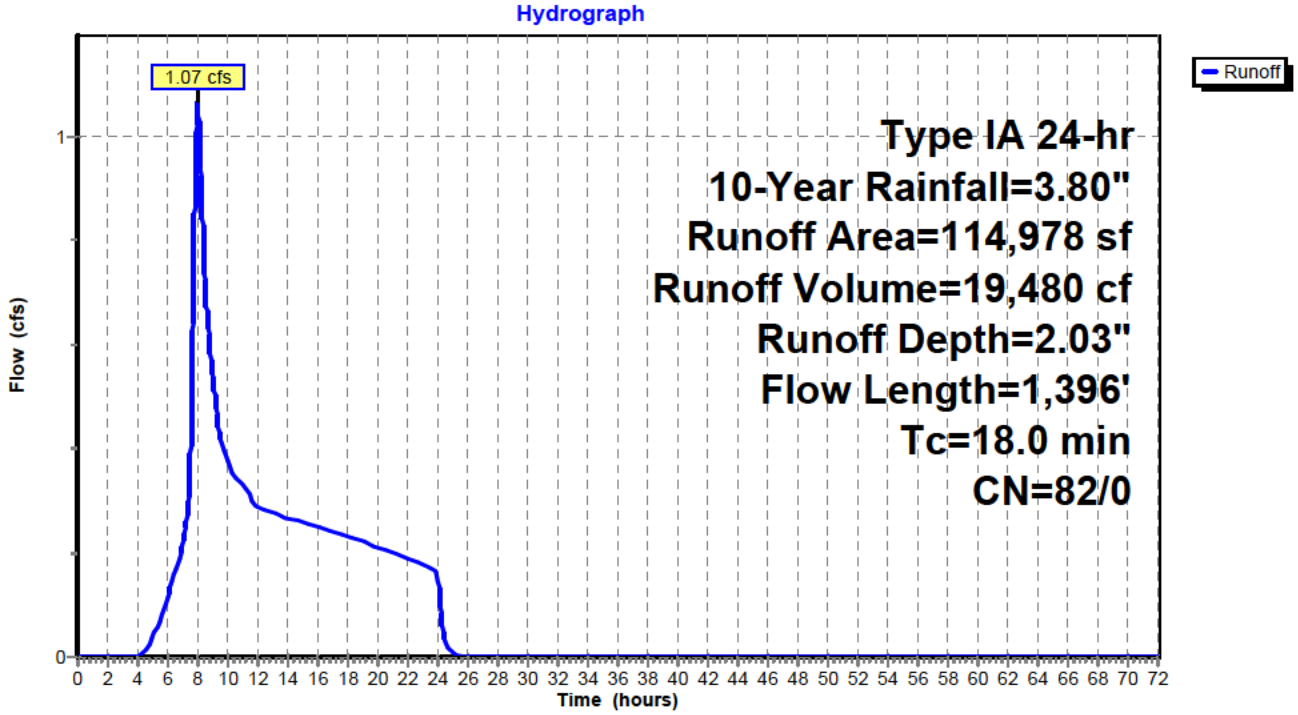
Runoff = 1.07 cfs @ 8.01 hrs, Volume= 19,480 cf, Depth= 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
114,978	82	Row crops, SR + CR, Good, HSG C
114,978	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	466	0.0200	1.27		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.9	930	0.0210	1.30		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
18.0	1,396	Total			

Subcatchment 1: Existing Subbasin 1



Hydrograph for Subcatchment 1: Existing Subbasin 1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.19	0.00	0.00	0.00
4.00	0.44	0.00	0.00	0.00
6.00	0.78	0.05	0.00	0.11
8.00	1.62	0.41	0.00	**1.07**
10.00	2.19	0.78	0.00	**0.38**
12.00	2.52	1.02	0.00	0.29
14.00	2.80	1.22	0.00	0.26
16.00	3.04	1.41	0.00	0.25
18.00	3.27	1.59	0.00	0.23
20.00	3.47	1.76	0.00	0.21
22.00	3.65	1.90	0.00	0.19
24.00	**3.80**	**2.03**	0.00	0.16
26.00	3.80	2.03	0.00	0.00
28.00	3.80	2.03	0.00	0.00
30.00	3.80	2.03	0.00	0.00
32.00	3.80	2.03	0.00	0.00
34.00	3.80	2.03	0.00	0.00
36.00	3.80	2.03	0.00	0.00
38.00	3.80	2.03	0.00	0.00
40.00	3.80	2.03	0.00	0.00
42.00	3.80	2.03	0.00	0.00
44.00	3.80	2.03	0.00	0.00
46.00	3.80	2.03	0.00	0.00
48.00	3.80	2.03	0.00	0.00
50.00	3.80	2.03	0.00	0.00
52.00	3.80	2.03	0.00	0.00
54.00	3.80	2.03	0.00	0.00
56.00	3.80	2.03	0.00	0.00
58.00	3.80	2.03	0.00	0.00
60.00	3.80	2.03	0.00	0.00
62.00	3.80	2.03	0.00	0.00
64.00	3.80	2.03	0.00	0.00
66.00	3.80	2.03	0.00	0.00
68.00	3.80	2.03	0.00	0.00
70.00	3.80	2.03	0.00	0.00
72.00	3.80	2.03	0.00	0.00

Summary for Subcatchment 2: Existing Subbasin 2

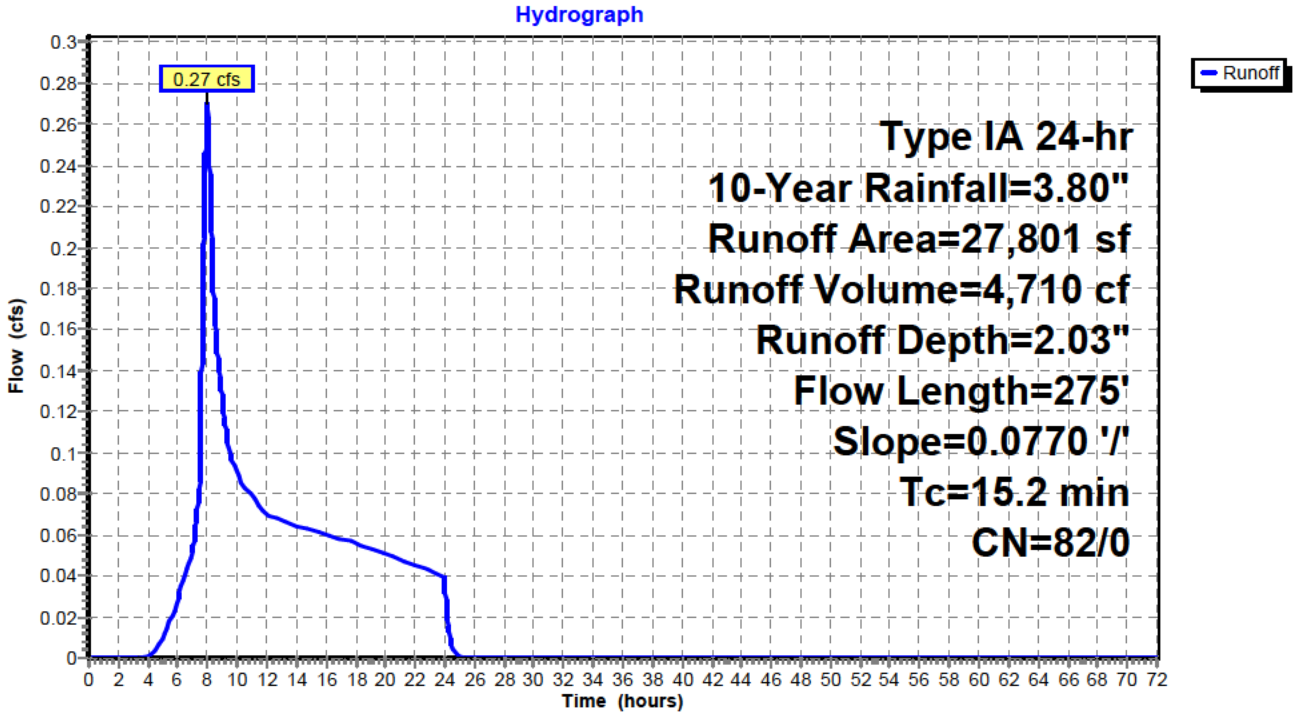
Runoff = 0.27 cfs @ 8.00 hrs, Volume= 4,710 cf, Depth= 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
27,801	82	Row crops, SR + CR, Good, HSG C
27,801	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	275	0.0770	0.30		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"

Subcatchment 2: Existing Subbasin 2



Hydrograph for Subcatchment 2: Existing Subbasin 2

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.19	0.00	0.00	0.00
4.00	0.44	0.00	0.00	0.00
6.00	0.78	0.05	0.00	0.03
8.00	1.62	0.41	0.00	**0.27**
10.00	2.19	0.78	0.00	0.09
12.00	2.52	1.02	0.00	0.07
14.00	2.80	1.22	0.00	0.06
16.00	3.04	1.41	0.00	0.06
18.00	3.27	1.59	0.00	0.06
20.00	3.47	1.76	0.00	0.05
22.00	3.65	1.90	0.00	0.05
24.00	**3.80**	**2.03**	0.00	0.04
26.00	3.80	2.03	0.00	0.00
28.00	3.80	2.03	0.00	0.00
30.00	3.80	2.03	0.00	0.00
32.00	3.80	2.03	0.00	0.00
34.00	3.80	2.03	0.00	0.00
36.00	3.80	2.03	0.00	0.00
38.00	3.80	2.03	0.00	0.00
40.00	3.80	2.03	0.00	0.00
42.00	3.80	2.03	0.00	0.00
44.00	3.80	2.03	0.00	0.00
46.00	3.80	2.03	0.00	0.00
48.00	3.80	2.03	0.00	0.00
50.00	3.80	2.03	0.00	0.00
52.00	3.80	2.03	0.00	0.00
54.00	3.80	2.03	0.00	0.00
56.00	3.80	2.03	0.00	0.00
58.00	3.80	2.03	0.00	0.00
60.00	3.80	2.03	0.00	0.00
62.00	3.80	2.03	0.00	0.00
64.00	3.80	2.03	0.00	0.00
66.00	3.80	2.03	0.00	0.00
68.00	3.80	2.03	0.00	0.00
70.00	3.80	2.03	0.00	0.00
72.00	3.80	2.03	0.00	0.00

Summary for Subcatchment 3: Existing Subbasin 3

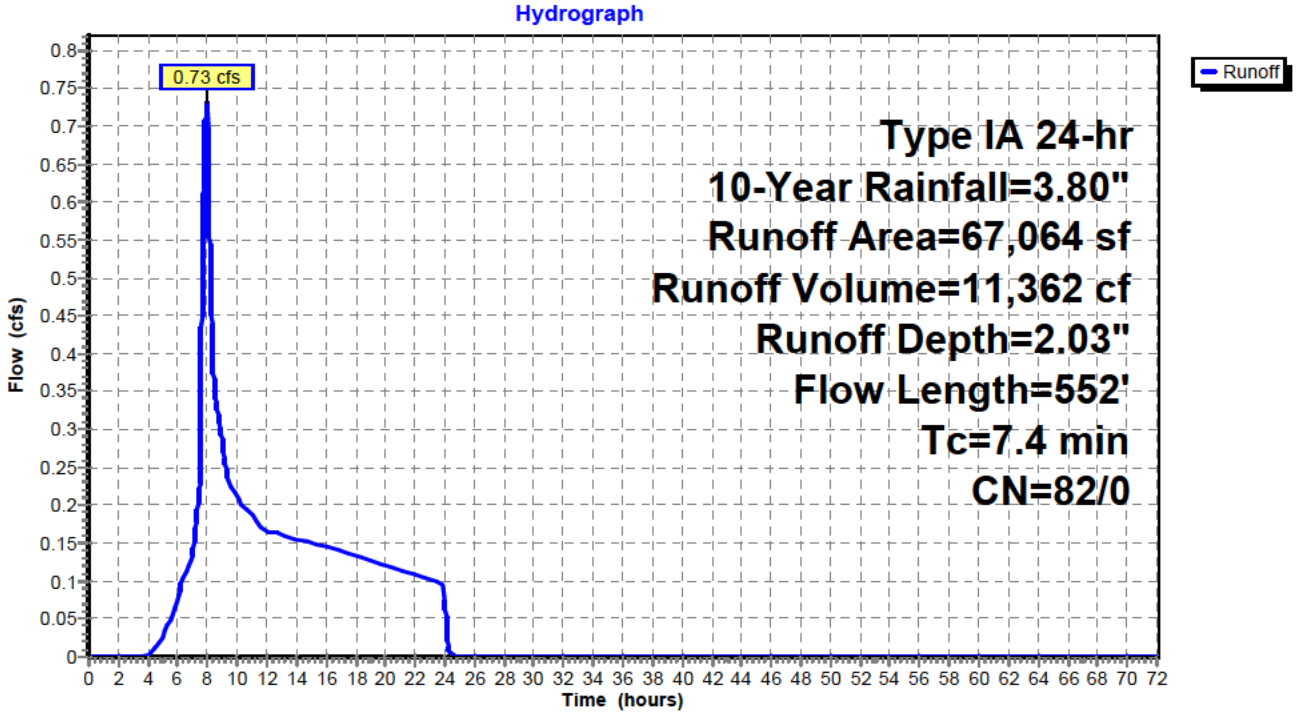
Runoff = 0.73 cfs @ 8.00 hrs, Volume= 11,362 cf, Depth= 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
67,064	82	Row crops, SR + CR, Good, HSG C
67,064	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	65	0.3300	0.41		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
4.7	487	0.0370	1.73		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
7.4	552	Total			

Subcatchment 3: Existing Subbasin 3



Hydrograph for Subcatchment 3: Existing Subbasin 3

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.19	0.00	0.00	0.00
4.00	0.44	0.00	0.00	0.00
6.00	0.78	0.05	0.00	0.08
8.00	1.62	0.41	0.00	**0.73**
10.00	2.19	0.78	0.00	0.21
12.00	2.52	1.02	0.00	0.16
14.00	2.80	1.22	0.00	0.15
16.00	3.04	1.41	0.00	0.15
18.00	3.27	1.59	0.00	0.13
20.00	3.47	1.76	0.00	0.12
22.00	3.65	1.90	0.00	0.11
24.00	**3.80**	**2.03**	0.00	0.09
26.00	3.80	2.03	0.00	0.00
28.00	3.80	2.03	0.00	0.00
30.00	3.80	2.03	0.00	0.00
32.00	3.80	2.03	0.00	0.00
34.00	3.80	2.03	0.00	0.00
36.00	3.80	2.03	0.00	0.00
38.00	3.80	2.03	0.00	0.00
40.00	3.80	2.03	0.00	0.00
42.00	3.80	2.03	0.00	0.00
44.00	3.80	2.03	0.00	0.00
46.00	3.80	2.03	0.00	0.00
48.00	3.80	2.03	0.00	0.00
50.00	3.80	2.03	0.00	0.00
52.00	3.80	2.03	0.00	0.00
54.00	3.80	2.03	0.00	0.00
56.00	3.80	2.03	0.00	0.00
58.00	3.80	2.03	0.00	0.00
60.00	3.80	2.03	0.00	0.00
62.00	3.80	2.03	0.00	0.00
64.00	3.80	2.03	0.00	0.00
66.00	3.80	2.03	0.00	0.00
68.00	3.80	2.03	0.00	0.00
70.00	3.80	2.03	0.00	0.00
72.00	3.80	2.03	0.00	0.00

Summary for Subcatchment 4: Existing Subbasin 4

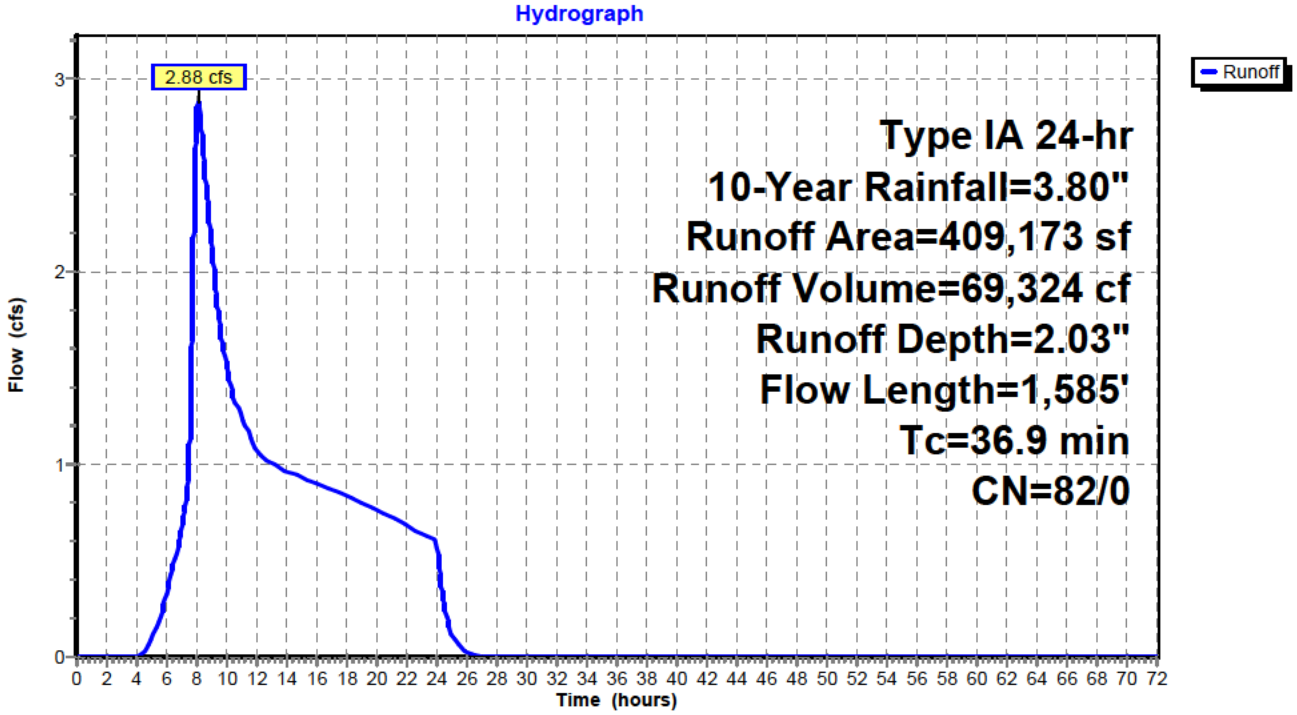
Runoff = 2.88 cfs @ 8.09 hrs, Volume= 69,324 cf, Depth= 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
409,173	82	Row crops, SR + CR, Good, HSG C
409,173	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	300	0.0200	0.18		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
9.0	1,285	0.0700	2.38		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
36.9	1,585	Total			

Subcatchment 4: Existing Subbasin 4



Hydrograph for Subcatchment 4: Existing Subbasin 4

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.19	0.00	0.00	0.00
4.00	0.44	0.00	0.00	0.00
6.00	0.78	0.05	0.00	0.33
8.00	1.62	0.41	0.00	**2.84**
10.00	2.19	0.78	0.00	**1.51**
12.00	2.52	1.02	0.00	1.07
14.00	2.80	1.22	0.00	0.96
16.00	3.04	1.41	0.00	0.90
18.00	3.27	1.59	0.00	0.83
20.00	3.47	1.76	0.00	0.76
22.00	3.65	1.90	0.00	0.68
24.00	**3.80**	**2.03**	0.00	0.60
26.00	3.80	2.03	0.00	0.02
28.00	3.80	2.03	0.00	0.00
30.00	3.80	2.03	0.00	0.00
32.00	3.80	2.03	0.00	0.00
34.00	3.80	2.03	0.00	0.00
36.00	3.80	2.03	0.00	0.00
38.00	3.80	2.03	0.00	0.00
40.00	3.80	2.03	0.00	0.00
42.00	3.80	2.03	0.00	0.00
44.00	3.80	2.03	0.00	0.00
46.00	3.80	2.03	0.00	0.00
48.00	3.80	2.03	0.00	0.00
50.00	3.80	2.03	0.00	0.00
52.00	3.80	2.03	0.00	0.00
54.00	3.80	2.03	0.00	0.00
56.00	3.80	2.03	0.00	0.00
58.00	3.80	2.03	0.00	0.00
60.00	3.80	2.03	0.00	0.00
62.00	3.80	2.03	0.00	0.00
64.00	3.80	2.03	0.00	0.00
66.00	3.80	2.03	0.00	0.00
68.00	3.80	2.03	0.00	0.00
70.00	3.80	2.03	0.00	0.00
72.00	3.80	2.03	0.00	0.00

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1: Existing Subbasin 1 Runoff Area=114,978 sf 0.00% Impervious Runoff Depth=2.64"
Flow Length=1,396' Tc=18.0 min CN=82/0 Runoff=1.43 cfs 25,258 cf

Subcatchment2: Existing Subbasin 2 Runoff Area=27,801 sf 0.00% Impervious Runoff Depth=2.64"
Flow Length=275' Slope=0.0770 '/' Tc=15.2 min CN=82/0 Runoff=0.36 cfs 6,107 cf

Subcatchment3: Existing Subbasin 3 Runoff Area=67,064 sf 0.00% Impervious Runoff Depth=2.64"
Flow Length=552' Tc=7.4 min CN=82/0 Runoff=0.98 cfs 14,732 cf

Subcatchment4: Existing Subbasin 4 Runoff Area=409,173 sf 0.00% Impervious Runoff Depth=2.64"
Flow Length=1,585' Tc=36.9 min CN=82/0 Runoff=3.89 cfs 89,884 cf

Total Runoff Area = 619,016 sf Runoff Volume = 135,981 cf Average Runoff Depth = 2.64"
100.00% Pervious = 619,016 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1: Existing Subbasin 1

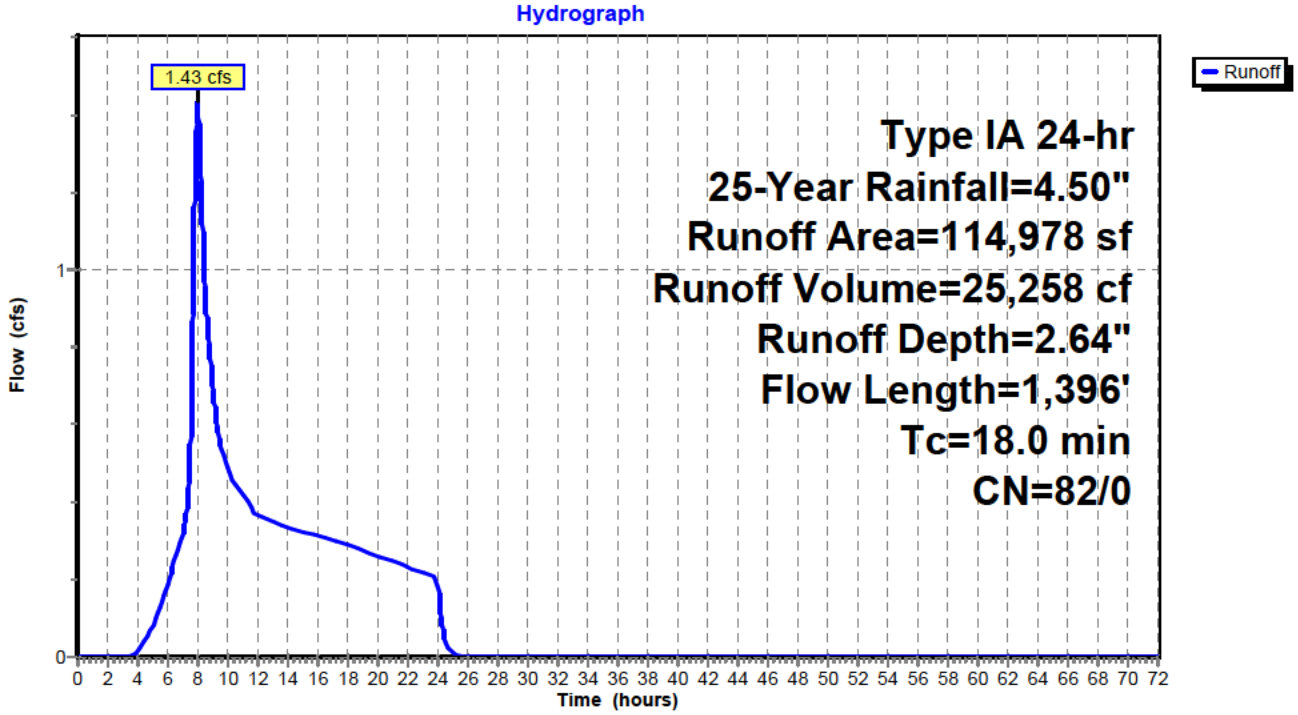
Runoff = 1.43 cfs @ 8.00 hrs, Volume= 25,258 cf, Depth= 2.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
114,978	82	Row crops, SR + CR, Good, HSG C
114,978	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	466	0.0200	1.27		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
11.9	930	0.0210	1.30		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
18.0	1,396	Total			

Subcatchment 1: Existing Subbasin 1



Hydrograph for Subcatchment 1: Existing Subbasin 1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.23	0.00	0.00	0.00
4.00	0.52	0.00	0.00	0.02
6.00	0.93	0.09	0.00	0.18
8.00	1.91	0.59	0.00	**1.43**
10.00	2.60	1.07	0.00	0.49
12.00	2.99	1.37	0.00	0.36
14.00	3.31	1.63	0.00	0.33
16.00	3.60	1.87	0.00	0.31
18.00	3.87	2.09	0.00	0.29
20.00	4.11	2.29	0.00	0.26
22.00	4.32	2.48	0.00	0.23
24.00	**4.50**	**2.64**	0.00	0.20
26.00	4.50	2.64	0.00	0.00
28.00	4.50	2.64	0.00	0.00
30.00	4.50	2.64	0.00	0.00
32.00	4.50	2.64	0.00	0.00
34.00	4.50	2.64	0.00	0.00
36.00	4.50	2.64	0.00	0.00
38.00	4.50	2.64	0.00	0.00
40.00	4.50	2.64	0.00	0.00
42.00	4.50	2.64	0.00	0.00
44.00	4.50	2.64	0.00	0.00
46.00	4.50	2.64	0.00	0.00
48.00	4.50	2.64	0.00	0.00
50.00	4.50	2.64	0.00	0.00
52.00	4.50	2.64	0.00	0.00
54.00	4.50	2.64	0.00	0.00
56.00	4.50	2.64	0.00	0.00
58.00	4.50	2.64	0.00	0.00
60.00	4.50	2.64	0.00	0.00
62.00	4.50	2.64	0.00	0.00
64.00	4.50	2.64	0.00	0.00
66.00	4.50	2.64	0.00	0.00
68.00	4.50	2.64	0.00	0.00
70.00	4.50	2.64	0.00	0.00
72.00	4.50	2.64	0.00	0.00

Summary for Subcatchment 2: Existing Subbasin 2

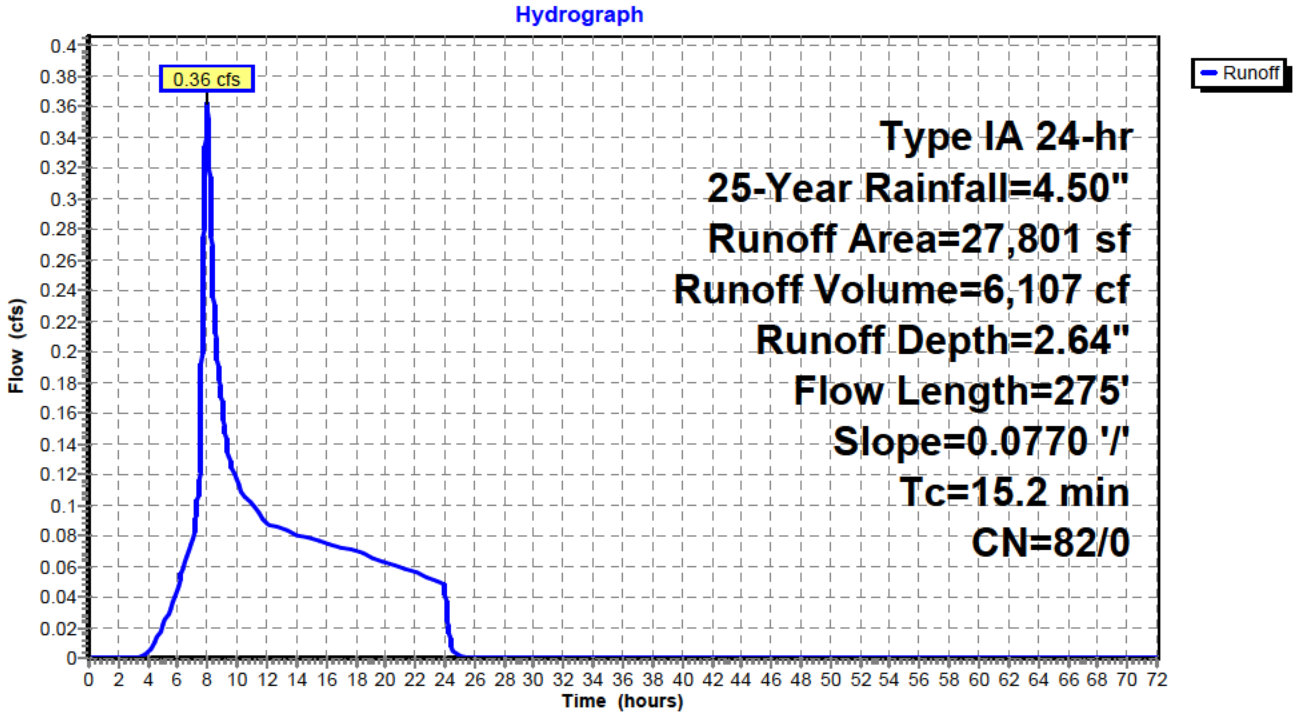
Runoff = 0.36 cfs @ 8.00 hrs, Volume= 6,107 cf, Depth= 2.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
27,801	82	Row crops, SR + CR, Good, HSG C
27,801	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	275	0.0770	0.30		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"

Subcatchment 2: Existing Subbasin 2



Hydrograph for Subcatchment 2: Existing Subbasin 2

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.23	0.00	0.00	0.00
4.00	0.52	0.00	0.00	0.00
6.00	0.93	0.09	0.00	0.05
8.00	1.91	0.59	0.00	**0.36**
10.00	2.60	1.07	0.00	0.12
12.00	2.99	1.37	0.00	0.09
14.00	3.31	1.63	0.00	0.08
16.00	3.60	1.87	0.00	0.08
18.00	3.87	2.09	0.00	0.07
20.00	4.11	2.29	0.00	0.06
22.00	4.32	2.48	0.00	0.06
24.00	**4.50**	**2.64**	0.00	0.05
26.00	4.50	2.64	0.00	0.00
28.00	4.50	2.64	0.00	0.00
30.00	4.50	2.64	0.00	0.00
32.00	4.50	2.64	0.00	0.00
34.00	4.50	2.64	0.00	0.00
36.00	4.50	2.64	0.00	0.00
38.00	4.50	2.64	0.00	0.00
40.00	4.50	2.64	0.00	0.00
42.00	4.50	2.64	0.00	0.00
44.00	4.50	2.64	0.00	0.00
46.00	4.50	2.64	0.00	0.00
48.00	4.50	2.64	0.00	0.00
50.00	4.50	2.64	0.00	0.00
52.00	4.50	2.64	0.00	0.00
54.00	4.50	2.64	0.00	0.00
56.00	4.50	2.64	0.00	0.00
58.00	4.50	2.64	0.00	0.00
60.00	4.50	2.64	0.00	0.00
62.00	4.50	2.64	0.00	0.00
64.00	4.50	2.64	0.00	0.00
66.00	4.50	2.64	0.00	0.00
68.00	4.50	2.64	0.00	0.00
70.00	4.50	2.64	0.00	0.00
72.00	4.50	2.64	0.00	0.00

Summary for Subcatchment 3: Existing Subbasin 3

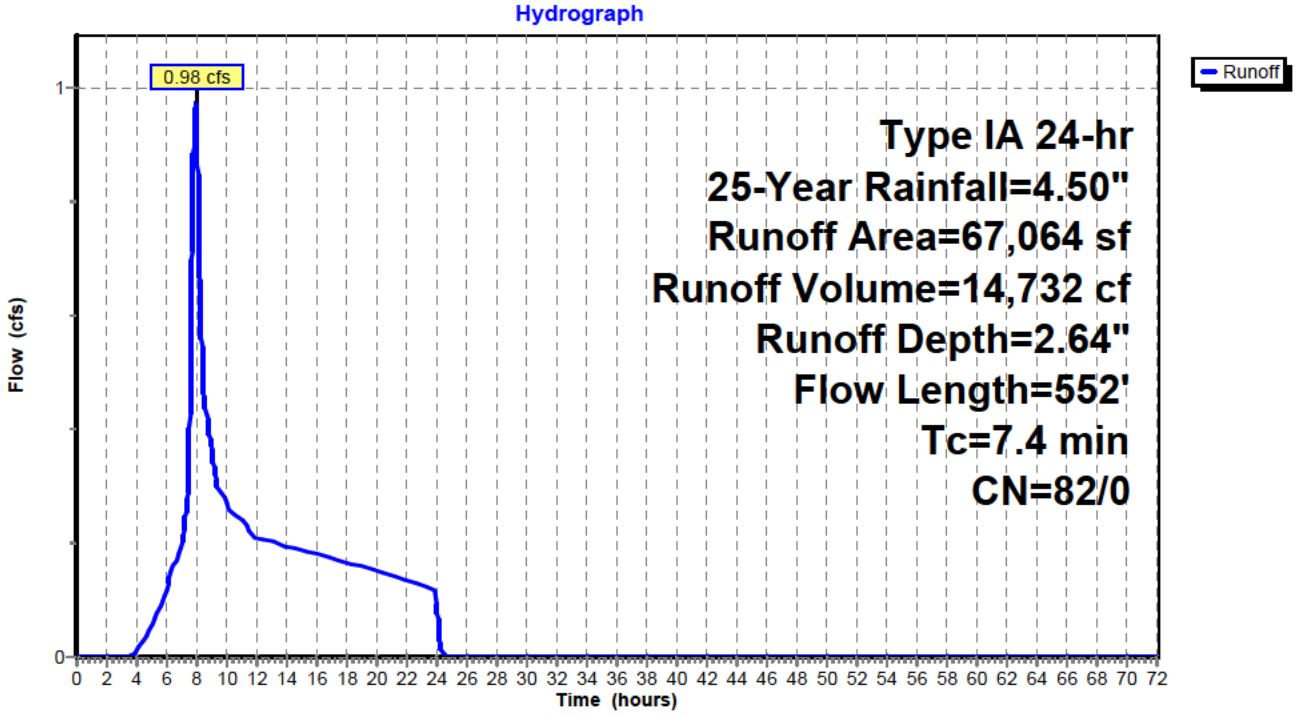
Runoff = 0.98 cfs @ 7.99 hrs, Volume= 14,732 cf, Depth= 2.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
67,064	82	Row crops, SR + CR, Good, HSG C
67,064	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	65	0.3300	0.41		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
4.7	487	0.0370	1.73		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
7.4	552	Total			

Subcatchment 3: Existing Subbasin 3



Hydrograph for Subcatchment 3: Existing Subbasin 3

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.23	0.00	0.00	0.00
4.00	0.52	0.00	0.00	0.01
6.00	0.93	0.09	0.00	**0.12**
8.00	1.91	0.59	0.00	**0.98**
10.00	2.60	1.07	0.00	0.27
12.00	2.99	1.37	0.00	0.21
14.00	3.31	1.63	0.00	0.19
16.00	3.60	1.87	0.00	0.18
18.00	3.87	2.09	0.00	0.17
20.00	4.11	2.29	0.00	0.15
22.00	4.32	2.48	0.00	0.13
24.00	**4.50**	**2.64**	0.00	0.12
26.00	4.50	2.64	0.00	0.00
28.00	4.50	2.64	0.00	0.00
30.00	4.50	2.64	0.00	0.00
32.00	4.50	2.64	0.00	0.00
34.00	4.50	2.64	0.00	0.00
36.00	4.50	2.64	0.00	0.00
38.00	4.50	2.64	0.00	0.00
40.00	4.50	2.64	0.00	0.00
42.00	4.50	2.64	0.00	0.00
44.00	4.50	2.64	0.00	0.00
46.00	4.50	2.64	0.00	0.00
48.00	4.50	2.64	0.00	0.00
50.00	4.50	2.64	0.00	0.00
52.00	4.50	2.64	0.00	0.00
54.00	4.50	2.64	0.00	0.00
56.00	4.50	2.64	0.00	0.00
58.00	4.50	2.64	0.00	0.00
60.00	4.50	2.64	0.00	0.00
62.00	4.50	2.64	0.00	0.00
64.00	4.50	2.64	0.00	0.00
66.00	4.50	2.64	0.00	0.00
68.00	4.50	2.64	0.00	0.00
70.00	4.50	2.64	0.00	0.00
72.00	4.50	2.64	0.00	0.00

Summary for Subcatchment 4: Existing Subbasin 4

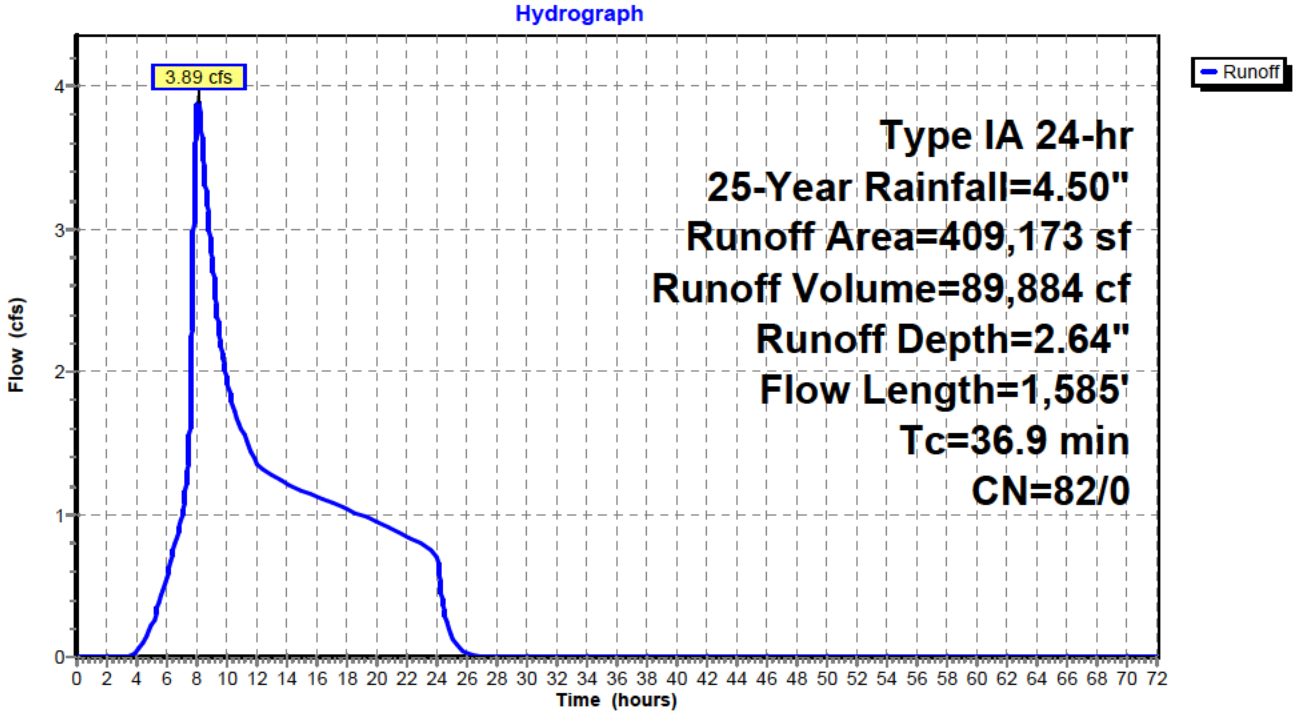
Runoff = 3.89 cfs @ 8.07 hrs, Volume= 89,884 cf, Depth= 2.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
409,173	82	Row crops, SR + CR, Good, HSG C
409,173	82	100.00% Pervious Area

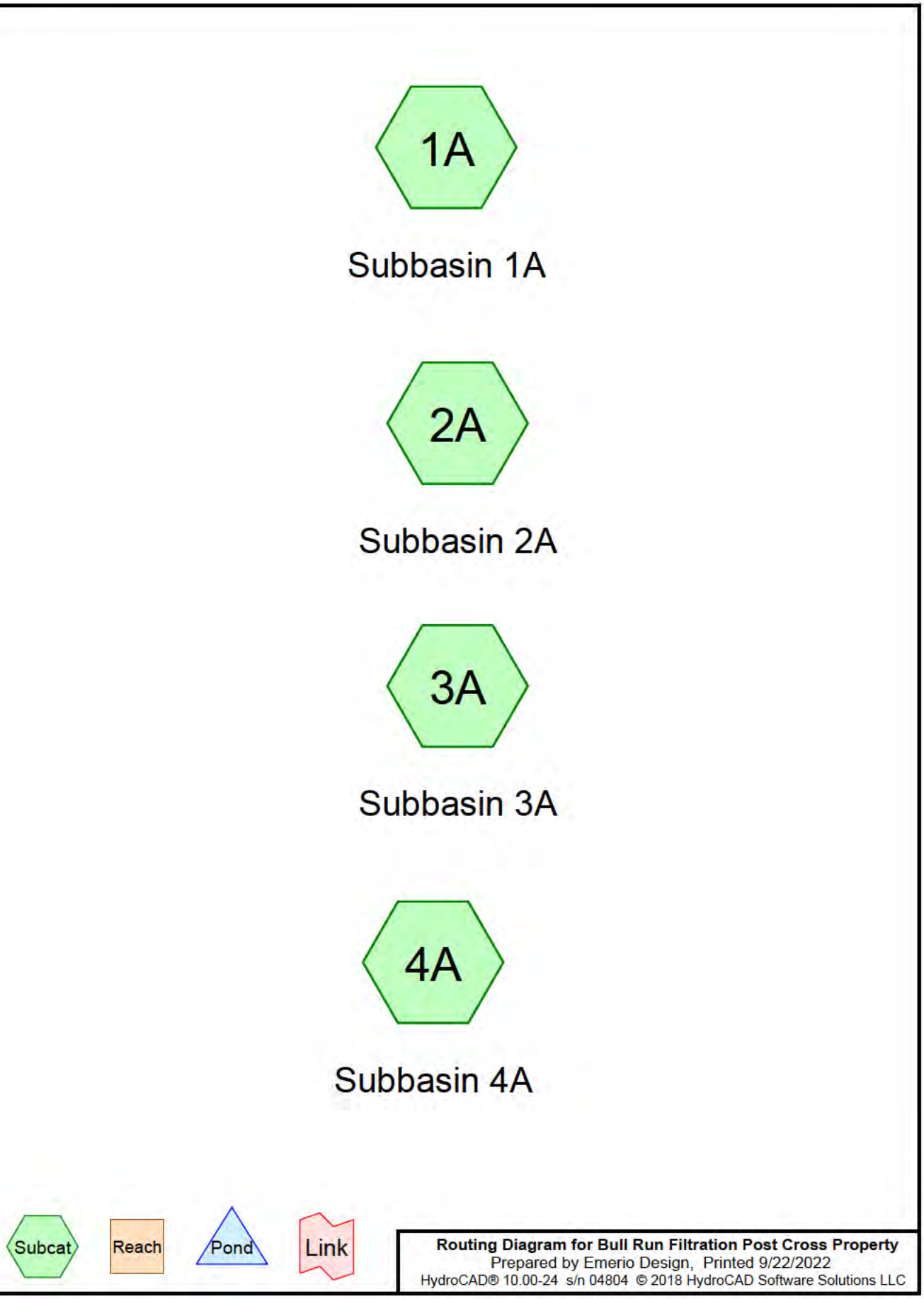
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	300	0.0200	0.18		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
9.0	1,285	0.0700	2.38		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
36.9	1,585	Total			

Subcatchment 4: Existing Subbasin 4



Hydrograph for Subcatchment 4: Existing Subbasin 4

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.23	0.00	0.00	0.00
4.00	0.52	0.00	0.00	0.04
6.00	0.93	0.09	0.00	0.54
8.00	1.91	0.59	0.00	**3.86**
10.00	2.60	1.07	0.00	**1.94**
12.00	2.99	1.37	0.00	1.36
14.00	3.31	1.63	0.00	1.20
16.00	3.60	1.87	0.00	1.12
18.00	3.87	2.09	0.00	1.04
20.00	4.11	2.29	0.00	0.94
22.00	4.32	2.48	0.00	0.84
24.00	**4.50**	**2.64**	0.00	0.74
26.00	4.50	2.64	0.00	0.03
28.00	4.50	2.64	0.00	0.00
30.00	4.50	2.64	0.00	0.00
32.00	4.50	2.64	0.00	0.00
34.00	4.50	2.64	0.00	0.00
36.00	4.50	2.64	0.00	0.00
38.00	4.50	2.64	0.00	0.00
40.00	4.50	2.64	0.00	0.00
42.00	4.50	2.64	0.00	0.00
44.00	4.50	2.64	0.00	0.00
46.00	4.50	2.64	0.00	0.00
48.00	4.50	2.64	0.00	0.00
50.00	4.50	2.64	0.00	0.00
52.00	4.50	2.64	0.00	0.00
54.00	4.50	2.64	0.00	0.00
56.00	4.50	2.64	0.00	0.00
58.00	4.50	2.64	0.00	0.00
60.00	4.50	2.64	0.00	0.00
62.00	4.50	2.64	0.00	0.00
64.00	4.50	2.64	0.00	0.00
66.00	4.50	2.64	0.00	0.00
68.00	4.50	2.64	0.00	0.00
70.00	4.50	2.64	0.00	0.00
72.00	4.50	2.64	0.00	0.00



Routing Diagram for Bull Run Filtration Post Cross Property
Prepared by Emerio Design, Printed 9/22/2022
HydroCAD® 10.00-24 s/n 04804 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
619,016	80	>75% Grass cover, Good, HSG D (1A, 2A, 3A, 4A)
619,016	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
0	HSG C	
619,016	HSG D	1A, 2A, 3A, 4A
0	Other	
619,016		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	0	0	619,016	0	619,016	>75% Grass cover, Good	
0	**0**	**0**	**619,016**	**0**	**619,016**	**TOTAL AREA**	

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1A: Subbasin 1A Runoff Area=114,978 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=1,396' Tc=12.5 min CN=80/0 Runoff=0.55 cfs 10,560 cf

Subcatchment2A: Subbasin 2A Runoff Area=27,801 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=275' Slope=0.0770 '/' Tc=30.1 min CN=80/0 Runoff=0.10 cfs 2,553 cf

Subcatchment3A: Subbasin 3A Runoff Area=67,064 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=552' Tc=7.2 min CN=80/0 Runoff=0.35 cfs 6,159 cf

Subcatchment4A: Subbasin 4A Runoff Area=409,173 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=1,585' Tc=48.3 min CN=80/0 Runoff=1.16 cfs 37,579 cf

Total Runoff Area = 619,016 sf Runoff Volume = 56,851 cf Average Runoff Depth = 1.10"
100.00% Pervious = 619,016 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1A: Subbasin 1A

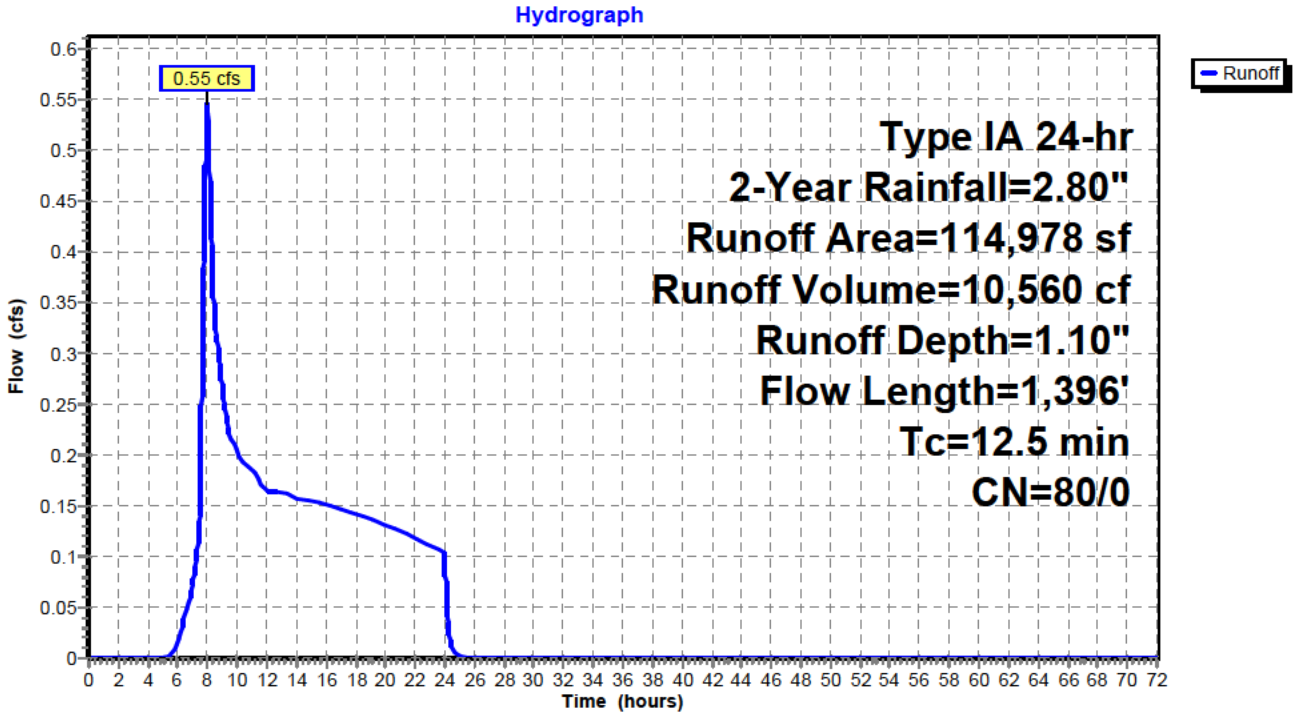
Runoff = 0.55 cfs @ 8.00 hrs, Volume= 10,560 cf, Depth= 1.10"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
114,978	80	>75% Grass cover, Good, HSG D
114,978	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	466	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.7	930	0.0210	3.29	19.72	**Channel Flow,** Area= 6.0 sf Perim= 9.0' r= 0.67' n= 0.050 Scattered brush, heavy weeds
12.5	1,396	Total			

Subcatchment 1A: Subbasin 1A



Hydrograph for Subcatchment 1A: Subbasin 1A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.14	0.00	0.00	0.00
4.00	0.32	0.00	0.00	0.00
6.00	0.58	0.00	0.00	0.01
8.00	1.19	0.15	0.00	**0.55**
10.00	1.62	0.34	0.00	0.20
12.00	1.86	0.48	0.00	0.16
14.00	2.06	0.60	0.00	0.16
16.00	2.24	0.72	0.00	0.15
18.00	2.41	0.83	0.00	0.14
20.00	2.56	0.93	0.00	0.13
22.00	2.69	1.02	0.00	0.12
24.00	**2.80**	**1.10**	0.00	0.10
26.00	2.80	1.10	0.00	0.00
28.00	2.80	1.10	0.00	0.00
30.00	2.80	1.10	0.00	0.00
32.00	2.80	1.10	0.00	0.00
34.00	2.80	1.10	0.00	0.00
36.00	2.80	1.10	0.00	0.00
38.00	2.80	1.10	0.00	0.00
40.00	2.80	1.10	0.00	0.00
42.00	2.80	1.10	0.00	0.00
44.00	2.80	1.10	0.00	0.00
46.00	2.80	1.10	0.00	0.00
48.00	2.80	1.10	0.00	0.00
50.00	2.80	1.10	0.00	0.00
52.00	2.80	1.10	0.00	0.00
54.00	2.80	1.10	0.00	0.00
56.00	2.80	1.10	0.00	0.00
58.00	2.80	1.10	0.00	0.00
60.00	2.80	1.10	0.00	0.00
62.00	2.80	1.10	0.00	0.00
64.00	2.80	1.10	0.00	0.00
66.00	2.80	1.10	0.00	0.00
68.00	2.80	1.10	0.00	0.00
70.00	2.80	1.10	0.00	0.00
72.00	2.80	1.10	0.00	0.00

Summary for Subcatchment 2A: Subbasin 2A

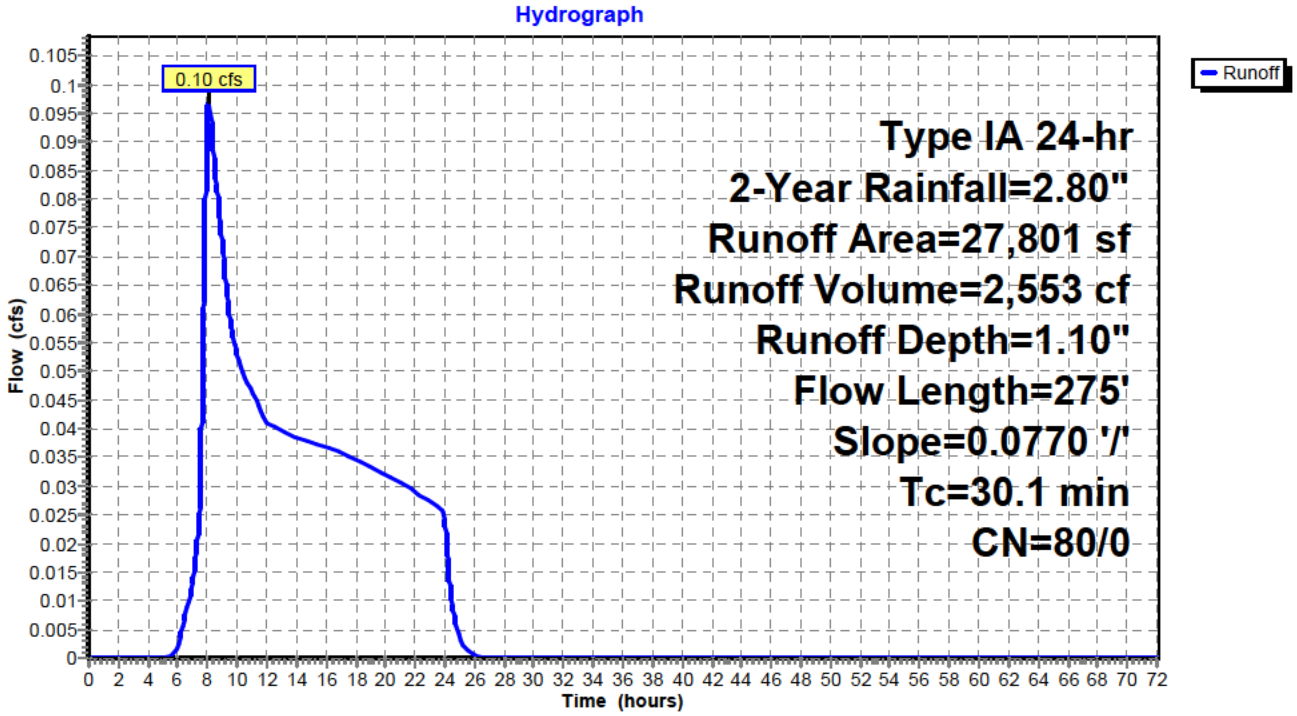
Runoff = 0.10 cfs @ 8.10 hrs, Volume= 2,553 cf, Depth= 1.10"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
27,801	80	>75% Grass cover, Good, HSG D
27,801	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.1	275	0.0770	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"

Subcatchment 2A: Subbasin 2A



Hydrograph for Subcatchment 2A: Subbasin 2A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.14	0.00	0.00	0.00
4.00	0.32	0.00	0.00	0.00
6.00	0.58	0.00	0.00	0.00
8.00	1.19	0.15	0.00	**0.10**
10.00	1.62	0.34	0.00	**0.05**
12.00	1.86	0.48	0.00	0.04
14.00	2.06	0.60	0.00	0.04
16.00	2.24	0.72	0.00	0.04
18.00	2.41	0.83	0.00	0.03
20.00	2.56	0.93	0.00	0.03
22.00	2.69	1.02	0.00	0.03
24.00	**2.80**	**1.10**	0.00	0.03
26.00	2.80	1.10	0.00	0.00
28.00	2.80	1.10	0.00	0.00
30.00	2.80	1.10	0.00	0.00
32.00	2.80	1.10	0.00	0.00
34.00	2.80	1.10	0.00	0.00
36.00	2.80	1.10	0.00	0.00
38.00	2.80	1.10	0.00	0.00
40.00	2.80	1.10	0.00	0.00
42.00	2.80	1.10	0.00	0.00
44.00	2.80	1.10	0.00	0.00
46.00	2.80	1.10	0.00	0.00
48.00	2.80	1.10	0.00	0.00
50.00	2.80	1.10	0.00	0.00
52.00	2.80	1.10	0.00	0.00
54.00	2.80	1.10	0.00	0.00
56.00	2.80	1.10	0.00	0.00
58.00	2.80	1.10	0.00	0.00
60.00	2.80	1.10	0.00	0.00
62.00	2.80	1.10	0.00	0.00
64.00	2.80	1.10	0.00	0.00
66.00	2.80	1.10	0.00	0.00
68.00	2.80	1.10	0.00	0.00
70.00	2.80	1.10	0.00	0.00
72.00	2.80	1.10	0.00	0.00

Summary for Subcatchment 3A: Subbasin 3A

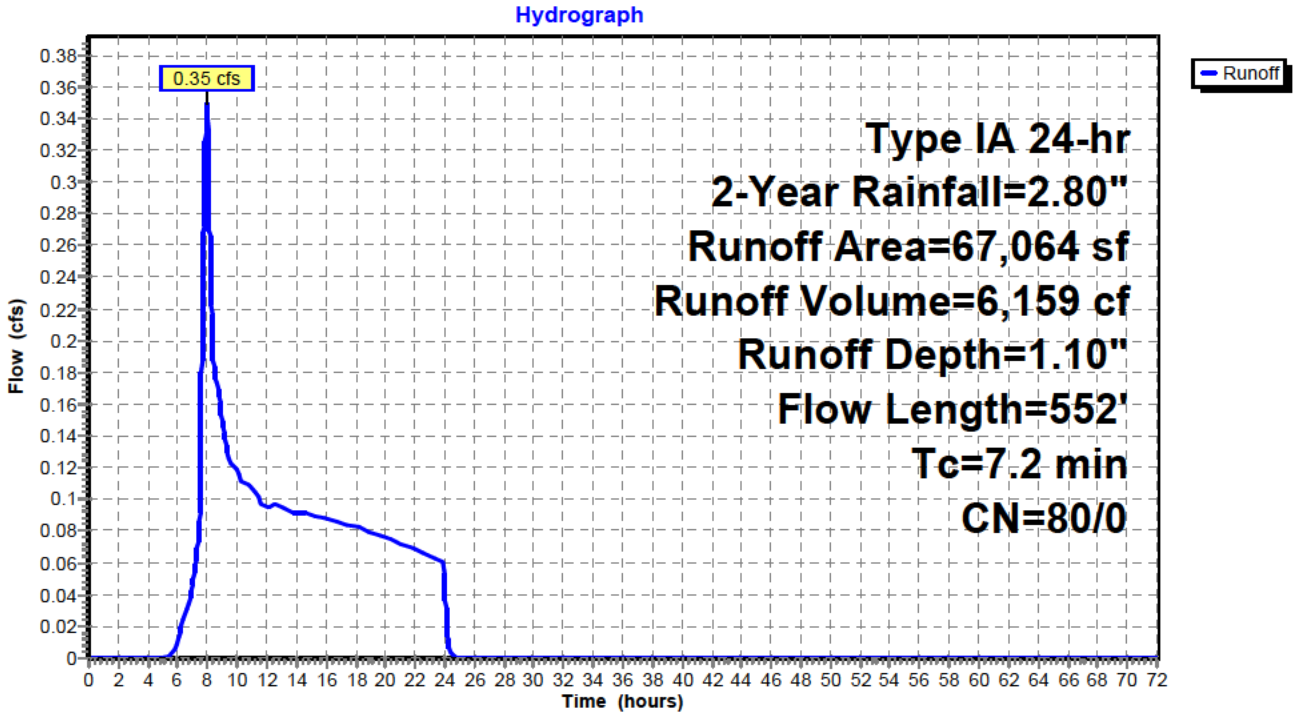
Runoff = 0.35 cfs @ 8.00 hrs, Volume= 6,159 cf, Depth= 1.10"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
67,064	80	>75% Grass cover, Good, HSG D
67,064	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	65	0.3300	0.20		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
1.9	487	0.0370	4.36	26.18	**Channel Flow,** Area= 6.0 sf Perim= 9.0' r= 0.67' n= 0.050 Scattered brush, heavy weeds
7.2	552	Total			

Subcatchment 3A: Subbasin 3A



Hydrograph for Subcatchment 3A: Subbasin 3A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.14	0.00	0.00	0.00
4.00	0.32	0.00	0.00	0.00
6.00	0.58	0.00	0.00	0.01
8.00	1.19	0.15	0.00	**0.35**
10.00	1.62	0.34	0.00	0.12
12.00	1.86	0.48	0.00	0.09
14.00	2.06	0.60	0.00	0.09
16.00	2.24	0.72	0.00	0.09
18.00	2.41	0.83	0.00	0.08
20.00	2.56	0.93	0.00	0.08
22.00	2.69	1.02	0.00	0.07
24.00	**2.80**	**1.10**	0.00	0.06
26.00	2.80	1.10	0.00	0.00
28.00	2.80	1.10	0.00	0.00
30.00	2.80	1.10	0.00	0.00
32.00	2.80	1.10	0.00	0.00
34.00	2.80	1.10	0.00	0.00
36.00	2.80	1.10	0.00	0.00
38.00	2.80	1.10	0.00	0.00
40.00	2.80	1.10	0.00	0.00
42.00	2.80	1.10	0.00	0.00
44.00	2.80	1.10	0.00	0.00
46.00	2.80	1.10	0.00	0.00
48.00	2.80	1.10	0.00	0.00
50.00	2.80	1.10	0.00	0.00
52.00	2.80	1.10	0.00	0.00
54.00	2.80	1.10	0.00	0.00
56.00	2.80	1.10	0.00	0.00
58.00	2.80	1.10	0.00	0.00
60.00	2.80	1.10	0.00	0.00
62.00	2.80	1.10	0.00	0.00
64.00	2.80	1.10	0.00	0.00
66.00	2.80	1.10	0.00	0.00
68.00	2.80	1.10	0.00	0.00
70.00	2.80	1.10	0.00	0.00
72.00	2.80	1.10	0.00	0.00

Summary for Subcatchment 4A: Subbasin 4A

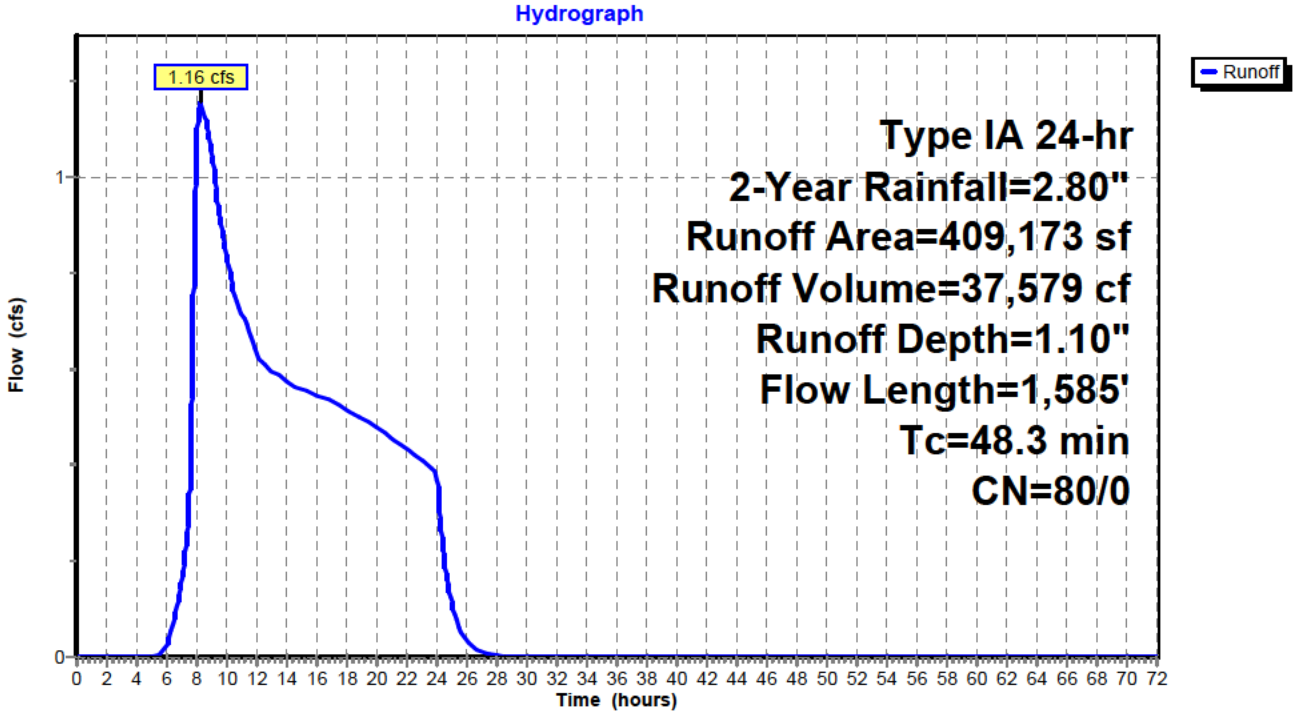
Runoff = 1.16 cfs @ 8.27 hrs, Volume= 37,579 cf, Depth= 1.10"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
409,173	80	>75% Grass cover, Good, HSG D
409,173	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.7	300	0.0200	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80"
11.6	1,285	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
48.3	1,585	Total			

Subcatchment 4A: Subbasin 4A



Hydrograph for Subcatchment 4A: Subbasin 4A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.14	0.00	0.00	0.00
4.00	0.32	0.00	0.00	0.00
6.00	0.58	0.00	0.00	0.02
8.00	1.19	0.15	0.00	**1.08**
10.00	1.62	0.34	0.00	**0.83**
12.00	1.86	0.48	0.00	0.63
14.00	2.06	0.60	0.00	0.57
16.00	2.24	0.72	0.00	0.55
18.00	2.41	0.83	0.00	0.52
20.00	2.56	0.93	0.00	0.48
22.00	2.69	1.02	0.00	0.43
24.00	**2.80**	**1.10**	0.00	0.38
26.00	2.80	1.10	0.00	0.03
28.00	2.80	1.10	0.00	0.00
30.00	2.80	1.10	0.00	0.00
32.00	2.80	1.10	0.00	0.00
34.00	2.80	1.10	0.00	0.00
36.00	2.80	1.10	0.00	0.00
38.00	2.80	1.10	0.00	0.00
40.00	2.80	1.10	0.00	0.00
42.00	2.80	1.10	0.00	0.00
44.00	2.80	1.10	0.00	0.00
46.00	2.80	1.10	0.00	0.00
48.00	2.80	1.10	0.00	0.00
50.00	2.80	1.10	0.00	0.00
52.00	2.80	1.10	0.00	0.00
54.00	2.80	1.10	0.00	0.00
56.00	2.80	1.10	0.00	0.00
58.00	2.80	1.10	0.00	0.00
60.00	2.80	1.10	0.00	0.00
62.00	2.80	1.10	0.00	0.00
64.00	2.80	1.10	0.00	0.00
66.00	2.80	1.10	0.00	0.00
68.00	2.80	1.10	0.00	0.00
70.00	2.80	1.10	0.00	0.00
72.00	2.80	1.10	0.00	0.00

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1A: Subbasin 1A Runoff Area=114,978 sf 0.00% Impervious Runoff Depth=1.56"
Flow Length=1,396' Tc=12.5 min CN=80/0 Runoff=0.84 cfs 14,922 cf

Subcatchment2A: Subbasin 2A Runoff Area=27,801 sf 0.00% Impervious Runoff Depth=1.56"
Flow Length=275' Slope=0.0770 '/' Tc=30.1 min CN=80/0 Runoff=0.15 cfs 3,608 cf

Subcatchment3A: Subbasin 3A Runoff Area=67,064 sf 0.00% Impervious Runoff Depth=1.56"
Flow Length=552' Tc=7.2 min CN=80/0 Runoff=0.53 cfs 8,704 cf

Subcatchment4A: Subbasin 4A Runoff Area=409,173 sf 0.00% Impervious Runoff Depth=1.56"
Flow Length=1,585' Tc=48.3 min CN=80/0 Runoff=1.80 cfs 53,104 cf

Total Runoff Area = 619,016 sf Runoff Volume = 80,338 cf Average Runoff Depth = 1.56"
100.00% Pervious = 619,016 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1A: Subbasin 1A

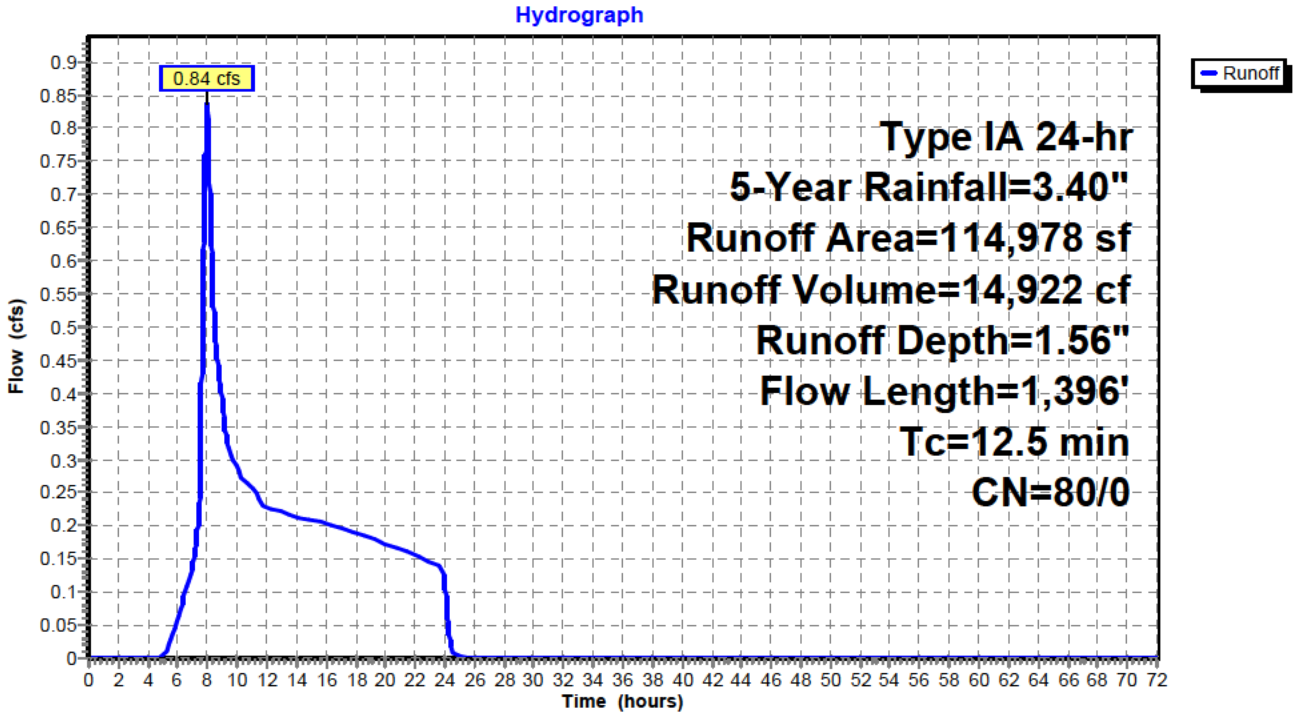
Runoff = 0.84 cfs @ 8.00 hrs, Volume= 14,922 cf, Depth= 1.56"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
114,978	80	>75% Grass cover, Good, HSG D
114,978	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	466	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.7	930	0.0210	3.29	19.72	**Channel Flow,** Area= 6.0 sf Perim= 9.0' r= 0.67' n= 0.050 Scattered brush, heavy weeds
12.5	1,396	Total			

Subcatchment 1A: Subbasin 1A



Hydrograph for Subcatchment 1A: Subbasin 1A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.17	0.00	0.00	0.00
4.00	0.39	0.00	0.00	0.00
6.00	0.70	0.01	0.00	0.06
8.00	1.45	0.26	0.00	**0.84**
10.00	1.96	0.54	0.00	0.29
12.00	2.26	0.73	0.00	0.22
14.00	2.50	0.89	0.00	0.21
16.00	2.72	1.05	0.00	0.20
18.00	2.92	1.19	0.00	0.19
20.00	3.10	1.33	0.00	0.17
22.00	3.26	1.45	0.00	0.16
24.00	**3.40**	**1.56**	0.00	0.14
26.00	3.40	1.56	0.00	0.00
28.00	3.40	1.56	0.00	0.00
30.00	3.40	1.56	0.00	0.00
32.00	3.40	1.56	0.00	0.00
34.00	3.40	1.56	0.00	0.00
36.00	3.40	1.56	0.00	0.00
38.00	3.40	1.56	0.00	0.00
40.00	3.40	1.56	0.00	0.00
42.00	3.40	1.56	0.00	0.00
44.00	3.40	1.56	0.00	0.00
46.00	3.40	1.56	0.00	0.00
48.00	3.40	1.56	0.00	0.00
50.00	3.40	1.56	0.00	0.00
52.00	3.40	1.56	0.00	0.00
54.00	3.40	1.56	0.00	0.00
56.00	3.40	1.56	0.00	0.00
58.00	3.40	1.56	0.00	0.00
60.00	3.40	1.56	0.00	0.00
62.00	3.40	1.56	0.00	0.00
64.00	3.40	1.56	0.00	0.00
66.00	3.40	1.56	0.00	0.00
68.00	3.40	1.56	0.00	0.00
70.00	3.40	1.56	0.00	0.00
72.00	3.40	1.56	0.00	0.00

Summary for Subcatchment 2A: Subbasin 2A

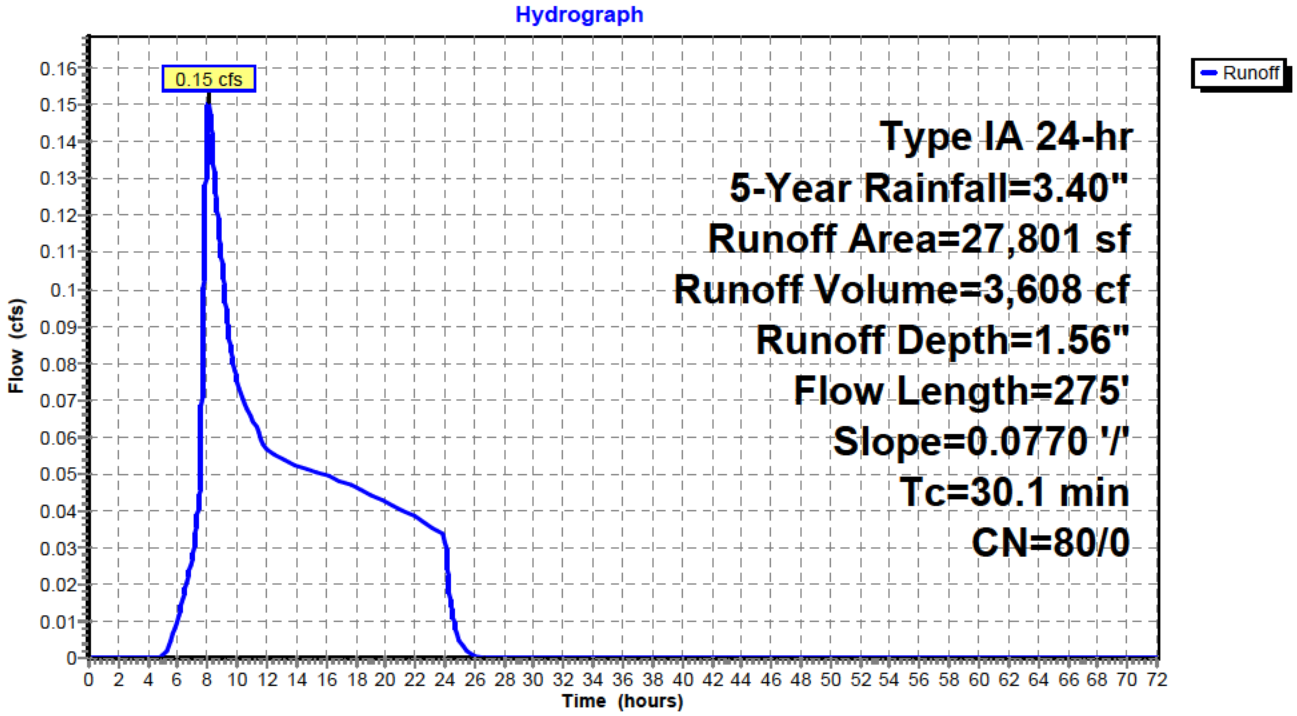
Runoff = 0.15 cfs @ 8.06 hrs, Volume= 3,608 cf, Depth= 1.56"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
27,801	80	>75% Grass cover, Good, HSG D
27,801	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.1	275	0.0770	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"

Subcatchment 2A: Subbasin 2A



Hydrograph for Subcatchment 2A: Subbasin 2A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.17	0.00	0.00	0.00
4.00	0.39	0.00	0.00	0.00
6.00	0.70	0.01	0.00	0.01
8.00	1.45	0.26	0.00	**0.15**
10.00	1.96	0.54	0.00	**0.08**
12.00	2.26	0.73	0.00	0.06
14.00	2.50	0.89	0.00	0.05
16.00	2.72	1.05	0.00	0.05
18.00	2.92	1.19	0.00	0.05
20.00	3.10	1.33	0.00	0.04
22.00	3.26	1.45	0.00	0.04
24.00	**3.40**	**1.56**	0.00	0.03
26.00	3.40	1.56	0.00	0.00
28.00	3.40	1.56	0.00	0.00
30.00	3.40	1.56	0.00	0.00
32.00	3.40	1.56	0.00	0.00
34.00	3.40	1.56	0.00	0.00
36.00	3.40	1.56	0.00	0.00
38.00	3.40	1.56	0.00	0.00
40.00	3.40	1.56	0.00	0.00
42.00	3.40	1.56	0.00	0.00
44.00	3.40	1.56	0.00	0.00
46.00	3.40	1.56	0.00	0.00
48.00	3.40	1.56	0.00	0.00
50.00	3.40	1.56	0.00	0.00
52.00	3.40	1.56	0.00	0.00
54.00	3.40	1.56	0.00	0.00
56.00	3.40	1.56	0.00	0.00
58.00	3.40	1.56	0.00	0.00
60.00	3.40	1.56	0.00	0.00
62.00	3.40	1.56	0.00	0.00
64.00	3.40	1.56	0.00	0.00
66.00	3.40	1.56	0.00	0.00
68.00	3.40	1.56	0.00	0.00
70.00	3.40	1.56	0.00	0.00
72.00	3.40	1.56	0.00	0.00

Summary for Subcatchment 3A: Subbasin 3A

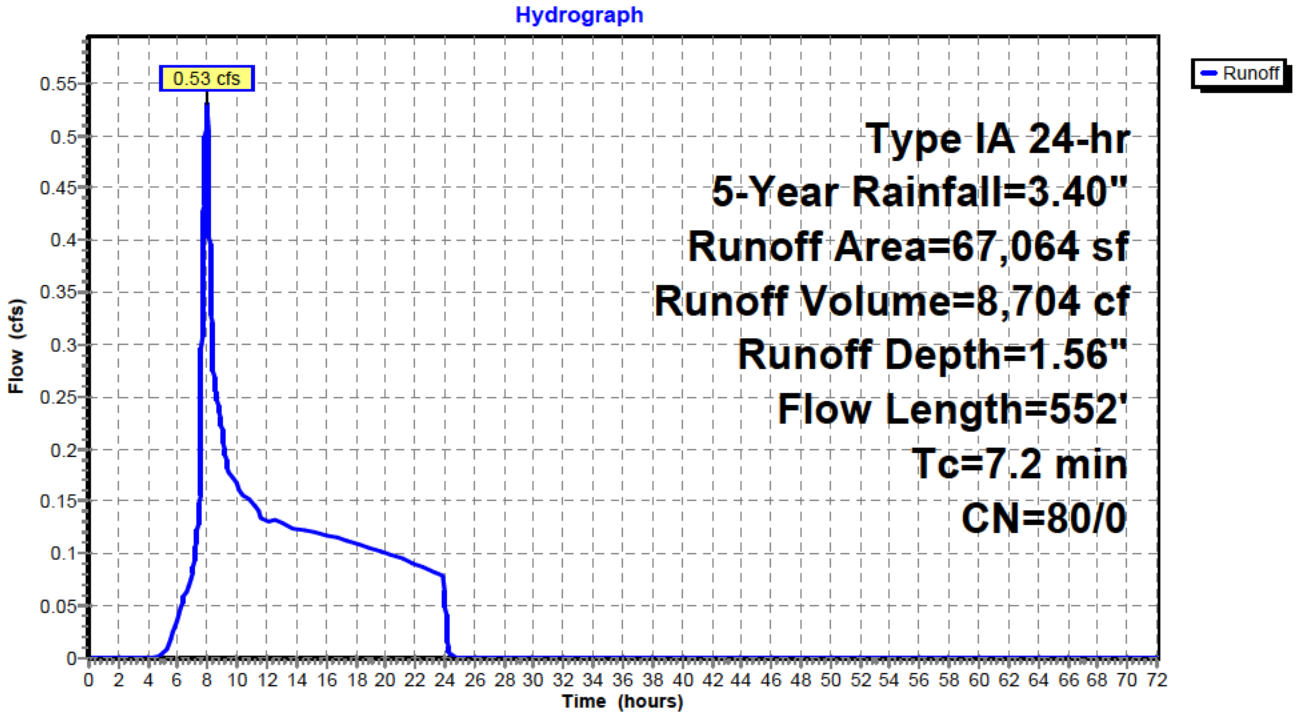
Runoff = 0.53 cfs @ 8.00 hrs, Volume= 8,704 cf, Depth= 1.56"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
67,064	80	>75% Grass cover, Good, HSG D
67,064	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	65	0.3300	0.20		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
1.9	487	0.0370	4.36	26.18	**Channel Flow,** Area= 6.0 sf Perim= 9.0' r= 0.67' n= 0.050 Scattered brush, heavy weeds
7.2	552	Total			

Subcatchment 3A: Subbasin 3A



Hydrograph for Subcatchment 3A: Subbasin 3A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.17	0.00	0.00	0.00
4.00	0.39	0.00	0.00	0.00
6.00	0.70	0.01	0.00	0.04
8.00	1.45	0.26	0.00	**0.53**
10.00	1.96	0.54	0.00	0.17
12.00	2.26	0.73	0.00	0.13
14.00	2.50	0.89	0.00	0.12
16.00	2.72	1.05	0.00	0.12
18.00	2.92	1.19	0.00	0.11
20.00	3.10	1.33	0.00	0.10
22.00	3.26	1.45	0.00	0.09
24.00	**3.40**	**1.56**	0.00	0.08
26.00	3.40	1.56	0.00	0.00
28.00	3.40	1.56	0.00	0.00
30.00	3.40	1.56	0.00	0.00
32.00	3.40	1.56	0.00	0.00
34.00	3.40	1.56	0.00	0.00
36.00	3.40	1.56	0.00	0.00
38.00	3.40	1.56	0.00	0.00
40.00	3.40	1.56	0.00	0.00
42.00	3.40	1.56	0.00	0.00
44.00	3.40	1.56	0.00	0.00
46.00	3.40	1.56	0.00	0.00
48.00	3.40	1.56	0.00	0.00
50.00	3.40	1.56	0.00	0.00
52.00	3.40	1.56	0.00	0.00
54.00	3.40	1.56	0.00	0.00
56.00	3.40	1.56	0.00	0.00
58.00	3.40	1.56	0.00	0.00
60.00	3.40	1.56	0.00	0.00
62.00	3.40	1.56	0.00	0.00
64.00	3.40	1.56	0.00	0.00
66.00	3.40	1.56	0.00	0.00
68.00	3.40	1.56	0.00	0.00
70.00	3.40	1.56	0.00	0.00
72.00	3.40	1.56	0.00	0.00

Summary for Subcatchment 4A: Subbasin 4A

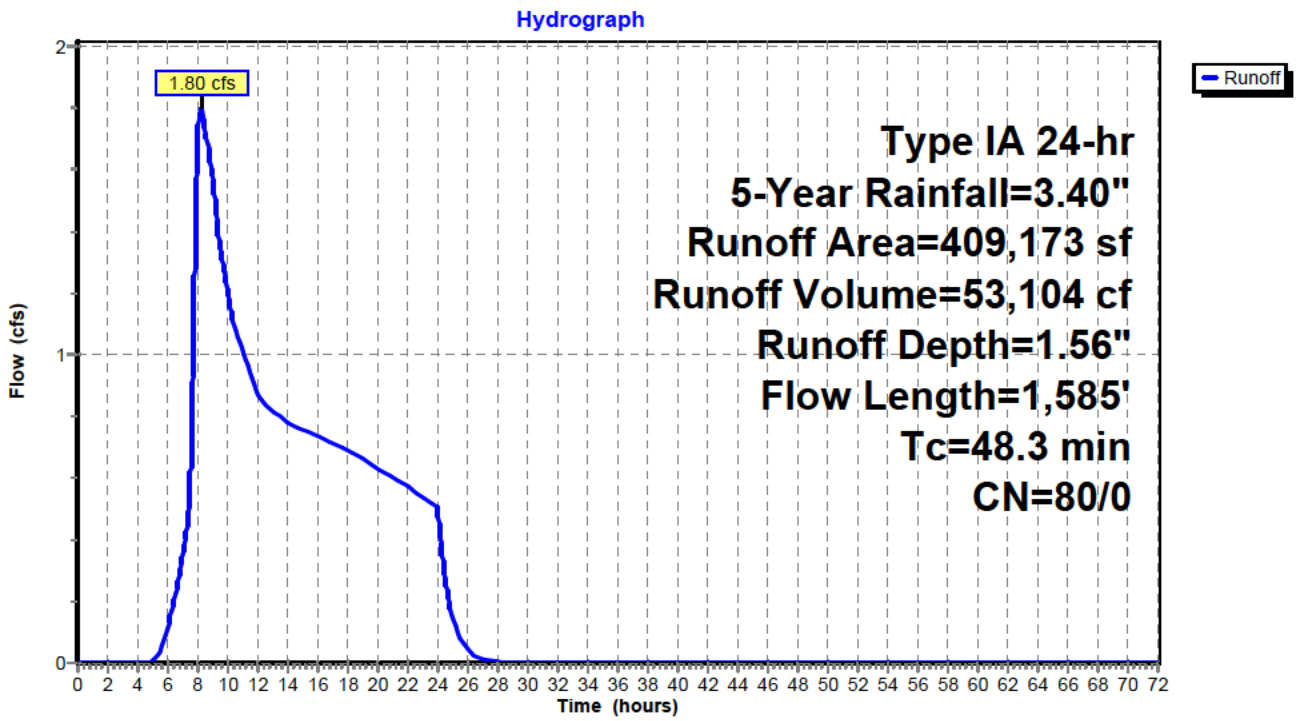
Runoff = 1.80 cfs @ 8.22 hrs, Volume= 53,104 cf, Depth= 1.56"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
409,173	80	>75% Grass cover, Good, HSG D
409,173	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.7	300	0.0200	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80"
11.6	1,285	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
48.3	1,585	Total			

Subcatchment 4A: Subbasin 4A



Hydrograph for Subcatchment 4A: Subbasin 4A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.17	0.00	0.00	0.00
4.00	0.39	0.00	0.00	0.00
6.00	0.70	0.01	0.00	0.11
8.00	1.45	0.26	0.00	**1.71**
10.00	1.96	0.54	0.00	**1.20**
12.00	2.26	0.73	0.00	0.87
14.00	2.50	0.89	0.00	0.78
16.00	2.72	1.05	0.00	0.73
18.00	2.92	1.19	0.00	0.69
20.00	3.10	1.33	0.00	0.63
22.00	3.26	1.45	0.00	0.57
24.00	**3.40**	**1.56**	0.00	0.50
26.00	3.40	1.56	0.00	0.04
28.00	3.40	1.56	0.00	0.00
30.00	3.40	1.56	0.00	0.00
32.00	3.40	1.56	0.00	0.00
34.00	3.40	1.56	0.00	0.00
36.00	3.40	1.56	0.00	0.00
38.00	3.40	1.56	0.00	0.00
40.00	3.40	1.56	0.00	0.00
42.00	3.40	1.56	0.00	0.00
44.00	3.40	1.56	0.00	0.00
46.00	3.40	1.56	0.00	0.00
48.00	3.40	1.56	0.00	0.00
50.00	3.40	1.56	0.00	0.00
52.00	3.40	1.56	0.00	0.00
54.00	3.40	1.56	0.00	0.00
56.00	3.40	1.56	0.00	0.00
58.00	3.40	1.56	0.00	0.00
60.00	3.40	1.56	0.00	0.00
62.00	3.40	1.56	0.00	0.00
64.00	3.40	1.56	0.00	0.00
66.00	3.40	1.56	0.00	0.00
68.00	3.40	1.56	0.00	0.00
70.00	3.40	1.56	0.00	0.00
72.00	3.40	1.56	0.00	0.00

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1A: Subbasin 1A Runoff Area=114,978 sf 0.00% Impervious Runoff Depth=1.88"
Flow Length=1,396' Tc=12.5 min CN=80/0 Runoff=1.05 cfs 17,990 cf

Subcatchment2A: Subbasin 2A Runoff Area=27,801 sf 0.00% Impervious Runoff Depth=1.88"
Flow Length=275' Slope=0.0770 '/' Tc=30.1 min CN=80/0 Runoff=0.19 cfs 4,350 cf

Subcatchment3A: Subbasin 3A Runoff Area=67,064 sf 0.00% Impervious Runoff Depth=1.88"
Flow Length=552' Tc=7.2 min CN=80/0 Runoff=0.66 cfs 10,493 cf

Subcatchment4A: Subbasin 4A Runoff Area=409,173 sf 0.00% Impervious Runoff Depth=1.88"
Flow Length=1,585' Tc=48.3 min CN=80/0 Runoff=2.27 cfs 64,021 cf

Total Runoff Area = 619,016 sf Runoff Volume = 96,855 cf Average Runoff Depth = 1.88"
100.00% Pervious = 619,016 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1A: Subbasin 1A

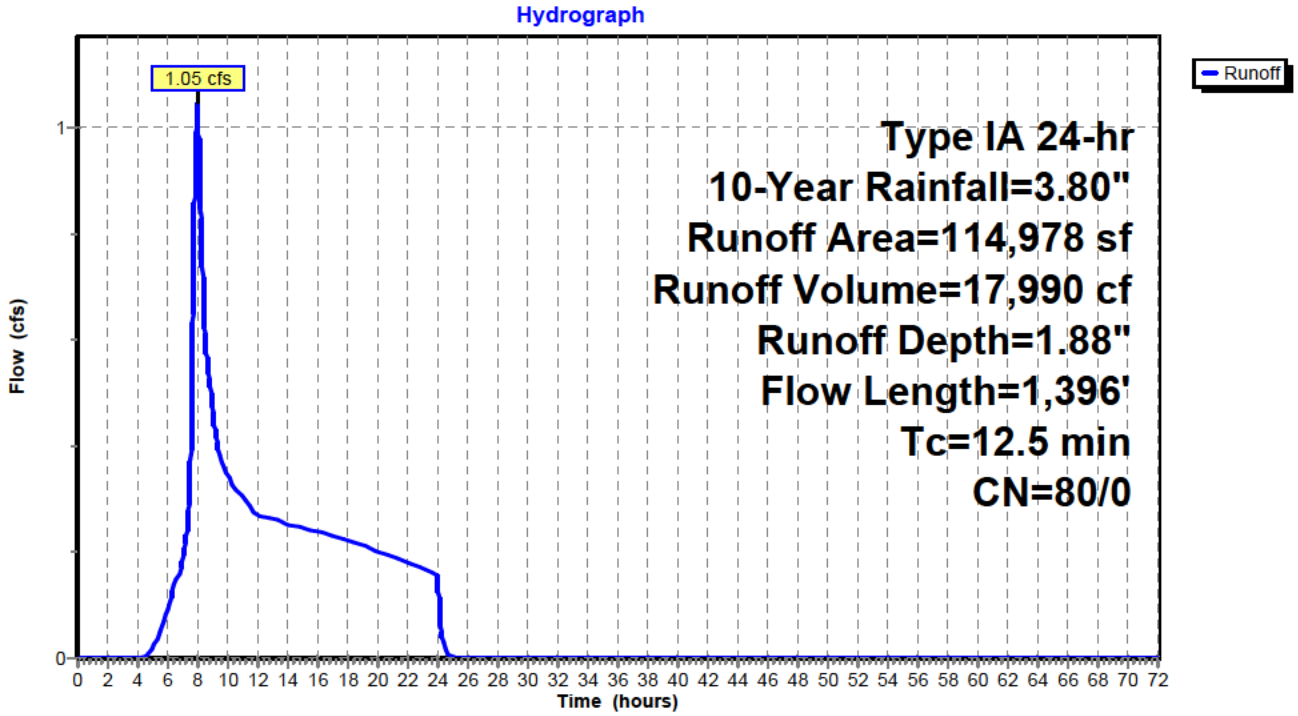
Runoff = 1.05 cfs @ 8.00 hrs, Volume= 17,990 cf, Depth= 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
114,978	80	>75% Grass cover, Good, HSG D
114,978	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	466	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.7	930	0.0210	3.29	19.72	**Channel Flow,** Area= 6.0 sf Perim= 9.0' r= 0.67' n= 0.050 Scattered brush, heavy weeds
12.5	1,396	Total			

Subcatchment 1A: Subbasin 1A



Hydrograph for Subcatchment 1A: Subbasin 1A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.19	0.00	0.00	0.00
4.00	0.44	0.00	0.00	0.00
6.00	0.78	0.03	0.00	0.09
8.00	1.62	0.34	0.00	**1.05**
10.00	2.19	0.68	0.00	0.34
12.00	2.52	0.90	0.00	0.27
14.00	2.80	1.10	0.00	0.25
16.00	3.04	1.28	0.00	0.24
18.00	3.27	1.45	0.00	0.22
20.00	3.47	1.61	0.00	0.20
22.00	3.65	1.75	0.00	0.18
24.00	**3.80**	**1.88**	0.00	0.16
26.00	3.80	1.88	0.00	0.00
28.00	3.80	1.88	0.00	0.00
30.00	3.80	1.88	0.00	0.00
32.00	3.80	1.88	0.00	0.00
34.00	3.80	1.88	0.00	0.00
36.00	3.80	1.88	0.00	0.00
38.00	3.80	1.88	0.00	0.00
40.00	3.80	1.88	0.00	0.00
42.00	3.80	1.88	0.00	0.00
44.00	3.80	1.88	0.00	0.00
46.00	3.80	1.88	0.00	0.00
48.00	3.80	1.88	0.00	0.00
50.00	3.80	1.88	0.00	0.00
52.00	3.80	1.88	0.00	0.00
54.00	3.80	1.88	0.00	0.00
56.00	3.80	1.88	0.00	0.00
58.00	3.80	1.88	0.00	0.00
60.00	3.80	1.88	0.00	0.00
62.00	3.80	1.88	0.00	0.00
64.00	3.80	1.88	0.00	0.00
66.00	3.80	1.88	0.00	0.00
68.00	3.80	1.88	0.00	0.00
70.00	3.80	1.88	0.00	0.00
72.00	3.80	1.88	0.00	0.00

Summary for Subcatchment 2A: Subbasin 2A

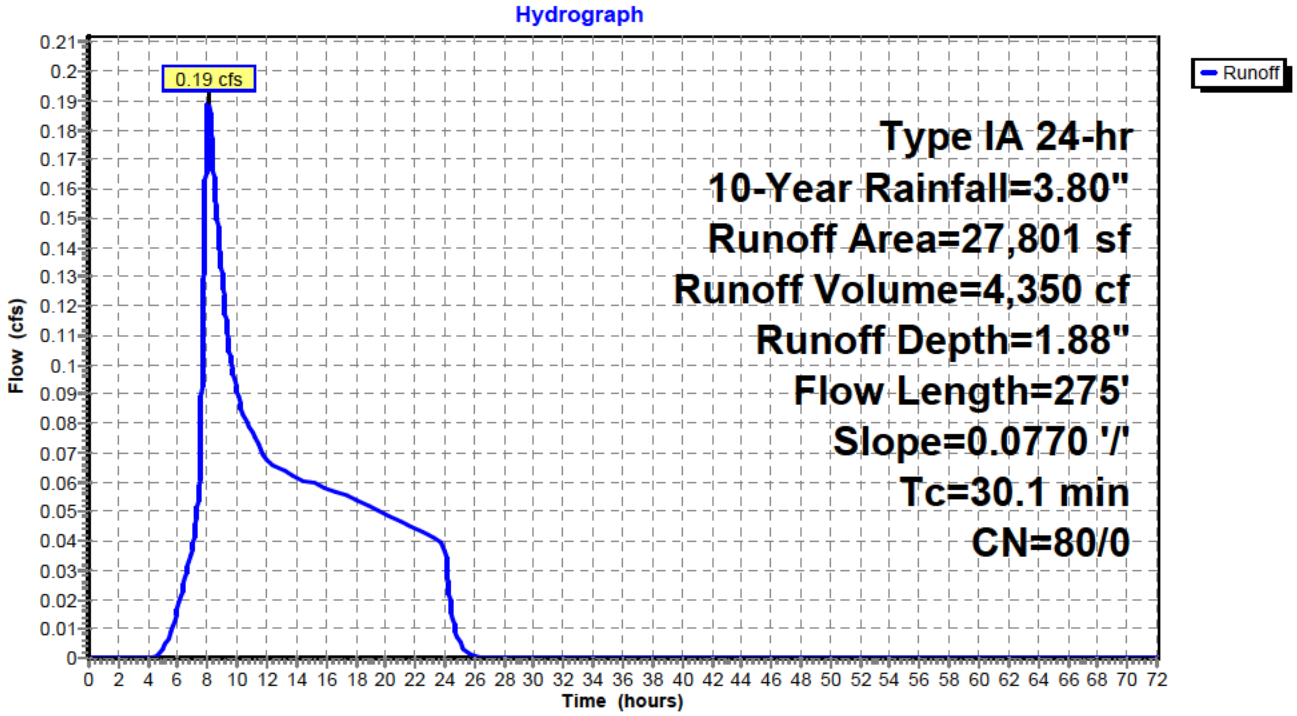
Runoff = 0.19 cfs @ 8.04 hrs, Volume= 4,350 cf, Depth= 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
27,801	80	>75% Grass cover, Good, HSG D
27,801	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.1	275	0.0770	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"

Subcatchment 2A: Subbasin 2A



Hydrograph for Subcatchment 2A: Subbasin 2A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.19	0.00	0.00	0.00
4.00	0.44	0.00	0.00	0.00
6.00	0.78	0.03	0.00	0.02
8.00	1.62	0.34	0.00	**0.19**
10.00	2.19	0.68	0.00	**0.09**
12.00	2.52	0.90	0.00	0.07
14.00	2.80	1.10	0.00	0.06
16.00	3.04	1.28	0.00	0.06
18.00	3.27	1.45	0.00	0.05
20.00	3.47	1.61	0.00	0.05
22.00	3.65	1.75	0.00	0.04
24.00	**3.80**	**1.88**	0.00	0.04
26.00	3.80	1.88	0.00	0.00
28.00	3.80	1.88	0.00	0.00
30.00	3.80	1.88	0.00	0.00
32.00	3.80	1.88	0.00	0.00
34.00	3.80	1.88	0.00	0.00
36.00	3.80	1.88	0.00	0.00
38.00	3.80	1.88	0.00	0.00
40.00	3.80	1.88	0.00	0.00
42.00	3.80	1.88	0.00	0.00
44.00	3.80	1.88	0.00	0.00
46.00	3.80	1.88	0.00	0.00
48.00	3.80	1.88	0.00	0.00
50.00	3.80	1.88	0.00	0.00
52.00	3.80	1.88	0.00	0.00
54.00	3.80	1.88	0.00	0.00
56.00	3.80	1.88	0.00	0.00
58.00	3.80	1.88	0.00	0.00
60.00	3.80	1.88	0.00	0.00
62.00	3.80	1.88	0.00	0.00
64.00	3.80	1.88	0.00	0.00
66.00	3.80	1.88	0.00	0.00
68.00	3.80	1.88	0.00	0.00
70.00	3.80	1.88	0.00	0.00
72.00	3.80	1.88	0.00	0.00

Summary for Subcatchment 3A: Subbasin 3A

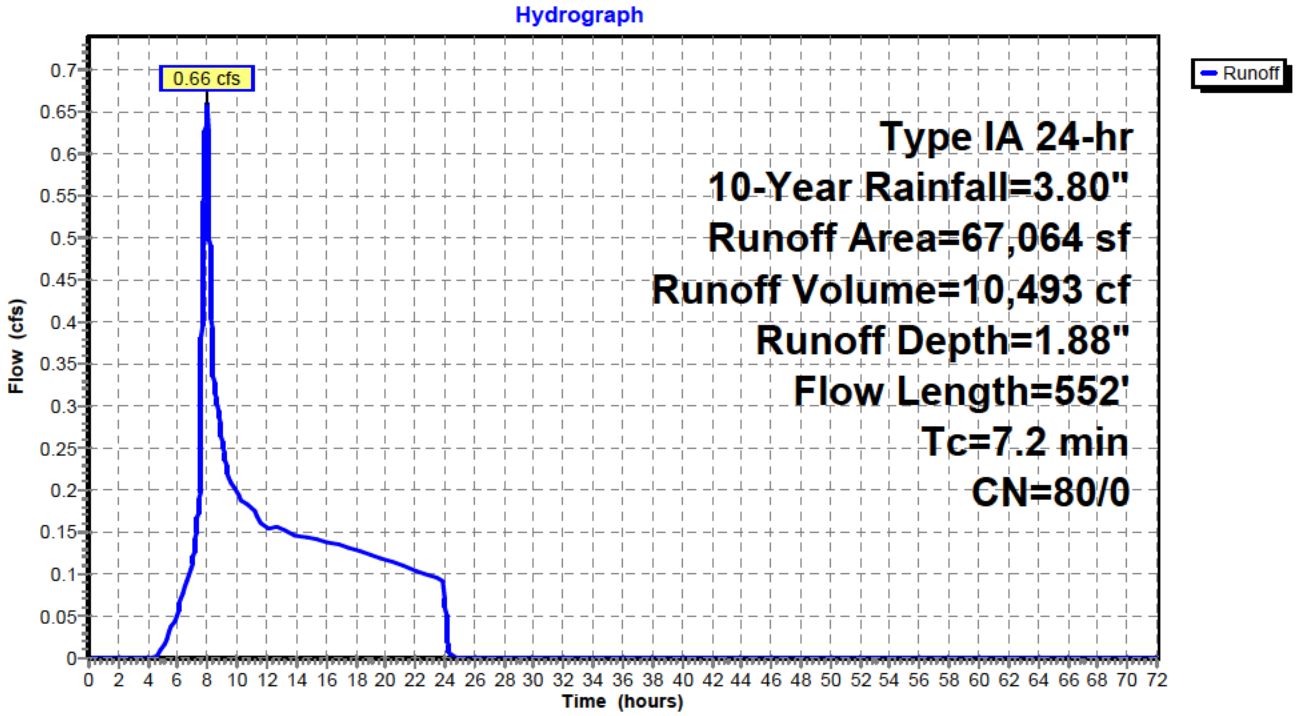
Runoff = 0.66 cfs @ 8.00 hrs, Volume= 10,493 cf, Depth= 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
67,064	80	>75% Grass cover, Good, HSG D
67,064	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	65	0.3300	0.20		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
1.9	487	0.0370	4.36	26.18	**Channel Flow,** Area= 6.0 sf Perim= 9.0' r= 0.67' n= 0.050 Scattered brush, heavy weeds
7.2	552	Total			

Subcatchment 3A: Subbasin 3A



Hydrograph for Subcatchment 3A: Subbasin 3A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.19	0.00	0.00	0.00
4.00	0.44	0.00	0.00	0.00
6.00	0.78	0.03	0.00	0.06
8.00	1.62	0.34	0.00	**0.66**
10.00	2.19	0.68	0.00	0.20
12.00	2.52	0.90	0.00	0.15
14.00	2.80	1.10	0.00	0.14
16.00	3.04	1.28	0.00	0.14
18.00	3.27	1.45	0.00	0.13
20.00	3.47	1.61	0.00	0.12
22.00	3.65	1.75	0.00	0.10
24.00	**3.80**	**1.88**	0.00	0.09
26.00	3.80	1.88	0.00	0.00
28.00	3.80	1.88	0.00	0.00
30.00	3.80	1.88	0.00	0.00
32.00	3.80	1.88	0.00	0.00
34.00	3.80	1.88	0.00	0.00
36.00	3.80	1.88	0.00	0.00
38.00	3.80	1.88	0.00	0.00
40.00	3.80	1.88	0.00	0.00
42.00	3.80	1.88	0.00	0.00
44.00	3.80	1.88	0.00	0.00
46.00	3.80	1.88	0.00	0.00
48.00	3.80	1.88	0.00	0.00
50.00	3.80	1.88	0.00	0.00
52.00	3.80	1.88	0.00	0.00
54.00	3.80	1.88	0.00	0.00
56.00	3.80	1.88	0.00	0.00
58.00	3.80	1.88	0.00	0.00
60.00	3.80	1.88	0.00	0.00
62.00	3.80	1.88	0.00	0.00
64.00	3.80	1.88	0.00	0.00
66.00	3.80	1.88	0.00	0.00
68.00	3.80	1.88	0.00	0.00
70.00	3.80	1.88	0.00	0.00
72.00	3.80	1.88	0.00	0.00

Summary for Subcatchment 4A: Subbasin 4A

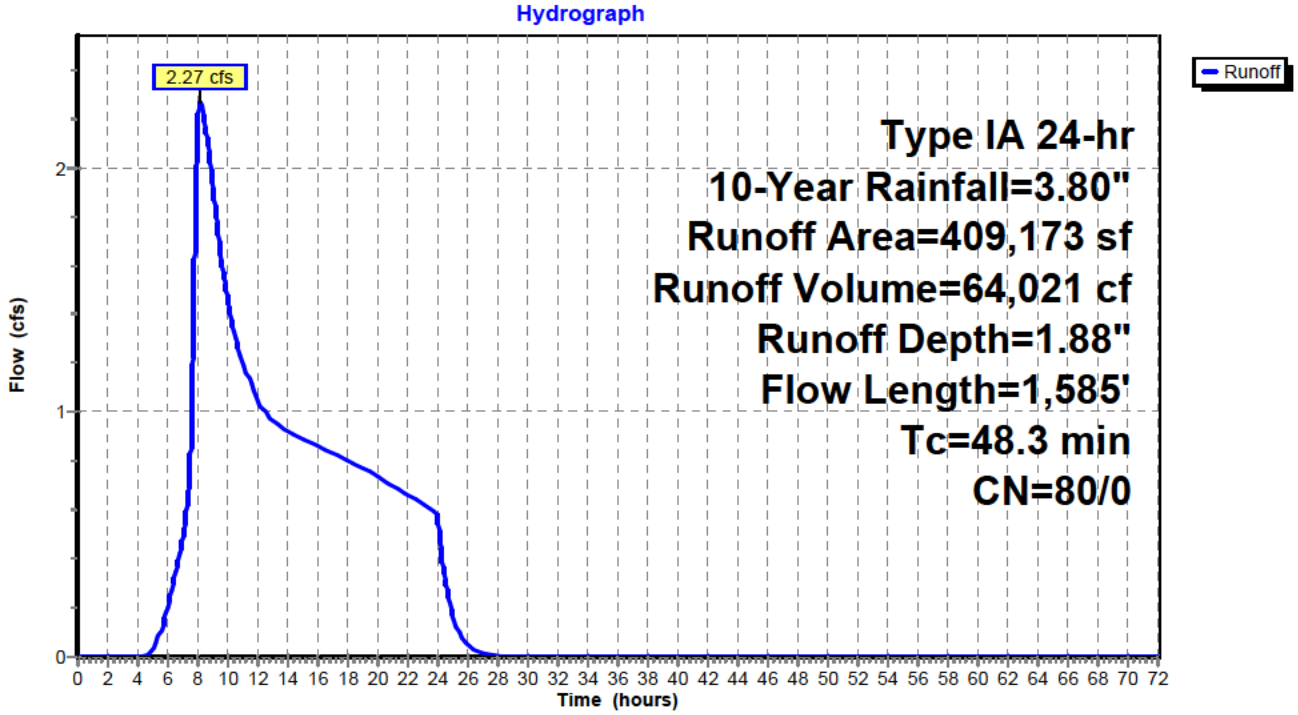
Runoff = 2.27 cfs @ 8.20 hrs, Volume= 64,021 cf, Depth= 1.88"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
409,173	80	>75% Grass cover, Good, HSG D
409,173	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.7	300	0.0200	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80"
11.6	1,285	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
48.3	1,585	Total			

Subcatchment 4A: Subbasin 4A



Hydrograph for Subcatchment 4A: Subbasin 4A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.19	0.00	0.00	0.00
4.00	0.44	0.00	0.00	0.00
6.00	0.78	0.03	0.00	0.20
8.00	1.62	0.34	0.00	**2.18**
10.00	2.19	0.68	0.00	**1.46**
12.00	2.52	0.90	0.00	1.04
14.00	2.80	1.10	0.00	0.92
16.00	3.04	1.28	0.00	0.86
18.00	3.27	1.45	0.00	0.80
20.00	3.47	1.61	0.00	0.74
22.00	3.65	1.75	0.00	0.66
24.00	**3.80**	**1.88**	0.00	0.58
26.00	3.80	1.88	0.00	0.05
28.00	3.80	1.88	0.00	0.00
30.00	3.80	1.88	0.00	0.00
32.00	3.80	1.88	0.00	0.00
34.00	3.80	1.88	0.00	0.00
36.00	3.80	1.88	0.00	0.00
38.00	3.80	1.88	0.00	0.00
40.00	3.80	1.88	0.00	0.00
42.00	3.80	1.88	0.00	0.00
44.00	3.80	1.88	0.00	0.00
46.00	3.80	1.88	0.00	0.00
48.00	3.80	1.88	0.00	0.00
50.00	3.80	1.88	0.00	0.00
52.00	3.80	1.88	0.00	0.00
54.00	3.80	1.88	0.00	0.00
56.00	3.80	1.88	0.00	0.00
58.00	3.80	1.88	0.00	0.00
60.00	3.80	1.88	0.00	0.00
62.00	3.80	1.88	0.00	0.00
64.00	3.80	1.88	0.00	0.00
66.00	3.80	1.88	0.00	0.00
68.00	3.80	1.88	0.00	0.00
70.00	3.80	1.88	0.00	0.00
72.00	3.80	1.88	0.00	0.00

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1A: Subbasin 1A Runoff Area=114,978 sf 0.00% Impervious Runoff Depth=2.46"
Flow Length=1,396' Tc=12.5 min CN=80/0 Runoff=1.43 cfs 23,585 cf

Subcatchment2A: Subbasin 2A Runoff Area=27,801 sf 0.00% Impervious Runoff Depth=2.46"
Flow Length=275' Slope=0.0770 '/' Tc=30.1 min CN=80/0 Runoff=0.26 cfs 5,703 cf

Subcatchment3A: Subbasin 3A Runoff Area=67,064 sf 0.00% Impervious Runoff Depth=2.46"
Flow Length=552' Tc=7.2 min CN=80/0 Runoff=0.89 cfs 13,757 cf

Subcatchment4A: Subbasin 4A Runoff Area=409,173 sf 0.00% Impervious Runoff Depth=2.46"
Flow Length=1,585' Tc=48.3 min CN=80/0 Runoff=3.13 cfs 83,933 cf

Total Runoff Area = 619,016 sf Runoff Volume = 126,978 cf Average Runoff Depth = 2.46"
100.00% Pervious = 619,016 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1A: Subbasin 1A

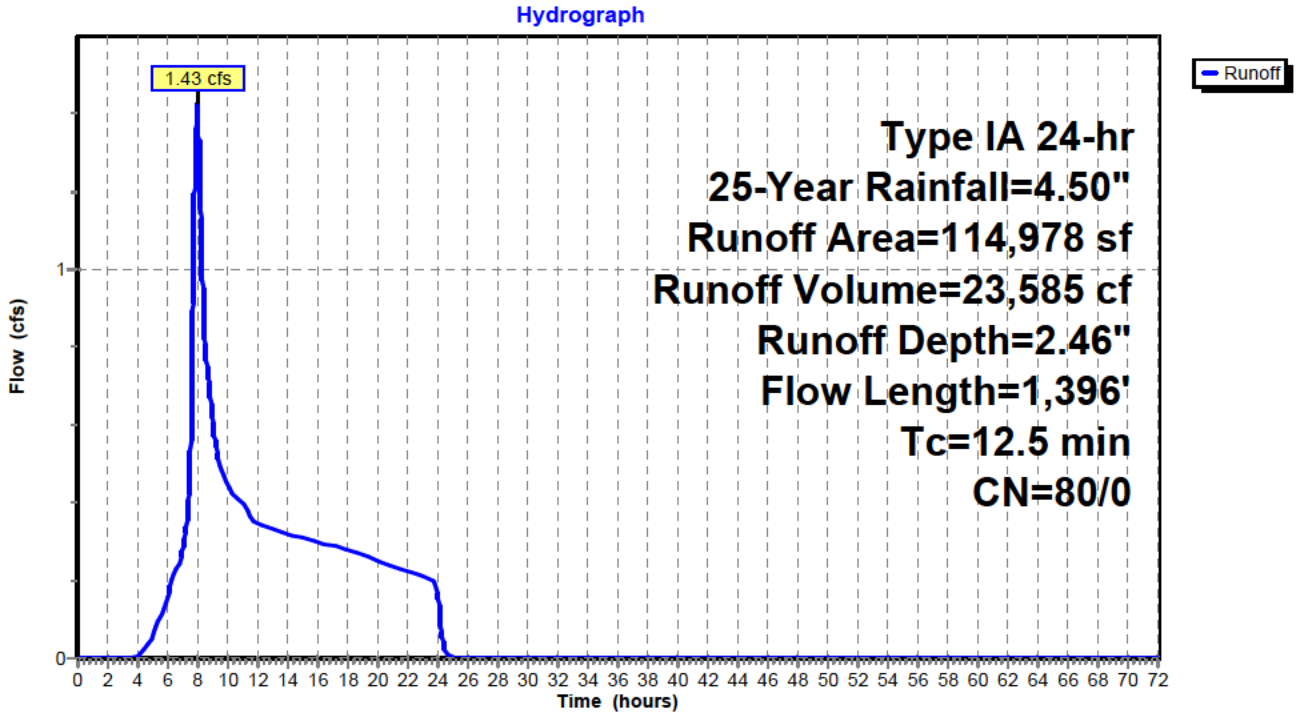
Runoff = 1.43 cfs @ 8.00 hrs, Volume= 23,585 cf, Depth= 2.46"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
114,978	80	>75% Grass cover, Good, HSG D
114,978	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	466	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.7	930	0.0210	3.29	19.72	**Channel Flow,** Area= 6.0 sf Perim= 9.0' r= 0.67' n= 0.050 Scattered brush, heavy weeds
12.5	1,396	Total			

Subcatchment 1A: Subbasin 1A



Hydrograph for Subcatchment 1A: Subbasin 1A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.23	0.00	0.00	0.00
4.00	0.52	0.00	0.00	0.00
6.00	0.93	0.06	0.00	0.15
8.00	1.91	0.51	0.00	**1.43**
10.00	2.60	0.96	0.00	0.45
12.00	2.99	1.24	0.00	0.34
14.00	3.31	1.49	0.00	0.32
16.00	3.60	1.72	0.00	0.30
18.00	3.87	1.93	0.00	0.28
20.00	4.11	2.13	0.00	0.25
22.00	4.32	2.31	0.00	0.22
24.00	**4.50**	**2.46**	0.00	0.19
26.00	4.50	2.46	0.00	0.00
28.00	4.50	2.46	0.00	0.00
30.00	4.50	2.46	0.00	0.00
32.00	4.50	2.46	0.00	0.00
34.00	4.50	2.46	0.00	0.00
36.00	4.50	2.46	0.00	0.00
38.00	4.50	2.46	0.00	0.00
40.00	4.50	2.46	0.00	0.00
42.00	4.50	2.46	0.00	0.00
44.00	4.50	2.46	0.00	0.00
46.00	4.50	2.46	0.00	0.00
48.00	4.50	2.46	0.00	0.00
50.00	4.50	2.46	0.00	0.00
52.00	4.50	2.46	0.00	0.00
54.00	4.50	2.46	0.00	0.00
56.00	4.50	2.46	0.00	0.00
58.00	4.50	2.46	0.00	0.00
60.00	4.50	2.46	0.00	0.00
62.00	4.50	2.46	0.00	0.00
64.00	4.50	2.46	0.00	0.00
66.00	4.50	2.46	0.00	0.00
68.00	4.50	2.46	0.00	0.00
70.00	4.50	2.46	0.00	0.00
72.00	4.50	2.46	0.00	0.00

Summary for Subcatchment 2A: Subbasin 2A

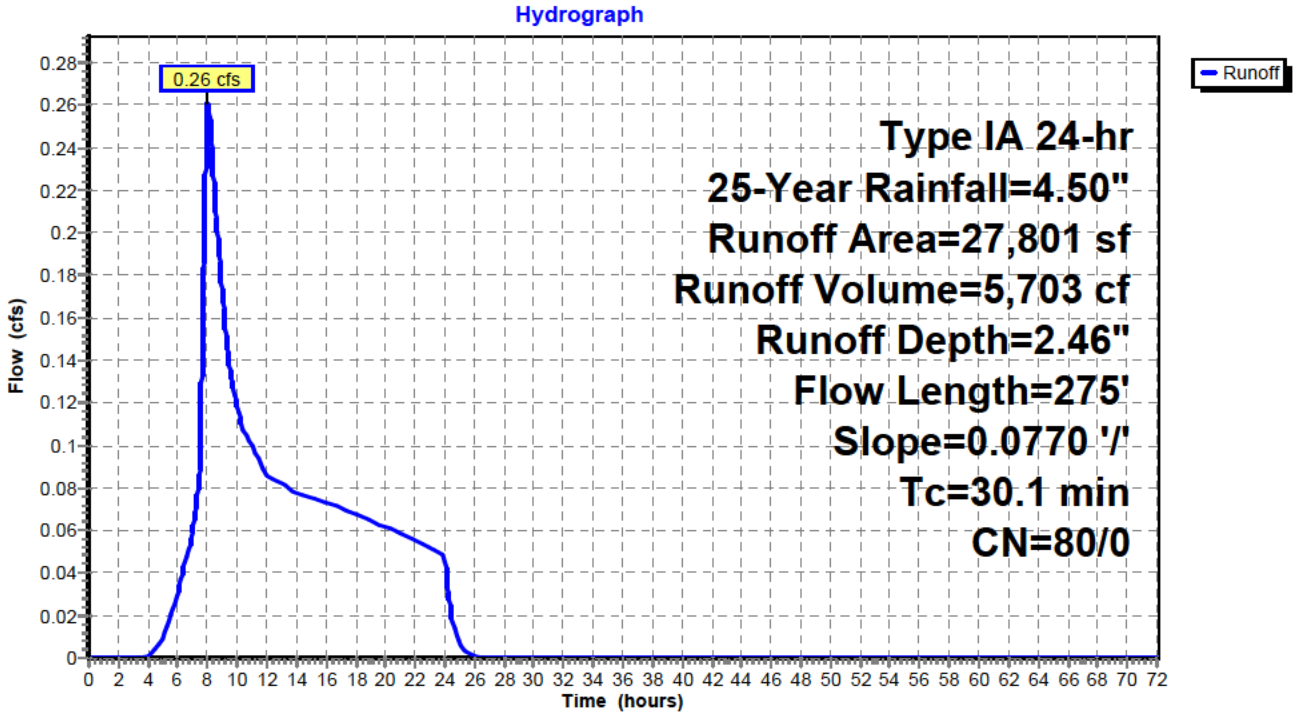
Runoff = 0.26 cfs @ 8.02 hrs, Volume= 5,703 cf, Depth= 2.46"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
27,801	80	>75% Grass cover, Good, HSG D
27,801	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.1	275	0.0770	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"

Subcatchment 2A: Subbasin 2A



Hydrograph for Subcatchment 2A: Subbasin 2A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.23	0.00	0.00	0.00
4.00	0.52	0.00	0.00	0.00
6.00	0.93	0.06	0.00	0.03
8.00	1.91	0.51	0.00	**0.26**
10.00	2.60	0.96	0.00	**0.12**
12.00	2.99	1.24	0.00	0.09
14.00	3.31	1.49	0.00	0.08
16.00	3.60	1.72	0.00	0.07
18.00	3.87	1.93	0.00	0.07
20.00	4.11	2.13	0.00	0.06
22.00	4.32	2.31	0.00	0.06
24.00	**4.50**	**2.46**	0.00	0.05
26.00	4.50	2.46	0.00	0.00
28.00	4.50	2.46	0.00	0.00
30.00	4.50	2.46	0.00	0.00
32.00	4.50	2.46	0.00	0.00
34.00	4.50	2.46	0.00	0.00
36.00	4.50	2.46	0.00	0.00
38.00	4.50	2.46	0.00	0.00
40.00	4.50	2.46	0.00	0.00
42.00	4.50	2.46	0.00	0.00
44.00	4.50	2.46	0.00	0.00
46.00	4.50	2.46	0.00	0.00
48.00	4.50	2.46	0.00	0.00
50.00	4.50	2.46	0.00	0.00
52.00	4.50	2.46	0.00	0.00
54.00	4.50	2.46	0.00	0.00
56.00	4.50	2.46	0.00	0.00
58.00	4.50	2.46	0.00	0.00
60.00	4.50	2.46	0.00	0.00
62.00	4.50	2.46	0.00	0.00
64.00	4.50	2.46	0.00	0.00
66.00	4.50	2.46	0.00	0.00
68.00	4.50	2.46	0.00	0.00
70.00	4.50	2.46	0.00	0.00
72.00	4.50	2.46	0.00	0.00

Summary for Subcatchment 3A: Subbasin 3A

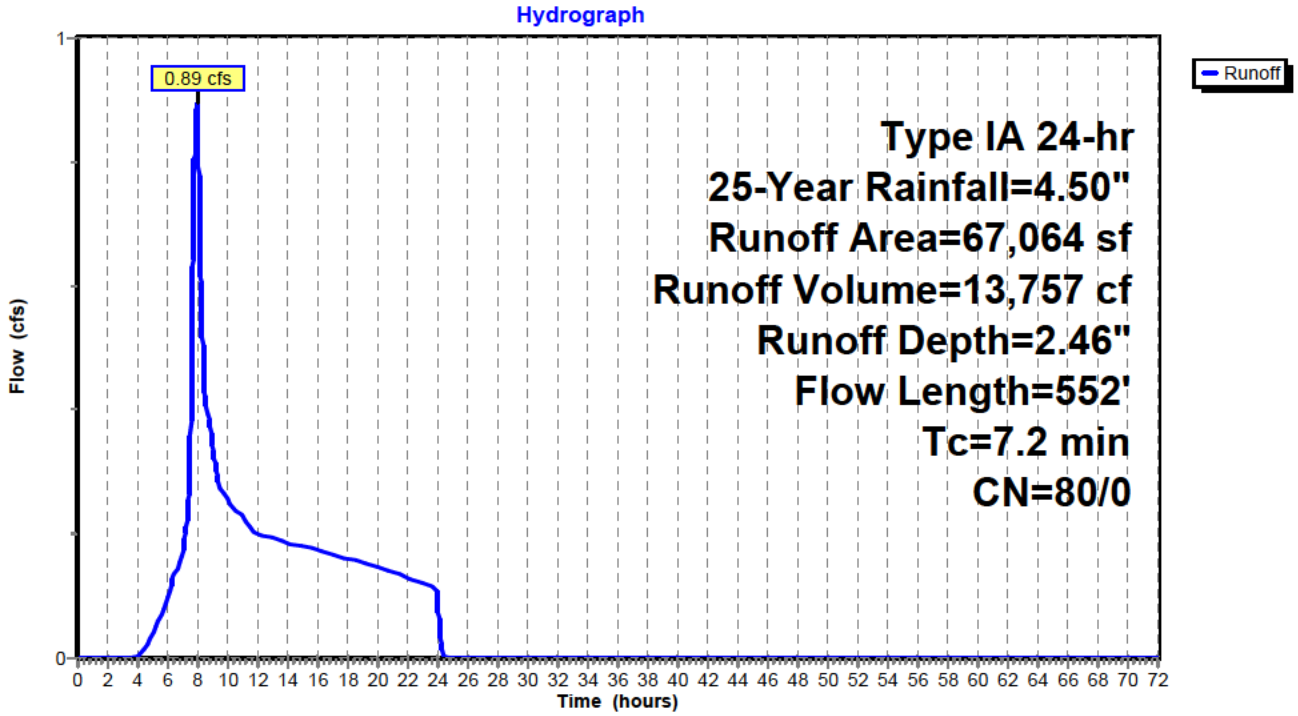
Runoff = 0.89 cfs @ 7.99 hrs, Volume= 13,757 cf, Depth= 2.46"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
67,064	80	>75% Grass cover, Good, HSG D
67,064	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	65	0.3300	0.20		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.80"
1.9	487	0.0370	4.36	26.18	**Channel Flow,** Area= 6.0 sf Perim= 9.0' r= 0.67' n= 0.050 Scattered brush, heavy weeds
7.2	552	Total			

Subcatchment 3A: Subbasin 3A



Hydrograph for Subcatchment 3A: Subbasin 3A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.23	0.00	0.00	0.00
4.00	0.52	0.00	0.00	0.00
6.00	0.93	0.06	0.00	**0.10**
8.00	1.91	0.51	0.00	**0.89**
10.00	2.60	0.96	0.00	0.26
12.00	2.99	1.24	0.00	0.20
14.00	3.31	1.49	0.00	0.18
16.00	3.60	1.72	0.00	0.17
18.00	3.87	1.93	0.00	0.16
20.00	4.11	2.13	0.00	0.15
22.00	4.32	2.31	0.00	0.13
24.00	**4.50**	**2.46**	0.00	0.11
26.00	4.50	2.46	0.00	0.00
28.00	4.50	2.46	0.00	0.00
30.00	4.50	2.46	0.00	0.00
32.00	4.50	2.46	0.00	0.00
34.00	4.50	2.46	0.00	0.00
36.00	4.50	2.46	0.00	0.00
38.00	4.50	2.46	0.00	0.00
40.00	4.50	2.46	0.00	0.00
42.00	4.50	2.46	0.00	0.00
44.00	4.50	2.46	0.00	0.00
46.00	4.50	2.46	0.00	0.00
48.00	4.50	2.46	0.00	0.00
50.00	4.50	2.46	0.00	0.00
52.00	4.50	2.46	0.00	0.00
54.00	4.50	2.46	0.00	0.00
56.00	4.50	2.46	0.00	0.00
58.00	4.50	2.46	0.00	0.00
60.00	4.50	2.46	0.00	0.00
62.00	4.50	2.46	0.00	0.00
64.00	4.50	2.46	0.00	0.00
66.00	4.50	2.46	0.00	0.00
68.00	4.50	2.46	0.00	0.00
70.00	4.50	2.46	0.00	0.00
72.00	4.50	2.46	0.00	0.00

Summary for Subcatchment 4A: Subbasin 4A

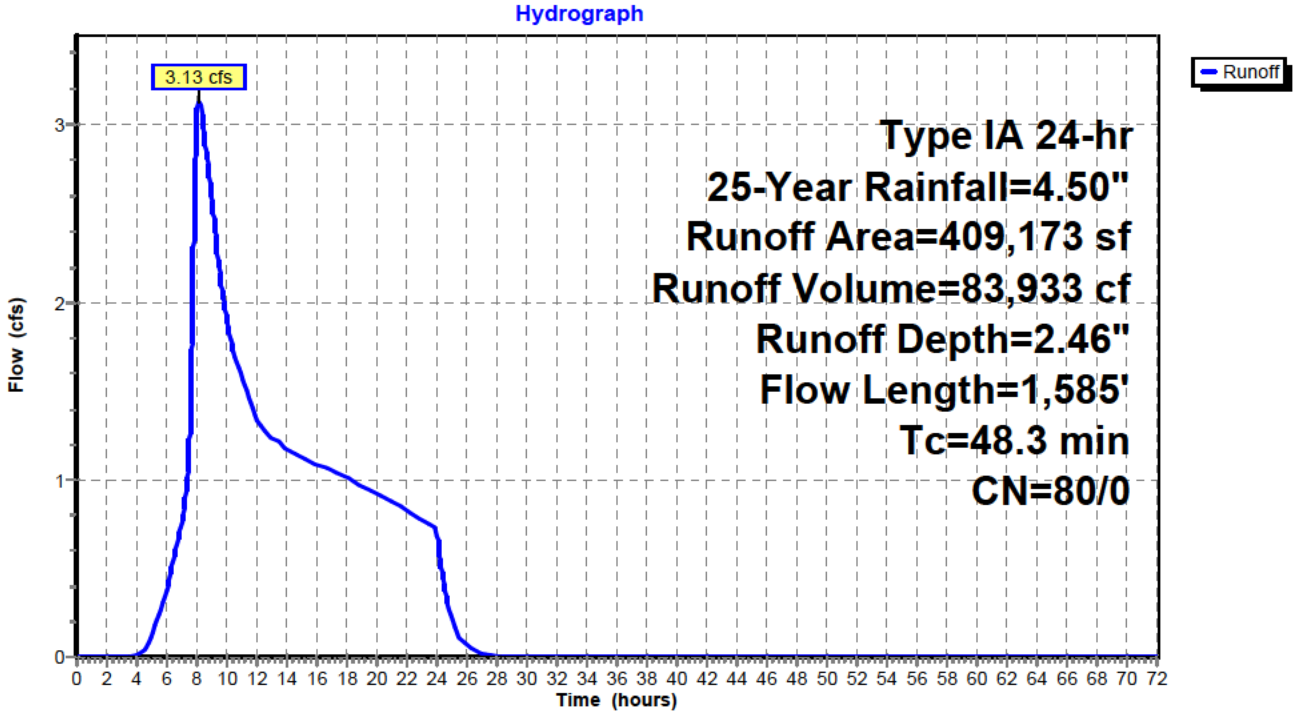
Runoff = 3.13 cfs @ 8.17 hrs, Volume= 83,933 cf, Depth= 2.46"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
409,173	80	>75% Grass cover, Good, HSG D
409,173	80	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.7	300	0.0200	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.80"
11.6	1,285	0.0700	1.85		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
48.3	1,585	Total			

Subcatchment 4A: Subbasin 4A



Hydrograph for Subcatchment 4A: Subbasin 4A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.23	0.00	0.00	0.00
4.00	0.52	0.00	0.00	0.00
6.00	0.93	0.06	0.00	0.38
8.00	1.91	0.51	0.00	**3.03**
10.00	2.60	0.96	0.00	**1.92**
12.00	2.99	1.24	0.00	1.34
14.00	3.31	1.49	0.00	1.17
16.00	3.60	1.72	0.00	1.09
18.00	3.87	1.93	0.00	1.01
20.00	4.11	2.13	0.00	0.92
22.00	4.32	2.31	0.00	0.82
24.00	**4.50**	**2.46**	0.00	0.72
26.00	4.50	2.46	0.00	0.06
28.00	4.50	2.46	0.00	0.01
30.00	4.50	2.46	0.00	0.00
32.00	4.50	2.46	0.00	0.00
34.00	4.50	2.46	0.00	0.00
36.00	4.50	2.46	0.00	0.00
38.00	4.50	2.46	0.00	0.00
40.00	4.50	2.46	0.00	0.00
42.00	4.50	2.46	0.00	0.00
44.00	4.50	2.46	0.00	0.00
46.00	4.50	2.46	0.00	0.00
48.00	4.50	2.46	0.00	0.00
50.00	4.50	2.46	0.00	0.00
52.00	4.50	2.46	0.00	0.00
54.00	4.50	2.46	0.00	0.00
56.00	4.50	2.46	0.00	0.00
58.00	4.50	2.46	0.00	0.00
60.00	4.50	2.46	0.00	0.00
62.00	4.50	2.46	0.00	0.00
64.00	4.50	2.46	0.00	0.00
66.00	4.50	2.46	0.00	0.00
68.00	4.50	2.46	0.00	0.00
70.00	4.50	2.46	0.00	0.00
72.00	4.50	2.46	0.00	0.00

Attachment D: Water Quality Treatment Calculations

PAC Report

Grassy Swale Calculations

PAC Report

Project Details

Project Name	Permit No	Created
Bull Run Filtration Stormwater	Land Use	9/4/2022 9:57:25 PM
Project Address	**Designer**	**Last Modified**
SE Carpenter Lane	Pat Tortora	9/4/2022 11:00:57 PM
	Company	**Report Generated**
	Emeriodesign	9/8/2022 11:56:49 AM

Project Summary

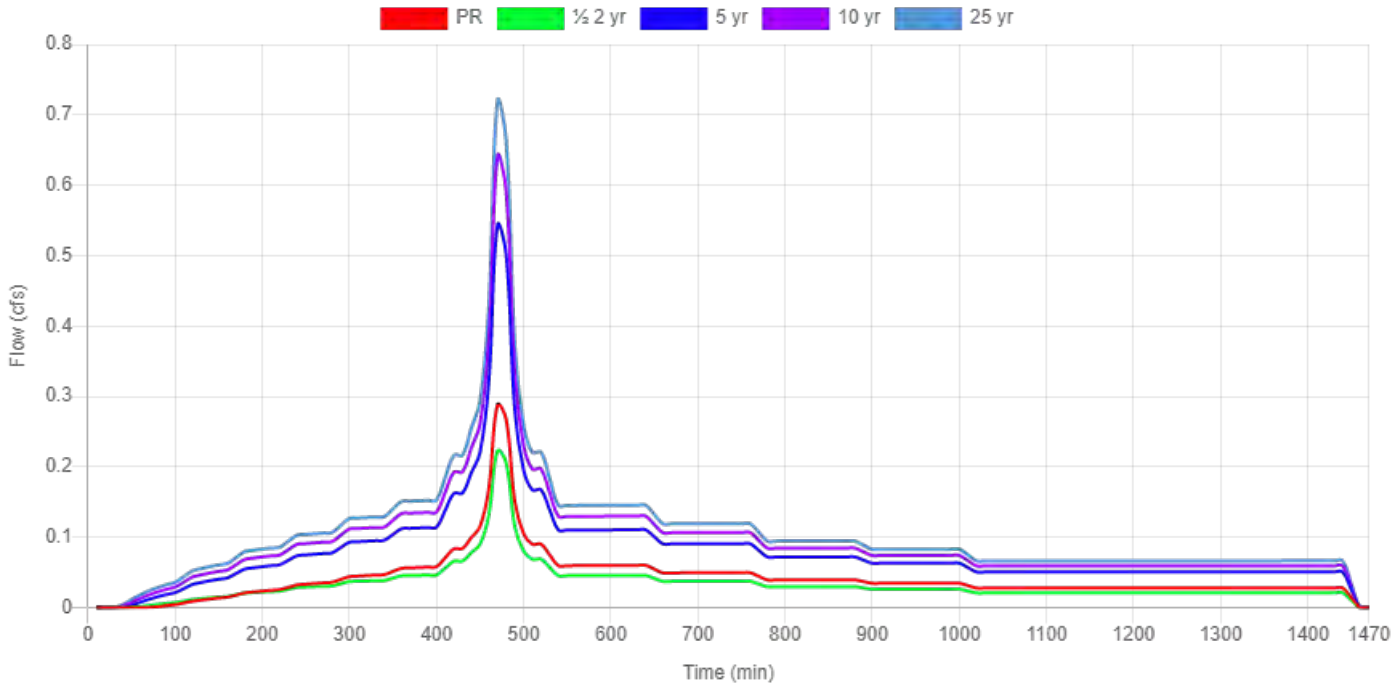
Catchment Name	Imper-vious Area (sq ft)	Native Soil Design Infilt-ration Rate (in/hr)	Level	Category	Config	Facility Area (excl. free board) (sq ft)	Facility Sizing Ratio (%)	PR Results	Infilt-ration Results	Flow Control Results
1A	31518	0	2B	Basin	D	1756.27	5.57	Pass	NA	Fail
11A	17535	0	2B	FlatPlanter	D	1440.00	8.21	Pass	NA	Fail
11B	40382	0	2B	FlatPlanter	D	640.00	1.58	Pass	NA	Fail
11C	8778	0	2B	FlatPlanter	D	728.00	8.29	Pass	NA	Fail
12A	33262	0	2B	FlatPlanter	D	728.00	2.19	Pass	NA	Fail
12B	14687	0	2B	FlatPlanter	D	360.00	2.45	Pass	NA	Fail
12C	22428	0	2B	Basin	D	862.27	3.84	Pass	NA	Fail
65A	11832	0	2B	FlatPlanter	D	568.00	4.8	Pass	NA	Fail
70A	36357	0	2B	FlatPlanter	D	500.00	1.38	Pass	NA	Fail
70B	15839	0	2B	FlatPlanter	D	270.00	1.7	Pass	NA	Fail
81A	58265	0	2B	FlatPlanter	D	1350.00	2.32	Pass	NA	Fail
F1	103529	0	2B	SlopedFacility	D	3108.00	3	Pass	NA	Pass

1A

Site Soils & Infiltration Testing	Infiltration Testing Procedure NA Tested Native Soil Infiltration Rate 0 in/hr
Correction Factor	CF test 2
Design Infiltration Rates	Native Soil 0 in/hr Imported Blended Soil 6 in/hr
Catchment Information	Hierarchy Level 2B Hierarchy Description Discharge to an overland storm drainage system, including streams, drainageways, and ditches, or to a storm-only pipe system that discharges to an overland storm drainage system. Pollution Reduction Requirement Filter the post-development stormwater runoff from the water quality storm event through the blended soil. Infiltration Requirement N/A Flow Control Requirement Limit the ½ the 2-yr, the 5-yr, and the 10-yr post-development peak flows to their respective pre-development peak flows. Unless the facility is a public facility (i.e., in the public right-of-way), also limit the 25-yr post-development peak flow to the 25-year pre-development peak flow. Impervious Area 31518 sq ft 0.724 acre Pre-Development Time of Concentration (Tc pre) 10 min Post-Development Time of Concentration (Tc post) 5 min Pre-Development Curve Number (CN pre) 82 Post-Development Curve Number (CN post) 98

SBUH Results

Post-Development Runoff



	Pre - Development Rate and Volume		Post - Development Rate and Volume	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0.0426	1069.9	0.2879	3647.1
½ 2-Year	0.0695	1215.1	0.2225	2851.5
5-Year	0.2112	3416.4	0.5435	7009.3
10-Year	0.289	4466.1	0.6415	8317.6
25-Year	0.3541	5340	0.7197	9365.1

	Overflow		Underdrain Outflow		Infiltration	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0	0	0.227	3647.1	0	0
½ 2-Year	0	0	0.216	2851.5	0	0
5-Year	0	0	0.227	7009.3	0	0
10-Year	0	0	0.227	8317.6	0	0
25-Year	0	0	0.227	9365.1	0	0

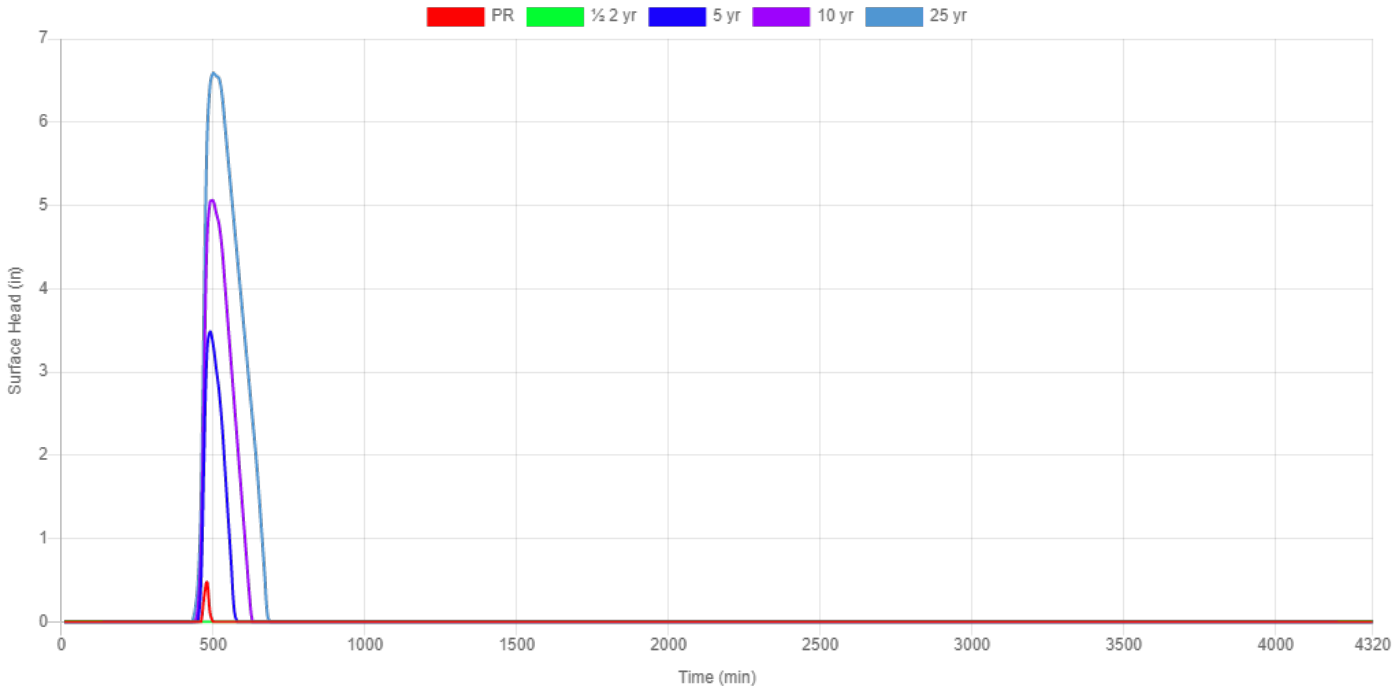
Rect Basin

Site Soils & Infiltration Testing	Category Rect Basin Shape Rectangular Location Parcel Configuration D: Lined Facility with RS and Ud **Above Grade Storage Data** Bottom Area 1296 sq ft Bottom Width 36.00 ft Side Slope 3.0 h:1v Freeboard Depth 6.0 in Overflow Height 12 in Total Depth of Blended Soil plus Rock 18 in Surface Storage Capacity at Overflow 1521.42 cu ft Design Infiltration Rate to Soil Underlying the Facility 0.000 cfs Design Infiltration Rate for Imported Blended Soil in the Facility 0.227 cfs **Below Grade Storage Data** Catchment is too small for flow control? No Rock Area 27.00 sq ft Rock Width 3.00 ft Rock Storage Depth

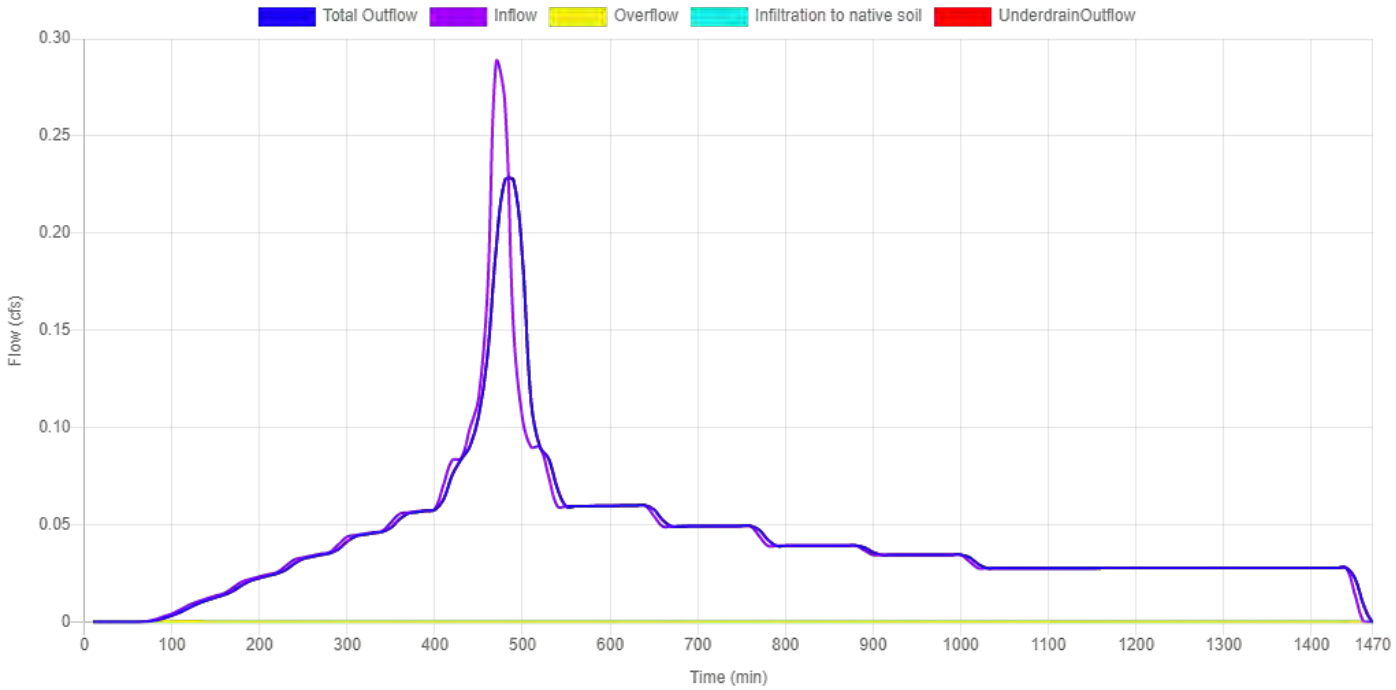
	12.0 in Rock Porosity 0.3 Underdrain Height 4 in Percent of Facility Base that Allows Infiltration 0 % Orifice (Y/N)? No Why no orifice Water-quality-only facility
Facility Facts	Total Facility Area (excluding freeboard) 1756.27 sq ft Sizing Ratio 5.57 %
Pollution Reduction Results	Pollution Reduction Score Pass Overflow Volume 0.00 cf Surface Capacity Used 3.98 %
Flow Control Results	Flow Control Score Fail

	STORMWATER FACILITY OUTFLOW (CFS)		PRE-DEVELOPMENT RUNOFF (CFS)
½ the 2 year	0.2158	<=	0.0695
5 year	0.2272	<=	0.2112
10 year	0.2272	<=	0.2890
25 year	0.2272	<=	0.3541

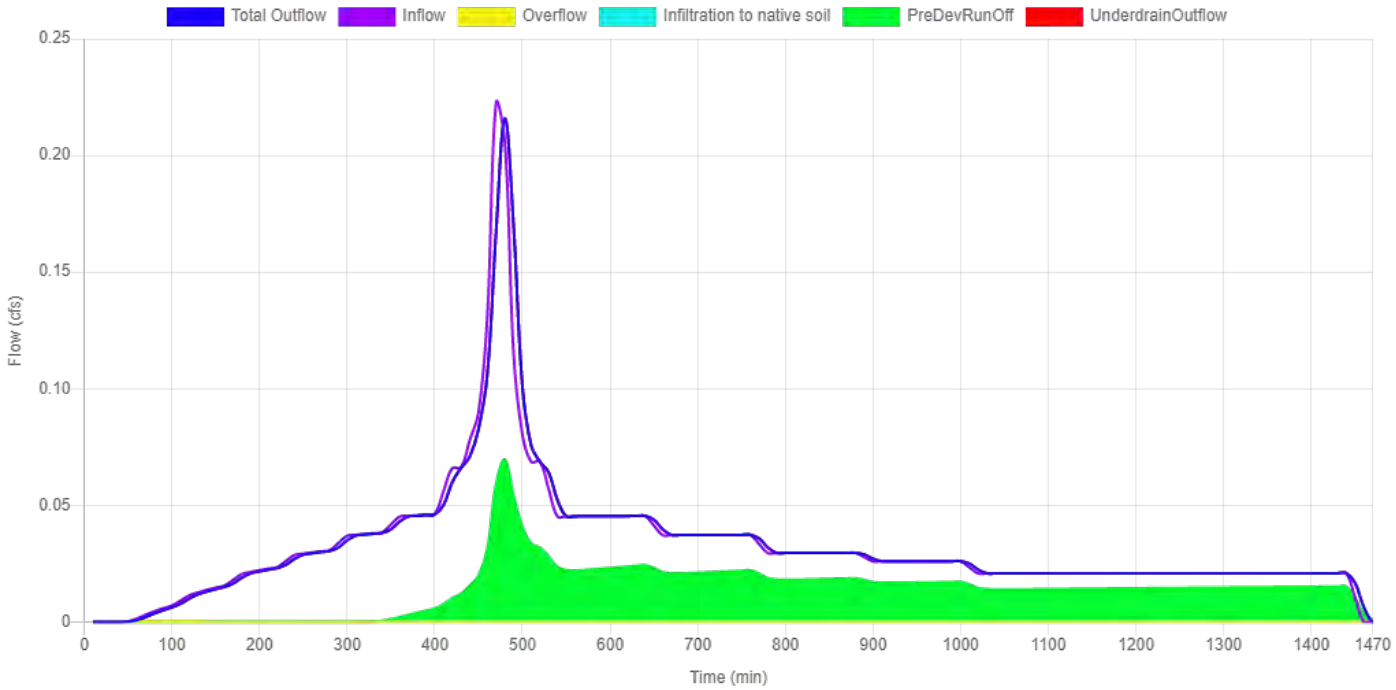
Surface Head



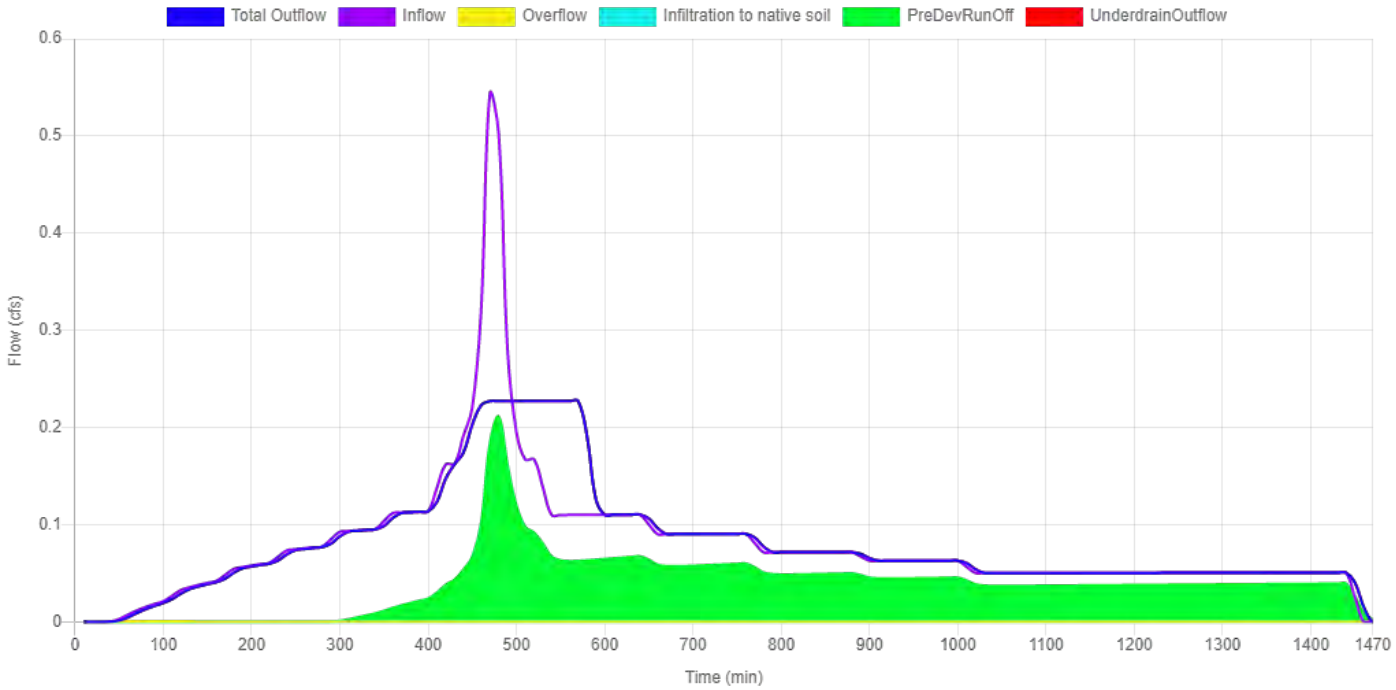
Water Quality



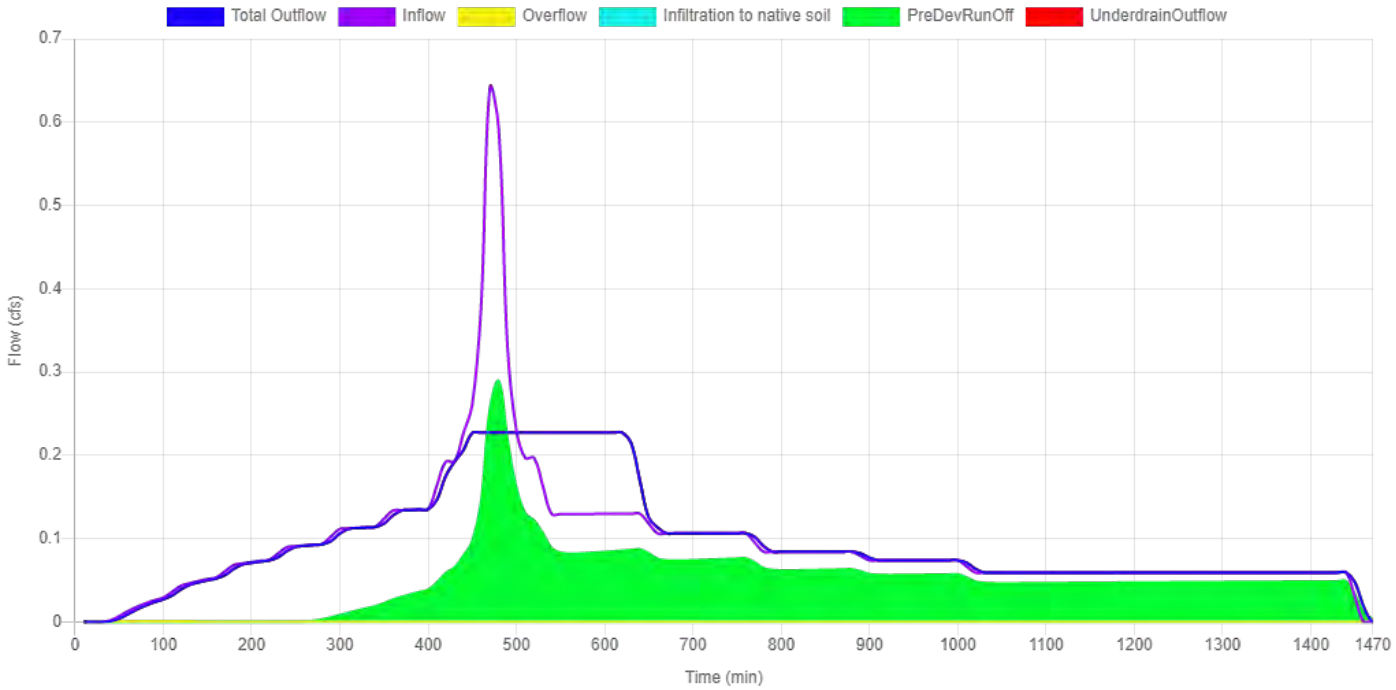
½ 2-Year



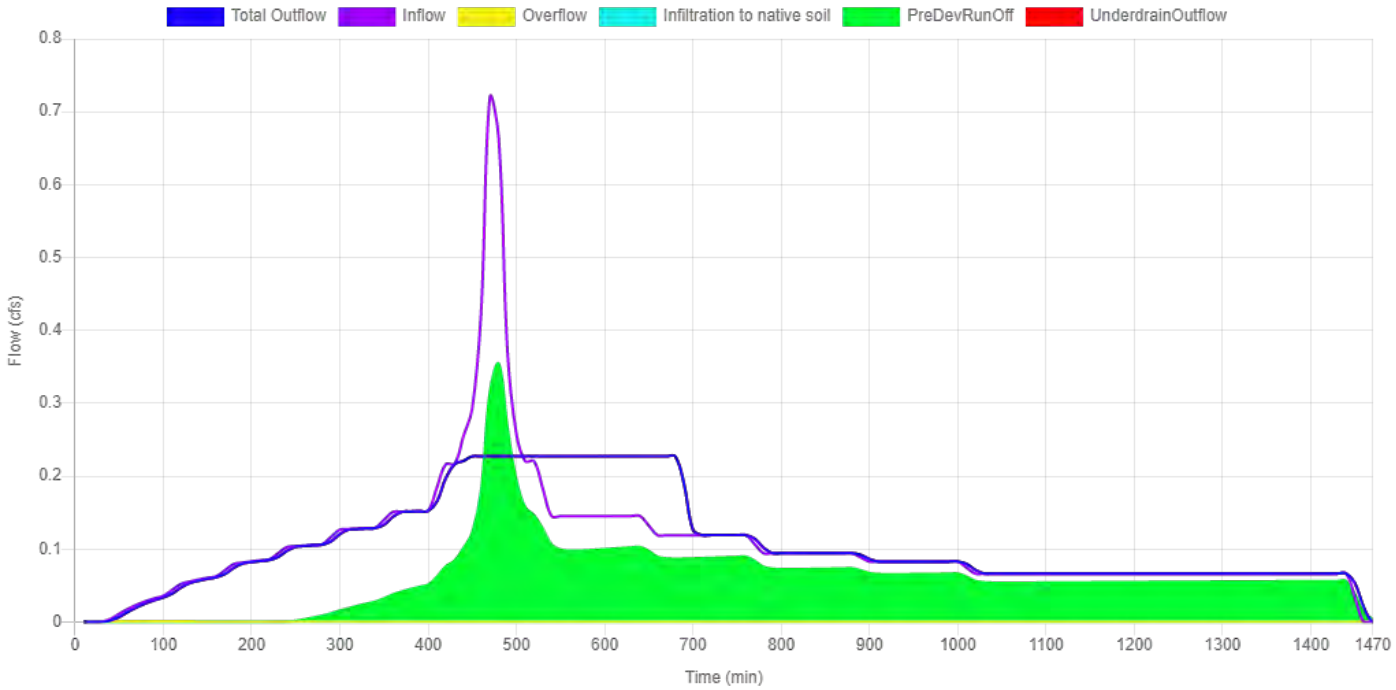
5-Year



10-Year



25-Year

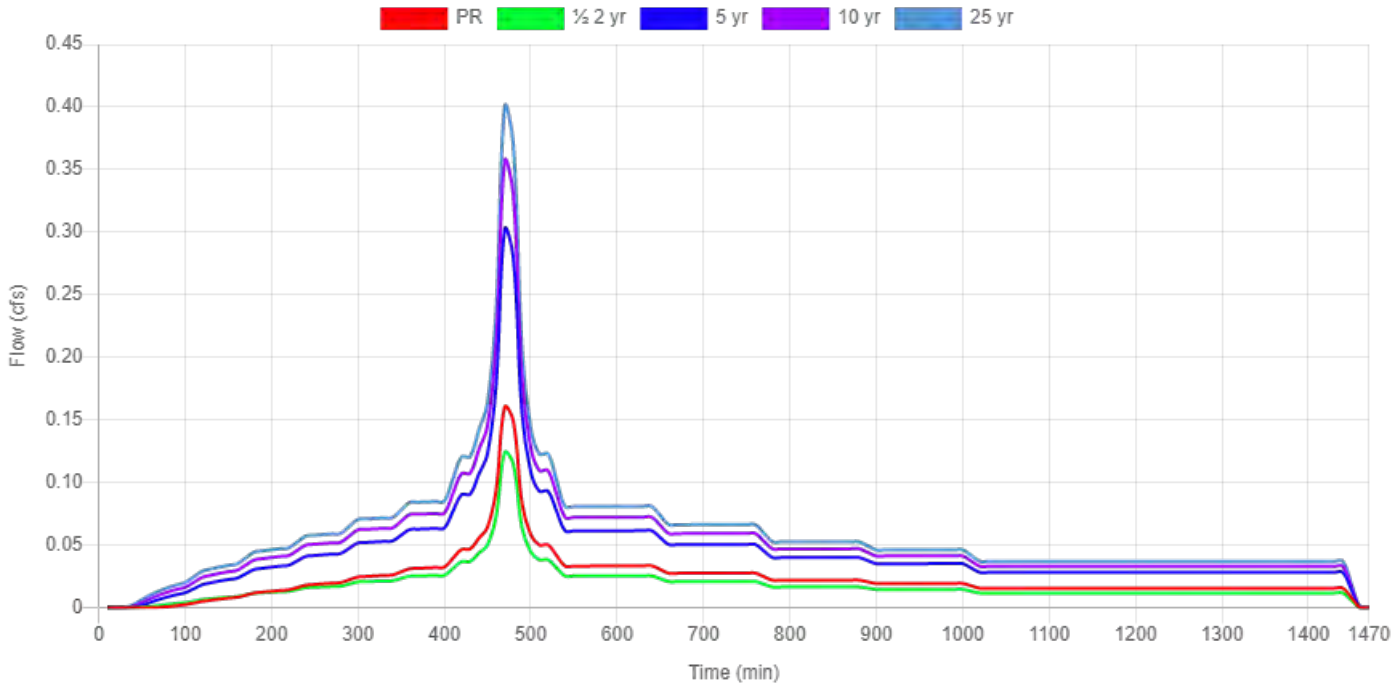


11A

Site Soils & Infiltration Testing	Infiltration Testing Procedure NA Tested Native Soil Infiltration Rate 0 in/hr
Correction Factor	CF test 2
Design Infiltration Rates	Native Soil 0 in/hr Imported Blended Soil 6 in/hr
Catchment Information	Hierarchy Level 2B Hierarchy Description Discharge to an overland storm drainage system, including streams, drainageways, and ditches, or to a storm-only pipe system that discharges to an overland storm drainage system. Pollution Reduction Requirement Filter the post-development stormwater runoff from the water quality storm event through the blended soil. Infiltration Requirement N/A Flow Control Requirement Limit the ½ the 2-yr, the 5-yr, and the 10-yr post-development peak flows to their respective pre-development peak flows. Unless the facility is a public facility (i.e., in the public right-of-way), also limit the 25-yr post-development peak flow to the 25-year pre-development peak flow. Impervious Area 17535 sq ft 0.403 acre Pre-Development Time of Concentration (Tc pre) 10 min Post-Development Time of Concentration (Tc post) 5 min Pre-Development Curve Number (CN pre) 82 Post-Development Curve Number (CN post) 98

SBUH Results

Post-Development Runoff



	Pre - Development Rate and Volume		Post - Development Rate and Volume	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0.0237	595.2	0.1602	2029.1
½ 2-Year	0.0387	676	0.1238	1586.4
5-Year	0.1175	1900.7	0.3024	3899.6
10-Year	0.1608	2484.7	0.3569	4627.5
25-Year	0.197	2970.9	0.4004	5210.2

	Overflow		Underdrain Outflow		Infiltration	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0	0	0.156	2029.1	0	0
½ 2-Year	0	0	0.12	1586.4	0	0
5-Year	0	0	0.2	3899.6	0	0
10-Year	0	0	0.2	4627.5	0	0
25-Year	0	0	0.2	5210.2	0	0

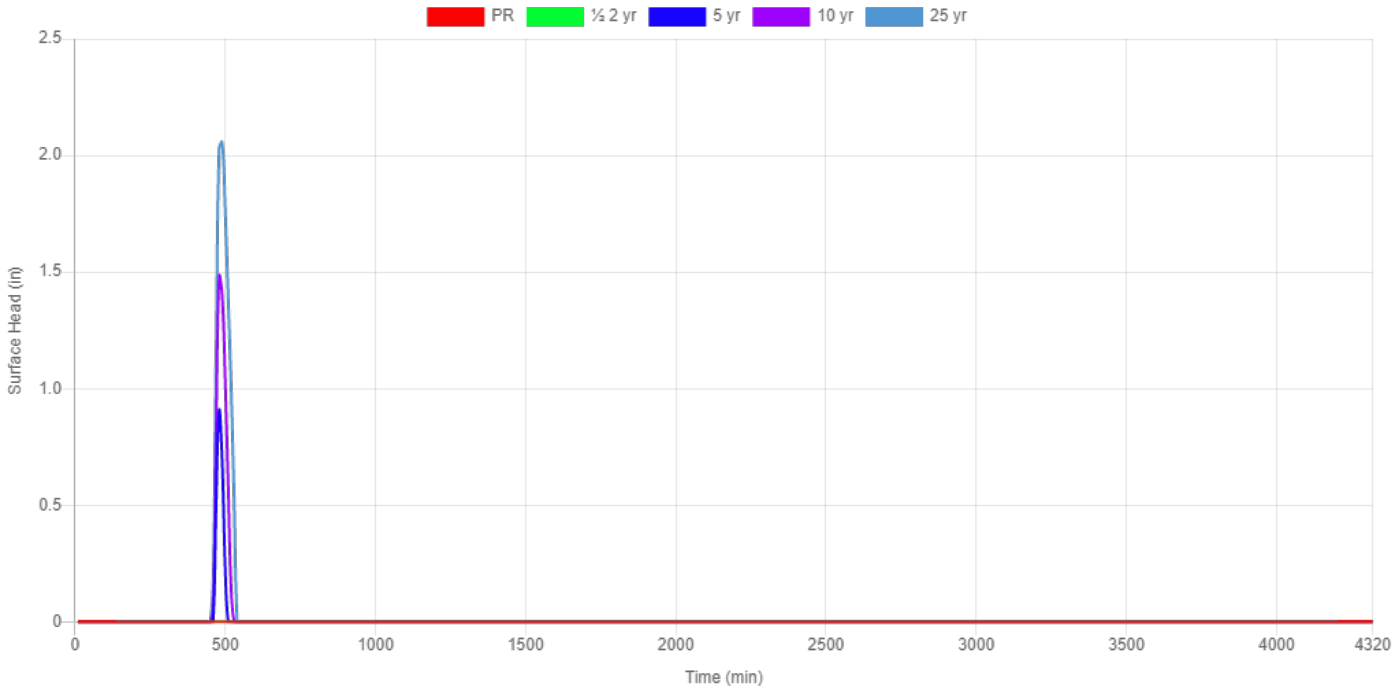
Flat Planter

Site Soils & Infiltration Testing	Category Flat Planter Shape Null Location Parcel Configuration D: Lined Facility with RS and Ud **Above Grade Storage Data** Bottom Area 1440 sq ft Bottom Width 20.00 ft Overflow Height 12 in Total Depth of Blended Soil plus Rock 18 in Surface Storage Capacity at Overflow 1440 cu ft Design Infiltration Rate to Soil Underlying the Facility 0.000 cfs Design Infiltration Rate for Imported Blended Soil in the Facility 0.200 cfs **Below Grade Storage Data** Catchment is too small for flow control? No Rock Area 360.00 sq ft Rock Width 3.00 ft Rock Storage Depth 12.0 in Rock Porosity 0.3 Underdrain Height

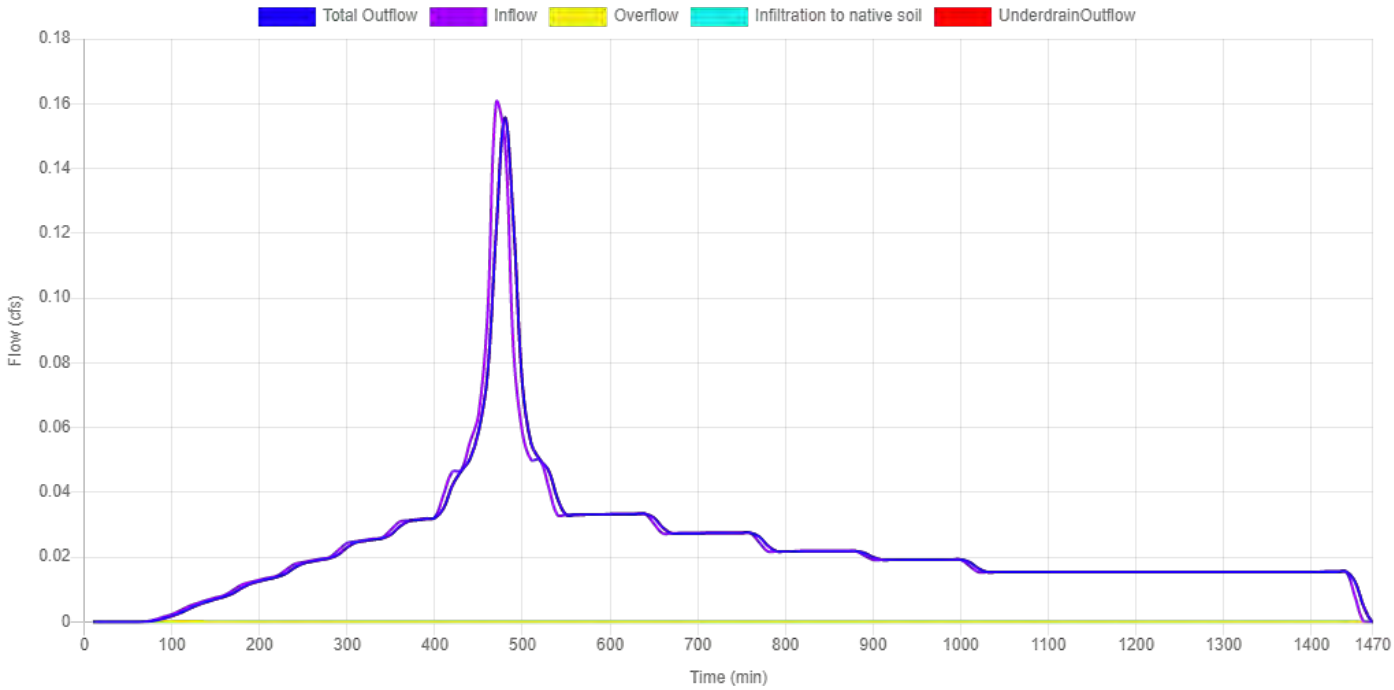
	4 in Percent of Facility Base that Allows Infiltration 0 % Orifice (Y/N)? No Why no orifice Water-quality-only facility
Facility Facts	Total Facility Area (excluding freeboard) 1440.00 sq ft Sizing Ratio 8.21 %
Pollution Reduction Results	Pollution Reduction Score Pass Overflow Volume 0.00 cf Surface Capacity Used 0.00 %
Flow Control Results	Flow Control Score Fail

	STORMWATER FACILITY OUTFLOW (CFS)		PRE-DEVELOPMENT RUNOFF (CFS)
½ the 2 year	0.1201	<=	0.0387
5 year	0.2000	<=	0.1175
10 year	0.2000	<=	0.1608
25 year	0.2000	<=	0.1970

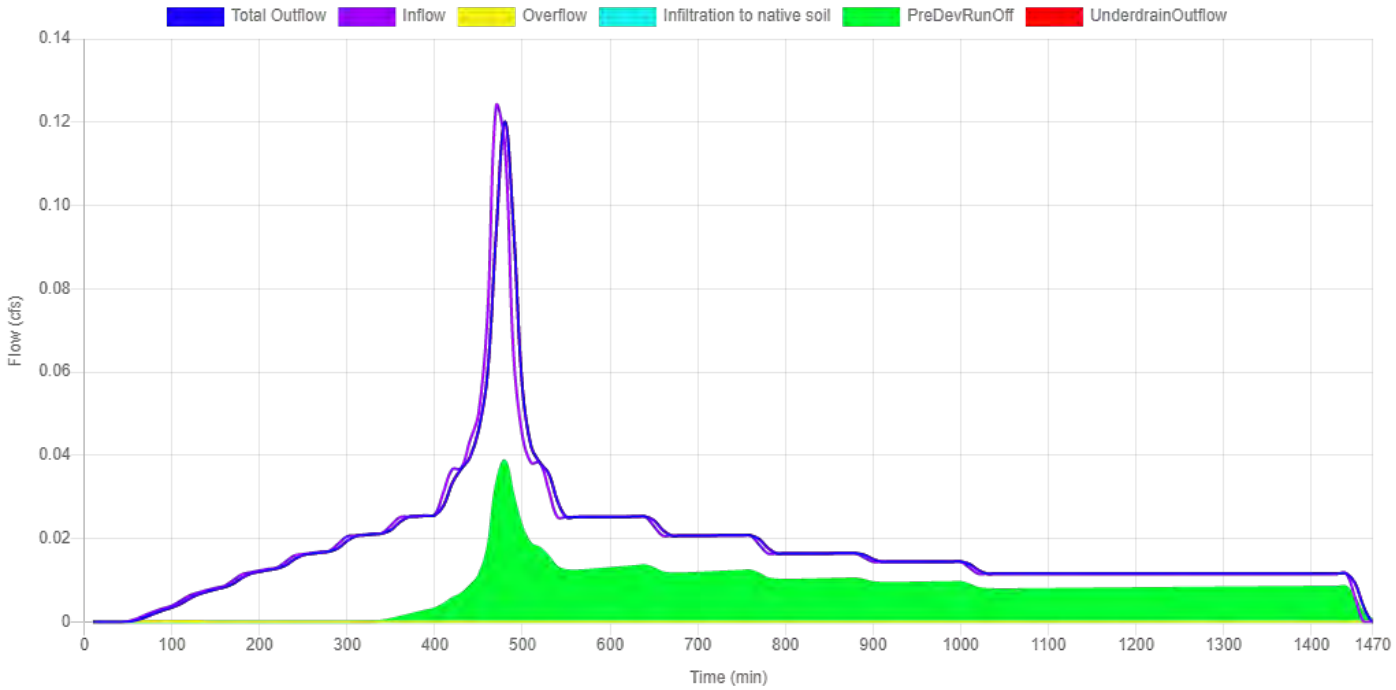
Surface Head



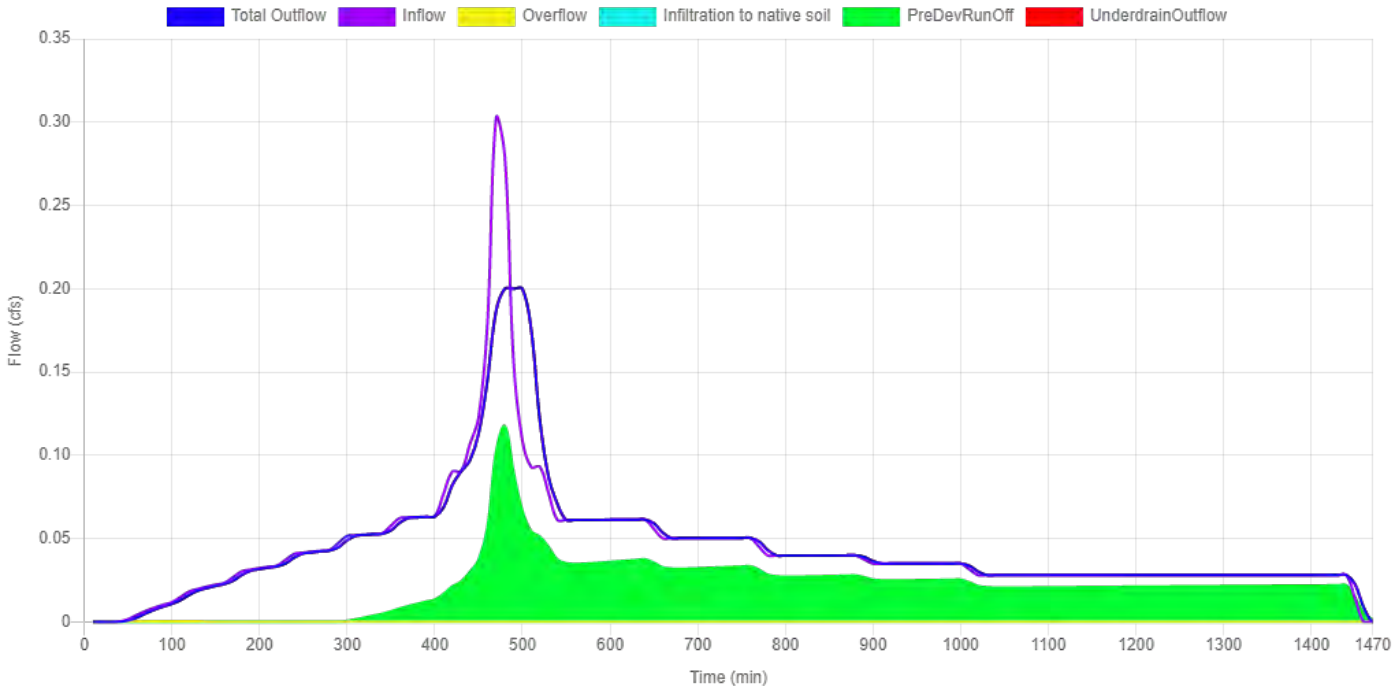
Water Quality



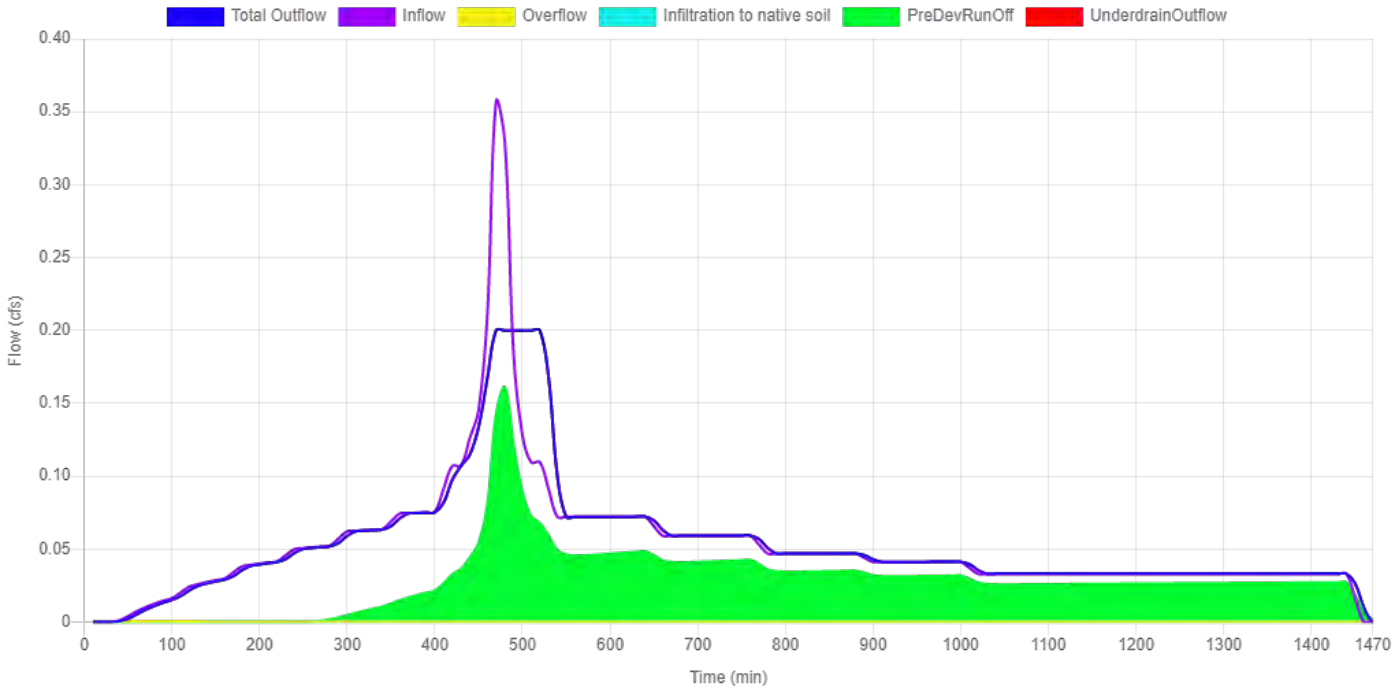
½ 2-Year



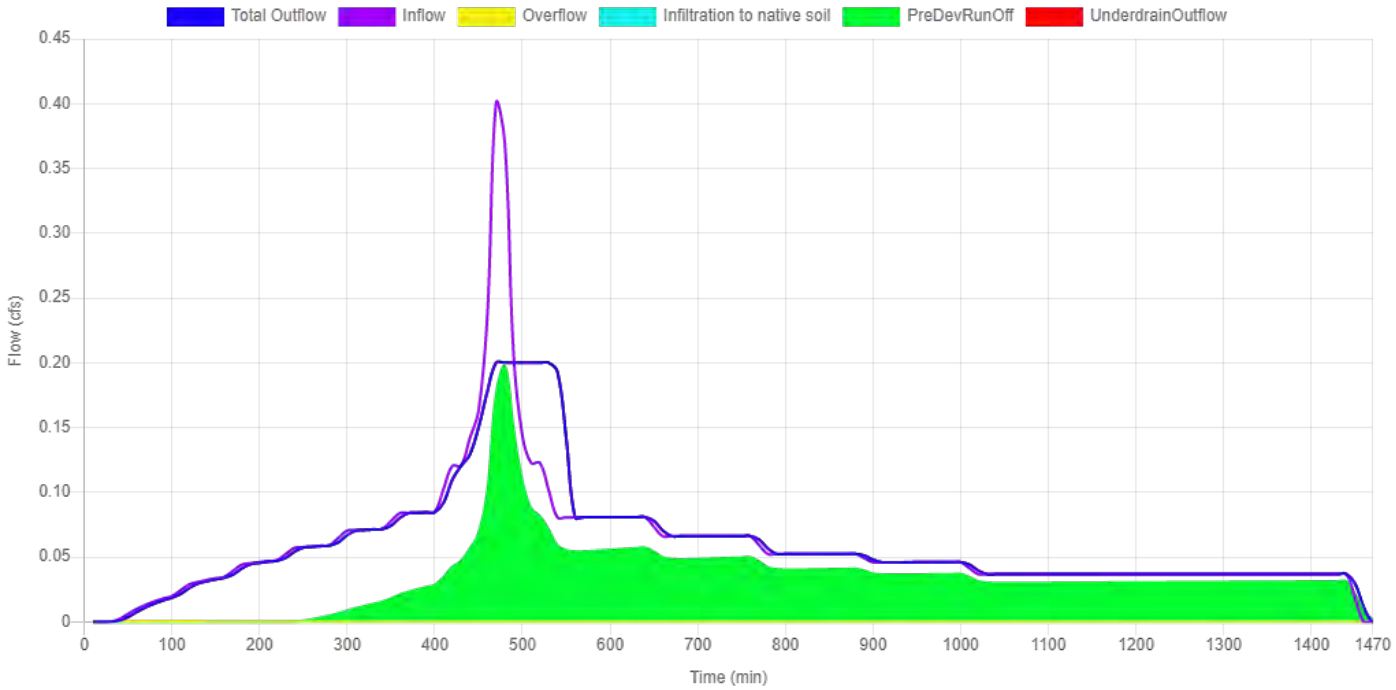
5-Year



10-Year



25-Year

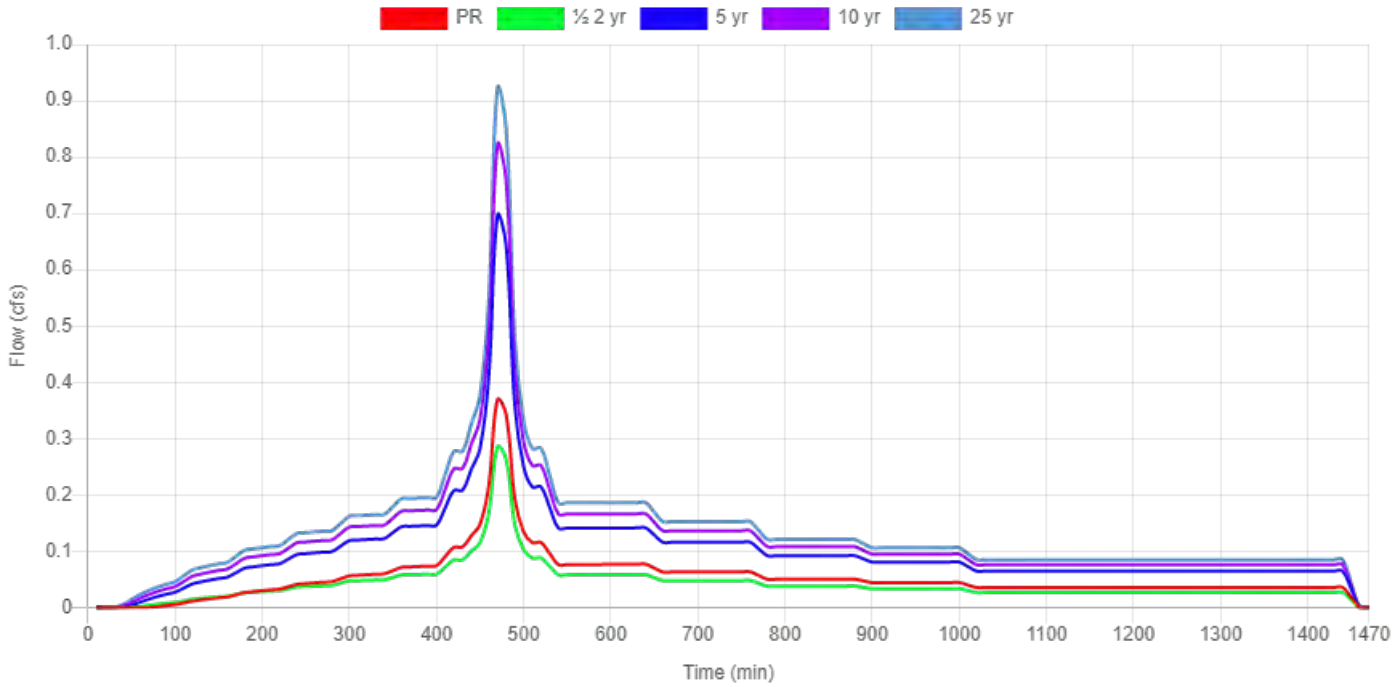


11B

Site Soils & Infiltration Testing	Infiltration Testing Procedure NA Tested Native Soil Infiltration Rate 0 in/hr
Correction Factor	CF test 2
Design Infiltration Rates	Native Soil 0 in/hr Imported Blended Soil 6 in/hr
Catchment Information	Hierarchy Level 2B Hierarchy Description Discharge to an overland storm drainage system, including streams, drainageways, and ditches, or to a storm-only pipe system that discharges to an overland storm drainage system. Pollution Reduction Requirement Filter the post-development stormwater runoff from the water quality storm event through the blended soil. Infiltration Requirement N/A Flow Control Requirement Limit the ½ the 2-yr, the 5-yr, and the 10-yr post-development peak flows to their respective pre-development peak flows. Unless the facility is a public facility (i.e., in the public right-of-way), also limit the 25-yr post-development peak flow to the 25-year pre-development peak flow. Impervious Area 40382 sq ft 0.927 acre Pre-Development Time of Concentration (Tc pre) 10 min Post-Development Time of Concentration (Tc post) 5 min Pre-Development Curve Number (CN pre) 82 Post-Development Curve Number (CN post) 98

SBUH Results

Post-Development Runoff



	Pre - Development Rate and Volume		Post - Development Rate and Volume	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0.0546	1370.8	0.3689	4672.8
½ 2-Year	0.0891	1556.8	0.2851	3653.5
5-Year	0.2706	4377.2	0.6964	8980.6
10-Year	0.3702	5722.1	0.8219	10656.8
25-Year	0.4536	6841.8	0.9221	11998.9

	Overflow		Underdrain Outflow		Infiltration	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0	0	0.089	4672.8	0	0
½ 2-Year	0	0	0.089	3653.5	0	0
5-Year	0.607	2020.3	0.089	6960.3	0	0
10-Year	0.733	3204.7	0.089	7452.1	0	0
25-Year	0.833	4234.5	0.089	7764.4	0	0

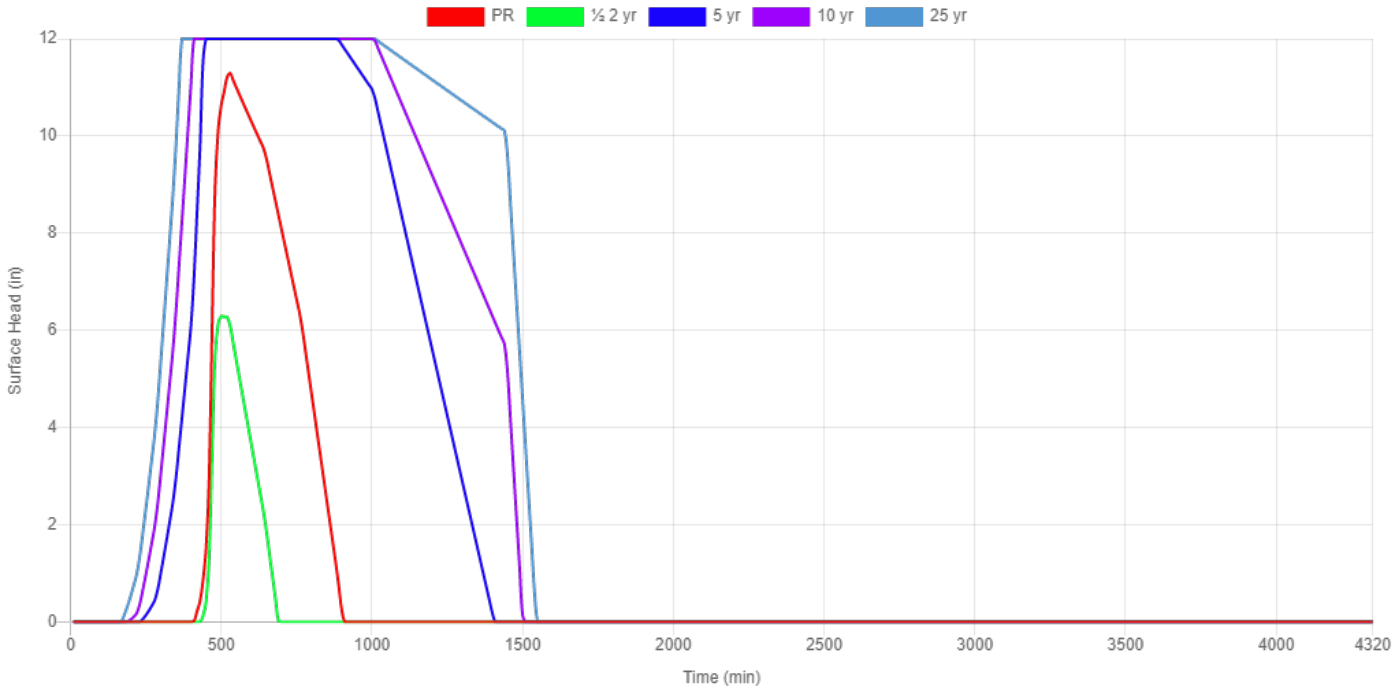
Flat Planter

Site Soils & Infiltration Testing	Category Flat Planter Shape Null Location Parcel Configuration D: Lined Facility with RS and Ud **Above Grade Storage Data** Bottom Area 640 sq ft Bottom Width 7.00 ft Overflow Height 12 in Total Depth of Blended Soil plus Rock 18 in Surface Storage Capacity at Overflow 640 cu ft Design Infiltration Rate to Soil Underlying the Facility 0.000 cfs Design Infiltration Rate for Imported Blended Soil in the Facility 0.089 cfs **Below Grade Storage Data** Catchment is too small for flow control? No Rock Area 68.57 sq ft Rock Width 3.00 ft Rock Storage Depth 12.0 in Rock Porosity 0.3 Underdrain Height

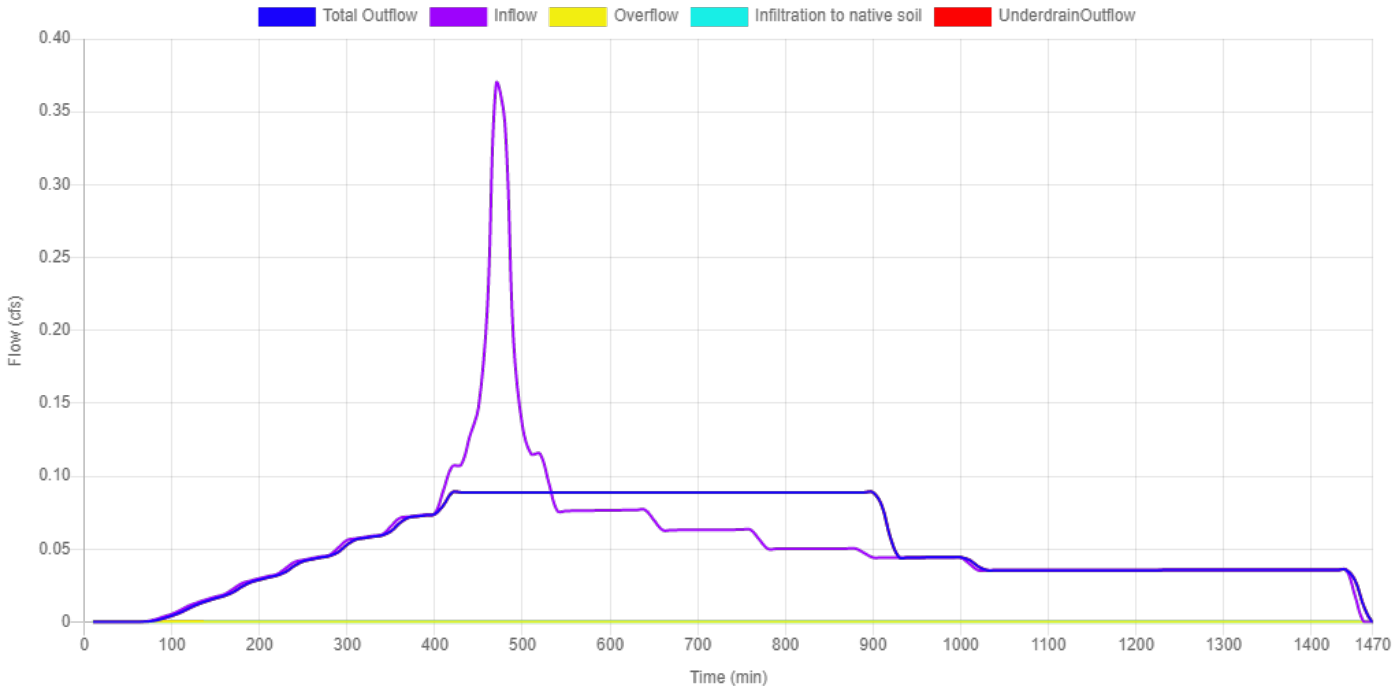
	4 in Percent of Facility Base that Allows Infiltration 0 % Orifice (Y/N)? No Why no orifice Water-quality-only facility
Facility Facts	Total Facility Area (excluding freeboard) 640.00 sq ft Sizing Ratio 1.58 %
Pollution Reduction Results	Pollution Reduction Score Pass Overflow Volume 0.00 cf Surface Capacity Used 94.09 %
Flow Control Results	Flow Control Score Fail

	STORMWATER FACILITY OUTFLOW (CFS)		PRE-DEVELOPMENT RUNOFF (CFS)
½ the 2 year	0.0889	<=	0.0891
5 year	0.6964	<=	0.2706
10 year	0.8219	<=	0.3702
25 year	0.9221	<=	0.4536

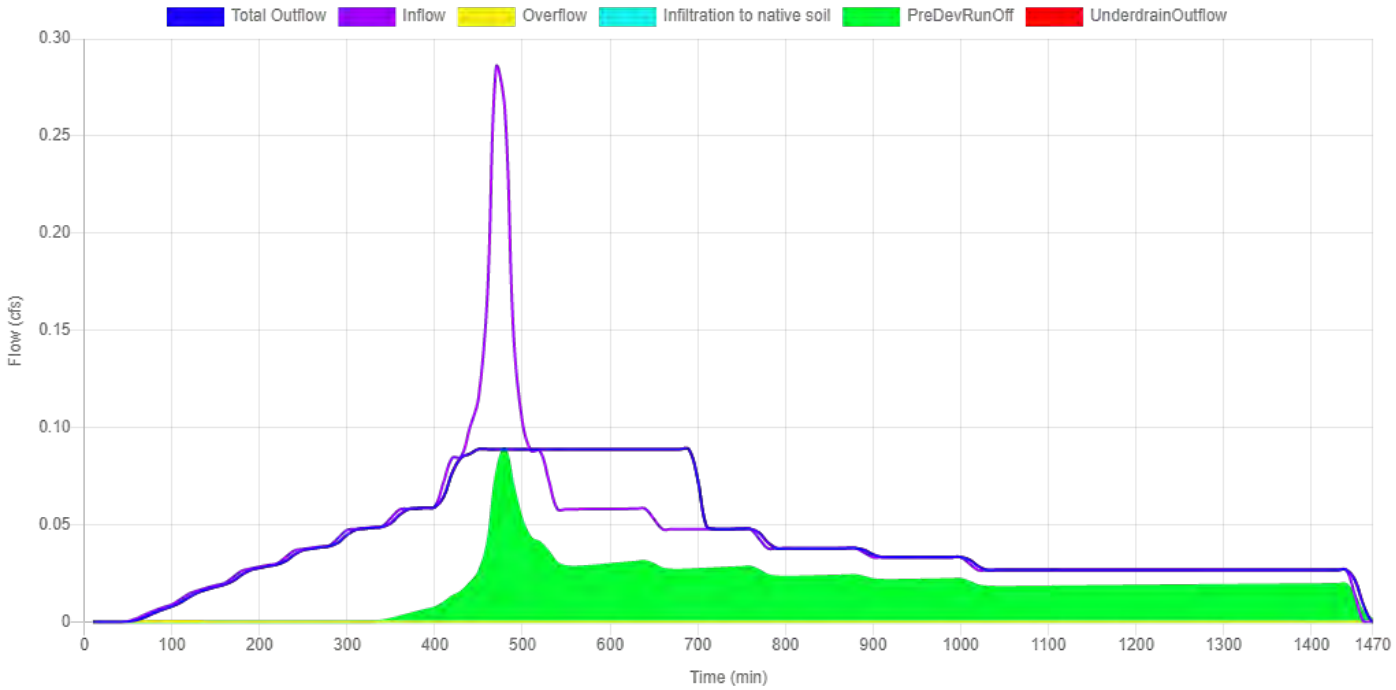
Surface Head



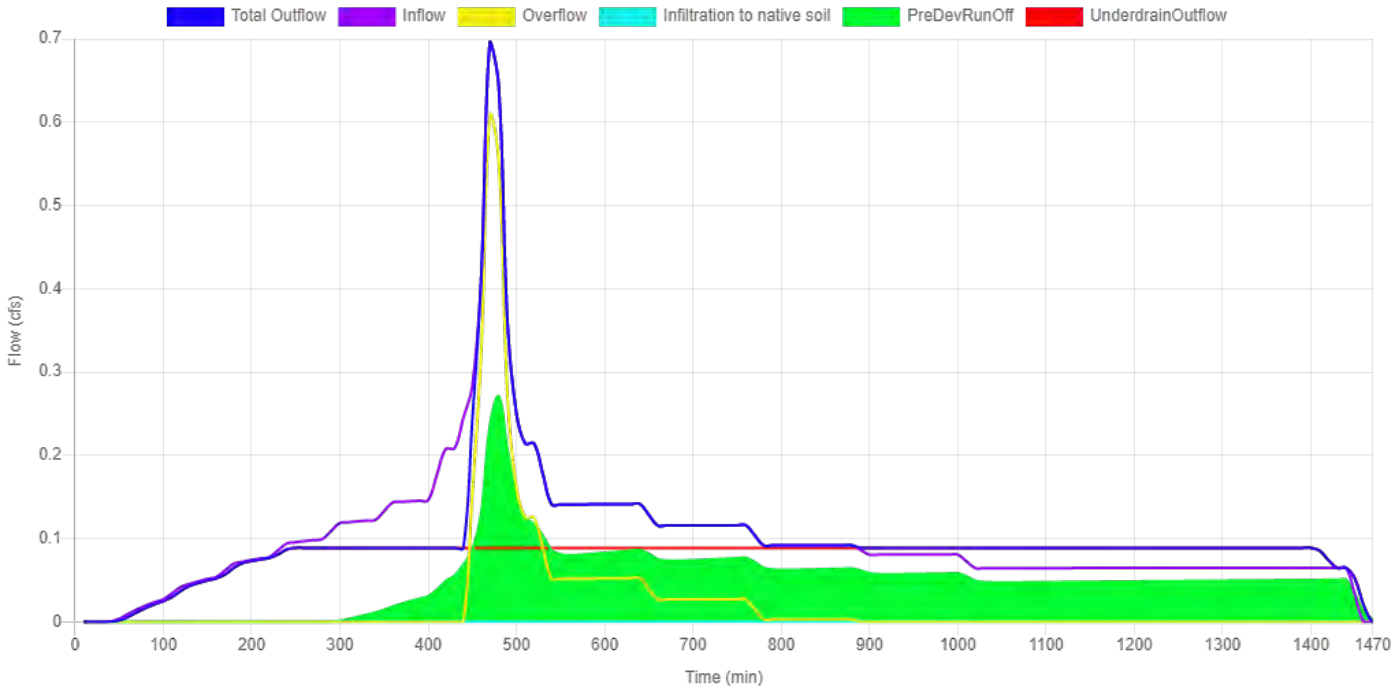
Water Quality



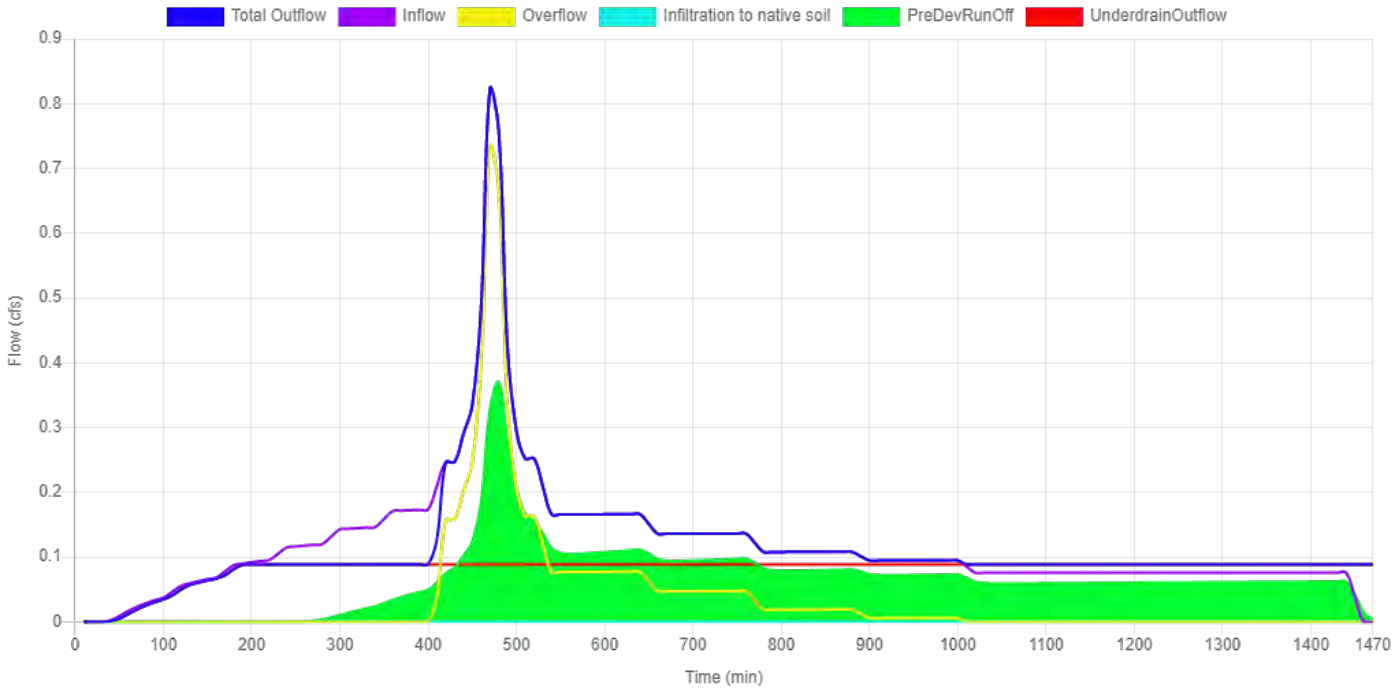
½ 2-Year



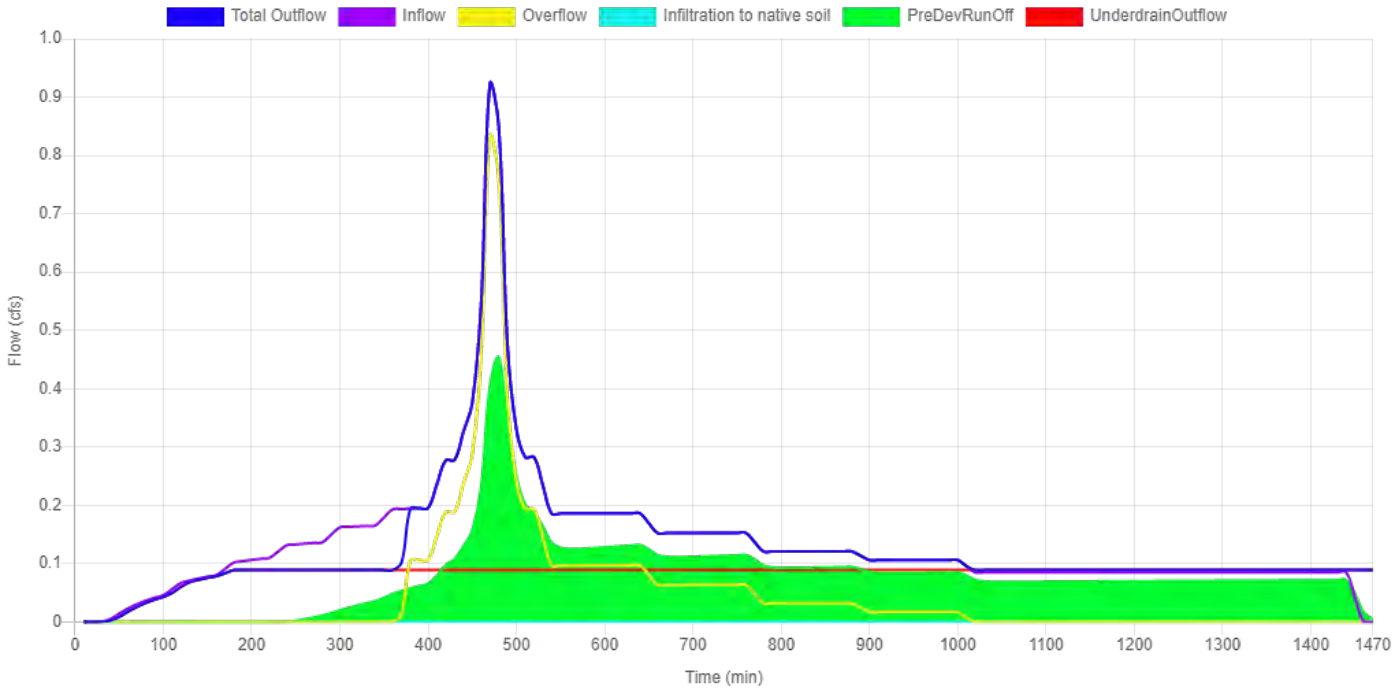
5-Year



10-Year



25-Year

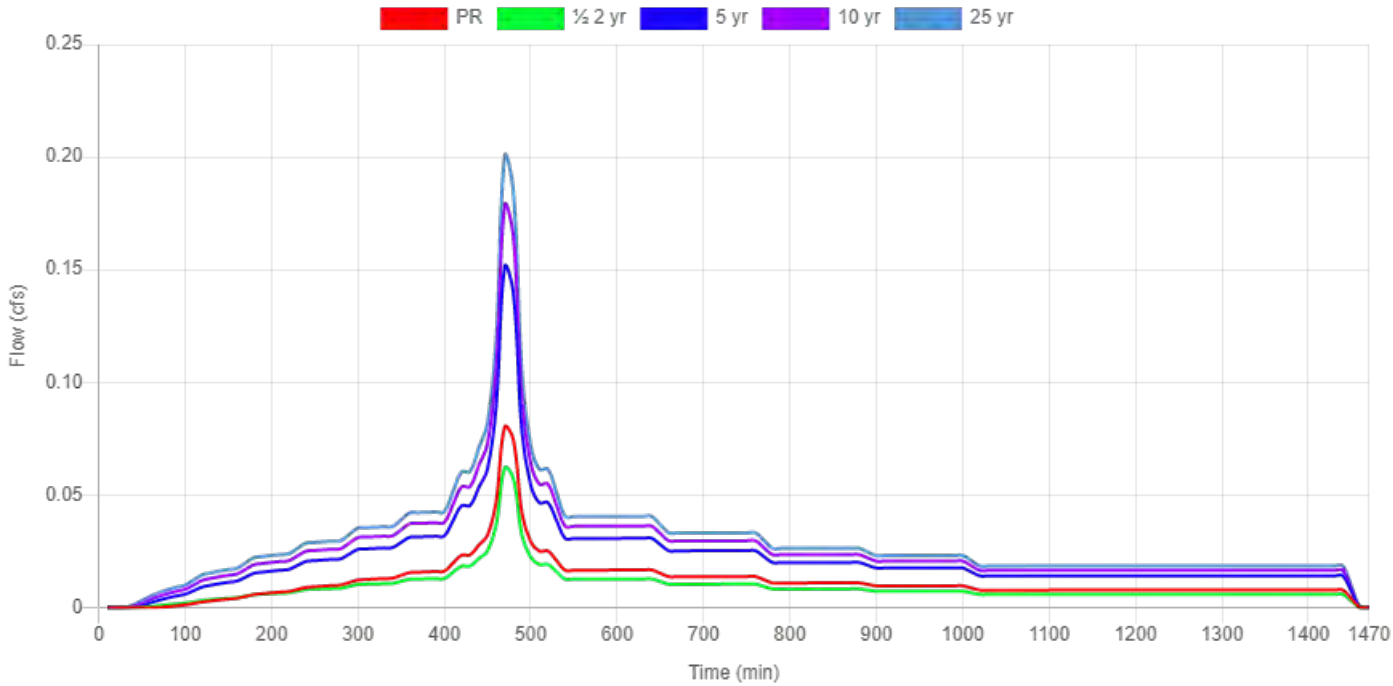


11C

Site Soils & Infiltration Testing	Infiltration Testing Procedure NA Tested Native Soil Infiltration Rate 0 in/hr
Correction Factor	CF test 2
Design Infiltration Rates	Native Soil 0 in/hr Imported Blended Soil 6 in/hr
Catchment Information	Hierarchy Level 2B Hierarchy Description Discharge to an overland storm drainage system, including streams, drainageways, and ditches, or to a storm-only pipe system that discharges to an overland storm drainage system. Pollution Reduction Requirement Filter the post-development stormwater runoff from the water quality storm event through the blended soil. Infiltration Requirement N/A Flow Control Requirement Limit the ½ the 2-yr, the 5-yr, and the 10-yr post-development peak flows to their respective pre-development peak flows. Unless the facility is a public facility (i.e., in the public right-of-way), also limit the 25-yr post-development peak flow to the 25-year pre-development peak flow. Impervious Area 8778 sq ft 0.202 acre Pre-Development Time of Concentration (Tc pre) 10 min Post-Development Time of Concentration (Tc post) 5 min Pre-Development Curve Number (CN pre) 82 Post-Development Curve Number (CN post) 98

SBUH Results

Post-Development Runoff



	Pre - Development Rate and Volume		Post - Development Rate and Volume	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0.0119	298	0.0802	1015.8
½ 2-Year	0.0194	338.4	0.062	794.2
5-Year	0.0588	951.5	0.1514	1952.2
10-Year	0.0805	1243.8	0.1787	2316.5
25-Year	0.0986	1487.2	0.2004	2608.2

	Overflow		Underdrain Outflow		Infiltration	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0	0	0.078	1015.8	0	0
½ 2-Year	0	0	0.06	794.2	0	0
5-Year	0	0	0.101	1952.2	0	0
10-Year	0	0	0.101	2316.5	0	0
25-Year	0	0	0.101	2608.2	0	0

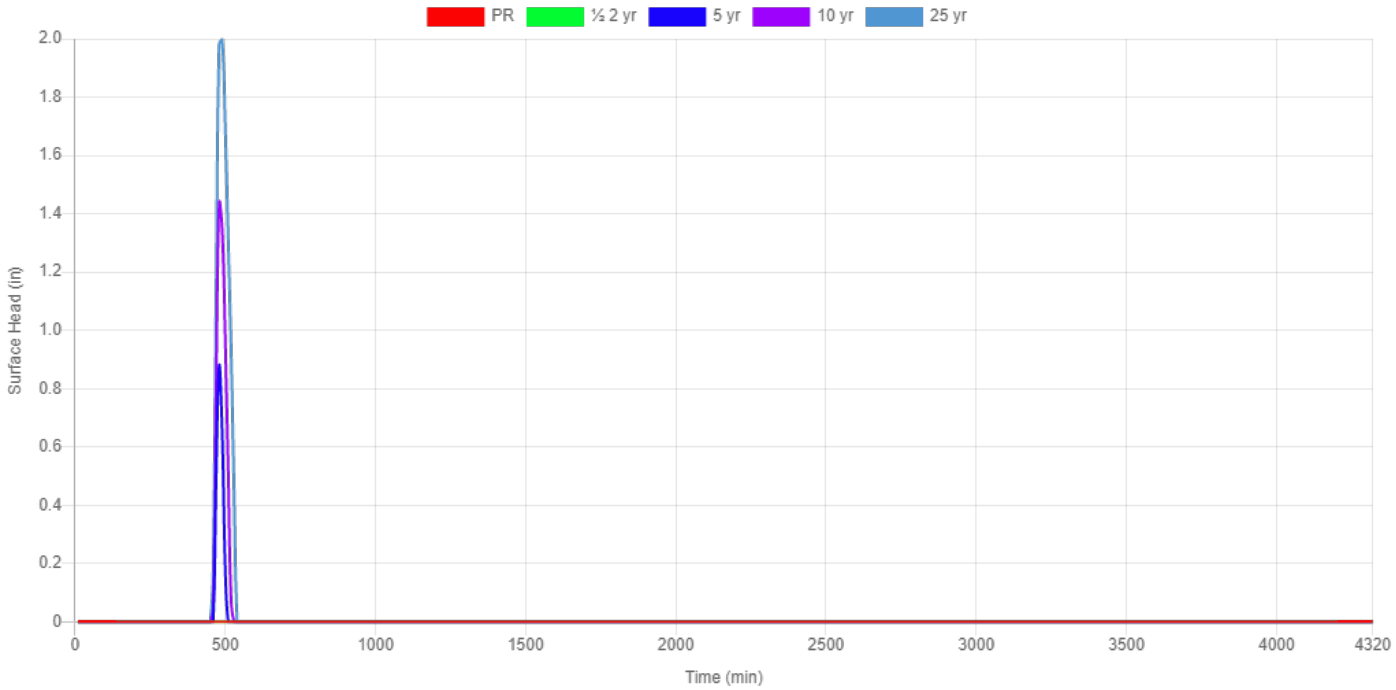
Flat Planter

Site Soils & Infiltration Testing	Category Flat Planter Shape Null Location Parcel Configuration D: Lined Facility with RS and Ud **Above Grade Storage Data** Bottom Area 728 sq ft Bottom Width 7.00 ft Overflow Height 12 in Total Depth of Blended Soil plus Rock 18 in Surface Storage Capacity at Overflow 728 cu ft Design Infiltration Rate to Soil Underlying the Facility 0.000 cfs Design Infiltration Rate for Imported Blended Soil in the Facility 0.101 cfs **Below Grade Storage Data** Catchment is too small for flow control? No Rock Area 78.00 sq ft Rock Width 3.00 ft Rock Storage Depth 12.0 in Rock Porosity 0.3 Underdrain Height

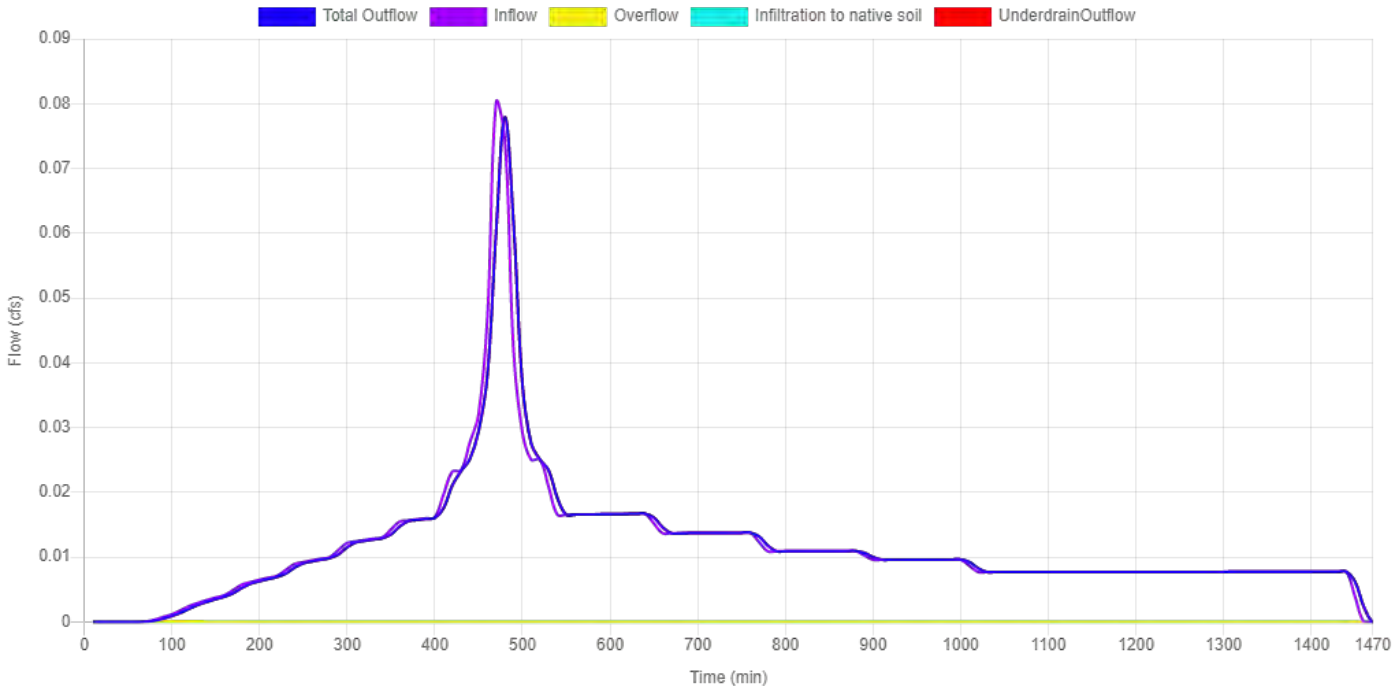
	4 in Percent of Facility Base that Allows Infiltration 0 % Orifice (Y/N)? No Why no orifice Water-quality-only facility
Facility Facts	Total Facility Area (excluding freeboard) 728.00 sq ft Sizing Ratio 8.29 %
Pollution Reduction Results	Pollution Reduction Score Pass Overflow Volume 0.00 cf Surface Capacity Used 0.00 %
Flow Control Results	Flow Control Score Fail

	STORMWATER FACILITY OUTFLOW (CFS)		PRE-DEVELOPMENT RUNOFF (CFS)
½ the 2 year	0.0601	<=	0.0194
5 year	0.1011	<=	0.0588
10 year	0.1011	<=	0.0805
25 year	0.1011	<=	0.0986

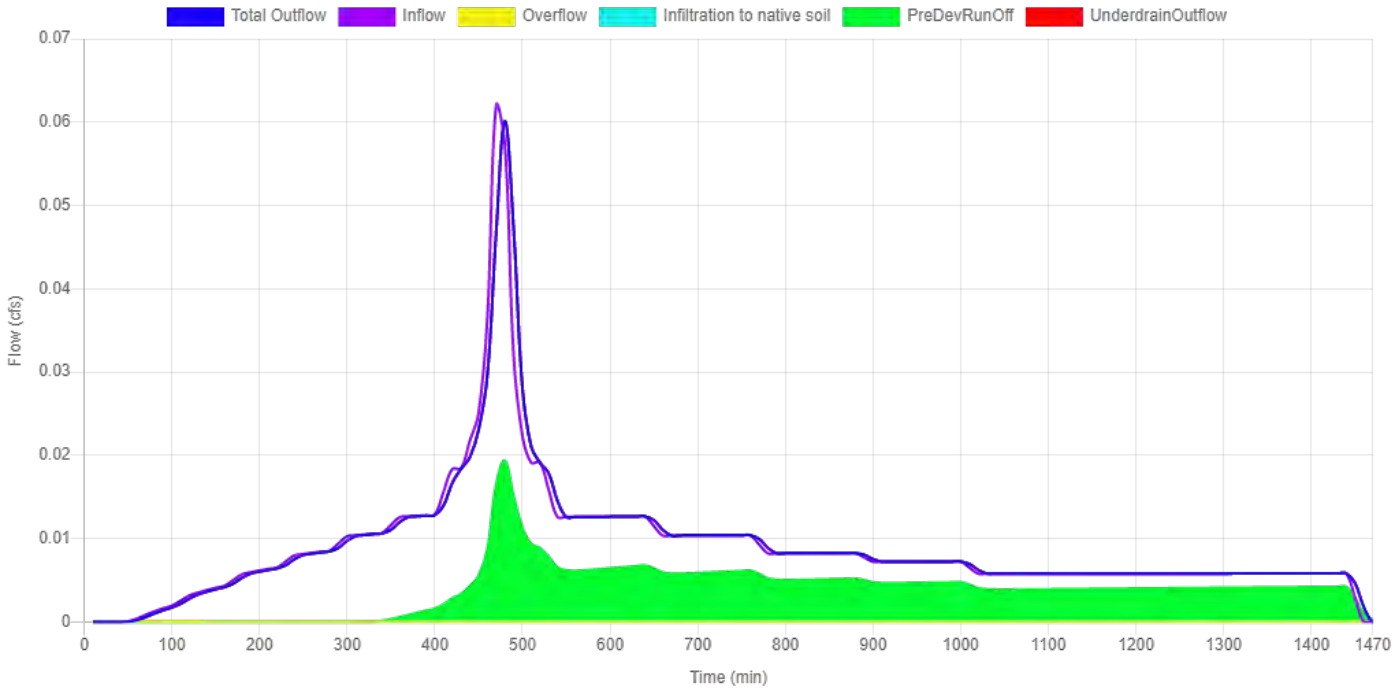
Surface Head



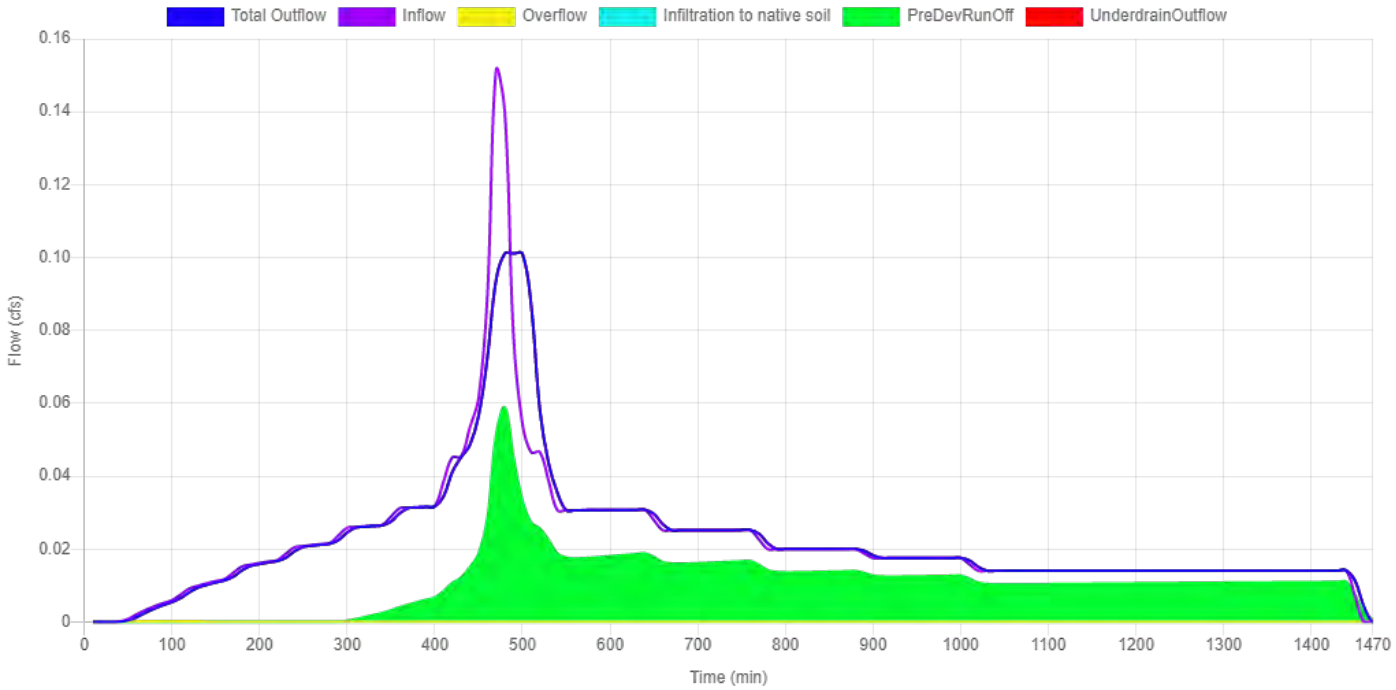
Water Quality



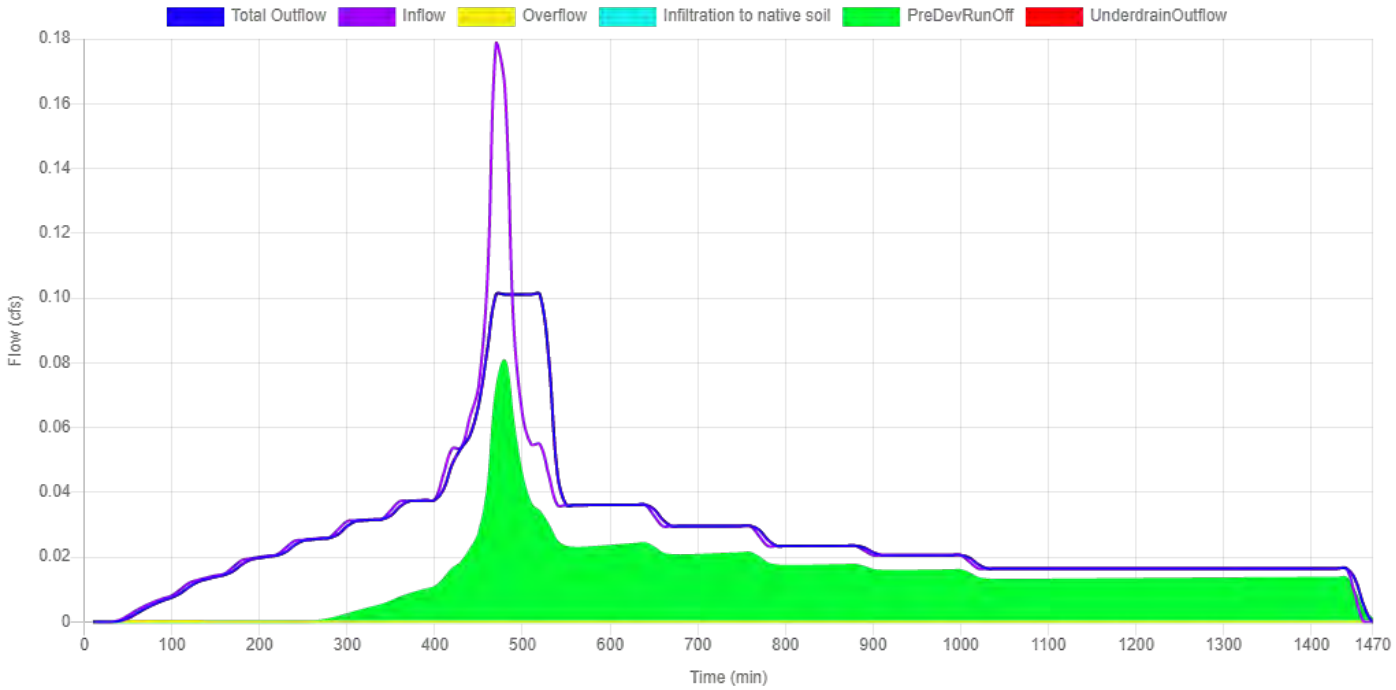
½ 2-Year



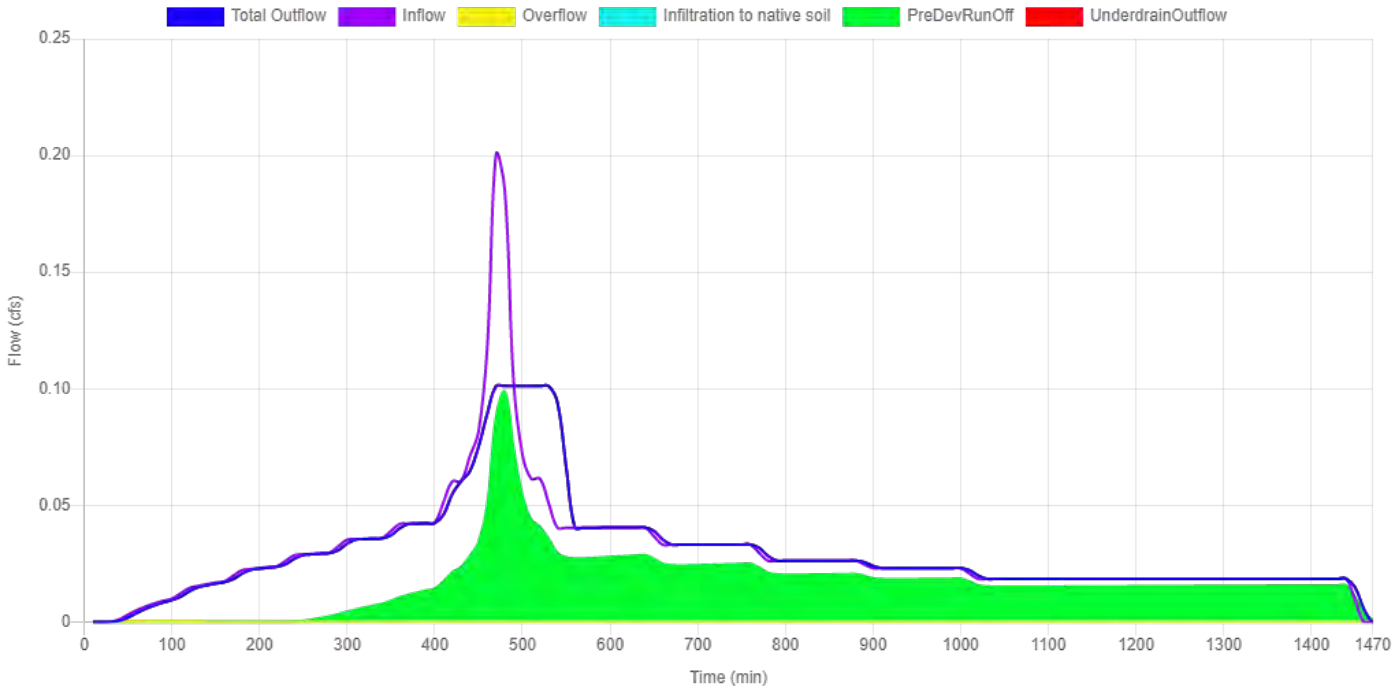
5-Year



10-Year



25-Year

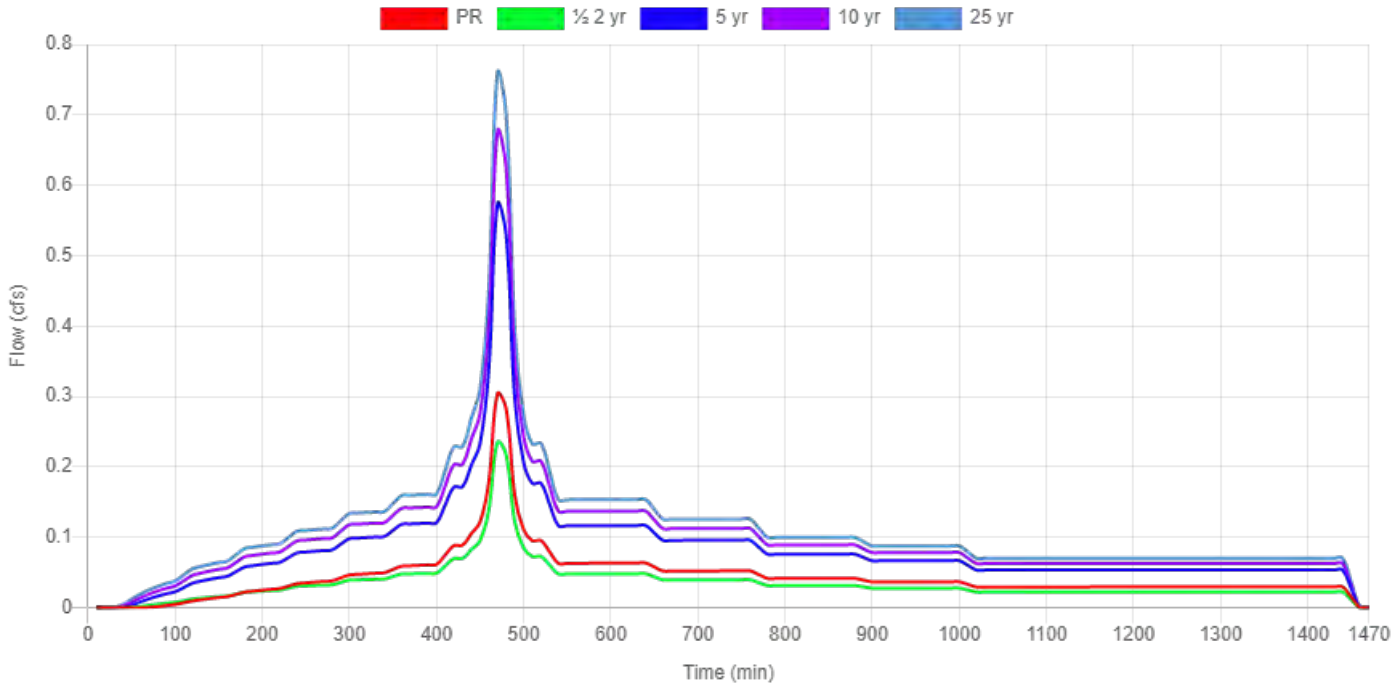


12A

Site Soils & Infiltration Testing	Infiltration Testing Procedure NA Tested Native Soil Infiltration Rate 0 in/hr
Correction Factor	CF test 2
Design Infiltration Rates	Native Soil 0 in/hr Imported Blended Soil 6 in/hr
Catchment Information	Hierarchy Level 2B Hierarchy Description Discharge to an overland storm drainage system, including streams, drainageways, and ditches, or to a storm-only pipe system that discharges to an overland storm drainage system. Pollution Reduction Requirement Filter the post-development stormwater runoff from the water quality storm event through the blended soil. Infiltration Requirement N/A Flow Control Requirement Limit the ½ the 2-yr, the 5-yr, and the 10-yr post-development peak flows to their respective pre-development peak flows. Unless the facility is a public facility (i.e., in the public right-of-way), also limit the 25-yr post-development peak flow to the 25-year pre-development peak flow. Impervious Area 33262 sq ft 0.764 acre Pre-Development Time of Concentration (Tc pre) 10 min Post-Development Time of Concentration (Tc post) 5 min Pre-Development Curve Number (CN pre) 82 Post-Development Curve Number (CN post) 98

SBUH Results

Post-Development Runoff



	Pre - Development Rate and Volume		Post - Development Rate and Volume	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0.045	1129.1	0.3038	3848.9
½ 2-Year	0.0734	1282.3	0.2348	3009.3
5-Year	0.2229	3605.5	0.5736	7397.2
10-Year	0.305	4713.2	0.677	8777.8
25-Year	0.3737	5635.4	0.7595	9883.3

	Overflow		Underdrain Outflow		Infiltration	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0	0	0.101	3848.9	0	0
½ 2-Year	0	0	0.101	3009.3	0	0
5-Year	0.429	664.9	0.101	6732.3	0	0
10-Year	0.576	1389.2	0.101	7388.6	0	0
25-Year	0.658	2041	0.101	7842.3	0	0

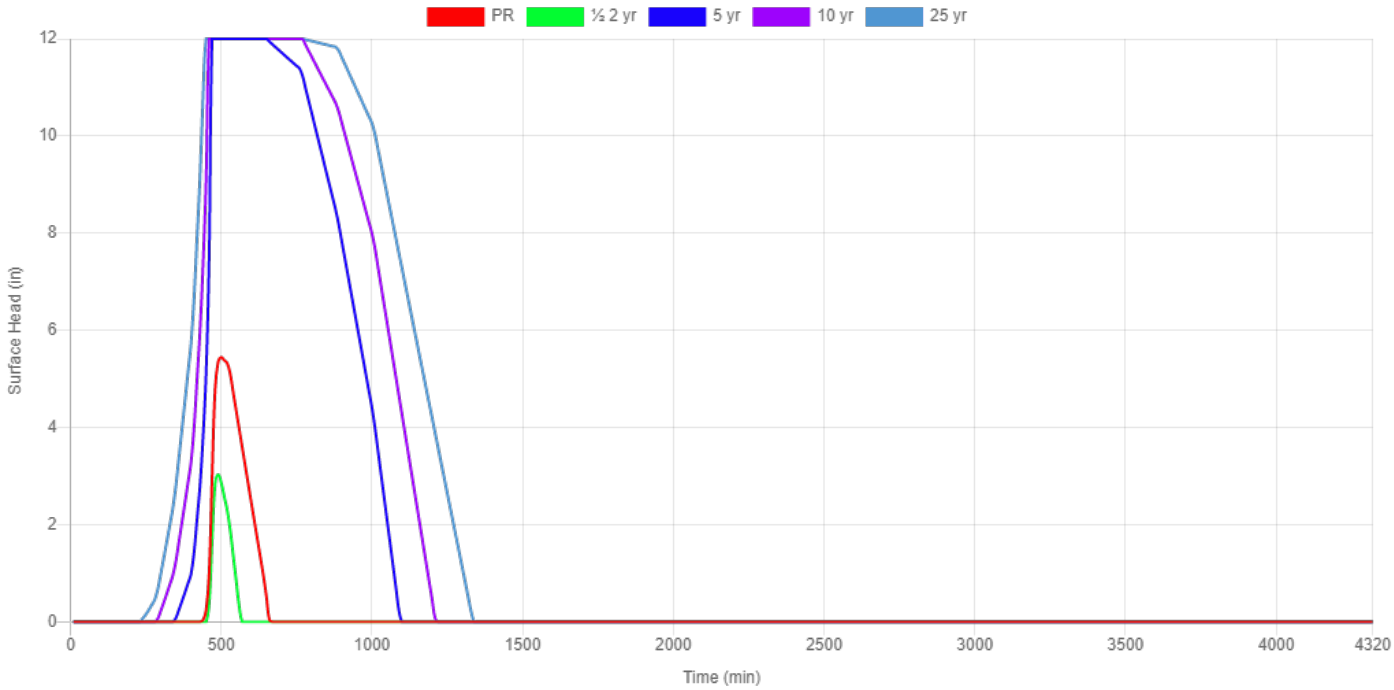
Flat Planter

Site Soils & Infiltration Testing	Category Flat Planter Shape Null Location Parcel Configuration D: Lined Facility with RS and Ud **Above Grade Storage Data** Bottom Area 728 sq ft Bottom Width 7.00 ft Overflow Height 12 in Total Depth of Blended Soil plus Rock 18 in Surface Storage Capacity at Overflow 728 cu ft Design Infiltration Rate to Soil Underlying the Facility 0.000 cfs Design Infiltration Rate for Imported Blended Soil in the Facility 0.101 cfs **Below Grade Storage Data** Catchment is too small for flow control? No Rock Area 78.00 sq ft Rock Width 3.00 ft Rock Storage Depth 12.0 in Rock Porosity 0.3 Underdrain Height

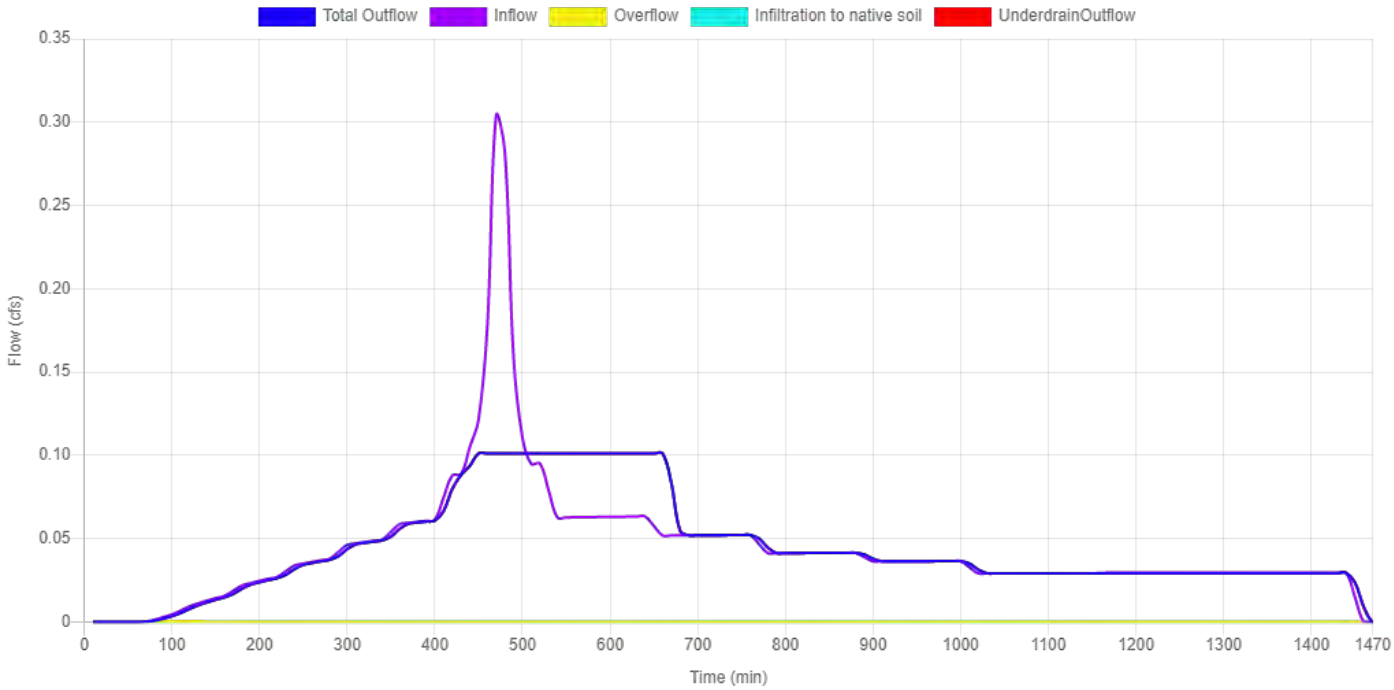
	4 in Percent of Facility Base that Allows Infiltration 0 % Orifice (Y/N)? No Why no orifice Water-quality-only facility
Facility Facts	Total Facility Area (excluding freeboard) 728.00 sq ft Sizing Ratio 2.19 %
Pollution Reduction Results	Pollution Reduction Score Pass Overflow Volume 0.00 cf Surface Capacity Used 45.39 %
Flow Control Results	Flow Control Score Fail

	STORMWATER FACILITY OUTFLOW (CFS)		PRE-DEVELOPMENT RUNOFF (CFS)
½ the 2 year	0.1011	<=	0.0734
5 year	0.5299	<=	0.2229
10 year	0.6770	<=	0.3050
25 year	0.7595	<=	0.3737

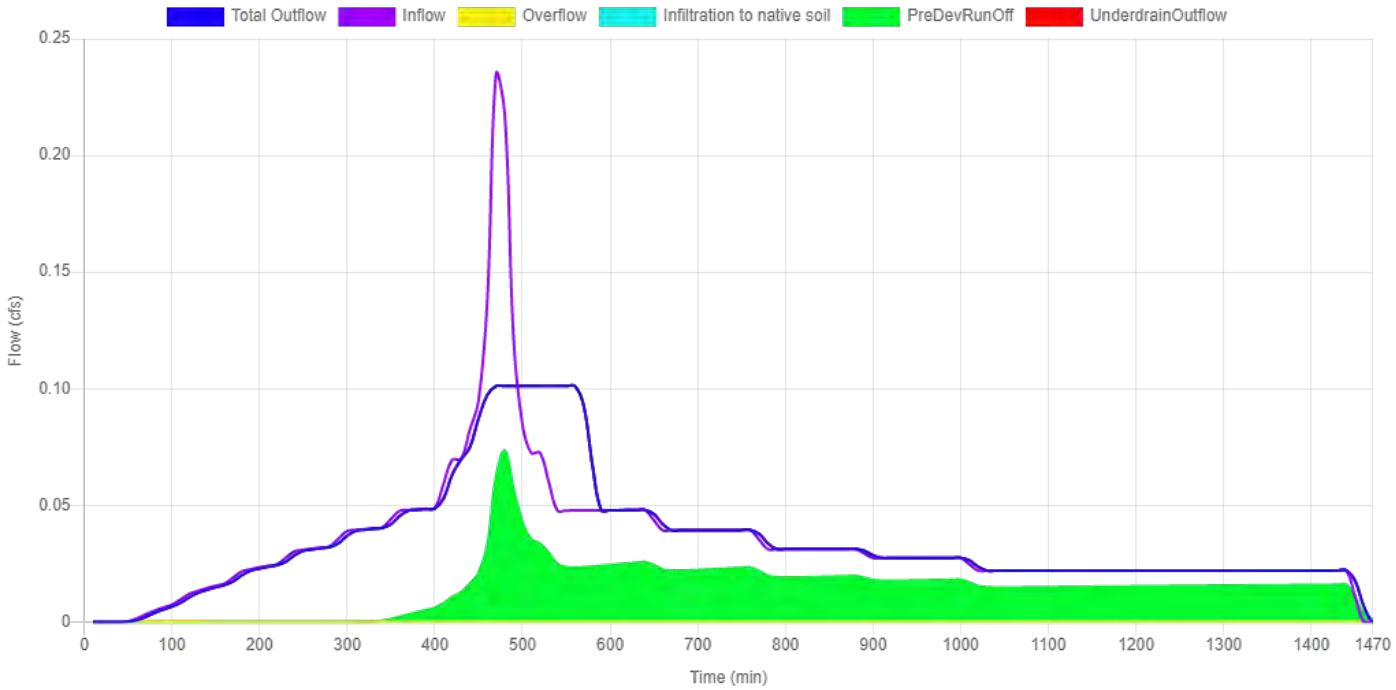
Surface Head



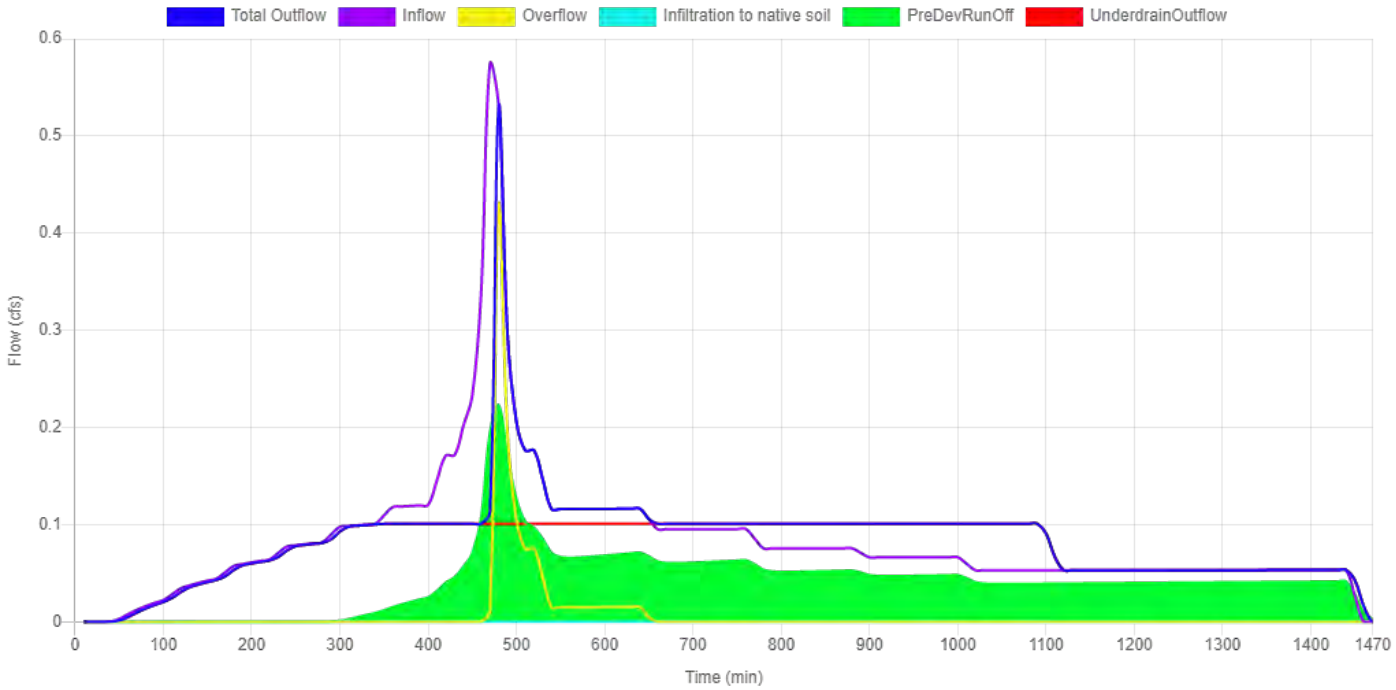
Water Quality



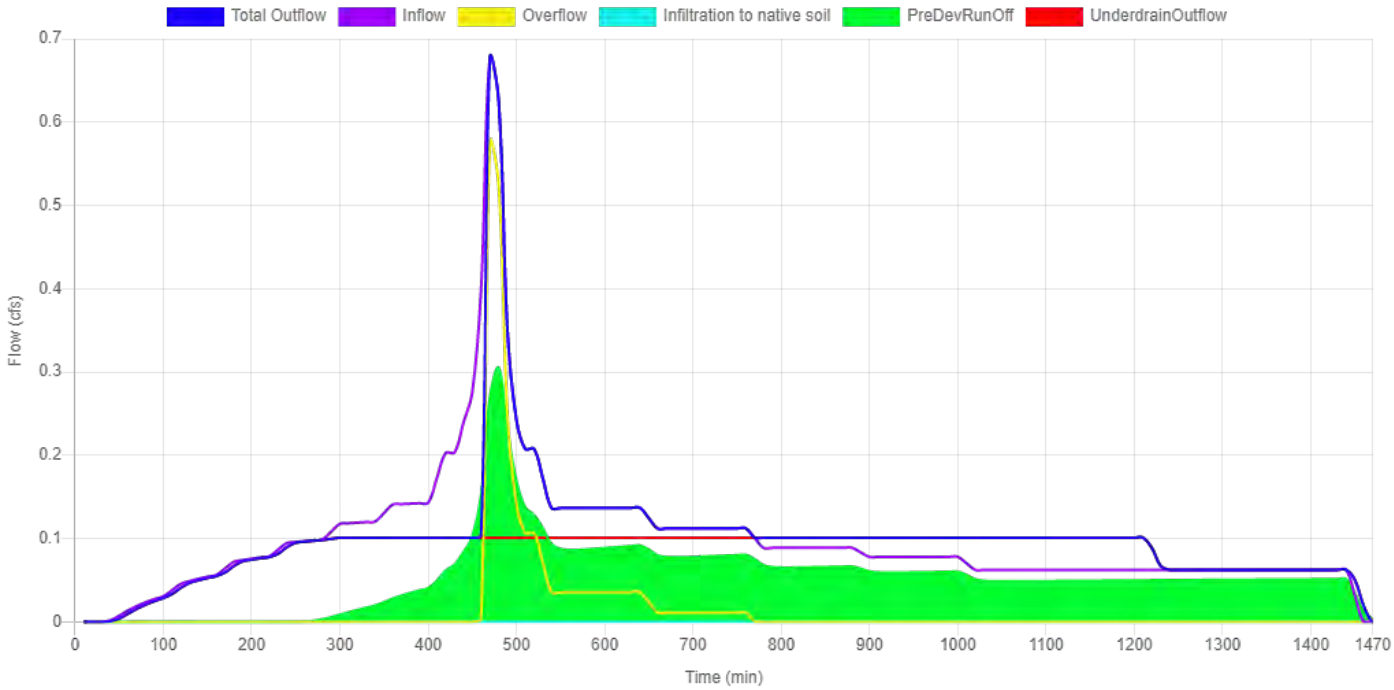
½ 2-Year



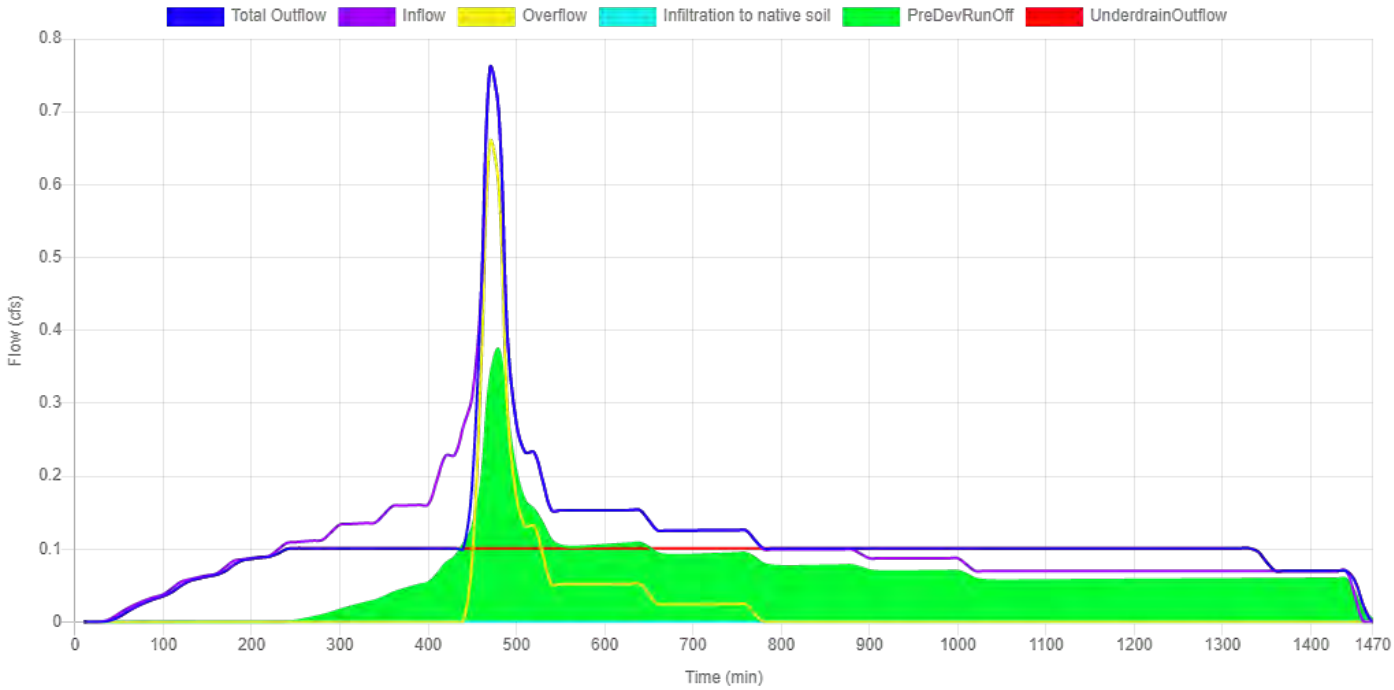
5-Year



10-Year



25-Year

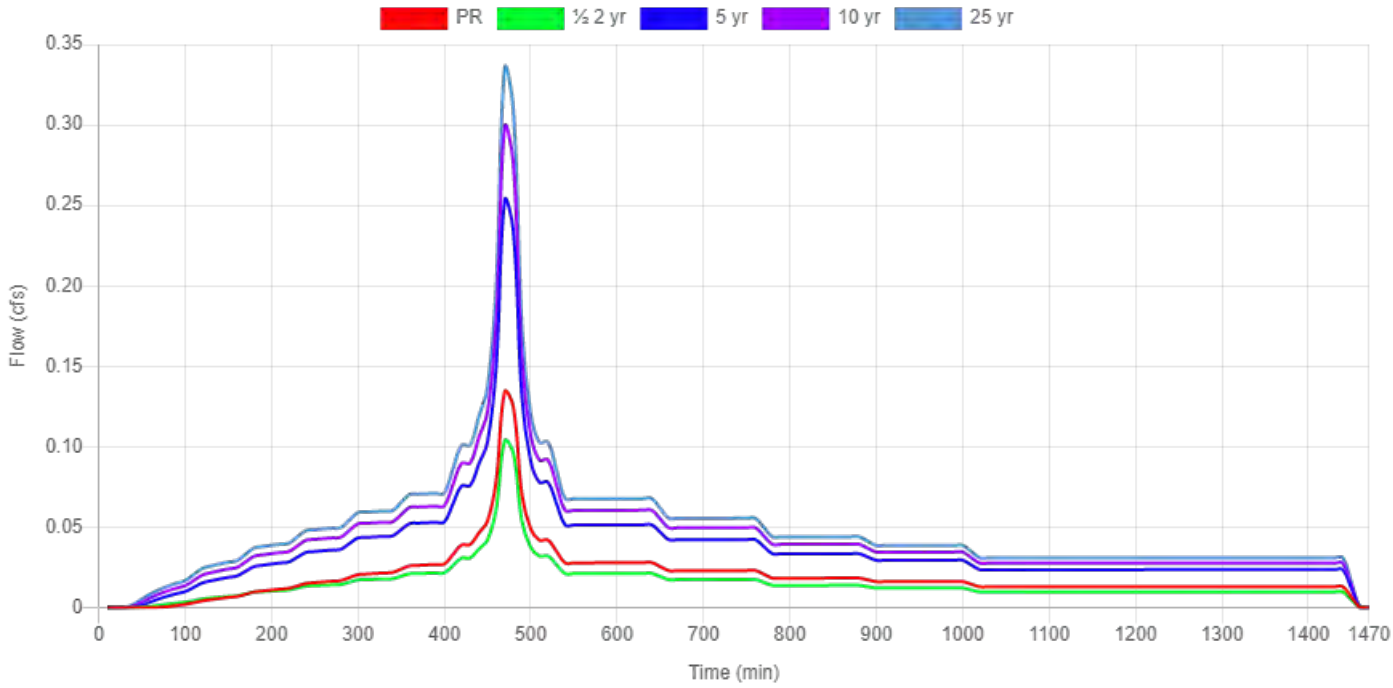


12B

Site Soils & Infiltration Testing	Infiltration Testing Procedure NA Tested Native Soil Infiltration Rate 0 in/hr
Correction Factor	CF test 2
Design Infiltration Rates	Native Soil 0 in/hr Imported Blended Soil 6 in/hr
Catchment Information	Hierarchy Level 2B Hierarchy Description Discharge to an overland storm drainage system, including streams, drainageways, and ditches, or to a storm-only pipe system that discharges to an overland storm drainage system. Pollution Reduction Requirement Filter the post-development stormwater runoff from the water quality storm event through the blended soil. Infiltration Requirement N/A Flow Control Requirement Limit the ½ the 2-yr, the 5-yr, and the 10-yr post-development peak flows to their respective pre-development peak flows. Unless the facility is a public facility (i.e., in the public right-of-way), also limit the 25-yr post-development peak flow to the 25-year pre-development peak flow. Impervious Area 14687 sq ft 0.337 acre Pre-Development Time of Concentration (Tc pre) 10 min Post-Development Time of Concentration (Tc post) 5 min Pre-Development Curve Number (CN pre) 82 Post-Development Curve Number (CN post) 98

SBUH Results

Post-Development Runoff



	Pre - Development Rate and Volume		Post - Development Rate and Volume	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0.0199	498.6	0.1342	1699.5
½ 2-Year	0.0324	566.2	0.1037	1328.8
5-Year	0.0984	1592	0.2533	3266.3
10-Year	0.1347	2081.1	0.2989	3875.9
25-Year	0.165	2488.4	0.3354	4364

	Overflow		Underdrain Outflow		Infiltration	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0	0	0.05	1699.5	0	0
½ 2-Year	0	0	0.05	1328.8	0	0
5-Year	0.08	158.4	0.05	3107.9	0	0
10-Year	0.226	424.9	0.05	3451	0	0
25-Year	0.285	693	0.05	3671	0	0

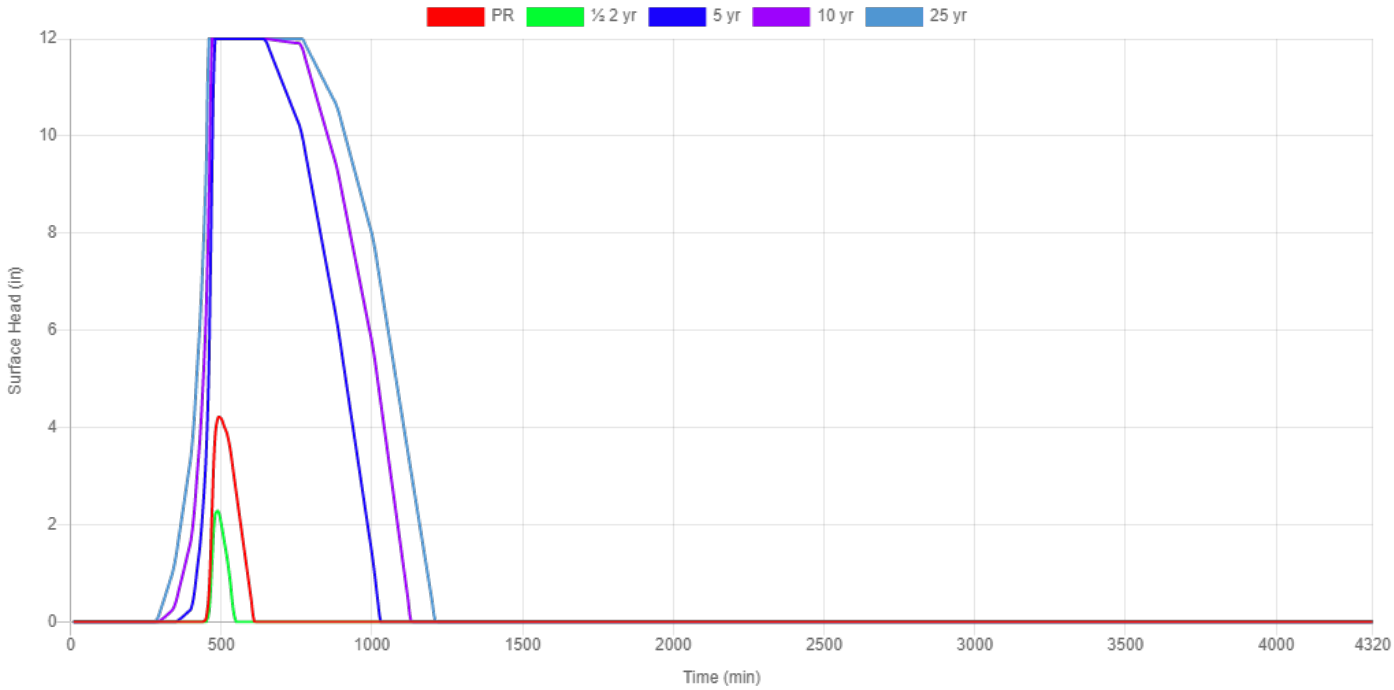
Flat Planter

Site Soils & Infiltration Testing	Category Flat Planter Shape Null Location Parcel Configuration D: Lined Facility with RS and Ud **Above Grade Storage Data** Bottom Area 360 sq ft Bottom Width 6.00 ft Overflow Height 12 in Total Depth of Blended Soil plus Rock 18 in Surface Storage Capacity at Overflow 360 cu ft Design Infiltration Rate to Soil Underlying the Facility 0.000 cfs Design Infiltration Rate for Imported Blended Soil in the Facility 0.050 cfs **Below Grade Storage Data** Catchment is too small for flow control? No Rock Area 45.00 sq ft Rock Width 3.00 ft Rock Storage Depth 12.0 in Rock Porosity 0.3 Underdrain Height

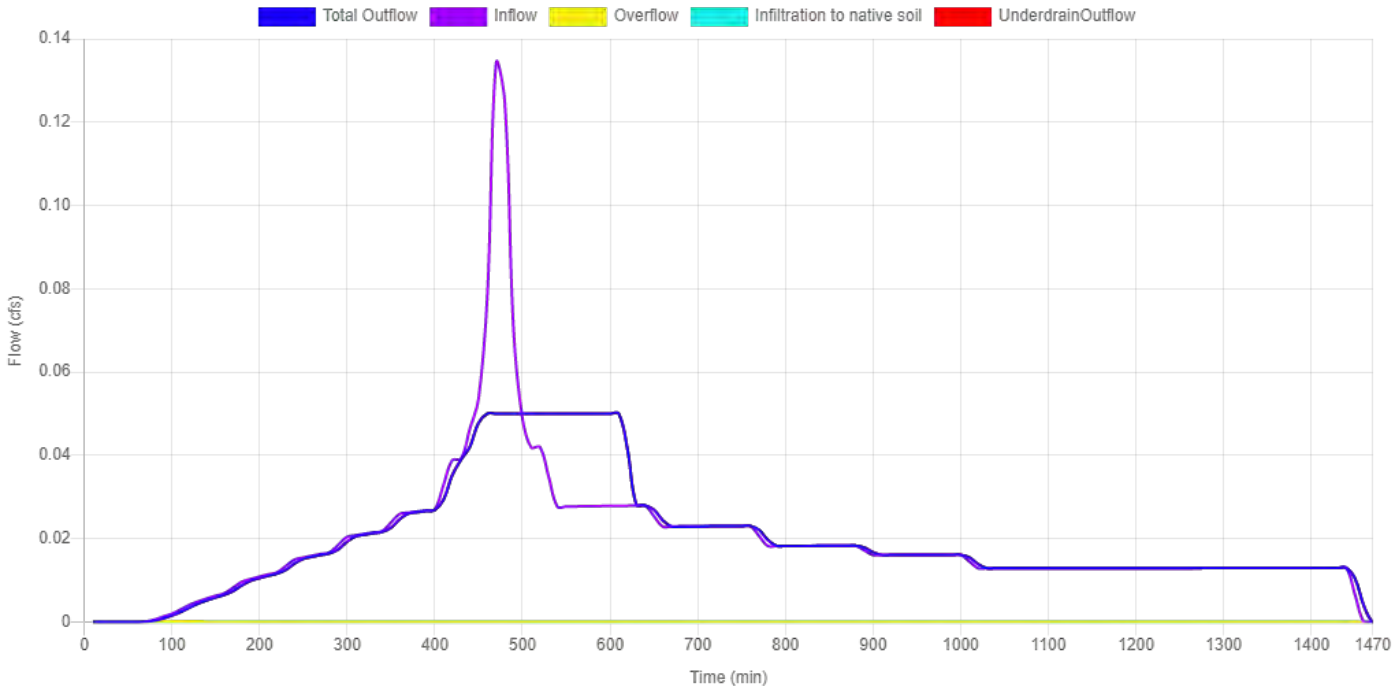
	4 in Percent of Facility Base that Allows Infiltration 0 % Orifice (Y/N)? No Why no orifice Water-quality-only facility
Facility Facts	Total Facility Area (excluding freeboard) 360.00 sq ft Sizing Ratio 2.45 %
Pollution Reduction Results	Pollution Reduction Score Pass Overflow Volume 0.00 cf Surface Capacity Used 35.08 %
Flow Control Results	Flow Control Score Fail

	STORMWATER FACILITY OUTFLOW (CFS)		PRE-DEVELOPMENT RUNOFF (CFS)
½ the 2 year	0.0500	<=	0.0324
5 year	0.1304	<=	0.0984
10 year	0.2759	<=	0.1347
25 year	0.3354	<=	0.1650

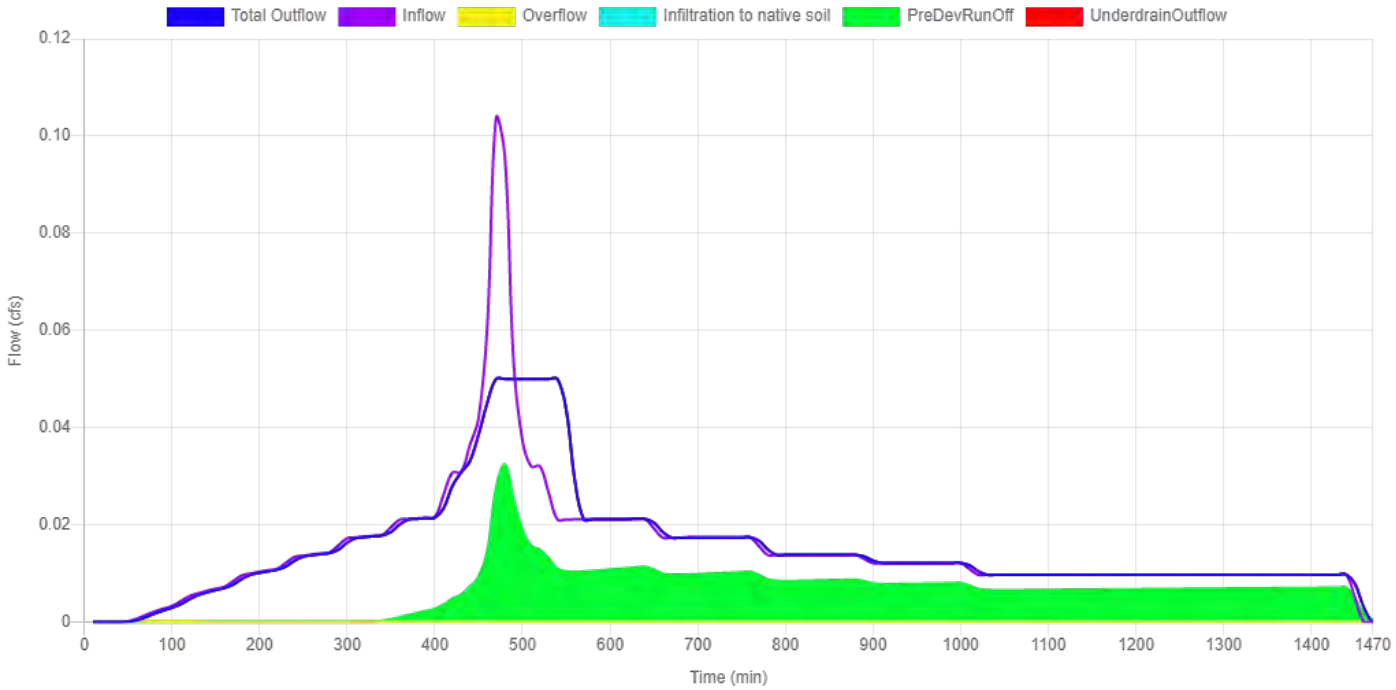
Surface Head



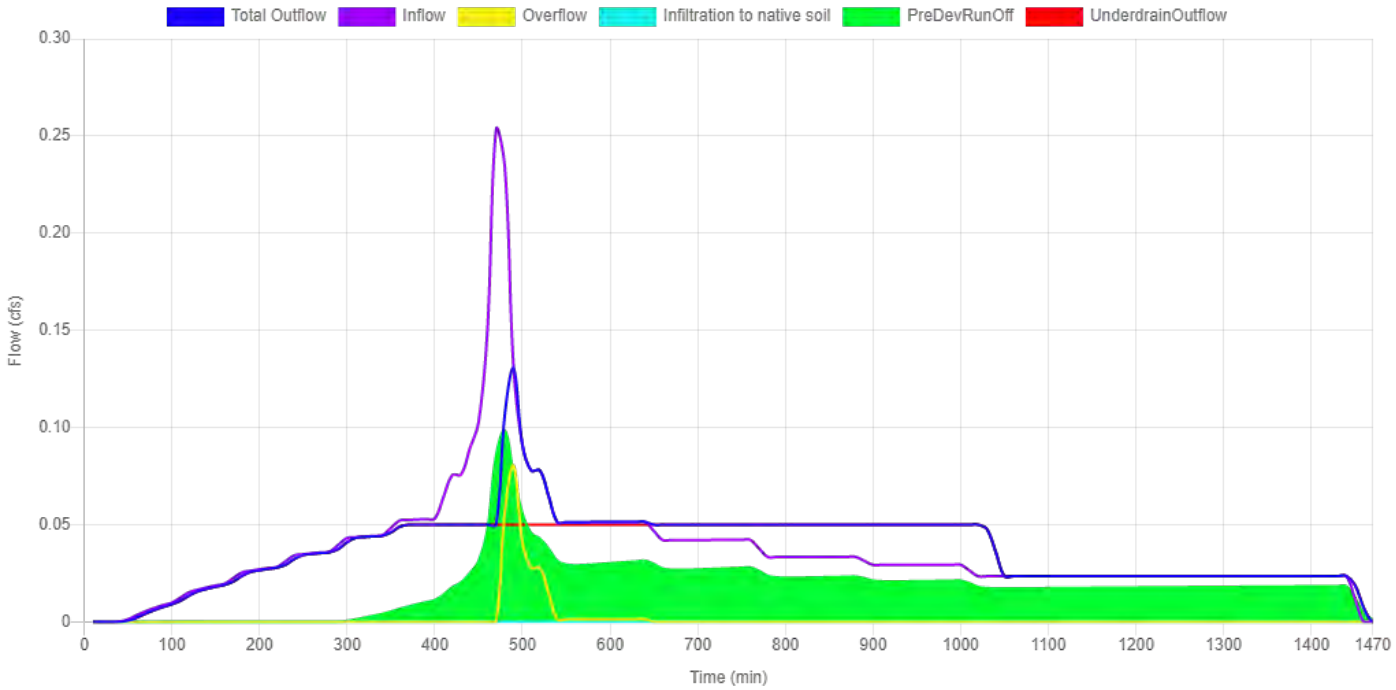
Water Quality



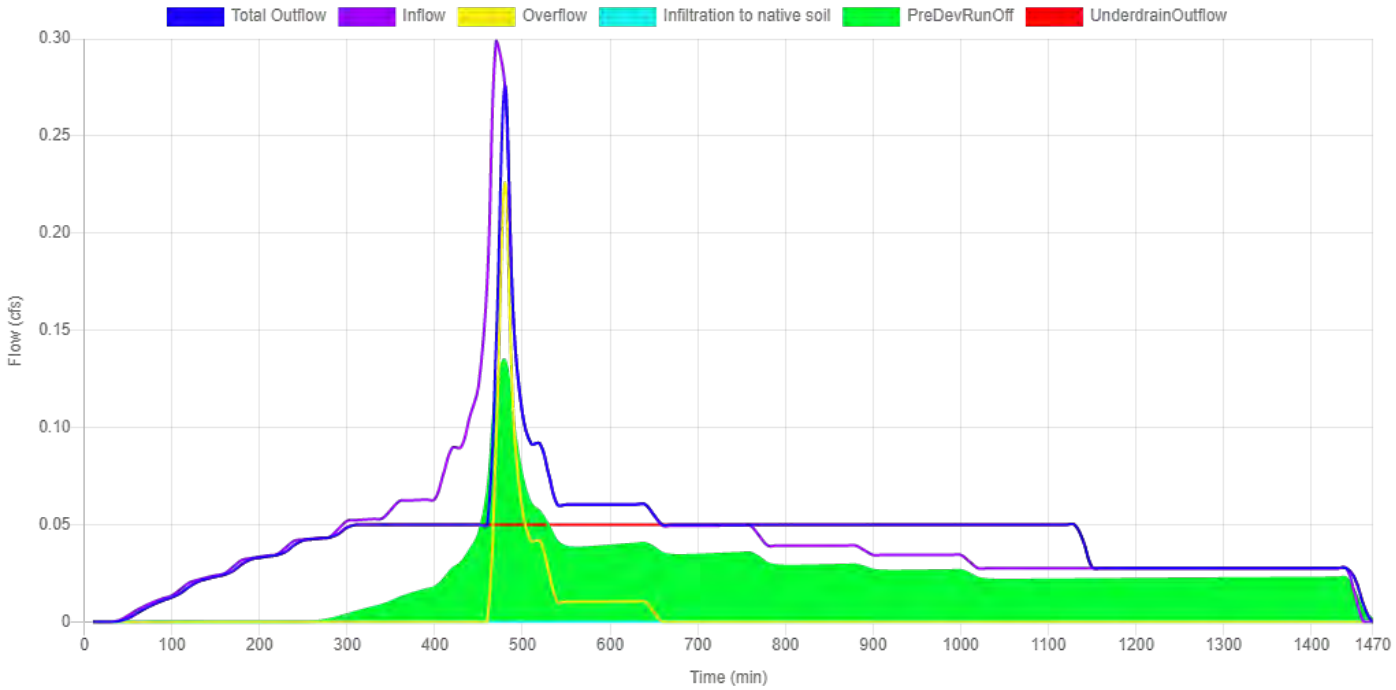
½ 2-Year



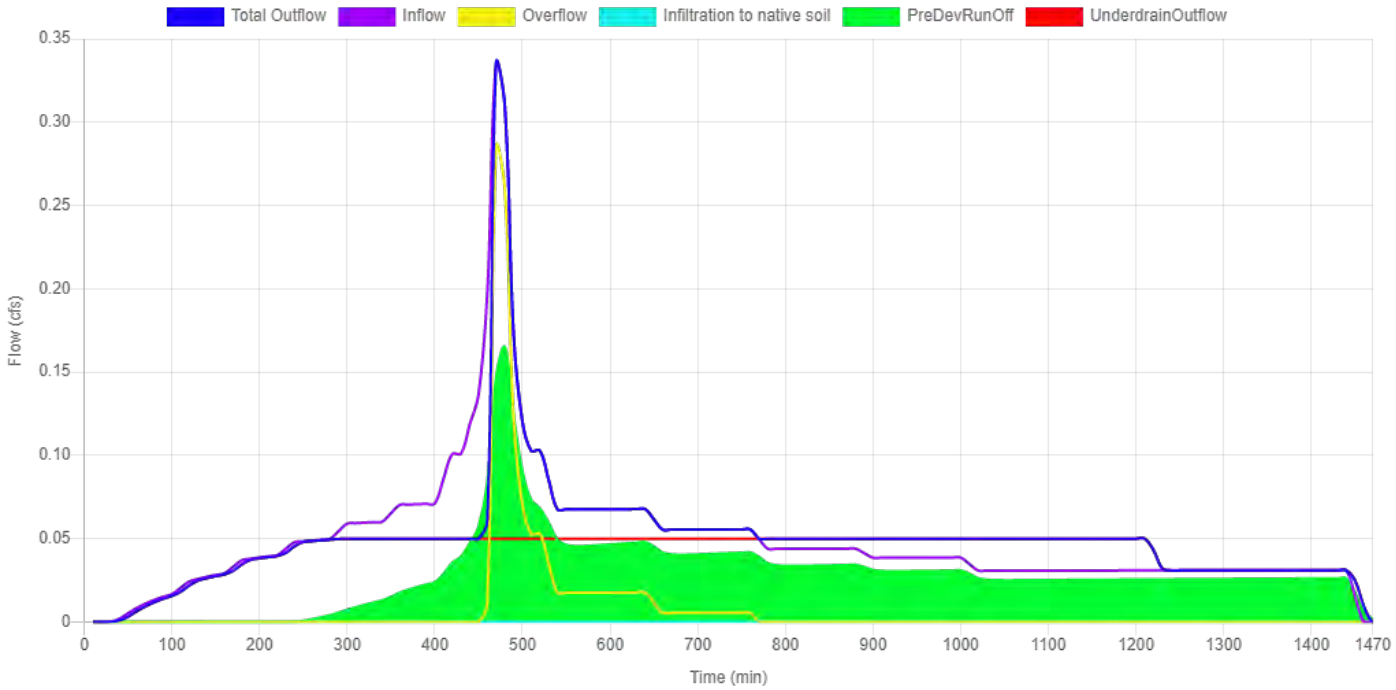
5-Year



10-Year



25-Year

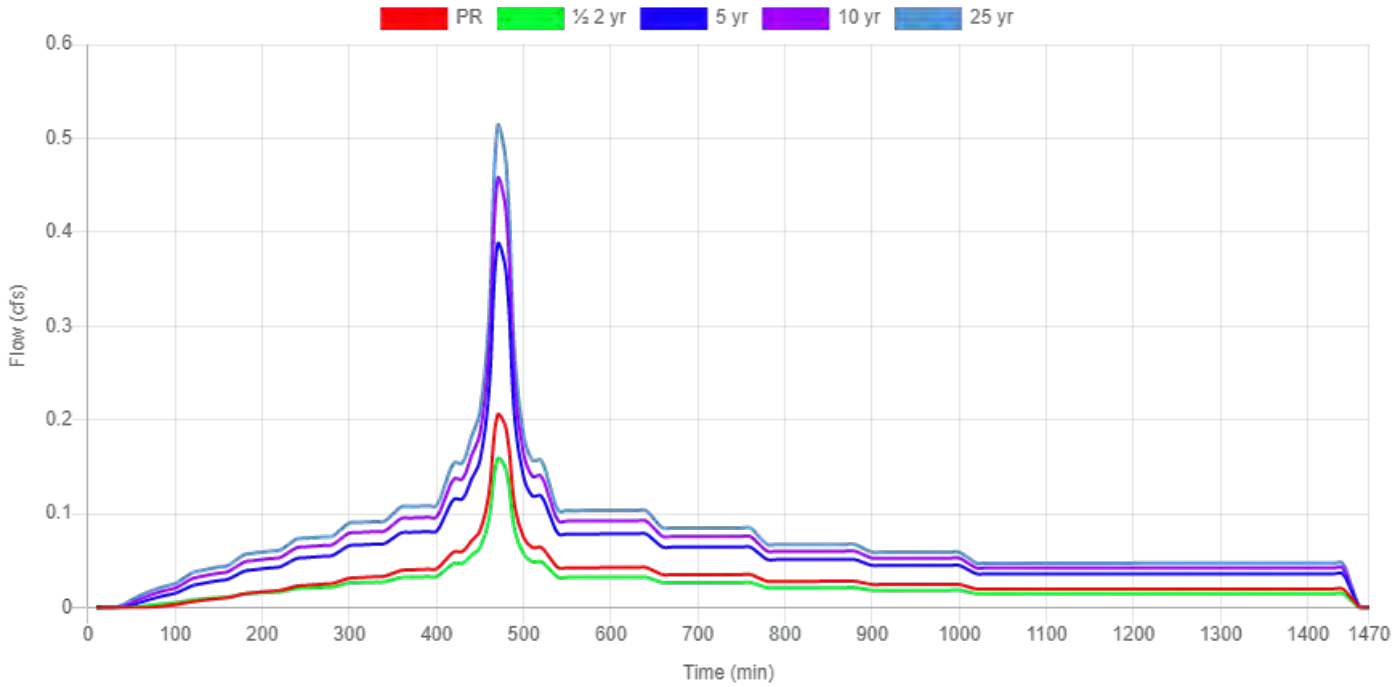


12C

Site Soils & Infiltration Testing	Infiltration Testing Procedure NA Tested Native Soil Infiltration Rate 0 in/hr
Correction Factor	CF test 2
Design Infiltration Rates	Native Soil 0 in/hr Imported Blended Soil 6 in/hr
Catchment Information	Hierarchy Level 2B Hierarchy Description Discharge to an overland storm drainage system, including streams, drainageways, and ditches, or to a storm-only pipe system that discharges to an overland storm drainage system. Pollution Reduction Requirement Filter the post-development stormwater runoff from the water quality storm event through the blended soil. Infiltration Requirement N/A Flow Control Requirement Limit the ½ the 2-yr, the 5-yr, and the 10-yr post-development peak flows to their respective pre-development peak flows. Unless the facility is a public facility (i.e., in the public right-of-way), also limit the 25-yr post-development peak flow to the 25-year pre-development peak flow. Impervious Area 22428 sq ft 0.515 acre Pre-Development Time of Concentration (Tc pre) 10 min Post-Development Time of Concentration (Tc post) 5 min Pre-Development Curve Number (CN pre) 82 Post-Development Curve Number (CN post) 98

SBUH Results

Post-Development Runoff



	Pre - Development Rate and Volume		Post - Development Rate and Volume	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0.0303	761.3	0.2049	2595.3
½ 2-Year	0.0495	864.6	0.1583	2029.1
5-Year	0.1503	2431.1	0.3868	4987.8
10-Year	0.2056	3178	0.4565	5918.7
25-Year	0.252	3799.9	0.5121	6664.1

	Overflow		Underdrain Outflow		Infiltration	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0	0	0.107	2595.3	0	0
½ 2-Year	0	0	0.107	2029.1	0	0
5-Year	0	0	0.107	4987.8	0	0
10-Year	0.057	94.3	0.107	5824.4	0	0
25-Year	0.156	294.1	0.107	6370	0	0

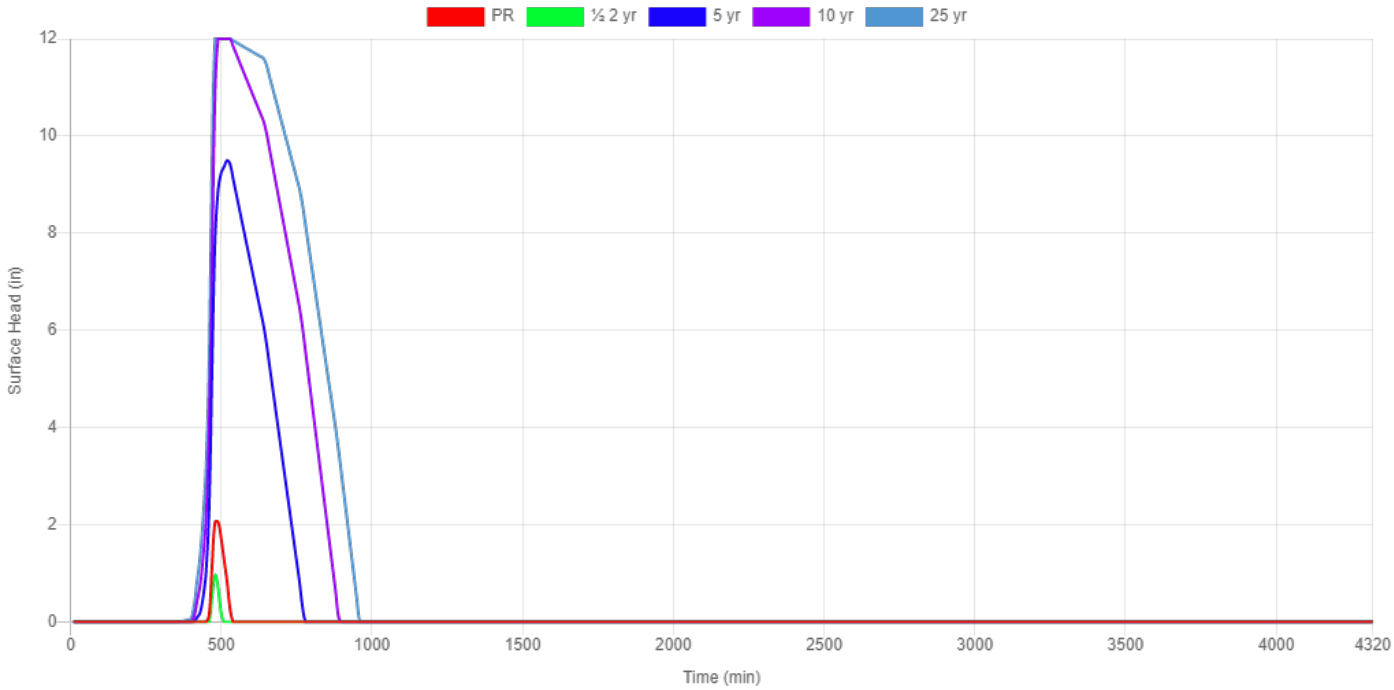
Rect Basin

Site Soils & Infiltration Testing	Category Rect Basin Shape Rectangular Location Parcel Configuration D: Lined Facility with RS and Ud **Above Grade Storage Data** Bottom Area 508 sq ft Bottom Width 12.00 ft Side Slope 3.0 h:1v Freeboard Depth 6.0 in Overflow Height 12 in Total Depth of Blended Soil plus Rock 18 in Surface Storage Capacity at Overflow 680.42 cu ft Design Infiltration Rate to Soil Underlying the Facility 0.000 cfs Design Infiltration Rate for Imported Blended Soil in the Facility 0.107 cfs **Below Grade Storage Data** Catchment is too small for flow control? No Rock Area 31.75 sq ft Rock Width 3.00 ft Rock Storage Depth

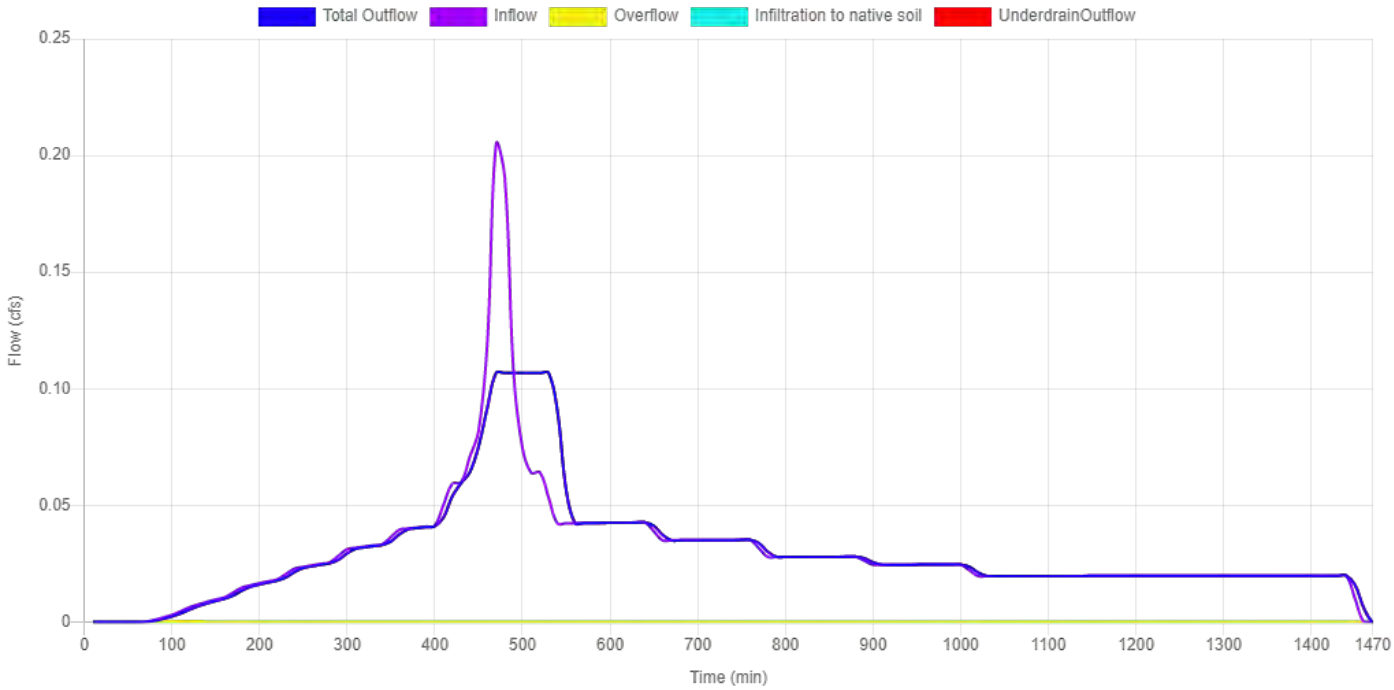
	12.0 in Rock Porosity 0.3 Underdrain Height 4 in Percent of Facility Base that Allows Infiltration 0 % Orifice (Y/N)? No Why no orifice Water-quality-only facility
Facility Facts	Total Facility Area (excluding freeboard) 862.27 sq ft Sizing Ratio 3.84 %
Pollution Reduction Results	Pollution Reduction Score Pass Overflow Volume 0.00 cf Surface Capacity Used 17.15 %
Flow Control Results	Flow Control Score Fail

	STORMWATER FACILITY OUTFLOW (CFS)		PRE-DEVELOPMENT RUNOFF (CFS)
½ the 2 year	0.1067	<=	0.0495
5 year	0.1067	<=	0.1503
10 year	0.1640	<=	0.2056
25 year	0.2630	<=	0.2520

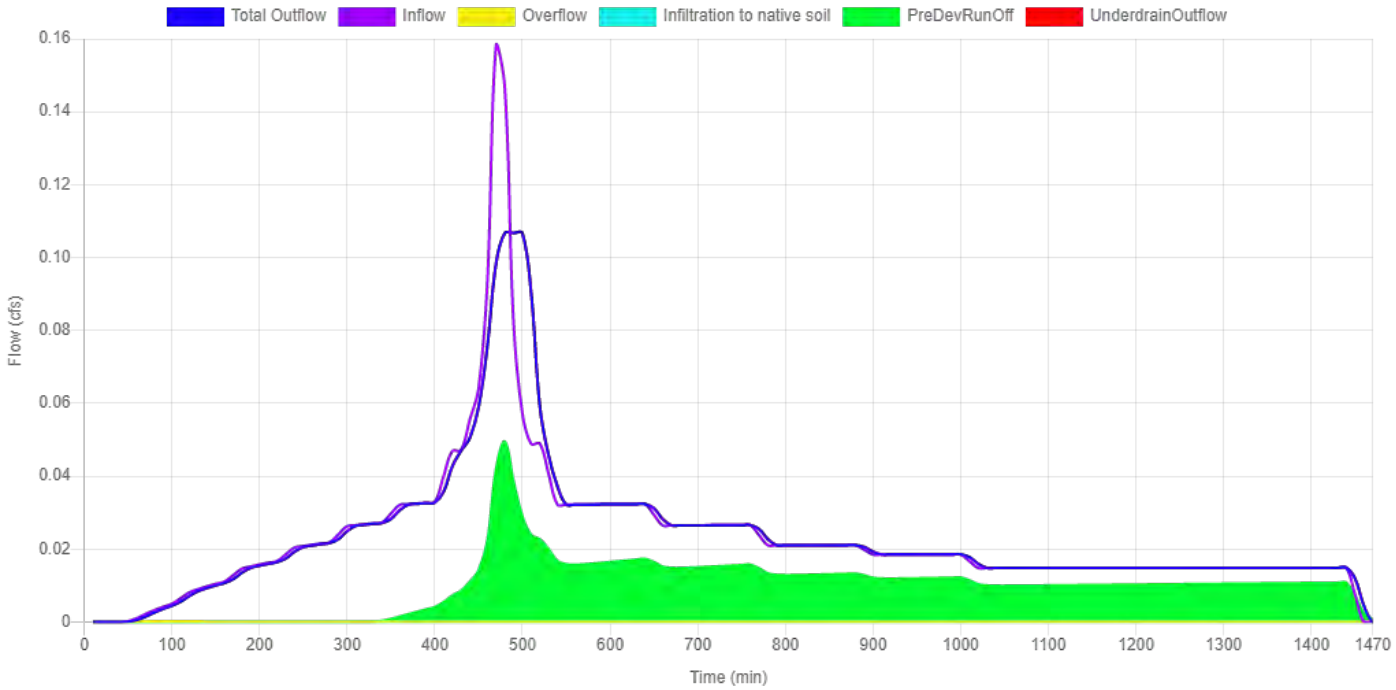
Surface Head



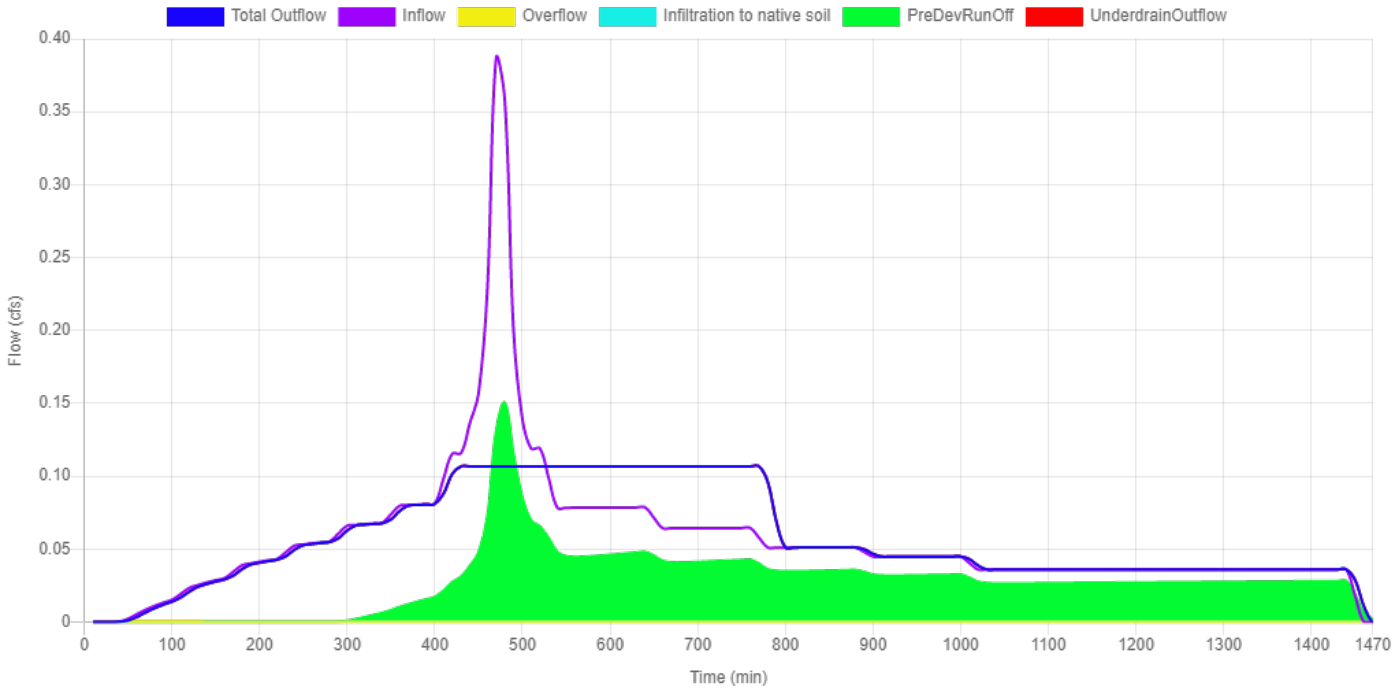
Water Quality



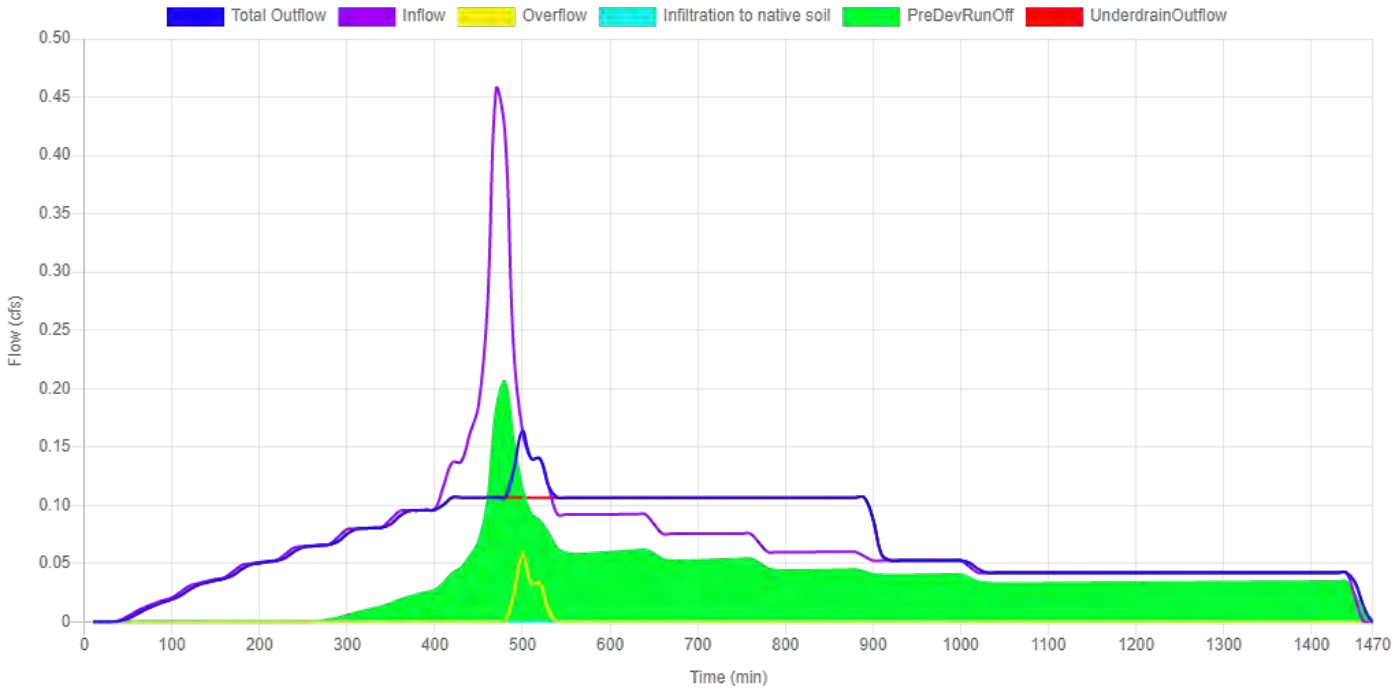
½ 2-Year



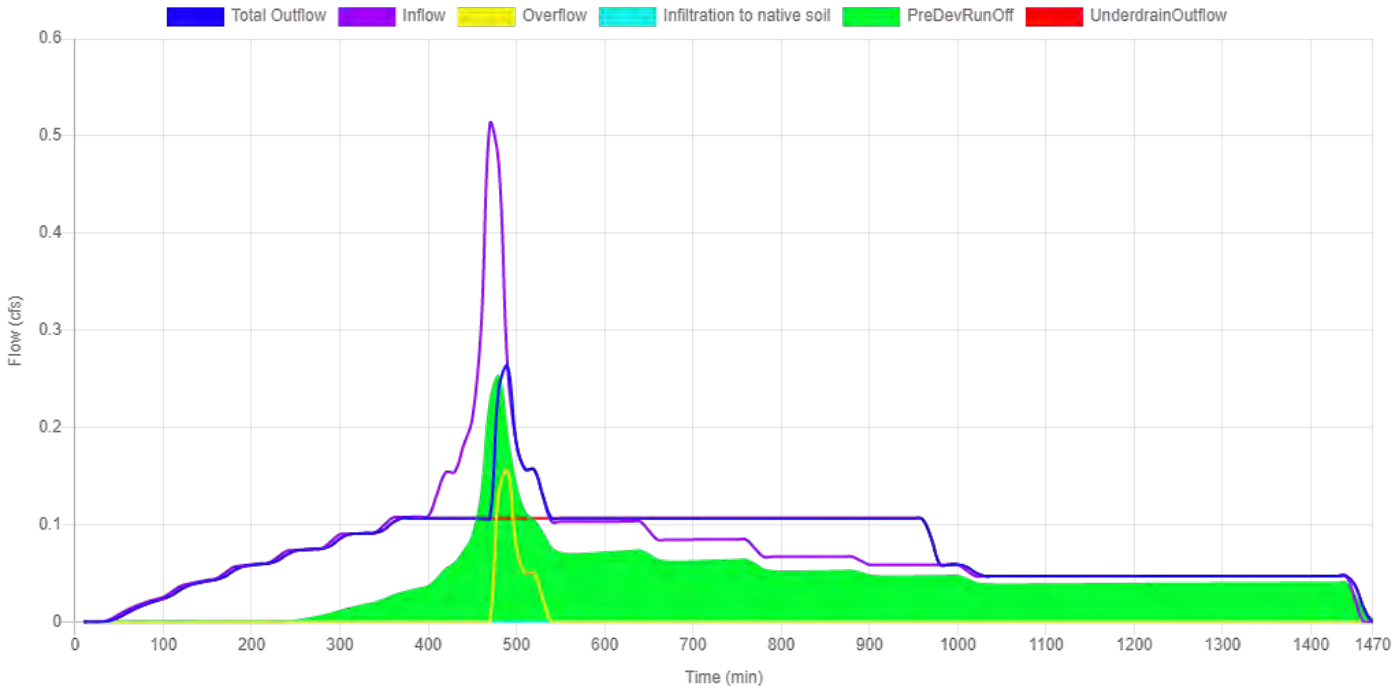
5-Year



10-Year



25-Year

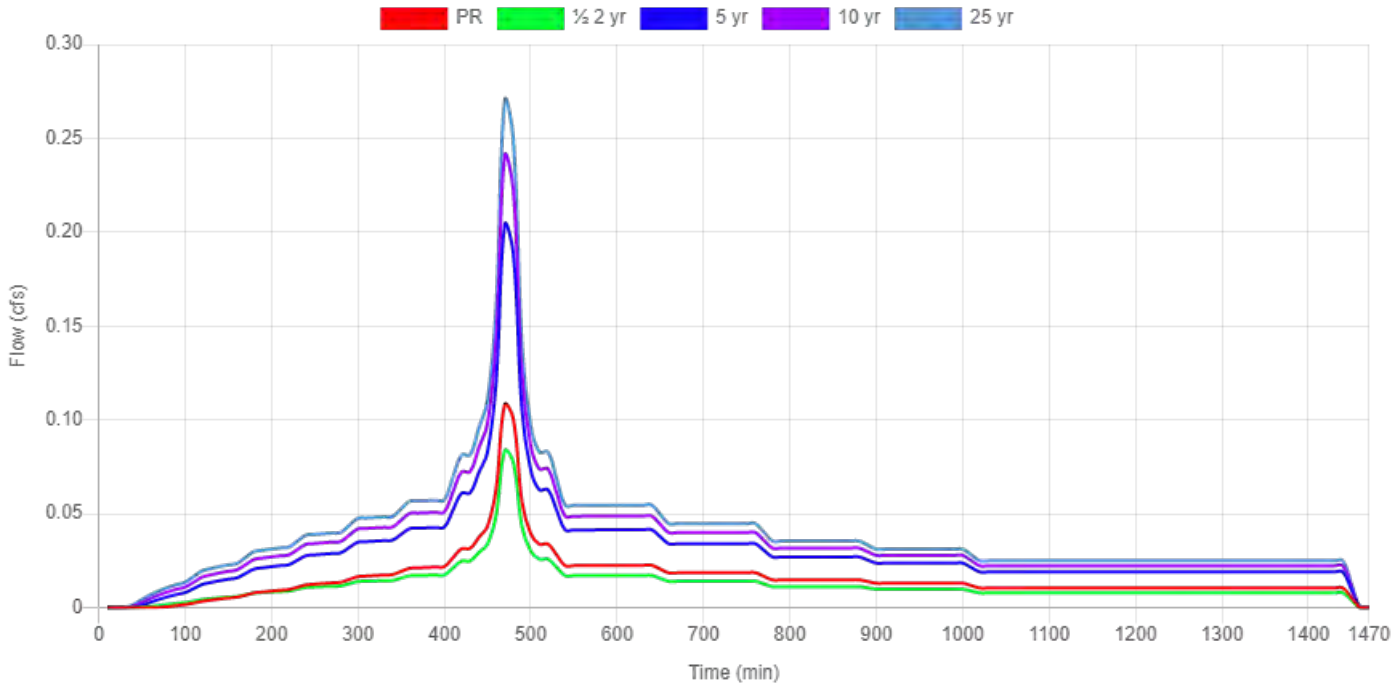


65A

Site Soils & Infiltration Testing	Infiltration Testing Procedure NA Tested Native Soil Infiltration Rate 0 in/hr
Correction Factor	CF test 2
Design Infiltration Rates	Native Soil 0 in/hr Imported Blended Soil 6 in/hr
Catchment Information	Hierarchy Level 2B Hierarchy Description Discharge to an overland storm drainage system, including streams, drainageways, and ditches, or to a storm-only pipe system that discharges to an overland storm drainage system. Pollution Reduction Requirement Filter the post-development stormwater runoff from the water quality storm event through the blended soil. Infiltration Requirement N/A Flow Control Requirement Limit the ½ the 2-yr, the 5-yr, and the 10-yr post-development peak flows to their respective pre-development peak flows. Unless the facility is a public facility (i.e., in the public right-of-way), also limit the 25-yr post-development peak flow to the 25-year pre-development peak flow. Impervious Area 11832 sq ft 0.272 acre Pre-Development Time of Concentration (Tc pre) 10 min Post-Development Time of Concentration (Tc post) 5 min Pre-Development Curve Number (CN pre) 82 Post-Development Curve Number (CN post) 98

SBUH Results

Post-Development Runoff



	Pre - Development Rate and Volume		Post - Development Rate and Volume	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0.016	401.6	0.1081	1369.1
½ 2-Year	0.0261	456.1	0.0835	1070.5
5-Year	0.0793	1282.5	0.204	2631.3
10-Year	0.1085	1676.6	0.2408	3122.5
25-Year	0.1329	2004.6	0.2702	3515.7

	Overflow		Underdrain Outflow		Infiltration	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0	0	0.079	1369.1	0	0
½ 2-Year	0	0	0.079	1070.5	0	0
5-Year	0	0	0.079	2631.3	0	0
10-Year	0	0	0.079	3122.5	0	0
25-Year	0	0	0.079	3515.7	0	0

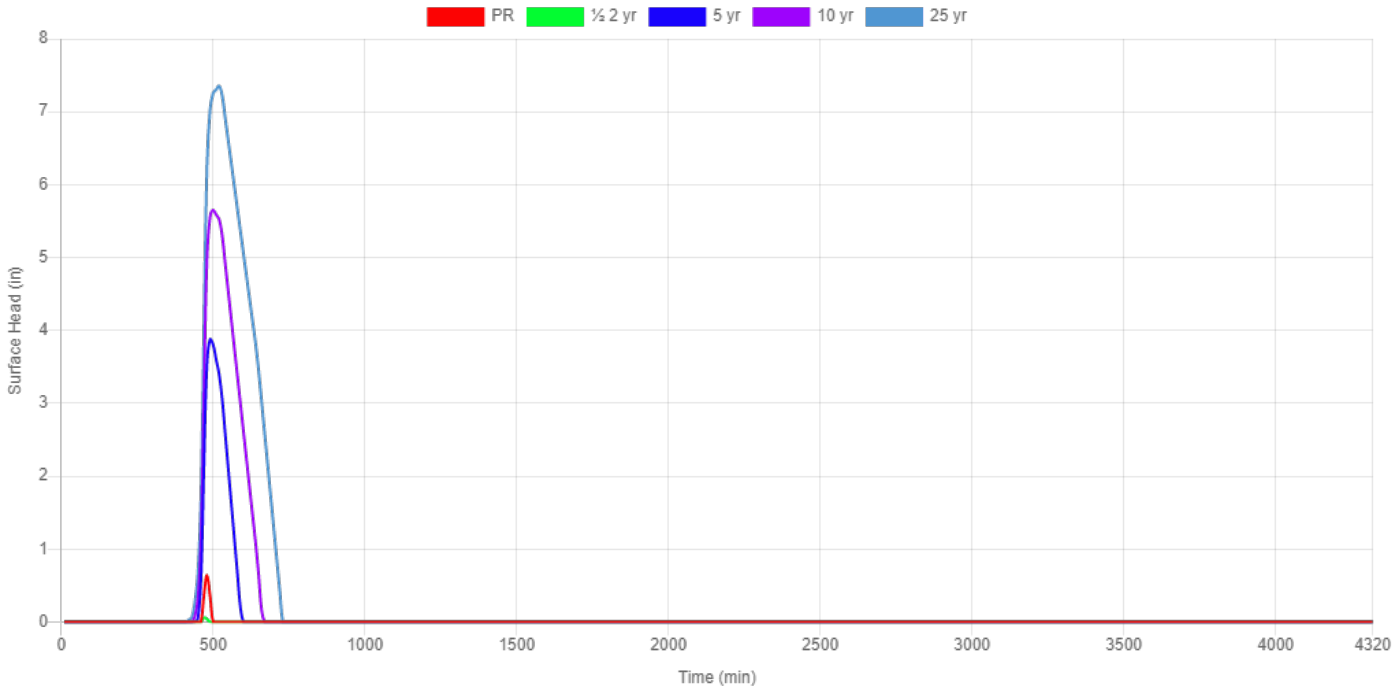
Flat Planter

Site Soils & Infiltration Testing	Category Flat Planter Shape Null Location Parcel Configuration D: Lined Facility with RS and Ud **Above Grade Storage Data** Bottom Area 568 sq ft Bottom Width 8.00 ft Overflow Height 12 in Total Depth of Blended Soil plus Rock 18 in Surface Storage Capacity at Overflow 568 cu ft Design Infiltration Rate to Soil Underlying the Facility 0.000 cfs Design Infiltration Rate for Imported Blended Soil in the Facility 0.079 cfs **Below Grade Storage Data** Catchment is too small for flow control? No Rock Area 53.25 sq ft Rock Width 3.00 ft Rock Storage Depth 12.0 in Rock Porosity 0.3 Underdrain Height

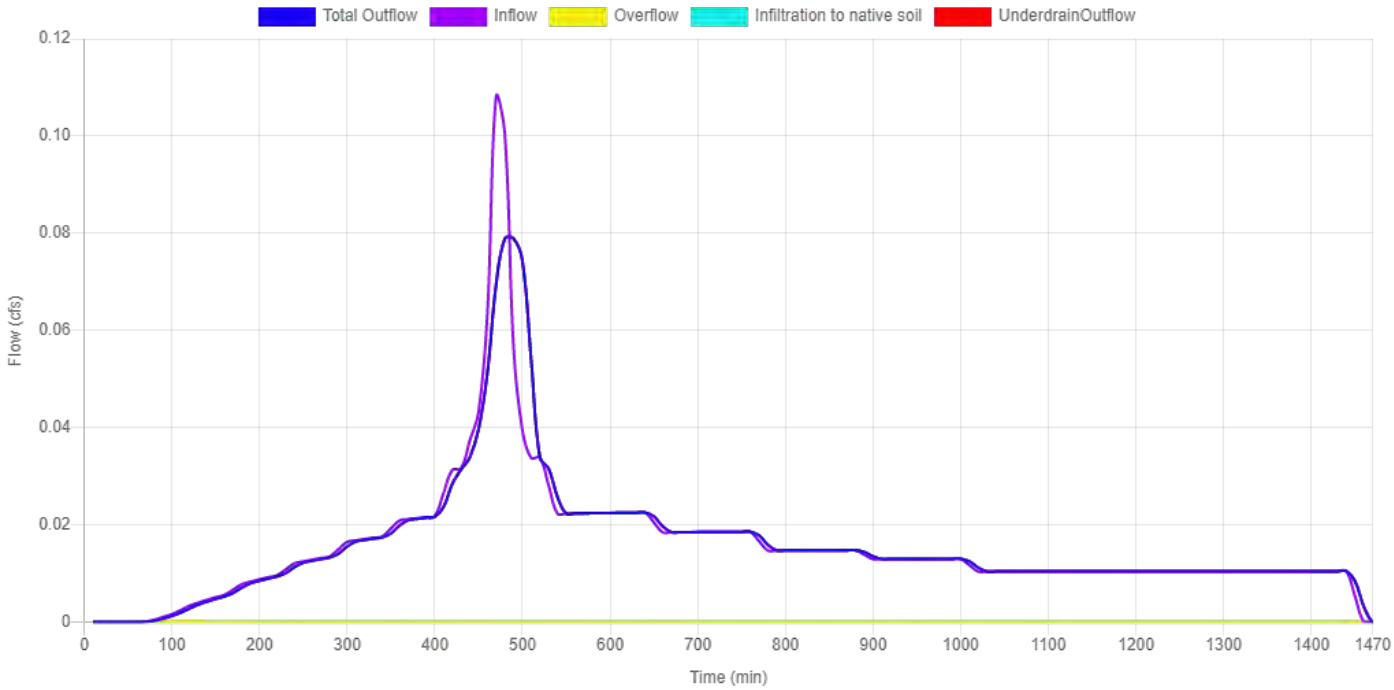
	4 in Percent of Facility Base that Allows Infiltration 0 % Orifice (Y/N)? No Why no orifice Water-quality-only facility
Facility Facts	Total Facility Area (excluding freeboard) 568.00 sq ft Sizing Ratio 4.80 %
Pollution Reduction Results	Pollution Reduction Score Pass Overflow Volume 0.00 cf Surface Capacity Used 5.36 %
Flow Control Results	Flow Control Score Fail

	STORMWATER FACILITY OUTFLOW (CFS)		PRE-DEVELOPMENT RUNOFF (CFS)
½ the 2 year	0.0789	<=	0.0261
5 year	0.0789	<=	0.0793
10 year	0.0789	<=	0.1085
25 year	0.0789	<=	0.1329

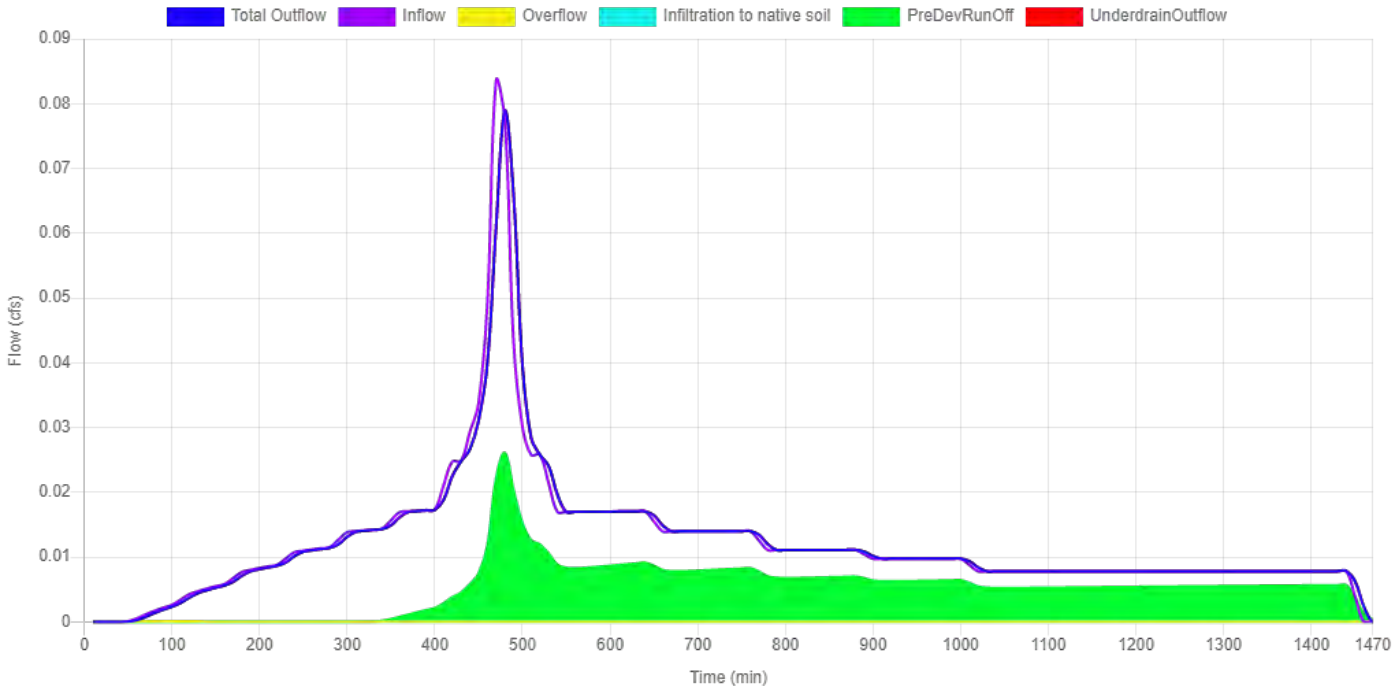
Surface Head



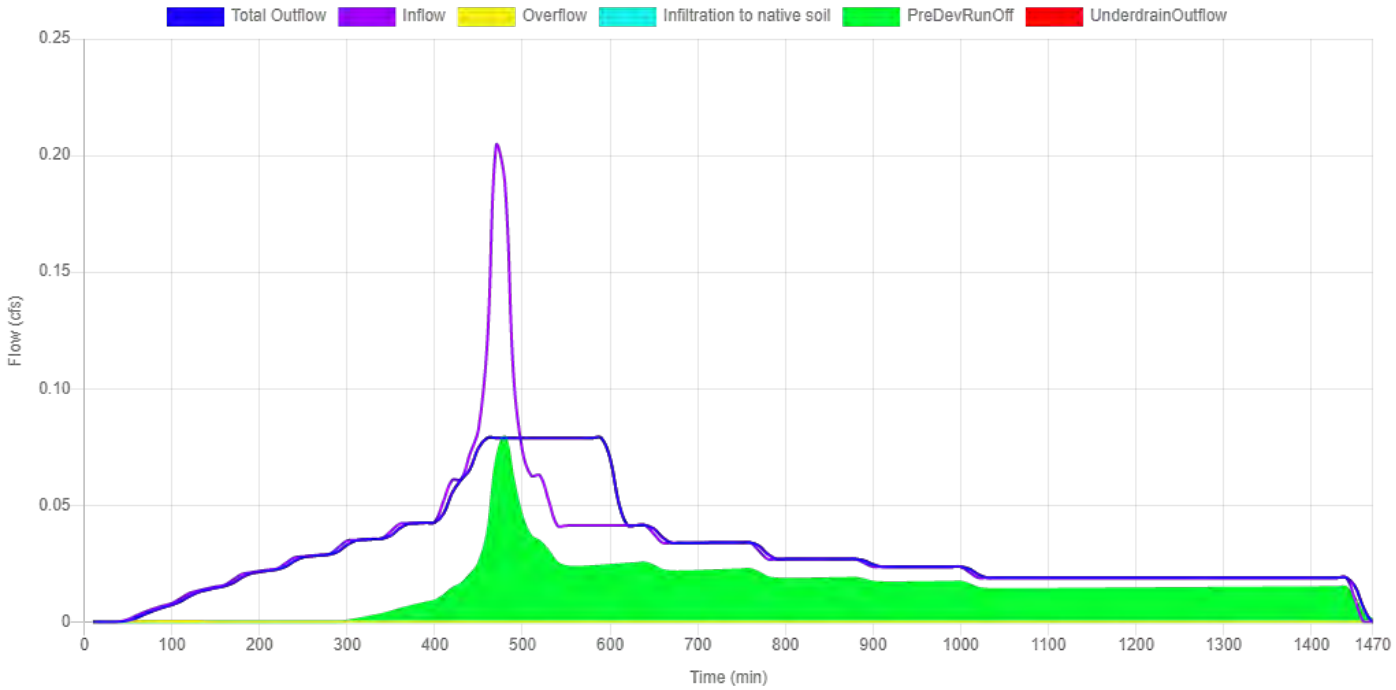
Water Quality



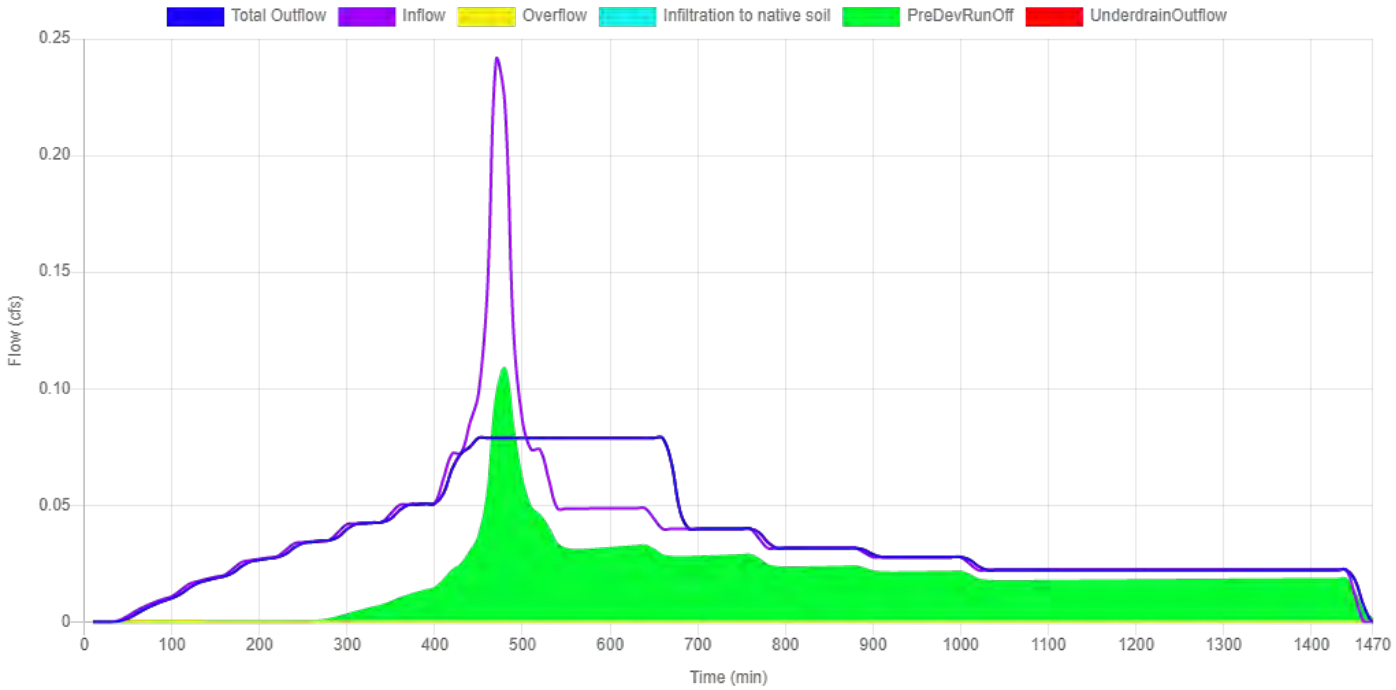
½ 2-Year



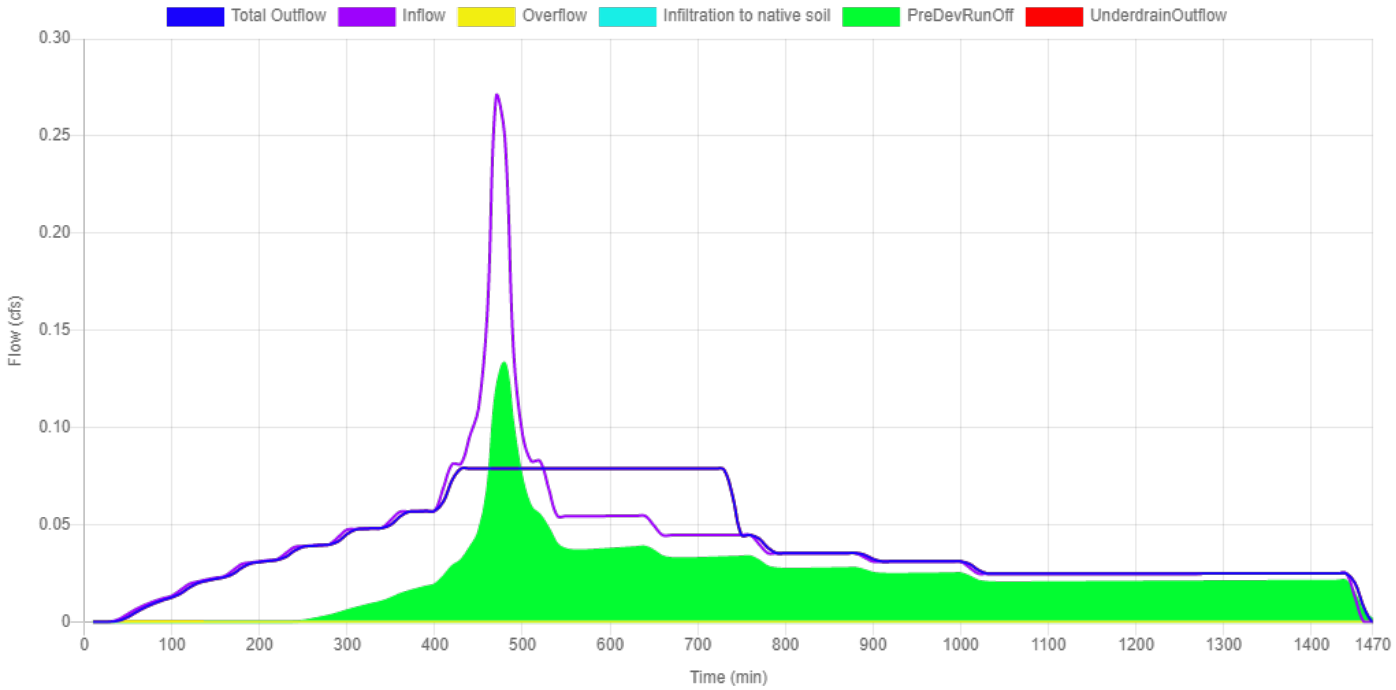
5-Year



10-Year



25-Year

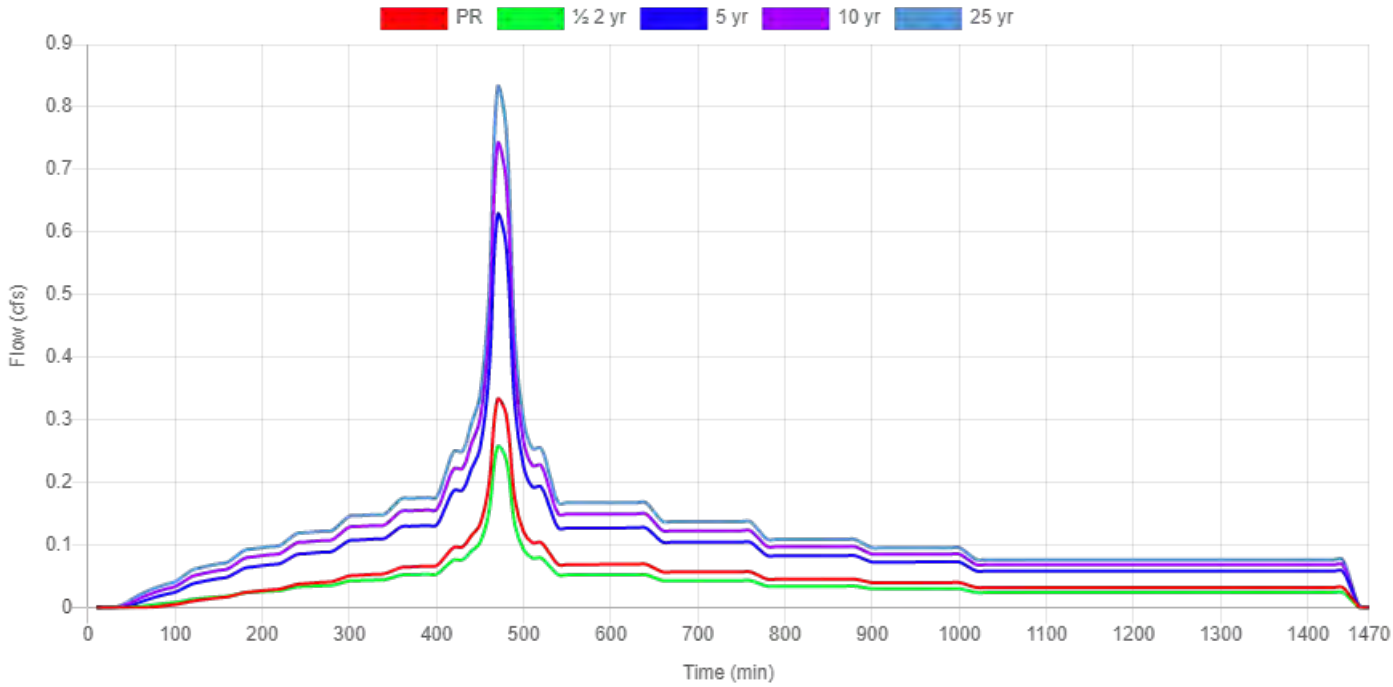


70A

Site Soils & Infiltration Testing	Infiltration Testing Procedure NA Tested Native Soil Infiltration Rate 0 in/hr
Correction Factor	CF test 2
Design Infiltration Rates	Native Soil 0 in/hr Imported Blended Soil 6 in/hr
Catchment Information	Hierarchy Level 2B Hierarchy Description Discharge to an overland storm drainage system, including streams, drainageways, and ditches, or to a storm-only pipe system that discharges to an overland storm drainage system. Pollution Reduction Requirement Filter the post-development stormwater runoff from the water quality storm event through the blended soil. Infiltration Requirement N/A Flow Control Requirement Limit the ½ the 2-yr, the 5-yr, and the 10-yr post-development peak flows to their respective pre-development peak flows. Unless the facility is a public facility (i.e., in the public right-of-way), also limit the 25-yr post-development peak flow to the 25-year pre-development peak flow. Impervious Area 36357 sq ft 0.835 acre Pre-Development Time of Concentration (Tc pre) 10 min Post-Development Time of Concentration (Tc post) 5 min Pre-Development Curve Number (CN pre) 82 Post-Development Curve Number (CN post) 98

SBUH Results

Post-Development Runoff



	Pre - Development Rate and Volume		Post - Development Rate and Volume	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0.0492	1234.2	0.3321	4207.1
½ 2-Year	0.0802	1401.6	0.2567	3289.3
5-Year	0.2436	3940.9	0.6269	8085.5
10-Year	0.3333	5151.8	0.74	9594.6
25-Year	0.4084	6159.8	0.8302	10802.9

	Overflow		Underdrain Outflow		Infiltration	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0	0	0.069	4207.1	0	0
½ 2-Year	0	0	0.069	3289.3	0	0
5-Year	0.557	2172.9	0.069	5912.5	0	0
10-Year	0.671	3326.1	0.069	6268.5	0	0
25-Year	0.761	4445.9	0.069	6357.1	0	0

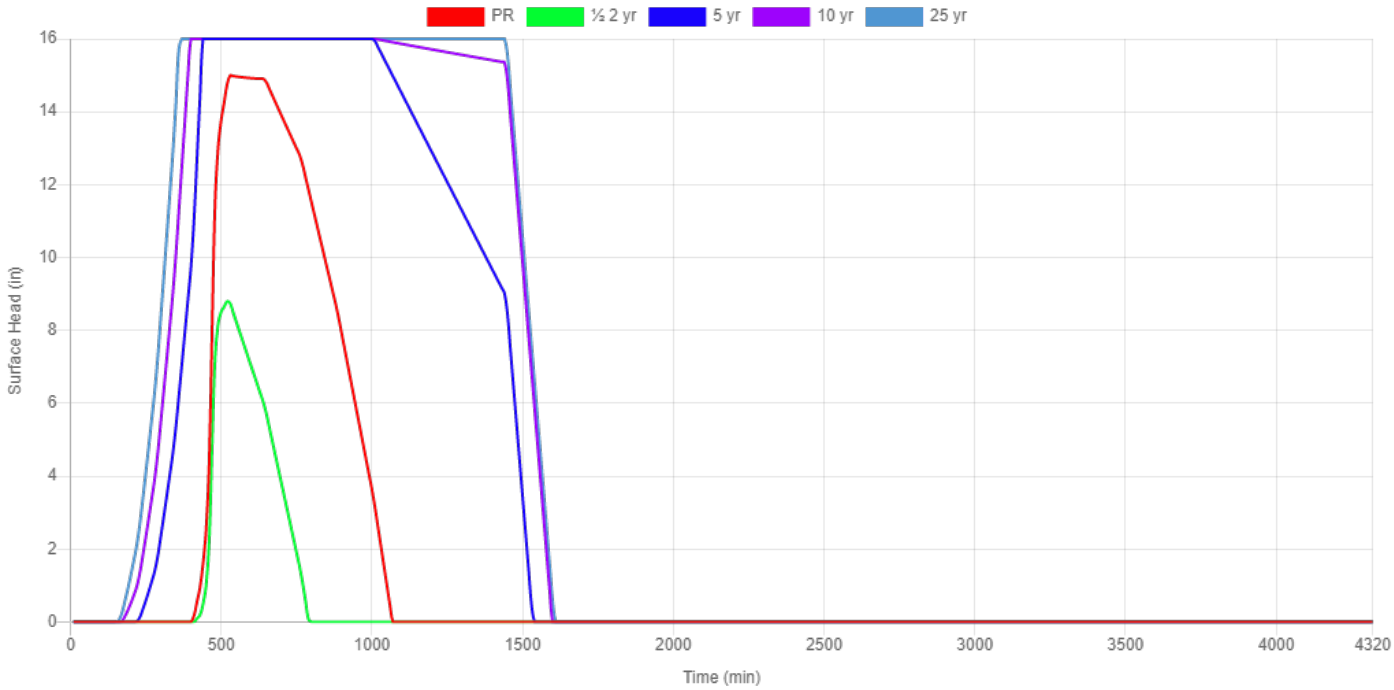
Flat Planter

Site Soils & Infiltration Testing	Category Flat Planter Shape Null Location Parcel Configuration D: Lined Facility with RS and Ud **Above Grade Storage Data** Bottom Area 500 sq ft Bottom Width 9.00 ft Overflow Height 16.0 in Total Depth of Blended Soil plus Rock 18 in Surface Storage Capacity at Overflow 666.67 cu ft Design Infiltration Rate to Soil Underlying the Facility 0.000 cfs Design Infiltration Rate for Imported Blended Soil in the Facility 0.069 cfs **Below Grade Storage Data** Catchment is too small for flow control? No Rock Area 500.00 sq ft Rock Width 9.00 ft Rock Storage Depth 12.0 in Rock Porosity 0.3 Underdrain Height

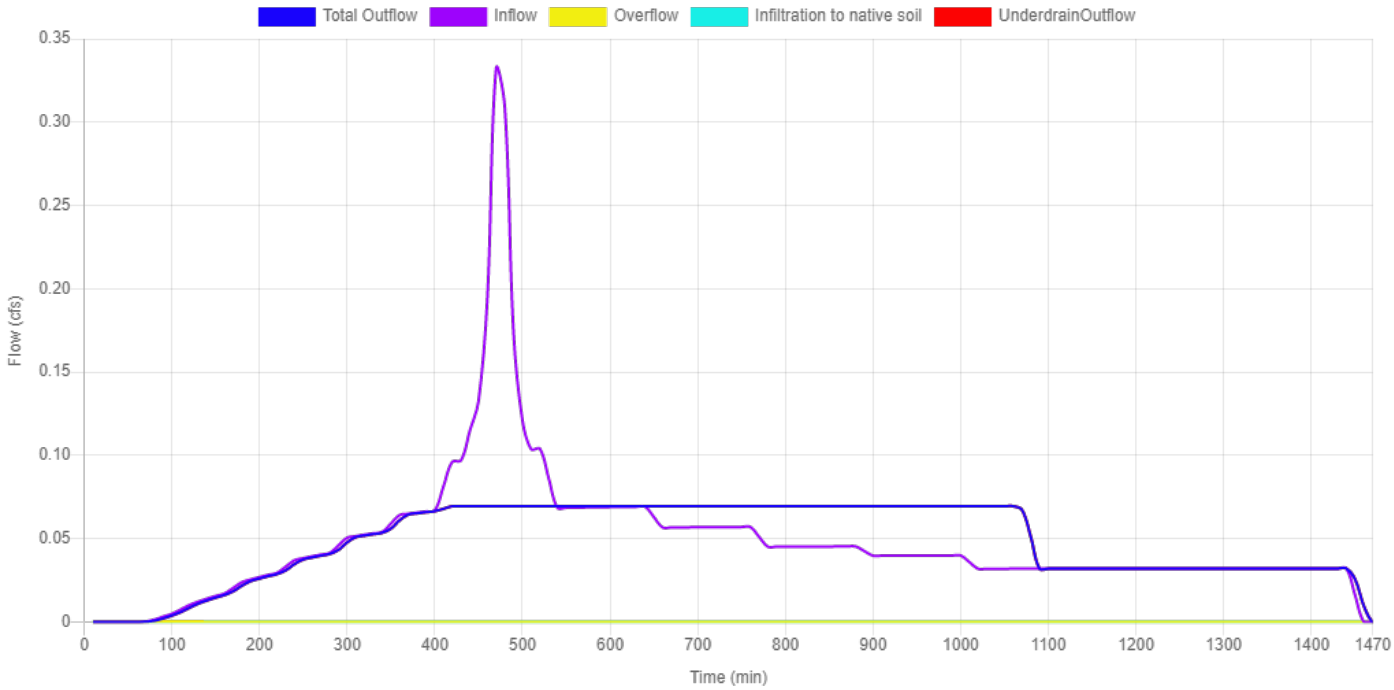
	4 in Percent of Facility Base that Allows Infiltration 0 % Orifice (Y/N)? No Why no orifice Water-quality-only facility
Facility Facts	Total Facility Area (excluding freeboard) 500.00 sq ft Sizing Ratio 1.38 %
Pollution Reduction Results	Pollution Reduction Score Pass Overflow Volume 0.00 cf Surface Capacity Used 93.71 %
Flow Control Results	Flow Control Score Fail

	STORMWATER FACILITY OUTFLOW (CFS)		PRE-DEVELOPMENT RUNOFF (CFS)
½ the 2 year	0.0694	<=	0.0802
5 year	0.6269	<=	0.2436
10 year	0.7400	<=	0.3333
25 year	0.8302	<=	0.4084

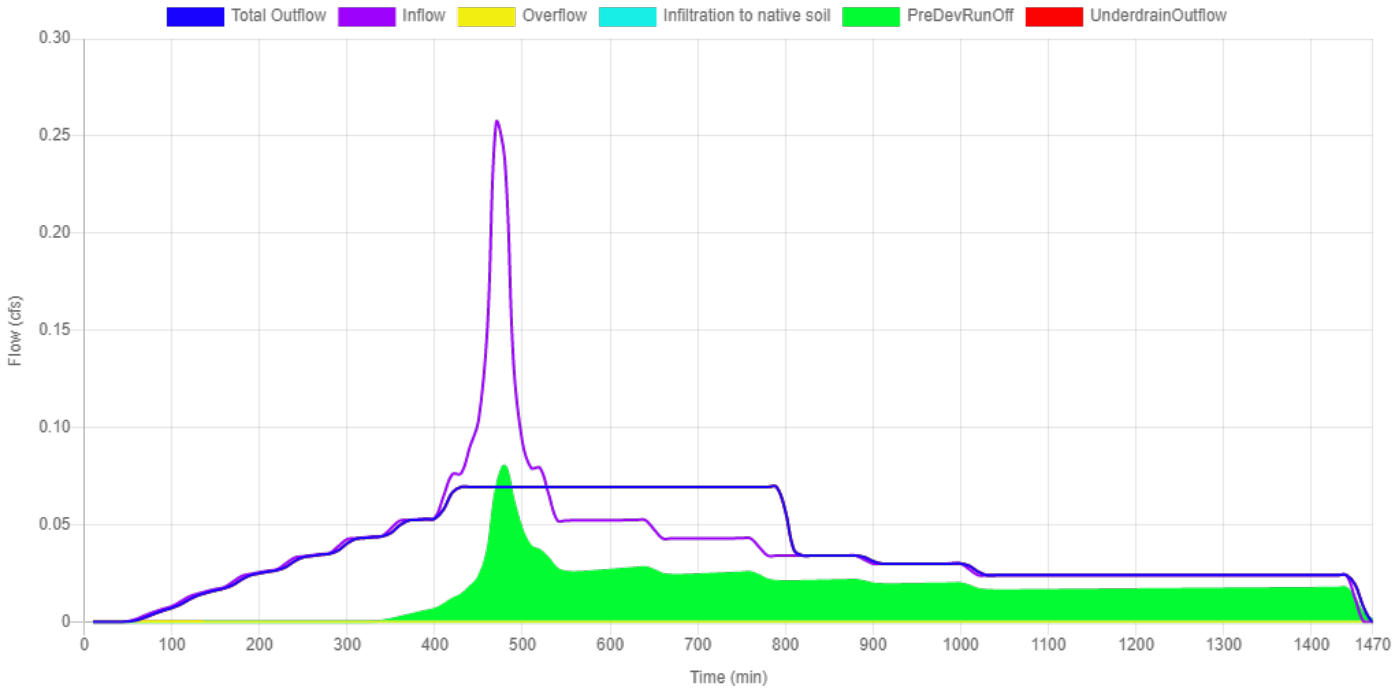
Surface Head



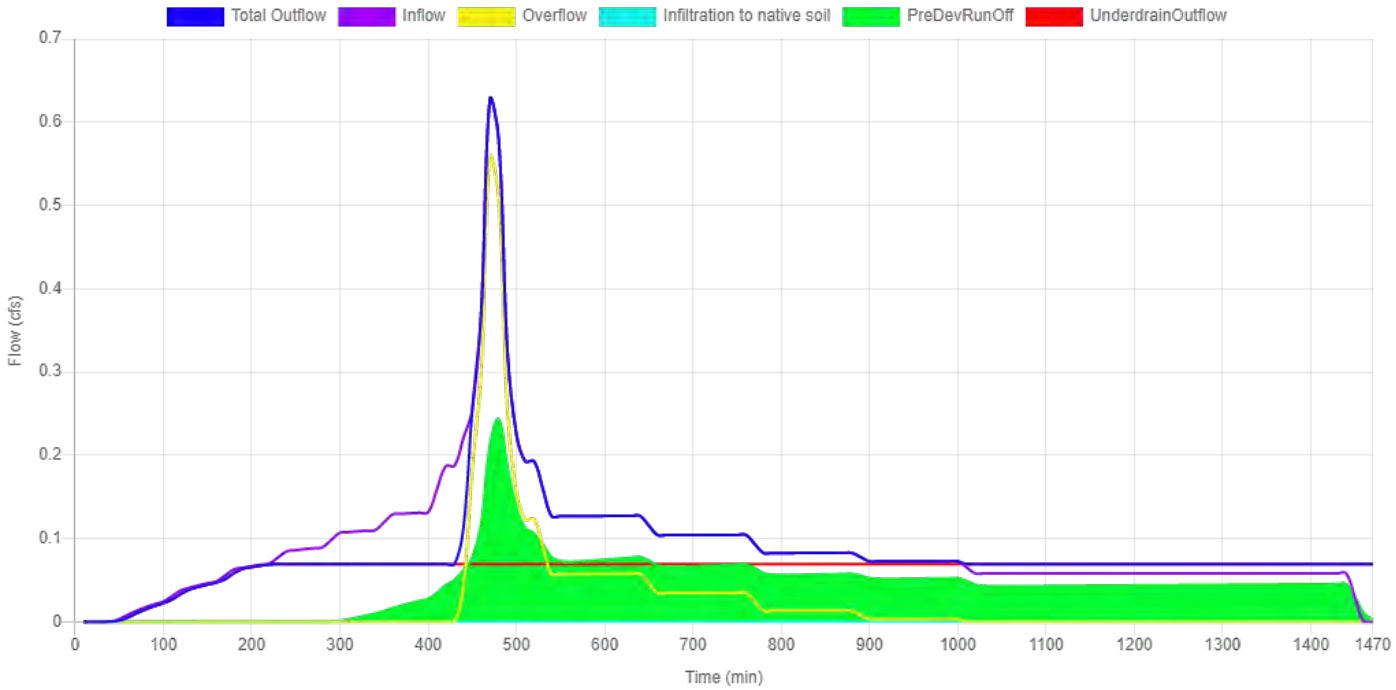
Water Quality



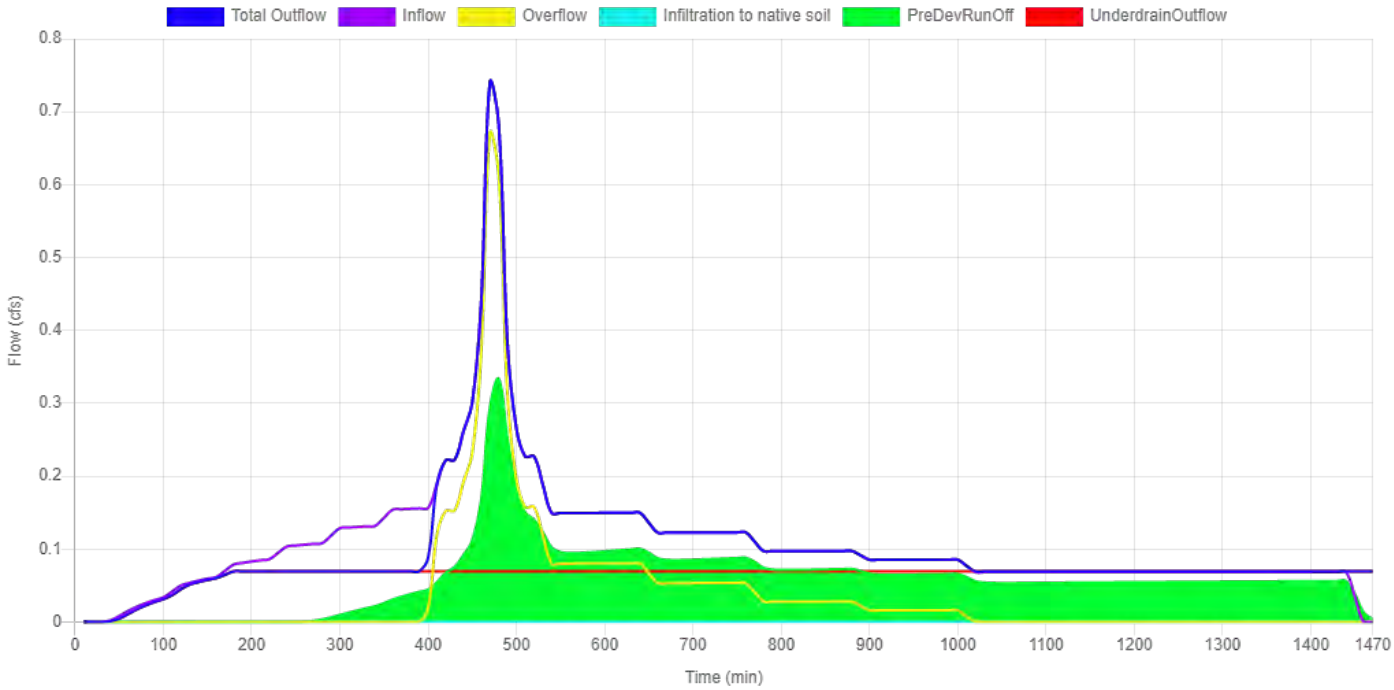
½ 2-Year



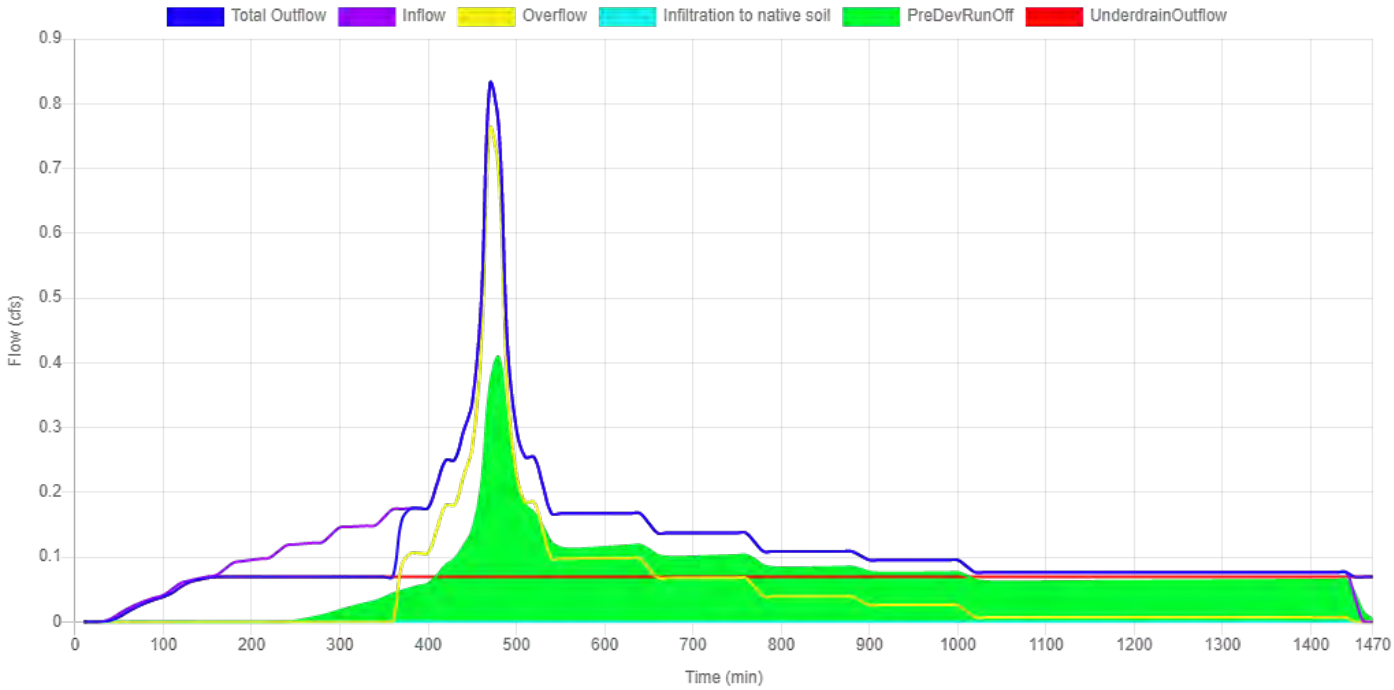
5-Year



10-Year



25-Year

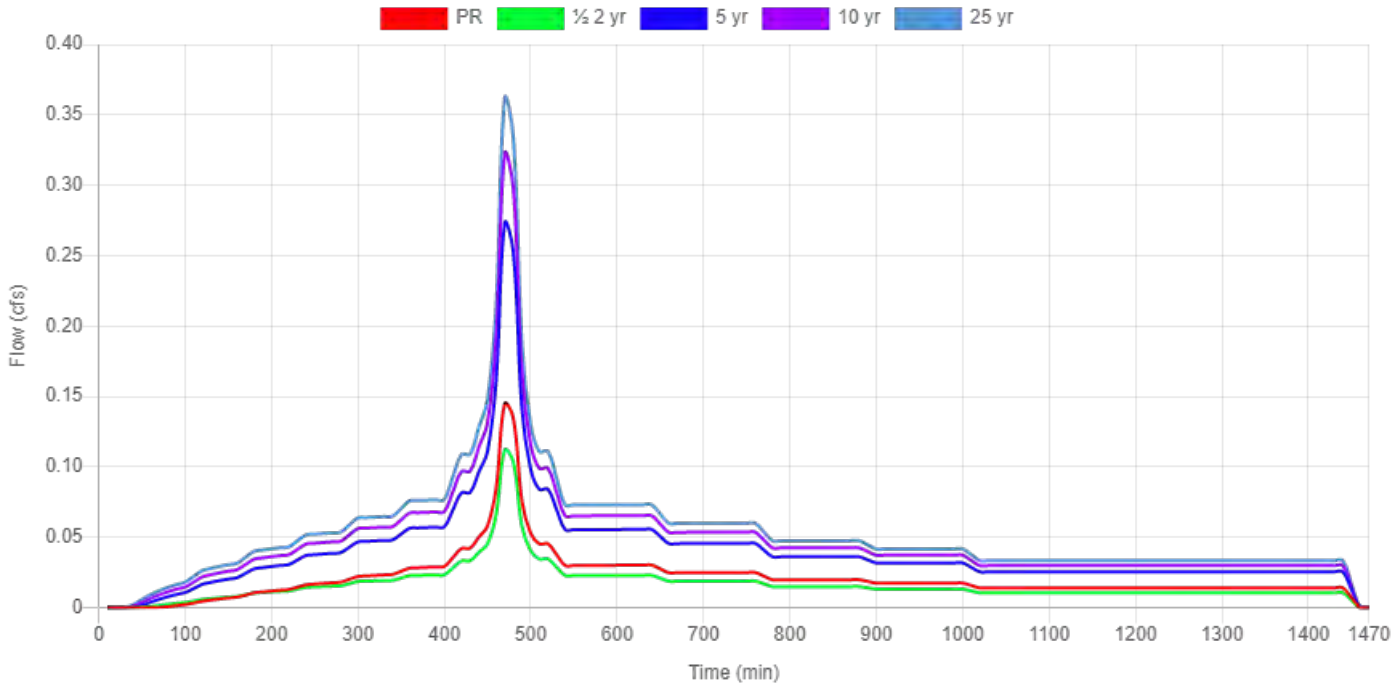


70B

Site Soils & Infiltration Testing	Infiltration Testing Procedure NA Tested Native Soil Infiltration Rate 0 in/hr
Correction Factor	CF test 2
Design Infiltration Rates	Native Soil 0 in/hr Imported Blended Soil 6 in/hr
Catchment Information	Hierarchy Level 2B Hierarchy Description Discharge to an overland storm drainage system, including streams, drainageways, and ditches, or to a storm-only pipe system that discharges to an overland storm drainage system. Pollution Reduction Requirement Filter the post-development stormwater runoff from the water quality storm event through the blended soil. Infiltration Requirement N/A Flow Control Requirement Limit the ½ the 2-yr, the 5-yr, and the 10-yr post-development peak flows to their respective pre-development peak flows. Unless the facility is a public facility (i.e., in the public right-of-way), also limit the 25-yr post-development peak flow to the 25-year pre-development peak flow. Impervious Area 15839 sq ft 0.364 acre Pre-Development Time of Concentration (Tc pre) 10 min Post-Development Time of Concentration (Tc post) 5 min Pre-Development Curve Number (CN pre) 82 Post-Development Curve Number (CN post) 98

SBUH Results

Post-Development Runoff



	Pre - Development Rate and Volume		Post - Development Rate and Volume	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0.0214	537.7	0.1447	1832.8
½ 2-Year	0.0349	610.6	0.1118	1433
5-Year	0.1061	1716.9	0.2731	3522.5
10-Year	0.1452	2244.4	0.3224	4179.9
25-Year	0.1779	2683.5	0.3617	4706.3

	Overflow		Underdrain Outflow		Infiltration	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0	0	0.038	1832.8	0	0
½ 2-Year	0	0	0.038	1433	0	0
5-Year	0.236	680.4	0.038	2842	0	0
10-Year	0.285	1112.8	0.038	3067.1	0	0
25-Year	0.324	1508.6	0.038	3197.7	0	0

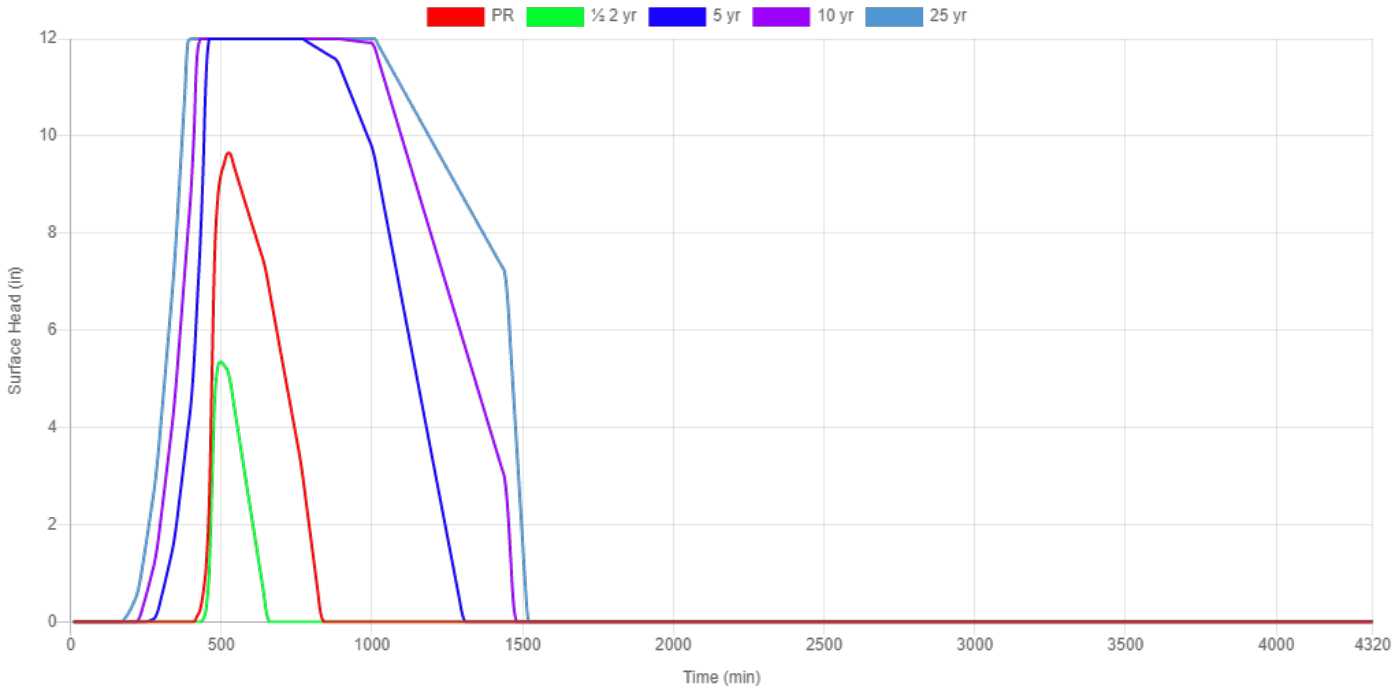
Flat Planter

Site Soils & Infiltration Testing	Category Flat Planter Shape Null Location Parcel Configuration D: Lined Facility with RS and Ud **Above Grade Storage Data** Bottom Area 270 sq ft Bottom Width 9.00 ft Overflow Height 12 in Total Depth of Blended Soil plus Rock 18 in Surface Storage Capacity at Overflow 270 cu ft Design Infiltration Rate to Soil Underlying the Facility 0.000 cfs Design Infiltration Rate for Imported Blended Soil in the Facility 0.038 cfs **Below Grade Storage Data** Catchment is too small for flow control? No Rock Area 22.50 sq ft Rock Width 3.00 ft Rock Storage Depth 12.0 in Rock Porosity 0.3 Underdrain Height

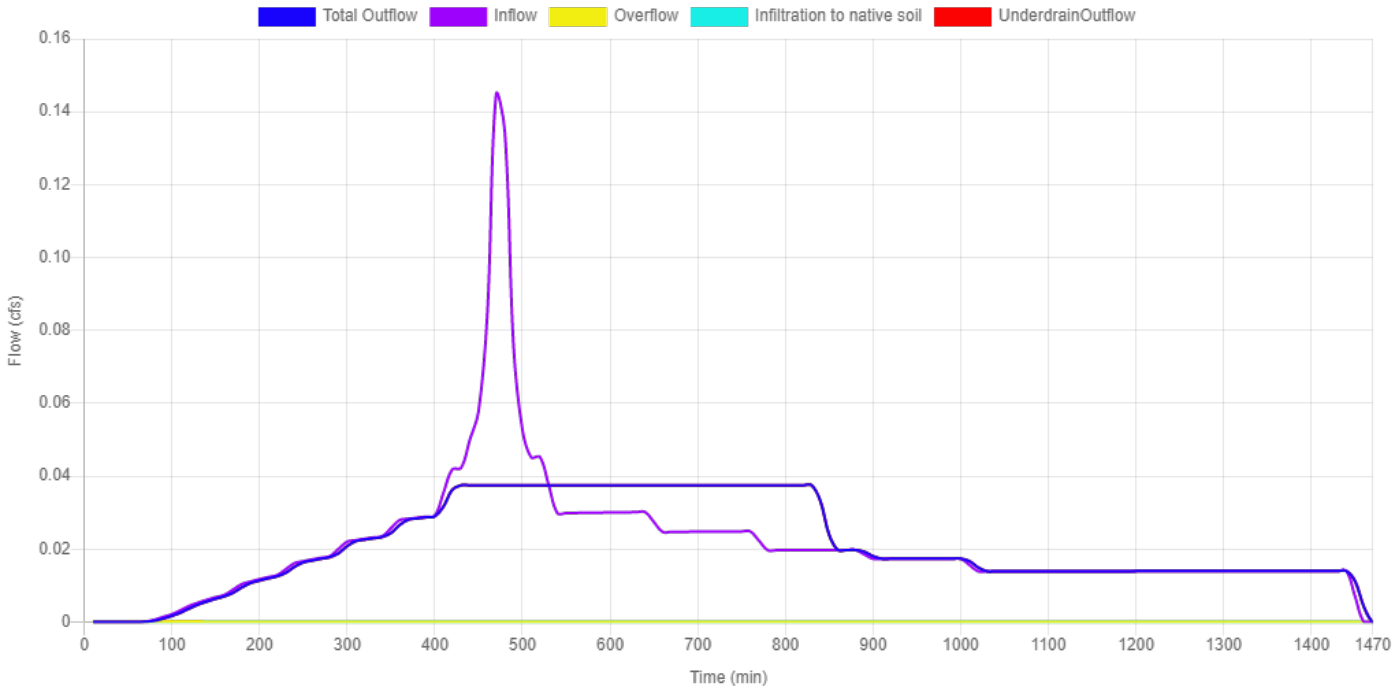
	4 in Percent of Facility Base that Allows Infiltration 0 % Orifice (Y/N)? No Why no orifice Water-quality-only facility
Facility Facts	Total Facility Area (excluding freeboard) 270.00 sq ft Sizing Ratio 1.70 %
Pollution Reduction Results	Pollution Reduction Score Pass Overflow Volume 0.00 cf Surface Capacity Used 80.32 %
Flow Control Results	Flow Control Score Fail

	STORMWATER FACILITY OUTFLOW (CFS)		PRE-DEVELOPMENT RUNOFF (CFS)
½ the 2 year	0.0375	<=	0.0349
5 year	0.2731	<=	0.1061
10 year	0.3224	<=	0.1452
25 year	0.3617	<=	0.1779

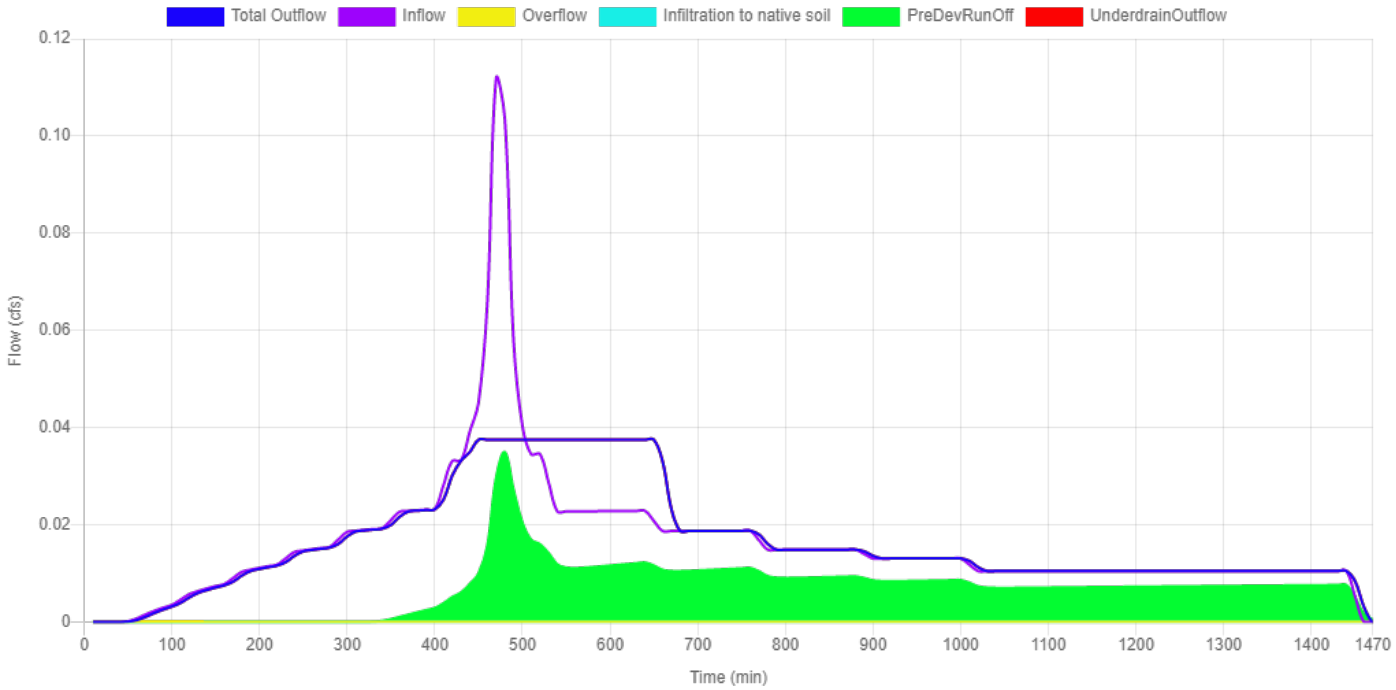
Surface Head



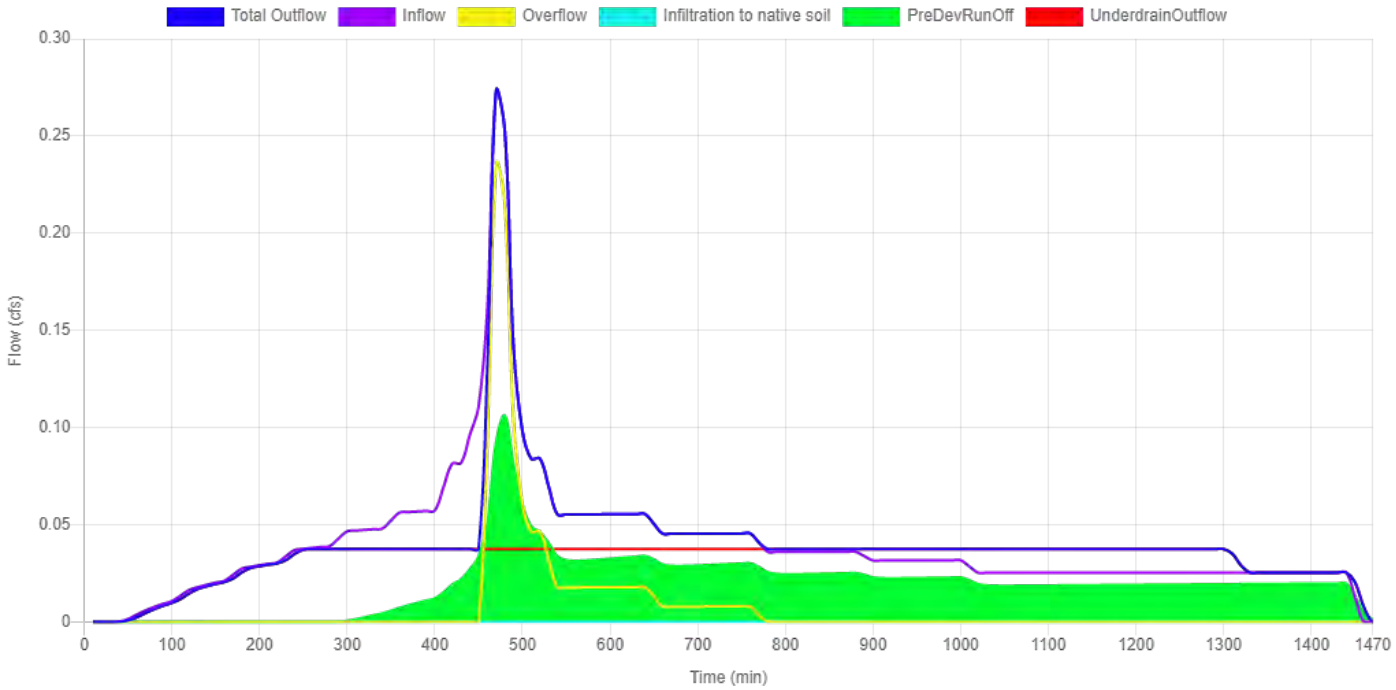
Water Quality



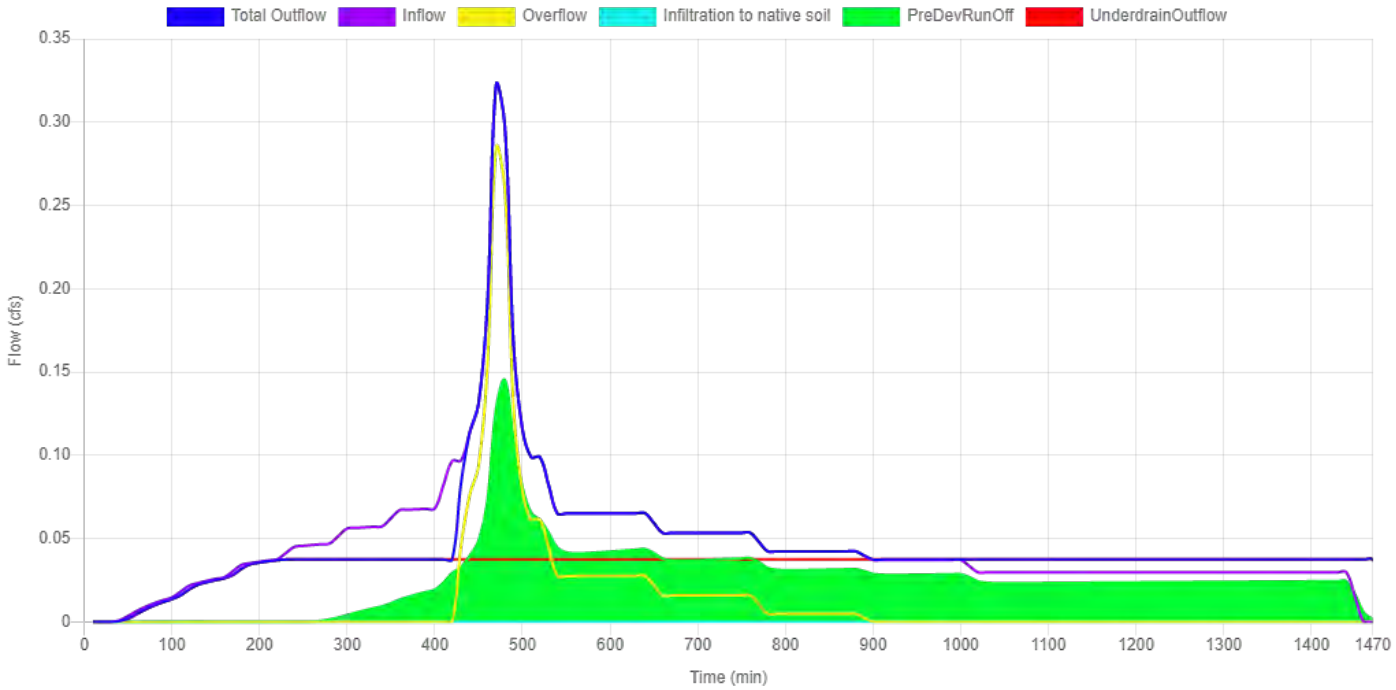
½ 2-Year



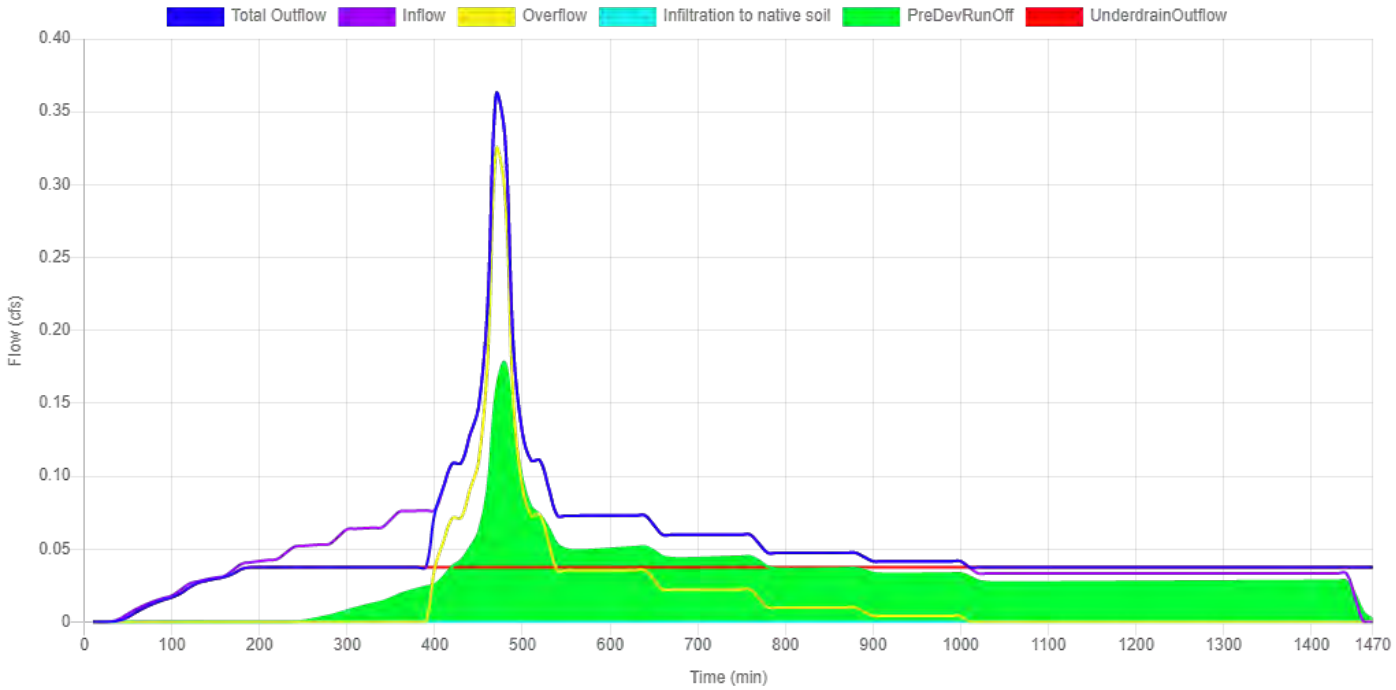
5-Year



10-Year



25-Year

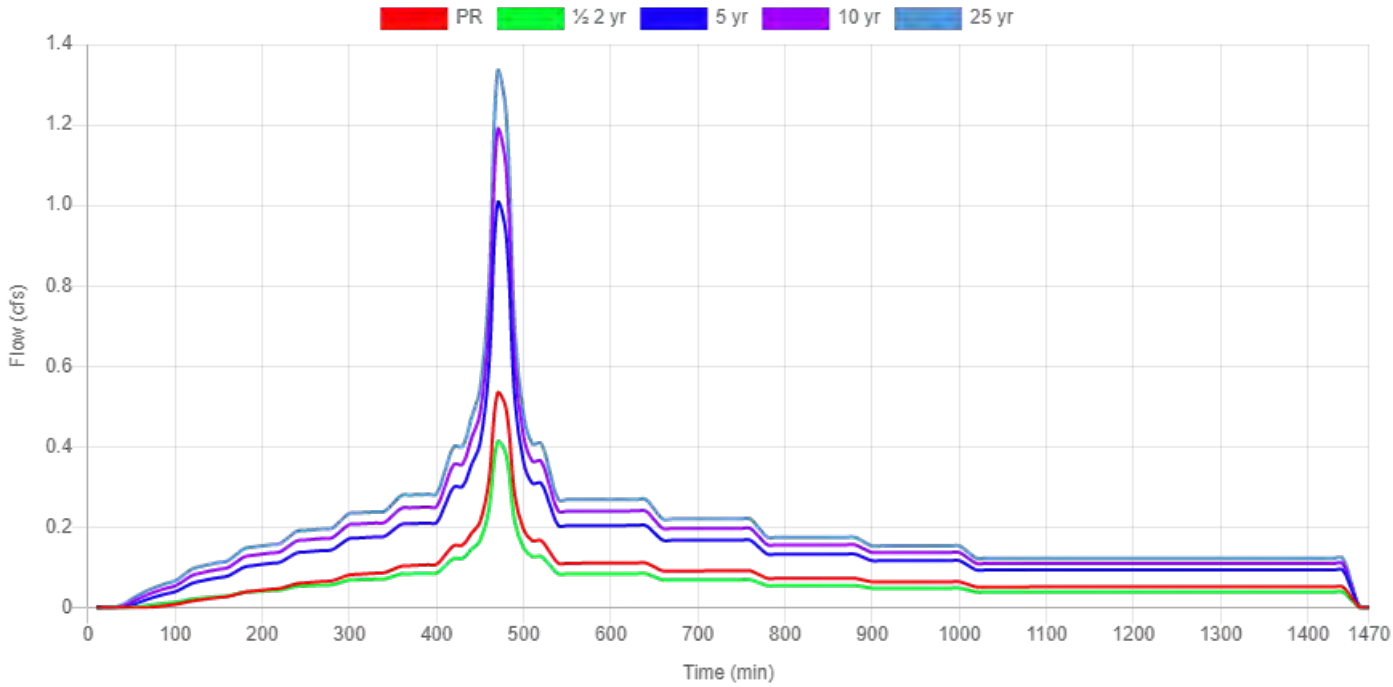


81A

Site Soils & Infiltration Testing	Infiltration Testing Procedure NA Tested Native Soil Infiltration Rate 0 in/hr
Correction Factor	CF test 2
Design Infiltration Rates	Native Soil 0 in/hr Imported Blended Soil 6 in/hr
Catchment Information	Hierarchy Level 2B Hierarchy Description Discharge to an overland storm drainage system, including streams, drainageways, and ditches, or to a storm-only pipe system that discharges to an overland storm drainage system. Pollution Reduction Requirement Filter the post-development stormwater runoff from the water quality storm event through the blended soil. Infiltration Requirement N/A Flow Control Requirement Limit the ½ the 2-yr, the 5-yr, and the 10-yr post-development peak flows to their respective pre-development peak flows. Unless the facility is a public facility (i.e., in the public right-of-way), also limit the 25-yr post-development peak flow to the 25-year pre-development peak flow. Impervious Area 58265 sq ft 1.338 acre Pre-Development Time of Concentration (Tc pre) 10 min Post-Development Time of Concentration (Tc post) 5 min Pre-Development Curve Number (CN pre) 82 Post-Development Curve Number (CN post) 98

SBUH Results

Post-Development Runoff



	Pre - Development Rate and Volume		Post - Development Rate and Volume	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0.0788	1977.9	0.5322	6742.2
½ 2-Year	0.1285	2246.2	0.4113	5271.4
5-Year	0.3904	6315.7	1.0047	12957.6
10-Year	0.5342	8256.1	1.1859	15376.1
25-Year	0.6545	9871.6	1.3304	17312.5

	Overflow		Underdrain Outflow		Infiltration	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0	0	0.188	6742.2	0	0
½ 2-Year	0	0	0.188	5271.4	0	0
5-Year	0.501	897.8	0.188	12059.8	0	0
10-Year	0.907	2059.7	0.188	13316.4	0	0
25-Year	1.143	3164	0.188	14148.5	0	0

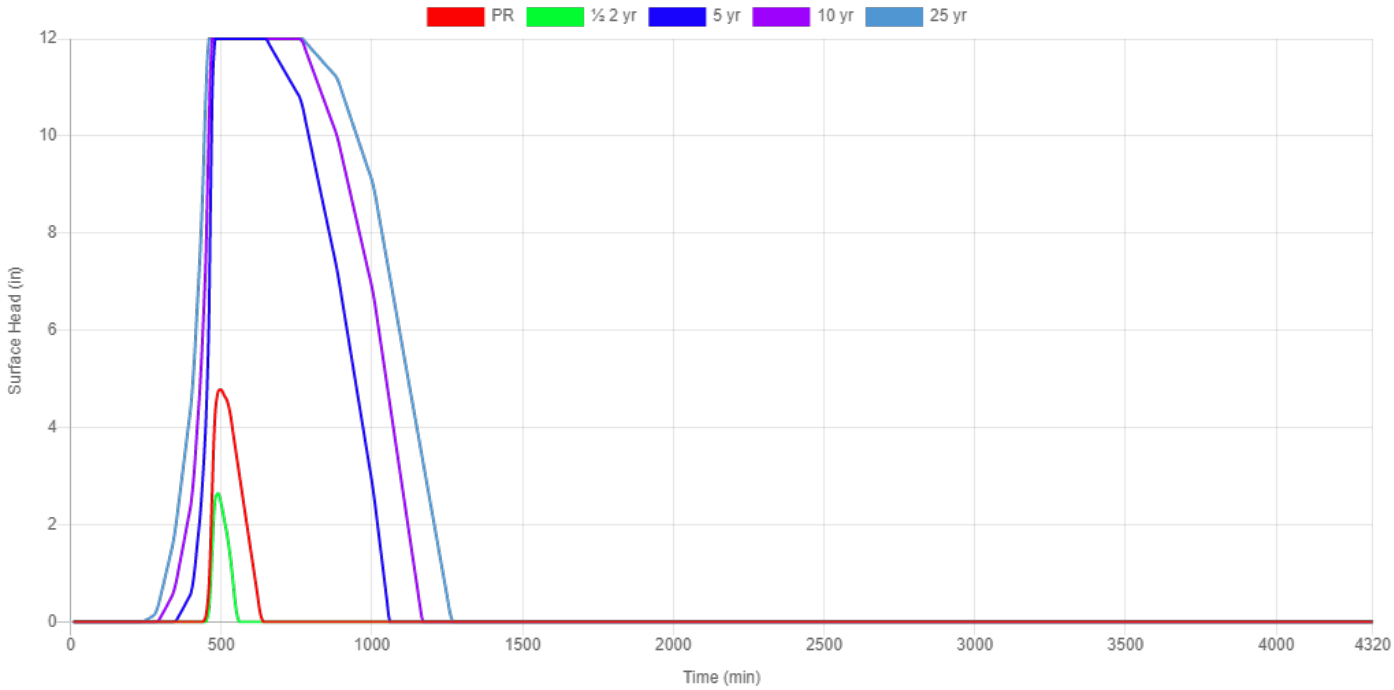
Flat Planter

Site Soils & Infiltration Testing	Category Flat Planter Shape Null Location Parcel Configuration D: Lined Facility with RS and Ud **Above Grade Storage Data** Bottom Area 1350 sq ft Bottom Width 9.00 ft Overflow Height 12 in Total Depth of Blended Soil plus Rock 18 in Surface Storage Capacity at Overflow 1350 cu ft Design Infiltration Rate to Soil Underlying the Facility 0.000 cfs Design Infiltration Rate for Imported Blended Soil in the Facility 0.188 cfs **Below Grade Storage Data** Catchment is too small for flow control? No Rock Area 112.50 sq ft Rock Width 3.00 ft Rock Storage Depth 12.0 in Rock Porosity 0.3 Underdrain Height

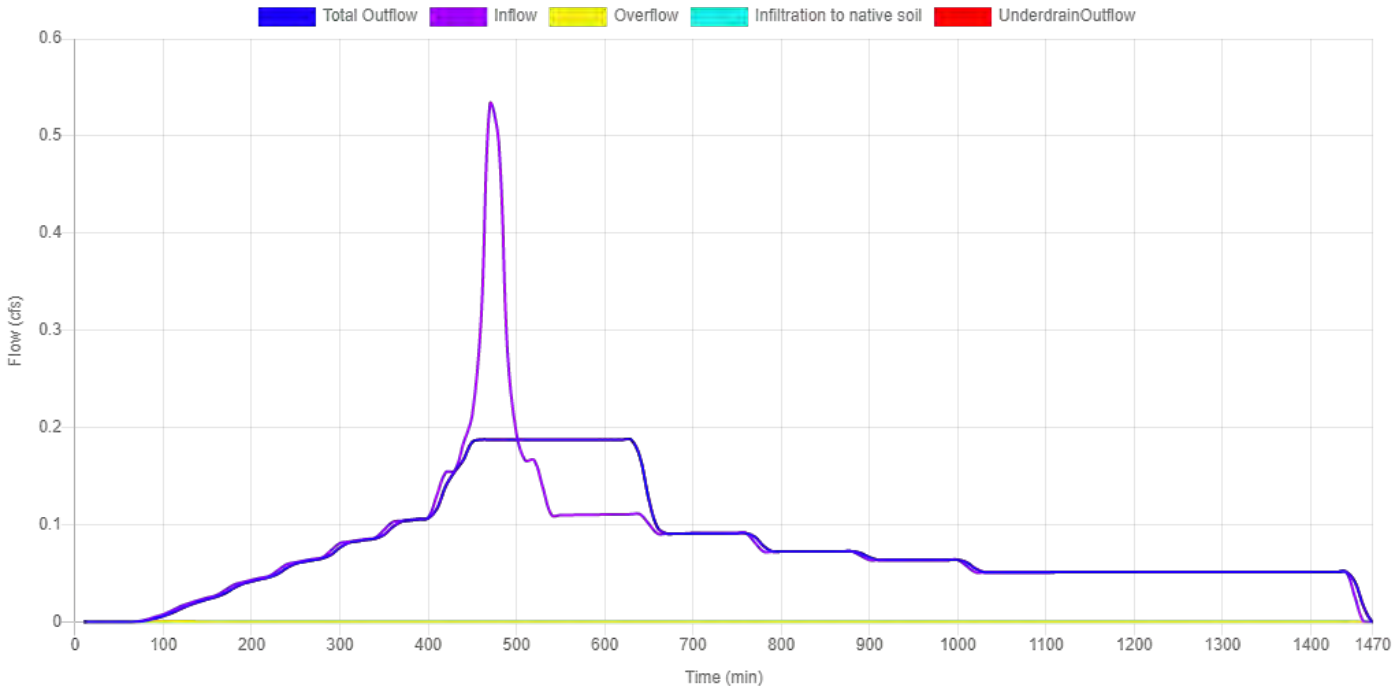
	4 in Percent of Facility Base that Allows Infiltration 0 % Orifice (Y/N)? No Why no orifice Water-quality-only facility
Facility Facts	Total Facility Area (excluding freeboard) 1350.00 sq ft Sizing Ratio 2.32 %
Pollution Reduction Results	Pollution Reduction Score Pass Overflow Volume 0.00 cf Surface Capacity Used 39.81 %
Flow Control Results	Flow Control Score Fail

	STORMWATER FACILITY OUTFLOW (CFS)		PRE-DEVELOPMENT RUNOFF (CFS)
½ the 2 year	0.1875	<=	0.1285
5 year	0.6887	<=	0.3904
10 year	1.0946	<=	0.5342
25 year	1.3304	<=	0.6545

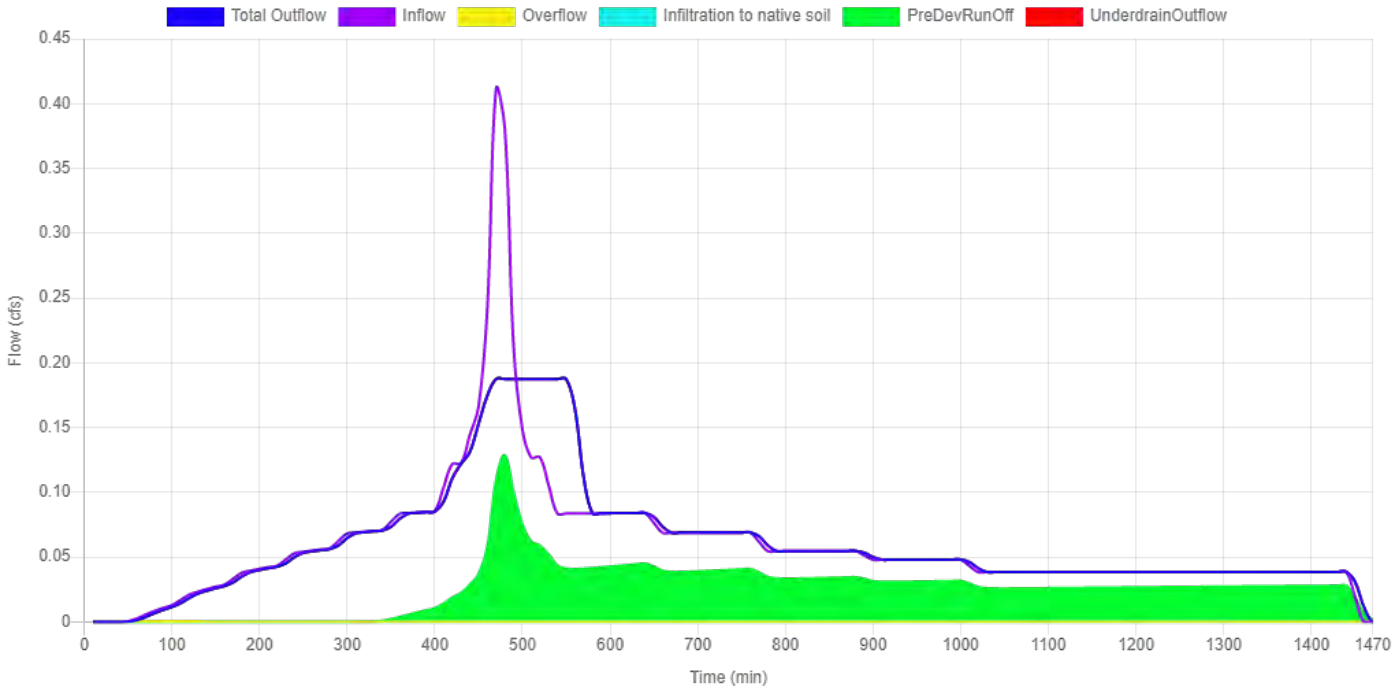
Surface Head



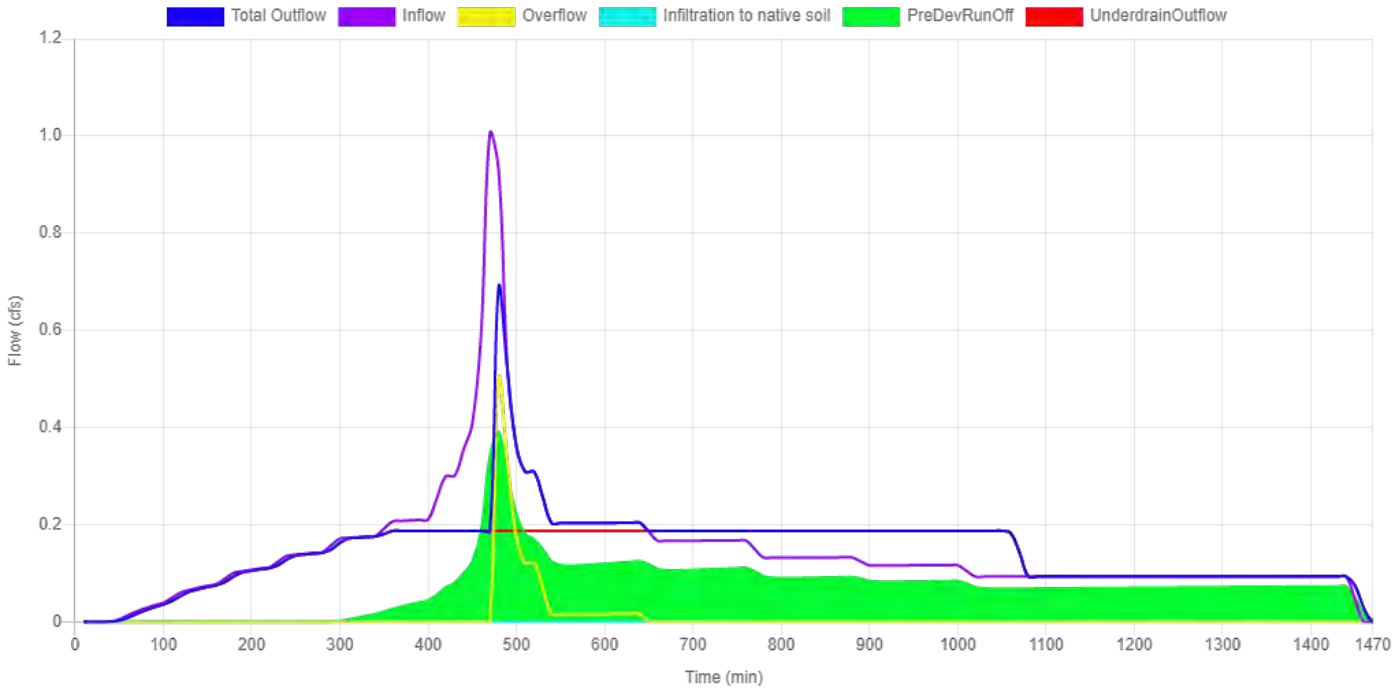
Water Quality



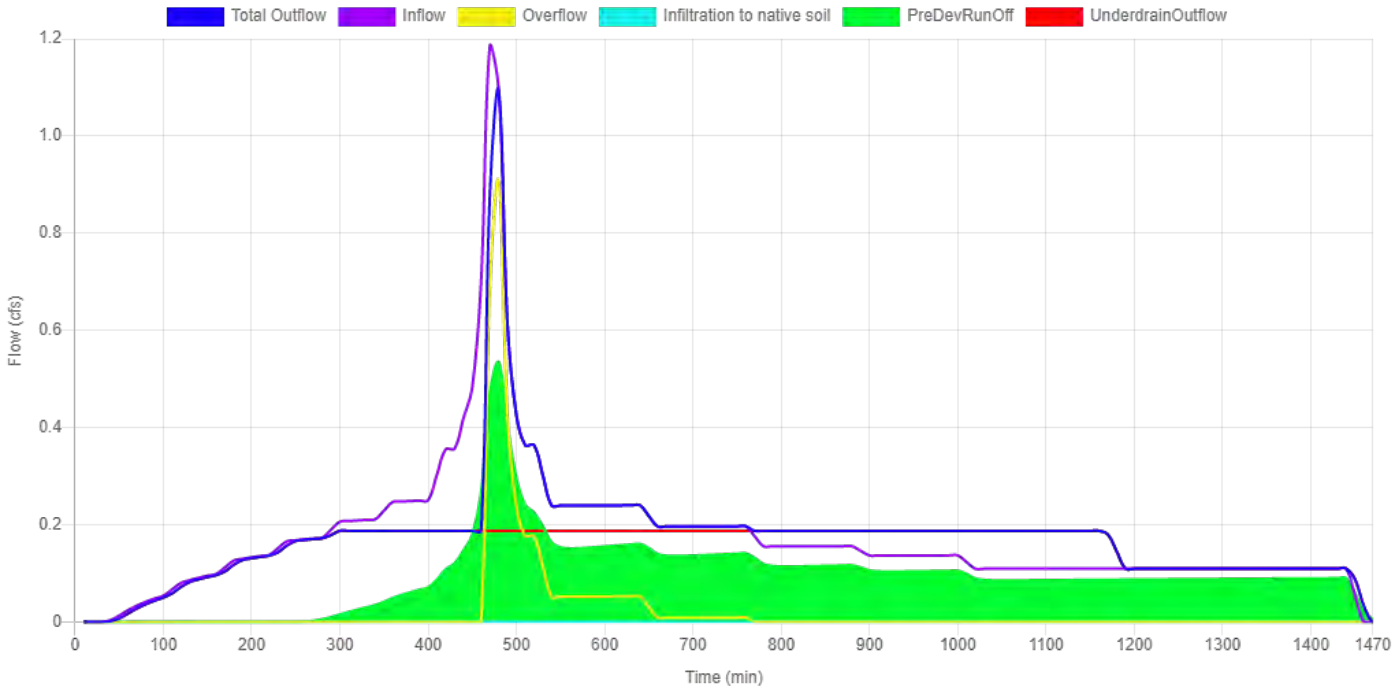
½ 2-Year



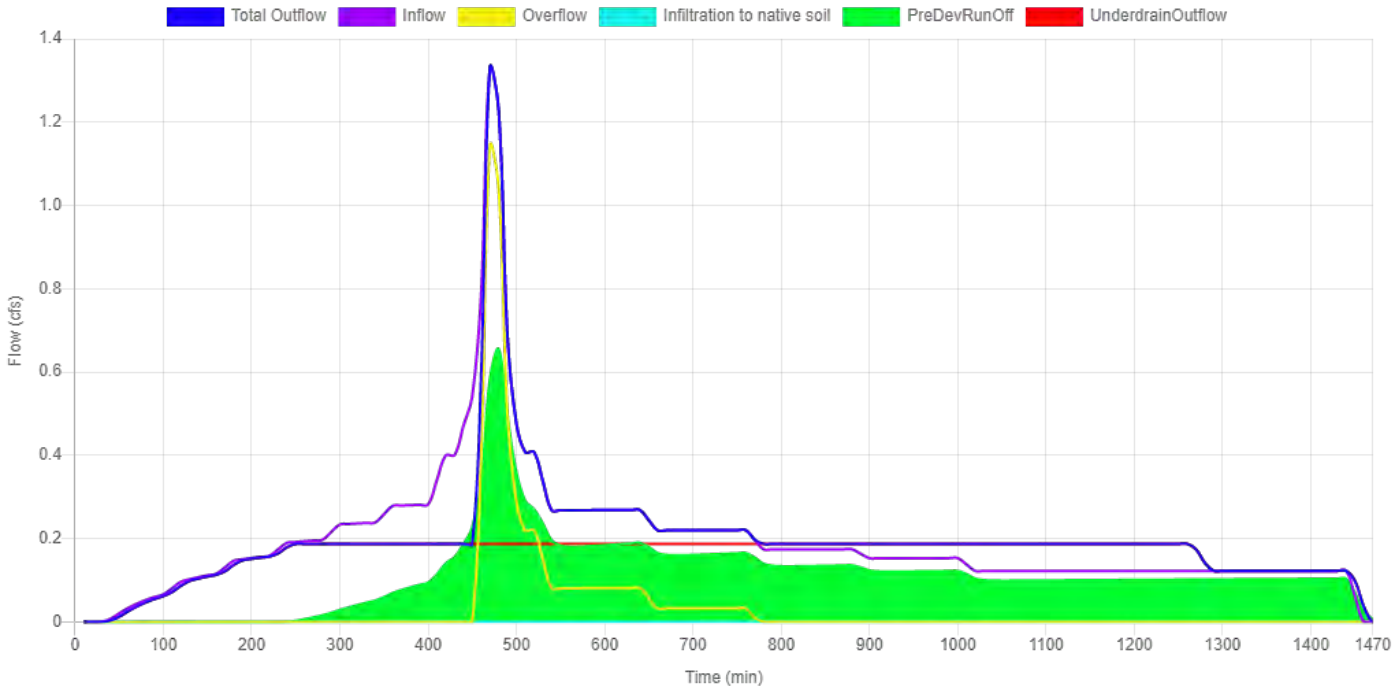
5-Year



10-Year



25-Year

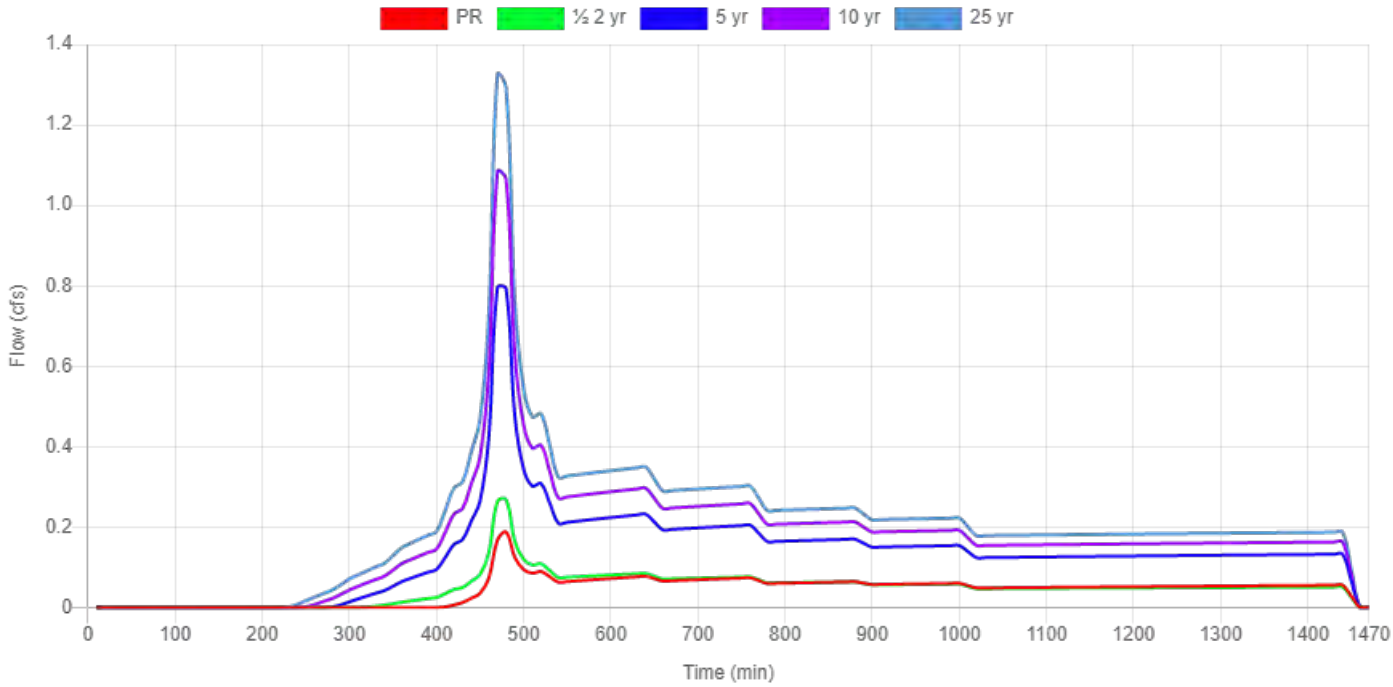


F1

Site Soils & Infiltration Testing	Infiltration Testing Procedure NA Tested Native Soil Infiltration Rate 0 in/hr
Correction Factor	CF test 2
Design Infiltration Rates	Native Soil 0 in/hr Imported Blended Soil 6 in/hr
Catchment Information	Hierarchy Level 2B Hierarchy Description Discharge to an overland storm drainage system, including streams, drainageways, and ditches, or to a storm-only pipe system that discharges to an overland storm drainage system. Pollution Reduction Requirement Filter the post-development stormwater runoff from the water quality storm event through the blended soil. Infiltration Requirement N/A Flow Control Requirement Limit the ½ the 2-yr, the 5-yr, and the 10-yr post-development peak flows to their respective pre-development peak flows. Unless the facility is a public facility (i.e., in the public right-of-way), also limit the 25-yr post-development peak flow to the 25-year pre-development peak flow. Impervious Area 103529 sq ft 2.377 acre Pre-Development Time of Concentration (Tc pre) 10 min Post-Development Time of Concentration (Tc post) 5 min Pre-Development Curve Number (CN pre) 82 Post-Development Curve Number (CN post) 83

SBUH Results

Post-Development Runoff



	Pre - Development Rate and Volume		Post - Development Rate and Volume	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0.1401	3514.4	0.1872	3826.6
½ 2-Year	0.2283	3991.3	0.268	4231.4
5-Year	0.6938	11222.1	0.7954	11789.3
10-Year	0.9492	14670	1.0837	15311.7
25-Year	1.163	17540.5	1.3247	18234.3

	Overflow		Underdrain Outflow		Infiltration	
	Peak Rate (cfs)	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**	**Peak Rate (cfs)**	**Total Volume (cf)**
PR	0	0	0.07	3629.2	0	0
½ 2-Year	0	0	0.101	4034	0	0
5-Year	0.098	1214.8	0.134	10377.1	0	0
10-Year	0.345	4428.6	0.132	10685.7	0	0
25-Year	0.988	7286.1	0.13	10750.8	0	0

Sloped Facility

Site Soils & Infiltration Testing	Category Sloped Facility Shape Null Location Parcel Configuration D: Lined Facility with RS and Ud **Above Grade Storage Data** Total Depth of Blended Soil plus Rock 36 in Surface Storage Capacity at Overflow 1614.2 cu ft Design Infiltration Rate to Soil Underlying the Facility 0.000 cfs Design Infiltration Rate for Imported Blended Soil in the Facility 0.359 cfs **Below Grade Storage Data** Catchment is too small for flow control? No Rock Area 420.00 sq ft Rock Width 4.00 ft Rock Storage Depth 18 in Rock Porosity 0.3 Percent of Facility Base that Allows Infiltration 0 % Underdrain Height 6.0 in Orifice (Y/N)? Yes Orifice Diameter

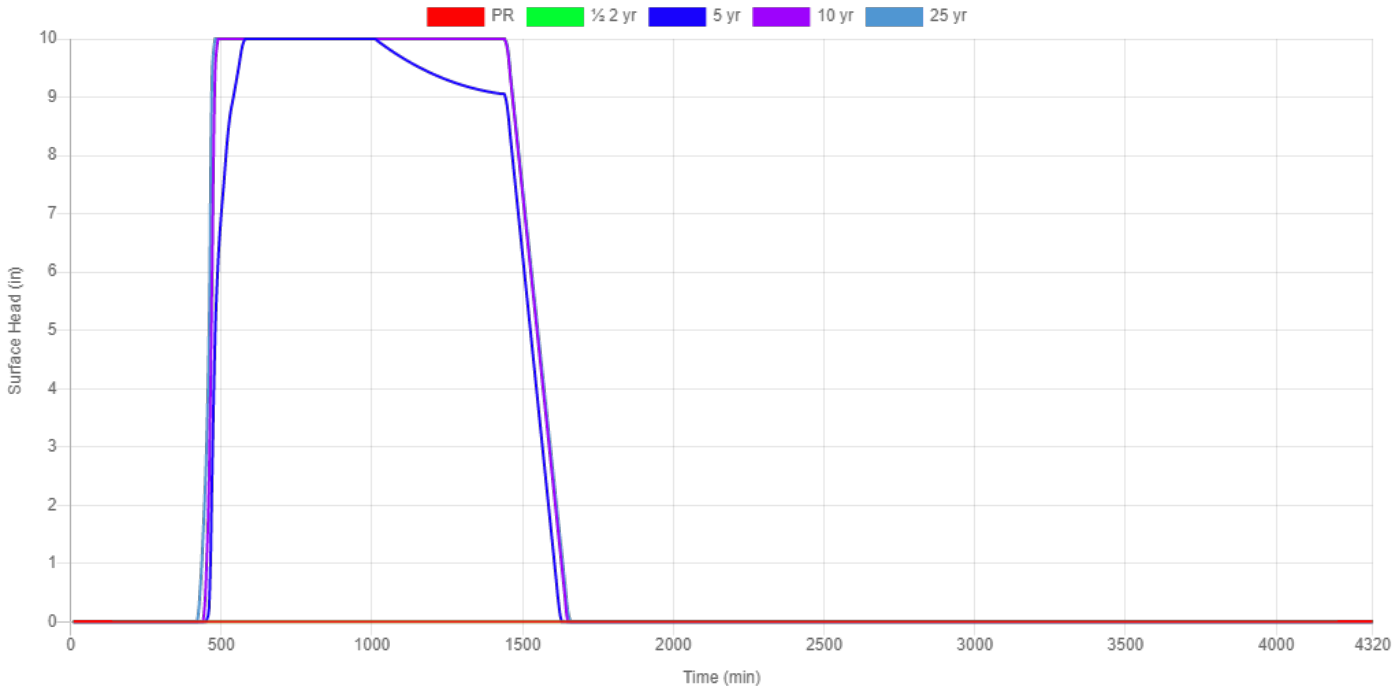
	1.875 in
Facility Facts	Total Facility Area (excluding freeboard) 3108.00 sq ft Sizing Ratio 3.00 % Segments Total Length 430.50 ft
Pollution Reduction Results	Pollution Reduction Score Pass Overflow Volume 0.00 cf Surface Capacity Used 0.00 %
Flow Control Results	Flow Control Score Pass

	STORMWATER FACILITY OUTFLOW (CFS)		PRE-DEVELOPMENT RUNOFF (CFS)
½ the 2 year	0.1011	<=	0.2283
5 year	0.2322	<=	0.6938
10 year	0.4770	<=	0.9492
25 year	1.1184	<=	1.1630

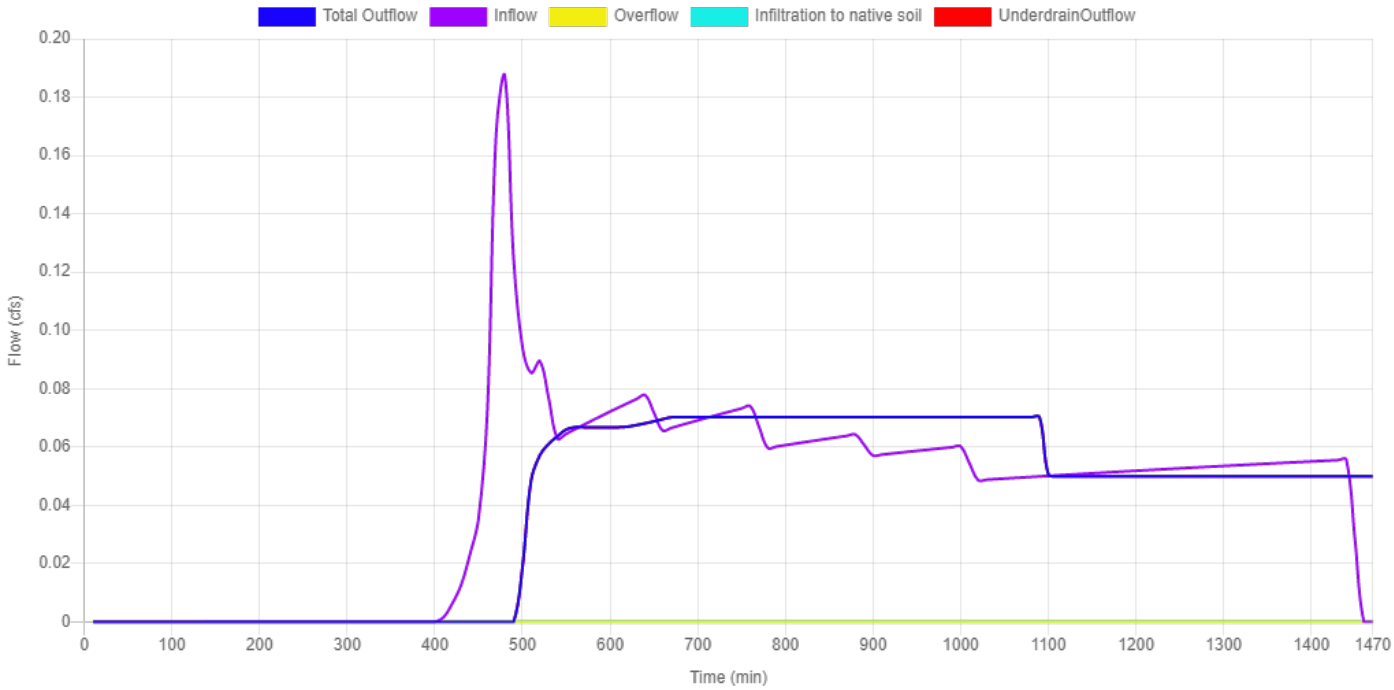
Sloped Facility Worksheet

#	Segment Length (ft)	Check Dam Width (ft)	Slope, v/h (ft/ft)	Bottom Width (ft)	Right Side Slope (_h:1v)	Left Side Slope (_h:1v)	Down-gradient Depth (in)	Landscape Width (ft)	Adjusted Length (ft)	Up-gradient Depth (ft)	Surface Capacity Volume (cf)
0	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
1	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
2	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
3	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
4	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
5	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
6	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
7	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
8	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
9	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
10	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
11	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
12	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
13	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
14	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
15	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
16	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
17	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
18	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
19	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87
20	20.00	0.5	0.01	3.00	3.0	3.0	10.0	9.0	20.00	0.63	76.87

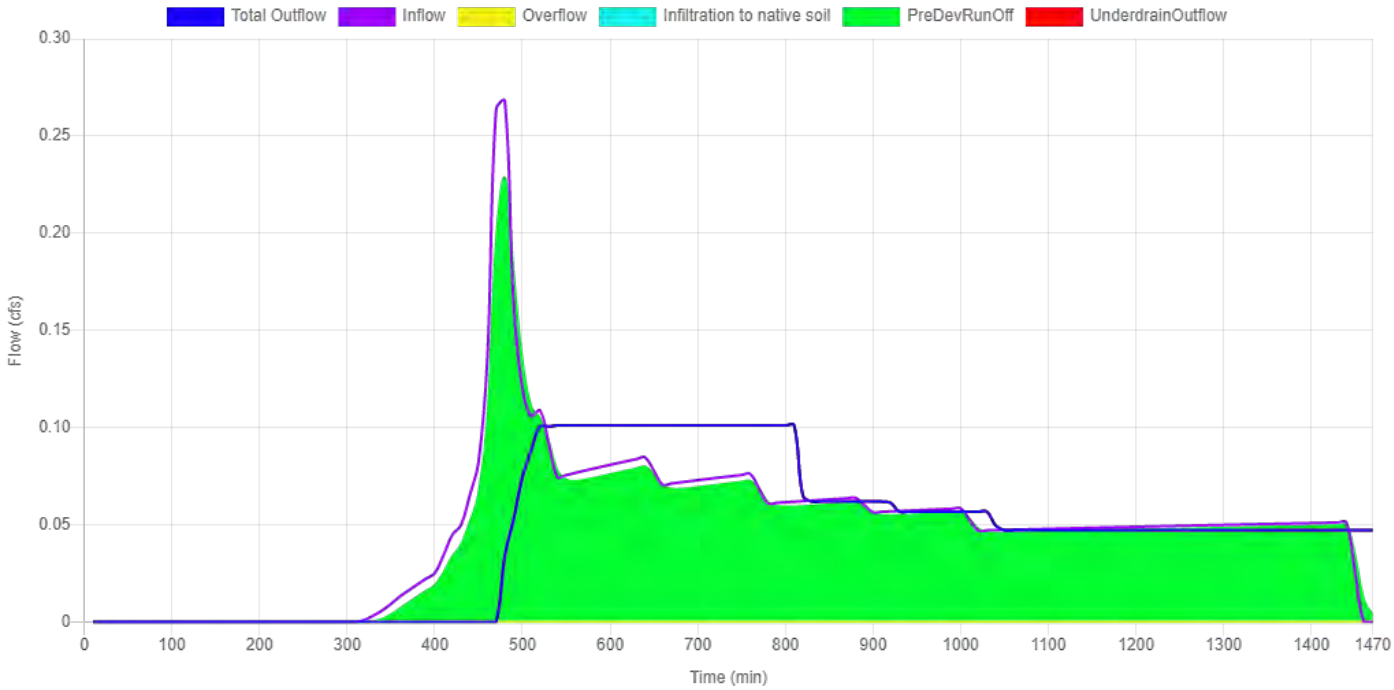
Surface Head



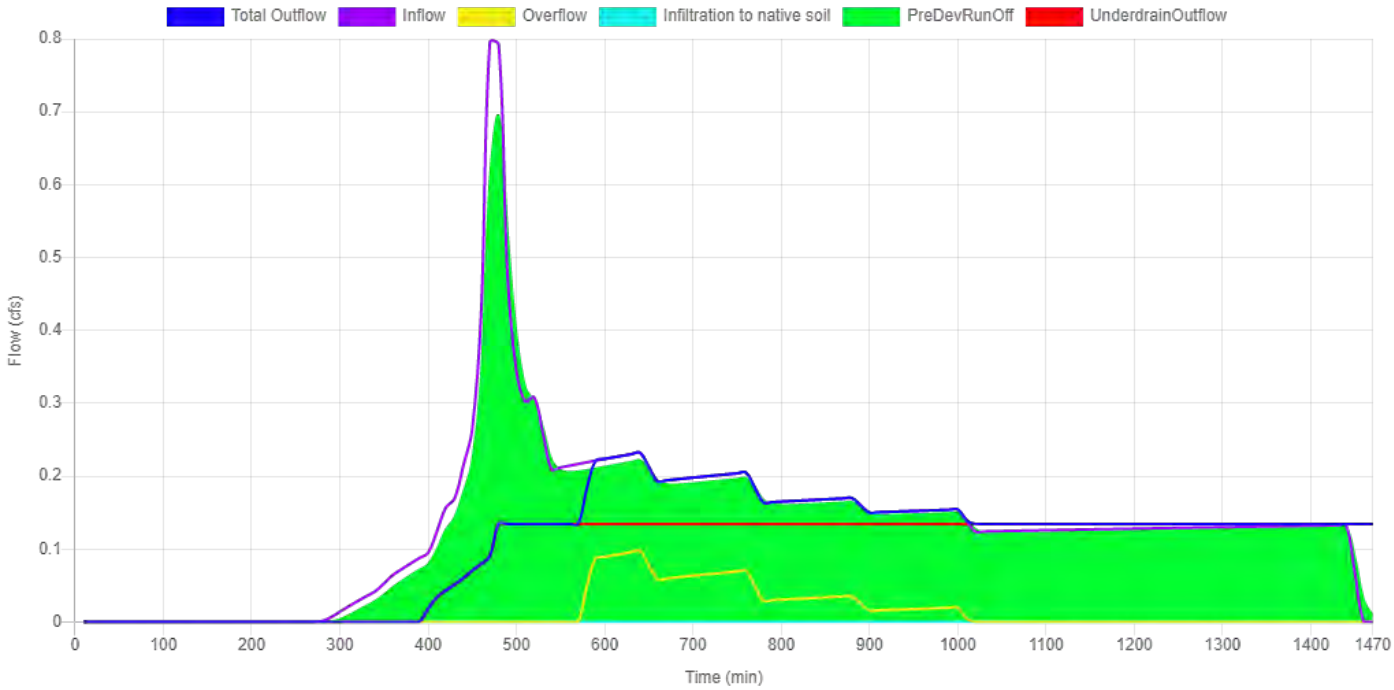
Water Quality



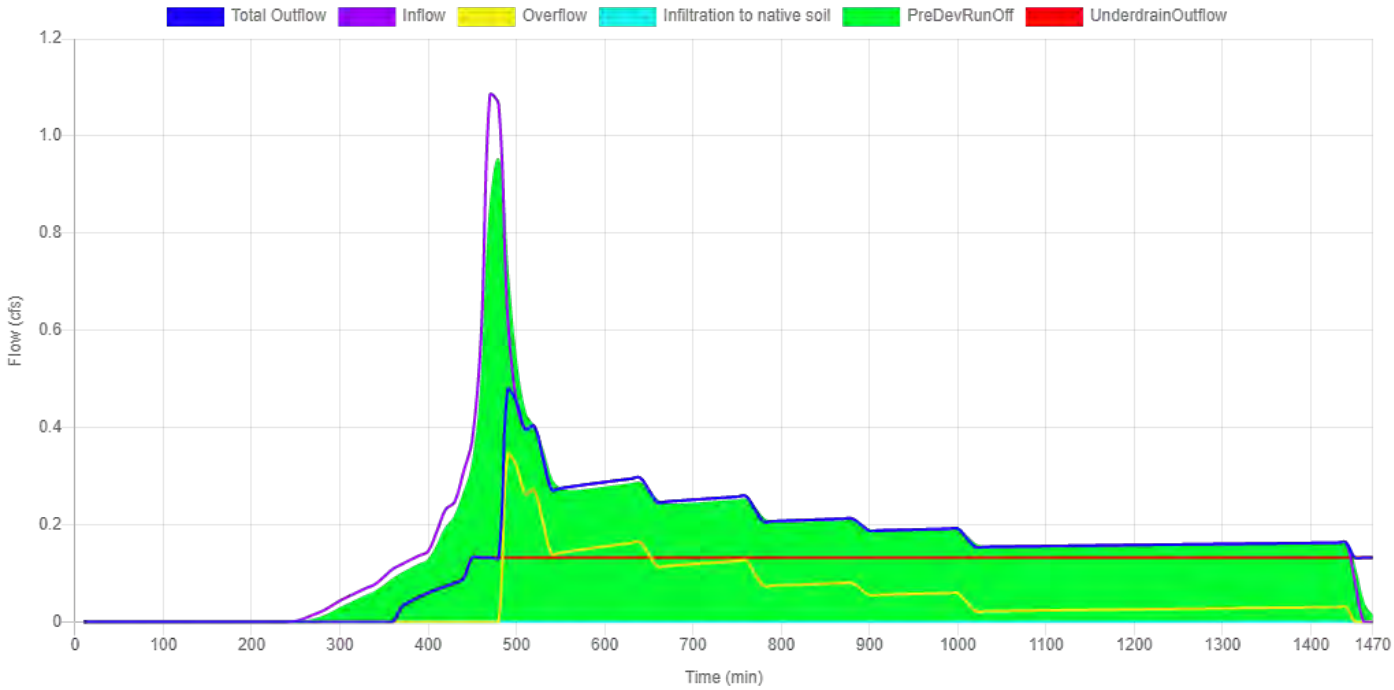
½ 2-Year



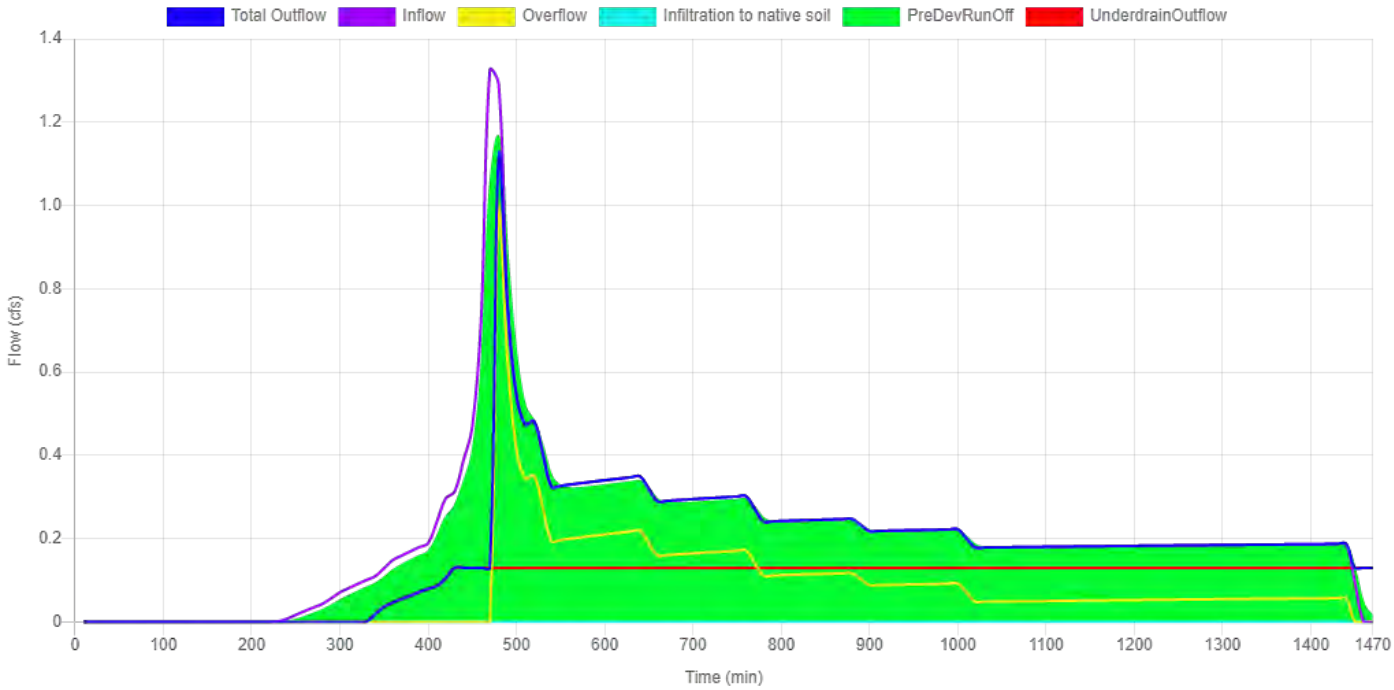
5-Year



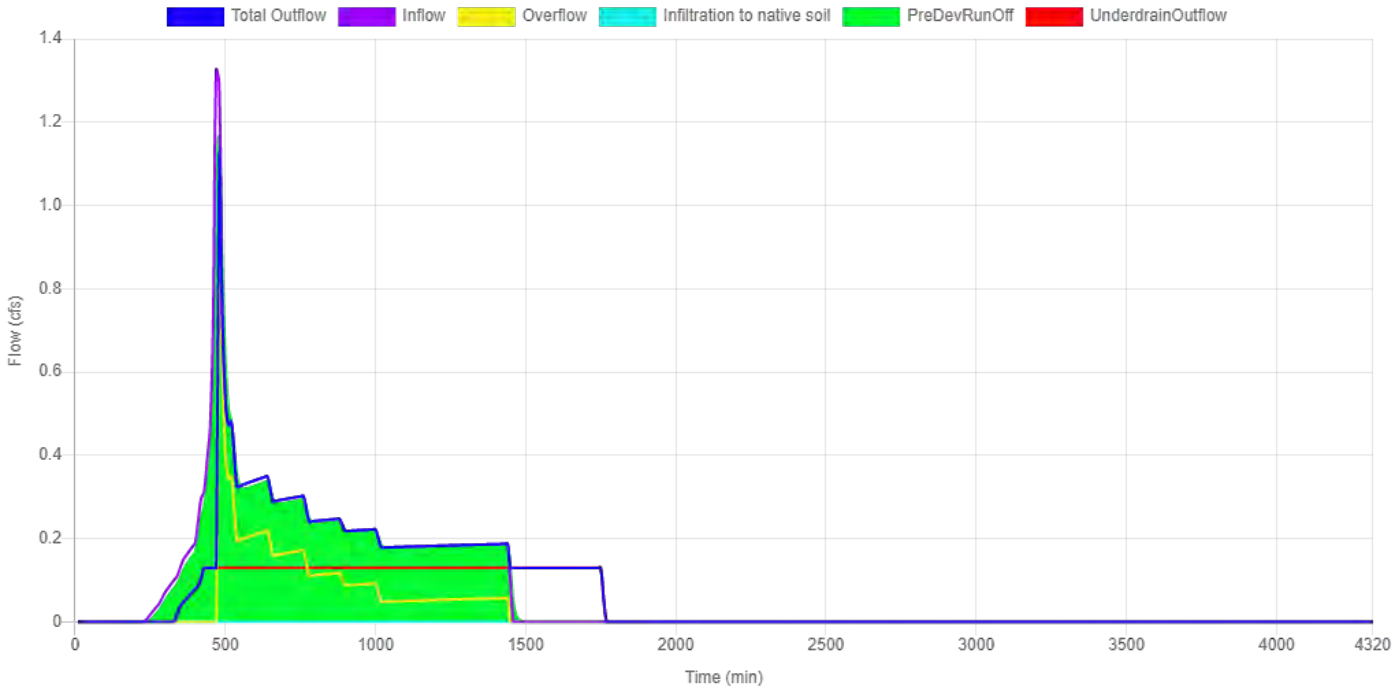
10-Year



25-Year



25-Year


Total Outflow
Inflow
Overflow
Infiltration to native soil
PreDevRunOff
UnderdrainOutflow
Flow (cfs)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
0
500
1000
1500
2000
2500
3000
3500
4000
4320
Time (min)

BIO-SWALE DESIGN

Area 51

Water Quality Flow:

A =	23,459	sf
I =	0.19	inches
WQF =	0.09	cfs

Bio-Swale Design Data:

Q =	0.092	Design flow rate (c.f.s.)
n =	0.24	manning's n
S =	1.0%	longitudinal slope of swale (ft/ft)
b =	2.00	width of bottom (ft.)
Z =	4	side slope (ft/ft)
t =	9	Min Residence Time

Depth y (ft)	Area A (sf)	Wetted Perimeter P (ft)	Hydraulic Radius R (ft)	Top Width T (ft)	Velocity V (ft/s)	Length L (ft)
0.3300	1.0956	4.7212	0.2321	4.6400	0.08	45.39

Water Quality Design Velocity:

Q =	0.092	
A =	1.10	sf
V=Q/A		
V =	**0.08**	**ft/s**

Bio-Swale Length

L=(V)(t)(60)

t =	9.00	min
V =	0.08	ft/s
L=	**45.39**	**Use Minimum Swale Length**

BIO-SWALE DESIGN

Road A1

Water Quality Flow:

A =	21,086	sf
I =	0.19	inches
WQF =	0.08	cfs

Bio-Swale Design Data:

Q =	0.083	Design flow rate (c.f.s.)
n =	0.24	manning's n
S =	1.0%	longitudinal slope of swale (ft/ft)
b =	2.00	width of bottom (ft.)
Z =	4	side slope (ft/ft)
t =	9	Min Residence Time

Depth y (ft)	Area A (sf)	Wetted Perimeter P (ft)	Hydraulic Radius R (ft)	Top Width T (ft)	Velocity V (ft/s)	Length L (ft)
0.3300	1.0956	4.7212	0.2321	4.6400	0.08	40.798

Water Quality Design Velocity:

Q =	0.083	
A =	1.10	sf
V=Q/A		
V =	**0.08**	**ft/s**

Bio-Swale Length

L=(V)(t)(60)

t =	9.00	min
V =	0.08	ft/s
L=	**40.80**	**Use Minimum Swale Length**

BIO-SWALE DESIGN

Road A2

Water Quality Flow:

A =	19,176	sf
I =	0.19	inches
WQF =	0.08	cfs

Bio-Swale Design Data:

Q =	0.075	Design flow rate (c.f.s.)
n =	0.24	manning's n
S =	1.0%	longitudinal slope of swale (ft/ft)
b =	2.00	width of bottom (ft.)
Z =	4	side slope (ft/ft)
t =	9	Min Residence Time

Depth y (ft)	Area A (sf)	Wetted Perimeter P (ft)	Hydraulic Radius R (ft)	Top Width T (ft)	Velocity V (ft/s)	Length L (ft)
0.3300	1.0956	4.7212	0.2321	4.6400	0.07	37.103

Water Quality Design Velocity:

Q =	0.075	
A =	1.10	sf
V=Q/A		
V =	**0.07**	**ft/s**

Bio-Swale Length

L=(V)(t)(60)

t =	9.00	min
V =	0.07	ft/s
L=	**37.10**	**Use Minimum Swale Length**

BIO-SWALE DESIGN

Road B1

Water Quality Flow:

A =	48,930	sf
I =	0.19	inches
WQF =	0.19	cfs

Bio-Swale Design Data:

Q =	0.192	Design flow rate (c.f.s.)
n =	0.24	manning's n
S =	1.0%	longitudinal slope of swale (ft/ft)
b =	2.00	width of bottom (ft.)
Z =	4	side slope (ft/ft)
t =	9	Min Residence Time

Depth y (ft)	Area A (sf)	Wetted Perimeter P (ft)	Hydraulic Radius R (ft)	Top Width T (ft)	Velocity V (ft/s)	Length L (ft)
0.3300	1.0956	4.7212	0.2321	4.6400	0.18	94.673

Water Quality Design Velocity:

Q =	0.192	
A =	1.10	sf
V=Q/A		
V =	**0.18**	**ft/s**

Bio-Swale Length

L=(V)(t)(60)

t =	9.00	min
V =	0.18	ft/s
L=	**94.67**	**Use Minimum Swale Length**

BIO-SWALE DESIGN

Road B2

Water Quality Flow:

A =	19,160	sf
I =	0.19	inches
WQF =	0.08	cfs

Bio-Swale Design Data:

Q =	0.075	Design flow rate (c.f.s.)
n =	0.24	manning's n
S =	1.0%	longitudinal slope of swale (ft/ft)
b =	2.00	width of bottom (ft.)
Z =	4	side slope (ft/ft)
t =	9	Min Residence Time

Depth y (ft)	Area A (sf)	Wetted Perimeter P (ft)	Hydraulic Radius R (ft)	Top Width T (ft)	Velocity V (ft/s)	Length L (ft)
0.3300	1.0956	4.7212	0.2321	4.6400	0.07	37.072

Water Quality Design Velocity:

Q =	0.075	
A =	1.10	sf
V=Q/A		
V =	**0.07**	**ft/s**

Bio-Swale Length

L=(V)(t)(60)

t =	9.00	min
V =	0.07	ft/s
L=	**37.07**	**Use Minimum Swale Length**

BIO-SWALE DESIGN

Road F1

Water Quality Flow:

A =	14,880	sf
I =	0.19	inches
WQF =	0.06	cfs

Bio-Swale Design Data:

Q =	0.058	Design flow rate (c.f.s.)
n =	0.24	manning's n
S =	1.0%	longitudinal slope of swale (ft/ft)
b =	2.00	width of bottom (ft.)
Z =	4	side slope (ft/ft)
t =	9	Min Residence Time

Depth y (ft)	Area A (sf)	Wetted Perimeter P (ft)	Hydraulic Radius R (ft)	Top Width T (ft)	Velocity V (ft/s)	Length L (ft)
0.3300	1.0956	4.7212	0.2321	4.6400	0.05	28.791

Water Quality Design Velocity:

Q =	0.058	
A =	1.10	sf
V=Q/A		
V =	**0.05**	**ft/s**

Bio-Swale Length

L=(V)(t)(60)		
t =	9.00	min
V =	0.05	ft/s
L=	**28.79**	**Use Minimum Swale Length**

BIO-SWALE DESIGN

Road F2

Water Quality Flow:

A =	23,639	sf
I =	0.19	inches
WQF =	0.09	cfs

Bio-Swale Design Data:

Q =	0.093	Design flow rate (c.f.s.)
n =	0.24	manning's n
S =	1.0%	longitudinal slope of swale (ft/ft)
b =	2.00	width of bottom (ft.)
Z =	4	side slope (ft/ft)
t =	9	Min Residence Time

Depth y (ft)	Area A (sf)	Wetted Perimeter P (ft)	Hydraulic Radius R (ft)	Top Width T (ft)	Velocity V (ft/s)	Length L (ft)
0.3300	1.0956	4.7212	0.2321	4.6400	0.08	45.738

Water Quality Design Velocity:

Q =	0.093	
A =	1.10	sf
V=Q/A		
V =	**0.08**	**ft/s**

Bio-Swale Length

L=(V)(t)(60)

t =	9.00	min
V =	0.08	ft/s
L=	**45.74**	**Use Minimum Swale Length**

BIO-SWALE DESIGN

Carpenter Lane

Water Quality Flow:

A =	13,539	sf
I =	0.19	inches
WQF =	0.05	cfs

Bio-Swale Design Data:

Q =	0.05	Design flow rate (c.f.s.)
n =	0.24	manning's n
S =	1.0%	longitudinal slope of swale (ft/ft)
b =	2.00	width of bottom (ft.)
Z =	4	side slope (ft/ft)
t =	9	Min Residence Time

Depth y (ft)	Area A (sf)	Wetted Perimeter P (ft)	Hydraulic Radius R (ft)	Top Width T (ft)	Velocity V (ft/s)	Length L (ft)
0.3300	1.0956	4.7212	0.2321	4.6400	0.05	26.196

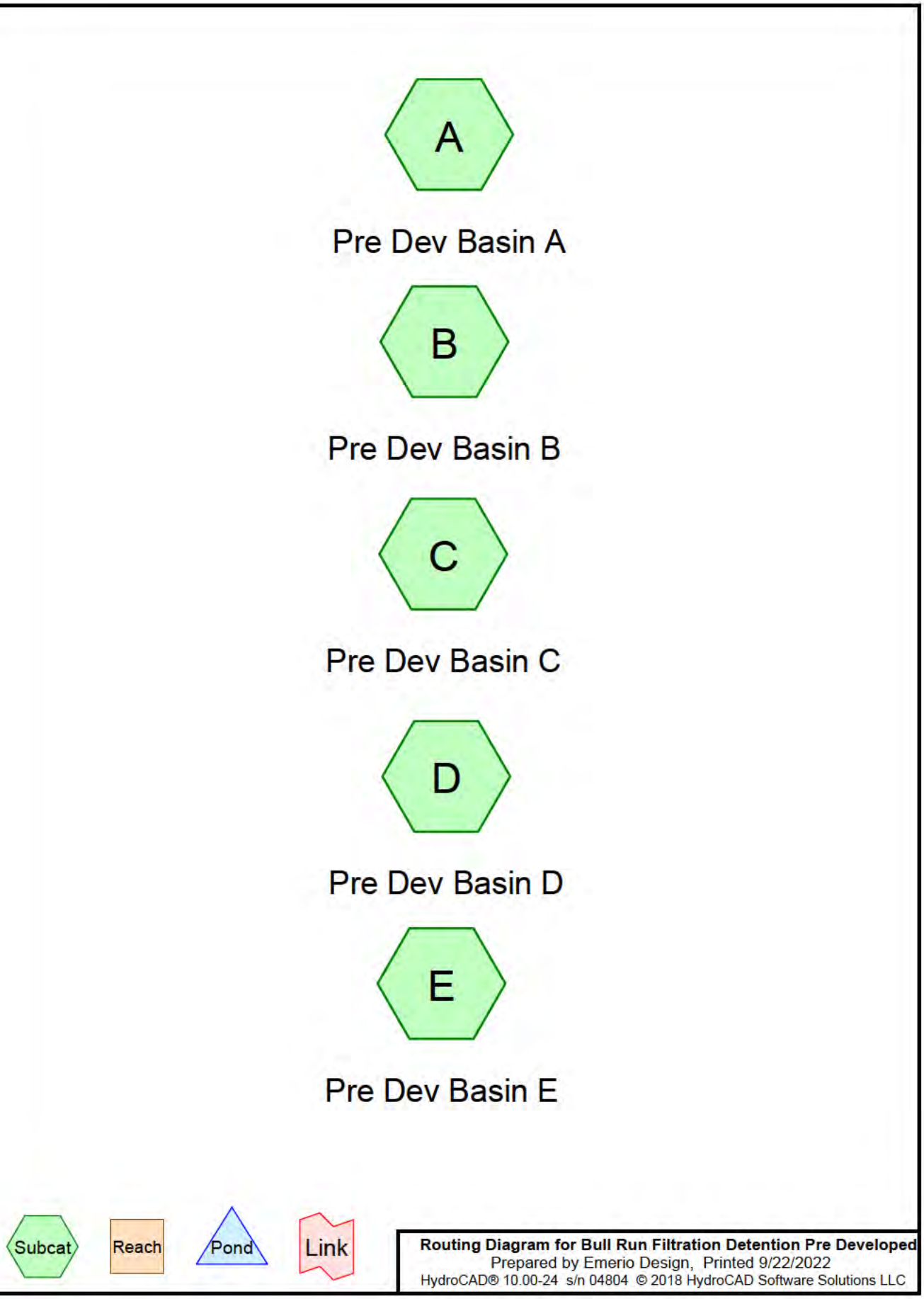
Water Quality Design Velocity:

Q =	0.05	
A =	1.10	sf
V=Q/A		
V =	**0.05**	**ft/s**

Bio-Swale Length

L=(V)(t)(60)		
t =	9.00	min
V =	0.05	ft/s
L=	**26.20**	**Use Minimum Swale Length**

Attachment E: Hydrologic Analysis of Pre-Developed Conditions (For Flow Control)


A
Pre Dev Basin A
B
Pre Dev Basin B
C
Pre Dev Basin C
D
Pre Dev Basin D
E
Pre Dev Basin E
Subcat
Reach
Pond
Link
Routing Diagram for Bull Run Filtration Detention Pre Developed
Prepared by Emerio Design, Printed 9/22/2022
HydroCAD® 10.00-24 s/n 04804 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
2,310,915	82	Row crops, SR + CR, Good, HSG C (A, B, C, D, E)
2,310,915	**82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
2,310,915	HSG C	A, B, C, D, E
0	HSG D	
0	Other	
2,310,915		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
0	0	2,310,915	0	0	2,310,915	Row crops, SR + CR, Good
0	**0**	**2,310,915**	**0**	**0**	**2,310,915**	**TOTAL AREA**

Time span=0.00-130.00 hrs, dt=0.01 hrs, 13001 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentA: Pre Dev Basin A Runoff Area=358,532 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=730' Tc=42.6 min CN=82/0 Runoff=1.28 cfs 36,554 cf

SubcatchmentB: Pre Dev Basin B Runoff Area=293,369 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=900' Slope=0.0200 '/' Tc=22.1 min CN=82/0 Runoff=1.38 cfs 29,910 cf

SubcatchmentC: Pre Dev Basin C Runoff Area=686,331 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=760' Slope=0.0400 '/' Tc=14.9 min CN=82/0 Runoff=3.67 cfs 69,975 cf

SubcatchmentD: Pre Dev Basin D Runoff Area=372,494 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=950' Tc=20.3 min CN=82/0 Runoff=1.81 cfs 37,978 cf

SubcatchmentE: Pre Dev Basin E Runoff Area=600,189 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=750' Slope=0.0466 '/' Tc=23.8 min CN=82/0 Runoff=2.74 cfs 61,192 cf

Total Runoff Area = 2,310,915 sf Runoff Volume = 235,609 cf Average Runoff Depth = 1.22"
100.00% Pervious = 2,310,915 sf 0.00% Impervious = 0 sf

Summary for Subcatchment A: Pre Dev Basin A

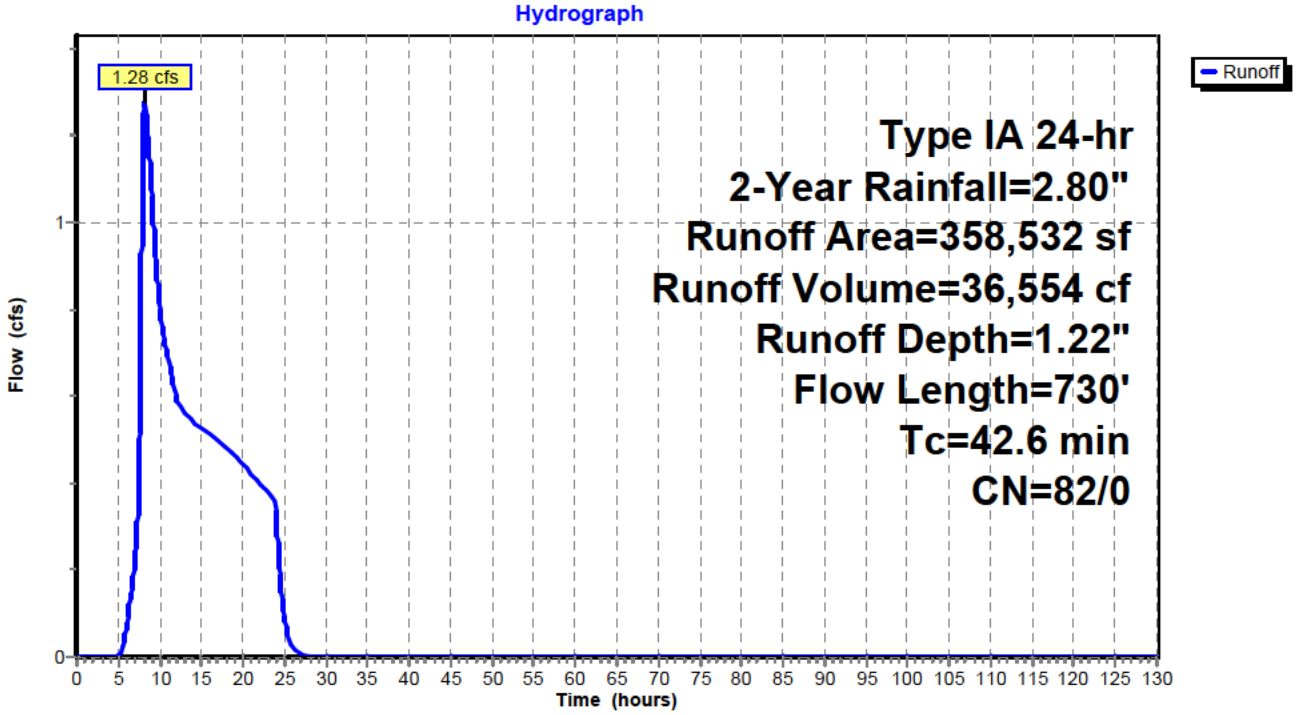
Runoff = 1.28 cfs @ 8.19 hrs, Volume= 36,554 cf, Depth= 1.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
358,532	82	Row crops, SR + CR, Good, HSG C
358,532	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.8	300	0.0100	0.14		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
5.8	430	0.0190	1.24		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
42.6	730	Total			

Subcatchment A: Pre Dev Basin A



Hydrograph for Subcatchment A: Pre Dev Basin A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.44	0.00	0.00	**0.00**
10.00	1.62	0.41	0.00	**0.81**
15.00	2.15	0.75	0.00	0.53
20.00	**2.56**	**1.04**	0.00	0.44
25.00	**2.80**	**1.22**	0.00	0.09
30.00	2.80	1.22	0.00	0.00
35.00	2.80	1.22	0.00	0.00
40.00	2.80	1.22	0.00	0.00
45.00	2.80	1.22	0.00	0.00
50.00	2.80	1.22	0.00	0.00
55.00	2.80	1.22	0.00	0.00
60.00	2.80	1.22	0.00	0.00
65.00	2.80	1.22	0.00	0.00
70.00	2.80	1.22	0.00	0.00
75.00	2.80	1.22	0.00	0.00
80.00	2.80	1.22	0.00	0.00
85.00	2.80	1.22	0.00	0.00
90.00	2.80	1.22	0.00	0.00
95.00	2.80	1.22	0.00	0.00
100.00	2.80	1.22	0.00	0.00
105.00	2.80	1.22	0.00	0.00
110.00	2.80	1.22	0.00	0.00
115.00	2.80	1.22	0.00	0.00
120.00	2.80	1.22	0.00	0.00
125.00	2.80	1.22	0.00	0.00
130.00	2.80	1.22	0.00	0.00

Summary for Subcatchment B: Pre Dev Basin B

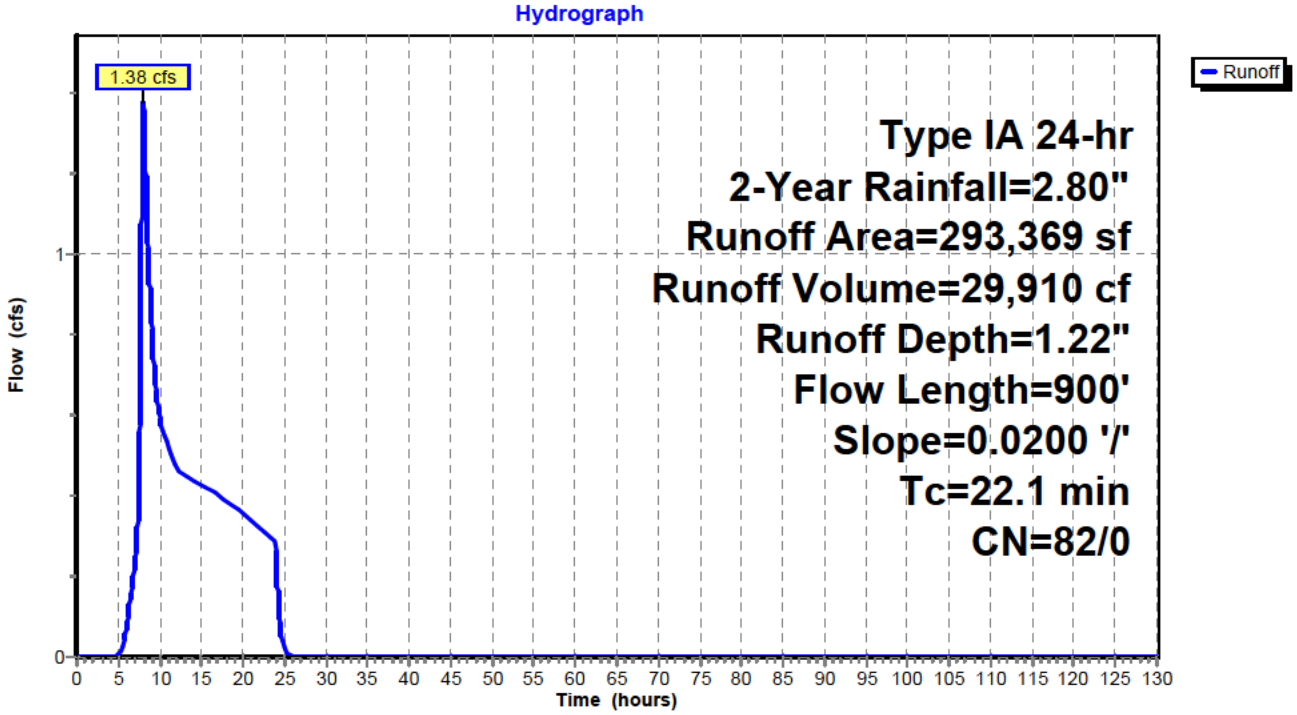
Runoff = 1.38 cfs @ 8.01 hrs, Volume= 29,910 cf, Depth= 1.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
293,369	82	Row crops, SR + CR, Good, HSG C
293,369	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0200	0.14		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
10.5	800	0.0200	1.27		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
22.1	900	Total			

Subcatchment B: Pre Dev Basin B



Hydrograph for Subcatchment B: Pre Dev Basin B

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.44	0.00	0.00	**0.00**
10.00	1.62	0.41	0.00	**0.60**
15.00	2.15	0.75	0.00	0.43
20.00	**2.56**	**1.04**	0.00	0.36
25.00	**2.80**	**1.22**	0.00	0.02
30.00	2.80	1.22	0.00	0.00
35.00	2.80	1.22	0.00	0.00
40.00	2.80	1.22	0.00	0.00
45.00	2.80	1.22	0.00	0.00
50.00	2.80	1.22	0.00	0.00
55.00	2.80	1.22	0.00	0.00
60.00	2.80	1.22	0.00	0.00
65.00	2.80	1.22	0.00	0.00
70.00	2.80	1.22	0.00	0.00
75.00	2.80	1.22	0.00	0.00
80.00	2.80	1.22	0.00	0.00
85.00	2.80	1.22	0.00	0.00
90.00	2.80	1.22	0.00	0.00
95.00	2.80	1.22	0.00	0.00
100.00	2.80	1.22	0.00	0.00
105.00	2.80	1.22	0.00	0.00
110.00	2.80	1.22	0.00	0.00
115.00	2.80	1.22	0.00	0.00
120.00	2.80	1.22	0.00	0.00
125.00	2.80	1.22	0.00	0.00
130.00	2.80	1.22	0.00	0.00

Summary for Subcatchment C: Pre Dev Basin C

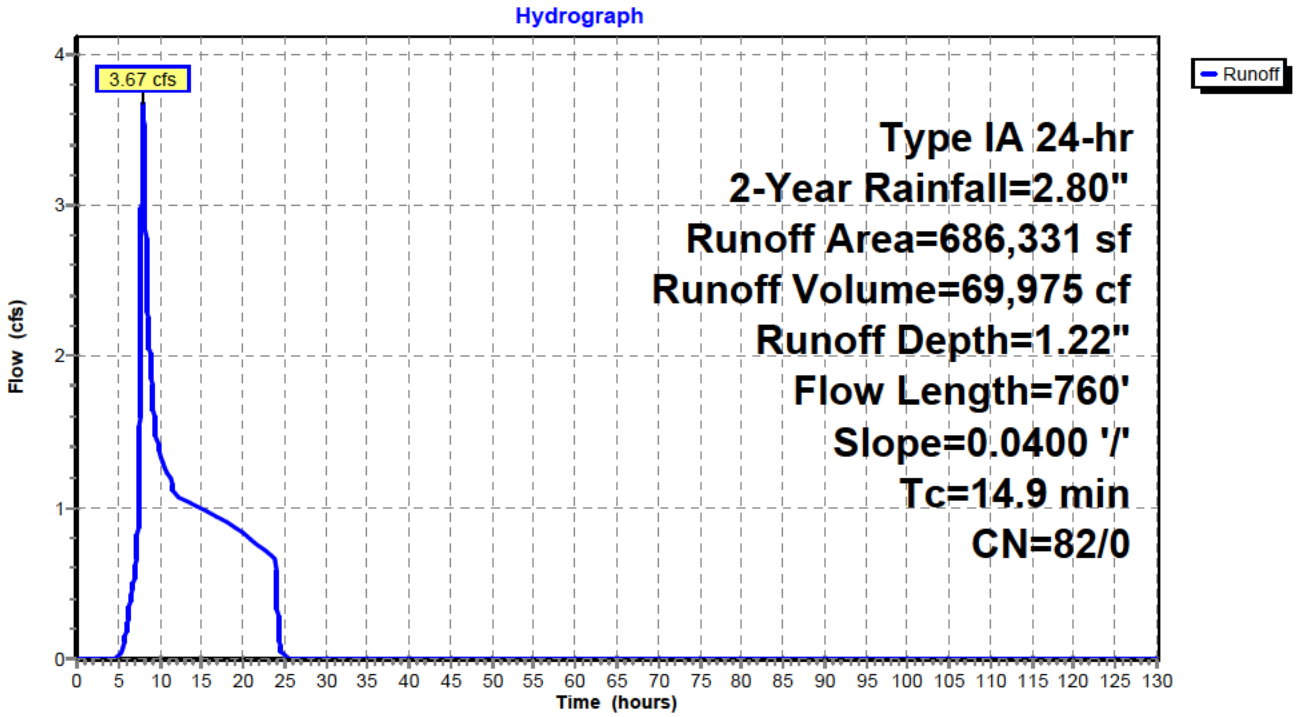
Runoff = 3.67 cfs @ 8.00 hrs, Volume= 69,975 cf, Depth= 1.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
104,630	82	Row crops, SR + CR, Good, HSG C
581,701	82	Row crops, SR + CR, Good, HSG C
686,331	82	Weighted Average
686,331	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0400	0.19		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
6.1	660	0.0400	1.80		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
14.9	760	Total			

Subcatchment C: Pre Dev Basin C



Hydrograph for Subcatchment C: Pre Dev Basin C

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.44	0.00	0.00	**0.00**
10.00	1.62	0.41	0.00	**1.36**
15.00	2.15	0.75	0.00	1.00
20.00	**2.56**	**1.04**	0.00	0.83
25.00	**2.80**	**1.22**	0.00	0.01
30.00	2.80	1.22	0.00	0.00
35.00	2.80	1.22	0.00	0.00
40.00	2.80	1.22	0.00	0.00
45.00	2.80	1.22	0.00	0.00
50.00	2.80	1.22	0.00	0.00
55.00	2.80	1.22	0.00	0.00
60.00	2.80	1.22	0.00	0.00
65.00	2.80	1.22	0.00	0.00
70.00	2.80	1.22	0.00	0.00
75.00	2.80	1.22	0.00	0.00
80.00	2.80	1.22	0.00	0.00
85.00	2.80	1.22	0.00	0.00
90.00	2.80	1.22	0.00	0.00
95.00	2.80	1.22	0.00	0.00
100.00	2.80	1.22	0.00	0.00
105.00	2.80	1.22	0.00	0.00
110.00	2.80	1.22	0.00	0.00
115.00	2.80	1.22	0.00	0.00
120.00	2.80	1.22	0.00	0.00
125.00	2.80	1.22	0.00	0.00
130.00	2.80	1.22	0.00	0.00

Summary for Subcatchment D: Pre Dev Basin D

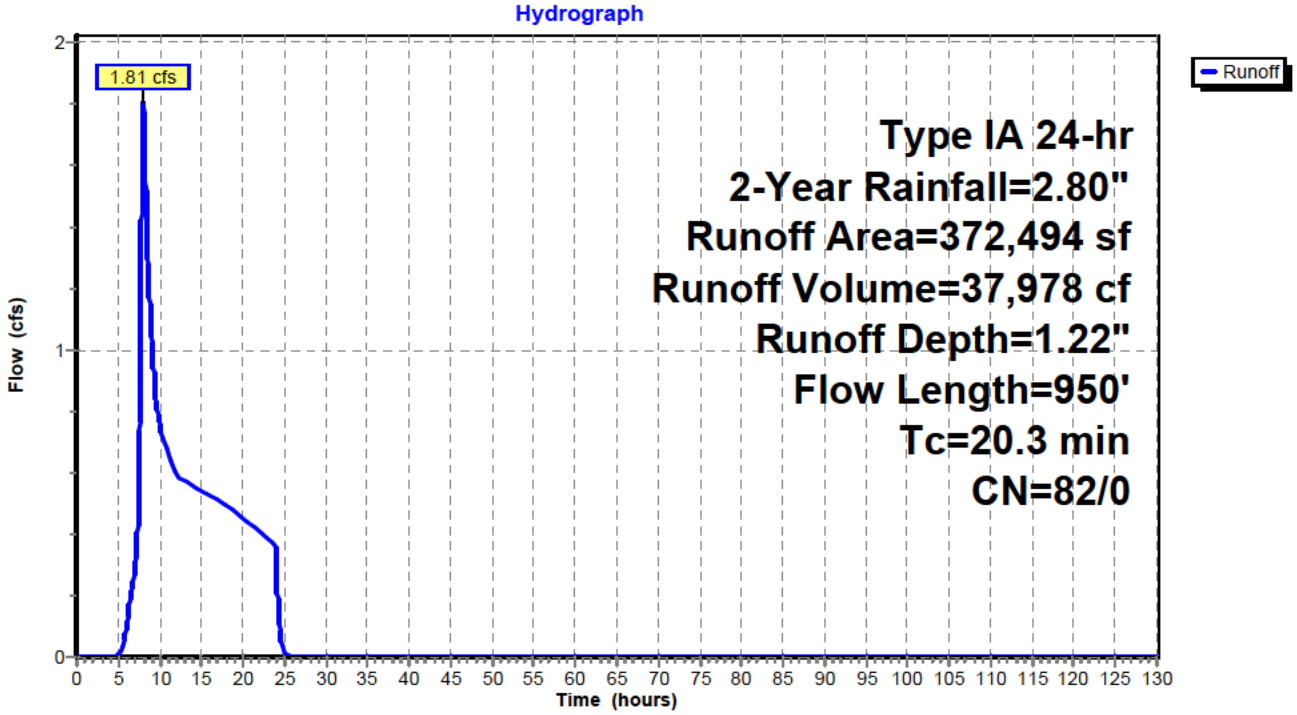
Runoff = 1.81 cfs @ 8.01 hrs, Volume= 37,978 cf, Depth= 1.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
372,494	82	Row crops, SR + CR, Good, HSG C
372,494	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0200	0.14		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
8.7	850	0.0330	1.63		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.3	950	Total			

Subcatchment D: Pre Dev Basin D



Hydrograph for Subcatchment D: Pre Dev Basin D

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.44	0.00	0.00	**0.00**
10.00	1.62	0.41	0.00	**0.76**
15.00	2.15	0.75	0.00	0.54
20.00	**2.56**	**1.04**	0.00	0.45
25.00	**2.80**	**1.22**	0.00	0.02
30.00	2.80	1.22	0.00	0.00
35.00	2.80	1.22	0.00	0.00
40.00	2.80	1.22	0.00	0.00
45.00	2.80	1.22	0.00	0.00
50.00	2.80	1.22	0.00	0.00
55.00	2.80	1.22	0.00	0.00
60.00	2.80	1.22	0.00	0.00
65.00	2.80	1.22	0.00	0.00
70.00	2.80	1.22	0.00	0.00
75.00	2.80	1.22	0.00	0.00
80.00	2.80	1.22	0.00	0.00
85.00	2.80	1.22	0.00	0.00
90.00	2.80	1.22	0.00	0.00
95.00	2.80	1.22	0.00	0.00
100.00	2.80	1.22	0.00	0.00
105.00	2.80	1.22	0.00	0.00
110.00	2.80	1.22	0.00	0.00
115.00	2.80	1.22	0.00	0.00
120.00	2.80	1.22	0.00	0.00
125.00	2.80	1.22	0.00	0.00
130.00	2.80	1.22	0.00	0.00

Summary for Subcatchment E: Pre Dev Basin E

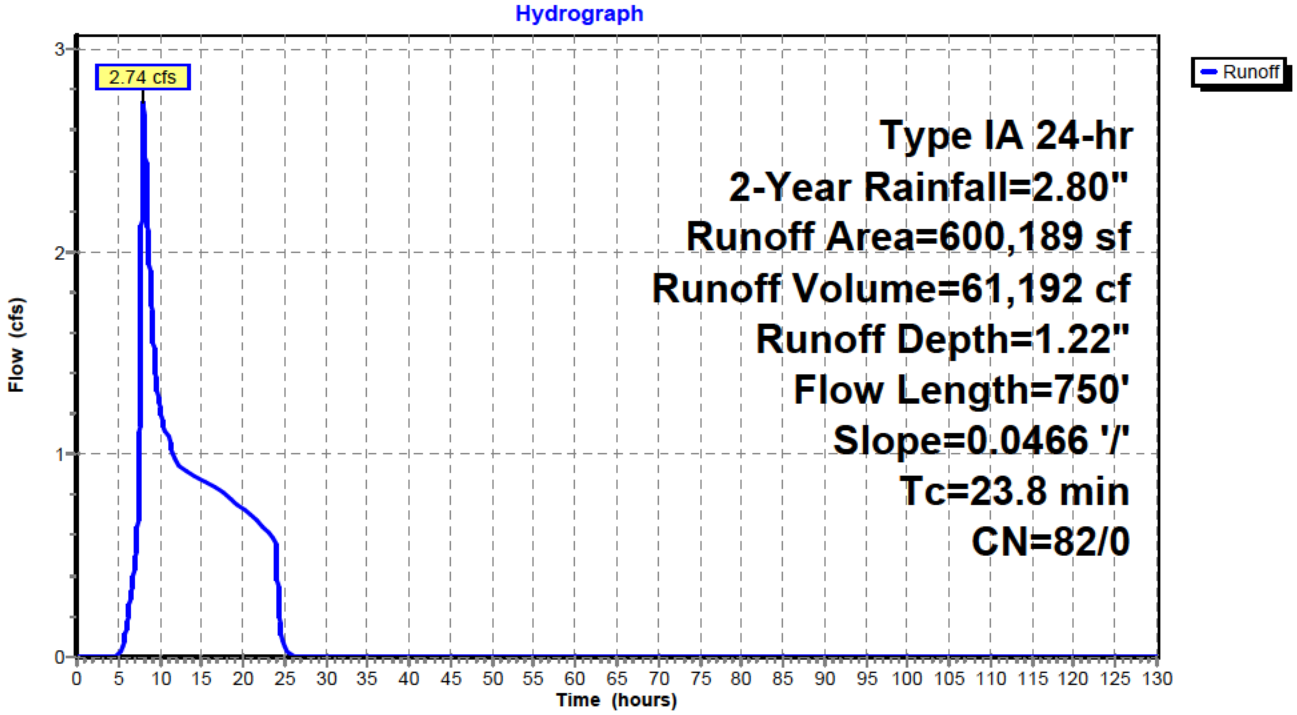
Runoff = 2.74 cfs @ 8.01 hrs, Volume= 61,192 cf, Depth= 1.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
600,189	82	Row crops, SR + CR, Good, HSG C
600,189	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	300	0.0466	0.25		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
3.9	450	0.0466	1.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.8	750	Total			

Subcatchment E: Pre Dev Basin E



Hydrograph for Subcatchment E: Pre Dev Basin E

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.44	0.00	0.00	**0.00**
10.00	1.62	0.41	0.00	**1.24**
15.00	2.15	0.75	0.00	0.87
20.00	**2.56**	**1.04**	0.00	0.73
25.00	**2.80**	**1.22**	0.00	0.05
30.00	2.80	1.22	0.00	0.00
35.00	2.80	1.22	0.00	0.00
40.00	2.80	1.22	0.00	0.00
45.00	2.80	1.22	0.00	0.00
50.00	2.80	1.22	0.00	0.00
55.00	2.80	1.22	0.00	0.00
60.00	2.80	1.22	0.00	0.00
65.00	2.80	1.22	0.00	0.00
70.00	2.80	1.22	0.00	0.00
75.00	2.80	1.22	0.00	0.00
80.00	2.80	1.22	0.00	0.00
85.00	2.80	1.22	0.00	0.00
90.00	2.80	1.22	0.00	0.00
95.00	2.80	1.22	0.00	0.00
100.00	2.80	1.22	0.00	0.00
105.00	2.80	1.22	0.00	0.00
110.00	2.80	1.22	0.00	0.00
115.00	2.80	1.22	0.00	0.00
120.00	2.80	1.22	0.00	0.00
125.00	2.80	1.22	0.00	0.00
130.00	2.80	1.22	0.00	0.00

Time span=0.00-130.00 hrs, dt=0.01 hrs, 13001 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentA: Pre Dev Basin A Runoff Area=358,532 sf 0.00% Impervious Runoff Depth=1.70"
Flow Length=730' Tc=42.6 min CN=82/0 Runoff=1.92 cfs 50,804 cf

SubcatchmentB: Pre Dev Basin B Runoff Area=293,369 sf 0.00% Impervious Runoff Depth=1.70"
Flow Length=900' Slope=0.0200 '/' Tc=22.1 min CN=82/0 Runoff=2.06 cfs 41,570 cf

SubcatchmentC: Pre Dev Basin C Runoff Area=686,331 sf 0.00% Impervious Runoff Depth=1.70"
Flow Length=760' Slope=0.0400 '/' Tc=14.9 min CN=82/0 Runoff=5.45 cfs 97,253 cf

SubcatchmentD: Pre Dev Basin D Runoff Area=372,494 sf 0.00% Impervious Runoff Depth=1.70"
Flow Length=950' Tc=20.3 min CN=82/0 Runoff=2.70 cfs 52,782 cf

SubcatchmentE: Pre Dev Basin E Runoff Area=600,189 sf 0.00% Impervious Runoff Depth=1.70"
Flow Length=750' Slope=0.0466 '/' Tc=23.8 min CN=82/0 Runoff=4.10 cfs 85,046 cf

Total Runoff Area = 2,310,915 sf Runoff Volume = 327,455 cf Average Runoff Depth = 1.70"
100.00% Pervious = 2,310,915 sf 0.00% Impervious = 0 sf

Summary for Subcatchment A: Pre Dev Basin A

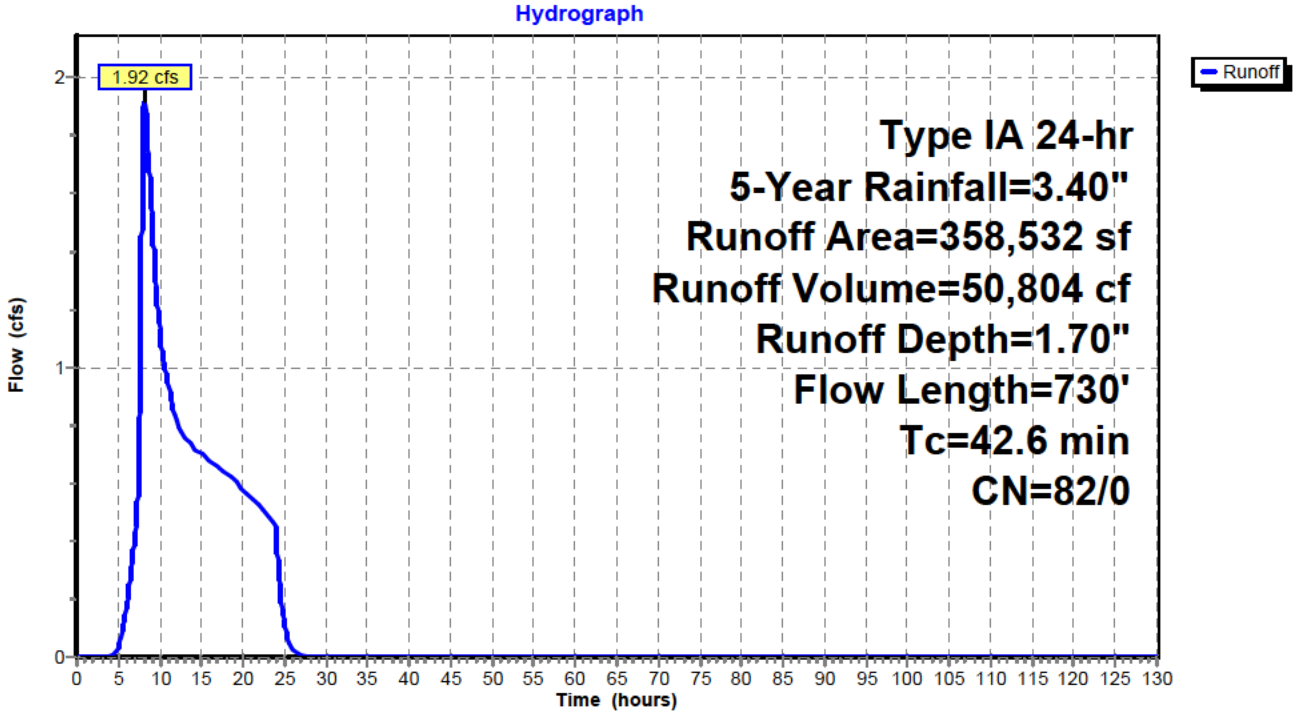
Runoff = 1.92 cfs @ 8.15 hrs, Volume= 50,804 cf, Depth= 1.70"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
358,532	82	Row crops, SR + CR, Good, HSG C
358,532	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.8	300	0.0100	0.14		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
5.8	430	0.0190	1.24		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
42.6	730	Total			

Subcatchment A: Pre Dev Basin A



Hydrograph for Subcatchment A: Pre Dev Basin A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.53	0.00	0.00	**0.03**
10.00	1.96	0.62	0.00	**1.13**
15.00	2.62	1.08	0.00	0.70
20.00	**3.10**	**1.46**	0.00	0.58
25.00	**3.40**	**1.70**	0.00	0.11
30.00	3.40	1.70	0.00	0.00
35.00	3.40	1.70	0.00	0.00
40.00	3.40	1.70	0.00	0.00
45.00	3.40	1.70	0.00	0.00
50.00	3.40	1.70	0.00	0.00
55.00	3.40	1.70	0.00	0.00
60.00	3.40	1.70	0.00	0.00
65.00	3.40	1.70	0.00	0.00
70.00	3.40	1.70	0.00	0.00
75.00	3.40	1.70	0.00	0.00
80.00	3.40	1.70	0.00	0.00
85.00	3.40	1.70	0.00	0.00
90.00	3.40	1.70	0.00	0.00
95.00	3.40	1.70	0.00	0.00
100.00	3.40	1.70	0.00	0.00
105.00	3.40	1.70	0.00	0.00
110.00	3.40	1.70	0.00	0.00
115.00	3.40	1.70	0.00	0.00
120.00	3.40	1.70	0.00	0.00
125.00	3.40	1.70	0.00	0.00
130.00	3.40	1.70	0.00	0.00

Summary for Subcatchment B: Pre Dev Basin B

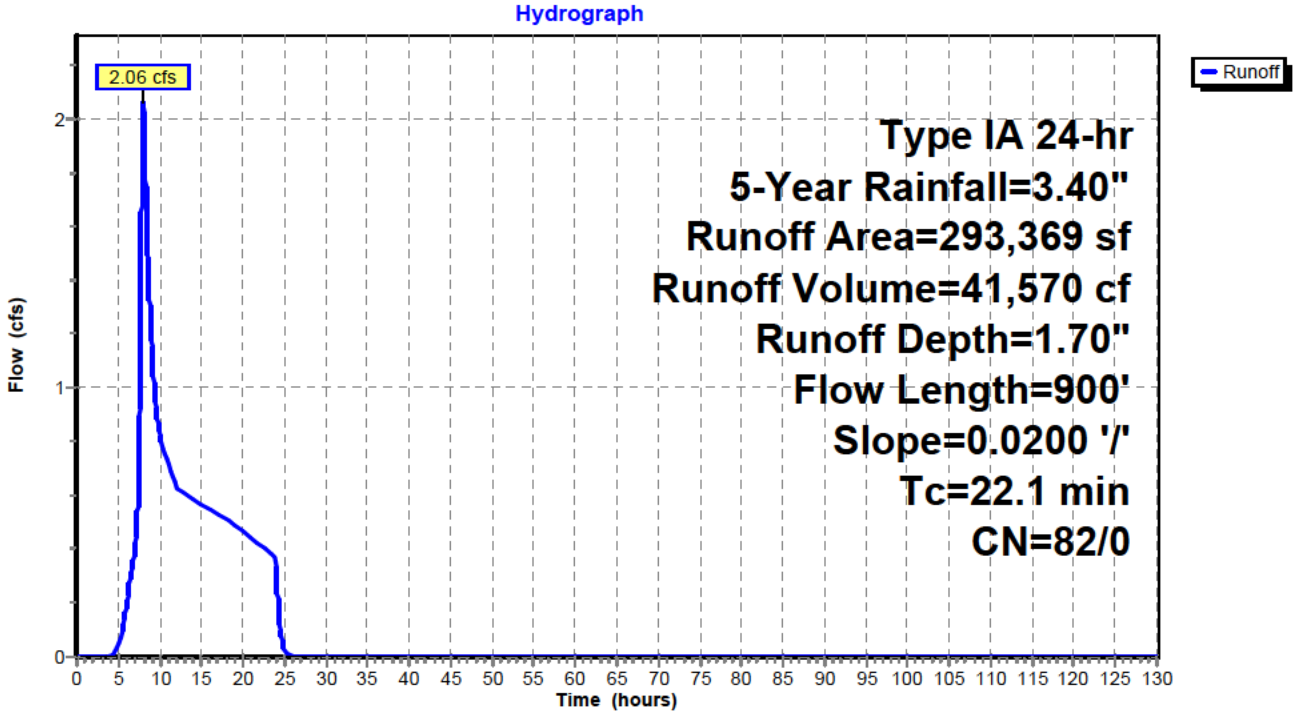
Runoff = 2.06 cfs @ 8.01 hrs, Volume= 41,570 cf, Depth= 1.70"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
293,369	82	Row crops, SR + CR, Good, HSG C
293,369	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0200	0.14		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
10.5	800	0.0200	1.27		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
22.1	900	Total			

Subcatchment B: Pre Dev Basin B



Hydrograph for Subcatchment B: Pre Dev Basin B

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.53	0.00	0.00	**0.04**
10.00	1.96	0.62	0.00	**0.83**
15.00	2.62	1.08	0.00	0.57
20.00	**3.10**	**1.46**	0.00	0.47
25.00	**3.40**	**1.70**	0.00	0.02
30.00	3.40	1.70	0.00	0.00
35.00	3.40	1.70	0.00	0.00
40.00	3.40	1.70	0.00	0.00
45.00	3.40	1.70	0.00	0.00
50.00	3.40	1.70	0.00	0.00
55.00	3.40	1.70	0.00	0.00
60.00	3.40	1.70	0.00	0.00
65.00	3.40	1.70	0.00	0.00
70.00	3.40	1.70	0.00	0.00
75.00	3.40	1.70	0.00	0.00
80.00	3.40	1.70	0.00	0.00
85.00	3.40	1.70	0.00	0.00
90.00	3.40	1.70	0.00	0.00
95.00	3.40	1.70	0.00	0.00
100.00	3.40	1.70	0.00	0.00
105.00	3.40	1.70	0.00	0.00
110.00	3.40	1.70	0.00	0.00
115.00	3.40	1.70	0.00	0.00
120.00	3.40	1.70	0.00	0.00
125.00	3.40	1.70	0.00	0.00
130.00	3.40	1.70	0.00	0.00

Summary for Subcatchment C: Pre Dev Basin C

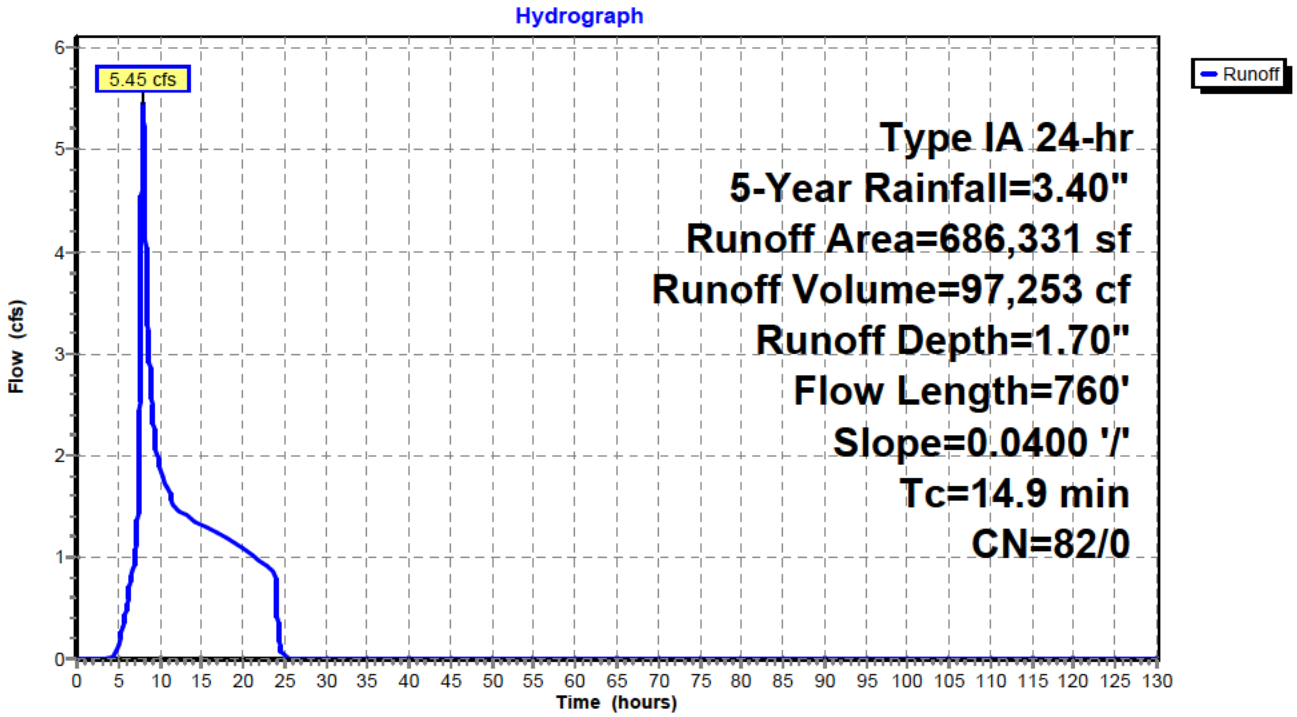
Runoff = 5.45 cfs @ 8.00 hrs, Volume= 97,253 cf, Depth= 1.70"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
104,630	82	Row crops, SR + CR, Good, HSG C
581,701	82	Row crops, SR + CR, Good, HSG C
686,331	82	Weighted Average
686,331	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0400	0.19		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
6.1	660	0.0400	1.80		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
14.9	760	Total			

Subcatchment C: Pre Dev Basin C



Hydrograph for Subcatchment C: Pre Dev Basin C

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.53	0.00	0.00	**0.12**
10.00	1.96	0.62	0.00	**1.88**
15.00	2.62	1.08	0.00	1.32
20.00	**3.10**	**1.46**	0.00	1.08
25.00	**3.40**	**1.70**	0.00	0.02
30.00	3.40	1.70	0.00	0.00
35.00	3.40	1.70	0.00	0.00
40.00	3.40	1.70	0.00	0.00
45.00	3.40	1.70	0.00	0.00
50.00	3.40	1.70	0.00	0.00
55.00	3.40	1.70	0.00	0.00
60.00	3.40	1.70	0.00	0.00
65.00	3.40	1.70	0.00	0.00
70.00	3.40	1.70	0.00	0.00
75.00	3.40	1.70	0.00	0.00
80.00	3.40	1.70	0.00	0.00
85.00	3.40	1.70	0.00	0.00
90.00	3.40	1.70	0.00	0.00
95.00	3.40	1.70	0.00	0.00
100.00	3.40	1.70	0.00	0.00
105.00	3.40	1.70	0.00	0.00
110.00	3.40	1.70	0.00	0.00
115.00	3.40	1.70	0.00	0.00
120.00	3.40	1.70	0.00	0.00
125.00	3.40	1.70	0.00	0.00
130.00	3.40	1.70	0.00	0.00

Summary for Subcatchment D: Pre Dev Basin D

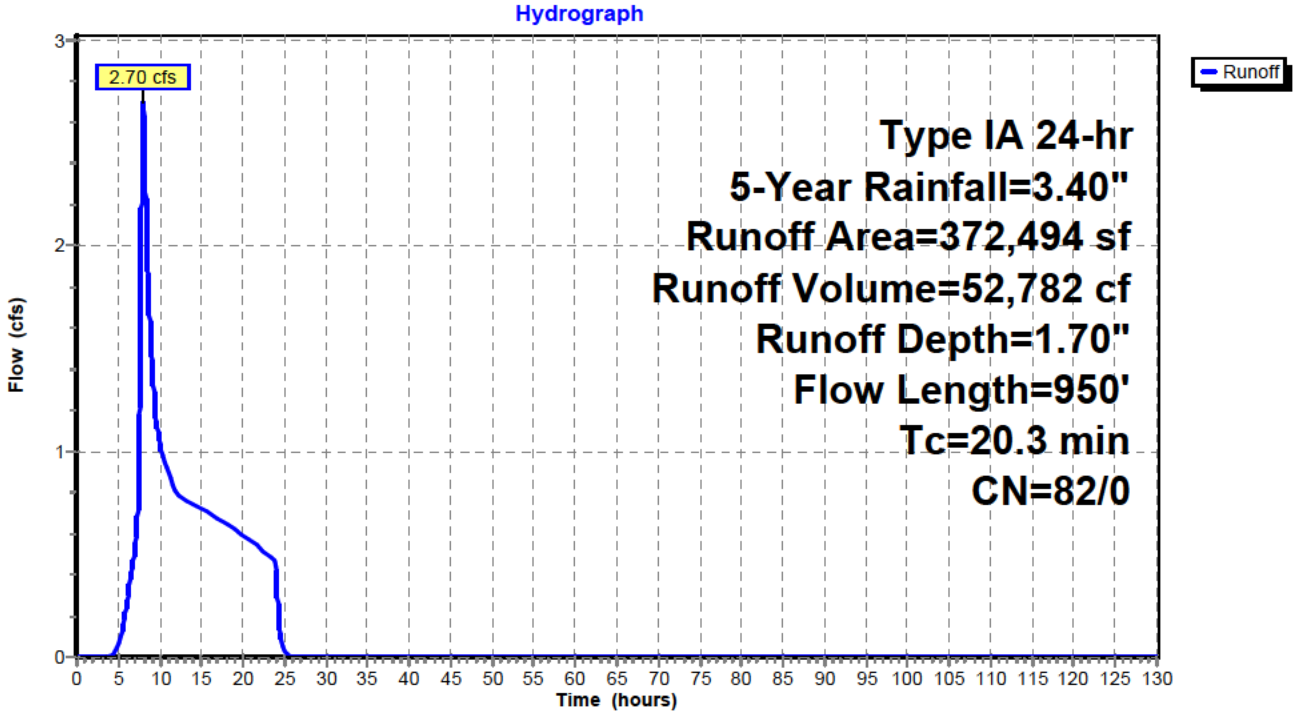
Runoff = 2.70 cfs @ 8.01 hrs, Volume= 52,782 cf, Depth= 1.70"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
372,494	82	Row crops, SR + CR, Good, HSG C
372,494	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0200	0.14		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
8.7	850	0.0330	1.63		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.3	950	Total			

Subcatchment D: Pre Dev Basin D



Hydrograph for Subcatchment D: Pre Dev Basin D

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.53	0.00	0.00	**0.05**
10.00	1.96	0.62	0.00	**1.04**
15.00	2.62	1.08	0.00	0.72
20.00	**3.10**	**1.46**	0.00	0.59
25.00	**3.40**	**1.70**	0.00	0.02
30.00	3.40	1.70	0.00	0.00
35.00	3.40	1.70	0.00	0.00
40.00	3.40	1.70	0.00	0.00
45.00	3.40	1.70	0.00	0.00
50.00	3.40	1.70	0.00	0.00
55.00	3.40	1.70	0.00	0.00
60.00	3.40	1.70	0.00	0.00
65.00	3.40	1.70	0.00	0.00
70.00	3.40	1.70	0.00	0.00
75.00	3.40	1.70	0.00	0.00
80.00	3.40	1.70	0.00	0.00
85.00	3.40	1.70	0.00	0.00
90.00	3.40	1.70	0.00	0.00
95.00	3.40	1.70	0.00	0.00
100.00	3.40	1.70	0.00	0.00
105.00	3.40	1.70	0.00	0.00
110.00	3.40	1.70	0.00	0.00
115.00	3.40	1.70	0.00	0.00
120.00	3.40	1.70	0.00	0.00
125.00	3.40	1.70	0.00	0.00
130.00	3.40	1.70	0.00	0.00

Summary for Subcatchment E: Pre Dev Basin E

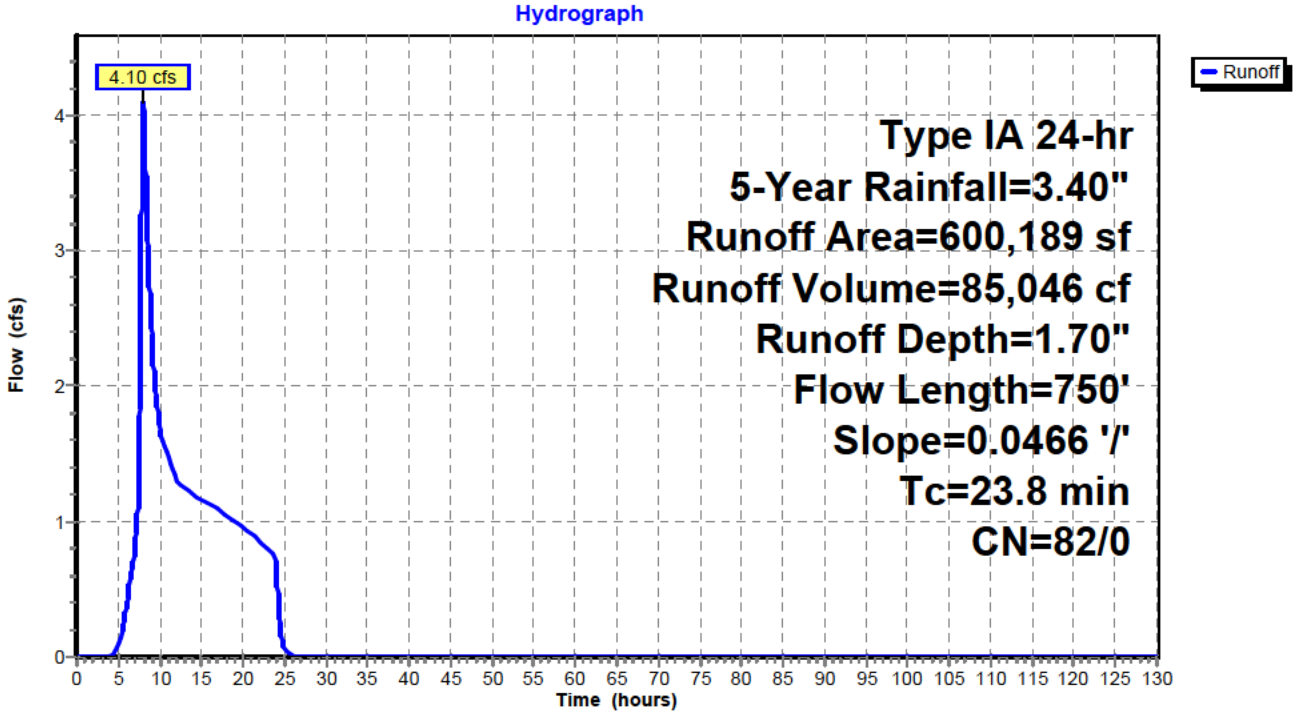
Runoff = 4.10 cfs @ 8.01 hrs, Volume= 85,046 cf, Depth= 1.70"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
600,189	82	Row crops, SR + CR, Good, HSG C
600,189	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	300	0.0466	0.25		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
3.9	450	0.0466	1.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.8	750	Total			

Subcatchment E: Pre Dev Basin E



Hydrograph for Subcatchment E: Pre Dev Basin E

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.53	0.00	0.00	**0.08**
10.00	1.96	0.62	0.00	**1.72**
15.00	2.62	1.08	0.00	1.16
20.00	**3.10**	**1.46**	0.00	0.95
25.00	**3.40**	**1.70**	0.00	0.06
30.00	3.40	1.70	0.00	0.00
35.00	3.40	1.70	0.00	0.00
40.00	3.40	1.70	0.00	0.00
45.00	3.40	1.70	0.00	0.00
50.00	3.40	1.70	0.00	0.00
55.00	3.40	1.70	0.00	0.00
60.00	3.40	1.70	0.00	0.00
65.00	3.40	1.70	0.00	0.00
70.00	3.40	1.70	0.00	0.00
75.00	3.40	1.70	0.00	0.00
80.00	3.40	1.70	0.00	0.00
85.00	3.40	1.70	0.00	0.00
90.00	3.40	1.70	0.00	0.00
95.00	3.40	1.70	0.00	0.00
100.00	3.40	1.70	0.00	0.00
105.00	3.40	1.70	0.00	0.00
110.00	3.40	1.70	0.00	0.00
115.00	3.40	1.70	0.00	0.00
120.00	3.40	1.70	0.00	0.00
125.00	3.40	1.70	0.00	0.00
130.00	3.40	1.70	0.00	0.00

Time span=0.00-130.00 hrs, dt=0.01 hrs, 13001 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentA: Pre Dev Basin A Runoff Area=358,532 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=730' Tc=42.6 min CN=82/0 Runoff=2.37 cfs 60,745 cf

SubcatchmentB: Pre Dev Basin B Runoff Area=293,369 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=900' Slope=0.0200 '/' Tc=22.1 min CN=82/0 Runoff=2.54 cfs 49,704 cf

SubcatchmentC: Pre Dev Basin C Runoff Area=686,331 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=760' Slope=0.0400 '/' Tc=14.9 min CN=82/0 Runoff=6.71 cfs 116,282 cf

SubcatchmentD: Pre Dev Basin D Runoff Area=372,494 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=950' Tc=20.3 min CN=82/0 Runoff=3.33 cfs 63,110 cf

SubcatchmentE: Pre Dev Basin E Runoff Area=600,189 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=750' Slope=0.0466 '/' Tc=23.8 min CN=82/0 Runoff=5.07 cfs 101,688 cf

Total Runoff Area = 2,310,915 sf Runoff Volume = 391,529 cf Average Runoff Depth = 2.03"
100.00% Pervious = 2,310,915 sf 0.00% Impervious = 0 sf

Summary for Subcatchment A: Pre Dev Basin A

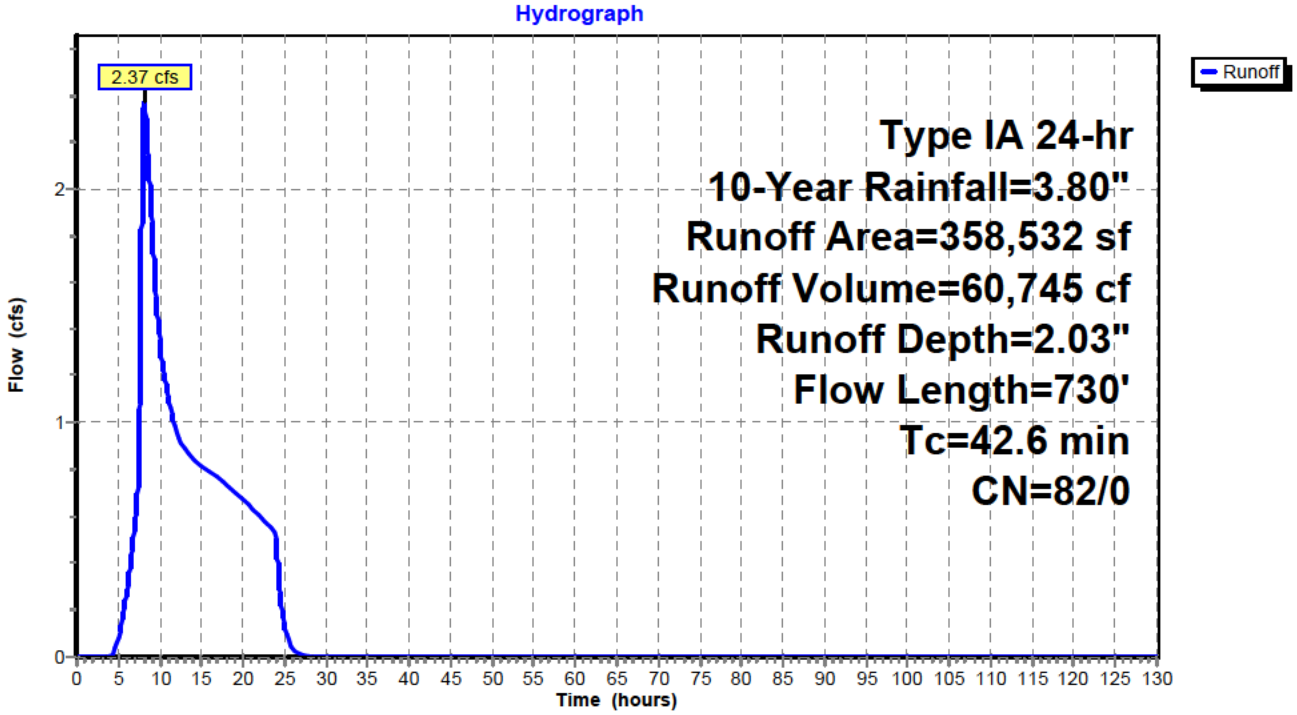
Runoff = 2.37 cfs @ 8.14 hrs, Volume= 60,745 cf, Depth= 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
358,532	82	Row crops, SR + CR, Good, HSG C
358,532	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.8	300	0.0100	0.14		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
5.8	430	0.0190	1.24		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
42.6	730	Total			

Subcatchment A: Pre Dev Basin A



Hydrograph for Subcatchment A: Pre Dev Basin A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.59	0.01	0.00	**0.08**
10.00	2.19	0.78	0.00	**1.36**
15.00	2.92	1.32	0.00	0.82
20.00	**3.47**	**1.76**	0.00	0.67
25.00	**3.80**	**2.03**	0.00	0.13
30.00	3.80	2.03	0.00	0.00
35.00	3.80	2.03	0.00	0.00
40.00	3.80	2.03	0.00	0.00
45.00	3.80	2.03	0.00	0.00
50.00	3.80	2.03	0.00	0.00
55.00	3.80	2.03	0.00	0.00
60.00	3.80	2.03	0.00	0.00
65.00	3.80	2.03	0.00	0.00
70.00	3.80	2.03	0.00	0.00
75.00	3.80	2.03	0.00	0.00
80.00	3.80	2.03	0.00	0.00
85.00	3.80	2.03	0.00	0.00
90.00	3.80	2.03	0.00	0.00
95.00	3.80	2.03	0.00	0.00
100.00	3.80	2.03	0.00	0.00
105.00	3.80	2.03	0.00	0.00
110.00	3.80	2.03	0.00	0.00
115.00	3.80	2.03	0.00	0.00
120.00	3.80	2.03	0.00	0.00
125.00	3.80	2.03	0.00	0.00
130.00	3.80	2.03	0.00	0.00

Summary for Subcatchment B: Pre Dev Basin B

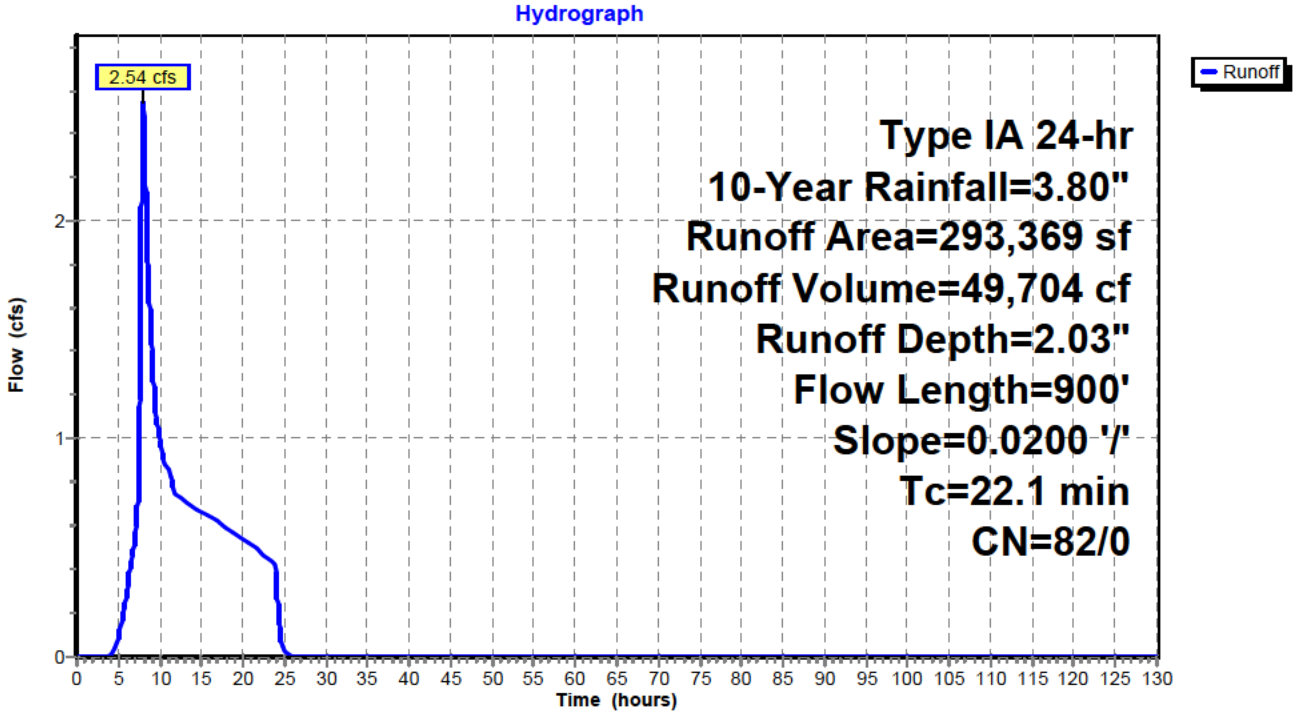
Runoff = 2.54 cfs @ 8.01 hrs, Volume= 49,704 cf, Depth= 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
293,369	82	Row crops, SR + CR, Good, HSG C
293,369	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0200	0.14		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
10.5	800	0.0200	1.27		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
22.1	900	Total			

Subcatchment B: Pre Dev Basin B



Hydrograph for Subcatchment B: Pre Dev Basin B

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.59	0.01	0.00	**0.09**
10.00	2.19	0.78	0.00	**0.99**
15.00	2.92	1.32	0.00	0.66
20.00	**3.47**	**1.76**	0.00	0.54
25.00	**3.80**	**2.03**	0.00	0.03
30.00	3.80	2.03	0.00	0.00
35.00	3.80	2.03	0.00	0.00
40.00	3.80	2.03	0.00	0.00
45.00	3.80	2.03	0.00	0.00
50.00	3.80	2.03	0.00	0.00
55.00	3.80	2.03	0.00	0.00
60.00	3.80	2.03	0.00	0.00
65.00	3.80	2.03	0.00	0.00
70.00	3.80	2.03	0.00	0.00
75.00	3.80	2.03	0.00	0.00
80.00	3.80	2.03	0.00	0.00
85.00	3.80	2.03	0.00	0.00
90.00	3.80	2.03	0.00	0.00
95.00	3.80	2.03	0.00	0.00
100.00	3.80	2.03	0.00	0.00
105.00	3.80	2.03	0.00	0.00
110.00	3.80	2.03	0.00	0.00
115.00	3.80	2.03	0.00	0.00
120.00	3.80	2.03	0.00	0.00
125.00	3.80	2.03	0.00	0.00
130.00	3.80	2.03	0.00	0.00

Summary for Subcatchment C: Pre Dev Basin C

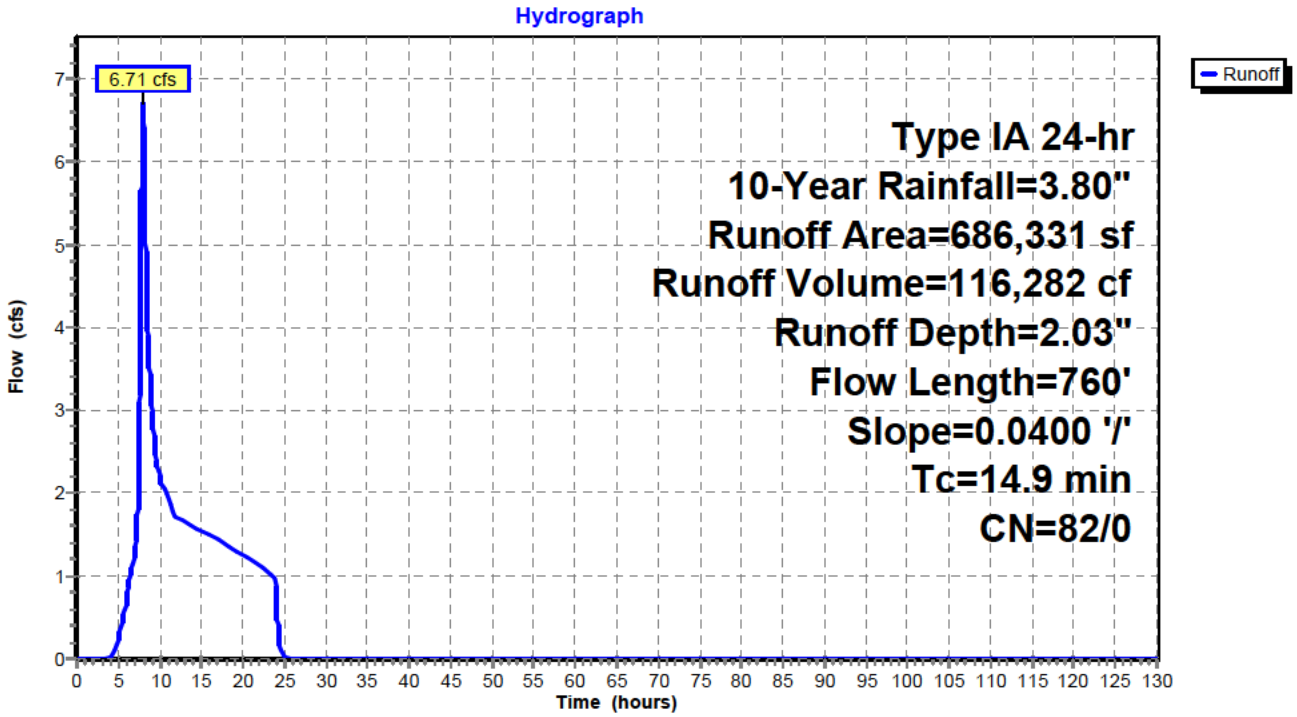
Runoff = 6.71 cfs @ 8.00 hrs, Volume= 116,282 cf, Depth= 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
104,630	82	Row crops, SR + CR, Good, HSG C
581,701	82	Row crops, SR + CR, Good, HSG C
686,331	82	Weighted Average
686,331	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0400	0.19		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
6.1	660	0.0400	1.80		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
14.9	760	Total			

Subcatchment C: Pre Dev Basin C



Hydrograph for Subcatchment C: Pre Dev Basin C

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.59	0.01	0.00	**0.25**
10.00	2.19	0.78	0.00	**2.23**
15.00	2.92	1.32	0.00	1.54
20.00	**3.47**	**1.76**	0.00	1.25
25.00	**3.80**	**2.03**	0.00	0.02
30.00	3.80	2.03	0.00	0.00
35.00	3.80	2.03	0.00	0.00
40.00	3.80	2.03	0.00	0.00
45.00	3.80	2.03	0.00	0.00
50.00	3.80	2.03	0.00	0.00
55.00	3.80	2.03	0.00	0.00
60.00	3.80	2.03	0.00	0.00
65.00	3.80	2.03	0.00	0.00
70.00	3.80	2.03	0.00	0.00
75.00	3.80	2.03	0.00	0.00
80.00	3.80	2.03	0.00	0.00
85.00	3.80	2.03	0.00	0.00
90.00	3.80	2.03	0.00	0.00
95.00	3.80	2.03	0.00	0.00
100.00	3.80	2.03	0.00	0.00
105.00	3.80	2.03	0.00	0.00
110.00	3.80	2.03	0.00	0.00
115.00	3.80	2.03	0.00	0.00
120.00	3.80	2.03	0.00	0.00
125.00	3.80	2.03	0.00	0.00
130.00	3.80	2.03	0.00	0.00

Summary for Subcatchment D: Pre Dev Basin D

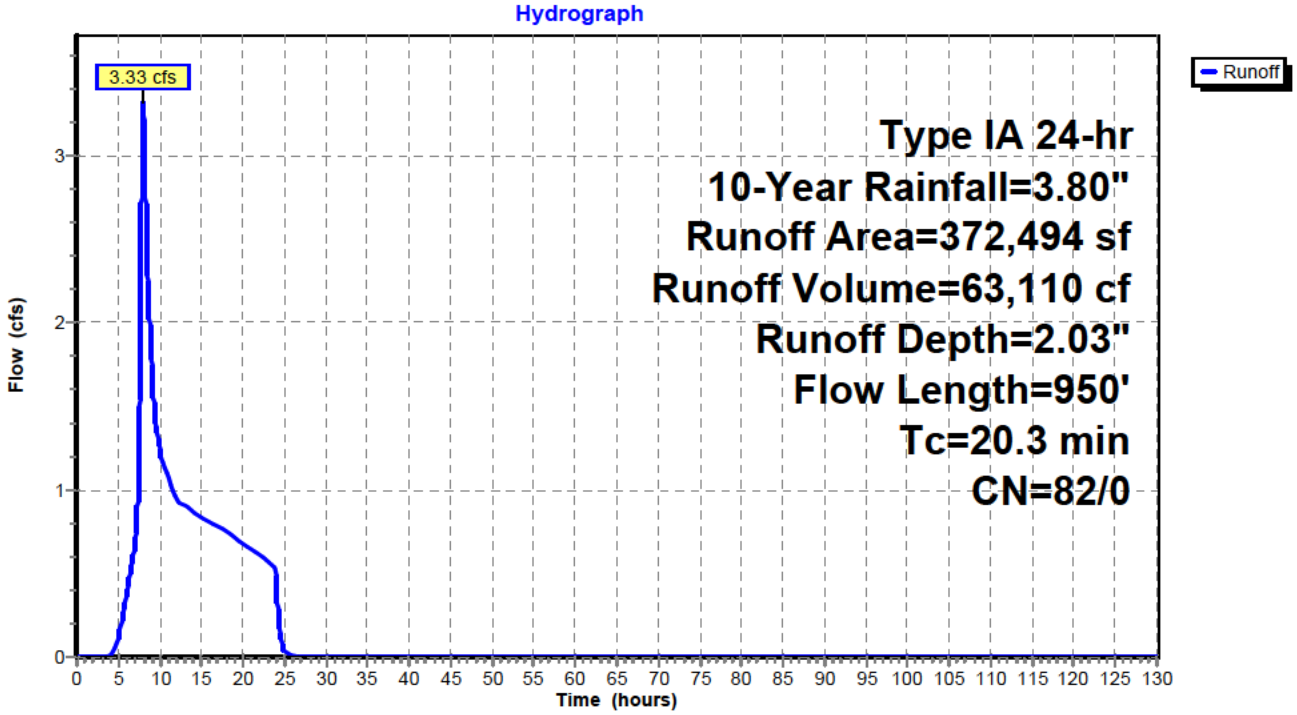
Runoff = 3.33 cfs @ 8.01 hrs, Volume= 63,110 cf, Depth= 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
372,494	82	Row crops, SR + CR, Good, HSG C
372,494	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0200	0.14		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
8.7	850	0.0330	1.63		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.3	950	Total			

Subcatchment D: Pre Dev Basin D



Hydrograph for Subcatchment D: Pre Dev Basin D

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.59	0.01	0.00	**0.12**
10.00	2.19	0.78	0.00	**1.24**
15.00	2.92	1.32	0.00	0.84
20.00	**3.47**	**1.76**	0.00	0.68
25.00	**3.80**	**2.03**	0.00	0.03
30.00	3.80	2.03	0.00	0.00
35.00	3.80	2.03	0.00	0.00
40.00	3.80	2.03	0.00	0.00
45.00	3.80	2.03	0.00	0.00
50.00	3.80	2.03	0.00	0.00
55.00	3.80	2.03	0.00	0.00
60.00	3.80	2.03	0.00	0.00
65.00	3.80	2.03	0.00	0.00
70.00	3.80	2.03	0.00	0.00
75.00	3.80	2.03	0.00	0.00
80.00	3.80	2.03	0.00	0.00
85.00	3.80	2.03	0.00	0.00
90.00	3.80	2.03	0.00	0.00
95.00	3.80	2.03	0.00	0.00
100.00	3.80	2.03	0.00	0.00
105.00	3.80	2.03	0.00	0.00
110.00	3.80	2.03	0.00	0.00
115.00	3.80	2.03	0.00	0.00
120.00	3.80	2.03	0.00	0.00
125.00	3.80	2.03	0.00	0.00
130.00	3.80	2.03	0.00	0.00

Summary for Subcatchment E: Pre Dev Basin E

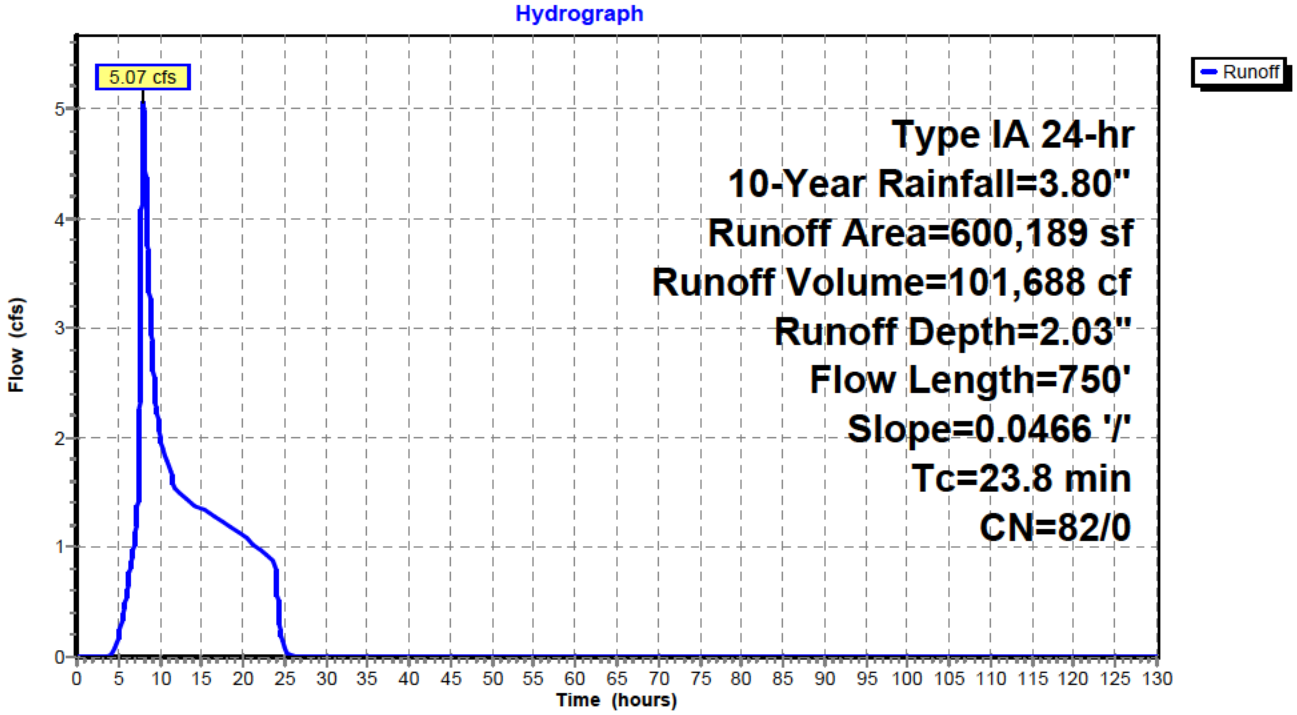
Runoff = 5.07 cfs @ 8.01 hrs, Volume= 101,688 cf, Depth= 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
600,189	82	Row crops, SR + CR, Good, HSG C
600,189	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	300	0.0466	0.25		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
3.9	450	0.0466	1.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.8	750	Total			

Subcatchment E: Pre Dev Basin E



Hydrograph for Subcatchment E: Pre Dev Basin E

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.59	0.01	0.00	**0.18**
10.00	2.19	0.78	0.00	**2.04**
15.00	2.92	1.32	0.00	1.35
20.00	**3.47**	**1.76**	0.00	1.10
25.00	**3.80**	**2.03**	0.00	0.07
30.00	3.80	2.03	0.00	0.00
35.00	3.80	2.03	0.00	0.00
40.00	3.80	2.03	0.00	0.00
45.00	3.80	2.03	0.00	0.00
50.00	3.80	2.03	0.00	0.00
55.00	3.80	2.03	0.00	0.00
60.00	3.80	2.03	0.00	0.00
65.00	3.80	2.03	0.00	0.00
70.00	3.80	2.03	0.00	0.00
75.00	3.80	2.03	0.00	0.00
80.00	3.80	2.03	0.00	0.00
85.00	3.80	2.03	0.00	0.00
90.00	3.80	2.03	0.00	0.00
95.00	3.80	2.03	0.00	0.00
100.00	3.80	2.03	0.00	0.00
105.00	3.80	2.03	0.00	0.00
110.00	3.80	2.03	0.00	0.00
115.00	3.80	2.03	0.00	0.00
120.00	3.80	2.03	0.00	0.00
125.00	3.80	2.03	0.00	0.00
130.00	3.80	2.03	0.00	0.00

Time span=0.00-130.00 hrs, dt=0.01 hrs, 13001 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentA: Pre Dev Basin A Runoff Area=358,532 sf 0.00% Impervious Runoff Depth=2.64"
Flow Length=730' Tc=42.6 min CN=82/0 Runoff=3.20 cfs 78,760 cf

SubcatchmentB: Pre Dev Basin B Runoff Area=293,369 sf 0.00% Impervious Runoff Depth=2.64"
Flow Length=900' Slope=0.0200 '/' Tc=22.1 min CN=82/0 Runoff=3.42 cfs 64,445 cf

SubcatchmentC: Pre Dev Basin C Runoff Area=686,331 sf 0.00% Impervious Runoff Depth=2.64"
Flow Length=760' Slope=0.0400 '/' Tc=14.9 min CN=82/0 Runoff=8.99 cfs 150,768 cf

SubcatchmentD: Pre Dev Basin D Runoff Area=372,494 sf 0.00% Impervious Runoff Depth=2.64"
Flow Length=950' Tc=20.3 min CN=82/0 Runoff=4.47 cfs 81,827 cf

SubcatchmentE: Pre Dev Basin E Runoff Area=600,189 sf 0.00% Impervious Runoff Depth=2.64"
Flow Length=750' Slope=0.0466 '/' Tc=23.8 min CN=82/0 Runoff=6.82 cfs 131,845 cf

Total Runoff Area = 2,310,915 sf Runoff Volume = 507,645 cf Average Runoff Depth = 2.64"
100.00% Pervious = 2,310,915 sf 0.00% Impervious = 0 sf

Summary for Subcatchment A: Pre Dev Basin A

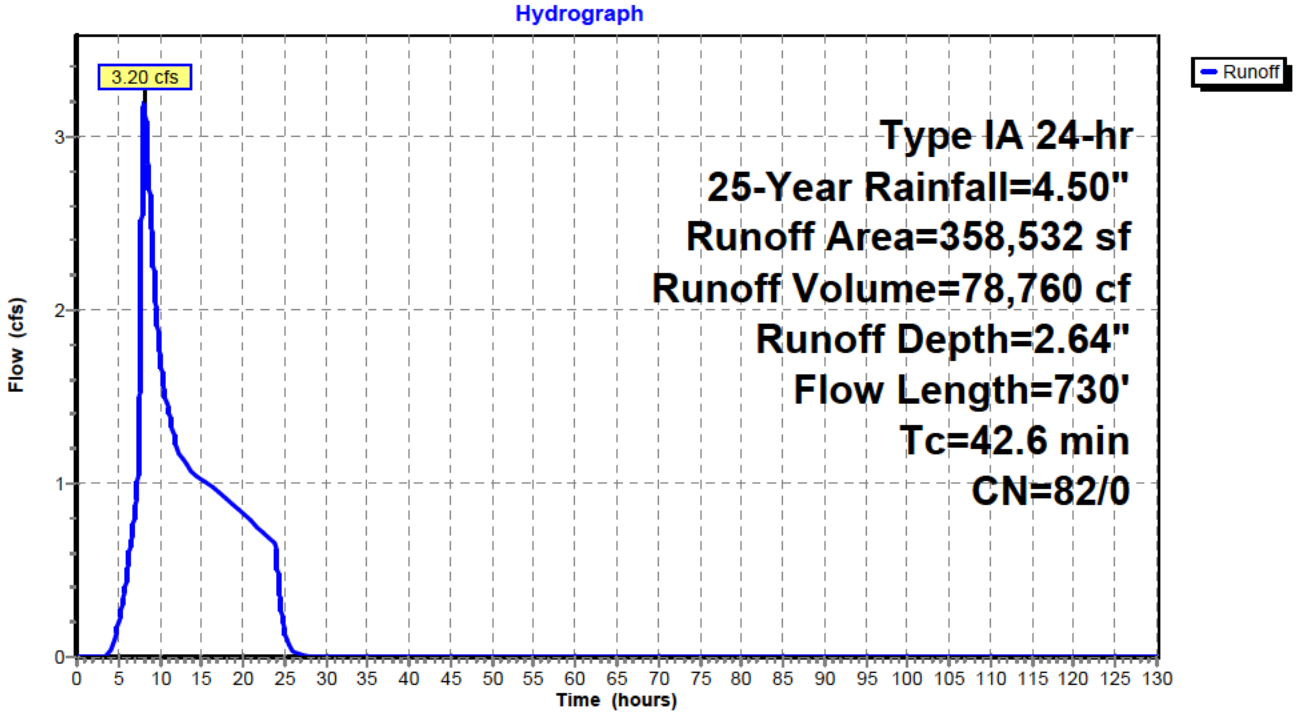
Runoff = 3.20 cfs @ 8.11 hrs, Volume= 78,760 cf, Depth= 2.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
358,532	82	Row crops, SR + CR, Good, HSG C
358,532	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.8	300	0.0100	0.14		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
5.8	430	0.0190	1.24		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
42.6	730	Total			

Subcatchment A: Pre Dev Basin A



Hydrograph for Subcatchment A: Pre Dev Basin A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.70	0.03	0.00	**0.18**
10.00	2.60	1.07	0.00	**1.76**
15.00	3.46	1.75	0.00	1.02
20.00	**4.11**	**2.29**	0.00	0.83
25.00	**4.50**	**2.64**	0.00	0.16
30.00	4.50	2.64	0.00	0.00
35.00	4.50	2.64	0.00	0.00
40.00	4.50	2.64	0.00	0.00
45.00	4.50	2.64	0.00	0.00
50.00	4.50	2.64	0.00	0.00
55.00	4.50	2.64	0.00	0.00
60.00	4.50	2.64	0.00	0.00
65.00	4.50	2.64	0.00	0.00
70.00	4.50	2.64	0.00	0.00
75.00	4.50	2.64	0.00	0.00
80.00	4.50	2.64	0.00	0.00
85.00	4.50	2.64	0.00	0.00
90.00	4.50	2.64	0.00	0.00
95.00	4.50	2.64	0.00	0.00
100.00	4.50	2.64	0.00	0.00
105.00	4.50	2.64	0.00	0.00
110.00	4.50	2.64	0.00	0.00
115.00	4.50	2.64	0.00	0.00
120.00	4.50	2.64	0.00	0.00
125.00	4.50	2.64	0.00	0.00
130.00	4.50	2.64	0.00	0.00

Summary for Subcatchment B: Pre Dev Basin B

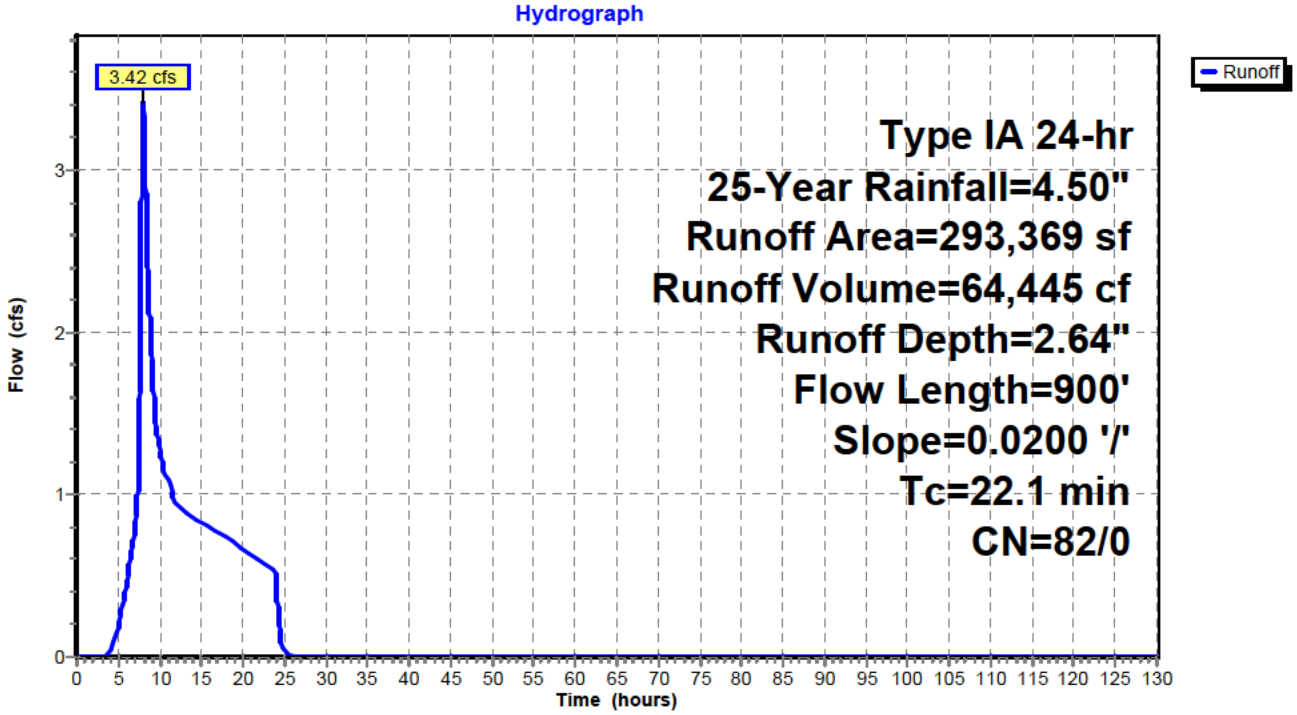
Runoff = 3.42 cfs @ 8.01 hrs, Volume= 64,445 cf, Depth= 2.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
293,369	82	Row crops, SR + CR, Good, HSG C
293,369	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0200	0.14		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
10.5	800	0.0200	1.27		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
22.1	900	Total			

Subcatchment B: Pre Dev Basin B



Hydrograph for Subcatchment B: Pre Dev Basin B

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.70	0.03	0.00	**0.20**
10.00	2.60	1.07	0.00	**1.27**
15.00	3.46	1.75	0.00	0.83
20.00	**4.11**	**2.29**	0.00	0.67
25.00	**4.50**	**2.64**	0.00	0.03
30.00	4.50	2.64	0.00	0.00
35.00	4.50	2.64	0.00	0.00
40.00	4.50	2.64	0.00	0.00
45.00	4.50	2.64	0.00	0.00
50.00	4.50	2.64	0.00	0.00
55.00	4.50	2.64	0.00	0.00
60.00	4.50	2.64	0.00	0.00
65.00	4.50	2.64	0.00	0.00
70.00	4.50	2.64	0.00	0.00
75.00	4.50	2.64	0.00	0.00
80.00	4.50	2.64	0.00	0.00
85.00	4.50	2.64	0.00	0.00
90.00	4.50	2.64	0.00	0.00
95.00	4.50	2.64	0.00	0.00
100.00	4.50	2.64	0.00	0.00
105.00	4.50	2.64	0.00	0.00
110.00	4.50	2.64	0.00	0.00
115.00	4.50	2.64	0.00	0.00
120.00	4.50	2.64	0.00	0.00
125.00	4.50	2.64	0.00	0.00
130.00	4.50	2.64	0.00	0.00

Summary for Subcatchment C: Pre Dev Basin C

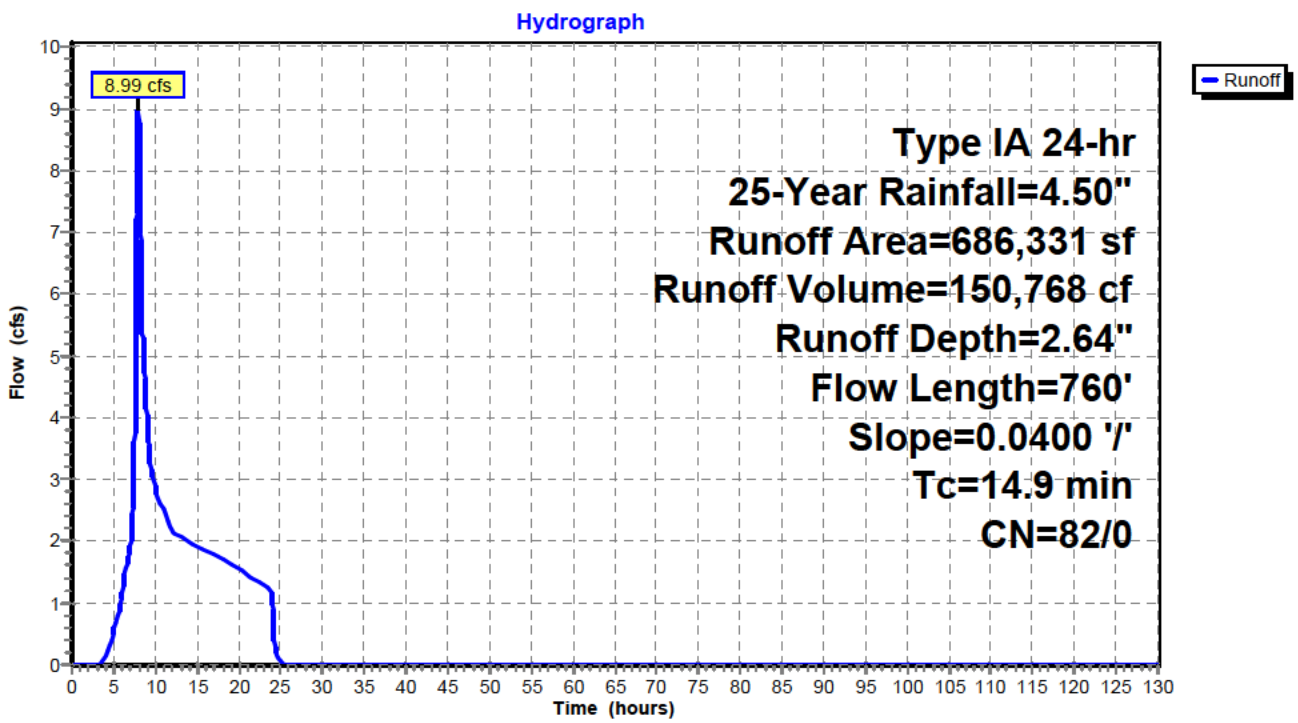
Runoff = 8.99 cfs @ 8.00 hrs, Volume= 150,768 cf, Depth= 2.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
104,630	82	Row crops, SR + CR, Good, HSG C
581,701	82	Row crops, SR + CR, Good, HSG C
686,331	82	Weighted Average
686,331	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0400	0.19		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
6.1	660	0.0400	1.80		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
14.9	760	Total			

Subcatchment C: Pre Dev Basin C



Hydrograph for Subcatchment C: Pre Dev Basin C

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.70	0.03	0.00	**0.52**
10.00	2.60	1.07	0.00	**2.86**
15.00	3.46	1.75	0.00	1.93
20.00	**4.11**	**2.29**	0.00	1.55
25.00	**4.50**	**2.64**	0.00	0.02
30.00	4.50	2.64	0.00	0.00
35.00	4.50	2.64	0.00	0.00
40.00	4.50	2.64	0.00	0.00
45.00	4.50	2.64	0.00	0.00
50.00	4.50	2.64	0.00	0.00
55.00	4.50	2.64	0.00	0.00
60.00	4.50	2.64	0.00	0.00
65.00	4.50	2.64	0.00	0.00
70.00	4.50	2.64	0.00	0.00
75.00	4.50	2.64	0.00	0.00
80.00	4.50	2.64	0.00	0.00
85.00	4.50	2.64	0.00	0.00
90.00	4.50	2.64	0.00	0.00
95.00	4.50	2.64	0.00	0.00
100.00	4.50	2.64	0.00	0.00
105.00	4.50	2.64	0.00	0.00
110.00	4.50	2.64	0.00	0.00
115.00	4.50	2.64	0.00	0.00
120.00	4.50	2.64	0.00	0.00
125.00	4.50	2.64	0.00	0.00
130.00	4.50	2.64	0.00	0.00

Summary for Subcatchment D: Pre Dev Basin D

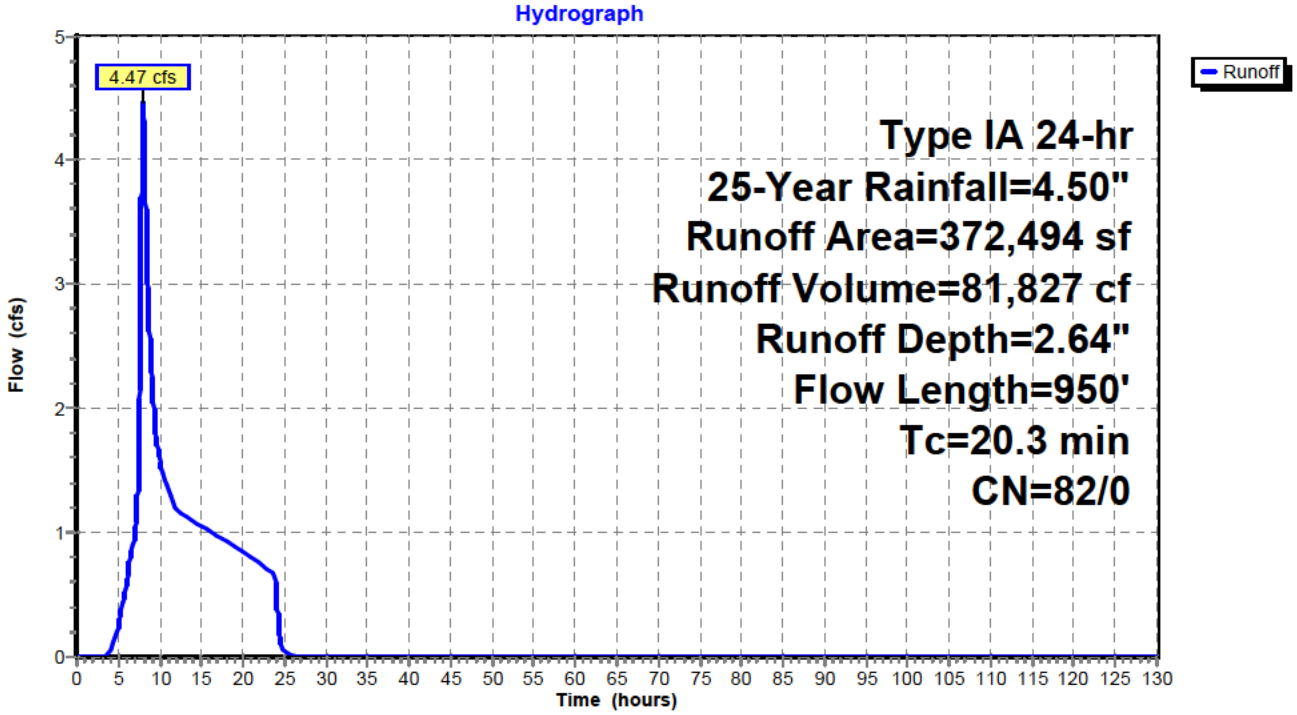
Runoff = 4.47 cfs @ 8.01 hrs, Volume= 81,827 cf, Depth= 2.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
372,494	82	Row crops, SR + CR, Good, HSG C
372,494	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	100	0.0200	0.14		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
8.7	850	0.0330	1.63		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.3	950	Total			

Subcatchment D: Pre Dev Basin D



Hydrograph for Subcatchment D: Pre Dev Basin D

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.70	0.03	0.00	**0.26**
10.00	2.60	1.07	0.00	**1.59**
15.00	3.46	1.75	0.00	1.05
20.00	**4.11**	**2.29**	0.00	0.85
25.00	**4.50**	**2.64**	0.00	0.03
30.00	4.50	2.64	0.00	0.00
35.00	4.50	2.64	0.00	0.00
40.00	4.50	2.64	0.00	0.00
45.00	4.50	2.64	0.00	0.00
50.00	4.50	2.64	0.00	0.00
55.00	4.50	2.64	0.00	0.00
60.00	4.50	2.64	0.00	0.00
65.00	4.50	2.64	0.00	0.00
70.00	4.50	2.64	0.00	0.00
75.00	4.50	2.64	0.00	0.00
80.00	4.50	2.64	0.00	0.00
85.00	4.50	2.64	0.00	0.00
90.00	4.50	2.64	0.00	0.00
95.00	4.50	2.64	0.00	0.00
100.00	4.50	2.64	0.00	0.00
105.00	4.50	2.64	0.00	0.00
110.00	4.50	2.64	0.00	0.00
115.00	4.50	2.64	0.00	0.00
120.00	4.50	2.64	0.00	0.00
125.00	4.50	2.64	0.00	0.00
130.00	4.50	2.64	0.00	0.00

Summary for Subcatchment E: Pre Dev Basin E

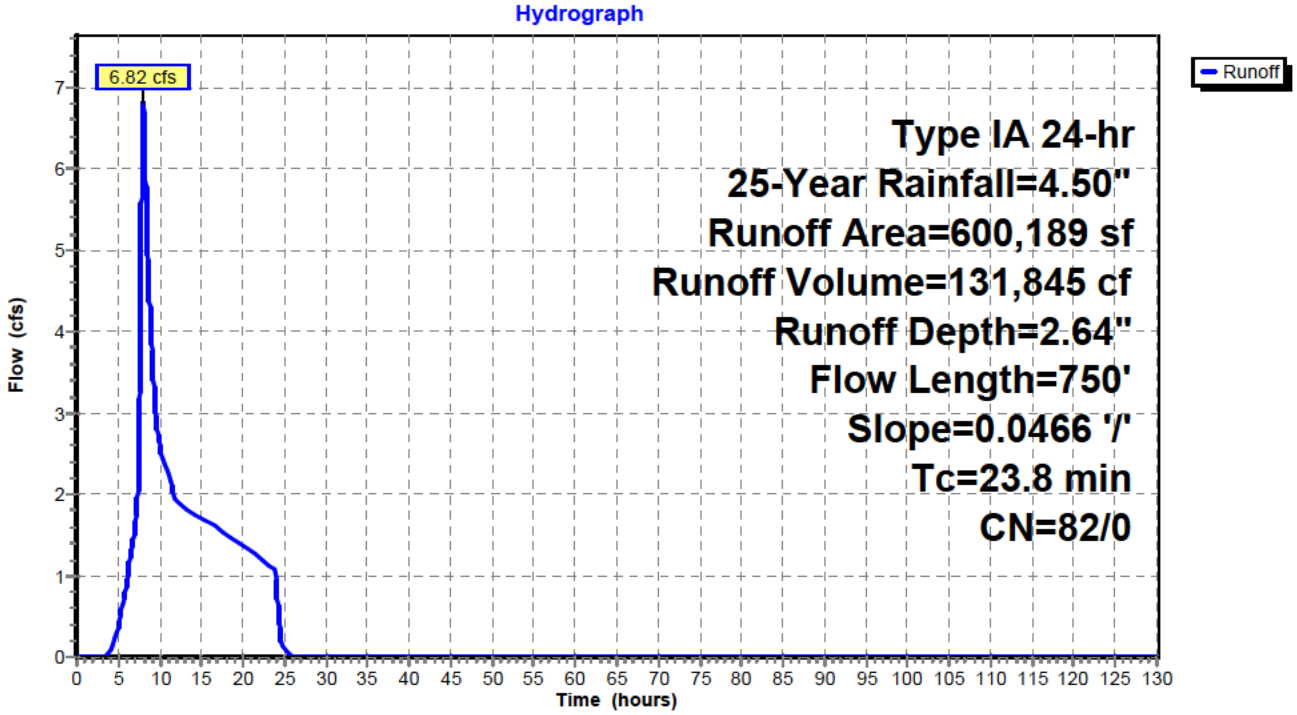
Runoff = 6.82 cfs @ 8.01 hrs, Volume= 131,845 cf, Depth= 2.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
600,189	82	Row crops, SR + CR, Good, HSG C
600,189	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	300	0.0466	0.25		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
3.9	450	0.0466	1.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.8	750	Total			

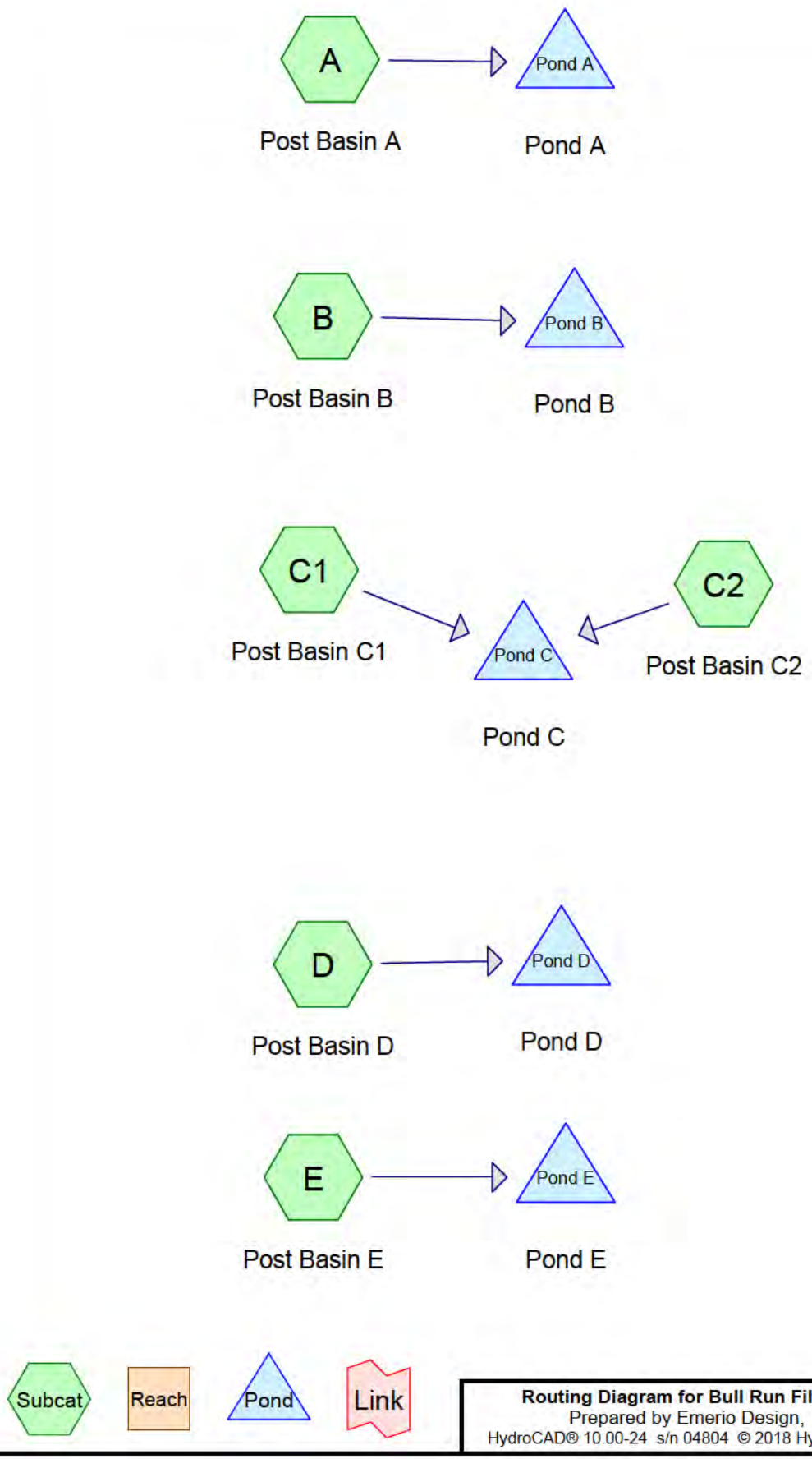
Subcatchment E: Pre Dev Basin E



Hydrograph for Subcatchment E: Pre Dev Basin E

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
5.00	0.70	0.03	0.00	**0.40**
10.00	2.60	1.07	0.00	**2.62**
15.00	3.46	1.75	0.00	1.69
20.00	**4.11**	**2.29**	0.00	1.37
25.00	**4.50**	**2.64**	0.00	0.09
30.00	4.50	2.64	0.00	0.00
35.00	4.50	2.64	0.00	0.00
40.00	4.50	2.64	0.00	0.00
45.00	4.50	2.64	0.00	0.00
50.00	4.50	2.64	0.00	0.00
55.00	4.50	2.64	0.00	0.00
60.00	4.50	2.64	0.00	0.00
65.00	4.50	2.64	0.00	0.00
70.00	4.50	2.64	0.00	0.00
75.00	4.50	2.64	0.00	0.00
80.00	4.50	2.64	0.00	0.00
85.00	4.50	2.64	0.00	0.00
90.00	4.50	2.64	0.00	0.00
95.00	4.50	2.64	0.00	0.00
100.00	4.50	2.64	0.00	0.00
105.00	4.50	2.64	0.00	0.00
110.00	4.50	2.64	0.00	0.00
115.00	4.50	2.64	0.00	0.00
120.00	4.50	2.64	0.00	0.00
125.00	4.50	2.64	0.00	0.00
130.00	4.50	2.64	0.00	0.00

Attachment F: Hydrologic Analysis of Post Developed Conditions and Pond Routing Calculations



Routing Diagram for Bull Run Filtration Detention Ponds
Prepared by Emerio Design, Printed 9/22/2022
HydroCAD® 10.00-24 s/n 04804 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
1,821,196	80	>75% Grass cover, Good, HSG D (A, B, C1, C2, D, E)
489,719	98	Impervious Area (A, B, C1, C2, D, E)
2,310,915	**84**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
0	HSG C	
1,821,196	HSG D	A, B, C1, C2, D, E
489,719	Other	A, B, C1, C2, D, E
2,310,915		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	0	0	1,821,196	0	1,821,196	>75% Grass cover, Good	
0	0	0	0	489,719	489,719	Impervious Area	
0	**0**	**0**	**1,821,196**	**489,719**	**2,310,915**	**TOTAL AREA**	

Time span=0.00-130.00 hrs, dt=0.01 hrs, 13001 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentA: Post Basin A Runoff Area=358,532 sf 46.88% Impervious Runoff Depth=1.79"
Tc=5.0 min CN=80/98 Runoff=3.49 cfs 53,477 cf

SubcatchmentB: Post Basin B Runoff Area=293,369 sf 49.49% Impervious Runoff Depth=1.83"
Tc=5.0 min CN=80/98 Runoff=2.93 cfs 44,694 cf

SubcatchmentC1: Post Basin C1 Runoff Area=104,630 sf 44.06% Impervious Runoff Depth=1.75"
Tc=5.0 min CN=80/98 Runoff=0.99 cfs 15,246 cf

SubcatchmentC2: Post Basin C2 Runoff Area=581,701 sf 3.45% Impervious Runoff Depth=1.15"
Flow Length=650' Slope=0.0330 '/' Tc=26.4 min CN=80/98 Runoff=2.29 cfs 55,875 cf

SubcatchmentD: Post Basin D Runoff Area=372,494 sf 24.46% Impervious Runoff Depth=1.46"
Tc=5.0 min CN=80/98 Runoff=2.83 cfs 45,350 cf

SubcatchmentE: Post Basin E Runoff Area=600,189 sf 3.19% Impervious Runoff Depth=1.15"
Flow Length=750' Slope=0.0466 '/' Tc=12.5 min CN=80/98 Runoff=3.02 cfs 57,464 cf

Pond Pond A: Pond A Peak Elev=709.47' Storage=13,662 cf Inflow=3.49 cfs 53,477 cf
Primary=0.62 cfs 53,477 cf Secondary=0.00 cfs 0 cf Outflow=0.62 cfs 53,477 cf

Pond Pond B: Pond B Peak Elev=709.30' Storage=7,689 cf Inflow=2.93 cfs 44,694 cf
Primary=0.69 cfs 44,694 cf Secondary=0.00 cfs 0 cf Outflow=0.69 cfs 44,694 cf

Pond Pond C: Pond C Peak Elev=704.69' Storage=13,024 cf Inflow=4.05 cfs 445,550 cf
Primary=1.82 cfs 444,986 cf Secondary=0.00 cfs 3 cf Outflow=1.82 cfs 444,989 cf

Pond Pond D: Pond D Peak Elev=694.08' Storage=5,373 cf Inflow=2.83 cfs 45,350 cf
Primary=0.88 cfs 45,349 cf Secondary=0.00 cfs 2 cf Outflow=0.88 cfs 45,350 cf

Pond Pond E: Pond E Peak Elev=713.71' Storage=6,350 cf Inflow=3.02 cfs 57,464 cf
Primary=1.36 cfs 57,464 cf Secondary=0.00 cfs 0 cf Outflow=1.36 cfs 57,464 cf

Total Runoff Area = 2,310,915 sf Runoff Volume = 272,106 cf Average Runoff Depth = 1.41"
78.81% Pervious = 1,821,196 sf 21.19% Impervious = 489,719 sf

Summary for Subcatchment A: Post Basin A

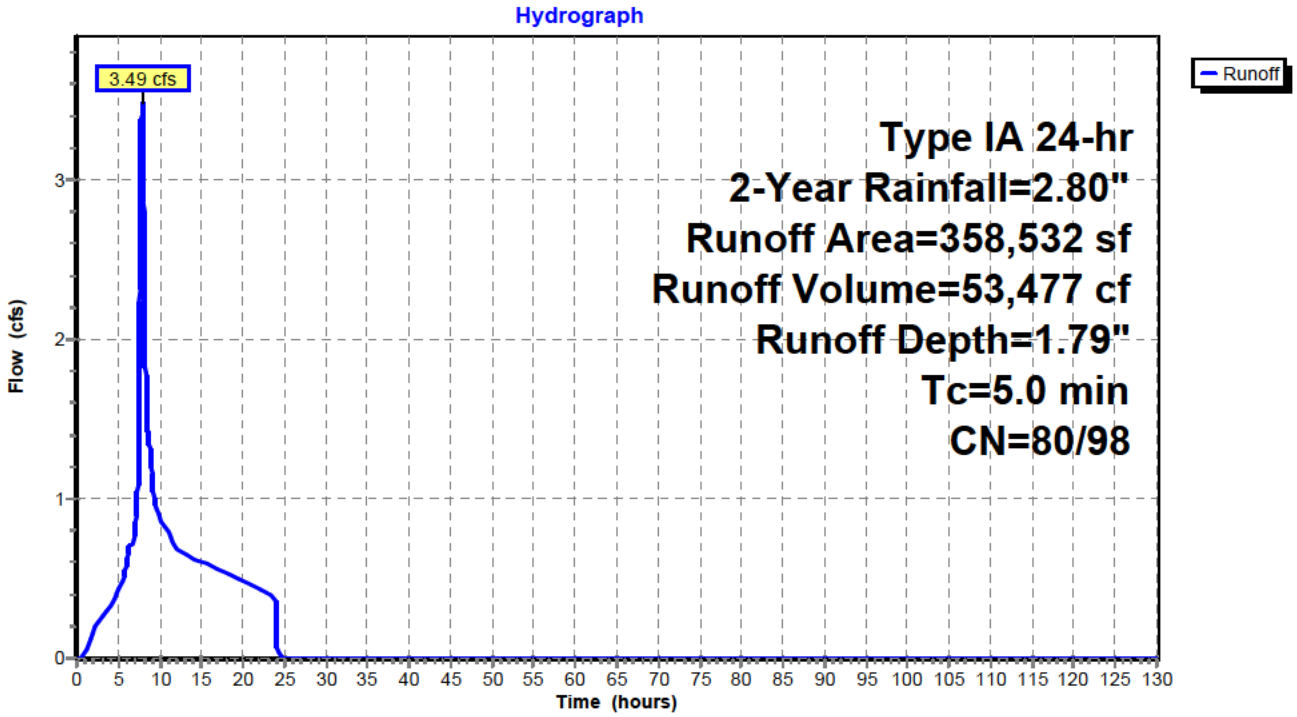
Runoff = 3.49 cfs @ 7.92 hrs, Volume= 53,477 cf, Depth= 1.79"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

	Area (sf)	CN	Description
*	168,081	98	Impervious Area
	190,451	80	>75% Grass cover, Good, HSG D
	358,532	88	Weighted Average
	190,451	80	53.12% Pervious Area
	168,081	98	46.88% Impervious Area

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

Subcatchment A: Post Basin A



Hydrograph for Subcatchment A: Post Basin A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.44	0.00	0.26	**0.42**
10.00	1.62	0.34	1.39	**0.89**
15.00	2.15	0.66	1.93	0.61
20.00	**2.56**	**0.93**	**2.33**	0.49
25.00	**2.80**	**1.10**	**2.57**	0.00
30.00	2.80	1.10	2.57	0.00
35.00	2.80	1.10	2.57	0.00
40.00	2.80	1.10	2.57	0.00
45.00	2.80	1.10	2.57	0.00
50.00	2.80	1.10	2.57	0.00
55.00	2.80	1.10	2.57	0.00
60.00	2.80	1.10	2.57	0.00
65.00	2.80	1.10	2.57	0.00
70.00	2.80	1.10	2.57	0.00
75.00	2.80	1.10	2.57	0.00
80.00	2.80	1.10	2.57	0.00
85.00	2.80	1.10	2.57	0.00
90.00	2.80	1.10	2.57	0.00
95.00	2.80	1.10	2.57	0.00
100.00	2.80	1.10	2.57	0.00
105.00	2.80	1.10	2.57	0.00
110.00	2.80	1.10	2.57	0.00
115.00	2.80	1.10	2.57	0.00
120.00	2.80	1.10	2.57	0.00
125.00	2.80	1.10	2.57	0.00
130.00	2.80	1.10	2.57	0.00

Summary for Subcatchment B: Post Basin B

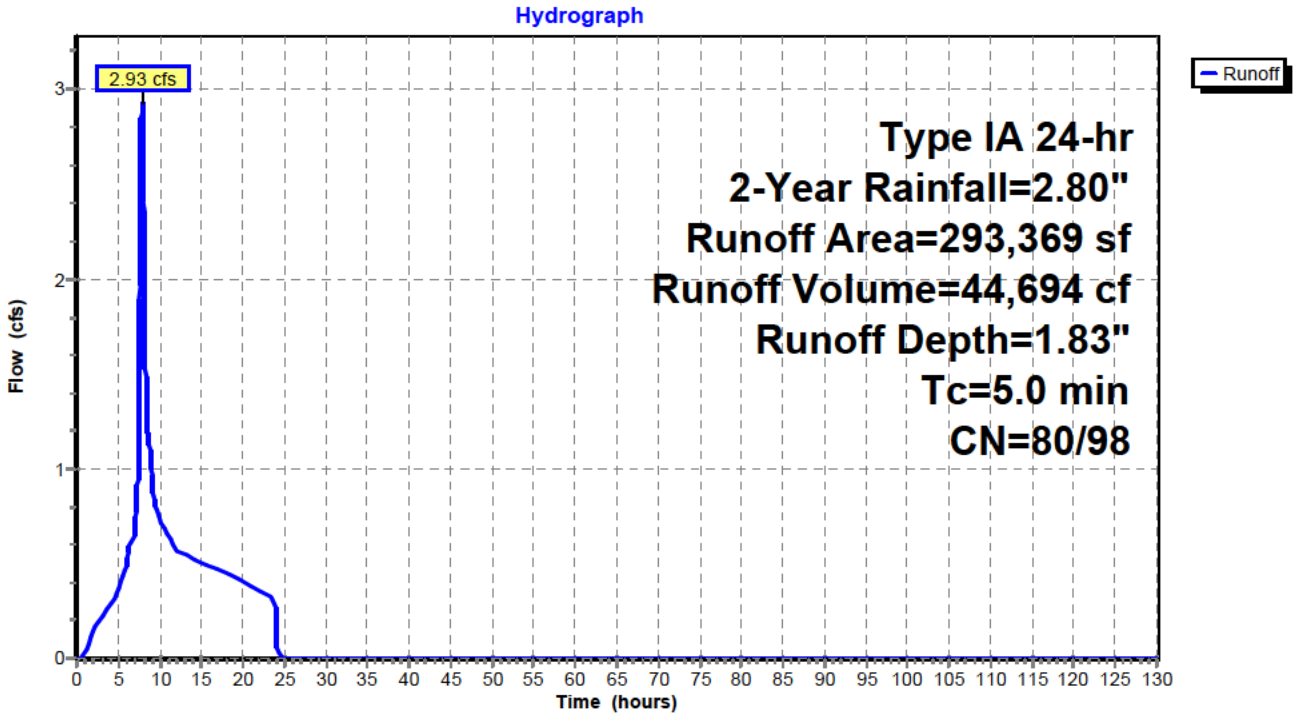
Runoff = 2.93 cfs @ 7.92 hrs, Volume= 44,694 cf, Depth= 1.83"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

	Area (sf)	CN	Description
*	145,197	98	Impervious Area
	148,172	80	>75% Grass cover, Good, HSG D
	293,369	89	Weighted Average
	148,172	80	50.51% Pervious Area
	145,197	98	49.49% Impervious Area

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

Subcatchment B: Post Basin B



Hydrograph for Subcatchment B: Post Basin B

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.44	0.00	0.26	**0.36**
10.00	1.62	0.34	1.39	**0.74**
15.00	2.15	0.66	1.93	0.50
20.00	**2.56**	**0.93**	**2.33**	0.40
25.00	**2.80**	**1.10**	**2.57**	0.00
30.00	2.80	1.10	2.57	0.00
35.00	2.80	1.10	2.57	0.00
40.00	2.80	1.10	2.57	0.00
45.00	2.80	1.10	2.57	0.00
50.00	2.80	1.10	2.57	0.00
55.00	2.80	1.10	2.57	0.00
60.00	2.80	1.10	2.57	0.00
65.00	2.80	1.10	2.57	0.00
70.00	2.80	1.10	2.57	0.00
75.00	2.80	1.10	2.57	0.00
80.00	2.80	1.10	2.57	0.00
85.00	2.80	1.10	2.57	0.00
90.00	2.80	1.10	2.57	0.00
95.00	2.80	1.10	2.57	0.00
100.00	2.80	1.10	2.57	0.00
105.00	2.80	1.10	2.57	0.00
110.00	2.80	1.10	2.57	0.00
115.00	2.80	1.10	2.57	0.00
120.00	2.80	1.10	2.57	0.00
125.00	2.80	1.10	2.57	0.00
130.00	2.80	1.10	2.57	0.00

Summary for Subcatchment C1: Post Basin C1

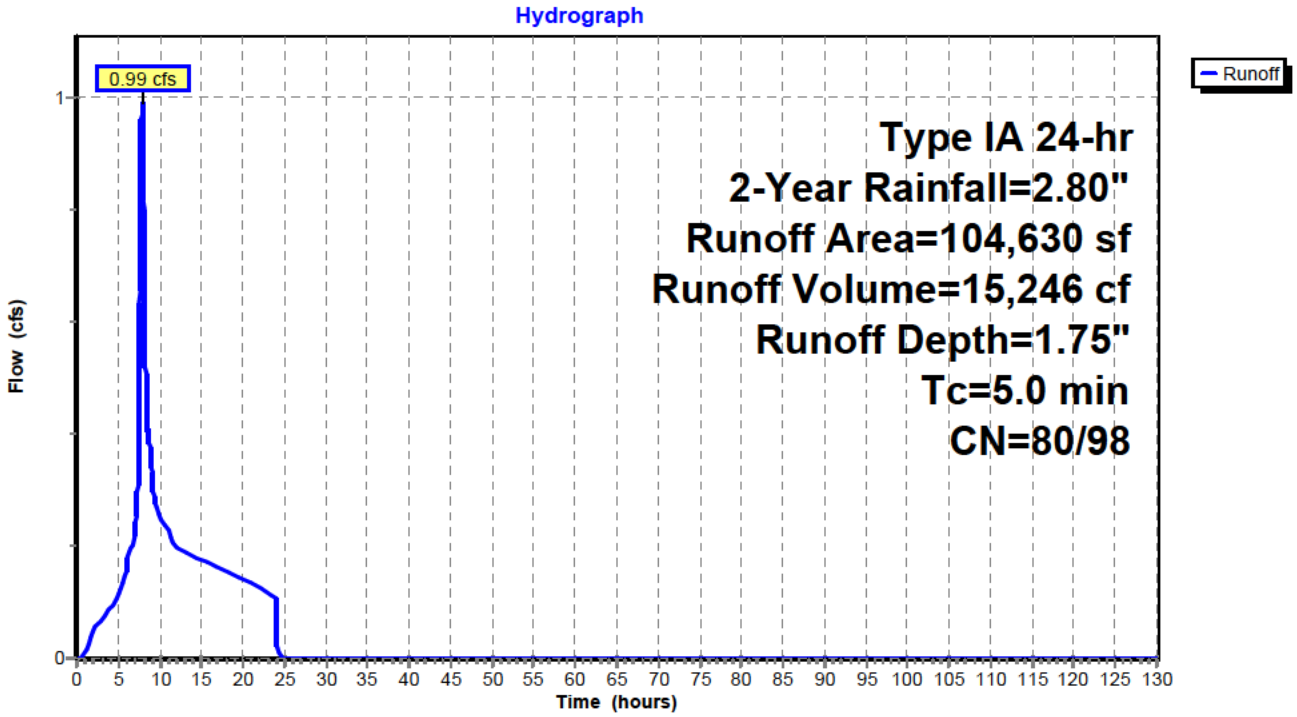
Runoff = 0.99 cfs @ 7.93 hrs, Volume= 15,246 cf, Depth= 1.75"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

	Area (sf)	CN	Description
*	46,105	98	Impervious Area
	58,525	80	>75% Grass cover, Good, HSG D
	104,630	88	Weighted Average
	58,525	80	55.94% Pervious Area
	46,105	98	44.06% Impervious Area

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

Subcatchment C1: Post Basin C1



Hydrograph for Subcatchment C1: Post Basin C1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.44	0.00	0.26	**0.11**
10.00	1.62	0.34	1.39	**0.26**
15.00	2.15	0.66	1.93	0.18
20.00	**2.56**	**0.93**	**2.33**	0.14
25.00	**2.80**	**1.10**	**2.57**	0.00
30.00	2.80	1.10	2.57	0.00
35.00	2.80	1.10	2.57	0.00
40.00	2.80	1.10	2.57	0.00
45.00	2.80	1.10	2.57	0.00
50.00	2.80	1.10	2.57	0.00
55.00	2.80	1.10	2.57	0.00
60.00	2.80	1.10	2.57	0.00
65.00	2.80	1.10	2.57	0.00
70.00	2.80	1.10	2.57	0.00
75.00	2.80	1.10	2.57	0.00
80.00	2.80	1.10	2.57	0.00
85.00	2.80	1.10	2.57	0.00
90.00	2.80	1.10	2.57	0.00
95.00	2.80	1.10	2.57	0.00
100.00	2.80	1.10	2.57	0.00
105.00	2.80	1.10	2.57	0.00
110.00	2.80	1.10	2.57	0.00
115.00	2.80	1.10	2.57	0.00
120.00	2.80	1.10	2.57	0.00
125.00	2.80	1.10	2.57	0.00
130.00	2.80	1.10	2.57	0.00

Summary for Subcatchment C2: Post Basin C2

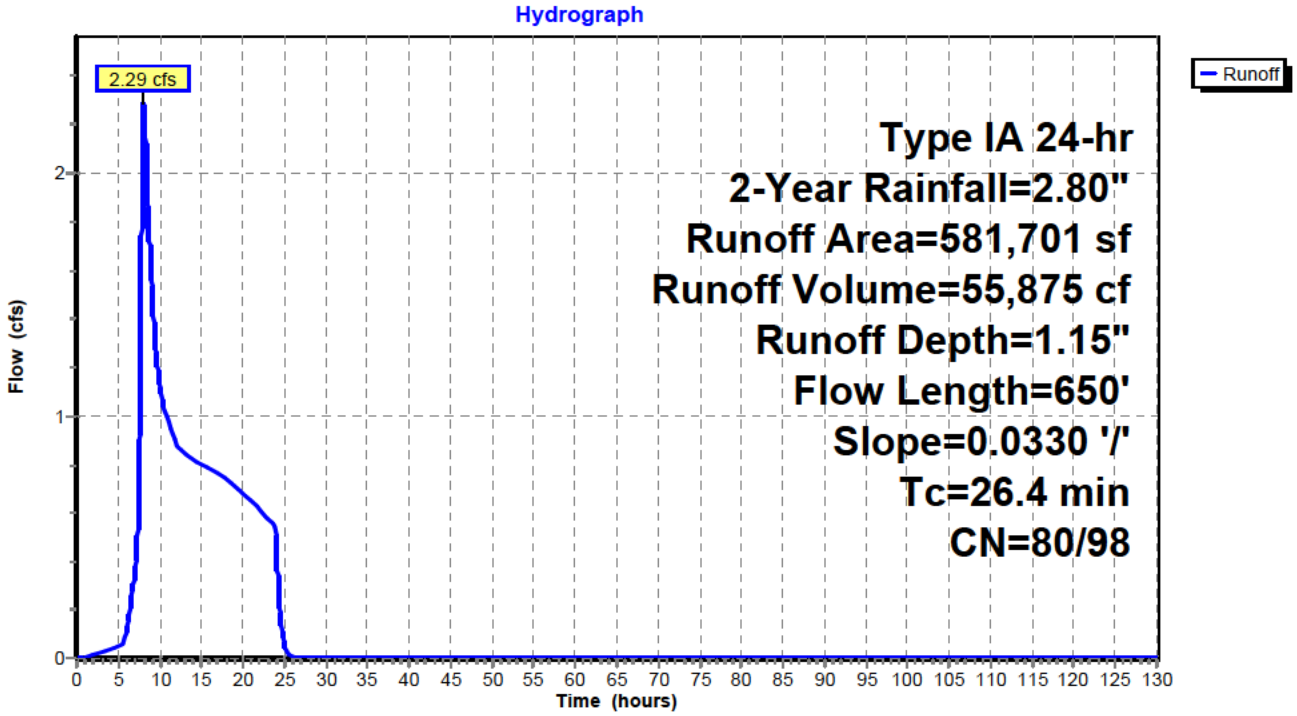
Runoff = 2.29 cfs @ 8.04 hrs, Volume= 55,875 cf, Depth= 1.15"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

	Area (sf)	CN	Description
*	20,053	98	Impervious Area
	561,648	80	>75% Grass cover, Good, HSG D
	581,701	81	Weighted Average
	561,648	80	96.55% Pervious Area
	20,053	98	3.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	300	0.0330	0.22		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
3.6	350	0.0330	1.63		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	650	Total			

Subcatchment C2: Post Basin C2



Hydrograph for Subcatchment C2: Post Basin C2

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.44	0.00	0.26	**0.05**
10.00	1.62	0.34	1.39	**1.13**
15.00	2.15	0.66	1.93	0.80
20.00	**2.56**	**0.93**	**2.33**	0.68
25.00	**2.80**	**1.10**	**2.57**	0.06
30.00	2.80	1.10	2.57	0.00
35.00	2.80	1.10	2.57	0.00
40.00	2.80	1.10	2.57	0.00
45.00	2.80	1.10	2.57	0.00
50.00	2.80	1.10	2.57	0.00
55.00	2.80	1.10	2.57	0.00
60.00	2.80	1.10	2.57	0.00
65.00	2.80	1.10	2.57	0.00
70.00	2.80	1.10	2.57	0.00
75.00	2.80	1.10	2.57	0.00
80.00	2.80	1.10	2.57	0.00
85.00	2.80	1.10	2.57	0.00
90.00	2.80	1.10	2.57	0.00
95.00	2.80	1.10	2.57	0.00
100.00	2.80	1.10	2.57	0.00
105.00	2.80	1.10	2.57	0.00
110.00	2.80	1.10	2.57	0.00
115.00	2.80	1.10	2.57	0.00
120.00	2.80	1.10	2.57	0.00
125.00	2.80	1.10	2.57	0.00
130.00	2.80	1.10	2.57	0.00

Summary for Subcatchment D: Post Basin D

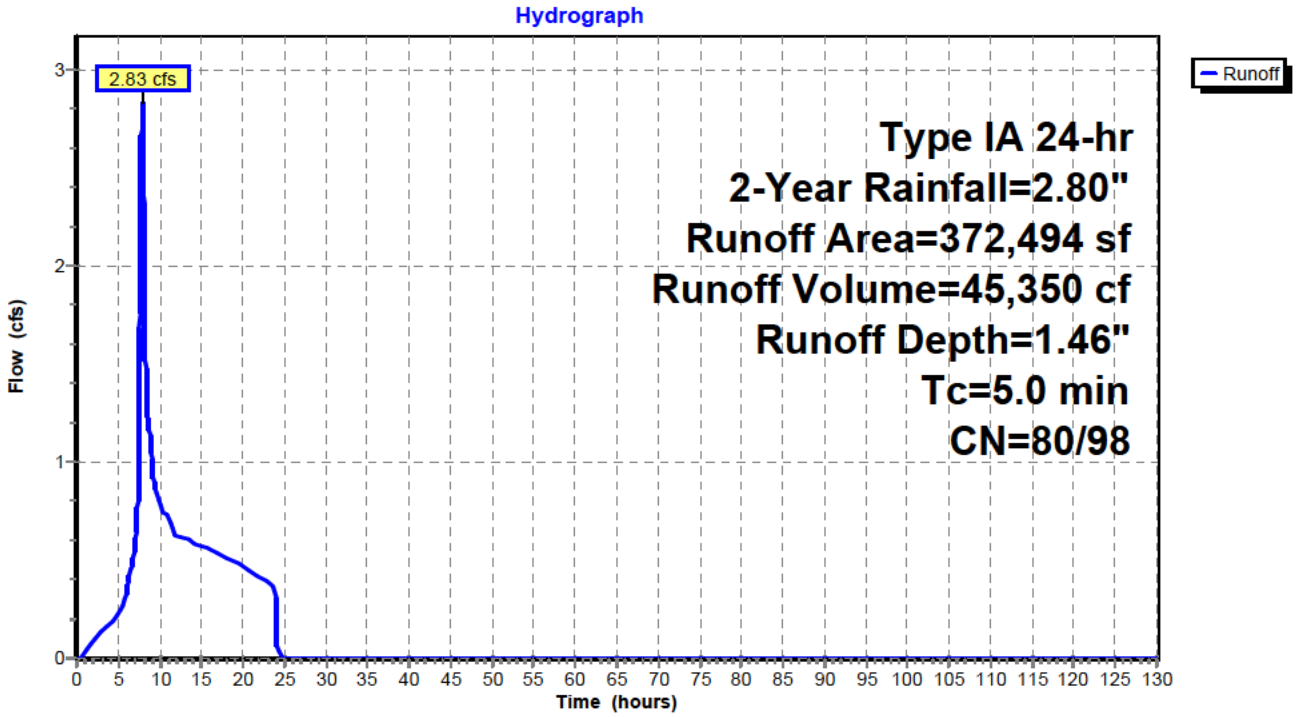
Runoff = 2.83 cfs @ 7.96 hrs, Volume= 45,350 cf, Depth= 1.46"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

	Area (sf)	CN	Description
*	91,123	98	Impervious Area
	281,371	80	>75% Grass cover, Good, HSG D
	372,494	84	Weighted Average
	281,371	80	75.54% Pervious Area
	91,123	98	24.46% Impervious Area

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

Subcatchment D: Post Basin D



Hydrograph for Subcatchment D: Post Basin D

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.44	0.00	0.26	**0.23**
10.00	1.62	0.34	1.39	**0.80**
15.00	2.15	0.66	1.93	0.57
20.00	**2.56**	**0.93**	**2.33**	0.47
25.00	**2.80**	**1.10**	**2.57**	0.00
30.00	2.80	1.10	2.57	0.00
35.00	2.80	1.10	2.57	0.00
40.00	2.80	1.10	2.57	0.00
45.00	2.80	1.10	2.57	0.00
50.00	2.80	1.10	2.57	0.00
55.00	2.80	1.10	2.57	0.00
60.00	2.80	1.10	2.57	0.00
65.00	2.80	1.10	2.57	0.00
70.00	2.80	1.10	2.57	0.00
75.00	2.80	1.10	2.57	0.00
80.00	2.80	1.10	2.57	0.00
85.00	2.80	1.10	2.57	0.00
90.00	2.80	1.10	2.57	0.00
95.00	2.80	1.10	2.57	0.00
100.00	2.80	1.10	2.57	0.00
105.00	2.80	1.10	2.57	0.00
110.00	2.80	1.10	2.57	0.00
115.00	2.80	1.10	2.57	0.00
120.00	2.80	1.10	2.57	0.00
125.00	2.80	1.10	2.57	0.00
130.00	2.80	1.10	2.57	0.00

Summary for Subcatchment E: Post Basin E

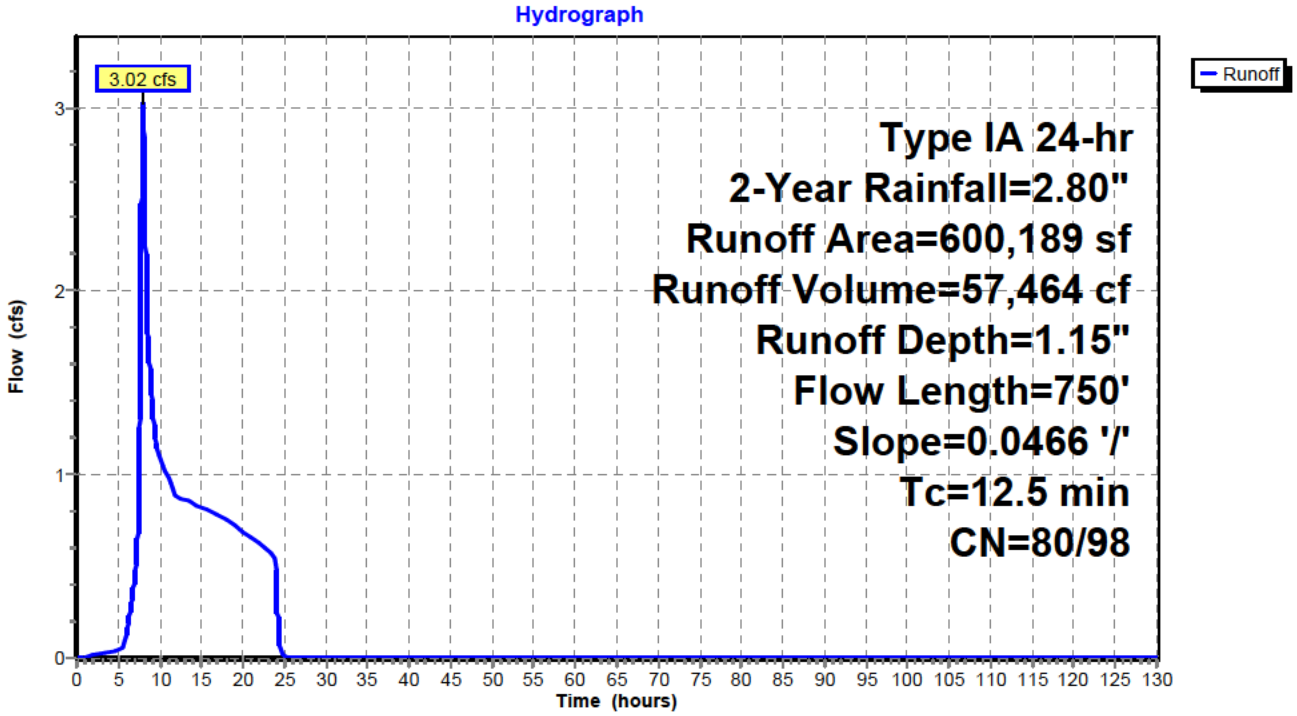
Runoff = 3.02 cfs @ 8.00 hrs, Volume= 57,464 cf, Depth= 1.15"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

	Area (sf)	CN	Description
*	19,160	98	Impervious Area
	581,029	80	>75% Grass cover, Good, HSG D
	600,189	81	Weighted Average
	581,029	80	96.81% Pervious Area
	19,160	98	3.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	300	0.0466	0.58		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
3.9	450	0.0466	1.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.5	750	Total			

Subcatchment E: Post Basin E



Hydrograph for Subcatchment E: Post Basin E

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.44	0.00	0.26	**0.05**
10.00	1.62	0.34	1.39	**1.10**
15.00	2.15	0.66	1.93	0.82
20.00	**2.56**	**0.93**	**2.33**	0.69
25.00	**2.80**	**1.10**	**2.57**	0.00
30.00	2.80	1.10	2.57	0.00
35.00	2.80	1.10	2.57	0.00
40.00	2.80	1.10	2.57	0.00
45.00	2.80	1.10	2.57	0.00
50.00	2.80	1.10	2.57	0.00
55.00	2.80	1.10	2.57	0.00
60.00	2.80	1.10	2.57	0.00
65.00	2.80	1.10	2.57	0.00
70.00	2.80	1.10	2.57	0.00
75.00	2.80	1.10	2.57	0.00
80.00	2.80	1.10	2.57	0.00
85.00	2.80	1.10	2.57	0.00
90.00	2.80	1.10	2.57	0.00
95.00	2.80	1.10	2.57	0.00
100.00	2.80	1.10	2.57	0.00
105.00	2.80	1.10	2.57	0.00
110.00	2.80	1.10	2.57	0.00
115.00	2.80	1.10	2.57	0.00
120.00	2.80	1.10	2.57	0.00
125.00	2.80	1.10	2.57	0.00
130.00	2.80	1.10	2.57	0.00

Summary for Pond Pond A: Pond A

Inflow Area =	358,532 sf,	46.88% Impervious,	Inflow Depth =	1.79"	for 2-Year event
Inflow =	3.49 cfs @	7.92 hrs,	Volume=	53,477 cf	
Outflow =	0.62 cfs @	14.66 hrs,	Volume=	53,477 cf,	Atten= 82%, Lag= 404.1 min
Primary =	0.62 cfs @	14.66 hrs,	Volume=	53,477 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 709.47' @ 14.66 hrs Surf.Area= 10,189 sf Storage= 13,662 cf

Plug-Flow detention time= 259.2 min calculated for 53,472 cf (100% of inflow)
Center-of-Mass det. time= 259.2 min (983.0 - 723.8)

Volume	Invert	Avail.Storage	Storage Description
#1	708.00'	90,236 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

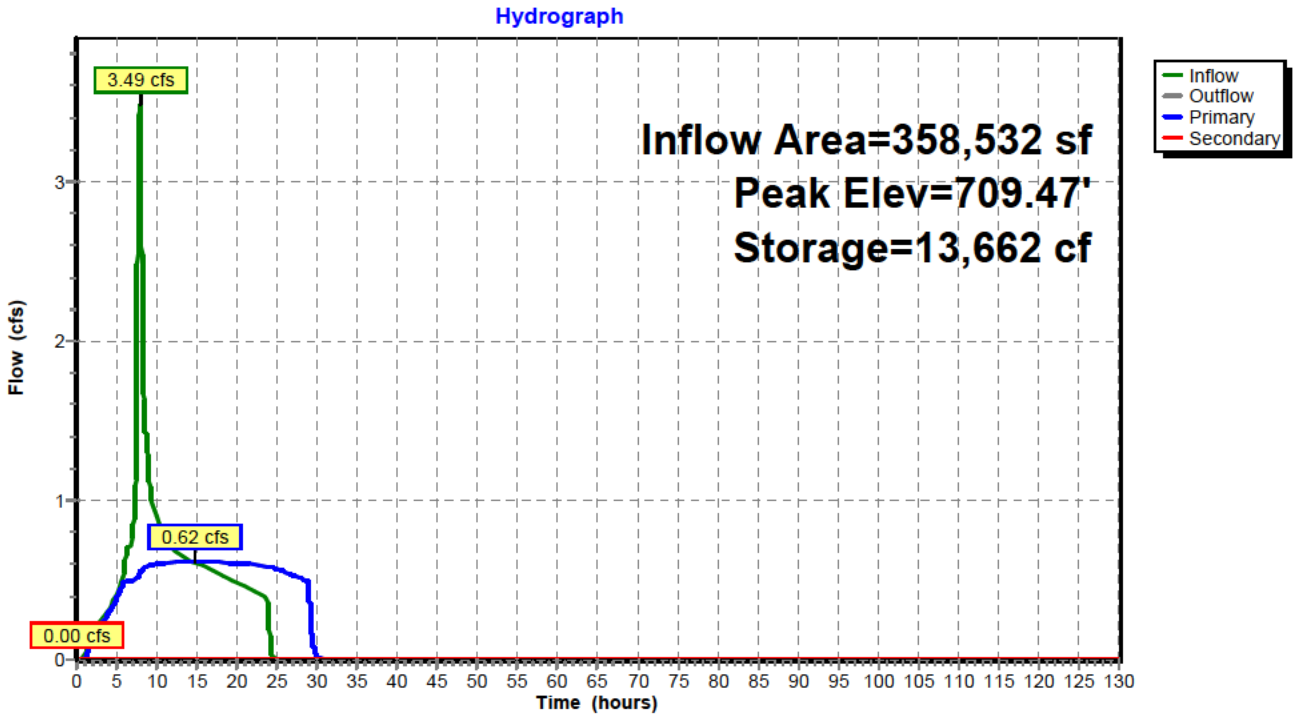
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
708.00	8,458	0	0
709.00	9,620	9,039	9,039
710.00	10,838	10,229	19,268
711.00	12,112	11,475	30,743
712.00	13,443	12,778	43,521
713.00	14,831	14,137	57,658
714.00	16,275	15,553	73,211
715.00	17,776	17,026	90,236

Device	Routing	Invert	Outlet Devices
#1	Primary	705.61'	**3.4" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	709.47'	**16.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

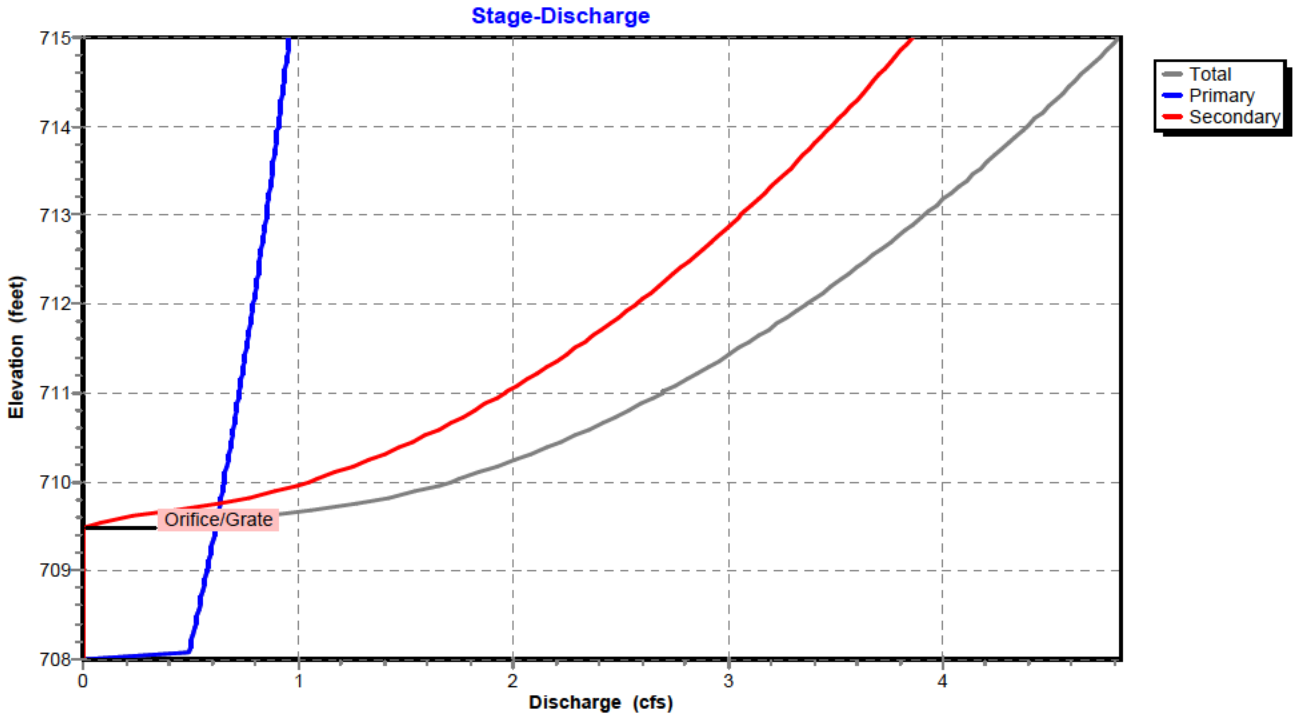
Primary OutFlow Max=0.62 cfs @ 14.66 hrs HW=709.47' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.62 cfs @ 9.77 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=708.00' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

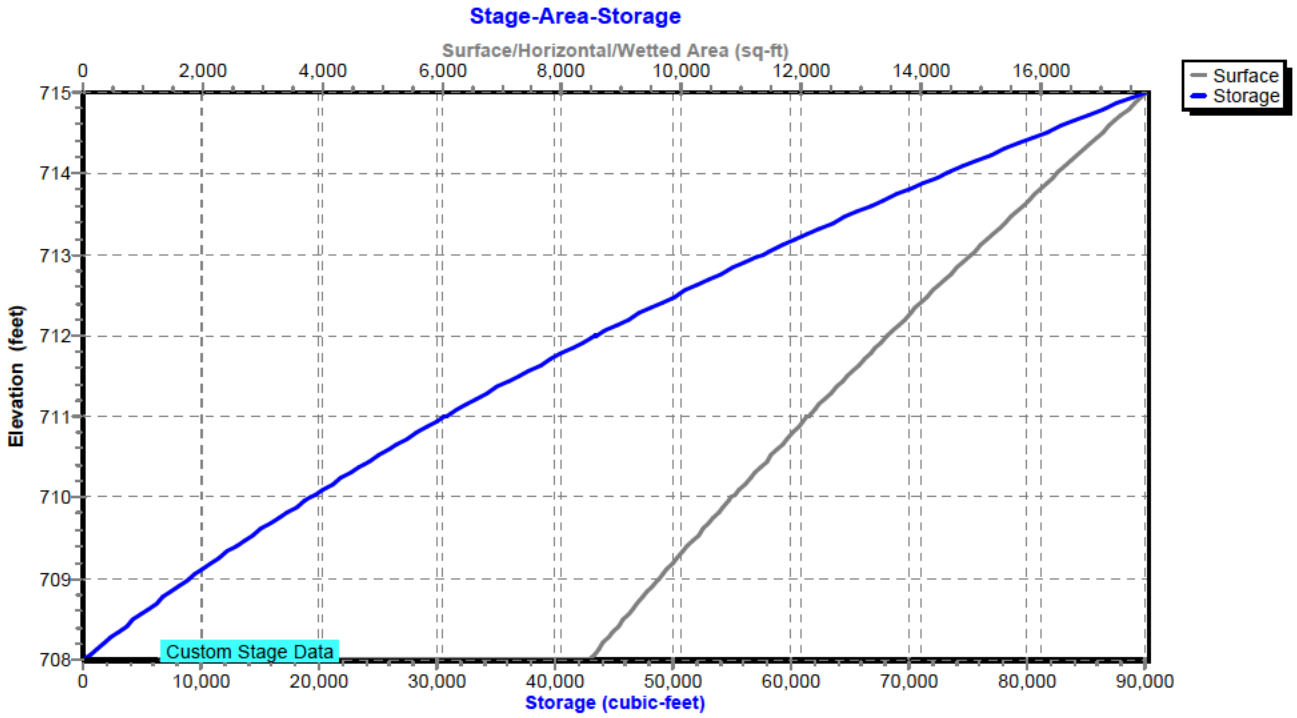
Pond Pond A: Pond A



Pond Pond A: Pond A



Pond Pond A: Pond A



Hydrograph for Pond Pond A: Pond A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	708.00	0.00	0.00	**0.00**
5.00	**0.42**	462	708.05	0.38	0.38	0.00
10.00	**0.89**	**12,153**	**709.32**	**0.60**	**0.60**	0.00
15.00	0.61	**13,657**	**709.47**	**0.62**	**0.62**	0.00
20.00	0.49	12,519	709.35	0.61	0.61	0.00
25.00	0.00	8,159	708.91	0.57	0.57	0.00
30.00	0.00	26	708.00	0.02	0.02	0.00
35.00	0.00	0	708.00	0.00	0.00	0.00
40.00	0.00	0	708.00	0.00	0.00	0.00
45.00	0.00	0	708.00	0.00	0.00	0.00
50.00	0.00	0	708.00	0.00	0.00	0.00
55.00	0.00	0	708.00	0.00	0.00	0.00
60.00	0.00	0	708.00	0.00	0.00	0.00
65.00	0.00	0	708.00	0.00	0.00	0.00
70.00	0.00	0	708.00	0.00	0.00	0.00
75.00	0.00	0	708.00	0.00	0.00	0.00
80.00	0.00	0	708.00	0.00	0.00	0.00
85.00	0.00	0	708.00	0.00	0.00	0.00
90.00	0.00	0	708.00	0.00	0.00	0.00
95.00	0.00	0	708.00	0.00	0.00	0.00
100.00	0.00	0	708.00	0.00	0.00	0.00
105.00	0.00	0	708.00	0.00	0.00	0.00
110.00	0.00	0	708.00	0.00	0.00	0.00
115.00	0.00	0	708.00	0.00	0.00	0.00
120.00	0.00	0	708.00	0.00	0.00	0.00
125.00	0.00	0	708.00	0.00	0.00	0.00
130.00	0.00	0	708.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond A: Pond A

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
708.00	0.00	0.00	0.00
708.10	0.50	0.50	0.00
708.20	0.50	0.50	0.00
708.30	0.51	0.51	0.00
708.40	0.52	0.52	0.00
708.50	0.53	0.53	0.00
708.60	0.54	0.54	0.00
708.70	0.55	0.55	0.00
708.80	0.56	0.56	0.00
708.90	0.57	0.57	0.00
709.00	0.58	0.58	0.00
709.10	0.59	0.59	0.00
709.20	0.59	0.59	0.00
709.30	0.60	0.60	0.00
709.40	0.61	0.61	0.00
709.50	0.64	0.62	0.02
709.60	0.83	0.63	0.21
709.70	1.12	0.63	0.49
709.80	1.38	0.64	0.74
709.90	1.56	0.65	0.91
710.00	1.71	0.66	1.05
710.10	1.84	0.66	1.18
710.20	1.96	0.67	1.29
710.30	2.07	0.68	1.39
710.40	2.17	0.69	1.49
710.50	2.27	0.69	1.58
710.60	2.36	0.70	1.66
710.70	2.45	0.71	1.74
710.80	2.53	0.71	1.82
710.90	2.62	0.72	1.89
711.00	2.69	0.73	1.97
711.10	2.77	0.74	2.03
711.20	2.84	0.74	2.10
711.30	2.91	0.75	2.17
711.40	2.98	0.75	2.23
711.50	3.05	0.76	2.29
711.60	3.12	0.77	2.35
711.70	3.18	0.77	2.41
711.80	3.24	0.78	2.46
711.90	3.30	0.79	2.52
712.00	3.36	0.79	2.57
712.10	3.42	0.80	2.62
712.20	3.48	0.81	2.68
712.30	3.54	0.81	2.73
712.40	3.59	0.82	2.78
712.50	3.65	0.82	2.83
712.60	3.70	0.83	2.87
712.70	3.76	0.84	2.92
712.80	3.81	0.84	2.97
712.90	3.86	0.85	3.01
713.00	3.91	0.85	3.06
713.10	3.96	0.86	3.10
713.20	4.01	0.86	3.15
713.30	4.06	0.87	3.19
713.40	4.11	0.88	3.23
713.50	4.16	0.88	3.28
713.60	4.21	0.89	3.32
713.70	4.25	0.89	3.36
713.80	4.30	0.90	3.40
713.90	4.34	0.90	3.44
714.00	4.39	0.91	3.48
714.10	4.43	0.91	3.52
714.20	4.48	0.92	3.56
714.30	4.52	0.92	3.60
714.40	4.57	0.93	3.64
714.50	4.61	0.94	3.67
714.60	4.65	0.94	3.71
714.70	4.69	0.95	3.75
714.80	4.73	0.95	3.78
714.90	4.78	0.96	3.82
715.00	**4.82**	**0.96**	**3.86**

Stage-Area-Storage for Pond Pond A: Pond A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
708.00	8,458	0
708.10	8,574	852
708.20	8,690	1,715
708.30	8,807	2,590
708.40	8,923	3,476
708.50	9,039	4,374
708.60	9,155	5,284
708.70	9,271	6,205
708.80	9,388	7,138
708.90	9,504	8,083
709.00	9,620	9,039
709.10	9,742	10,007
709.20	9,864	10,987
709.30	9,985	11,980
709.40	10,107	12,984
709.50	10,229	14,001
709.60	10,351	15,030
709.70	10,473	16,071
709.80	10,594	17,125
709.90	10,716	18,190
710.00	10,838	19,268
710.10	10,965	20,358
710.20	11,093	21,461
710.30	11,220	22,577
710.40	11,348	23,705
710.50	11,475	24,846
710.60	11,602	26,000
710.70	11,730	27,167
710.80	11,857	28,346
710.90	11,985	29,538
711.00	12,112	30,743
711.10	12,245	31,961
711.20	12,378	33,192
711.30	12,511	34,436
711.40	12,644	35,694
711.50	12,778	36,965
711.60	12,911	38,250
711.70	13,044	39,547
711.80	13,177	40,859
711.90	13,310	42,183
712.00	13,443	43,521
712.10	13,582	44,872
712.20	13,721	46,237
712.30	13,859	47,616
712.40	13,998	49,009
712.50	14,137	50,416
712.60	14,276	51,836
712.70	14,415	53,271
712.80	14,553	54,719
712.90	14,692	56,181
713.00	14,831	57,658
713.10	14,975	59,148
713.20	15,120	60,653
713.30	15,264	62,172
713.40	15,409	63,705
713.50	15,553	65,254
713.60	15,697	66,816
713.70	15,842	68,393
713.80	15,986	69,984
713.90	16,131	71,590
714.00	16,275	73,211
714.10	16,425	74,846
714.20	16,575	76,496
714.30	16,725	78,161
714.40	16,875	79,841
714.50	17,026	81,536
714.60	17,176	83,246
714.70	17,326	84,971
714.80	17,476	86,711
714.90	17,626	88,466
715.00	**17,776**	**90,236**

Summary for Pond Pond B: Pond B

Inflow Area =	293,369 sf,	49.49% Impervious,	Inflow Depth =	1.83"	for 2-Year event
Inflow =	2.93 cfs @	7.92 hrs,	Volume=	44,694 cf	
Outflow =	0.69 cfs @	10.38 hrs,	Volume=	44,694 cf,	Atten= 77%, Lag= 147.5 min
Primary =	0.69 cfs @	10.38 hrs,	Volume=	44,694 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 709.30' @ 10.38 hrs Surf.Area= 6,564 sf Storage= 7,689 cf

Plug-Flow detention time= 104.4 min calculated for 44,691 cf (100% of inflow)
Center-of-Mass det. time= 104.4 min (824.4 - 720.0)

Volume	Invert	Avail.Storage	Storage Description
#1	708.00'	50,732 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

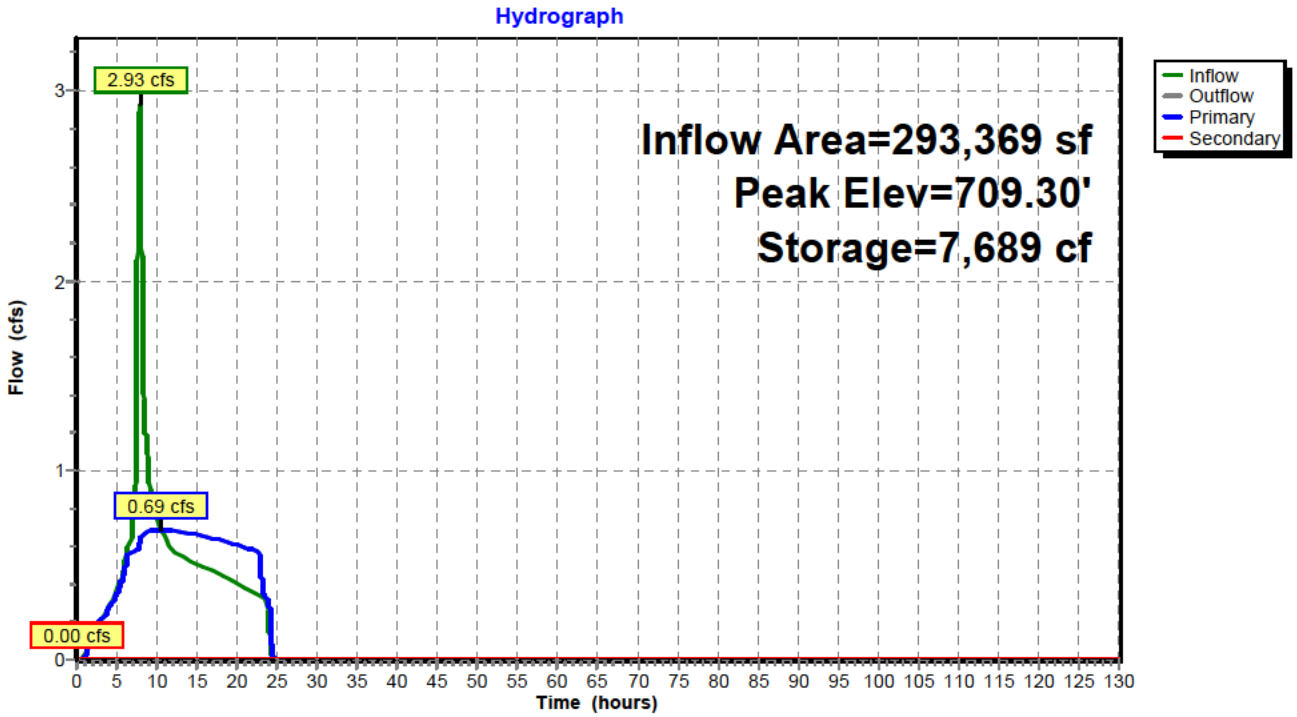
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
708.00	5,287	0	0
709.00	6,257	5,772	5,772
710.00	7,283	6,770	12,542
711.00	8,366	7,825	20,367
712.00	9,505	8,936	29,302
713.00	10,701	10,103	39,405
714.00	11,953	11,327	50,732

Device	Routing	Invert	Outlet Devices
#1	Primary	705.50'	**3.6" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	709.30'	**14.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

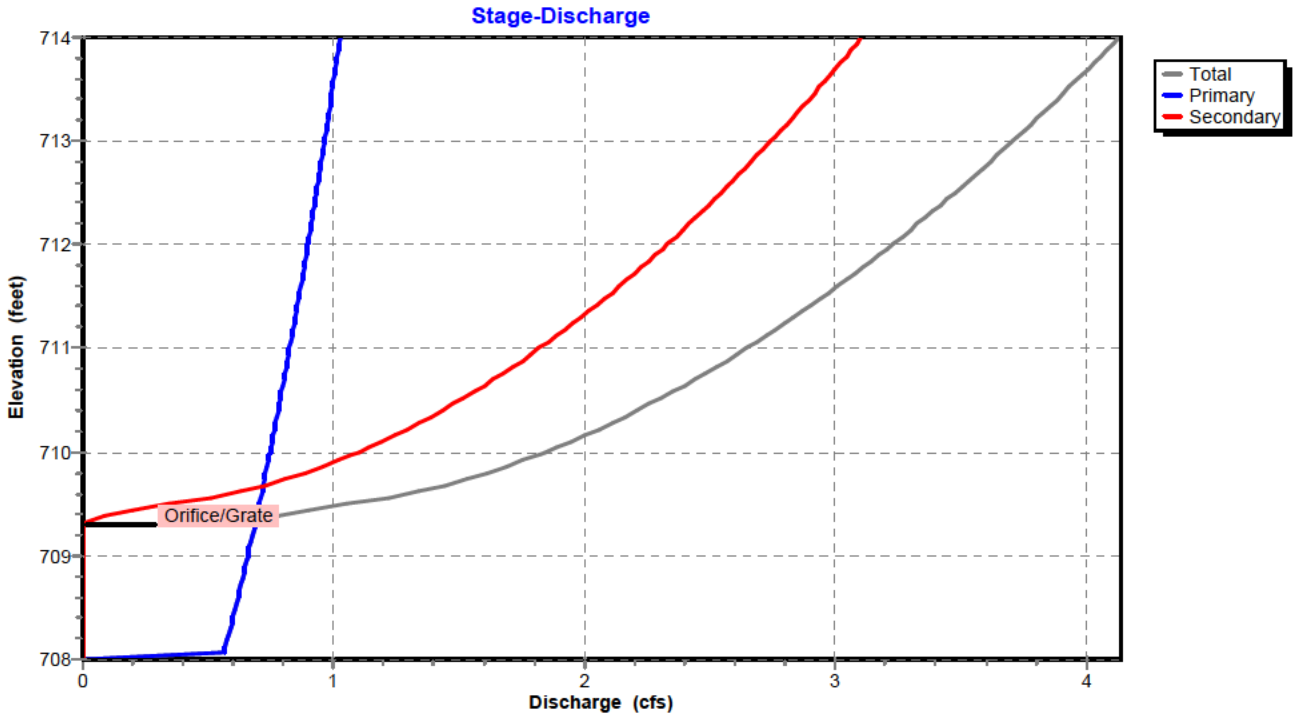
Primary OutFlow Max=0.69 cfs @ 10.38 hrs HW=709.30' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.69 cfs @ 9.70 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=708.00' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

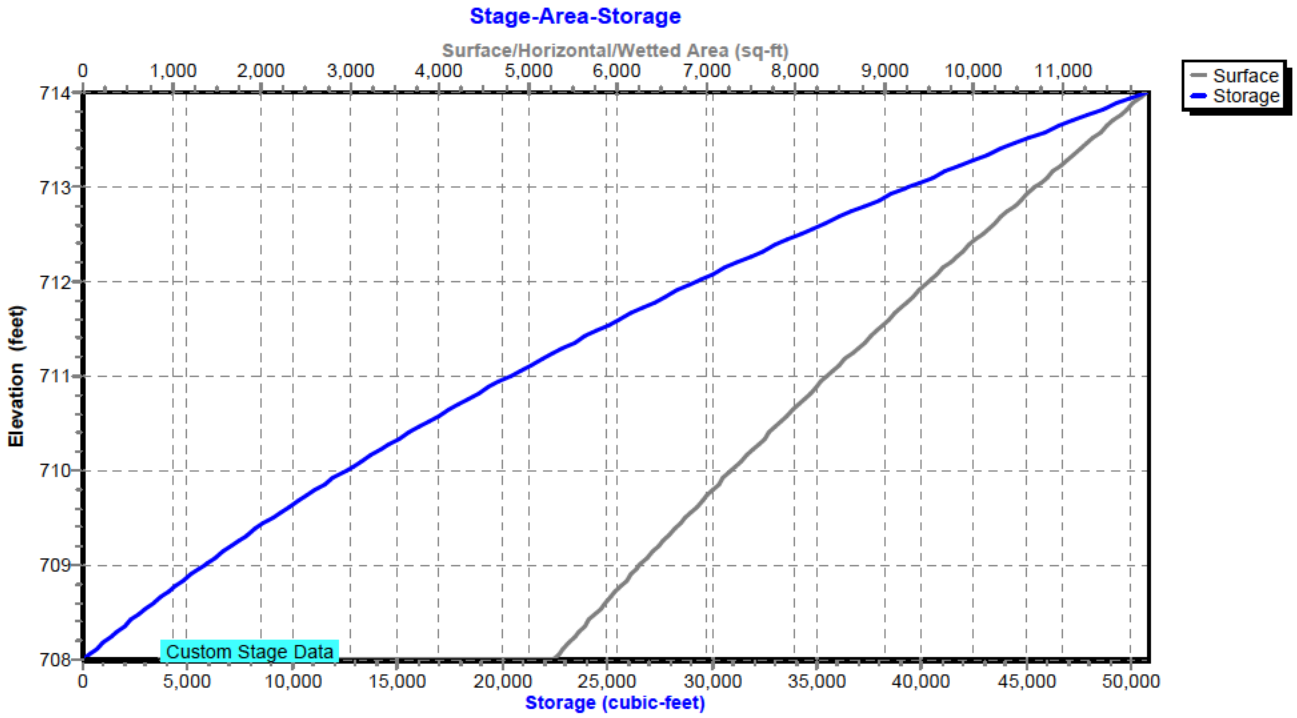
Pond Pond B: Pond B



Pond Pond B: Pond B



Pond Pond B: Pond B



Hydrograph for Pond Pond B: Pond B

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	708.00	0.00	0.00	**0.00**
5.00	**0.36**	196	708.04	0.35	0.35	0.00
10.00	**0.74**	**7,657**	**709.29**	**0.69**	**0.69**	0.00
15.00	0.50	**5,885**	**709.02**	**0.66**	**0.66**	0.00
20.00	0.40	2,631	708.48	0.61	0.61	0.00
25.00	0.00	1	708.00	0.00	0.00	0.00
30.00	0.00	0	708.00	0.00	0.00	0.00
35.00	0.00	0	708.00	0.00	0.00	0.00
40.00	0.00	0	708.00	0.00	0.00	0.00
45.00	0.00	0	708.00	0.00	0.00	0.00
50.00	0.00	0	708.00	0.00	0.00	0.00
55.00	0.00	0	708.00	0.00	0.00	0.00
60.00	0.00	0	708.00	0.00	0.00	0.00
65.00	0.00	0	708.00	0.00	0.00	0.00
70.00	0.00	0	708.00	0.00	0.00	0.00
75.00	0.00	0	708.00	0.00	0.00	0.00
80.00	0.00	0	708.00	0.00	0.00	0.00
85.00	0.00	0	708.00	0.00	0.00	0.00
90.00	0.00	0	708.00	0.00	0.00	0.00
95.00	0.00	0	708.00	0.00	0.00	0.00
100.00	0.00	0	708.00	0.00	0.00	0.00
105.00	0.00	0	708.00	0.00	0.00	0.00
110.00	0.00	0	708.00	0.00	0.00	0.00
115.00	0.00	0	708.00	0.00	0.00	0.00
120.00	0.00	0	708.00	0.00	0.00	0.00
125.00	0.00	0	708.00	0.00	0.00	0.00
130.00	0.00	0	708.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond B: Pond B

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
708.00	0.00	0.00	0.00
708.10	0.57	0.57	0.00
708.20	0.58	0.58	0.00
708.30	0.59	0.59	0.00
708.40	0.60	0.60	0.00
708.50	0.61	0.61	0.00
708.60	0.62	0.62	0.00
708.70	0.63	0.63	0.00
708.80	0.64	0.64	0.00
708.90	0.65	0.65	0.00
709.00	0.66	0.66	0.00
709.10	0.67	0.67	0.00
709.20	0.68	0.68	0.00
709.30	0.69	0.69	0.00
709.40	0.82	0.69	0.12
709.50	1.05	0.70	0.35
709.60	1.30	0.71	0.59
709.70	1.47	0.72	0.75
709.80	1.61	0.73	0.88
709.90	1.73	0.74	1.00
710.00	1.84	0.75	1.10
710.10	1.94	0.75	1.19
710.20	2.04	0.76	1.28
710.30	2.13	0.77	1.36
710.40	2.21	0.78	1.43
710.50	2.29	0.79	1.50
710.60	2.37	0.79	1.57
710.70	2.44	0.80	1.64
710.80	2.51	0.81	1.70
710.90	2.58	0.82	1.76
711.00	2.65	0.82	1.82
711.10	2.71	0.83	1.88
711.20	2.77	0.84	1.93
711.30	2.83	0.85	1.99
711.40	2.89	0.85	2.04
711.50	2.95	0.86	2.09
711.60	3.01	0.87	2.14
711.70	3.06	0.88	2.19
711.80	3.12	0.88	2.24
711.90	3.17	0.89	2.28
712.00	3.23	0.90	2.33
712.10	3.28	0.90	2.37
712.20	3.33	0.91	2.42
712.30	3.38	0.92	2.46
712.40	3.43	0.92	2.50
712.50	3.48	0.93	2.54
712.60	3.52	0.94	2.59
712.70	3.57	0.94	2.63
712.80	3.62	0.95	2.67
712.90	3.66	0.96	2.71
713.00	3.71	0.96	2.74
713.10	3.75	0.97	2.78
713.20	3.80	0.98	2.82
713.30	3.84	0.98	2.86
713.40	3.88	0.99	2.89
713.50	3.92	0.99	2.93
713.60	3.97	1.00	2.97
713.70	4.01	1.01	3.00
713.80	4.05	1.01	3.04
713.90	4.09	1.02	3.07
714.00	**4.13**	**1.03**	**3.10**

Stage-Area-Storage for Pond Pond B: Pond B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
708.00	5,287	0
708.10	5,384	534
708.20	5,481	1,077
708.30	5,578	1,630
708.40	5,675	2,192
708.50	5,772	2,765
708.60	5,869	3,347
708.70	5,966	3,939
708.80	6,063	4,540
708.90	6,160	5,151
709.00	6,257	5,772
709.10	6,360	6,403
709.20	6,462	7,044
709.30	6,565	7,695
709.40	6,667	8,357
709.50	6,770	9,029
709.60	6,873	9,711
709.70	6,975	10,403
709.80	7,078	11,106
709.90	7,180	11,819
710.00	7,283	12,542
710.10	7,391	13,276
710.20	7,500	14,020
710.30	7,608	14,776
710.40	7,716	15,542
710.50	7,825	16,319
710.60	7,933	17,107
710.70	8,041	17,905
710.80	8,149	18,715
710.90	8,258	19,535
711.00	8,366	20,367
711.10	8,480	21,209
711.20	8,594	22,062
711.30	8,708	22,928
711.40	8,822	23,804
711.50	8,936	24,692
711.60	9,049	25,591
711.70	9,163	26,502
711.80	9,277	27,424
711.90	9,391	28,357
712.00	9,505	29,302
712.10	9,625	30,258
712.20	9,744	31,227
712.30	9,864	32,207
712.40	9,983	33,200
712.50	10,103	34,204
712.60	10,223	35,220
712.70	10,342	36,249
712.80	10,462	37,289
712.90	10,581	38,341
713.00	10,701	39,405
713.10	10,826	40,481
713.20	10,951	41,570
713.30	11,077	42,672
713.40	11,202	43,786
713.50	11,327	44,912
713.60	11,452	46,051
713.70	11,577	47,202
713.80	11,703	48,366
713.90	11,828	49,543
714.00	**11,953**	**50,732**

Summary for Pond Pond C: Pond C

Inflow Area =	686,331 sf,	9.64% Impervious,	Inflow Depth >	7.79"	for 2-Year event
Inflow =	4.05 cfs @	8.00 hrs,	Volume=	445,550 cf,	Incl. 0.80 cfs Base Flow
Outflow =	1.82 cfs @	13.48 hrs,	Volume=	444,989 cf,	Atten= 55%, Lag= 328.4 min
Primary =	1.82 cfs @	13.48 hrs,	Volume=	444,986 cf	
Secondary =	0.00 cfs @	13.48 hrs,	Volume=	3 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 704.69' @ 13.48 hrs Surf.Area= 19,392 sf Storage= 13,024 cf

Plug-Flow detention time= 34.6 min calculated for 444,984 cf (100% of inflow)
Center-of-Mass det. time= 29.0 min (3,437.3 - 3,408.3)

Volume	Invert	Avail.Storage	Storage Description
#1	704.00'	140,242 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

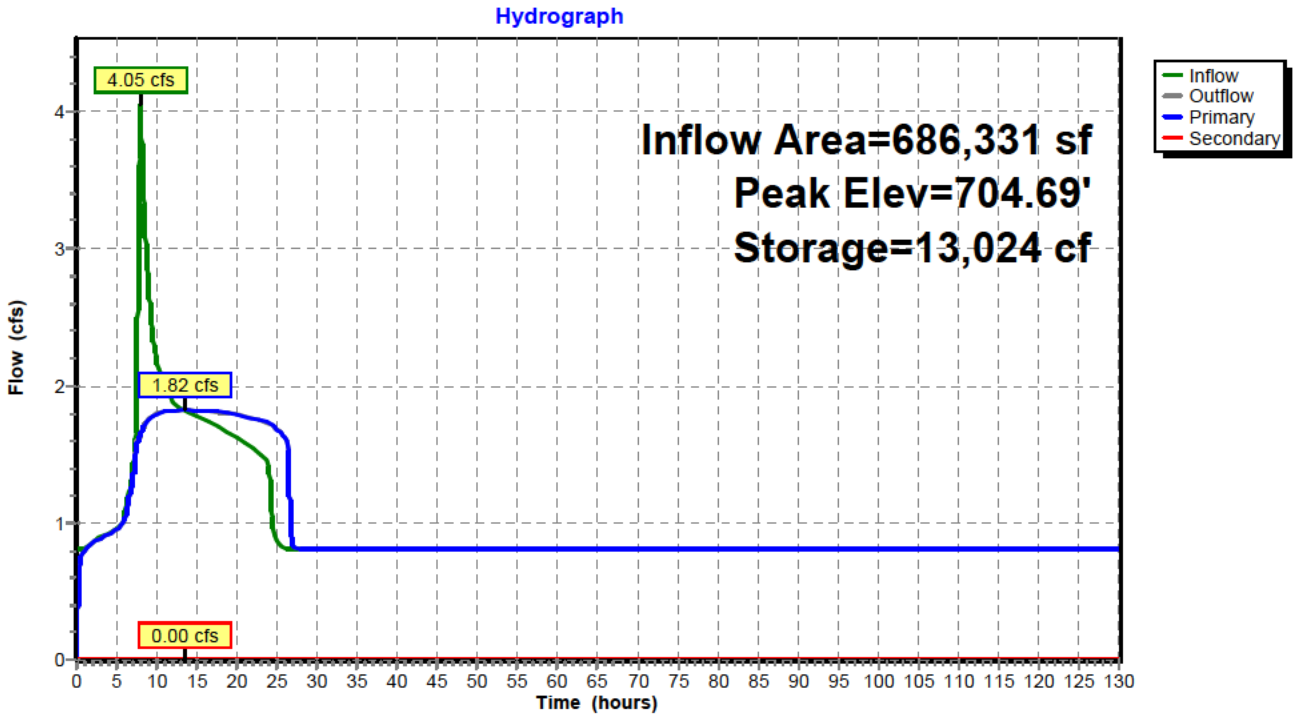
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
704.00	18,277	0	0
705.00	19,889	19,083	19,083
706.00	21,558	20,724	39,807
707.00	23,284	22,421	62,228
708.00	25,067	24,176	86,403
709.00	26,905	25,986	112,389
710.00	28,801	27,853	140,242

Device	Routing	Invert	Outlet Devices
#1	Primary	702.00'	**6.4" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	704.69'	**16.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

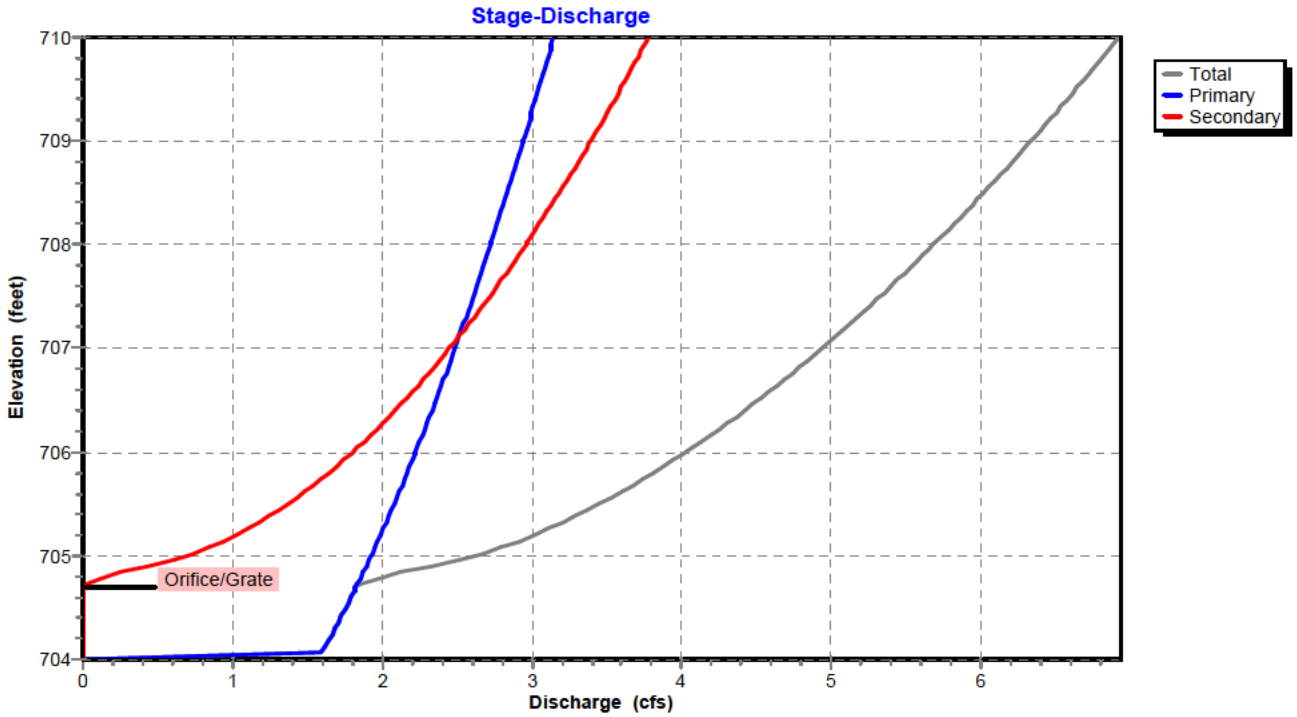
Primary OutFlow Max=1.82 cfs @ 13.48 hrs HW=704.69' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 1.82 cfs @ 8.16 fps)

Secondary OutFlow Max=0.00 cfs @ 13.48 hrs HW=704.69' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.13 fps)

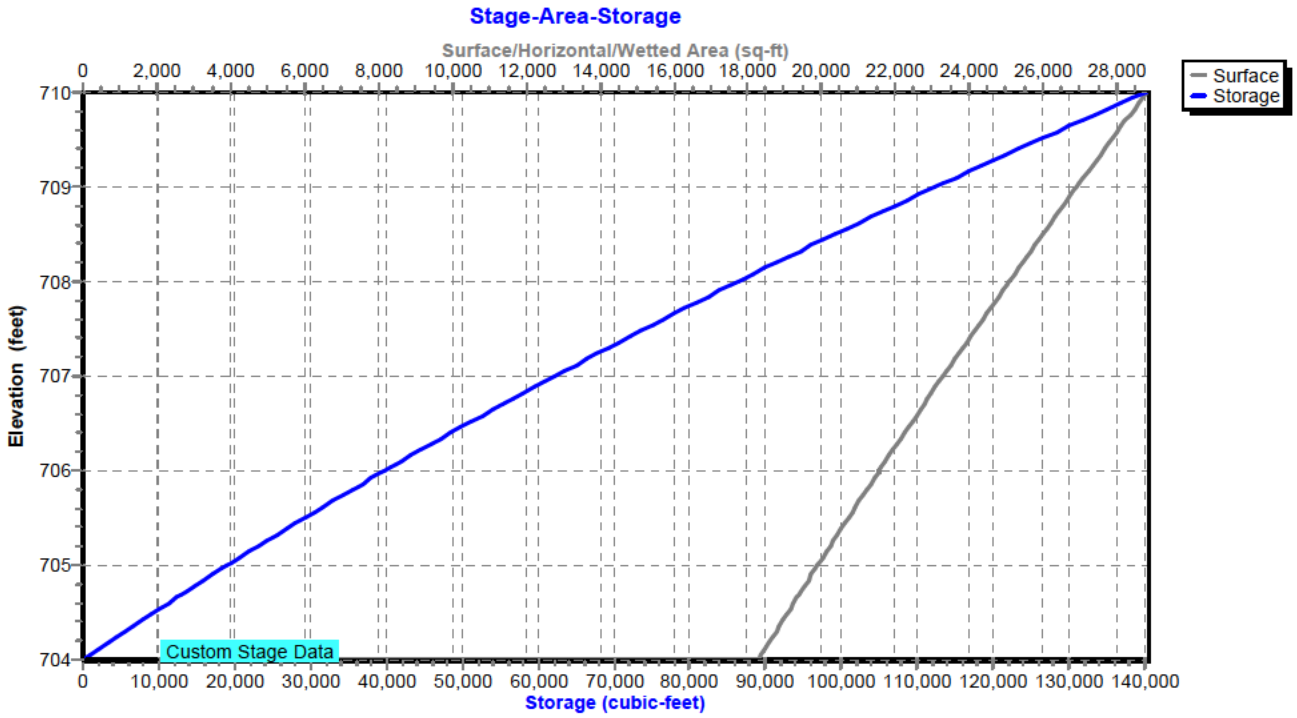
Pond Pond C: Pond C



Pond Pond C: Pond C



Pond Pond C: Pond C



Hydrograph for Pond Pond C: Pond C

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.80	5	704.00	0.01	0.01	0.00
5.00	**0.96**	656	704.04	0.95	0.95	0.00
10.00	**2.19**	**11,478**	**704.61**	**1.80**	**1.80**	**0.00**
15.00	1.78	**12,873**	**704.68**	**1.82**	**1.82**	**0.00**
20.00	1.62	11,035	704.59	1.79	1.79	0.00
25.00	0.86	5,338	704.29	1.68	1.68	0.00
30.00	0.80	551	704.03	0.80	0.80	0.00
35.00	0.80	551	704.03	0.80	0.80	0.00
40.00	0.80	551	704.03	0.80	0.80	0.00
45.00	0.80	551	704.03	0.80	0.80	0.00
50.00	0.80	551	704.03	0.80	0.80	0.00
55.00	0.80	551	704.03	0.80	0.80	0.00
60.00	0.80	551	704.03	0.80	0.80	0.00
65.00	0.80	551	704.03	0.80	0.80	0.00
70.00	0.80	551	704.03	0.80	0.80	0.00
75.00	0.80	551	704.03	0.80	0.80	0.00
80.00	0.80	551	704.03	0.80	0.80	0.00
85.00	0.80	551	704.03	0.80	0.80	0.00
90.00	0.80	551	704.03	0.80	0.80	0.00
95.00	0.80	551	704.03	0.80	0.80	0.00
100.00	0.80	551	704.03	0.80	0.80	0.00
105.00	0.80	551	704.03	0.80	0.80	0.00
110.00	0.80	551	704.03	0.80	0.80	0.00
115.00	0.80	551	704.03	0.80	0.80	0.00
120.00	0.80	551	704.03	0.80	0.80	0.00
125.00	0.80	551	704.03	0.80	0.80	0.00
130.00	0.80	551	704.03	0.80	0.80	0.00

Stage-Discharge for Pond Pond C: Pond C

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
704.00	0.00	0.00	0.00
704.10	1.61	1.61	0.00
704.20	1.65	1.65	0.00
704.30	1.69	1.69	0.00
704.40	1.72	1.72	0.00
704.50	1.76	1.76	0.00
704.60	1.79	1.79	0.00
704.70	1.83	1.83	0.00
704.80	2.02	1.86	0.16
704.90	2.32	1.89	0.43
705.00	2.62	1.93	0.70
705.10	2.84	1.96	0.88
705.20	3.01	1.99	1.02
705.30	3.17	2.02	1.15
705.40	3.32	2.05	1.27
705.50	3.45	2.08	1.37
705.60	3.58	2.11	1.47
705.70	3.70	2.14	1.56
705.80	3.81	2.17	1.64
705.90	3.92	2.20	1.73
706.00	4.03	2.22	1.80
706.10	4.13	2.25	1.88
706.20	4.23	2.28	1.95
706.30	4.33	2.30	2.02
706.40	4.42	2.33	2.09
706.50	4.51	2.36	2.15
706.60	4.60	2.38	2.22
706.70	4.69	2.41	2.28
706.80	4.77	2.44	2.34
706.90	4.85	2.46	2.39
707.00	4.94	2.49	2.45
707.10	5.02	2.51	2.51
707.20	5.10	2.53	2.56
707.30	5.17	2.56	2.61
707.40	5.25	2.58	2.67
707.50	5.32	2.61	2.72
707.60	5.40	2.63	2.77
707.70	5.47	2.65	2.82
707.80	5.54	2.68	2.87
707.90	5.61	2.70	2.91
708.00	5.68	2.72	2.96
708.10	5.75	2.75	3.01
708.20	5.82	2.77	3.05
708.30	5.89	2.79	3.10
708.40	5.95	2.81	3.14
708.50	6.02	2.83	3.18
708.60	6.08	2.86	3.23
708.70	6.15	2.88	3.27
708.80	6.21	2.90	3.31
708.90	6.27	2.92	3.35
709.00	6.33	2.94	3.39
709.10	6.39	2.96	3.43
709.20	6.46	2.98	3.47
709.30	6.52	3.00	3.51
709.40	6.57	3.02	3.55
709.50	6.63	3.04	3.59
709.60	6.69	3.06	3.63
709.70	6.75	3.08	3.67
709.80	6.81	3.10	3.70
709.90	6.86	3.12	3.74
710.00	**6.92**	**3.14**	**3.78**

Stage-Area-Storage for Pond Pond C: Pond C

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
704.00	18,277	0
704.10	18,438	1,836
704.20	18,599	3,688
704.30	18,761	5,556
704.40	18,922	7,440
704.50	19,083	9,340
704.60	19,244	11,256
704.70	19,405	13,189
704.80	19,567	15,137
704.90	19,728	17,102
705.00	19,889	19,083
705.10	20,056	21,080
705.20	20,223	23,094
705.30	20,390	25,125
705.40	20,557	27,172
705.50	20,724	29,236
705.60	20,890	31,317
705.70	21,057	33,414
705.80	21,224	35,528
705.90	21,391	37,659
706.00	21,558	39,807
706.10	21,731	41,971
706.20	21,903	44,153
706.30	22,076	46,352
706.40	22,248	48,568
706.50	22,421	50,801
706.60	22,594	53,052
706.70	22,766	55,320
706.80	22,939	57,605
706.90	23,111	59,908
707.00	23,284	62,228
707.10	23,462	64,565
707.20	23,641	66,920
707.30	23,819	69,293
707.40	23,997	71,684
707.50	24,176	74,092
707.60	24,354	76,519
707.70	24,532	78,963
707.80	24,710	81,425
707.90	24,889	83,905
708.00	25,067	86,403
708.10	25,251	88,919
708.20	25,435	91,453
708.30	25,618	94,006
708.40	25,802	96,577
708.50	25,986	99,166
708.60	26,170	101,774
708.70	26,354	104,400
708.80	26,537	107,045
708.90	26,721	109,708
709.00	26,905	112,389
709.10	27,095	115,089
709.20	27,284	117,808
709.30	27,474	120,546
709.40	27,663	123,303
709.50	27,853	126,079
709.60	28,043	128,873
709.70	28,232	131,687
709.80	28,422	134,520
709.90	28,611	137,371
710.00	**28,801**	**140,242**

Summary for Pond Pond D: Pond D

Inflow Area =	372,494 sf,	24.46% Impervious,	Inflow Depth =	1.46"	for 2-Year event
Inflow =	2.83 cfs @	7.96 hrs,	Volume=	45,350 cf	
Outflow =	0.88 cfs @	9.33 hrs,	Volume=	45,350 cf,	Atten= 69%, Lag= 82.2 min
Primary =	0.88 cfs @	9.33 hrs,	Volume=	45,349 cf	
Secondary =	0.00 cfs @	9.33 hrs,	Volume=	2 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.08' @ 9.33 hrs Surf.Area= 5,475 sf Storage= 5,373 cf

Plug-Flow detention time= 43.5 min calculated for 45,350 cf (100% of inflow)
Center-of-Mass det. time= 43.5 min (807.8 - 764.4)

Volume	Invert	Avail.Storage	Storage Description
#1	693.00'	45,136 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

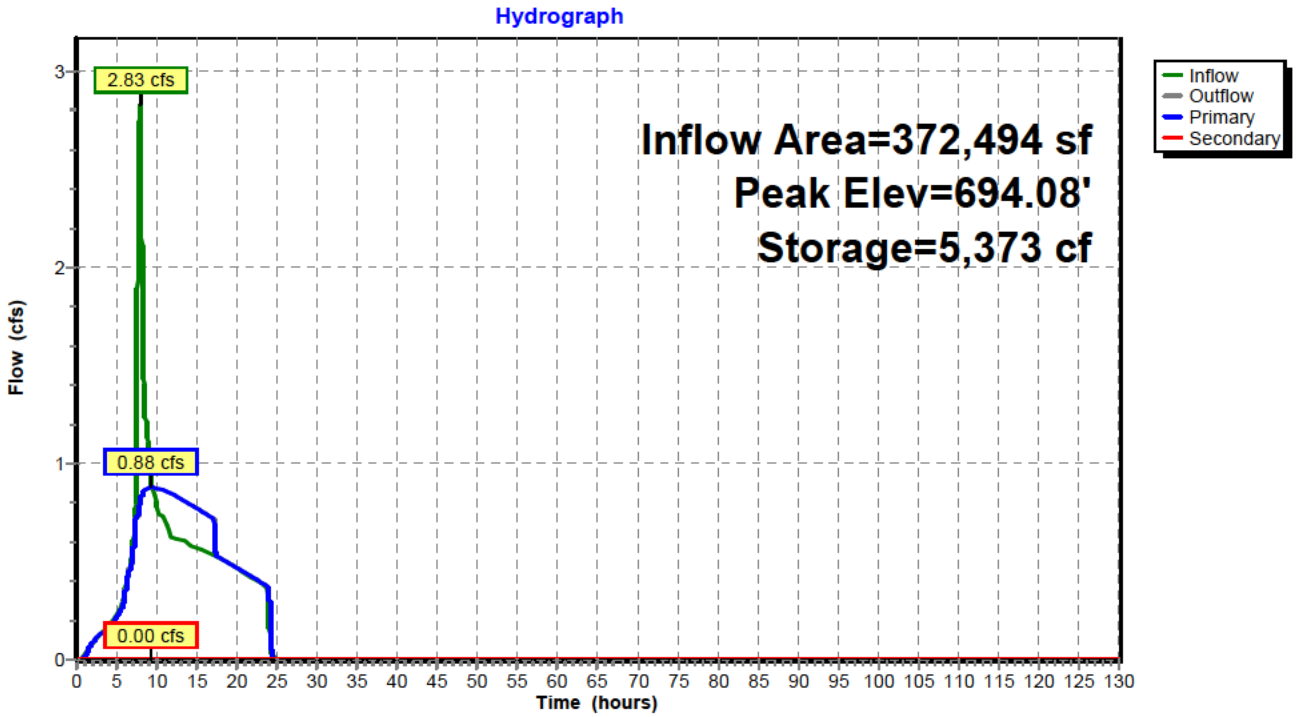
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
693.00	4,458	0	0
694.00	5,393	4,926	4,926
695.00	6,385	5,889	10,815
696.00	7,433	6,909	17,724
697.00	8,538	7,986	25,709
698.00	9,699	9,119	34,828
699.00	10,917	10,308	45,136

Device	Routing	Invert	Outlet Devices
#1	Primary	691.00'	**4.3" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	694.08'	**15.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

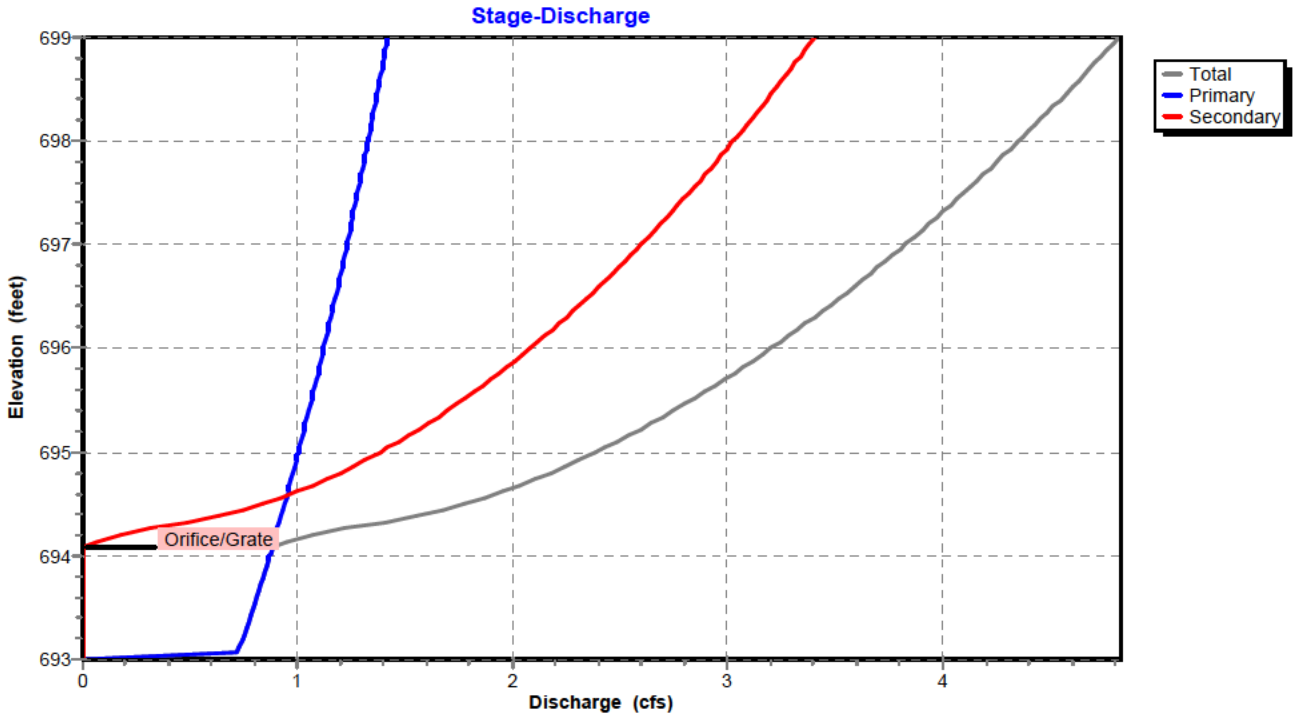
Primary OutFlow Max=0.88 cfs @ 9.33 hrs HW=694.08' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.88 cfs @ 8.74 fps)

Secondary OutFlow Max=0.00 cfs @ 9.33 hrs HW=694.08' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.16 fps)

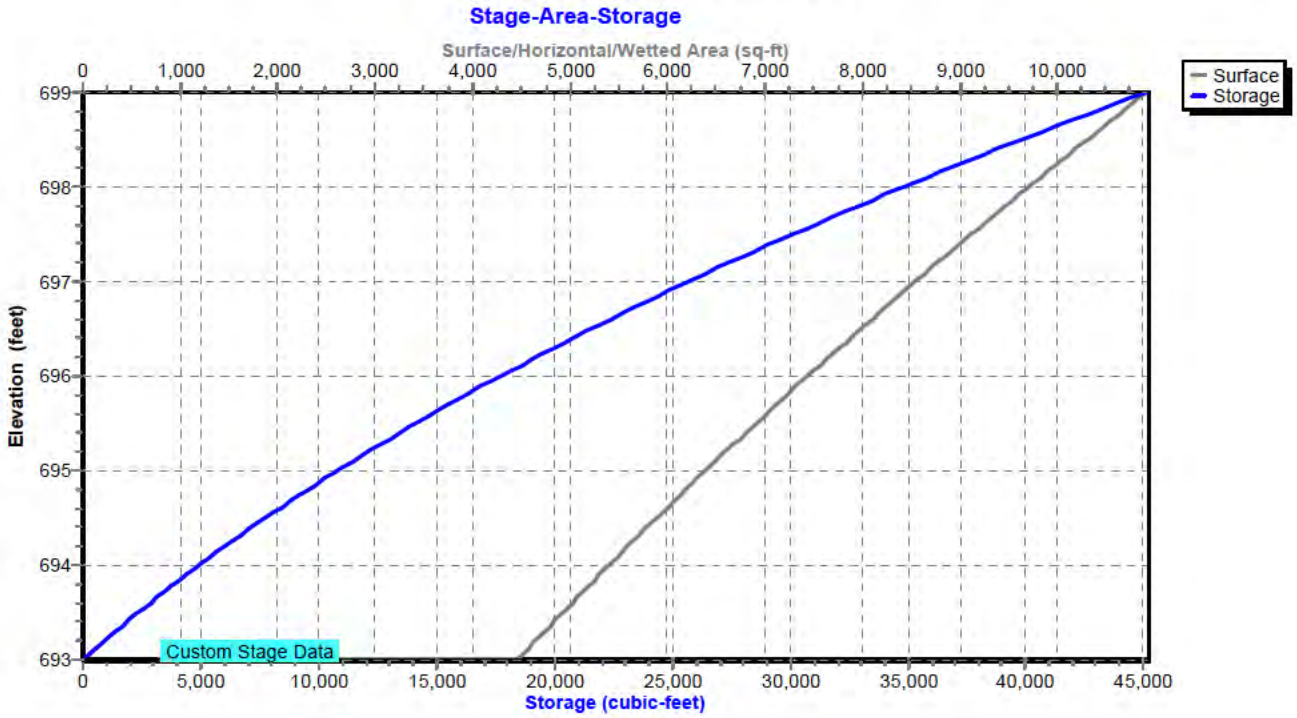
Pond Pond D: Pond D



Pond Pond D: Pond D



Pond Pond D: Pond D



Hydrograph for Pond Pond D: Pond D

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	693.00	0.00	0.00	0.00
5.00	**0.23**	**82**	**693.02**	**0.22**	**0.22**	**0.00**
10.00	**0.80**	**5,260**	**694.06**	**0.88**	**0.88**	**0.00**
15.00	0.57	1,768	693.38	0.77	0.77	0.00
20.00	0.47	175	693.04	0.47	0.47	0.00
25.00	0.00	0	693.00	0.00	0.00	0.00
30.00	0.00	0	693.00	0.00	0.00	0.00
35.00	0.00	0	693.00	0.00	0.00	0.00
40.00	0.00	0	693.00	0.00	0.00	0.00
45.00	0.00	0	693.00	0.00	0.00	0.00
50.00	0.00	0	693.00	0.00	0.00	0.00
55.00	0.00	0	693.00	0.00	0.00	0.00
60.00	0.00	0	693.00	0.00	0.00	0.00
65.00	0.00	0	693.00	0.00	0.00	0.00
70.00	0.00	0	693.00	0.00	0.00	0.00
75.00	0.00	0	693.00	0.00	0.00	0.00
80.00	0.00	0	693.00	0.00	0.00	0.00
85.00	0.00	0	693.00	0.00	0.00	0.00
90.00	0.00	0	693.00	0.00	0.00	0.00
95.00	0.00	0	693.00	0.00	0.00	0.00
100.00	0.00	0	693.00	0.00	0.00	0.00
105.00	0.00	0	693.00	0.00	0.00	0.00
110.00	0.00	0	693.00	0.00	0.00	0.00
115.00	0.00	0	693.00	0.00	0.00	0.00
120.00	0.00	0	693.00	0.00	0.00	0.00
125.00	0.00	0	693.00	0.00	0.00	0.00
130.00	0.00	0	693.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond D: Pond D

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
693.00	0.00	0.00	0.00
693.10	0.73	0.73	0.00
693.20	0.74	0.74	0.00
693.30	0.76	0.76	0.00
693.40	0.78	0.78	0.00
693.50	0.79	0.79	0.00
693.60	0.81	0.81	0.00
693.70	0.82	0.82	0.00
693.80	0.84	0.84	0.00
693.90	0.85	0.85	0.00
694.00	0.87	0.87	0.00
694.10	0.90	0.88	0.01
694.20	1.07	0.90	0.17
694.30	1.34	0.91	0.43
694.40	1.60	0.93	0.67
694.50	1.78	0.94	0.84
694.60	1.93	0.95	0.97
694.70	2.06	0.97	1.09
694.80	2.18	0.98	1.20
694.90	2.29	0.99	1.29
695.00	2.39	1.00	1.38
695.10	2.49	1.02	1.47
695.20	2.58	1.03	1.55
695.30	2.67	1.04	1.63
695.40	2.75	1.05	1.70
695.50	2.83	1.06	1.77
695.60	2.91	1.08	1.84
695.70	2.99	1.09	1.90
695.80	3.06	1.10	1.96
695.90	3.13	1.11	2.02
696.00	3.20	1.12	2.08
696.10	3.27	1.13	2.14
696.20	3.34	1.14	2.20
696.30	3.41	1.16	2.25
696.40	3.47	1.17	2.30
696.50	3.53	1.18	2.36
696.60	3.59	1.19	2.41
696.70	3.65	1.20	2.46
696.80	3.71	1.21	2.50
696.90	3.77	1.22	2.55
697.00	3.83	1.23	2.60
697.10	3.88	1.24	2.65
697.20	3.94	1.25	2.69
697.30	3.99	1.26	2.74
697.40	4.05	1.27	2.78
697.50	4.10	1.28	2.82
697.60	4.15	1.29	2.86
697.70	4.21	1.30	2.91
697.80	4.26	1.31	2.95
697.90	4.31	1.32	2.99
698.00	4.36	1.33	3.03
698.10	4.41	1.34	3.07
698.20	4.45	1.35	3.11
698.30	4.50	1.36	3.15
698.40	4.55	1.36	3.18
698.50	4.60	1.37	3.22
698.60	4.64	1.38	3.26
698.70	4.69	1.39	3.30
698.80	4.73	1.40	3.33
698.90	4.78	1.41	3.37
699.00	**4.82**	**1.42**	**3.40**

Stage-Area-Storage for Pond Pond D: Pond D

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
693.00	4,458	0
693.10	4,552	450
693.20	4,645	910
693.30	4,738	1,379
693.40	4,832	1,858
693.50	4,926	2,346
693.60	5,019	2,843
693.70	5,113	3,350
693.80	5,206	3,866
693.90	5,299	4,391
694.00	5,393	4,926
694.10	5,492	5,470
694.20	5,591	6,024
694.30	5,691	6,588
694.40	5,790	7,162
694.50	5,889	7,746
694.60	5,988	8,340
694.70	6,087	8,944
694.80	6,187	9,557
694.90	6,286	10,181
695.00	6,385	10,815
695.10	6,490	11,458
695.20	6,595	12,112
695.30	6,699	12,777
695.40	6,804	13,452
695.50	6,909	14,138
695.60	7,014	14,834
695.70	7,119	15,541
695.80	7,223	16,258
695.90	7,328	16,985
696.00	7,433	17,724
696.10	7,544	18,472
696.20	7,654	19,232
696.30	7,764	20,003
696.40	7,875	20,785
696.50	7,986	21,578
696.60	8,096	22,382
696.70	8,207	23,197
696.80	8,317	24,023
696.90	8,427	24,861
697.00	8,538	25,709
697.10	8,654	26,569
697.20	8,770	27,440
697.30	8,886	28,323
697.40	9,002	29,217
697.50	9,119	30,123
697.60	9,235	31,041
697.70	9,351	31,970
697.80	9,467	32,911
697.90	9,583	33,863
698.00	9,699	34,828
698.10	9,821	35,803
698.20	9,943	36,792
698.30	10,064	37,792
698.40	10,186	38,805
698.50	10,308	39,829
698.60	10,430	40,866
698.70	10,552	41,915
698.80	10,673	42,976
698.90	10,795	44,050
699.00	**10,917**	**45,136**

Summary for Pond Pond E: Pond E

Inflow Area =	600,189 sf,	3.19% Impervious,	Inflow Depth =	1.15"	for 2-Year event
Inflow =	3.02 cfs @	8.00 hrs, Volume=	57,464 cf		
Outflow =	1.36 cfs @	9.14 hrs, Volume=	57,464 cf,	Atten= 55%,	Lag= 68.3 min
Primary =	1.36 cfs @	9.14 hrs, Volume=	57,464 cf		
Secondary =	0.00 cfs @	9.14 hrs, Volume=	0 cf		

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 713.71' @ 9.14 hrs Surf.Area= 9,967 sf Storage= 6,350 cf

Plug-Flow detention time= 56.8 min calculated for 57,464 cf (100% of inflow)
Center-of-Mass det. time= 56.8 min (888.6 - 831.9)

Volume	Invert	Avail.Storage	Storage Description
#1	713.00'	56,362 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

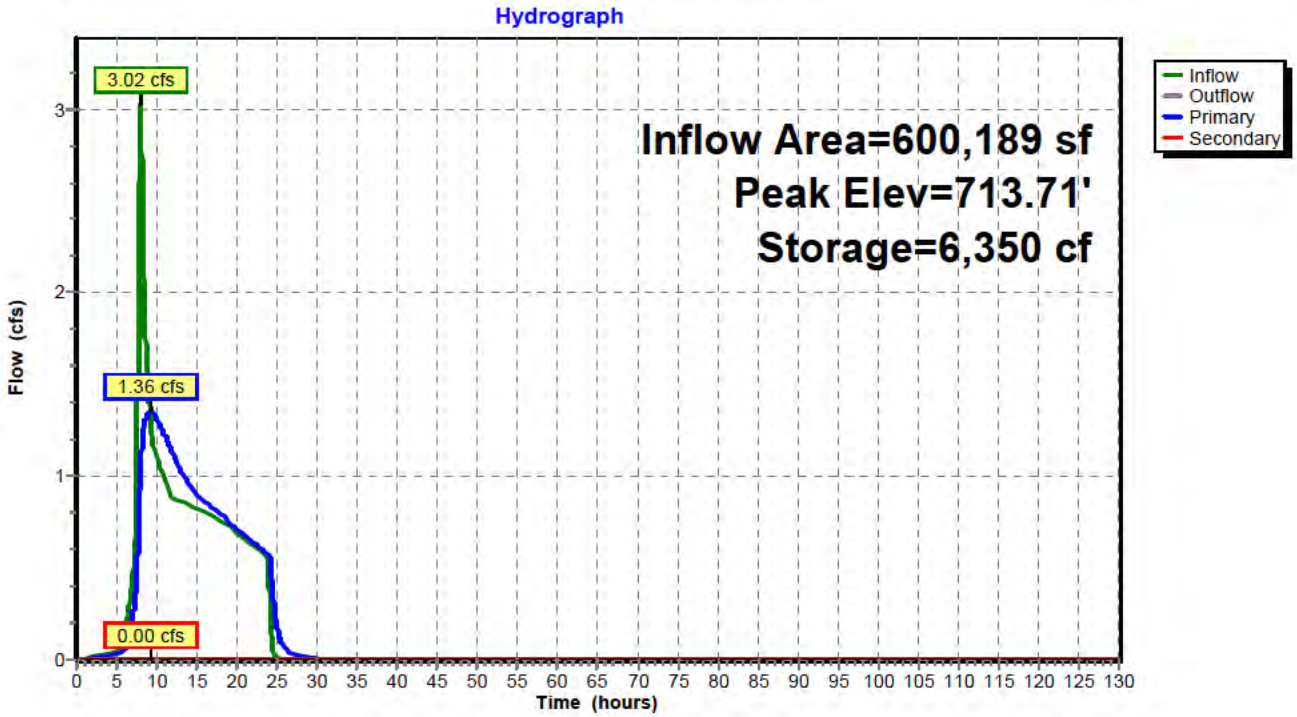
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
713.00	7,916	0	0
714.00	10,804	9,360	9,360
715.00	13,920	12,362	21,722
716.00	17,264	15,592	37,314
717.00	20,832	19,048	56,362

Device	Routing	Invert	Outlet Devices
#1	Primary	713.00'	**7.7" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	713.71'	**16.0" W x 3.0" H Vert. Orifice/Grate X 2.00** C= 0.620

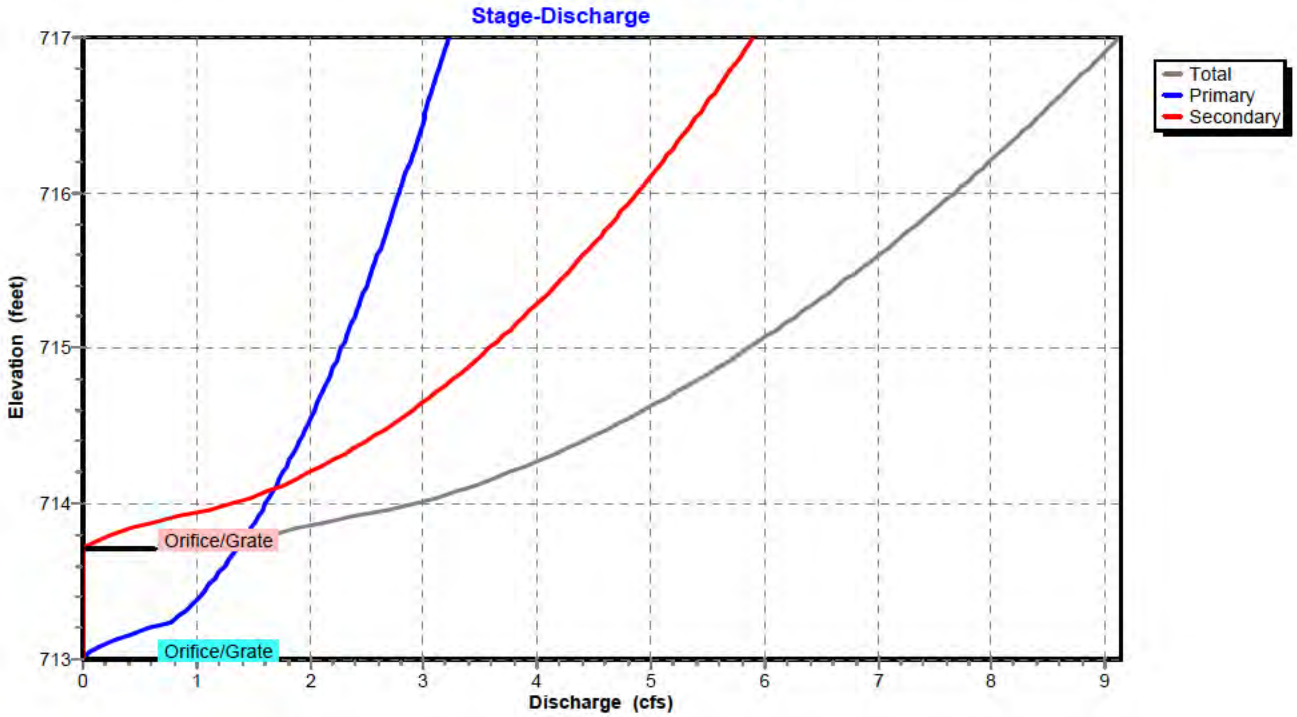
Primary OutFlow Max=1.36 cfs @ 9.14 hrs HW=713.71' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 1.36 cfs @ 4.19 fps)

Secondary OutFlow Max=0.00 cfs @ 9.14 hrs HW=713.71' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.05 fps)

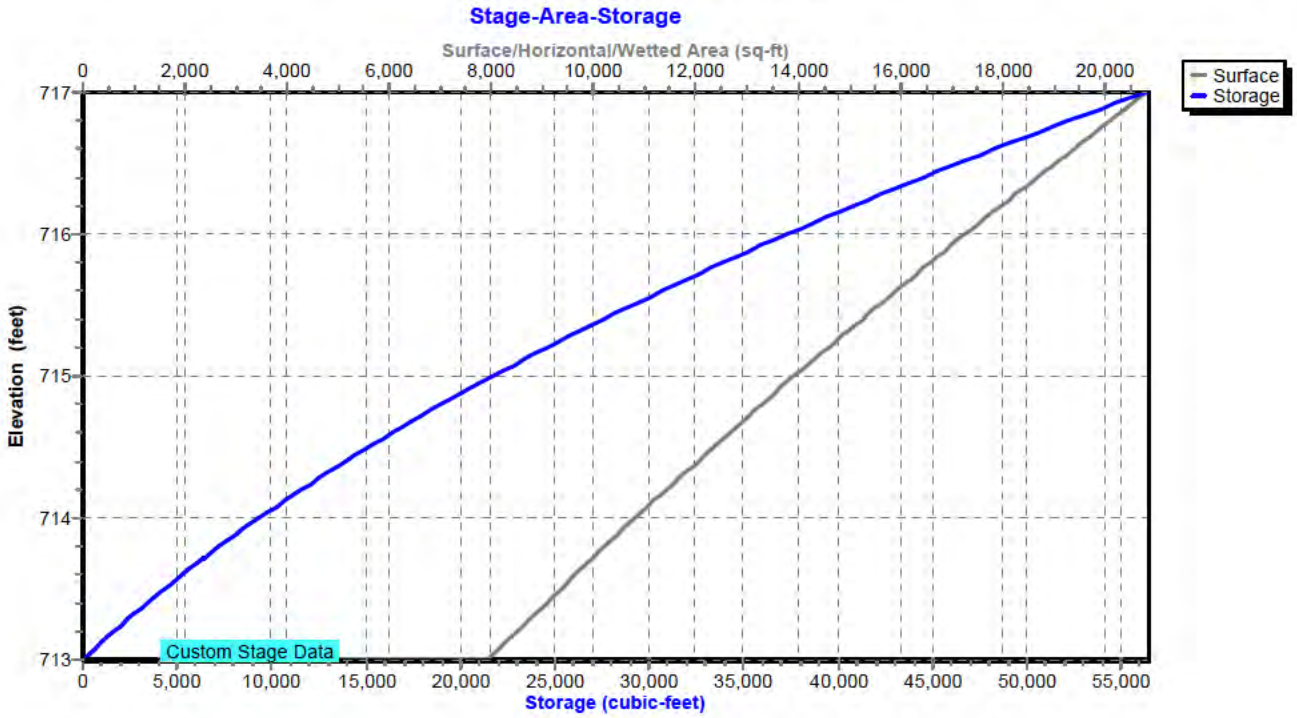
Pond Pond E: Pond E



Pond Pond E: Pond E



Pond Pond E: Pond E



Hydrograph for Pond Pond E: Pond E

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	713.00	0.00	0.00	0.00
5.00	**0.05**	**184**	**713.02**	**0.03**	**0.03**	**0.00**
10.00	**1.10**	**5,885**	**713.66**	**1.31**	**1.31**	**0.00**
15.00	0.82	2,627	713.31	0.90	0.90	0.00
20.00	0.69	1,863	713.23	0.71	0.71	0.00
25.00	0.00	716	713.09	0.18	0.18	0.00
30.00	0.00	31	713.00	0.01	0.01	0.00
35.00	0.00	2	713.00	0.00	0.00	0.00
40.00	0.00	0	713.00	0.00	0.00	0.00
45.00	0.00	0	713.00	0.00	0.00	0.00
50.00	0.00	0	713.00	0.00	0.00	0.00
55.00	0.00	0	713.00	0.00	0.00	0.00
60.00	0.00	0	713.00	0.00	0.00	0.00
65.00	0.00	0	713.00	0.00	0.00	0.00
70.00	0.00	0	713.00	0.00	0.00	0.00
75.00	0.00	0	713.00	0.00	0.00	0.00
80.00	0.00	0	713.00	0.00	0.00	0.00
85.00	0.00	0	713.00	0.00	0.00	0.00
90.00	0.00	0	713.00	0.00	0.00	0.00
95.00	0.00	0	713.00	0.00	0.00	0.00
100.00	0.00	0	713.00	0.00	0.00	0.00
105.00	0.00	0	713.00	0.00	0.00	0.00
110.00	0.00	0	713.00	0.00	0.00	0.00
115.00	0.00	0	713.00	0.00	0.00	0.00
120.00	0.00	0	713.00	0.00	0.00	0.00
125.00	0.00	0	713.00	0.00	0.00	0.00
130.00	0.00	0	713.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond E: Pond E

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
713.00	0.00	0.00	0.00
713.05	0.07	0.07	0.00
713.10	0.21	0.21	0.00
713.15	0.38	0.38	0.00
713.20	0.59	0.59	0.00
713.25	0.80	0.80	0.00
713.30	0.88	0.88	0.00
713.35	0.95	0.95	0.00
713.40	1.02	1.02	0.00
713.45	1.08	1.08	0.00
713.50	1.14	1.14	0.00
713.55	1.19	1.19	0.00
713.60	1.25	1.25	0.00
713.65	1.30	1.30	0.00
713.70	1.35	1.35	0.00
713.75	1.46	1.39	0.07
713.80	1.68	1.44	0.24
713.85	1.95	1.48	0.46
713.90	2.26	1.53	0.73
713.95	2.61	1.57	1.04
714.00	2.92	1.61	1.31
714.05	3.16	1.65	1.51
714.10	3.38	1.69	1.69
714.15	3.57	1.73	1.85
714.20	3.76	1.76	1.99
714.25	3.93	1.80	2.13
714.30	4.09	1.83	2.25
714.35	4.24	1.87	2.37
714.40	4.39	1.90	2.49
714.45	4.53	1.94	2.60
714.50	4.67	1.97	2.70
714.55	4.80	2.00	2.80
714.60	4.93	2.04	2.90
714.65	5.06	2.07	2.99
714.70	5.18	2.10	3.08
714.75	5.30	2.13	3.17
714.80	5.41	2.16	3.26
714.85	5.53	2.19	3.34
714.90	5.64	2.22	3.42
714.95	5.75	2.25	3.50
715.00	5.85	2.28	3.58
715.05	5.96	2.30	3.65
715.10	6.06	2.33	3.73
715.15	6.16	2.36	3.80
715.20	6.26	2.39	3.87
715.25	6.36	2.41	3.94
715.30	6.45	2.44	4.01
715.35	6.55	2.47	4.08
715.40	6.64	2.49	4.15
715.45	6.73	2.52	4.21
715.50	6.82	2.54	4.28
715.55	6.91	2.57	4.34
715.60	7.00	2.59	4.41
715.65	7.09	2.62	4.47
715.70	7.17	2.64	4.53
715.75	7.26	2.67	4.59
715.80	7.34	2.69	4.65
715.85	7.42	2.72	4.71
715.90	7.51	2.74	4.77
715.95	7.59	2.76	4.82
716.00	7.67	2.79	4.88
716.05	7.75	2.81	4.94
716.10	7.82	2.83	4.99
716.15	7.90	2.86	5.05
716.20	7.98	2.88	5.10
716.25	8.05	2.90	5.15
716.30	8.13	2.92	5.21
716.35	8.20	2.94	5.26
716.40	8.28	2.97	5.31
716.45	8.35	2.99	5.36
716.50	8.42	3.01	5.41
716.55	8.50	3.03	5.46
716.60	8.57	3.05	5.52
716.65	8.64	3.07	5.56
716.70	8.71	3.09	5.61
716.75	8.78	3.12	5.66
716.80	8.85	3.14	5.71
716.85	8.92	3.16	5.76
716.90	8.98	3.18	5.81
716.95	9.05	3.20	5.85
717.00	**9.12**	**3.22**	**5.90**

Stage-Area-Storage for Pond Pond E: Pond E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
713.00	7,916	0
713.05	8,060	399
713.10	8,205	806
713.15	8,349	1,220
713.20	8,494	1,641
713.25	8,638	2,069
713.30	8,782	2,505
713.35	8,927	2,947
713.40	9,071	3,397
713.45	9,216	3,855
713.50	9,360	4,319
713.55	9,504	4,791
713.60	9,649	5,269
713.65	9,793	5,755
713.70	9,938	6,249
713.75	10,082	6,749
713.80	10,226	7,257
713.85	10,371	7,772
713.90	10,515	8,294
713.95	10,660	8,823
714.00	10,804	9,360
714.05	10,960	9,904
714.10	11,116	10,456
714.15	11,271	11,016
714.20	11,427	11,583
714.25	11,583	12,158
714.30	11,739	12,741
714.35	11,895	13,332
714.40	12,050	13,931
714.45	12,206	14,537
714.50	12,362	15,152
714.55	12,518	15,773
714.60	12,674	16,403
714.65	12,829	17,041
714.70	12,985	17,686
714.75	13,141	18,339
714.80	13,297	19,000
714.85	13,453	19,669
714.90	13,608	20,346
714.95	13,764	21,030
715.00	13,920	21,722
715.05	14,087	22,422
715.10	14,254	23,131
715.15	14,422	23,848
715.20	14,589	24,573
715.25	14,756	25,307
715.30	14,923	26,048
715.35	15,090	26,799
715.40	15,258	27,558
715.45	15,425	28,325
715.50	15,592	29,100
715.55	15,759	29,884
715.60	15,926	30,676
715.65	16,094	31,476
715.70	16,261	32,285
715.75	16,428	33,103
715.80	16,595	33,928
715.85	16,762	34,762
715.90	16,930	35,604
715.95	17,097	36,455
716.00	17,264	37,314
716.05	17,442	38,182
716.10	17,621	39,058
716.15	17,799	39,944
716.20	17,978	40,838
716.25	18,156	41,742
716.30	18,334	42,654
716.35	18,513	43,575
716.40	18,691	44,505
716.45	18,870	45,444
716.50	19,048	46,392
716.55	19,226	47,349
716.60	19,405	48,315
716.65	19,583	49,289
716.70	19,762	50,273
716.75	19,940	51,266
716.80	20,118	52,267
716.85	20,297	53,277
716.90	20,475	54,297
716.95	20,654	55,325
717.00	**20,832**	**56,362**

Time span=0.00-130.00 hrs, dt=0.01 hrs, 13001 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentA: Post Basin A Runoff Area=358,532 sf 46.88% Impervious Runoff Depth=2.31"
Tc=5.0 min CN=80/98 Runoff=4.57 cfs 69,074 cf

SubcatchmentB: Post Basin B Runoff Area=293,369 sf 49.49% Impervious Runoff Depth=2.35"
Tc=5.0 min CN=80/98 Runoff=3.82 cfs 57,548 cf

SubcatchmentC1: Post Basin C1 Runoff Area=104,630 sf 44.06% Impervious Runoff Depth=2.27"
Tc=5.0 min CN=80/98 Runoff=1.30 cfs 19,763 cf

SubcatchmentC2: Post Basin C2 Runoff Area=581,701 sf 3.45% Impervious Runoff Depth=1.61"
Flow Length=650' Slope=0.0330 '/' Tc=26.4 min CN=80/98 Runoff=3.50 cfs 78,185 cf

SubcatchmentD: Post Basin D Runoff Area=372,494 sf 24.46% Impervious Runoff Depth=1.95"
Tc=5.0 min CN=80/98 Runoff=3.91 cfs 60,565 cf

SubcatchmentE: Post Basin E Runoff Area=600,189 sf 3.19% Impervious Runoff Depth=1.61"
Flow Length=750' Slope=0.0466 '/' Tc=12.5 min CN=80/98 Runoff=4.56 cfs 80,465 cf

Pond Pond A: Pond A Peak Elev=709.71' Storage=16,228 cf Inflow=4.57 cfs 69,074 cf
Primary=0.64 cfs 58,648 cf Secondary=0.53 cfs 10,425 cf Outflow=1.16 cfs 69,074 cf

Pond Pond B: Pond B Peak Elev=709.60' Storage=9,694 cf Inflow=3.82 cfs 57,548 cf
Primary=0.71 cfs 52,132 cf Secondary=0.58 cfs 5,415 cf Outflow=1.30 cfs 57,548 cf

Pond Pond C: Pond C Peak Elev=704.96' Storage=18,265 cf Inflow=5.57 cfs 472,376 cf
Primary=1.91 cfs 456,853 cf Secondary=0.60 cfs 14,962 cf Outflow=2.52 cfs 471,815 cf

Pond Pond D: Pond D Peak Elev=694.40' Storage=7,168 cf Inflow=3.91 cfs 60,565 cf
Primary=0.93 cfs 55,845 cf Secondary=0.67 cfs 4,720 cf Outflow=1.60 cfs 60,565 cf

Pond Pond E: Pond E Peak Elev=713.94' Storage=8,718 cf Inflow=4.56 cfs 80,465 cf
Primary=1.56 cfs 75,122 cf Secondary=0.98 cfs 5,343 cf Outflow=2.54 cfs 80,465 cf

Total Runoff Area = 2,310,915 sf Runoff Volume = 365,598 cf Average Runoff Depth = 1.90"
78.81% Pervious = 1,821,196 sf 21.19% Impervious = 489,719 sf

Summary for Subcatchment A: Post Basin A

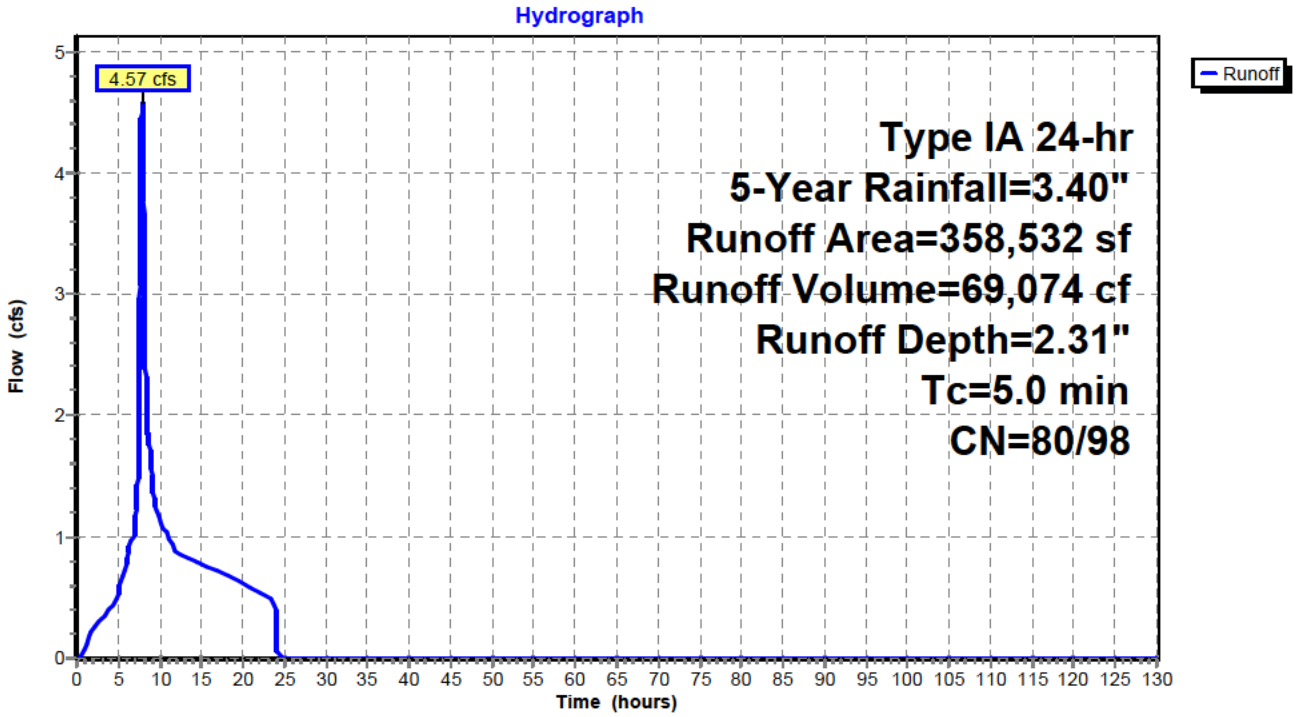
Runoff = 4.57 cfs @ 7.92 hrs, Volume= 69,074 cf, Depth= 2.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

	Area (sf)	CN	Description
*	168,081	98	Impervious Area
	190,451	80	>75% Grass cover, Good, HSG D
	358,532	88	Weighted Average
	190,451	80	53.12% Pervious Area
	168,081	98	46.88% Impervious Area

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

Subcatchment A: Post Basin A



Hydrograph for Subcatchment A: Post Basin A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.53	0.00	0.35	**0.54**
10.00	1.96	0.54	1.74	**1.15**
15.00	2.62	0.97	2.39	0.77
20.00	**3.10**	**1.33**	**2.87**	0.61
25.00	**3.40**	**1.56**	**3.17**	0.00
30.00	3.40	1.56	3.17	0.00
35.00	3.40	1.56	3.17	0.00
40.00	3.40	1.56	3.17	0.00
45.00	3.40	1.56	3.17	0.00
50.00	3.40	1.56	3.17	0.00
55.00	3.40	1.56	3.17	0.00
60.00	3.40	1.56	3.17	0.00
65.00	3.40	1.56	3.17	0.00
70.00	3.40	1.56	3.17	0.00
75.00	3.40	1.56	3.17	0.00
80.00	3.40	1.56	3.17	0.00
85.00	3.40	1.56	3.17	0.00
90.00	3.40	1.56	3.17	0.00
95.00	3.40	1.56	3.17	0.00
100.00	3.40	1.56	3.17	0.00
105.00	3.40	1.56	3.17	0.00
110.00	3.40	1.56	3.17	0.00
115.00	3.40	1.56	3.17	0.00
120.00	3.40	1.56	3.17	0.00
125.00	3.40	1.56	3.17	0.00
130.00	3.40	1.56	3.17	0.00

Summary for Subcatchment B: Post Basin B

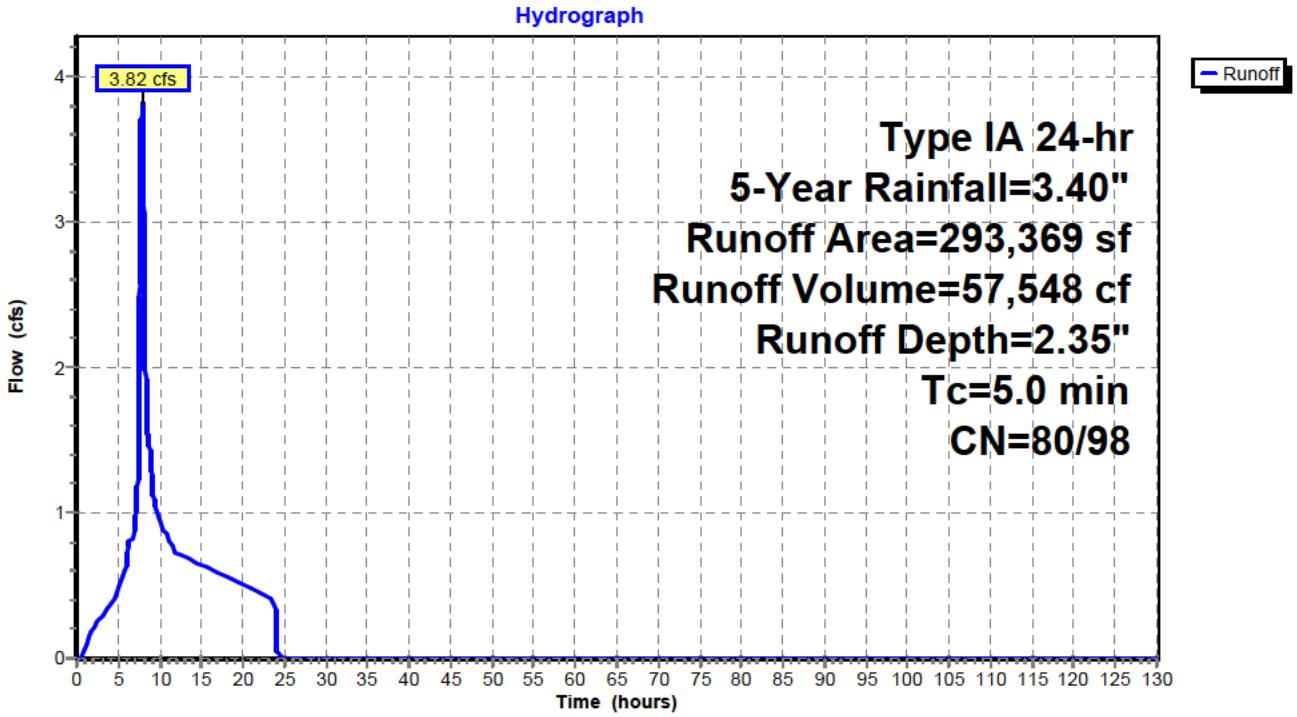
Runoff = 3.82 cfs @ 7.91 hrs, Volume= 57,548 cf, Depth= 2.35"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

	Area (sf)	CN	Description
*	145,197	98	Impervious Area
	148,172	80	>75% Grass cover, Good, HSG D
	293,369	89	Weighted Average
	148,172	80	50.51% Pervious Area
	145,197	98	49.49% Impervious Area

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

Subcatchment B: Post Basin B



Hydrograph for Subcatchment B: Post Basin B

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.53	0.00	0.35	**0.46**
10.00	1.96	0.54	1.74	**0.95**
15.00	2.62	0.97	2.39	0.64
20.00	**3.10**	**1.33**	**2.87**	0.51
25.00	**3.40**	**1.56**	**3.17**	0.00
30.00	3.40	1.56	3.17	0.00
35.00	3.40	1.56	3.17	0.00
40.00	3.40	1.56	3.17	0.00
45.00	3.40	1.56	3.17	0.00
50.00	3.40	1.56	3.17	0.00
55.00	3.40	1.56	3.17	0.00
60.00	3.40	1.56	3.17	0.00
65.00	3.40	1.56	3.17	0.00
70.00	3.40	1.56	3.17	0.00
75.00	3.40	1.56	3.17	0.00
80.00	3.40	1.56	3.17	0.00
85.00	3.40	1.56	3.17	0.00
90.00	3.40	1.56	3.17	0.00
95.00	3.40	1.56	3.17	0.00
100.00	3.40	1.56	3.17	0.00
105.00	3.40	1.56	3.17	0.00
110.00	3.40	1.56	3.17	0.00
115.00	3.40	1.56	3.17	0.00
120.00	3.40	1.56	3.17	0.00
125.00	3.40	1.56	3.17	0.00
130.00	3.40	1.56	3.17	0.00

Summary for Subcatchment C1: Post Basin C1

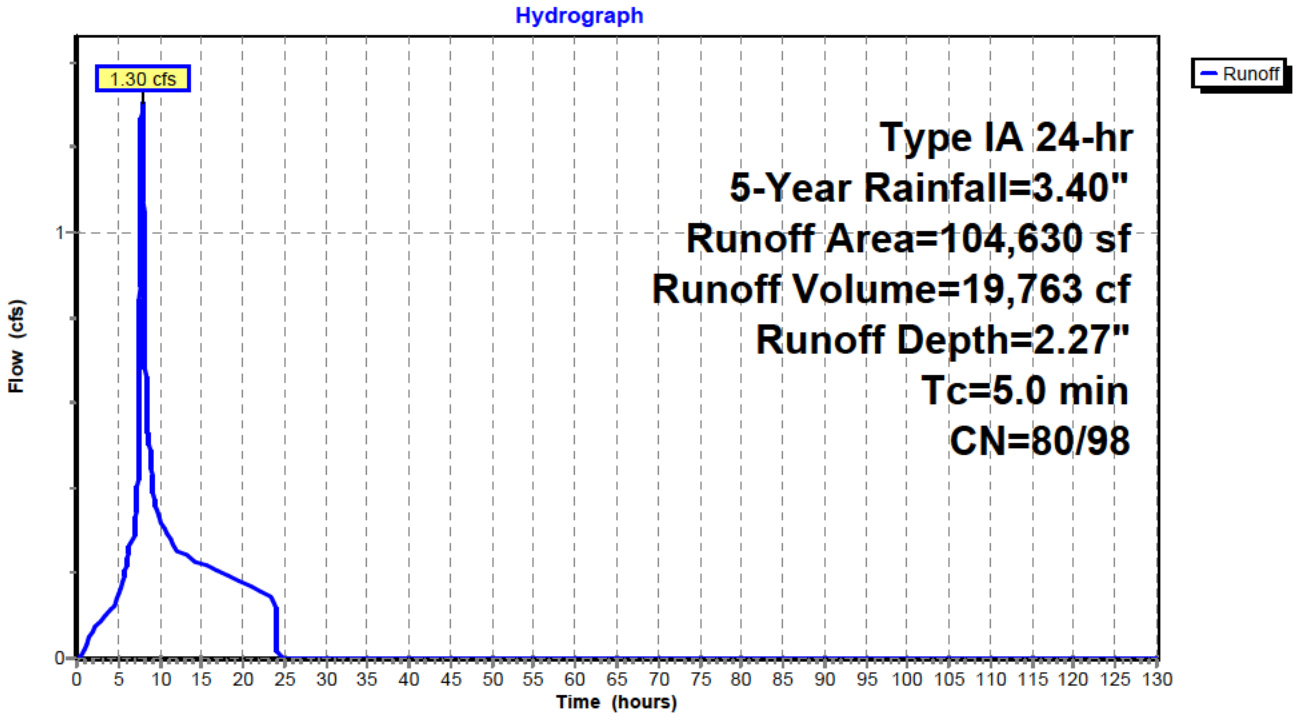
Runoff = 1.30 cfs @ 7.92 hrs, Volume= 19,763 cf, Depth= 2.27"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

	Area (sf)	CN	Description
*	46,105	98	Impervious Area
	58,525	80	>75% Grass cover, Good, HSG D
	104,630	88	Weighted Average
	58,525	80	55.94% Pervious Area
	46,105	98	44.06% Impervious Area

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

Subcatchment C1: Post Basin C1



Hydrograph for Subcatchment C1: Post Basin C1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.53	0.00	0.35	**0.15**
10.00	1.96	0.54	1.74	**0.33**
15.00	2.62	0.97	2.39	0.22
20.00	**3.10**	**1.33**	**2.87**	0.18
25.00	**3.40**	**1.56**	**3.17**	0.00
30.00	3.40	1.56	3.17	0.00
35.00	3.40	1.56	3.17	0.00
40.00	3.40	1.56	3.17	0.00
45.00	3.40	1.56	3.17	0.00
50.00	3.40	1.56	3.17	0.00
55.00	3.40	1.56	3.17	0.00
60.00	3.40	1.56	3.17	0.00
65.00	3.40	1.56	3.17	0.00
70.00	3.40	1.56	3.17	0.00
75.00	3.40	1.56	3.17	0.00
80.00	3.40	1.56	3.17	0.00
85.00	3.40	1.56	3.17	0.00
90.00	3.40	1.56	3.17	0.00
95.00	3.40	1.56	3.17	0.00
100.00	3.40	1.56	3.17	0.00
105.00	3.40	1.56	3.17	0.00
110.00	3.40	1.56	3.17	0.00
115.00	3.40	1.56	3.17	0.00
120.00	3.40	1.56	3.17	0.00
125.00	3.40	1.56	3.17	0.00
130.00	3.40	1.56	3.17	0.00

Summary for Subcatchment C2: Post Basin C2

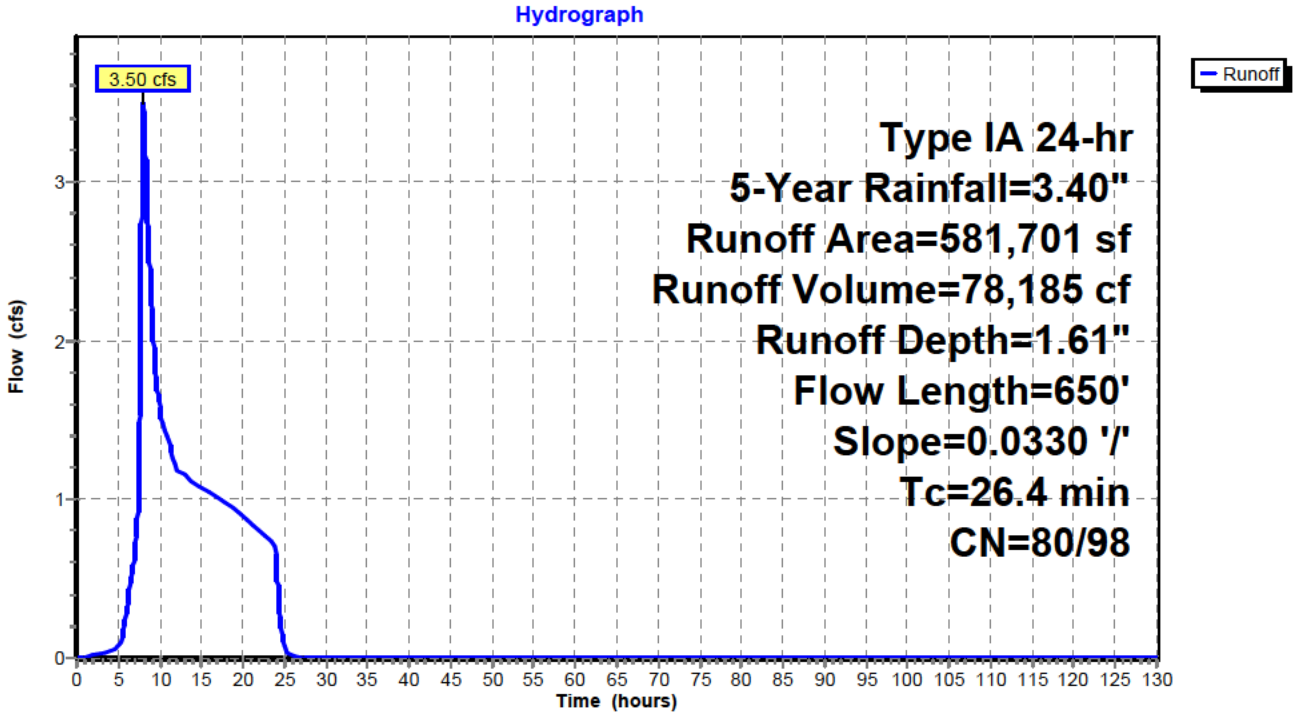
Runoff = 3.50 cfs @ 8.01 hrs, Volume= 78,185 cf, Depth= 1.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

	Area (sf)	CN	Description
*	20,053	98	Impervious Area
	561,648	80	>75% Grass cover, Good, HSG D
	581,701	81	Weighted Average
	561,648	80	96.55% Pervious Area
	20,053	98	3.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	300	0.0330	0.22		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
3.6	350	0.0330	1.63		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	650	Total			

Subcatchment C2: Post Basin C2



Hydrograph for Subcatchment C2: Post Basin C2

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.53	0.00	0.35	**0.07**
10.00	1.96	0.54	1.74	**1.59**
15.00	2.62	0.97	2.39	1.08
20.00	**3.10**	**1.33**	**2.87**	0.89
25.00	**3.40**	**1.56**	**3.17**	0.07
30.00	3.40	1.56	3.17	0.00
35.00	3.40	1.56	3.17	0.00
40.00	3.40	1.56	3.17	0.00
45.00	3.40	1.56	3.17	0.00
50.00	3.40	1.56	3.17	0.00
55.00	3.40	1.56	3.17	0.00
60.00	3.40	1.56	3.17	0.00
65.00	3.40	1.56	3.17	0.00
70.00	3.40	1.56	3.17	0.00
75.00	3.40	1.56	3.17	0.00
80.00	3.40	1.56	3.17	0.00
85.00	3.40	1.56	3.17	0.00
90.00	3.40	1.56	3.17	0.00
95.00	3.40	1.56	3.17	0.00
100.00	3.40	1.56	3.17	0.00
105.00	3.40	1.56	3.17	0.00
110.00	3.40	1.56	3.17	0.00
115.00	3.40	1.56	3.17	0.00
120.00	3.40	1.56	3.17	0.00
125.00	3.40	1.56	3.17	0.00
130.00	3.40	1.56	3.17	0.00

Summary for Subcatchment D: Post Basin D

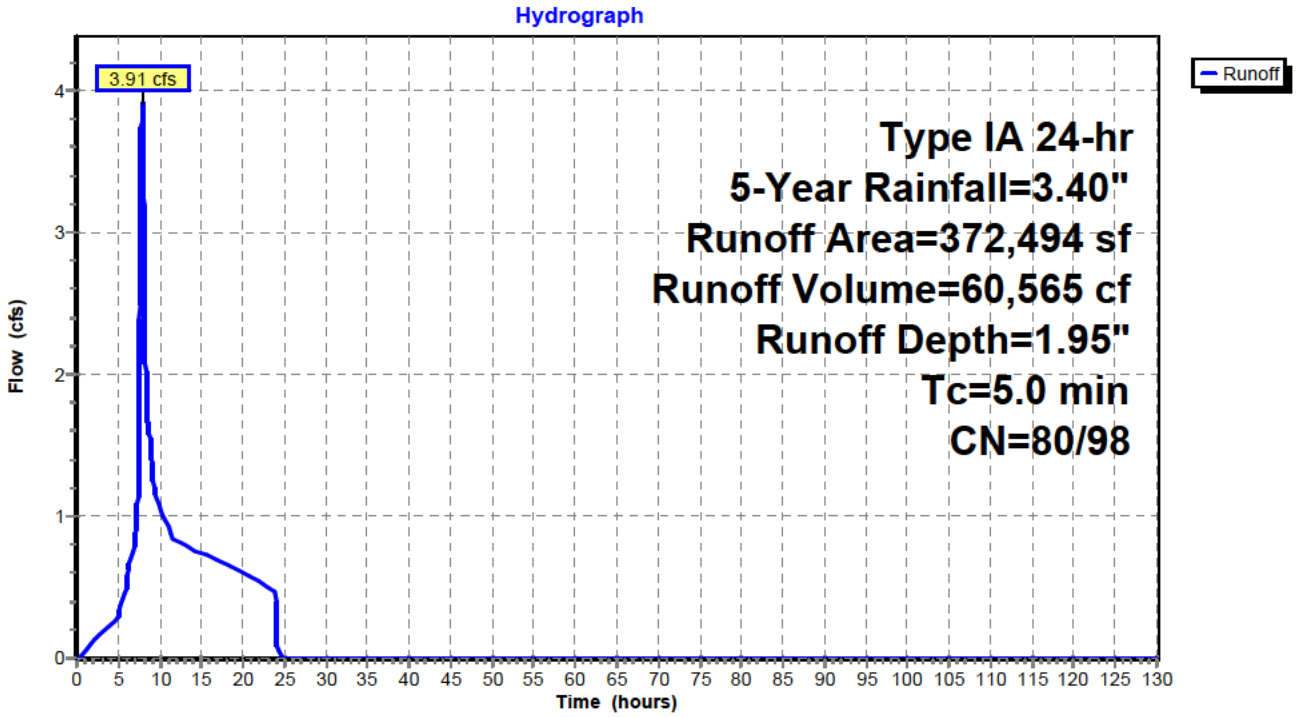
Runoff = 3.91 cfs @ 7.94 hrs, Volume= 60,565 cf, Depth= 1.95"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

	Area (sf)	CN	Description
*	91,123	98	Impervious Area
	281,371	80	>75% Grass cover, Good, HSG D
	372,494	84	Weighted Average
	281,371	80	75.54% Pervious Area
	91,123	98	24.46% Impervious Area

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

Subcatchment D: Post Basin D



Hydrograph for Subcatchment D: Post Basin D

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.53	0.00	0.35	**0.30**
10.00	1.96	0.54	1.74	**1.06**
15.00	2.62	0.97	2.39	0.74
20.00	**3.10**	**1.33**	**2.87**	0.60
25.00	**3.40**	**1.56**	**3.17**	0.00
30.00	3.40	1.56	3.17	0.00
35.00	3.40	1.56	3.17	0.00
40.00	3.40	1.56	3.17	0.00
45.00	3.40	1.56	3.17	0.00
50.00	3.40	1.56	3.17	0.00
55.00	3.40	1.56	3.17	0.00
60.00	3.40	1.56	3.17	0.00
65.00	3.40	1.56	3.17	0.00
70.00	3.40	1.56	3.17	0.00
75.00	3.40	1.56	3.17	0.00
80.00	3.40	1.56	3.17	0.00
85.00	3.40	1.56	3.17	0.00
90.00	3.40	1.56	3.17	0.00
95.00	3.40	1.56	3.17	0.00
100.00	3.40	1.56	3.17	0.00
105.00	3.40	1.56	3.17	0.00
110.00	3.40	1.56	3.17	0.00
115.00	3.40	1.56	3.17	0.00
120.00	3.40	1.56	3.17	0.00
125.00	3.40	1.56	3.17	0.00
130.00	3.40	1.56	3.17	0.00

Summary for Subcatchment E: Post Basin E

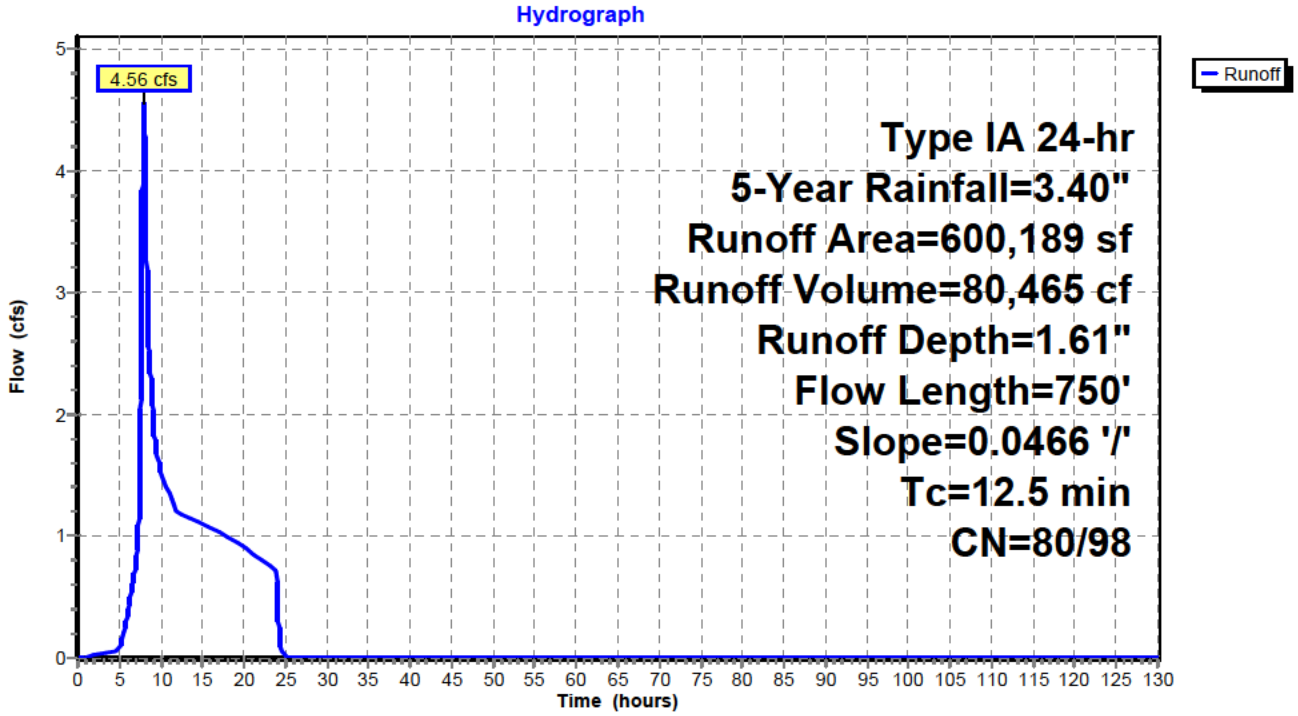
Runoff = 4.56 cfs @ 8.00 hrs, Volume= 80,465 cf, Depth= 1.61"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

	Area (sf)	CN	Description
*	19,160	98	Impervious Area
	581,029	80	>75% Grass cover, Good, HSG D
	600,189	81	Weighted Average
	581,029	80	96.81% Pervious Area
	19,160	98	3.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	300	0.0466	0.58		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
3.9	450	0.0466	1.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.5	750	Total			

Subcatchment E: Post Basin E



Hydrograph for Subcatchment E: Post Basin E

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.53	0.00	0.35	**0.07**
10.00	1.96	0.54	1.74	**1.53**
15.00	2.62	0.97	2.39	1.10
20.00	**3.10**	**1.33**	**2.87**	0.91
25.00	**3.40**	**1.56**	**3.17**	0.01
30.00	3.40	1.56	3.17	0.00
35.00	3.40	1.56	3.17	0.00
40.00	3.40	1.56	3.17	0.00
45.00	3.40	1.56	3.17	0.00
50.00	3.40	1.56	3.17	0.00
55.00	3.40	1.56	3.17	0.00
60.00	3.40	1.56	3.17	0.00
65.00	3.40	1.56	3.17	0.00
70.00	3.40	1.56	3.17	0.00
75.00	3.40	1.56	3.17	0.00
80.00	3.40	1.56	3.17	0.00
85.00	3.40	1.56	3.17	0.00
90.00	3.40	1.56	3.17	0.00
95.00	3.40	1.56	3.17	0.00
100.00	3.40	1.56	3.17	0.00
105.00	3.40	1.56	3.17	0.00
110.00	3.40	1.56	3.17	0.00
115.00	3.40	1.56	3.17	0.00
120.00	3.40	1.56	3.17	0.00
125.00	3.40	1.56	3.17	0.00
130.00	3.40	1.56	3.17	0.00

Summary for Pond Pond A: Pond A

Inflow Area =	358,532 sf,	46.88% Impervious,	Inflow Depth =	2.31"	for 5-Year event
Inflow =	4.57 cfs @	7.92 hrs,	Volume=	69,074 cf	
Outflow =	1.16 cfs @	9.93 hrs,	Volume=	69,074 cf,	Atten= 75%, Lag= 121.0 min
Primary =	0.64 cfs @	9.93 hrs,	Volume=	58,648 cf	
Secondary =	0.53 cfs @	9.93 hrs,	Volume=	10,425 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 709.71' @ 9.93 hrs Surf.Area= 10,491 sf Storage= 16,228 cf

Plug-Flow detention time= 248.1 min calculated for 69,074 cf (100% of inflow)
Center-of-Mass det. time= 248.1 min (965.5 - 717.5)

Volume	Invert	Avail.Storage	Storage Description
#1	708.00'	90,236 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

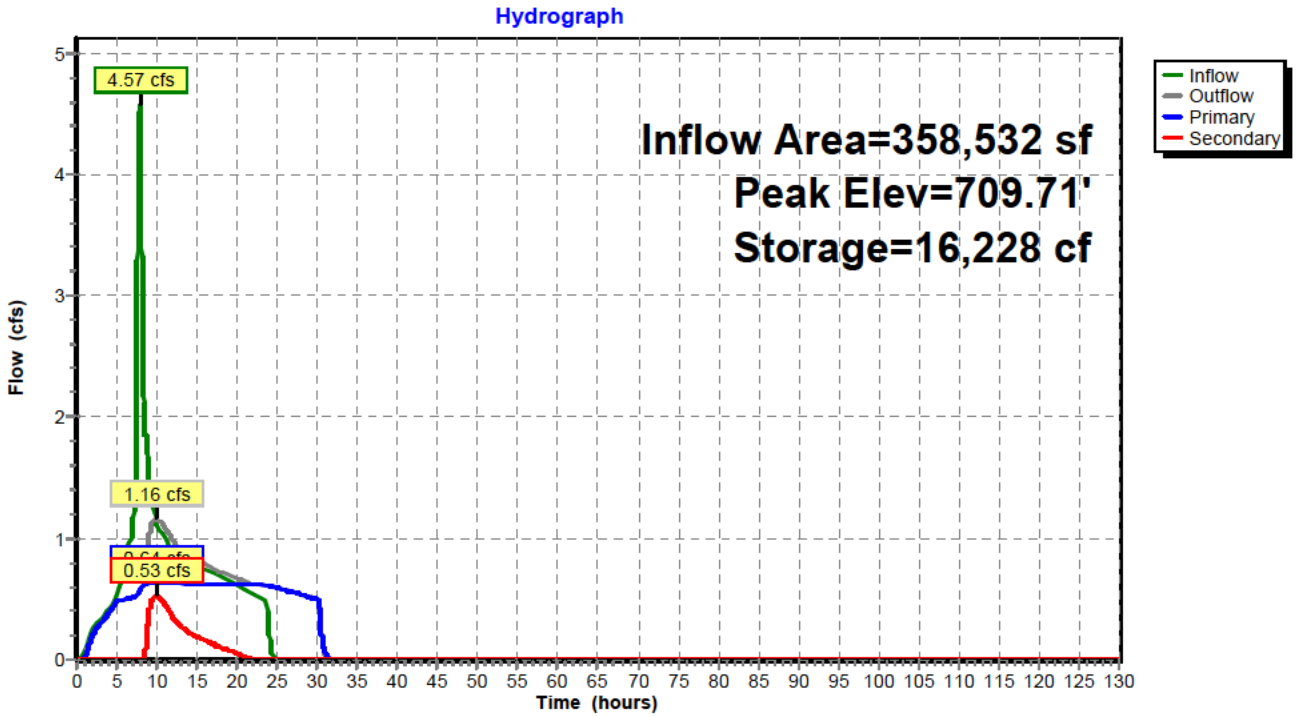
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
708.00	8,458	0	0
709.00	9,620	9,039	9,039
710.00	10,838	10,229	19,268
711.00	12,112	11,475	30,743
712.00	13,443	12,778	43,521
713.00	14,831	14,137	57,658
714.00	16,275	15,553	73,211
715.00	17,776	17,026	90,236

Device	Routing	Invert	Outlet Devices
#1	Primary	705.61'	**3.4" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	709.47'	**16.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

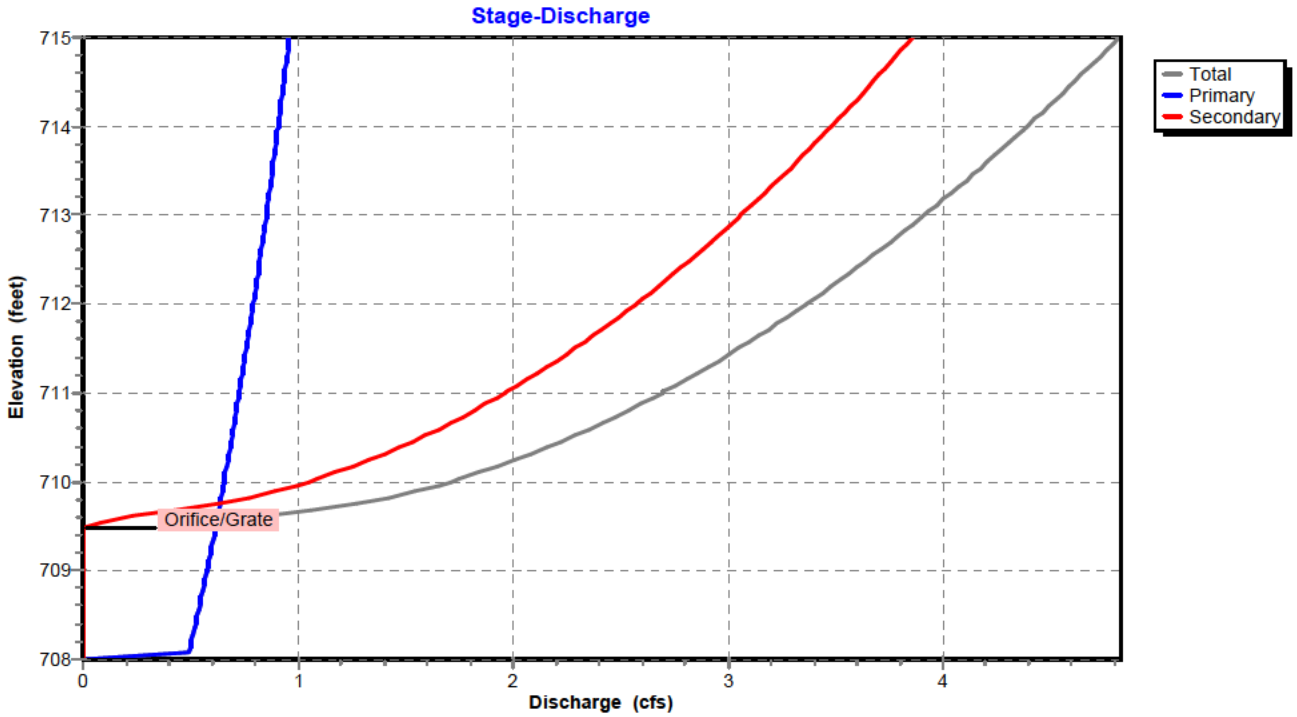
Primary OutFlow Max=0.64 cfs @ 9.93 hrs HW=709.71' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.64 cfs @ 10.08 fps)

Secondary OutFlow Max=0.54 cfs @ 9.93 hrs HW=709.71' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.54 cfs @ 1.64 fps)

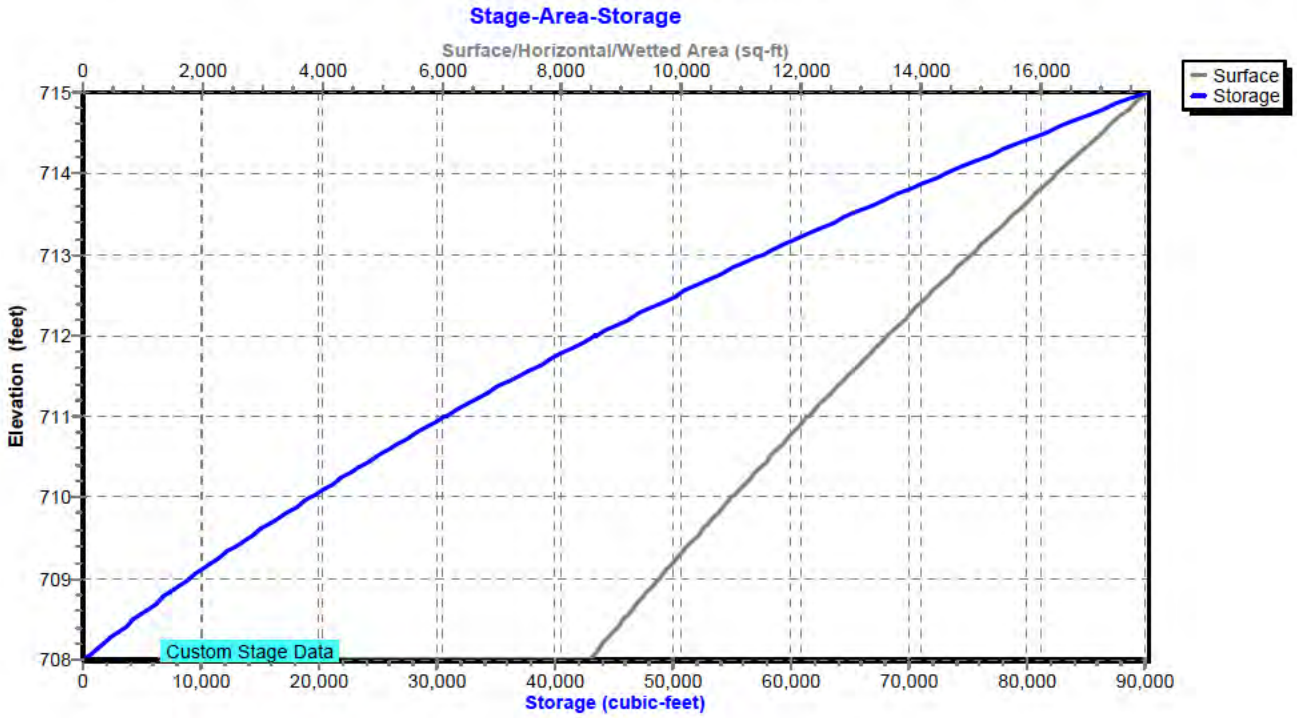
Pond Pond A: Pond A



Pond Pond A: Pond A



Pond Pond A: Pond A



Hydrograph for Pond Pond A: Pond A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	708.00	0.00	0.00	0.00
5.00	**0.54**	**585**	**708.07**	**0.48**	**0.48**	**0.00**
10.00	**1.15**	**16,227**	**709.71**	**1.16**	**0.64**	**0.53**
15.00	0.77	14,930	709.59	0.82	0.63	0.19
20.00	0.61	14,153	709.51	0.67	0.62	0.05
25.00	0.00	10,910	709.19	0.59	0.59	0.00
30.00	0.00	1,070	708.13	0.50	0.50	0.00
35.00	0.00	0	708.00	0.00	0.00	0.00
40.00	0.00	0	708.00	0.00	0.00	0.00
45.00	0.00	0	708.00	0.00	0.00	0.00
50.00	0.00	0	708.00	0.00	0.00	0.00
55.00	0.00	0	708.00	0.00	0.00	0.00
60.00	0.00	0	708.00	0.00	0.00	0.00
65.00	0.00	0	708.00	0.00	0.00	0.00
70.00	0.00	0	708.00	0.00	0.00	0.00
75.00	0.00	0	708.00	0.00	0.00	0.00
80.00	0.00	0	708.00	0.00	0.00	0.00
85.00	0.00	0	708.00	0.00	0.00	0.00
90.00	0.00	0	708.00	0.00	0.00	0.00
95.00	0.00	0	708.00	0.00	0.00	0.00
100.00	0.00	0	708.00	0.00	0.00	0.00
105.00	0.00	0	708.00	0.00	0.00	0.00
110.00	0.00	0	708.00	0.00	0.00	0.00
115.00	0.00	0	708.00	0.00	0.00	0.00
120.00	0.00	0	708.00	0.00	0.00	0.00
125.00	0.00	0	708.00	0.00	0.00	0.00
130.00	0.00	0	708.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond A: Pond A

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
708.00	0.00	0.00	0.00
708.10	0.50	0.50	0.00
708.20	0.50	0.50	0.00
708.30	0.51	0.51	0.00
708.40	0.52	0.52	0.00
708.50	0.53	0.53	0.00
708.60	0.54	0.54	0.00
708.70	0.55	0.55	0.00
708.80	0.56	0.56	0.00
708.90	0.57	0.57	0.00
709.00	0.58	0.58	0.00
709.10	0.59	0.59	0.00
709.20	0.59	0.59	0.00
709.30	0.60	0.60	0.00
709.40	0.61	0.61	0.00
709.50	0.64	0.62	0.02
709.60	0.83	0.63	0.21
709.70	1.12	0.63	0.49
709.80	1.38	0.64	0.74
709.90	1.56	0.65	0.91
710.00	1.71	0.66	1.05
710.10	1.84	0.66	1.18
710.20	1.96	0.67	1.29
710.30	2.07	0.68	1.39
710.40	2.17	0.69	1.49
710.50	2.27	0.69	1.58
710.60	2.36	0.70	1.66
710.70	2.45	0.71	1.74
710.80	2.53	0.71	1.82
710.90	2.62	0.72	1.89
711.00	2.69	0.73	1.97
711.10	2.77	0.74	2.03
711.20	2.84	0.74	2.10
711.30	2.91	0.75	2.17
711.40	2.98	0.75	2.23
711.50	3.05	0.76	2.29
711.60	3.12	0.77	2.35
711.70	3.18	0.77	2.41
711.80	3.24	0.78	2.46
711.90	3.30	0.79	2.52
712.00	3.36	0.79	2.57
712.10	3.42	0.80	2.62
712.20	3.48	0.81	2.68
712.30	3.54	0.81	2.73
712.40	3.59	0.82	2.78
712.50	3.65	0.82	2.83
712.60	3.70	0.83	2.87
712.70	3.76	0.84	2.92
712.80	3.81	0.84	2.97
712.90	3.86	0.85	3.01
713.00	3.91	0.85	3.06
713.10	3.96	0.86	3.10
713.20	4.01	0.86	3.15
713.30	4.06	0.87	3.19
713.40	4.11	0.88	3.23
713.50	4.16	0.88	3.28
713.60	4.21	0.89	3.32
713.70	4.25	0.89	3.36
713.80	4.30	0.90	3.40
713.90	4.34	0.90	3.44
714.00	4.39	0.91	3.48
714.10	4.43	0.91	3.52
714.20	4.48	0.92	3.56
714.30	4.52	0.92	3.60
714.40	4.57	0.93	3.64
714.50	4.61	0.94	3.67
714.60	4.65	0.94	3.71
714.70	4.69	0.95	3.75
714.80	4.73	0.95	3.78
714.90	4.78	0.96	3.82
715.00	**4.82**	**0.96**	**3.86**

Stage-Area-Storage for Pond Pond A: Pond A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
708.00	8,458	0
708.10	8,574	852
708.20	8,690	1,715
708.30	8,807	2,590
708.40	8,923	3,476
708.50	9,039	4,374
708.60	9,155	5,284
708.70	9,271	6,205
708.80	9,388	7,138
708.90	9,504	8,083
709.00	9,620	9,039
709.10	9,742	10,007
709.20	9,864	10,987
709.30	9,985	11,980
709.40	10,107	12,984
709.50	10,229	14,001
709.60	10,351	15,030
709.70	10,473	16,071
709.80	10,594	17,125
709.90	10,716	18,190
710.00	10,838	19,268
710.10	10,965	20,358
710.20	11,093	21,461
710.30	11,220	22,577
710.40	11,348	23,705
710.50	11,475	24,846
710.60	11,602	26,000
710.70	11,730	27,167
710.80	11,857	28,346
710.90	11,985	29,538
711.00	12,112	30,743
711.10	12,245	31,961
711.20	12,378	33,192
711.30	12,511	34,436
711.40	12,644	35,694
711.50	12,778	36,965
711.60	12,911	38,250
711.70	13,044	39,547
711.80	13,177	40,859
711.90	13,310	42,183
712.00	13,443	43,521
712.10	13,582	44,872
712.20	13,721	46,237
712.30	13,859	47,616
712.40	13,998	49,009
712.50	14,137	50,416
712.60	14,276	51,836
712.70	14,415	53,271
712.80	14,553	54,719
712.90	14,692	56,181
713.00	14,831	57,658
713.10	14,975	59,148
713.20	15,120	60,653
713.30	15,264	62,172
713.40	15,409	63,705
713.50	15,553	65,254
713.60	15,697	66,816
713.70	15,842	68,393
713.80	15,986	69,984
713.90	16,131	71,590
714.00	16,275	73,211
714.10	16,425	74,846
714.20	16,575	76,496
714.30	16,725	78,161
714.40	16,875	79,841
714.50	17,026	81,536
714.60	17,176	83,246
714.70	17,326	84,971
714.80	17,476	86,711
714.90	17,626	88,466
715.00	**17,776**	**90,236**

Summary for Pond Pond B: Pond B

Inflow Area =	293,369 sf,	49.49% Impervious,	Inflow Depth =	2.35"	for 5-Year event
Inflow =	3.82 cfs @	7.91 hrs,	Volume=	57,548 cf	
Outflow =	1.30 cfs @	8.98 hrs,	Volume=	57,548 cf,	Atten= 66%, Lag= 63.9 min
Primary =	0.71 cfs @	8.98 hrs,	Volume=	52,132 cf	
Secondary =	0.58 cfs @	8.98 hrs,	Volume=	5,415 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 709.60' @ 8.98 hrs Surf.Area= 6,870 sf Storage= 9,694 cf

Plug-Flow detention time= 125.5 min calculated for 57,548 cf (100% of inflow)
Center-of-Mass det. time= 125.4 min (839.3 - 713.9)

Volume	Invert	Avail.Storage	Storage Description
#1	708.00'	50,732 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

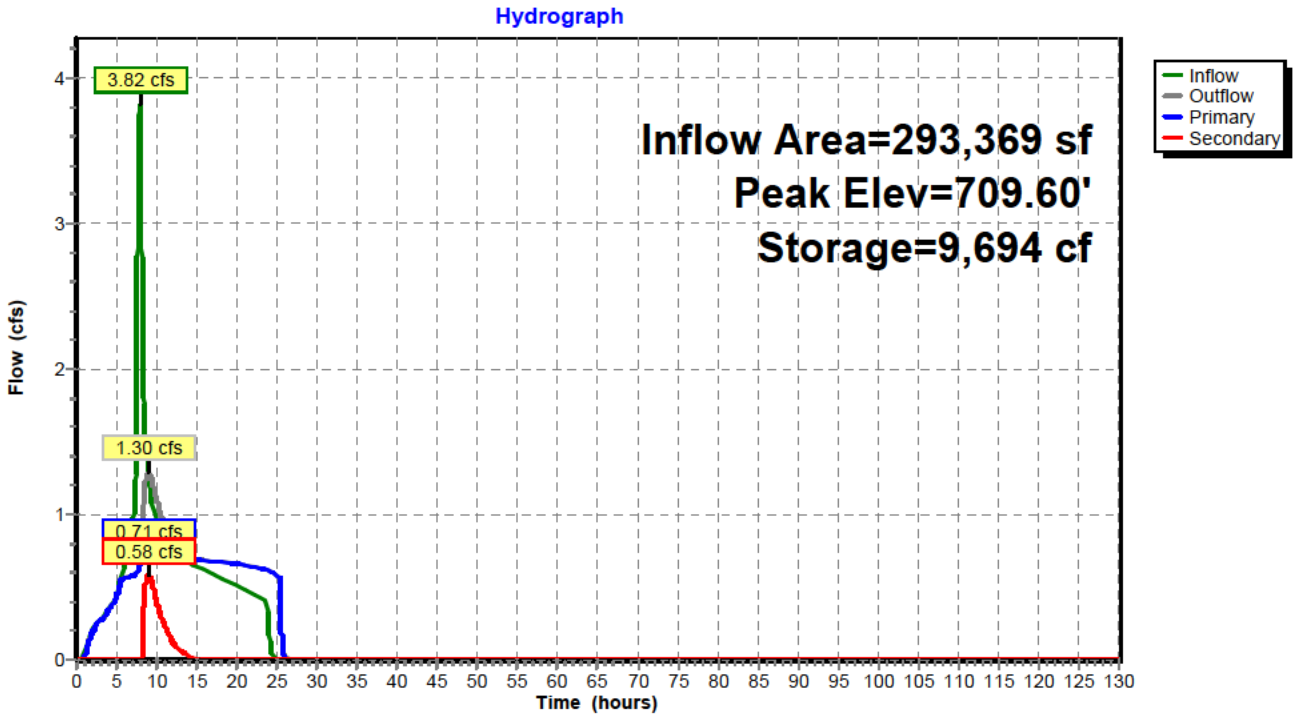
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
708.00	5,287	0	0
709.00	6,257	5,772	5,772
710.00	7,283	6,770	12,542
711.00	8,366	7,825	20,367
712.00	9,505	8,936	29,302
713.00	10,701	10,103	39,405
714.00	11,953	11,327	50,732

Device	Routing	Invert	Outlet Devices
#1	Primary	705.50'	**3.6" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	709.30'	**14.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

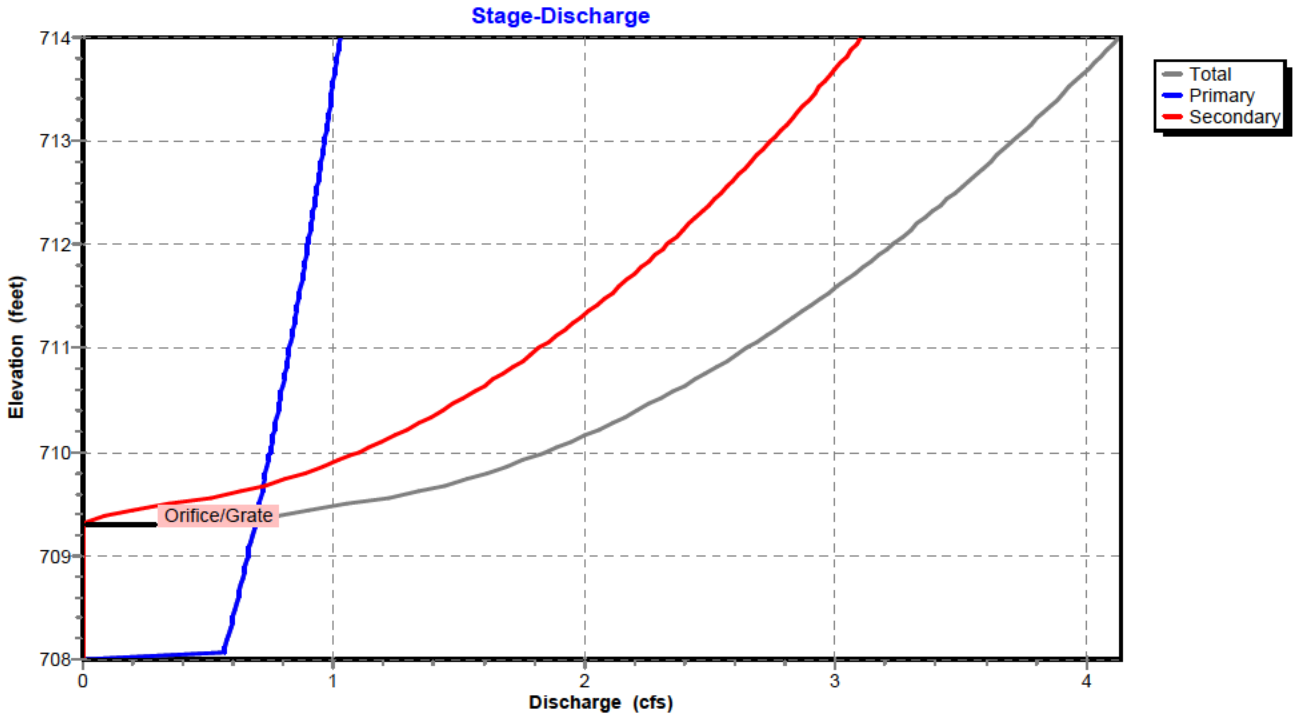
Primary OutFlow Max=0.71 cfs @ 8.98 hrs HW=709.60' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.71 cfs @ 10.07 fps)

Secondary OutFlow Max=0.59 cfs @ 8.98 hrs HW=709.60' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.59 cfs @ 2.02 fps)

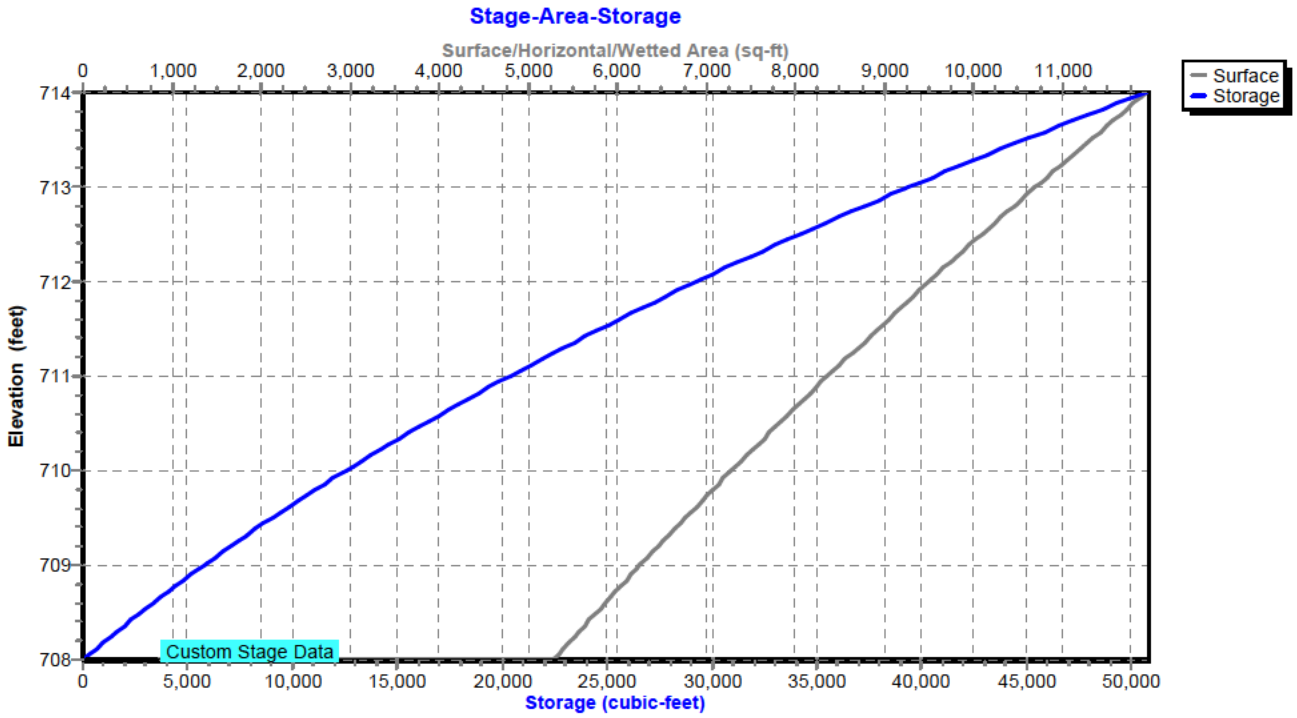
Pond Pond B: Pond B



Pond Pond B: Pond B



Pond Pond B: Pond B



Hydrograph for Pond Pond B: Pond B

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	708.00	0.00	0.00	0.00
5.00	**0.46**	**248**	**708.05**	**0.44**	**0.44**	**0.00**
10.00	**0.95**	**9,150**	**709.52**	**1.10**	**0.70**	**0.39**
15.00	0.64	7,720	709.30	0.69	0.69	0.00
20.00	0.51	5,900	709.02	0.66	0.66	0.00
25.00	0.00	1,112	708.21	0.58	0.58	0.00
30.00	0.00	0	708.00	0.00	0.00	0.00
35.00	0.00	0	708.00	0.00	0.00	0.00
40.00	0.00	0	708.00	0.00	0.00	0.00
45.00	0.00	0	708.00	0.00	0.00	0.00
50.00	0.00	0	708.00	0.00	0.00	0.00
55.00	0.00	0	708.00	0.00	0.00	0.00
60.00	0.00	0	708.00	0.00	0.00	0.00
65.00	0.00	0	708.00	0.00	0.00	0.00
70.00	0.00	0	708.00	0.00	0.00	0.00
75.00	0.00	0	708.00	0.00	0.00	0.00
80.00	0.00	0	708.00	0.00	0.00	0.00
85.00	0.00	0	708.00	0.00	0.00	0.00
90.00	0.00	0	708.00	0.00	0.00	0.00
95.00	0.00	0	708.00	0.00	0.00	0.00
100.00	0.00	0	708.00	0.00	0.00	0.00
105.00	0.00	0	708.00	0.00	0.00	0.00
110.00	0.00	0	708.00	0.00	0.00	0.00
115.00	0.00	0	708.00	0.00	0.00	0.00
120.00	0.00	0	708.00	0.00	0.00	0.00
125.00	0.00	0	708.00	0.00	0.00	0.00
130.00	0.00	0	708.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond B: Pond B

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
708.00	0.00	0.00	0.00
708.10	0.57	0.57	0.00
708.20	0.58	0.58	0.00
708.30	0.59	0.59	0.00
708.40	0.60	0.60	0.00
708.50	0.61	0.61	0.00
708.60	0.62	0.62	0.00
708.70	0.63	0.63	0.00
708.80	0.64	0.64	0.00
708.90	0.65	0.65	0.00
709.00	0.66	0.66	0.00
709.10	0.67	0.67	0.00
709.20	0.68	0.68	0.00
709.30	0.69	0.69	0.00
709.40	0.82	0.69	0.12
709.50	1.05	0.70	0.35
709.60	1.30	0.71	0.59
709.70	1.47	0.72	0.75
709.80	1.61	0.73	0.88
709.90	1.73	0.74	1.00
710.00	1.84	0.75	1.10
710.10	1.94	0.75	1.19
710.20	2.04	0.76	1.28
710.30	2.13	0.77	1.36
710.40	2.21	0.78	1.43
710.50	2.29	0.79	1.50
710.60	2.37	0.79	1.57
710.70	2.44	0.80	1.64
710.80	2.51	0.81	1.70
710.90	2.58	0.82	1.76
711.00	2.65	0.82	1.82
711.10	2.71	0.83	1.88
711.20	2.77	0.84	1.93
711.30	2.83	0.85	1.99
711.40	2.89	0.85	2.04
711.50	2.95	0.86	2.09
711.60	3.01	0.87	2.14
711.70	3.06	0.88	2.19
711.80	3.12	0.88	2.24
711.90	3.17	0.89	2.28
712.00	3.23	0.90	2.33
712.10	3.28	0.90	2.37
712.20	3.33	0.91	2.42
712.30	3.38	0.92	2.46
712.40	3.43	0.92	2.50
712.50	3.48	0.93	2.54
712.60	3.52	0.94	2.59
712.70	3.57	0.94	2.63
712.80	3.62	0.95	2.67
712.90	3.66	0.96	2.71
713.00	3.71	0.96	2.74
713.10	3.75	0.97	2.78
713.20	3.80	0.98	2.82
713.30	3.84	0.98	2.86
713.40	3.88	0.99	2.89
713.50	3.92	0.99	2.93
713.60	3.97	1.00	2.97
713.70	4.01	1.01	3.00
713.80	4.05	1.01	3.04
713.90	4.09	1.02	3.07
714.00	**4.13**	**1.03**	**3.10**

Stage-Area-Storage for Pond Pond B: Pond B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
708.00	5,287	0
708.10	5,384	534
708.20	5,481	1,077
708.30	5,578	1,630
708.40	5,675	2,192
708.50	5,772	2,765
708.60	5,869	3,347
708.70	5,966	3,939
708.80	6,063	4,540
708.90	6,160	5,151
709.00	6,257	5,772
709.10	6,360	6,403
709.20	6,462	7,044
709.30	6,565	7,695
709.40	6,667	8,357
709.50	6,770	9,029
709.60	6,873	9,711
709.70	6,975	10,403
709.80	7,078	11,106
709.90	7,180	11,819
710.00	7,283	12,542
710.10	7,391	13,276
710.20	7,500	14,020
710.30	7,608	14,776
710.40	7,716	15,542
710.50	7,825	16,319
710.60	7,933	17,107
710.70	8,041	17,905
710.80	8,149	18,715
710.90	8,258	19,535
711.00	8,366	20,367
711.10	8,480	21,209
711.20	8,594	22,062
711.30	8,708	22,928
711.40	8,822	23,804
711.50	8,936	24,692
711.60	9,049	25,591
711.70	9,163	26,502
711.80	9,277	27,424
711.90	9,391	28,357
712.00	9,505	29,302
712.10	9,625	30,258
712.20	9,744	31,227
712.30	9,864	32,207
712.40	9,983	33,200
712.50	10,103	34,204
712.60	10,223	35,220
712.70	10,342	36,249
712.80	10,462	37,289
712.90	10,581	38,341
713.00	10,701	39,405
713.10	10,826	40,481
713.20	10,951	41,570
713.30	11,077	42,672
713.40	11,202	43,786
713.50	11,327	44,912
713.60	11,452	46,051
713.70	11,577	47,202
713.80	11,703	48,366
713.90	11,828	49,543
714.00	**11,953**	**50,732**

Summary for Pond Pond C: Pond C

Inflow Area =	686,331 sf,	9.64% Impervious,	Inflow Depth >	8.26"	for 5-Year event
Inflow =	5.57 cfs @	8.00 hrs, Volume=	472,376 cf,	Incl. 0.80 cfs Base Flow	
Outflow =	2.52 cfs @	10.68 hrs, Volume=	471,815 cf,	Atten= 55%, Lag= 160.8 min	
Primary =	1.91 cfs @	10.68 hrs, Volume=	456,853 cf		
Secondary =	0.60 cfs @	10.68 hrs, Volume=	14,962 cf		

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 704.96' @ 10.68 hrs Surf.Area= 19,823 sf Storage= 18,265 cf

Plug-Flow detention time= 43.6 min calculated for 471,811 cf (100% of inflow)
Center-of-Mass det. time= 38.2 min (3,296.3 - 3,258.1)

Volume	Invert	Avail.Storage	Storage Description
#1	704.00'	140,242 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

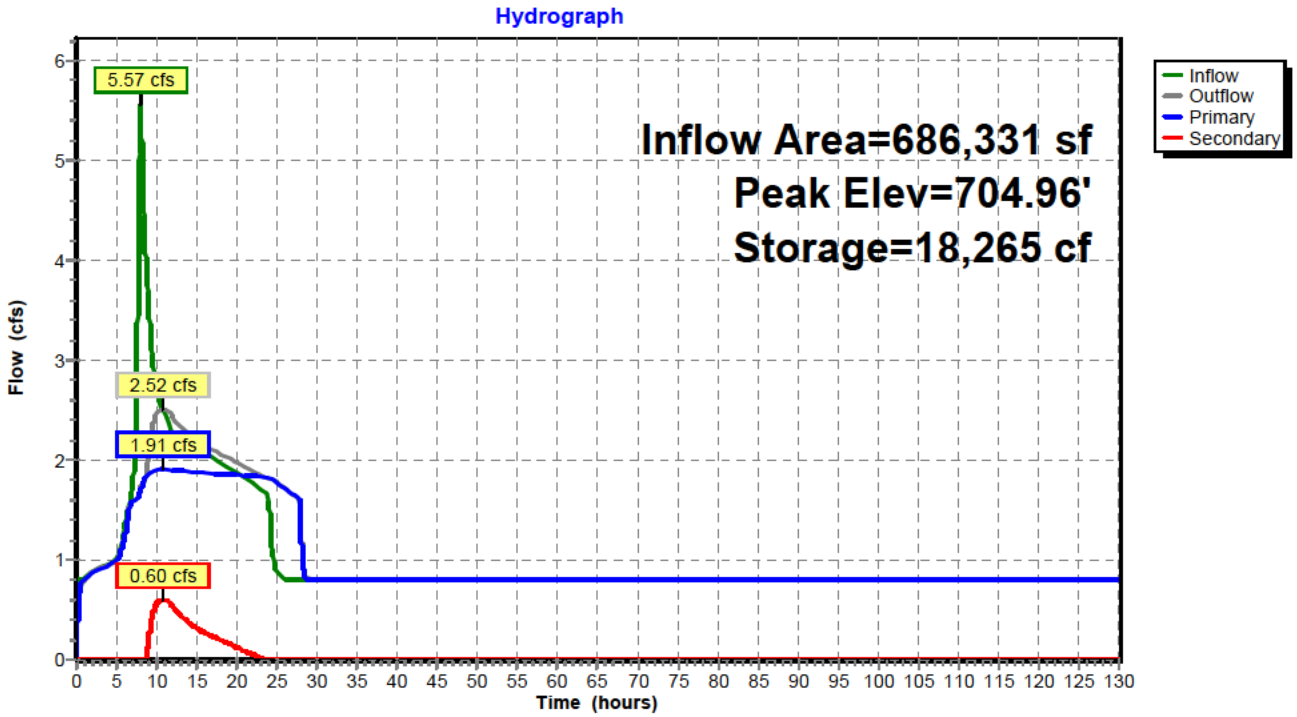
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
704.00	18,277	0	0
705.00	19,889	19,083	19,083
706.00	21,558	20,724	39,807
707.00	23,284	22,421	62,228
708.00	25,067	24,176	86,403
709.00	26,905	25,986	112,389
710.00	28,801	27,853	140,242

Device	Routing	Invert	Outlet Devices
#1	Primary	702.00'	**6.4" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	704.69'	**16.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

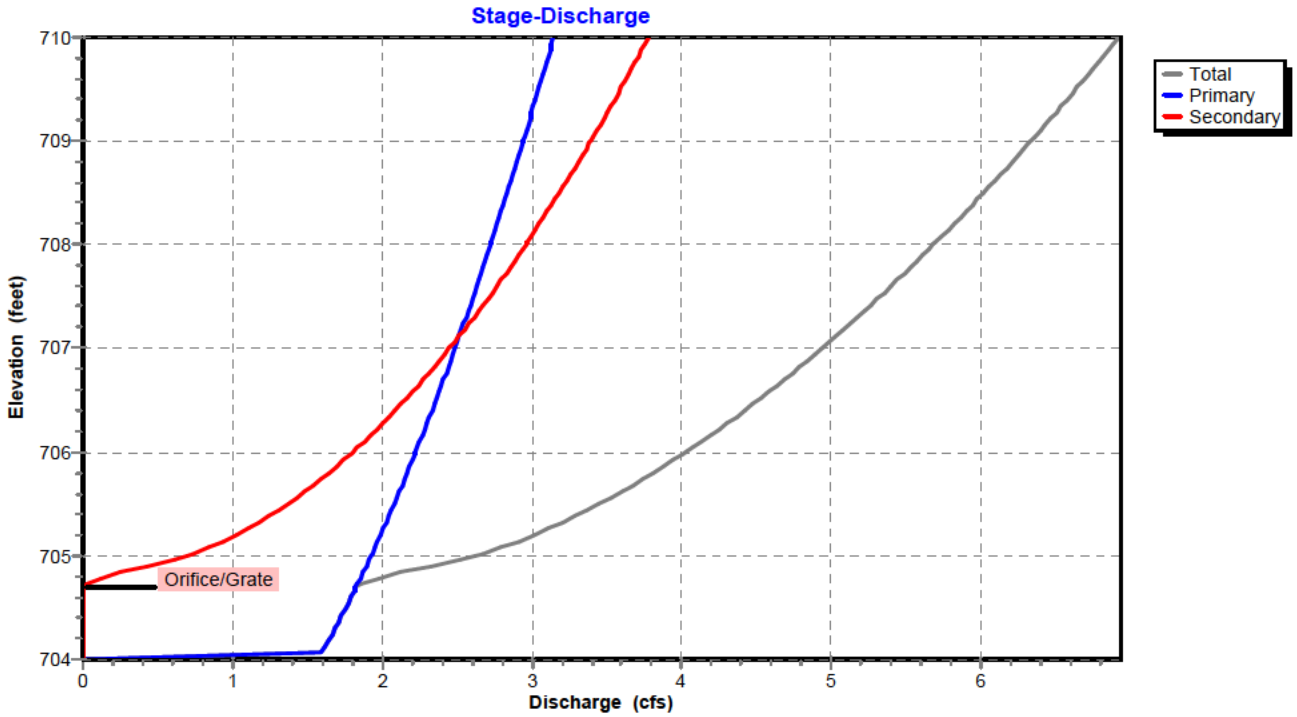
Primary OutFlow Max=1.91 cfs @ 10.68 hrs HW=704.96' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 1.91 cfs @ 8.56 fps)

Secondary OutFlow Max=0.60 cfs @ 10.68 hrs HW=704.96' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.60 cfs @ 1.81 fps)

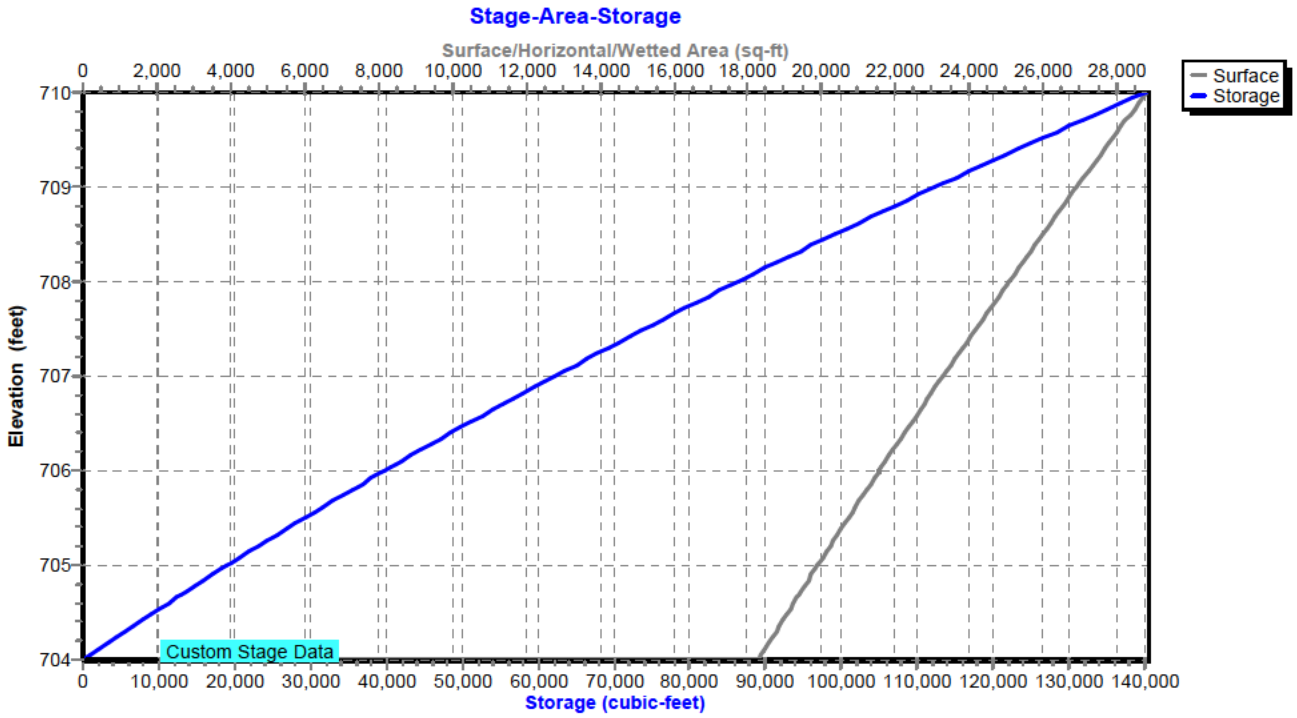
Pond Pond C: Pond C



Pond Pond C: Pond C



Pond Pond C: Pond C



Hydrograph for Pond Pond C: Pond C

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.80	5	704.00	0.01	0.01	0.00
5.00	**1.01**	686	704.04	1.00	1.00	0.00
10.00	**2.72**	**18,050**	**704.95**	**2.48**	**1.91**	**0.57**
15.00	2.10	**16,331**	**704.86**	**2.20**	**1.88**	**0.32**
20.00	1.87	14,740	704.78	1.97	1.85	0.12
25.00	0.87	10,300	704.55	1.78	1.78	0.00
30.00	0.80	551	704.03	0.80	0.80	0.00
35.00	0.80	551	704.03	0.80	0.80	0.00
40.00	0.80	551	704.03	0.80	0.80	0.00
45.00	0.80	551	704.03	0.80	0.80	0.00
50.00	0.80	551	704.03	0.80	0.80	0.00
55.00	0.80	551	704.03	0.80	0.80	0.00
60.00	0.80	551	704.03	0.80	0.80	0.00
65.00	0.80	551	704.03	0.80	0.80	0.00
70.00	0.80	551	704.03	0.80	0.80	0.00
75.00	0.80	551	704.03	0.80	0.80	0.00
80.00	0.80	551	704.03	0.80	0.80	0.00
85.00	0.80	551	704.03	0.80	0.80	0.00
90.00	0.80	551	704.03	0.80	0.80	0.00
95.00	0.80	551	704.03	0.80	0.80	0.00
100.00	0.80	551	704.03	0.80	0.80	0.00
105.00	0.80	551	704.03	0.80	0.80	0.00
110.00	0.80	551	704.03	0.80	0.80	0.00
115.00	0.80	551	704.03	0.80	0.80	0.00
120.00	0.80	551	704.03	0.80	0.80	0.00
125.00	0.80	551	704.03	0.80	0.80	0.00
130.00	0.80	551	704.03	0.80	0.80	0.00

Stage-Discharge for Pond Pond C: Pond C

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
704.00	0.00	0.00	0.00
704.10	1.61	1.61	0.00
704.20	1.65	1.65	0.00
704.30	1.69	1.69	0.00
704.40	1.72	1.72	0.00
704.50	1.76	1.76	0.00
704.60	1.79	1.79	0.00
704.70	1.83	1.83	0.00
704.80	2.02	1.86	0.16
704.90	2.32	1.89	0.43
705.00	2.62	1.93	0.70
705.10	2.84	1.96	0.88
705.20	3.01	1.99	1.02
705.30	3.17	2.02	1.15
705.40	3.32	2.05	1.27
705.50	3.45	2.08	1.37
705.60	3.58	2.11	1.47
705.70	3.70	2.14	1.56
705.80	3.81	2.17	1.64
705.90	3.92	2.20	1.73
706.00	4.03	2.22	1.80
706.10	4.13	2.25	1.88
706.20	4.23	2.28	1.95
706.30	4.33	2.30	2.02
706.40	4.42	2.33	2.09
706.50	4.51	2.36	2.15
706.60	4.60	2.38	2.22
706.70	4.69	2.41	2.28
706.80	4.77	2.44	2.34
706.90	4.85	2.46	2.39
707.00	4.94	2.49	2.45
707.10	5.02	2.51	2.51
707.20	5.10	2.53	2.56
707.30	5.17	2.56	2.61
707.40	5.25	2.58	2.67
707.50	5.32	2.61	2.72
707.60	5.40	2.63	2.77
707.70	5.47	2.65	2.82
707.80	5.54	2.68	2.87
707.90	5.61	2.70	2.91
708.00	5.68	2.72	2.96
708.10	5.75	2.75	3.01
708.20	5.82	2.77	3.05
708.30	5.89	2.79	3.10
708.40	5.95	2.81	3.14
708.50	6.02	2.83	3.18
708.60	6.08	2.86	3.23
708.70	6.15	2.88	3.27
708.80	6.21	2.90	3.31
708.90	6.27	2.92	3.35
709.00	6.33	2.94	3.39
709.10	6.39	2.96	3.43
709.20	6.46	2.98	3.47
709.30	6.52	3.00	3.51
709.40	6.57	3.02	3.55
709.50	6.63	3.04	3.59
709.60	6.69	3.06	3.63
709.70	6.75	3.08	3.67
709.80	6.81	3.10	3.70
709.90	6.86	3.12	3.74
710.00	**6.92**	**3.14**	**3.78**

Stage-Area-Storage for Pond Pond C: Pond C

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
704.00	18,277	0
704.10	18,438	1,836
704.20	18,599	3,688
704.30	18,761	5,556
704.40	18,922	7,440
704.50	19,083	9,340
704.60	19,244	11,256
704.70	19,405	13,189
704.80	19,567	15,137
704.90	19,728	17,102
705.00	19,889	19,083
705.10	20,056	21,080
705.20	20,223	23,094
705.30	20,390	25,125
705.40	20,557	27,172
705.50	20,724	29,236
705.60	20,890	31,317
705.70	21,057	33,414
705.80	21,224	35,528
705.90	21,391	37,659
706.00	21,558	39,807
706.10	21,731	41,971
706.20	21,903	44,153
706.30	22,076	46,352
706.40	22,248	48,568
706.50	22,421	50,801
706.60	22,594	53,052
706.70	22,766	55,320
706.80	22,939	57,605
706.90	23,111	59,908
707.00	23,284	62,228
707.10	23,462	64,565
707.20	23,641	66,920
707.30	23,819	69,293
707.40	23,997	71,684
707.50	24,176	74,092
707.60	24,354	76,519
707.70	24,532	78,963
707.80	24,710	81,425
707.90	24,889	83,905
708.00	25,067	86,403
708.10	25,251	88,919
708.20	25,435	91,453
708.30	25,618	94,006
708.40	25,802	96,577
708.50	25,986	99,166
708.60	26,170	101,774
708.70	26,354	104,400
708.80	26,537	107,045
708.90	26,721	109,708
709.00	26,905	112,389
709.10	27,095	115,089
709.20	27,284	117,808
709.30	27,474	120,546
709.40	27,663	123,303
709.50	27,853	126,079
709.60	28,043	128,873
709.70	28,232	131,687
709.80	28,422	134,520
709.90	28,611	137,371
710.00	**28,801**	**140,242**

Summary for Pond Pond D: Pond D

Inflow Area =	372,494 sf,	24.46% Impervious,	Inflow Depth =	1.95"	for 5-Year event
Inflow =	3.91 cfs @	7.94 hrs,	Volume=	60,565 cf	
Outflow =	1.60 cfs @	8.74 hrs,	Volume=	60,565 cf,	Atten= 59%, Lag= 47.7 min
Primary =	0.93 cfs @	8.74 hrs,	Volume=	55,845 cf	
Secondary =	0.67 cfs @	8.74 hrs,	Volume=	4,720 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.40' @ 8.74 hrs Surf.Area= 5,791 sf Storage= 7,168 cf

Plug-Flow detention time= 61.6 min calculated for 60,560 cf (100% of inflow)
Center-of-Mass det. time= 61.5 min (815.9 - 754.4)

Volume	Invert	Avail.Storage	Storage Description
#1	693.00'	45,136 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

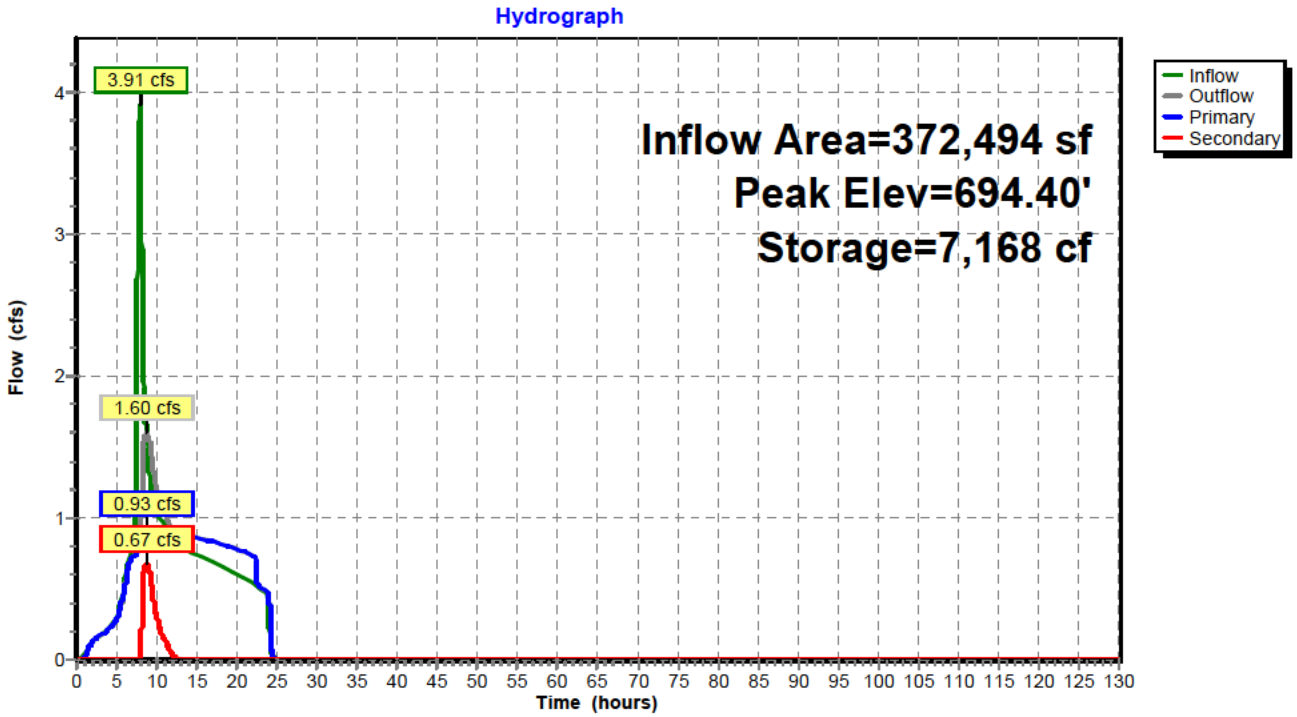
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
693.00	4,458	0	0
694.00	5,393	4,926	4,926
695.00	6,385	5,889	10,815
696.00	7,433	6,909	17,724
697.00	8,538	7,986	25,709
698.00	9,699	9,119	34,828
699.00	10,917	10,308	45,136

Device	Routing	Invert	Outlet Devices
#1	Primary	691.00'	**4.3" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	694.08'	**15.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

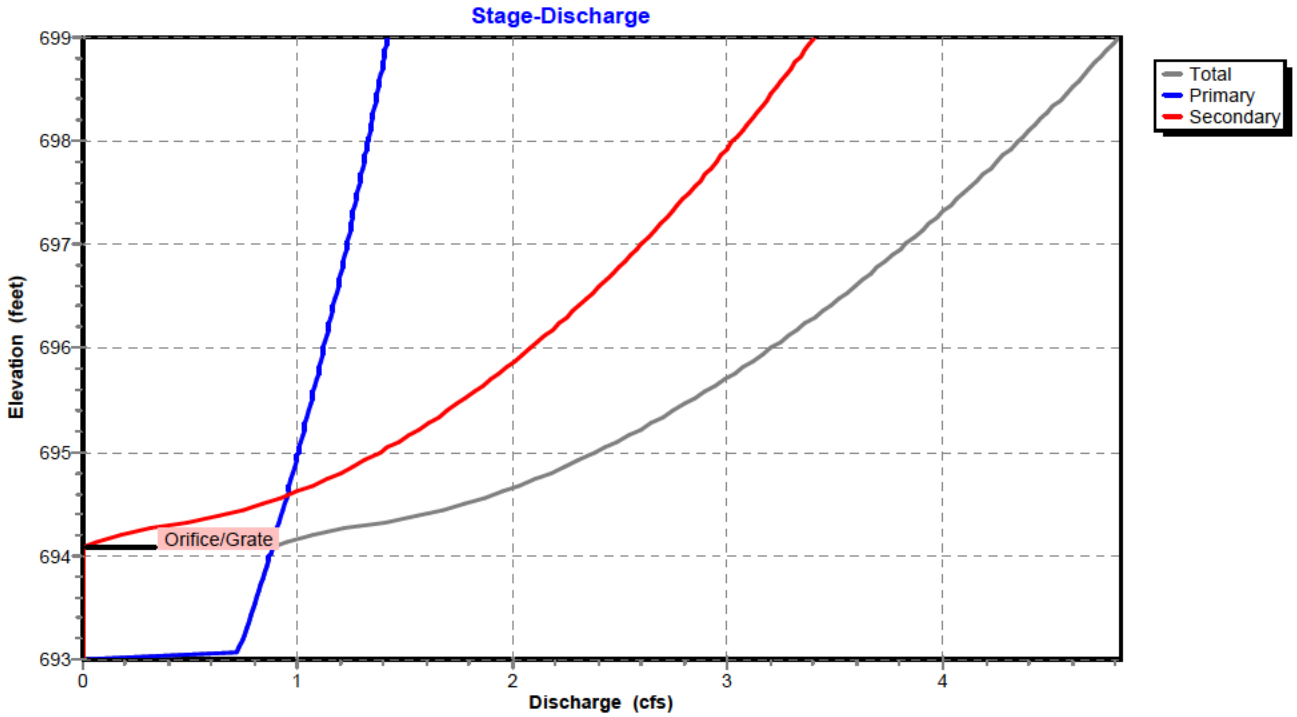
Primary OutFlow Max=0.93 cfs @ 8.74 hrs HW=694.40' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.93 cfs @ 9.18 fps)

Secondary OutFlow Max=0.68 cfs @ 8.74 hrs HW=694.40' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.68 cfs @ 2.16 fps)

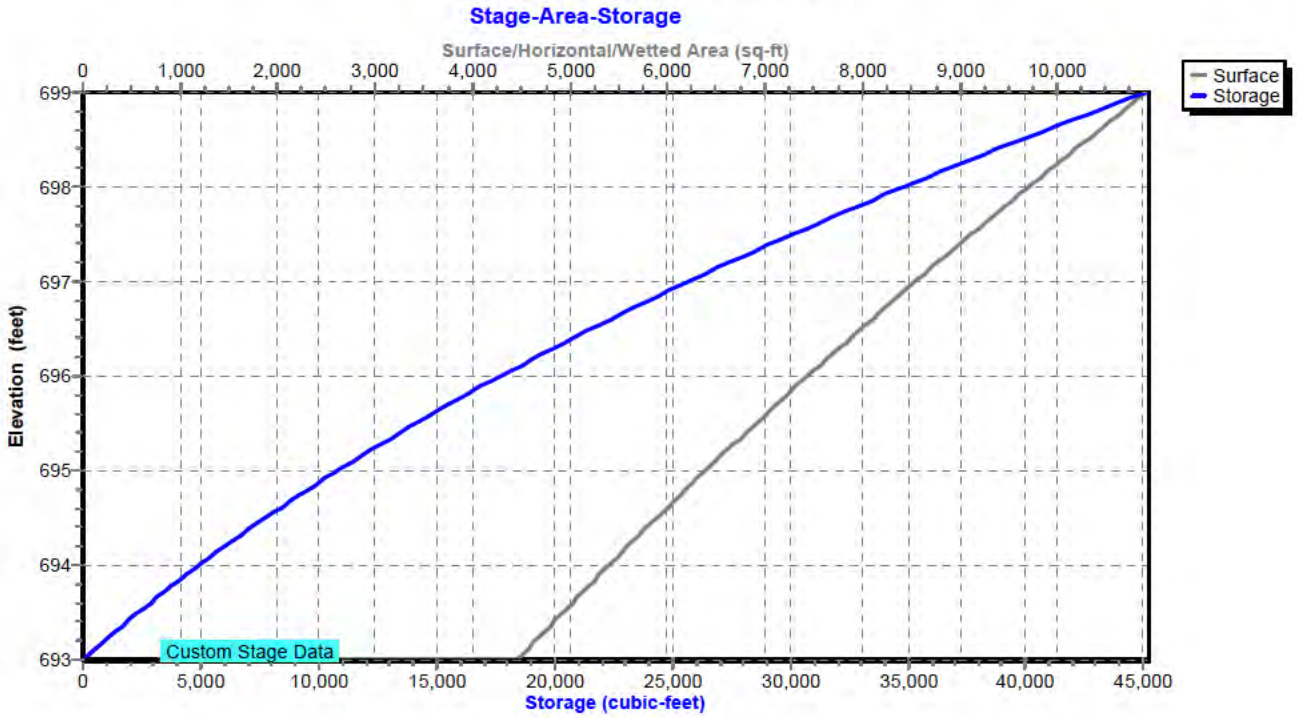
Pond Pond D: Pond D



Pond Pond D: Pond D



Pond Pond D: Pond D



Hydrograph for Pond Pond D: Pond D

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	693.00	0.00	0.00	0.00
5.00	**0.30**	**106**	**693.02**	**0.28**	**0.28**	**0.00**
10.00	**1.06**	**6,323**	**694.25**	**1.21**	**0.91**	**0.30**
15.00	0.74	4,521	693.92	0.86	0.86	0.00
20.00	0.60	1,857	693.40	0.78	0.78	0.00
25.00	0.00	0	693.00	0.00	0.00	0.00
30.00	0.00	0	693.00	0.00	0.00	0.00
35.00	0.00	0	693.00	0.00	0.00	0.00
40.00	0.00	0	693.00	0.00	0.00	0.00
45.00	0.00	0	693.00	0.00	0.00	0.00
50.00	0.00	0	693.00	0.00	0.00	0.00
55.00	0.00	0	693.00	0.00	0.00	0.00
60.00	0.00	0	693.00	0.00	0.00	0.00
65.00	0.00	0	693.00	0.00	0.00	0.00
70.00	0.00	0	693.00	0.00	0.00	0.00
75.00	0.00	0	693.00	0.00	0.00	0.00
80.00	0.00	0	693.00	0.00	0.00	0.00
85.00	0.00	0	693.00	0.00	0.00	0.00
90.00	0.00	0	693.00	0.00	0.00	0.00
95.00	0.00	0	693.00	0.00	0.00	0.00
100.00	0.00	0	693.00	0.00	0.00	0.00
105.00	0.00	0	693.00	0.00	0.00	0.00
110.00	0.00	0	693.00	0.00	0.00	0.00
115.00	0.00	0	693.00	0.00	0.00	0.00
120.00	0.00	0	693.00	0.00	0.00	0.00
125.00	0.00	0	693.00	0.00	0.00	0.00
130.00	0.00	0	693.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond D: Pond D

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
693.00	0.00	0.00	0.00
693.10	0.73	0.73	0.00
693.20	0.74	0.74	0.00
693.30	0.76	0.76	0.00
693.40	0.78	0.78	0.00
693.50	0.79	0.79	0.00
693.60	0.81	0.81	0.00
693.70	0.82	0.82	0.00
693.80	0.84	0.84	0.00
693.90	0.85	0.85	0.00
694.00	0.87	0.87	0.00
694.10	0.90	0.88	0.01
694.20	1.07	0.90	0.17
694.30	1.34	0.91	0.43
694.40	1.60	0.93	0.67
694.50	1.78	0.94	0.84
694.60	1.93	0.95	0.97
694.70	2.06	0.97	1.09
694.80	2.18	0.98	1.20
694.90	2.29	0.99	1.29
695.00	2.39	1.00	1.38
695.10	2.49	1.02	1.47
695.20	2.58	1.03	1.55
695.30	2.67	1.04	1.63
695.40	2.75	1.05	1.70
695.50	2.83	1.06	1.77
695.60	2.91	1.08	1.84
695.70	2.99	1.09	1.90
695.80	3.06	1.10	1.96
695.90	3.13	1.11	2.02
696.00	3.20	1.12	2.08
696.10	3.27	1.13	2.14
696.20	3.34	1.14	2.20
696.30	3.41	1.16	2.25
696.40	3.47	1.17	2.30
696.50	3.53	1.18	2.36
696.60	3.59	1.19	2.41
696.70	3.65	1.20	2.46
696.80	3.71	1.21	2.50
696.90	3.77	1.22	2.55
697.00	3.83	1.23	2.60
697.10	3.88	1.24	2.65
697.20	3.94	1.25	2.69
697.30	3.99	1.26	2.74
697.40	4.05	1.27	2.78
697.50	4.10	1.28	2.82
697.60	4.15	1.29	2.86
697.70	4.21	1.30	2.91
697.80	4.26	1.31	2.95
697.90	4.31	1.32	2.99
698.00	4.36	1.33	3.03
698.10	4.41	1.34	3.07
698.20	4.45	1.35	3.11
698.30	4.50	1.36	3.15
698.40	4.55	1.36	3.18
698.50	4.60	1.37	3.22
698.60	4.64	1.38	3.26
698.70	4.69	1.39	3.30
698.80	4.73	1.40	3.33
698.90	4.78	1.41	3.37
699.00	**4.82**	**1.42**	**3.40**

Stage-Area-Storage for Pond Pond D: Pond D

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
693.00	4,458	0
693.10	4,552	450
693.20	4,645	910
693.30	4,738	1,379
693.40	4,832	1,858
693.50	4,926	2,346
693.60	5,019	2,843
693.70	5,113	3,350
693.80	5,206	3,866
693.90	5,299	4,391
694.00	5,393	4,926
694.10	5,492	5,470
694.20	5,591	6,024
694.30	5,691	6,588
694.40	5,790	7,162
694.50	5,889	7,746
694.60	5,988	8,340
694.70	6,087	8,944
694.80	6,187	9,557
694.90	6,286	10,181
695.00	6,385	10,815
695.10	6,490	11,458
695.20	6,595	12,112
695.30	6,699	12,777
695.40	6,804	13,452
695.50	6,909	14,138
695.60	7,014	14,834
695.70	7,119	15,541
695.80	7,223	16,258
695.90	7,328	16,985
696.00	7,433	17,724
696.10	7,544	18,472
696.20	7,654	19,232
696.30	7,764	20,003
696.40	7,875	20,785
696.50	7,986	21,578
696.60	8,096	22,382
696.70	8,207	23,197
696.80	8,317	24,023
696.90	8,427	24,861
697.00	8,538	25,709
697.10	8,654	26,569
697.20	8,770	27,440
697.30	8,886	28,323
697.40	9,002	29,217
697.50	9,119	30,123
697.60	9,235	31,041
697.70	9,351	31,970
697.80	9,467	32,911
697.90	9,583	33,863
698.00	9,699	34,828
698.10	9,821	35,803
698.20	9,943	36,792
698.30	10,064	37,792
698.40	10,186	38,805
698.50	10,308	39,829
698.60	10,430	40,866
698.70	10,552	41,915
698.80	10,673	42,976
698.90	10,795	44,050
699.00	**10,917**	**45,136**

Summary for Pond Pond E: Pond E

Inflow Area =	600,189 sf,	3.19% Impervious,	Inflow Depth =	1.61"	for 5-Year event
Inflow =	4.56 cfs @	8.00 hrs, Volume=	80,465 cf		
Outflow =	2.54 cfs @	8.56 hrs, Volume=	80,465 cf,	Atten= 44%,	Lag= 33.8 min
Primary =	1.56 cfs @	8.56 hrs, Volume=	75,122 cf		
Secondary =	0.98 cfs @	8.56 hrs, Volume=	5,343 cf		

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 713.94' @ 8.56 hrs Surf.Area= 10,631 sf Storage= 8,718 cf

Plug-Flow detention time= 63.4 min calculated for 80,465 cf (100% of inflow)
Center-of-Mass det. time= 63.3 min (875.5 - 812.2)

Volume	Invert	Avail.Storage	Storage Description
#1	713.00'	56,362 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

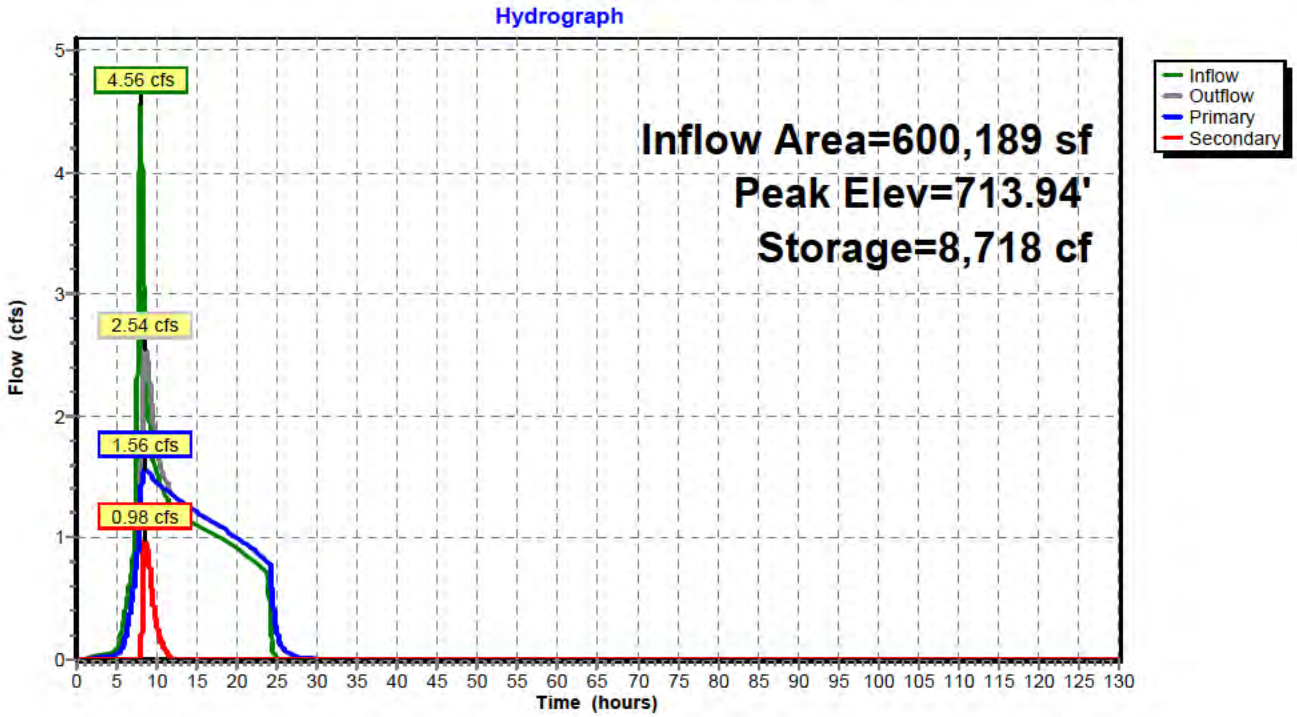
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
713.00	7,916	0	0
714.00	10,804	9,360	9,360
715.00	13,920	12,362	21,722
716.00	17,264	15,592	37,314
717.00	20,832	19,048	56,362

Device	Routing	Invert	Outlet Devices
#1	Primary	713.00'	**7.7" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	713.71'	**16.0" W x 3.0" H Vert. Orifice/Grate X 2.00** C= 0.620

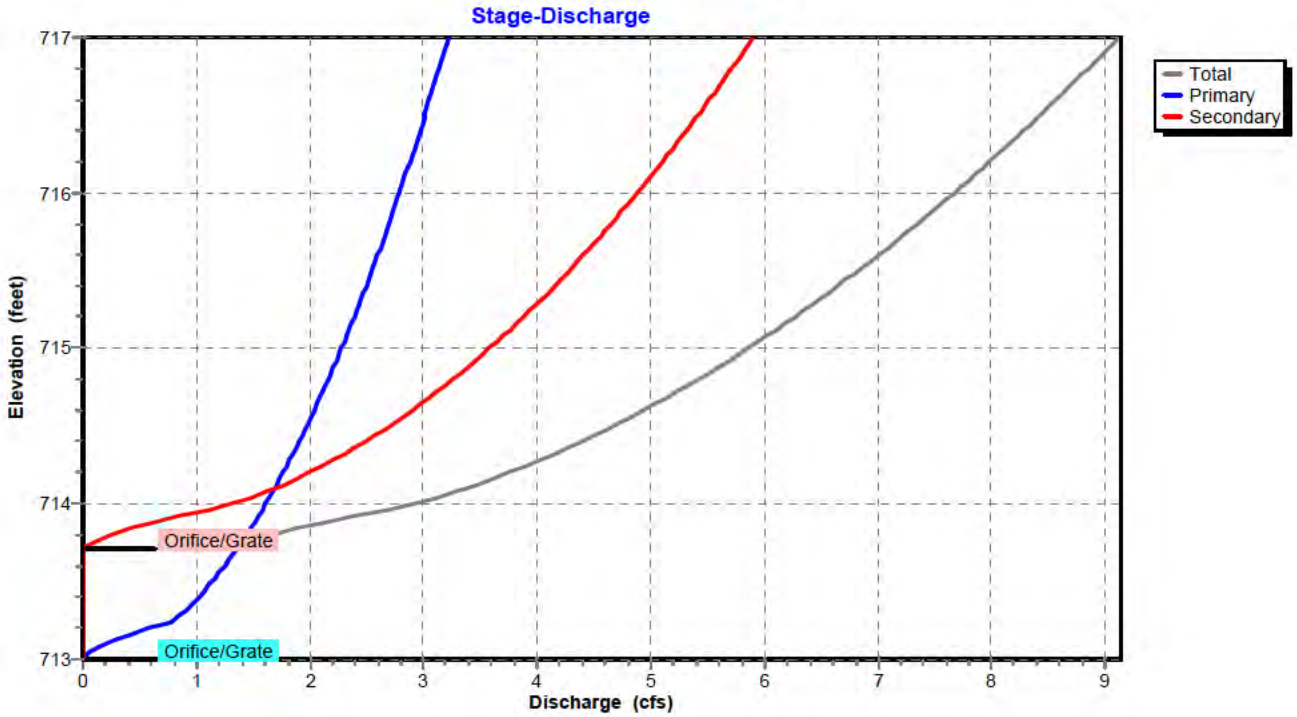
Primary OutFlow Max=1.56 cfs @ 8.56 hrs HW=713.94' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 1.56 cfs @ 4.82 fps)

Secondary OutFlow Max=0.98 cfs @ 8.56 hrs HW=713.94' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.98 cfs @ 1.59 fps)

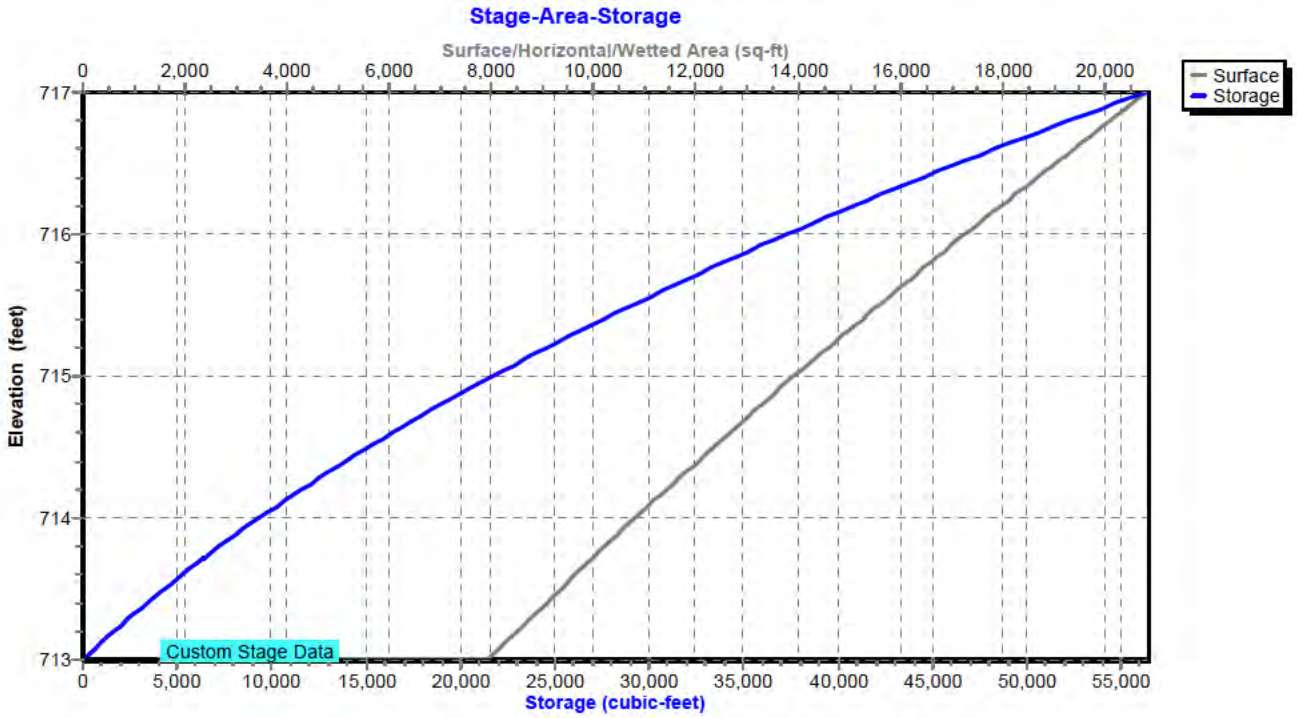
Pond Pond E: Pond E



Pond Pond E: Pond E



Pond Pond E: Pond E



Hydrograph for Pond Pond E: Pond E

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	713.00	0.00	0.00	0.00
5.00	**0.07**	**242**	**713.03**	**0.04**	**0.04**	**0.00**
10.00	**1.53**	**7,376**	**713.81**	**1.74**	**1.45**	**0.29**
15.00	1.10	4,937	713.57	1.21	1.21	0.00
20.00	0.91	3,279	713.39	1.00	1.00	0.00
25.00	0.01	839	713.10	0.22	0.22	0.00
30.00	0.00	35	713.00	0.01	0.01	0.00
35.00	0.00	2	713.00	0.00	0.00	0.00
40.00	0.00	0	713.00	0.00	0.00	0.00
45.00	0.00	0	713.00	0.00	0.00	0.00
50.00	0.00	0	713.00	0.00	0.00	0.00
55.00	0.00	0	713.00	0.00	0.00	0.00
60.00	0.00	0	713.00	0.00	0.00	0.00
65.00	0.00	0	713.00	0.00	0.00	0.00
70.00	0.00	0	713.00	0.00	0.00	0.00
75.00	0.00	0	713.00	0.00	0.00	0.00
80.00	0.00	0	713.00	0.00	0.00	0.00
85.00	0.00	0	713.00	0.00	0.00	0.00
90.00	0.00	0	713.00	0.00	0.00	0.00
95.00	0.00	0	713.00	0.00	0.00	0.00
100.00	0.00	0	713.00	0.00	0.00	0.00
105.00	0.00	0	713.00	0.00	0.00	0.00
110.00	0.00	0	713.00	0.00	0.00	0.00
115.00	0.00	0	713.00	0.00	0.00	0.00
120.00	0.00	0	713.00	0.00	0.00	0.00
125.00	0.00	0	713.00	0.00	0.00	0.00
130.00	0.00	0	713.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond E: Pond E

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
713.00	0.00	0.00	0.00
713.05	0.07	0.07	0.00
713.10	0.21	0.21	0.00
713.15	0.38	0.38	0.00
713.20	0.59	0.59	0.00
713.25	0.80	0.80	0.00
713.30	0.88	0.88	0.00
713.35	0.95	0.95	0.00
713.40	1.02	1.02	0.00
713.45	1.08	1.08	0.00
713.50	1.14	1.14	0.00
713.55	1.19	1.19	0.00
713.60	1.25	1.25	0.00
713.65	1.30	1.30	0.00
713.70	1.35	1.35	0.00
713.75	1.46	1.39	0.07
713.80	1.68	1.44	0.24
713.85	1.95	1.48	0.46
713.90	2.26	1.53	0.73
713.95	2.61	1.57	1.04
714.00	2.92	1.61	1.31
714.05	3.16	1.65	1.51
714.10	3.38	1.69	1.69
714.15	3.57	1.73	1.85
714.20	3.76	1.76	1.99
714.25	3.93	1.80	2.13
714.30	4.09	1.83	2.25
714.35	4.24	1.87	2.37
714.40	4.39	1.90	2.49
714.45	4.53	1.94	2.60
714.50	4.67	1.97	2.70
714.55	4.80	2.00	2.80
714.60	4.93	2.04	2.90
714.65	5.06	2.07	2.99
714.70	5.18	2.10	3.08
714.75	5.30	2.13	3.17
714.80	5.41	2.16	3.26
714.85	5.53	2.19	3.34
714.90	5.64	2.22	3.42
714.95	5.75	2.25	3.50
715.00	5.85	2.28	3.58
715.05	5.96	2.30	3.65
715.10	6.06	2.33	3.73
715.15	6.16	2.36	3.80
715.20	6.26	2.39	3.87
715.25	6.36	2.41	3.94
715.30	6.45	2.44	4.01
715.35	6.55	2.47	4.08
715.40	6.64	2.49	4.15
715.45	6.73	2.52	4.21
715.50	6.82	2.54	4.28
715.55	6.91	2.57	4.34
715.60	7.00	2.59	4.41
715.65	7.09	2.62	4.47
715.70	7.17	2.64	4.53
715.75	7.26	2.67	4.59
715.80	7.34	2.69	4.65
715.85	7.42	2.72	4.71
715.90	7.51	2.74	4.77
715.95	7.59	2.76	4.82
716.00	7.67	2.79	4.88
716.05	7.75	2.81	4.94
716.10	7.82	2.83	4.99
716.15	7.90	2.86	5.05
716.20	7.98	2.88	5.10
716.25	8.05	2.90	5.15
716.30	8.13	2.92	5.21
716.35	8.20	2.94	5.26
716.40	8.28	2.97	5.31
716.45	8.35	2.99	5.36
716.50	8.42	3.01	5.41
716.55	8.50	3.03	5.46
716.60	8.57	3.05	5.52
716.65	8.64	3.07	5.56
716.70	8.71	3.09	5.61
716.75	8.78	3.12	5.66
716.80	8.85	3.14	5.71
716.85	8.92	3.16	5.76
716.90	8.98	3.18	5.81
716.95	9.05	3.20	5.85
717.00	**9.12**	**3.22**	**5.90**

Stage-Area-Storage for Pond Pond E: Pond E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
713.00	7,916	0
713.05	8,060	399
713.10	8,205	806
713.15	8,349	1,220
713.20	8,494	1,641
713.25	8,638	2,069
713.30	8,782	2,505
713.35	8,927	2,947
713.40	9,071	3,397
713.45	9,216	3,855
713.50	9,360	4,319
713.55	9,504	4,791
713.60	9,649	5,269
713.65	9,793	5,755
713.70	9,938	6,249
713.75	10,082	6,749
713.80	10,226	7,257
713.85	10,371	7,772
713.90	10,515	8,294
713.95	10,660	8,823
714.00	10,804	9,360
714.05	10,960	9,904
714.10	11,116	10,456
714.15	11,271	11,016
714.20	11,427	11,583
714.25	11,583	12,158
714.30	11,739	12,741
714.35	11,895	13,332
714.40	12,050	13,931
714.45	12,206	14,537
714.50	12,362	15,152
714.55	12,518	15,773
714.60	12,674	16,403
714.65	12,829	17,041
714.70	12,985	17,686
714.75	13,141	18,339
714.80	13,297	19,000
714.85	13,453	19,669
714.90	13,608	20,346
714.95	13,764	21,030
715.00	13,920	21,722
715.05	14,087	22,422
715.10	14,254	23,131
715.15	14,422	23,848
715.20	14,589	24,573
715.25	14,756	25,307
715.30	14,923	26,048
715.35	15,090	26,799
715.40	15,258	27,558
715.45	15,425	28,325
715.50	15,592	29,100
715.55	15,759	29,884
715.60	15,926	30,676
715.65	16,094	31,476
715.70	16,261	32,285
715.75	16,428	33,103
715.80	16,595	33,928
715.85	16,762	34,762
715.90	16,930	35,604
715.95	17,097	36,455
716.00	17,264	37,314
716.05	17,442	38,182
716.10	17,621	39,058
716.15	17,799	39,944
716.20	17,978	40,838
716.25	18,156	41,742
716.30	18,334	42,654
716.35	18,513	43,575
716.40	18,691	44,505
716.45	18,870	45,444
716.50	19,048	46,392
716.55	19,226	47,349
716.60	19,405	48,315
716.65	19,583	49,289
716.70	19,762	50,273
716.75	19,940	51,266
716.80	20,118	52,267
716.85	20,297	53,277
716.90	20,475	54,297
716.95	20,654	55,325
717.00	**20,832**	**56,362**

Time span=0.00-130.00 hrs, dt=0.01 hrs, 13001 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentA: Post Basin A Runoff Area=358,532 sf 46.88% Impervious Runoff Depth=2.67"
Tc=5.0 min CN=80/98 Runoff=5.32 cfs 79,742 cf

SubcatchmentB: Post Basin B Runoff Area=293,369 sf 49.49% Impervious Runoff Depth=2.71"
Tc=5.0 min CN=80/98 Runoff=4.43 cfs 66,327 cf

SubcatchmentC1: Post Basin C1 Runoff Area=104,630 sf 44.06% Impervious Runoff Depth=2.62"
Tc=5.0 min CN=80/98 Runoff=1.52 cfs 22,857 cf

SubcatchmentC2: Post Basin C2 Runoff Area=581,701 sf 3.45% Impervious Runoff Depth=1.94"
Flow Length=650' Slope=0.0330 '/' Tc=26.4 min CN=80/98 Runoff=4.36 cfs 93,837 cf

SubcatchmentD: Post Basin D Runoff Area=372,494 sf 24.46% Impervious Runoff Depth=2.29"
Tc=5.0 min CN=80/98 Runoff=4.66 cfs 71,101 cf

SubcatchmentE: Post Basin E Runoff Area=600,189 sf 3.19% Impervious Runoff Depth=1.93"
Flow Length=750' Slope=0.0466 '/' Tc=12.5 min CN=80/98 Runoff=5.65 cfs 96,604 cf

Pond Pond A: Pond A Peak Elev=709.88' Storage=18,012 cf Inflow=5.32 cfs 79,742 cf
Primary=0.65 cfs 60,566 cf Secondary=0.88 cfs 19,175 cf Outflow=1.53 cfs 79,742 cf

Pond Pond B: Pond B Peak Elev=709.81' Storage=11,146 cf Inflow=4.43 cfs 66,327 cf
Primary=0.73 cfs 55,662 cf Secondary=0.89 cfs 10,665 cf Outflow=1.62 cfs 66,327 cf

Pond Pond C: Pond C Peak Elev=705.15' Storage=22,005 cf Inflow=6.64 cfs 491,122 cf
Primary=1.97 cfs 461,688 cf Secondary=0.95 cfs 28,874 cf Outflow=2.92 cfs 490,561 cf

Pond Pond D: Pond D Peak Elev=694.66' Storage=8,673 cf Inflow=4.66 cfs 71,101 cf
Primary=0.96 cfs 61,409 cf Secondary=1.04 cfs 9,691 cf Outflow=2.00 cfs 71,100 cf

Pond Pond E: Pond E Peak Elev=714.09' Storage=10,306 cf Inflow=5.65 cfs 96,604 cf
Primary=1.68 cfs 85,147 cf Secondary=1.64 cfs 11,457 cf Outflow=3.32 cfs 96,604 cf

Total Runoff Area = 2,310,915 sf Runoff Volume = 430,467 cf Average Runoff Depth = 2.24"
78.81% Pervious = 1,821,196 sf 21.19% Impervious = 489,719 sf

Summary for Subcatchment A: Post Basin A

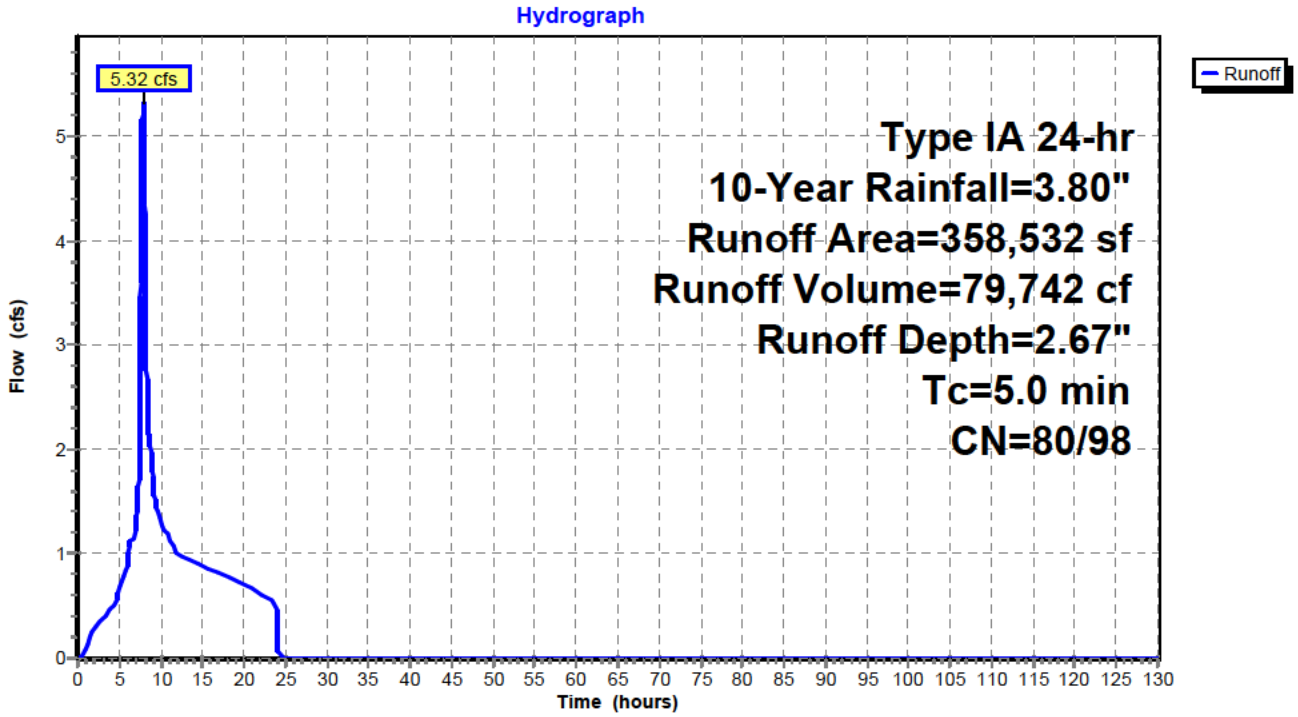
Runoff = 5.32 cfs @ 7.91 hrs, Volume= 79,742 cf, Depth= 2.67"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

	Area (sf)	CN	Description
*	168,081	98	Impervious Area
	190,451	80	>75% Grass cover, Good, HSG D
	358,532	88	Weighted Average
	190,451	80	53.12% Pervious Area
	168,081	98	46.88% Impervious Area

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

Subcatchment A: Post Basin A



Hydrograph for Subcatchment A: Post Basin A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.59	0.00	0.40	**0.64**
10.00	2.19	0.68	1.97	**1.32**
15.00	2.92	1.19	2.69	0.88
20.00	**3.47**	**1.61**	**3.23**	0.70
25.00	**3.80**	**1.88**	**3.57**	0.00
30.00	3.80	1.88	3.57	0.00
35.00	3.80	1.88	3.57	0.00
40.00	3.80	1.88	3.57	0.00
45.00	3.80	1.88	3.57	0.00
50.00	3.80	1.88	3.57	0.00
55.00	3.80	1.88	3.57	0.00
60.00	3.80	1.88	3.57	0.00
65.00	3.80	1.88	3.57	0.00
70.00	3.80	1.88	3.57	0.00
75.00	3.80	1.88	3.57	0.00
80.00	3.80	1.88	3.57	0.00
85.00	3.80	1.88	3.57	0.00
90.00	3.80	1.88	3.57	0.00
95.00	3.80	1.88	3.57	0.00
100.00	3.80	1.88	3.57	0.00
105.00	3.80	1.88	3.57	0.00
110.00	3.80	1.88	3.57	0.00
115.00	3.80	1.88	3.57	0.00
120.00	3.80	1.88	3.57	0.00
125.00	3.80	1.88	3.57	0.00
130.00	3.80	1.88	3.57	0.00

Summary for Subcatchment B: Post Basin B

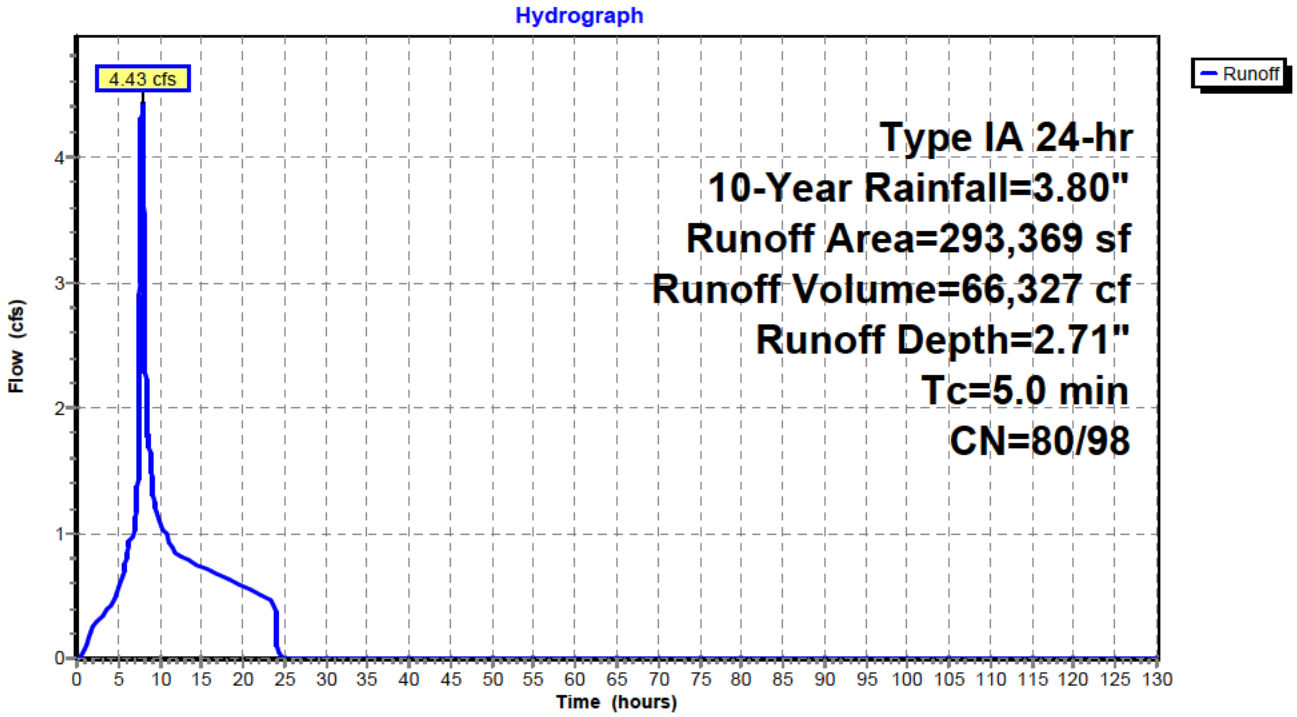
Runoff = 4.43 cfs @ 7.91 hrs, Volume= 66,327 cf, Depth= 2.71"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

	Area (sf)	CN	Description
*	145,197	98	Impervious Area
	148,172	80	>75% Grass cover, Good, HSG D
	293,369	89	Weighted Average
	148,172	80	50.51% Pervious Area
	145,197	98	49.49% Impervious Area

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

Subcatchment B: Post Basin B



Hydrograph for Subcatchment B: Post Basin B

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.59	0.00	0.40	**0.55**
10.00	2.19	0.68	1.97	**1.09**
15.00	2.92	1.19	2.69	0.73
20.00	**3.47**	**1.61**	**3.23**	0.58
25.00	**3.80**	**1.88**	**3.57**	0.00
30.00	3.80	1.88	3.57	0.00
35.00	3.80	1.88	3.57	0.00
40.00	3.80	1.88	3.57	0.00
45.00	3.80	1.88	3.57	0.00
50.00	3.80	1.88	3.57	0.00
55.00	3.80	1.88	3.57	0.00
60.00	3.80	1.88	3.57	0.00
65.00	3.80	1.88	3.57	0.00
70.00	3.80	1.88	3.57	0.00
75.00	3.80	1.88	3.57	0.00
80.00	3.80	1.88	3.57	0.00
85.00	3.80	1.88	3.57	0.00
90.00	3.80	1.88	3.57	0.00
95.00	3.80	1.88	3.57	0.00
100.00	3.80	1.88	3.57	0.00
105.00	3.80	1.88	3.57	0.00
110.00	3.80	1.88	3.57	0.00
115.00	3.80	1.88	3.57	0.00
120.00	3.80	1.88	3.57	0.00
125.00	3.80	1.88	3.57	0.00
130.00	3.80	1.88	3.57	0.00

Summary for Subcatchment C1: Post Basin C1

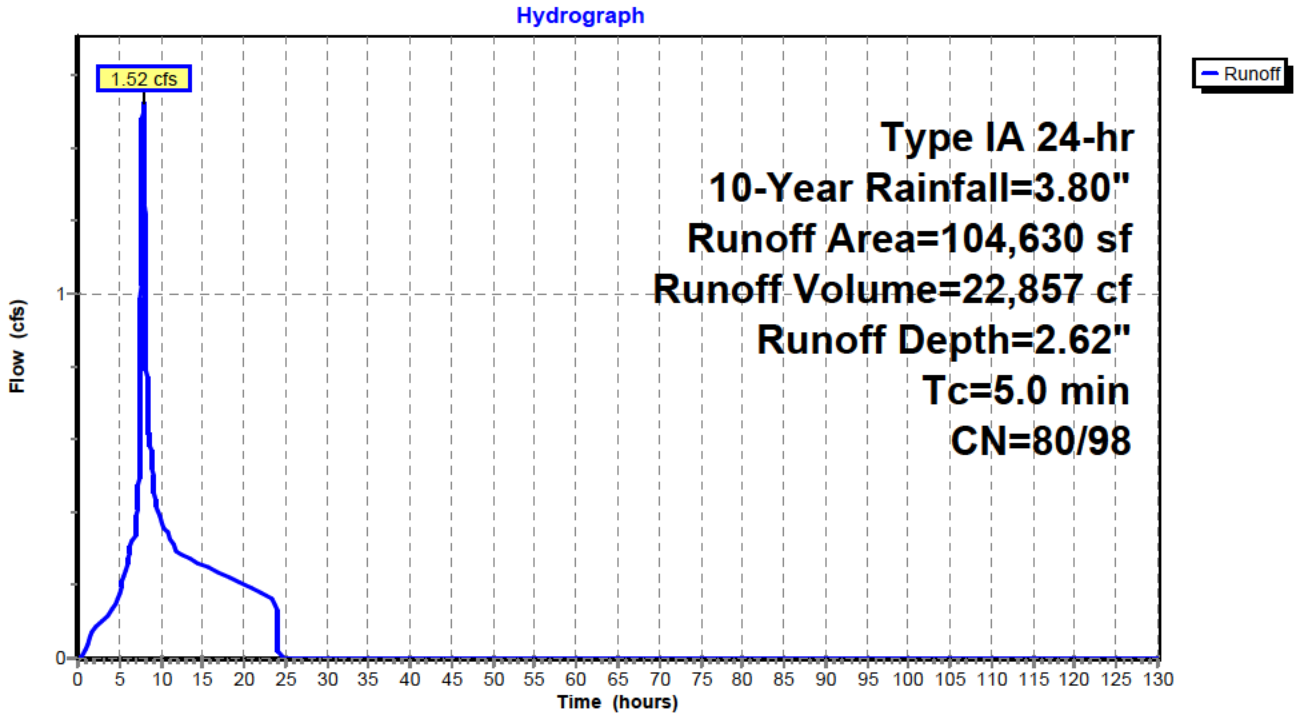
Runoff = 1.52 cfs @ 7.92 hrs, Volume= 22,857 cf, Depth= 2.62"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

	Area (sf)	CN	Description
*	46,105	98	Impervious Area
	58,525	80	>75% Grass cover, Good, HSG D
	104,630	88	Weighted Average
	58,525	80	55.94% Pervious Area
	46,105	98	44.06% Impervious Area

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

Subcatchment C1: Post Basin C1



Hydrograph for Subcatchment C1: Post Basin C1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.59	0.00	0.40	**0.18**
10.00	2.19	0.68	1.97	**0.38**
15.00	2.92	1.19	2.69	0.26
20.00	**3.47**	**1.61**	**3.23**	0.20
25.00	**3.80**	**1.88**	**3.57**	0.00
30.00	3.80	1.88	3.57	0.00
35.00	3.80	1.88	3.57	0.00
40.00	3.80	1.88	3.57	0.00
45.00	3.80	1.88	3.57	0.00
50.00	3.80	1.88	3.57	0.00
55.00	3.80	1.88	3.57	0.00
60.00	3.80	1.88	3.57	0.00
65.00	3.80	1.88	3.57	0.00
70.00	3.80	1.88	3.57	0.00
75.00	3.80	1.88	3.57	0.00
80.00	3.80	1.88	3.57	0.00
85.00	3.80	1.88	3.57	0.00
90.00	3.80	1.88	3.57	0.00
95.00	3.80	1.88	3.57	0.00
100.00	3.80	1.88	3.57	0.00
105.00	3.80	1.88	3.57	0.00
110.00	3.80	1.88	3.57	0.00
115.00	3.80	1.88	3.57	0.00
120.00	3.80	1.88	3.57	0.00
125.00	3.80	1.88	3.57	0.00
130.00	3.80	1.88	3.57	0.00

Summary for Subcatchment C2: Post Basin C2

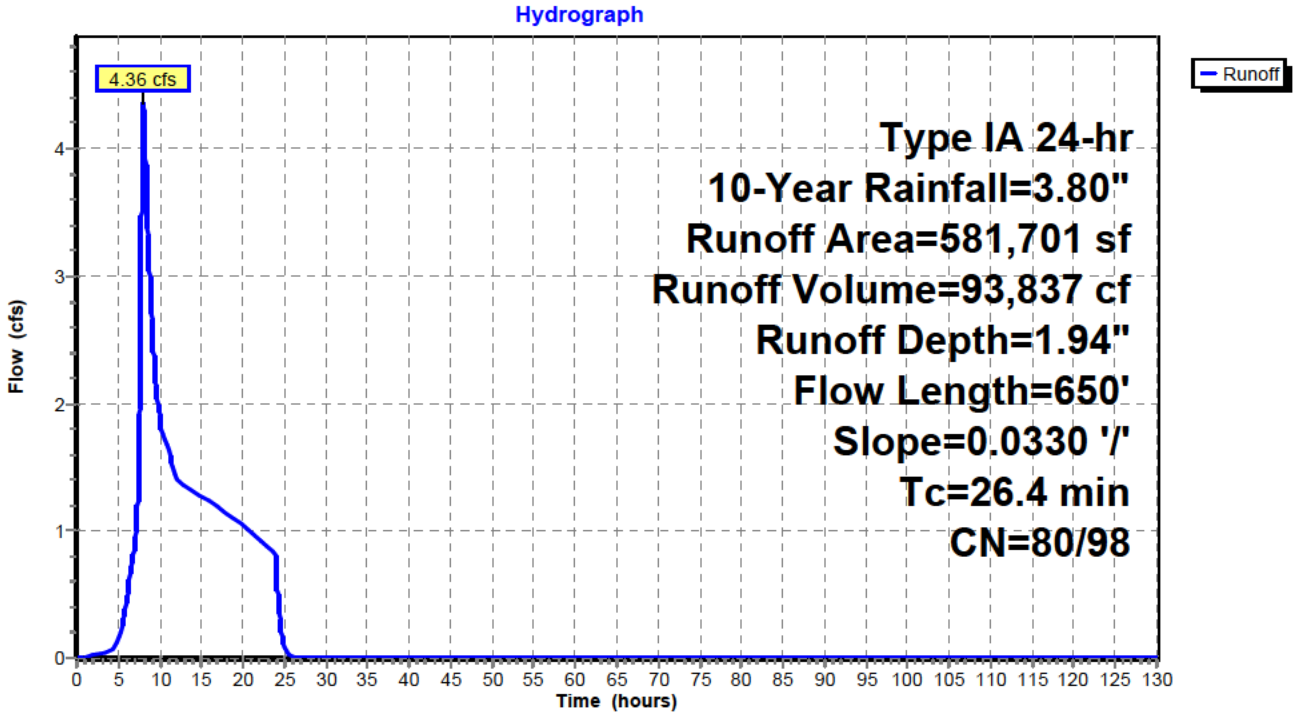
Runoff = 4.36 cfs @ 8.01 hrs, Volume= 93,837 cf, Depth= 1.94"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

	Area (sf)	CN	Description
*	20,053	98	Impervious Area
	561,648	80	>75% Grass cover, Good, HSG D
	581,701	81	Weighted Average
	561,648	80	96.55% Pervious Area
	20,053	98	3.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	300	0.0330	0.22		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
3.6	350	0.0330	1.63		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	650	Total			

Subcatchment C2: Post Basin C2



Hydrograph for Subcatchment C2: Post Basin C2

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.59	0.00	0.40	**0.13**
10.00	2.19	0.68	1.97	**1.90**
15.00	2.92	1.19	2.69	1.26
20.00	**3.47**	**1.61**	**3.23**	1.04
25.00	**3.80**	**1.88**	**3.57**	0.08
30.00	3.80	1.88	3.57	0.00
35.00	3.80	1.88	3.57	0.00
40.00	3.80	1.88	3.57	0.00
45.00	3.80	1.88	3.57	0.00
50.00	3.80	1.88	3.57	0.00
55.00	3.80	1.88	3.57	0.00
60.00	3.80	1.88	3.57	0.00
65.00	3.80	1.88	3.57	0.00
70.00	3.80	1.88	3.57	0.00
75.00	3.80	1.88	3.57	0.00
80.00	3.80	1.88	3.57	0.00
85.00	3.80	1.88	3.57	0.00
90.00	3.80	1.88	3.57	0.00
95.00	3.80	1.88	3.57	0.00
100.00	3.80	1.88	3.57	0.00
105.00	3.80	1.88	3.57	0.00
110.00	3.80	1.88	3.57	0.00
115.00	3.80	1.88	3.57	0.00
120.00	3.80	1.88	3.57	0.00
125.00	3.80	1.88	3.57	0.00
130.00	3.80	1.88	3.57	0.00

Summary for Subcatchment D: Post Basin D

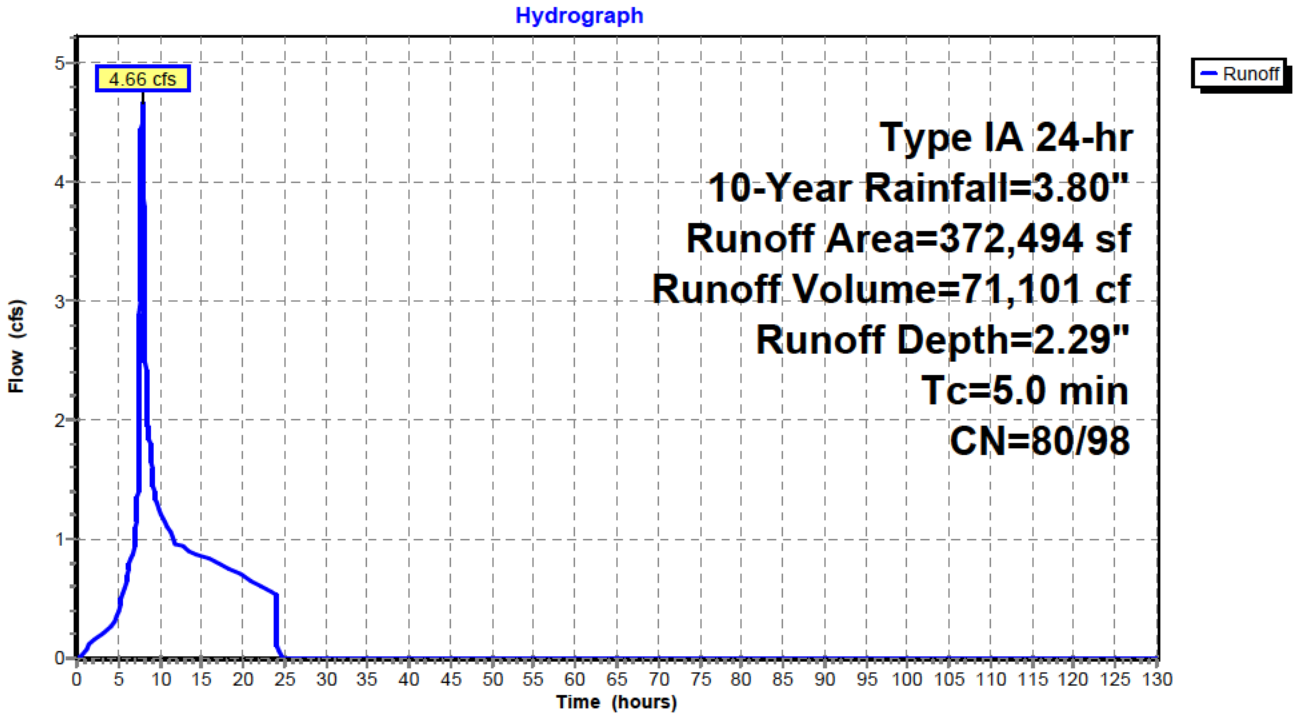
Runoff = 4.66 cfs @ 7.94 hrs, Volume= 71,101 cf, Depth= 2.29"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

	Area (sf)	CN	Description
*	91,123	98	Impervious Area
	281,371	80	>75% Grass cover, Good, HSG D
	372,494	84	Weighted Average
	281,371	80	75.54% Pervious Area
	91,123	98	24.46% Impervious Area

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

Subcatchment D: Post Basin D



Hydrograph for Subcatchment D: Post Basin D

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.59	0.00	0.40	**0.39**
10.00	2.19	0.68	1.97	**1.24**
15.00	2.92	1.19	2.69	0.86
20.00	**3.47**	**1.61**	**3.23**	0.69
25.00	**3.80**	**1.88**	**3.57**	0.00
30.00	3.80	1.88	3.57	0.00
35.00	3.80	1.88	3.57	0.00
40.00	3.80	1.88	3.57	0.00
45.00	3.80	1.88	3.57	0.00
50.00	3.80	1.88	3.57	0.00
55.00	3.80	1.88	3.57	0.00
60.00	3.80	1.88	3.57	0.00
65.00	3.80	1.88	3.57	0.00
70.00	3.80	1.88	3.57	0.00
75.00	3.80	1.88	3.57	0.00
80.00	3.80	1.88	3.57	0.00
85.00	3.80	1.88	3.57	0.00
90.00	3.80	1.88	3.57	0.00
95.00	3.80	1.88	3.57	0.00
100.00	3.80	1.88	3.57	0.00
105.00	3.80	1.88	3.57	0.00
110.00	3.80	1.88	3.57	0.00
115.00	3.80	1.88	3.57	0.00
120.00	3.80	1.88	3.57	0.00
125.00	3.80	1.88	3.57	0.00
130.00	3.80	1.88	3.57	0.00

Summary for Subcatchment E: Post Basin E

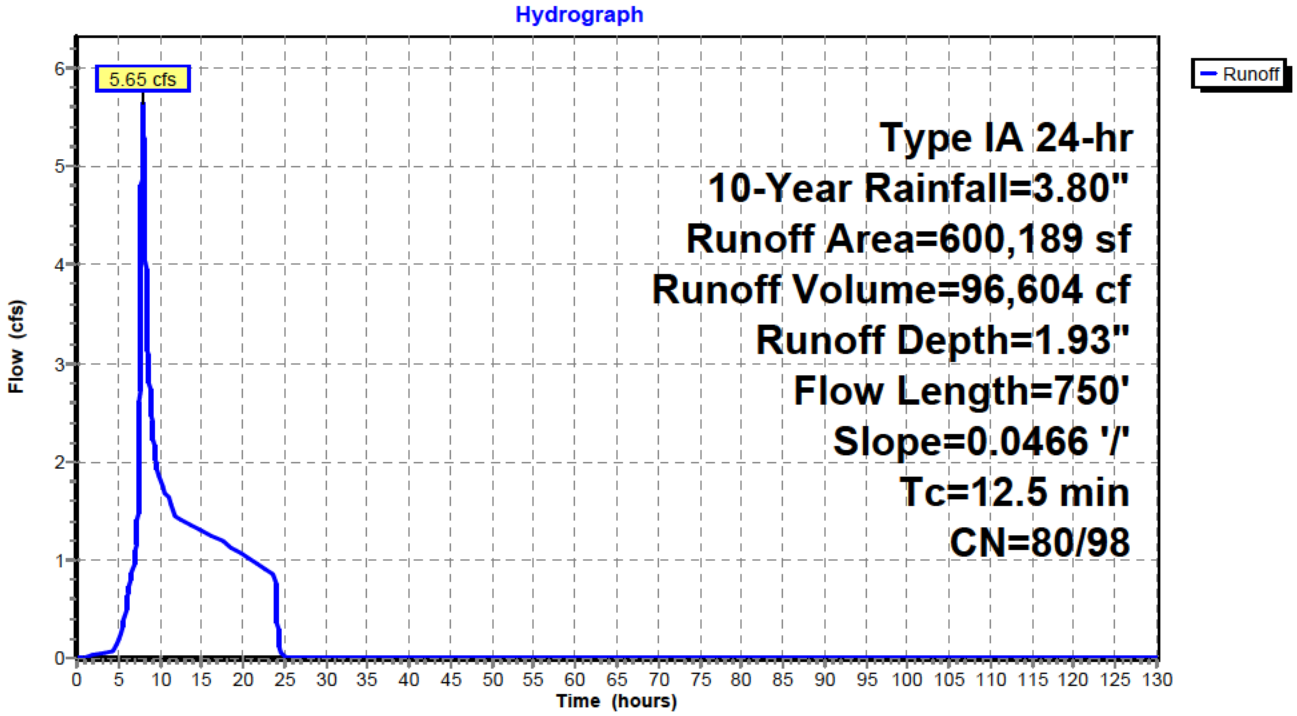
Runoff = 5.65 cfs @ 8.00 hrs, Volume= 96,604 cf, Depth= 1.93"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

	Area (sf)	CN	Description
*	19,160	98	Impervious Area
	581,029	80	>75% Grass cover, Good, HSG D
	600,189	81	Weighted Average
	581,029	80	96.81% Pervious Area
	19,160	98	3.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	300	0.0466	0.58		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
3.9	450	0.0466	1.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.5	750	Total			

Subcatchment E: Post Basin E



Hydrograph for Subcatchment E: Post Basin E

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.59	0.00	0.40	**0.17**
10.00	2.19	0.68	1.97	**1.83**
15.00	2.92	1.19	2.69	1.29
20.00	**3.47**	**1.61**	**3.23**	1.06
25.00	**3.80**	**1.88**	**3.57**	0.01
30.00	3.80	1.88	3.57	0.00
35.00	3.80	1.88	3.57	0.00
40.00	3.80	1.88	3.57	0.00
45.00	3.80	1.88	3.57	0.00
50.00	3.80	1.88	3.57	0.00
55.00	3.80	1.88	3.57	0.00
60.00	3.80	1.88	3.57	0.00
65.00	3.80	1.88	3.57	0.00
70.00	3.80	1.88	3.57	0.00
75.00	3.80	1.88	3.57	0.00
80.00	3.80	1.88	3.57	0.00
85.00	3.80	1.88	3.57	0.00
90.00	3.80	1.88	3.57	0.00
95.00	3.80	1.88	3.57	0.00
100.00	3.80	1.88	3.57	0.00
105.00	3.80	1.88	3.57	0.00
110.00	3.80	1.88	3.57	0.00
115.00	3.80	1.88	3.57	0.00
120.00	3.80	1.88	3.57	0.00
125.00	3.80	1.88	3.57	0.00
130.00	3.80	1.88	3.57	0.00

Summary for Pond Pond A: Pond A

Inflow Area =	358,532 sf,	46.88% Impervious,	Inflow Depth =	2.67"	for 10-Year event
Inflow =	5.32 cfs @	7.91 hrs,	Volume=	79,742 cf	
Outflow =	1.53 cfs @	9.27 hrs,	Volume=	79,742 cf,	Atten= 71%, Lag= 81.6 min
Primary =	0.65 cfs @	9.27 hrs,	Volume=	60,566 cf	
Secondary =	0.88 cfs @	9.27 hrs,	Volume=	19,175 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 709.88' @ 9.27 hrs Surf.Area= 10,696 sf Storage= 18,012 cf

Plug-Flow detention time= 230.6 min calculated for 79,742 cf (100% of inflow)
Center-of-Mass det. time= 230.6 min (944.3 - 713.7)

Volume	Invert	Avail.Storage	Storage Description
#1	708.00'	90,236 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

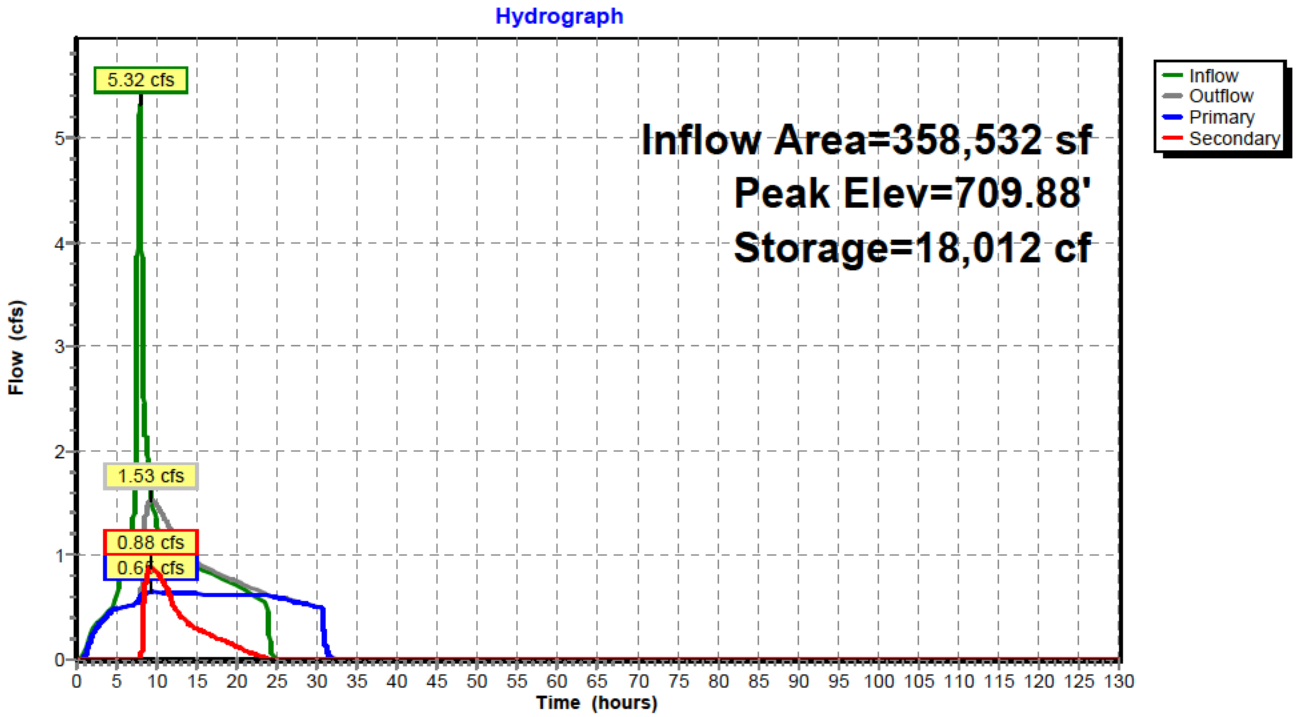
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
708.00	8,458	0	0
709.00	9,620	9,039	9,039
710.00	10,838	10,229	19,268
711.00	12,112	11,475	30,743
712.00	13,443	12,778	43,521
713.00	14,831	14,137	57,658
714.00	16,275	15,553	73,211
715.00	17,776	17,026	90,236

Device	Routing	Invert	Outlet Devices
#1	Primary	705.61'	**3.4" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	709.47'	**16.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

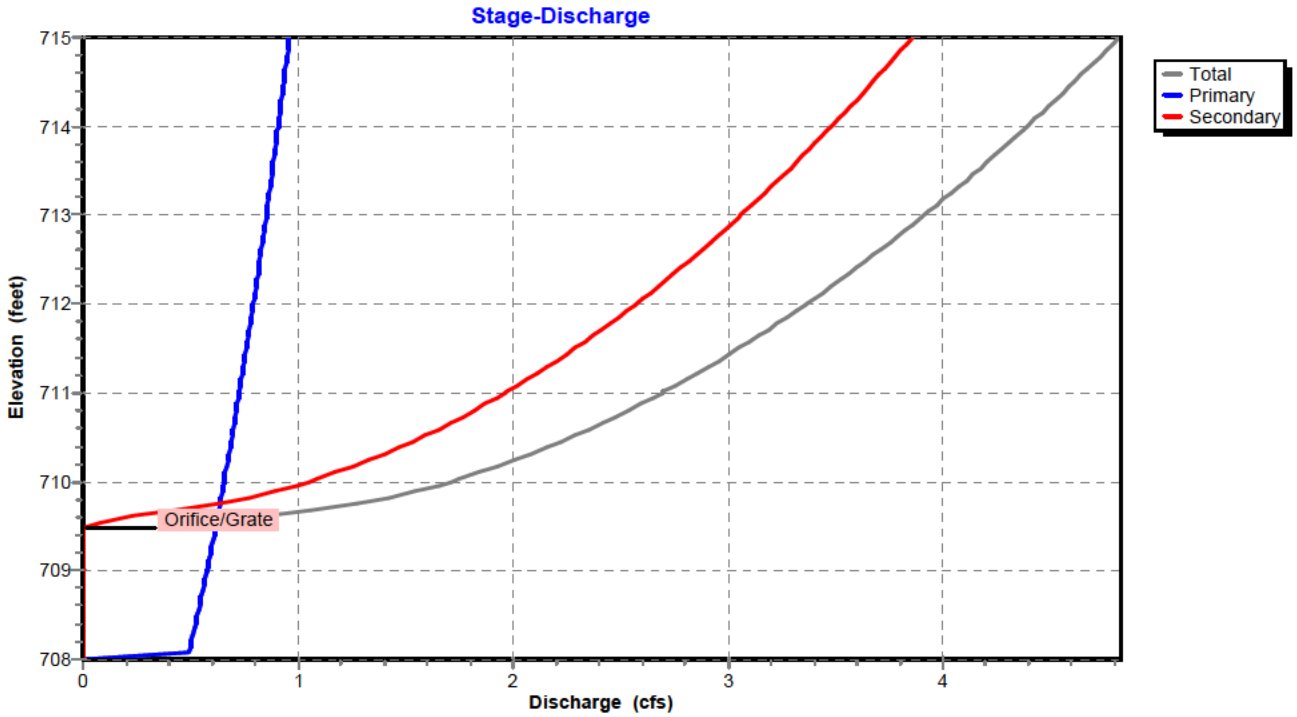
Primary OutFlow Max=0.65 cfs @ 9.27 hrs HW=709.88' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.65 cfs @ 10.29 fps)

Secondary OutFlow Max=0.88 cfs @ 9.27 hrs HW=709.88' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.88 cfs @ 2.65 fps)

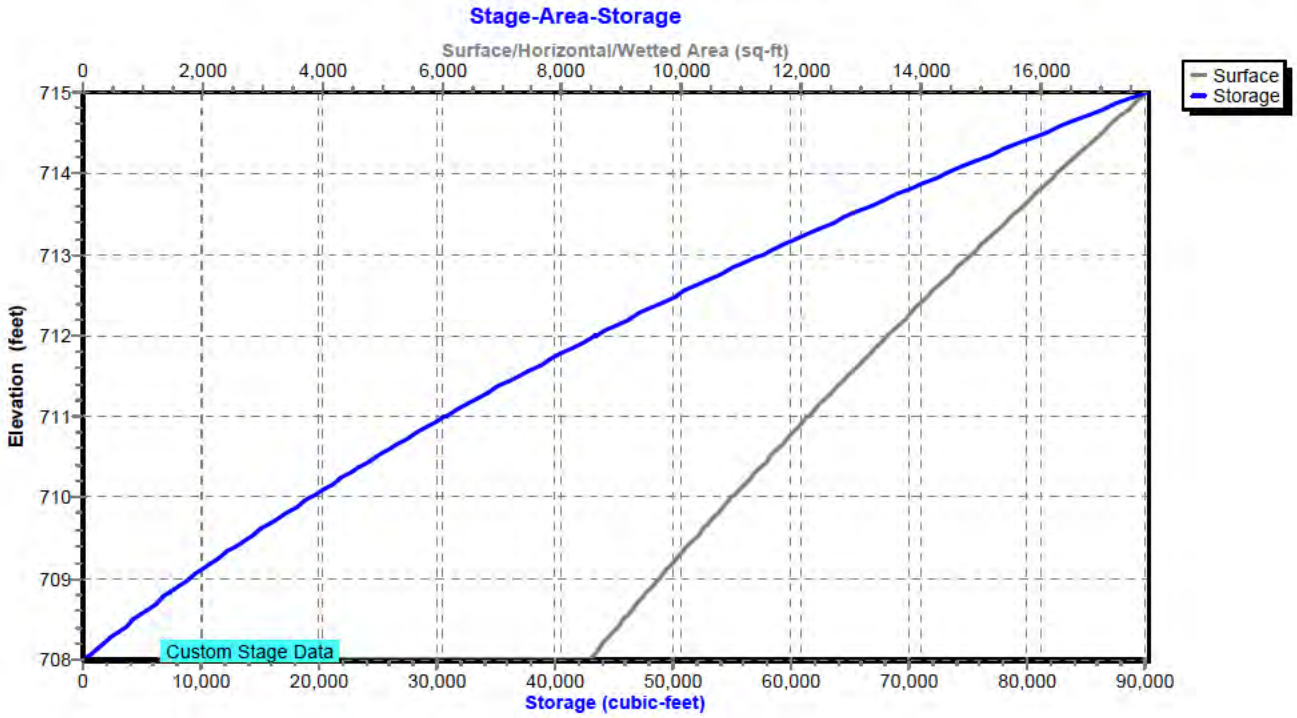
Pond Pond A: Pond A



Pond Pond A: Pond A



Pond Pond A: Pond A



Hydrograph for Pond Pond A: Pond A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	708.00	0.00	0.00	0.00
5.00	**0.64**	**746**	**708.09**	**0.49**	**0.49**	**0.00**
10.00	**1.32**	**17,738**	**709.86**	**1.49**	**0.65**	**0.84**
15.00	0.88	15,384	709.63	0.93	0.63	0.30
20.00	0.70	14,620	709.56	0.75	0.62	0.13
25.00	0.00	11,691	709.27	0.60	0.60	0.00
30.00	0.00	1,725	708.20	0.50	0.50	0.00
35.00	0.00	0	708.00	0.00	0.00	0.00
40.00	0.00	0	708.00	0.00	0.00	0.00
45.00	0.00	0	708.00	0.00	0.00	0.00
50.00	0.00	0	708.00	0.00	0.00	0.00
55.00	0.00	0	708.00	0.00	0.00	0.00
60.00	0.00	0	708.00	0.00	0.00	0.00
65.00	0.00	0	708.00	0.00	0.00	0.00
70.00	0.00	0	708.00	0.00	0.00	0.00
75.00	0.00	0	708.00	0.00	0.00	0.00
80.00	0.00	0	708.00	0.00	0.00	0.00
85.00	0.00	0	708.00	0.00	0.00	0.00
90.00	0.00	0	708.00	0.00	0.00	0.00
95.00	0.00	0	708.00	0.00	0.00	0.00
100.00	0.00	0	708.00	0.00	0.00	0.00
105.00	0.00	0	708.00	0.00	0.00	0.00
110.00	0.00	0	708.00	0.00	0.00	0.00
115.00	0.00	0	708.00	0.00	0.00	0.00
120.00	0.00	0	708.00	0.00	0.00	0.00
125.00	0.00	0	708.00	0.00	0.00	0.00
130.00	0.00	0	708.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond A: Pond A

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
708.00	0.00	0.00	0.00
708.10	0.50	0.50	0.00
708.20	0.50	0.50	0.00
708.30	0.51	0.51	0.00
708.40	0.52	0.52	0.00
708.50	0.53	0.53	0.00
708.60	0.54	0.54	0.00
708.70	0.55	0.55	0.00
708.80	0.56	0.56	0.00
708.90	0.57	0.57	0.00
709.00	0.58	0.58	0.00
709.10	0.59	0.59	0.00
709.20	0.59	0.59	0.00
709.30	0.60	0.60	0.00
709.40	0.61	0.61	0.00
709.50	0.64	0.62	0.02
709.60	0.83	0.63	0.21
709.70	1.12	0.63	0.49
709.80	1.38	0.64	0.74
709.90	1.56	0.65	0.91
710.00	1.71	0.66	1.05
710.10	1.84	0.66	1.18
710.20	1.96	0.67	1.29
710.30	2.07	0.68	1.39
710.40	2.17	0.69	1.49
710.50	2.27	0.69	1.58
710.60	2.36	0.70	1.66
710.70	2.45	0.71	1.74
710.80	2.53	0.71	1.82
710.90	2.62	0.72	1.89
711.00	2.69	0.73	1.97
711.10	2.77	0.74	2.03
711.20	2.84	0.74	2.10
711.30	2.91	0.75	2.17
711.40	2.98	0.75	2.23
711.50	3.05	0.76	2.29
711.60	3.12	0.77	2.35
711.70	3.18	0.77	2.41
711.80	3.24	0.78	2.46
711.90	3.30	0.79	2.52
712.00	3.36	0.79	2.57
712.10	3.42	0.80	2.62
712.20	3.48	0.81	2.68
712.30	3.54	0.81	2.73
712.40	3.59	0.82	2.78
712.50	3.65	0.82	2.83
712.60	3.70	0.83	2.87
712.70	3.76	0.84	2.92
712.80	3.81	0.84	2.97
712.90	3.86	0.85	3.01
713.00	3.91	0.85	3.06
713.10	3.96	0.86	3.10
713.20	4.01	0.86	3.15
713.30	4.06	0.87	3.19
713.40	4.11	0.88	3.23
713.50	4.16	0.88	3.28
713.60	4.21	0.89	3.32
713.70	4.25	0.89	3.36
713.80	4.30	0.90	3.40
713.90	4.34	0.90	3.44
714.00	4.39	0.91	3.48
714.10	4.43	0.91	3.52
714.20	4.48	0.92	3.56
714.30	4.52	0.92	3.60
714.40	4.57	0.93	3.64
714.50	4.61	0.94	3.67
714.60	4.65	0.94	3.71
714.70	4.69	0.95	3.75
714.80	4.73	0.95	3.78
714.90	4.78	0.96	3.82
715.00	**4.82**	**0.96**	**3.86**

Stage-Area-Storage for Pond Pond A: Pond A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
708.00	8,458	0
708.10	8,574	852
708.20	8,690	1,715
708.30	8,807	2,590
708.40	8,923	3,476
708.50	9,039	4,374
708.60	9,155	5,284
708.70	9,271	6,205
708.80	9,388	7,138
708.90	9,504	8,083
709.00	9,620	9,039
709.10	9,742	10,007
709.20	9,864	10,987
709.30	9,985	11,980
709.40	10,107	12,984
709.50	10,229	14,001
709.60	10,351	15,030
709.70	10,473	16,071
709.80	10,594	17,125
709.90	10,716	18,190
710.00	10,838	19,268
710.10	10,965	20,358
710.20	11,093	21,461
710.30	11,220	22,577
710.40	11,348	23,705
710.50	11,475	24,846
710.60	11,602	26,000
710.70	11,730	27,167
710.80	11,857	28,346
710.90	11,985	29,538
711.00	12,112	30,743
711.10	12,245	31,961
711.20	12,378	33,192
711.30	12,511	34,436
711.40	12,644	35,694
711.50	12,778	36,965
711.60	12,911	38,250
711.70	13,044	39,547
711.80	13,177	40,859
711.90	13,310	42,183
712.00	13,443	43,521
712.10	13,582	44,872
712.20	13,721	46,237
712.30	13,859	47,616
712.40	13,998	49,009
712.50	14,137	50,416
712.60	14,276	51,836
712.70	14,415	53,271
712.80	14,553	54,719
712.90	14,692	56,181
713.00	14,831	57,658
713.10	14,975	59,148
713.20	15,120	60,653
713.30	15,264	62,172
713.40	15,409	63,705
713.50	15,553	65,254
713.60	15,697	66,816
713.70	15,842	68,393
713.80	15,986	69,984
713.90	16,131	71,590
714.00	16,275	73,211
714.10	16,425	74,846
714.20	16,575	76,496
714.30	16,725	78,161
714.40	16,875	79,841
714.50	17,026	81,536
714.60	17,176	83,246
714.70	17,326	84,971
714.80	17,476	86,711
714.90	17,626	88,466
715.00	**17,776**	**90,236**

Summary for Pond Pond B: Pond B

Inflow Area =	293,369 sf,	49.49% Impervious,	Inflow Depth =	2.71"	for 10-Year event
Inflow =	4.43 cfs @	7.91 hrs,	Volume=	66,327 cf	
Outflow =	1.62 cfs @	8.83 hrs,	Volume=	66,327 cf,	Atten= 63%, Lag= 55.4 min
Primary =	0.73 cfs @	8.83 hrs,	Volume=	55,662 cf	
Secondary =	0.89 cfs @	8.83 hrs,	Volume=	10,665 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 709.81' @ 8.83 hrs Surf.Area= 7,084 sf Storage= 11,146 cf

Plug-Flow detention time= 127.6 min calculated for 66,322 cf (100% of inflow)
Center-of-Mass det. time= 127.6 min (837.9 - 710.3)

Volume	Invert	Avail.Storage	Storage Description
#1	708.00'	50,732 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

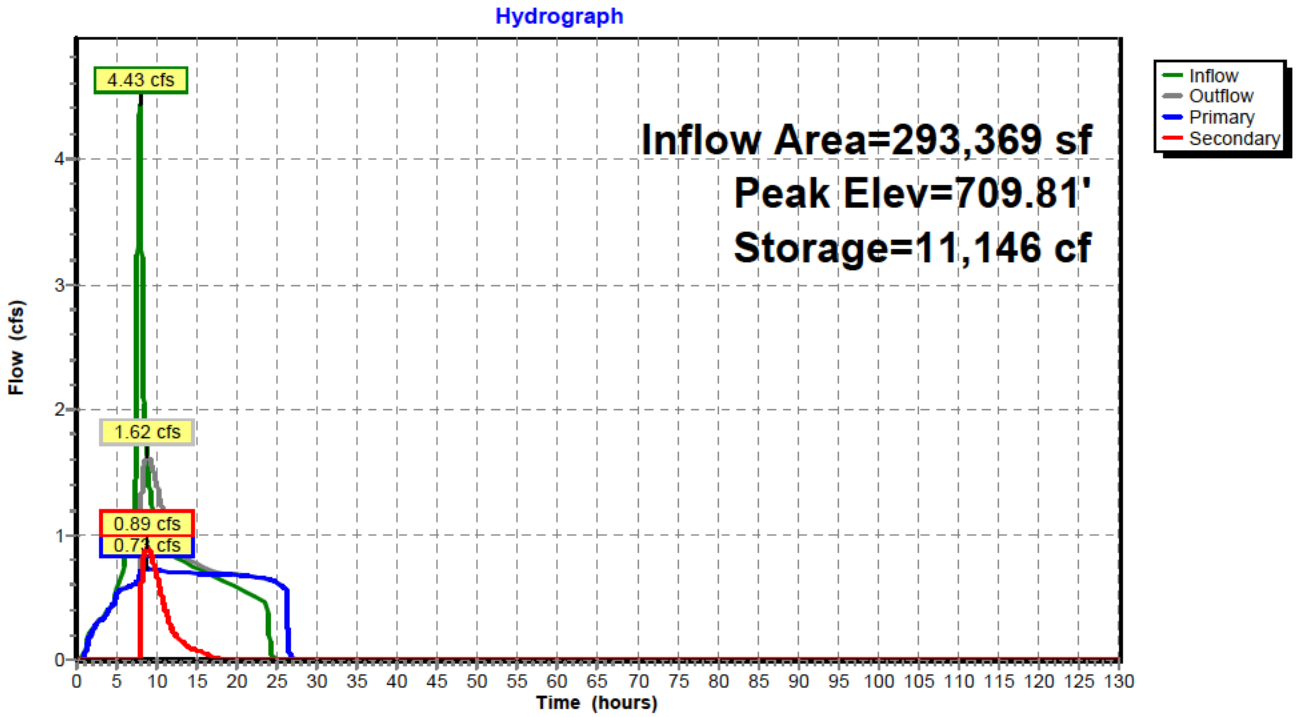
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
708.00	5,287	0	0
709.00	6,257	5,772	5,772
710.00	7,283	6,770	12,542
711.00	8,366	7,825	20,367
712.00	9,505	8,936	29,302
713.00	10,701	10,103	39,405
714.00	11,953	11,327	50,732

Device	Routing	Invert	Outlet Devices
#1	Primary	705.50'	**3.6" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	709.30'	**14.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

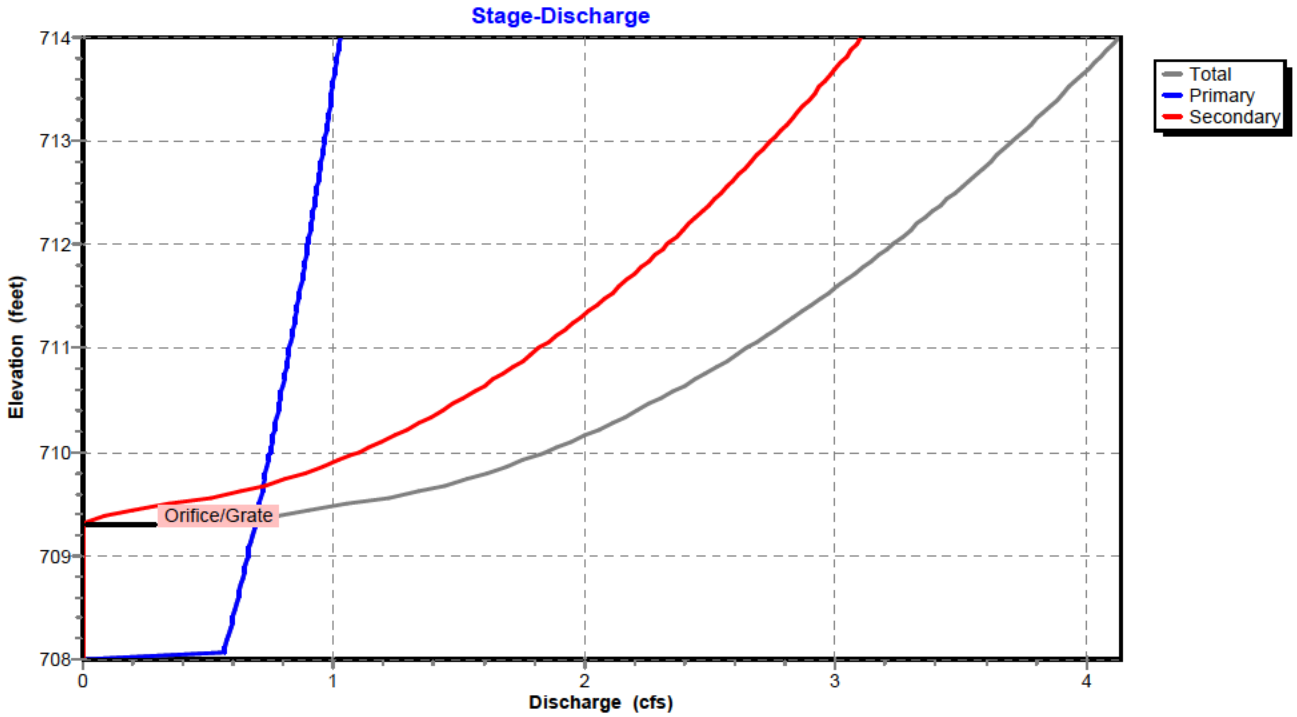
Primary OutFlow Max=0.73 cfs @ 8.83 hrs HW=709.81' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.73 cfs @ 10.32 fps)

Secondary OutFlow Max=0.89 cfs @ 8.83 hrs HW=709.81' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.89 cfs @ 3.06 fps)

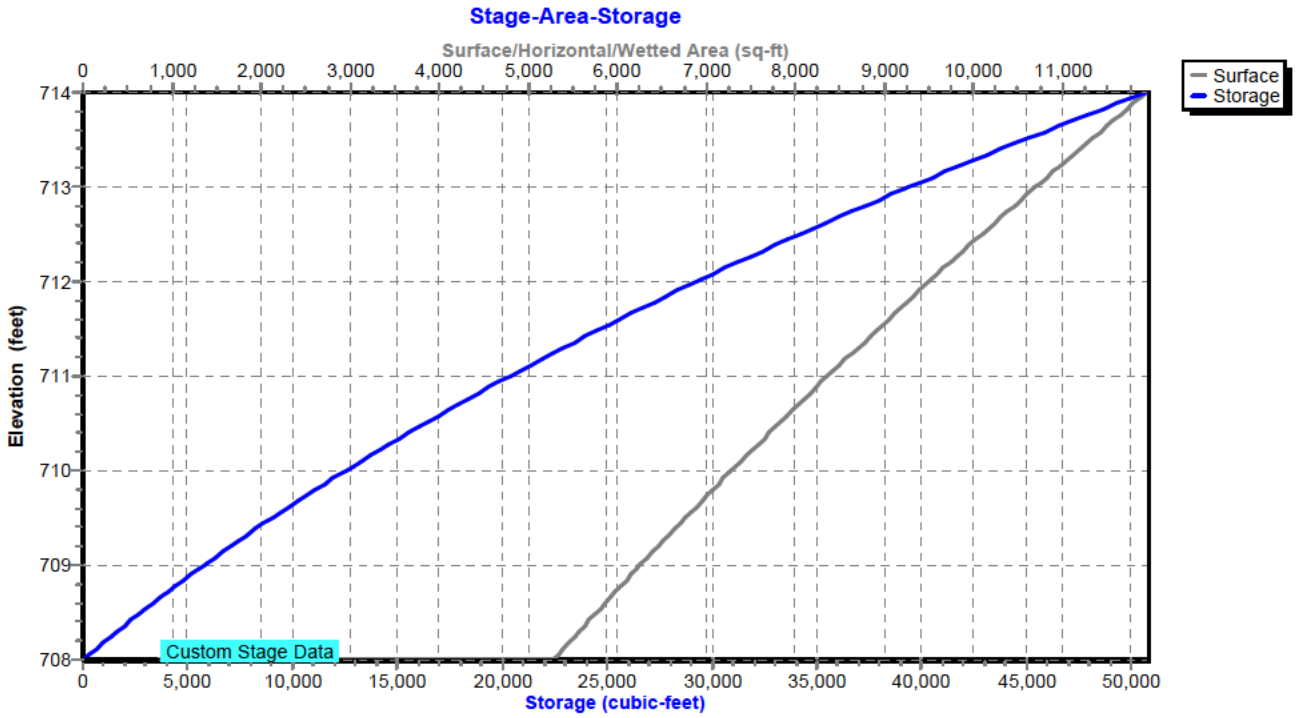
Pond Pond B: Pond B



Pond Pond B: Pond B



Pond Pond B: Pond B



Hydrograph for Pond Pond B: Pond B

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	708.00	0.00	0.00	0.00
5.00	**0.55**	**293**	**708.06**	**0.52**	**0.52**	**0.00**
10.00	**1.09**	**10,048**	**709.65**	**1.39**	**0.72**	**0.67**
15.00	0.73	8,148	709.37	0.76	0.69	0.07
20.00	0.58	7,192	709.22	0.68	0.68	0.00
25.00	0.00	2,842	708.51	0.61	0.61	0.00
30.00	0.00	0	708.00	0.00	0.00	0.00
35.00	0.00	0	708.00	0.00	0.00	0.00
40.00	0.00	0	708.00	0.00	0.00	0.00
45.00	0.00	0	708.00	0.00	0.00	0.00
50.00	0.00	0	708.00	0.00	0.00	0.00
55.00	0.00	0	708.00	0.00	0.00	0.00
60.00	0.00	0	708.00	0.00	0.00	0.00
65.00	0.00	0	708.00	0.00	0.00	0.00
70.00	0.00	0	708.00	0.00	0.00	0.00
75.00	0.00	0	708.00	0.00	0.00	0.00
80.00	0.00	0	708.00	0.00	0.00	0.00
85.00	0.00	0	708.00	0.00	0.00	0.00
90.00	0.00	0	708.00	0.00	0.00	0.00
95.00	0.00	0	708.00	0.00	0.00	0.00
100.00	0.00	0	708.00	0.00	0.00	0.00
105.00	0.00	0	708.00	0.00	0.00	0.00
110.00	0.00	0	708.00	0.00	0.00	0.00
115.00	0.00	0	708.00	0.00	0.00	0.00
120.00	0.00	0	708.00	0.00	0.00	0.00
125.00	0.00	0	708.00	0.00	0.00	0.00
130.00	0.00	0	708.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond B: Pond B

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
708.00	0.00	0.00	0.00
708.10	0.57	0.57	0.00
708.20	0.58	0.58	0.00
708.30	0.59	0.59	0.00
708.40	0.60	0.60	0.00
708.50	0.61	0.61	0.00
708.60	0.62	0.62	0.00
708.70	0.63	0.63	0.00
708.80	0.64	0.64	0.00
708.90	0.65	0.65	0.00
709.00	0.66	0.66	0.00
709.10	0.67	0.67	0.00
709.20	0.68	0.68	0.00
709.30	0.69	0.69	0.00
709.40	0.82	0.69	0.12
709.50	1.05	0.70	0.35
709.60	1.30	0.71	0.59
709.70	1.47	0.72	0.75
709.80	1.61	0.73	0.88
709.90	1.73	0.74	1.00
710.00	1.84	0.75	1.10
710.10	1.94	0.75	1.19
710.20	2.04	0.76	1.28
710.30	2.13	0.77	1.36
710.40	2.21	0.78	1.43
710.50	2.29	0.79	1.50
710.60	2.37	0.79	1.57
710.70	2.44	0.80	1.64
710.80	2.51	0.81	1.70
710.90	2.58	0.82	1.76
711.00	2.65	0.82	1.82
711.10	2.71	0.83	1.88
711.20	2.77	0.84	1.93
711.30	2.83	0.85	1.99
711.40	2.89	0.85	2.04
711.50	2.95	0.86	2.09
711.60	3.01	0.87	2.14
711.70	3.06	0.88	2.19
711.80	3.12	0.88	2.24
711.90	3.17	0.89	2.28
712.00	3.23	0.90	2.33
712.10	3.28	0.90	2.37
712.20	3.33	0.91	2.42
712.30	3.38	0.92	2.46
712.40	3.43	0.92	2.50
712.50	3.48	0.93	2.54
712.60	3.52	0.94	2.59
712.70	3.57	0.94	2.63
712.80	3.62	0.95	2.67
712.90	3.66	0.96	2.71
713.00	3.71	0.96	2.74
713.10	3.75	0.97	2.78
713.20	3.80	0.98	2.82
713.30	3.84	0.98	2.86
713.40	3.88	0.99	2.89
713.50	3.92	0.99	2.93
713.60	3.97	1.00	2.97
713.70	4.01	1.01	3.00
713.80	4.05	1.01	3.04
713.90	4.09	1.02	3.07
714.00	**4.13**	**1.03**	**3.10**

Stage-Area-Storage for Pond Pond B: Pond B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
708.00	5,287	0
708.10	5,384	534
708.20	5,481	1,077
708.30	5,578	1,630
708.40	5,675	2,192
708.50	5,772	2,765
708.60	5,869	3,347
708.70	5,966	3,939
708.80	6,063	4,540
708.90	6,160	5,151
709.00	6,257	5,772
709.10	6,360	6,403
709.20	6,462	7,044
709.30	6,565	7,695
709.40	6,667	8,357
709.50	6,770	9,029
709.60	6,873	9,711
709.70	6,975	10,403
709.80	7,078	11,106
709.90	7,180	11,819
710.00	7,283	12,542
710.10	7,391	13,276
710.20	7,500	14,020
710.30	7,608	14,776
710.40	7,716	15,542
710.50	7,825	16,319
710.60	7,933	17,107
710.70	8,041	17,905
710.80	8,149	18,715
710.90	8,258	19,535
711.00	8,366	20,367
711.10	8,480	21,209
711.20	8,594	22,062
711.30	8,708	22,928
711.40	8,822	23,804
711.50	8,936	24,692
711.60	9,049	25,591
711.70	9,163	26,502
711.80	9,277	27,424
711.90	9,391	28,357
712.00	9,505	29,302
712.10	9,625	30,258
712.20	9,744	31,227
712.30	9,864	32,207
712.40	9,983	33,200
712.50	10,103	34,204
712.60	10,223	35,220
712.70	10,342	36,249
712.80	10,462	37,289
712.90	10,581	38,341
713.00	10,701	39,405
713.10	10,826	40,481
713.20	10,951	41,570
713.30	11,077	42,672
713.40	11,202	43,786
713.50	11,327	44,912
713.60	11,452	46,051
713.70	11,577	47,202
713.80	11,703	48,366
713.90	11,828	49,543
714.00	**11,953**	**50,732**

Summary for Pond Pond C: Pond C

Inflow Area =	686,331 sf,	9.64% Impervious,	Inflow Depth >	8.59"	for 10-Year event
Inflow =	6.64 cfs @	8.00 hrs,	Volume=	491,122 cf,	Incl. 0.80 cfs Base Flow
Outflow =	2.92 cfs @	10.33 hrs,	Volume=	490,561 cf,	Atten= 56%, Lag= 139.8 min
Primary =	1.97 cfs @	10.33 hrs,	Volume=	461,688 cf	
Secondary =	0.95 cfs @	10.33 hrs,	Volume=	28,874 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 705.15' @ 10.33 hrs Surf.Area= 20,133 sf Storage= 22,005 cf

Plug-Flow detention time= 47.1 min calculated for 490,557 cf (100% of inflow)
Center-of-Mass det. time= 41.7 min (3,204.2 - 3,162.4)

Volume	Invert	Avail.Storage	Storage Description
#1	704.00'	140,242 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

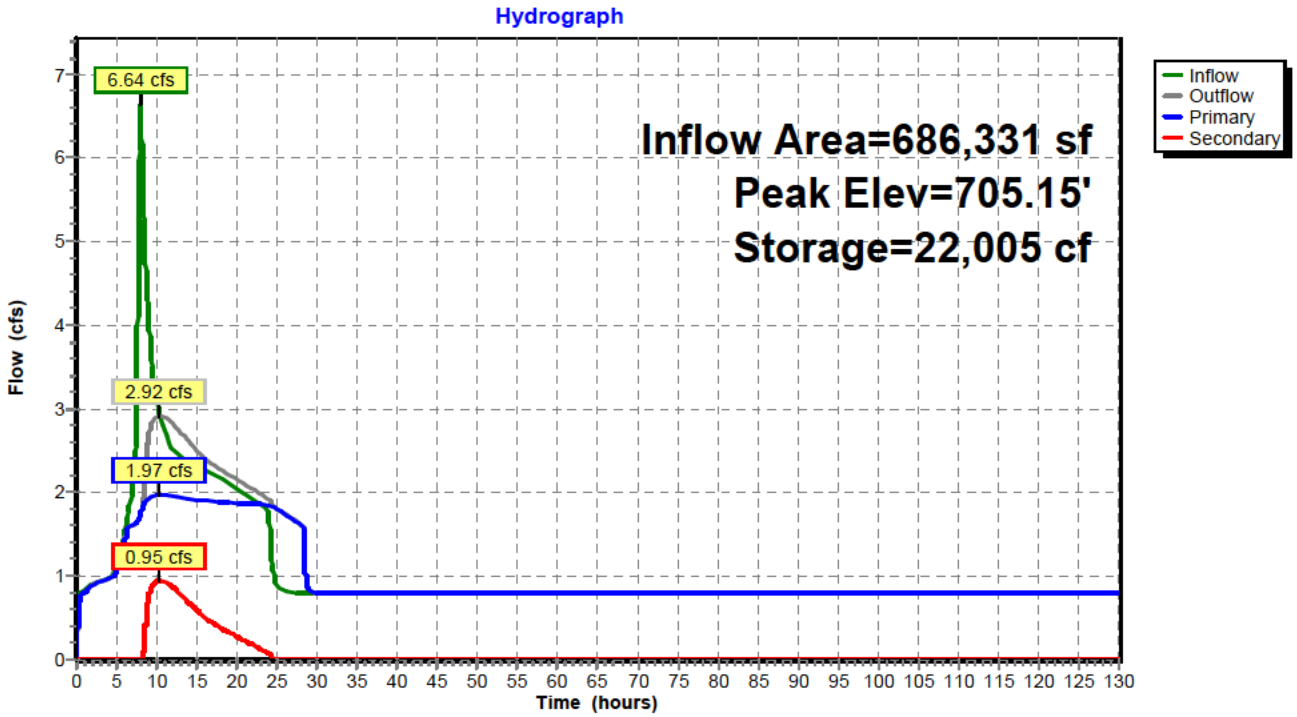
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
704.00	18,277	0	0
705.00	19,889	19,083	19,083
706.00	21,558	20,724	39,807
707.00	23,284	22,421	62,228
708.00	25,067	24,176	86,403
709.00	26,905	25,986	112,389
710.00	28,801	27,853	140,242

Device	Routing	Invert	Outlet Devices
#1	Primary	702.00'	**6.4" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	704.69'	**16.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

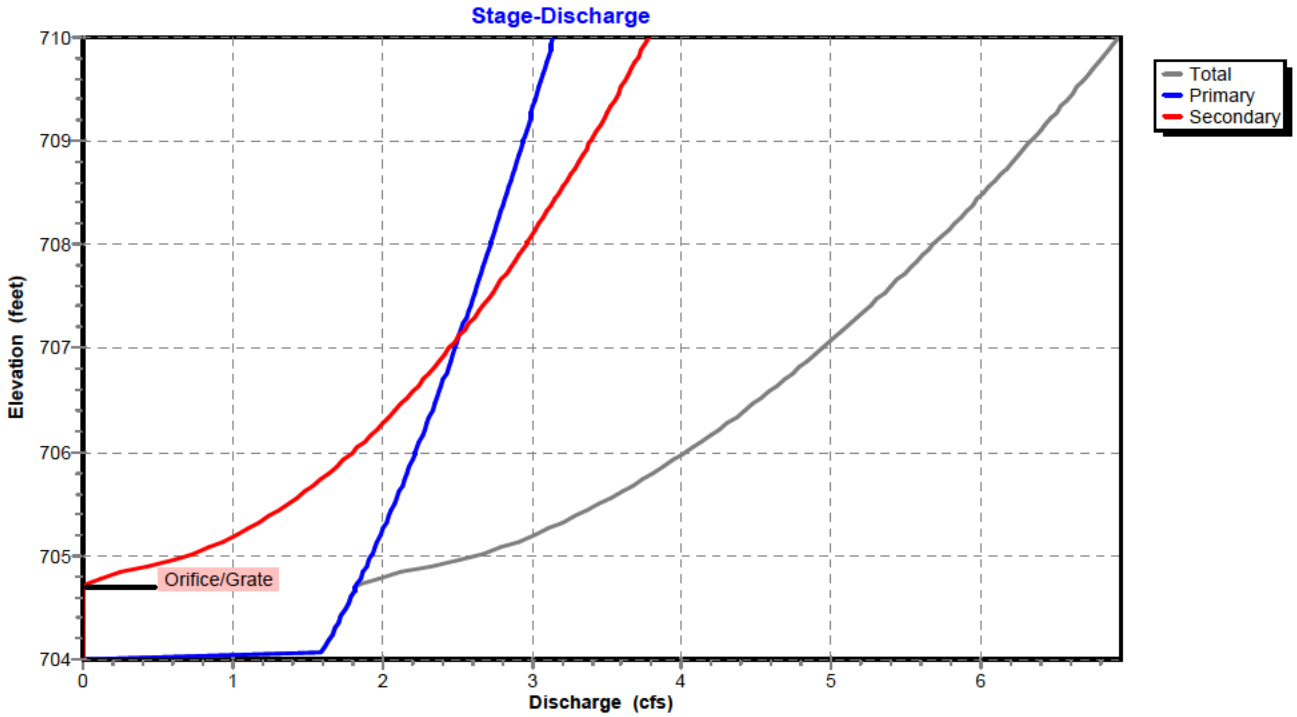
Primary OutFlow Max=1.97 cfs @ 10.33 hrs HW=705.15' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 1.97 cfs @ 8.82 fps)

Secondary OutFlow Max=0.95 cfs @ 10.33 hrs HW=705.15' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.95 cfs @ 2.85 fps)

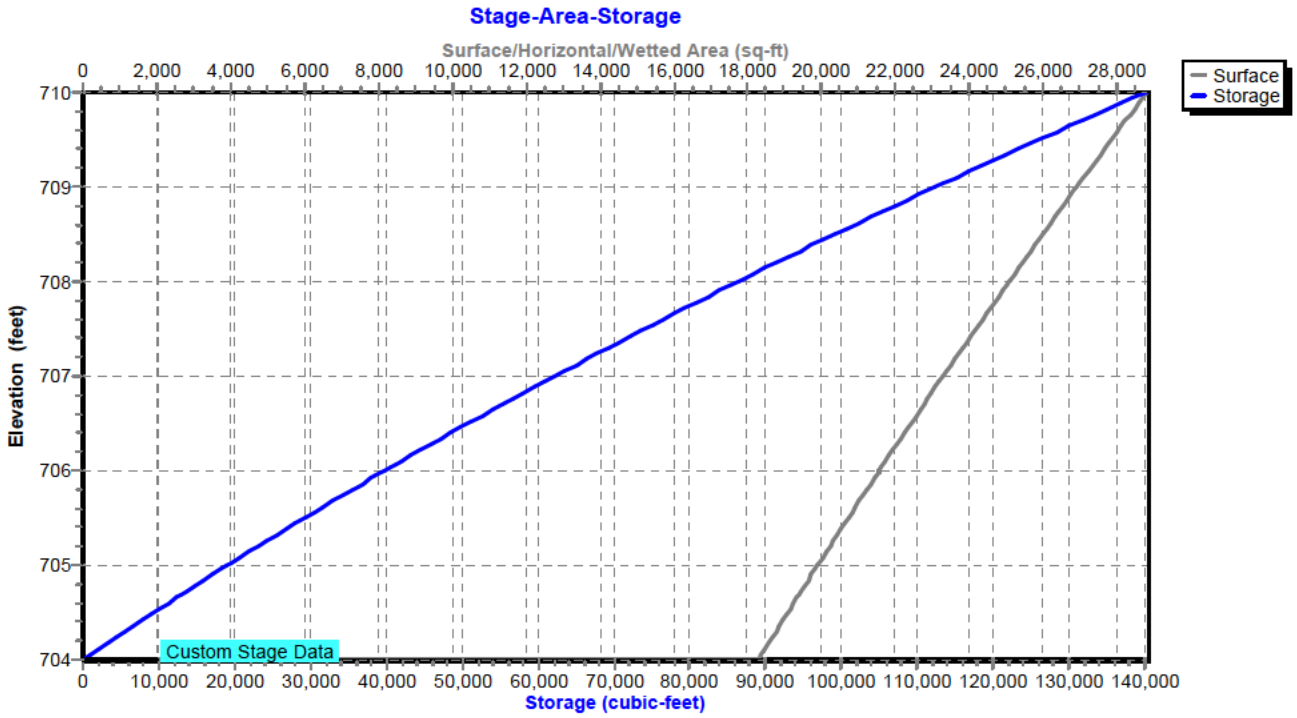
Pond Pond C: Pond C



Pond Pond C: Pond C



Pond Pond C: Pond C



Hydrograph for Pond Pond C: Pond C

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.80	5	704.00	0.01	0.01	0.00
5.00	**1.11**	733	704.04	1.06	1.06	0.00
10.00	**3.09**	**21,909**	**705.14**	**2.91**	**1.97**	**0.94**
15.00	2.32	**18,172**	**704.95**	**2.50**	**1.91**	**0.59**
20.00	2.04	16,036	704.85	2.15	1.88	0.27
25.00	0.88	11,687	704.62	1.80	1.80	0.00
30.00	0.80	551	704.03	0.80	0.80	0.00
35.00	0.80	551	704.03	0.80	0.80	0.00
40.00	0.80	551	704.03	0.80	0.80	0.00
45.00	0.80	551	704.03	0.80	0.80	0.00
50.00	0.80	551	704.03	0.80	0.80	0.00
55.00	0.80	551	704.03	0.80	0.80	0.00
60.00	0.80	551	704.03	0.80	0.80	0.00
65.00	0.80	551	704.03	0.80	0.80	0.00
70.00	0.80	551	704.03	0.80	0.80	0.00
75.00	0.80	551	704.03	0.80	0.80	0.00
80.00	0.80	551	704.03	0.80	0.80	0.00
85.00	0.80	551	704.03	0.80	0.80	0.00
90.00	0.80	551	704.03	0.80	0.80	0.00
95.00	0.80	551	704.03	0.80	0.80	0.00
100.00	0.80	551	704.03	0.80	0.80	0.00
105.00	0.80	551	704.03	0.80	0.80	0.00
110.00	0.80	551	704.03	0.80	0.80	0.00
115.00	0.80	551	704.03	0.80	0.80	0.00
120.00	0.80	551	704.03	0.80	0.80	0.00
125.00	0.80	551	704.03	0.80	0.80	0.00
130.00	0.80	551	704.03	0.80	0.80	0.00

Stage-Discharge for Pond Pond C: Pond C

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
704.00	0.00	0.00	0.00
704.10	1.61	1.61	0.00
704.20	1.65	1.65	0.00
704.30	1.69	1.69	0.00
704.40	1.72	1.72	0.00
704.50	1.76	1.76	0.00
704.60	1.79	1.79	0.00
704.70	1.83	1.83	0.00
704.80	2.02	1.86	0.16
704.90	2.32	1.89	0.43
705.00	2.62	1.93	0.70
705.10	2.84	1.96	0.88
705.20	3.01	1.99	1.02
705.30	3.17	2.02	1.15
705.40	3.32	2.05	1.27
705.50	3.45	2.08	1.37
705.60	3.58	2.11	1.47
705.70	3.70	2.14	1.56
705.80	3.81	2.17	1.64
705.90	3.92	2.20	1.73
706.00	4.03	2.22	1.80
706.10	4.13	2.25	1.88
706.20	4.23	2.28	1.95
706.30	4.33	2.30	2.02
706.40	4.42	2.33	2.09
706.50	4.51	2.36	2.15
706.60	4.60	2.38	2.22
706.70	4.69	2.41	2.28
706.80	4.77	2.44	2.34
706.90	4.85	2.46	2.39
707.00	4.94	2.49	2.45
707.10	5.02	2.51	2.51
707.20	5.10	2.53	2.56
707.30	5.17	2.56	2.61
707.40	5.25	2.58	2.67
707.50	5.32	2.61	2.72
707.60	5.40	2.63	2.77
707.70	5.47	2.65	2.82
707.80	5.54	2.68	2.87
707.90	5.61	2.70	2.91
708.00	5.68	2.72	2.96
708.10	5.75	2.75	3.01
708.20	5.82	2.77	3.05
708.30	5.89	2.79	3.10
708.40	5.95	2.81	3.14
708.50	6.02	2.83	3.18
708.60	6.08	2.86	3.23
708.70	6.15	2.88	3.27
708.80	6.21	2.90	3.31
708.90	6.27	2.92	3.35
709.00	6.33	2.94	3.39
709.10	6.39	2.96	3.43
709.20	6.46	2.98	3.47
709.30	6.52	3.00	3.51
709.40	6.57	3.02	3.55
709.50	6.63	3.04	3.59
709.60	6.69	3.06	3.63
709.70	6.75	3.08	3.67
709.80	6.81	3.10	3.70
709.90	6.86	3.12	3.74
710.00	**6.92**	**3.14**	**3.78**

Stage-Area-Storage for Pond Pond C: Pond C

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
704.00	18,277	0
704.10	18,438	1,836
704.20	18,599	3,688
704.30	18,761	5,556
704.40	18,922	7,440
704.50	19,083	9,340
704.60	19,244	11,256
704.70	19,405	13,189
704.80	19,567	15,137
704.90	19,728	17,102
705.00	19,889	19,083
705.10	20,056	21,080
705.20	20,223	23,094
705.30	20,390	25,125
705.40	20,557	27,172
705.50	20,724	29,236
705.60	20,890	31,317
705.70	21,057	33,414
705.80	21,224	35,528
705.90	21,391	37,659
706.00	21,558	39,807
706.10	21,731	41,971
706.20	21,903	44,153
706.30	22,076	46,352
706.40	22,248	48,568
706.50	22,421	50,801
706.60	22,594	53,052
706.70	22,766	55,320
706.80	22,939	57,605
706.90	23,111	59,908
707.00	23,284	62,228
707.10	23,462	64,565
707.20	23,641	66,920
707.30	23,819	69,293
707.40	23,997	71,684
707.50	24,176	74,092
707.60	24,354	76,519
707.70	24,532	78,963
707.80	24,710	81,425
707.90	24,889	83,905
708.00	25,067	86,403
708.10	25,251	88,919
708.20	25,435	91,453
708.30	25,618	94,006
708.40	25,802	96,577
708.50	25,986	99,166
708.60	26,170	101,774
708.70	26,354	104,400
708.80	26,537	107,045
708.90	26,721	109,708
709.00	26,905	112,389
709.10	27,095	115,089
709.20	27,284	117,808
709.30	27,474	120,546
709.40	27,663	123,303
709.50	27,853	126,079
709.60	28,043	128,873
709.70	28,232	131,687
709.80	28,422	134,520
709.90	28,611	137,371
710.00	**28,801**	**140,242**

Summary for Pond Pond D: Pond D

Inflow Area =	372,494 sf,	24.46% Impervious,	Inflow Depth =	2.29"	for 10-Year event
Inflow =	4.66 cfs @	7.94 hrs,	Volume=	71,101 cf	
Outflow =	2.00 cfs @	8.47 hrs,	Volume=	71,100 cf,	Atten= 57%, Lag= 31.6 min
Primary =	0.96 cfs @	8.47 hrs,	Volume=	61,409 cf	
Secondary =	1.04 cfs @	8.47 hrs,	Volume=	9,691 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 694.66' @ 8.47 hrs Surf.Area= 6,043 sf Storage= 8,673 cf

Plug-Flow detention time= 70.8 min calculated for 71,095 cf (100% of inflow)
Center-of-Mass det. time= 70.8 min (819.3 - 748.5)

Volume	Invert	Avail.Storage	Storage Description
#1	693.00'	45,136 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

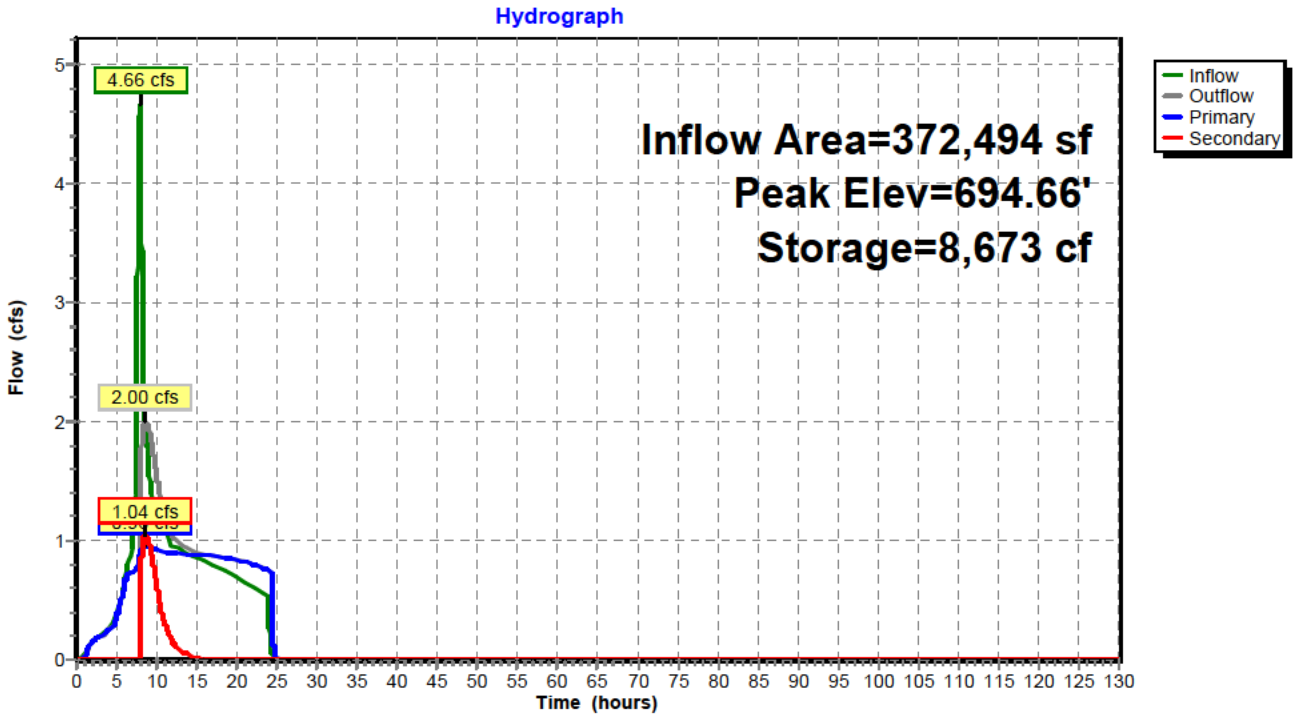
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
693.00	4,458	0	0
694.00	5,393	4,926	4,926
695.00	6,385	5,889	10,815
696.00	7,433	6,909	17,724
697.00	8,538	7,986	25,709
698.00	9,699	9,119	34,828
699.00	10,917	10,308	45,136

Device	Routing	Invert	Outlet Devices
#1	Primary	691.00'	**4.3" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	694.08'	**15.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

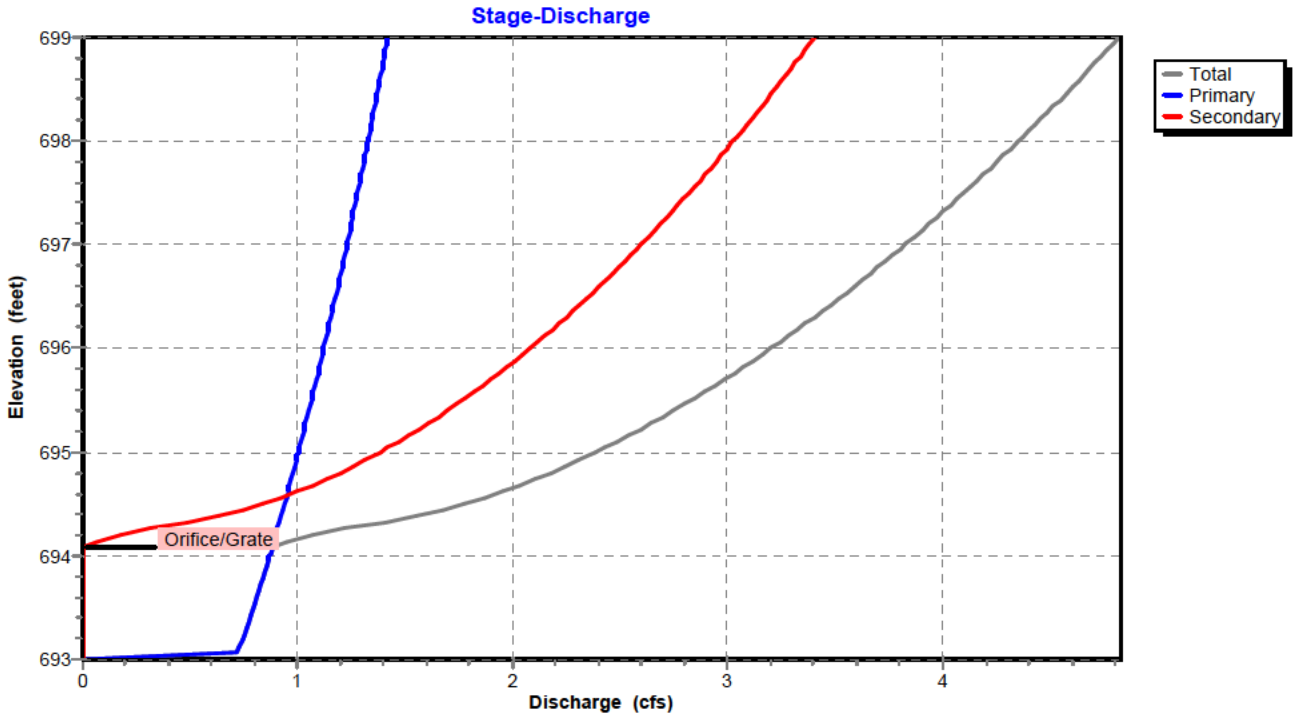
Primary OutFlow Max=0.96 cfs @ 8.47 hrs HW=694.66' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.96 cfs @ 9.51 fps)

Secondary OutFlow Max=1.04 cfs @ 8.47 hrs HW=694.66' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 1.04 cfs @ 3.33 fps)

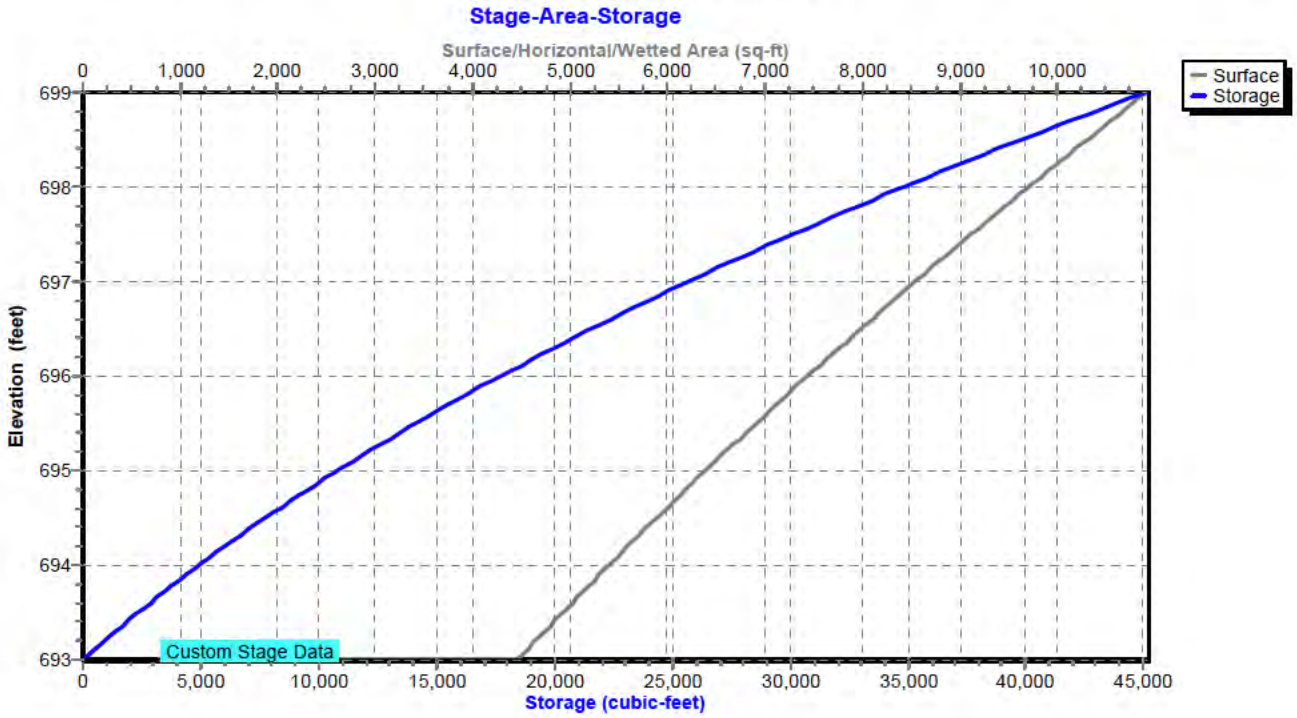
Pond Pond D: Pond D



Pond Pond D: Pond D



Pond Pond D: Pond D



Hydrograph for Pond Pond D: Pond D

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	693.00	0.00	0.00	0.00
5.00	**0.39**	**136**	**693.03**	**0.36**	**0.36**	**0.00**
10.00	**1.24**	**7,036**	**694.38**	**1.55**	**0.92**	**0.63**
15.00	0.86	5,440	694.09	0.90	0.88	0.01
20.00	0.69	3,826	693.79	0.84	0.84	0.00
25.00	0.00	1	693.00	0.00	0.00	0.00
30.00	0.00	0	693.00	0.00	0.00	0.00
35.00	0.00	0	693.00	0.00	0.00	0.00
40.00	0.00	0	693.00	0.00	0.00	0.00
45.00	0.00	0	693.00	0.00	0.00	0.00
50.00	0.00	0	693.00	0.00	0.00	0.00
55.00	0.00	0	693.00	0.00	0.00	0.00
60.00	0.00	0	693.00	0.00	0.00	0.00
65.00	0.00	0	693.00	0.00	0.00	0.00
70.00	0.00	0	693.00	0.00	0.00	0.00
75.00	0.00	0	693.00	0.00	0.00	0.00
80.00	0.00	0	693.00	0.00	0.00	0.00
85.00	0.00	0	693.00	0.00	0.00	0.00
90.00	0.00	0	693.00	0.00	0.00	0.00
95.00	0.00	0	693.00	0.00	0.00	0.00
100.00	0.00	0	693.00	0.00	0.00	0.00
105.00	0.00	0	693.00	0.00	0.00	0.00
110.00	0.00	0	693.00	0.00	0.00	0.00
115.00	0.00	0	693.00	0.00	0.00	0.00
120.00	0.00	0	693.00	0.00	0.00	0.00
125.00	0.00	0	693.00	0.00	0.00	0.00
130.00	0.00	0	693.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond D: Pond D

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
693.00	0.00	0.00	0.00
693.10	0.73	0.73	0.00
693.20	0.74	0.74	0.00
693.30	0.76	0.76	0.00
693.40	0.78	0.78	0.00
693.50	0.79	0.79	0.00
693.60	0.81	0.81	0.00
693.70	0.82	0.82	0.00
693.80	0.84	0.84	0.00
693.90	0.85	0.85	0.00
694.00	0.87	0.87	0.00
694.10	0.90	0.88	0.01
694.20	1.07	0.90	0.17
694.30	1.34	0.91	0.43
694.40	1.60	0.93	0.67
694.50	1.78	0.94	0.84
694.60	1.93	0.95	0.97
694.70	2.06	0.97	1.09
694.80	2.18	0.98	1.20
694.90	2.29	0.99	1.29
695.00	2.39	1.00	1.38
695.10	2.49	1.02	1.47
695.20	2.58	1.03	1.55
695.30	2.67	1.04	1.63
695.40	2.75	1.05	1.70
695.50	2.83	1.06	1.77
695.60	2.91	1.08	1.84
695.70	2.99	1.09	1.90
695.80	3.06	1.10	1.96
695.90	3.13	1.11	2.02
696.00	3.20	1.12	2.08
696.10	3.27	1.13	2.14
696.20	3.34	1.14	2.20
696.30	3.41	1.16	2.25
696.40	3.47	1.17	2.30
696.50	3.53	1.18	2.36
696.60	3.59	1.19	2.41
696.70	3.65	1.20	2.46
696.80	3.71	1.21	2.50
696.90	3.77	1.22	2.55
697.00	3.83	1.23	2.60
697.10	3.88	1.24	2.65
697.20	3.94	1.25	2.69
697.30	3.99	1.26	2.74
697.40	4.05	1.27	2.78
697.50	4.10	1.28	2.82
697.60	4.15	1.29	2.86
697.70	4.21	1.30	2.91
697.80	4.26	1.31	2.95
697.90	4.31	1.32	2.99
698.00	4.36	1.33	3.03
698.10	4.41	1.34	3.07
698.20	4.45	1.35	3.11
698.30	4.50	1.36	3.15
698.40	4.55	1.36	3.18
698.50	4.60	1.37	3.22
698.60	4.64	1.38	3.26
698.70	4.69	1.39	3.30
698.80	4.73	1.40	3.33
698.90	4.78	1.41	3.37
699.00	**4.82**	**1.42**	**3.40**

Stage-Area-Storage for Pond Pond D: Pond D

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
693.00	4,458	0
693.10	4,552	450
693.20	4,645	910
693.30	4,738	1,379
693.40	4,832	1,858
693.50	4,926	2,346
693.60	5,019	2,843
693.70	5,113	3,350
693.80	5,206	3,866
693.90	5,299	4,391
694.00	5,393	4,926
694.10	5,492	5,470
694.20	5,591	6,024
694.30	5,691	6,588
694.40	5,790	7,162
694.50	5,889	7,746
694.60	5,988	8,340
694.70	6,087	8,944
694.80	6,187	9,557
694.90	6,286	10,181
695.00	6,385	10,815
695.10	6,490	11,458
695.20	6,595	12,112
695.30	6,699	12,777
695.40	6,804	13,452
695.50	6,909	14,138
695.60	7,014	14,834
695.70	7,119	15,541
695.80	7,223	16,258
695.90	7,328	16,985
696.00	7,433	17,724
696.10	7,544	18,472
696.20	7,654	19,232
696.30	7,764	20,003
696.40	7,875	20,785
696.50	7,986	21,578
696.60	8,096	22,382
696.70	8,207	23,197
696.80	8,317	24,023
696.90	8,427	24,861
697.00	8,538	25,709
697.10	8,654	26,569
697.20	8,770	27,440
697.30	8,886	28,323
697.40	9,002	29,217
697.50	9,119	30,123
697.60	9,235	31,041
697.70	9,351	31,970
697.80	9,467	32,911
697.90	9,583	33,863
698.00	9,699	34,828
698.10	9,821	35,803
698.20	9,943	36,792
698.30	10,064	37,792
698.40	10,186	38,805
698.50	10,308	39,829
698.60	10,430	40,866
698.70	10,552	41,915
698.80	10,673	42,976
698.90	10,795	44,050
699.00	**10,917**	**45,136**

Summary for Pond Pond E: Pond E

Inflow Area =	600,189 sf,	3.19% Impervious,	Inflow Depth =	1.93"	for 10-Year event
Inflow =	5.65 cfs @	8.00 hrs, Volume=	96,604 cf		
Outflow =	3.32 cfs @	8.46 hrs, Volume=	96,604 cf,	Atten= 41%,	Lag= 27.7 min
Primary =	1.68 cfs @	8.46 hrs, Volume=	85,147 cf		
Secondary =	1.64 cfs @	8.46 hrs, Volume=	11,457 cf		

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 714.09' @ 8.46 hrs Surf.Area= 11,074 sf Storage= 10,306 cf

Plug-Flow detention time= 65.7 min calculated for 96,604 cf (100% of inflow)
Center-of-Mass det. time= 65.6 min (867.3 - 801.7)

Volume	Invert	Avail.Storage	Storage Description
#1	713.00'	56,362 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

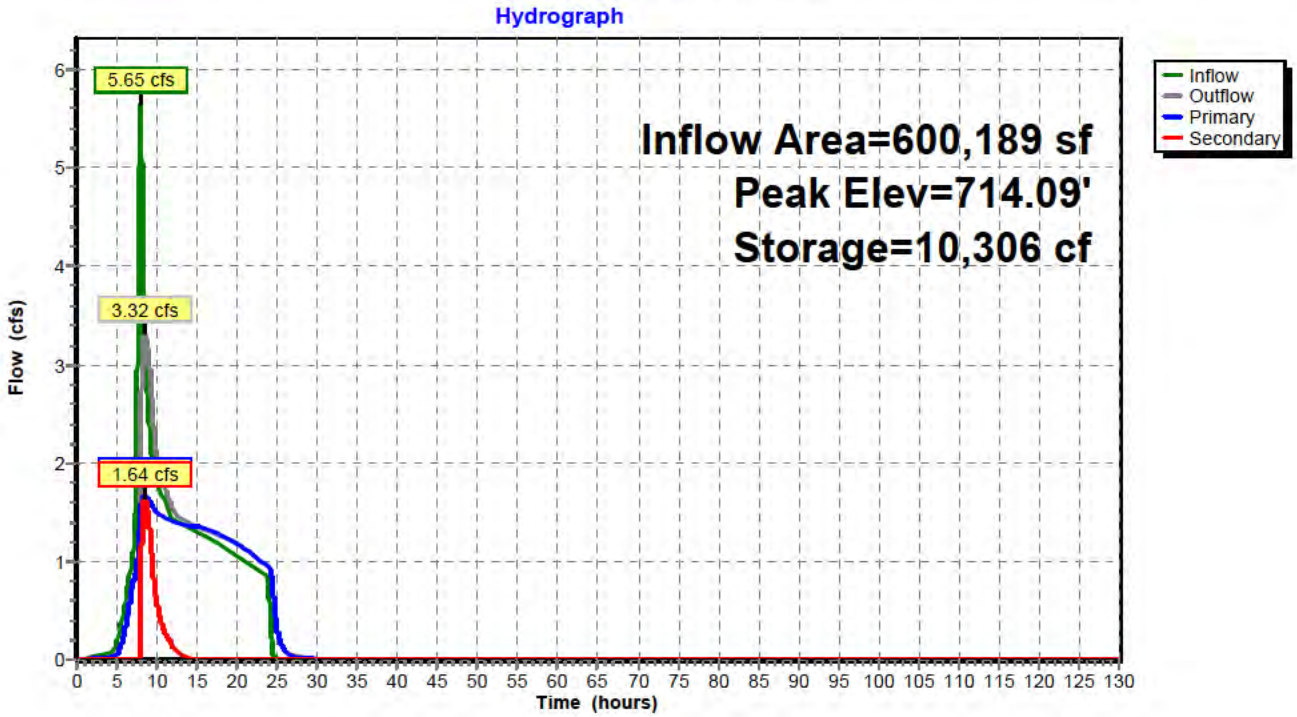
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
713.00	7,916	0	0
714.00	10,804	9,360	9,360
715.00	13,920	12,362	21,722
716.00	17,264	15,592	37,314
717.00	20,832	19,048	56,362

Device	Routing	Invert	Outlet Devices
#1	Primary	713.00'	**7.7" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	713.71'	**16.0" W x 3.0" H Vert. Orifice/Grate X 2.00** C= 0.620

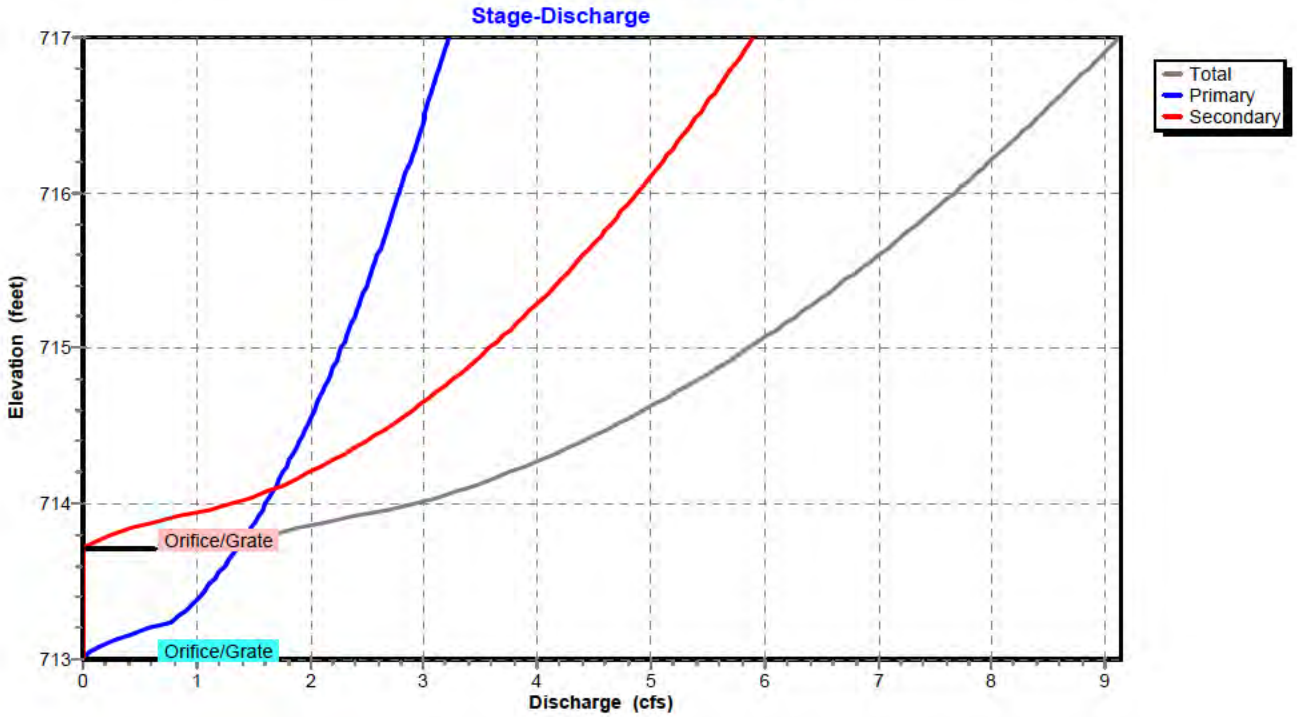
Primary OutFlow Max=1.68 cfs @ 8.46 hrs HW=714.09' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 1.68 cfs @ 5.19 fps)

Secondary OutFlow Max=1.65 cfs @ 8.46 hrs HW=714.09' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 1.65 cfs @ 2.47 fps)

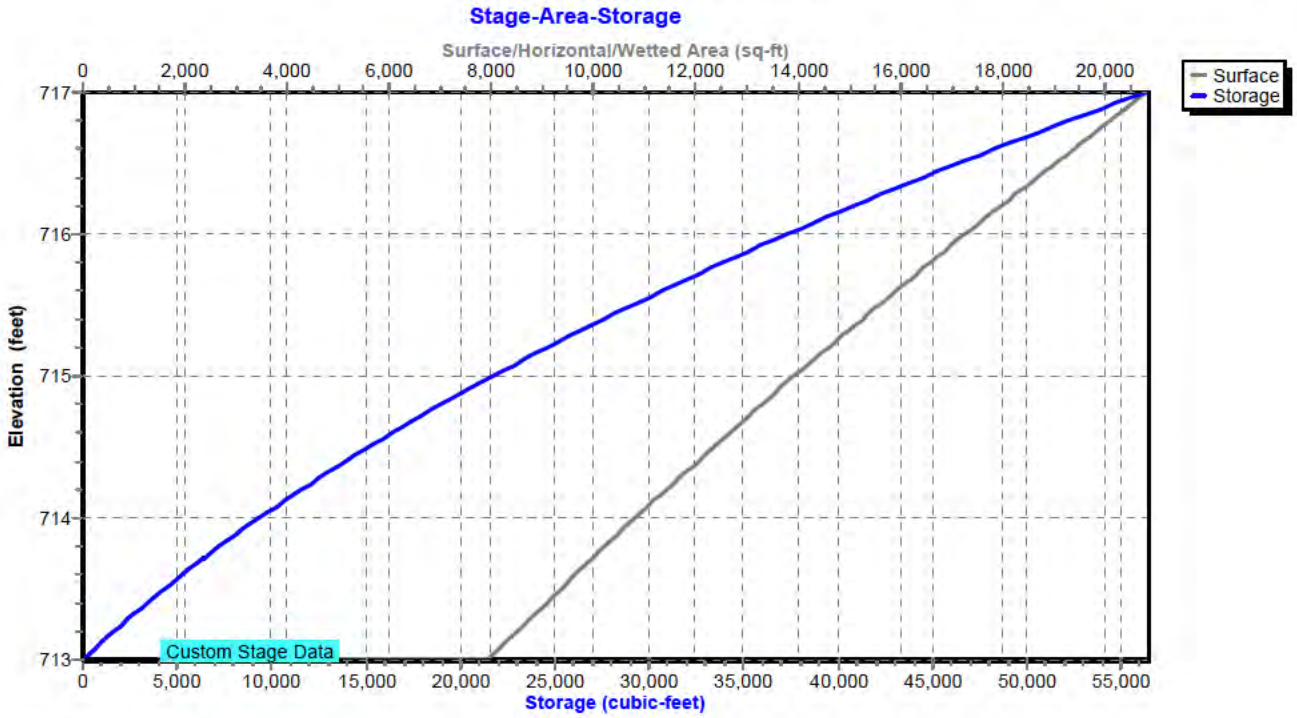
Pond Pond E: Pond E



Pond Pond E: Pond E



Pond Pond E: Pond E



Hydrograph for Pond Pond E: Pond E

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	713.00	0.00	0.00	0.00
5.00	**0.17**	**347**	**713.04**	**0.06**	**0.06**	**0.00**
10.00	**1.83**	**7,998**	**713.87**	**2.08**	**1.50**	**0.58**
15.00	1.29	6,278	713.70	1.35	1.35	0.00
20.00	1.06	4,639	713.53	1.18	1.18	0.00
25.00	0.01	1,075	713.13	0.32	0.32	0.00
30.00	0.00	40	713.01	0.01	0.01	0.00
35.00	0.00	2	713.00	0.00	0.00	0.00
40.00	0.00	0	713.00	0.00	0.00	0.00
45.00	0.00	0	713.00	0.00	0.00	0.00
50.00	0.00	0	713.00	0.00	0.00	0.00
55.00	0.00	0	713.00	0.00	0.00	0.00
60.00	0.00	0	713.00	0.00	0.00	0.00
65.00	0.00	0	713.00	0.00	0.00	0.00
70.00	0.00	0	713.00	0.00	0.00	0.00
75.00	0.00	0	713.00	0.00	0.00	0.00
80.00	0.00	0	713.00	0.00	0.00	0.00
85.00	0.00	0	713.00	0.00	0.00	0.00
90.00	0.00	0	713.00	0.00	0.00	0.00
95.00	0.00	0	713.00	0.00	0.00	0.00
100.00	0.00	0	713.00	0.00	0.00	0.00
105.00	0.00	0	713.00	0.00	0.00	0.00
110.00	0.00	0	713.00	0.00	0.00	0.00
115.00	0.00	0	713.00	0.00	0.00	0.00
120.00	0.00	0	713.00	0.00	0.00	0.00
125.00	0.00	0	713.00	0.00	0.00	0.00
130.00	0.00	0	713.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond E: Pond E

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
713.00	0.00	0.00	0.00
713.05	0.07	0.07	0.00
713.10	0.21	0.21	0.00
713.15	0.38	0.38	0.00
713.20	0.59	0.59	0.00
713.25	0.80	0.80	0.00
713.30	0.88	0.88	0.00
713.35	0.95	0.95	0.00
713.40	1.02	1.02	0.00
713.45	1.08	1.08	0.00
713.50	1.14	1.14	0.00
713.55	1.19	1.19	0.00
713.60	1.25	1.25	0.00
713.65	1.30	1.30	0.00
713.70	1.35	1.35	0.00
713.75	1.46	1.39	0.07
713.80	1.68	1.44	0.24
713.85	1.95	1.48	0.46
713.90	2.26	1.53	0.73
713.95	2.61	1.57	1.04
714.00	2.92	1.61	1.31
714.05	3.16	1.65	1.51
714.10	3.38	1.69	1.69
714.15	3.57	1.73	1.85
714.20	3.76	1.76	1.99
714.25	3.93	1.80	2.13
714.30	4.09	1.83	2.25
714.35	4.24	1.87	2.37
714.40	4.39	1.90	2.49
714.45	4.53	1.94	2.60
714.50	4.67	1.97	2.70
714.55	4.80	2.00	2.80
714.60	4.93	2.04	2.90
714.65	5.06	2.07	2.99
714.70	5.18	2.10	3.08
714.75	5.30	2.13	3.17
714.80	5.41	2.16	3.26
714.85	5.53	2.19	3.34
714.90	5.64	2.22	3.42
714.95	5.75	2.25	3.50
715.00	5.85	2.28	3.58
715.05	5.96	2.30	3.65
715.10	6.06	2.33	3.73
715.15	6.16	2.36	3.80
715.20	6.26	2.39	3.87
715.25	6.36	2.41	3.94
715.30	6.45	2.44	4.01
715.35	6.55	2.47	4.08
715.40	6.64	2.49	4.15
715.45	6.73	2.52	4.21
715.50	6.82	2.54	4.28
715.55	6.91	2.57	4.34
715.60	7.00	2.59	4.41
715.65	7.09	2.62	4.47
715.70	7.17	2.64	4.53
715.75	7.26	2.67	4.59
715.80	7.34	2.69	4.65
715.85	7.42	2.72	4.71
715.90	7.51	2.74	4.77
715.95	7.59	2.76	4.82
716.00	7.67	2.79	4.88
716.05	7.75	2.81	4.94
716.10	7.82	2.83	4.99
716.15	7.90	2.86	5.05
716.20	7.98	2.88	5.10
716.25	8.05	2.90	5.15
716.30	8.13	2.92	5.21
716.35	8.20	2.94	5.26
716.40	8.28	2.97	5.31
716.45	8.35	2.99	5.36
716.50	8.42	3.01	5.41
716.55	8.50	3.03	5.46
716.60	8.57	3.05	5.52
716.65	8.64	3.07	5.56
716.70	8.71	3.09	5.61
716.75	8.78	3.12	5.66
716.80	8.85	3.14	5.71
716.85	8.92	3.16	5.76
716.90	8.98	3.18	5.81
716.95	9.05	3.20	5.85
717.00	**9.12**	**3.22**	**5.90**

Stage-Area-Storage for Pond Pond E: Pond E

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
713.00	7,916	0
713.05	8,060	399
713.10	8,205	806
713.15	8,349	1,220
713.20	8,494	1,641
713.25	8,638	2,069
713.30	8,782	2,505
713.35	8,927	2,947
713.40	9,071	3,397
713.45	9,216	3,855
713.50	9,360	4,319
713.55	9,504	4,791
713.60	9,649	5,269
713.65	9,793	5,755
713.70	9,938	6,249
713.75	10,082	6,749
713.80	10,226	7,257
713.85	10,371	7,772
713.90	10,515	8,294
713.95	10,660	8,823
714.00	10,804	9,360
714.05	10,960	9,904
714.10	11,116	10,456
714.15	11,271	11,016
714.20	11,427	11,583
714.25	11,583	12,158
714.30	11,739	12,741
714.35	11,895	13,332
714.40	12,050	13,931
714.45	12,206	14,537
714.50	12,362	15,152
714.55	12,518	15,773
714.60	12,674	16,403
714.65	12,829	17,041
714.70	12,985	17,686
714.75	13,141	18,339
714.80	13,297	19,000
714.85	13,453	19,669
714.90	13,608	20,346
714.95	13,764	21,030
715.00	13,920	21,722
715.05	14,087	22,422
715.10	14,254	23,131
715.15	14,422	23,848
715.20	14,589	24,573
715.25	14,756	25,307
715.30	14,923	26,048
715.35	15,090	26,799
715.40	15,258	27,558
715.45	15,425	28,325
715.50	15,592	29,100
715.55	15,759	29,884
715.60	15,926	30,676
715.65	16,094	31,476
715.70	16,261	32,285
715.75	16,428	33,103
715.80	16,595	33,928
715.85	16,762	34,762
715.90	16,930	35,604
715.95	17,097	36,455
716.00	17,264	37,314
716.05	17,442	38,182
716.10	17,621	39,058
716.15	17,799	39,944
716.20	17,978	40,838
716.25	18,156	41,742
716.30	18,334	42,654
716.35	18,513	43,575
716.40	18,691	44,505
716.45	18,870	45,444
716.50	19,048	46,392
716.55	19,226	47,349
716.60	19,405	48,315
716.65	19,583	49,289
716.70	19,762	50,273
716.75	19,940	51,266
716.80	20,118	52,267
716.85	20,297	53,277
716.90	20,475	54,297
716.95	20,654	55,325
717.00	**20,832**	**56,362**

Time span=0.00-130.00 hrs, dt=0.01 hrs, 13001 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentA: Post Basin A Runoff Area=358,532 sf 46.88% Impervious Runoff Depth=3.31"
Tc=5.0 min CN=80/98 Runoff=6.66 cfs 98,792 cf

SubcatchmentB: Post Basin B Runoff Area=293,369 sf 49.49% Impervious Runoff Depth=3.35"
Tc=5.0 min CN=80/98 Runoff=5.53 cfs 81,988 cf

SubcatchmentC1: Post Basin C1 Runoff Area=104,630 sf 44.06% Impervious Runoff Depth=3.26"
Tc=5.0 min CN=80/98 Runoff=1.91 cfs 28,388 cf

SubcatchmentC2: Post Basin C2 Runoff Area=581,701 sf 3.45% Impervious Runoff Depth=2.52"
Flow Length=650' Slope=0.0330 '/' Tc=26.4 min CN=80/98 Runoff=5.94 cfs 122,335 cf

SubcatchmentD: Post Basin D Runoff Area=372,494 sf 24.46% Impervious Runoff Depth=2.90"
Tc=5.0 min CN=80/98 Runoff=6.02 cfs 90,096 cf

SubcatchmentE: Post Basin E Runoff Area=600,189 sf 3.19% Impervious Runoff Depth=2.52"
Flow Length=750' Slope=0.0466 '/' Tc=12.5 min CN=80/98 Runoff=7.64 cfs 125,994 cf

Pond Pond A: Pond A Peak Elev=710.29' Storage=22,505 cf Inflow=6.66 cfs 98,792 cf
Primary=0.68 cfs 63,076 cf Secondary=1.38 cfs 35,717 cf Outflow=2.06 cfs 98,792 cf

Pond Pond B: Pond B Peak Elev=710.26' Storage=14,477 cf Inflow=5.53 cfs 81,988 cf
Primary=0.77 cfs 60,007 cf Secondary=1.33 cfs 21,981 cf Outflow=2.09 cfs 81,988 cf

Pond Pond C: Pond C Peak Elev=705.56' Storage=30,484 cf Inflow=8.60 cfs 525,152 cf
Primary=2.10 cfs 470,082 cf Secondary=1.43 cfs 54,509 cf Outflow=3.53 cfs 524,591 cf

Pond Pond D: Pond D Peak Elev=695.20' Storage=12,096 cf Inflow=6.02 cfs 90,096 cf
Primary=1.03 cfs 68,280 cf Secondary=1.55 cfs 21,817 cf Outflow=2.58 cfs 90,097 cf

Pond Pond E: Pond E Peak Elev=714.40' Storage=13,991 cf Inflow=7.64 cfs 125,994 cf
Primary=1.91 cfs 98,451 cf Secondary=2.50 cfs 27,543 cf Outflow=4.41 cfs 125,994 cf

Total Runoff Area = 2,310,915 sf Runoff Volume = 547,594 cf Average Runoff Depth = 2.84"
78.81% Pervious = 1,821,196 sf 21.19% Impervious = 489,719 sf

Summary for Subcatchment A: Post Basin A

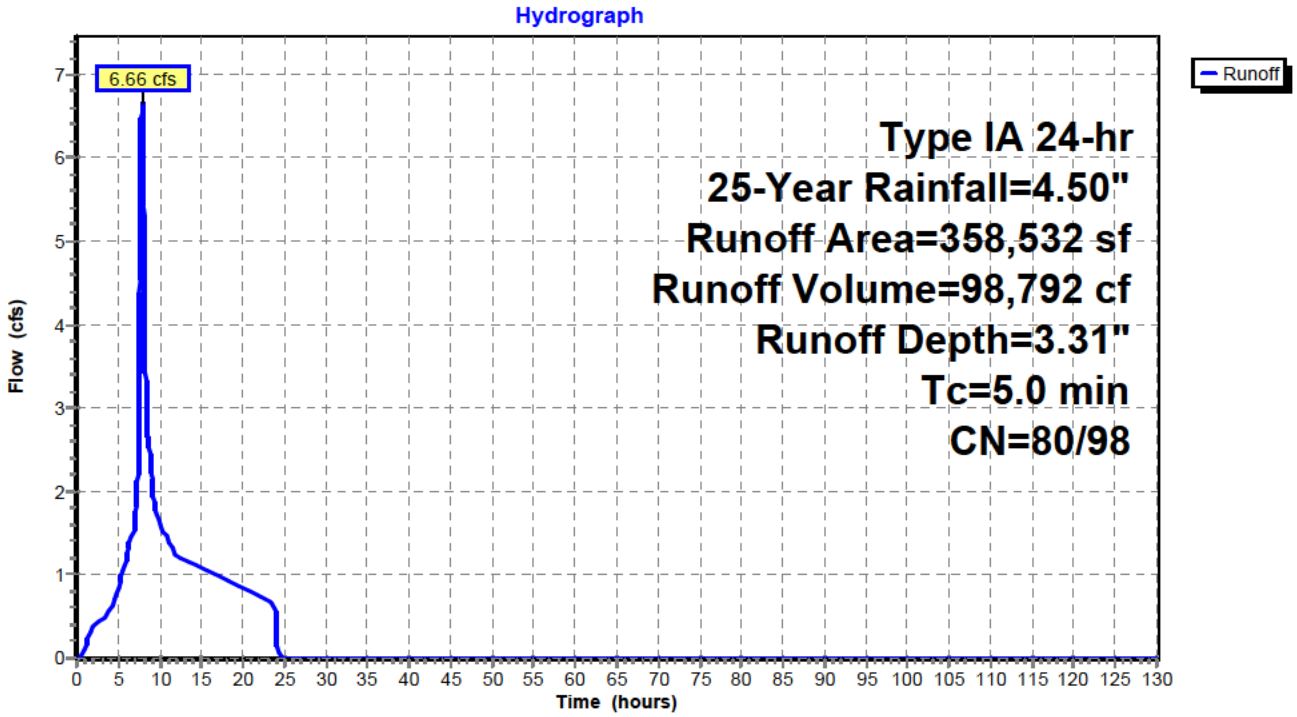
Runoff = 6.66 cfs @ 7.91 hrs, Volume= 98,792 cf, Depth= 3.31"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

	Area (sf)	CN	Description
*	168,081	98	Impervious Area
	190,451	80	>75% Grass cover, Good, HSG D
	358,532	88	Weighted Average
	190,451	80	53.12% Pervious Area
	168,081	98	46.88% Impervious Area

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

Subcatchment A: Post Basin A



Hydrograph for Subcatchment A: Post Basin A

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.70	0.02	0.51	**0.84**
10.00	2.60	0.96	2.37	**1.63**
15.00	3.46	1.61	3.23	1.08
20.00	**4.11**	**2.13**	**3.87**	0.85
25.00	**4.50**	**2.46**	**4.26**	0.00
30.00	4.50	2.46	4.26	0.00
35.00	4.50	2.46	4.26	0.00
40.00	4.50	2.46	4.26	0.00
45.00	4.50	2.46	4.26	0.00
50.00	4.50	2.46	4.26	0.00
55.00	4.50	2.46	4.26	0.00
60.00	4.50	2.46	4.26	0.00
65.00	4.50	2.46	4.26	0.00
70.00	4.50	2.46	4.26	0.00
75.00	4.50	2.46	4.26	0.00
80.00	4.50	2.46	4.26	0.00
85.00	4.50	2.46	4.26	0.00
90.00	4.50	2.46	4.26	0.00
95.00	4.50	2.46	4.26	0.00
100.00	4.50	2.46	4.26	0.00
105.00	4.50	2.46	4.26	0.00
110.00	4.50	2.46	4.26	0.00
115.00	4.50	2.46	4.26	0.00
120.00	4.50	2.46	4.26	0.00
125.00	4.50	2.46	4.26	0.00
130.00	4.50	2.46	4.26	0.00

Summary for Subcatchment B: Post Basin B

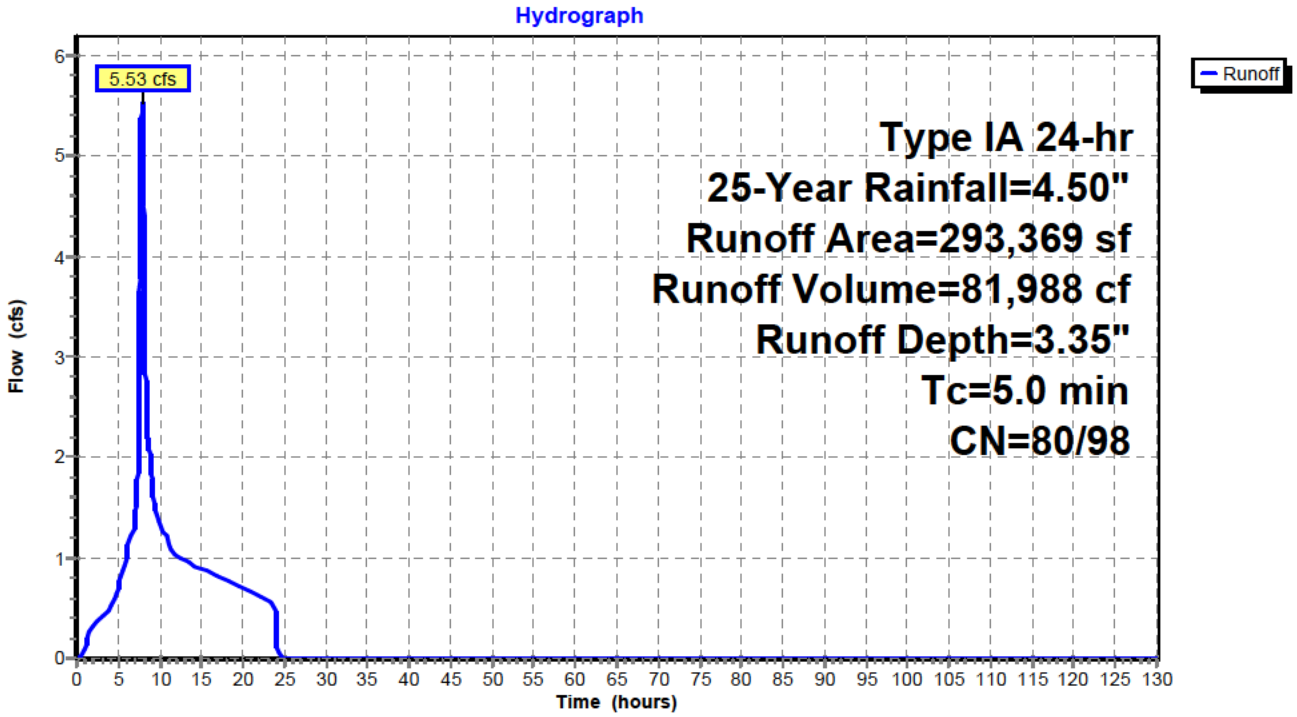
Runoff = 5.53 cfs @ 7.91 hrs, Volume= 81,988 cf, Depth= 3.35"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

	Area (sf)	CN	Description
*	145,197	98	Impervious Area
	148,172	80	>75% Grass cover, Good, HSG D
	293,369	89	Weighted Average
	148,172	80	50.51% Pervious Area
	145,197	98	49.49% Impervious Area

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

Subcatchment B: Post Basin B



Hydrograph for Subcatchment B: Post Basin B

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.70	0.02	0.51	**0.71**
10.00	2.60	0.96	2.37	**1.35**
15.00	3.46	1.61	3.23	0.89
20.00	**4.11**	**2.13**	**3.87**	0.70
25.00	**4.50**	**2.46**	**4.26**	0.00
30.00	4.50	2.46	4.26	0.00
35.00	4.50	2.46	4.26	0.00
40.00	4.50	2.46	4.26	0.00
45.00	4.50	2.46	4.26	0.00
50.00	4.50	2.46	4.26	0.00
55.00	4.50	2.46	4.26	0.00
60.00	4.50	2.46	4.26	0.00
65.00	4.50	2.46	4.26	0.00
70.00	4.50	2.46	4.26	0.00
75.00	4.50	2.46	4.26	0.00
80.00	4.50	2.46	4.26	0.00
85.00	4.50	2.46	4.26	0.00
90.00	4.50	2.46	4.26	0.00
95.00	4.50	2.46	4.26	0.00
100.00	4.50	2.46	4.26	0.00
105.00	4.50	2.46	4.26	0.00
110.00	4.50	2.46	4.26	0.00
115.00	4.50	2.46	4.26	0.00
120.00	4.50	2.46	4.26	0.00
125.00	4.50	2.46	4.26	0.00
130.00	4.50	2.46	4.26	0.00

Summary for Subcatchment C1: Post Basin C1

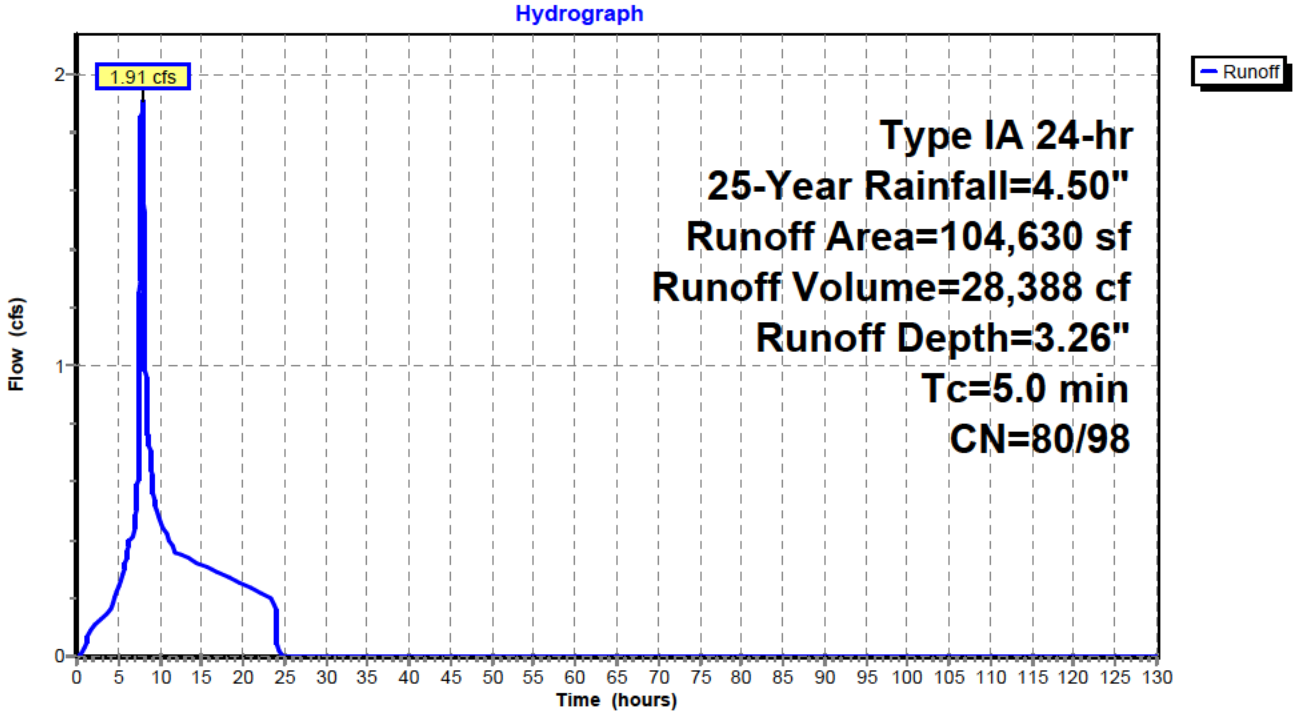
Runoff = 1.91 cfs @ 7.91 hrs, Volume= 28,388 cf, Depth= 3.26"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

	Area (sf)	CN	Description
*	46,105	98	Impervious Area
	58,525	80	>75% Grass cover, Good, HSG D
	104,630	88	Weighted Average
	58,525	80	55.94% Pervious Area
	46,105	98	44.06% Impervious Area

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

Subcatchment C1: Post Basin C1



Hydrograph for Subcatchment C1: Post Basin C1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.70	0.02	0.51	**0.23**
10.00	2.60	0.96	2.37	**0.47**
15.00	3.46	1.61	3.23	0.31
20.00	**4.11**	**2.13**	**3.87**	0.25
25.00	**4.50**	**2.46**	**4.26**	0.00
30.00	4.50	2.46	4.26	0.00
35.00	4.50	2.46	4.26	0.00
40.00	4.50	2.46	4.26	0.00
45.00	4.50	2.46	4.26	0.00
50.00	4.50	2.46	4.26	0.00
55.00	4.50	2.46	4.26	0.00
60.00	4.50	2.46	4.26	0.00
65.00	4.50	2.46	4.26	0.00
70.00	4.50	2.46	4.26	0.00
75.00	4.50	2.46	4.26	0.00
80.00	4.50	2.46	4.26	0.00
85.00	4.50	2.46	4.26	0.00
90.00	4.50	2.46	4.26	0.00
95.00	4.50	2.46	4.26	0.00
100.00	4.50	2.46	4.26	0.00
105.00	4.50	2.46	4.26	0.00
110.00	4.50	2.46	4.26	0.00
115.00	4.50	2.46	4.26	0.00
120.00	4.50	2.46	4.26	0.00
125.00	4.50	2.46	4.26	0.00
130.00	4.50	2.46	4.26	0.00

Summary for Subcatchment C2: Post Basin C2

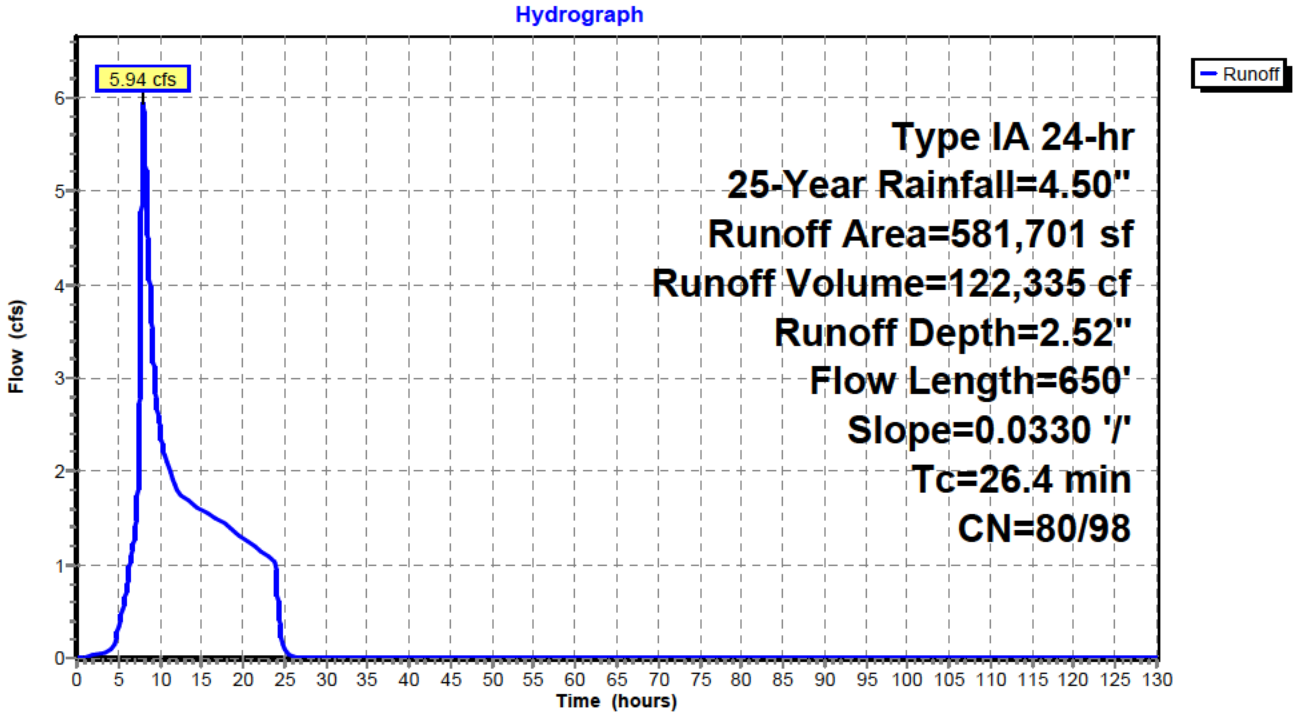
Runoff = 5.94 cfs @ 8.01 hrs, Volume= 122,335 cf, Depth= 2.52"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

	Area (sf)	CN	Description
*	20,053	98	Impervious Area
	561,648	80	>75% Grass cover, Good, HSG D
	581,701	81	Weighted Average
	561,648	80	96.55% Pervious Area
	20,053	98	3.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.8	300	0.0330	0.22		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
3.6	350	0.0330	1.63		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
26.4	650	Total			

Subcatchment C2: Post Basin C2



Hydrograph for Subcatchment C2: Post Basin C2

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.70	0.02	0.51	**0.31**
10.00	2.60	0.96	2.37	**2.47**
15.00	3.46	1.61	3.23	1.59
20.00	**4.11**	**2.13**	**3.87**	1.29
25.00	**4.50**	**2.46**	**4.26**	0.11
30.00	4.50	2.46	4.26	0.00
35.00	4.50	2.46	4.26	0.00
40.00	4.50	2.46	4.26	0.00
45.00	4.50	2.46	4.26	0.00
50.00	4.50	2.46	4.26	0.00
55.00	4.50	2.46	4.26	0.00
60.00	4.50	2.46	4.26	0.00
65.00	4.50	2.46	4.26	0.00
70.00	4.50	2.46	4.26	0.00
75.00	4.50	2.46	4.26	0.00
80.00	4.50	2.46	4.26	0.00
85.00	4.50	2.46	4.26	0.00
90.00	4.50	2.46	4.26	0.00
95.00	4.50	2.46	4.26	0.00
100.00	4.50	2.46	4.26	0.00
105.00	4.50	2.46	4.26	0.00
110.00	4.50	2.46	4.26	0.00
115.00	4.50	2.46	4.26	0.00
120.00	4.50	2.46	4.26	0.00
125.00	4.50	2.46	4.26	0.00
130.00	4.50	2.46	4.26	0.00

Summary for Subcatchment D: Post Basin D

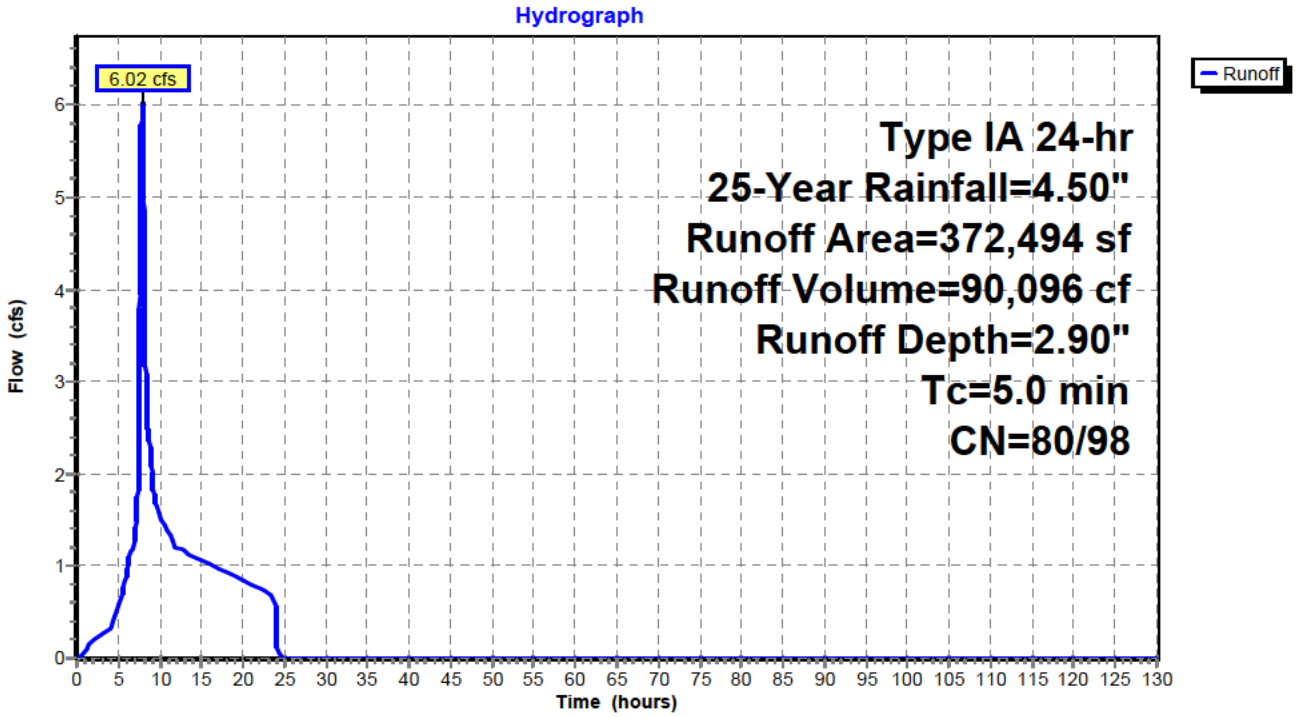
Runoff = 6.02 cfs @ 7.93 hrs, Volume= 90,096 cf, Depth= 2.90"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

	Area (sf)	CN	Description
*	91,123	98	Impervious Area
	281,371	80	>75% Grass cover, Good, HSG D
	372,494	84	Weighted Average
	281,371	80	75.54% Pervious Area
	91,123	98	24.46% Impervious Area

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

Subcatchment D: Post Basin D



Hydrograph for Subcatchment D: Post Basin D

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.70	0.02	0.51	**0.56**
10.00	2.60	0.96	2.37	**1.56**
15.00	3.46	1.61	3.23	1.06
20.00	**4.11**	**2.13**	**3.87**	0.85
25.00	**4.50**	**2.46**	**4.26**	0.00
30.00	4.50	2.46	4.26	0.00
35.00	4.50	2.46	4.26	0.00
40.00	4.50	2.46	4.26	0.00
45.00	4.50	2.46	4.26	0.00
50.00	4.50	2.46	4.26	0.00
55.00	4.50	2.46	4.26	0.00
60.00	4.50	2.46	4.26	0.00
65.00	4.50	2.46	4.26	0.00
70.00	4.50	2.46	4.26	0.00
75.00	4.50	2.46	4.26	0.00
80.00	4.50	2.46	4.26	0.00
85.00	4.50	2.46	4.26	0.00
90.00	4.50	2.46	4.26	0.00
95.00	4.50	2.46	4.26	0.00
100.00	4.50	2.46	4.26	0.00
105.00	4.50	2.46	4.26	0.00
110.00	4.50	2.46	4.26	0.00
115.00	4.50	2.46	4.26	0.00
120.00	4.50	2.46	4.26	0.00
125.00	4.50	2.46	4.26	0.00
130.00	4.50	2.46	4.26	0.00

Summary for Subcatchment E: Post Basin E

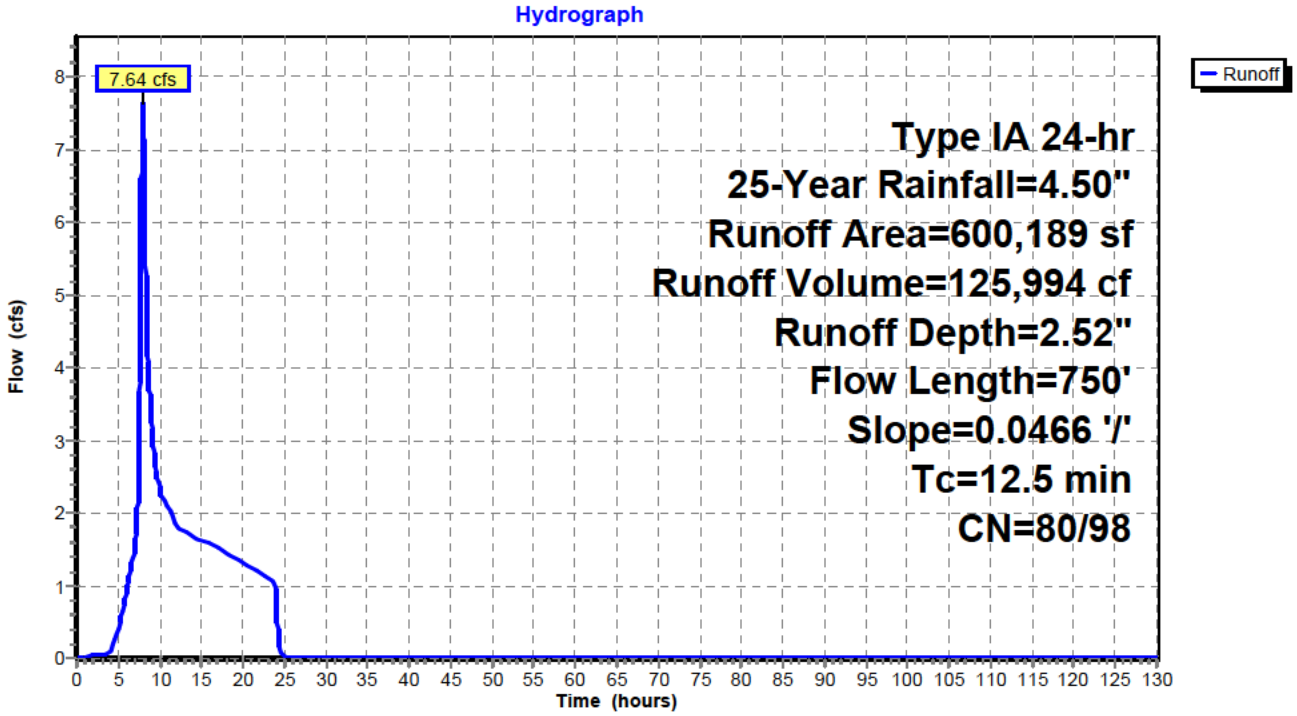
Runoff = 7.64 cfs @ 8.00 hrs, Volume= 125,994 cf, Depth= 2.52"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-130.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

	Area (sf)	CN	Description
*	19,160	98	Impervious Area
	581,029	80	>75% Grass cover, Good, HSG D
	600,189	81	Weighted Average
	581,029	80	96.81% Pervious Area
	19,160	98	3.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	300	0.0466	0.58		**Sheet Flow,** Cultivated: Residue<=20% n= 0.060 P2= 2.80"
3.9	450	0.0466	1.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.5	750	Total			

Subcatchment E: Post Basin E



Hydrograph for Subcatchment E: Post Basin E

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	0.00
5.00	0.70	0.02	0.51	**0.38**
10.00	2.60	0.96	2.37	**2.37**
15.00	3.46	1.61	3.23	1.63
20.00	**4.11**	**2.13**	**3.87**	1.32
25.00	**4.50**	**2.46**	**4.26**	0.01
30.00	4.50	2.46	4.26	0.00
35.00	4.50	2.46	4.26	0.00
40.00	4.50	2.46	4.26	0.00
45.00	4.50	2.46	4.26	0.00
50.00	4.50	2.46	4.26	0.00
55.00	4.50	2.46	4.26	0.00
60.00	4.50	2.46	4.26	0.00
65.00	4.50	2.46	4.26	0.00
70.00	4.50	2.46	4.26	0.00
75.00	4.50	2.46	4.26	0.00
80.00	4.50	2.46	4.26	0.00
85.00	4.50	2.46	4.26	0.00
90.00	4.50	2.46	4.26	0.00
95.00	4.50	2.46	4.26	0.00
100.00	4.50	2.46	4.26	0.00
105.00	4.50	2.46	4.26	0.00
110.00	4.50	2.46	4.26	0.00
115.00	4.50	2.46	4.26	0.00
120.00	4.50	2.46	4.26	0.00
125.00	4.50	2.46	4.26	0.00
130.00	4.50	2.46	4.26	0.00

Summary for Pond Pond A: Pond A

Inflow Area =	358,532 sf,	46.88% Impervious,	Inflow Depth =	3.31"	for 25-Year event
Inflow =	6.66 cfs @	7.91 hrs,	Volume=	98,792 cf	
Outflow =	2.06 cfs @	9.11 hrs,	Volume=	98,792 cf,	Atten= 69%, Lag= 71.8 min
Primary =	0.68 cfs @	9.11 hrs,	Volume=	63,076 cf	
Secondary =	1.38 cfs @	9.11 hrs,	Volume=	35,717 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 710.29' @ 9.11 hrs Surf.Area= 11,212 sf Storage= 22,505 cf

Plug-Flow detention time= 209.1 min calculated for 98,785 cf (100% of inflow)
Center-of-Mass det. time= 209.1 min (917.1 - 708.0)

Volume	Invert	Avail.Storage	Storage Description
#1	708.00'	90,236 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

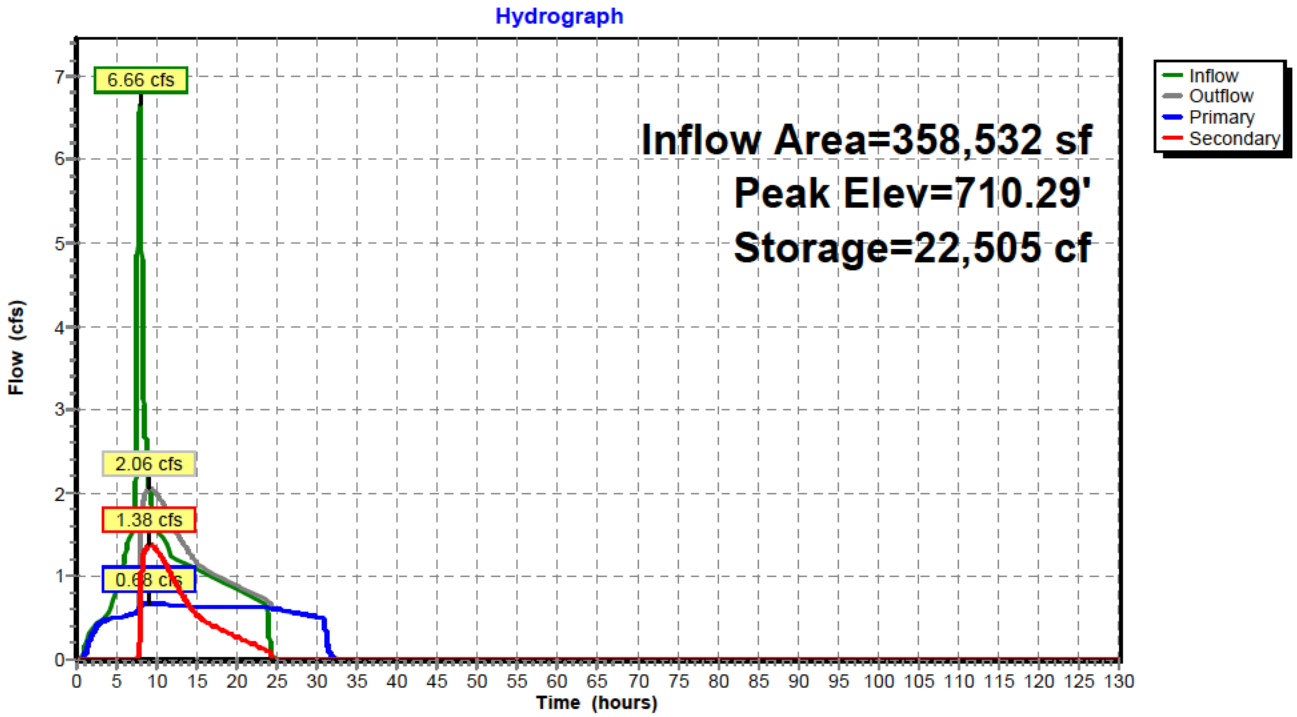
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
708.00	8,458	0	0
709.00	9,620	9,039	9,039
710.00	10,838	10,229	19,268
711.00	12,112	11,475	30,743
712.00	13,443	12,778	43,521
713.00	14,831	14,137	57,658
714.00	16,275	15,553	73,211
715.00	17,776	17,026	90,236

Device	Routing	Invert	Outlet Devices
#1	Primary	705.61'	**3.4" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	709.47'	**16.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

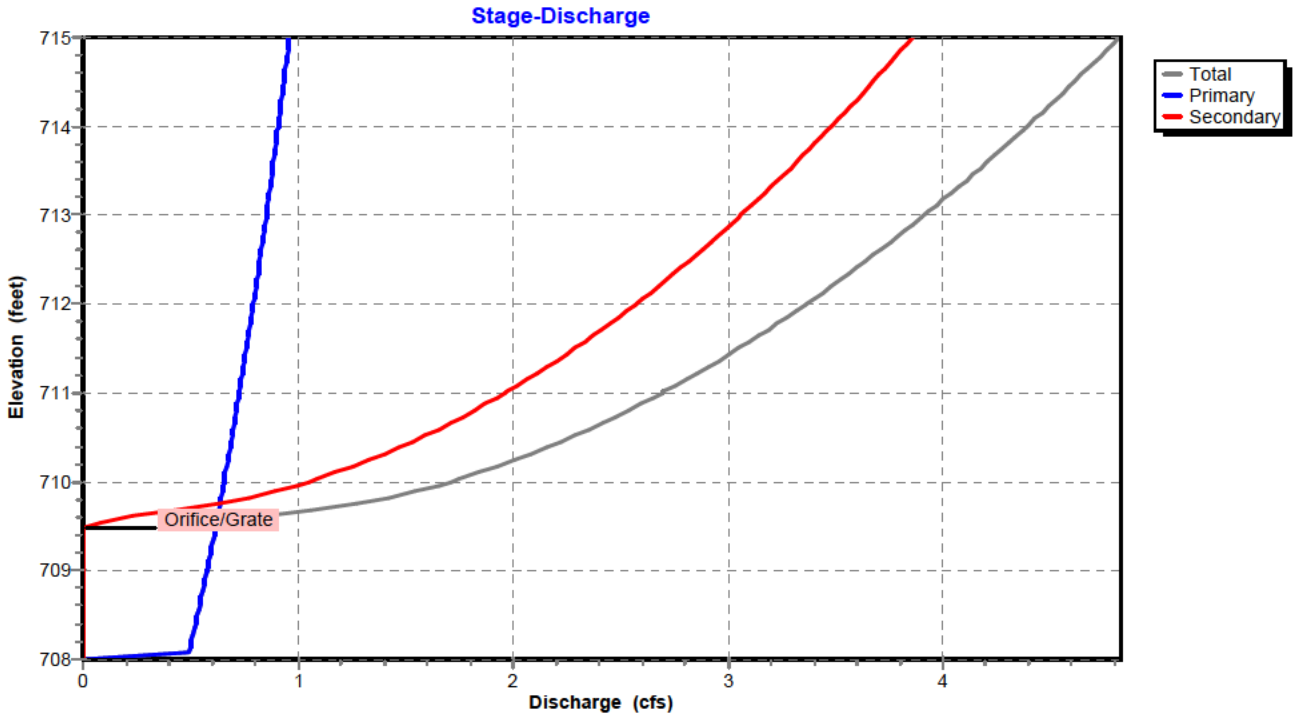
Primary OutFlow Max=0.68 cfs @ 9.11 hrs HW=710.29' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.68 cfs @ 10.77 fps)

Secondary OutFlow Max=1.38 cfs @ 9.11 hrs HW=710.29' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 1.38 cfs @ 4.15 fps)

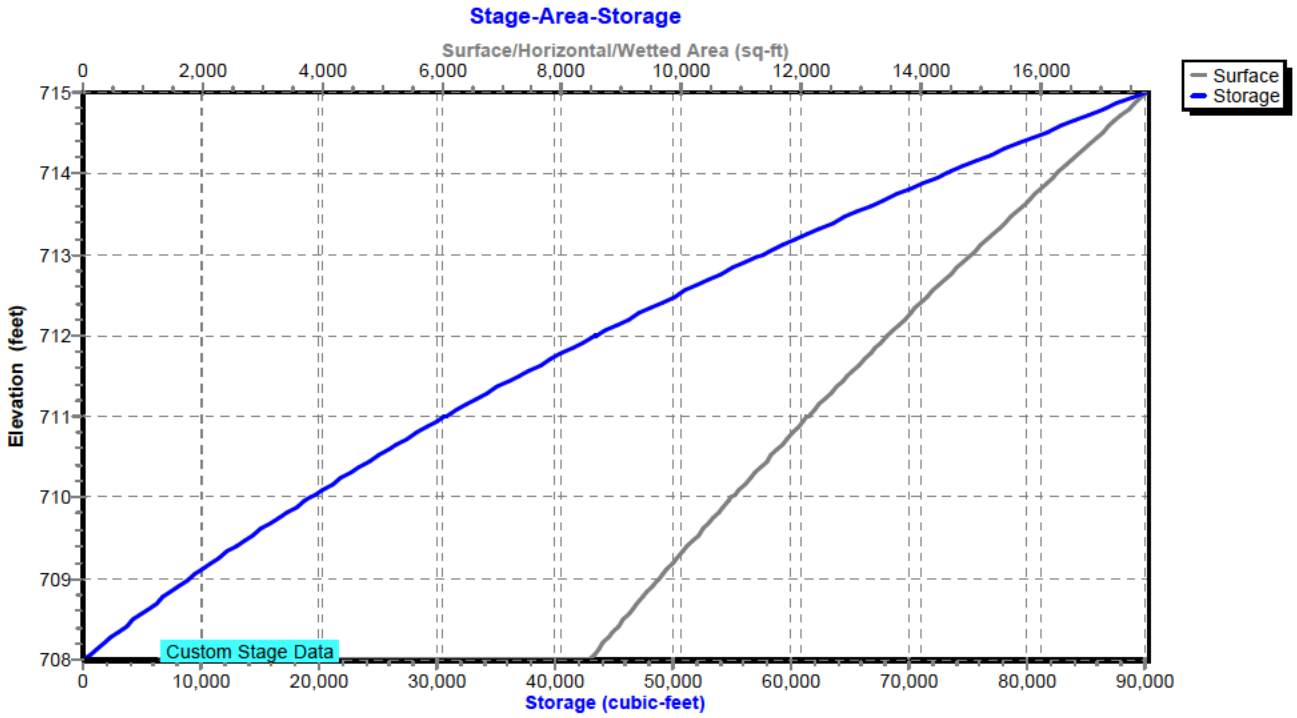
Pond Pond A: Pond A



Pond Pond A: Pond A



Pond Pond A: Pond A



Hydrograph for Pond Pond A: Pond A

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	708.00	0.00	0.00	0.00
5.00	**0.84**	**1,407**	**708.16**	**0.50**	**0.50**	**0.00**
10.00	**1.63**	**21,703**	**710.22**	**1.98**	**0.67**	**1.31**
15.00	1.08	16,251	709.72	1.17	0.64	0.54
20.00	0.85	15,277	709.62	0.90	0.63	0.27
25.00	0.00	12,383	709.34	0.61	0.61	0.00
30.00	0.00	2,308	708.27	0.51	0.51	0.00
35.00	0.00	0	708.00	0.00	0.00	0.00
40.00	0.00	0	708.00	0.00	0.00	0.00
45.00	0.00	0	708.00	0.00	0.00	0.00
50.00	0.00	0	708.00	0.00	0.00	0.00
55.00	0.00	0	708.00	0.00	0.00	0.00
60.00	0.00	0	708.00	0.00	0.00	0.00
65.00	0.00	0	708.00	0.00	0.00	0.00
70.00	0.00	0	708.00	0.00	0.00	0.00
75.00	0.00	0	708.00	0.00	0.00	0.00
80.00	0.00	0	708.00	0.00	0.00	0.00
85.00	0.00	0	708.00	0.00	0.00	0.00
90.00	0.00	0	708.00	0.00	0.00	0.00
95.00	0.00	0	708.00	0.00	0.00	0.00
100.00	0.00	0	708.00	0.00	0.00	0.00
105.00	0.00	0	708.00	0.00	0.00	0.00
110.00	0.00	0	708.00	0.00	0.00	0.00
115.00	0.00	0	708.00	0.00	0.00	0.00
120.00	0.00	0	708.00	0.00	0.00	0.00
125.00	0.00	0	708.00	0.00	0.00	0.00
130.00	0.00	0	708.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond A: Pond A

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
708.00	0.00	0.00	0.00
708.10	0.50	0.50	0.00
708.20	0.50	0.50	0.00
708.30	0.51	0.51	0.00
708.40	0.52	0.52	0.00
708.50	0.53	0.53	0.00
708.60	0.54	0.54	0.00
708.70	0.55	0.55	0.00
708.80	0.56	0.56	0.00
708.90	0.57	0.57	0.00
709.00	0.58	0.58	0.00
709.10	0.59	0.59	0.00
709.20	0.59	0.59	0.00
709.30	0.60	0.60	0.00
709.40	0.61	0.61	0.00
709.50	0.64	0.62	0.02
709.60	0.83	0.63	0.21
709.70	1.12	0.63	0.49
709.80	1.38	0.64	0.74
709.90	1.56	0.65	0.91
710.00	1.71	0.66	1.05
710.10	1.84	0.66	1.18
710.20	1.96	0.67	1.29
710.30	2.07	0.68	1.39
710.40	2.17	0.69	1.49
710.50	2.27	0.69	1.58
710.60	2.36	0.70	1.66
710.70	2.45	0.71	1.74
710.80	2.53	0.71	1.82
710.90	2.62	0.72	1.89
711.00	2.69	0.73	1.97
711.10	2.77	0.74	2.03
711.20	2.84	0.74	2.10
711.30	2.91	0.75	2.17
711.40	2.98	0.75	2.23
711.50	3.05	0.76	2.29
711.60	3.12	0.77	2.35
711.70	3.18	0.77	2.41
711.80	3.24	0.78	2.46
711.90	3.30	0.79	2.52
712.00	3.36	0.79	2.57
712.10	3.42	0.80	2.62
712.20	3.48	0.81	2.68
712.30	3.54	0.81	2.73
712.40	3.59	0.82	2.78
712.50	3.65	0.82	2.83
712.60	3.70	0.83	2.87
712.70	3.76	0.84	2.92
712.80	3.81	0.84	2.97
712.90	3.86	0.85	3.01
713.00	3.91	0.85	3.06
713.10	3.96	0.86	3.10
713.20	4.01	0.86	3.15
713.30	4.06	0.87	3.19
713.40	4.11	0.88	3.23
713.50	4.16	0.88	3.28
713.60	4.21	0.89	3.32
713.70	4.25	0.89	3.36
713.80	4.30	0.90	3.40
713.90	4.34	0.90	3.44
714.00	4.39	0.91	3.48
714.10	4.43	0.91	3.52
714.20	4.48	0.92	3.56
714.30	4.52	0.92	3.60
714.40	4.57	0.93	3.64
714.50	4.61	0.94	3.67
714.60	4.65	0.94	3.71
714.70	4.69	0.95	3.75
714.80	4.73	0.95	3.78
714.90	4.78	0.96	3.82
715.00	**4.82**	**0.96**	**3.86**

Stage-Area-Storage for Pond Pond A: Pond A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
708.00	8,458	0
708.10	8,574	852
708.20	8,690	1,715
708.30	8,807	2,590
708.40	8,923	3,476
708.50	9,039	4,374
708.60	9,155	5,284
708.70	9,271	6,205
708.80	9,388	7,138
708.90	9,504	8,083
709.00	9,620	9,039
709.10	9,742	10,007
709.20	9,864	10,987
709.30	9,985	11,980
709.40	10,107	12,984
709.50	10,229	14,001
709.60	10,351	15,030
709.70	10,473	16,071
709.80	10,594	17,125
709.90	10,716	18,190
710.00	10,838	19,268
710.10	10,965	20,358
710.20	11,093	21,461
710.30	11,220	22,577
710.40	11,348	23,705
710.50	11,475	24,846
710.60	11,602	26,000
710.70	11,730	27,167
710.80	11,857	28,346
710.90	11,985	29,538
711.00	12,112	30,743
711.10	12,245	31,961
711.20	12,378	33,192
711.30	12,511	34,436
711.40	12,644	35,694
711.50	12,778	36,965
711.60	12,911	38,250
711.70	13,044	39,547
711.80	13,177	40,859
711.90	13,310	42,183
712.00	13,443	43,521
712.10	13,582	44,872
712.20	13,721	46,237
712.30	13,859	47,616
712.40	13,998	49,009
712.50	14,137	50,416
712.60	14,276	51,836
712.70	14,415	53,271
712.80	14,553	54,719
712.90	14,692	56,181
713.00	14,831	57,658
713.10	14,975	59,148
713.20	15,120	60,653
713.30	15,264	62,172
713.40	15,409	63,705
713.50	15,553	65,254
713.60	15,697	66,816
713.70	15,842	68,393
713.80	15,986	69,984
713.90	16,131	71,590
714.00	16,275	73,211
714.10	16,425	74,846
714.20	16,575	76,496
714.30	16,725	78,161
714.40	16,875	79,841
714.50	17,026	81,536
714.60	17,176	83,246
714.70	17,326	84,971
714.80	17,476	86,711
714.90	17,626	88,466
715.00	**17,776**	**90,236**

Summary for Pond Pond B: Pond B

Inflow Area =	293,369 sf,	49.49% Impervious,	Inflow Depth =	3.35"	for 25-Year event
Inflow =	5.53 cfs @	7.91 hrs,	Volume=	81,988 cf	
Outflow =	2.09 cfs @	8.75 hrs,	Volume=	81,988 cf,	Atten= 62%, Lag= 50.8 min
Primary =	0.77 cfs @	8.75 hrs,	Volume=	60,007 cf	
Secondary =	1.33 cfs @	8.75 hrs,	Volume=	21,981 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 710.26' @ 8.75 hrs Surf.Area= 7,565 sf Storage= 14,477 cf

Plug-Flow detention time= 124.9 min calculated for 81,988 cf (100% of inflow)
Center-of-Mass det. time= 124.9 min (829.7 - 704.8)

Volume	Invert	Avail.Storage	Storage Description
#1	708.00'	50,732 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

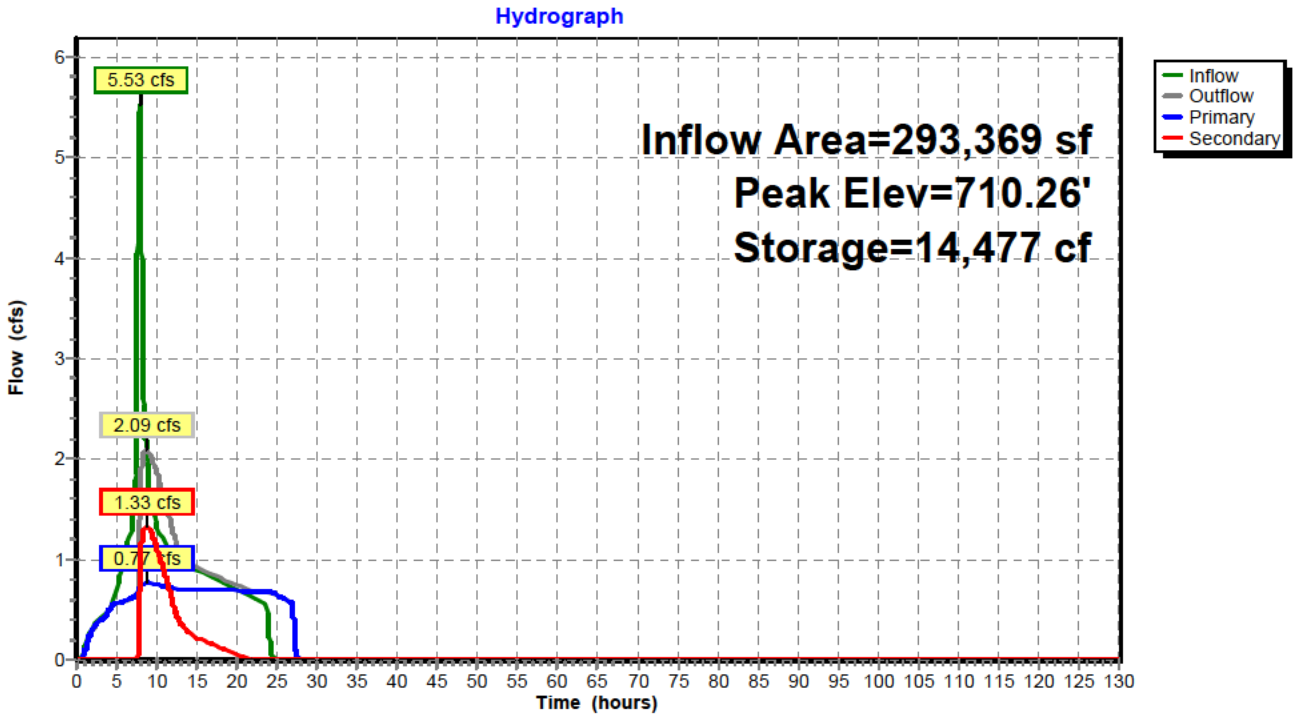
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
708.00	5,287	0	0
709.00	6,257	5,772	5,772
710.00	7,283	6,770	12,542
711.00	8,366	7,825	20,367
712.00	9,505	8,936	29,302
713.00	10,701	10,103	39,405
714.00	11,953	11,327	50,732

Device	Routing	Invert	Outlet Devices
#1	Primary	705.50'	**3.6" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	709.30'	**14.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

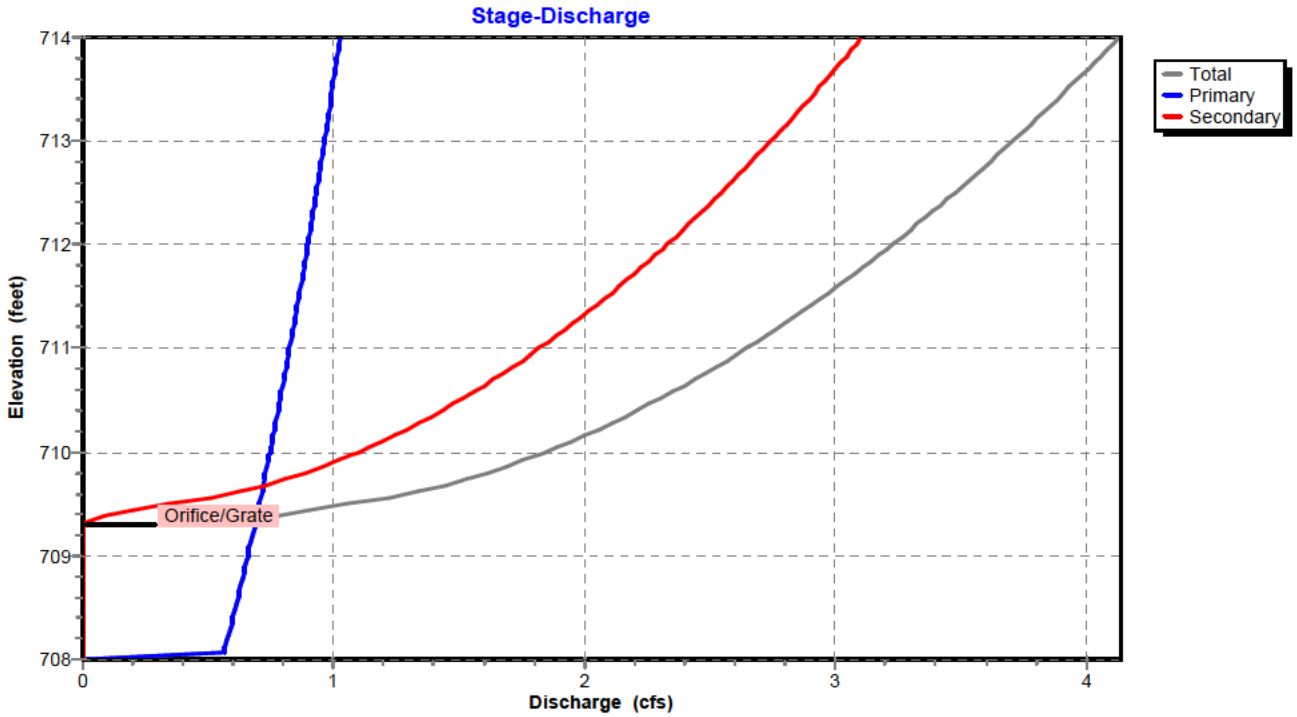
Primary OutFlow Max=0.77 cfs @ 8.75 hrs HW=710.26' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.77 cfs @ 10.86 fps)

Secondary OutFlow Max=1.33 cfs @ 8.75 hrs HW=710.26' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 1.33 cfs @ 4.54 fps)

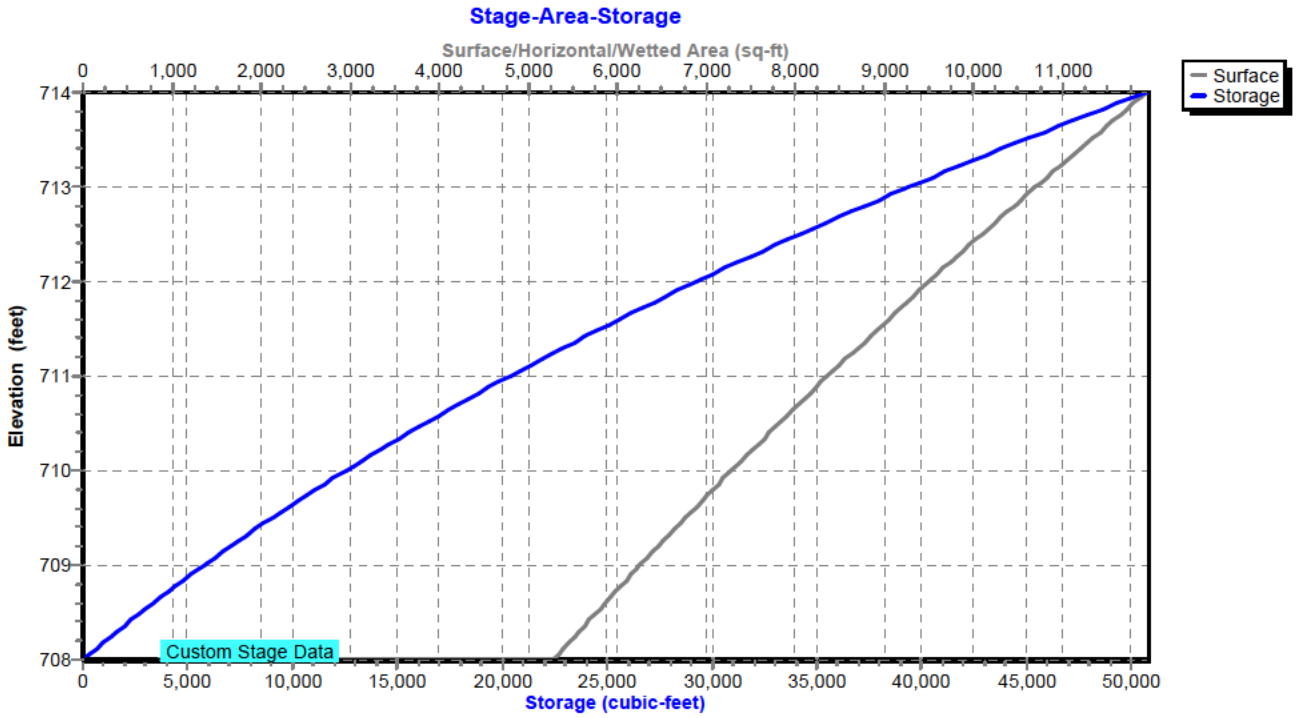
Pond Pond B: Pond B



Pond Pond B: Pond B



Pond Pond B: Pond B



Hydrograph for Pond Pond B: Pond B

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	708.00	0.00	0.00	0.00
5.00	**0.71**	**468**	**708.09**	**0.57**	**0.57**	**0.00**
10.00	**1.35**	**12,646**	**710.01**	**1.86**	**0.75**	**1.11**
15.00	0.89	8,678	709.45	0.92	0.70	0.22
20.00	0.70	8,050	709.35	0.74	0.69	0.05
25.00	0.00	4,717	708.83	0.64	0.64	0.00
30.00	0.00	0	708.00	0.00	0.00	0.00
35.00	0.00	0	708.00	0.00	0.00	0.00
40.00	0.00	0	708.00	0.00	0.00	0.00
45.00	0.00	0	708.00	0.00	0.00	0.00
50.00	0.00	0	708.00	0.00	0.00	0.00
55.00	0.00	0	708.00	0.00	0.00	0.00
60.00	0.00	0	708.00	0.00	0.00	0.00
65.00	0.00	0	708.00	0.00	0.00	0.00
70.00	0.00	0	708.00	0.00	0.00	0.00
75.00	0.00	0	708.00	0.00	0.00	0.00
80.00	0.00	0	708.00	0.00	0.00	0.00
85.00	0.00	0	708.00	0.00	0.00	0.00
90.00	0.00	0	708.00	0.00	0.00	0.00
95.00	0.00	0	708.00	0.00	0.00	0.00
100.00	0.00	0	708.00	0.00	0.00	0.00
105.00	0.00	0	708.00	0.00	0.00	0.00
110.00	0.00	0	708.00	0.00	0.00	0.00
115.00	0.00	0	708.00	0.00	0.00	0.00
120.00	0.00	0	708.00	0.00	0.00	0.00
125.00	0.00	0	708.00	0.00	0.00	0.00
130.00	0.00	0	708.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond B: Pond B

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
708.00	0.00	0.00	0.00
708.10	0.57	0.57	0.00
708.20	0.58	0.58	0.00
708.30	0.59	0.59	0.00
708.40	0.60	0.60	0.00
708.50	0.61	0.61	0.00
708.60	0.62	0.62	0.00
708.70	0.63	0.63	0.00
708.80	0.64	0.64	0.00
708.90	0.65	0.65	0.00
709.00	0.66	0.66	0.00
709.10	0.67	0.67	0.00
709.20	0.68	0.68	0.00
709.30	0.69	0.69	0.00
709.40	0.82	0.69	0.12
709.50	1.05	0.70	0.35
709.60	1.30	0.71	0.59
709.70	1.47	0.72	0.75
709.80	1.61	0.73	0.88
709.90	1.73	0.74	1.00
710.00	1.84	0.75	1.10
710.10	1.94	0.75	1.19
710.20	2.04	0.76	1.28
710.30	2.13	0.77	1.36
710.40	2.21	0.78	1.43
710.50	2.29	0.79	1.50
710.60	2.37	0.79	1.57
710.70	2.44	0.80	1.64
710.80	2.51	0.81	1.70
710.90	2.58	0.82	1.76
711.00	2.65	0.82	1.82
711.10	2.71	0.83	1.88
711.20	2.77	0.84	1.93
711.30	2.83	0.85	1.99
711.40	2.89	0.85	2.04
711.50	2.95	0.86	2.09
711.60	3.01	0.87	2.14
711.70	3.06	0.88	2.19
711.80	3.12	0.88	2.24
711.90	3.17	0.89	2.28
712.00	3.23	0.90	2.33
712.10	3.28	0.90	2.37
712.20	3.33	0.91	2.42
712.30	3.38	0.92	2.46
712.40	3.43	0.92	2.50
712.50	3.48	0.93	2.54
712.60	3.52	0.94	2.59
712.70	3.57	0.94	2.63
712.80	3.62	0.95	2.67
712.90	3.66	0.96	2.71
713.00	3.71	0.96	2.74
713.10	3.75	0.97	2.78
713.20	3.80	0.98	2.82
713.30	3.84	0.98	2.86
713.40	3.88	0.99	2.89
713.50	3.92	0.99	2.93
713.60	3.97	1.00	2.97
713.70	4.01	1.01	3.00
713.80	4.05	1.01	3.04
713.90	4.09	1.02	3.07
714.00	**4.13**	**1.03**	**3.10**

Stage-Area-Storage for Pond Pond B: Pond B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
708.00	5,287	0
708.10	5,384	534
708.20	5,481	1,077
708.30	5,578	1,630
708.40	5,675	2,192
708.50	5,772	2,765
708.60	5,869	3,347
708.70	5,966	3,939
708.80	6,063	4,540
708.90	6,160	5,151
709.00	6,257	5,772
709.10	6,360	6,403
709.20	6,462	7,044
709.30	6,565	7,695
709.40	6,667	8,357
709.50	6,770	9,029
709.60	6,873	9,711
709.70	6,975	10,403
709.80	7,078	11,106
709.90	7,180	11,819
710.00	7,283	12,542
710.10	7,391	13,276
710.20	7,500	14,020
710.30	7,608	14,776
710.40	7,716	15,542
710.50	7,825	16,319
710.60	7,933	17,107
710.70	8,041	17,905
710.80	8,149	18,715
710.90	8,258	19,535
711.00	8,366	20,367
711.10	8,480	21,209
711.20	8,594	22,062
711.30	8,708	22,928
711.40	8,822	23,804
711.50	8,936	24,692
711.60	9,049	25,591
711.70	9,163	26,502
711.80	9,277	27,424
711.90	9,391	28,357
712.00	9,505	29,302
712.10	9,625	30,258
712.20	9,744	31,227
712.30	9,864	32,207
712.40	9,983	33,200
712.50	10,103	34,204
712.60	10,223	35,220
712.70	10,342	36,249
712.80	10,462	37,289
712.90	10,581	38,341
713.00	10,701	39,405
713.10	10,826	40,481
713.20	10,951	41,570
713.30	11,077	42,672
713.40	11,202	43,786
713.50	11,327	44,912
713.60	11,452	46,051
713.70	11,577	47,202
713.80	11,703	48,366
713.90	11,828	49,543
714.00	**11,953**	**50,732**

Summary for Pond Pond C: Pond C

Inflow Area =	686,331 sf,	9.64% Impervious,	Inflow Depth >	9.18"	for 25-Year event
Inflow =	8.60 cfs @	8.00 hrs,	Volume=	525,152 cf,	Incl. 0.80 cfs Base Flow
Outflow =	3.53 cfs @	10.31 hrs,	Volume=	524,591 cf,	Atten= 59%, Lag= 138.7 min
Primary =	2.10 cfs @	10.31 hrs,	Volume=	470,082 cf	
Secondary =	1.43 cfs @	10.31 hrs,	Volume=	54,509 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 705.56' @ 10.31 hrs Surf.Area= 20,824 sf Storage= 30,484 cf

Plug-Flow detention time= 54.8 min calculated for 524,586 cf (100% of inflow)
Center-of-Mass det. time= 49.6 min (3,055.1 - 3,005.5)

Volume	Invert	Avail.Storage	Storage Description
#1	704.00'	140,242 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

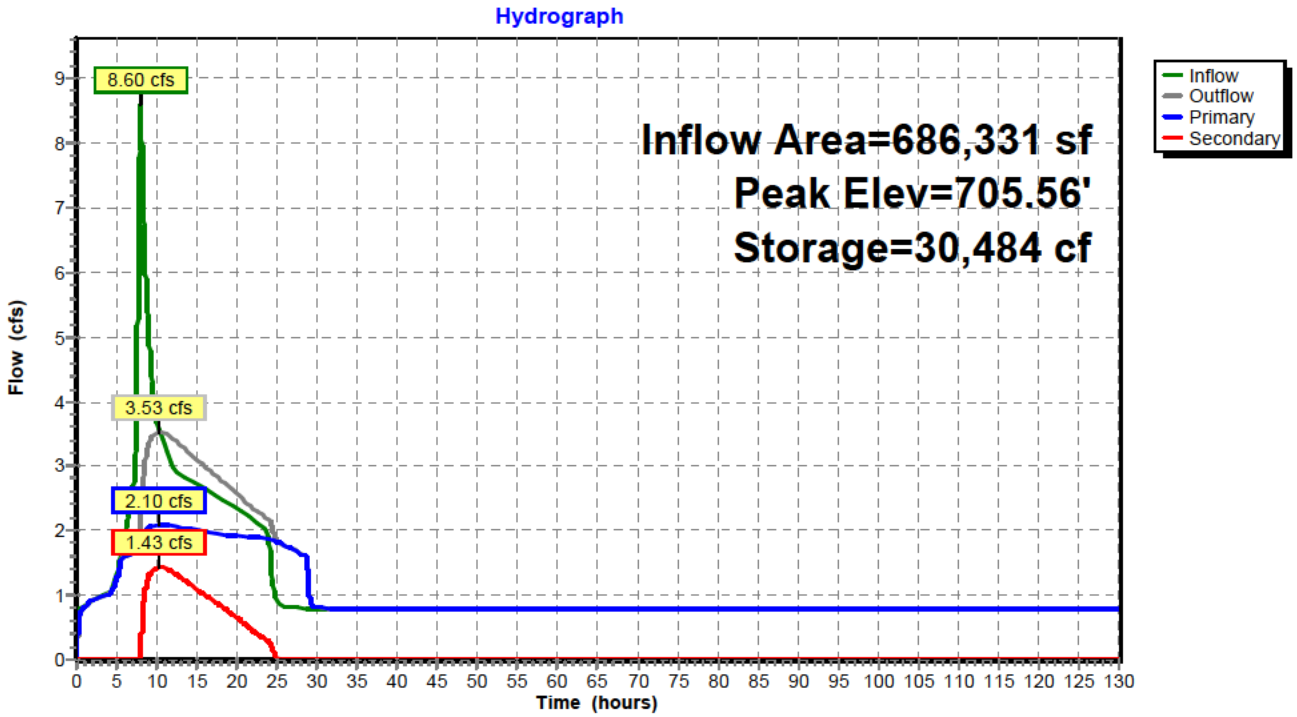
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
704.00	18,277	0	0
705.00	19,889	19,083	19,083
706.00	21,558	20,724	39,807
707.00	23,284	22,421	62,228
708.00	25,067	24,176	86,403
709.00	26,905	25,986	112,389
710.00	28,801	27,853	140,242

Device	Routing	Invert	Outlet Devices
#1	Primary	702.00'	**6.4" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	704.69'	**16.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

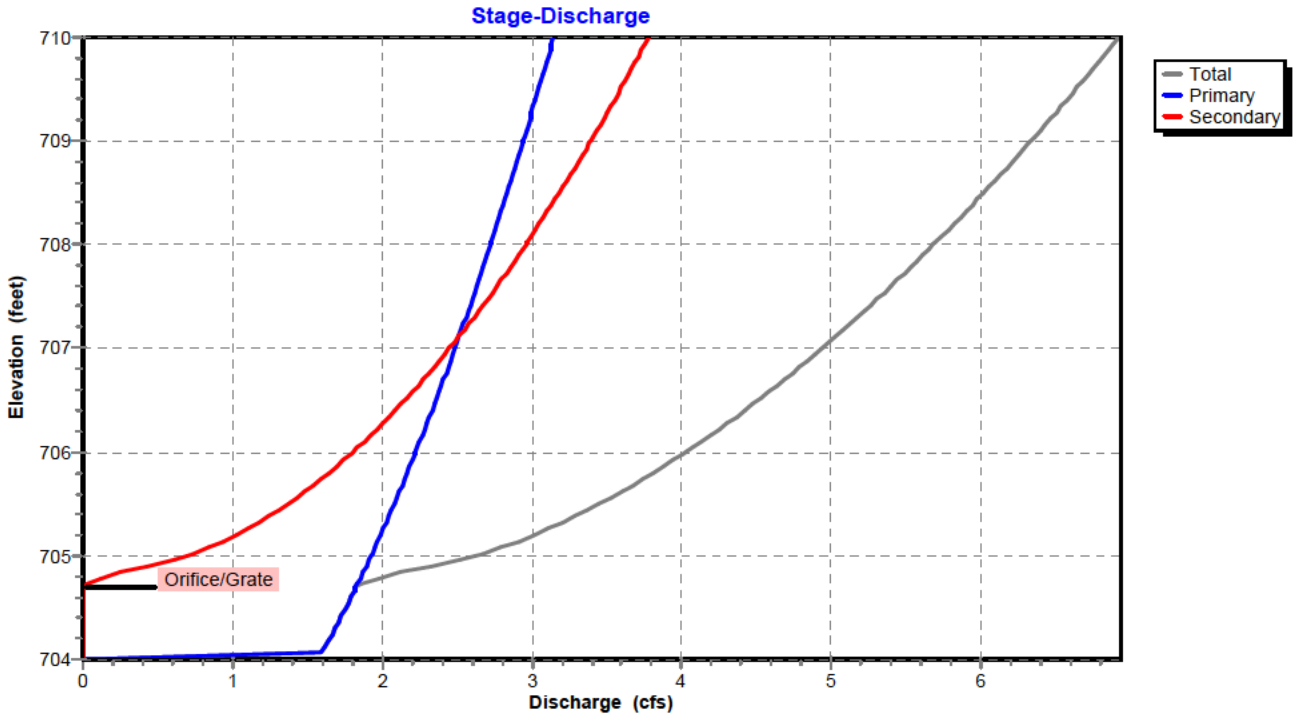
Primary OutFlow Max=2.10 cfs @ 10.31 hrs HW=705.56' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 2.10 cfs @ 9.39 fps)

Secondary OutFlow Max=1.43 cfs @ 10.31 hrs HW=705.56' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 1.43 cfs @ 4.29 fps)

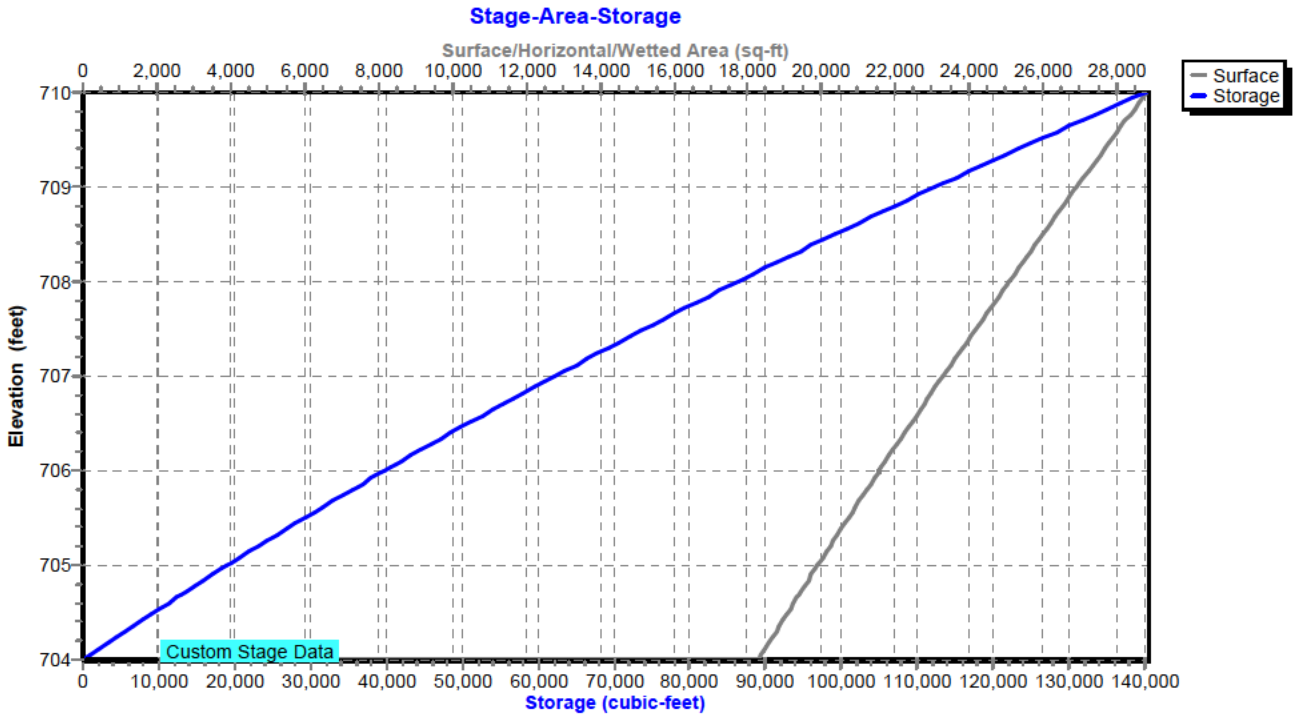
Pond Pond C: Pond C



Pond Pond C: Pond C



Pond Pond C: Pond C



Hydrograph for Pond Pond C: Pond C

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.80	5	704.00	0.01	0.01	0.00
5.00	**1.34**	870	704.05	1.26	1.26	0.00
10.00	**3.74**	**30,369**	**705.55**	**3.52**	**2.10**	**1.42**
15.00	2.70	**24,120**	**705.25**	**3.09**	**2.00**	**1.09**
20.00	2.34	18,680	704.98	2.57	1.92	0.65
25.00	0.91	13,277	704.70	1.84	1.83	0.01
30.00	0.80	552	704.03	0.80	0.80	0.00
35.00	0.80	551	704.03	0.80	0.80	0.00
40.00	0.80	551	704.03	0.80	0.80	0.00
45.00	0.80	551	704.03	0.80	0.80	0.00
50.00	0.80	551	704.03	0.80	0.80	0.00
55.00	0.80	551	704.03	0.80	0.80	0.00
60.00	0.80	551	704.03	0.80	0.80	0.00
65.00	0.80	551	704.03	0.80	0.80	0.00
70.00	0.80	551	704.03	0.80	0.80	0.00
75.00	0.80	551	704.03	0.80	0.80	0.00
80.00	0.80	551	704.03	0.80	0.80	0.00
85.00	0.80	551	704.03	0.80	0.80	0.00
90.00	0.80	551	704.03	0.80	0.80	0.00
95.00	0.80	551	704.03	0.80	0.80	0.00
100.00	0.80	551	704.03	0.80	0.80	0.00
105.00	0.80	551	704.03	0.80	0.80	0.00
110.00	0.80	551	704.03	0.80	0.80	0.00
115.00	0.80	551	704.03	0.80	0.80	0.00
120.00	0.80	551	704.03	0.80	0.80	0.00
125.00	0.80	551	704.03	0.80	0.80	0.00
130.00	0.80	551	704.03	0.80	0.80	0.00

Stage-Discharge for Pond Pond C: Pond C

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
704.00	0.00	0.00	0.00
704.10	1.61	1.61	0.00
704.20	1.65	1.65	0.00
704.30	1.69	1.69	0.00
704.40	1.72	1.72	0.00
704.50	1.76	1.76	0.00
704.60	1.79	1.79	0.00
704.70	1.83	1.83	0.00
704.80	2.02	1.86	0.16
704.90	2.32	1.89	0.43
705.00	2.62	1.93	0.70
705.10	2.84	1.96	0.88
705.20	3.01	1.99	1.02
705.30	3.17	2.02	1.15
705.40	3.32	2.05	1.27
705.50	3.45	2.08	1.37
705.60	3.58	2.11	1.47
705.70	3.70	2.14	1.56
705.80	3.81	2.17	1.64
705.90	3.92	2.20	1.73
706.00	4.03	2.22	1.80
706.10	4.13	2.25	1.88
706.20	4.23	2.28	1.95
706.30	4.33	2.30	2.02
706.40	4.42	2.33	2.09
706.50	4.51	2.36	2.15
706.60	4.60	2.38	2.22
706.70	4.69	2.41	2.28
706.80	4.77	2.44	2.34
706.90	4.85	2.46	2.39
707.00	4.94	2.49	2.45
707.10	5.02	2.51	2.51
707.20	5.10	2.53	2.56
707.30	5.17	2.56	2.61
707.40	5.25	2.58	2.67
707.50	5.32	2.61	2.72
707.60	5.40	2.63	2.77
707.70	5.47	2.65	2.82
707.80	5.54	2.68	2.87
707.90	5.61	2.70	2.91
708.00	5.68	2.72	2.96
708.10	5.75	2.75	3.01
708.20	5.82	2.77	3.05
708.30	5.89	2.79	3.10
708.40	5.95	2.81	3.14
708.50	6.02	2.83	3.18
708.60	6.08	2.86	3.23
708.70	6.15	2.88	3.27
708.80	6.21	2.90	3.31
708.90	6.27	2.92	3.35
709.00	6.33	2.94	3.39
709.10	6.39	2.96	3.43
709.20	6.46	2.98	3.47
709.30	6.52	3.00	3.51
709.40	6.57	3.02	3.55
709.50	6.63	3.04	3.59
709.60	6.69	3.06	3.63
709.70	6.75	3.08	3.67
709.80	6.81	3.10	3.70
709.90	6.86	3.12	3.74
710.00	**6.92**	**3.14**	**3.78**

Stage-Area-Storage for Pond Pond C: Pond C

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
704.00	18,277	0
704.10	18,438	1,836
704.20	18,599	3,688
704.30	18,761	5,556
704.40	18,922	7,440
704.50	19,083	9,340
704.60	19,244	11,256
704.70	19,405	13,189
704.80	19,567	15,137
704.90	19,728	17,102
705.00	19,889	19,083
705.10	20,056	21,080
705.20	20,223	23,094
705.30	20,390	25,125
705.40	20,557	27,172
705.50	20,724	29,236
705.60	20,890	31,317
705.70	21,057	33,414
705.80	21,224	35,528
705.90	21,391	37,659
706.00	21,558	39,807
706.10	21,731	41,971
706.20	21,903	44,153
706.30	22,076	46,352
706.40	22,248	48,568
706.50	22,421	50,801
706.60	22,594	53,052
706.70	22,766	55,320
706.80	22,939	57,605
706.90	23,111	59,908
707.00	23,284	62,228
707.10	23,462	64,565
707.20	23,641	66,920
707.30	23,819	69,293
707.40	23,997	71,684
707.50	24,176	74,092
707.60	24,354	76,519
707.70	24,532	78,963
707.80	24,710	81,425
707.90	24,889	83,905
708.00	25,067	86,403
708.10	25,251	88,919
708.20	25,435	91,453
708.30	25,618	94,006
708.40	25,802	96,577
708.50	25,986	99,166
708.60	26,170	101,774
708.70	26,354	104,400
708.80	26,537	107,045
708.90	26,721	109,708
709.00	26,905	112,389
709.10	27,095	115,089
709.20	27,284	117,808
709.30	27,474	120,546
709.40	27,663	123,303
709.50	27,853	126,079
709.60	28,043	128,873
709.70	28,232	131,687
709.80	28,422	134,520
709.90	28,611	137,371
710.00	**28,801**	**140,242**

Summary for Pond Pond D: Pond D

Inflow Area =	372,494 sf,	24.46% Impervious,	Inflow Depth =	2.90"	for 25-Year event
Inflow =	6.02 cfs @	7.93 hrs,	Volume=	90,096 cf	
Outflow =	2.58 cfs @	8.46 hrs,	Volume=	90,097 cf,	Atten= 57%, Lag= 31.6 min
Primary =	1.03 cfs @	8.46 hrs,	Volume=	68,280 cf	
Secondary =	1.55 cfs @	8.46 hrs,	Volume=	21,817 cf	

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 695.20' @ 8.46 hrs Surf.Area= 6,592 sf Storage= 12,096 cf

Plug-Flow detention time= 75.8 min calculated for 90,090 cf (100% of inflow)
Center-of-Mass det. time= 75.8 min (815.5 - 739.7)

Volume	Invert	Avail.Storage	Storage Description
#1	693.00'	45,136 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

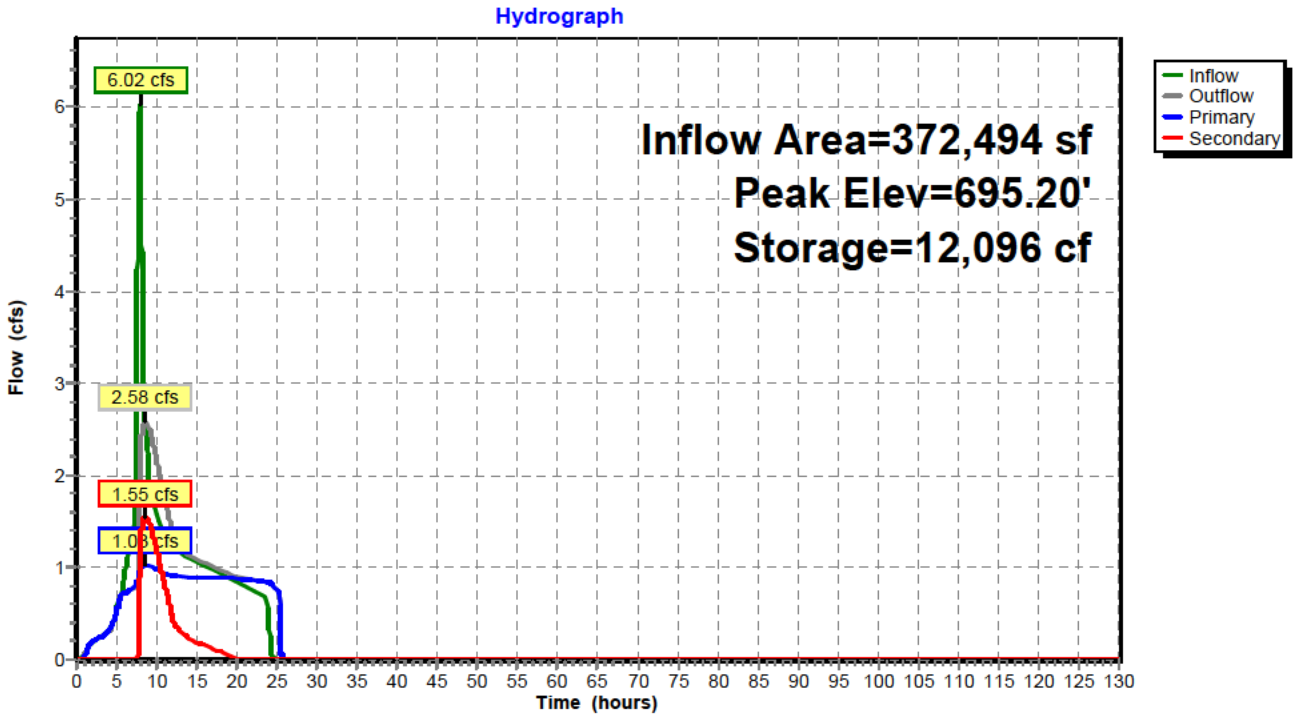
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
693.00	4,458	0	0
694.00	5,393	4,926	4,926
695.00	6,385	5,889	10,815
696.00	7,433	6,909	17,724
697.00	8,538	7,986	25,709
698.00	9,699	9,119	34,828
699.00	10,917	10,308	45,136

Device	Routing	Invert	Outlet Devices
#1	Primary	691.00'	**4.3" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	694.08'	**15.0" W x 3.0" H Vert. Orifice/Grate** C= 0.620

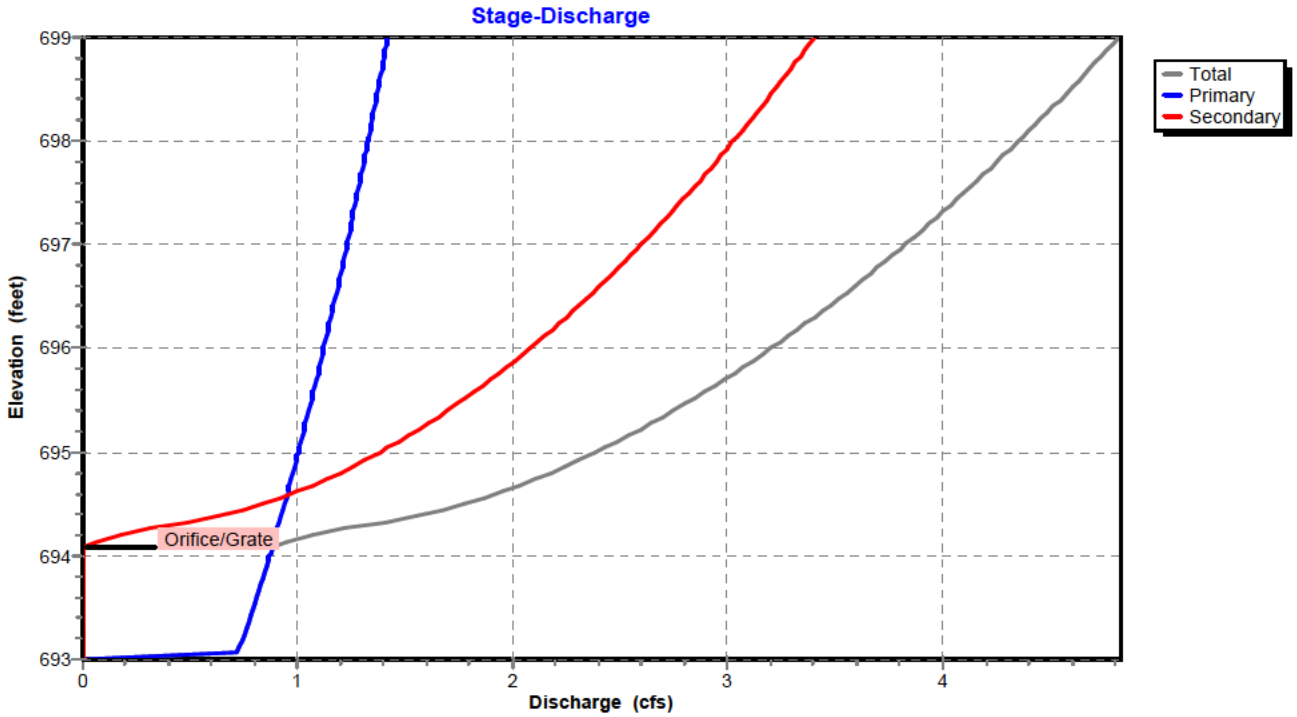
Primary OutFlow Max=1.03 cfs @ 8.46 hrs HW=695.20' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 1.03 cfs @ 10.19 fps)

Secondary OutFlow Max=1.55 cfs @ 8.46 hrs HW=695.20' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 1.55 cfs @ 4.95 fps)

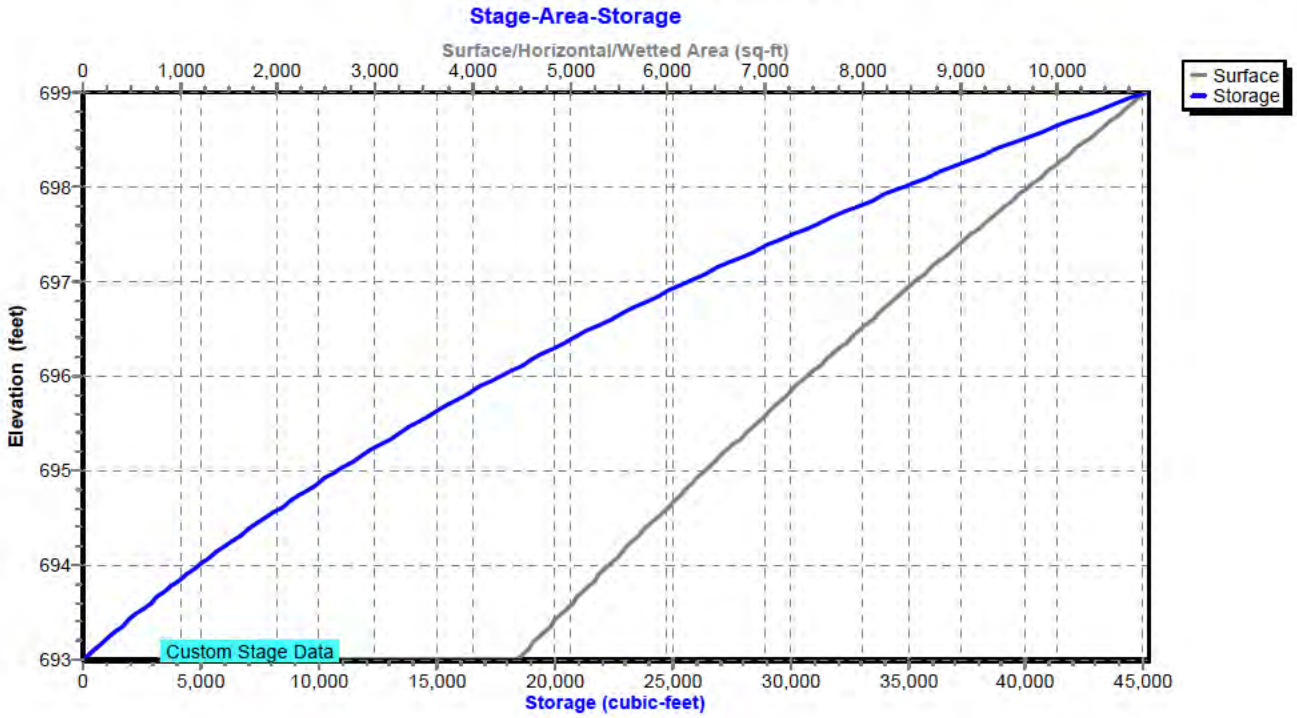
Pond Pond D: Pond D



Pond Pond D: Pond D



Pond Pond D: Pond D



Hydrograph for Pond Pond D: Pond D

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	693.00	0.00	0.00	0.00
5.00	**0.56**	**198**	**693.04**	**0.53**	**0.53**	**0.00**
10.00	**1.56**	**9,478**	**694.79**	**2.16**	**0.98**	**1.18**
15.00	1.06	6,062	694.21	1.09	0.90	0.19
20.00	0.85	5,448	694.10	0.90	0.88	0.02
25.00	0.00	1,119	693.24	0.75	0.75	0.00
30.00	0.00	0	693.00	0.00	0.00	0.00
35.00	0.00	0	693.00	0.00	0.00	0.00
40.00	0.00	0	693.00	0.00	0.00	0.00
45.00	0.00	0	693.00	0.00	0.00	0.00
50.00	0.00	0	693.00	0.00	0.00	0.00
55.00	0.00	0	693.00	0.00	0.00	0.00
60.00	0.00	0	693.00	0.00	0.00	0.00
65.00	0.00	0	693.00	0.00	0.00	0.00
70.00	0.00	0	693.00	0.00	0.00	0.00
75.00	0.00	0	693.00	0.00	0.00	0.00
80.00	0.00	0	693.00	0.00	0.00	0.00
85.00	0.00	0	693.00	0.00	0.00	0.00
90.00	0.00	0	693.00	0.00	0.00	0.00
95.00	0.00	0	693.00	0.00	0.00	0.00
100.00	0.00	0	693.00	0.00	0.00	0.00
105.00	0.00	0	693.00	0.00	0.00	0.00
110.00	0.00	0	693.00	0.00	0.00	0.00
115.00	0.00	0	693.00	0.00	0.00	0.00
120.00	0.00	0	693.00	0.00	0.00	0.00
125.00	0.00	0	693.00	0.00	0.00	0.00
130.00	0.00	0	693.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond D: Pond D

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
693.00	0.00	0.00	0.00
693.10	0.73	0.73	0.00
693.20	0.74	0.74	0.00
693.30	0.76	0.76	0.00
693.40	0.78	0.78	0.00
693.50	0.79	0.79	0.00
693.60	0.81	0.81	0.00
693.70	0.82	0.82	0.00
693.80	0.84	0.84	0.00
693.90	0.85	0.85	0.00
694.00	0.87	0.87	0.00
694.10	0.90	0.88	0.01
694.20	1.07	0.90	0.17
694.30	1.34	0.91	0.43
694.40	1.60	0.93	0.67
694.50	1.78	0.94	0.84
694.60	1.93	0.95	0.97
694.70	2.06	0.97	1.09
694.80	2.18	0.98	1.20
694.90	2.29	0.99	1.29
695.00	2.39	1.00	1.38
695.10	2.49	1.02	1.47
695.20	2.58	1.03	1.55
695.30	2.67	1.04	1.63
695.40	2.75	1.05	1.70
695.50	2.83	1.06	1.77
695.60	2.91	1.08	1.84
695.70	2.99	1.09	1.90
695.80	3.06	1.10	1.96
695.90	3.13	1.11	2.02
696.00	3.20	1.12	2.08
696.10	3.27	1.13	2.14
696.20	3.34	1.14	2.20
696.30	3.41	1.16	2.25
696.40	3.47	1.17	2.30
696.50	3.53	1.18	2.36
696.60	3.59	1.19	2.41
696.70	3.65	1.20	2.46
696.80	3.71	1.21	2.50
696.90	3.77	1.22	2.55
697.00	3.83	1.23	2.60
697.10	3.88	1.24	2.65
697.20	3.94	1.25	2.69
697.30	3.99	1.26	2.74
697.40	4.05	1.27	2.78
697.50	4.10	1.28	2.82
697.60	4.15	1.29	2.86
697.70	4.21	1.30	2.91
697.80	4.26	1.31	2.95
697.90	4.31	1.32	2.99
698.00	4.36	1.33	3.03
698.10	4.41	1.34	3.07
698.20	4.45	1.35	3.11
698.30	4.50	1.36	3.15
698.40	4.55	1.36	3.18
698.50	4.60	1.37	3.22
698.60	4.64	1.38	3.26
698.70	4.69	1.39	3.30
698.80	4.73	1.40	3.33
698.90	4.78	1.41	3.37
699.00	**4.82**	**1.42**	**3.40**

Stage-Area-Storage for Pond Pond D: Pond D

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
693.00	4,458	0
693.10	4,552	450
693.20	4,645	910
693.30	4,738	1,379
693.40	4,832	1,858
693.50	4,926	2,346
693.60	5,019	2,843
693.70	5,113	3,350
693.80	5,206	3,866
693.90	5,299	4,391
694.00	5,393	4,926
694.10	5,492	5,470
694.20	5,591	6,024
694.30	5,691	6,588
694.40	5,790	7,162
694.50	5,889	7,746
694.60	5,988	8,340
694.70	6,087	8,944
694.80	6,187	9,557
694.90	6,286	10,181
695.00	6,385	10,815
695.10	6,490	11,458
695.20	6,595	12,112
695.30	6,699	12,777
695.40	6,804	13,452
695.50	6,909	14,138
695.60	7,014	14,834
695.70	7,119	15,541
695.80	7,223	16,258
695.90	7,328	16,985
696.00	7,433	17,724
696.10	7,544	18,472
696.20	7,654	19,232
696.30	7,764	20,003
696.40	7,875	20,785
696.50	7,986	21,578
696.60	8,096	22,382
696.70	8,207	23,197
696.80	8,317	24,023
696.90	8,427	24,861
697.00	8,538	25,709
697.10	8,654	26,569
697.20	8,770	27,440
697.30	8,886	28,323
697.40	9,002	29,217
697.50	9,119	30,123
697.60	9,235	31,041
697.70	9,351	31,970
697.80	9,467	32,911
697.90	9,583	33,863
698.00	9,699	34,828
698.10	9,821	35,803
698.20	9,943	36,792
698.30	10,064	37,792
698.40	10,186	38,805
698.50	10,308	39,829
698.60	10,430	40,866
698.70	10,552	41,915
698.80	10,673	42,976
698.90	10,795	44,050
699.00	**10,917**	**45,136**

Summary for Pond Pond E: Pond E

Inflow Area =	600,189 sf,	3.19% Impervious,	Inflow Depth =	2.52"	for 25-Year event
Inflow =	7.64 cfs @	8.00 hrs, Volume=	125,994 cf		
Outflow =	4.41 cfs @	8.46 hrs, Volume=	125,994 cf,	Atten= 42%,	Lag= 27.8 min
Primary =	1.91 cfs @	8.46 hrs, Volume=	98,451 cf		
Secondary =	2.50 cfs @	8.46 hrs, Volume=	27,543 cf		

Routing by Stor-Ind method, Time Span= 0.00-130.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 714.40' @ 8.46 hrs Surf.Area= 12,066 sf Storage= 13,991 cf

Plug-Flow detention time= 65.0 min calculated for 125,994 cf (100% of inflow)
Center-of-Mass det. time= 64.9 min (851.5 - 786.6)

Volume	Invert	Avail.Storage	Storage Description
#1	713.00'	56,362 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

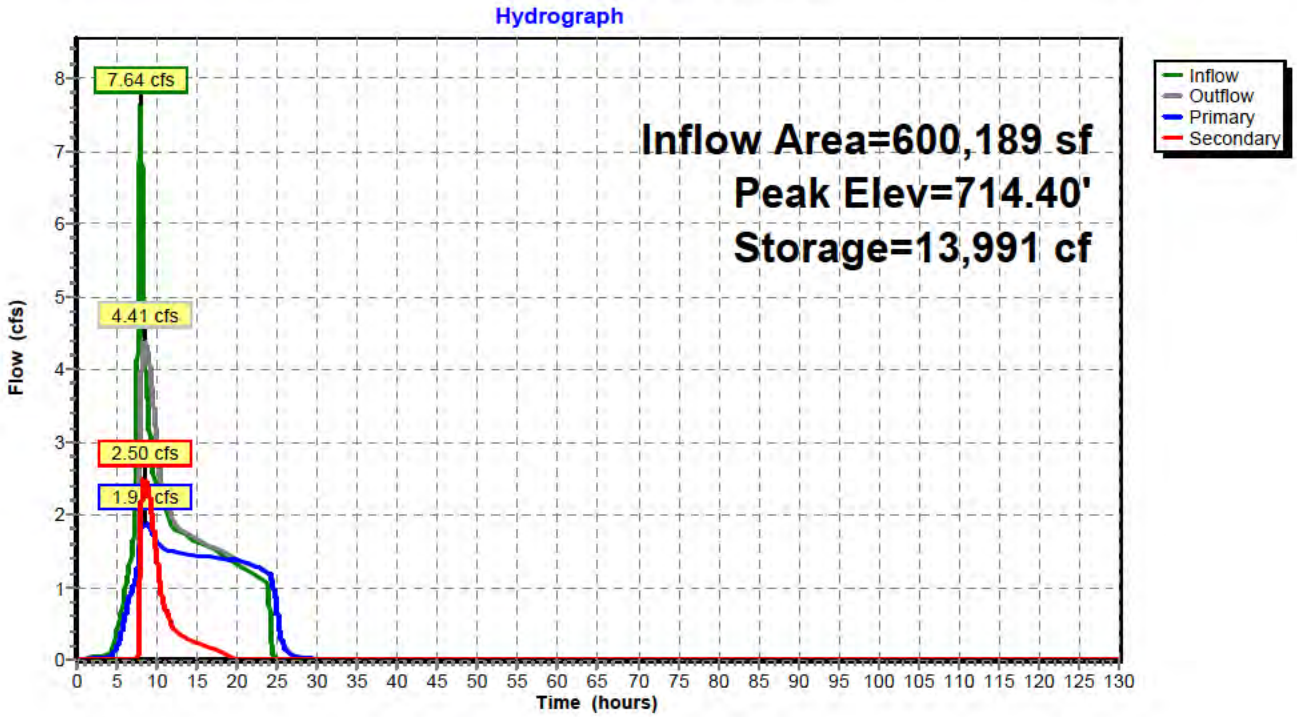
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
713.00	7,916	0	0
714.00	10,804	9,360	9,360
715.00	13,920	12,362	21,722
716.00	17,264	15,592	37,314
717.00	20,832	19,048	56,362

Device	Routing	Invert	Outlet Devices
#1	Primary	713.00'	**7.7" Horiz. Orifice/Grate** C= 0.620 Limited to weir flow at low heads
#2	Secondary	713.71'	**16.0" W x 3.0" H Vert. Orifice/Grate X 2.00** C= 0.620

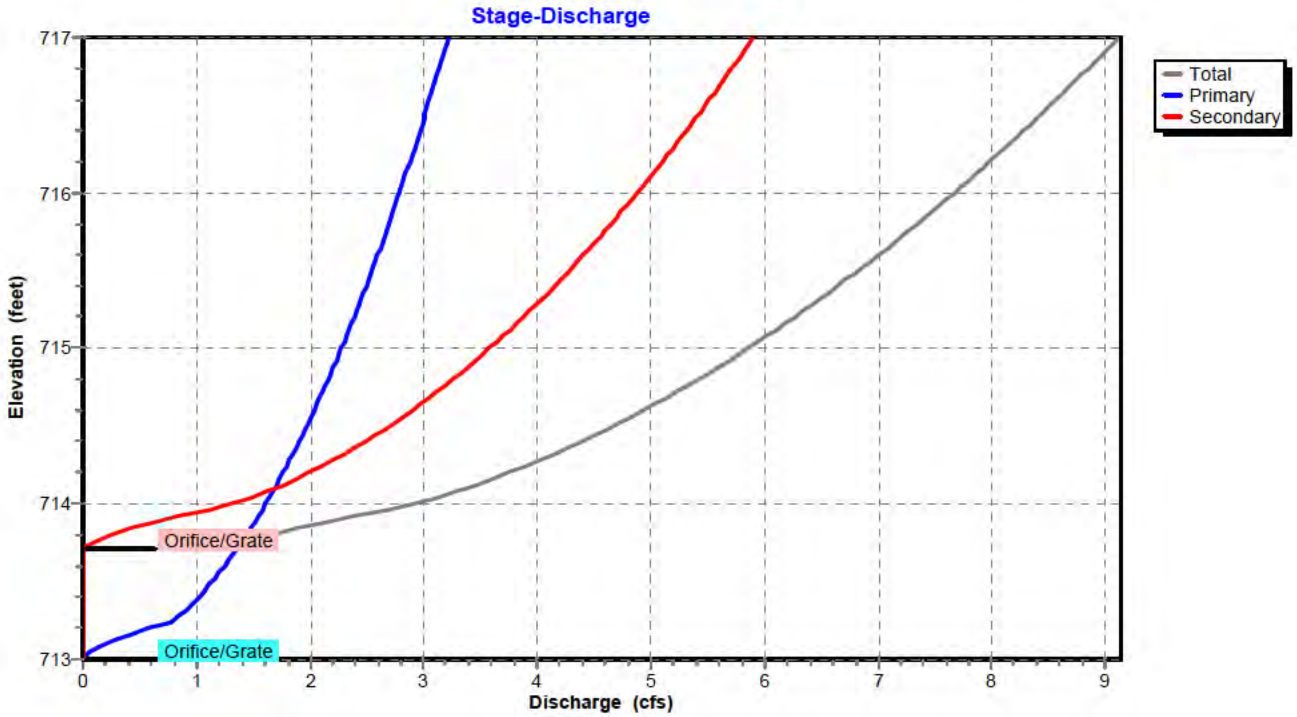
Primary OutFlow Max=1.91 cfs @ 8.46 hrs HW=714.40' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 1.91 cfs @ 5.90 fps)

Secondary OutFlow Max=2.50 cfs @ 8.46 hrs HW=714.40' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 2.50 cfs @ 3.75 fps)

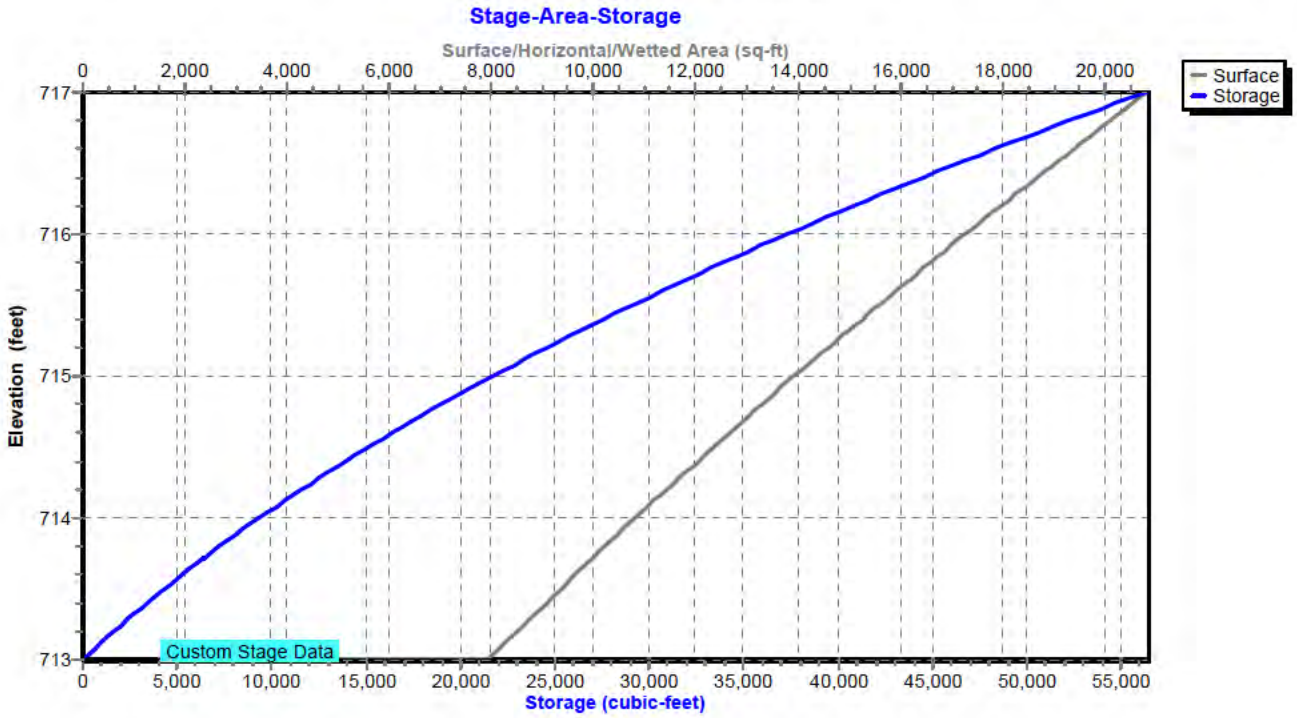
Pond Pond E: Pond E



Pond Pond E: Pond E



Pond Pond E: Pond E



Hydrograph for Pond Pond E: Pond E

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	713.00	0.00	0.00	0.00
5.00	**0.38**	**701**	**713.09**	**0.17**	**0.17**	**0.00**
10.00	**2.37**	**9,599**	**714.02**	**3.03**	**1.63**	**1.40**
15.00	1.63	7,215	713.80	1.66	1.44	0.22
20.00	1.32	6,454	713.72	1.38	1.37	0.01
25.00	0.01	1,884	713.23	0.72	0.72	0.00
30.00	0.00	53	713.01	0.01	0.01	0.00
35.00	0.00	3	713.00	0.00	0.00	0.00
40.00	0.00	0	713.00	0.00	0.00	0.00
45.00	0.00	0	713.00	0.00	0.00	0.00
50.00	0.00	0	713.00	0.00	0.00	0.00
55.00	0.00	0	713.00	0.00	0.00	0.00
60.00	0.00	0	713.00	0.00	0.00	0.00
65.00	0.00	0	713.00	0.00	0.00	0.00
70.00	0.00	0	713.00	0.00	0.00	0.00
75.00	0.00	0	713.00	0.00	0.00	0.00
80.00	0.00	0	713.00	0.00	0.00	0.00
85.00	0.00	0	713.00	0.00	0.00	0.00
90.00	0.00	0	713.00	0.00	0.00	0.00
95.00	0.00	0	713.00	0.00	0.00	0.00
100.00	0.00	0	713.00	0.00	0.00	0.00
105.00	0.00	0	713.00	0.00	0.00	0.00
110.00	0.00	0	713.00	0.00	0.00	0.00
115.00	0.00	0	713.00	0.00	0.00	0.00
120.00	0.00	0	713.00	0.00	0.00	0.00
125.00	0.00	0	713.00	0.00	0.00	0.00
130.00	0.00	0	713.00	0.00	0.00	0.00

Stage-Discharge for Pond Pond E: Pond E

Elevation (feet)	Discharge (cfs)	Primary (cfs)	Secondary (cfs)
713.00	0.00	0.00	0.00
713.05	0.07	0.07	0.00
713.10	0.21	0.21	0.00
713.15	0.38	0.38	0.00
713.20	0.59	0.59	0.00
713.25	0.80	0.80	0.00
713.30	0.88	0.88	0.00
713.35	0.95	0.95	0.00
713.40	1.02	1.02	0.00
713.45	1.08	1.08	0.00
713.50	1.14	1.14	0.00
713.55	1.19	1.19	0.00
713.60	1.25	1.25	0.00
713.65	1.30	1.30	0.00
713.70	1.35	1.35	0.00
713.75	1.46	1.39	0.07
713.80	1.68	1.44	0.24
713.85	1.95	1.48	0.46
713.90	2.26	1.53	0.73
713.95	2.61	1.57	1.04
714.00	2.92	1.61	1.31
714.05	3.16	1.65	1.51
714.10	3.38	1.69	1.69
714.15	3.57	1.73	1.85
714.20	3.76	1.76	1.99
714.25	3.93	1.80	2.13
714.30	4.09	1.83	2.25
714.35	4.24	1.87	2.37
714.40	4.39	1.90	2.49
714.45	4.53	1.94	2.60
714.50	4.67	1.97	2.70
714.55	4.80	2.00	2.80
714.60	4.93	2.04	2.90
714.65	5.06	2.07	2.99
714.70	5.18	2.10	3.08
714.75	5.30	2.13	3.17
714.80	5.41	2.16	3.26
714.85	5.53	2.19	3.34
714.90	5.64	2.22	3.42
714.95	5.75	2.25	3.50
715.00	5.85	2.28	3.58
715.05	5.96	2.30	3.65
715.10	6.06	2.33	3.73
715.15	6.16	2.36	3.80
715.20	6.26	2.39	3.87
715.25	6.36	2.41	3.94
715.30	6.45	2.44	4.01
715.35	6.55	2.47	4.08
715.40	6.64	2.49	4.15
715.45	6.73	2.52	4.21
715.50	6.82	2.54	4.28
715.55	6.91	2.57	4.34
715.60	7.00	2.59	4.41
715.65	7.09	2.62	4.47
715.70	7.17	2.64	4.53
715.75	7.26	2.67	4.59
715.80	7.34	2.69	4.65
715.85	7.42	2.72	4.71
715.90	7.51	2.74	4.77
715.95	7.59	2.76	4.82
716.00	7.67	2.79	4.88
716.05	7.75	2.81	4.94
716.10	7.82	2.83	4.99
716.15	7.90	2.86	5.05
716.20	7.98	2.88	5.10
716.25	8.05	2.90	5.15
716.30	8.13	2.92	5.21
716.35	8.20	2.94	5.26
716.40	8.28	2.97	5.31
716.45	8.35	2.99	5.36
716.50	8.42	3.01	5.41
716.55	8.50	3.03	5.46
716.60	8.57	3.05	5.52
716.65	8.64	3.07	5.56
716.70	8.71	3.09	5.61
716.75	8.78	3.12	5.66
716.80	8.85	3.14	5.71
716.85	8.92	3.16	5.76
716.90	8.98	3.18	5.81
716.95	9.05	3.20	5.85
717.00	**9.12**	**3.22**	**5.90**

Stage-Area-Storage for Pond Pond E: Pond E

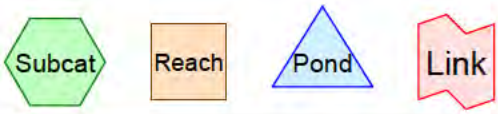
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
713.00	7,916	0
713.05	8,060	399
713.10	8,205	806
713.15	8,349	1,220
713.20	8,494	1,641
713.25	8,638	2,069
713.30	8,782	2,505
713.35	8,927	2,947
713.40	9,071	3,397
713.45	9,216	3,855
713.50	9,360	4,319
713.55	9,504	4,791
713.60	9,649	5,269
713.65	9,793	5,755
713.70	9,938	6,249
713.75	10,082	6,749
713.80	10,226	7,257
713.85	10,371	7,772
713.90	10,515	8,294
713.95	10,660	8,823
714.00	10,804	9,360
714.05	10,960	9,904
714.10	11,116	10,456
714.15	11,271	11,016
714.20	11,427	11,583
714.25	11,583	12,158
714.30	11,739	12,741
714.35	11,895	13,332
714.40	12,050	13,931
714.45	12,206	14,537
714.50	12,362	15,152
714.55	12,518	15,773
714.60	12,674	16,403
714.65	12,829	17,041
714.70	12,985	17,686
714.75	13,141	18,339
714.80	13,297	19,000
714.85	13,453	19,669
714.90	13,608	20,346
714.95	13,764	21,030
715.00	13,920	21,722
715.05	14,087	22,422
715.10	14,254	23,131
715.15	14,422	23,848
715.20	14,589	24,573
715.25	14,756	25,307
715.30	14,923	26,048
715.35	15,090	26,799
715.40	15,258	27,558
715.45	15,425	28,325
715.50	15,592	29,100
715.55	15,759	29,884
715.60	15,926	30,676
715.65	16,094	31,476
715.70	16,261	32,285
715.75	16,428	33,103
715.80	16,595	33,928
715.85	16,762	34,762
715.90	16,930	35,604
715.95	17,097	36,455
716.00	17,264	37,314
716.05	17,442	38,182
716.10	17,621	39,058
716.15	17,799	39,944
716.20	17,978	40,838
716.25	18,156	41,742
716.30	18,334	42,654
716.35	18,513	43,575
716.40	18,691	44,505
716.45	18,870	45,444
716.50	19,048	46,392
716.55	19,226	47,349
716.60	19,405	48,315
716.65	19,583	49,289
716.70	19,762	50,273
716.75	19,940	51,266
716.80	20,118	52,267
716.85	20,297	53,277
716.90	20,475	54,297
716.95	20,654	55,325
717.00	**20,832**	**56,362**

Attachment G: Hydrologic Analysis of Pre-Developed Points of Discharge Calculations

Exist Point of Discharge
#1

Exist Point of Discharge
#2

Exist Point of Discharge
#3



Routing Diagram for Bull Run Filtration Existing Points of Discharge
Prepared by Emerio Design, Printed 9/22/2022
HydroCAD® 10.00-24 s/n 04804 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
3,612,208	82	Row crops, SR + CR, Good, HSG C (1, 2, 3)
3,612,208	**82**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
3,612,208	HSG C	1, 2, 3
0	HSG D	
0	Other	
3,612,208		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
0	0	3,612,208	0	0	3,612,208	Row crops, SR + CR, Good
0	**0**	**3,612,208**	**0**	**0**	**3,612,208**	**TOTAL AREA**

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1: Exist Point of Runoff Area=2,055,130 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=1,955' Tc=42.4 min CN=82/0 Runoff=7.34 cfs 209,531 cf

Subcatchment2: Exist Point of Discharge Runoff Area=956,889 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=1,542' Tc=20.9 min CN=82/0 Runoff=4.60 cfs 97,560 cf

Subcatchment3: Exist Point of Discharge Runoff Area=600,189 sf 0.00% Impervious Runoff Depth=1.22"
Flow Length=750' Slope=0.0466 '/' Tc=23.8 min CN=82/0 Runoff=2.74 cfs 61,192 cf

Total Runoff Area = 3,612,208 sf Runoff Volume = 368,283 cf Average Runoff Depth = 1.22"
100.00% Pervious = 3,612,208 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1: Exist Point of Discharge #1

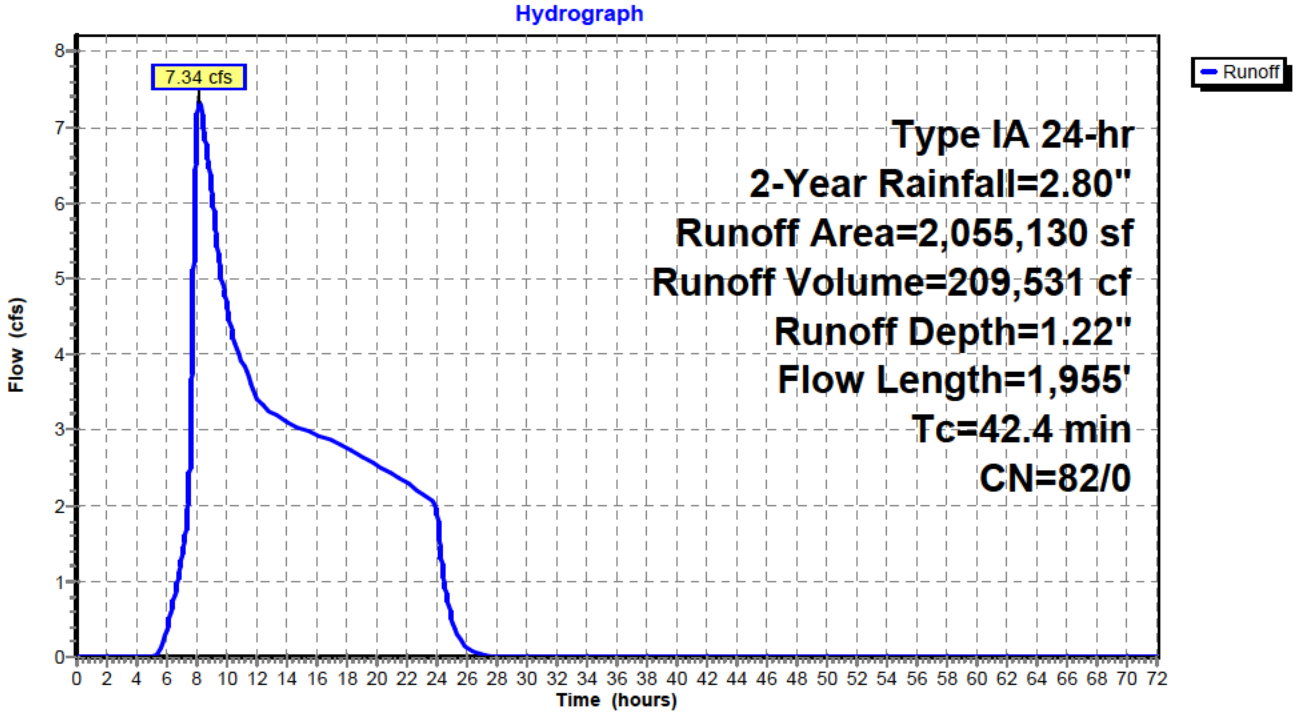
Runoff = 7.34 cfs @ 8.19 hrs, Volume= 209,531 cf, Depth= 1.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
2,055,130	82	Row crops, SR + CR, Good, HSG C
2,055,130	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	300	0.0300	0.21		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
18.7	1,655	0.0270	1.48		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
42.4	1,955	Total			

Subcatchment 1: Exist Point of Discharge #1



Hydrograph for Subcatchment 1: Exist Point of Discharge #1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.14	0.00	0.00	0.00
4.00	0.32	0.00	0.00	0.00
6.00	0.58	0.01	0.00	0.36
8.00	1.19	0.19	0.00	**7.04**
10.00	1.62	0.41	0.00	**4.63**
12.00	1.86	0.56	0.00	3.41
14.00	2.06	0.69	0.00	3.09
16.00	2.24	0.81	0.00	2.94
18.00	2.41	0.93	0.00	2.76
20.00	2.56	1.04	0.00	2.54
22.00	2.69	1.14	0.00	2.29
24.00	**2.80**	**1.22**	0.00	2.02
26.00	2.80	1.22	0.00	0.12
28.00	2.80	1.22	0.00	0.01
30.00	2.80	1.22	0.00	0.00
32.00	2.80	1.22	0.00	0.00
34.00	2.80	1.22	0.00	0.00
36.00	2.80	1.22	0.00	0.00
38.00	2.80	1.22	0.00	0.00
40.00	2.80	1.22	0.00	0.00
42.00	2.80	1.22	0.00	0.00
44.00	2.80	1.22	0.00	0.00
46.00	2.80	1.22	0.00	0.00
48.00	2.80	1.22	0.00	0.00
50.00	2.80	1.22	0.00	0.00
52.00	2.80	1.22	0.00	0.00
54.00	2.80	1.22	0.00	0.00
56.00	2.80	1.22	0.00	0.00
58.00	2.80	1.22	0.00	0.00
60.00	2.80	1.22	0.00	0.00
62.00	2.80	1.22	0.00	0.00
64.00	2.80	1.22	0.00	0.00
66.00	2.80	1.22	0.00	0.00
68.00	2.80	1.22	0.00	0.00
70.00	2.80	1.22	0.00	0.00
72.00	2.80	1.22	0.00	0.00

Summary for Subcatchment 2: Exist Point of Discharge #2

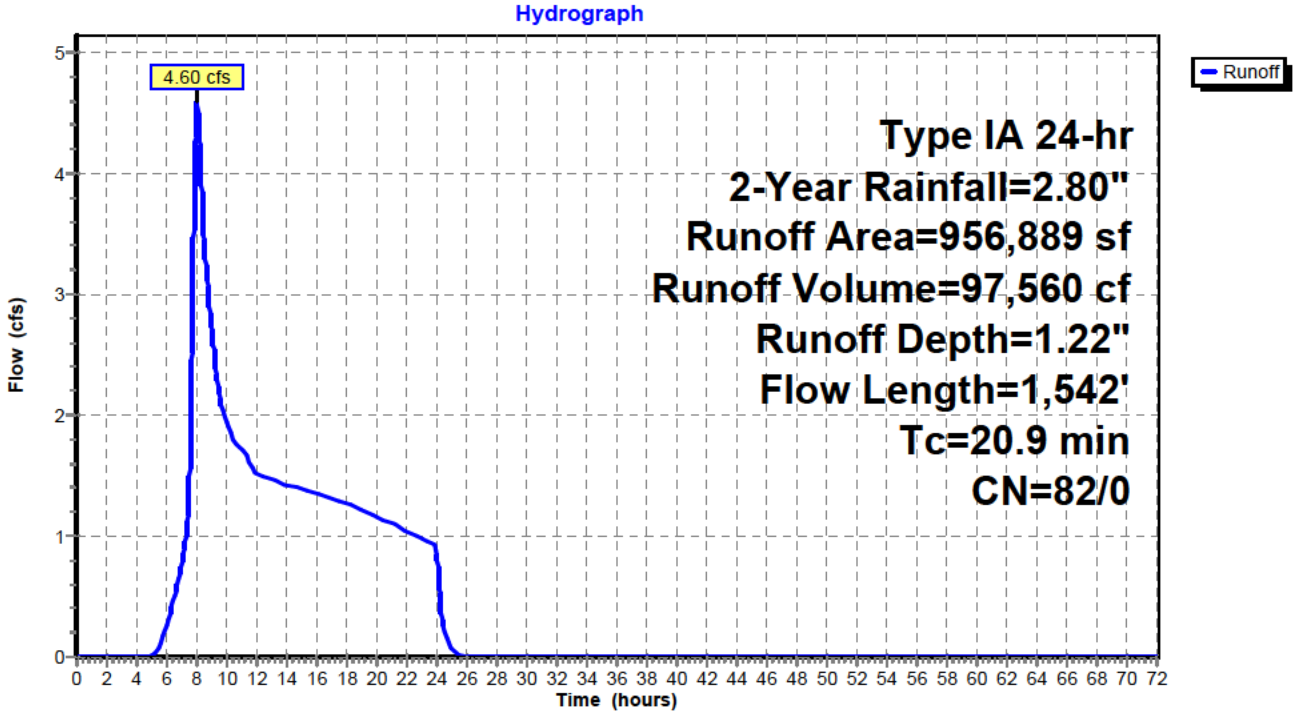
Runoff = 4.60 cfs @ 8.01 hrs, Volume= 97,560 cf, Depth= 1.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
956,889	82	Row crops, SR + CR, Good, HSG C
956,889	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	300	0.1670	0.42		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
9.0	1,242	0.0660	2.31		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.9	1,542	Total			

Subcatchment 2: Exist Point of Discharge #2



Hydrograph for Subcatchment 2: Exist Point of Discharge #2

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.14	0.00	0.00	0.00
4.00	0.32	0.00	0.00	0.00
6.00	0.58	0.01	0.00	0.25
8.00	1.19	0.19	0.00	**4.58**
10.00	1.62	0.41	0.00	**1.95**
12.00	1.86	0.56	0.00	1.51
14.00	2.06	0.69	0.00	1.41
16.00	2.24	0.81	0.00	1.36
18.00	2.41	0.93	0.00	1.27
20.00	2.56	1.04	0.00	1.16
22.00	2.69	1.14	0.00	1.05
24.00	**2.80**	**1.22**	0.00	0.92
26.00	2.80	1.22	0.00	0.00
28.00	2.80	1.22	0.00	0.00
30.00	2.80	1.22	0.00	0.00
32.00	2.80	1.22	0.00	0.00
34.00	2.80	1.22	0.00	0.00
36.00	2.80	1.22	0.00	0.00
38.00	2.80	1.22	0.00	0.00
40.00	2.80	1.22	0.00	0.00
42.00	2.80	1.22	0.00	0.00
44.00	2.80	1.22	0.00	0.00
46.00	2.80	1.22	0.00	0.00
48.00	2.80	1.22	0.00	0.00
50.00	2.80	1.22	0.00	0.00
52.00	2.80	1.22	0.00	0.00
54.00	2.80	1.22	0.00	0.00
56.00	2.80	1.22	0.00	0.00
58.00	2.80	1.22	0.00	0.00
60.00	2.80	1.22	0.00	0.00
62.00	2.80	1.22	0.00	0.00
64.00	2.80	1.22	0.00	0.00
66.00	2.80	1.22	0.00	0.00
68.00	2.80	1.22	0.00	0.00
70.00	2.80	1.22	0.00	0.00
72.00	2.80	1.22	0.00	0.00

Summary for Subcatchment 3: Exist Point of Discharge #3

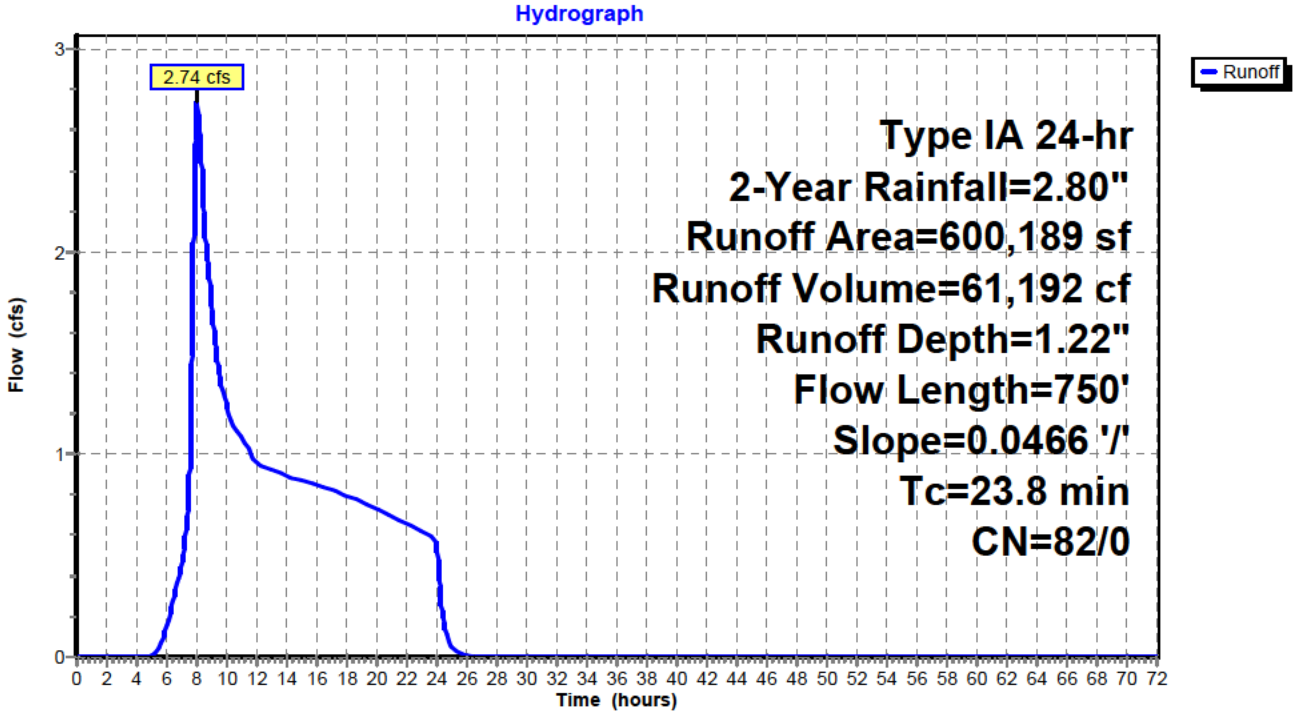
Runoff = 2.74 cfs @ 8.01 hrs, Volume= 61,192 cf, Depth= 1.22"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 2-Year Rainfall=2.80"

Area (sf)	CN	Description
600,189	82	Row crops, SR + CR, Good, HSG C
600,189	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	300	0.0466	0.25		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
3.9	450	0.0466	1.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.8	750	Total			

Subcatchment 3: Exist Point of Discharge #3



Hydrograph for Subcatchment 3: Exist Point of Discharge #3

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.14	0.00	0.00	0.00
4.00	0.32	0.00	0.00	0.00
6.00	0.58	0.01	0.00	0.15
8.00	1.19	0.19	0.00	**2.73**
10.00	1.62	0.41	0.00	**1.24**
12.00	1.86	0.56	0.00	0.95
14.00	2.06	0.69	0.00	0.89
16.00	2.24	0.81	0.00	0.85
18.00	2.41	0.93	0.00	0.80
20.00	2.56	1.04	0.00	0.73
22.00	2.69	1.14	0.00	0.66
24.00	**2.80**	**1.22**	0.00	0.58
26.00	2.80	1.22	0.00	0.00
28.00	2.80	1.22	0.00	0.00
30.00	2.80	1.22	0.00	0.00
32.00	2.80	1.22	0.00	0.00
34.00	2.80	1.22	0.00	0.00
36.00	2.80	1.22	0.00	0.00
38.00	2.80	1.22	0.00	0.00
40.00	2.80	1.22	0.00	0.00
42.00	2.80	1.22	0.00	0.00
44.00	2.80	1.22	0.00	0.00
46.00	2.80	1.22	0.00	0.00
48.00	2.80	1.22	0.00	0.00
50.00	2.80	1.22	0.00	0.00
52.00	2.80	1.22	0.00	0.00
54.00	2.80	1.22	0.00	0.00
56.00	2.80	1.22	0.00	0.00
58.00	2.80	1.22	0.00	0.00
60.00	2.80	1.22	0.00	0.00
62.00	2.80	1.22	0.00	0.00
64.00	2.80	1.22	0.00	0.00
66.00	2.80	1.22	0.00	0.00
68.00	2.80	1.22	0.00	0.00
70.00	2.80	1.22	0.00	0.00
72.00	2.80	1.22	0.00	0.00

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1: Exist Point of Runoff Area=2,055,130 sf 0.00% Impervious Runoff Depth=1.70"
Flow Length=1,955' Tc=42.4 min CN=82/0 Runoff=11.01 cfs 291,210 cf

Subcatchment2: Exist Point of Discharge Runoff Area=956,889 sf 0.00% Impervious Runoff Depth=1.70"
Flow Length=1,542' Tc=20.9 min CN=82/0 Runoff=6.86 cfs 135,590 cf

Subcatchment3: Exist Point of Discharge Runoff Area=600,189 sf 0.00% Impervious Runoff Depth=1.70"
Flow Length=750' Slope=0.0466 '/' Tc=23.8 min CN=82/0 Runoff=4.10 cfs 85,046 cf

Total Runoff Area = 3,612,208 sf Runoff Volume = 511,847 cf Average Runoff Depth = 1.70"
100.00% Pervious = 3,612,208 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1: Exist Point of Discharge #1

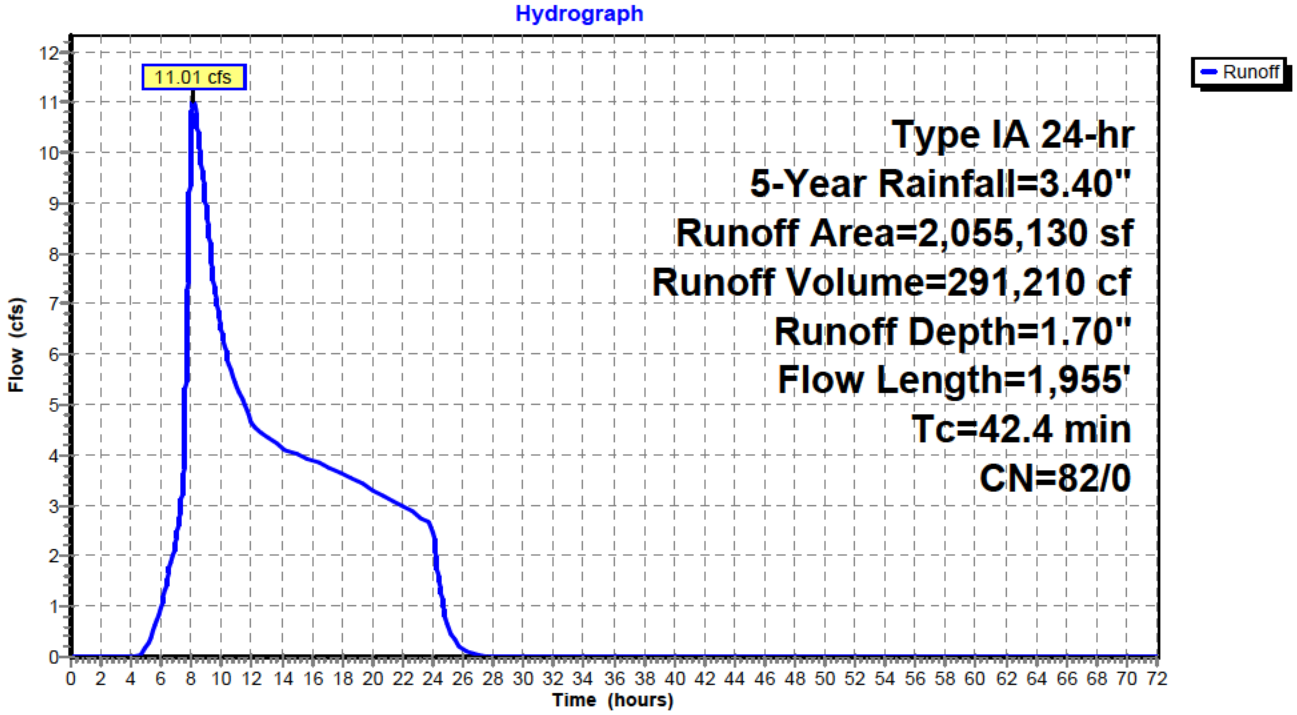
Runoff = 11.01 cfs @ 8.15 hrs, Volume= 291,210 cf, Depth= 1.70"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
2,055,130	82	Row crops, SR + CR, Good, HSG C
2,055,130	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	300	0.0300	0.21		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
18.7	1,655	0.0270	1.48		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
42.4	1,955	Total			

Subcatchment 1: Exist Point of Discharge #1



Hydrograph for Subcatchment 1: Exist Point of Discharge #1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.17	0.00	0.00	0.00
4.00	0.39	0.00	0.00	0.00
6.00	0.70	0.03	0.00	1.01
8.00	1.45	0.32	0.00	**10.71**
10.00	1.96	0.62	0.00	**6.49**
12.00	2.26	0.82	0.00	4.63
14.00	2.50	1.00	0.00	4.13
16.00	2.72	1.16	0.00	3.89
18.00	2.92	1.32	0.00	3.63
20.00	3.10	1.46	0.00	3.32
22.00	3.26	1.59	0.00	2.98
24.00	**3.40**	**1.70**	0.00	2.62
26.00	3.40	1.70	0.00	0.16
28.00	3.40	1.70	0.00	0.01
30.00	3.40	1.70	0.00	0.00
32.00	3.40	1.70	0.00	0.00
34.00	3.40	1.70	0.00	0.00
36.00	3.40	1.70	0.00	0.00
38.00	3.40	1.70	0.00	0.00
40.00	3.40	1.70	0.00	0.00
42.00	3.40	1.70	0.00	0.00
44.00	3.40	1.70	0.00	0.00
46.00	3.40	1.70	0.00	0.00
48.00	3.40	1.70	0.00	0.00
50.00	3.40	1.70	0.00	0.00
52.00	3.40	1.70	0.00	0.00
54.00	3.40	1.70	0.00	0.00
56.00	3.40	1.70	0.00	0.00
58.00	3.40	1.70	0.00	0.00
60.00	3.40	1.70	0.00	0.00
62.00	3.40	1.70	0.00	0.00
64.00	3.40	1.70	0.00	0.00
66.00	3.40	1.70	0.00	0.00
68.00	3.40	1.70	0.00	0.00
70.00	3.40	1.70	0.00	0.00
72.00	3.40	1.70	0.00	0.00

Summary for Subcatchment 2: Exist Point of Discharge #2

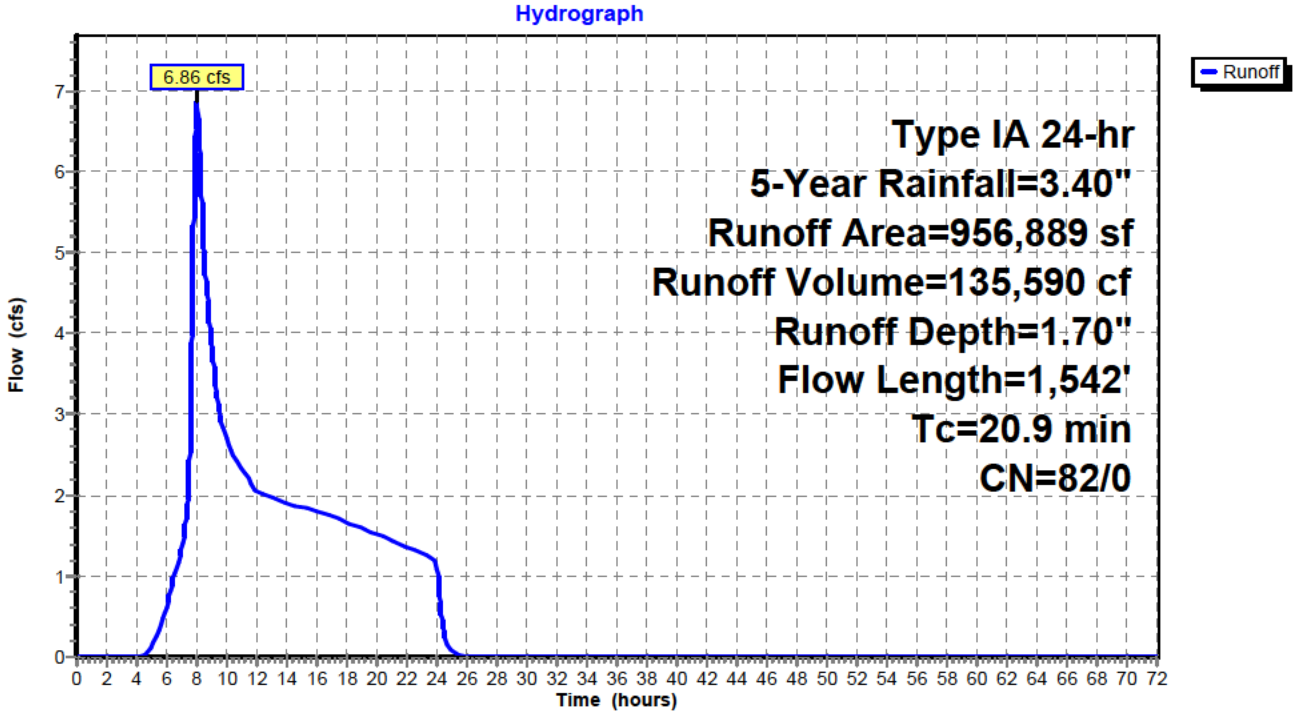
Runoff = 6.86 cfs @ 8.01 hrs, Volume= 135,590 cf, Depth= 1.70"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
956,889	82	Row crops, SR + CR, Good, HSG C
956,889	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	300	0.1670	0.42		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
9.0	1,242	0.0660	2.31		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.9	1,542	Total			

Subcatchment 2: Exist Point of Discharge #2



Hydrograph for Subcatchment 2: Exist Point of Discharge #2

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.17	0.00	0.00	0.00
4.00	0.39	0.00	0.00	0.00
6.00	0.70	0.03	0.00	0.62
8.00	1.45	0.32	0.00	**6.85**
10.00	1.96	0.62	0.00	**2.69**
12.00	2.26	0.82	0.00	2.03
14.00	2.50	1.00	0.00	1.89
16.00	2.72	1.16	0.00	1.79
18.00	2.92	1.32	0.00	1.66
20.00	3.10	1.46	0.00	1.52
22.00	3.26	1.59	0.00	1.36
24.00	**3.40**	**1.70**	0.00	1.19
26.00	3.40	1.70	0.00	0.00
28.00	3.40	1.70	0.00	0.00
30.00	3.40	1.70	0.00	0.00
32.00	3.40	1.70	0.00	0.00
34.00	3.40	1.70	0.00	0.00
36.00	3.40	1.70	0.00	0.00
38.00	3.40	1.70	0.00	0.00
40.00	3.40	1.70	0.00	0.00
42.00	3.40	1.70	0.00	0.00
44.00	3.40	1.70	0.00	0.00
46.00	3.40	1.70	0.00	0.00
48.00	3.40	1.70	0.00	0.00
50.00	3.40	1.70	0.00	0.00
52.00	3.40	1.70	0.00	0.00
54.00	3.40	1.70	0.00	0.00
56.00	3.40	1.70	0.00	0.00
58.00	3.40	1.70	0.00	0.00
60.00	3.40	1.70	0.00	0.00
62.00	3.40	1.70	0.00	0.00
64.00	3.40	1.70	0.00	0.00
66.00	3.40	1.70	0.00	0.00
68.00	3.40	1.70	0.00	0.00
70.00	3.40	1.70	0.00	0.00
72.00	3.40	1.70	0.00	0.00

Summary for Subcatchment 3: Exist Point of Discharge #3

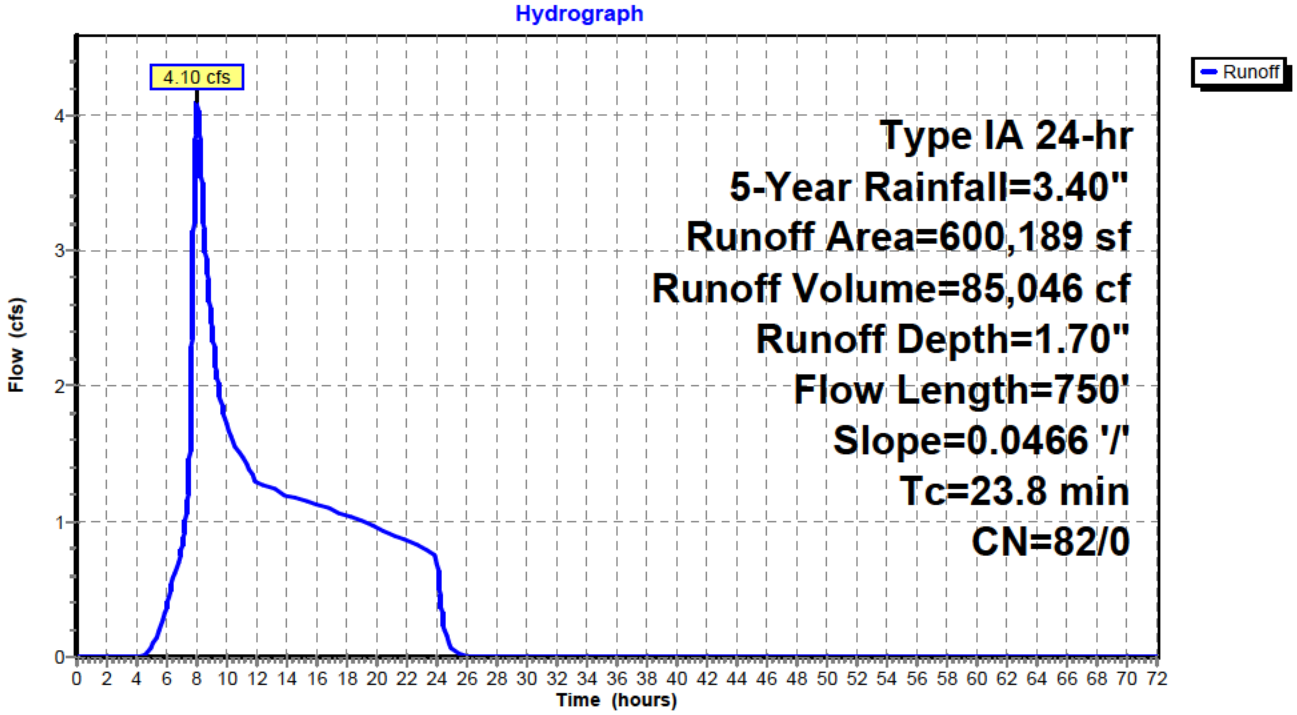
Runoff = 4.10 cfs @ 8.01 hrs, Volume= 85,046 cf, Depth= 1.70"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 5-Year Rainfall=3.40"

Area (sf)	CN	Description
600,189	82	Row crops, SR + CR, Good, HSG C
600,189	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	300	0.0466	0.25		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
3.9	450	0.0466	1.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.8	750	Total			

Subcatchment 3: Exist Point of Discharge #3



Hydrograph for Subcatchment 3: Exist Point of Discharge #3

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.17	0.00	0.00	0.00
4.00	0.39	0.00	0.00	0.00
6.00	0.70	0.03	0.00	0.38
8.00	1.45	0.32	0.00	**4.09**
10.00	1.96	0.62	0.00	**1.72**
12.00	2.26	0.82	0.00	1.29
14.00	2.50	1.00	0.00	1.19
16.00	2.72	1.16	0.00	1.13
18.00	2.92	1.32	0.00	1.05
20.00	3.10	1.46	0.00	0.95
22.00	3.26	1.59	0.00	0.85
24.00	**3.40**	**1.70**	0.00	0.75
26.00	3.40	1.70	0.00	0.00
28.00	3.40	1.70	0.00	0.00
30.00	3.40	1.70	0.00	0.00
32.00	3.40	1.70	0.00	0.00
34.00	3.40	1.70	0.00	0.00
36.00	3.40	1.70	0.00	0.00
38.00	3.40	1.70	0.00	0.00
40.00	3.40	1.70	0.00	0.00
42.00	3.40	1.70	0.00	0.00
44.00	3.40	1.70	0.00	0.00
46.00	3.40	1.70	0.00	0.00
48.00	3.40	1.70	0.00	0.00
50.00	3.40	1.70	0.00	0.00
52.00	3.40	1.70	0.00	0.00
54.00	3.40	1.70	0.00	0.00
56.00	3.40	1.70	0.00	0.00
58.00	3.40	1.70	0.00	0.00
60.00	3.40	1.70	0.00	0.00
62.00	3.40	1.70	0.00	0.00
64.00	3.40	1.70	0.00	0.00
66.00	3.40	1.70	0.00	0.00
68.00	3.40	1.70	0.00	0.00
70.00	3.40	1.70	0.00	0.00
72.00	3.40	1.70	0.00	0.00

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1: Exist Point of Runoff Area=2,055,130 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=1,955' Tc=42.4 min CN=82/0 Runoff=13.62 cfs 348,192 cf

Subcatchment2: Exist Point of Discharge Runoff Area=956,889 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=1,542' Tc=20.9 min CN=82/0 Runoff=8.46 cfs 162,122 cf

Subcatchment3: Exist Point of Discharge Runoff Area=600,189 sf 0.00% Impervious Runoff Depth=2.03"
Flow Length=750' Slope=0.0466 '/' Tc=23.8 min CN=82/0 Runoff=5.07 cfs 101,688 cf

Total Runoff Area = 3,612,208 sf Runoff Volume = 612,001 cf Average Runoff Depth = 2.03"
100.00% Pervious = 3,612,208 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1: Exist Point of Discharge #1

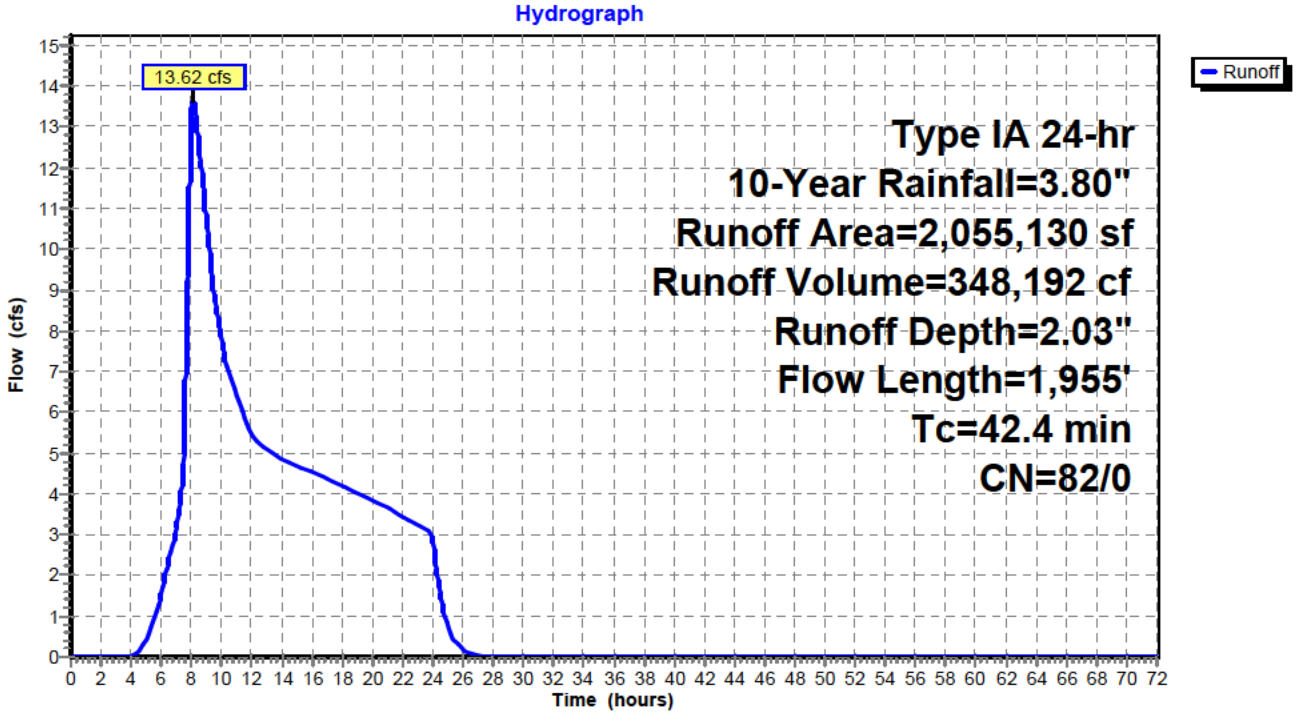
Runoff = 13.62 cfs @ 8.13 hrs, Volume= 348,192 cf, Depth= 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
2,055,130	82	Row crops, SR + CR, Good, HSG C
2,055,130	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	300	0.0300	0.21		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
18.7	1,655	0.0270	1.48		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
42.4	1,955	Total			

Subcatchment 1: Exist Point of Discharge #1



Hydrograph for Subcatchment 1: Exist Point of Discharge #1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.19	0.00	0.00	0.00
4.00	0.44	0.00	0.00	0.00
6.00	0.78	0.05	0.00	1.54
8.00	1.62	0.41	0.00	**13.32**
10.00	2.19	0.78	0.00	**7.77**
12.00	2.52	1.02	0.00	5.46
14.00	2.80	1.22	0.00	4.84
16.00	3.04	1.41	0.00	4.54
18.00	3.27	1.59	0.00	4.21
20.00	3.47	1.76	0.00	3.84
22.00	3.65	1.90	0.00	3.44
24.00	**3.80**	**2.03**	0.00	3.02
26.00	3.80	2.03	0.00	0.18
28.00	3.80	2.03	0.00	0.01
30.00	3.80	2.03	0.00	0.00
32.00	3.80	2.03	0.00	0.00
34.00	3.80	2.03	0.00	0.00
36.00	3.80	2.03	0.00	0.00
38.00	3.80	2.03	0.00	0.00
40.00	3.80	2.03	0.00	0.00
42.00	3.80	2.03	0.00	0.00
44.00	3.80	2.03	0.00	0.00
46.00	3.80	2.03	0.00	0.00
48.00	3.80	2.03	0.00	0.00
50.00	3.80	2.03	0.00	0.00
52.00	3.80	2.03	0.00	0.00
54.00	3.80	2.03	0.00	0.00
56.00	3.80	2.03	0.00	0.00
58.00	3.80	2.03	0.00	0.00
60.00	3.80	2.03	0.00	0.00
62.00	3.80	2.03	0.00	0.00
64.00	3.80	2.03	0.00	0.00
66.00	3.80	2.03	0.00	0.00
68.00	3.80	2.03	0.00	0.00
70.00	3.80	2.03	0.00	0.00
72.00	3.80	2.03	0.00	0.00

Summary for Subcatchment 2: Exist Point of Discharge #2

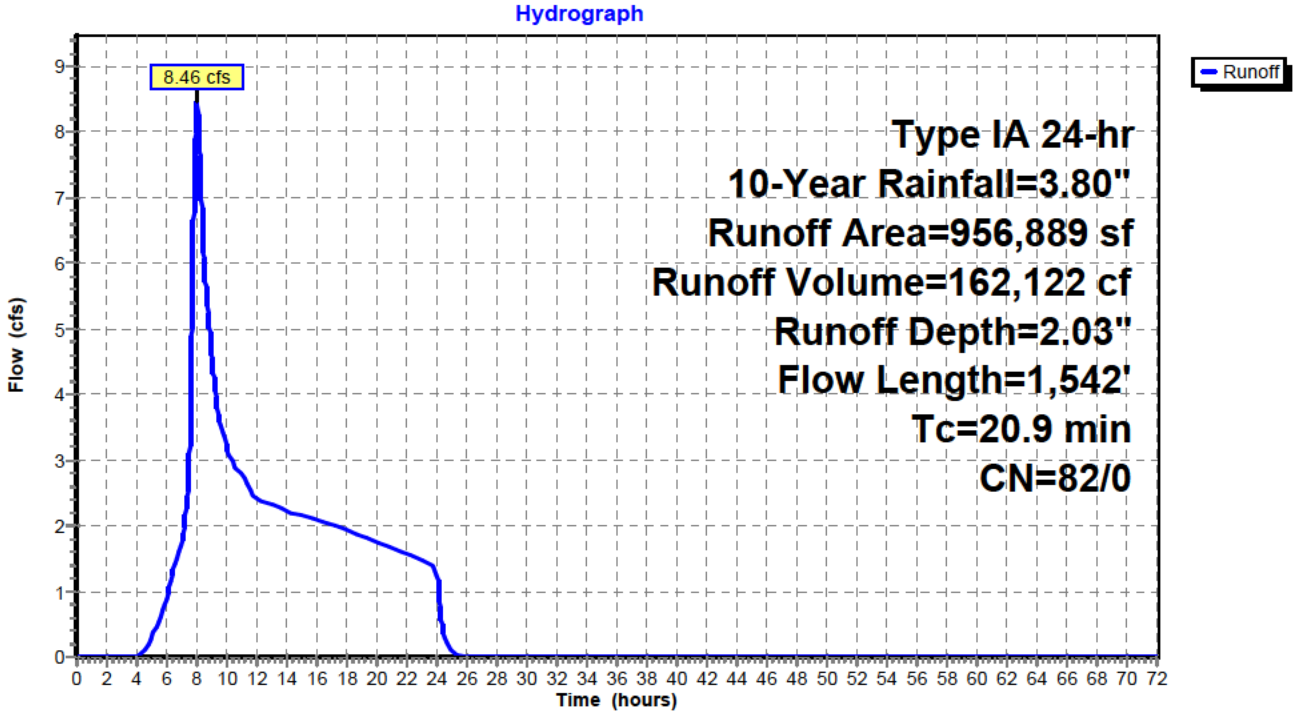
Runoff = 8.46 cfs @ 8.01 hrs, Volume= 162,122 cf, Depth= 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
956,889	82	Row crops, SR + CR, Good, HSG C
956,889	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	300	0.1670	0.42		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
9.0	1,242	0.0660	2.31		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.9	1,542	Total			

Subcatchment 2: Exist Point of Discharge #2



Hydrograph for Subcatchment 2: Exist Point of Discharge #2

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.19	0.00	0.00	0.00
4.00	0.44	0.00	0.00	0.00
6.00	0.78	0.05	0.00	0.91
8.00	1.62	0.41	0.00	**8.44**
10.00	2.19	0.78	0.00	**3.20**
12.00	2.52	1.02	0.00	2.39
14.00	2.80	1.22	0.00	2.21
16.00	3.04	1.41	0.00	2.09
18.00	3.27	1.59	0.00	1.93
20.00	3.47	1.76	0.00	1.76
22.00	3.65	1.90	0.00	1.57
24.00	**3.80**	**2.03**	0.00	1.37
26.00	3.80	2.03	0.00	0.00
28.00	3.80	2.03	0.00	0.00
30.00	3.80	2.03	0.00	0.00
32.00	3.80	2.03	0.00	0.00
34.00	3.80	2.03	0.00	0.00
36.00	3.80	2.03	0.00	0.00
38.00	3.80	2.03	0.00	0.00
40.00	3.80	2.03	0.00	0.00
42.00	3.80	2.03	0.00	0.00
44.00	3.80	2.03	0.00	0.00
46.00	3.80	2.03	0.00	0.00
48.00	3.80	2.03	0.00	0.00
50.00	3.80	2.03	0.00	0.00
52.00	3.80	2.03	0.00	0.00
54.00	3.80	2.03	0.00	0.00
56.00	3.80	2.03	0.00	0.00
58.00	3.80	2.03	0.00	0.00
60.00	3.80	2.03	0.00	0.00
62.00	3.80	2.03	0.00	0.00
64.00	3.80	2.03	0.00	0.00
66.00	3.80	2.03	0.00	0.00
68.00	3.80	2.03	0.00	0.00
70.00	3.80	2.03	0.00	0.00
72.00	3.80	2.03	0.00	0.00

Summary for Subcatchment 3: Exist Point of Discharge #3

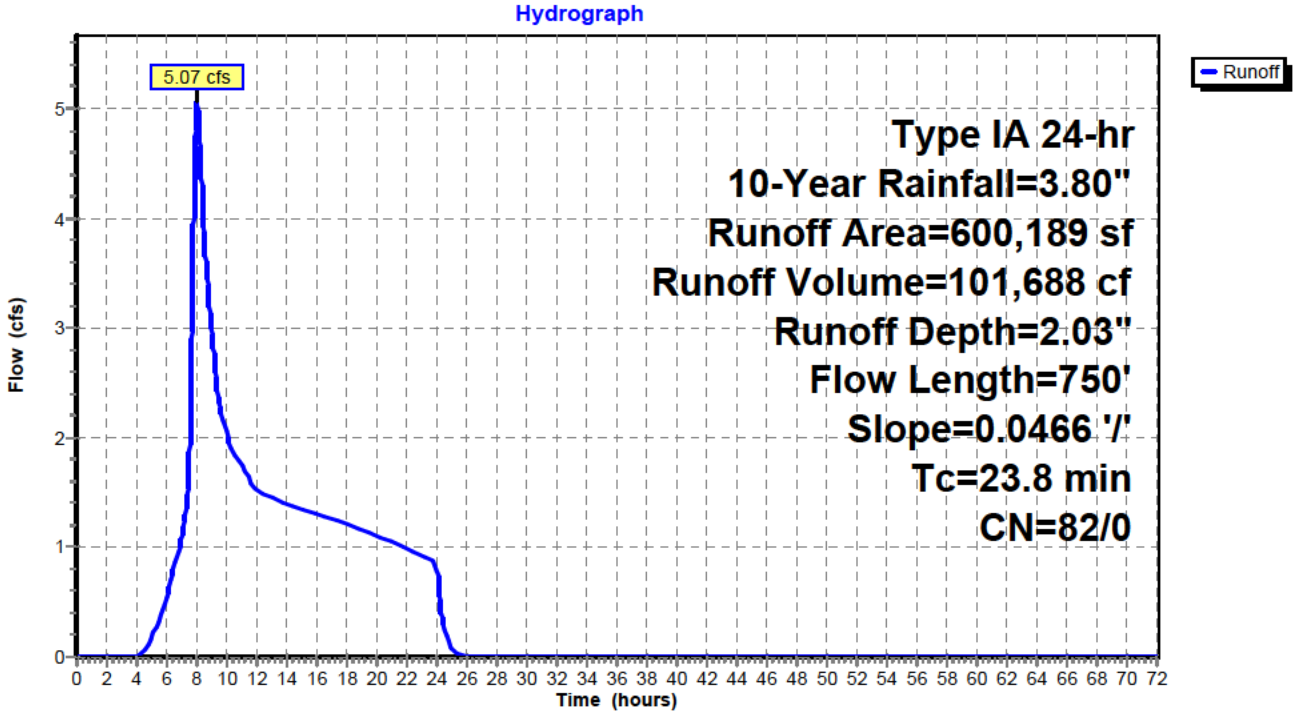
Runoff = 5.07 cfs @ 8.01 hrs, Volume= 101,688 cf, Depth= 2.03"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 10-Year Rainfall=3.80"

Area (sf)	CN	Description
600,189	82	Row crops, SR + CR, Good, HSG C
600,189	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	300	0.0466	0.25		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
3.9	450	0.0466	1.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.8	750	Total			

Subcatchment 3: Exist Point of Discharge #3



Hydrograph for Subcatchment 3: Exist Point of Discharge #3

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.19	0.00	0.00	0.00
4.00	0.44	0.00	0.00	0.00
6.00	0.78	0.05	0.00	0.55
8.00	1.62	0.41	0.00	**5.05**
10.00	2.19	0.78	0.00	**2.04**
12.00	2.52	1.02	0.00	1.51
14.00	2.80	1.22	0.00	1.39
16.00	3.04	1.41	0.00	1.31
18.00	3.27	1.59	0.00	1.21
20.00	3.47	1.76	0.00	1.10
22.00	3.65	1.90	0.00	0.99
24.00	**3.80**	**2.03**	0.00	0.86
26.00	3.80	2.03	0.00	0.01
28.00	3.80	2.03	0.00	0.00
30.00	3.80	2.03	0.00	0.00
32.00	3.80	2.03	0.00	0.00
34.00	3.80	2.03	0.00	0.00
36.00	3.80	2.03	0.00	0.00
38.00	3.80	2.03	0.00	0.00
40.00	3.80	2.03	0.00	0.00
42.00	3.80	2.03	0.00	0.00
44.00	3.80	2.03	0.00	0.00
46.00	3.80	2.03	0.00	0.00
48.00	3.80	2.03	0.00	0.00
50.00	3.80	2.03	0.00	0.00
52.00	3.80	2.03	0.00	0.00
54.00	3.80	2.03	0.00	0.00
56.00	3.80	2.03	0.00	0.00
58.00	3.80	2.03	0.00	0.00
60.00	3.80	2.03	0.00	0.00
62.00	3.80	2.03	0.00	0.00
64.00	3.80	2.03	0.00	0.00
66.00	3.80	2.03	0.00	0.00
68.00	3.80	2.03	0.00	0.00
70.00	3.80	2.03	0.00	0.00
72.00	3.80	2.03	0.00	0.00

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SBUH method, Split Pervious/Imperv.
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1: Exist Point of Runoff Area=2,055,130 sf 0.00% Impervious Runoff Depth=2.64"
Flow Length=1,955' Tc=42.4 min CN=82/0 Runoff=18.41 cfs 451,456 cf

Subcatchment2: Exist Point of Discharge Runoff Area=956,889 sf 0.00% Impervious Runoff Depth=2.64"
Flow Length=1,542' Tc=20.9 min CN=82/0 Runoff=11.38 cfs 210,202 cf

Subcatchment3: Exist Point of Discharge Runoff Area=600,189 sf 0.00% Impervious Runoff Depth=2.64"
Flow Length=750' Slope=0.0466 '/' Tc=23.8 min CN=82/0 Runoff=6.82 cfs 131,845 cf

Total Runoff Area = 3,612,208 sf Runoff Volume = 793,503 cf Average Runoff Depth = 2.64"
100.00% Pervious = 3,612,208 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1: Exist Point of Discharge #1

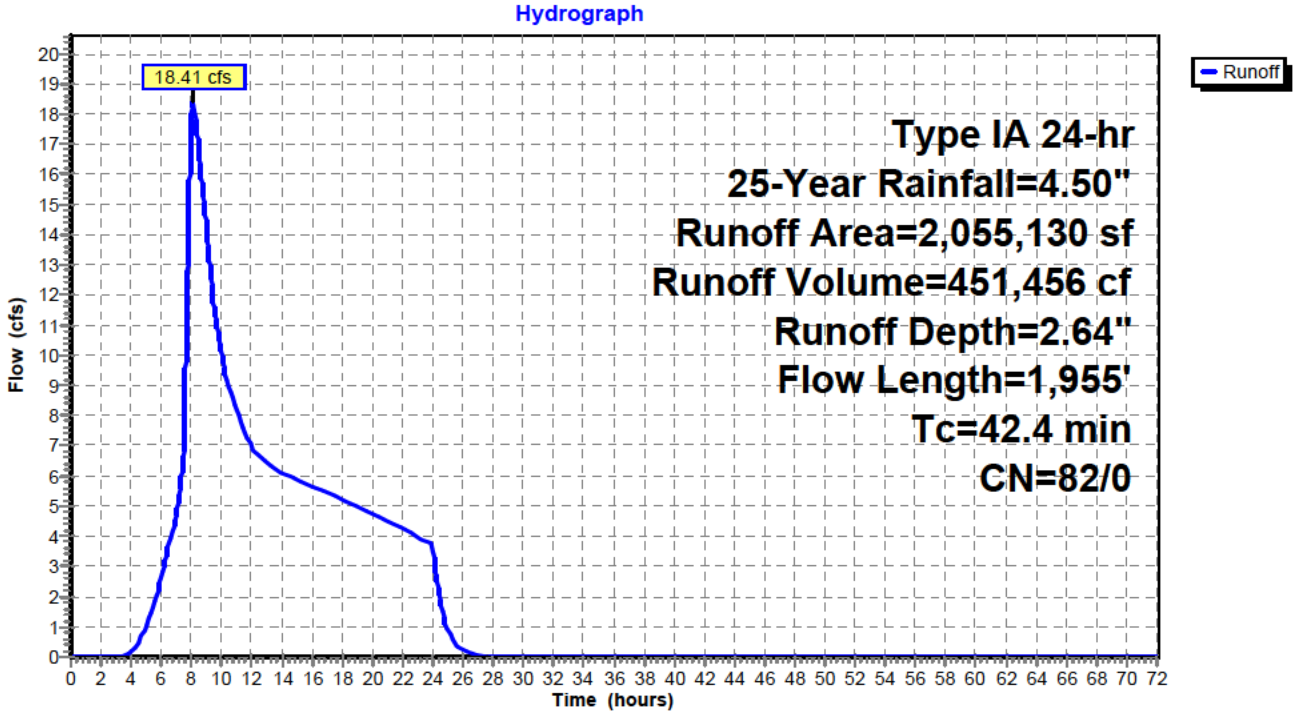
Runoff = 18.41 cfs @ 8.11 hrs, Volume= 451,456 cf, Depth= 2.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
2,055,130	82	Row crops, SR + CR, Good, HSG C
2,055,130	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.7	300	0.0300	0.21		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
18.7	1,655	0.0270	1.48		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
42.4	1,955	Total			

Subcatchment 1: Exist Point of Discharge #1



Hydrograph for Subcatchment 1: Exist Point of Discharge #1

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.23	0.00	0.00	0.00
4.00	0.52	0.00	0.00	0.16
6.00	0.93	0.09	0.00	2.60
8.00	1.91	0.59	0.00	**18.10**
10.00	2.60	1.07	0.00	**10.05**
12.00	2.99	1.37	0.00	6.93
14.00	3.31	1.63	0.00	6.08
16.00	3.60	1.87	0.00	5.66
18.00	3.87	2.09	0.00	5.23
20.00	4.11	2.29	0.00	4.75
22.00	4.32	2.48	0.00	4.25
24.00	**4.50**	**2.64**	0.00	3.72
26.00	4.50	2.64	0.00	0.22
28.00	4.50	2.64	0.00	0.01
30.00	4.50	2.64	0.00	0.00
32.00	4.50	2.64	0.00	0.00
34.00	4.50	2.64	0.00	0.00
36.00	4.50	2.64	0.00	0.00
38.00	4.50	2.64	0.00	0.00
40.00	4.50	2.64	0.00	0.00
42.00	4.50	2.64	0.00	0.00
44.00	4.50	2.64	0.00	0.00
46.00	4.50	2.64	0.00	0.00
48.00	4.50	2.64	0.00	0.00
50.00	4.50	2.64	0.00	0.00
52.00	4.50	2.64	0.00	0.00
54.00	4.50	2.64	0.00	0.00
56.00	4.50	2.64	0.00	0.00
58.00	4.50	2.64	0.00	0.00
60.00	4.50	2.64	0.00	0.00
62.00	4.50	2.64	0.00	0.00
64.00	4.50	2.64	0.00	0.00
66.00	4.50	2.64	0.00	0.00
68.00	4.50	2.64	0.00	0.00
70.00	4.50	2.64	0.00	0.00
72.00	4.50	2.64	0.00	0.00

Summary for Subcatchment 2: Exist Point of Discharge #2

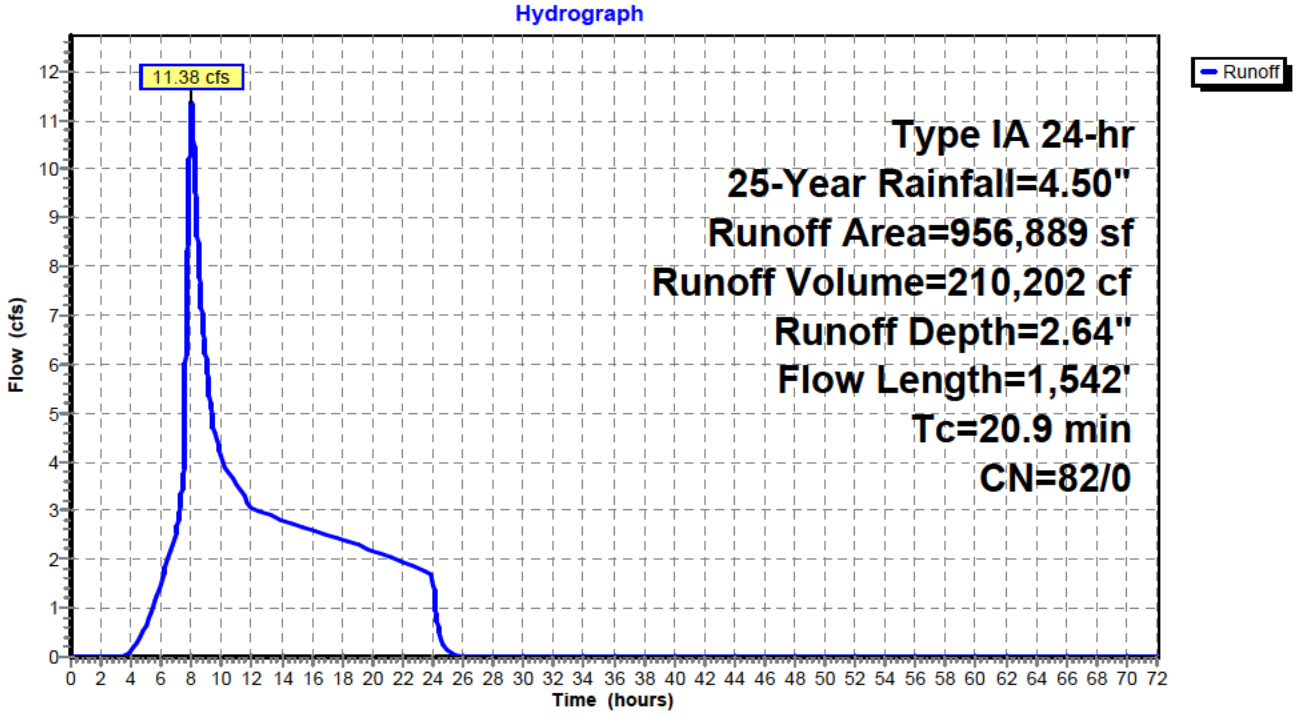
Runoff = 11.38 cfs @ 8.01 hrs, Volume= 210,202 cf, Depth= 2.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
956,889	82	Row crops, SR + CR, Good, HSG C
956,889	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.9	300	0.1670	0.42		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
9.0	1,242	0.0660	2.31		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.9	1,542	Total			

Subcatchment 2: Exist Point of Discharge #2



Hydrograph for Subcatchment 2: Exist Point of Discharge #2

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.23	0.00	0.00	0.00
4.00	0.52	0.00	0.00	0.12
6.00	0.93	0.09	0.00	1.48
8.00	1.91	0.59	0.00	**11.36**
10.00	2.60	1.07	0.00	**4.11**
12.00	2.99	1.37	0.00	3.03
14.00	3.31	1.63	0.00	2.77
16.00	3.60	1.87	0.00	2.60
18.00	3.87	2.09	0.00	2.40
20.00	4.11	2.29	0.00	2.17
22.00	4.32	2.48	0.00	1.94
24.00	**4.50**	**2.64**	0.00	1.69
26.00	4.50	2.64	0.00	0.01
28.00	4.50	2.64	0.00	0.00
30.00	4.50	2.64	0.00	0.00
32.00	4.50	2.64	0.00	0.00
34.00	4.50	2.64	0.00	0.00
36.00	4.50	2.64	0.00	0.00
38.00	4.50	2.64	0.00	0.00
40.00	4.50	2.64	0.00	0.00
42.00	4.50	2.64	0.00	0.00
44.00	4.50	2.64	0.00	0.00
46.00	4.50	2.64	0.00	0.00
48.00	4.50	2.64	0.00	0.00
50.00	4.50	2.64	0.00	0.00
52.00	4.50	2.64	0.00	0.00
54.00	4.50	2.64	0.00	0.00
56.00	4.50	2.64	0.00	0.00
58.00	4.50	2.64	0.00	0.00
60.00	4.50	2.64	0.00	0.00
62.00	4.50	2.64	0.00	0.00
64.00	4.50	2.64	0.00	0.00
66.00	4.50	2.64	0.00	0.00
68.00	4.50	2.64	0.00	0.00
70.00	4.50	2.64	0.00	0.00
72.00	4.50	2.64	0.00	0.00

Summary for Subcatchment 3: Exist Point of Discharge #3

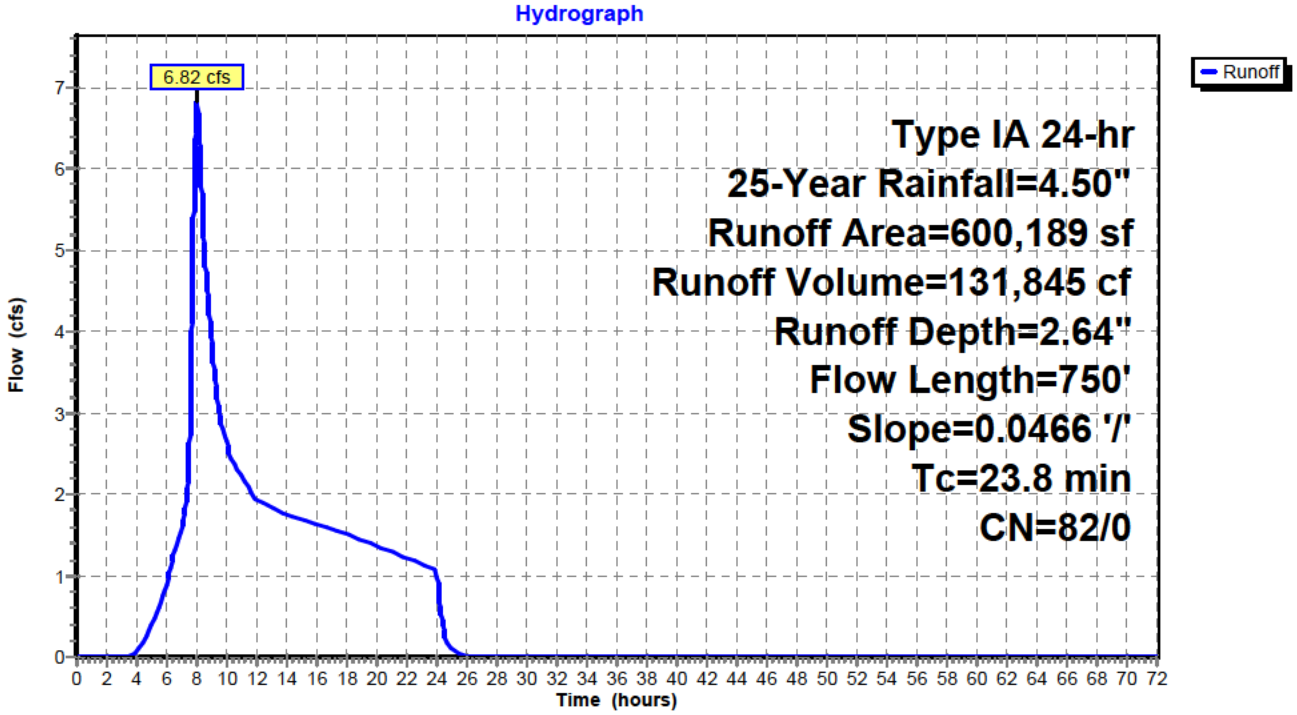
Runoff = 6.82 cfs @ 8.01 hrs, Volume= 131,845 cf, Depth= 2.64"

Runoff by SBUH method, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type IA 24-hr 25-Year Rainfall=4.50"

Area (sf)	CN	Description
600,189	82	Row crops, SR + CR, Good, HSG C
600,189	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.9	300	0.0466	0.25		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.80"
3.9	450	0.0466	1.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
23.8	750	Total			

Subcatchment 3: Exist Point of Discharge #3



Hydrograph for Subcatchment 3: Exist Point of Discharge #3

Time (hours)	Precip. (inches)	Perv.Excess (inches)	Imp.Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	**0.00**	0.00
2.00	0.23	0.00	0.00	0.00
4.00	0.52	0.00	0.00	0.07
6.00	0.93	0.09	0.00	0.90
8.00	1.91	0.59	0.00	**6.81**
10.00	2.60	1.07	0.00	**2.62**
12.00	2.99	1.37	0.00	1.91
14.00	3.31	1.63	0.00	1.74
16.00	3.60	1.87	0.00	1.64
18.00	3.87	2.09	0.00	1.51
20.00	4.11	2.29	0.00	1.37
22.00	4.32	2.48	0.00	1.22
24.00	**4.50**	**2.64**	0.00	1.06
26.00	4.50	2.64	0.00	0.01
28.00	4.50	2.64	0.00	0.00
30.00	4.50	2.64	0.00	0.00
32.00	4.50	2.64	0.00	0.00
34.00	4.50	2.64	0.00	0.00
36.00	4.50	2.64	0.00	0.00
38.00	4.50	2.64	0.00	0.00
40.00	4.50	2.64	0.00	0.00
42.00	4.50	2.64	0.00	0.00
44.00	4.50	2.64	0.00	0.00
46.00	4.50	2.64	0.00	0.00
48.00	4.50	2.64	0.00	0.00
50.00	4.50	2.64	0.00	0.00
52.00	4.50	2.64	0.00	0.00
54.00	4.50	2.64	0.00	0.00
56.00	4.50	2.64	0.00	0.00
58.00	4.50	2.64	0.00	0.00
60.00	4.50	2.64	0.00	0.00
62.00	4.50	2.64	0.00	0.00
64.00	4.50	2.64	0.00	0.00
66.00	4.50	2.64	0.00	0.00
68.00	4.50	2.64	0.00	0.00
70.00	4.50	2.64	0.00	0.00
72.00	4.50	2.64	0.00	0.00

Attachment H: Outfall Flow Spreader Calculations and Details

Flow Spreader

Project Description	
Solve For	Crest Elevation

Input Data	
Discharge	15.00 cfs
Headwater Elevation	100.00 ft
Tailwater Elevation	99.90 ft
Crest Surface Type	Paved
Crest Breadth	1.00 ft
Crest Length	175.0 ft

Results	
Crest Elevation	99.91 ft
Headwater Height Above Crest	0.09 ft
Tailwater Height Above Crest	-0.01 ft
Weir Coefficient	2.93 ft^(1/2)/s
Submergence Factor	1.000
Adjusted Weir Coefficient	2.93 ft^(1/2)/s
Flow Area	16.6 ft^2
Velocity	0.90 ft/s
Wetted Perimeter	175.2 ft
Top Width	175.00 ft

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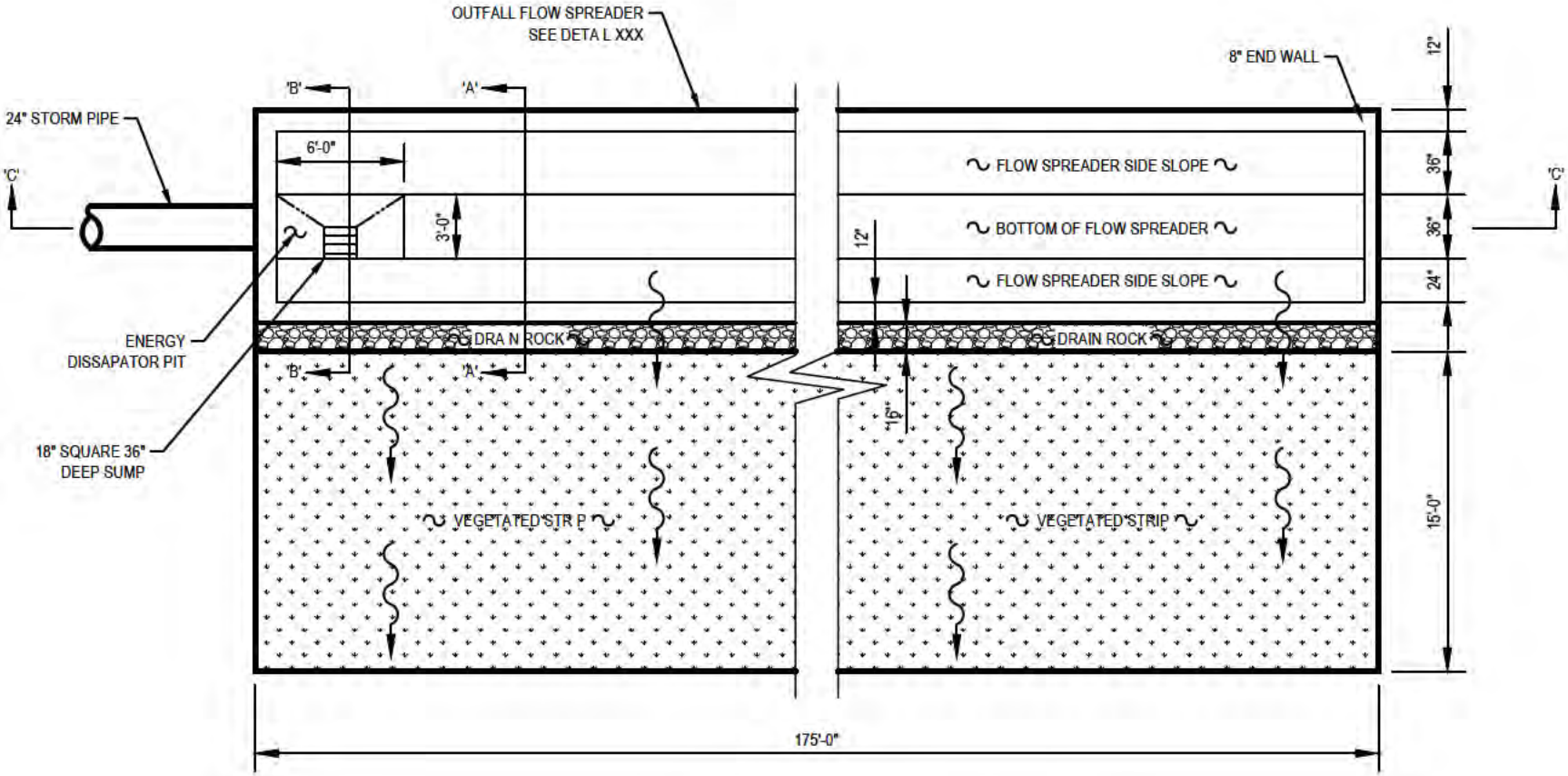
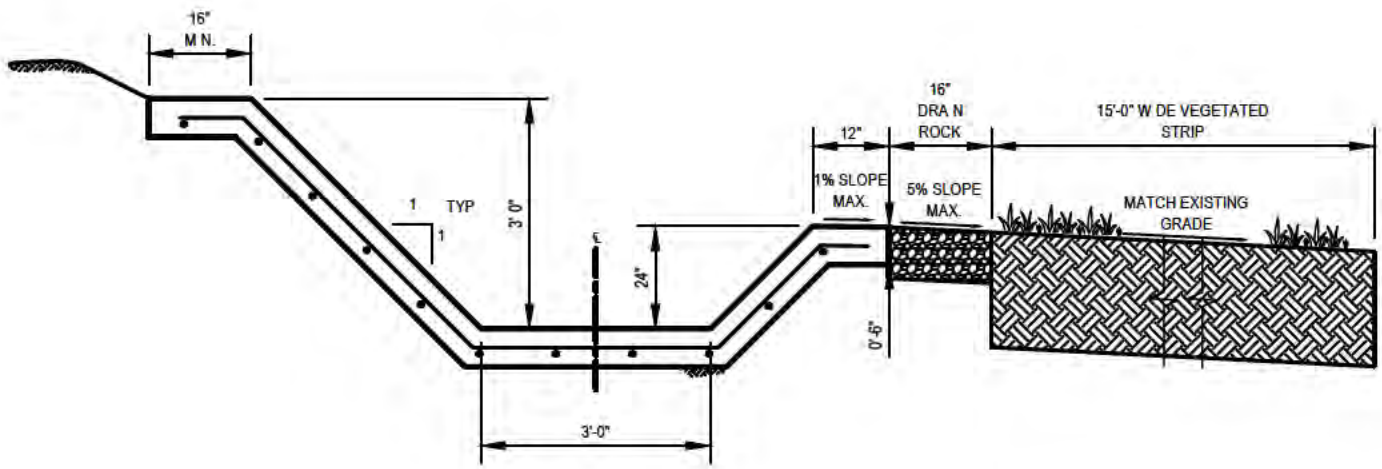
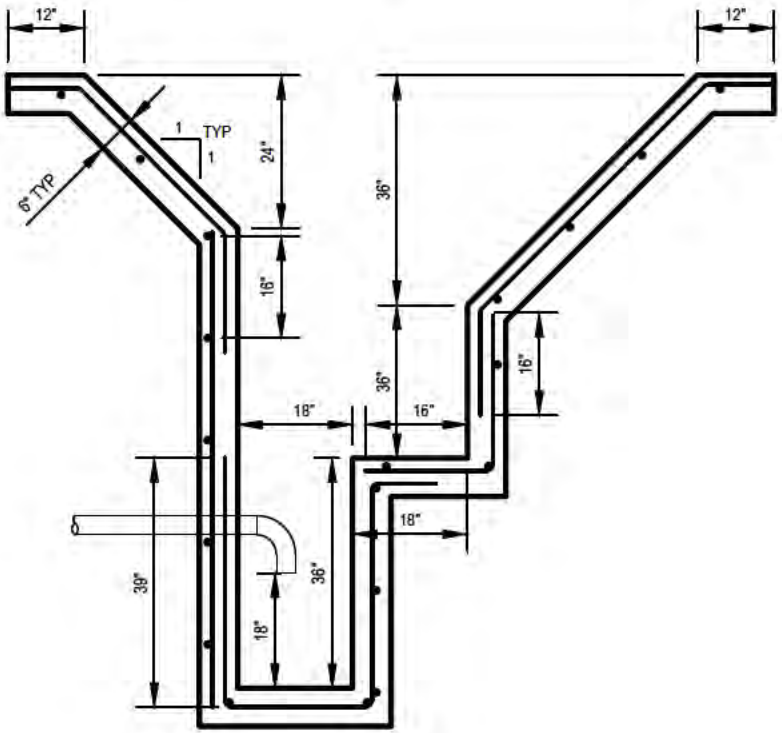


1 OUTFALL FLOW SPREADER
NTS



A **SECTION A-A**
NTS



B SECTION B-B
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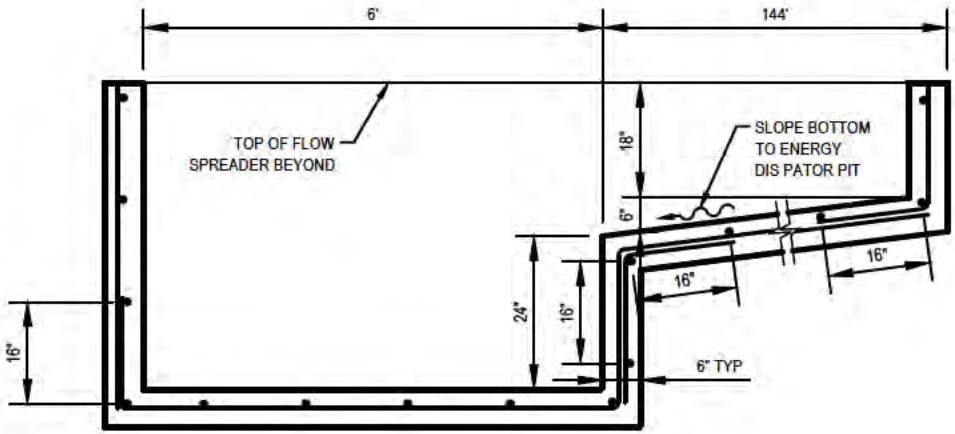

C SECTION C-C
NTS

Attachment I: Stormwater Pond Cross Sections, Basins, Planters, Grassy Swale and Flow Control Manholes

See Land Use drawings under separate cover.