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Stormwater Analysis and Drainage Report
Atlantic Subaru Improvements

124 Waterhouse Road
Bourne, MA

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Prepared for:
Atlantic Subaru
124 Waterhouse Road
Bourne, MA

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TABLE OF CONTENTS **Page**

1.0	STORMWATER AND DRAINAGE NARRATIVE		1
	1.1	Existing Conditions	1
	1.2	Proposed Conditions	2
	1.3	Drainage Design Methodology	4
2.0	COMPLIANCE WITH MASSDEP STORMWATER STANDARDS		8
3.0	POST CONSTRUCTION STORMWATER MANAGEMENT		10
	3.1	Bioretention Facilities	10
	3.2	Vegetated Swale	11
	3.3	Infiltration Basin	11
	3.4	Underground Recharge Chambers	11
4.0	POLLUTANT CONTROLS		11
	4.1	Structural Practices	11
	4.2	Stabilization Practices	12
	4.3	Other Types of Controls	13
5.0	REFERENCES		16

TABLES

Table 1: Peak Flow and Volume Comparison 7

FIGURES

Figure 1: USGS Locus
Figure 2: Environmental Constraints Map
Figure 3: Soil Survey Map
Figure 4: Groundwater Contours

APPENDICES

Appendix A: Site Soil Evaluations
Appendix B: Drainage Area Maps
Appendix C: HydroCAD® Drainage Calculations
Appendix D: U.S. Rainfall Frequency Atlas
Appendix E: Bioretention Sizing Calculations
Appendix F: Recharge Calculations
Appendix G: TSS Removal
Appendix H: Nitrogen Loading Calculations

1.0 STORMWATER AND DRAINAGE NARRATIVE

This Stormwater Analysis and Drainage Report provides a summary of the stormwater management system for the proposed Atlantic Subaru Site Improvements located at 124 Waterhouse Road Bourne, Massachusetts. The purpose of this report is to describe the pre- and post-development site conditions as well as the practices to be used to reduce pollutants in stormwater discharges during and after construction. The proposed stormwater system for the Atlantic Subaru and the associated parking area has been developed to incorporate "low-impact" design elements. The proposed design minimizes site disturbance where possible and incorporates a bioretention area into the site landscape to provide pretreatment.

Although this site does not fall within MassDEP wetland jurisdiction, the Massachusetts Stormwater Standards were applied to the stormwater management design to the greatest extents practicable. In order to promote smart, environmentally friendly development, the proposed concept treats at a minimum the first ½ inch of stormwater runoff. The pre and post peak flows (cfs) have been analyzed for the 2-, 10, 25, and 100-year storm events. The proposed stormwater controls will be operated and maintained appropriately during regular operation of the site in the post-construction period as well as during the construction phase.

1.1 Existing Conditions

The project area includes two parcels, lot 152 (.94 acres) & lot 153 (3.39 acres) located along the west side of Waterhouse Road at Latitude: 41° 43' 35.6376'' N Longitude: -70° 35' 8.7036'' W. The property is defined by the Bourne Assessors Department as Map 27 Parcels 152 & 153 and is within the Business 4 zoning district under the Bourne Zoning Bylaw. Lot 153 is abutted by Dornick Road (dirt road) to the west, lot 152 to the north, and Bayview Campground to the south. Lot 152 is abutted by Lot 154 to the west, lot 153 to the south and a wooded vacant lot 151 to the north. Lot 153 is currently developed as an auto dealership and repair facility with wooded buffer along the north, south and west boundaries. The general topography of the site slopes from south to northwest with the steepest grades along the southern and western boundaries. The elevation across the property project area varies from 144 to 111 feet above mean sea level.

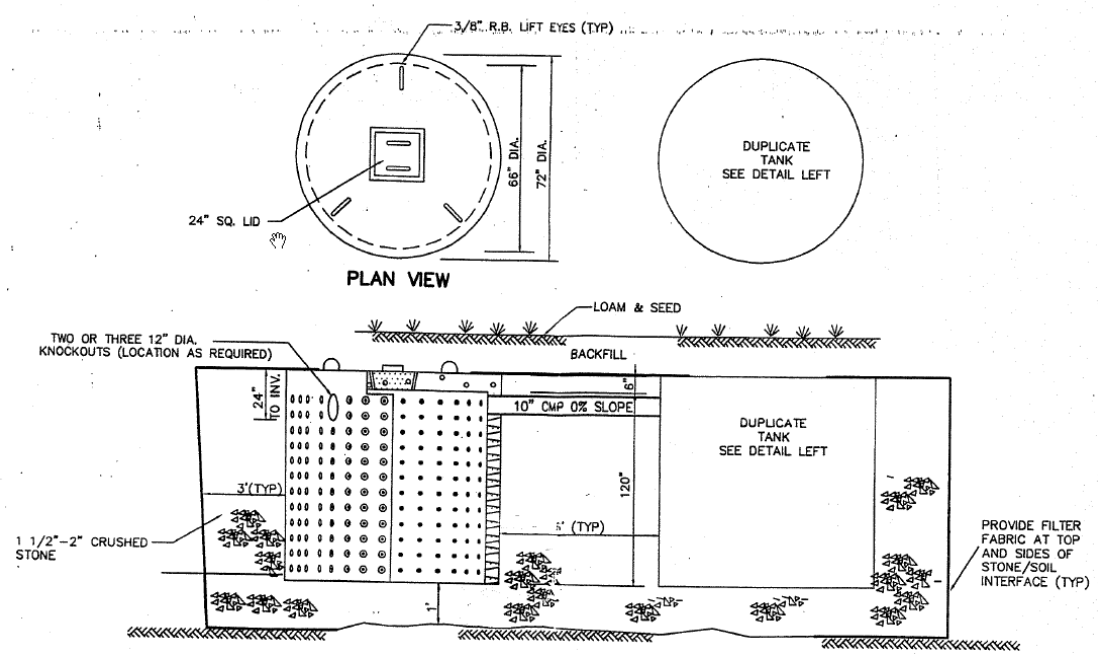
According to the Barnstable County Soil Survey, the soils underlying the site are classified as Barnstable sandy loam (BbC), which is described as "very stony, moderately well drained soils formed in glacial fluvial deposits on outwash plains, delta, kames, and ice contact deposits". The hydrologic soil group for this soil is A with an estimated infiltration rate of 8.27 in/hr. A soils map is included in **Figure 3**. Based upon the Cape Cod Commission GIS department groundwater contours (August 1998) the depth to water is estimated at approximately elevation 40 feet, which is 80 to 100 feet below existing grade depending upon the specific location at the site (**Figure 4**).

The site is located within the Bourne Back River Area of Critical Concern (ACEC). The project area is located entirely within the X-Zone as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community Panel Number 255210 0008F revised August 9, 1999.

The majority of the site surface runoff from the existing Atlantic Subaru facilities currently drains to catch basins/recharge basins and is managed on site. The stormwater management system includes

deep sump catch basins, which discharge to underground perforated 6' diameter pre-cast recharge basins to provide localized infiltration.

Existing Recharge Basin



The deep sump catch basins capture sediment and outlet pipe hoods are provided to separate oils and grease as well as floatable debris prior to infiltration. All vehicle maintenance occurs within the service bays and any wash water is captured via floor drains and discharged to an underground holding tank, which is emptied monthly.

The roof runoff is collected through existing downspouts, which are discharged, to the existing drainage systems via overland flow.

1.2 Proposed Conditions

The Applicant proposes to construct a 8,500 square foot addition to the existing service facilities including 8 new service bays, drive thru check-in, customer lounge and showroom. Due to the building expansion, 20 customer parking spaces and 19 display spaces will be eliminated from the existing facilities located on lot 153. Therefore, additional parking and vehicle display will constructed at the rear and front of the existing facilities on Lot 153 (6 spaces) and a new parking display area is proposed for the abutting lot 152 to provide space for an additional 111 display spaces. A summary of the proposed improvements is provided below.

Existing Building Area	= 11,100 sf
Proposed Addition	
• 8 Service bays	= 3,360 sf
• Customer Lounge	= 1,363 sf
• Showroom	= 1,980 sf

• Drive Thru	= 1,800 sf
Total Proposed Addition	=8,503 sf
Total Building Area	= 19,603 Sf
Total Existing Paved Surface (Lot 153 only)	= 37,045 sf
Additional Proposed Paved Surface (Lot 152)	= 23,500 sf
Additional Proposed Paved Surface (Lot 153)	= 1,742 sf
Total Impervious Area	= 62,287 sf

The existing gravel parking lot at the rear of the facilities will be formalized with a portion of the gravel lot, which encroaches on the Dornick Road ROWT being removed.

Existing Gravel Lot (including off site encroachment)	= 10,065 sf
Proposed Gravel Lot	= 5,854 sf

The total limit of disturbance associated with construction is 73,200 +/- sf. The limit of disturbance will be located by field survey and marked prior to the commencement of any construction. All disturbed areas will be loam and seeded as indicated on the plans.

Stormwater Management

The proposed Stormwater Management System is designed to meet the Town of Bourne) stormwater management requirements. Although this site does not fall within MassDEP wetland jurisdiction, the Massachusetts Stormwater Standards were applied to the stormwater management design to the greatest extent practicable. The stormwater management design includes a bioretention area to treat and infiltrate the first 1" of runoff from the proposed new vehicle display area on lot 152. Overflow for the bioretention area will discharge, via a 24" diameter overflow structure, to an underground recharge chamber field (URC1) located under the proposed new 23,500 sf paved vehicle display area. The design also includes the installation of three additional underground pre-cast recharge basins and the relocation of one catch basin and recharge basin system to accommodate the additional parking on Lot 153. As part of the proposed building expansion, the existing gravel parking lot at the rear of the facilities will be re-graded and formalized drainage provided with a vegetated swale, small infiltration basin and catch basin/recharge basins. Deep sump catch basins are provided to capture sediment and outlet pipe hoods are provided to separate oils and grease as well as floatable debris. Similar to the existing facilities, all vehicle maintenance will occur within the service bays. Wash water will be captured within the relocated underground holding tank, which will be continue to be emptied monthly.

The Stormwater Management System has been designed to accomplish the following major objectives:

- To capture and treat at a minimum the first 1 inch of stormwater runoff from the proposed vehicle storage area;
- To provide groundwater recharge to the greatest extent practicable in conformance with the Massachusetts Department of Environmental Protection groundwater recharge criteria through the use of infiltration practices; and
- To minimize runoff from the post developed conditions at the study points located along the periphery of the site.

These objectives are met through the use of the following stormwater management measures:

- A bioretention area sized to treat the first 1-inch of runoff from the new vehicle display area. The shallow landscape within the bioretention area is designed to filter runoff sediment and facilitate pollutant uptake through vegetation that will be planted within the bioretention areas. The systems will be equipped with an overflow to convey runoff from larger storm events to an underground recharge chamber field;
- Vegetated swale and infiltration basin;
- Deep sump catch basins; and
- Outlet pipe hoods.

Stormwater runoff quality was evaluated to ensure that pollutant export from the project site was minimized to the maximum extent practicable. The stormwater management system for the site was designed in accordance with the DEP Stormwater Management Policy and the applicable town regulations.

Details of the proposed project are provided on the enclosed site plans entitled "*Atlantic Subaru Improvement, Bourne, Massachusetts Permitting Plans*" (dated June 2015), revised: March 2016 and June 2016.

1.3 Drainage Design Methodology and Analysis

The drainage design was completed by performing a series of tasks that included:

- Excavating soil test pits;
- Measuring soil infiltration rates;
- Determining site drainage areas and subcatchments;
- Sizing the bioretention area;
- Sizing the infiltration practices; and
- Modeling the proposed drainage network with HydroCAD® software.

The soil test pits were excavated on July 1, 2015 near the proposed bioretention and underground recharge chamber area. Soil tests results showed parent materials of very coarse to gravelly sands (HSG A). An infiltration rate of 17 in/hr was applied to the recharge areas. This rate was selected by performing double-ring infiltrometer testing within several of the excavated test pit areas. The double-ring infiltrometer test is a MADEP approved method for determining soil infiltration rates; the method used for the measurement process followed ASTM Standard Test Method D3385-03 (2003). Soil infiltration rates were measured as high 35.0 inches/hour; however, in order to provide a high margin of safety to account for partial clogging over time, the 17 in/hr rate was applied in the HydroCAD model. The data from the infiltration tests is provided in **Appendix A**.

The existing project drainage area is 5.7 acres and currently comprised of 12 subcatchments: DA1 thru DA12. Subcatchments DA1 thru DA4 are predominantly wooded vacant lots (152, 153 &154) and drain to Study Point 1 (SP1) located in the northwest corner along Dornick Road. All existing facilities, including the driveway, parking and associated buildings drain to recharge basins (RB1 thru RB6) located throughout the site and for the most part will remain unchanged. See **Appendix B** for both "Pre" and "Post" developed" Drainage Area Maps.

- DA1 is comprised of the northern portion of the project site (Lot 152) drainage area and is approximately 1.84 acre. The subcatchment is wooded and drains to SP1 at Dornick Road.

- DA2 is comprised of the central portion of the drainage area and is approximately 0.67 acres. The subcatchment is 100% wooded and drains to a small wooded depression in the northeast corner modeled as Depression 1 (P1).

- DA3 is comprised of the western portion of the drainage area and is approximately 1.02 acres. The subcatchment is 100% wooded and drains via overland flow to SP1.

- DA 4 is comprised of the rear/western portion of the drainage area, is approximately .83 acres and 59% wooded and drains to SP1. The remainder of the subcatchment is comprised of a gravel parking area and dirt road (Dornick Road).

- DA 5 is comprised of the southwestern portion of the drainage area and is approximately .13 acres. The subcatchment includes the rear portion of the existing facilities and is 74% impervious. This areas drains to an existing catch basin and one recharge chambers (RB1).

- DA6 is comprised of the southeastern portion of the drainage area and is approximately .37 acres. The subcatchment includes the rear portion of the existing building and parking area and is 64% impervious. This area drains to an existing catch basin and two recharge chambers (RB2).

- DA7 is located in the central portion of the existing facilities and includes the paved area in the northeast corner of the building. The subcatchment is approximately .05 acres and is 100% impervious. This area drains to an existing catch basin and one recharge basin (RB3).

- DA8 is located in the central portion of the drainage area and includes the paved area on the northwest side of the building. The subcatchment is approximately .07 acres and is 100% impervious. This areas drains to an existing catch basins and six recharge basins (RB4).

- DA9 is located in the central portion of the drainage area and includes the paved parking area on the northeast side of the building. The subcatchment is approximately .18 acres and is 97% impervious. This area drains to an six existing catch basins and six recharge basins (RB4).

- DA10 is located in the eastern portion of the drainage area and includes the driveway, parking area and associated landscape at the entrance of the existing facilities. The subcatchment is approximately .24 acres and is 81% impervious. This area drains to an existing catch basin and three recharge basins (RB5).

- DA11 is located in the eastern portion of the drainage area and includes the paved parking area on the northeast side of the building. The subcatchment is approximately .06 acres and is 80% impervious. This area drains to an existing catch basin and one recharge basins (RB6).

- DA12 is located in the southeastern portion of the front parking lot adjacent to Waterhouse Road, closest to Route 28. The total area of DA12 is .28 acres and is 46% impervious. This area drains to an existing catch basin and three recharge basins (RB7).

The proposed project drainage area is 5.7 acres and comprised of 13 subcatchments. All of the subcatchments remain similar to the existing drainage area, except DA2, which has been subdivided into two subcatchments DA2 and DA2a to account for the new vehicle storage area proposed on Lot 152. The remainder of the subcatchments will continue to discharge to existing locations identified above.

- DA1 is comprised of the northern portion of the project site, Lot 152, drainage area and is approximately 1.59 acre. The subcatchment is wooded and drains to study point 1 (SP1) at Dornick Road.

- DA2 has been divided into two subcatchments DA2 and DA2a. DA2 is comprised of a portion of the area included in the existing DA2 and DA1 and is approximately 0.49 acres. The subcatchment is 100% wooded and drains to a small wooded depression in the northeast corner modeled as Depression 1 (P1). DA2a is comprised of former portions of DA1, DA2 and DA3 and is approximately 0.81 acres. The subcatchment is 68% impervious and drains to bioretention area 1 (B1) and underground recharge chambers (URC1) located under the paved surfaces. Any overflow from larger rain events will drain to the IB1 located in DA2.

- DA3 is comprised of the western portion of the drainage area and is approximately 0.63 acres. The subcatchment is 100% wooded and drains via overland flow to SP1.

- DA4 is comprised of the rear/western portion of the drainage area, which includes the existing gravel lot. The area is approximately .76 acres with 32% gravel lot. The remainder of the subcatchment is comprised of wooded area. The formalized gravel lot drains to a vegetated swale and small shallow infiltration basin and two recharge basins (RB8. The remainder of the drainage areas drains via overland flow to SP1.

- DA5 is comprised of the southwestern portion of the drainage area and is approximately .14 acres. The subcatchment includes the rear portion of the lot, proposed addition and is 86% impervious. This areas drains to an relocated catch basin and one recharge chambers (RB1).

- DA6 is comprised of the southeastern portion of the drainage area and is approximately .38 acres. The subcatchment includes the rear portion of the existing building and parking area and is 70% impervious. This area drains to a relocated catch basin and 4 recharge chambers (RB2).

- DA7 is located in the central portion of the drainage area and includes the paved area in the northeast corner of the building. The subcatchment is approximately .05 acres and is 100% impervious. This area drains to an existing catch basin and one recharge basin (RB3).

- DA8 is located in the central portion of the drainage area and includes the paved area on the northwest side of the building. The subcatchment is approximately .13 acres and is 100% impervious. This area drains to an existing catch basin and six recharge chambers (RB4).

- DA9 is located in the central portion of the drainage area and includes the paved parking area on the northeast side of the building. The subcatchment is approximately .19 acres and is 100% impervious. This area drains to an existing catch basin and six recharge chambers (RB4).

- DA10 is located in the western portion of the drainage area and includes the driveway, parking area and associated landscape at the entrance of the existing facilities. The subcatchment is approximately .24 acres and is 83% impervious. This area drains to an existing catch basin and three recharge chambers (RB5).

- DA11 is located in the western portion of the drainage area and includes the paved parking area on the northeast side of the building. The subcatchment is approximately .06 acres and is 80% impervious. This area drains to an existing catch basin and one recharge chambers (RB6).

- DA12 is located in the southeastern front portion of the drainage area and includes the existing paved parking area and proposed additional six spaces. The subcatchment is approximately .28 acres and is 55% impervious. This area drains to an existing catch basin and three recharge chambers (RB7).

The proposed Stormwater Management System was designed to accommodate pre-development site hydrologic conditions as well eliminate stormwater pollution from the proposed site conditions. Stormwater runoff quantity was evaluated for the 2-year, 10-year and 25-year Type III, 24-hour storm for both pre-development and post-development conditions. The bioretention storage above the outlet structure was modeled as a separate pond (BO1) to account for additional storage and overflow for the larger rain events (50 & 100 YR).

The Stormwater Management System was sized to treat the 1 -inch of runoff from the site. Pre-development and post-development conditions were modeled using HydroCAD software, which combines USDA Soil Conservation Service hydrology and hydraulic techniques (commonly known as SCS TR-55 and TR-20) to generate hydrographs (**Appendix C**). The rainfall amounts used for calculating runoff for the storm events were obtained from the Rainfall Frequency Atlas of the United States (TP40) (**Appendix D**).

Table 1: Peak Flow and Volume Comparison

Study Point 1 (SP1)

DESIGN STORM	PRE-DEVELOPMENT		POST-DEVELOPMENT		PERCENT REDUCTION	
	PEAK FLOW (CFS)	VOLUME (AF)	PEAK FLOW (CFS)	VOLUME (AF)	PEAK FLOW	VOLUME
2 YR	0.02	0.01	0.01	0.005	50%	50%
10 YR	0.18	0.033	0.10	0.022	44%	33%
25 YR	0.45	0.066	0.24	0.049	47%	26%

2.0 COMPLIANCE WITH MassDEP STORMWATER STANDARDS

The Massachusetts Stormwater Standards were revised in February 2008 to include ten stormwater management standards, established jointly by MassDEP and the Office of Coastal Zone Management and published in the 2008 update of the Stormwater Management Handbook. Projects that are within the jurisdiction of the Wetlands Protection Act Regulations, 310 CMR 10.00 are subjected to these Stormwater Management Standards. For this project, adherence to the Handbook is not required because it is not within the jurisdiction of the Wetlands Protection Act. However, the stormwater management system was designed in accordance with the MASWS to maximum extents practicable and in accordance with the Town of Bourne Regulations and Bylaws.

The following is a list of Stormwater Management Standards and accompanying description of compliance for the Atlantic Subaru site improvements.

1. No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

No new untreated stormwater runoff will be directed to any off-site wetlands. Runoff from all proposed impervious areas will be treated by bioretention areas and infiltration practices.

2. Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

Discharge rates for pre and post-development were calculated using HydroCAD® 2009, and SCS-TR20 based stormwater modeling computer program (**Appendix C**). Post-development peak discharge rates are equal to or less than Pre-development conditions for the 2-year, 10-year, and 25-year. A comparison summary table of the peak flows and volumes is shown in **Table 1**.

3. Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The stormwater management system is designed to infiltrate up to the 25-year event for all of the new impervious area. The proposed stormwater design mimics natural processes by directing runoff to vegetated swales, bioretention systems, and infiltration basins. Recharge calculations are provided in **Appendix F.**

4. Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

- **Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;**
- **Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and**

- **Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.**

The project satisfies all three of the above requirements. Source controls and pollution prevention will be controlled by the methods outlined in the Stormwater Operation and Maintenance Plan. The stormwater management treatment system for the site has been selected and sized to equal or exceed the required 80% average annual load of TSS, as follows:

Sediment Forebay:	Recommended design rate:	25%
Bioretention Filters:	Recommended design rate:	90%
Underground Recharge Chambers:	Recommended design rate:	80%
Vegetated Swale:	Recommended design rate:	25%
Infiltration Basin:	Recommended design rate:	80%
Deep Sump Catch Basin:	Recommended design rate:	25%
Leaching Catch Basin:	Recommended design rate:	80%

The proposed Operation and Maintenance Plan is designed to ensure that the stormwater system continues to function as it was designed into the future. TSS removal calculations are provided in **Appendix G**.

5. For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated there under at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

The proposed project site will not include any land uses with higher potential pollutant load (LUHPPL). All vehicle maintenance is provided within the interior service bays and water collected is stored in an onsite holding tank.

6. Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314

CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

The site is not within a Zone II wellhead protection recharge area.

7. A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

The project is classified as new development.

8. A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

Silt fence will be placed at all down-sloping areas and within above-ground stormwater BMPs to prevent erosion and sedimentation at these locations. Storm drain inlet protection will be provided at all existing drainage structures.

9. A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

The long-term stormwater operation and maintenance plan is provided in Stormwater Operation and Maintenance Plan.

10. All illicit discharges to the stormwater management system are prohibited.

There will be no illicit discharges to the stormwater management system. The Long-Term Pollution Prevention Plan provided in Stormwater Operation and Maintenance Plan includes measures to prevent illicit discharges. An illicit discharge compliance statement will be submitted prior to the discharge of any stormwater to post-construction BMPs.

3.0 POST-CONSTRUCTION STORMWATER MANAGEMENT

Stormwater treatment and conveyance for the newly constructed areas will be provided by the following proposed BMPs.

3.1. Bioretention Facilities

The bioretention facilities (also referred to as a “rain garden” or a “biofilter”) is a stormwater management practice to manage and treat stormwater runoff using a conditioned planting soil bed and planting materials to filter runoff stored within a shallow depression. The method combines physical filtering and adsorption with bio-geochemical processes to remove pollutants. The system consists of an

inflow component, a pretreatment element, an overflow structure, an underdrain, a shallow ponding area (6 inches deep), a surface organic layer of mulch, a planting soil bed, and plant materials.

3.2. Vegetated Swale

Vegetated swales are concave, conveyance systems that can improve water quality through infiltration and filtering. When designed properly, they can be used to retain and treat stormwater runoff. Dry swales are appropriate in areas where standing water is not desirable such as residential, commercial, industrial areas and parking areas. Vegetated swales are typically constructed with slopes ranging from 0.5% (min.) to 2% (max.).

3.3. Infiltration Basin

An infiltration basin is a shallow impoundment that is designed to infiltrate stormwater into the soil. These basins are sized to provide storage and exfiltration for recharge volume and treatment for water quality. Infiltration basins are designed to maximize pollutant removal efficiency, and can also help recharge the groundwater, thus restoring low flows to stream systems. They also attenuate peak discharges.

3.4. Underground Recharge Chambers

On-site, underground stormwater retention /detention capture and stores stormwater collected from surrounding impervious areas. Riser pipes or curb cuts lead surface storm water to subsurface vaults, systems of large diameter interconnected storage pipes or underground stormwater recharge units. Stored water is then released directly through an outlet pipe back into natural waters at rates designed to reduce peak water flows during storms to mimic pre-development conditions. Use of underground stormwater recharge units allows the stored stormwater water to infiltrate into the subsurface to recharge groundwater**.**

4.0 POLLUTANT CONTROLS

Perimeter controls and sediment settling devices will be installed during construction to minimize sediment movement in stormwater and to protect the adjacent wetland and any associated buffers on the property.

4.1. Structural Practices

The following are the structural practices that will be implemented as part of the construction activity.

- Silt Fence will be installed prior to commencement of construction. This type of practice creates erosion control barriers to intercept sediment in diffuse runoff. The Town will be informed upon installation so that they may inspect these barriers prior to construction. Portions of the erosion control barriers will be replaced and/or repaired as necessary to prevent erosion. Barriers will be installed parallel to land slope at the perimeter of the work site.

- Silt Sacks (or approved equivalent) will be installed at identified existing catch basins and following construction of the proposed catch basins to prevent sedimentation during

construction. The silt sack will be emptied/replaced and disposed of off-site if damage is observed.

- Bioretention Area(s), infiltration basins(s) and vegetated swales will be graded to within one foot of design elevations until site is fully stabilized to capture sediment during construction. Heavy equipment will not be allowed to operate on the surface location where the systems are planned because soil compaction can adversely impact their long-term performance. Silt fencing will be utilized around the perimeter of the bioretention systems during construction. Light earth-moving equipment will be used for excavation and construction of the systems. All excavated materials from the area will be removed and disposed of in an approved location. All bioretention areas will be inspected at least once every seven calendar days and immediately after storm events by the Construction Manager.

- Slope Stabilization will occur immediately upon obtaining final grades as shown on the project site plans. Areas that fail to stabilize will be re-graded to final grade and stabilized as necessary. Amount of land disturbed will be minimized to reduce potential for erosion and sedimentation. Stabilization measures shall be initiated within 14 days following the end of construction at each portion of the site and as soon as practicable.

The entire stormwater management system including piping, inlets, swales infiltration basin and bioretention facility will be inspected upon completion of construction. Sediment will be removed from all elements of the stormwater management system. All control measures must be installed and maintained in accordance with manufacturer's specifications, good engineering practices, and in accordance with this report (every seven calendar days and after storm events). If inspections show that a control has failed or been installed incorrectly, the Operator must replace or modify it within 24 hours.

4.2. Stabilization Practices

The amount of land disturbed during construction will be minimized to reduce the potential for erosion and sedimentation. Prompt surface stabilization will be practiced to control erosion in areas where disturbances cannot be avoided during construction. Stabilization measures shall be initiated within 14 days following the end of construction at each portion of the site. Exceptions to this requirement are allowable when snow cover prevents the initiation of stabilization within 14 days, in which case such measures shall be undertaken as soon as possible.

Stabilization measures that will be, or may be, used during construction are described below:

- Temporary Seeding – Temporary seeding of disturbed surfaces with fast-growing grasses (annual rye) to provide greater resistance to stormwater runoff and/or wind erosion for areas where construction has temporarily ceased.

- Permanent Seeding – Permanent seeding of surfaces with vegetation, including but not limited to grass, trees, bushes, and shrubs, to stabilize the soil. Establishing a permanent and sustainable ground cover at a site stabilizes the soil while reducing the sediment content in runoff.

- Permanent Planting –establish all planting as required at the completion of the project.

- Erosion Control Blankets- install erosion control blankets along all 4: 1 slopes or greater.

- Mulching – materials, including but not limited to hay, grass, woodchips, straw, and gravel will be placed on the soil surface to cover and hold in place disturbed soils.

Temporary seeding or other soil stabilization measures will be provided where construction activities have ceased at the site. Topsoil stockpiles will be temporarily seeded or covered to prevent erosion, and will be surrounded with silt fence or strawbales. When the site's final grade has been established, permanent vegetation will be planted on the disturbed areas. The vegetation will consist of grass, shrubs, bushes, and trees in the locations indicate on the plans.

4.3. Other Types of Controls

Additional controls/practices will be undertaken to reduce pollution in stormwater runoff flows which include, but are not limited to, control of off-site mud tracking from construction site, dust suppression, proper sanitary waste disposal, earthwork procedures timed and conducted in manners aimed to minimize erosion and sedimentation, snow removal plans, proper management of waste materials, proper management of hazardous waste, proper material stockpiling, and spill prevention and control measures.

- Dust Suppression – Water sprays shall be used to control dust during extended dry periods during construction.

- Earthwork – The exposure of disturbed surfaces to stormwater and potential stormwater erosion will be minimized by well organized earthwork procedures. Stabilization procedures shall be undertaken in accordance with this report. Grubbing during wet seasons will be avoided if feasible.

- Waste Materials – Dumpsters rented from a licensed solid waste management company will be used to store solid waste and debris that cannot be recycled, reused or salvaged. The dumpsters will meet all local and state solid waste management regulations. Dumpsters will be covered when refuse is not being directly deposited or withdrawn from them. Potentially hazardous wastes will be separated from normal wastes, including segregation of storage areas and proper labeling of containers. Removal of all waste from the site will be performed by licensed contractors in accordance with applicable regulatory requirements and disposed of at either local or regional approved facilities. Waste materials will not be buried on-site. All site personnel will be instructed regarding the correct procedures for waste disposal. Notices stating these procedures will be posted at the site. Solvents and flushing materials used during construction and pre-operational cleaning will be provided, handled, managed, and removed by the contractor for appropriate off-site disposal.

- Hazardous Waste Materials – Any disposal of hazardous materials will be completed using the required paperwork. Copies will be provided to the Engineer and to the Town.

- Spill Prevention and Control Measures – To minimize the risk of spills or other accidental exposure of materials and substances to stormwater runoff, the following material management practices will be used throughout the project:

    - An effort will be made to store only enough products required to do the job.
    - All materials stored on-site 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 manufacturer.
    - Whenever possible, the maximum amount of a product will be used before disposing of the container.
    - Manufacturers' recommendations for proper use and disposal will be followed.
    - The site superintendent will conduct daily inspections to ensure proper use and disposal of materials.

  To reduce the risk associated with hazardous materials used on the site, the following practices will be used:

    - Products will be kept in original containers unless they are not resealable.
    - Original labels and material safety data sheets will be retained and kept on-site; they contain important product information.
    - If surplus product must be disposed of, manufacturers' or local and state recommended methods for proper disposal will be followed.

- Materials List - Materials or substances listed below are expected to be present on-site during construction:

  - Concrete
  - Asphalt
  - Paints (enamel and latex)
  - Metal Studs
  - Concrete
  - Sealants
  - Fertilizers
  - Petroleum Based Products
  - Cleaning Solvents
  - Wood
  - Tar
  - Adhesives

  The following product-specific practices will be followed on-site:

  Petroleum Products - All on-site vehicles will be monitored for leaks and receive preventative maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which area clearly labeled. Any asphalt substances used on-site will be applied according to the manufacturers' recommendations.

  Fertilizers – Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to stormwater. Products will be stored in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

Paints – All containers will be tightly sealed and stored indoors when not required for use. Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to the manufacturers' instructions or state and local regulations.

Concrete Trucks – Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site.

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted, and site personnel will be made aware of the procedures and location of the information and cleanup supplies.

- Materials and equipment necessary for spill cleanup will be kept in the material storage area on-site. Equipment and materials will include, but not be limited to, brooms, dust pans, mops, rags, gloves, goggles, speedi-dry, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

- All spills will be cleaned up immediately after discovery. Spills large enough to reach the storm water system will be reported to the National Response Center at 1-800-424-8802.

- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

- Spills of toxic or hazardous material will be reported to the appropriate state or local government agency, regardless of the size.

- The site superintendent responsible for the day-to-day site operations will be the spill prevention and clean-up coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the material storage area and in the on-site office trailer.

5.0 REFERENCES

1. ASTM (American Society of Testing and Materials). 2003. ASTM D3385-03 Standard test method for field measurement of infiltration rate of soils in field using double-ring infiltrometer.

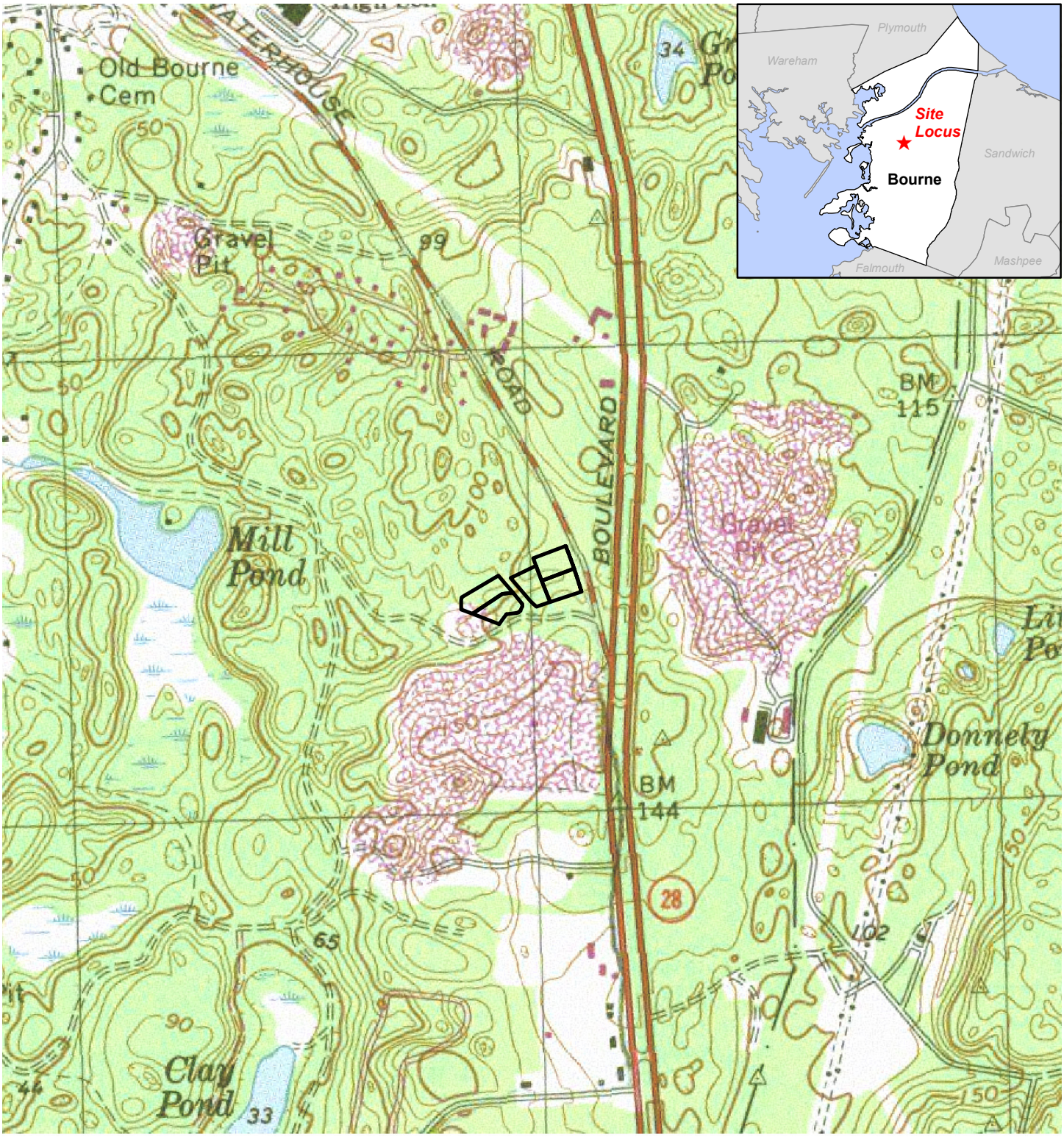
2. Federal Emergency Management Agency (FEMA). See their homepage at: http://www.fema.gov/

3. Massachusetts Department of Environmental Protection. See their homepage at www.state.ma.gov/dep

4. Massachusetts Department of Environmental Protection. 2008. Massachusetts Stormwater Standards Manual.

5. Massachusetts Office of Geographic and Environmental Information (MassGIS). See their homepage at: http://www.mass.gov/mgis/.

Figures



Document Path: H:\Projects\2014\14028 Atlantic Subaru Survey\GIS\Maps\USGS.mxd

*Pocasset Topographic Quadrangle

Legend

Site Parcels

N

Feet

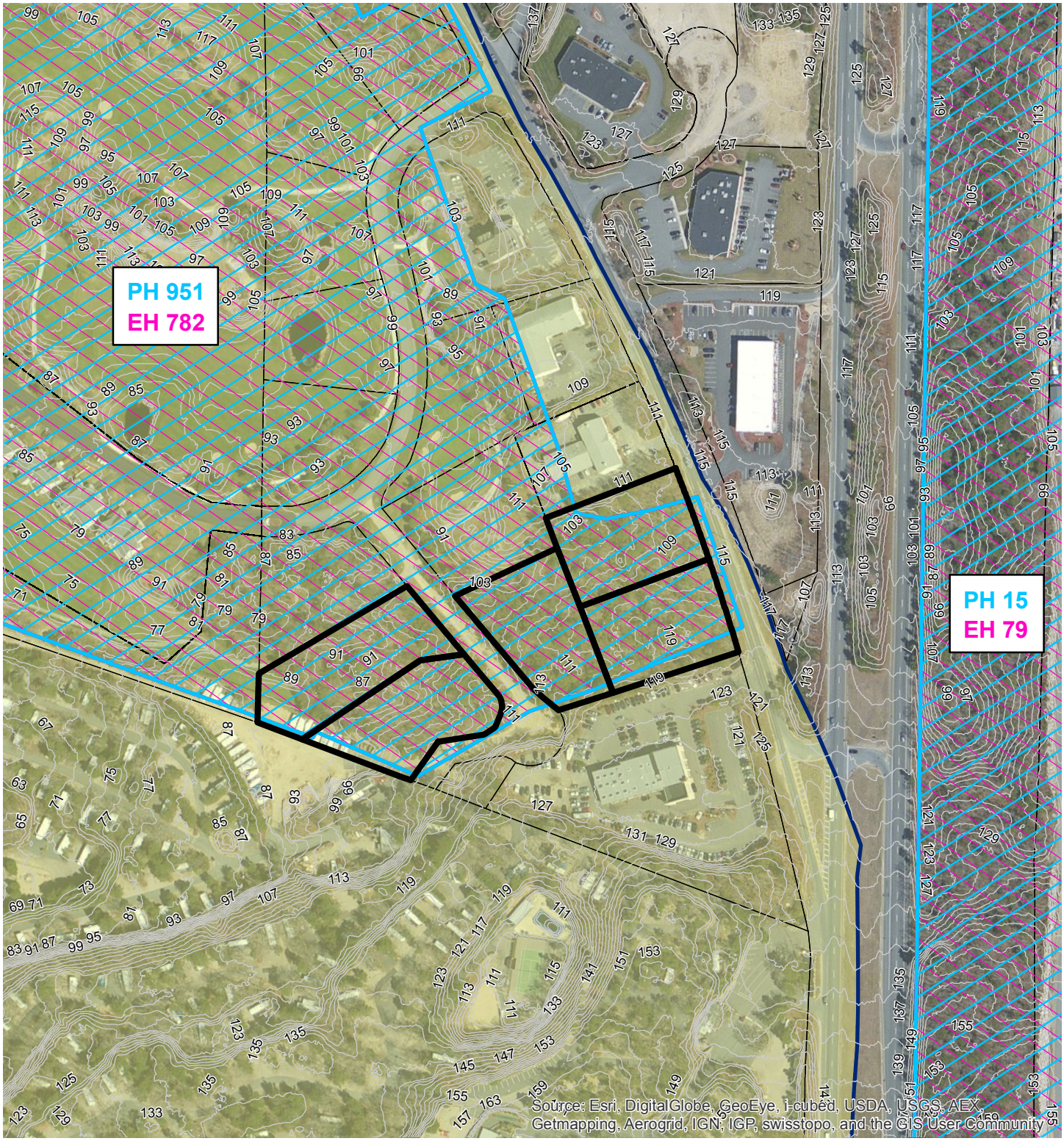
1,000

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Sandwich, MA • 02563
Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

USGS Topographic Quadrangle
122 Waterhouse Road
Bourne, MA

Date: 6/10/2014

Figure 1



Document Path: H:\Projects\2014\14028 Atlantic Subaru Survey\GIS\Maps\Updated_Constraints.mxd

Legend

- Site Parcels
- Parcels
- 2ft. Contours
- NHESP Priority Habitats of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- ACECs - Bourne Back River

N

250 Feet

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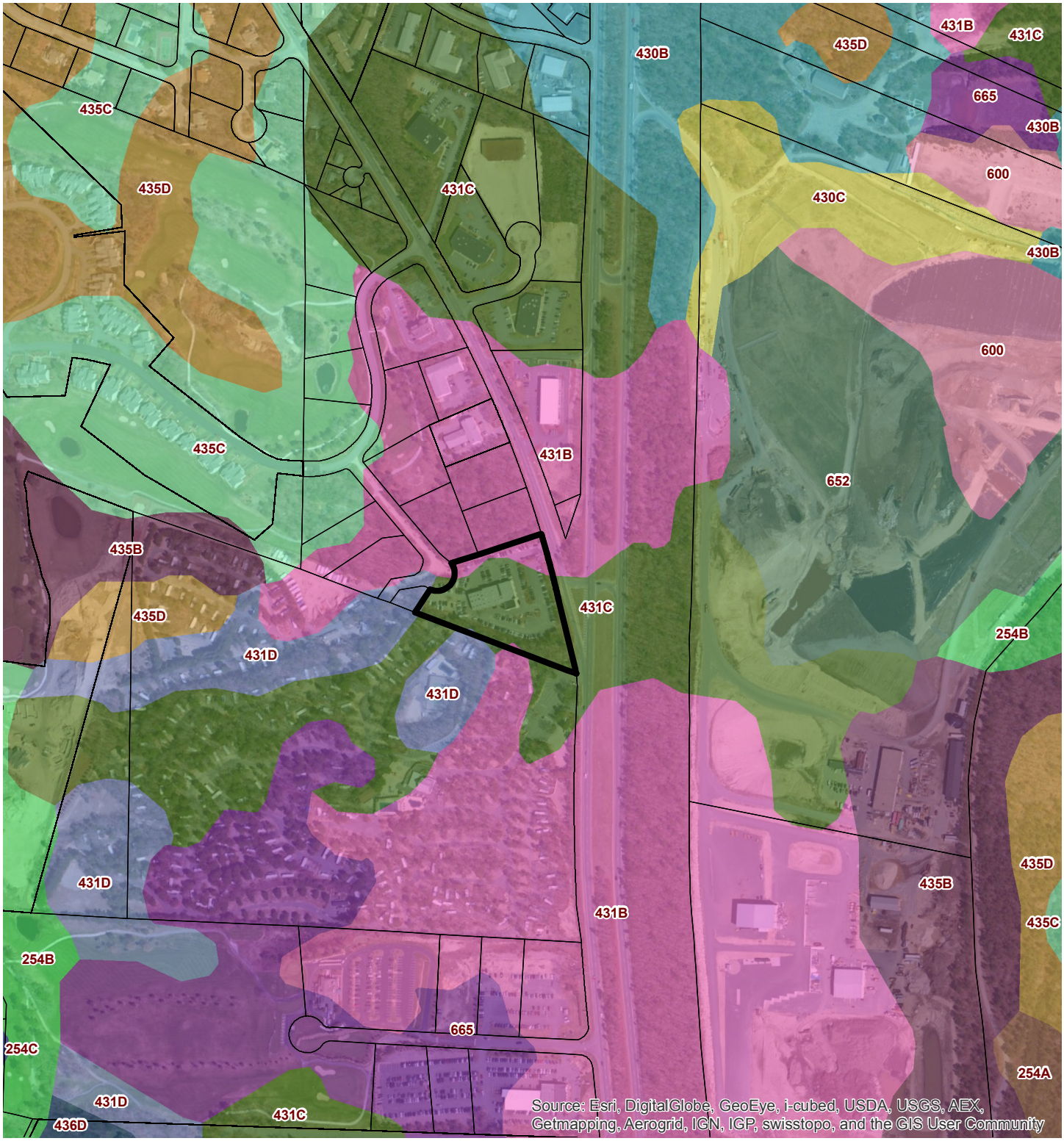
Existing Constraints
122 Waterhouse Road
Bourne, MA

Date: 6/10/2014

Figure 2



Document Path: H:\Projects\2014\14028 Atlantic Subaru Survey\GIS\Maps\Soils.mxd

Legend

- Site Parcel
- Parcels
- 254A, Merrimac
- 254B, Merrimac
- 254C, Merrimac
- 430B, Barnstable
- 430C, Barnstable
- 431B, Barnstable
- 431C, Barnstable
- 431D, Barnstable
- 435B, Plymouth
- 435C, Plymouth
- 435D, Plymouth
- 436D, Plymouth
- 600, Pits
- 652, Dumps
- 665, Udipsamments

N

0 500

1" = 500 feet

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Barnstable County Soils
Atlantic Subaru
124 Waterhouse Rd
Bourne, MA 02532

Date: 5/1/2014

Figure 3

Document Path: H:\Projects\2014\14028 Atlantic Subaru Survey\GIS\Maps\gwcontours.mxd

**Groundwater Contours - Cape Cod Commission GIS*

Legend

- Site Parcel
- Parcels
- Groundwater Contours

N

Feet

750

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Groundwater Contours
124 Waterhouse Road
Bourne, MA

Date: 6/3/2014

Figure 4

Appendix A

Site Soil Evaluation

Horsley Witten Group
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MEMORANDUM

TO: Levon Semerjian

FROM: Joe Henderson, P.E.

DATE: July 2, 2015

RE: Atlantic Subaru – Bourne, MA
Soil Test Testing

CC: Brian Kuchar, P.E.

Horsley Witten Group, Inc. (HW) has recently conducted three soil test holes, a percolation test and a double ring infiltrometer tests at the Atlantic Subaru property, located at 124 Waterhouse Road. Test pits 1 & 2 along with the percolation test data will be used to size the septic leaching field and were witnessed by Terri Guarino the Bourne Health Agent. The infiltrometer test will be used to determine the infiltration rate used in sizing the Underground Infiltration Chambers (UIC) drainage system. Test pit logs along with percolation and infiltrometer testing data are attached.

The soil test holes were located at the location of the proposed leaching field. Soils in test pits 1 & 2 were loamy sand to a depth of 2 feet underlain by fine – medium sand to a depth of approximately 10-feet. Some pockets of firm loamy sand material were observed at a depth of 6-feet in test pit 2 and the extent of the material should be monitored during construction. A percolation test was performed at Test Pit 1 and resulted in a percolation rate of less than 2 minutes per inch. Test hole 3 was located at the location of the UIC drainage system and consisted of loamy sand to a depth of approximately 4 feet underlain by fine – medium sand to a depth of 10-feet.

The double ring infiltrometer test was used to measure the infiltration capacity of the parent soil material where the UIC system is located. The double-ring infiltrometer test is a MADEP approved method for determining soil infiltration rates; the method used for the measurement process followed ASTM Standard Test Method D3385-03 (2003). The infiltration test results in the location of UIC system revealed an infiltration rate of 35 in/hr, however, rates this high prove to be difficult to accurately measure with the double ring infiltrometer device. To be conservative in the HydroCAD drainage model, a reduced rate of 17 in/hr will be used for all proposed infiltration areas. This rate is approximately 50% of the measured in-situ infiltration rate and coincides with the requirements set forth in the Massachusetts Stormwater Management Standards. A conservative rate allows for a high margin of safety if partial system clogging were to occur over time.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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: Barnstable County, Massachusetts
Survey Area Data: Version 11, Sep 24, 2014

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—Oct 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

Barnstable County, Massachusetts (MA001)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
431B	Barnstable sandy loam, 3 to 8 percent slopes, very stony	10.9	61.0%
431C	Barnstable sandy loam, 8 to 15 percent slopes, very stony	5.1	28.6%
431D	Barnstable sandy loam, 15 to 25 percent slopes, very stony	1.7	9.5%
435C	Plymouth loamy coarse sand, 8 to 15 percent slopes	0.2	0.9%
Totals for Area of Interest		**17.8**	**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.

Barnstable County, Massachusetts

431B—Barnstable sandy loam, 3 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 98pv
Elevation: 0 to 1,000 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 160 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Barnstable

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable loamy ablation till over reworked sandy glaciofluvial deposits; loamy ablation till over reworked sandy outwash

Typical profile

H1 - 0 to 1 inches: sandy loam
H2 - 1 to 23 inches: sandy loam
H3 - 23 to 64 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent
Percent of area covered with surface fragments: 2.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.0 inches)

Interpretive groups

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

Minor Components

Plymouth

Percent of map unit: 10 percent

Nantucket
Percent of map unit: 8 percent

Carver
Percent of map unit: 7 percent

431C—Barnstable sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting
National map unit symbol: 98pw
Elevation: 0 to 1,000 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 160 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Barnstable and similar soils: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Barnstable

Setting
Landform: Ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable loamy ablation till over reworked sandy glaciofluvial deposits; loamy ablation till over reworked sandy outwash

Typical profile
H1 - 0 to 1 inches: sandy loam
H2 - 1 to 23 inches: sandy loam
H3 - 23 to 64 inches: coarse sand

Properties and qualities
Slope: 8 to 15 percent
Percent of area covered with surface fragments: 2.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Minor Components

Carver
Percent of map unit: 10 percent

Plymouth
Percent of map unit: 10 percent

Nantucket
Percent of map unit: 10 percent

431D—Barnstable sandy loam, 15 to 25 percent slopes, very stony

Map Unit Setting
National map unit symbol: 98px
Elevation: 0 to 1,000 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Barnstable and similar soils: 65 percent
Minor components: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Barnstable

Setting
Landform: Ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable loamy ablation till over reworked sandy glaciofluvial deposits; loamy ablation till over reworked sandy outwash

Typical profile
H1 - 0 to 1 inches: sandy loam
H2 - 1 to 23 inches: sandy loam
H3 - 23 to 64 inches: coarse sand

Properties and qualities
Slope: 15 to 25 percent
Percent of area covered with surface fragments: 2.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Minor Components

Plymouth
Percent of map unit: 10 percent

Nantucket
Percent of map unit: 9 percent

Hinckley
Percent of map unit: 8 percent

Carver
Percent of map unit: 8 percent

435C—Plymouth loamy coarse sand, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 98rt
Elevation: 0 to 1,000 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Plymouth and similar soils: 65 percent
Minor components: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plymouth

Setting
Landform: Ice-contact slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loose sandy glaciofluvial deposits and/or loose sandy ablation till; loose sandy ablation till and/or loose sandy glaciofluvial deposits

Typical profile
H1 - 0 to 3 inches: loamy coarse sand

H2 - 3 to 29 inches: gravelly loamy coarse sand
H3 - 29 to 64 inches: gravelly coarse sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Very high
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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A

Minor Components

Carver

Percent of map unit: 15 percent

Hinckley

Percent of map unit: 8 percent

Nantucket

Percent of map unit: 6 percent

Barnstable

Percent of map unit: 6 percent

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
www.horsleywitten.com

Double Ring Infiltrometer Test Results
Project: Atlantic Subaru
Project No: 14028
Performed By: JEH (HW)
Calculated By: JEH
Checked By: BRK

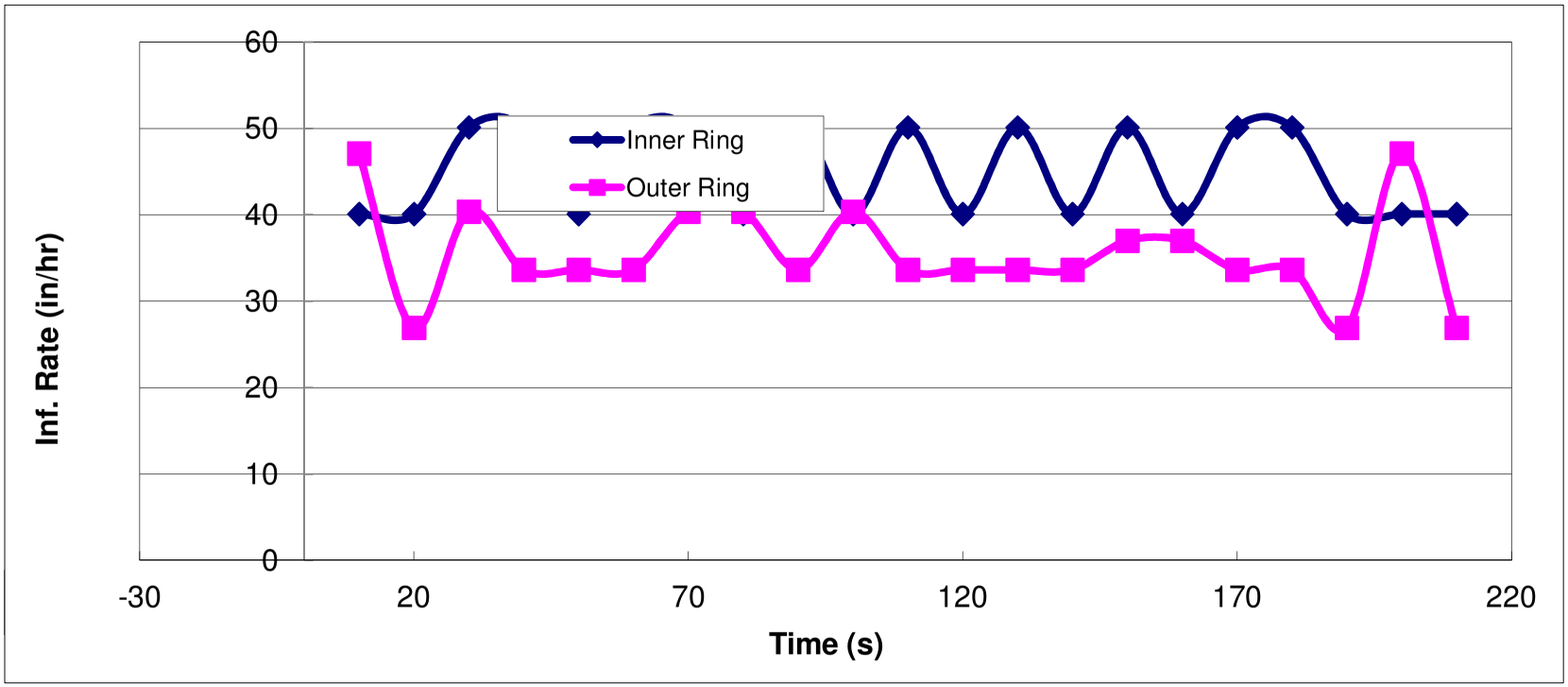
Location: UIC1
Date: 7/1/15
Time: 12:00
Test #: 1

	Depth of Water, H (in)		Ring Penetration Depth (in)	
	inner	outer	inner	outer
H_{init}	5	5	3	3
H_{final}	5	5		

Weather: Sunny
Air (°F): 75
H_2O (°F): ~50

Time (mm:ss)	Time (s)	Δ Time (s)	Inner Ring Level (cm3)	Inner Ring Δ Level (cm3)	Inner Ring IC (cm/s)	Inner Ring IC (cm/hr)	Inner Ring IC (in/hr)	Outer Ring Level (cm3)	Outer Ring Δ Level (cm3)	Outer Ring IR (cm/s)	Outer Ring IR (cm/hr)	Outer Ring IC (in/hr)
0:00	0	0		-	-	-	-		-	-	-	-
0:10	10	10	200	200	0.028	102	40	700	700	0.033	120	47
0:20	20	10	400	200	0.028	102	40	1100	400	0.019	68	27
0:30	30	10	650	250	0.035	127	50	1700	600	0.028	103	40
0:40	40	10	900	250	0.035	127	50	2200	500	0.024	85	34
0:50	50	10	1100	200	0.028	102	40	2700	500	0.024	85	34
1:00	60	10	1350	250	0.035	127	50	3200	500	0.024	85	34
1:10	70	10	1600	250	0.035	127	50	3800	600	0.028	103	40
1:20	80	10	1800	200	0.028	102	40	4400	600	0.028	103	40
1:30	90	10	2050	250	0.035	127	50	4900	500	0.024	85	34
1:40	100	10	2250	200	0.028	102	40	5500	600	0.028	103	40
1:50	110	10	2500	250	0.035	127	50	6000	500	0.024	85	34
2:00	120	10	2700	200	0.028	102	40	6500	500	0.024	85	34
2:10	130	10	2950	250	0.035	127	50	7000	500	0.024	85	34
2:20	140	10	3150	200	0.028	102	40	7500	500	0.024	85	34
2:30	150	10	3400	250	0.035	127	50	8050	550	0.026	94	37
2:40	160	10	3600	200	0.028	102	40	8600	550	0.026	94	37
2:50	170	10	3850	250	0.035	127	50	9100	500	0.024	85	34
3:00	180	10	4100	250	0.035	127	50	9600	500	0.024	85	34
3:10	190	10	4300	200	0.028	102	40	10000	400	0.019	68	27
3:20	200	10	4500	200	0.028	102	40	10700	700	0.033	120	47
3:30	210	10	4700	200	0.028	102	40	11100	400	0.019	68	27
					Avg	**114**	**45**			**Avg**	**90**	**36**

Area Inner Ring (cm2)	**707**
Area Outer Ring (cm2)	**2827**
Area Annular Space (cm2)	**2107**



Horsley Witten Group, Inc.
Sustainable Environmental Solutions
www.horsleywitten.com

Double Ring Infiltrometer Test Results
Project: Atlantic Subaru
Project No: 14028
Performed By: JEH (HW)
Calculated By: JEH
Checked By: BRK

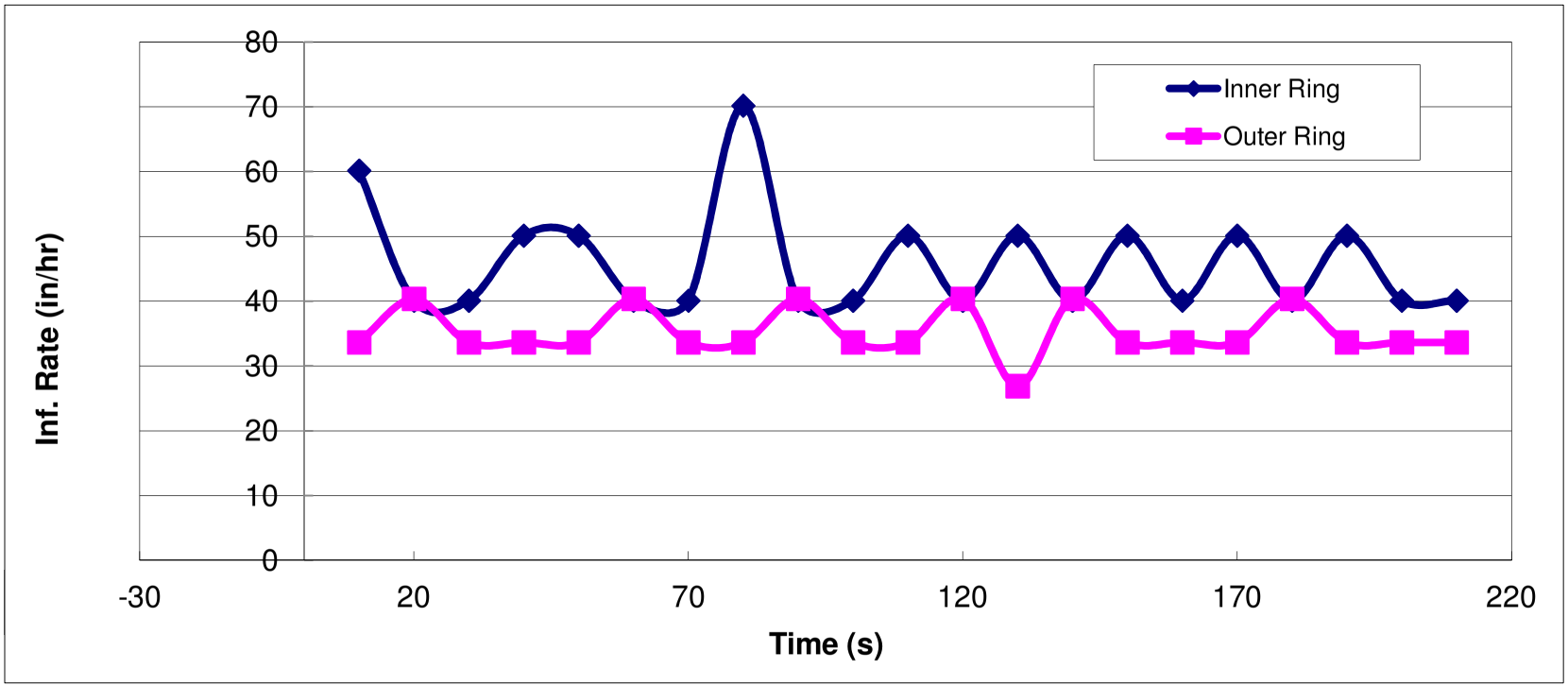
Location: UIC1
Date: 7/1/15
Time: 12:00
Test #: 2

	Depth of Water, H (in)		Ring Penetration Depth (in)	
	inner	outer	inner	outer
H_{init}	5	5	3	3
H_{final}	5	5		

Weather: Sunny
Air (°F): 75
H_2O (°F): ~50

Time (mm:ss)	Time (s)	Δ Time (s)	Inner Ring Level (cm3)	Inner Ring Δ Level (cm3)	Inner Ring IC (cm/s)	Inner Ring IC (cm/hr)	Inner Ring IC (in/hr)	Outer Ring Level (cm3)	Outer Ring Δ Level (cm3)	Outer Ring IR (cm/s)	Outer Ring IR (cm/hr)	Outer Ring IC (in/hr)
0:00	0	0		-	-	-	-		-	-	-	-
0:10	10	10	300	300	0.042	153	60	500	500	0.024	85	34
0:20	20	10	500	200	0.028	102	40	1100	600	0.028	103	40
0:30	30	10	700	200	0.028	102	40	1600	500	0.024	85	34
0:40	40	10	950	250	0.035	127	50	2100	500	0.024	85	34
0:50	50	10	1200	250	0.035	127	50	2600	500	0.024	85	34
1:00	60	10	1400	200	0.028	102	40	3200	600	0.028	103	40
1:10	70	10	1600	200	0.028	102	40	3700	500	0.024	85	34
1:20	80	10	1950	350	0.050	178	70	4200	500	0.024	85	34
1:30	90	10	2150	200	0.028	102	40	4800	600	0.028	103	40
1:40	100	10	2350	200	0.028	102	40	5300	500	0.024	85	34
1:50	110	10	2600	250	0.035	127	50	5800	500	0.024	85	34
2:00	120	10	2800	200	0.028	102	40	6400	600	0.028	103	40
2:10	130	10	3050	250	0.035	127	50	6800	400	0.019	68	27
2:20	140	10	3250	200	0.028	102	40	7400	600	0.028	103	40
2:30	150	10	3500	250	0.035	127	50	7900	500	0.024	85	34
2:40	160	10	3700	200	0.028	102	40	8400	500	0.024	85	34
2:50	170	10	3950	250	0.035	127	50	8900	500	0.024	85	34
3:00	180	10	4150	200	0.028	102	40	9500	600	0.028	103	40
3:10	190	10	4400	250	0.035	127	50	10000	500	0.024	85	34
3:20	200	10	4600	200	0.028	102	40	10500	500	0.024	85	34
3:30	210	10	4800	200	0.028	102	40	11000	500	0.024	85	34
					Avg	**116**	**46**			**Avg**	**90**	**35**

Area Inner Ring (cm2)	**707**
Area Outer Ring (cm2)	**2827**
Area Annular Space (cm2)	**2107**



Appendix B

Drainage Area Maps

Revisions

Rev.	Date	By	Appr.	Description

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
90 Route 6A
Sandwich, MA 02563
508-833-6600 voice
508-833-3150 fax

Checked By: BRK
Drawn By: BRK
Designed By:
Date: 07/08/15

Plan Set:

Plan Title:

ATLANTIC SUBARU
BOURNE, MASSACHUSETTS
EXISTING DRAINAGE MAP

Prepared For:
Atlantic Subaru
124 Waterhouse Road
Bourne, MA
Phone:(508) 759-6000
Fax:(508) 759-4595

Survey Provided By:
Horsley Witten Group, Inc.
90 Route 6A
Phone:(508) 833-6600
Fax:(508) 833-3150
Date:MARCH 2014

Registrations:

Project Number:
14028

Sheet Number:
1 of 2

last modified: 06/21/16 printed: 06/21/16 by bk H:\Projects\2014\14028 Atlantic Subaru Survey\Drawings - 14028\14028-MISC\14028-DR.dwg

Revisions

Rev.	Date	By	Appr.	Description

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
90 Route 6A
Sandwich, MA 02563
508-833-6600 voice
508-833-3150 fax

Checked By: BRK
Drawn By: BRK
Design By:
Date: 06/20/16

Plan Set:

ATLANTIC SUBARU
BOURNE, MASSACHUSETTS

Plan Title:

PROPOSED DRAINAGE MAP

Prepared For:
Atlantic Subaru
124 Waterhouse Road
Bourne, MA
Phone:(508) 759-5000
Fax:(508) 759-4595

Survey Provided By:
Horsley Witten Group, Inc.
90 Route 6A
Phone:(508) 833-6600
Fax:(508) 833-3150
Dated:MARCH 2014

Registration:

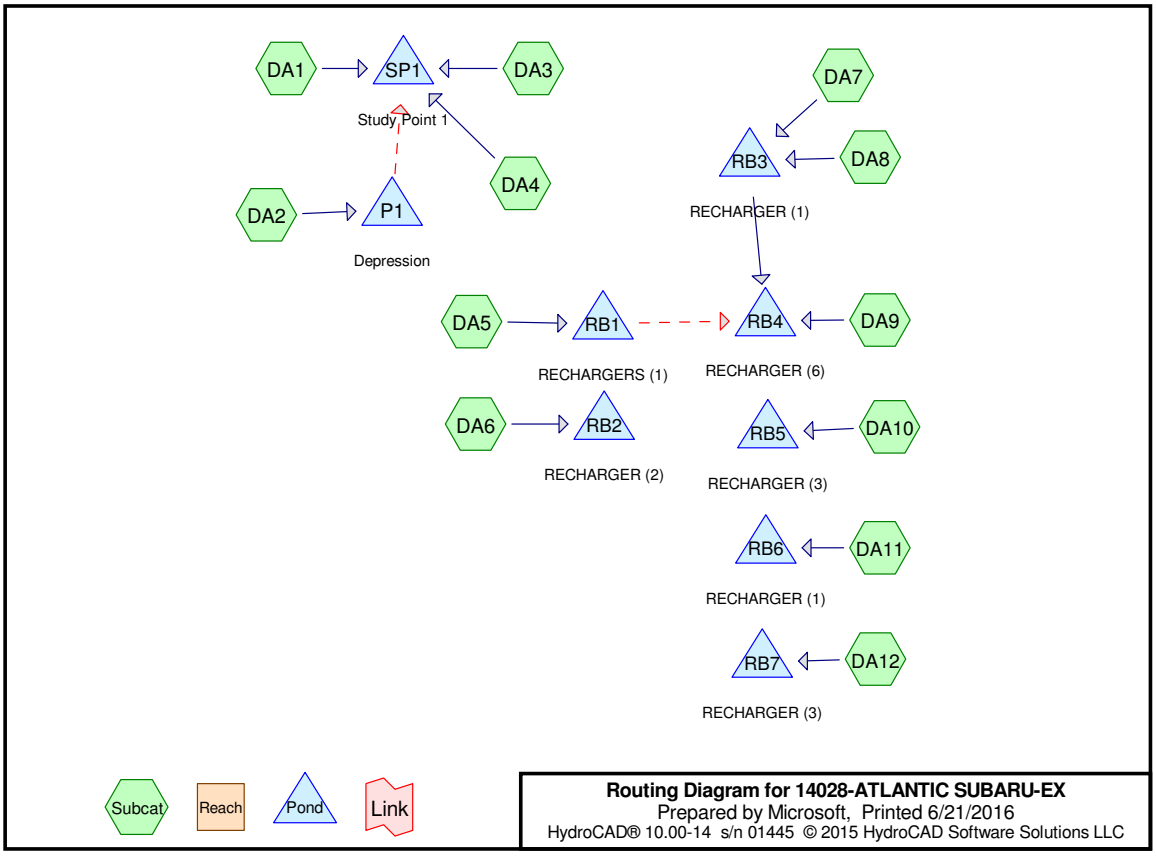
Project Number:
14028

Sheet Number:
1 of 2

last modified: 06/21/16 printed: 06/21/16 by bk H:\Projects\2014\14028 Atlantic Subaru Survey\Drawings 14028\14028-MISC\14028-DR.dwg

Appendix C

HydroCAD® Drainage Calculations



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.176	39	>75% Grass cover, Good, HSG A (DA10, DA11, DA12, DA9)
0.339	72	Dirt roads, HSG A (DA4)
0.162	98	Ex. Paved parking, HSG A (DA6)
0.148	98	Paved parking, HSG A (DA5, DA7)
0.619	98	Paved roads w/curbs & sewers, HSG A (DA10, DA11, DA12, DA8, DA9)
0.075	98	Roofs, HSG A (DA6)
4.090	30	Woods, Good, HSG A (DA1, DA12, DA2, DA3, DA4, DA5)
0.133	32	Woods/grass comb., Good, HSG A (DA6)
5.741	**45**	**TOTAL AREA**

Summary for Subcatchment DA1:

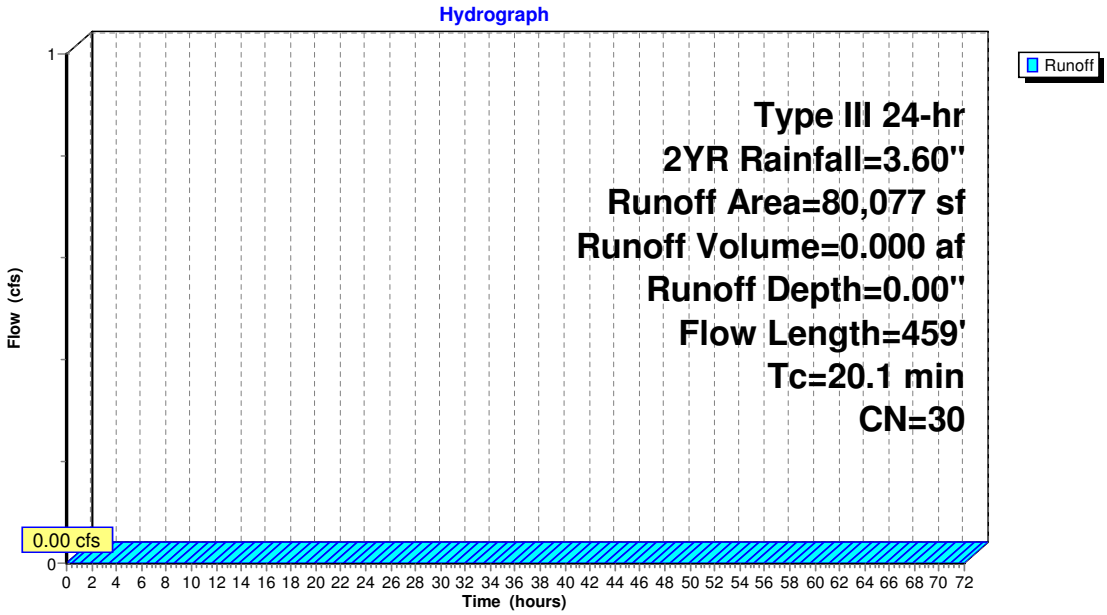
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
80,077	30	Woods, Good, HSG A
80,077		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	103	0.0490	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
5.6	356	0.0450	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	459	Total			

Subcatchment DA1:



Summary for Subcatchment DA10:

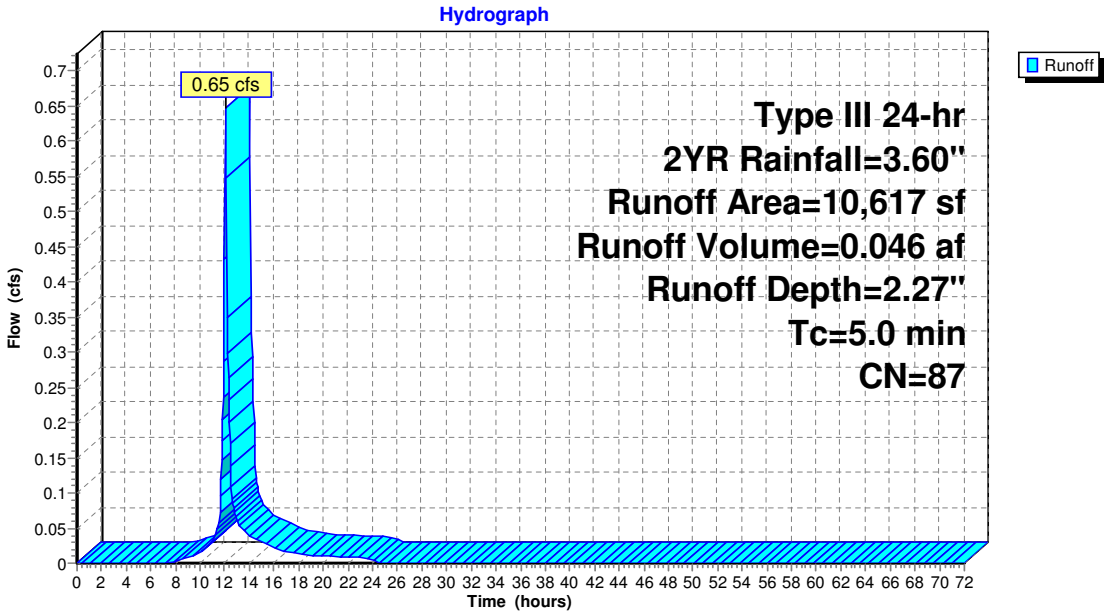
Runoff = 0.65 cfs @ 12.08 hrs, Volume= 0.046 af, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
8,648	98	Paved roads w/curbs & sewers, HSG A
1,969	39	>75% Grass cover, Good, HSG A
10,617	87	Weighted Average
1,969		18.55% Pervious Area
8,648		81.45% Impervious Area

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

Subcatchment DA10:



Summary for Subcatchment DA11:

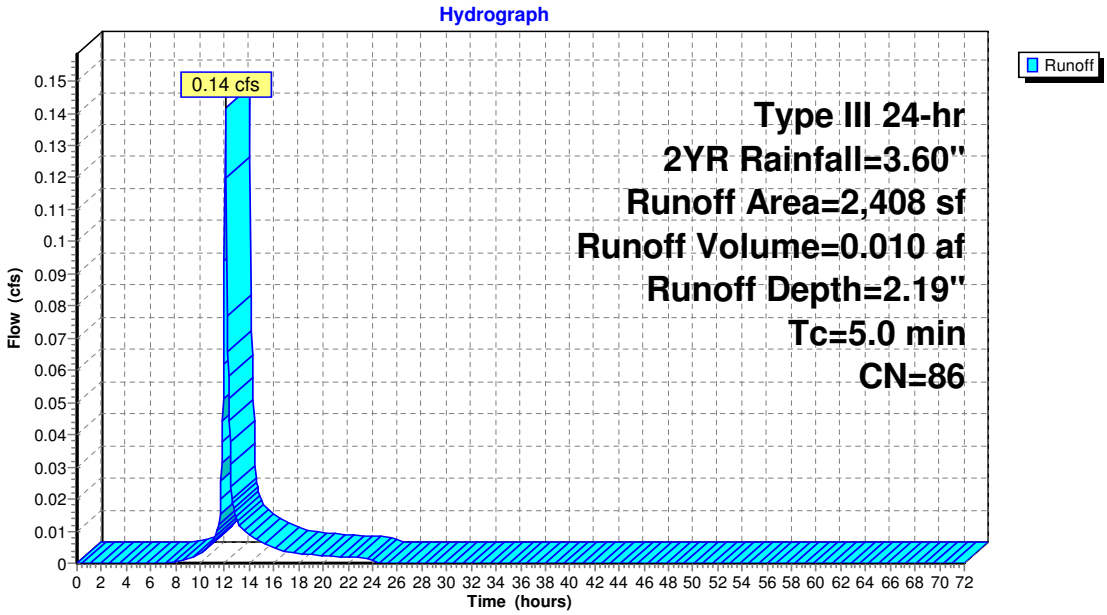
Runoff = 0.14 cfs @ 12.08 hrs, Volume= 0.010 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
1,932	98	Paved roads w/curbs & sewers, HSG A
476	39	>75% Grass cover, Good, HSG A
2,408	86	Weighted Average
476		19.77% Pervious Area
1,932		80.23% Impervious Area

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

Subcatchment DA11:



Summary for Subcatchment DA12:

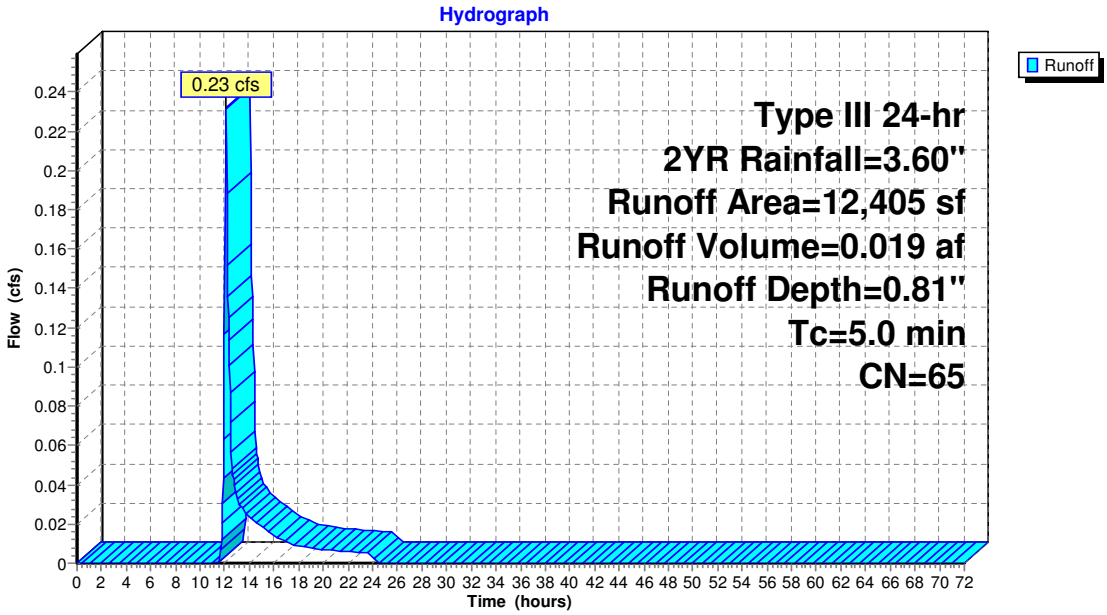
Runoff = 0.23 cfs @ 12.10 hrs, Volume= 0.019 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
5,743	98	Paved roads w/curbs & sewers, HSG A
5,045	39	>75% Grass cover, Good, HSG A
1,617	30	Woods, Good, HSG A
12,405	65	Weighted Average
6,662		53.70% Pervious Area
5,743		46.30% Impervious Area

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

Subcatchment DA12:



Summary for Subcatchment DA2:

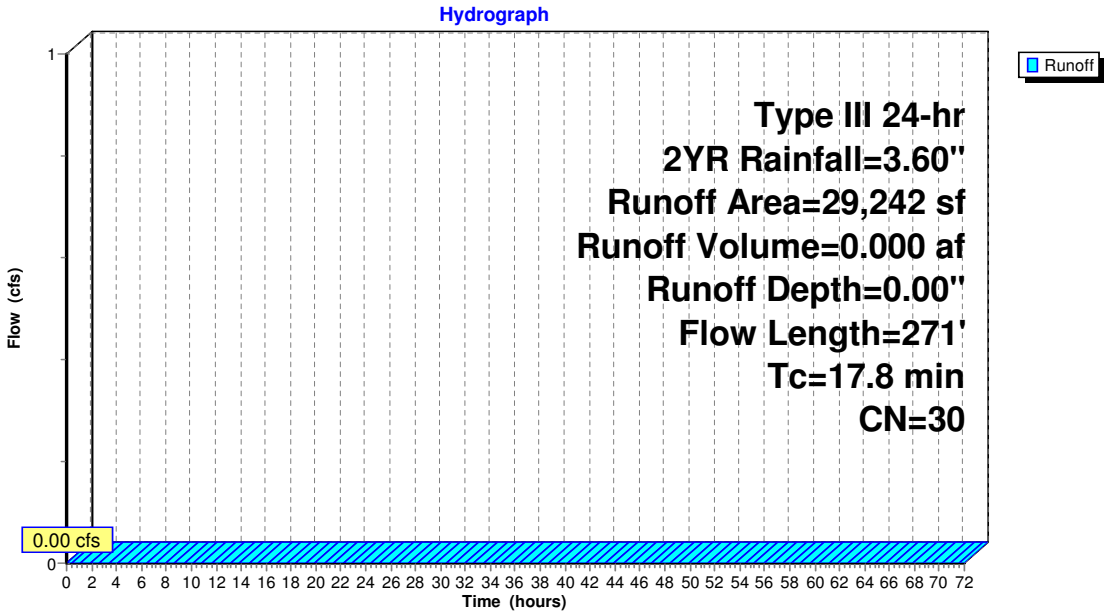
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
29,242	30	Woods, Good, HSG A
29,242		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
2.5	171	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.8	271	Total			

Subcatchment DA2:



Summary for Subcatchment DA3:

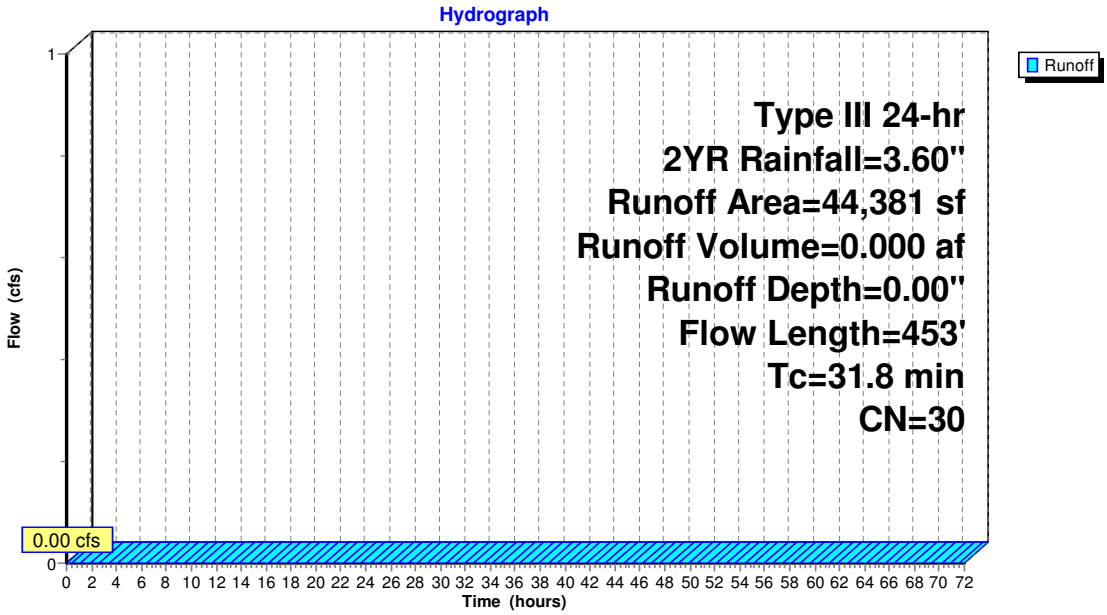
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
44,381	30	Woods, Good, HSG A
44,381		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4	163	0.0250	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.4	290	0.0480	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
31.8	453	Total			

Subcatchment DA3:



Summary for Subcatchment DA4:

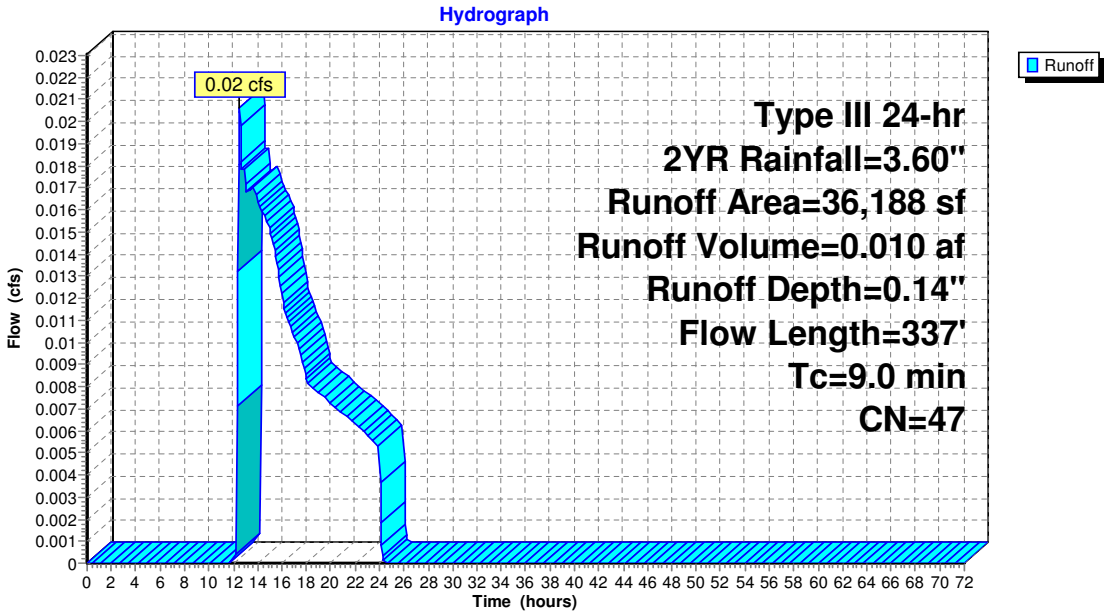
Runoff = 0.02 cfs @ 12.53 hrs, Volume= 0.010 af, Depth= 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
21,432	30	Woods, Good, HSG A
14,756	72	Dirt roads, HSG A
36,188	47	Weighted Average
36,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	34	0.1760	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	106	0.0190	0.43		**Sheet Flow,** Fallow n= 0.050 P2= 3.60"
0.6	60	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	137	0.0440	3.38		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.0	337	Total			

Subcatchment DA4:



Summary for Subcatchment DA5:

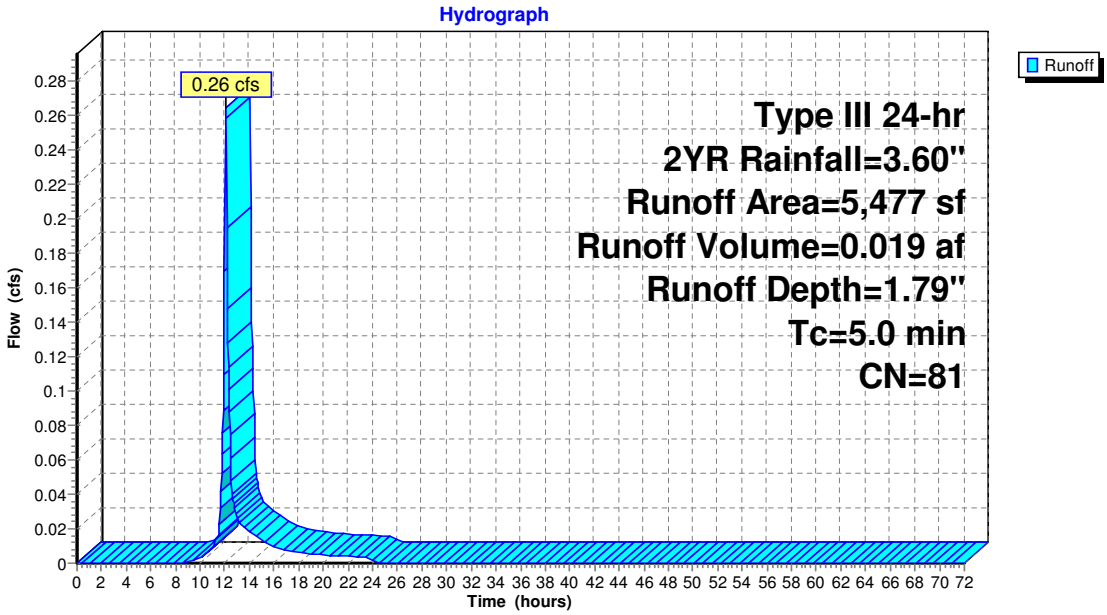
Runoff = 0.26 cfs @ 12.08 hrs, Volume= 0.019 af, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
4,075	98	Paved parking, HSG A
1,402	30	Woods, Good, HSG A
5,477	81	Weighted Average
1,402		25.60% Pervious Area
4,075		74.40% Impervious Area

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

Subcatchment DA5:



Summary for Subcatchment DA6:

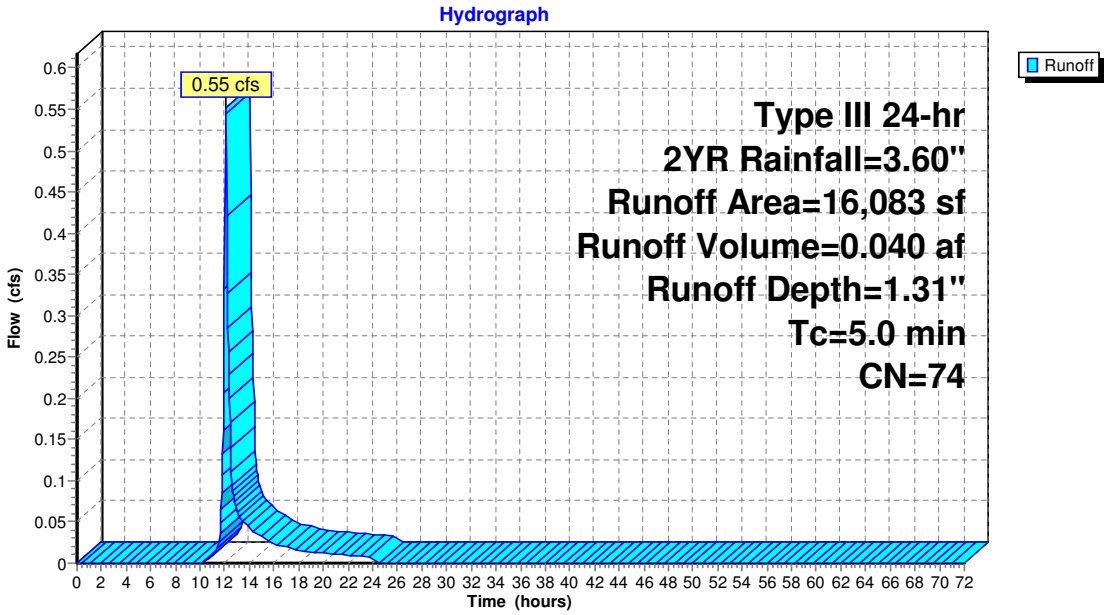
Runoff = 0.55 cfs @ 12.08 hrs, Volume= 0.040 af, Depth= 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.60"

	Area (sf)	CN	Description
*	7,044	98	Ex. Paved parking, HSG A
	3,261	98	Roofs, HSG A
	5,778	32	Woods/grass comb., Good, HSG A
	16,083	74	Weighted Average
	5,778		35.93% Pervious Area
	10,305		64.07% Impervious Area

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

Subcatchment DA6:



Summary for Subcatchment DA7:

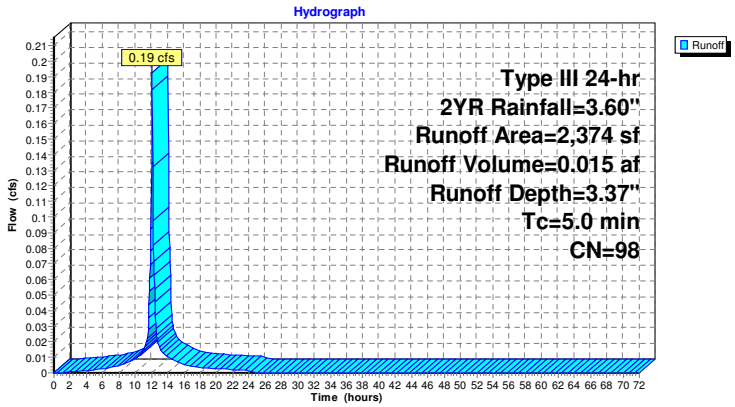
Runoff = 0.19 cfs @ 12.07 hrs, Volume= 0.015 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
2,374	98	Paved parking, HSG A
2,374		100.00% Impervious Area

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

Subcatchment DA7:



Summary for Subcatchment DA8:

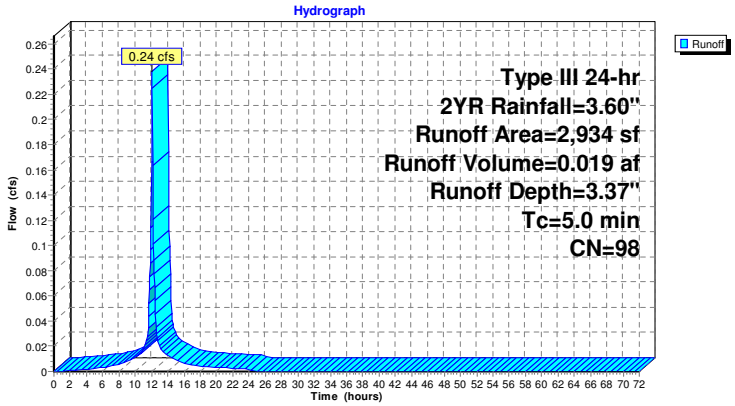
Runoff = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
2,934	98	Paved roads w/curbs & sewers, HSG A
2,934		100.00% Impervious Area

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

Subcatchment DA8:



Summary for Subcatchment DA9:

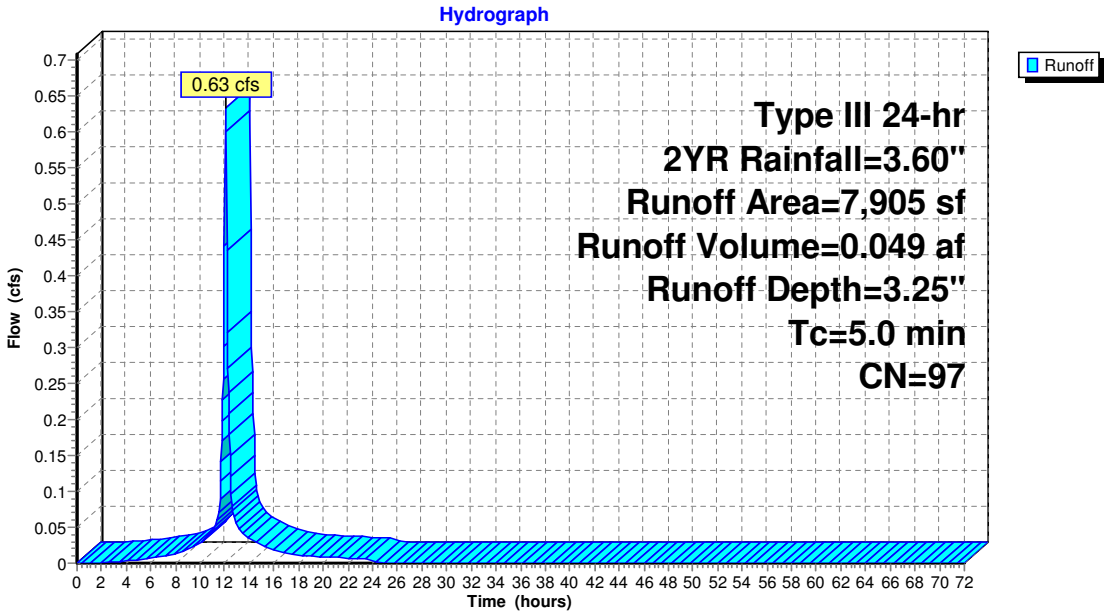
Runoff = 0.63 cfs @ 12.07 hrs, Volume= 0.049 af, Depth= 3.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
7,723	98	Paved roads w/curbs & sewers, HSG A
182	39	>75% Grass cover, Good, HSG A
7,905	97	Weighted Average
182		2.30% Pervious Area
7,723		97.70% Impervious Area

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

Subcatchment DA9:



Summary for Pond P1: Depression

Inflow Area = 0.671 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 111.00' @ 0.00 hrs Surf.Area= 254 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	5,074 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

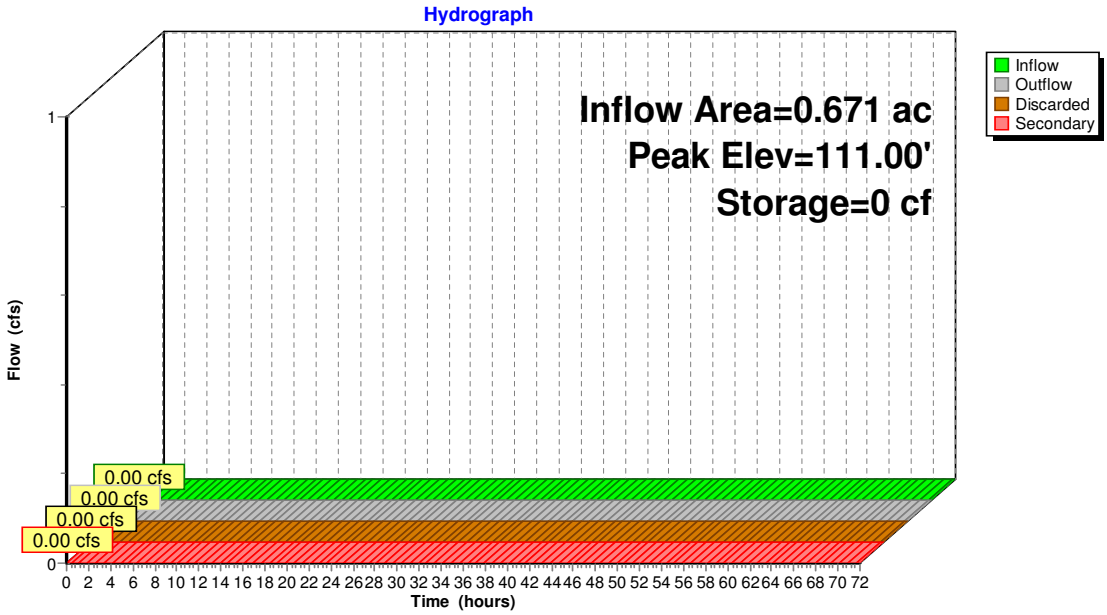
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
111.00	254	0	0
114.00	1,440	2,541	2,541
115.00	3,625	2,533	5,074

Device	Routing	Invert	Outlet Devices
#1	Secondary	114.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Discarded	111.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Exfiltration** (Passes 0.00 cfs of 0.01 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: Depression



Summary for Pond RB1: RECHARGERS (1)

Inflow Area = 0.126 ac, 74.40% Impervious, Inflow Depth = 1.79" for 2YR event
Inflow = 0.26 cfs @ 12.08 hrs, Volume= 0.019 af
Outflow = 0.09 cfs @ 12.39 hrs, Volume= 0.019 af, Atten= 65%, Lag= 18.4 min
Discarded = 0.09 cfs @ 12.39 hrs, Volume= 0.019 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 115.55' @ 12.39 hrs Surf.Area= 0.002 ac Storage= 0.004 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 12.0 min (844.9 - 832.9)

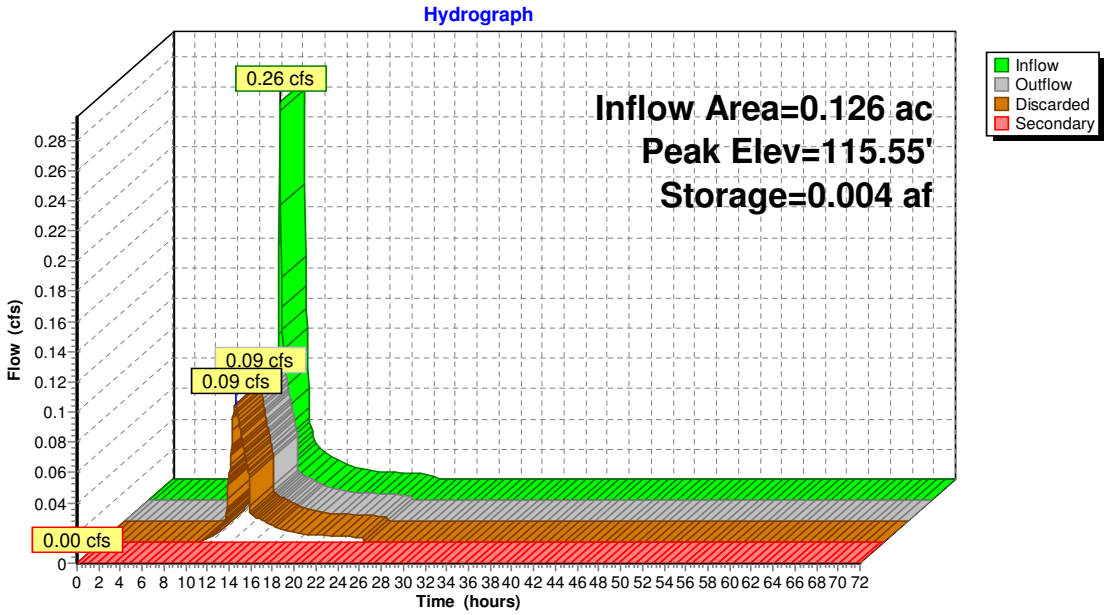
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.005 af	**5.50'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	112.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** 0.026 af Overall - 0.005 af Embedded = 0.021 af x 33.0% Voids
		0.012 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.09 cfs @ 12.39 hrs HW=115.55' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=112.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB1: RECHARGERS (1)



Summary for Pond RB2: RECHARGER (2)

Inflow Area = 0.369 ac, 64.07% Impervious, Inflow Depth = 1.31" for 2YR event
Inflow = 0.55 cfs @ 12.08 hrs, Volume= 0.040 af
Outflow = 0.19 cfs @ 12.42 hrs, Volume= 0.040 af, Atten= 66%, Lag= 20.1 min
Discarded = 0.19 cfs @ 12.42 hrs, Volume= 0.040 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 115.77' @ 12.42 hrs Surf.Area= 208 sf Storage= 346 cf

Plug-Flow detention time= 12.9 min calculated for 0.040 af (100% of inflow)
Center-of-Mass det. time= 12.6 min (866.7 - 854.0)

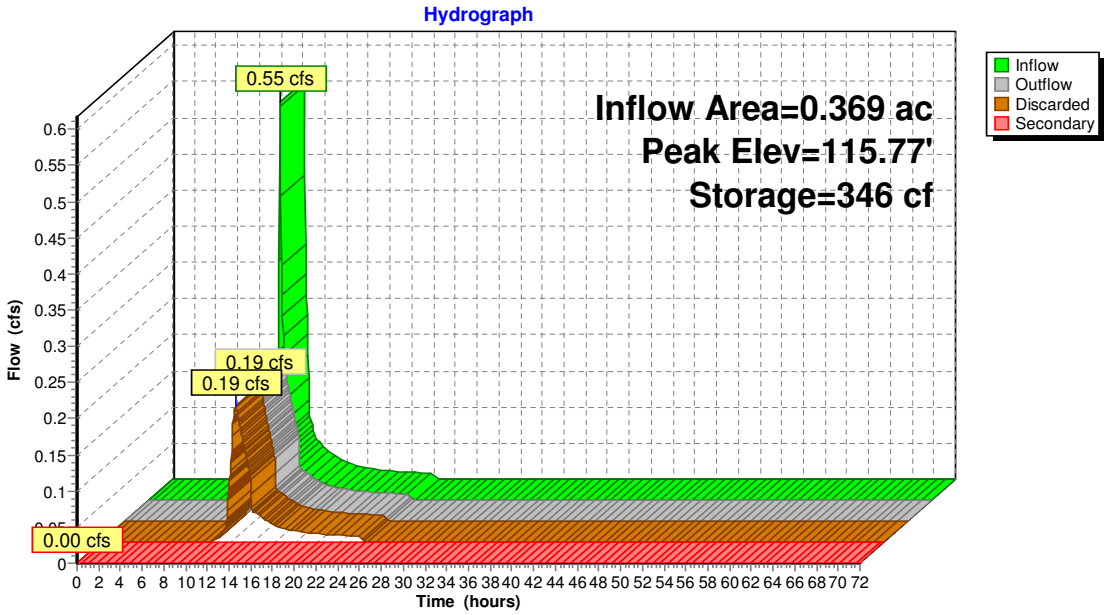
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	475 cf	**5.50'D x 10.00'H Vertical Cone/Cylinder** x 2 Inside #2
#2	112.00'	597 cf	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 2
			2,285 cf Overall - 475 cf Embedded = 1,810 cf x 33.0% Voids
		1,072 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.19 cfs @ 12.42 hrs HW=115.76' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.19 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=112.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB2: RECHARGER (2)



Summary for Pond RB3: RECHARGER (1)

Inflow Area = 0.122 ac,100.00% Impervious, Inflow Depth = 3.37" for 2YR event
Inflow = 0.43 cfs @ 12.07 hrs, Volume= 0.034 af
Outflow = 0.13 cfs @ 12.37 hrs, Volume= 0.034 af, Atten= 69%, Lag= 17.9 min
Discarded = 0.13 cfs @ 12.37 hrs, Volume= 0.034 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 116.49' @ 12.37 hrs Surf.Area= 0.002 ac Storage= 0.007 af

Plug-Flow detention time= 16.9 min calculated for 0.034 af (100% of inflow)
Center-of-Mass det. time= 16.7 min (769.8 - 753.1)

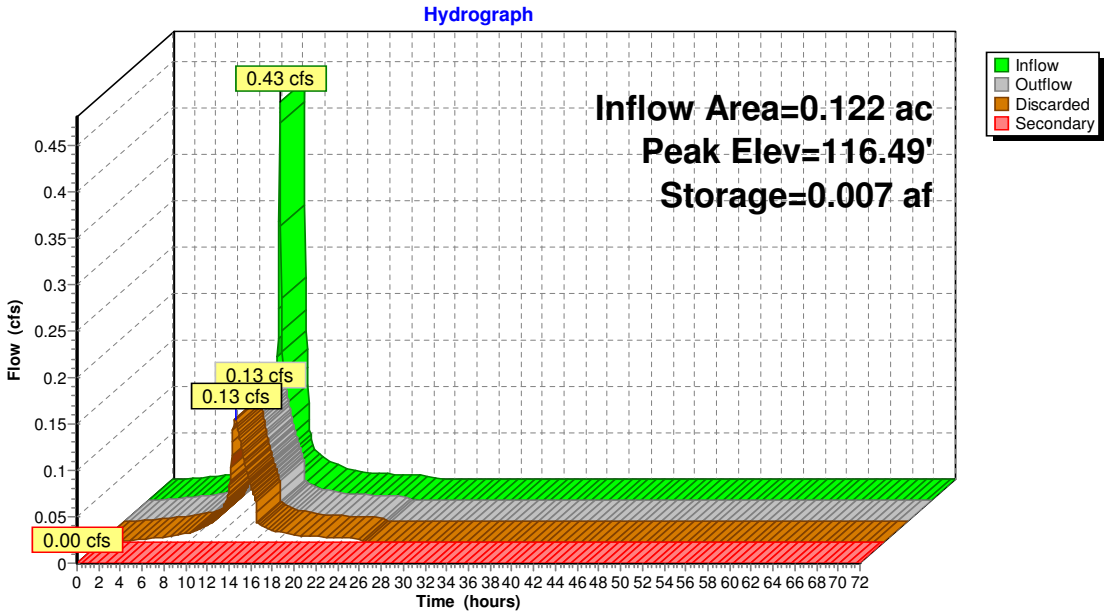
Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	110.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** 0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	110.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	120.99'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.13 cfs @ 12.37 hrs HW=116.48' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=110.00' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond RB3: RECHARGER (1)



Summary for Pond RB4: RECHARGER (6)

Inflow Area = 0.303 ac, 98.62% Impervious, Inflow Depth = 1.95" for 2YR event
Inflow = 0.63 cfs @ 12.07 hrs, Volume= 0.049 af
Outflow = 0.33 cfs @ 12.21 hrs, Volume= 0.049 af, Atten= 48%, Lag= 8.2 min
Discarded = 0.33 cfs @ 12.21 hrs, Volume= 0.049 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 111.95' @ 12.21 hrs Surf.Area= 0.014 ac Storage= 0.004 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.3 min (765.5 - 762.2)

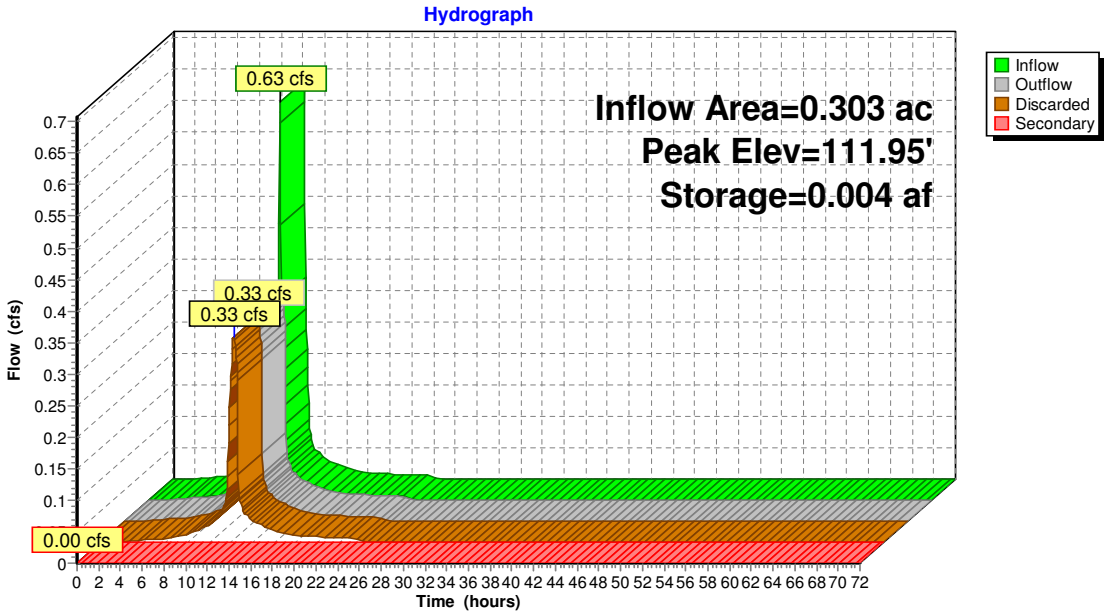
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.039 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 6 Inside #2
#2	111.00'	0.039 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 6 0.157 af Overall - 0.039 af Embedded = 0.118 af x 33.0% Voids
		0.078 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	121.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.33 cfs @ 12.21 hrs HW=111.94' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB4: RECHARGER (6)



Summary for Pond RB5: RECHARGER (3)

Inflow Area = 0.244 ac, 81.45% Impervious, Inflow Depth = 2.27" for 2YR event
Inflow = 0.65 cfs @ 12.08 hrs, Volume= 0.046 af
Outflow = 0.37 cfs @ 12.20 hrs, Volume= 0.046 af, Atten= 43%, Lag= 7.5 min
Discarded = 0.37 cfs @ 12.20 hrs, Volume= 0.046 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 112.42' @ 12.20 hrs Surf.Area= 0.007 ac Storage= 0.004 af

Plug-Flow detention time= 4.2 min calculated for 0.046 af (100% of inflow)
Center-of-Mass det. time= 2.6 min (815.6 - 813.1)

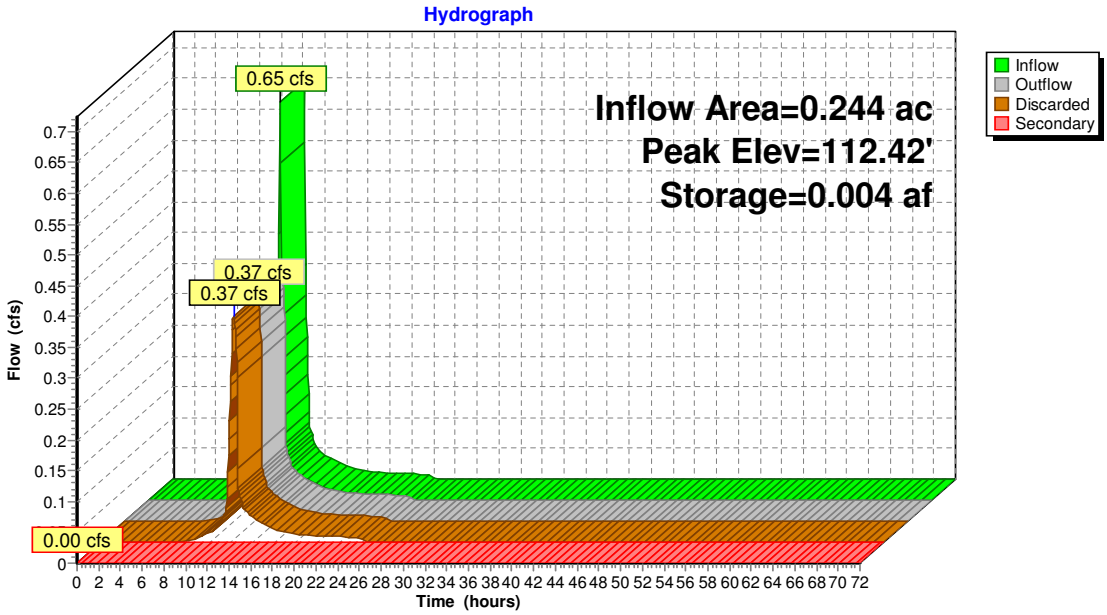
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	111.00'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3 0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	121.90'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.37 cfs @ 12.20 hrs HW=112.42' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.37 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB5: RECHARGER (3)



Summary for Pond RB6: RECHARGER (1)

Inflow Area = 0.055 ac, 80.23% Impervious, Inflow Depth = 2.19" for 2YR event
Inflow = 0.14 cfs @ 12.08 hrs, Volume= 0.010 af
Outflow = 0.06 cfs @ 12.30 hrs, Volume= 0.010 af, Atten= 59%, Lag= 13.6 min
Discarded = 0.06 cfs @ 12.30 hrs, Volume= 0.010 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 114.20' @ 12.30 hrs Surf.Area= 0.002 ac Storage= 0.001 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 6.9 min (823.5 - 816.6)

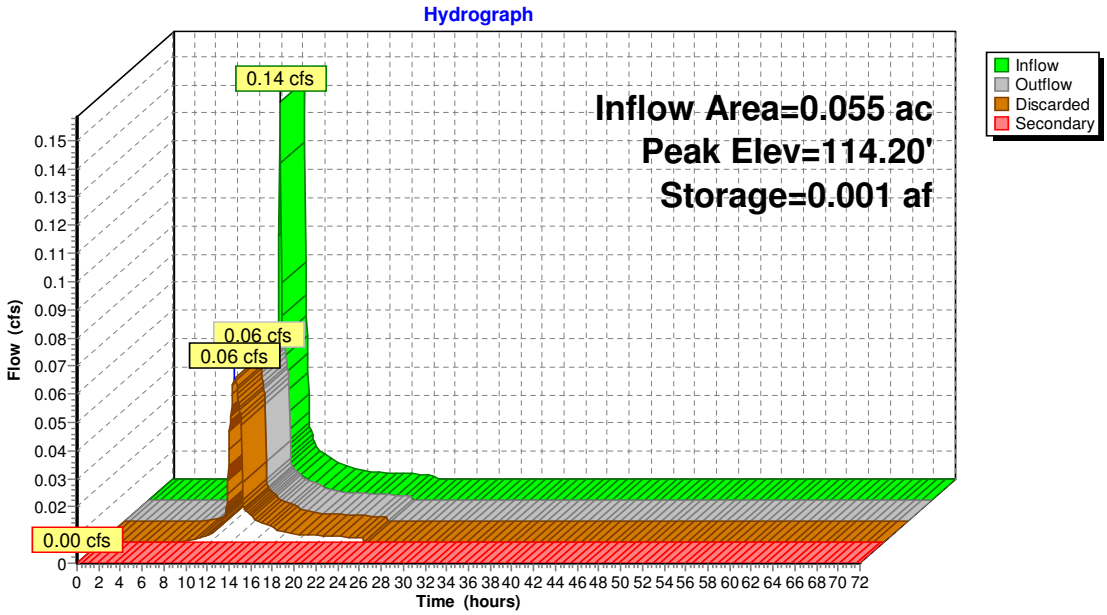
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** 0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 12.30 hrs HW=114.20' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB6: RECHARGER (1)



Summary for Pond RB7: RECHARGER (3)

Inflow Area = 0.285 ac, 46.30% Impervious, Inflow Depth = 0.81" for 2YR event
Inflow = 0.23 cfs @ 12.10 hrs, Volume= 0.019 af
Outflow = 0.22 cfs @ 12.11 hrs, Volume= 0.019 af, Atten= 3%, Lag= 0.7 min
Discarded = 0.22 cfs @ 12.11 hrs, Volume= 0.019 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 114.63' @ 12.11 hrs Surf.Area= 0.007 ac Storage= 0.000 af

Plug-Flow detention time= 0.7 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (884.4 - 883.6)

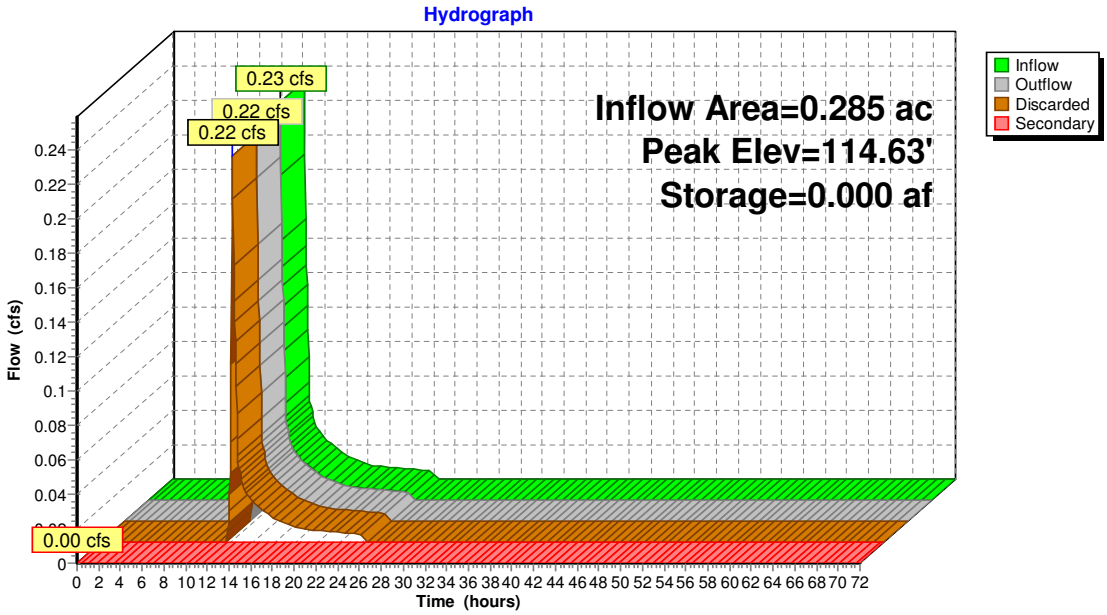
Volume	Invert	Avail.Storage	Storage Description
#1	115.53'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	114.53'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3
			0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.53'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	125.53'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.25 cfs @ 12.11 hrs HW=114.63' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=114.53' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB7: RECHARGER (3)

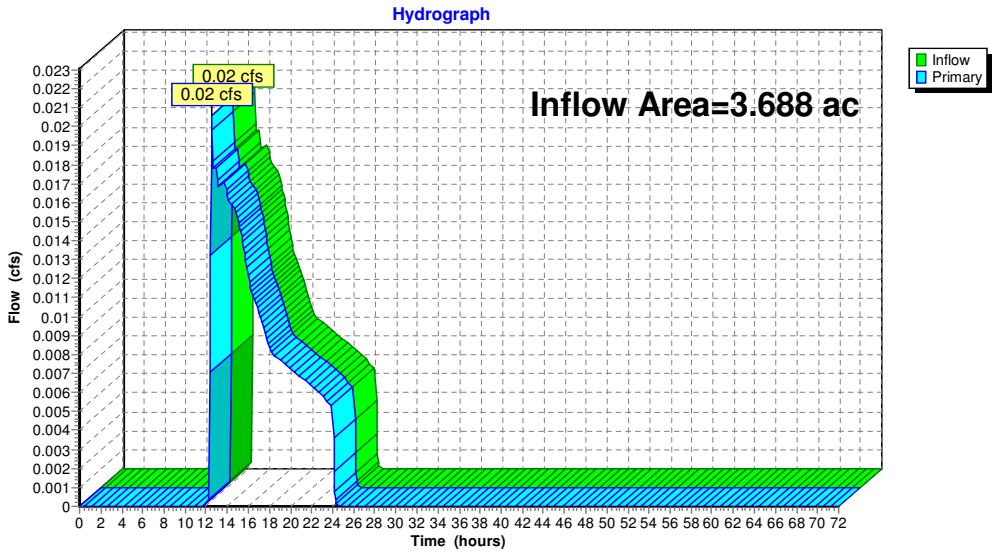


Summary for Pond SP1: Study Point 1

Inflow Area = 3.688 ac, 0.00% Impervious, Inflow Depth = 0.03" for 2YR event
Inflow = 0.02 cfs @ 12.53 hrs, Volume= 0.010 af
Primary = 0.02 cfs @ 12.53 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Pond SP1: Study Point 1



Summary for Subcatchment DA1:

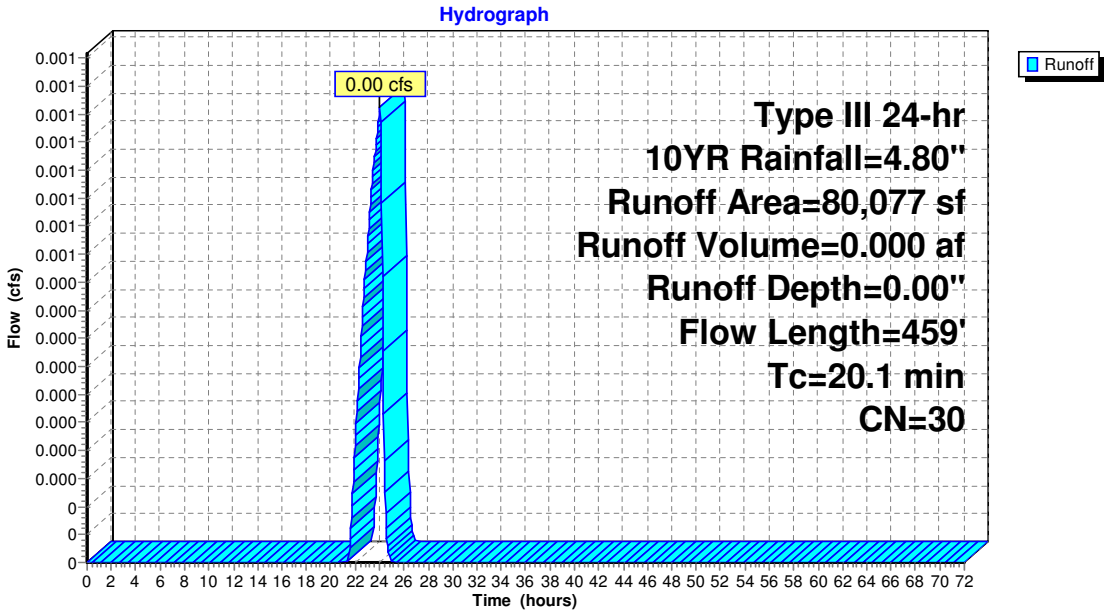
Runoff = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
80,077	30	Woods, Good, HSG A
80,077		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	103	0.0490	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
5.6	356	0.0450	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	459	Total			

Subcatchment DA1:



Summary for Subcatchment DA10:

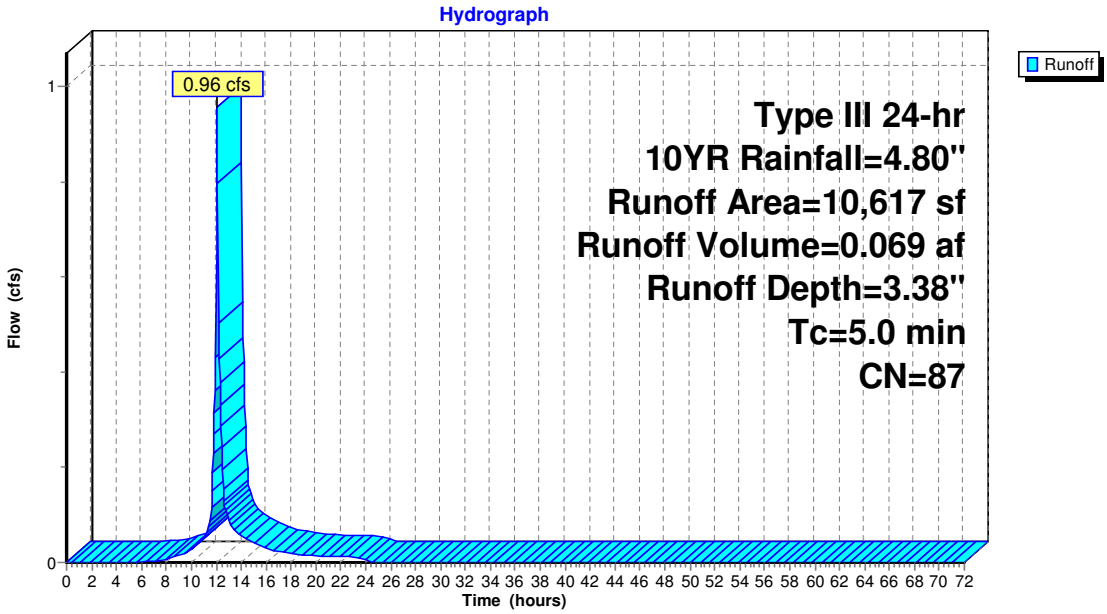
Runoff = 0.96 cfs @ 12.07 hrs, Volume= 0.069 af, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
8,648	98	Paved roads w/curbs & sewers, HSG A
1,969	39	>75% Grass cover, Good, HSG A
10,617	87	Weighted Average
1,969		18.55% Pervious Area
8,648		81.45% Impervious Area

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

Subcatchment DA10:



Summary for Subcatchment DA11:

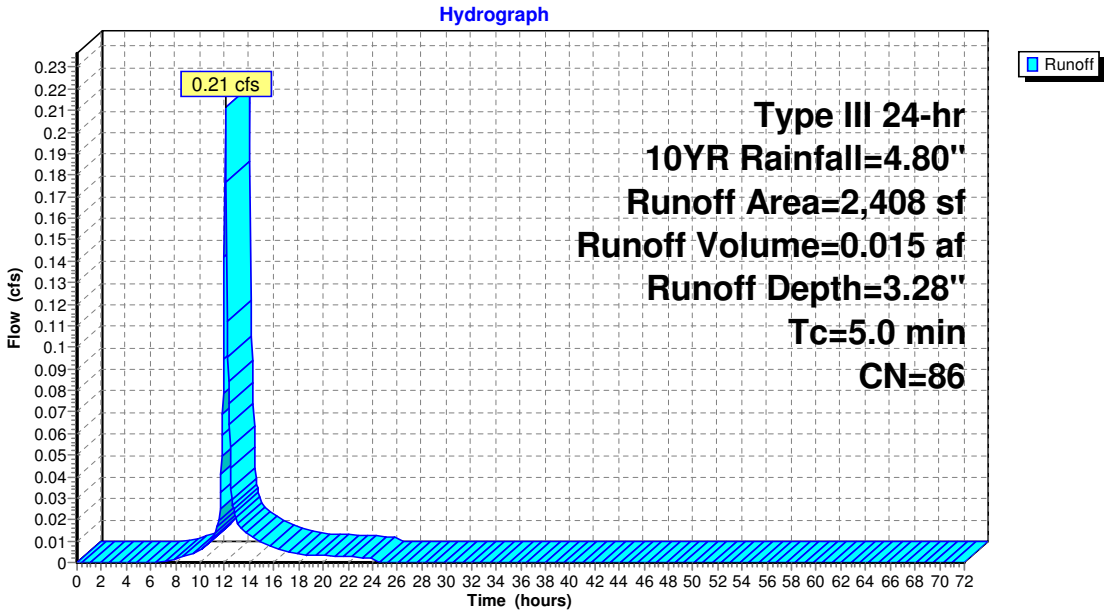
Runoff = 0.21 cfs @ 12.07 hrs, Volume= 0.015 af, Depth= 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
1,932	98	Paved roads w/curbs & sewers, HSG A
476	39	>75% Grass cover, Good, HSG A
2,408	86	Weighted Average
476		19.77% Pervious Area
1,932		80.23% Impervious Area

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

Subcatchment DA11:



Summary for Subcatchment DA12:

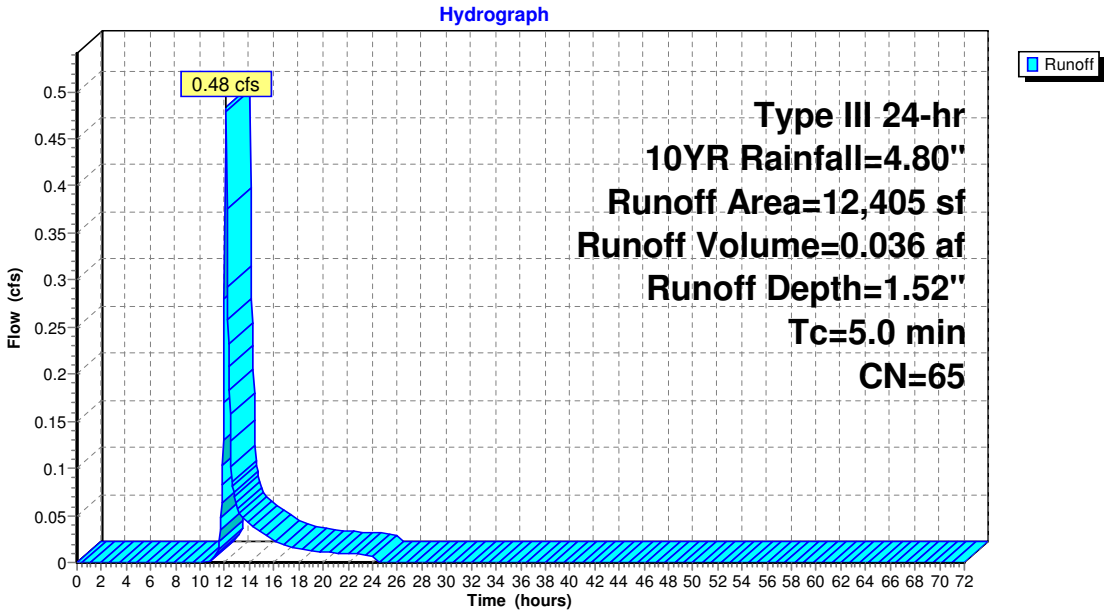
Runoff = 0.48 cfs @ 12.09 hrs, Volume= 0.036 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
5,743	98	Paved roads w/curbs & sewers, HSG A
5,045	39	>75% Grass cover, Good, HSG A
1,617	30	Woods, Good, HSG A
12,405	65	Weighted Average
6,662		53.70% Pervious Area
5,743		46.30% Impervious Area

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

Subcatchment DA12:



Summary for Subcatchment DA2:

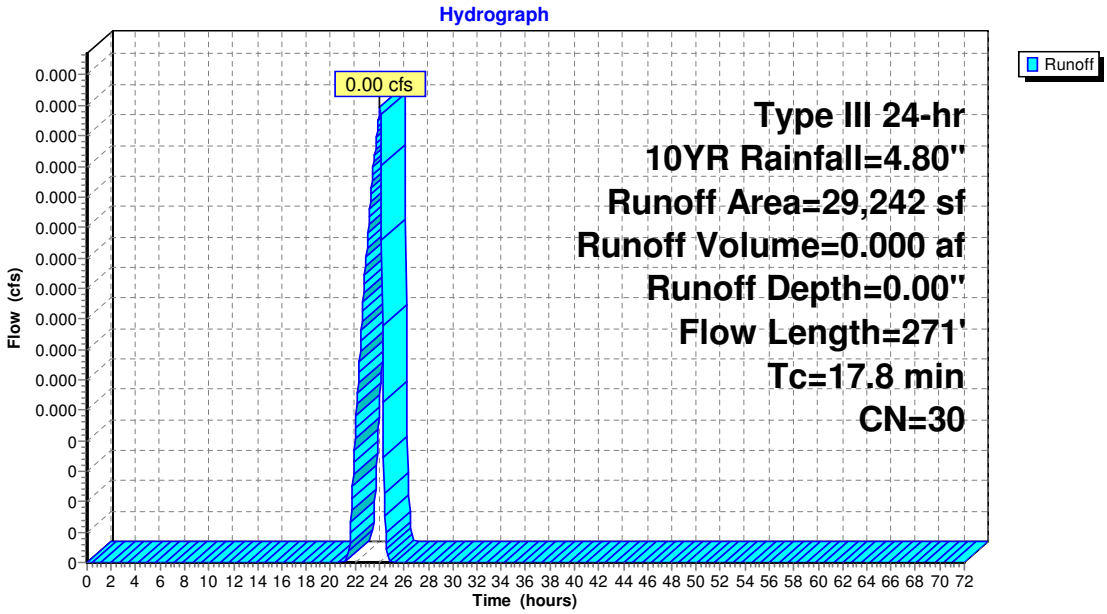
Runoff = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
29,242	30	Woods, Good, HSG A
29,242		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
2.5	171	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.8	271	Total			

Subcatchment DA2:



Summary for Subcatchment DA3:

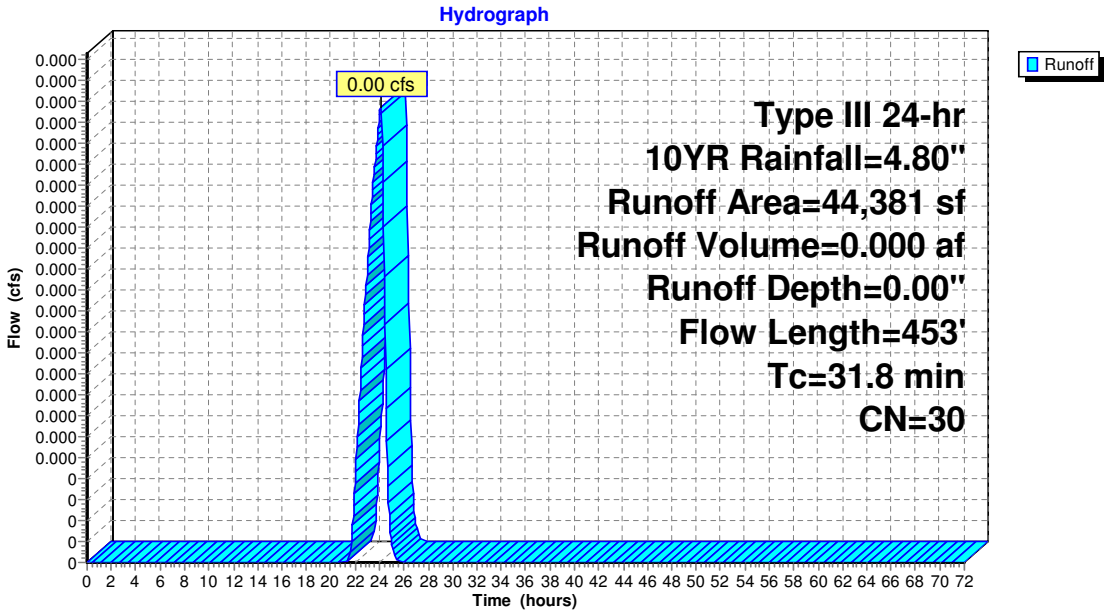
Runoff = 0.00 cfs @ 24.10 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
44,381	30	Woods, Good, HSG A
44,381		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4	163	0.0250	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.4	290	0.0480	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
31.8	453	Total			

Subcatchment DA3:



Summary for Subcatchment DA4:

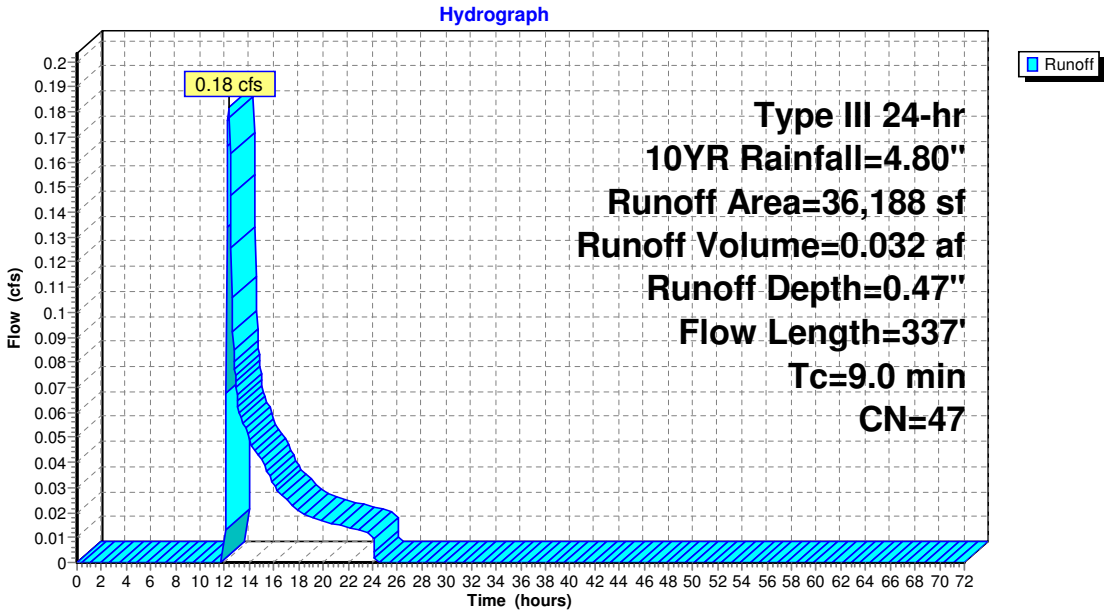
Runoff = 0.18 cfs @ 12.32 hrs, Volume= 0.032 af, Depth= 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
21,432	30	Woods, Good, HSG A
14,756	72	Dirt roads, HSG A
36,188	47	Weighted Average
36,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	34	0.1760	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	106	0.0190	0.43		**Sheet Flow,** Fallow n= 0.050 P2= 3.60"
0.6	60	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	137	0.0440	3.38		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.0	337	Total			

Subcatchment DA4:



Summary for Subcatchment DA5:

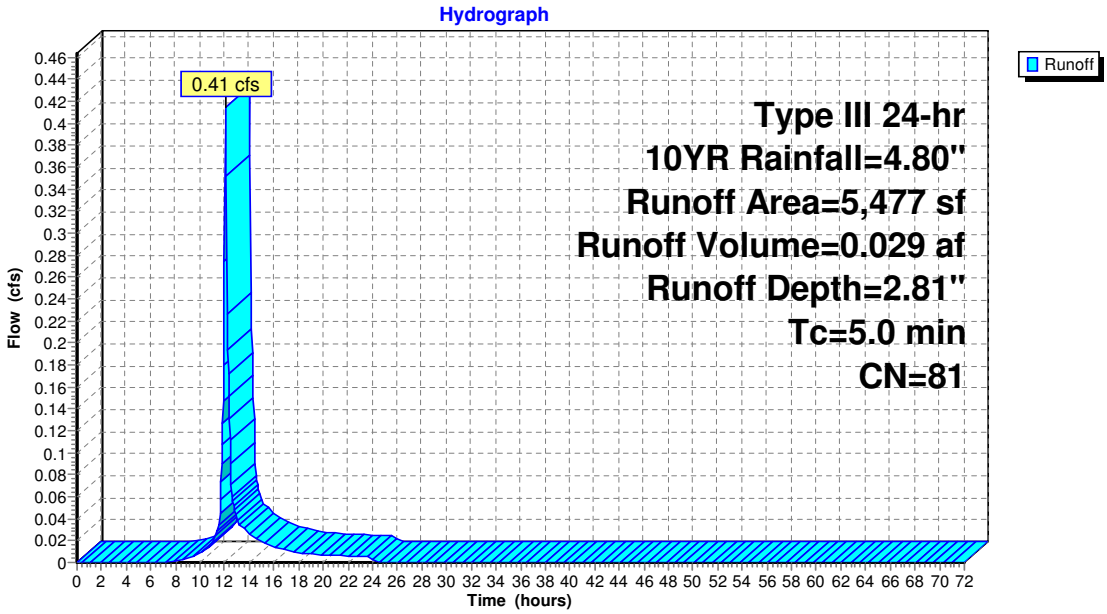
Runoff = 0.41 cfs @ 12.08 hrs, Volume= 0.029 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
4,075	98	Paved parking, HSG A
1,402	30	Woods, Good, HSG A
5,477	81	Weighted Average
1,402		25.60% Pervious Area
4,075		74.40% Impervious Area

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

Subcatchment DA5:



Summary for Subcatchment DA6:

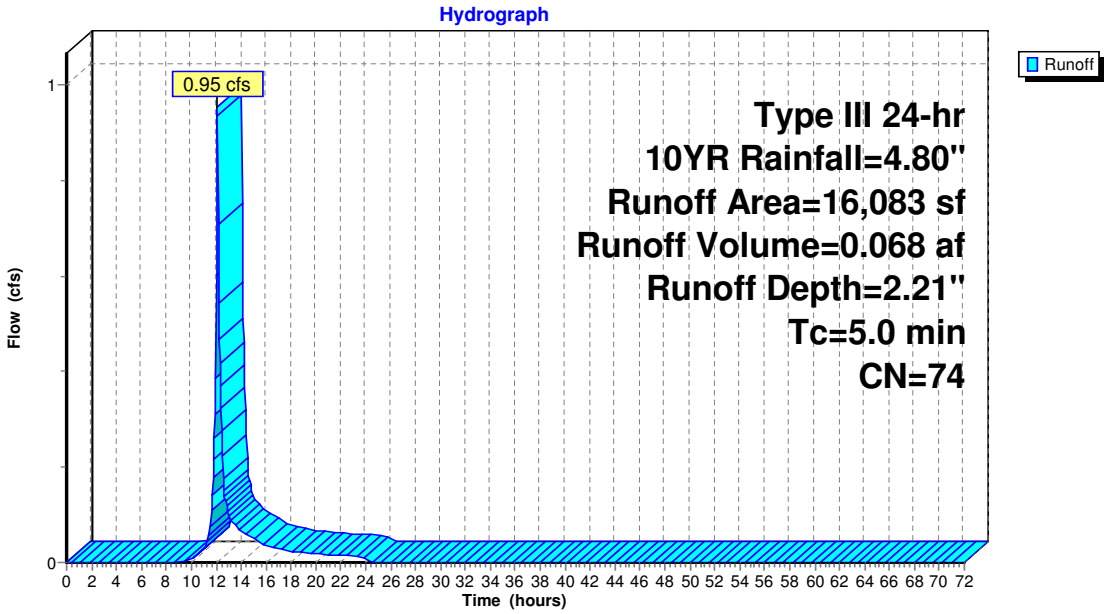
Runoff = 0.95 cfs @ 12.08 hrs, Volume= 0.068 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.80"

	Area (sf)	CN	Description
*	7,044	98	Ex. Paved parking, HSG A
	3,261	98	Roofs, HSG A
	5,778	32	Woods/grass comb., Good, HSG A
	16,083	74	Weighted Average
	5,778		35.93% Pervious Area
	10,305		64.07% Impervious Area

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

Subcatchment DA6:



Summary for Subcatchment DA7:

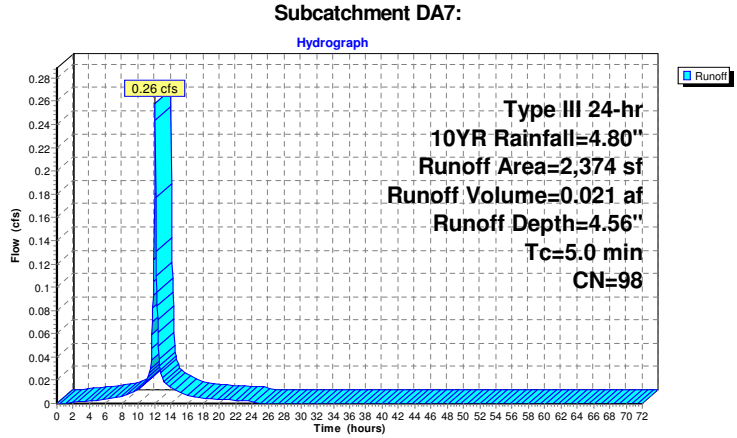
Runoff = 0.26 cfs @ 12.07 hrs, Volume= 0.021 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
2,374	98	Paved parking, HSG A
2,374		100.00% Impervious Area

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

Subcatchment DA7:



Summary for Subcatchment DA8:

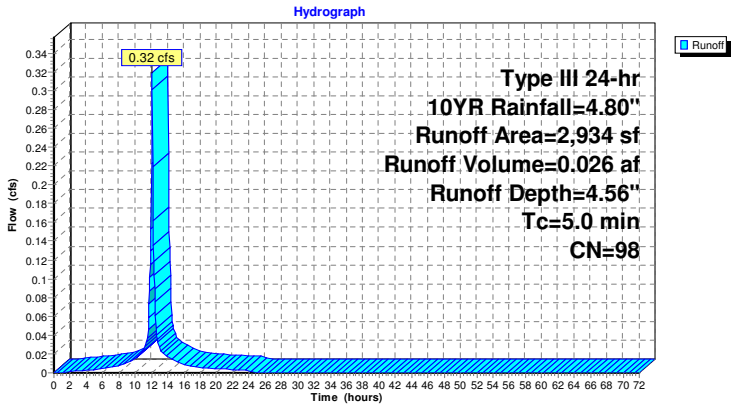
Runoff = 0.32 cfs @ 12.07 hrs, Volume= 0.026 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
2,934	98	Paved roads w/curbs & sewers, HSG A
2,934		100.00% Impervious Area

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

Subcatchment DA8:



Summary for Subcatchment DA9:

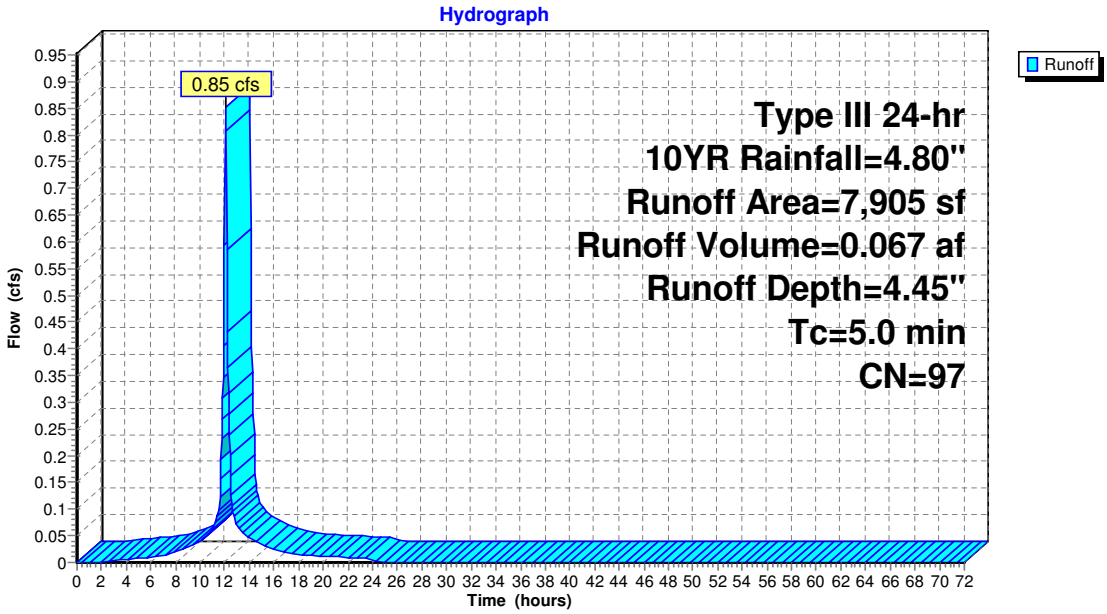
Runoff = 0.85 cfs @ 12.07 hrs, Volume= 0.067 af, Depth= 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
7,723	98	Paved roads w/curbs & sewers, HSG A
182	39	>75% Grass cover, Good, HSG A
7,905	97	Weighted Average
182		2.30% Pervious Area
7,723		97.70% Impervious Area

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

Subcatchment DA9:



Summary for Pond P1: Depression

Inflow Area = 0.671 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10YR event
Inflow = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 24.09 hrs, Volume= 0.000 af, Atten= 4%, Lag= 3.7 min
Discarded = 0.00 cfs @ 24.09 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 111.00' @ 24.09 hrs Surf.Area= 254 sf Storage= 0 cf

Plug-Flow detention time= 11.6 min calculated for 0.000 af (100% of inflow)
Center-of-Mass det. time= 11.6 min (1,408.4 - 1,396.8)

Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	5,074 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

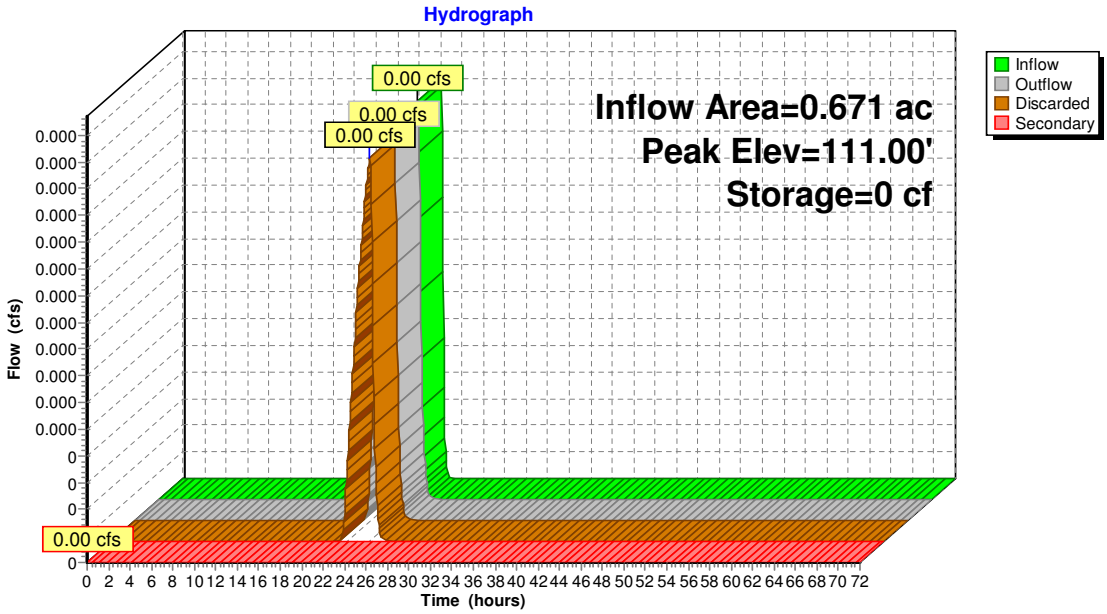
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
111.00	254	0	0
114.00	1,440	2,541	2,541
115.00	3,625	2,533	5,074

Device	Routing	Invert	Outlet Devices
#1	Secondary	114.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50
			Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Discarded	111.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 24.09 hrs HW=111.00' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: Depression



Summary for Pond RB1: RECHARGERS (1)

Inflow Area = 0.126 ac, 74.40% Impervious, Inflow Depth = 2.81" for 10YR event
Inflow = 0.41 cfs @ 12.08 hrs, Volume= 0.029 af
Outflow = 0.13 cfs @ 12.40 hrs, Volume= 0.029 af, Atten= 68%, Lag= 19.5 min
Discarded = 0.13 cfs @ 12.40 hrs, Volume= 0.029 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 118.33' @ 12.40 hrs Surf.Area= 0.002 ac Storage= 0.007 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 17.7 min (837.6 - 819.9)

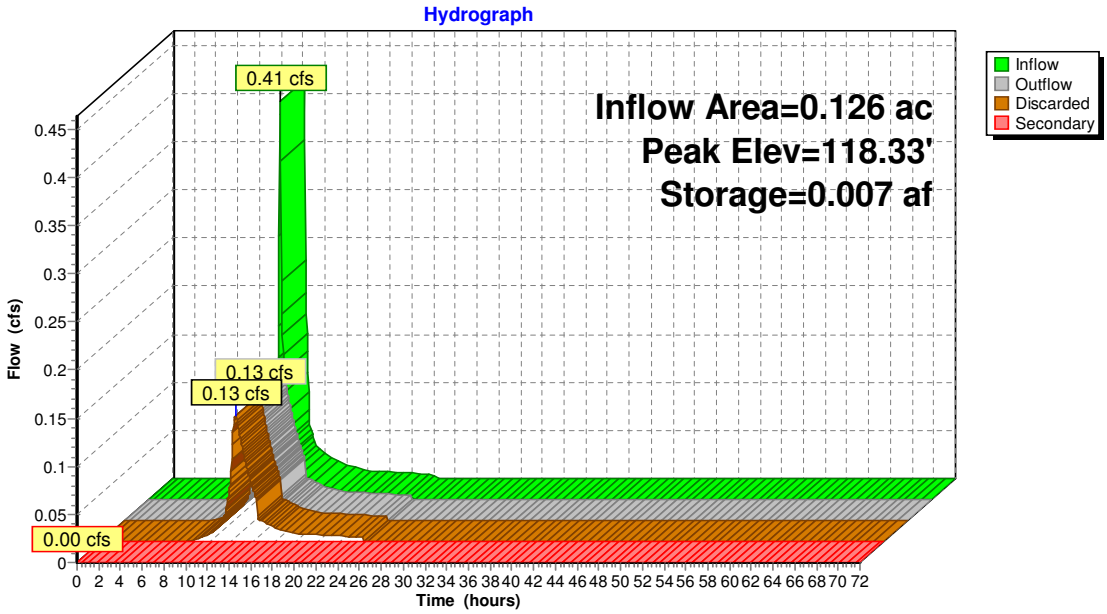
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.005 af	**5.50'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	112.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder**
			0.026 af Overall - 0.005 af Embedded = 0.021 af x 33.0% Voids
		0.012 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.13 cfs @ 12.40 hrs HW=118.33' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.13 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=112.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB1: RECHARGERS (1)



Summary for Pond RB2: RECHARGER (2)

Inflow Area = 0.369 ac, 64.07% Impervious, Inflow Depth = 2.21" for 10YR event
Inflow = 0.95 cfs @ 12.08 hrs, Volume= 0.068 af
Outflow = 0.29 cfs @ 12.43 hrs, Volume= 0.068 af, Atten= 69%, Lag= 21.0 min
Discarded = 0.29 cfs @ 12.43 hrs, Volume= 0.068 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 119.44' @ 12.43 hrs Surf.Area= 208 sf Storage= 715 cf

Plug-Flow detention time= 20.1 min calculated for 0.068 af (100% of inflow)
Center-of-Mass det. time= 20.0 min (858.5 - 838.5)

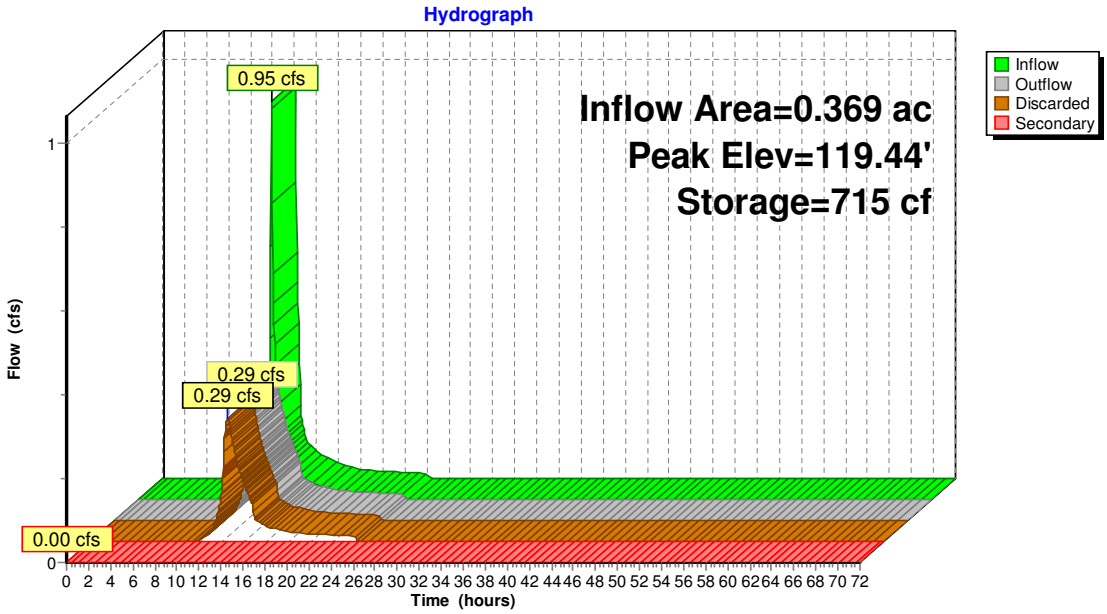
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	475 cf	**5.50'D x 10.00'H Vertical Cone/Cylinder** x 2 Inside #2
#2	112.00'	597 cf	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 2
			2,285 cf Overall - 475 cf Embedded = 1,810 cf x 33.0% Voids
		1,072 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.29 cfs @ 12.43 hrs HW=119.43' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.29 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=112.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB2: RECHARGER (2)



Summary for Pond RB3: RECHARGER (1)

Inflow Area =	0.122 ac,100.00% Impervious, Inflow Depth = 4.56" for 10YR event			
Inflow =	0.58 cfs @ 12.07 hrs, Volume=	0.046 af		
Outflow =	0.17 cfs @ 12.38 hrs, Volume=	0.046 af, Atten= 70%, Lag= 18.5 min		
Discarded =	0.17 cfs @ 12.38 hrs, Volume=	0.046 af		
Secondary =	0.00 cfs @ 0.00 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 119.26' @ 12.38 hrs Surf.Area= 0.002 ac Storage= 0.011 af

Plug-Flow detention time= 20.4 min calculated for 0.046 af (100% of inflow)
Center-of-Mass det. time= 20.4 min (768.2 - 747.8)

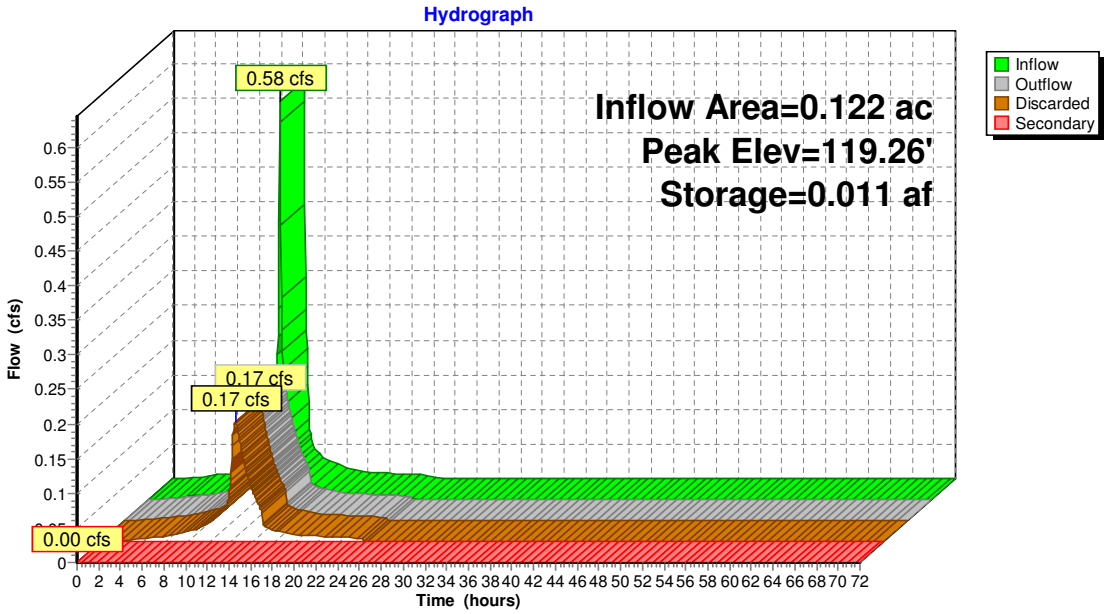
Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	110.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder**
			0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	110.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	120.99'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.17 cfs @ 12.38 hrs HW=119.25' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=110.00' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond RB3: RECHARGER (1)



Summary for Pond RB4: RECHARGER (6)

Inflow Area = 0.303 ac, 98.62% Impervious, Inflow Depth = 2.66" for 10YR event
Inflow = 0.85 cfs @ 12.07 hrs, Volume= 0.067 af
Outflow = 0.37 cfs @ 12.25 hrs, Volume= 0.067 af, Atten= 56%, Lag= 10.7 min
Discarded = 0.37 cfs @ 12.25 hrs, Volume= 0.067 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 112.46' @ 12.25 hrs Surf.Area= 0.014 ac Storage= 0.008 af

Plug-Flow detention time= 5.3 min calculated for 0.067 af (100% of inflow)
Center-of-Mass det. time= 5.0 min (760.7 - 755.7)

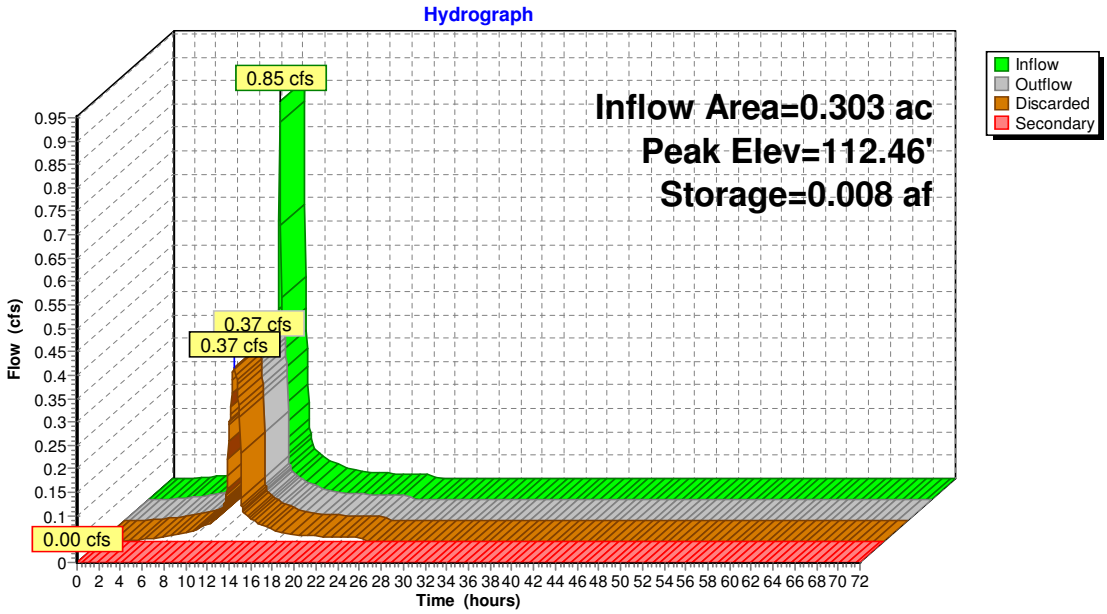
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.039 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 6 Inside #2
#2	111.00'	0.039 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 6
			0.157 af Overall - 0.039 af Embedded = 0.118 af x 33.0% Voids
		0.078 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	121.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.37 cfs @ 12.25 hrs HW=112.46' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.37 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB4: RECHARGER (6)



Summary for Pond RB5: RECHARGER (3)

Inflow Area =	0.244 ac, 81.45% Impervious, Inflow Depth = 3.38" for 10YR event				
Inflow =	0.96 cfs @	12.07 hrs,	Volume=	0.069 af	
Outflow =	0.47 cfs @	12.22 hrs,	Volume=	0.069 af,	Atten= 51%, Lag= 9.1 min
Discarded =	0.47 cfs @	12.22 hrs,	Volume=	0.069 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 113.60' @ 12.22 hrs Surf.Area= 0.007 ac Storage= 0.008 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.2 min (806.0 - 801.8)

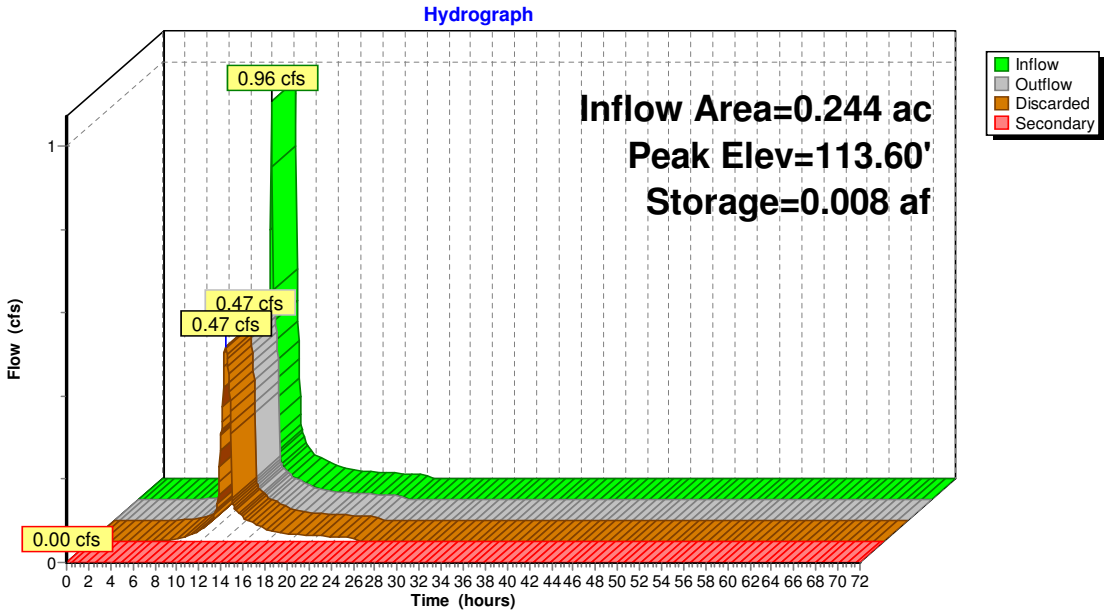
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	111.00'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3
			0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	121.90'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.47 cfs @ 12.22 hrs HW=113.59' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.47 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB5: RECHARGER (3)



Summary for Pond RB6: RECHARGER (1)

Inflow Area =	0.055 ac, 80.23% Impervious, Inflow Depth = 3.28" for 10YR event				
Inflow =	0.21 cfs @	12.07 hrs,	Volume=	0.015 af	
Outflow =	0.07 cfs @	12.35 hrs,	Volume=	0.015 af, Atten= 65%, Lag= 16.5 min	
Discarded =	0.07 cfs @	12.35 hrs,	Volume=	0.015 af	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 115.34' @ 12.35 hrs Surf.Area= 0.002 ac Storage= 0.003 af

Plug-Flow detention time= 10.9 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 11.0 min (816.0 - 805.1)

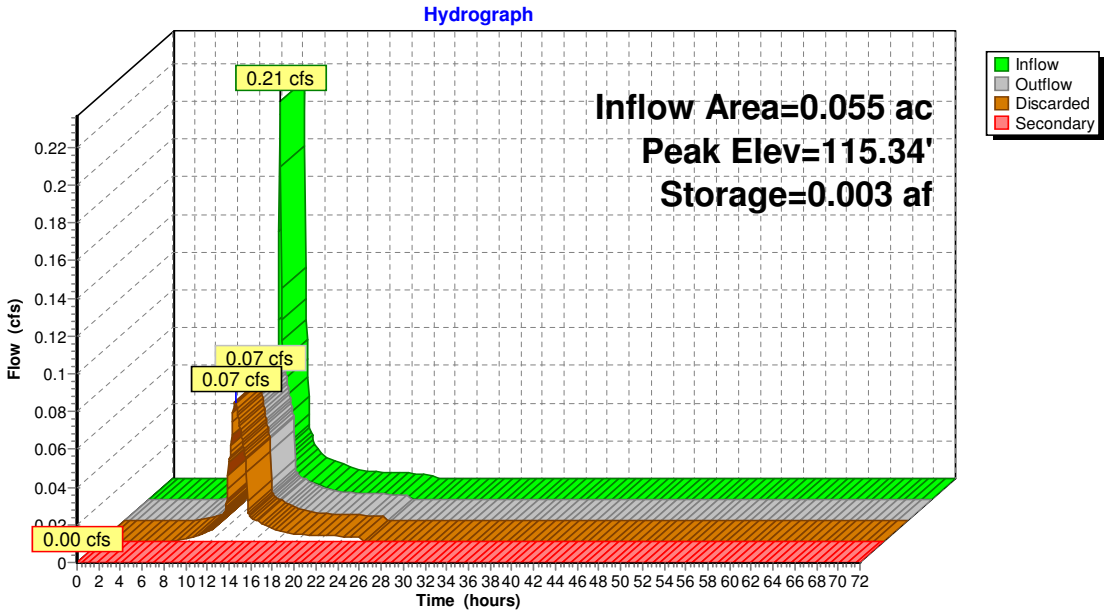
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder**
			0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 12.35 hrs HW=115.34' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB6: RECHARGER (1)



Summary for Pond RB7: RECHARGER (3)

Inflow Area =	0.285 ac, 46.30% Impervious, Inflow Depth = 1.52" for 10YR event			
Inflow =	0.48 cfs @	12.09 hrs, Volume=	0.036 af	
Outflow =	0.32 cfs @	12.19 hrs, Volume=	0.036 af, Atten= 34%, Lag= 6.2 min	
Discarded =	0.32 cfs @	12.19 hrs, Volume=	0.036 af	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 115.37' @ 12.19 hrs Surf.Area= 0.007 ac Storage= 0.002 af

Plug-Flow detention time= 2.1 min calculated for 0.036 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (864.1 - 862.5)

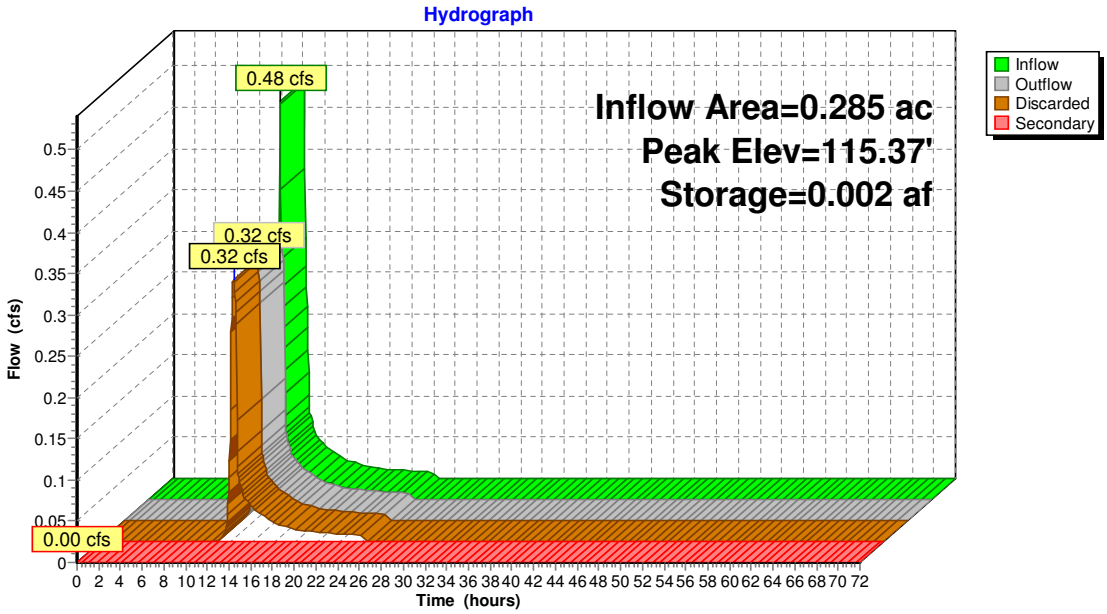
Volume	Invert	Avail.Storage	Storage Description
#1	115.53'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	114.53'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3
			0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.53'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	125.53'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.32 cfs @ 12.19 hrs HW=115.36' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.32 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=114.53' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB7: RECHARGER (3)

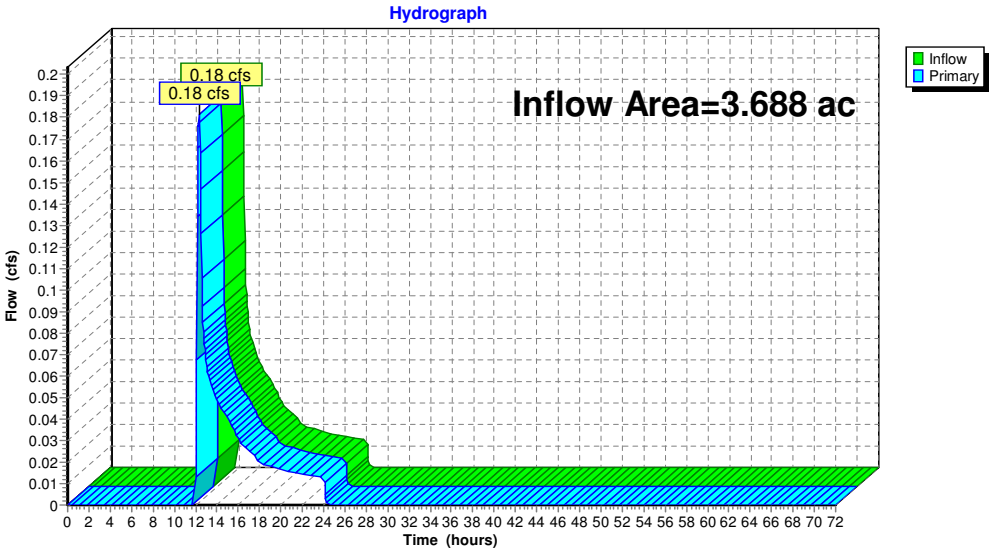


Summary for Pond SP1: Study Point 1

Inflow Area =	3.688 ac,	0.00% Impervious,	Inflow Depth =	0.11"	for	10YR event
Inflow =	0.18 cfs @	12.32 hrs,	Volume=	0.033 af		
Primary =	0.18 cfs @	12.32 hrs,	Volume=	0.033 af,	Atten= 0%,	Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Pond SP1: Study Point 1



Summary for Subcatchment DA1:

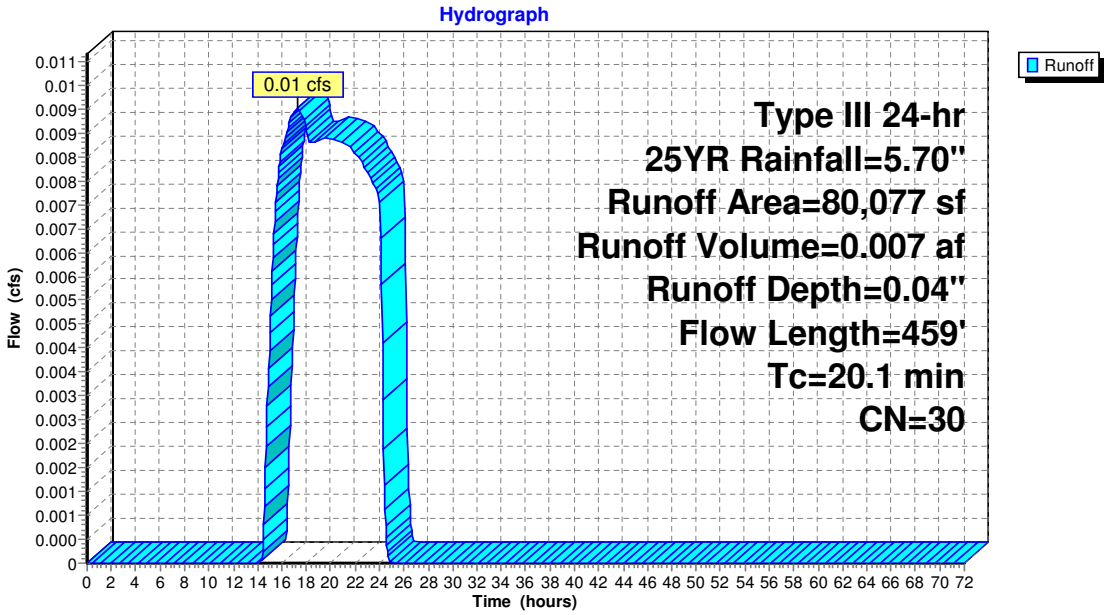
Runoff = 0.01 cfs @ 17.22 hrs, Volume= 0.007 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
80,077	30	Woods, Good, HSG A
80,077		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	103	0.0490	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
5.6	356	0.0450	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	459	Total			

Subcatchment DA1:



Summary for Subcatchment DA10:

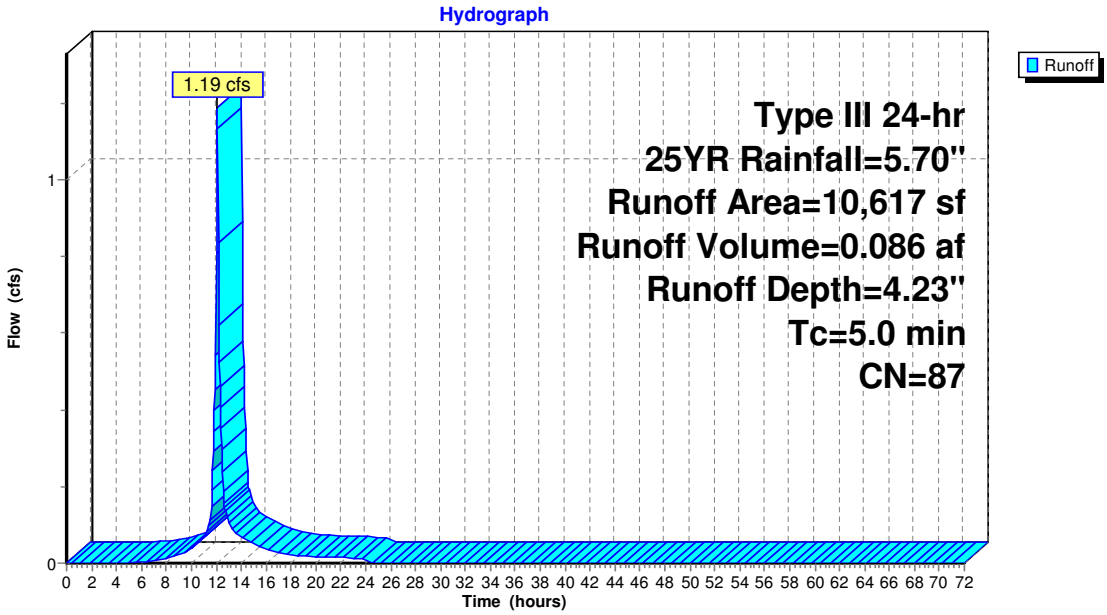
Runoff = 1.19 cfs @ 12.07 hrs, Volume= 0.086 af, Depth= 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
8,648	98	Paved roads w/curbs & sewers, HSG A
1,969	39	>75% Grass cover, Good, HSG A
10,617	87	Weighted Average
1,969		18.55% Pervious Area
8,648		81.45% Impervious Area

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

Subcatchment DA10:



Summary for Subcatchment DA11:

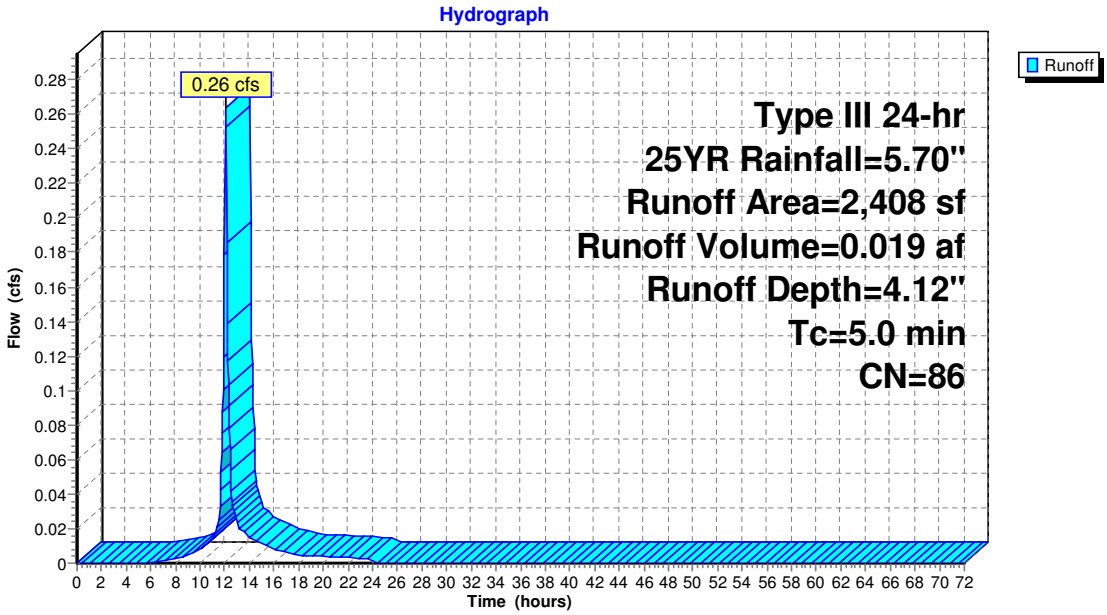
Runoff = 0.26 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
1,932	98	Paved roads w/curbs & sewers, HSG A
476	39	>75% Grass cover, Good, HSG A
2,408	86	Weighted Average
476		19.77% Pervious Area
1,932		80.23% Impervious Area

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

Subcatchment DA11:



Summary for Subcatchment DA12:

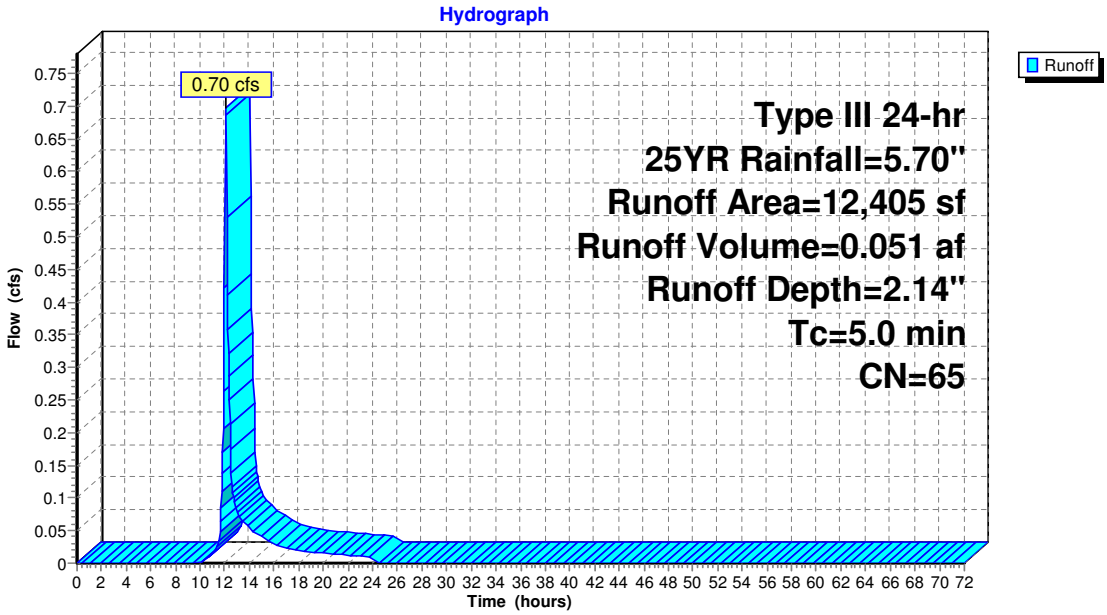
Runoff = 0.70 cfs @ 12.08 hrs, Volume= 0.051 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
5,743	98	Paved roads w/curbs & sewers, HSG A
5,045	39	>75% Grass cover, Good, HSG A
1,617	30	Woods, Good, HSG A
12,405	65	Weighted Average
6,662		53.70% Pervious Area
5,743		46.30% Impervious Area

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

Subcatchment DA12:



Summary for Subcatchment DA2:

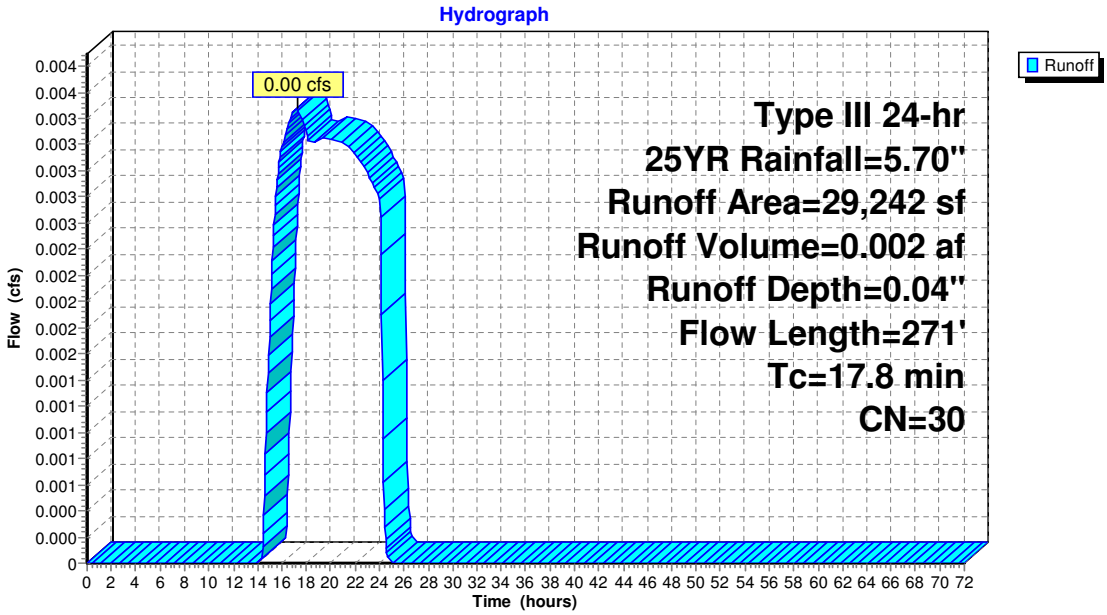
Runoff = 0.00 cfs @ 17.20 hrs, Volume= 0.002 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
29,242	30	Woods, Good, HSG A
29,242		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
2.5	171	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.8	271	Total			

Subcatchment DA2:



Summary for Subcatchment DA3:

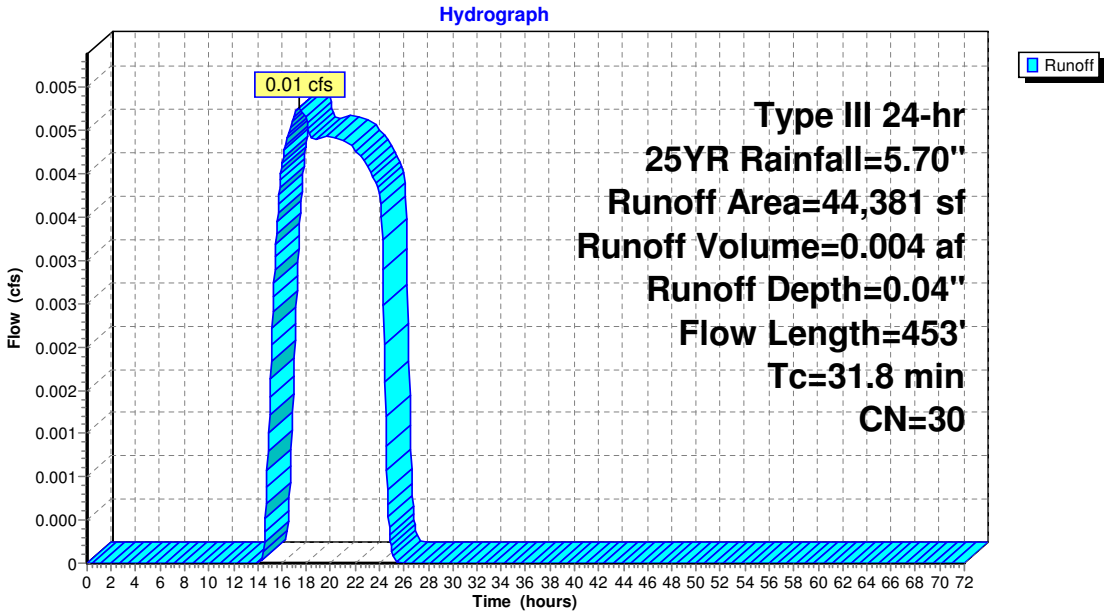
Runoff = 0.01 cfs @ 17.37 hrs, Volume= 0.004 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
44,381	30	Woods, Good, HSG A
44,381		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4	163	0.0250	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.4	290	0.0480	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
31.8	453	Total			

Subcatchment DA3:



Summary for Subcatchment DA4:

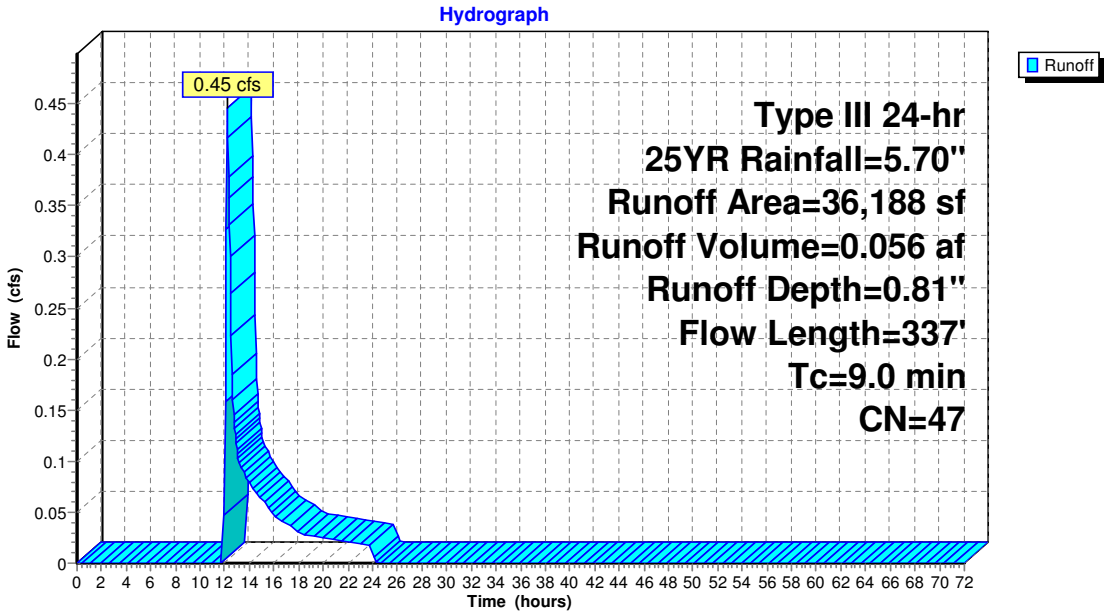
Runoff = 0.45 cfs @ 12.17 hrs, Volume= 0.056 af, Depth= 0.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
21,432	30	Woods, Good, HSG A
14,756	72	Dirt roads, HSG A
36,188	47	Weighted Average
36,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	34	0.1760	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	106	0.0190	0.43		**Sheet Flow,** Fallow n= 0.050 P2= 3.60"
0.6	60	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	137	0.0440	3.38		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.0	337	Total			

Subcatchment DA4:



Summary for Subcatchment DA5:

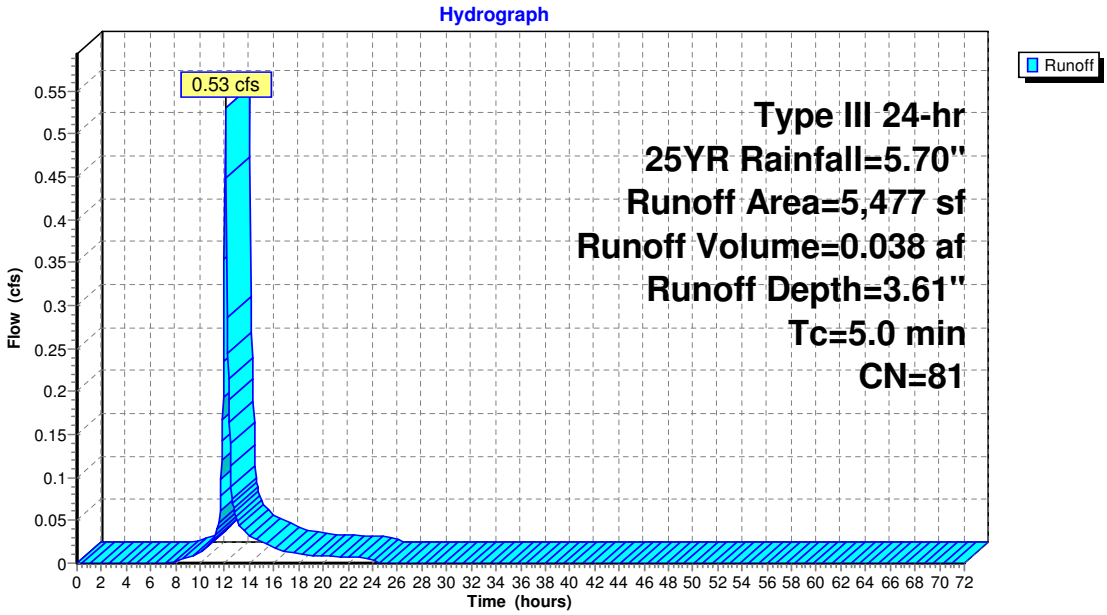
Runoff = 0.53 cfs @ 12.08 hrs, Volume= 0.038 af, Depth= 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
4,075	98	Paved parking, HSG A
1,402	30	Woods, Good, HSG A
5,477	81	Weighted Average
1,402		25.60% Pervious Area
4,075		74.40% Impervious Area

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

Subcatchment DA5:



Summary for Subcatchment DA6:

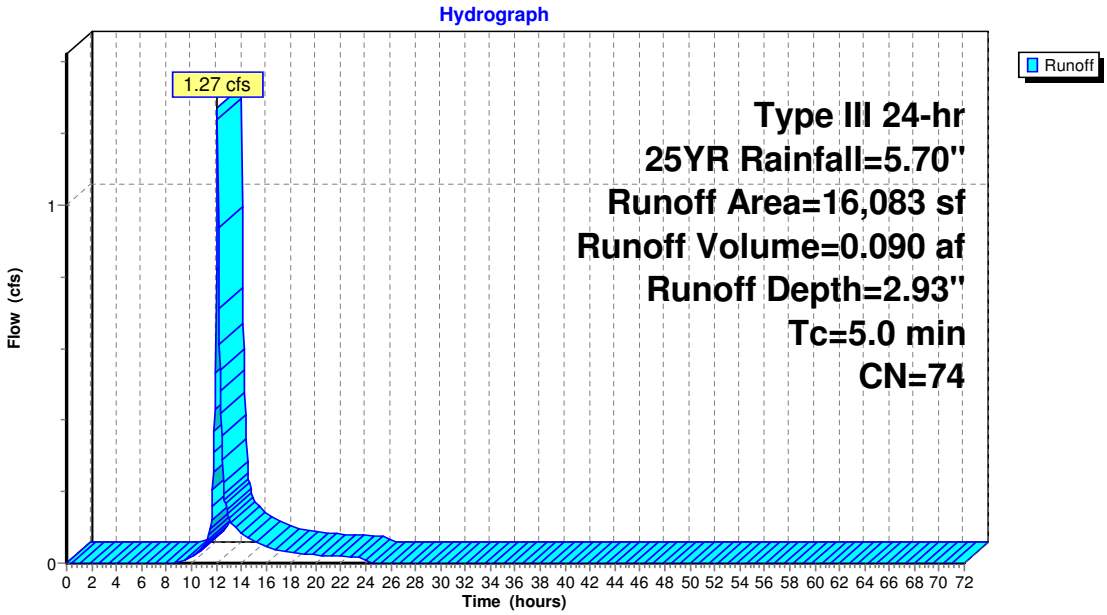
Runoff = 1.27 cfs @ 12.08 hrs, Volume= 0.090 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.70"

	Area (sf)	CN	Description
*	7,044	98	Ex. Paved parking, HSG A
	3,261	98	Roofs, HSG A
	5,778	32	Woods/grass comb., Good, HSG A
	16,083	74	Weighted Average
	5,778		35.93% Pervious Area
	10,305		64.07% Impervious Area

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

Subcatchment DA6:



Summary for Subcatchment DA7:

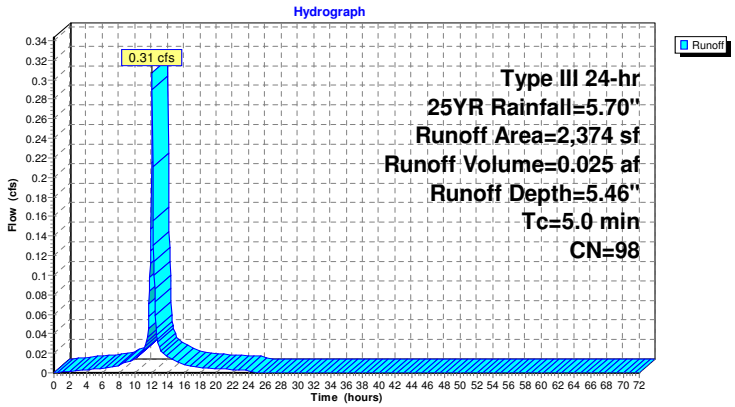
Runoff = 0.31 cfs @ 12.07 hrs, Volume= 0.025 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
2,374	98	Paved parking, HSG A
2,374		100.00% Impervious Area

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

Subcatchment DA7:



Summary for Subcatchment DA8:

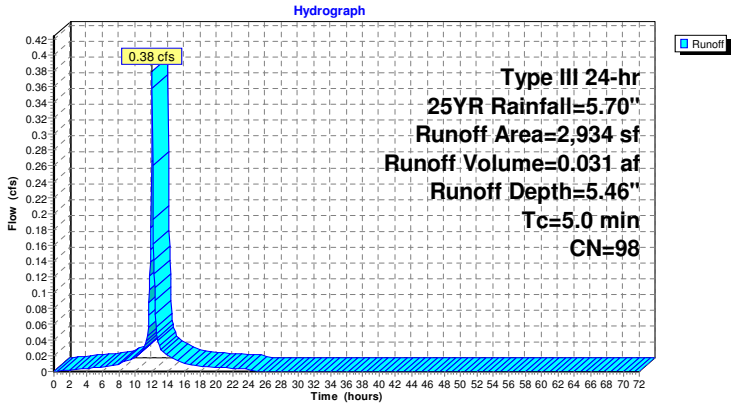
Runoff = 0.38 cfs @ 12.07 hrs, Volume= 0.031 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
2,934	98	Paved roads w/curbs & sewers, HSG A
2,934		100.00% Impervious Area

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

Subcatchment DA8:



Summary for Subcatchment DA9:

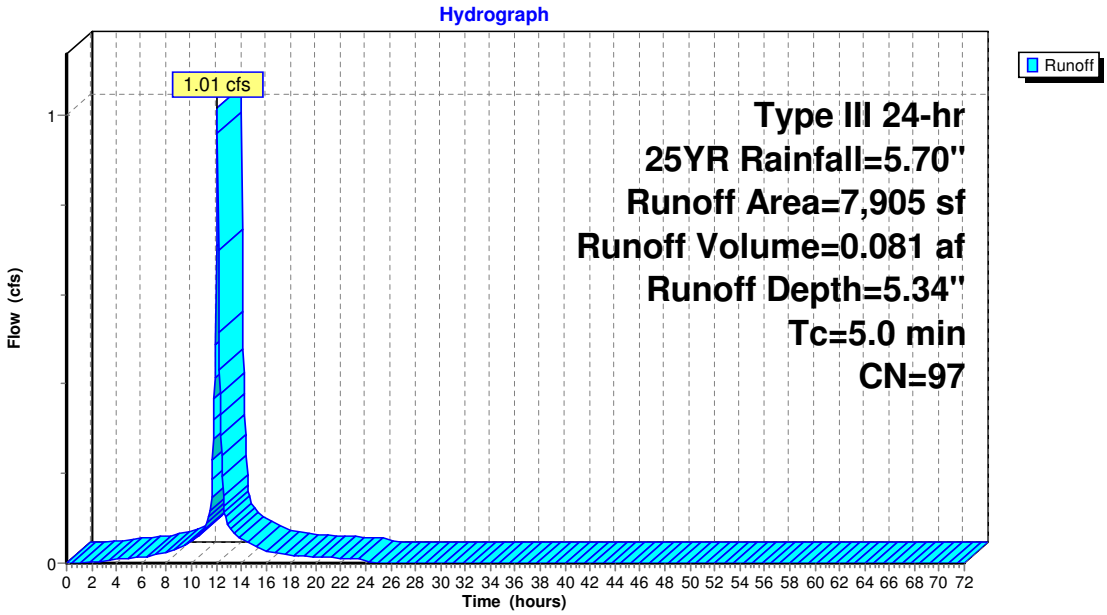
Runoff = 1.01 cfs @ 12.07 hrs, Volume= 0.081 af, Depth= 5.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
7,723	98	Paved roads w/curbs & sewers, HSG A
182	39	>75% Grass cover, Good, HSG A
7,905	97	Weighted Average
182		2.30% Pervious Area
7,723		97.70% Impervious Area

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

Subcatchment DA9:



Summary for Pond P1: Depression

Inflow Area = 0.671 ac, 0.00% Impervious, Inflow Depth = 0.04" for 25YR event
Inflow = 0.00 cfs @ 17.20 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 17.39 hrs, Volume= 0.002 af, Atten= 0%, Lag= 10.9 min
Discarded = 0.00 cfs @ 17.39 hrs, Volume= 0.002 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 111.01' @ 17.39 hrs Surf.Area= 258 sf Storage= 2 cf

Plug-Flow detention time= 11.7 min calculated for 0.002 af (100% of inflow)
Center-of-Mass det. time= 11.6 min (1,182.0 - 1,170.4)

Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	5,074 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

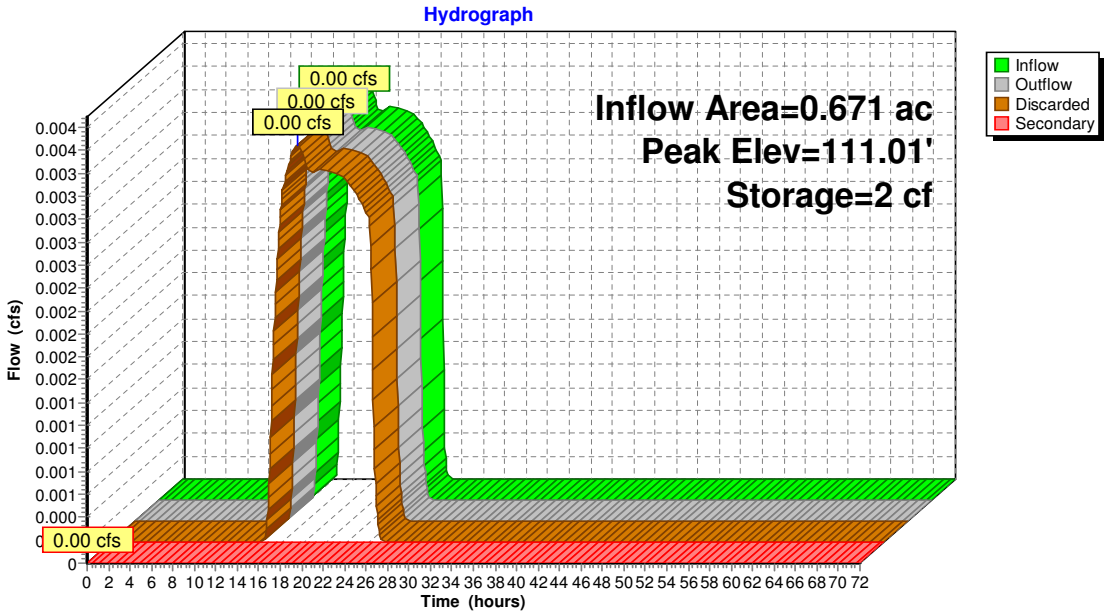
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
111.00	254	0	0
114.00	1,440	2,541	2,541
115.00	3,625	2,533	5,074

Device	Routing	Invert	Outlet Devices
#1	Secondary	114.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Discarded	111.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 17.39 hrs HW=111.01' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: Depression



Summary for Pond RB1: RECHARGERS (1)

Inflow Area = 0.126 ac, 74.40% Impervious, Inflow Depth = 3.61" for 25YR event
Inflow = 0.53 cfs @ 12.08 hrs, Volume= 0.038 af
Outflow = 0.16 cfs @ 12.41 hrs, Volume= 0.038 af, Atten= 69%, Lag= 19.8 min
Discarded = 0.16 cfs @ 12.41 hrs, Volume= 0.038 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 120.53' @ 12.41 hrs Surf.Area= 0.002 ac Storage= 0.009 af

Plug-Flow detention time= 20.9 min calculated for 0.038 af (100% of inflow)
Center-of-Mass det. time= 20.9 min (833.6 - 812.7)

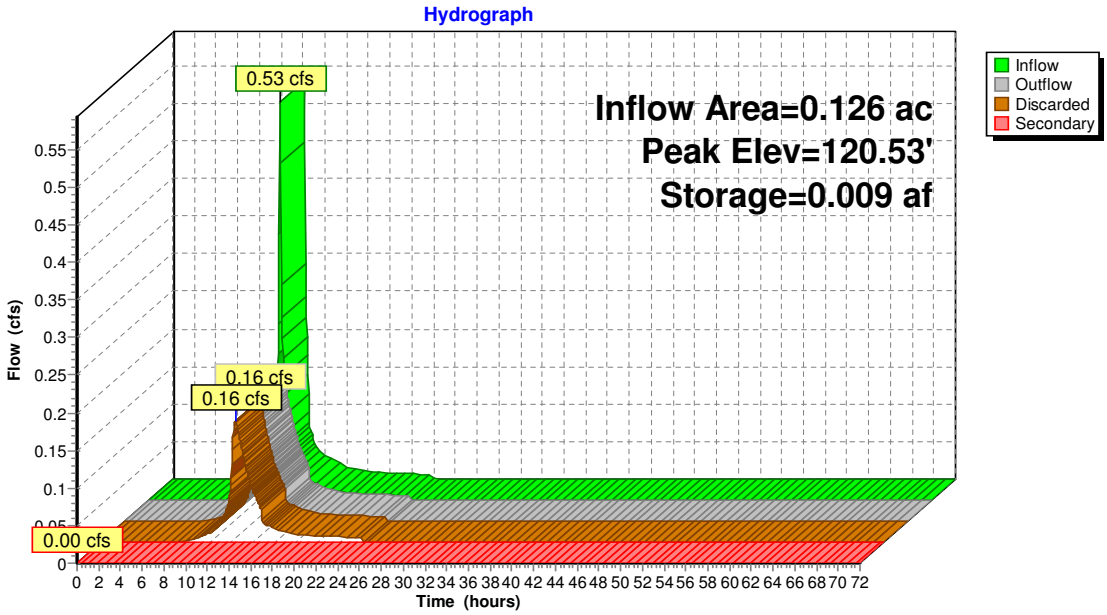
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.005 af	**5.50'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	112.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** 0.026 af Overall - 0.005 af Embedded = 0.021 af x 33.0% Voids
		0.012 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.16 cfs @ 12.41 hrs HW=120.53' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=112.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB1: RECHARGERS (1)



Summary for Pond RB2: RECHARGER (2)

Inflow Area = 0.369 ac, 64.07% Impervious, Inflow Depth = 2.93" for 25YR event
Inflow = 1.27 cfs @ 12.08 hrs, Volume= 0.090 af
Outflow = 0.38 cfs @ 12.43 hrs, Volume= 0.090 af, Atten= 70%, Lag= 21.1 min
Discarded = 0.38 cfs @ 12.43 hrs, Volume= 0.090 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 122.47' @ 12.43 hrs Surf.Area= 208 sf Storage= 1,019 cf

Plug-Flow detention time= 23.9 min calculated for 0.090 af (100% of inflow)
Center-of-Mass det. time= 23.9 min (854.1 - 830.2)

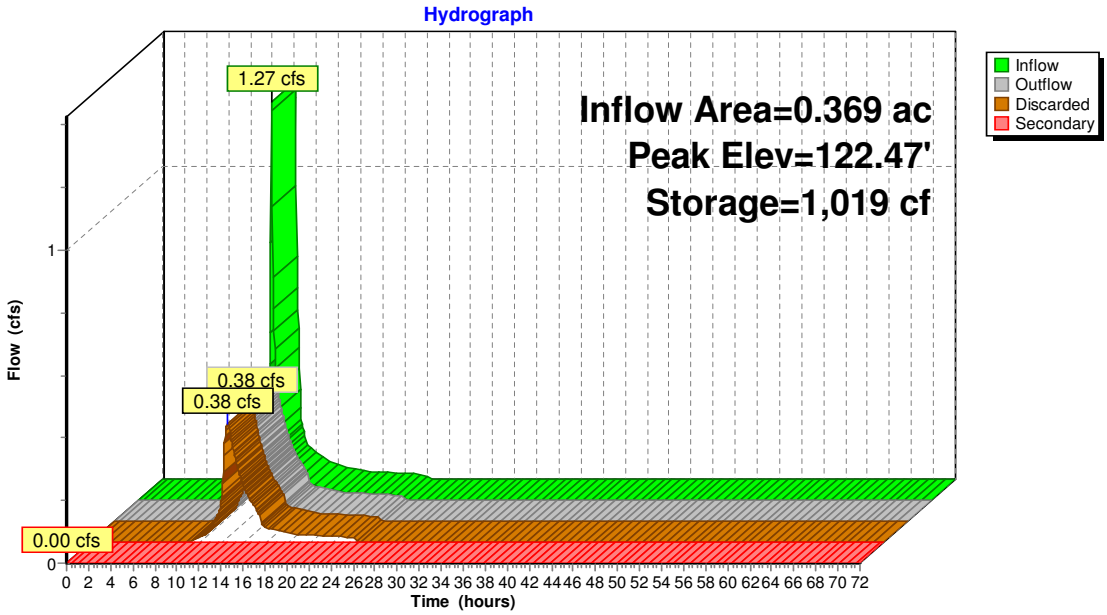
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	475 cf	**5.50'D x 10.00'H Vertical Cone/Cylinder** x 2 Inside #2
#2	112.00'	597 cf	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 2
			2,285 cf Overall - 475 cf Embedded = 1,810 cf x 33.0% Voids
		1,072 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.38 cfs @ 12.43 hrs HW=122.46' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.38 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=112.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB2: RECHARGER (2)



Summary for Pond RB3: RECHARGER (1)

Inflow Area = 0.122 ac,100.00% Impervious, Inflow Depth = 5.46" for 25YR event
Inflow = 0.68 cfs @ 12.07 hrs, Volume= 0.055 af
Outflow = 0.31 cfs @ 12.30 hrs, Volume= 0.055 af, Atten= 55%, Lag= 13.8 min
Discarded = 0.20 cfs @ 12.30 hrs, Volume= 0.055 af
Secondary = 0.11 cfs @ 12.30 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 121.01' @ 12.30 hrs Surf.Area= 0.002 ac Storage= 0.013 af

Plug-Flow detention time= 22.6 min calculated for 0.055 af (100% of inflow)
Center-of-Mass det. time= 22.2 min (767.2 - 745.0)

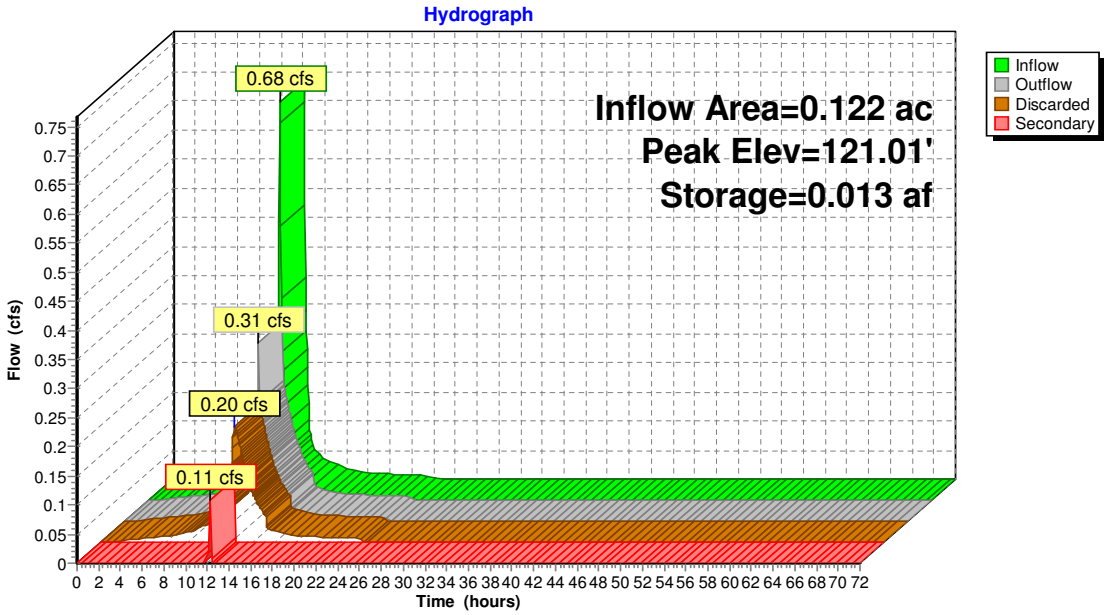
Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	110.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** 0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	110.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	120.99'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.20 cfs @ 12.30 hrs HW=121.01' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.20 cfs)

Secondary OutFlow Max=0.06 cfs @ 12.30 hrs HW=121.01' (Free Discharge)
└**2=Orifice/Grate** (Weir Controls 0.06 cfs @ 0.48 fps)

Pond RB3: RECHARGER (1)



Summary for Pond RB4: RECHARGER (6)

Inflow Area = 0.303 ac, 98.62% Impervious, Inflow Depth = 3.20" for 25YR event
Inflow = 1.01 cfs @ 12.07 hrs, Volume= 0.081 af
Outflow = 0.41 cfs @ 12.27 hrs, Volume= 0.081 af, Atten= 60%, Lag= 12.2 min
Discarded = 0.41 cfs @ 12.27 hrs, Volume= 0.081 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 112.89' @ 12.27 hrs Surf.Area= 0.014 ac Storage= 0.011 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 6.5 min (758.7 - 752.2)

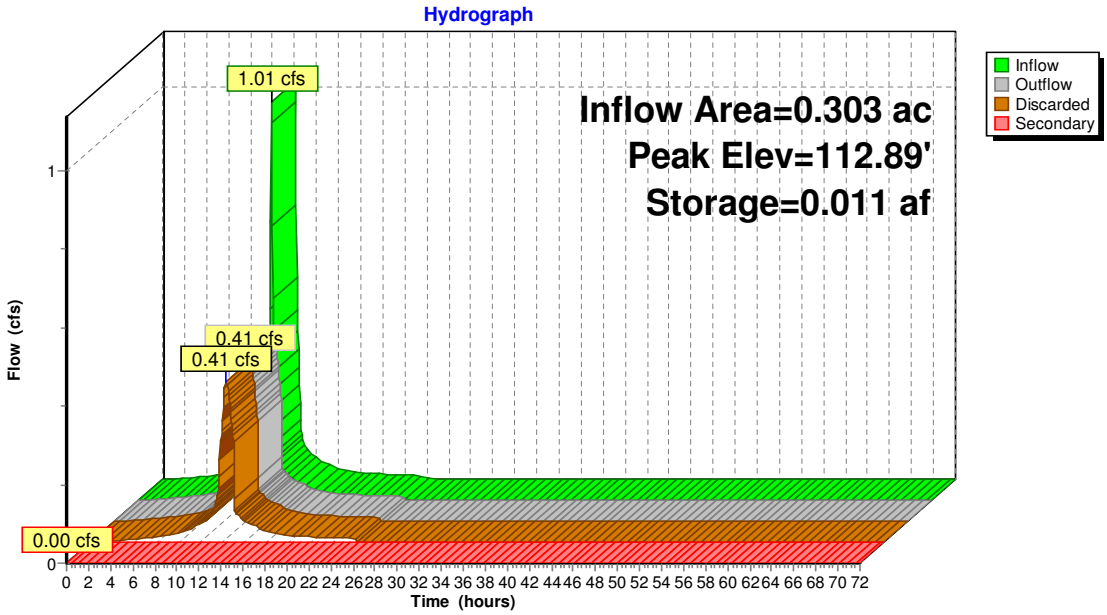
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.039 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 6 Inside #2
#2	111.00'	0.039 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 6 0.157 af Overall - 0.039 af Embedded = 0.118 af x 33.0% Voids
		0.078 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	121.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.41 cfs @ 12.27 hrs HW=112.88' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.41 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB4: RECHARGER (6)



Summary for Pond RB5: RECHARGER (3)

Inflow Area = 0.244 ac, 81.45% Impervious, Inflow Depth = 4.23" for 25YR event
Inflow = 1.19 cfs @ 12.07 hrs, Volume= 0.086 af
Outflow = 0.55 cfs @ 12.24 hrs, Volume= 0.086 af, Atten= 54%, Lag= 10.0 min
Discarded = 0.55 cfs @ 12.24 hrs, Volume= 0.086 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 114.57' @ 12.24 hrs Surf.Area= 0.007 ac Storage= 0.012 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 5.4 min (801.0 - 795.5)

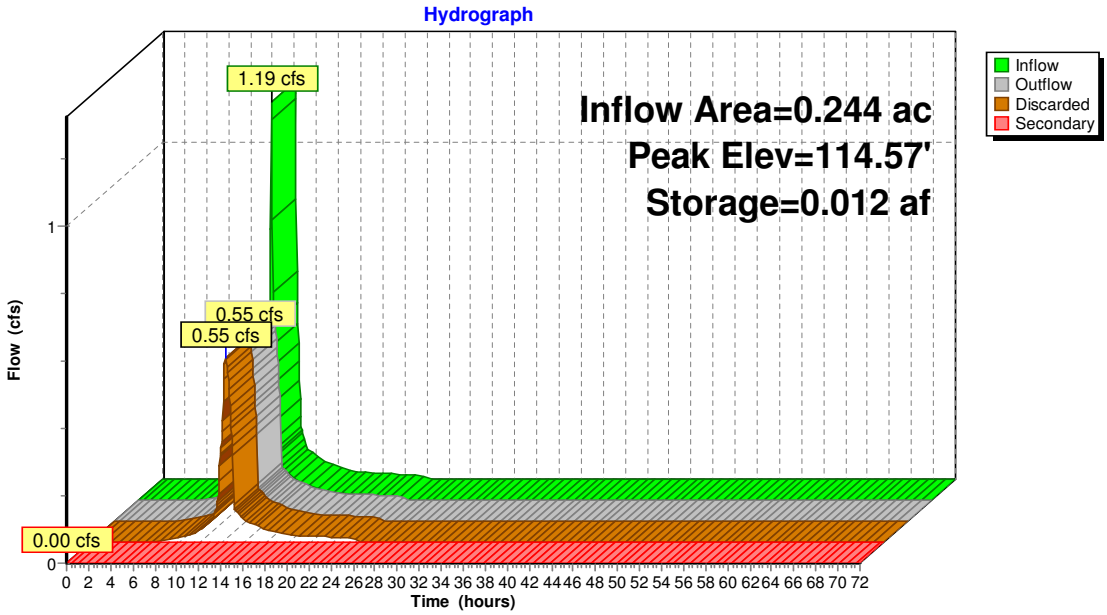
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	111.00'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3 0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	121.90'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.55 cfs @ 12.24 hrs HW=114.56' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.55 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB5: RECHARGER (3)



Summary for Pond RB6: RECHARGER (1)

Inflow Area = 0.055 ac, 80.23% Impervious, Inflow Depth = 4.12" for 25YR event
Inflow = 0.26 cfs @ 12.07 hrs, Volume= 0.019 af
Outflow = 0.09 cfs @ 12.37 hrs, Volume= 0.019 af, Atten= 67%, Lag= 17.5 min
Discarded = 0.09 cfs @ 12.37 hrs, Volume= 0.019 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 116.24' @ 12.37 hrs Surf.Area= 0.002 ac Storage= 0.004 af

Plug-Flow detention time= 13.7 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 13.6 min (812.2 - 798.6)

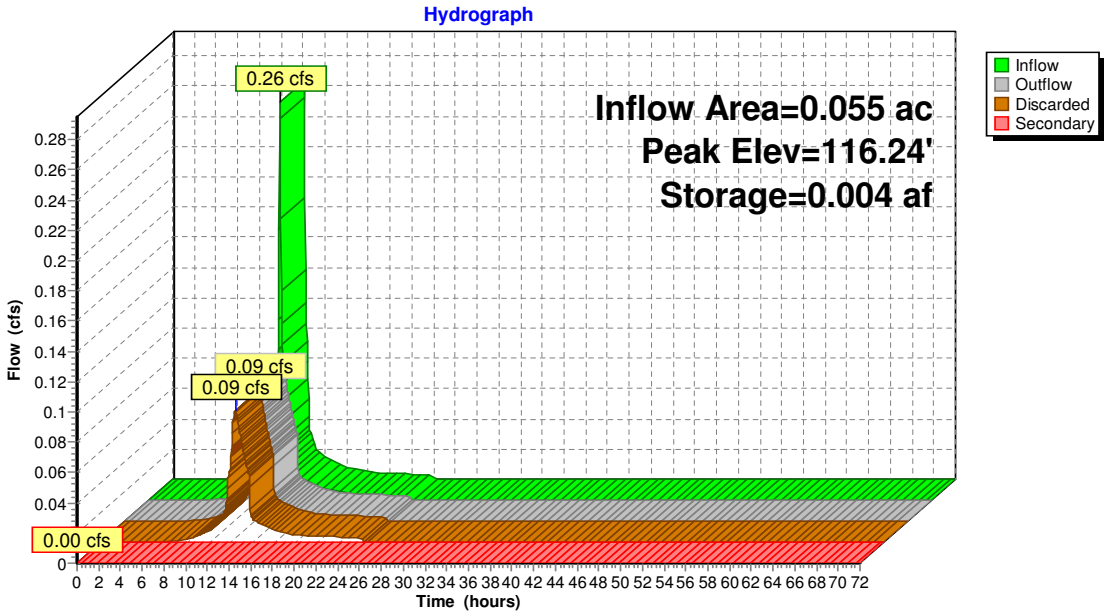
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** 0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.09 cfs @ 12.37 hrs HW=116.24' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB6: RECHARGER (1)



Summary for Pond RB7: RECHARGER (3)

Inflow Area = 0.285 ac, 46.30% Impervious, Inflow Depth = 2.14" for 25YR event
Inflow = 0.70 cfs @ 12.08 hrs, Volume= 0.051 af
Outflow = 0.38 cfs @ 12.23 hrs, Volume= 0.051 af, Atten= 45%, Lag= 8.7 min
Discarded = 0.38 cfs @ 12.23 hrs, Volume= 0.051 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 116.11' @ 12.23 hrs Surf.Area= 0.007 ac Storage= 0.005 af

Plug-Flow detention time= 3.0 min calculated for 0.051 af (100% of inflow)
Center-of-Mass det. time= 2.8 min (854.9 - 852.1)

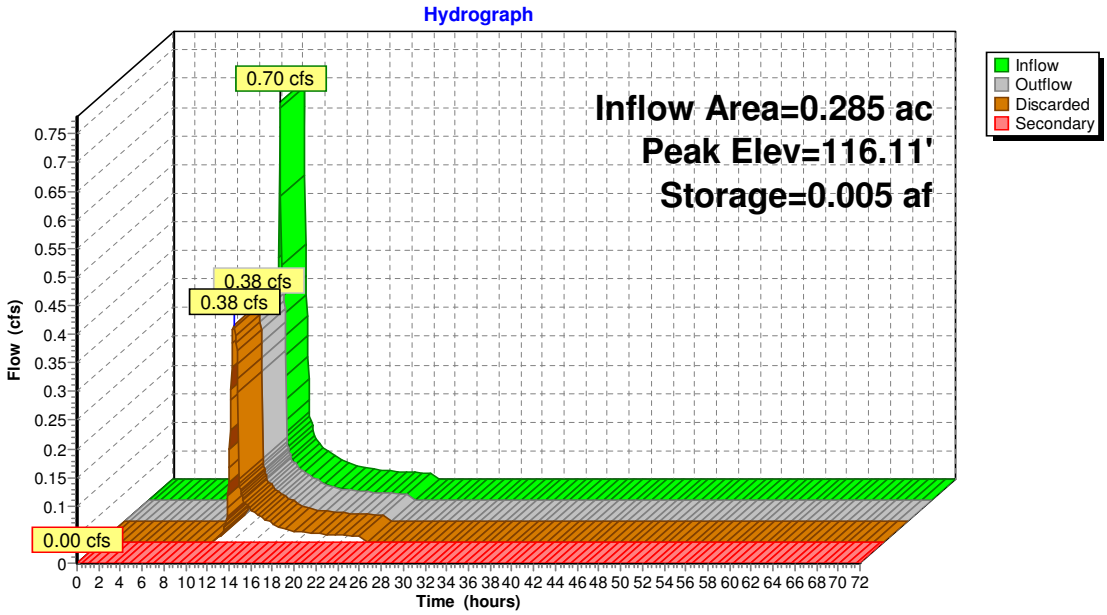
Volume	Invert	Avail.Storage	Storage Description
#1	115.53'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	114.53'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3
			0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	114.53'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	125.53'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.38 cfs @ 12.23 hrs HW=116.11' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.38 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=114.53' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB7: RECHARGER (3)

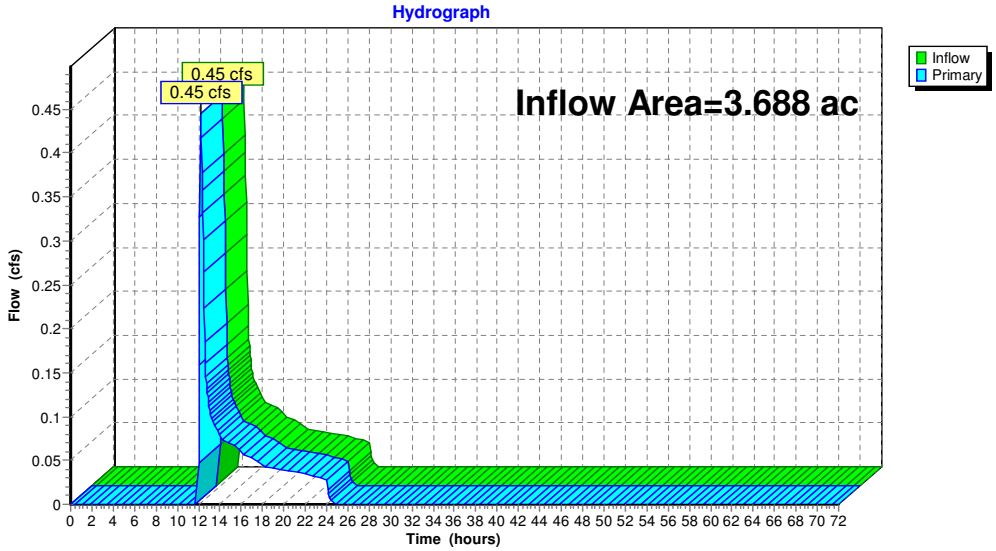


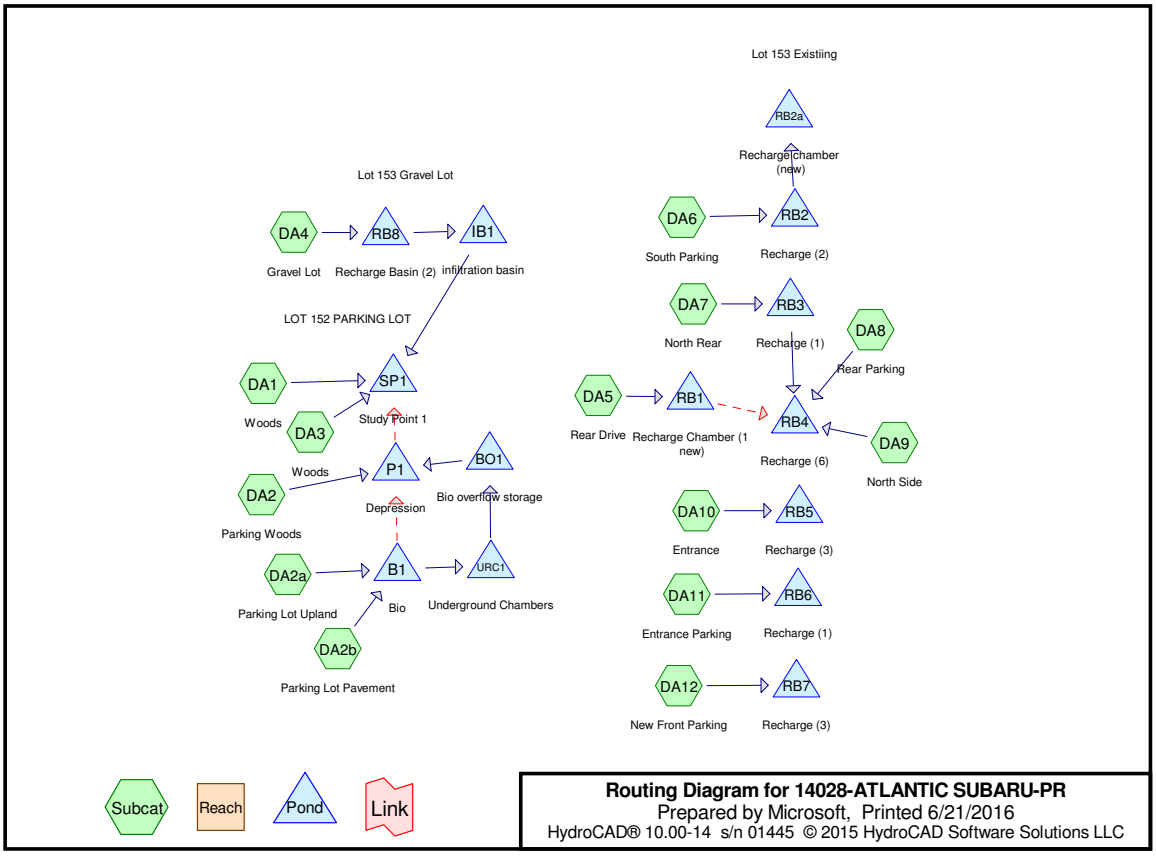
Summary for Pond SP1: Study Point 1

Inflow Area = 3.688 ac, 0.00% Impervious, Inflow Depth = 0.22" for 25YR event
Inflow = 0.45 cfs @ 12.17 hrs, Volume= 0.066 af
Primary = 0.45 cfs @ 12.17 hrs, Volume= 0.066 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Pond SP1: Study Point 1





Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.529	39	>75% Grass cover, Good, HSG A (DA10, DA11, DA12, DA2a, DA3, DA4, DA5)
0.108	72	Dirt roads, HSG A (DA4)
0.140	72	Gravel Parking, HSG A (DA4)
0.991	98	Paved parking, HSG A (DA12, DA2b, DA5, DA6, DA7)
0.439	98	Paved roads w/curbs & sewers, HSG A (DA10, DA11, DA8, DA9)
0.270	98	Roofs, HSG A (DA10, DA5, DA6, DA9)
0.047	98	Water Surface, HSG A (DA2b, DA4)
3.111	30	Woods, Good, HSG A (DA1, DA12, DA2, DA2a, DA3, DA4, DA5)
0.113	43	Woods/grass comb., Fair, HSG A (DA6)
5.747	**54**	**TOTAL AREA**

Summary for Subcatchment DA1: Woods

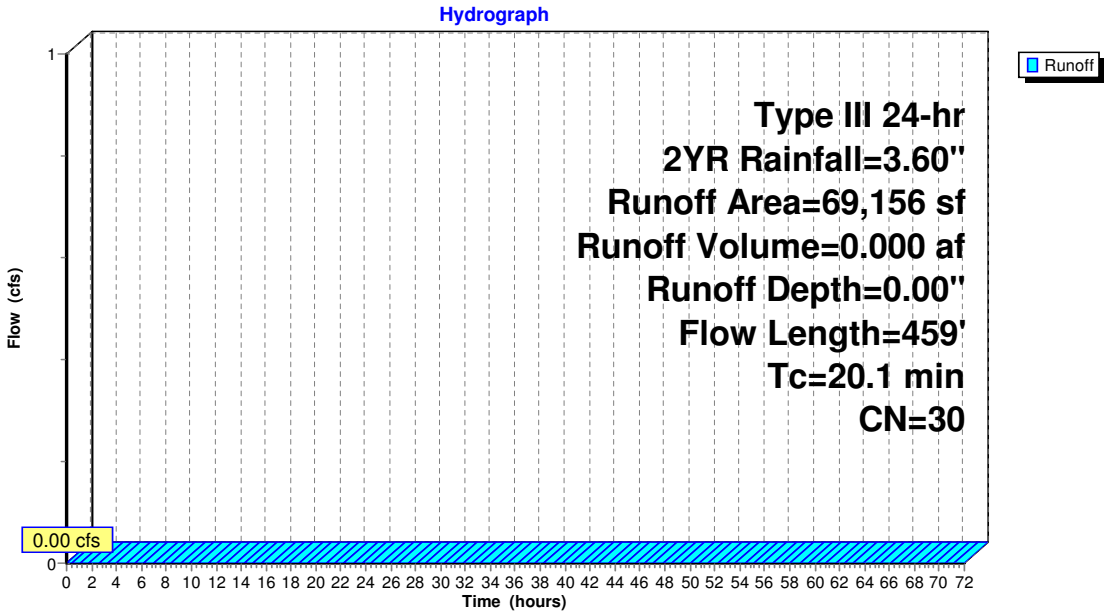
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
69,156	30	Woods, Good, HSG A
69,156		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	103	0.0490	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
5.6	356	0.0450	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	459	Total			

Subcatchment DA1: Woods



Summary for Subcatchment DA10: Entrance

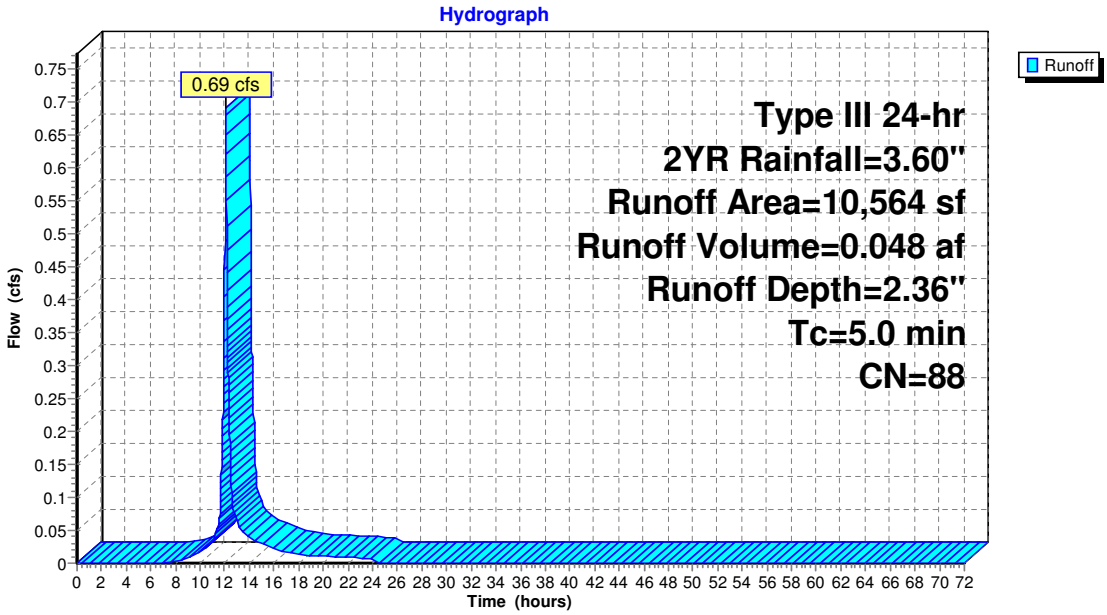
Runoff = 0.69 cfs @ 12.07 hrs, Volume= 0.048 af, Depth= 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
7,431	98	Paved roads w/curbs & sewers, HSG A
1,763	39	>75% Grass cover, Good, HSG A
1,370	98	Roofs, HSG A
10,564	88	Weighted Average
1,763		16.69% Pervious Area
8,801		83.31% Impervious Area

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

Subcatchment DA10: Entrance



Summary for Subcatchment DA11: Entrance Parking

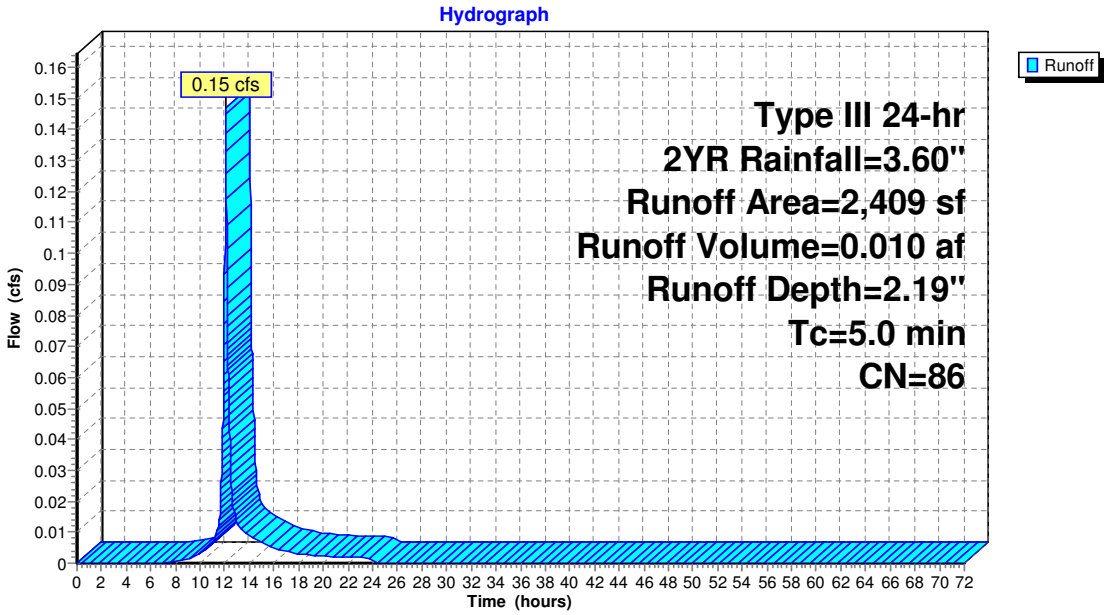
Runoff = 0.15 cfs @ 12.07 hrs, Volume= 0.010 af, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
1,932	98	Paved roads w/curbs & sewers, HSG A
477	39	>75% Grass cover, Good, HSG A
2,409	86	Weighted Average
477		19.80% Pervious Area
1,932		80.20% Impervious Area

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

Subcatchment DA11: Entrance Parking



Summary for Subcatchment DA12: New Front Parking

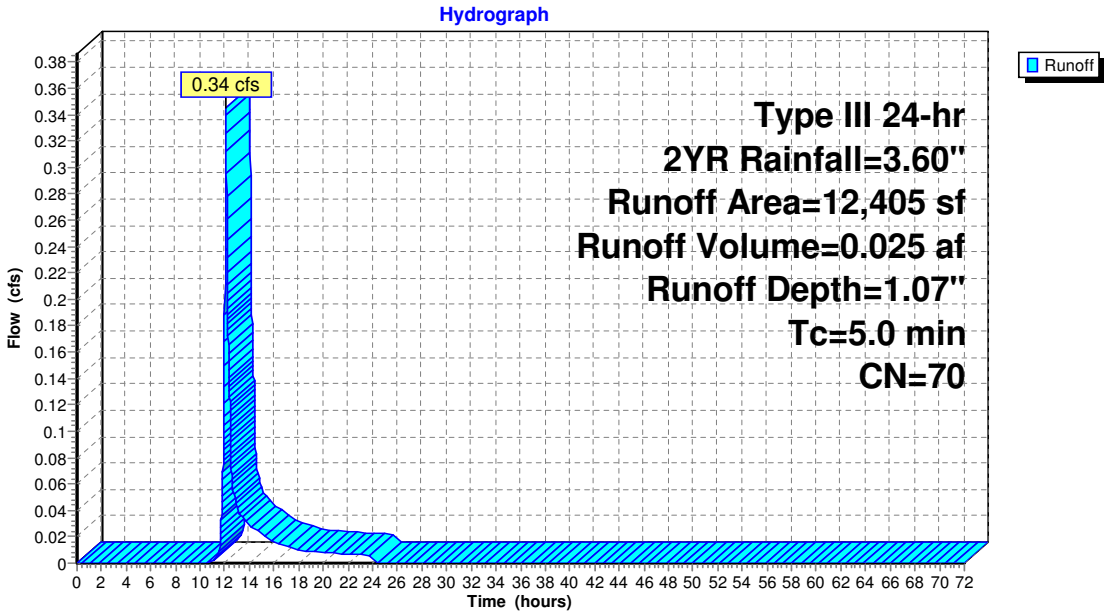
Runoff = 0.34 cfs @ 12.08 hrs, Volume= 0.025 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
6,812	98	Paved parking, HSG A
1,617	30	Woods, Good, HSG A
3,976	39	>75% Grass cover, Good, HSG A
12,405	70	Weighted Average
5,593		45.09% Pervious Area
6,812		54.91% Impervious Area

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

Subcatchment DA12: New Front Parking



Summary for Subcatchment DA2: Parking Woods

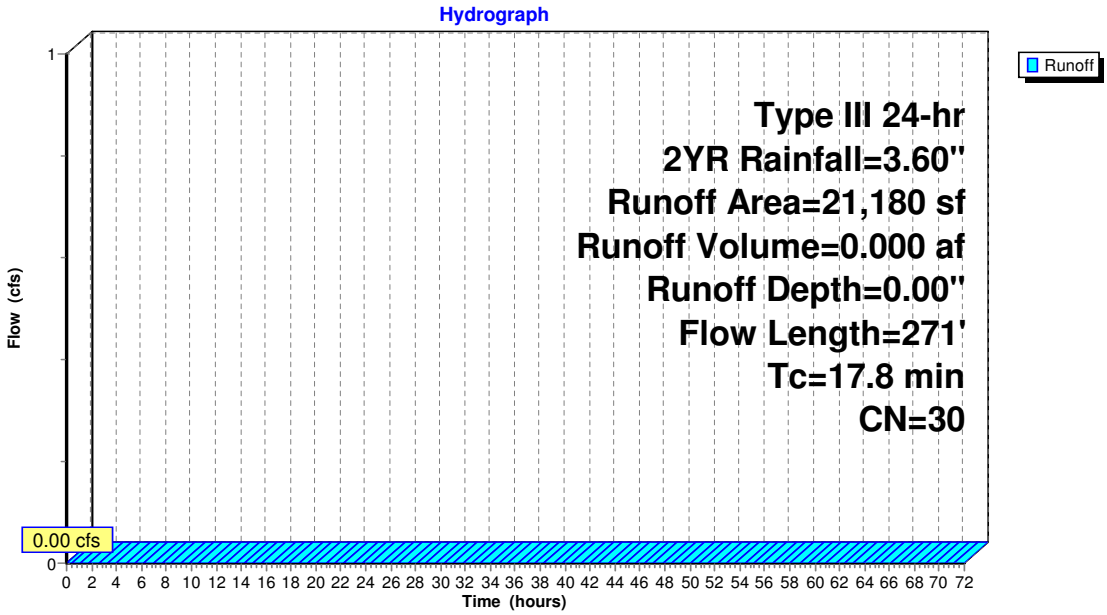
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
21,180	30	Woods, Good, HSG A
21,180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
2.5	171	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.8	271	Total			

Subcatchment DA2: Parking Woods



Summary for Subcatchment DA2a: Parking Lot Upland

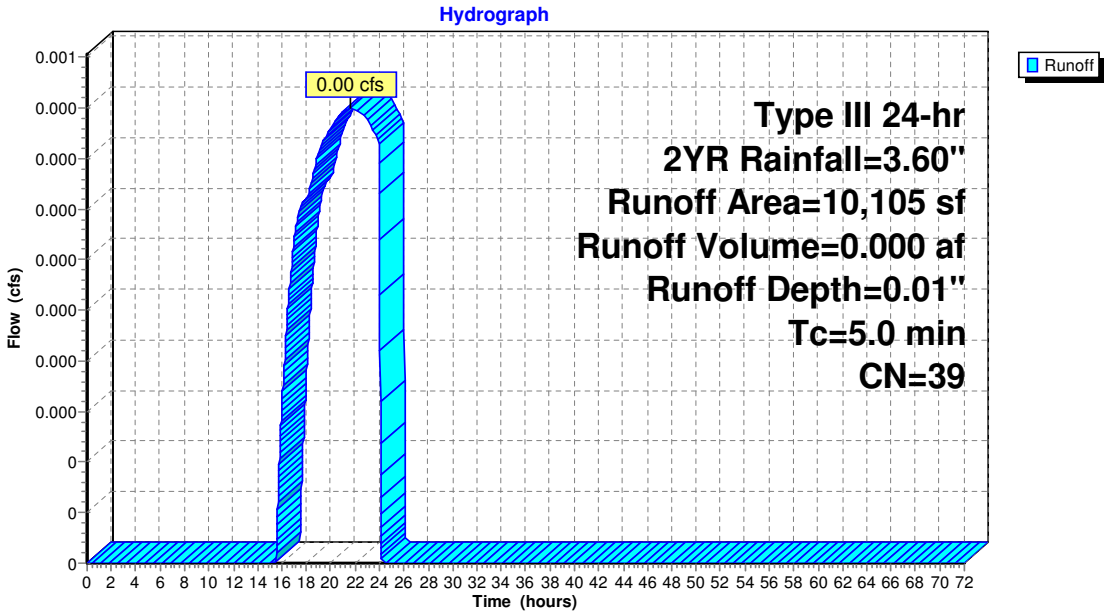
Runoff = 0.00 cfs @ 21.65 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
9,591	39	>75% Grass cover, Good, HSG A
514	30	Woods, Good, HSG A
10,105	39	Weighted Average
10,105		100.00% Pervious Area

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

Subcatchment DA2a: Parking Lot Upland



Summary for Subcatchment DA2b: Parking Lot Pavement

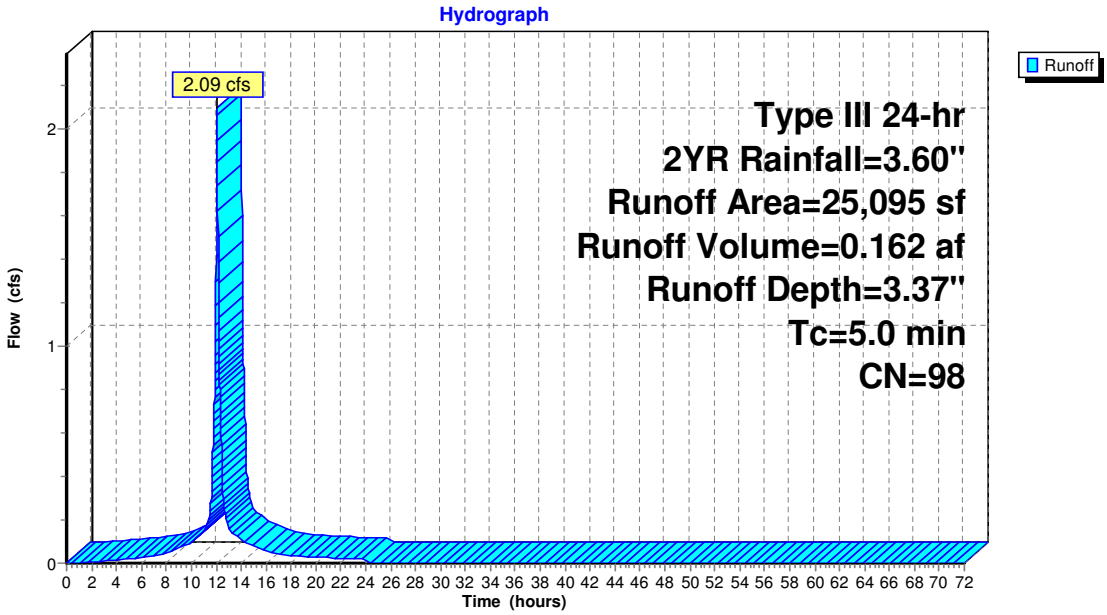
Runoff = 2.09 cfs @ 12.07 hrs, Volume= 0.162 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
23,865	98	Paved parking, HSG A
1,230	98	Water Surface, HSG A
25,095	98	Weighted Average
25,095		100.00% Impervious Area

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

Subcatchment DA2b: Parking Lot Pavement



Summary for Subcatchment DA3: Woods

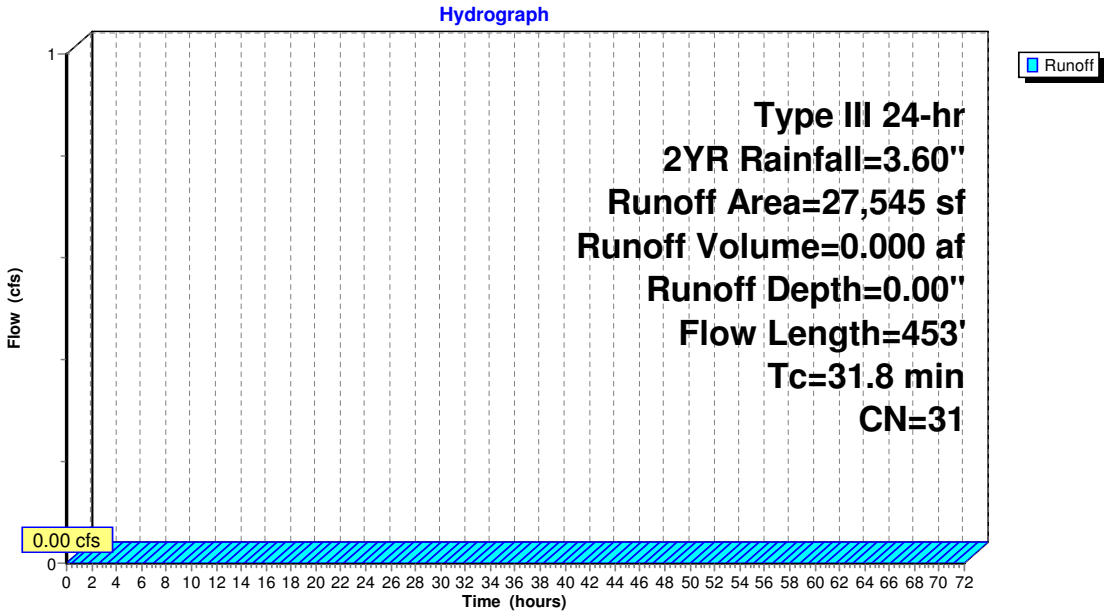
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
24,515	30	Woods, Good, HSG A
3,030	39	>75% Grass cover, Good, HSG A
27,545	31	Weighted Average
27,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4	163	0.0250	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.4	290	0.0480	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
31.8	453	Total			

Subcatchment DA3: Woods



Summary for Subcatchment DA4: Gravel Lot

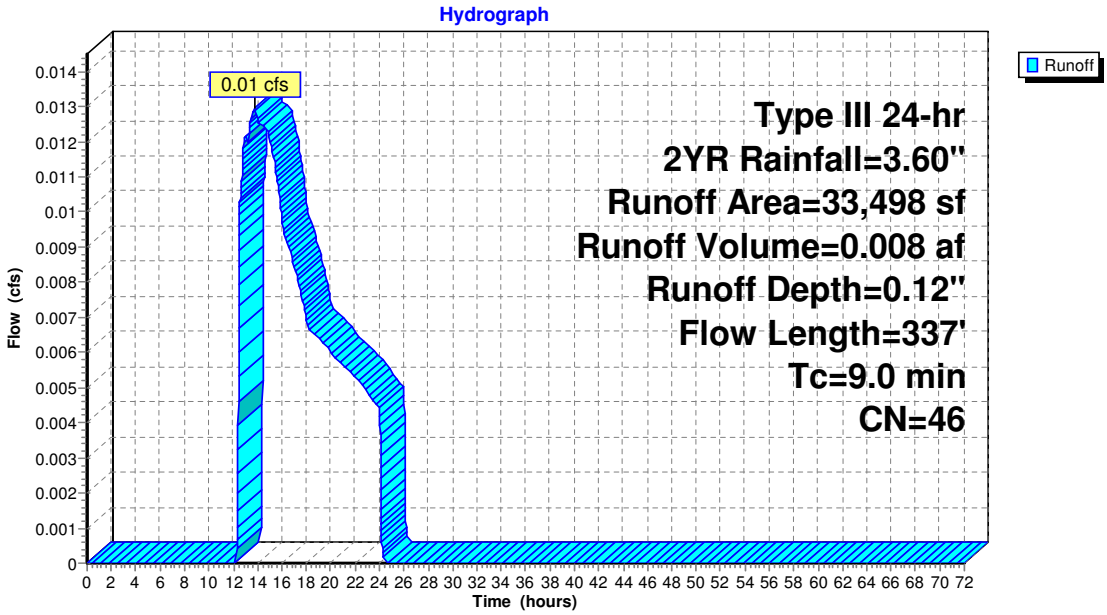
Runoff = 0.01 cfs @ 13.73 hrs, Volume= 0.008 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

	Area (sf)	CN	Description
	17,778	30	Woods, Good, HSG A
*	6,095	72	Gravel Parking, HSG A
	837	98	Water Surface, HSG A
	4,097	39	>75% Grass cover, Good, HSG A
	4,691	72	Dirt roads, HSG A
	33,498	46	Weighted Average
	32,661		97.50% Pervious Area
	837		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	34	0.1760	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	106	0.0190	0.43		**Sheet Flow,** Fallow n= 0.050 P2= 3.60"
0.6	60	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	137	0.0440	3.38		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.0	337	Total			

Subcatchment DA4: Gravel Lot



Summary for Subcatchment DA5: Rear Drive

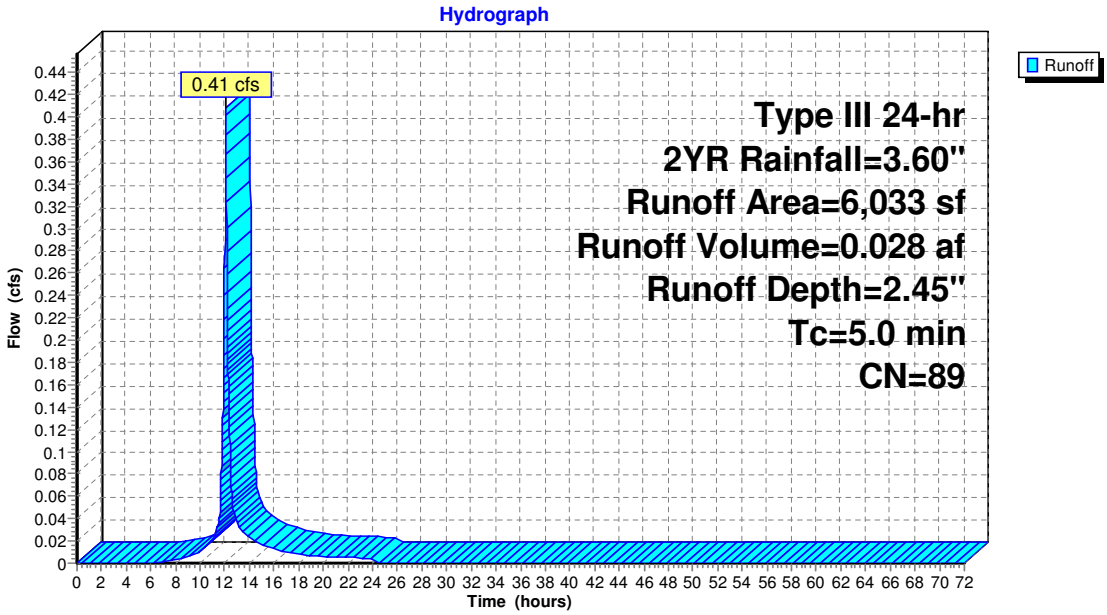
Runoff = 0.41 cfs @ 12.07 hrs, Volume= 0.028 af, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
1,843	98	Paved parking, HSG A
744	30	Woods, Good, HSG A
3,358	98	Roofs, HSG A
88	39	>75% Grass cover, Good, HSG A
6,033	89	Weighted Average
832		13.79% Pervious Area
5,201		86.21% Impervious Area

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

Subcatchment DA5: Rear Drive



Summary for Subcatchment DA6: South Parking

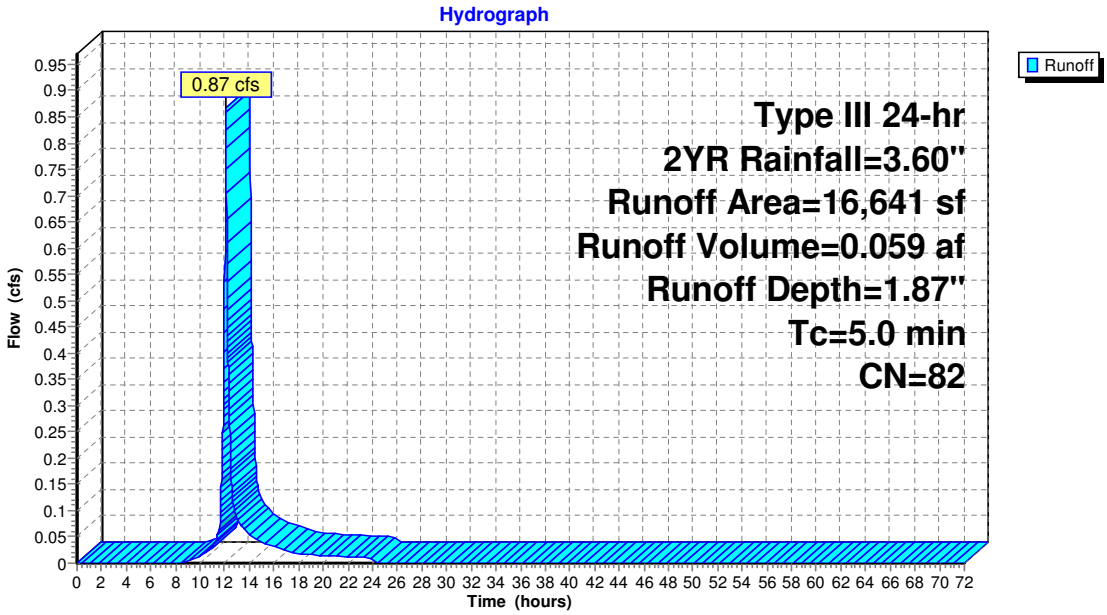
Runoff = 0.87 cfs @ 12.08 hrs, Volume= 0.059 af, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
8,472	98	Paved parking, HSG A
3,261	98	Roofs, HSG A
4,908	43	Woods/grass comb., Fair, HSG A
16,641	82	Weighted Average
4,908		29.49% Pervious Area
11,733		70.51% Impervious Area

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

Subcatchment DA6: South Parking



Summary for Subcatchment DA7: North Rear

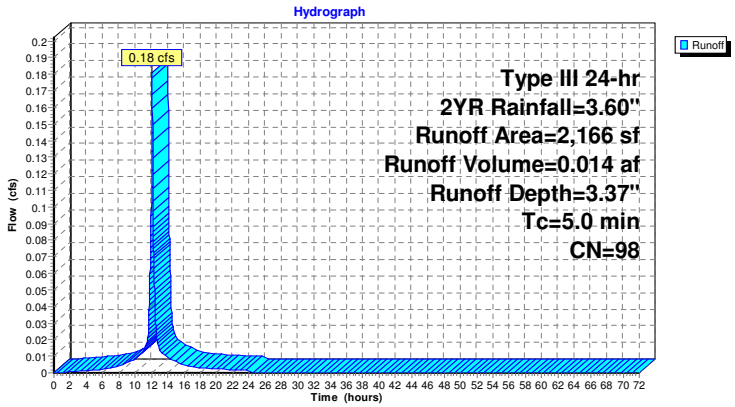
Runoff = 0.18 cfs @ 12.07 hrs, Volume= 0.014 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
2,166	98	Paved parking, HSG A
2,166		100.00% Impervious Area

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

Subcatchment DA7: North Rear



Summary for Subcatchment DA8: Rear Parking

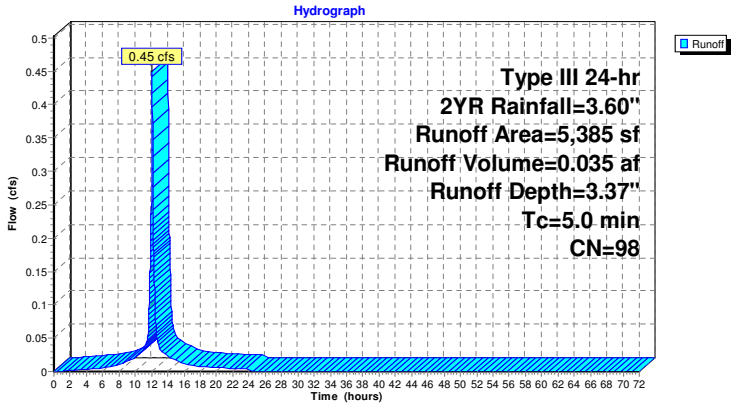
Runoff = 0.45 cfs @ 12.07 hrs, Volume= 0.035 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
5,385	98	Paved roads w/curbs & sewers, HSG A
5,385		100.00% Impervious Area

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

Subcatchment DA8: Rear Parking



Summary for Subcatchment DA9: North Side

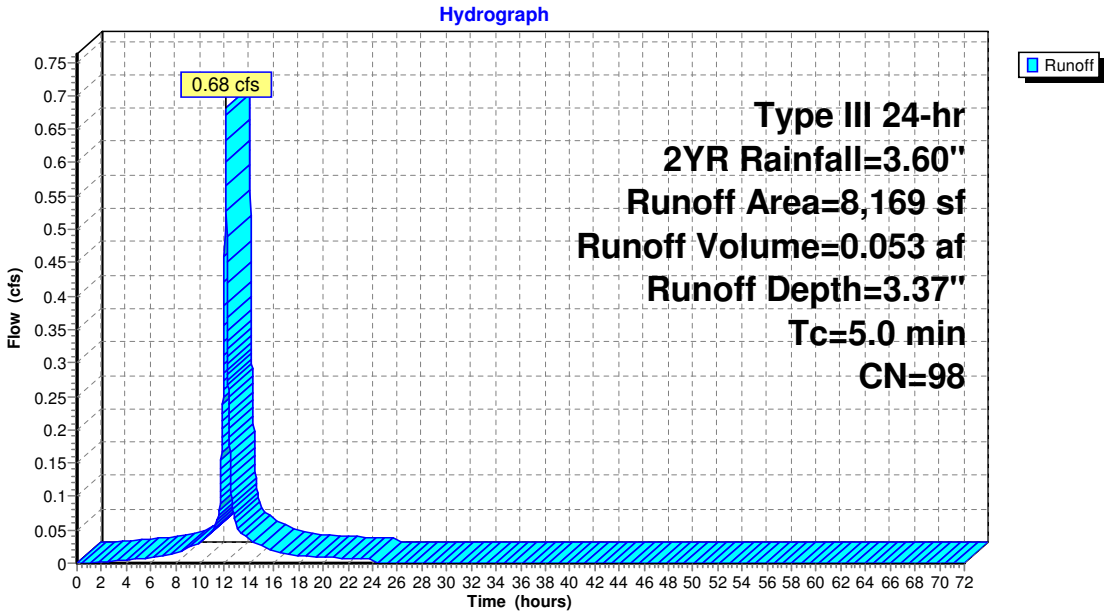
Runoff = 0.68 cfs @ 12.07 hrs, Volume= 0.053 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.60"

Area (sf)	CN	Description
4,393	98	Paved roads w/curbs & sewers, HSG A
3,776	98	Roofs, HSG A
8,169	98	Weighted Average
8,169		100.00% Impervious Area

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

Subcatchment DA9: North Side



Summary for Pond B1: Bio

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 2.40" for 2YR event
Inflow = 2.09 cfs @ 12.07 hrs, Volume= 0.162 af
Outflow = 2.01 cfs @ 12.09 hrs, Volume= 0.162 af, Atten= 4%, Lag= 1.3 min
Discarded = 0.10 cfs @ 12.09 hrs, Volume= 0.093 af
Primary = 1.92 cfs @ 12.09 hrs, Volume= 0.069 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 113.46' @ 12.09 hrs Surf.Area= 1,722 sf Storage= 679 cf

Plug-Flow detention time= 26.6 min calculated for 0.162 af (100% of inflow)
Center-of-Mass det. time= 26.6 min (780.4 - 753.8)

Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	1,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
113.00	1,232	0	0
113.50	1,765	749	749
113.76	2,018	492	1,241

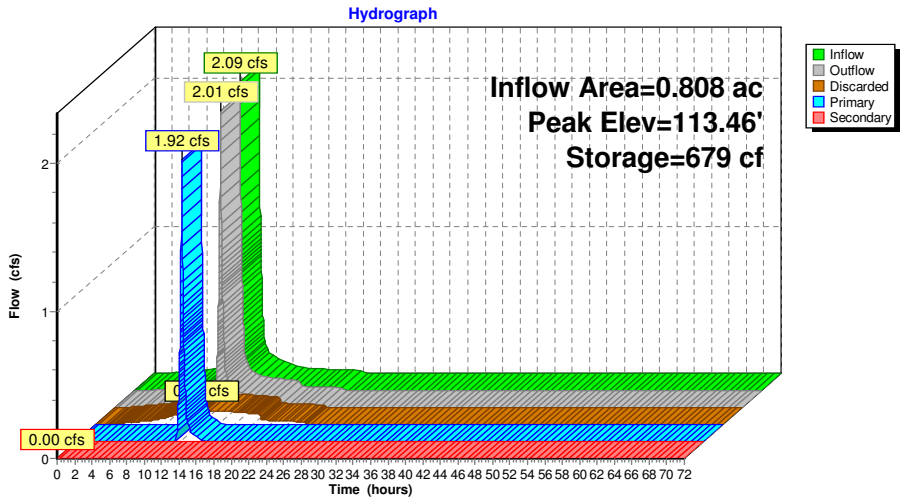
Device	Routing	Invert	Outlet Devices
#1	Device 2	113.33'	**24.0" Horiz. Orifice/Grate** X 2 rows C= 0.600 Limited to weir flow at low heads
#2	Primary	110.50'	**12.0" Round Culvert X 2.00** L= 26.0' CPP, end-section conforming to fill, Ke= 0.500
			Inlet / Outlet Invert= 110.50' / 110.40' S= 0.0038 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Discarded	113.00'	**2.410 in/hr Exfiltration over Surface area**
#4	Secondary	113.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50
			Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.10 cfs @ 12.09 hrs HW=113.46' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=1.91 cfs @ 12.09 hrs HW=113.46' (Free Discharge)
└**2=Culvert** (Passes 1.91 cfs of 11.86 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 1.91 cfs @ 1.18 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B1: Bio



Summary for Pond BO1: Bio overflow storage

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 0.00" for 2YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 113.52' @ 0.00 hrs Surf.Area= 1,765 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	113.52'	454 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

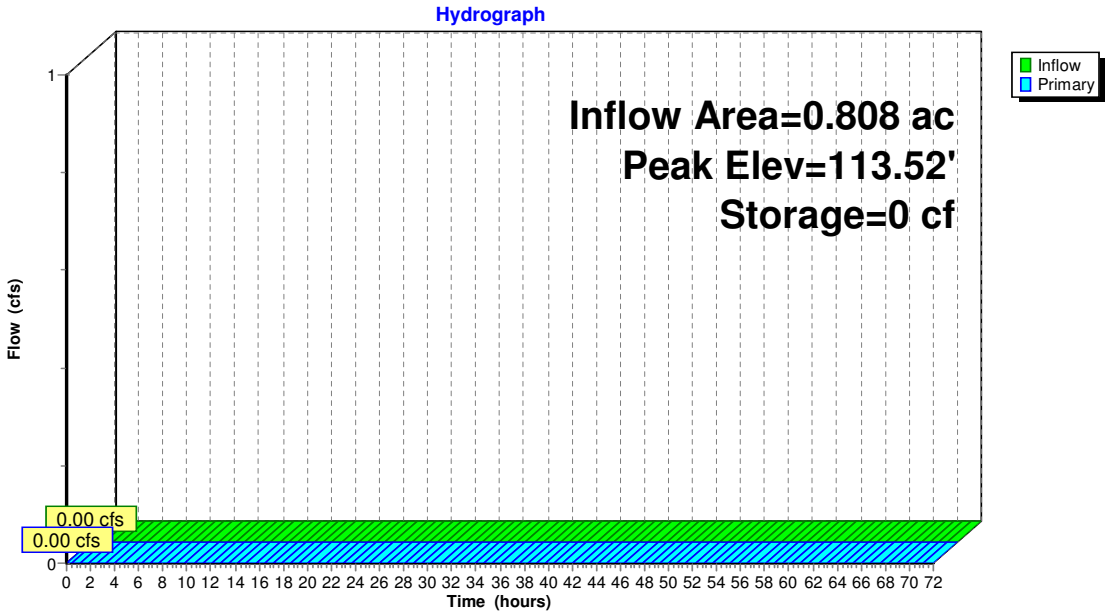
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
113.52	1,765	0	0
113.76	2,018	454	454

Device	Routing	Invert	Outlet Devices
#1	Primary	113.75'	**8.0' long x 5.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.52' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BO1: Bio overflow storage



Summary for Pond IB1: infiltration basin

Inflow Area = 0.769 ac, 2.50% Impervious, Inflow Depth = 0.00" for 2YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 122.00' @ 0.00 hrs Surf.Area= 170 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	518 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

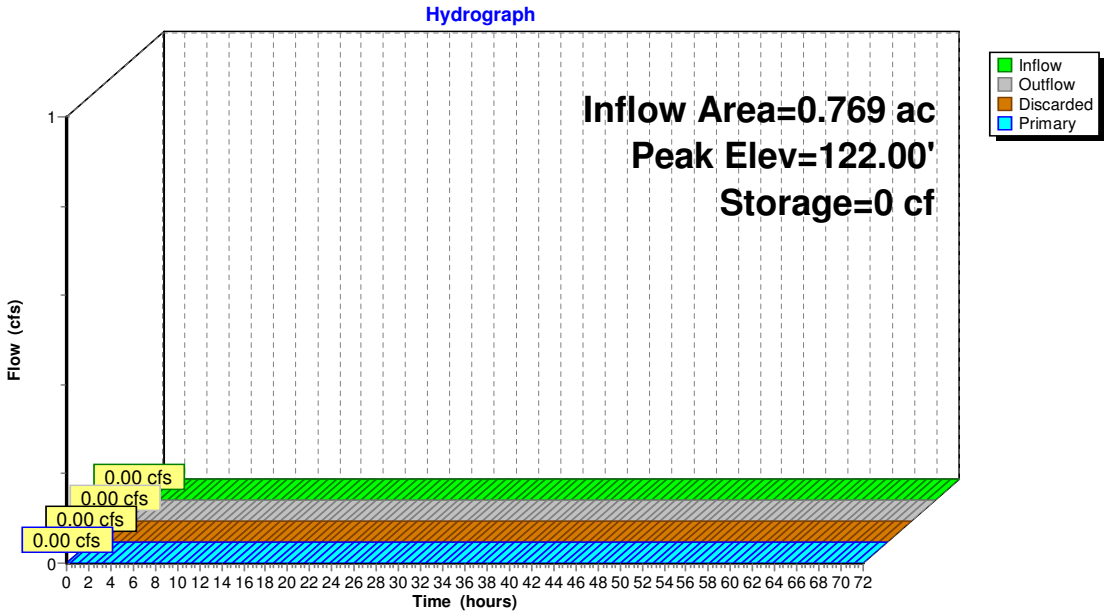
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	170	0	0
122.50	500	168	168
123.00	900	350	518

Device	Routing	Invert	Outlet Devices
#1	Primary	122.75'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	122.00'	**2.410 in/hr Exfiltration over Surface area above 122.00'** Excluded Surface area = 170 sf

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.00' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond IB1: infiltration basin



Summary for Pond P1: Depression

Inflow Area = 1.294 ac, 44.51% Impervious, Inflow Depth = 0.00" for 2YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 111.00' @ 0.00 hrs Surf.Area= 254 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	5,074 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

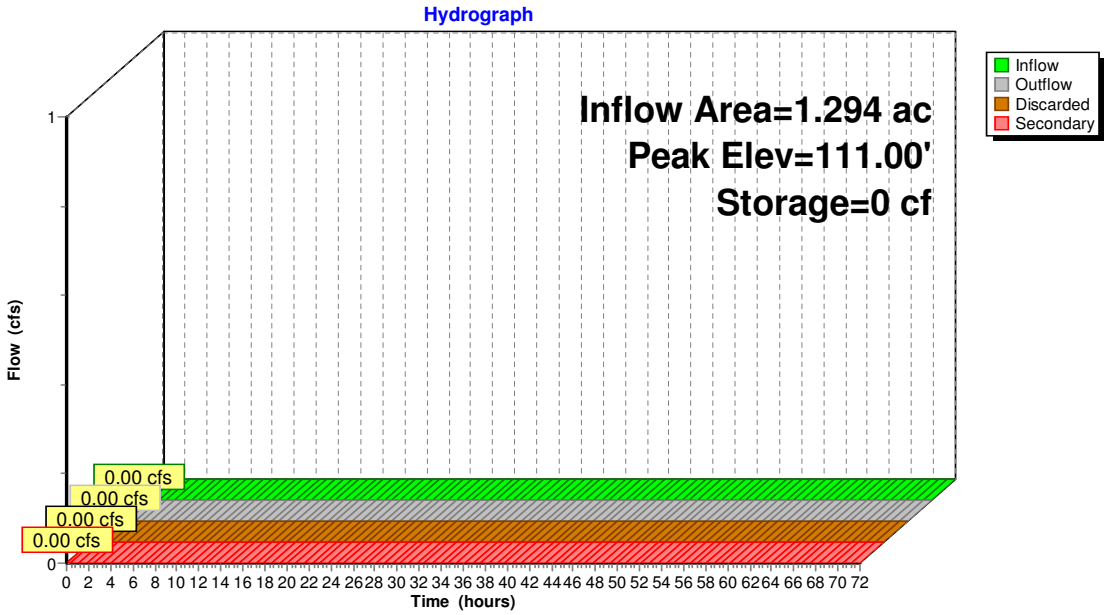
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
111.00	254	0	0
114.00	1,440	2,541	2,541
115.00	3,625	2,533	5,074

Device	Routing	Invert	Outlet Devices
#1	Secondary	114.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Discarded	111.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Exfiltration** (Passes 0.00 cfs of 0.01 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: Depression



Summary for Pond RB1: Recharge Chamber (1 new)

Inflow Area = 0.138 ac, 86.21% Impervious, Inflow Depth = 2.45" for 2YR event
Inflow = 0.41 cfs @ 12.07 hrs, Volume= 0.028 af
Outflow = 0.17 cfs @ 12.26 hrs, Volume= 0.028 af, Atten= 57%, Lag= 11.2 min
Discarded = 0.17 cfs @ 12.26 hrs, Volume= 0.028 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 117.54' @ 12.26 hrs Surf.Area= 79 sf Storage= 204 cf

Plug-Flow detention time= 8.0 min calculated for 0.028 af (100% of inflow)
Center-of-Mass det. time= 8.0 min (813.6 - 805.5)

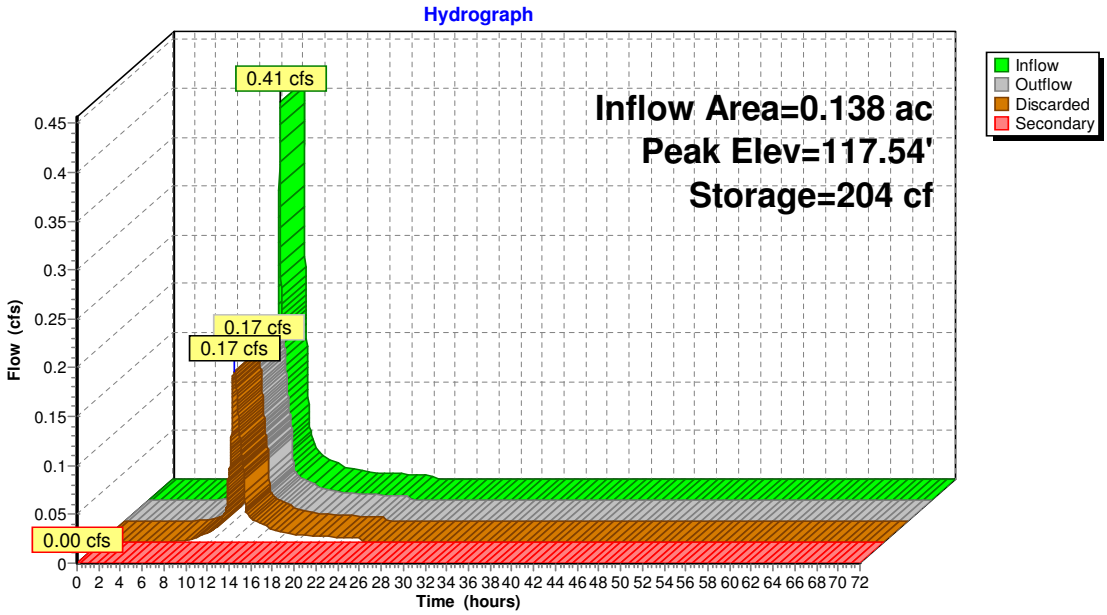
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	283 cf	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	192 cf	**10.00'D x 11.00'H Vertical Cone/Cylinder** 864 cf Overall - 283 cf Embedded = 581 cf x 33.0% Voids
		475 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.17 cfs @ 12.26 hrs HW=117.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB1: Recharge Chamber (1 new)



Summary for Pond RB2: Recharge (2)

Inflow Area = 0.382 ac, 70.51% Impervious, Inflow Depth = 1.87" for 2YR event
Inflow = 0.87 cfs @ 12.08 hrs, Volume= 0.059 af
Outflow = 0.26 cfs @ 12.41 hrs, Volume= 0.059 af, Atten= 70%, Lag= 20.3 min
Discarded = 0.26 cfs @ 12.41 hrs, Volume= 0.059 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 118.40' @ 12.41 hrs Surf.Area= 208 sf Storage= 610 cf

Plug-Flow detention time= 18.1 min calculated for 0.059 af (100% of inflow)
Center-of-Mass det. time= 18.1 min (847.8 - 829.7)

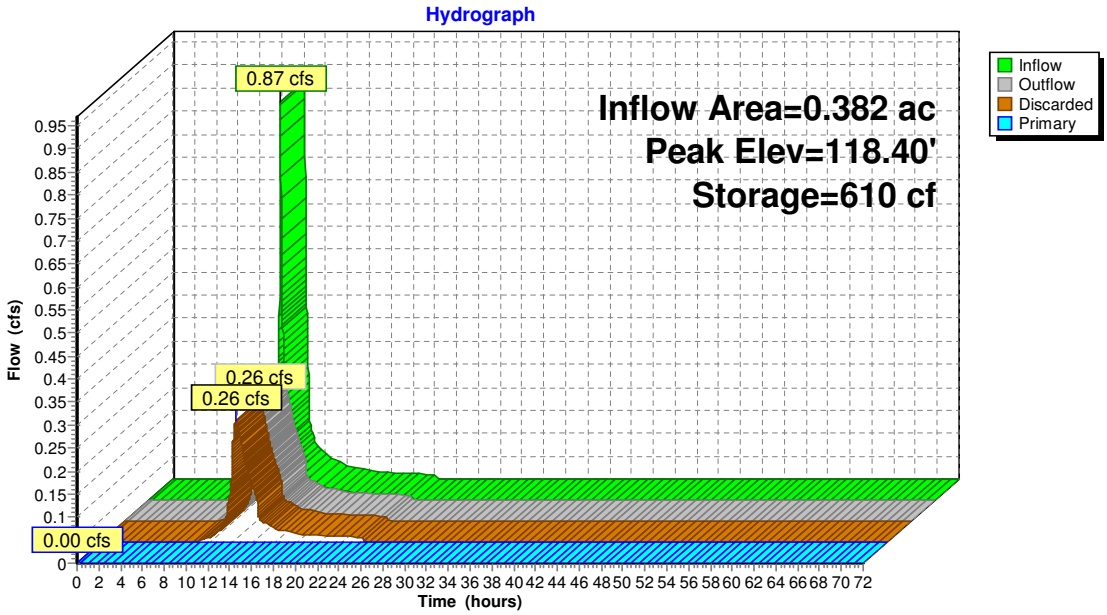
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	475 cf	**5.50'D x 10.00'H Vertical Cone/Cylinder** x 2 Inside #2
#2	112.00'	597 cf	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 2 2,285 cf Overall - 475 cf Embedded = 1,810 cf x 33.0% Voids
		1,072 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Primary	122.00'	**8.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 122.00' / 122.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.26 cfs @ 12.41 hrs HW=118.40' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=112.00' (Free Discharge)
└**2=Culvert** (Controls 0.00 cfs)

Pond RB2: Recharge (2)



Summary for Pond RB2a: Recharge chamber (new)

Inflow Area = 0.382 ac, 70.51% Impervious, Inflow Depth = 0.00" for 2YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 113.00' @ 0.00 hrs Surf.Area= 79 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

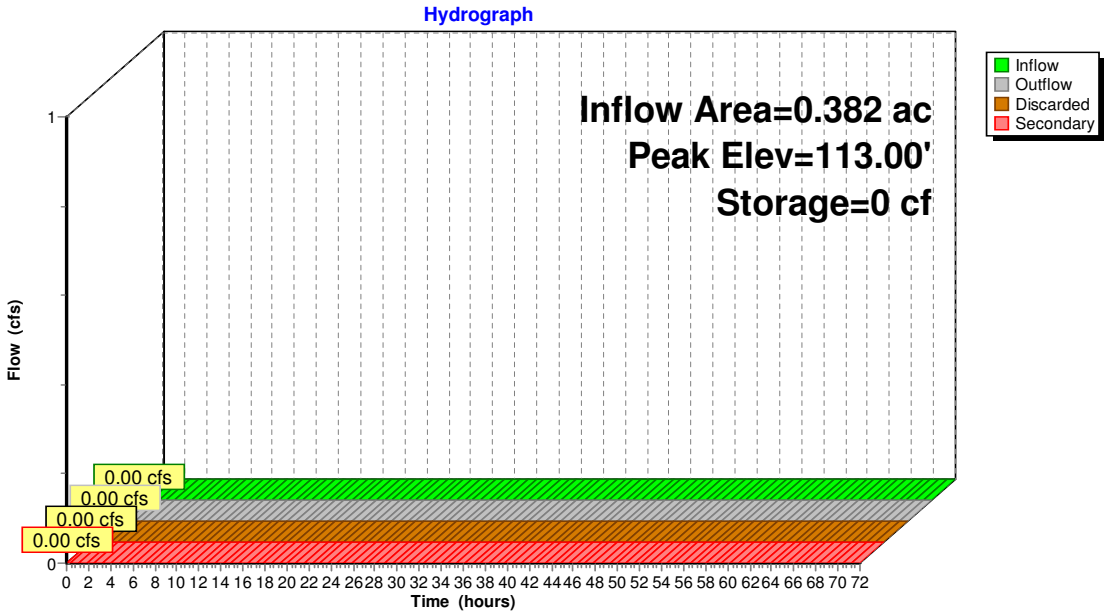
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	283 cf	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	192 cf	**10.00'D x 11.00'H Vertical Cone/Cylinder** 864 cf Overall - 283 cf Embedded = 581 cf x 33.0% Voids
		475 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**1=Exfiltration** (Passes 0.00 cfs of 0.06 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB2a: Recharge chamber (new)



Summary for Pond RB3: Recharge (1)

Inflow Area = 0.050 ac,100.00% Impervious, Inflow Depth = 3.37" for 2YR event
Inflow = 0.18 cfs @ 12.07 hrs, Volume= 0.014 af
Outflow = 0.07 cfs @ 12.28 hrs, Volume= 0.014 af, Atten= 62%, Lag= 12.5 min
Discarded = 0.07 cfs @ 12.28 hrs, Volume= 0.014 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 112.00' @ 12.28 hrs Surf.Area= 0.002 ac Storage= 0.002 af

Plug-Flow detention time= 6.8 min calculated for 0.014 af (100% of inflow)
Center-of-Mass det. time= 6.8 min (759.9 - 753.1)

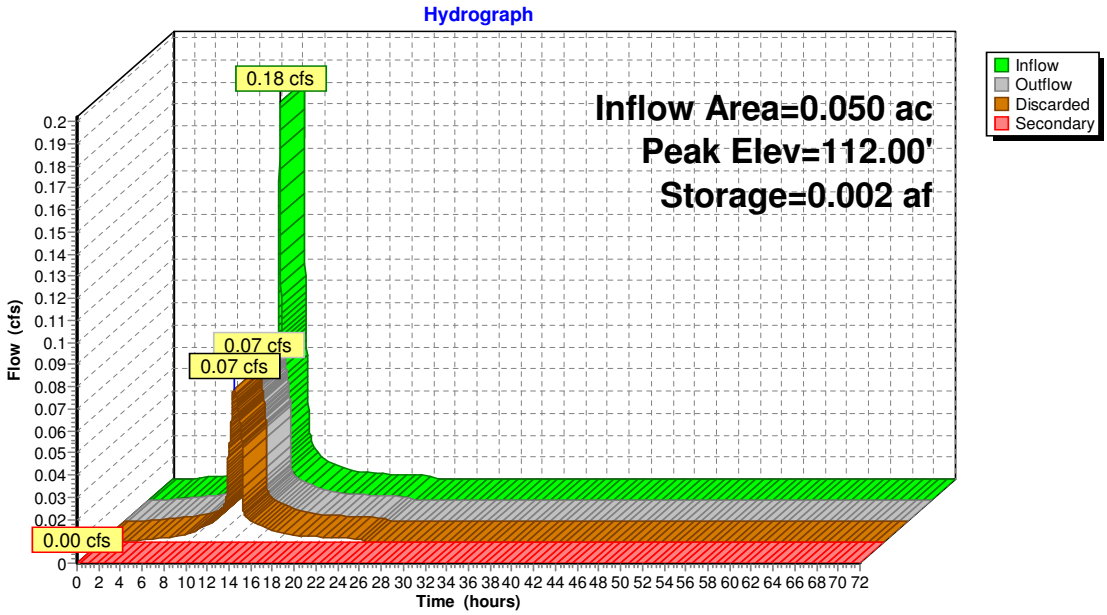
Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	110.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** 0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	110.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	120.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 12.28 hrs HW=112.00' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=110.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB3: Recharge (1)



Summary for Pond RB4: Recharge (6)

Inflow Area = 0.361 ac,100.00% Impervious, Inflow Depth = 2.90" for 2YR event
Inflow = 1.13 cfs @ 12.07 hrs, Volume= 0.087 af
Outflow = 0.43 cfs @ 12.28 hrs, Volume= 0.087 af, Atten= 62%, Lag= 12.9 min
Discarded = 0.43 cfs @ 12.28 hrs, Volume= 0.087 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 113.12' @ 12.28 hrs Surf.Area= 0.014 ac Storage= 0.013 af

Plug-Flow detention time= 7.2 min calculated for 0.087 af (100% of inflow)
Center-of-Mass det. time= 7.2 min (760.3 - 753.1)

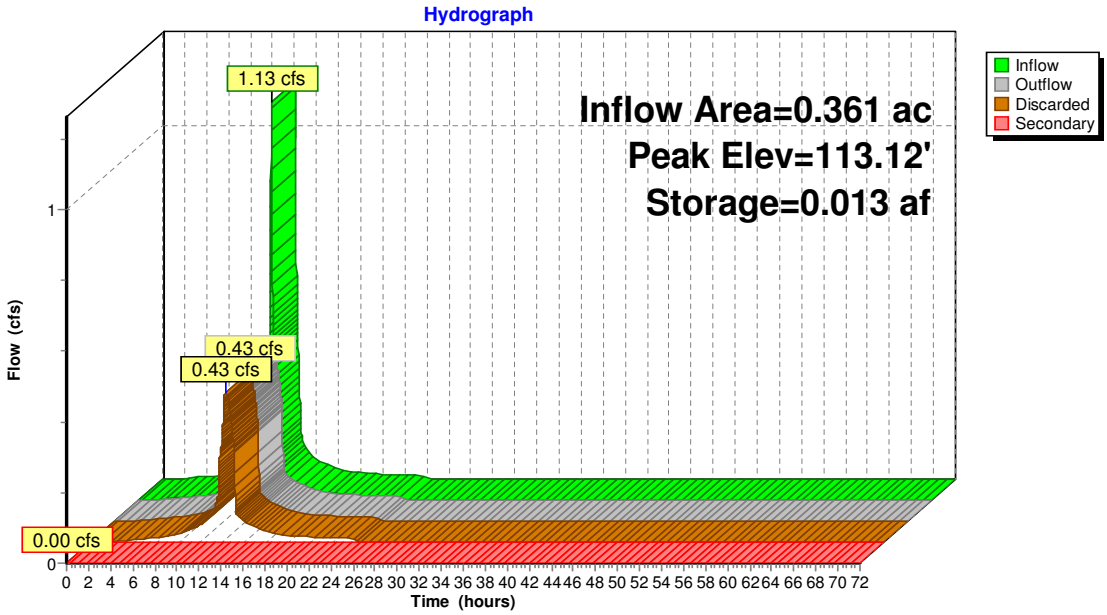
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.039 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 6 Inside #2
#2	111.00'	0.039 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 6
			0.157 af Overall - 0.039 af Embedded = 0.118 af x 33.0% Voids
		0.078 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	121.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.43 cfs @ 12.28 hrs HW=113.12' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.43 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB4: Recharge (6)



Summary for Pond RB5: Recharge (3)

Inflow Area = 0.243 ac, 83.31% Impervious, Inflow Depth = 2.36" for 2YR event
Inflow = 0.69 cfs @ 12.07 hrs, Volume= 0.048 af
Outflow = 0.37 cfs @ 12.19 hrs, Volume= 0.048 af, Atten= 46%, Lag= 6.9 min
Discarded = 0.37 cfs @ 12.19 hrs, Volume= 0.048 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 112.51' @ 12.19 hrs Surf.Area= 0.007 ac Storage= 0.004 af

Plug-Flow detention time= 2.5 min calculated for 0.048 af (100% of inflow)
Center-of-Mass det. time= 2.5 min (811.9 - 809.4)

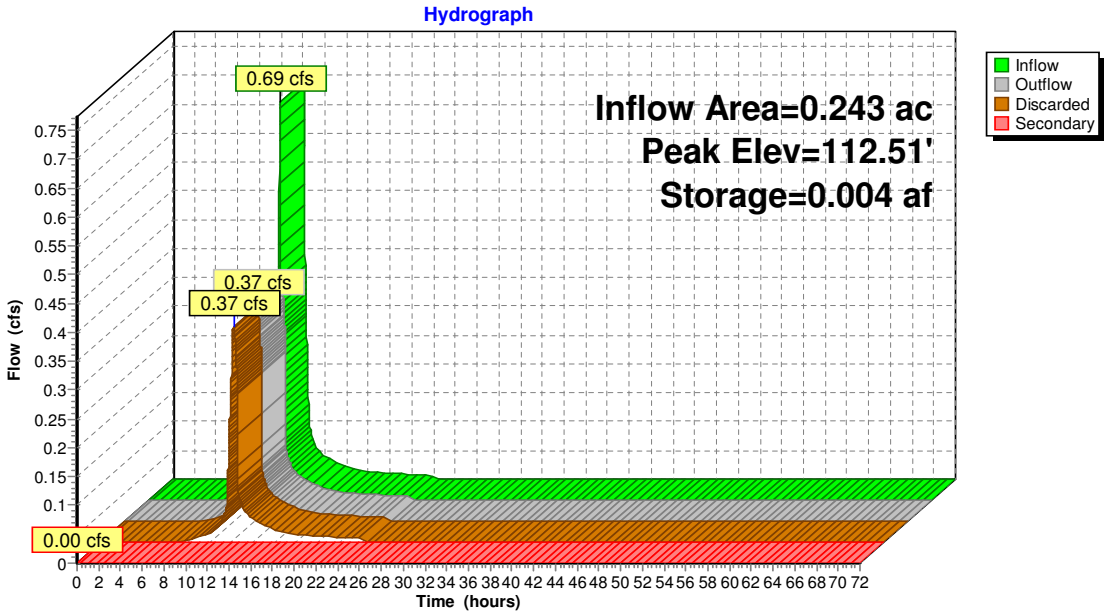
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	111.00'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3 0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	121.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.37 cfs @ 12.19 hrs HW=112.51' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.37 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB5: Recharge (3)



Summary for Pond RB6: Recharge (1)

Inflow Area = 0.055 ac, 80.20% Impervious, Inflow Depth = 2.19" for 2YR event
Inflow = 0.15 cfs @ 12.07 hrs, Volume= 0.010 af
Outflow = 0.06 cfs @ 12.30 hrs, Volume= 0.010 af, Atten= 60%, Lag= 13.6 min
Discarded = 0.06 cfs @ 12.30 hrs, Volume= 0.010 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 114.21' @ 12.30 hrs Surf.Area= 0.002 ac Storage= 0.001 af

Plug-Flow detention time= 6.9 min calculated for 0.010 af (100% of inflow)
Center-of-Mass det. time= 6.9 min (823.5 - 816.6)

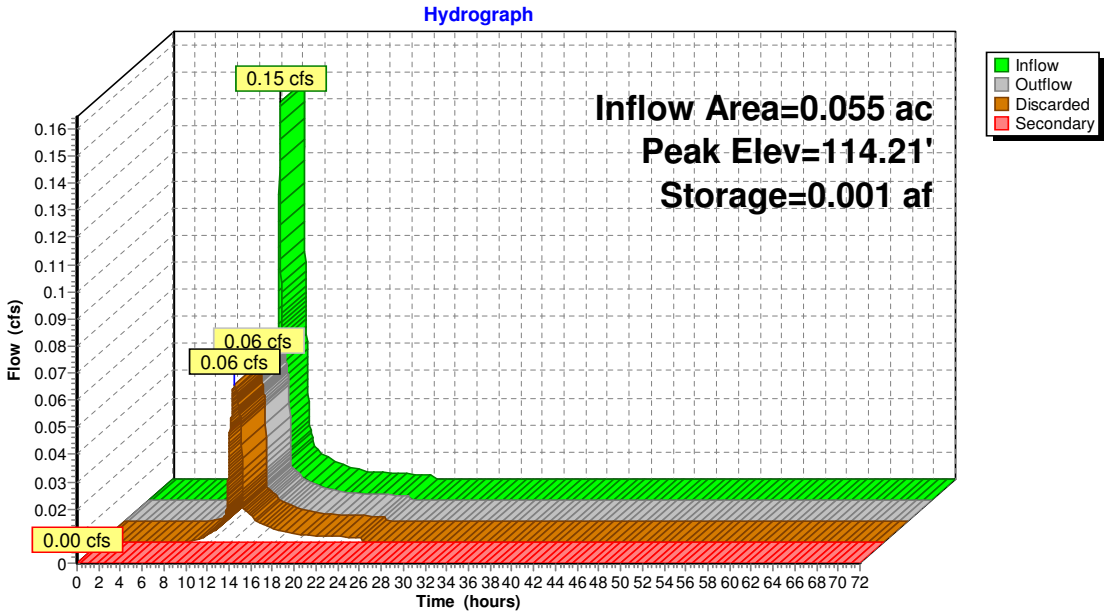
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder**
			0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 12.30 hrs HW=114.21' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB6: Recharge (1)



Summary for Pond RB7: Recharge (3)

Inflow Area = 0.285 ac, 54.91% Impervious, Inflow Depth = 1.07" for 2YR event
Inflow = 0.34 cfs @ 12.08 hrs, Volume= 0.025 af
Outflow = 0.16 cfs @ 12.32 hrs, Volume= 0.025 af, Atten= 55%, Lag= 14.4 min
Discarded = 0.16 cfs @ 12.32 hrs, Volume= 0.025 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 113.80' @ 12.32 hrs Surf.Area= 0.007 ac Storage= 0.003 af

Plug-Flow detention time= 5.3 min calculated for 0.025 af (100% of inflow)
Center-of-Mass det. time= 5.3 min (871.7 - 866.4)

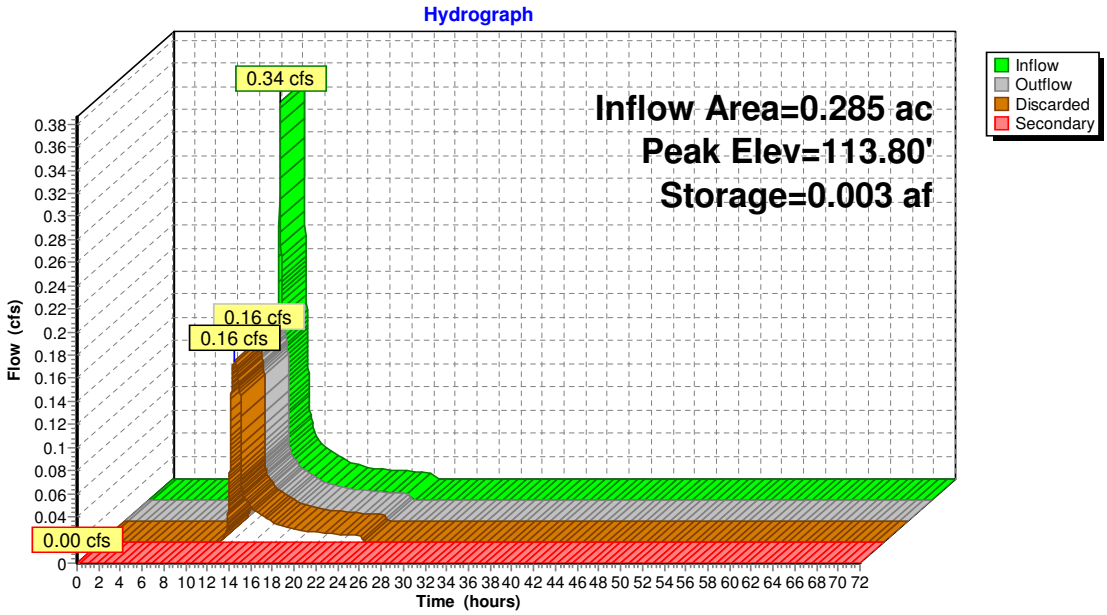
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	113.00'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3 0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.16 cfs @ 12.32 hrs HW=113.80' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB7: Recharge (3)



Summary for Pond RB8: Recharge Basin (2)

Inflow Area = 0.769 ac, 2.50% Impervious, Inflow Depth = 0.12" for 2YR event
Inflow = 0.01 cfs @ 13.73 hrs, Volume= 0.008 af
Outflow = 0.01 cfs @ 13.74 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.6 min
Discarded = 0.01 cfs @ 13.74 hrs, Volume= 0.008 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 115.53' @ 13.74 hrs Surf.Area= 77 sf Storage= 1 cf

Plug-Flow detention time= 0.9 min calculated for 0.008 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (1,029.6 - 1,028.6)

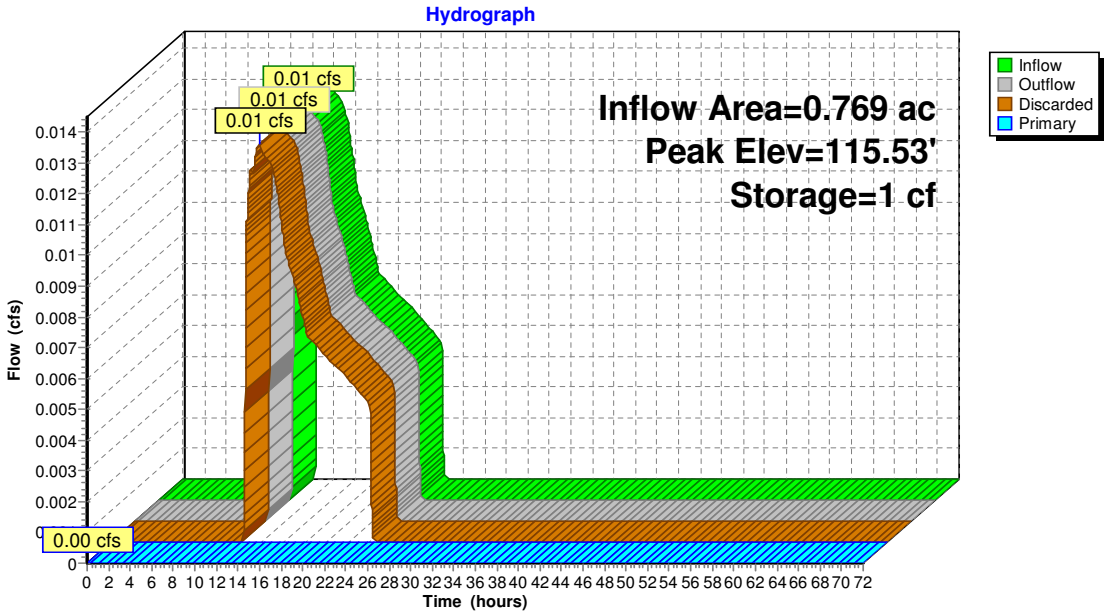
Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	339 cf	**6.00'D x 6.00'H Vertical Cone/Cylinder** x 2 Inside #2
#2	115.50'	66 cf	**7.00'D x 7.00'H Vertical Cone/Cylinder** x 2
			539 cf Overall - 339 cf Embedded = 199 cf x 33.0% Voids
		405 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.50'	**17.000 in/hr Exfiltration over Wetted area**
#2	Primary	122.50'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 13.74 hrs HW=115.53' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.50' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond RB8: Recharge Basin (2)

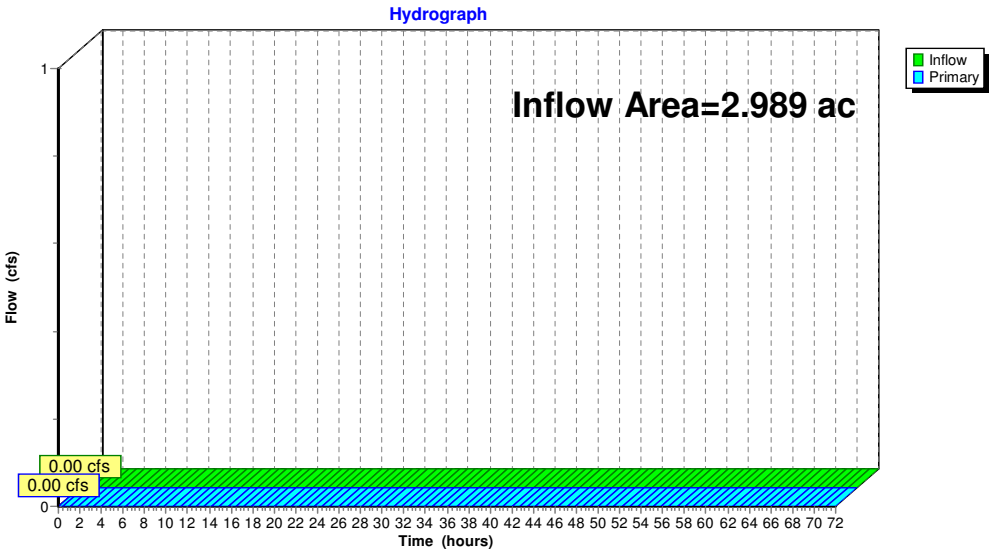


Summary for Pond SP1: Study Point 1

Inflow Area = 2.989 ac, 0.64% Impervious, Inflow Depth = 0.00" for 2YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond SP1: Study Point 1



Summary for Pond URC1: Underground Chambers

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 1.02" for 2YR event
Inflow = 1.92 cfs @ 12.09 hrs, Volume= 0.069 af
Outflow = 0.54 cfs @ 11.85 hrs, Volume= 0.069 af, Atten= 72%, Lag= 0.0 min
Discarded = 0.54 cfs @ 11.85 hrs, Volume= 0.069 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 109.05' @ 12.40 hrs Surf.Area= 1,364 sf Storage= 1,044 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 16.3 min (751.4 - 735.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	107.50'	1,250 cf	**20.50'W x 66.52'L x 4.00'H Field A** 5,455 cf Overall - 1,665 cf Embedded = 3,789 cf x 33.0% Voids
#2A	108.50'	1,665 cf	**StormTech SC-740** x 36 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 4 rows
		2,916 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	107.50'	**17.000 in/hr Exfiltration over Surface area**
#2	Primary	113.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.54 cfs @ 11.85 hrs HW=107.57' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.54 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=107.50' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond URC1: Underground Chambers - Chamber Wizard Field A

Chamber Model = StormTech SC-740 (StormTech® SC-740)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Row Length Adjustment= +0.44' x 6.45 sf x 4 rows

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

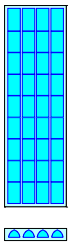
9 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 64.52' Row Length +12.0" End Stone x 2 = 66.52' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
12.0" Base + 30.0" Chamber Height + 6.0" Cover = 4.00' Field Height

36 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 4 Rows = 1,665.2 cf Chamber Storage

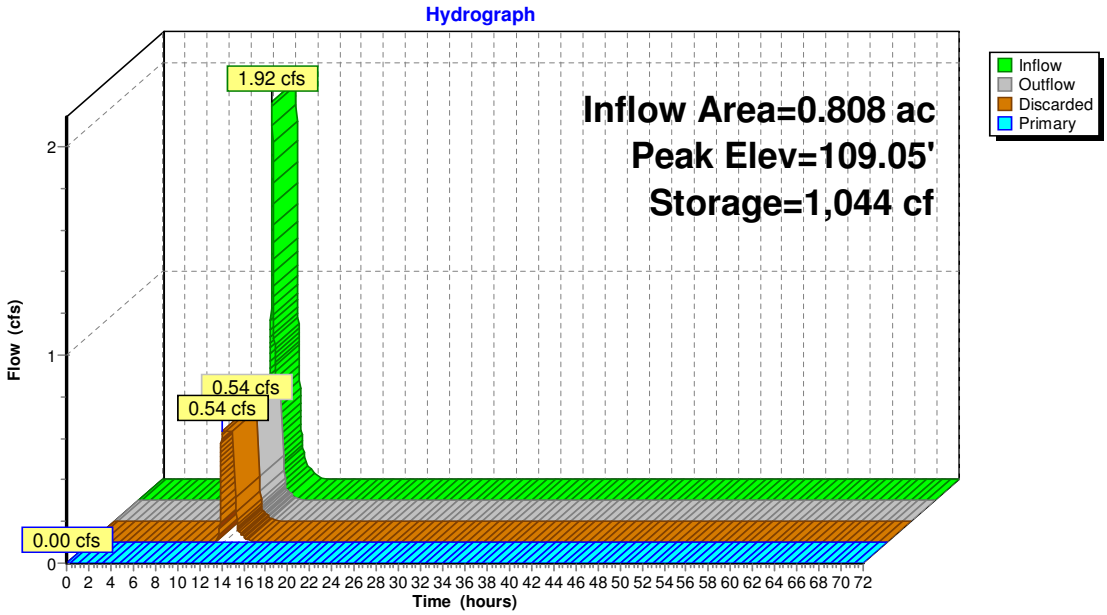
5,454.5 cf Field - 1,665.2 cf Chambers = 3,789.3 cf Stone x 33.0% Voids = 1,250.5 cf Stone Storage

Chamber Storage + Stone Storage = 2,915.6 cf = 0.067 af
Overall Storage Efficiency = 53.5%

36 Chambers
202.0 cy Field
140.3 cy Stone



Pond URC1: Underground Chambers



Summary for Subcatchment DA1: Woods

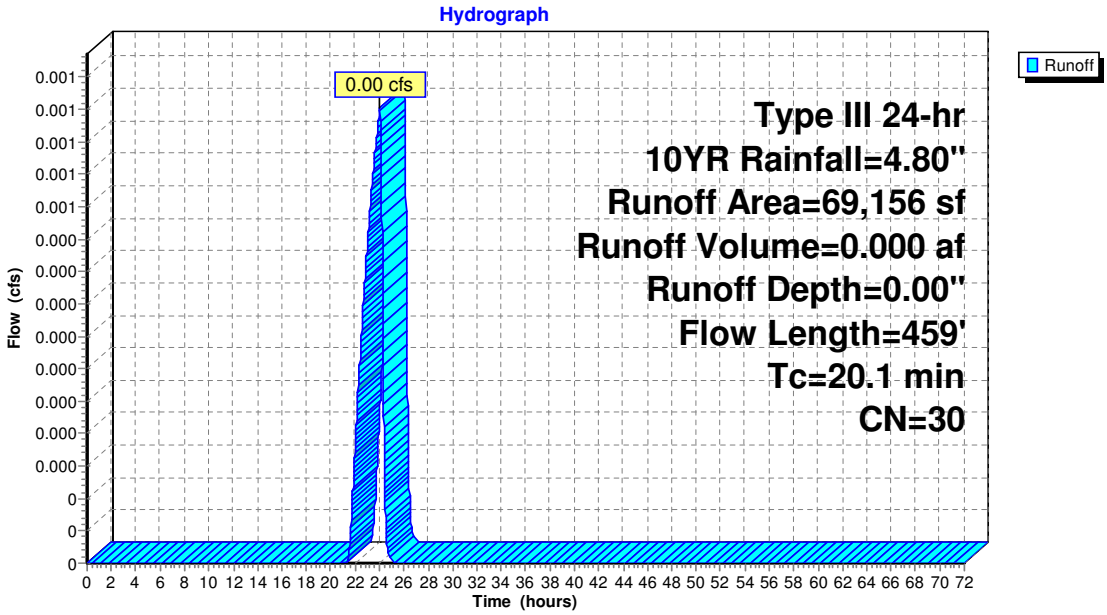
Runoff = 0.00 cfs @ 24.05 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
69,156	30	Woods, Good, HSG A
69,156		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	103	0.0490	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
5.6	356	0.0450	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	459	Total			

Subcatchment DA1: Woods



Summary for Subcatchment DA10: Entrance

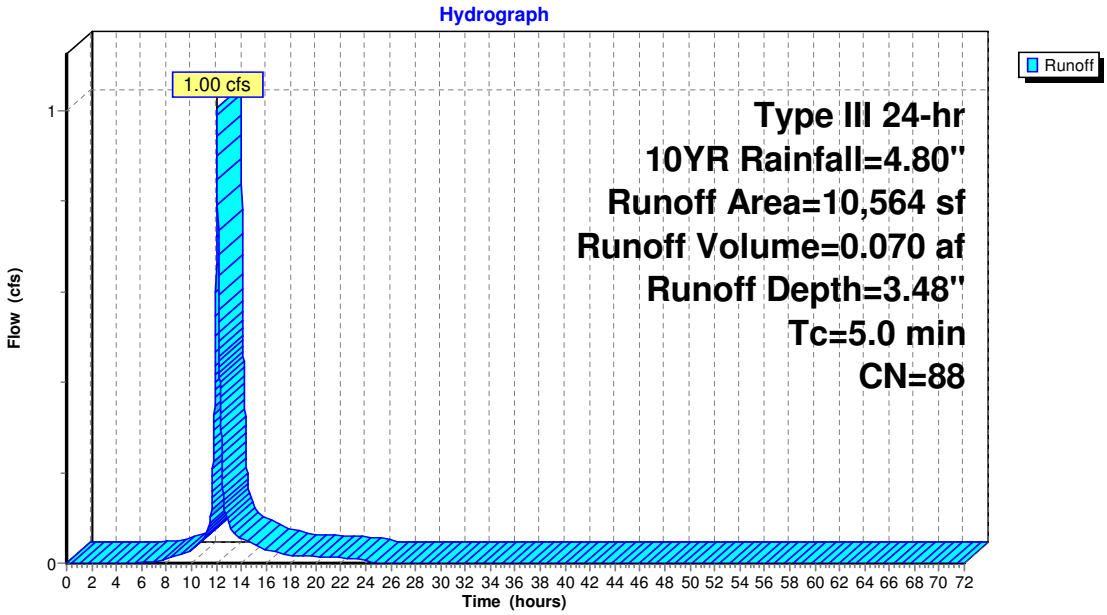
Runoff = 1.00 cfs @ 12.07 hrs, Volume= 0.070 af, Depth= 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
7,431	98	Paved roads w/curbs & sewers, HSG A
1,763	39	>75% Grass cover, Good, HSG A
1,370	98	Roofs, HSG A
10,564	88	Weighted Average
1,763		16.69% Pervious Area
8,801		83.31% Impervious Area

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

Subcatchment DA10: Entrance



Summary for Subcatchment DA11: Entrance Parking

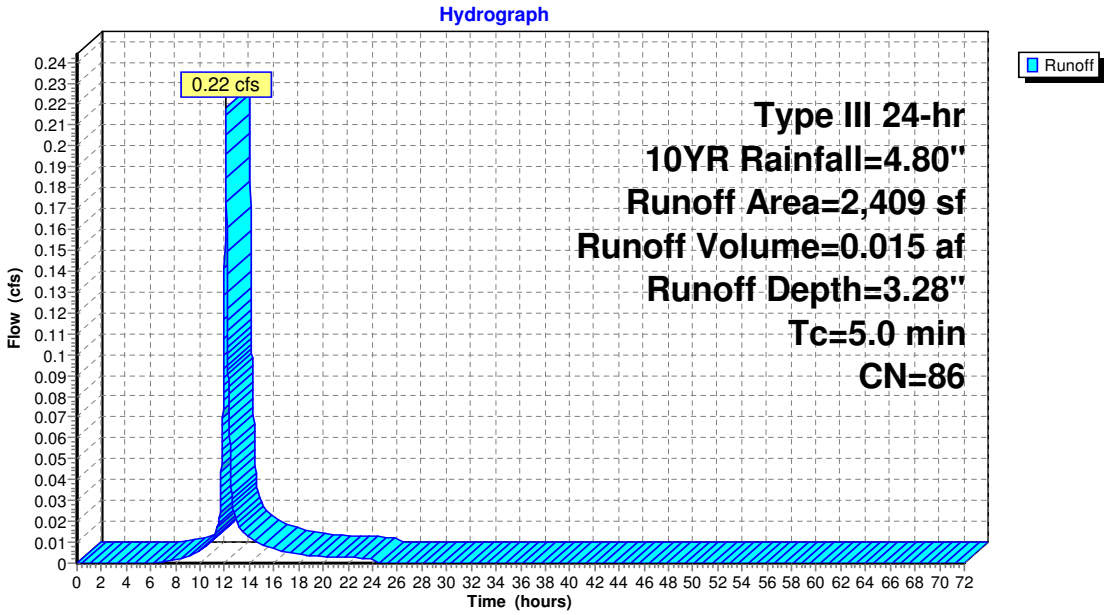
Runoff = 0.22 cfs @ 12.07 hrs, Volume= 0.015 af, Depth= 3.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
1,932	98	Paved roads w/curbs & sewers, HSG A
477	39	>75% Grass cover, Good, HSG A
2,409	86	Weighted Average
477		19.80% Pervious Area
1,932		80.20% Impervious Area

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

Subcatchment DA11: Entrance Parking



Summary for Subcatchment DA12: New Front Parking

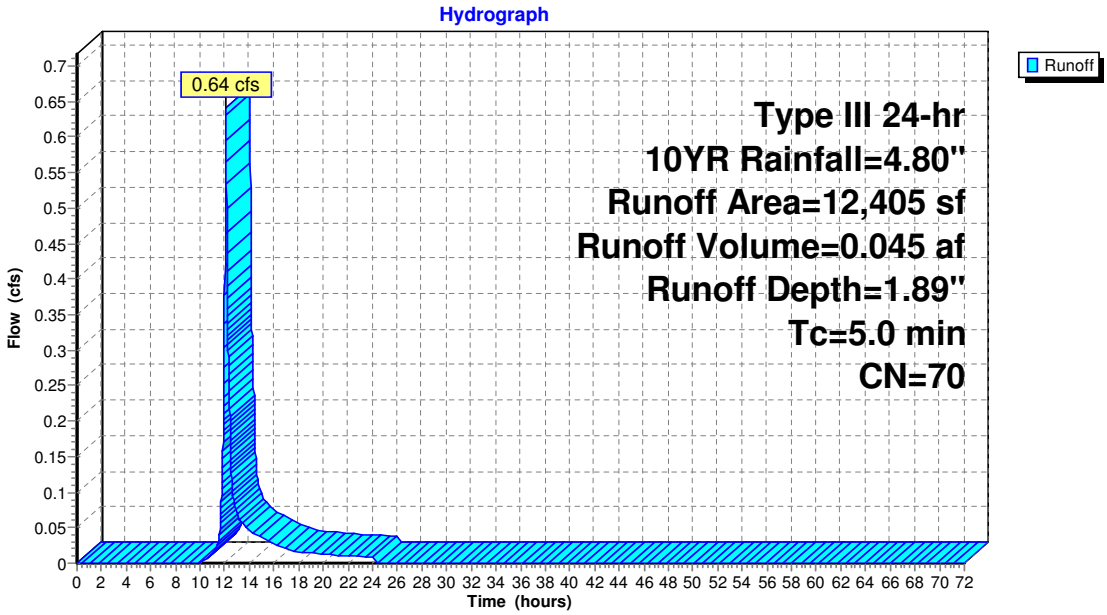
Runoff = 0.64 cfs @ 12.08 hrs, Volume= 0.045 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
6,812	98	Paved parking, HSG A
1,617	30	Woods, Good, HSG A
3,976	39	>75% Grass cover, Good, HSG A
12,405	70	Weighted Average
5,593		45.09% Pervious Area
6,812		54.91% Impervious Area

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

Subcatchment DA12: New Front Parking



Summary for Subcatchment DA2: Parking Woods

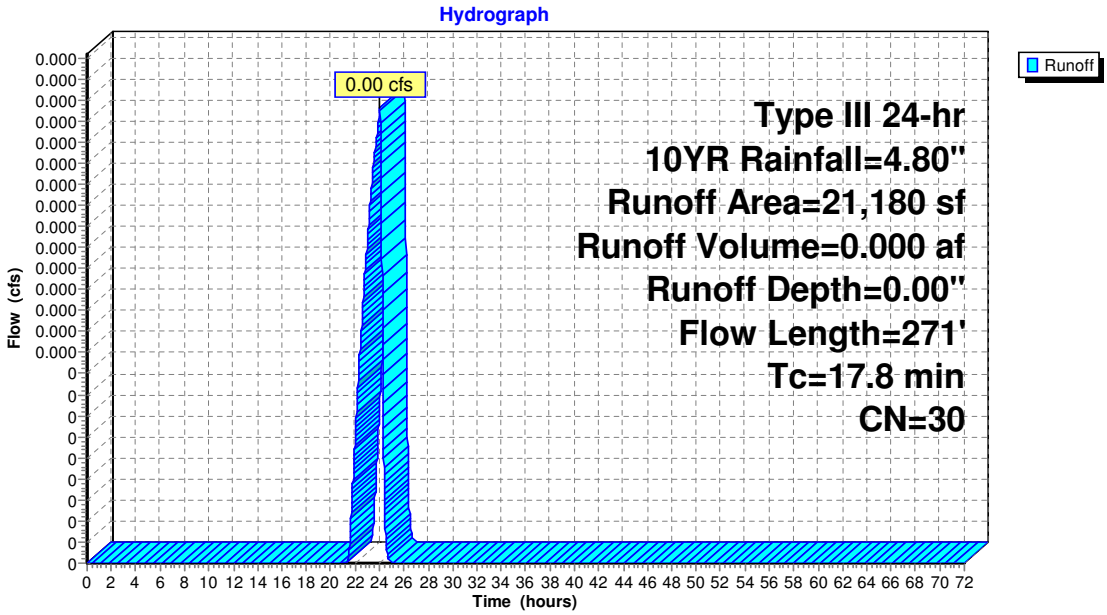
Runoff = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
21,180	30	Woods, Good, HSG A
21,180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
2.5	171	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.8	271	Total			

Subcatchment DA2: Parking Woods



Summary for Subcatchment DA2a: Parking Lot Upland

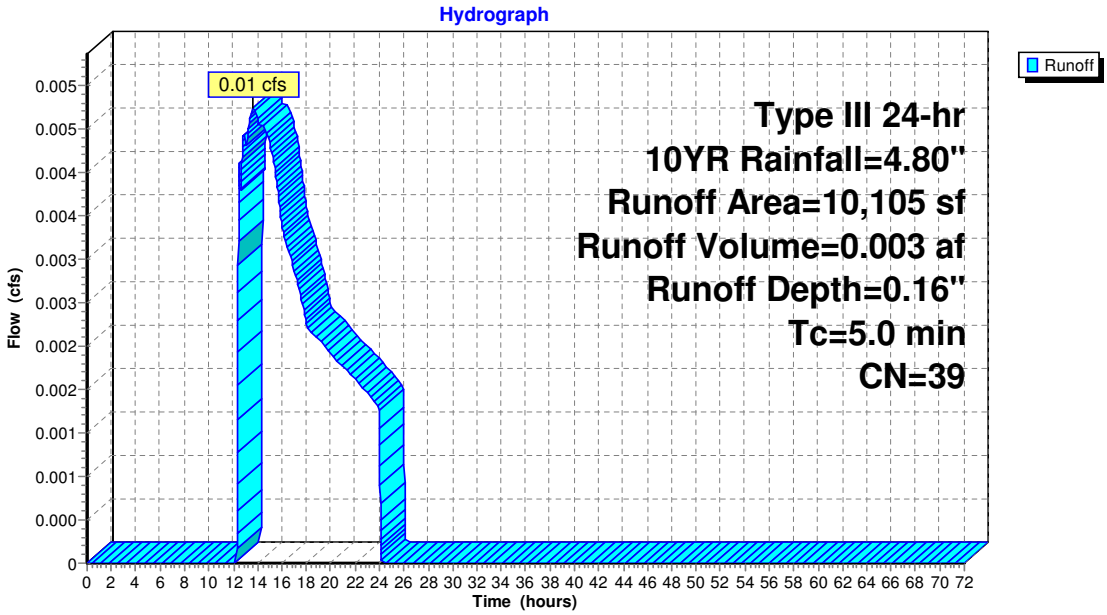
Runoff = 0.01 cfs @ 13.65 hrs, Volume= 0.003 af, Depth= 0.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
9,591	39	>75% Grass cover, Good, HSG A
514	30	Woods, Good, HSG A
10,105	39	Weighted Average
10,105		100.00% Pervious Area

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

Subcatchment DA2a: Parking Lot Upland



Summary for Subcatchment DA2b: Parking Lot Pavement

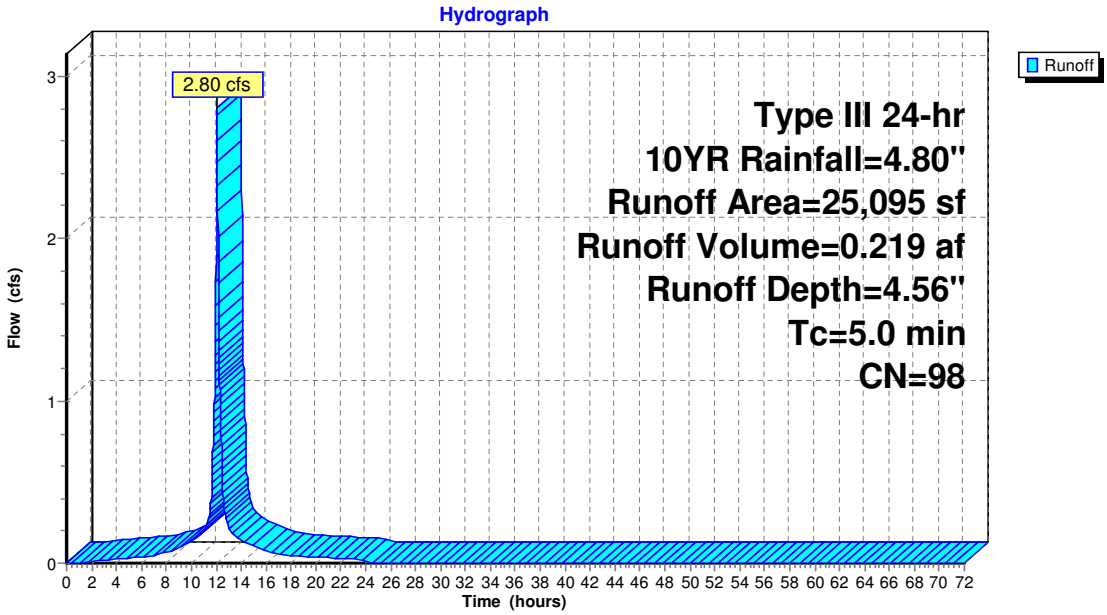
Runoff = 2.80 cfs @ 12.07 hrs, Volume= 0.219 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
23,865	98	Paved parking, HSG A
1,230	98	Water Surface, HSG A
25,095	98	Weighted Average
25,095		100.00% Impervious Area

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

Subcatchment DA2b: Parking Lot Pavement



Summary for Subcatchment DA3: Woods

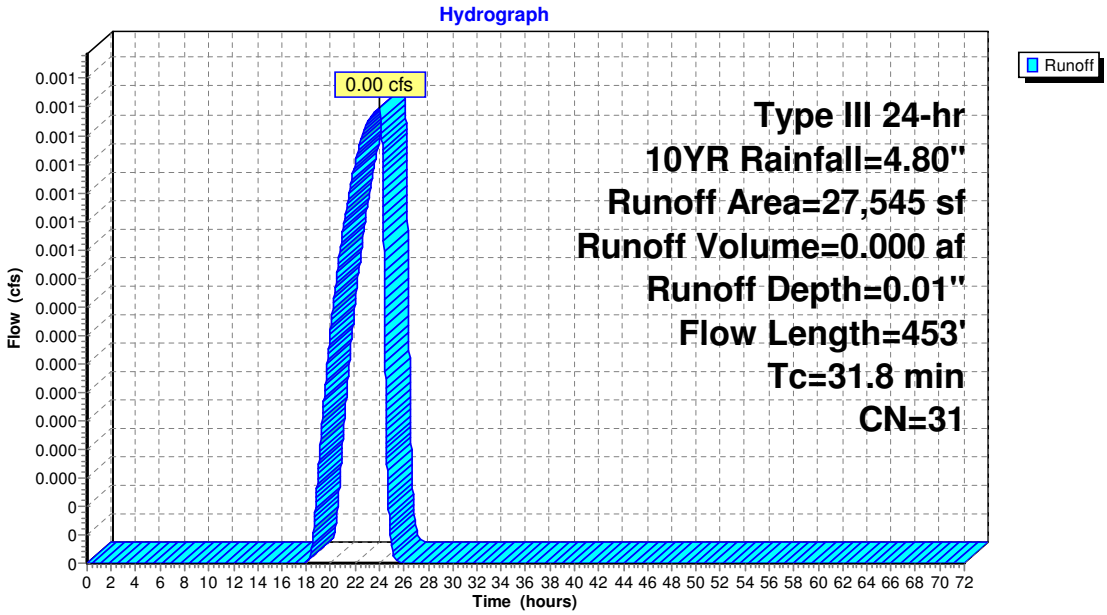
Runoff = 0.00 cfs @ 23.99 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
24,515	30	Woods, Good, HSG A
3,030	39	>75% Grass cover, Good, HSG A
27,545	31	Weighted Average
27,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4	163	0.0250	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.4	290	0.0480	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
31.8	453	Total			

Subcatchment DA3: Woods



Summary for Subcatchment DA4: Gravel Lot

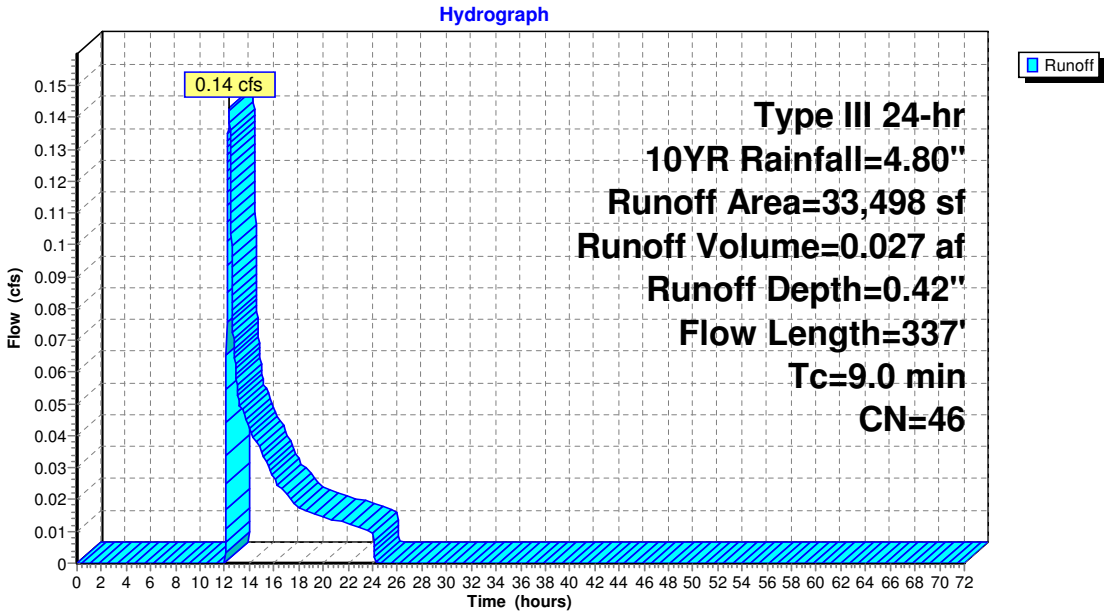
Runoff = 0.14 cfs @ 12.35 hrs, Volume= 0.027 af, Depth= 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

	Area (sf)	CN	Description
	17,778	30	Woods, Good, HSG A
*	6,095	72	Gravel Parking, HSG A
	837	98	Water Surface, HSG A
	4,097	39	>75% Grass cover, Good, HSG A
	4,691	72	Dirt roads, HSG A
	33,498	46	Weighted Average
	32,661		97.50% Pervious Area
	837		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	34	0.1760	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	106	0.0190	0.43		**Sheet Flow,** Fallow n= 0.050 P2= 3.60"
0.6	60	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	137	0.0440	3.38		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.0	337	Total			

Subcatchment DA4: Gravel Lot



Summary for Subcatchment DA5: Rear Drive

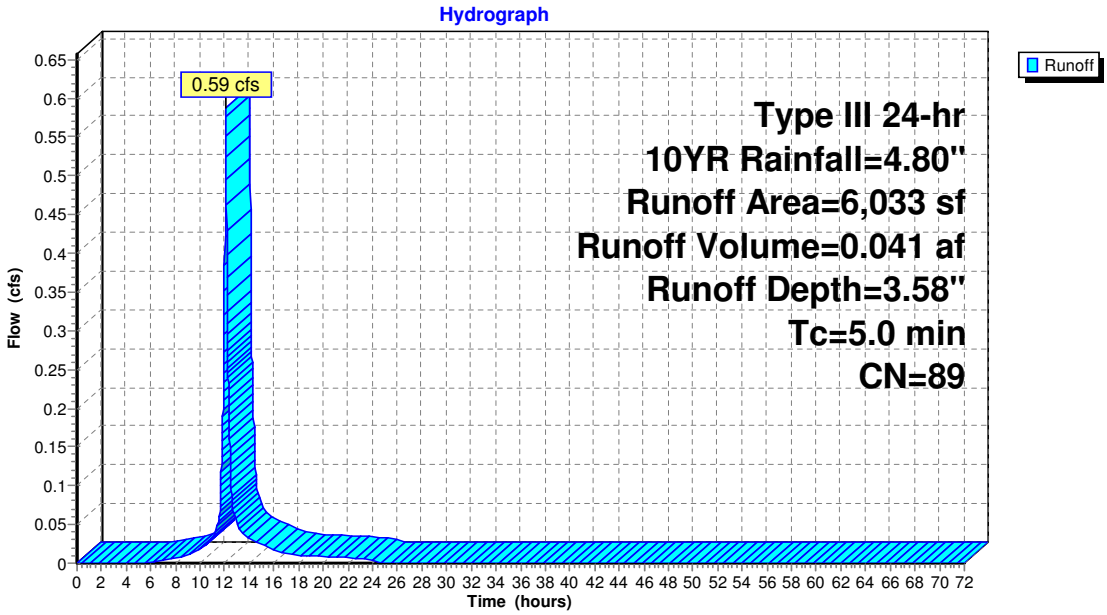
Runoff = 0.59 cfs @ 12.07 hrs, Volume= 0.041 af, Depth= 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
1,843	98	Paved parking, HSG A
744	30	Woods, Good, HSG A
3,358	98	Roofs, HSG A
88	39	>75% Grass cover, Good, HSG A
6,033	89	Weighted Average
832		13.79% Pervious Area
5,201		86.21% Impervious Area

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

Subcatchment DA5: Rear Drive



Summary for Subcatchment DA6: South Parking

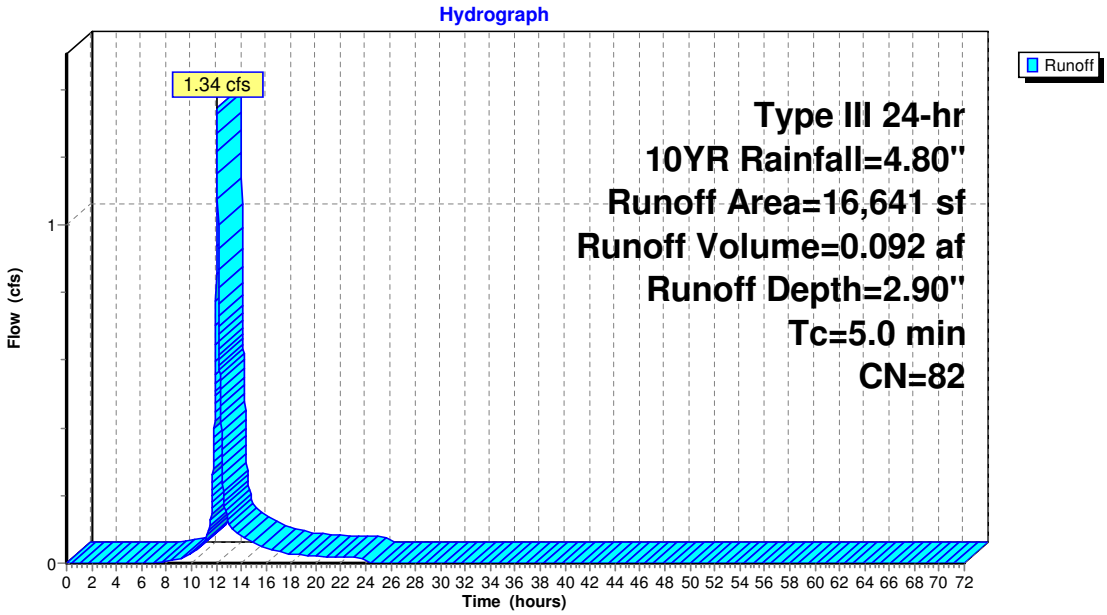
Runoff = 1.34 cfs @ 12.07 hrs, Volume= 0.092 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
8,472	98	Paved parking, HSG A
3,261	98	Roofs, HSG A
4,908	43	Woods/grass comb., Fair, HSG A
16,641	82	Weighted Average
4,908		29.49% Pervious Area
11,733		70.51% Impervious Area

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

Subcatchment DA6: South Parking



Summary for Subcatchment DA7: North Rear

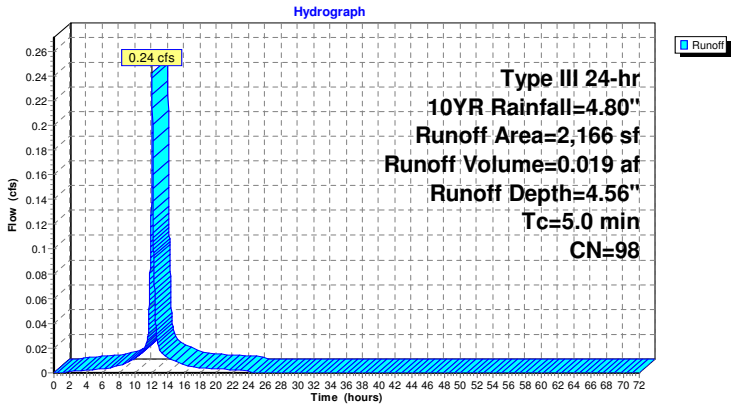
Runoff = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
2,166	98	Paved parking, HSG A
2,166		100.00% Impervious Area

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

Subcatchment DA7: North Rear



Summary for Subcatchment DA8: Rear Parking

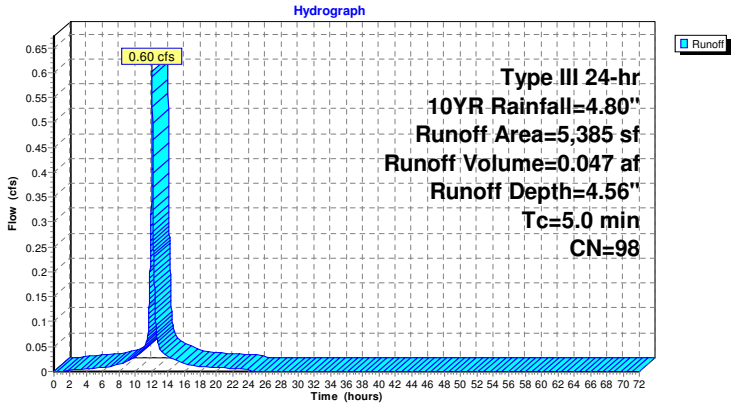
Runoff = 0.60 cfs @ 12.07 hrs, Volume= 0.047 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
5,385	98	Paved roads w/curbs & sewers, HSG A
5,385		100.00% Impervious Area

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

Subcatchment DA8: Rear Parking



Summary for Subcatchment DA9: North Side

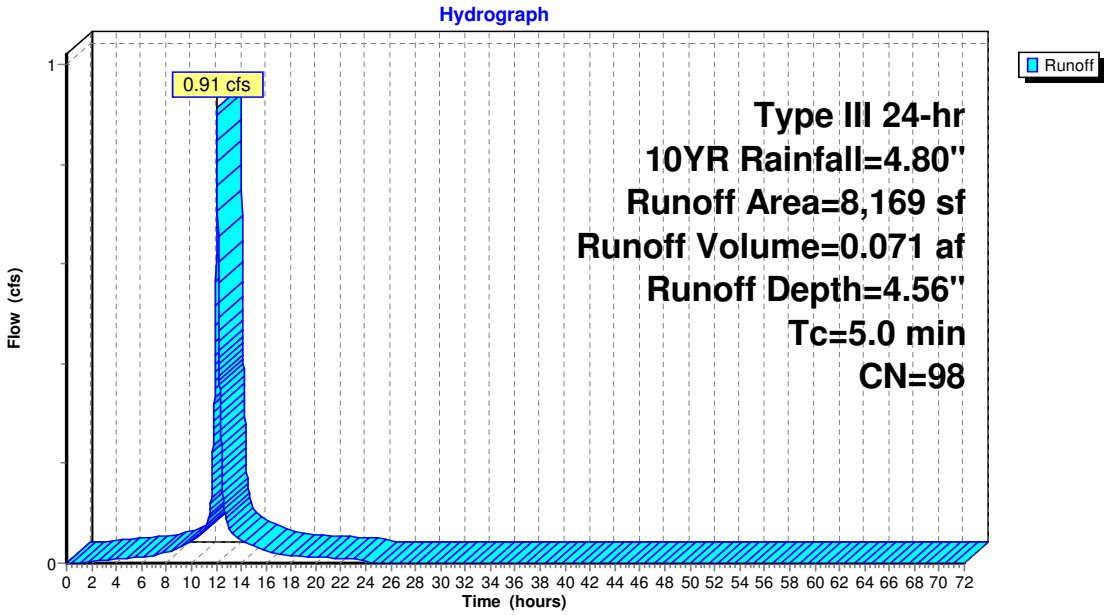
Runoff = 0.91 cfs @ 12.07 hrs, Volume= 0.071 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.80"

Area (sf)	CN	Description
4,393	98	Paved roads w/curbs & sewers, HSG A
3,776	98	Roofs, HSG A
8,169	98	Weighted Average
8,169		100.00% Impervious Area

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

Subcatchment DA9: North Side



Summary for Pond B1: Bio

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 3.30" for 10YR event
Inflow = 2.80 cfs @ 12.07 hrs, Volume= 0.222 af
Outflow = 2.71 cfs @ 12.09 hrs, Volume= 0.222 af, Atten= 3%, Lag= 1.2 min
Discarded = 0.10 cfs @ 12.09 hrs, Volume= 0.111 af
Primary = 2.61 cfs @ 12.09 hrs, Volume= 0.111 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 113.49' @ 12.09 hrs Surf.Area= 1,754 sf Storage= 730 cf

Plug-Flow detention time= 25.9 min calculated for 0.222 af (100% of inflow)
Center-of-Mass det. time= 25.9 min (777.6 - 751.7)

Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	1,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
113.00	1,232	0	0
113.50	1,765	749	749
113.76	2,018	492	1,241

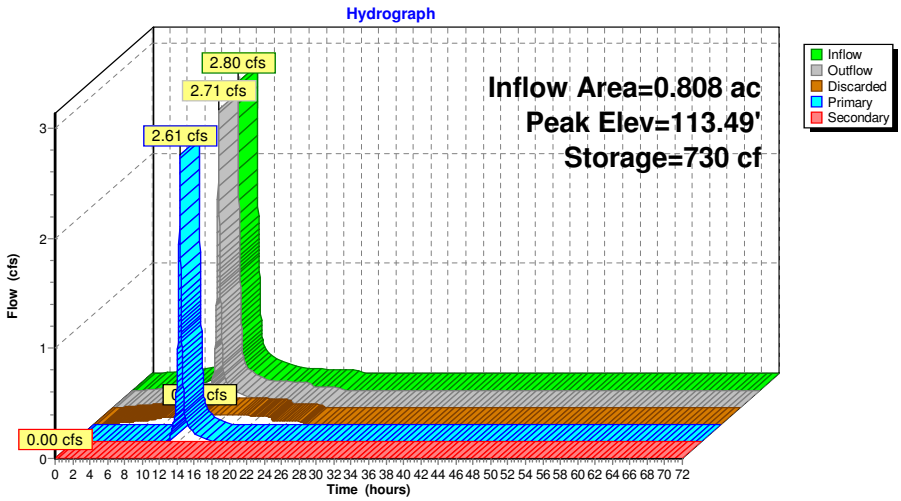
Device	Routing	Invert	Outlet Devices
#1	Device 2	113.33'	**24.0" Horiz. Orifice/Grate** X 2 rows C= 0.600 Limited to weir flow at low heads
#2	Primary	110.50'	**12.0" Round Culvert X 2.00** L= 26.0' CPP, end-section conforming to fill, Ke= 0.500
			Inlet / Outlet Invert= 110.50' / 110.40' S= 0.0038 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Discarded	113.00'	**2.410 in/hr Exfiltration over Surface area**
#4	Secondary	113.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50
			Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.10 cfs @ 12.09 hrs HW=113.49' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=2.61 cfs @ 12.09 hrs HW=113.49' (Free Discharge)
└**2=Culvert** (Passes 2.61 cfs of 11.93 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 2.61 cfs @ 1.30 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B1: Bio



Summary for Pond BO1: Bio overflow storage

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 0.00" for 10YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 113.52' @ 0.00 hrs Surf.Area= 1,765 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	113.52'	454 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

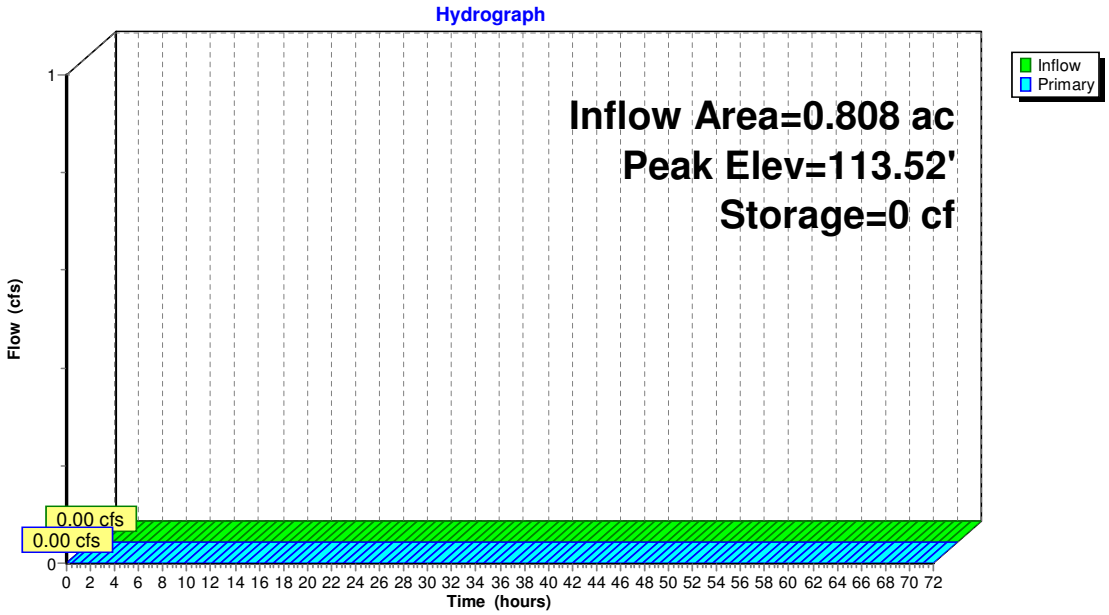
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
113.52	1,765	0	0
113.76	2,018	454	454

Device	Routing	Invert	Outlet Devices
#1	Primary	113.75'	**8.0' long x 5.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.52' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BO1: Bio overflow storage



Summary for Pond IB1: infiltration basin

Inflow Area = 0.769 ac, 2.50% Impervious, Inflow Depth = 0.00" for 10YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 122.00' @ 0.00 hrs Surf.Area= 170 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	518 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

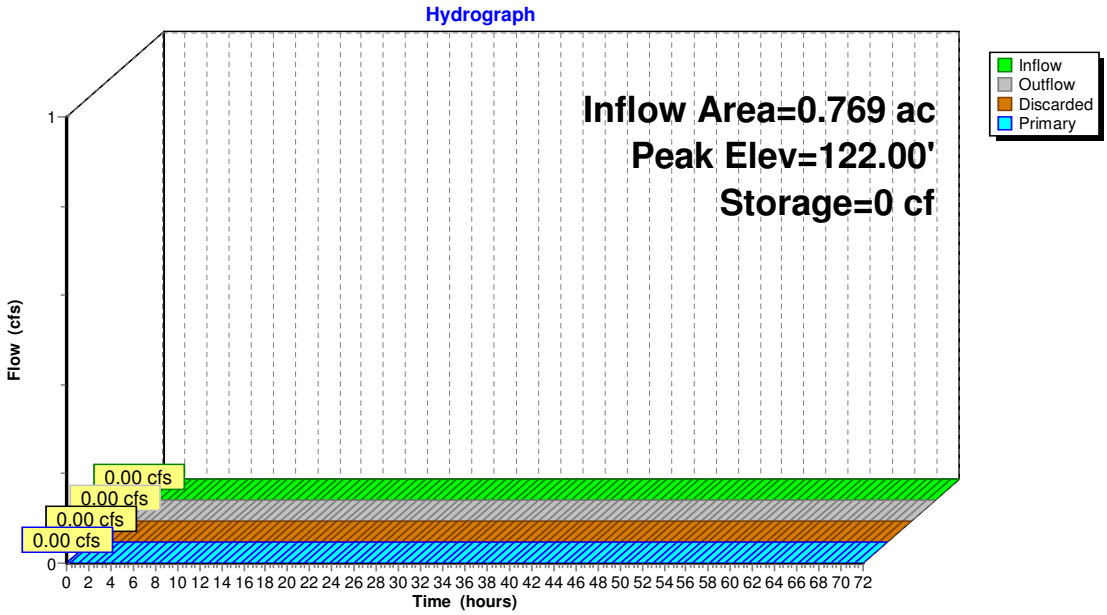
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	170	0	0
122.50	500	168	168
123.00	900	350	518

Device	Routing	Invert	Outlet Devices
#1	Primary	122.75'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	122.00'	**2.410 in/hr Exfiltration over Surface area above 122.00'** Excluded Surface area = 170 sf

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.00' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond IB1: infiltration basin



Summary for Pond P1: Depression

Inflow Area = 1.294 ac, 44.51% Impervious, Inflow Depth = 0.00" for 10YR event
Inflow = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 24.11 hrs, Volume= 0.000 af, Atten= 3%, Lag= 4.1 min
Discarded = 0.00 cfs @ 24.11 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 111.00' @ 24.11 hrs Surf.Area= 254 sf Storage= 0 cf

Plug-Flow detention time= 11.6 min calculated for 0.000 af (100% of inflow)
Center-of-Mass det. time= 11.6 min (1,408.4 - 1,396.8)

Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	5,074 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

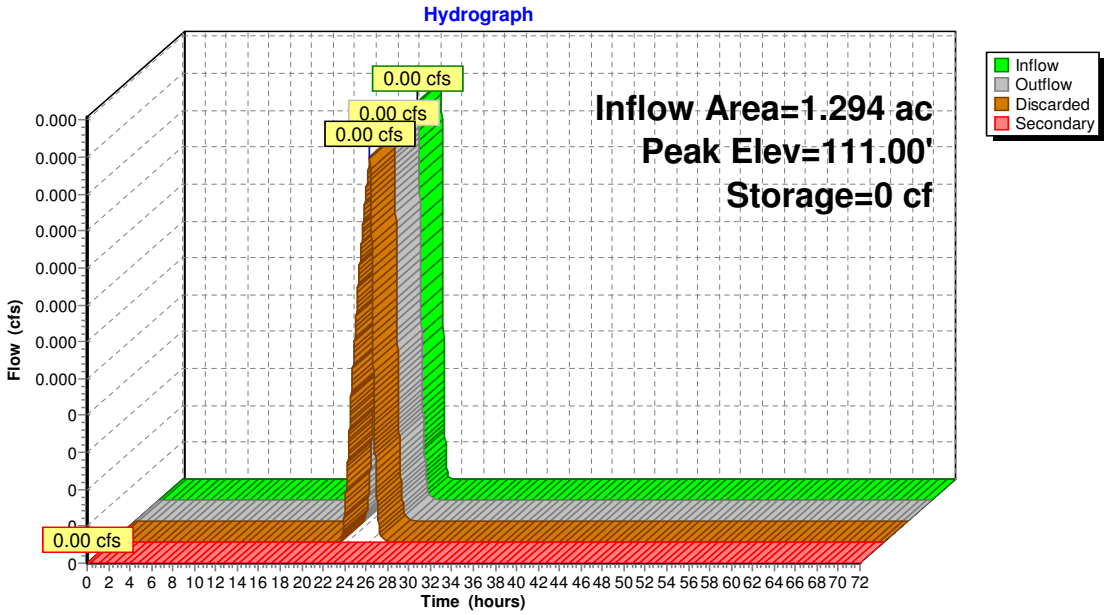
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
111.00	254	0	0
114.00	1,440	2,541	2,541
115.00	3,625	2,533	5,074

Device	Routing	Invert	Outlet Devices
#1	Secondary	114.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Discarded	111.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 24.11 hrs HW=111.00' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: Depression



Summary for Pond RB1: Recharge Chamber (1 new)

Inflow Area = 0.138 ac, 86.21% Impervious, Inflow Depth = 3.58" for 10YR event
Inflow = 0.59 cfs @ 12.07 hrs, Volume= 0.041 af
Outflow = 0.24 cfs @ 12.26 hrs, Volume= 0.041 af, Atten= 58%, Lag= 11.4 min
Discarded = 0.24 cfs @ 12.26 hrs, Volume= 0.041 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 120.35' @ 12.26 hrs Surf.Area= 79 sf Storage= 330 cf

Plug-Flow detention time= 10.1 min calculated for 0.041 af (100% of inflow)
Center-of-Mass det. time= 10.1 min (805.0 - 794.9)

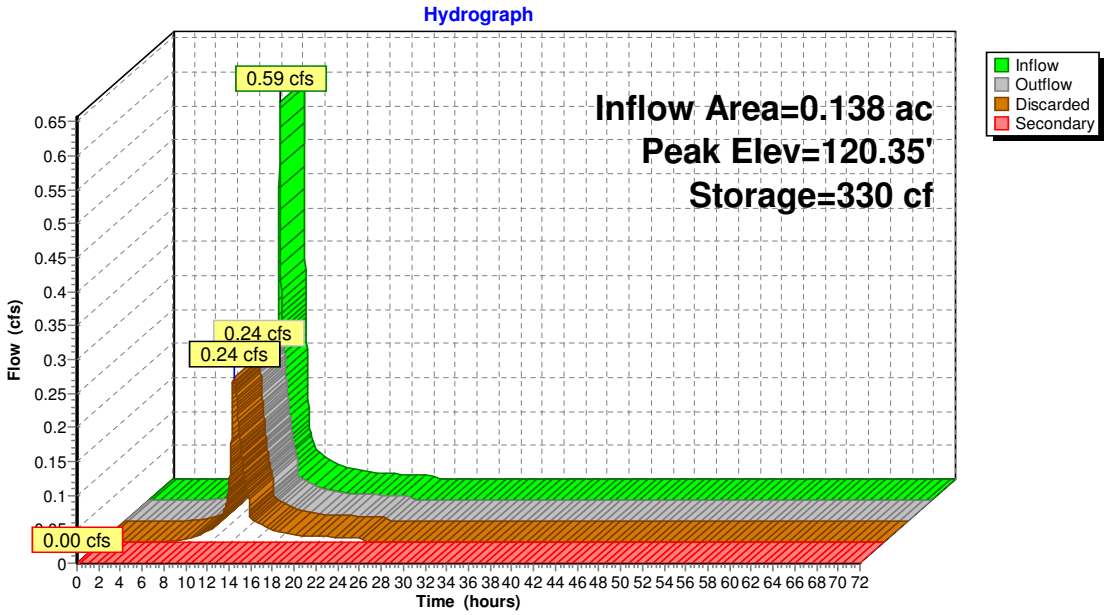
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	283 cf	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	192 cf	**10.00'D x 11.00'H Vertical Cone/Cylinder** 864 cf Overall - 283 cf Embedded = 581 cf x 33.0% Voids
		475 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.24 cfs @ 12.26 hrs HW=120.35' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.24 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB1: Recharge Chamber (1 new)



Summary for Pond RB2: Recharge (2)

Inflow Area = 0.382 ac, 70.51% Impervious, Inflow Depth = 2.90" for 10YR event
Inflow = 1.34 cfs @ 12.07 hrs, Volume= 0.092 af
Outflow = 0.52 cfs @ 12.31 hrs, Volume= 0.092 af, Atten= 61%, Lag= 14.0 min
Discarded = 0.37 cfs @ 12.31 hrs, Volume= 0.091 af
Primary = 0.15 cfs @ 12.31 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 122.30' @ 12.31 hrs Surf.Area= 208 sf Storage= 1,002 cf

Plug-Flow detention time= 22.7 min calculated for 0.092 af (100% of inflow)
Center-of-Mass det. time= 22.7 min (839.8 - 817.1)

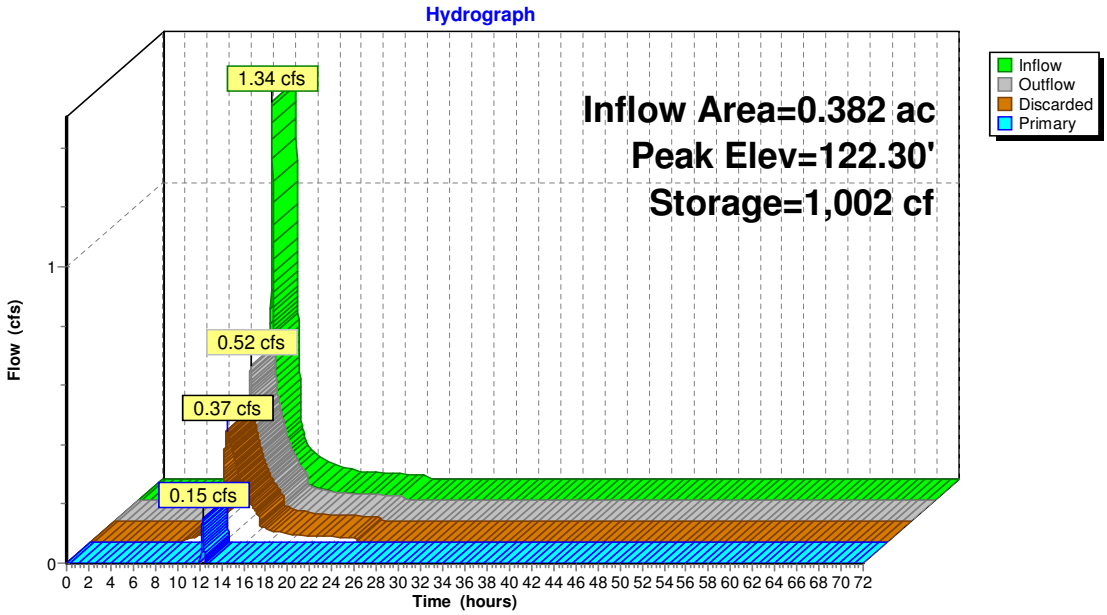
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	475 cf	**5.50'D x 10.00'H Vertical Cone/Cylinder** x 2 Inside #2
#2	112.00'	597 cf	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 2 2,285 cf Overall - 475 cf Embedded = 1,810 cf x 33.0% Voids
		1,072 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Primary	122.00'	**8.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 122.00' / 122.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.37 cfs @ 12.31 hrs HW=122.30' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.37 cfs)

Primary OutFlow Max=0.15 cfs @ 12.31 hrs HW=122.30' (Free Discharge)
└**2=Culvert** (Barrel Controls 0.15 cfs @ 1.44 fps)

Pond RB2: Recharge (2)



Summary for Pond RB2a: Recharge chamber (new)

Inflow Area = 0.382 ac, 70.51% Impervious, Inflow Depth = 0.05" for 10YR event
Inflow = 0.15 cfs @ 12.31 hrs, Volume= 0.002 af
Outflow = 0.08 cfs @ 12.40 hrs, Volume= 0.002 af, Atten= 49%, Lag= 5.5 min
Discarded = 0.08 cfs @ 12.40 hrs, Volume= 0.002 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 113.62' @ 12.40 hrs Surf.Area= 79 sf Storage= 28 cf

Plug-Flow detention time= 4.1 min calculated for 0.002 af (100% of inflow)
Center-of-Mass det. time= 4.1 min (744.5 - 740.4)

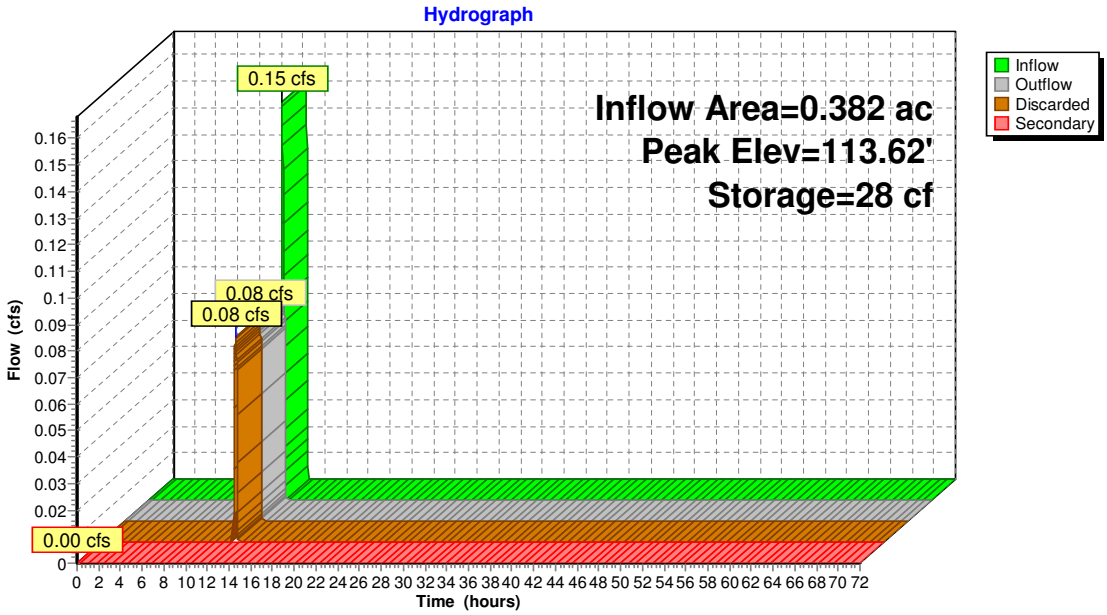
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	283 cf	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	192 cf	**10.00'D x 11.00'H Vertical Cone/Cylinder** 864 cf Overall - 283 cf Embedded = 581 cf x 33.0% Voids
		475 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.08 cfs @ 12.40 hrs HW=113.62' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB2a: Recharge chamber (new)



Summary for Pond RB3: Recharge (1)

Inflow Area = 0.050 ac,100.00% Impervious, Inflow Depth = 4.56" for 10YR event
Inflow = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af
Outflow = 0.08 cfs @ 12.32 hrs, Volume= 0.019 af, Atten= 65%, Lag= 14.9 min
Discarded = 0.08 cfs @ 12.32 hrs, Volume= 0.019 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 113.00' @ 12.32 hrs Surf.Area= 0.002 ac Storage= 0.003 af

Plug-Flow detention time= 9.6 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 9.6 min (757.4 - 747.8)

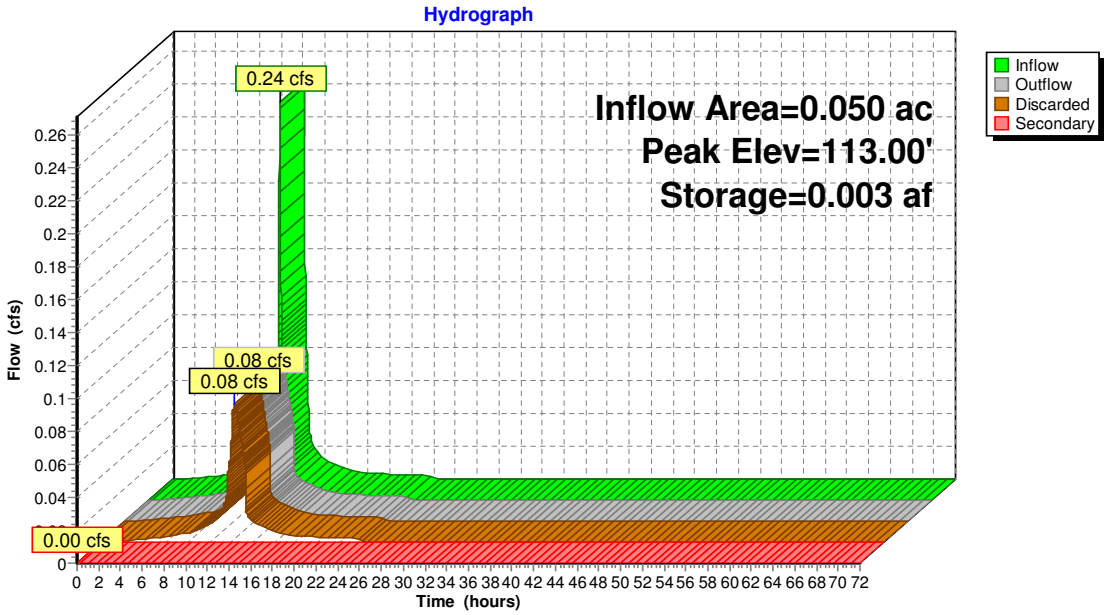
Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	110.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder**
			0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	110.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	120.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.08 cfs @ 12.32 hrs HW=113.00' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=110.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB3: Recharge (1)



Summary for Pond RB4: Recharge (6)

Inflow Area = 0.361 ac,100.00% Impervious, Inflow Depth = 3.93" for 10YR event
Inflow = 1.51 cfs @ 12.07 hrs, Volume= 0.118 af
Outflow = 0.52 cfs @ 12.32 hrs, Volume= 0.118 af, Atten= 66%, Lag= 15.2 min
Discarded = 0.52 cfs @ 12.32 hrs, Volume= 0.118 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 114.17' @ 12.32 hrs Surf.Area= 0.014 ac Storage= 0.021 af

Plug-Flow detention time= 10.0 min calculated for 0.118 af (100% of inflow)
Center-of-Mass det. time= 10.0 min (757.8 - 747.8)

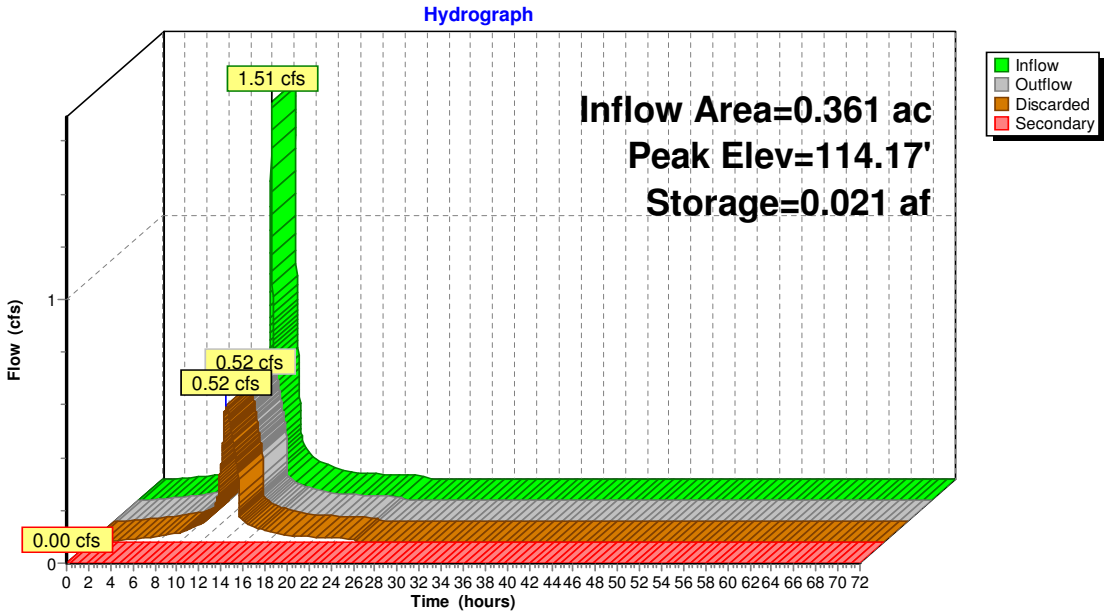
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.039 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 6 Inside #2
#2	111.00'	0.039 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 6
			0.157 af Overall - 0.039 af Embedded = 0.118 af x 33.0% Voids
		0.078 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	121.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.52 cfs @ 12.32 hrs HW=114.17' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.52 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB4: Recharge (6)



Summary for Pond RB5: Recharge (3)

Inflow Area = 0.243 ac, 83.31% Impervious, Inflow Depth = 3.48" for 10YR event
Inflow = 1.00 cfs @ 12.07 hrs, Volume= 0.070 af
Outflow = 0.47 cfs @ 12.22 hrs, Volume= 0.070 af, Atten= 53%, Lag= 8.8 min
Discarded = 0.47 cfs @ 12.22 hrs, Volume= 0.070 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 113.69' @ 12.22 hrs Surf.Area= 0.007 ac Storage= 0.009 af

Plug-Flow detention time= 4.3 min calculated for 0.070 af (100% of inflow)
Center-of-Mass det. time= 4.3 min (802.7 - 798.4)

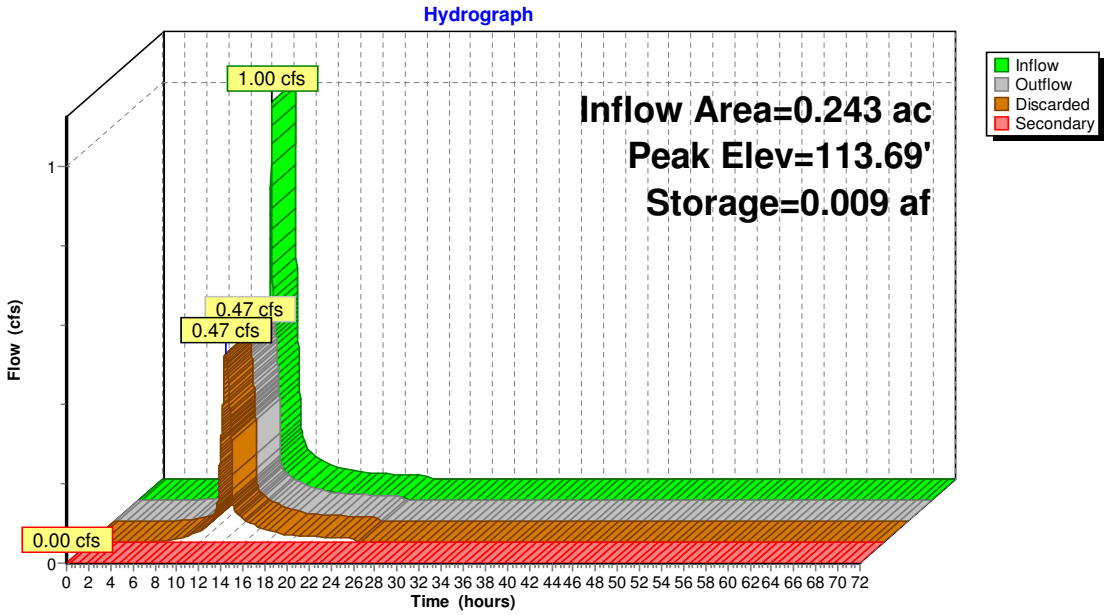
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	111.00'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3 0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	121.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.47 cfs @ 12.22 hrs HW=113.69' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.47 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB5: Recharge (3)



Summary for Pond RB6: Recharge (1)

Inflow Area = 0.055 ac, 80.20% Impervious, Inflow Depth = 3.28" for 10YR event
Inflow = 0.22 cfs @ 12.07 hrs, Volume= 0.015 af
Outflow = 0.07 cfs @ 12.35 hrs, Volume= 0.015 af, Atten= 66%, Lag= 16.5 min
Discarded = 0.07 cfs @ 12.35 hrs, Volume= 0.015 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 115.34' @ 12.35 hrs Surf.Area= 0.002 ac Storage= 0.003 af

Plug-Flow detention time= 11.0 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 11.0 min (816.1 - 805.1)

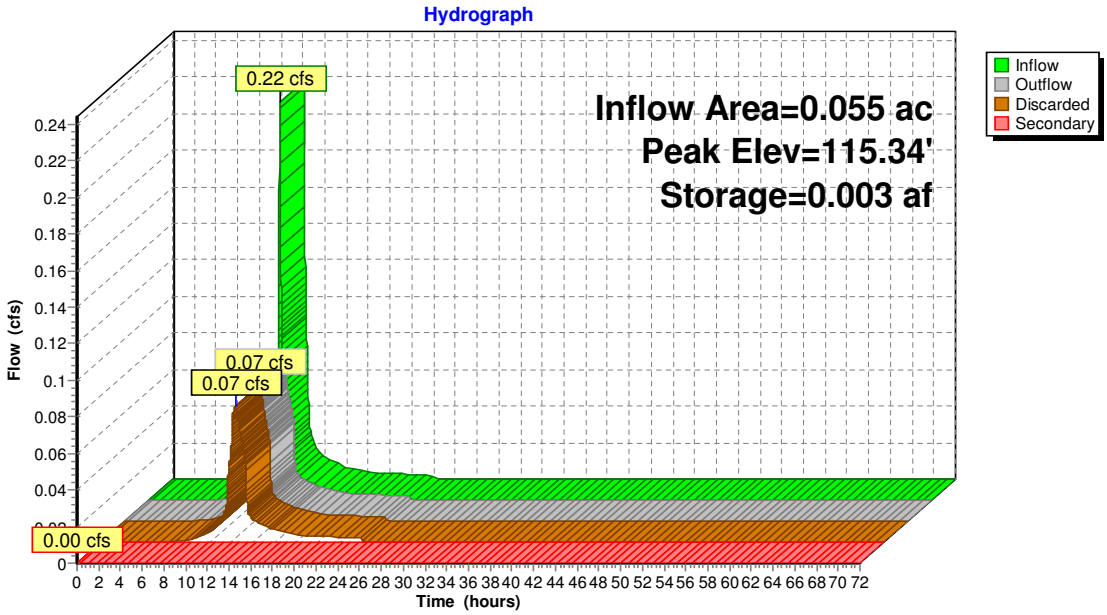
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** 0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 12.35 hrs HW=115.34' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB6: Recharge (1)



Summary for Pond RB7: Recharge (3)

Inflow Area = 0.285 ac, 54.91% Impervious, Inflow Depth = 1.89" for 10YR event
Inflow = 0.64 cfs @ 12.08 hrs, Volume= 0.045 af
Outflow = 0.22 cfs @ 12.40 hrs, Volume= 0.045 af, Atten= 66%, Lag= 19.3 min
Discarded = 0.22 cfs @ 12.40 hrs, Volume= 0.045 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 115.27' @ 12.40 hrs Surf.Area= 0.007 ac Storage= 0.008 af

Plug-Flow detention time= 11.1 min calculated for 0.045 af (100% of inflow)
Center-of-Mass det. time= 11.1 min (860.0 - 849.0)

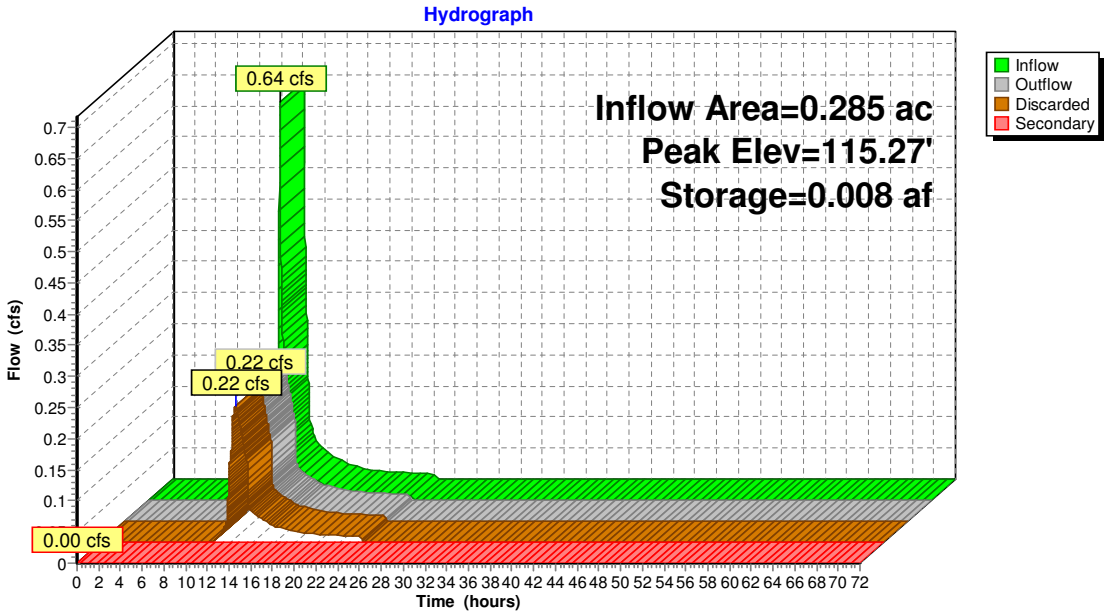
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	113.00'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3 0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.22 cfs @ 12.40 hrs HW=115.27' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.22 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB7: Recharge (3)



Summary for Pond RB8: Recharge Basin (2)

Inflow Area = 0.769 ac, 2.50% Impervious, Inflow Depth = 0.42" for 10YR event
Inflow = 0.14 cfs @ 12.35 hrs, Volume= 0.027 af
Outflow = 0.07 cfs @ 12.68 hrs, Volume= 0.027 af, Atten= 50%, Lag= 19.7 min
Discarded = 0.07 cfs @ 12.68 hrs, Volume= 0.027 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 117.91' @ 12.68 hrs Surf.Area= 77 sf Storage= 115 cf

Plug-Flow detention time= 10.1 min calculated for 0.027 af (100% of inflow)
Center-of-Mass det. time= 10.1 min (959.4 - 949.3)

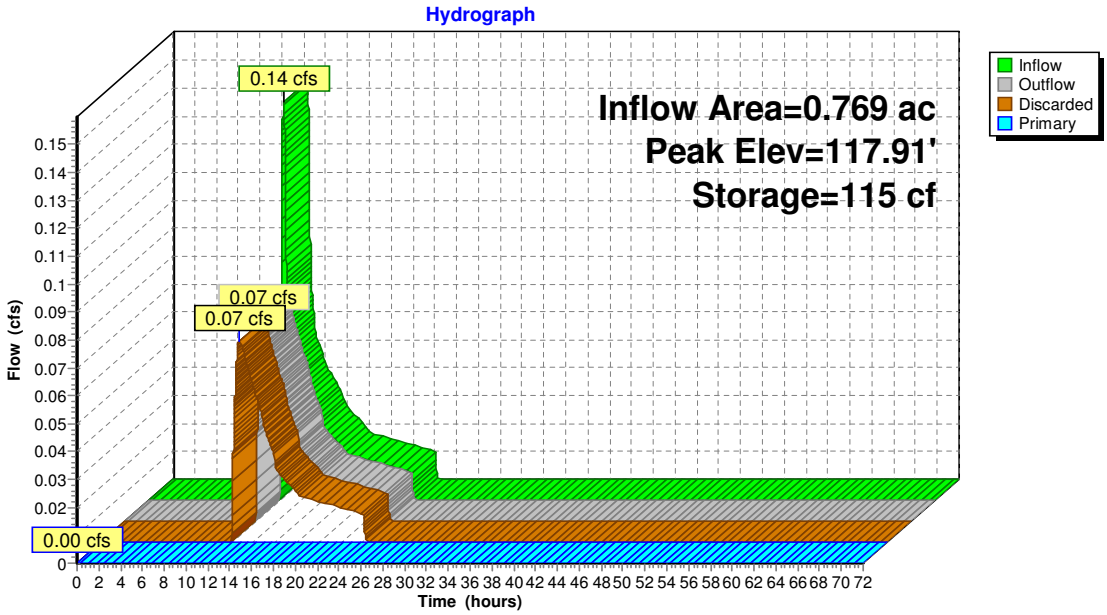
Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	339 cf	**6.00'D x 6.00'H Vertical Cone/Cylinder** x 2 Inside #2
#2	115.50'	66 cf	**7.00'D x 7.00'H Vertical Cone/Cylinder** x 2
			539 cf Overall - 339 cf Embedded = 199 cf x 33.0% Voids
		405 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.50'	**17.000 in/hr Exfiltration over Wetted area**
#2	Primary	122.50'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.07 cfs @ 12.68 hrs HW=117.91' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.50' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond RB8: Recharge Basin (2)

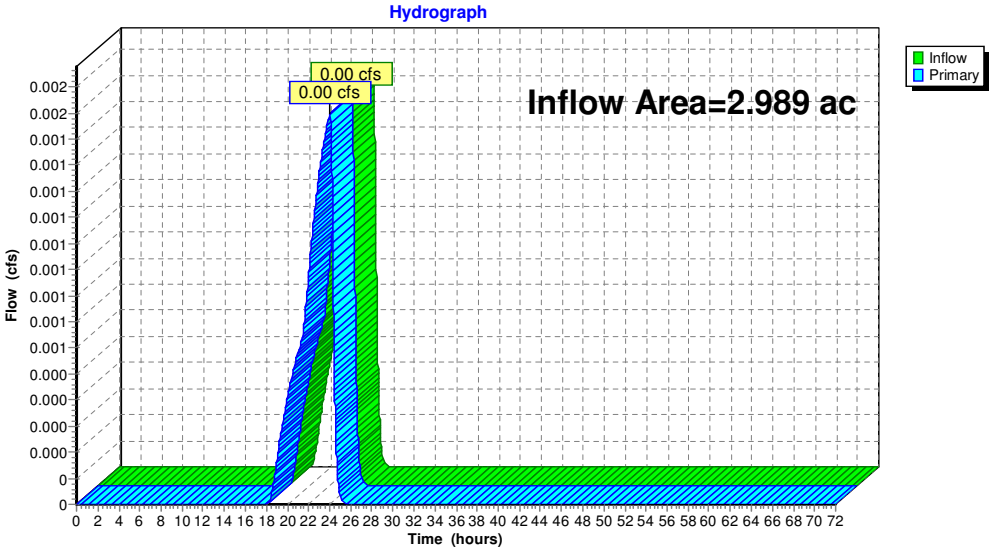


Summary for Pond SP1: Study Point 1

Inflow Area = 2.989 ac, 0.64% Impervious, Inflow Depth = 0.00" for 10YR event
Inflow = 0.00 cfs @ 24.05 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.05 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond SP1: Study Point 1



Summary for Pond URC1: Underground Chambers

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 1.64" for 10YR event
Inflow = 2.61 cfs @ 12.09 hrs, Volume= 0.111 af
Outflow = 0.54 cfs @ 11.76 hrs, Volume= 0.111 af, Atten= 79%, Lag= 0.0 min
Discarded = 0.54 cfs @ 11.76 hrs, Volume= 0.111 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 109.91' @ 12.49 hrs Surf.Area= 1,364 sf Storage= 1,901 cf

Plug-Flow detention time= 27.8 min calculated for 0.111 af (100% of inflow)
Center-of-Mass det. time= 27.7 min (765.2 - 737.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	107.50'	1,250 cf	**20.50'W x 66.52'L x 4.00'H Field A** 5,455 cf Overall - 1,665 cf Embedded = 3,789 cf x 33.0% Voids
#2A	108.50'	1,665 cf	**StormTech SC-740** x 36 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 4 rows
		2,916 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	107.50'	**17.000 in/hr Exfiltration over Surface area**
#2	Primary	113.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.54 cfs @ 11.76 hrs HW=107.57' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.54 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=107.50' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond URC1: Underground Chambers - Chamber Wizard Field A

Chamber Model = StormTech SC-740 (StormTech® SC-740)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Row Length Adjustment= +0.44' x 6.45 sf x 4 rows

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

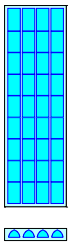
9 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 64.52' Row Length +12.0" End Stone x 2 = 66.52' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
12.0" Base + 30.0" Chamber Height + 6.0" Cover = 4.00' Field Height

36 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 4 Rows = 1,665.2 cf Chamber Storage

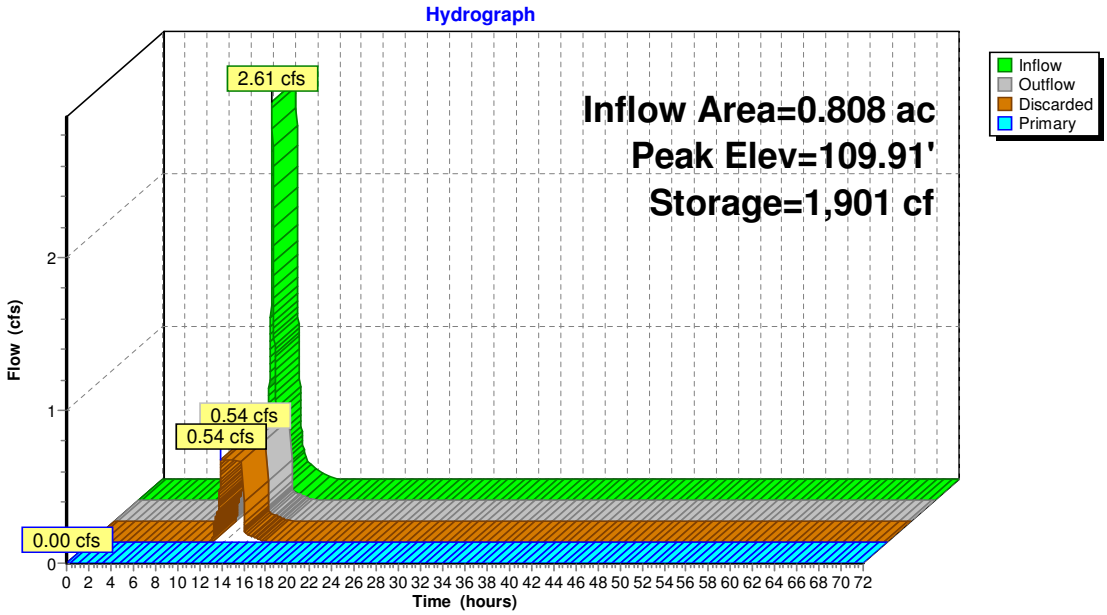
5,454.5 cf Field - 1,665.2 cf Chambers = 3,789.3 cf Stone x 33.0% Voids = 1,250.5 cf Stone Storage

Chamber Storage + Stone Storage = 2,915.6 cf = 0.067 af
Overall Storage Efficiency = 53.5%

36 Chambers
202.0 cy Field
140.3 cy Stone



Pond URC1: Underground Chambers



Summary for Subcatchment DA1: Woods

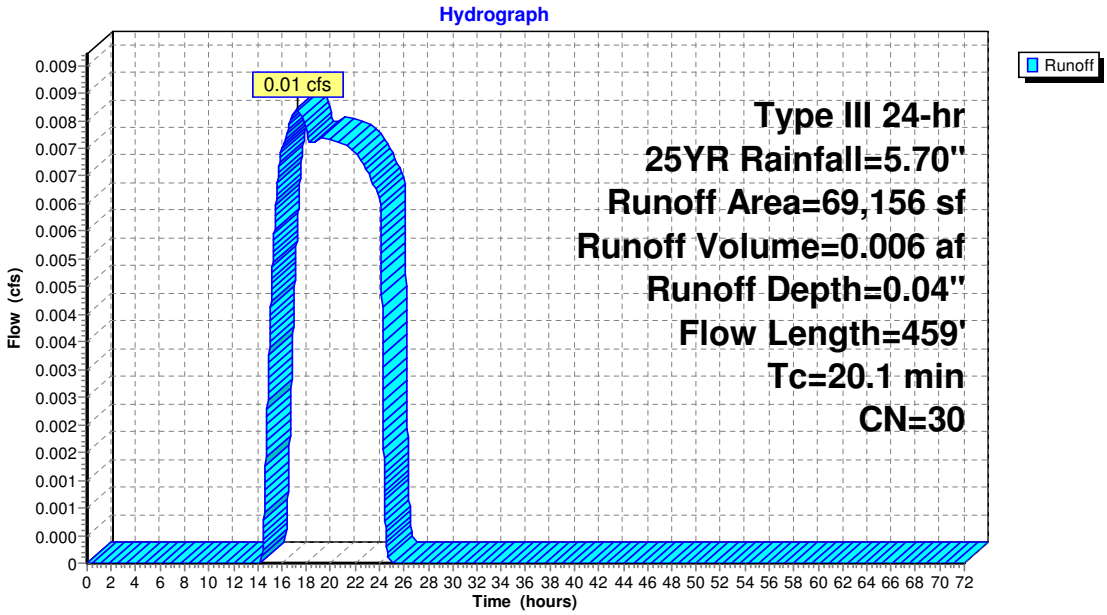
Runoff = 0.01 cfs @ 17.22 hrs, Volume= 0.006 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
69,156	30	Woods, Good, HSG A
69,156		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	103	0.0490	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
5.6	356	0.0450	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	459	Total			

Subcatchment DA1: Woods



Summary for Subcatchment DA10: Entrance

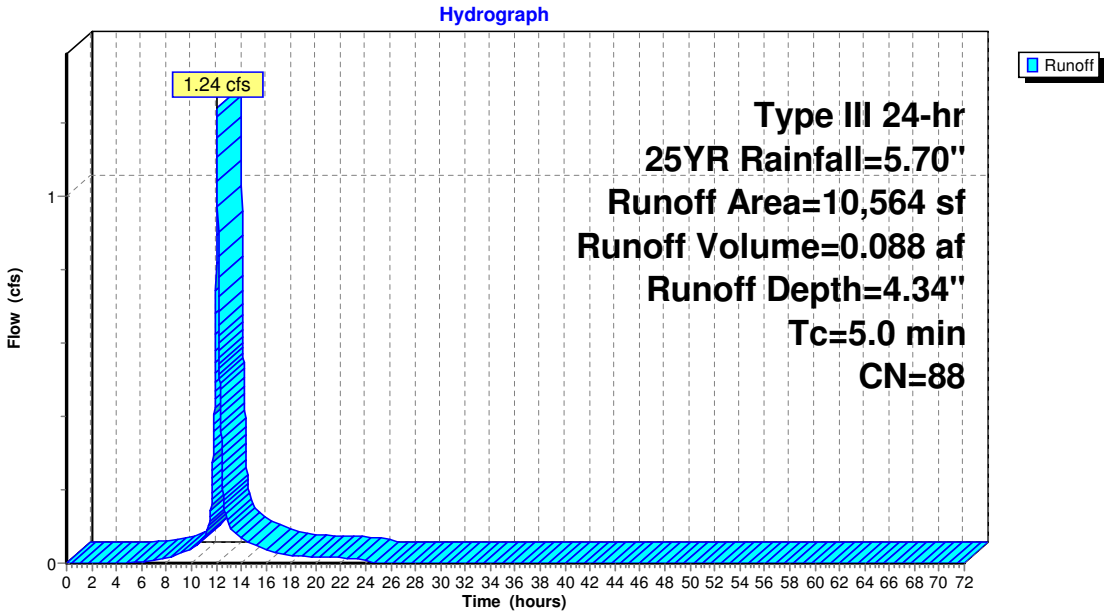
Runoff = 1.24 cfs @ 12.07 hrs, Volume= 0.088 af, Depth= 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
7,431	98	Paved roads w/curbs & sewers, HSG A
1,763	39	>75% Grass cover, Good, HSG A
1,370	98	Roofs, HSG A
10,564	88	Weighted Average
1,763		16.69% Pervious Area
8,801		83.31% Impervious Area

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

Subcatchment DA10: Entrance



Summary for Subcatchment DA11: Entrance Parking

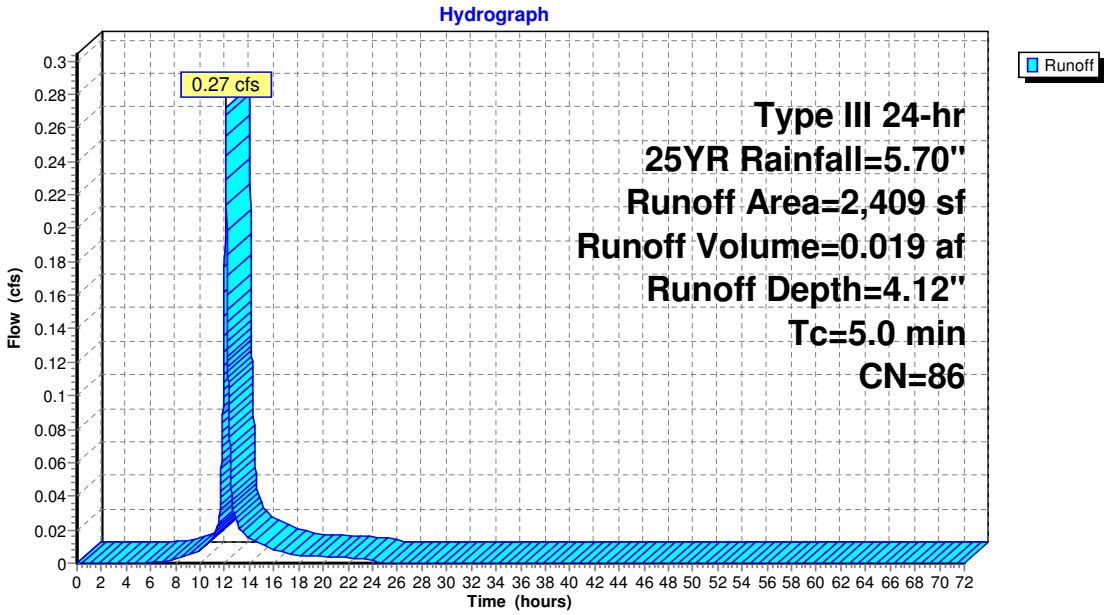
Runoff = 0.27 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
1,932	98	Paved roads w/curbs & sewers, HSG A
477	39	>75% Grass cover, Good, HSG A
2,409	86	Weighted Average
477		19.80% Pervious Area
1,932		80.20% Impervious Area

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

Subcatchment DA11: Entrance Parking



Summary for Subcatchment DA12: New Front Parking

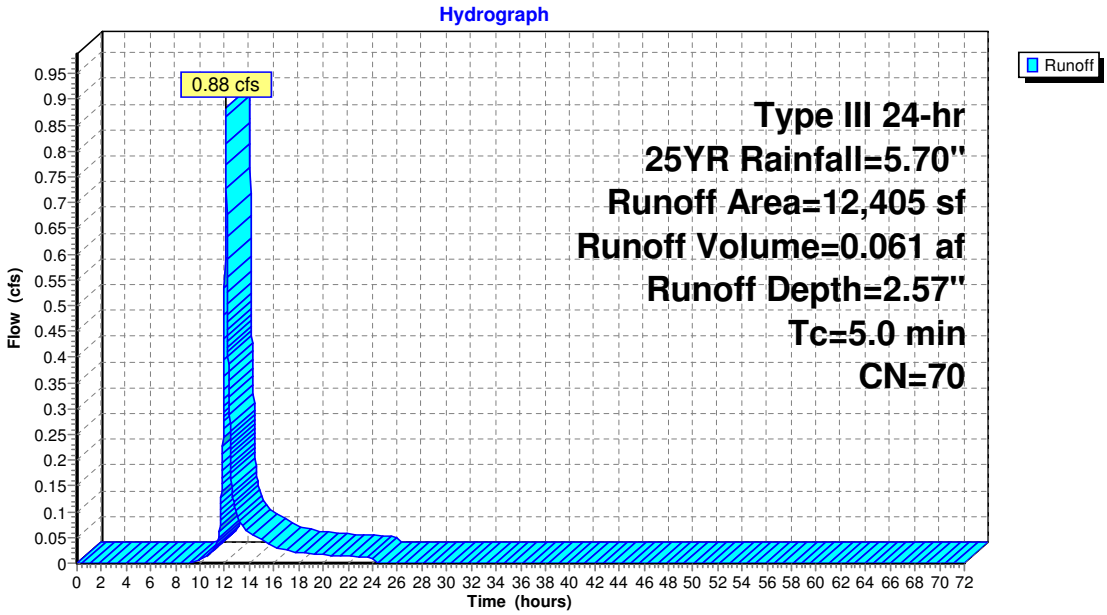
Runoff = 0.88 cfs @ 12.08 hrs, Volume= 0.061 af, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
6,812	98	Paved parking, HSG A
1,617	30	Woods, Good, HSG A
3,976	39	>75% Grass cover, Good, HSG A
12,405	70	Weighted Average
5,593		45.09% Pervious Area
6,812		54.91% Impervious Area

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

Subcatchment DA12: New Front Parking



Summary for Subcatchment DA2: Parking Woods

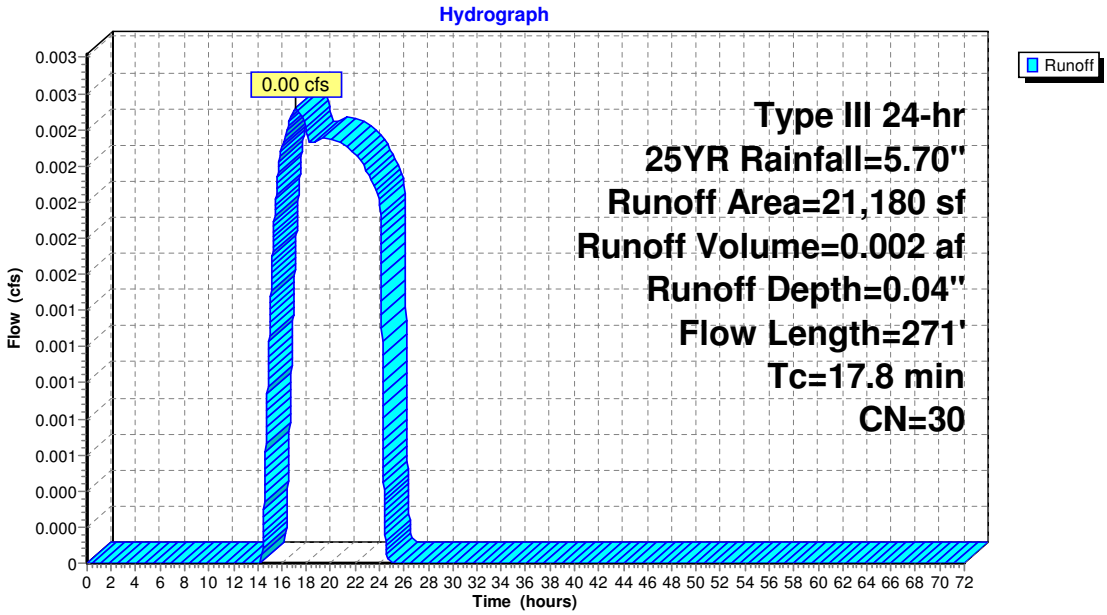
Runoff = 0.00 cfs @ 17.19 hrs, Volume= 0.002 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
21,180	30	Woods, Good, HSG A
21,180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
2.5	171	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.8	271	Total			

Subcatchment DA2: Parking Woods



Summary for Subcatchment DA2a: Parking Lot Upland

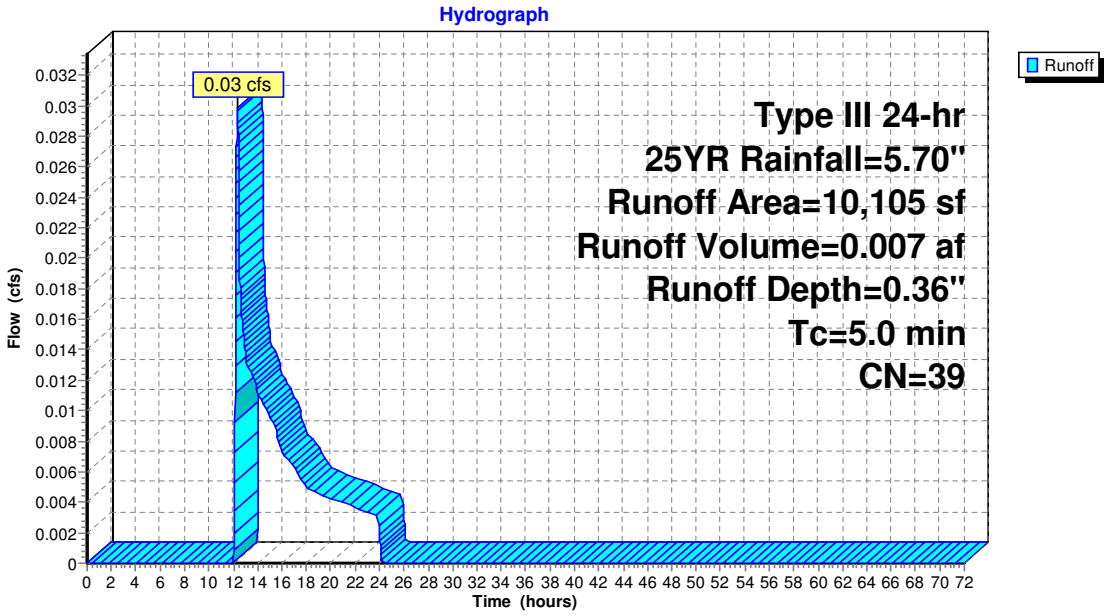
Runoff = 0.03 cfs @ 12.36 hrs, Volume= 0.007 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
9,591	39	>75% Grass cover, Good, HSG A
514	30	Woods, Good, HSG A
10,105	39	Weighted Average
10,105		100.00% Pervious Area

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

Subcatchment DA2a: Parking Lot Upland



Summary for Subcatchment DA2b: Parking Lot Pavement

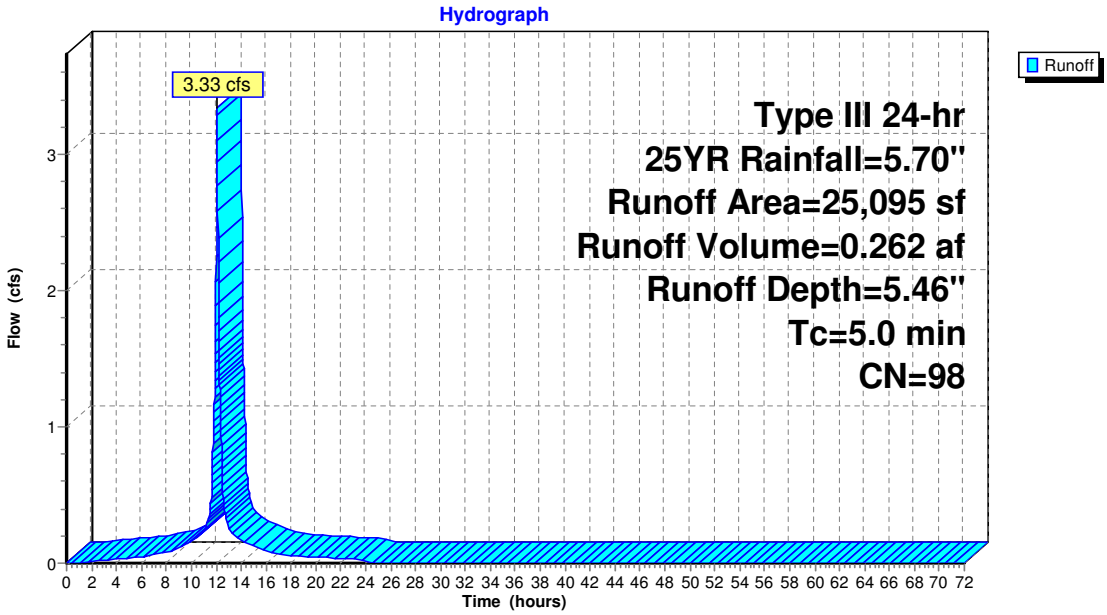
Runoff = 3.33 cfs @ 12.07 hrs, Volume= 0.262 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
23,865	98	Paved parking, HSG A
1,230	98	Water Surface, HSG A
25,095	98	Weighted Average
25,095		100.00% Impervious Area

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

Subcatchment DA2b: Parking Lot Pavement



Summary for Subcatchment DA3: Woods

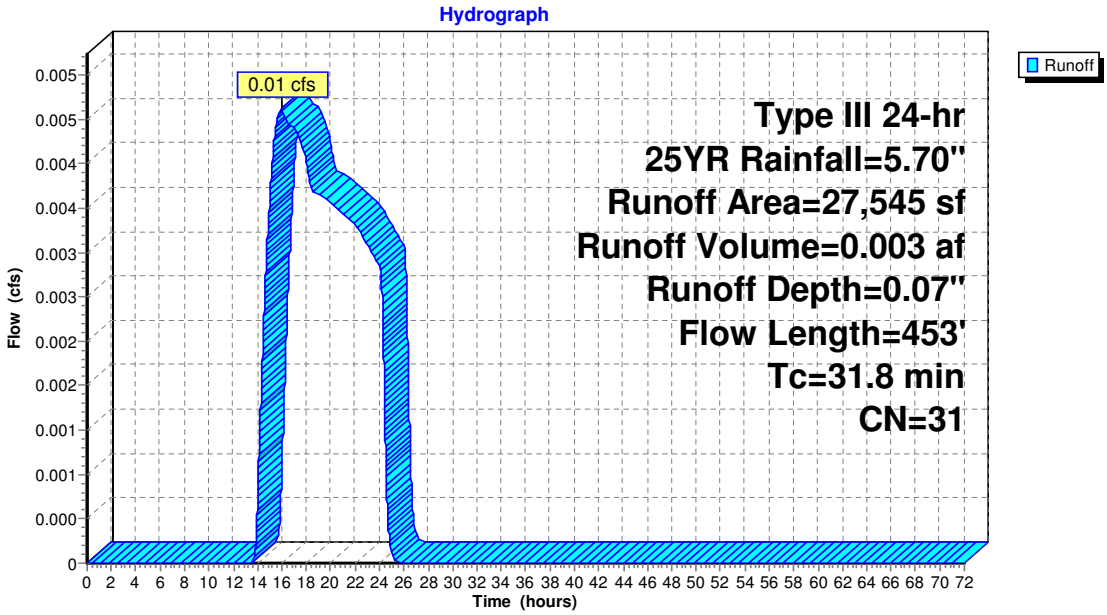
Runoff = 0.01 cfs @ 15.94 hrs, Volume= 0.003 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
24,515	30	Woods, Good, HSG A
3,030	39	>75% Grass cover, Good, HSG A
27,545	31	Weighted Average
27,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4	163	0.0250	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.4	290	0.0480	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
31.8	453	Total			

Subcatchment DA3: Woods



Summary for Subcatchment DA4: Gravel Lot

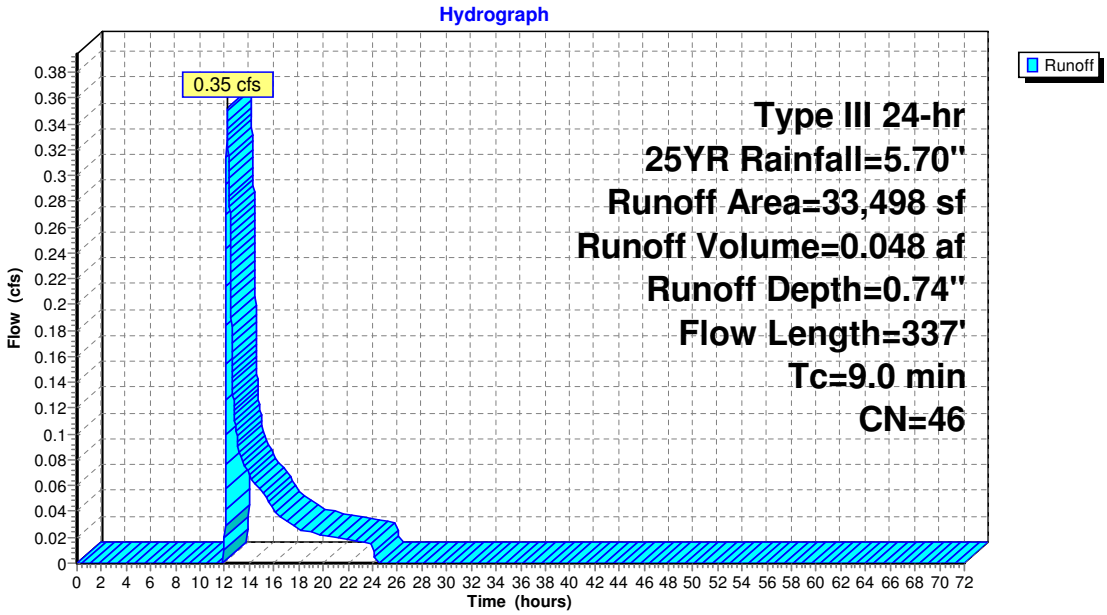
Runoff = 0.35 cfs @ 12.18 hrs, Volume= 0.048 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

	Area (sf)	CN	Description
	17,778	30	Woods, Good, HSG A
*	6,095	72	Gravel Parking, HSG A
	837	98	Water Surface, HSG A
	4,097	39	>75% Grass cover, Good, HSG A
	4,691	72	Dirt roads, HSG A
	33,498	46	Weighted Average
	32,661		97.50% Pervious Area
	837		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	34	0.1760	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	106	0.0190	0.43		**Sheet Flow,** Fallow n= 0.050 P2= 3.60"
0.6	60	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	137	0.0440	3.38		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.0	337	Total			

Subcatchment DA4: Gravel Lot



Summary for Subcatchment DA5: Rear Drive

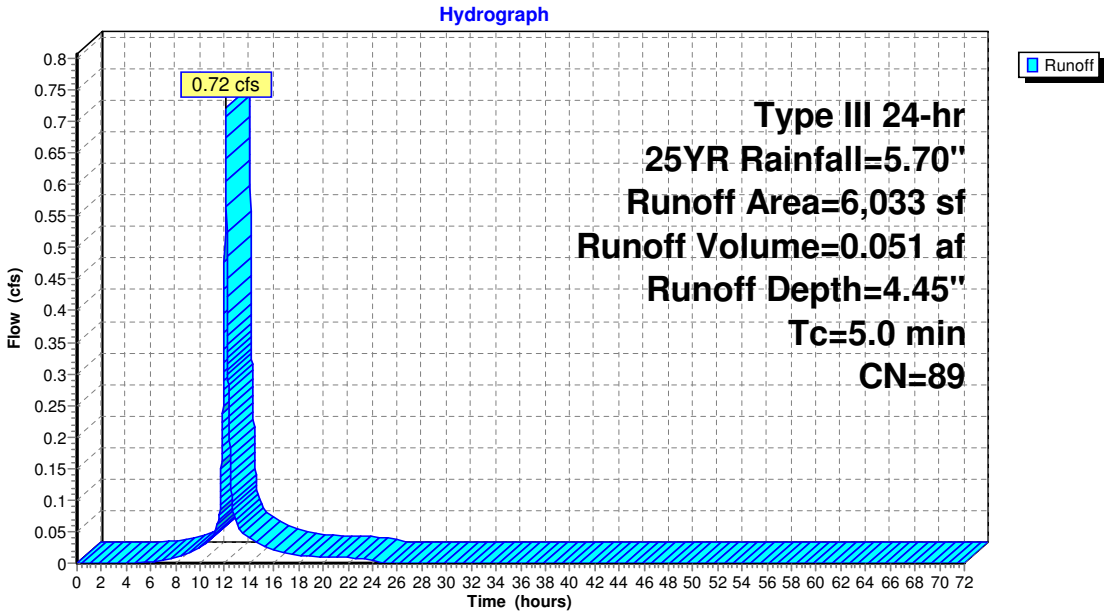
Runoff = 0.72 cfs @ 12.07 hrs, Volume= 0.051 af, Depth= 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
1,843	98	Paved parking, HSG A
744	30	Woods, Good, HSG A
3,358	98	Roofs, HSG A
88	39	>75% Grass cover, Good, HSG A
6,033	89	Weighted Average
832		13.79% Pervious Area
5,201		86.21% Impervious Area

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

Subcatchment DA5: Rear Drive



Summary for Subcatchment DA6: South Parking

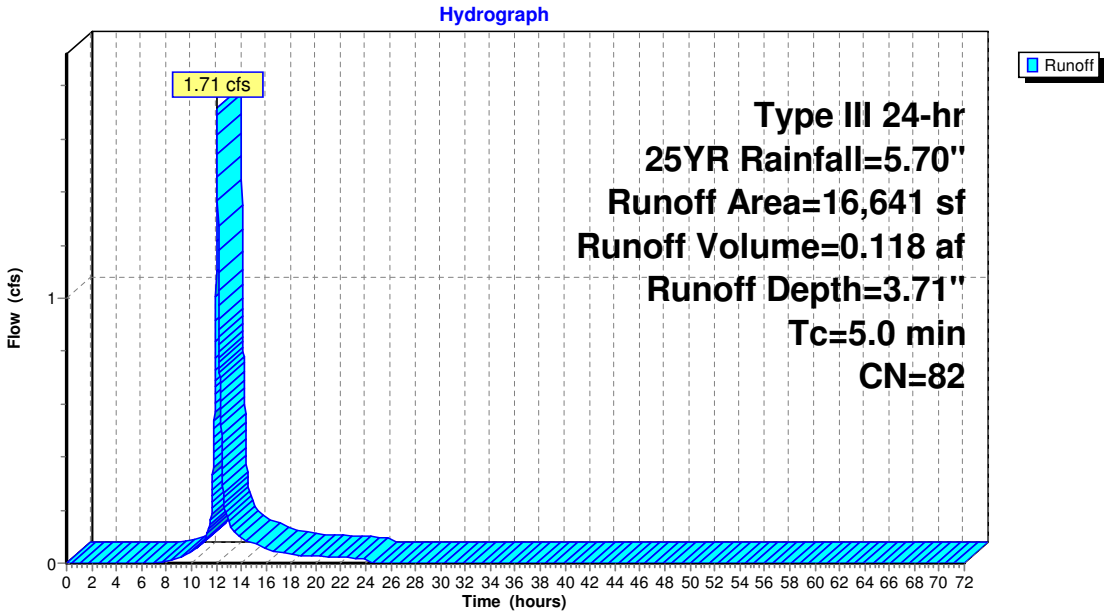
Runoff = 1.71 cfs @ 12.07 hrs, Volume= 0.118 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
8,472	98	Paved parking, HSG A
3,261	98	Roofs, HSG A
4,908	43	Woods/grass comb., Fair, HSG A
16,641	82	Weighted Average
4,908		29.49% Pervious Area
11,733		70.51% Impervious Area

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

Subcatchment DA6: South Parking



Summary for Subcatchment DA7: North Rear

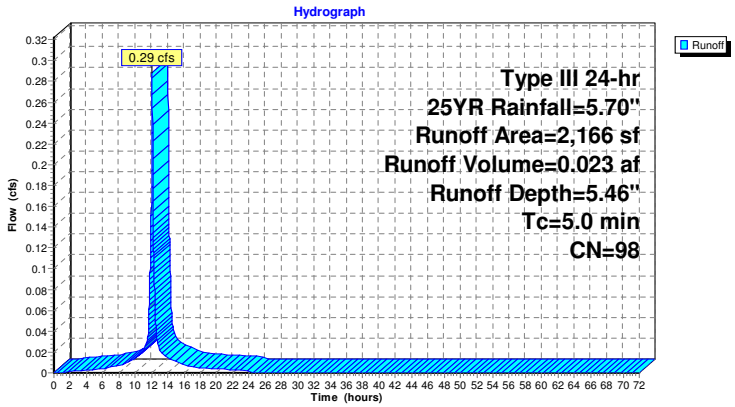
Runoff = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
2,166	98	Paved parking, HSG A
2,166		100.00% Impervious Area

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

Subcatchment DA7: North Rear



Summary for Subcatchment DA8: Rear Parking

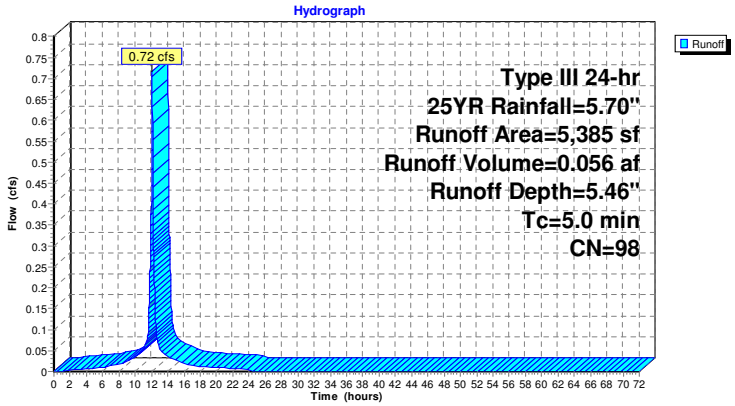
Runoff = 0.72 cfs @ 12.07 hrs, Volume= 0.056 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
5,385	98	Paved roads w/curbs & sewers, HSG A
5,385		100.00% Impervious Area

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

Subcatchment DA8: Rear Parking



Summary for Subcatchment DA9: North Side

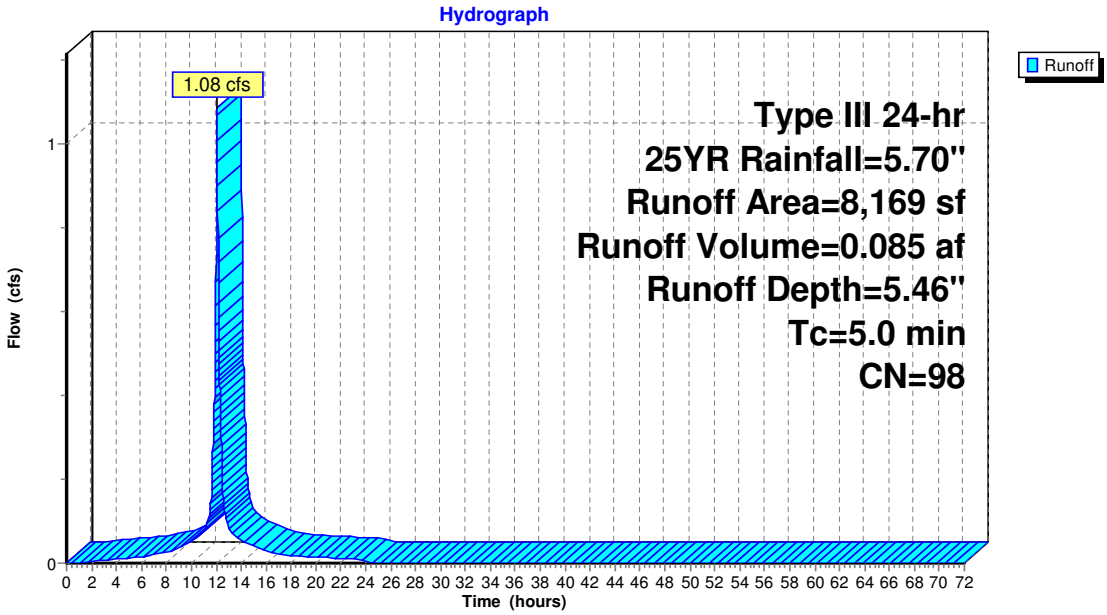
Runoff = 1.08 cfs @ 12.07 hrs, Volume= 0.085 af, Depth= 5.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=5.70"

Area (sf)	CN	Description
4,393	98	Paved roads w/curbs & sewers, HSG A
3,776	98	Roofs, HSG A
8,169	98	Weighted Average
8,169		100.00% Impervious Area

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

Subcatchment DA9: North Side



Summary for Pond B1: Bio

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 4.00" for 25YR event
Inflow = 3.33 cfs @ 12.07 hrs, Volume= 0.269 af
Outflow = 3.23 cfs @ 12.09 hrs, Volume= 0.269 af, Atten= 3%, Lag= 1.1 min
Discarded = 0.10 cfs @ 12.09 hrs, Volume= 0.123 af
Primary = 3.13 cfs @ 12.09 hrs, Volume= 0.146 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 113.51' @ 12.09 hrs Surf.Area= 1,775 sf Storage= 767 cf

Plug-Flow detention time= 25.4 min calculated for 0.269 af (100% of inflow)
Center-of-Mass det. time= 25.4 min (776.3 - 750.9)

Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	1,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
113.00	1,232	0	0
113.50	1,765	749	749
113.76	2,018	492	1,241

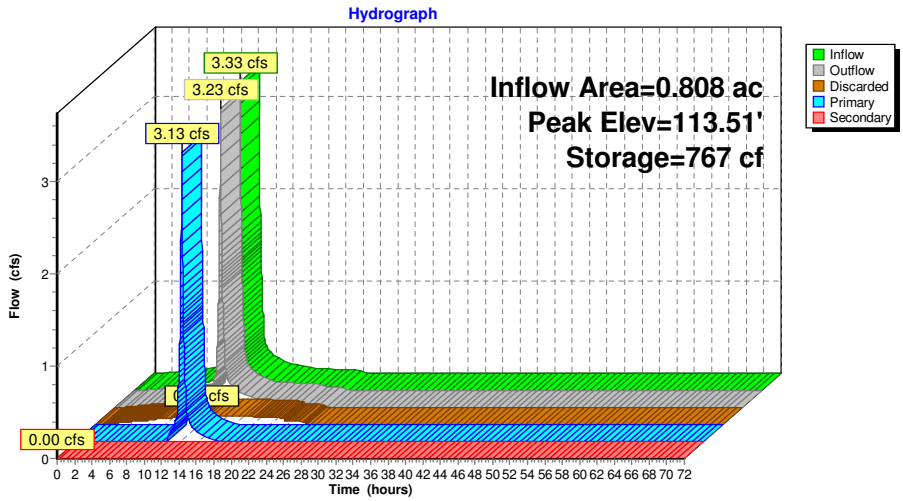
Device	Routing	Invert	Outlet Devices
#1	Device 2	113.33'	**24.0" Horiz. Orifice/Grate** X 2 rows C= 0.600 Limited to weir flow at low heads
#2	Primary	110.50'	**12.0" Round Culvert X 2.00** L= 26.0' CPP, end-section conforming to fill, Ke= 0.500
			Inlet / Outlet Invert= 110.50' / 110.40' S= 0.0038 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Discarded	113.00'	**2.410 in/hr Exfiltration over Surface area**
#4	Secondary	113.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50
			Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.10 cfs @ 12.09 hrs HW=113.51' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=3.13 cfs @ 12.09 hrs HW=113.51' (Free Discharge)
└**2=Culvert** (Passes 3.13 cfs of 11.98 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 3.13 cfs @ 1.39 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B1: Bio



Summary for Pond BO1: Bio overflow storage

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 0.00" for 25YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 113.52' @ 0.00 hrs Surf.Area= 1,765 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	113.52'	454 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

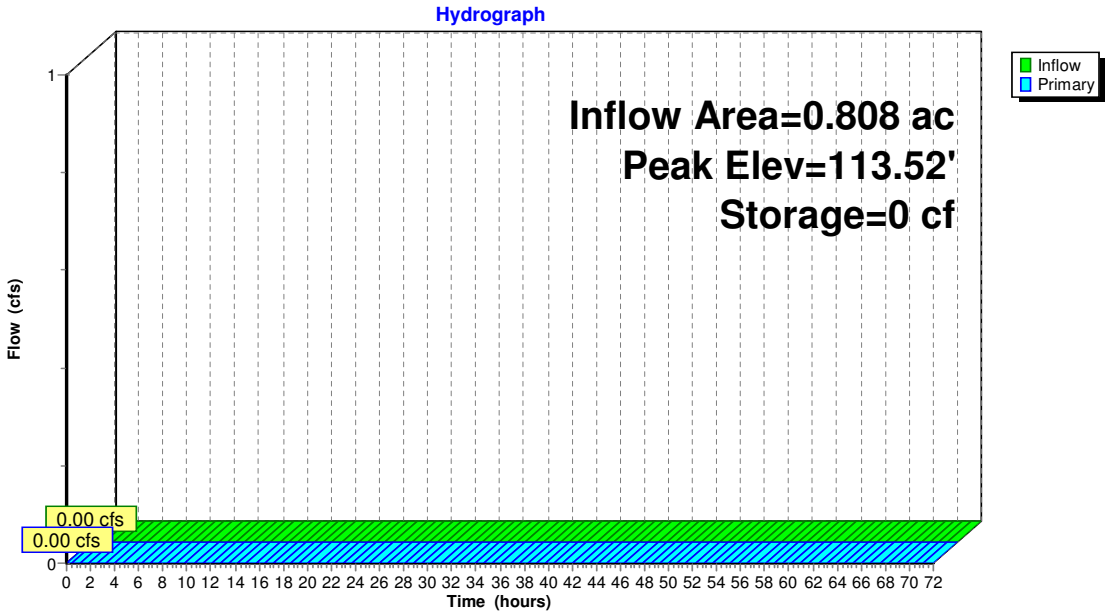
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
113.52	1,765	0	0
113.76	2,018	454	454

Device	Routing	Invert	Outlet Devices
#1	Primary	113.75'	**8.0' long x 5.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.52' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BO1: Bio overflow storage



Summary for Pond IB1: infiltration basin

Inflow Area = 0.769 ac, 2.50% Impervious, Inflow Depth = 0.00" for 25YR event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 122.00' @ 0.00 hrs Surf.Area= 170 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	518 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

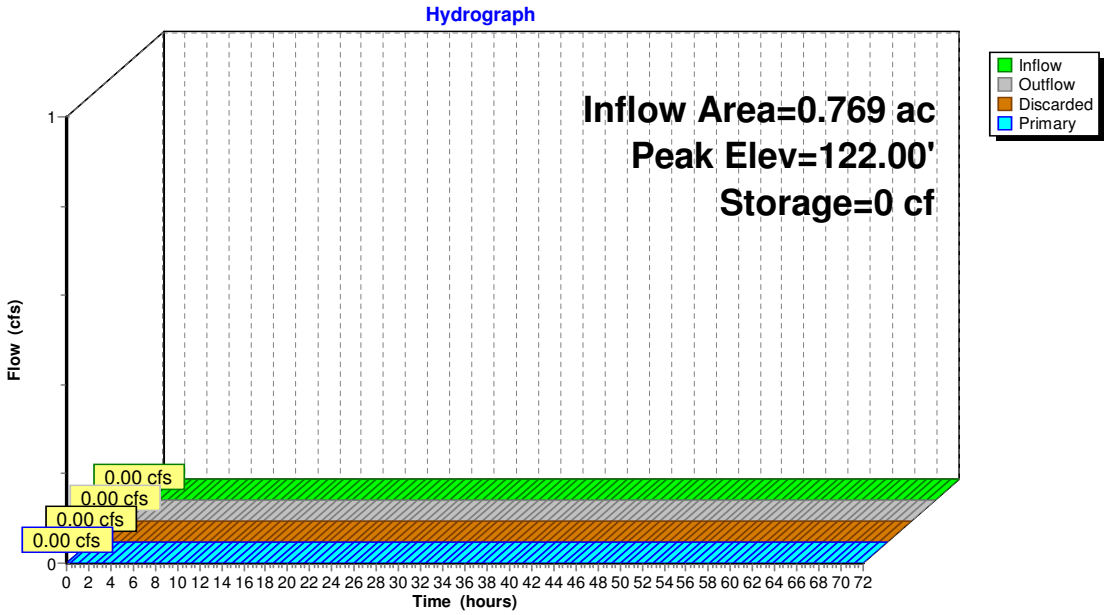
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	170	0	0
122.50	500	168	168
123.00	900	350	518

Device	Routing	Invert	Outlet Devices
#1	Primary	122.75'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	122.00'	**2.410 in/hr Exfiltration over Surface area above 122.00'** Excluded Surface area = 170 sf

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.00' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond IB1: infiltration basin



Summary for Pond P1: Depression

Inflow Area = 1.294 ac, 44.51% Impervious, Inflow Depth = 0.02" for 25YR event
Inflow = 0.00 cfs @ 17.19 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 17.39 hrs, Volume= 0.002 af, Atten= 0%, Lag= 12.1 min
Discarded = 0.00 cfs @ 17.39 hrs, Volume= 0.002 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 111.01' @ 17.39 hrs Surf.Area= 257 sf Storage= 2 cf

Plug-Flow detention time= 11.6 min calculated for 0.002 af (100% of inflow)
Center-of-Mass det. time= 11.6 min (1,182.0 - 1,170.4)

Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	5,074 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

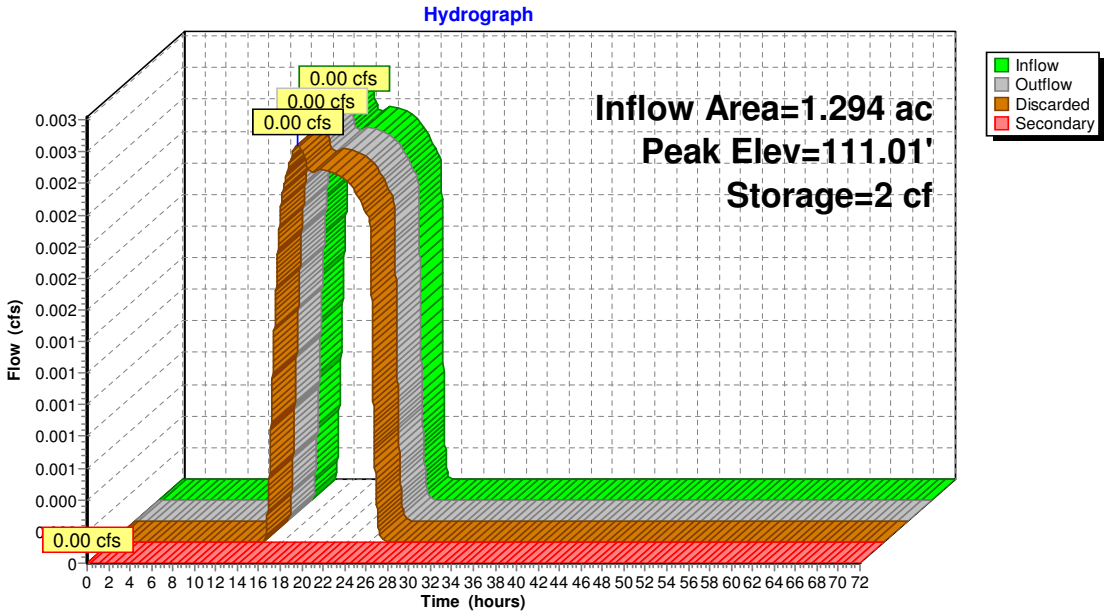
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
111.00	254	0	0
114.00	1,440	2,541	2,541
115.00	3,625	2,533	5,074

Device	Routing	Invert	Outlet Devices
#1	Secondary	114.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Discarded	111.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 17.39 hrs HW=111.01' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: Depression



Summary for Pond RB1: Recharge Chamber (1 new)

Inflow Area = 0.138 ac, 86.21% Impervious, Inflow Depth = 4.45" for 25YR event
Inflow = 0.72 cfs @ 12.07 hrs, Volume= 0.051 af
Outflow = 0.30 cfs @ 12.26 hrs, Volume= 0.051 af, Atten= 59%, Lag= 11.5 min
Discarded = 0.30 cfs @ 12.26 hrs, Volume= 0.051 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 122.49' @ 12.26 hrs Surf.Area= 79 sf Storage= 426 cf

Plug-Flow detention time= 11.2 min calculated for 0.051 af (100% of inflow)
Center-of-Mass det. time= 11.2 min (800.1 - 789.0)

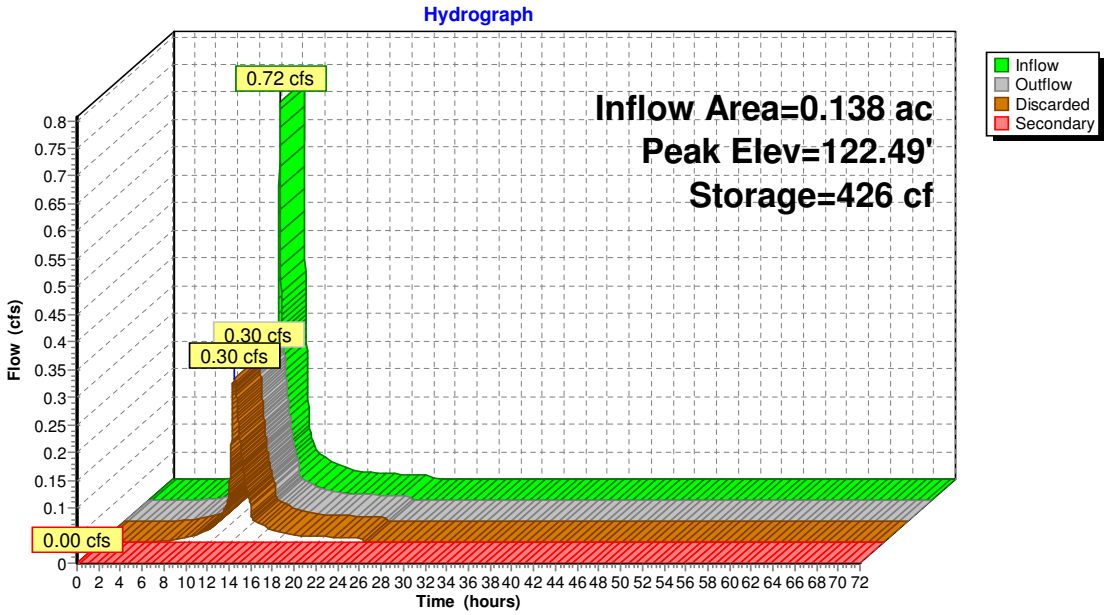
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	283 cf	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	192 cf	**10.00'D x 11.00'H Vertical Cone/Cylinder** 864 cf Overall - 283 cf Embedded = 581 cf x 33.0% Voids
		475 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.30 cfs @ 12.26 hrs HW=122.49' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.30 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB1: Recharge Chamber (1 new)



Summary for Pond RB2: Recharge (2)

Inflow Area = 0.382 ac, 70.51% Impervious, Inflow Depth = 3.71" for 25YR event
Inflow = 1.71 cfs @ 12.07 hrs, Volume= 0.118 af
Outflow = 1.22 cfs @ 12.15 hrs, Volume= 0.118 af, Atten= 29%, Lag= 4.3 min
Discarded = 0.39 cfs @ 12.15 hrs, Volume= 0.106 af
Primary = 0.83 cfs @ 12.15 hrs, Volume= 0.012 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 122.82' @ 12.15 hrs Surf.Area= 208 sf Storage= 1,054 cf

Plug-Flow detention time= 21.1 min calculated for 0.118 af (100% of inflow)
Center-of-Mass det. time= 21.1 min (831.2 - 810.0)

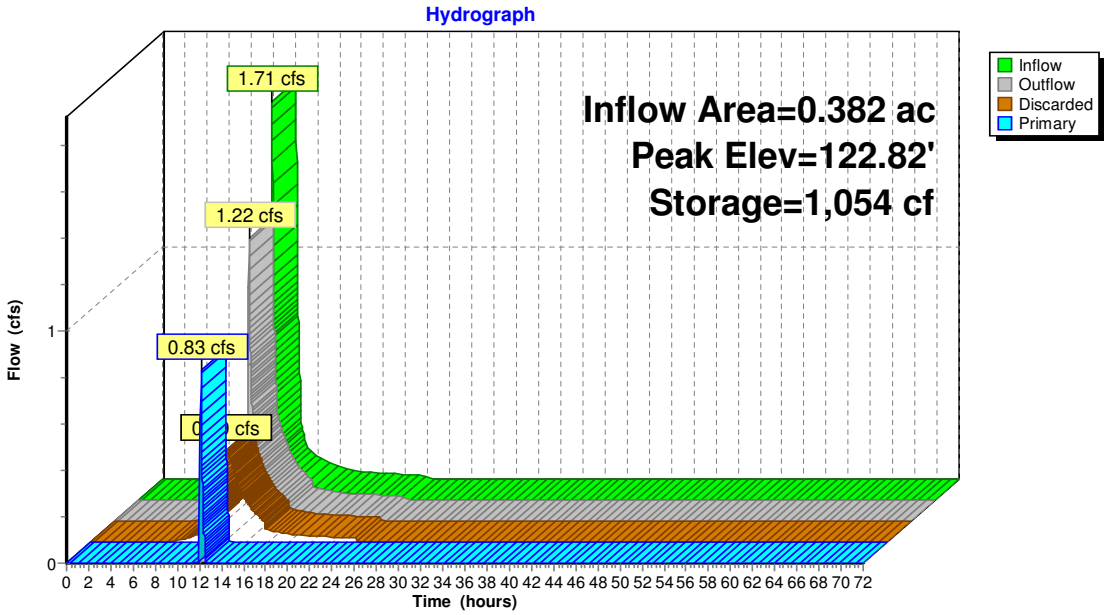
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	475 cf	**5.50'D x 10.00'H Vertical Cone/Cylinder** x 2 Inside #2
#2	112.00'	597 cf	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 2 2,285 cf Overall - 475 cf Embedded = 1,810 cf x 33.0% Voids
		1,072 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Primary	122.00'	**8.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 122.00' / 122.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.39 cfs @ 12.15 hrs HW=122.81' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=0.83 cfs @ 12.15 hrs HW=122.81' (Free Discharge)
└**2=Culvert** (Barrel Controls 0.83 cfs @ 2.49 fps)

Pond RB2: Recharge (2)



Summary for Pond RB2a: Recharge chamber (new)

Inflow Area = 0.382 ac, 70.51% Impervious, Inflow Depth = 0.38" for 25YR event
Inflow = 0.83 cfs @ 12.15 hrs, Volume= 0.012 af
Outflow = 0.22 cfs @ 12.36 hrs, Volume= 0.012 af, Atten= 73%, Lag= 13.2 min
Discarded = 0.22 cfs @ 12.36 hrs, Volume= 0.012 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 119.52' @ 12.36 hrs Surf.Area= 79 sf Storage= 293 cf

Plug-Flow detention time= 17.4 min calculated for 0.012 af (100% of inflow)
Center-of-Mass det. time= 17.4 min (751.6 - 734.2)

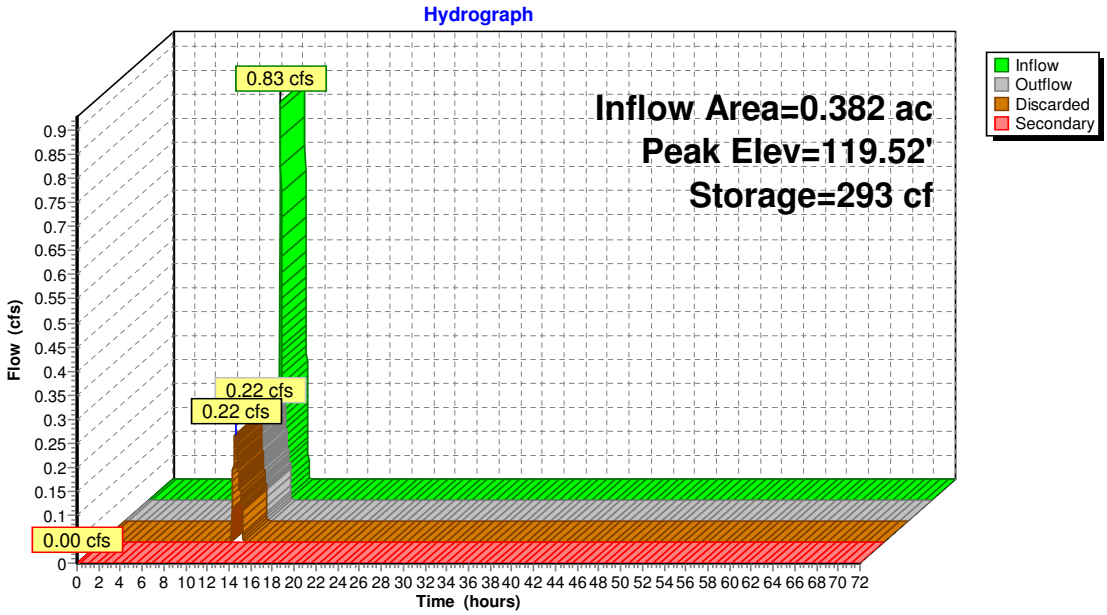
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	283 cf	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	192 cf	**10.00'D x 11.00'H Vertical Cone/Cylinder**
			864 cf Overall - 283 cf Embedded = 581 cf x 33.0% Voids
		475 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.22 cfs @ 12.36 hrs HW=119.52' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.22 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB2a: Recharge chamber (new)



Summary for Pond RB3: Recharge (1)

Inflow Area = 0.050 ac,100.00% Impervious, Inflow Depth = 5.46" for 25YR event
Inflow = 0.29 cfs @ 12.07 hrs, Volume= 0.023 af
Outflow = 0.09 cfs @ 12.34 hrs, Volume= 0.023 af, Atten= 67%, Lag= 16.0 min
Discarded = 0.09 cfs @ 12.34 hrs, Volume= 0.023 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 113.78' @ 12.34 hrs Surf.Area= 0.002 ac Storage= 0.004 af

Plug-Flow detention time= 11.4 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 11.4 min (756.4 - 745.0)

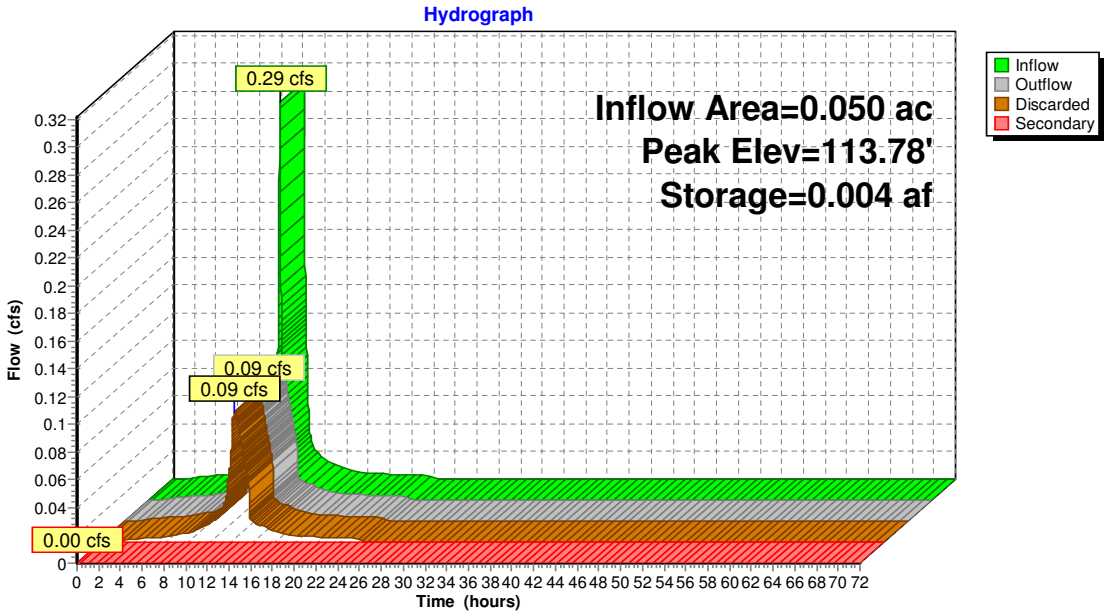
Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	110.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** 0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	110.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	120.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.09 cfs @ 12.34 hrs HW=113.78' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=110.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB3: Recharge (1)



Summary for Pond RB4: Recharge (6)

Inflow Area = 0.361 ac,100.00% Impervious, Inflow Depth = 4.71" for 25YR event
Inflow = 1.80 cfs @ 12.07 hrs, Volume= 0.142 af
Outflow = 0.59 cfs @ 12.34 hrs, Volume= 0.142 af, Atten= 67%, Lag= 16.2 min
Discarded = 0.59 cfs @ 12.34 hrs, Volume= 0.142 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 114.99' @ 12.34 hrs Surf.Area= 0.014 ac Storage= 0.027 af

Plug-Flow detention time= 11.9 min calculated for 0.142 af (100% of inflow)
Center-of-Mass det. time= 11.9 min (756.9 - 745.0)

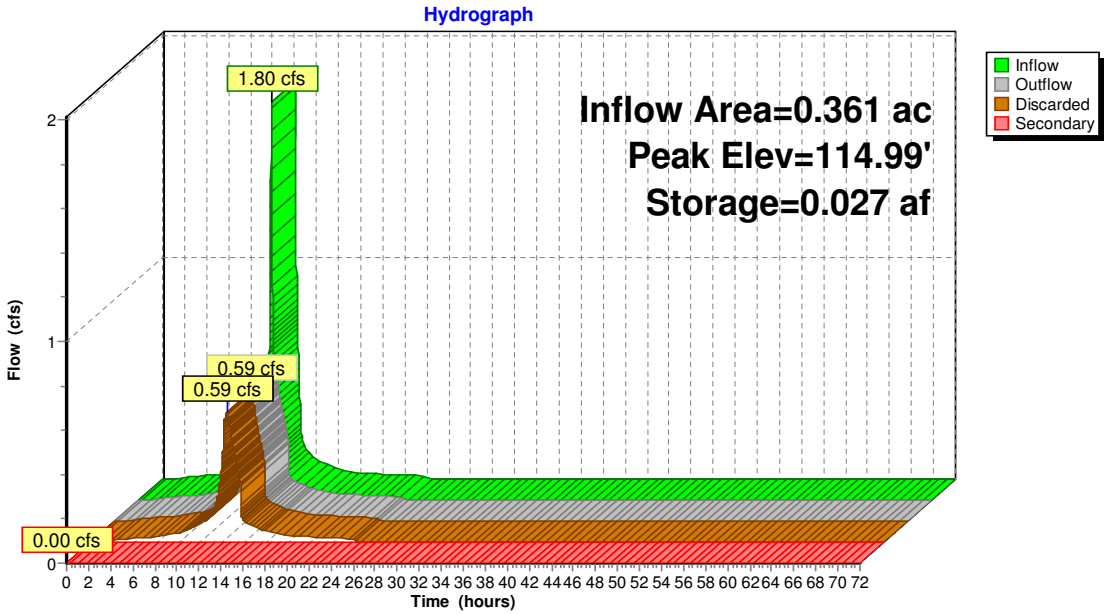
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.039 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 6 Inside #2
#2	111.00'	0.039 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 6
			0.157 af Overall - 0.039 af Embedded = 0.118 af x 33.0% Voids
		0.078 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	121.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.59 cfs @ 12.34 hrs HW=114.99' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.59 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB4: Recharge (6)



Summary for Pond RB5: Recharge (3)

Inflow Area = 0.243 ac, 83.31% Impervious, Inflow Depth = 4.34" for 25YR event
Inflow = 1.24 cfs @ 12.07 hrs, Volume= 0.088 af
Outflow = 0.56 cfs @ 12.23 hrs, Volume= 0.088 af, Atten= 55%, Lag= 9.6 min
Discarded = 0.56 cfs @ 12.23 hrs, Volume= 0.088 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 114.67' @ 12.23 hrs Surf.Area= 0.007 ac Storage= 0.012 af

Plug-Flow detention time= 5.5 min calculated for 0.088 af (100% of inflow)
Center-of-Mass det. time= 5.5 min (797.8 - 792.3)

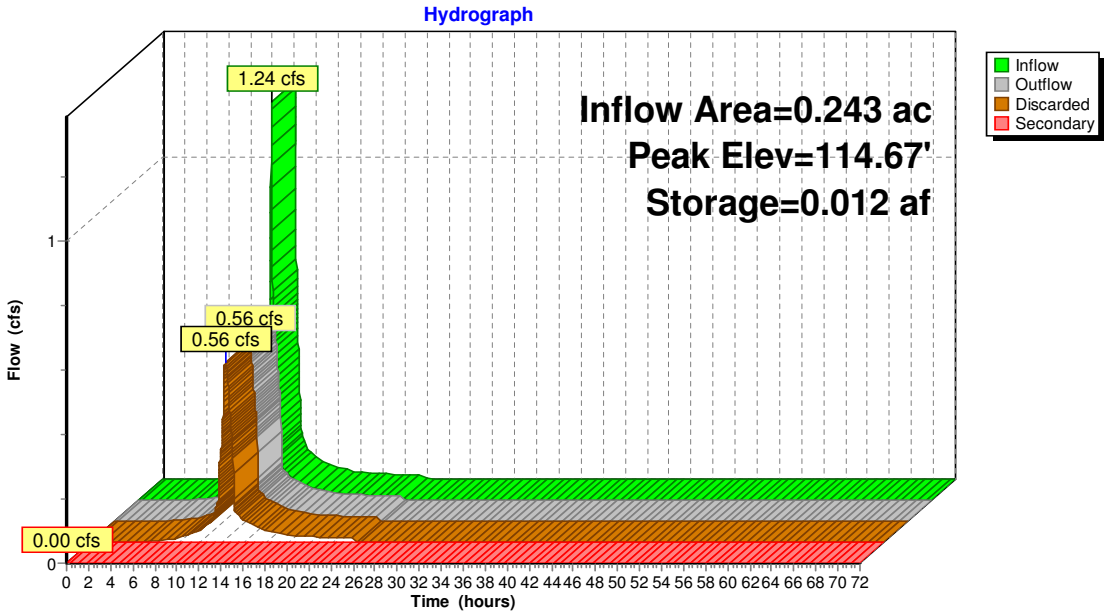
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	111.00'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3 0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	121.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.56 cfs @ 12.23 hrs HW=114.66' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.56 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB5: Recharge (3)



Summary for Pond RB6: Recharge (1)

Inflow Area = 0.055 ac, 80.20% Impervious, Inflow Depth = 4.12" for 25YR event
Inflow = 0.27 cfs @ 12.07 hrs, Volume= 0.019 af
Outflow = 0.09 cfs @ 12.36 hrs, Volume= 0.019 af, Atten= 68%, Lag= 17.5 min
Discarded = 0.09 cfs @ 12.36 hrs, Volume= 0.019 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 116.25' @ 12.36 hrs Surf.Area= 0.002 ac Storage= 0.004 af

Plug-Flow detention time= 13.6 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 13.6 min (812.3 - 798.6)

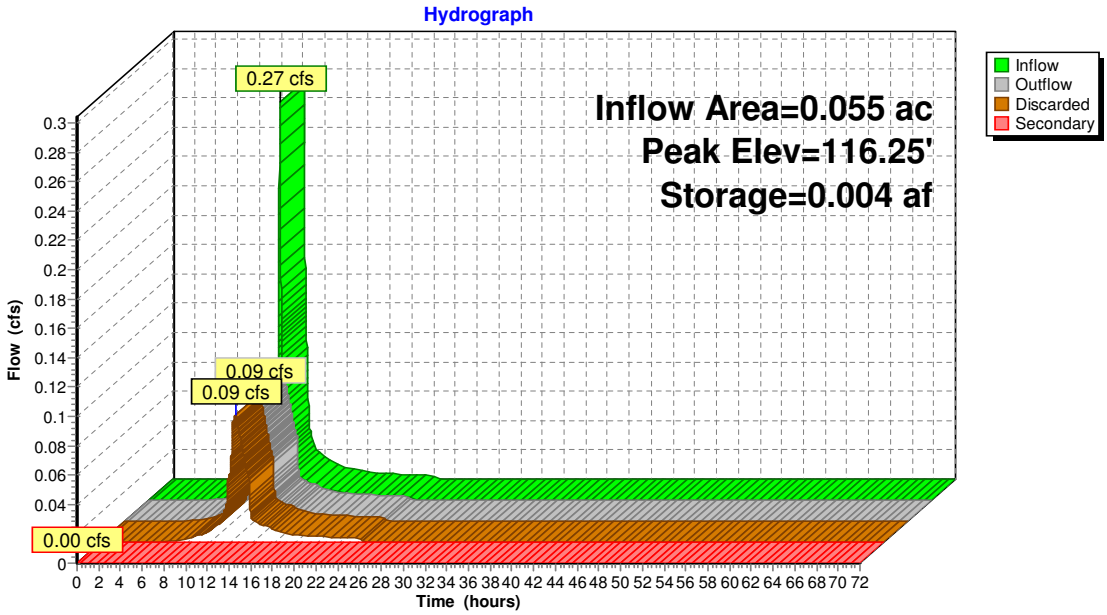
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** 0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.09 cfs @ 12.36 hrs HW=116.25' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB6: Recharge (1)



Summary for Pond RB7: Recharge (3)

Inflow Area = 0.285 ac, 54.91% Impervious, Inflow Depth = 2.57" for 25YR event
Inflow = 0.88 cfs @ 12.08 hrs, Volume= 0.061 af
Outflow = 0.28 cfs @ 12.42 hrs, Volume= 0.061 af, Atten= 69%, Lag= 20.4 min
Discarded = 0.28 cfs @ 12.42 hrs, Volume= 0.061 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 116.61' @ 12.42 hrs Surf.Area= 0.007 ac Storage= 0.013 af

Plug-Flow detention time= 15.3 min calculated for 0.061 af (100% of inflow)
Center-of-Mass det. time= 15.3 min (855.1 - 839.9)

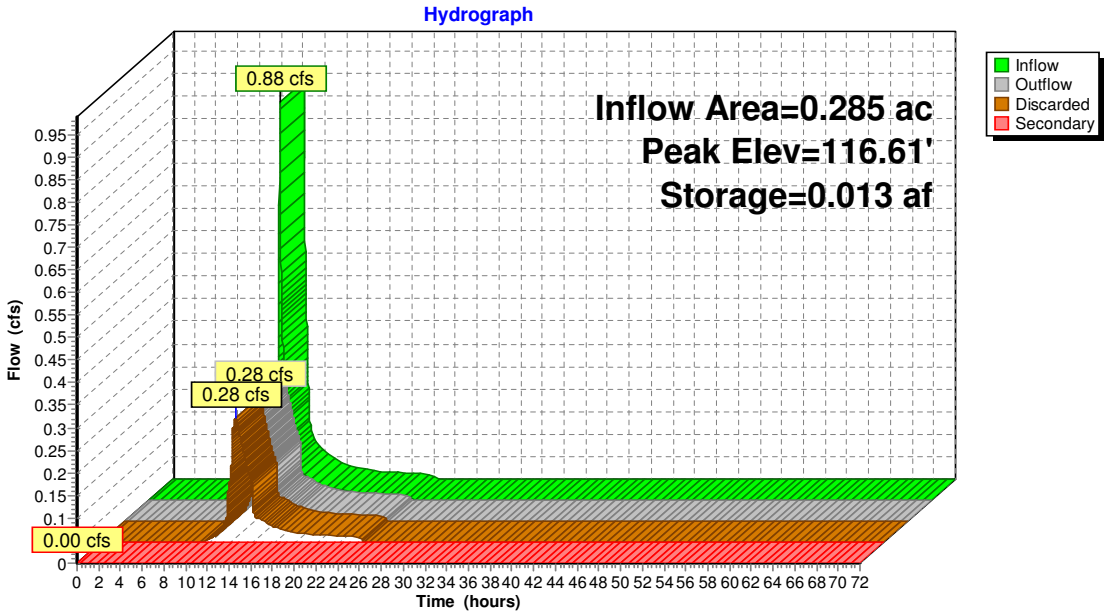
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	113.00'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3 0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.28 cfs @ 12.42 hrs HW=116.61' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.28 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB7: Recharge (3)



Summary for Pond RB8: Recharge Basin (2)

Inflow Area =	0.769 ac,	2.50% Impervious,	Inflow Depth =	0.74"	for 25YR event
Inflow =	0.35 cfs @	12.18 hrs,	Volume=	0.048 af	
Outflow =	0.14 cfs @	12.65 hrs,	Volume=	0.048 af,	Atten= 61%, Lag= 28.5 min
Discarded =	0.14 cfs @	12.65 hrs,	Volume=	0.048 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 121.61' @ 12.65 hrs Surf.Area= 77 sf Storage= 349 cf

Plug-Flow detention time= 23.3 min calculated for 0.048 af (100% of inflow)
Center-of-Mass det. time= 23.3 min (944.9 - 921.6)

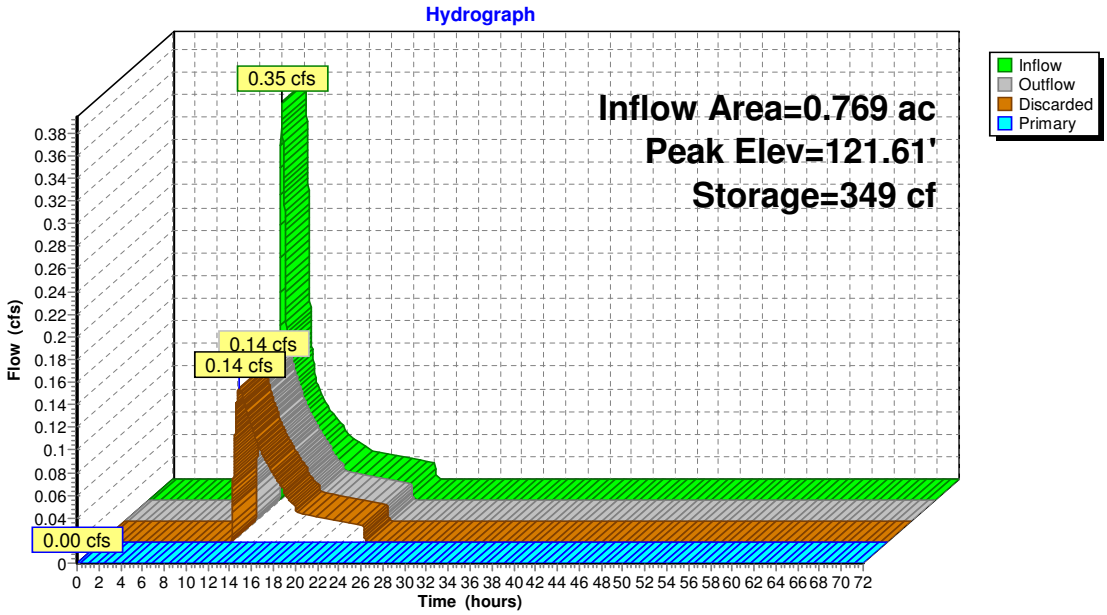
Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	339 cf	**6.00'D x 6.00'H Vertical Cone/Cylinder** x 2 Inside #2
#2	115.50'	66 cf	**7.00'D x 7.00'H Vertical Cone/Cylinder** x 2
			539 cf Overall - 339 cf Embedded = 199 cf x 33.0% Voids
		405 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.50'	**17.000 in/hr Exfiltration over Wetted area**
#2	Primary	122.50'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.14 cfs @ 12.65 hrs HW=121.61' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.50' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond RB8: Recharge Basin (2)

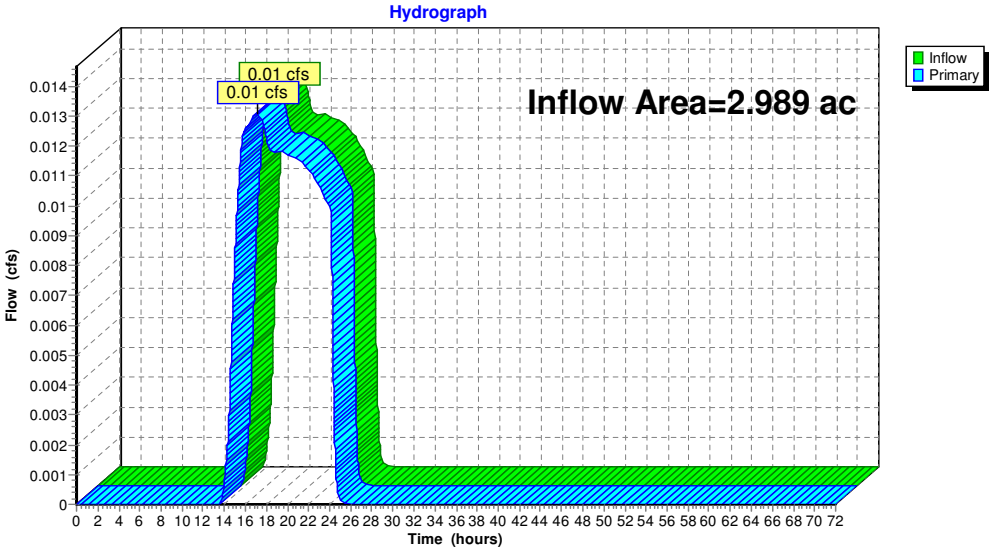


Summary for Pond SP1: Study Point 1

Inflow Area = 2.989 ac, 0.64% Impervious, Inflow Depth = 0.04" for 25YR event
Inflow = 0.01 cfs @ 17.13 hrs, Volume= 0.009 af
Primary = 0.01 cfs @ 17.13 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond SP1: Study Point 1



Summary for Pond URC1: Underground Chambers

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 2.17" for 25YR event
Inflow = 3.13 cfs @ 12.09 hrs, Volume= 0.146 af
Outflow = 0.54 cfs @ 11.71 hrs, Volume= 0.146 af, Atten= 83%, Lag= 0.0 min
Discarded = 0.54 cfs @ 11.71 hrs, Volume= 0.146 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 110.87' @ 12.53 hrs Surf.Area= 1,364 sf Storage= 2,629 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 37.9 min (776.7 - 738.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	107.50'	1,250 cf	**20.50'W x 66.52'L x 4.00'H Field A** 5,455 cf Overall - 1,665 cf Embedded = 3,789 cf x 33.0% Voids
#2A	108.50'	1,665 cf	**StormTech SC-740** x 36 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 4 rows
		2,916 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	107.50'	**17.000 in/hr Exfiltration over Surface area**
#2	Primary	113.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.54 cfs @ 11.71 hrs HW=107.57' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.54 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=107.50' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond URC1: Underground Chambers - Chamber Wizard Field A

Chamber Model = StormTech SC-740 (StormTech® SC-740)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Row Length Adjustment= +0.44' x 6.45 sf x 4 rows

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

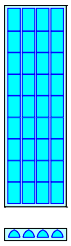
9 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 64.52' Row Length +12.0" End Stone x 2 = 66.52' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
12.0" Base + 30.0" Chamber Height + 6.0" Cover = 4.00' Field Height

36 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 4 Rows = 1,665.2 cf Chamber Storage

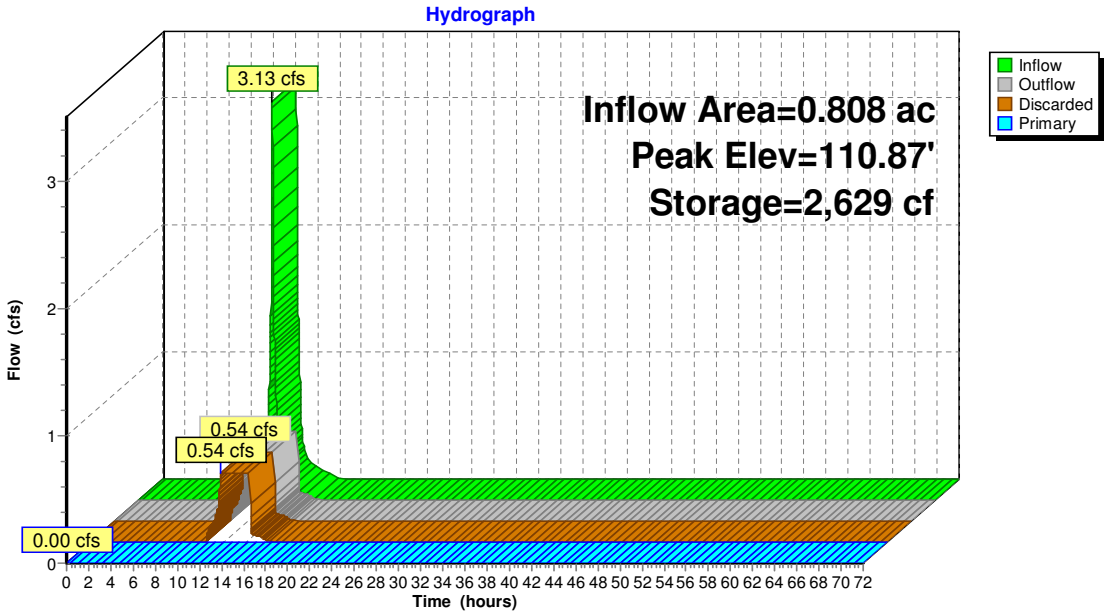
5,454.5 cf Field - 1,665.2 cf Chambers = 3,789.3 cf Stone x 33.0% Voids = 1,250.5 cf Stone Storage

Chamber Storage + Stone Storage = 2,915.6 cf = 0.067 af
Overall Storage Efficiency = 53.5%

36 Chambers
202.0 cy Field
140.3 cy Stone



Pond URC1: Underground Chambers



Summary for Subcatchment DA1: Woods

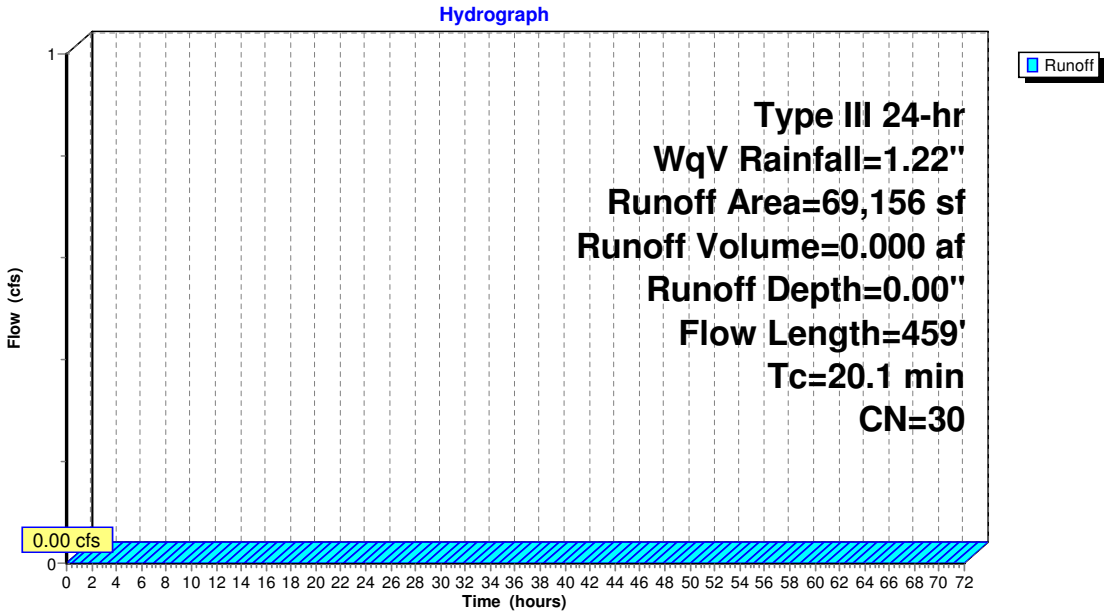
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
69,156	30	Woods, Good, HSG A
69,156		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	103	0.0490	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
5.6	356	0.0450	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	459	Total			

Subcatchment DA1: Woods



Summary for Subcatchment DA10: Entrance

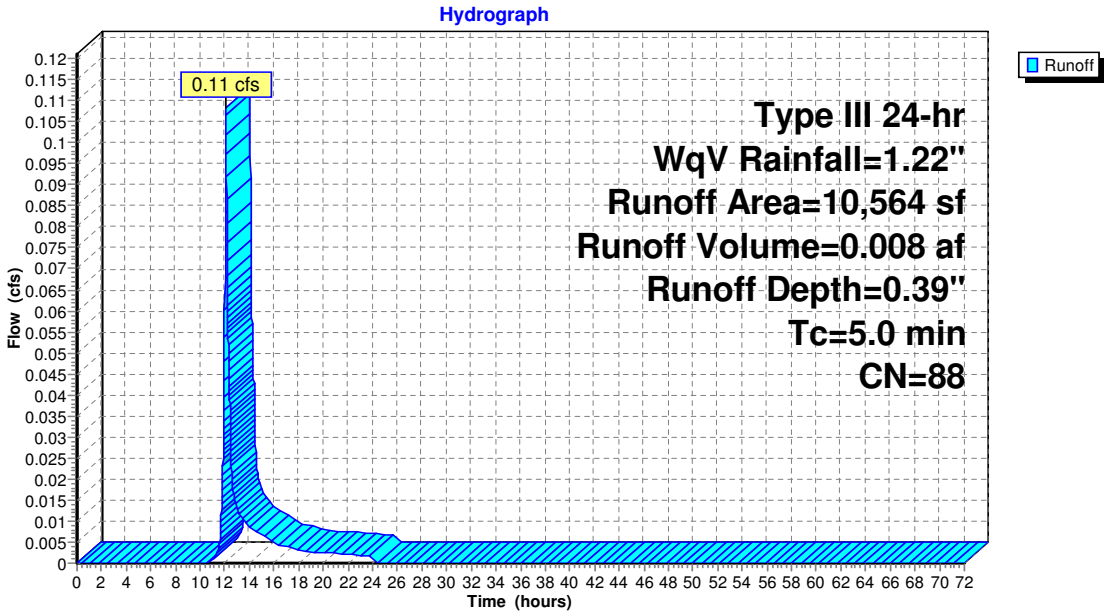
Runoff = 0.11 cfs @ 12.08 hrs, Volume= 0.008 af, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
7,431	98	Paved roads w/curbs & sewers, HSG A
1,763	39	>75% Grass cover, Good, HSG A
1,370	98	Roofs, HSG A
10,564	88	Weighted Average
1,763		16.69% Pervious Area
8,801		83.31% Impervious Area

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

Subcatchment DA10: Entrance



Summary for Subcatchment DA11: Entrance Parking

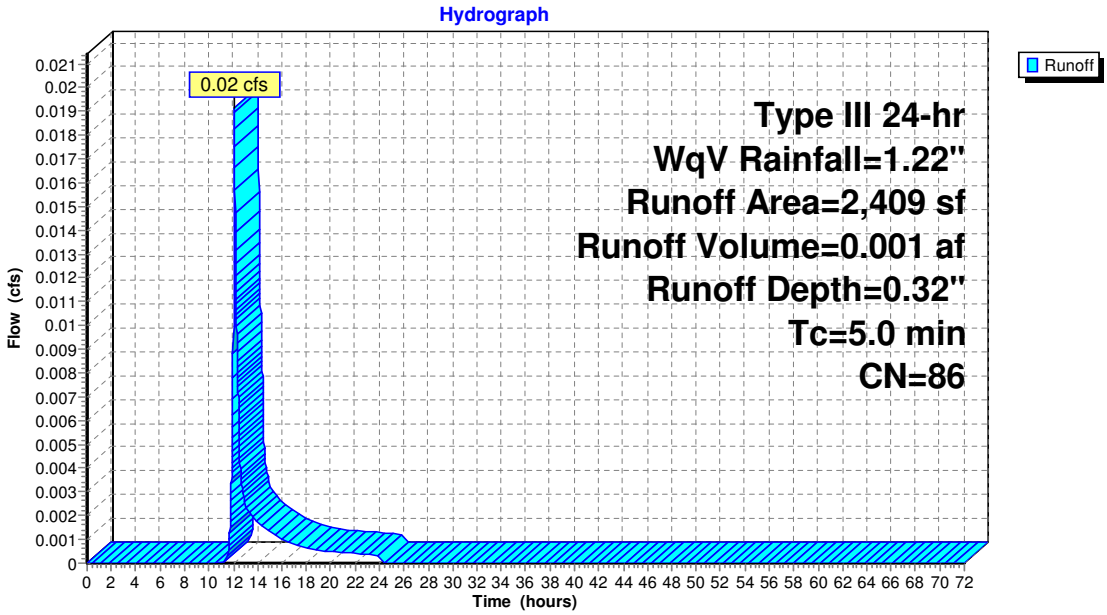
Runoff = 0.02 cfs @ 12.09 hrs, Volume= 0.001 af, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
1,932	98	Paved roads w/curbs & sewers, HSG A
477	39	>75% Grass cover, Good, HSG A
2,409	86	Weighted Average
477		19.80% Pervious Area
1,932		80.20% Impervious Area

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

Subcatchment DA11: Entrance Parking



Summary for Subcatchment DA12: New Front Parking

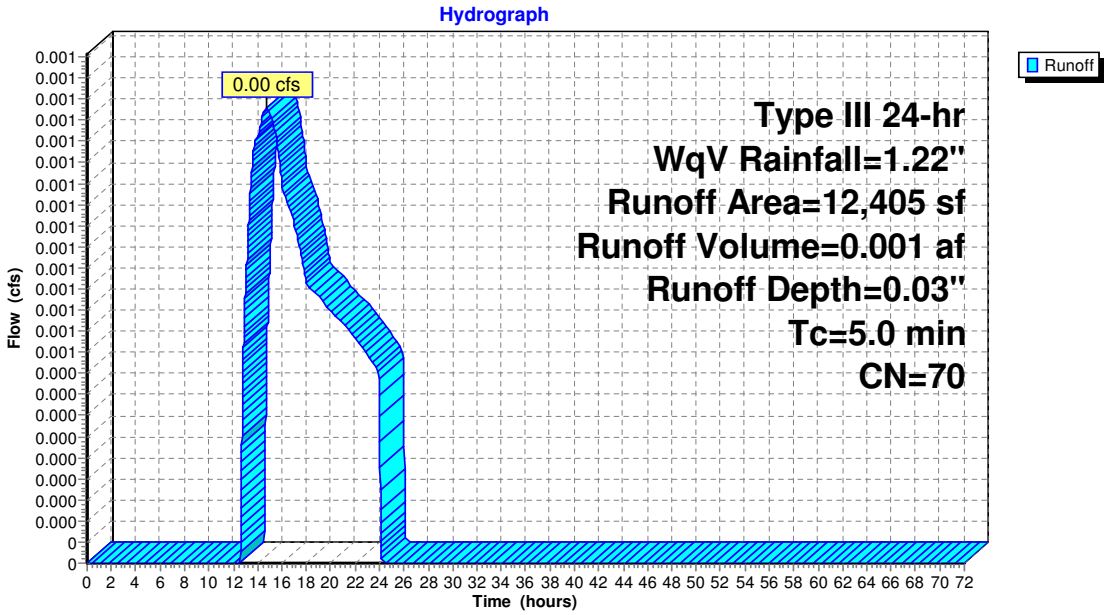
Runoff = 0.00 cfs @ 14.75 hrs, Volume= 0.001 af, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
6,812	98	Paved parking, HSG A
1,617	30	Woods, Good, HSG A
3,976	39	>75% Grass cover, Good, HSG A
12,405	70	Weighted Average
5,593		45.09% Pervious Area
6,812		54.91% Impervious Area

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

Subcatchment DA12: New Front Parking



Summary for Subcatchment DA2: Parking Woods

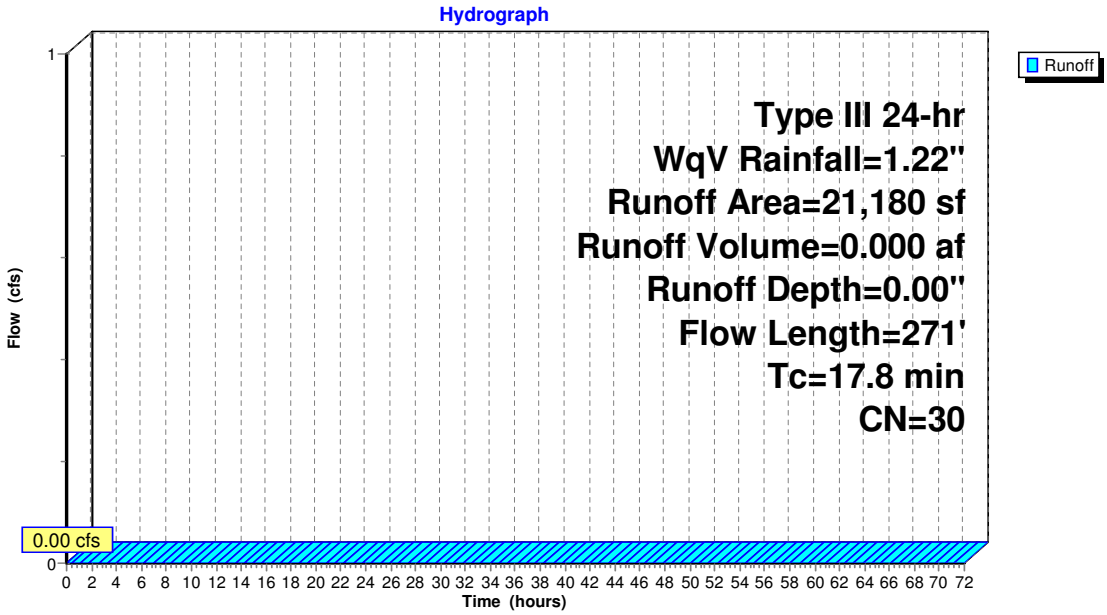
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
21,180	30	Woods, Good, HSG A
21,180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
2.5	171	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.8	271	Total			

Subcatchment DA2: Parking Woods



Summary for Subcatchment DA2a: Parking Lot Upland

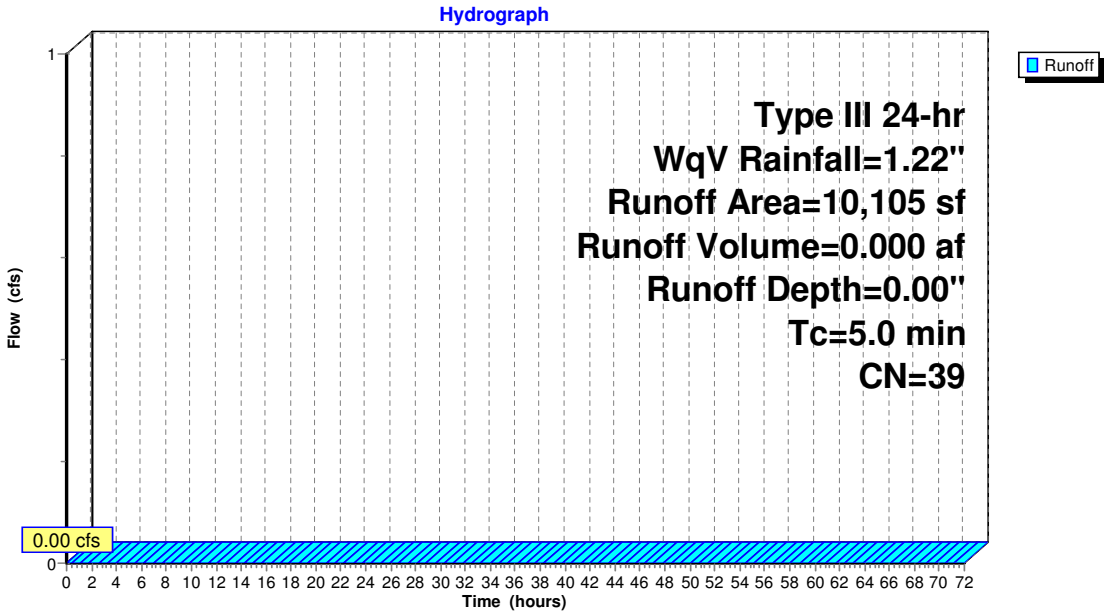
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
9,591	39	>75% Grass cover, Good, HSG A
514	30	Woods, Good, HSG A
10,105	39	Weighted Average
10,105		100.00% Pervious Area

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

Subcatchment DA2a: Parking Lot Upland



Summary for Subcatchment DA2b: Parking Lot Pavement

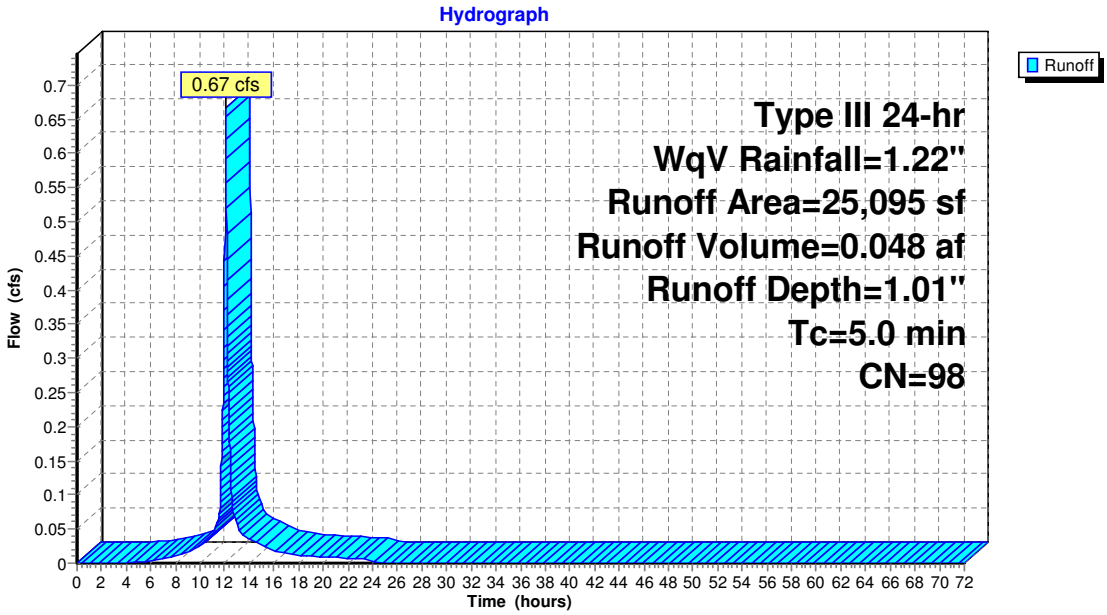
Runoff = 0.67 cfs @ 12.07 hrs, Volume= 0.048 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
23,865	98	Paved parking, HSG A
1,230	98	Water Surface, HSG A
25,095	98	Weighted Average
25,095		100.00% Impervious Area

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

Subcatchment DA2b: Parking Lot Pavement



Summary for Subcatchment DA3: Woods

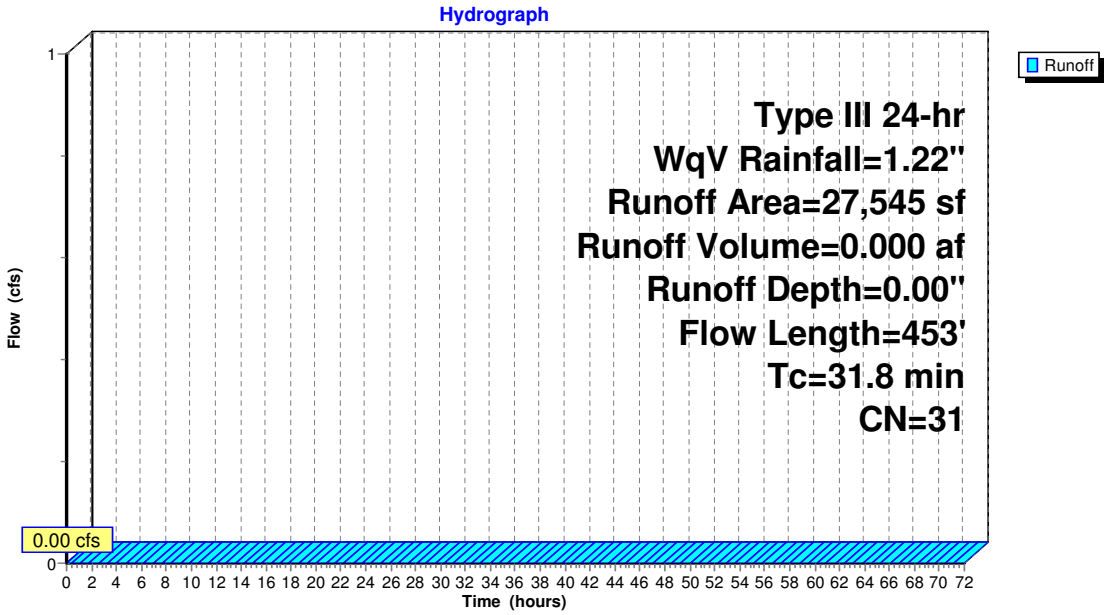
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
24,515	30	Woods, Good, HSG A
3,030	39	>75% Grass cover, Good, HSG A
27,545	31	Weighted Average
27,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4	163	0.0250	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.4	290	0.0480	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
31.8	453	Total			

Subcatchment DA3: Woods



Summary for Subcatchment DA4: Gravel Lot

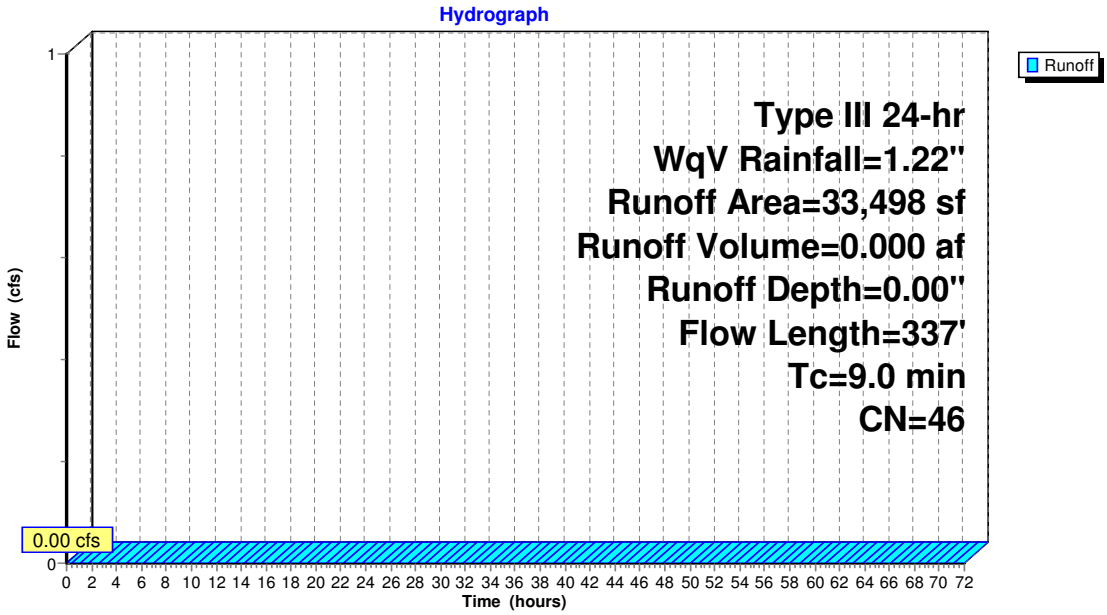
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

	Area (sf)	CN	Description
	17,778	30	Woods, Good, HSG A
*	6,095	72	Gravel Parking, HSG A
	837	98	Water Surface, HSG A
	4,097	39	>75% Grass cover, Good, HSG A
	4,691	72	Dirt roads, HSG A
	33,498	46	Weighted Average
	32,661		97.50% Pervious Area
	837		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	34	0.1760	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	106	0.0190	0.43		**Sheet Flow,** Fallow n= 0.050 P2= 3.60"
0.6	60	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	137	0.0440	3.38		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.0	337	Total			

Subcatchment DA4: Gravel Lot



Summary for Subcatchment DA5: Rear Drive

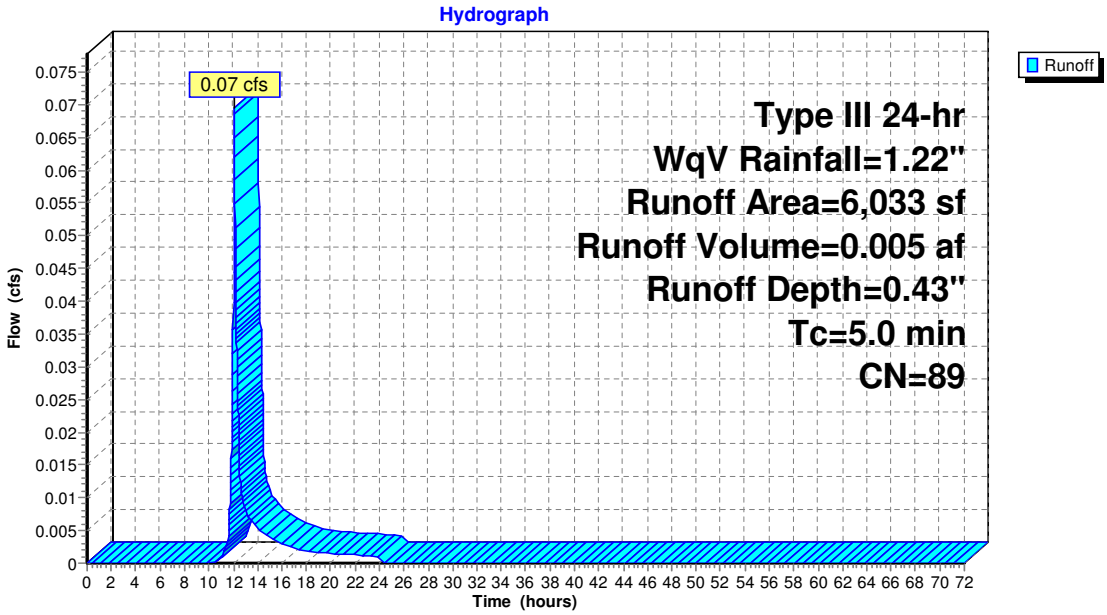
Runoff = 0.07 cfs @ 12.08 hrs, Volume= 0.005 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
1,843	98	Paved parking, HSG A
744	30	Woods, Good, HSG A
3,358	98	Roofs, HSG A
88	39	>75% Grass cover, Good, HSG A
6,033	89	Weighted Average
832		13.79% Pervious Area
5,201		86.21% Impervious Area

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

Subcatchment DA5: Rear Drive



Summary for Subcatchment DA6: South Parking

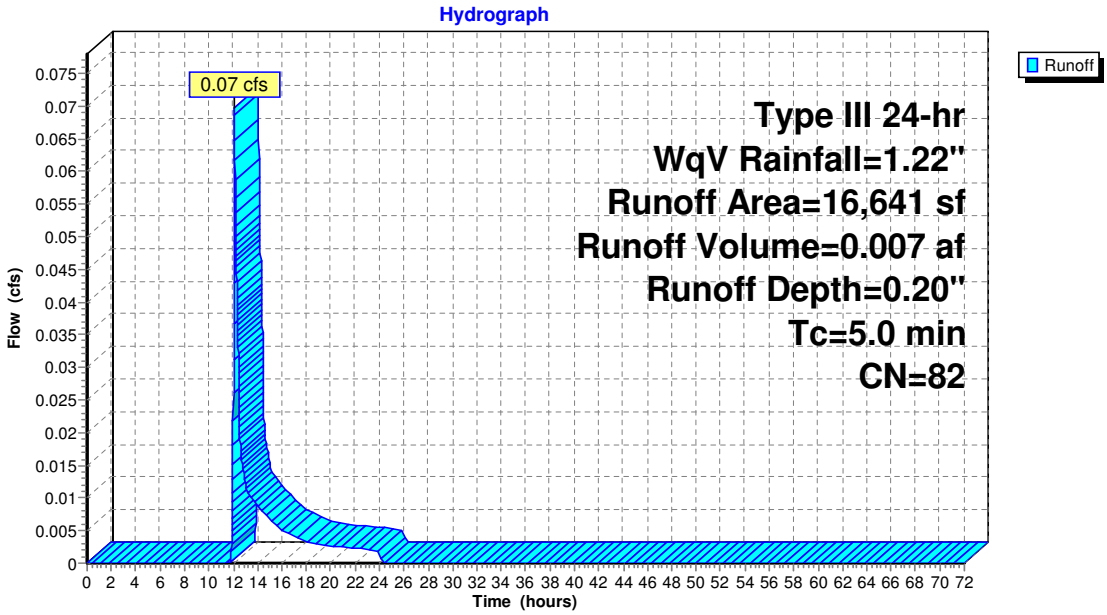
Runoff = 0.07 cfs @ 12.10 hrs, Volume= 0.007 af, Depth= 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
8,472	98	Paved parking, HSG A
3,261	98	Roofs, HSG A
4,908	43	Woods/grass comb., Fair, HSG A
16,641	82	Weighted Average
4,908		29.49% Pervious Area
11,733		70.51% Impervious Area

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

Subcatchment DA6: South Parking



Summary for Subcatchment DA7: North Rear

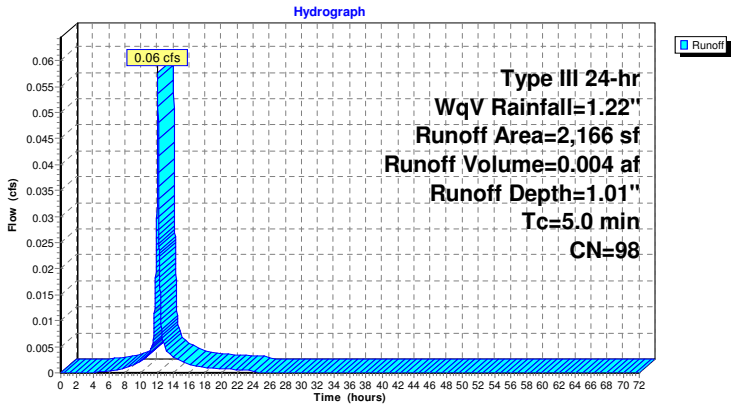
Runoff = 0.06 cfs @ 12.07 hrs, Volume= 0.004 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
2,166	98	Paved parking, HSG A
2,166		100.00% Impervious Area

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

Subcatchment DA7: North Rear



Summary for Subcatchment DA8: Rear Parking

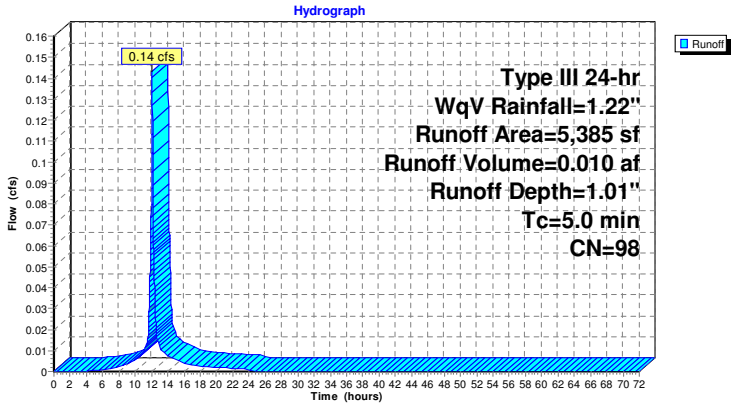
Runoff = 0.14 cfs @ 12.07 hrs, Volume= 0.010 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
5,385	98	Paved roads w/curbs & sewers, HSG A
5,385		100.00% Impervious Area

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

Subcatchment DA8: Rear Parking



Summary for Subcatchment DA9: North Side

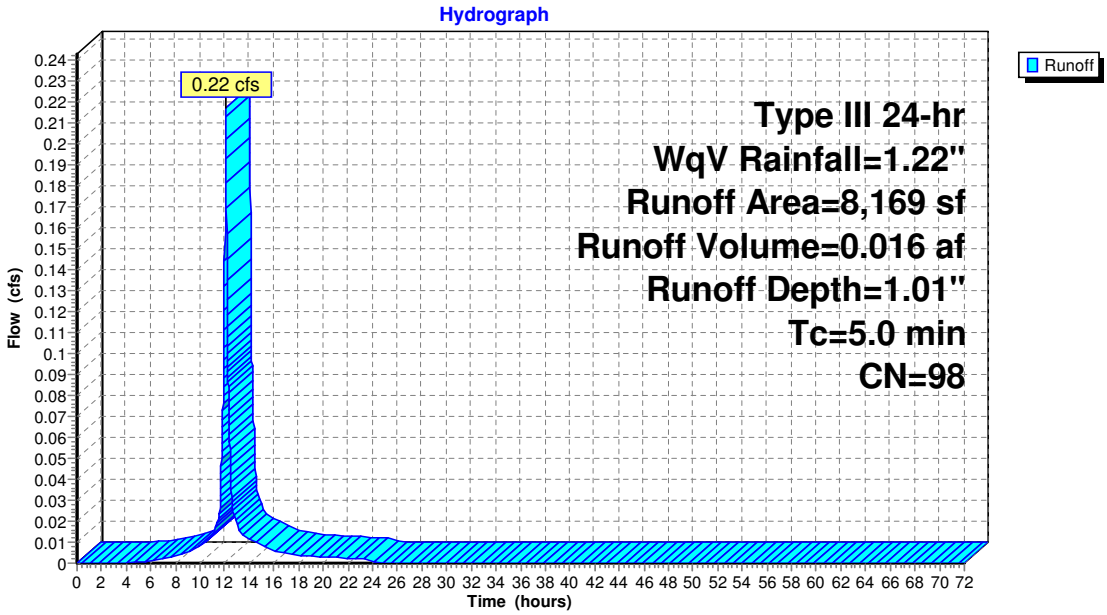
Runoff = 0.22 cfs @ 12.07 hrs, Volume= 0.016 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WqV Rainfall=1.22"

Area (sf)	CN	Description
4,393	98	Paved roads w/curbs & sewers, HSG A
3,776	98	Roofs, HSG A
8,169	98	Weighted Average
8,169		100.00% Impervious Area

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

Subcatchment DA9: North Side



Summary for Pond B1: Bio

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 0.72" for WqV event
Inflow = 0.67 cfs @ 12.07 hrs, Volume= 0.048 af
Outflow = 0.29 cfs @ 12.24 hrs, Volume= 0.048 af, Atten= 57%, Lag= 10.4 min
Discarded = 0.09 cfs @ 12.24 hrs, Volume= 0.044 af
Primary = 0.20 cfs @ 12.24 hrs, Volume= 0.004 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 113.36' @ 12.24 hrs Surf.Area= 1,614 sf Storage= 510 cf

Plug-Flow detention time= 32.3 min calculated for 0.048 af (100% of inflow)
Center-of-Mass det. time= 32.3 min (812.9 - 780.6)

Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	1,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
113.00	1,232	0	0
113.50	1,765	749	749
113.76	2,018	492	1,241

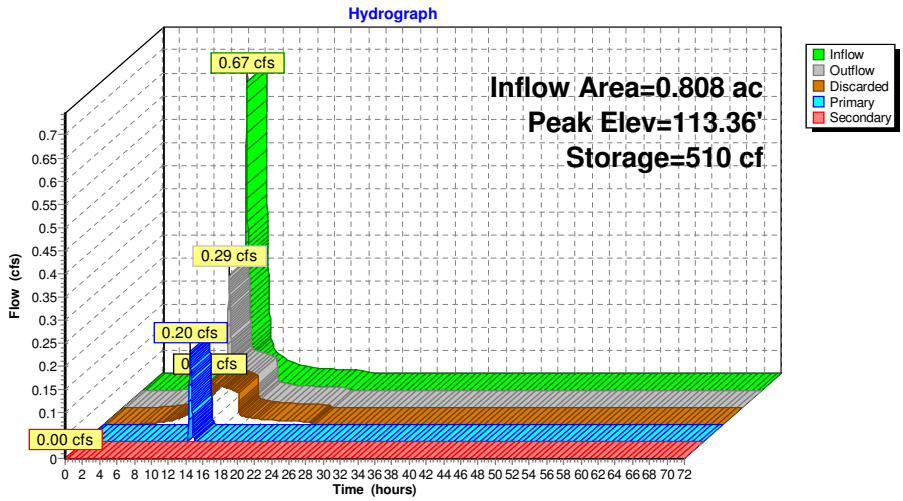
Device	Routing	Invert	Outlet Devices
#1	Device 2	113.33'	**24.0" Horiz. Orifice/Grate** X 2 rows C= 0.600 Limited to weir flow at low heads
#2	Primary	110.50'	**12.0" Round Culvert X 2.00** L= 26.0' CPP, end-section conforming to fill, Ke= 0.500
			Inlet / Outlet Invert= 110.50' / 110.40' S= 0.0038 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Discarded	113.00'	**2.410 in/hr Exfiltration over Surface area**
#4	Secondary	113.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50
			Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.09 cfs @ 12.24 hrs HW=113.36' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.19 cfs @ 12.24 hrs HW=113.36' (Free Discharge)
└**2=Culvert** (Passes 0.19 cfs of 11.61 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 0.19 cfs @ 0.55 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B1: Bio



Summary for Pond BO1: Bio overflow storage

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 0.00" for WqV event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 113.52' @ 0.00 hrs Surf.Area= 1,765 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

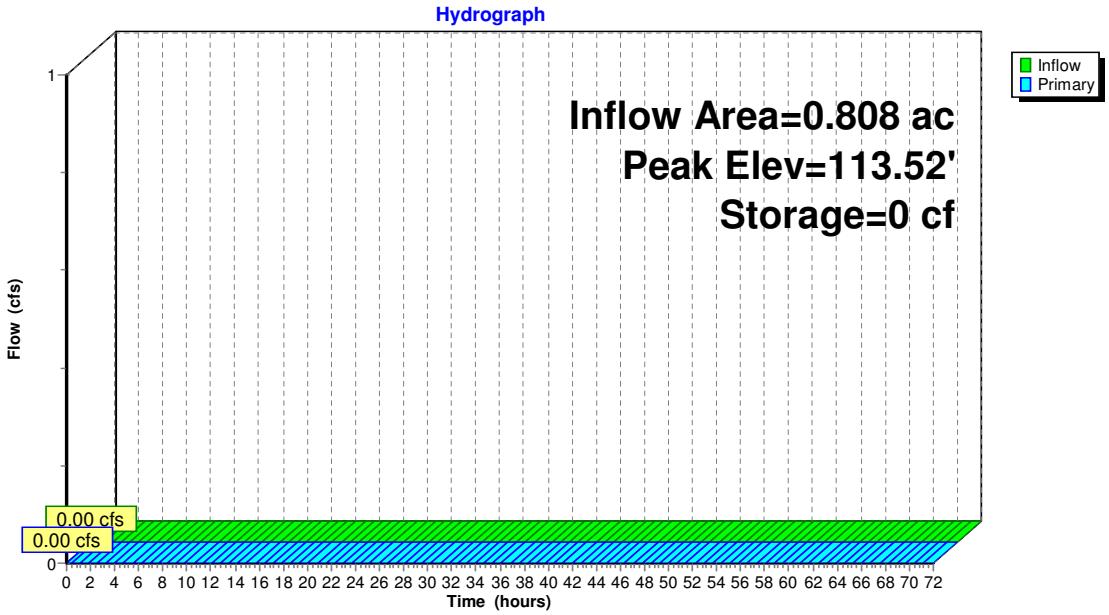
Volume	Invert	Avail.Storage	Storage Description
#1	113.52'	454 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
113.52	1,765	0	0
113.76	2,018	454	454

Device	Routing	Invert	Outlet Devices
#1	Primary	113.75'	**8.0' long x 5.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.52' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BO1: Bio overflow storage



Summary for Pond IB1: infiltration basin

Inflow Area = 0.769 ac, 2.50% Impervious, Inflow Depth = 0.00" for WqV event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 122.00' @ 0.00 hrs Surf.Area= 170 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	518 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

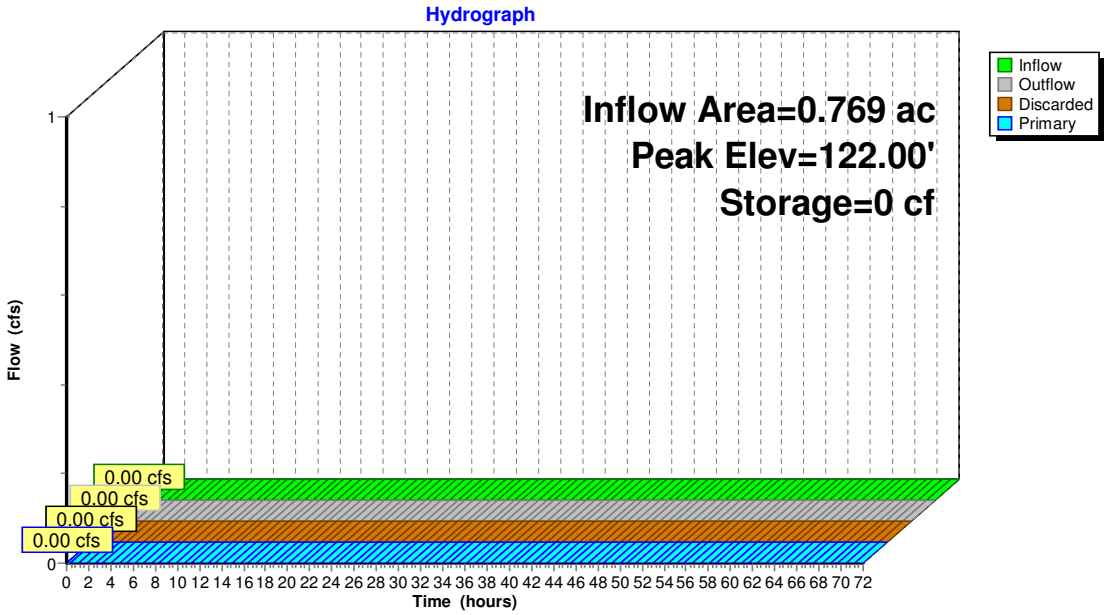
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	170	0	0
122.50	500	168	168
123.00	900	350	518

Device	Routing	Invert	Outlet Devices
#1	Primary	122.75'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	122.00'	**2.410 in/hr Exfiltration over Surface area above 122.00'** Excluded Surface area = 170 sf

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.00' (Free Discharge)
└**2=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=122.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond IB1: infiltration basin



Summary for Pond P1: Depression

Inflow Area = 1.294 ac, 44.51% Impervious, Inflow Depth = 0.00" for WqV event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 111.00' @ 0.00 hrs Surf.Area= 254 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	5,074 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

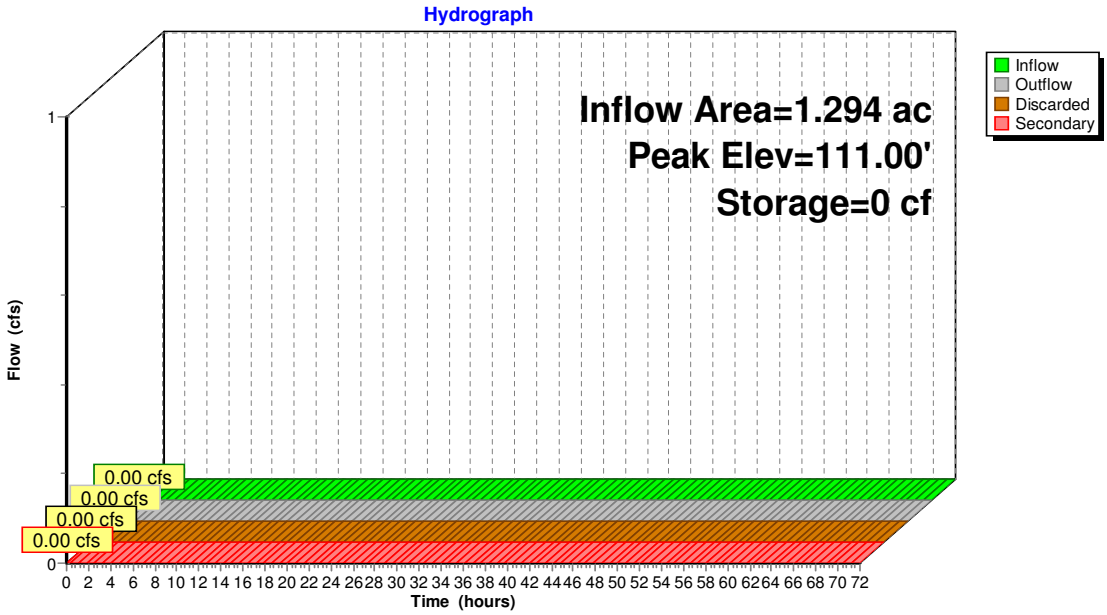
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
111.00	254	0	0
114.00	1,440	2,541	2,541
115.00	3,625	2,533	5,074

Device	Routing	Invert	Outlet Devices
#1	Secondary	114.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Discarded	111.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Exfiltration** (Passes 0.00 cfs of 0.01 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: Depression



Summary for Pond RB1: Recharge Chamber (1 new)

Inflow Area = 0.138 ac, 86.21% Impervious, Inflow Depth = 0.43" for WqV event
Inflow = 0.07 cfs @ 12.08 hrs, Volume= 0.005 af
Outflow = 0.06 cfs @ 12.11 hrs, Volume= 0.005 af, Atten= 7%, Lag= 1.8 min
Discarded = 0.06 cfs @ 12.11 hrs, Volume= 0.005 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 113.12' @ 12.11 hrs Surf.Area= 79 sf Storage= 5 cf

Plug-Flow detention time= 1.3 min calculated for 0.005 af (100% of inflow)
Center-of-Mass det. time= 1.3 min (857.5 - 856.2)

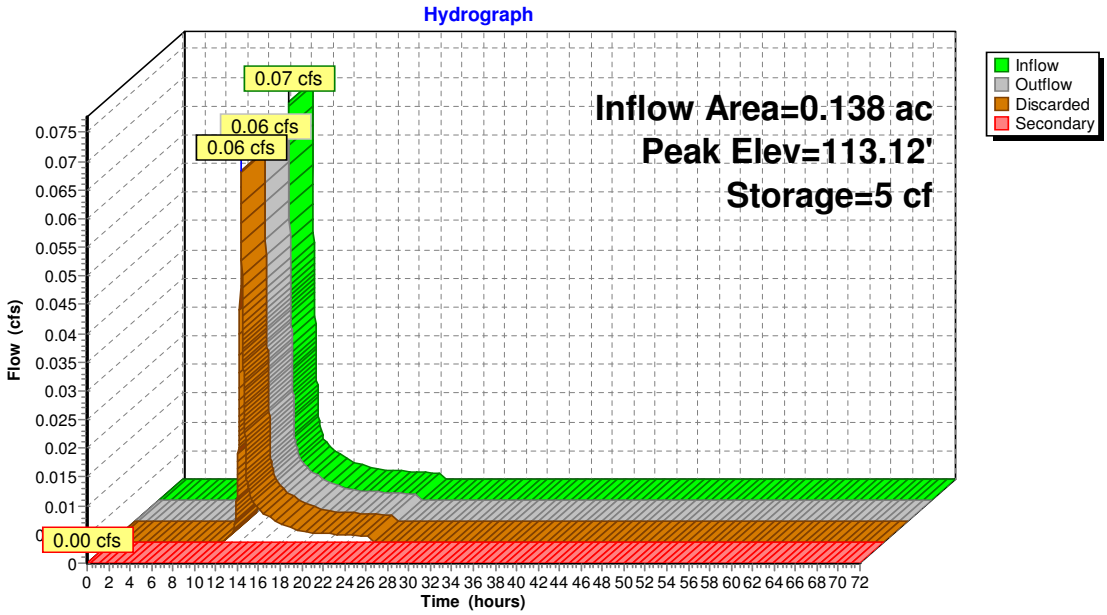
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	283 cf	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	192 cf	**10.00'D x 11.00'H Vertical Cone/Cylinder** 864 cf Overall - 283 cf Embedded = 581 cf x 33.0% Voids
		475 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 12.11 hrs HW=113.12' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB1: Recharge Chamber (1 new)



Summary for Pond RB2: Recharge (2)

Inflow Area = 0.382 ac, 70.51% Impervious, Inflow Depth = 0.20" for WqV event
Inflow = 0.07 cfs @ 12.10 hrs, Volume= 0.007 af
Outflow = 0.07 cfs @ 12.12 hrs, Volume= 0.007 af, Atten= 5%, Lag= 1.5 min
Discarded = 0.07 cfs @ 12.12 hrs, Volume= 0.007 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 112.09' @ 12.12 hrs Surf.Area= 208 sf Storage= 6 cf

Plug-Flow detention time= 1.5 min calculated for 0.007 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (902.9 - 901.4)

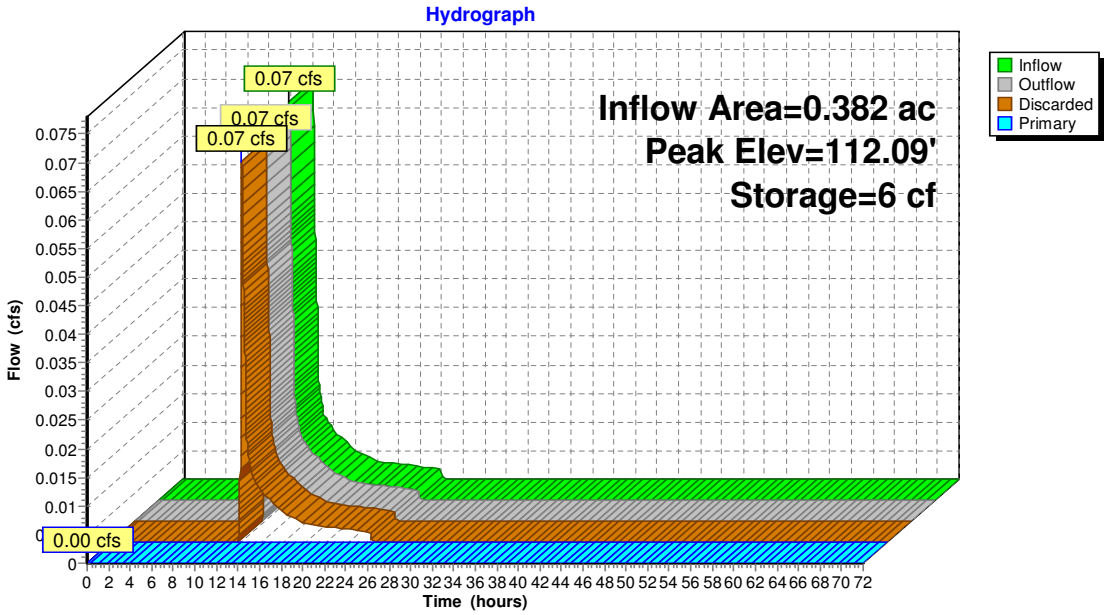
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	475 cf	**5.50'D x 10.00'H Vertical Cone/Cylinder** x 2 Inside #2
#2	112.00'	597 cf	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 2 2,285 cf Overall - 475 cf Embedded = 1,810 cf x 33.0% Voids
		1,072 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	112.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Primary	122.00'	**8.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 122.00' / 122.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.08 cfs @ 12.12 hrs HW=112.09' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=112.00' (Free Discharge)
└**2=Culvert** (Controls 0.00 cfs)

Pond RB2: Recharge (2)



Summary for Pond RB2a: Recharge chamber (new)

Inflow Area = 0.382 ac, 70.51% Impervious, Inflow Depth = 0.00" for WqV event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 113.00' @ 0.00 hrs Surf.Area= 79 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

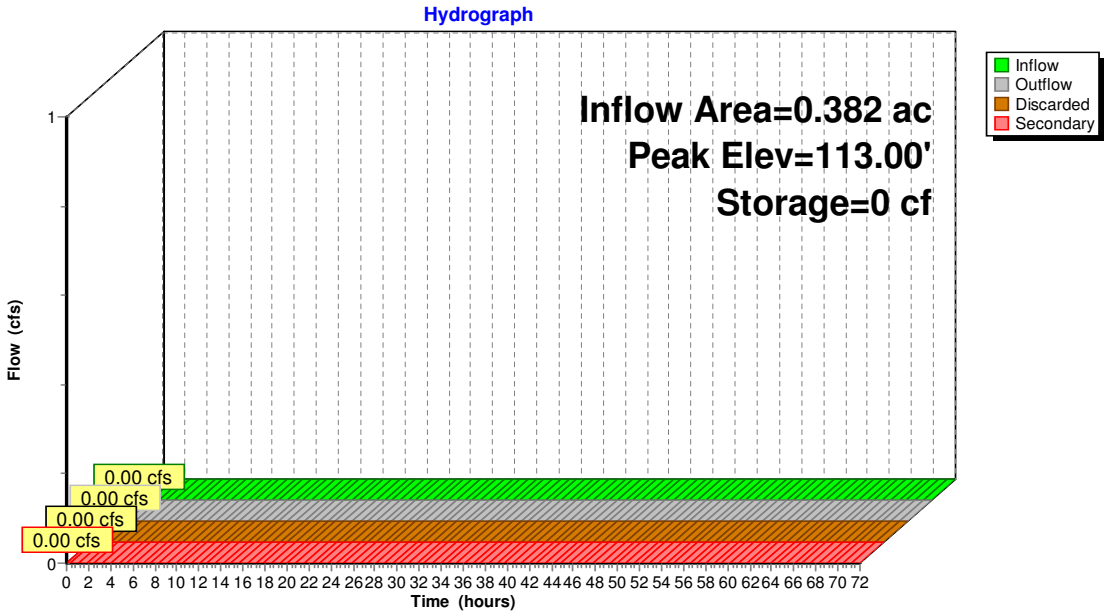
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	283 cf	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	192 cf	**10.00'D x 11.00'H Vertical Cone/Cylinder** 864 cf Overall - 283 cf Embedded = 581 cf x 33.0% Voids
		475 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**1=Exfiltration** (Passes 0.00 cfs of 0.06 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB2a: Recharge chamber (new)



Summary for Pond RB3: Recharge (1)

Inflow Area = 0.050 ac,100.00% Impervious, Inflow Depth = 1.01" for WqV event
Inflow = 0.06 cfs @ 12.07 hrs, Volume= 0.004 af
Outflow = 0.04 cfs @ 12.13 hrs, Volume= 0.004 af, Atten= 24%, Lag= 3.7 min
Discarded = 0.04 cfs @ 12.13 hrs, Volume= 0.004 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 110.21' @ 12.13 hrs Surf.Area= 0.002 ac Storage= 0.000 af

Plug-Flow detention time= 1.6 min calculated for 0.004 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (782.2 - 780.6)

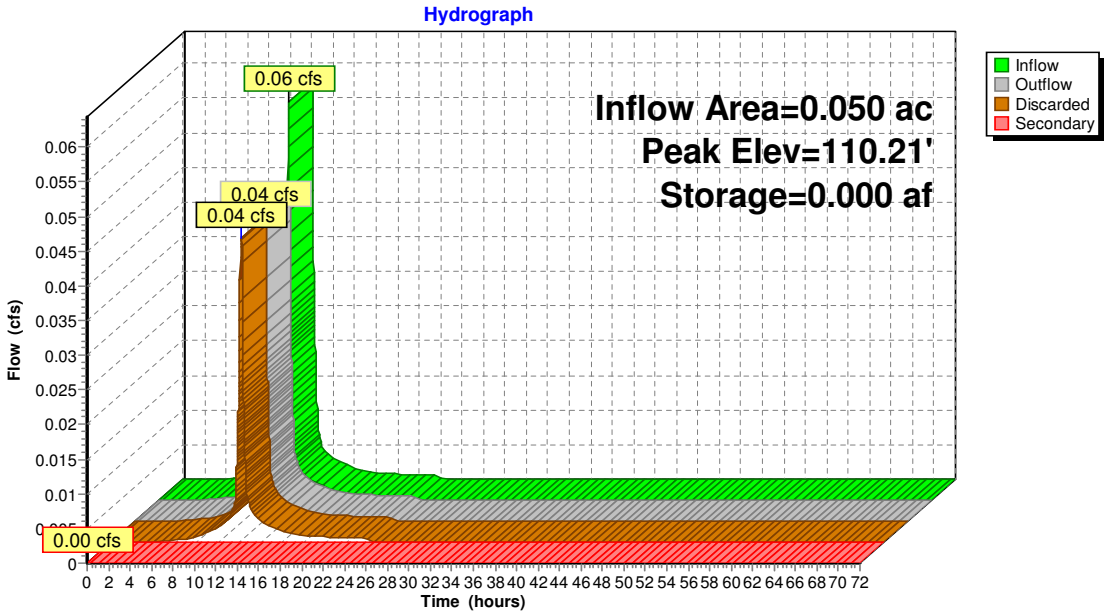
Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	110.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder**
			0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	110.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	120.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.04 cfs @ 12.13 hrs HW=110.21' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=110.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB3: Recharge (1)



Summary for Pond RB4: Recharge (6)

Inflow Area = 0.361 ac,100.00% Impervious, Inflow Depth = 0.87" for WqV event
Inflow = 0.36 cfs @ 12.07 hrs, Volume= 0.026 af
Outflow = 0.27 cfs @ 12.14 hrs, Volume= 0.026 af, Atten= 26%, Lag= 4.0 min
Discarded = 0.27 cfs @ 12.14 hrs, Volume= 0.026 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 111.24' @ 12.14 hrs Surf.Area= 0.014 ac Storage= 0.001 af

Plug-Flow detention time= 1.7 min calculated for 0.026 af (100% of inflow)
Center-of-Mass det. time= 1.7 min (782.2 - 780.6)

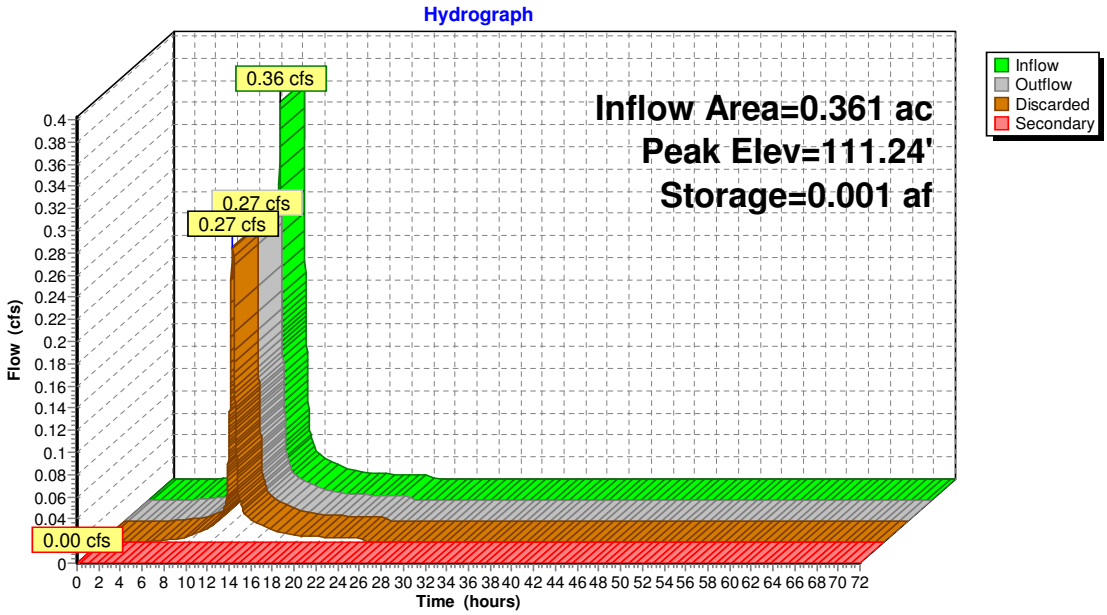
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.039 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 6 Inside #2
#2	111.00'	0.039 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 6
			0.157 af Overall - 0.039 af Embedded = 0.118 af x 33.0% Voids
		0.078 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	121.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.27 cfs @ 12.14 hrs HW=111.24' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB4: Recharge (6)



Summary for Pond RB5: Recharge (3)

Inflow Area = 0.243 ac, 83.31% Impervious, Inflow Depth = 0.39" for WqV event
Inflow = 0.11 cfs @ 12.08 hrs, Volume= 0.008 af
Outflow = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Atten= 1%, Lag= 0.8 min
Discarded = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 111.05' @ 12.09 hrs Surf.Area= 0.007 ac Storage= 0.000 af

Plug-Flow detention time= 0.7 min calculated for 0.008 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (863.0 - 862.3)

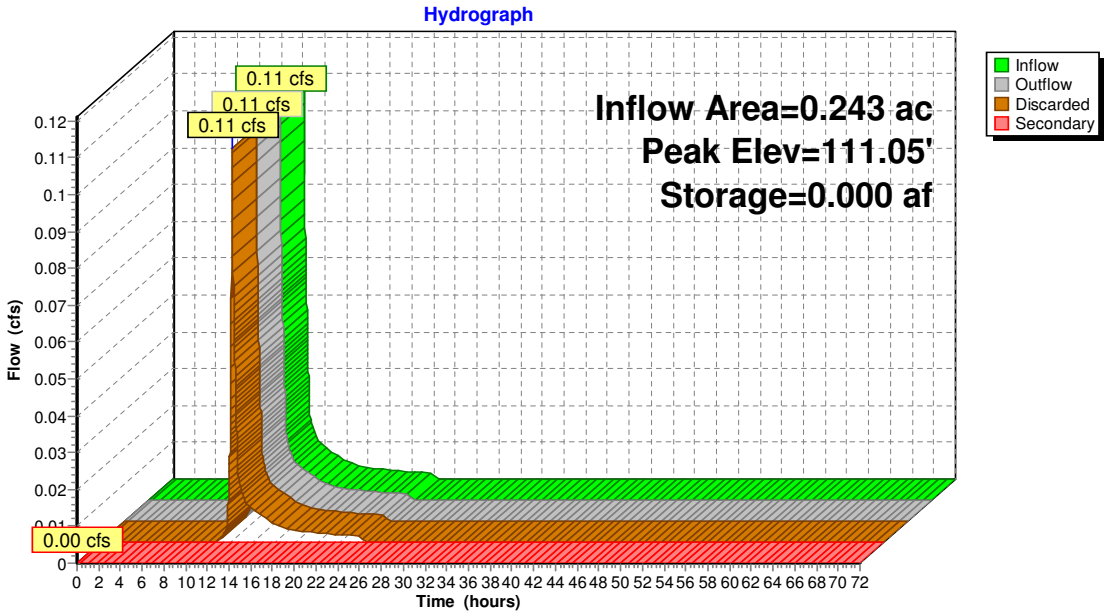
Volume	Invert	Avail.Storage	Storage Description
#1	112.00'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	111.00'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3 0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	111.00'	**17.000 in/hr Exfiltration X 2.00 over Wetted area**
#2	Secondary	121.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.25 cfs @ 12.09 hrs HW=111.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB5: Recharge (3)



Summary for Pond RB6: Recharge (1)

Inflow Area = 0.055 ac, 80.20% Impervious, Inflow Depth = 0.32" for WqV event
Inflow = 0.02 cfs @ 12.09 hrs, Volume= 0.001 af
Outflow = 0.02 cfs @ 12.12 hrs, Volume= 0.001 af, Atten= 9%, Lag= 2.1 min
Discarded = 0.02 cfs @ 12.12 hrs, Volume= 0.001 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 113.05' @ 12.12 hrs Surf.Area= 0.002 ac Storage= 0.000 af

Plug-Flow detention time= 2.3 min calculated for 0.001 af (100% of inflow)
Center-of-Mass det. time= 2.3 min (876.8 - 874.5)

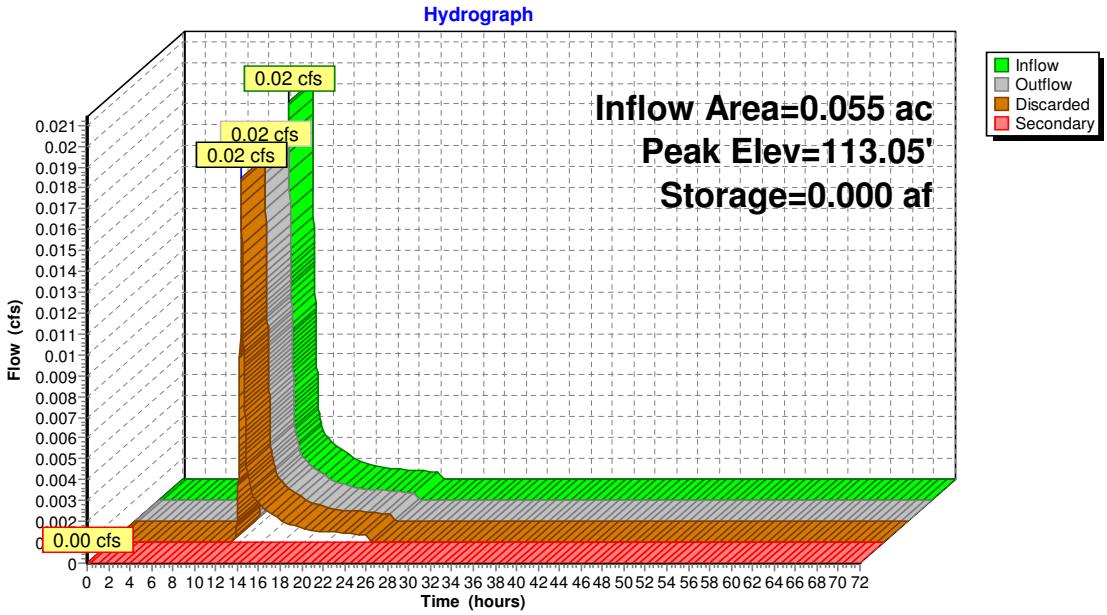
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.006 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** Inside #2
#2	113.00'	0.007 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** 0.026 af Overall - 0.006 af Embedded = 0.020 af x 33.0% Voids
		0.013 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.04 cfs @ 12.12 hrs HW=113.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB6: Recharge (1)



Summary for Pond RB7: Recharge (3)

Inflow Area = 0.285 ac, 54.91% Impervious, Inflow Depth = 0.03" for WqV event
Inflow = 0.00 cfs @ 14.75 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 14.79 hrs, Volume= 0.001 af, Atten= 0%, Lag= 2.3 min
Discarded = 0.00 cfs @ 14.79 hrs, Volume= 0.001 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 113.00' @ 14.79 hrs Surf.Area= 0.007 ac Storage= 0.000 af

Plug-Flow detention time= 2.3 min calculated for 0.001 af (100% of inflow)
Center-of-Mass det. time= 2.3 min (1,060.4 - 1,058.1)

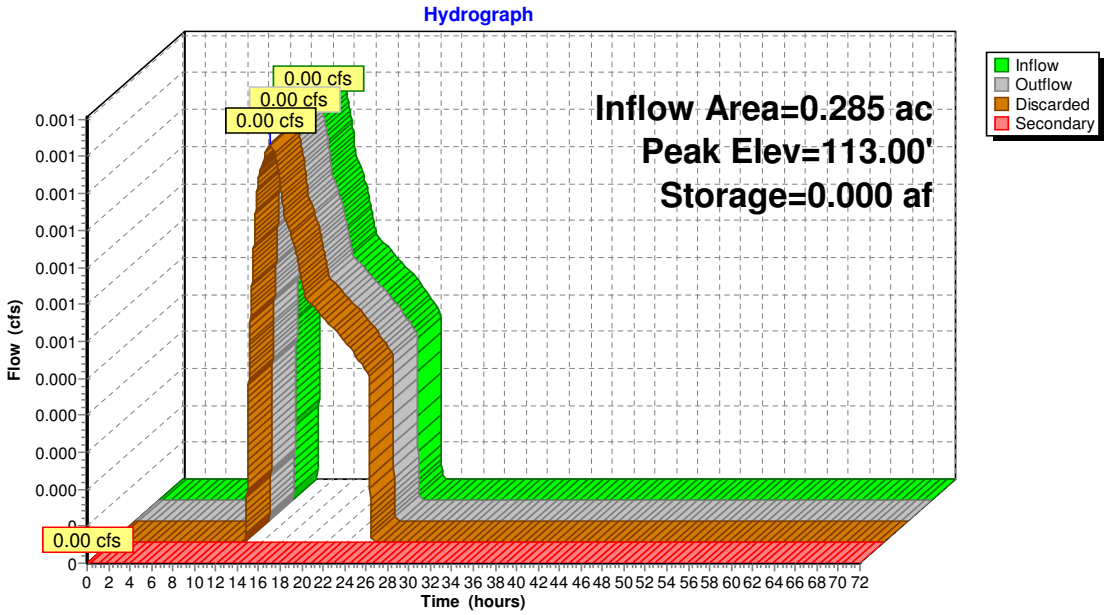
Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	0.019 af	**6.00'D x 10.00'H Vertical Cone/Cylinder** x 3 Inside #2
#2	113.00'	0.020 af	**11.50'D x 11.00'H Vertical Cone/Cylinder** x 3
			0.079 af Overall - 0.019 af Embedded = 0.059 af x 33.0% Voids
		0.039 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	113.00'	**17.000 in/hr Exfiltration over Wetted area**
#2	Secondary	122.99'	**24.0" Horiz. Overflow** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.12 cfs @ 14.79 hrs HW=113.00' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**2=Overflow** (Controls 0.00 cfs)

Pond RB7: Recharge (3)



Summary for Pond RB8: Recharge Basin (2)

Inflow Area = 0.769 ac, 2.50% Impervious, Inflow Depth = 0.00" for WqV event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 115.50' @ 0.00 hrs Surf.Area= 77 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

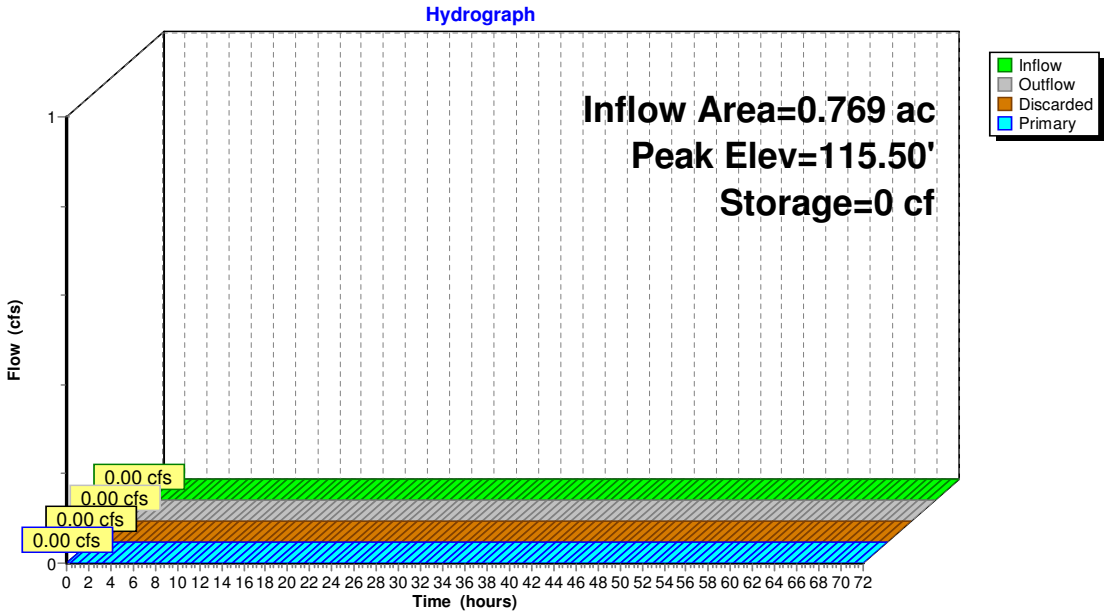
Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	339 cf	**6.00'D x 6.00'H Vertical Cone/Cylinder** x 2 Inside #2
#2	115.50'	66 cf	**7.00'D x 7.00'H Vertical Cone/Cylinder** x 2
			539 cf Overall - 339 cf Embedded = 199 cf x 33.0% Voids
		405 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.50'	**17.000 in/hr Exfiltration over Wetted area**
#2	Primary	122.50'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.50' (Free Discharge)
└**1=Exfiltration** (Passes 0.00 cfs of 0.03 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=115.50' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond RB8: Recharge Basin (2)

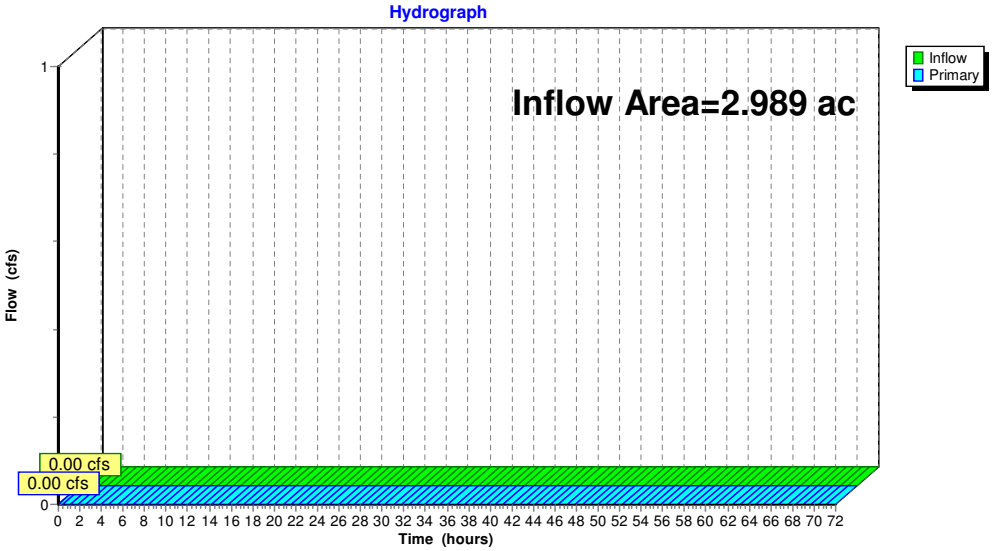


Summary for Pond SP1: Study Point 1

Inflow Area = 2.989 ac, 0.64% Impervious, Inflow Depth = 0.00" for WqV event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond SP1: Study Point 1



Summary for Pond URC1: Underground Chambers

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 0.07" for WqV event
Inflow = 0.20 cfs @ 12.24 hrs, Volume= 0.004 af
Outflow = 0.19 cfs @ 12.26 hrs, Volume= 0.004 af, Atten= 2%, Lag= 1.2 min
Discarded = 0.19 cfs @ 12.26 hrs, Volume= 0.004 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 107.53' @ 12.26 hrs Surf.Area= 1,364 sf Storage= 11 cf

Plug-Flow detention time= 1.0 min calculated for 0.004 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (741.3 - 740.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	107.50'	1,250 cf	**20.50'W x 66.52'L x 4.00'H Field A** 5,455 cf Overall - 1,665 cf Embedded = 3,789 cf x 33.0% Voids
#2A	108.50'	1,665 cf	**StormTech SC-740** x 36 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 4 rows
		2,916 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	107.50'	**17.000 in/hr Exfiltration over Surface area**
#2	Primary	113.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.54 cfs @ 12.26 hrs HW=107.52' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.54 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=107.50' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond URC1: Underground Chambers - Chamber Wizard Field A

Chamber Model = StormTech SC-740 (StormTech® SC-740)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Row Length Adjustment= +0.44' x 6.45 sf x 4 rows

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

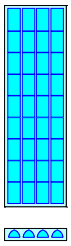
9 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 64.52' Row Length +12.0" End Stone x 2 = 66.52' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
12.0" Base + 30.0" Chamber Height + 6.0" Cover = 4.00' Field Height

36 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 4 Rows = 1,665.2 cf Chamber Storage

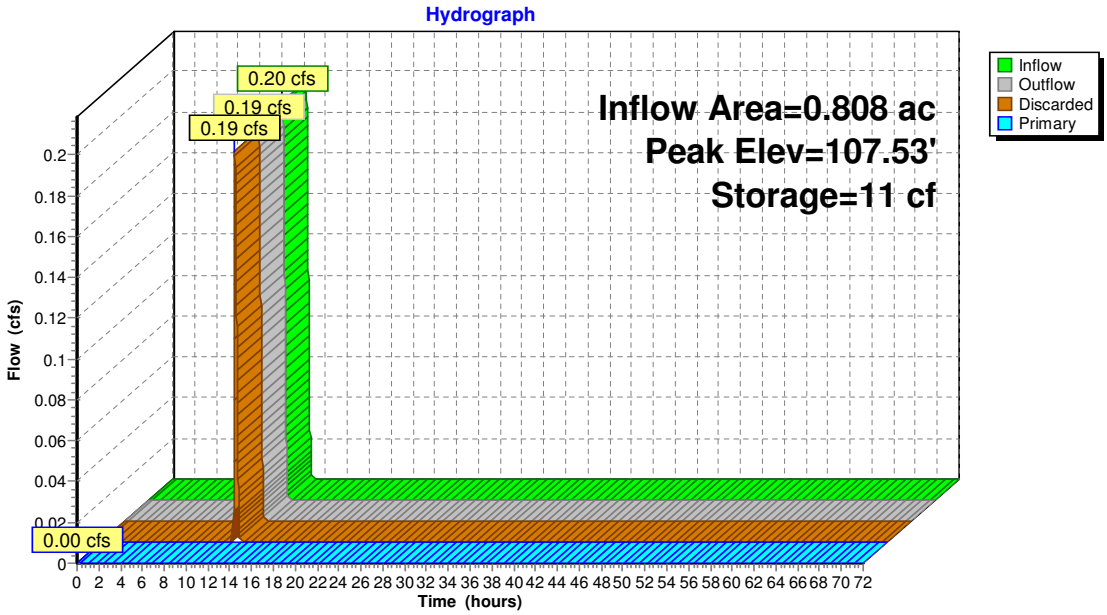
5,454.5 cf Field - 1,665.2 cf Chambers = 3,789.3 cf Stone x 33.0% Voids = 1,250.5 cf Stone Storage

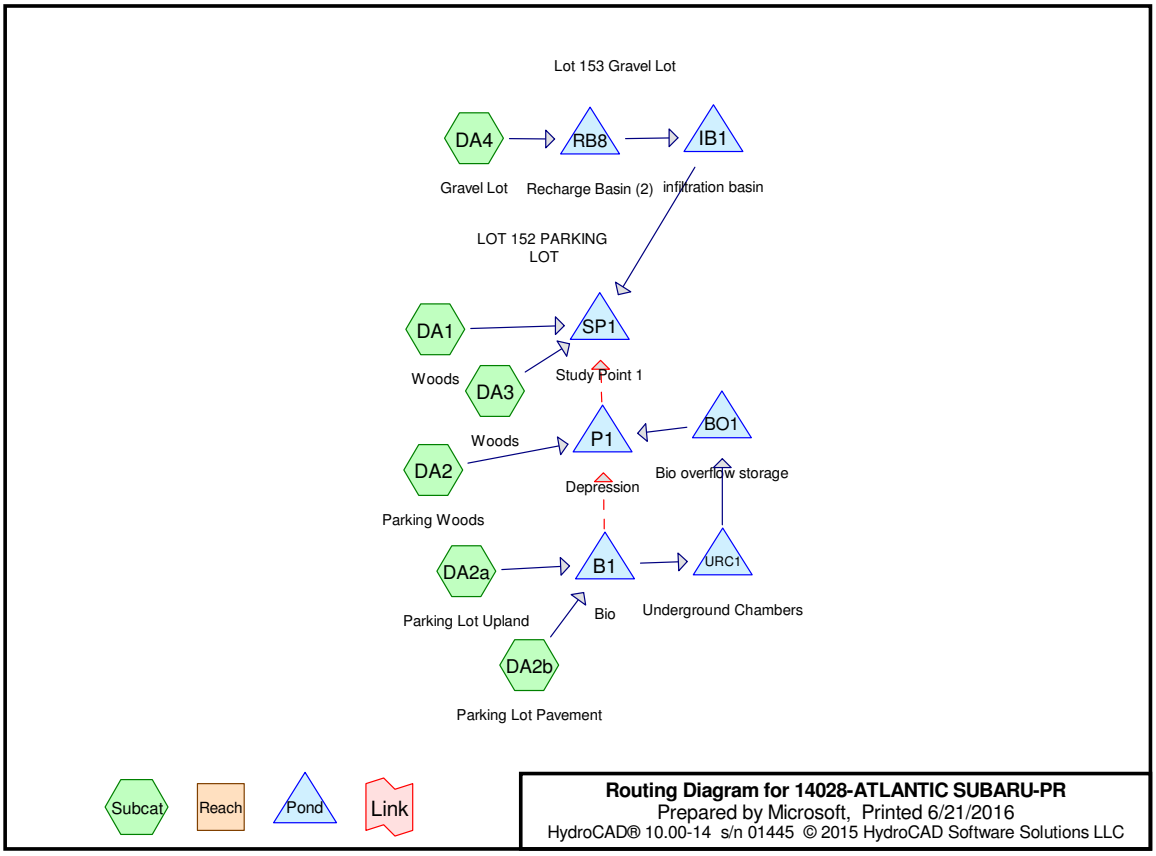
Chamber Storage + Stone Storage = 2,915.6 cf = 0.067 af
Overall Storage Efficiency = 53.5%

36 Chambers
202.0 cy Field
140.3 cy Stone



Pond URC1: Underground Chambers





Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.384	39	>75% Grass cover, Good, HSG A (DA2a, DA3, DA4)
0.108	72	Dirt roads, HSG A (DA4)
0.140	72	Gravel Parking, HSG A (DA4)
0.548	98	Paved parking, HSG A (DA2b)
0.047	98	Water Surface, HSG A (DA2b, DA4)
3.057	30	Woods, Good, HSG A (DA1, DA2, DA2a, DA3, DA4)
4.283	**43**	**TOTAL AREA**

Summary for Subcatchment DA1: Woods

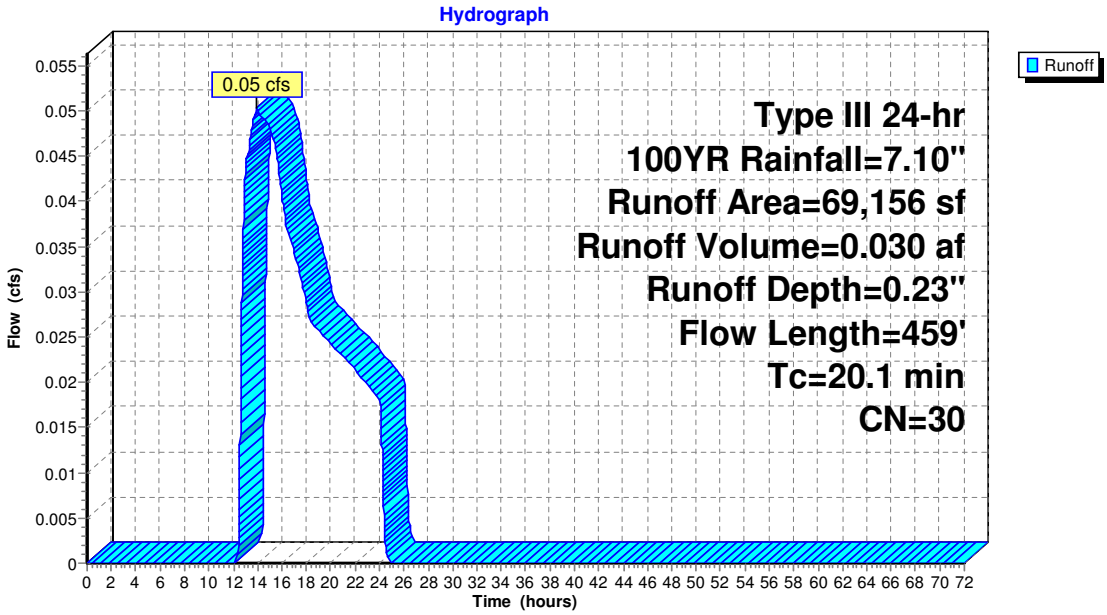
Runoff = 0.05 cfs @ 13.91 hrs, Volume= 0.030 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100YR Rainfall=7.10"

Area (sf)	CN	Description
69,156	30	Woods, Good, HSG A
69,156		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.5	103	0.0490	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
5.6	356	0.0450	1.06		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	459	Total			

Subcatchment DA1: Woods



Summary for Subcatchment DA2: Parking Woods

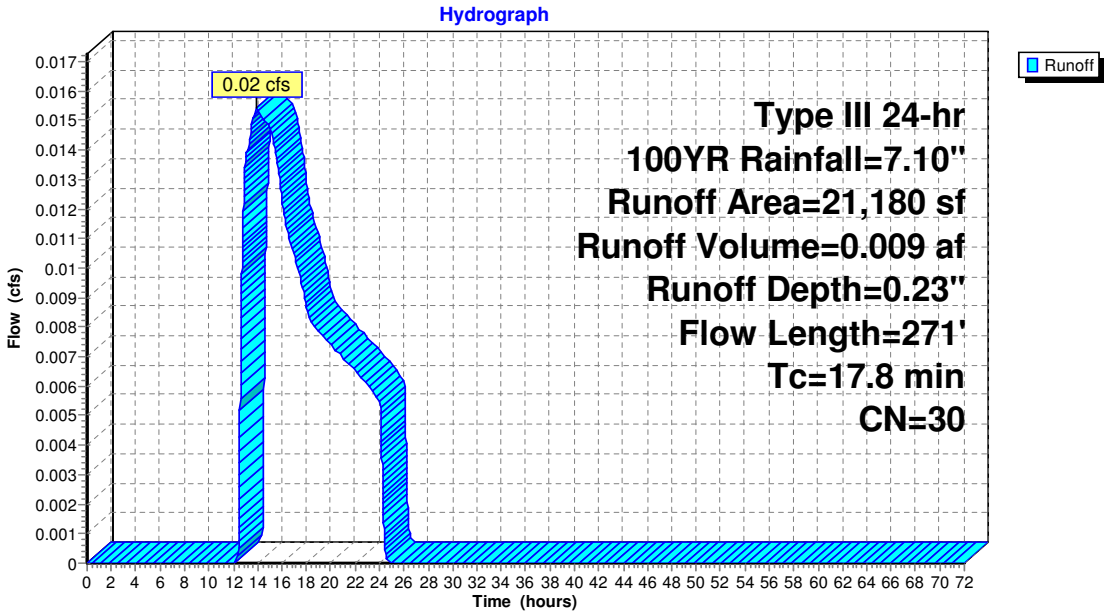
Runoff = 0.02 cfs @ 13.90 hrs, Volume= 0.009 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100YR Rainfall=7.10"

Area (sf)	CN	Description
21,180	30	Woods, Good, HSG A
21,180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	100	0.0400	0.11		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
2.5	171	0.0530	1.15		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.8	271	Total			

Subcatchment DA2: Parking Woods



Summary for Subcatchment DA2a: Parking Lot Upland

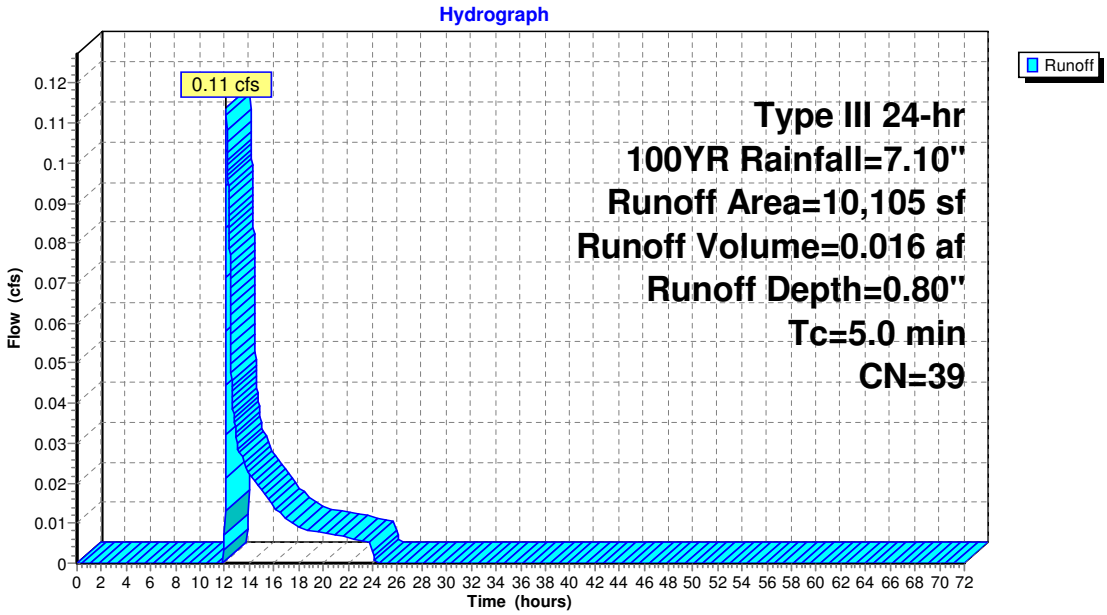
Runoff = 0.11 cfs @ 12.12 hrs, Volume= 0.016 af, Depth= 0.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100YR Rainfall=7.10"

Area (sf)	CN	Description
9,591	39	>75% Grass cover, Good, HSG A
514	30	Woods, Good, HSG A
10,105	39	Weighted Average
10,105		100.00% Pervious Area

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

Subcatchment DA2a: Parking Lot Upland



Summary for Subcatchment DA2b: Parking Lot Pavement

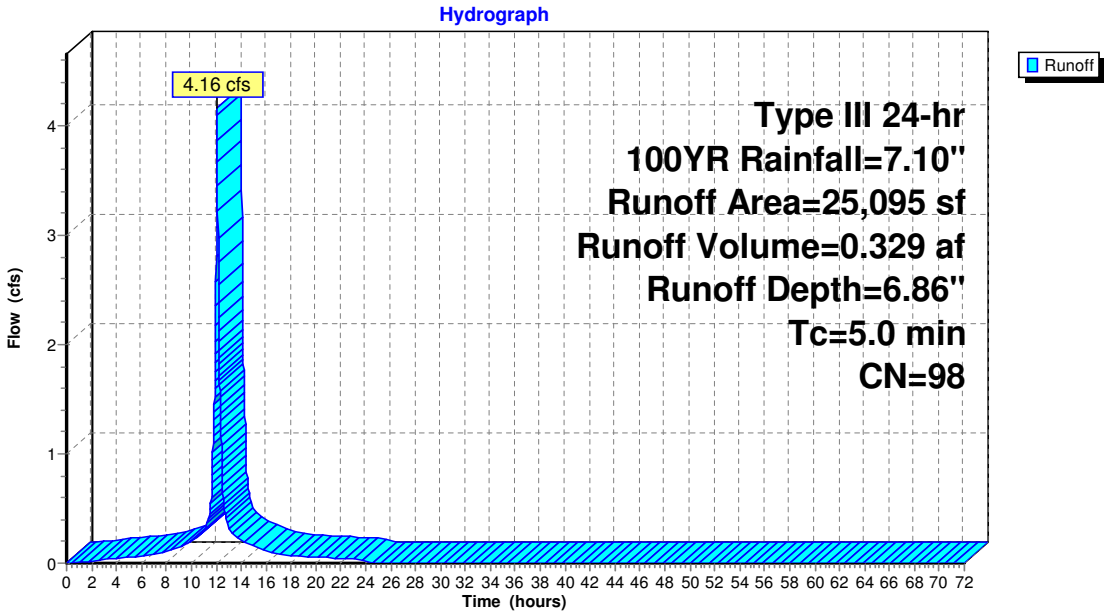
Runoff = 4.16 cfs @ 12.07 hrs, Volume= 0.329 af, Depth= 6.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100YR Rainfall=7.10"

Area (sf)	CN	Description
23,865	98	Paved parking, HSG A
1,230	98	Water Surface, HSG A
25,095	98	Weighted Average
25,095		100.00% Impervious Area

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

Subcatchment DA2b: Parking Lot Pavement



Summary for Subcatchment DA3: Woods

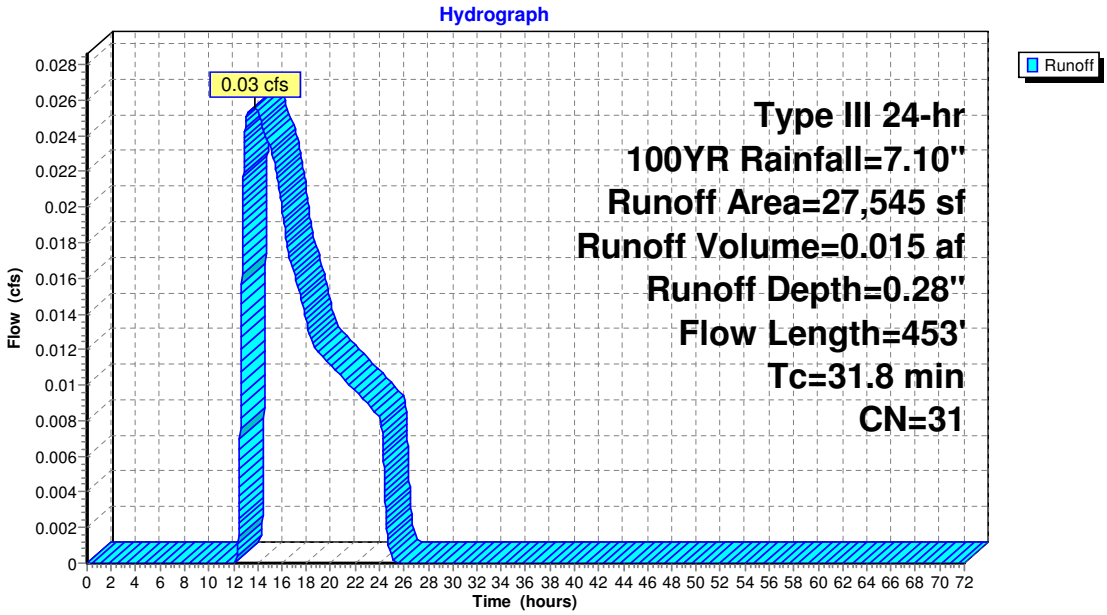
Runoff = 0.03 cfs @ 13.82 hrs, Volume= 0.015 af, Depth= 0.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100YR Rainfall=7.10"

Area (sf)	CN	Description
24,515	30	Woods, Good, HSG A
3,030	39	>75% Grass cover, Good, HSG A
27,545	31	Weighted Average
27,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.4	163	0.0250	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.4	290	0.0480	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
31.8	453	Total			

Subcatchment DA3: Woods



Summary for Subcatchment DA4: Gravel Lot

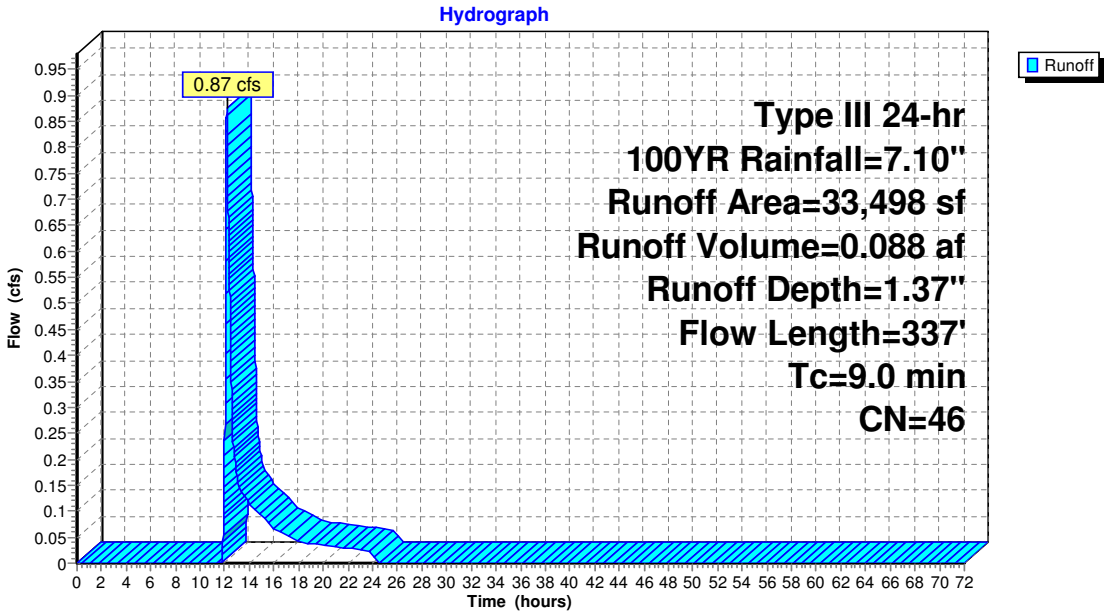
Runoff = 0.87 cfs @ 12.15 hrs, Volume= 0.088 af, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100YR Rainfall=7.10"

	Area (sf)	CN	Description
	17,778	30	Woods, Good, HSG A
*	6,095	72	Gravel Parking, HSG A
	837	98	Water Surface, HSG A
	4,097	39	>75% Grass cover, Good, HSG A
	4,691	72	Dirt roads, HSG A
	33,498	46	Weighted Average
	32,661		97.50% Pervious Area
	837		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	34	0.1760	0.16		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.60"
4.1	106	0.0190	0.43		**Sheet Flow,** Fallow n= 0.050 P2= 3.60"
0.6	60	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	137	0.0440	3.38		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.0	337	Total			

Subcatchment DA4: Gravel Lot



Summary for Pond B1: Bio

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 5.12" for 100YR event
Inflow = 4.24 cfs @ 12.07 hrs, Volume= 0.345 af
Outflow = 4.13 cfs @ 12.09 hrs, Volume= 0.345 af, Atten= 3%, Lag= 1.1 min
Discarded = 0.10 cfs @ 12.09 hrs, Volume= 0.138 af
Primary = 4.03 cfs @ 12.09 hrs, Volume= 0.207 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 113.54' @ 12.09 hrs Surf.Area= 1,806 sf Storage= 825 cf

Plug-Flow detention time= 24.7 min calculated for 0.345 af (100% of inflow)
Center-of-Mass det. time= 24.6 min (774.9 - 750.2)

Volume	Invert	Avail.Storage	Storage Description
#1	113.00'	1,241 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
113.00	1,232	0	0
113.50	1,765	749	749
113.76	2,018	492	1,241

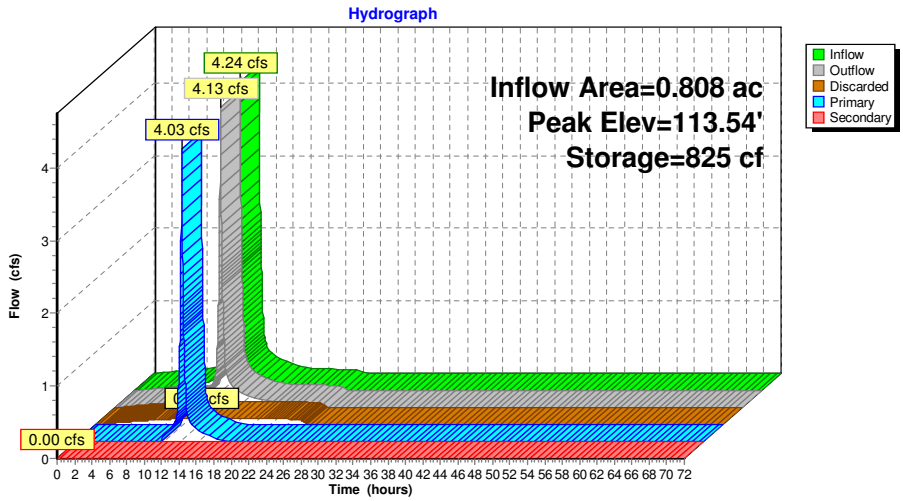
Device	Routing	Invert	Outlet Devices
#1	Device 2	113.33'	**24.0" Horiz. Orifice/Grate** X 2 rows C= 0.600 Limited to weir flow at low heads
#2	Primary	110.50'	**12.0" Round Culvert X 2.00** L= 26.0' CPP, end-section conforming to fill, Ke= 0.500
			Inlet / Outlet Invert= 110.50' / 110.40' S= 0.0038 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#3	Discarded	113.00'	**2.410 in/hr Exfiltration over Surface area**
#4	Secondary	113.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50
			Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Discarded OutFlow Max=0.10 cfs @ 12.09 hrs HW=113.54' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=4.02 cfs @ 12.09 hrs HW=113.54' (Free Discharge)
└**2=Culvert** (Passes 4.02 cfs of 12.06 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 4.02 cfs @ 1.51 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=113.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond B1: Bio



Summary for Pond BO1: Bio overflow storage

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 0.34" for 100YR event
Inflow = 2.86 cfs @ 12.21 hrs, Volume= 0.023 af
Outflow = 1.69 cfs @ 12.31 hrs, Volume= 0.013 af, Atten= 41%, Lag= 6.0 min
Primary = 1.69 cfs @ 12.31 hrs, Volume= 0.013 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 113.95' @ 12.31 hrs Surf.Area= 2,018 sf Storage= 454 cf

Plug-Flow detention time= 10.0 min calculated for 0.013 af (55% of inflow)
Center-of-Mass det. time= 5.8 min (745.3 - 739.5)

Volume	Invert	Avail.Storage	Storage Description
#1	113.52'	454 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

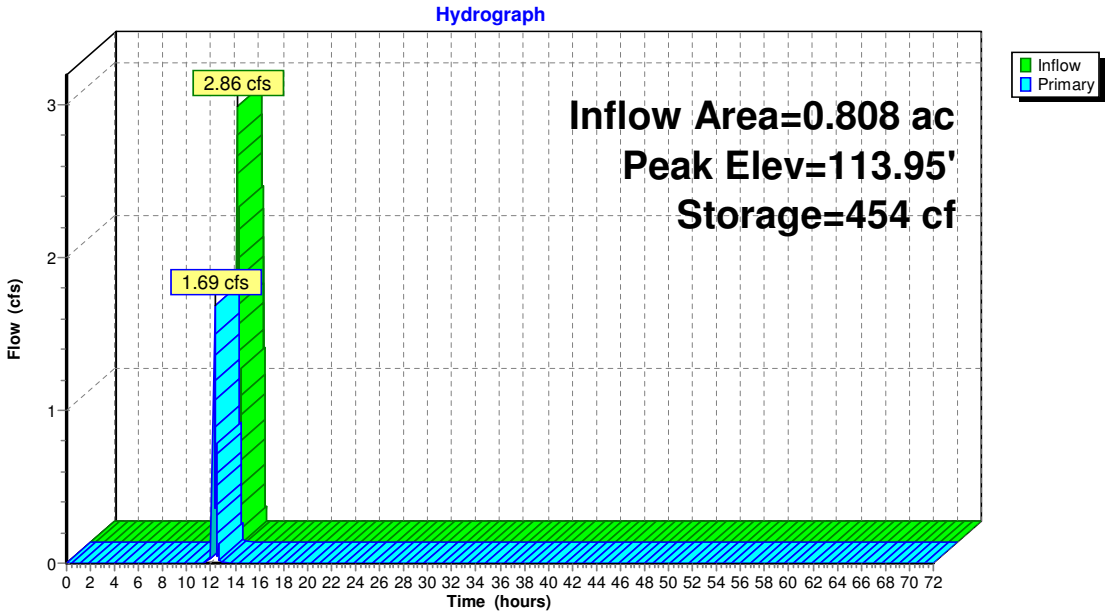
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
113.52	1,765	0	0
113.76	2,018	454	454

Device	Routing	Invert	Outlet Devices
#1	Primary	113.75'	**8.0' long x 5.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.59 cfs @ 12.31 hrs HW=113.94' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 1.59 cfs @ 1.03 fps)

Pond BO1: Bio overflow storage



Summary for Pond IB1: infiltration basin

Inflow Area = 0.769 ac, 2.50% Impervious, Inflow Depth = 0.24" for 100YR event
Inflow = 0.84 cfs @ 12.19 hrs, Volume= 0.015 af
Outflow = 0.31 cfs @ 12.46 hrs, Volume= 0.015 af, Atten= 62%, Lag= 16.1 min
Discarded = 0.03 cfs @ 12.46 hrs, Volume= 0.009 af
Primary = 0.28 cfs @ 12.46 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 122.83' @ 12.46 hrs Surf.Area= 767 sf Storage= 378 cf

Plug-Flow detention time= 91.6 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 91.7 min (835.5 - 743.8)

Volume	Invert	Avail.Storage	Storage Description
#1	122.00'	518 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

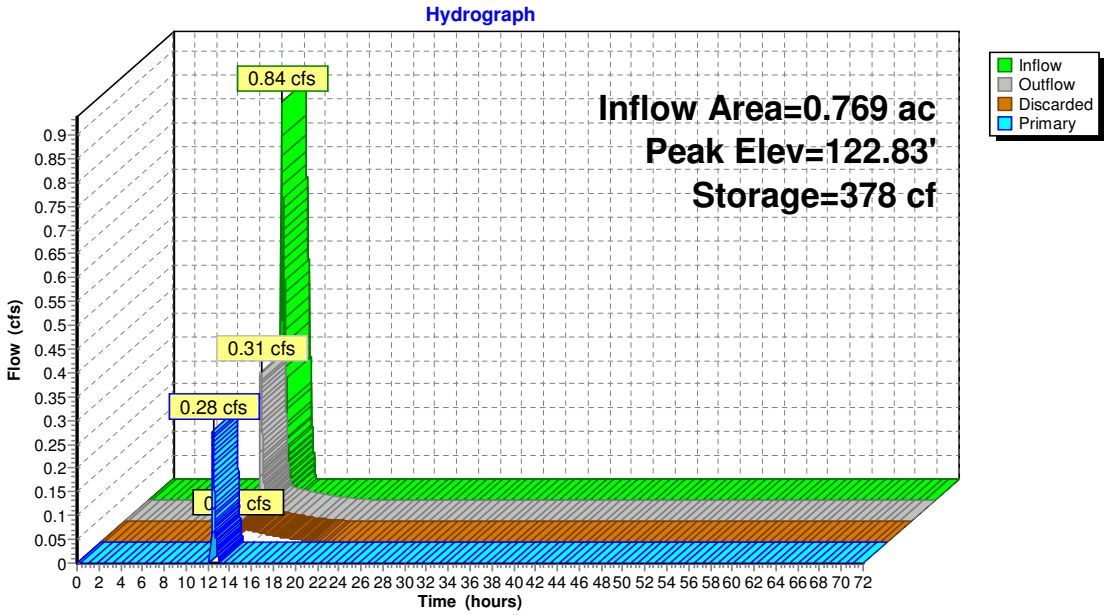
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
122.00	170	0	0
122.50	500	168	168
123.00	900	350	518

Device	Routing	Invert	Outlet Devices
#1	Primary	122.75'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	122.00'	**2.410 in/hr Exfiltration over Surface area above 122.00'** Excluded Surface area = 170 sf

Discarded OutFlow Max=0.03 cfs @ 12.46 hrs HW=122.83' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.28 cfs @ 12.46 hrs HW=122.83' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 0.28 cfs @ 0.67 fps)

Pond IB1: infiltration basin



Summary for Pond P1: Depression

Inflow Area = 1.294 ac, 44.51% Impervious, Inflow Depth = 0.20" for 100YR event
Inflow = 1.69 cfs @ 12.31 hrs, Volume= 0.022 af
Outflow = 0.04 cfs @ 12.58 hrs, Volume= 0.022 af, Atten= 98%, Lag= 16.3 min
Discarded = 0.04 cfs @ 12.58 hrs, Volume= 0.022 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 112.08' @ 12.58 hrs Surf.Area= 680 sf Storage= 503 cf

Plug-Flow detention time= 133.9 min calculated for 0.022 af (100% of inflow)
Center-of-Mass det. time= 133.7 min (1,003.6 - 869.9)

Volume	Invert	Avail.Storage	Storage Description
#1	111.00'	5,074 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

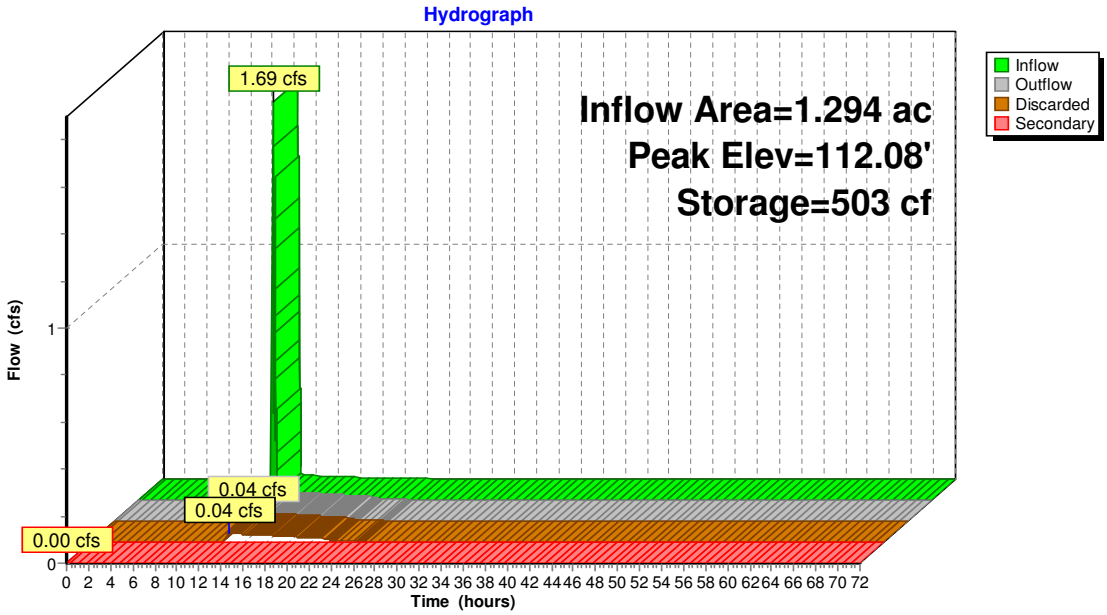
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
111.00	254	0	0
114.00	1,440	2,541	2,541
115.00	3,625	2,533	5,074

Device	Routing	Invert	Outlet Devices
#1	Secondary	114.75'	**5.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32
#2	Discarded	111.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 12.58 hrs HW=112.08' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.04 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=111.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P1: Depression



Summary for Pond RB8: Recharge Basin (2)

Inflow Area = 0.769 ac, 2.50% Impervious, Inflow Depth = 1.37" for 100YR event
Inflow = 0.87 cfs @ 12.15 hrs, Volume= 0.088 af
Outflow = 0.99 cfs @ 12.19 hrs, Volume= 0.088 af, Atten= 0%, Lag= 2.5 min
Discarded = 0.15 cfs @ 12.19 hrs, Volume= 0.072 af
Primary = 0.84 cfs @ 12.19 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 122.61' @ 12.19 hrs Surf.Area= 77 sf Storage= 405 cf

Plug-Flow detention time= 24.8 min calculated for 0.088 af (100% of inflow)
Center-of-Mass det. time= 24.8 min (921.2 - 896.4)

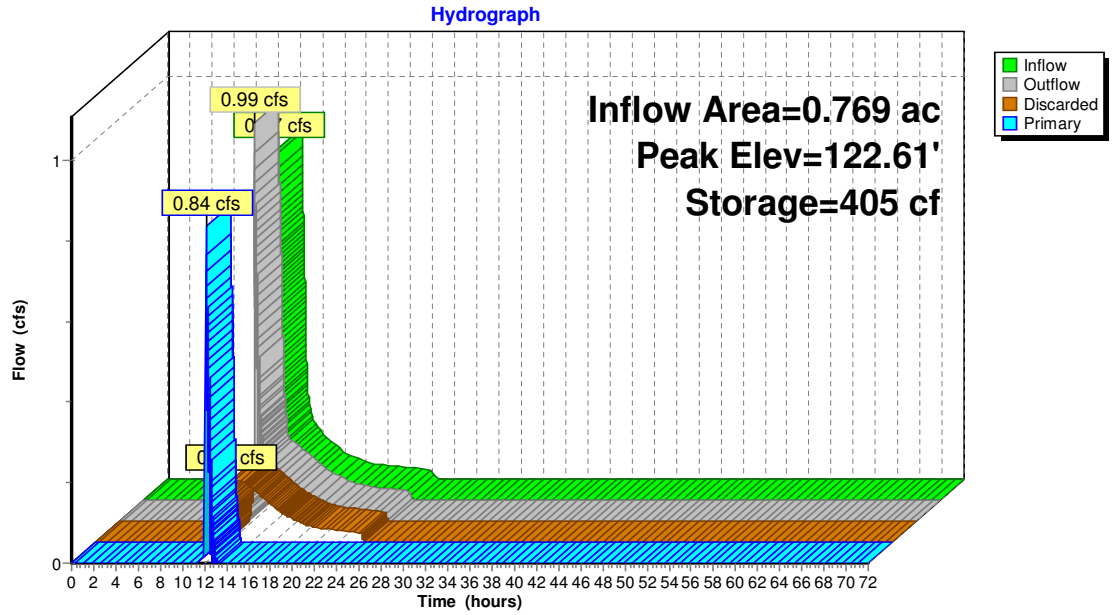
Volume	Invert	Avail.Storage	Storage Description
#1	116.50'	339 cf	**6.00'D x 6.00'H Vertical Cone/Cylinder** x 2 Inside #2
#2	115.50'	66 cf	**7.00'D x 7.00'H Vertical Cone/Cylinder** x 2 539 cf Overall - 339 cf Embedded = 199 cf x 33.0% Voids
		405 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	115.50'	**17.000 in/hr Exfiltration over Wetted area**
#2	Primary	122.50'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.15 cfs @ 12.19 hrs HW=122.61' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.71 cfs @ 12.19 hrs HW=122.61' (Free Discharge)
└**2=Orifice/Grate** (Weir Controls 0.71 cfs @ 1.06 fps)

Pond RB8: Recharge Basin (2)

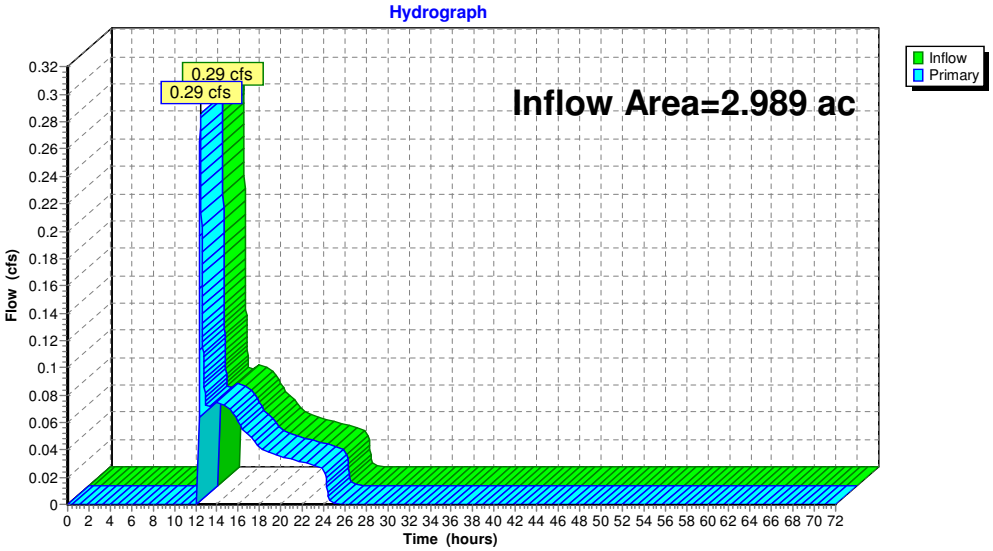


Summary for Pond SP1: Study Point 1

Inflow Area = 2.989 ac, 0.64% Impervious, Inflow Depth = 0.21" for 100YR event
Inflow = 0.29 cfs @ 12.46 hrs, Volume= 0.051 af
Primary = 0.29 cfs @ 12.46 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond SP1: Study Point 1



Summary for Pond URC1: Underground Chambers

Inflow Area = 0.808 ac, 71.29% Impervious, Inflow Depth = 3.07" for 100YR event
Inflow = 4.03 cfs @ 12.09 hrs, Volume= 0.207 af
Outflow = 3.39 cfs @ 12.21 hrs, Volume= 0.207 af, Atten= 16%, Lag= 7.3 min
Discarded = 0.54 cfs @ 11.66 hrs, Volume= 0.184 af
Primary = 2.86 cfs @ 12.21 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 114.57' @ 12.21 hrs Surf.Area= 1,364 sf Storage= 2,916 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 37.5 min (778.0 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	107.50'	1,250 cf	**20.50'W x 66.52'L x 4.00'H Field A** 5,455 cf Overall - 1,665 cf Embedded = 3,789 cf x 33.0% Voids
#2A	108.50'	1,665 cf	**StormTech SC-740** x 36 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 4 rows
		2,916 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	107.50'	**17.000 in/hr Exfiltration over Surface area**
#2	Primary	113.50'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.54 cfs @ 11.66 hrs HW=107.57' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.54 cfs)

Primary OutFlow Max=2.80 cfs @ 12.21 hrs HW=114.55' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 2.80 cfs @ 3.56 fps)

Pond URC1: Underground Chambers - Chamber Wizard Field A

Chamber Model = StormTech SC-740 (StormTech® SC-740)
Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
Row Length Adjustment= +0.44' x 6.45 sf x 4 rows

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

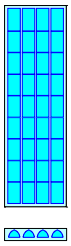
9 Chambers/Row x 7.12' Long +0.44' Row Adjustment = 64.52' Row Length +12.0" End Stone x 2 = 66.52' Base Length
4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width
12.0" Base + 30.0" Chamber Height + 6.0" Cover = 4.00' Field Height

36 Chambers x 45.9 cf +0.44' Row Adjustment x 6.45 sf x 4 Rows = 1,665.2 cf Chamber Storage

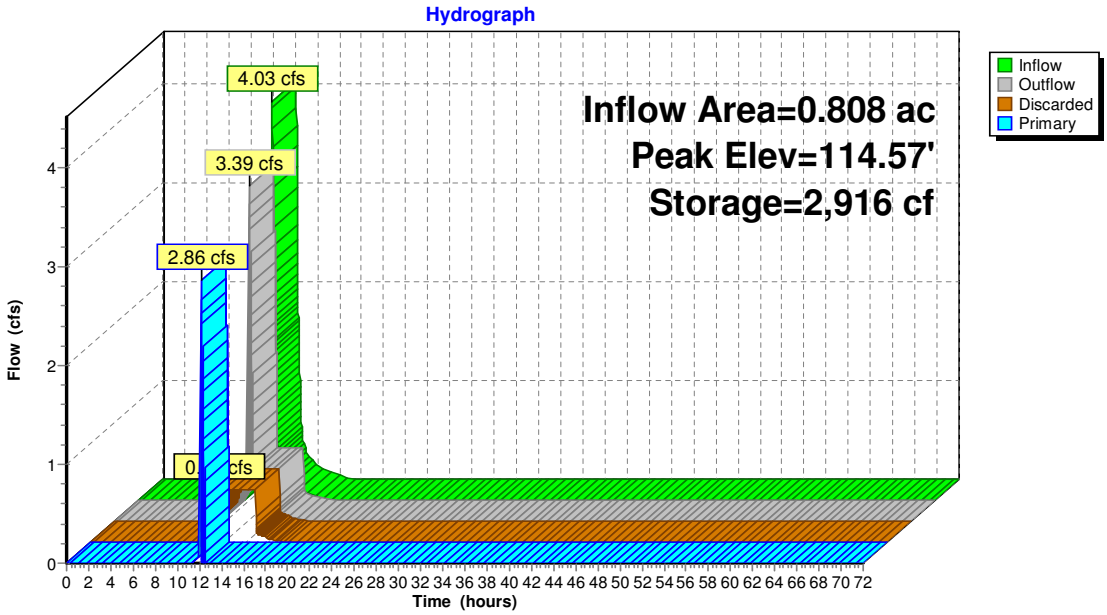
5,454.5 cf Field - 1,665.2 cf Chambers = 3,789.3 cf Stone x 33.0% Voids = 1,250.5 cf Stone Storage

Chamber Storage + Stone Storage = 2,915.6 cf = 0.067 af
Overall Storage Efficiency = 53.5%

36 Chambers
202.0 cy Field
140.3 cy Stone



Pond URC1: Underground Chambers



Appendix D

U.S. Rainfall Frequency Atlas

F-1. Rainfall Data for Massachusetts from *Rainfall Frequency Atlas of the United States* (TP-40)

- Users of this Handbook should note that current MA DEP written guidance (see DEP Waterlines newsletter -- Fall 2000) requires the use of TP-40 Rainfall Data for calculations under the Wetlands Protection Regulations and the Stormwater Management Policy. More stringent design storms may be used under a local bylaw or ordinance. However, DEP will continue to require the use of TP-40 in any case it reviews under the Wetlands Protection Act and Stormwater Management Policy.

Adjusted Technical Paper 40 Design Storms for 24-hour Event by County

County Name	1-yr 24-hr	2-yr 24-hr	5-yr 24-hr	10-yr 24-hr	25-yr 24-hr	50-yr 24-hr	100-yr 24-hr
Barnstable	2.5	3.6	4.5	4.8	5.7	6.4	7.1
Berkshire	2.5	2.9	3.8	4.4	5.1	5.9	6.4
Bristol	2.5	3.4	4.3	4.8	5.6	6.3	7.0
Dukes	2.5	3.6	4.6	4.9	5.8	6.5	7.2
Essex	2.5	3.1	3.9	4.5	5.4	5.9	6.5
Franklin	2.5	2.9	3.8	4.3	5.1	5.8	6.2
Hampden	2.5	3.0	4.0	4.6	5.3	6.0	6.5
Hampshire	2.5	3.0	3.9	4.5	5.2	5.9	6.4
Middlesex	2.5	3.1	4.0	4.5	5.3	5.9	6.5
Nantucket	2.5	3.6	4.6	4.9	5.8	6.5	7.2
Norfolk	2.5	3.2	4.1	4.7	5.5	6.1	6.7
Plymouth	2.5	3.4	4.3	4.7	5.6	6.2	7.0
Suffolk	2.5	3.2	4.0	4.6	5.5	6.0	6.6
Worcester	2.5	3.0	4.0	4.5	5.3	5.9	6.5

Appendix E

Bioretention Sizing Calculations

Horsley Witten Group
Sustainable Environmental Solutions

Project: Atlantic Subaru **Project No:** 14028
Project Location: Waterhouse Road
Bourne, MA
Calculated By: BAL
Checked By: BRK
Date : 7/1/2014
Revised: 6/10/2016

Instructions: Enter values in [ ] cells only. All other cells are formulas or links and do not need to be edited. See cell comments for descriptions and formulas used.

Water Quality Volume (WQv)
Based upon 1-inch of rainfall times the contributing impervious area contributing impervious area

WQv (cf) = (1" rainfall/12) * Imp. Area (sf)

Storm Type: 1 ***Inch***

DA	Description	% Imp.	Drainage Area		Imp. Area		WQv Required*	WQv required
		%	sf	ac	sf	ac	cf	af
DA2a	New Parking Lot	68%	35,200	0.81	23,865	0.55	1,989	0.046
	TOTALS		52155	1.20	33,246	0.76	0	

Bioretention Sizing Calculations

Sizing Equations: Bioretention

Required Surface Area (sf) = (WQv) (df) / [(k) (hf + df) (tf)]
Where: df = Filter bed depth (ft) k = Coefficient of permeability of filter media (ft/day)
hf = Ave. height of water above filter bed (ft) tf = Design filter bed drain time (days)

BIORETENTION SIZING:

Bio Area	Drainage Area Name	WQv Required (af)	df (ft)	K (ft/day)	hmax-Height of water above filter (in.)	hf=avg of above (ft)	tf (days)	Surface Area Required (sf)	Surface Area Provided (sf)	Sediment Forebay Required 10% WQv (cf)	Sediment Forebay Provided (cf)	WQV Treatment Provided (af)
1	DA2a	0.046	2.50	1	5	0.2083	1.67	1099	1230	199	115	0.051
	TOTALS	0.064						1531	1230	277	115	0.051
							Percentage of Treatment Provided		**80%**		**42%**	**80%**

Appendix F

Recharge Calculations

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
www.horsleywitten.com
Date: June 21, 2011

STANDARD 3-RECHARGE REQUIREMENTS
Project: Atlantic Subari-Bourne, MA
Project No: 14028
Calculated By: BRK
Checked By: BRK

TOTAL IMPERVIOUS	62,287	sqft
DRAINAGE AREA	2.05	acres

TOTAL IMPERVIOUS DIRECTED TO RECHARGE	62,287	sqft
TOTAL IMPERVIOUS DIRECTED TO RECHARGE	1.43	acres

% SITE TO BE RECHARGED	**100.0**	**%**

SOIL TYPE	A	
RECHARGE VOLUME REQUIRED	**3114**	cft
RECHARGE PROVIDED (1" STORM)	0.12	af
RECHARGE PROVIDED (1" STORM)	**5191**	cft

Soil Type	Target Depth (in)
A	0.6
B	0.35
C	0.25
D	0.1

Appendix G

TSS Removal

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Lot 152 New Display Area

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Sediment Forebay	**0.25**	**1.00**	**0.25**	**0.75**
Bioretention Area	**0.90**	**0.75**	**0.68**	**0.08**
Subsurface Infiltration Structure	**0.80**	**0.08**	**0.06**	**0.02**
	0.00	**0.02**	**0.00**	**0.02**
	0.00	**0.02**	**0.00**	**0.02**

Total TSS Removal = **99%**

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

Project: Atlantic Subaru
Prepared By: BRK
Date: 6/19/2016

*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

Mass. Dept. of Environmental Protection

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Lot 153 Gravel Parking lot

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Grass Channel	**0.50**	**1.00**	**0.50**	**0.50**
Deep Sump and Hooded Catch Basin	**0.25**	**0.50**	**0.13**	**0.38**
Infiltration Basin	**0.80**	**0.38**	**0.30**	**0.08**
	0.00	**0.08**	**0.00**	**0.08**
	0.00	**0.08**	**0.00**	**0.08**

Total TSS Removal = **93%**

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

Project: Atlantic Subaru
Prepared By: BRK
Date: 6/19/2016

*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:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: Lot 153- Existing Drainage

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Leaching Catch Basin	**0.80**	**0.75**	**0.60**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**

Total TSS Removal = **85%**

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

Project: Atlantic Subaru
Prepared By: BRK
Date: 6/19/2016

*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:

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)
		1.00		

Total TSS Removal =

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

Project:

Prepared By:

Date:

*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

Mass. Dept. of Environmental Protection

Appendix H

Nitrogen Loading Calculations

Atlantic Subaru
Bourne, MA
Nitrogen Loading Calculations for Proposed Improvements

INPUT FACTORS

Wastewater Design Flow	**740**
Wastewater N-conc. in effluent (mg/L)	**25**
Lawn/Landscape area (square feet)	**26,193**
Lawn/Landscape N- conc. (lbs/ft^2)[1]	**3 lbs/1000 ft^2**
Pavement (square feet)	**89,117**
Road runoff N-conc. (mg/L)[1]	**1.5**
Roof area (square feet)	**19,603**
Roof runoff N-conc. (mg/L)[1]	**0.75**
Total recharge area (acres)	**4.31**
Recharge rate for pervious area (in/yr)[1]	**21**
Recharge rate for impervious area (in/yr)[1]	**40**

[1] From Cape Cod Commission Nitrogen Loading Technical Bulletin 91-001

INPUT	**CALCULATIONS**	**RESULTS**
Sewage (gal/day)		**CALCULATED LOADING (LBS/YR)**
740	x N-conc (mg/L) x 3.785 L/gal x 365 days/yr ÷ 454000 mg/lb	**56**
Lawn/Landscape area (sq ft)		
26,193	x 0.00075 lb N/sq ft (3 lbs./1000 ft^2 x 0.25)	**20**
Pavement area (sq ft)		
89,117	x (40 in/yr ÷ 12 in/ft) x 7.48 gal/ft^3 x N-conc (mg/L) x 3.785 L/gal ÷ 454000 mg/lb	**28**
Roof area (sq ft)		
19,603	x (40 in/yr ÷ 12 in/ft) x 7.48 gal/ft^3 x N-conc (mg/l) x 3.785 l/gal ÷ 454000 mg/lb	**3**
	TOTAL NITROGEN LOADING (LBS/YR)	**107**
		TOTAL RECHARGE (MG/YR)
Recharge from sewage (gal/day)		
740	x 365 days/yr : 1,000,000 gal/million gal	**0.27**
Total pervious area (sq ft)		
79,024	x 21in/yr /12 in/ft x 7.48 gal/cu ft : 1,000,000 gal/million gal	**1.03**
Total impervious area (sq ft)		
108,720	x 40 in/yr /12 in/ft x 7.48 gal/cu ft : 1,000,000 gal/million gal	**2.71**
Total recharge area, pervious + impervious (acres)		
4.3		
	TOTAL RECHARGE (MGAL/YR)	**4.02**
TOTAL NITROGEN LOAD/TOTAL RECHARGE X 454,000 MG/LB : 3,785,000 L/MGAL		
	=RECHARGE NITROGEN CONCENTRATION (mg/L or ppm)	**3.19**

PREPARED BY HORSLEY WITTEN GROUP, INC.
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