156 Lafayette Road Redevelopment
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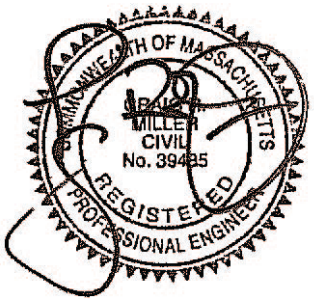
STORMWATER REPORT

February, 2022



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WDG Project No.: W-1686

Date: February, 2022
Project: 156 Lafayette Road Redevelopment

Introduction:

This Stormwater Report, Erosion and Sedimentation Control Plan and Long Term Operations and Maintenance Plan have been prepared in conformance with the requirements of the 2008 Massachusetts Department of Environmental Protection (MADEP) Stormwater Handbook, the 2008 amendments to 310 CMR 10.00 et. seq. (Massachusetts Wetlands Act Regulations (MAWPA Regs)), and the Town of Salisbury Conservation Commission Rules and Policies, Town of Salisbury Site Plan Review Requirements, and Town of Salisbury Special Permit Application. This report is prepared to meet the requirements of MADEP Stormwater Checklist and is submitted as part of a Notice of Intent under the Massachusetts Wetlands Protection Act.

Site Description:

The proposed project site is located along Lafayette Road in the Town of Salisbury the intersection of Lafayette Road and Toll Road. The proposed project is located on land, which is presently Architectural Fence Company, that is mostly a storage/junk yard with some areas of lawn, a 2,400 SF existing building, a concrete slab, and internal gravel roads. The site is owned by Jaycee Triandafilou and is located on the Town of Salisbury's Assessor's Map 22 Lot 2. The land on which the project is proposed is located in the Lafayette Main Commercial Subdistrict B Zoning District/Subdistrict (LM-B). A portion of the site is located within the 100-foot buffer zone of bordering vegetated wetlands located on the southern abutting property line.

Description of Proposed Project:

The proposed project is for the re-development of the site from a storage/junk yard to a dog training facility with appropriate buildings, fencing, lighting, and parking.

Access to the site will be provided by the existing curb cuts along Lafayette Road.

Domestic water service for the proposed buildings will be provided by the existing water main along Lafayette Road.

Sanitary sewer service for the existing building will use the existing on-site subsurface sewage disposal system. The proposed building and the existing building will connect to the new sewer line in Lafayette Road when the sewer line is complete.

Telephone, fire alarm, cable TV and electric utility services for the proposed site will be provided by through the existing overhead utility lines along Lafayette Road.

Existing Conditions:

156 Lafayette Road is a storage/junk yard with some areas of lawn, a 2,400 SF existing building, a concrete slab, and internal gravel roads. Stormwater runoff from most of the site sheet flows northwest to southeast down to the existing wetlands in the southeast corner of the property. There is no existing drainage system at the site. The discharge point from the existing site is the wetland in the southeast corner of the site.

Proposed Conditions:

156 Lafayette Road will be redeveloped into a dog training facility with appropriate buildings, fencing, stonedust/crushed stone surface material, lighting, and parking.

Stormwater runoff from the existing and proposed buildings will be handled by the stonedust/crushed stone surface. Stormwater runoff from the new parking and driveways areas will be handled by a series of catch basins, manholes, and stormwater treatment units, which will flow into the underground pipe infiltration system.

The underground pipe infiltration system has an overflow release weir, which allows any overflow to flow to the wetlands. The stonedust/crushed stone surface mix will overflow the concrete curb and flow to the parking area.

The existing site, which currently discharges runoff into wetlands at the southwest property line, will be modified to treat all proposed pavement runoff on the site.

The on-site storage is designed to not increase the flows from the site for up to the 100-year storm event. The total area disturbed by the project will be approximately 0.98 acres and an NPDES General Permit for Construction Activity as well as a Stormwater Pollution Prevention Plan will not be required for the project.

Soils

According to the NRCS Custom Soil Resource Report, the soils on site are listed as 38A – Pipestone Sandy Loam Hydrologic Soil Group (HSG): A and 260A – Sudbury Fine Sandy Loam (NRCS Soils Report) Hydrologic Soil Group (HSG): B.

Test pits conducted at the site found loamy sand soils. Groundwater table was found to be 64" deep at the area of the infiltration pipes.

Due to the sands and loamy sands found out the site the HSG for the site was determined to be class A.

The infiltration rate for sandy loam soils from Table 2.3.3 Rawl's Rates in the DEP Handbook is 2.41 inch/hour. This rate was used in the design of the underground infiltration pipe system.

Low Impact Development (LID) Practices

The DEP Stormwater Standards require LID measures be considered. 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 does not disturb the any bordering vegetated resource areas.

Site Design Practices

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

Minimize Disturbance to Existing Trees and Shrubs

The proposed disturbance seeks to retain wooded areas in the northern portion of the site. The rest of the site is clear of significant vegetation.

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

A swale is used in the western portion of the property to collect runoff. Stonedust play areas are used as detention areas to retain runoff on site. The paved parking area sheet flows to the catch basin instead of using a curb and gutter system. In addition, the stondust areas have a 2" lip which will retain the stormwater from most storm events within the play areas for infiltration.

Bioretention Cells

Due to the use of the site bioretention cells were not financially feasible maintenance as they would require frequent maintenance that is not practical for the small business operations at the site.

Constructed Wetlands

Constructed wetlands would require a large area of the site, which is not practically feasible given size of the site.

Treebox Filter

Treebox filters were not practical given the space at the site.

Water Quality Swales & Grass Channels

As stated in "country drainage" a grass channels was provided in the western part of the site to collect runoff.

Green Roof

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

Permeable Pavements

The maintenance required for permeable pavements is not financially viable for the small business operation proposed at the site.

Green walls & Fences

Green walls were not practical due as no walls are proposed at the site. The fences proposed at the site need to be see through and therefore, cannot be screened with greenery.

Cisterns

Cistern and water reuse are not financially viable systems to incorporate into the site design for the small business operation.

Standard 1: No New Untreated Discharges

No new stormwater conveyance outfalls discharge untreated stormwater directly to or cause erosion in wetlands or water of the Commonwealth.

Therefore, Standard 1 has been met by the proposed project.

Standard 2: Peak Rate Attenuation

Attached to this report are the existing and proposed (site developed) runoff and volume calculations for the Project for the 2, 10, 25, 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 Salisbury (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, 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. Times of concentration for the study were computed using SCS Methodology. Rainfall data for the study is based on the U.S. Weather Bureau Technical Paper #40 and the U.S. Weather Service Technical Memorandum No. Hydro. 35.

Discharge Point #1		
Storm Return Period (years)	Existing Peak Inflow Rate (c.f.s.)	Proposed (Site Developed) Peak Inflow Rate (c.f.s.)
2	1.25	0.72 (-0.53)
10	2.90	1.47 (-1.43)
25	3.95	2.04 (-1.91)
100	5.48	2.89 (-2.59)

Based on the results of the calculations as demonstrated above, the requirements of Standard 2 have been met and the development 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 proposed project will provide infiltration from the existing and proposed buildings via the stonedust/crushed stone play areas.

The proposed project will provide infiltration from the proposed parking area and driveways via underground infiltration pipe system.

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

Therefore, Standard 3 has been met by the proposed project.

Standard 4: Water Quality

The proposed project will provide for the treatment of stormwater from the paved parking area and driveways. Of this pavement 13,699 SF is treated with a deep sump catch basin and a propriety separator.

Total Suspended Solids (TSS) will be removed by the use of deep sump catch basins and proprietary separators before the water discharges to Underground Pipe Infiltration System.

50% of the average annual load of total phosphorus (TP) related to the total post-construction impervious area on the site will be treated by infiltration in the Underground Pipe Infiltration System and in the Stonedust/crushed stone play yards.

Attached to this report are calculations sheets showing the TSS removal for the proposed pre-treatment and treatment trains along with technical data regarding the design of and the removal efficiencies for the proprietary separator units.

Therefore, by treating the runoff from the proposed paved areas for TSS and infiltrating impervious area at the entire site to remove 50% phosphorous the water quality standards have been me at the site.

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

Therefore, Standard 4 has been met by the proposed project.

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

The proposed project use does not constitute a Land Use with Higher Potential Pollutant Loads as defined by the 2008 MADEP Stormwater Handbook and the 2008 amendments to 310 CMR 10.00 et. seq. (MAWPA Regs).

Therefore Standard 5 has been met by the proposed project.

Standard 6: Critical Areas

No portion of the site is in a critical area. Therefore, Standard 6 has been met by the proposed project.

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

A portion of proposed project is a redevelopment project as defined by the 2008 MADEP Stormwater Handbook and the 2008 amendments to 310 CMR 10.00 et. seq. (MAWPA Regs.). Below is a summary of how the different Standards are met for the redevelopment portions of the site.

Standard 1 (must be met to the maximum extent practical):

> Since the runoff from the redeveloped will flow to the existing wetlands which currently accepts site runoff, no new stormwater conveyance (outfalls) will discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. Therefore, Standard 1 has been met by the redevelopment project.

Standard 2 (must be met to the maximum extent practical)

> Based on the results of the calculations as demonstrated in the report, the requirements of Standard 2 have been met and the redevelopment of the site as proposed will not result in any net increase in the peak rate of runoff from the site (See HydroCAD calculations). Therefore, Standard 2 is met for the redevelopment project.

Standard 3 (must be met to the maximum extent practical)

> Based on the results of the calculations as demonstrated in the report, the requirements of Standard 3 have been met and the redevelopment of the site as proposed will meet the recharge requirement for the site. Therefore, Standard 3 is met for the redevelopment project.

Standard 4 (must be met to the maximum extent practical)

> Based on the results of the calculations as demonstrated in the report, the requirements of Standard 4 have been met and the redevelopment of the site as proposed will meet the water quality standards for the site. Therefore, Standard 4 is met for the redevelopment project.

Standard 5 (must be met to the maximum extent practical)

> The proposed project use does not constitute a Land Use with Higher Potential Pollutant Loads as defined by the 2008 MADEP Stormwater Handbook and the 2008 amendments to 310 CMR 10.00 et. seq. (MAWPA Regs). Therefore, Standard 5 is met for the redevelopment project.

Standard 6 (must be met to the maximum extent practical)

> No portion of the site is in a critical area. Therefore, Standard 6 has been met by the redevelopment project.

Standard 8 (must be met)

> Standard 8 is met for the redevelopment project as described as described below.

Standard 9 (must be met)

> Standard 9 is met for the redevelopment portion as described as described below.

Standard 10 (must be met)

> Standard 10 is met for the redevelopment portion as described below.

Therefore, Standard 7 has been met.

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

Construction Notes

1. Contractor shall substantially complete and stabilize all disturbed areas in one area of construction prior to beginning the next area of construction.

Demolition Notes

1. All demolition debris shall be legally disposed of offsite and shall be considered incidental work.

2. The contractor shall be responsible for all permits and licenses, fees and approvals required to correctly complete the work.

3. The contractor shall assume complete responsibility and liability for the safety of all who will traverse through the site and the structural integrity and safety of all excavations, stored items, work and utilities to remain during construction.

4. Demolition, site work and landscaping shall be sequenced so as to avoid long periods of disturbance to the site. Construction sequencing shall be scheduled so that work progresses quickly, efficiently and with the least amount of disturbance to the site.

5. Contractor shall clean construction site daily to prevent dust and debris from leaving the site. Contractor shall clear debris from site at the end of each day. All potential loose material shall be secured in closed containers. Contractor shall have a water source on site to wash vehicles and spray down dust.

6. The contractor shall call Dig Safe (1-888-DIG-SAFE, notify private and public utility companies and receive formal clearance/verification from all affected utilities at least 72 hours prior to excavating near any utilities that may be affected by any portion of this construction. The contractor shall notify the town of Winchester at the same time Dig Safe is called. The contractor shall also notify the Winchester department of public works to mark out any town-owned utilities, which are not registered with Dig Safe.

7. The contractor shall conform with the specific requirements for excavation as set forth in Massachusetts General Law: Chapter 82, Section 40a and OSHA Regulations 29cfr1926.651(a. The contractor shall coordinate all work involving utility company facilities, whether those facilities be existing or proposed.

8. The contractor shall protect all existing catch basins with silt sacks and prevent all construction debris from entering the drainage system. Contractor shall follow manufacturer's instructions regarding frequency of inspection, repair, and cleaning of silt sacks.

9. All trees, shrubs, grass and landscaping areas, and physical site features (buildings, fences, paving, light poles, signs etc. not included in this project; along with all other property not included in this project shall be protected during construction operations at all times. This includes abutting property as well. Any damage or loss to the above items or areas caused by the actions of the contractor shall be immediately repaired or replaced by the contractor at no cost to the owner. The contractor is also responsible for the actions of all sub-trades and subcontractors that the contractor may invite to perform the work of this contract.

10. The contractors shall verify all existing conditions in the field and report any discrepancies between plans and actual conditions to the engineer prior to starting work.

11. Install erosion control measures as indicated prior to beginning demolition activities.

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 pavement 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 implemented 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. 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. Construction entrance and silt sack catch basin protection shall be replaced as necessary to maintain its function of controlling erosion and siltation to the work area.

5. 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 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.

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 Stormwater Report 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 eliminate impacts to adjacent areas during construction. If sediment escapes the construction site, off-site accumulations of sediment must be completely removed immediately.

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 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.

Prior to commencing any land disturbance activities, the limits of disturbance must be delineated at the site with erosion control measures, flagging, signs, or orange construction fencing and said delineation must be inspected and approved by the town engineer, conservation agent or their construction inspection designee.

Prior to the commencement of any site work, the applicant or a representative will meet with the town engineer or the board's designee and conservation agent, if applicable, to review erosion control barrier installation(s). Said measures shall be installed by the developer and inspected by the town or its designee prior to soil disturbance. Once installed, erosion control barriers shall be inspected weekly by the applicant or a representative and immediately after every storm event. An adequate supply of erosion control barriers shall be kept on site at all times to replace failing sections. The applicant or a representative shall be available 24 hours a day, seven days a week to make repairs as needed. Weekly erosion and sedimentation control inspection logs shall be kept on site at all times and shall be made available to the town engineer or the board's designee upon request.

Contractor shall stabilized all exposed soils within five business days of disturbance.

Contractor shall applying mulch and establishing vegetation, water spraying, and/or applying polymers, spray on tackifiers, chlorides, and barriers as needed to control dust and minimize soil disturbance.

Disturbed areas remaining idle for more than 14 days shall be stabilized with hydro seeding or other appropriate stabilization measure(s).

Permanent seeding be undertaken in spring (from March through June) or in the late summer and early fall (from August 1 to October 15). During the peak summer months and in the fall after October 15, when seeding is found to be impractical, an appropriate temporary mulch or sod shall be applied.

All slopes steeper than 3:1, as well as perimeter dykes, sediment basins or traps, and embankments must, upon completion, be immediately stabilized with sod, seed, anchored straw mulch, or other approved stabilization measure(s); areas outside of the perimeter sediment control system must not be disturbed.

The cut side of roads and ditches shall be stabilized immediately with rock rip-rap or other non-erodible erosion control liners, or where appropriate, vegetative measures such as sod.

After each inspection, a written report shall be prepared documenting compliance with the esc o&m plan and recommending any repairs or maintenance required. Inspection reports must be retained by the permittee and be made available to the town for review upon request.

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.

Drain System Protection

Silt Sack sediment traps supplemented with hay bale erosion checks will be installed at drainage structures and maintained and cleaned until slopes have healthy stands of grass. Catch basins, drain manholes, storm drain pipes, water quality inlets, and detention basins will be cleaned of sediment and debris after the completion of construction. Sediment collected in structures will be disposed of properly and covered, if stored on-site.

- Straw bale check dams will be used on roadways to divert runoff onto stabilized areas.
- Until tributary areas are stabilized, catch basin inlets will be filtered with Silt sacks. If intense rainfall is predicted before all tributary areas are stabilized, erosion control measures will be reinforced for the duration of the storm. Downstream areas will be inspected and any sediment removed at the end of the storm.
- Unfiltered water will not be allowed to enter pipes from unstabilized surfaces.
- Trench excavation will be limited to the minimum length required for daily pipe installation. All trenches will be backfilled as soon as possible. The ends of pipes will be closed nightly with plywood
- During construction of the site, silt-laden waters should be intercepted prior to reaching catch basins. Any gross depositions of materials on paved surfaces will be removed by sweeping.
- All paved areas will be swept on a weekly basis, as permitted by weather, during the construction period.

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.

Waste Containers

The Contractor must close or cover actively used waste containers when not in use and at the end of each business day.

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.

The Contractor must cover or temporarily stabilize all inactive stockpiles and land clearing debris piles that will not be used for 14 days or more.

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 2012 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 Stormwater Report 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 Report, and actions taken will be made and retained as part of the Report for at least three years after the date of the inspection.

Weekly reports of maintenance and inspection activities will be maintained on-site.

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 Report 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 Report 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.

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 Report 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 area of prevention and response. The names of these personnel will be posted in the material storage area and in the office trailer onsite.

In case of a spill the site superintendent will determine if the fire department needs to be called.

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 Report 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
- Fire Hydrant flushings
- Waters used to wash vehicles where detergents are not used
- Water used to control dust in accordance with off-site vehicle tracking
- Potable water including uncontaminated water line flushings
- Routine external building wash down that does not use detergents
- 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 air conditioner compressor condensate
- Uncontaminated ground water or spring water
- Foundation or footing drains where flows are not contaminated with process materials such as solvents
- Uncontaminated excavation dewatering
- Landscape irrigation

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 Stormwater Report

This Report must be modified as necessary to:

- 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 Report 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 Report must be recorded on the Report Amendment Log included in the Report Appendix.

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 Report. 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.

Redevelopment of 156 Lafayette Road Salisbury, MA Report No. ____

Stormwater Construction Site Inspection Report

General Information			
Project Name	Redevelopment of 156 Lafayette Road, Salisbury, MA		
NPDES Tracking No.	None	**Location**	156 Lafayette Road Salisbury, MA
Date of Inspection		**Time Start/End**	
Inspector's Name(s) & Title			
Inspector's Company			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present area 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	
	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	

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

In the event of a spill refer to the Spill Response Procedure and contact appropriate agencies. Refer to Report 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:
Report Contact:

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

Report Amendment Log

Project Name:
Report Contact:

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

Subcontractor Certifications/Agreements

SUBCONTRACTOR CERTIFICATION
STORMWATER PLAN

Project Number: _____

Project Title: _____

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 Stormwater Plan for the above designated project and agree to follow the BMPs and practices described in the Stormwater Plan.

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:
Report 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

Stormwater Plan Training Log

Stormwater Plan 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: Seacoast Canine
Contact: Ms. Jennifer Ford
Address: 5a Fanaras Drive
City: Salisbury, MA 01952
Tel: (978) 270-6868

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

POST CONSTRUCTION PERIOD LONG-TERM POLLUTION PREVENTION PLAN

Post-Construction BMP's for Water Quality

- Good housekeeping practices for long-term pollution prevention are a detailed below.
- All material and waste products used for maintaining the site shall be stored inside, outside under cover, or placed in the dumpster if it is being disposed of.
- No post-construction vehicle washing shall occur on site.
- Requirements for routine inspections and maintenance of stormwater BMPs are detailed below.
- Spill prevention and response plans are detailed below.
- Provisions for maintenance of lawns, gardens, and other landscaped areas are detailed below.
- Storage of all fertilizers, herbicides, and pesticides shall follow the material storage requirements listed above. Use of all fertilizers, herbicides, and pesticides is detailed below.
- Winter salt and sand use are detailed below.
- Street sweeping schedules are detailed below.
- Provisions for prevention of illicit discharges to the stormwater management system are detailed below.
- Stormwater BMPs are not near a critical area or an LUHPPL. If a spill occurs that directs contaminants to the catch

basin entry points on site. Those spills shall be contained by closing the flap gates at the outfalls.
- Training of staff involved with implementing the Long-Term Pollution Prevention Plan is detailed below.
- List of Emergency contacts responsible for implementing the Long-Term Pollution Prevention Plan are listed above in the Basic Information section.
- No fertilizers shall be used within 25' of wetlands or waterbodies.

Several types of structural and non-structural water quality controls in various combinations are proposed to treat stormwater generated on the site. These measures include deep sump catch basins with hoods and stormwater treatment units. These Water quality treatment measures will result in the removal of total suspended solids (TSS) load in runoff prior to discharge from the site, consistent with DEP's TSS removal standard.

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
- Stormwater Treatment Units
- Underground Pipe Infiltration System
- Stonedust/Crushed Stone Surface

Post-Development Activities

1. Paved Areas: Paved Areas shall be mechanically swept during the dry weather to remove excess sediments, thereby reducing the amount of sediments that the drainage system will have to remove from the runoff. Paved areas shall be mechanically swept a minimum of twice each year (in the spring (March/April) and in the fall (November/December)).

2. Catch Basins: Catch basins shall be inspected at least four times/year and at the end of the snowfall and foliage seasons to verify that the inlet openings are not clogged by debris. Debris shall be removed from the grates and disposed of properly. The catch basin sumps shall also be inspected and cleaned at the same times and whenever the depth of the sediment is 50% or more of the sump depth the collected sediment and debris shall be removed. Material shall be removed from catch basins and disposed of in accordance with all applicable regulations.

3. The Contech TSS removal units shall be cleaned and inspected at least four times/year and at the end of the snowfall and foliage seasons for the first year and twice per year thereafter if the silt and sediment trap does not require cleaning in six months. 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.

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.

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

6. 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.

7. Snow storage at the site will be managed to prevent blockage of storm drain catch basins and other elements of the storm drainage system.

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

9. Salt or deicing materials such as calcium chloride, calcium magnesium acetate (CMA), magnesium chloride or approved equivalent may be used on for de-icing on the paved parking and driveway areas and walkways during the winter months in the minimum amount necessary to maintain public safety. No sodium chloride is permitted for de-icing.

10. All contracts for snow plowing and removal at the site shall include items 8 through 10 above.

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 which will be submitted annually to the Winchester Conservation Commission as part of the Order of Conditions:

OPERATION AND MAINTENANCE PLAN

Project: 156 Lafayette Road
Location: Salisbury, MA

Date: January 2022

Structure or Task	Inspection Schedule	Inspection Performed		Method	Notes/Remarks
		Date	By:		
Street Sweeping	April / May			Power broom or vacuum walks and pavement	
Catch Basins	March			Clam shell or vacuum sumps	Clean when sediment is 12" deep
	June				
	September				
	December				
ConTech Units	March			Clam shell or vacuum sumps	Reduce to bi-annual inspections after first year of operations
	June				
	September				
	December				
Underground Pipe Infiltration System	April / May			Inspect maintenance ports	Remove accumulated debris and silt
	Sept. / Oct.				

Party responsible for O & M Plan:

Name Seacoast Canine
Address 156 Lafayette Road, Salisbury, MA 01952
Contact Jennifer Ford
Phone (978) 270-6868

NOTE: This form must be submitted to the North Andover Conservation Commission yearly by May 1st.

Annual Operating Budget

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

Plan of BMP's

Reference is made to the Proposed Utility Plan for the location of all BMP's.

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 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

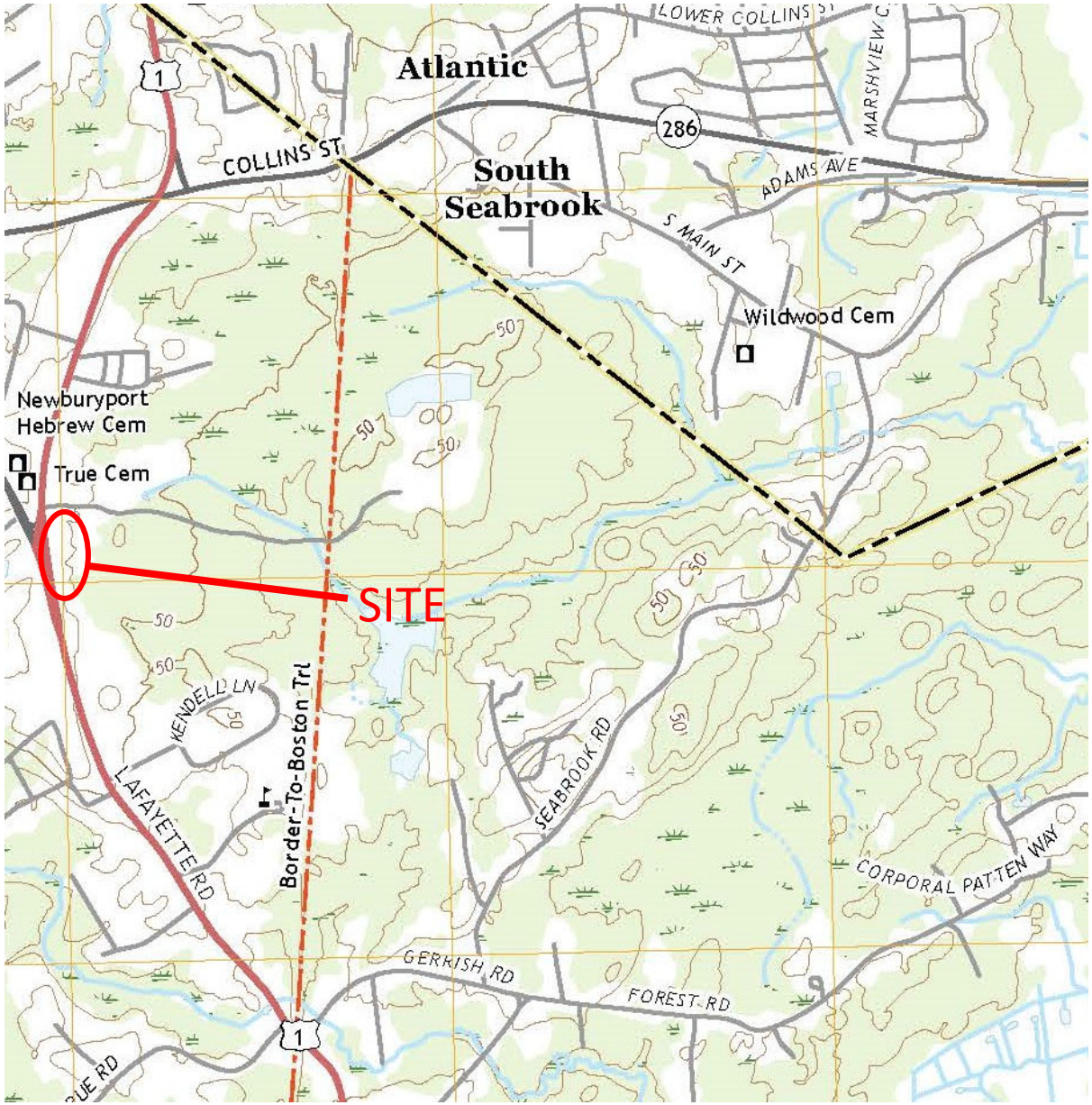
As demonstrated in this report, the construction of the proposed project will meet the requirements of the 2008 MADEP Stormwater Handbook and the 2008 amendments to 310 CMR 10.00 et. seq. (MAWPA Regs)MADEP Stormwater Guidelines and the Town of Salisbury Site Plan Review Requirements as outlined in the Town of Salisbury Zoning Ordinance.

Date: February, 2022
Project: 156 Lafayette Road Redevelopment

LOCUS MAP &
NRCS SOIL MAP
TEST PIT/SOILS DATA

Regional Locus

156 Lafayette Road, Salisbury, 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 Essex County, Massachusetts, Northern Part

September 8, 2021

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: 1:4,290 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N 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 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 16, Jun 9, 2020

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

Date(s) aerial images were photographed: Mar 30, 2011—Apr 8, 2011

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
30A	Raynham silt loam, 0 to 3 percent slopes	0.2	0.4%
38A	Pipestone loamy sand, 0 to 3 percent slopes	3.8	10.0%
253A	Hinckley loamy sand, 0 to 3 percent slopes	2.6	7.0%
253B	Hinckley loamy sand, 3 to 8 percent slopes	9.6	25.5%
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	17.3	45.8%
276B	Ninigret fine sandy loam, 3 to 8 percent slopes	4.1	10.8%
651	Udorthents, smoothed	0.2	0.5%
Totals for Area of Interest		**37.8**	**100.0%**

Map Unit Descriptions

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

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

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

components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

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

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

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

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

Essex County, Massachusetts, Northern Part

30A—Raynham silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: vjq9
Elevation: 50 to 500 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Raynham

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Soft coarse-silty lacustrine deposits

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 27 inches: very fine sandy loam
H3 - 27 to 60 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F144AY019NH - Wet Lake Plain
Hydric soil rating: Yes

Minor Components

Belgrade

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

Walpole variant
Percent of map unit: 5 percent
Landform: Terraces
Hydric soil rating: Yes

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

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

38A—Pipestone loamy sand, 0 to 3 percent slopes

Map Unit Setting
National map unit symbol: vjpy
Elevation: 600 to 1,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

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

Description of Pipestone

Setting
Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loose sandy glaciofluvial deposits

Typical profile
O - 0 to 3 inches: muck
H2 - 3 to 11 inches: loamy sand
H3 - 11 to 24 inches: loamy sand
H4 - 24 to 60 inches: stratified sand to fine sand

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)

Depth to water table: About 18 to 41 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: Yes

Minor Components

Wareham

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

Scarboro

Percent of map unit: 7 percent
Landform: Terraces
Hydric soil rating: Yes

Deerfield

Percent of map unit: 3 percent
Hydric soil rating: No

253A—Hinckley loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svm7
Elevation: 0 to 1,420 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

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

Description of Hinckley

Setting

Landform: Outwash terraces, outwash deltas, kame terraces, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Concave, linear, convex

Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 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 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Kame terraces, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Convex, concave, linear
Across-slope shape: Linear, convex, concave
Hydric soil rating: No

Windsor

Percent of map unit: 5 percent
Landform: Outwash terraces, kame terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear, convex
Across-slope shape: Linear, convex, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Kame terraces, outwash terraces, outwash deltas
Landform position (three-dimensional): Tread
Down-slope shape: Convex, concave, linear
Across-slope shape: Linear, convex, concave
Hydric soil rating: No

253B—Hinckley loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svm8
Elevation: 0 to 1,430 feet
Mean annual precipitation: 36 to 53 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Hinckley

Setting

Landform: Moraines, kame terraces, kames, outwash terraces, outwash deltas, outwash plains, eskers
Landform position (two-dimensional): Summit, backslope, footslope, shoulder
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, tread, riser
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 8 inches: loamy sand
Bw1 - 8 to 11 inches: gravelly loamy sand
Bw2 - 11 to 16 inches: gravelly loamy sand
BC - 16 to 19 inches: very gravelly loamy sand
C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 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: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 8 percent
Landform: Outwash plains, kames, eskers, moraines, outwash terraces, outwash deltas, kame terraces
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, tread, riser
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Moraines, outwash terraces, outwash deltas, kame terraces, outwash plains
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope, head slope, tread
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Eskers, moraines, outwash terraces, outwash deltas, kame terraces, outwash plains, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Nose slope, side slope, base slope, crest, riser, tread
Down-slope shape: Linear, convex, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

260A—Sudbury fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: vjsk
Elevation: 0 to 2,100 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Sudbury

Setting

Landform: Flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Rise
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Friable loamy eolian deposits over loose sandy glaciofluvial deposits derived from granite and gneiss

Typical profile

O - 0 to 1 inches: muck
H2 - 1 to 5 inches: fine sandy loam
H3 - 5 to 21 inches: sandy loam
H4 - 21 to 27 inches: loamy sand
H5 - 27 to 60 inches: Error

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: F144AY027MA - Moist Sandy Outwash
Hydric soil rating: No

Minor Components

Merrimac

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

Walpole

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

276B—Ninigret fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyr7
Elevation: 0 to 1,070 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Ninigret

Setting

Landform: Moraines, outwash plains, kame terraces, depressions, drainageways, outwash terraces, kames
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, rise, dip
Down-slope shape: Convex, concave, linear
Across-slope shape: Convex, concave
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C - 26 to 65 inches: stratified loamy sand to loamy fine sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 38 inches to strongly contrasting textural stratification
Drainage class: Moderately well drained
Runoff class: Very 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: About 17 to 39 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 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: C
Ecological site: F144AY026CT - Moist Silty Outwash
Hydric soil rating: No

Minor Components

Agawam
Percent of map unit: 5 percent
Landform: Kame terraces, kames, moraines, outwash terraces, outwash plains
Landform position (two-dimensional): Backslope, shoulder, footslope, summit
Landform position (three-dimensional): Side slope, crest, tread, riser, rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Sudbury
Percent of map unit: 5 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Windsor
Percent of map unit: 5 percent
Landform: Outwash plains, dunes, outwash terraces, deltas
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

651—Udorthents, smoothed

Map Unit Setting
National map unit symbol: vjwk
Elevation: 0 to 3,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

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

Description of Udorthents

Setting

Parent material: Excavated and filled land loamy and/or excavated and filled land sandy and gravelly

Typical profile

H1 - 0 to 6 inches: variable
H2 - 6 to 60 inches: variable

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: Unranked

Minor Components

Urban land

Percent of map unit: 10 percent
Hydric soil rating: Unranked

Beaches

Percent of map unit: 8 percent
Hydric soil rating: Unranked

Dumps

Percent of map unit: 2 percent
Hydric soil rating: Unranked

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Commonwealth of Massachusetts
City/Town of Worcester

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			
0-29”	FILL	10YR3/2									
29-43”	A	2.5Y3/2	31”			Fine Sandy Loam					
43-51”	B	10YR4/4				Loamy Sand					
51-60”	C	10YR6/4				Loamy Sand					

Additional Notes:

Weeping water at 39”. Standing water at 50”

Commonwealth of Massachusetts
City/Town of Worcester
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 & Stones			
0-16”	FILL					Gravelly Sand					
16-39”	FILL					Loamy Sand					
39-41”	FILL					Fine Sandy Loam					
41-49	FILL					Loamy Sand					
49-58	FILL					Loamy Sand					
58-107	C	10YR6/4	64"			Loamy Sand					

Additional Notes:

Weeping water at 91”. Standing water at 107”

Commonwealth of Massachusetts
City/Town of Worcester

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			
0-39”	FILL					Sandy Loam					
39-40”	A	2.5Y3/2				Fine Sandy Loam					
40-41”	B	10YR4/4				Sandy Loam					
41-109”	C	10YR6/4	59”			Loamy Sand					

Additional Notes:

Weeping water at 59”. Standing water at 91”.

Commonwealth of Massachusetts
City/Town of Worcester
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 & Stones			
0-20”	FILL										
20-24”	A	2.5Y3/2				Fine Sandy Loam					
24-34”	B	10YR4/4				Sand					
34-84”	C	10YR6/4	45”			Loamy Sand					

Additional Notes:

Weeping water at 54”. Standing water at 59”

Commonwealth of Massachusetts
City/Town of Worcester

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			
0-18”	FILL										
18-29”	B	10YR4/4				Sandy Loam					
29-47”	C1	10YR6/4				Sandy Loam					
47-64”	C2	2.5Y5/4	50”			Loamy Sand					

Additional Notes:

Weeping water at 58”. Standing water at 58”.

Commonwealth of Massachusetts
City/Town of Worcester
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 & Stones			
0-16”	FILL										
16-24”	A	2.5Y3/2				Fine Sandy Loam					
24-40”	B	10YR4/4				Sand					
40-70”	C	10YR6/4	45”			Sand					

Additional Notes:

Weeping water at 50”. Standing water at 50”

Date: February, 2022
Project: 156 Lafayette Road Redevelopment

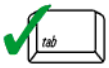
CHECKLIST FOR STORMWATER REPORT

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

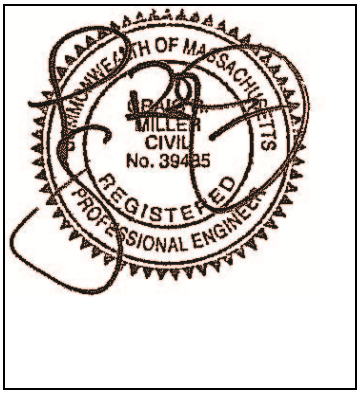
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



February 15, 2022

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☒ Use of “country drainage” versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☒ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☒ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Date: February, 2022
Project: 156 Lafayette Road Redevelopment

INFILTRATION DRAWDOWN CALCULATIONS

Project Name: 156 Lafayette Road Redevelopment Sheet No.: 1

Infiltration Drawdown Calculations for Stonedust/Crushed Stone Play Areas

Peak Elevation of Water in Pipe System from HydroCAD for 100 Year Storm.
Bottom of stones from Drainage drawings.

Time to empty based on Rawls Rate for Class A Soils:

60.76-60.33 = 0.43' = 5"

Rate from Table for A soils (Loamy Sand) = 2.41 in./hr.

Time to empty = 5"/2.41 in./hr. = 2.1 hrs.

2.1 hrs. < 72 hrs.

GWT - ESHGWT = 56.3 TP-3 (See Soil Test Pits)

Bottom of Stonedust/Crushed Stone = 59.38 - 56.3 = 3.2'

2 foot seperation is provided.

Infiltration Drawdown Calculations for Underground Pipe Infiltration System

Peak Elevation of Water in Pipe System from HydroCAD for 100 Year Storm.
Bottom of stones from Drainage drawings.

Time to empty based on Rawls Rate for Class A Soils:

58.58-57.40 = 1.2' = 14.2"

Rate from Table for A soils (Loamy Sand) = 2.41 in./hr.

Time to empty = 14.2"/2.41 in./hr. = 5.9 hrs.

5.9 hrs. < 72 hrs.

GWT - ESHGWT = 55.4 TP-2 (See Soil Test Pits)

Bottom of Pipe Stone = 57.40 - 55.2 = 2.2'

2 foot seperation is provided.

Date: February, 2022
Project: 156 Lafayette Road Redevelopment

WATER QUALITY/RECHARGE CALCULATIONS

Project Name:	156 Lafayette Road Redevelopment	Sheet No.:	1
	JRM	Date:	2/15/2022

Infiltration Calculations

Proposed Impervious Area = 33820 SF (All impervious areas)
13699 SF (Paved parking)

Infiltration Volume

Water Quality Volume (WQV) = 1/2"/12 0.0416667 ft.

WQV = .0417 ft. * 13,699 571 cu. ft.

Volume Provided
(See HydroCAD calculations for Underground
Pipe Infiltration System & Stonedust/Crushed Stone Play Areas) = 3,167 cu. ft.

Recharge Volume (RV) = 0.8"/12 0.7 ft.

RV .07 ft. * 33,820 SF 2256 cu. ft.

Volume Provided
(See HydroCAD calculations for Underground
Pipe Infiltration System & Stonedust/Crushed Stone Play Areas) = 3,167 cu. ft.

Therefore the infiltration volume is in excess of standard.

44% TSS has been removed prior to infiltration as required.

Distance to Groundwater

Stonedust/Crushed Stone Play Areas

Bottom of Stonedust/Crushed Stone = 60.33

E.S.H.G.T. = 56.2

59.38-56.2 = 3.2 feet of seperation to ground water provided

Underground Pipe Infiltration System

Bottom of Crushed Stone = 57.40

E.S.H.G.T. = 55.2

57.40 - 55.2 = 2.2 feet of seperation to ground water provided

Date: February, 2022
Project: 156 Lafayette Road Redevelopment

TSS CALCULATIONS
CONTECH CALCULATIONS
CONTECH DATA

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: 156 Lafayette Road Eastern Entrance PSH1

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
Catch Unit #1	80%	0.75	0.60	0.15

Total TSS Removal = 85%

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

Project: 156 Lafayette Rd.

Prepared By: JRM

Date: 1/5/22

*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: 156 Lafayette Road Parking Lot PSH1

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
CanTech Unit#1	80%	0.75	0.60	0.15

Total TSS Removal = 85%

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

Project: 156 Lafayette Rd

Prepared By: JRM

Date: 1/5/2022

*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: 156 Lafayette Rd. Infiltration Pipes System
Front entrance + Parking area

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)
Underground Pipe Infiltration System	80%	1.00	0.80	0.20

Total TSS Removal = 80%

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

Project: 156 Lafayette Rd
Prepared By: JKm
Date: 1/5/2022

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

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

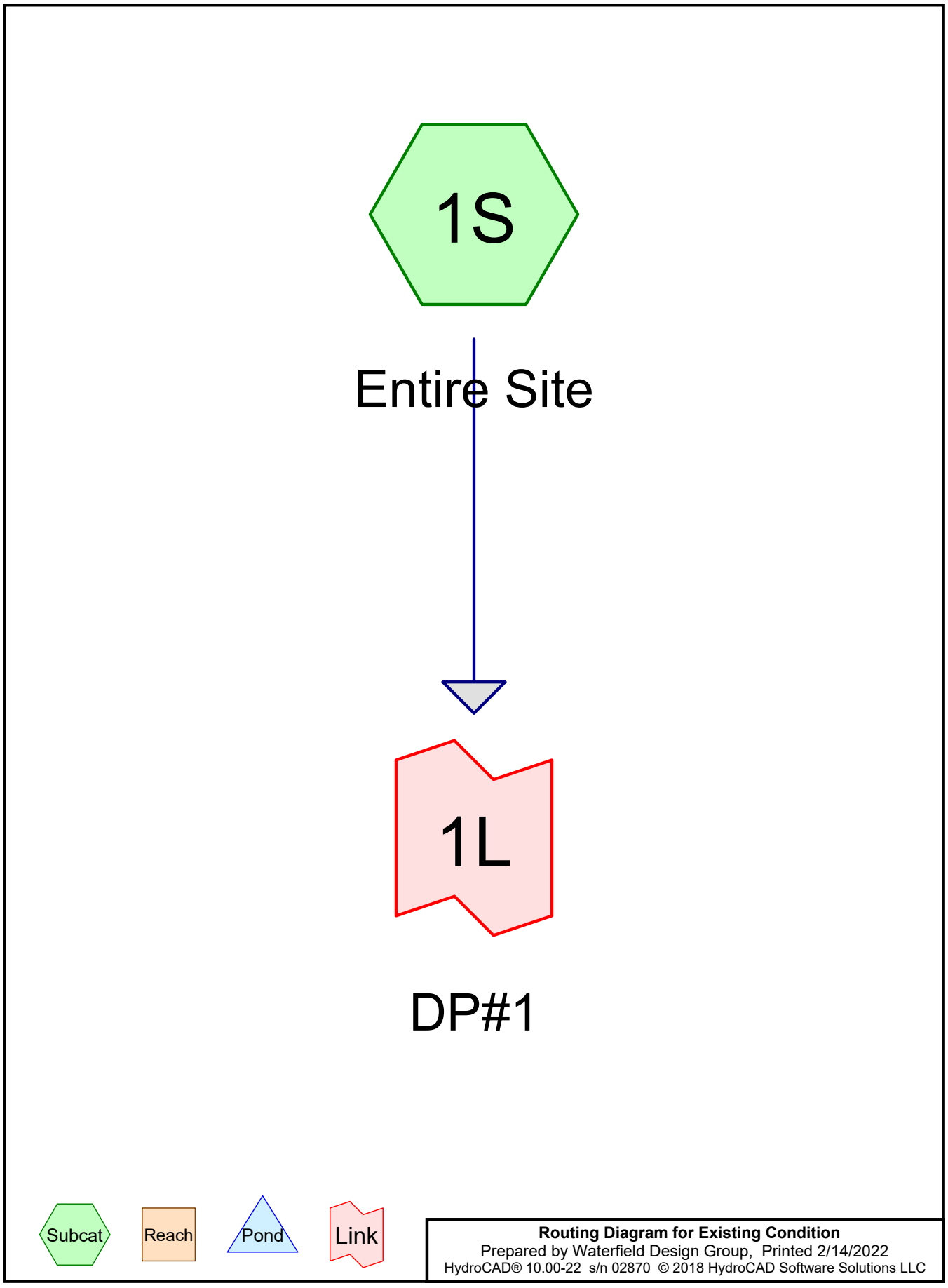
1. From MassDEP Stormwater Handbook Vol. 1

Date: February, 2022
Project: 156 Lafayette Road Redevelopment

EXISTING CONDITIONS

RUNOFF CALCULATIONS

(2, 10, 25, & 100 YEAR STORMS)



Routing Diagram for Existing Condition
Prepared by Waterfield Design Group, Printed 2/14/2022

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Entire Site Runoff Area=66,872 sf 8.62% Impervious Runoff Depth>0.82"
Flow Length=389' Tc=7.6 min CN=71 Runoff=1.25 cfs 0.104 af

Link 1L: DP#1 Inflow=1.25 cfs 0.104 af
Primary=1.25 cfs 0.104 af

Summary for Subcatchment 1S: Entire Site

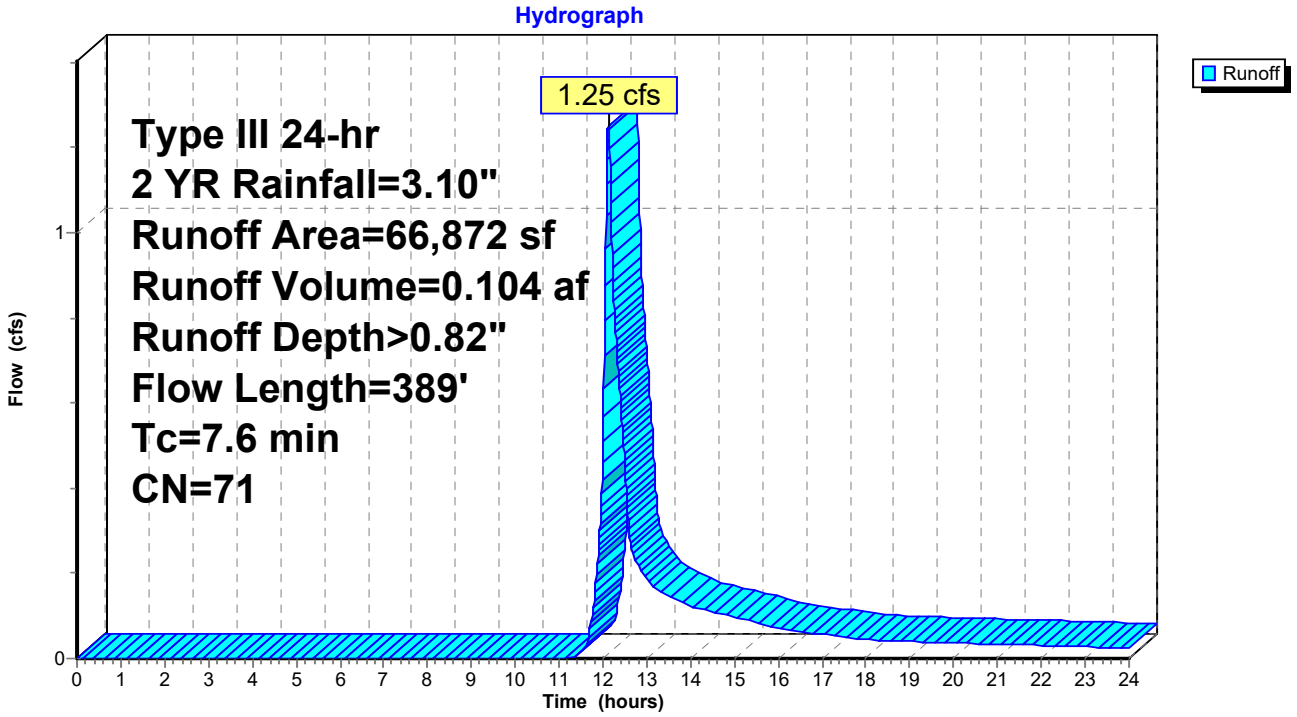
Runoff = 1.25 cfs @ 12.12 hrs, Volume= 0.104 af, Depth> 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.10"

	Area (sf)	CN	Description
	515	98	Paved roads w/curbs & sewers, HSG A
	401	98	Paved roads w/curbs & sewers, HSG A
	600	98	Paved parking, HSG A
	973	98	Paved parking, HSG A
	826	98	Roofs, HSG A
	2,396	98	Roofs, HSG A
	53	98	Paved parking, HSG A
	9,135	76	Gravel roads, HSG A
	1,727	76	Gravel roads, HSG A
	1,697	76	Gravel roads, HSG A
	2,844	76	Gravel roads, HSG A
*	41,344	68	Junk Piles <50% Grass cover, Poor, HSG A
	883	45	Woods, Poor, HSG A
	3,478	45	Woods, Poor, HSG A
	66,872	71	Weighted Average
	61,108		91.38% Pervious Area
	5,764		8.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	100	0.0325	0.50		**Sheet Flow, Gravel/Junk** Fallow n= 0.050 P2= 3.20"
4.2	289	0.0129	1.14		**Shallow Concentrated Flow, Gravel/Junk** Nearly Bare & Untilled Kv= 10.0 fps
7.6	389	Total			

Subcatchment 1S: Entire Site

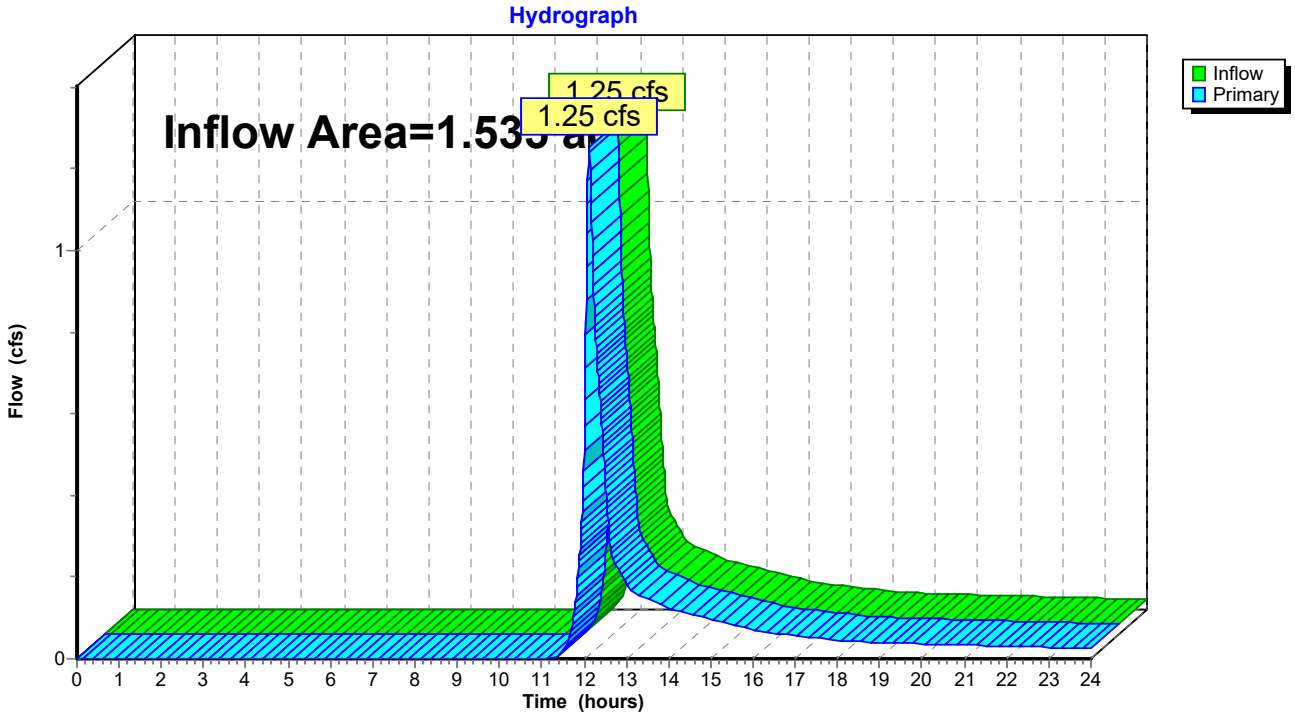


Summary for Link 1L: DP#1

Inflow Area = 1.535 ac, 8.62% Impervious, Inflow Depth > 0.82" for 2 YR event
Inflow = 1.25 cfs @ 12.12 hrs, Volume= 0.104 af
Primary = 1.25 cfs @ 12.12 hrs, Volume= 0.104 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: DP#1



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Entire Site Runoff Area=66,872 sf 8.62% Impervious Runoff Depth>1.74"
Flow Length=389' Tc=7.6 min CN=71 Runoff=2.90 cfs 0.223 af

Link 1L: DP#1 Inflow=2.90 cfs 0.223 af
Primary=2.90 cfs 0.223 af

Summary for Subcatchment 1S: Entire Site

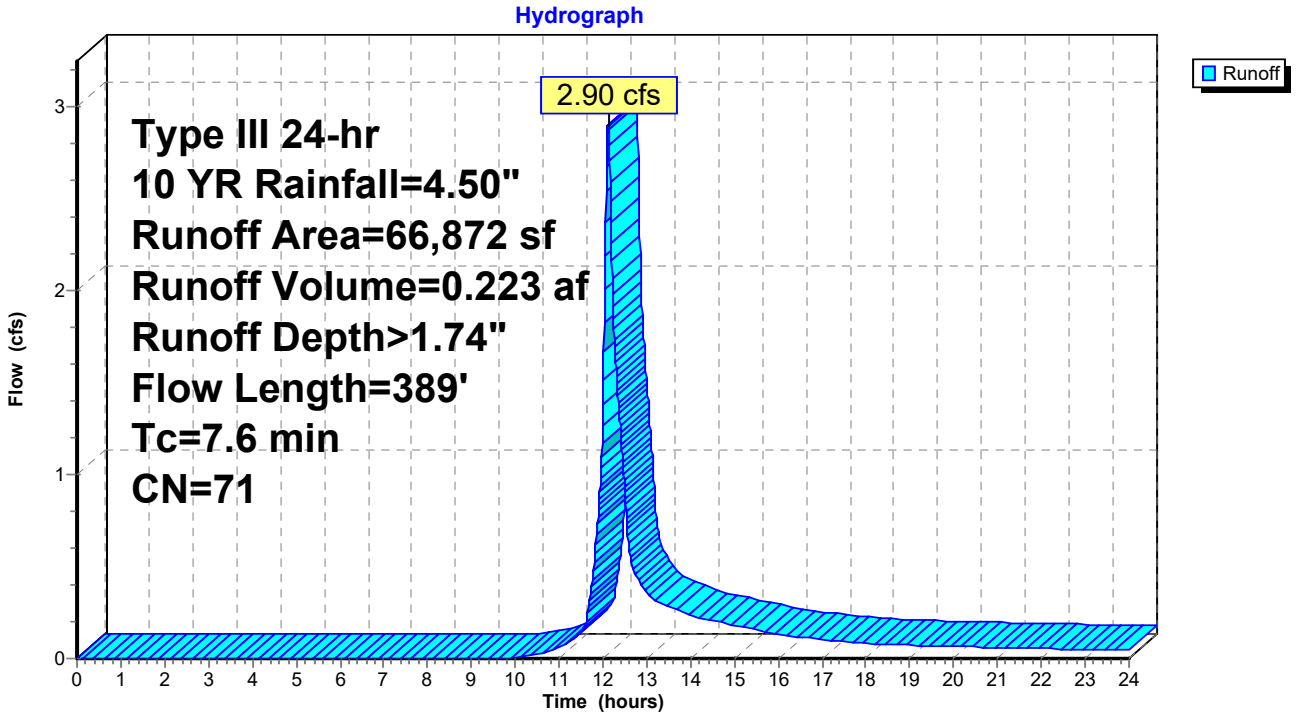
Runoff = 2.90 cfs @ 12.12 hrs, Volume= 0.223 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (sf)	CN	Description
	515	98	Paved roads w/curbs & sewers, HSG A
	401	98	Paved roads w/curbs & sewers, HSG A
	600	98	Paved parking, HSG A
	973	98	Paved parking, HSG A
	826	98	Roofs, HSG A
	2,396	98	Roofs, HSG A
	53	98	Paved parking, HSG A
	9,135	76	Gravel roads, HSG A
	1,727	76	Gravel roads, HSG A
	1,697	76	Gravel roads, HSG A
	2,844	76	Gravel roads, HSG A
*	41,344	68	Junk Piles <50% Grass cover, Poor, HSG A
	883	45	Woods, Poor, HSG A
	3,478	45	Woods, Poor, HSG A
	66,872	71	Weighted Average
	61,108		91.38% Pervious Area
	5,764		8.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	100	0.0325	0.50		**Sheet Flow, Gravel/Junk** Fallow n= 0.050 P2= 3.20"
4.2	289	0.0129	1.14		**Shallow Concentrated Flow, Gravel/Junk** Nearly Bare & Untilled Kv= 10.0 fps
7.6	389	Total			

Subcatchment 1S: Entire Site

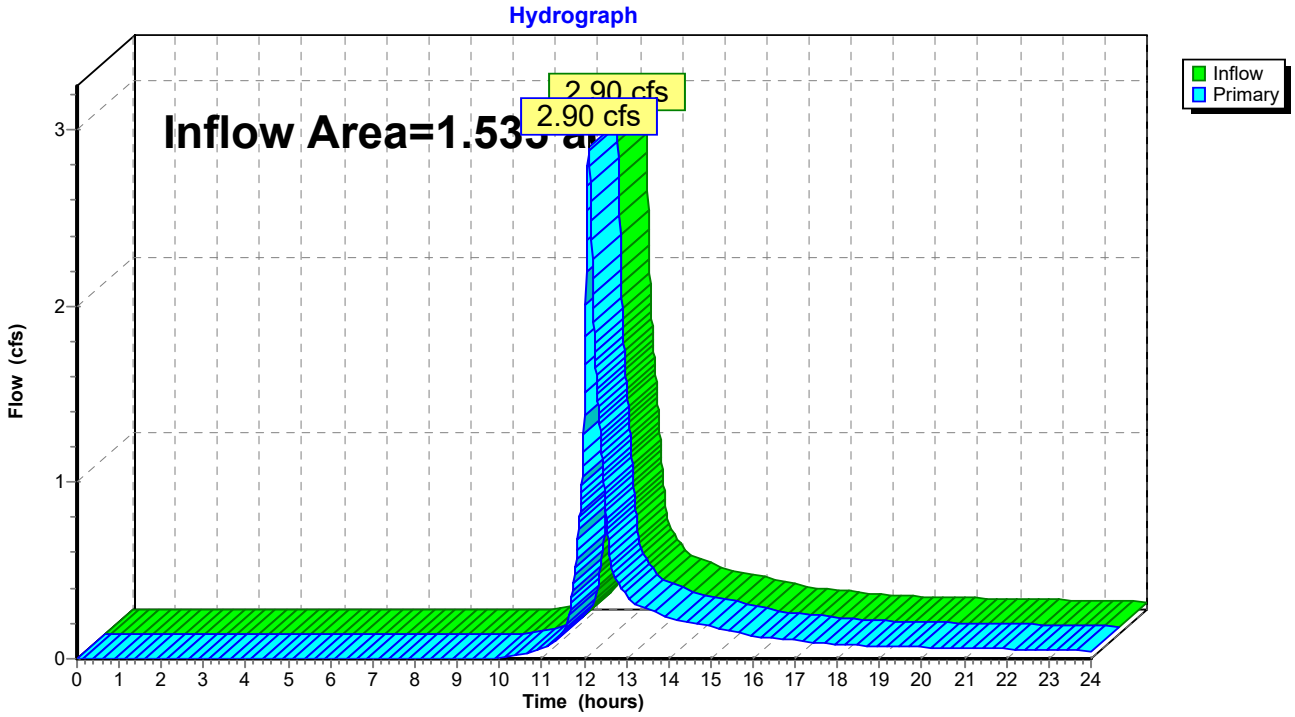


Summary for Link 1L: DP#1

Inflow Area = 1.535 ac, 8.62% Impervious, Inflow Depth > 1.74" for 10 YR event
Inflow = 2.90 cfs @ 12.12 hrs, Volume= 0.223 af
Primary = 2.90 cfs @ 12.12 hrs, Volume= 0.223 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: DP#1



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Entire Site Runoff Area=66,872 sf 8.62% Impervious Runoff Depth>2.34"
Flow Length=389' Tc=7.6 min CN=71 Runoff=3.95 cfs 0.300 af

Link 1L: DP#1 Inflow=3.95 cfs 0.300 af
Primary=3.95 cfs 0.300 af

Summary for Subcatchment 1S: Entire Site

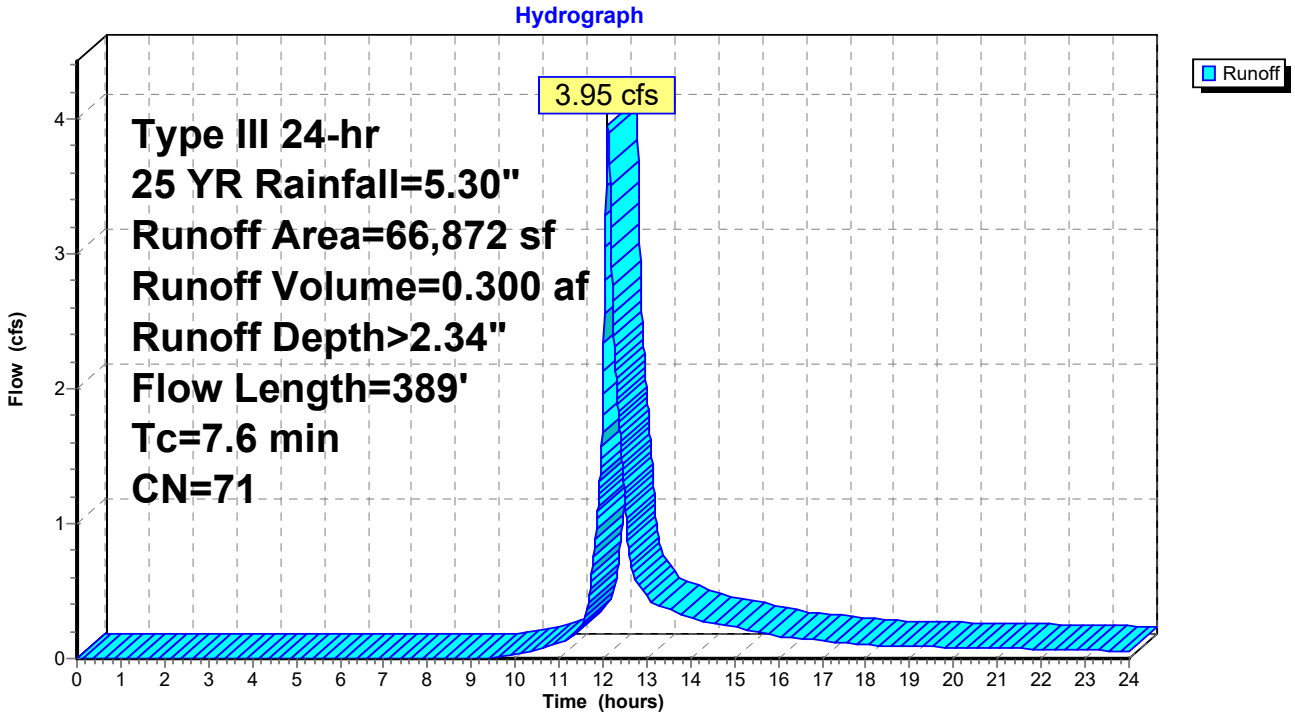
Runoff = 3.95 cfs @ 12.11 hrs, Volume= 0.300 af, Depth> 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.30"

	Area (sf)	CN	Description
	515	98	Paved roads w/curbs & sewers, HSG A
	401	98	Paved roads w/curbs & sewers, HSG A
	600	98	Paved parking, HSG A
	973	98	Paved parking, HSG A
	826	98	Roofs, HSG A
	2,396	98	Roofs, HSG A
	53	98	Paved parking, HSG A
	9,135	76	Gravel roads, HSG A
	1,727	76	Gravel roads, HSG A
	1,697	76	Gravel roads, HSG A
	2,844	76	Gravel roads, HSG A
*	41,344	68	Junk Piles <50% Grass cover, Poor, HSG A
	883	45	Woods, Poor, HSG A
	3,478	45	Woods, Poor, HSG A
	66,872	71	Weighted Average
	61,108		91.38% Pervious Area
	5,764		8.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	100	0.0325	0.50		**Sheet Flow, Gravel/Junk** Fallow n= 0.050 P2= 3.20"
4.2	289	0.0129	1.14		**Shallow Concentrated Flow, Gravel/Junk** Nearly Bare & Untilled Kv= 10.0 fps
7.6	389	Total			

Subcatchment 1S: Entire Site

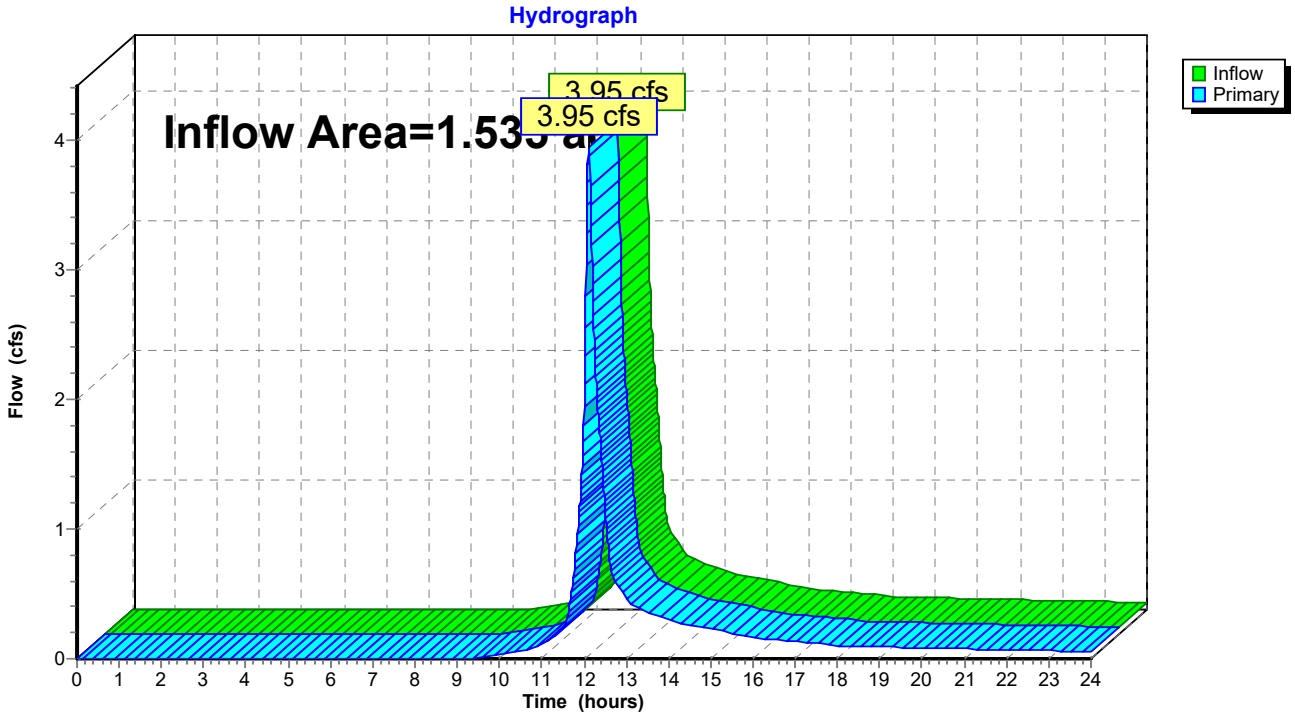


Summary for Link 1L: DP#1

Inflow Area = 1.535 ac, 8.62% Impervious, Inflow Depth > 2.34" for 25 YR event
Inflow = 3.95 cfs @ 12.11 hrs, Volume= 0.300 af
Primary = 3.95 cfs @ 12.11 hrs, Volume= 0.300 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: DP#1



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Entire Site Runoff Area=66,872 sf 8.62% Impervious Runoff Depth>3.22"
Flow Length=389' Tc=7.6 min CN=71 Runoff=5.48 cfs 0.412 af

Link 1L: DP#1 Inflow=5.48 cfs 0.412 af
Primary=5.48 cfs 0.412 af

Summary for Subcatchment 1S: Entire Site

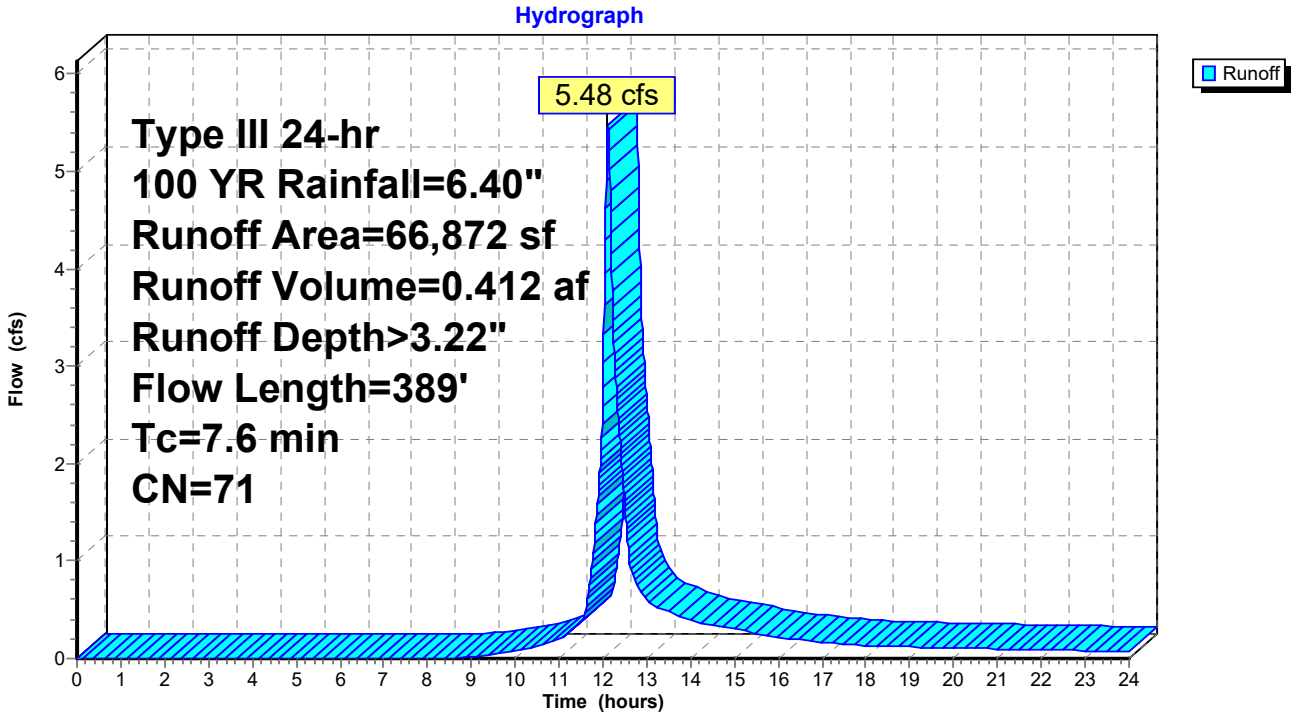
Runoff = 5.48 cfs @ 12.11 hrs, Volume= 0.412 af, Depth> 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=6.40"

	Area (sf)	CN	Description
	515	98	Paved roads w/curbs & sewers, HSG A
	401	98	Paved roads w/curbs & sewers, HSG A
	600	98	Paved parking, HSG A
	973	98	Paved parking, HSG A
	826	98	Roofs, HSG A
	2,396	98	Roofs, HSG A
	53	98	Paved parking, HSG A
	9,135	76	Gravel roads, HSG A
	1,727	76	Gravel roads, HSG A
	1,697	76	Gravel roads, HSG A
	2,844	76	Gravel roads, HSG A
*	41,344	68	Junk Piles <50% Grass cover, Poor, HSG A
	883	45	Woods, Poor, HSG A
	3,478	45	Woods, Poor, HSG A
	66,872	71	Weighted Average
	61,108		91.38% Pervious Area
	5,764		8.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	100	0.0325	0.50		**Sheet Flow, Gravel/Junk** Fallow n= 0.050 P2= 3.20"
4.2	289	0.0129	1.14		**Shallow Concentrated Flow, Gravel/Junk** Nearly Bare & Untilled Kv= 10.0 fps
7.6	389	Total			

Subcatchment 1S: Entire Site

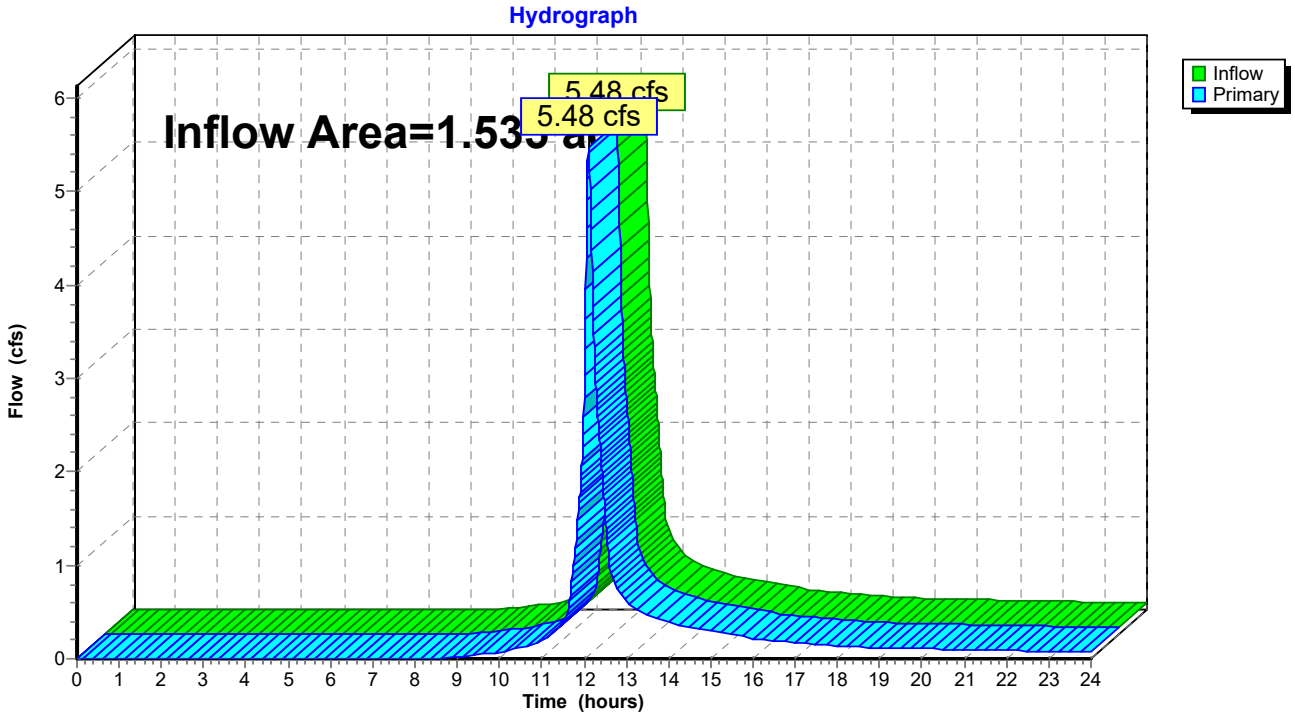


Summary for Link 1L: DP#1

Inflow Area = 1.535 ac, 8.62% Impervious, Inflow Depth > 3.22" for 100 YR event
Inflow = 5.48 cfs @ 12.11 hrs, Volume= 0.412 af
Primary = 5.48 cfs @ 12.11 hrs, Volume= 0.412 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: DP#1

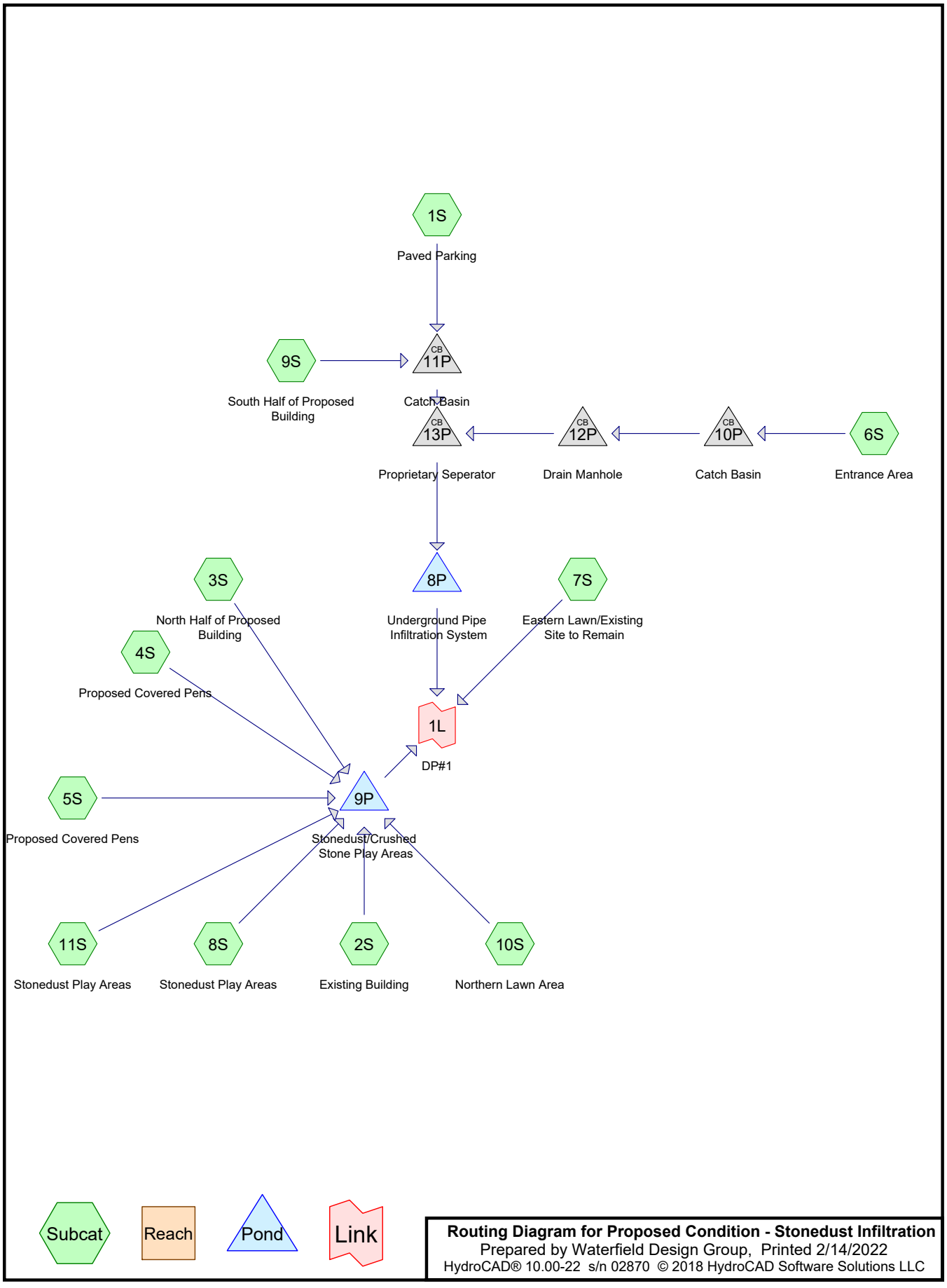


Date: February, 2022
Project: 156 Lafayette Road Redevelopment

PROPOSED (SITE DEVELOPED) CONDITIONS

RUNOFF CALCULATIONS

(2, 10, 25, & 100 YEAR STORMS)



Routing Diagram for Proposed Condition - Stonedust Infiltration
Prepared by Waterfield Design Group, Printed 2/14/2022

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Paved Parking Runoff Area=13,522 sf 85.64% Impervious Runoff Depth>2.07"
Tc=6.0 min CN=90 Runoff=0.75 cfs 0.054 af

Subcatchment 2S: Existing Building Runoff Area=2,400 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.17 cfs 0.013 af

Subcatchment 3S: North Half of Proposed Runoff Area=480 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.03 cfs 0.003 af

Subcatchment 4S: Proposed Covered Pens Runoff Area=3,611 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.25 cfs 0.020 af

Subcatchment 5S: Proposed Covered Pens Runoff Area=3,611 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.25 cfs 0.020 af

Subcatchment 6S: Entrance Area Runoff Area=7,945 sf 26.67% Impervious Runoff Depth>0.22"
Tc=6.0 min CN=55 Runoff=0.02 cfs 0.003 af

Subcatchment 7S: Eastern Lawn/Existing Runoff Area=22,431 sf 1.11% Impervious Runoff Depth>0.13"
Tc=6.0 min CN=51 Runoff=0.01 cfs 0.006 af

Subcatchment 8S: Stonedust Play Areas Runoff Area=5,874 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.41 cfs 0.032 af

Subcatchment 9S: South Half of Proposed Runoff Area=480 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.03 cfs 0.003 af

Subcatchment 10S: Northern Lawn Area Runoff Area=3,093 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment 11S: Stonedust Play Areas Runoff Area=3,410 sf 100.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=98 Runoff=0.24 cfs 0.019 af

Pond 8P: Underground Pipe Infiltration System Peak Elev=58.44' Storage=390 cf Inflow=0.78 cfs 0.060 af
Discarded=0.04 cfs 0.038 af Primary=0.72 cfs 0.021 af Outflow=0.76 cfs 0.060 af

Pond 9P: Stonedust/Crushed Stone Play Areas Peak Elev=59.64' Storage=625 cf Inflow=1.34 cfs 0.106 af
Discarded=0.45 cfs 0.106 af Primary=0.00 cfs 0.000 af Outflow=0.45 cfs 0.106 af

Pond 10P: Catch Basin Peak Elev=58.63' Inflow=0.02 cfs 0.003 af
8.0" Round Culvert n=0.013 L=75.0' S=0.0040 '/' Outflow=0.02 cfs 0.003 af

Pond 11P: Catch Basin Peak Elev=59.01' Inflow=0.78 cfs 0.056 af
8.0" Round Culvert n=0.013 L=49.0' S=0.0022 '/' Outflow=0.78 cfs 0.056 af

Pond 12P: Drain Manhole Peak Elev=58.33' Inflow=0.02 cfs 0.003 af
8.0" Round Culvert n=0.013 L=67.0' S=0.0039 '/' Outflow=0.02 cfs 0.003 af

Pond 13P: Proprietary Seperator Peak Elev=58.58' Inflow=0.78 cfs 0.060 af
12.0" Round Culvert n=0.013 L=28.0' S=0.0029 '/' Outflow=0.78 cfs 0.060 af

Link 1L: DP#1 Inflow=0.72 cfs 0.027 af
Primary=0.72 cfs 0.027 af

Summary for Subcatchment 1S: Paved Parking

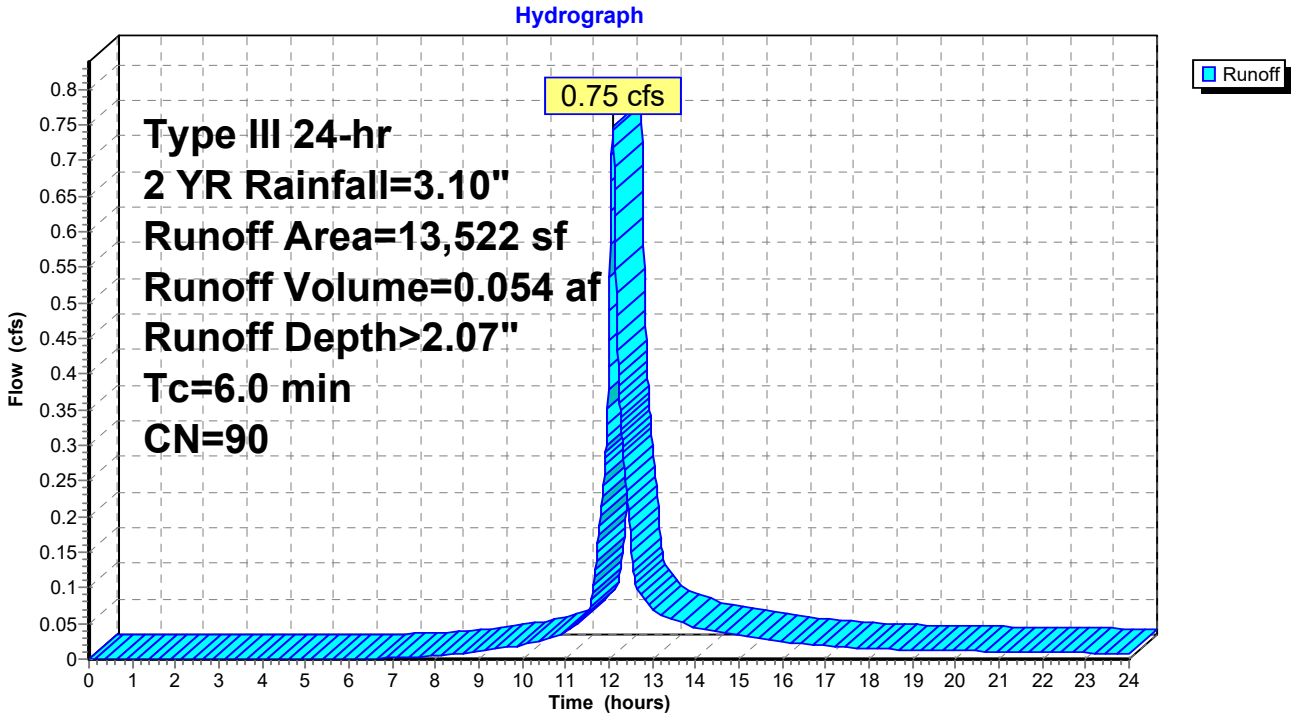
Runoff = 0.75 cfs @ 12.09 hrs, Volume= 0.054 af, Depth> 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
11,340	98	Paved parking, HSG A
240	98	Paved parking, HSG A
394	39	>75% Grass cover, Good, HSG A
106	39	>75% Grass cover, Good, HSG A
1,442	39	>75% Grass cover, Good, HSG A
13,522	90	Weighted Average
1,942		14.36% Pervious Area
11,580		85.64% Impervious Area

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

Subcatchment 1S: Paved Parking



Summary for Subcatchment 2S: Existing Building

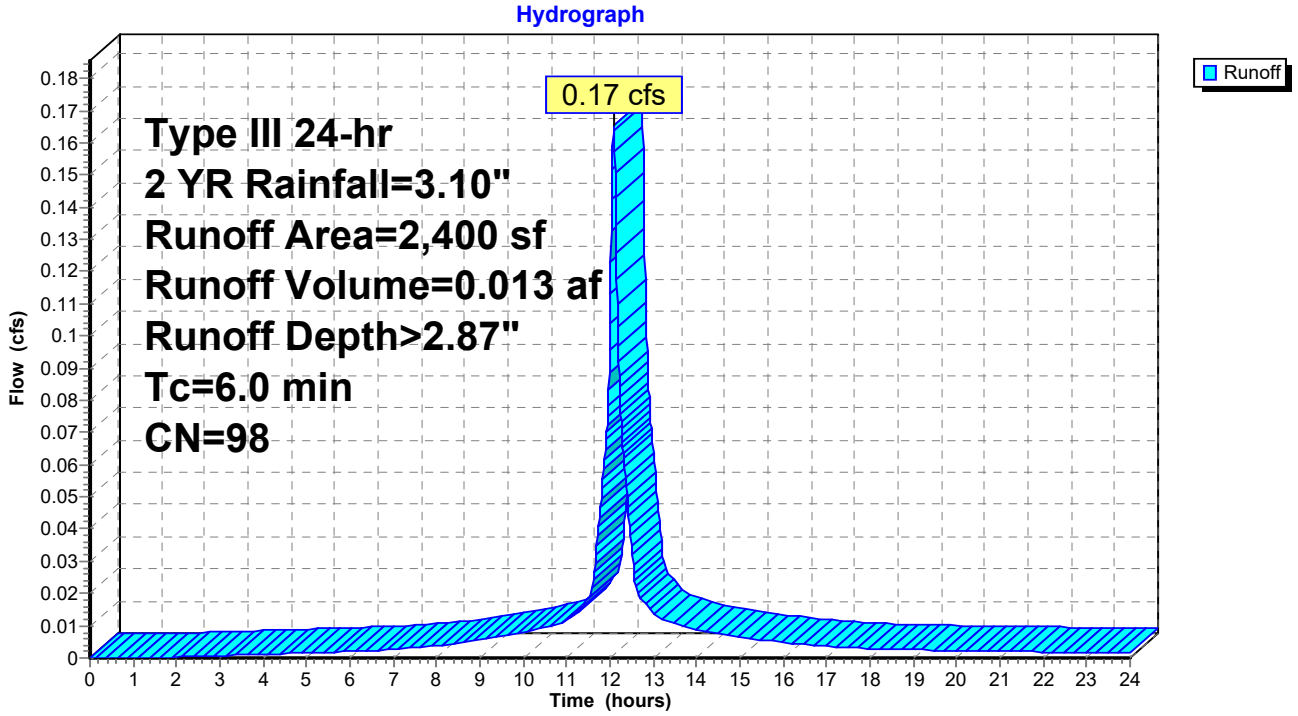
Runoff = 0.17 cfs @ 12.08 hrs, Volume= 0.013 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
2,400	98	Roofs, HSG A
2,400		100.00% Impervious Area

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

Subcatchment 2S: Existing Building



Summary for Subcatchment 3S: North Half of Proposed Building

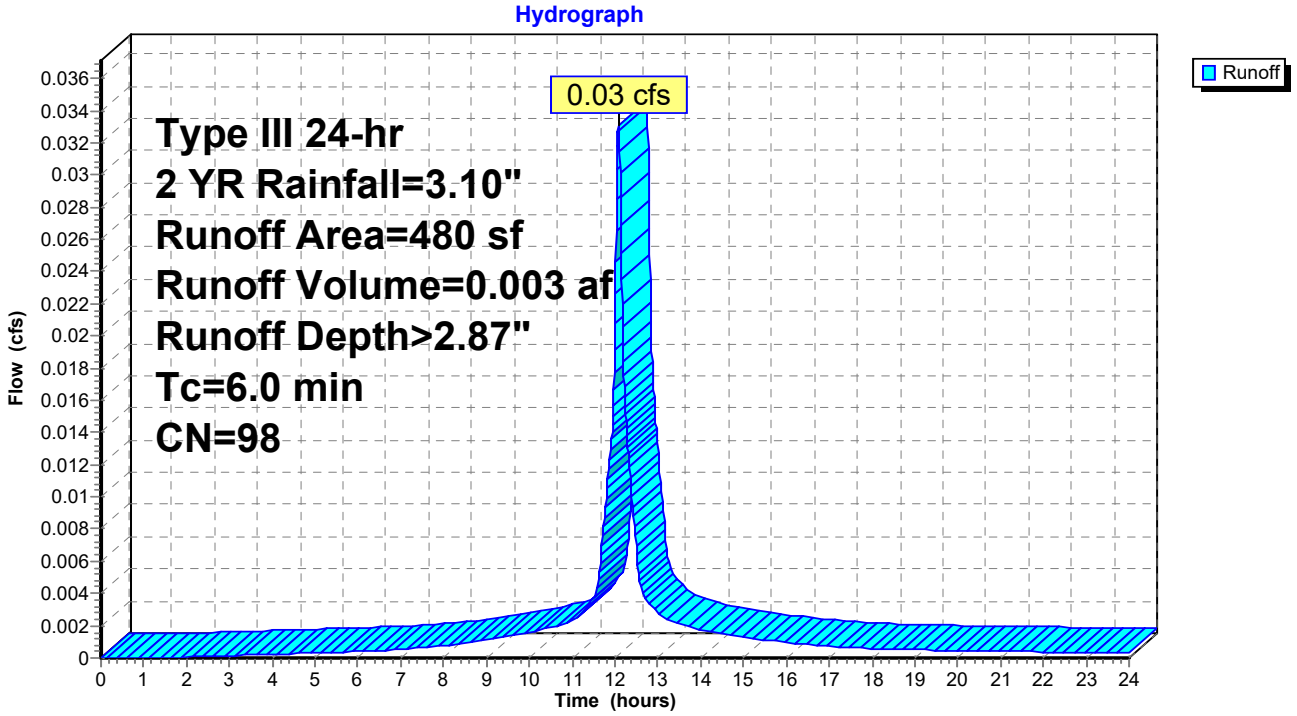
Runoff = 0.03 cfs @ 12.08 hrs, Volume= 0.003 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
480	98	Roofs, HSG A
480		100.00% Impervious Area

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

Subcatchment 3S: North Half of Proposed Building



Summary for Subcatchment 4S: Proposed Covered Pens

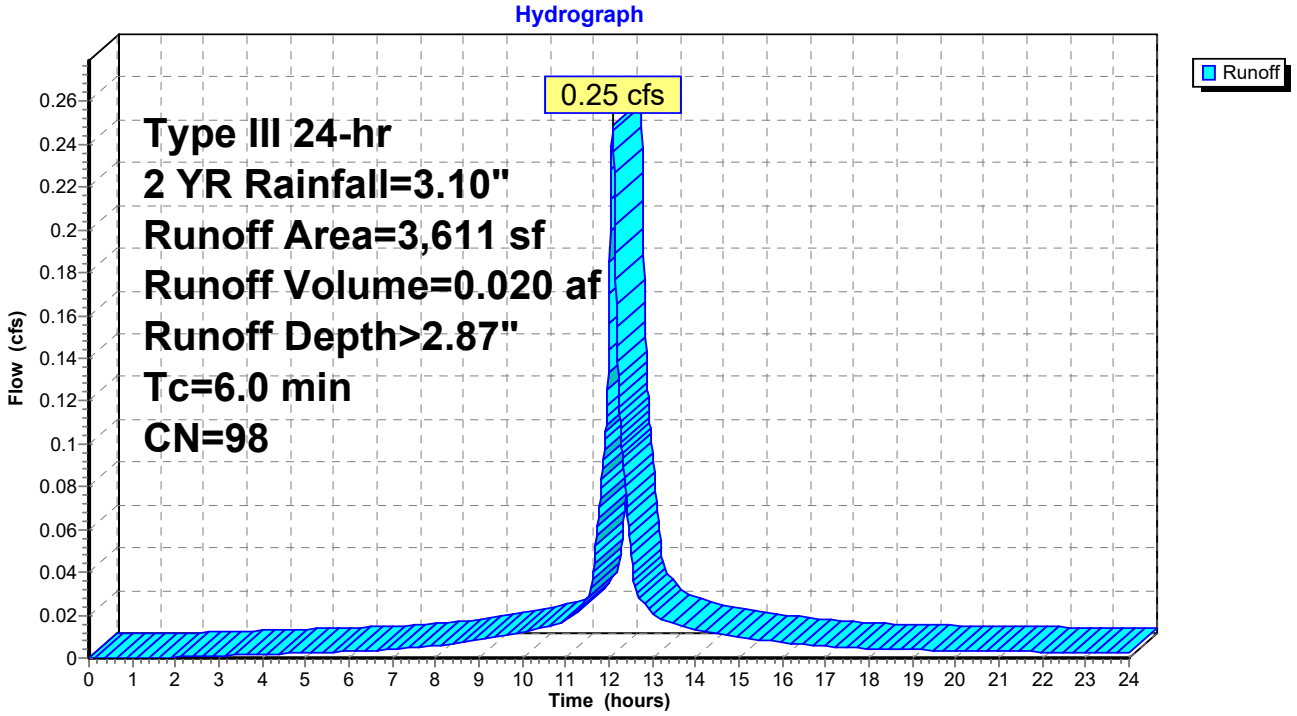
Runoff = 0.25 cfs @ 12.08 hrs, Volume= 0.020 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
3,611	98	Roofs, HSG A
3,611		100.00% Impervious Area

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

Subcatchment 4S: Proposed Covered Pens



Summary for Subcatchment 5S: Proposed Covered Pens

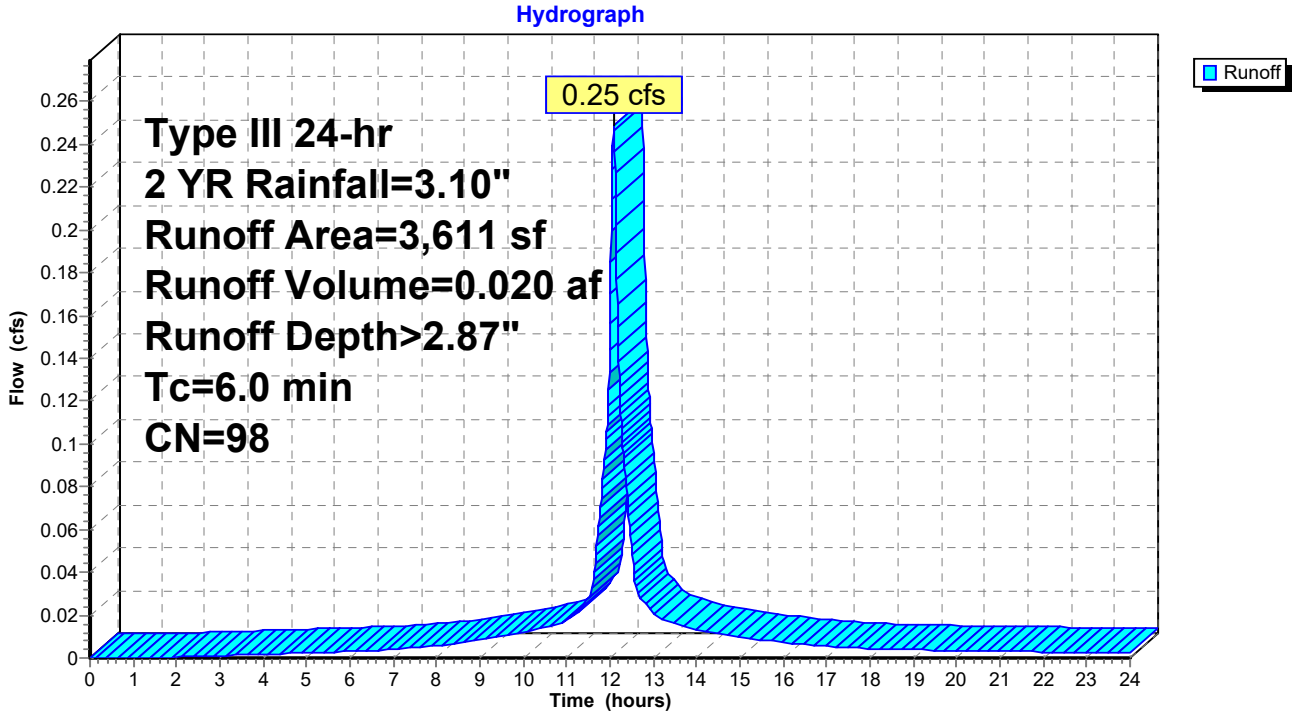
Runoff = 0.25 cfs @ 12.08 hrs, Volume= 0.020 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
3,611	98	Roofs, HSG A
3,611		100.00% Impervious Area

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

Subcatchment 5S: Proposed Covered Pens



Summary for Subcatchment 6S: Entrance Area

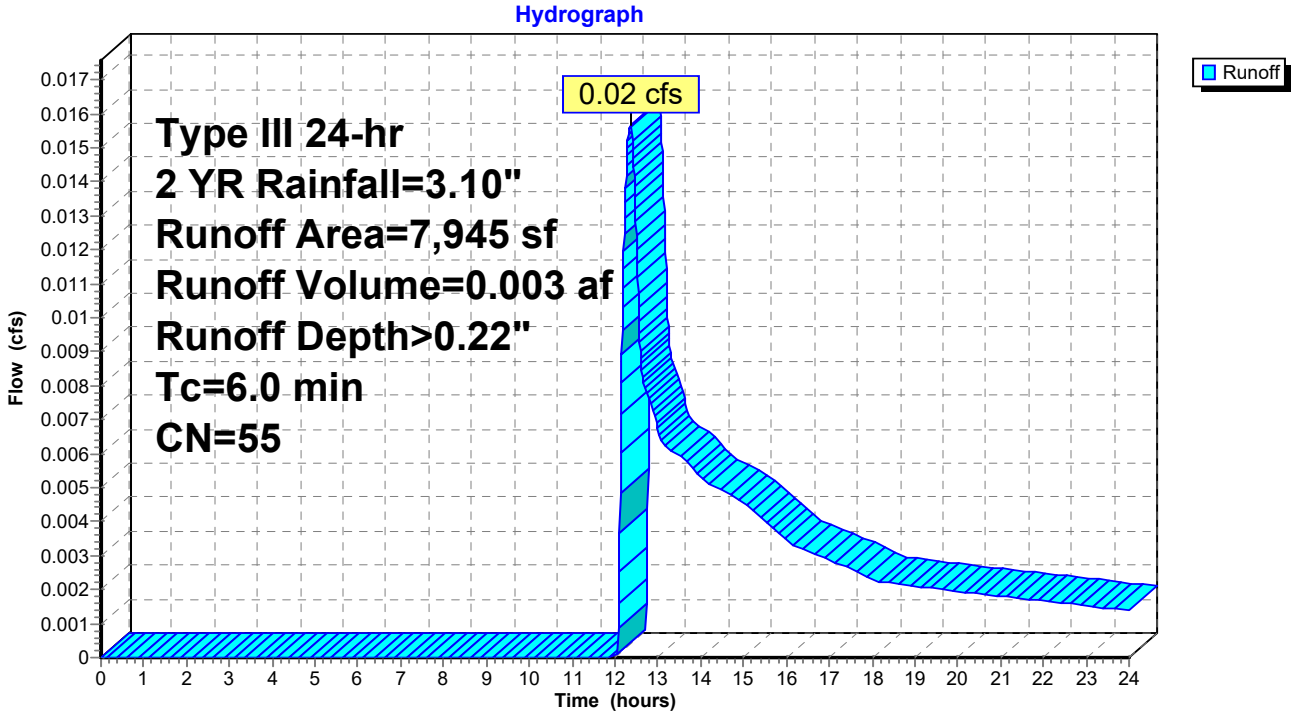
Runoff = 0.02 cfs @ 12.35 hrs, Volume= 0.003 af, Depth> 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
1,816	98	Paved parking, HSG A
303	98	Paved parking, HSG A
164	76	Gravel roads, HSG A
5,662	39	>75% Grass cover, Good, HSG A
7,945	55	Weighted Average
5,826		73.33% Pervious Area
2,119		26.67% Impervious Area

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

Subcatchment 6S: Entrance Area



Summary for Subcatchment 7S: Eastern Lawn/Existing Site to Remain

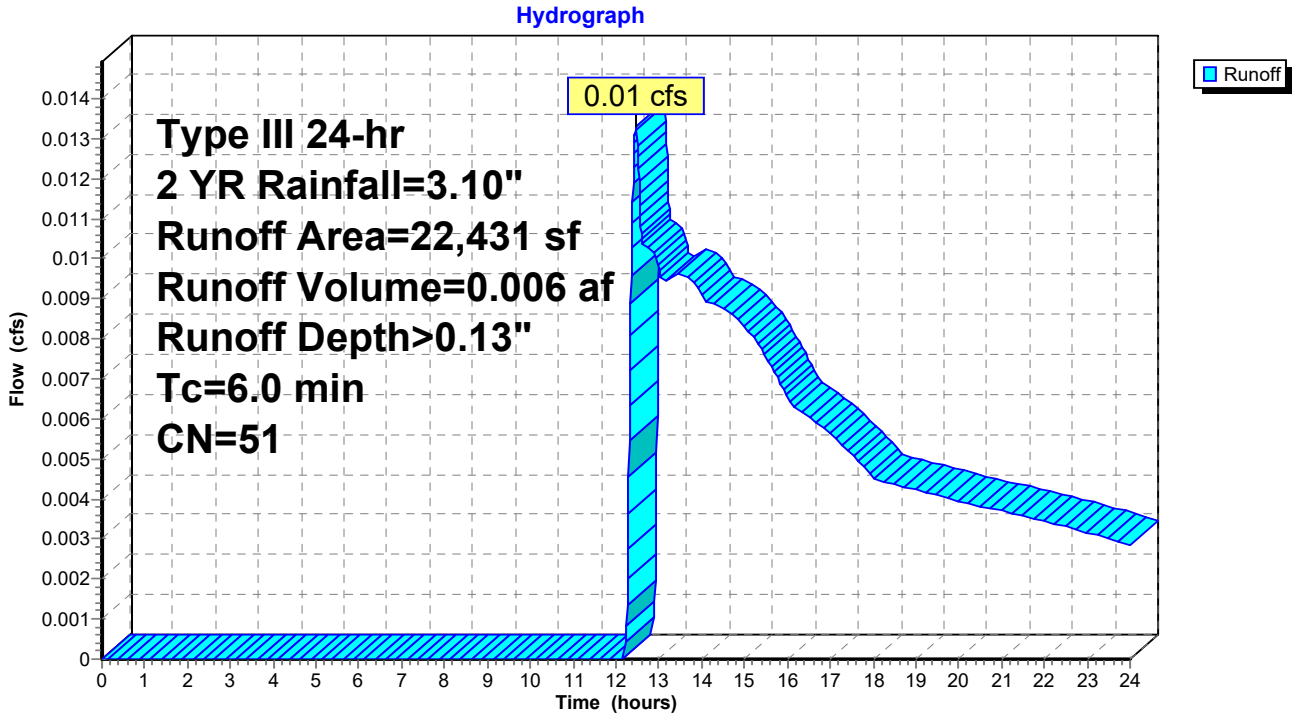
Runoff = 0.01 cfs @ 12.47 hrs, Volume= 0.006 af, Depth> 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.10"

	Area (sf)	CN	Description
	883	45	Woods, Poor, HSG A
	3,478	45	Woods, Poor, HSG A
	9,747	39	>75% Grass cover, Good, HSG A
	250	98	Paved parking, HSG A
	90	39	>75% Grass cover, Good, HSG A
	353	39	>75% Grass cover, Good, HSG A
*	7,630	68	Junk Piles Off Site
	22,431	51	Weighted Average
	22,181		98.89% Pervious Area
	250		1.11% Impervious Area

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

Subcatchment 7S: Eastern Lawn/Existing Site to Remain



Summary for Subcatchment 8S: Stonedust Play Areas

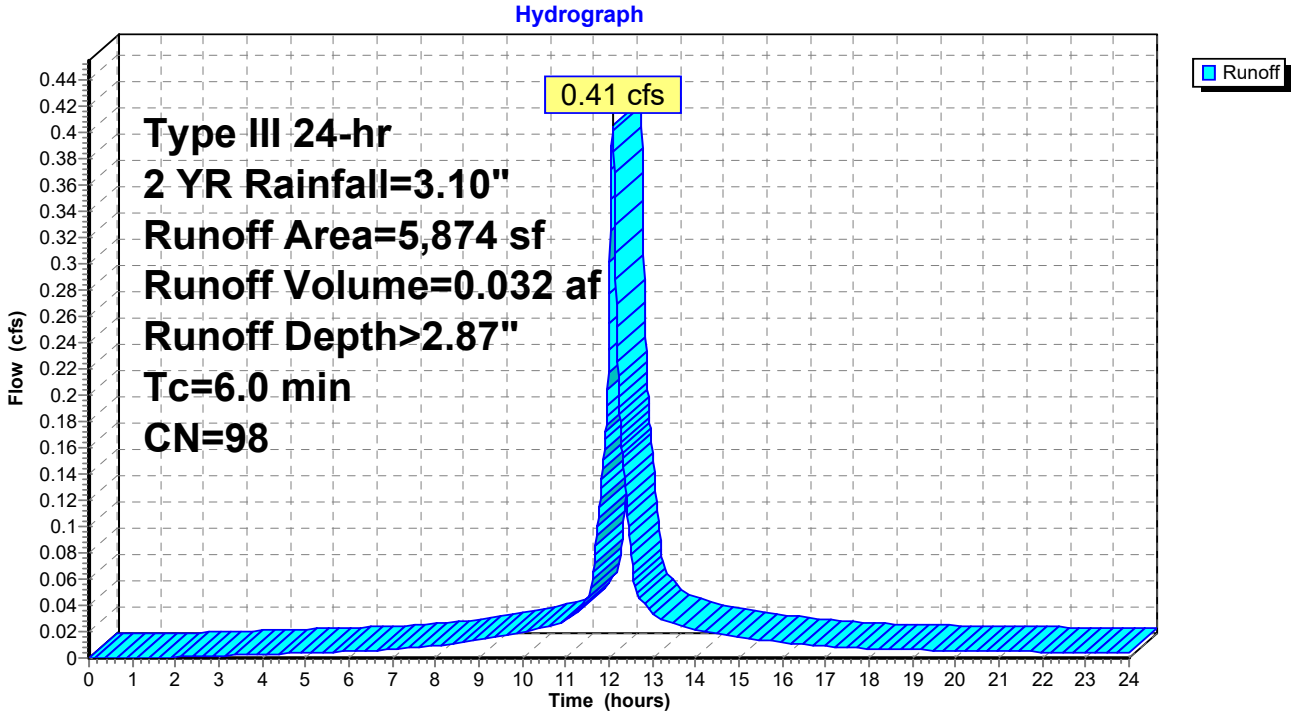
Runoff = 0.41 cfs @ 12.08 hrs, Volume= 0.032 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.10"

	Area (sf)	CN	Description
*	5,874	98	Stonedust Play Areas Not Covered by Roof
	5,874		100.00% Impervious Area

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

Subcatchment 8S: Stonedust Play Areas



Summary for Subcatchment 9S: South Half of Proposed Building

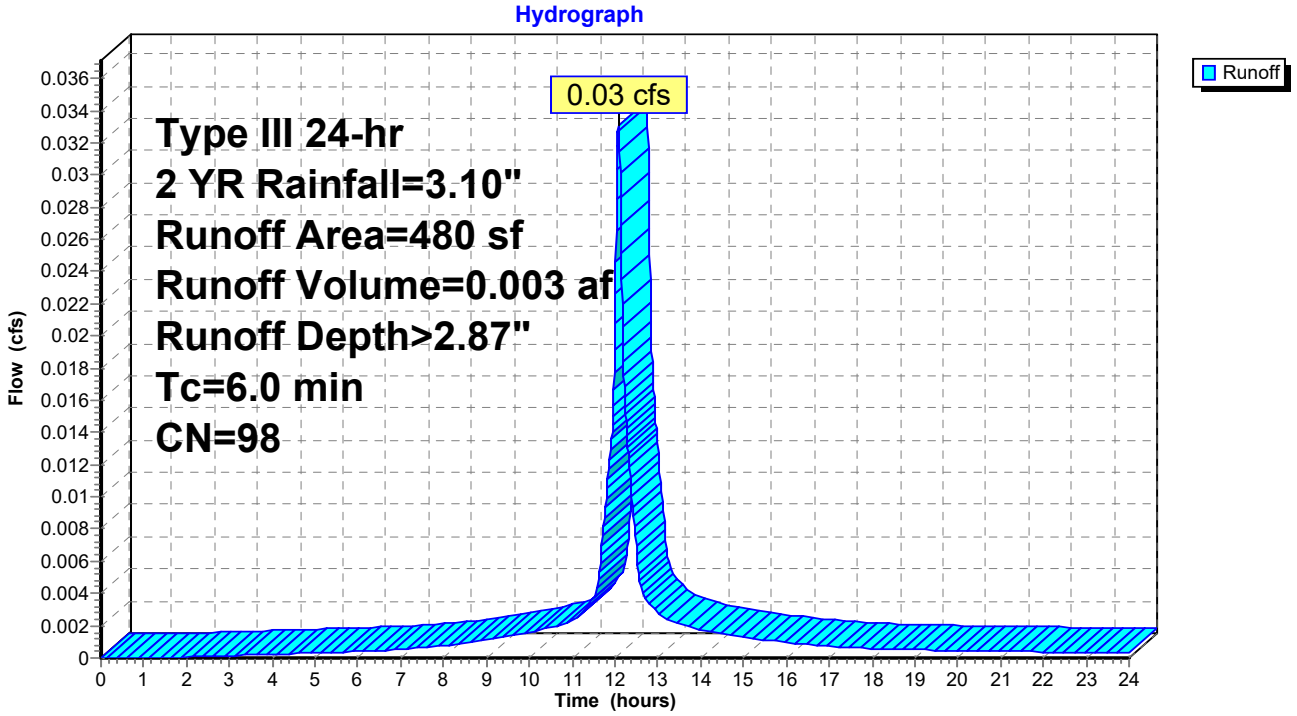
Runoff = 0.03 cfs @ 12.08 hrs, Volume= 0.003 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
480	98	Roofs, HSG A
480		100.00% Impervious Area

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

Subcatchment 9S: South Half of Proposed Building



Summary for Subcatchment 10S: Northern Lawn Area

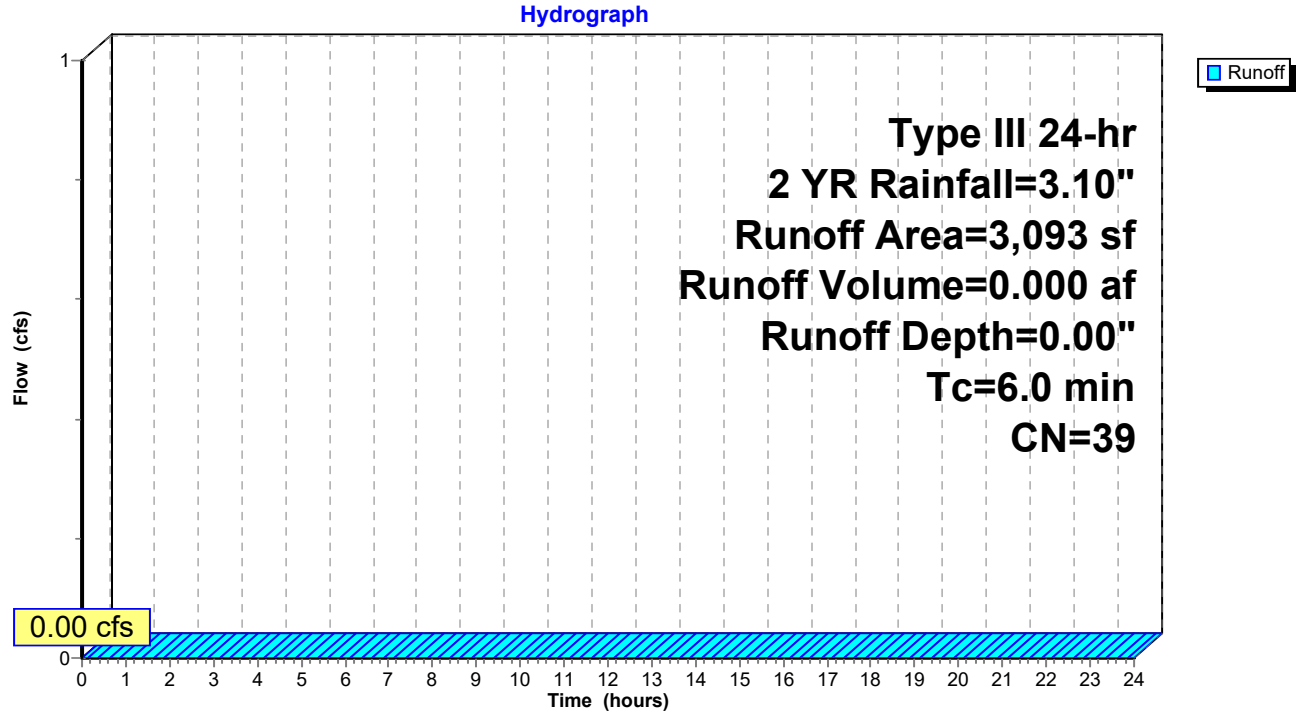
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
3,093	39	>75% Grass cover, Good, HSG A
3,093		100.00% Pervious Area

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

Subcatchment 10S: Northern Lawn Area



Summary for Subcatchment 11S: Stonedust Play Areas

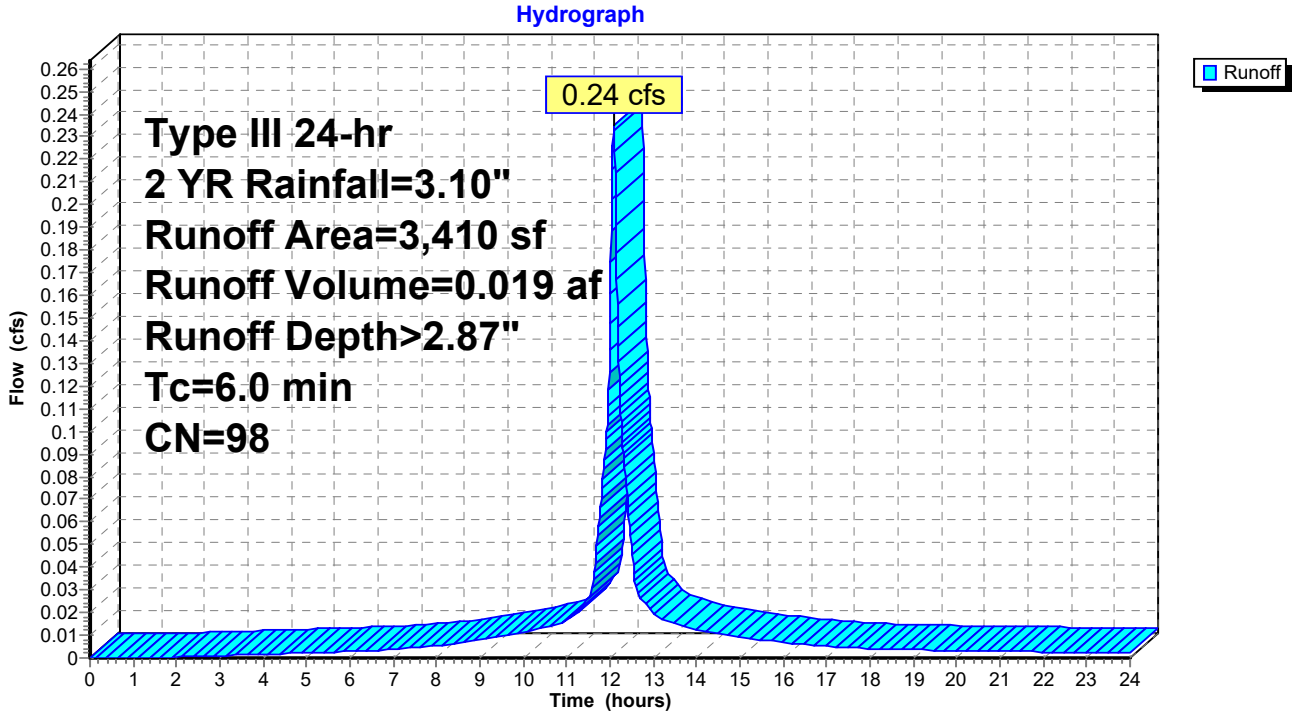
Runoff = 0.24 cfs @ 12.08 hrs, Volume= 0.019 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 YR Rainfall=3.10"

	Area (sf)	CN	Description
*	3,410	98	Stonedust Play Areas Not Covered by Roof
	3,410		100.00% Impervious Area

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

Subcatchment 11S: Stonedust Play Areas



Summary for Pond 8P: Underground Pipe Infiltration System

Inflow Area = 0.504 ac, 64.61% Impervious, Inflow Depth > 1.42" for 2 YR event
Inflow = 0.78 cfs @ 12.09 hrs, Volume= 0.060 af
Outflow = 0.76 cfs @ 12.11 hrs, Volume= 0.060 af, Atten= 3%, Lag= 1.2 min
Discarded = 0.04 cfs @ 11.03 hrs, Volume= 0.038 af
Primary = 0.72 cfs @ 12.11 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.44' @ 12.11 hrs Surf.Area= 705 sf Storage= 390 cf

Plug-Flow detention time= 48.7 min calculated for 0.060 af (100% of inflow)
Center-of-Mass det. time= 48.4 min (862.3 - 813.9)

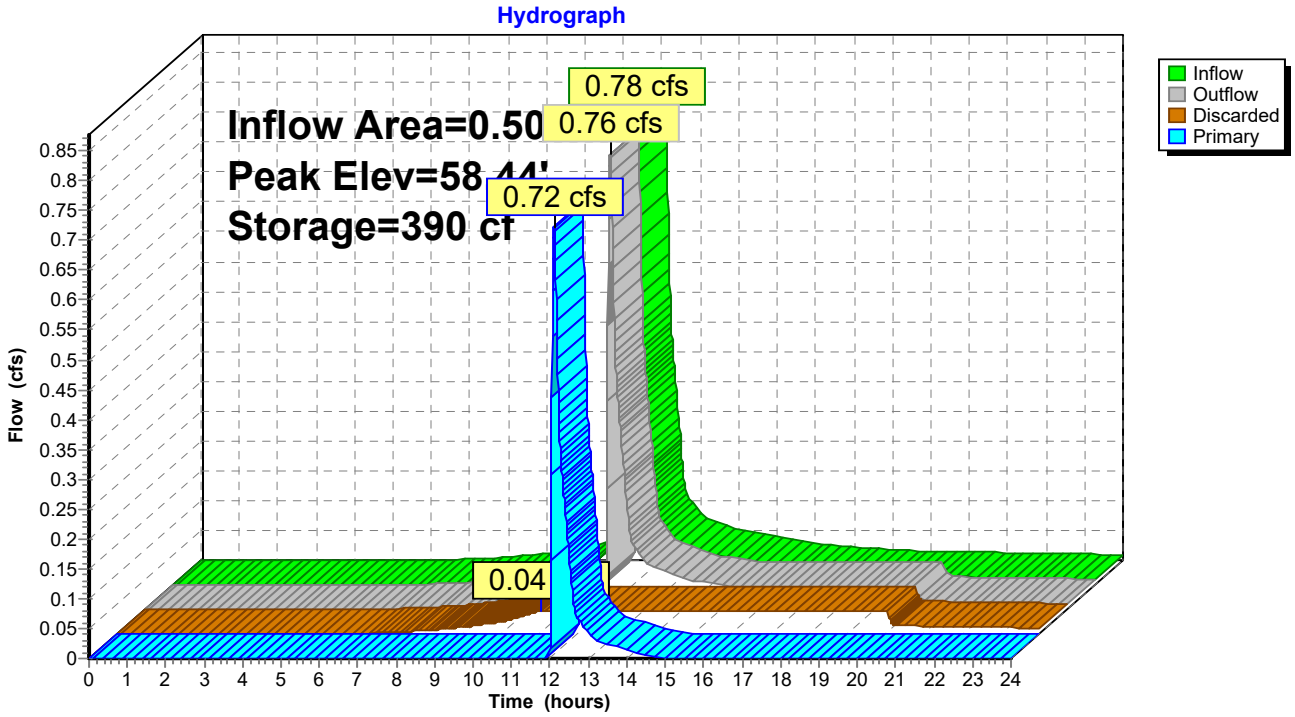
Volume	Invert	Avail.Storage	Storage Description
#1	57.40'	396 cf	**30.00'W x 23.50'L x 1.67'H Prismatoid** 1,177 cf Overall - 188 cf Embedded = 990 cf x 40.0% Voids
#2	57.90'	188 cf	**8.0" Round Pipe Storage** x 25 Inside #1 L= 21.5'
		584 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	57.40'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	58.30'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.04 cfs @ 11.03 hrs HW=57.42' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.72 cfs @ 12.11 hrs HW=58.44' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 0.72 cfs @ 1.04 fps)

Pond 8P: Underground Pipe Infiltration System



Summary for Pond 9P: Stonedust/Crushed Stone Play Areas

Inflow Area = 0.516 ac, 86.24% Impervious, Inflow Depth > 2.47" for 2 YR event
Inflow = 1.34 cfs @ 12.08 hrs, Volume= 0.106 af
Outflow = 0.45 cfs @ 11.85 hrs, Volume= 0.106 af, Atten= 66%, Lag= 0.0 min
Discarded = 0.45 cfs @ 11.85 hrs, Volume= 0.106 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 59.64' @ 12.36 hrs Surf.Area= 8,072 sf Storage= 625 cf

Plug-Flow detention time= 5.8 min calculated for 0.106 af (100% of inflow)
Center-of-Mass det. time= 5.8 min (762.3 - 756.5)

Volume	Invert	Avail.Storage	Storage Description
#1	59.38'	2,583 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

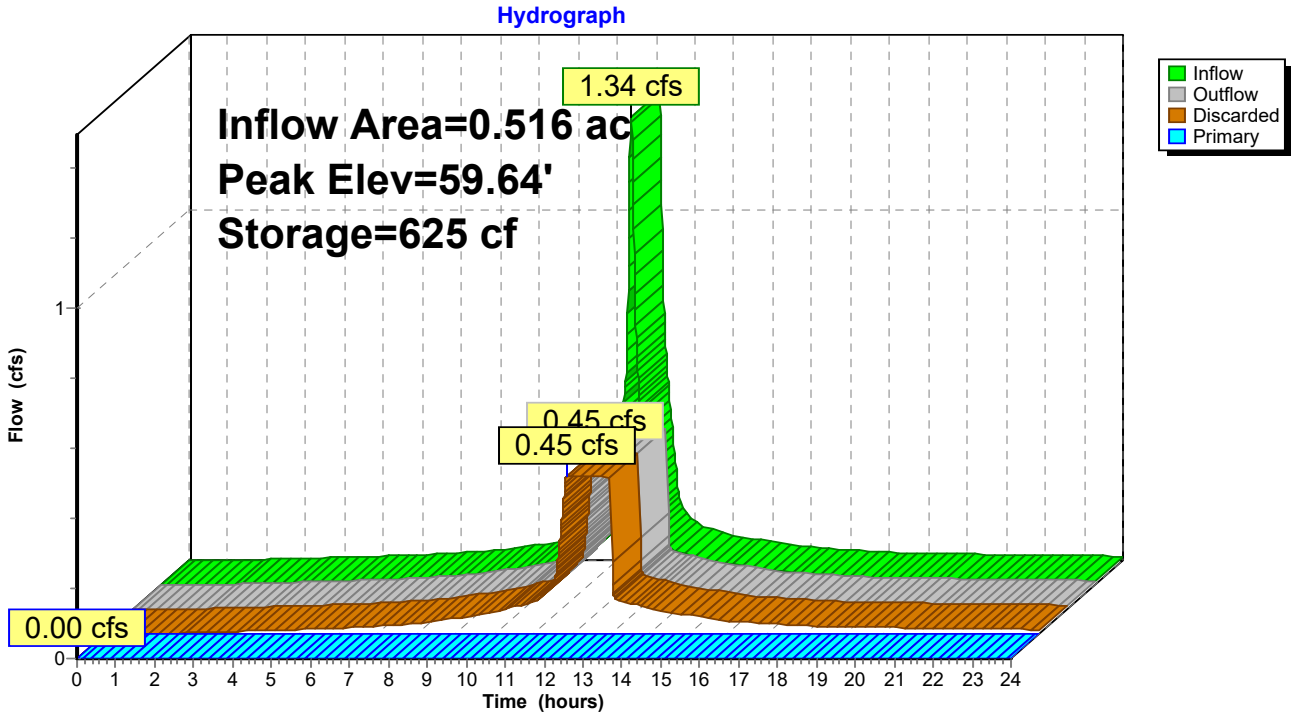
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.38	8,072	0.0	0	0
59.40	8,072	30.0	48	48
59.88	8,072	30.0	1,162	1,211
59.90	8,072	100.0	161	1,372
60.05	8,072	100.0	1,211	2,583

Device	Routing	Invert	Outlet Devices
#1	Discarded	59.38'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	60.00'	**0.5' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.45 cfs @ 11.85 hrs HW=59.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.45 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=59.38' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 9P: Stonedust/Crushed Stone Play Areas



Summary for Pond 10P: Catch Basin

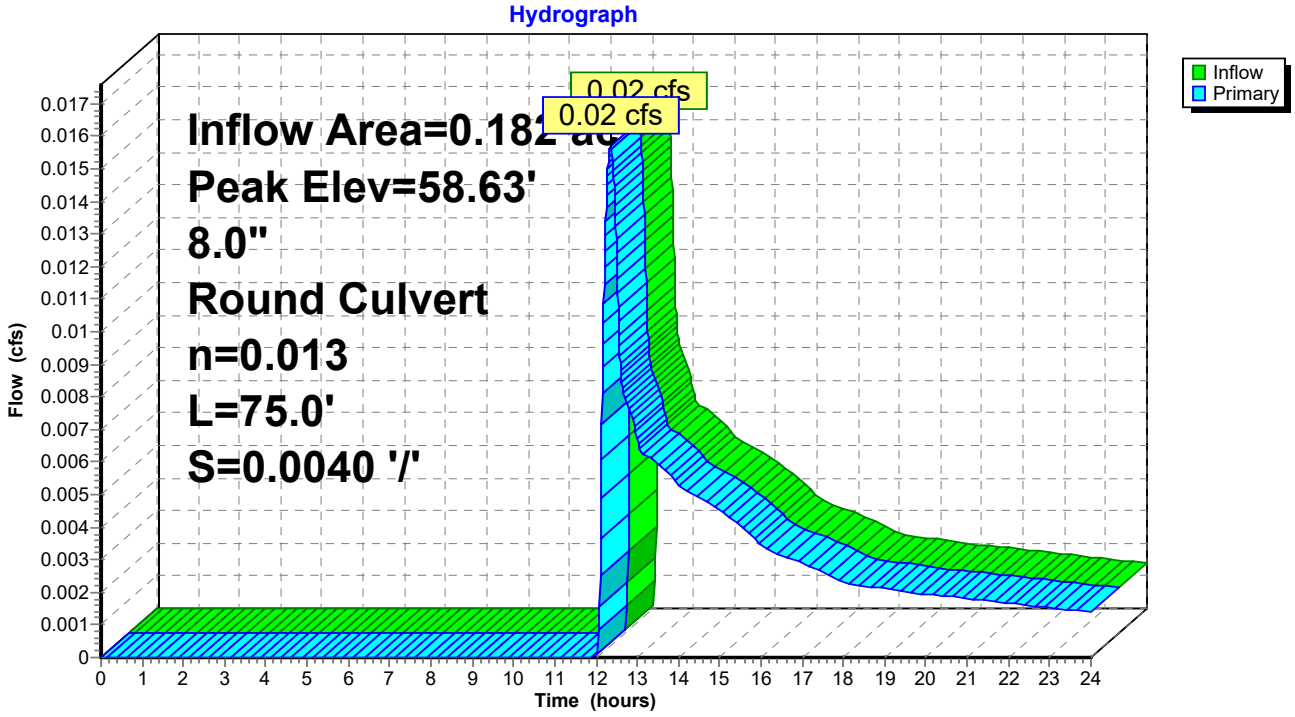
Inflow Area = 0.182 ac, 26.67% Impervious, Inflow Depth > 0.22" for 2 YR event
Inflow = 0.02 cfs @ 12.35 hrs, Volume= 0.003 af
Outflow = 0.02 cfs @ 12.35 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min
Primary = 0.02 cfs @ 12.35 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.63' @ 12.35 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	58.54'	**8.0" Round Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.54' / 58.24' S= 0.0040 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.35 sf

Primary OutFlow Max=0.02 cfs @ 12.35 hrs HW=58.63' (Free Discharge)
1=Culvert (Barrel Controls 0.02 cfs @ 0.87 fps)

Pond 10P: Catch Basin



Summary for Pond 11P: Catch Basin

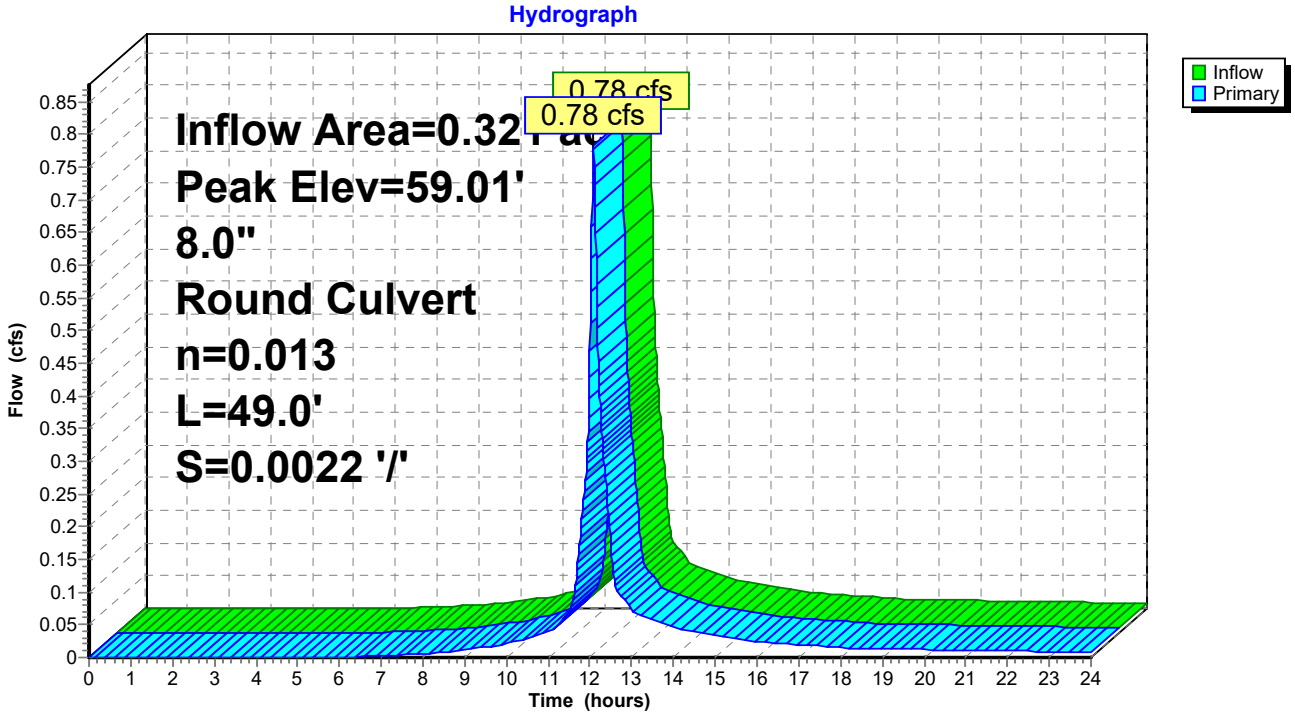
Inflow Area = 0.321 ac, 86.13% Impervious, Inflow Depth > 2.10" for 2 YR event
Inflow = 0.78 cfs @ 12.09 hrs, Volume= 0.056 af
Outflow = 0.78 cfs @ 12.09 hrs, Volume= 0.056 af, Atten= 0%, Lag= 0.0 min
Primary = 0.78 cfs @ 12.09 hrs, Volume= 0.056 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 59.01' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	58.09'	**8.0" Round Culvert** L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.09' / 57.98' S= 0.0022 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.78 cfs @ 12.09 hrs HW=59.00' (Free Discharge)
1=Culvert (Barrel Controls 0.78 cfs @ 2.24 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Drain Manhole

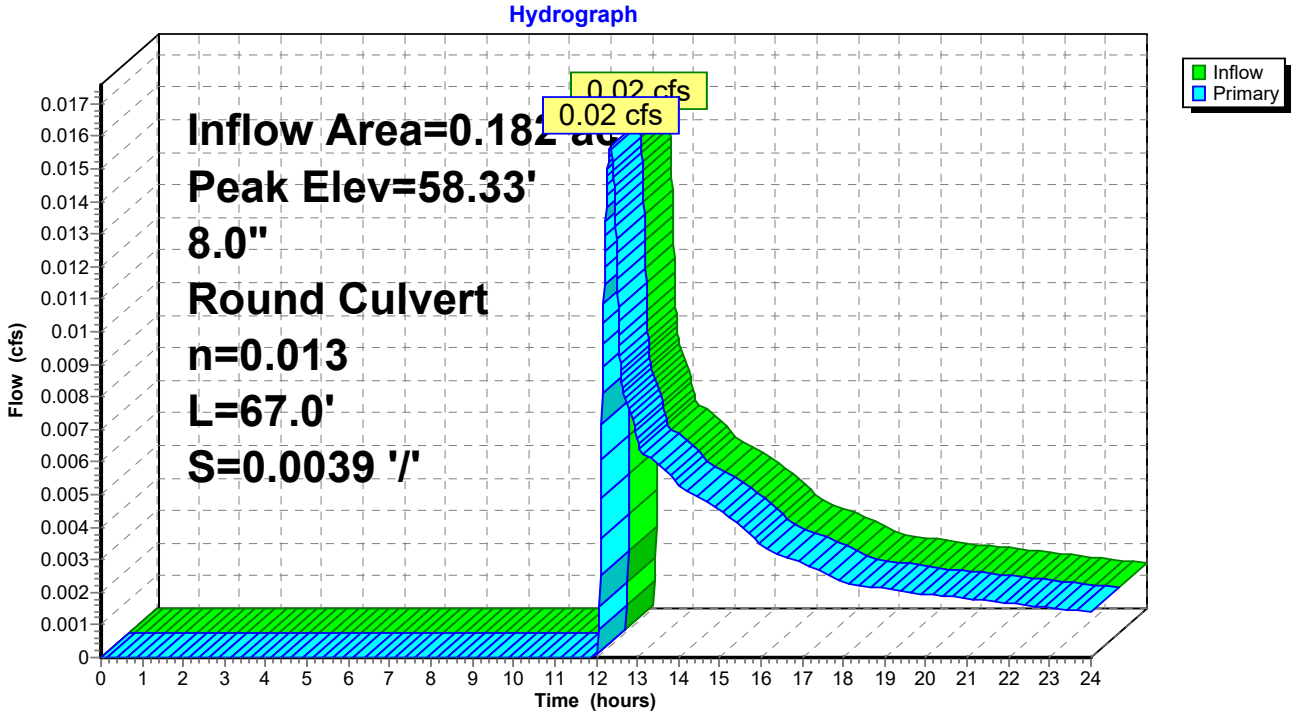
Inflow Area = 0.182 ac, 26.67% Impervious, Inflow Depth > 0.22" for 2 YR event
Inflow = 0.02 cfs @ 12.35 hrs, Volume= 0.003 af
Outflow = 0.02 cfs @ 12.35 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min
Primary = 0.02 cfs @ 12.35 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.33' @ 12.35 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	58.24'	**8.0" Round Culvert** L= 67.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.24' / 57.98' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.02 cfs @ 12.35 hrs HW=58.33' (Free Discharge)
1=Culvert (Barrel Controls 0.02 cfs @ 0.86 fps)

Pond 12P: Drain Manhole



Summary for Pond 13P: Proprietary Seperator

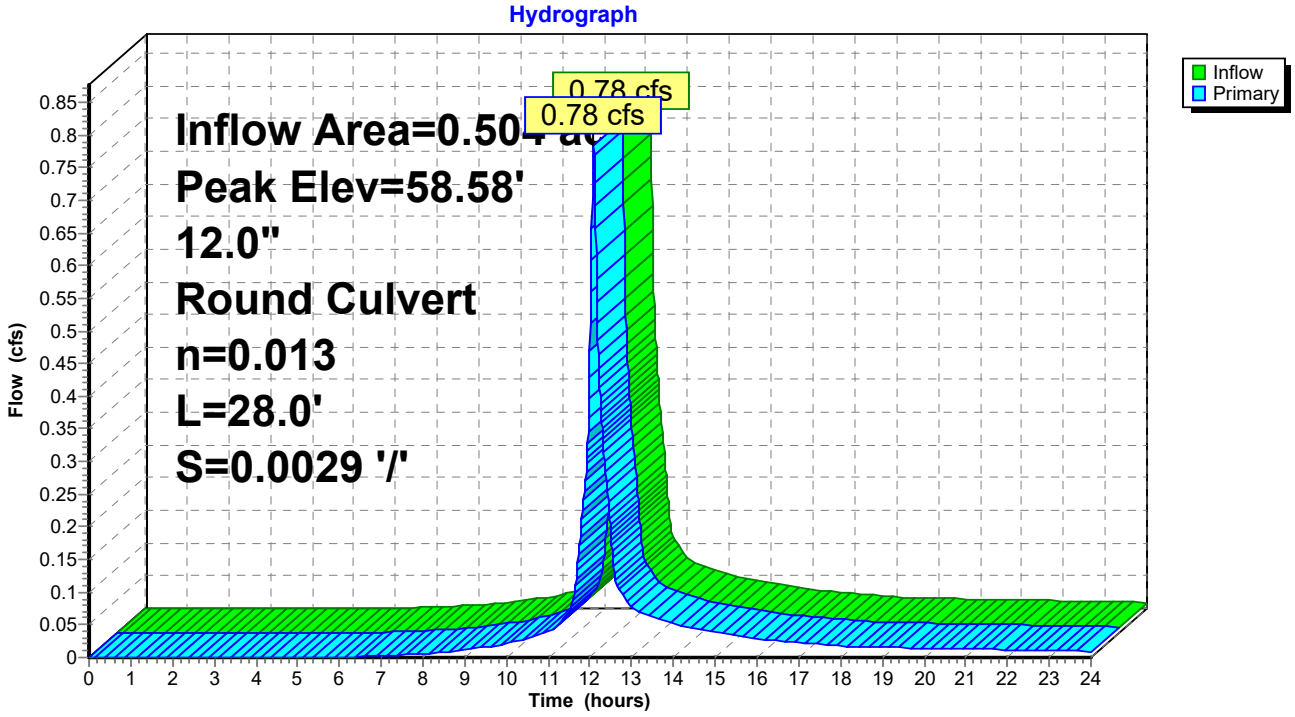
Inflow Area = 0.504 ac, 64.61% Impervious, Inflow Depth > 1.42" for 2 YR event
Inflow = 0.78 cfs @ 12.09 hrs, Volume= 0.060 af
Outflow = 0.78 cfs @ 12.09 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min
Primary = 0.78 cfs @ 12.09 hrs, Volume= 0.060 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.58' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	57.98'	**12.0" Round Culvert** L= 28.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 57.98' / 57.90' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.78 cfs @ 12.09 hrs HW=58.58' (Free Discharge)
1=Culvert (Barrel Controls 0.78 cfs @ 2.28 fps)

Pond 13P: Proprietary Seperator

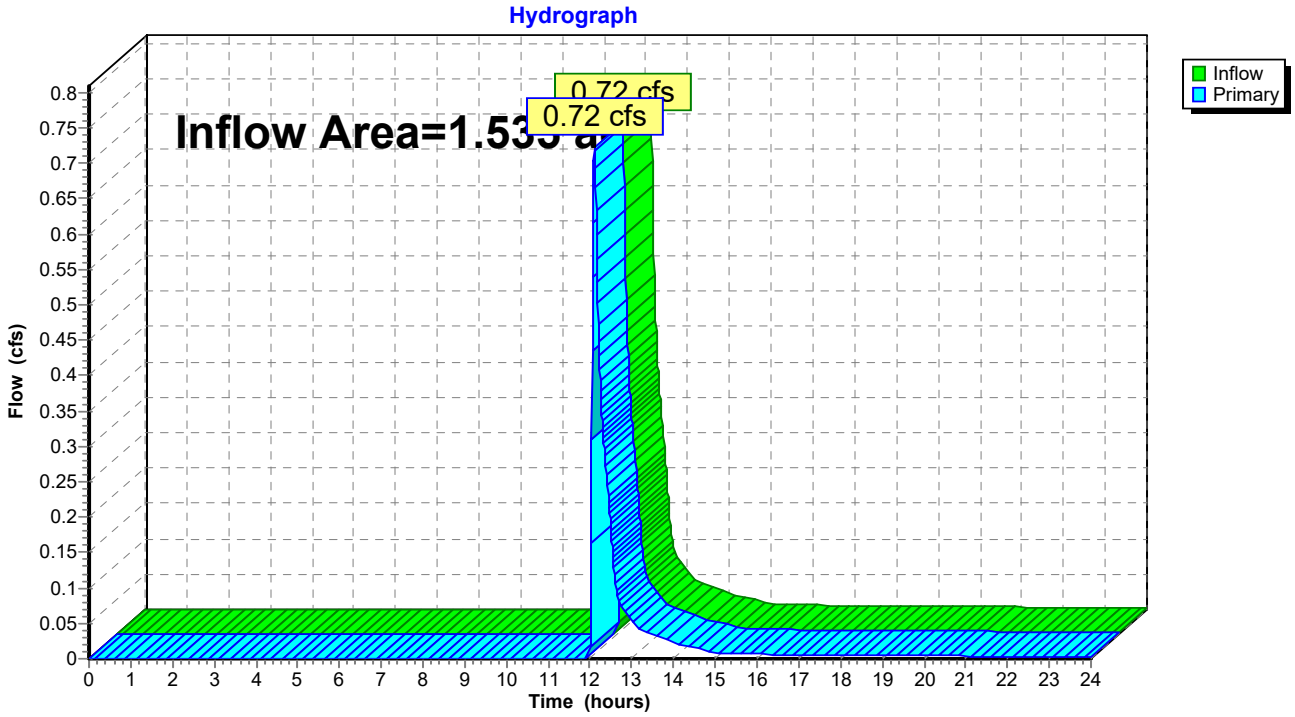


Summary for Link 1L: DP#1

Inflow Area = 1.535 ac, 50.58% Impervious, Inflow Depth > 0.21" for 2 YR event
Inflow = 0.72 cfs @ 12.11 hrs, Volume= 0.027 af
Primary = 0.72 cfs @ 12.11 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: DP#1



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Paved Parking Runoff Area=13,522 sf 85.64% Impervious Runoff Depth>3.39"
Tc=6.0 min CN=90 Runoff=1.20 cfs 0.088 af

Subcatchment 2S: Existing Building Runoff Area=2,400 sf 100.00% Impervious Runoff Depth>4.26"
Tc=6.0 min CN=98 Runoff=0.24 cfs 0.020 af

Subcatchment 3S: North Half of Proposed Runoff Area=480 sf 100.00% Impervious Runoff Depth>4.26"
Tc=6.0 min CN=98 Runoff=0.05 cfs 0.004 af

Subcatchment 4S: Proposed Covered Pens Runoff Area=3,611 sf 100.00% Impervious Runoff Depth>4.26"
Tc=6.0 min CN=98 Runoff=0.36 cfs 0.029 af

Subcatchment 5S: Proposed Covered Pens Runoff Area=3,611 sf 100.00% Impervious Runoff Depth>4.26"
Tc=6.0 min CN=98 Runoff=0.36 cfs 0.029 af

Subcatchment 6S: Entrance Area Runoff Area=7,945 sf 26.67% Impervious Runoff Depth>0.74"
Tc=6.0 min CN=55 Runoff=0.11 cfs 0.011 af

Subcatchment 7S: Eastern Lawn/Existing Runoff Area=22,431 sf 1.11% Impervious Runoff Depth>0.54"
Tc=6.0 min CN=51 Runoff=0.18 cfs 0.023 af

Subcatchment 8S: Stonedust Play Areas Runoff Area=5,874 sf 100.00% Impervious Runoff Depth>4.26"
Tc=6.0 min CN=98 Runoff=0.59 cfs 0.048 af

Subcatchment 9S: South Half of Proposed Runoff Area=480 sf 100.00% Impervious Runoff Depth>4.26"
Tc=6.0 min CN=98 Runoff=0.05 cfs 0.004 af

Subcatchment 10S: Northern Lawn Area Runoff Area=3,093 sf 0.00% Impervious Runoff Depth>0.11"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.001 af

Subcatchment 11S: Stonedust Play Areas Runoff Area=3,410 sf 100.00% Impervious Runoff Depth>4.26"
Tc=6.0 min CN=98 Runoff=0.34 cfs 0.028 af

Pond 8P: Underground Pipe Infiltration System Peak Elev=58.51' Storage=419 cf Inflow=1.36 cfs 0.103 af
Discarded=0.04 cfs 0.049 af Primary=1.30 cfs 0.053 af Outflow=1.34 cfs 0.103 af

Pond 9P: Stonedust/Crushed Stone Play Peak Elev=59.90' Storage=1,387 cf Inflow=1.96 cfs 0.159 af
Discarded=0.45 cfs 0.159 af Primary=0.00 cfs 0.000 af Outflow=0.45 cfs 0.159 af

Pond 10P: Catch Basin Peak Elev=58.78' Inflow=0.11 cfs 0.011 af
8.0" Round Culvert n=0.013 L=75.0' S=0.0040 '/' Outflow=0.11 cfs 0.011 af

Pond 11P: Catch Basin Peak Elev=59.55' Inflow=1.25 cfs 0.092 af
8.0" Round Culvert n=0.013 L=49.0' S=0.0022 '/' Outflow=1.25 cfs 0.092 af

Pond 12P: Drain Manhole Peak Elev=58.48' Inflow=0.11 cfs 0.011 af
8.0" Round Culvert n=0.013 L=67.0' S=0.0039 '/' Outflow=0.11 cfs 0.011 af

Pond 13P: Proprietary Seperator Peak Elev=58.81' Inflow=1.36 cfs 0.103 af
12.0" Round Culvert n=0.013 L=28.0' S=0.0029 '/' Outflow=1.36 cfs 0.103 af

Link 1L: DP#1 Inflow=1.47 cfs 0.077 af
Primary=1.47 cfs 0.077 af

Summary for Subcatchment 1S: Paved Parking

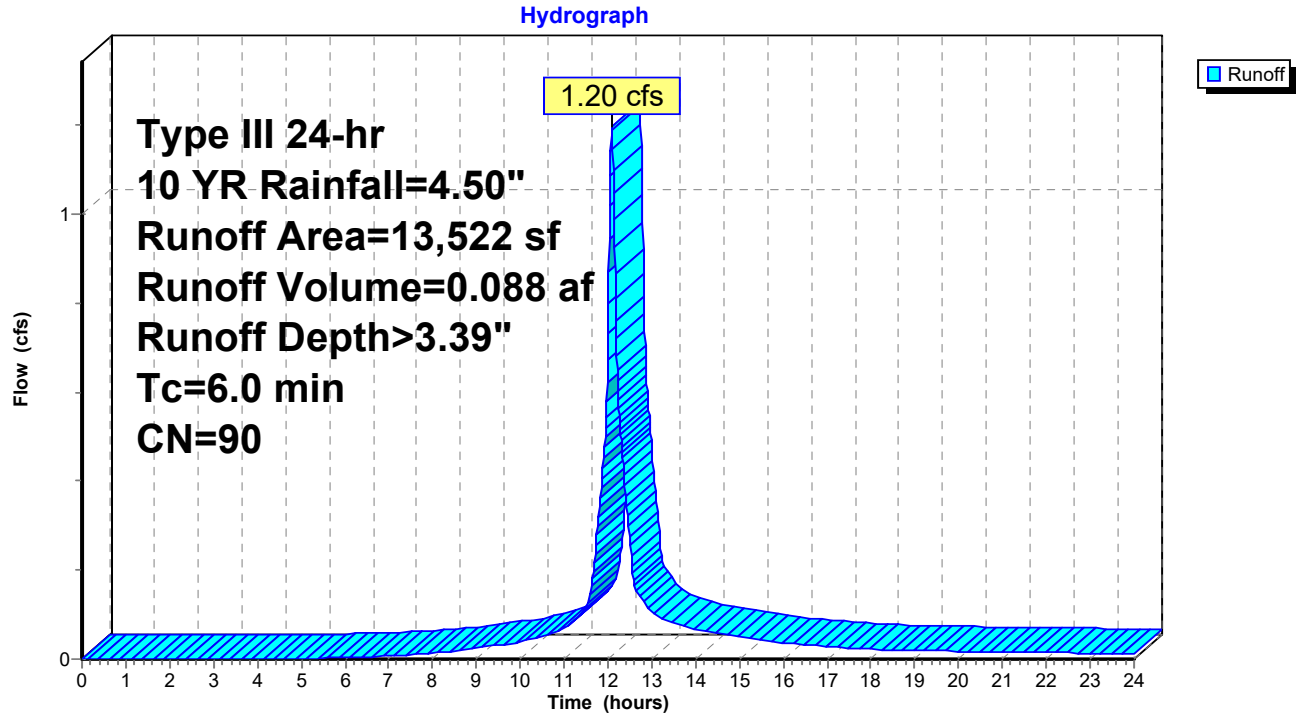
Runoff = 1.20 cfs @ 12.09 hrs, Volume= 0.088 af, Depth> 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
11,340	98	Paved parking, HSG A
240	98	Paved parking, HSG A
394	39	>75% Grass cover, Good, HSG A
106	39	>75% Grass cover, Good, HSG A
1,442	39	>75% Grass cover, Good, HSG A
13,522	90	Weighted Average
1,942		14.36% Pervious Area
11,580		85.64% Impervious Area

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

Subcatchment 1S: Paved Parking



Summary for Subcatchment 2S: Existing Building

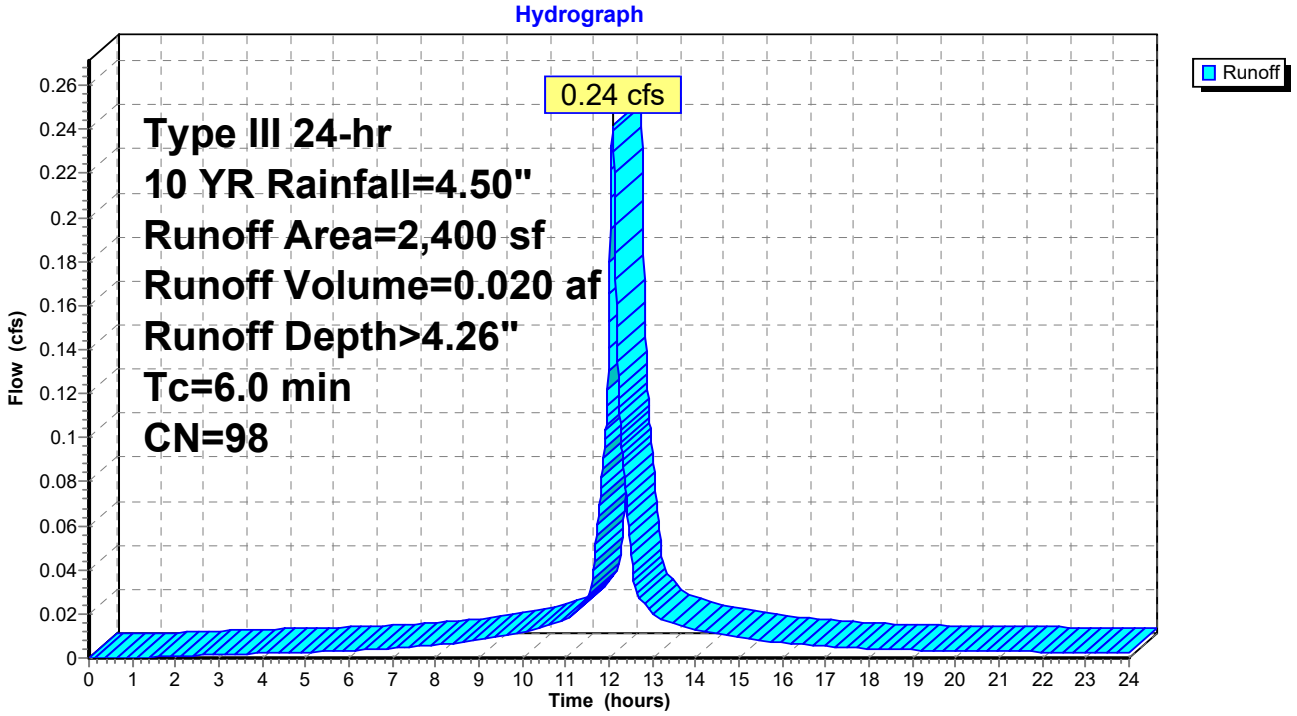
Runoff = 0.24 cfs @ 12.08 hrs, Volume= 0.020 af, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
2,400	98	Roofs, HSG A
2,400		100.00% Impervious Area

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

Subcatchment 2S: Existing Building



Summary for Subcatchment 3S: North Half of Proposed Building

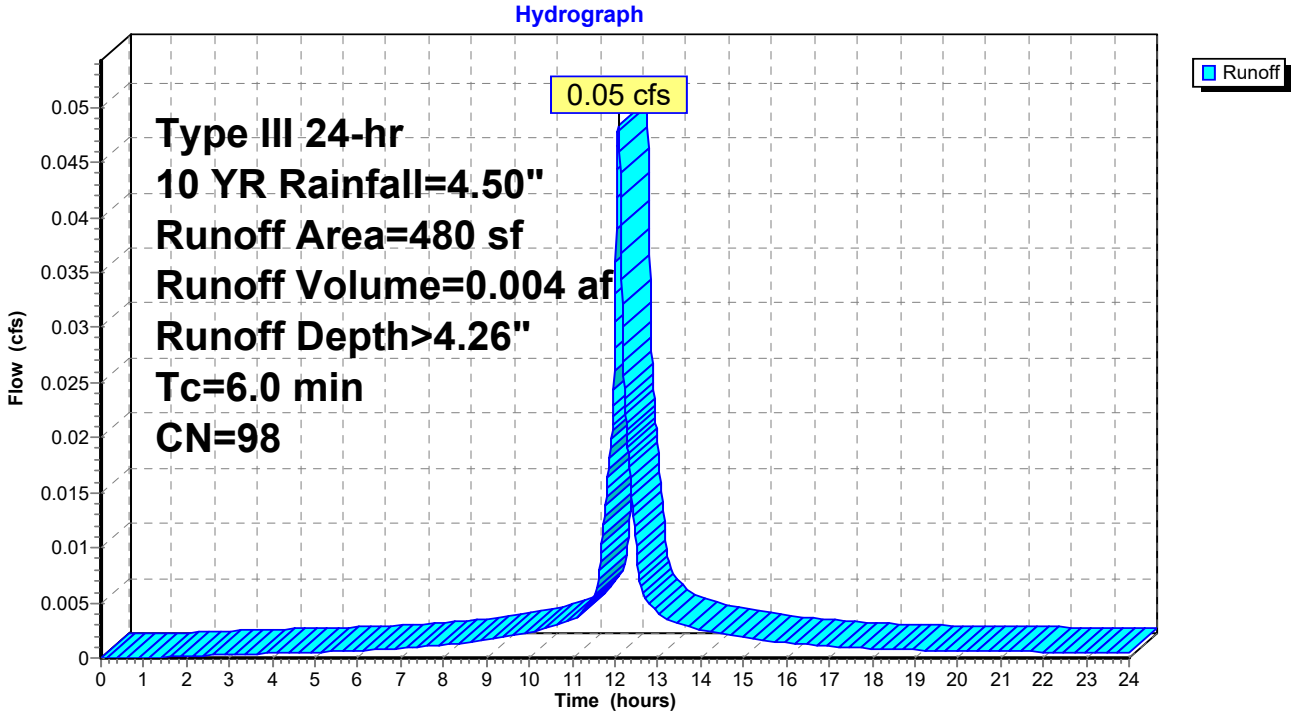
Runoff = 0.05 cfs @ 12.08 hrs, Volume= 0.004 af, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
480	98	Roofs, HSG A
480		100.00% Impervious Area

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

Subcatchment 3S: North Half of Proposed Building



Summary for Subcatchment 4S: Proposed Covered Pens

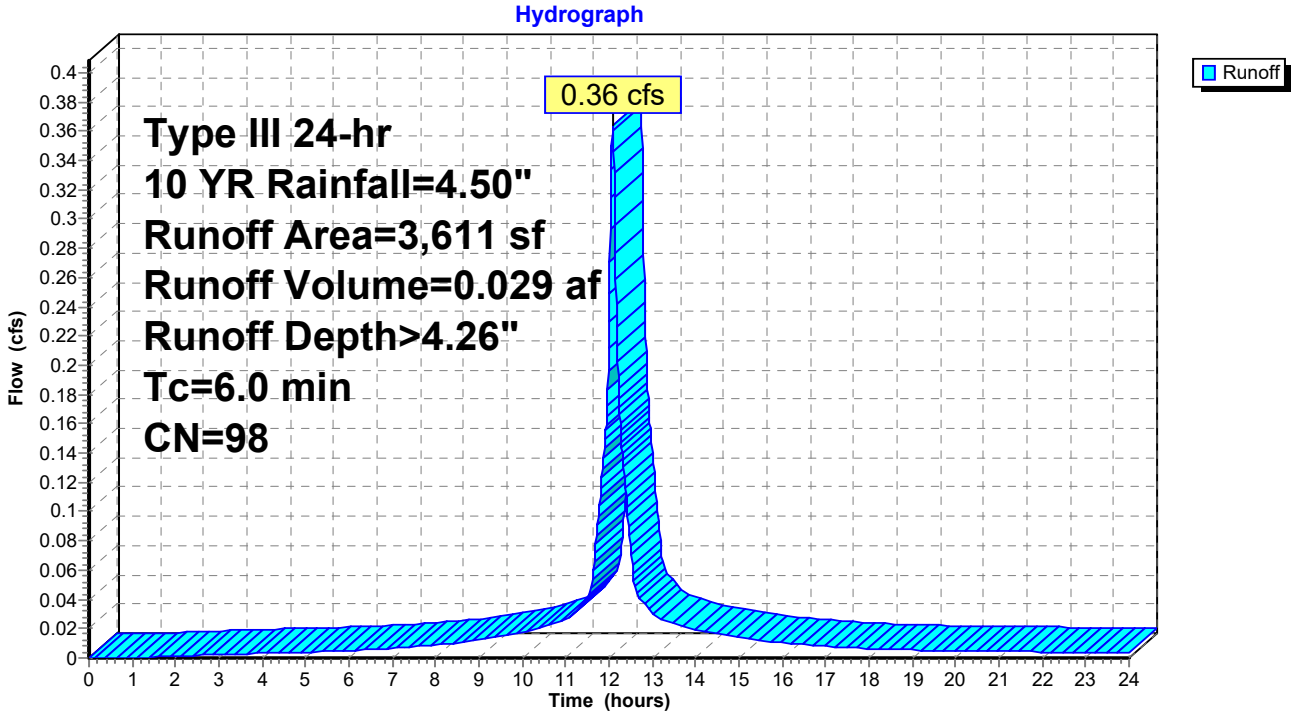
Runoff = 0.36 cfs @ 12.08 hrs, Volume= 0.029 af, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
3,611	98	Roofs, HSG A
3,611		100.00% Impervious Area

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

Subcatchment 4S: Proposed Covered Pens



Summary for Subcatchment 5S: Proposed Covered Pens

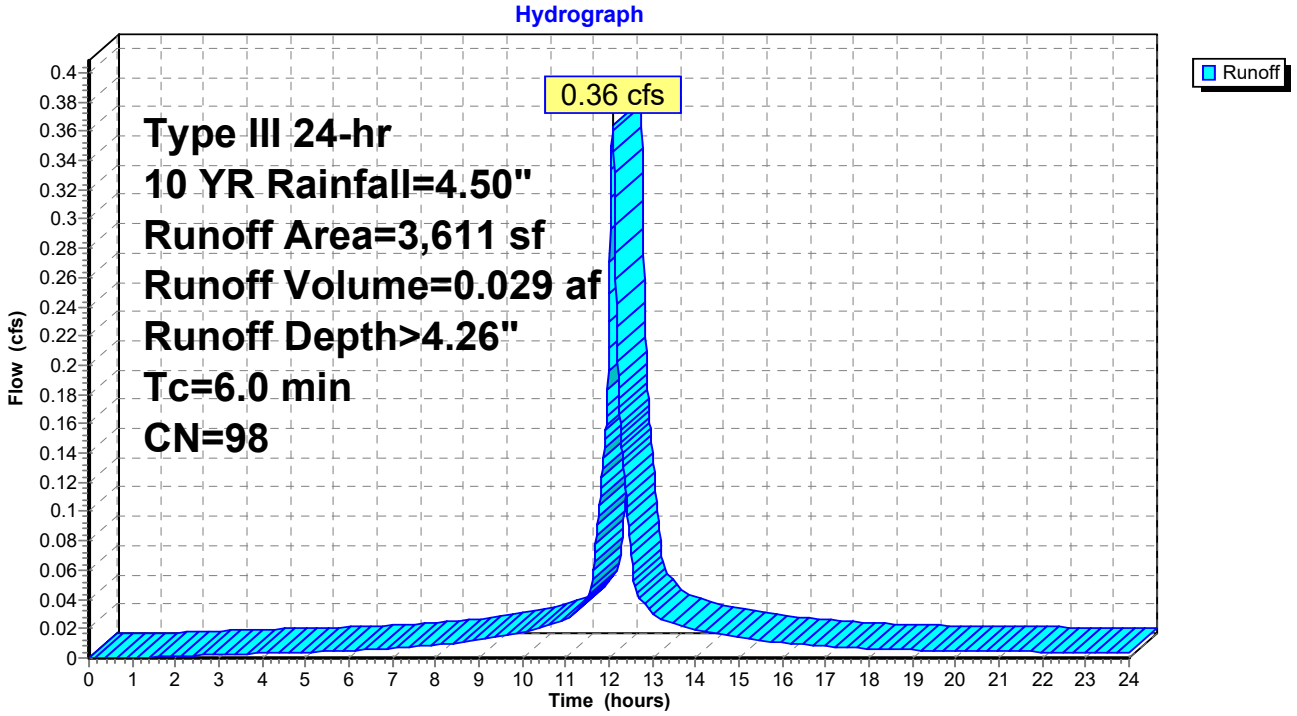
Runoff = 0.36 cfs @ 12.08 hrs, Volume= 0.029 af, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
3,611	98	Roofs, HSG A
3,611		100.00% Impervious Area

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

Subcatchment 5S: Proposed Covered Pens



Summary for Subcatchment 6S: Entrance Area

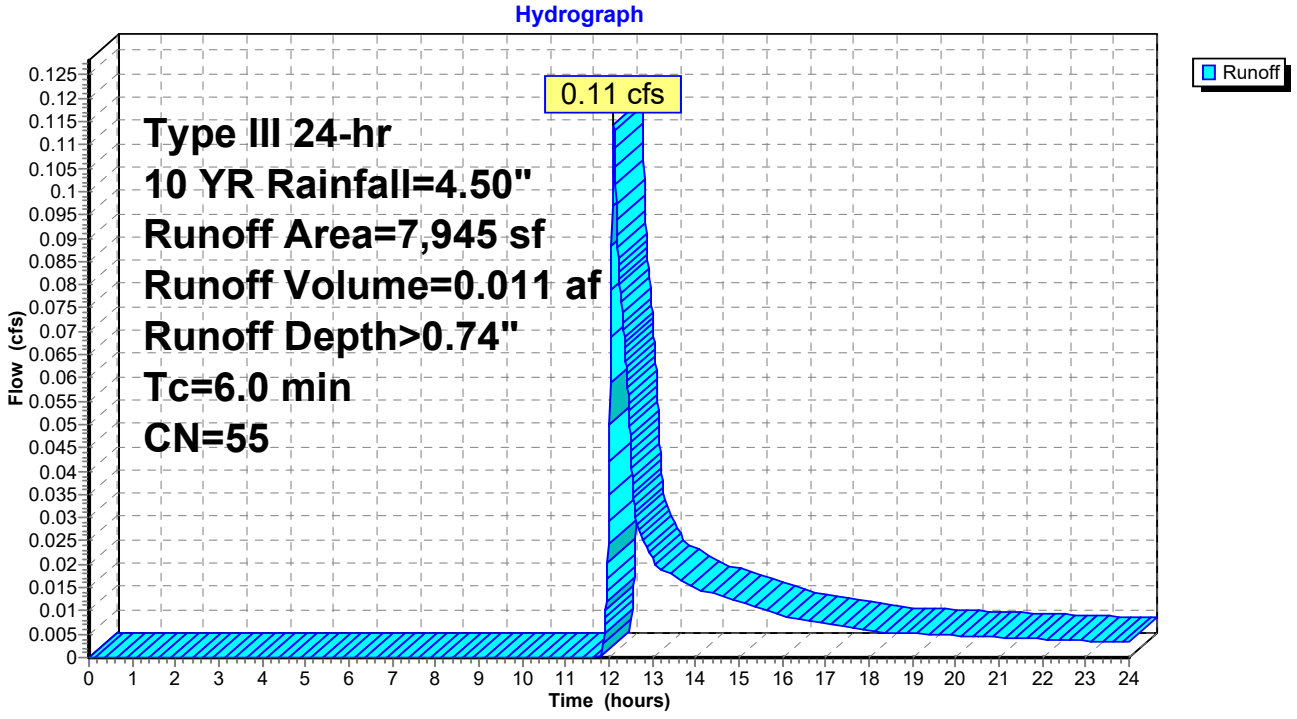
Runoff = 0.11 cfs @ 12.11 hrs, Volume= 0.011 af, Depth> 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
1,816	98	Paved parking, HSG A
303	98	Paved parking, HSG A
164	76	Gravel roads, HSG A
5,662	39	>75% Grass cover, Good, HSG A
7,945	55	Weighted Average
5,826		73.33% Pervious Area
2,119		26.67% Impervious Area

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

Subcatchment 6S: Entrance Area



Summary for Subcatchment 7S: Eastern Lawn/Existing Site to Remain

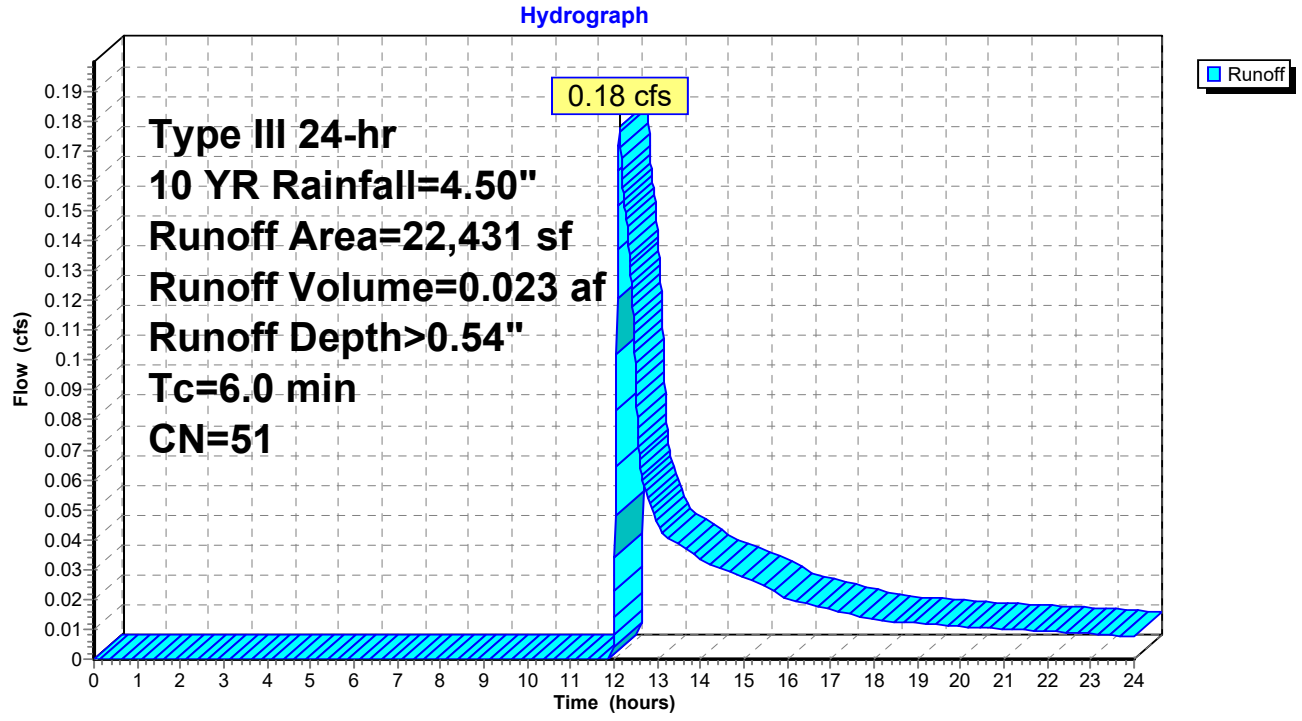
Runoff = 0.18 cfs @ 12.13 hrs, Volume= 0.023 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (sf)	CN	Description
	883	45	Woods, Poor, HSG A
	3,478	45	Woods, Poor, HSG A
	9,747	39	>75% Grass cover, Good, HSG A
	250	98	Paved parking, HSG A
	90	39	>75% Grass cover, Good, HSG A
	353	39	>75% Grass cover, Good, HSG A
*	7,630	68	Junk Piles Off Site
	22,431	51	Weighted Average
	22,181		98.89% Pervious Area
	250		1.11% Impervious Area

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

Subcatchment 7S: Eastern Lawn/Existing Site to Remain



Summary for Subcatchment 8S: Stonedust Play Areas

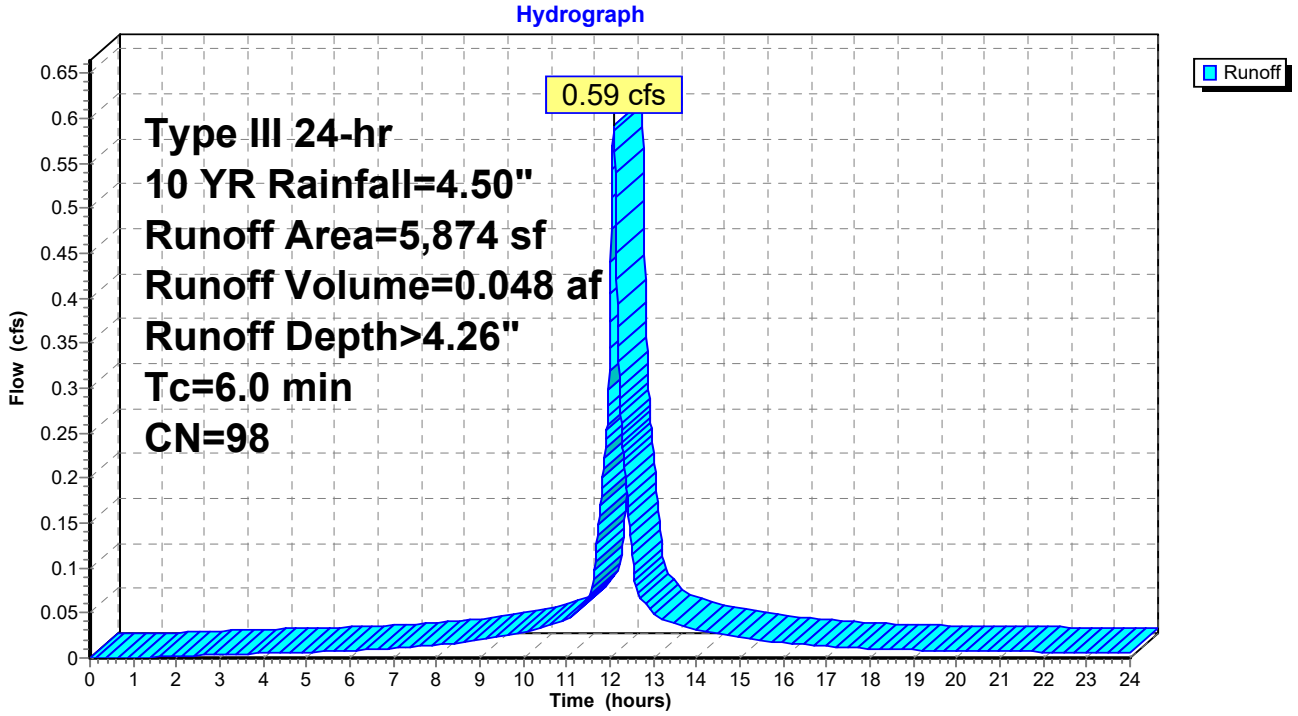
Runoff = 0.59 cfs @ 12.08 hrs, Volume= 0.048 af, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (sf)	CN	Description
*	5,874	98	Stonedust Play Areas Not Covered by Roof
	5,874		100.00% Impervious Area

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

Subcatchment 8S: Stonedust Play Areas



Summary for Subcatchment 9S: South Half of Proposed Building

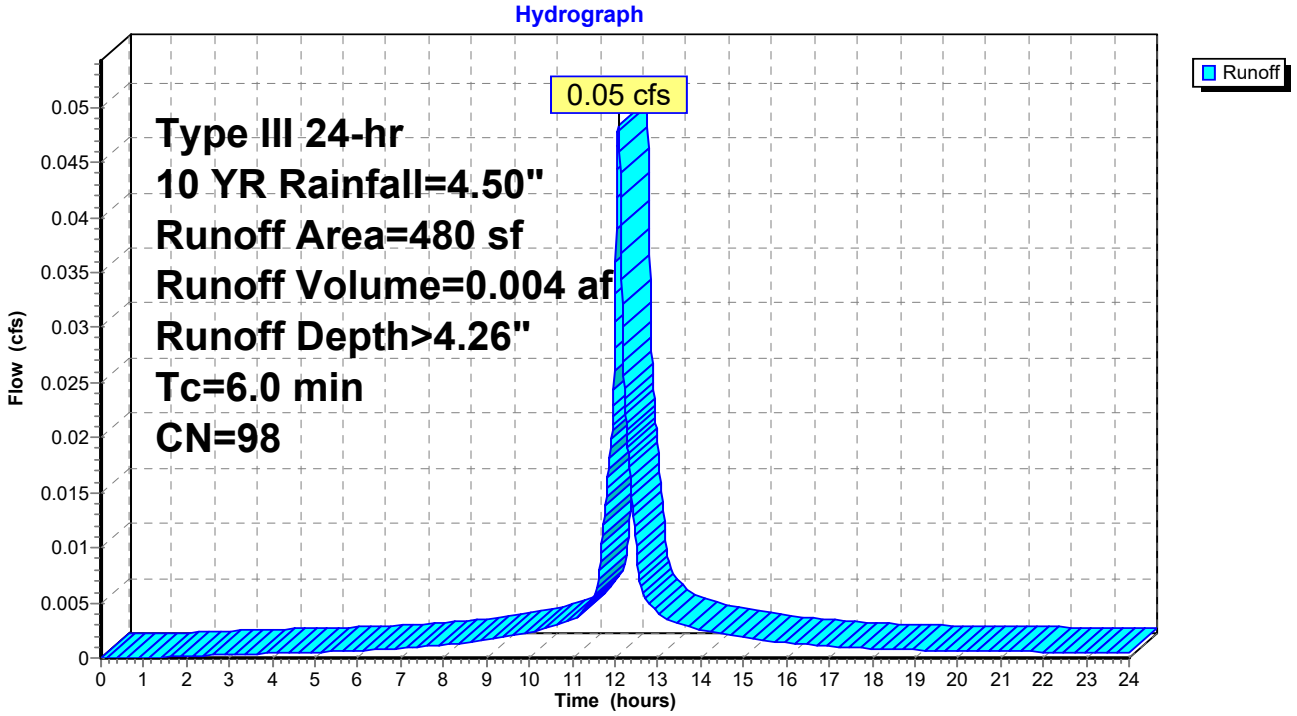
Runoff = 0.05 cfs @ 12.08 hrs, Volume= 0.004 af, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
480	98	Roofs, HSG A
480		100.00% Impervious Area

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

Subcatchment 9S: South Half of Proposed Building



Summary for Subcatchment 10S: Northern Lawn Area

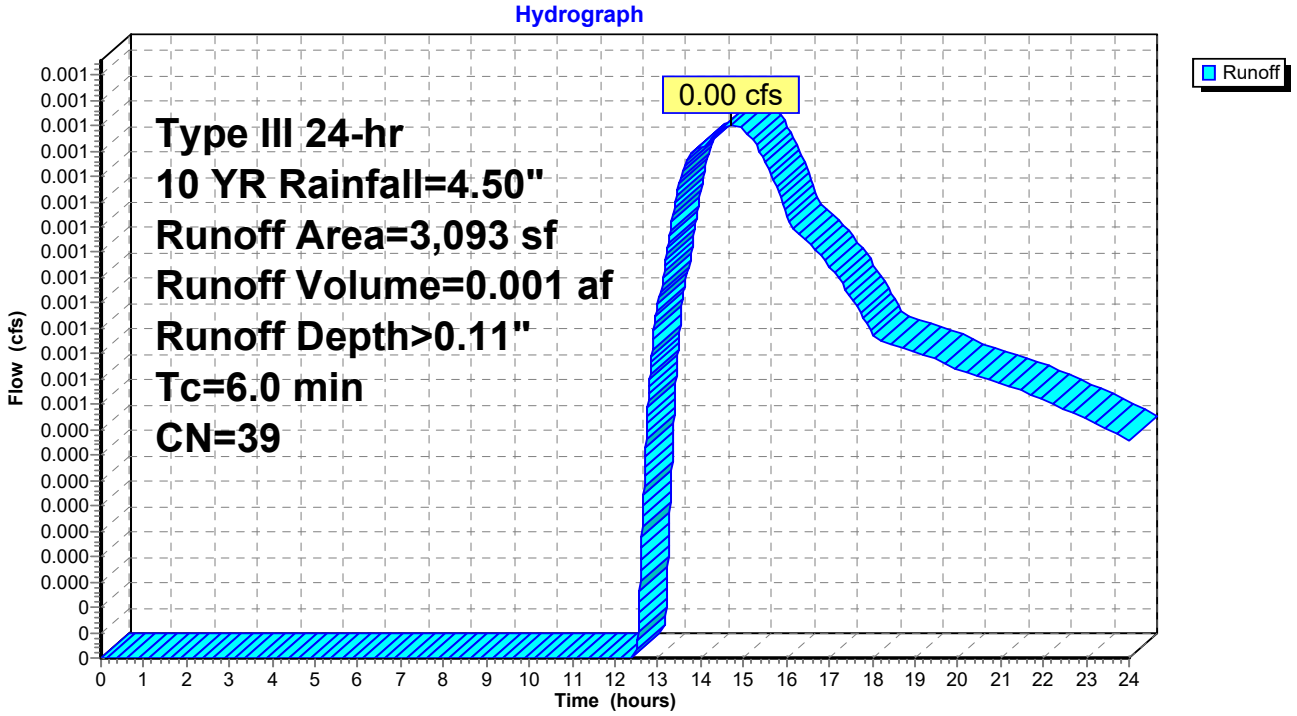
Runoff = 0.00 cfs @ 14.70 hrs, Volume= 0.001 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
3,093	39	>75% Grass cover, Good, HSG A
3,093		100.00% Pervious Area

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

Subcatchment 10S: Northern Lawn Area



Summary for Subcatchment 11S: Stonedust Play Areas

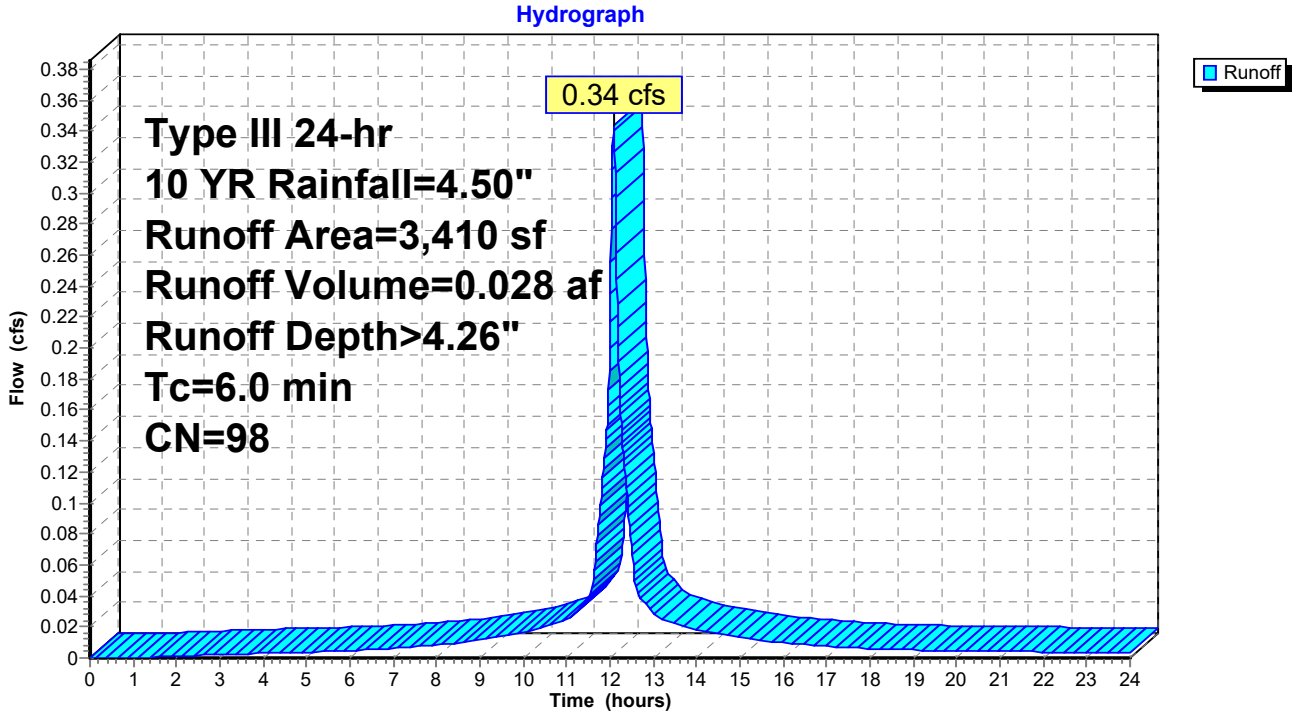
Runoff = 0.34 cfs @ 12.08 hrs, Volume= 0.028 af, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YR Rainfall=4.50"

	Area (sf)	CN	Description
*	3,410	98	Stonedust Play Areas Not Covered by Roof
	3,410		100.00% Impervious Area

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

Subcatchment 11S: Stonedust Play Areas



Summary for Pond 8P: Underground Pipe Infiltration System

Inflow Area = 0.504 ac, 64.61% Impervious, Inflow Depth > 2.45" for 10 YR event
Inflow = 1.36 cfs @ 12.09 hrs, Volume= 0.103 af
Outflow = 1.34 cfs @ 12.10 hrs, Volume= 0.103 af, Atten= 1%, Lag= 0.7 min
Discarded = 0.04 cfs @ 9.90 hrs, Volume= 0.049 af
Primary = 1.30 cfs @ 12.10 hrs, Volume= 0.053 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.51' @ 12.10 hrs Surf.Area= 705 sf Storage= 419 cf

Plug-Flow detention time= 40.9 min calculated for 0.103 af (100% of inflow)
Center-of-Mass det. time= 40.6 min (844.6 - 803.9)

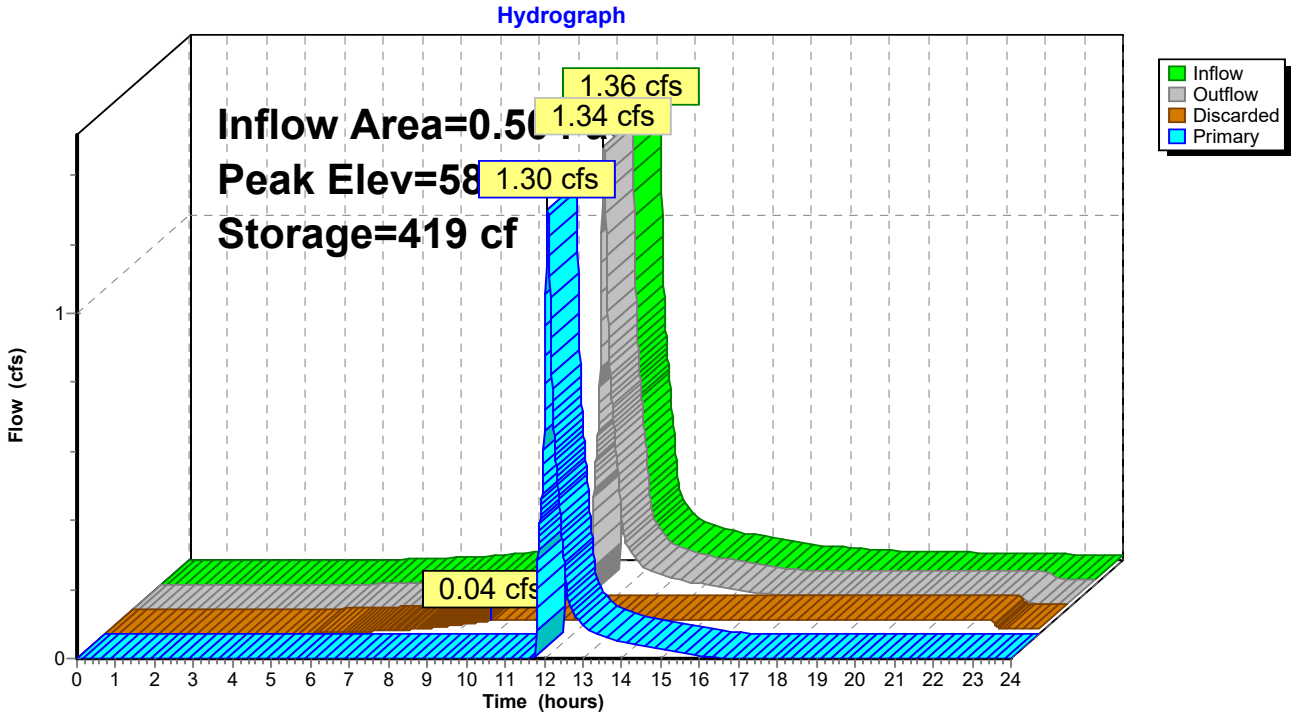
Volume	Invert	Avail.Storage	Storage Description
#1	57.40'	396 cf	**30.00'W x 23.50'L x 1.67'H Prismatoid** 1,177 cf Overall - 188 cf Embedded = 990 cf x 40.0% Voids
#2	57.90'	188 cf	**8.0" Round Pipe Storage** x 25 Inside #1 L= 21.5'
		584 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	57.40'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	58.30'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.04 cfs @ 9.90 hrs HW=57.42' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=1.30 cfs @ 12.10 hrs HW=58.51' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 1.30 cfs @ 1.27 fps)

Pond 8P: Underground Pipe Infiltration System



Summary for Pond 9P: Stonedust/Crushed Stone Play Areas

Inflow Area = 0.516 ac, 86.24% Impervious, Inflow Depth > 3.69" for 10 YR event
Inflow = 1.96 cfs @ 12.08 hrs, Volume= 0.159 af
Outflow = 0.45 cfs @ 11.73 hrs, Volume= 0.159 af, Atten= 77%, Lag= 0.0 min
Discarded = 0.45 cfs @ 11.73 hrs, Volume= 0.159 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 59.90' @ 12.47 hrs Surf.Area= 8,072 sf Storage= 1,387 cf

Plug-Flow detention time= 14.3 min calculated for 0.159 af (100% of inflow)
Center-of-Mass det. time= 14.2 min (764.7 - 750.5)

Volume	Invert	Avail.Storage	Storage Description
#1	59.38'	2,583 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

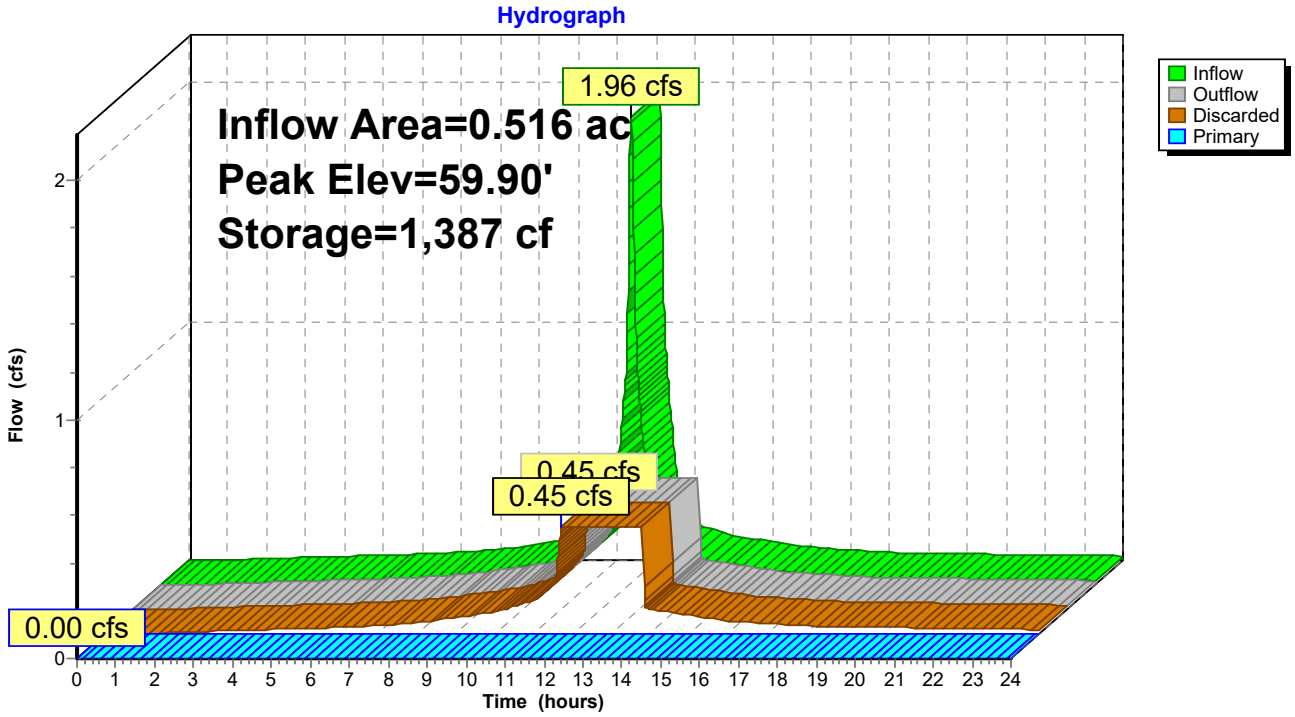
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.38	8,072	0.0	0	0
59.40	8,072	30.0	48	48
59.88	8,072	30.0	1,162	1,211
59.90	8,072	100.0	161	1,372
60.05	8,072	100.0	1,211	2,583

Device	Routing	Invert	Outlet Devices
#1	Discarded	59.38'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	60.00'	**0.5' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.45 cfs @ 11.73 hrs HW=59.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.45 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=59.38' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 9P: Stonedust/Crushed Stone Play Areas



Summary for Pond 10P: Catch Basin

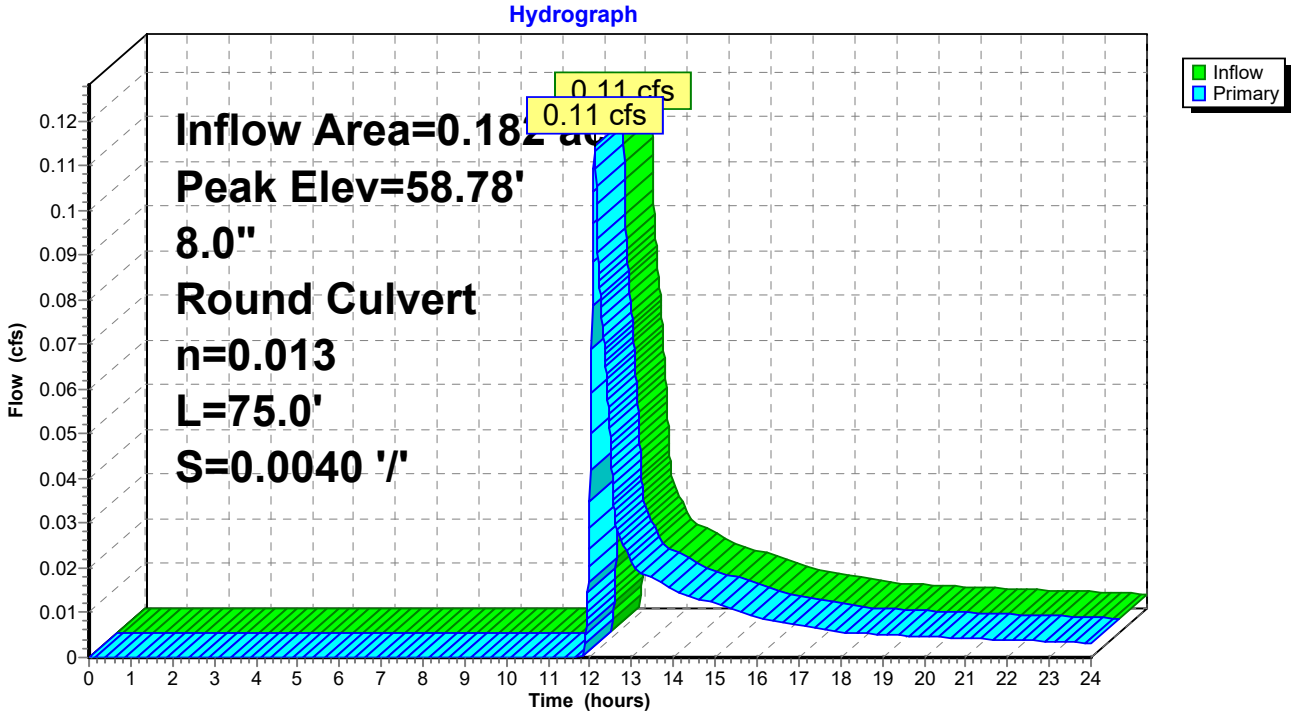
Inflow Area = 0.182 ac, 26.67% Impervious, Inflow Depth > 0.74" for 10 YR event
Inflow = 0.11 cfs @ 12.11 hrs, Volume= 0.011 af
Outflow = 0.11 cfs @ 12.11 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min
Primary = 0.11 cfs @ 12.11 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.78' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	58.54'	**8.0" Round Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.54' / 58.24' S= 0.0040 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.35 sf

Primary OutFlow Max=0.11 cfs @ 12.11 hrs HW=58.77' (Free Discharge)
1=Culvert (Barrel Controls 0.11 cfs @ 1.55 fps)

Pond 10P: Catch Basin



Summary for Pond 11P: Catch Basin

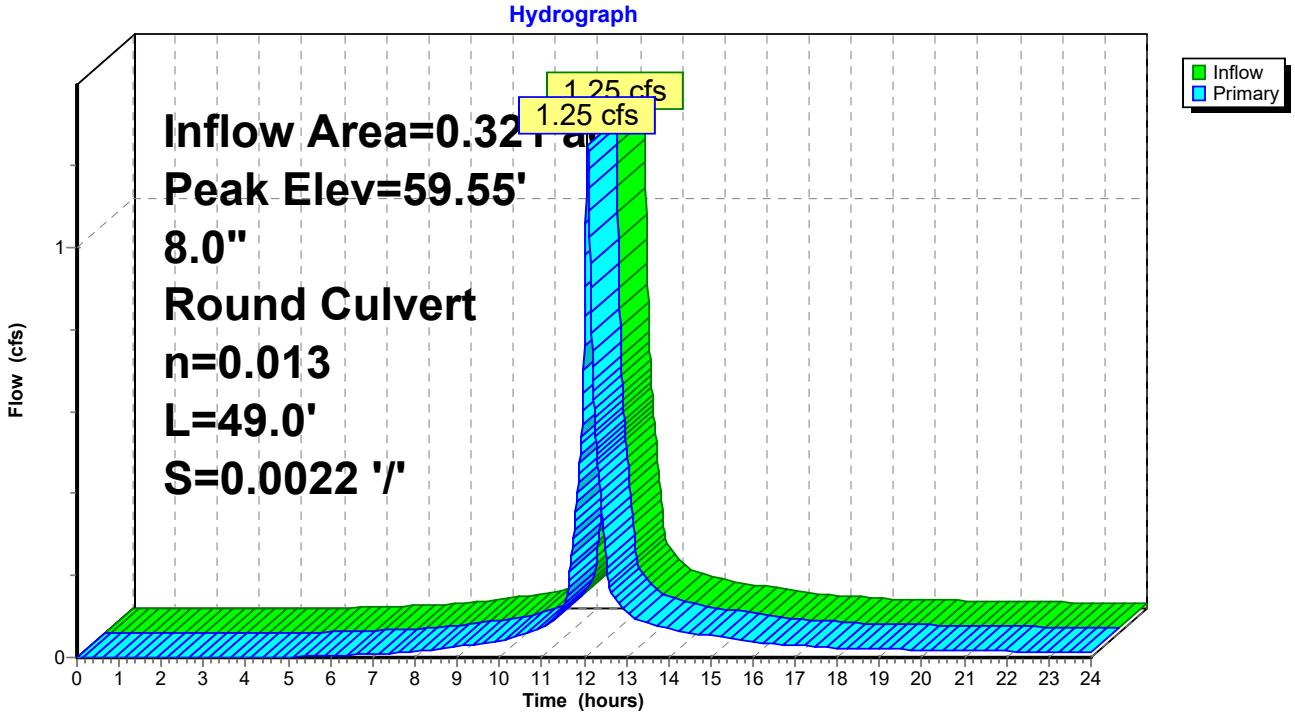
Inflow Area = 0.321 ac, 86.13% Impervious, Inflow Depth > 3.42" for 10 YR event
Inflow = 1.25 cfs @ 12.09 hrs, Volume= 0.092 af
Outflow = 1.25 cfs @ 12.09 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min
Primary = 1.25 cfs @ 12.09 hrs, Volume= 0.092 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 59.55' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	58.09'	**8.0" Round Culvert** L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.09' / 57.98' S= 0.0022 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.25 cfs @ 12.09 hrs HW=59.55' (Free Discharge)
1=Culvert (Barrel Controls 1.25 cfs @ 3.57 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Drain Manhole

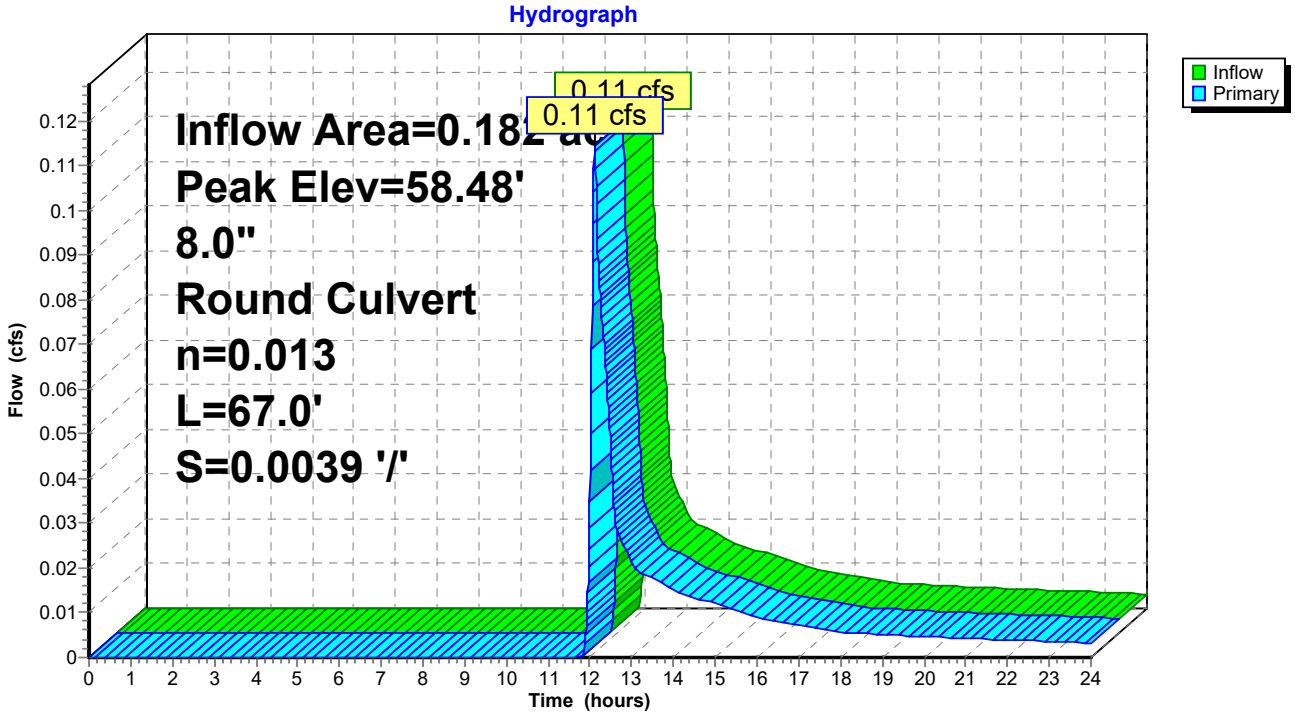
Inflow Area = 0.182 ac, 26.67% Impervious, Inflow Depth > 0.74" for 10 YR event
Inflow = 0.11 cfs @ 12.11 hrs, Volume= 0.011 af
Outflow = 0.11 cfs @ 12.11 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min
Primary = 0.11 cfs @ 12.11 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.48' @ 12.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	58.24'	**8.0" Round Culvert** L= 67.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.24' / 57.98' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.11 cfs @ 12.11 hrs HW=58.48' (Free Discharge)
1=Culvert (Barrel Controls 0.11 cfs @ 1.53 fps)

Pond 12P: Drain Manhole



Summary for Pond 13P: Proprietary Seperator

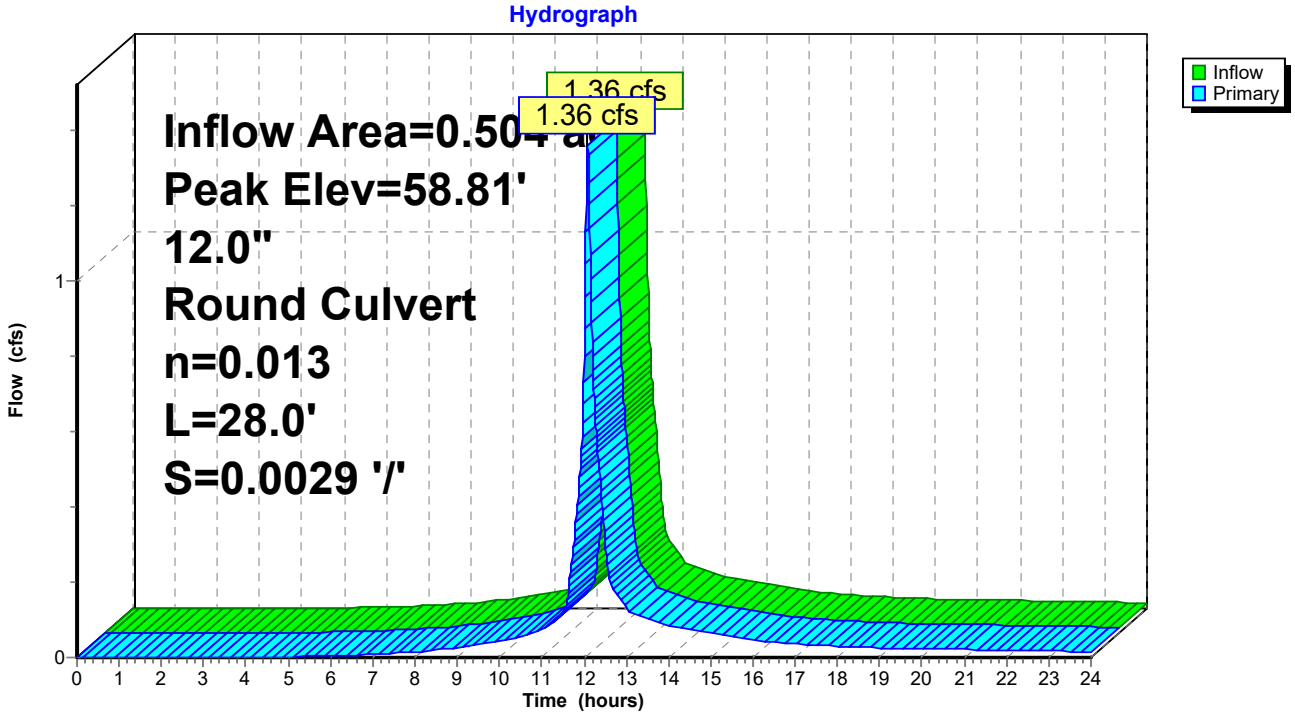
Inflow Area = 0.504 ac, 64.61% Impervious, Inflow Depth > 2.45" for 10 YR event
Inflow = 1.36 cfs @ 12.09 hrs, Volume= 0.103 af
Outflow = 1.36 cfs @ 12.09 hrs, Volume= 0.103 af, Atten= 0%, Lag= 0.0 min
Primary = 1.36 cfs @ 12.09 hrs, Volume= 0.103 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.81' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	57.98'	**12.0" Round Culvert** L= 28.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 57.98' / 57.90' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.35 cfs @ 12.09 hrs HW=58.81' (Free Discharge)
1=Culvert (Barrel Controls 1.35 cfs @ 2.64 fps)

Pond 13P: Proprietary Seperator

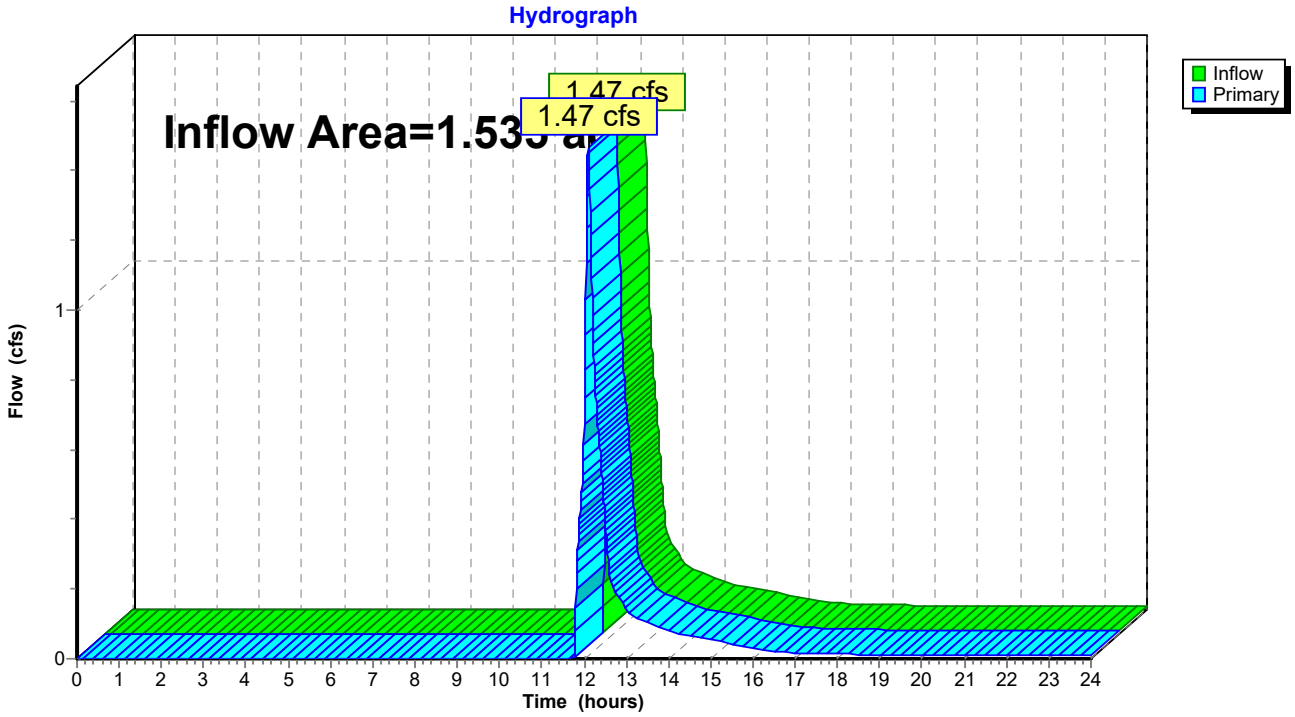


Summary for Link 1L: DP#1

Inflow Area = 1.535 ac, 50.58% Impervious, Inflow Depth > 0.60" for 10 YR event
Inflow = 1.47 cfs @ 12.10 hrs, Volume= 0.077 af
Primary = 1.47 cfs @ 12.10 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: DP#1



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Paved Parking Runoff Area=13,522 sf 85.64% Impervious Runoff Depth>4.16"
Tc=6.0 min CN=90 Runoff=1.46 cfs 0.108 af

Subcatchment 2S: Existing Building Runoff Area=2,400 sf 100.00% Impervious Runoff Depth>5.06"
Tc=6.0 min CN=98 Runoff=0.29 cfs 0.023 af

Subcatchment 3S: North Half of Proposed Runoff Area=480 sf 100.00% Impervious Runoff Depth>5.06"
Tc=6.0 min CN=98 Runoff=0.06 cfs 0.005 af

Subcatchment 4S: Proposed Covered Pens Runoff Area=3,611 sf 100.00% Impervious Runoff Depth>5.06"
Tc=6.0 min CN=98 Runoff=0.43 cfs 0.035 af

Subcatchment 5S: Proposed Covered Pens Runoff Area=3,611 sf 100.00% Impervious Runoff Depth>5.06"
Tc=6.0 min CN=98 Runoff=0.43 cfs 0.035 af

Subcatchment 6S: Entrance Area Runoff Area=7,945 sf 26.67% Impervious Runoff Depth>1.13"
Tc=6.0 min CN=55 Runoff=0.20 cfs 0.017 af

Subcatchment 7S: Eastern Lawn/Existing Runoff Area=22,431 sf 1.11% Impervious Runoff Depth>0.88"
Tc=6.0 min CN=51 Runoff=0.38 cfs 0.038 af

Subcatchment 8S: Stonedust Play Areas Runoff Area=5,874 sf 100.00% Impervious Runoff Depth>5.06"
Tc=6.0 min CN=98 Runoff=0.70 cfs 0.057 af

Subcatchment 9S: South Half of Proposed Runoff Area=480 sf 100.00% Impervious Runoff Depth>5.06"
Tc=6.0 min CN=98 Runoff=0.06 cfs 0.005 af

Subcatchment 10S: Northern Lawn Area Runoff Area=3,093 sf 0.00% Impervious Runoff Depth>0.26"
Tc=6.0 min CN=39 Runoff=0.01 cfs 0.002 af

Subcatchment 11S: Stonedust Play Areas Runoff Area=3,410 sf 100.00% Impervious Runoff Depth>5.06"
Tc=6.0 min CN=98 Runoff=0.41 cfs 0.033 af

Pond 8P: Underground Pipe Infiltration System Peak Elev=58.54' Storage=432 cf Inflow=1.71 cfs 0.130 af
Discarded=0.04 cfs 0.054 af Primary=1.66 cfs 0.075 af Outflow=1.70 cfs 0.129 af

Pond 9P: Stonedust/Crushed Stone Play Peak Elev=59.96' Storage=1,872 cf Inflow=2.31 cfs 0.189 af
Discarded=0.45 cfs 0.189 af Primary=0.00 cfs 0.000 af Outflow=0.45 cfs 0.189 af

Pond 10P: Catch Basin Peak Elev=58.86' Inflow=0.20 cfs 0.017 af
8.0" Round Culvert n=0.013 L=75.0' S=0.0040 '/' Outflow=0.20 cfs 0.017 af

Pond 11P: Catch Basin Peak Elev=59.97' Inflow=1.51 cfs 0.112 af
8.0" Round Culvert n=0.013 L=49.0' S=0.0022 '/' Outflow=1.51 cfs 0.112 af

Pond 12P: Drain Manhole Peak Elev=58.56' Inflow=0.20 cfs 0.017 af
8.0" Round Culvert n=0.013 L=67.0' S=0.0039 '/' Outflow=0.20 cfs 0.017 af

Pond 13P: Proprietary Seperator Peak Elev=58.94' Inflow=1.71 cfs 0.130 af
12.0" Round Culvert n=0.013 L=28.0' S=0.0029 '/' Outflow=1.71 cfs 0.130 af

Link 1L: DP#1 Inflow=2.04 cfs 0.113 af
Primary=2.04 cfs 0.113 af

Summary for Subcatchment 1S: Paved Parking

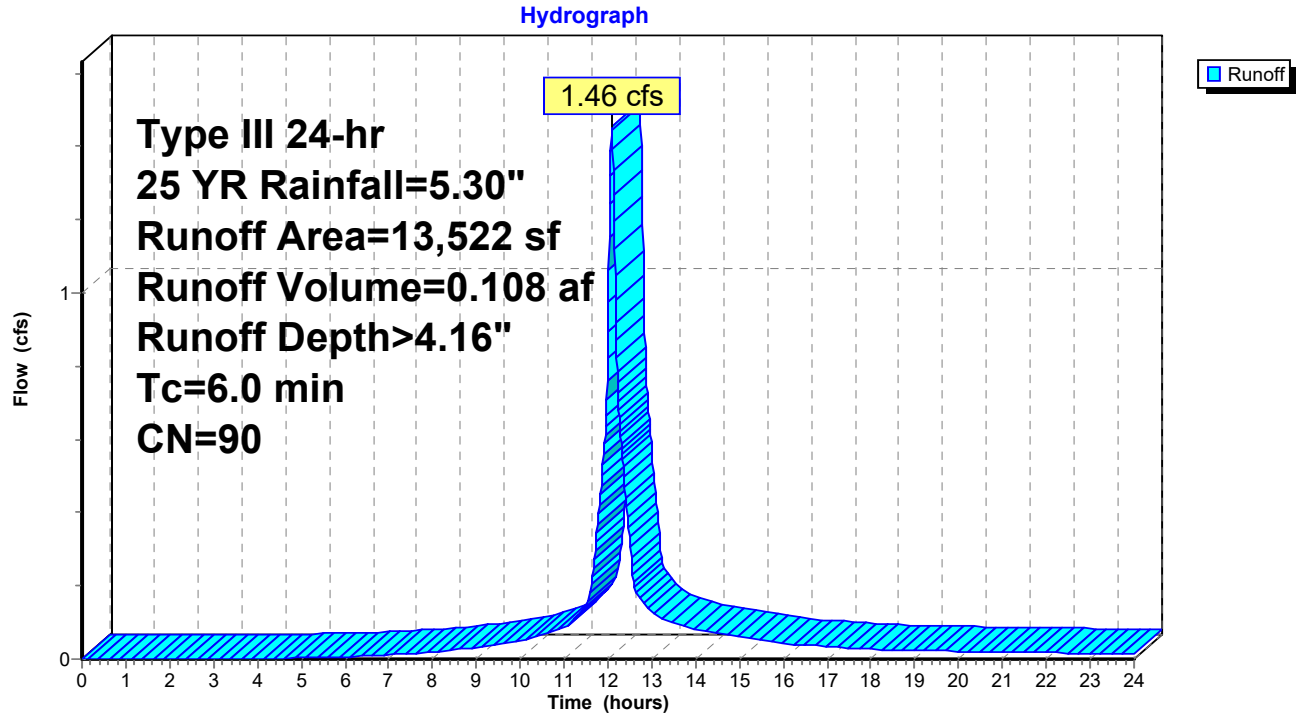
Runoff = 1.46 cfs @ 12.08 hrs, Volume= 0.108 af, Depth> 4.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.30"

Area (sf)	CN	Description
11,340	98	Paved parking, HSG A
240	98	Paved parking, HSG A
394	39	>75% Grass cover, Good, HSG A
106	39	>75% Grass cover, Good, HSG A
1,442	39	>75% Grass cover, Good, HSG A
13,522	90	Weighted Average
1,942		14.36% Pervious Area
11,580		85.64% Impervious Area

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

Subcatchment 1S: Paved Parking



Summary for Subcatchment 2S: Existing Building

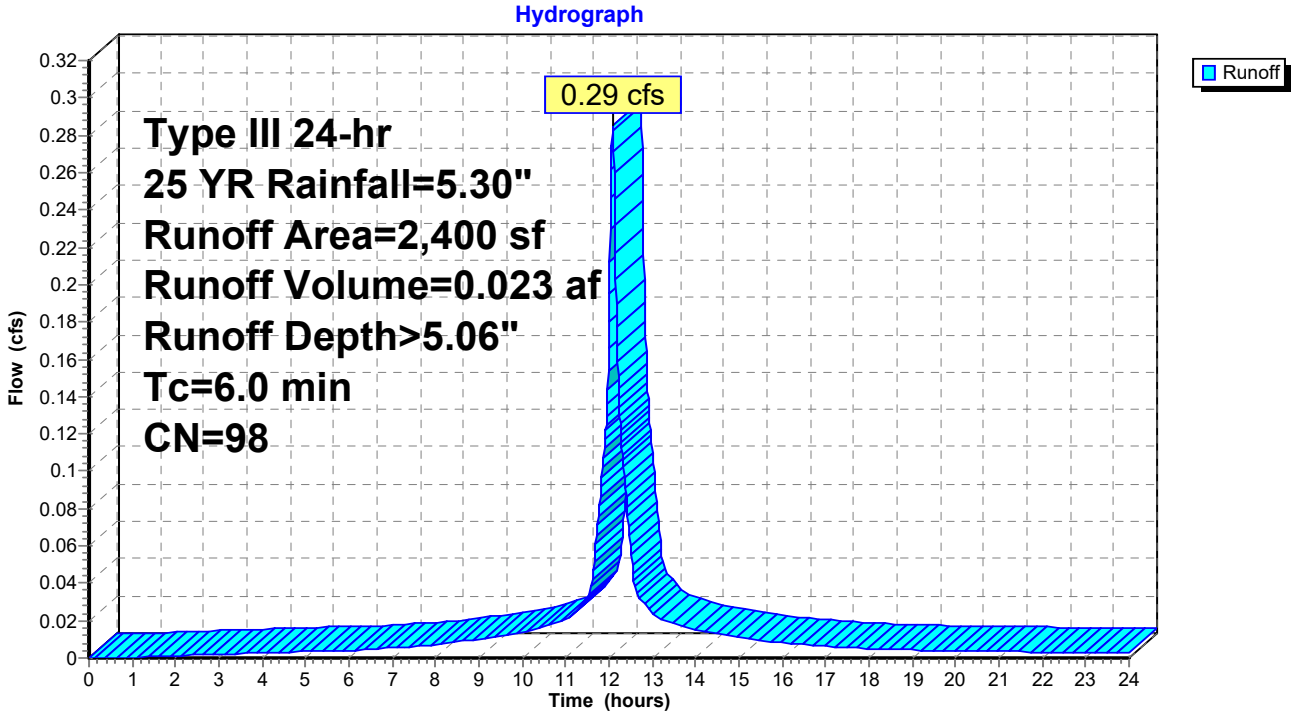
Runoff = 0.29 cfs @ 12.08 hrs, Volume= 0.023 af, Depth> 5.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.30"

Area (sf)	CN	Description
2,400	98	Roofs, HSG A
2,400		100.00% Impervious Area

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

Subcatchment 2S: Existing Building



Summary for Subcatchment 3S: North Half of Proposed Building

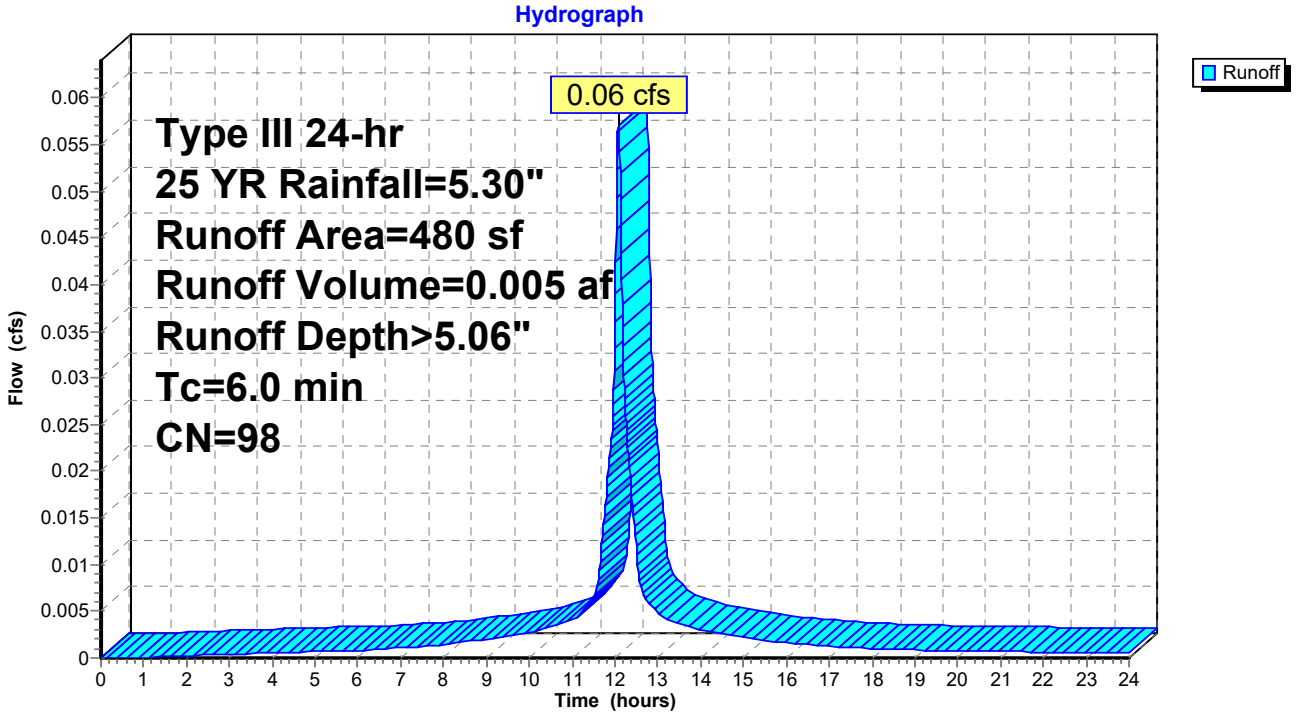
Runoff = 0.06 cfs @ 12.08 hrs, Volume= 0.005 af, Depth> 5.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.30"

Area (sf)	CN	Description
480	98	Roofs, HSG A
480		100.00% Impervious Area

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

Subcatchment 3S: North Half of Proposed Building



Summary for Subcatchment 4S: Proposed Covered Pens

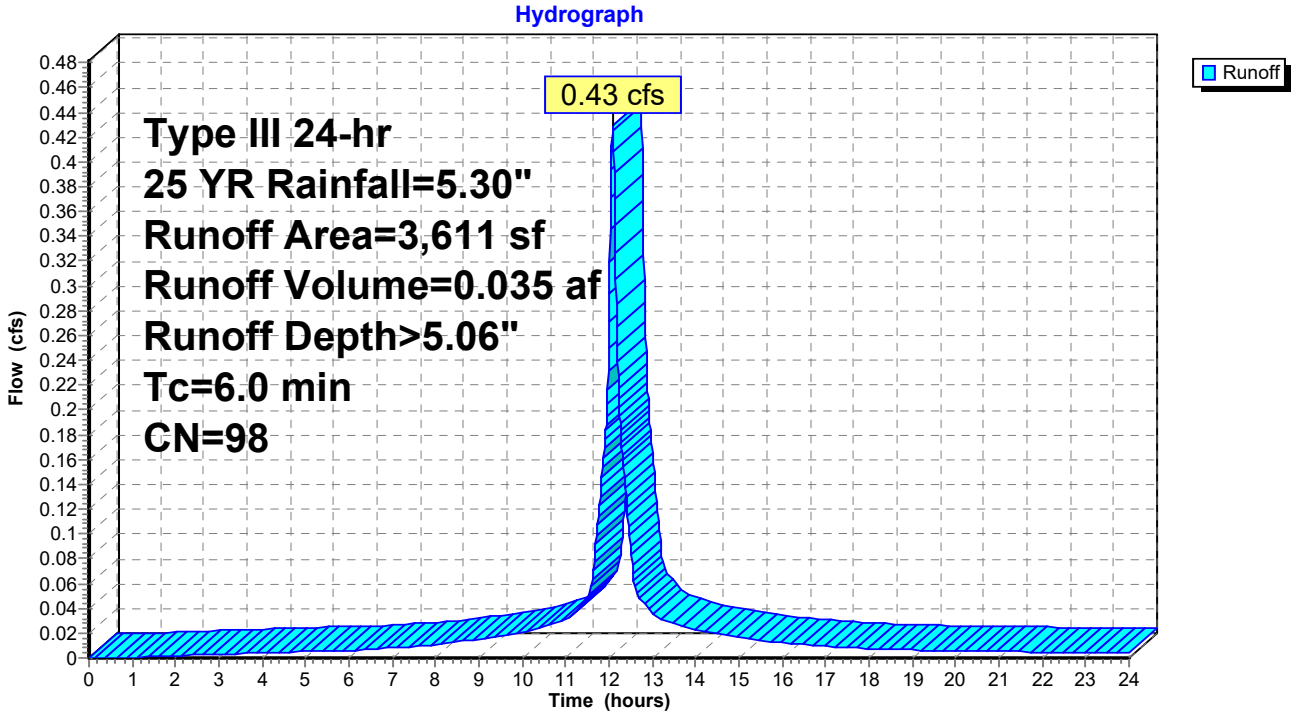
Runoff = 0.43 cfs @ 12.08 hrs, Volume= 0.035 af, Depth> 5.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.30"

Area (sf)	CN	Description
3,611	98	Roofs, HSG A
3,611		100.00% Impervious Area

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

Subcatchment 4S: Proposed Covered Pens



Summary for Subcatchment 5S: Proposed Covered Pens

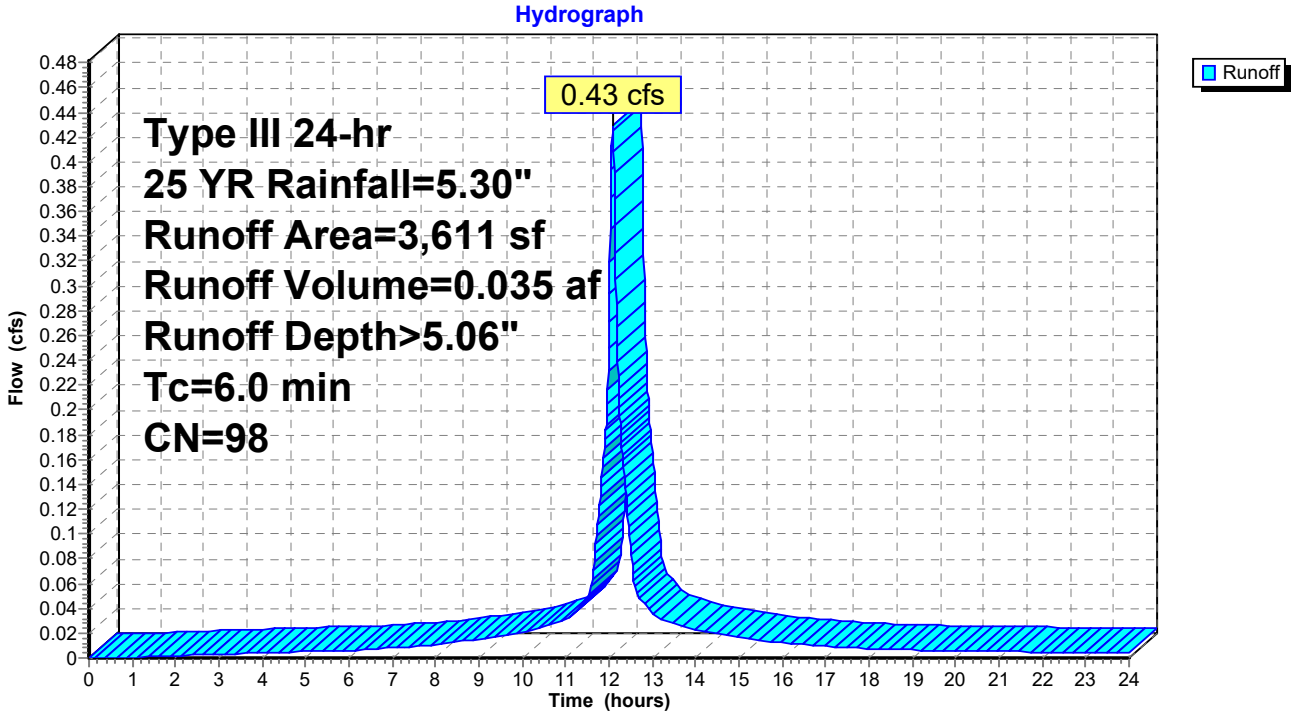
Runoff = 0.43 cfs @ 12.08 hrs, Volume= 0.035 af, Depth> 5.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.30"

Area (sf)	CN	Description
3,611	98	Roofs, HSG A
3,611		100.00% Impervious Area

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

Subcatchment 5S: Proposed Covered Pens



Summary for Subcatchment 6S: Entrance Area

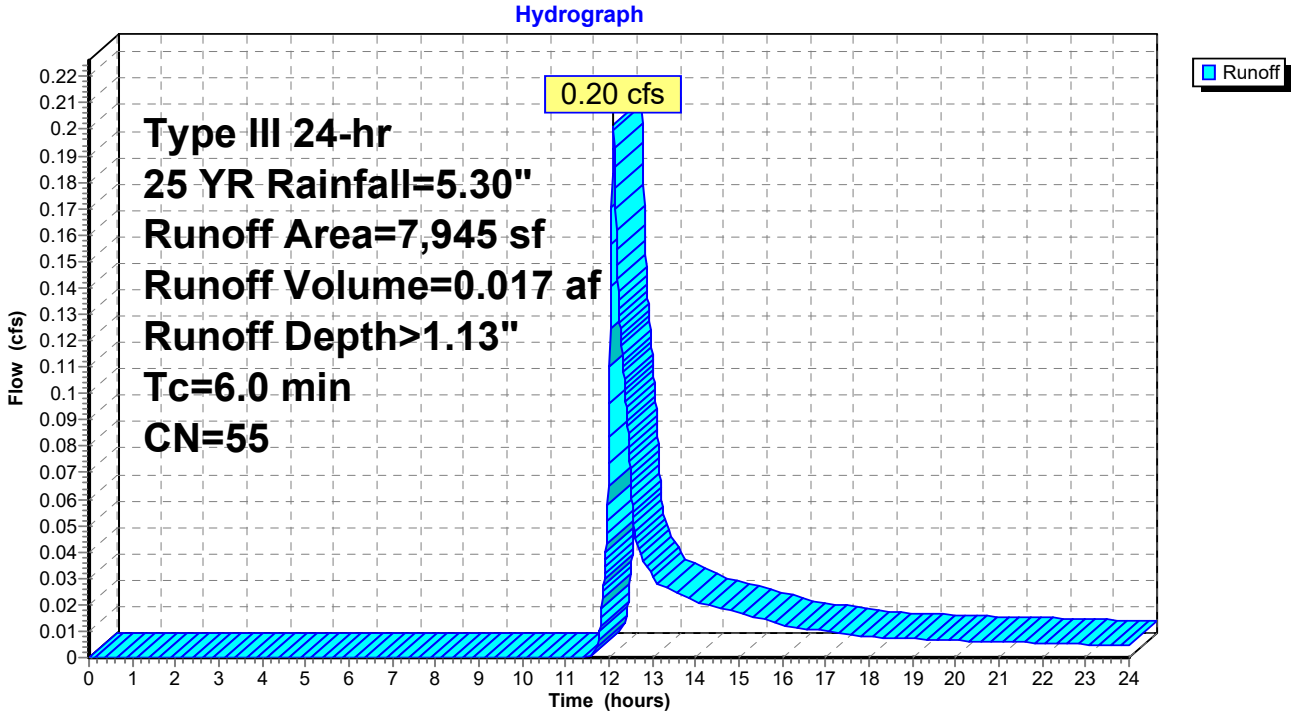
Runoff = 0.20 cfs @ 12.10 hrs, Volume= 0.017 af, Depth> 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.30"

Area (sf)	CN	Description
1,816	98	Paved parking, HSG A
303	98	Paved parking, HSG A
164	76	Gravel roads, HSG A
5,662	39	>75% Grass cover, Good, HSG A
7,945	55	Weighted Average
5,826		73.33% Pervious Area
2,119		26.67% Impervious Area

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

Subcatchment 6S: Entrance Area



Summary for Subcatchment 7S: Eastern Lawn/Existing Site to Remain

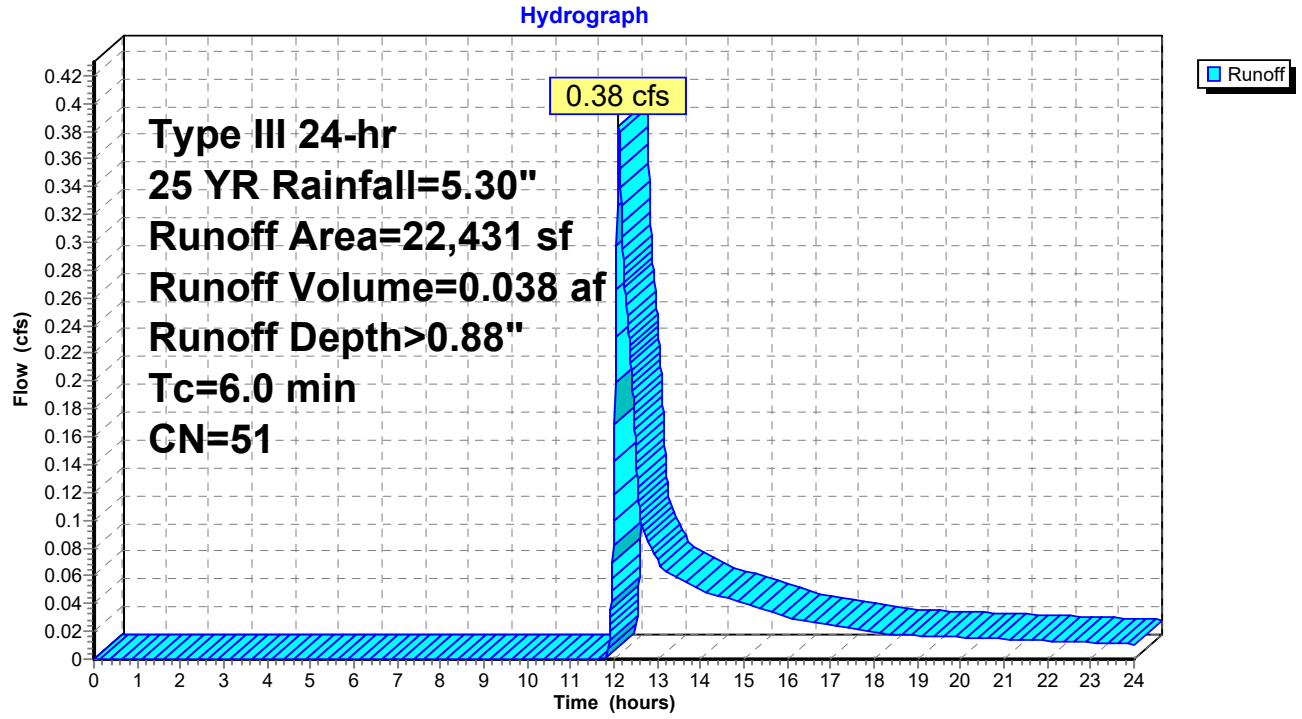
Runoff = 0.38 cfs @ 12.11 hrs, Volume= 0.038 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.30"

	Area (sf)	CN	Description
	883	45	Woods, Poor, HSG A
	3,478	45	Woods, Poor, HSG A
	9,747	39	>75% Grass cover, Good, HSG A
	250	98	Paved parking, HSG A
	90	39	>75% Grass cover, Good, HSG A
	353	39	>75% Grass cover, Good, HSG A
*	7,630	68	Junk Piles Off Site
	22,431	51	Weighted Average
	22,181		98.89% Pervious Area
	250		1.11% Impervious Area

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

Subcatchment 7S: Eastern Lawn/Existing Site to Remain



Summary for Subcatchment 8S: Stonedust Play Areas

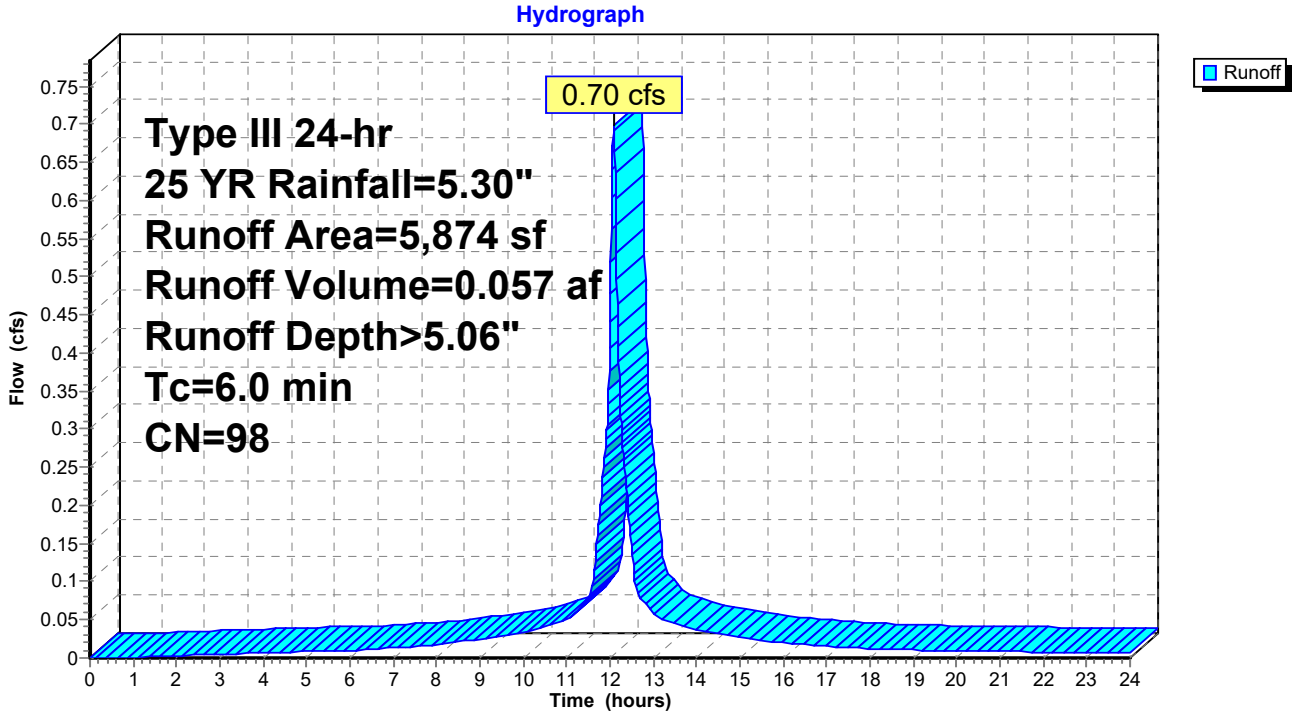
Runoff = 0.70 cfs @ 12.08 hrs, Volume= 0.057 af, Depth> 5.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.30"

	Area (sf)	CN	Description
*	5,874	98	Stonedust Play Areas Not Covered by Roof
	5,874		100.00% Impervious Area

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

Subcatchment 8S: Stonedust Play Areas



Summary for Subcatchment 9S: South Half of Proposed Building

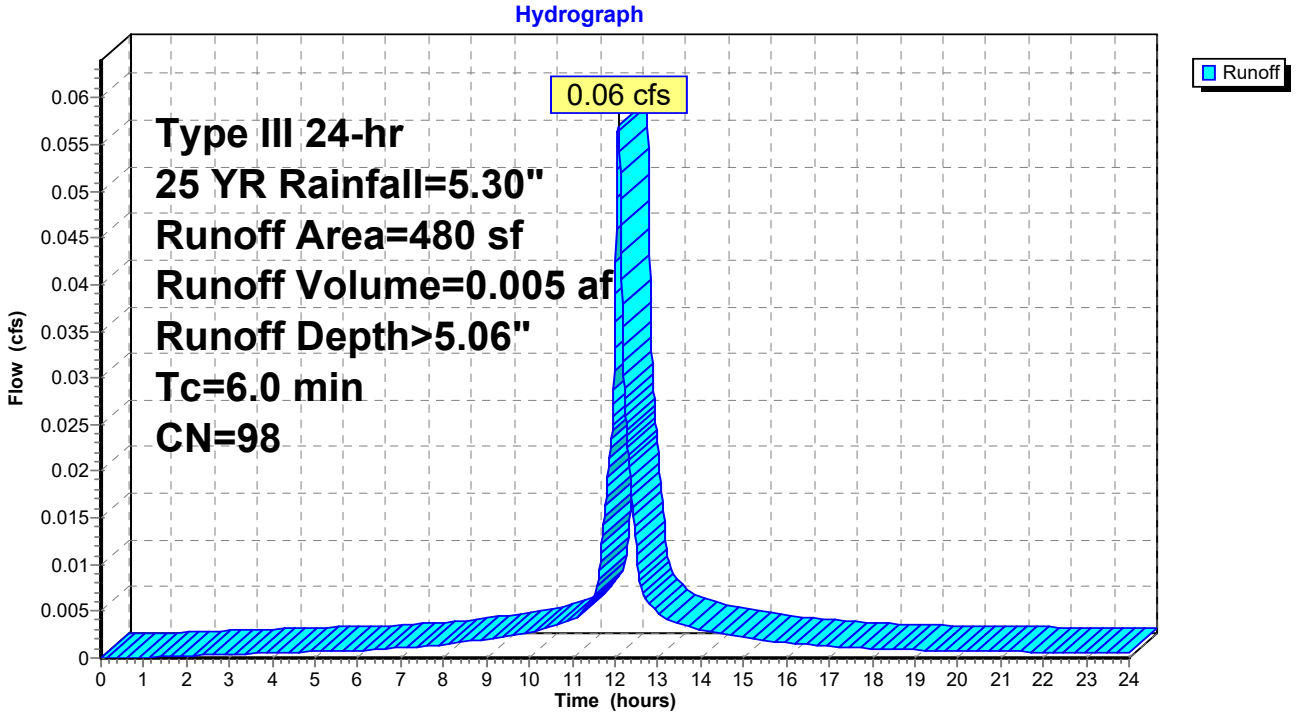
Runoff = 0.06 cfs @ 12.08 hrs, Volume= 0.005 af, Depth> 5.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.30"

Area (sf)	CN	Description
480	98	Roofs, HSG A
480		100.00% Impervious Area

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

Subcatchment 9S: South Half of Proposed Building



Summary for Subcatchment 10S: Northern Lawn Area

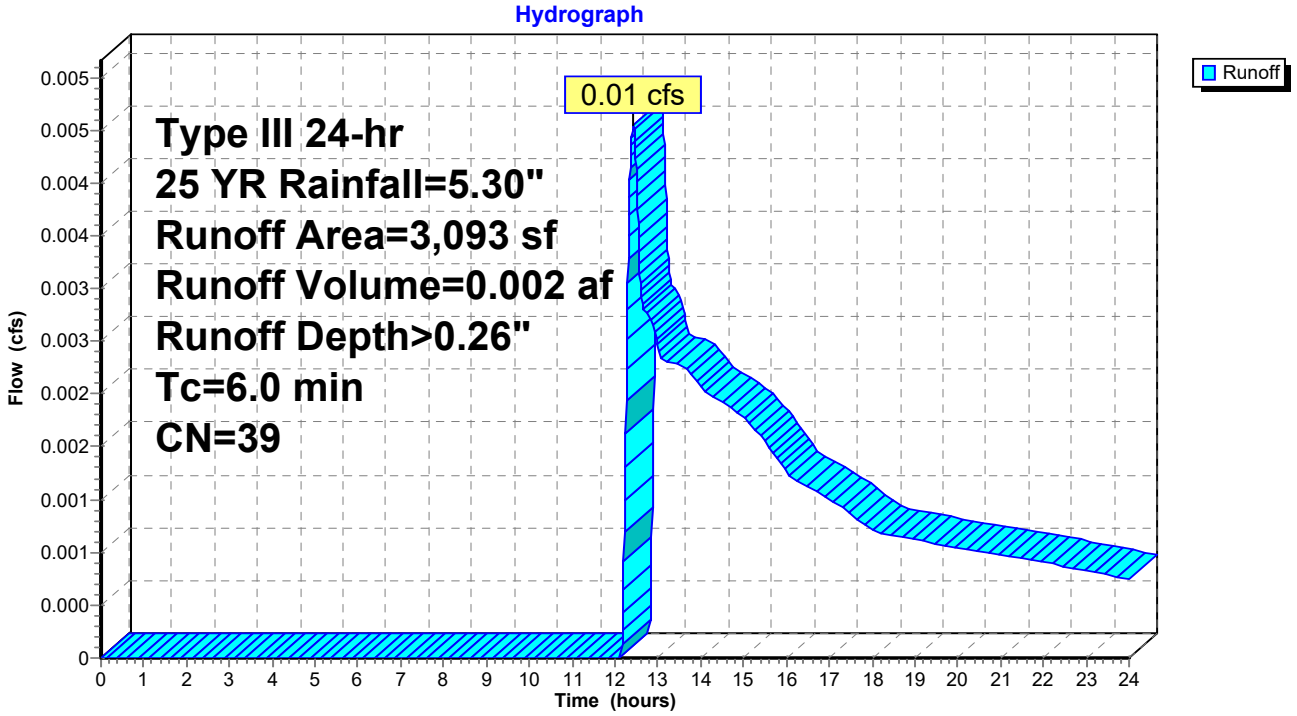
Runoff = 0.01 cfs @ 12.43 hrs, Volume= 0.002 af, Depth> 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.30"

Area (sf)	CN	Description
3,093	39	>75% Grass cover, Good, HSG A
3,093		100.00% Pervious Area

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

Subcatchment 10S: Northern Lawn Area



Summary for Subcatchment 11S: Stonedust Play Areas

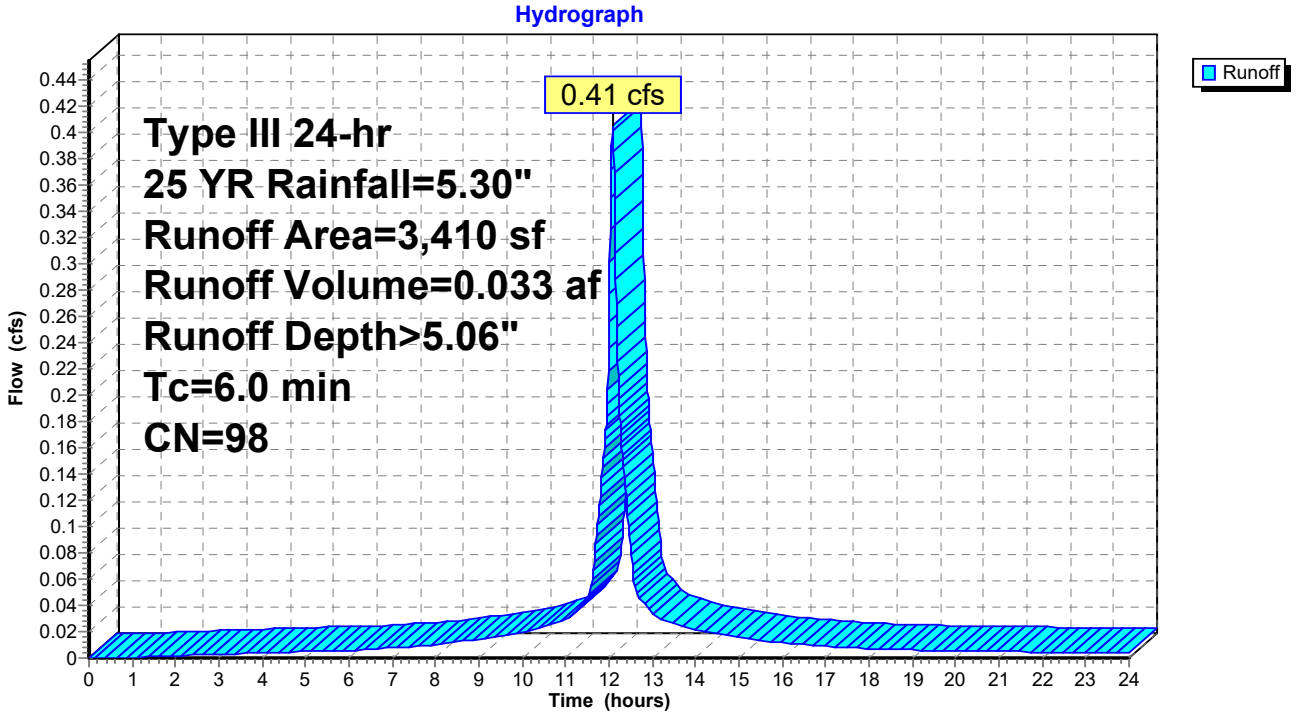
Runoff = 0.41 cfs @ 12.08 hrs, Volume= 0.033 af, Depth> 5.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 YR Rainfall=5.30"

	Area (sf)	CN	Description
*	3,410	98	Stonedust Play Areas Not Covered by Roof
	3,410		100.00% Impervious Area

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

Subcatchment 11S: Stonedust Play Areas



Summary for Pond 8P: Underground Pipe Infiltration System

Inflow Area = 0.504 ac, 64.61% Impervious, Inflow Depth > 3.08" for 25 YR event
Inflow = 1.71 cfs @ 12.09 hrs, Volume= 0.130 af
Outflow = 1.70 cfs @ 12.10 hrs, Volume= 0.129 af, Atten= 1%, Lag= 0.6 min
Discarded = 0.04 cfs @ 9.29 hrs, Volume= 0.054 af
Primary = 1.66 cfs @ 12.10 hrs, Volume= 0.075 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.54' @ 12.10 hrs Surf.Area= 705 sf Storage= 432 cf

Plug-Flow detention time= 38.9 min calculated for 0.129 af (99% of inflow)
Center-of-Mass det. time= 34.9 min (834.6 - 799.7)

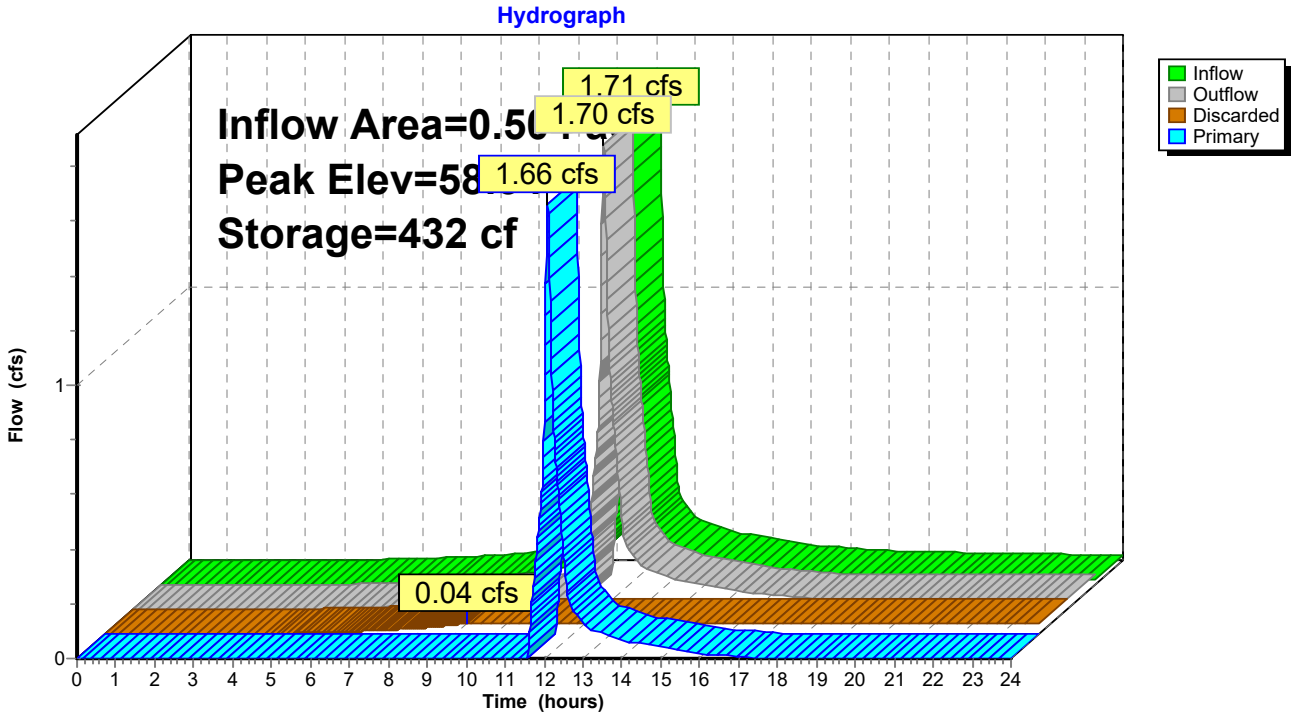
Volume	Invert	Avail.Storage	Storage Description
#1	57.40'	396 cf	**30.00'W x 23.50'L x 1.67'H Prismatoid** 1,177 cf Overall - 188 cf Embedded = 990 cf x 40.0% Voids
#2	57.90'	188 cf	**8.0" Round Pipe Storage** x 25 Inside #1 L= 21.5'
		584 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	57.40'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	58.30'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.04 cfs @ 9.29 hrs HW=57.42' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=1.66 cfs @ 12.10 hrs HW=58.54' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 1.66 cfs @ 1.38 fps)

Pond 8P: Underground Pipe Infiltration System



Summary for Pond 9P: Stonedust/Crushed Stone Play Areas

Inflow Area = 0.516 ac, 86.24% Impervious, Inflow Depth > 4.40" for 25 YR event
Inflow = 2.31 cfs @ 12.08 hrs, Volume= 0.189 af
Outflow = 0.45 cfs @ 11.69 hrs, Volume= 0.189 af, Atten= 80%, Lag= 0.0 min
Discarded = 0.45 cfs @ 11.69 hrs, Volume= 0.189 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 59.96' @ 12.51 hrs Surf.Area= 8,072 sf Storage= 1,872 cf

Plug-Flow detention time= 20.4 min calculated for 0.189 af (100% of inflow)
Center-of-Mass det. time= 20.4 min (768.9 - 748.5)

Volume	Invert	Avail.Storage	Storage Description
#1	59.38'	2,583 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

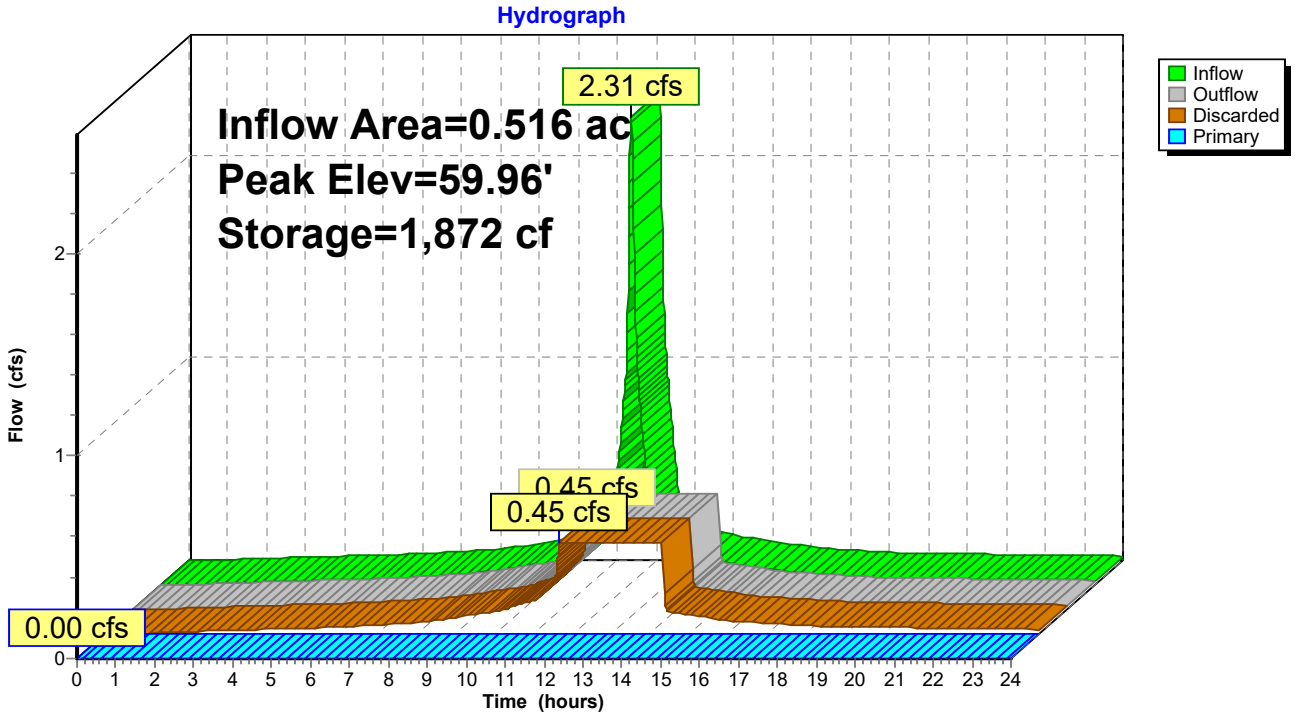
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.38	8,072	0.0	0	0
59.40	8,072	30.0	48	48
59.88	8,072	30.0	1,162	1,211
59.90	8,072	100.0	161	1,372
60.05	8,072	100.0	1,211	2,583

Device	Routing	Invert	Outlet Devices
#1	Discarded	59.38'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	60.00'	**0.5' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.45 cfs @ 11.69 hrs HW=59.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.45 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=59.38' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 9P: Stonedust/Crushed Stone Play Areas



Summary for Pond 10P: Catch Basin

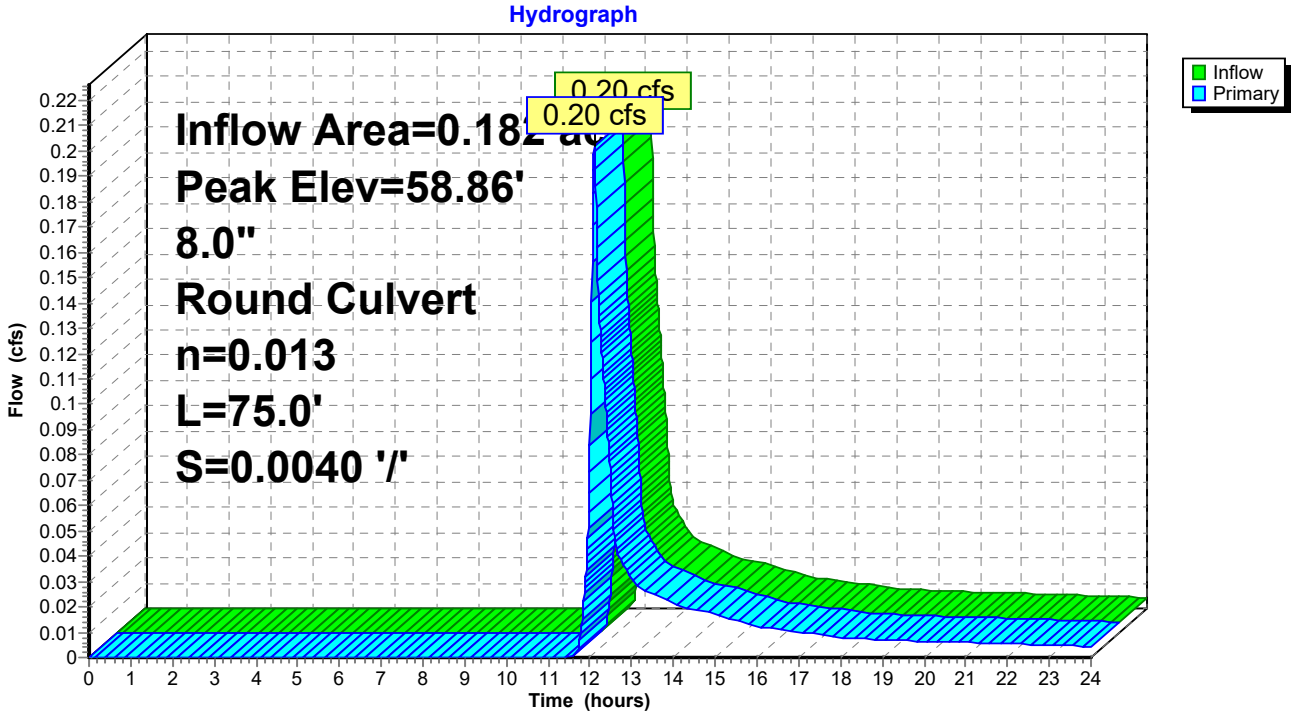
Inflow Area = 0.182 ac, 26.67% Impervious, Inflow Depth > 1.13" for 25 YR event
Inflow = 0.20 cfs @ 12.10 hrs, Volume= 0.017 af
Outflow = 0.20 cfs @ 12.10 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min
Primary = 0.20 cfs @ 12.10 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.86' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	58.54'	**8.0" Round Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.54' / 58.24' S= 0.0040 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.35 sf

Primary OutFlow Max=0.20 cfs @ 12.10 hrs HW=58.86' (Free Discharge)
1=Culvert (Barrel Controls 0.20 cfs @ 1.81 fps)

Pond 10P: Catch Basin



Summary for Pond 11P: Catch Basin

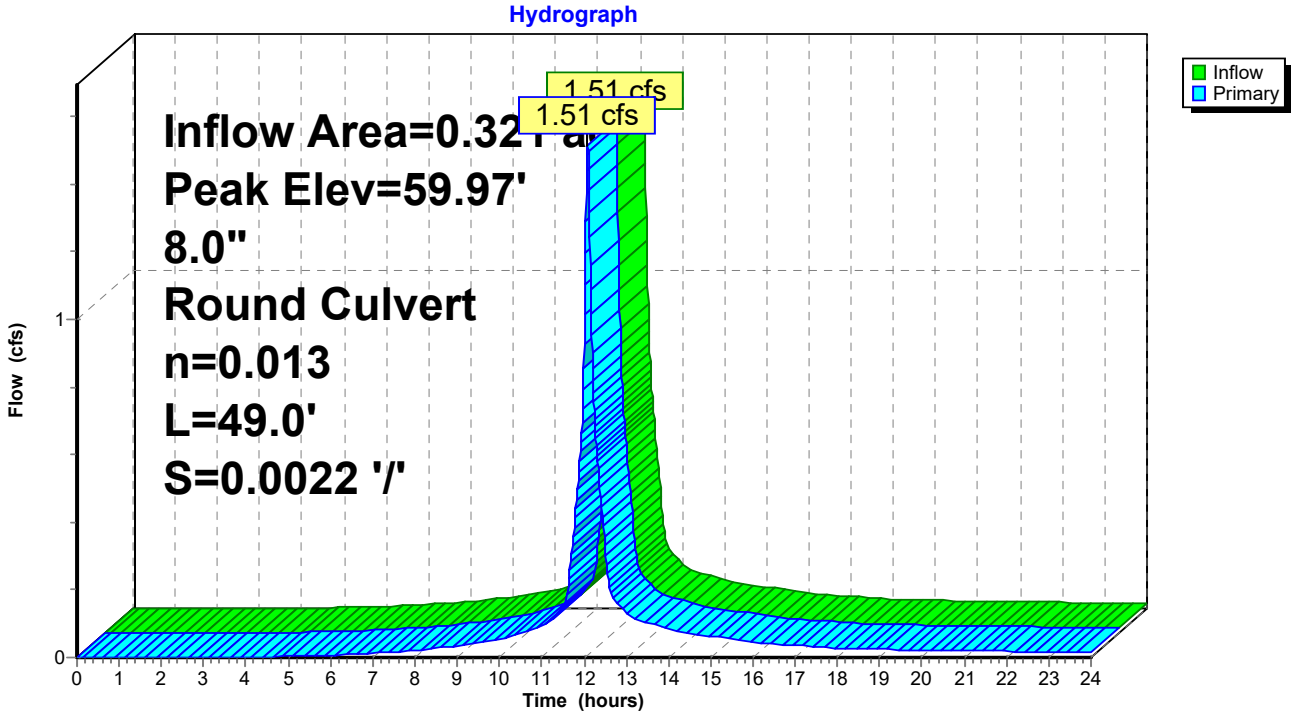
Inflow Area = 0.321 ac, 86.13% Impervious, Inflow Depth > 4.19" for 25 YR event
Inflow = 1.51 cfs @ 12.08 hrs, Volume= 0.112 af
Outflow = 1.51 cfs @ 12.08 hrs, Volume= 0.112 af, Atten= 0%, Lag= 0.0 min
Primary = 1.51 cfs @ 12.08 hrs, Volume= 0.112 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 59.97' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	58.09'	**8.0" Round Culvert** L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.09' / 57.98' S= 0.0022 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.51 cfs @ 12.08 hrs HW=59.97' (Free Discharge)
└**1=Culvert** (Barrel Controls 1.51 cfs @ 4.33 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Drain Manhole

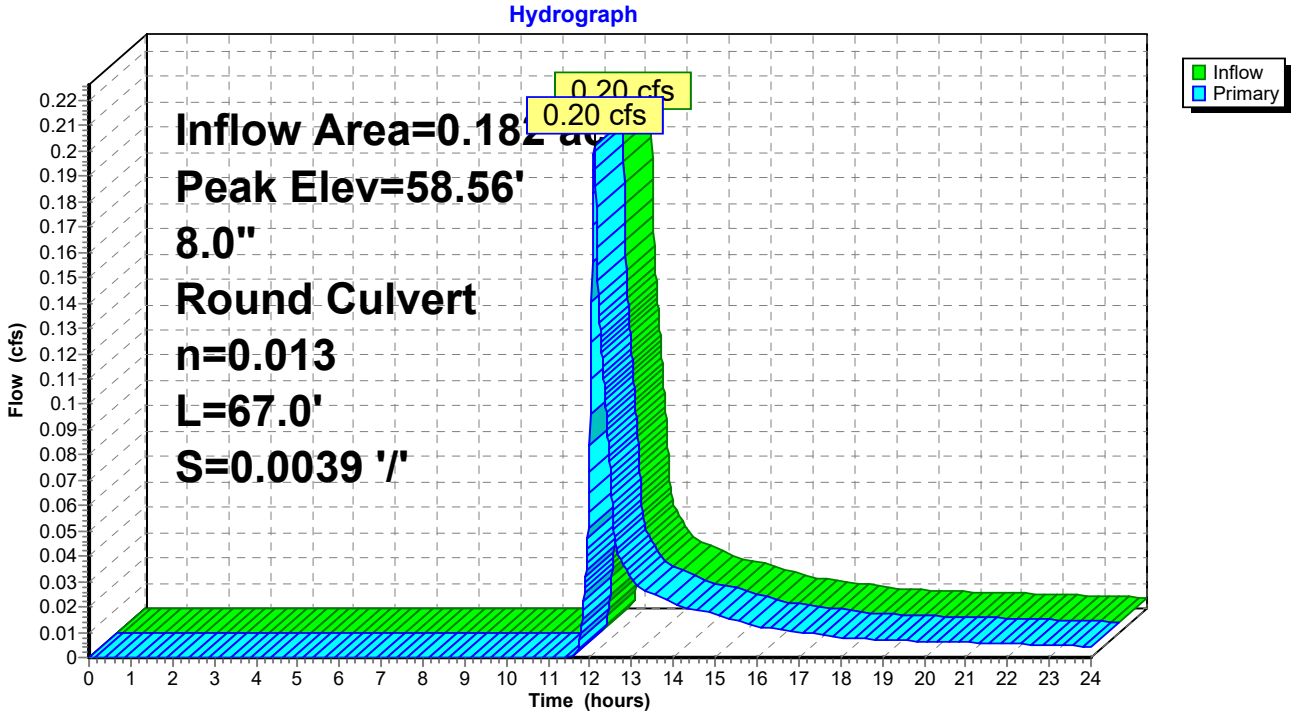
Inflow Area = 0.182 ac, 26.67% Impervious, Inflow Depth > 1.13" for 25 YR event
Inflow = 0.20 cfs @ 12.10 hrs, Volume= 0.017 af
Outflow = 0.20 cfs @ 12.10 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min
Primary = 0.20 cfs @ 12.10 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.56' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	58.24'	**8.0" Round Culvert** L= 67.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.24' / 57.98' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.20 cfs @ 12.10 hrs HW=58.56' (Free Discharge)
1=Culvert (Barrel Controls 0.20 cfs @ 1.79 fps)

Pond 12P: Drain Manhole



Summary for Pond 13P: Proprietary Seperator

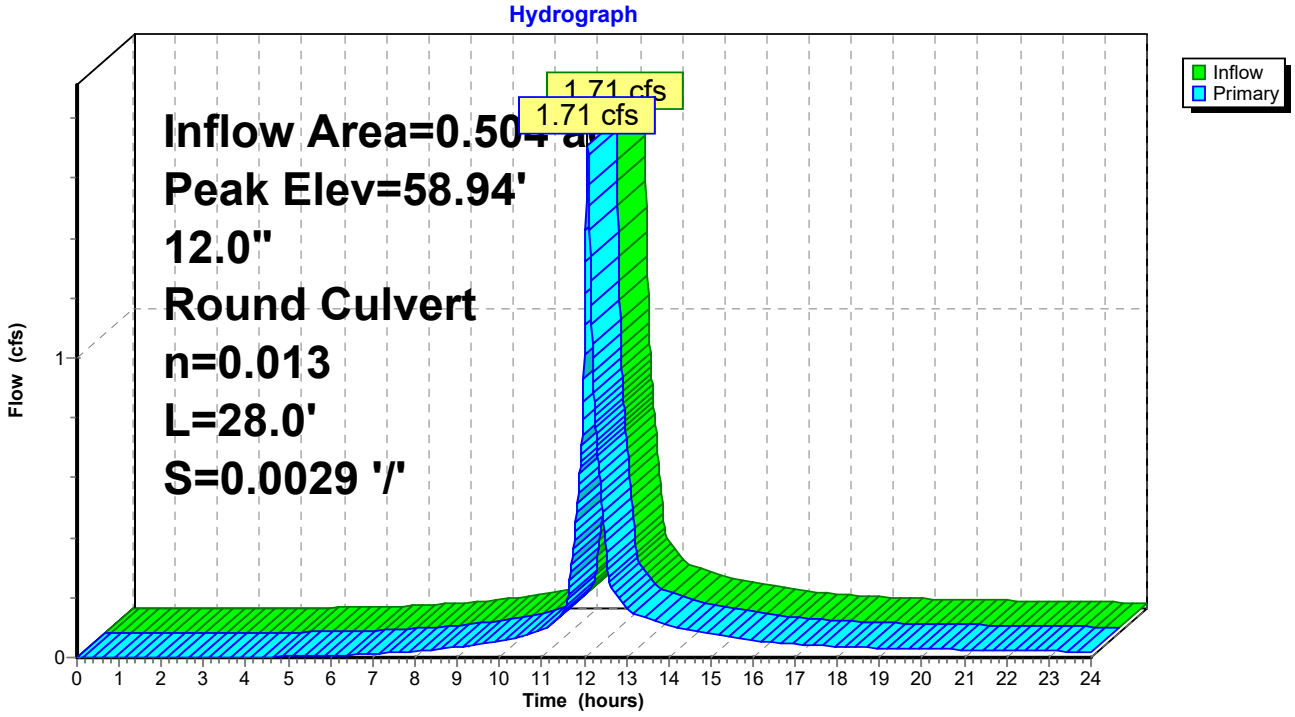
Inflow Area = 0.504 ac, 64.61% Impervious, Inflow Depth > 3.08" for 25 YR event
Inflow = 1.71 cfs @ 12.09 hrs, Volume= 0.130 af
Outflow = 1.71 cfs @ 12.09 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min
Primary = 1.71 cfs @ 12.09 hrs, Volume= 0.130 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.94' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	57.98'	**12.0" Round Culvert** L= 28.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 57.98' / 57.90' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.71 cfs @ 12.09 hrs HW=58.94' (Free Discharge)
1=Culvert (Barrel Controls 1.71 cfs @ 2.82 fps)

Pond 13P: Proprietary Seperator

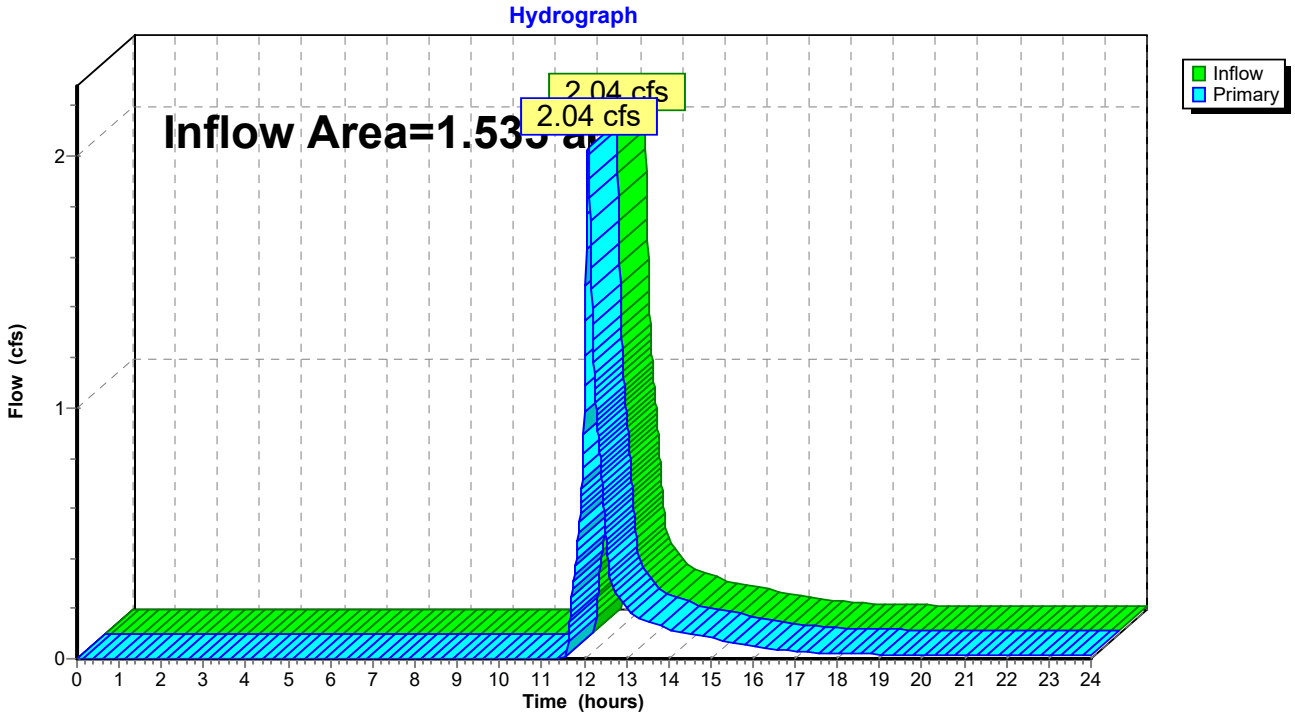


Summary for Link 1L: DP#1

Inflow Area = 1.535 ac, 50.58% Impervious, Inflow Depth > 0.88" for 25 YR event
Inflow = 2.04 cfs @ 12.10 hrs, Volume= 0.113 af
Primary = 2.04 cfs @ 12.10 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: DP#1



Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 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: Paved Parking Runoff Area=13,522 sf 85.64% Impervious Runoff Depth>5.23"
Tc=6.0 min CN=90 Runoff=1.81 cfs 0.135 af

Subcatchment 2S: Existing Building Runoff Area=2,400 sf 100.00% Impervious Runoff Depth>6.16"
Tc=6.0 min CN=98 Runoff=0.35 cfs 0.028 af

Subcatchment 3S: North Half of Proposed Runoff Area=480 sf 100.00% Impervious Runoff Depth>6.16"
Tc=6.0 min CN=98 Runoff=0.07 cfs 0.006 af

Subcatchment 4S: Proposed Covered Pens Runoff Area=3,611 sf 100.00% Impervious Runoff Depth>6.16"
Tc=6.0 min CN=98 Runoff=0.52 cfs 0.043 af

Subcatchment 5S: Proposed Covered Pens Runoff Area=3,611 sf 100.00% Impervious Runoff Depth>6.16"
Tc=6.0 min CN=98 Runoff=0.52 cfs 0.043 af

Subcatchment 6S: Entrance Area Runoff Area=7,945 sf 26.67% Impervious Runoff Depth>1.75"
Tc=6.0 min CN=55 Runoff=0.34 cfs 0.027 af

Subcatchment 7S: Eastern Lawn/Existing Runoff Area=22,431 sf 1.11% Impervious Runoff Depth>1.42"
Tc=6.0 min CN=51 Runoff=0.73 cfs 0.061 af

Subcatchment 8S: Stonedust Play Areas Runoff Area=5,874 sf 100.00% Impervious Runoff Depth>6.16"
Tc=6.0 min CN=98 Runoff=0.85 cfs 0.069 af

Subcatchment 9S: South Half of Proposed Runoff Area=480 sf 100.00% Impervious Runoff Depth>6.16"
Tc=6.0 min CN=98 Runoff=0.07 cfs 0.006 af

Subcatchment 10S: Northern Lawn Area Runoff Area=3,093 sf 0.00% Impervious Runoff Depth>0.56"
Tc=6.0 min CN=39 Runoff=0.02 cfs 0.003 af

Subcatchment 11S: Stonedust Play Areas Runoff Area=3,410 sf 100.00% Impervious Runoff Depth>6.16"
Tc=6.0 min CN=98 Runoff=0.49 cfs 0.040 af

Pond 8P: Underground Pipe Infiltration System Peak Elev=58.58' Storage=447 cf Inflow=2.21 cfs 0.168 af
Discarded=0.04 cfs 0.056 af Primary=2.17 cfs 0.108 af Outflow=2.21 cfs 0.164 af

Pond 9P: Stonedust/Crushed Stone Play Peak Elev=60.05' Storage=2,572 cf Inflow=2.80 cfs 0.232 af
Discarded=0.45 cfs 0.231 af Primary=0.02 cfs 0.001 af Outflow=0.47 cfs 0.232 af

Pond 10P: Catch Basin Peak Elev=58.96' Inflow=0.34 cfs 0.027 af
8.0" Round Culvert n=0.013 L=75.0' S=0.0040 '/' Outflow=0.34 cfs 0.027 af

Pond 11P: Catch Basin Peak Elev=60.69' Inflow=1.88 cfs 0.141 af
8.0" Round Culvert n=0.013 L=49.0' S=0.0022 '/' Outflow=1.88 cfs 0.141 af

Pond 12P: Drain Manhole Peak Elev=58.67' Inflow=0.34 cfs 0.027 af
8.0" Round Culvert n=0.013 L=67.0' S=0.0039 '/' Outflow=0.34 cfs 0.027 af

Pond 13P: Proprietary Seperator Peak Elev=59.15' Inflow=2.21 cfs 0.168 af
12.0" Round Culvert n=0.013 L=28.0' S=0.0029 '/' Outflow=2.21 cfs 0.168 af

Link 1L: DP#1 Inflow=2.89 cfs 0.169 af
Primary=2.89 cfs 0.169 af

Summary for Subcatchment 1S: Paved Parking

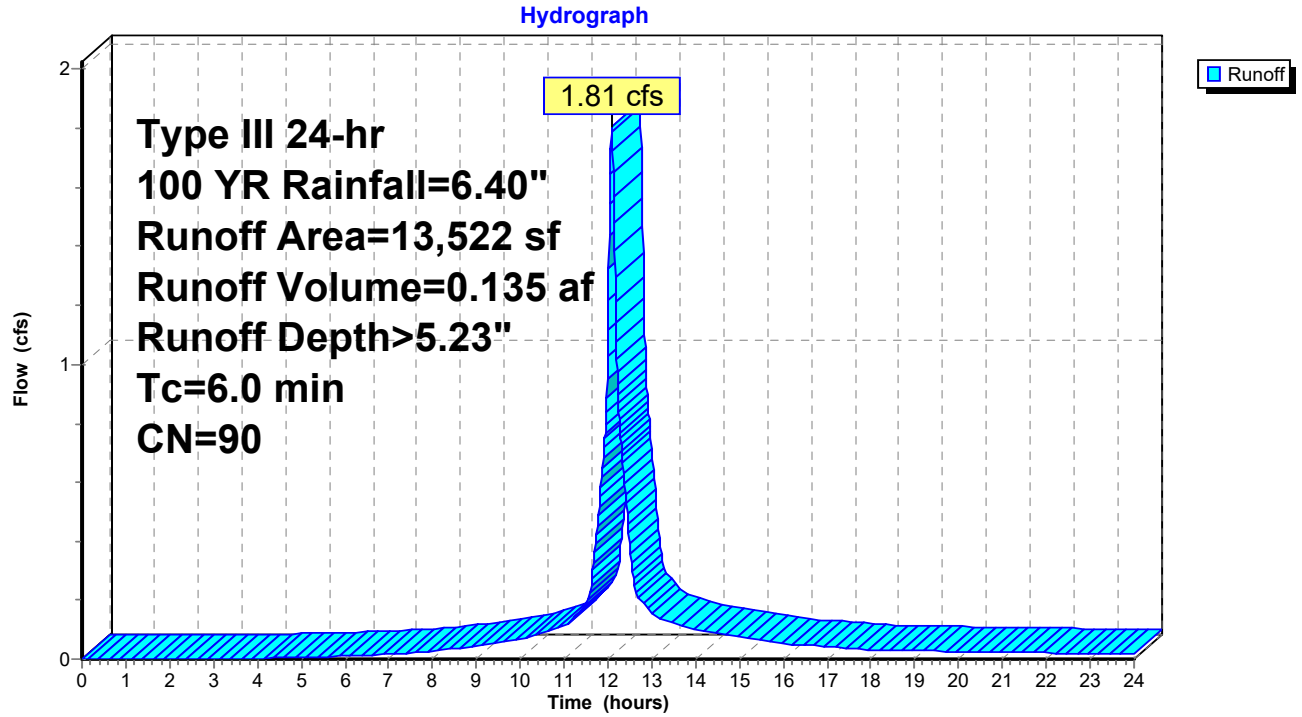
Runoff = 1.81 cfs @ 12.08 hrs, Volume= 0.135 af, Depth> 5.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=6.40"

Area (sf)	CN	Description
11,340	98	Paved parking, HSG A
240	98	Paved parking, HSG A
394	39	>75% Grass cover, Good, HSG A
106	39	>75% Grass cover, Good, HSG A
1,442	39	>75% Grass cover, Good, HSG A
13,522	90	Weighted Average
1,942		14.36% Pervious Area
11,580		85.64% Impervious Area

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

Subcatchment 1S: Paved Parking



Summary for Subcatchment 2S: Existing Building

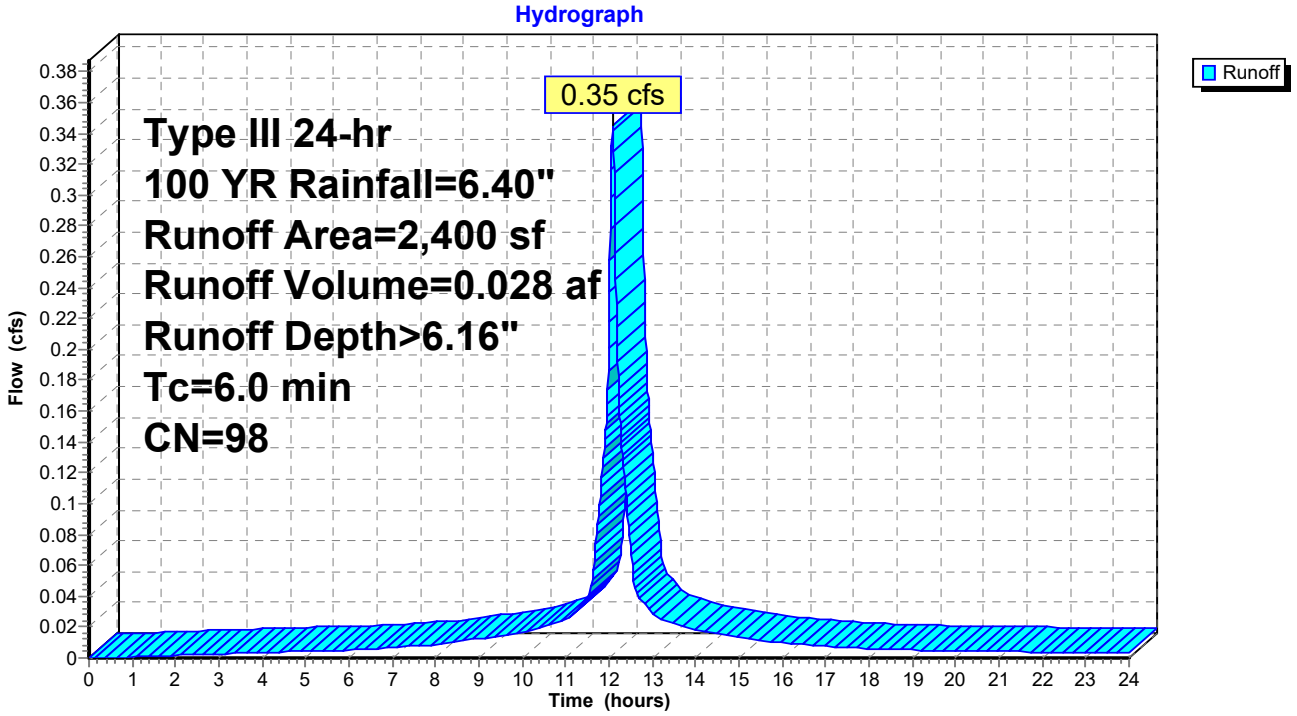
Runoff = 0.35 cfs @ 12.08 hrs, Volume= 0.028 af, Depth> 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=6.40"

Area (sf)	CN	Description
2,400	98	Roofs, HSG A
2,400		100.00% Impervious Area

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

Subcatchment 2S: Existing Building



Summary for Subcatchment 3S: North Half of Proposed Building

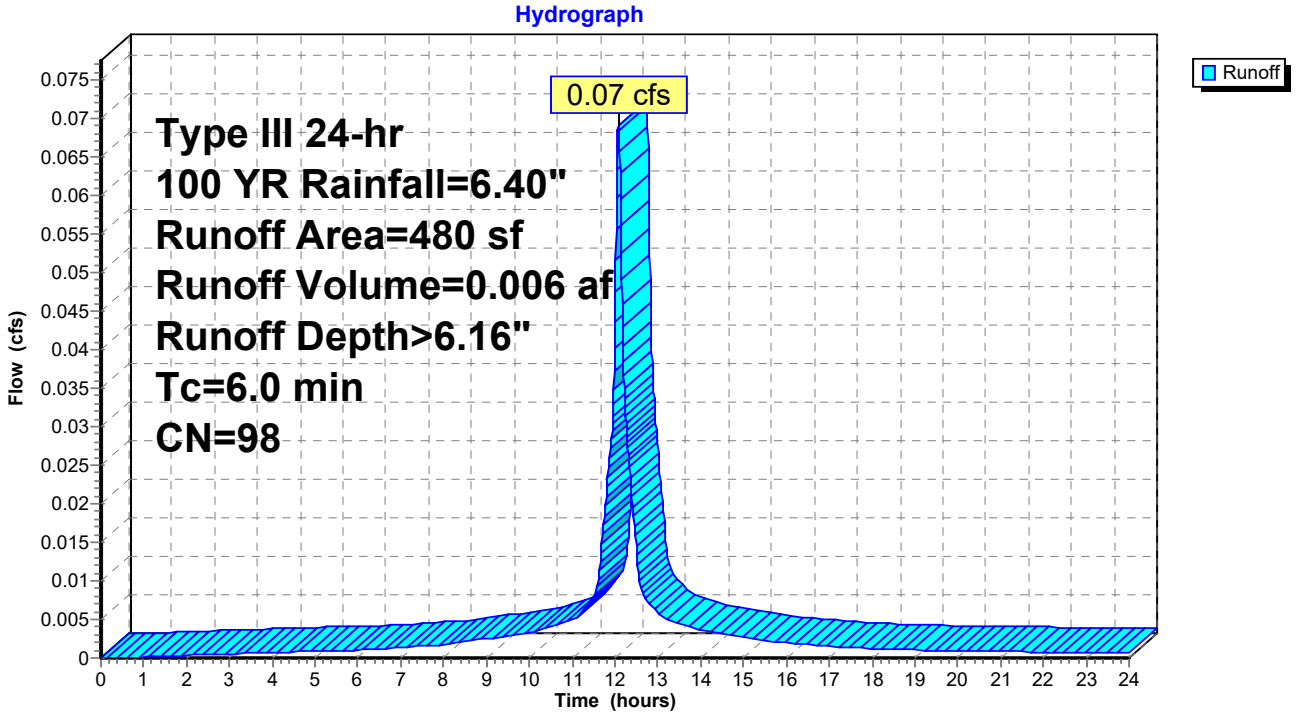
Runoff = 0.07 cfs @ 12.08 hrs, Volume= 0.006 af, Depth> 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=6.40"

Area (sf)	CN	Description
480	98	Roofs, HSG A
480		100.00% Impervious Area

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

Subcatchment 3S: North Half of Proposed Building



Summary for Subcatchment 4S: Proposed Covered Pens

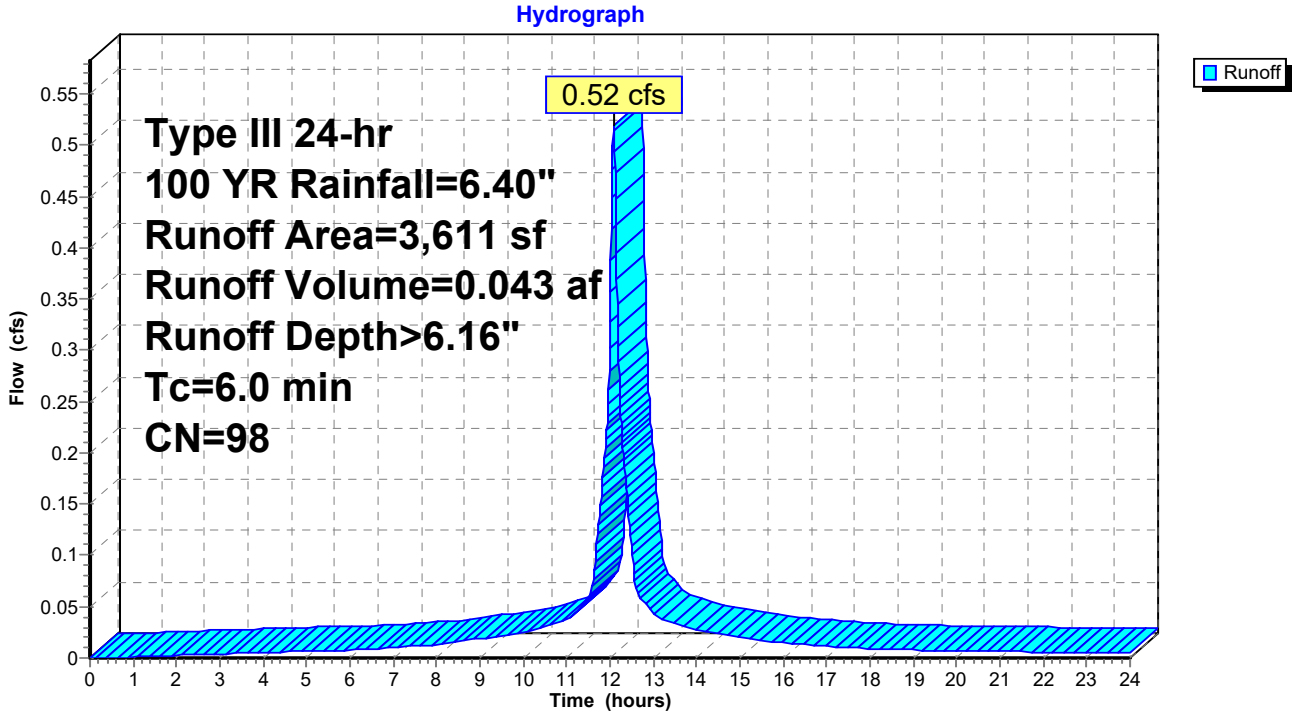
Runoff = 0.52 cfs @ 12.08 hrs, Volume= 0.043 af, Depth> 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=6.40"

Area (sf)	CN	Description
3,611	98	Roofs, HSG A
3,611		100.00% Impervious Area

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

Subcatchment 4S: Proposed Covered Pens



Summary for Subcatchment 5S: Proposed Covered Pens

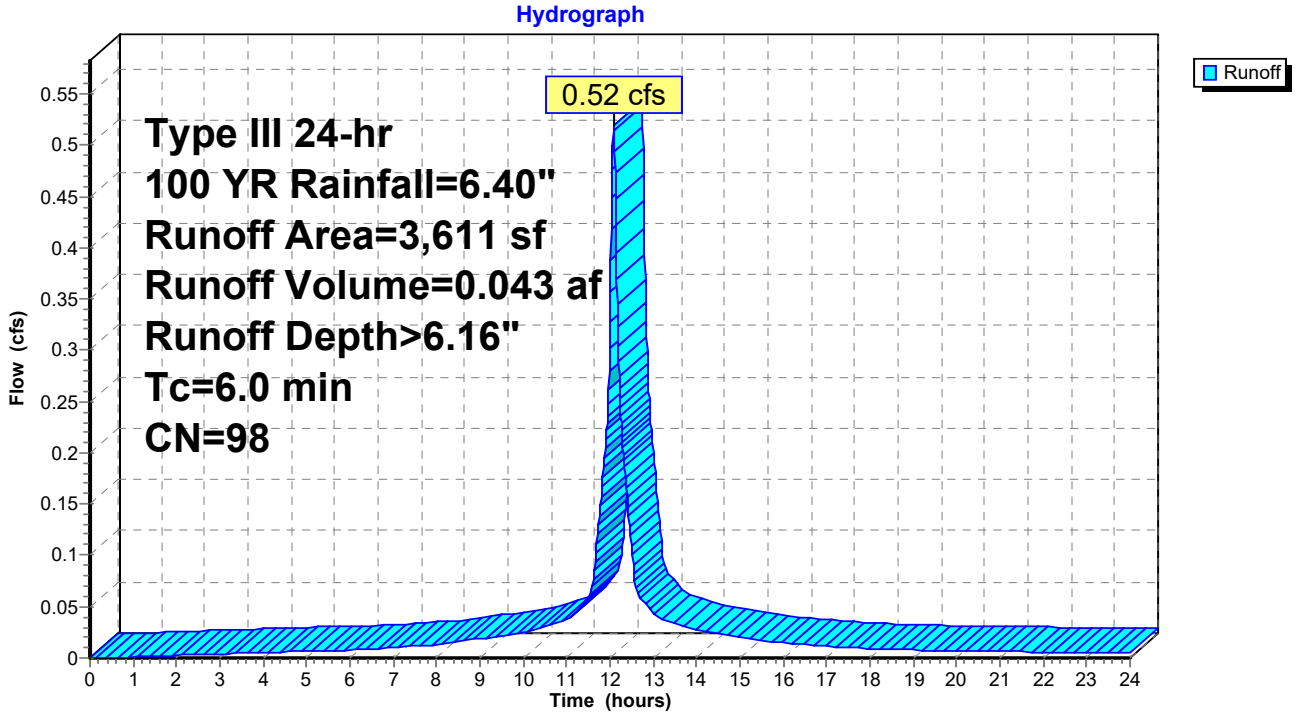
Runoff = 0.52 cfs @ 12.08 hrs, Volume= 0.043 af, Depth> 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=6.40"

Area (sf)	CN	Description
3,611	98	Roofs, HSG A
3,611		100.00% Impervious Area

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

Subcatchment 5S: Proposed Covered Pens



Summary for Subcatchment 6S: Entrance Area

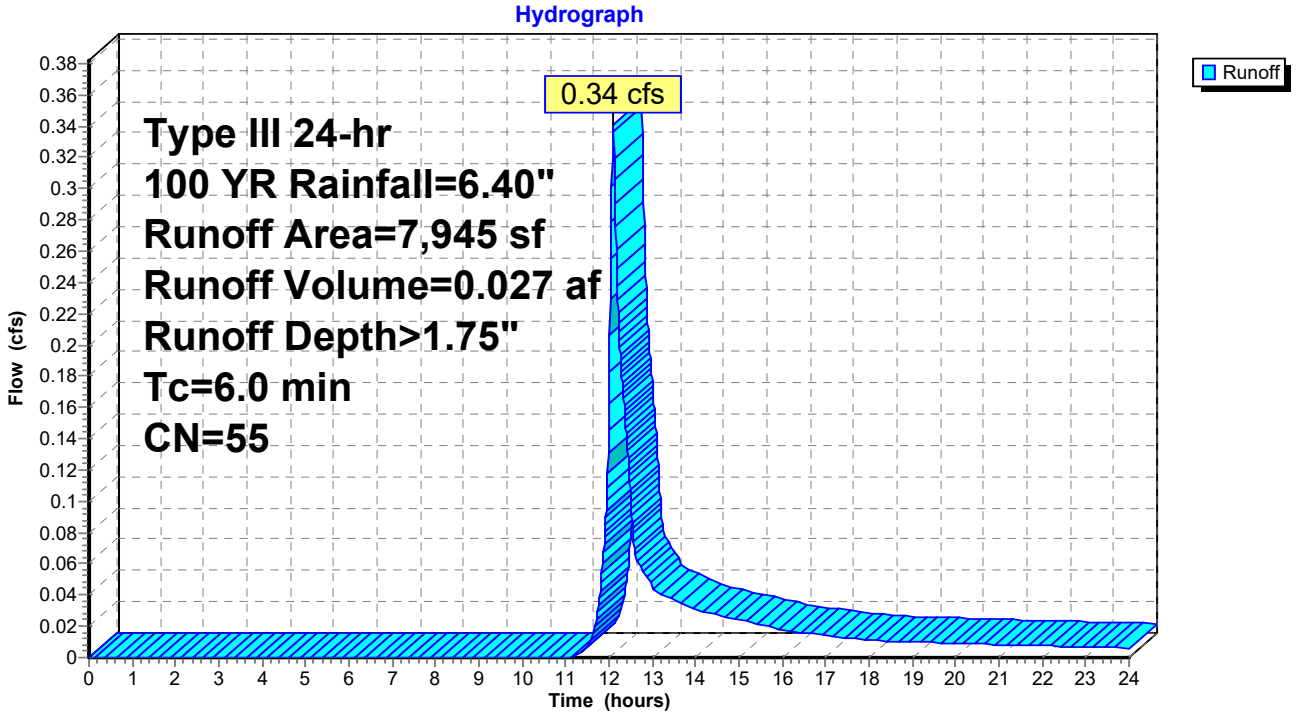
Runoff = 0.34 cfs @ 12.10 hrs, Volume= 0.027 af, Depth> 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=6.40"

Area (sf)	CN	Description
1,816	98	Paved parking, HSG A
303	98	Paved parking, HSG A
164	76	Gravel roads, HSG A
5,662	39	>75% Grass cover, Good, HSG A
7,945	55	Weighted Average
5,826		73.33% Pervious Area
2,119		26.67% Impervious Area

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

Subcatchment 6S: Entrance Area



Summary for Subcatchment 7S: Eastern Lawn/Existing Site to Remain

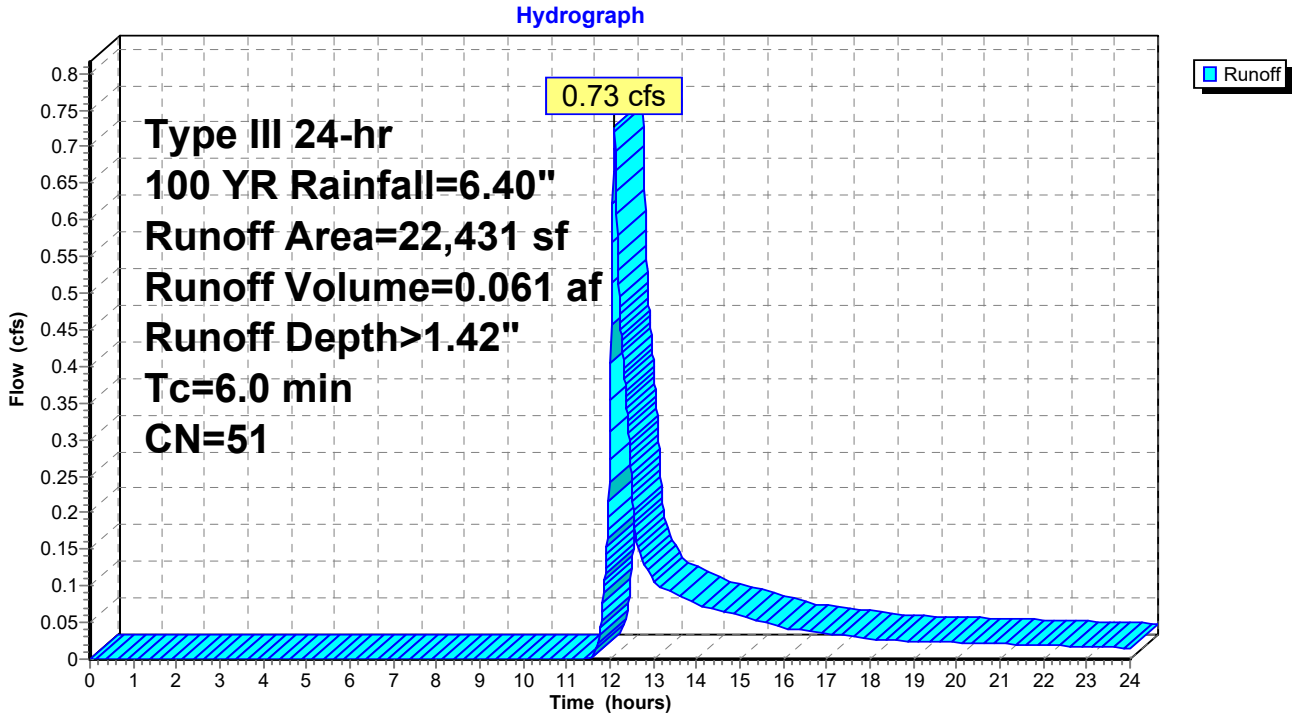
Runoff = 0.73 cfs @ 12.10 hrs, Volume= 0.061 af, Depth> 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=6.40"

	Area (sf)	CN	Description
	883	45	Woods, Poor, HSG A
	3,478	45	Woods, Poor, HSG A
	9,747	39	>75% Grass cover, Good, HSG A
	250	98	Paved parking, HSG A
	90	39	>75% Grass cover, Good, HSG A
	353	39	>75% Grass cover, Good, HSG A
*	7,630	68	Junk Piles Off Site
	22,431	51	Weighted Average
	22,181		98.89% Pervious Area
	250		1.11% Impervious Area

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

Subcatchment 7S: Eastern Lawn/Existing Site to Remain



Summary for Subcatchment 8S: Stonedust Play Areas

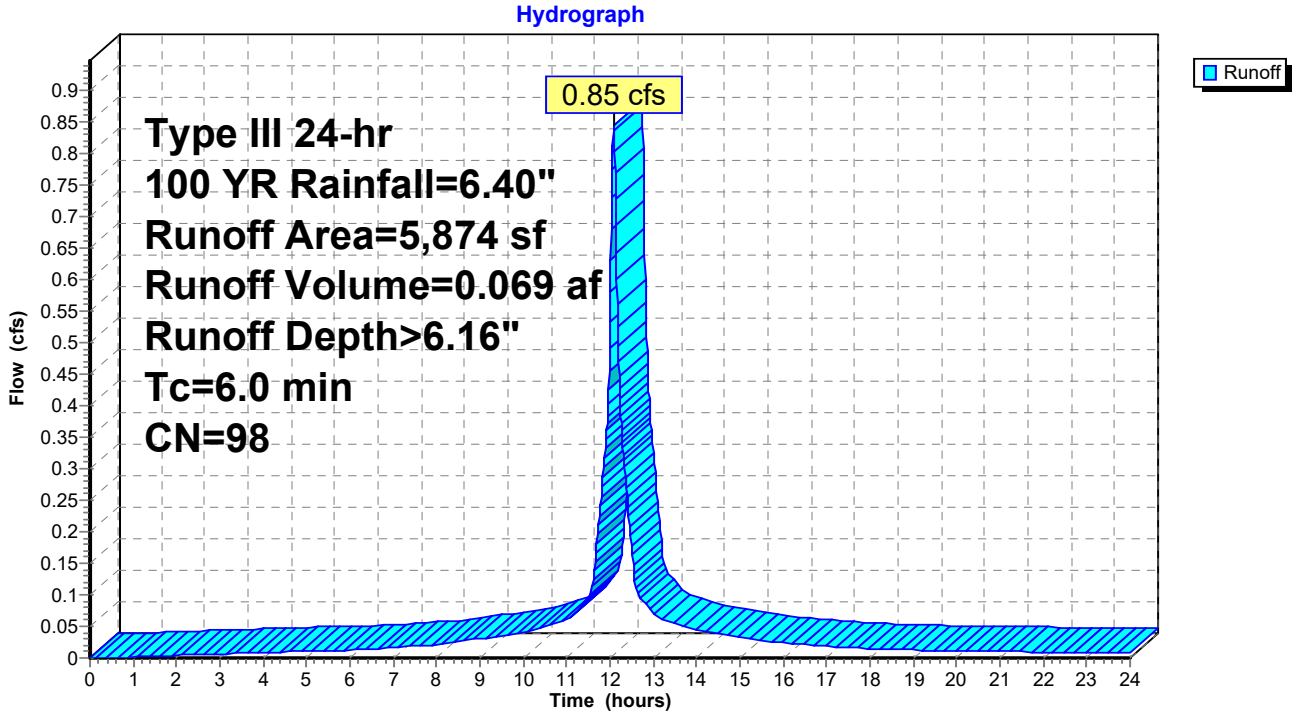
Runoff = 0.85 cfs @ 12.08 hrs, Volume= 0.069 af, Depth> 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=6.40"

	Area (sf)	CN	Description
*	5,874	98	Stonedust Play Areas Not Covered by Roof
	5,874		100.00% Impervious Area

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

Subcatchment 8S: Stonedust Play Areas



Summary for Subcatchment 9S: South Half of Proposed Building

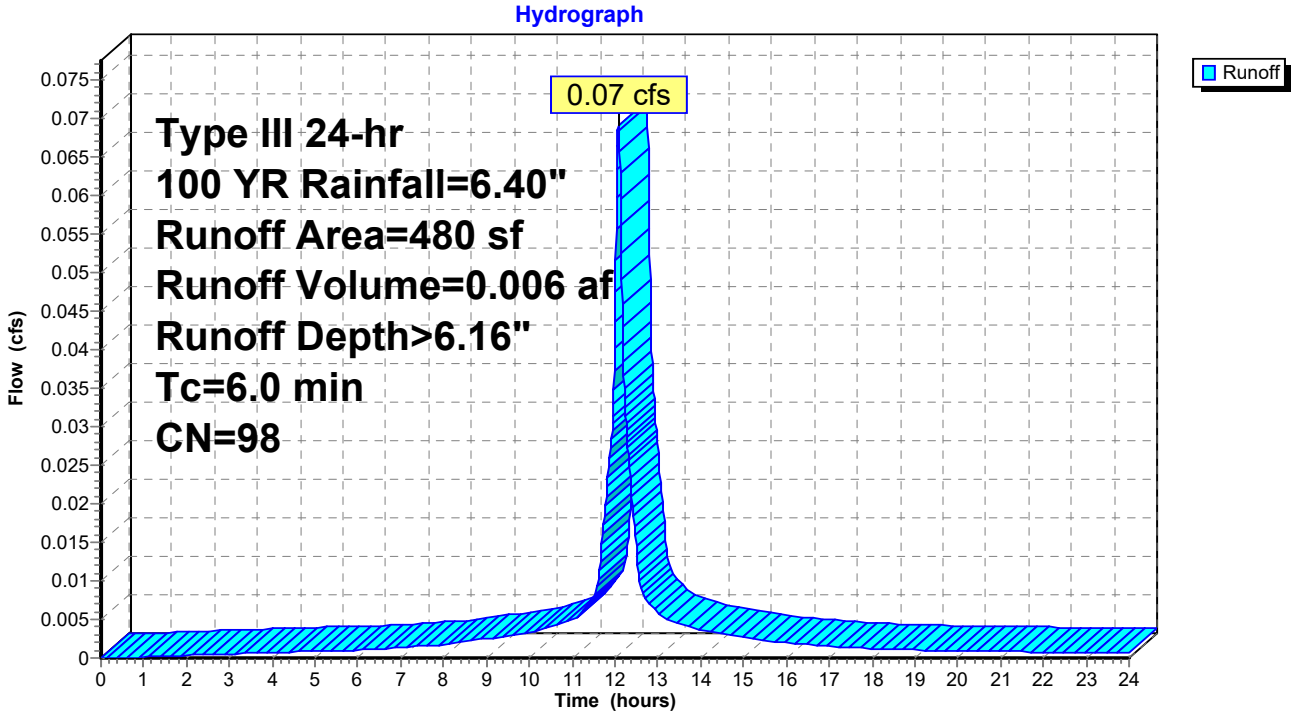
Runoff = 0.07 cfs @ 12.08 hrs, Volume= 0.006 af, Depth> 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=6.40"

Area (sf)	CN	Description
480	98	Roofs, HSG A
480		100.00% Impervious Area

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

Subcatchment 9S: South Half of Proposed Building



Summary for Subcatchment 10S: Northern Lawn Area

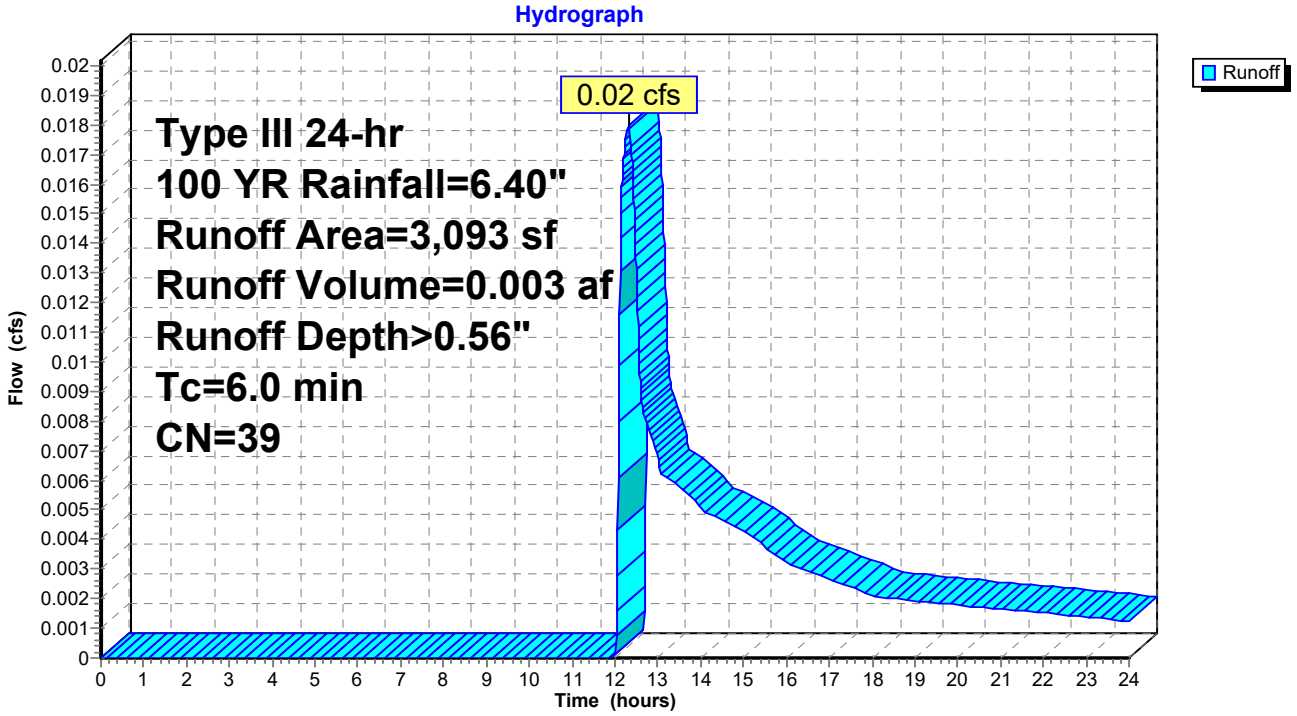
Runoff = 0.02 cfs @ 12.30 hrs, Volume= 0.003 af, Depth> 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=6.40"

Area (sf)	CN	Description
3,093	39	>75% Grass cover, Good, HSG A
3,093		100.00% Pervious Area

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

Subcatchment 10S: Northern Lawn Area



Summary for Subcatchment 11S: Stonedust Play Areas

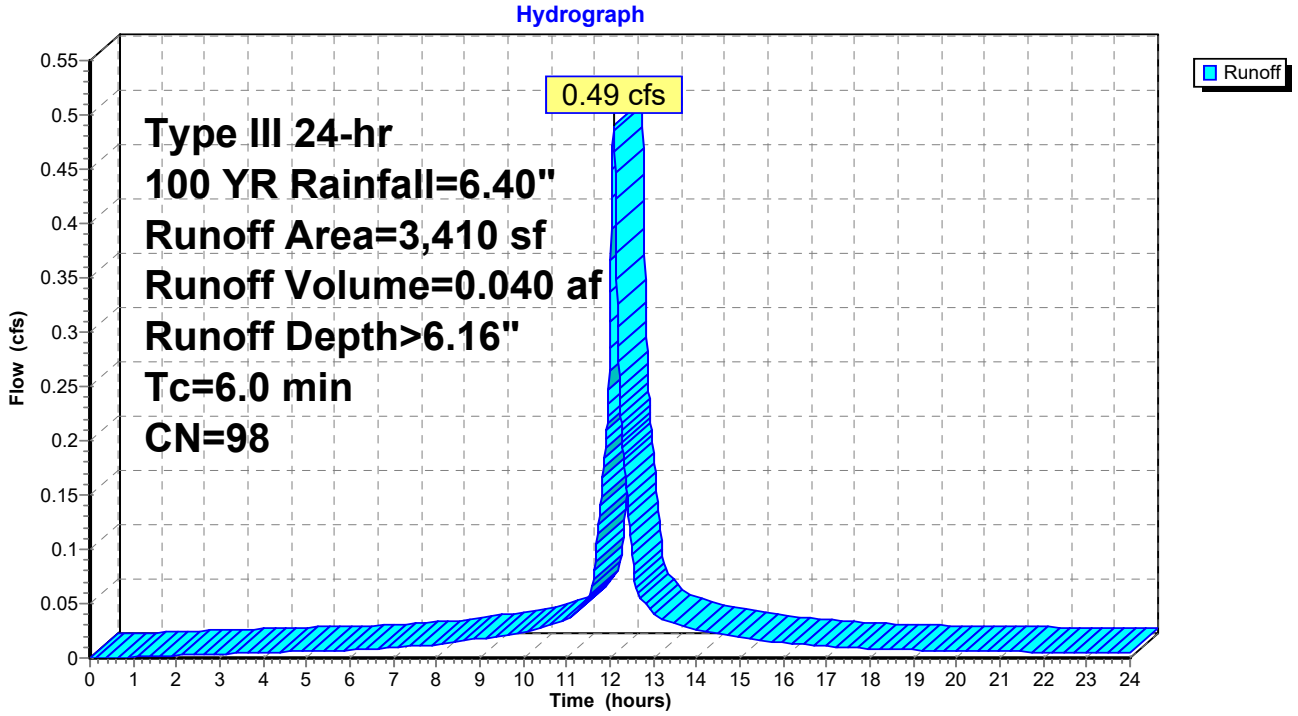
Runoff = 0.49 cfs @ 12.08 hrs, Volume= 0.040 af, Depth> 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YR Rainfall=6.40"

	Area (sf)	CN	Description
*	3,410	98	Stonedust Play Areas Not Covered by Roof
	3,410		100.00% Impervious Area

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

Subcatchment 11S: Stonedust Play Areas



Summary for Pond 8P: Underground Pipe Infiltration System

Inflow Area = 0.504 ac, 64.61% Impervious, Inflow Depth > 3.99" for 100 YR event
Inflow = 2.21 cfs @ 12.09 hrs, Volume= 0.168 af
Outflow = 2.21 cfs @ 12.09 hrs, Volume= 0.164 af, Atten= 0%, Lag= 0.4 min
Discarded = 0.04 cfs @ 8.65 hrs, Volume= 0.056 af
Primary = 2.17 cfs @ 12.09 hrs, Volume= 0.108 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.58' @ 12.09 hrs Surf.Area= 705 sf Storage= 447 cf

Plug-Flow detention time= 35.0 min calculated for 0.164 af (98% of inflow)
Center-of-Mass det. time= 20.4 min (815.4 - 794.9)

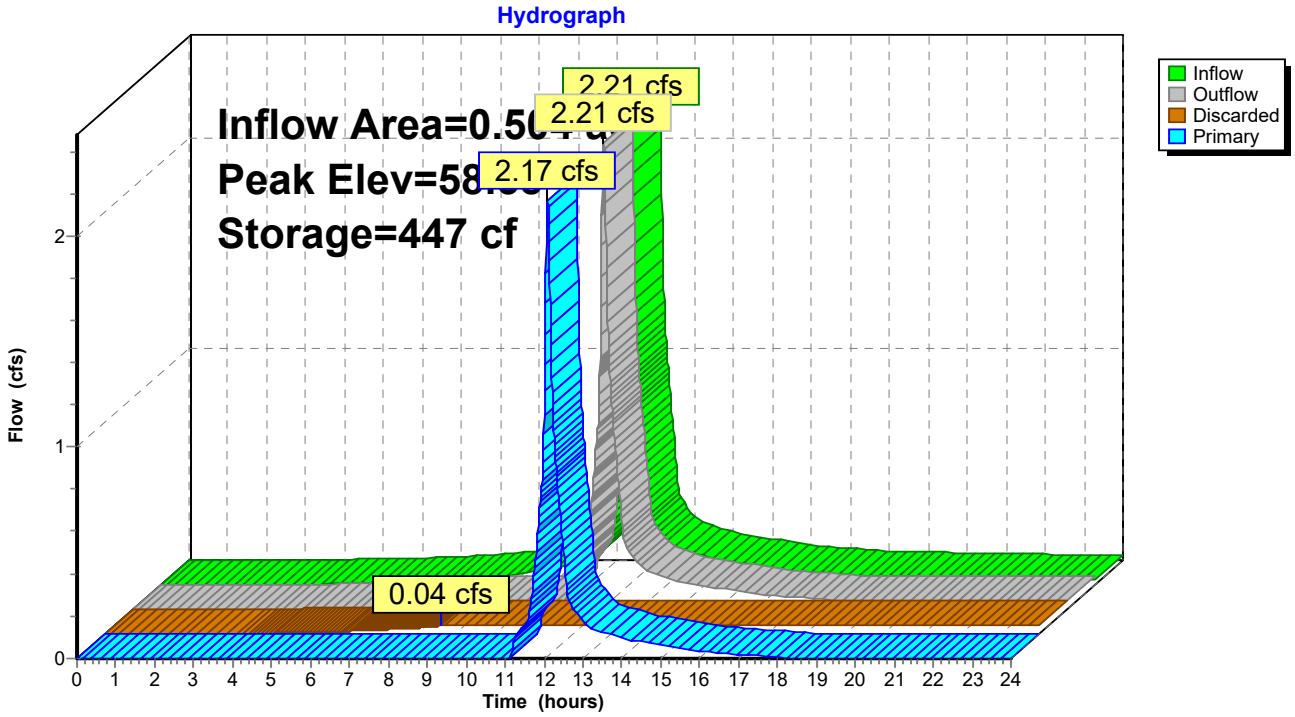
Volume	Invert	Avail.Storage	Storage Description
#1	57.40'	396 cf	**30.00'W x 23.50'L x 1.67'H Prismatoid** 1,177 cf Overall - 188 cf Embedded = 990 cf x 40.0% Voids
#2	57.90'	188 cf	**8.0" Round Pipe Storage** x 25 Inside #1 L= 21.5'
		584 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	57.40'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	58.30'	**5.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.04 cfs @ 8.65 hrs HW=57.42' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=2.16 cfs @ 12.09 hrs HW=58.58' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 2.16 cfs @ 1.52 fps)

Pond 8P: Underground Pipe Infiltration System



Summary for Pond 9P: Stonedust/Crushed Stone Play Areas

Inflow Area = 0.516 ac, 86.24% Impervious, Inflow Depth > 5.39" for 100 YR event
Inflow = 2.80 cfs @ 12.08 hrs, Volume= 0.232 af
Outflow = 0.47 cfs @ 12.55 hrs, Volume= 0.232 af, Atten= 83%, Lag= 27.9 min
Discarded = 0.45 cfs @ 11.65 hrs, Volume= 0.231 af
Primary = 0.02 cfs @ 12.55 hrs, Volume= 0.001 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 60.05' @ 12.55 hrs Surf.Area= 8,072 sf Storage= 2,572 cf

Plug-Flow detention time= 30.1 min calculated for 0.232 af (100% of inflow)
Center-of-Mass det. time= 30.0 min (776.6 - 746.6)

Volume	Invert	Avail.Storage	Storage Description
#1	59.38'	2,583 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

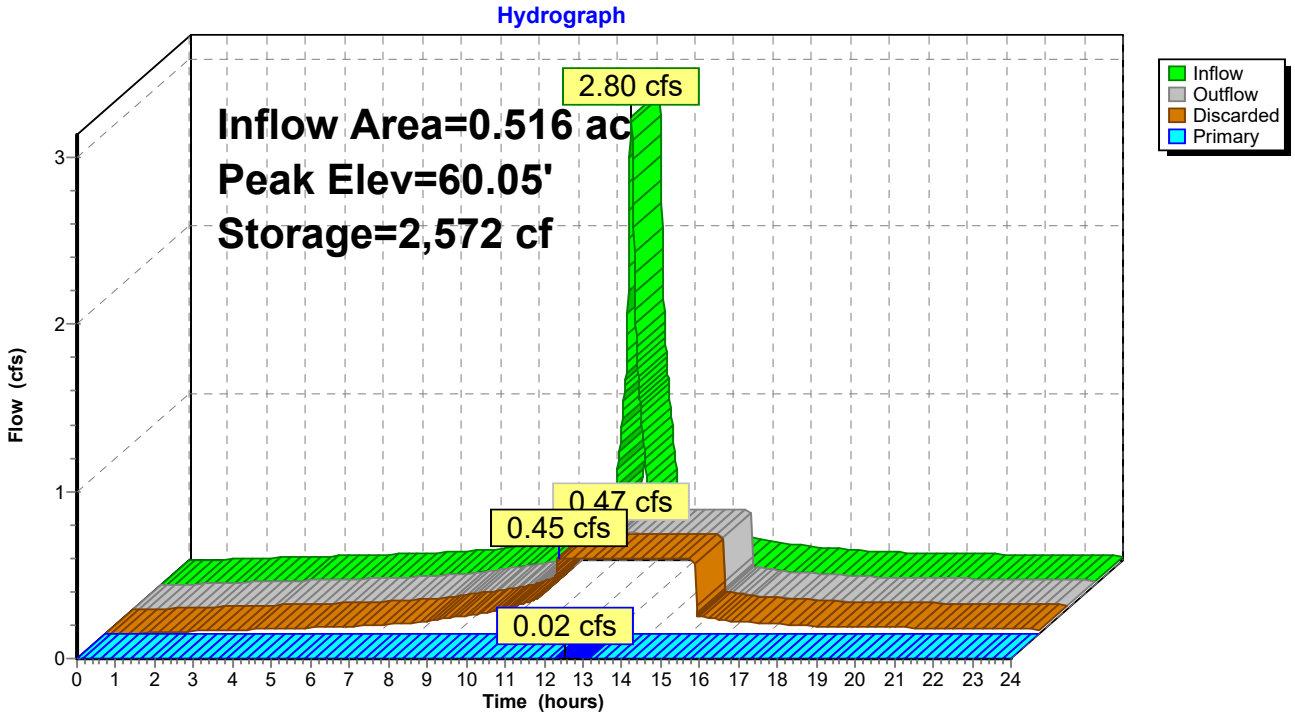
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
59.38	8,072	0.0	0	0
59.40	8,072	30.0	48	48
59.88	8,072	30.0	1,162	1,211
59.90	8,072	100.0	161	1,372
60.05	8,072	100.0	1,211	2,583

Device	Routing	Invert	Outlet Devices
#1	Discarded	59.38'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	60.00'	**0.5' long x 0.5' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00
			Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.45 cfs @ 11.65 hrs HW=59.39' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.45 cfs)

Primary OutFlow Max=0.02 cfs @ 12.55 hrs HW=60.05' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.02 cfs @ 0.62 fps)

Pond 9P: Stonedust/Crushed Stone Play Areas



Summary for Pond 10P: Catch Basin

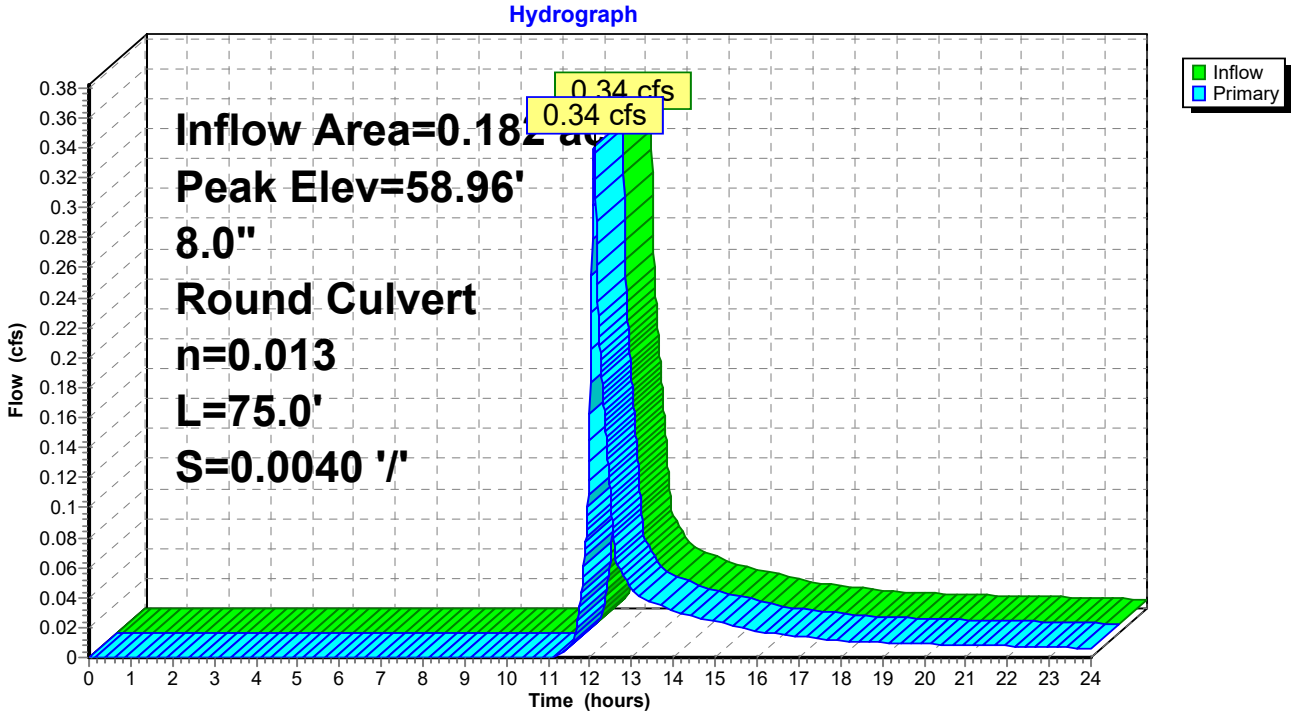
Inflow Area = 0.182 ac, 26.67% Impervious, Inflow Depth > 1.75" for 100 YR event
Inflow = 0.34 cfs @ 12.10 hrs, Volume= 0.027 af
Outflow = 0.34 cfs @ 12.10 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.10 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.96' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	58.54'	**8.0" Round Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.54' / 58.24' S= 0.0040 '/' Cc= 0.900 n= 0.013 Cast iron, coated, Flow Area= 0.35 sf

Primary OutFlow Max=0.34 cfs @ 12.10 hrs HW=58.96' (Free Discharge)
1=Culvert (Barrel Controls 0.34 cfs @ 2.07 fps)

Pond 10P: Catch Basin



Summary for Pond 11P: Catch Basin

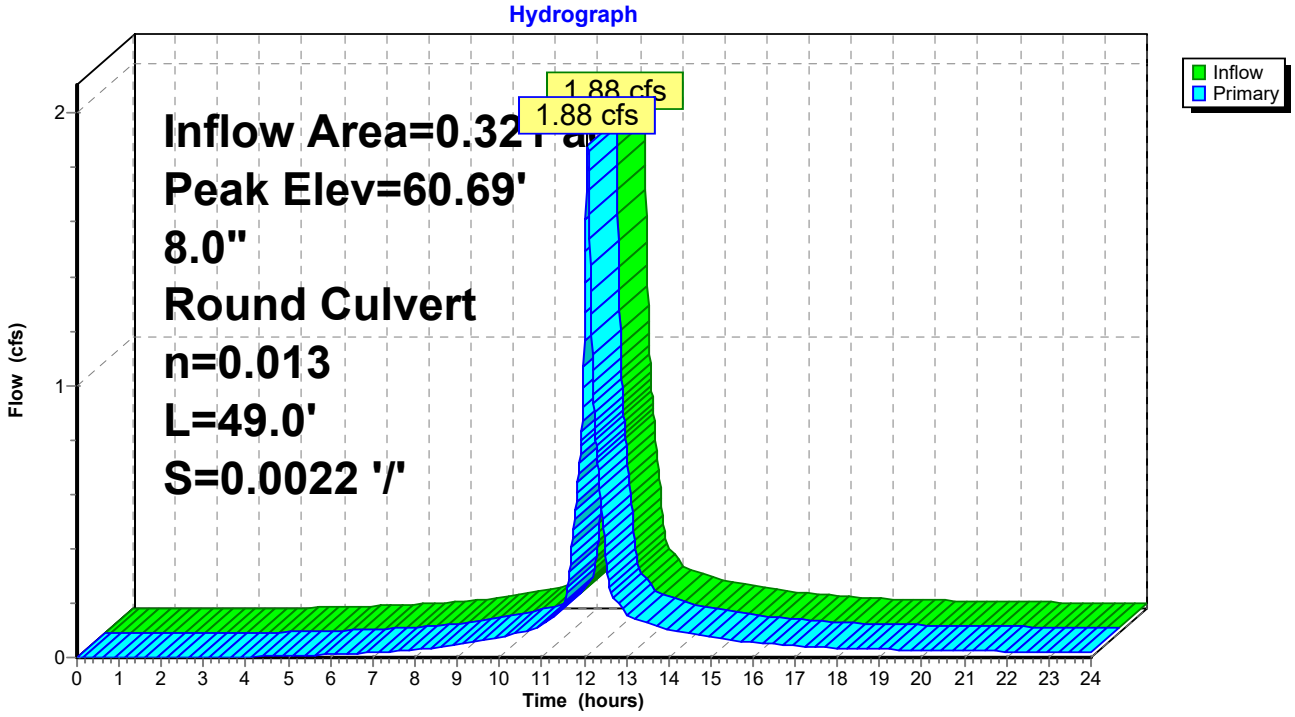
Inflow Area = 0.321 ac, 86.13% Impervious, Inflow Depth > 5.26" for 100 YR event
Inflow = 1.88 cfs @ 12.08 hrs, Volume= 0.141 af
Outflow = 1.88 cfs @ 12.08 hrs, Volume= 0.141 af, Atten= 0%, Lag= 0.0 min
Primary = 1.88 cfs @ 12.08 hrs, Volume= 0.141 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 60.69' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	58.09'	**8.0" Round Culvert** L= 49.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.09' / 57.98' S= 0.0022 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.87 cfs @ 12.08 hrs HW=60.68' (Free Discharge)
1=Culvert (Barrel Controls 1.87 cfs @ 5.37 fps)

Pond 11P: Catch Basin



Summary for Pond 12P: Drain Manhole

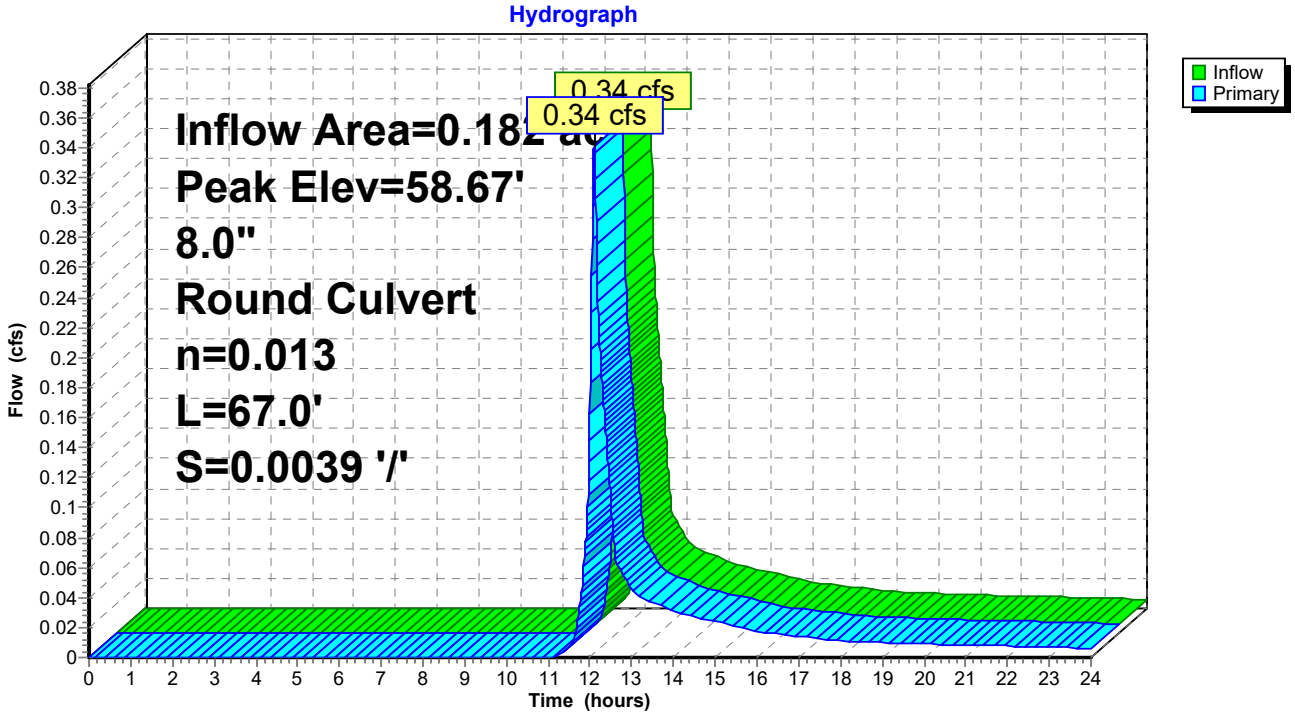
Inflow Area = 0.182 ac, 26.67% Impervious, Inflow Depth > 1.75" for 100 YR event
Inflow = 0.34 cfs @ 12.10 hrs, Volume= 0.027 af
Outflow = 0.34 cfs @ 12.10 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.10 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 58.67' @ 12.10 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	58.24'	**8.0" Round Culvert** L= 67.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 58.24' / 57.98' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=0.34 cfs @ 12.10 hrs HW=58.67' (Free Discharge)
1=Culvert (Barrel Controls 0.34 cfs @ 2.05 fps)

Pond 12P: Drain Manhole



Summary for Pond 13P: Proprietary Seperator

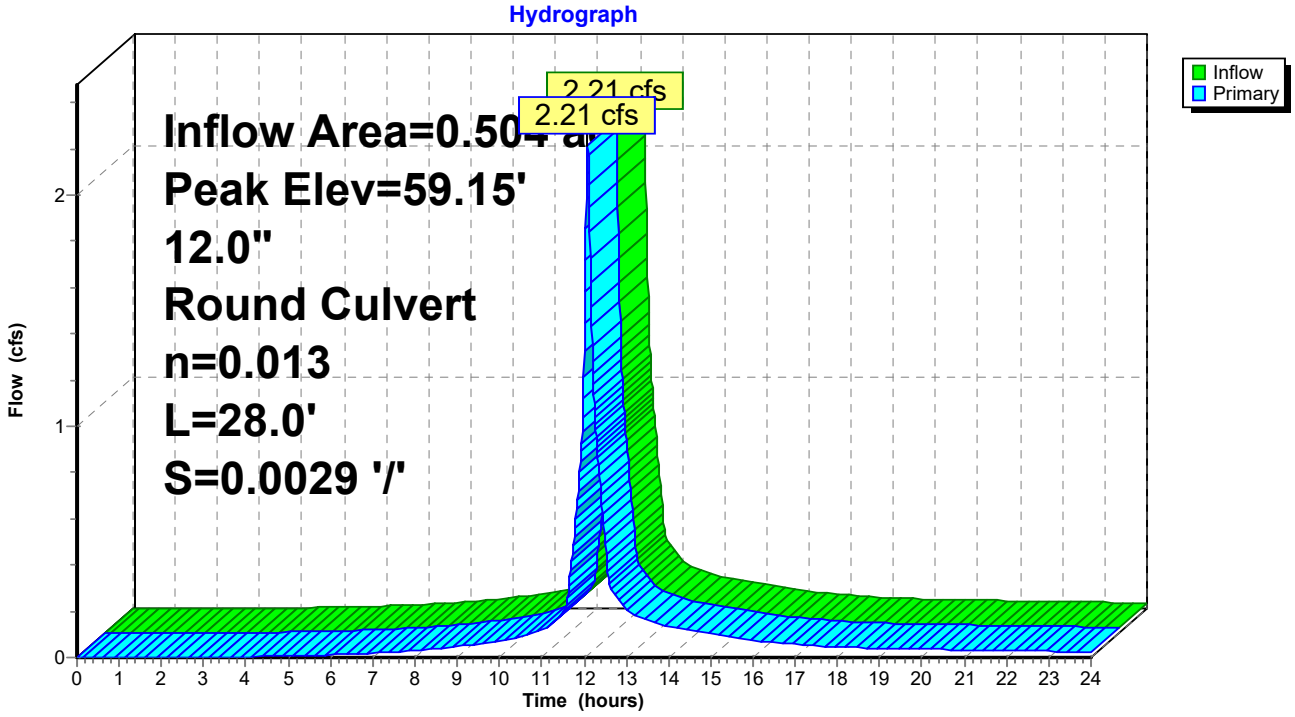
Inflow Area = 0.504 ac, 64.61% Impervious, Inflow Depth > 3.99" for 100 YR event
Inflow = 2.21 cfs @ 12.09 hrs, Volume= 0.168 af
Outflow = 2.21 cfs @ 12.09 hrs, Volume= 0.168 af, Atten= 0%, Lag= 0.0 min
Primary = 2.21 cfs @ 12.09 hrs, Volume= 0.168 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 59.15' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	57.98'	**12.0" Round Culvert** L= 28.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 57.98' / 57.90' S= 0.0029 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.21 cfs @ 12.09 hrs HW=59.14' (Free Discharge)
1=Culvert (Barrel Controls 2.21 cfs @ 3.04 fps)

Pond 13P: Proprietary Seperator

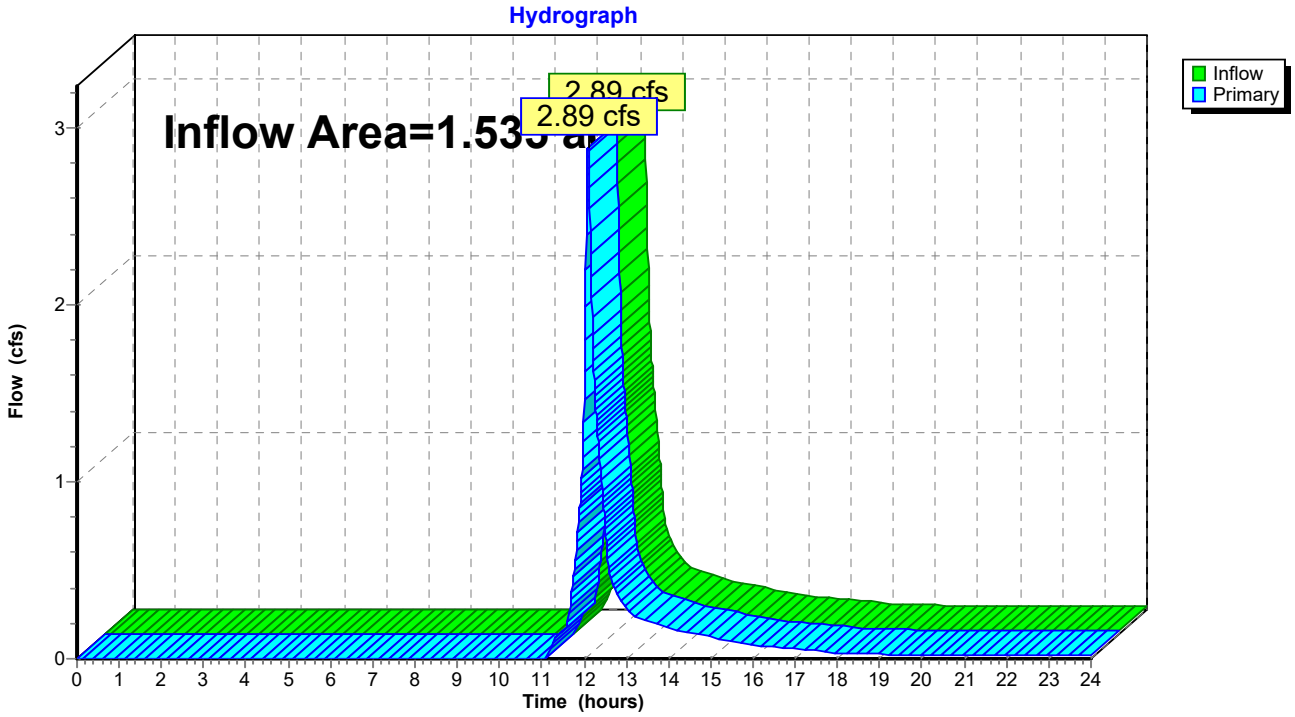


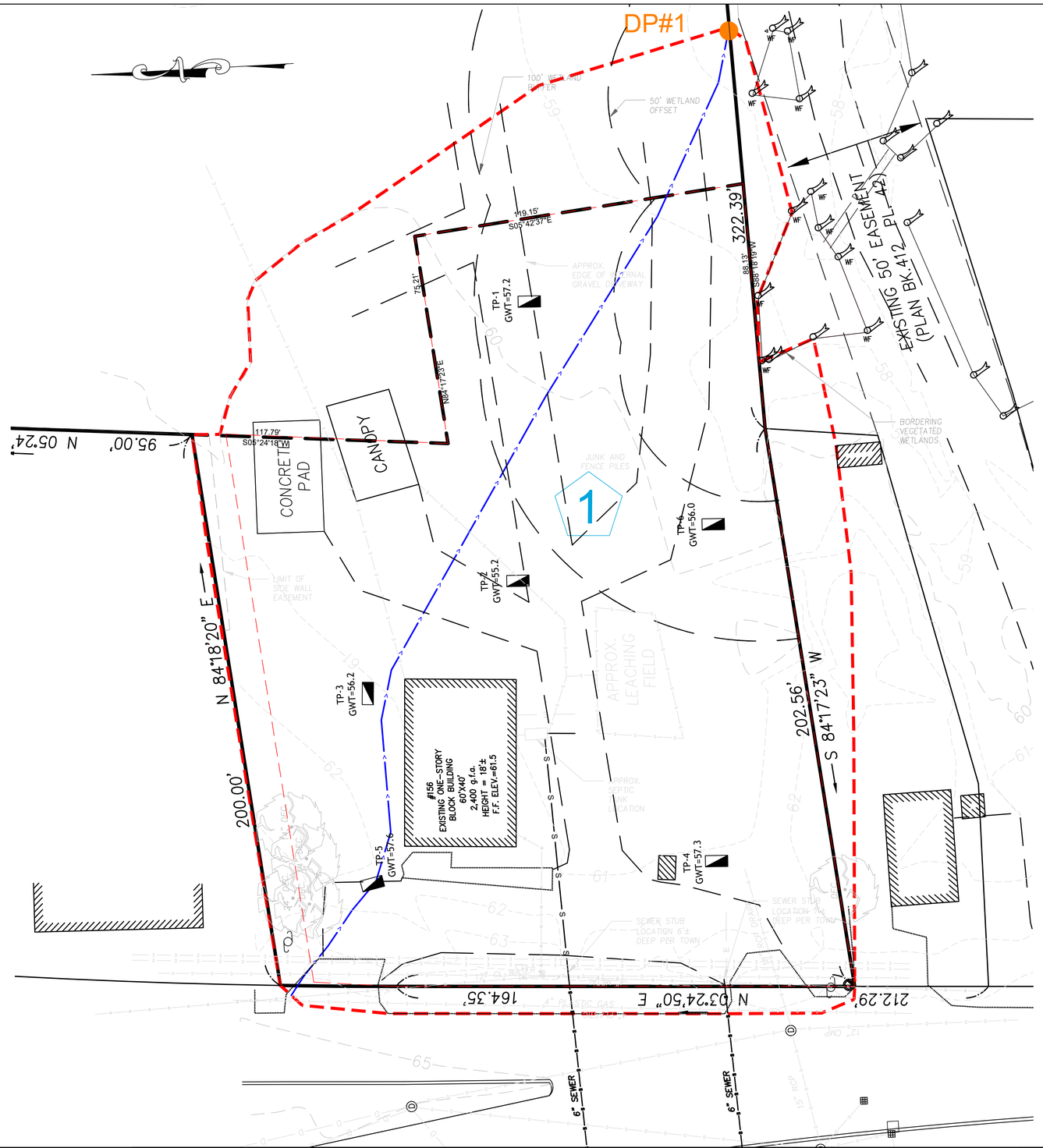
Summary for Link 1L: DP#1

Inflow Area = 1.535 ac, 50.58% Impervious, Inflow Depth > 1.32" for 100 YR event
Inflow = 2.89 cfs @ 12.10 hrs, Volume= 0.169 af
Primary = 2.89 cfs @ 12.10 hrs, Volume= 0.169 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 1L: DP#1





LEGEND

1 — SUBCATCHMENT NUMBER

DP#1 — DESIGN POINT

TIME OF CONCENTRATION

WATERSHED

DESIGN BY:	DRAWING TITLE: **EXISTING WATERSHED**	CLIENT: Seacoast Canine, 5a Fanaras Drive, Salisbury, MA 01952	PROJECT TITLE: **156 LAFAYETTE ROAD** SALISBURY, MASSACHUSETTS
DRAWN BY: JRM	REV / DATE / BY		
CHECK BY: CRM			

Waterfield Design Group
50 Cross Street | Winchester, Massachusetts | 01890
T 781.756.0001 F 781.756.0007

SCALE: 1" = 20'

DATE: 2-15-2022

FILENAME: W-1686

DRAWING NUMBER: **W-1**

SHEET OF 10