

Operation and Maintenance Plan

19 Cottage Street
Franklin, Massachusetts
May 9, 2024



APPLICANT:
James A. Colace, Trustee &
Abruzzi Realty Trust
55 Coutu Street
Franklin, MA 02038

PREPARED BY:
Dunbar Engineering and Management, LLC
30 Madison Avenue
Franklin, MA 02038



Operation and Maintenance Plan

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1. GENERAL

1.1. Introduction

The purpose of this manual is to provide an overview of the proposed stormwater management system (SMS) for the proposed construction of a paved parking lot for 19 parking spaces and 1,050 square feet of pervious grassed area located at Lot 217, 19 Cottage Street in Franklin, MA. The proposed stormwater management system meets the Massachusetts Department of Environmental Protection (MassDEP) stormwater standards, and the Town's Stormwater Management Regulations. The proposed SMS incorporates structural and non-structural Best Management Practices (BMPs) to provide stormwater peak flow mitigation, quality treatment, and conveyance.

1.2. Site Categorization for Stormwater Regulations

The proposed site improvements at 19 Cottage Street are considered a redevelopment project under the DEP Stormwater Management Standards due to the net decrease in impervious area and improved stormwater management. A redevelopment project is required to meet the following Stormwater Management Standards listed within the MA DEP Stormwater Handbook 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.

1.3. Site Location and Access

The site is a single 9,644 square foot lot with 65 feet of frontage along Cottage Street, entirely within the Town of Franklin. The parcel is located in the Downtown Commercial District and bordered by Parcel 287-042 (Commuter Rail property), Parcel 279-017 (Rome Restaurant), Parcel 286-216 (Oteri Funeral Home) and the Cottage Street Right of Way. The site is currently accessed by an existing curb cut along Cottage Street and via a connection to Adjacent Lot 17 at the northwest corner of the lot. The existing curb cut will be shifted southwest along Cottage Street to accommodate two-way traffic entering and exiting the proposed parking area.

2. OPERATION & MAINTENANCE PLAN

2.1. Introduction

In accordance with the standards set forth by the Stormwater Management Policy issued by the Massachusetts Department of Environmental Protection (MassDEP), Allen & Major Associates, Inc. has prepared the following Operations & Maintenance (O&M) Plan for the existing development at Lot 286-217, 19 Cottage Street, Franklin, Massachusetts.

The plan is broken down into three major sections. The first section describes construction-related erosion and sedimentation controls (Demolition & Construction Maintenance Plan). The second section describes the long-term pollution prevention measures (Long Term Pollution Prevention Plan). The third section is a post-construction operation and maintenance plan designed to address the long-term maintenance needs of the stormwater management system (Long-Term Maintenance Plan – Facilities Description).

2.2. Notification Procedures for Change of Responsibility for O&M

The Stormwater Management System (SMS) for this project is owned by James A. Colace, Trustee, Abbruzzi Realty Trust (owner). The owner shall be legally responsible for the long-term operation and maintenance of this SMS as outlined in this Operation and Maintenance Plan.

The owner shall submit an annual summary report and the completed Operation & Maintenance Schedule & Checklist to the Conservation Commission (via email or print copy), highlighting inspection and maintenance activities including performances of BMPs. Should ownership of the SMS change, the owner will continue to be responsible until the succeeding owner shall notify the Commission that the succeeding owner has assumed such responsibility. Upon subsequent transfers, the responsibility shall continue to be that of transferring owner until the transferee owner notifies the Commission of its assumption of responsibility.

In the event the SMS will serve multiple lots/owners, such as the subdivision of the existing parcel or creation of lease areas, the owner(s) shall establish an association on other legally enforceable arrangements under which the association or a single party shall have legal responsibility for the operation and maintenance of the entire SMS. The legal instrument creating such responsibility shall be recorded with the Registry of Deeds and promptly following its recording, a copy thereof shall be furnished to the Commission.

2.3. Contact Information

Stormwater Management System Owner:	James A. Colace/Abbruzzi Realty Trust 55 Coutu Street Franklin MA 02038 Phone: (508) 863-3606
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2.4. Emergency Contact Information:

James A. Colace/Abbruzzi Realty Trust (Owner/Operator)	Phone: (508) 863-3606
Steve Dunbar, Dunbar Engineering & Management, LLC (Site Civil Engineer)	Phone: (774)-737-4301

Franklin Department of Public Works	Phone: (508) 553-5500
Franklin Conservation Commission	Phone: (508) 520-4929
Franklin Fire Department (non-emergency line)	Phone: (508) 528-2323
MassDEP Emergency Response	Phone: (888) 304-1133
Clean Harbors Inc (24-Hour Line)	Phone: (800) 645-8265

2.5. Demolition & Construction Maintenance Plan

1. Call Digsafe: 1-888-344-7233.
2. Contact the Town of Franklin at least three (3) days prior to start of demolition and/or construction activities.
3. Install Erosion Control measures as shown on the SED. & EROSION CONTROL plan, Sheet 24-03 prepared by Dunbar Engineering and Management dated 3/15/24 and revised 5/9/24. The Town shall review the installation of catch basin filters and tubular barrier protection prior to the start of any site demolition work. Install Construction fencing if determined to be necessary at the commencement of construction.
4. Install construction entrances, catch basin filters, and tubular sediment barriers at the locations shown on the SED. & EROSION CONTROL plan.
5. Site access shall be achieved only from the designated construction entrances.
6. Cut and clear trees in construction areas only (within the limit of work; see plans)(N/A).
7. Stockpiles of materials subject to erosion shall be stabilized with erosion control matting or temporary seeding whenever practicable, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.
8. Install silt sacks at each drain inlet prior to any demolition and or construction activities.
9. All erosion control measures shall be inspected weekly and after every rainfall event. Records of these inspections shall be kept on-site for review.
10. All erosion control measures shall be maintained, repaired, or replaced as required or at the direction of the owner's engineer or the Town.
11. Sediment accumulation up-gradient of the tubular sediment barriers greater than 6" in depth shall be removed and disposed of in accordance with all applicable regulations.
12. If it appears that sediment is exiting the site, silt sacks shall be installed in all catch basins adjacent to the site. Sediment accumulation on all adjacent catch basin inlets shall be removed and the silt sack replaced if torn or damaged.

13. Install stone check dams on-site during construction as needed. Refer to the erosion control details. Temporary sediment basins combined with stone check dams shall be installed on-site during construction to control and collect runoff from upland areas of this site during demolition and construction activities.
14. The contractor shall comply with the Sedimentation and Erosion Control Notes as shown on the Site Development Plans and Specifications.
15. The stabilized construction entrances shall be inspected weekly and records of inspections kept. The entrances shall be maintained by adding additional clean, angular, durable stone to remove the soil from the construction vehicle's tires when exiting the site. If soil is still leaving the site via the construction vehicle tires, adjacent roadways shall be kept clean by street sweeping.
16. Dust pollution shall be controlled using on-site water trucks and/or an approved soil stabilization product.
17. During demolition and construction activities, Status Reports on compliance with this O&M Document shall be submitted weekly. The report shall document any deficiencies and corrective actions taken by the applicant.

2.6. Long-Term Pollution Prevention Plan

Standard #4 from the MassDEP Stormwater Management Handbook requires that a Long-Term Pollution Prevention Plan (LTPPP) be prepared and incorporated as part of the Operation and Maintenance Plan of the Stormwater Management System. The purpose of the LTPPP is to identify potential sources of pollution that may affect the quality of stormwater discharges, and to describe the implementation of practices to reduce the pollutants in stormwater discharges. The following items describe the source control and proper procedures of the LTPPP.

- Housekeeping

The existing development has been designed to maintain a high level of water quality treatment for all stormwater discharge. An Operation and Maintenance (O&M) plan has been prepared and is included in this section of the report. The owner (or its designee) is responsible for adherence to the O&M plan in a strict and complete manner.

- Storing of Materials & Water Products

The trash and waste program for the site includes exterior dumpsters. There is a trash contractor used to pick up the waste material in the dumpsters. The stormwater drainage system has water quality inlets designed to capture trash and debris.

- Vehicle Washing

Outdoor vehicle washing has the potential to result in high loads of nutrients, metals, and hydrocarbons during dry weather conditions, as the detergent-rich

water used to wash the grime off the vehicle enters the stormwater drainage system. The existing development does not include any designated vehicle washing areas, nor is it expected that any vehicle washing will take place on-site.

- Spill Prevention & Response

Sources of potential spill hazards include vehicle fluids, liquid fuels, pesticides, paints, solvents, and liquid cleaning products. The majority of the spill hazards would likely occur within the buildings and would not enter the stormwater drainage system. However, there are spill hazards from vehicle fluids or liquid fuels located outside of the buildings. These exterior spill hazards have the potential to enter the stormwater drainage system and are to be addressed as follows:

1. Spill hazards of pesticides, paints, and solvents shall be remediated using the Manufacturers' recommended spill cleanup protocol.
2. Vehicle fluids and liquid fuel spill shall be remediated according to the local and state regulations governing fuel spills.
3. The owner shall have the following equipment and materials on hand to address a spill clean-up: brooms, dust pans, mops, rags, gloves, absorptive material, sand, sawdust, plastic and metal trash containers.
4. All spills shall be cleaned up immediately after discovery.
5. Spills of toxic or hazardous material shall be reported, regardless of size, to the Massachusetts Department of Environmental Protection at (888) 304-1333.
6. Should a spill occur, the pollution prevention plan will be adjusted to include measures to prevent another spill of a similar nature. A description of the spill, along with the causes and cleanup measures will be included in the updated pollution prevention plan.

- Maintenance of Lawns, Gardens, and Other Landscaped Areas

It should be recognized that this is a general guideline towards achieving high quality and well-groomed landscaped areas. The grounds staff/landscape contractor must recognize the shortcomings of a general maintenance plan such as this, and modify and/or augment it based on weekly, monthly, and yearly observations. In order to assure the highest quality conditions, the staff must also recognize and appreciate the need to be aware of the constantly changing conditions of the landscaping and be able to respond to them on a proactive basis. No trees shall be planted over the drain lines or recharge area, and that only shallow rooted plants and shrubs will be allowed.

- o Fertilizer

Maintenance practices should be aimed at reducing environmental, mechanical and pest stresses to promote healthy and vigorous growth. When necessary, pest outbreaks should be treated with the most sensitive control measure available. Synthetic chemical controls should be used only as a last resort to organic and biological control methods. Fertilizer, synthetic chemical controls and pest

management applications (when necessary) shall be performed only by licensed applicators in accordance with the manufacturer's label instructions when environmental conditions are conducive to controlled product application. Only slow-release organic fertilizers should be used in the planting and mulch areas to limit the amount of nutrients that could enter downstream resource areas. Fertilization of the planting and mulch areas will be performed within manufacturers labeling instructions and shall not exceed an NPK ration of 1:1:1 (i.e. Triple 10 fertilizer mix), considered a low nitrogen mixture. Fertilizers approved for the use under this O&M Plan are as follows:

Type: LESCO® 28-0-12 (Lawn Fertilizer)
MERIT® 0.2 Plus Turf Fertilizer
MOMENTUM™ Force Weed & Feed

o Suggested Aeration Program

In-season aeration of lawn areas is good cultural practice, and is recommended whenever feasible. It should be accomplished with a solid thin tine aeration method to reduce disruption to the use of the area. The depth of solid tine aeration is similar to core type, but should be performed when the soil is somewhat drier for a greater overall effect.

Depending on the intensity of use, it can be expected that all landscaped lawn areas will need aeration to reduce compaction at least once per year. The first operation should occur in late May following the spring season. Methods of reducing compaction will vary based on the nature of the compaction. Compaction on newly established landscaped areas is generally limited to the top 2-3" and can be alleviated using hollow core or thin tine aeration methods.

The spring aeration should consist of two passes at opposite directions with 1/4" hollow core tines penetrating 3-5" into the soil profile. Aeration should occur when the soil is moist but not saturated. The soil cores should be shattered in place and dragged or swept back into the turf to control thatch. If desired the cores may also be removed and the area top-dressed with sand or sandy loam. If the area drains on average too slowly, the topdressing should contain a higher percentage of sand. If it is draining on average too quickly, the top dressing should contain a higher percentage of soil and organic matter.

o Landscape Maintenance Program Practices:

o Lawn

1. Mow a minimum of once a week in spring, to a height of 2" to 2 1/2" high. Mowing should be frequent enough so that no more than 1/3 of grass blade is removed at each mowing. The top growth supports the roots; the shorter the grass is cut, the less the roots will grow. Short cutting also dries out the soil and encourages weeds to germinate.

2. Mow approximately once every two weeks from July 1st to August 15th depending on lawn growth.
 3. Mow on a ten-day cycle in fall, when growth is stimulated by cooler nights and increased moisture.
 4. Do not remove grass clippings after mowing.
 5. Keep mower blades sharp to prevent ragged cuts on grass leaves, which cause a brownish appearance and increase the chance for disease to enter a leaf.
- Shrubs (N/A)
 1. Mulch not more than 3" depth with shredded pine or fir bark.
 2. Hand prune annually, immediately after blooming, to remove 1/3 of the above-ground biomass (older stems). Stem removals are to occur within 6" of the ground to open up shrub and maintain two-year wood (the blooming wood).
 3. Hand-prune evergreen shrubs only as needed to remove dead and damaged wood and to maintain the naturalistic form of the shrub. Never mechanically shear evergreen shrubs.
 - Trees (N/A)
 1. Provide aftercare of new tree plantings for the first three years.
 2. Do not fertilize trees, it artificially stimulates them (unless tree health warrants).
 3. Water once a week for the first year; twice a month for the second; once a month for the third year.
 4. Prune trees on a four-year cycle.
 - Invasive Species

Inform the Conservation Commission Agent prior to the removal of invasive species proposed either through hand work or through chemical removal.
- Storage and Use of Herbicides and Pesticides

Integrated Pest Management is the combination of all methods (of pest control) which may prevent, reduce, suppress, eliminate, or repel an insect population. The main requirements necessary to support any pest population are food, shelter and water, and any upset of the balance of these will assist in controlling a pest population. Scientific pest management is the knowledgeable use of all pest control methods (sanitation, mechanical, chemical) to benefit mankind's health, welfare, comfort, property and food. A Pest Management Professional (PMP) should be retained who is licensed with the Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, Department of Agricultural Resources.

The site manager will be provided with approved bulletin before entering into or renewing an agreement to apply pesticides for the control of indoor household or structural pests, refer to 333 CMR 13.08.

Before beginning each application, the applicator must post a Department

approved notice on all of the entrances to the treated room or area. The applicator must leave such notices posted after the application. The notice will be posted at conspicuous point(s) of access to the area treated. The location and number of signs will be determined by the configuration of the area to be treated based on the applicator's best judgment. It is intended to give sufficient notice so that no one comes into an area being treated unaware that the applicator is working and pesticides are being applied. However, if the contracting entity does not want the signs posted, he/she may sign a Department approved waiver indicating this. The applicator or employer will provide to any person upon their request the following information on previously conducted applications:

1. Name and phone number of pest control company;
2. Date and time of the application;
3. Name and license number of the applicator;
4. Target pests; and
5. Name and EPA Registration Number of pesticide products applied.

- Pet Waste Management

The owner's landscape crew (or designee) shall remove any obvious pet waste that has been left behind by pet owners within the development. The pet waste shall be disposed of in accordance with local and state regulations.

- Operations and Management of Septic Systems

There are no proposed septic systems within the limits of the project.

- Management of Deicing Chemicals and Snow

Snow will be stockpiled on site until the accumulated snow becomes a hazard to the daily operations of the site. It will be the responsibility of the snow removal contractor to properly dispose of transported snow according to MassDEP, Bureau of Resource Protection – Snow Disposal Guideline #BRPG01-01, governing the proper disposal of snow. It will be the responsibility of the snow removal contractor to follow these guidelines and all applicable laws and regulations. The owner's maintenance staff (or its designee) will be responsible for the clearing of the sidewalk and building entrances. The owner may be required to use a deicing agent such as potassium chloride to maintain a safe walking surface. If used, the de-icing agent for the walkways and building entrances will be kept within the storage rooms located within the building. If used, de-icing agents will not be stored outside. The owner's maintenance staff will limit the application of sand.

2.7. Long-Term Maintenance Plan – Facilities Description

A maintenance log will be kept (i.e. report) summarizing inspections, maintenance, and any corrective actions taken. The log will include the date on which each inspection or

maintenance task was performed, a description of the inspection findings or maintenance completed, and the name of the inspector or maintenance personnel performing the task. If a maintenance task requires the clean-out of any sediments or debris, the location where the sediment and debris was disposed after removal will be indicated. The log will be made accessible to department staff and a copy provided to the department upon request.

The following is a description of the Stormwater Management System for the project site.
Stormwater Collection System – On-Site:

The stormwater collection system on site is composed of one catch basin at the rear/SW corner of the lot, a 12-inch drainage conveyance pipe, one drain manhole at the NW end of the infiltration system, a 24-inch conveyance into the Isolator Row, three (3) 12-inch HDPE manifold for stormwater distribution, and a Stormtech SC-740 infiltration system. All of the proposed on-site catch basins incorporate a deep sump and hooded outlet. The proposed catch basins are connected by a closed gravity pipe network that routes stormwater to the infiltration system for treatment prior to discharge.

Structural Pretreatment BMPs: Regular maintenance of these BMPs is especially critical because they typically receive the highest concentration of suspended solids during the first flush of a storm event.

- Deep Sump Catch Basin:

The catch basin has a 4-foot sump and the drain manhole has a 2-foot sump. These sumps shall be inspected four times per year. These units should be cleaned at each inspection or when the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin.

Infiltration BMPs:

- Subsurface Structure – Stormtech MC-3500 Chamber System:

Inspect the catch basins that inlet to the subsurface infiltration system as recommended to ensure no trash or debris is entering the system. JetVac maintenance is recommended if sediment within the isolator row has been collected to an average depth of 3".

Other BMPs and Accessories:

- Mosquito Control:

Both above ground and underground stormwater BMPs have the potential to serve as mosquito breeding areas. Good design, proper operation and maintenance, and treatment with larvicides can minimize this potential. See the supplemental information for Mosquito Control in Stormwater Management Practices, and the

Operation and Maintenance Plan Schedule for inspection schedule.

- Street Sweeping:

Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring. Accumulations on pavement may be removed by pavement sweeping. Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader.

2.8. Inspection and Maintenance Frequency and Corrective Measures

In accordance with MA DEP Stormwater Handbook: Volume 2, Chapter 2; the previously described BMPs will be inspected and the identified deficiencies will be corrected. Cleanout must include the removal and legal disposal of any accumulated sediments, trash, and debris. In any and all cases, operations, inspections, and maintenance activities shall utilize best practical measures to avoid and minimize impacts to wetland resource areas outside the footprint of the SMS.

2.9. Supplemental Information (Exhibits)

- Operation & Maintenance Plan Schedule & Estimated Costs
- Illicit Discharge Compliance Statement
- Massachusetts Stormwater Handbook, Chapter 5, Miscellaneous Stormwater Topics, Mosquito Control in Stormwater Management Practices
- Massachusetts DEP – Snow Disposal Guidance
- Stormtech SC-740 Operation & Maintenance
- HydroCAD Report for 2-yr, 10-yr and 100-yr storms

OPERATION AND MAINTENANCE SCHEDULE & ESTIMATED COSTS

Project: Stormwater Management System

Project address: 19 Cottage Street Franklin, MA 02038

Responsible for O&M: James A. Colace/Abbruzzi Realty Trust

55 Coutu Street Franklin, MA 02038

(508) 863-3606

All information within table is derived from Massachusetts Stormwater Handbook: Volume 2, Chapter 2

BMP CATEGORY	BMP OR MAINTENANCE ACTIVITY	SCHEDULE/ FREQUENCY	NOTES	ESTIMATED ANNUAL MAINTENANCE COST	INSPECTION PERFORMED	
					DATE:	BY:
STRUCTURAL PRETREATMENT BMPs	DEEP SUMP CATCH BASIN	Four times per year (quarterly).	Inspect and clean catch basin units whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin.	\$1,000		
INFILTRATION BMPs	SUBSURFACE STRUCTURES	Inspect structure inlets at least twice a year. Remove debris that may clog the system as needed.	Because subsurface structures are installed underground, they are extremely difficult to maintain. Remove any debris that might clog the system.	\$1,000		
BMP ACCESSORIES	OUTLET STRUCTURES	Periodic cleaning of Outlet Control Structures as needed.	Clear trash and debris as necessary.	\$250		
OTHER MAINTENANCE ACTIVITY	MISQUITO CONTROL	Inspect BMPs as needed to ensure the system's drainage time is less than the maximum 72 hour period.	Massachusetts stormwater handbook requires all stormwater practices that are designed to drain do so within 72 hours to reduce the number of mosquitos that mature to adults since the aquatic stage of a mosquito is 7-10 days.	\$200		
	SNOW STORAGE	Clear and remove snow to approved storage locations as necessary to ensure systems are working properly and are protected from meltwater pollutants.	Carefully select snow disposal sites before winter. Avoid dumping removed snow over catch basins, or in detention ponds, sediment forebays, rivers, wetlands, and flood plains. It is also prohibited to dump snow in the bioretention basins or gravel swales.	\$500		
	STREET SWEEPING	Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring.	Sweep, power broom or vacuum paved areas. Submit information that confirms that all street sweepings have been completed in accordance with state and local requirements	\$1,500		

OPERATION AND MAINTENANCE SCHEDULE & ESTIMATED COSTS

Project: Stormwater Management System

Project address: 19 Cottage Street Franklin, MA 02038

Responsible for O&M: James A. Colace/Abbruzzi Realty Trust
55 Coutu Street Franklin, MA 02038
(508) 863-3606

All information within table is derived from Massachusetts Stormwater Handbook: Volume 2, Chapter 2

BMP CATEGORY	BMP OR MAINTENANCE ACTIVITY	SCHEDULE/FREQUENCY	NOTES	ESTIMATED ANNUAL MAINTENANCE COST	INSPECTION PERFORMED	
					DATE:	BY:
STRUCTURAL PRETREATMENT BMPs	DEEP SUMP CATCH BASIN	Four times per year (quarterly).	Inspect and clean catch basin units whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin.	\$1,000		
	SUBSURFACE STRUCTURES	Inspect structure inlets at least twice a year. Remove debris that may clog the system as needed.	Because subsurface structures are installed underground, they are extremely difficult to maintain. Remove any debris that might clog the system.	\$1,000		
BMP ACCESSORIES	OUTLET STRUCTURES	Periodic cleaning of Outlet Control Structures as needed.	Clear trash and debris as necessary.	\$250		
OTHER MAINTENANCE ACTIVITY	MISQUITO CONTROL	Inspect BMPs as needed to ensure the system's drainage time is less than the maximum 72 hour period.	Massachusetts stormwater handbook requires all stormwater practices that are designed to drain do so within 72 hours to reduce the number of mosquitos that mature to adults since the aquatic stage of a mosquito is 7-10 days.	\$200		
	SNOW STORAGE	Clear and remove snow to approved storage locations as necessary to ensure systems are working properly and are protected from meltwater pollutants.	Carefully select snow disposal sites before winter. Avoid dumping removed snow over catch basins, or in detention ponds, sediment forebays, rivers, wetlands, and flood plains. It is also prohibited to dump snow in the bioretention basins or gravel swales.	\$500		
	STREET SWEEPING	Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring.	Sweep, power broom or vacuum paved areas. Submit information that confirms that all street sweepings have been completed in accordance with state and local requirements	\$1,500		

ILLICIT DISCHARGE COMPLIANCE STATEMENT

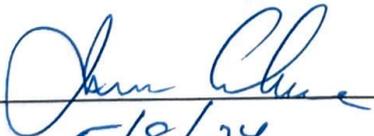
SITE ADDRESS: Lot 217, 19 Cottage St, Franklin MA 02038
OWNER: James A. Colace/Abbruzzi Realty Trust
PLAN REFERENCES: DEVELOPMENT PLAN, Proposed Parking Lot, 19 Cottage St dtd May 9, 2024
Drainage Report, 19 Cottage St dtd May 9, 2024

As required by Standard 10 of the Massachusetts Stormwater Standards, I, the undersigned, being the authorized owner/responsible party of the above referenced property do hereby certify that no illicit discharges exist on the site and that the stormwater management system, as shown on the above referenced plan, does not contain or permit any illicit discharges to enter the stormwater management system. Furthermore, discharges from interior building drains or plumbing within the buildings are prohibited. Illicit discharges do not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

The pollution prevention plan measures to be implemented in this project to prevent illicit discharges to the stormwater management system, including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease, include:

1. Identifying the responsible personnel for the implementation of an effective Illicit Discharge Detection and Elimination (IDDE) program.
2. Identifying potential sources of Illicit Discharges.
3. Following the Spill Prevention and Response guidance contained in the Long Term Pollution Prevention Plan.

Further, I certify that the stormwater management system as shown on the referenced plan will be maintained in accordance with the conditions of the Long Term Pollution Prevention Plan.

NAME: James A. Colace, Trustee
SIGNED: 
DATE: 5/8/24

Chapter 5 Miscellaneous Stormwater Topics

Mosquito Control in Stormwater Management Practices

Both aboveground and underground stormwater BMPs have the potential to serve as mosquito breeding areas. Good design, proper operation and maintenance and treatment with larvicides can minimize this potential.

EPA recommends that stormwater treatment practices dewater within 3 days (72 hours) to reduce the number of mosquitoes that mature to adults, since the aquatic stage of many mosquito species is 7 to 10 days. Massachusetts has had a 72-hour dewatering rule in its Stormwater Management Standards since 1996. The 2008 technical specifications for BMPs set forth in Volume 2, Chapter 2 of the Massachusetts Stormwater Handbook also concur with this practice by requiring that all stormwater practices designed to drain do so within 72 hours.

Some stormwater practices are designed to include permanent wet pools. These practices – if maintained properly – can limit mosquito breeding by providing habitat for mosquito predators. Additional measures that can be taken to reduce mosquito populations include increasing water circulation, attracting mosquito predators by adding suitable habitat, and applying larvicides.

The Massachusetts State Reclamation and Mosquito Control Board (SRMCB), through the Massachusetts Mosquito Control Districts, can undertake further mosquito control actions specifically for the purpose of mosquito control pursuant to Massachusetts General Law Chapter 252. The Mosquito Control Board, <http://www.mass.gov/agr/mosquito/>, describes mosquito control methods and is in the process of developing guidance documents that describe Best Management Practices for mosquito control projects.

The SRMCB and Mosquito Control Districts are not responsible for operating and maintaining stormwater BMPs to reduce mosquito populations. The owners of property that construct the stormwater BMPs or municipalities that “accept” them through local subdivision approval are responsible for their maintenance.¹ The SRMCB is composed of officials from MassDEP, Department of Agricultural Resources, and Department of Conservation and Recreation. The nine (9) Mosquito Control Districts overseen by the SRMCB are located throughout Massachusetts, covering 176 municipalities.

Construction Period Best Management Practices for Mosquito Control

To minimize mosquito breeding during construction, it is essential that the following actions be taken to minimize the creation of standing pools by taking the following actions:

- **Minimize Land Disturbance:** Minimizing land disturbance reduces the likelihood of mosquito breeding by reducing silt in runoff that will cause construction period controls to clog and retain standing pools of water for more than 72 hours.
- **Catch Basin inlets:** Inspect and refresh filter fabric, hay bales, filter socks or stone dams on a regular basis to ensure that any stormwater ponded at the inlet drains within 8 hours after precipitation stops. Shorter periods may be necessary to avoid hydroplaning in roads

¹ MassDEP and MassHighway understand that the numerous stormwater BMPs along state highways pose a unique challenge. To address this challenge, the 2004 MassHighway Stormwater Handbook will provide additional information on appropriate operation and maintenance practices for mosquito control when the Handbook is revised to reflect the 2008 changes to the Stormwater Management Standards..

caused by water ponded at the catch basin inlet. Treat catch basin sumps with larvicides such as *Bacillus sphaericus* (*Bs*) using a licensed pesticide applicator.

- **Check Dams:** If temporary check dams are used during the construction period to lag peak rate of runoff or pond runoff for exfiltration, inspect and repair the check dams on a regular basis to ensure that any stormwater ponded behind the check dam drains within 72 hours.
- **Design construction period sediment traps** to dewater within 72 hours after precipitation. Because these traps are subject to high silt loads and tend to clog, treat them with the larvicide *Bs* after it rains from June through October, until the first frost occurs.
- **Construction period open conveyances:** When temporary manmade ditches are used for channelizing construction period runoff, inspect them on a regular basis to remove any accumulated sediment to restore flow capacity to the temporary ditch.
- **Revegetating Disturbed Surfaces:** Revegetating disturbed surfaces reduces sediment in runoff that will cause construction period controls to clog and retain standing pools of water for greater than 72 hours.
- **Sediment fences/hay bale barriers:** When inspections find standing pools of water beyond the 24-hour period after a storm, take action to restore barrier to its normal function.

Post-Construction Stormwater Treatment Practices

- Mosquito control begins with the environmentally sensitive site design. Environmentally sensitive site design that minimizes impervious surfaces reduces the amount of stormwater runoff. Disconnecting runoff using the LID Site Design credits outlined in the Massachusetts Stormwater Handbook reduces the amount of stormwater that must be conveyed to a treatment practice. Utilizing green roofs minimizes runoff from smaller storms. Storage media must be designed to dewater within 72 hours after precipitation.
- Mosquito control continues with the selection of structural stormwater BMPs that are unlikely to become breeding grounds for mosquitoes, such as:
 - **Bioretention Areas/Rain Gardens/Sand Filter:** These practices tend not to result in mosquito breeding. If any level spreaders, weirs or sediment forebays are used as part of the design, inspect them and correct them as necessary to prevent standing pools of water for more than 72 hours.
 - **Infiltration Trenches:** This practice tends not to result in mosquito breeding. If any level spreaders, weirs, or sediment forebays are used as part of the design, inspect them and correct them as necessary to prevent standing pools of water for more than 72 hours.
- Another mosquito control strategy is to select BMPs that can become habitats for mosquito predators, such as:
 - **Constructed Stormwater Wetlands:** Habitat features can be incorporated in constructed stormwater wetlands to attract dragonflies, amphibians, turtles, birds, bats, and other natural predators of mosquitoes.
 - **Wet Basins:** Wet basins can be designed to incorporate fish habitat features, such as deep pools. Introduce fish in consultation with Massachusetts Division of Fisheries and Wildlife. Vegetation within wet basins designed as fish habitat must be properly managed to ensure that vegetation does not overtake the habitat. Proper design to ensure that no low circulation or “dead” zones are created may reduce the potential for mosquito breeding. Introducing bubblers may increase water circulation in the wet basin.

Effective mosquito controls require proponents to design structural BMPs to prevent ponding and facilitate maintenance and, if necessary, the application of larvicides. Examples of such design practices include the following:

- **Basins:** Provide perimeter access around wet basins, extended dry detention basins and dry detention basins for both larviciding and routine maintenance. Control vegetation to ensure that access pathways stay open.
- **BMPs without a permanent pool of water:** All structural BMPs that do not rely on a permanent pool of water must drain and completely dewater within 72 hours after precipitation. This includes dry detention basins, extended dry detention basins, infiltration basins, and dry water quality swales. Use underdrains at extended dry detention basins to drain the small pools that form due to accumulation of silts. Wallace indicates that extended dry extended detention basins may breed more mosquitoes than wet basins. It is, therefore, imperative to design outlets from extended dry detention basins to completely dewater within the 72-hour period.
- **Energy Dissipators and Flow Spreaders:** Currier and Moeller, 2000 indicate that shallow recesses in energy dissipators and flow spreaders trap water where mosquitoes breed. Set the riprap in grout to reduce the shallow recesses and minimize mosquito breeding.
- **Outlet control structures:** Debris trapped in small orifices or on trash racks of outlet control structures such as multiple stage outlet risers may clog the orifices or the trash rack, causing a standing pool of water. Optimize the orifice size or trash rack mesh size to provide required peak rate attenuation/water quality detention/retention time while minimizing clogging.
- **Rain Barrels and Cisterns:** Seal lids to reduce the likelihood of mosquitoes laying eggs in standing water. Install mosquito netting over inlets. The cistern system should be designed to ensure that all collected water is drained into it within 72 hours.
- **Subsurface Structures, Deep Sump Catch Basins, Oil Grit Separators, and Leaching Catch Basins:** Seal all manhole covers to reduce likelihood of mosquitoes laying eggs in standing water. Install mosquito netting over the outlet (CALTRANS 2004).

The Operation and Maintenance Plan should provide for mosquito prevention and control.

- **Check dams:** Inspect permanent check dams on the schedule set forth in the O&M Plan. Inspect check dams 72 hours after storms for standing water ponding behind the dam. Take corrective action if standing water is found.
- **Cisterns:** Apply *Bs* larvicide in the cistern if any evidence of mosquitoes is found. The Operation and Maintenance Plan shall specify how often larvicides should be applied to waters in the cistern.
- **Water quality swales:** Remove and properly dispose of any accumulated sediment as scheduled in the Operation and Maintenance Plan.
- **Larvicide Treatment:** The Operation and Maintenance Plan must include measures to minimize mosquito breeding, including larviciding.
- The party identified in the Operation and Maintenance Plan as responsible for maintenance shall see that larvicides are applied as necessary to the following stormwater treatment practices: catch basins, oil/grit separators, wet basins, wet water quality swales, dry extended detention basins, infiltration basins, and constructed stormwater wetlands. The Operation and Maintenance Plan must ensure that all larvicides are applied by a licensed pesticide applicator and in compliance with all pesticide label requirements.
- The Operation and Maintenance Plan should identify the appropriate larvicide and the time and method of application. For example, *Bacillus sphaericus* (*Bs*), the preferred

larvicide for stormwater BMPs, should be hand-broadcast.² Alternatively, Altosid, a Methopren product, may be used. Because some practices are designed to dewater between storms, such as dry extended detention and infiltration basins, the Operation and Maintenance Plan should provide that larviciding must be conducted during or immediately after wet weather, when the detention or infiltration basin has a standing pool of water, unless a product is used that can withstand extended dry periods.

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² *Bacillus thuringiensis israelensis* or *Bti* is usually applied by helicopter to wetlands and floodplains

Roads and Stormwater BMPs

In general, the stormwater BMPs used for land development projects can also be used for new roadways and roadway improvement projects. However, for improvement of existing roads, there are often constraints that limit the choice of BMP. These constraints derive from the linear configuration of the road, the limited area within the existing right-of-way, the structural and safety requirements attendant to good roadway design, and the long-term maintainability of the roadway drainage systems. The MassHighway Handbook provides strategies for dealing with the constraints associated with providing stormwater BMPs for roadway redevelopment projects.

Roadway design can minimize impacts caused by stormwater. Reducing roadway width reduces the total and peak volume of runoff. Designing a road with country drainage (no road shoulders or curbs) disconnects roadway runoff. Disconnection of roadway runoff is eligible for the Low Impact Site Design Credit provided the drainage is disconnected in accordance with specifications outlined in Volume 3.

Like other parties, municipalities that work within wetlands jurisdictional areas and adjacent buffer zones must design and implement structural stormwater best management practices in accordance with the Stormwater Management Standards and the Stormwater Management Handbook. In addition, in municipalities and areas where state agencies operate stormwater systems, the DPWs (or other town or state agencies) must meet the “good housekeeping” requirement of the municipality’s or agency’s MS4 permit.

MassHighway has taken stormwater management one step further by working with MassDEP to develop the MassHighway Storm Water Handbook for Highways and Bridges. The purpose of the MassHighway Handbook is to provide guidance for persons involved in the design, permitting, review and implementation of state highway projects, especially those involving existing roadways where physical constraints often limit the stormwater management options available. These constraints, like those common to redevelopment sites, may make it difficult to comply precisely with the requirements of the Stormwater Management Standards and the Massachusetts Stormwater Handbook.³ In response to these constraints, MassDEP and MHD developed specific design, permitting, review and implementation practices that meet the unique challenges of providing environmental protection for existing state roads. The information in the MassHighway Handbook may also aid in the planning and design of projects to build new highways and to add lanes to existing highways, since they may face similar difficulties in meeting the requirements of the Stormwater Management Standards.

Although it is very useful, the MassHighway Handbook does not allow MassHighway projects to proceed without individual review and approval by the issuing authority when subject to the Wetlands Protection Act Regulations, 310 CMR 10.00, or the 401 Water Quality Certification Regulations, 314 CMR 9.00. For example, MassHighway must provide a Conservation Commission with a project-specific Operation and Maintenance Plan in accordance with Standard 9 that documents how the project’s post-construction BMPs will be operated and maintained.⁴

³ The 2004 MassHighway Handbook outlines standardized methods for dealing with these constraints as they apply to highway redevelopment projects. MassDEP and MassHighway intend to work together to provide guidance for add a lane projects when the 2004 Handbook is revised to reflect the 2008 changes to the Stormwater Management Standards.

⁴ The general permit for municipal separate storm sewer systems (the MS4 Permit) requires MassHighway to develop and implement procedures for the proper operation and maintenance of stormwater BMPs. To

Some municipalities have asked if the MassHighway Handbook governs municipal road projects. The answer is no.⁵ The MassHighway Handbook was developed in response to the unique problems and challenges arising out of the management of the state highway system. Like other project proponents, cities and towns planning road or other projects in areas subject to jurisdiction under the Wetlands Protection Act must design and implement LID, non-structural and structural best management practices in accordance with the Stormwater Management Standards and the Massachusetts Stormwater Handbook.

avoid duplication of effort, MassHighway may be able rely on the same procedures to fulfill the operation and maintenance requirements of Standard 9 and the MS 4 Permit.

⁵ Although the MassHighway Handbook does not govern municipal road projects, cities and towns may find some of the information presented in the Handbook useful.



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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Secretary

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Massachusetts Department of Environmental Protection Bureau of Water Resources Snow Disposal Guidance

Effective Date: December 11, 2020

Applicability: Applies to all federal, state, regional and local agencies, as well as to private businesses.

Supersedes: Bureau of Resource Protection (BRP) Snow Disposal Guideline No. BRPG97-1 issued December 12, 1997 and BRPG01-01 issued March 8, 2001; Bureau of Water Resources (BWR) snow disposal guidance issued December 21, 2015 and December 12, 2018.

Approved by: Kathleen Baskin, Assistant Commissioner, Bureau of Water Resources

PURPOSE: To provide guidelines to all government agencies and private businesses regarding snow disposal site selection, site preparation and maintenance, and emergency snow disposal options that are protective of wetlands, drinking water, and water bodies, and are acceptable to the Massachusetts Department of Environmental Protection (MassDEP), Bureau of Water Resources.

APPLICABILITY: These Guidelines are issued by MassDEP's Bureau of Water Resources on behalf of all Bureau Programs (including Drinking Water Supply, Wetlands and Waterways, Wastewater Management, and Watershed Planning and Permitting). They apply to all federal agencies, state agencies, state authorities, municipal agencies and private businesses disposing of snow in the Commonwealth of Massachusetts.

INTRODUCTION

Finding a place to dispose of collected snow poses a challenge to municipalities and businesses as they clear roads, parking lots, bridges, and sidewalks. While MassDEP is aware of the threats to public safety caused by snow, collected snow that is contaminated with road salt, sand, litter, and automotive pollutants such as oil also threatens public health and the environment.

As snow melts, road salt, sand, litter, and other pollutants are transported into surface water or through the soil where they may eventually reach the groundwater. Road salt and other pollutants can contaminate water supplies and are toxic to aquatic life at certain levels. Sand washed into

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waterbodies can create sand bars or fill in wetlands and ponds, impacting aquatic life, causing flooding, and affecting our use of these resources.

There are several steps that communities can take to minimize the impacts of snow disposal on public health and the environment. These steps will help communities avoid the costs of a contaminated water supply, degraded waterbodies, and flooding. Everything that occurs on the land has the potential to impact the Commonwealth's water resources. Given the authority of local government over the use of the land, municipal officials and staff have a critically important role to play in protecting our water resources.

The purpose of these guidelines is to help federal agencies, state agencies, state authorities, municipalities and businesses select, prepare, and maintain appropriate snow disposal sites before the snow begins to accumulate through the winter. Following these guidelines and obtaining the necessary approvals may also help municipalities in cases when seeking reimbursement for snow disposal costs from the Federal Emergency Management Agency is possible.

RECOMMENDED GUIDELINES

These snow disposal guidelines address: (1) site selection; (2) site preparation and maintenance; and (3) emergency snow disposal.

1. SITE SELECTION

The key to selecting effective snow disposal sites is to locate them adjacent to or on pervious surfaces in upland areas or upland locations on impervious surfaces away from water resources and drinking water wells. At these locations, the snow meltwater can filter into the soil, leaving behind sand and debris which can be removed in the spring. The following conditions should be followed:

- Within water supply Zone A and Zone II, avoid storage or disposal of snow and ice containing deicing chemicals that has been collected from streets located outside these zones. Municipalities may have a water supply protection land use control that prohibits the disposal of snow and ice containing deicing chemicals from outside the Zone A and Zone II, subject to the Massachusetts Drinking Water Regulations at 310 CMR 22.20C and 310 CMR 22.21(2).
- Avoid storage or disposal of snow or ice in Interim Wellhead Protection Areas (IWPA) of public water supply wells, and within 75 feet of a private well, where road salt may contaminate water supplies.
- Avoid dumping snow into any waterbody, including rivers, the ocean, reservoirs, ponds, or wetlands. In addition to water quality impacts and flooding, snow disposed of in open water can cause navigational hazards when it freezes into ice blocks.
- Avoid dumping snow on MassDEP-designated high and medium-yield aquifers where it may contaminate groundwater.
- Avoid dumping snow in sanitary landfills and gravel pits. Snow meltwater will create more contaminated leachate in landfills posing a greater risk to groundwater, and in gravel pits, there is little opportunity for pollutants to be filtered out of the meltwater because groundwater is close to the land surface.

- Avoid disposing of snow on top of storm drain catch basins or in stormwater drainage systems including detention basins, swales or ditches. Snow combined with sand and debris may block a stormwater drainage system, causing localized flooding. A high volume of sand, sediment, and litter released from melting snow also may be quickly transported through the system into surface water.

Recommended Site Selection Procedures

It is important that the municipal Department of Public Works or Highway Department, Conservation Commission, and Board of Health work together to select appropriate snow disposal sites. The following steps should be taken:

- Estimate how much snow disposal capacity may be needed for the season so that an adequate number of disposal sites can be selected and prepared.
- Identify sites that could potentially be used for snow disposal, such as municipal open space (e.g., parking lots or parks).
- Select sites located in upland locations that are not likely to impact sensitive environmental resources first.
- If more storage space is still needed, prioritize the sites with the least environmental impact (using the site selection criteria, and local or MassGIS maps as a guide).

Snow Disposal Mapping Assistance

MassDEP has an online mapping tool to assist in identifying possible locations to potentially dispose of snow. MassDEP encourages municipalities to use this tool to identify possible snow disposal options. The tool identifies wetland resource areas, public drinking water supplies and other sensitive locations where snow should not be disposed. The tool may be accessed through the Internet at the following web address:

<https://maps.env.state.ma.us/dep/arcgis/js/templates/PSE/>.

2. SITE PREPARATION AND MAINTENANCE

In addition to carefully selecting disposal sites before the winter begins, it is important to prepare and maintain these sites to maximize their effectiveness. The following maintenance measures should be undertaken for all snow disposal sites:

- A silt fence or equivalent barrier should be placed securely on the downgradient side of the snow disposal site.
- Wherever possible maintain a 50-foot vegetated buffer between the disposal site and adjacent waterbodies to filter pollutants from the meltwater.
- Clear debris from the site prior to using the site for snow disposal.
- Clear debris from the site and properly dispose of it at the end of the snow season, and no later than May 15.

3. SNOW DISPOSAL APPROVALS

Proper snow disposal may be undertaken through one of the following approval procedures:

- Routine snow disposal – Minimal, if any, administrative review is required in these cases when upland and pervious snow disposal locations or upland locations on impervious surfaces that have functioning and maintained stormwater management systems have been identified, mapped, and used for snow disposal following ordinary snowfalls. Use of upland and pervious snow disposal sites avoids wetland resource areas and allows snow meltwater to recharge groundwater and will help filter pollutants, sand, and other debris. This process will address the majority of snow removal efforts until an entity exhausts all available upland snow disposal sites. The location and mapping of snow disposal sites will help facilitate each entity's routine snow management efforts.
- Emergency Certifications – If an entity demonstrates that there is no remaining capacity at upland snow disposal locations, local conservation commissions may issue an Emergency Certification under the Massachusetts Wetlands Protection regulations to authorize snow disposal in buffer zones to wetlands, certain open water areas, and certain wetland resource areas (i.e. within flood plains). Emergency Certifications can only be issued at the request of a public agency or by order of a public agency for the protection of the health or safety of citizens, and are limited to those activities necessary to abate the emergency. See 310 CMR 10.06(1)-(4). Use the following guidelines in these emergency situations:
 - Dispose of snow in open water with adequate flow and mixing to prevent ice dams from forming.
 - Do not dispose of snow in salt marshes, vegetated wetlands, certified vernal pools, shellfish beds, mudflats, drinking water reservoirs and their tributaries, Zone IIs or IWPA's of public water supply wells, Outstanding Resource Waters, or Areas of Critical Environmental Concern.
 - Do not dispose of snow where trucks may cause shoreline damage or erosion.
 - Consult with the municipal Conservation Commission to ensure that snow disposal in open water complies with local ordinances and bylaws.
- Severe Weather Emergency Declarations – In the event of a large-scale severe weather event, MassDEP may issue a broader Emergency Declaration under the Wetlands Protection Act which allows federal agencies, state agencies, state authorities, municipalities, and businesses greater flexibility in snow disposal practices. Emergency Declarations typically authorize greater snow disposal options while protecting especially sensitive resources such as public drinking water supplies, vernal pools, land containing shellfish, FEMA designated floodways, coastal dunes, and salt marsh. In the event of severe winter storm emergencies, the snow disposal site maps created by municipalities will enable MassDEP and the Massachusetts Emergency Management Agency (MEMA) in helping communities identify appropriate snow disposal locations.

If upland disposal sites have been exhausted, the Emergency Declaration issued by MassDEP allows for snow disposal near water bodies. In these situations, a buffer of at

least 50 feet, preferably vegetated, should still be maintained between the site and the waterbody. Furthermore, it is essential that the other guidelines for preparing and maintaining snow disposal sites be followed to minimize the threat to adjacent waterbodies.

Under extraordinary conditions, when all land-based snow disposal options are exhausted, the Emergency Declaration issued by MassDEP may allow disposal of snow in certain waterbodies under certain conditions. *A federal agency, state agency, state authority, municipality or business seeking to dispose of snow in a waterbody should take the following steps:*

- Call the emergency contact phone number [(888) 304-1133] and notify the MEMA of the municipality's intent.
- MEMA will ask for some information about where the requested disposal will take place.
- MEMA will confirm that the disposal is consistent with MassDEP's Severe Weather Emergency Declaration and these guidelines and is therefore approved.

During declared statewide snow emergency events, MassDEP's website will also highlight the emergency contact phone number [(888) 304-1133] for authorizations and inquiries. For further non-emergency information about this Guidance you may contact your MassDEP Regional Office Service Center:

Northeast Regional Office, Wilmington, 978-694-3246
Southeast Regional Office, Lakeville, 508-946-2714
Central Regional Office, Worcester, 508-792-7650
Western Regional Office, Springfield, 413-755-2114

SC-160LP, SC-310, SC-740 & DC-780 Design Manual

StormTech® Chamber Systems for Stormwater Management



SC-740 Chamber

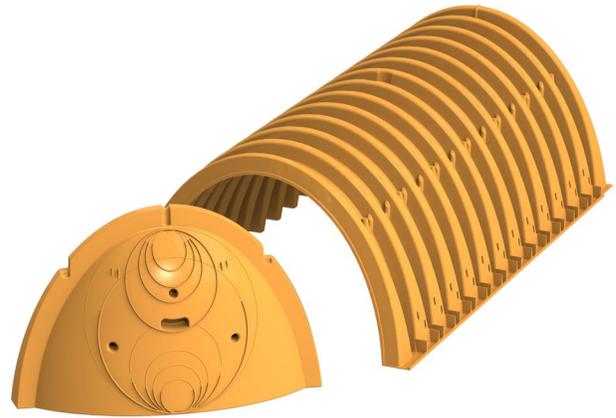
Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.

StormTech SC-740 Chamber (not to scale)

Nominal Specifications

Size (L x W x H)	85.4" x 51.0" x 30.0" (2,170 x 1,295 x 762 mm)
Chamber Storage	45.9 ft ³ (1.30 m ³)
Min. Installed Storage*	74.9 ft ³ (2.12 m ³)
Weight	74.0 lbs (33.6 kg)

*Assumes 6" (150 mm) stone above, below and between chambers and 40% stone porosity.

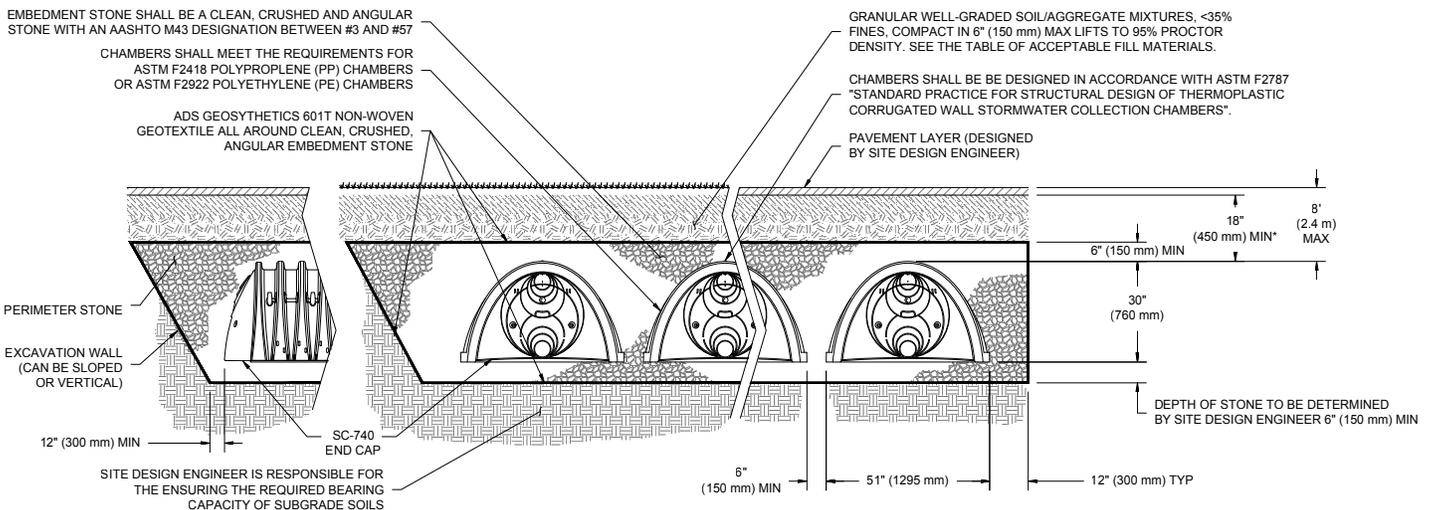
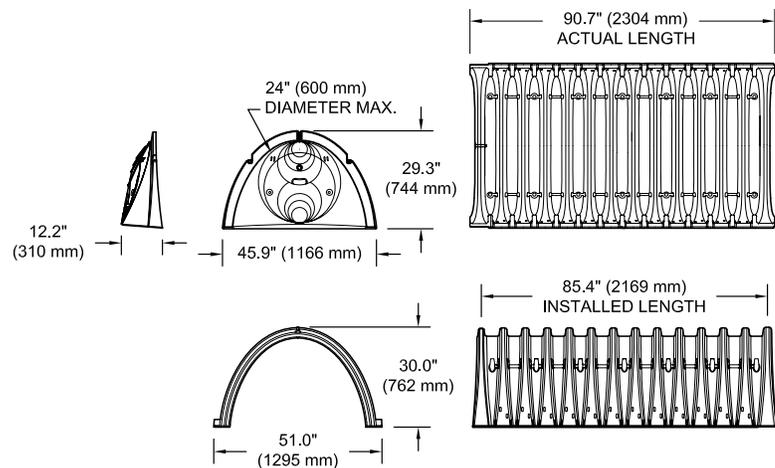


Shipping

30 chambers/pallet

60 end caps/pallet

12 pallets/truck



*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

The installed chamber system shall provide the load factors specified in the aashto lrd bridge design specifications section 12.12 for earth and live loads, with consideration for impact and multiple vehicle presences.

SC-740 Cumulative Storage Volumes per chamber
Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under Chambers.

Depth of Water in System in. (mm)	Cumulative Chamber Storage ft ³ (m ³)	Total System Cumulative Storage ft ³ (m ³)
42 (1067)	45.90 (1.300)	74.90 (2.121)
41 (1041)	45.90 (1.300)	73.77 (2.089)
40 (1016)	45.90 (1.300)	72.64 (2.057)
39 (991)	45.90 (1.300)	71.52 (2.025)
38 (965)	45.90 (1.300)	70.39 (1.993)
37 (940)	45.90 (1.300)	69.26 (1.961)
36 (914)	45.90 (1.300)	68.14 (1.929)
35 (889)	45.85 (1.298)	66.98 (1.897)
34 (864)	45.69 (1.294)	65.75 (1.862)
33 (838)	45.41 (1.286)	64.46 (1.825)
32 (813)	44.81 (1.269)	62.97 (1.783)
31 (787)	44.01 (1.246)	61.36 (1.737)
30 (762)	43.06 (1.219)	59.66 (1.689)
29 (737)	41.98 (1.189)	57.89 (1.639)
28 (711)	40.80 (1.155)	56.05 (1.587)
27 (686)	39.54 (1.120)	54.17 (1.534)
26 (660)	38.18 (1.081)	52.23 (1.479)
25 (635)	36.74 (1.040)	50.23 (1.422)
24 (610)	35.22 (0.977)	48.19 (1.365)
23 (584)	33.64 (0.953)	46.11 (1.306)
22 (559)	31.99 (0.906)	44.00 (1.246)
21 (533)	30.29 (0.858)	41.85 (1.185)
20 (508)	28.54 (0.808)	39.67 (1.123)
19 (483)	26.74 (0.757)	37.47 (1.061)
18 (457)	24.89 (0.705)	35.23 (0.997)
17 (432)	23.00 (0.651)	32.96 (0.939)
16 (406)	21.06 (0.596)	30.68 (0.869)
15 (381)	19.09 (0.541)	28.36 (0.803)
14 (356)	17.08 (0.484)	26.03 (0.737)
13 (330)	15.04 (0.426)	23.68 (0.670)
12 (305)	12.97 (0.367)	21.31 (0.608)
11 (279)	10.87 (0.309)	18.92 (0.535)
10 (254)	8.74 (0.247)	16.51 (0.468)
9 (229)	6.58 (0.186)	14.09 (0.399)
8 (203)	4.41 (0.125)	11.66 (0.330)
7 (178)	2.21 (0.063)	9.21 (0.264)
6 (152)	0 (0)	6.76 (0.191)
5 (127)	0 (0)	5.63 (0.160)
4 (102)	0 (0)	4.51 (0.128)
3 (76)	0 (0)	3.38 (0.096)
2 (51)	0 (0)	2.25 (0.064)
1 (25)	0 (0)	1.13 (0.032)

Note: Add 1.13 ft³ (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber

ft ³ (m ³)	Bare Chamber Storage ft ³ (m ³)	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
SC-740	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)

Note: Assumes 6" (150 mm) stone above chambers, 6" (150 mm) row spacing and 40% stone porosity.

Amount of Stone Per Chamber

TONS (yds ³)	Stone Foundation Depth		
	6	12	16
SC-740	3.8 (2.8)	4.6 (3.3)	5.5 (3.9)
KILOGRAMS (m ³)	150 mm	300 mm	450 mm
SC-740	3,450 (2.1)	4,170 (2.5)	4,490 (3.0)

Note: Assumes 6" (150 mm) of stone above and between chambers.

Volume Excavation Per Chamber

yd ³ (m ³)	Stone Foundation Depth		
	6 (150)	12 (300)	18 (450)
SC-740	5.5 (4.2)	6.2 (4.7)	6.8 (5.2)

Note: Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. The volume of excavation will vary as depth of cover increases.



12.0 Inspection and Maintenance

12.1 Isolator Row Plus Inspection

Regular inspection and maintenance are essential to assure a properly functioning stormwater system. Inspection is easily accomplished through the manhole or optional inspection ports of an Isolator Row PLUS. Please follow local and OSHA rules for a confined space entry.

Inspection ports can allow inspection to be accomplished completely from the surface without the need for a confined space entry. Inspection ports provide visual access to the system with the use of a flashlight. A stadia rod may be inserted to determine the depth of sediment. If upon visual inspection it is found that sediment has accumulated to an average depth exceeding 3 (76 mm), cleanout is required.

A StormTech Isolator Row PLUS should initially be inspected immediately after completion of the site's construction. While every effort should be made to prevent sediment from entering the system during construction, it is during this time that excess amounts of sediments are most likely to enter any stormwater system. Inspection and maintenance, if necessary, should be performed prior to passing responsibility over to the site's owner. Once in normal service, a StormTech Isolator Row PLUS should be inspected bi-annually until an understanding of the sites characteristics is developed. The site's maintenance manager can then revise the inspection schedule based on experience or local requirements.

12.2 Isolator Row Plus Maintenance

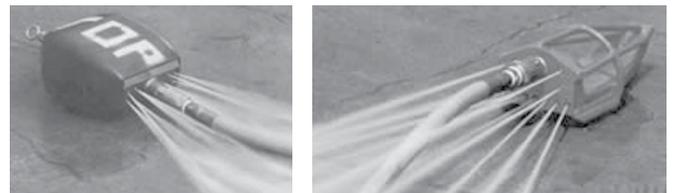
JetVac maintenance is recommended if sediment has been collected to an average depth of 3 (76 mm) inside the Isolator Row PLUS. More frequent maintenance may be required to maintain minimum flow rates through the Isolator Row PLUS. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row PLUS while scouring and suspending sediments. As the nozzle is retrieved, a wave of suspended sediments is flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/ JetVac combination vehicles. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45 (1143 mm) are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. The JetVac process shall only be performed on StormTech Rows that have ADS PLUS fabric over the foundation stone.



Looking down the Isolator Row PLUS



A typical JetVac truck (This is not a StormTech product.)



Examples of culvert cleaning nozzles appropriate for Isolator Row PLUS maintenance. (These are not StormTech products).

12.0 Inspection & Maintenance

StormTech Isolator Row Plus - Step-by-Step Maintenance Procedures

Step 1: Inspect Isolator Row PLUS 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
 - iv. If sediment is at, or above, 3" (76 mm) depth proceed to Step 2. If not proceed to Step 3.
- B) All Isolator Plus Rows
 - i. Remove cover from manhole at upstream end of Isolator Row PLUS
 - ii. Using a flashlight, inspect down Isolator Row PLUS through outlet pipe
 1. Follow OSHA regulations for confined space entry if entering manhole
 2. Mirrors on poles or cameras may be used to avoid a confined space entry
 - iii. If sediment is at or above the lower row of sidewall holes [approximately 3" (76 mm)] proceed to Step 2. If not proceed to Step 3.

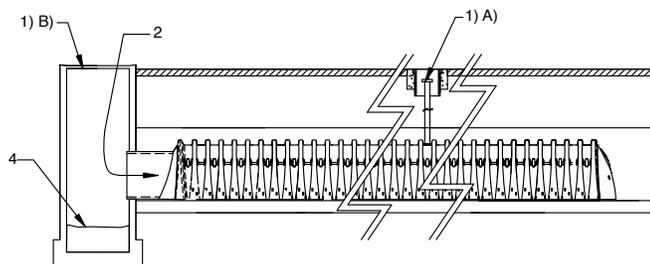
Step 2: Clean out Isolator Row PLUS using the JetVac process

- A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 (1143 mm) or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required during jetting

Step 3: Replace all caps, lids and covers

Step 4: Inspect and clean catch basins and manholes upstream of the StormTech system following local guidelines.

Figure 20 – StormTech Isolator Row Plus (not to scale)



12.3 Eccentric Pipe Header Inspection

These guidelines do not supercede a pipe manufacturer's recommended I&M procedures. Consult with the manufacturer of the pipe header system for specific I&M procedures. Inspection of the header system should be carried out quarterly. On sites which generate higher levels of sediment more frequent inspections may be necessary. Headers may be accessed through risers, access ports or manholes. Measurement of sediment may be taken with a stadia rod or similar device. Cleanout of sediment should occur when the sediment volume has reduced the storage area by 25% or the depth of sediment has reached approximately 25% of the diameter of the structure.

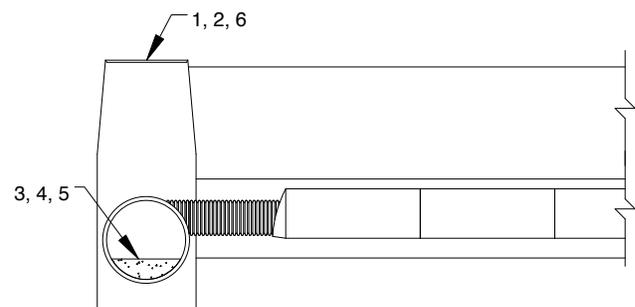
12.4 Eccentric Pipe Manifold Maintenance

Cleanout of accumulated material should be accomplished by vacuum pumping the material from the header. Cleanout should be accomplished during dry weather. Care should be taken to avoid flushing sediments out through the outlet pipes and into the chamber rows.

Eccentric Header Step-by-Step Maintenance Procedures

1. Locate manholes connected to the manifold system
2. Remove grates or covers
3. Using a stadia rod, measure the depth of sediment
4. If sediment is at a depth of about 25% pipe volume or 25% pipe diameter proceed to step 5. If not proceed to step 6.
5. Vacuum pump the sediment. Do not flush sediment out inlet pipes.
6. Replace grates and covers
7. Record depth and date and schedule next inspection

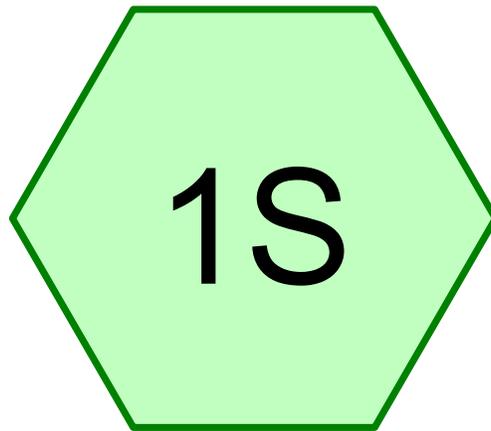
Figure 21 – Eccentric Manifold Maintenance



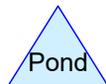
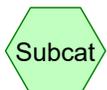
Please contact StormTech's Technical Services Department at 888-892-2894 for a spreadsheet to estimate cleaning intervals.

13.0 General Notes

1. StormTech requires installing contractors to use and understand StormTech's latest Installation Instructions prior to beginning system installation.
2. Our Technical Services Department offers installation consultations to installing contractors. Contact our Technical Service Representatives at least 30 days prior to system installation to arrange a preinstallation consultation. Our representatives can then answer questions or address comments on the StormTech chamber system and inform the Installing contractor of the minimum installation requirements before beginning the system's construction. Call **860-529-8188** to speak to a Technical Service Representative or visit **www.stormtech.com** to receive a copy of our Installation Instructions.
3. StormTech's requirements for systems with pavement design (asphalt, concrete pavers, etc.): Minimum cover for the SC-740, DC-780 and SC-310 chambers is 18" (457 mm) not including pavement; Minimum cover for the SC-160LP chamber is 14 (350 mm); Maximum cover for the SC-740 and SC-310 chambers is 96" (2.4 m) including pavement design; Maximum cover for the SC-160LP chamber is 10' (3.0 m); Maximum cover for the DC-780 chamber is 12' (3.6 m) including pavement design. For installations that do not include pavement, where rutting from vehicles may occur, minimum required cover is 24" (610 mm), maximum cover is as stated above.
4. The contractor must report any discrepancies with the bearing capacity of the chamber foundation materials to the design engineer.
5. AASHTO M288 Class 2 non-woven geotextile (filter fabric) must be used as indicated in the project plans.
6. Stone placement between chamber rows and around perimeter must follow instructions as indicated in the most current version of StormTech's Installation Instructions.
7. Backfilling over the chambers must follow requirements as indicated in the most current version of StormTech's Installation Instructions.
8. The contractor must refer to StormTech's Installation Instructions for a Table of Acceptable Vehicle Loads at various depths of cover. This information is also available at StormTech's website: **www.stormtech.com**. The contractor is responsible for preventing vehicles that exceed StormTech's requirements from traveling across or parking over the stormwater system. Temporary fencing, warning tape and appropriately located signs are commonly used to prevent unauthorized vehicles from entering sensitive construction areas.
9. The contractor must apply erosion and sediment control measures to protect the stormwater system during all phases of site construction per local codes and design engineer's specifications.
10. STORMTECH PRODUCT WARRANTY IS LIMITED. Contact StormTech for warranty information.



Pre-Construction - Existing



Parking Lot - Pre-Construction Runoff

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Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 4101 MA Franklin Norfolk County

Rainfall events imported from "NRCS-Rain.txt" for 4101 MA Franklin Norfolk County

Parking Lot - Pre-Construction Runoff

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NRCC 24-hr	C	Default	24.00	1	3.22	2
2	10-Year	NRCC 24-hr	C	Default	24.00	1	4.86	2
3	100-Year	NRCC 24-hr	C	Default	24.00	1	8.80	2

Parking Lot - Pre-Construction Runoff

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.004	85	Gravel roads, HSG B (1S)
0.335	98	Paved parking, HSG A (1S)
0.339	98	TOTAL AREA

Parking Lot - Pre-Construction Runoff

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.335	HSG A	1S
0.004	HSG B	1S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.339		TOTAL AREA

Parking Lot - Pre-Construction Runoff

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.004	0.000	0.000	0.000	0.004	Gravel roads	1S
0.335	0.000	0.000	0.000	0.000	0.335	Paved parking	1S
0.335	0.004	0.000	0.000	0.000	0.339	TOTAL AREA	

Parking Lot - Pre-Construction Runoff

NRCC 24-hr C 2-Year Rainfall=3.22"

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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+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre-Construction -

Runoff Area=14,750 sf 98.92% Impervious Runoff Depth=2.99"
Tc=5.0 min CN=98 Runoff=1.15 cfs 0.084 af

Total Runoff Area = 0.339 ac Runoff Volume = 0.084 af Average Runoff Depth = 2.99"
1.08% Pervious = 0.004 ac 98.92% Impervious = 0.335 ac

Parking Lot - Pre-Construction Runoff

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NRCC 24-hr C 2-Year Rainfall=3.22"

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Summary for Subcatchment 1S: Pre-Construction - Existing

Runoff = 1.15 cfs @ 12.12 hrs, Volume= 0.084 af, Depth= 2.99"

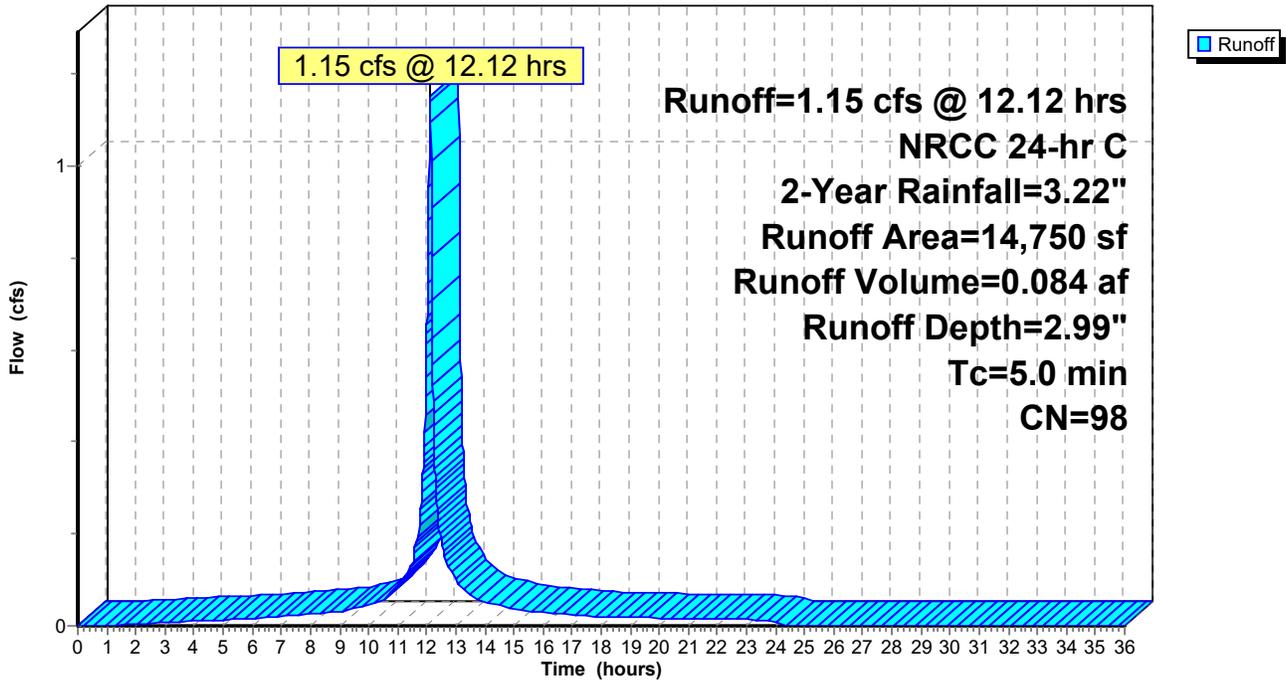
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.22"

Area (sf)	CN	Description
2,240	98	Paved parking, HSG A
12,350	98	Paved parking, HSG A
160	85	Gravel roads, HSG B
14,750	98	Weighted Average
160		1.08% Pervious Area
14,590		98.92% Impervious Area

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

Subcatchment 1S: Pre-Construction - Existing

Hydrograph



Parking Lot - Pre-Construction Runoff

NRCC 24-hr C 10-Year Rainfall=4.86"

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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+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre-Construction -

Runoff Area=14,750 sf 98.92% Impervious Runoff Depth=4.62"
Tc=5.0 min CN=98 Runoff=1.75 cfs 0.130 af

Total Runoff Area = 0.339 ac Runoff Volume = 0.130 af Average Runoff Depth = 4.62"
1.08% Pervious = 0.004 ac 98.92% Impervious = 0.335 ac

Parking Lot - Pre-Construction Runoff

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NRCC 24-hr C 10-Year Rainfall=4.86"

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Summary for Subcatchment 1S: Pre-Construction - Existing

Runoff = 1.75 cfs @ 12.12 hrs, Volume= 0.130 af, Depth= 4.62"

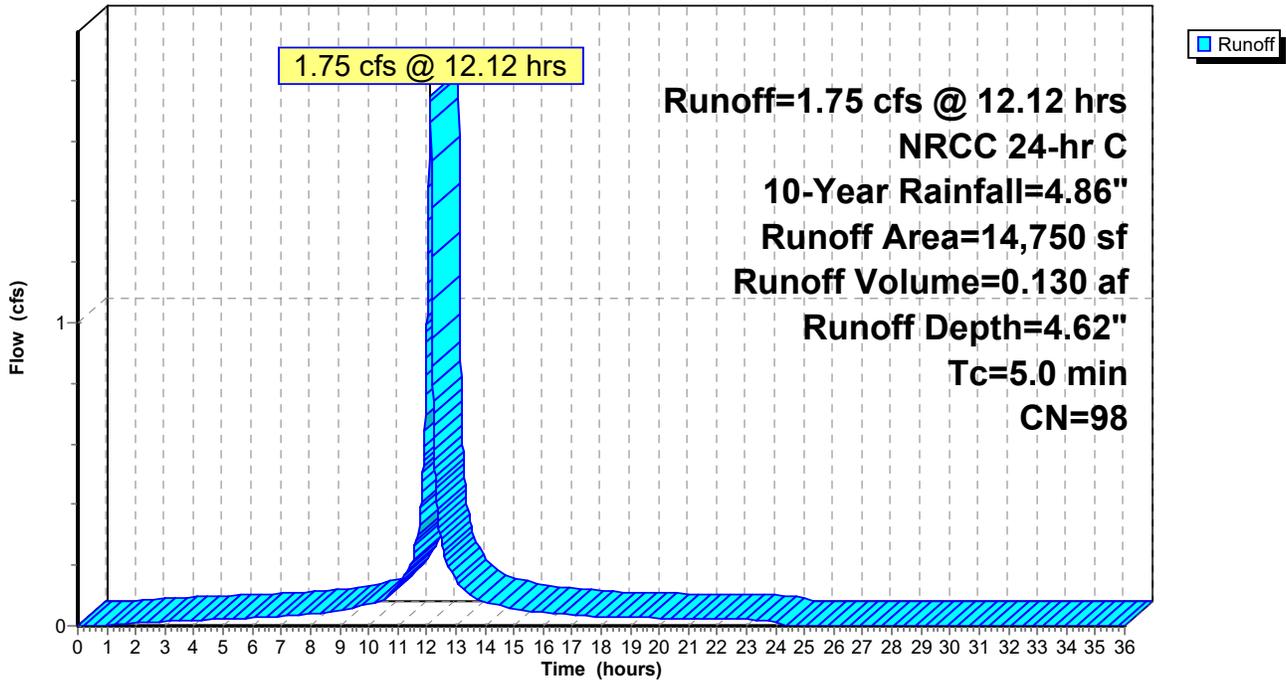
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.86"

Area (sf)	CN	Description
2,240	98	Paved parking, HSG A
12,350	98	Paved parking, HSG A
160	85	Gravel roads, HSG B
14,750	98	Weighted Average
160		1.08% Pervious Area
14,590		98.92% Impervious Area

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

Subcatchment 1S: Pre-Construction - Existing

Hydrograph



Parking Lot - Pre-Construction Runoff

NRCC 24-hr C 100-Year Rainfall=8.80"

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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+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Pre-Construction -

Runoff Area=14,750 sf 98.92% Impervious Runoff Depth=8.56"
Tc=5.0 min CN=98 Runoff=3.19 cfs 0.242 af

Total Runoff Area = 0.339 ac Runoff Volume = 0.242 af Average Runoff Depth = 8.56"
1.08% Pervious = 0.004 ac 98.92% Impervious = 0.335 ac

Parking Lot - Pre-Construction Runoff

NRCC 24-hr C 100-Year Rainfall=8.80"

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Summary for Subcatchment 1S: Pre-Construction - Existing

Runoff = 3.19 cfs @ 12.12 hrs, Volume= 0.242 af, Depth= 8.56"

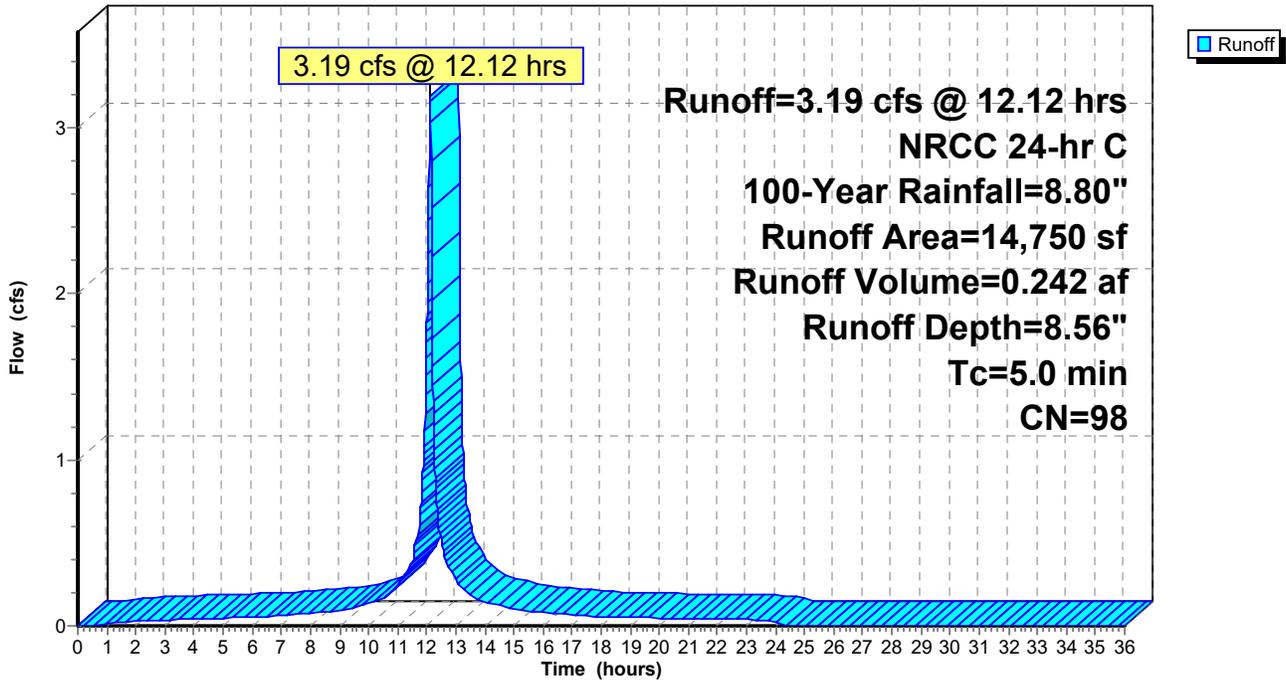
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.80"

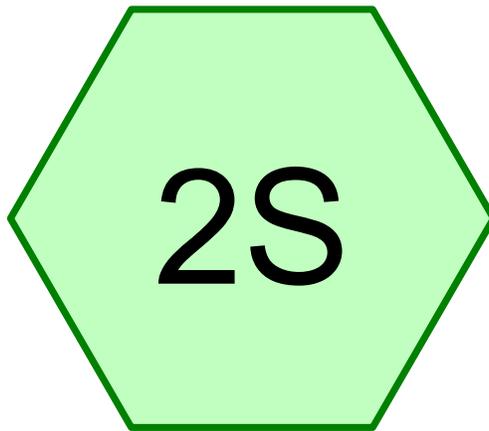
Area (sf)	CN	Description
2,240	98	Paved parking, HSG A
12,350	98	Paved parking, HSG A
160	85	Gravel roads, HSG B
14,750	98	Weighted Average
160		1.08% Pervious Area
14,590		98.92% Impervious Area

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

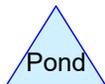
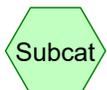
Subcatchment 1S: Pre-Construction - Existing

Hydrograph





Post-Construction



Parking Lot - Post - Construction Runoff

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Project Notes

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Rainfall events imported from "NRCS-Rain.txt" for 4101 MA Franklin Norfolk County

Parking Lot - Post - Construction Runoff

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NRCC 24-hr	C	Default	24.00	1	3.22	2
2	10-Year	NRCC 24-hr	C	Default	24.00	1	4.86	2
3	100-Year	NRCC 24-hr	C	Default	24.00	1	8.80	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.026	39	>75% Grass cover, Good, HSG A (2S)
0.001	85	Gravel roads, HSG B (2S)
0.311	98	Paved parking, HSG A (2S)
0.339	93	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.337	HSG A	2S
0.001	HSG B	2S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.339		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.026	0.000	0.000	0.000	0.000	0.026	>75% Grass cover, Good	2S
0.000	0.001	0.000	0.000	0.000	0.001	Gravel roads	2S
0.311	0.000	0.000	0.000	0.000	0.311	Paved parking	2S
0.337	0.001	0.000	0.000	0.000	0.339	TOTAL AREA	

Parking Lot - Post - Construction Runoff

NRCC 24-hr C 2-Year Rainfall=3.22"

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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+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: Post-Construction

Runoff Area=14,750 sf 91.80% Impervious Runoff Depth=2.46"
Tc=5.0 min CN=93 Runoff=1.04 cfs 0.070 af

Total Runoff Area = 0.339 ac Runoff Volume = 0.070 af Average Runoff Depth = 2.46"
8.20% Pervious = 0.028 ac 91.80% Impervious = 0.311 ac

Parking Lot - Post - Construction Runoff

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NRCC 24-hr C 2-Year Rainfall=3.22"

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Summary for Subcatchment 2S: Post-Construction

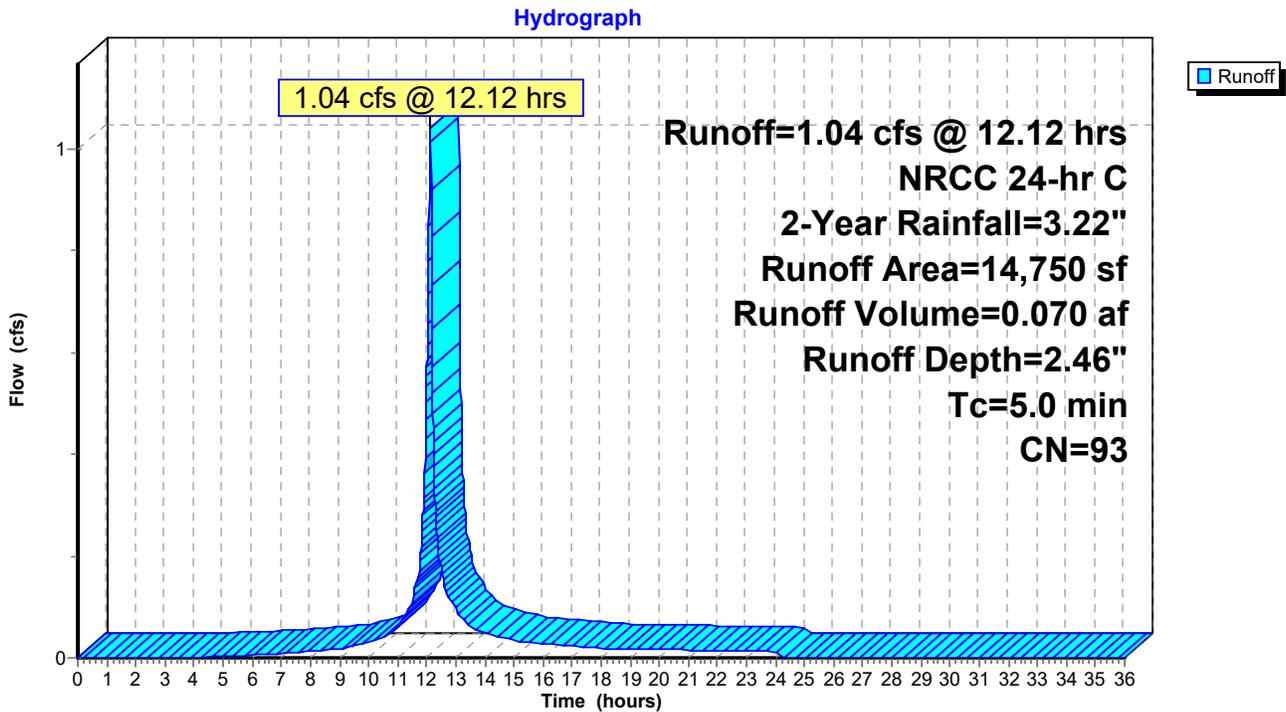
Runoff = 1.04 cfs @ 12.12 hrs, Volume= 0.070 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 2-Year Rainfall=3.22"

Area (sf)	CN	Description
60	85	Gravel roads, HSG B
13,540	98	Paved parking, HSG A
1,150	39	>75% Grass cover, Good, HSG A
14,750	93	Weighted Average
1,210		8.20% Pervious Area
13,540		91.80% Impervious Area

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

Subcatchment 2S: Post-Construction



Parking Lot - Post - Construction Runoff

NRCC 24-hr C 10-Year Rainfall=4.86"

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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+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: Post-Construction

Runoff Area=14,750 sf 91.80% Impervious Runoff Depth=4.06"
Tc=5.0 min CN=93 Runoff=1.66 cfs 0.115 af

Total Runoff Area = 0.339 ac Runoff Volume = 0.115 af Average Runoff Depth = 4.06"
8.20% Pervious = 0.028 ac 91.80% Impervious = 0.311 ac

Parking Lot - Post - Construction Runoff

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NRCC 24-hr C 10-Year Rainfall=4.86"

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Summary for Subcatchment 2S: Post-Construction

Runoff = 1.66 cfs @ 12.12 hrs, Volume= 0.115 af, Depth= 4.06"

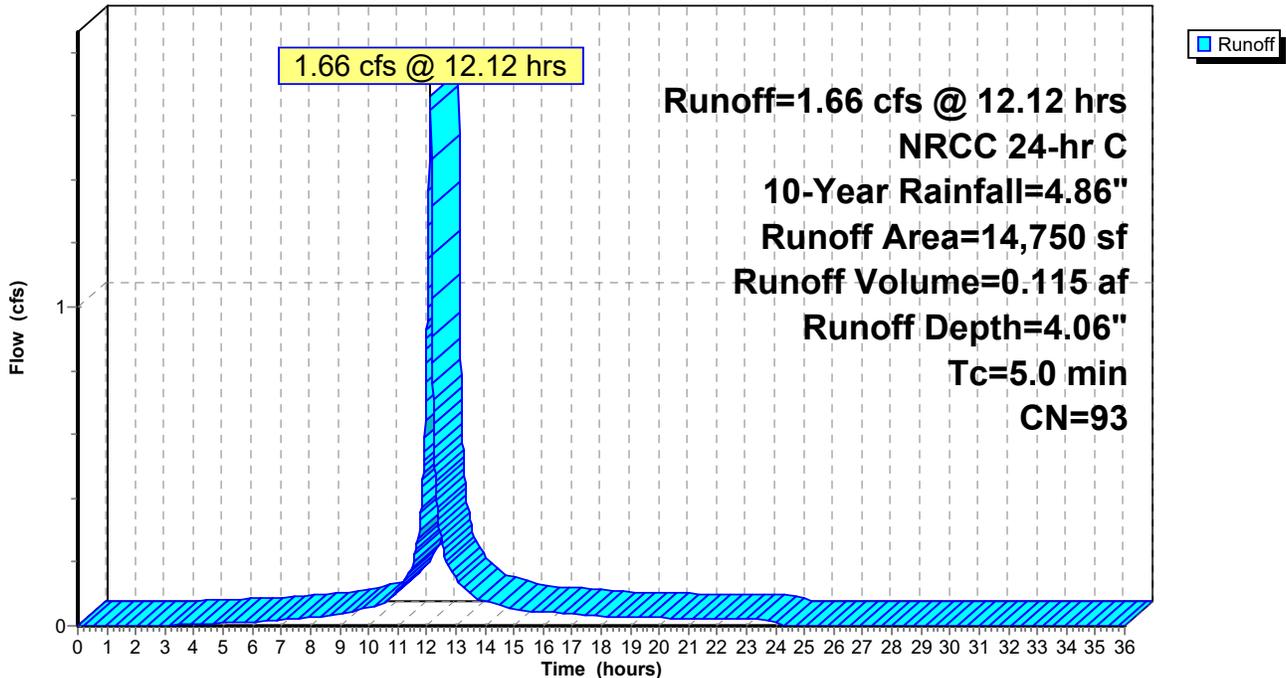
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 10-Year Rainfall=4.86"

Area (sf)	CN	Description
60	85	Gravel roads, HSG B
13,540	98	Paved parking, HSG A
1,150	39	>75% Grass cover, Good, HSG A
14,750	93	Weighted Average
1,210		8.20% Pervious Area
13,540		91.80% Impervious Area

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

Subcatchment 2S: Post-Construction

Hydrograph



Parking Lot - Post - Construction Runoff

NRCC 24-hr C 100-Year Rainfall=8.80"

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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+Trans method - Pond routing by Stor-Ind method

Subcatchment2S: Post-Construction

Runoff Area=14,750 sf 91.80% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=93 Runoff=3.13 cfs 0.225 af

Total Runoff Area = 0.339 ac Runoff Volume = 0.225 af Average Runoff Depth = 7.96"
8.20% Pervious = 0.028 ac 91.80% Impervious = 0.311 ac

Parking Lot - Post - Construction Runoff

NRCC 24-hr C 100-Year Rainfall=8.80"

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Summary for Subcatchment 2S: Post-Construction

Runoff = 3.13 cfs @ 12.12 hrs, Volume= 0.225 af, Depth= 7.96"

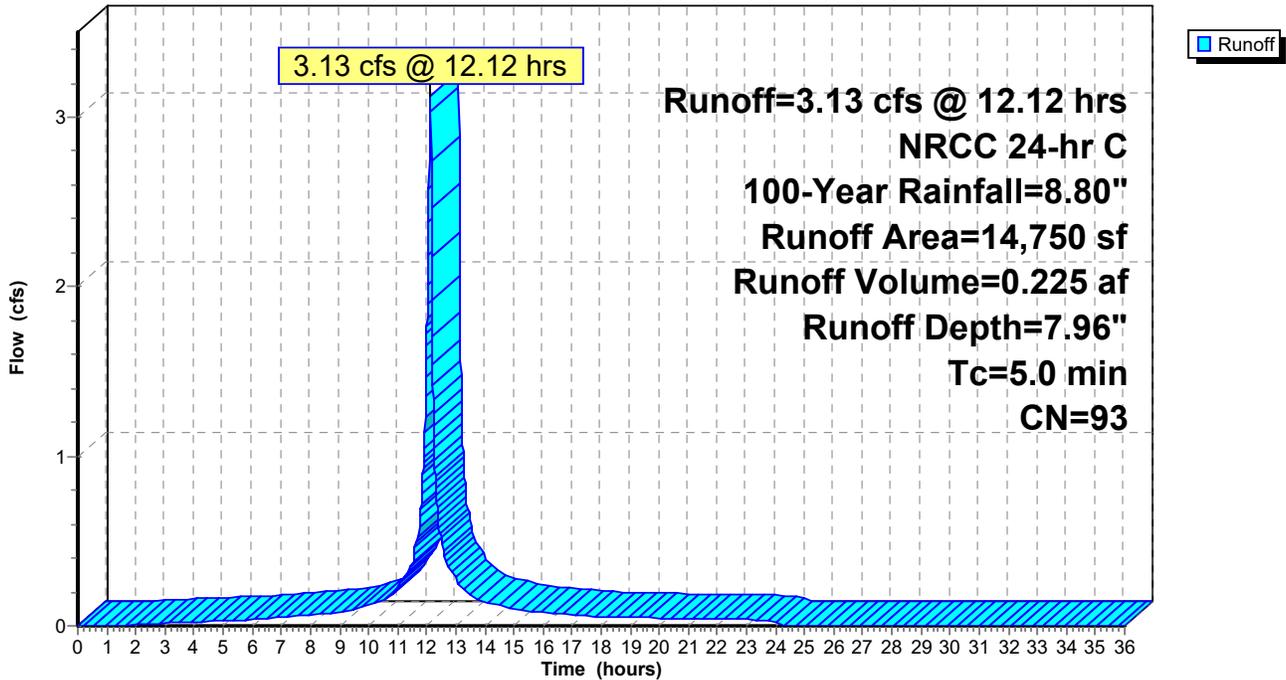
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
NRCC 24-hr C 100-Year Rainfall=8.80"

Area (sf)	CN	Description
60	85	Gravel roads, HSG B
13,540	98	Paved parking, HSG A
1,150	39	>75% Grass cover, Good, HSG A
14,750	93	Weighted Average
1,210		8.20% Pervious Area
13,540		91.80% Impervious Area

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

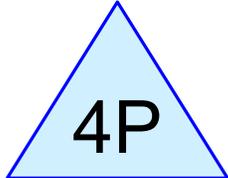
Subcatchment 2S: Post-Construction

Hydrograph

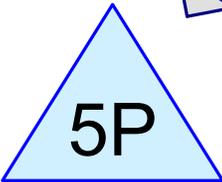




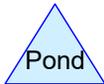
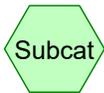
Back Parking Lot
Drainage



CB - 2 - 4' Sump



ADS_Stormtech
SC-740



Routing Diagram for Parking Lot with CB & Chambers - Final - get rid of front CB

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Parking Lot with CB & Chambers - Final - get rid of front CB

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Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 4101 MA Franklin Norfolk County

Rainfall events imported from "NRCS-Rain.txt" for 4101 MA Franklin Norfolk County

Rainfall events imported from "NRCS-Rain.txt" for 4101 MA Franklin Norfolk County

Rainfall events imported from "NRCS-Rain.txt" for 4101 MA Franklin Norfolk County

Parking Lot with CB & Chambers - Final - get rid of front CB

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.22	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.86	2
3	100-Year	Type III 24-hr		Default	24.00	1	8.80	2

Parking Lot with CB & Chambers - Final - get rid of front CB

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.026	39	>75% Grass cover, Good, HSG A (2S)
0.001	85	Gravel roads, HSG B (2S)
0.311	98	Paved parking, HSG A (2S)
0.339	93	TOTAL AREA

Parking Lot with CB & Chambers - Final - get rid of front CB

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.337	HSG A	2S
0.001	HSG B	2S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.339		TOTAL AREA

Parking Lot with CB & Chambers - Final - get rid of front CB

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.026	0.000	0.000	0.000	0.000	0.026	>75% Grass cover, Good	2S
0.000	0.001	0.000	0.000	0.000	0.001	Gravel roads	2S
0.311	0.000	0.000	0.000	0.000	0.311	Paved parking	2S
0.337	0.001	0.000	0.000	0.000	0.339	TOTAL AREA	

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2S: Back Parking Lot	Runoff Area=14,750 sf 91.80% Impervious Runoff Depth=2.46" Tc=5.0 min CN=93 Runoff=0.98 cfs 0.070 af
Pond 4P: CB - 2 - 4' Sump	Peak Elev=302.96' Storage=0.001 af Inflow=0.98 cfs 0.070 af Outflow=0.98 cfs 0.068 af
Pond 5P: ADS _Stormtech SC-740	Peak Elev=300.33' Storage=0.014 af Inflow=0.98 cfs 0.068 af Outflow=0.24 cfs 0.068 af

Total Runoff Area = 0.339 ac Runoff Volume = 0.070 af Average Runoff Depth = 2.46"
8.20% Pervious = 0.028 ac 91.80% Impervious = 0.311 ac

Summary for Subcatchment 2S: Back Parking Lot Drainage

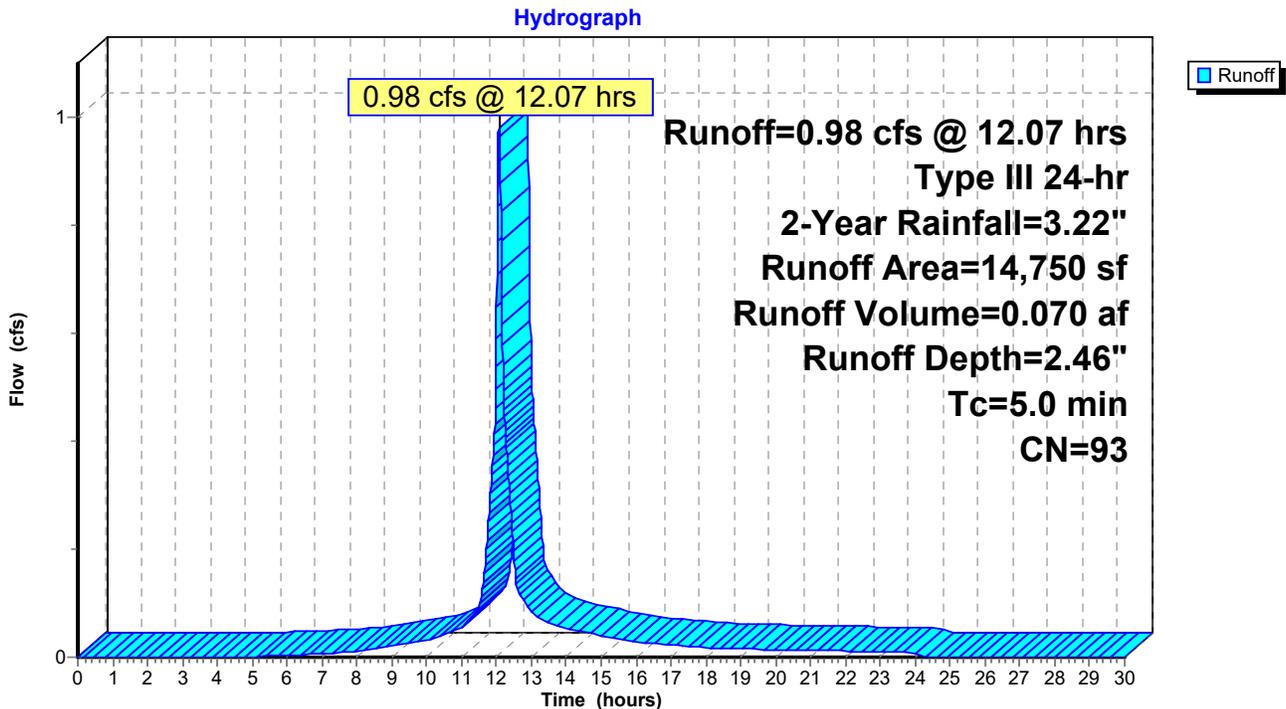
Runoff = 0.98 cfs @ 12.07 hrs, Volume= 0.070 af, Depth= 2.46"
 Routed to Pond 4P : CB - 2 - 4' Sump

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
13,540	98	Paved parking, HSG A
1,150	39	>75% Grass cover, Good, HSG A
60	85	Gravel roads, HSG B
14,750	93	Weighted Average
1,210		8.20% Pervious Area
13,540		91.80% Impervious Area

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

Subcatchment 2S: Back Parking Lot Drainage



Summary for Pond 4P: CB - 2 - 4' Sump

Inflow Area = 0.339 ac, 91.80% Impervious, Inflow Depth = 2.46" for 2-Year event
 Inflow = 0.98 cfs @ 12.07 hrs, Volume= 0.070 af
 Outflow = 0.98 cfs @ 12.07 hrs, Volume= 0.068 af, Atten= 0%, Lag= 0.1 min
 Primary = 0.98 cfs @ 12.07 hrs, Volume= 0.068 af
 Routed to Pond 5P : ADS_Stormtech SC-740

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 302.96' @ 12.07 hrs Surf.Area= 0.000 ac Storage= 0.001 af
 Flood Elev= 307.45' Surf.Area= 0.000 ac Storage= 0.003 af

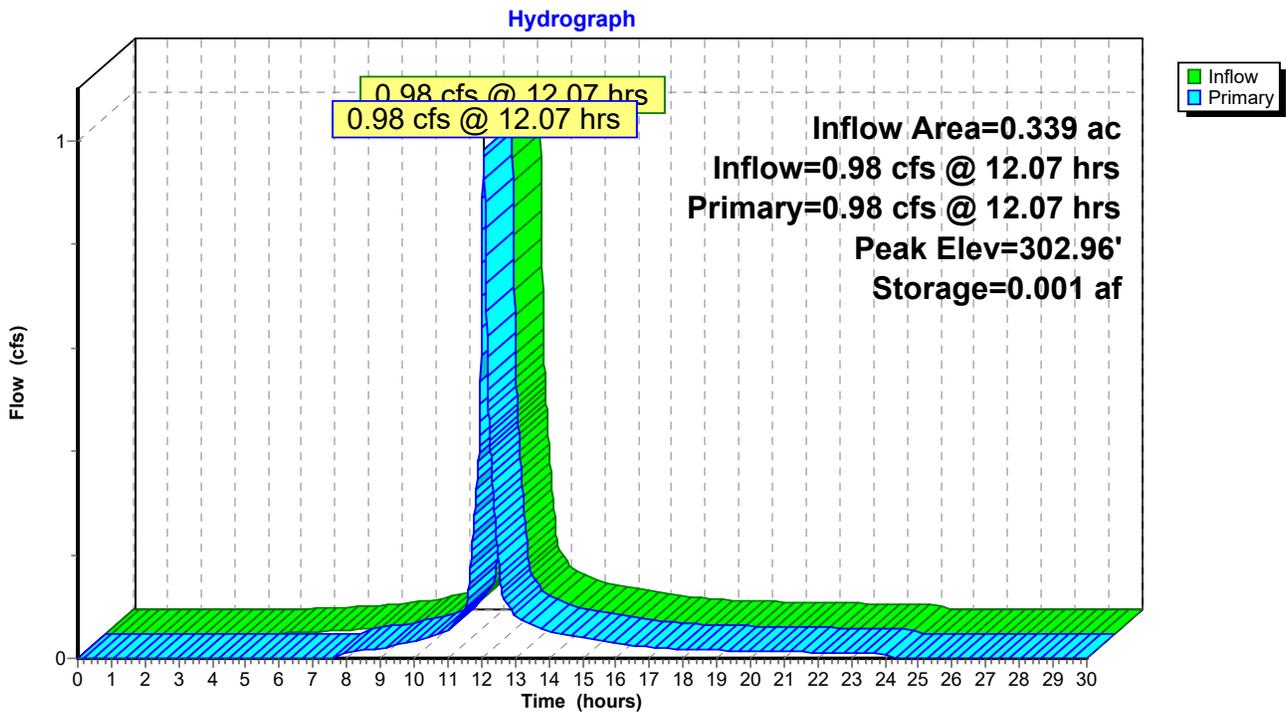
Plug-Flow detention time= 15.9 min calculated for 0.068 af (98% of inflow)
 Center-of-Mass det. time= 6.4 min (797.9 - 791.5)

Volume	Invert	Avail.Storage	Storage Description
#1	298.75'	0.003 af	4.00'D x 8.70'H Vertical Cone/Cylinder

Device	Routing	Invert	Outlet Devices
#1	Primary	302.45'	12.0" Vert. Orifice C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.98 cfs @ 12.07 hrs HW=302.96' TW=299.78' (Dynamic Tailwater)
 ←1=Orifice (Orifice Controls 0.98 cfs @ 2.43 fps)

Pond 4P: CB - 2 - 4' Sump



Summary for Pond 5P: ADS _Stormtech SC-740

Inflow Area = 0.339 ac, 91.80% Impervious, Inflow Depth = 2.43" for 2-Year event
 Inflow = 0.98 cfs @ 12.07 hrs, Volume= 0.068 af
 Outflow = 0.24 cfs @ 11.88 hrs, Volume= 0.068 af, Atten= 76%, Lag= 0.0 min
 Discarded = 0.24 cfs @ 11.88 hrs, Volume= 0.068 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 300.33' @ 12.45 hrs Surf.Area= 0.029 ac Storage= 0.014 af

Plug-Flow detention time= 12.8 min calculated for 0.068 af (100% of inflow)
 Center-of-Mass det. time= 12.8 min (810.7 - 797.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	299.22'	0.032 af	20.50'W x 60.58'L x 4.00'H Field A 0.114 af Overall - 0.034 af Embedded = 0.080 af x 40.0% Voids
#2A	300.22'	0.034 af	ADS_StormTech SC-740 +Cap x 32 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 32 Chambers in 4 Rows
#3	303.22'	0.057 af	20.50'W x 60.58'L x 2.00'H Prismatic
		0.123 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	299.22'	8.270 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.24 cfs @ 11.88 hrs HW=299.28' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.24 cfs)

Pond 5P: ADS_Stormtech SC-740 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

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

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length

4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width

12.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

32 Chambers x 45.9 cf = 1,470.1 cf Chamber Storage

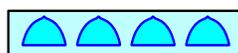
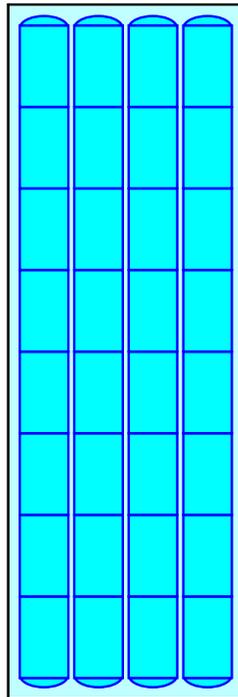
4,967.3 cf Field - 1,470.1 cf Chambers = 3,497.2 cf Stone x 40.0% Voids = 1,398.9 cf Stone Storage

Chamber Storage + Stone Storage = 2,869.0 cf = 0.066 af

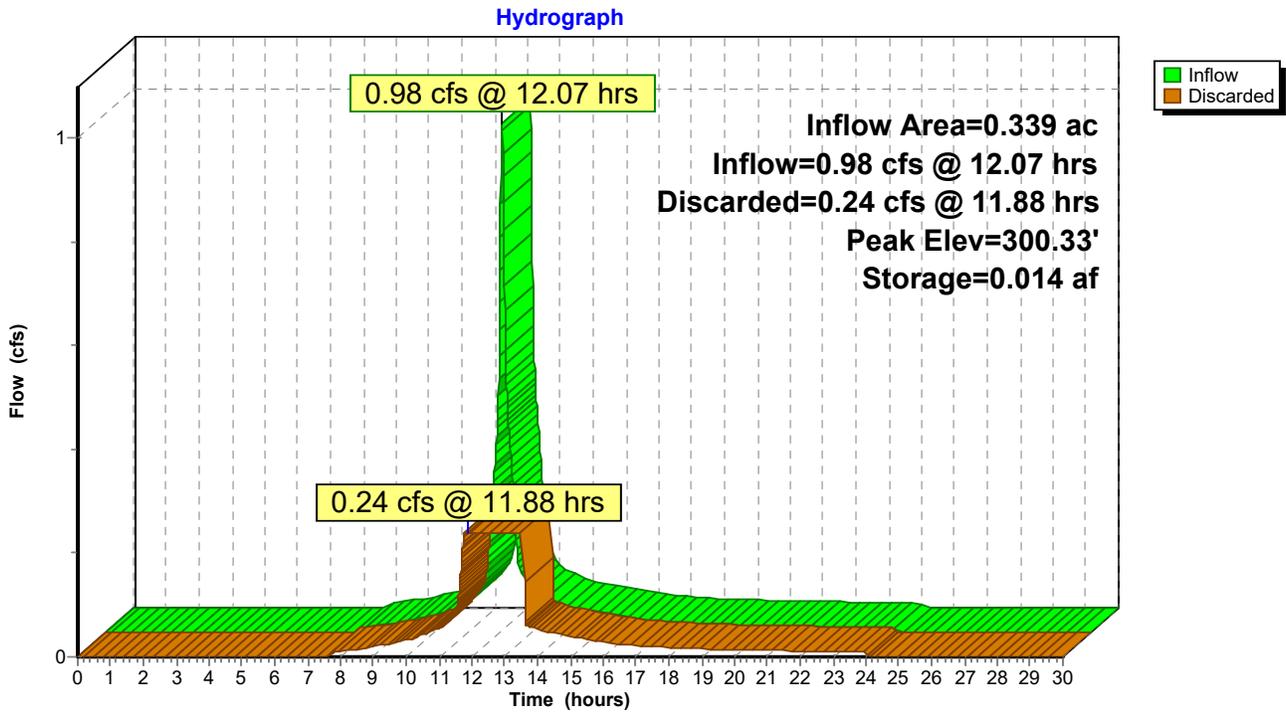
Overall Storage Efficiency = 57.8%

Overall System Size = 60.58' x 20.50' x 4.00'

32 Chambers
184.0 cy Field
129.5 cy Stone



Pond 5P: ADS_Stormtech SC-740



Parking Lot with CB & Chambers - Final - get rid of fr Type III 24-hr 10-Year Rainfall=4.86"

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Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2S: Back Parking Lot Runoff Area=14,750 sf 91.80% Impervious Runoff Depth=4.06"
Tc=5.0 min CN=93 Runoff=1.57 cfs 0.115 af

Pond 4P: CB - 2 - 4' Sump Peak Elev=303.12' Storage=0.001 af Inflow=1.57 cfs 0.115 af
Outflow=1.57 cfs 0.114 af

Pond 5P: ADS_Stormtech SC-740 Peak Elev=301.14' Storage=0.032 af Inflow=1.57 cfs 0.114 af
Outflow=0.24 cfs 0.114 af

Total Runoff Area = 0.339 ac Runoff Volume = 0.115 af Average Runoff Depth = 4.06"
8.20% Pervious = 0.028 ac 91.80% Impervious = 0.311 ac

Summary for Subcatchment 2S: Back Parking Lot Drainage

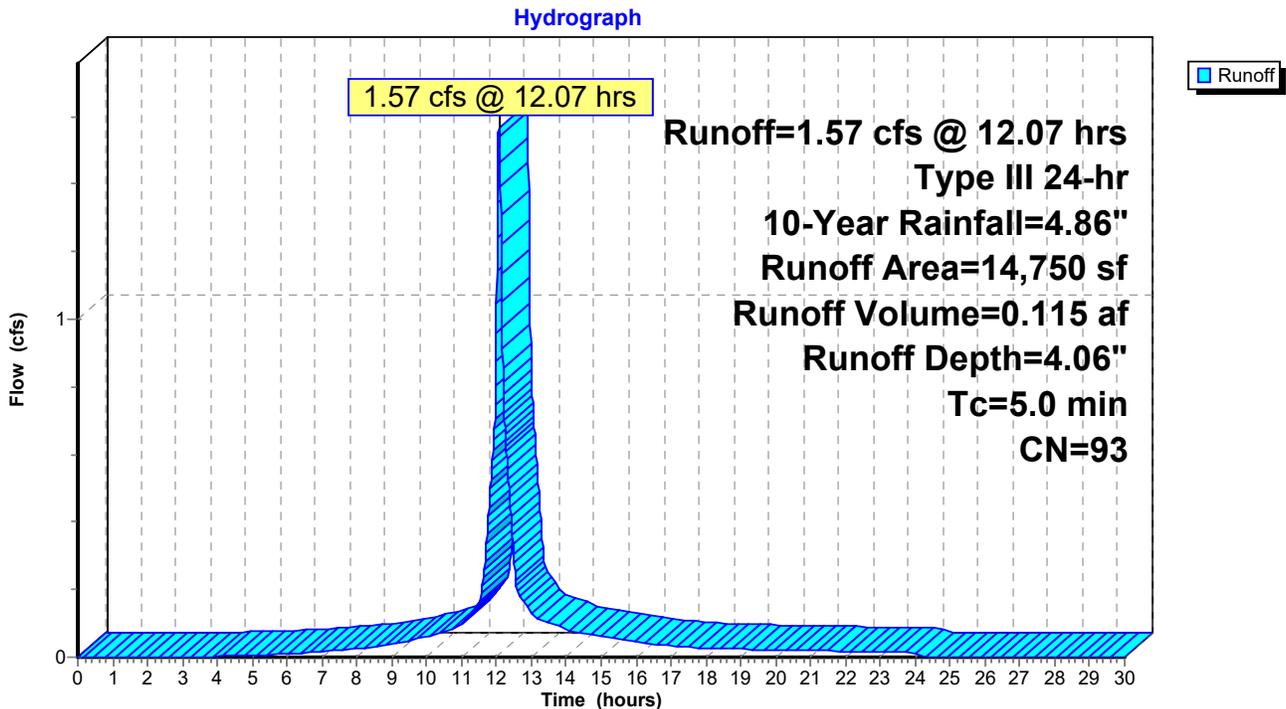
Runoff = 1.57 cfs @ 12.07 hrs, Volume= 0.115 af, Depth= 4.06"
 Routed to Pond 4P : CB - 2 - 4' Sump

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
13,540	98	Paved parking, HSG A
1,150	39	>75% Grass cover, Good, HSG A
60	85	Gravel roads, HSG B
14,750	93	Weighted Average
1,210		8.20% Pervious Area
13,540		91.80% Impervious Area

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

Subcatchment 2S: Back Parking Lot Drainage



Summary for Pond 4P: CB - 2 - 4' Sump

Inflow Area = 0.339 ac, 91.80% Impervious, Inflow Depth = 4.06" for 10-Year event
 Inflow = 1.57 cfs @ 12.07 hrs, Volume= 0.115 af
 Outflow = 1.57 cfs @ 12.07 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.1 min
 Primary = 1.57 cfs @ 12.07 hrs, Volume= 0.114 af
 Routed to Pond 5P : ADS_Stormtech SC-740

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 303.12' @ 12.07 hrs Surf.Area= 0.000 ac Storage= 0.001 af
 Flood Elev= 307.45' Surf.Area= 0.000 ac Storage= 0.003 af

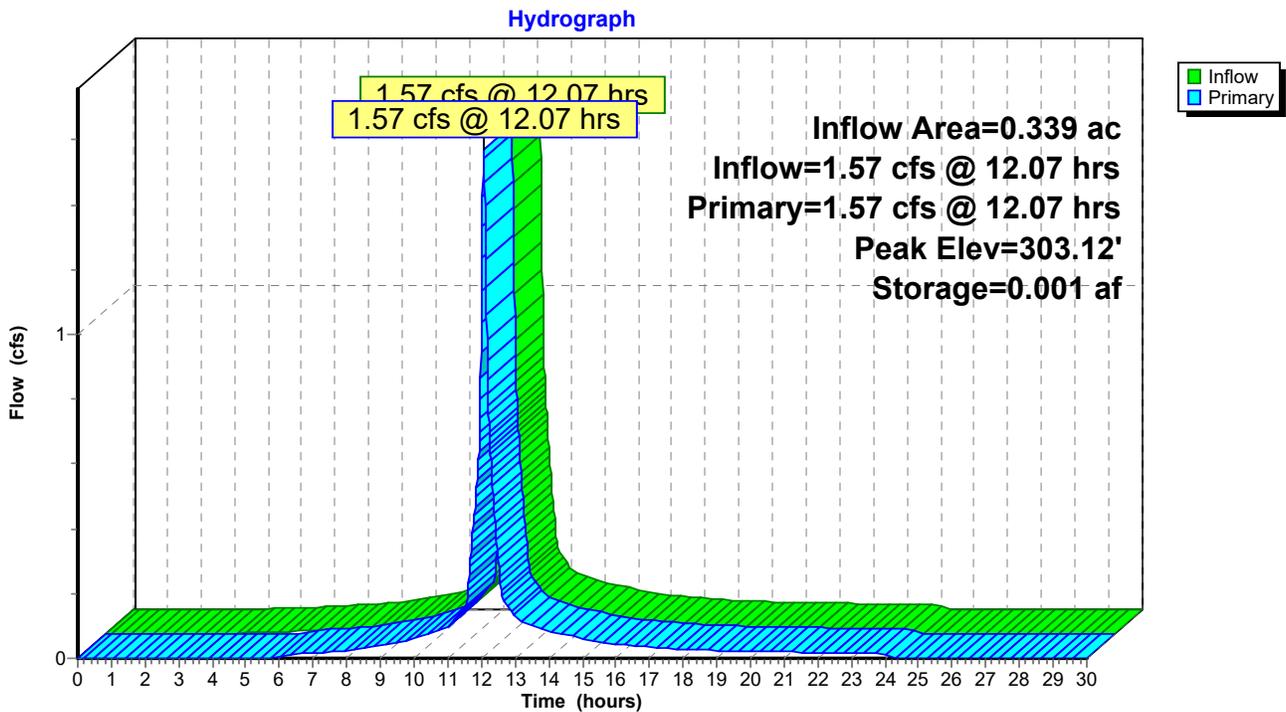
Plug-Flow detention time= 10.8 min calculated for 0.114 af (99% of inflow)
 Center-of-Mass det. time= 4.8 min (783.0 - 778.2)

Volume	Invert	Avail.Storage	Storage Description
#1	298.75'	0.003 af	4.00'D x 8.70'H Vertical Cone/Cylinder

Device	Routing	Invert	Outlet Devices
#1	Primary	302.45'	12.0" Vert. Orifice C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.57 cfs @ 12.07 hrs HW=303.12' TW=300.38' (Dynamic Tailwater)
 ←**1=Orifice** (Orifice Controls 1.57 cfs @ 2.79 fps)

Pond 4P: CB - 2 - 4' Sump



Summary for Pond 5P: ADS _Stormtech SC-740

Inflow Area = 0.339 ac, 91.80% Impervious, Inflow Depth = 4.02" for 10-Year event
 Inflow = 1.57 cfs @ 12.07 hrs, Volume= 0.114 af
 Outflow = 0.24 cfs @ 11.74 hrs, Volume= 0.114 af, Atten= 85%, Lag= 0.0 min
 Discarded = 0.24 cfs @ 11.74 hrs, Volume= 0.114 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 301.14' @ 12.55 hrs Surf.Area= 0.029 ac Storage= 0.032 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 34.5 min (817.5 - 783.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	299.22'	0.032 af	20.50'W x 60.58'L x 4.00'H Field A 0.114 af Overall - 0.034 af Embedded = 0.080 af x 40.0% Voids
#2A	300.22'	0.034 af	ADS_StormTech SC-740 +Cap x 32 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 32 Chambers in 4 Rows
#3	303.22'	0.057 af	20.50'W x 60.58'L x 2.00'H Prismatic
		0.123 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	299.22'	8.270 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.24 cfs @ 11.74 hrs HW=299.29' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.24 cfs)

Pond 5P: ADS_Stormtech SC-740 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

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

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length

4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width

12.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

32 Chambers x 45.9 cf = 1,470.1 cf Chamber Storage

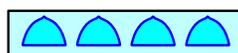
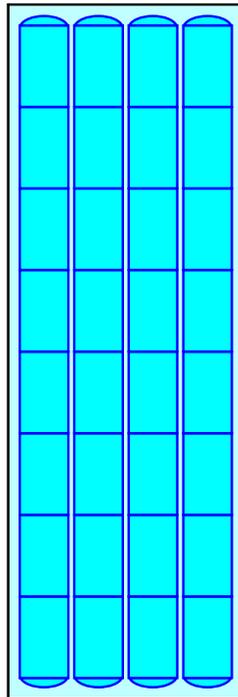
4,967.3 cf Field - 1,470.1 cf Chambers = 3,497.2 cf Stone x 40.0% Voids = 1,398.9 cf Stone Storage

Chamber Storage + Stone Storage = 2,869.0 cf = 0.066 af

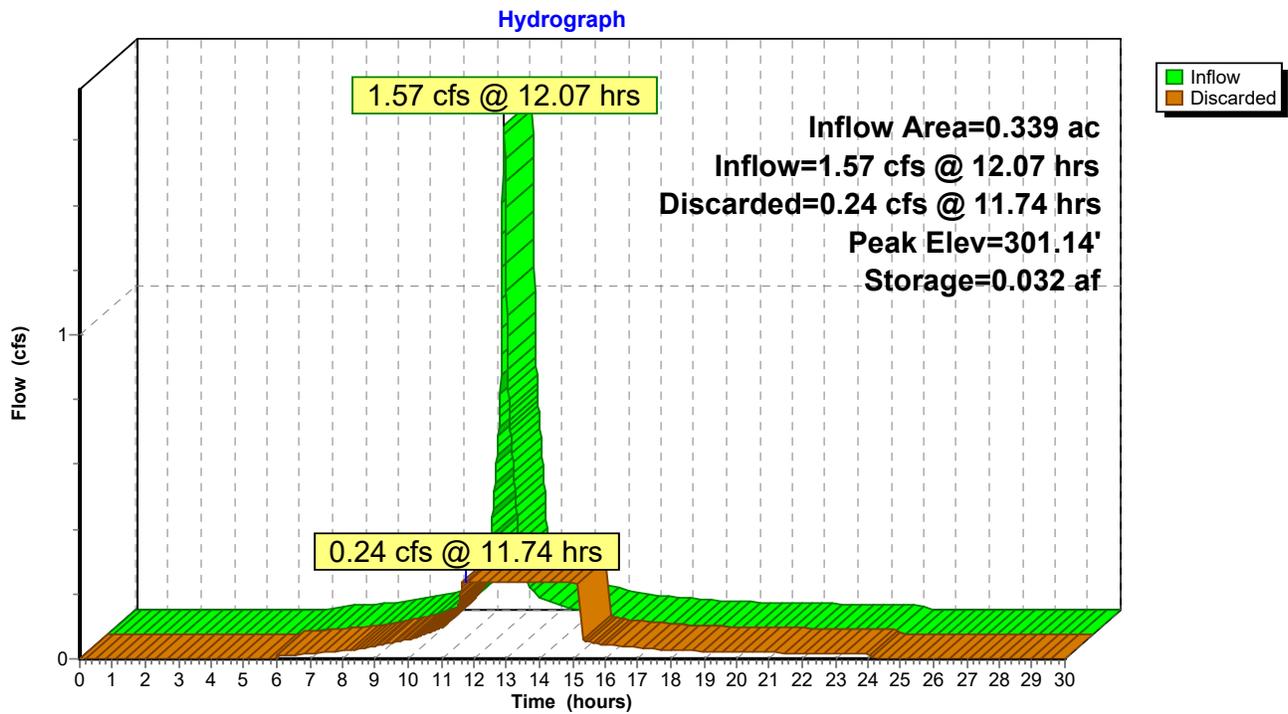
Overall Storage Efficiency = 57.8%

Overall System Size = 60.58' x 20.50' x 4.00'

32 Chambers
184.0 cy Field
129.5 cy Stone



Pond 5P: ADS_Stormtech SC-740



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 2S: Back Parking Lot	Runoff Area=14,750 sf 91.80% Impervious Runoff Depth=7.96" Tc=5.0 min CN=93 Runoff=2.97 cfs 0.225 af
Pond 4P: CB - 2 - 4' Sump	Peak Elev=303.57' Storage=0.001 af Inflow=2.97 cfs 0.225 af Outflow=2.97 cfs 0.223 af
Pond 5P: ADS_Stormtech SC-740	Peak Elev=303.49' Storage=0.073 af Inflow=2.97 cfs 0.223 af Outflow=0.48 cfs 0.223 af

Total Runoff Area = 0.339 ac Runoff Volume = 0.225 af Average Runoff Depth = 7.96"
8.20% Pervious = 0.028 ac 91.80% Impervious = 0.311 ac

Summary for Subcatchment 2S: Back Parking Lot Drainage

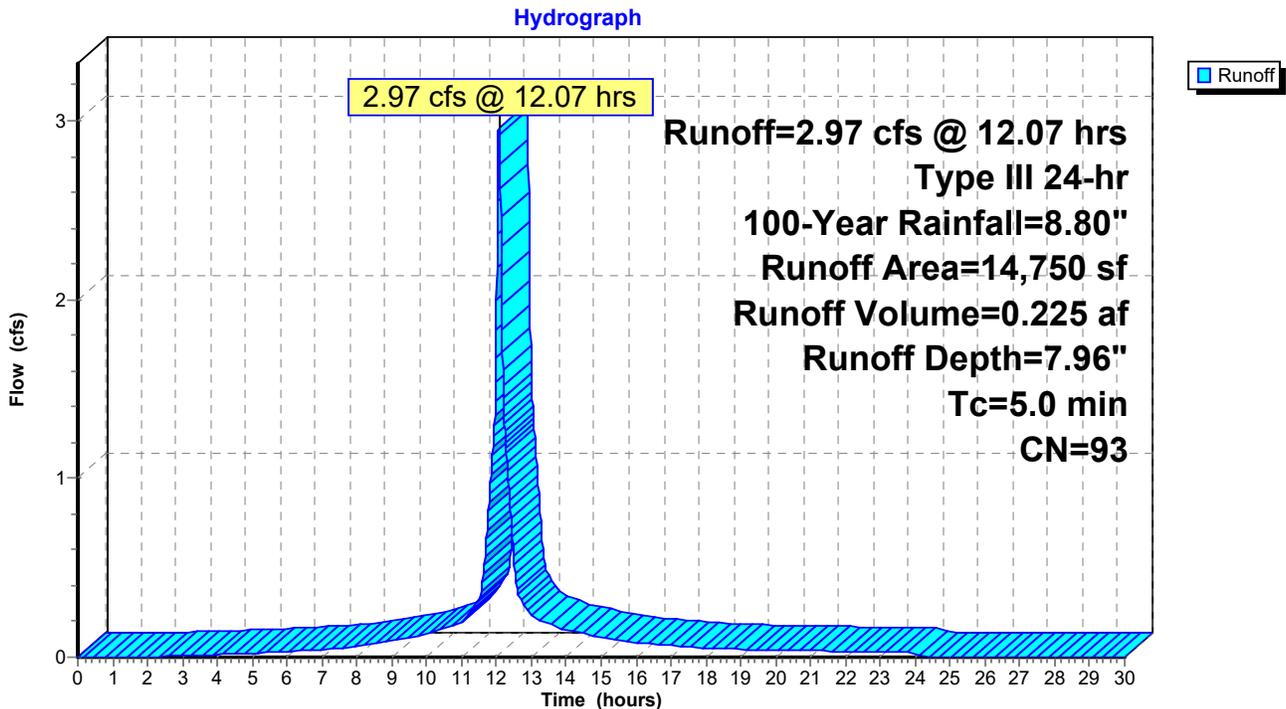
Runoff = 2.97 cfs @ 12.07 hrs, Volume= 0.225 af, Depth= 7.96"
 Routed to Pond 4P : CB - 2 - 4' Sump

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
13,540	98	Paved parking, HSG A
1,150	39	>75% Grass cover, Good, HSG A
60	85	Gravel roads, HSG B
14,750	93	Weighted Average
1,210		8.20% Pervious Area
13,540		91.80% Impervious Area

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

Subcatchment 2S: Back Parking Lot Drainage



Summary for Pond 4P: CB - 2 - 4' Sump

Inflow Area = 0.339 ac, 91.80% Impervious, Inflow Depth = 7.96" for 100-Year event
 Inflow = 2.97 cfs @ 12.07 hrs, Volume= 0.225 af
 Outflow = 2.97 cfs @ 12.07 hrs, Volume= 0.223 af, Atten= 0%, Lag= 0.1 min
 Primary = 2.97 cfs @ 12.07 hrs, Volume= 0.223 af
 Routed to Pond 5P : ADS_Stormtech SC-740

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 303.57' @ 12.07 hrs Surf.Area= 0.000 ac Storage= 0.001 af
 Flood Elev= 307.45' Surf.Area= 0.000 ac Storage= 0.003 af

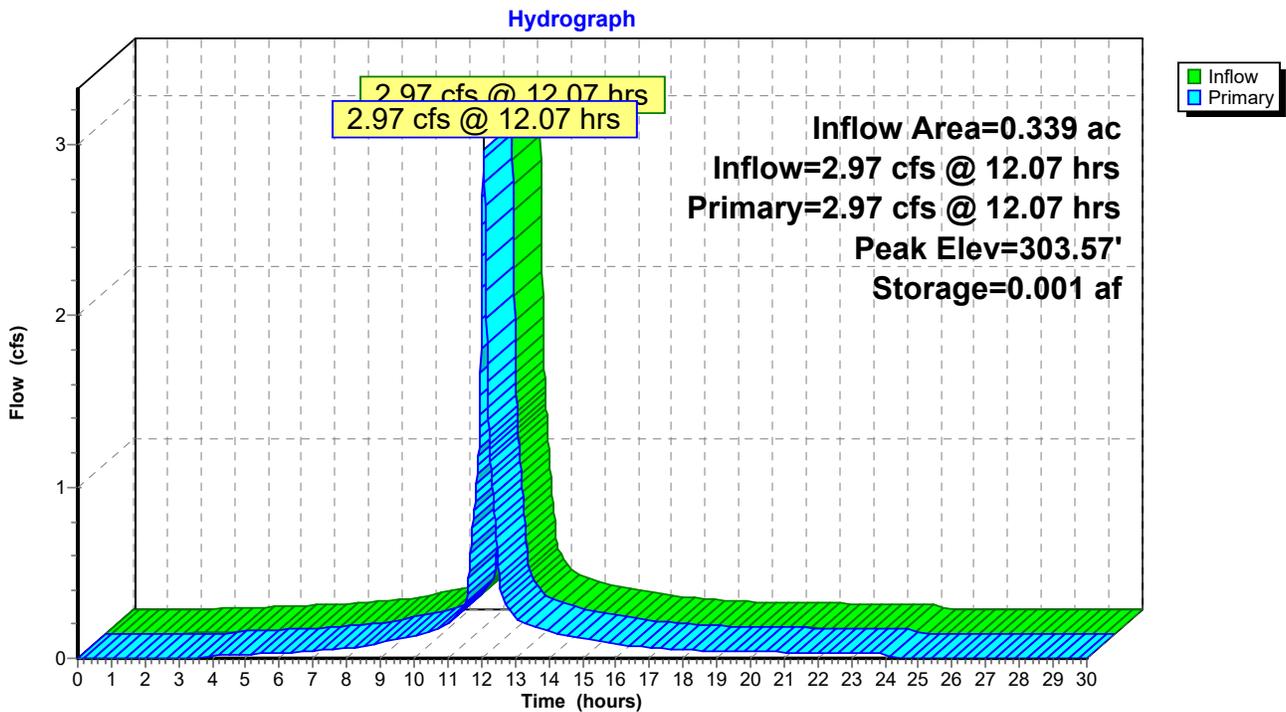
Plug-Flow detention time= 6.3 min calculated for 0.223 af (100% of inflow)
 Center-of-Mass det. time= 3.1 min (765.1 - 762.1)

Volume	Invert	Avail.Storage	Storage Description
#1	298.75'	0.003 af	4.00'D x 8.70'H Vertical Cone/Cylinder

Device	Routing	Invert	Outlet Devices
#1	Primary	302.45'	12.0" Vert. Orifice C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.96 cfs @ 12.07 hrs HW=303.56' TW=301.47' (Dynamic Tailwater)
 ←1=Orifice (Orifice Controls 2.96 cfs @ 3.77 fps)

Pond 4P: CB - 2 - 4' Sump



Summary for Pond 5P: ADS _Stormtech SC-740

Inflow Area = 0.339 ac, 91.80% Impervious, Inflow Depth = 7.92" for 100-Year event
 Inflow = 2.97 cfs @ 12.07 hrs, Volume= 0.223 af
 Outflow = 0.48 cfs @ 12.27 hrs, Volume= 0.223 af, Atten= 84%, Lag= 11.9 min
 Discarded = 0.48 cfs @ 12.27 hrs, Volume= 0.223 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 3
 Peak Elev= 303.49' @ 12.53 hrs Surf.Area= 0.057 ac Storage= 0.073 af

Plug-Flow detention time= 80.5 min calculated for 0.223 af (100% of inflow)
 Center-of-Mass det. time= 80.4 min (845.6 - 765.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	299.22'	0.032 af	20.50'W x 60.58'L x 4.00'H Field A 0.114 af Overall - 0.034 af Embedded = 0.080 af x 40.0% Voids
#2A	300.22'	0.034 af	ADS_StormTech SC-740 +Cap x 32 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 32 Chambers in 4 Rows
#3	303.22'	0.057 af	20.50'W x 60.58'L x 2.00'H Prismatic
		0.123 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	299.22'	8.270 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.48 cfs @ 12.27 hrs HW=303.23' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.48 cfs)

Pond 5P: ADS_Stormtech SC-740 - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

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

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length

4 Rows x 51.0" Wide + 6.0" Spacing x 3 + 12.0" Side Stone x 2 = 20.50' Base Width

12.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 4.00' Field Height

32 Chambers x 45.9 cf = 1,470.1 cf Chamber Storage

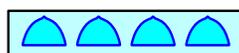
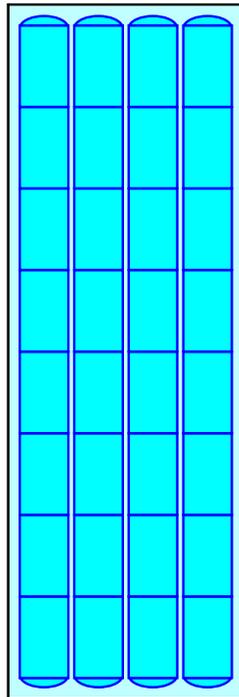
4,967.3 cf Field - 1,470.1 cf Chambers = 3,497.2 cf Stone x 40.0% Voids = 1,398.9 cf Stone Storage

Chamber Storage + Stone Storage = 2,869.0 cf = 0.066 af

Overall Storage Efficiency = 57.8%

Overall System Size = 60.58' x 20.50' x 4.00'

32 Chambers
 184.0 cy Field
 129.5 cy Stone



Pond 5P: ADS_Stormtech SC-740

