Senior Center
Town of Sturbridge

STORMWATER MANAGEMENT PLAN, EROSION AND SEDIMENTATION CONTROL PLAN, AND LONG TERM OPERATIONS AND MAINTENANCE PLAN

March, 2023

Prepared by:

WDG | Waterfield Design Group

50 Cross Street | Winchester, Massachusetts | 01890 | t 781.756.0001 f 781.756.0007

WDG Project No.: 1717

Introduction:

This Stormwater Management Plan, Erosion and Sedimentation Control Plan and Long Term Operations and Maintenance Plan has been prepared in conformance with the requirements of the Stormwater Management Regulations of the Town of Sturbridge and the Site Plan Review criteria of the Town of Sturbridge Planning Board. The project is within the Sturbridge Groundwater Overlay Protection District and meets the requirements of Groundwater Protection District Bylaw.

Name and Address of Applicant/Owner/Contact:

Town of Sturbridge Senior Center
Robyn Chrabascz, Facilities Manager
308 Main Street
Sturbridge, MA 01566
Phone: 774-304-1408

Site Description:

The subject parcel is approximately 1.79+/- acres in size and located at 480 Main Street in Sturbridge. The parcel is abutted by the 4 Arnold Road, a residential property to the north, a hotel to the east, by Main Street (Route 20) to the south and Arnold Road to the west and south. An existing 3,089 SF Senior Center is on the lot with associated parking and walking paths.

The site is the existing building, paved parking, lawn, and woods. The overall site gradient slopes from the north to the south. The woods have a drainage channel that directs runoff to Main Street. The existing building and paved parking sheet flow to the lawn area south of the building and then onto Main Street.

Description of Proposed Project/Proposed Land Use:

The applicant is proposing to construct an addition to the existing building and increases in associated parking. Water and sewer will be supplied through existing mains in Arnold Road. Electricity will be supplied through existing utilities. No gas is proposed on site. The site is zoned Commercial Tourist.

Existing Conditions:

The site is a developed area with a building, paved parking, lawn, and woods.

Proposed Conditions:

The applicant is proposing to construct an addition to the existing building and increase the parking to provide for the increased capacity of the building. Stormwater drainage for the proposed site will collect in deep sump catch basins which will be directed to proprietary separators and then outlet to underground infiltration chambers. The chambers will have overflow pips outleting to the existing wooded swale on site.

Low Impact Development (LID) Practices

The Town of Sturbridge Stormwater Management Regulations require LID measures be considered to the maximum extent feasible. The DEP Stormwater checklist requires that the proponent document which environmentally sensitive and LID Techniques were considered during the planning and design of the projects.

Below are a list of environmentally sensitive and LID Techniques and how they were or were not able to be implemented into the project:

No disturbance to any Wetland Resource Areas

The proposed project is the redevelopment of an existing site. The project does not disturb any resource areas.

Site Design Practices

The site is designed to incorporate the minimum amount of facilities necessary in order for the project to be financially viable. Wherever practical the design was limited to decrease disturbance.

Minimize Disturbance to Existing Trees and Shrubs

The applicant has sought to minimize the disturbance of existing trees and shrubs wherever possible. The wooded area outside of the proposed grading necessary for the site will be maintained.

Use of "country drainage" versus curb and gutter conveyance and pipe/vegetated filter strips

Give the high-performance needs of the paved parking and walking areas on the site and the need to maximize the parking areas the use of "county drainage" was not practical.

Bioretention Area

Give the high-performance needs of the paved parking and walking areas on the site and the need to maximize the parking areas the use of bioretention areas was not practical.

Constructed Wetlands

The site is designed to be a Senior Center to be used elderly adults. Constructed wetlands could breed mosquitos and unnecessarily bring these disease carrying insects into contact with the Center's users.

Treebox Filter

Give the high-performance needs of the paved parking and walking areas on the site, the need to maximize the parking areas, and the large volume of runff created by the impervious area on site treebox filters were not practical to use on site.

Water Quality Swales & Grass Channels

Give the high-performance needs of the paved parking and walking areas on the site and the need to maximize the parking areas the use of water quality, and grass swales was not practical.

Green Roof

The maintenance and additional structural construction necessary to install and maintain a green roof on the proposed building is not economically feasible for the Town.

Permeable Pavements

Give the high-performance needs of the paved parking and walking areas on the site, the need to maximize the parking areas and the need of the high vehicle trip loadings of the parking areas the use of permeable pavers was not possible.

Cisterns

Cistern and water reuse are not financially viable systems to incorporate into the site design for the Town of Sturbridge constructing and operating the site.

Identify & Map Critical Environmental Resources

There are no critical environmental resources on the site.

Delineate Building to Avoid Environmental Resources & Appropriate Buffers
The building has been located on the site to avoid environmental resources and appropriate buffers.

Develop Methods to Minimize Impervious Surfaces and Preserve Open Space.

The parking, access drives, and walkways have been minimized to provide impervious area for the what is needed to access and park at the site only. In addition, the wooded open space in the east of the property have been preserved outside of the grading area for the site improvements.

Stormwater Credits

The proposed project is not seeking any Stormwater Credits.

Total Site Area

Total Site Area to be Developed = 1.45 acres

Existing Impervious Area = 0.48 acres

Proposed Impervious Area = 0.92 acres

Soils

According to the NRCS Custom Soil Resource Report, the soils on site are listed as 420B – Canton fine sandy loam.

Canton is a well-draining soil with gentle to moderate slopes.

Test pits conducted at the site found fine sandy loams in the naturally occurring layers of in the test pits. Ground water or refusal due to ledge or boulders was found 3' to 8' below grade.

100 Year Floodplain

No portion of the site is within the 100' Year Floodplain.

Standard 1: No New Untreated Discharges

The new development areas on the site will flow overland and enter deep sump catch basins, proprietary separators, and underground infiltration chambers with overflows to the existing wooded swales which discharge to the Town drainage system in Main Street.

Since the runoff from the developed impervious surfaces on the site will be treated in accordance with the requirements of the Stormwater Management Regulations of the Town of Sturbridge and since the discharge will flow to the existing Town drainage system which currently accepts site runoff, no new untreated discharge will be added to the site. Therefore, Standard 1 has been met by the proposed project.

Standard 2: Peak Rate & Volume Attenuation

The proposed project involves the development of a predominantly developed site. Attached to this report are the existing and proposed (site developed) runoff calculations for the Project for the 2, 10, and 100 year storms.

All calculations were prepared using SCS Methods consistent with the requirements of the Wetland Protection Regulations and the 2008 MADEP Stormwater Handbook. The calculations were prepared using HydroCAD version 10.00 by Applied Microcomputers Systems. Soils data for the modeling was obtained from the National Resource Conservation Service Soil Map (Online) for the Town of Sturbridge (see attached Existing Watershed Plans and copy of a portion of the Map covering the site area) and field test pits (see attached Test Pit Soil Logs). Ground cover data is based on existing and proposed site conditions, aerial maps, and times of concentration are based on the tributary watershed characteristics. Hydrologic soil group data was obtained from the SCS National Engineering Handbook NEH #4 - Hydrology. Times of concentration for the study were computed using SCS Methodology. Rainfall data for the study is based on NRCC Extreme Precipitation Tables.

Discharge Point #1		
Storm Return Period (years)	Existing Peak Inflow Rate (c.f.s.)	Proposed (Site Developed) Peak Inflow Rate (c.f.s.)
2	1.94	0.39 (-1.55)
10	4.12	2.75 (-1.37)
100	10.04	9.88 (-0.16)

Discharge Point #1		
Storm Return Period (years)	Existing Volume of Runoff (af)	Proposed (Site Developed) Volume of Runoff (af)
2	0.298	0.099 (-0.199)
10	0.648	0.310 (-0.338)
100	1.649	1.119 (-0.530)

Based on the results of the calculations as demonstrated above, the requirements of Standard 2 have been met and the redevelopment of the site will not result in any net increase in the peak rate of runoff or the runoff volume from the site.

Standard 3: Recharge

The soils at the site are Hydrologic Soil Group Class B soils.

See the infiltration calculations attached to the end of the report for the stormwater infiltration calculations.

Infiltration rates used are from the Rawls rates chart in the 2008 MADEP Stormwater Handbook.

As the infiltration calculations show, the proposed design provides the required recharge volume of the Stormwater Management Regulations of the Town of Sturbridge. Therefore, Standard 3 has been met by the proposed project.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

Does not apply to the site.

Standard 6: Critical Areas

Does not apply to the site.

Retain volume of 1" of runoff

The proposed infiltration units retain the volume of runoff equivalent to, or greater than, one inch multiplied by the total post-construction impervious surface area on the site.

See attached calculations.

Therefore, this item has been met.

Remove 80% TSS and 60% TP

The proposed project removes 80% of the average annual load of total suspended solids (TSS) generated from the total post-construction impervious area on the site, see attached TSS removal calculations and 60-70% of the average annual load of total phosphorus (TP) generated from the total post-construction impervious surface area on the site, per the MA DEP Handbook for Infiltration Basins.

The Contech Units act as Oil/Grease Separators to meet the requirements of the Groundwater Protection Overlay District.

Therefore, this item has been met.

Standard 8: Construction Period Pollution Prevention Plan/Erosion and Sedimentation Control Plan

Erosion Control and Construction Sequencing

With regard to work proposed on the project and erosion and siltation control, the sequence of activities will generally take place as follows:

1. Prior to general gravel roadway removal, clearing, grubbing or topsoil stripping, place all strawbales, silt fence, and erosion control dikes in the location shown on the drawings. Although installation of these measures can be phased according to the construction schedule, strawbales, silt fence, and erosion control dikes must be in place prior to any work in a specific location.

2. Prior to any earthwork operations, install temporary siltation sump/filtration dams and swales with check dams and truck tracking pad in the locations approved by the Landscape Architect. These measures may be installed in phases according to the construction schedule, but must be completed prior to earthwork operations in the adjacent work area.

3. Damaged or loose strawbales and silt fence shall be replaced as necessary to maintain their function of controlling erosion and siltation. Damaged or broken down check dams and filtration dams shall be replaced immediately. Truck tracking pad shall be replaced as necessary to maintain its function of controlling erosion and siltation to the work area.

4. Remove any accumulation of silt or soil build-up behind strawbales, silt fence, check dams, and filtration dams as it occurs. Remove accumulations of silt and soil build-up from the siltation sumps and silt traps when it is approximately 18 inches deep. Replace the gravel filter on the inside of the filtration dams when it becomes clogged with silt or does not permit free drainage of stormwater through it, whichever occurs first.

5. Throughout excavation, filling, and grading operations, in addition to drainage swales, check dams, siltation sumps/filtration dams, and other items shown on the drawings, the Contractor shall take other necessary precautions, including installation of temporary drainage swales, siltation sumps/filtration dams, check dams, strawbales, silt fences, and temporary pipe, to direct and control drainage from disturbed areas on the site so that erosion and siltation is minimal. In addition, no erosion or discharge of silt or larger particles shall occur in areas to remain undisturbed or onto adjacent properties.

6. Remove all erosion control measures, including strawbales, silt fence, siltation sumps and check dams, only when construction is completed, upland surfaces are stabilized and the piped drainage system is fully operational and it has been approved to do so.

If the Contractor anticipates deviations from the above procedures, he shall obtain written approval from the Engineer prior to proceeding.

Erosion and Sediment Control BMP's

The Erosion and Sediment Controls represent the suggested best management practices proposed for the project. The Contractor's approach to controlling stormwater runoff from the site may vary somewhat; however they must update the SWPPP for the project to reflect the changes and implement appropriate corresponding erosion control measures.

The use of erosion and sediment controls are mandatory and must be employed to minimize impacts to adjacent areas during construction. If sediment escapes the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize off-site impacts.

The control practices which are required to minimize stormwater pollution during construction must remain functional until disturbed areas have been stabilized. Erosion control products are to be installed and maintained in accordance with manufacturer's specifications and good engineering practices.

The most important aspects of controlling erosion and sedimentation are limiting the extent of drainage structures. These fundamental principles will be the key factors in the contractor's control of erosion on the project site. If appropriate, the

contractor will construct temporary diversion swales and settling basins or use a settling tank. If additional drainage or erosion control measures are needed, they will be located up-gradient from the hay bales and silt fences.

The contractor is responsible for the maintenance and repair of all erosion control devices on-site. All erosion control devices will be regularly inspected. At no time will silt-laden water be allowed to enter sensitive areas (wetlands, streams, and drainage systems). Any runoff from disturbed surfaces will be directed through a sedimentation process prior to being discharged to the existing on site drainage system.

The contractor will establish a staging area on a lot to be disturbed, outside the wetlands buffer zone for the overnight storage of equipment and stockpiling of materials.

In the staging area, the contractor will have a stockpile of materials required to control erosion on-site to be used to supplement or repair erosion control devices. These materials will include, but are not limited to hay bales, silt fence, erosion control matting, and crushed stone. As mentioned previously, erosion and sedimentation controls will be employed to minimize the erosion and transport of sediment into resource areas during the earthwork and construction phases of the Project. Erosion and sedimentation control measures will be installed prior to site excavation or disturbance and will be maintained throughout the construction period.

The contractor is responsible for erosion control on the site and will utilize supplemental erosion control measures to supplement the erosion controls shown on the plans prepared for this project to work with his day to day operations at the site.

Primary erosion control techniques proposed include hay bale barriers, silt fence barriers, inlet sediment traps, siltation control dikes, a stabilized construction entrance, temporary diversion channels, and temporary sedimentation ponds when applicable. A detailed description of each technique is discussed below. During the growing season, slope stabilization will be achieved by applying topsoil followed by seeding and mulching as soon as final grades are achieved. Organic mulching, jute netting, geo-textiles, or a combination will be used to stabilize slopes completed outside of the growing season.

Best Management Practices (BMPs)

Silt Fence Strawbale Barriers

Erosion control barriers (silt fences or strawbale dike) will be installed prior to the start of construction. These barriers will remain in place until all tributary surfaces have been fully stabilized.

Strawbale barriers will be placed to trap sediment transported by runoff before it reaches the drainage system or leaves the construction site. In areas where high runoff velocities or high sediment loads are expected, silt fencing may be installed adjacent to the strawbale barriers. This semi-permeable barrier made of a synthetic porous fabric will provide additional protection. The silt fences and hay bale barrier will be replaced as determined by periodic field inspection. The underside of hay bales will be kept in close contact with the earth and reset as necessary. Hay bale barriers and siltation fences will be maintained and cleaned until slopes have healthy stands of grass.

Diversion Channels

Diversion channels may be used to intercept and divert runoff from slopes that are exposed during construction. These diversions will minimize the development of concentrated runoff down slopes, which could produce gully erosion. Diversions will also be used to collect runoff from construction areas and convey it to temporary sediment basins or traps. Temporary diversions will remain in place until slopes are stabilized or graded level. If vegetation of the diversion channel is required to avoid erosion of the channel, the channel will be temporarily stabilized to ensure viability of the grass seed.

Temporary Sediment Ponds

Temporary sediment ponds/basins will be constructed as necessary on the site either as excavations or bermed water detention structures, depending on grading. These temporary ponds will retain runoff for a sufficient period of time to allow suspended soil particles to settle out prior to discharge. These temporary basins will be located at low points on the site and will receive runoff from temporary diversion swales. Discharge points from sediment basins will be stabilized as necessary to minimize

erosion. The bottom of sediment basins will be cleaned periodically, with the sediment removed to a secure location to prevent siltation of natural waterways.

Utility Construction

The Contractor will construct utility trenches in a manner that will not direct runoff toward drainage system structures.

Stabilization Activities

All disturbed surfaces will be stabilized within 14 days after construction in any portion of the project site is completed or is temporarily halted, unless additional construction is intended to be initiated within 14 days. The Contractor will not disturb more area than can be stabilized within 14 days unless the area is to remain active. The Contractor will not disturb more area than can be stabilized within the same construction season.

Slope Stabilization

The smallest practicable area of land will be exposed at a time. Slopes greater than three-to-one (horizontal to vertical) will be stabilized with seed, organic mulch, jute fabric, or rip-rap, as appropriate, to prevent erosion during construction. After disturbed areas have been stabilized, the temporary erosion control measures will be removed and accumulated sediment will be removed and disposed of in an appropriate location. Disturbed areas will be stabilized with appropriate ground cover as soon as possible. After the removal of temporary erosion control measures, disturbed areas will receive a layer of topsoil for stabilization.

Stabilized Construction Entrance

Temporary stabilized construction entrances will be installed at the project site. The purpose of the construction entrance is to remove sediment attached to vehicle tires and to minimize sediment transport and deposition onto public road surfaces. The construction entrances will be composed of beds of crushed stone which will be replenished as necessary to maintain their proper function.

Inspections

The 2022 EPA Construction General Permit Conditions require routine inspections of the site and careful documentation of events and conditions. The following inspection activities will be completed by a qualified, designated site monitor.

- Erosion control, sedimentation prevention, and stormwater management measures will be inspected at least once per week throughout the construction period.
- All controls, outfalls, and potential problem areas will also be inspected within 24 hours of any storm exceeding 0.5 inches of precipitation.

A log of inspection results will be maintained on-site and will include the name of the inspector, date, major observations, and necessary corrective measures.

Built up sediment will be removed when it has reached one-third the height of the silt fence.

All needed repairs or modifications will be reported to the contractors to permit the timely implementation of required actions. Where necessary repairs do not pose an immediate concern, repairs or modifications will be implemented within two (2) days of inspection.

The SWPPP for the project will be modified within seven days to reflect any modifications to measures as a result of inspection.

A report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the SWPPP, and actions taken will be made and retained as part of the SWPPP for at least three years after the date of the inspection.

Weekly reports of maintenance and inspection activities will be maintained on-site, in conformance with the NPDES permit conditions.

Maintenance

The following maintenance practices will be used by the Contractor to maintain erosion and sediment controls. Maintenance activities will be documented on the Inspection Report Forms.

Erosion and sediment control measures and other protective measures must be maintained in effective operating condition.

- If site inspections indicate that BMPs are not operating effectively, maintenance must be performed as soon as possible and before the next storm event whenever practicable to maintain the continued effectiveness of the BMPs. If implementation before the next storm event is impracticable, the situation must be documented in the SWPPP and alternative BMPs must be implemented as soon as possible.

- If existing BMPs need to be modified or if additional BMPs are necessary for any reason, implementation must be completed before next storm event whenever practicable. If implementation before the next storm event is impracticable, the situation must be documented in the SWPPP and alternative BMPs must be implemented as soon as possible.

- Pollution prevention measures must be maintained in good working order. If a repair is necessary, it will be initiated, if practicable, within 24 hours of report.

- Accumulated sediment within the catch basin inlet protection must be removed on a weekly basis.

- Maintenance and inspection of pollution prevention measures must be continued on the site for as long as a portion of the site remains disturbed.

- Stabilization measures will be initiated as soon as practicable on portions of the site where construction has temporarily or permanently ceased. This will occur in NO CASE more than 14 days after construction activities have temporarily or permanently ceased.

- If issues are identified at hazardous materials storage areas, corrective actions will be implemented immediately. If leaks or spills are identified procedures outlined in Standard 9 will be followed.

Record Keeping

Records will be retained for a minimum period of at least 3 years after the permit is terminated. Any time the following activities occur the *Grading and Stabilization Activities Log* will be filled out:

- When major grading activities occur

- When construction activities temporarily or permanently cease on a portion of the site

- When an area is either temporarily or permanently stabilized

Log of Changes To The SWPPP

This SWPPP must be modified as necessary to:

- Ensure permit compliance when notified by EPA that the plan does comply

- Include additional or modified BMPs that correct problems identified as a result of an inspection. Revisions must be completed with seven (7) calendar days following the inspection.

- Ensure the effectiveness of the SWPPP in eliminating or significantly minimizing pollutants from stormwater discharges from the site.
- Prevent the reoccurrence of release of a hazardous material or oil.
- Address a change in design, construction, operation, or maintenance which has or may have a significant effect on the potential for the discharge of pollutants.

All modifications to the SWPPP must be recorded on the SWPPP Amendment Log included in the SWPPP Appendix.

Stockpiling

All materials to be stockpiled on site shall be stockpiled outside of the 100 year floodplain in the area of the proposed building.

Hazardous Materials

No hazardous materials are located on the site.

Training

Training sessions must be provided by the Contractor for construction personnel. The training will review specific BMPs used in the work are as well as reporting and response measures that may be needed by either construction personnel and/or inspectors to implement the SWPPP. Additionally, appropriate construction personnel will be trained in the operation and maintenance of equipment to prevent the discharge of oil/hazmat and spill response procedures. Training sessions will highlight known spills or releases and recently developed precautionary measures. The Training Log shall be kept up to date by the Contractor.

69 Route 84, Sturbridge MA Report No. ____

Stormwater Construction Site Inspection Report

General Information			
Project Name	Sturbridge Senior Center		
NPDES Tracking No.		**Location**	480 Main Street Sturbridge, MA
Date of Inspection		**Time Start/End**	
Inspector's Name(s) & Title			
Inspector's Company			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			
Type of Inspection: ❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event			
Weather Information			
Has there been a storm event since the last inspection? ❑Yes ❑No **If yes, provide:** Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):			
Weather at time of this inspection? ❑ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds ❑ Other: Temperature:			
Have any discharges occurred since the last inspection? ❑Yes ❑No **If yes, describe:**			
Are there any discharges at the time of inspection? ❑Yes ❑No **If yes, describe:**			

Site-specific BMPs

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
	Hay Bales / Silt Fence	❑Yes ❑No	❑Yes ❑No	
	Catch Basin Protection	❑Yes ❑No	❑Yes ❑No	
	Interior Site Erosion Controls	❑Yes ❑No	❑Yes ❑No	
	Temporary Check Dams	❑Yes ❑No	❑Yes ❑No	
	Diversion Channels	❑Yes ❑No	❑Yes ❑No	
	Temporary Sediment Basins	❑Yes ❑No	❑Yes ❑No	
	Stabilized Construction Entrance	❑Yes ❑No	❑Yes ❑No	
	Street Sweeping / Construction Access	❑Yes ❑No	❑Yes ❑No	
	Temp. and Permanent Slope Stabilization	❑Yes ❑No	❑Yes ❑No	
	Dust Control	❑Yes ❑No	❑Yes ❑No	

N/A – Not Applicable

Overall Site Issues

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs	❑Yes ❑No	❑Yes ❑No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	
	Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	
	Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No	
	Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	
	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	
	Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No	
	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
	(Other)	❑Yes ❑No	❑Yes ❑No	

In the event of a spill refer to the Spill Response Procedure and contact appropriate agencies. Refer to SWPPP for Spill Prevention Plan and Response Procedures.

Are sediment / pollution discharges from the site present?
☐ No ☐ Yes If yes, describe: _____

_____

_____

Describe any corrective action at this time: _____

_____

_____

_____

_____

Non-Compliance

Describe any incidents of non-compliance not described above:

_____

_____

_____

_____

_____

_____

General Comments (Attached figures to show locations of concern):

_____

_____

_____

Are Additional Erosion Control Measures Needed?

☐ No ☐ Yes If yes, describe: _____

_____

Notes:_____

_____

_____

_____

_____

_____

_____

_____

_____

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title: _____

Signature: _____

Date: _____

**** A copy of this report should be placed in the Monitoring Section of the Stormwater Pollution Prevention Plan.**

Corrective Action Log

Project Name: **Sturbridge Senior Center**
SWPPP Contact:

Inspection Date	Inspector Name(s)	Description of BMP Deficiency	Corrective Action Needed (including planned date/responsible person)	Date Action Taken/ Responsible person

SWPPP Amendment Log

Project Name: **Sturbridge Senior Center**
SWPPP Contact:

Amendment No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title]

Subcontractor Certifications/Agreements

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: _____

Project Title: **Sturbridge Senior Center**

Operator(s): _____

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the BMPs and practices described in the SWPPP.

This certification is hereby signed in reference to the above named project:

Company: _____

Address: _____

Telephone Number: _____

Type of construction service to be provided: _____

_____

_____

Signature: _____

Title: _____ Date: _____

Grading and Stabilization Activities Log

Project Name: Sturbridge Senior Center
SWPPP Contact:

Date Grading Activity Initiated	Description of Grading Activity	Date Grading Activity Ceased (Indicate Temporary or Permanent)	Date When Stabilization Measures are Initiated	Description of Stabilization Measure and Location

SWPPP Training Log

Stormwater Pollution Prevention Training Log

Project Name:

Project Location:

Instructor's Name(s):

Instructor's Title(s):

Course Location: _____ Date: _____

Course Length (hours): _____

Stormwater Training Topic: *(check as appropriate)*

- ❑ **Erosion Control BMPs**
- ❑ **Emergency Procedures**
- ❑ **Sediment Control BMPs**
- ❑ **Good Housekeeping BMPs**
- ❑ **Non-Stormwater BMPs**

Specific Training Objective:_____

_____

Attendee Roster: *(attach additional pages as necessary)*

No.	Name of Attendee	Company
1		
2		
3		
4		
5		
6		
7		
8		
9		

Delegation of Authority Form

Delegation of Authority

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Construction General Permit, at the _____ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

_____ (name of person or position)
_____ (company)
_____ (address)
_____ (city, state, zip)
_____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in _____ (Reference State Permit), and that the designee above meets the definition of a "duly authorized representative" as set forth in _____ (Reference State Permit).

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____

Company: _____

Title: _____

Signature: _____

Date: _____

Standard 9: Long Term Operation and Maintenance Plan

An Operation and Maintenance Plan is summarized below and will be incorporated into the construction documents for this project.

In accordance with the Stormwater Management Policy issued by the Department of Environmental Protection (DEP), Waterfield Design Group, Inc. has prepared the following Operation and Maintenance Plan for the proposed project. This plan is broken into two major sections. The first section describes construction-related controls and practices. The second section is devoted to the post-construction operation and maintenance plan.

Basic Information

Developer: Town of Sturbridge Senior Center
Contact: Robyn Chrabascz, Facilities Manager
Address: 308 Main Street
City: Sturbridge, MA 01566
Tel: 774-304-1408

Map of System Locations

See Drainage & Utilities Plan.

Good Housekeeping BMP's (Construction and Post Construction Periods)

The following good housekeeping practices will be followed onsite during and after the construction project:

- An effort will be made to store only enough product required to do the job. All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible under a roof or other enclosure
- Products will be kept in their original containers with the original manufacturer's label
- Substances will not be mixed with one another unless recommended by the manufacture
- Whenever possible, all of a product will be used up before disposing of the container
- Manufacturer's recommendations for proper use and disposal will be followed
- The site superintendent will inspect daily to ensure proper use and disposal of materials

CONSTRUCTION PERIOD

Material Handling And Waste Management

Hazardous Products:

These practices will be used to reduce the risks associated with hazardous materials. Material Safety Data Sheets (MSDSs) for each substance with hazardous properties that is used on the job site will be obtained and used for the proper management of potential wastes that may result from these products. An MSDS will be posted in the immediate area where such product is stored and/or used and another copy of each MSDS will be maintained in the SWPPP file at the job site construction trailer office. Each employee who must handle a substance with hazardous properties will be instructed on the use of MSDS sheets and the specific information in the applicable MSDS for the product they are using, particularly regarding spill control

techniques.

- Products will be kept in original containers unless they are not re-sealable
- Original labels and material safety data will be retained; they contain important product information
- If surplus product must be disposed of, manufacture's or local and State recommended methods for proper disposal will be followed

Hazardous Waste

All hazardous waste material will be disposed of by the Contractor in the manner specified by local, state, and/or federal regulations and by the manufacturer of such products. Site personnel will be instructed in these practices by the job site superintendent, who will also be responsible for seeing that these practices are followed.

Solid and Construction Wastes

All waste materials will be collected and stored in accordance with state and federal law in an appropriately covered container and/or securely lidded metal dumpster.

All trash and construction debris from the site will be deposited in the dumpster. No construction waste materials will be buried on site. All personnel will be instructed regarding the correct procedures for waste disposal.

All waste dumpsters and roll-off containers will be located in an area where the likelihood of the containers contributing to storm water discharges is negligible. If required, additional BMPs must be implemented, such as sandbags around the base, to prevent wastes from contributing to storm water discharges.

Sanitary Wastes

All sanitary waste will be collected from the portable units a minimum of three times per week by a licensed portable facility provider in complete compliance with local and state regulations.

All sanitary waste units will be located in an area where the likelihood of the unit contributing to storm water discharges is negligible. If required, additional BMP’s must be implemented, such as sandbags around the base, to prevent wastes from contributing to storm water discharges.

Washout Areas

The Contractor will provide wheel wash stations and concrete washout areas at the site as described below.

Wheel Wash Stations

The Contractor will provide wheel wash stations adjacent to the construction entrance which lead directly to a public way or portions of the site outside the limits of work

Concrete Washout

Trucks will be allowed to washout or discharge surplus concrete or drum wash water on the site, but only in specifically designated diked and impervious washout areas which have been prepared to prevent contact between the concrete wash and stormwater. Waste generated from concrete wash water shall not be allowed to flow into drainage ways, inlets, receiving waters

or highway right of ways, or any location other than the designated concrete washout. Waste concrete may be poured into forms to make riprap or other useful concrete products. Proper signage designating the "concrete washout" shall be placed near the facility.

The hardened residue from the concrete washout diked areas will be disposed of in the same manner as other non-hazardous construction waste materials or may be broken up and used on site as deemed appropriate by the Contractor. Maintenance of the washout is to include removal of hardened concrete. Facility shall have sufficient volume to contain all the concrete waste resulting from washout and a minimum freeboard of 1 foot. Facility shall not be filled beyond 95% capacity and shall be cleaned out once 75% full unless a new facility is constructed.

Vehicle and Equipment Fueling

Areas will be designated on site, outside of any resource or buffer area, to refuel or maintain equipment used on site. Equipment fuel storage and refueling operations will be in an upland area at a horizontal distance greater than 100 feet from the boundaries of the wetland resource areas. The fueling areas will include secondary containment. The fueling areas will be inspected and cleaned weekly.

Spill Prevention and Control Plan

The Contractor will train all personnel in the proper handling and cleanup of spilled materials. No spilled hazardous materials or hazardous wastes will be allowed to come in contact with storm water discharges. If such contact occurs, the storm water discharge will be contained on site until appropriate measures in compliance with state and federal regulations are taken to dispose of such contaminated storm water. It shall be the responsibility of the job site superintendent to properly train all personnel in spill prevention and clean up procedures.

In order to minimize the potential for a spill of hazardous materials to come into contact with storm water, the following steps will be implemented:

1. All materials with hazardous properties (such as pesticides, petroleum products, fertilizers, detergents, construction chemicals, acids, paints, paint solvents, cleaning solvents, additives for soil stabilization, concrete curing compounds and additives, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.

2. During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area, An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials

3. The minimum practical quantity of all such materials will be kept on the job site at all times.

4. A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided at the storage site. Catch basin inlet cover blankets and inflatable pipe plugs will be used to seal the openings in the outlet control structure and isolate product in the wet pond should a spill occur.

5. Manufacturer’s recommended methods for spill cleanup will be clearly posted and site personnel will be trained

regarding these procedures and the location of the information and cleanup supplies.

In the event of a spill, the following procedures should be followed:

1. All spills will be cleaned up immediately after discovery.

2. The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with the hazardous substances.

3. The project manager and the Engineer of Record will be notified immediately.

4. Spills of toxic or hazardous materials will be reported to the appropriate federal, state, and/or local government agency, regardless of the size of the spill.

5. If the spill exceeds a Reportable Quantity, the SWPPP must be modified within seven (7) calendar days of knowledge of the discharge to provide a description of the release, the circumstances leading to the release, and the date of the release. The plans must identify measures to prevent the recurrence of such releases and to respond to such releases.

The job site superintendent will be the spill prevention and response coordinator. He will designate the individuals who will receive spill prevention and response training. These individuals will each become responsible for a particular phase of prevention and response. The names of these personnel will be posted in the material storage area and in the office trailer onsite.

Allowable Non-Stormwater Discharge Management

Certain types of discharges are allowed under the NPDES General Permit for Construction Activity, and it is the intent of this SWPPP to allow such discharges. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come into contact with the water prior to or after its discharge. The control measures that have been outlined previously in this SWPPP will be strictly followed to ensure that no contamination of these non-stormwater discharges takes place. The following non-stormwater discharges that may occur from the job site include:

- Discharges from fire-fighting activities
- Waters used to wash vehicles where detergents are not used
- Water used to control dust in accordance with off-site vehicle tracking
- Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used
- Uncontaminated ground water or spring water
- Uncontaminated excavation dewatering
- Landscape irrigation

POST CONSTRUCTION PERIOD

Post-Construction BMP's

The following best management practices are specified in the proposed development program to mitigate the increase in stormwater runoff from the site.

BMPs Used

- Deep Sump Catch Basins
- Proprietary Separators/Oil-Grease Separators
- Underground Infiltration System

Post-Development Activities

1. All sediments removed from the site drainage facilities shall be disposed of properly and in accordance with all applicable local and state regulations.

2. All vegetated slope areas on the site shall be stabilized following completion of construction and maintained to control erosion. Any disturbed areas shall be re-seeded and stabilized by the application of jute mesh if the slope exceeds 3 feet horizontal to 1 foot vertical.

3. Snow shall not be dumped into any waterbody, pond, wetland resource area, wet basin or detention basin.

4. The underground flood storage chambers and the inlet/outlet pipes shall be inspected a minimum of twice/year for signs of accumulated water or debris. Implement appropriate corrective action if any issues are discovered during the inspection. Cleaning shall be in strict conformance with the manufacturer's recommendations, which are attached to and made part of this Long Term Operation and Maintenance Plan.

All structural BMP's and maintenance responsibilities as identified on the site plans and within this document will be owned and maintained by the owner of the property and shall run with the title of the property.

Annual Reporting Form

The Owner shall keep complete records of all BMP maintenance activities using the following form:

OPERATION AND MAINTENANCE PLAN

Project: 480 Main Street **Date: February 2023**
Location: Sturbridge, MA

Structure or Task	Inspection Schedule	Inspection Performed		Method	Notes/Remarks
		Date	By:		
Street Sweeping	April / May			Power broom or vacuum walks and pavement	
Deep Sump Catch Basin	March / June / September / November			Clam shell or vacuum sumps	Clean when sediment is 12" deep
Proprietary Separator	March / June / September / November			Clam shell or vacuum sumps	Reduce to bi-annual inspections after first year of operations
Underground Infiltration System	April / May and October/ November			Inspect maintenance ports	Remove accumulated sediment.

Party responsible for O & M Plan:

Name Sturbridge Senior Center
Address 308 Main Street, Sturbridge, MA 01566
Contact Robyn Chrabascz
Phone 774-304-1408

Annual Operating Budget

The estimated annual operating budget for the O & M Plan is $2,000±.

Plan of BMP's

Reference is made to the proposed Drainage and Utilities plan for the location of all BMP's.

Post-Construction Snow Storage

Reference is made to the proposed Grading plan for the location of snow storage.

Maintenance of Natural Turf Areas

The Maintenance of Turf Areas (MTA) contains a program of maintenance practices to be used on this site. This program is designed to serve as the maintenance blueprint and describe materials used, rates of application and where possible, and expected time of application.

Fertilizing: No pesticides, fertilizers, and herbicides will be used within 100 foot buffer of wetlands. No salts quick release pesticides, quick release fertilizers and quick release herbicides within 200 foot buffer of wetlands.

Mowing: Lawns will be mowed at a height of three (3) inches during the active growing season. Longer grass helps shade the soil and gather moisture, while competing more effectively with weeds. Mowing frequency will vary with the growing season and should be set by the plant height and not a set date. It will often be necessary to mow twice a week during periods of surge growth to help maintain plant health and color. Mowing should be less frequent during periods of heat and drought. The basic rule of thumb is to never remove more than 1/3 of the grass blade in one mowing. Removing more than half of the grass blade at a time can put the plant into shock, thus making it more susceptible to stress, disease and pests. A sharp mower blade is also key for clean cuts that heal quickly, versus a worn blade that invites disease and looks unsightly. A final mowing in November should be at two (2) inches to avoid matting and over wintering diseases.

Clipping Management: Clippings from all lawn areas will be left in place. Heavily clumped grass clippings are an indication of infrequent mowing, calling for an adjustment in the schedule. Heavy clumps must be raked in and dispersed by hand. Take care with the direction of mower machine movement - do not blow clippings into mulch beds and alternate patterns to assure an even cut and avoid soil compaction.

Topdressing: Topdressing is a practice of adding a small amount of sterile compost to the surface of the turf to reduce the development of thatch. Fine lawns will be topdressed annually with an approved source of composted organic matter, or as needed based on the turfgrass growth rate.

Integrated Pest Management: The basic goal and philosophy of the Integrated Pest Management (IPM) program is to produce a healthy, pest resistant lawn that will have little or no impact on the surrounding environment. Every available pest management practice will be utilized in order to not use pesticides. A new site provides the opportunity to construct a system that is less prone to stress, which is often the main cause of pest damage or invasion of weedy species.

The components of this IPM plan as established for New England sites are: proper grass selection, developing the site specific pest knowledge base, using action thresholds, soil, plant tissue and water testing, pest management options (cultural and biological) and yearly evaluation on the effectiveness of program and modification of plan.

It is anticipated that, after the first year of establishment of this site, weed problems will tend to be minimal. This is a result of sound site practices that will produce a dense, competitive environment against weed encroachment. Thus, the anticipated weeds on this site will be limited to broad leaf weeds and crabgrass, and less frequently moss. Weed control measures will be minimized to prevent runoff to the river area.

Standard 10: Prohibition of Illicit Discharges

As provided for in the 2008 MADEP Stormwater Handbook and the 2008 amendments to 310 CMR 10.00 et. seq. (MAWPA Regs) the following will serve as the Illicit Discharge Compliance Statement for the project.

The existing developed site has no existing illicit discharges from the site. The new site is being designed such that there will not be any illicit discharges from the site.

Conclusion

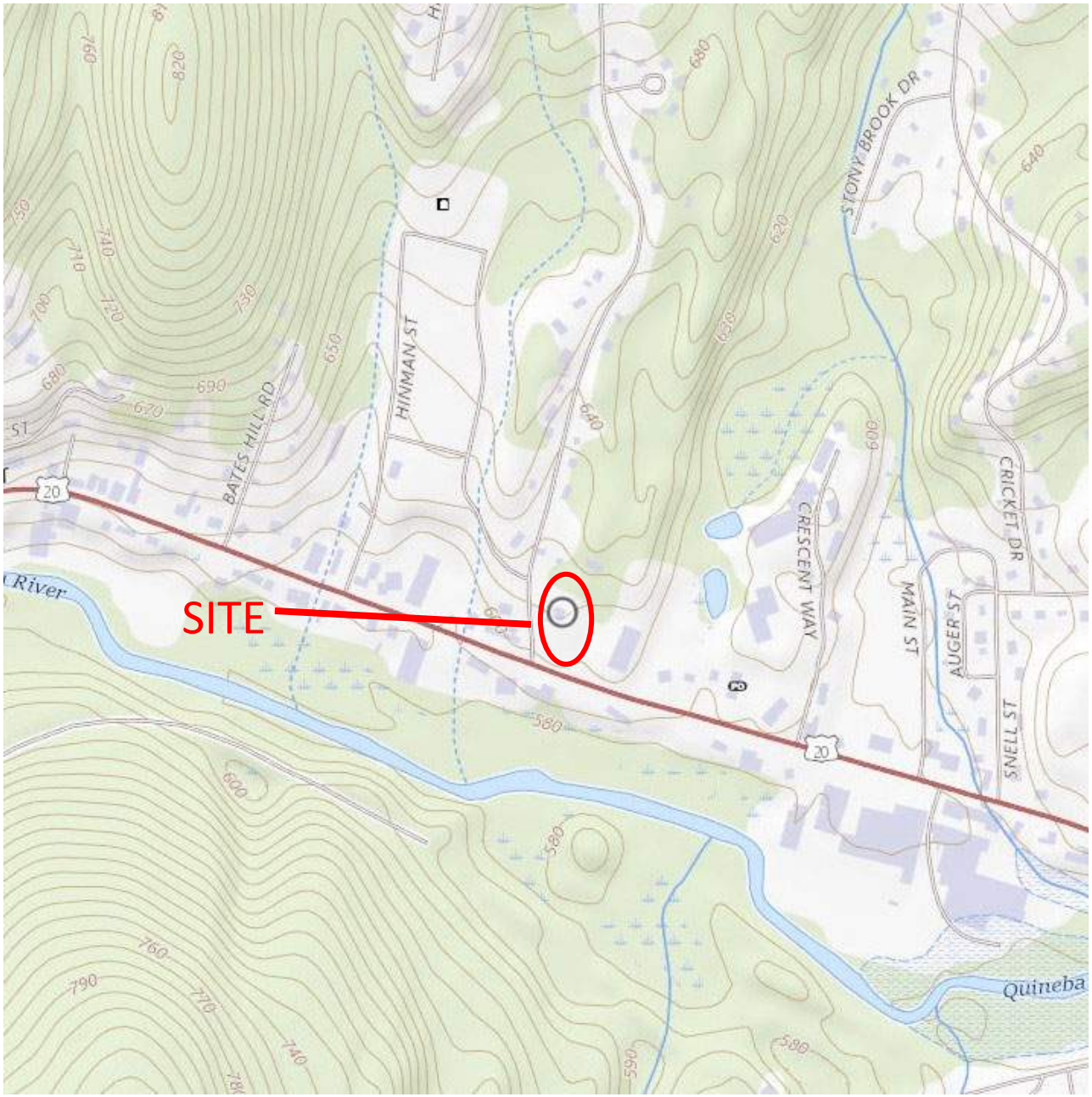
As demonstrated in this report, the construction of the proposed development will meet the requirements of the the Stormwater Management Regulations of the Town of Sturbridge and the Site Plan Review criteria of the Town of Sturbridge Planning Board.

.

LOCUS MAP &
NRCS SOIL MAP
TEST PIT/SOILS DATA

Regional Locus

480 Main Street, Sturbridge, MA



United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Worcester County, Massachusetts, Southern Part

February 9, 2023

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

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

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

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

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

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

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,210 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

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

MAP LEGEND

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

Soils
- Soil 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 1:25,000.

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: Worcester County, Massachusetts, Southern Part
Survey Area Data: Version 15, Sep 9, 2022

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

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

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
1	Water	0.9	2.5%
2A	Pootatuck fine sandy loam, 0 to 3 percent slopes, occasionally flooded	4.9	14.0%
3A	Scarboro and Walpole soils, 0 to 3 percent slopes	1.0	2.9%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	0.3	0.7%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	2.7	7.8%
401B	Brookfield fine sandy loam, 3 to 8 percent slopes, extremely stony	8.2	23.5%
401C	Brookfield fine sandy loam, 8 to 15 percent slopes, extremely stony	1.5	4.2%
420B	Canton fine sandy loam, 3 to 8 percent slopes	14.1	40.3%
420C	Canton fine sandy loam, 8 to 15 percent slopes	1.4	4.1%
Totals for Area of Interest		**35.0**	**100.0%**

Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties

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

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

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

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

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

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

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

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

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

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

Worcester County, Massachusetts, Southern Part

1—Water

Map Unit Setting

National map unit symbol: 9bgp
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Setting

Landform: Lakes

2A—Pootatuck fine sandy loam, 0 to 3 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2zvdw
Elevation: 150 to 770 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 145 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Pootatuck and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pootatuck

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

O - 0 to 2 inches: muck
H2 - 2 to 12 inches: fine sandy loam
H3 - 12 to 27 inches: fine sandy loam
H4 - 27 to 65 inches: stratified gravelly coarse sand to loamy fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 19 to 23 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F144AY012CT - Sandy Low Floodplain
Hydric soil rating: No

Minor Components

Rippowam

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

Occum

Percent of map unit: 10 percent
Hydric soil rating: No

Whitman

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

3A—Scarboro and Walpole soils, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svks
Elevation: 160 to 480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Scarboro and similar soils: 45 percent
Walpole and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Scarboro

Setting

Landform: Drainageways, depressions, outwash deltas, outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy glaciofluvial deposits derived from schist and/or sandy glaciofluvial deposits derived from gneiss and/or sandy glaciofluvial deposits derived from granite

Typical profile

Oe - 0 to 3 inches: mucky peat
A - 3 to 11 inches: mucky fine sandy loam
Cg1 - 11 to 21 inches: sand
Cg2 - 21 to 65 inches: gravelly coarse sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (1.42 to 14.17 in/hr)
Depth to water table: About 0 to 2 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Ecological site: F144AY031MA - Very Wet Outwash
Hydric soil rating: Yes

Description of Walpole

Setting

Landform: Depressions on outwash plains, drainageways on outwash terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip, talf
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss

Typical profile

O - 0 to 2 inches: muck
A - 2 to 11 inches: fine sandy loam
Bg - 11 to 24 inches: fine sandy loam
Bw - 24 to 28 inches: sandy loam
Cg - 28 to 65 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

Minor Components

Wareham

Percent of map unit: 10 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 10 percent
Landform: Swamps, bogs
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

71B—Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w69c
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, extremely stony, and similar soils: 80 percent
Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

Landform: Drumlins, depressions, ground moraines, hills, drainageways
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Woodbridge, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Whitman, extremely stony

Percent of map unit: 8 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave

Hydric soil rating: Yes

Paxton, extremely stony

Percent of map unit: 2 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

305C—Paxton fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w66y
Elevation: 0 to 1,320 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Paxton

Setting

Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches

Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 7 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge

Percent of map unit: 6 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 2 percent
Landform: Drumlins, drainageways, depressions, ground moraines, hills
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

401B—Brookfield fine sandy loam, 3 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 9bd2
Elevation: 510 to 1,020 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Brookfield and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brookfield

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable coarse-loamy eolian deposits over friable coarse-loamy basal till derived from mica schist

Typical profile

O - 0 to 1 inches: muck
H2 - 1 to 3 inches: fine sandy loam
H3 - 3 to 32 inches: gravelly fine sandy loam
H4 - 32 to 41 inches: gravelly loamy sand
H5 - 41 to 65 inches: sandy loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Brimfield

Percent of map unit: 10 percent
Hydric soil rating: No

Charlton

Percent of map unit: 10 percent
Hydric soil rating: No

Paxton

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

401C—Brookfield fine sandy loam, 8 to 15 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 9bd3
Elevation: 560 to 970 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Brookfield

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable coarse-loamy eolian deposits over friable coarse-loamy basal till derived from mica schist

Typical profile

O - 0 to 1 inches: muck
H2 - 1 to 3 inches: fine sandy loam
H3 - 3 to 32 inches: gravelly fine sandy loam
H4 - 32 to 41 inches: gravelly loamy sand
H5 - 41 to 65 inches: sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Brimfield
Percent of map unit: 10 percent
Hydric soil rating: No

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

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

420B—Canton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 2w81b
Elevation: 0 to 1,180 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

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

Description of Canton

Setting
Landform: Hills, moraines, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile
Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: gravelly fine sandy loam
2C - 26 to 65 inches: gravelly loamy sand

Properties and qualities
Slope: 3 to 8 percent

Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Scituate

Percent of map unit: 10 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Montauk

Percent of map unit: 5 percent
Landform: Moraines, ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Charlton

Percent of map unit: 4 percent
Landform: Ridges, ground moraines, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Swansea

Percent of map unit: 1 percent
Landform: Marshes, depressions, bogs, swamps, kettles
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

420C—Canton fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w817
Elevation: 0 to 1,330 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Canton

Setting

Landform: Hills, moraines, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: gravelly fine sandy loam
2C - 26 to 65 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands

Hydric soil rating: No

Minor Components

Montauk

Percent of map unit: 6 percent
Landform: Moraines, ground moraines, hills, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Scituate

Percent of map unit: 6 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Newfields

Percent of map unit: 4 percent
Landform: Ground moraines, hills, moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Charlton

Percent of map unit: 4 percent
Landform: Ridges, ground moraines, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Commonwealth of Massachusetts
City/Town of Sturbridge

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-1

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-8”	Ap	2.5Y3/2				Fine Sandy Loam					
8-16”	B	10YR5/6				Sandy Loam					
16-35”	C1	2.5Y6/4				Sandy Loam	5%				
35-86”	C2	2.5Y6/3	36”			Sandy Loam	5%				

Additional Notes:

Mottles at 36”. Weeping at 38” No Standing water.

Commonwealth of Massachusetts
City/Town of Sturbridge
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-2

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stone s			
0-33”	Fill	10 YR 3/2				Fine Sandy Loam					
33”-36”	B	10YR4/6				Sandy Loam					
36”-65”	C1	2.5Y5/4				Sandy Loam					
65-75”	C2	2.5Y4/6	75”			Sand					
75-86”	C3	2.5Y5/4				Sandy Loam					

Additional Notes:

No Standing or weeping water.

Commonwealth of Massachusetts
City/Town of Sturbridge

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-3

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-20”	Fill	10YR3/2				Fine Sandy Loam	5%	20%			
20-32”	B	10YR4/6				Sandy Loam	5%	10%			
32-82”	C1	2.5Y5/3	36”			Sandy Loam	5%	10%			

Additional Notes:

Mottles at 36”. Weeping at 39”. No Standing water.

Commonwealth of Massachusetts
City/Town of Sturbridge
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-4

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stone s			
0-55”	Fill	10 YR 3/2				Mix	20%	20%			
55”-85”	C	2.5Y5/3	65”			Sandy Loam					

Additional Notes:

Mottles at 65”. No standing or weeping water.

Commonwealth of Massachusetts
City/Town of Sturbridge
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-5

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-77”	FILL	10YR3/2									
77-96”	C	2.5Y3/2									

Additional Notes:

No Mottles. No Weeping. No Standing water.

Commonwealth of Massachusetts
City/Town of Sturbridge
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (continued)

Deep Observation Hole Number: TP-6

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stone s			
0-36”	FILL	10YR3/2				Fine Sandy Loam	20%	20%			
36-43”	Ab	10YR3/2				Fine Sandy Loam	5%				
43-66”	B	10YR5/6				Sandy Loam	5%				
66-96”	C	2.5Y3/2				Sandy Loam	5%				

Additional Notes:

No Mottles. No Weeping. No Standing water.

TSS REMOVAL CHARTS

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Pretreatment Underground Infiltration North

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Catch Basin	25%	1.00	0.25	0.75
CDS Unit	80%	0.75	0.60	0.15

Total TSS Removal = 85%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Stw. Senior Center

Prepared By: JRM

Date: 2/13/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Underground Infiltration North

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
SC-740	80%	1.00	0.80	0.20

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Stur. Senior Center

Prepared By: JRM

Date: 2/13/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Pretreatment

Location: Underground Infiltration South

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Catch Basin	25%	1.00	0.25	0.75
CDS Unit	80%	0.75	0.60	0.15

Total TSS Removal = 85%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Stur. Senior Center

Prepared By: JRM

Date: 2/13/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Underground Infiltration South

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
SC-740	80%	1.00	0.80	0.20

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: Stur. Senior Center

Prepared By: JRM

Date: 2/13/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

STURBRIDGE SENIOR CENTER
STURBRIDGE , MA

Area	0.76 ac	Unit Site Designation	PS#1
Weighted C	0.9	Rainfall Station #	70
t_c	6 min		
CDS Model	2015-4	CDS Treatment Capacity	**1.4 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.04	15.1%	15.1%	0.03	0.03	14.5
0.08	24.6%	39.7%	0.05	0.05	23.2
0.12	13.7%	53.4%	0.08	0.08	12.8
0.16	9.4%	62.8%	0.11	0.11	8.7
0.20	6.6%	69.5%	0.14	0.14	6.0
0.24	5.2%	74.7%	0.16	0.16	4.7
0.28	4.8%	79.5%	0.19	0.19	4.2
0.32	3.1%	82.6%	0.22	0.22	2.7
0.36	2.7%	85.3%	0.24	0.24	2.3
0.40	2.1%	87.4%	0.27	0.27	1.8
0.48	2.5%	89.9%	0.33	0.33	2.0
0.56	2.0%	91.9%	0.38	0.38	1.6
0.64	1.4%	93.3%	0.43	0.43	1.1
0.72	1.0%	94.3%	0.49	0.49	0.7
0.80	1.1%	95.4%	0.54	0.54	0.8
1.00	1.6%	97.1%	0.68	0.68	1.1
1.20	0.9%	98.0%	0.82	0.82	0.5
1.40	0.6%	98.6%	0.95	0.95	0.3
1.60	0.5%	99.1%	1.09	1.09	0.2
1.80	0.5%	99.6%	1.22	1.22	0.2
0.00	0.0%	99.6%	0.00	0.00	0.0
					89.3
				Removal Efficiency Adjustment[2] =	0.0%
				Predicted % Annual Rainfall Treated =	99.6%
				Predicted Net Annual Load Removal Efficiency =	**89.3%**

1 - Based on 14 years of 15-minute rainfall data from NCDC Station 2107, East Brimfield Lake, Worcester County, M
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

STURBRIDGE SENIOR CENTER
STURBRIDGE , MA

Area	**0.44 ac**	Unit Site Designation	**PS#2**
Weighted C	**0.9**	Rainfall Station #	**70**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.04	15.1%	15.1%	0.02	0.02	14.6
0.08	24.6%	39.7%	0.03	0.03	23.4
0.12	13.7%	53.4%	0.05	0.05	12.9
0.16	9.4%	62.8%	0.06	0.06	8.7
0.20	6.6%	69.5%	0.08	0.08	6.1
0.24	5.2%	74.7%	0.09	0.09	4.8
0.28	4.8%	79.5%	0.11	0.11	4.3
0.32	3.1%	82.6%	0.13	0.13	2.8
0.36	2.7%	85.3%	0.14	0.14	2.4
0.40	2.1%	87.4%	0.16	0.16	1.8
0.48	2.5%	89.9%	0.19	0.19	2.1
0.56	2.0%	91.9%	0.22	0.22	1.7
0.64	1.4%	93.3%	0.25	0.25	1.1
0.72	1.0%	94.3%	0.28	0.28	0.8
0.80	1.1%	95.4%	0.31	0.31	0.8
1.00	1.6%	97.1%	0.39	0.39	1.2
1.20	0.9%	98.0%	0.47	0.47	0.6
1.40	0.6%	98.6%	0.55	0.55	0.4
1.60	0.5%	99.1%	0.63	0.63	0.3
1.80	0.5%	99.6%	0.71	0.71	0.2
0.00	0.0%	99.6%	0.00	0.00	0.0
					90.8
				Removal Efficiency Adjustment[2] =	0.0%
				Predicted % Annual Rainfall Treated =	99.6%
				Predicted Net Annual Load Removal Efficiency =	**90.8%**

1 - Based on 14 years of 15-minute rainfall data from NCDC Station 2107, East Brimfield Lake, Worcester County, M
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Project: Sturbridge Senior Center
Location: Sturbridge , MA
Prepared For: Waterfield Design Group

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

$$Q = (qu)\ (A)\ (WQV)$$

where:

Q = flow rate associated with first 1" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
PS#1	0.76	0.0011797	6.0	0.100	1.00	774.00	0.91
PS#2	0.44	0.0006813	6.0	0.100	1.00	774.00	0.53

RECHARGE CALCULATIONS
& 1” VOLUME INFILTRATION

Project Name:	Town of Sturbridge Senior Center	Sheet No.:	1
Done by:	JRM	Date:	2/17/2023

Recharge Volume Calculations

480 Main Street

Paved Area (HSG B) = 40,075.2 SF

Infiltration Volume

HSG B Volume = .35"/12 0.029167 ft.

Volume .029167 ft. * 40,075 SF 1,169 cu. ft.

Underground Infiltration System Volume Provided (From HCAD) = 15,940 cu. ft.

Retain 1" of Total Post-Construction Impervious Surface

1" Volume = 1"/12 0.083333 ft.

Volume = .083333 ft. * 40,075 SF 3,340 cu. ft.

Underground Infiltration System Volume Provided (From HCAD) = 15,940 cu. ft.

Underground Infiltration System Rear

Bottom of Stone Elevation = 607.5
High Groundwater Elevation = 604.3
3.2' > 2.0' Required

Time to empty based on Rawls Rate for B Soils:

610.75 - 607.50 = 3.25' = 39"

Time to empty = 39"/1.02 in./hr. = 38.3 hrs.

38.3 hrs. < 72 hrs.

Underground Infiltration System Front

Bottom of Stone Elevation = 600.5
High Groundwater Elevation = 597.5
3.0' > 2.0' Required

Time to empty based on Rawls Rate for B Soils:

603.75 - 600.50 = 3.25' = 39"

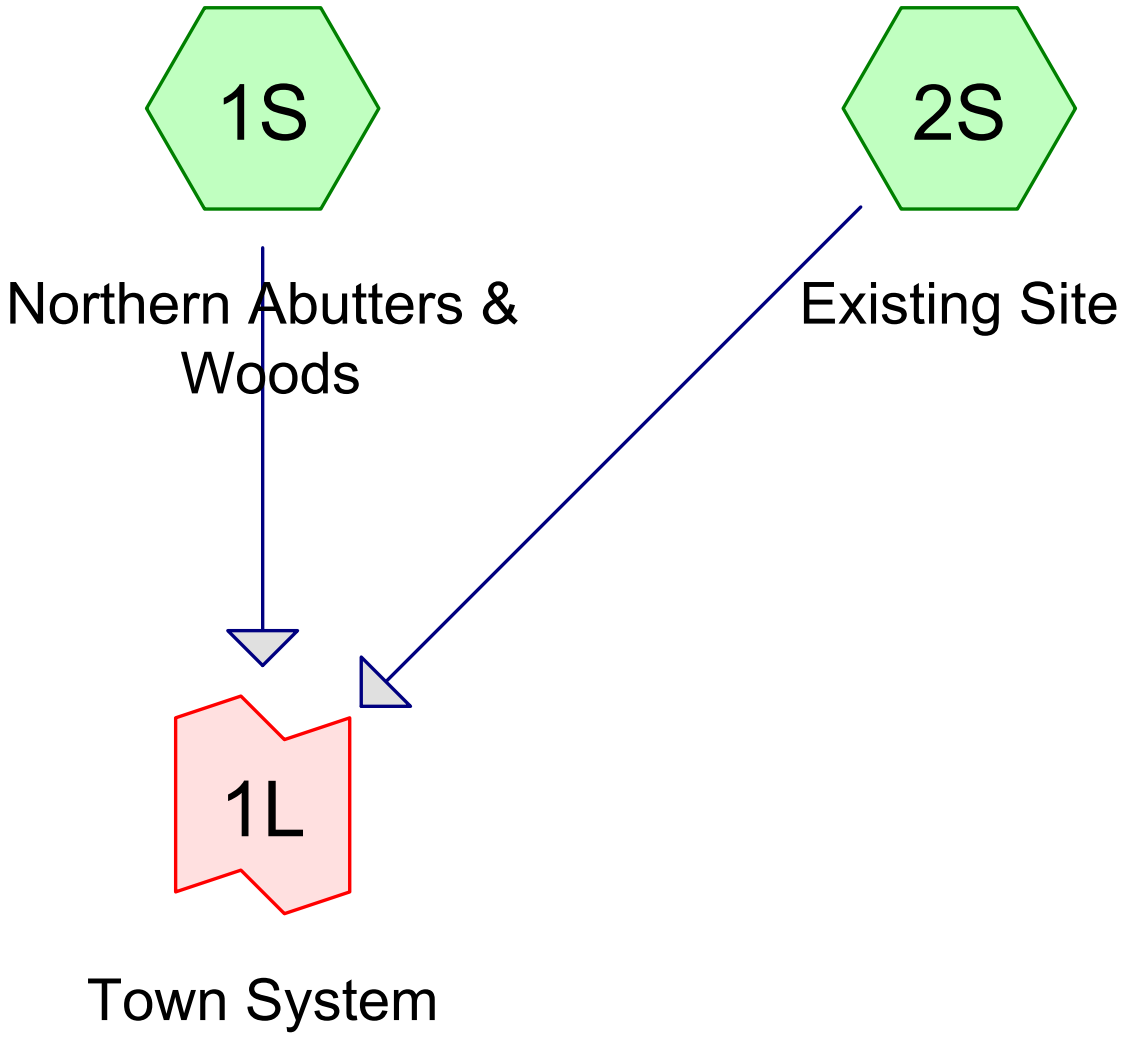
Time to empty = 39"/1.02 in./hr. = 38.3 hrs.

38.3 hrs. < 72 hrs.

EXISTING CONDITIONS

RUNOFF & VOLUME CALCULATIONS

(2, 10, & 100 YEAR STORMS)



Subcat Reach Pond Link

Routing Diagram for Existing Conditions - 2-15-23
Prepared by Waterfield Design Group, Printed 2/15/2023

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Northern Abutters & Runoff Area=129,244 sf 12.22% Impervious Runoff Depth=0.65"
Flow Length=927' Tc=42.7 min CN=67 Runoff=0.89 cfs 0.161 af

Subcatchment 2S: Existing Site Runoff Area=53,232 sf 37.77% Impervious Runoff Depth=1.35"
Flow Length=250' Tc=6.0 min CN=80 Runoff=1.87 cfs 0.137 af

Link 1L: Town System Inflow=1.94 cfs 0.298 af
Primary=1.94 cfs 0.298 af

Summary for Subcatchment 1S: Northern Abutters & Woods

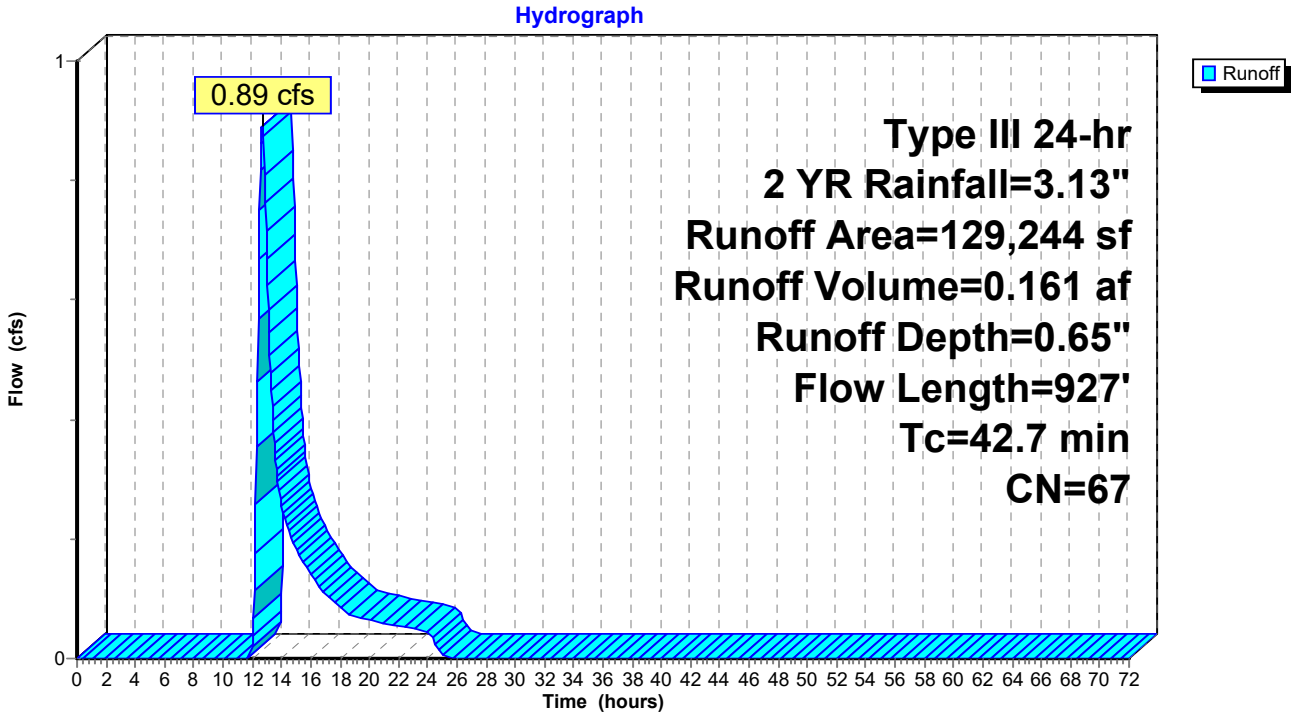
Runoff = 0.89 cfs @ 12.69 hrs, Volume= 0.161 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.13"

	Area (sf)	CN	Description
*	6,719	98	Paved Road HSB B
	30,242	69	50-75% Grass cover, Fair, HSG B
*	9,074	98	Buildings
	83,209	60	Woods, Fair, HSG B
	129,244	67	Weighted Average
	113,451		87.78% Pervious Area
	15,793		12.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
2.3	200	0.0500	1.42	31.29	**Channel Flow, Drain Channel #1** Area= 22.0 sf Perim= 12.0' r= 1.83' n= 0.350
0.3	200	0.0150	13.10	786.18	**Channel Flow, Draing Channel #2** Area= 60.0 sf Perim= 15.0' r= 4.00' n= 0.035
42.7	927	Total			

Subcatchment 1S: Northern Abutters & Woods



Summary for Subcatchment 2S: Existing Site

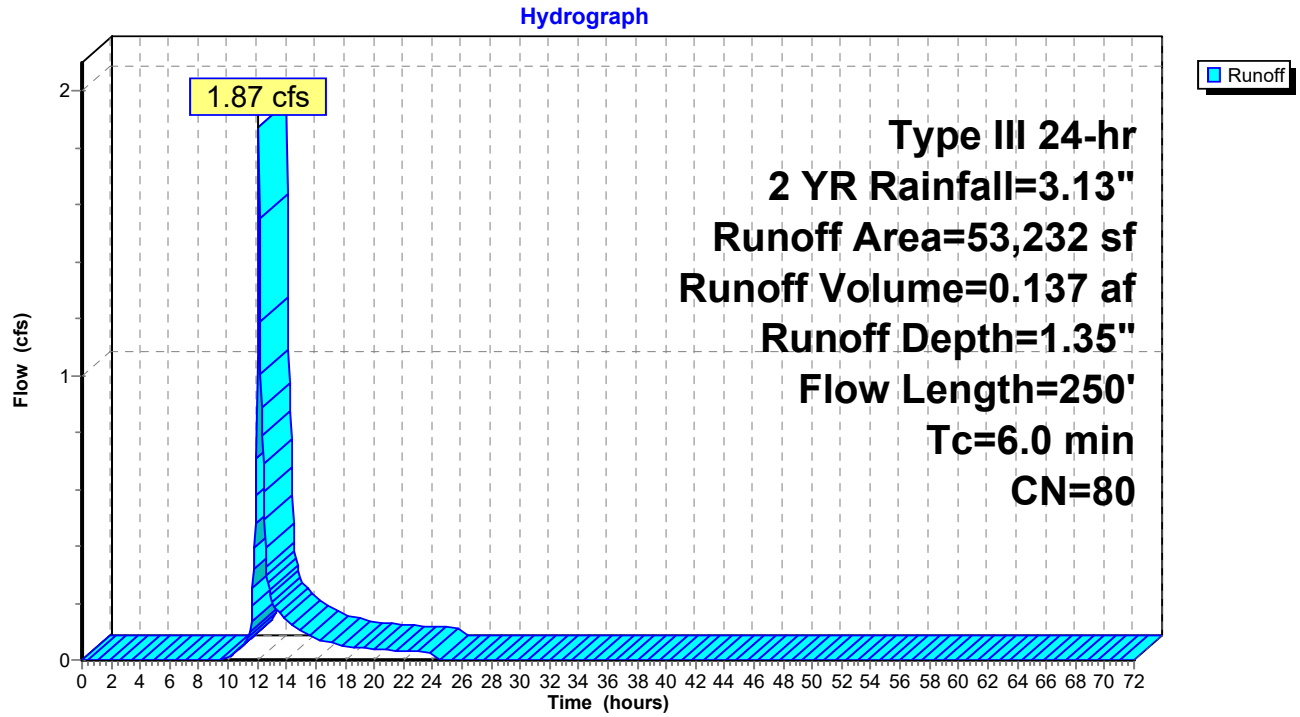
Runoff = 1.87 cfs @ 12.10 hrs, Volume= 0.137 af, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.13"

	Area (sf)	CN	Description
*	16,831	98	Paved Road HSB B
	33,128	69	50-75% Grass cover, Fair, HSG B
*	3,273	98	Buildings
	53,232	80	Weighted Average
	33,128		62.23% Pervious Area
	20,104		37.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.38		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.20"
1.6	150	0.0500	1.57		**Shallow Concentrated Flow, Lawn** Short Grass Pasture Kv= 7.0 fps
3.2					**Direct Entry, Direct Entry**
6.0	250	Total			

Subcatchment 2S: Existing Site

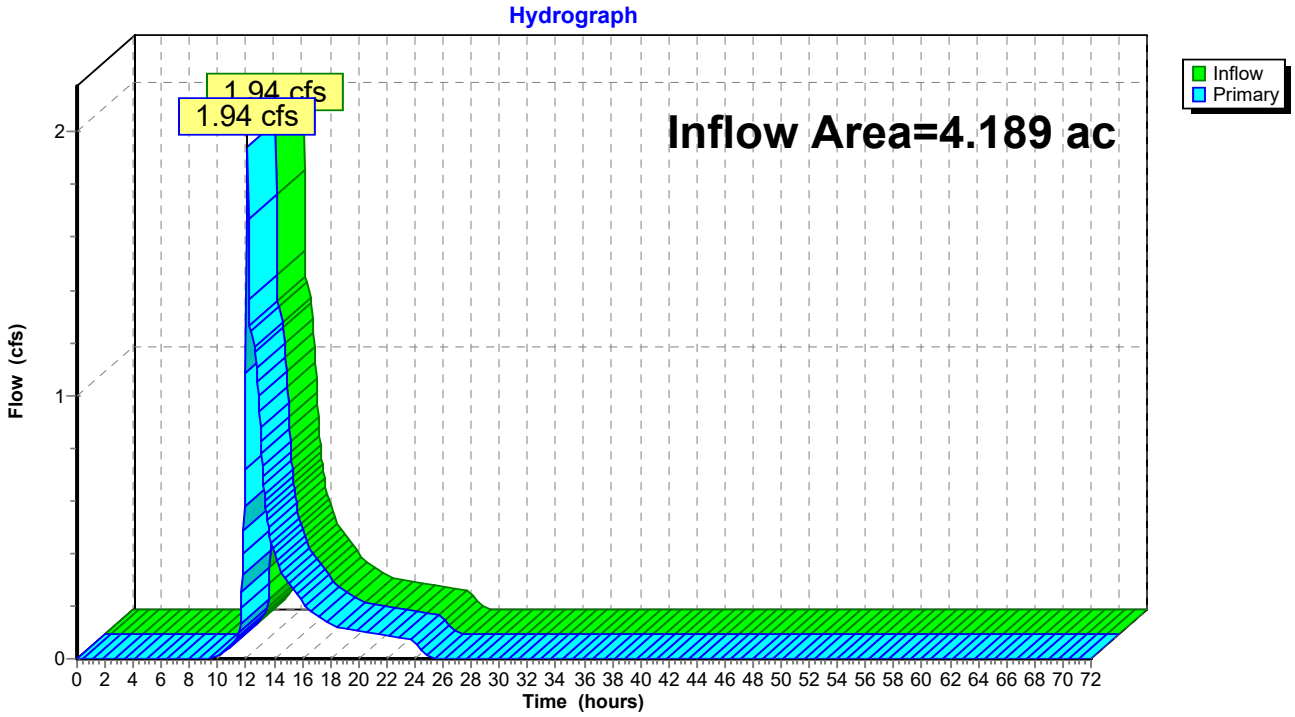


Summary for Link 1L: Town System

Inflow Area = 4.189 ac, 19.67% Impervious, Inflow Depth = 0.85" for 2 YR event
Inflow = 1.94 cfs @ 12.10 hrs, Volume= 0.298 af
Primary = 1.94 cfs @ 12.10 hrs, Volume= 0.298 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Town System



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Northern Abutters & Runoff Area=129,244 sf 12.22% Impervious Runoff Depth=1.56"
Flow Length=927' Tc=42.7 min CN=67 Runoff=2.45 cfs 0.385 af

Subcatchment 2S: Existing Site Runoff Area=53,232 sf 37.77% Impervious Runoff Depth=2.58"
Flow Length=250' Tc=6.0 min CN=80 Runoff=3.63 cfs 0.263 af

Link 1L: Town System Inflow=4.12 cfs 0.648 af
Primary=4.12 cfs 0.648 af

Summary for Subcatchment 1S: Northern Abutters & Woods

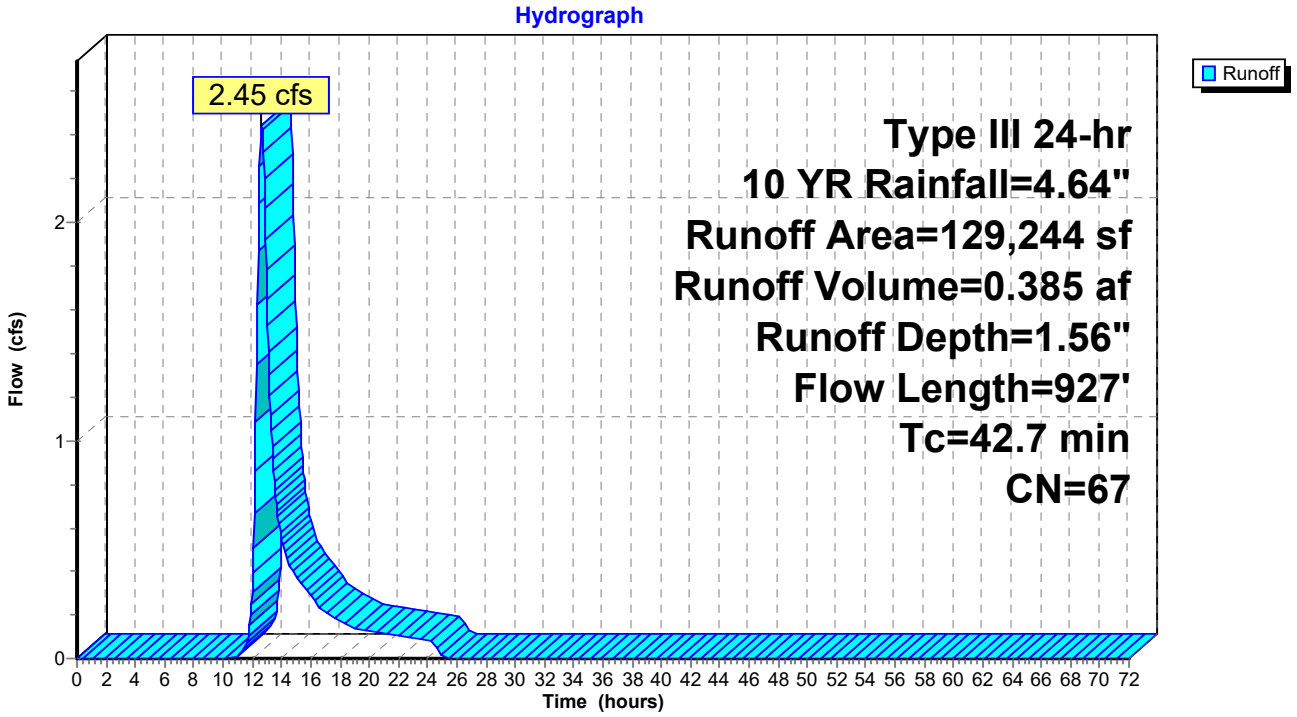
Runoff = 2.45 cfs @ 12.63 hrs, Volume= 0.385 af, Depth= 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.64"

	Area (sf)	CN	Description
*	6,719	98	Paved Road HSB B
	30,242	69	50-75% Grass cover, Fair, HSG B
*	9,074	98	Buildings
	83,209	60	Woods, Fair, HSG B
	129,244	67	Weighted Average
	113,451		87.78% Pervious Area
	15,793		12.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
2.3	200	0.0500	1.42	31.29	**Channel Flow, Drain Channel #1** Area= 22.0 sf Perim= 12.0' r= 1.83' n= 0.350
0.3	200	0.0150	13.10	786.18	**Channel Flow, Draing Channel #2** Area= 60.0 sf Perim= 15.0' r= 4.00' n= 0.035
42.7	927	Total			

Subcatchment 1S: Northern Abutters & Woods



Summary for Subcatchment 2S: Existing Site

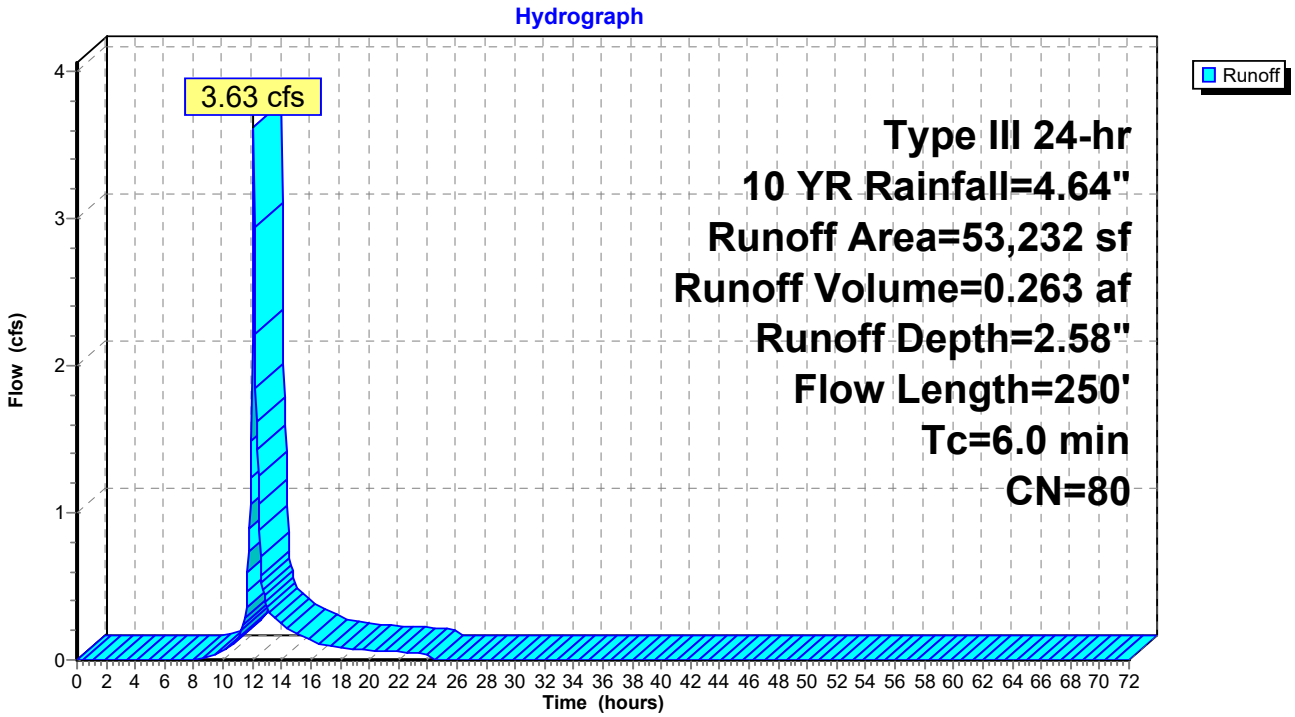
Runoff = 3.63 cfs @ 12.09 hrs, Volume= 0.263 af, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.64"

	Area (sf)	CN	Description
*	16,831	98	Paved Road HSB B
	33,128	69	50-75% Grass cover, Fair, HSG B
*	3,273	98	Buildings
	53,232	80	Weighted Average
	33,128		62.23% Pervious Area
	20,104		37.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.38		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.20"
1.6	150	0.0500	1.57		**Shallow Concentrated Flow, Lawn** Short Grass Pasture Kv= 7.0 fps
3.2					**Direct Entry, Direct Entry**
6.0	250	Total			

Subcatchment 2S: Existing Site

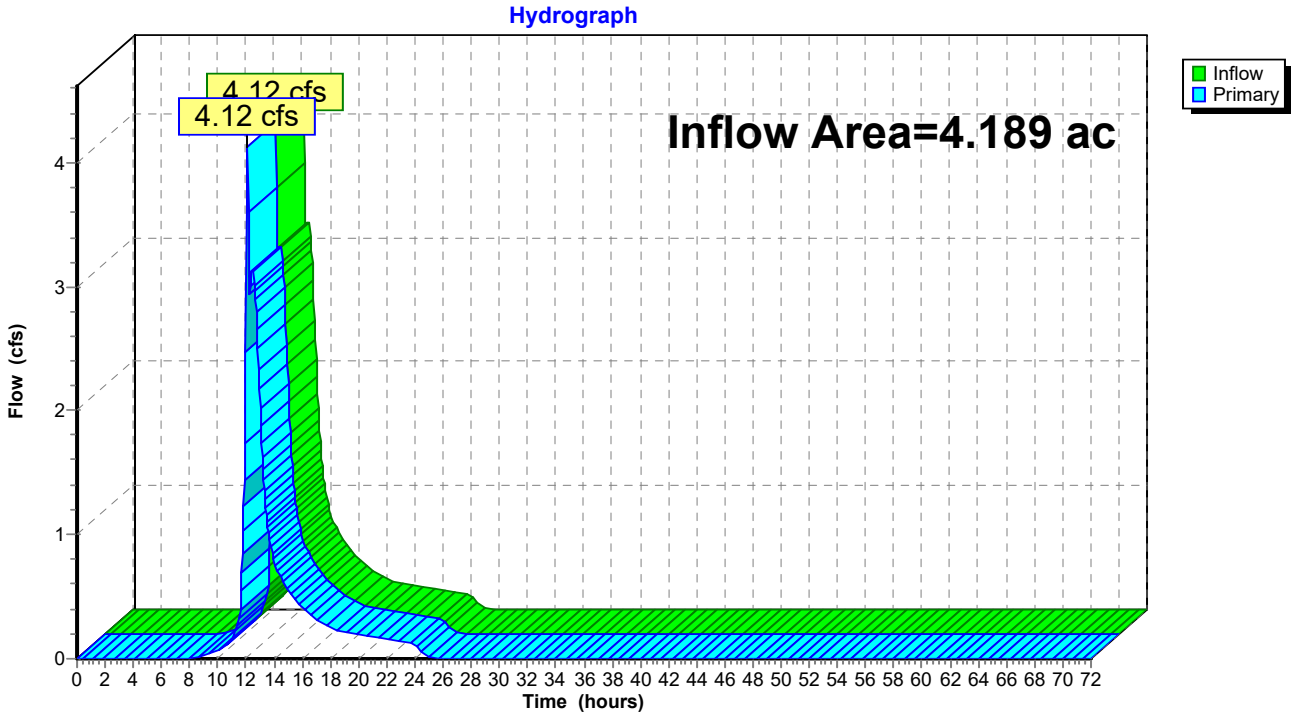


Summary for Link 1L: Town System

Inflow Area = 4.189 ac, 19.67% Impervious, Inflow Depth = 1.86" for 10 YR event
Inflow = 4.12 cfs @ 12.10 hrs, Volume= 0.648 af
Primary = 4.12 cfs @ 12.10 hrs, Volume= 0.648 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Town System



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Northern Abutters & Runoff Area=129,244 sf 12.22% Impervious Runoff Depth=2.39"
Flow Length=927' Tc=42.7 min CN=67 Runoff=3.87 cfs 0.590 af

Subcatchment 2S: Existing Site Runoff Area=53,232 sf 37.77% Impervious Runoff Depth=3.61"
Flow Length=250' Tc=6.0 min CN=80 Runoff=5.05 cfs 0.368 af

Link 1L: Town System Inflow=6.00 cfs 0.958 af
Primary=6.00 cfs 0.958 af

Summary for Subcatchment 1S: Northern Abutters & Woods

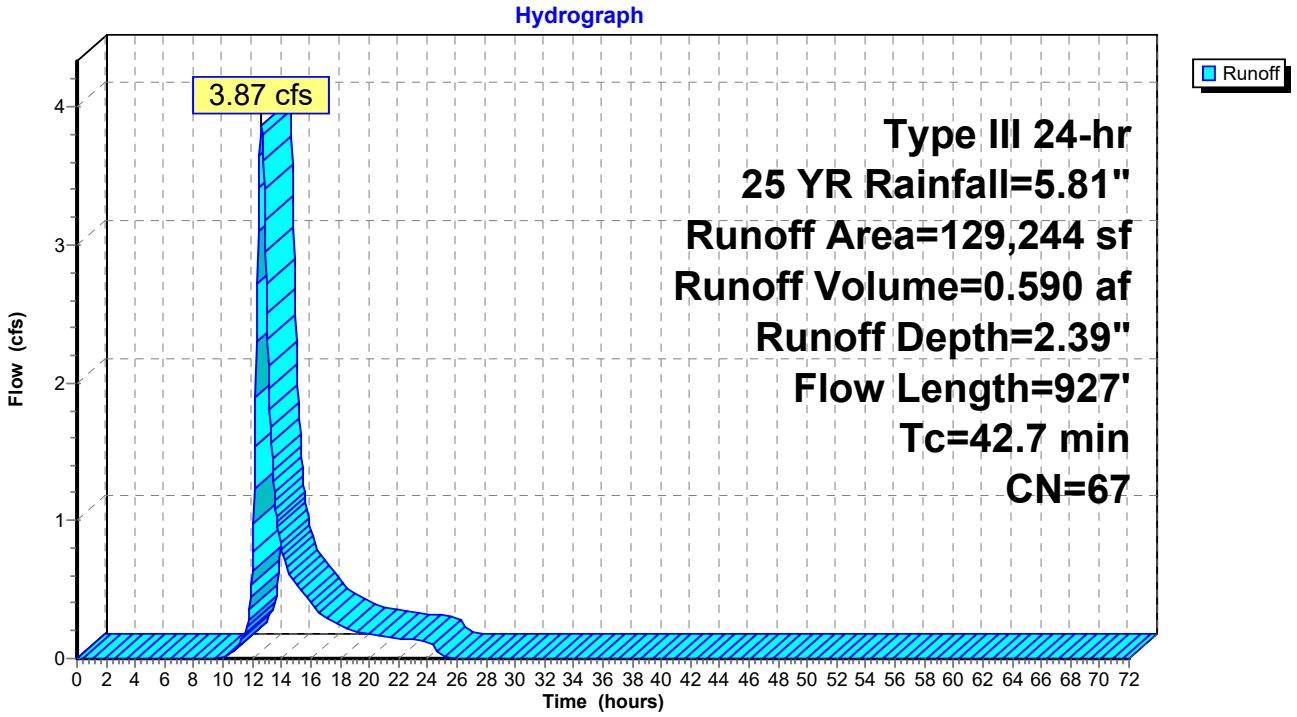
Runoff = 3.87 cfs @ 12.61 hrs, Volume= 0.590 af, Depth= 2.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.81"

	Area (sf)	CN	Description
*	6,719	98	Paved Road HSB B
	30,242	69	50-75% Grass cover, Fair, HSG B
*	9,074	98	Buildings
	83,209	60	Woods, Fair, HSG B
	129,244	67	Weighted Average
	113,451		87.78% Pervious Area
	15,793		12.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
2.3	200	0.0500	1.42	31.29	**Channel Flow, Drain Channel #1** Area= 22.0 sf Perim= 12.0' r= 1.83' n= 0.350
0.3	200	0.0150	13.10	786.18	**Channel Flow, Draing Channel #2** Area= 60.0 sf Perim= 15.0' r= 4.00' n= 0.035
42.7	927	Total			

Subcatchment 1S: Northern Abutters & Woods



Summary for Subcatchment 2S: Existing Site

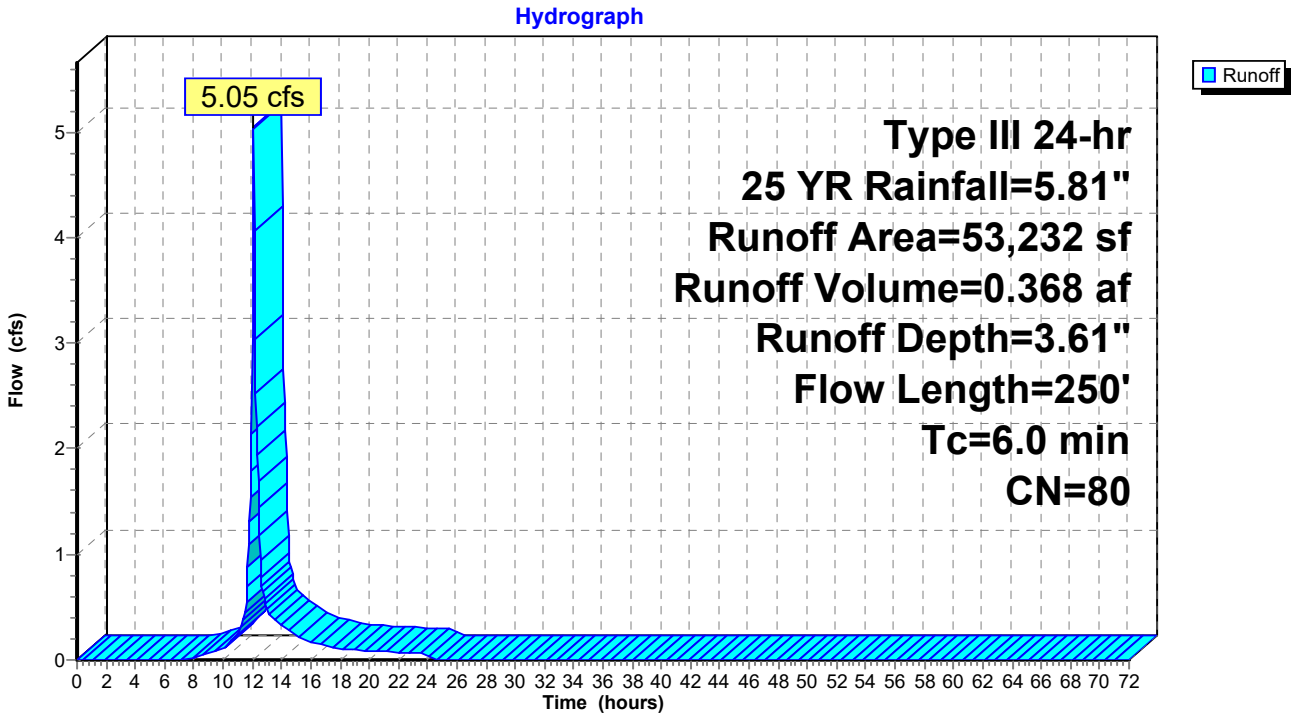
Runoff = 5.05 cfs @ 12.09 hrs, Volume= 0.368 af, Depth= 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.81"

	Area (sf)	CN	Description
*	16,831	98	Paved Road HSB B
	33,128	69	50-75% Grass cover, Fair, HSG B
*	3,273	98	Buildings
	53,232	80	Weighted Average
	33,128		62.23% Pervious Area
	20,104		37.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.38		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.20"
1.6	150	0.0500	1.57		**Shallow Concentrated Flow, Lawn** Short Grass Pasture Kv= 7.0 fps
3.2					**Direct Entry, Direct Entry**
6.0	250	Total			

Subcatchment 2S: Existing Site

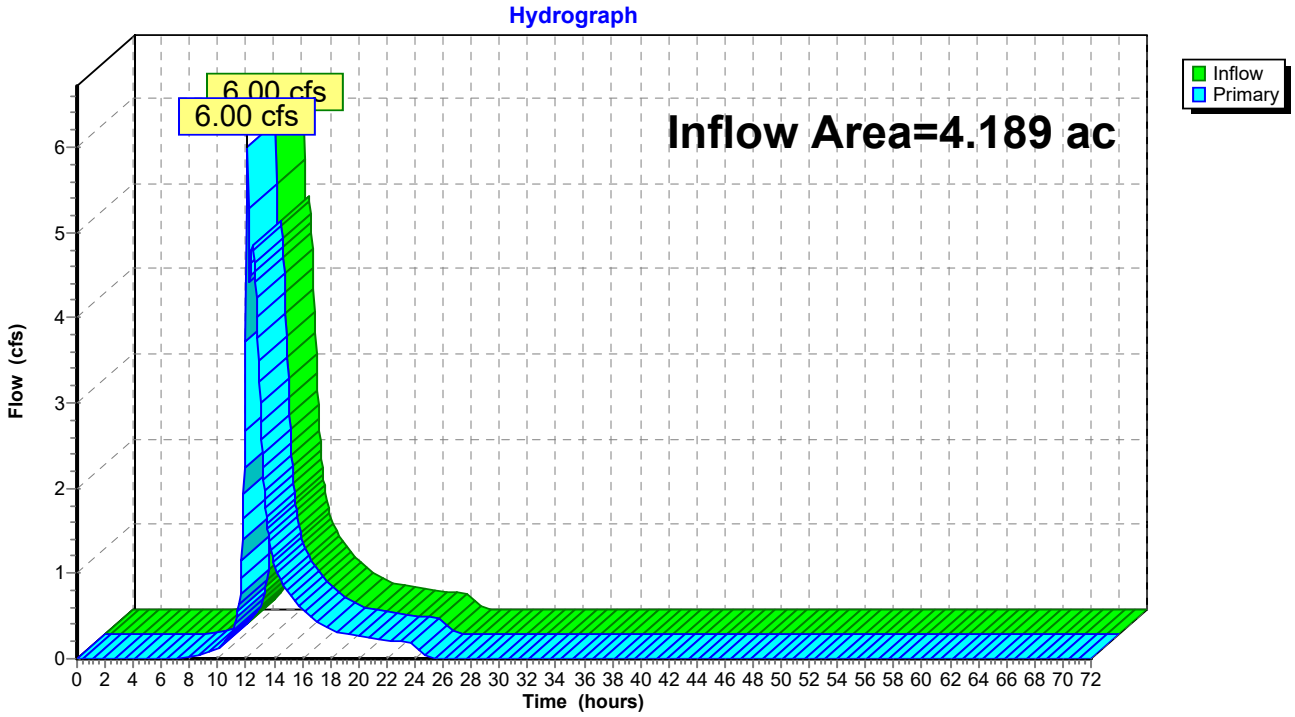


Summary for Link 1L: Town System

Inflow Area = 4.189 ac, 19.67% Impervious, Inflow Depth = 2.74" for 25 YR event
Inflow = 6.00 cfs @ 12.10 hrs, Volume= 0.958 af
Primary = 6.00 cfs @ 12.10 hrs, Volume= 0.958 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Town System



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Northern Abutters & Runoff Area=129,244 sf 12.22% Impervious Runoff Depth=4.28"
Flow Length=927' Tc=42.7 min CN=67 Runoff=7.07 cfs 1.058 af

Subcatchment 2S: Existing Site Runoff Area=53,232 sf 37.77% Impervious Runoff Depth=5.80"
Flow Length=250' Tc=6.0 min CN=80 Runoff=7.99 cfs 0.591 af

Link 1L: Town System Inflow=10.04 cfs 1.649 af
Primary=10.04 cfs 1.649 af

Summary for Subcatchment 1S: Northern Abutters & Woods

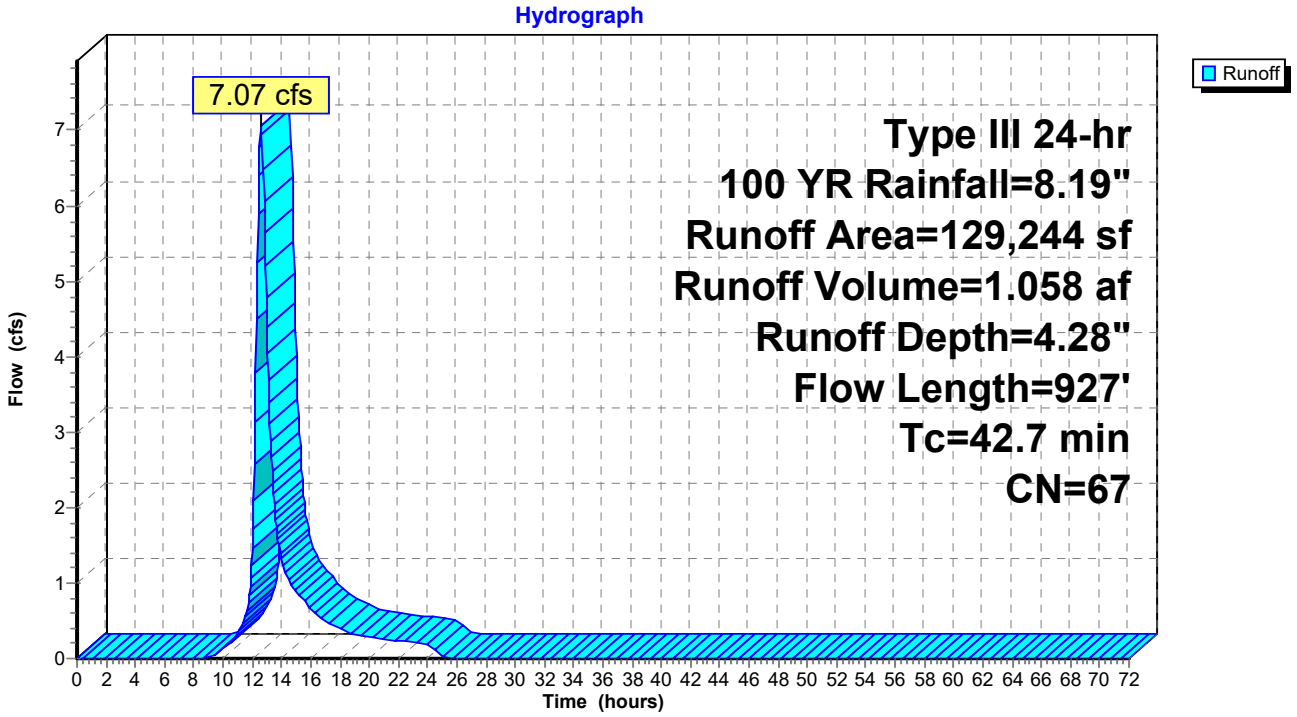
Runoff = 7.07 cfs @ 12.60 hrs, Volume= 1.058 af, Depth= 4.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=8.19"

	Area (sf)	CN	Description
*	6,719	98	Paved Road HSB B
	30,242	69	50-75% Grass cover, Fair, HSG B
*	9,074	98	Buildings
	83,209	60	Woods, Fair, HSG B
	129,244	67	Weighted Average
	113,451		87.78% Pervious Area
	15,793		12.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
2.3	200	0.0500	1.42	31.29	**Channel Flow, Drain Channel #1** Area= 22.0 sf Perim= 12.0' r= 1.83' n= 0.350
0.3	200	0.0150	13.10	786.18	**Channel Flow, Draing Channel #2** Area= 60.0 sf Perim= 15.0' r= 4.00' n= 0.035
42.7	927	Total			

Subcatchment 1S: Northern Abutters & Woods



Summary for Subcatchment 2S: Existing Site

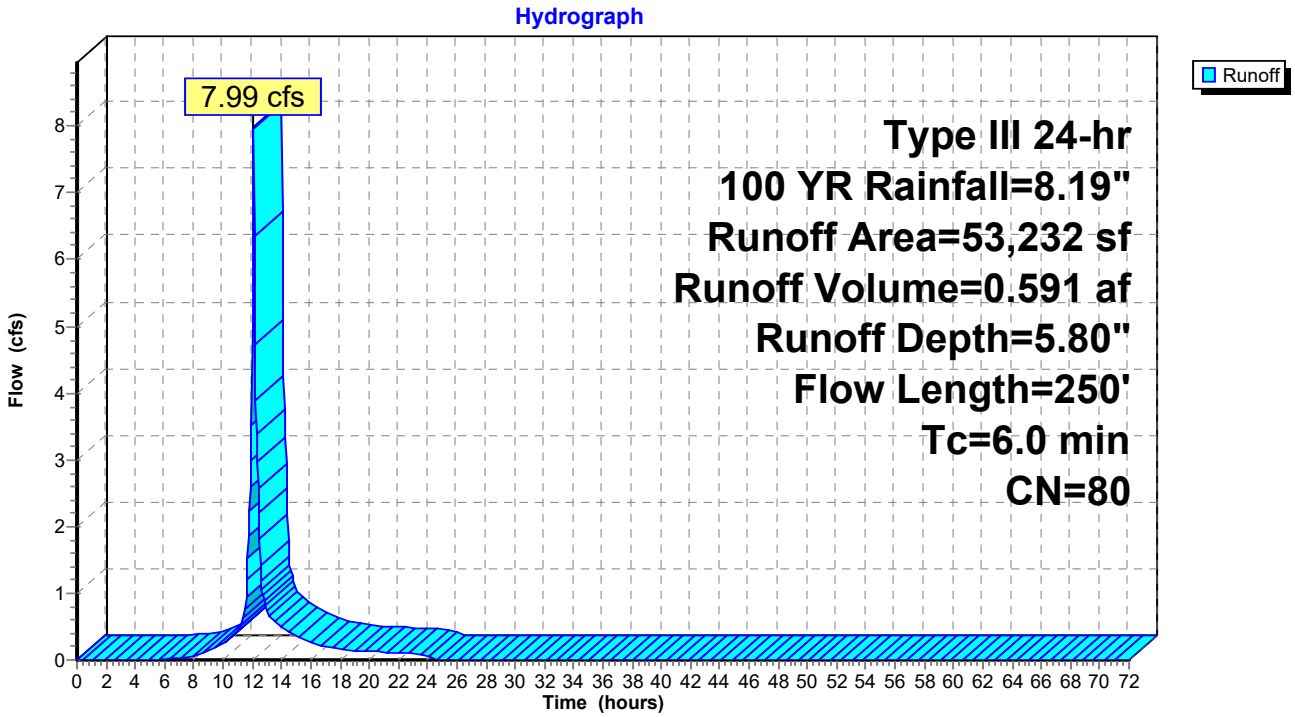
Runoff = 7.99 cfs @ 12.09 hrs, Volume= 0.591 af, Depth= 5.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=8.19"

	Area (sf)	CN	Description
*	16,831	98	Paved Road HSB B
	33,128	69	50-75% Grass cover, Fair, HSG B
*	3,273	98	Buildings
	53,232	80	Weighted Average
	33,128		62.23% Pervious Area
	20,104		37.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	100	0.0200	1.38		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.20"
1.6	150	0.0500	1.57		**Shallow Concentrated Flow, Lawn** Short Grass Pasture Kv= 7.0 fps
3.2					**Direct Entry, Direct Entry**
6.0	250	Total			

Subcatchment 2S: Existing Site

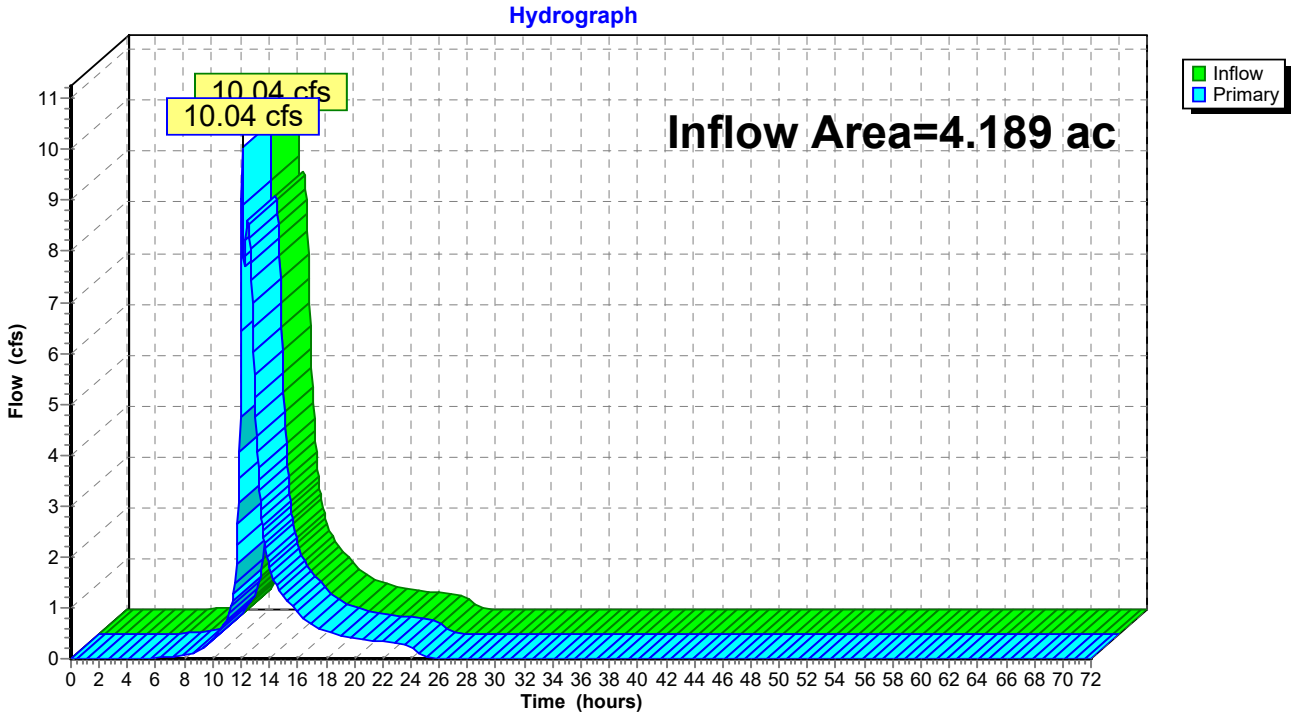


Summary for Link 1L: Town System

Inflow Area = 4.189 ac, 19.67% Impervious, Inflow Depth = 4.72" for 100 YR event
Inflow = 10.04 cfs @ 12.10 hrs, Volume= 1.649 af
Primary = 10.04 cfs @ 12.10 hrs, Volume= 1.649 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

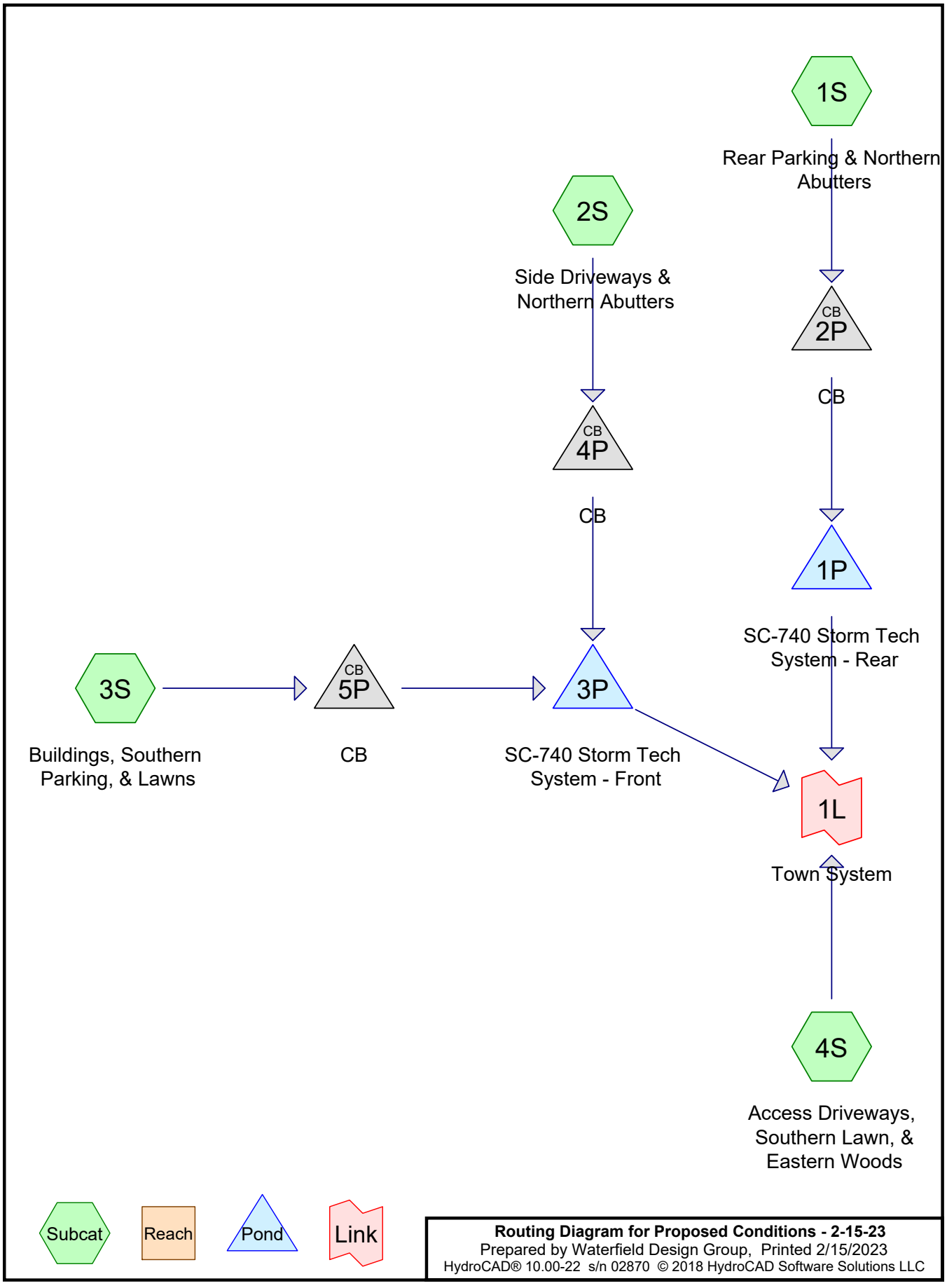
Link 1L: Town System



PROPOSED (SITE DEVELOPED) CONDITIONS

RUNOFF & VOLUME CALCULATIONS

(2, 10, & 100 YEAR STORMS)


1S
Rear Parking & Northern Abutters
2S
Side Driveways & Northern Abutters
CB
2P
CB
CB
4P
CB
1P
SC-740 Storm Tech System - Rear
3S
Buildings, Southern Parking, & Lawns
CB
5P
CB
3P
SC-740 Storm Tech System - Front
1L
Town System
4S
Access Driveways, Southern Lawn, & Eastern Woods
Subcat
Reach
Pond
Link
Routing Diagram for Proposed Conditions - 2-15-23
Prepared by Waterfield Design Group, Printed 2/15/2023
HydroCAD® 10.00-22 s/n 02870 © 2018 HydroCAD Software Solutions LLC

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Rear Parking & Runoff Area=72,157 sf 26.36% Impervious Runoff Depth=0.01"
Flow Length=527' Tc=40.1 min CN=72 Runoff=0.00 cfs 0.002 af

Subcatchment 2S: Side Driveways & Runoff Area=34,445 sf 36.79% Impervious Runoff Depth=0.05"
Flow Length=527' Tc=40.1 min CN=77 Runoff=0.01 cfs 0.003 af

Subcatchment 3S: Buildings, Southern Runoff Area=35,108 sf 57.63% Impervious Runoff Depth=0.36"
Tc=6.0 min CN=91 Runoff=0.32 cfs 0.024 af

Subcatchment 4S: Access Driveways, Runoff Area=40,758 sf 7.04% Impervious Runoff Depth=0.00"
Flow Length=579' Tc=33.3 min CN=68 Runoff=0.00 cfs 0.000 af

Pond 1P: SC-740 Storm Tech System - Rear Peak Elev=607.50' Storage=1 cf Inflow=0.00 cfs 0.002 af
Discarded=0.00 cfs 0.002 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.002 af

Pond 2P: CB Peak Elev=609.32' Inflow=0.00 cfs 0.002 af
12.0" Round Culvert n=0.013 L=95.0' S=0.0100 '/' Outflow=0.00 cfs 0.002 af

Pond 3P: SC-740 Storm Tech System - Front Peak Elev=600.56' Storage=156 cf Inflow=0.32 cfs 0.027 af
Discarded=0.15 cfs 0.027 af Primary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.027 af

Pond 4P: CB Peak Elev=602.97' Inflow=0.01 cfs 0.003 af
12.0" Round Culvert n=0.013 L=21.0' S=0.0086 '/' Outflow=0.01 cfs 0.003 af

Pond 5P: CB Peak Elev=601.65' Inflow=0.32 cfs 0.024 af
12.0" Round Culvert n=0.013 L=20.0' S=0.0100 '/' Outflow=0.32 cfs 0.024 af

Link 1L: Town System Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Summary for Subcatchment 1S: Rear Parking & Northern Abutters

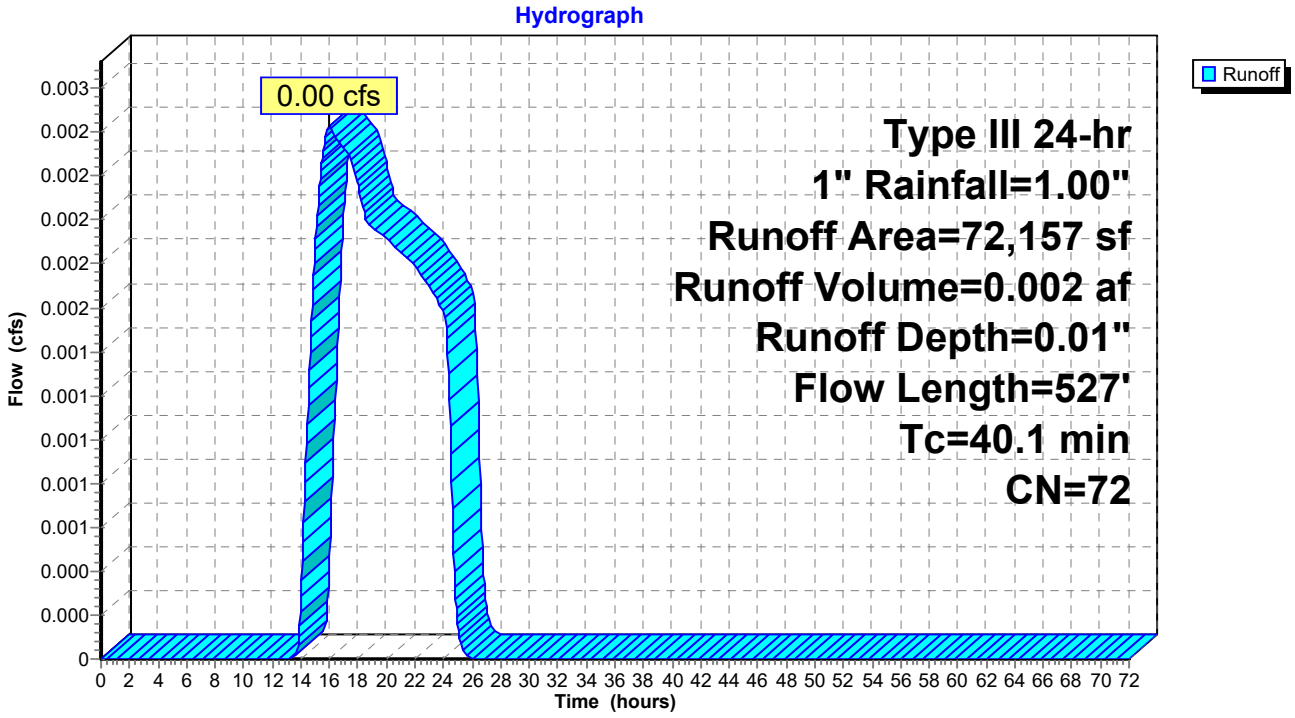
Runoff = 0.00 cfs @ 16.02 hrs, Volume= 0.002 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1" Rainfall=1.00"

	Area (sf)	CN	Description
*	13,899	98	Paved Road HSB B
	12,683	69	50-75% Grass cover, Fair, HSG B
*	5,122	98	Buildings
	40,453	60	Woods, Fair, HSG B
	72,157	72	Weighted Average
	53,136		73.64% Pervious Area
	19,021		26.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
40.1	527	Total			

Subcatchment 1S: Rear Parking & Northern Abutters



Summary for Subcatchment 2S: Side Driveways & Northern Abutters

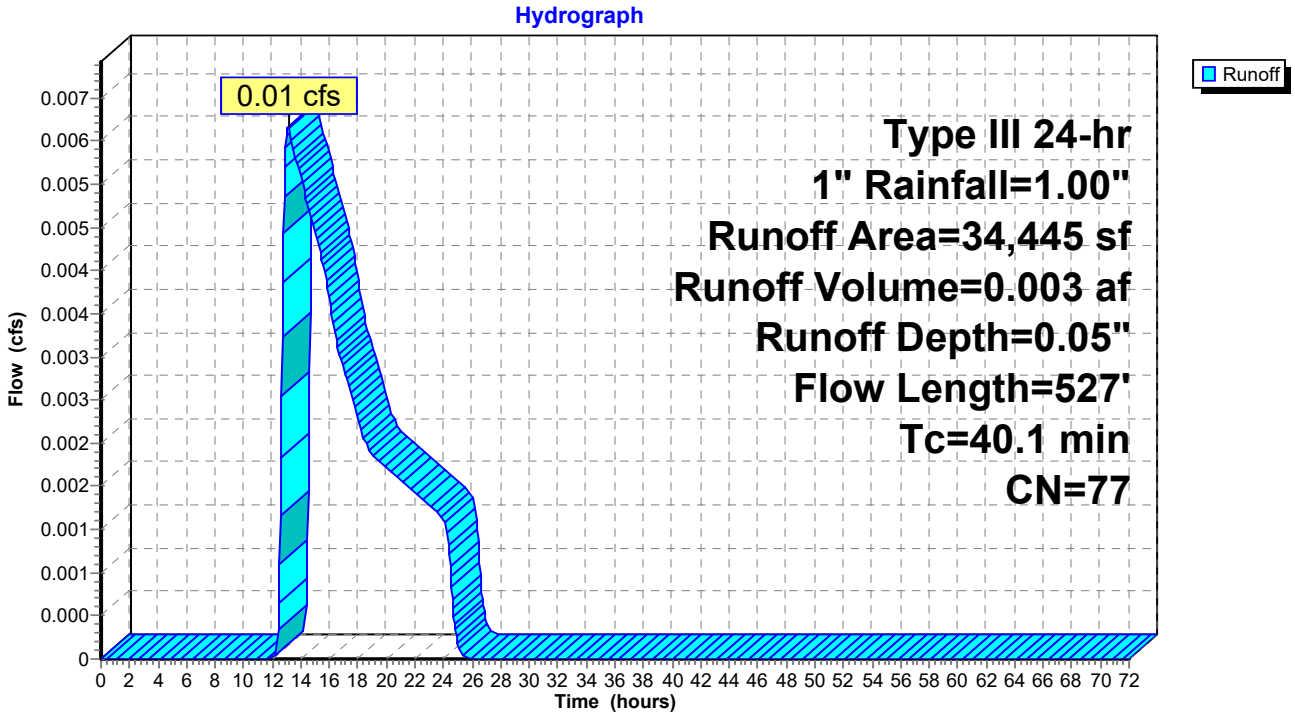
Runoff = 0.01 cfs @ 13.13 hrs, Volume= 0.003 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1" Rainfall=1.00"

	Area (sf)	CN	Description
*	7,619	98	Paved Road HSB B
	12,149	69	50-75% Grass cover, Fair, HSG B
*	5,055	98	Buildings
	9,622	60	Woods, Fair, HSG B
	34,445	77	Weighted Average
	21,771		63.21% Pervious Area
	12,674		36.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
40.1	527	Total			

Subcatchment 2S: Side Driveways & Northern Abutters



Summary for Subcatchment 3S: Buildings, Southern Parking, & Lawns

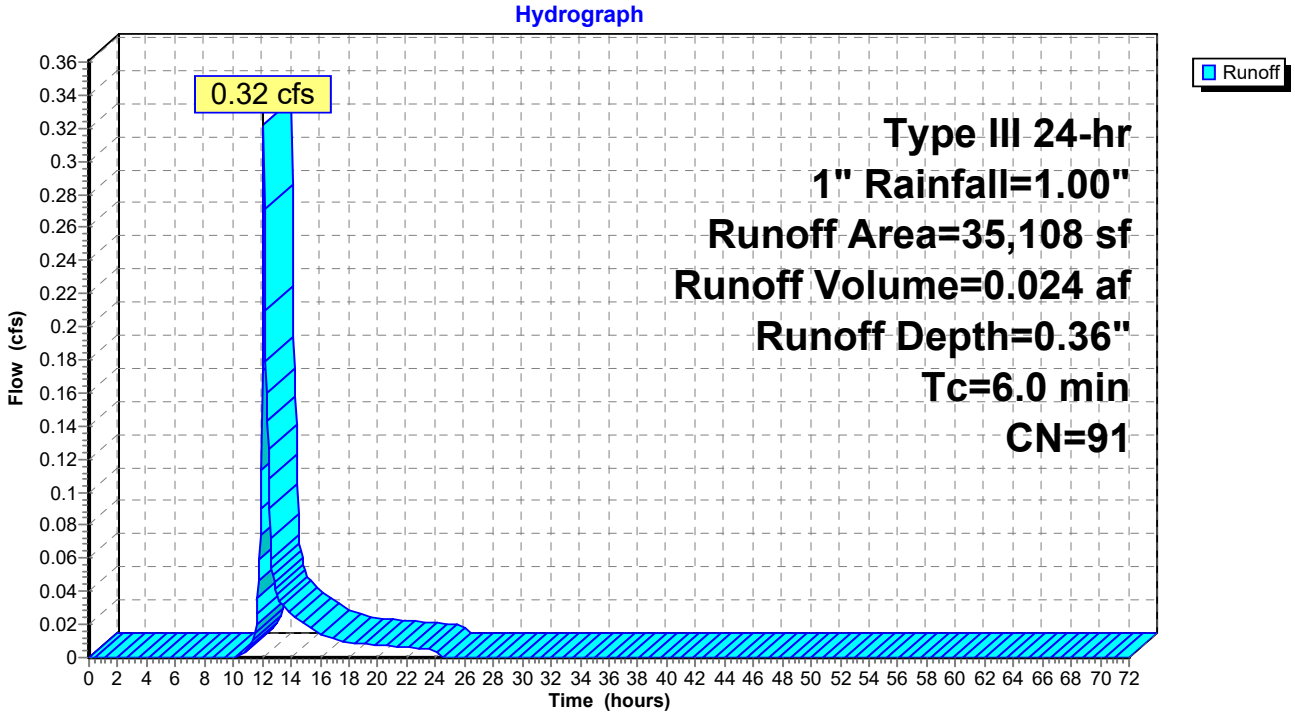
Runoff = 0.32 cfs @ 12.10 hrs, Volume= 0.024 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1" Rainfall=1.00"

	Area (sf)	CN	Description
*	10,966	98	Paved Road HSB B
	3,289	69	50-75% Grass cover, Fair, HSG B
*	9,267	98	Buildings
	11,586	85	Gravel roads, HSG B
	35,108	91	Weighted Average
	14,875		42.37% Pervious Area
	20,233		57.63% Impervious Area

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

Subcatchment 3S: Buildings, Southern Parking, & Lawns



Summary for Subcatchment 4S: Access Driveways, Southern Lawn, & Eastern Woods

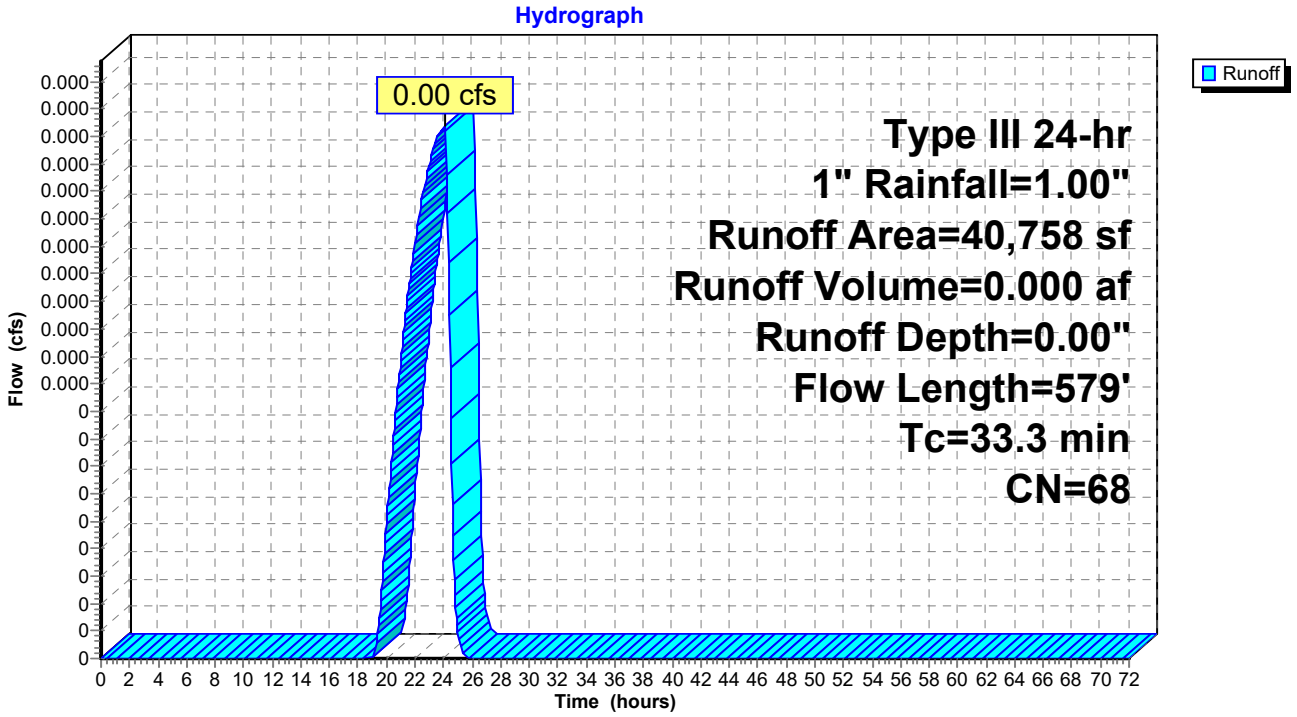
Runoff = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 1" Rainfall=1.00"

	Area (sf)	CN	Description
*	2,870	98	Paved Road HSB B
	26,302	69	50-75% Grass cover, Fair, HSG B
*	0	98	Buildings
	11,586	60	Woods, Fair, HSG B
	40,758	68	Weighted Average
	37,888		92.96% Pervious Area
	2,870		7.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
4.3	214	0.0140	0.83		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.1	100	0.1100	23.09	577.34	**Channel Flow, Channel** Area= 25.0 sf Perim= 15.0' r= 1.67' n= 0.030 Earth, grassed & winding
0.6	165	0.0060	4.65	185.92	**Channel Flow, Drain Channel** Area= 40.0 sf Perim= 30.0' r= 1.33' n= 0.030 Earth, grassed & winding
33.3	579	Total			

Subcatchment 4S: Access Driveways, Southern Lawn, & Eastern Woods



Summary for Pond 1P: SC-740 Storm Tech System - Rear

Inflow Area = 1.656 ac, 26.36% Impervious, Inflow Depth = 0.01" for 1" event
Inflow = 0.00 cfs @ 16.02 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 16.22 hrs, Volume= 0.002 af, Atten= 1%, Lag= 12.0 min
Discarded = 0.00 cfs @ 16.22 hrs, Volume= 0.002 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 607.50' @ 16.22 hrs Surf.Area= 1,096 sf Storage= 1 cf

Plug-Flow detention time= 9.9 min calculated for 0.002 af (100% of inflow)
Center-of-Mass det. time= 9.9 min (1,160.9 - 1,151.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	607.50'	1,020 cf	**20.50'W x 53.46'L x 3.50'H Field A** 3,836 cf Overall - 1,286 cf Embedded = 2,549 cf x 40.0% Voids
#2A	608.00'	1,286 cf	**ADS_StormTech SC-740 +Cap** x 28 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Rows of 7 Chambers
		2,306 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	607.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	610.75'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.03 cfs @ 16.22 hrs HW=607.50' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=607.50' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: SC-740 Storm Tech System - Rear - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

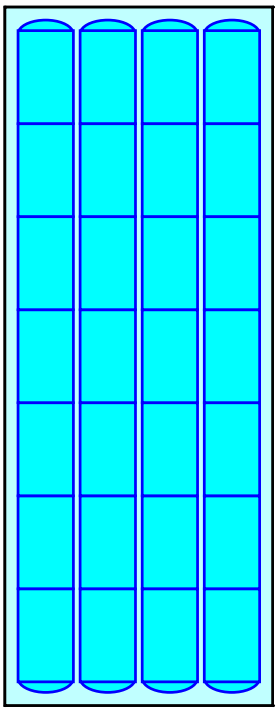
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

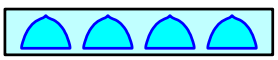
28 Chambers x 45.9 cf = 1,286.3 cf Chamber Storage

3,835.5 cf Field - 1,286.3 cf Chambers = 2,549.2 cf Stone x 40.0% Voids = 1,019.7 cf Stone Storage

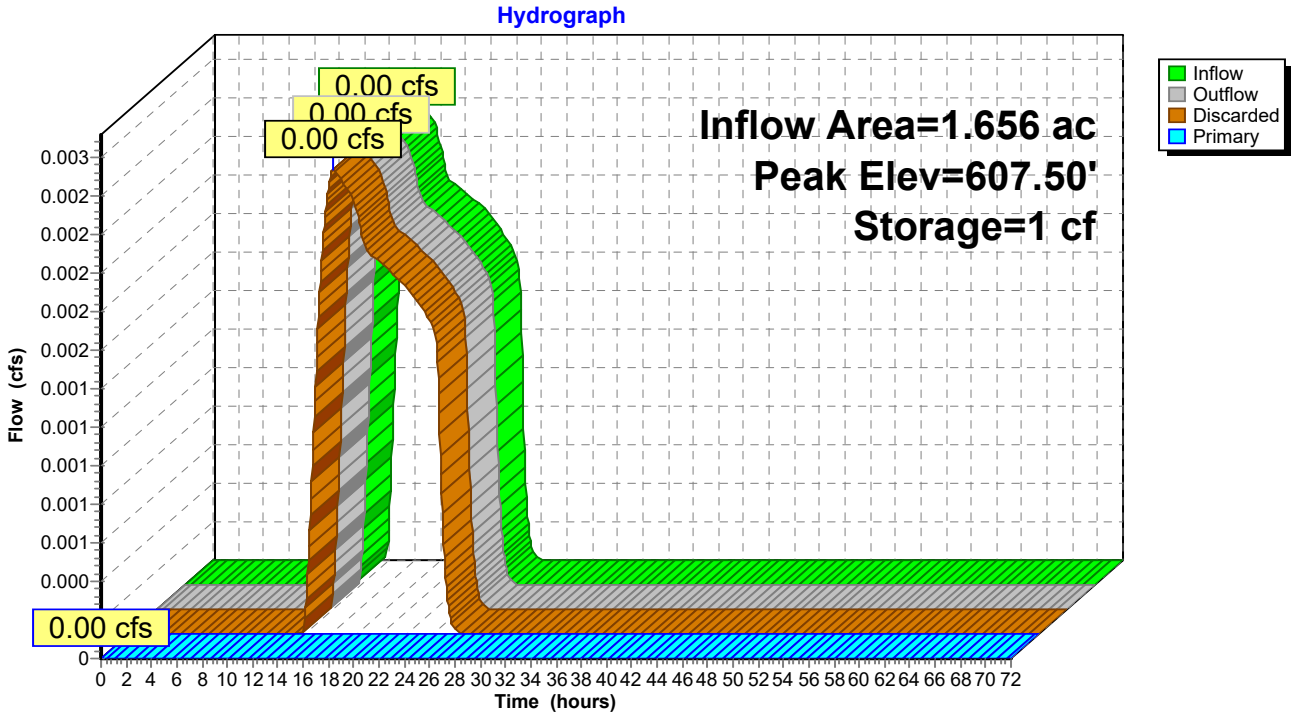
Chamber Storage + Stone Storage = 2,306.0 cf = 0.053 af
Overall Storage Efficiency = 60.1%
Overall System Size = 53.46' x 20.50' x 3.50'

28 Chambers
142.1 cy Field
94.4 cy Stone





Pond 1P: SC-740 Storm Tech System - Rear



Summary for Pond 2P: CB

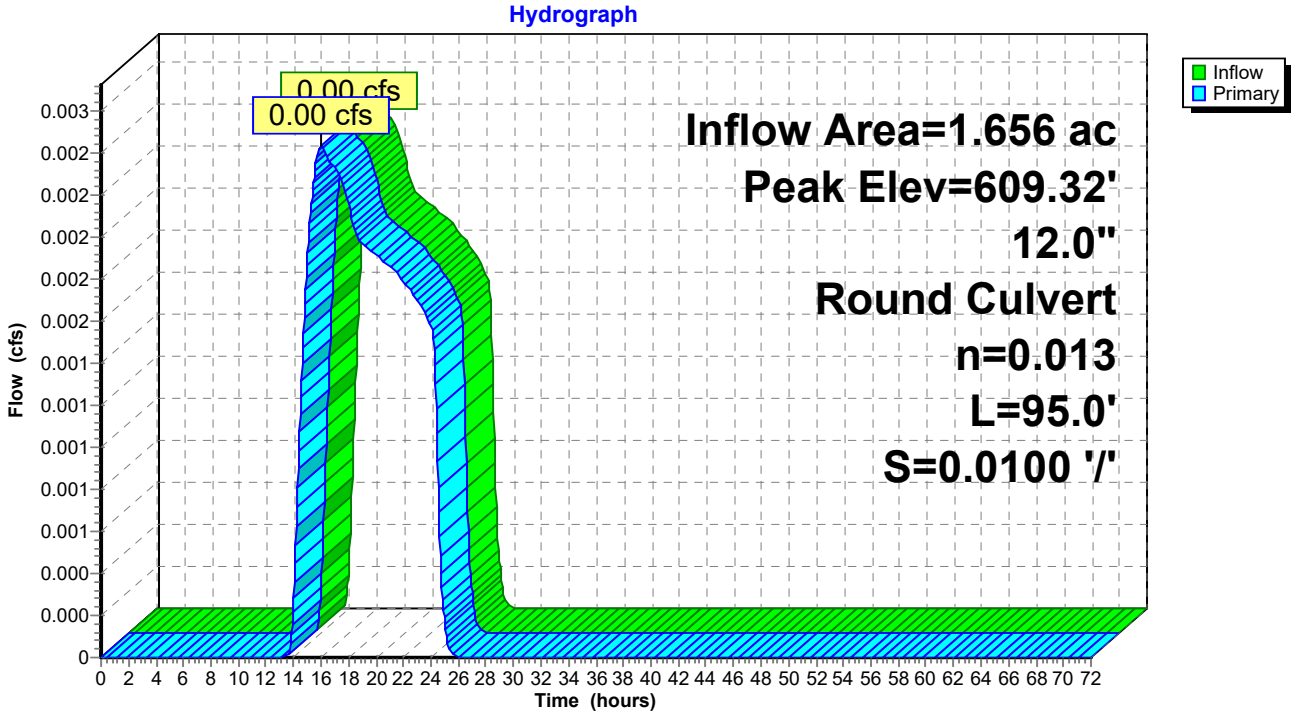
Inflow Area = 1.656 ac, 26.36% Impervious, Inflow Depth = 0.01" for 1" event
Inflow = 0.00 cfs @ 16.02 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 16.02 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 16.02 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 609.32' @ 16.02 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	609.29'	**12.0" Round Culvert** L= 95.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 609.29' / 608.34' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 16.02 hrs HW=609.32' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.00 cfs @ 0.63 fps)

Pond 2P: CB



Summary for Pond 3P: SC-740 Storm Tech System - Front

Inflow Area = 1.597 ac, 47.31% Impervious, Inflow Depth = 0.21" for 1" event
Inflow = 0.32 cfs @ 12.10 hrs, Volume= 0.027 af
Outflow = 0.15 cfs @ 12.10 hrs, Volume= 0.027 af, Atten= 53%, Lag= 0.1 min
Discarded = 0.15 cfs @ 12.10 hrs, Volume= 0.027 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 600.56' @ 12.33 hrs Surf.Area= 6,372 sf Storage= 156 cf

Plug-Flow detention time= 11.5 min calculated for 0.027 af (100% of inflow)
Center-of-Mass det. time= 11.3 min (886.7 - 875.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	600.50'	5,778 cf	**92.75'W x 68.70'L x 3.50'H Field A** 22,301 cf Overall - 7,856 cf Embedded = 14,445 cf x 40.0% Voids
#2A	601.00'	7,856 cf	**ADS_StormTech SC-740 +Cap** x 171 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 19 Rows of 9 Chambers
		13,634 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	600.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	603.90'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.15 cfs @ 12.10 hrs HW=600.54' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=600.50' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: SC-740 Storm Tech System - Front - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

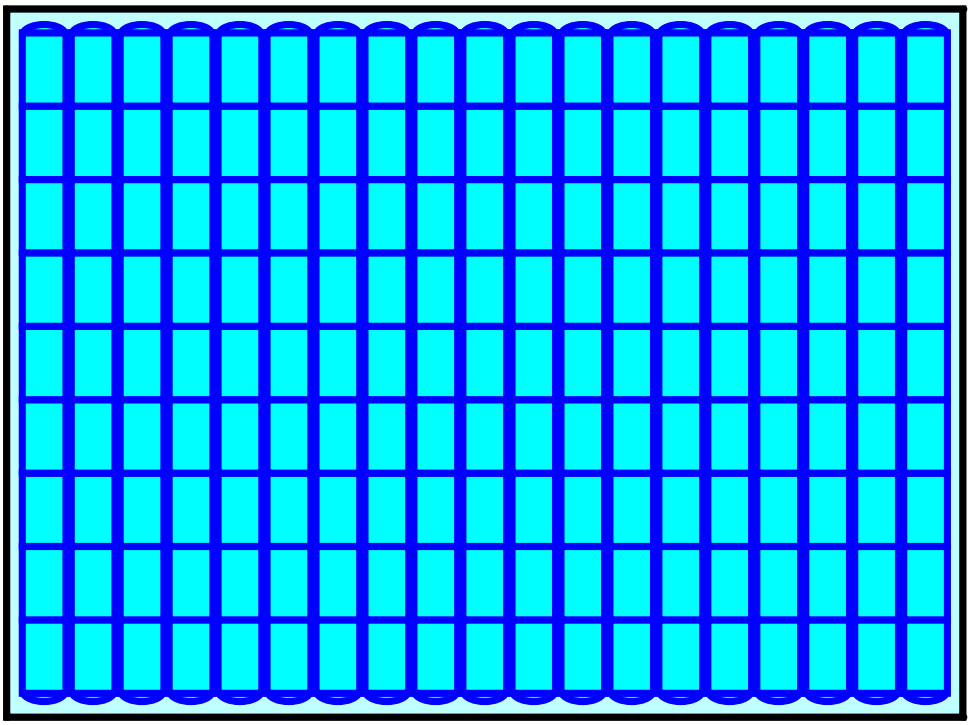
9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +18.0" End Stone x 2 = 68.70' Base Length
19 Rows x 51.0" Wide + 6.0" Spacing x 18 + 18.0" Side Stone x 2 = 92.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

171 Chambers x 45.9 cf = 7,855.7 cf Chamber Storage

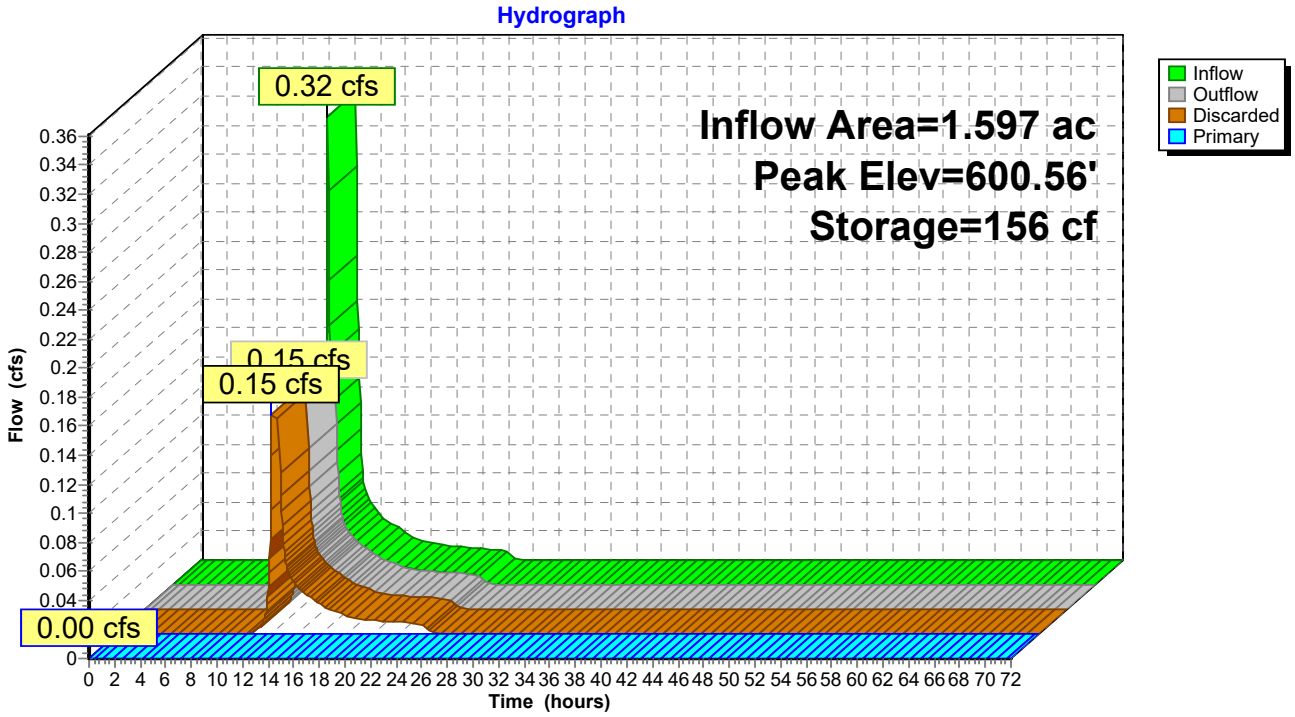
22,300.7 cf Field - 7,855.7 cf Chambers = 14,444.9 cf Stone x 40.0% Voids = 5,778.0 cf Stone Storage

Chamber Storage + Stone Storage = 13,633.7 cf = 0.313 af
Overall Storage Efficiency = 61.1%
Overall System Size = 68.70' x 92.75' x 3.50'

171 Chambers
826.0 cy Field
535.0 cy Stone



Pond 3P: SC-740 Storm Tech System - Front



Summary for Pond 4P: CB

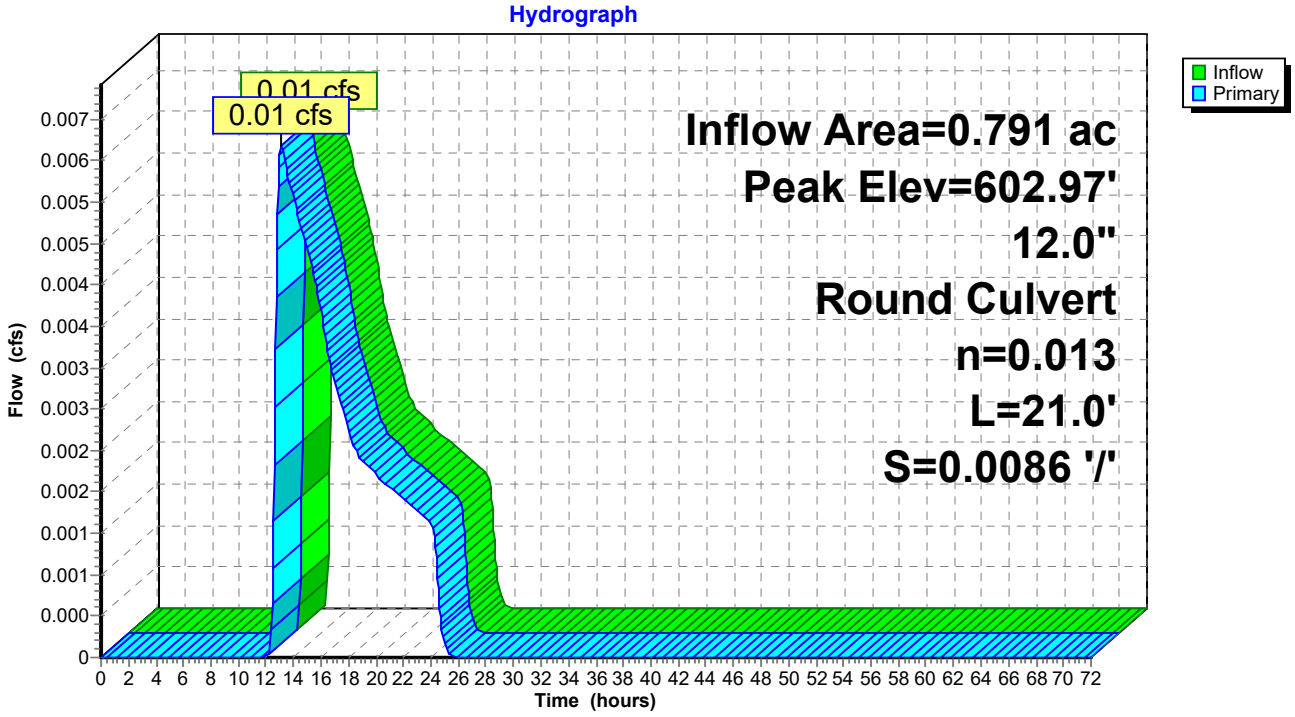
Inflow Area = 0.791 ac, 36.79% Impervious, Inflow Depth = 0.05" for 1" event
Inflow = 0.01 cfs @ 13.13 hrs, Volume= 0.003 af
Outflow = 0.01 cfs @ 13.13 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min
Primary = 0.01 cfs @ 13.13 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 602.97' @ 13.13 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	602.93'	**12.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 602.93' / 602.75' S= 0.0086 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.01 cfs @ 13.13 hrs HW=602.97' (Free Discharge)
1=Culvert (Barrel Controls 0.01 cfs @ 0.79 fps)

Pond 4P: CB



Summary for Pond 5P: CB

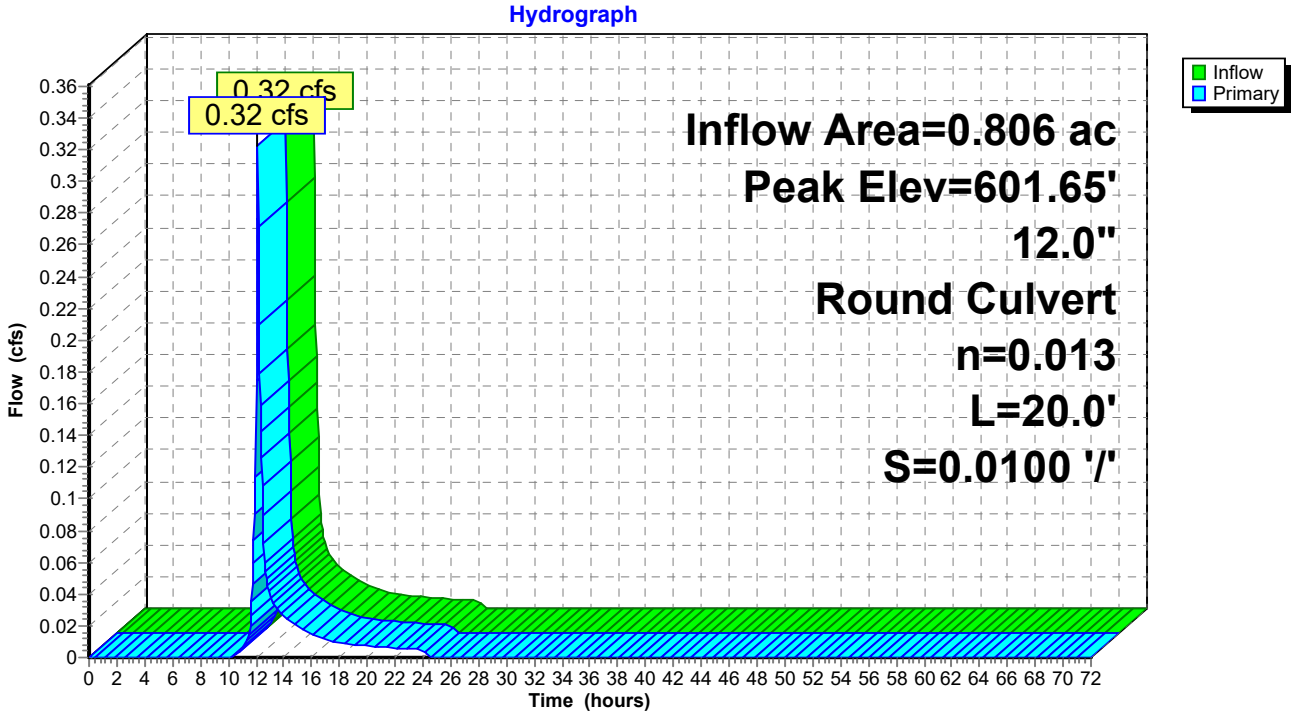
Inflow Area = 0.806 ac, 57.63% Impervious, Inflow Depth = 0.36" for 1" event
Inflow = 0.32 cfs @ 12.10 hrs, Volume= 0.024 af
Outflow = 0.32 cfs @ 12.10 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min
Primary = 0.32 cfs @ 12.10 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 601.65' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	601.33'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 601.33' / 601.13' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.32 cfs @ 12.10 hrs HW=601.65' (Free Discharge)
1=Culvert (Inlet Controls 0.32 cfs @ 1.51 fps)

Pond 5P: CB

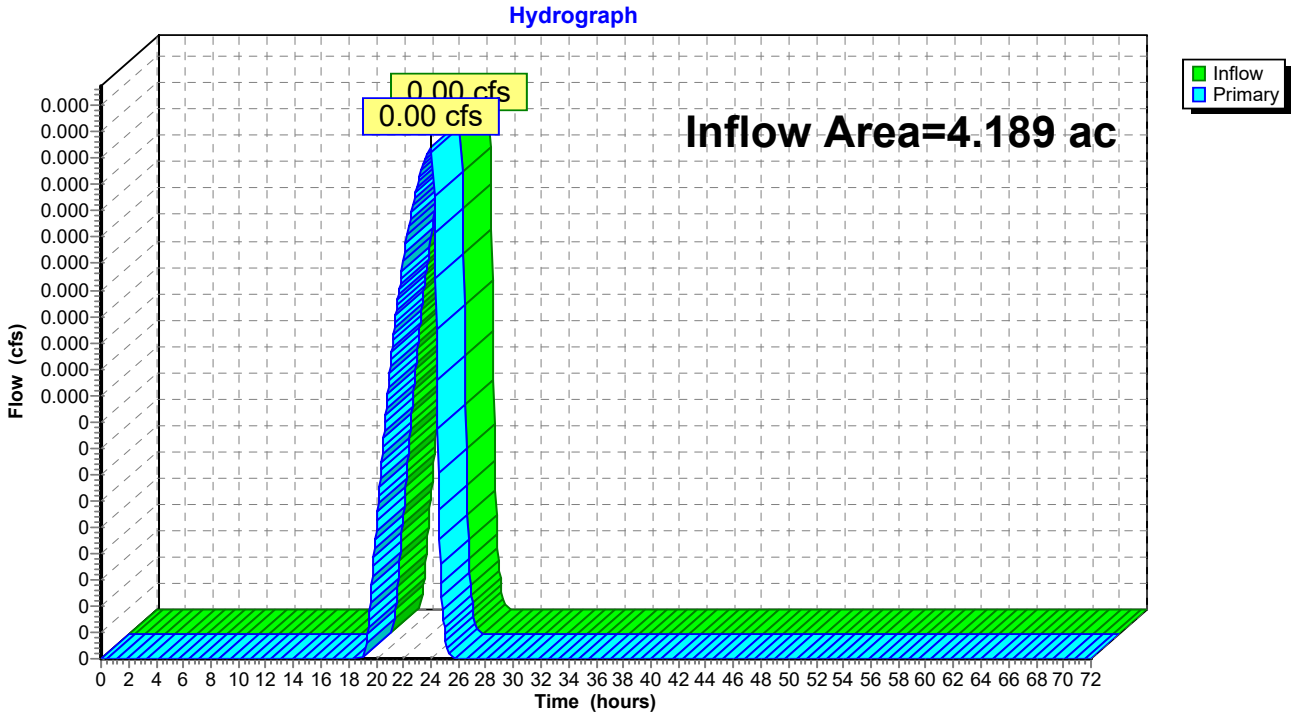


Summary for Link 1L: Town System

Inflow Area = 4.189 ac, 30.03% Impervious, Inflow Depth = 0.00" for 1" event
Inflow = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Town System



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Rear Parking & Runoff Area=72,157 sf 26.36% Impervious Runoff Depth=0.89"
Flow Length=527' Tc=40.1 min CN=72 Runoff=0.78 cfs 0.122 af

Subcatchment 2S: Side Driveways & Runoff Area=34,445 sf 36.79% Impervious Runoff Depth=1.16"
Flow Length=527' Tc=40.1 min CN=77 Runoff=0.51 cfs 0.077 af

Subcatchment 3S: Buildings, Southern Runoff Area=35,108 sf 57.63% Impervious Runoff Depth=2.19"
Tc=6.0 min CN=91 Runoff=2.00 cfs 0.147 af

Subcatchment 4S: Access Driveways, Runoff Area=40,758 sf 7.04% Impervious Runoff Depth=0.69"
Flow Length=579' Tc=33.3 min CN=68 Runoff=0.35 cfs 0.054 af

Pond 1P: SC-740 Storm Tech System - Rear Peak Elev=610.83' Storage=2,231 cf Inflow=0.78 cfs 0.122 af
Discarded=0.03 cfs 0.078 af Primary=0.26 cfs 0.044 af Outflow=0.29 cfs 0.122 af

Pond 2P: CB Peak Elev=609.80' Inflow=0.78 cfs 0.122 af
12.0" Round Culvert n=0.013 L=95.0' S=0.0100 '/' Outflow=0.78 cfs 0.122 af

Pond 3P: SC-740 Storm Tech System - Front Peak Elev=601.68' Storage=4,775 cf Inflow=2.12 cfs 0.224 af
Discarded=0.15 cfs 0.224 af Primary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.224 af

Pond 4P: CB Peak Elev=603.34' Inflow=0.51 cfs 0.077 af
12.0" Round Culvert n=0.013 L=21.0' S=0.0086 '/' Outflow=0.51 cfs 0.077 af

Pond 5P: CB Peak Elev=602.27' Inflow=2.00 cfs 0.147 af
12.0" Round Culvert n=0.013 L=20.0' S=0.0100 '/' Outflow=2.00 cfs 0.147 af

Link 1L: Town System Inflow=0.39 cfs 0.099 af
Primary=0.39 cfs 0.099 af

Summary for Subcatchment 1S: Rear Parking & Northern Abutters

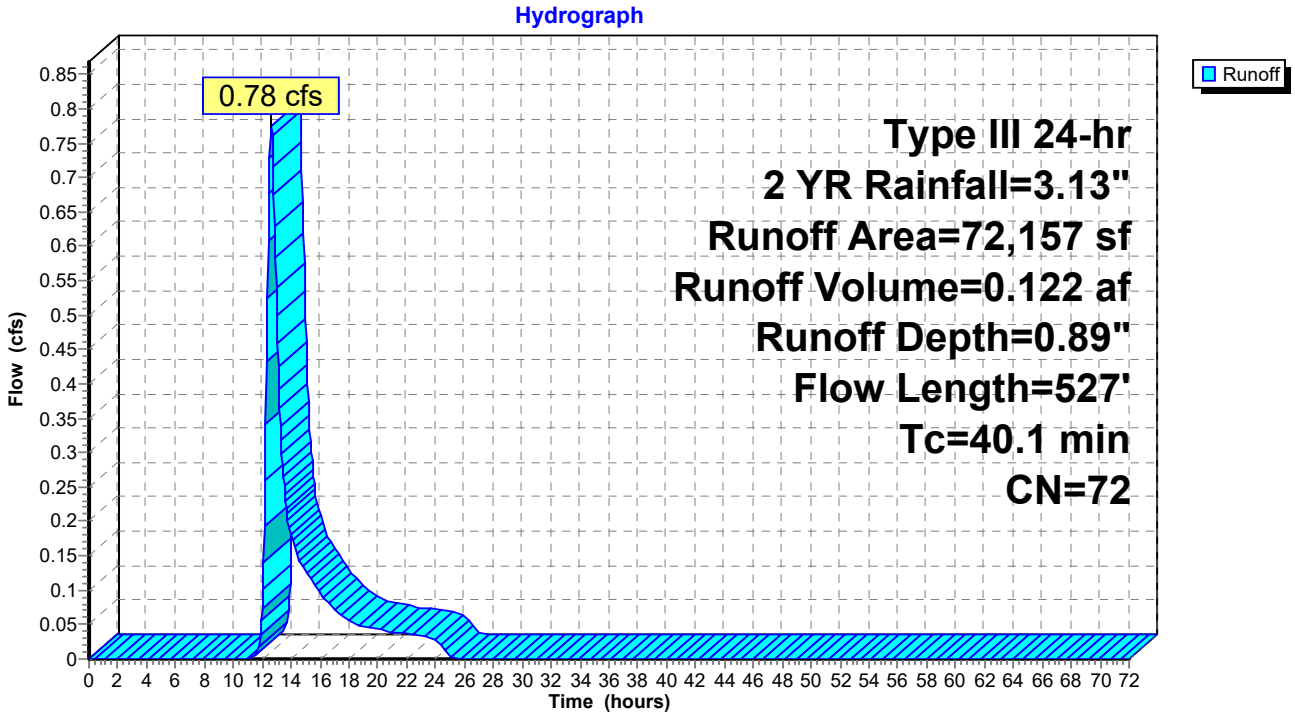
Runoff = 0.78 cfs @ 12.61 hrs, Volume= 0.122 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.13"

	Area (sf)	CN	Description
*	13,899	98	Paved Road HSB B
	12,683	69	50-75% Grass cover, Fair, HSG B
*	5,122	98	Buildings
	40,453	60	Woods, Fair, HSG B
	72,157	72	Weighted Average
	53,136		73.64% Pervious Area
	19,021		26.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
40.1	527	Total			

Subcatchment 1S: Rear Parking & Northern Abutters



Summary for Subcatchment 2S: Side Driveways & Northern Abutters

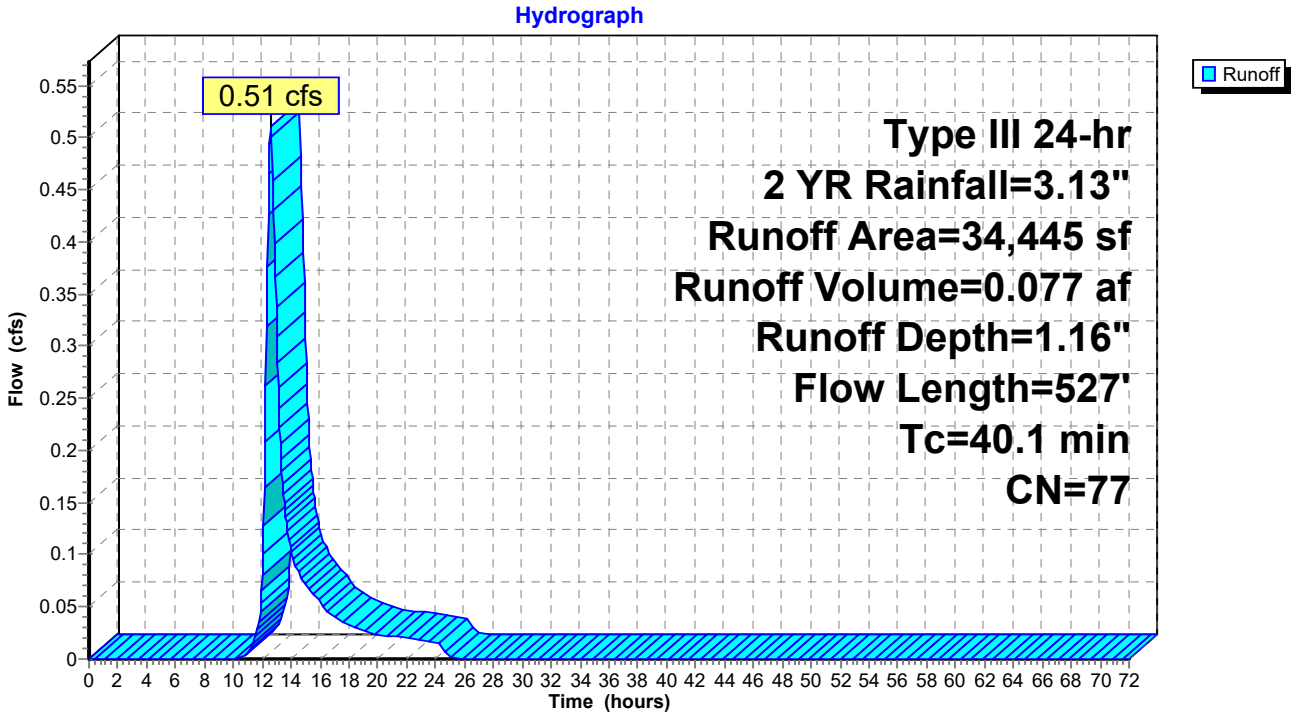
Runoff = 0.51 cfs @ 12.59 hrs, Volume= 0.077 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.13"

	Area (sf)	CN	Description
*	7,619	98	Paved Road HSB B
	12,149	69	50-75% Grass cover, Fair, HSG B
*	5,055	98	Buildings
	9,622	60	Woods, Fair, HSG B
	34,445	77	Weighted Average
	21,771		63.21% Pervious Area
	12,674		36.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
40.1	527	Total			

Subcatchment 2S: Side Driveways & Northern Abutters



Summary for Subcatchment 3S: Buildings, Southern Parking, & Lawns

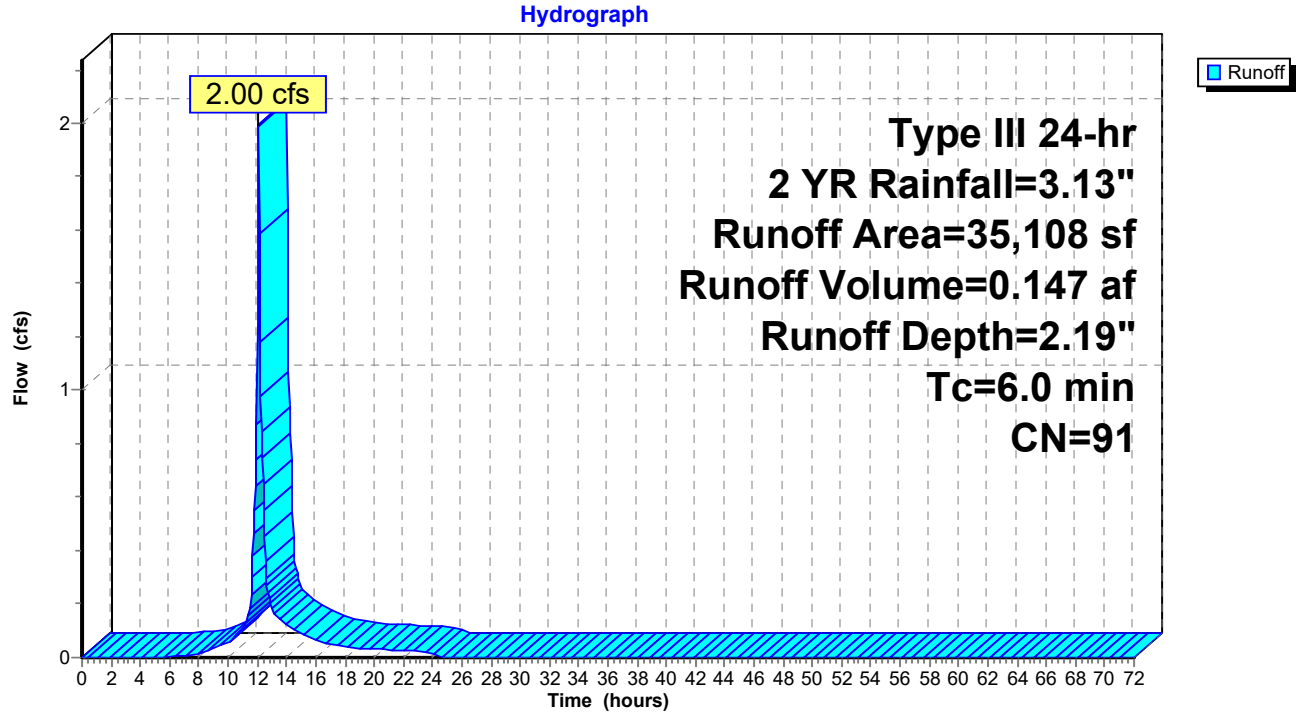
Runoff = 2.00 cfs @ 12.09 hrs, Volume= 0.147 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.13"

	Area (sf)	CN	Description
*	10,966	98	Paved Road HSB B
	3,289	69	50-75% Grass cover, Fair, HSG B
*	9,267	98	Buildings
	11,586	85	Gravel roads, HSG B
	35,108	91	Weighted Average
	14,875		42.37% Pervious Area
	20,233		57.63% Impervious Area

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

Subcatchment 3S: Buildings, Southern Parking, & Lawns



Summary for Subcatchment 4S: Access Driveways, Southern Lawn, & Eastern Woods

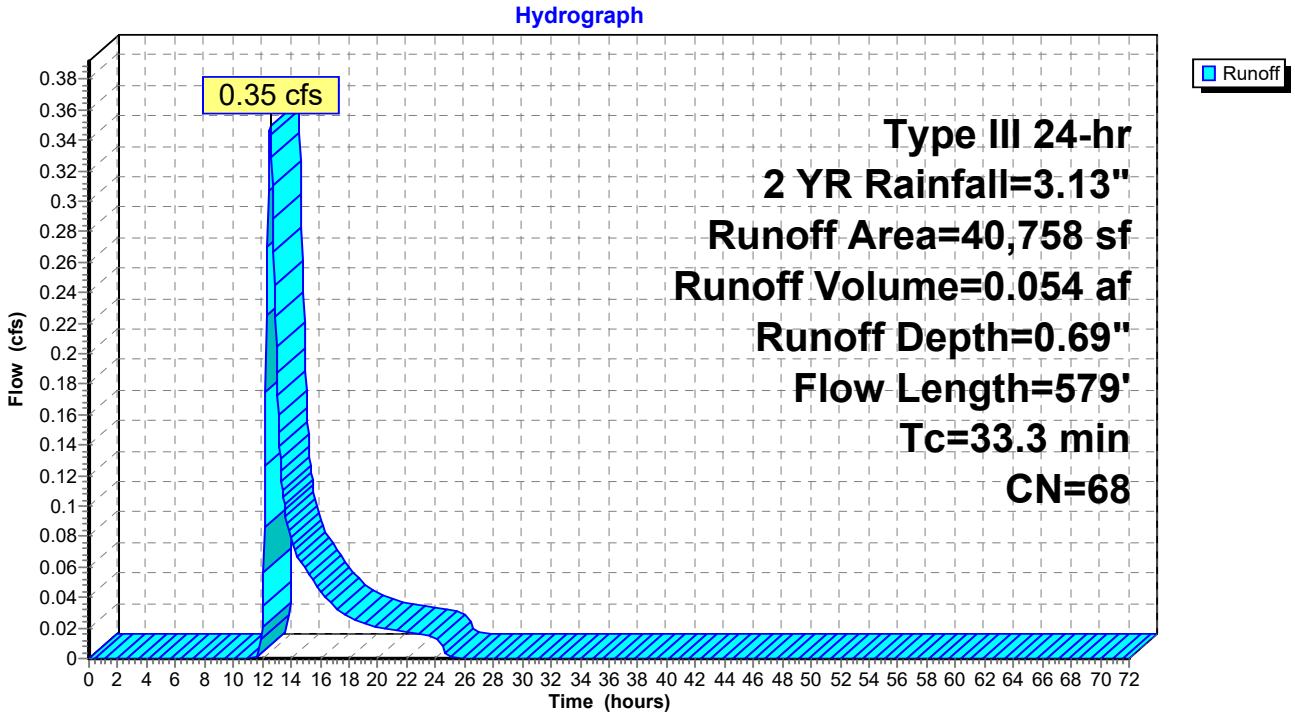
Runoff = 0.35 cfs @ 12.54 hrs, Volume= 0.054 af, Depth= 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.13"

	Area (sf)	CN	Description
*	2,870	98	Paved Road HSB B
	26,302	69	50-75% Grass cover, Fair, HSG B
*	0	98	Buildings
	11,586	60	Woods, Fair, HSG B
	40,758	68	Weighted Average
	37,888		92.96% Pervious Area
	2,870		7.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
4.3	214	0.0140	0.83		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.1	100	0.1100	23.09	577.34	**Channel Flow, Channel** Area= 25.0 sf Perim= 15.0' r= 1.67' n= 0.030 Earth, grassed & winding
0.6	165	0.0060	4.65	185.92	**Channel Flow, Drain Channel** Area= 40.0 sf Perim= 30.0' r= 1.33' n= 0.030 Earth, grassed & winding
33.3	579	Total			

Subcatchment 4S: Access Driveways, Southern Lawn, & Eastern Woods



Summary for Pond 1P: SC-740 Storm Tech System - Rear

Inflow Area = 1.656 ac, 26.36% Impervious, Inflow Depth = 0.89" for 2 YR event
Inflow = 0.78 cfs @ 12.61 hrs, Volume= 0.122 af
Outflow = 0.29 cfs @ 13.38 hrs, Volume= 0.122 af, Atten= 63%, Lag= 46.2 min
Discarded = 0.03 cfs @ 11.95 hrs, Volume= 0.078 af
Primary = 0.26 cfs @ 13.38 hrs, Volume= 0.044 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 610.83' @ 13.38 hrs Surf.Area= 1,096 sf Storage= 2,231 cf

Plug-Flow detention time= 587.7 min calculated for 0.122 af (100% of inflow)
Center-of-Mass det. time= 588.5 min (1,490.4 - 901.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	607.50'	1,020 cf	**20.50'W x 53.46'L x 3.50'H Field A** 3,836 cf Overall - 1,286 cf Embedded = 2,549 cf x 40.0% Voids
#2A	608.00'	1,286 cf	**ADS_StormTech SC-740 +Cap** x 28 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Rows of 7 Chambers
		2,306 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	607.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	610.75'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.03 cfs @ 11.95 hrs HW=607.54' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.26 cfs @ 13.38 hrs HW=610.83' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 0.26 cfs @ 0.66 fps)

Pond 1P: SC-740 Storm Tech System - Rear - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

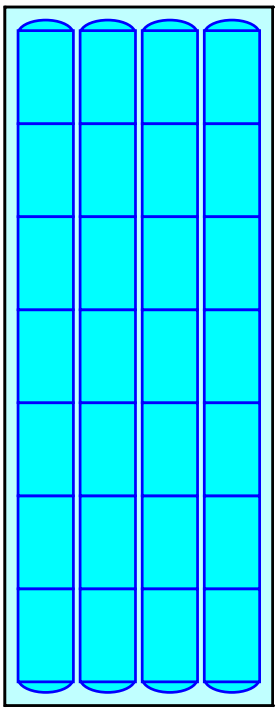
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

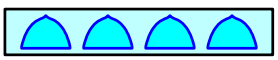
28 Chambers x 45.9 cf = 1,286.3 cf Chamber Storage

3,835.5 cf Field - 1,286.3 cf Chambers = 2,549.2 cf Stone x 40.0% Voids = 1,019.7 cf Stone Storage

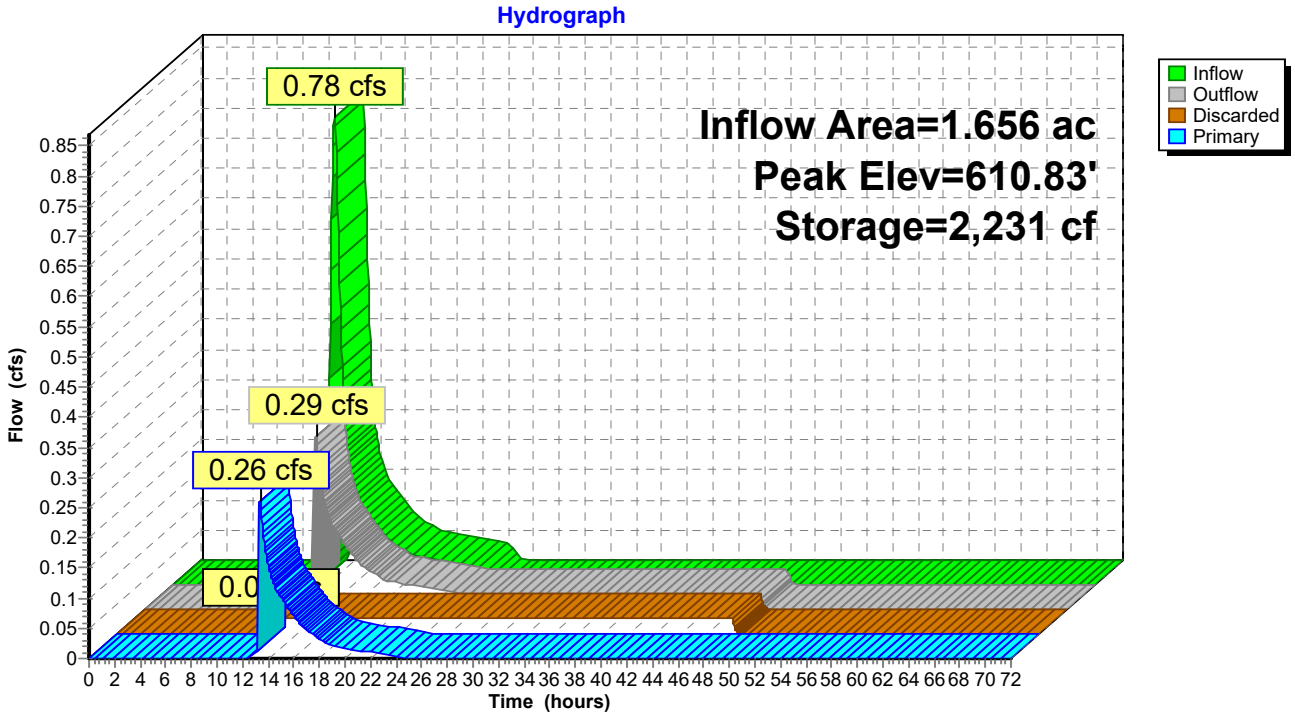
Chamber Storage + Stone Storage = 2,306.0 cf = 0.053 af
Overall Storage Efficiency = 60.1%
Overall System Size = 53.46' x 20.50' x 3.50'

28 Chambers
142.1 cy Field
94.4 cy Stone





Pond 1P: SC-740 Storm Tech System - Rear



Summary for Pond 2P: CB

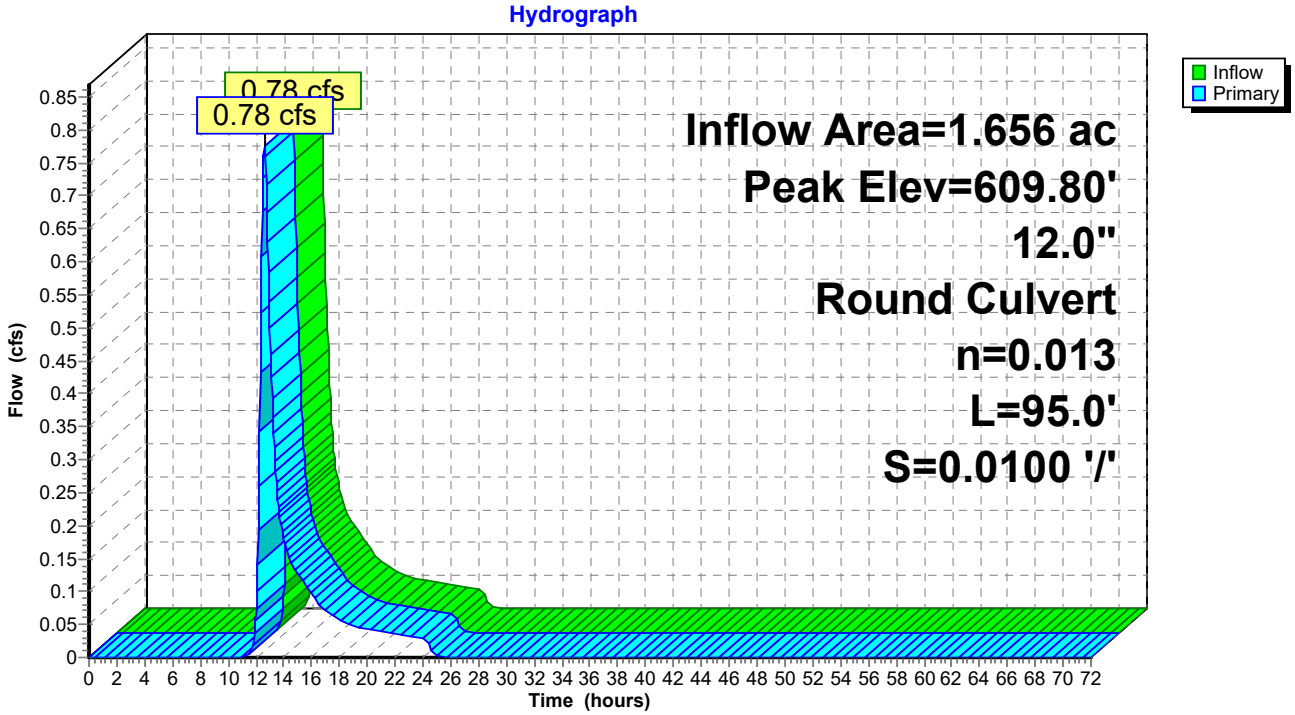
Inflow Area = 1.656 ac, 26.36% Impervious, Inflow Depth = 0.89" for 2 YR event
Inflow = 0.78 cfs @ 12.61 hrs, Volume= 0.122 af
Outflow = 0.78 cfs @ 12.61 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min
Primary = 0.78 cfs @ 12.61 hrs, Volume= 0.122 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 609.80' @ 12.61 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	609.29'	**12.0" Round Culvert** L= 95.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 609.29' / 608.34' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.77 cfs @ 12.61 hrs HW=609.80' (Free Discharge)
1=Culvert (Inlet Controls 0.77 cfs @ 1.92 fps)

Pond 2P: CB



Summary for Pond 3P: SC-740 Storm Tech System - Front

Inflow Area = 1.597 ac, 47.31% Impervious, Inflow Depth = 1.68" for 2 YR event
Inflow = 2.12 cfs @ 12.09 hrs, Volume= 0.224 af
Outflow = 0.15 cfs @ 11.40 hrs, Volume= 0.224 af, Atten= 93%, Lag= 0.0 min
Discarded = 0.15 cfs @ 11.40 hrs, Volume= 0.224 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 601.68' @ 15.26 hrs Surf.Area= 6,372 sf Storage= 4,775 cf

Plug-Flow detention time= 310.1 min calculated for 0.224 af (100% of inflow)
Center-of-Mass det. time= 310.0 min (1,141.4 - 831.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	600.50'	5,778 cf	**92.75'W x 68.70'L x 3.50'H Field A** 22,301 cf Overall - 7,856 cf Embedded = 14,445 cf x 40.0% Voids
#2A	601.00'	7,856 cf	**ADS_StormTech SC-740 +Cap** x 171 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 19 Rows of 9 Chambers
		13,634 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	600.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	603.90'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.15 cfs @ 11.40 hrs HW=600.54' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=600.50' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: SC-740 Storm Tech System - Front - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

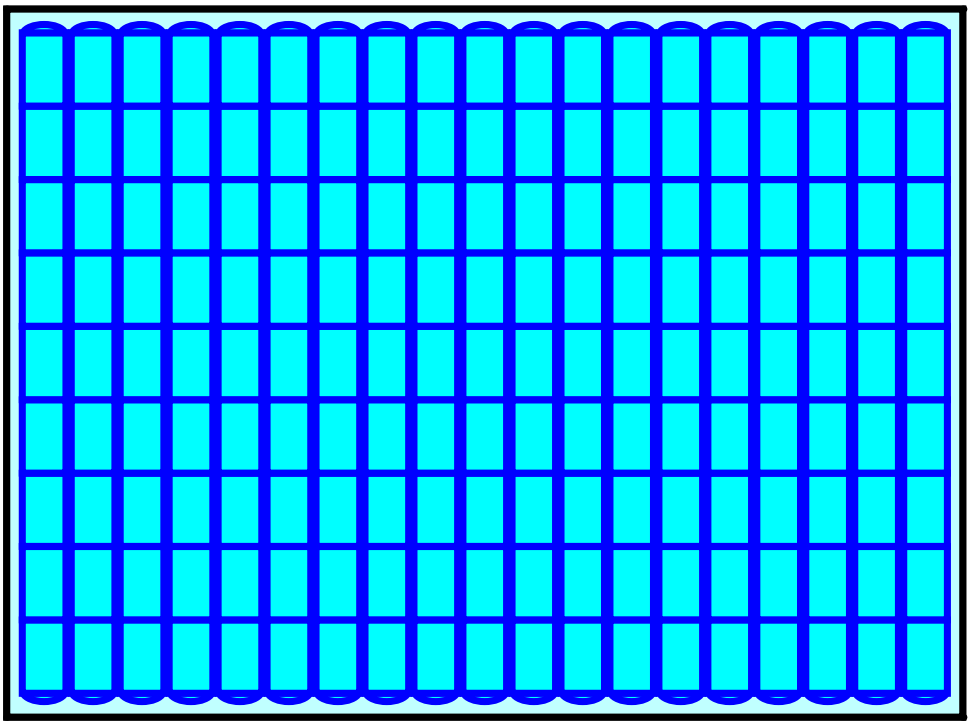
9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +18.0" End Stone x 2 = 68.70' Base Length
19 Rows x 51.0" Wide + 6.0" Spacing x 18 + 18.0" Side Stone x 2 = 92.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

171 Chambers x 45.9 cf = 7,855.7 cf Chamber Storage

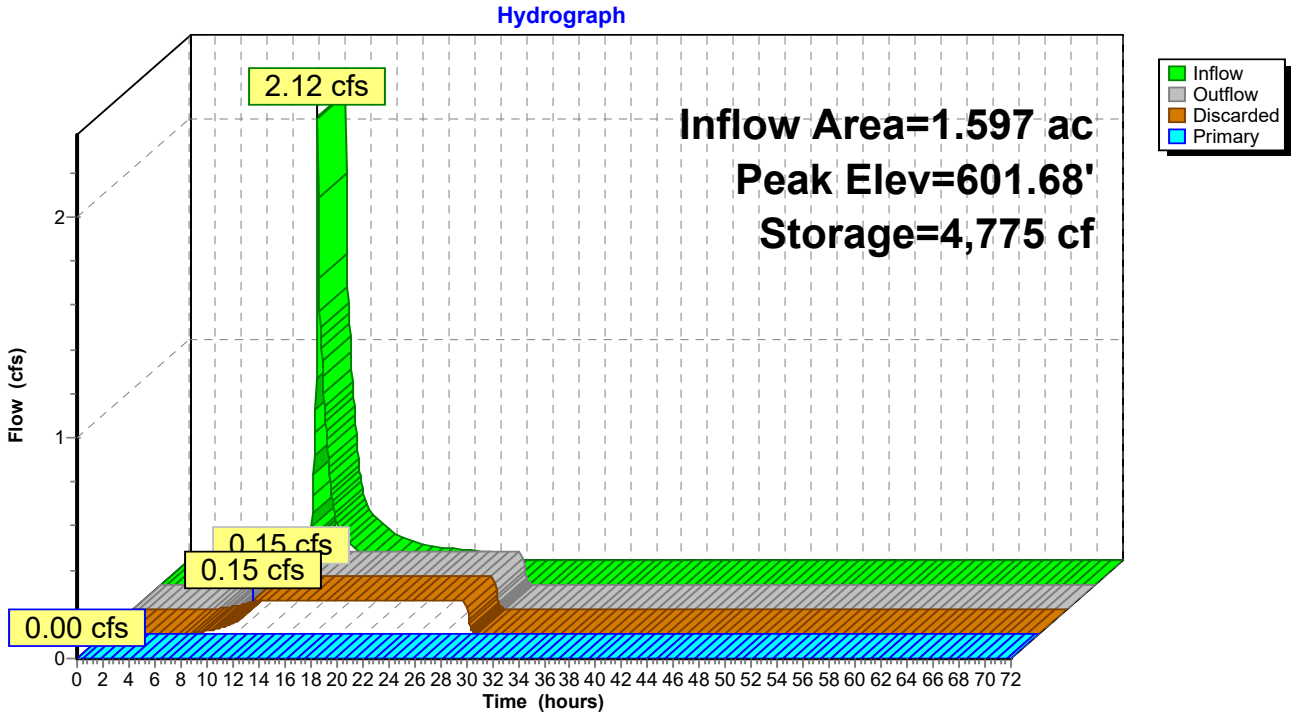
22,300.7 cf Field - 7,855.7 cf Chambers = 14,444.9 cf Stone x 40.0% Voids = 5,778.0 cf Stone Storage

Chamber Storage + Stone Storage = 13,633.7 cf = 0.313 af
Overall Storage Efficiency = 61.1%
Overall System Size = 68.70' x 92.75' x 3.50'

171 Chambers
826.0 cy Field
535.0 cy Stone



Pond 3P: SC-740 Storm Tech System - Front



Summary for Pond 4P: CB

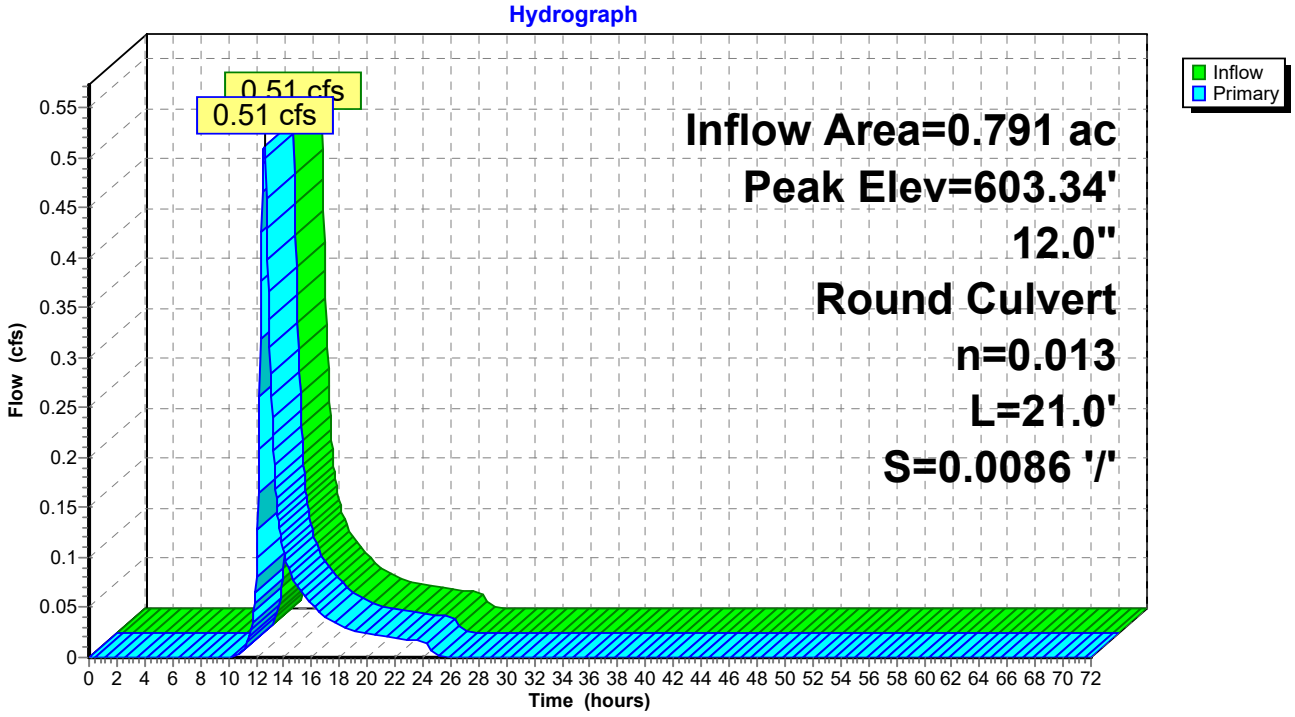
Inflow Area = 0.791 ac, 36.79% Impervious, Inflow Depth = 1.16" for 2 YR event
Inflow = 0.51 cfs @ 12.59 hrs, Volume= 0.077 af
Outflow = 0.51 cfs @ 12.59 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min
Primary = 0.51 cfs @ 12.59 hrs, Volume= 0.077 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 603.34' @ 12.59 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	602.93'	**12.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 602.93' / 602.75' S= 0.0086 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.51 cfs @ 12.59 hrs HW=603.34' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.51 cfs @ 2.48 fps)

Pond 4P: CB



Summary for Pond 5P: CB

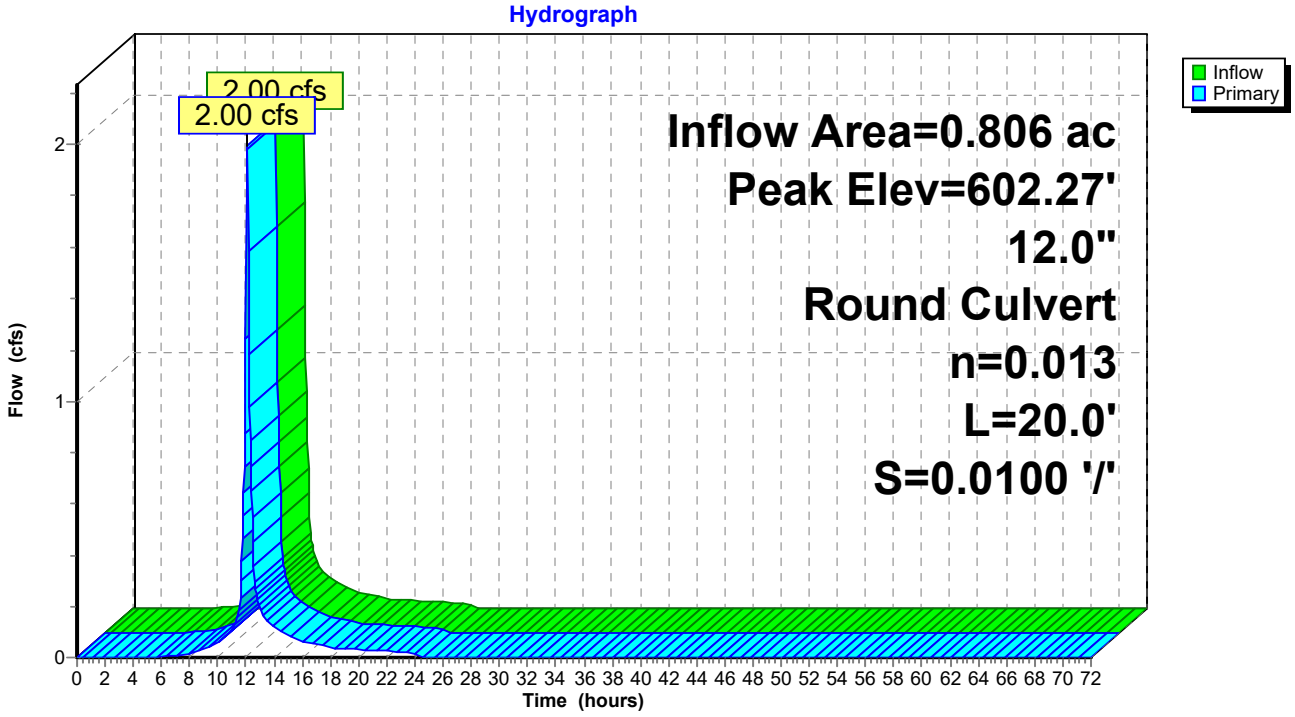
Inflow Area = 0.806 ac, 57.63% Impervious, Inflow Depth = 2.19" for 2 YR event
Inflow = 2.00 cfs @ 12.09 hrs, Volume= 0.147 af
Outflow = 2.00 cfs @ 12.09 hrs, Volume= 0.147 af, Atten= 0%, Lag= 0.0 min
Primary = 2.00 cfs @ 12.09 hrs, Volume= 0.147 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 602.27' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	601.33'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 601.33' / 601.13' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.95 cfs @ 12.09 hrs HW=602.25' (Free Discharge)
1=Culvert (Inlet Controls 1.95 cfs @ 2.58 fps)

Pond 5P: CB

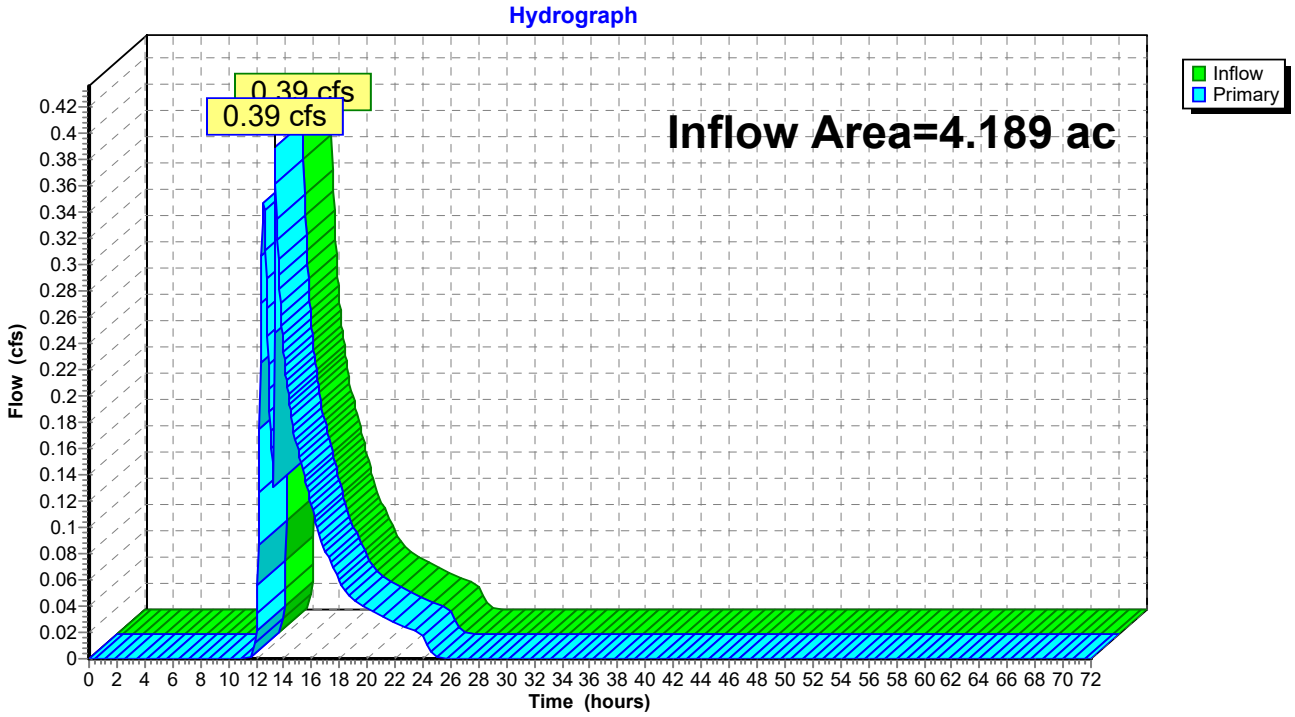


Summary for Link 1L: Town System

Inflow Area = 4.189 ac, 30.03% Impervious, Inflow Depth = 0.28" for 2 YR event
Inflow = 0.39 cfs @ 13.37 hrs, Volume= 0.099 af
Primary = 0.39 cfs @ 13.37 hrs, Volume= 0.099 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Town System



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Rear Parking & Runoff Area=72,157 sf 26.36% Impervious Runoff Depth=1.92"
Flow Length=527' Tc=40.1 min CN=72 Runoff=1.80 cfs 0.266 af

Subcatchment 2S: Side Driveways & Runoff Area=34,445 sf 36.79% Impervious Runoff Depth=2.32"
Flow Length=527' Tc=40.1 min CN=77 Runoff=1.05 cfs 0.153 af

Subcatchment 3S: Buildings, Southern Runoff Area=35,108 sf 57.63% Impervious Runoff Depth=3.63"
Tc=6.0 min CN=91 Runoff=3.23 cfs 0.244 af

Subcatchment 4S: Access Driveways, Runoff Area=40,758 sf 7.04% Impervious Runoff Depth=1.63"
Flow Length=579' Tc=33.3 min CN=68 Runoff=0.92 cfs 0.127 af

Pond 1P: SC-740 Storm Tech System - Rear Peak Elev=611.02' Storage=2,306 cf Inflow=1.80 cfs 0.266 af
Discarded=0.03 cfs 0.081 af Primary=1.65 cfs 0.183 af Outflow=1.68 cfs 0.264 af

Pond 2P: CB Peak Elev=610.15' Inflow=1.80 cfs 0.266 af
12.0" Round Culvert n=0.013 L=95.0' S=0.0100 '/' Outflow=1.80 cfs 0.266 af

Pond 3P: SC-740 Storm Tech System - Peak Elev=602.92' Storage=10,478 cf Inflow=3.54 cfs 0.397 af
Discarded=0.15 cfs 0.397 af Primary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.397 af

Pond 4P: CB Peak Elev=603.56' Inflow=1.05 cfs 0.153 af
12.0" Round Culvert n=0.013 L=21.0' S=0.0086 '/' Outflow=1.05 cfs 0.153 af

Pond 5P: CB Peak Elev=603.00' Inflow=3.23 cfs 0.244 af
12.0" Round Culvert n=0.013 L=20.0' S=0.0100 '/' Outflow=3.23 cfs 0.244 af

Link 1L: Town System Inflow=2.75 cfs 0.310 af
Primary=2.75 cfs 0.310 af

Summary for Subcatchment 1S: Rear Parking & Northern Abutters

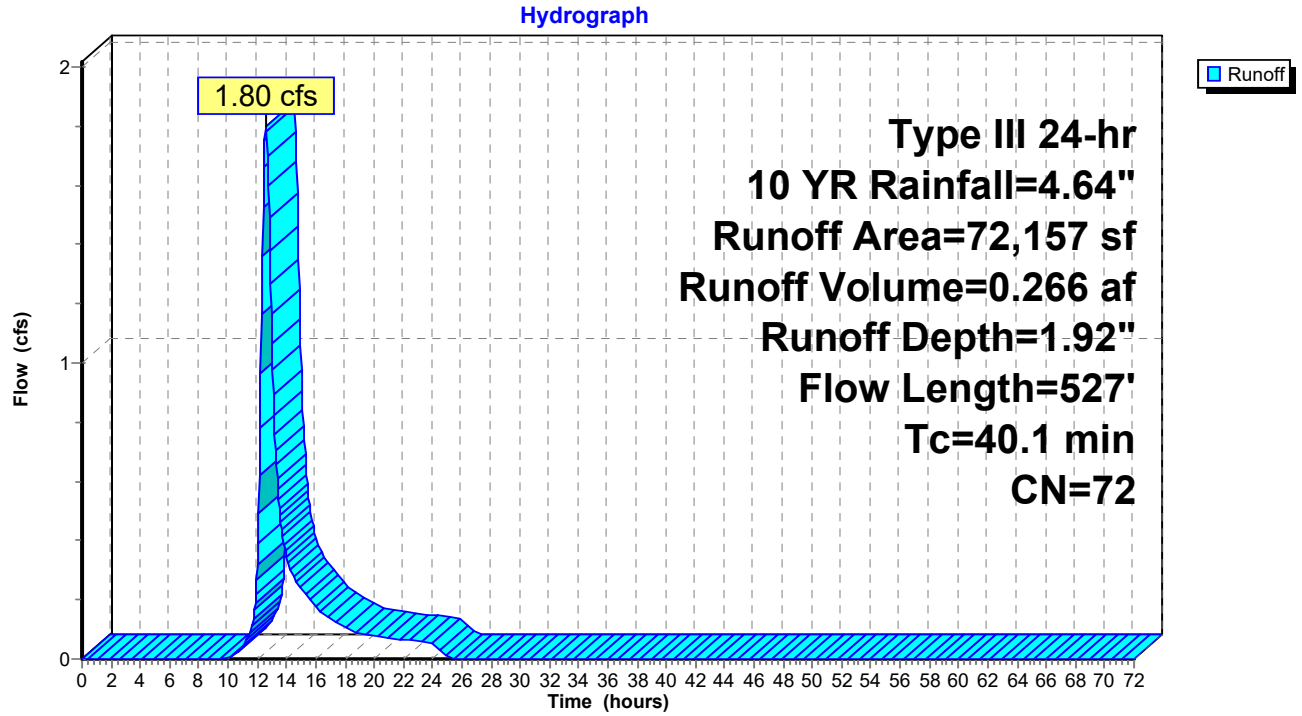
Runoff = 1.80 cfs @ 12.58 hrs, Volume= 0.266 af, Depth= 1.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.64"

	Area (sf)	CN	Description
*	13,899	98	Paved Road HSB B
	12,683	69	50-75% Grass cover, Fair, HSG B
*	5,122	98	Buildings
	40,453	60	Woods, Fair, HSG B
	72,157	72	Weighted Average
	53,136		73.64% Pervious Area
	19,021		26.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
40.1	527	Total			

Subcatchment 1S: Rear Parking & Northern Abutters



Summary for Subcatchment 2S: Side Driveways & Northern Abutters

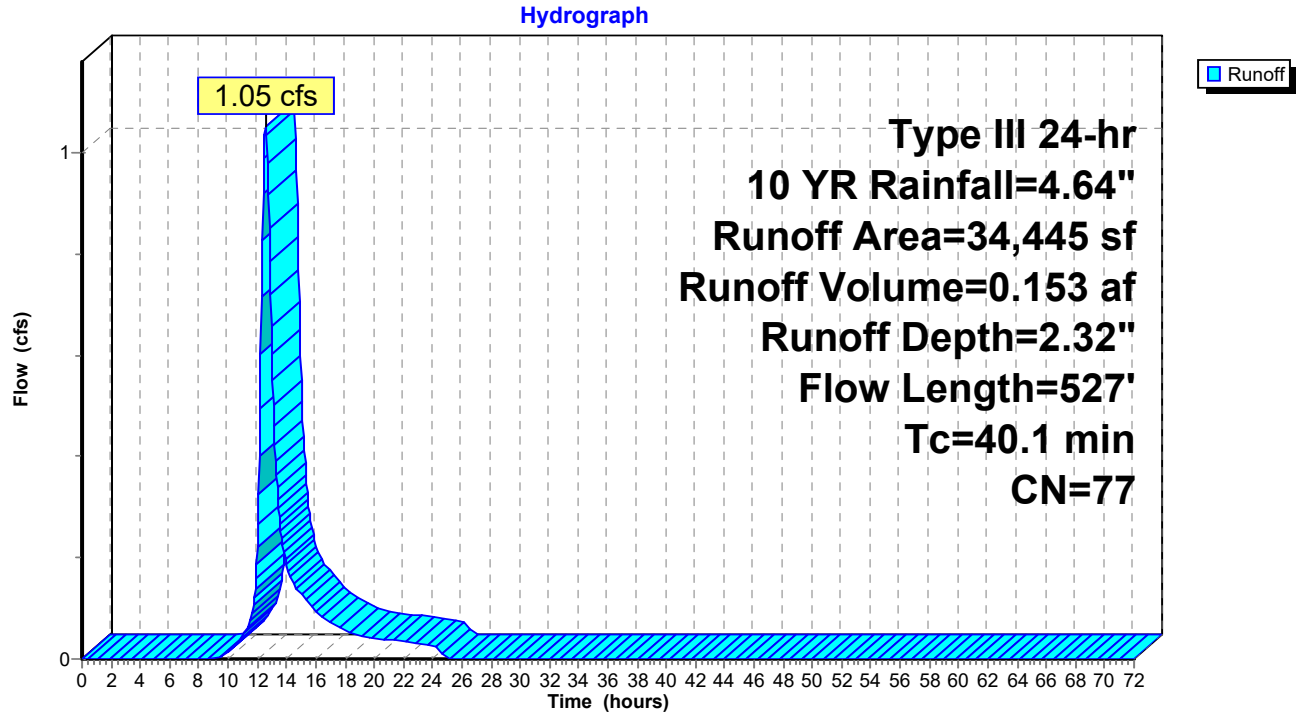
Runoff = 1.05 cfs @ 12.57 hrs, Volume= 0.153 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.64"

	Area (sf)	CN	Description
*	7,619	98	Paved Road HSB B
	12,149	69	50-75% Grass cover, Fair, HSG B
*	5,055	98	Buildings
	9,622	60	Woods, Fair, HSG B
	34,445	77	Weighted Average
	21,771		63.21% Pervious Area
	12,674		36.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
40.1	527	Total			

Subcatchment 2S: Side Driveways & Northern Abutters



Summary for Subcatchment 3S: Buildings, Southern Parking, & Lawns

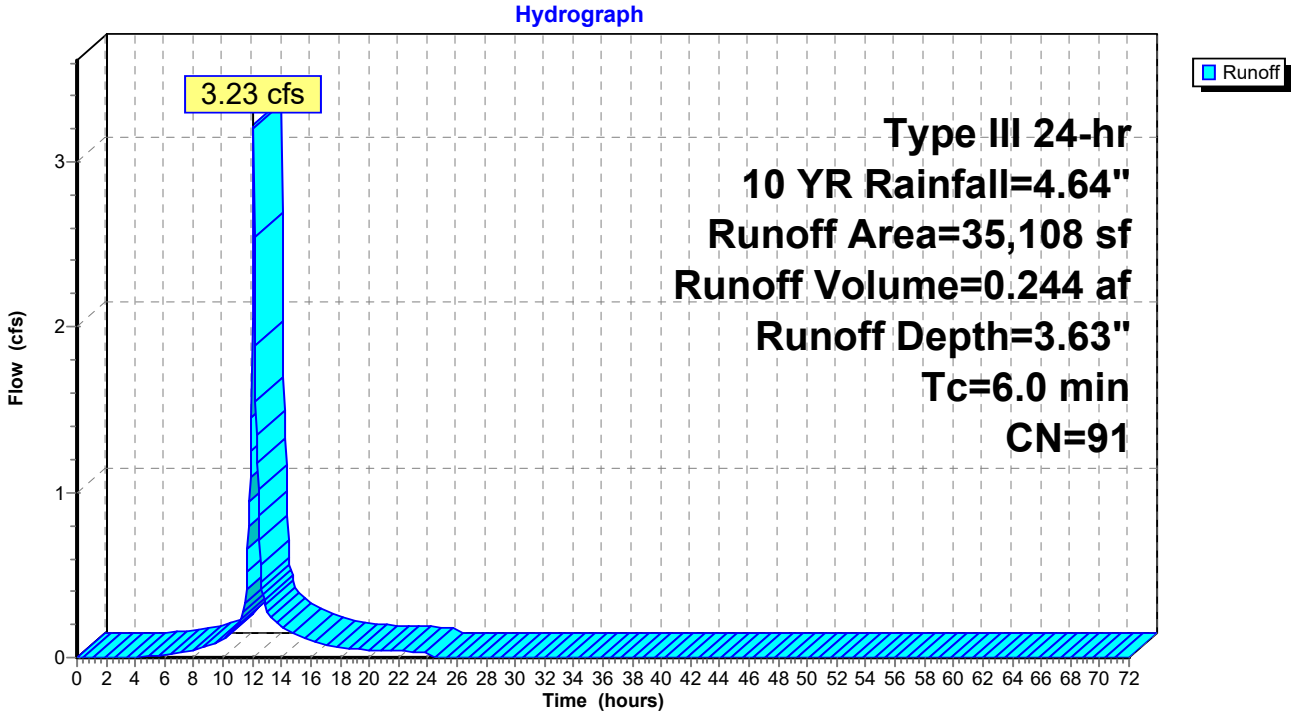
Runoff = 3.23 cfs @ 12.09 hrs, Volume= 0.244 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.64"

	Area (sf)	CN	Description
*	10,966	98	Paved Road HSB B
	3,289	69	50-75% Grass cover, Fair, HSG B
*	9,267	98	Buildings
	11,586	85	Gravel roads, HSG B
	35,108	91	Weighted Average
	14,875		42.37% Pervious Area
	20,233		57.63% Impervious Area

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

Subcatchment 3S: Buildings, Southern Parking, & Lawns



Summary for Subcatchment 4S: Access Driveways, Southern Lawn, & Eastern Woods

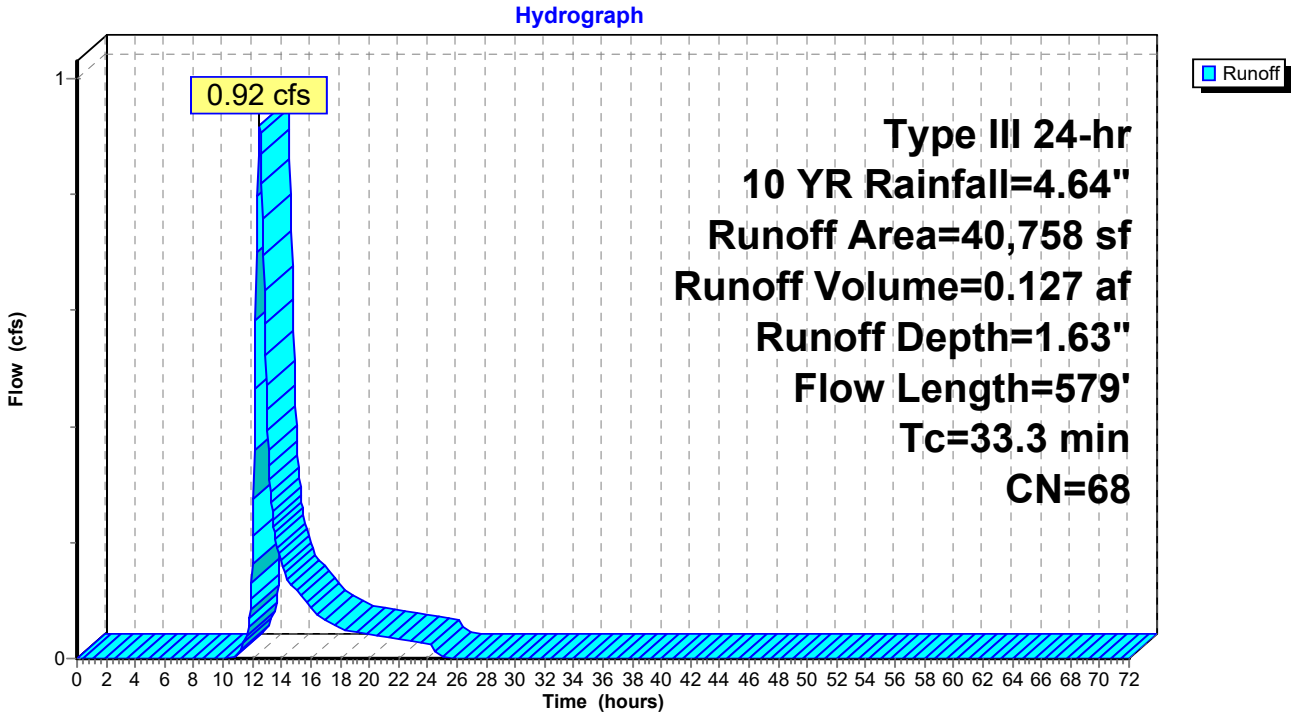
Runoff = 0.92 cfs @ 12.50 hrs, Volume= 0.127 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 YR Rainfall=4.64"

	Area (sf)	CN	Description
*	2,870	98	Paved Road HSB B
	26,302	69	50-75% Grass cover, Fair, HSG B
*	0	98	Buildings
	11,586	60	Woods, Fair, HSG B
	40,758	68	Weighted Average
	37,888		92.96% Pervious Area
	2,870		7.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
4.3	214	0.0140	0.83		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.1	100	0.1100	23.09	577.34	**Channel Flow, Channel** Area= 25.0 sf Perim= 15.0' r= 1.67' n= 0.030 Earth, grassed & winding
0.6	165	0.0060	4.65	185.92	**Channel Flow, Drain Channel** Area= 40.0 sf Perim= 30.0' r= 1.33' n= 0.030 Earth, grassed & winding
33.3	579	Total			

Subcatchment 4S: Access Driveways, Southern Lawn, & Eastern Woods



Summary for Pond 1P: SC-740 Storm Tech System - Rear

Inflow Area = 1.656 ac, 26.36% Impervious, Inflow Depth = 1.92" for 10 YR event
Inflow = 1.80 cfs @ 12.58 hrs, Volume= 0.266 af
Outflow = 1.68 cfs @ 12.58 hrs, Volume= 0.264 af, Atten= 7%, Lag= 0.0 min
Discarded = 0.03 cfs @ 10.90 hrs, Volume= 0.081 af
Primary = 1.65 cfs @ 12.58 hrs, Volume= 0.183 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 611.02' @ 12.60 hrs Surf.Area= 1,096 sf Storage= 2,306 cf

Plug-Flow detention time= 284.5 min calculated for 0.264 af (100% of inflow)
Center-of-Mass det. time= 281.5 min (1,159.5 - 878.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	607.50'	1,020 cf	**20.50'W x 53.46'L x 3.50'H Field A** 3,836 cf Overall - 1,286 cf Embedded = 2,549 cf x 40.0% Voids
#2A	608.00'	1,286 cf	**ADS_StormTech SC-740 +Cap** x 28 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Rows of 7 Chambers
		2,306 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	607.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	610.75'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.03 cfs @ 10.90 hrs HW=607.54' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.64 cfs @ 12.58 hrs HW=611.02' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.64 cfs @ 1.24 fps)

Pond 1P: SC-740 Storm Tech System - Rear - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

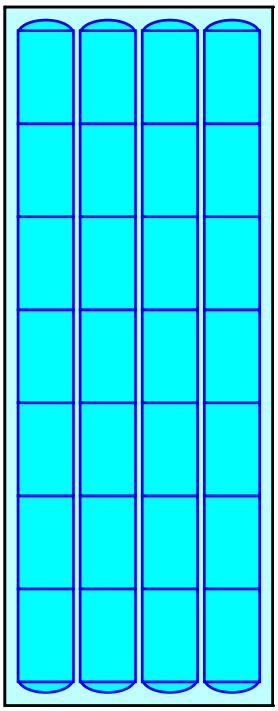
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

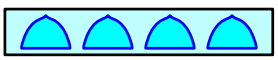
28 Chambers x 45.9 cf = 1,286.3 cf Chamber Storage

3,835.5 cf Field - 1,286.3 cf Chambers = 2,549.2 cf Stone x 40.0% Voids = 1,019.7 cf Stone Storage

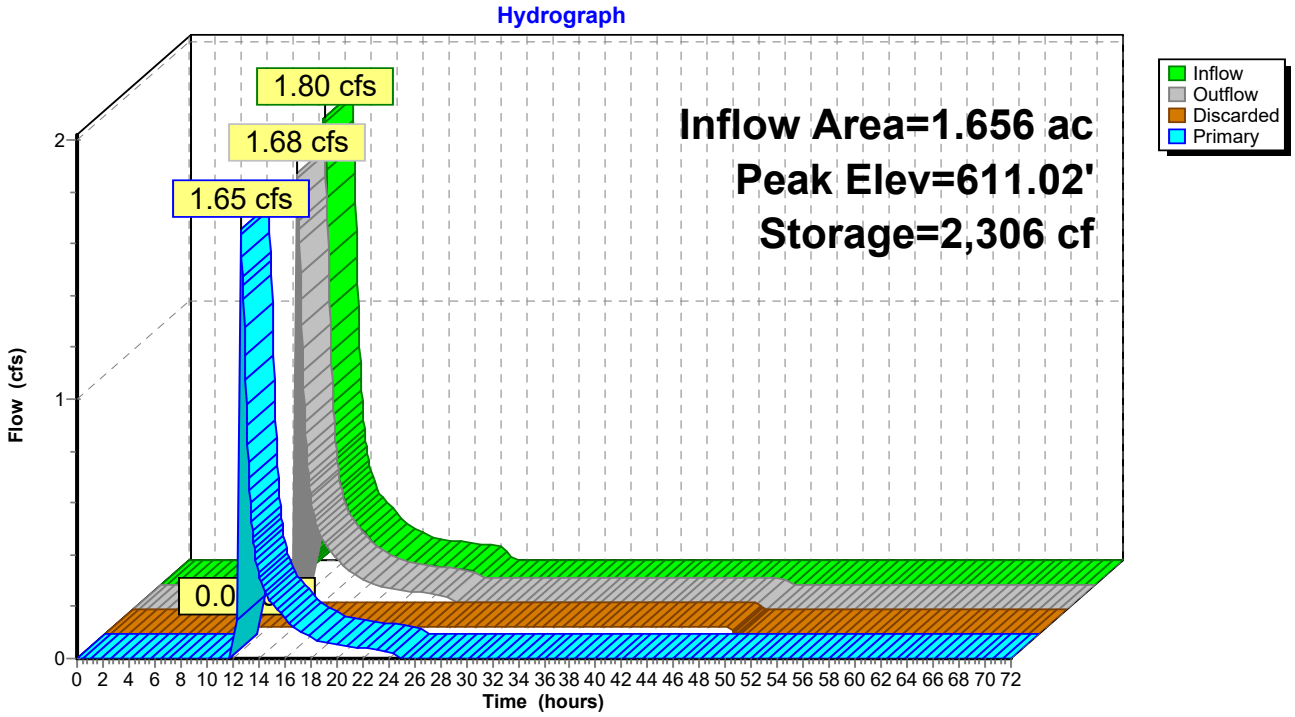
Chamber Storage + Stone Storage = 2,306.0 cf = 0.053 af
Overall Storage Efficiency = 60.1%
Overall System Size = 53.46' x 20.50' x 3.50'

28 Chambers
142.1 cy Field
94.4 cy Stone





Pond 1P: SC-740 Storm Tech System - Rear



Summary for Pond 2P: CB

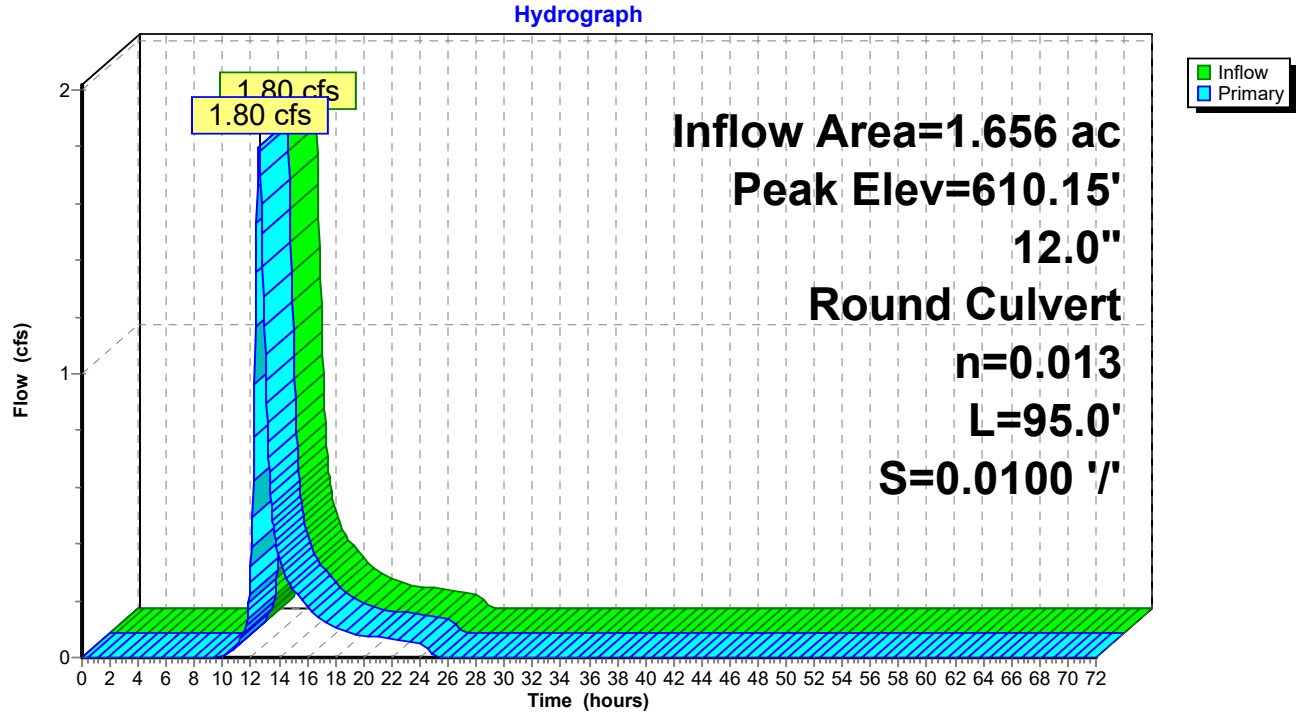
Inflow Area = 1.656 ac, 26.36% Impervious, Inflow Depth = 1.92" for 10 YR event
Inflow = 1.80 cfs @ 12.58 hrs, Volume= 0.266 af
Outflow = 1.80 cfs @ 12.58 hrs, Volume= 0.266 af, Atten= 0%, Lag= 0.0 min
Primary = 1.80 cfs @ 12.58 hrs, Volume= 0.266 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 610.15' @ 12.58 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	609.29'	**12.0" Round Culvert** L= 95.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 609.29' / 608.34' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.80 cfs @ 12.58 hrs HW=610.15' (Free Discharge)
1=Culvert (Inlet Controls 1.80 cfs @ 2.50 fps)

Pond 2P: CB



Summary for Pond 3P: SC-740 Storm Tech System - Front

Inflow Area = 1.597 ac, 47.31% Impervious, Inflow Depth = 2.99" for 10 YR event
Inflow = 3.54 cfs @ 12.09 hrs, Volume= 0.397 af
Outflow = 0.15 cfs @ 10.40 hrs, Volume= 0.397 af, Atten= 96%, Lag= 0.0 min
Discarded = 0.15 cfs @ 10.40 hrs, Volume= 0.397 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 602.92' @ 16.95 hrs Surf.Area= 6,372 sf Storage= 10,478 cf

Plug-Flow detention time= 660.2 min calculated for 0.397 af (100% of inflow)
Center-of-Mass det. time= 660.4 min (1,478.9 - 818.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	600.50'	5,778 cf	**92.75'W x 68.70'L x 3.50'H Field A** 22,301 cf Overall - 7,856 cf Embedded = 14,445 cf x 40.0% Voids
#2A	601.00'	7,856 cf	**ADS_StormTech SC-740 +Cap** x 171 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 19 Rows of 9 Chambers
		13,634 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	600.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	603.90'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.15 cfs @ 10.40 hrs HW=600.54' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=600.50' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P: SC-740 Storm Tech System - Front - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

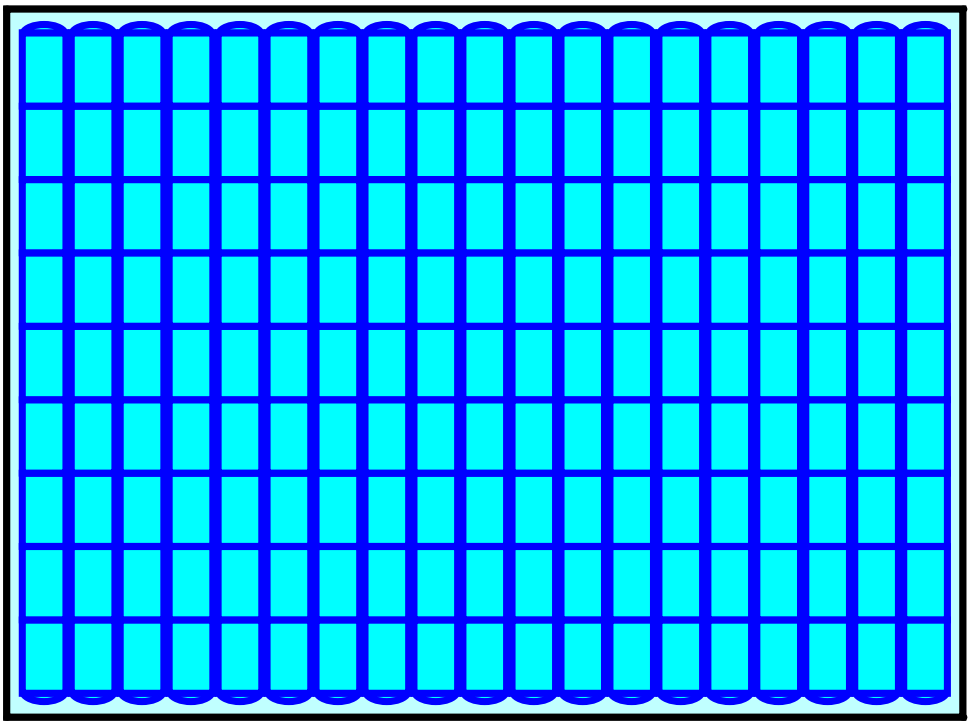
9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +18.0" End Stone x 2 = 68.70' Base Length
19 Rows x 51.0" Wide + 6.0" Spacing x 18 + 18.0" Side Stone x 2 = 92.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

171 Chambers x 45.9 cf = 7,855.7 cf Chamber Storage

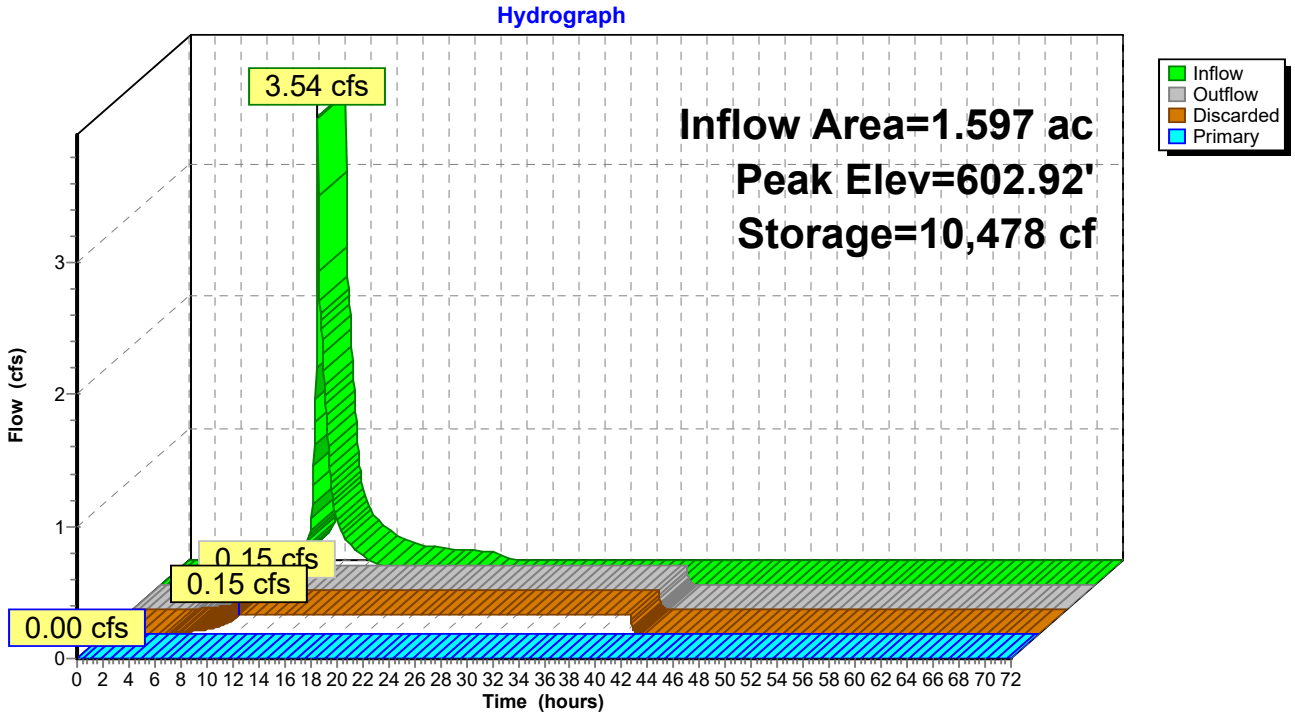
22,300.7 cf Field - 7,855.7 cf Chambers = 14,444.9 cf Stone x 40.0% Voids = 5,778.0 cf Stone Storage

Chamber Storage + Stone Storage = 13,633.7 cf = 0.313 af
Overall Storage Efficiency = 61.1%
Overall System Size = 68.70' x 92.75' x 3.50'

171 Chambers
826.0 cy Field
535.0 cy Stone



Pond 3P: SC-740 Storm Tech System - Front



Summary for Pond 4P: CB

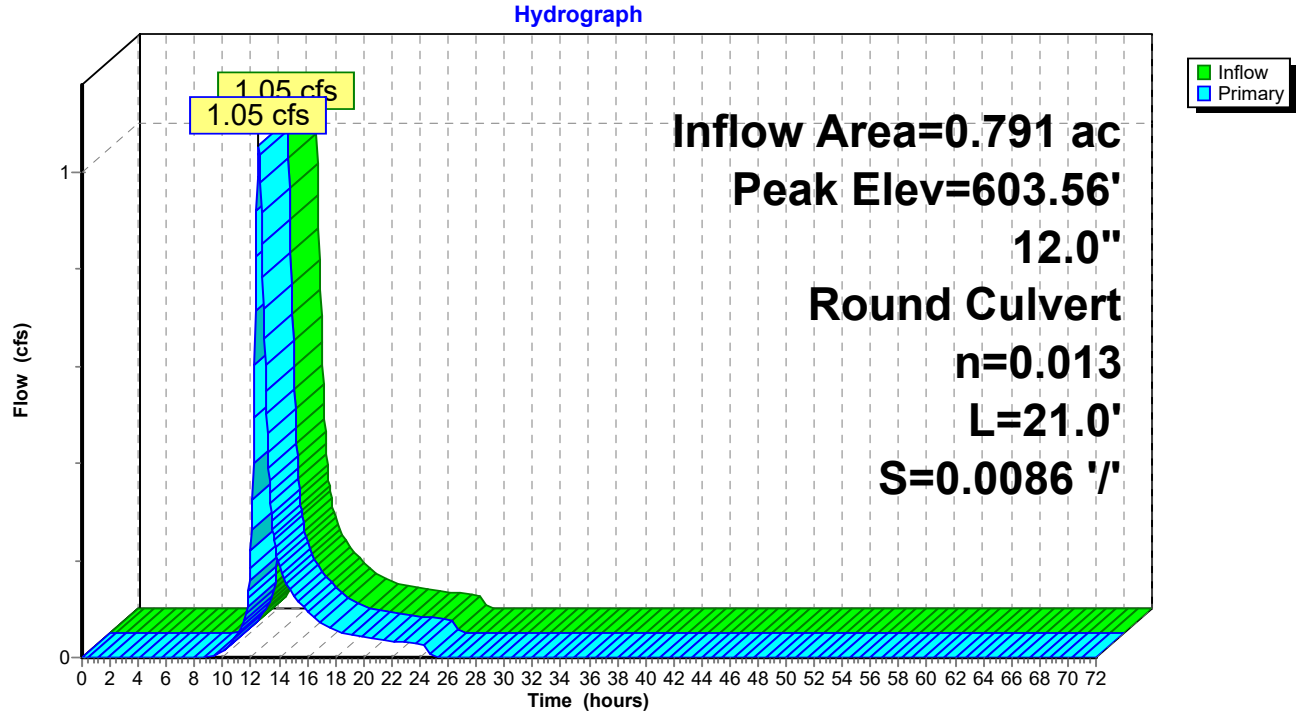
Inflow Area = 0.791 ac, 36.79% Impervious, Inflow Depth = 2.32" for 10 YR event
Inflow = 1.05 cfs @ 12.57 hrs, Volume= 0.153 af
Outflow = 1.05 cfs @ 12.57 hrs, Volume= 0.153 af, Atten= 0%, Lag= 0.0 min
Primary = 1.05 cfs @ 12.57 hrs, Volume= 0.153 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 603.56' @ 12.57 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	602.93'	**12.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 602.93' / 602.75' S= 0.0086 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.05 cfs @ 12.57 hrs HW=603.56' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.05 cfs @ 2.89 fps)

Pond 4P: CB



Summary for Pond 5P: CB

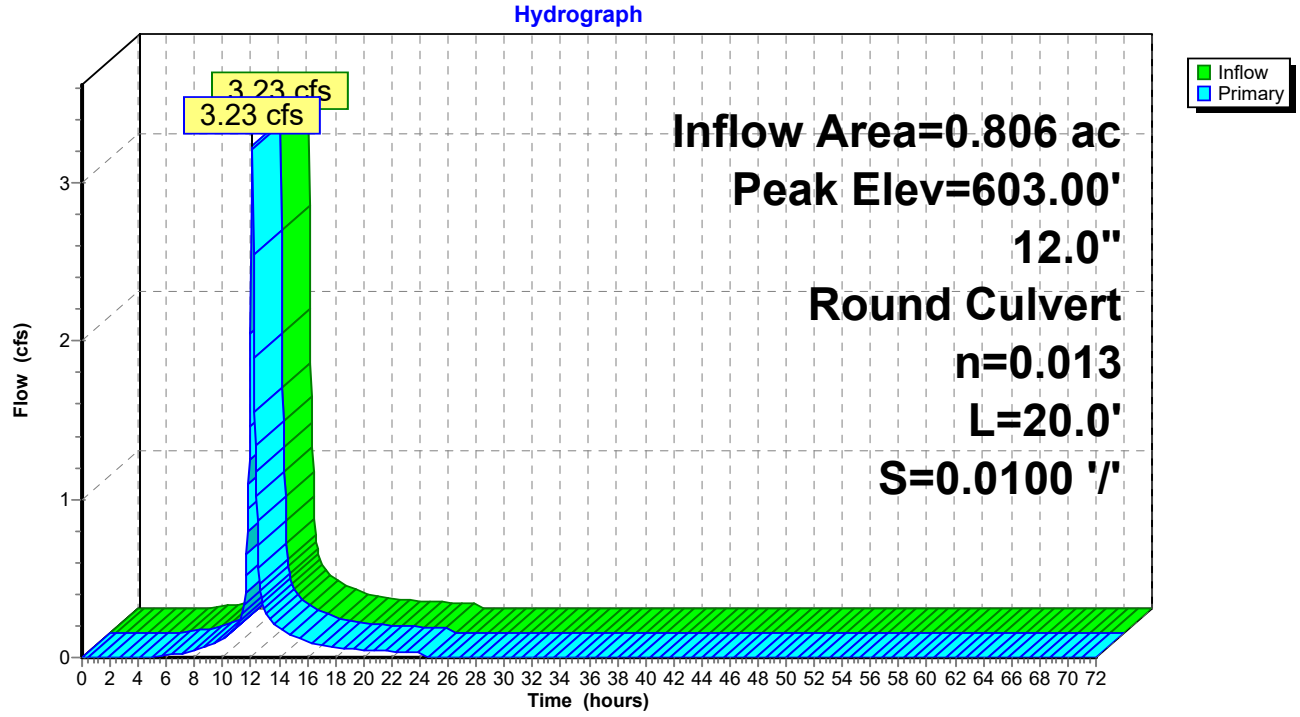
Inflow Area = 0.806 ac, 57.63% Impervious, Inflow Depth = 3.63" for 10 YR event
Inflow = 3.23 cfs @ 12.09 hrs, Volume= 0.244 af
Outflow = 3.23 cfs @ 12.09 hrs, Volume= 0.244 af, Atten= 0%, Lag= 0.0 min
Primary = 3.23 cfs @ 12.09 hrs, Volume= 0.244 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 603.00' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	601.33'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 601.33' / 601.13' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.15 cfs @ 12.09 hrs HW=602.94' (Free Discharge)
1=Culvert (Inlet Controls 3.15 cfs @ 4.01 fps)

Pond 5P: CB

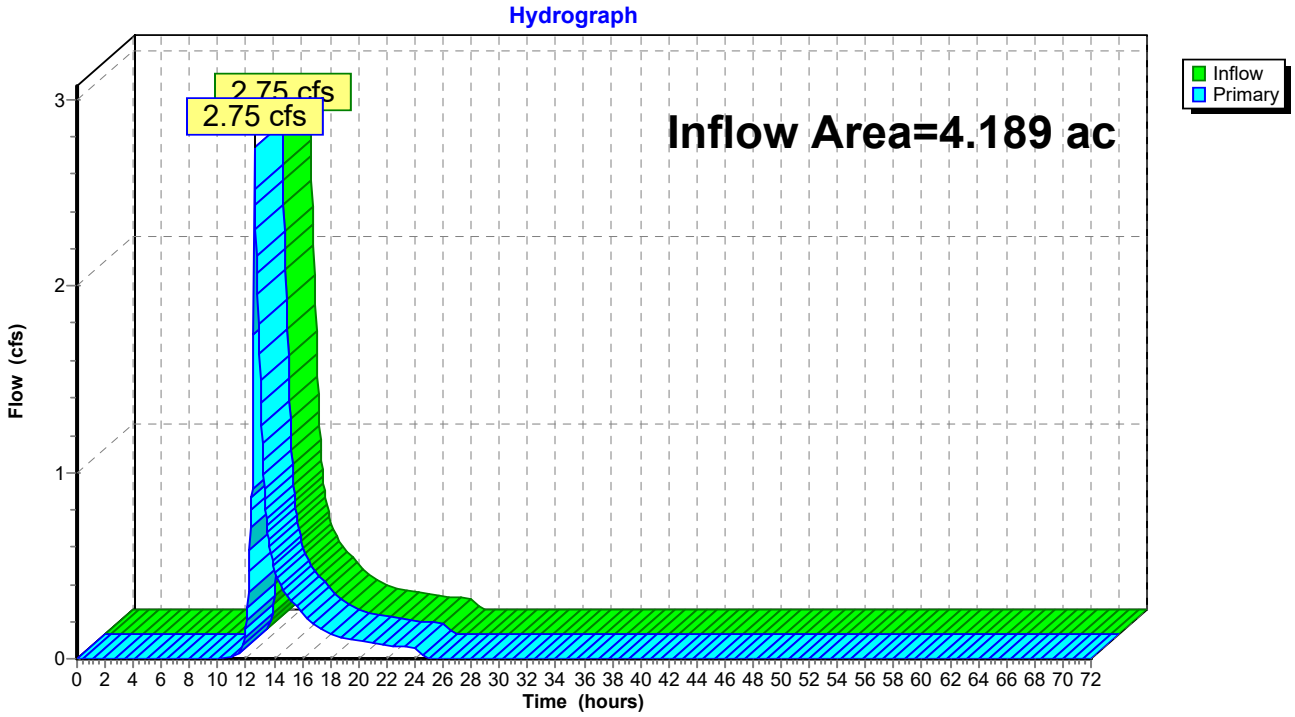


Summary for Link 1L: Town System

Inflow Area = 4.189 ac, 30.03% Impervious, Inflow Depth = 0.89" for 10 YR event
Inflow = 2.75 cfs @ 12.57 hrs, Volume= 0.310 af
Primary = 2.75 cfs @ 12.57 hrs, Volume= 0.310 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Town System



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Rear Parking & Runoff Area=72,157 sf 26.36% Impervious Runoff Depth=2.84"
Flow Length=527' Tc=40.1 min CN=72 Runoff=2.69 cfs 0.392 af

Subcatchment 2S: Side Driveways & Runoff Area=34,445 sf 36.79% Impervious Runoff Depth=3.31"
Flow Length=527' Tc=40.1 min CN=77 Runoff=1.51 cfs 0.218 af

Subcatchment 3S: Buildings, Southern Runoff Area=35,108 sf 57.63% Impervious Runoff Depth=4.77"
Tc=6.0 min CN=91 Runoff=4.18 cfs 0.320 af

Subcatchment 4S: Access Driveways, Runoff Area=40,758 sf 7.04% Impervious Runoff Depth=2.48"
Flow Length=579' Tc=33.3 min CN=68 Runoff=1.44 cfs 0.193 af

Pond 1P: SC-740 Storm Tech System - Rear Peak Elev=611.06' Storage=2,306 cf Inflow=2.69 cfs 0.392 af
Discarded=0.03 cfs 0.083 af Primary=2.09 cfs 0.282 af Outflow=2.11 cfs 0.365 af

Pond 2P: CB Peak Elev=610.60' Inflow=2.69 cfs 0.392 af
12.0" Round Culvert n=0.013 L=95.0' S=0.0100 '/' Outflow=2.69 cfs 0.392 af

Pond 3P: SC-740 Storm Tech System - Peak Elev=603.99' Storage=13,603 cf Inflow=4.66 cfs 0.539 af
Discarded=0.15 cfs 0.489 af Primary=0.31 cfs 0.050 af Outflow=0.46 cfs 0.539 af

Pond 4P: CB Peak Elev=603.72' Inflow=1.51 cfs 0.218 af
12.0" Round Culvert n=0.013 L=21.0' S=0.0086 '/' Outflow=1.51 cfs 0.218 af

Pond 5P: CB Peak Elev=603.78' Inflow=4.18 cfs 0.320 af
12.0" Round Culvert n=0.013 L=20.0' S=0.0100 '/' Outflow=4.18 cfs 0.320 af

Link 1L: Town System Inflow=3.49 cfs 0.525 af
Primary=3.49 cfs 0.525 af

Summary for Subcatchment 1S: Rear Parking & Northern Abutters

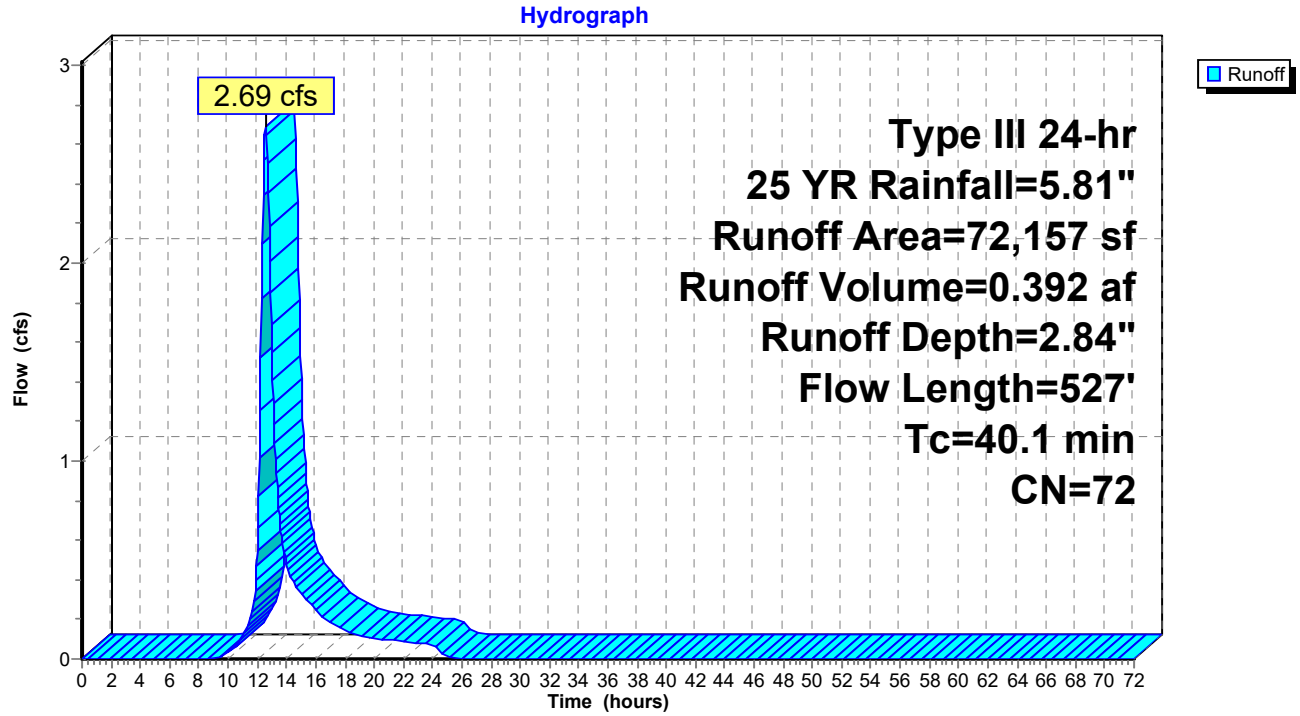
Runoff = 2.69 cfs @ 12.57 hrs, Volume= 0.392 af, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.81"

	Area (sf)	CN	Description
*	13,899	98	Paved Road HSB B
	12,683	69	50-75% Grass cover, Fair, HSG B
*	5,122	98	Buildings
	40,453	60	Woods, Fair, HSG B
	72,157	72	Weighted Average
	53,136		73.64% Pervious Area
	19,021		26.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
40.1	527	Total			

Subcatchment 1S: Rear Parking & Northern Abutters



Summary for Subcatchment 2S: Side Driveways & Northern Abutters

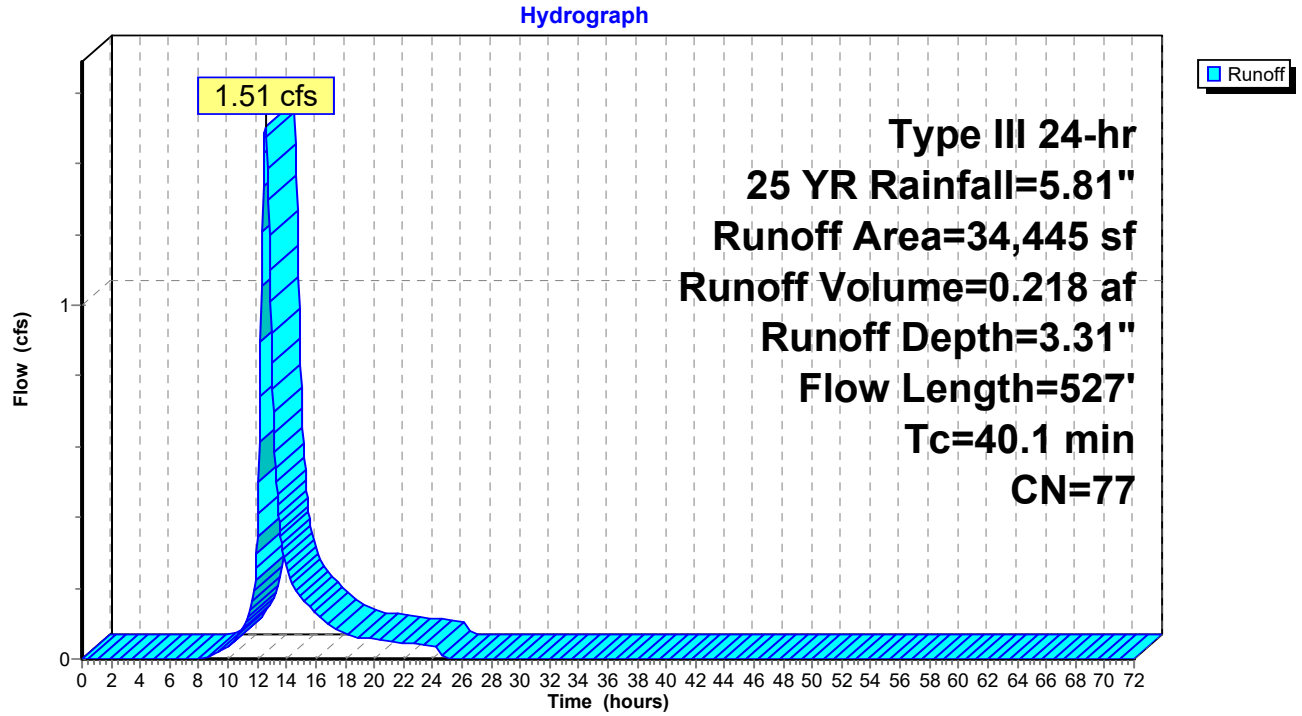
Runoff = 1.51 cfs @ 12.56 hrs, Volume= 0.218 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.81"

	Area (sf)	CN	Description
*	7,619	98	Paved Road HSB B
	12,149	69	50-75% Grass cover, Fair, HSG B
*	5,055	98	Buildings
	9,622	60	Woods, Fair, HSG B
	34,445	77	Weighted Average
	21,771		63.21% Pervious Area
	12,674		36.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
40.1	527	Total			

Subcatchment 2S: Side Driveways & Northern Abutters



Summary for Subcatchment 3S: Buildings, Southern Parking, & Lawns

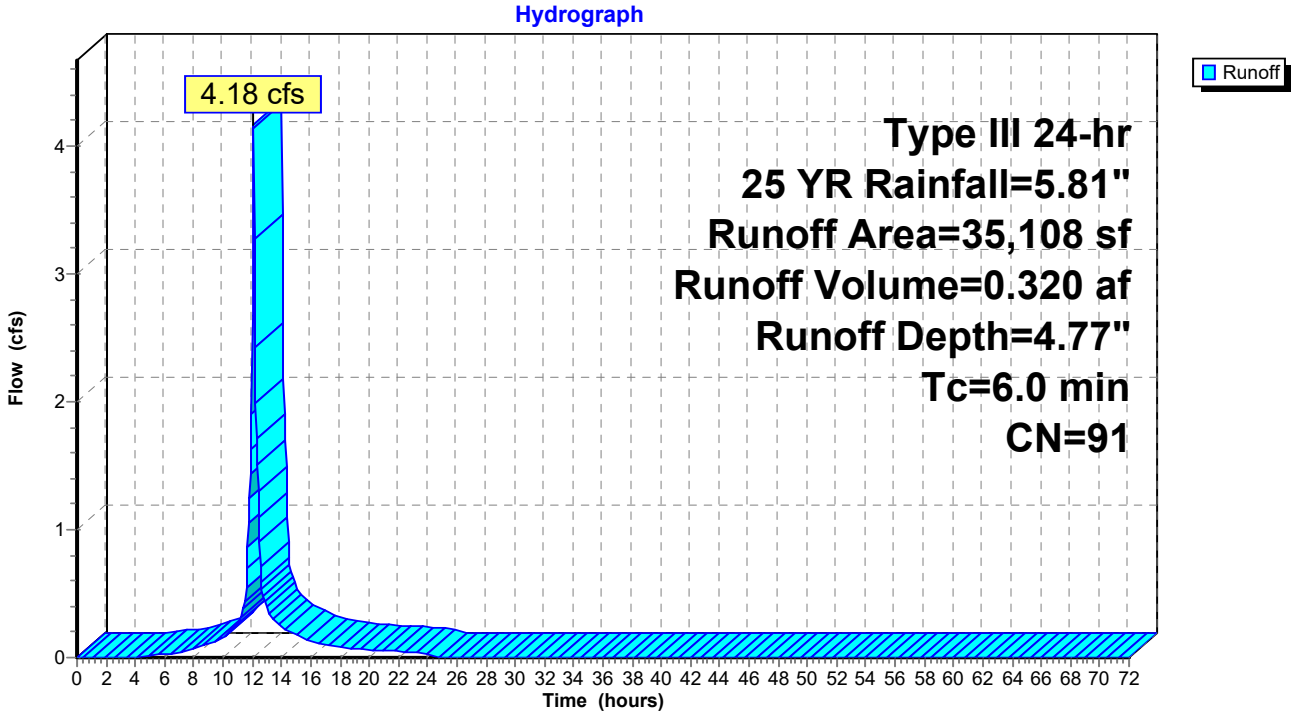
Runoff = 4.18 cfs @ 12.09 hrs, Volume= 0.320 af, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.81"

	Area (sf)	CN	Description
*	10,966	98	Paved Road HSB B
	3,289	69	50-75% Grass cover, Fair, HSG B
*	9,267	98	Buildings
	11,586	85	Gravel roads, HSG B
	35,108	91	Weighted Average
	14,875		42.37% Pervious Area
	20,233		57.63% Impervious Area

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

Subcatchment 3S: Buildings, Southern Parking, & Lawns



Summary for Subcatchment 4S: Access Driveways, Southern Lawn, & Eastern Woods

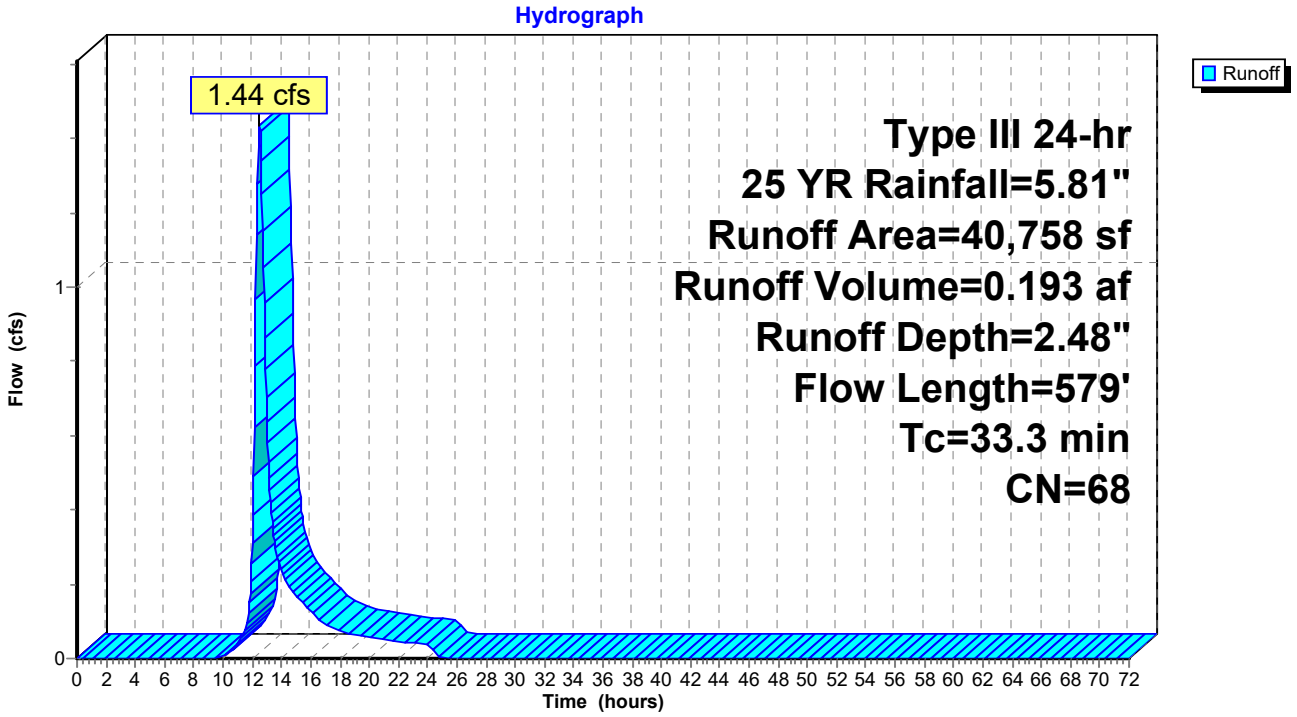
Runoff = 1.44 cfs @ 12.48 hrs, Volume= 0.193 af, Depth= 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.81"

	Area (sf)	CN	Description
*	2,870	98	Paved Road HSB B
	26,302	69	50-75% Grass cover, Fair, HSG B
*	0	98	Buildings
	11,586	60	Woods, Fair, HSG B
	40,758	68	Weighted Average
	37,888		92.96% Pervious Area
	2,870		7.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
4.3	214	0.0140	0.83		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.1	100	0.1100	23.09	577.34	**Channel Flow, Channel** Area= 25.0 sf Perim= 15.0' r= 1.67' n= 0.030 Earth, grassed & winding
0.6	165	0.0060	4.65	185.92	**Channel Flow, Drain Channel** Area= 40.0 sf Perim= 30.0' r= 1.33' n= 0.030 Earth, grassed & winding
33.3	579	Total			

Subcatchment 4S: Access Driveways, Southern Lawn, & Eastern Woods



Summary for Pond 1P: SC-740 Storm Tech System - Rear

Inflow Area = 1.656 ac, 26.36% Impervious, Inflow Depth = 2.84" for 25 YR event
Inflow = 2.69 cfs @ 12.57 hrs, Volume= 0.392 af
Outflow = 2.11 cfs @ 12.57 hrs, Volume= 0.365 af, Atten= 22%, Lag= 0.0 min
Discarded = 0.03 cfs @ 10.05 hrs, Volume= 0.083 af
Primary = 2.09 cfs @ 12.57 hrs, Volume= 0.282 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 611.06' @ 12.57 hrs Surf.Area= 1,096 sf Storage= 2,306 cf

Plug-Flow detention time= 249.7 min calculated for 0.365 af (93% of inflow)
Center-of-Mass det. time= 215.0 min (1,081.7 - 866.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	607.50'	1,020 cf	**20.50'W x 53.46'L x 3.50'H Field A** 3,836 cf Overall - 1,286 cf Embedded = 2,549 cf x 40.0% Voids
#2A	608.00'	1,286 cf	**ADS_StormTech SC-740 +Cap** x 28 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Rows of 7 Chambers
		2,306 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	607.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	610.75'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.03 cfs @ 10.05 hrs HW=607.54' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.08 cfs @ 12.57 hrs HW=611.06' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 2.08 cfs @ 1.35 fps)

Pond 1P: SC-740 Storm Tech System - Rear - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

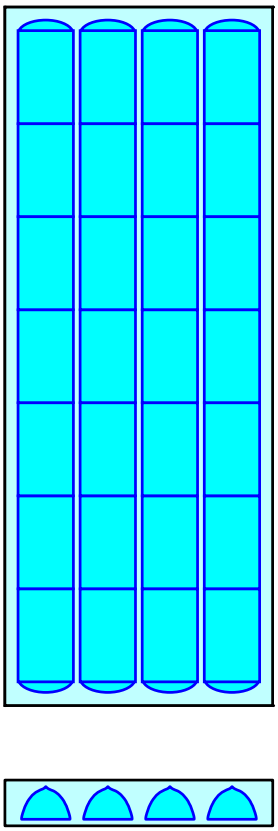
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

28 Chambers x 45.9 cf = 1,286.3 cf Chamber Storage

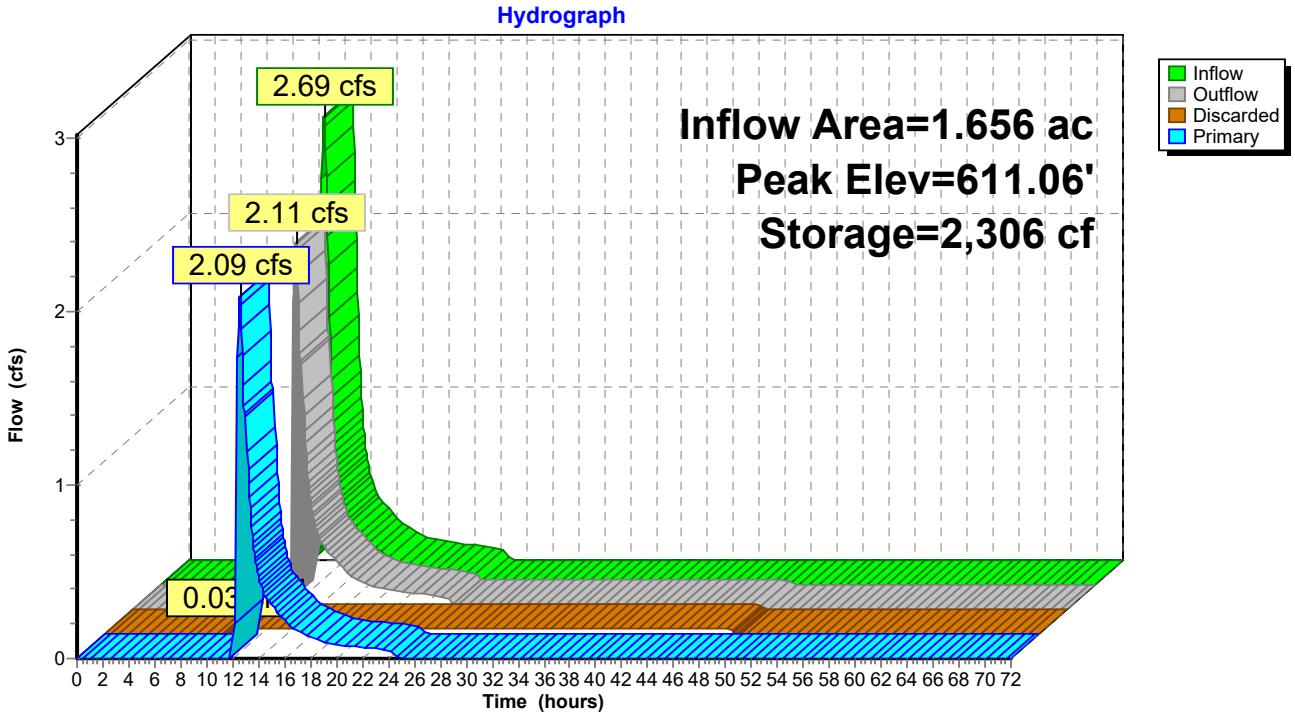
3,835.5 cf Field - 1,286.3 cf Chambers = 2,549.2 cf Stone x 40.0% Voids = 1,019.7 cf Stone Storage

Chamber Storage + Stone Storage = 2,306.0 cf = 0.053 af
Overall Storage Efficiency = 60.1%
Overall System Size = 53.46' x 20.50' x 3.50'

28 Chambers
142.1 cy Field
94.4 cy Stone



Pond 1P: SC-740 Storm Tech System - Rear



Summary for Pond 2P: CB

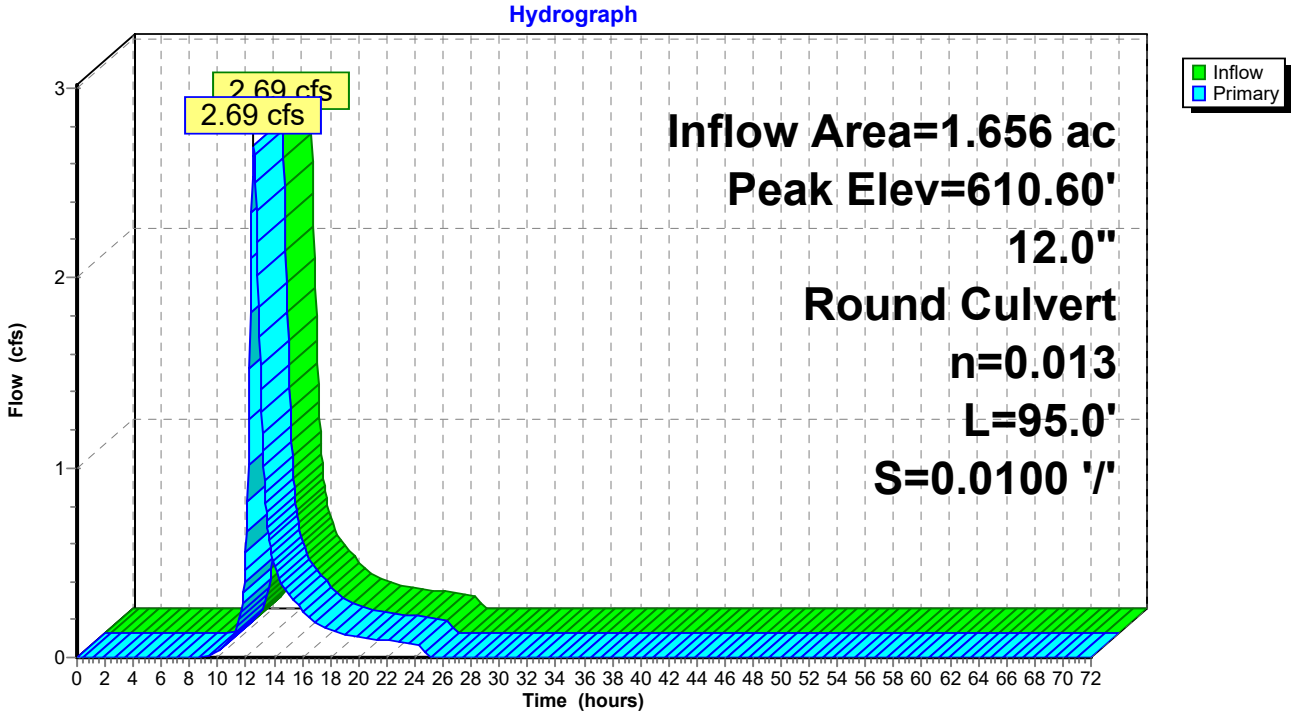
Inflow Area = 1.656 ac, 26.36% Impervious, Inflow Depth = 2.84" for 25 YR event
Inflow = 2.69 cfs @ 12.57 hrs, Volume= 0.392 af
Outflow = 2.69 cfs @ 12.57 hrs, Volume= 0.392 af, Atten= 0%, Lag= 0.0 min
Primary = 2.69 cfs @ 12.57 hrs, Volume= 0.392 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 610.60' @ 12.57 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	609.29'	**12.0" Round Culvert** L= 95.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 609.29' / 608.34' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.69 cfs @ 12.57 hrs HW=610.60' (Free Discharge)
1=Culvert (Inlet Controls 2.69 cfs @ 3.42 fps)

Pond 2P: CB



Summary for Pond 3P: SC-740 Storm Tech System - Front

Inflow Area = 1.597 ac, 47.31% Impervious, Inflow Depth = 4.05" for 25 YR event
Inflow = 4.66 cfs @ 12.09 hrs, Volume= 0.539 af
Outflow = 0.46 cfs @ 14.14 hrs, Volume= 0.539 af, Atten= 90%, Lag= 122.7 min
Discarded = 0.15 cfs @ 9.60 hrs, Volume= 0.489 af
Primary = 0.31 cfs @ 14.14 hrs, Volume= 0.050 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 603.99' @ 14.14 hrs Surf.Area= 6,372 sf Storage= 13,603 cf

Plug-Flow detention time= 768.2 min calculated for 0.538 af (100% of inflow)
Center-of-Mass det. time= 768.7 min (1,580.1 - 811.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	600.50'	5,778 cf	**92.75'W x 68.70'L x 3.50'H Field A** 22,301 cf Overall - 7,856 cf Embedded = 14,445 cf x 40.0% Voids
#2A	601.00'	7,856 cf	**ADS_StormTech SC-740 +Cap** x 171 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 19 Rows of 9 Chambers
		13,634 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	600.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	603.90'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.15 cfs @ 9.60 hrs HW=600.54' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.31 cfs @ 14.14 hrs HW=603.99' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.31 cfs @ 0.69 fps)

Pond 3P: SC-740 Storm Tech System - Front - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

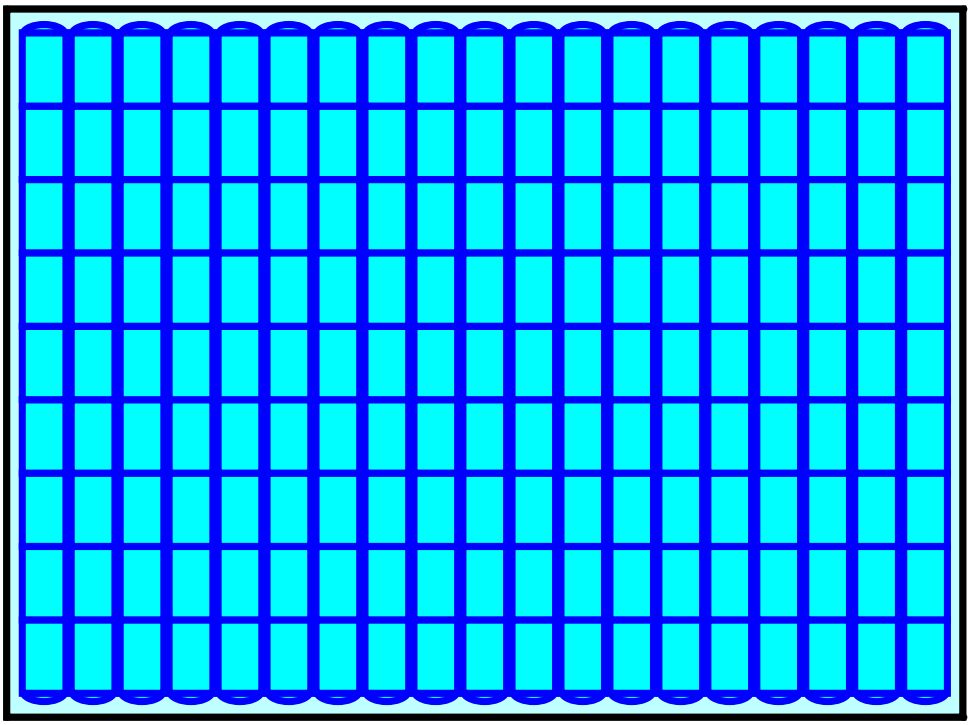
9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +18.0" End Stone x 2 = 68.70' Base Length
19 Rows x 51.0" Wide + 6.0" Spacing x 18 + 18.0" Side Stone x 2 = 92.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

171 Chambers x 45.9 cf = 7,855.7 cf Chamber Storage

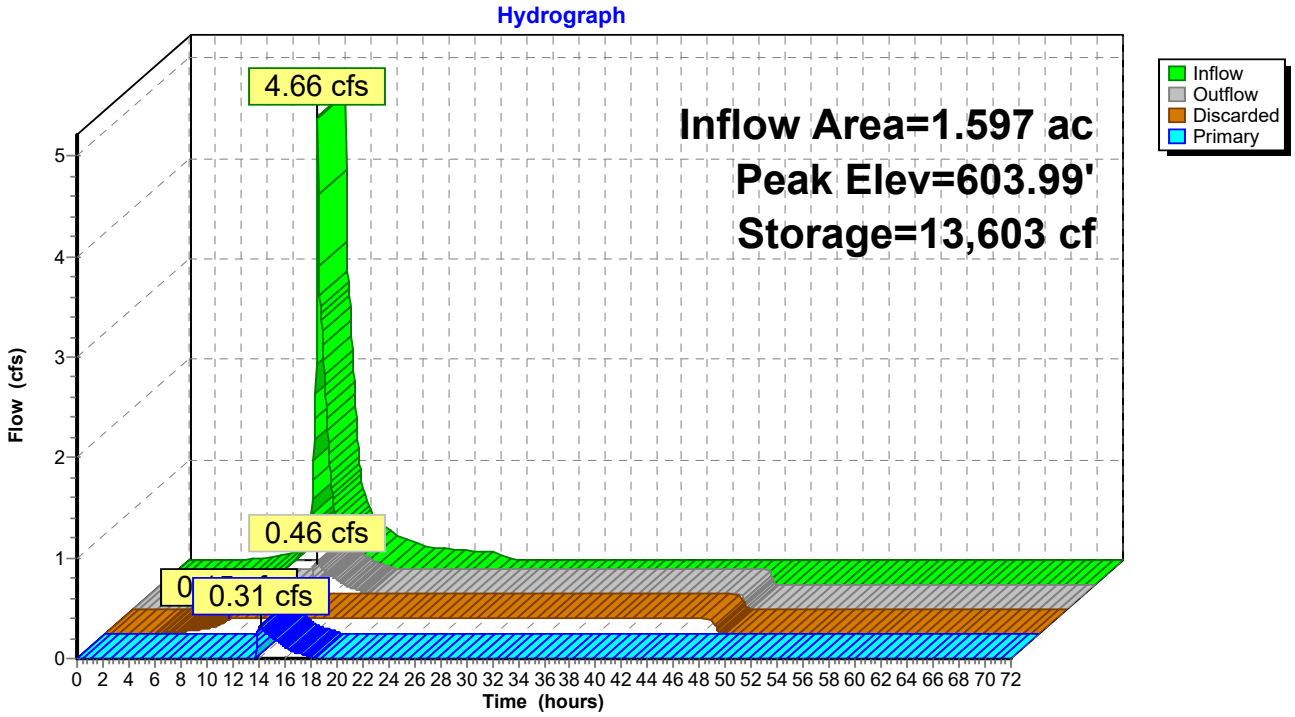
22,300.7 cf Field - 7,855.7 cf Chambers = 14,444.9 cf Stone x 40.0% Voids = 5,778.0 cf Stone Storage

Chamber Storage + Stone Storage = 13,633.7 cf = 0.313 af
Overall Storage Efficiency = 61.1%
Overall System Size = 68.70' x 92.75' x 3.50'

171 Chambers
826.0 cy Field
535.0 cy Stone



Pond 3P: SC-740 Storm Tech System - Front



Summary for Pond 4P: CB

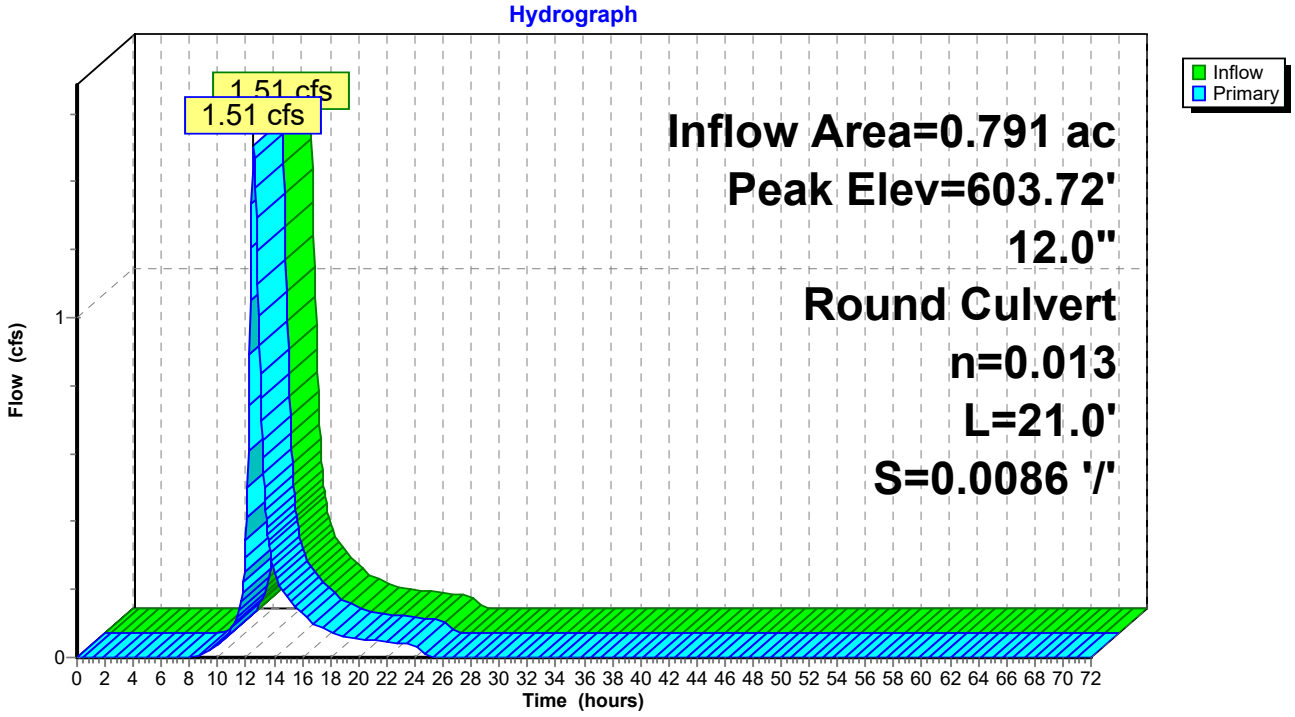
Inflow Area = 0.791 ac, 36.79% Impervious, Inflow Depth = 3.31" for 25 YR event
Inflow = 1.51 cfs @ 12.56 hrs, Volume= 0.218 af
Outflow = 1.51 cfs @ 12.56 hrs, Volume= 0.218 af, Atten= 0%, Lag= 0.0 min
Primary = 1.51 cfs @ 12.56 hrs, Volume= 0.218 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 603.72' @ 12.56 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	602.93'	**12.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 602.93' / 602.75' S= 0.0086 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.51 cfs @ 12.56 hrs HW=603.72' (Free Discharge)
1=Culvert (Barrel Controls 1.51 cfs @ 3.13 fps)

Pond 4P: CB



Summary for Pond 5P: CB

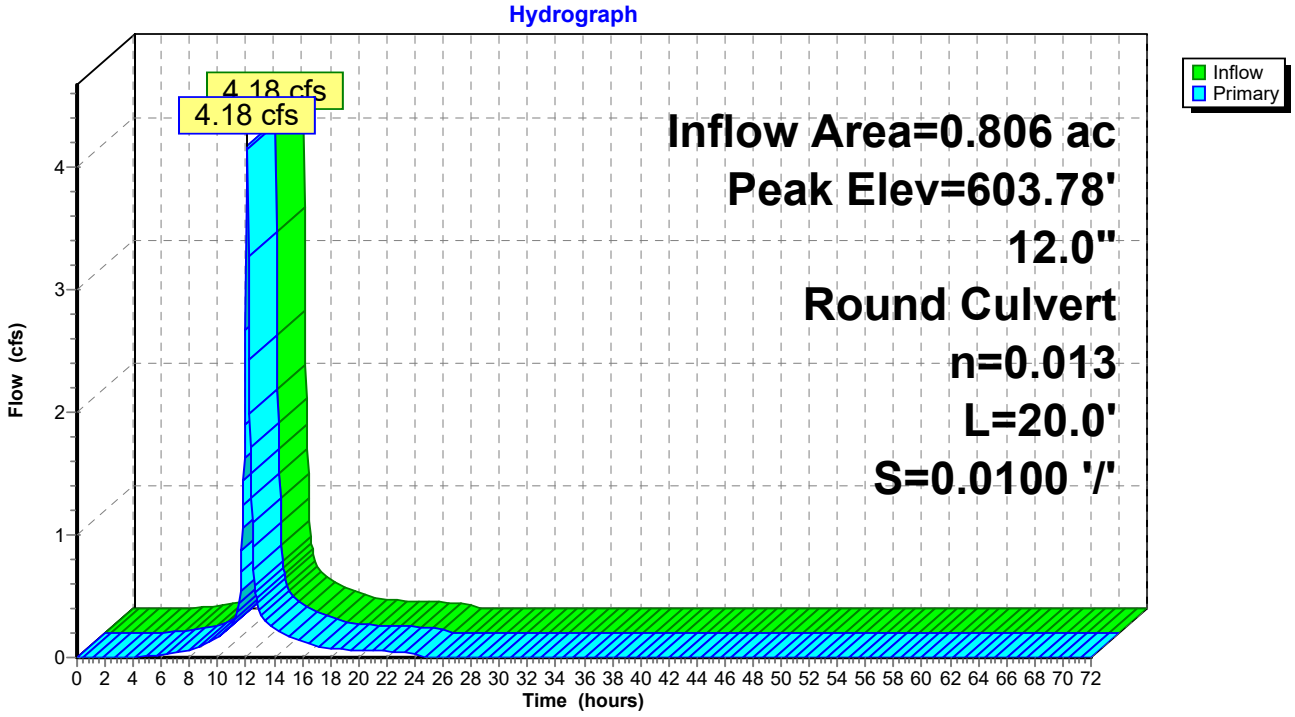
Inflow Area = 0.806 ac, 57.63% Impervious, Inflow Depth = 4.77" for 25 YR event
Inflow = 4.18 cfs @ 12.09 hrs, Volume= 0.320 af
Outflow = 4.18 cfs @ 12.09 hrs, Volume= 0.320 af, Atten= 0%, Lag= 0.0 min
Primary = 4.18 cfs @ 12.09 hrs, Volume= 0.320 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 603.78' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	601.33'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 601.33' / 601.13' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.07 cfs @ 12.09 hrs HW=603.69' (Free Discharge)
└**1=Culvert** (Inlet Controls 4.07 cfs @ 5.18 fps)

Pond 5P: CB

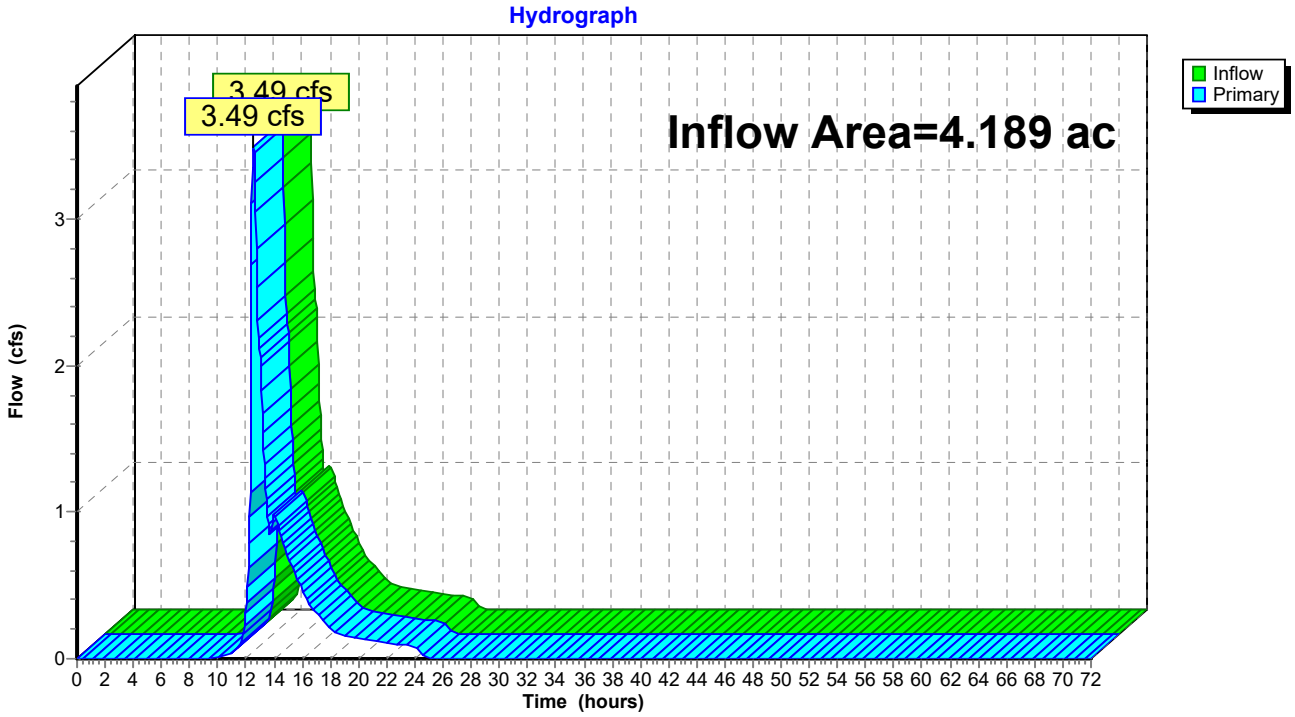


Summary for Link 1L: Town System

Inflow Area = 4.189 ac, 30.03% Impervious, Inflow Depth = 1.50" for 25 YR event
Inflow = 3.49 cfs @ 12.53 hrs, Volume= 0.525 af
Primary = 3.49 cfs @ 12.53 hrs, Volume= 0.525 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Town System



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Rear Parking & Runoff Area=72,157 sf 26.36% Impervious Runoff Depth=4.86"
Flow Length=527' Tc=40.1 min CN=72 Runoff=4.64 cfs 0.671 af

Subcatchment 2S: Side Driveways & Runoff Area=34,445 sf 36.79% Impervious Runoff Depth=5.45"
Flow Length=527' Tc=40.1 min CN=77 Runoff=2.47 cfs 0.359 af

Subcatchment 3S: Buildings, Southern Runoff Area=35,108 sf 57.63% Impervious Runoff Depth=7.11"
Tc=6.0 min CN=91 Runoff=6.08 cfs 0.478 af

Subcatchment 4S: Access Driveways, Runoff Area=40,758 sf 7.04% Impervious Runoff Depth=4.40"
Flow Length=579' Tc=33.3 min CN=68 Runoff=2.59 cfs 0.343 af

Pond 1P: SC-740 Storm Tech System - Rear Peak Elev=611.25' Storage=2,306 cf Inflow=4.64 cfs 0.671 af
Discarded=0.03 cfs 0.086 af Primary=4.55 cfs 0.579 af Outflow=4.58 cfs 0.665 af

Pond 2P: CB Peak Elev=612.20' Inflow=4.64 cfs 0.671 af
12.0" Round Culvert n=0.013 L=95.0' S=0.0100 '/' Outflow=4.64 cfs 0.671 af

Pond 3P: SC-740 Storm Tech System - Peak Elev=604.29' Storage=13,634 cf Inflow=6.93 cfs 0.837 af
Discarded=0.15 cfs 0.524 af Primary=2.87 cfs 0.197 af Outflow=3.02 cfs 0.721 af

Pond 4P: CB Peak Elev=604.11' Inflow=2.47 cfs 0.359 af
12.0" Round Culvert n=0.013 L=21.0' S=0.0086 '/' Outflow=2.47 cfs 0.359 af

Pond 5P: CB Peak Elev=605.96' Inflow=6.08 cfs 0.478 af
12.0" Round Culvert n=0.013 L=20.0' S=0.0100 '/' Outflow=6.08 cfs 0.478 af

Link 1L: Town System Inflow=9.88 cfs 1.119 af
Primary=9.88 cfs 1.119 af

Summary for Subcatchment 1S: Rear Parking & Northern Abutters

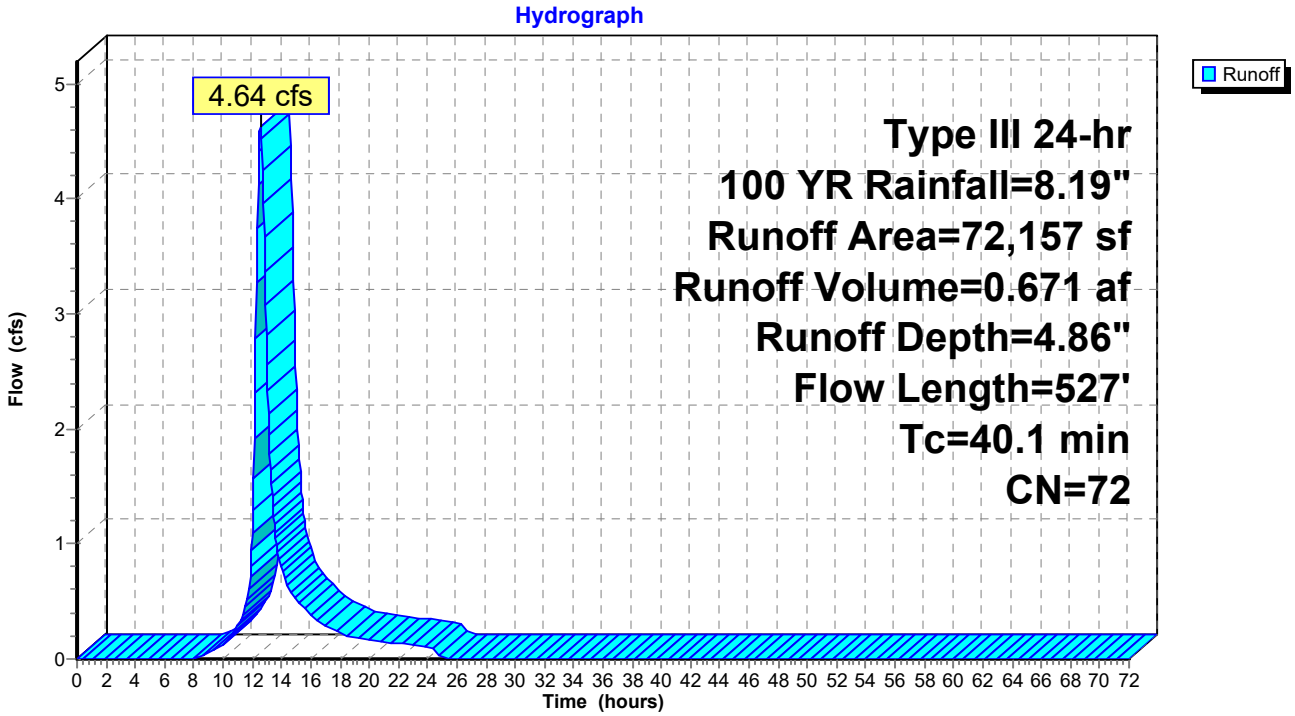
Runoff = 4.64 cfs @ 12.55 hrs, Volume= 0.671 af, Depth= 4.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=8.19"

	Area (sf)	CN	Description
*	13,899	98	Paved Road HSB B
	12,683	69	50-75% Grass cover, Fair, HSG B
*	5,122	98	Buildings
	40,453	60	Woods, Fair, HSG B
	72,157	72	Weighted Average
	53,136		73.64% Pervious Area
	19,021		26.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
40.1	527	Total			

Subcatchment 1S: Rear Parking & Northern Abutters



Summary for Subcatchment 2S: Side Driveways & Northern Abutters

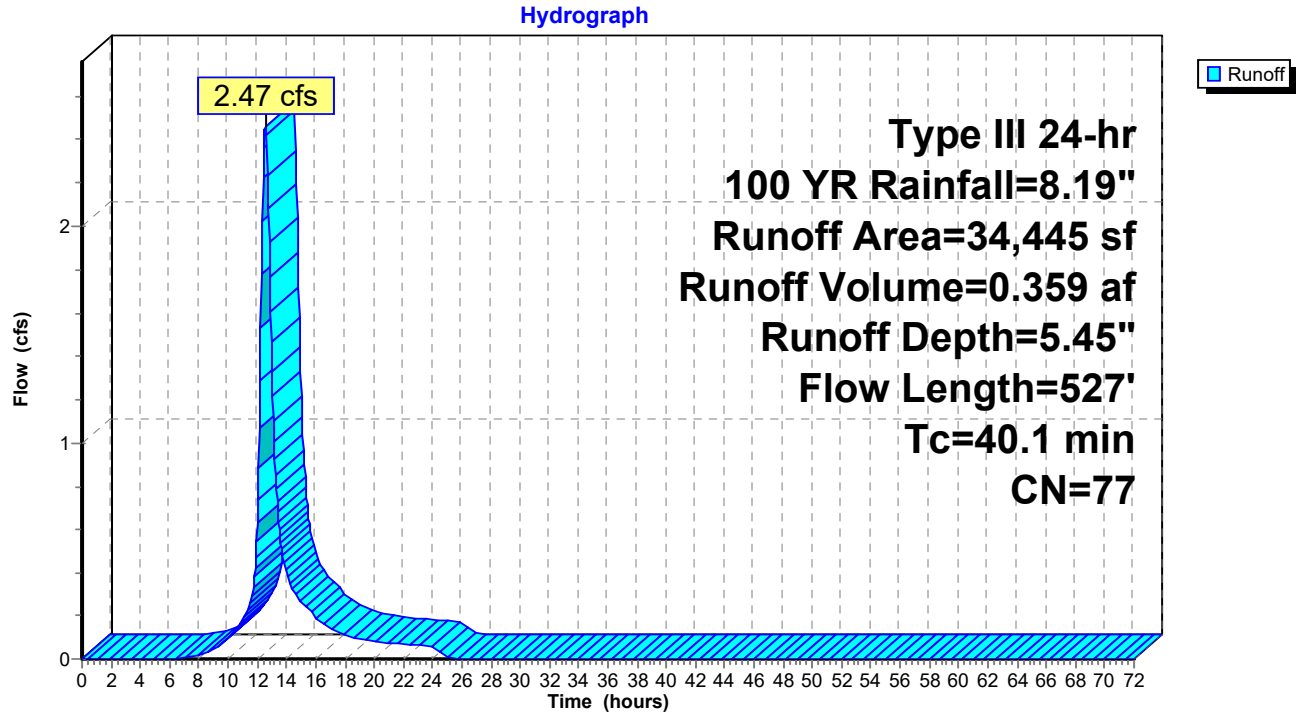
Runoff = 2.47 cfs @ 12.54 hrs, Volume= 0.359 af, Depth= 5.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=8.19"

	Area (sf)	CN	Description
*	7,619	98	Paved Road HSB B
	12,149	69	50-75% Grass cover, Fair, HSG B
*	5,055	98	Buildings
	9,622	60	Woods, Fair, HSG B
	34,445	77	Weighted Average
	21,771		63.21% Pervious Area
	12,674		36.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
8.1	306	0.0080	0.63		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
3.7	121	0.0120	0.55		**Shallow Concentrated Flow, Shallow Concetrate Flow - Woods** Woodland Kv= 5.0 fps
40.1	527	Total			

Subcatchment 2S: Side Driveways & Northern Abutters



Summary for Subcatchment 3S: Buildings, Southern Parking, & Lawns

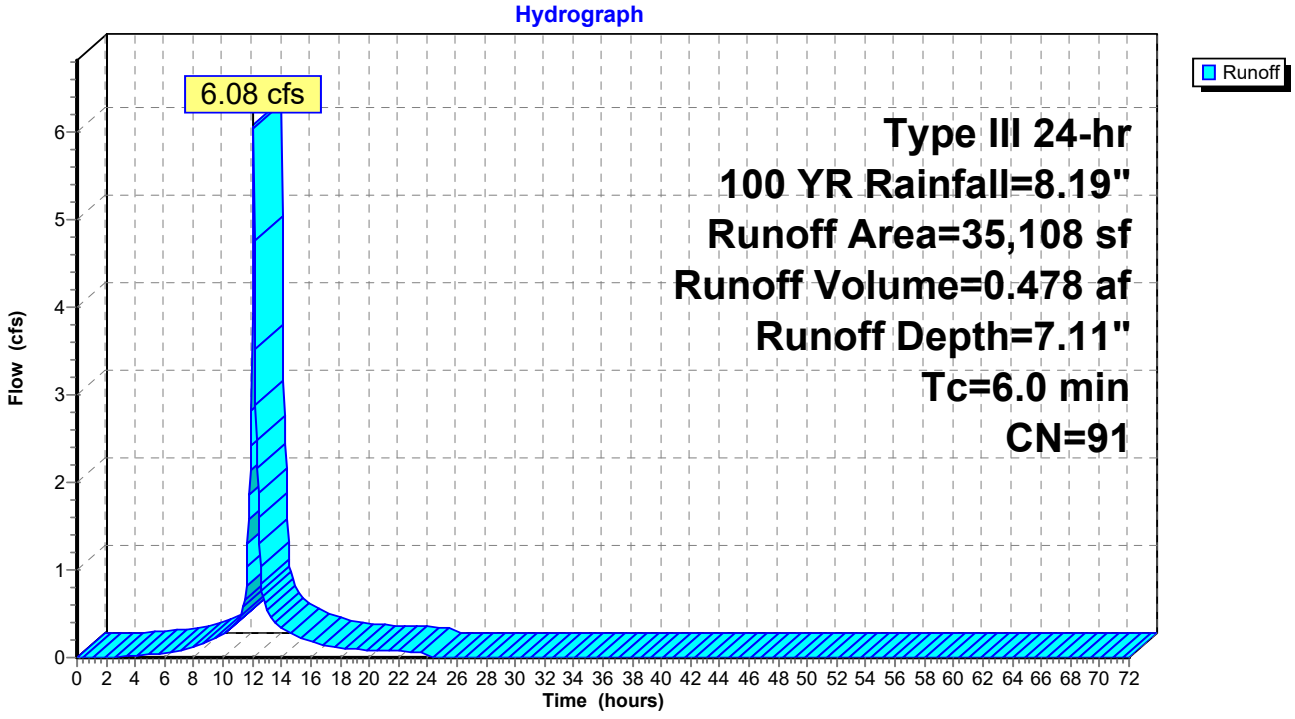
Runoff = 6.08 cfs @ 12.09 hrs, Volume= 0.478 af, Depth= 7.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=8.19"

	Area (sf)	CN	Description
*	10,966	98	Paved Road HSB B
	3,289	69	50-75% Grass cover, Fair, HSG B
*	9,267	98	Buildings
	11,586	85	Gravel roads, HSG B
	35,108	91	Weighted Average
	14,875		42.37% Pervious Area
	20,233		57.63% Impervious Area

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

Subcatchment 3S: Buildings, Southern Parking, & Lawns



Summary for Subcatchment 4S: Access Driveways, Southern Lawn, & Eastern Woods

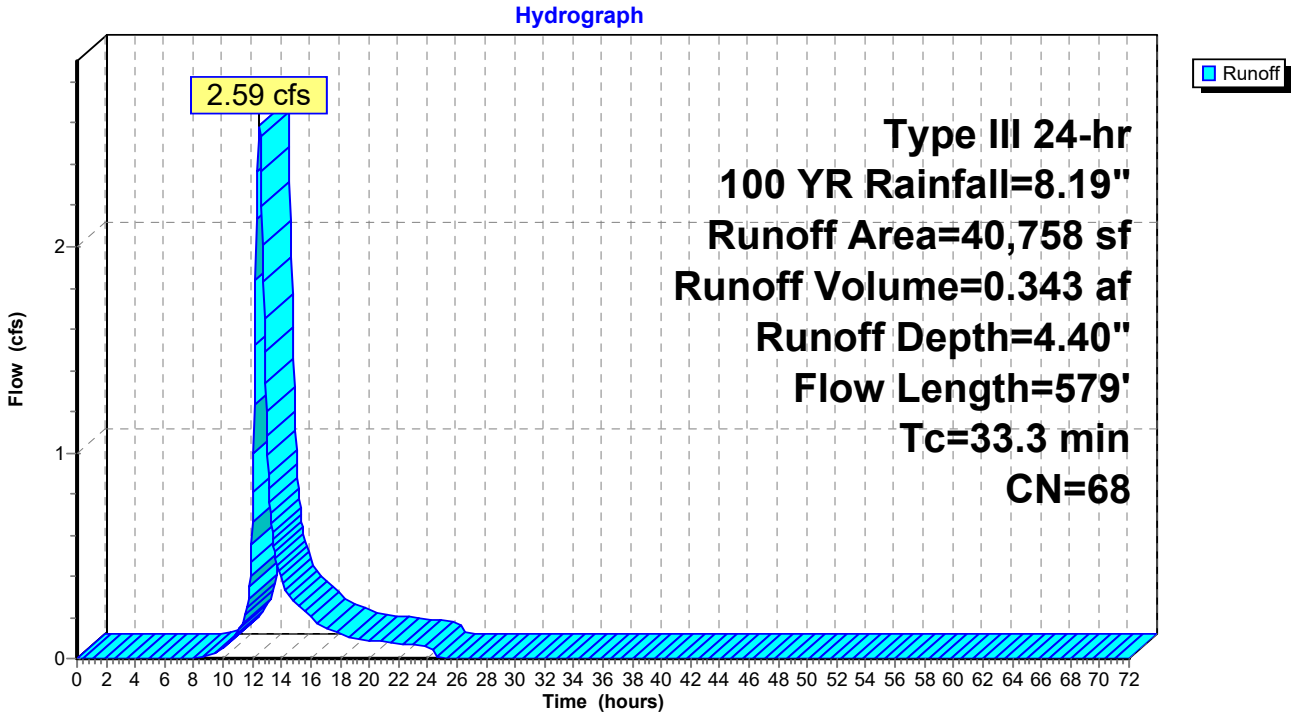
Runoff = 2.59 cfs @ 12.47 hrs, Volume= 0.343 af, Depth= 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=8.19"

	Area (sf)	CN	Description
*	2,870	98	Paved Road HSB B
	26,302	69	50-75% Grass cover, Fair, HSG B
*	0	98	Buildings
	11,586	60	Woods, Fair, HSG B
	40,758	68	Weighted Average
	37,888		92.96% Pervious Area
	2,870		7.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.3	100	0.0100	0.06		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
4.3	214	0.0140	0.83		**Shallow Concentrated Flow, Shallow Concentrated Flow** Short Grass Pasture Kv= 7.0 fps
0.1	100	0.1100	23.09	577.34	**Channel Flow, Channel** Area= 25.0 sf Perim= 15.0' r= 1.67' n= 0.030 Earth, grassed & winding
0.6	165	0.0060	4.65	185.92	**Channel Flow, Drain Channel** Area= 40.0 sf Perim= 30.0' r= 1.33' n= 0.030 Earth, grassed & winding
33.3	579	Total			

Subcatchment 4S: Access Driveways, Southern Lawn, & Eastern Woods



Summary for Pond 1P: SC-740 Storm Tech System - Rear

Inflow Area = 1.656 ac, 26.36% Impervious, Inflow Depth = 4.86" for 100 YR event
Inflow = 4.64 cfs @ 12.55 hrs, Volume= 0.671 af
Outflow = 4.58 cfs @ 12.55 hrs, Volume= 0.665 af, Atten= 1%, Lag= 0.0 min
Discarded = 0.03 cfs @ 8.75 hrs, Volume= 0.086 af
Primary = 4.55 cfs @ 12.55 hrs, Volume= 0.579 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 611.25' @ 12.55 hrs Surf.Area= 1,096 sf Storage= 2,306 cf

Plug-Flow detention time= 124.9 min calculated for 0.665 af (99% of inflow)
Center-of-Mass det. time= 119.3 min (970.5 - 851.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	607.50'	1,020 cf	**20.50'W x 53.46'L x 3.50'H Field A** 3,836 cf Overall - 1,286 cf Embedded = 2,549 cf x 40.0% Voids
#2A	608.00'	1,286 cf	**ADS_StormTech SC-740 +Cap** x 28 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 4 Rows of 7 Chambers
		2,306 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	607.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	610.75'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.03 cfs @ 8.75 hrs HW=607.54' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=4.55 cfs @ 12.55 hrs HW=611.25' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 4.55 cfs @ 1.83 fps)

Pond 1P: SC-740 Storm Tech System - Rear - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

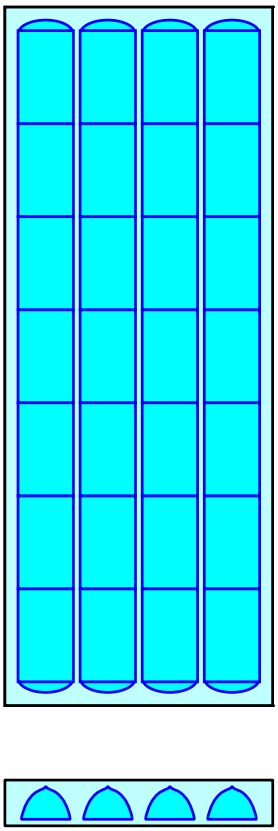
7 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 51.46' Row Length +12.0" End Stone x 2 = 53.46' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

28 Chambers x 45.9 cf = 1,286.3 cf Chamber Storage

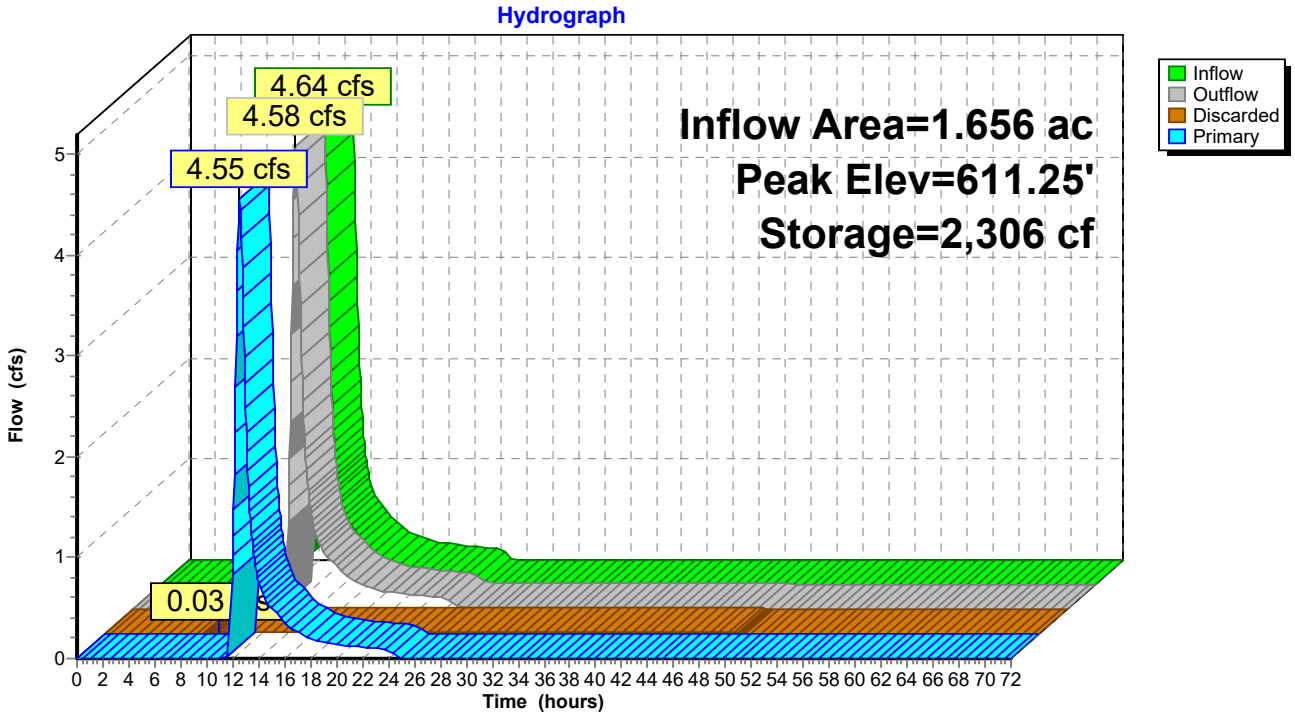
3,835.5 cf Field - 1,286.3 cf Chambers = 2,549.2 cf Stone x 40.0% Voids = 1,019.7 cf Stone Storage

Chamber Storage + Stone Storage = 2,306.0 cf = 0.053 af
Overall Storage Efficiency = 60.1%
Overall System Size = 53.46' x 20.50' x 3.50'

28 Chambers
142.1 cy Field
94.4 cy Stone



Pond 1P: SC-740 Storm Tech System - Rear



Summary for Pond 2P: CB

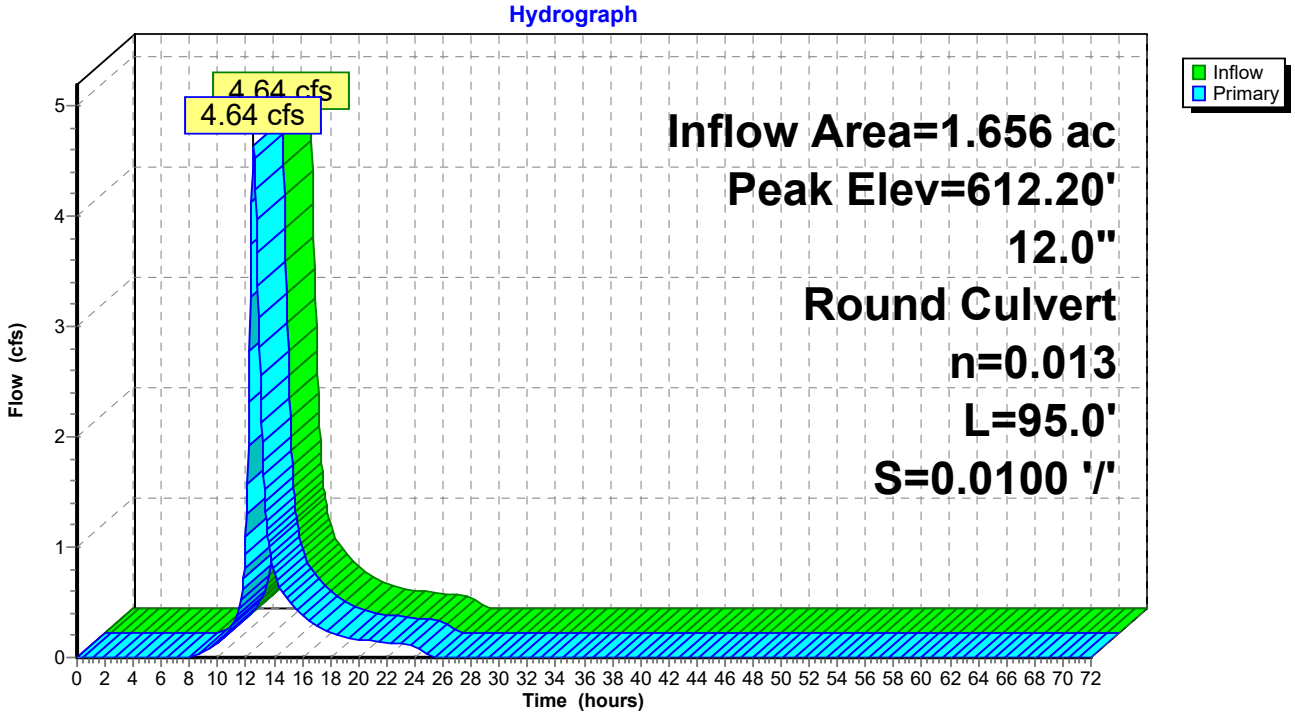
Inflow Area = 1.656 ac, 26.36% Impervious, Inflow Depth = 4.86" for 100 YR event
Inflow = 4.64 cfs @ 12.55 hrs, Volume= 0.671 af
Outflow = 4.64 cfs @ 12.55 hrs, Volume= 0.671 af, Atten= 0%, Lag= 0.0 min
Primary = 4.64 cfs @ 12.55 hrs, Volume= 0.671 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 612.20' @ 12.55 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	609.29'	**12.0" Round Culvert** L= 95.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 609.29' / 608.34' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=4.63 cfs @ 12.55 hrs HW=612.20' (Free Discharge)
1=Culvert (Inlet Controls 4.63 cfs @ 5.90 fps)

Pond 2P: CB



Summary for Pond 3P: SC-740 Storm Tech System - Front

Inflow Area = 1.597 ac, 47.31% Impervious, Inflow Depth = 6.29" for 100 YR event
Inflow = 6.93 cfs @ 12.09 hrs, Volume= 0.837 af
Outflow = 3.02 cfs @ 12.47 hrs, Volume= 0.721 af, Atten= 56%, Lag= 22.8 min
Discarded = 0.15 cfs @ 8.40 hrs, Volume= 0.524 af
Primary = 2.87 cfs @ 12.47 hrs, Volume= 0.197 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 604.29' @ 12.47 hrs Surf.Area= 6,372 sf Storage= 13,634 cf

Plug-Flow detention time= 693.5 min calculated for 0.721 af (86% of inflow)
Center-of-Mass det. time= 632.1 min (1,433.4 - 801.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	600.50'	5,778 cf	**92.75'W x 68.70'L x 3.50'H Field A** 22,301 cf Overall - 7,856 cf Embedded = 14,445 cf x 40.0% Voids
#2A	601.00'	7,856 cf	**ADS_StormTech SC-740 +Cap** x 171 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 19 Rows of 9 Chambers
		13,634 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	600.50'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	603.90'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.15 cfs @ 8.40 hrs HW=600.54' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=2.54 cfs @ 12.47 hrs HW=604.25' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 2.54 cfs @ 1.45 fps)

Pond 3P: SC-740 Storm Tech System - Front - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

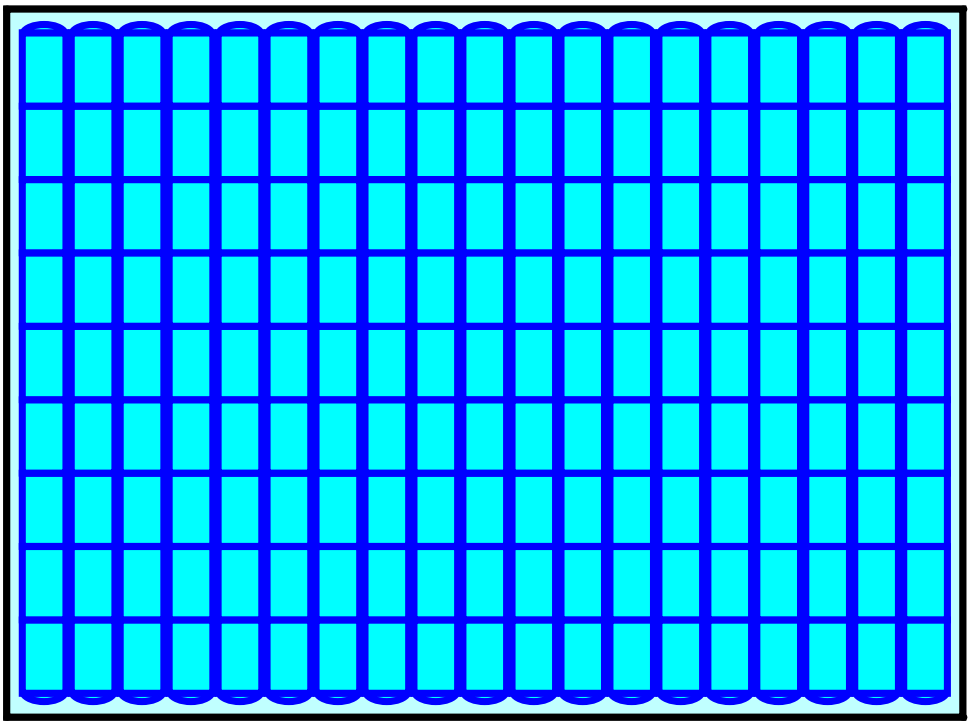
9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +18.0" End Stone x 2 = 68.70' Base Length
19 Rows x 51.0" Wide + 6.0" Spacing x 18 + 18.0" Side Stone x 2 = 92.75' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

171 Chambers x 45.9 cf = 7,855.7 cf Chamber Storage

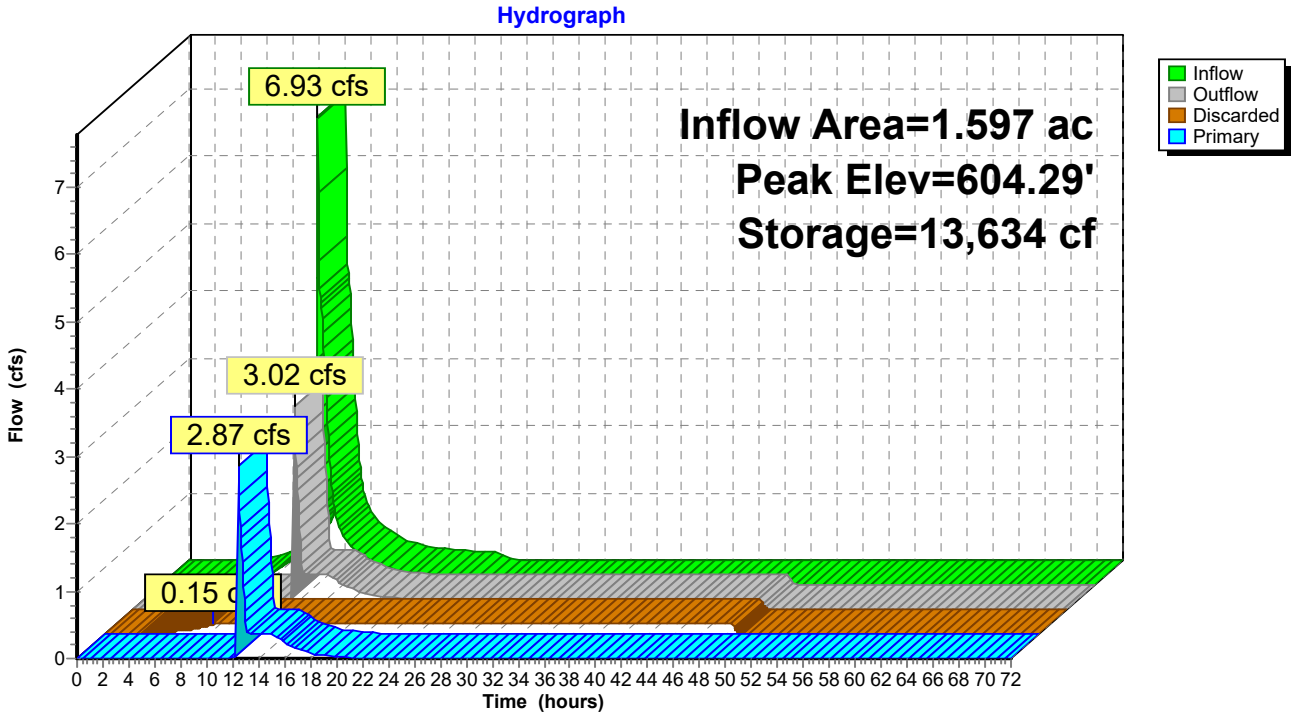
22,300.7 cf Field - 7,855.7 cf Chambers = 14,444.9 cf Stone x 40.0% Voids = 5,778.0 cf Stone Storage

Chamber Storage + Stone Storage = 13,633.7 cf = 0.313 af
Overall Storage Efficiency = 61.1%
Overall System Size = 68.70' x 92.75' x 3.50'

171 Chambers
826.0 cy Field
535.0 cy Stone



Pond 3P: SC-740 Storm Tech System - Front



Summary for Pond 4P: CB

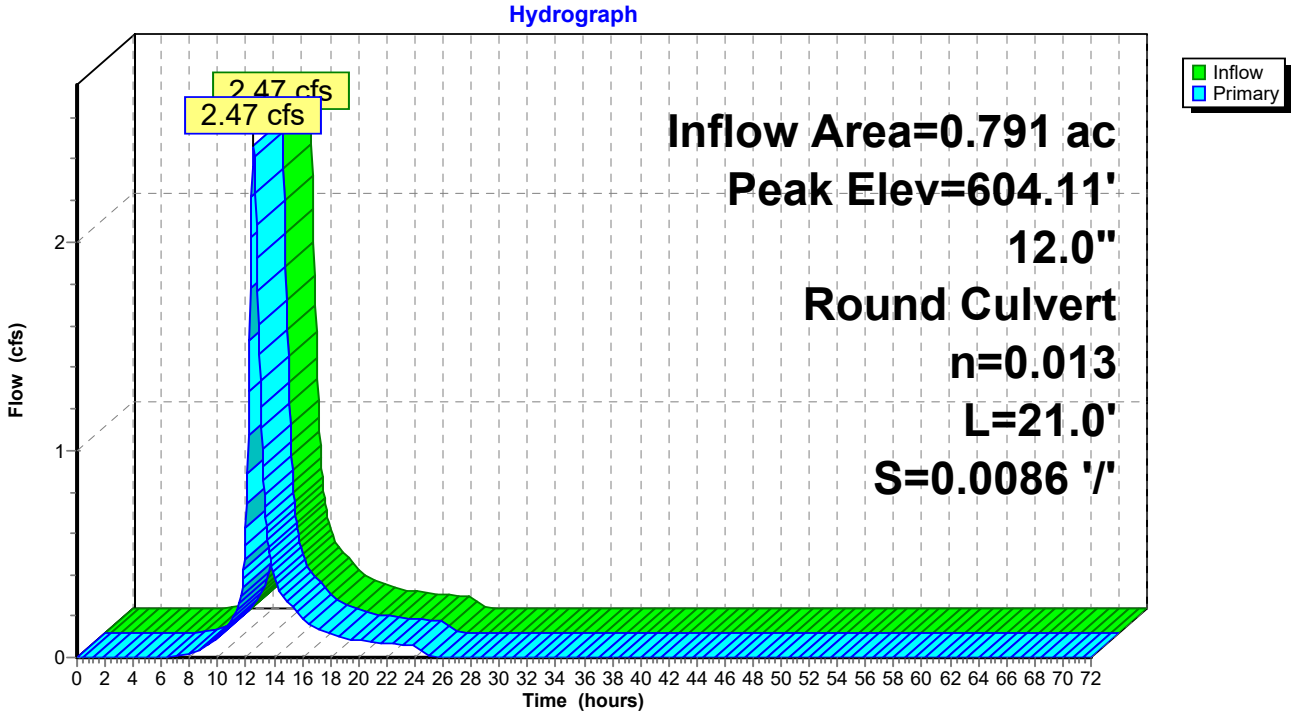
Inflow Area = 0.791 ac, 36.79% Impervious, Inflow Depth = 5.45" for 100 YR event
Inflow = 2.47 cfs @ 12.54 hrs, Volume= 0.359 af
Outflow = 2.47 cfs @ 12.54 hrs, Volume= 0.359 af, Atten= 0%, Lag= 0.0 min
Primary = 2.47 cfs @ 12.54 hrs, Volume= 0.359 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 604.11' @ 12.54 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	602.93'	**12.0" Round Culvert** L= 21.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 602.93' / 602.75' S= 0.0086 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.46 cfs @ 12.54 hrs HW=604.11' (Free Discharge)
1=Culvert (Inlet Controls 2.46 cfs @ 3.14 fps)

Pond 4P: CB



Summary for Pond 5P: CB

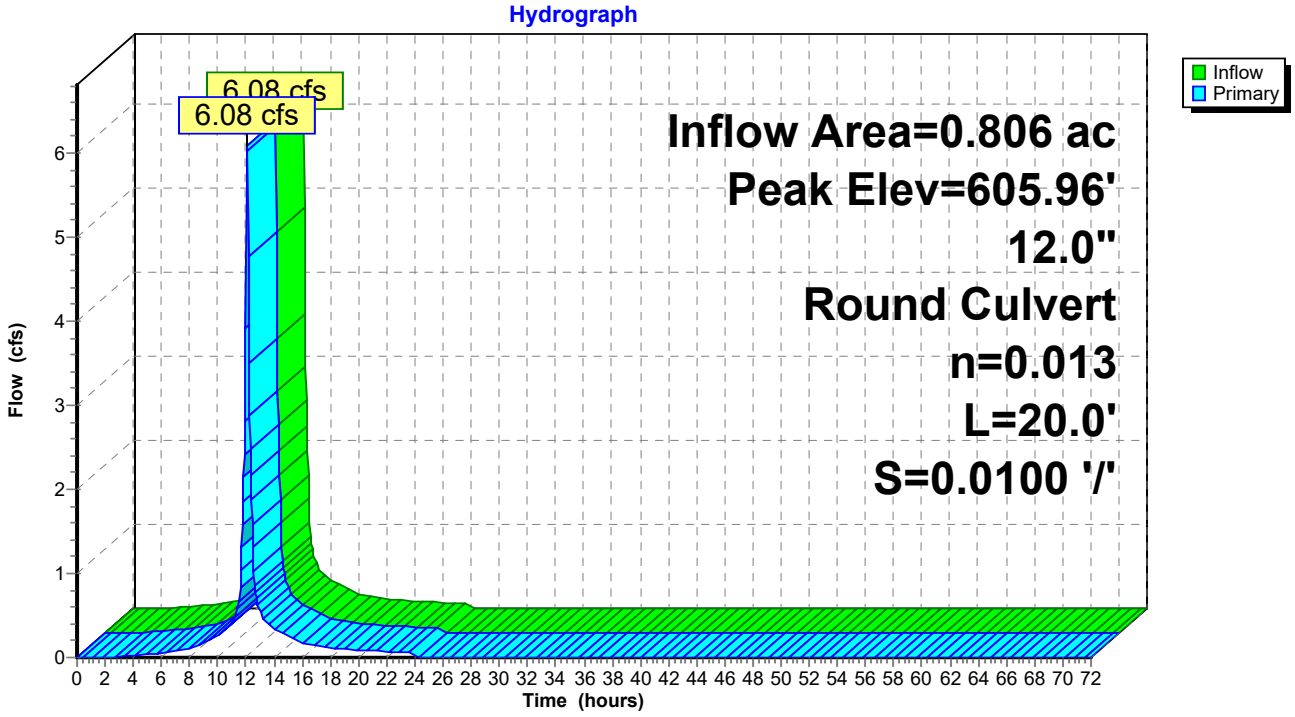
Inflow Area = 0.806 ac, 57.63% Impervious, Inflow Depth = 7.11" for 100 YR event
Inflow = 6.08 cfs @ 12.09 hrs, Volume= 0.478 af
Outflow = 6.08 cfs @ 12.09 hrs, Volume= 0.478 af, Atten= 0%, Lag= 0.0 min
Primary = 6.08 cfs @ 12.09 hrs, Volume= 0.478 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 605.96' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	601.33'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 601.33' / 601.13' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=5.92 cfs @ 12.09 hrs HW=605.77' (Free Discharge)
└**1=Culvert** (Inlet Controls 5.92 cfs @ 7.54 fps)

Pond 5P: CB



Summary for Link 1L: Town System

Inflow Area = 4.189 ac, 30.03% Impervious, Inflow Depth = 3.21" for 100 YR event
Inflow = 9.88 cfs @ 12.47 hrs, Volume= 1.119 af
Primary = 9.88 cfs @ 12.47 hrs, Volume= 1.119 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link 1L: Town System