STORMWATER ANALYSIS AND DRAINAGE REPORT

CAPE VIEW WAY
BOURNE, MASSACHUSETTS

Prepared for:

PRESERVATION OF AFFORDABLE HOUSING

2 OLIVER STREET, SUITE 500

BOSTON, MA 02109

AND

HOUSING ASSISTANCE CORPORATION

460 WEST MAIN STREET

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1.0 STORMWATER AND DRAINAGE NARRATIVE

This Stormwater Management Report provides a summary of the proposed stormwater management for the Cape View Way housing development project (Project). The purpose of this report is to describe the pre- and post-development site conditions and the practices to be used for reducing stormwater runoff and pollutants during and after construction. The proposed project has been developed to incorporate a series of green stormwater infrastructure (GSI) practices into the overall site and landscape design. The design includes practices such as tree trenches, vegetated bioretention systems, and underground recharge areas to manage the onsite runoff.

Due to the proximity of the proposed Project to existing wetlands, adherence to the Massachusetts Stormwater Standards (MASWS) (revised in January 2008) is required. The proposed site design conforms to the Standards by providing stormwater runoff treatment or the first 1-inch runoff from proposed impervious areas contributing to site runoff. On-site attenuation and infiltration is provided to match or reduce peak runoff conditions for the 10 and 100-year storm events. The proposed stormwater controls will be maintained during as part of the development regular landscape maintenance as well as during the construction.

1.1. Existing Conditions

The project site is located at Cape View Way off of Meetinghouse Lane in the Town of Bourne, Massachusetts (Latitude: 41°46'57.8"N, Longitude: 70°32'17.2"W) (**Figure 1**) and includes the following parcels:

Table 1. Project Site Parcel Information

Map/Parcel	Street Address	Lot Size (acres)
Map 7, Parcel 23	0 Cape View Way	0.263
Map 7, Parcel 86	6 Cape View Way	0.478
Map 7, Parcel 87	8 Cape View Way	0.475
Map 7, Parcel 88	10 Cape View Way	0.491
Map 7, Parcel 89	12 Cape View Way	0.528
Map 7, Parcel 90	11 Cape View Way	0.542[1]
Map 6, Parcel 38	0 Homestead Road Extension	0.159

[1] This is the value in the Bourne Assessors Database. HW's research indicates a slightly larger size lot.

The site is bordered by Cherry Hill Court to the east and Meetinghouse Lane and commercial properties to the south. The site abuts residential properties located on Homestead Road, Homestead Road Extension, and Andrew Road to the west. The site is near the Bourne Fire Department and United States Postal Service, located in an area near transit and amenities.

The site is currently undeveloped and is characterized by dense vegetation and invasive species. The existing Cape View Way road has a paved surface that extends approximately 145 feet from Meetinghouse Lane. The road then continues as a dirt road. There are two abandoned hydrants along the road.

There is a wetland on the western portion of the site, which was confirmed during a field survey conducted by Horsley Witten Group, Inc. in May 2019. This wetland was delineated and flagged in accordance with methods developed by MassDEP, the Massachusetts Wetlands Protection Act regulations, and the Bourne *Wetlands Protection* Regulations.

The existing drainage area is 7.96 acres (346,654 square feet) and is comprised of the following land cover:

Table 2: Existing Land Coverage

Coverage	Area (ft2)	Area (acres)	%
Roadway	5,583	0.13	2%
Sidewalks	0	0.00	0%
Roof	9,642	0.22	3%
Gravel	1,705	0.04	0%
Pervious Pavers	0	0.00	0%
Pond/SW	0	0.00	0%
Forest (Type A)	297,534	6.63	86%
Grass (Type A)	32,190	0.74	9%
Subcatchment total	346,654	7.96	100%

The site is divided into three sub catchments, DA1, DA2, and DA3, which discharges via overland flow to the wetlands Study Point 1 (SP1), Study Point 2 (SP2), and Study Point 3 (SP3).

DA1 is approximately 3.64 acres, includes the north and western portion of the site and is comprised of woodlands, grass, roofs and roadway from abutting properties. The area gently slopes from the northwest to a wetland on the western portion of the site, SP1.

DA2 is approximately 1.83 acres, includes the central part of the site and is comprised of woodlands and grass. The area gently slopes from the northeast and the ends in on the southwestern border of the site. Runoff appears to flow overland to SP2.

DA3 is approximately 2.48 acres and located in the eastern part of the property and is comprised of woodlands, roadway, gravel, and grass. The area gently slopes from the northwest to the south towards Meetinghouse Lane, SP3.

1.1.1. Soils

According to the “Soil Survey of Barnstable County, Massachusetts” (Fletcher, 1993) soils underlying the Site are classified as Carver Loamy Coarse Sand (**Figure 2**). This soil group is classified as hydrologic soil group A and described as “very deep, gently sloping, excessively drained soil generally is in broad areas on outwash plains but is also in areas of sandy glacial lake deposits.”

Nine site soil evaluation test pits were performed in October 2019 to complete a Phase 2 environmental assessment and assess the subsurface conditions to determine its suitability for the construction of wastewater and stormwater management practices. Infiltrometer testing was conducted at one test pit. The test pits were conducted by a Massachusetts Licensed Soil Evaluator. The soils were determined to be a sandy permeable soil. No standing water was observed in any of the test pits. A memo describing the soil test pits is included in **Appendix A**.

1.2. Proposed Conditions

The Applicant proposes to construct the following:

- 51 dwelling units located in one building
- Approximately 800 linear feet of paved access road
- Paved parking areas for 89 spaces (24,837 sf)
- ADA accessible sidewalks (3,859 sf)
- Interior landscaped areas, open spaces, and lighting.

1.2.1. Stormwater Management

The proposed stormwater management includes a GSI approach to capture, treat, infiltrate, and detain runoff, when applicable and to the maximum extent practicable, by using the following BMPs.

Bioretention Areas (BIO)

A bioretention area (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 or “filter” media and plants to filter runoff captured in 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 (3 to 6 inches deep), a well-drained planting soil bed, and plants.

Tree Trench (TT)

A tree trench is a tree pit with underground infiltration trenches. The tree trench uses a stone reservoir and planting soils (within the tree pit). The systems are designed to be off-line; meaning the that the water quality treatment volume is diverted into the trenches and an overflow pipe is provided to convey larger storms to the drainage pipe network. The system consists of a perforated inflow pipe, pretreatment via deep sump catchbasins, an overflow pipe out of the catchbasins, the stone (and soil for tree trenches) storage reservoir, and street trees (for the tree trenches).

Underground Recharge Chambers (URC)

Underground recharge chambers and basins capture, and store stormwater collected from surrounding impervious areas. Riser pipes, curb cuts, and/or drainage structures direct surface stormwater to subsurface interconnected storage units. When site conditions are appropriate, stored water is released directly into the ground mimicking pre-development conditions. Use of stormwater recharge chambers allows stored water to infiltrate and recharge groundwater.

Dry Well (Recharge Basin (RB))

A subsurface stormwater facility that is designed to collect and temporarily store runoff before infiltration into the subsoil. Use of stormwater recharge basins allows stored water to infiltrate and recharge groundwater.

Sediment Forebays

Sediment forebays are also provided at the bioretention areas for pretreatment of the surface water runoff from the proposed pavement and concrete surfaces to allow for sediment to settle from the incoming stormwater runoff prior to conveyance to the bioretention and infiltration basin areas. The forebays are designed to provide less volume than required by the Massachusetts Stormwater Standards. This is due to limited space and to reduce unsightly large quantities of sediment accumulation over time. The sediment forebays are designed to be smaller and require more frequent cleaning. See the Stormwater Operation and Maintenance Plan.

Deep Sump Catch Basins (CB)

Deep sump catch basins equipped with a hooded outlet are also provided to remove trash, debris, and coarse sediment from stormwater runoff.

1.2.2. Drainage Area

The proposed site development includes a low impact stormwater management approach, private septic, public water, natural gas and other associated utilities. The total proposed development is comprised of the following land cover:

Table 3: Proposed Land Coverage

Coverage	Area (ft2)	Area (acres)	%
Roadway	47,446	1.09	14%
Sidewalks	3,859	0.09	1%
Roof	30,973	0.71	9%
Gravel	0	0	0&
Pervious Pavers	784	0.02	0%
Pond/SW	2,159	0.05	1%
Forest (Type A)	187,339	4.30	54%
Grass (Type A)	74,094	1.70	21%
Subcatchment total	346,654	7.96	100%

The proposed site drainage is divided into eight subcatchments: DA1, DA2a, DA2b, DA3a, DA3b, DA3c, DA3d, and R1. The eight drainage areas drain to same three study points (SP1, SP2, and SP4) as outlined in the existing conditions above. Pre and Post Drainage maps can be found in **Appendix B**.

DA1 is approximately 3.64 acres, located in the north and western portion of the site and is comprised of woodlands, grass, roofs and roadway from abutting properties and runoff will continue to drain via overland flow to the wetland (SP1). This drainage area remains unchanged from existing conditions.

DA2a is approximately 1.00 acres, located in the central portion of the property, and includes behind the building pervious pavers, grass, and woodlands. The area drains north to south and runoff will continue to drain via overland flow to SP2.

DA2b is approximately 0.45 acres, located in the central portion site and driveway turnaround area. The area includes sidewalks, roadway, and landscaped areas. The area slopes from north to south. Runoff is captured at a curb inlet/sediment forebay at BIO-2 for treatment and discharged to underground chambers (URC-3) for infiltration.

DA3a is approximately 1.26 acres, located along the northern boundary of the site and consists of the upper parking lot. The area includes driveway, parking areas, sidewalks, woodlands, and landscaped areas. The area slopes from north to south. Runoff is captured at a curb inlet/sediment forebay at BIO-1 for treatment and discharged to underground chambers (URC-1) for infiltration.

DA3b is approximately 0.33 acres, located on the southwestern boundary of the site. The area includes the lower parking lot, roadway, sidewalks, woodlands, and landscaped areas. Runoff is captured in a deep sump catch baingan direct to a tree trench (TT1) for treatment and underground chambers (URC-1) for infiltration.

DA3c is approximately 0.67 acres, located on the southern boundary of the site. The area includes roadway, sidewalks, woodlands, and landscaped areas. Runoff is directed to localized recharge basins for infiltration.

DA3d is approximately 0.11 acres, located in the southern part of the site. The area includes parking lot, roadway, sidewalks, and landscaped areas. Runoff is directed to a tree trench (TT2) for treatment and recharge basins for infiltration.

R1 is approximately 0.49 acres and it is the proposed building's roof. Runoff is directed via roof leaders to underground chambers (URC-2 and URC-4) for infiltration.

2.0 DRAINAGE DESIGN METHODOLOGY AND ANALYSIS

The drainage design was completed by performing the following series of tasks:

- Site soil evaluations (9 test pits) (**Appendix A**)
- Delineation of drainage areas and sub catchments (**Appendix B**)

- Sizing the bioretention areas, tree trenches and underground recharge chambers (**Appendix C**)
- Modeling the proposed drainage network with HydroCAD® software (**Appendix D**)
- TSS and Recharge calculations (**Appendix E**)

Nine soil test pits were excavated; six test pits were for the purposes of the Phase 2 environmental assessment and three test pits were for assess subsoil conditions for wastewater and stormwater practices. No standing water was found in any of the test pits. Redoximorphic features (mottling) were found in two test pits: TP-E & TP-F. In TP-E, two lenses of mottling were observed: one in the sandy loam just above the silt loam layer, and one within the sandy loam layer just below the silt loam layer. Based on the soil evaluator's judgement, both sets of mottles are due to the interface between the loamy sand and silt loam layers and is indicative of the restriction of infiltration of surface water caused by this textural change and that this is a sign of a perched water table in this area of the site. Based upon our field observations and the topography in this area, it appears that the wetland on the west side of the site is the result of runoff that most likely settles in the area and becomes "trapped" in the subsurface, unable to infiltrate and creating the perched water table. The soil test pit data are included in **Appendix A**.

The site is located approximately half a mile from the Cape Cod Canal, a navigable ocean channel connecting Cape Cod Bay with Buzzards Bay. The lowest test pit (TP-F) observed was at ground surface elevation 63.5 and was excavated to a depth of 10 feet. No redoximorphic features, seepage, or restrictive layers were encountered in this excavation. Comparable regional groundwater monitoring wells less than a mile from the ocean indicate a high groundwater elevation of approximately 5 to 10. This would correlate to a depth to estimated seasonal high groundwater elevation of approximately 55 feet.

A double-ring infiltrometer test was performed at TP-F which resulted in an infiltration rate of 7.0 inches/hour. Based on the infiltration test data results, existing subsoils, and deep depth to groundwater, this site is ideal for stormwater infiltration, confirming prior assumptions and expectations for the proposed site and drainage design other than the area of TP-E.

Soil logs are provided in **Appendix A** and the test pits locations are located on the Grading and Drainage Plan.

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

- To capture and treat, at a minimum, the "first flush" (first one-inch of stormwater runoff) from the impervious surfaces to maintain or improve water quality conditions when compared to existing conditions.
- To provide groundwater recharge to the greatest extent practicable in conformance with the Massachusetts Department of Environmental Protection groundwater recharge criteria.

- To minimize runoff from the post-developed conditions at the study point located along the periphery of the site.

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

- Bioretention systems and tree trenches sized to treat the first one-inch of stormwater runoff for water quality treatment of runoff from the driveway, walkways, and parking areas. The systems are equipped with overflows to convey runoff from larger storm events into proposed underground recharge chambers. (**Appendix C**).

- Underground recharge chambers and recharge basins sized to retain and infiltrate onsite runoff.

The proposed Stormwater Management System was designed to accommodate pre-development site hydrologic conditions as well reduce stormwater pollution from the proposed site conditions. Stormwater runoff quantity was evaluated for the 2-year, 10-year, 25-year, and 100-year Type III, 24-hour storm events for both pre-development and post-development conditions. Per the town's subdivision provisions, the Stormwater Management System was designed to detain runoff from the 25-year event. 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 (See **Appendix B** for both "Pre-developed" and "Post-developed" Drainage Area Maps). The model was run for the 100-year events to ensure peak flows would be managed. The rainfall amounts used for calculating runoff for the storm events were obtained from the Cornell University Extreme Precipitation Events for the area (**Appendix D**). A summary table of pre- and post-development runoff peak flow rates and volumes is provided in Table 3.

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 MASWS and the applicable criteria within the Town's Subdivision Regulations and Zoning Bylaw.

Table 4: Peak Flow and Volume Comparison

STUDY POINT 1

DESIGN STORM	PRE-DEVELOPMENT		POST-DEVELOPMENT		PERCENT REDUCTION	
	PEAK FLOW (CFS)	VOLUME (AF)	PEAK FLOW (CFS)	VOLUME (AF)	PEAK FLOW	VOLUME
2 YR	0.00	0.000	0.00	0.000	0%	0%
10 YR	0.07	0.045	0.07	0.045	0%	0%
25 YR	0.52	0.129	0.52	0.129	0%	0%
100 YR	2.78	0.394	2.78	0.394	0%	0%

STUDY POINT 2

DESIGN STORM	PRE-DEVELOPMENT		POST-DEVELOPMENT		PERCENT REDUCTION	
	PEAK FLOW (CFS)	VOLUME (AF)	PEAK FLOW (CFS)	VOLUME (AF)	PEAK FLOW	VOLUME
2 YR	0.00	0.000	0.00	0.000	0%	0%
10 YR	0.00	0.001	0.00	0.000	0%	0%
25 YR	0.03	0.018	0.00	0.000	0%	0%
100 YR	0.33	0.098	0.29	0.075	12%	23%

STUDY POINT 3

DESIGN STORM	PRE-DEVELOPMENT		POST-DEVELOPMENT		PERCENT REDUCTION	
	PEAK FLOW (CFS)	VOLUME (AF)	PEAK FLOW (CFS)	VOLUME (AF)	PEAK FLOW	VOLUME
2 YR	0.00	0.000	0.00	0.000	0%	0%
10 YR	0.00	0.002	0.00	0.000	0%	100%
25 YR	0.04	0.024	0.00	0.000	100%	100%
100 YR	0.44	0.132	0.42	0.017	5%	87%

3.0 COMPLIANCE WITH MADEP STORMWATER STANDARDS

The Massachusetts Stormwater Standards were revised in February 2008 to include ten stormwater management standards, established jointly by the DEP 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 required as the project is within the jurisdiction of the Wetlands Protection Act. Therefore, the stormwater management system was designed in accordance with the MASWS.

The following is a list of Stormwater Management Standards and accompanying documentation describing compliance of the proposed retrofit project with each Standard:

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 will discharge to wetland areas. .

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® 2010, and SCS-TR20 based stormwater modeling computer program (**Appendix D**). Post-development peak discharge rates are less than pre-development rates for the 2-, 10-, 25- and 100-year storms. A summary table of these precipitation events is provided in **Table 4**. Rainfall values from the NRCC Extreme Precipitation for New England database were utilized for this analysis.

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.

Under the proposed design, the stormwater runoff is being directed to recharge basins and underground recharge chambers. The intent is to recharge groundwater to the maximum extent practicable as required by Standard 3. Since the site is characterized with a high infiltration rate (greater than 2.4 in/hr.), at least 44% of the total suspended solids must be removed prior to discharge to the infiltration structure. The required TSS pretreatment will be done through deep sump catch basins, bioretention practices, and tree trenches. TSS and recharge calculations are provided in **Appendix E**.

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 stormwater management practices are sized to capture the required water quality volume (**Appendix C**).

The stormwater management pretreatment and treatment systems for the sites have been selected and sized for the most removal of the average annual load of TSS possible. The following removal rates were taken from MA Stormwater Handbook:

Sediment Forebay or Deep Sump Hooded Catch Basin:	Recommended design rate:	25%
Tree Trench (Treebox filter)	Recommended design rate:	80%
Bioretention (with sediment forebay):	Recommended design rate:	90%

TSS calculations are provided in **Appendix E.** Source controls and pollution prevention will be controlled by the methods outlined in **Sections 5.0 and 7.0**. The proposed Operation and Maintenance Plan was developed to ensure that the stormwater system continues to function as it was designed into the future (**Appendix F**).

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 thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

The site is not considered a LUHPPL; thus, this standard is not applicable.

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 project site is not located within a Zone II or Interim Wellhead Protection Area. The stormwater discharges are near to a wetland on the western portion of the site.

The project proposes to use stormwater pretreatment, treatment, and infiltration BMPs identified in Standard 6. Sediment forebays and deep sump catch basins are approved pretreatment BMPs, filtering bioretention areas (included tree trenches) are approved treatment BMPs with 44% TSS reduction prior to treatment occurring, and dry wells and subsurface structures are approved infiltration BMPs.

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.

This project is not a redevelopment project, therefore, Standard 7 does not apply.

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.

An Erosion and Sediment Control Plan is included in construction documents, and a Pollutant Prevention Plan is included in this Report. Silt fence and/or silt socks are proposed at the limit of work; silt socks are proposed along the downgradient edges of the area of disturbance. Disturbed areas will be stabilized with seeding and/or erosion control blankets, if necessary, as soon as possible to minimize erosion and sedimentation. Additional pollutant controls during construction are described in **Section 5.0** and on the plans. A Stormwater Pollution Plan (SWPPP) is required as part of the NPDES Construction General Permit and will be submitted prior to construction.

The contractor will be required to establish erosion controls prior to beginning any other project-related work. The Erosion and Sediment Control Plan will also establish the limit of work, beyond which the contractor will not be allowed to perform any project work. It is the contractor's responsibility to monitor and correct erosion control practices throughout the duration of the project. Erosion control measures will not be removed until the project reaches completion as directed by the project engineer or landscape architect.

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 for each stormwater best management practice is discussed in **Section 6.0** and provided with this report in **Appendix F**.

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 includes measures to prevent illicit discharges.

4.0 CONSTRUCTION ACTIVITIES AND GENERAL CONSTRUCTION SEQUENCE

Construction activities will involve site preparation and earthwork necessary for construction of the proposed project. These activities primarily include the following:

- Erosion control installation
- Clearing and grubbing of existing vegetation within the proposed limits of work
- Excavation stockpiling, and hauling of excavated foundation, topsoil and subsoils
- Rough grading of all disturbed areas
- Construction of new housing unit
- Construction of stormwater management system
- Installation of utilities

- Paving
- Finish grading, final site stabilization and landscaping

Erosion and sediment control (ESC) measures will be installed per the construction plans and specifications prior to commencement of any soil disturbing activities. ESC measures will remain in place until final site stabilization is complete. Topsoil will be separated from the remaining soil and stockpiled on-site for use during site finish grading. The stockpiled topsoil will be protected to prevent erosion and sedimentation.

5.0 POLLUTANT CONTROLS DURING CONSTRUCTION

Controls will be used to reduce erosion during the construction period. Perimeter controls and sediment settling devices will be installed during construction to minimize sediment movement in stormwater and to protect the adjacent properties and buffers on the property.

5.1. Structural Practices

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

- Silt Fence & Sediment Silt Sock Barrier 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. In addition, silt fence barriers will be installed around the bioretention areas during construction.

- Silt Sacks (or approved equivalent) will be installed at identified existing catch basins and structure following construction of the proposed catch basins to prevent sedimentation during the any additional construction. The Silt Sack will be replaced and disposed of off-site if damage is observed.

- Bioretention Area(s) 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 would adversely impact their long-term performance. Silt fence 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 Site Superintendent.

- Slope Stabilization will be installed 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 overflow spillway and sediment forebay 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 Plan (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.

Structural controls will be regularly inspected to ensure proper performance. The following operation and maintenance provisions will be provided:

- Silt fences will be inspected for depth of sediment, tears, to determine if the fabric is securely attached to the fence posts, and to determine if the fence posts are firmly in the ground. Silt fence will be replaced when necessary.
- Silt Socks shall be inspected for depth of sediment and any breaches will promptly be repaired or replaced when necessary.
- Sediment shall be removed where accumulation reaches one-third the above ground height of any barrier.
- Once each workday structural control measures receiving flows from areas that have not been stabilized shall be inspected.
- Remedial action shall be taken in areas where temporary and permanent seeding is deemed inefficient through weekly inspections to establish a stabilized surface.
- All BMP's will be cleared of accumulated foreign debris, including leaves and lawn cuttings.
- All BMP's will be inspected for slope integrity and erosion.
- All control measures will be inspected at least once every 7-calendar days and within 24 hours after storm events of 0.5 inches or more.
- All measures will be maintained in good working order, if a repair is necessary, it will be initiated within 24 hours of discovery.

5.2. 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 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 – the contractor shall install and adequately establish all planting as required at the completion of the project.

- Mulching/Hydro mulching – hydro mulch 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. 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.

5.3. 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.

- Sanitary Wastes – All sanitary wastes will be collected from the portable units by a licensed sanitary waste management contractor (as required by local regulations).

- 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.

- Snow Removal Plan – Plowed snow collected from the parking areas will be deposited onto free draining, pervious surfaces, away from the site's drainage conveyance structures to maximize infiltration. Snowmelt runoff that is not infiltrated will be directed to the site's stormwater management system. Snow is not to be plowed or piled onto the stormwater management facility or wetlands.

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

6.0 STORMWATER OPERATION AND MAINTENANCE PLAN

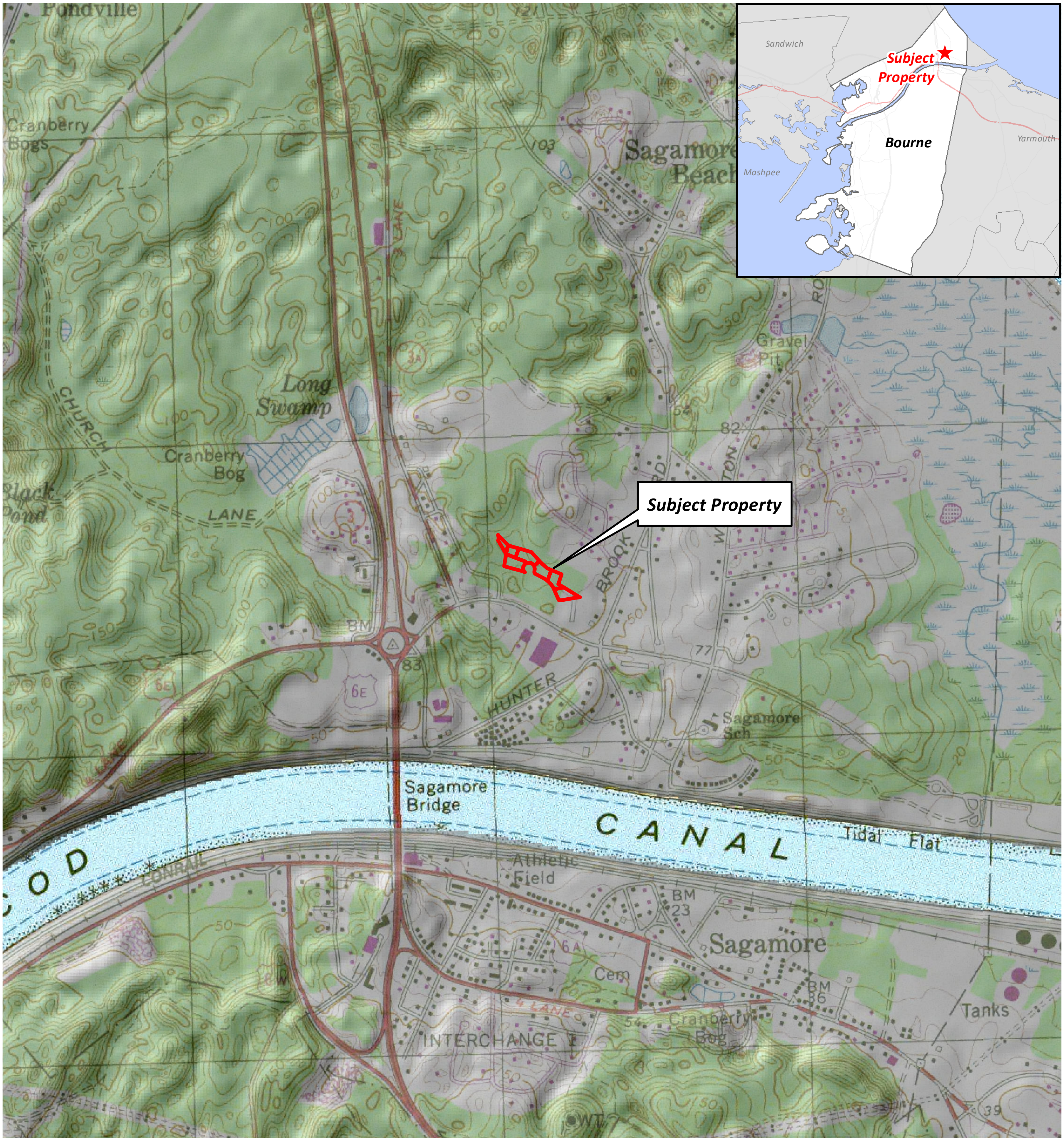
All stormwater management measures and controls identified in this report shall be operated and maintained appropriately during the construction phase of the project and during regular operation of the site in the post-construction period as required on the construction drawings and the separate Stormwater Management Maintenance Plan (**Appendix F**).

7.0 REFERENCES

1. MADEP (Massachusetts Department of Environmental Protection). 2008. Massachusetts Stormwater Standards Manual.

2. Northeast Regional Climate Center and Natural Resources Conservation Service. 2010-2018. Extreme Precipitation for New York and New England. Version 1.12. http://precip.eas.cornell.edu/

FIGURES



Document Path: H:\Projects\2019\19038 Cape View Way\19038A Survey-Environmental Services Cape View Way\GIS\Maps\USGS_Locus.mxd

*Hyannis Topographic Quadrangle

Legend

Subject Property

N

0 1,500

1" = 1,500 feet

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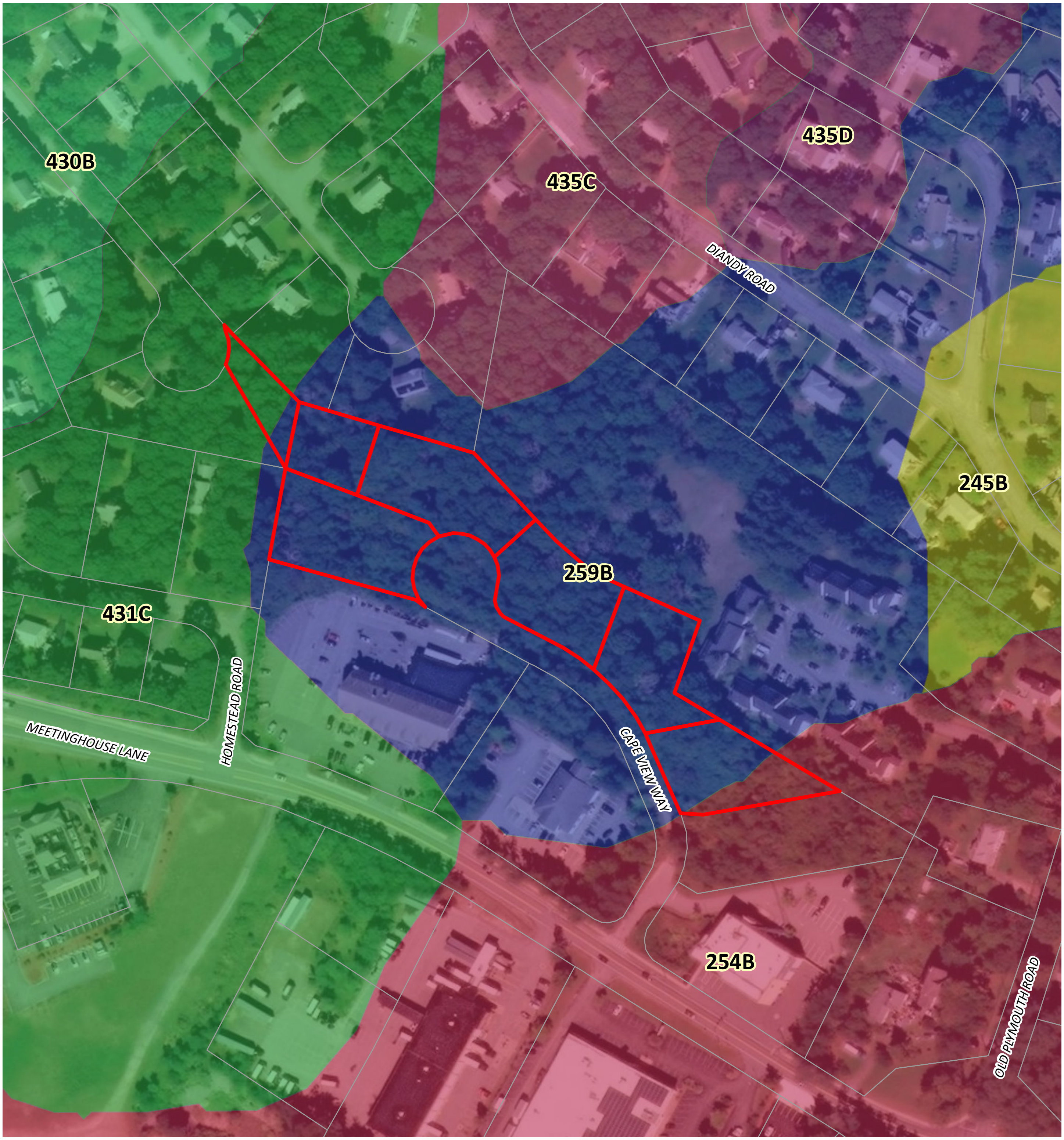
USGS Locus
Cape View Way
Bourne, MA

Date: 6/13/2019

Figure 1

*Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



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*Soils - MassGIS 2012

Legend

Subject Property

Parcels

MUSYM, compname, hydgrp

245B, Hinckley, A

254B, Merrimac, A

259B, Carver, A

430B, Barnstable, B

431C, Barnstable, B

435C, Plymouth, A

435D, Plymouth, A

N

0 200

1" = 200 feet

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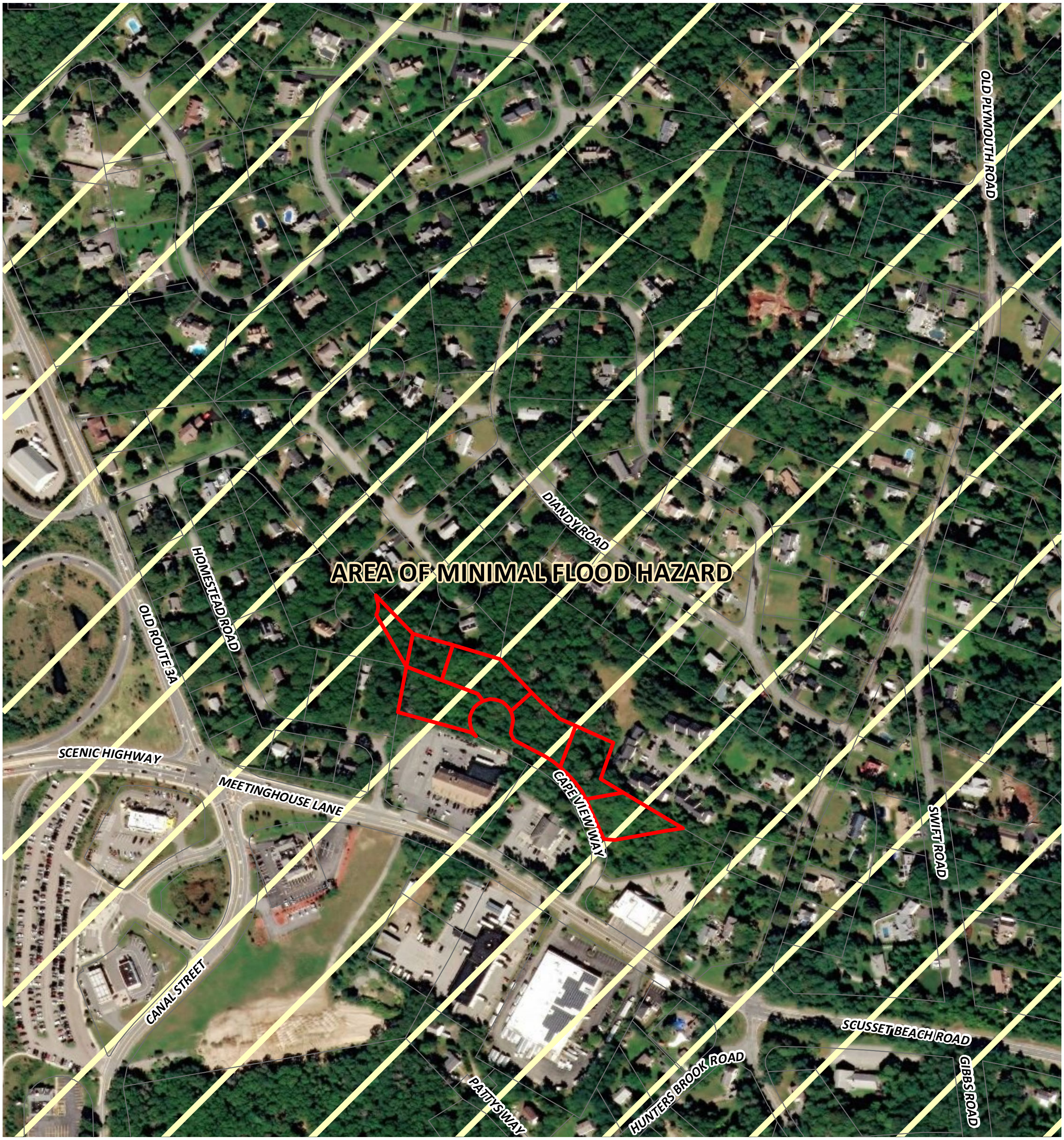
NRCS SSURGO-Certified Soils
Cape View Way
Bourne, MA

Date: 6/13/2019

Figure 2

*Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



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**FEMA's National Flood Hazard Layer, 2014*

Legend

- Subject Property
- Parcels
- Zone X - Area of Minimal Flood Hazard

N

0 400

1" = 400 feet

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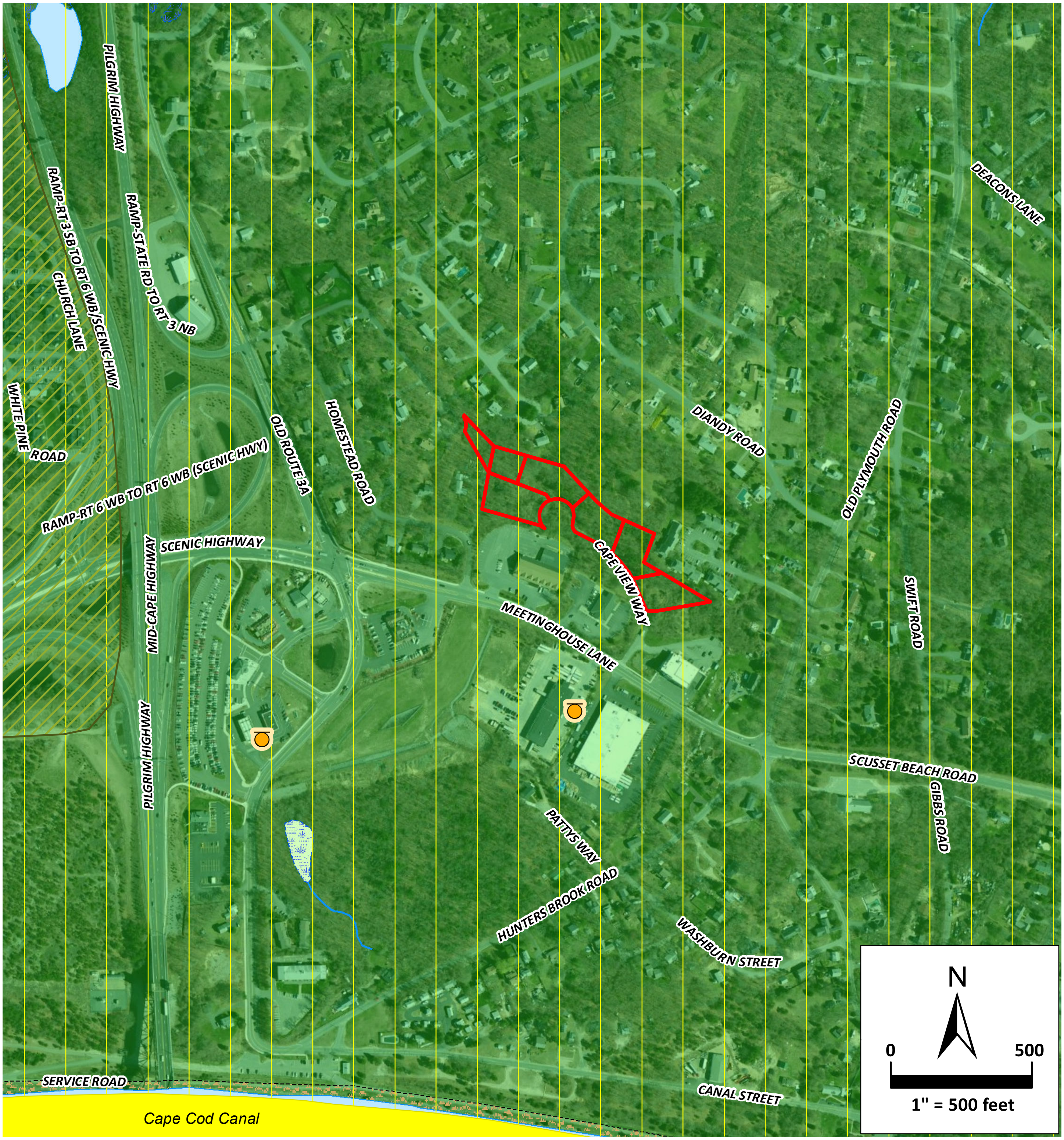
FEMA's National Flood Hazard Layer
Cape View Way
Bourne, MA

Date: 6/13/2019

Figure 3

**Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services*



Document Path: H:\Projects\2019\19038 Cape View Way\19038A Survey-Environmental Services Cape View Way\GIS\Maps\Existing_Constraints.mxd

Legend

*GIS Data - MassGIS

- Subject Property
- Parcels
- Underground Storage Tanks
- Sole Source Aquifer
- 4A -Impaired - TMDL is completed
- Marsh/Bog
- Wooded marsh
- Open Water
- Beach/Dune
- Hydrologic Connection
- ACECs
- High Yield Aquifer

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Existing Constraints
Cape View Way
Bourne, MA

Date: 6/13/2019

Figure 4

*Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

APPENDIX A

Site Soil Evaluations

Horsley Witten Group
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MEMORANDUM

TO:	Meena Jacobs – Senior Project Manager – Real Estate Development Preservation of Affordable Housing, Inc.
FROM:	Joe Henderson, P.E.
DATE:	October 28, 2019
RE:	Cape View Way, Bourne MA Site Soil Evaluation
CC:	Brian Kuchar, RLA, P.E.

Horsley Witten Group, Inc. (HW) has conducted a total of 14 soil test pits at Cape View Way to complete a Phase 2 assessment and assess the subsurface conditions and determine its suitability for the construction of wastewater and stormwater management practices. The test pits were spread throughout the site and locations are shown on the attached plan. The results of the nine test pits for stormwater and wastewater soil test pit data are attached. For more information on the Phase 2 assessment, please see the Limited Investigation Subsurface Report dated November 22, 2019.

The soil map units according to the USDA Natural Resources Conservation Service for this location are “fine sandy loam” and “loamy coarse sand.” The majority of test pits consisted of varying depths of loamy sand overlaying fine sand with a gravelly lens. The top layers of soil were generally friable and the underlying layers were more firm in place but generally friable in hand. The outlier test pit (TP-E) was closest to the existing wetland (approx. 100 ft away) and consisted of much tighter soils, including a silt loam layer from 66-116” with gleyed soils containing decomposed organic matter underlain by sandy soil.

No standing water was observed in any of the test pits; TP-E encountered seepage at 116” that was held above the restrictive silt loam layer but was determined to be not indicative of the groundwater table.

Redoximorphic features (mottling) were found in two test pits: TP-E & TP-F. In TP-E, two lenses of mottling were observed: one in the sandy loam just above the silt loam layer, and one within the sandy loam layer just below the silt loam layer. In our opinion, both sets of mottles are due to the interface between the loamy sand and silt loam layers and is indicative of the restriction of infiltration of surface water caused by this textural change. A gap between the two sets of mottles was observed where no redoximorphic features could be seen. In TP-F, a similar two lenses of mottling were observed, both of which we believe are a result of textural changes. Based on the soil textures, it is our opinion that the redox in these pits and the seepage in TP-E are not indication of a high water table in this area.

The site is located approximately half a mile from the Cape Cod Canal, a navigable ocean channel connecting Cape Cod Bay with Buzzards Bay. The lowest test pit (TP-F) observed was at ground surface elevation 63.5 and was excavated to a depth of 10 feet with no indication of a seasonal high water table. Comparable regional groundwater monitoring wells less than a mile from the ocean indicate a high groundwater elevation of approximately 5 to 10. The recommended design Estimated Seasonal High Ground Water (ESHGW) elevation is el. 10.0 ft.

Bourne Health Agent Terri Guarino observed percolation tests at TP-6 and TP-B on October 24, 2019. At TP-6, the percolation test was performed from 60" to 75" and the soil was unable to maintain a water height of 12". The full 24 gallons were applied to TP-6, giving the percolation test a default rate of 5 minutes/inch. At TP-B, the percolation test was performed from 44" to 59", resulting in a rate of 3.3 minutes/inch. The Health Agent also observed TP-A, TP-C and TP-D and concluded that the material was of similar nature and did not require further percolation tests. The design percolation rate for sizing wastewater leaching facilities is 5 minutes/inch.

In addition, HW performed a double-ring infiltrometer test at TP-F in the fine loamy sand layer, which resulted in an infiltration rate of 7.0 inches/hour. To be conservative, half of the average observed rate will be used in the design of infiltrating stormwater practices (e.g., 3.5in/hr). Although not tested with the infiltrometer, the underlying sandy layer would likely have an infiltration rate of 8.27 in/hr based on the percolation testing results.

Based upon the results of on-site soil evaluations, the underlying sandy soils onsite are acceptable for wastewater and stormwater infiltration. Stormwater practices located near TP-E and TP-F should be located in the underlying sandy layers below the restrictive soil layers (approx., El. 55 – 57). The extent of restrictive soil layers should be confirmed during construction if necessary.

C. On-Site Review

Test Hole Number: TP-A

Date: 24-Oct-19 | Time: 1:30 PM | Weather: 60F, sunny

1. Location

   Ground Elevation at Surface of Hole: 60.8

   Location (Identify on Plan): Northeast corner of site, closest to Cherry Hill buildings

2. Land Use: Woodland (e.g. woodland, agricultural field, vacant lot, etc.)

   Surface Stones: No

   Slope (%): 0-3

   Vegetation: mix of brush and trees

   Landform: ____

   Position on landscape (attach sheet): ____

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Possible Wet Area ____ feet

   Property Line ____ feet Drinking Water Well ____ feet Other ____

4 Parent Material: Unsuitable Materials Present: Yes [ ] No [x]

If Yes: Disturbed Soil [ ] Fill Material [ ] Impervious Layer(s) [ ] Weathered/Fractured Rock [ ] Bedrock [ ]

5 Groundwater Observed: Yes [ ] No [X]

If Yes: Depth Weeping from Pit ____ Depth Standing Water in Hole ____

Estimated Depth to High Groundwater: ____ feet ____ elevation Observed ____ elevation

Test Pit Number: TP-A

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-10	A	10 YR 4/2	-	-	-	SL	<5	-			
10-38	Bw	10YR 4/6	-	-	-	SL	-	-			
38-50	C1	10YR 6/3	-	-	-	FS	-	-			
50-68	C2	10YR 6/3	-	-	-	G-FS	50	10			

C. On-Site Review

Test Hole Number: TP-B | Date: 24-Oct-19 | Time: 2:00 PM | Weather: 60F, sunny

1. Location

Ground Elevation at Surface of Hole: 63.1

Location (Identify on Plan): North edge of the site, near Cherry Hill property line (west of A, north of C)

2. Land Use: Woodland (e.g. woodland, agricultural field, vacant lot, etc.) | Surface Stones: No | Slope (%): 0-3

Vegetation: mix of brush and trees | Landform: | Position on landscape (attach sheet):

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Possible Wet Area ____ feet

Property Line ____ feet Drinking Water Well ____ feet Other ____

4 Parent Material: Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5 Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit ____ Depth Standing Water in Hole ____

Estimated Depth to High Groundwater: ____ feet ____ elevation Observed ____ elevation

Test Pit Number: TP-B

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10 YR 4/2	-	-	-	SL	<5	-			
6-36	Bw	10YR 5/8	-	-	-	SL	-	-			
36-66	C1	10YR 6/4	-	-	-	MS	-	-			
66-84	C2	10YR 6/4	-	-	-	G-FS	30	10			

C. On-Site Review

Test Hole Number: TP-C

Date	24-Oct-19
Time	3:00 PM
Weather	60F, sunny

1. Location

Ground Elevation at Surface of Hole: 62.9

Location (Identify on Plan): South side of TP B (toward Meetinghouse Rd)

2. Land Use: Woodland (e.g. woodland, agricultural field, vacant lot, etc.)

Surface Stones: No

Slope (%): 0-3

Vegetation: mix of brush and trees

Landform:

Position on landscape (attach sheet):

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Possible Wet Area ______ feet

Property Line ______ feet Drinking Water Well ______ feet Other ______

4 Parent Material:

Unsuitable Materials Present: Yes [ ] No [x]

If Yes: Disturbed Soil [ ] Fill Material [ ] Impervious Layer(s) [ ] Weathered/Fractured Rock [ ] Bedrock [ ]

5 Groundwater Observed: Yes [ ] No [X]

If Yes: Depth Weeping from Pit ______ Depth Standing Water in Hole ______

Estimated Depth to High Groundwater: ______ feet ______ elevation Observed ______ elevation

Test Pit Number: TP-C

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-5	A	10 YR 4/2	-	-	-	SL	<5	-			
5-45	Bw	10YR 5/8	-	-	-	SL	-	-			
45-68	C1	10YR 6/4	-	-	-	MS	-	-			
68-80	C2	10YR 6/4	-	-	-	G-FS	30	10			

C. On-Site Review

Test Hole Number: TP-D

Date: 24-Oct-19 Time: 4:00 PM Weather: 60F, sunny

1. Location

Ground Elevation at Surface of Hole: 61

Location (Identify on Plan): South side of TP A (farther from Cherry Hill)

2. Land Use: Woodland (e.g. woodland, agricultural field, vacant lot, etc.)

Surface Stones: No

Slope (%): 0-3

Vegetation: mix of brush and trees

Landform: ______

Position on landscape (attach sheet): ______

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Possible Wet Area ______ feet

Property Line ______ feet Drinking Water Well ______ feet Other ______

4 Parent Material: ______ Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5 Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit ______ Depth Standing Water in Hole ______

Estimated Depth to High Groundwater: ______ feet ______ elevation Observed ______ elevation

Test Pit Number: TP-D

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-8	A	10 YR 4/2	-	-	-	SL	<5	-			
8-40	Bw	10YR 5/8	-	-	-	SL	-	-			
40-62	C1	10YR 6/4	-	-	-	MS	-	-			
62-74	C2	10YR 6/4	-	-	-	G-FS	30	10			

C. On-Site Review

Test Hole Number: TP-E | Date: 25-Oct-19 | Time: 9:00 AM | Weather: 60F, sunny

1. Location

Ground Elevation at Surface of Hole: 66.2

Location (Identify on Plan): Between proposed building footprint and wetland (Northwest side of building)

2. Land Use: Woodland (e.g. woodland, agricultural field, vacant lot, etc.) | Surface Stones: No | Slope (%): 0-3

Vegetation: Sumac trees, lower brush | Landform: | Position on landscape (attach sheet):

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Possible Wet Area ______ feet

Property Line ______ feet Drinking Water Well ______ feet Other ______

4 Parent Material: Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5 Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit ______ Depth Standing Water in Hole ______

Estimated Depth to High Groundwater: ______ feet ______ elevation Observed ______ elevation

Test Pit Number: TP-E

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-4	A	10YR 3/2	-	-	-	VFSL	-	-			
4-14	Bw	10YR 5/2	-	-	-	VFSL	-	-			
14-66	C1	10YR 5/2	-	-	-	VFLS	-	-			
66-116	C2	GLEY 1 2.5/N, GLEY 5/10Y	66	2.5 YR 4/6	100	SiL	-	-			clays, black

C. On-Site Review

Test Hole Number: TP-F | Date: 25-Oct-19 | Time: 11:00 AM | Weather: 60F, sunny

1. Location

Ground Elevation at Surface of Hole: 63.8

Location (Identify on Plan): In proposed circle in front of building

2. Land Use: Woodland (e.g. woodland, agricultural field, vacant lot, etc.) | Surface Stones: No | Slope (%): 0-3

Vegetation: Sumac trees, lower brush | Landform: ______ | Position on landscape (attach sheet): ______

3. Distances from: Open Water Body ______ feet | Drainage Way ______ feet | Possible Wet Area ______ feet

Property Line ______ feet | Drinking Water Well ______ feet | Other ______

4 Parent Material: ______ Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5 Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit ______ Depth Standing Water in Hole ______

Estimated Depth to High Groundwater: ______ feet ______ elevation Observed ______ elevation

Test Pit Number: TP-F

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR 3/2	-	-	-	FLS	-	-			
6-18	Bw	10YR 5/2	-	-	-	FLS	-	-			
18-60	C1	10YR 5/2	48	10 YR 6/8	-	FLS	-	-			
60-78	C2	GLEY 1 2.5/N, GLEY 5/10Y	66	2.5 YR 4/6	-	SiL	-	-			

C. On-Site Review

Test Hole Number: TP-6 | Date: 24-Oct-19 | Time: 10:00 AM | Weather: 60F, sunny

1. Location

Ground Elevation at Surface of Hole: 61.4

Location (Identify on Plan): Just southwest of Cherry Hill buildings

2. Land Use: Woodland (e.g. woodland, agricultural field, vacant lot, etc.) | Surface Stones: No | Slope (%): 0-3

Vegetation: mix of brush and trees | Landform: | Position on landscape (attach sheet):

3. Distances from: Open Water Body ____ feet | Drainage Way ____ feet | Possible Wet Area ____ feet

Property Line ____ feet | Drinking Water Well ____ feet | Other ____

4 Parent Material: | Unsuitable Materials Present: Yes [ ] No [x]

If Yes: Disturbed Soil [ ] Fill Material [ ] Impervious Layer(s) [ ] Weathered/Fractured Rock [ ] Bedrock [ ]

5 Groundwater Observed: Yes [ ] No [X]

If Yes: Depth Weeping from Pit ____ Depth Standing Water in Hole ____

Estimated Depth to High Groundwater: ____ feet ____ elevation | Observed ____ elevation

Test Pit Number: TP-6

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-12	A	10 YR 4/2	-	-	-	FSL	-	-			
12-36	Bw	10YR 4/6	-	-	-	SL	-	-			
36-48	C1	10YR 6/3	-	-	-	G-FS	30	5			
48-120	C2	10YR 6/3	-	-	-	MS	-	-			

C. On-Site Review

Test Hole Number: TP-7 | Date: 23-Oct-19 | Time: 10:30 AM | Weather: 50F, cloudy and rainy

1. Location

   Ground Elevation at Surface of Hole: 59.6

   Location (Identify on Plan): North side of entrance road, farther into site than TP-8

2. Land Use: Woodland (e.g. woodland, agricultural field, vacant lot, etc.) | Surface Stones: No | Slope (%): 0-3

   Vegetation: mix of brush and trees | Landform: ______ | Position on landscape (attach sheet): ______

3. Distances from: Open Water Body ______ feet | Drainage Way ______ feet | Possible Wet Area ______ feet

   Property Line ______ feet | Drinking Water Well ______ feet | Other ______

4 Parent Material: | Unsuitable Materials Present: Yes [ ] No [x]

If Yes: Disturbed Soil [ ] Fill Material [ ] Impervious Layer(s) [ ] Weathered/Fractured Rock [ ] Bedrock [ ]

5 Groundwater Observed: Yes [ ] No [X]

If Yes: Depth Weeping from Pit ______ Depth Standing Water in Hole ______

Estimated Depth to High Groundwater: ______ feet ______ elevation | Observed ______ elevation

Test Pit Number: TP-7

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-22	HTM	10YR 3/4	-	-	-	FSL					
2-24	Ab	10YR 4/6	-	-	-	FSL					
24-32	Bw	10YR 6/6	-	-	-	FSL					
32-38	C1	10YR 6/3	-	-	-	G-FS					

C. On-Site Review

Test Hole Number: TP-8 | Date: 23-Oct-19 | Time: 9:30 AM | Weather: 50F, cloudy and rainy

1. Location

   Ground Elevation at Surface of Hole: 58.7

   Location (Identify on Plan): North side of entrance road, near post office and fire station

2. Land Use: Woodland (e.g. woodland, agricultural field, vacant lot, etc.) | Surface Stones: No | Slope (%): 0-3

   Vegetation: mix of brush and trees, knotweed | Landform: ____ | Position on landscape (attach sheet): ____

3. Distances from: Open Water Body ____ feet | Drainage Way ____ feet | Possible Wet Area ____ feet

   Property Line ____ feet | Drinking Water Well ____ feet | Other ____

4 Parent Material: | Unsuitable Materials Present: Yes [ ] No [x]

If Yes: Disturbed Soil [ ] Fill Material [ ] Impervious Layer(s) [ ] Weathered/Fractured Rock [ ] Bedrock [ ]

5 Groundwater Observed: Yes [ ] No [X]

If Yes: Depth Weeping from Pit ____ Depth Standing Water in Hole ____

Estimated Depth to High Groundwater: ____ feet ____ Observed ____ elevation

Test Pit Number: TP-8

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6	A	10YR 3/4	-	-	-	FSL	5	-	GRANULAR		
6-21	Bw	10YR 4/6	-	-	-	FSL	-	-	MASSIVE		
21-45	C1	10YR 6/6	-	-	-	G-FS	50	10	MASSIVE		
45-84	C2	10YR 6/3	-	-	-	MS	-	-	MASSIVE		

United States Department of Agriculture

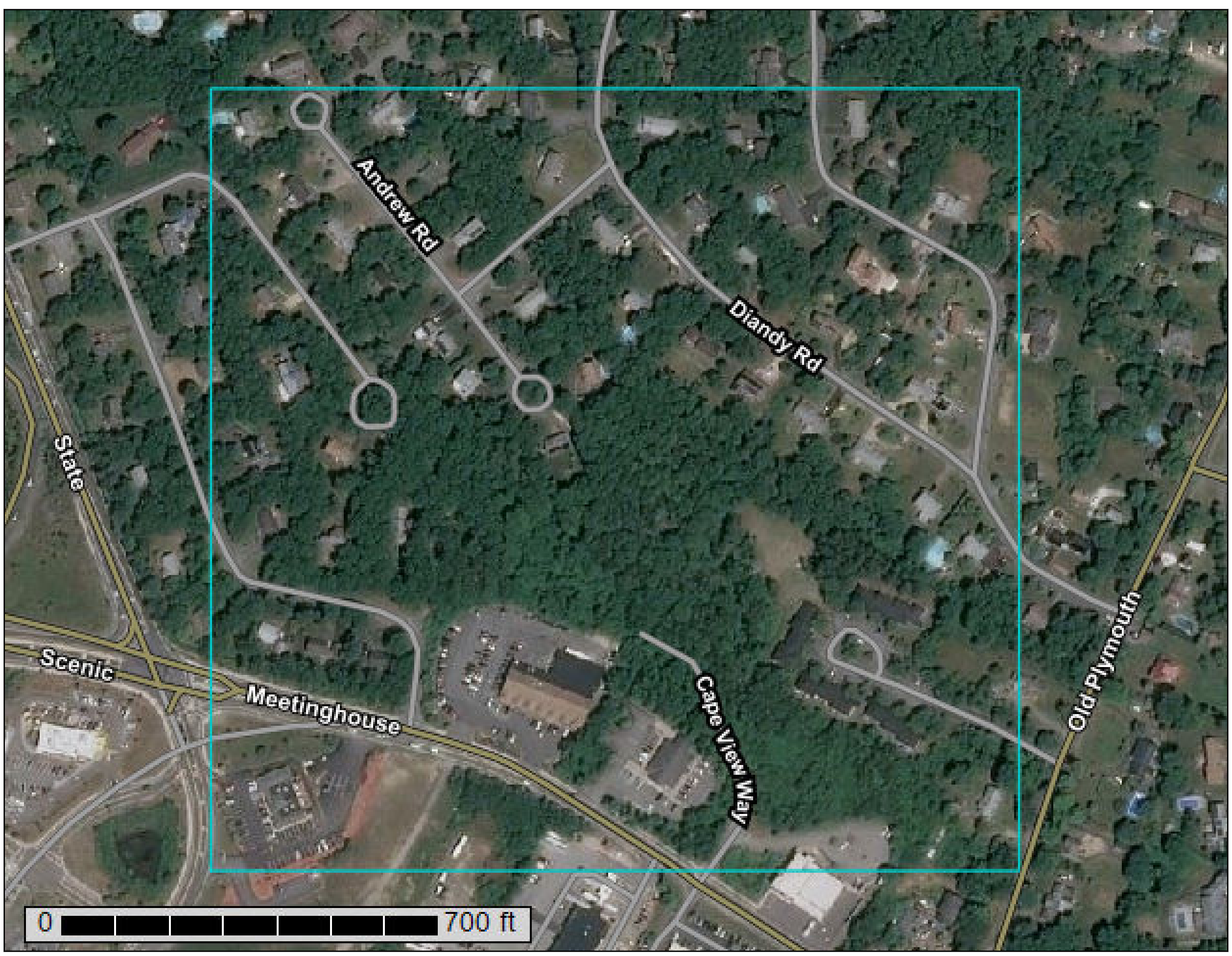
NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for

Barnstable County, Massachusetts



January 27, 2021

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

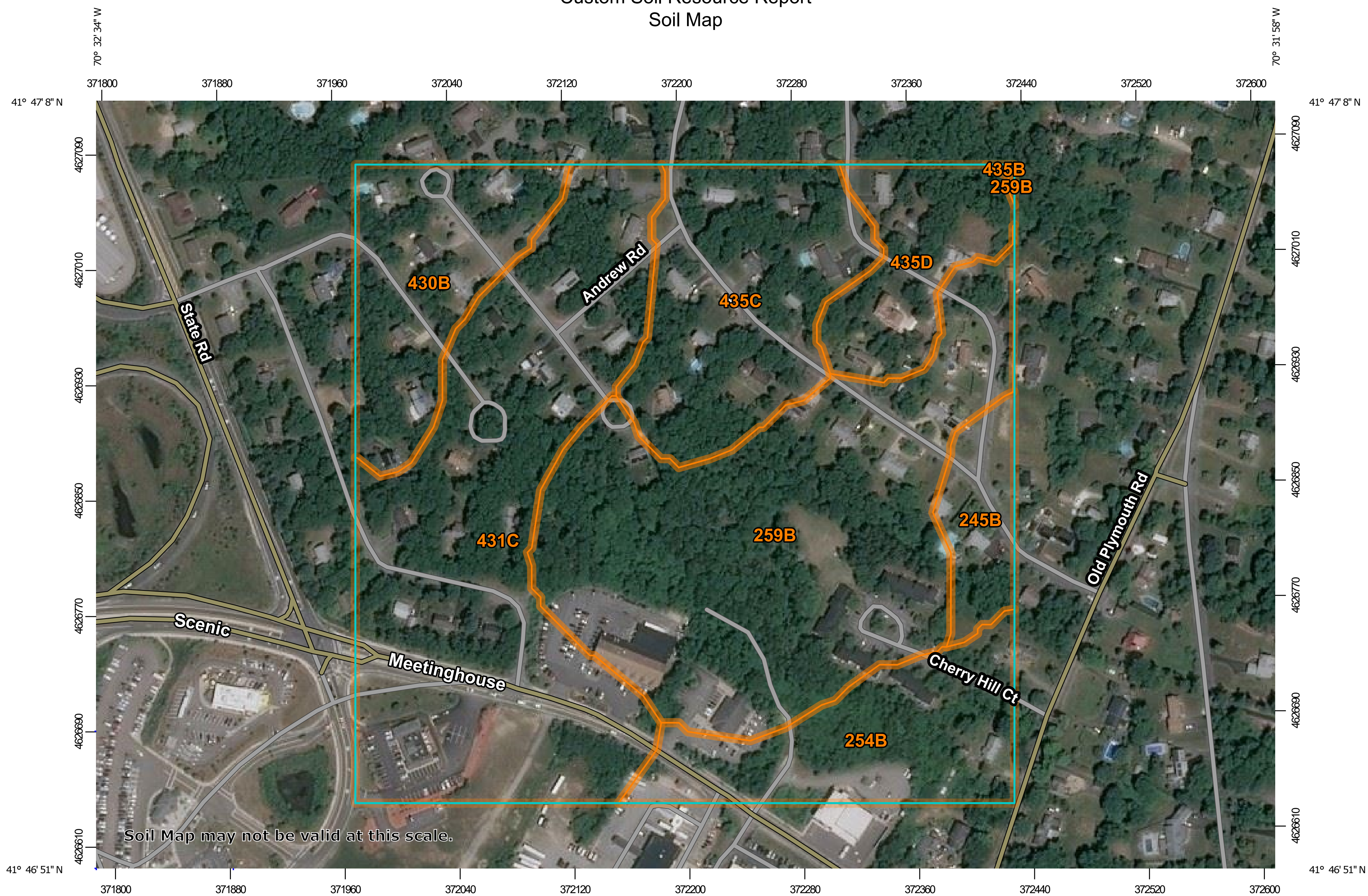
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Soil Map



Map Scale: 1:3,750 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Barnstable County, Massachusetts
Survey Area Data: Version 17, Jun 9, 2020

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

Date(s) aerial images were photographed: Jul 10, 2018—Nov 17, 2018

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
245B	Hinckley loamy sand, 3 to 8 percent slopes	1.8	3.5%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	5.0	9.9%
259B	Carver loamy coarse sand, 3 to 8 percent slopes	14.8	29.4%
430B	Barnstable sandy loam, 3 to 8 percent slopes	4.6	9.2%
431C	Barnstable sandy loam, 8 to 15 percent slopes, very stony	14.7	29.1%
435B	Plymouth loamy coarse sand, 3 to 8 percent slopes	0.0	0.0%
435C	Plymouth loamy coarse sand, 8 to 15 percent slopes	6.4	12.7%
435D	Plymouth loamy coarse sand, 15 to 35 percent slopes	3.2	6.3%
Totals for Area of Interest		**50.4**	**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

245B—Hinckley loamy sand, 3 to 8 percent slopes

Map Unit Setting

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

Map Unit Composition

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

Description of Hinckley

Setting

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

Typical profile

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

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A

Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Windsor

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

Sudbury

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

Agawam

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

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqs
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent

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

Description of Merrimac

Setting

Landform: Outwash terraces, eskers, moraines, outwash plains, kames
Landform position (two-dimensional): Backslope, footslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, tread, riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury

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

Hinckley

Percent of map unit: 5 percent
Landform: Kames, eskers, deltas, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Head slope, crest, side slope, nose slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Outwash plains, outwash terraces, deltas, dunes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent
Landform: Stream terraces, outwash plains, kames, outwash terraces, eskers, moraines
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

259B—Carver loamy coarse sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2y07t
Elevation: 0 to 240 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Carver, Loamy Coarse Sand

Setting

Landform: Moraines, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, tread
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Sandy glaciofluvial deposits

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
Oe - 2 to 3 inches: moderately decomposed plant material
A - 3 to 7 inches: loamy coarse sand
E - 7 to 10 inches: coarse sand
Bw1 - 10 to 15 inches: coarse sand
Bw2 - 15 to 28 inches: coarse sand
BC - 28 to 32 inches: coarse sand
C - 32 to 67 inches: coarse sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F149BY005MA - Dry Outwash
Hydric soil rating: No

Minor Components

Deerfield

Percent of map unit: 10 percent
Landform: Outwash terraces, outwash plains, outwash deltas, kame terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent
Landform: Outwash plains, kames, outwash deltas, kame terraces, outwash terraces, eskers, moraines
Landform position (two-dimensional): Shoulder, backslope, footslope, summit, toeslope
Landform position (three-dimensional): Crest, head slope, nose slope, side slope, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Merrimac

Percent of map unit: 3 percent
Landform: Outwash deltas, kame terraces, outwash terraces
Landform position (three-dimensional): Tread, riser

Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Mashpee

Percent of map unit: 2 percent
Landform: Drainageways, terraces, depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

430B—Barnstable sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 98ps
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

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
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): 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 capacity: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F149BY011MA - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Plymouth

Percent of map unit: 8 percent
Hydric soil rating: No

Nantucket

Percent of map unit: 7 percent
Hydric soil rating: No

Merrimac

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

Carver

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

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
Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: More than 80 inches
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 capacity: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F149BY011MA - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Nantucket

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

Plymouth

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

Carver

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

435B—Plymouth loamy coarse sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 98rs
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: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plymouth

Setting

Landform: Outwash plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser
Down-slope shape: Convex
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; 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: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
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 capacity: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F149BY005MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 8 percent
Hydric soil rating: No

Carver

Percent of map unit: 8 percent
Hydric soil rating: No

Barnstable

Percent of map unit: 6 percent
Hydric soil rating: No

Nantucket

Percent of map unit: 6 percent

Hydric soil rating: No

Merrimac

Percent of map unit: 2 percent
Hydric soil rating: No

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
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 capacity: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: F149BY005MA - Dry Outwash
Hydric soil rating: No

Minor Components

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

Hinckley
Percent of map unit: 8 percent
Hydric soil rating: No

Barnstable
Percent of map unit: 6 percent
Hydric soil rating: No

Nantucket
Percent of map unit: 6 percent
Hydric soil rating: No

435D—Plymouth loamy coarse sand, 15 to 35 percent slopes

Map Unit Setting
National map unit symbol: 98rv
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 glaciofluvial deposits and/or loose sandy ablation till

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: 15 to 35 percent
Depth to restrictive feature: More than 80 inches
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 capacity: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: F149BY005MA - Dry Outwash
Hydric soil rating: No

Minor Components

Carver

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

Hinckley

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

Barnstable

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

Nantucket

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

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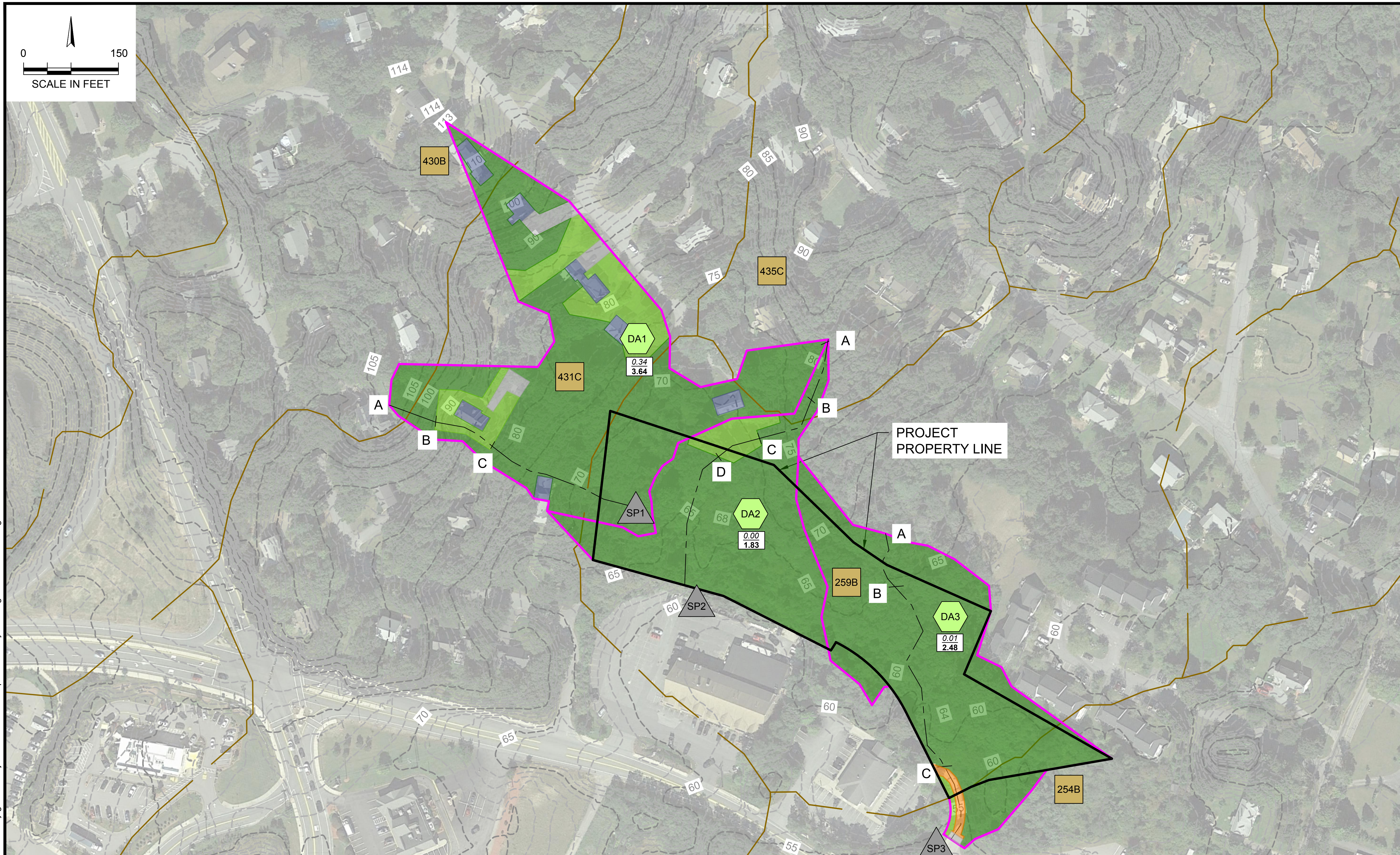
APPENDIX B

Drainage Area Maps



LEGEND

DRAINAGE AREA BOUNDARY — WOODS, ROOFTOPS, GRASS, GRAVEL, PAVEMENT

IMP. AREA / TOTAL AREA (ACRES) — 5,000 / 15,000

DA1 — DRAINAGE AREA

SP1 — STUDY POINT

SOIL BOUNDARY

TIME OF CONCENTRATION FLOW PATH

5' MAJOR CONTOUR

1' MINOR CONTOUR

SOIL TYPES

254B	MERRIMAC FINE SANDY LOAM 3-8% SLOPES (HSG A)
259B	CARVER LOAMY COARSE SAND 3-8% SLOPES (HSG A)
430B	BARNSTABLE SANDY LOAM 3-8% SLOPES (HSG A)
431C	BARNSTABLE VERY STONY SANDY LOAM 8-15% SLOPES (HSG A)
435C	PLYMOUTH LOAMY COARSE SAND 8-15% SLOPES (HSG A)

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

Date: 3/4/2021 | Design By: | Drawn By: GLK | Checked By: BRK

Plan Set:
SITE FOR AFFORDABLE HOUSING CAPE VIEW WAY BOURNE, MASSACHUSETTS

Plan Title:
PRE-CONSTRUCTION DRAINAGE MAP

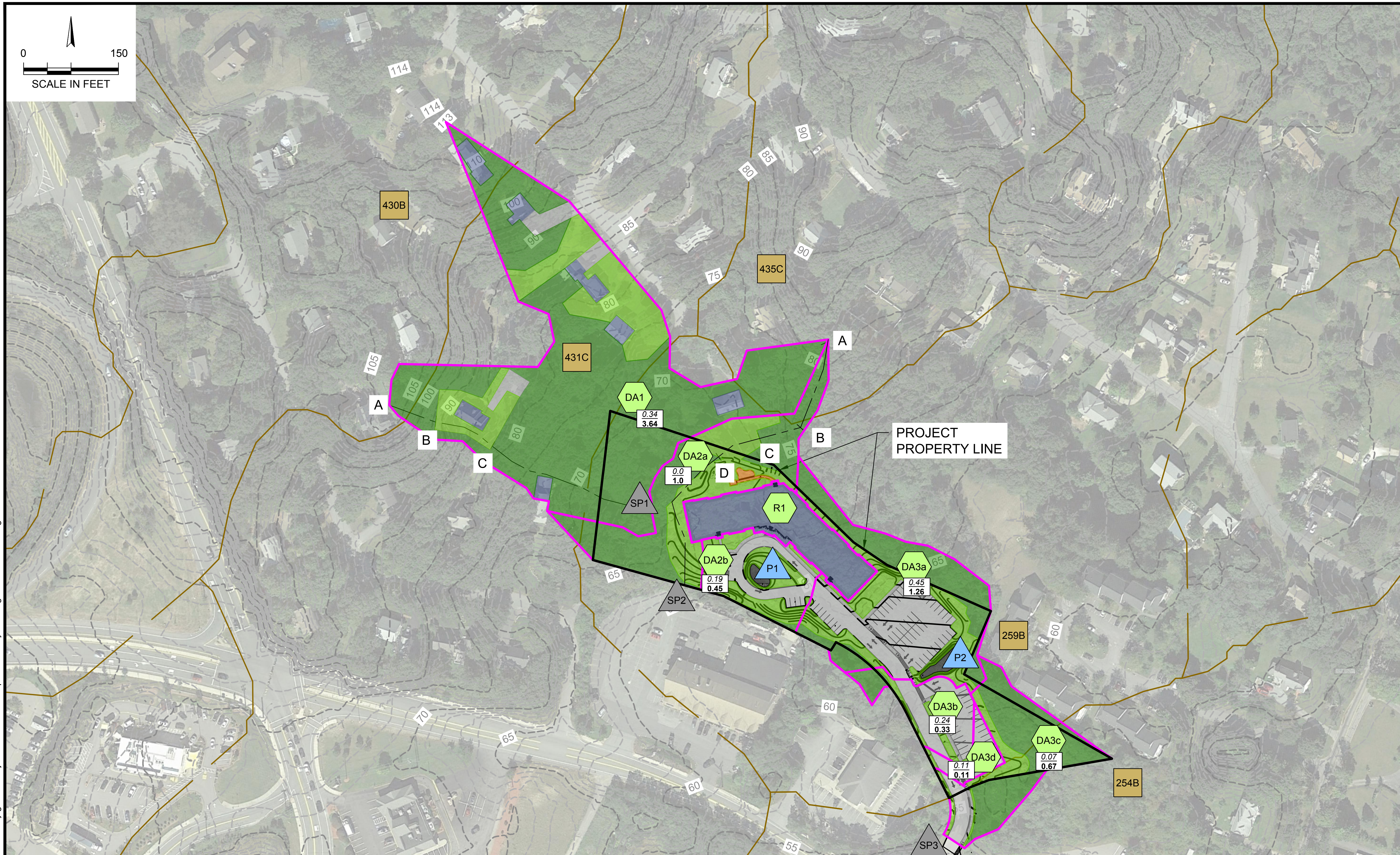
Prepared For:
POAH, INC.
2 OLIVER STREET, SUITE 500
BOSTON, MA 02109
Phone:(617) 261-9898
Fax: ----

Prepared By:
Horsley Witten Group, Inc.
90 Route 6A
Phone(508) 833-6600
Dated: September 2019

Registration:

Project Number: 19038

Sheet Number: 1 of 2



LEGEND

DRAINAGE AREA BOUNDARY	WOODS
	ROOFTOPS
	GRASS
IMP. AREA / TOTAL AREA (ACRES) — 5,000 / 15,000	GRAVEL
	PAVEMENT
DA1	DRAINAGE AREA
SP1	STUDY POINT
	SOIL BOUNDARY
	TIME OF CONCENTRATION FLOW PATH
	5' MAJOR CONTOUR
	1' MINOR CONTOUR

SOIL TYPES

254B	MERRIMAC FINE SANDY LOAM 3-8% SLOPES (HSG A)
259B	CARVER LOAMY COARSE SAND 3-8% SLOPES (HSG A)
430B	BARNSTABLE SANDY LOAM 3-8% SLOPES (HSG A)
431C	BARNSTABLE VERY STONY SANDY LOAM 8-15% SLOPES (HSG A)
435C	PLYMOUTH LOAMY COARSE SAND 8-15% SLOPES (HSG A)

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

Date: 9/5/2019 | Design By: | Drawn By: MCL | Checked By: BRK

Plan Set:
SITE FOR AFFORDABLE HOUSING
CAPE VIEW WAY
BOURNE, MASSACHUSETTS

Plan Title:
POST-CONSTRUCTION DRAINAGE MAP

Prepared For:
POAH, INC.
2 OLIVER STREET, SUITE 500
BOSTON, MA 02109
Phone:(617) 261-9898
Fax: ----

Prepared By:
Horsley Witten Group, Inc.
90 Route 6A
Phone:(508) 833-6600
Dated: September 2019

Registration:

Project Number: 19038

Sheet Number: 2 of 2

APPENDIX C

GSI Sizing Calculations

Horsley Witten Group
Sustainable Environmental Solutions

Project: Cape View Way **Project No:** 19038
Project Location: Bourne, MA

Calculated By: GLK **Date :** 2/10/2021
Checked By: BRK **Date :** 3/5/2021

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
3a	Upper parkin	36%	52,874	1.21	18,913	0.43	1,576	0.036
2b	Driveway loo	47%	17,418	0.40	8,176	0.19	681	0.016
	TOTALS		70292	1.21	27,089	0.43	2,257	0.052

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 Depth (ft)	Sediment Forebay Area (sf)	Sediment Forebay Provided (cf)	WQV Treatment Provided (af)
1	3a	0.036	2.00	1	9	0.375	1.67	795	801	158	0.50	132	66	0.036
2	2b	0.016	2.00	1	6	0.25	1.67	363	408	68	0.50	104	52	0.018
	TOTALS	0.052						1157	1209	226			118	0.054
					Percentage of Treatment Provided				**104%**				**52%**	

Project: Cape View Way **Project No:** 19038
Project Location: Bourne, MA

Calculated By: GK **Date :** 1/27/2021
Checked By: BRK **Date :** 3/5/2021
Revised By: BRK **Date :** 3/5/2021

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

Storm Depth: 1 ***Inch***

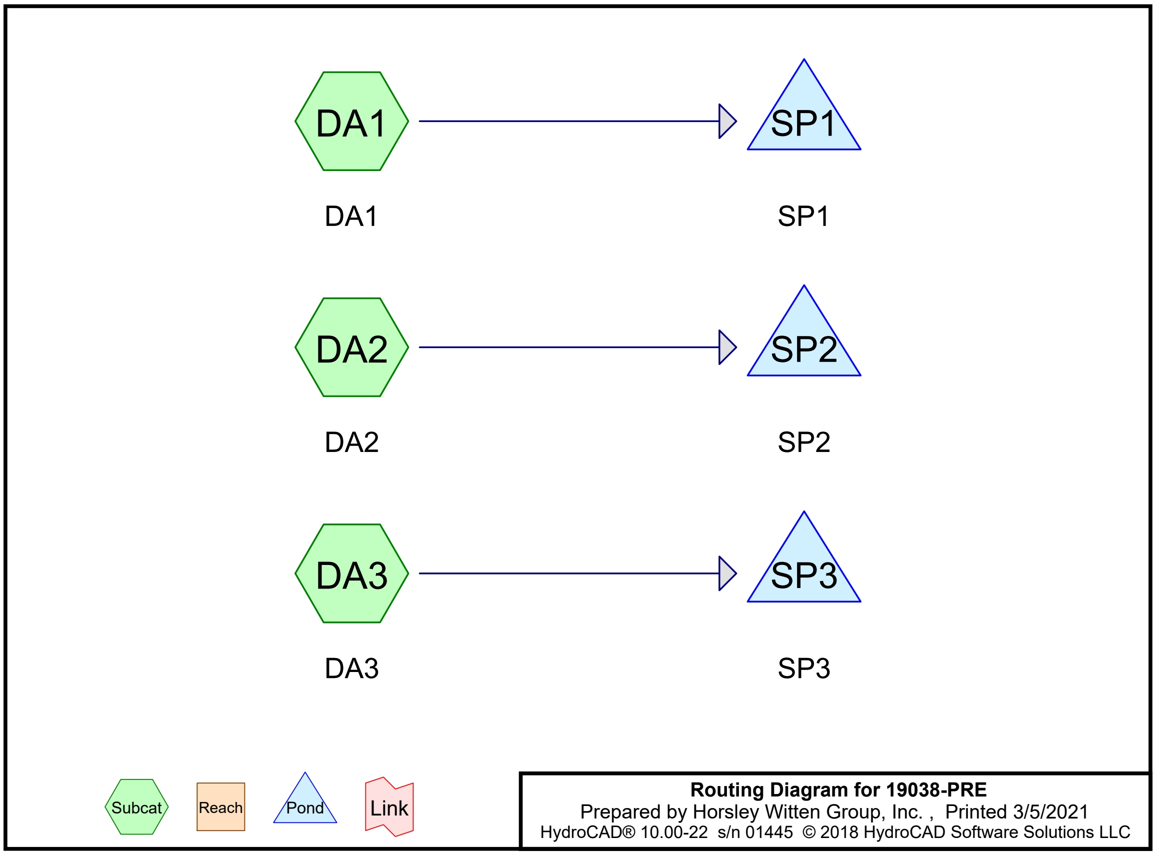
ENHANCED TREE TRENCH VOLUME CALCULATIONS

PARAMETER					DESIGN									CALCULATION		
Tree Trench #	Location	Drainage Area (sf)	IC (sf)	WQv (cf)	Length (feet) "X"	Width (feet) "Y"	Area (sf)	Total Depth (feet) "Z"	Media Depth (feet)	% Voids (1.00)	Media Storage Volume (cf)	Soil Type	Infiltration Rate (in/hr)	WQv Storage Volume Provided (%)	WQv Volume Treated (includes infiltration)[1]	% WQV
1	DA3b	14143	9883	823.58	103	9.9	1019.7	4.97	2.17	0.33	729	A -Sandy Loam	7.4	88.5%	844.0	102%
2	DA3d	4900	4675	389.58	30	5	150	5.63	2.50	0.33	124	A -Sandy Loam	8.27	31.8%	389.0	100%

[1] From HydroCAD

APPENDIX D

HydroCAD Modeling



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment DA1: DA1
Runoff Area=158,640 sf 9.44% Impervious Runoff Depth=0.00"
Flow Length=417' Tc=15.9 min CN=38 Runoff=0.00 cfs 0.000 af

Subcatchment DA2: DA2
Runoff Area=79,824 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=505' Tc=31.5 min CN=31 Runoff=0.00 cfs 0.000 af

Subcatchment DA3: DA3
Runoff Area=108,190 sf 0.23% Impervious Runoff Depth=0.00"
Flow Length=541' Tc=32.9 min CN=31 Runoff=0.00 cfs 0.000 af

Pond SP1: SP1
Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SP2: SP2
Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SP3: SP3
Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Summary for Subcatchment DA1: DA1

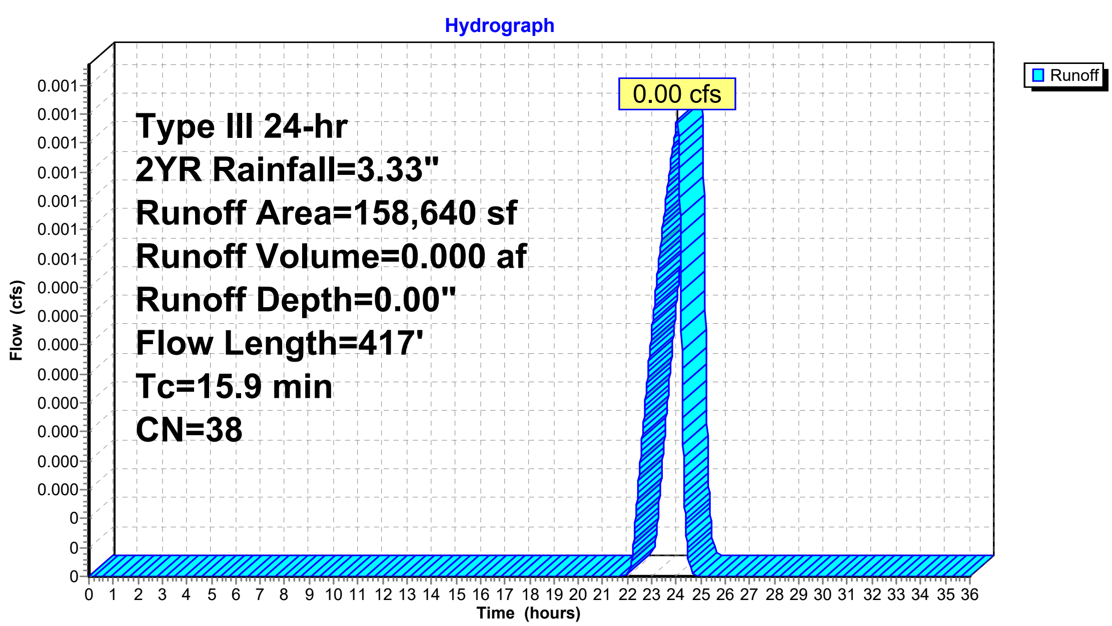
Runoff = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.33"

Area (sf)	CN	Description
118,297	30	Woods, Good, HSG A
25,363	39	>75% Grass cover, Good, HSG A
9,642	98	Roofs, HSG A
5,338	98	Paved parking, HSG A
158,640	38	Weighted Average
143,660		90.56% Pervious Area
14,980		9.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	78	0.1730	0.11		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.7	99	0.1110	2.33		**Shallow Concentrated Flow, B TO C** Short Grass Pasture Kv= 7.0 fps
3.0	240	0.0690	1.31		**Shallow Concentrated Flow, C TO SP1** Woodland Kv= 5.0 fps
15.9	417	Total			

Subcatchment DA1: DA1



Summary for Subcatchment DA2: DA2

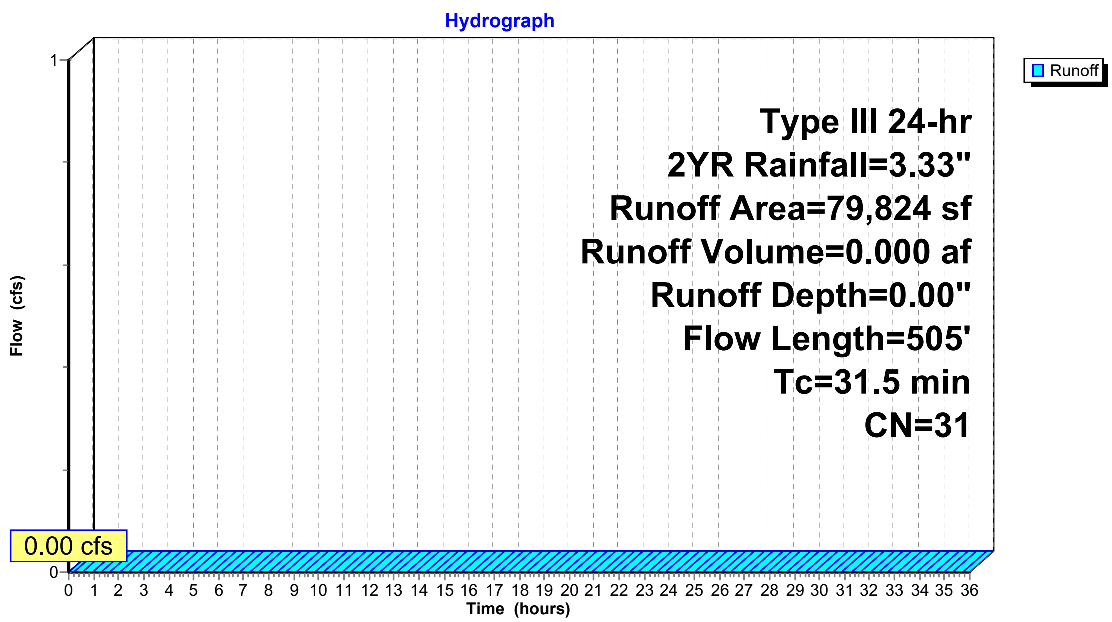
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.33"

Area (sf)	CN	Description
73,961	30	Woods, Good, HSG A
5,863	39	>75% Grass cover, Good, HSG A
79,824	31	Weighted Average
79,824		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.4	100	0.0500	0.07		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
1.7	114	0.0530	1.15		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
0.8	73	0.0480	1.53		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
4.6	218	0.0250	0.79		**Shallow Concentrated Flow, D to SP2** Woodland Kv= 5.0 fps
31.5	505	Total			

Subcatchment DA2: DA2



Summary for Subcatchment DA3: DA3

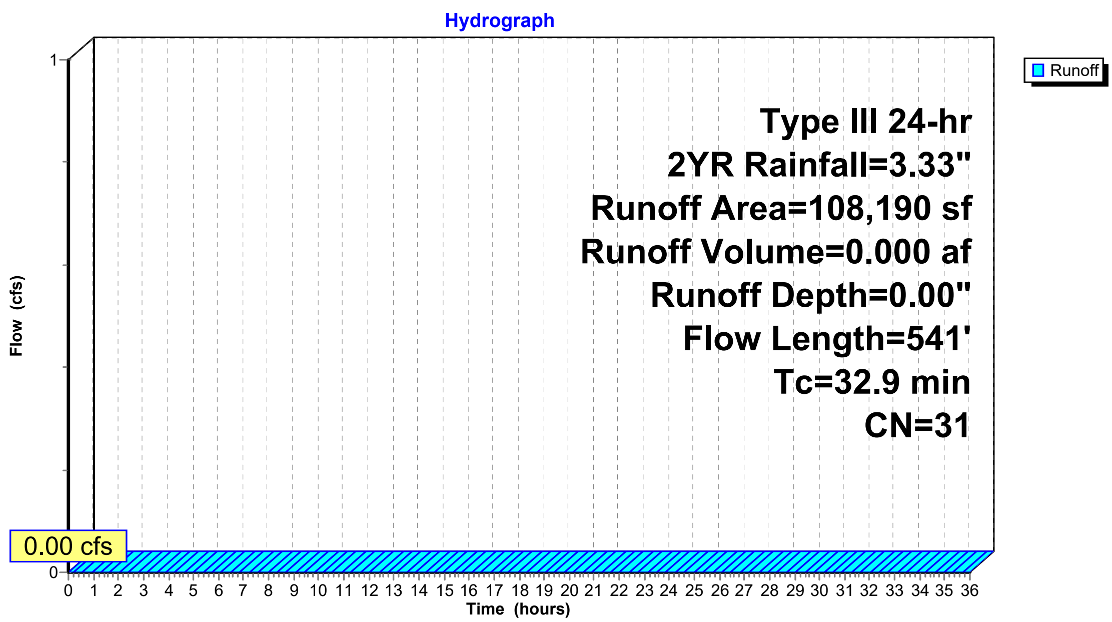
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.33"

Area (sf)	CN	Description
105,276	30	Woods, Good, HSG A
964	39	>75% Grass cover, Good, HSG A
245	98	Paved parking, HSG A
1,705	96	Gravel surface, HSG A
108,190	31	Weighted Average
107,945		99.77% Pervious Area
245		0.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	93	0.0430	0.06		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
7.8	323	0.0190	0.69		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
0.6	125	0.0340	3.74		**Shallow Concentrated Flow, C to SP2** Paved Kv= 20.3 fps
32.9	541	Total			

Subcatchment DA3: DA3

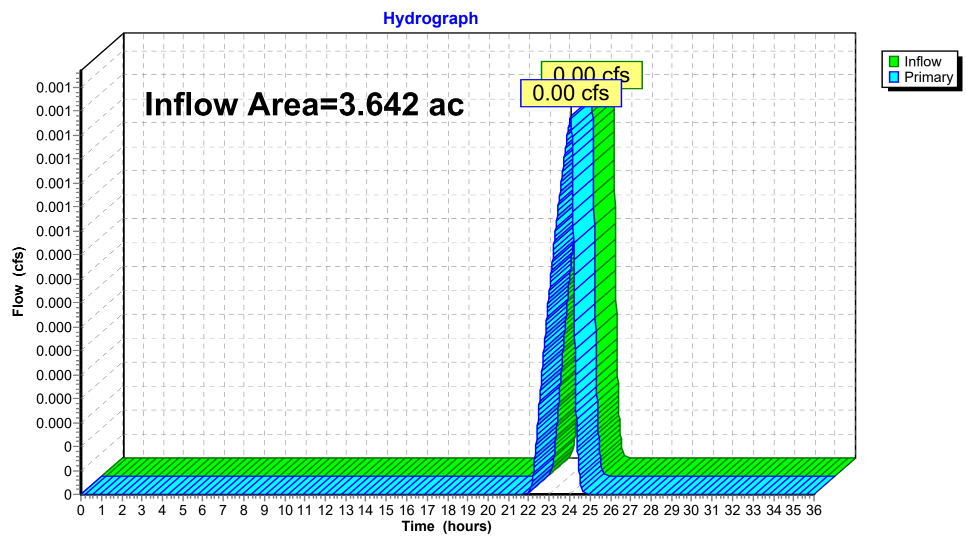


Summary for Pond SP1: SP1

Inflow Area = 3.642 ac, 9.44% Impervious, Inflow Depth = 0.00" for 2YR event
Inflow = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP1: SP1

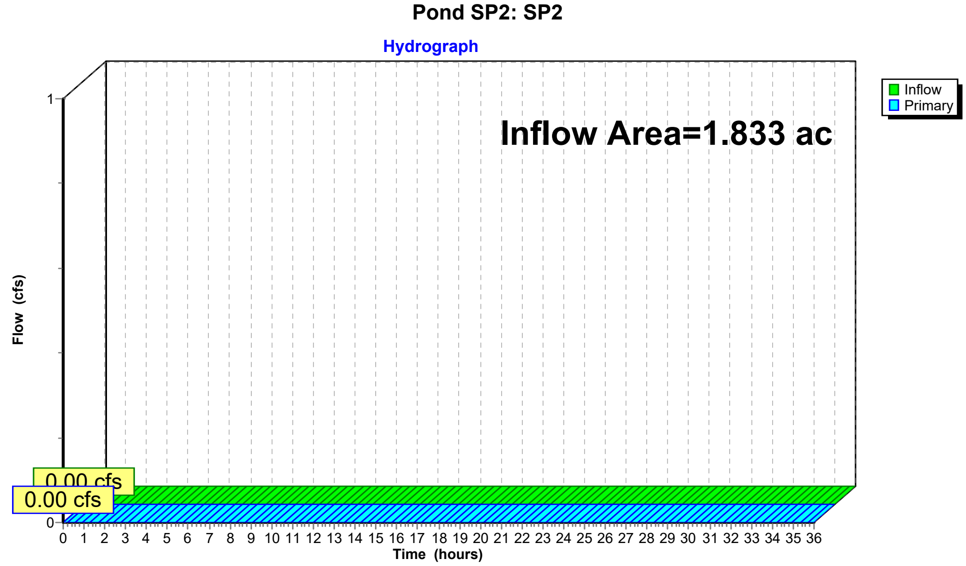


Summary for Pond SP2: SP2

Inflow Area = 1.833 ac, 0.00% 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= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP2: SP2

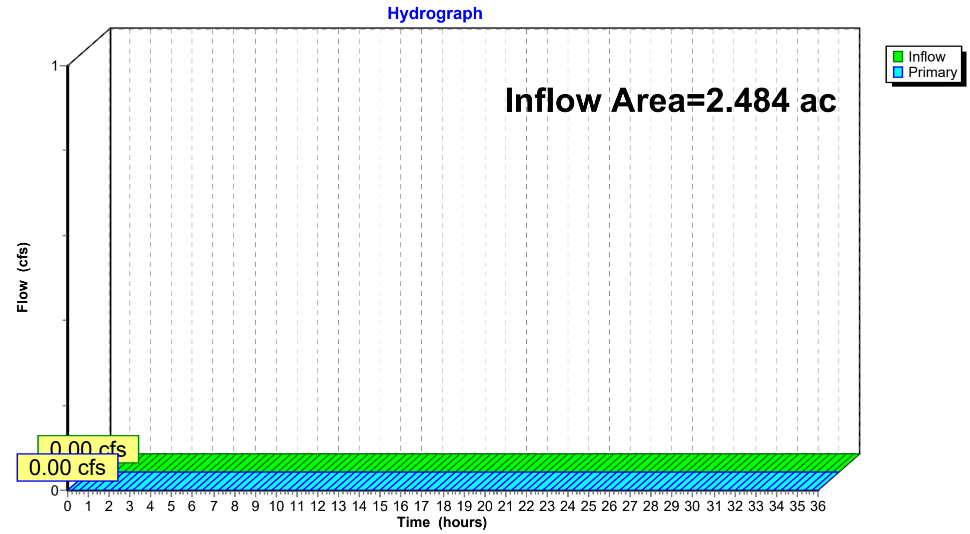


Summary for Pond SP3: SP3

Inflow Area =	2.484 ac, 0.23% 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= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP3: SP3



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

SubcatchmentDA1: DA1 Runoff Area=158,640 sf 9.44% Impervious Runoff Depth=0.15"
Flow Length=417' Tc=15.9 min CN=38 Runoff=0.07 cfs 0.045 af

SubcatchmentDA2: DA2 Runoff Area=79,824 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=505' Tc=31.5 min CN=31 Runoff=0.00 cfs 0.001 af

SubcatchmentDA3: DA3 Runoff Area=108,190 sf 0.23% Impervious Runoff Depth=0.01"
Flow Length=541' Tc=32.9 min CN=31 Runoff=0.00 cfs 0.002 af

Pond SP1: SP1 Inflow=0.07 cfs 0.045 af
Primary=0.07 cfs 0.045 af

Pond SP2: SP2 Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af

Pond SP3: SP3 Inflow=0.00 cfs 0.002 af
Primary=0.00 cfs 0.002 af

Summary for Subcatchment DA1: DA1

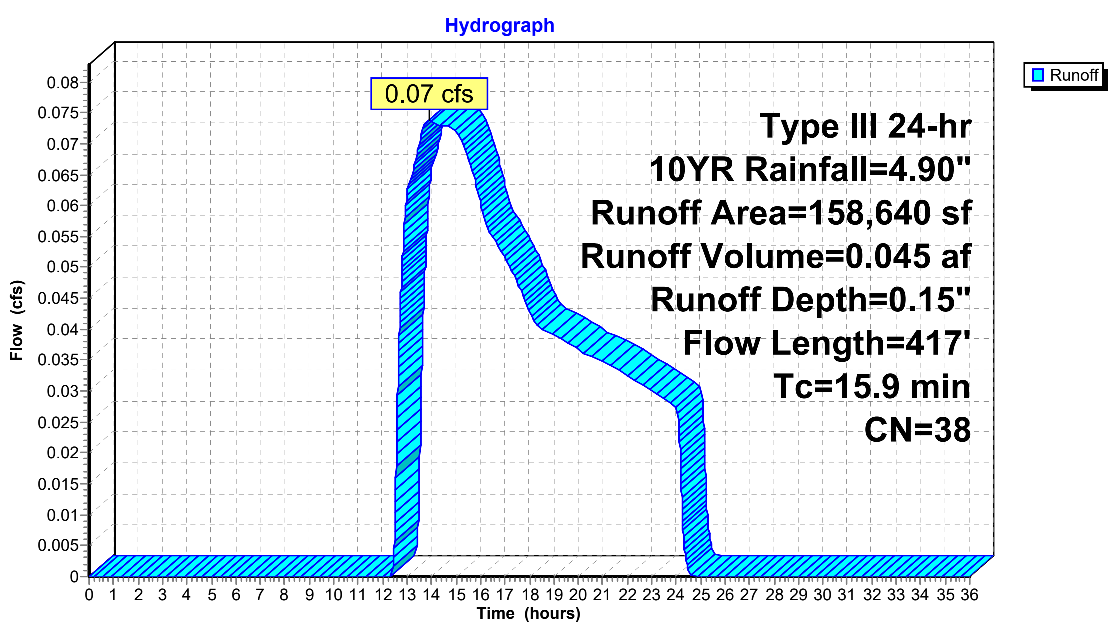
Runoff = 0.07 cfs @ 13.94 hrs, Volume= 0.045 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
118,297	30	Woods, Good, HSG A
25,363	39	>75% Grass cover, Good, HSG A
9,642	98	Roofs, HSG A
5,338	98	Paved parking, HSG A
158,640	38	Weighted Average
143,660		90.56% Pervious Area
14,980		9.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	78	0.1730	0.11		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.7	99	0.1110	2.33		**Shallow Concentrated Flow, B TO C** Short Grass Pasture Kv= 7.0 fps
3.0	240	0.0690	1.31		**Shallow Concentrated Flow, C TO SP1** Woodland Kv= 5.0 fps
15.9	417	Total			

Subcatchment DA1: DA1



Summary for Subcatchment DA2: DA2

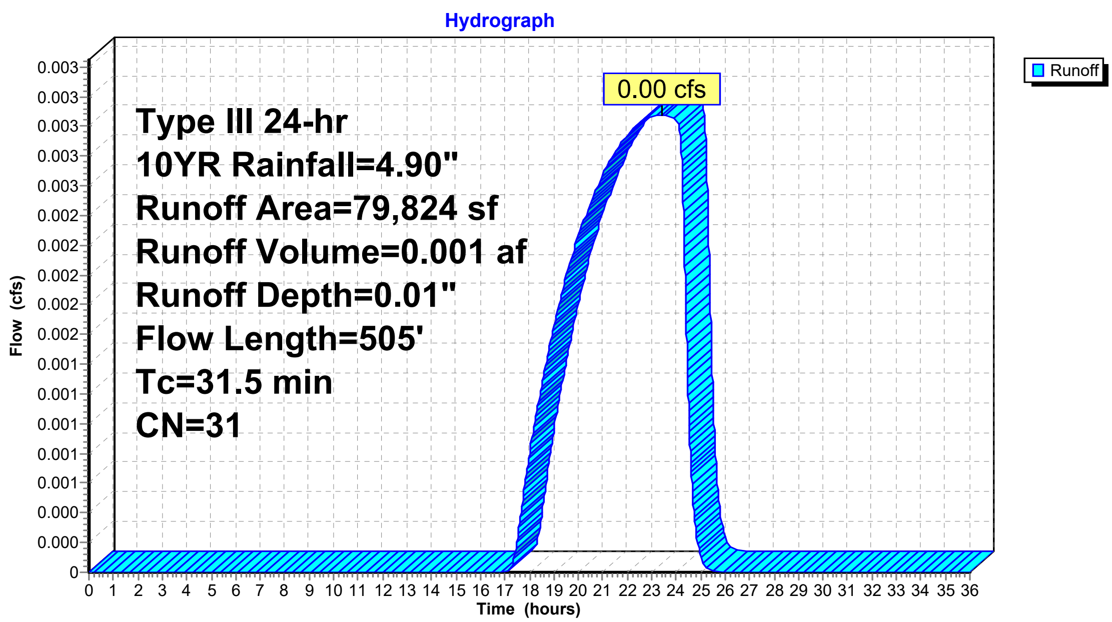
Runoff = 0.00 cfs @ 23.41 hrs, Volume= 0.001 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
73,961	30	Woods, Good, HSG A
5,863	39	>75% Grass cover, Good, HSG A
79,824	31	Weighted Average
79,824		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.4	100	0.0500	0.07		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
1.7	114	0.0530	1.15		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
0.8	73	0.0480	1.53		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
4.6	218	0.0250	0.79		**Shallow Concentrated Flow, D to SP2** Woodland Kv= 5.0 fps
31.5	505	Total			

Subcatchment DA2: DA2



Summary for Subcatchment DA3: DA3

Runoff = 0.00 cfs @ 23.43 hrs, Volume= 0.002 af, Depth= 0.01"

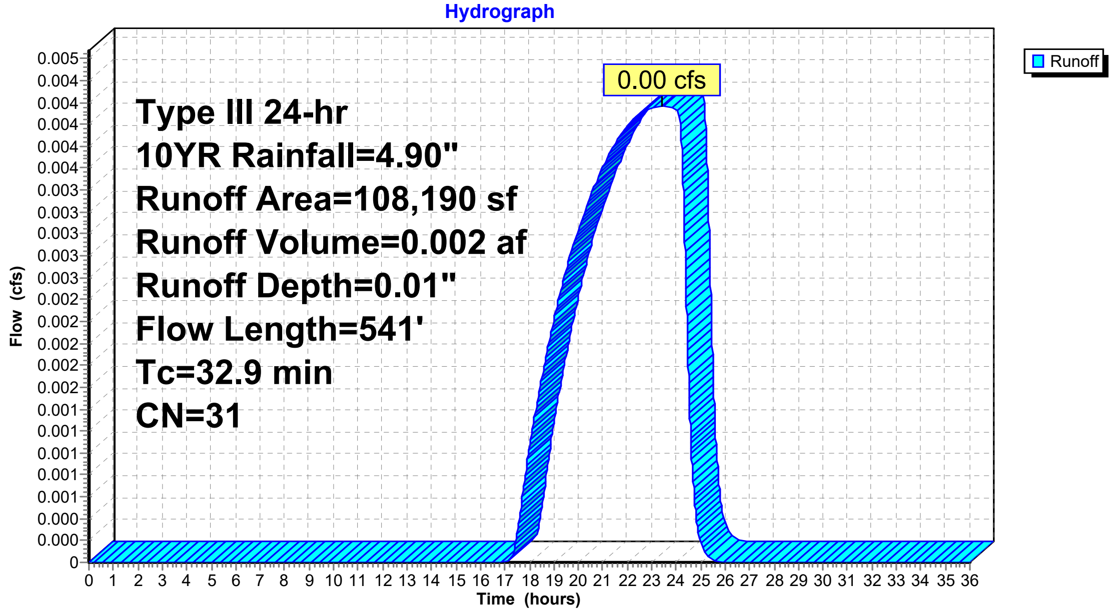
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
105,276	30	Woods, Good, HSG A
964	39	>75% Grass cover, Good, HSG A
245	98	Paved parking, HSG A
1,705	96	Gravel surface, HSG A
108,190	31	Weighted Average
107,945		99.77% Pervious Area
245		0.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	93	0.0430	0.06		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
7.8	323	0.0190	0.69		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
0.6	125	0.0340	3.74		**Shallow Concentrated Flow, C to SP2** Paved Kv= 20.3 fps
32.9	541	Total			

Subcatchment DA3: DA3

Hydrograph

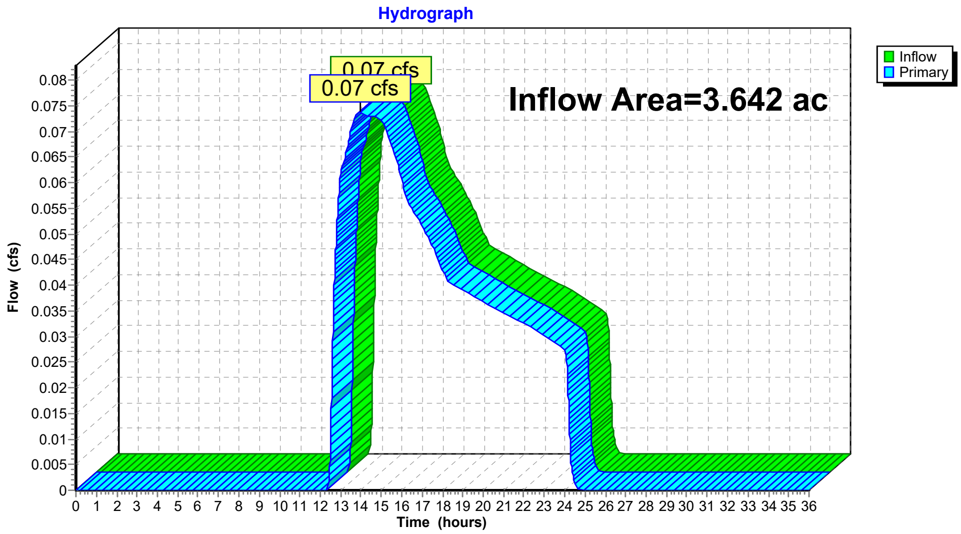


Summary for Pond SP1: SP1

Inflow Area =	3.642 ac, 9.44% Impervious, Inflow Depth = 0.15" for 10YR event	
Inflow =	0.07 cfs @ 13.94 hrs, Volume=	0.045 af
Primary =	0.07 cfs @ 13.94 hrs, Volume=	0.045 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP1: SP1

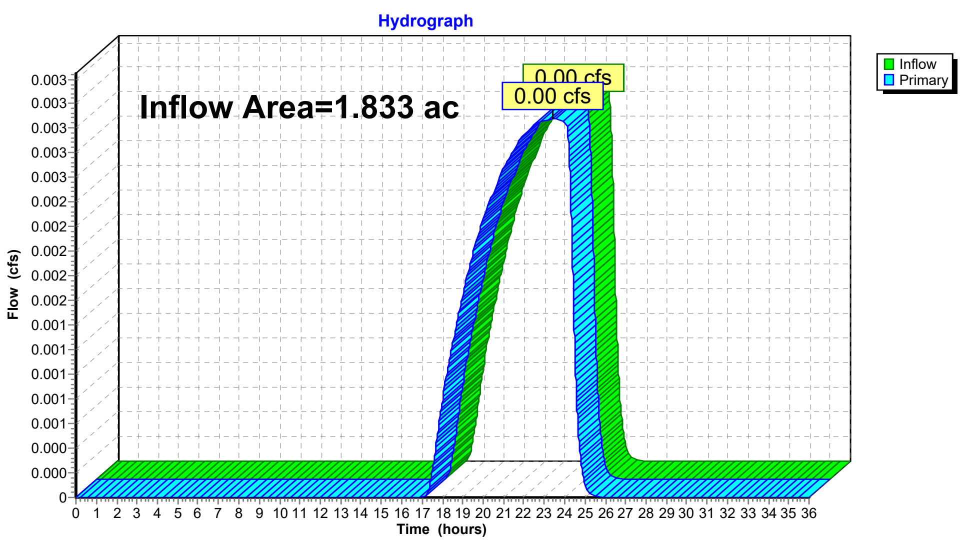


Summary for Pond SP2: SP2

Inflow Area =	1.833 ac, 0.00% Impervious, Inflow Depth = 0.01" for 10YR event	
Inflow =	0.00 cfs @ 23.41 hrs, Volume=	0.001 af
Primary =	0.00 cfs @ 23.41 hrs, Volume=	0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP2: SP2

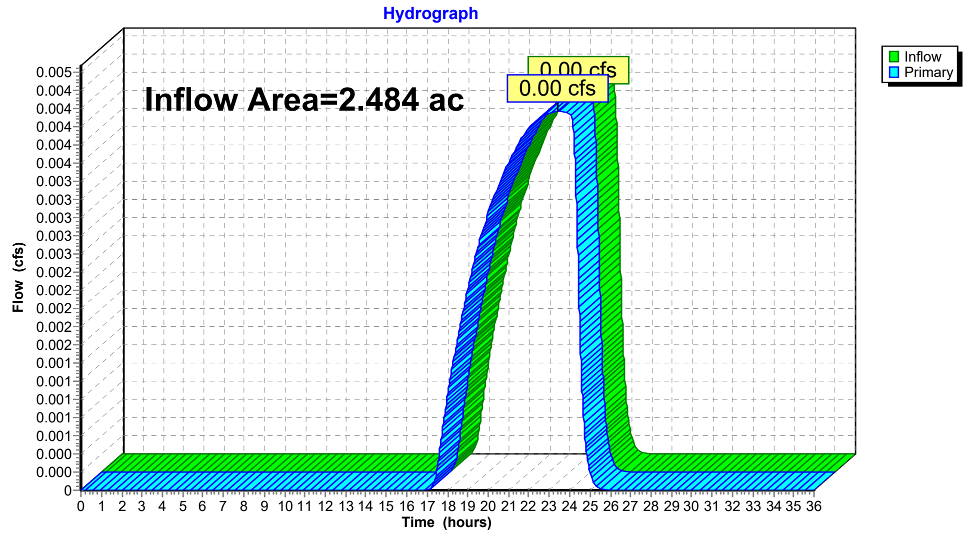


Summary for Pond SP3: SP3

Inflow Area =	2.484 ac, 0.23% Impervious, Inflow Depth = 0.01" for 10YR event	
Inflow =	0.00 cfs @ 23.43 hrs, Volume=	0.002 af
Primary =	0.00 cfs @ 23.43 hrs, Volume=	0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP3: SP3



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment DA1: DA1
Runoff Area=158,640 sf 9.44% Impervious Runoff Depth=0.43"
Flow Length=417' Tc=15.9 min CN=38 Runoff=0.52 cfs 0.129 af

Subcatchment DA2: DA2
Runoff Area=79,824 sf 0.00% Impervious Runoff Depth=0.12"
Flow Length=505' Tc=31.5 min CN=31 Runoff=0.03 cfs 0.018 af

Subcatchment DA3: DA3
Runoff Area=108,190 sf 0.23% Impervious Runoff Depth=0.12"
Flow Length=541' Tc=32.9 min CN=31 Runoff=0.04 cfs 0.024 af

Pond SP1: SP1
Inflow=0.52 cfs 0.129 af
Primary=0.52 cfs 0.129 af

Pond SP2: SP2
Inflow=0.03 cfs 0.018 af
Primary=0.03 cfs 0.018 af

Pond SP3: SP3
Inflow=0.04 cfs 0.024 af
Primary=0.04 cfs 0.024 af

Summary for Subcatchment DA1: DA1

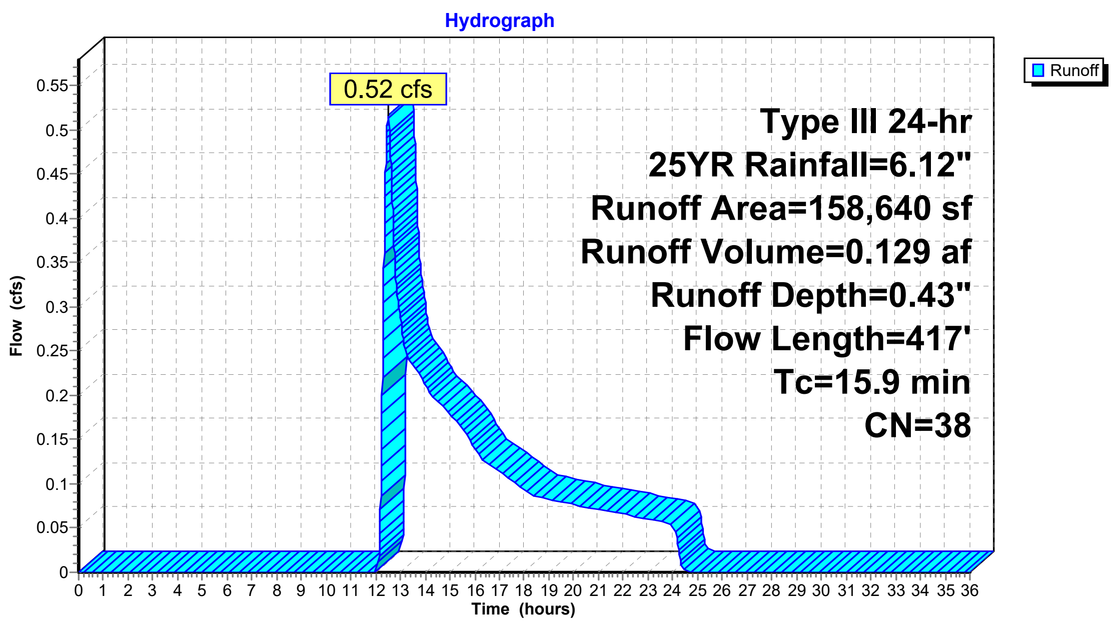
Runoff = 0.52 cfs @ 12.51 hrs, Volume= 0.129 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.12"

Area (sf)	CN	Description
118,297	30	Woods, Good, HSG A
25,363	39	>75% Grass cover, Good, HSG A
9,642	98	Roofs, HSG A
5,338	98	Paved parking, HSG A
158,640	38	Weighted Average
143,660		90.56% Pervious Area
14,980		9.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	78	0.1730	0.11		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.7	99	0.1110	2.33		**Shallow Concentrated Flow, B TO C** Short Grass Pasture Kv= 7.0 fps
3.0	240	0.0690	1.31		**Shallow Concentrated Flow, C TO SP1** Woodland Kv= 5.0 fps
15.9	417	Total			

Subcatchment DA1: DA1



Summary for Subcatchment DA2: DA2

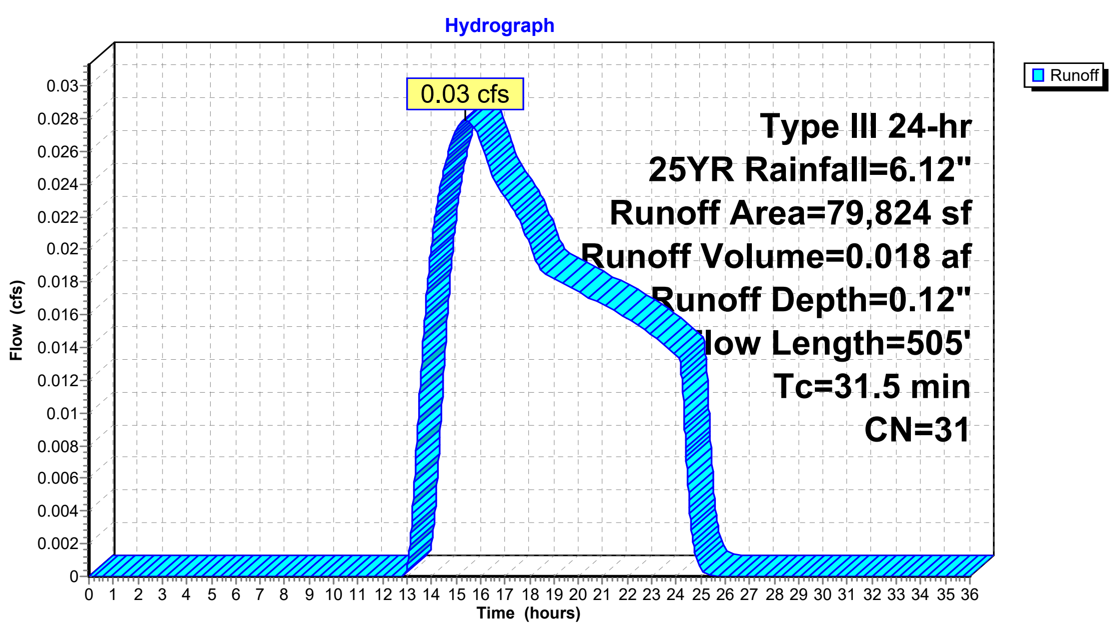
Runoff = 0.03 cfs @ 15.37 hrs, Volume= 0.018 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.12"

Area (sf)	CN	Description
73,961	30	Woods, Good, HSG A
5,863	39	>75% Grass cover, Good, HSG A
79,824	31	Weighted Average
79,824		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.4	100	0.0500	0.07		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
1.7	114	0.0530	1.15		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
0.8	73	0.0480	1.53		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
4.6	218	0.0250	0.79		**Shallow Concentrated Flow, D to SP2** Woodland Kv= 5.0 fps
31.5	505	Total			

Subcatchment DA2: DA2



Summary for Subcatchment DA3: DA3

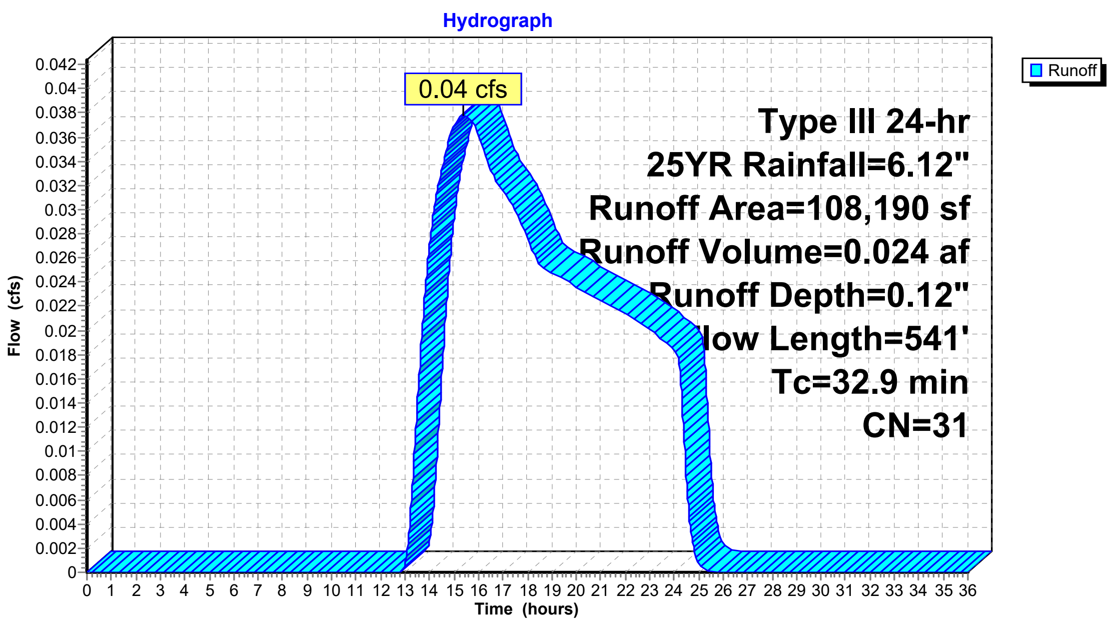
Runoff = 0.04 cfs @ 15.39 hrs, Volume= 0.024 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.12"

Area (sf)	CN	Description
105,276	30	Woods, Good, HSG A
964	39	>75% Grass cover, Good, HSG A
245	98	Paved parking, HSG A
1,705	96	Gravel surface, HSG A
108,190	31	Weighted Average
107,945		99.77% Pervious Area
245		0.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	93	0.0430	0.06		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
7.8	323	0.0190	0.69		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
0.6	125	0.0340	3.74		**Shallow Concentrated Flow, C to SP2** Paved Kv= 20.3 fps
32.9	541	Total			

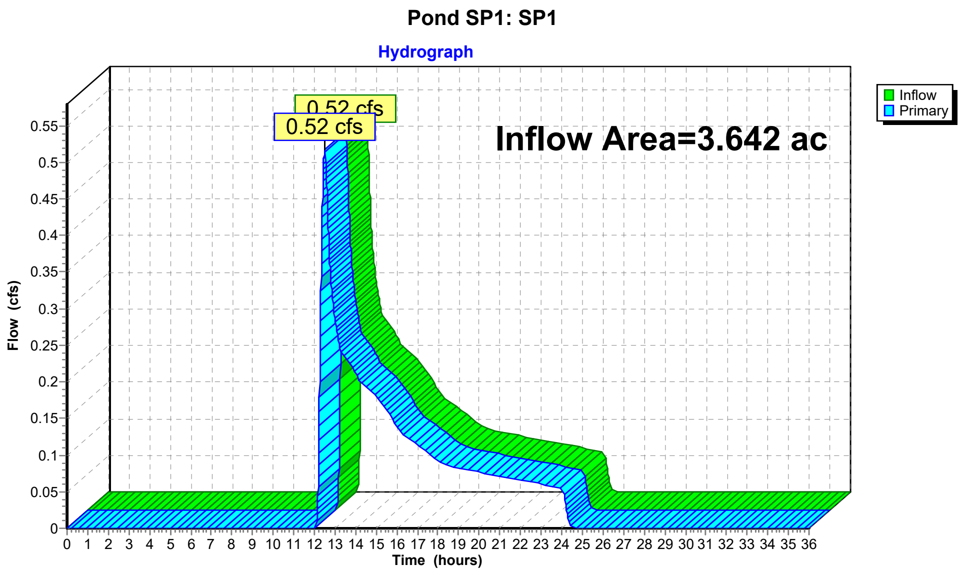
Subcatchment DA3: DA3



Summary for Pond SP1: SP1

Inflow Area = 3.642 ac, 9.44% Impervious, Inflow Depth = 0.43" for 25YR event
Inflow = 0.52 cfs @ 12.51 hrs, Volume= 0.129 af
Primary = 0.52 cfs @ 12.51 hrs, Volume= 0.129 af, Atten= 0%, Lag= 0.0 min

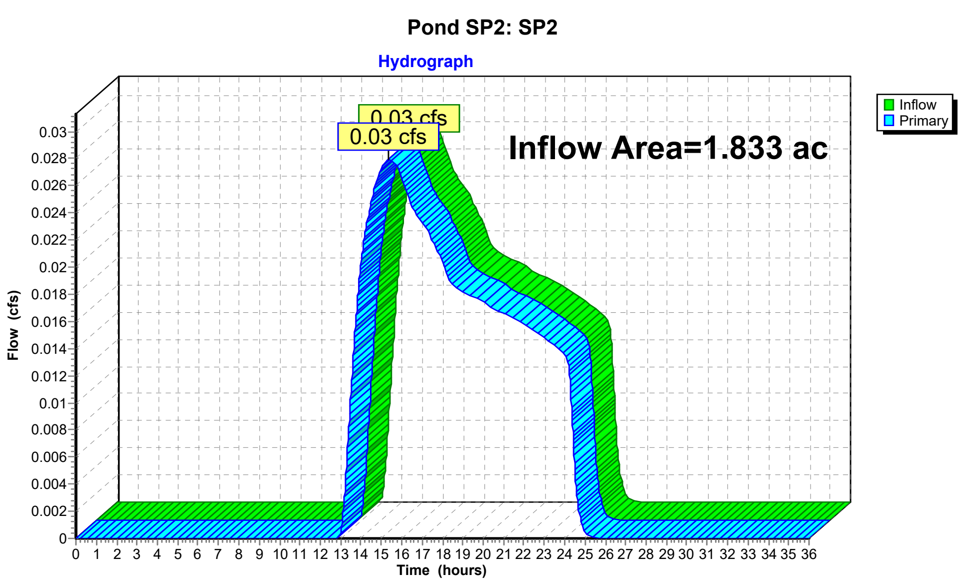
Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs



Summary for Pond SP2: SP2

Inflow Area = 1.833 ac, 0.00% Impervious, Inflow Depth = 0.12" for 25YR event
Inflow = 0.03 cfs @ 15.37 hrs, Volume= 0.018 af
Primary = 0.03 cfs @ 15.37 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

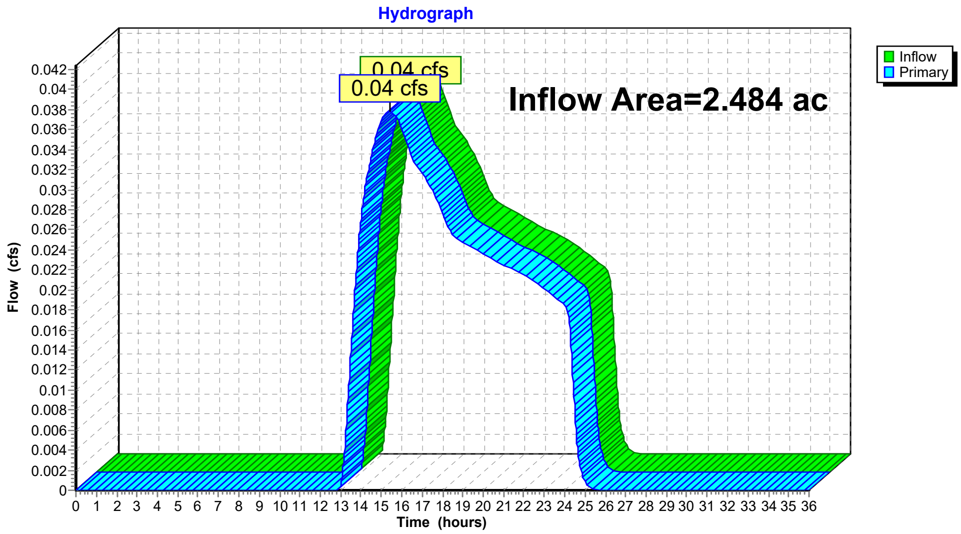


Summary for Pond SP3: SP3

Inflow Area = 2.484 ac, 0.23% Impervious, Inflow Depth = 0.12" for 25YR event
Inflow = 0.04 cfs @ 15.39 hrs, Volume= 0.024 af
Primary = 0.04 cfs @ 15.39 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP3: SP3



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment DA1: DA1	Runoff Area=158,640 sf 9.44% Impervious Runoff Depth=1.30" Flow Length=417' Tc=15.9 min CN=38 Runoff=2.78 cfs 0.394 af
Subcatchment DA2: DA2	Runoff Area=79,824 sf 0.00% Impervious Runoff Depth=0.64" Flow Length=505' Tc=31.5 min CN=31 Runoff=0.33 cfs 0.098 af
Subcatchment DA3: DA3	Runoff Area=108,190 sf 0.23% Impervious Runoff Depth=0.64" Flow Length=541' Tc=32.9 min CN=31 Runoff=0.44 cfs 0.132 af
Pond SP1: SP1	Inflow=2.78 cfs 0.394 af Primary=2.78 cfs 0.394 af
Pond SP2: SP2	Inflow=0.33 cfs 0.098 af Primary=0.33 cfs 0.098 af
Pond SP3: SP3	Inflow=0.44 cfs 0.132 af Primary=0.44 cfs 0.132 af

Summary for Subcatchment DA1: DA1

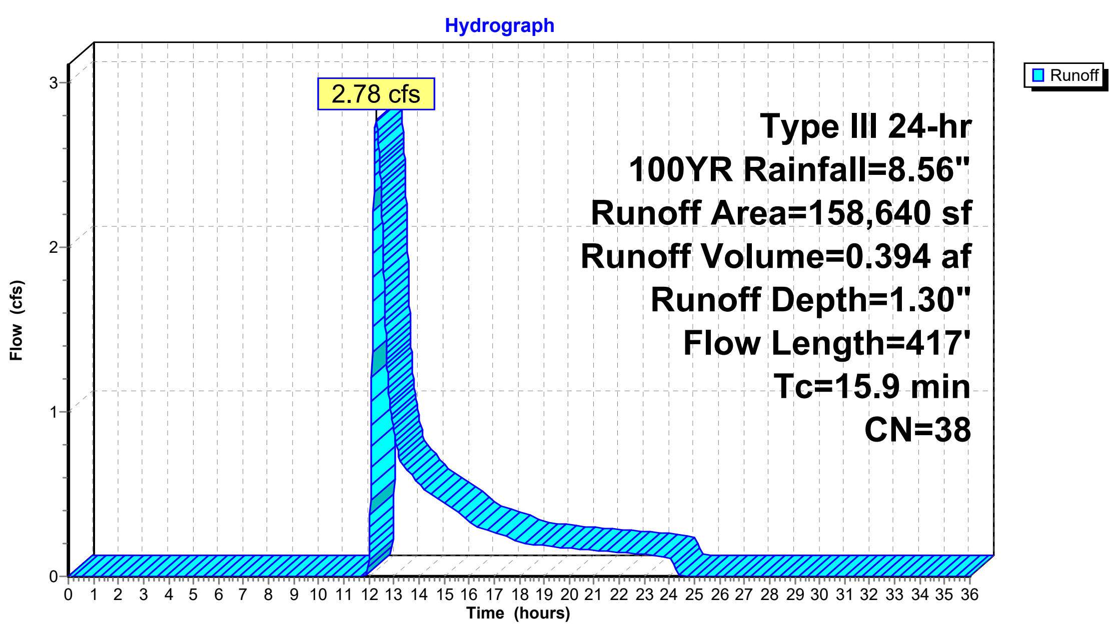
Runoff = 2.78 cfs @ 12.30 hrs, Volume= 0.394 af, Depth= 1.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100YR Rainfall=8.56"

Area (sf)	CN	Description
118,297	30	Woods, Good, HSG A
25,363	39	>75% Grass cover, Good, HSG A
9,642	98	Roofs, HSG A
5,338	98	Paved parking, HSG A
158,640	38	Weighted Average
143,660		90.56% Pervious Area
14,980		9.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	78	0.1730	0.11		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.7	99	0.1110	2.33		**Shallow Concentrated Flow, B TO C** Short Grass Pasture Kv= 7.0 fps
3.0	240	0.0690	1.31		**Shallow Concentrated Flow, C TO SP1** Woodland Kv= 5.0 fps
15.9	417	Total			

Subcatchment DA1: DA1



Summary for Subcatchment DA2: DA2

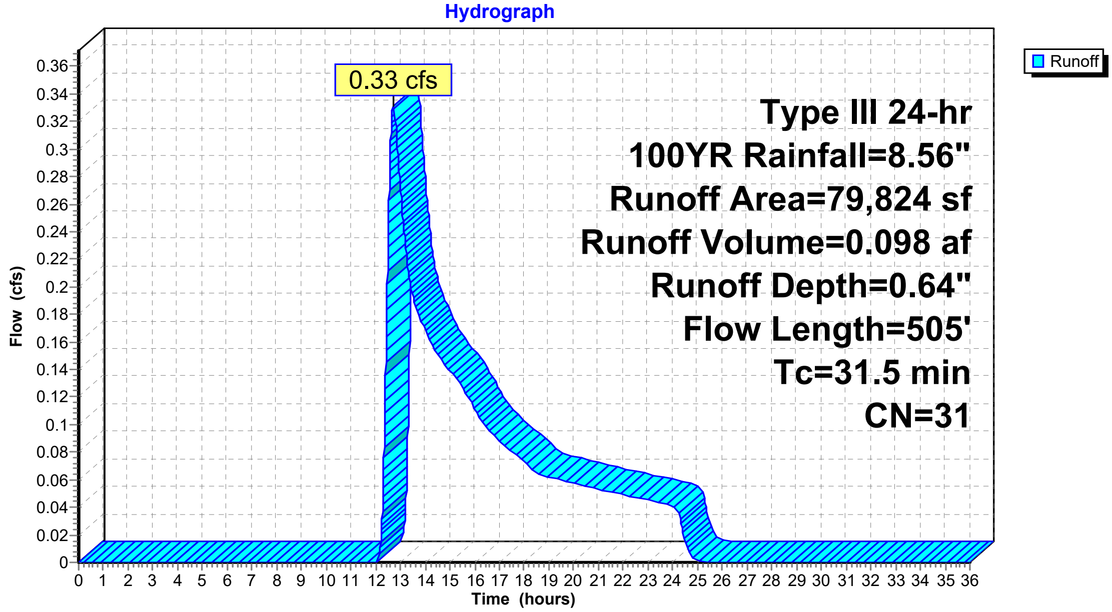
Runoff = 0.33 cfs @ 12.71 hrs, Volume= 0.098 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100YR Rainfall=8.56"

Area (sf)	CN	Description
73,961	30	Woods, Good, HSG A
5,863	39	>75% Grass cover, Good, HSG A
79,824	31	Weighted Average
79,824		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.4	100	0.0500	0.07		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
1.7	114	0.0530	1.15		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
0.8	73	0.0480	1.53		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
4.6	218	0.0250	0.79		**Shallow Concentrated Flow, D to SP2** Woodland Kv= 5.0 fps
31.5	505	Total			

Subcatchment DA2: DA2



Summary for Subcatchment DA3: DA3

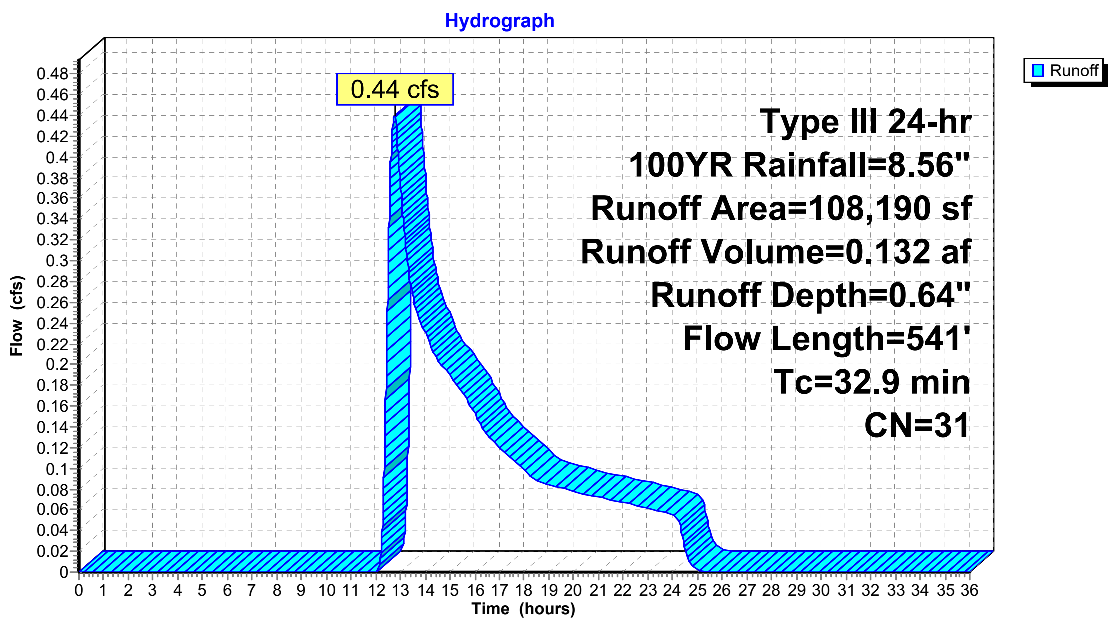
Runoff = 0.44 cfs @ 12.75 hrs, Volume= 0.132 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100YR Rainfall=8.56"

Area (sf)	CN	Description
105,276	30	Woods, Good, HSG A
964	39	>75% Grass cover, Good, HSG A
245	98	Paved parking, HSG A
1,705	96	Gravel surface, HSG A
108,190	31	Weighted Average
107,945		99.77% Pervious Area
245		0.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	93	0.0430	0.06		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
7.8	323	0.0190	0.69		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
0.6	125	0.0340	3.74		**Shallow Concentrated Flow, C to SP2** Paved Kv= 20.3 fps
32.9	541	Total			

Subcatchment DA3: DA3

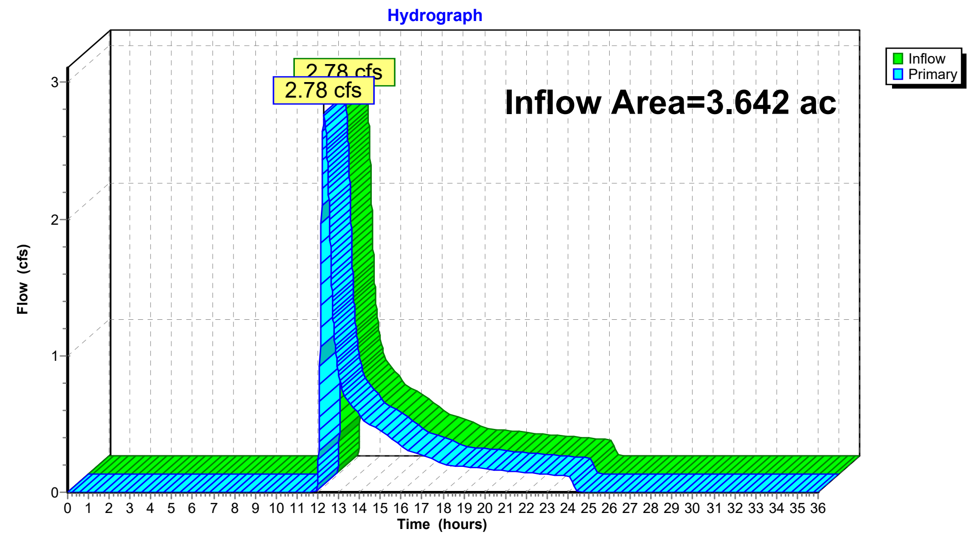


Summary for Pond SP1: SP1

Inflow Area = 3.642 ac, 9.44% Impervious, Inflow Depth = 1.30" for 100YR event
Inflow = 2.78 cfs @ 12.30 hrs, Volume= 0.394 af
Primary = 2.78 cfs @ 12.30 hrs, Volume= 0.394 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP1: SP1

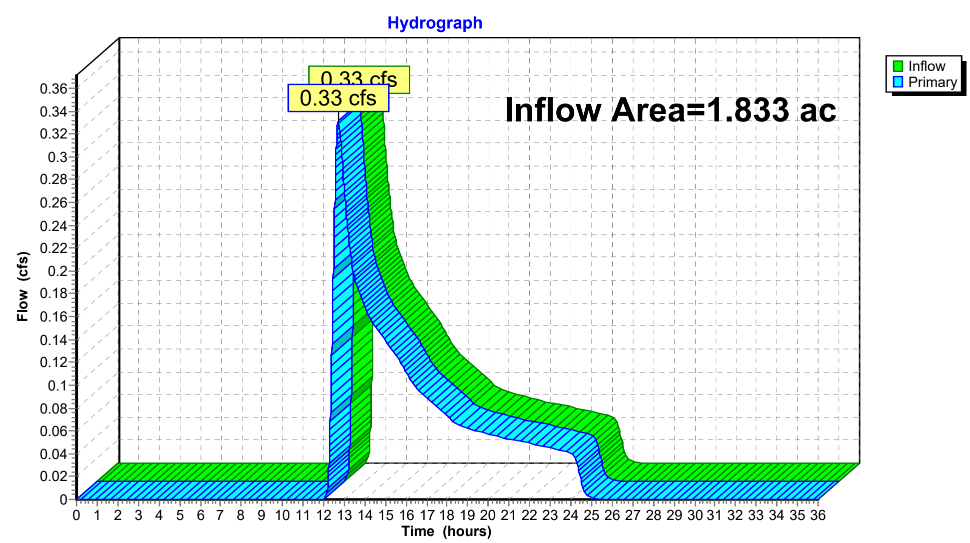


Summary for Pond SP2: SP2

Inflow Area = 1.833 ac, 0.00% Impervious, Inflow Depth = 0.64" for 100YR event
Inflow = 0.33 cfs @ 12.71 hrs, Volume= 0.098 af
Primary = 0.33 cfs @ 12.71 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP2: SP2

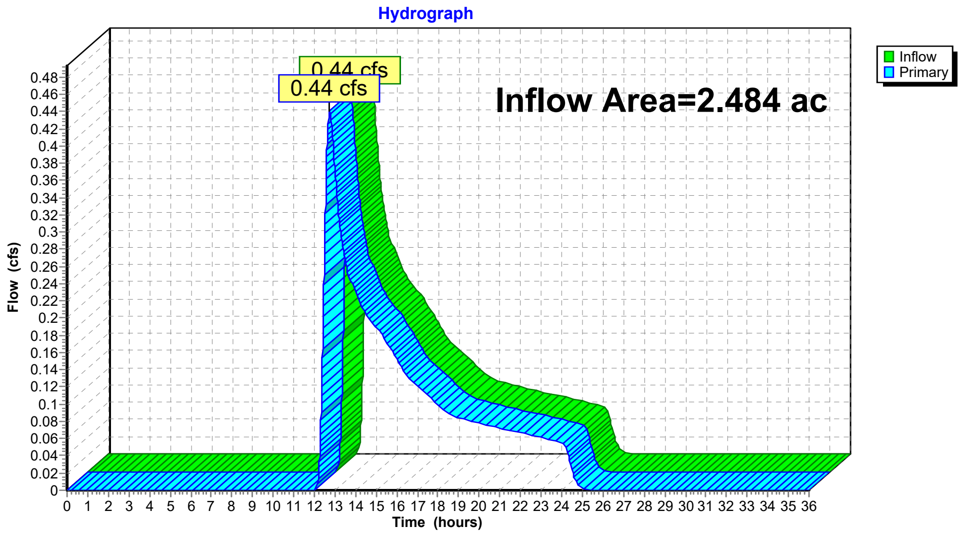


Summary for Pond SP3: SP3

Inflow Area = 2.484 ac, 0.23% Impervious, Inflow Depth = 0.64" for 100YR event
Inflow = 0.44 cfs @ 12.75 hrs, Volume= 0.132 af
Primary = 0.44 cfs @ 12.75 hrs, Volume= 0.132 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP3: SP3



Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment DA1: DA1 Runoff Area=158,640 sf 9.44% Impervious Runoff Depth=0.00"
Flow Length=417' Tc=15.9 min CN=38 Runoff=0.00 cfs 0.000 af

Subcatchment DA2: DA2 Runoff Area=79,824 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=505' Tc=31.5 min CN=31 Runoff=0.00 cfs 0.000 af

Subcatchment DA3: DA3 Runoff Area=108,190 sf 0.23% Impervious Runoff Depth=0.00"
Flow Length=541' Tc=32.9 min CN=31 Runoff=0.00 cfs 0.000 af

Pond SP1: SP1 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SP2: SP2 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SP3: SP3 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Summary for Subcatchment DA1: DA1

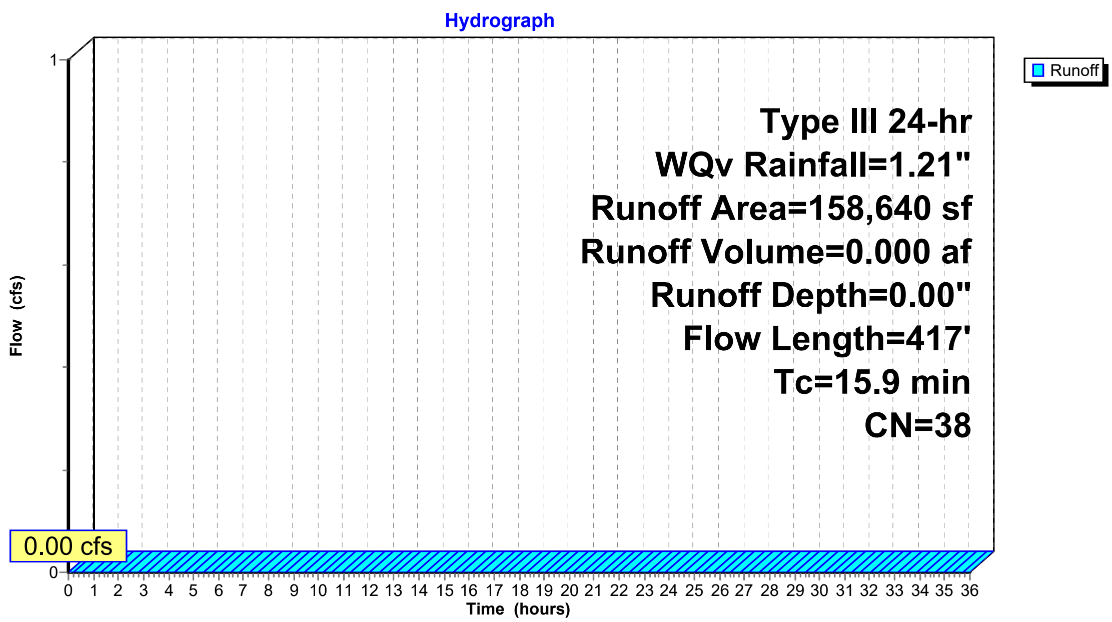
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.21"

Area (sf)	CN	Description
118,297	30	Woods, Good, HSG A
25,363	39	>75% Grass cover, Good, HSG A
9,642	98	Roofs, HSG A
5,338	98	Paved parking, HSG A
158,640	38	Weighted Average
143,660		90.56% Pervious Area
14,980		9.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	78	0.1730	0.11		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.7	99	0.1110	2.33		**Shallow Concentrated Flow, B TO C** Short Grass Pasture Kv= 7.0 fps
3.0	240	0.0690	1.31		**Shallow Concentrated Flow, C TO SP1** Woodland Kv= 5.0 fps
15.9	417	Total			

Subcatchment DA1: DA1



Summary for Subcatchment DA2: DA2

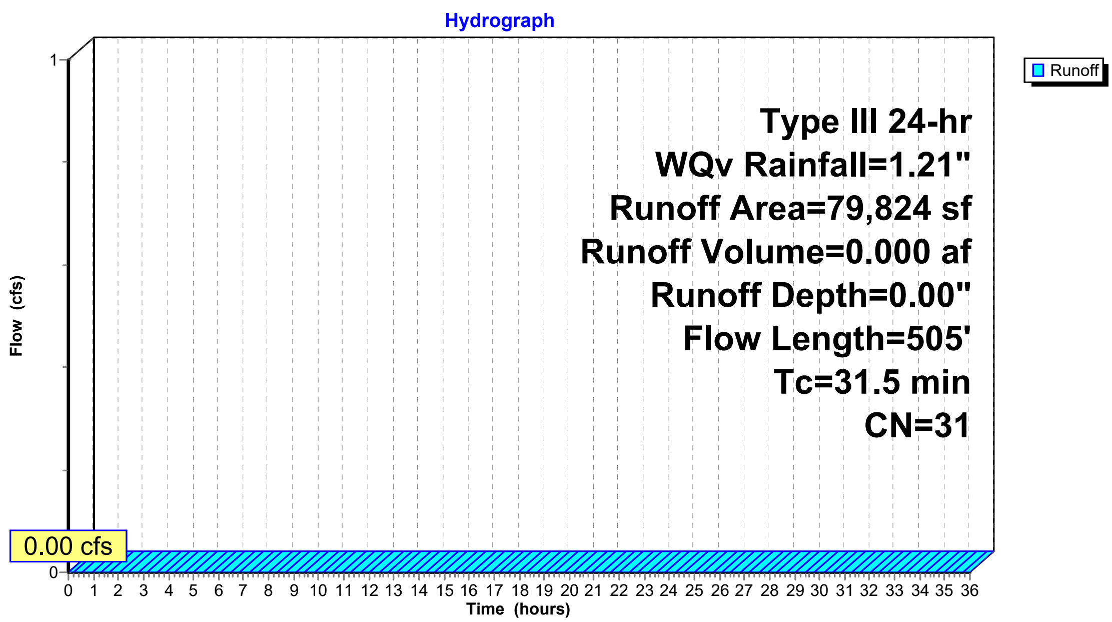
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.21"

Area (sf)	CN	Description
73,961	30	Woods, Good, HSG A
5,863	39	>75% Grass cover, Good, HSG A
79,824	31	Weighted Average
79,824		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.4	100	0.0500	0.07		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
1.7	114	0.0530	1.15		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
0.8	73	0.0480	1.53		**Shallow Concentrated Flow, C to D** Short Grass Pasture Kv= 7.0 fps
4.6	218	0.0250	0.79		**Shallow Concentrated Flow, D to SP2** Woodland Kv= 5.0 fps
31.5	505	Total			

Subcatchment DA2: DA2



Summary for Subcatchment DA3: DA3

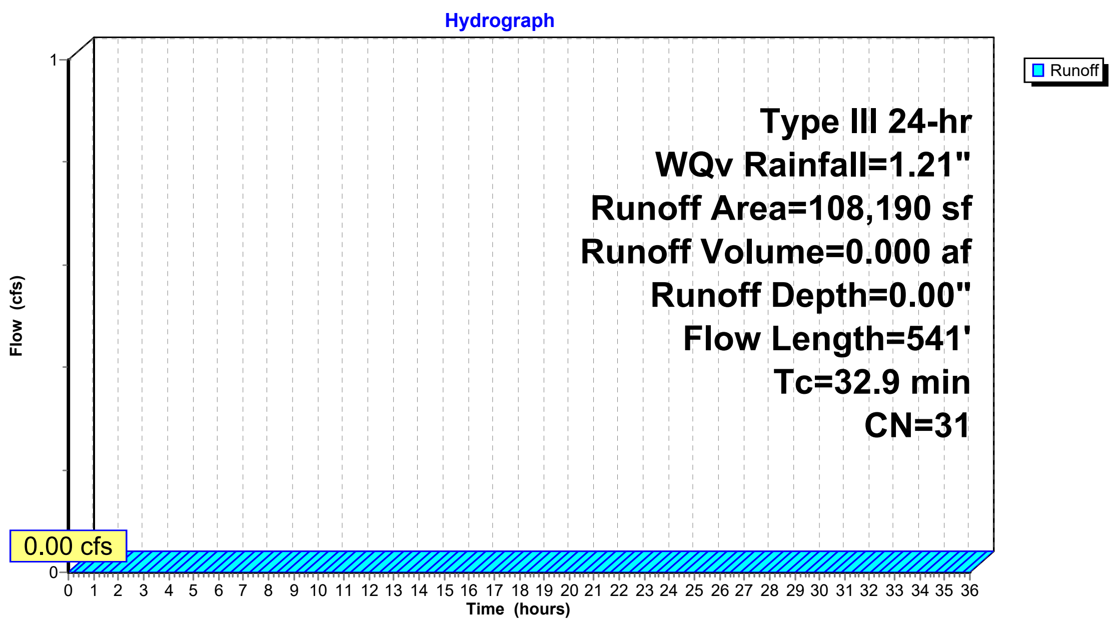
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.21"

Area (sf)	CN	Description
105,276	30	Woods, Good, HSG A
964	39	>75% Grass cover, Good, HSG A
245	98	Paved parking, HSG A
1,705	96	Gravel surface, HSG A
108,190	31	Weighted Average
107,945		99.77% Pervious Area
245		0.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5	93	0.0430	0.06		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
7.8	323	0.0190	0.69		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
0.6	125	0.0340	3.74		**Shallow Concentrated Flow, C to SP2** Paved Kv= 20.3 fps
32.9	541	Total			

Subcatchment DA3: DA3

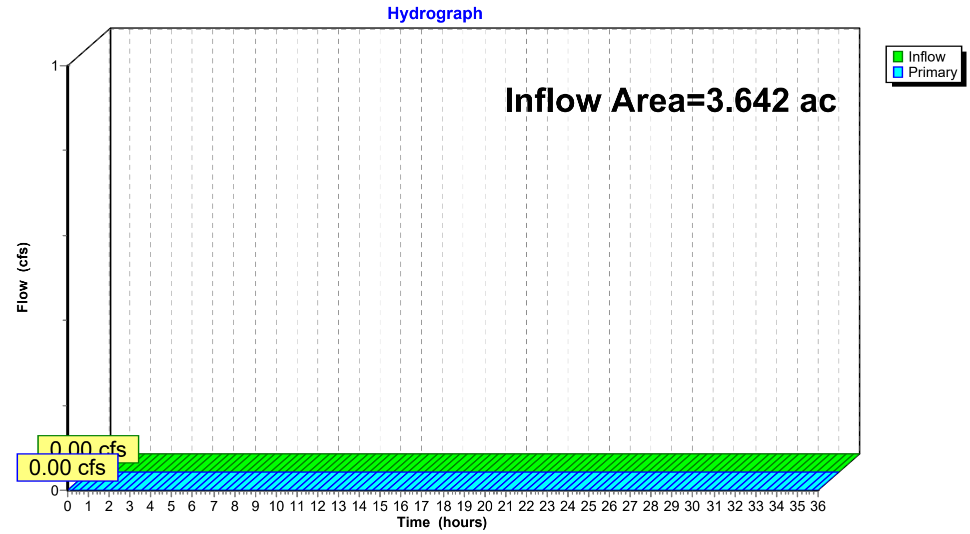


Summary for Pond SP1: SP1

Inflow Area =	3.642 ac, 9.44% 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= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP1: SP1

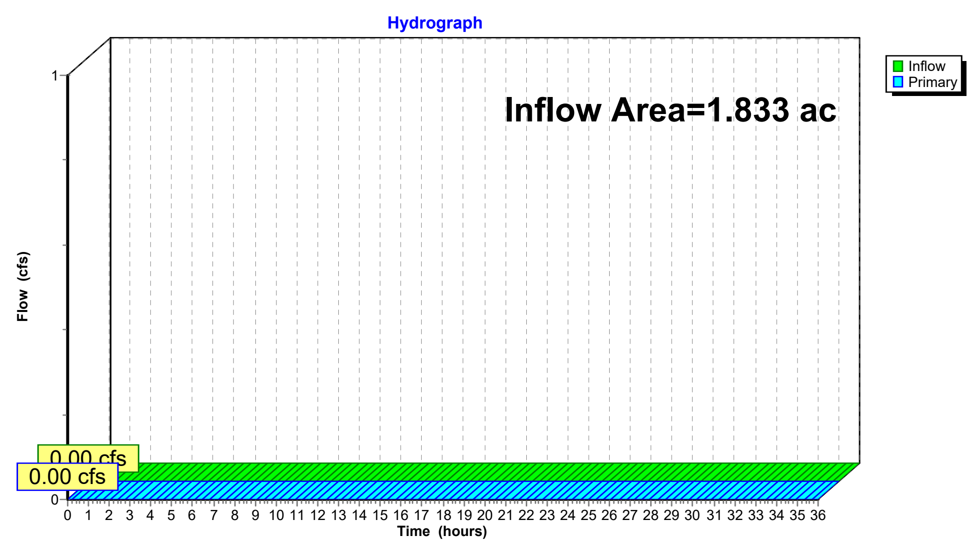


Summary for Pond SP2: SP2

Inflow Area =	1.833 ac, 0.00% 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= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP2: SP2

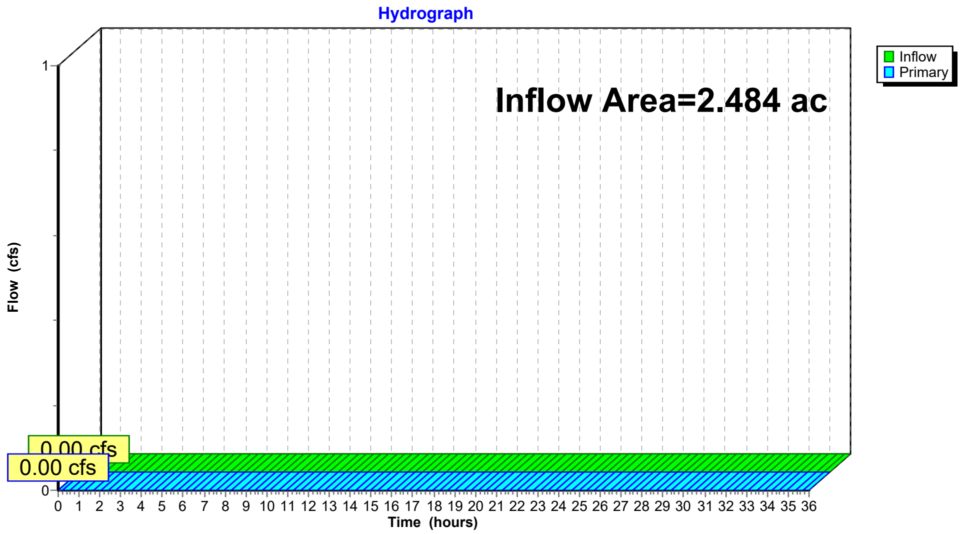


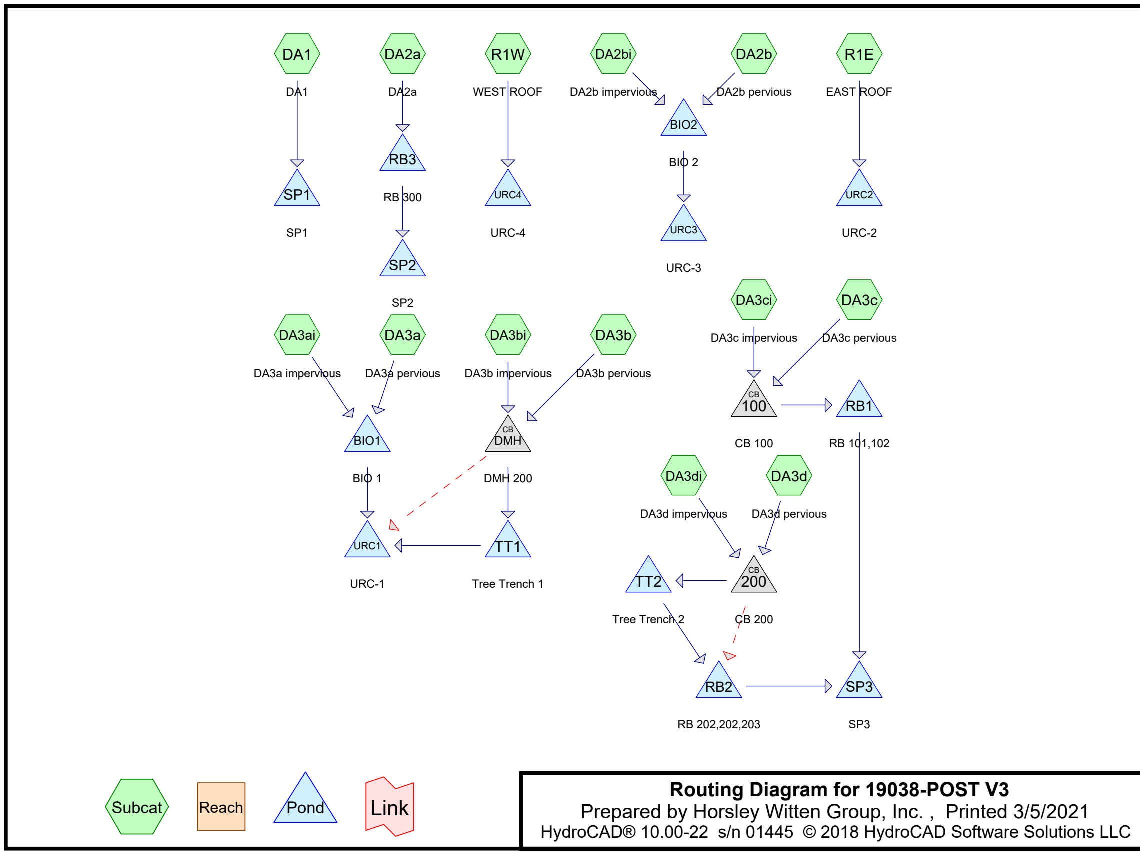
Summary for Pond SP3: SP3

Inflow Area = 2.484 ac, 0.23% 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= 0.00-36.00 hrs, dt= 0.01 hrs

Pond SP3: SP3





Routing Diagram for 19038-POST V3
Prepared by Horsley Witten Group, Inc. , Printed 3/5/2021
HydroCAD® 10.00-22 s/n 01445 © 2018 HydroCAD Software Solutions LLC

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA1: DA1 Runoff Area=158,640 sf 9.44% Impervious Runoff Depth=0.00"
Flow Length=417' Tc=15.9 min CN=38 Runoff=0.00 cfs 0.000 af

Subcatchment DA2a: DA2a Runoff Area=43,429 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=525' Tc=43.3 min CN=34 Runoff=0.00 cfs 0.000 af

Subcatchment DA2b: DA2b pervious Runoff Area=10,709 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment DA2bi: DA2b impervious Runoff Area=8,285 sf 100.00% Impervious Runoff Depth=1.00"
Tc=5.0 min CN=98 Runoff=0.22 cfs 0.016 af

Subcatchment DA3a: DA3a pervious Runoff Area=33,821 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=34 Runoff=0.00 cfs 0.000 af

Subcatchment DA3ai: DA3a impervious Runoff Area=19,638 sf 100.00% Impervious Runoff Depth=1.00"
Tc=5.0 min CN=98 Runoff=0.52 cfs 0.037 af

Subcatchment DA3b: DA3b pervious Runoff Area=4,260 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=35 Runoff=0.00 cfs 0.000 af

Subcatchment DA3bi: DA3b impervious Runoff Area=10,179 sf 100.00% Impervious Runoff Depth=1.00"
Tc=5.0 min CN=98 Runoff=0.27 cfs 0.019 af

Subcatchment DA3c: DA3c pervious Runoff Area=26,141 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=32 Runoff=0.00 cfs 0.000 af

Subcatchment DA3ci: DA3c impervious Runoff Area=3,179 sf 100.00% Impervious Runoff Depth=1.00"
Tc=5.0 min CN=98 Runoff=0.08 cfs 0.006 af

Subcatchment DA3d: DA3d pervious Runoff Area=197 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment DA3di: DA3d impervious Runoff Area=4,686 sf 100.00% Impervious Runoff Depth=1.00"
Tc=5.0 min CN=98 Runoff=0.12 cfs 0.009 af

Subcatchment R1E: EAST ROOF Runoff Area=11,331 sf 100.00% Impervious Runoff Depth=1.00"
Tc=5.0 min CN=98 Runoff=0.30 cfs 0.022 af

Subcatchment R1W: WEST ROOF Runoff Area=10,000 sf 100.00% Impervious Runoff Depth=1.00"
Tc=5.0 min CN=98 Runoff=0.26 cfs 0.019 af

Pond 100: CB 100 Peak Elev=50.18' Inflow=0.08 cfs 0.006 af
12.0" Round Culvert n=0.013 L=4.0' S=0.0050 '/' Outflow=0.08 cfs 0.006 af

Pond 200: CB 200 Peak Elev=51.89' Inflow=0.12 cfs 0.009 af
Primary=0.12 cfs 0.009 af Secondary=0.00 cfs 0.000 af Outflow=0.12 cfs 0.009 af

Pond BIO1: BIO 1 Peak Elev=58.98' Storage=522 cf Inflow=0.52 cfs 0.037 af
Outflow=0.08 cfs 0.037 af

Pond BIO2: BIO 2 Peak Elev=62.54' Storage=22 cf Inflow=0.22 cfs 0.016 af
Outflow=0.21 cfs 0.016 af

Pond DMH: DMH 200 Peak Elev=54.25' Inflow=0.27 cfs 0.019 af
Primary=0.27 cfs 0.019 af Secondary=0.00 cfs 0.000 af Outflow=0.27 cfs 0.019 af

Pond RB1: RB 101,102 Peak Elev=39.22' Storage=11 cf Inflow=0.08 cfs 0.006 af
Discarded=0.06 cfs 0.006 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.006 af

Pond RB2: RB 202,202,203 Peak Elev=44.50' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond RB3: RB 300 Peak Elev=58.50' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond SP1: SP1 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SP2: SP2 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SP3: SP3 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond TT1: Tree Trench 1 Peak Elev=52.43' Storage=30 cf Inflow=0.27 cfs 0.019 af
Discarded=0.20 cfs 0.019 af Primary=0.00 cfs 0.000 af Outflow=0.20 cfs 0.019 af

Pond TT2: Tree Trench 2 Peak Elev=51.78' Storage=81 cf Inflow=0.12 cfs 0.009 af
Discarded=0.03 cfs 0.009 af Primary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.009 af

Pond URC1: URC-1 Peak Elev=48.61' Storage=0.000 af Inflow=0.08 cfs 0.037 af
Outflow=0.08 cfs 0.037 af

Pond URC2: URC-2 Peak Elev=54.34' Storage=69 cf Inflow=0.30 cfs 0.022 af
Outflow=0.17 cfs 0.022 af

Pond URC3: URC-3 Peak Elev=55.74' Storage=50 cf Inflow=0.21 cfs 0.016 af
Outflow=0.12 cfs 0.016 af

Pond URC4: URC-4 Peak Elev=57.04' Storage=69 cf Inflow=0.26 cfs 0.019 af
Outflow=0.14 cfs 0.019 af

Summary for Subcatchment DA1: DA1

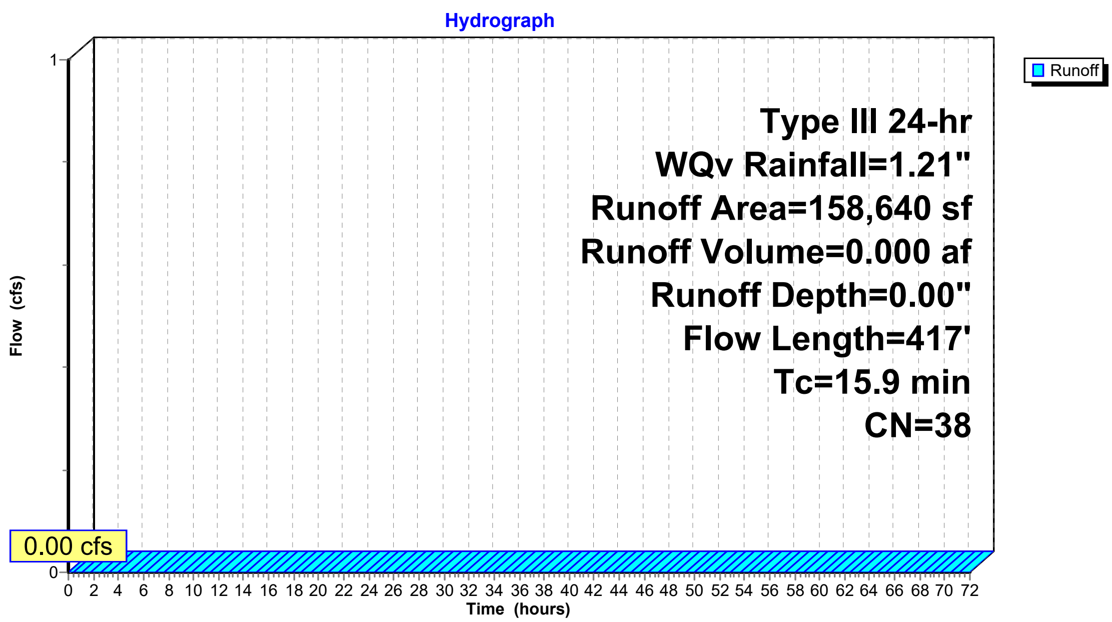
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr WQv Rainfall=1.21"

Area (sf)	CN	Description
118,297	30	Woods, Good, HSG A
25,363	39	>75% Grass cover, Good, HSG A
9,642	98	Roofs, HSG A
5,338	98	Paved parking, HSG A
158,640	38	Weighted Average
143,660		90.56% Pervious Area
14,980		9.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	78	0.1730	0.11		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.7	99	0.1110	2.33		**Shallow Concentrated Flow, B TO C** Short Grass Pasture Kv= 7.0 fps
3.0	240	0.0690	1.31		**Shallow Concentrated Flow, C TO SP1** Woodland Kv= 5.0 fps
15.9	417	Total			

Subcatchment DA1: DA1



Summary for Subcatchment DA2a: DA2a

CN for permeable pavers taken from RI Stormwater Design

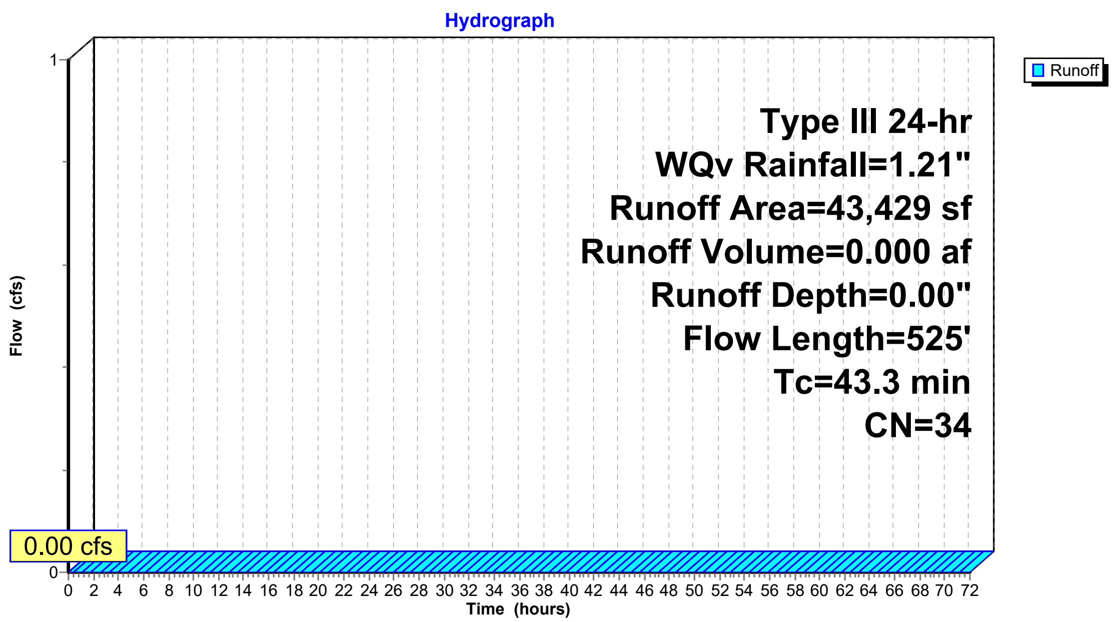
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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=1.21"

	Area (sf)	CN	Description
	25,414	30	Woods, Good, HSG A
	17,231	39	>75% Grass cover, Good, HSG A
*	784	40	Pervious Pavers
	43,429	34	Weighted Average
	43,429		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.4	147	0.0400	0.07		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.8	67	0.0760	1.38		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
1.1	73	0.0480	1.10		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
5.0	238	0.0250	0.79		**Shallow Concentrated Flow, D to SP2** Woodland Kv= 5.0 fps
43.3	525	Total			

Subcatchment DA2a: DA2a



Summary for Subcatchment DA2b: DA2b pervious

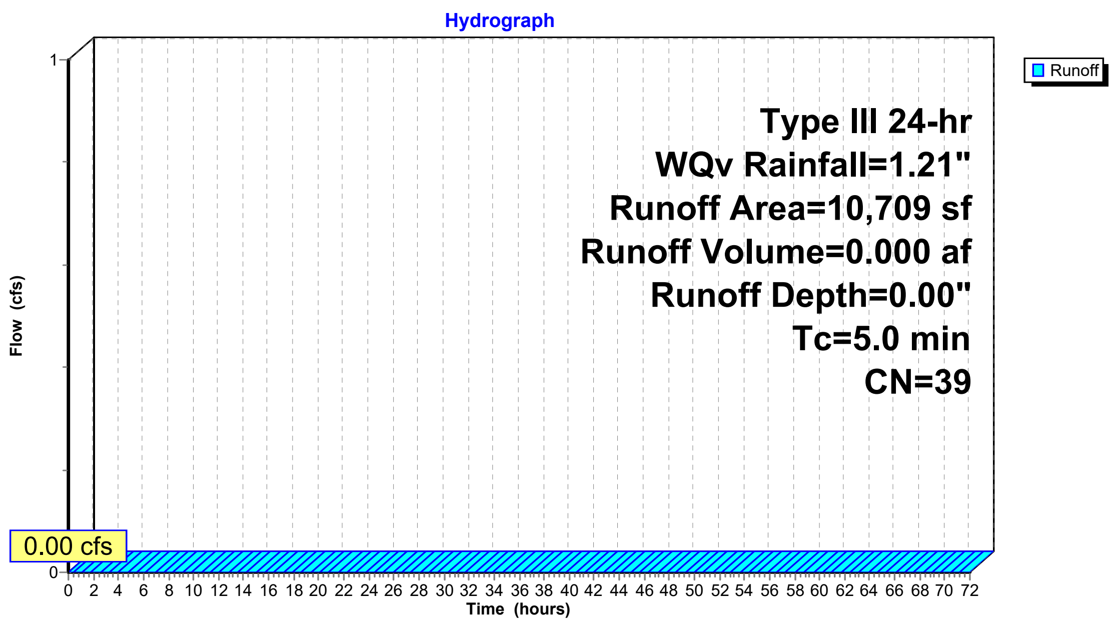
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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=1.21"

Area (sf)	CN	Description
10,238	39	>75% Grass cover, Good, HSG A
471	30	Woods, Good, HSG A
10,709	39	Weighted Average
10,709		100.00% Pervious Area

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

Subcatchment DA2b: DA2b pervious



Summary for Subcatchment DA2bi: DA2b impervious

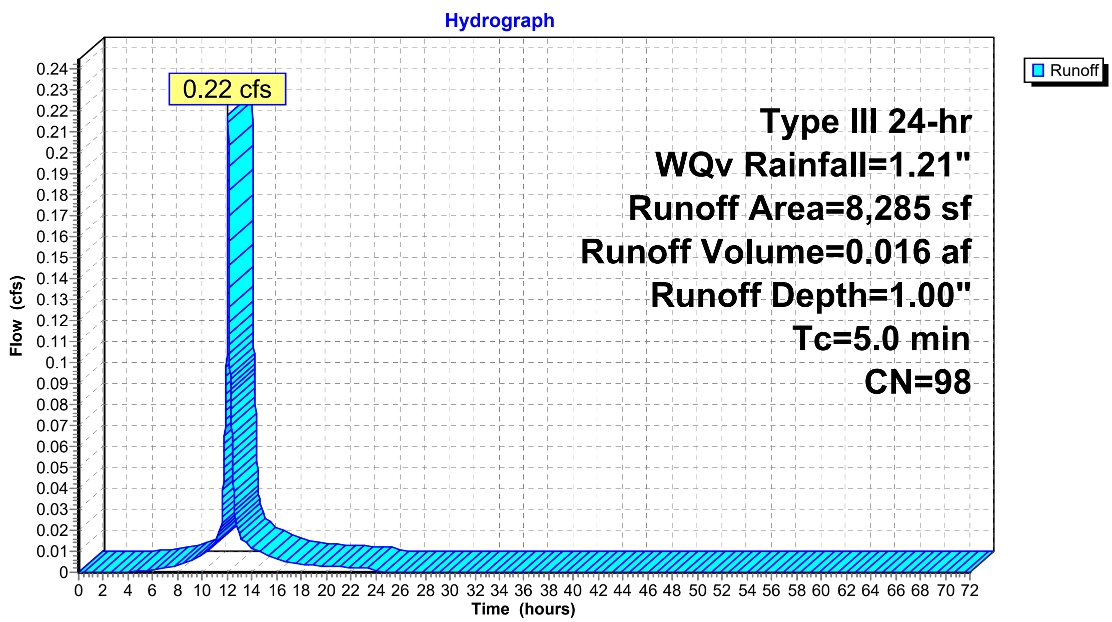
Runoff = 0.22 cfs @ 12.07 hrs, Volume= 0.016 af, Depth= 1.00"

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=1.21"

	Area (sf)	CN	Description
	7,010	98	Paved parking, HSG A
*	1,275	98	Sidewalks, HSG A
	8,285	98	Weighted Average
	8,285		100.00% Impervious Area

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

Subcatchment DA2bi: DA2b impervious



Summary for Subcatchment DA3a: DA3a pervious

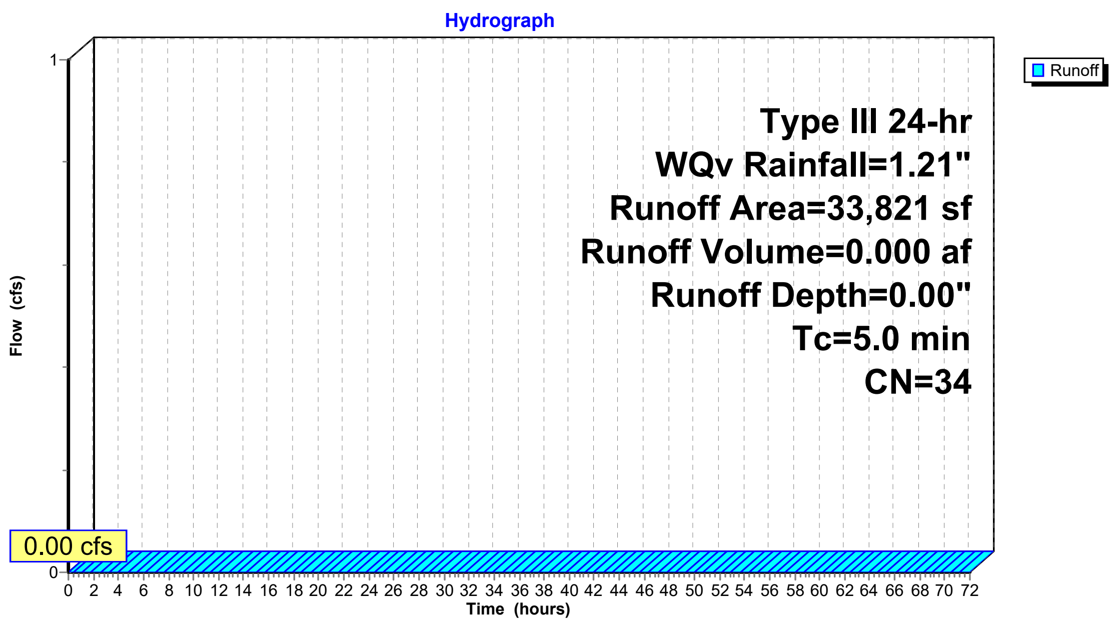
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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=1.21"

Area (sf)	CN	Description
14,079	39	>75% Grass cover, Good, HSG A
19,742	30	Woods, Good, HSG A
33,821	34	Weighted Average
33,821		100.00% Pervious Area

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

Subcatchment DA3a: DA3a pervious



Summary for Subcatchment DA3ai: DA3a impervious

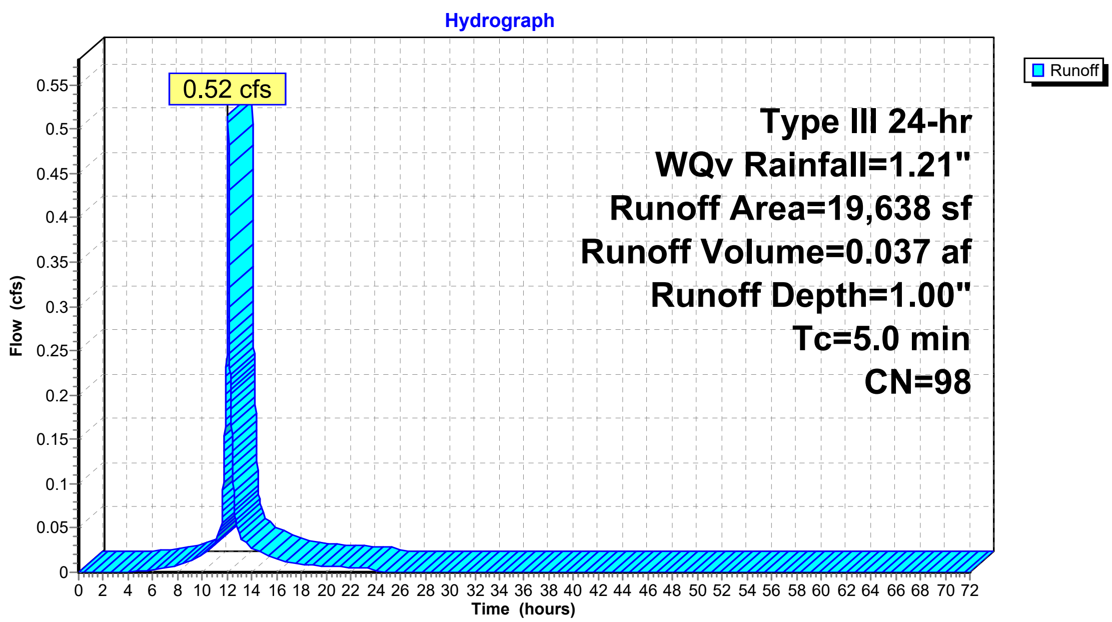
Runoff = 0.52 cfs @ 12.07 hrs, Volume= 0.037 af, Depth= 1.00"

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=1.21"

	Area (sf)	CN	Description
	18,277	98	Paved parking, HSG A
*	1,361	98	Sidewalk, HSG A
	19,638	98	Weighted Average
	19,638		100.00% Impervious Area

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

Subcatchment DA3ai: DA3a impervious



Summary for Subcatchment DA3b: DA3b pervious

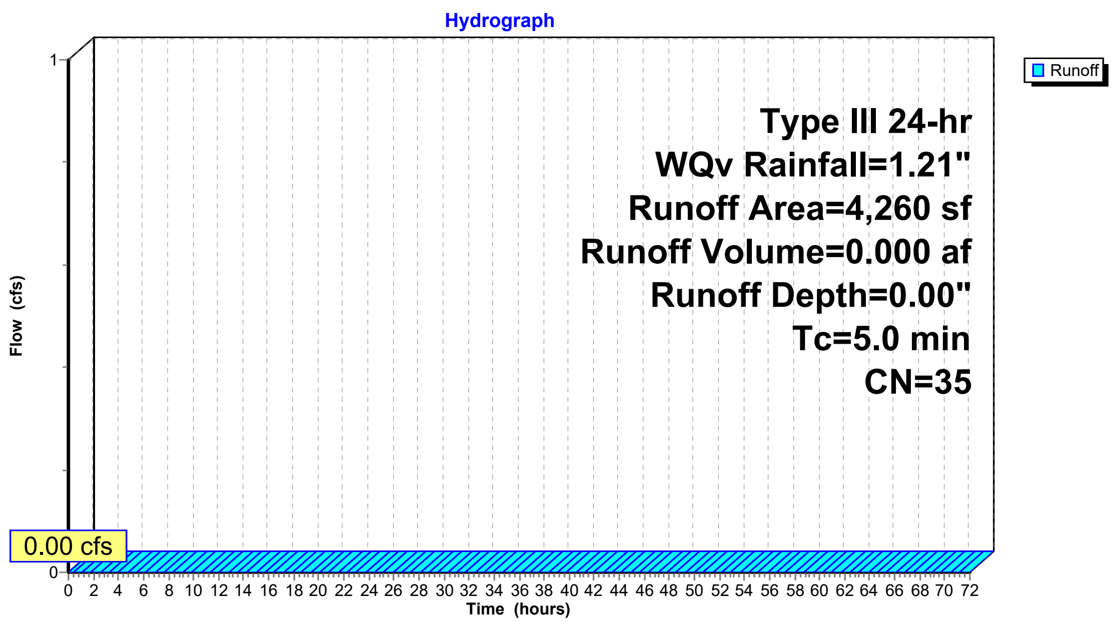
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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=1.21"

Area (sf)	CN	Description
2,324	39	>75% Grass cover, Good, HSG A
1,936	30	Woods, Good, HSG A
4,260	35	Weighted Average
4,260		100.00% Pervious Area

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

Subcatchment DA3b: DA3b pervious



Summary for Subcatchment DA3bi: DA3b impervious

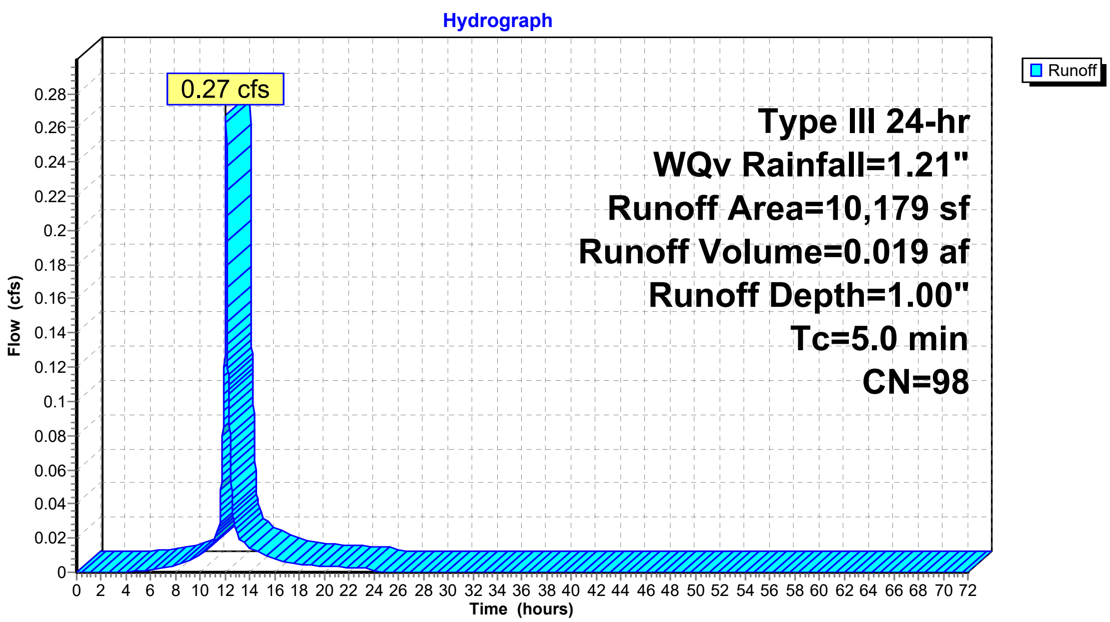
Runoff = 0.27 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 1.00"

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=1.21"

	Area (sf)	CN	Description
	9,486	98	Paved parking, HSG A
*	693	98	Sidewalks, HSG A
	10,179	98	Weighted Average
	10,179		100.00% Impervious Area

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

Subcatchment DA3bi: DA3b impervious



Summary for Subcatchment DA3c: DA3c pervious

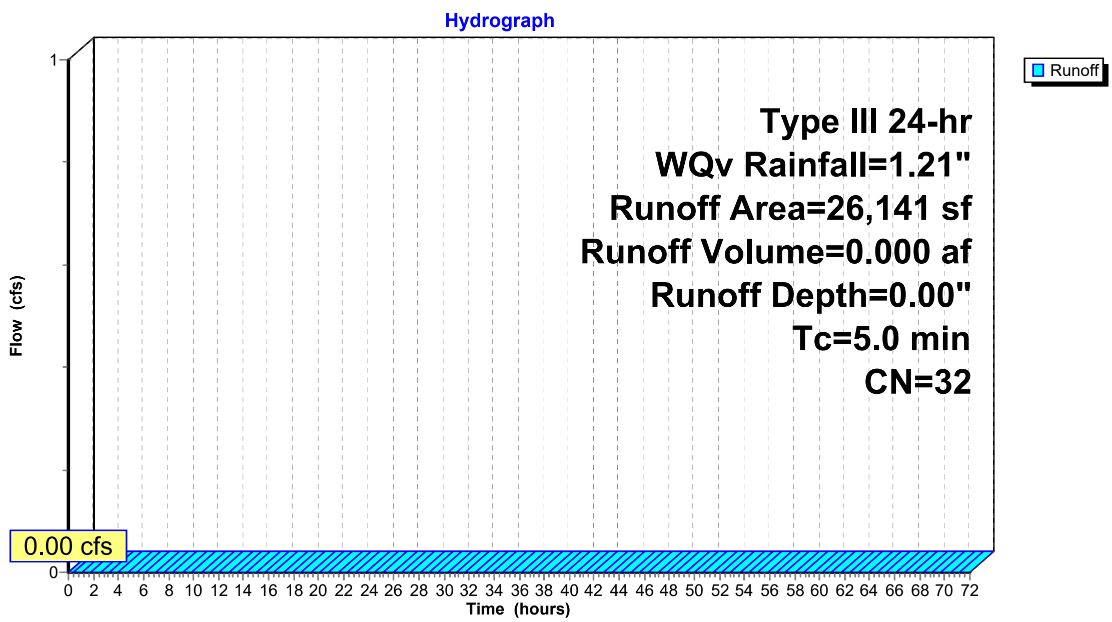
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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=1.21"

Area (sf)	CN	Description
4,662	39	>75% Grass cover, Good, HSG A
21,479	30	Woods, Good, HSG A
26,141	32	Weighted Average
26,141		100.00% Pervious Area

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

Subcatchment DA3c: DA3c pervious



Summary for Subcatchment DA3ci: DA3c impervious

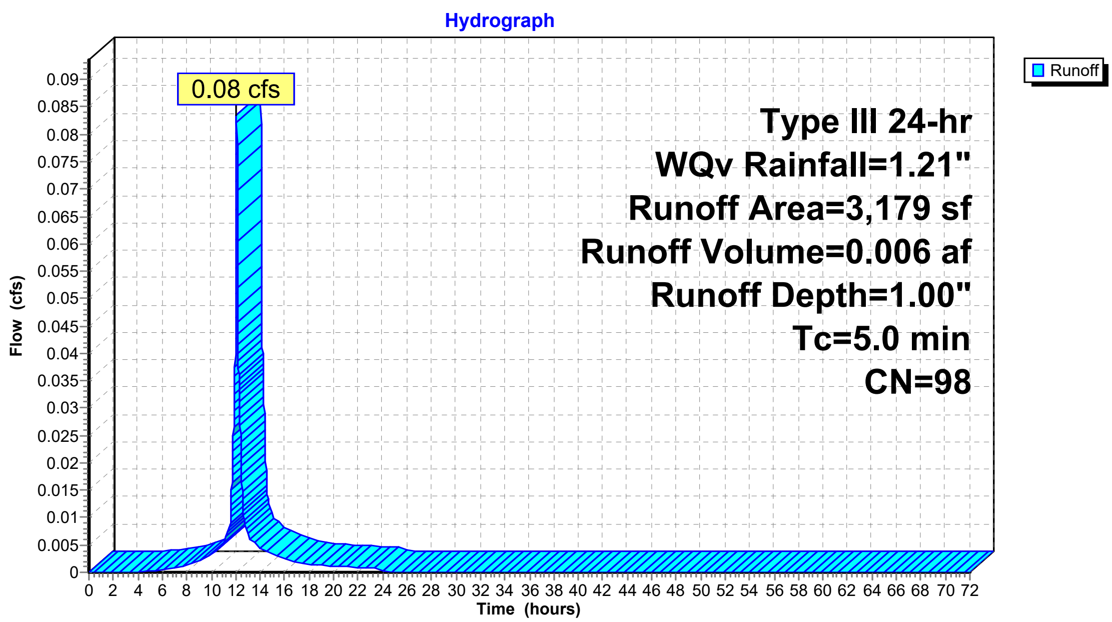
Runoff = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af, Depth= 1.00"

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=1.21"

	Area (sf)	CN	Description
	2,649	98	Paved parking, HSG A
*	530	98	Sidewalks, HSG A
	3,179	98	Weighted Average
	3,179		100.00% Impervious Area

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

Subcatchment DA3ci: DA3c impervious



Summary for Subcatchment DA3d: DA3d pervious

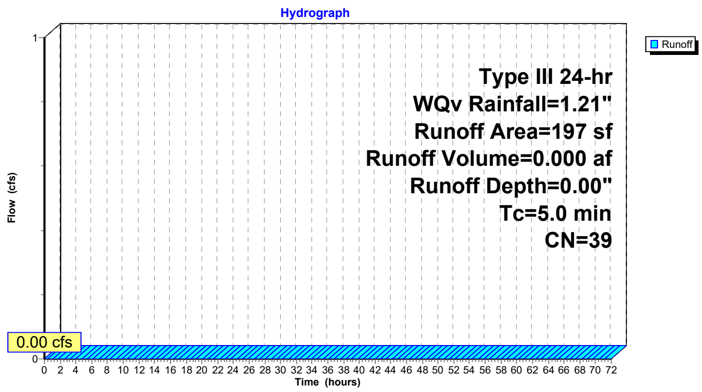
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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=1.21"

Area (sf)	CN	Description
197	39	>75% Grass cover, Good, HSG A
197		100.00% Pervious Area

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

Subcatchment DA3d: DA3d pervious



Summary for Subcatchment DA3di: DA3d impervious

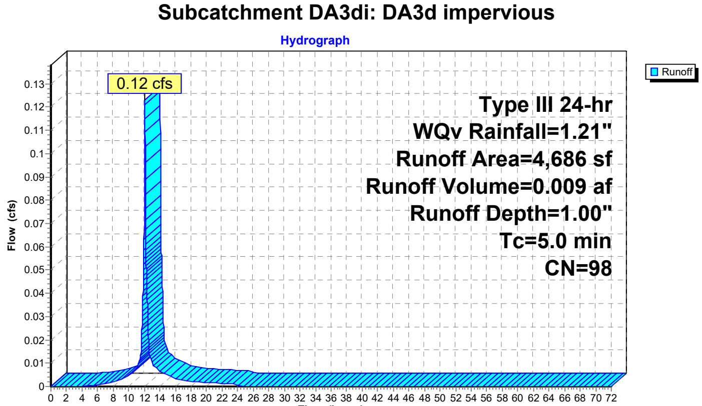
Runoff = 0.12 cfs @ 12.07 hrs, Volume= 0.009 af, Depth= 1.00"

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=1.21"

Area (sf)	CN	Description
4,686	98	Paved parking, HSG A
4,686		100.00% Impervious Area

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

Subcatchment DA3di: DA3d impervious



Summary for Subcatchment R1E: EAST ROOF

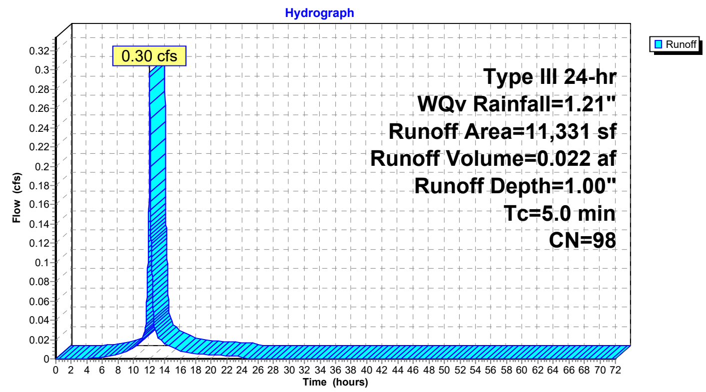
Runoff = 0.30 cfs @ 12.07 hrs, Volume= 0.022 af, Depth= 1.00"

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=1.21"

Area (sf)	CN	Description
11,331	98	Roofs, HSG A
11,331		100.00% Impervious Area

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

Subcatchment R1E: EAST ROOF



Summary for Subcatchment R1W: WEST ROOF

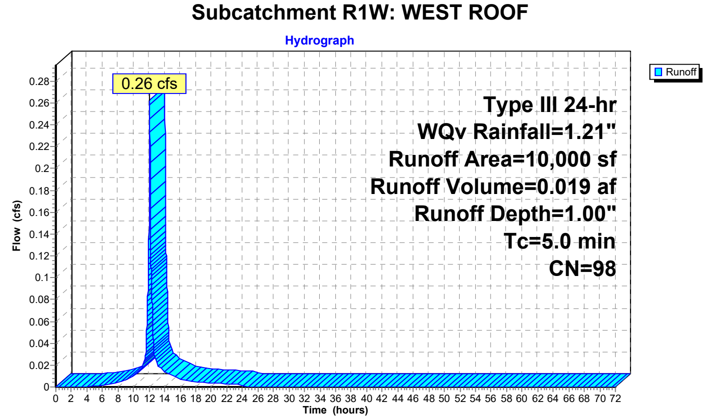
Runoff = 0.26 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 1.00"

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=1.21"

Area (sf)	CN	Description
10,000	98	Roofs, HSG A
10,000		100.00% Impervious Area

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

Subcatchment R1W: WEST ROOF



Summary for Pond 100: CB 100

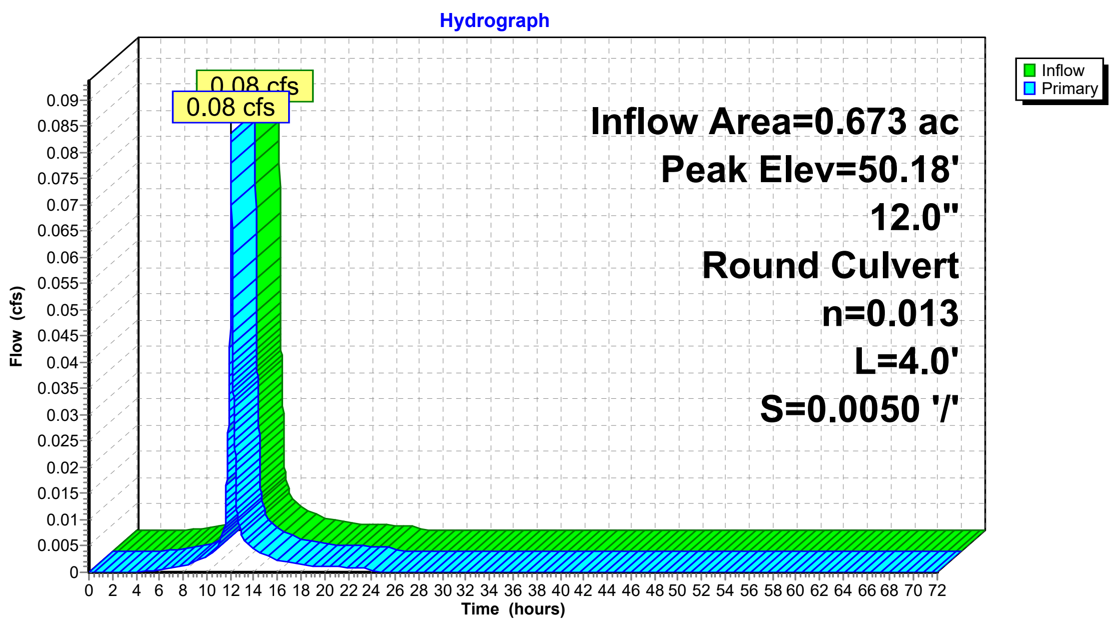
Inflow Area = 0.673 ac, 10.84% Impervious, Inflow Depth = 0.11" for WQv event
Inflow = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af
Outflow = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min
Primary = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 50.18' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	50.00'	**12.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 50.00' / 49.98' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.08 cfs @ 12.07 hrs HW=50.18' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.08 cfs @ 1.31 fps)

Pond 100: CB 100



Summary for Pond 200: CB 200

Inflow Area =	0.112 ac, 95.97% Impervious, Inflow Depth = 0.96"	for WQv event	
Inflow =	0.12 cfs @ 12.07 hrs, Volume=	0.009 af	
Outflow =	0.12 cfs @ 12.07 hrs, Volume=	0.009 af, Atten= 0%, Lag= 0.0 min	
Primary =	0.12 cfs @ 12.07 hrs, Volume=	0.009 af	
Secondary =	0.00 cfs @ 0.00 hrs, Volume=	0.000 af	

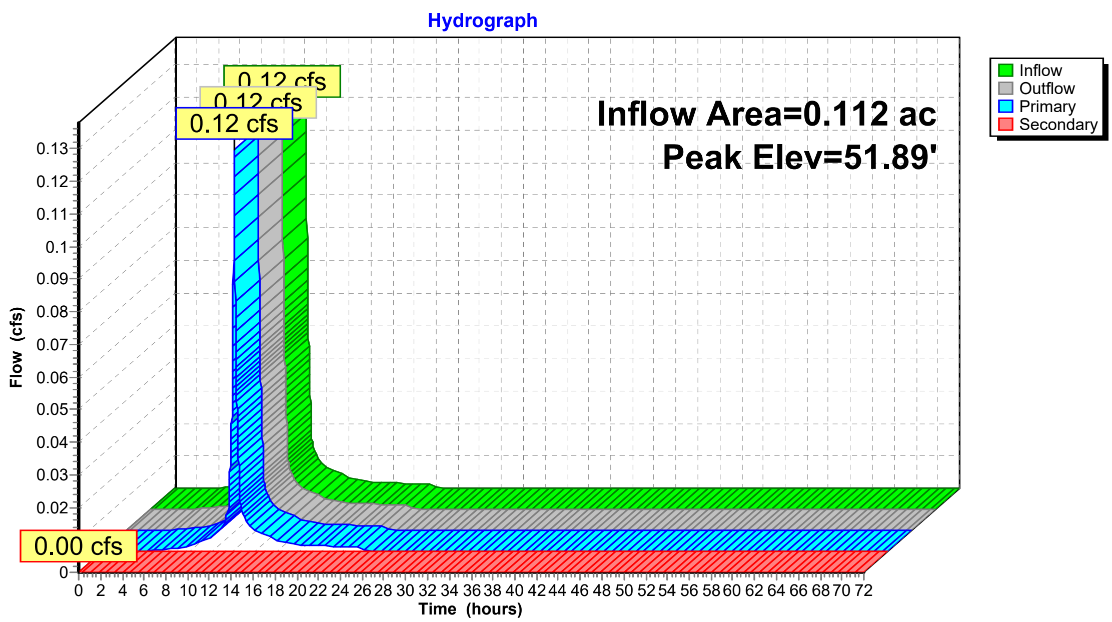
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 51.89' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	52.70'	**12.0" Round Culvert** L= 4.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 52.70' / 52.68' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	51.66'	**8.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.66' / 51.41' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#3	Secondary	55.79'	**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

Primary OutFlow Max=0.12 cfs @ 12.07 hrs HW=51.89' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.12 cfs @ 1.67 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=51.66' (Free Discharge)
├─**1=Culvert** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 200: CB 200



Summary for Pond BIO1: BIO 1

Inflow Area = 1.227 ac, 36.73% Impervious, Inflow Depth = 0.37" for WQv event
Inflow = 0.52 cfs @ 12.07 hrs, Volume= 0.037 af
Outflow = 0.08 cfs @ 12.55 hrs, Volume= 0.037 af, Atten= 85%, Lag= 28.6 min
Primary = 0.08 cfs @ 12.55 hrs, Volume= 0.037 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 58.98' @ 12.55 hrs Surf.Area= 1,361 sf Storage= 522 cf

Plug-Flow detention time= 50.1 min calculated for 0.037 af (100% of inflow)
Center-of-Mass det. time= 50.1 min (830.9 - 780.8)

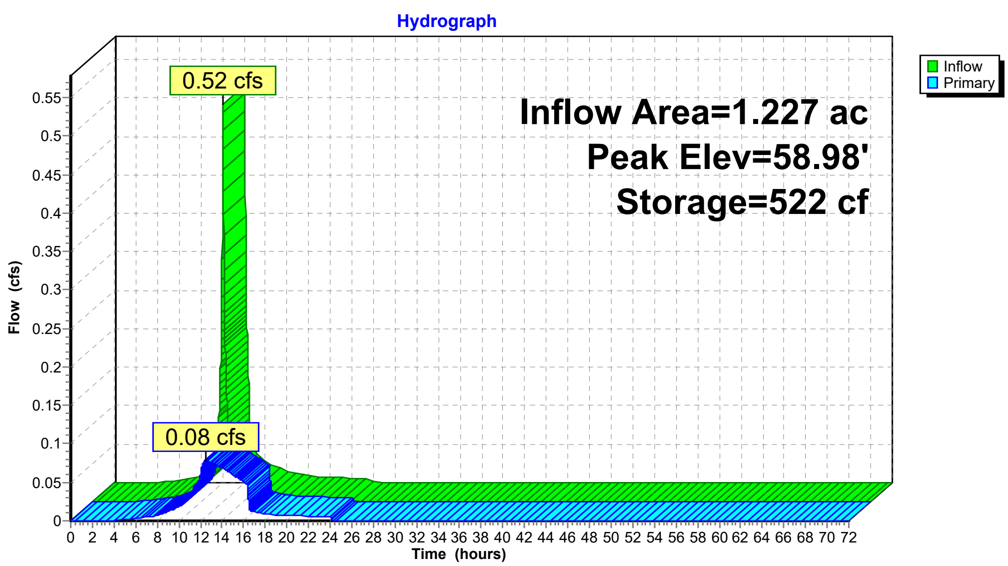
Volume	Invert	Avail.Storage	Storage Description
#1	58.50'	2,210 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	800	0	0
59.00	1,380	545	545
60.00	1,950	1,665	2,210

Device	Routing	Invert	Outlet Devices
#1	Primary	55.09'	**12.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 55.09' / 54.87' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	59.25'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	55.38'	**4.0" Round Culvert** L= 38.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 55.38' / 55.19' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#4	Device 3	58.50'	**2.470 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.08 cfs @ 12.55 hrs HW=58.98' (Free Discharge)
└─**1=Culvert** (Passes 0.08 cfs of 5.50 cfs potential flow)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Culvert** (Passes 0.08 cfs of 0.59 cfs potential flow)
    └─**4=Exfiltration** (Exfiltration Controls 0.08 cfs)

Pond BIO1: BIO 1



Summary for Pond BIO2: BIO 2

Inflow Area = 0.436 ac, 43.62% Impervious, Inflow Depth = 0.43" for WQv event
Inflow = 0.22 cfs @ 12.07 hrs, Volume= 0.016 af
Outflow = 0.21 cfs @ 12.09 hrs, Volume= 0.016 af, Atten= 5%, Lag= 1.4 min
Primary = 0.21 cfs @ 12.09 hrs, Volume= 0.016 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 62.54' @ 12.09 hrs Surf.Area= 543 sf Storage= 22 cf

Plug-Flow detention time= 1.9 min calculated for 0.016 af (100% of inflow)
Center-of-Mass det. time= 1.9 min (782.7 - 780.8)

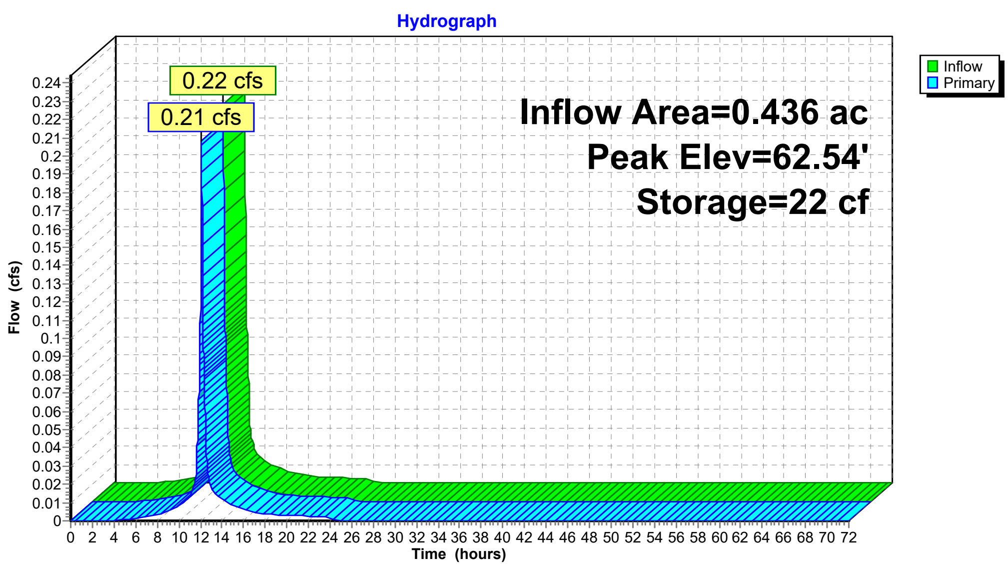
Volume	Invert	Avail.Storage	Storage Description
#1	62.50'	1,414 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
62.50	522	0	0
63.00	775	324	324
64.00	1,405	1,090	1,414

Device	Routing	Invert	Outlet Devices
#1	Primary	59.00'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 59.00' / 58.88' S= 0.0048 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	62.50'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	59.30'	**6.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.30' / 59.18' S= 0.0048 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#4	Device 3	62.50'	**2.470 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.21 cfs @ 12.09 hrs HW=62.54' (Free Discharge)
└─**1=Culvert** (Passes 0.21 cfs of 6.60 cfs potential flow)
  ├─**2=Orifice/Grate** (Weir Controls 0.17 cfs @ 0.67 fps)
  └─**3=Culvert** (Passes 0.03 cfs of 1.29 cfs potential flow)
    └─**4=Exfiltration** (Exfiltration Controls 0.03 cfs)

Pond BIO2: BIO 2



Summary for Pond DMH: DMH 200

Inflow Area = 0.331 ac, 70.50% Impervious, Inflow Depth = 0.70" for WQv event
Inflow = 0.27 cfs @ 12.07 hrs, Volume= 0.019 af
Outflow = 0.27 cfs @ 12.07 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min
Primary = 0.27 cfs @ 12.07 hrs, Volume= 0.019 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

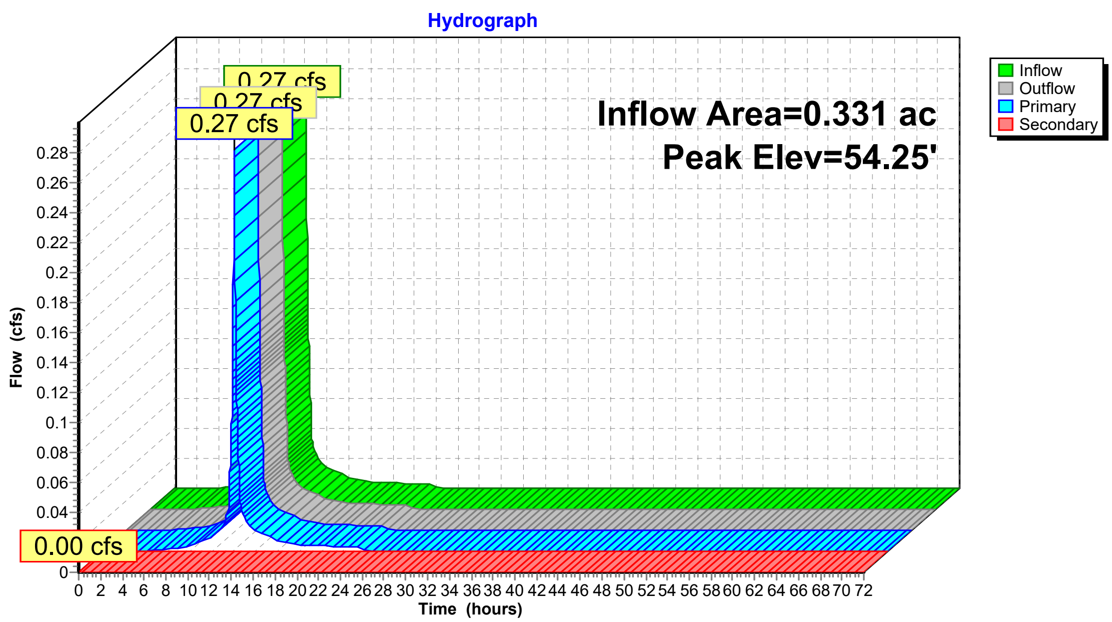
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 54.25' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	54.30'	**12.0" Round Culvert** L= 9.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 54.30' / 54.26' S= 0.0044 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	53.78'	**12.0" Round Culvert** L= 98.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 53.78' / 53.78' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.27 cfs @ 12.07 hrs HW=54.25' (Free Discharge)
└**2=Culvert** (Barrel Controls 0.27 cfs @ 1.10 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=53.78' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)

Pond DMH: DMH 200



Summary for Pond RB1: RB 101,102

Inflow Area = 0.673 ac, 10.84% Impervious, Inflow Depth = 0.11" for WQv event
Inflow = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af
Outflow = 0.06 cfs @ 12.03 hrs, Volume= 0.006 af, Atten= 28%, Lag= 0.0 min
Discarded = 0.06 cfs @ 12.03 hrs, Volume= 0.006 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= 39.22' @ 12.14 hrs Surf.Area= 157 sf Storage= 11 cf

Plug-Flow detention time= 1.5 min calculated for 0.006 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (782.3 - 780.8)

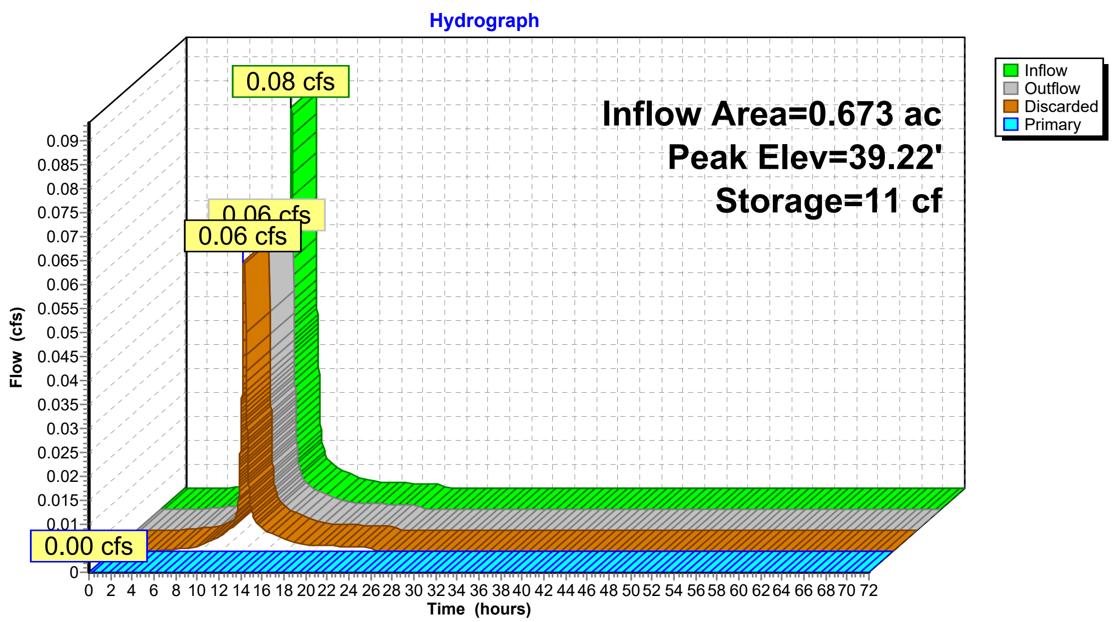
Volume	Invert	Avail.Storage	Storage Description
#1	41.00'	339 cf	**6.00'D x 6.00'H Recharger** x 2 Inside #2
#2	39.00'	355 cf	**10.00'D x 9.00'H Stone** x 2 1,414 cf Overall - 339 cf Embedded = 1,074 cf x 33.0% Voids
		694 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	39.00'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	46.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 12.03 hrs HW=39.09' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=39.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond RB1: RB 101,102



Summary for Pond RB2: RB 202,202,203

Inflow Area =	0.112 ac, 95.97% 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 / 3
Peak Elev= 44.50' @ 0.00 hrs Surf.Area= 236 sf Storage= 0 cf

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

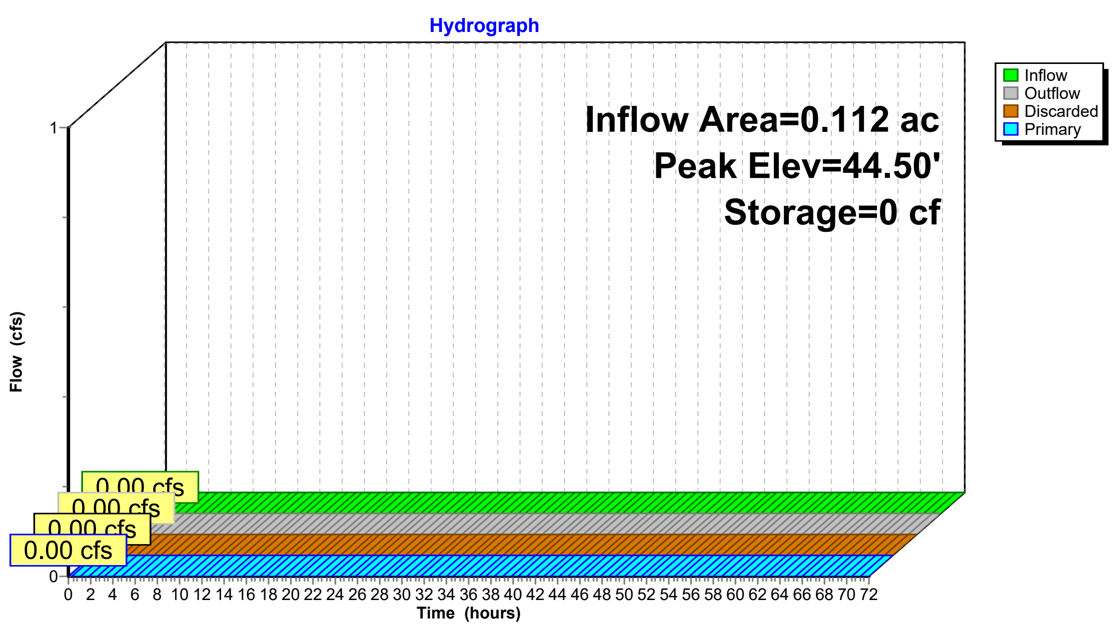
Volume	Invert	Avail.Storage	Storage Description
#1	46.50'	509 cf	**6.00'D x 6.00'H Recharger** x 3 Inside #2
#2	44.50'	532 cf	**10.00'D x 9.00'H Stone** x 3
			2,121 cf Overall - 509 cf Embedded = 1,612 cf x 33.0% Voids
		1,041 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.50'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	55.61'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=44.50' (Free Discharge)
└**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=44.50' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond RB2: RB 202,202,203



Summary for Pond RB3: RB 300

Inflow Area = 0.997 ac, 0.00% 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 / 3
Peak Elev= 58.50' @ 0.00 hrs Surf.Area= 57 sf Storage= 0 cf

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

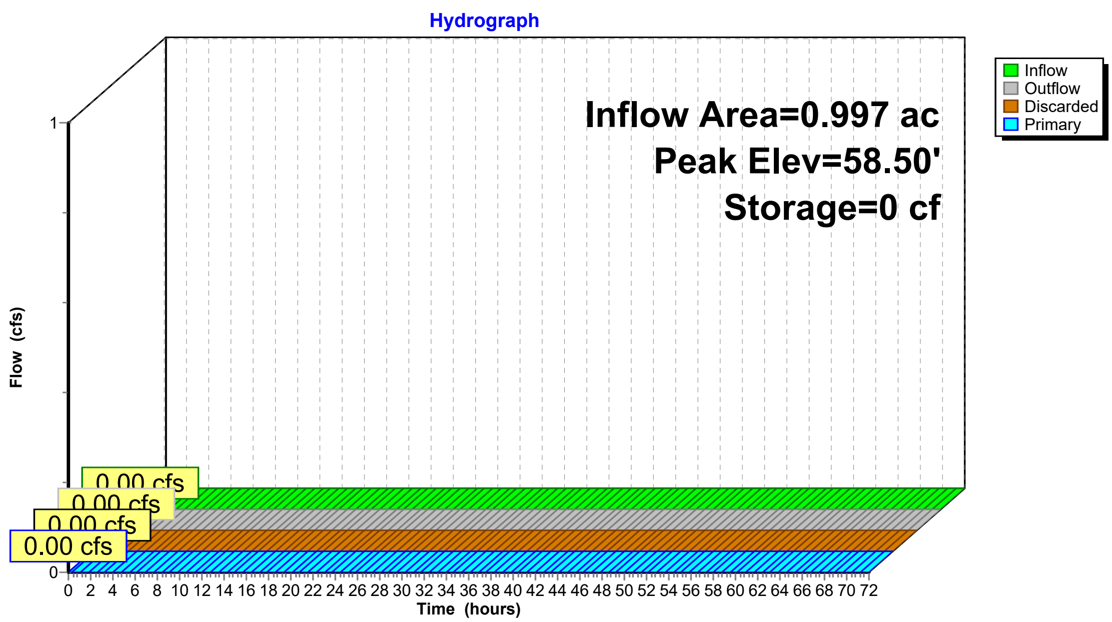
Volume	Invert	Avail.Storage	Storage Description
#1	59.50'	50 cf	**4.00'D x 4.00'H Recharger** Inside #2
#2	58.50'	95 cf	**6.00'D x 6.00'H Stone** x 2 339 cf Overall - 50 cf Embedded = 289 cf x 33.0% Voids
		146 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	58.50'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	65.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=58.50' (Free Discharge)
└─**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=58.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond RB3: RB 300

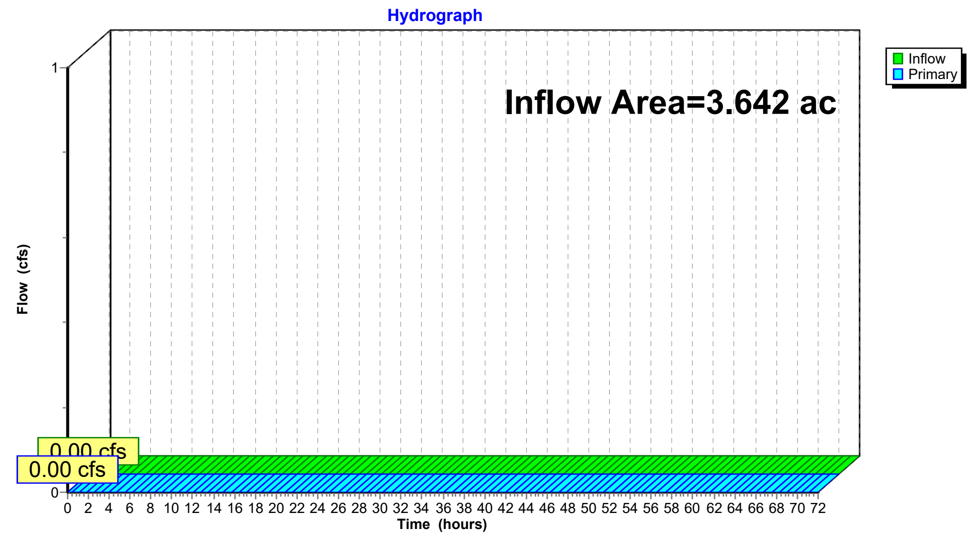


Summary for Pond SP1: SP1

Inflow Area = 3.642 ac, 9.44% 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: SP1

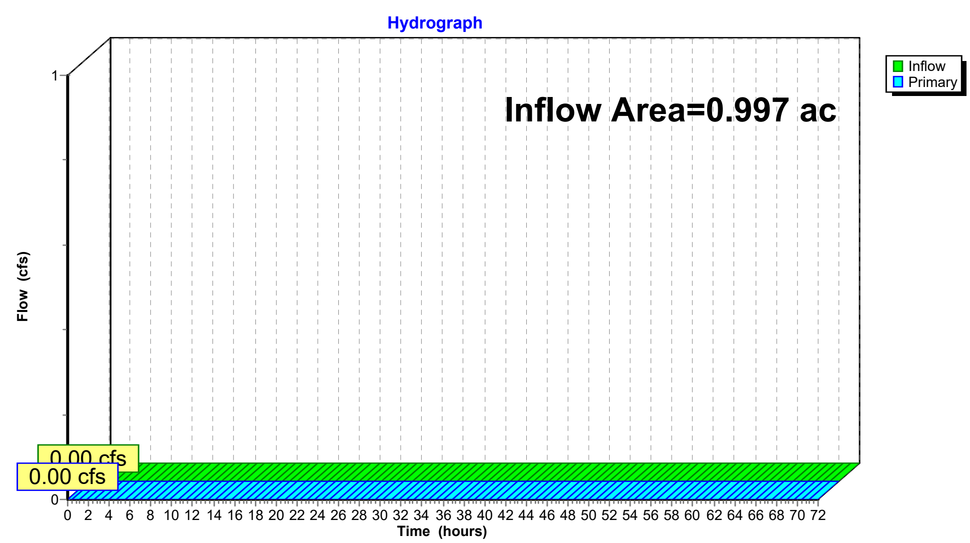


Summary for Pond SP2: SP2

Inflow Area = 0.997 ac, 0.00% 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 SP2: SP2

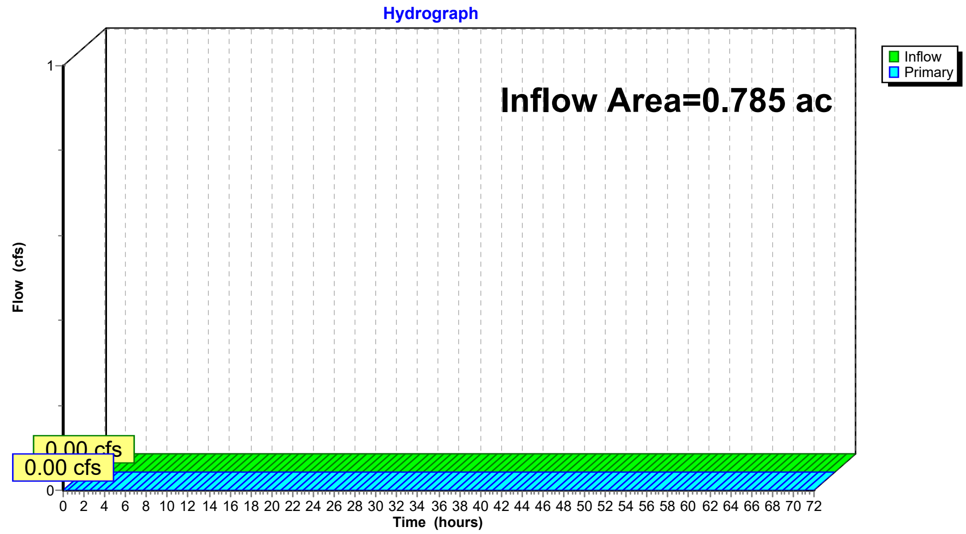


Summary for Pond SP3: SP3

Inflow Area = 0.785 ac, 23.00% 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 SP3: SP3



Summary for Pond TT1: Tree Trench 1

Inflow Area = 0.331 ac, 70.50% Impervious, Inflow Depth = 0.70" for WQv event
Inflow = 0.27 cfs @ 12.07 hrs, Volume= 0.019 af
Outflow = 0.20 cfs @ 12.03 hrs, Volume= 0.019 af, Atten= 27%, Lag= 0.0 min
Discarded = 0.20 cfs @ 12.03 hrs, Volume= 0.019 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= 52.43' @ 12.14 hrs Surf.Area= 1,020 sf Storage= 30 cf

Plug-Flow detention time= 1.1 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 1.1 min (781.9 - 780.8)

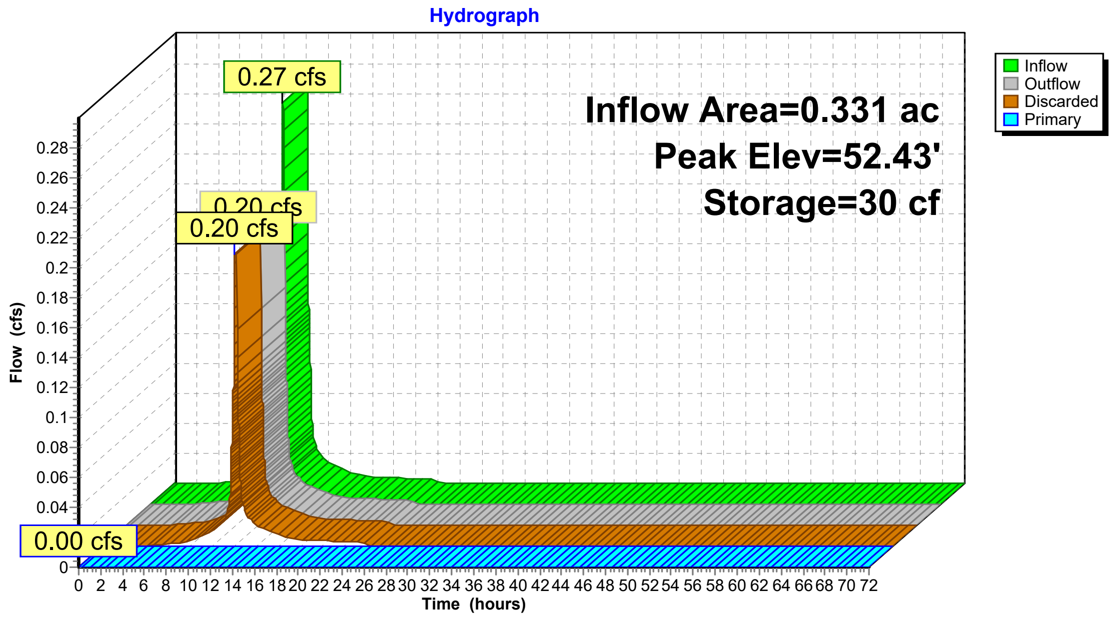
Volume	Invert	Avail.Storage	Storage Description
#1	52.34'	1,008 cf	**9.90'W x 103.00'L x 3.00'H Prismatoid** 3,059 cf Overall - 32 cf Embedded = 3,027 cf x 33.3% Voids
#2	53.78'	32 cf	**8.0" Round Pipe Storage** Inside #1 L= 92.0' S= 0.0050 '/'
		1,040 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	52.34'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	54.30'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.20 cfs @ 12.03 hrs HW=52.37' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=52.34' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond TT1: Tree Trench 1



Summary for Pond TT2: Tree Trench 2

Inflow Area =	0.112 ac, 95.97% Impervious, Inflow Depth = 0.96" for WQv event	
Inflow =	0.12 cfs @ 12.07 hrs, Volume=	0.009 af
Outflow =	0.03 cfs @ 11.75 hrs, Volume=	0.009 af, Atten= 77%, Lag= 0.0 min
Discarded =	0.03 cfs @ 11.75 hrs, Volume=	0.009 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= 51.78' @ 12.45 hrs Surf.Area= 150 sf Storage= 81 cf

Plug-Flow detention time= 14.2 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 14.2 min (795.0 - 780.8)

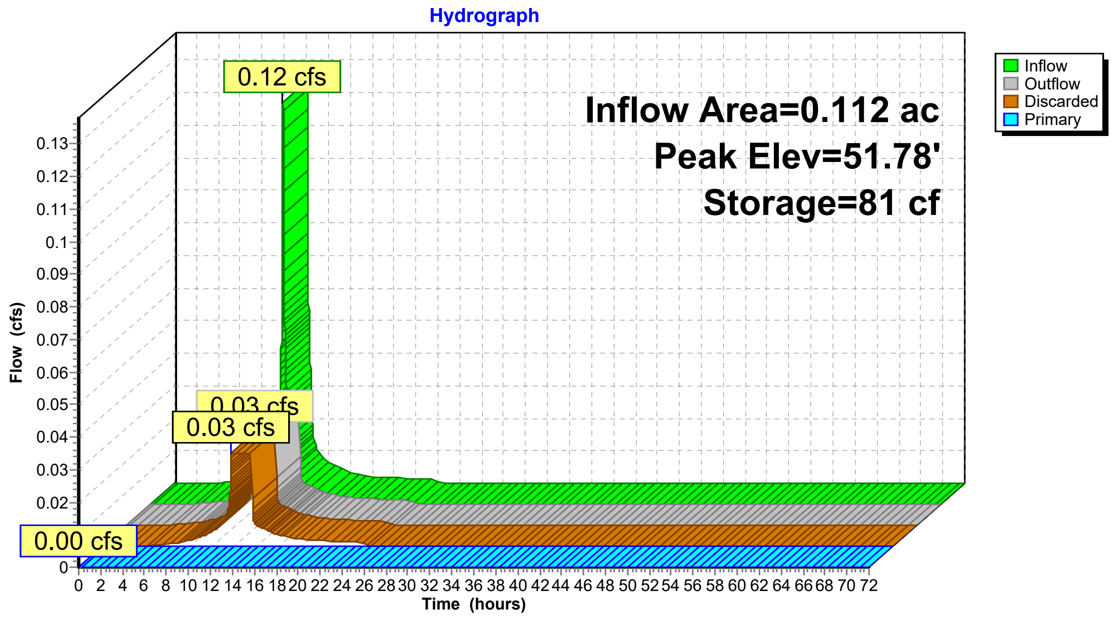
Volume	Invert	Avail.Storage	Storage Description
#1	50.16'	184 cf	**5.00'W x 30.00'L x 3.80'H Prismatoid** 570 cf Overall - 17 cf Embedded = 553 cf x 33.3% Voids
#2	51.66'	17 cf	**8.0" Round Pipe Storage** Inside #1 L= 50.0' S= 0.0050 '/'
		201 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.16'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	52.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.03 cfs @ 11.75 hrs HW=50.20' (Free Discharge)
└1=**Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=50.16' (Free Discharge)
└2=**Orifice/Grate** (Controls 0.00 cfs)

Pond TT2: Tree Trench 2



Summary for Pond URC1: URC-1

Inflow Area = 1.559 ac, 43.91% Impervious, Inflow Depth = 0.29" for WQv event
Inflow = 0.08 cfs @ 12.55 hrs, Volume= 0.037 af
Outflow = 0.08 cfs @ 12.58 hrs, Volume= 0.037 af, Atten= 0%, Lag= 2.2 min
Discarded = 0.08 cfs @ 12.58 hrs, Volume= 0.037 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 48.61' @ 12.58 hrs Surf.Area= 0.046 ac Storage= 0.000 af

Plug-Flow detention time= 2.0 min calculated for 0.037 af (100% of inflow)
Center-of-Mass det. time= 2.0 min (832.9 - 830.9)

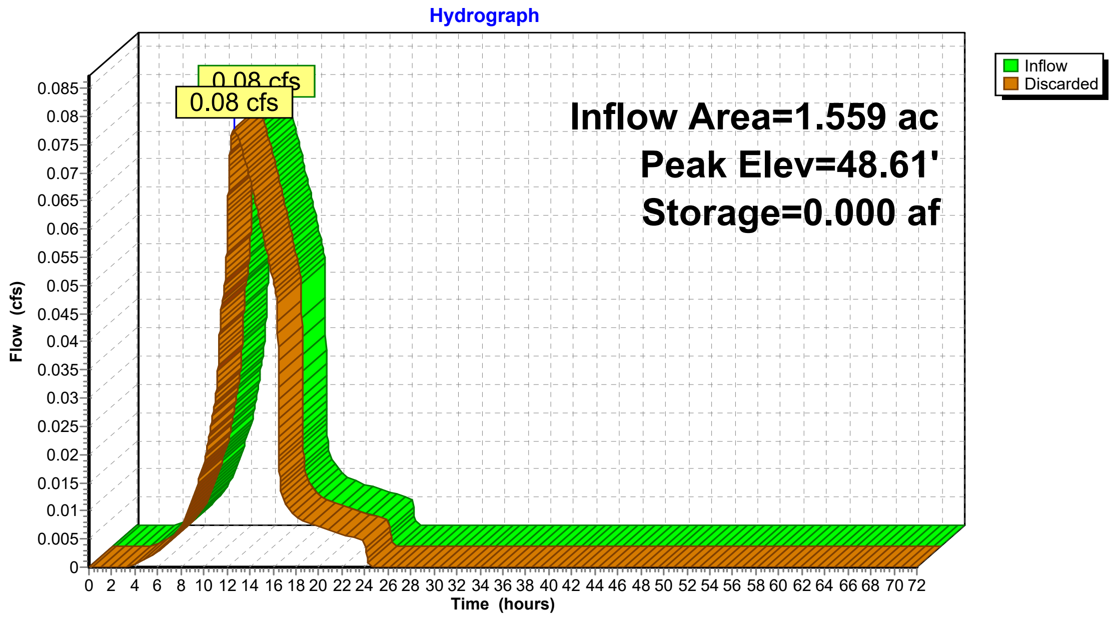
Volume	Invert	Avail.Storage	Storage Description
#1A	48.60'	0.074 af	**23.25'W x 85.57'L x 6.75'H Field A** 0.308 af Overall - 0.085 af Embedded = 0.223 af x 33.3% Voids
#2A	50.60'	0.085 af	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 11 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		0.160 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	48.60'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.38 cfs @ 12.58 hrs HW=48.61' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.38 cfs)

Pond URC1: URC-1



Summary for Pond URC2: URC-2

Inflow Area = 0.260 ac,100.00% Impervious, Inflow Depth = 1.00" for WQv event
Inflow = 0.30 cfs @ 12.07 hrs, Volume= 0.022 af
Outflow = 0.17 cfs @ 12.01 hrs, Volume= 0.022 af, Atten= 44%, Lag= 0.0 min
Discarded = 0.17 cfs @ 12.01 hrs, Volume= 0.022 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 54.34' @ 12.17 hrs Surf.Area= 879 sf Storage= 69 cf

Plug-Flow detention time= 2.7 min calculated for 0.022 af (100% of inflow)
Center-of-Mass det. time= 2.7 min (783.6 - 780.8)

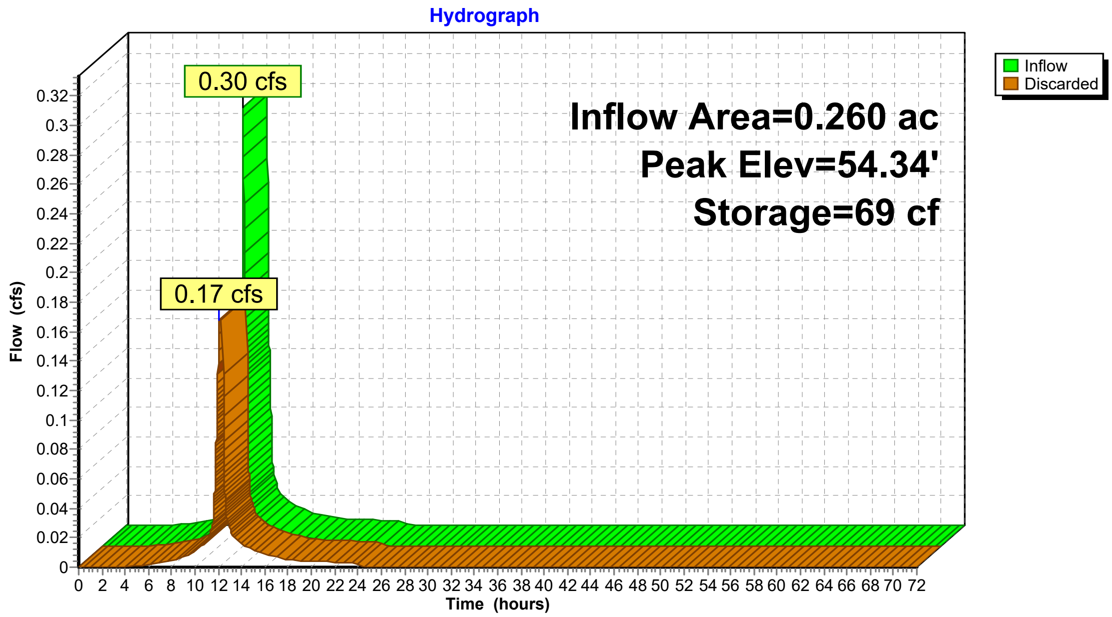
Volume	Invert	Avail.Storage	Storage Description
#1A	54.10'	1,517 cf	**17.33'W x 50.72'L x 6.75'H Field A** 5,934 cf Overall - 1,379 cf Embedded = 4,555 cf x 33.3% Voids
#2A	56.10'	1,379 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 2 Rows of 6 Chambers Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf
		2,896 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	54.10'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.17 cfs @ 12.01 hrs HW=54.17' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Pond URC2: URC-2



Summary for Pond URC3: URC-3

Inflow Area = 0.436 ac, 43.62% Impervious, Inflow Depth = 0.43" for WQv event
Inflow = 0.21 cfs @ 12.09 hrs, Volume= 0.016 af
Outflow = 0.12 cfs @ 12.04 hrs, Volume= 0.016 af, Atten= 40%, Lag= 0.0 min
Discarded = 0.12 cfs @ 12.04 hrs, Volume= 0.016 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 55.74' @ 12.21 hrs Surf.Area= 765 sf Storage= 50 cf

Plug-Flow detention time= 3.0 min calculated for 0.016 af (100% of inflow)
Center-of-Mass det. time= 3.0 min (785.8 - 782.7)

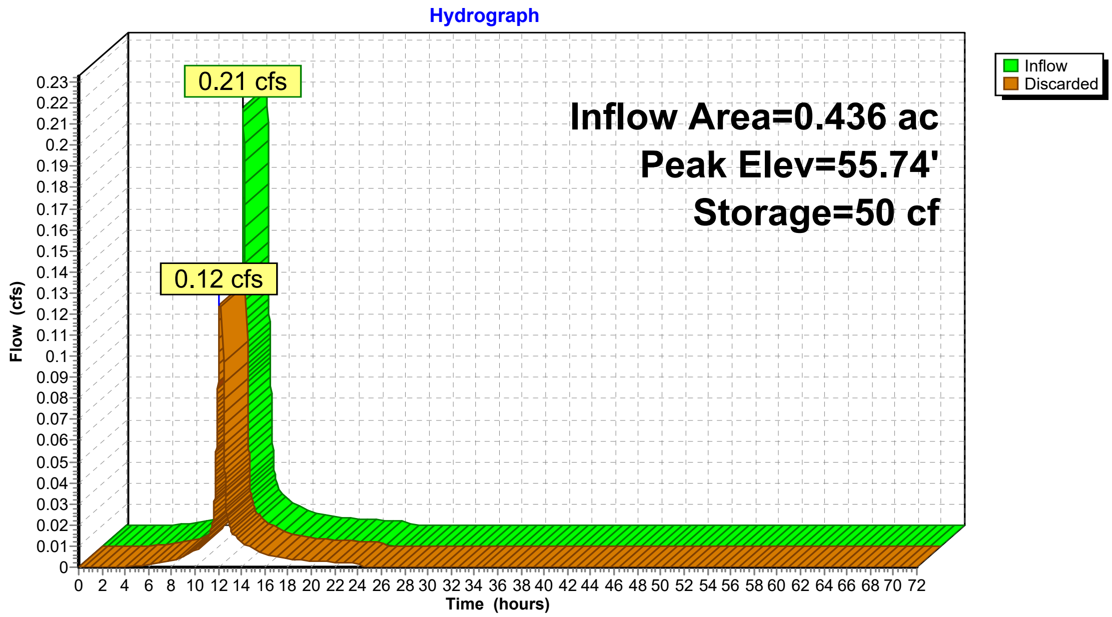
Volume	Invert	Avail.Storage	Storage Description
#1A	55.55'	1,250 cf	**22.25'W x 34.38'L x 6.75'H Field A** 5,163 cf Overall - 1,409 cf Embedded = 3,755 cf x 33.3% Voids
#2A	57.55'	1,409 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 4 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		2,659 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	55.55'	**7.000 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.12 cfs @ 12.04 hrs HW=55.62' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Pond URC3: URC-3



Summary for Pond URC4: URC-4

Inflow Area = 0.230 ac,100.00% Impervious, Inflow Depth = 1.00" for WQv event
Inflow = 0.26 cfs @ 12.07 hrs, Volume= 0.019 af
Outflow = 0.14 cfs @ 12.00 hrs, Volume= 0.019 af, Atten= 48%, Lag= 0.0 min
Discarded = 0.14 cfs @ 12.00 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 57.04' @ 12.19 hrs Surf.Area= 851 sf Storage= 69 cf

Plug-Flow detention time= 3.2 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 3.2 min (784.1 - 780.8)

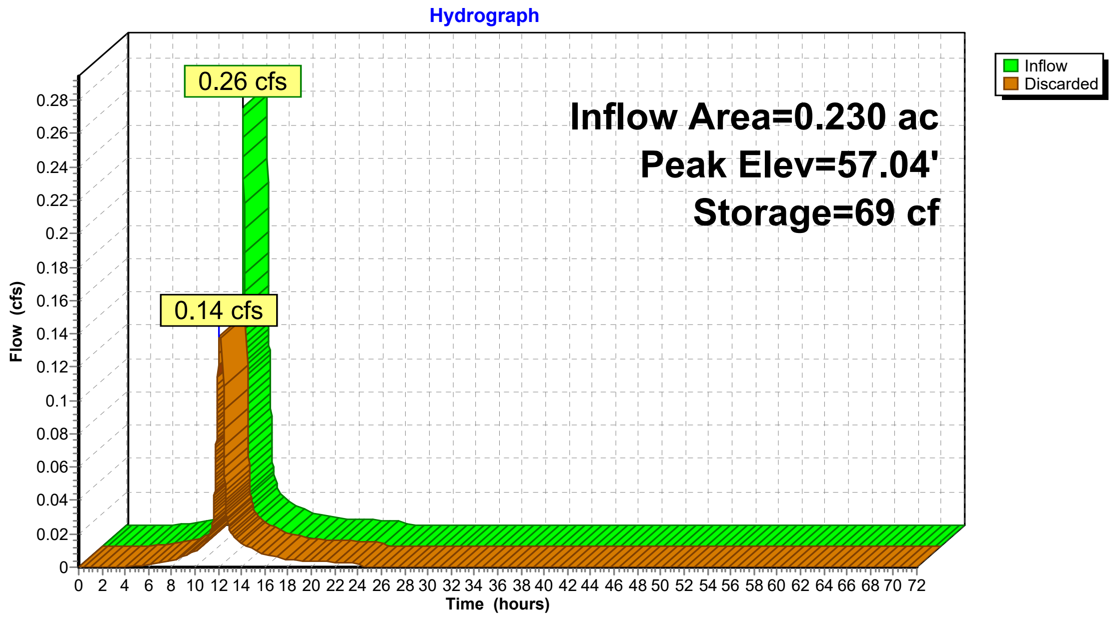
Volume	Invert	Avail.Storage	Storage Description
#1A	56.80'	1,292 cf	**30.17'W x 28.21'L x 6.25'H Field A** 5,319 cf Overall - 1,439 cf Embedded = 3,880 cf x 33.3% Voids
#2A	58.30'	1,439 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 4 Rows of 3 Chambers Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		2,731 cf	Total Available Storage

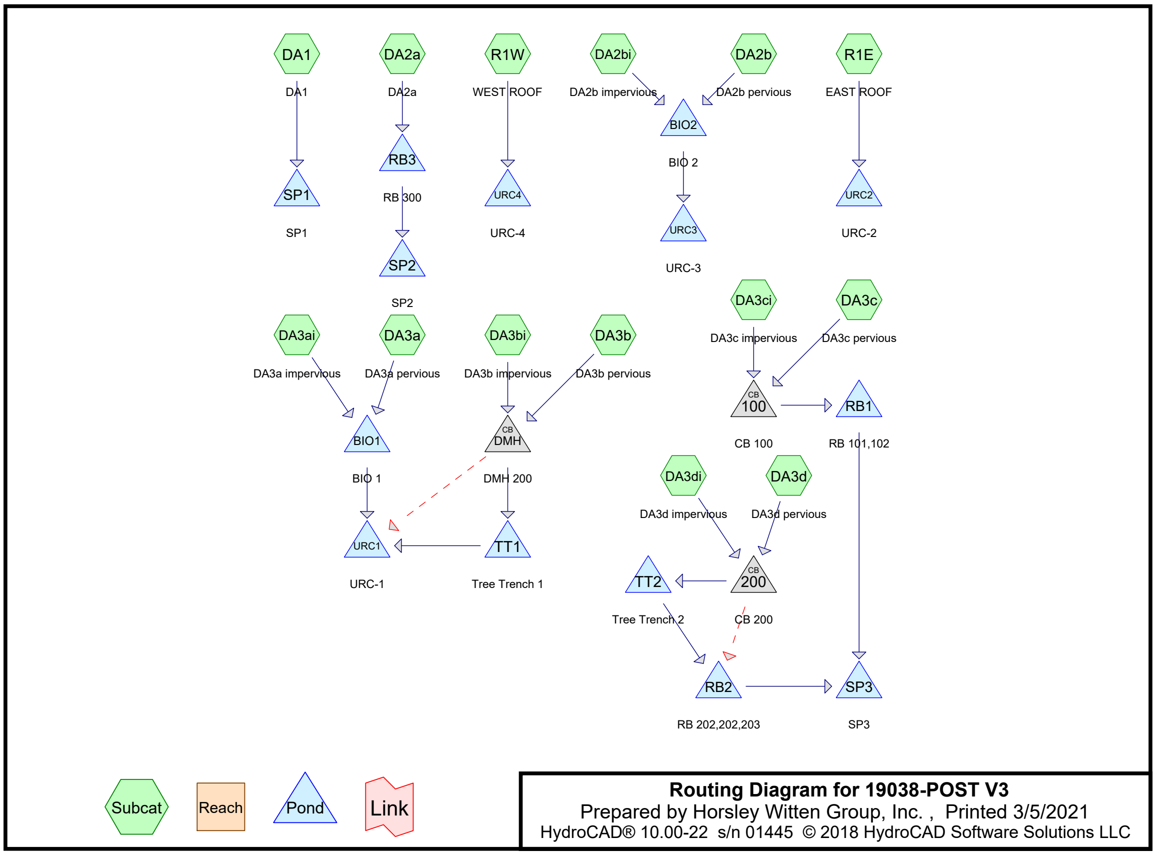
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	56.80'	**7.000 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.14 cfs @ 12.00 hrs HW=56.86' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Pond URC4: URC-4





Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA1: DA1
Runoff Area=158,640 sf 9.44% Impervious Runoff Depth=0.00"
Flow Length=417' Tc=15.9 min CN=38 Runoff=0.00 cfs 0.000 af

Subcatchment DA2a: DA2a
Runoff Area=43,429 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=525' Tc=43.3 min CN=34 Runoff=0.00 cfs 0.000 af

Subcatchment DA2b: DA2b pervious
Runoff Area=10,709 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment DA2bi: DA2b impervious
Runoff Area=8,285 sf 100.00% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=98 Runoff=0.64 cfs 0.049 af

Subcatchment DA3a: DA3a pervious
Runoff Area=33,821 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=34 Runoff=0.00 cfs 0.000 af

Subcatchment DA3ai: DA3a impervious
Runoff Area=19,638 sf 100.00% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=98 Runoff=1.51 cfs 0.116 af

Subcatchment DA3b: DA3b pervious
Runoff Area=4,260 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=35 Runoff=0.00 cfs 0.000 af

Subcatchment DA3bi: DA3b impervious
Runoff Area=10,179 sf 100.00% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=98 Runoff=0.78 cfs 0.060 af

Subcatchment DA3c: DA3c pervious
Runoff Area=26,141 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=32 Runoff=0.00 cfs 0.000 af

Subcatchment DA3ci: DA3c impervious
Runoff Area=3,179 sf 100.00% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=98 Runoff=0.24 cfs 0.019 af

Subcatchment DA3d: DA3d pervious
Runoff Area=197 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment DA3di: DA3d impervious Runoff Area=4,686 sf 100.00% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=98 Runoff=0.36 cfs 0.028 af

Subcatchment R1E: EAST ROOF Runoff Area=11,331 sf 100.00% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=98 Runoff=0.87 cfs 0.067 af

Subcatchment R1W: WEST ROOF Runoff Area=10,000 sf 100.00% Impervious Runoff Depth=3.10"
Tc=5.0 min CN=98 Runoff=0.77 cfs 0.059 af

Pond 100: CB 100 Peak Elev=50.32' Inflow=0.24 cfs 0.019 af
12.0" Round Culvert n=0.013 L=4.0' S=0.0050 '/' Outflow=0.24 cfs 0.019 af

Pond 200: CB 200 Peak Elev=52.08' Inflow=0.36 cfs 0.028 af
Primary=0.36 cfs 0.028 af Secondary=0.00 cfs 0.000 af Outflow=0.36 cfs 0.028 af

Pond BIO1: BIO 1 Peak Elev=59.40' Storage=1,145 cf Inflow=1.51 cfs 0.116 af
Outflow=1.30 cfs 0.116 af

Pond BIO2: BIO 2 Peak Elev=62.59' Storage=51 cf Inflow=0.64 cfs 0.049 af
Outflow=0.62 cfs 0.049 af

Pond DMH: DMH 200 Peak Elev=54.50' Inflow=0.78 cfs 0.060 af
Primary=0.67 cfs 0.059 af Secondary=0.11 cfs 0.001 af Outflow=0.78 cfs 0.060 af

Pond RB1: RB 101,102 Peak Elev=41.57' Storage=155 cf Inflow=0.24 cfs 0.019 af
Discarded=0.06 cfs 0.019 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.019 af

Pond RB2: RB 202,202,203 Peak Elev=46.18' Storage=130 cf Inflow=0.33 cfs 0.007 af
Discarded=0.09 cfs 0.007 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.007 af

Pond RB3: RB 300 Peak Elev=58.50' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond SP1: SP1 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SP2: SP2 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SP3: SP3 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond TT1: Tree Trench 1 Peak Elev=53.64' Storage=441 cf Inflow=0.67 cfs 0.059 af
Discarded=0.20 cfs 0.059 af Primary=0.00 cfs 0.000 af Outflow=0.20 cfs 0.059 af

Pond TT2: Tree Trench 2 Peak Elev=52.98' Storage=153 cf Inflow=0.36 cfs 0.028 af
Discarded=0.03 cfs 0.021 af Primary=0.33 cfs 0.007 af Outflow=0.36 cfs 0.028 af

Pond URC1: URC-1 Peak Elev=49.67' Storage=0.016 af Inflow=1.38 cfs 0.117 af
Outflow=0.38 cfs 0.117 af

Pond URC2: URC-2 Peak Elev=56.25' Storage=682 cf Inflow=0.87 cfs 0.067 af
Outflow=0.17 cfs 0.067 af

Pond URC3: URC-3 Peak Elev=57.50' Storage=497 cf Inflow=0.62 cfs 0.049 af
Outflow=0.12 cfs 0.049 af

Pond URC4: URC-4 Peak Elev=58.62' Storage=634 cf Inflow=0.77 cfs 0.059 af
Outflow=0.14 cfs 0.059 af

Summary for Subcatchment DA1: DA1

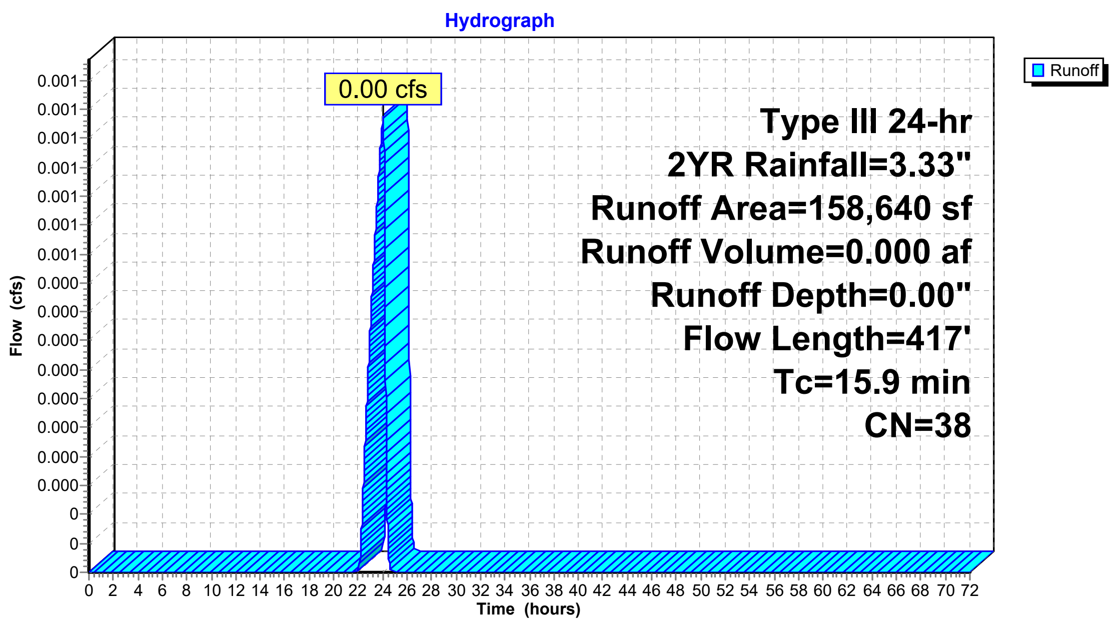
Runoff = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2YR Rainfall=3.33"

Area (sf)	CN	Description
118,297	30	Woods, Good, HSG A
25,363	39	>75% Grass cover, Good, HSG A
9,642	98	Roofs, HSG A
5,338	98	Paved parking, HSG A
158,640	38	Weighted Average
143,660		90.56% Pervious Area
14,980		9.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	78	0.1730	0.11		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.7	99	0.1110	2.33		**Shallow Concentrated Flow, B TO C** Short Grass Pasture Kv= 7.0 fps
3.0	240	0.0690	1.31		**Shallow Concentrated Flow, C TO SP1** Woodland Kv= 5.0 fps
15.9	417	Total			

Subcatchment DA1: DA1



Summary for Subcatchment DA2a: DA2a

CN for permeable pavers taken from RI Stormwater Design

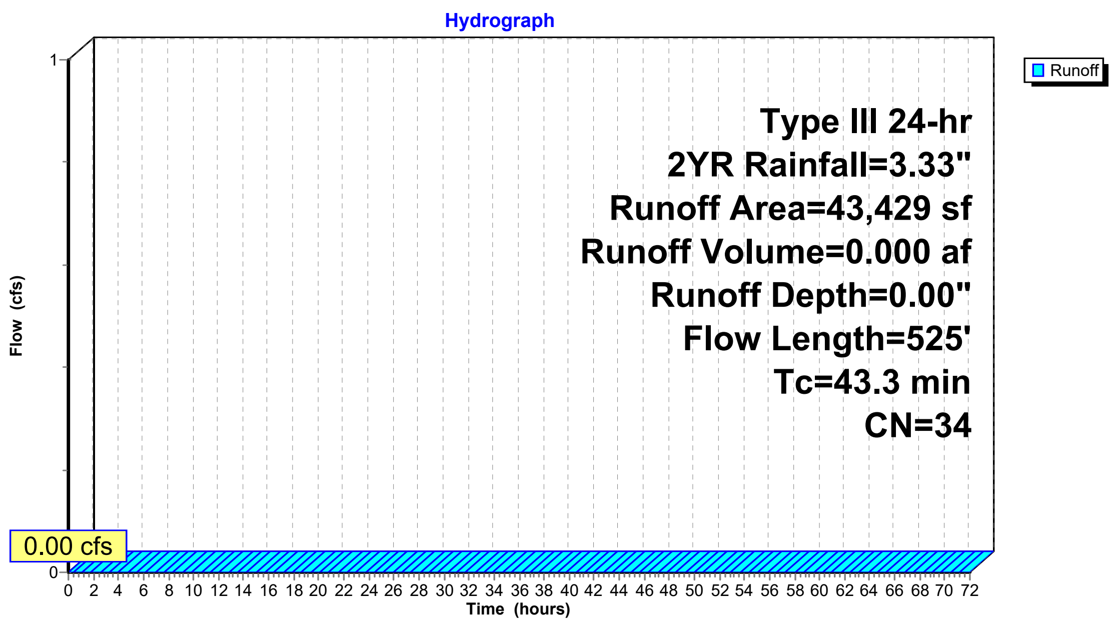
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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=3.33"

	Area (sf)	CN	Description
	25,414	30	Woods, Good, HSG A
	17,231	39	>75% Grass cover, Good, HSG A
*	784	40	Pervious Pavers
	43,429	34	Weighted Average
	43,429		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.4	147	0.0400	0.07		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.8	67	0.0760	1.38		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
1.1	73	0.0480	1.10		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
5.0	238	0.0250	0.79		**Shallow Concentrated Flow, D to SP2** Woodland Kv= 5.0 fps
43.3	525	Total			

Subcatchment DA2a: DA2a



Summary for Subcatchment DA2b: DA2b pervious

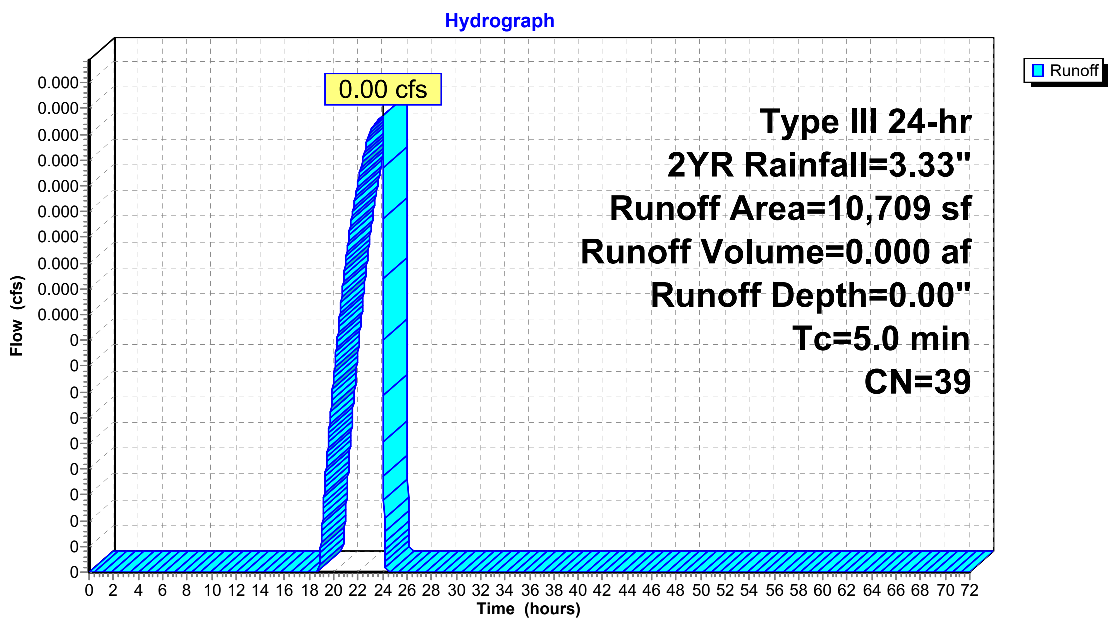
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

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=3.33"

Area (sf)	CN	Description
10,238	39	>75% Grass cover, Good, HSG A
471	30	Woods, Good, HSG A
10,709	39	Weighted Average
10,709		100.00% Pervious Area

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

Subcatchment DA2b: DA2b pervious



Summary for Subcatchment DA2bi: DA2b impervious

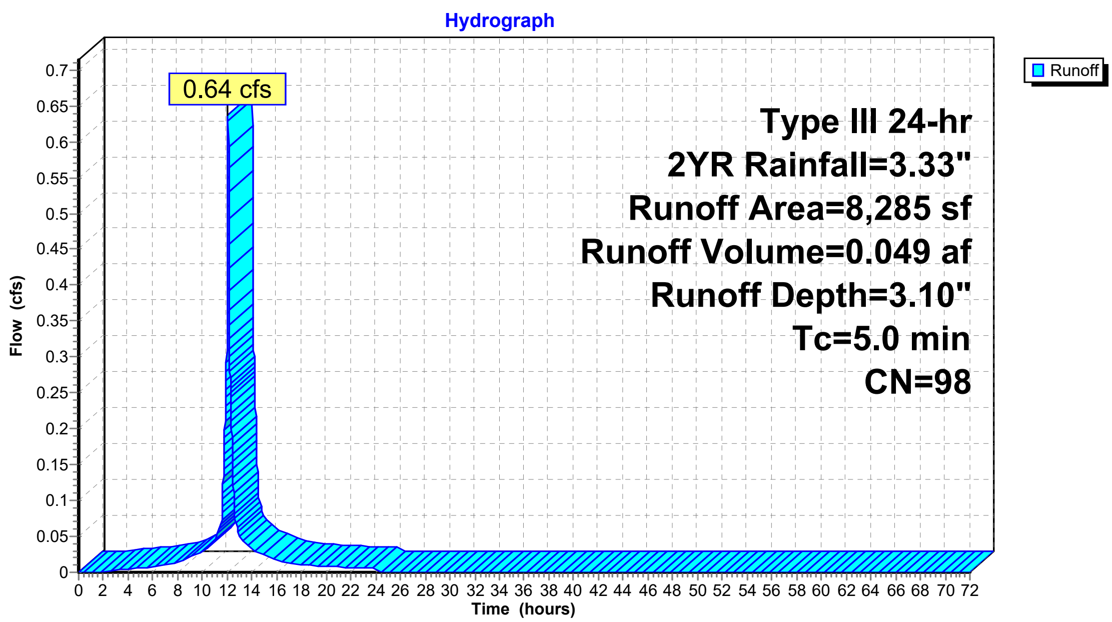
Runoff = 0.64 cfs @ 12.07 hrs, Volume= 0.049 af, Depth= 3.10"

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=3.33"

	Area (sf)	CN	Description
	7,010	98	Paved parking, HSG A
*	1,275	98	Sidewalks, HSG A
	8,285	98	Weighted Average
	8,285		100.00% Impervious Area

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

Subcatchment DA2bi: DA2b impervious



Summary for Subcatchment DA3a: DA3a pervious

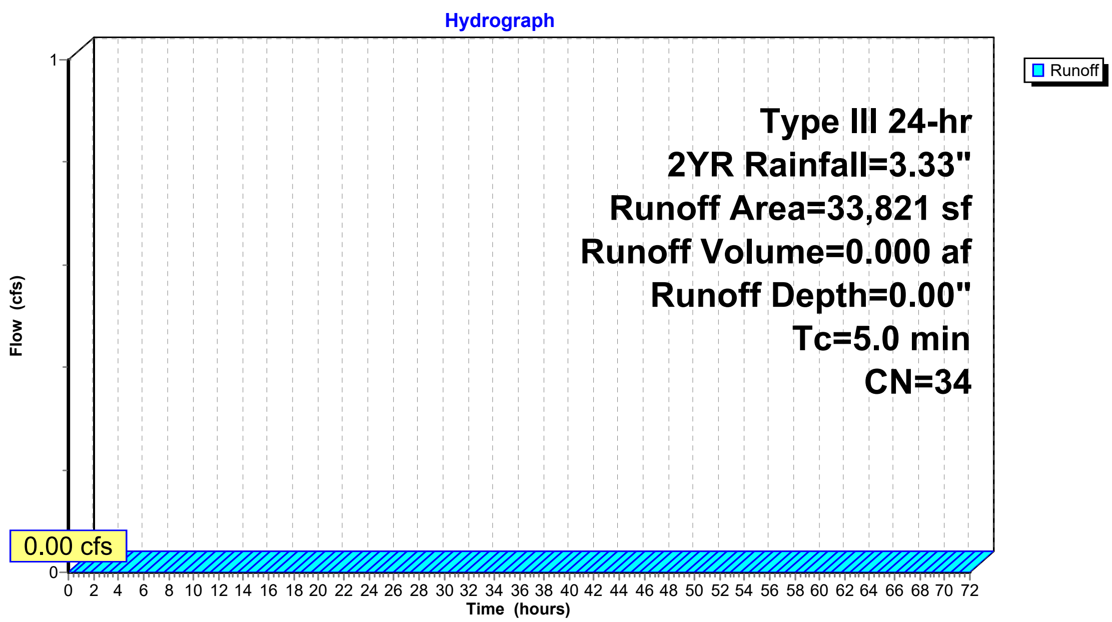
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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=3.33"

Area (sf)	CN	Description
14,079	39	>75% Grass cover, Good, HSG A
19,742	30	Woods, Good, HSG A
33,821	34	Weighted Average
33,821		100.00% Pervious Area

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

Subcatchment DA3a: DA3a pervious



Summary for Subcatchment DA3ai: DA3a impervious

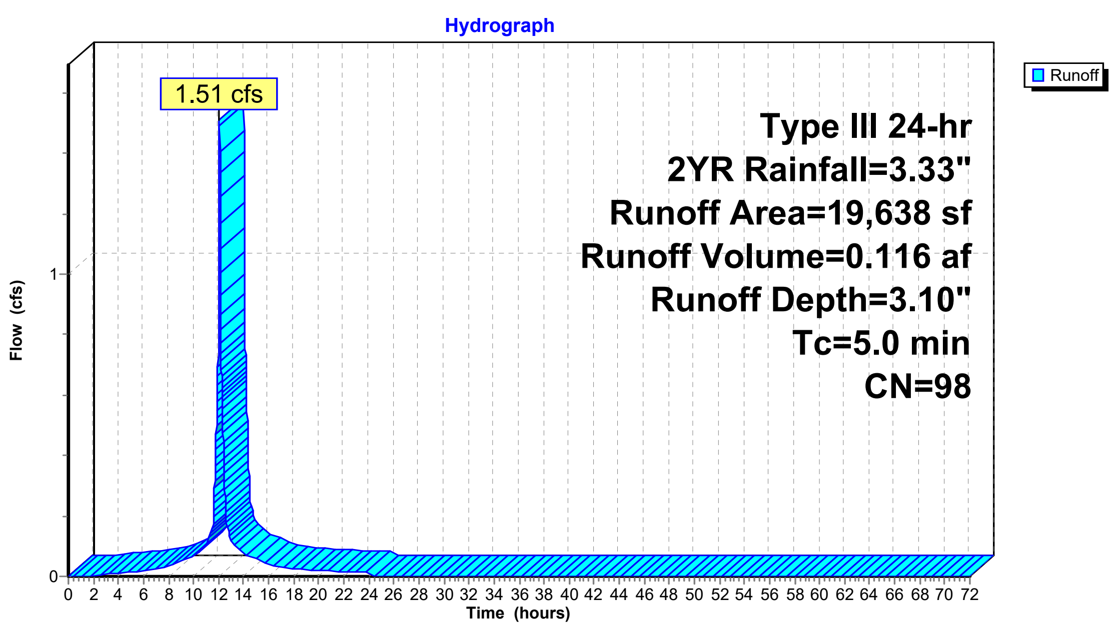
Runoff = 1.51 cfs @ 12.07 hrs, Volume= 0.116 af, Depth= 3.10"

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=3.33"

	Area (sf)	CN	Description
	18,277	98	Paved parking, HSG A
*	1,361	98	Sidewalk, HSG A
	19,638	98	Weighted Average
	19,638		100.00% Impervious Area

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

Subcatchment DA3ai: DA3a impervious



Summary for Subcatchment DA3b: DA3b pervious

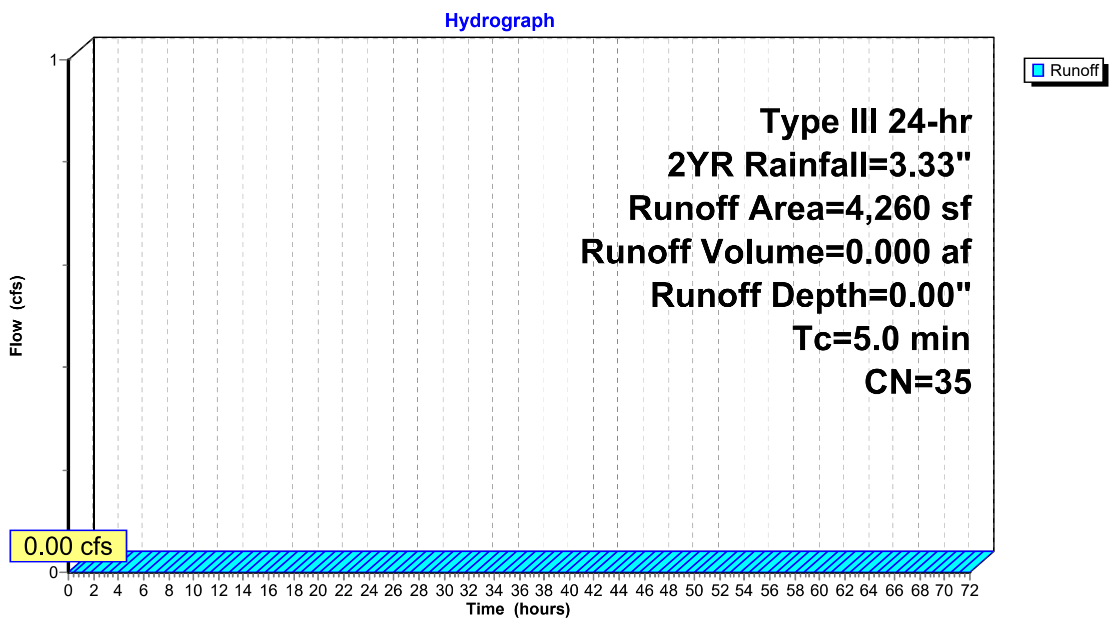
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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=3.33"

Area (sf)	CN	Description
2,324	39	>75% Grass cover, Good, HSG A
1,936	30	Woods, Good, HSG A
4,260	35	Weighted Average
4,260		100.00% Pervious Area

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

Subcatchment DA3b: DA3b pervious



Summary for Subcatchment DA3bi: DA3b impervious

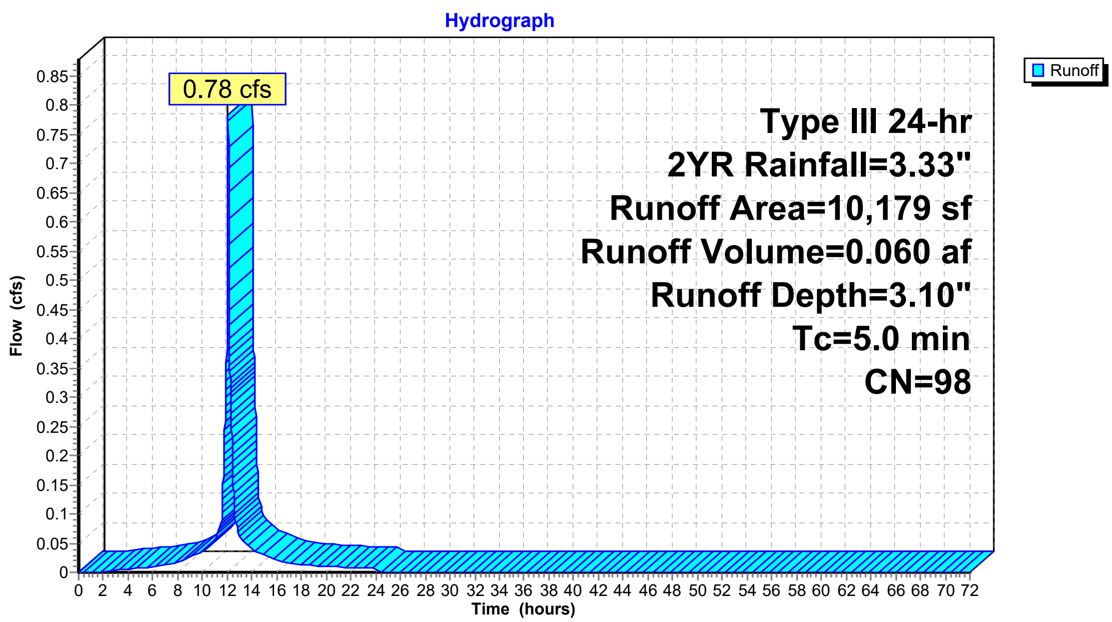
Runoff = 0.78 cfs @ 12.07 hrs, Volume= 0.060 af, Depth= 3.10"

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=3.33"

	Area (sf)	CN	Description
	9,486	98	Paved parking, HSG A
*	693	98	Sidewalks, HSG A
	10,179	98	Weighted Average
	10,179		100.00% Impervious Area

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

Subcatchment DA3bi: DA3b impervious



Summary for Subcatchment DA3c: DA3c pervious

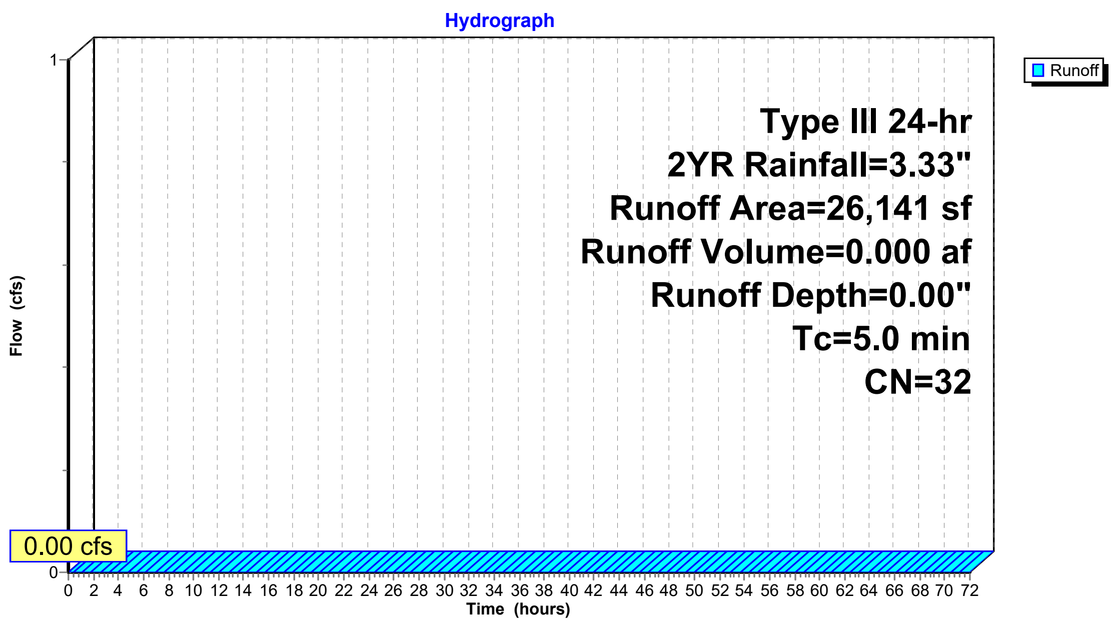
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

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=3.33"

Area (sf)	CN	Description
4,662	39	>75% Grass cover, Good, HSG A
21,479	30	Woods, Good, HSG A
26,141	32	Weighted Average
26,141		100.00% Pervious Area

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

Subcatchment DA3c: DA3c pervious



Summary for Subcatchment DA3ci: DA3c impervious

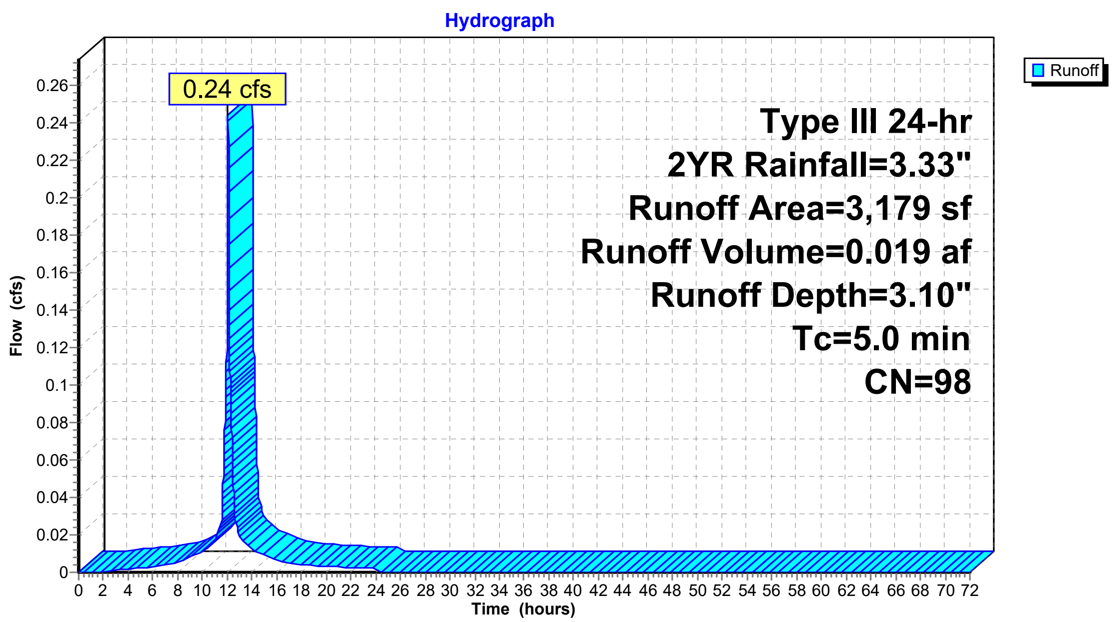
Runoff = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 3.10"

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=3.33"

	Area (sf)	CN	Description
	2,649	98	Paved parking, HSG A
*	530	98	Sidewalks, HSG A
	3,179	98	Weighted Average
	3,179		100.00% Impervious Area

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

Subcatchment DA3ci: DA3c impervious



Summary for Subcatchment DA3d: DA3d pervious

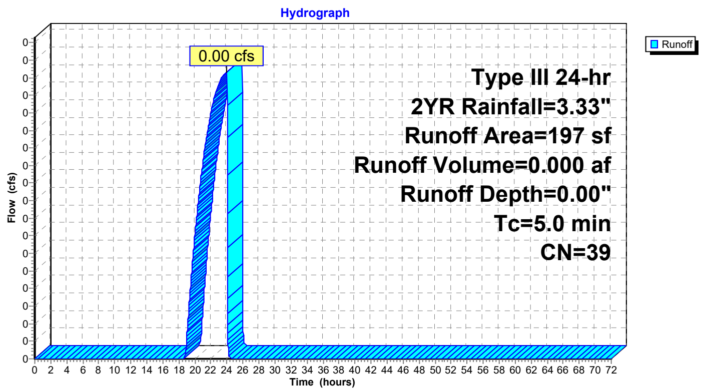
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

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=3.33"

Area (sf)	CN	Description
197	39	>75% Grass cover, Good, HSG A
197		100.00% Pervious Area

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

Subcatchment DA3d: DA3d pervious



Summary for Subcatchment DA3di: DA3d impervious

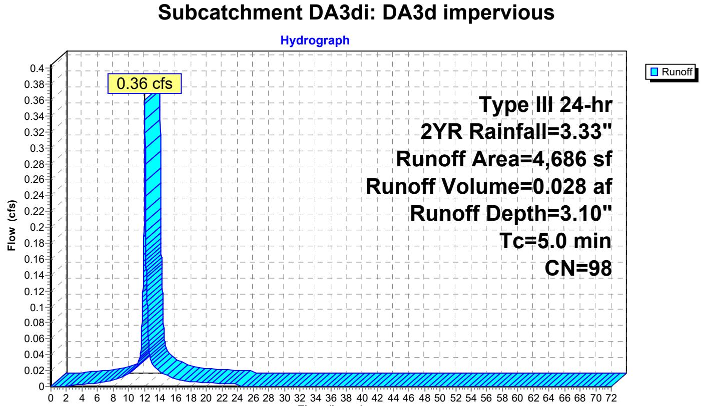
Runoff = 0.36 cfs @ 12.07 hrs, Volume= 0.028 af, Depth= 3.10"

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=3.33"

Area (sf)	CN	Description
4,686	98	Paved parking, HSG A
4,686		100.00% Impervious Area

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

Subcatchment DA3di: DA3d impervious



Summary for Subcatchment R1E: EAST ROOF

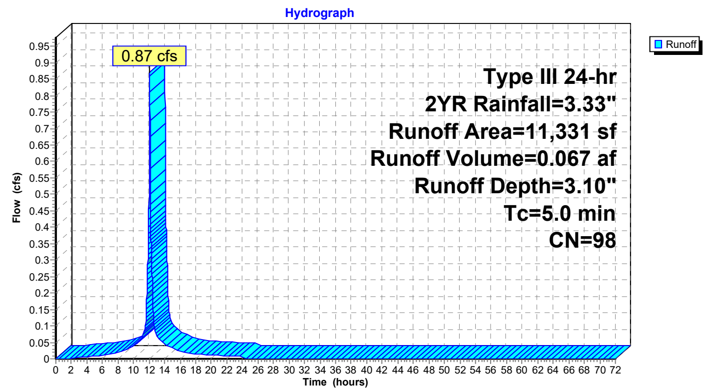
Runoff = 0.87 cfs @ 12.07 hrs, Volume= 0.067 af, Depth= 3.10"

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=3.33"

Area (sf)	CN	Description
11,331	98	Roofs, HSG A
11,331		100.00% Impervious Area

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

Subcatchment R1E: EAST ROOF



Summary for Subcatchment R1W: WEST ROOF

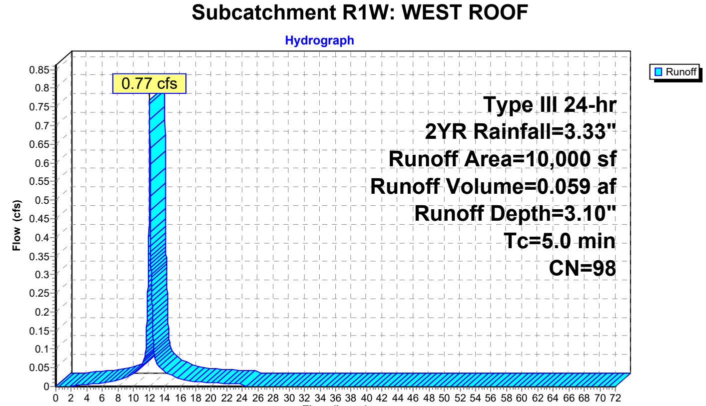
Runoff = 0.77 cfs @ 12.07 hrs, Volume= 0.059 af, Depth= 3.10"

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=3.33"

Area (sf)	CN	Description
10,000	98	Roofs, HSG A
10,000		100.00% Impervious Area

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

Subcatchment R1W: WEST ROOF



Summary for Pond 100: CB 100

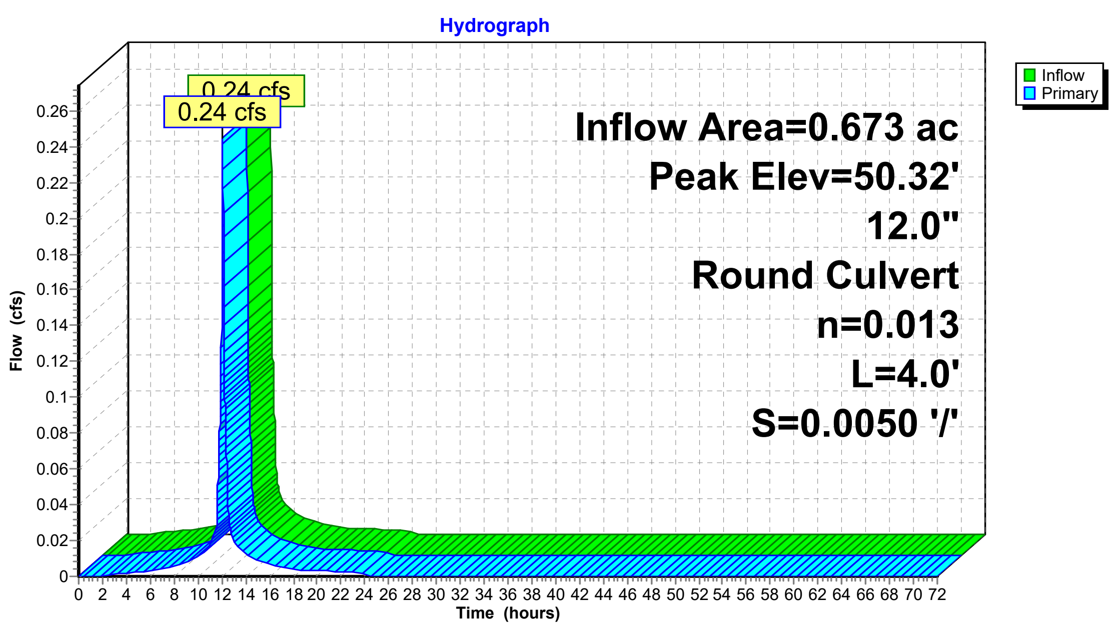
Inflow Area = 0.673 ac, 10.84% Impervious, Inflow Depth = 0.34" for 2YR event
Inflow = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af
Outflow = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min
Primary = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 50.32' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	50.00'	**12.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 50.00' / 49.98' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.24 cfs @ 12.07 hrs HW=50.32' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.24 cfs @ 1.71 fps)

Pond 100: CB 100



Summary for Pond 200: CB 200

Inflow Area = 0.112 ac, 95.97% Impervious, Inflow Depth = 2.97" for 2YR event
Inflow = 0.36 cfs @ 12.07 hrs, Volume= 0.028 af
Outflow = 0.36 cfs @ 12.07 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
Primary = 0.36 cfs @ 12.07 hrs, Volume= 0.028 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

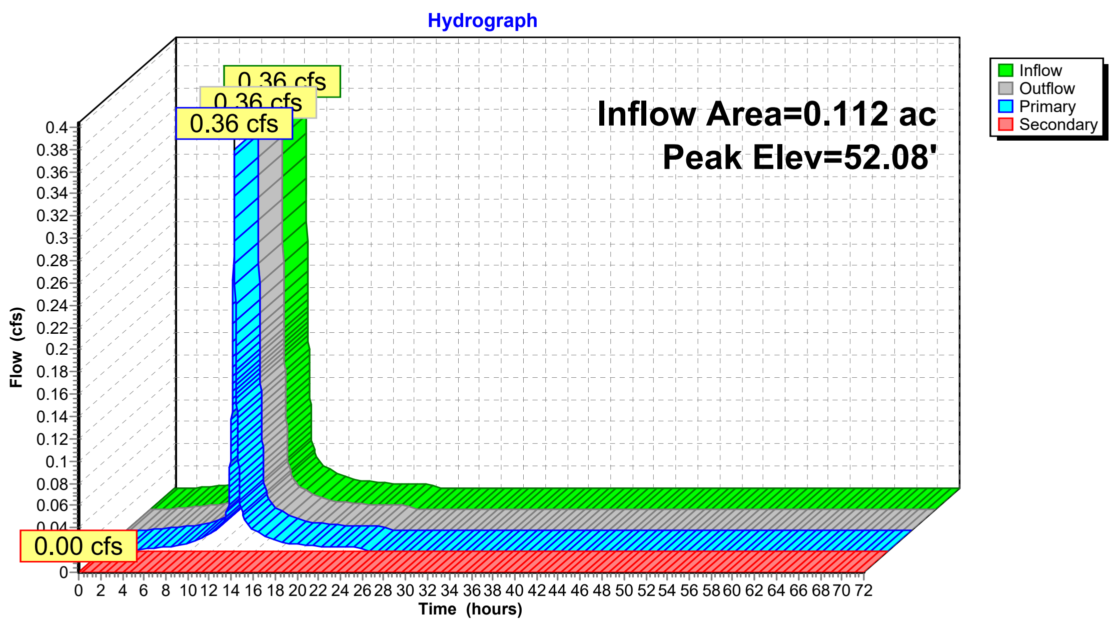
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 52.08' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	52.70'	**12.0" Round Culvert** L= 4.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 52.70' / 52.68' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	51.66'	**8.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.66' / 51.41' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#3	Secondary	55.79'	**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

Primary OutFlow Max=0.36 cfs @ 12.07 hrs HW=52.08' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.36 cfs @ 2.20 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=51.66' (Free Discharge)
├─**1=Culvert** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 200: CB 200



Summary for Pond BIO1: BIO 1

Inflow Area = 1.227 ac, 36.73% Impervious, Inflow Depth = 1.14" for 2YR event
Inflow = 1.51 cfs @ 12.07 hrs, Volume= 0.116 af
Outflow = 1.30 cfs @ 12.11 hrs, Volume= 0.116 af, Atten= 14%, Lag= 2.7 min
Primary = 1.30 cfs @ 12.11 hrs, Volume= 0.116 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 59.40' @ 12.11 hrs Surf.Area= 1,609 sf Storage= 1,145 cf

Plug-Flow detention time= 67.4 min calculated for 0.116 af (100% of inflow)
Center-of-Mass det. time= 67.4 min (822.0 - 754.6)

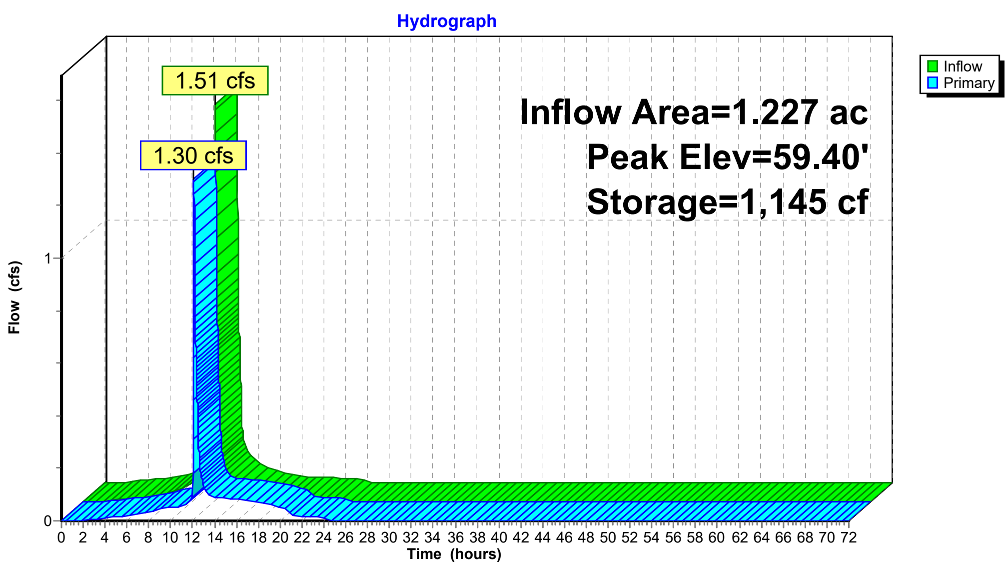
Volume	Invert	Avail.Storage	Storage Description
#1	58.50'	2,210 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	800	0	0
59.00	1,380	545	545
60.00	1,950	1,665	2,210

Device	Routing	Invert	Outlet Devices
#1	Primary	55.09'	**12.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 55.09' / 54.87' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	59.25'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	55.38'	**4.0" Round Culvert** L= 38.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 55.38' / 55.19' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#4	Device 3	58.50'	**2.470 in/hr Exfiltration over Surface area**

Primary OutFlow Max=1.30 cfs @ 12.11 hrs HW=59.40' (Free Discharge)
└─**1=Culvert** (Passes 1.30 cfs of 5.83 cfs potential flow)
  ├─**2=Orifice/Grate** (Weir Controls 1.21 cfs @ 1.27 fps)
  └─**3=Culvert** (Passes 0.09 cfs of 0.62 cfs potential flow)
    └─**4=Exfiltration** (Exfiltration Controls 0.09 cfs)

Pond BIO1: BIO 1



Summary for Pond BIO2: BIO 2

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Inflow Area =     0.436 ac, 43.62% Impervious, Inflow Depth =  1.35"   for 2YR event
Inflow      =     0.64 cfs @  12.07 hrs, Volume=        0.049 af
Outflow     =     0.62 cfs @  12.09 hrs, Volume=        0.049 af, Atten= 2%, Lag= 1.0 min
Primary     =     0.62 cfs @  12.09 hrs, Volume=        0.049 af
```

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 62.59' @ 12.09 hrs Surf.Area= 569 sf Storage= 51 cf

Plug-Flow detention time= 1.8 min calculated for 0.049 af (100% of inflow)
Center-of-Mass det. time= 1.8 min (757.1 - 755.3)

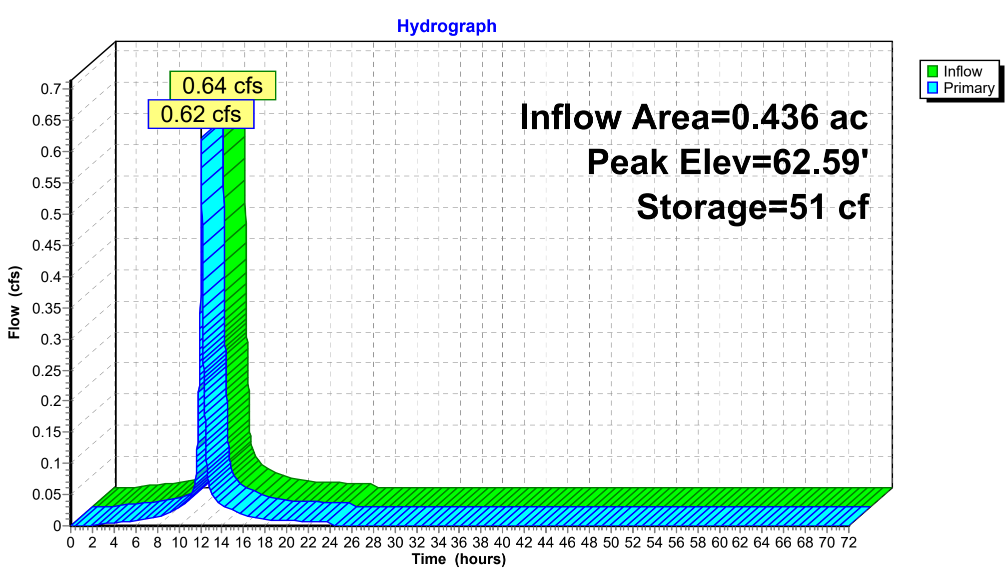
Volume	Invert	Avail.Storage	Storage Description
#1	62.50'	1,414 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
62.50	522	0	0
63.00	775	324	324
64.00	1,405	1,090	1,414

Device	Routing	Invert	Outlet Devices
#1	Primary	59.00'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 59.00' / 58.88' S= 0.0048 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	62.50'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	59.30'	**6.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.30' / 59.18' S= 0.0048 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#4	Device 3	62.50'	**2.470 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.62 cfs @ 12.09 hrs HW=62.59' (Free Discharge)
└1=**Culvert** (Passes 0.62 cfs of 6.65 cfs potential flow)
  ├2=**Orifice/Grate** (Weir Controls 0.59 cfs @ 1.00 fps)
  └3=**Culvert** (Passes 0.03 cfs of 1.30 cfs potential flow)
    └4=**Exfiltration** (Exfiltration Controls 0.03 cfs)

Pond BIO2: BIO 2



Summary for Pond DMH: DMH 200

Inflow Area = 0.331 ac, 70.50% Impervious, Inflow Depth = 2.18" for 2YR event
Inflow = 0.78 cfs @ 12.07 hrs, Volume= 0.060 af
Outflow = 0.78 cfs @ 12.07 hrs, Volume= 0.060 af, Atten= 0%, Lag= 0.0 min
Primary = 0.67 cfs @ 12.07 hrs, Volume= 0.059 af
Secondary = 0.11 cfs @ 12.07 hrs, Volume= 0.001 af

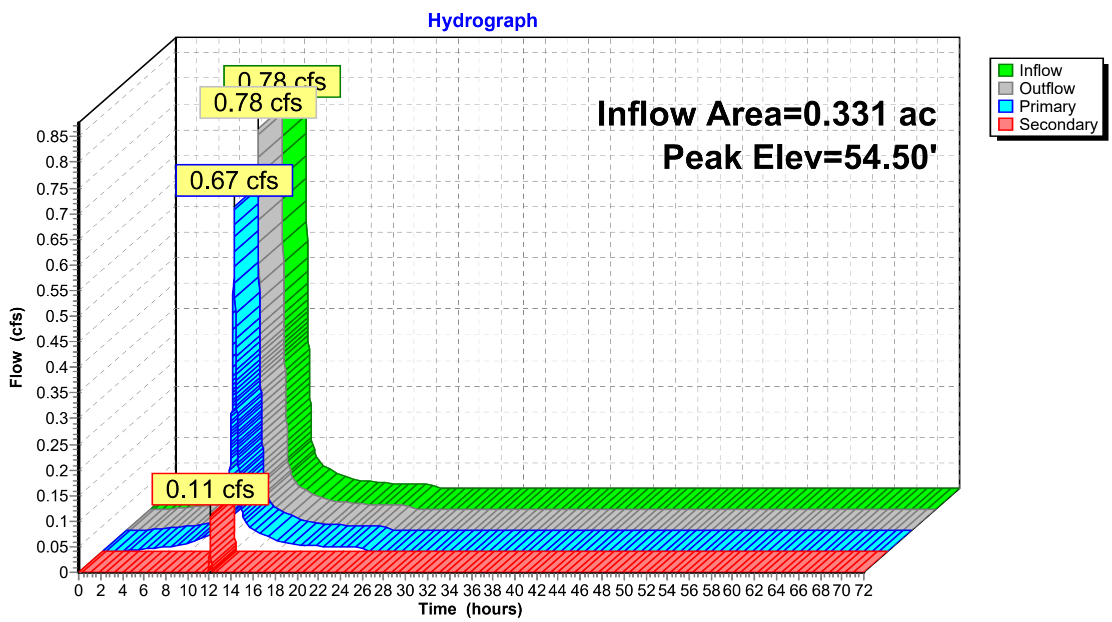
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 54.50' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	54.30'	**12.0" Round Culvert** L= 9.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 54.30' / 54.26' S= 0.0044 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	53.78'	**12.0" Round Culvert** L= 98.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 53.78' / 53.78' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.67 cfs @ 12.07 hrs HW=54.50' (Free Discharge)
└**2=Culvert** (Barrel Controls 0.67 cfs @ 1.56 fps)

Secondary OutFlow Max=0.11 cfs @ 12.07 hrs HW=54.50' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.11 cfs @ 1.50 fps)

Pond DMH: DMH 200



Summary for Pond RB1: RB 101,102

Inflow Area = 0.673 ac, 10.84% Impervious, Inflow Depth = 0.34" for 2YR event
Inflow = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af
Outflow = 0.06 cfs @ 11.75 hrs, Volume= 0.019 af, Atten= 75%, Lag= 0.0 min
Discarded = 0.06 cfs @ 11.75 hrs, Volume= 0.019 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= 41.57' @ 12.43 hrs Surf.Area= 157 sf Storage= 155 cf

Plug-Flow detention time= 12.2 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 12.2 min (766.8 - 754.6)

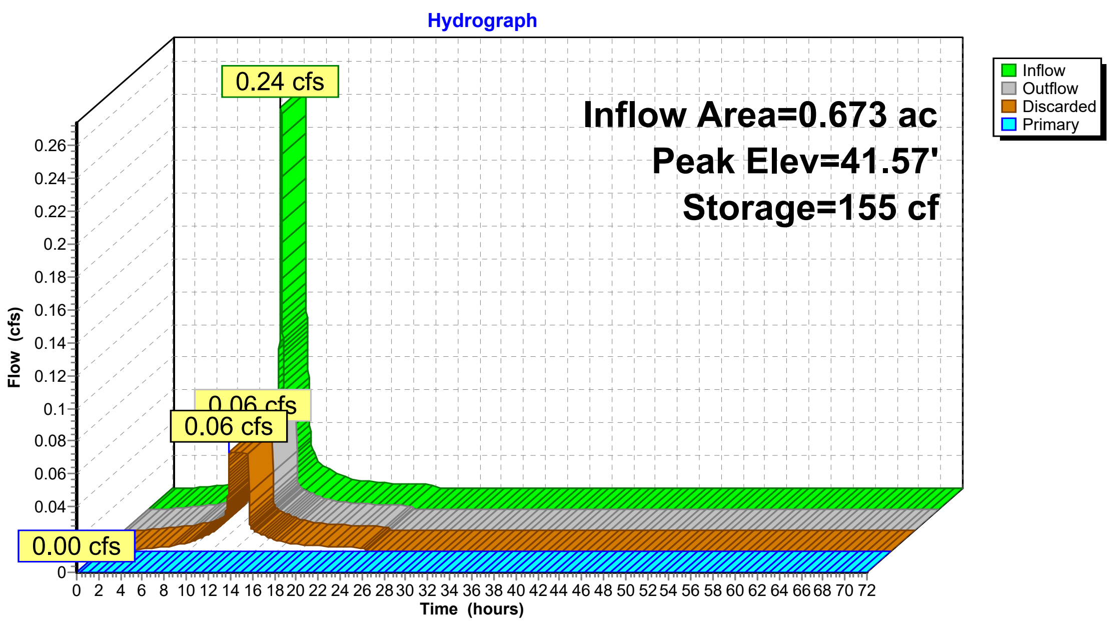
Volume	Invert	Avail.Storage	Storage Description
#1	41.00'	339 cf	**6.00'D x 6.00'H Recharger** x 2 Inside #2
#2	39.00'	355 cf	**10.00'D x 9.00'H Stone** x 2 1,414 cf Overall - 339 cf Embedded = 1,074 cf x 33.0% Voids
		694 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	39.00'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	46.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 11.75 hrs HW=39.09' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=39.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond RB1: RB 101,102



Summary for Pond RB2: RB 202,202,203

Inflow Area = 0.112 ac, 95.97% Impervious, Inflow Depth = 0.73" for 2YR event
Inflow = 0.33 cfs @ 12.08 hrs, Volume= 0.007 af
Outflow = 0.09 cfs @ 12.03 hrs, Volume= 0.007 af, Atten= 73%, Lag= 0.0 min
Discarded = 0.09 cfs @ 12.03 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 / 3
Peak Elev= 46.18' @ 12.35 hrs Surf.Area= 236 sf Storage= 130 cf

Plug-Flow detention time= 15.6 min calculated for 0.007 af (100% of inflow)
Center-of-Mass det. time= 15.6 min (748.5 - 733.0)

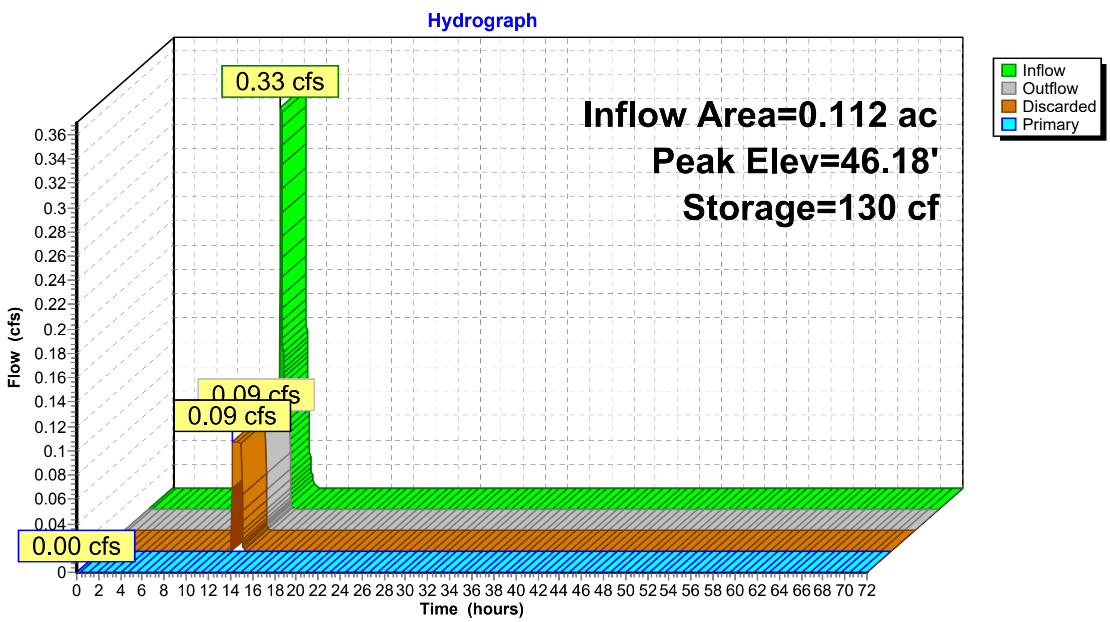
Volume	Invert	Avail.Storage	Storage Description
#1	46.50'	509 cf	**6.00'D x 6.00'H Recharger** x 3 Inside #2
#2	44.50'	532 cf	**10.00'D x 9.00'H Stone** x 3
			2,121 cf Overall - 509 cf Embedded = 1,612 cf x 33.0% Voids
		1,041 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.50'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	55.61'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.09 cfs @ 12.03 hrs HW=44.63' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=44.50' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond RB2: RB 202,202,203



Summary for Pond RB3: RB 300

Inflow Area = 0.997 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
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= 58.50' @ 0.00 hrs Surf.Area= 57 sf Storage= 0 cf

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

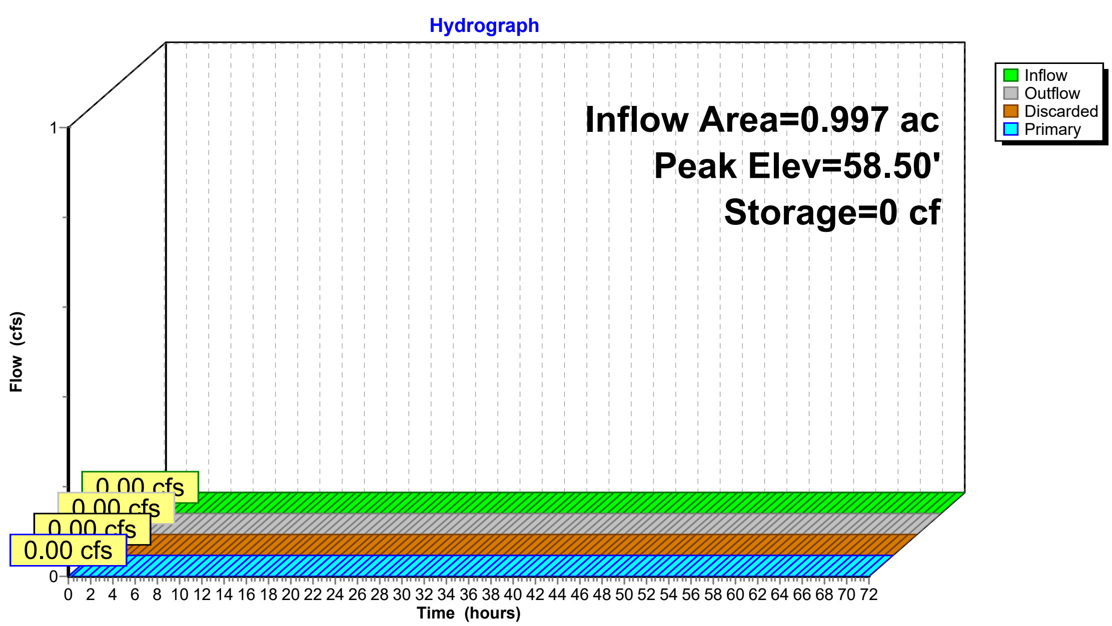
Volume	Invert	Avail.Storage	Storage Description
#1	59.50'	50 cf	**4.00'D x 4.00'H Recharger** Inside #2
#2	58.50'	95 cf	**6.00'D x 6.00'H Stone** x 2 339 cf Overall - 50 cf Embedded = 289 cf x 33.0% Voids
		146 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	58.50'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	65.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=58.50' (Free Discharge)
└─**1=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=58.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond RB3: RB 300

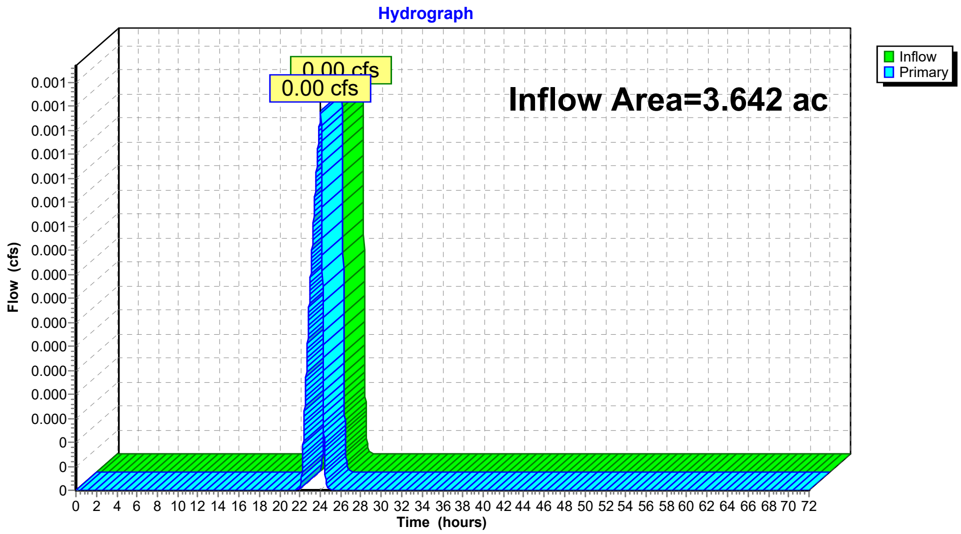


Summary for Pond SP1: SP1

Inflow Area = 3.642 ac, 9.44% Impervious, Inflow Depth = 0.00" for 2YR event
Inflow = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.04 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

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

Pond SP1: SP1

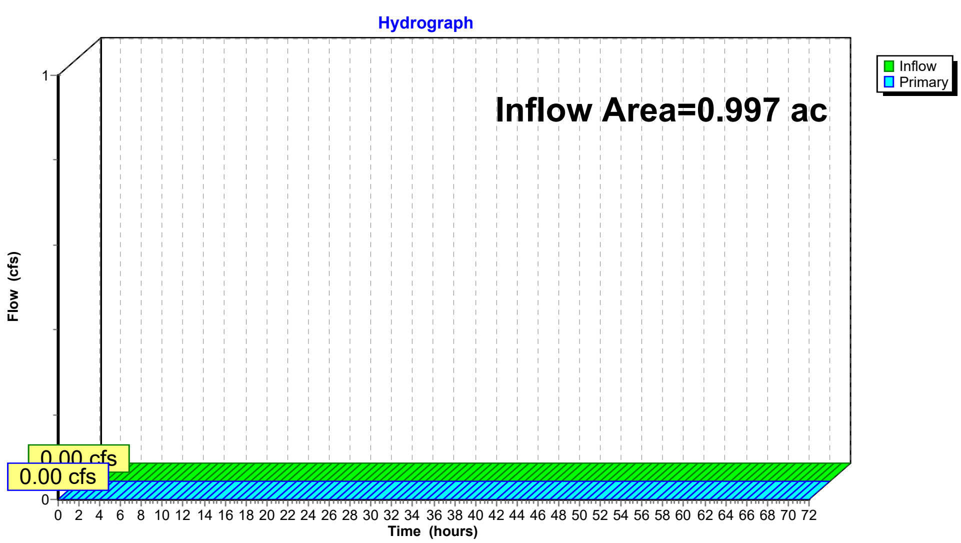


Summary for Pond SP2: SP2

Inflow Area = 0.997 ac, 0.00% 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 SP2: SP2

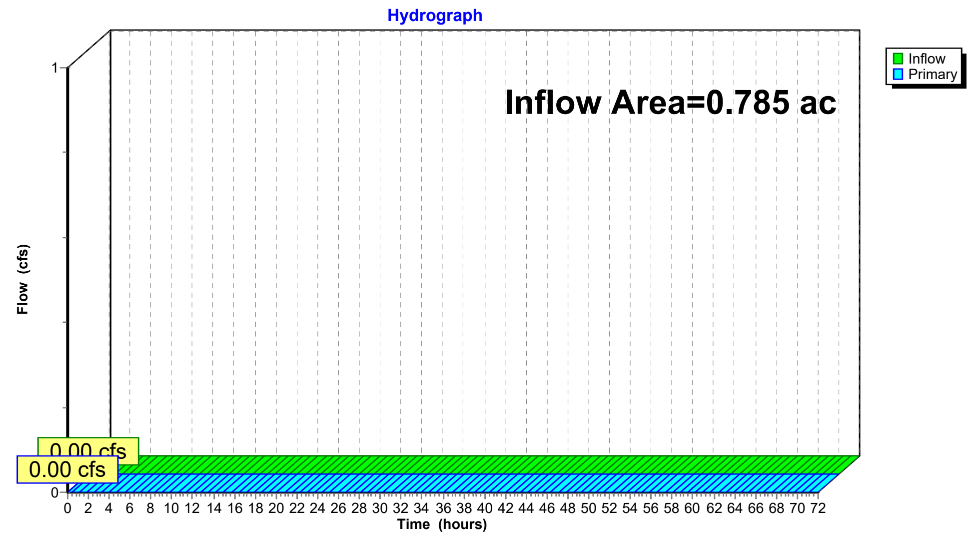


Summary for Pond SP3: SP3

Inflow Area =	0.785 ac, 23.00% 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 SP3: SP3



Summary for Pond TT1: Tree Trench 1

Inflow Area =	0.331 ac, 70.50% Impervious, Inflow Depth = 2.15"	for 2YR event
Inflow =	0.67 cfs @ 12.07 hrs, Volume=	0.059 af
Outflow =	0.20 cfs @ 11.75 hrs, Volume=	0.059 af, Atten= 71%, Lag= 0.0 min
Discarded =	0.20 cfs @ 11.75 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 / 3
Peak Elev= 53.64' @ 12.43 hrs Surf.Area= 1,020 sf Storage= 441 cf

Plug-Flow detention time= 10.2 min calculated for 0.059 af (100% of inflow)
Center-of-Mass det. time= 10.1 min (765.3 - 755.2)

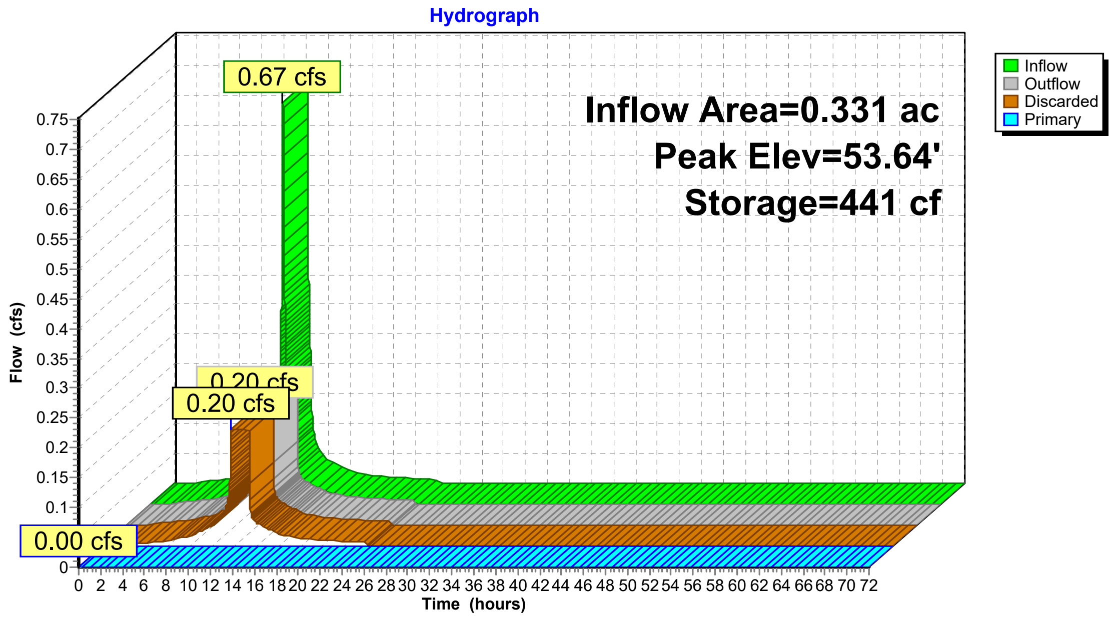
Volume	Invert	Avail.Storage	Storage Description
#1	52.34'	1,008 cf	**9.90'W x 103.00'L x 3.00'H Prismatoid** 3,059 cf Overall - 32 cf Embedded = 3,027 cf x 33.3% Voids
#2	53.78'	32 cf	**8.0" Round Pipe Storage** Inside #1 L= 92.0' S= 0.0050 '/'
		1,040 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	52.34'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	54.30'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.20 cfs @ 11.75 hrs HW=52.37' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=52.34' (Free Discharge)
└─**2=Orifice/Grate** (Controls 0.00 cfs)

Pond TT1: Tree Trench 1



Summary for Pond TT2: Tree Trench 2

Inflow Area = 0.112 ac, 95.97% Impervious, Inflow Depth = 2.97" for 2YR event
Inflow = 0.36 cfs @ 12.07 hrs, Volume= 0.028 af
Outflow = 0.36 cfs @ 12.08 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.4 min
Discarded = 0.03 cfs @ 11.21 hrs, Volume= 0.021 af
Primary = 0.33 cfs @ 12.08 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 52.98' @ 12.08 hrs Surf.Area= 150 sf Storage= 153 cf

Plug-Flow detention time= 22.1 min calculated for 0.028 af (100% of inflow)
Center-of-Mass det. time= 22.1 min (776.8 - 754.7)

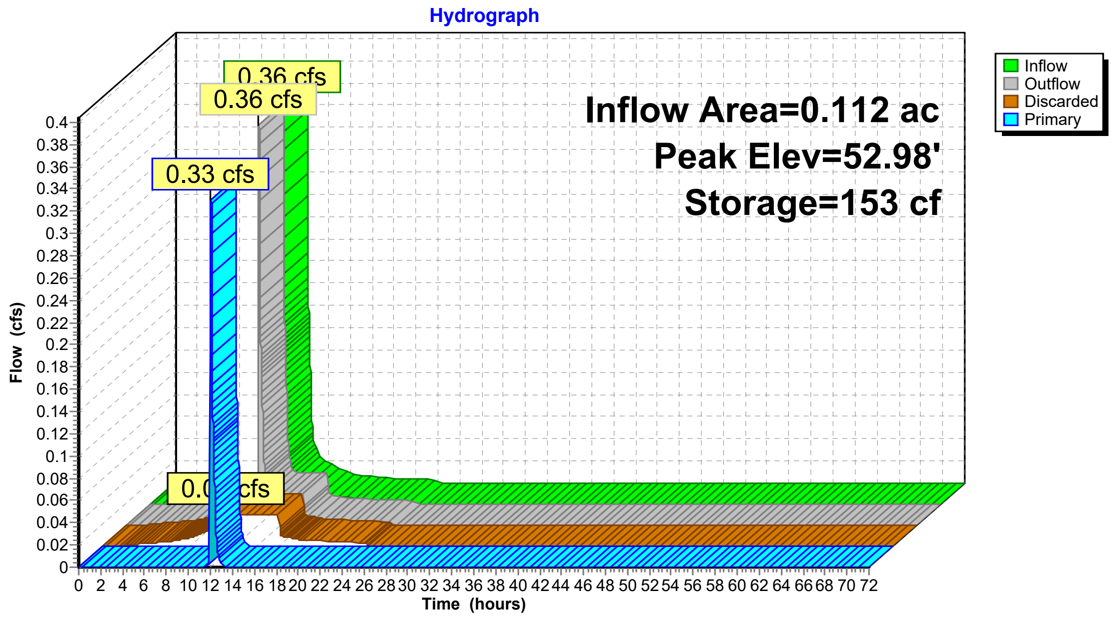
Volume	Invert	Avail.Storage	Storage Description
#1	50.16'	184 cf	**5.00'W x 30.00'L x 3.80'H Prismatoid** 570 cf Overall - 17 cf Embedded = 553 cf x 33.3% Voids
#2	51.66'	17 cf	**8.0" Round Pipe Storage** Inside #1 L= 50.0' S= 0.0050 '/'
		201 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.16'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	52.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.03 cfs @ 11.21 hrs HW=50.20' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.33 cfs @ 12.08 hrs HW=52.98' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.33 cfs @ 1.81 fps)

Pond TT2: Tree Trench 2



Summary for Pond URC1: URC-1

Inflow Area = 1.559 ac, 43.91% Impervious, Inflow Depth = 0.90" for 2YR event
Inflow = 1.38 cfs @ 12.11 hrs, Volume= 0.117 af
Outflow = 0.38 cfs @ 12.05 hrs, Volume= 0.117 af, Atten= 72%, Lag= 0.0 min
Discarded = 0.38 cfs @ 12.05 hrs, Volume= 0.117 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 49.67' @ 12.48 hrs Surf.Area= 0.046 ac Storage= 0.016 af

Plug-Flow detention time= 8.3 min calculated for 0.117 af (100% of inflow)
Center-of-Mass det. time= 8.3 min (829.5 - 821.2)

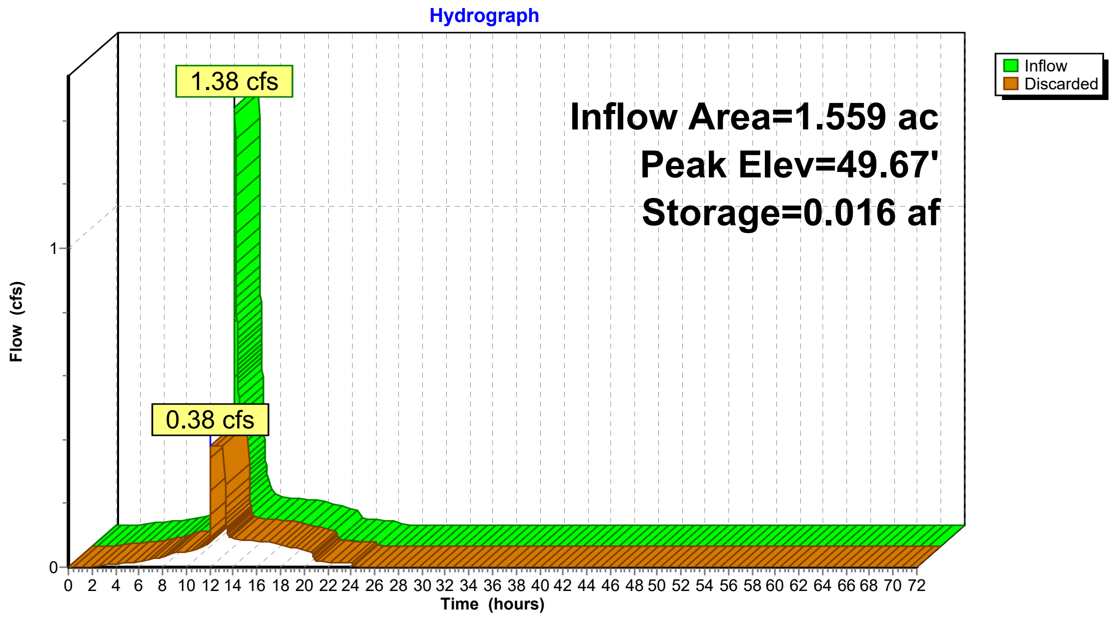
Volume	Invert	Avail.Storage	Storage Description
#1A	48.60'	0.074 af	**23.25'W x 85.57'L x 6.75'H Field A** 0.308 af Overall - 0.085 af Embedded = 0.223 af x 33.3% Voids
#2A	50.60'	0.085 af	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 11 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		0.160 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	48.60'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.38 cfs @ 12.05 hrs HW=48.68' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.38 cfs)

Pond URC1: URC-1



Summary for Pond URC2: URC-2

Inflow Area = 0.260 ac,100.00% Impervious, Inflow Depth = 3.10" for 2YR event
Inflow = 0.87 cfs @ 12.07 hrs, Volume= 0.067 af
Outflow = 0.17 cfs @ 11.70 hrs, Volume= 0.067 af, Atten= 81%, Lag= 0.0 min
Discarded = 0.17 cfs @ 11.70 hrs, Volume= 0.067 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 56.25' @ 12.49 hrs Surf.Area= 879 sf Storage= 682 cf

Plug-Flow detention time= 21.0 min calculated for 0.067 af (100% of inflow)
Center-of-Mass det. time= 21.0 min (775.6 - 754.6)

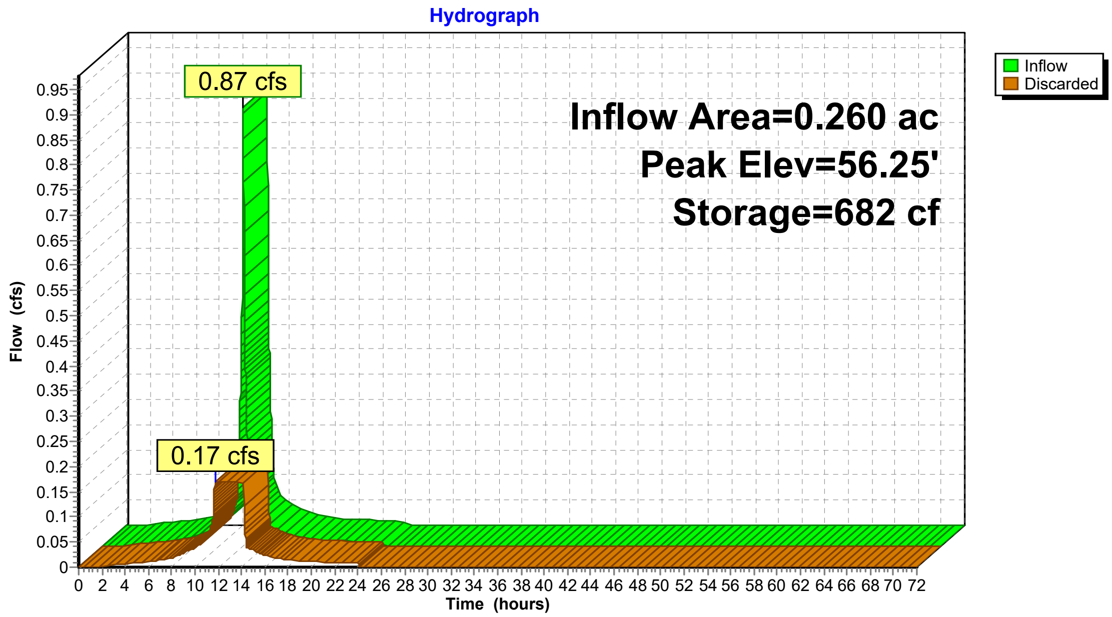
Volume	Invert	Avail.Storage	Storage Description
#1A	54.10'	1,517 cf	**17.33'W x 50.72'L x 6.75'H Field A**
			5,934 cf Overall - 1,379 cf Embedded = 4,555 cf x 33.3% Voids
#2A	56.10'	1,379 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1
			Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf
			Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap
			2 Rows of 6 Chambers
			Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf
		2,896 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	54.10'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.17 cfs @ 11.70 hrs HW=54.17' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Pond URC2: URC-2



Summary for Pond URC3: URC-3

Inflow Area = 0.436 ac, 43.62% Impervious, Inflow Depth = 1.35" for 2YR event
Inflow = 0.62 cfs @ 12.09 hrs, Volume= 0.049 af
Outflow = 0.12 cfs @ 11.74 hrs, Volume= 0.049 af, Atten= 80%, Lag= 0.0 min
Discarded = 0.12 cfs @ 11.74 hrs, Volume= 0.049 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 57.50' @ 12.52 hrs Surf.Area= 765 sf Storage= 497 cf

Plug-Flow detention time= 21.1 min calculated for 0.049 af (100% of inflow)
Center-of-Mass det. time= 21.1 min (778.1 - 757.1)

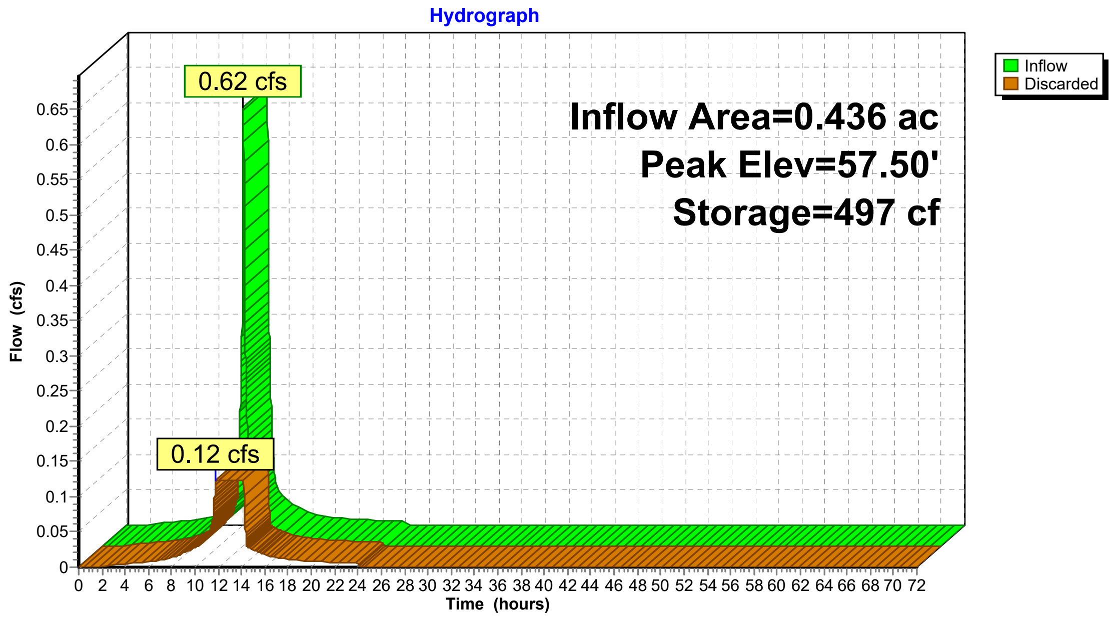
Volume	Invert	Avail.Storage	Storage Description
#1A	55.55'	1,250 cf	**22.25'W x 34.38'L x 6.75'H Field A** 5,163 cf Overall - 1,409 cf Embedded = 3,755 cf x 33.3% Voids
#2A	57.55'	1,409 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 4 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		2,659 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	55.55'	**7.000 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.12 cfs @ 11.74 hrs HW=55.62' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Pond URC3: URC-3



Summary for Pond URC4: URC-4

Inflow Area = 0.230 ac,100.00% Impervious, Inflow Depth = 3.10" for 2YR event
Inflow = 0.77 cfs @ 12.07 hrs, Volume= 0.059 af
Outflow = 0.14 cfs @ 11.69 hrs, Volume= 0.059 af, Atten= 82%, Lag= 0.0 min
Discarded = 0.14 cfs @ 11.69 hrs, Volume= 0.059 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 58.62' @ 12.51 hrs Surf.Area= 851 sf Storage= 634 cf

Plug-Flow detention time= 24.5 min calculated for 0.059 af (100% of inflow)
Center-of-Mass det. time= 24.5 min (779.2 - 754.6)

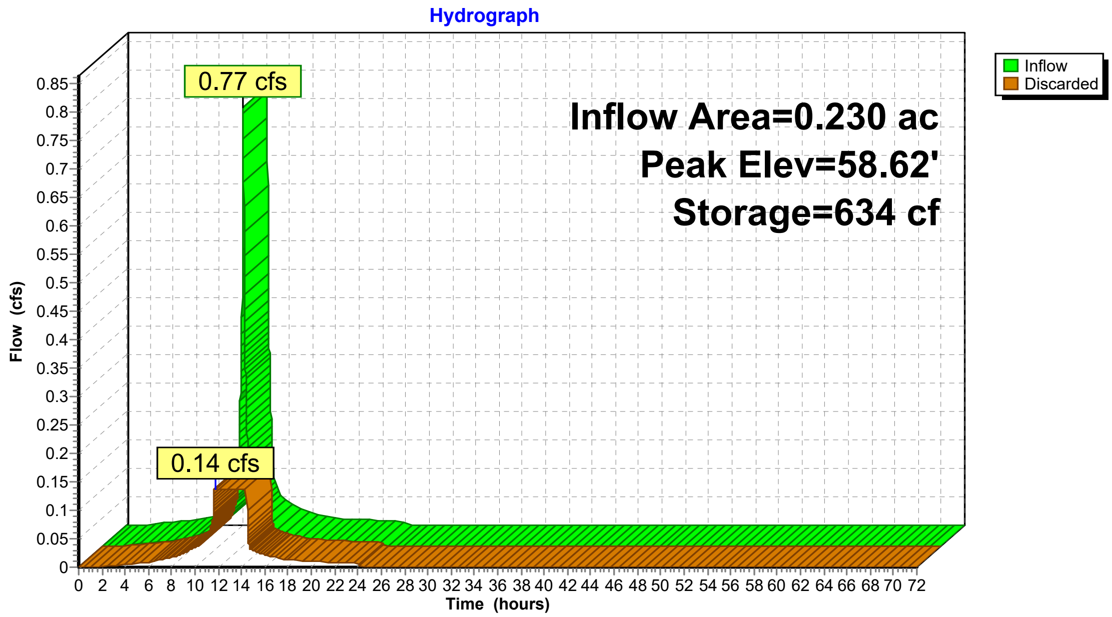
Volume	Invert	Avail.Storage	Storage Description
#1A	56.80'	1,292 cf	**30.17'W x 28.21'L x 6.25'H Field A** 5,319 cf Overall - 1,439 cf Embedded = 3,880 cf x 33.3% Voids
#2A	58.30'	1,439 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 4 Rows of 3 Chambers Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		2,731 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	56.80'	**7.000 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.14 cfs @ 11.69 hrs HW=56.86' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Pond URC4: URC-4



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA1: DA1 — Runoff Area=158,640 sf 9.44% Impervious Runoff Depth=0.15"
Flow Length=417' Tc=15.9 min CN=38 Runoff=0.07 cfs 0.045 af

Subcatchment DA2a: DA2a — Runoff Area=43,429 sf 0.00% Impervious Runoff Depth=0.05"
Flow Length=525' Tc=43.3 min CN=34 Runoff=0.01 cfs 0.004 af

Subcatchment DA2b: DA2b pervious — Runoff Area=10,709 sf 0.00% Impervious Runoff Depth=0.18"
Tc=5.0 min CN=39 Runoff=0.01 cfs 0.004 af

Subcatchment DA2bi: DA2b impervious — Runoff Area=8,285 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=98 Runoff=0.94 cfs 0.074 af

Subcatchment DA3a: DA3a pervious — Runoff Area=33,821 sf 0.00% Impervious Runoff Depth=0.05"
Tc=5.0 min CN=34 Runoff=0.00 cfs 0.003 af

Subcatchment DA3ai: DA3a impervious — Runoff Area=19,638 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=98 Runoff=2.24 cfs 0.175 af

Subcatchment DA3b: DA3b pervious — Runoff Area=4,260 sf 0.00% Impervious Runoff Depth=0.07"
Tc=5.0 min CN=35 Runoff=0.00 cfs 0.001 af

Subcatchment DA3bi: DA3b impervious — Runoff Area=10,179 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=98 Runoff=1.16 cfs 0.091 af

Subcatchment DA3c: DA3c pervious — Runoff Area=26,141 sf 0.00% Impervious Runoff Depth=0.02"
Tc=5.0 min CN=32 Runoff=0.00 cfs 0.001 af

Subcatchment DA3ci: DA3c impervious — Runoff Area=3,179 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=98 Runoff=0.36 cfs 0.028 af

Subcatchment DA3d: DA3d pervious — Runoff Area=197 sf 0.00% Impervious Runoff Depth=0.18"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment DA3di: DA3d impervious Runoff Area=4,686 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=98 Runoff=0.53 cfs 0.042 af

Subcatchment R1E: EAST ROOF Runoff Area=11,331 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=98 Runoff=1.29 cfs 0.101 af

Subcatchment R1W: WEST ROOF Runoff Area=10,000 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=98 Runoff=1.14 cfs 0.089 af

Pond 100: CB 100 Peak Elev=50.39' Inflow=0.36 cfs 0.029 af
12.0" Round Culvert n=0.013 L=4.0' S=0.0050 '/' Outflow=0.36 cfs 0.029 af

Pond 200: CB 200 Peak Elev=52.20' Inflow=0.53 cfs 0.042 af
Primary=0.53 cfs 0.042 af Secondary=0.00 cfs 0.000 af Outflow=0.53 cfs 0.042 af

Pond BIO1: BIO 1 Peak Elev=59.46' Storage=1,242 cf Inflow=2.24 cfs 0.178 af
Outflow=2.08 cfs 0.178 af

Pond BIO2: BIO 2 Peak Elev=62.62' Storage=68 cf Inflow=0.94 cfs 0.078 af
Outflow=0.93 cfs 0.078 af

Pond DMH: DMH 200 Peak Elev=54.61' Inflow=1.16 cfs 0.091 af
Primary=0.89 cfs 0.088 af Secondary=0.27 cfs 0.003 af Outflow=1.16 cfs 0.091 af

Pond RB1: RB 101,102 Peak Elev=43.31' Storage=311 cf Inflow=0.36 cfs 0.029 af
Discarded=0.06 cfs 0.029 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.029 af

Pond RB2: RB 202,202,203 Peak Elev=47.93' Storage=348 cf Inflow=0.50 cfs 0.015 af
Discarded=0.09 cfs 0.015 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.015 af

Pond RB3: RB 300 Peak Elev=58.52' Storage=0 cf Inflow=0.01 cfs 0.004 af
Discarded=0.01 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.004 af

Pond SP1: SP1 Inflow=0.07 cfs 0.045 af
Primary=0.07 cfs 0.045 af

Pond SP2: SP2 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SP3: SP3 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond TT1: Tree Trench 1 Peak Elev=54.49' Storage=746 cf Inflow=0.89 cfs 0.088 af
Discarded=0.20 cfs 0.085 af Primary=0.16 cfs 0.003 af Outflow=0.35 cfs 0.088 af

Pond TT2: Tree Trench 2 Peak Elev=53.05' Storage=156 cf Inflow=0.53 cfs 0.042 af
Discarded=0.03 cfs 0.027 af Primary=0.50 cfs 0.015 af Outflow=0.53 cfs 0.042 af

Pond URC1: URC-1 Peak Elev=51.06' Storage=0.047 af Inflow=2.32 cfs 0.185 af
Outflow=0.38 cfs 0.185 af

Pond URC2: URC-2 Peak Elev=57.18' Storage=1,266 cf Inflow=1.29 cfs 0.101 af
Outflow=0.17 cfs 0.101 af

Pond URC3: URC-3 Peak Elev=58.24' Storage=929 cf Inflow=0.93 cfs 0.078 af
Outflow=0.12 cfs 0.078 af

Pond URC4: URC-4 Peak Elev=59.45' Storage=1,156 cf Inflow=1.14 cfs 0.089 af
Outflow=0.14 cfs 0.089 af

Summary for Subcatchment DA1: DA1

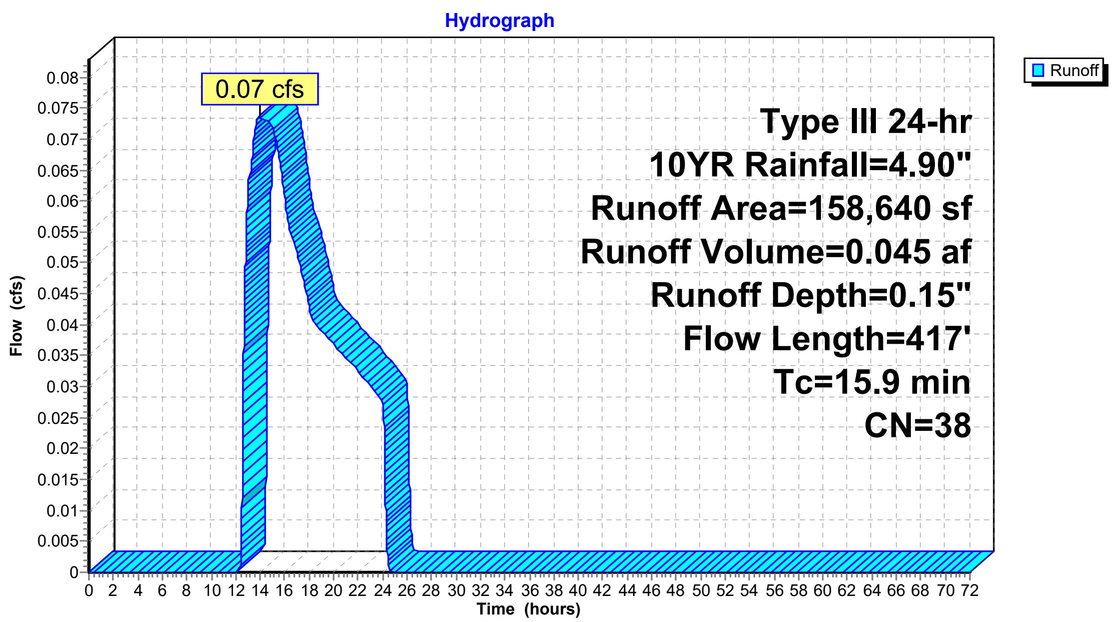
Runoff = 0.07 cfs @ 13.94 hrs, Volume= 0.045 af, Depth= 0.15"

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=4.90"

Area (sf)	CN	Description
118,297	30	Woods, Good, HSG A
25,363	39	>75% Grass cover, Good, HSG A
9,642	98	Roofs, HSG A
5,338	98	Paved parking, HSG A
158,640	38	Weighted Average
143,660		90.56% Pervious Area
14,980		9.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	78	0.1730	0.11		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.7	99	0.1110	2.33		**Shallow Concentrated Flow, B TO C** Short Grass Pasture Kv= 7.0 fps
3.0	240	0.0690	1.31		**Shallow Concentrated Flow, C TO SP1** Woodland Kv= 5.0 fps
15.9	417	Total			

Subcatchment DA1: DA1



Summary for Subcatchment DA2a: DA2a

CN for permeable pavers taken from RI Stormwater Design

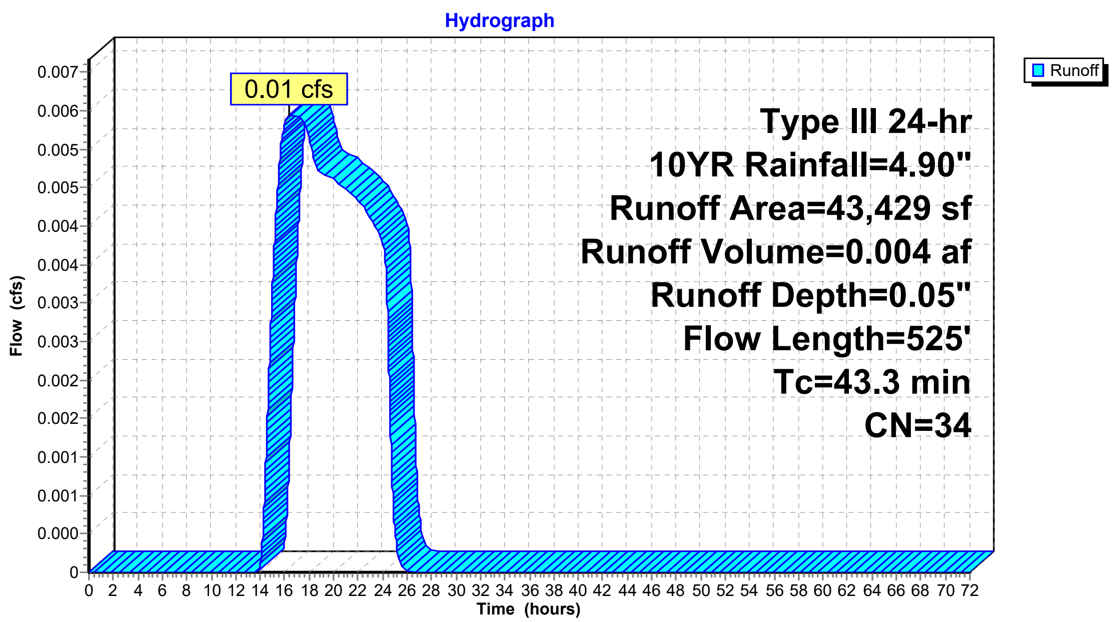
Runoff = 0.01 cfs @ 16.31 hrs, Volume= 0.004 af, Depth= 0.05"

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=4.90"

	Area (sf)	CN	Description
	25,414	30	Woods, Good, HSG A
	17,231	39	>75% Grass cover, Good, HSG A
*	784	40	Pervious Pavers
	43,429	34	Weighted Average
	43,429		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.4	147	0.0400	0.07		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.8	67	0.0760	1.38		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
1.1	73	0.0480	1.10		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
5.0	238	0.0250	0.79		**Shallow Concentrated Flow, D to SP2** Woodland Kv= 5.0 fps
43.3	525	Total			

Subcatchment DA2a: DA2a



Summary for Subcatchment DA2b: DA2b pervious

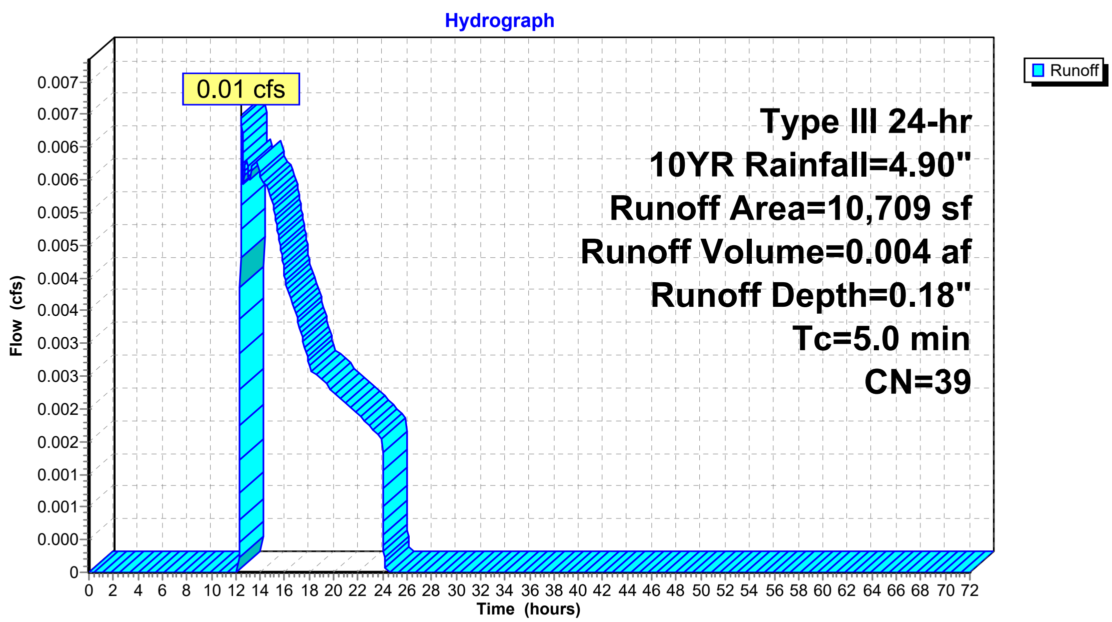
Runoff = 0.01 cfs @ 12.48 hrs, Volume= 0.004 af, Depth= 0.18"

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=4.90"

Area (sf)	CN	Description
10,238	39	>75% Grass cover, Good, HSG A
471	30	Woods, Good, HSG A
10,709	39	Weighted Average
10,709		100.00% Pervious Area

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

Subcatchment DA2b: DA2b pervious



Summary for Subcatchment DA2bi: DA2b impervious

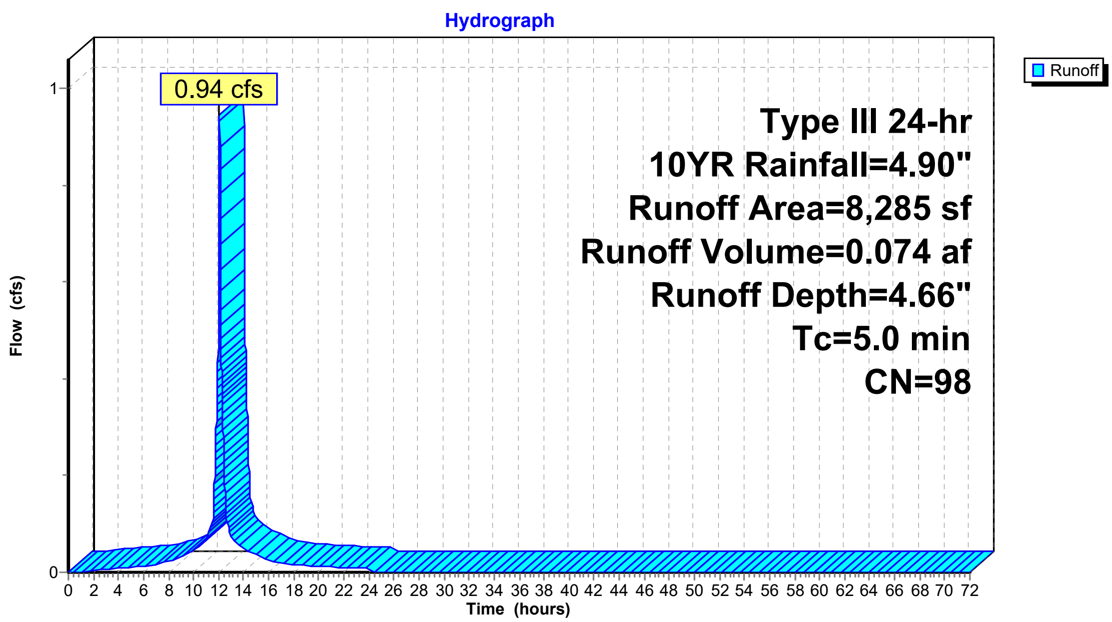
Runoff = 0.94 cfs @ 12.07 hrs, Volume= 0.074 af, Depth= 4.66"

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=4.90"

	Area (sf)	CN	Description
	7,010	98	Paved parking, HSG A
*	1,275	98	Sidewalks, HSG A
	8,285	98	Weighted Average
	8,285		100.00% Impervious Area

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

Subcatchment DA2bi: DA2b impervious



Summary for Subcatchment DA3a: DA3a pervious

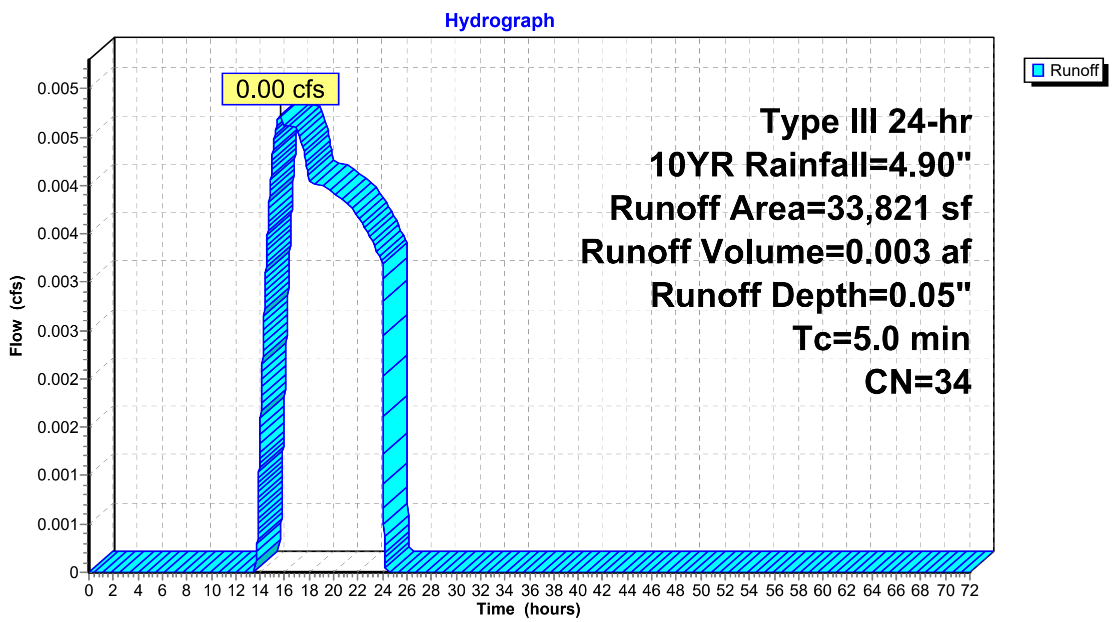
Runoff = 0.00 cfs @ 15.65 hrs, Volume= 0.003 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
14,079	39	>75% Grass cover, Good, HSG A
19,742	30	Woods, Good, HSG A
33,821	34	Weighted Average
33,821		100.00% Pervious Area

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

Subcatchment DA3a: DA3a pervious



Summary for Subcatchment DA3ai: DA3a impervious

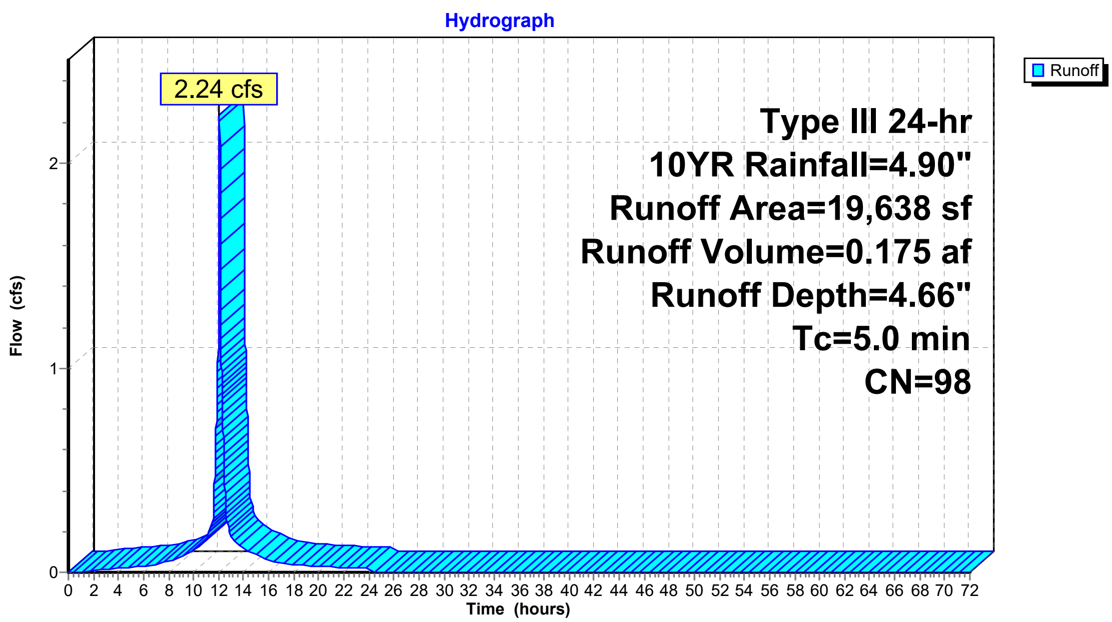
Runoff = 2.24 cfs @ 12.07 hrs, Volume= 0.175 af, Depth= 4.66"

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=4.90"

	Area (sf)	CN	Description
	18,277	98	Paved parking, HSG A
*	1,361	98	Sidewalk, HSG A
	19,638	98	Weighted Average
	19,638		100.00% Impervious Area

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

Subcatchment DA3ai: DA3a impervious



Summary for Subcatchment DA3b: DA3b pervious

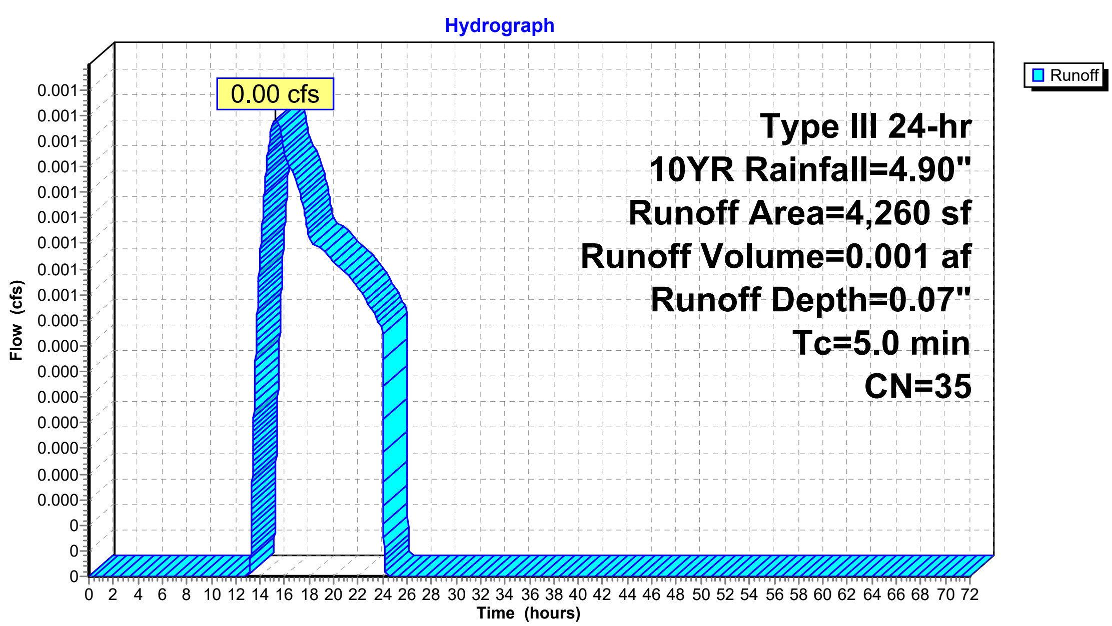
Runoff = 0.00 cfs @ 15.27 hrs, Volume= 0.001 af, Depth= 0.07"

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 10YR Rainfall=4.90"

Area (sf)	CN	Description
2,324	39	>75% Grass cover, Good, HSG A
1,936	30	Woods, Good, HSG A
4,260	35	Weighted Average
4,260		100.00% Pervious Area

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

Subcatchment DA3b: DA3b pervious



Summary for Subcatchment DA3bi: DA3b impervious

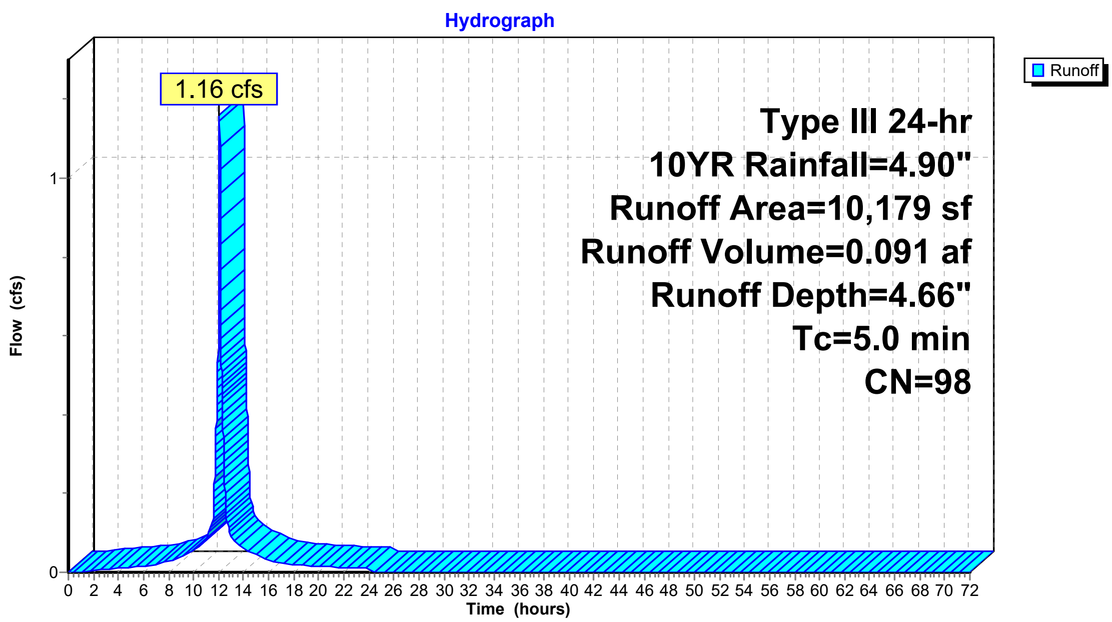
Runoff = 1.16 cfs @ 12.07 hrs, Volume= 0.091 af, Depth= 4.66"

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=4.90"

	Area (sf)	CN	Description
	9,486	98	Paved parking, HSG A
*	693	98	Sidewalks, HSG A
	10,179	98	Weighted Average
	10,179		100.00% Impervious Area

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

Subcatchment DA3bi: DA3b impervious



Summary for Subcatchment DA3c: DA3c pervious

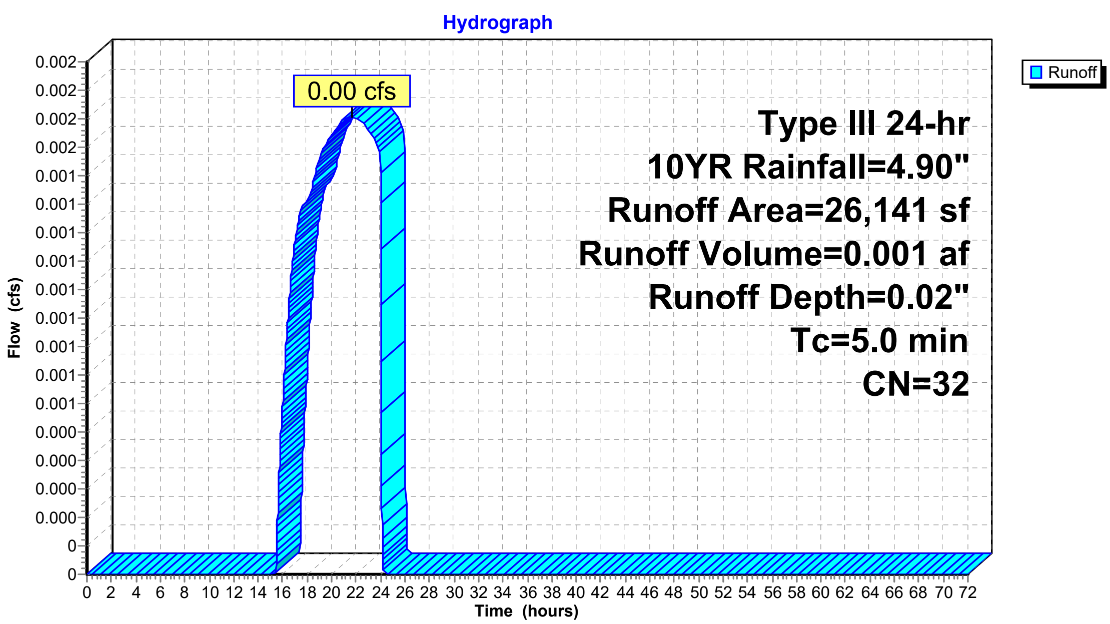
Runoff = 0.00 cfs @ 21.65 hrs, Volume= 0.001 af, Depth= 0.02"

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=4.90"

Area (sf)	CN	Description
4,662	39	>75% Grass cover, Good, HSG A
21,479	30	Woods, Good, HSG A
26,141	32	Weighted Average
26,141		100.00% Pervious Area

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

Subcatchment DA3c: DA3c pervious



Summary for Subcatchment DA3ci: DA3c impervious

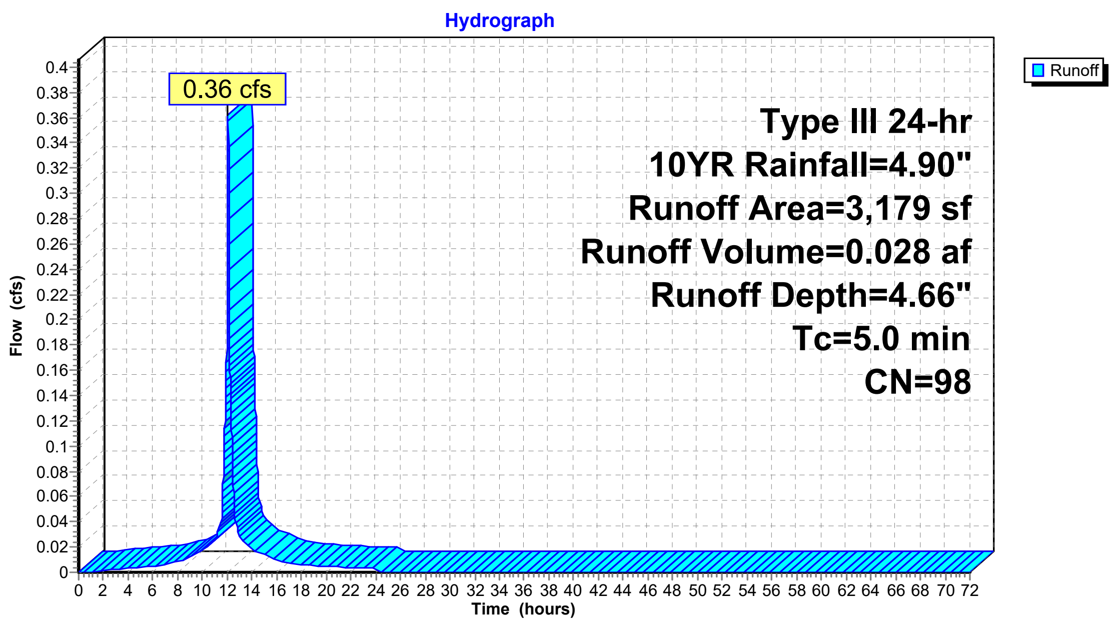
Runoff = 0.36 cfs @ 12.07 hrs, Volume= 0.028 af, Depth= 4.66"

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=4.90"

	Area (sf)	CN	Description
	2,649	98	Paved parking, HSG A
*	530	98	Sidewalks, HSG A
	3,179	98	Weighted Average
	3,179		100.00% Impervious Area

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

Subcatchment DA3ci: DA3c impervious



Summary for Subcatchment DA3d: DA3d pervious

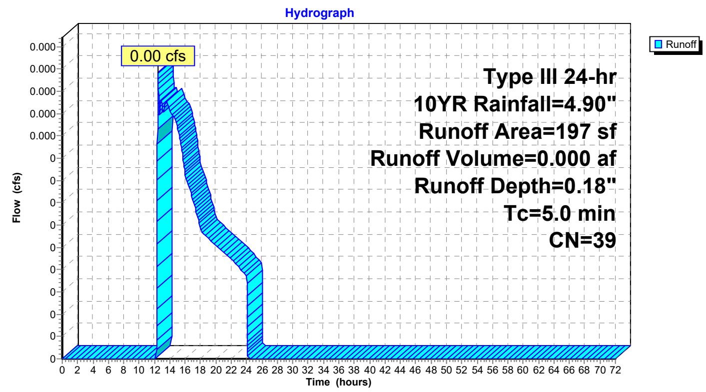
Runoff = 0.00 cfs @ 12.48 hrs, Volume= 0.000 af, Depth= 0.18"

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=4.90"

Area (sf)	CN	Description
197	39	>75% Grass cover, Good, HSG A
197		100.00% Pervious Area

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

Subcatchment DA3d: DA3d pervious



Summary for Subcatchment DA3di: DA3d impervious

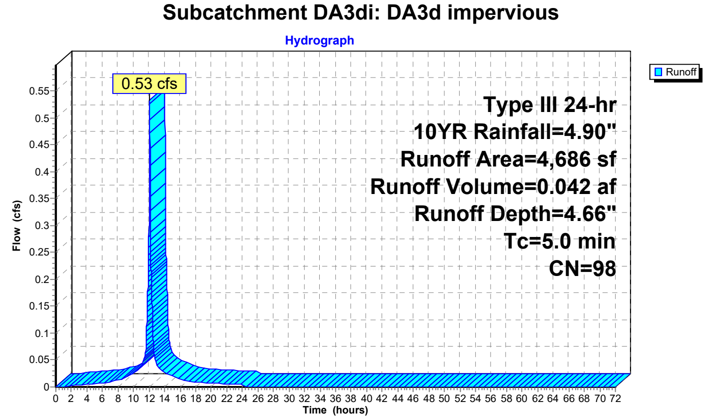
Runoff = 0.53 cfs @ 12.07 hrs, Volume= 0.042 af, Depth= 4.66"

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=4.90"

Area (sf)	CN	Description
4,686	98	Paved parking, HSG A
4,686		100.00% Impervious Area

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

Subcatchment DA3di: DA3d impervious



Summary for Subcatchment R1E: EAST ROOF

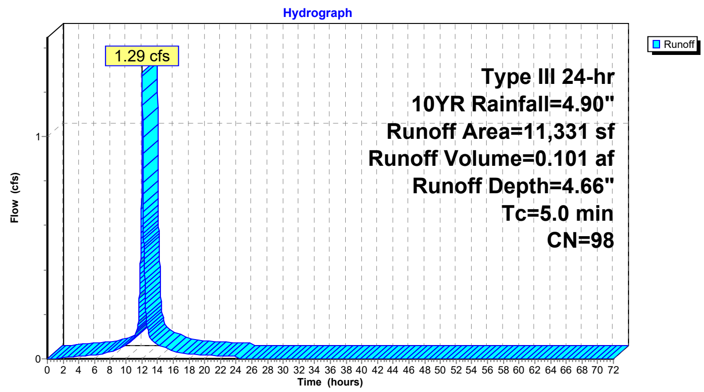
Runoff = 1.29 cfs @ 12.07 hrs, Volume= 0.101 af, Depth= 4.66"

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=4.90"

Area (sf)	CN	Description
11,331	98	Roofs, HSG A
11,331		100.00% Impervious Area

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

Subcatchment R1E: EAST ROOF



Summary for Subcatchment R1W: WEST ROOF

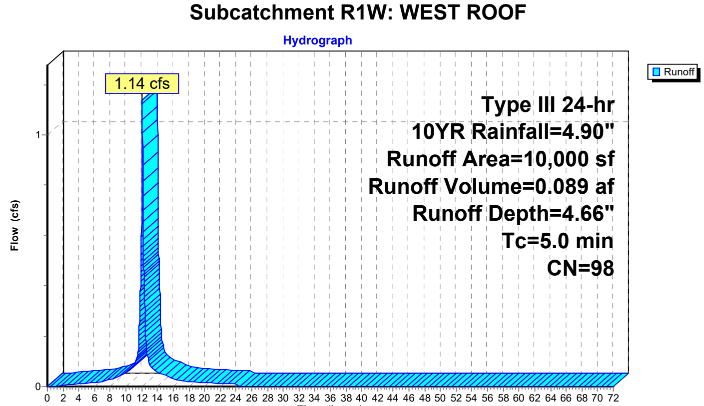
Runoff = 1.14 cfs @ 12.07 hrs, Volume= 0.089 af, Depth= 4.66"

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=4.90"

Area (sf)	CN	Description
10,000	98	Roofs, HSG A
10,000		100.00% Impervious Area

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

Subcatchment R1W: WEST ROOF



Summary for Pond 100: CB 100

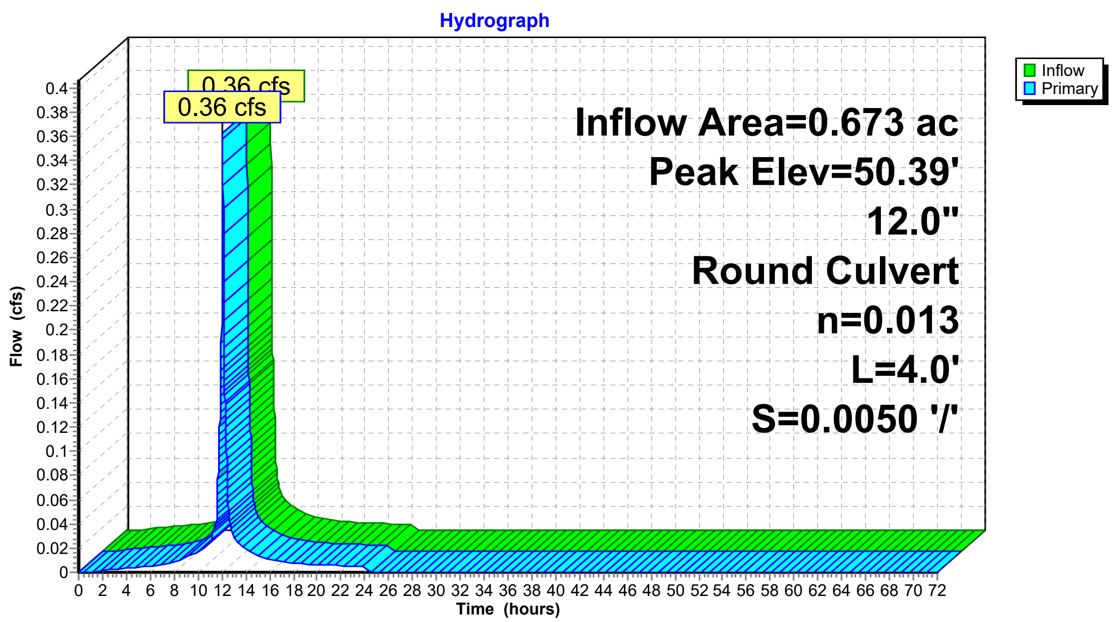
Inflow Area = 0.673 ac, 10.84% Impervious, Inflow Depth = 0.52" for 10YR event
Inflow = 0.36 cfs @ 12.07 hrs, Volume= 0.029 af
Outflow = 0.36 cfs @ 12.07 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min
Primary = 0.36 cfs @ 12.07 hrs, Volume= 0.029 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 50.39' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	50.00'	**12.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 50.00' / 49.98' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.36 cfs @ 12.07 hrs HW=50.39' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.36 cfs @ 1.89 fps)

Pond 100: CB 100



Summary for Pond 200: CB 200

Inflow Area =	0.112 ac, 95.97% Impervious, Inflow Depth = 4.48"	for 10YR event	
Inflow =	0.53 cfs @ 12.07 hrs, Volume=	0.042 af	
Outflow =	0.53 cfs @ 12.07 hrs, Volume=	0.042 af, Atten= 0%, Lag= 0.0 min	
Primary =	0.53 cfs @ 12.07 hrs, Volume=	0.042 af	
Secondary =	0.00 cfs @ 0.00 hrs, Volume=	0.000 af	

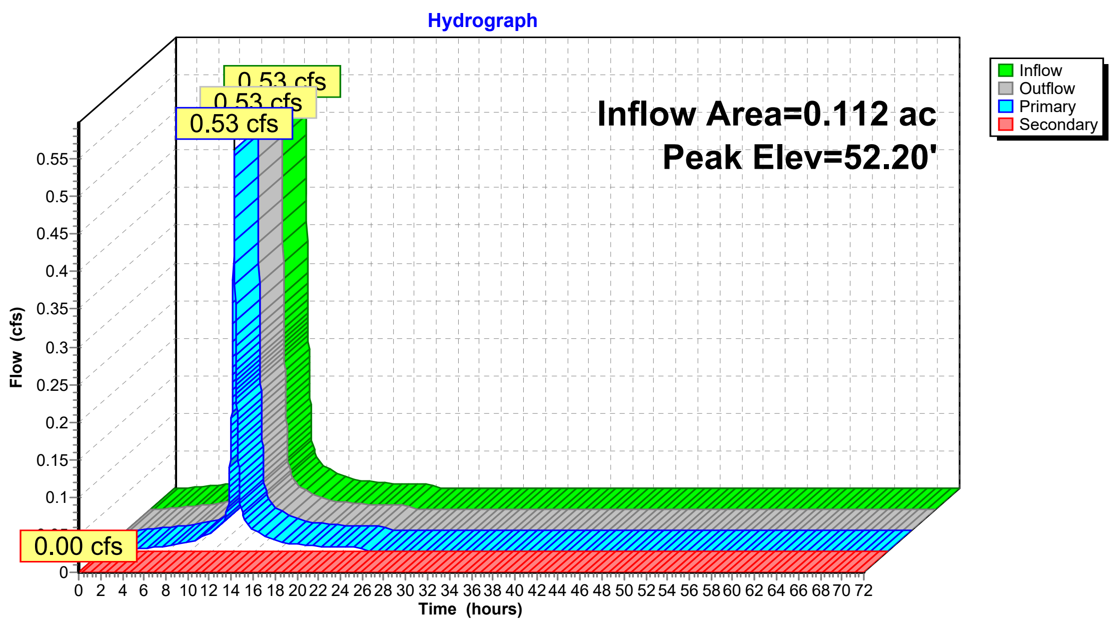
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 52.20' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	52.70'	**12.0" Round Culvert** L= 4.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 52.70' / 52.68' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	51.66'	**8.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.66' / 51.41' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#3	Secondary	55.79'	**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

Primary OutFlow Max=0.53 cfs @ 12.07 hrs HW=52.20' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.53 cfs @ 2.42 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=51.66' (Free Discharge)
├─**1=Culvert** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 200: CB 200



Summary for Pond BIO1: BIO 1

Inflow Area = 1.227 ac, 36.73% Impervious, Inflow Depth = 1.75" for 10YR event
Inflow = 2.24 cfs @ 12.07 hrs, Volume= 0.178 af
Outflow = 2.08 cfs @ 12.10 hrs, Volume= 0.178 af, Atten= 7%, Lag= 1.8 min
Primary = 2.08 cfs @ 12.10 hrs, Volume= 0.178 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 59.46' @ 12.10 hrs Surf.Area= 1,643 sf Storage= 1,242 cf

Plug-Flow detention time= 62.7 min calculated for 0.178 af (100% of inflow)
Center-of-Mass det. time= 62.7 min (817.2 - 754.5)

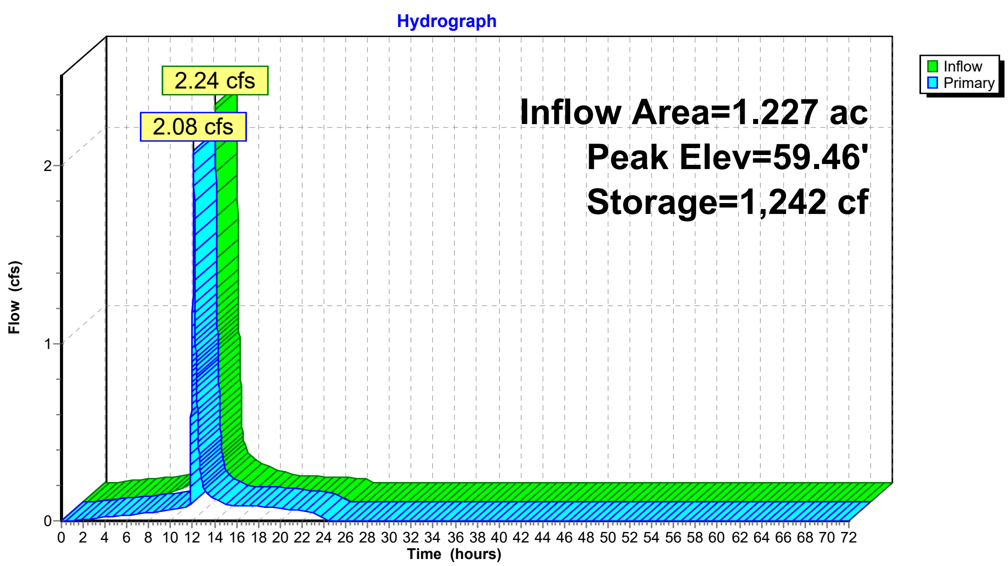
Volume	Invert	Avail.Storage	Storage Description
#1	58.50'	2,210 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	800	0	0
59.00	1,380	545	545
60.00	1,950	1,665	2,210

Device	Routing	Invert	Outlet Devices
#1	Primary	55.09'	**12.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 55.09' / 54.87' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	59.25'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	55.38'	**4.0" Round Culvert** L= 38.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 55.38' / 55.19' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#4	Device 3	58.50'	**2.470 in/hr Exfiltration over Surface area**

Primary OutFlow Max=2.08 cfs @ 12.10 hrs HW=59.46' (Free Discharge)
└─**1=Culvert** (Passes 2.08 cfs of 5.87 cfs potential flow)
  ├─**2=Orifice/Grate** (Weir Controls 1.99 cfs @ 1.50 fps)
  └─**3=Culvert** (Passes 0.09 cfs of 0.62 cfs potential flow)
    └─**4=Exfiltration** (Exfiltration Controls 0.09 cfs)

Pond BIO1: BIO 1



Summary for Pond BIO2: BIO 2

Inflow Area = 0.436 ac, 43.62% Impervious, Inflow Depth = 2.14" for 10YR event
Inflow = 0.94 cfs @ 12.07 hrs, Volume= 0.078 af
Outflow = 0.93 cfs @ 12.08 hrs, Volume= 0.078 af, Atten= 2%, Lag= 0.9 min
Primary = 0.93 cfs @ 12.08 hrs, Volume= 0.078 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 62.62' @ 12.08 hrs Surf.Area= 585 sf Storage= 68 cf

Plug-Flow detention time= 1.8 min calculated for 0.078 af (100% of inflow)
Center-of-Mass det. time= 1.8 min (762.0 - 760.2)

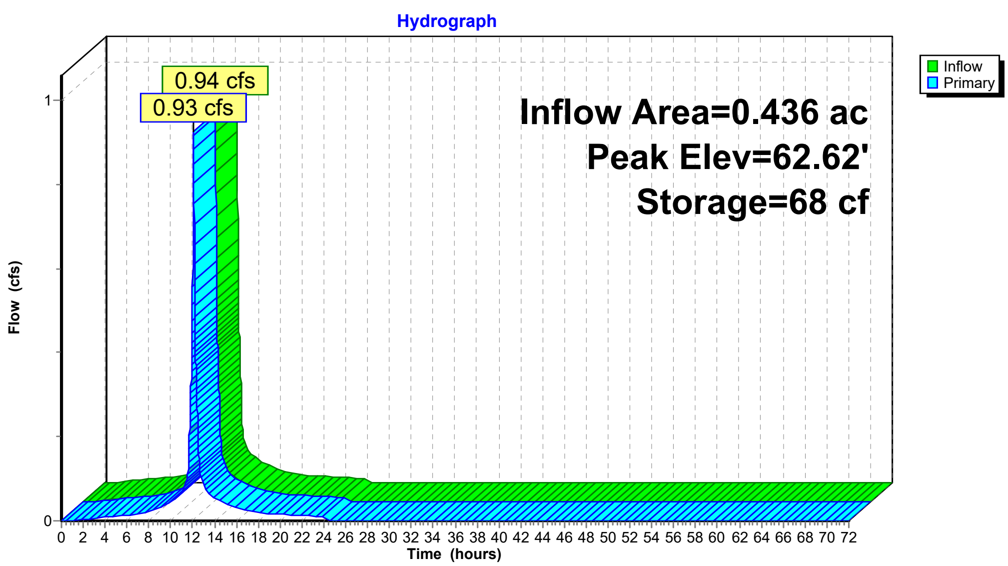
Volume	Invert	Avail.Storage	Storage Description
#1	62.50'	1,414 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
62.50	522	0	0
63.00	775	324	324
64.00	1,405	1,090	1,414

Device	Routing	Invert	Outlet Devices
#1	Primary	59.00'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 59.00' / 58.88' S= 0.0048 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	62.50'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	59.30'	**6.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.30' / 59.18' S= 0.0048 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#4	Device 3	62.50'	**2.470 in/hr Exfiltration over Surface area**

Primary OutFlow Max=0.92 cfs @ 12.08 hrs HW=62.62' (Free Discharge)
└─**1=Culvert** (Passes 0.92 cfs of 6.68 cfs potential flow)
  ├─**2=Orifice/Grate** (Weir Controls 0.89 cfs @ 1.15 fps)
  └─**3=Culvert** (Passes 0.03 cfs of 1.31 cfs potential flow)
    └─**4=Exfiltration** (Exfiltration Controls 0.03 cfs)

Pond BIO2: BIO 2



Summary for Pond DMH: DMH 200

Inflow Area = 0.331 ac, 70.50% Impervious, Inflow Depth = 3.31" for 10YR event
Inflow = 1.16 cfs @ 12.07 hrs, Volume= 0.091 af
Outflow = 1.16 cfs @ 12.07 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min
Primary = 0.89 cfs @ 12.07 hrs, Volume= 0.088 af
Secondary = 0.27 cfs @ 12.07 hrs, Volume= 0.003 af

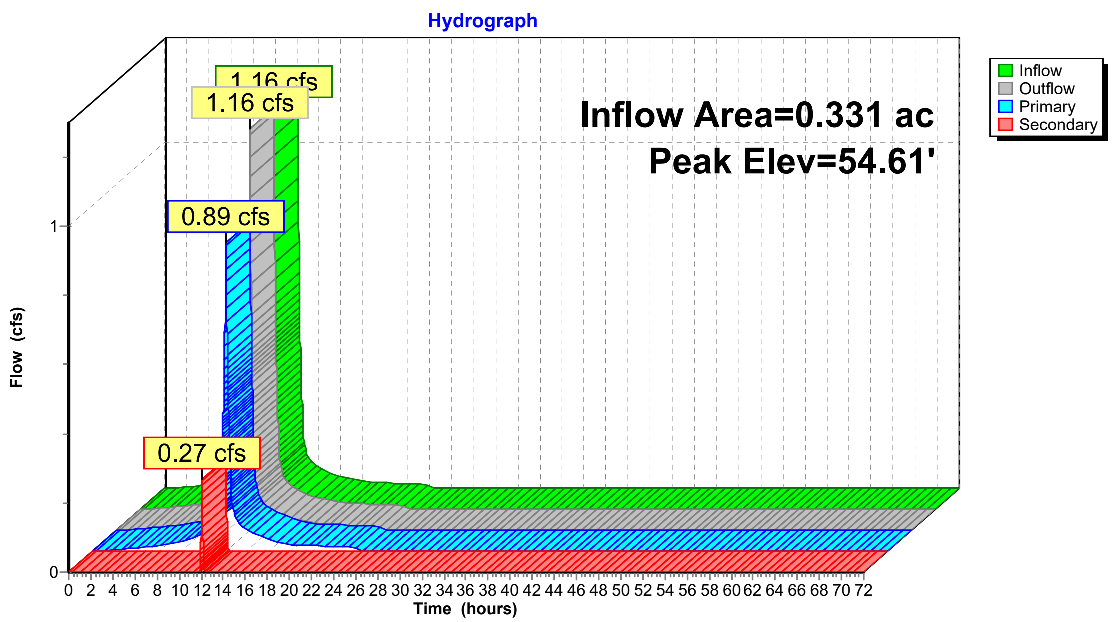
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 54.61' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	54.30'	**12.0" Round Culvert** L= 9.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 54.30' / 54.26' S= 0.0044 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	53.78'	**12.0" Round Culvert** L= 98.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 53.78' / 53.78' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.89 cfs @ 12.07 hrs HW=54.61' (Free Discharge)
└**2=Culvert** (Barrel Controls 0.89 cfs @ 1.73 fps)

Secondary OutFlow Max=0.27 cfs @ 12.07 hrs HW=54.61' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.27 cfs @ 1.90 fps)

Pond DMH: DMH 200



Summary for Pond RB1: RB 101,102

Inflow Area = 0.673 ac, 10.84% Impervious, Inflow Depth = 0.52" for 10YR event
Inflow = 0.36 cfs @ 12.07 hrs, Volume= 0.029 af
Outflow = 0.06 cfs @ 11.66 hrs, Volume= 0.029 af, Atten= 83%, Lag= 0.0 min
Discarded = 0.06 cfs @ 11.66 hrs, Volume= 0.029 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= 43.31' @ 12.52 hrs Surf.Area= 157 sf Storage= 311 cf

Plug-Flow detention time= 26.4 min calculated for 0.029 af (100% of inflow)
Center-of-Mass det. time= 26.4 min (789.2 - 762.8)

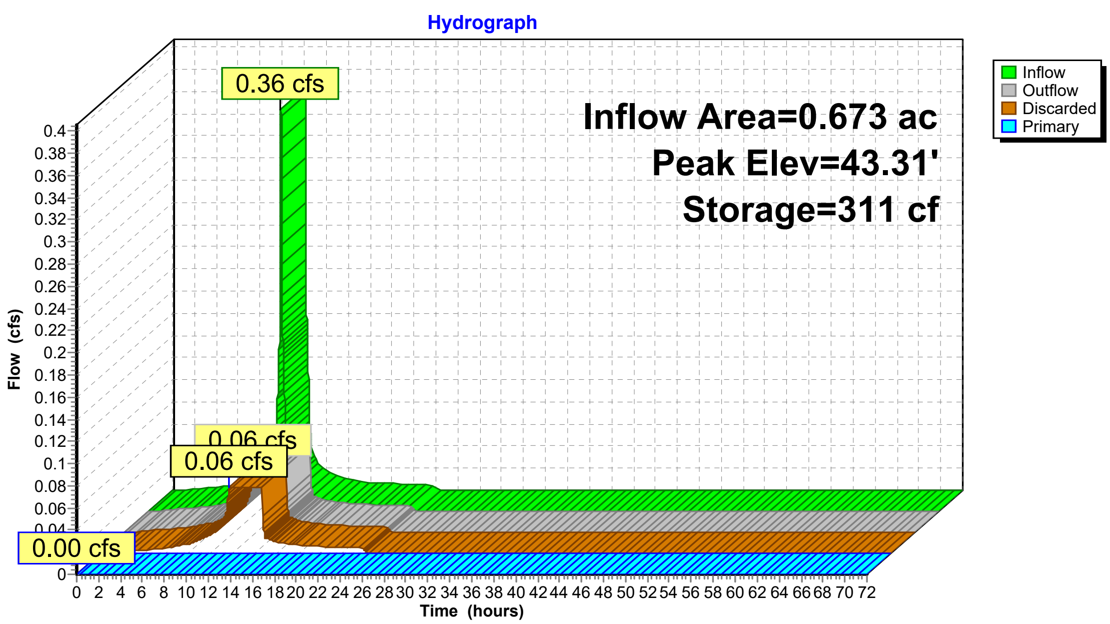
Volume	Invert	Avail.Storage	Storage Description
#1	41.00'	339 cf	**6.00'D x 6.00'H Recharger** x 2 Inside #2
#2	39.00'	355 cf	**10.00'D x 9.00'H Stone** x 2 1,414 cf Overall - 339 cf Embedded = 1,074 cf x 33.0% Voids
		694 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	39.00'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	46.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 11.66 hrs HW=39.09' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=39.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond RB1: RB 101,102



Summary for Pond RB2: RB 202,202,203

Inflow Area = 0.112 ac, 95.97% Impervious, Inflow Depth = 1.55" for 10YR event
Inflow = 0.50 cfs @ 12.08 hrs, Volume= 0.015 af
Outflow = 0.09 cfs @ 11.88 hrs, Volume= 0.015 af, Atten= 82%, Lag= 0.0 min
Discarded = 0.09 cfs @ 11.88 hrs, Volume= 0.015 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= 47.93' @ 12.47 hrs Surf.Area= 236 sf Storage= 348 cf

Plug-Flow detention time= 36.9 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 36.9 min (769.8 - 732.9)

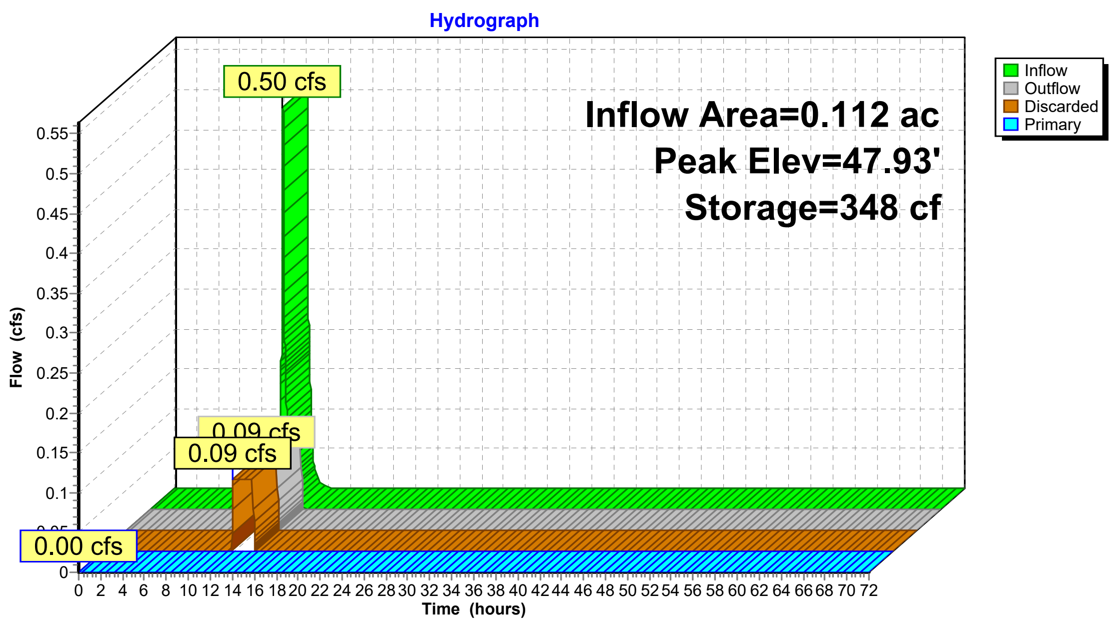
Volume	Invert	Avail.Storage	Storage Description
#1	46.50'	509 cf	**6.00'D x 6.00'H Recharger** x 3 Inside #2
#2	44.50'	532 cf	**10.00'D x 9.00'H Stone** x 3
			2,121 cf Overall - 509 cf Embedded = 1,612 cf x 33.0% Voids
		1,041 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.50'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	55.61'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.09 cfs @ 11.88 hrs HW=44.64' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=44.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond RB2: RB 202,202,203



Summary for Pond RB3: RB 300

Inflow Area = 0.997 ac, 0.00% Impervious, Inflow Depth = 0.05" for 10YR event
Inflow = 0.01 cfs @ 16.31 hrs, Volume= 0.004 af
Outflow = 0.01 cfs @ 16.32 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.7 min
Discarded = 0.01 cfs @ 16.32 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= 58.52' @ 16.32 hrs Surf.Area= 57 sf Storage= 0 cf

Plug-Flow detention time= 1.0 min calculated for 0.004 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (1,168.5 - 1,167.5)

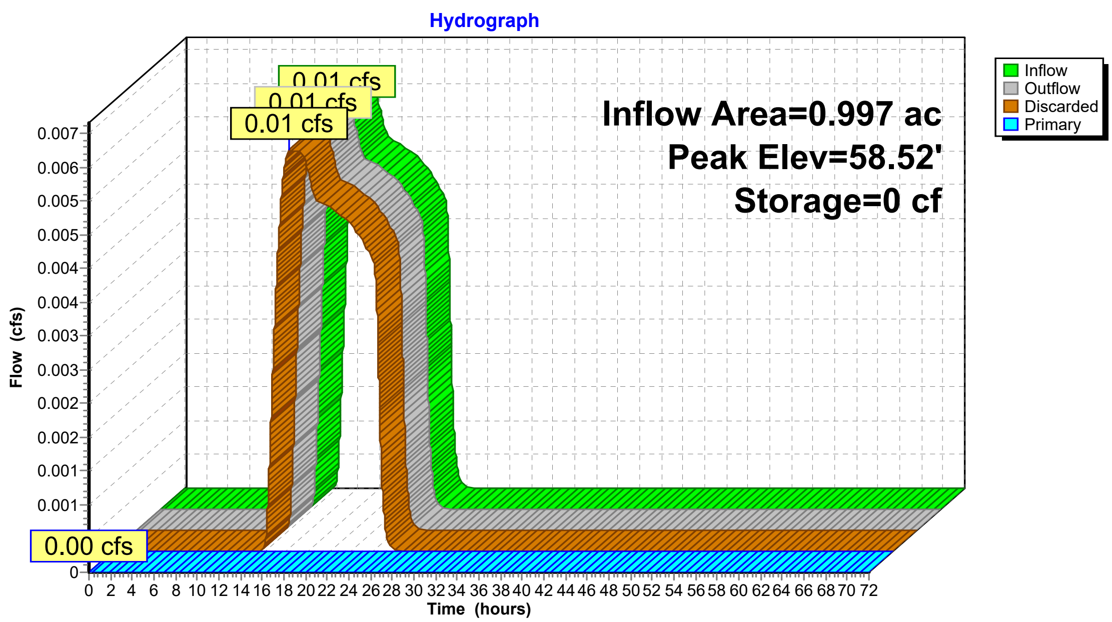
Volume	Invert	Avail.Storage	Storage Description
#1	59.50'	50 cf	**4.00'D x 4.00'H Recharger** Inside #2
#2	58.50'	95 cf	**6.00'D x 6.00'H Stone** x 2 339 cf Overall - 50 cf Embedded = 289 cf x 33.0% Voids
		146 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	58.50'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	65.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.02 cfs @ 16.32 hrs HW=58.52' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=58.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond RB3: RB 300

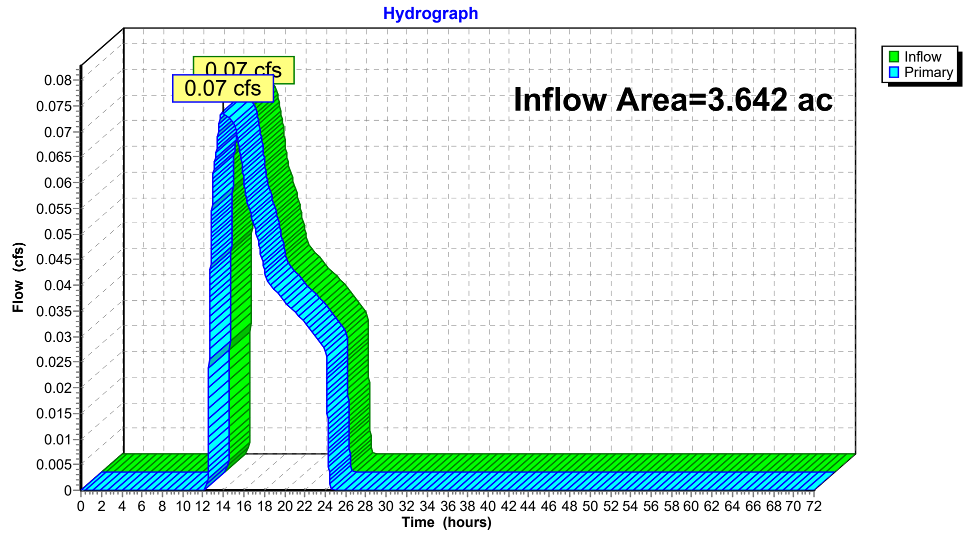


Summary for Pond SP1: SP1

Inflow Area =	3.642 ac, 9.44% Impervious, Inflow Depth = 0.15" for 10YR event	
Inflow =	0.07 cfs @ 13.94 hrs, Volume=	0.045 af
Primary =	0.07 cfs @ 13.94 hrs, Volume=	0.045 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: SP1

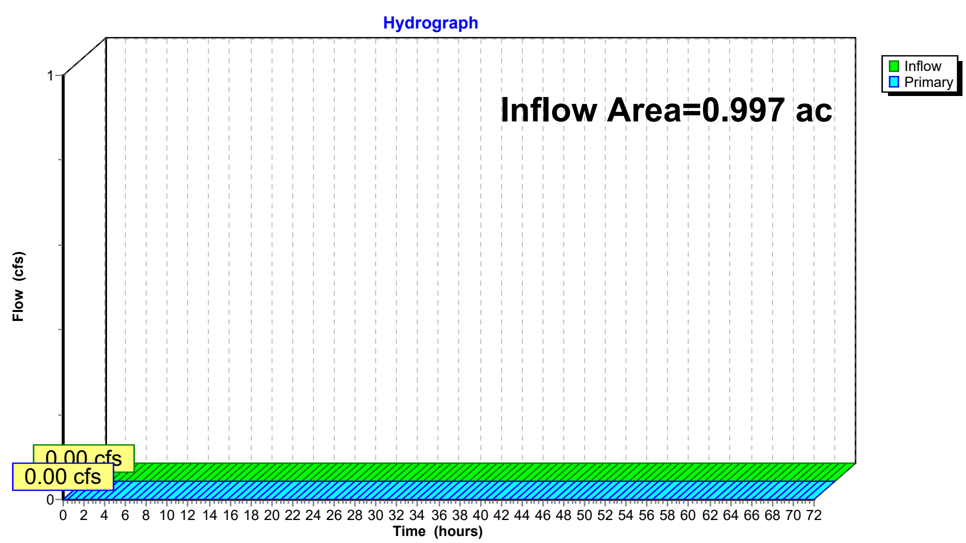


Summary for Pond SP2: SP2

Inflow Area =	0.997 ac, 0.00% Impervious, Inflow Depth = 0.00" for 10YR 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 SP2: SP2

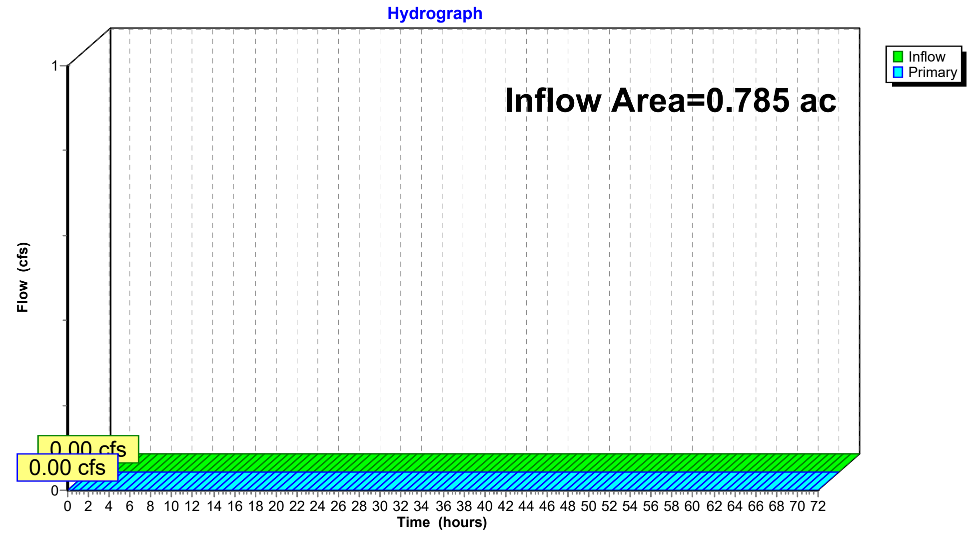


Summary for Pond SP3: SP3

Inflow Area =	0.785 ac,	23.00% Impervious,	Inflow Depth = 0.00"	for 10YR 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 SP3: SP3



Summary for Pond TT1: Tree Trench 1

Inflow Area =	0.331 ac,	70.50% Impervious,	Inflow Depth = 3.19"	for 10YR event		
Inflow =	0.89 cfs @	12.07 hrs,	Volume=	0.088 af		
Outflow =	0.35 cfs @	12.37 hrs,	Volume=	0.088 af,	Atten= 61%,	Lag= 17.8 min
Discarded =	0.20 cfs @	11.65 hrs,	Volume=	0.085 af		
Primary =	0.16 cfs @	12.37 hrs,	Volume=	0.003 af		

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 54.49' @ 12.37 hrs Surf.Area= 1,020 sf Storage= 746 cf

Plug-Flow detention time= 17.0 min calculated for 0.088 af (100% of inflow)
Center-of-Mass det. time= 17.0 min (767.7 - 750.6)

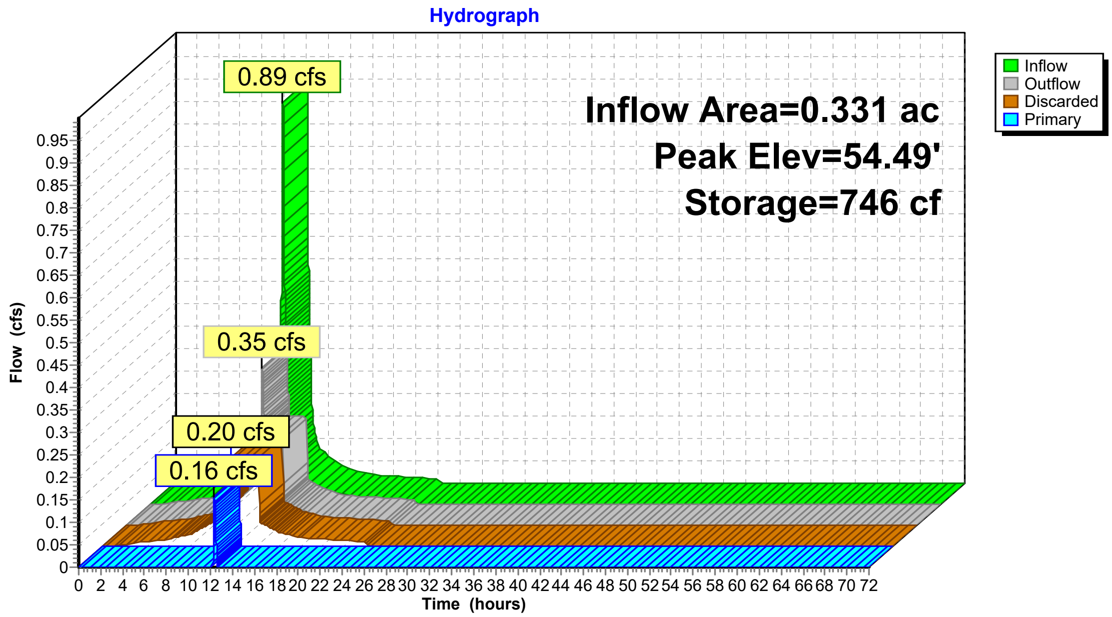
Volume	Invert	Avail.Storage	Storage Description
#1	52.34'	1,008 cf	**9.90'W x 103.00'L x 3.00'H Prismatoid** 3,059 cf Overall - 32 cf Embedded = 3,027 cf x 33.3% Voids
#2	53.78'	32 cf	**8.0" Round Pipe Storage** Inside #1 L= 92.0' S= 0.0050 '/'
		1,040 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	52.34'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	54.30'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.20 cfs @ 11.65 hrs HW=52.37' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=0.15 cfs @ 12.37 hrs HW=54.49' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.15 cfs @ 1.48 fps)

Pond TT1: Tree Trench 1



Summary for Pond TT2: Tree Trench 2

Inflow Area = 0.112 ac, 95.97% Impervious, Inflow Depth = 4.48" for 10YR event
Inflow = 0.53 cfs @ 12.07 hrs, Volume= 0.042 af
Outflow = 0.53 cfs @ 12.08 hrs, Volume= 0.042 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.03 cfs @ 10.38 hrs, Volume= 0.027 af
Primary = 0.50 cfs @ 12.08 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 53.05' @ 12.08 hrs Surf.Area= 150 sf Storage= 156 cf

Plug-Flow detention time= 21.3 min calculated for 0.042 af (100% of inflow)
Center-of-Mass det. time= 21.3 min (769.2 - 747.9)

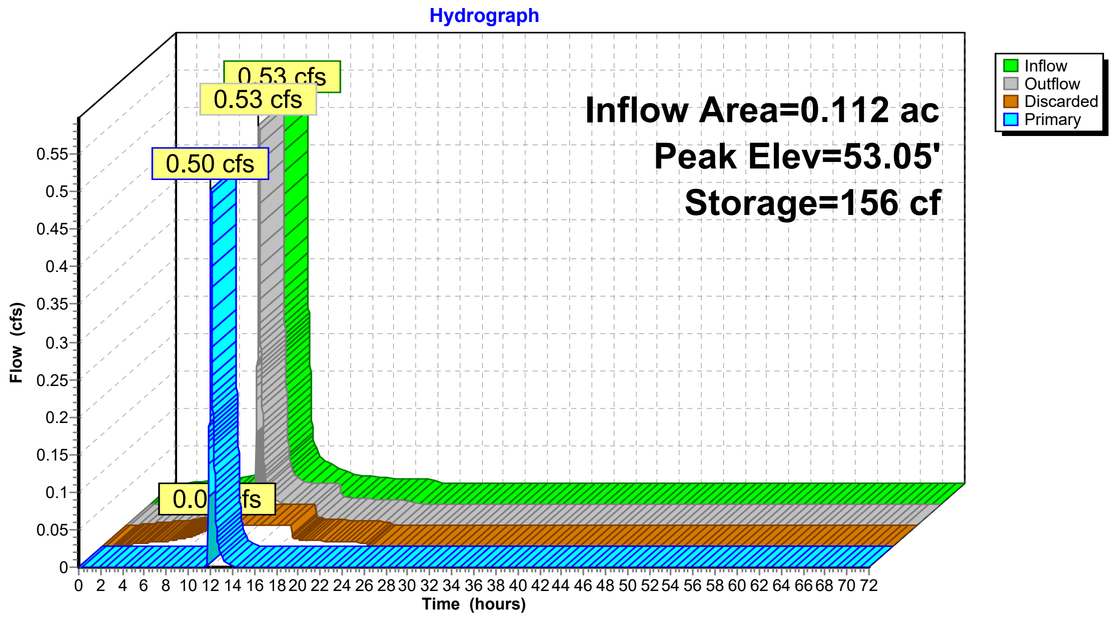
Volume	Invert	Avail.Storage	Storage Description
#1	50.16'	184 cf	**5.00'W x 30.00'L x 3.80'H Prismatoid** 570 cf Overall - 17 cf Embedded = 553 cf x 33.3% Voids
#2	51.66'	17 cf	**8.0" Round Pipe Storage** Inside #1 L= 50.0' S= 0.0050 '/'
		201 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.16'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	52.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.03 cfs @ 10.38 hrs HW=50.20' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.50 cfs @ 12.08 hrs HW=53.05' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.50 cfs @ 2.02 fps)

Pond TT2: Tree Trench 2



Summary for Pond URC1: URC-1

Inflow Area = 1.559 ac, 43.91% Impervious, Inflow Depth = 1.42" for 10YR event
Inflow = 2.32 cfs @ 12.09 hrs, Volume= 0.185 af
Outflow = 0.38 cfs @ 11.85 hrs, Volume= 0.185 af, Atten= 84%, Lag= 0.0 min
Discarded = 0.38 cfs @ 11.85 hrs, Volume= 0.185 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 51.06' @ 12.59 hrs Surf.Area= 0.046 ac Storage= 0.047 af

Plug-Flow detention time= 28.6 min calculated for 0.185 af (100% of inflow)
Center-of-Mass det. time= 28.6 min (842.9 - 814.3)

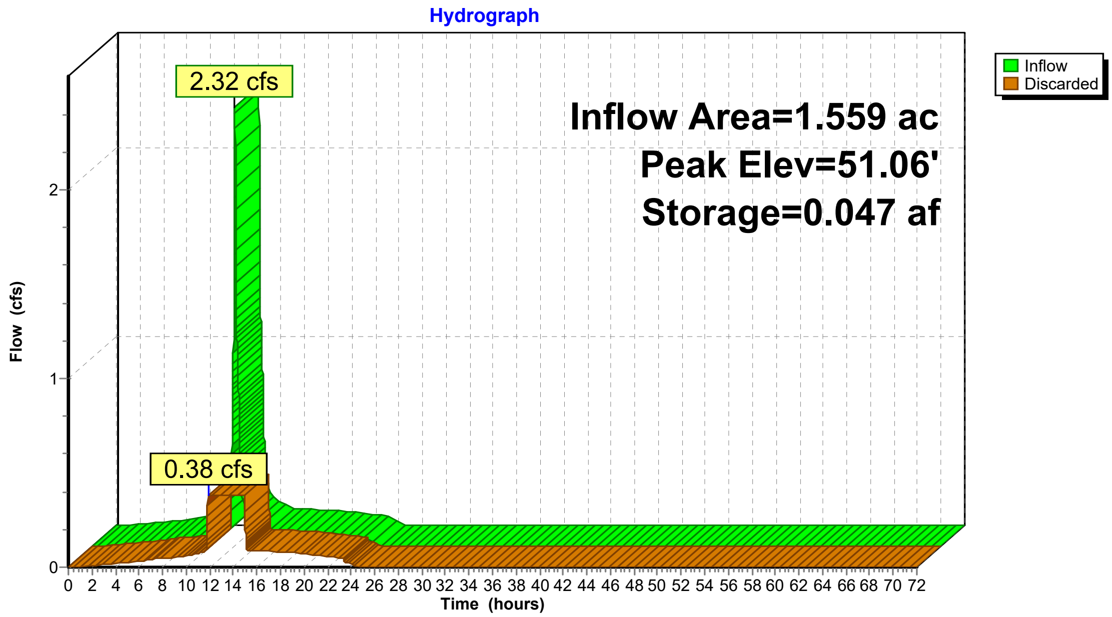
Volume	Invert	Avail.Storage	Storage Description
#1A	48.60'	0.074 af	**23.25'W x 85.57'L x 6.75'H Field A** 0.308 af Overall - 0.085 af Embedded = 0.223 af x 33.3% Voids
#2A	50.60'	0.085 af	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 11 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		0.160 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	48.60'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.38 cfs @ 11.85 hrs HW=48.68' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.38 cfs)

Pond URC1: URC-1



Summary for Pond URC2: URC-2

Inflow Area = 0.260 ac,100.00% Impervious, Inflow Depth = 4.66" for 10YR event
Inflow = 1.29 cfs @ 12.07 hrs, Volume= 0.101 af
Outflow = 0.17 cfs @ 11.61 hrs, Volume= 0.101 af, Atten= 87%, Lag= 0.0 min
Discarded = 0.17 cfs @ 11.61 hrs, Volume= 0.101 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 57.18' @ 12.57 hrs Surf.Area= 879 sf Storage= 1,266 cf

Plug-Flow detention time= 44.2 min calculated for 0.101 af (100% of inflow)
Center-of-Mass det. time= 44.2 min (791.6 - 747.4)

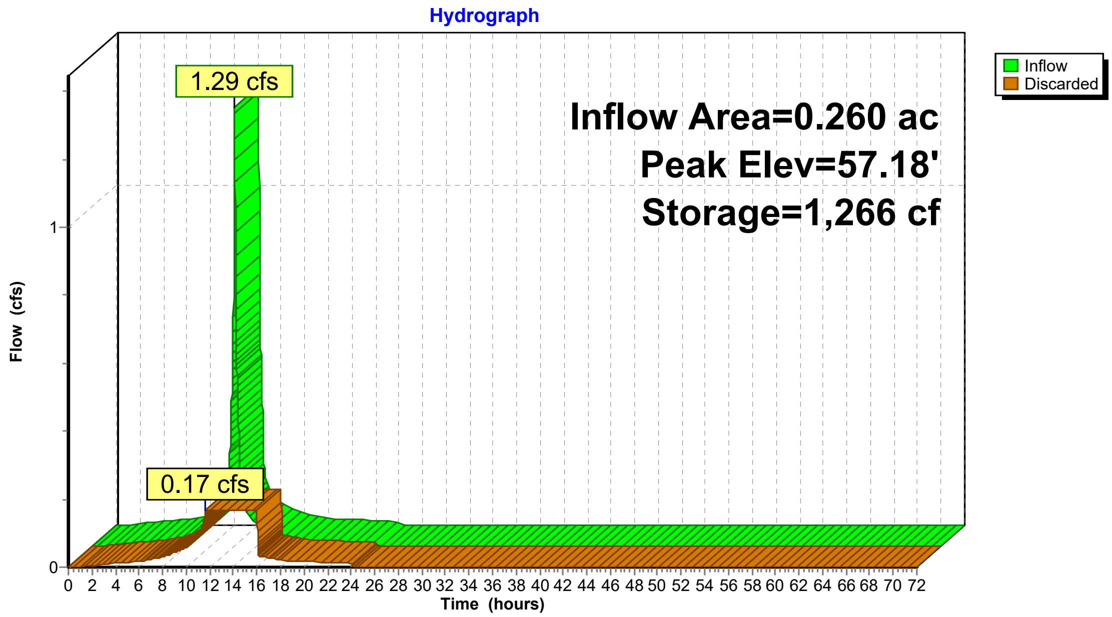
Volume	Invert	Avail.Storage	Storage Description
#1A	54.10'	1,517 cf	**17.33'W x 50.72'L x 6.75'H Field A** 5,934 cf Overall - 1,379 cf Embedded = 4,555 cf x 33.3% Voids
#2A	56.10'	1,379 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 2 Rows of 6 Chambers Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf
		2,896 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	54.10'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.17 cfs @ 11.61 hrs HW=54.17' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Pond URC2: URC-2



Summary for Pond URC3: URC-3

Inflow Area = 0.436 ac, 43.62% Impervious, Inflow Depth = 2.14" for 10YR event
Inflow = 0.93 cfs @ 12.08 hrs, Volume= 0.078 af
Outflow = 0.12 cfs @ 11.64 hrs, Volume= 0.078 af, Atten= 87%, Lag= 0.0 min
Discarded = 0.12 cfs @ 11.64 hrs, Volume= 0.078 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 58.24' @ 12.63 hrs Surf.Area= 765 sf Storage= 929 cf

Plug-Flow detention time= 44.8 min calculated for 0.078 af (100% of inflow)
Center-of-Mass det. time= 44.8 min (806.8 - 762.0)

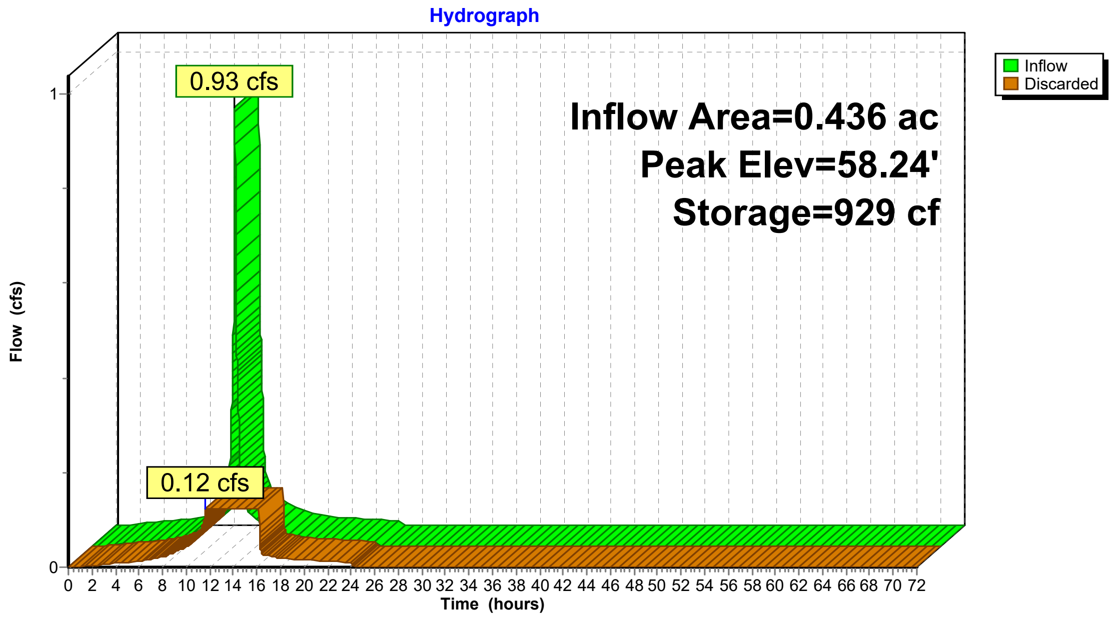
Volume	Invert	Avail.Storage	Storage Description
#1A	55.55'	1,250 cf	**22.25'W x 34.38'L x 6.75'H Field A** 5,163 cf Overall - 1,409 cf Embedded = 3,755 cf x 33.3% Voids
#2A	57.55'	1,409 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 4 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		2,659 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	55.55'	**7.000 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.12 cfs @ 11.64 hrs HW=55.62' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Pond URC3: URC-3



Summary for Pond URC4: URC-4

Inflow Area = 0.230 ac,100.00% Impervious, Inflow Depth = 4.66" for 10YR event
Inflow = 1.14 cfs @ 12.07 hrs, Volume= 0.089 af
Outflow = 0.14 cfs @ 11.59 hrs, Volume= 0.089 af, Atten= 88%, Lag= 0.0 min
Discarded = 0.14 cfs @ 11.59 hrs, Volume= 0.089 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 59.45' @ 12.60 hrs Surf.Area= 851 sf Storage= 1,156 cf

Plug-Flow detention time= 50.8 min calculated for 0.089 af (100% of inflow)
Center-of-Mass det. time= 50.8 min (798.2 - 747.4)

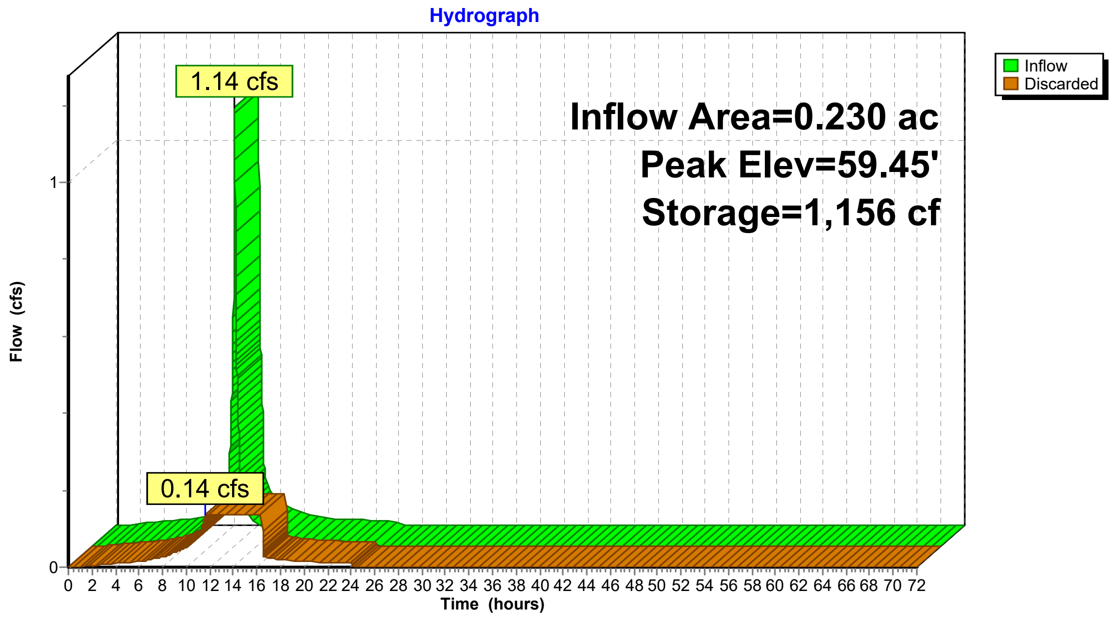
Volume	Invert	Avail.Storage	Storage Description
#1A	56.80'	1,292 cf	**30.17'W x 28.21'L x 6.25'H Field A** 5,319 cf Overall - 1,439 cf Embedded = 3,880 cf x 33.3% Voids
#2A	58.30'	1,439 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 4 Rows of 3 Chambers Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		2,731 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	56.80'	**7.000 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.14 cfs @ 11.59 hrs HW=56.86' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Pond URC4: URC-4



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA1: DA1	Runoff Area=158,640 sf 9.44% Impervious Runoff Depth=0.43" Flow Length=417' Tc=15.9 min CN=38 Runoff=0.52 cfs 0.129 af
Subcatchment DA2a: DA2a	Runoff Area=43,429 sf 0.00% Impervious Runoff Depth=0.23" Flow Length=525' Tc=43.3 min CN=34 Runoff=0.03 cfs 0.019 af
Subcatchment DA2b: DA2b pervious	Runoff Area=10,709 sf 0.00% Impervious Runoff Depth=0.48" Tc=5.0 min CN=39 Runoff=0.05 cfs 0.010 af
Subcatchment DA2bi: DA2b impervious	Runoff Area=8,285 sf 100.00% Impervious Runoff Depth=5.88" Tc=5.0 min CN=98 Runoff=1.18 cfs 0.093 af
Subcatchment DA3a: DA3a pervious	Runoff Area=33,821 sf 0.00% Impervious Runoff Depth=0.23" Tc=5.0 min CN=34 Runoff=0.03 cfs 0.015 af
Subcatchment DA3ai: DA3a impervious	Runoff Area=19,638 sf 100.00% Impervious Runoff Depth=5.88" Tc=5.0 min CN=98 Runoff=2.80 cfs 0.221 af
Subcatchment DA3b: DA3b pervious	Runoff Area=4,260 sf 0.00% Impervious Runoff Depth=0.28" Tc=5.0 min CN=35 Runoff=0.01 cfs 0.002 af
Subcatchment DA3bi: DA3b impervious	Runoff Area=10,179 sf 100.00% Impervious Runoff Depth=5.88" Tc=5.0 min CN=98 Runoff=1.45 cfs 0.115 af
Subcatchment DA3c: DA3c pervious	Runoff Area=26,141 sf 0.00% Impervious Runoff Depth=0.15" Tc=5.0 min CN=32 Runoff=0.01 cfs 0.008 af
Subcatchment DA3ci: DA3c impervious	Runoff Area=3,179 sf 100.00% Impervious Runoff Depth=5.88" Tc=5.0 min CN=98 Runoff=0.45 cfs 0.036 af
Subcatchment DA3d: DA3d pervious	Runoff Area=197 sf 0.00% Impervious Runoff Depth=0.48" Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment DA3di: DA3d impervious Runoff Area=4,686 sf 100.00% Impervious Runoff Depth=5.88"
Tc=5.0 min CN=98 Runoff=0.67 cfs 0.053 af

Subcatchment R1E: EAST ROOF Runoff Area=11,331 sf 100.00% Impervious Runoff Depth=5.88"
Tc=5.0 min CN=98 Runoff=1.62 cfs 0.127 af

Subcatchment R1W: WEST ROOF Runoff Area=10,000 sf 100.00% Impervious Runoff Depth=5.88"
Tc=5.0 min CN=98 Runoff=1.43 cfs 0.113 af

Pond 100: CB 100 Peak Elev=50.44' Inflow=0.45 cfs 0.043 af
12.0" Round Culvert n=0.013 L=4.0' S=0.0050 '/' Outflow=0.45 cfs 0.043 af

Pond 200: CB 200 Peak Elev=52.29' Inflow=0.67 cfs 0.053 af
Primary=0.67 cfs 0.053 af Secondary=0.00 cfs 0.000 af Outflow=0.67 cfs 0.053 af

Pond BIO1: BIO 1 Peak Elev=59.50' Storage=1,302 cf Inflow=2.80 cfs 0.236 af
Outflow=2.63 cfs 0.236 af

Pond BIO2: BIO 2 Peak Elev=62.65' Storage=81 cf Inflow=1.19 cfs 0.103 af
Outflow=1.17 cfs 0.103 af

Pond DMH: DMH 200 Peak Elev=54.69' Inflow=1.45 cfs 0.117 af
Primary=1.05 cfs 0.111 af Secondary=0.41 cfs 0.006 af Outflow=1.45 cfs 0.117 af

Pond RB1: RB 101,102 Peak Elev=44.74' Storage=439 cf Inflow=0.45 cfs 0.043 af
Discarded=0.06 cfs 0.043 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.043 af

Pond RB2: RB 202,202,203 Peak Elev=49.38' Storage=543 cf Inflow=0.64 cfs 0.021 af
Discarded=0.09 cfs 0.021 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.021 af

Pond RB3: RB 300 Peak Elev=62.66' Storage=104 cf Inflow=0.03 cfs 0.019 af
Discarded=0.02 cfs 0.019 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.019 af

Pond SP1: SP1 Inflow=0.52 cfs 0.129 af
Primary=0.52 cfs 0.129 af

Pond SP2: SP2 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond SP3: SP3 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond TT1: Tree Trench 1 Peak Elev=54.61' Storage=790 cf Inflow=1.05 cfs 0.111 af
Discarded=0.20 cfs 0.101 af Primary=0.40 cfs 0.010 af Outflow=0.59 cfs 0.111 af

Pond TT2: Tree Trench 2 Peak Elev=53.10' Storage=159 cf Inflow=0.67 cfs 0.053 af
Discarded=0.03 cfs 0.031 af Primary=0.64 cfs 0.021 af Outflow=0.67 cfs 0.053 af

Pond URC1: URC-1 Peak Elev=51.92' Storage=0.078 af Inflow=3.00 cfs 0.252 af
Outflow=0.38 cfs 0.252 af

Pond URC2: URC-2 Peak Elev=57.99' Storage=1,748 cf Inflow=1.62 cfs 0.127 af
Outflow=0.17 cfs 0.127 af

Pond URC3: URC-3 Peak Elev=59.00' Storage=1,369 cf Inflow=1.17 cfs 0.103 af
Outflow=0.12 cfs 0.103 af

Pond URC4: URC-4 Peak Elev=60.19' Storage=1,595 cf Inflow=1.43 cfs 0.113 af
Outflow=0.14 cfs 0.113 af

Summary for Subcatchment DA1: DA1

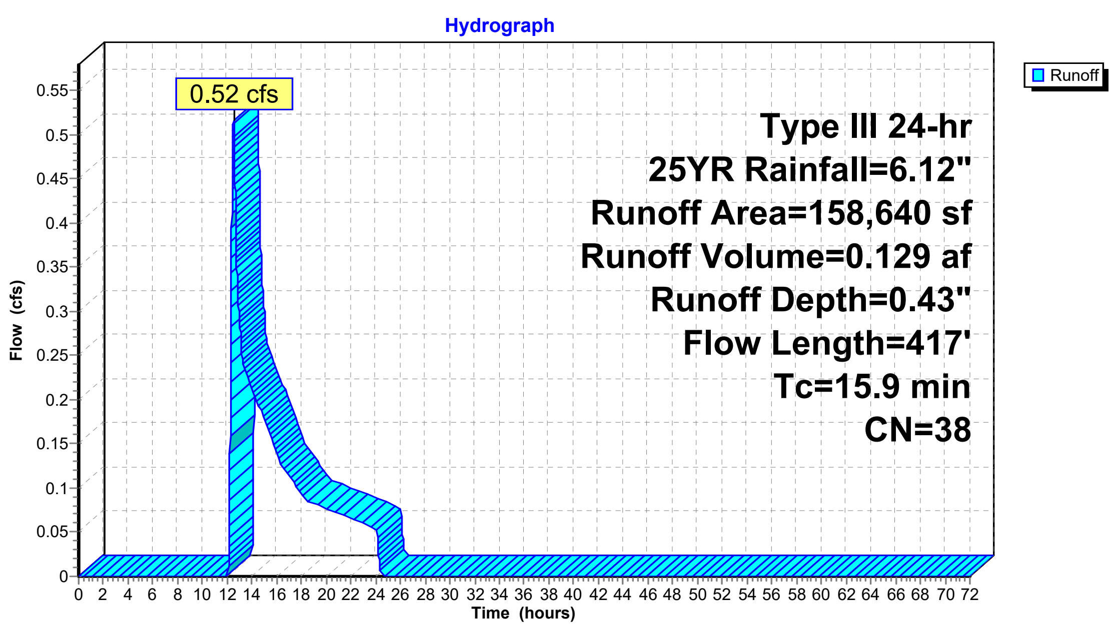
Runoff = 0.52 cfs @ 12.51 hrs, Volume= 0.129 af, Depth= 0.43"

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 25YR Rainfall=6.12"

Area (sf)	CN	Description
118,297	30	Woods, Good, HSG A
25,363	39	>75% Grass cover, Good, HSG A
9,642	98	Roofs, HSG A
5,338	98	Paved parking, HSG A
158,640	38	Weighted Average
143,660		90.56% Pervious Area
14,980		9.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	78	0.1730	0.11		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.7	99	0.1110	2.33		**Shallow Concentrated Flow, B TO C** Short Grass Pasture Kv= 7.0 fps
3.0	240	0.0690	1.31		**Shallow Concentrated Flow, C TO SP1** Woodland Kv= 5.0 fps
15.9	417	Total			

Subcatchment DA1: DA1



Summary for Subcatchment DA2a: DA2a

CN for permeable pavers taken from RI Stormwater Design

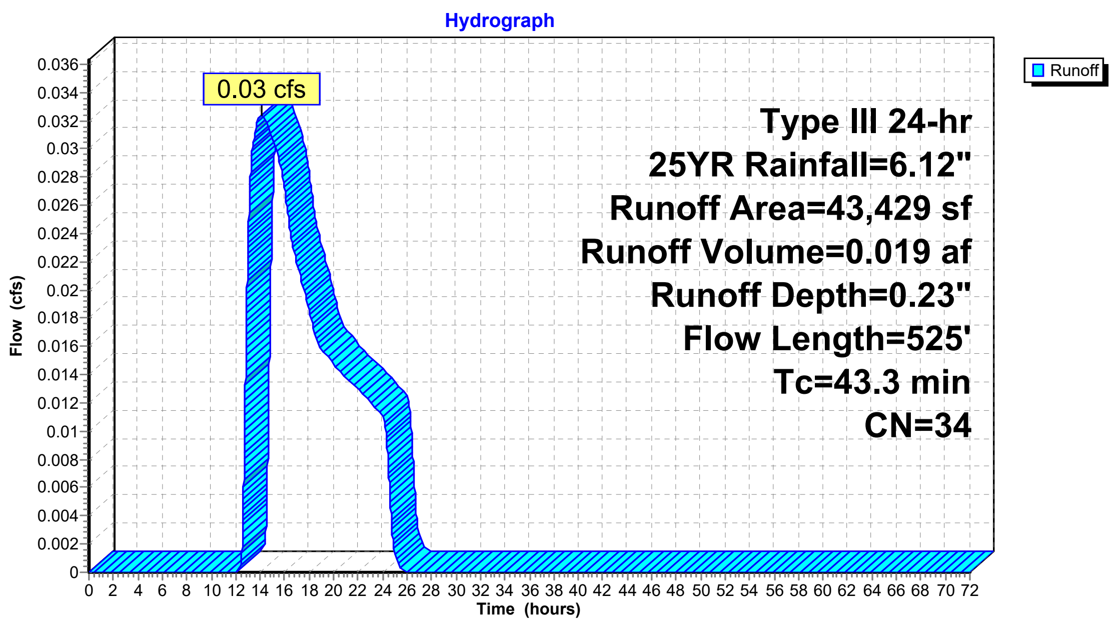
Runoff = 0.03 cfs @ 14.10 hrs, Volume= 0.019 af, Depth= 0.23"

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 25YR Rainfall=6.12"

	Area (sf)	CN	Description
	25,414	30	Woods, Good, HSG A
	17,231	39	>75% Grass cover, Good, HSG A
*	784	40	Pervious Pavers
	43,429	34	Weighted Average
	43,429		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.4	147	0.0400	0.07		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.8	67	0.0760	1.38		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
1.1	73	0.0480	1.10		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
5.0	238	0.0250	0.79		**Shallow Concentrated Flow, D to SP2** Woodland Kv= 5.0 fps
43.3	525	Total			

Subcatchment DA2a: DA2a



Summary for Subcatchment DA2b: DA2b pervious

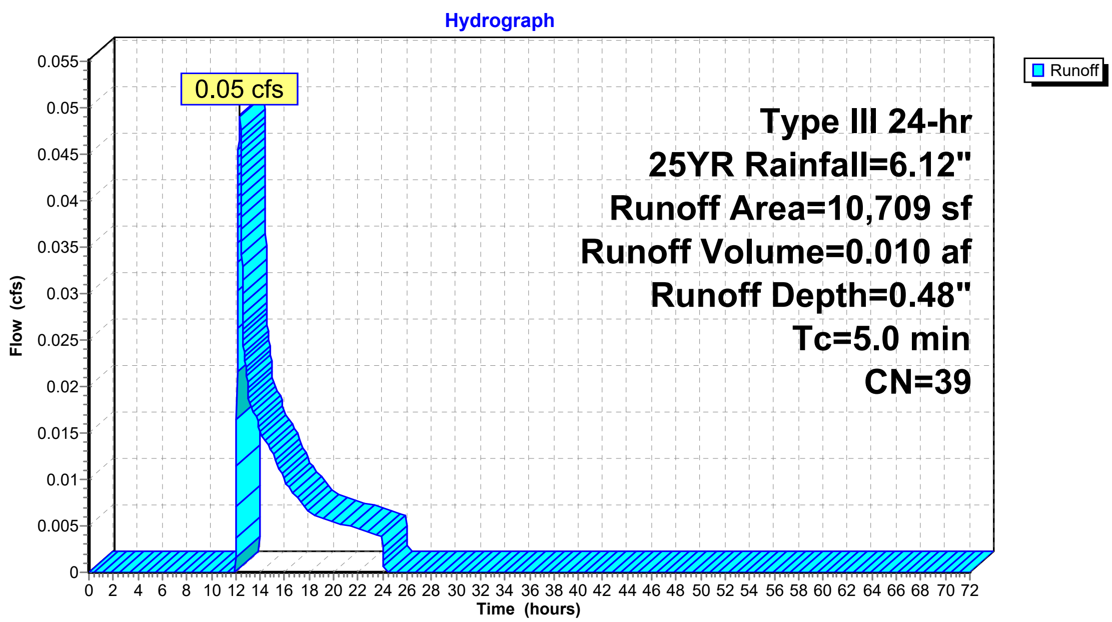
Runoff = 0.05 cfs @ 12.32 hrs, Volume= 0.010 af, Depth= 0.48"

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 25YR Rainfall=6.12"

Area (sf)	CN	Description
10,238	39	>75% Grass cover, Good, HSG A
471	30	Woods, Good, HSG A
10,709	39	Weighted Average
10,709		100.00% Pervious Area

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

Subcatchment DA2b: DA2b pervious



Summary for Subcatchment DA2bi: DA2b impervious

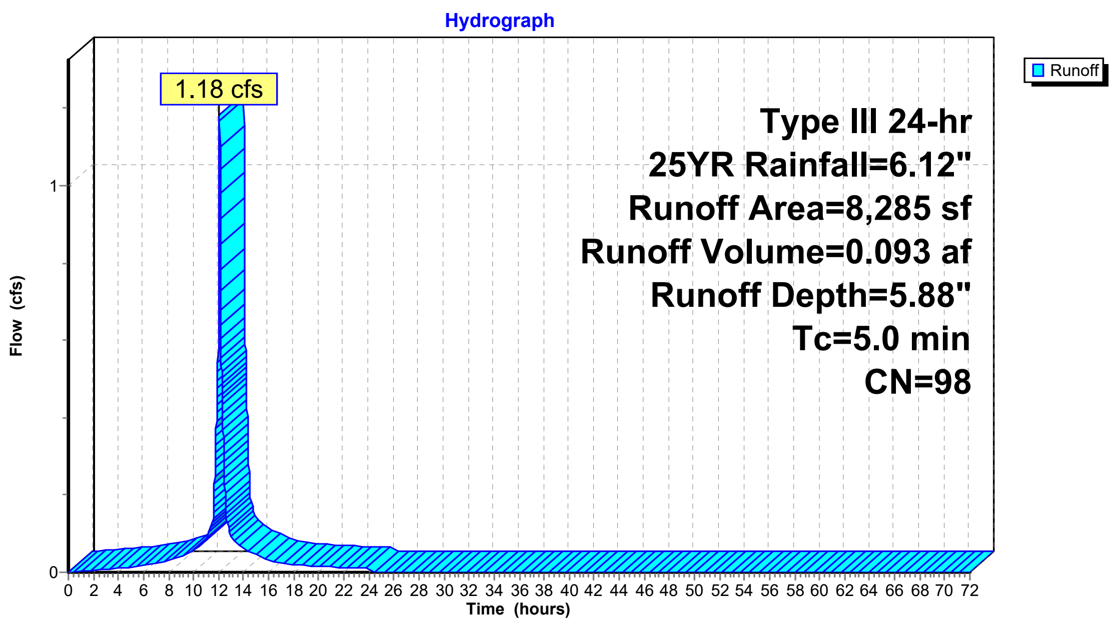
Runoff = 1.18 cfs @ 12.07 hrs, Volume= 0.093 af, Depth= 5.88"

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=6.12"

	Area (sf)	CN	Description
	7,010	98	Paved parking, HSG A
*	1,275	98	Sidewalks, HSG A
	8,285	98	Weighted Average
	8,285		100.00% Impervious Area

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

Subcatchment DA2bi: DA2b impervious



Summary for Subcatchment DA3a: DA3a pervious

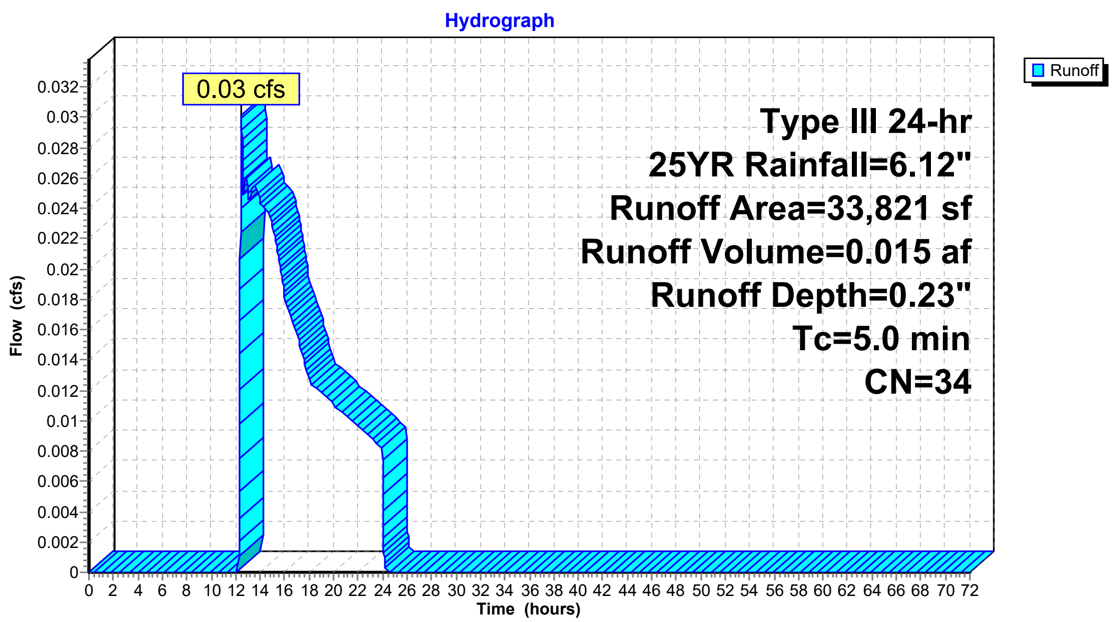
Runoff = 0.03 cfs @ 12.47 hrs, Volume= 0.015 af, Depth= 0.23"

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 25YR Rainfall=6.12"

Area (sf)	CN	Description
14,079	39	>75% Grass cover, Good, HSG A
19,742	30	Woods, Good, HSG A
33,821	34	Weighted Average
33,821		100.00% Pervious Area

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

Subcatchment DA3a: DA3a pervious



Summary for Subcatchment DA3ai: DA3a impervious

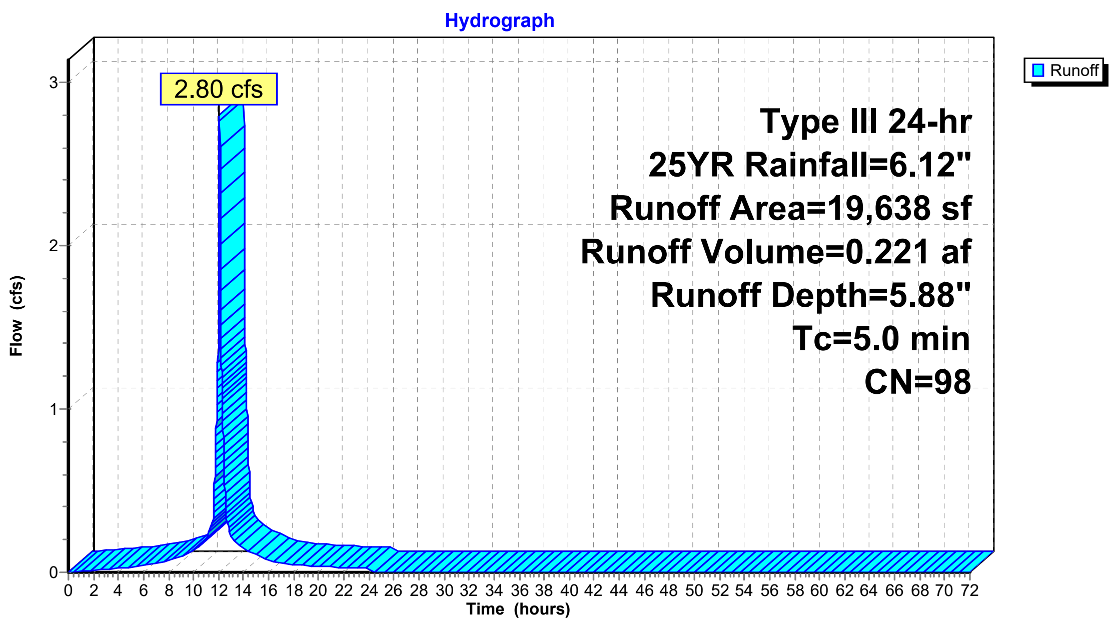
Runoff = 2.80 cfs @ 12.07 hrs, Volume= 0.221 af, Depth= 5.88"

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=6.12"

	Area (sf)	CN	Description
	18,277	98	Paved parking, HSG A
*	1,361	98	Sidewalk, HSG A
	19,638	98	Weighted Average
	19,638		100.00% Impervious Area

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

Subcatchment DA3ai: DA3a impervious



Summary for Subcatchment DA3b: DA3b pervious

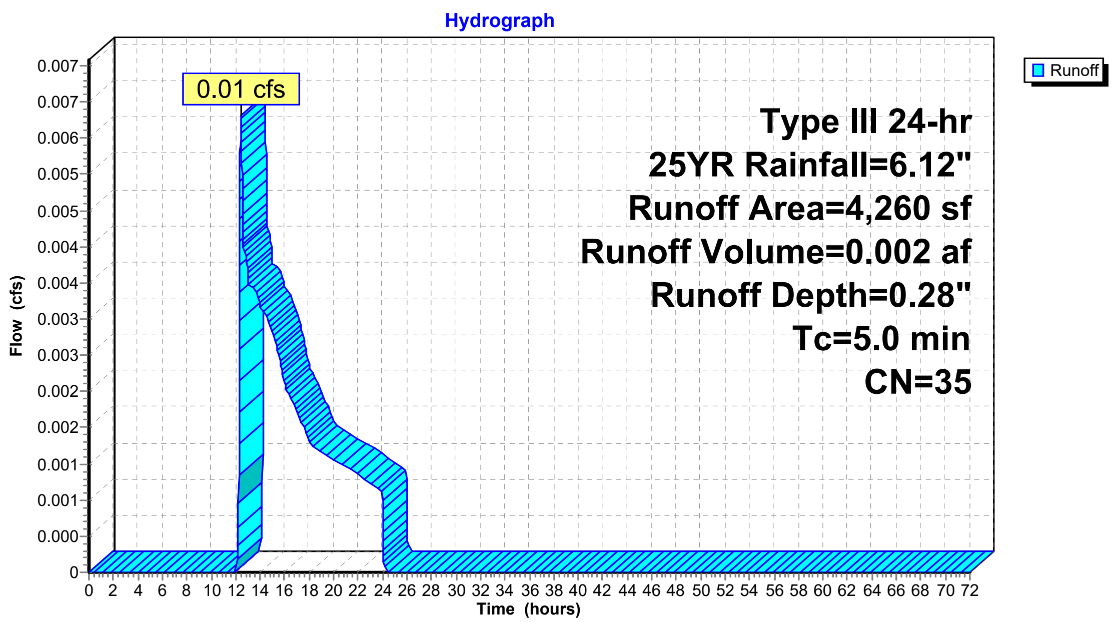
Runoff = 0.01 cfs @ 12.43 hrs, Volume= 0.002 af, Depth= 0.28"

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 25YR Rainfall=6.12"

Area (sf)	CN	Description
2,324	39	>75% Grass cover, Good, HSG A
1,936	30	Woods, Good, HSG A
4,260	35	Weighted Average
4,260		100.00% Pervious Area

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

Subcatchment DA3b: DA3b pervious



Summary for Subcatchment DA3bi: DA3b impervious

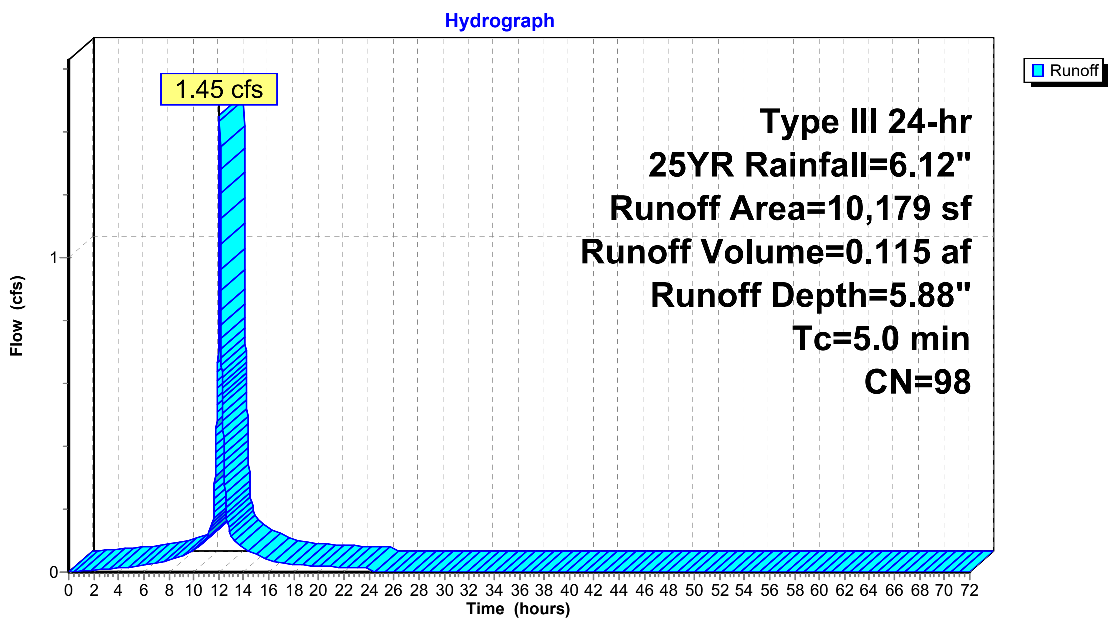
Runoff = 1.45 cfs @ 12.07 hrs, Volume= 0.115 af, Depth= 5.88"

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=6.12"

	Area (sf)	CN	Description
	9,486	98	Paved parking, HSG A
*	693	98	Sidewalks, HSG A
	10,179	98	Weighted Average
	10,179		100.00% Impervious Area

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

Subcatchment DA3bi: DA3b impervious



Summary for Subcatchment DA3c: DA3c pervious

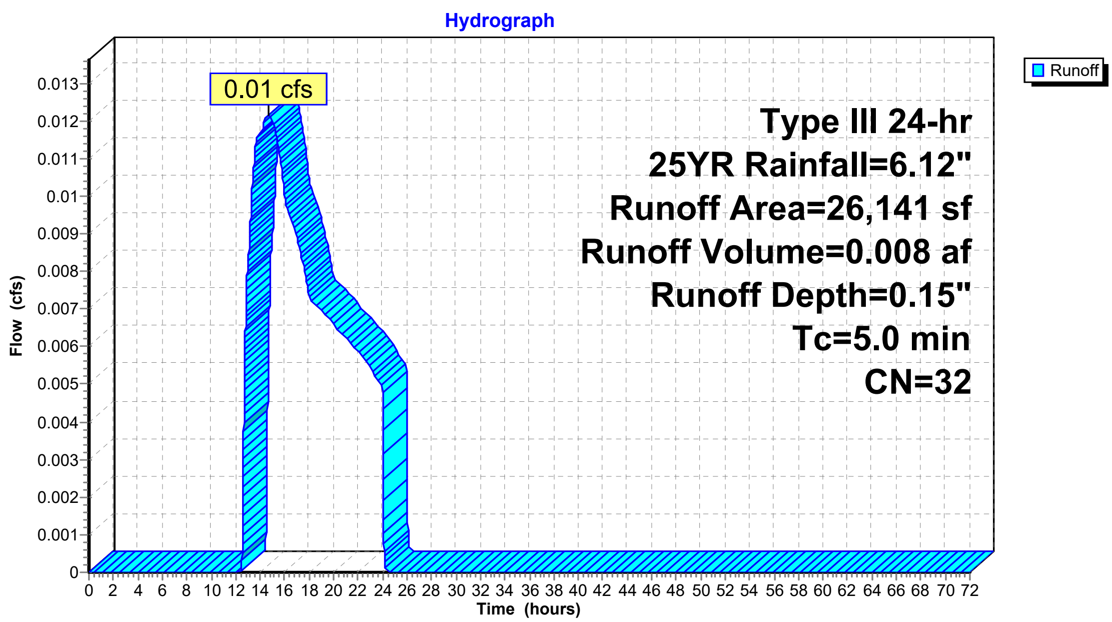
Runoff = 0.01 cfs @ 14.67 hrs, Volume= 0.008 af, Depth= 0.15"

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=6.12"

Area (sf)	CN	Description
4,662	39	>75% Grass cover, Good, HSG A
21,479	30	Woods, Good, HSG A
26,141	32	Weighted Average
26,141		100.00% Pervious Area

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

Subcatchment DA3c: DA3c pervious



Summary for Subcatchment DA3ci: DA3c impervious

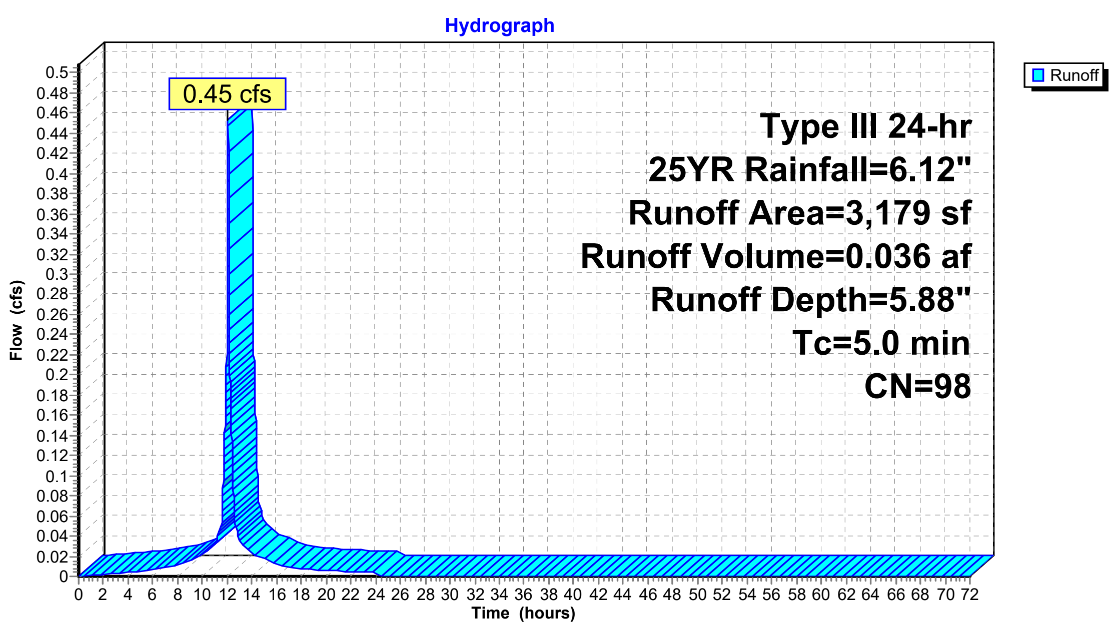
Runoff = 0.45 cfs @ 12.07 hrs, Volume= 0.036 af, Depth= 5.88"

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=6.12"

	Area (sf)	CN	Description
	2,649	98	Paved parking, HSG A
*	530	98	Sidewalks, HSG A
	3,179	98	Weighted Average
	3,179		100.00% Impervious Area

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

Subcatchment DA3ci: DA3c impervious



Summary for Subcatchment DA3d: DA3d pervious

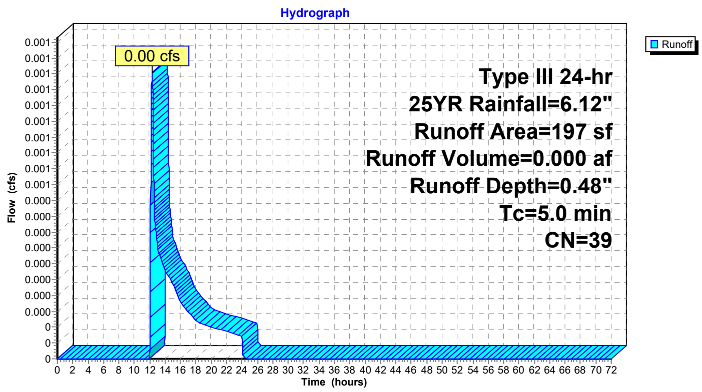
Runoff = 0.00 cfs @ 12.32 hrs, Volume= 0.000 af, Depth= 0.48"

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 25YR Rainfall=6.12"

Area (sf)	CN	Description
197	39	>75% Grass cover, Good, HSG A
197		100.00% Pervious Area

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

Subcatchment DA3d: DA3d pervious



Summary for Subcatchment DA3di: DA3d impervious

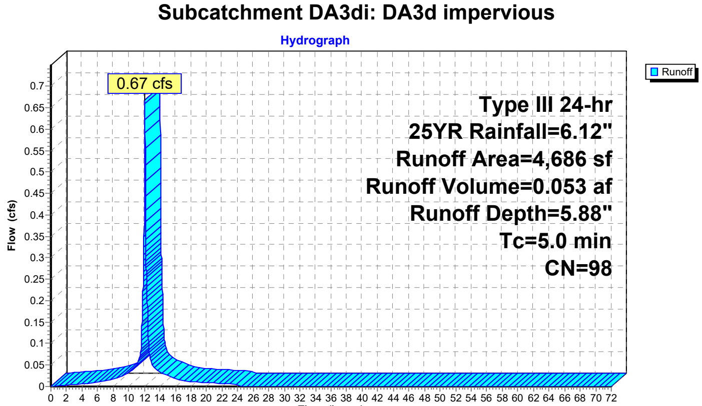
Runoff = 0.67 cfs @ 12.07 hrs, Volume= 0.053 af, Depth= 5.88"

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=6.12"

Area (sf)	CN	Description
4,686	98	Paved parking, HSG A
4,686		100.00% Impervious Area

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

Subcatchment DA3di: DA3d impervious



Summary for Subcatchment R1E: EAST ROOF

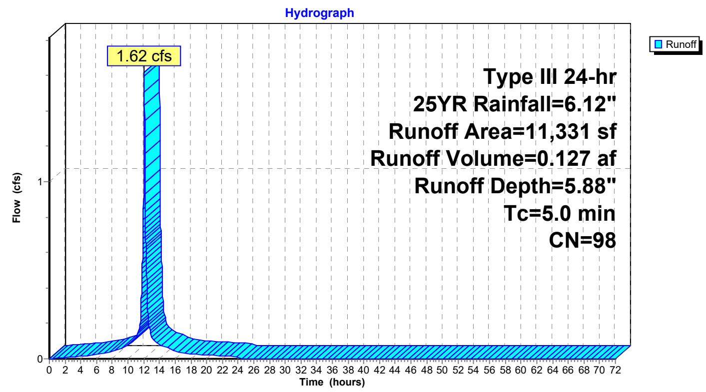
Runoff = 1.62 cfs @ 12.07 hrs, Volume= 0.127 af, Depth= 5.88"

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=6.12"

Area (sf)	CN	Description
11,331	98	Roofs, HSG A
11,331		100.00% Impervious Area

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

Subcatchment R1E: EAST ROOF



Summary for Subcatchment R1W: WEST ROOF

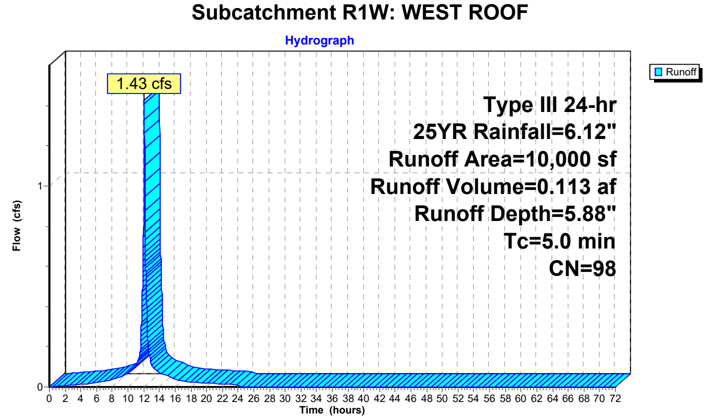
Runoff = 1.43 cfs @ 12.07 hrs, Volume= 0.113 af, Depth= 5.88"

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=6.12"

Area (sf)	CN	Description
10,000	98	Roofs, HSG A
10,000		100.00% Impervious Area

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

Subcatchment R1W: WEST ROOF



Summary for Pond 100: CB 100

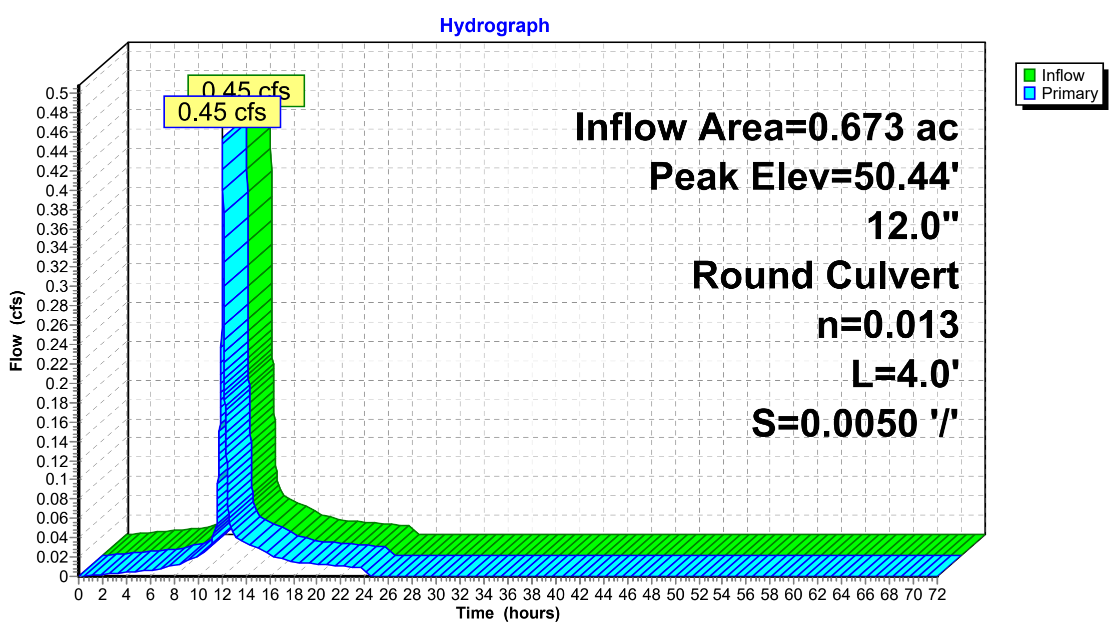
Inflow Area = 0.673 ac, 10.84% Impervious, Inflow Depth = 0.77" for 25YR event
Inflow = 0.45 cfs @ 12.07 hrs, Volume= 0.043 af
Outflow = 0.45 cfs @ 12.07 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min
Primary = 0.45 cfs @ 12.07 hrs, Volume= 0.043 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 50.44' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	50.00'	**12.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 50.00' / 49.98' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.45 cfs @ 12.07 hrs HW=50.44' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.45 cfs @ 2.00 fps)

Pond 100: CB 100



Summary for Pond 200: CB 200

Inflow Area = 0.112 ac, 95.97% Impervious, Inflow Depth = 5.66" for 25YR event
Inflow = 0.67 cfs @ 12.07 hrs, Volume= 0.053 af
Outflow = 0.67 cfs @ 12.07 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.0 min
Primary = 0.67 cfs @ 12.07 hrs, Volume= 0.053 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

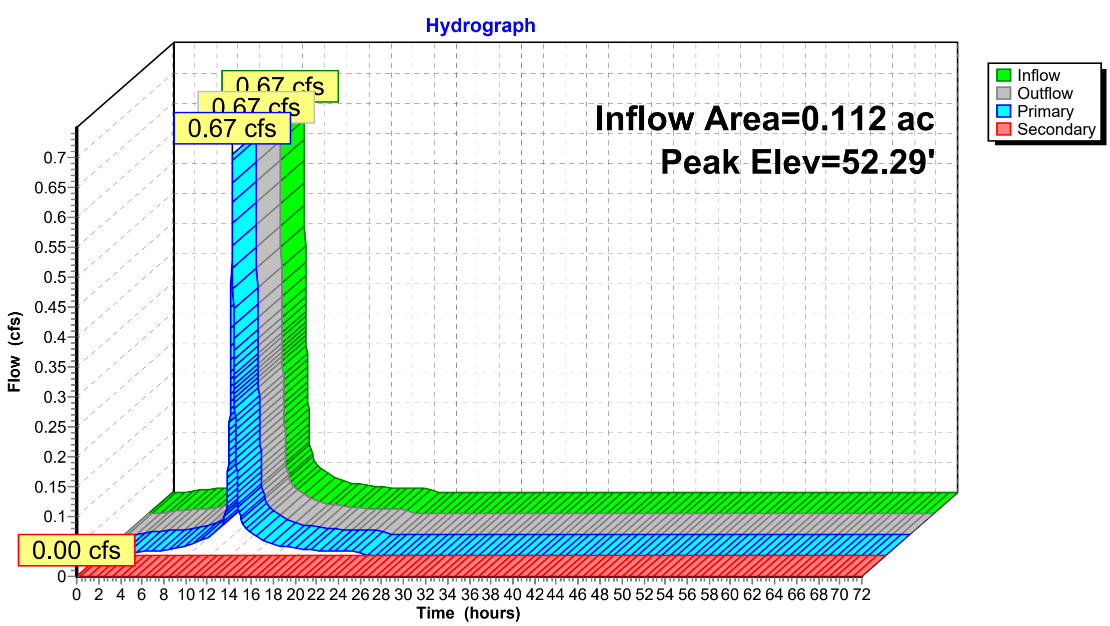
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 52.29' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	52.70'	**12.0" Round Culvert** L= 4.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 52.70' / 52.68' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	51.66'	**8.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.66' / 51.41' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#3	Secondary	55.79'	**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

Primary OutFlow Max=0.67 cfs @ 12.07 hrs HW=52.29' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.67 cfs @ 2.54 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=51.66' (Free Discharge)
├─**1=Culvert** (Controls 0.00 cfs)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 200: CB 200



Summary for Pond BIO1: BIO 1

Inflow Area = 1.227 ac, 36.73% Impervious, Inflow Depth = 2.31" for 25YR event
Inflow = 2.80 cfs @ 12.07 hrs, Volume= 0.236 af
Outflow = 2.63 cfs @ 12.10 hrs, Volume= 0.236 af, Atten= 6%, Lag= 1.7 min
Primary = 2.63 cfs @ 12.10 hrs, Volume= 0.236 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 59.50' @ 12.10 hrs Surf.Area= 1,664 sf Storage= 1,302 cf

Plug-Flow detention time= 61.4 min calculated for 0.236 af (100% of inflow)
Center-of-Mass det. time= 61.4 min (822.5 - 761.1)

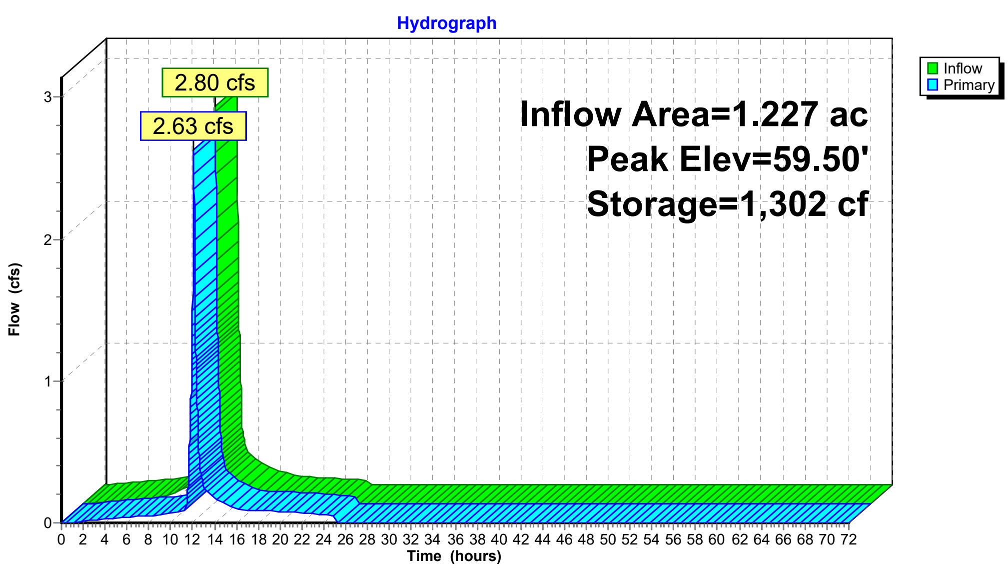
Volume	Invert	Avail.Storage	Storage Description
#1	58.50'	2,210 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	800	0	0
59.00	1,380	545	545
60.00	1,950	1,665	2,210

Device	Routing	Invert	Outlet Devices
#1	Primary	55.09'	**12.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 55.09' / 54.87' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	59.25'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	55.38'	**4.0" Round Culvert** L= 38.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 55.38' / 55.19' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#4	Device 3	58.50'	**2.470 in/hr Exfiltration over Surface area**

Primary OutFlow Max=2.62 cfs @ 12.10 hrs HW=59.50' (Free Discharge)
└1=**Culvert** (Passes 2.62 cfs of 5.90 cfs potential flow)
  ├2=**Orifice/Grate** (Weir Controls 2.53 cfs @ 1.63 fps)
  └3=**Culvert** (Passes 0.10 cfs of 0.63 cfs potential flow)
    └4=**Exfiltration** (Exfiltration Controls 0.10 cfs)

Pond BIO1: BIO 1



Summary for Pond BIO2: BIO 2

Inflow Area =	0.436 ac, 43.62% Impervious, Inflow Depth = 2.84" for 25YR event		
Inflow =	1.19 cfs @	12.07 hrs, Volume=	0.103 af
Outflow =	1.17 cfs @	12.09 hrs, Volume=	0.103 af, Atten= 2%, Lag= 0.9 min
Primary =	1.17 cfs @	12.09 hrs, Volume=	0.103 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 62.65' @ 12.09 hrs Surf.Area= 595 sf Storage= 81 cf

Plug-Flow detention time= 1.7 min calculated for 0.103 af (100% of inflow)
Center-of-Mass det. time= 1.7 min (765.7 - 764.0)

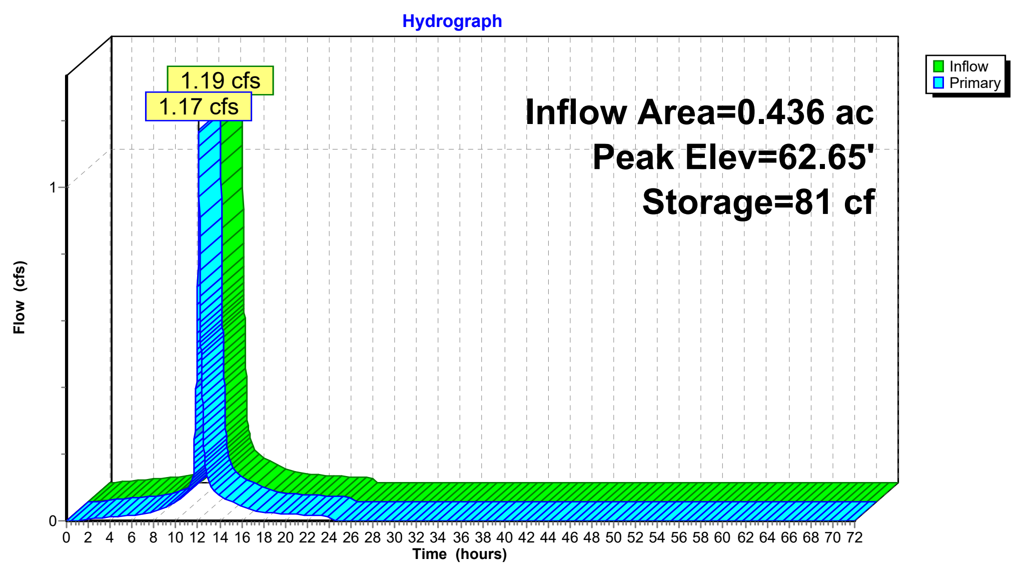
Volume	Invert	Avail.Storage	Storage Description
#1	62.50'	1,414 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
62.50	522	0	0
63.00	775	324	324
64.00	1,405	1,090	1,414

Device	Routing	Invert	Outlet Devices
#1	Primary	59.00'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 59.00' / 58.88' S= 0.0048 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	62.50'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	59.30'	**6.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.30' / 59.18' S= 0.0048 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#4	Device 3	62.50'	**2.470 in/hr Exfiltration over Surface area**

Primary OutFlow Max=1.17 cfs @ 12.09 hrs HW=62.64' (Free Discharge)
1=**Culvert** (Passes 1.17 cfs of 6.71 cfs potential flow)
2=**Orifice/Grate** (Weir Controls 1.13 cfs @ 1.24 fps)
3=**Culvert** (Passes 0.03 cfs of 1.31 cfs potential flow)
4=**Exfiltration** (Exfiltration Controls 0.03 cfs)

Pond BIO2: BIO 2



Summary for Pond DMH: DMH 200

Inflow Area = 0.331 ac, 70.50% Impervious, Inflow Depth = 4.23" for 25YR event
Inflow = 1.45 cfs @ 12.07 hrs, Volume= 0.117 af
Outflow = 1.45 cfs @ 12.07 hrs, Volume= 0.117 af, Atten= 0%, Lag= 0.0 min
Primary = 1.05 cfs @ 12.07 hrs, Volume= 0.111 af
Secondary = 0.41 cfs @ 12.07 hrs, Volume= 0.006 af

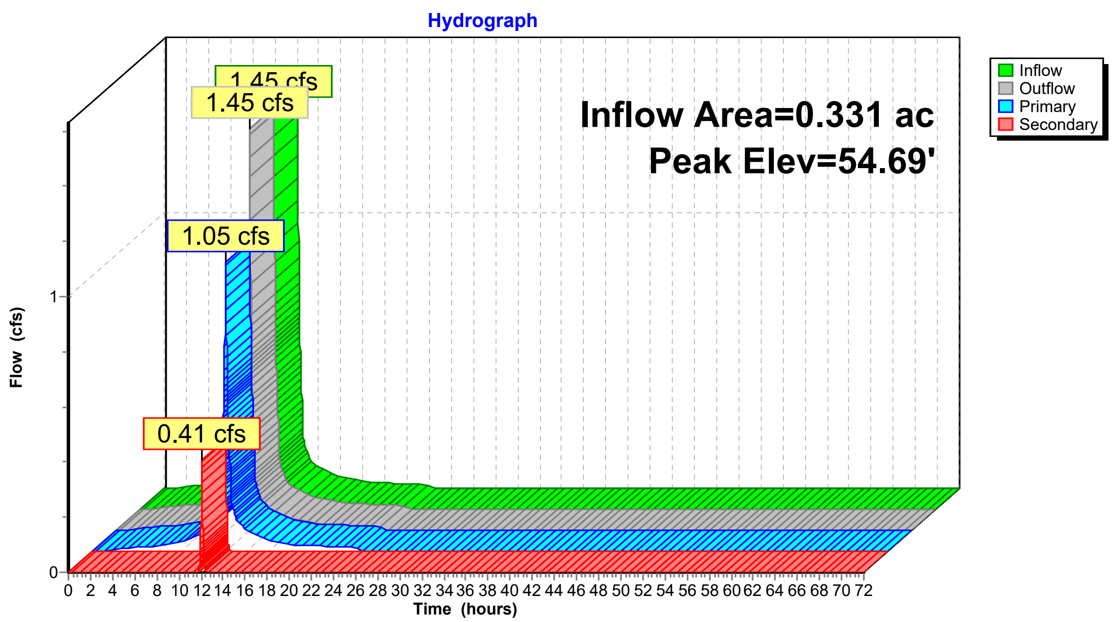
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 54.69' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	54.30'	**12.0" Round Culvert** L= 9.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 54.30' / 54.26' S= 0.0044 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	53.78'	**12.0" Round Culvert** L= 98.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 53.78' / 53.78' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.05 cfs @ 12.07 hrs HW=54.69' (Free Discharge)
└**2=Culvert** (Barrel Controls 1.05 cfs @ 1.83 fps)

Secondary OutFlow Max=0.41 cfs @ 12.07 hrs HW=54.69' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.41 cfs @ 2.12 fps)

Pond DMH: DMH 200



Summary for Pond RB1: RB 101,102

Inflow Area =	0.673 ac, 10.84% Impervious, Inflow Depth = 0.77"	for 25YR event
Inflow =	0.45 cfs @ 12.07 hrs, Volume=	0.043 af
Outflow =	0.06 cfs @ 11.61 hrs, Volume=	0.043 af, Atten= 87%, Lag= 0.0 min
Discarded =	0.06 cfs @ 11.61 hrs, Volume=	0.043 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= 44.74' @ 12.58 hrs Surf.Area= 157 sf Storage= 439 cf

Plug-Flow detention time= 43.0 min calculated for 0.043 af (100% of inflow)
Center-of-Mass det. time= 43.0 min (840.7 - 797.8)

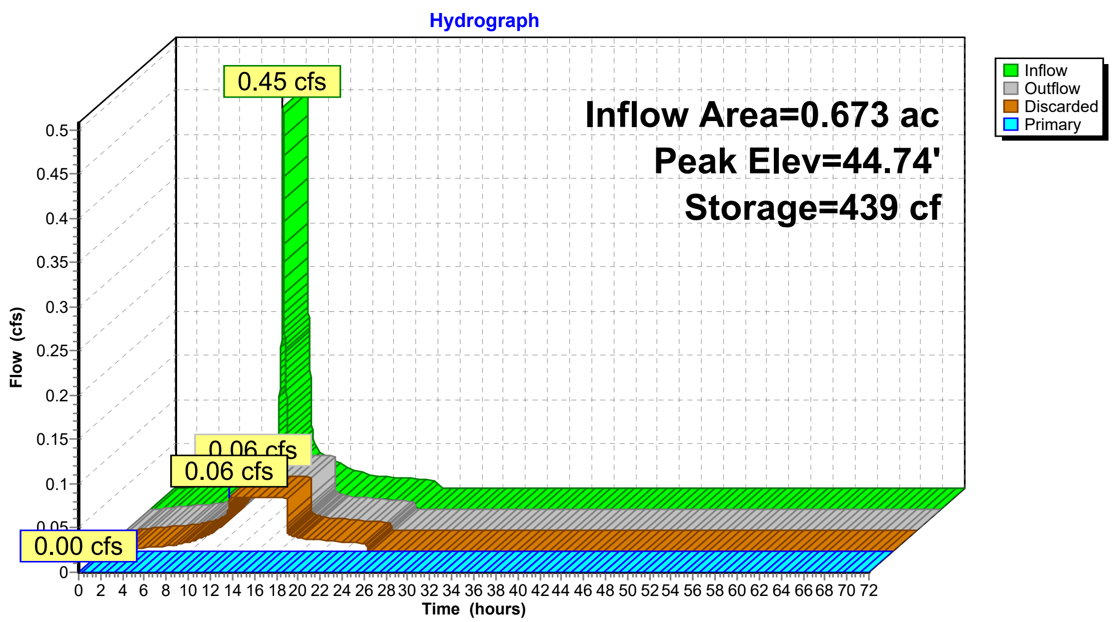
Volume	Invert	Avail.Storage	Storage Description
#1	41.00'	339 cf	**6.00'D x 6.00'H Recharger** x 2 Inside #2
#2	39.00'	355 cf	**10.00'D x 9.00'H Stone** x 2
			1,414 cf Overall - 339 cf Embedded = 1,074 cf x 33.0% Voids
		694 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	39.00'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	46.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 11.61 hrs HW=39.09' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=39.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond RB1: RB 101,102



Summary for Pond RB2: RB 202,202,203

Inflow Area = 0.112 ac, 95.97% Impervious, Inflow Depth = 2.30" for 25YR event
Inflow = 0.64 cfs @ 12.07 hrs, Volume= 0.021 af
Outflow = 0.09 cfs @ 11.74 hrs, Volume= 0.021 af, Atten= 86%, Lag= 0.0 min
Discarded = 0.09 cfs @ 11.74 hrs, Volume= 0.021 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= 49.38' @ 12.52 hrs Surf.Area= 236 sf Storage= 543 cf

Plug-Flow detention time= 55.6 min calculated for 0.021 af (100% of inflow)
Center-of-Mass det. time= 55.6 min (789.5 - 733.9)

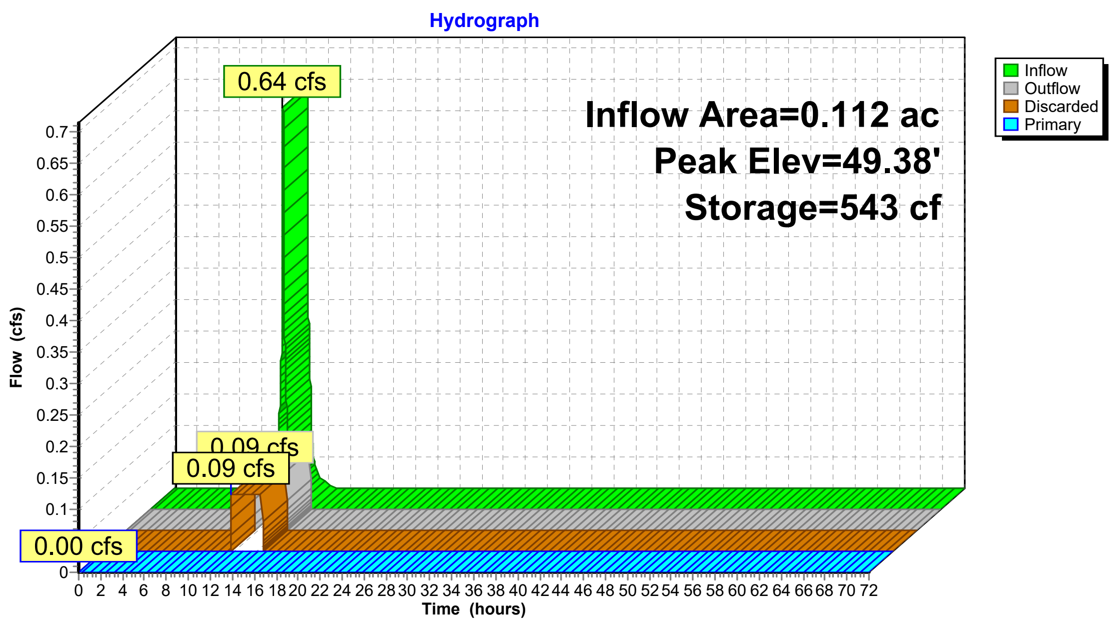
Volume	Invert	Avail.Storage	Storage Description
#1	46.50'	509 cf	**6.00'D x 6.00'H Recharger** x 3 Inside #2
#2	44.50'	532 cf	**10.00'D x 9.00'H Stone** x 3 2,121 cf Overall - 509 cf Embedded = 1,612 cf x 33.0% Voids
		1,041 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.50'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	55.61'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.09 cfs @ 11.74 hrs HW=44.61' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=44.50' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond RB2: RB 202,202,203



Summary for Pond RB3: RB 300

Inflow Area = 0.997 ac, 0.00% Impervious, Inflow Depth = 0.23" for 25YR event
Inflow = 0.03 cfs @ 14.10 hrs, Volume= 0.019 af
Outflow = 0.02 cfs @ 12.99 hrs, Volume= 0.019 af, Atten= 33%, Lag= 0.0 min
Discarded = 0.02 cfs @ 12.99 hrs, Volume= 0.019 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= 62.66' @ 17.10 hrs Surf.Area= 57 sf Storage= 104 cf

Plug-Flow detention time= 41.7 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 41.7 min (1,091.5 - 1,049.9)

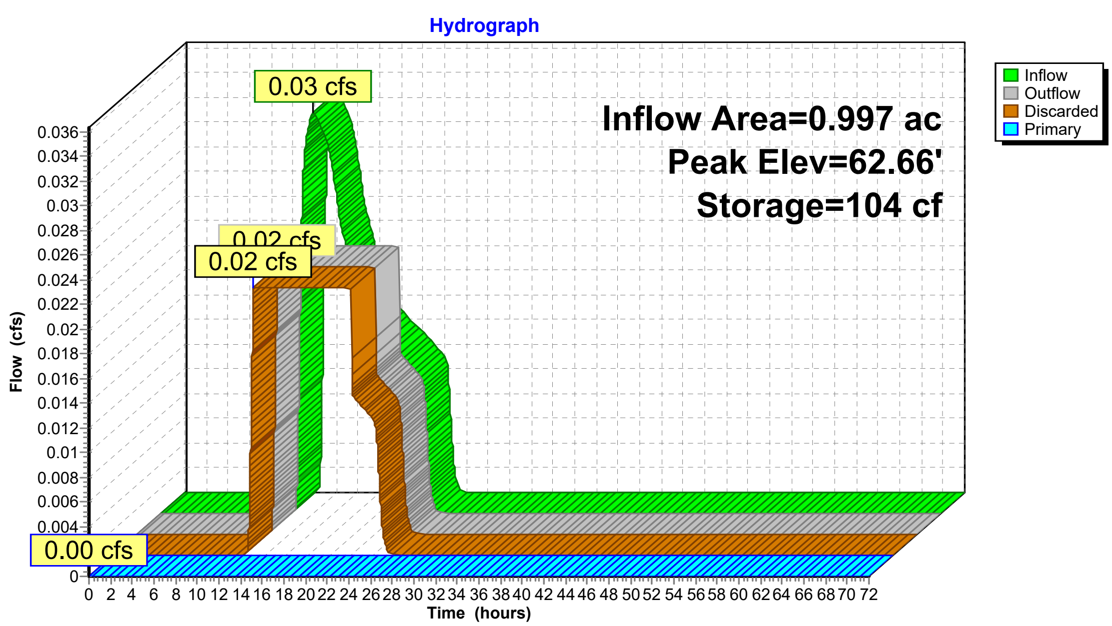
Volume	Invert	Avail.Storage	Storage Description
#1	59.50'	50 cf	**4.00'D x 4.00'H Recharger** Inside #2
#2	58.50'	95 cf	**6.00'D x 6.00'H Stone** x 2 339 cf Overall - 50 cf Embedded = 289 cf x 33.0% Voids
		146 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	58.50'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	65.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.02 cfs @ 12.99 hrs HW=58.57' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=58.50' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond RB3: RB 300

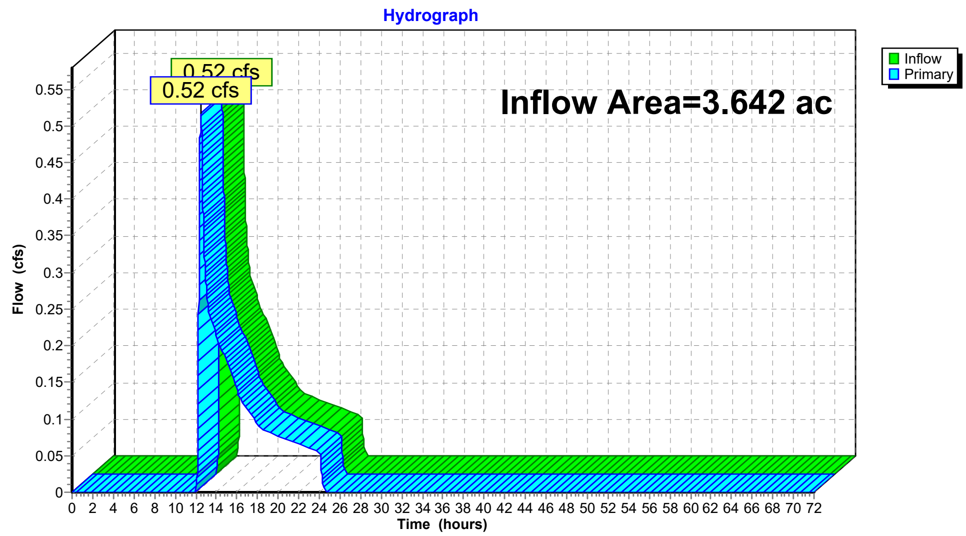


Summary for Pond SP1: SP1

Inflow Area =	3.642 ac,	9.44% Impervious, Inflow Depth = 0.43"	for 25YR event	
Inflow =	0.52 cfs @	12.51 hrs, Volume=	0.129 af	
Primary =	0.52 cfs @	12.51 hrs, Volume=	0.129 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: SP1

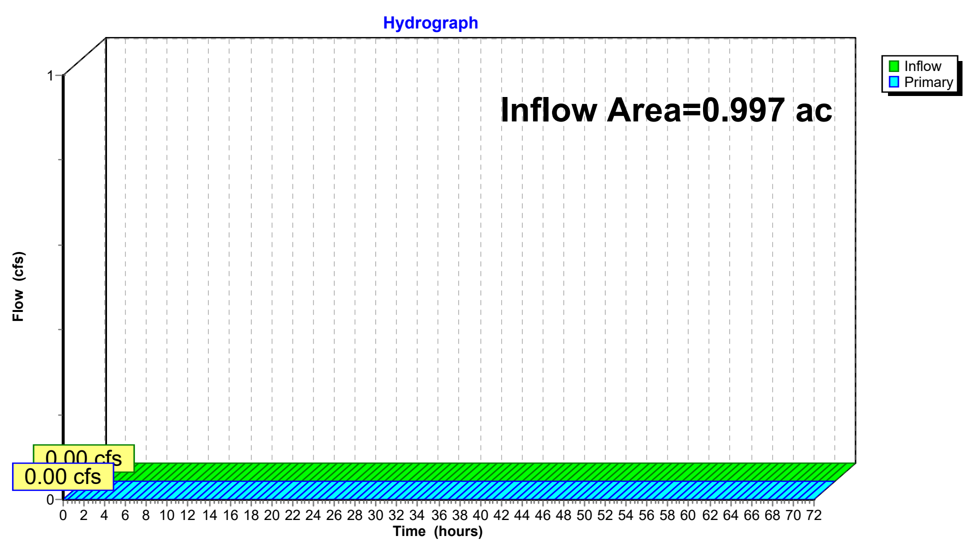


Summary for Pond SP2: SP2

Inflow Area =	0.997 ac,	0.00% Impervious, Inflow Depth = 0.00"	for 25YR 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 SP2: SP2

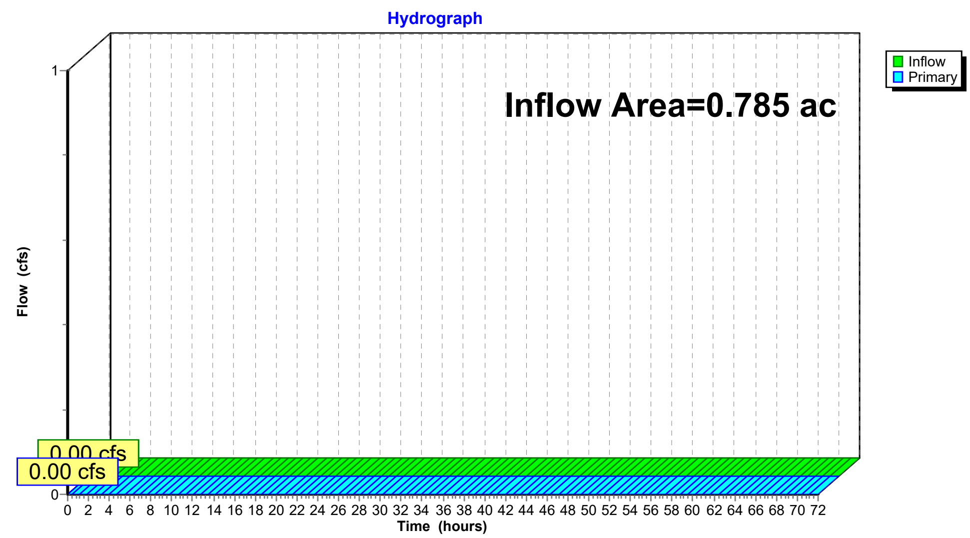


Summary for Pond SP3: SP3

Inflow Area =	0.785 ac, 23.00% Impervious, Inflow Depth = 0.00"	for 25YR 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 SP3: SP3



Summary for Pond TT1: Tree Trench 1

Inflow Area =	0.331 ac, 70.50% Impervious, Inflow Depth = 4.01"	for 25YR event
Inflow =	1.05 cfs @ 12.07 hrs, Volume=	0.111 af
Outflow =	0.59 cfs @ 12.22 hrs, Volume=	0.111 af, Atten= 44%, Lag= 9.1 min
Discarded =	0.20 cfs @ 11.61 hrs, Volume=	0.101 af
Primary =	0.40 cfs @ 12.22 hrs, Volume=	0.010 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 54.61' @ 12.22 hrs Surf.Area= 1,020 sf Storage= 790 cf

Plug-Flow detention time= 16.6 min calculated for 0.111 af (100% of inflow)
Center-of-Mass det. time= 16.5 min (766.7 - 750.1)

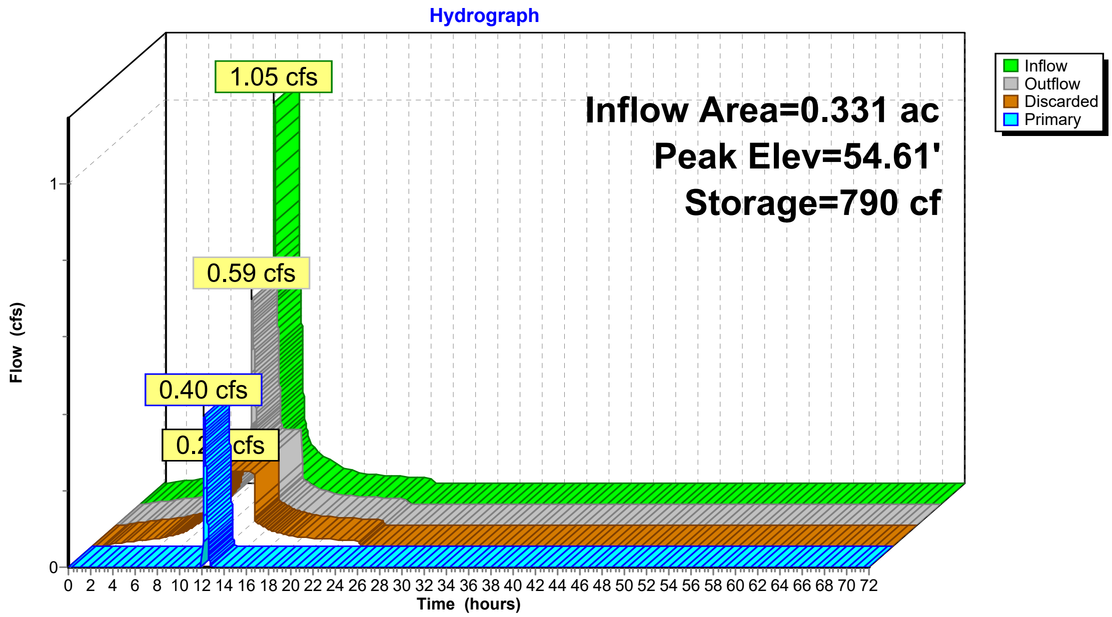
Volume	Invert	Avail.Storage	Storage Description
#1	52.34'	1,008 cf	**9.90'W x 103.00'L x 3.00'H Prismatoid** 3,059 cf Overall - 32 cf Embedded = 3,027 cf x 33.3% Voids
#2	53.78'	32 cf	**8.0" Round Pipe Storage** Inside #1 L= 92.0' S= 0.0050 '/'
		1,040 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	52.34'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	54.30'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.20 cfs @ 11.61 hrs HW=52.37' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=0.39 cfs @ 12.22 hrs HW=54.61' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.39 cfs @ 1.90 fps)

Pond TT1: Tree Trench 1



Summary for Pond TT2: Tree Trench 2

Inflow Area = 0.112 ac, 95.97% Impervious, Inflow Depth = 5.66" for 25YR event
Inflow = 0.67 cfs @ 12.07 hrs, Volume= 0.053 af
Outflow = 0.67 cfs @ 12.07 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.03 cfs @ 9.71 hrs, Volume= 0.031 af
Primary = 0.64 cfs @ 12.07 hrs, Volume= 0.021 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 53.10' @ 12.07 hrs Surf.Area= 150 sf Storage= 159 cf

Plug-Flow detention time= 21.0 min calculated for 0.053 af (100% of inflow)
Center-of-Mass det. time= 21.0 min (765.7 - 744.6)

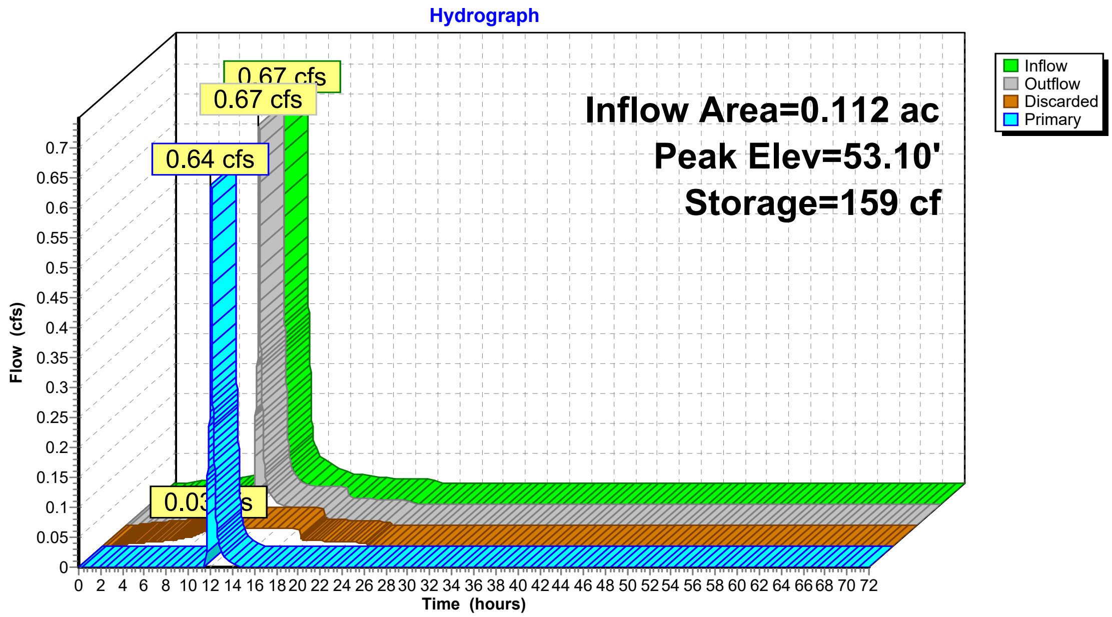
Volume	Invert	Avail.Storage	Storage Description
#1	50.16'	184 cf	**5.00'W x 30.00'L x 3.80'H Prismatoid** 570 cf Overall - 17 cf Embedded = 553 cf x 33.3% Voids
#2	51.66'	17 cf	**8.0" Round Pipe Storage** Inside #1 L= 50.0' S= 0.0050 '/'
		201 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.16'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	52.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.03 cfs @ 9.71 hrs HW=50.20' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.64 cfs @ 12.07 hrs HW=53.10' (Free Discharge)
↑—**2=Orifice/Grate** (Orifice Controls 0.64 cfs @ 2.16 fps)

Pond TT2: Tree Trench 2



Summary for Pond URC1: URC-1

Inflow Area = 1.559 ac, 43.91% Impervious, Inflow Depth = 1.94" for 25YR event
Inflow = 3.00 cfs @ 12.09 hrs, Volume= 0.252 af
Outflow = 0.38 cfs @ 11.68 hrs, Volume= 0.252 af, Atten= 87%, Lag= 0.0 min
Discarded = 0.38 cfs @ 11.68 hrs, Volume= 0.252 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 51.92' @ 12.69 hrs Surf.Area= 0.046 ac Storage= 0.078 af

Plug-Flow detention time= 55.2 min calculated for 0.252 af (100% of inflow)
Center-of-Mass det. time= 55.2 min (872.1 - 816.9)

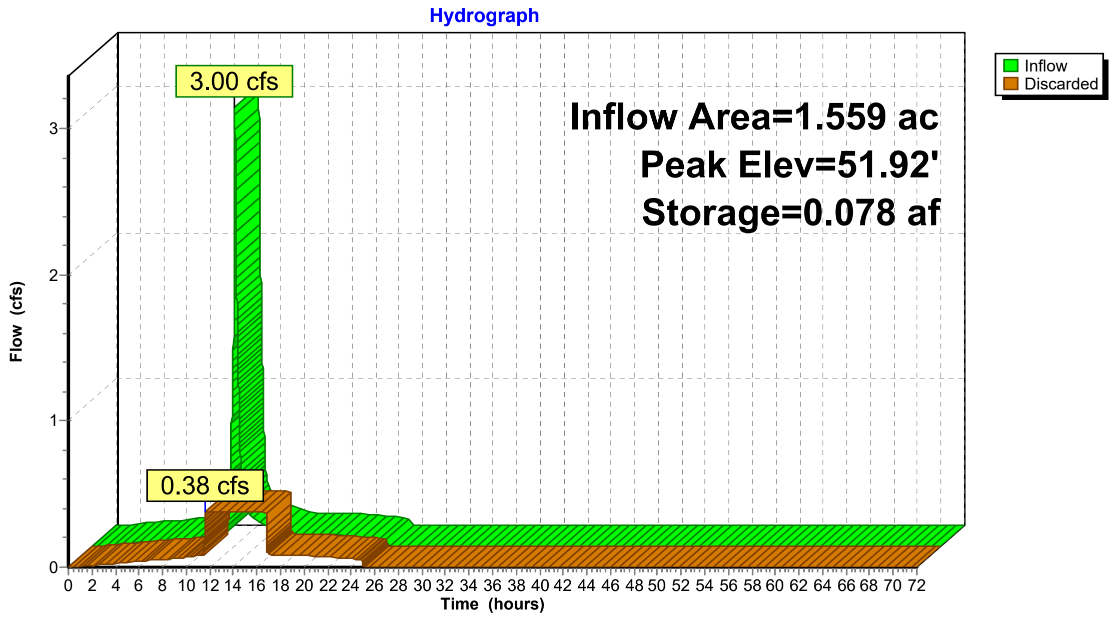
Volume	Invert	Avail.Storage	Storage Description
#1A	48.60'	0.074 af	**23.25'W x 85.57'L x 6.75'H Field A** 0.308 af Overall - 0.085 af Embedded = 0.223 af x 33.3% Voids
#2A	50.60'	0.085 af	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 11 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		0.160 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	48.60'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.38 cfs @ 11.68 hrs HW=48.67' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.38 cfs)

Pond URC1: URC-1



Summary for Pond URC2: URC-2

Inflow Area = 0.260 ac,100.00% Impervious, Inflow Depth = 5.88" for 25YR event
Inflow = 1.62 cfs @ 12.07 hrs, Volume= 0.127 af
Outflow = 0.17 cfs @ 11.47 hrs, Volume= 0.127 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.17 cfs @ 11.47 hrs, Volume= 0.127 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 57.99' @ 12.73 hrs Surf.Area= 879 sf Storage= 1,748 cf

Plug-Flow detention time= 65.9 min calculated for 0.127 af (100% of inflow)
Center-of-Mass det. time= 65.9 min (809.9 - 743.9)

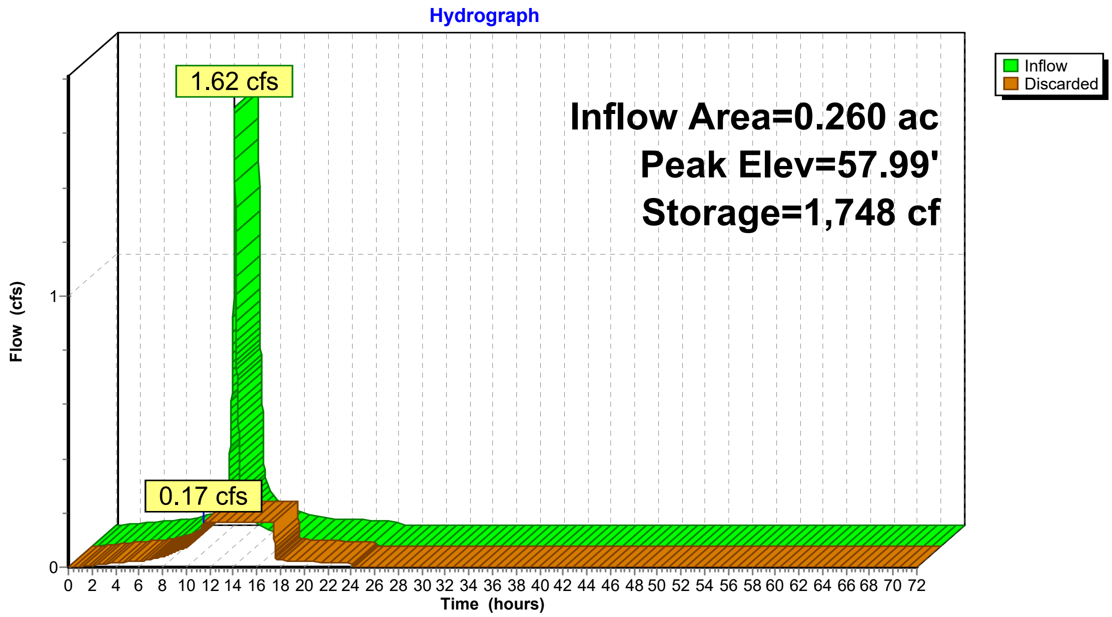
Volume	Invert	Avail.Storage	Storage Description
#1A	54.10'	1,517 cf	**17.33'W x 50.72'L x 6.75'H Field A** 5,934 cf Overall - 1,379 cf Embedded = 4,555 cf x 33.3% Voids
#2A	56.10'	1,379 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 2 Rows of 6 Chambers Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf
		2,896 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	54.10'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.17 cfs @ 11.47 hrs HW=54.17' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Pond URC2: URC-2



Summary for Pond URC3: URC-3

Inflow Area = 0.436 ac, 43.62% Impervious, Inflow Depth = 2.84" for 25YR event
Inflow = 1.17 cfs @ 12.09 hrs, Volume= 0.103 af
Outflow = 0.12 cfs @ 11.52 hrs, Volume= 0.103 af, Atten= 89%, Lag= 0.0 min
Discarded = 0.12 cfs @ 11.52 hrs, Volume= 0.103 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 59.00' @ 12.95 hrs Surf.Area= 765 sf Storage= 1,369 cf

Plug-Flow detention time= 75.1 min calculated for 0.103 af (100% of inflow)
Center-of-Mass det. time= 75.1 min (840.8 - 765.7)

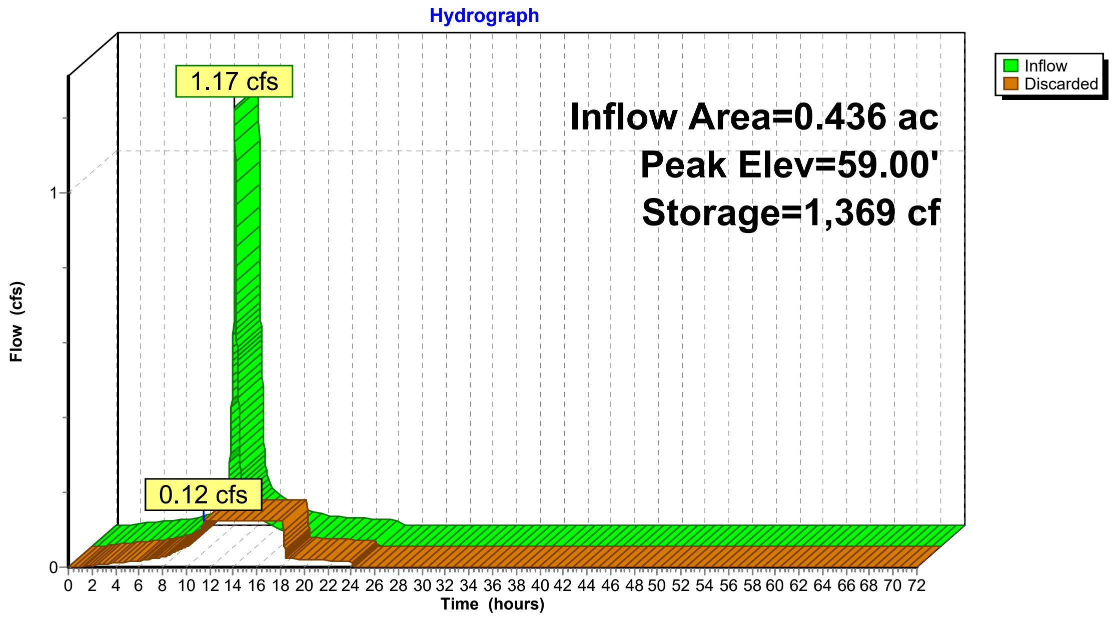
Volume	Invert	Avail.Storage	Storage Description
#1A	55.55'	1,250 cf	**22.25'W x 34.38'L x 6.75'H Field A** 5,163 cf Overall - 1,409 cf Embedded = 3,755 cf x 33.3% Voids
#2A	57.55'	1,409 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 4 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		2,659 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	55.55'	**7.000 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.12 cfs @ 11.52 hrs HW=55.62' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Pond URC3: URC-3



Summary for Pond URC4: URC-4

Inflow Area = 0.230 ac,100.00% Impervious, Inflow Depth = 5.88" for 25YR event
Inflow = 1.43 cfs @ 12.07 hrs, Volume= 0.113 af
Outflow = 0.14 cfs @ 11.40 hrs, Volume= 0.113 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.14 cfs @ 11.40 hrs, Volume= 0.113 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 60.19' @ 12.81 hrs Surf.Area= 851 sf Storage= 1,595 cf

Plug-Flow detention time= 75.6 min calculated for 0.113 af (100% of inflow)
Center-of-Mass det. time= 75.6 min (819.5 - 743.9)

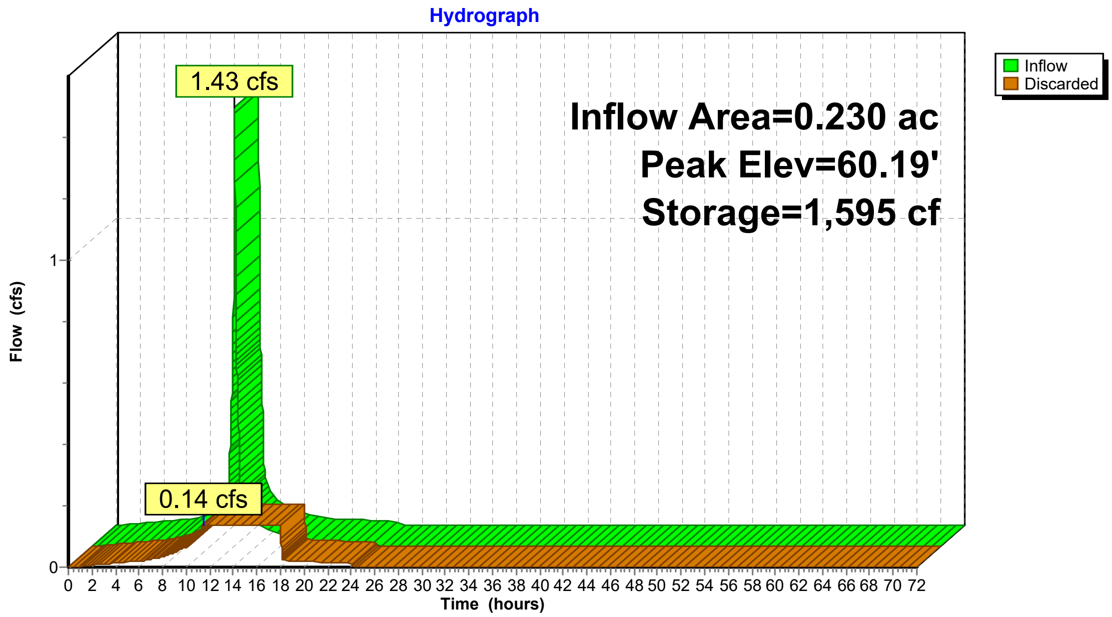
Volume	Invert	Avail.Storage	Storage Description
#1A	56.80'	1,292 cf	**30.17'W x 28.21'L x 6.25'H Field A** 5,319 cf Overall - 1,439 cf Embedded = 3,880 cf x 33.3% Voids
#2A	58.30'	1,439 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 4 Rows of 3 Chambers Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		2,731 cf	Total Available Storage

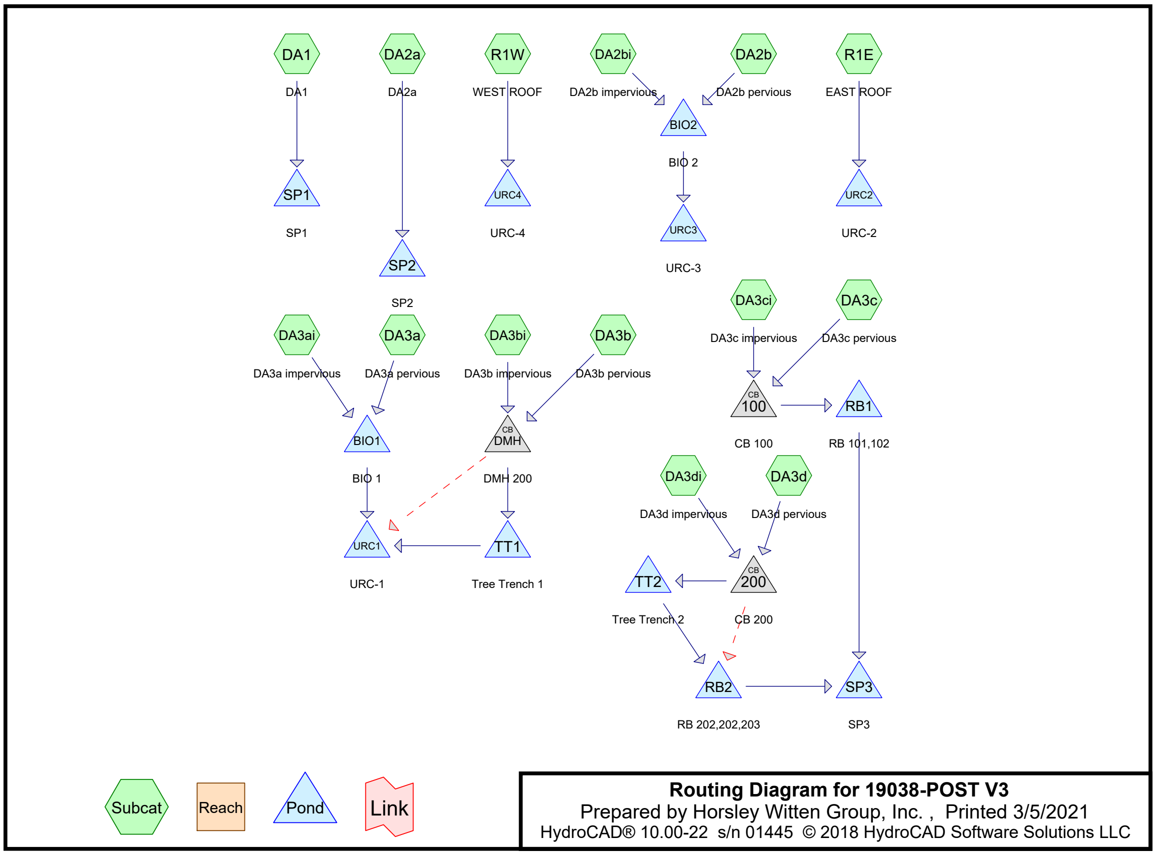
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	56.80'	**7.000 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.14 cfs @ 11.40 hrs HW=56.86' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Pond URC4: URC-4





Routing Diagram for 19038-POST V3
Prepared by Horsley Witten Group, Inc. , Printed 3/5/2021
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Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment DA1: DA1	Runoff Area=158,640 sf 9.44% Impervious Runoff Depth=1.30" Flow Length=417' Tc=15.9 min CN=38 Runoff=2.78 cfs 0.394 af
Subcatchment DA2a: DA2a	Runoff Area=43,429 sf 0.00% Impervious Runoff Depth=0.91" Flow Length=525' Tc=43.3 min CN=34 Runoff=0.29 cfs 0.075 af
Subcatchment DA2b: DA2b pervious	Runoff Area=10,709 sf 0.00% Impervious Runoff Depth=1.40" Tc=5.0 min CN=39 Runoff=0.30 cfs 0.029 af
Subcatchment DA2bi: DA2b impervious	Runoff Area=8,285 sf 100.00% Impervious Runoff Depth=8.32" Tc=5.0 min CN=98 Runoff=1.66 cfs 0.132 af
Subcatchment DA3a: DA3a pervious	Runoff Area=33,821 sf 0.00% Impervious Runoff Depth=0.91" Tc=5.0 min CN=34 Runoff=0.39 cfs 0.059 af
Subcatchment DA3ai: DA3a impervious	Runoff Area=19,638 sf 100.00% Impervious Runoff Depth=8.32" Tc=5.0 min CN=98 Runoff=3.93 cfs 0.313 af
Subcatchment DA3b: DA3b pervious	Runoff Area=4,260 sf 0.00% Impervious Runoff Depth=1.00" Tc=5.0 min CN=35 Runoff=0.06 cfs 0.008 af
Subcatchment DA3bi: DA3b impervious	Runoff Area=10,179 sf 100.00% Impervious Runoff Depth=8.32" Tc=5.0 min CN=98 Runoff=2.04 cfs 0.162 af
Subcatchment DA3c: DA3c pervious	Runoff Area=26,141 sf 0.00% Impervious Runoff Depth=0.73" Tc=5.0 min CN=32 Runoff=0.19 cfs 0.036 af
Subcatchment DA3ci: DA3c impervious	Runoff Area=3,179 sf 100.00% Impervious Runoff Depth=8.32" Tc=5.0 min CN=98 Runoff=0.64 cfs 0.051 af
Subcatchment DA3d: DA3d pervious	Runoff Area=197 sf 0.00% Impervious Runoff Depth=1.40" Tc=5.0 min CN=39 Runoff=0.01 cfs 0.001 af

Subcatchment DA3di: DA3d impervious Runoff Area=4,686 sf 100.00% Impervious Runoff Depth=8.32"
Tc=5.0 min CN=98 Runoff=0.94 cfs 0.075 af

Subcatchment R1E: EAST ROOF Runoff Area=11,331 sf 100.00% Impervious Runoff Depth=8.32"
Tc=5.0 min CN=98 Runoff=2.27 cfs 0.180 af

Subcatchment R1W: WEST ROOF Runoff Area=10,000 sf 100.00% Impervious Runoff Depth=8.32"
Tc=5.0 min CN=98 Runoff=2.00 cfs 0.159 af

Pond 100: CB 100 Peak Elev=50.56' Inflow=0.71 cfs 0.087 af
12.0" Round Culvert n=0.013 L=4.0' S=0.0050 '/' Outflow=0.71 cfs 0.087 af

Pond 200: CB 200 Peak Elev=52.60' Inflow=0.94 cfs 0.075 af
Primary=0.94 cfs 0.075 af Secondary=0.00 cfs 0.000 af Outflow=0.94 cfs 0.075 af

Pond BIO1: BIO 1 Peak Elev=59.58' Storage=1,440 cf Inflow=4.20 cfs 0.371 af
Outflow=3.98 cfs 0.371 af

Pond BIO2: BIO 2 Peak Elev=62.70' Storage=116 cf Inflow=1.94 cfs 0.161 af
Outflow=1.91 cfs 0.161 af

Pond DMH: DMH 200 Peak Elev=54.84' Inflow=2.08 cfs 0.170 af
Primary=1.34 cfs 0.157 af Secondary=0.74 cfs 0.013 af Outflow=2.08 cfs 0.170 af

Pond RB1: RB 101,102 Peak Elev=46.57' Storage=603 cf Inflow=0.71 cfs 0.087 af
Discarded=0.06 cfs 0.069 af Primary=0.42 cfs 0.017 af Outflow=0.48 cfs 0.087 af

Pond RB2: RB 202,202,203 Peak Elev=52.27' Storage=932 cf Inflow=0.91 cfs 0.037 af
Discarded=0.09 cfs 0.037 af Primary=0.00 cfs 0.000 af Outflow=0.09 cfs 0.037 af

Pond SP1: SP1 Inflow=2.78 cfs 0.394 af
Primary=2.78 cfs 0.394 af

Pond SP2: SP2 Inflow=0.29 cfs 0.075 af
Primary=0.29 cfs 0.075 af

Pond SP3: SP3 Inflow=0.42 cfs 0.017 af
Primary=0.42 cfs 0.017 af

Pond TT1: Tree Trench 1 Peak Elev=54.81' Storage=859 cf Inflow=1.34 cfs 0.157 af
Discarded=0.20 cfs 0.131 af Primary=0.97 cfs 0.025 af Outflow=1.17 cfs 0.157 af

Pond TT2: Tree Trench 2 Peak Elev=53.19' Storage=163 cf Inflow=0.94 cfs 0.075 af
Discarded=0.03 cfs 0.038 af Primary=0.91 cfs 0.037 af Outflow=0.94 cfs 0.075 af

Pond URC1: URC-1 Peak Elev=55.19' Storage=0.157 af Inflow=5.55 cfs 0.410 af
Outflow=0.38 cfs 0.410 af

Pond URC2: URC-2 Peak Elev=60.65' Storage=2,838 cf Inflow=2.27 cfs 0.180 af
Outflow=0.17 cfs 0.180 af

Pond URC3: URC-3 Peak Elev=62.28' Storage=2,654 cf Inflow=1.91 cfs 0.161 af
Outflow=0.12 cfs 0.161 af

Pond URC4: URC-4 Peak Elev=62.53' Storage=2,584 cf Inflow=2.00 cfs 0.159 af
Outflow=0.14 cfs 0.159 af

Summary for Subcatchment DA1: DA1

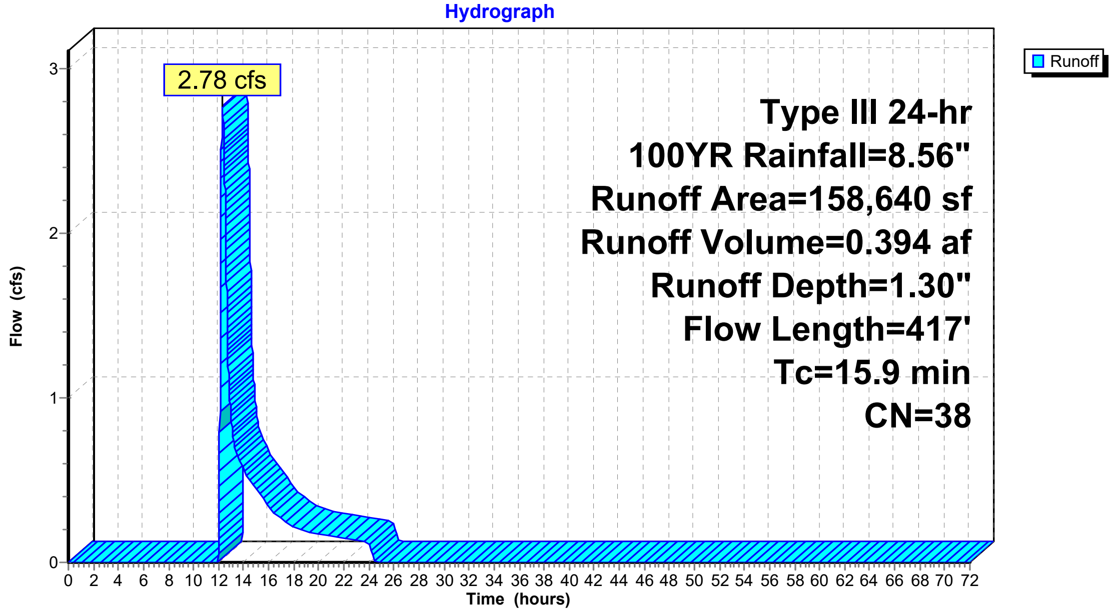
Runoff = 2.78 cfs @ 12.30 hrs, Volume= 0.394 af, Depth= 1.30"

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=8.56"

Area (sf)	CN	Description
118,297	30	Woods, Good, HSG A
25,363	39	>75% Grass cover, Good, HSG A
9,642	98	Roofs, HSG A
5,338	98	Paved parking, HSG A
158,640	38	Weighted Average
143,660		90.56% Pervious Area
14,980		9.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2	78	0.1730	0.11		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.7	99	0.1110	2.33		**Shallow Concentrated Flow, B TO C** Short Grass Pasture Kv= 7.0 fps
3.0	240	0.0690	1.31		**Shallow Concentrated Flow, C TO SP1** Woodland Kv= 5.0 fps
15.9	417	Total			

Subcatchment DA1: DA1



Summary for Subcatchment DA2a: DA2a

CN for permeable pavers taken from RI Stormwater Design

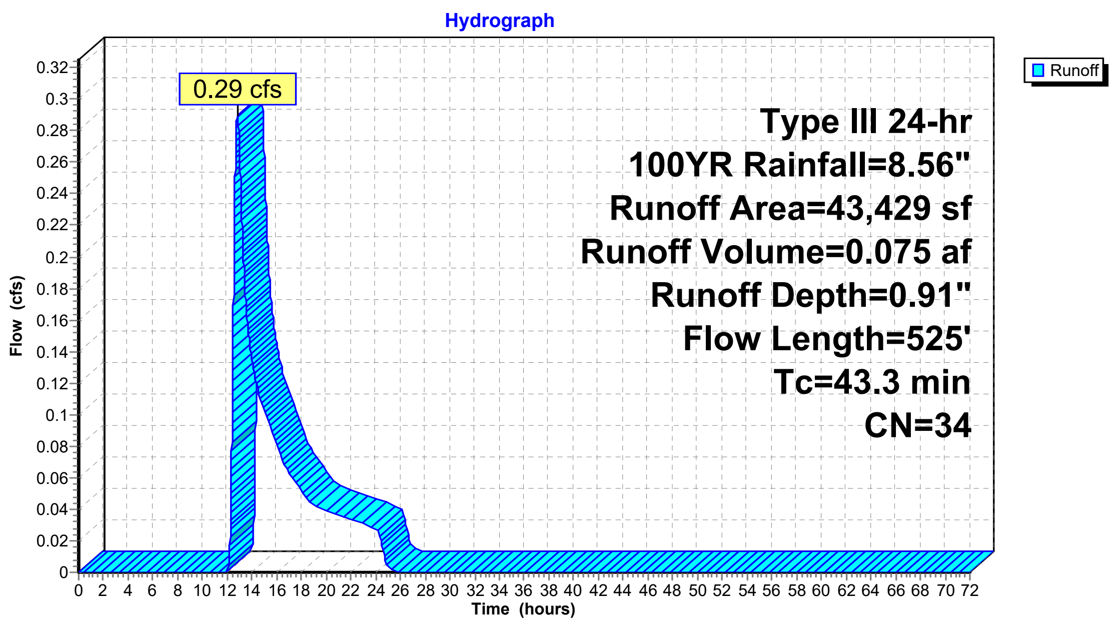
Runoff = 0.29 cfs @ 12.84 hrs, Volume= 0.075 af, Depth= 0.91"

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=8.56"

	Area (sf)	CN	Description
	25,414	30	Woods, Good, HSG A
	17,231	39	>75% Grass cover, Good, HSG A
*	784	40	Pervious Pavers
	43,429	34	Weighted Average
	43,429		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
36.4	147	0.0400	0.07		**Sheet Flow, A TO B** Woods: Dense underbrush n= 0.800 P2= 3.60"
0.8	67	0.0760	1.38		**Shallow Concentrated Flow, B to C** Woodland Kv= 5.0 fps
1.1	73	0.0480	1.10		**Shallow Concentrated Flow, C to D** Woodland Kv= 5.0 fps
5.0	238	0.0250	0.79		**Shallow Concentrated Flow, D to SP2** Woodland Kv= 5.0 fps
43.3	525	Total			

Subcatchment DA2a: DA2a



Summary for Subcatchment DA2b: DA2b pervious

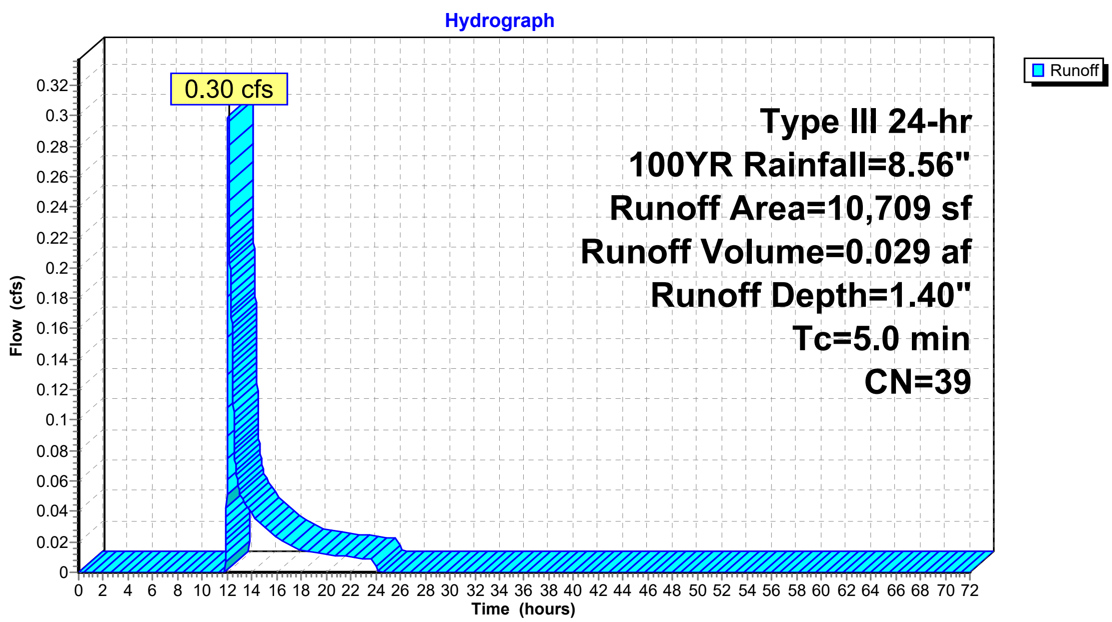
Runoff = 0.30 cfs @ 12.10 hrs, Volume= 0.029 af, Depth= 1.40"

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=8.56"

Area (sf)	CN	Description
10,238	39	>75% Grass cover, Good, HSG A
471	30	Woods, Good, HSG A
10,709	39	Weighted Average
10,709		100.00% Pervious Area

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

Subcatchment DA2b: DA2b pervious



Summary for Subcatchment DA2bi: DA2b impervious

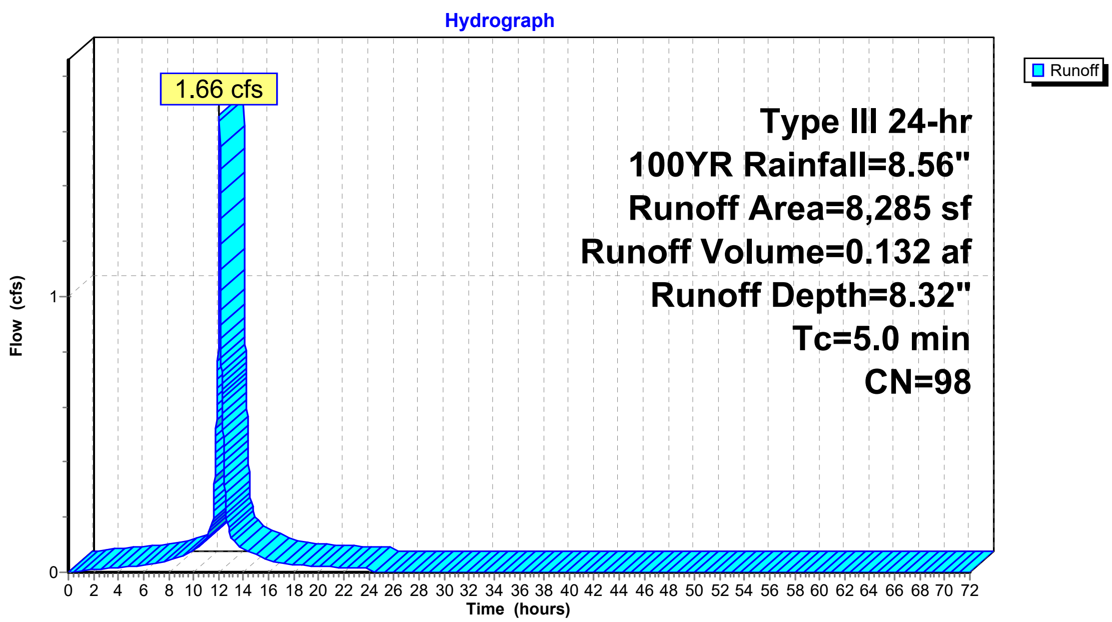
Runoff = 1.66 cfs @ 12.07 hrs, Volume= 0.132 af, Depth= 8.32"

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 100YR Rainfall=8.56"

	Area (sf)	CN	Description
	7,010	98	Paved parking, HSG A
*	1,275	98	Sidewalks, HSG A
	8,285	98	Weighted Average
	8,285		100.00% Impervious Area

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

Subcatchment DA2bi: DA2b impervious



Summary for Subcatchment DA3a: DA3a pervious

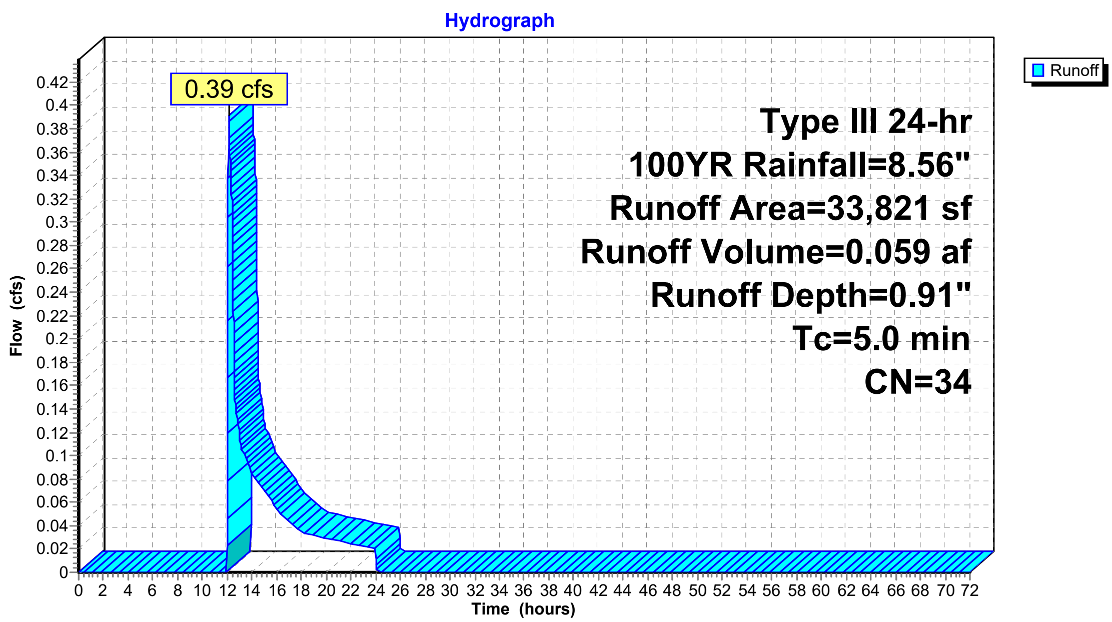
Runoff = 0.39 cfs @ 12.13 hrs, Volume= 0.059 af, Depth= 0.91"

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=8.56"

Area (sf)	CN	Description
14,079	39	>75% Grass cover, Good, HSG A
19,742	30	Woods, Good, HSG A
33,821	34	Weighted Average
33,821		100.00% Pervious Area

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

Subcatchment DA3a: DA3a pervious



Summary for Subcatchment DA3ai: DA3a impervious

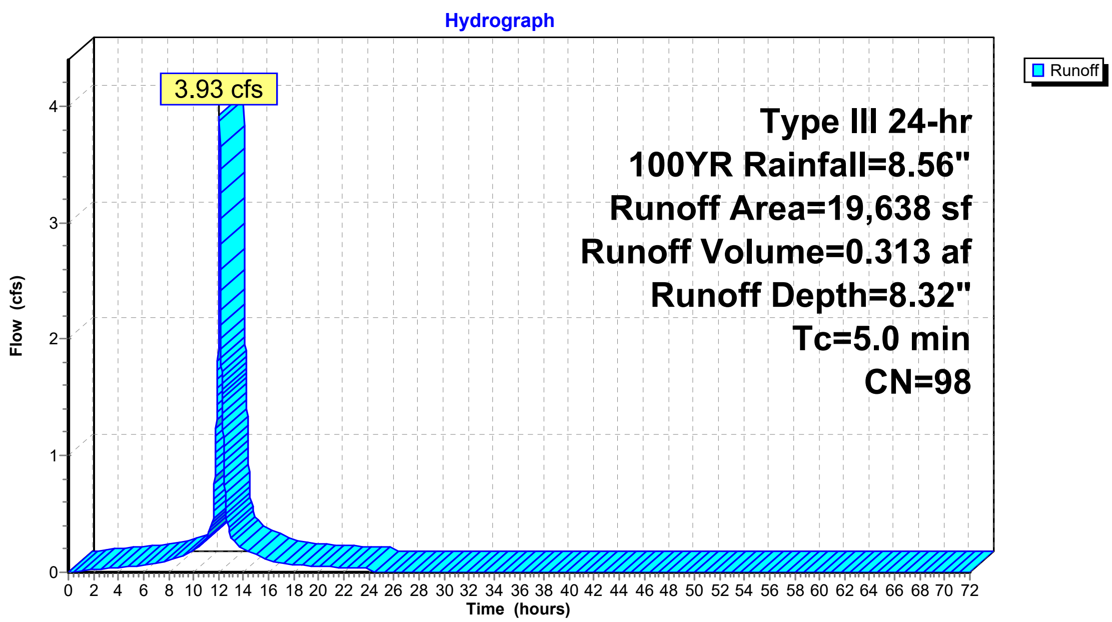
Runoff = 3.93 cfs @ 12.07 hrs, Volume= 0.313 af, Depth= 8.32"

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 100YR Rainfall=8.56"

	Area (sf)	CN	Description
	18,277	98	Paved parking, HSG A
*	1,361	98	Sidewalk, HSG A
	19,638	98	Weighted Average
	19,638		100.00% Impervious Area

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

Subcatchment DA3ai: DA3a impervious



Summary for Subcatchment DA3b: DA3b pervious

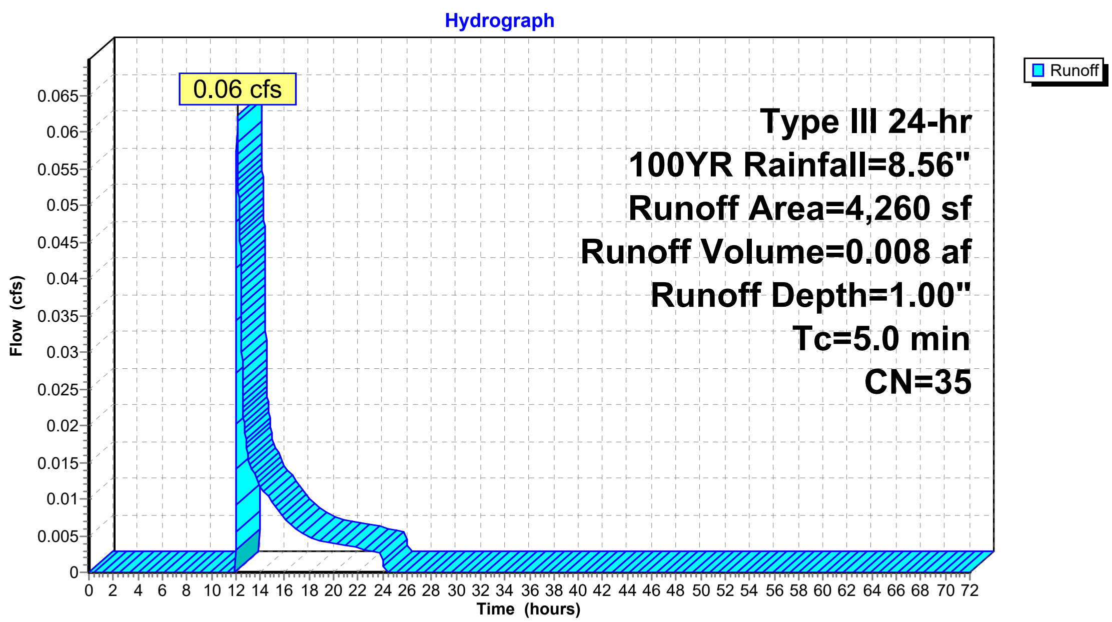
Runoff = 0.06 cfs @ 12.12 hrs, Volume= 0.008 af, Depth= 1.00"

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 100YR Rainfall=8.56"

Area (sf)	CN	Description
2,324	39	>75% Grass cover, Good, HSG A
1,936	30	Woods, Good, HSG A
4,260	35	Weighted Average
4,260		100.00% Pervious Area

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

Subcatchment DA3b: DA3b pervious



Summary for Subcatchment DA3bi: DA3b impervious

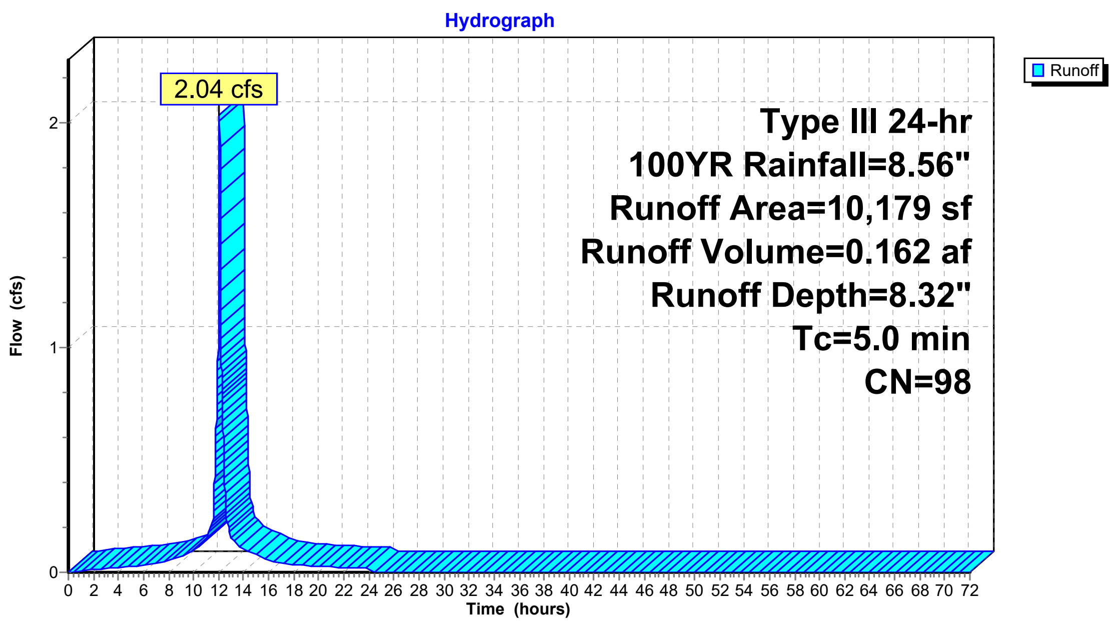
Runoff = 2.04 cfs @ 12.07 hrs, Volume= 0.162 af, Depth= 8.32"

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 100YR Rainfall=8.56"

	Area (sf)	CN	Description
	9,486	98	Paved parking, HSG A
*	693	98	Sidewalks, HSG A
	10,179	98	Weighted Average
	10,179		100.00% Impervious Area

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

Subcatchment DA3bi: DA3b impervious



Summary for Subcatchment DA3c: DA3c pervious

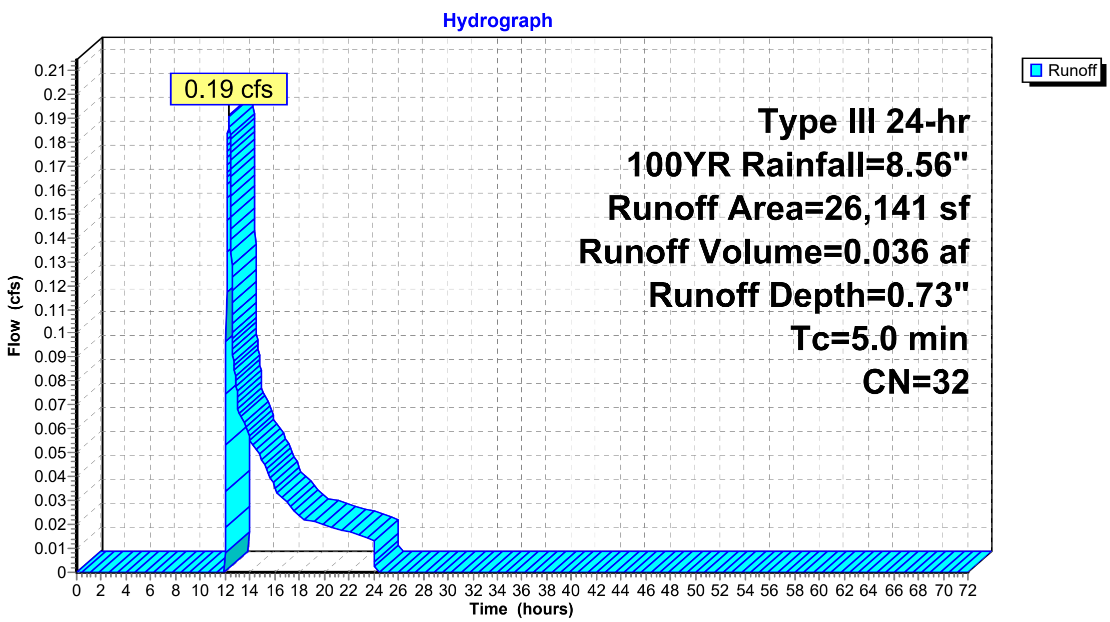
Runoff = 0.19 cfs @ 12.30 hrs, Volume= 0.036 af, Depth= 0.73"

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=8.56"

Area (sf)	CN	Description
4,662	39	>75% Grass cover, Good, HSG A
21,479	30	Woods, Good, HSG A
26,141	32	Weighted Average
26,141		100.00% Pervious Area

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

Subcatchment DA3c: DA3c pervious



Summary for Subcatchment DA3ci: DA3c impervious

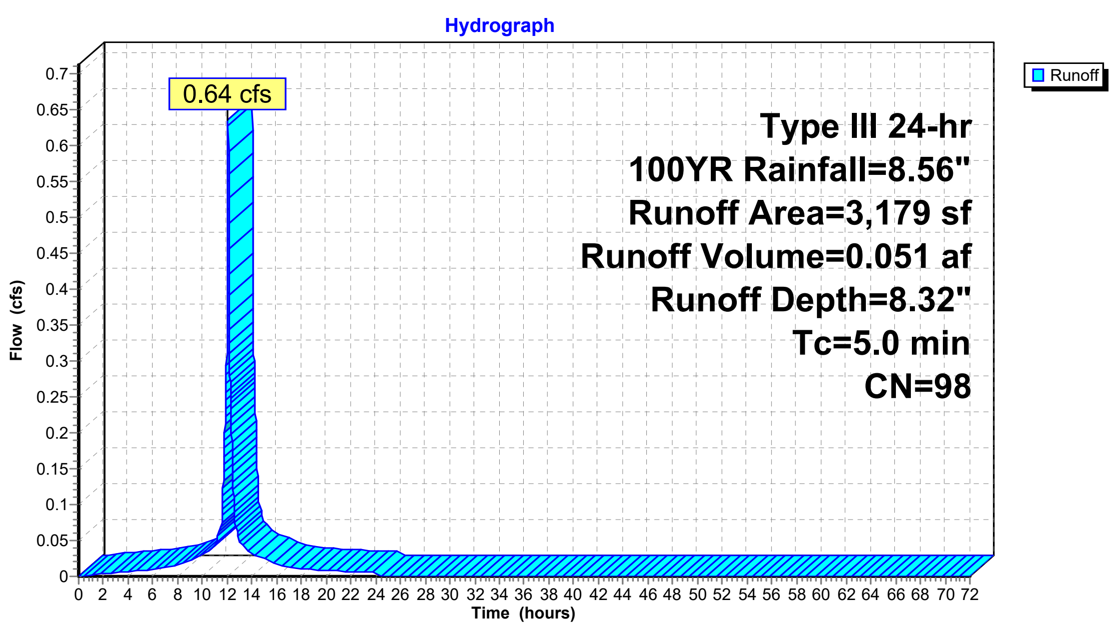
Runoff = 0.64 cfs @ 12.07 hrs, Volume= 0.051 af, Depth= 8.32"

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 100YR Rainfall=8.56"

	Area (sf)	CN	Description
	2,649	98	Paved parking, HSG A
*	530	98	Sidewalks, HSG A
	3,179	98	Weighted Average
	3,179		100.00% Impervious Area

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

Subcatchment DA3ci: DA3c impervious



Summary for Subcatchment DA3d: DA3d pervious

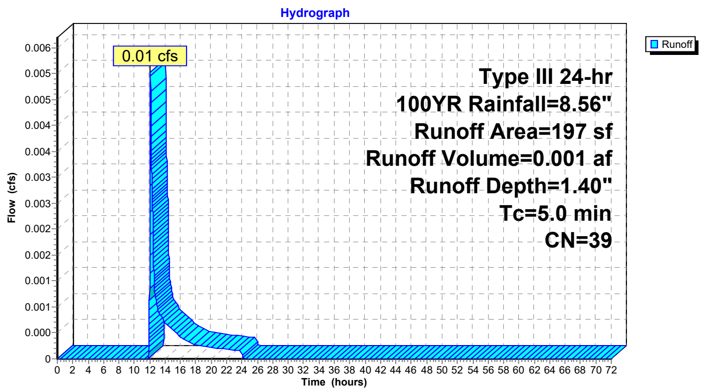
Runoff = 0.01 cfs @ 12.10 hrs, Volume= 0.001 af, Depth= 1.40"

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=8.56"

Area (sf)	CN	Description
197	39	>75% Grass cover, Good, HSG A
197		100.00% Pervious Area

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

Subcatchment DA3d: DA3d pervious



Summary for Subcatchment DA3di: DA3d impervious

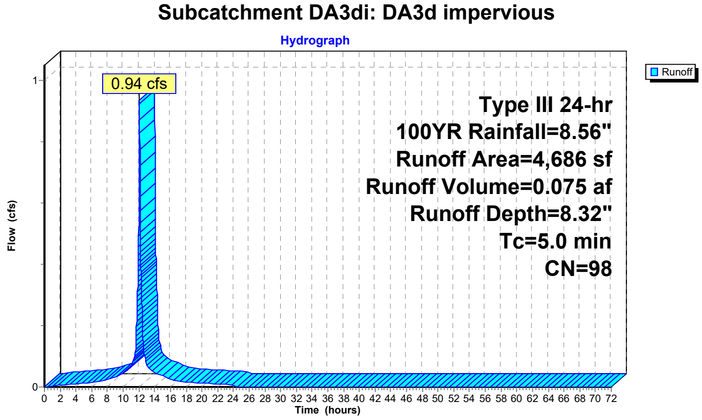
Runoff = 0.94 cfs @ 12.07 hrs, Volume= 0.075 af, Depth= 8.32"

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 100YR Rainfall=8.56"

Area (sf)	CN	Description
4,686	98	Paved parking, HSG A
4,686		100.00% Impervious Area

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

Subcatchment DA3di: DA3d impervious



Summary for Subcatchment R1E: EAST ROOF

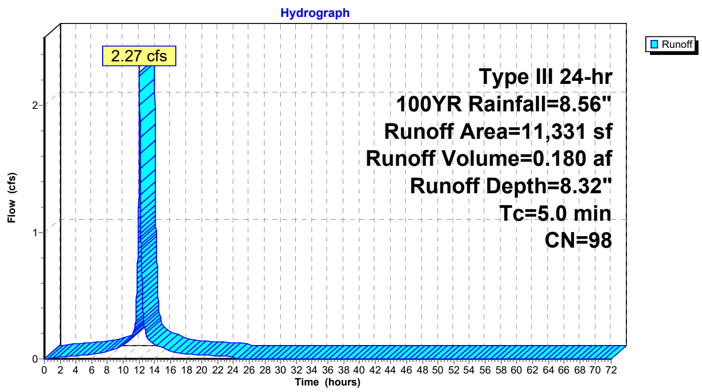
Runoff = 2.27 cfs @ 12.07 hrs, Volume= 0.180 af, Depth= 8.32"

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 100YR Rainfall=8.56"

Area (sf)	CN	Description
11,331	98	Roofs, HSG A
11,331		100.00% Impervious Area

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

Subcatchment R1E: EAST ROOF



Summary for Subcatchment R1W: WEST ROOF

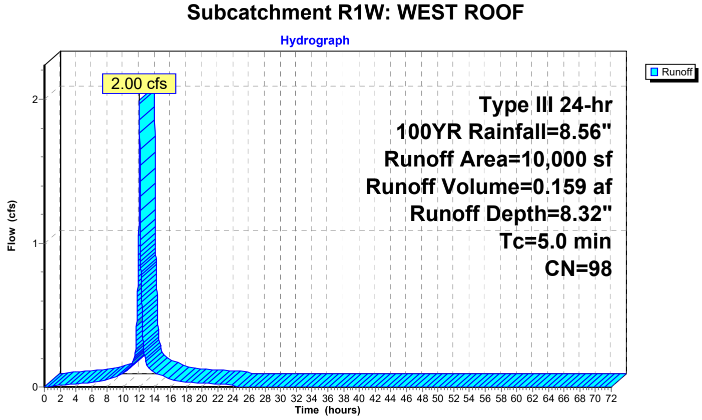
Runoff = 2.00 cfs @ 12.07 hrs, Volume= 0.159 af, Depth= 8.32"

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 100YR Rainfall=8.56"

Area (sf)	CN	Description
10,000	98	Roofs, HSG A
10,000		100.00% Impervious Area

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

Subcatchment R1W: WEST ROOF



Summary for Pond 100: CB 100

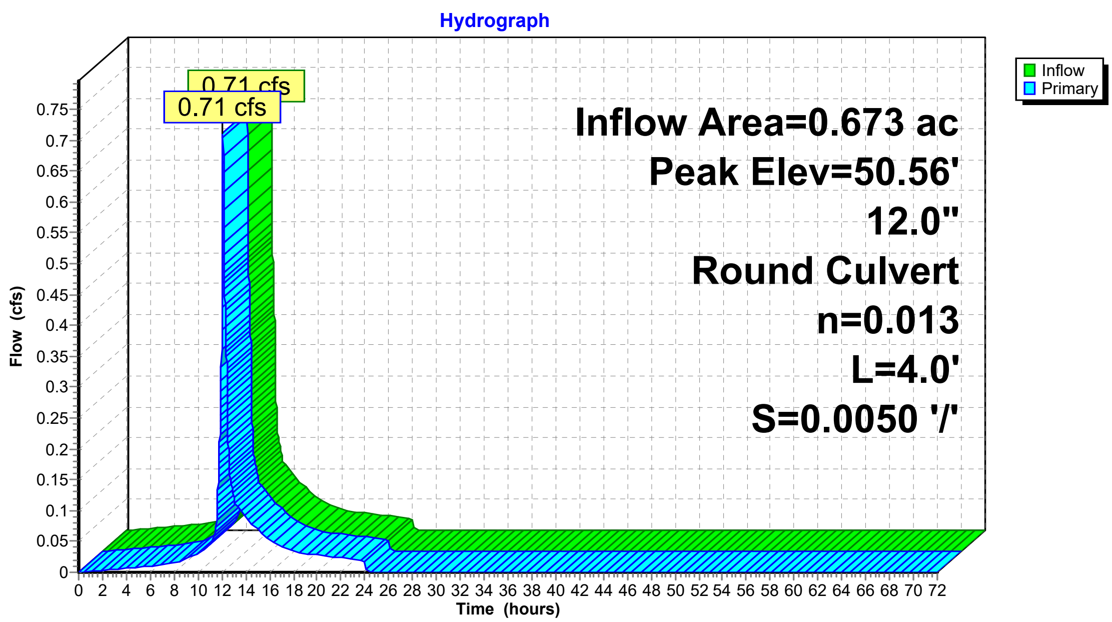
Inflow Area = 0.673 ac, 10.84% Impervious, Inflow Depth = 1.55" for 100YR event
Inflow = 0.71 cfs @ 12.09 hrs, Volume= 0.087 af
Outflow = 0.71 cfs @ 12.09 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min
Primary = 0.71 cfs @ 12.09 hrs, Volume= 0.087 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 50.56' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	50.00'	**12.0" Round Culvert** L= 4.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 50.00' / 49.98' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.71 cfs @ 12.09 hrs HW=50.56' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.71 cfs @ 2.25 fps)

Pond 100: CB 100



Summary for Pond 200: CB 200

Inflow Area = 0.112 ac, 95.97% Impervious, Inflow Depth = 8.04" for 100YR event
Inflow = 0.94 cfs @ 12.07 hrs, Volume= 0.075 af
Outflow = 0.94 cfs @ 12.07 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 12.07 hrs, Volume= 0.075 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

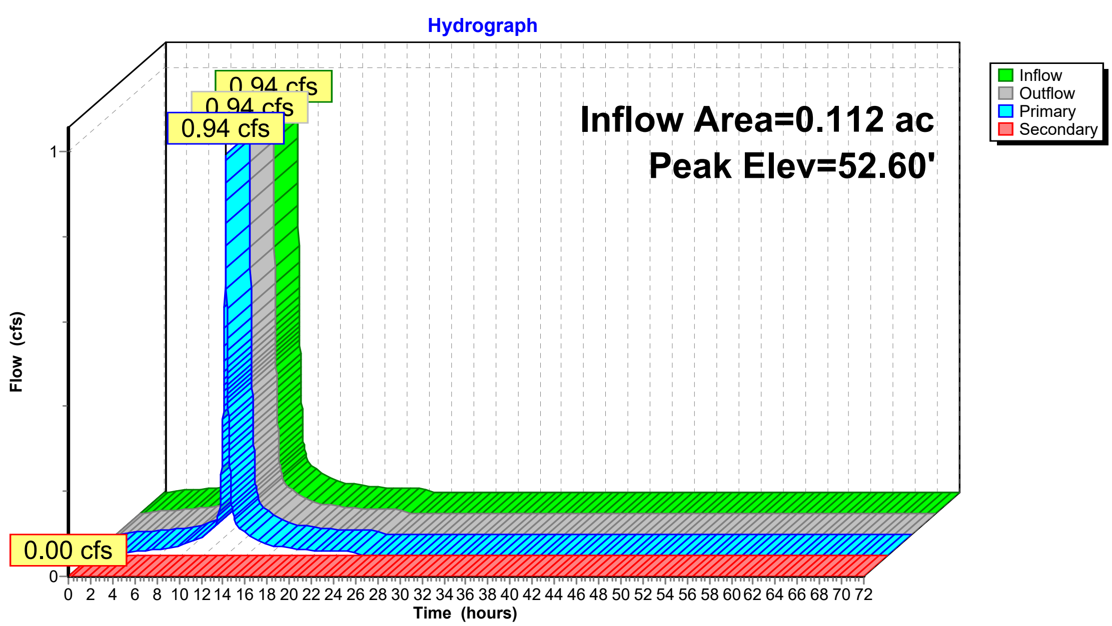
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 52.60' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	52.70'	**12.0" Round Culvert** L= 4.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 52.70' / 52.68' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	51.66'	**8.0" Round Culvert** L= 50.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 51.66' / 51.41' S= 0.0050 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#3	Secondary	55.79'	**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

Primary OutFlow Max=0.94 cfs @ 12.07 hrs HW=52.60' (Free Discharge)
└**2=Culvert** (Barrel Controls 0.94 cfs @ 2.70 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=51.66' (Free Discharge)
├**1=Culvert** (Controls 0.00 cfs)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 200: CB 200



Summary for Pond BIO1: BIO 1

Inflow Area = 1.227 ac, 36.73% Impervious, Inflow Depth = 3.63" for 100YR event
Inflow = 4.20 cfs @ 12.08 hrs, Volume= 0.371 af
Outflow = 3.98 cfs @ 12.10 hrs, Volume= 0.371 af, Atten= 5%, Lag= 1.6 min
Primary = 3.98 cfs @ 12.10 hrs, Volume= 0.371 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 59.58' @ 12.10 hrs Surf.Area= 1,710 sf Storage= 1,440 cf

Plug-Flow detention time= 54.7 min calculated for 0.371 af (100% of inflow)
Center-of-Mass det. time= 54.8 min (824.7 - 770.0)

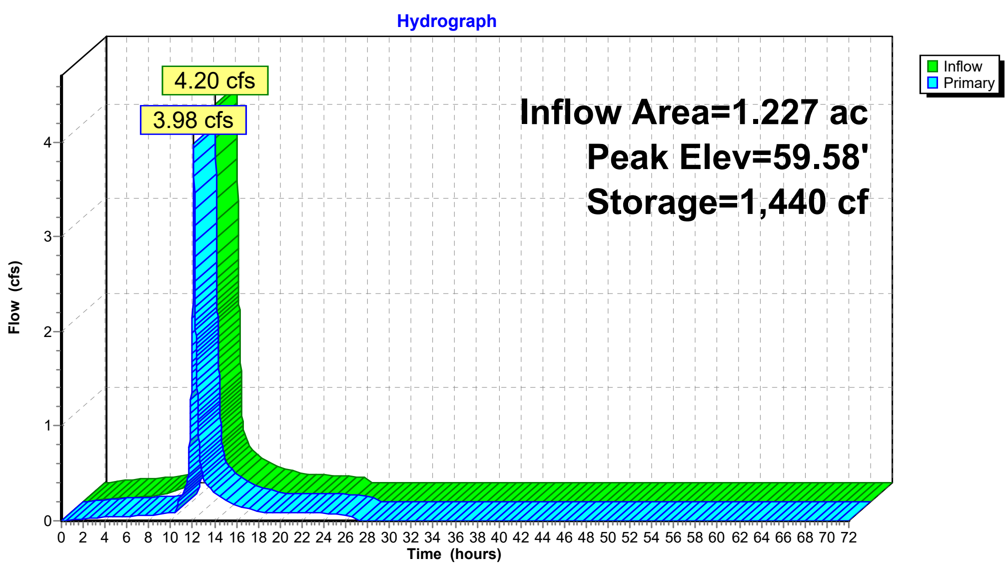
Volume	Invert	Avail.Storage	Storage Description
#1	58.50'	2,210 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
58.50	800	0	0
59.00	1,380	545	545
60.00	1,950	1,665	2,210

Device	Routing	Invert	Outlet Devices
#1	Primary	55.09'	**12.0" Round Culvert** L= 45.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 55.09' / 54.87' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	59.25'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	55.38'	**4.0" Round Culvert** L= 38.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 55.38' / 55.19' S= 0.0050 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#4	Device 3	58.50'	**2.470 in/hr Exfiltration over Surface area**

Primary OutFlow Max=3.98 cfs @ 12.10 hrs HW=59.58' (Free Discharge)
└─**1=Culvert** (Passes 3.98 cfs of 5.96 cfs potential flow)
  ├─**2=Orifice/Grate** (Weir Controls 3.88 cfs @ 1.88 fps)
  └─**3=Culvert** (Passes 0.10 cfs of 0.63 cfs potential flow)
    └─**4=Exfiltration** (Exfiltration Controls 0.10 cfs)

Pond BIO1: BIO 1



Summary for Pond BIO2: BIO 2

Inflow Area = 0.436 ac, 43.62% Impervious, Inflow Depth = 4.42" for 100YR event
Inflow = 1.94 cfs @ 12.07 hrs, Volume= 0.161 af
Outflow = 1.91 cfs @ 12.09 hrs, Volume= 0.161 af, Atten= 1%, Lag= 0.8 min
Primary = 1.91 cfs @ 12.09 hrs, Volume= 0.161 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 62.70' @ 12.09 hrs Surf.Area= 625 sf Storage= 116 cf

Plug-Flow detention time= 1.6 min calculated for 0.161 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (770.3 - 768.7)

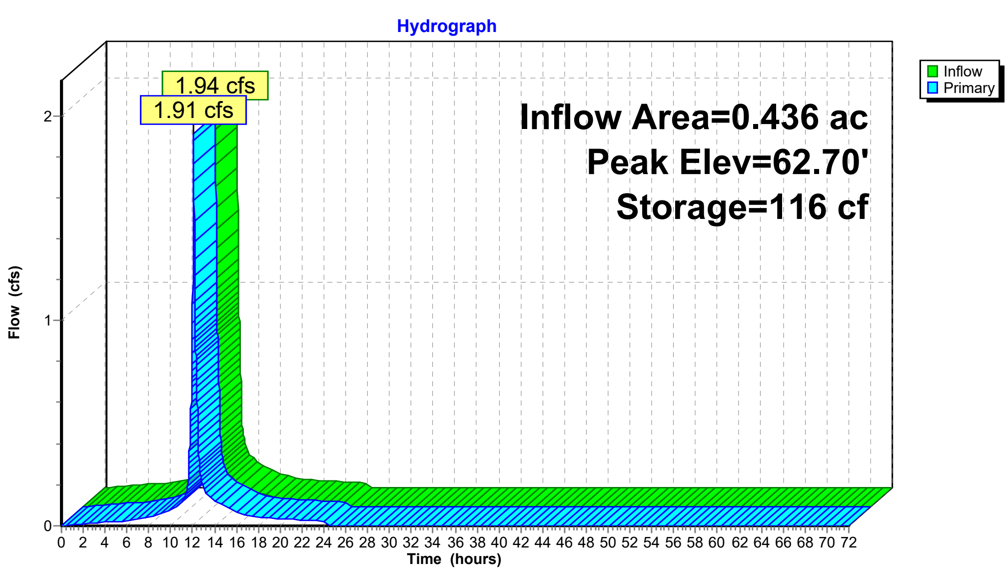
Volume	Invert	Avail.Storage	Storage Description
#1	62.50'	1,414 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
62.50	522	0	0
63.00	775	324	324
64.00	1,405	1,090	1,414

Device	Routing	Invert	Outlet Devices
#1	Primary	59.00'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 59.00' / 58.88' S= 0.0048 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	62.50'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	59.30'	**6.0" Round Culvert** L= 25.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 59.30' / 59.18' S= 0.0048 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#4	Device 3	62.50'	**2.470 in/hr Exfiltration over Surface area**

Primary OutFlow Max=1.91 cfs @ 12.09 hrs HW=62.70' (Free Discharge)
└1=**Culvert** (Passes 1.91 cfs of 6.77 cfs potential flow)
  ├2=**Orifice/Grate** (Weir Controls 1.87 cfs @ 1.47 fps)
  └3=**Culvert** (Passes 0.04 cfs of 1.33 cfs potential flow)
    └4=**Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond BIO2: BIO 2



Summary for Pond DMH: DMH 200

Inflow Area = 0.331 ac, 70.50% Impervious, Inflow Depth = 6.16" for 100YR event
Inflow = 2.08 cfs @ 12.07 hrs, Volume= 0.170 af
Outflow = 2.08 cfs @ 12.07 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min
Primary = 1.34 cfs @ 12.07 hrs, Volume= 0.157 af
Secondary = 0.74 cfs @ 12.07 hrs, Volume= 0.013 af

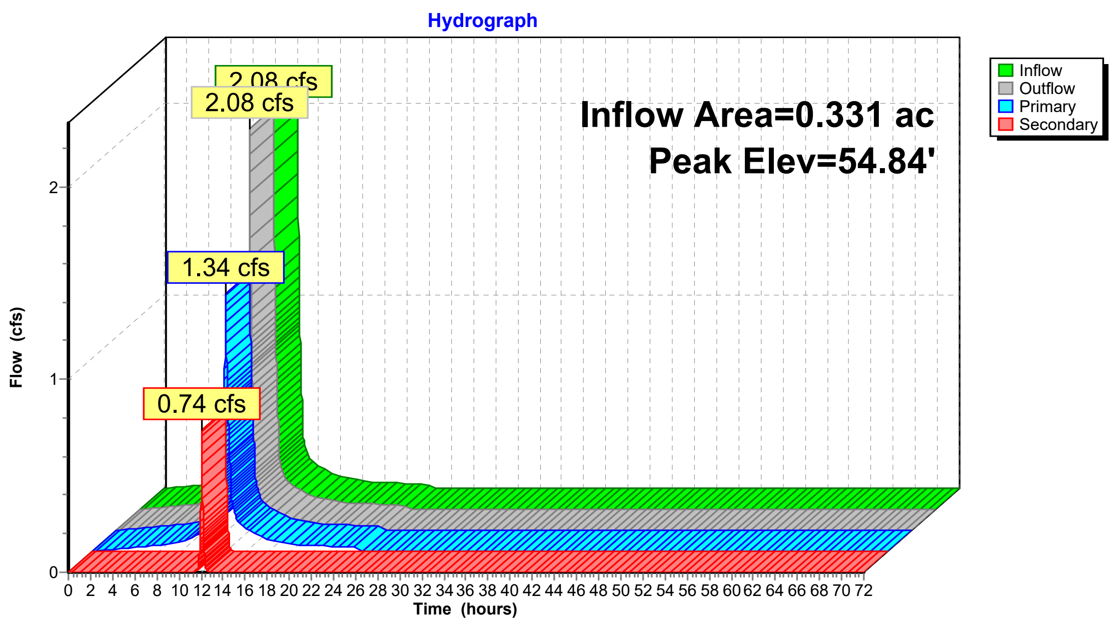
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 54.84' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Secondary	54.30'	**12.0" Round Culvert** L= 9.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 54.30' / 54.26' S= 0.0044 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	53.78'	**12.0" Round Culvert** L= 98.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 53.78' / 53.78' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.34 cfs @ 12.07 hrs HW=54.84' (Free Discharge)
↑—**2=Culvert** (Barrel Controls 1.34 cfs @ 2.00 fps)

Secondary OutFlow Max=0.74 cfs @ 12.07 hrs HW=54.84' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.74 cfs @ 2.48 fps)

Pond DMH: DMH 200



Summary for Pond RB1: RB 101,102

Inflow Area = 0.673 ac, 10.84% Impervious, Inflow Depth = 1.55" for 100YR event
Inflow = 0.71 cfs @ 12.09 hrs, Volume= 0.087 af
Outflow = 0.48 cfs @ 12.21 hrs, Volume= 0.087 af, Atten= 33%, Lag= 7.1 min
Discarded = 0.06 cfs @ 11.36 hrs, Volume= 0.069 af
Primary = 0.42 cfs @ 12.21 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 46.57' @ 12.21 hrs Surf.Area= 157 sf Storage= 603 cf

Plug-Flow detention time= 71.1 min calculated for 0.087 af (100% of inflow)
Center-of-Mass det. time= 70.8 min (897.7 - 826.8)

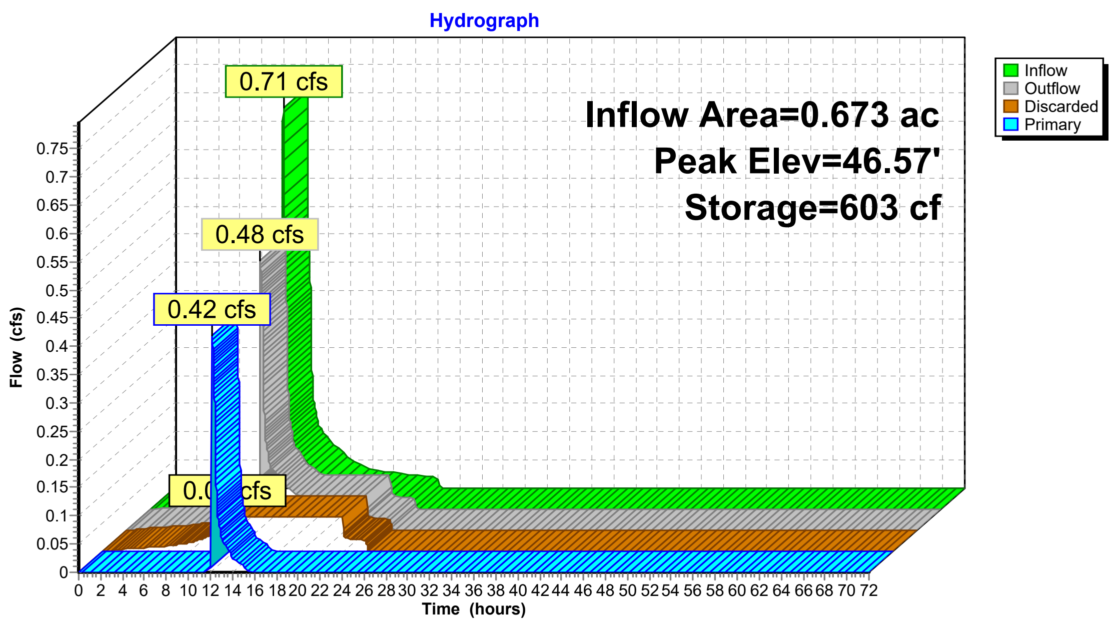
Volume	Invert	Avail.Storage	Storage Description
#1	41.00'	339 cf	**6.00'D x 6.00'H Recharger** x 2 Inside #2
#2	39.00'	355 cf	**10.00'D x 9.00'H Stone** x 2
			1,414 cf Overall - 339 cf Embedded = 1,074 cf x 33.0% Voids
		694 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	39.00'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	46.50'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.06 cfs @ 11.36 hrs HW=39.09' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.40 cfs @ 12.21 hrs HW=46.57' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.40 cfs @ 0.60 fps)

Pond RB1: RB 101,102



Summary for Pond RB2: RB 202,202,203

Inflow Area = 0.112 ac, 95.97% Impervious, Inflow Depth = 4.00" for 100YR event
Inflow = 0.91 cfs @ 12.07 hrs, Volume= 0.037 af
Outflow = 0.09 cfs @ 11.61 hrs, Volume= 0.037 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.09 cfs @ 11.61 hrs, Volume= 0.037 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= 52.27' @ 12.60 hrs Surf.Area= 236 sf Storage= 932 cf

Plug-Flow detention time= 90.9 min calculated for 0.037 af (100% of inflow)
Center-of-Mass det. time= 90.9 min (826.6 - 735.7)

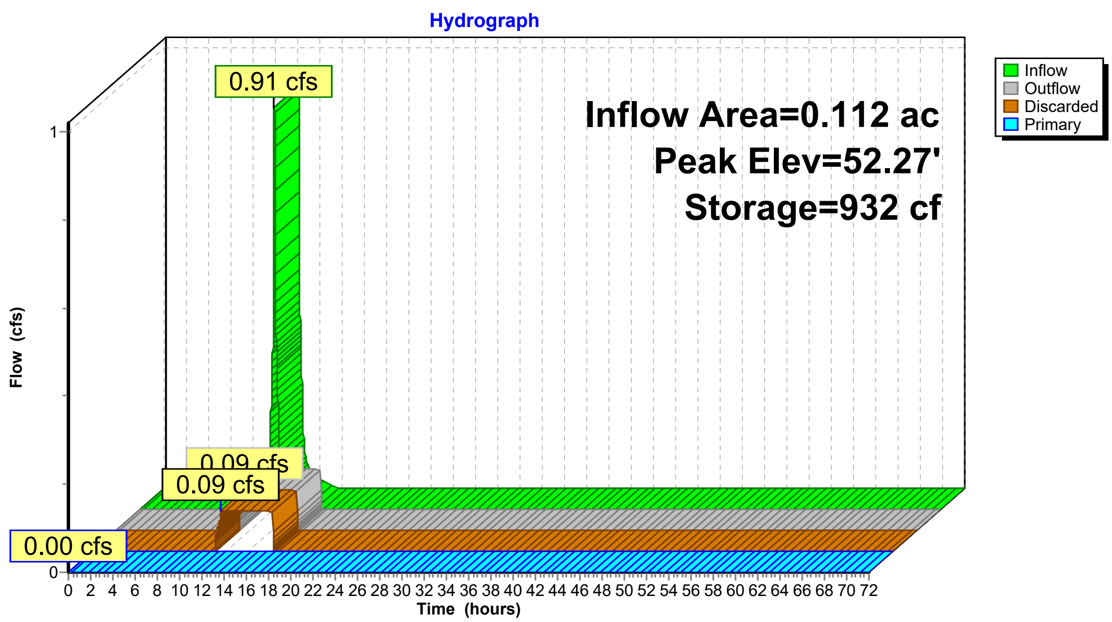
Volume	Invert	Avail.Storage	Storage Description
#1	46.50'	509 cf	**6.00'D x 6.00'H Recharger** x 3 Inside #2
#2	44.50'	532 cf	**10.00'D x 9.00'H Stone** x 3
			2,121 cf Overall - 509 cf Embedded = 1,612 cf x 33.0% Voids
		1,041 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.50'	**8.270 in/hr Exfiltration X 2.00 over Surface area** Phase-In= 0.01'
#2	Primary	55.61'	**5.0' long x 5.0' breadth Broad-Crested Rectangular Weir X 2.00** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=0.09 cfs @ 11.61 hrs HW=44.61' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=44.50' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond RB2: RB 202,202,203

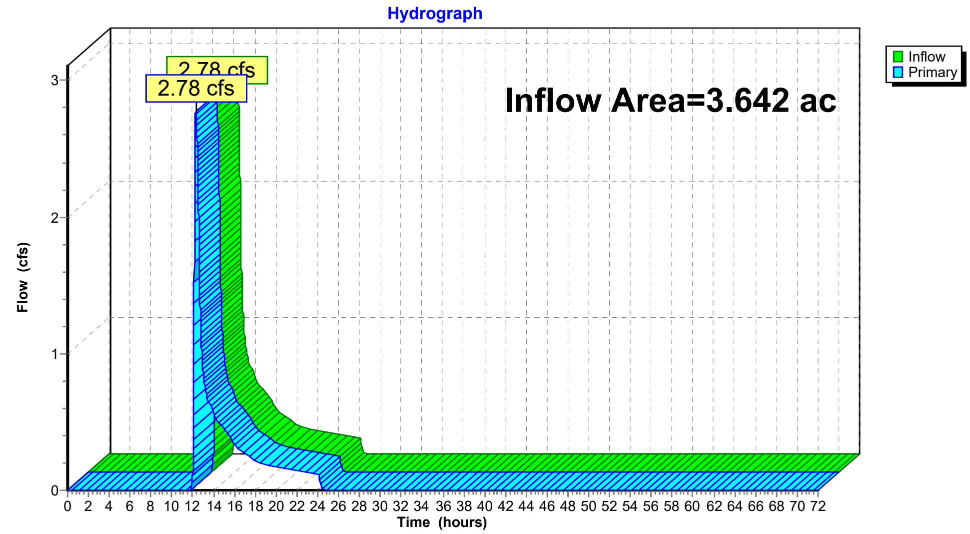


Summary for Pond SP1: SP1

Inflow Area = 3.642 ac, 9.44% Impervious, Inflow Depth = 1.30" for 100YR event
Inflow = 2.78 cfs @ 12.30 hrs, Volume= 0.394 af
Primary = 2.78 cfs @ 12.30 hrs, Volume= 0.394 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: SP1

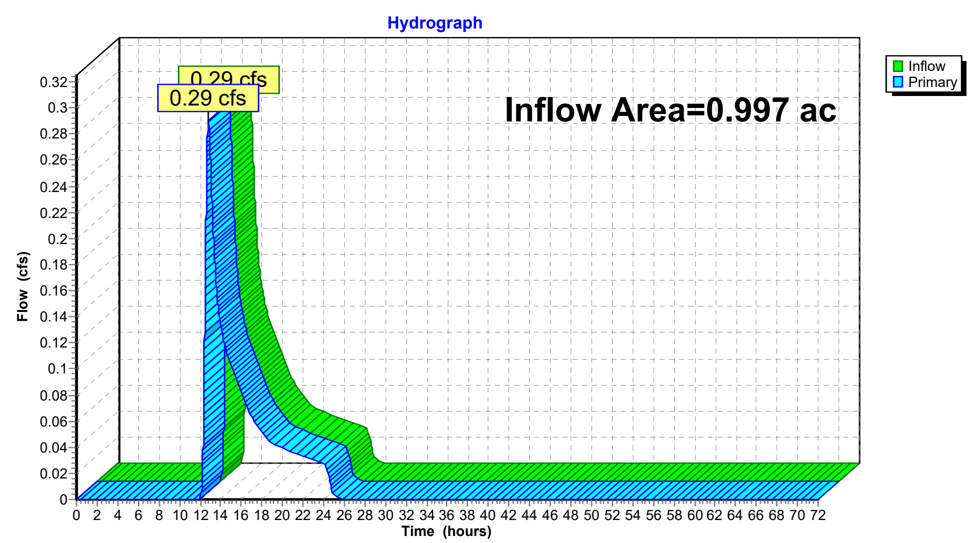


Summary for Pond SP2: SP2

Inflow Area = 0.997 ac, 0.00% Impervious, Inflow Depth = 0.91" for 100YR event
Inflow = 0.29 cfs @ 12.84 hrs, Volume= 0.075 af
Primary = 0.29 cfs @ 12.84 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min

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

Pond SP2: SP2

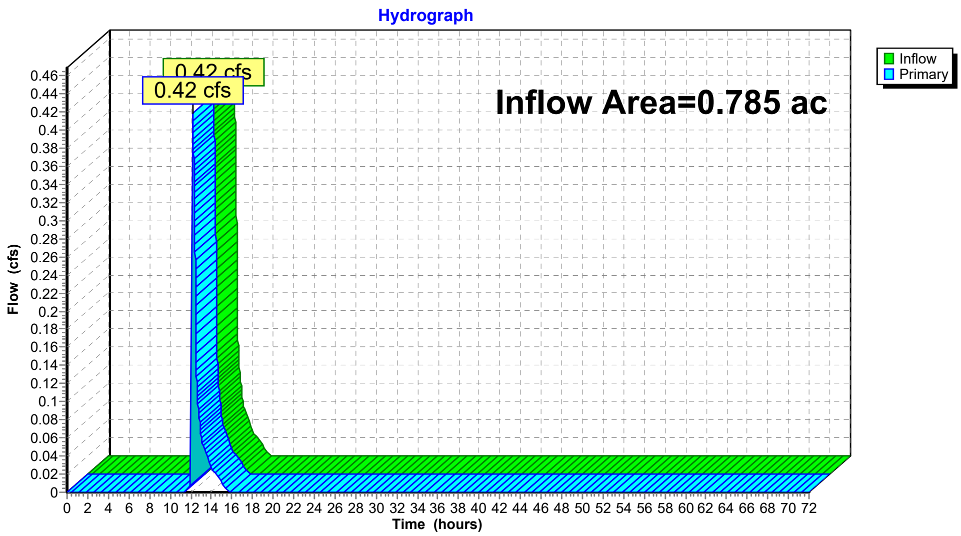


Summary for Pond SP3: SP3

Inflow Area =	0.785 ac,	23.00% Impervious,	Inflow Depth = 0.27"	for 100YR event	
Inflow =	0.42 cfs @	12.21 hrs,	Volume=	0.017 af	
Primary =	0.42 cfs @	12.21 hrs,	Volume=	0.017 af,	Atten= 0%, Lag= 0.0 min

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

Pond SP3: SP3



Summary for Pond TT1: Tree Trench 1

Inflow Area =	0.331 ac,	70.50% Impervious,	Inflow Depth = 5.68"	for 100YR event	
Inflow =	1.34 cfs @	12.07 hrs,	Volume=	0.157 af	
Outflow =	1.17 cfs @	12.12 hrs,	Volume=	0.157 af,	Atten= 13%, Lag= 3.2 min
Discarded =	0.20 cfs @	11.36 hrs,	Volume=	0.131 af	
Primary =	0.97 cfs @	12.12 hrs,	Volume=	0.025 af	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 54.81' @ 12.12 hrs Surf.Area= 1,020 sf Storage= 859 cf

Plug-Flow detention time= 16.5 min calculated for 0.157 af (100% of inflow)
Center-of-Mass det. time= 16.5 min (766.8 - 750.4)

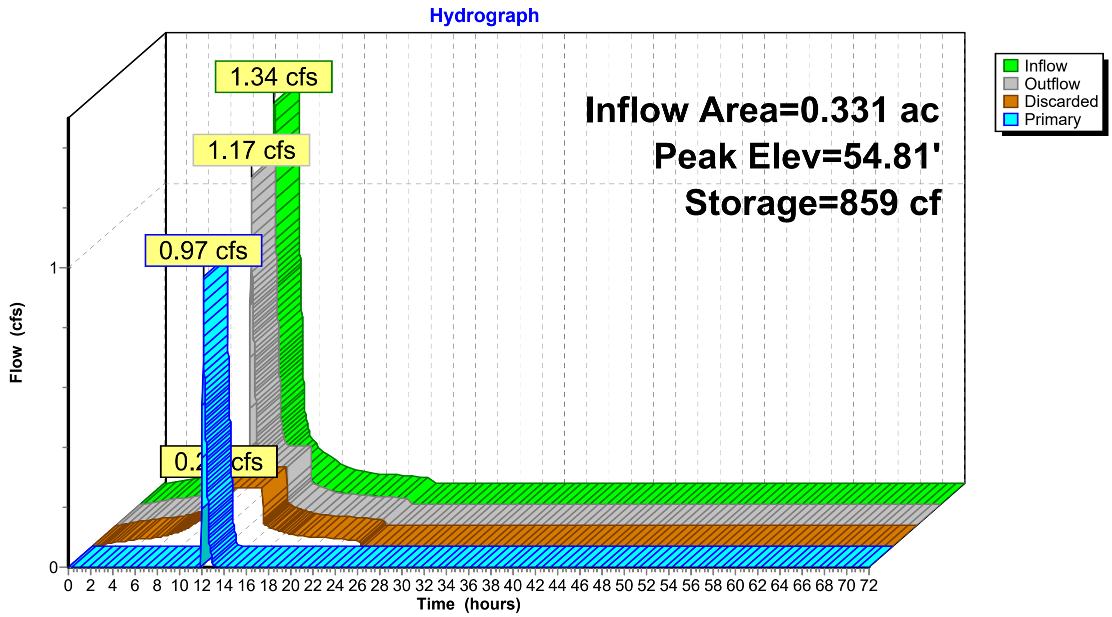
Volume	Invert	Avail.Storage	Storage Description
#1	52.34'	1,008 cf	**9.90'W x 103.00'L x 3.00'H Prismatoid** 3,059 cf Overall - 32 cf Embedded = 3,027 cf x 33.3% Voids
#2	53.78'	32 cf	**8.0" Round Pipe Storage** Inside #1 L= 92.0' S= 0.0050 '/'
		1,040 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	52.34'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	54.30'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.20 cfs @ 11.36 hrs HW=52.37' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=0.97 cfs @ 12.12 hrs HW=54.81' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.97 cfs @ 2.42 fps)

Pond TT1: Tree Trench 1



Summary for Pond TT2: Tree Trench 2

Inflow Area = 0.112 ac, 95.97% Impervious, Inflow Depth = 8.04" for 100YR event
Inflow = 0.94 cfs @ 12.07 hrs, Volume= 0.075 af
Outflow = 0.94 cfs @ 12.07 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.3 min
Discarded = 0.03 cfs @ 8.60 hrs, Volume= 0.038 af
Primary = 0.91 cfs @ 12.07 hrs, Volume= 0.037 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 53.19' @ 12.07 hrs Surf.Area= 150 sf Storage= 163 cf

Plug-Flow detention time= 20.4 min calculated for 0.075 af (100% of inflow)
Center-of-Mass det. time= 20.4 min (761.0 - 740.6)

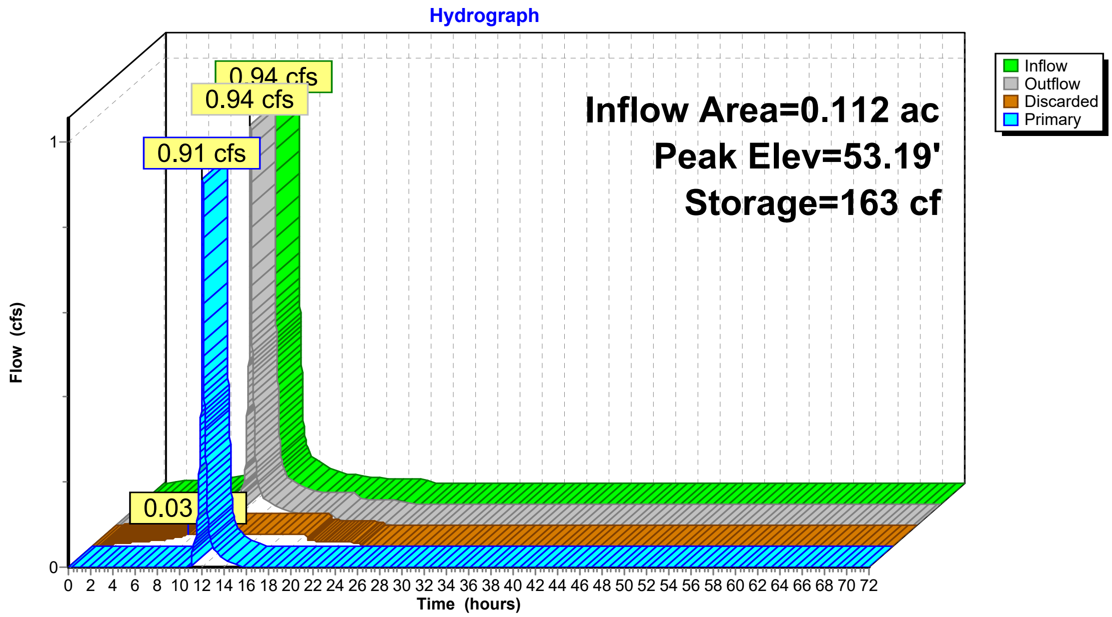
Volume	Invert	Avail.Storage	Storage Description
#1	50.16'	184 cf	**5.00'W x 30.00'L x 3.80'H Prismatoid** 570 cf Overall - 17 cf Embedded = 553 cf x 33.3% Voids
#2	51.66'	17 cf	**8.0" Round Pipe Storage** Inside #1 L= 50.0' S= 0.0050 '/'
		201 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	50.16'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#2	Primary	52.70'	**12.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.03 cfs @ 8.60 hrs HW=50.20' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.91 cfs @ 12.07 hrs HW=53.19' (Free Discharge)
└─**2=Orifice/Grate** (Orifice Controls 0.91 cfs @ 2.38 fps)

Pond TT2: Tree Trench 2



Summary for Pond URC1: URC-1

Inflow Area = 1.559 ac, 43.91% Impervious, Inflow Depth = 3.16" for 100YR event
Inflow = 5.55 cfs @ 12.10 hrs, Volume= 0.410 af
Outflow = 0.38 cfs @ 11.45 hrs, Volume= 0.410 af, Atten= 93%, Lag= 0.0 min
Discarded = 0.38 cfs @ 11.45 hrs, Volume= 0.410 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 55.19' @ 13.24 hrs Surf.Area= 0.046 ac Storage= 0.157 af

Plug-Flow detention time= 139.1 min calculated for 0.410 af (100% of inflow)
Center-of-Mass det. time= 139.1 min (955.2 - 816.1)

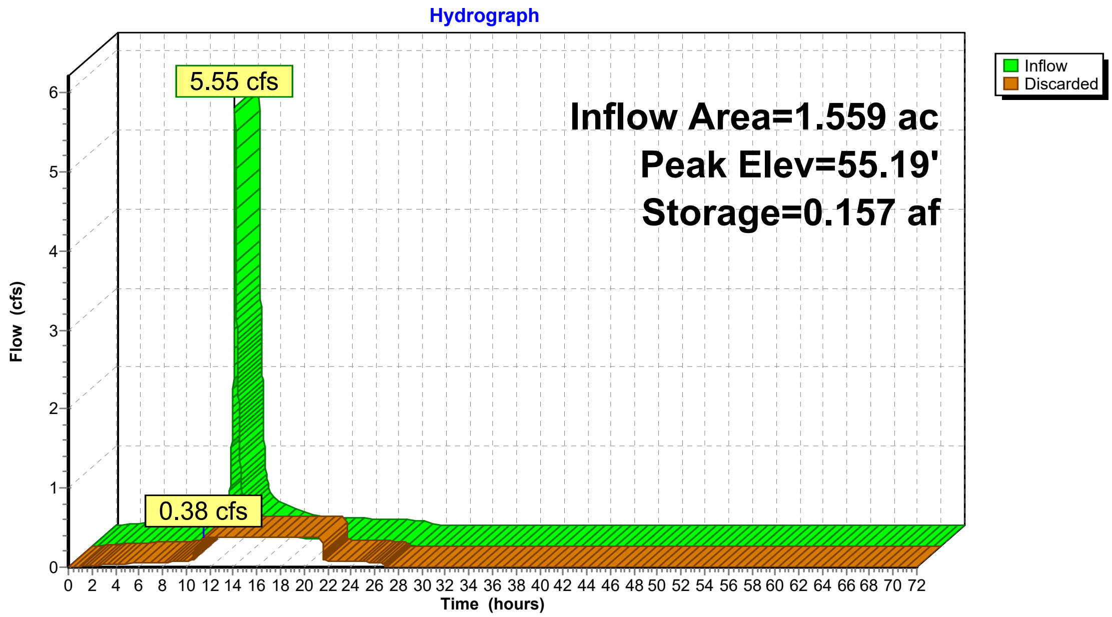
Volume	Invert	Avail.Storage	Storage Description
#1A	48.60'	0.074 af	**23.25'W x 85.57'L x 6.75'H Field A** 0.308 af Overall - 0.085 af Embedded = 0.223 af x 33.3% Voids
#2A	50.60'	0.085 af	**ADS_StormTech MC-3500 d +Cap** x 33 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 11 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		0.160 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	48.60'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.38 cfs @ 11.45 hrs HW=48.67' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.38 cfs)

Pond URC1: URC-1



Summary for Pond URC2: URC-2

Inflow Area = 0.260 ac,100.00% Impervious, Inflow Depth = 8.32" for 100YR event
Inflow = 2.27 cfs @ 12.07 hrs, Volume= 0.180 af
Outflow = 0.17 cfs @ 11.13 hrs, Volume= 0.180 af, Atten= 93%, Lag= 0.0 min
Discarded = 0.17 cfs @ 11.13 hrs, Volume= 0.180 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 60.65' @ 13.06 hrs Surf.Area= 879 sf Storage= 2,838 cf

Plug-Flow detention time= 119.2 min calculated for 0.180 af (100% of inflow)
Center-of-Mass det. time= 119.2 min (858.7 - 739.5)

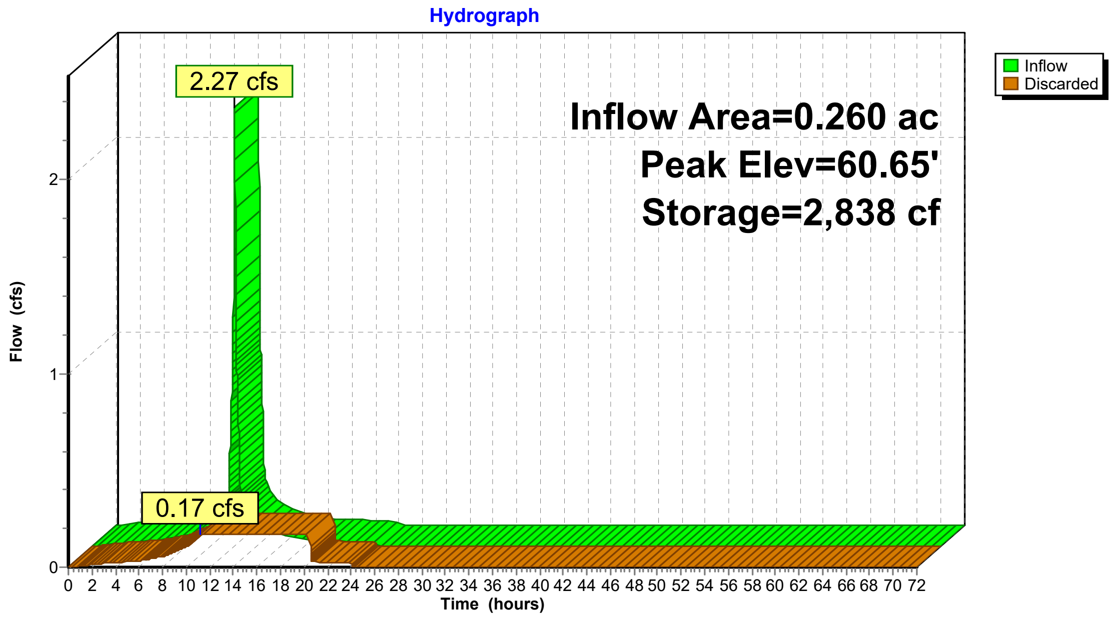
Volume	Invert	Avail.Storage	Storage Description
#1A	54.10'	1,517 cf	**17.33'W x 50.72'L x 6.75'H Field A** 5,934 cf Overall - 1,379 cf Embedded = 4,555 cf x 33.3% Voids
#2A	56.10'	1,379 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 2 Rows of 6 Chambers Cap Storage= +14.9 cf x 2 x 2 rows = 59.6 cf
		2,896 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	54.10'	**8.270 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.17 cfs @ 11.13 hrs HW=54.17' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Pond URC2: URC-2



Summary for Pond URC3: URC-3

Inflow Area = 0.436 ac, 43.62% Impervious, Inflow Depth = 4.42" for 100YR event
Inflow = 1.91 cfs @ 12.09 hrs, Volume= 0.161 af
Outflow = 0.12 cfs @ 11.17 hrs, Volume= 0.161 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.12 cfs @ 11.17 hrs, Volume= 0.161 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 62.28' @ 13.98 hrs Surf.Area= 765 sf Storage= 2,654 cf

Plug-Flow detention time= 173.6 min calculated for 0.161 af (100% of inflow)
Center-of-Mass det. time= 173.6 min (944.0 - 770.3)

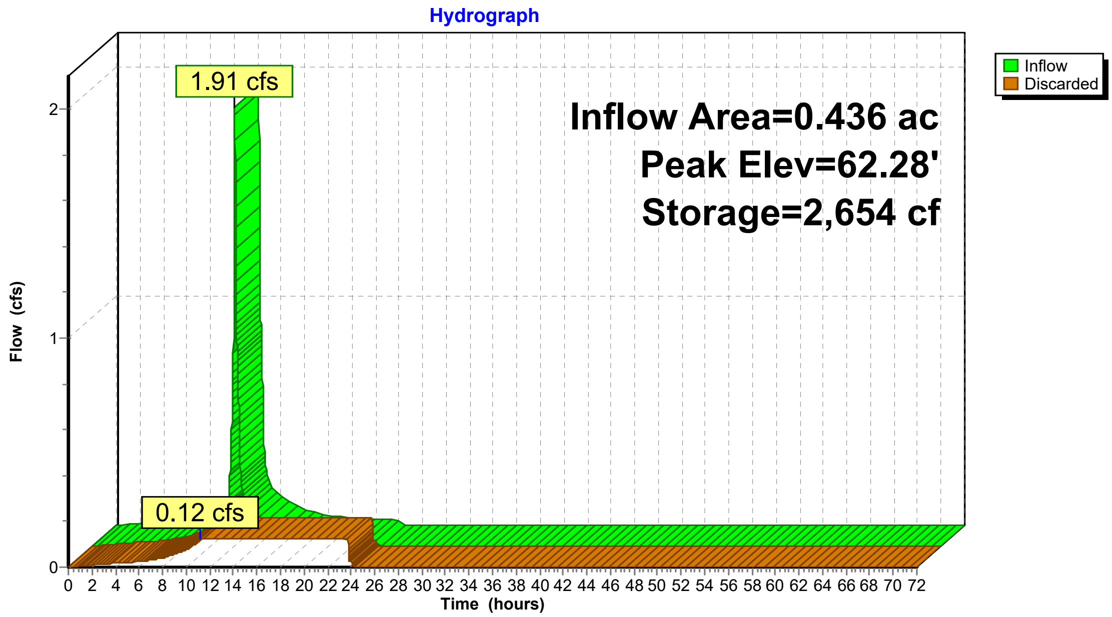
Volume	Invert	Avail.Storage	Storage Description
#1A	55.55'	1,250 cf	**22.25'W x 34.38'L x 6.75'H Field A** 5,163 cf Overall - 1,409 cf Embedded = 3,755 cf x 33.3% Voids
#2A	57.55'	1,409 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 3 Rows of 4 Chambers Cap Storage= +14.9 cf x 2 x 3 rows = 89.4 cf
		2,659 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	55.55'	**7.000 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.12 cfs @ 11.17 hrs HW=55.62' (Free Discharge)
└1=**Exfiltration** (Exfiltration Controls 0.12 cfs)

Pond URC3: URC-3



Summary for Pond URC4: URC-4

Inflow Area = 0.230 ac,100.00% Impervious, Inflow Depth = 8.32" for 100YR event
Inflow = 2.00 cfs @ 12.07 hrs, Volume= 0.159 af
Outflow = 0.14 cfs @ 11.00 hrs, Volume= 0.159 af, Atten= 93%, Lag= 0.0 min
Discarded = 0.14 cfs @ 11.00 hrs, Volume= 0.159 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 62.53' @ 13.22 hrs Surf.Area= 851 sf Storage= 2,584 cf

Plug-Flow detention time= 135.9 min calculated for 0.159 af (100% of inflow)
Center-of-Mass det. time= 135.9 min (875.3 - 739.5)

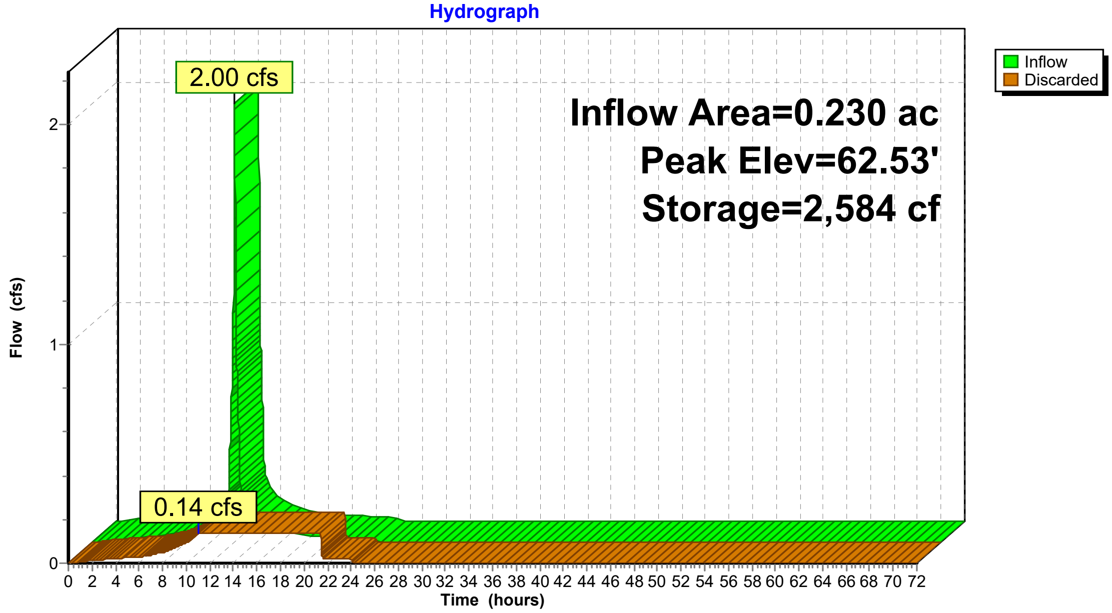
Volume	Invert	Avail.Storage	Storage Description
#1A	56.80'	1,292 cf	**30.17'W x 28.21'L x 6.25'H Field A** 5,319 cf Overall - 1,439 cf Embedded = 3,880 cf x 33.3% Voids
#2A	58.30'	1,439 cf	**ADS_StormTech MC-3500 d +Cap** x 12 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 4 Rows of 3 Chambers Cap Storage= +14.9 cf x 2 x 4 rows = 119.2 cf
		2,731 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	56.80'	**7.000 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.14 cfs @ 11.00 hrs HW=56.86' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Pond URC4: URC-4



Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	Massachusetts
Location	
Longitude	70.538 degrees West
Latitude	41.783 degrees North
Elevation	0 feet
Date/Time	Thu, 21 Jan 2021 13:15:17 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.29	0.44	0.55	0.72	0.90	1.14	**1yr**	0.78	1.12	1.33	1.69	2.17	2.79	3.15	**1yr**	2.47	3.03	3.49	4.03	4.66	**1yr**
2yr	0.36	0.56	0.69	0.92	1.15	1.45	**2yr**	0.99	1.37	1.68	2.11	2.65	3.33	3.71	**2yr**	2.95	3.57	4.07	4.81	5.46	**2yr**
5yr	0.44	0.68	0.85	1.14	1.46	1.85	**5yr**	1.26	1.74	2.15	2.68	3.34	4.15	4.67	**5yr**	3.67	4.49	5.08	5.96	6.68	**5yr**
10yr	0.50	0.78	0.99	1.34	1.75	2.23	**10yr**	1.51	2.09	2.59	3.23	3.99	4.90	5.57	**10yr**	4.34	5.35	6.01	7.00	7.78	**10yr**
25yr	0.59	0.94	1.20	1.66	2.21	2.85	**25yr**	1.91	2.66	3.31	4.11	5.04	6.12	7.02	**25yr**	5.41	6.75	7.52	8.68	9.52	**25yr**
50yr	0.68	1.10	1.41	1.97	2.65	3.43	**50yr**	2.29	3.20	3.98	4.93	6.01	7.24	8.37	**50yr**	6.40	8.05	8.91	10.22	11.10	**50yr**
100yr	0.79	1.28	1.65	2.33	3.18	4.12	**100yr**	2.74	3.85	4.79	5.91	7.16	8.56	9.98	**100yr**	7.58	9.60	10.56	12.03	12.94	**100yr**
200yr	0.91	1.49	1.92	2.76	3.81	4.96	**200yr**	3.29	4.64	5.77	7.10	8.54	10.13	11.91	**200yr**	8.97	11.45	12.52	14.18	15.09	**200yr**
500yr	1.12	1.84	2.39	3.47	4.85	6.33	**500yr**	4.18	5.93	7.36	9.01	10.78	12.67	15.05	**500yr**	11.22	14.47	15.69	17.62	18.51	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.25	0.38	0.47	0.63	0.77	0.92	**1yr**	0.67	0.90	1.09	1.52	1.97	2.31	2.89	**1yr**	2.04	2.78	3.07	3.60	4.39	**1yr**
2yr	0.35	0.54	0.66	0.90	1.11	1.35	**2yr**	0.96	1.32	1.57	2.09	2.62	3.20	3.62	**2yr**	2.84	3.48	3.92	4.64	5.37	**2yr**
5yr	0.40	0.61	0.76	1.04	1.33	1.62	**5yr**	1.15	1.58	1.88	2.48	3.09	3.77	4.20	**5yr**	3.34	4.04	4.67	5.69	6.14	**5yr**
10yr	0.44	0.68	0.84	1.17	1.51	1.84	**10yr**	1.30	1.80	2.13	2.81	3.48	4.28	5.04	**10yr**	3.78	4.84	5.26	5.94	6.86	**10yr**
25yr	0.50	0.76	0.95	1.36	1.78	2.19	**25yr**	1.54	2.14	2.45	3.28	4.04	5.06	6.08	**25yr**	4.48	5.85	6.15	6.82	7.92	**25yr**
50yr	0.55	0.84	1.05	1.51	2.03	2.48	**50yr**	1.75	2.42	2.68	3.68	4.49	5.77	7.01	**50yr**	5.11	6.74	6.95	7.54	8.83	**50yr**
100yr	0.62	0.93	1.17	1.68	2.31	2.80	**100yr**	1.99	2.74	2.94	4.14	4.99	6.58	8.09	**100yr**	5.82	7.78	7.82	8.35	9.82	**100yr**
200yr	0.68	1.02	1.29	1.87	2.61	3.18	**200yr**	2.25	3.11	3.22	4.62	5.55	7.51	9.33	**200yr**	6.65	8.97	8.88	9.25	10.99	**200yr**
500yr	0.78	1.15	1.48	2.16	3.07	3.73	**500yr**	2.65	3.65	3.58	5.36	6.38	8.99	11.31	**500yr**	7.96	10.87	10.53	10.65	12.72	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.32	0.50	0.61	0.82	1.00	1.26	**1yr**	0.87	1.23	1.50	2.00	2.51	3.13	3.35	**1yr**	2.77	3.22	3.74	4.30	4.91	**1yr**
2yr	0.38	0.59	0.72	0.98	1.20	1.47	**2yr**	1.04	1.44	1.71	2.27	2.84	3.49	3.82	**2yr**	3.09	3.68	4.35	5.11	5.59	**2yr**
5yr	0.48	0.74	0.92	1.26	1.61	1.94	**5yr**	1.39	1.90	2.26	2.90	3.57	4.60	5.09	**5yr**	4.07	4.89	5.45	6.22	7.29	**5yr**
10yr	0.58	0.90	1.11	1.55	2.01	2.42	**10yr**	1.73	2.37	2.80	3.54	4.30	5.65	6.12	**10yr**	5.00	5.88	6.64	8.11	8.86	**10yr**
25yr	0.76	1.16	1.45	2.06	2.71	3.25	**25yr**	2.34	3.18	3.79	4.63	5.53	7.43	8.00	**25yr**	6.57	7.70	8.58	10.58	11.49	**25yr**
50yr	0.93	1.42	1.77	2.54	3.42	4.08	**50yr**	2.95	3.99	4.77	5.67	6.71	9.11	9.82	**50yr**	8.06	9.44	10.42	12.95	13.99	**50yr**
100yr	1.15	1.74	2.17	3.14	4.31	5.11	**100yr**	3.72	5.00	6.01	6.94	8.16	11.20	12.05	**100yr**	9.91	11.59	12.73	15.91	17.06	**100yr**
200yr	1.41	2.12	2.69	3.89	5.43	6.41	**200yr**	4.68	6.27	7.59	8.53	9.92	13.75	14.80	**200yr**	12.16	14.23	15.50	19.49	20.82	**200yr**
500yr	1.87	2.78	3.57	5.19	7.38	8.65	**500yr**	6.37	8.46	10.36	11.22	12.88	17.97	19.42	**500yr**	15.91	18.67	20.06	25.47	27.11	**500yr**

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APPENDIX E

TSS and Recharge Calculations

Location: Subcatchment DA2b to BIO2 to URC-3

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: 19038
Prepared By: GK
Date: 2/19/2021

*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

TSS Removal Calculation Worksheet

Location: Subcatchment DA3a to BIO1 to URC-1

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: 19038
Prepared By: GK
Date: 2/19/2021

*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

TSS Removal Calculation Worksheet

Location: Subcatchment DA3b to TT1 to URC-1

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
Treebox Filter	0.80	0.75	0.60	0.15
Subsurface Infiltration Structure	0.80	0.15	0.12	0.03
	0.00	0.03	0.00	0.03
	0.00	0.03	0.00	0.03

Total TSS Removal = 97%

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

Project: 19038
Prepared By: GK
Date: 2/19/2021

*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

Location: Subcatchment DA3c to RB1

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**
Dry Well	**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: 19038
Prepared By: **GK**
Date: **2/19/2021**

*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

TSS Removal Calculation Worksheet

Location: Subcatchment DA3d to TT2 to RB2

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
Treebox Filter	0.80	0.75	0.60	0.15
Dry Well	0.80	0.15	0.12	0.03
	0.00	0.03	0.00	0.03
	0.00	0.03	0.00	0.03

Total TSS Removal = 97%

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

Project: 19038
Prepared By: GK
Date: 2/19/2021

*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

Horsley Witten Group
Sustainable Environmental Solutions

STANDARD 3-RECHARGE REQUIREMENTS

Project Name:	Cape View Way
Project No:	19038
Calculated by:	GK — Date: 2/19/2021
Checked:	BRK — Date: 3/5/2021

TOTAL DRAINAGE AREA	346,654	sf
	7.96	acres
TOTAL IMPERVIOUS AREA	82,278	sf
	1.89	acres
TOTAL IMPERVIOUS DIRECTED TO RECHARGE	67,298	sf
	1.54	acres
% IMPERVIOUS TO BE RECHARGED	81.79343	%

SOIL TYPE	A	
RECHARGE VOLUME REQUIRED (Rv)	**3,365**	cft
AVE. INFILTRATION RATE	2.41	in/hr

RECHARGE VOLUMES		
RAINFALL	1	in
TREE TRENCH 1	3,059	cf
TREE TRENCH 2	570	cf
BIO-1	1,611	cf
BIO-2	696	cf
TOTAL RECHARGE VOLUME PROVIDED	**5,936**	**cf**
TOTAL RECHARGE VOLUME REQUIRED	**3,365**	**cf**

Soil Type	Target Depth (in)	Target Depth (ft)
A	0.6	0.05
B	0.35	0.029
C	0.25	0.021
D	0.1	0.008

Rawls Table

Texture Class	NRCS Hydrologic Soil Group (HSG)	Infiltration Rate Inches/Hour
Sand	A	8.27
Loamy Sand	A	2.41
Sandy Loam	B	1.02
Loam	B	0.52
Silt Loam	C	0.27
Sandy Clay	C	0.17
Clay Loam	D	0.09
Silty Clay Loam	D	0.06
Sandy Clay	D	0.05
Silty Clay	D	0.04
Clay	D	0.02

Calculate *Required Recharge Volume*.[7] The *Required Recharge Volume* equals a depth of runoff corresponding to the soil type times the impervious areas covering that soil type at the post-development site.

$Rv = F \times impervious\ area$ **Equation (1)**

Rv = *Required Recharge Volume*, expressed in Ft^3, cubic yards, or acre-feet
F = Target Depth Factor associated with each Hydrologic Soil Group
Impervious Area = pavement and rooftop area on site

To determine whether an infiltration BMP will drain within 72 hours, the following formula must be used[21]:

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$

Where:
Rv = Storage Volume
K = Saturated Hydraulic Conductivity For "Static" and "Simple Dynamic" Methods, use Rawls Rate (see Table 2.3.3). For "Dynamic Field" Method, use 50% of the in-situ saturatec hydraulic conductivity.
Bottom Area = Bottom Area of Recharge Structure[22]

[20] The drawdown analysis also assumes that the water table does not fluctuate during the draw down period.

[21] In some cases, the infiltration structure may be designed to treat the *Required Water Quality Volume* and/or to attenuate peak discharges in addition to infiltrating the *Required Recharge Volume*. In that event, the storage volume of the structure must be used in the formula for determining drawdown time in place of the *Required Recharge Volume*.

Practice	(cf))	(sf)	K	Time to drawdown (hrs)*
TREE TRENCH 1	3,059	1,020	2.41	15
TREE TRENCH 2	570	375	2.41	8
BIO-1	1,611	1,361	2.41	6
BIO-2	696	150	2.41	23

*MUST BE LESS THAN 72 HOURS

APPENDIX F

Stormwater Operation and Maintenance Plan

Stormwater Management
Operation and Maintenance Plan

Cape View Way
Bourne, Massachusetts

Prepared for:

PRESERVATION OF AFFORDABLE HOUSING
2 Oliver Street, Suite 500
Boston, MA 02109

Prepared by: Horsley Witten Group, Inc

March 2021

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Unit 1 • Sandwich, MA 02563
508-833-6600 • horsleywitten.com

TABLE OF CONTENTS

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APPENDICES

1.0 OWNER AND RESPONSIBILITY FOR MAINTENANCE

POAH, LLC is responsible for the financing and continuous operation, maintenance and required emergency repair for the stormwater management system and associated drainage network.

Owner: POAH, LLC
2 Oliver Street
Suite 500
Boston, MA 02109

Contact: TBD
Name:
Email:
Ph:

Signed:____________________________________

Date:______________________________________

2.0 INTRODUCTION

This Guide provides a general description of the function and maintenance requirements for the Stormwater Management System for the Cape View Way Housing Development. Proper maintenance is vital to their long-term success.

The proposed stormwater management includes a green stormwater infrastructure (GSI) approach to filter, infiltrate and store stormwater runoff prior to discharge. Therefore, the maintenance provider is required to familiarize themselves with this Guide and inspect and maintain the following GSI practices, as indicated on the construction drawings, and as outlined in this maintenance guide throughout the year.

PRETREATS AND FILTERS

- Deep Sump Catch Basins
    - An underground retention system designed to remove trash, debris, and coarse sediment from runoff. Typically, deep sump catch basins have a minimum four-foot sump.
- Bioretention Area
    - A shallow depression in the landscape designed to collect, move, hold, and treat stormwater as it infiltrates through a soil matrix to remove phosphorus and reduce stormwater runoff prior to discharge to the storm drain system.
- Tree Trench
    - A tree pit with underground infiltration trenches. It is a type of bioretention facility.

STORES AND INFILTRATES

- Dry Well (Recharge Basin)
    - An excavated pit used to infiltrate runoff. Pretreatment must occur prior to the runoff discharging to a dry well for runoff sourced from parking lots and other impervious cover with higher potential pollutant loads.
- Underground Recharge Chambers
    - The underground recharge chambers are designed to store and infiltrate runoff. The underground chambers include an overflow structure to slowly release runoff from larger storm events to the drainage system.

3.0 FUNCTION & MAINTENANCE

How Does Green Infrastructure Work?

GSI is nature-based approach to stormwater treatment and management. These stormwater practices or “treatment areas” are designed to mimic nature and use the natural filtration properties of soil and plants to remove pollutants from stormwater runoff prior to discharging to the drainage system. GSI relies on the following five basic design elements, or steps, to function properly.

1. **Collect (Inlets)**
2. **Capture Sediment (Pretreatment)**
3. **Move Water (Pipes)**
4. **Treat and Manage (Stores, Filters, and Infiltrates)**
5. **Overflows (Structure)**

These five steps will be referenced throughout this Guide. If one of these steps does not function properly, the entire system can be compromised and the GSI practice itself could be contributing to maintenance problems. This can lead to a landscape nuisances, more frequent maintenance, and costly repairs/improvement.

What is required for Maintenance?

As these are nature-based systems that often rely on plant care, the maintenance for GSI typically falls under landscape and general site maintenance services. The regularly scheduled maintenance as outlined in this Guide is critical to ensure proper function, maintain infiltration rates and storage capacity and preserve the pollutant removal capabilities as well as the visual appearance. Regularly scheduled maintenance can prevent deficiencies in the effectiveness of the systems, due to sediment build-up, damage, or deterioration.

General maintenance includes the following:

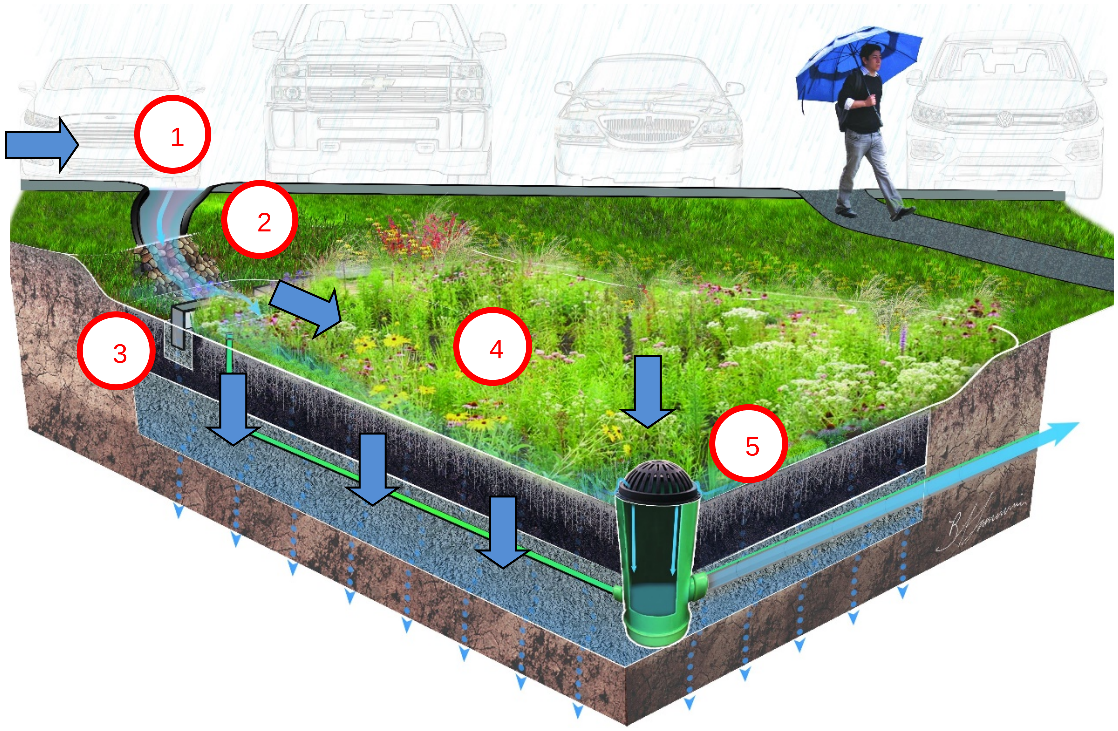
1. Removing sediment from the pretreatment practices used to capture sediment.
2. Maintaining the proper drainage function and pollutant removal capacity of the systems.
3. Maintaining healthy native, tress, plants, and vegetative cover as well as the removal of unwanted weeds.

It is recommended that all practices be maintained regularly as part of the routine landscape maintenance or at a minimum four times per year and after major rain events.

- **Early Spring**: during spring cleanup
- **Summer:** during lawn mowing and other routine park maintenance
- **Early Fall:** when leaves begin to fall
- **Late Fall/Early Winter:** after all the leaves have fallen during leaf removal
- **After major storm events**: 2” of rain or greater.

The following sections describes the general function and landscape maintenance of each practice. Included in the appendices is a specific maintenance checklist for each practice type along with a plan showing the location of the items to be inspected and maintained.

3.1 Bioretention Area



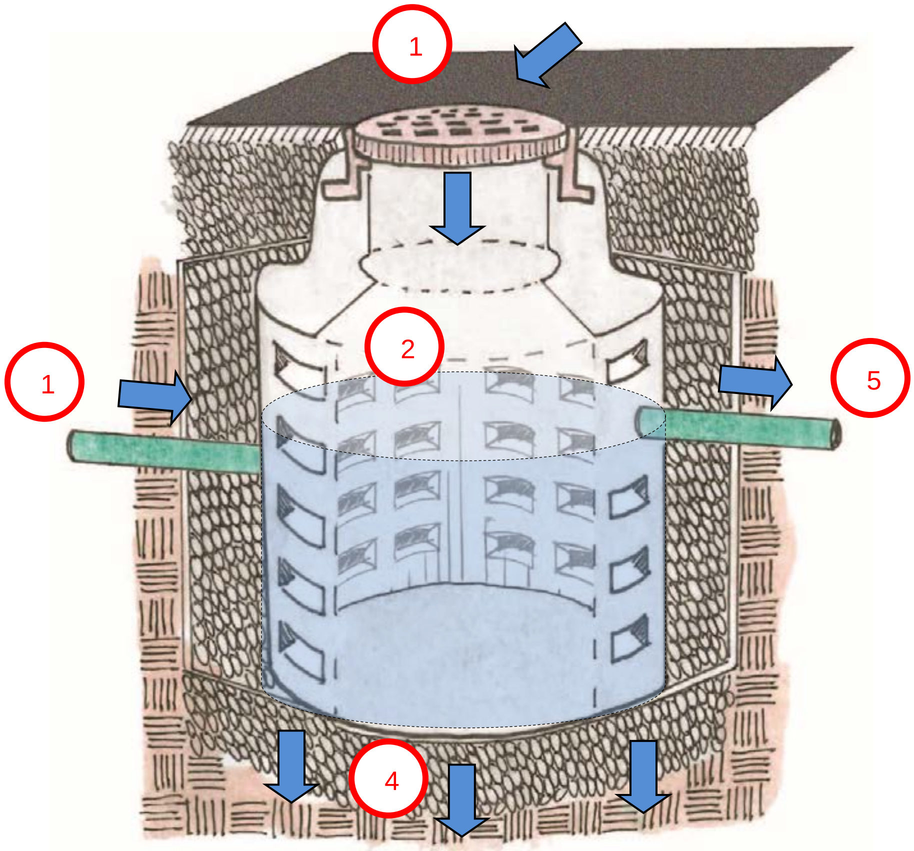
FUNCTION:

1. COLLECT – Inlet flume
   Stormwater runoff is collected at the inlet flume and diverted to the sediment forebay.
2. CAPTURE - Sediment Forebay
   Sediment, trash, and debris is captured and accumulates overtime in the sediment forebay.
3. MOVE - The stormwater discharges directly to the bioretention area via a granite check dam weir.
4. TREAT AND MANAGE – Bioretention Soil (filters)
   Stormwater overtops the forebay granite check dam and flows through the planted bioretention area, which infiltrates or filters stormwater through the planted sandy soil matric and subsoils.
5. OVERFLOW - Perforated Underdrain and Structure
   During larger rain events, soils become saturated and the underdrain drains water to the overflow structure. For extreme events, the water level will rise and overflow into the outlet structure.

SURROUNDING AREA - Parking lots, roadways, sidewalks, and open lawns
Problems such as unstabilized soils, erosion, invasive plants and over sanding of the parking lot can contribute to long-term maintenance problems (See Section 6.0).

See Appendix A for Maintenance Checklist

3.2 Dry Well (Recharge Basin)



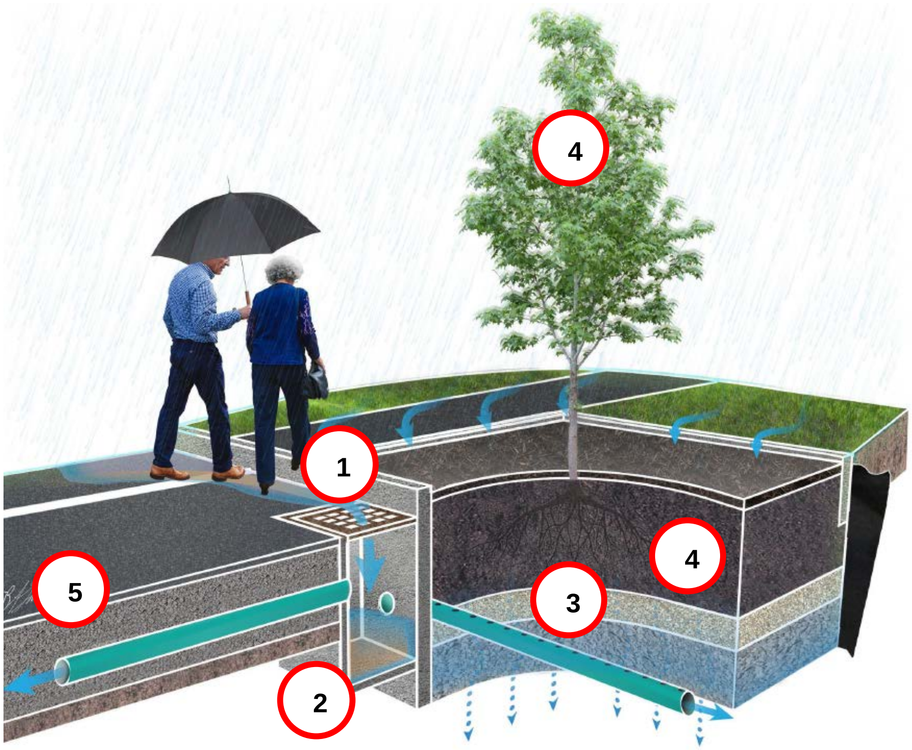
FUNCTION:

1. COLLECT – Catch Basin Grate and Inlet Pipes
   Stormwater runoff is collected from roof drains by pipe and overland flow through the catch basin grate.
2. CAPTURE–Dry Well
   Stormwater runoff is captured in the dry wells and stored during rain events.
3. MOVE– NA
4. INFILTRATE – Gravel and Subsoil
   Runoff if is infiltrated into the sub soils through the dry well perforations and surrounding gravel.
5. OVERFLOW –
   When the capacity of the dry well is exceeded an overflow pipe is provided, which is assumed to discharge to the City drainage network in Thatcher Street.

SURROUNDING AREA – Landscape Area
Problems such as unstabilized soils, erosion, and leaf litter can contribute to long-term maintenance problems (See Section 6.0).

See Appendix A for Maintenance Checklist

3.3 Tree Trench



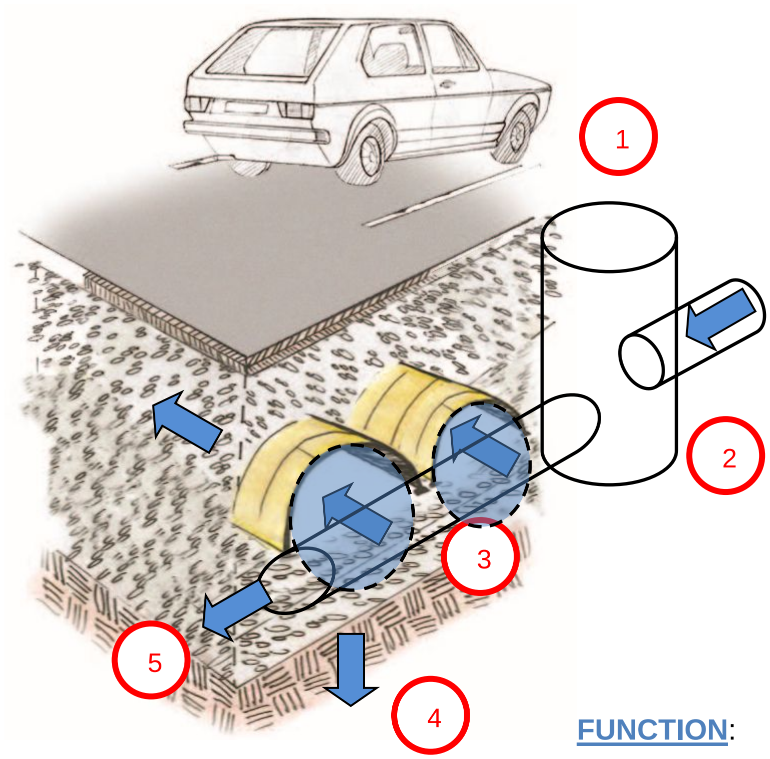
FUNCTION:

1. COLLECT – Catch Basin Grate and Sidewalk Area Drain
   Stormwater runoff is collected along the road gutter and sidewalk surface via overland flow through the catch basin and area drain.
2. CAPTURE – Catch Basin and Area Drain Sump
   The catch basin and area capture sediment and debris in the 4’ sump prior to discharge.
3. MOVE - Pipe and Laterals
   Stormwater is diverted to an 8” pipe from the catch basin to an 8” perforated pipe or lateral which discharges to the gravel storage bed.
4. TREAT AND MANAGE – Tree, Gravel Bed and Subsoil
   Runoff off is stored in the gravel bed providing water for the trees and infiltrated into the subsoils.
5. OVERFLOW – Pipe and chimney connection to the city storm drain
   When the capacity of the gravel bed is exceeded an overflow pipe in the catch basin diverts overflow runoff to the existing drainage system.

SURROUNDING AREA –Roadway and Sidewalks
Problems such as unstabilized soils, erosion, and over sanding during the winter can contribute to long-term maintenance problems (See Section 6.0).

See Appendix A for Maintenance Checklist

3.4 Underground Chambers



FUNCTION:

1. COLLECT – Catch basin or Bioretention/Sand Filter (See Section 3.1 and 3.2)
   Stormwater runoff is directed overland to the inlet(s) where stormwater enters the system.
2. CAPTURE –Catch basin/Isolator Row/ Bioretention/Sand Filter)
   Sediment, trash, and debris is captured and accumulates overtime in the deep sumps, the bioretention area or sand filter forebays, or chamber isolator row (see Appendix C)
3. MOVE - Pipes and Manifold
   Runoff is directed to the isolator row and underground chambers via a closed pipe/manifold system.
4. STORE AND INFILTRATE- Underground Chambers (infiltrates and/or stores)
   For recharge chambers, runoff from small rain events infiltrate into the subsurface soils beneath the chambers. Larger storm events are stored and slowly released. For underground storage pipes, stormwater is stored and slowly released.
5. OVERFLOW – Manhole with Weir
   During larger rain events and underdrain will supplement the infiltration to release stored water from the chambers and discharge via an overflow structure.

SURROUNDING AREA – Parking Lot/Driveway
Problems such as unstabilized soils, erosion, invasive plants and over sanding can contribute to long-term maintenance problems (See Section 6.0).

See Appendix A for Maintenance Checklist
See Appendix D for additional manufacturer's requirements.

3.5 Landscape Maintenance

By design, plants in the GIS practices are meant to help filter the stormwater and flourish throughout the growing season. The plants do not require fertilizers, watering and/or mowing. Remove and replace vegetation as necessary, using the appropriate species as shown on the recommended plant list below.

Plants			
Task	**Frequency**	**Requirement**	**Time of Year**
Watering	First three months after planting or drought	• During establishment or drought conditions, plants should be watered a minimum of once every seven to ten days.	• June-Sept.
Plant Cutting & Pruning	Annually	• Leave dry standing stalks during the dormant months and remove in the spring. • Cut back grasses, sedges, and rushes in the spring. • Prune trees to remove deadwood and low hanging branches.	• Early Spring
Plant Thinning	Once every 3 years	• Separation of herbaceous vegetation rootstock should occur when over-crowding is observed	• Early Spring or Late Fall
Plant Replacement	As required	• Replace/replant diseases, unhealthy or dead plans to maintain a healthy plant community	• Early Spring or Fall
Mowing, Bioretention	NOT REQUIRED	• NONE, DO NOT MOW	• NA
Fertilizing	NOT REQUIRED	• NONE	• NA
Mulch	NOT REQUIRED	• NONE	• NA

To reduce the level of effort, regular weeding should occur quarterly from April thru October.

Weeds			
Task	**Frequency**	**Requirement**	**Time of Year**
Weeding	Quarterly	• Weeding should be limited to invasive and exotic species, which can overwhelm the desired plant community. • Non-chemical methods including hand pulling and hoeing are recommended • Chemical herbicides should be avoided.	• Early Spring • Late Spring • Late Summer • Late Fall

REPLACEMENT PLANTS

The plants that thrive in bioretention areas and tree trenches are typically quite drought tolerant due to the filter profile having a top layer of planting soil and sandy soil media or aggregate below. In bioretention areas, they need to be able to withstand periods of inundation after storm events, however; when it doesn't rain, there will be less water held naturally in the sand than in other soil types for the plants to use.

If replacements are needed, use the planting plan as a guide (see proposed species list below). However, if all the plants of a certain species have not done well in the bioretention area, do not replace with that same species. Rather, replant with one or more of the other species that has thrived under the bioretention area conditions or have a plant professional choose a different species based on current photos of the site and the following site-specific considerations.

Plants for bioretention areas should be:

- Preferably native species to help support native wildlife like pollinators
- Drought tolerant
- Tolerant of inundation for 24 hours
- Size constraints: Not so tall that they impact sightlines, as applicable
- Sun and salt tolerant
- A mix of different types of plants that will create a resilient plant community: cold & warm season grasses, perennials, groundcovers in all areas.

Trees

Amelanchier x grandiflora	Serviceberry
Betula nigra	River Birch
Acer Rubrum	Red Maple

Ornamental Grasses / Perennials

Asclepia tuberosa	Butterflyweed
Carex pensylvanica	Pennsylvania Sedge
Deschampsia cespitosa	Tufted Hair Grass
Elymus virginicus	Virginia Wild Rye
Eupatorium maculatum	Joe-Pye Weed
Geranium maculatum	Cranesbill
Iris versicolor	Blue Flag
Juncus effusus	Soft Rush
Liatris spicata	Blazing Star
Monarda fistulosa	Wild bergamot
Muhlenbergia capillaris	Pink Muhly Grass
Pycnanthemum muticum	Big Leaf Mountain Mint
Panicum virgatum	Switch grass
Schizachyrium scoparium	Little Bluestem
Sporobolus heterolepis	Prairie Dropseed

WEED GUIDE

Yellow Toadflax *(Linaris vulgaris)*

Redroot Pigweed- (*Amaranthus retroflexus)*

Smartweed *(Polygonum lapathifolium)*

Dandelion *(Taraxacum officinale)*

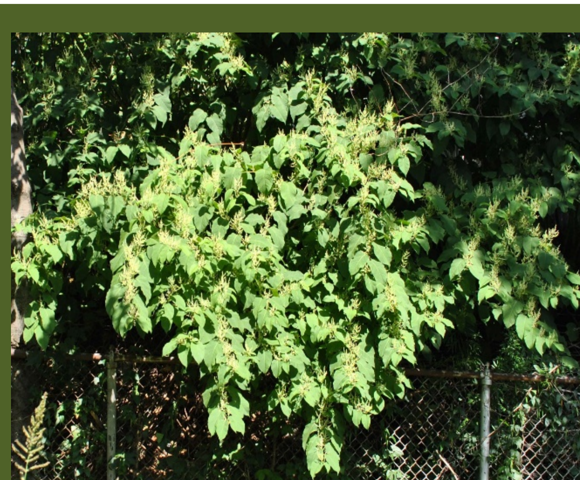
Fireweed *(Erechtites hieracifolia)*

Spotted Spurge (Euphorbia maculata)

Crabgrass *(Digitaria ischaemum)*

Crabgrass with seedheads

Ragweed (*Ambrosia artemisiifolia*)



Japanese Knotweed (Polygonum cuspidatum)


Ragweed (*Ambrosia artemisiifolia*)


Japanese Knotweed (Polygonum cuspidatum)


Green Foxtail (Setaria viridis)


Norway Maple Tree Seedling (Acer platanoides)

Catalpa Tree Seedling (Catalpa speciosa)

Purple Loosetrife (*Lythrum salicaria*)

Field Bindweed (*Convolvulus arvensis*)

Black Swallow-wort (*Cynanchum louisea*)

4.0 ROUTINE MAINTENANCE

Other routine maintenance should include the following:

- Remove of trash and litter from paved and perimeter areas.
- Pavement Sweeping:
  - Minimum of once per year after the spring thaw.
- Check for erosions problems and sediment source(s) along the GSI practice sidewalls if excessive, frequent sediment accumulation occurs in practice area.
- Check for erosions problems and sediment source(s) in the contributing drainage area if excessive, frequent sediment accumulation occurs at inlet flume of sediment forebay.
- Contributing drainage pipes:
  - Inspect annually for proper operation.

5.0 SNOW REMOVAL

Snow removal from the practice is not necessary. Plowed or shoveled snow piles should not block the catch basin grates or inlet flumes.

Excessive salting, sanding or other de-icing practices should be avoided. Use of large amounts of sand should also be avoided to avoid obstructing/clogging the conveyance system.

6.0 LONG-TERM POLLUTION PREVENTION PLAN

Long-term pollution prevention measures implemented throughout the development site will further reduce pollutants in stormwater discharges after construction.

6.1 Lawn/Landscaping Maintenance

Lawn and landscaping maintenance should be conducted with minimal use of fertilizers and pesticides to protect the nearby wetland and water resources. In particular, phosphate-based fertilizers are not to be used. Prior to applying fertilizers to the lawn and landscape, a soil analysis should be completed,

6.2 Pet Waste Management

Residents and visitors will be encouraged to pick up after their pets with signage along lawn areas.

6.3 Solid Waste Management

Enclosed dumpsters with lids will be provided on-site for solid waste management at the site.

6.4 Pavement Sweeping Schedules

The road and parking area will be, at a minimum, swept annually after spring snowmelt.

6.5 Illicit Discharges

No sewer pipes, floor drains or other new pipe connections will be connected to the drainage system. All wastewater will be connected to the municipal sewer.

6.6 Personnel Training

All staff/ personnel responsible for maintaining the practices will be given a copy of this Guide and will receive training in the applicable practices and implementation described in herein.

7.0 ESTIMATED OPERATION AND MAINTENANCE BUDGET

The estimated average annual operating and maintenance budget for the proposed system is shown below:

Bioretention (2):	**$ 2,000**
$1,000 per practice	
Source: Center for Watershed Protection (CWP)	
Tree Trench (2)	**$ 2,000**
$1,000 per practice	
Source: Estimate	
Catch Basin and Recharge Basins (6):	**$ 1,200**
$200/structure	
Source: Massachusetts Highway Department	
Underground Chamber (4):	**$ 8,000**
$2,000/field	
Source: Manufacturer	
Other Routine Maintenance:	**$ 2,000**
Removal of trash and litter	
Annual parking lot cleaning	
Drainage network inspections	
Source: Estimate	
Total:	**$ 15,200**

It should be noted that the maintenance costs provided are estimates only.

APPENDIX A

Maintenance Checklists

Bioretention/Bioswale Maintenance Checklist
Cape View Way Development

Date:

Time:

Inspector:

Maintenance Item	Description	Maintenance (Y/N)
1. COLLECT **Includes:** Catch basin/Inlet Structure **Frequency:** Inspect four times per years during regular park maintenance and after major storm events (2” of rain or greater) **When:** March, June, September, November		
Surface Debris Cleaning	Remove all trash, leaf litter and inlet clogging.	
Inlets	Check for clogging and sediment accumulation that impacts inflow. If sediment/debris accumulation	
Actions to be taken:		
2. CAPTURE **Includes:** Sediment Forebay **Frequency:** Inspect four times per year and after major storm events the first year; then annually and after major storm events (2” of rain or greater) **When:** March, June, September, November		
Debris Cleanout	Remove all trash and debris.	
Side Slopes	Signs of erosion gullies, animal burrowing, overtopping, or slumping are observed. Repair, as necessary.	
Sediment/Organic Debris Removal	Remove sediment accumulation and properly dispose when accumulation is greater than or equal to 3 inches or you cannot see stones.*	
Actions to be taken:		
3 & 4. MOVES & FILTERS **Includes:** Planting bed **Frequency:** Inspect four times per years during regular park maintenance and after major storm events (2” of rain or greater) **When:** March, June, September, November		
Debris Cleanout	Remove trash and debris from the surface.	
Sediment/Organic Debris Removal	Remove and properly disposed of when build-up is greater than or equal to 3 inches.*	

Maintenance Item	Description	Maintenance (Y/N)
Erosion	Check for areas of erosion/ gullies, particularly along the bottom. Repair/reseed as necessary	
Side Slopes	Signs of erosion gullies, animal burrowing, overtopping, or slumping are observed. Repair, as necessary.	
Vegetation Maintenance Replacement	Cut back twice per year minimum (12” grass height). Over seed bare or thin grass growth areas. See also Landscape Maintenance	
Water Draining properly	If standing water is observed for more than 48 hours after a storm event, check for standing water in cleanouts. If standing water observed flush underdrains. If still not draining, rototill or aerate the bottom 6 inches to breakup any hard-packed sediment	
Actions to be taken:		
5. OVERFLOW **Includes:** Outlet structures **Frequency:** Inspect bi-annually and after major storm events (2” of rain or greater) **When:** March and September		
Overflow Structure	Water level should below underdrain and outlet pipe inverts. Check for sediment accumulation that impacts outflow. If sediment accumulation. Schedule cleaning. Check for leaf litter, debris, and inlet clogging.	
Actions to be taken:		
Other Routine Grounds Maintenance **Includes:** Surrounding landscape beyond the practice. **Frequency:** Inspect four times per year during regular park maintenance and after major storm events **When:** March, June, September, November		
Debris Removal	Remove trash from perimeter areas.	
Contributing drainage area	Look for sediment sources from erosion in the surrounding area.	
Drainage Network	Ensure proper operation.	
Pavement Sweeping	Sweep parking lot minimum once a year after spring thaw.	
Actions to be taken:		

*Sediment shall be disposed of offsite in a pre-approved location.

Tree Trench - Maintenance Checklist
Cape View Way Development

Date:

Time:

Inspector:

Maintenance Item	Description	Maintenance Req'd (Y/N)
1. Collect		
Includes: Catch basin grate/sidewalk area drain		
Frequency: Inspect three times per years during regular landscape maintenance and after major storm events (2" of rain or greater)		
When: Spring, Summer, Late Fall		
Inlet Grate	Remove all trash, leaf litter and inlet clogging. Remove sediment regularly or when accumulation impedes proper inflow and/or outflow.	
Actions to be taken:		
2. Capture		
Includes: Deep sump		
Frequency: Inspect bi-annually and after major storm events the first year; then annually and after major storm events (2" of rain or greater)		
When: Spring and Fall		
Deep Sump	Remove trash, sediment and debris from the structures and debris from the surface.	
Actions to be taken:		
3. Move		
Includes: Inlet pipe		
Frequency: Inspect bi-annually for sediment, sand, debris accumulation and clogging.		
When: Early Spring, Late Fall		
Clogging	Check catch basin for standing water above inlet invert (lowest pipe). Water level should be below pipe invert. If standing water is observed clean pipe.	
Actions to be taken:		
4. Treat and Manage (stores and infiltrates)		
Includes: Laterals, subsurface gravel storage bed and trees		
Frequency: Inspect three times per years during regular landscape maintenance and after major storm events (2" of rain or greater)		
When: Spring, Summer, Late Fall		

Maintenance Item	Description	Maintenance Req'd (Y/N)
Laterals	If standing water is observed in the catch basin, open cleanouts and check for standing water. If standing water is observed flush laterals.	
Tree	Check tree health and look for evidence of stress, insects, or disease	
Action to be Taken:		
5. Overflow **Includes:** Pipe and chimney connection to city storm drain **Frequency:** Inspect annually and after major storm events (2" of rain or greater) **When:** Spring		
Water Draining properly	If water is observed in the catch basin above the overflow invert (highest pipe), check pipe for clogging and flush, as necessary.	
Actions to be taken:		
Other Routine Maintenance **Includes:** Surrounding landscape beyond the practice. **Frequency:** Inspect three times per year during regular park maintenance and after major storm events **When:** Spring, Summer, Late Fall		
Debris Removal	Remove trash from perimeter areas.	
Pavement Sweeping	Sweep contributing paved surfaces minimum once a year after spring thaw.	
Surrounding Drainage Network	Ensure proper operation of surrounding catch basins	
Contributing drainage area	Check to ensure the surrounding area is stabilized. Look for erosion and other sediment sources	
Actions to be taken:		

*Sediment shall be disposed of offsite in a pre-approved location.

Dry Well - Maintenance Checklist
Cape View Way Development

Date:

Time:

Inspector:

Maintenance Item	Description	Maintenance Req'd (Y/N)
1. COLLECT **Includes:** Catch basin grate/Inlet pipes **Frequency:** Inspect four times per years during regular park maintenance and after major storm events (2" of rain or greater) **When:** March, June, September, November		
Surface Debris Cleaning	Remove all trash, leaf litter and inlet clogging	
Inlet Pipes	Check for clogging and sediment accumulation that impacts inflow. If sediment/debris accumulation. Check roof downspouts for clogging.	
Actions to be taken:		
2. CAPTURE **Includes:** Dry Well **Frequency:** Inspect four times per year and after major storm events the first year; then annually and after major storm events (2" of rain or greater) **When:** March, June, September, November		
Debris Cleanout	Remove trash and debris	
Sediment/Organic Debris Removal	Remove sediment accumulation and properly dispose when accumulation is greater than or equal to 6 inches or you cannot see stones along the bottom.	
Actions to be taken:		
3. MOVE **Includes:** NA **Frequency:** NA **When:** NA		
4. INFILTRATE **Includes:** See # 2 above **Frequency:** See # 2 above **When:** See # 2 above		
Water Draining properly	If standing water is observed for more than 48 hours after a storm event, check for clogging. If necessary, vactor basin and use a hose to breakup any hard-packed sediment along the bottom.	
Actions to be taken:		

Maintenance Item	Description	Maintenance Req'd (Y/N)
5. OVERFLOW **Includes:** Outlet pipe **Frequency:** Inspect bi-annually and after major storm events (2" of rain or greater) **When:** March and November		
Overflow Pipe	Check for sediment accumulation that impacts inflow. If sediment accumulation. Schedule cleaning. See # 4 above	
Actions to be taken:		
Other Routine Grounds Maintenance **Includes:** Surrounding landscape beyond the practice. **Frequency:** Inspect four times per year during regular park maintenance and after major storm events **When:** March, June, September, November		
Debris Removal	Remove trash from perimeter areas.	
Leaf and landscape debris removal	Clean grate regularly during landscape maintenance.	
Surrounding Drainage Network	Ensure proper operation.	
Contributing drainage area	Check to ensure the surrounding area is stabilized. Look for erosion and other sediment sources	
Actions to be taken:		

*Sediment shall be disposed of offsite in a pre-approved location.

Underground Chambers - Maintenance Checklist
Cape View Way Development

Date:

Time:

Inspector:

Maintenance Item	Description	Maintenance (Y/N)
1. COLLECT **Includes:** Catch basin/Inlet Structure - see also bioretention **Frequency:** Inspect four times per years during regular park maintenance and after major storm events (2" of rain or greater) **When:** March, June, September and November		
Inlet Grate	Remove all trash, leaf litter and inlet clogging. Remove sediment regularly or when accumulation impedes proper inflow and/or outflow.	
Surface Debris Cleaning	Remove all trash, leaf litter and inlet clogging. Check for clogging and sediment accumulation that impacts inflow.	
Actions to be taken:		
2. CAPTURE **Includes:** Deep Sump/Sediment Forebay/Isolator Row **Frequency:** Inspect four times per year and after major storm events the first year; then annually and after major storm events (2" of rain or greater) **When:** Mar March, June, September and November		
Debris Cleanout	Remove all trash and debris from the swale.	
Sediment/Organic Debris Removal	Remove sediment accumulation and properly dispose when accumulation is greater than or equal to 3 inches or you cannot see stones.*	
Actions to be taken:		
3. MOVE		
Drain Manhole and manifold Cleanout	• Remove trash and debris from the surface.	
See Also Manufacturer's Requirements		
Actions to be taken:		

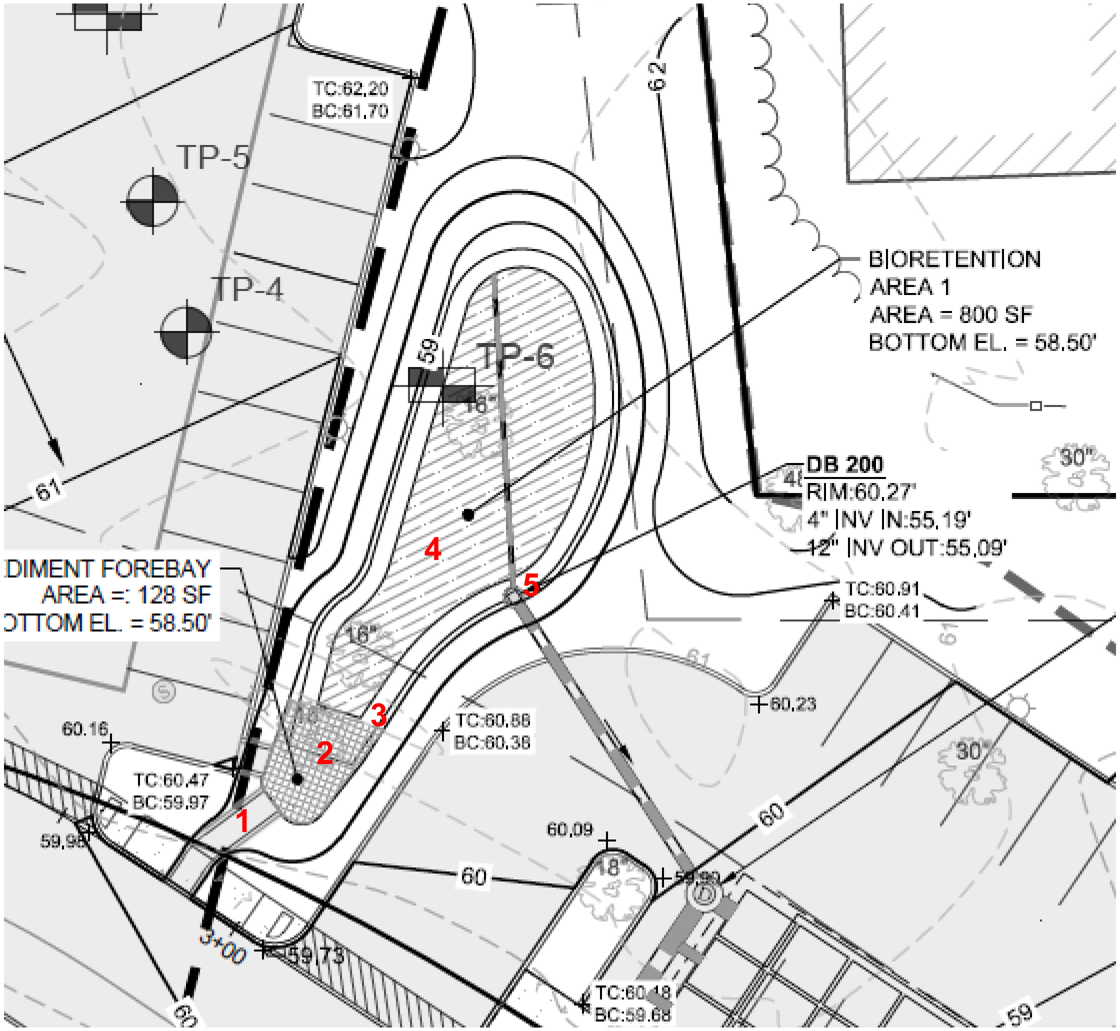
Maintenance Item	Description	Maintenance (Y/N)
4. STORE AND INFILTRATE **Includes:** Chambers **Frequency:** Inspect annually – see manufacturer's requirements **When:** Spring		
Sediment/Organic Debris Removal	Use inspection ports to check chambers for sediment accumulation in isolator row.	
Water Draining properly	If standing water is observed for more than 48 hours after a storm event, jet vac chambers.	
5. OVERFLOW **Includes:** Drain manholes and weir walls **Frequency:** Inspect annually and after major storm events (2" of rain or greater) **When:** Spring		
Overflow Structure	Check for sediment accumulation that impacts inflow. If sediment accumulation. Schedule cleaning. Check for leaf litter, debris, and inlet clogging.	
Actions to be taken:		
Other Routine Grounds Maintenance **Includes:** Surrounding landscape beyond the practice. **Frequency:** Inspect four times per year during regular park maintenance and after major storm events **When:** March, June, September and November		
Debris Removal	Remove trash from perimeter areas.	
Contributing drainage area	Look for sediment sources from erosion in the surrounding area.	
Drainage Network	Ensure proper operation.	
Pavement Sweeping	Sweep parking lot minimum once a year after spring thaw.	
Actions to be taken:		

*Sediment shall be disposed of offsite in a pre-approved location.

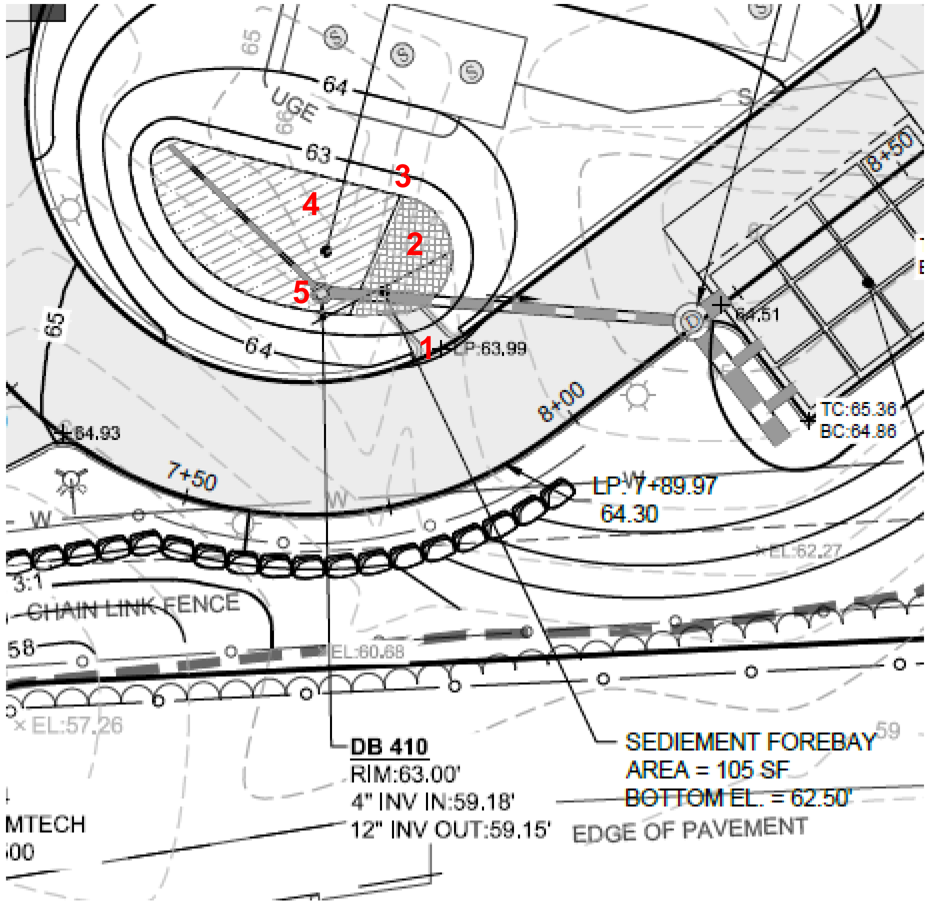
APPENDIX B

Maintenance Plans

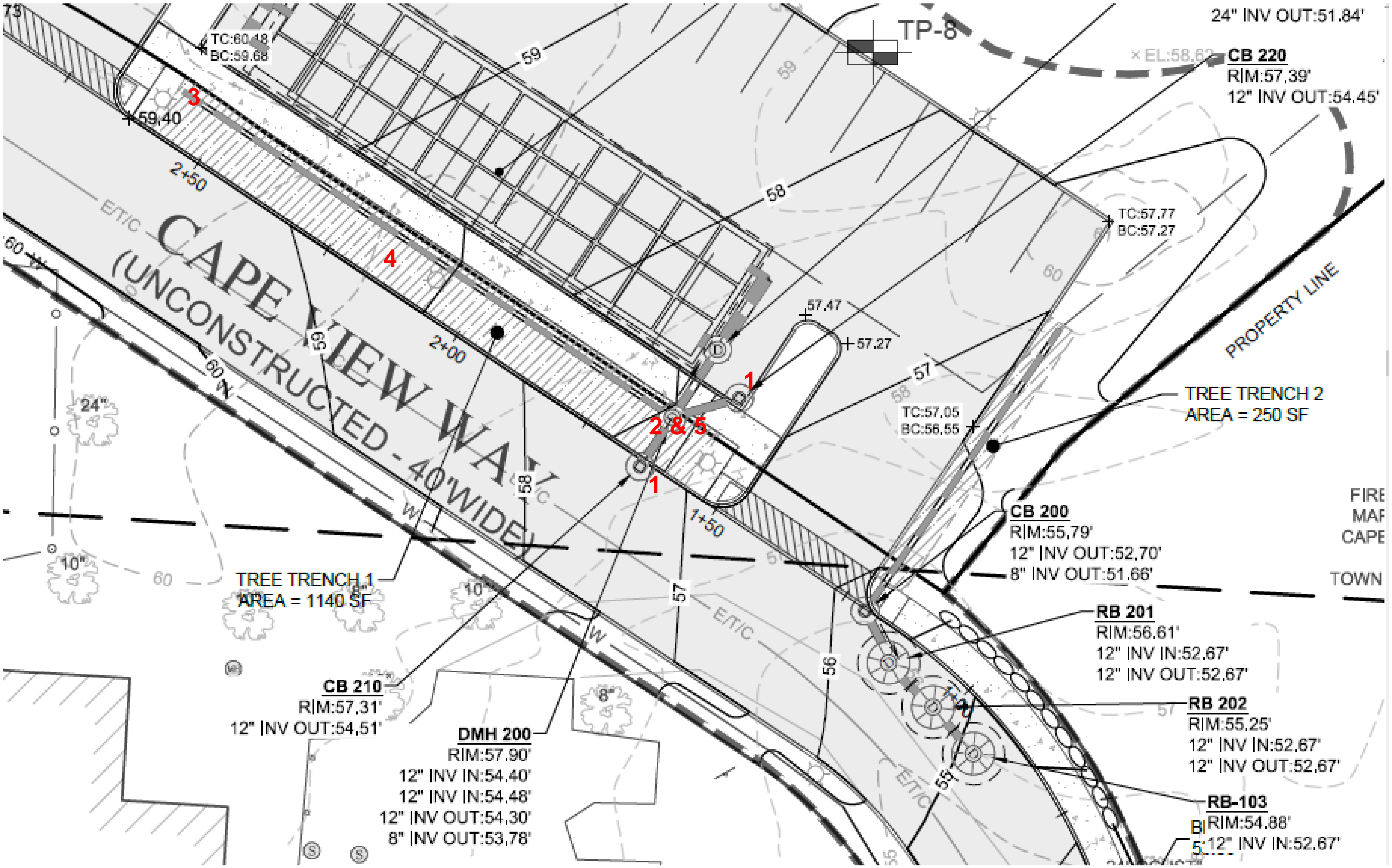
BIORETENTION AREA 1



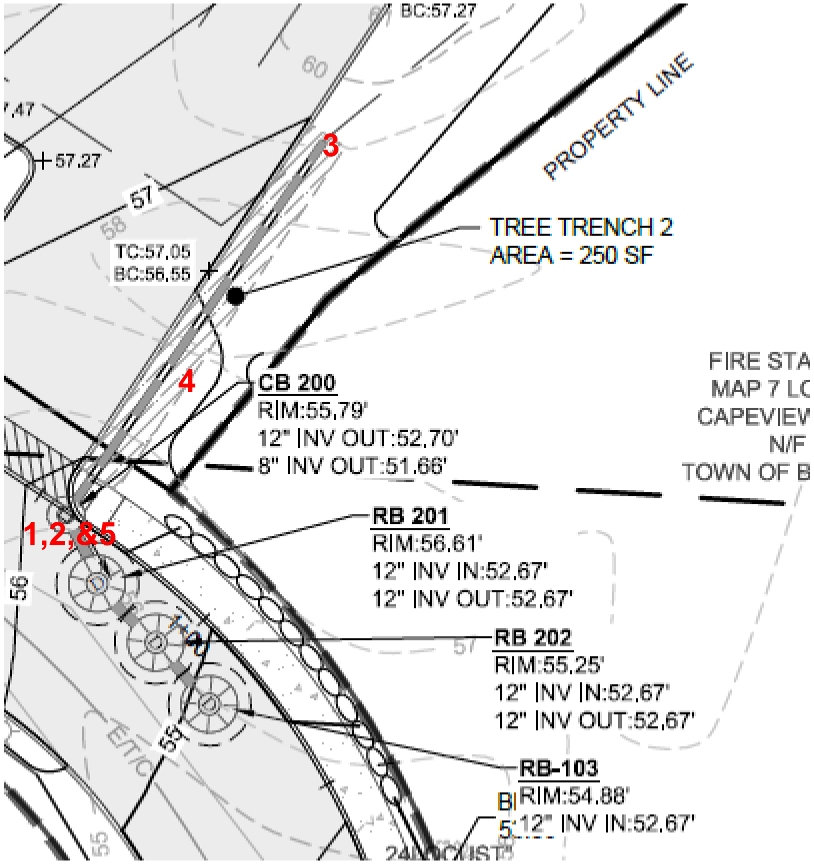
BIORETENTION AREA 2



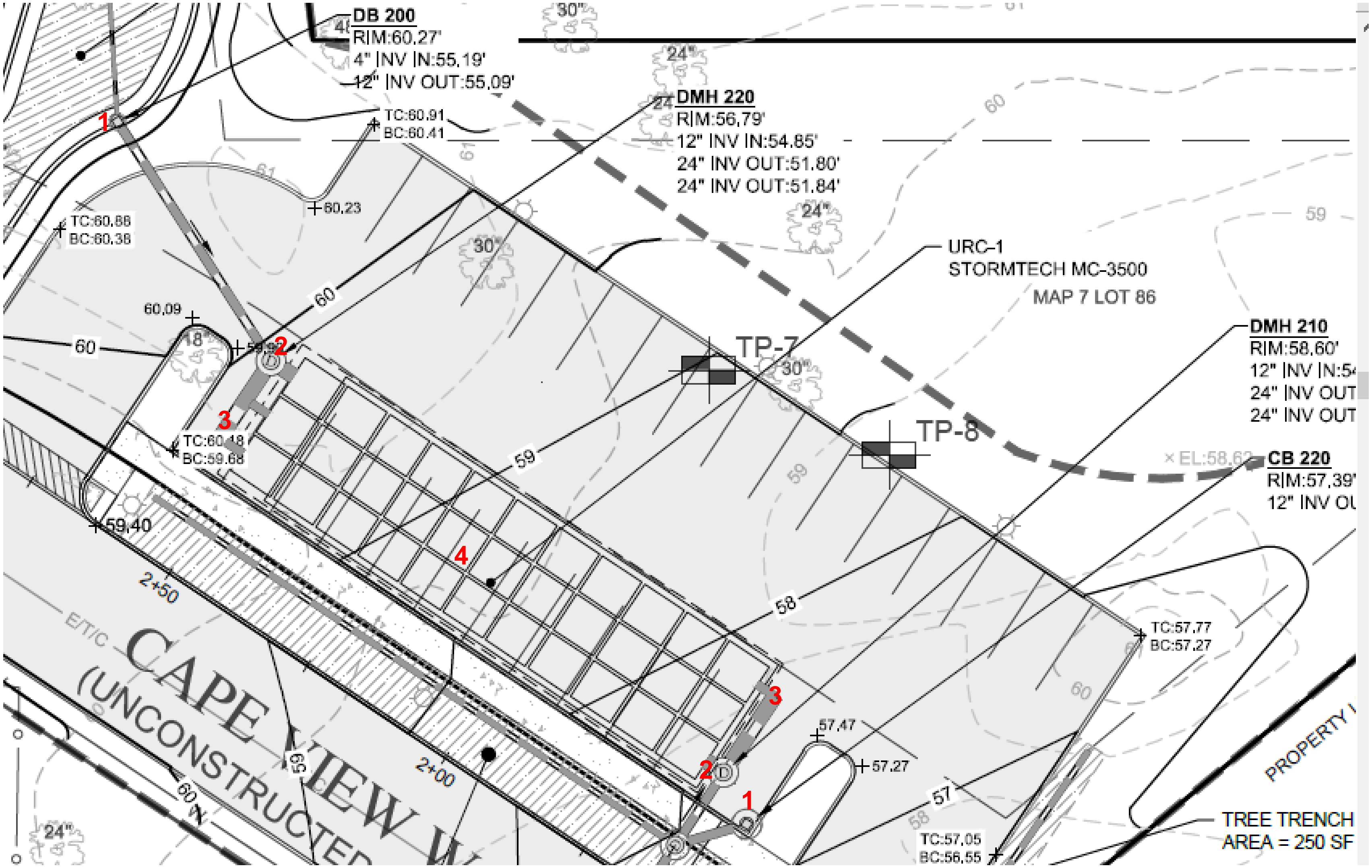
TREE TRENCH 1



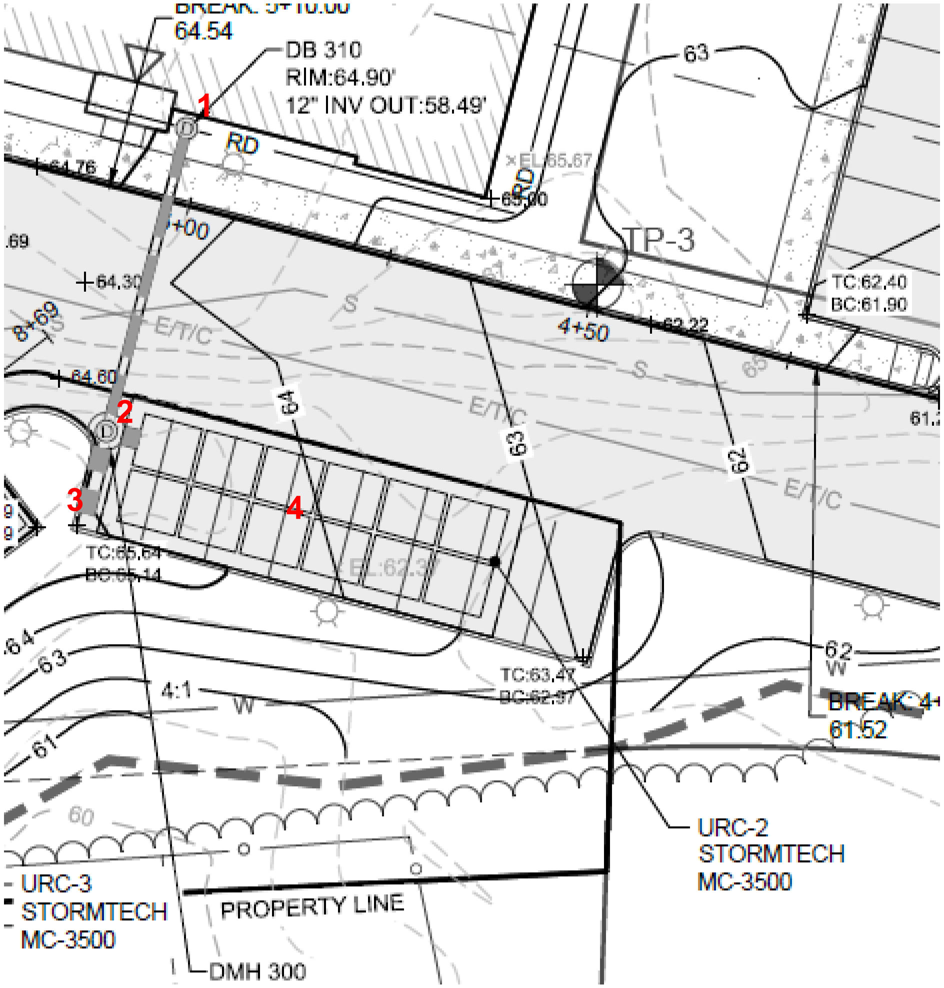
TREE TRENCH 2



UNDERGROUND RECHARGE CHAMBERS 1



UNDERGROUND RECHARGE CHAMBERS 2



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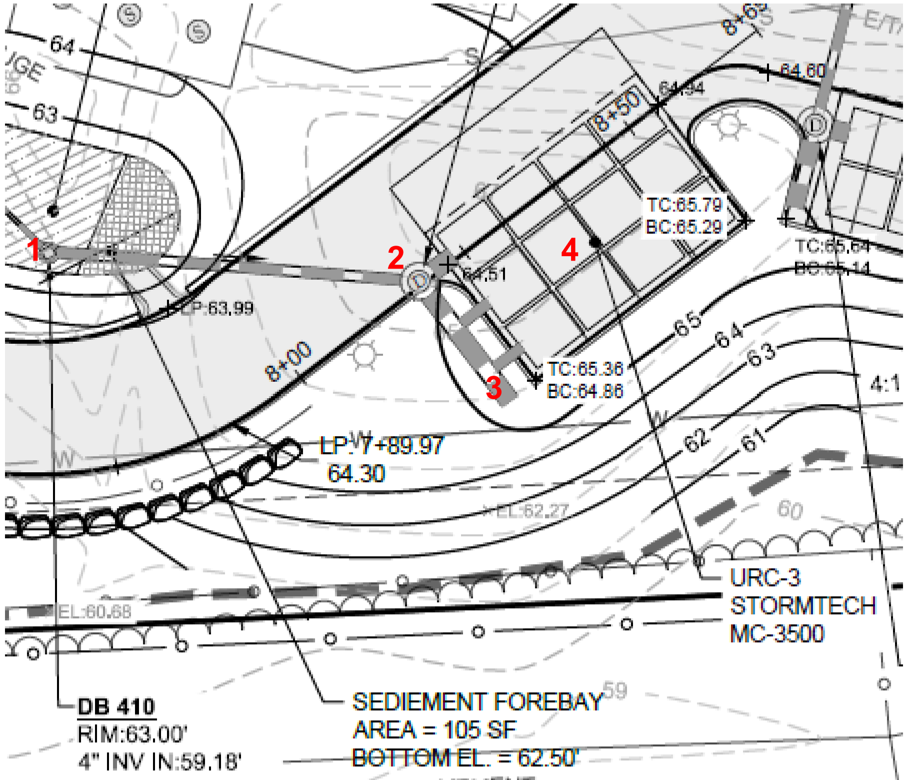
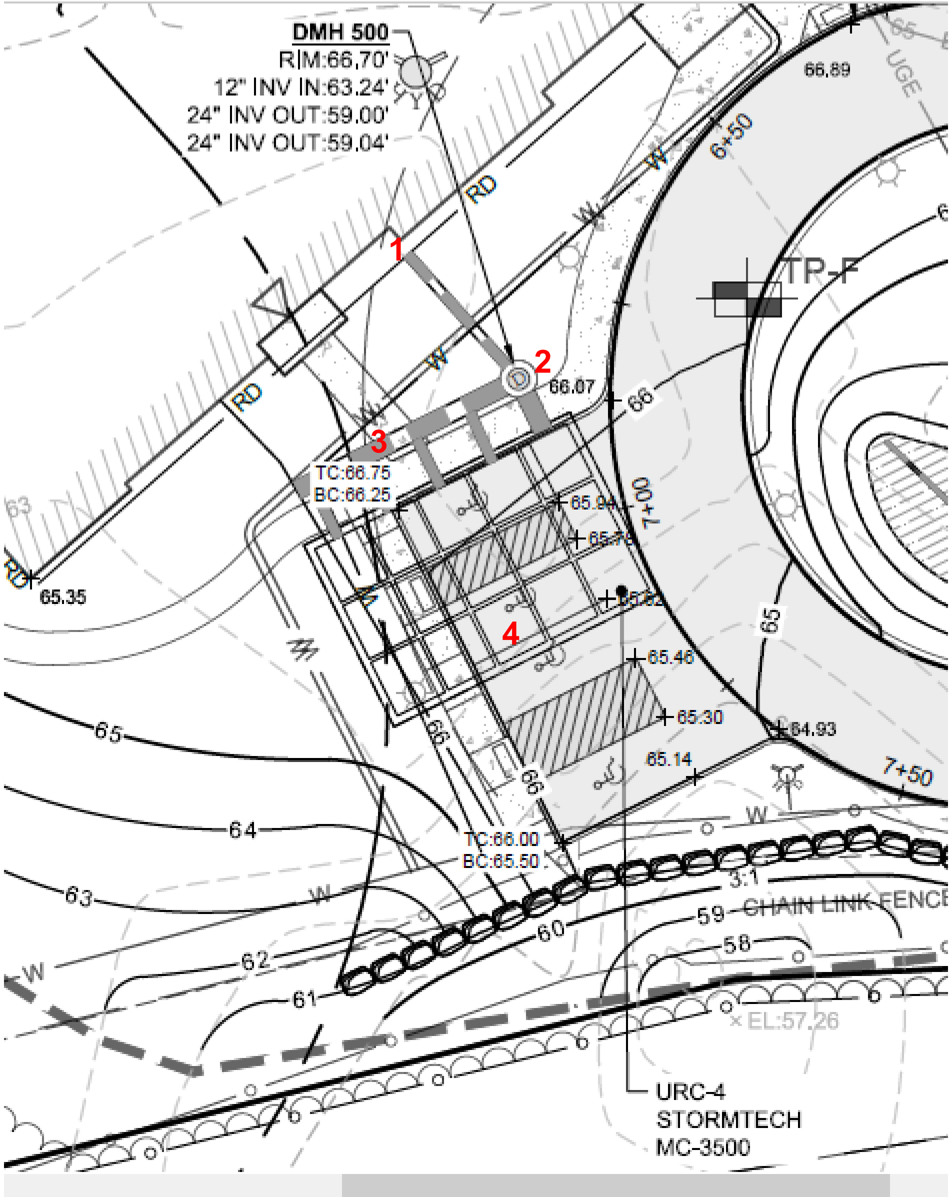
UNDERGROUND RECHARGE CHAMBERS 3



UNDERGROUND RECHARGE CHAMBERS 4



APPENDIX C

Overall Stormwater BMP Locations

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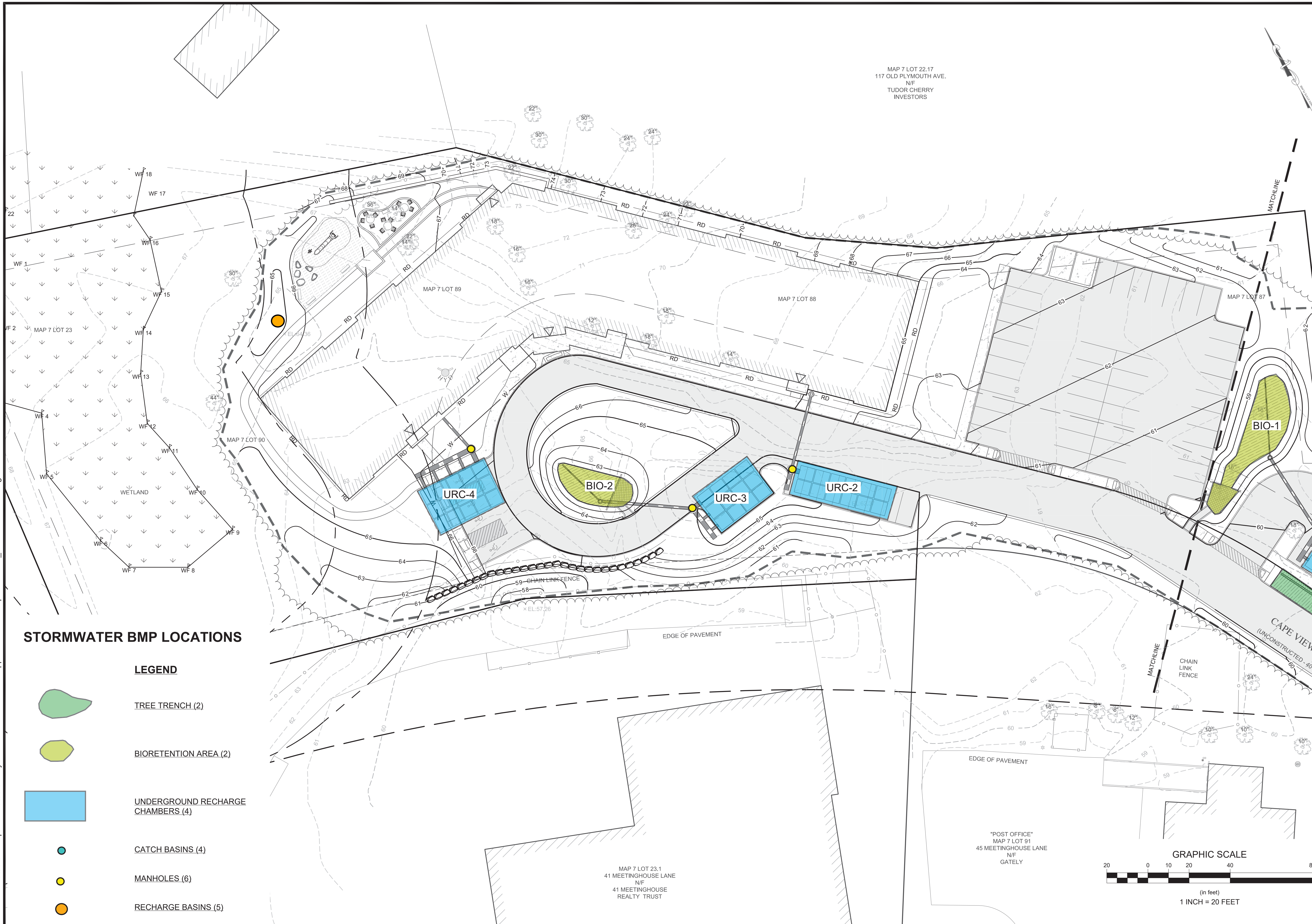


STORMWATER BMP LOCATIONS

LEGEND

- TREE TRENCH (2)
- BIORETENTION AREA (2)
- UNDERGROUND RECHARGE CHAMBERS (4)
- CATCH BASINS (4)
- MANHOLES (6)
- RECHARGE BASINS (5)

Revisions

Rev.	Date	By	Appr.	Description
1				
2				
3				
4				
5				
6				
7				

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

Date: MARCH 2021 | Designed By: EWH | Drawn By: EWH | Checked By: BRK

Plan Set:

CAPE VIEW WAY PERMITTING PLANS BOURNE, MASSACHUSETTS

Plan Title:

GRADING & DRAINAGE PLAN (1)

Prepared For:
PRESERVATION OF AFFORDABLE HOUSING
2 OLIVER STREET, SUITE 500
BOSTON, MA 02109
Phone: (617) 261-9898
Fax: ---

Survey Provided By:
Horsley Witten Group, Inc.
90 Route 6A
Sandwich, MA 02563
Phone: (508) 833-6600
Fax: (508) 833-3150
Dated: JUNE 2019

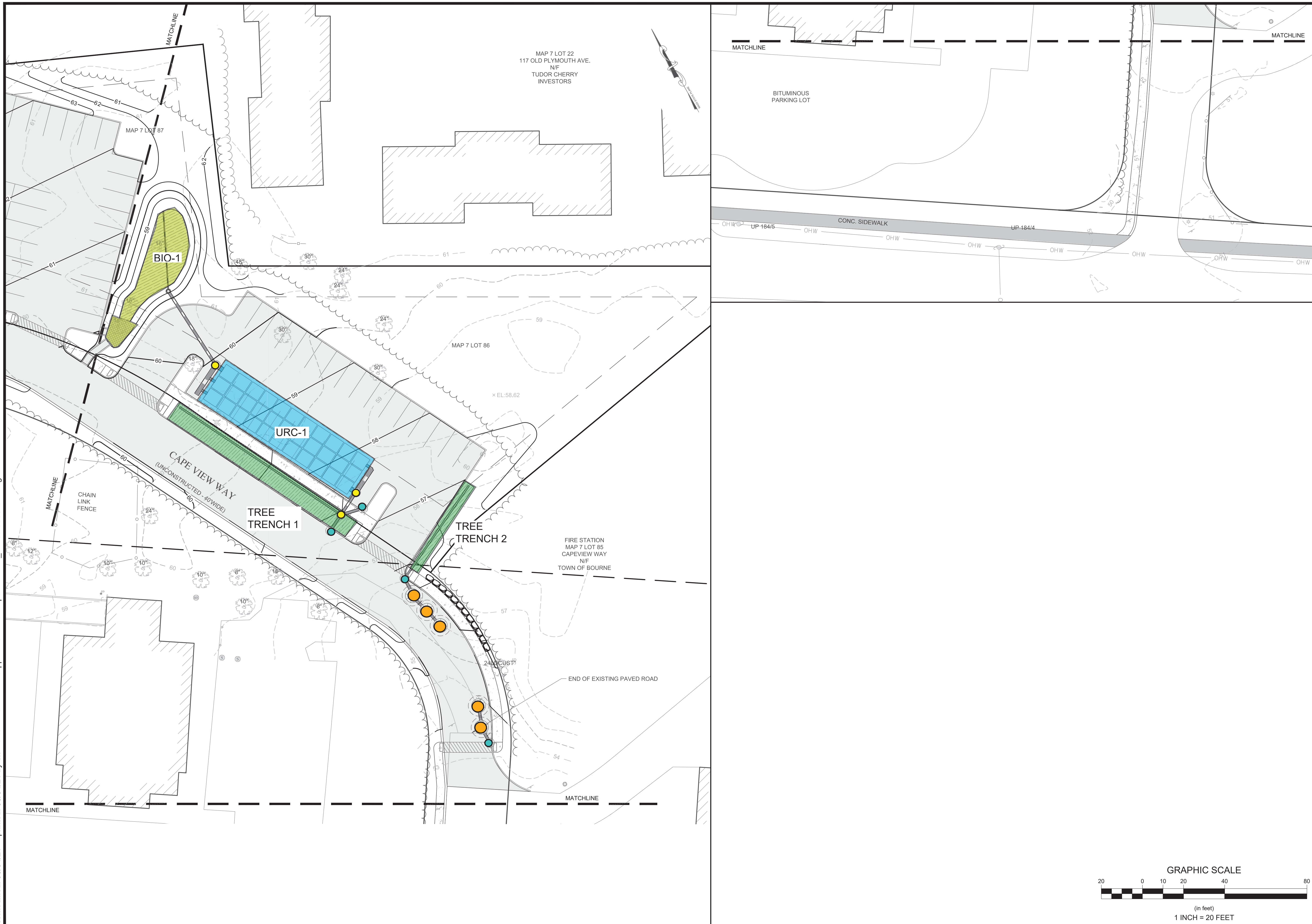
Registration:

DRAFT NOT FOR CONSTRUCTION

Project Number: 19038

Sheet : 8 of 21

Sheet Number: C - 8



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Revisions

Rev.	Date	By	Appr.	Description
1				
2				
3				
4				
5				
6				
7				

Horsley Witten Group, Inc.
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www.horsleywitten.com
90 Route 6A
Sandwich, MA 02563
508-833-6600 voice
508-833-3150 fax

Date: MARCH 2021
Designed By: EWH
Drawn By: EWH
Checked By: BRK

Plan Set:
CAPE VIEW WAY PERMITTING PLANS BOURNE, MASSACHUSETTS

Plan Title:
GRADING & DRAINAGE PLAN (2)

Prepared For:
PRESERVATION OF AFFORDABLE HOUSING
2 OLIVER STREET, SUITE 500
BOSTON, MA 02109
Phone: (617) 261-9898
Fax: ---

Survey Provided By:
Horsley Witten Group, Inc.
90 Route 6A
Sandwich, MA 02563
Phone: (508) 833-6600
Fax: (508) 833-3150
Dated: JUNE 2019

Registration:
DRAFT
NOT FOR CONSTRUCTION

Project Number: 19038
Sheet : 9 of 21
Sheet Number: C - 9

APPENDIX D

Underground Chambers Manufacturer's Requirements

StormTech Maintenance Log

Project Name:
Location:

StormTech
www.stormtech.com

	Stadia Rod Readings				
Date	**Fixed point to chamber bottom (1)**	**Fixed point to top of sediment (2)**	**Sediment Depth (1) - (2)**	**Observations / Actions**	**Inspector**

STANDARD LIMITED WARRANTY OF STORMTECH LLC ("STORMTECH"): PRODUCTS

(A) This Limited Warranty applies solely to the StormTech chambers and end plates manufactured by StormTech and sold to the original purchaser (the "Purchaser"). The chambers and end plates are collectively referred to as the "Products."

(B) The structural integrity of the Products, when installed strictly in accordance with StormTech's written installation instructions at the time of installation, are warranted to the Purchaser against defective materials and workmanship for one (1) year from the date of purchase. Should a defect appear in the Limited Warranty period, the Purchaser shall provide StormTech with written notice of the alleged defect at StormTech's corporate headquarters within ten (10) days of the discovery of the defect. The notice shall describe the alleged defect in reasonable detail. StormTech agrees to supply replacements for those Products determined by StormTech to be defective and covered by this Limited Warranty. The supply of replacement products is the sole remedy of the Purchaser for breaches of this Limited Warranty. StormTech's liability specifically excludes the cost of removal and/or installation of the Products.

(C) THIS LIMITED WARRANTY IS EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCTS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

(D) This Limited Warranty only applies to the Products when the Products are installed in a single layer. UNDER NO CIRCUMSTANCES, SHALL THE PRODUCTS BE INSTALLED IN A MULTI-LAYER CONFIGURATION.

(E) No representative of StormTech has the authority to change this Limited Warranty in any manner or to extend this Limited Warranty. This Limited Warranty does not apply to any person other than to the Purchaser.

(F) Under no circumstances shall StormTech be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the Products, or the cost of other goods or services related to the purchase and installation of the Products. For this Limited Warranty to apply, the Products must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and StormTech's written installation instructions.

(G) THE LIMITED WARRANTY DOES NOT EXTEND TO INCIDENTAL, CONSEQUENTIAL, SPECIAL OR INDIRECT DAMAGES. STORMTECH SHALL NOT BE LIABLE FOR PENALTIES OR LIQUIDATED DAMAGES, INCLUDING LOSS OF PRODUCTION AND PROFITS; LABOR AND MATERIALS; OVERHEAD COSTS; OR OTHER LOSS OR EXPENSE INCURRED BY THE PURCHASER OR ANY THIRD PARTY. SPECIFICALLY EXCLUDED FROM LIMITED WARRANTY COVERAGE ARE DAMAGE TO THE PRODUCTS ARISING FROM ORDINARY WEAR AND TEAR; ALTERATION, ACCIDENT, MISUSE, ABUSE OR NEGLECT; THE PRODUCTS BEING SUBJECTED TO VEHICLE TRAFFIC OR OTHER CONDITIONS WHICH ARE NOT PERMITTED BY STORMTECH'S WRITTEN SPECIFICATIONS OR INSTALLATION INSTRUCTIONS; FAILURE TO MAINTAIN THE MINIMUM GROUND COVERS SET FORTH IN THE INSTALLATION INSTRUCTIONS; THE PLACEMENT OF IMPROPER MATERIALS INTO THE PRODUCTS; FAILURE OF THE PRODUCTS DUE TO IMPROPER SITING OR IMPROPER SIZING; OR ANY OTHER EVENT NOT CAUSED BY STORMTECH. THIS LIMITED WARRANTY REPRESENTS STORMTECH'S SOLE LIABILITY TO THE PURCHASER FOR CLAIMS RELATED TO THE PRODUCTS, WHETHER THE CLAIM IS BASED UPON CONTRACT, TORT, OR OTHER LEGAL THEORY.

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Isolator® Row O&M Manual

*THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS™*

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THE ISOLATOR® ROW

INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a technique to inexpensively enhance Total Suspended Solids (TSS) and Total Phosphorus (TP) removal with easy access for inspection and maintenance.

THE ISOLATOR ROW

The Isolator Row is a row of StormTech chambers, either SC-160, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-4500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

A woven geotextile fabric is placed between the stone and the Isolator Row chambers. The woven geotextile provides a media for stormwater filtration, a durable surface for maintenance, prevents scour of the underlying stone and remains intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber. The non-woven fabric is not required over the SC-160, DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

The Isolator Row is typically designed to capture the "first flush" and offers the versatility to be sized on a volume basis or flow rate basis. An upstream manhole provides access to the Isolator Row and typically includes a high flow weir. When flow rates or volumes exceed the Isolator Row weir capacity the water will flow over the weir and discharge through a manifold to the other chambers.

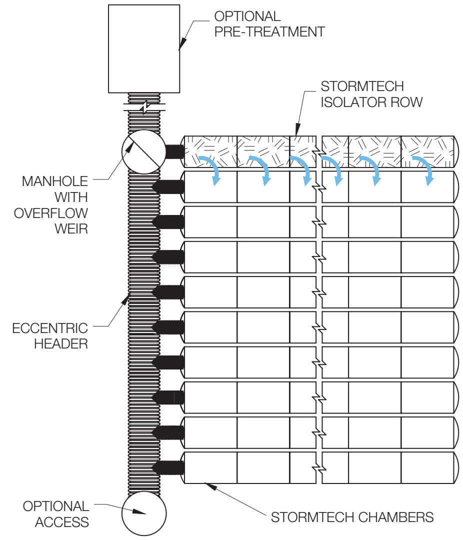
Another acceptable design uses one open grate inlet structure. Using a "high/low" design (low invert elevation on the Isolator Row and a higher invert elevation on the manifold) an open grate structure can provide the advantages of the Isolator Row by creating a differential between the Isolator Row and manifold thus allowing for settlement in the Isolator Row.

The Isolator Row may be part of a treatment train system. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.

Looking down the Isolator Row from the manhole opening, woven geotextile is shown between the chamber and stone base.

StormTech Isolator Row with Overflow Spillway (not to scale)



ISOLATOR ROW INSPECTION/MAINTENANCE

INSPECTION

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

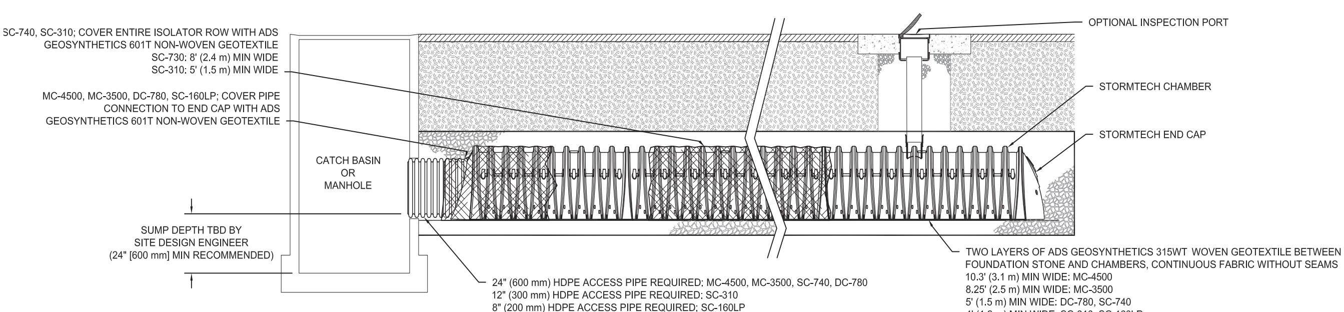
MAINTENANCE

The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row (not to scale)

Note: Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-4500 chamber models and is not required over the entire Isolator Row.



ISOLATOR ROW STEP BY STEP MAINTENANCE PROCEDURES

STEP 1

Inspect Isolator Row for sediment.

A) Inspection ports (if present)
   i. Remove lid from floor box frame
   ii. Remove cap from inspection riser
   iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
   iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

B) All Isolator Rows
   i. Remove cover from manhole at upstream end of Isolator Row
   ii. Using a flashlight, inspect down Isolator Row through outlet pipe
      1. Mirrors on poles or cameras may be used to avoid a confined space entry
      2. Follow OSHA regulations for confined space entry if entering manhole
   iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

STEP 2

Clean out Isolator Row using the JetVac process.

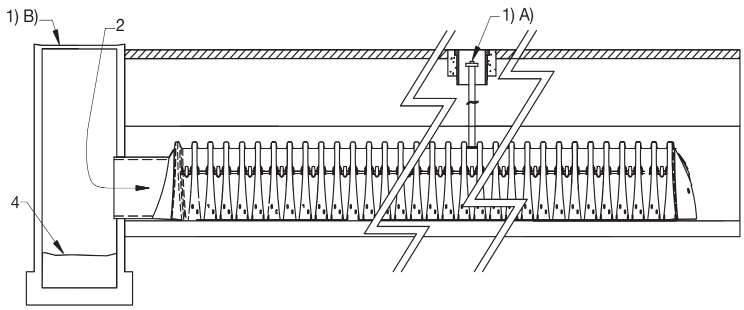
A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
B) Apply multiple passes of JetVac until backflush water is clean
C) Vacuum manhole sump as required

STEP 3

Replace all caps, lids and covers, record observations and actions.

STEP 4

Inspect & clean catch basins and manholes upstream of the StormTech system.



SAMPLE MAINTENANCE LOG

Date	Stadia Rod Readings: Fixed point to chamber bottom (1)	Stadia Rod Readings: Fixed point to top of sediment (2)	Sediment Depth (1)–(2)	Observations/Actions	Inspector
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

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