INSITE
ENGINEERING, SURVEYING &
LANDSCAPE ARCHITECTURE, P.C.

PRELIMINARY STORMWATER POLLUTION PREVENTION PLAN

Prepared For

BEACON VIEWS

City of Beacon, New York

April 28, 2020

STATE OF NEW YORK
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<u>Applicant Information:</u>

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Note: This report in conjunction with the project plans make up the complete Preliminary Stormwater Pollution Prevention Plan.

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1.0 INTRODUCTION

1.1 Project Description

The proposed project is located off of Conklin Street in the City of Beacon. The site is approximately 8.6 acres and is identified as Tax Map No. 6055-03-331123. The parcel is located in the RD-5 zoning district. The subject parcel and surroundings are shown on Figure 1. The project proposes seven (7) multi-family townhouse buildings (40 total townhouse units) and associated appurtenances. The primary access to the site will be off Hastings Drive, through the adjoining the former St. Francis Hospital property. An emergency access drive will be provided to the north, through the adjacent parcel. It is proposed to capture and treat the stormwater runoff associated with the proposed improvements.

1.2 Existing Stormwater Runoff Conditions

The subject project is located on one tax parcel off of Conklin Street, immediately north of Hastings Drive. The existing ground cover on the site is characterized as a mixture of woods and open grassed meadow areas. The property generally drains from north to south down to the onsite wetland.

The hydrologic soils groups for the project consists of C/D soils. The designations of the onsite soils located within the proposed limits of disturbance consist of Bernardston Silt Loam (BeB), Canandigua Silt Loam (Ca), and Nassau-Cardigan Complex (NwC) as identified on the Soil Conservation Service Web Soil Survey. The soils boundaries are shown on Figure 2 and 3 of this report.

As previously stated, the stormwater runoff from the existing property generally drains from north to south towards the existing onsite wetland. Approximately 20 acres of offsite stormwater runoff is conveyed through the subject property from offsite runoff. The analysis included in the project SWPPP utilizes one design line, within the onsite wetland, to assess the stormwater runoff from the property and any potential impacts from development to the existing natural resources on the property. The Pre-Development Drainage Map (Figure 2 of this report) shows the location of Design Line 1. The contributing area to Design Point 1 is identified as subcatchment PRE.

1.3 Proposed Stormwater Runoff Conditions

As previously stated, the proposed application includes the construction of seven (7) multi-family town house buildings, asphalt driveway, parking areas and associated appurtenances. Stormwater mitigation for the newly created impervious surfaces will be provided in the form of proposed stormwater management practices (SMP's) discussed further in later sections of this report. The proposed SMP's will be designed to capture and treat runoff from the impervious surfaces associated with the proposed buildings, driveway, parking areas and pedestrian walkways.

It is proposed to maintain the existing drainage patterns on the site to the maximum extent practical in the proposed condition to minimize the impact to the existing downstream wetland. Stormwater treatment for the subject project will be accomplished with several different practices including a hydrodynamic separator and extended detention basin for pretreatment, an infiltration basin and subsurface infiltration system. The stormwater management practices have been sized to capture and treat the Water Quality Volume from the developed area.

The stormwater runoff from the proposed development will be captured in a collection system and conveyed to the stormwater management practices. The stormwater runoff will be treated by three (3) stormwater management practices, including a I-4 Subsurface Infiltration System (1.2P), F-5 Biorentention Filter (1.3P) and a P-2 Wet Pond (1.1P). Pretreatment of the stormwater runoff will be provided with a hydrodynamic separator upstream of the proposed subsurface infiltration system, gravel diaphragm and mulch layer for the bioretention filter and a forebay in the wet pond. A flow splitter is proposed upstream of the subsurface infiltration system to discharge the water quality volume to the practice for treatment and bypass the larger storm events. The contributing area to the subsurface infiltration system is shown as subcatchment 1.2S. The contributing area to the bioretention filter and wet pond are shown as subcatchment 1.3S and 1.1S, respectively. The subcatchments are shown in Figure 3 of this report.

As shown in the following sections of this report, the stormwater quality and quantity for the proposed development have been mitigated to the maximum extent practicable to minimize the impacts to the existing conditions of the downstream, onsite wetland. Additionally, an erosion and sediment control plan has been prepared in accordance with the *New York State Standards and Specifications for Erosion and Sediment Control* to protect the existing waterbodies and drainage features during construction activities and in the post development condition.

2.0 STORMWATER MANAGEMENT

The proposed stormwater management system for the Beacon Views has been designed to meet the requirements of local, city, and state stormwater ordinances and guidelines, including but not limited to those of the City of Beacon and the NYSDEC.

Since the subject project proposes the disturbance of more than one (1) acre, coverage under the New York State Department of Environmental Conservation (NYSDEC) SPDES General Permit No. GP-0-20-001 is required. In order to meet the requirements, set forth by this permit, the latest edition of the NYSDEC *New York State Stormwater Management Design Manual* (NYSSMDM) was referenced for the design of the proposed stormwater management system. The NYSSMDM specifies five design criteria that are discussed in detail below. They are Runoff Reduction Volume, Water Quality Volume, Stream Channel Protection Volume, Overbank Flood Control, and Extreme Flood Control. The first two of the requirements relates to treating water quality, while the later pertain to stormwater quantity (peak flow) attenuation.

To address stormwater quantity requirements of the NYSDEC, the “HydroCAD” Stormwater Modeling System,” by HydroCAD Software Solutions LLC in Tamworth, New Hampshire, was used to model and assess the peak stormwater flows for the subject project. HydroCAD is a computer aided design program for modeling the hydrology and hydraulics of stormwater runoff. It is based primarily on hydrology techniques developed by the United States Department of Agriculture, Soil Conservation Service (USDA, SCS) TR-20 method combined with standard hydraulic calculations. For details on the input data for the subcatchments and design storms, please refer to Appendices B and C.

The input requirements for the HydroCAD computer program are as follows:

Subcatchments (contributing watershed/sub-watersheds)

- Design storm rainfall in inches
- CN (runoff curve number) values which are based on soil type and land use/ground cover
- Tc (time of concentration) flow path information
- Watershed Area in Acres

Stormwater Basins

- Surface area at appropriate elevations
- Flood elevation
- Outlet structure information

The precipitation values and intensity duration frequency (IDF) curves for the 1-Year, 10-Year, 100-Year 24-hour design storm events and rainfall distribution curves utilized for this report were obtained from the information provided by Northeast Regional Climate Center (NRCC) and the Natural Resources Conservation Service (NRCS) which is available online at *www.precip.eas.cornell.edu.* The values provided for all design storms analyzed have been listed below.

Table 2.0.1 – Precipitation Values for Corresponding Design Storms

Design Storm	24-Hour Rainfall
1-Year	2.6”
10-Year	4.7”
100-Year	8.3”

The CN (runoff curve number) values utilized in this report were referenced from the USDA, SCS publication *Urban Hydrology for Small Watersheds*. The following is a summary of the various land uses/ground covers and their associated CN values utilized in this report.

Table 2.0.2 – Project Ground Cover and Associated Curve Numbers (CN)

Land Use/Ground Cover	CN Value
Woods, D Soil	77
Meadow, D Soil	78
>75% Grass Cover, D Soil	80
Impervious Surface	98

2.1 NYSDEC Runoff Reduction Volume, RR_v

The Runoff Reduction Volume (RR_v) criterion is intended to replicate pre-development hydrology by maintaining preconstruction infiltration, peak flow runoff, discharge volume, as well as minimizing concentrated stormwater flow. As stated in Chapter 4 of the Design Manual, RR_v may be treated with standard SMP’s with RR_v capacity sized in accordance with the Chapter 4/6 requirements, or with green infrastructure practices (GIP’s) sized in accordance with the requirements set forth in Chapter 5. Runoff reduction is achieved when runoff from a site is captured, directed to a SMP or a GIP, infiltrated to the ground, reused, or removed by evapotranspiration, so it does not contribute to the stormwater discharge from the site. The goal for each site is to reduce the entire WQ_v (100%) through the implementation of GIP’s and standard SMP’s with RR_v capacity. However, if 100% of the WQ_v cannot be reduced by applying a combination of green infrastructure techniques and standard SMP’s with RR_v capacity, “they must, at a minimum, reduce runoff from a percentage of the impervious area constructed as part of the project using the green infrastructure techniques and standard SMPs with RR_v capacity. In addition, the designer must provide justification in the SWPPP that evaluates each of the green infrastructure techniques listed in Table 3.2 and identify the specific site limitations that make application of the technique(s) infeasible.”

The project SWPPP cannot provide 100% of the WQ_v through the implementation of GIP’s or standard SMP’s with RR_v capacity. This is because the onsite soils conditions and depth to groundwater in portions of the site, thus minimizing the area where infiltration practices for treatment of the RR_v / WQ_v is possible. With respect to runoff volume, the project SWPPP addresses and satisfies the RR_V requirements of the Design Manual. In order to meet these requirements to the maximum extent practicable, the project SWPPP has minimized the creation of impervious surfaces to the maximum extent practicable. The types of GIP’s and standard SMP’s with RR_v capacity that can be employed onsite are limited. The project SWPPP as required by the Design Manual meets and exceeds the RR_v minimum required. In addition, as required by the Design Manual, an analysis evaluating each of the green infrastructure techniques in Table 3.2 has been provided in Appendix F. For this project there are two (2) types of practices employed towards meeting the RR_v requirements.

The project proposes a F-5 Bioretention Filter and an I-4 Subsurface Infiltration System in an area of the project site where the soil conditions meet the Design Manual requirements. These two stormwater practices, sized in accordance with the Design Manual, will be applied as a GIP/SMP with volume reduction towards meeting the RR_v minimum. The biorentention filter sizing calculations have been provided in Appendix I of this SWPPP. Sizing calculations for the subsurface infiltration practice are provided in Section 2.2 below.

For a calculation of the Initial WQ_v / RR_v, the RR_v minimum, the RR_v / WQ_v required, and the RR_v provided, refer to Appendix A. In calculating the RR_v minimum, onsite soils belongs to the Hydrologic Soil Groups D. These soil groups have a specific reduction factor of 0.20. The table below summarizes the RR_v requirements for the site, as calculated in Appendix A.

Table 2.1.1 Runoff Reduction Volume Summary

Design Line	**Initial WQ_v / RR_v (c.f.)[1]**	**RR_v Minimum (c.f.)**	**WQ_v RR_v Required (Initial WQ_v / RR_v minus RR_v provided through GIP with Area Reduction) (c.f.)**	**RR_v Provided (c.f.)**	**WQ_v Required for Downstream SMP (c.f.)**
Design Line 1	12,599	2,414	12,599	3,856	8,743

[1] Refer to Appendix A for Initial WQ_v Calculations

As noted in the table above the project has provided greater than the RR_v minimum. By implementing GIP's to the greatest extent practicable, and exceeding the RR_v minimum, the NYSDEC RR_v requirement has been addressed. As previously stated, 100% of the WQ_v/RR_v required could not be provided due to onsite soil conditions and the limited area where infiltration is feasible. As 100% of the WQ_v / RR_v required was not provided for the subcatchments, a downstream standard SMP must be provided to treat the difference between the WQ_v / RR_v required and the RR_v provided. A P-2 Wet Pond will be provided as the primary downstream stormwater management practice to treat the remaining WQ_v for the subcatchments. As the WQv for subcatchment 1.1S, shown in Table 2.2.1, is greater than the WQv required, the Wet Pond has been sized to treat the greater WQ_v. The proposed Wet Pond is being provided to meet stormwater quality/quantity requirements of the NYSDEC.

2.2 NYSDEC Water Quality Volume, WQ_v

The stormwater management practices have been designed in accordance with the *Performance Criteria* (Chapter 4) of the NYSSMDM. As outlined in Chapter 4, the WQv is the runoff volume produced during the 90% storm. The proposed infiltration practices have been designed to treat the WQv in accordance with the NYSSMDM. The following equation, per Chapter 4, was used to determine the water quality volume for the 90% storm for each of the contributing areas to the treatment practices:

The water quality volume shall be $$WQ_v = \frac{(P)(R_v)(A)}{12}$$

Where,

WQ_v	= water quality volume (in acre-feet)
P	= 90% Rainfall Event Number
R_v	= 0.05 + 0.009(I), where I is percent impervious cover
A	= site area in acres

The stormwater management practices have been designed in accordance with the *Performance Criteria* (Chapter 4) of the NYSSMDM. As outlined in Chapter 4, the WQv is the runoff volume produced during the 90% storm. The proposed infiltration practices have been designed to treat the WQv in accordance with the NYSSMDM. The equation above, per Chapter 4, was used to determine the water quality volume for the 90% storm for each of the contributing areas to the treatment practices:

Table 2.2.1 - Water Quality Volume Calculation Summary

Subcatchment	WQ_v[1] (cf)
1.1S	9,818
1.2S	1,839
1.3S	942

[1] For detailed calculations see Appendix A

As previously stated, there are three stormwater management practices proposed as part of the development of the site to meet both the WQv and RRv requirements. Each practice has been designed to treat the Water Quality Volume from the contributing area. The subsurface infiltration practice is designed as an offline practice with a flow splitter upstream of the practice. The infiltration practice is sized to treat at a minimum the WQv from the contributing area, while allowing portions of larger storms to discharge from the infiltration practice through an overflow pipe as allowed by the NYSSMDM. The overflow pipe is set to allow the full WQv storage within the practice as required by the Design Manual. The calculation of the WQv is performed per the methods of the NYSSMDM in Appendix A.

Deep test holes have been performed in the area of the proposed infiltration practice but infiltration testing has yet to be performed. The deep test results performed meet the requirements of the Design Manual for an infiltration practice. Test results can be found on Figure 4. As such the infiltration rate used in the HydroCAD stormwater modeling of the infiltration practices was kept conservative to an infiltration rate of 1-inch per hour. Infiltration testing will be performed to confirm the design of the infiltration practice.

Pretreatment has been provided for the proposed subsurface infiltration system in the form of a hydrodynamic separator. The peak flow for the 1-year storm was used to size the hydrodynamic separator used as pretreatment for the infiltration units. The data (including capacities) for the hydrodynamic separators are included in Appendix H. The table below summarizes the WQv-year peak flows and hydrodynamic separate flow rates.

Table 2.2.2 – Pretreatment Hydrodynamic Separator Summary

Stormwater Management Practice	WQv[1] Peak Flow (C.F.S).	Hydrodynamic Separator Model	Hydrodynamic Separator Capacity (C.F.S.)
1.2P	1.65	HydroStorm HS 6	1.98 CFS

[1] For detailed calculations see Appendix A

As noted in the table above the capacity of the hydrodynamic separator exceeds the calculated WQv peak flow. The hydrodynamic separator has an internal bypass capable of passing the flows from the contributing areas from the larger storm events.

As previously stated above the F-5 Bioretention Filter has been sized to treat the WQv from the contributing area. Sizing calculations for the biorententio filter per the Design Manual Requirements are shown in Appendix I of the SWPPP.

The P-2 wet pond has been sized in accordance with Chapter 6 of the Design Manual as shown in the table below. The P-2 Wet Pond has been sized to store 100% of the WQv in the permanent pool. As previously stated, the P-2 Wet Pond has been sized for the WQv calculated in Appendix A as the WQv from the contributing area. The provided volume for the P-2 Wet Pond can be verified in the stage storage tables contained in Appendix C.

Table 2.1.3 P-2 Wet Pond Summary

Design Elements	Required	Provided	Remarks
Pond Location	Not within Jurisdictional Waters	Outside of Jurisdictional Waters	See Project Plans
Forebay Volume	10% of WQv (982 cubic feet)	21% of WQv (2,050 cubic feet)	See Appendix C
Forebay Depth	4' Min. – 6' Max.	5' Provided	See Project Plans
WQv Storage	100% Min. within Permanent Pool (9,818 cubic feet)	100%+ within Permanent Pool (10,715 cubic feet)	See Appendix C
Minimum Length to Width Ratio	1.5 : 1	Greater than 2 : 1	See Project Plans
Minimum Surface Area to Drainage Area Ratio	1 : 100	1 : 39	See Project Plans
Benches at Water Level	Aquatic Bench	Aquatic Bench	See Project Plans
Landscaping	Pond and Buffer Plantings Required	Pond and Buffer Plantings Provided	See Project Plans

2.3 NYSDEC Stream Channel Protection Volume, CP_v

The Stream Channel Protection (CP_v) criterion is intended to protect stream channels from erosion and is accomplished by the 24-hour extended detention of the 1-year, 24-hour storm event or by fully infiltrating the stormwater runoff from the 1-year, 24-hour storm event. As shown in Appendix C, the proposed I-4 Subsurface Infiltration System has been designed to fully infiltrate the stormwater runoff from the 1-year, 24-hour design storm and the P-2 Wet Pond has been designed to provide 24-hour extended detention of the 1-year, 24-hour storm, therefore the CPv criterion has been met for the proposed areas of new development.

2.4 NYSDEC Overbank Flood Control, Q_p, and Extreme Flood Control, Q_f

The Overbank Flood Control (Q_p) requirement is intended to prevent an increase in the frequency and magnitude of out-of-bank flooding events generated by urban development. Overbank control requires storage to attenuate the post-development 10-year, 24-hour peak discharge to pre-development rates. The Extreme Flood Control (Q_f) requirement is intended to prevent the increased risk of flood damage from large storm events, maintain the boundaries of the pre-development 100-year flood plain, and protect the physical integrity of stormwater management practices. Extreme flood control requires storage to attenuate the post-development 100-year, 24-hour peak discharge to pre-development rates. As shown in Table 2.4.1 attenuation for both the 10-year and 100-year 24-hour storms has been provided thus satisfying the Q_p and Q_f requirements. The following table summarizes the pre and post development peak flows expected for the proposed project.

Table 2.4.1– Pre and Post-Development Peak Flows

24-HOUR DESIGN STORM PEAK FLOWS (c.f.s.)				
	10-YEAR (Overbank Flood Control)		100-YEAR (Extreme Flood Control)	
	Pre	Post	Pre	Post
Design Line 1	43.1	41.5	93.6	92.5

As shown in the above table the peak flows discharging to the design line in the proposed condition have been mitigated to slightly below the existing condition levels. Since the rate of runoff in the proposed condition is less than the existing condition, the proposed onsite stormwater improvements will mitigate the potential impact of the peak flows downstream in the final condition.

3.0 STORMWATER CONVEYANCE SYSTEM

The stormwater collection and conveyance systems for the project will consist of catch basins, drain inlets, drainage manholes, swales and HDPE pipe. The system will be sized to collect and convey at minimum the 100-year, 1-hour design storm using the Rational Method. The Rational Method is a standard method used by engineers to develop flow rates for sizing collection systems. The Rational Method calculates flows based on a one-hour design storm. Calculations shall be provided in future reports.

4.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control should be accomplished by four basic principles: diversion of clean water, containment of sediment, treatment of dirty water, and stabilization of disturbed areas. Diversion of clean water should be accomplished with swales. This diverted water should be safely conveyed around the construction area as necessary and discharged downstream of the disturbed areas. Sediment should be contained with the use of silt fence at the toe of disturbed slopes and excavation of the temporary sediment basin. Disturbed areas should be permanently stabilized within 14 days of final grading to limit the required length of time that the temporary facilities must be utilized. The owner will be responsible for the maintenance of the temporary erosion control facilities.

4.1 Temporary Erosion and Sediment Control Facilities

Temporary erosion and sediment control facilities should be installed and maintained as required to reduce the impacts to off-site properties. The owner will be required to provide maintenance for the temporary erosion and sediment control facilities. In general, the following temporary methods and materials should be used to control erosion and sedimentation from the project site:

- Stabilized Construction Entrance
- Silt Fence Barriers
- Storm Drain Inlet Protection

A stabilized construction entrance should be installed at the entrance to the site as shown on the plan. The design drawings will include details to guide the contractor in the construction of this entrance. The intent of the stabilized construction entrance is to prevent the “tracking” of soil from the site. Dust control should be accomplished with water sprinkling trucks if required. During dry periods, sprinkler trucks should wet all exposed earth surfaces as required to prevent the transport of air-borne particles to adjoining areas.

Siltation barriers constructed of geosynthetic filter cloth should be installed at the toe of all disturbed slopes. The intent of these barriers is to contain silt and sediment at the source and inhibit its transport by stormwater runoff. The siltation barriers will also help reduce the rate of runoff by creating filters through which the stormwater must pass.

4.2 Permanent Erosion and Sediment Control Facilities

Permanent erosion and sediment control will be accomplished by diverting stormwater runoff from steep slopes, controlling/reducing stormwater runoff velocities and volumes, and vegetative and structural surface stabilization. All of the permanent facilities are relatively maintenance free and only require periodic inspections. The owner will provide maintenance for all the permanent erosion and sediment control facilities.

The temporary sediment trap shall be cleaned of all sediment and debris, and converted to an extended detention dry stormwater basin per the final elevations and dimensions, and stabilized with the vegetation as indicated on the project drawings. Riprap aprons will be used at the discharge end of all piped drainage systems. Runoff velocities will be reduced to levels that are non-erosive to the receiving waterbodies through use of these aprons.

Other than the buildings and paved surfaces, disturbed surfaces will be stabilized with vegetation. The vegetation will control stormwater runoff by preventing soil erosion, reducing runoff volume and velocities, and providing a filter medium. Permanent seeding should optimally be undertaken in the spring from March 21st through May 20th and in late summer from August 15th to October 15th.

5.0 IMPLEMENTATION, MAINTENANCE & GENERAL HOUSEKEEPING

5.1 Construction Phase

Details associated with the implementation and maintenance of the proposed stormwater facilities and erosion control measures during construction are shown on the project drawings. A Construction Sequence has been provided to guide the contractor in the installation of the erosion control measures as well as the site plan features. In accordance with NYSDEC SPDES General Permit GP-0-20-001 no phase will exceed the maximum of 5 acres of disturbance at any given time as less than 5 acres of disturbance is proposed. The erosion control plan includes associated details and notes to aid the contractor in implementing the plan.

During construction, a Site Log Book, Appendix E, is required to be kept per NYSDEC SPDES General Permit GP-0-20-001. Erosion and sediment control inspections are required to be conducted as necessary under coverage of the permit (minimum twice a week) and an updated logbook and a copy of the SWPPP is required to be kept on site for the duration of the construction activities. The Construction Site Log Book is an appendix taken from the *New York Standards and Specifications for Erosion and Sediment Control* (Blue Book).

In addition to the proposed erosion and sediment control facilities, the following good housekeeping best management practices shall be implemented to mitigate potential pollution during the construction phase of the project. The general contractor overseeing the day-to-day site operation shall be responsible for the good housekeeping best management practices included in the following general categories:

- Material Handling and Waste Management
- Establishment of Building Material Staging Areas
- Establishment of Washout Areas
- Proper Equipment Fueling and Maintenance Practices
- Spill Prevention and Control Plan

All construction waste materials shall be collected and removed from the site regularly by the general contractor. The general contractor shall supply waste barrels for proper disposal of waste materials. All personnel working on the site shall be instructed of the proper procedures for construction waste disposal.

Although it is not anticipated any hazardous waste materials will be utilized during construction, any hazardous waste materials shall be disposed of in accordance with federal, state, and local regulations. No hazardous waste shall be disposed of on-site. Hazardous waste materials shall be stored in appropriate and clearly marked containers and segregated from the other non-waste materials. All hazardous waste shall be stored in a structurally sound and sealed shipping containers located in the staging areas. Material safety data sheets, material inventory, and emergency contact numbers will be maintained in the office trailer. All personnel working on the site shall be instructed of the proper procedures for hazardous waste disposal.

Temporary sanitary facilities (portable toilets) shall be provided on site during the entire length of construction. The sanitary facilities shall be in an alternate area away from the construction activities on the site. The portable toilets shall be inspected weekly for evidence of leaking holding tanks.

All recyclables, including wood pallets, cardboard boxes, and all other recyclable construction scraps shall be disposed of in a designated recycling barrel provided by the contractor and removed from the site regularly. All personnel working on the site shall be instructed of the proper procedures for construction waste recycling.

All construction equipment and maintenance materials shall be stored in a designated staging area. Silt fence shall be installed down gradient of the construction staging area. Shipping containers shall be utilized to store hand tools, small parts, and other construction materials, not taken off site daily. Construction waste barrels, recycling barrels and if necessary hazardous waste containers shall be located within the limits of the construction staging area.

Throughout the construction of the project, several types of vehicles and equipment will be used on-site. Fueling of the equipment shall occur within the limits of the construction staging area. Fuel will be delivered to the site as needed, by the general contractor, or a party chosen by the general contractor. Only minor vehicle equipment maintenance shall occur on-site, all major maintenance shall be performed off-site. All equipment fluids generated from minor maintenance activities shall be disposed of into designated drums and stored in accordance with the hazardous waste storage as previously discussed.

Vehicles and equipment shall be inspected on each day of use. Any leak discovered shall be repaired immediately. All leaking equipment unable to be repaired shall be removed from the site. Ample supplies of absorbent, spill-cleanup materials, and spill kits shall be located in the construction staging area. All spills shall be cleaned up immediately upon discovery. Spent absorbent materials and rags shall be hauled off-site immediately after the spill is cleaned for disposal at a local landfill. All personnel working on the site shall be instructed of the proper procedures for spill prevention and control. Any spill large enough to discharge to surface water will be immediately reported to the local fire / police departments and the National Response Center 1-800-424-8802.

During the initial year of planting, the plants may require watering to germinate and establish. Note that several seedings may be required during the first year to completely establish vegetation on the site.

5.2 Soil Restoration

Soil Restoration is required to be applied across areas of the development site where soils have been disturbed and will be vegetated. The purpose is to recover the original properties and porosity of the soil compacted during construction activity. Soil Restoration is applied in the cleanup, restoration, and landscaping phase of construction followed by the permanent establishment of an appropriate, deep-rooted groundcover to help maintain the restored soil structure. Soil restoration includes mechanical decompaction and compost amendment. The table below describes various soil disturbance activities related to land development, soil types and the requirements for soil restoration for each activity as identified in the Design Manual. Restoration is applied across areas of a development site where soils have been compacted and will be vegetated according to the criteria defined in the table below:

Soil Restoration Requirements[1, 2,4] (Onsite soils within the limit of disturbance belong to Hydrologic Soil Groups (HSG) D)			
Type of Soil Disturbance	**Soil Restoration Requirement**		**Comments/Examples**
No soil disturbance	Restoration not permitted		Preservation of Natural Features
Minimal soil disturbance	Restoration not required		Clearing and grubbing
Areas where topsoil is stripped only - no change in grade	HSG A & B	HSG C&D	Protect area from any ongoing construction activities.
	Apply 6 inches of topsoil	Aerate[3] and apply 6 inches of topsoil	
Areas of cut or fill	HSG A &B	HSG C&D	
	Aerate[1] and apply 6 inches of topsoil	Apply full Soil Restoration [2]	
Heavy traffic areas on site (especially in a zone 5-25 feet around buildings but not within a 5-foot perimeter around foundation walls)	Apply full Soil Restoration (decompaction and compost Enhancement[6])		
Areas where Runoff Reduction and/or Infiltration practices are applied	Restoration not required, but may be applied to enhance the reduction specified for appropriate practices.		Keep construction equipment from crossing these areas. To protect newly installed practice from any ongoing construction activities construct a single phase operation fence area
Redevelopment projects	Soil Restoration is required on redevelopment projects in areas where existing impervious area will be converted to pervious area.		

1. Aeration includes the use of machines such as tractor-drawn implements with coulters making a narrow slit in the soil, a roller with many spikes making indentations in the soil, or prongs which function like a mini-subsoiler.
2. Per "Deep Ripping and De-compaction, DEC 2008".
3. Aeration includes the use of machines such as tractor-drawn implements with coulters making a narrow slit in the soil, a roller with many spikes making indentations in the soil, or prongs which functions like a mini-subsoiler.
4. During periods of relatively low to moderate subsoil moisture, the disturbed soils are returned to rough grade and the following Soil Restoration steps applied:
   - 5.1. Apply 3 inches of compost over subsoil.
   - 5.2. Till compost into subsoil to a depth of at least 12 inches using a cat-mounted ripper, tractor-mounted disc, or tiller, mixing, and circulating air and compost into subsoils.
   - 5.3. Rock-pick until uplifted stone/rock materials of four inches and larger size area cleaned off the site.
   - 5.4. Apply topsoil to a depth of 6 inches.
   - 5.5. Vegetate as required by seeding notes located on the project drawings.
   - 5.6. Tilling should not be performed within the drip line of any existing trees or over any utility installations that are within 24 inches of the surface.
6. Compost shall be aged, from plant derived materials, free of viable weed seeds, have no visible free water or dust produced when handling, pass through a half inch screen and have a pH suitable to grow desired plants.

After soil restoration is completed an inspector should be able to push a 3/8" metal bar twelve inches into the soil with just body weight. Following decompaction/soil restoration activities, the following maintenance is anticipated during the first year:

- Initial inspections for the first six months (once after each storm greater than a half-inch).
- Reseeding to repair bare or eroding areas to assure grass stabilization.
- Water once every three days for first month, and then provide a half inch of water per week during first year. Irrigation plan may be adjusted according to the rain event.
- Fertilization may be needed in the fall after the first growing season to increase plant vigor.

In order to ensure the soil remains decompacted the following ongoing maintenance is recommended:

- Planting the appropriate ground cover with deep roots to maintain the soil structure.
- Keeping the site free of vehicular and foot traffic or other weight loads. Consider pedestrian footpaths (sometimes it may be necessary to de-thatch the turf every few years).

5.3 Long Term Maintenance Plan

Each spring the paved areas should be cleaned to remove the winter’s accumulation of traction sand. After this is completed, all drain inlets sumps and the stormwater basins should be cleaned. All pipes should be checked for debris and blockages and cleaned as required. During the cleaning process, the drain inlets, catch basins, and pipes should be inspected for structural integrity and overall condition; repairs and/or replacement will be made as required.

The stormwater facilities for the subject project have been designed to minimize the required maintenance. This section discusses the minimum maintenance requirements to insure long-term performance of the stormwater facilities. Initially the stormwater facilities will require an increased maintenance and inspection schedule until all portions of the site are stable. Generally, the stormwater facilities consist of either collection and conveyance components or treatment components.

The stormwater collection and conveyance system is composed of HDPE, drainage pipe and precast concrete drainage structures. The owner will assume the maintenance responsibilities for the drainage system. Minimal maintenance is typically required for these facilities. All pipes should be checked for debris and blockages and cleaned as required. All drain inlet sumps, including the sumps within the hydrodynamic separators, shall be inspected bi-annually and cleaned to removed deposited sediment. During the cleaning process, the pipes should be inspected for structural integrity and overall condition; repairs and/or replacement should be made as required. Additionally, the detention systems shall be checked for deposited sediment as well. Visual inspection of system through the inspection ports shall take place yearly, and the system shall be cleaned / jetted as necessary to remove deposited sediment.

The stormwater facilities have been designed to limit the routine maintenance requirements. Initially the filter will require regular maintenance until the permanent vegetation is established. Permanent vegetation is considered established when 80% of the final plant density is established. Vegetation should be inspected weekly during construction as part of coverage under NYSDEC SPDES General Permit GP-0-20-001 during construction and in the permanent condition. Damaged areas should be immediately re-seeded and re-mulched. The floor of the filter will be planted with a seed mixture that contains plants that are tolerant of occasional flooding. The seed mixtures contain several plant species that vary slightly in their needs for survival. It is expected that not all of the species will survive within the basin due to variations such as water, nutrients, and light. During the initial year of planting, the plants may require watering to germinate and become established. Note that several seedings may be required during the first year to completely establish vegetation within the basin. After the initial year of establishment, the filter does not need to be fertilized or watered. A natural selection process will occur over the first few years, such that the species within the seed mixture most suitable to the conditions will survive.

Refer to the Infiltration Trench and Basin Inspection & Maintenance checklist found in Appendix G of this report prepared for all portions of this project the requirements to insure long-term performance of all stormwater facilities

Refer to the Hydroworks Hydrostorm Operations & Maintenance Manual in Appendix H of this report for the manufacture maintenance requirements for the proposed hydrodynamic separator.

APPENDIX A

NYSDEC Water Quality Volume and Runoff Reduction Calculations

WQv Calculation Worksheet

Project: Beacon Views, LLC
Project #: 19131.100
Date: 4/28/2020

INSITE ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.

The following calculation determines the water quality flow rate for the 90% Water Quality Event using the Small Storm Hydrology Method specified in Appendix B of the New York State Stormwater Management Design Manual.

Subcatchment ID: **1.1**

1.Water Quality Volume $= WQ_v = \frac{P * R_v * A}{12}$

P = WQv 24-hour Rainfall Amount	=	1.4	in.
A = Subcatchment Area	=	135730	SF
Ai= Impervious Area within Subcatchment Area	=	85680	
I = Ai/A	=	63.1	%
Rv = 0.05 + 0.009 (I%)	=	0.62	
WQv = Water Quality Volume	=	9,818	CF

Subcatchment ID: **1.2**

1.Water Quality Volume $= WQ_v = \frac{P * R_v * A}{12}$

P = WQv 24-hour Rainfall Amount	=	1.4	in.
A = Subcatchment Area	=	21300	SF
Ai= Impervious Area within Subcatchment Area	=	16400	
I = Ai/A	=	77.0	%
Rv = 0.05 + 0.009 (I%)	=	0.74	
WQv = Water Quality Volume	=	1,839	CF

WQv Calculation Worksheet

Project: Beacon Views, LLC
Project #: 19131.100
Date: 4/28/2020

The following calculation determines the water quality flow rate for the 90% Water Quality Event using the Small Storm Hydrology Method specified in Appendix B of the New York State Stormwater Management Design Manual.

Subcatchment ID: 1.3S

1.Water Quality Volume $= WQ_v = \frac{P * R_v * A}{12}$

P = WQv 24-hour Rainfall Amount	=	1.4	in.
A = Subcatchment Area	=	16480	SF
Ai= Impervious Area within Subcatchment Area	=	8140	
I = Ai/A	=	49.4	%
Rv = 0.05 + 0.009 (I%)	=	0.49	
WQv = Water Quality Volume	=	942	CF

RRv Calculation Worksheet - Design Line 1

Project: Beacon Views, LLC
Project #: 19131.100
Date: 4/28/2020

INSITE ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.

1. RRv Initial = Water Quality Volume (WQv) *0.289 ac-ft* = *12,599 c.f.*
(refer to Water Quality Volume Calculation Sheet)

2. *RRv Minimum* = [(P) (Rv) (S) (Aic)] /12 where…

P = Rainfall (in.)	=	1.40 in.
Rv = 0.05 + 0.009 (100%)	=	0.95
S = Hydrologic Soil Group Specific Reduction Factor [HSG A = 0.55] [HSG B = 0.40] [HSG C = 0.30] [HSG D = 0.20]	=	0.20
Aic = Total area of new impervious cover	=	2.5 Acres
RRv Minimum	=	*2,414 c.f.*

3. *RRv Required* = RRv Initial - Green Infrastructure Practice (GIP) with Area Reduction

<u>GIP with Area Reduction Applied in Project</u>

5.3.1 Conservation of Natural Area	N/A
5.3.2 Sheet Flow to Riparian Buffers or Filter Strips	N/A
5.3.4 Tree Planting / Tree Box (37 trees at 100 s.f. per tree)	c.f.
5.3.5 Disconnection of Rooftop Runoff	-
5.3.6 Stream Daylighting	N/A

RRv Required(=WQv-RRV by area) = 12,599 c.f.

4. *RRv Provided*

GIP with Volume Reduction Applied in Project	WQv Treated (c.f.)	% of WQv Applied to *RRv Provided*	*RRv Provided (c.f.)*
5.3.3 Vegetated Open Swales [HSG A / B = 20%] [HSG C / D = 10%] {Modified HSG C - D = 15% - 12%]		20% 10%	0 0
5.3.7 Rain Garden [No underdrains / Good Soils = 100%] [With underdrains / Poor Soils = 40%]		40%	0
5.3.8 Green Roof [RRv provided equals volume provided in Green Roof]		100%	N/A
5.3.9 Stormwater Planters [Infiltration Planters = 100%] [Flow Through HSG C = 45%] [Flow Though HSG D = 30%]		45%	N/A
5.3.10 Rain Tank / Cisterns		100%	N/A
5.3.11 Porous Pavement		100%	0
Infiltration Practice (Standard SMP)	3572	100%	3,572
Bioretention Practice (Standard SMP) [Without Underdrains HSG A/B = 80%] [With Underdrain HSG C\D = 40%]	709	40%	284
Dry Swale (Open Channel Practice) (Standard SMP) [HSG A/B = 40%] [HSG C/D = 20%]		20%	N/A
RRv Provided =			*3,856*

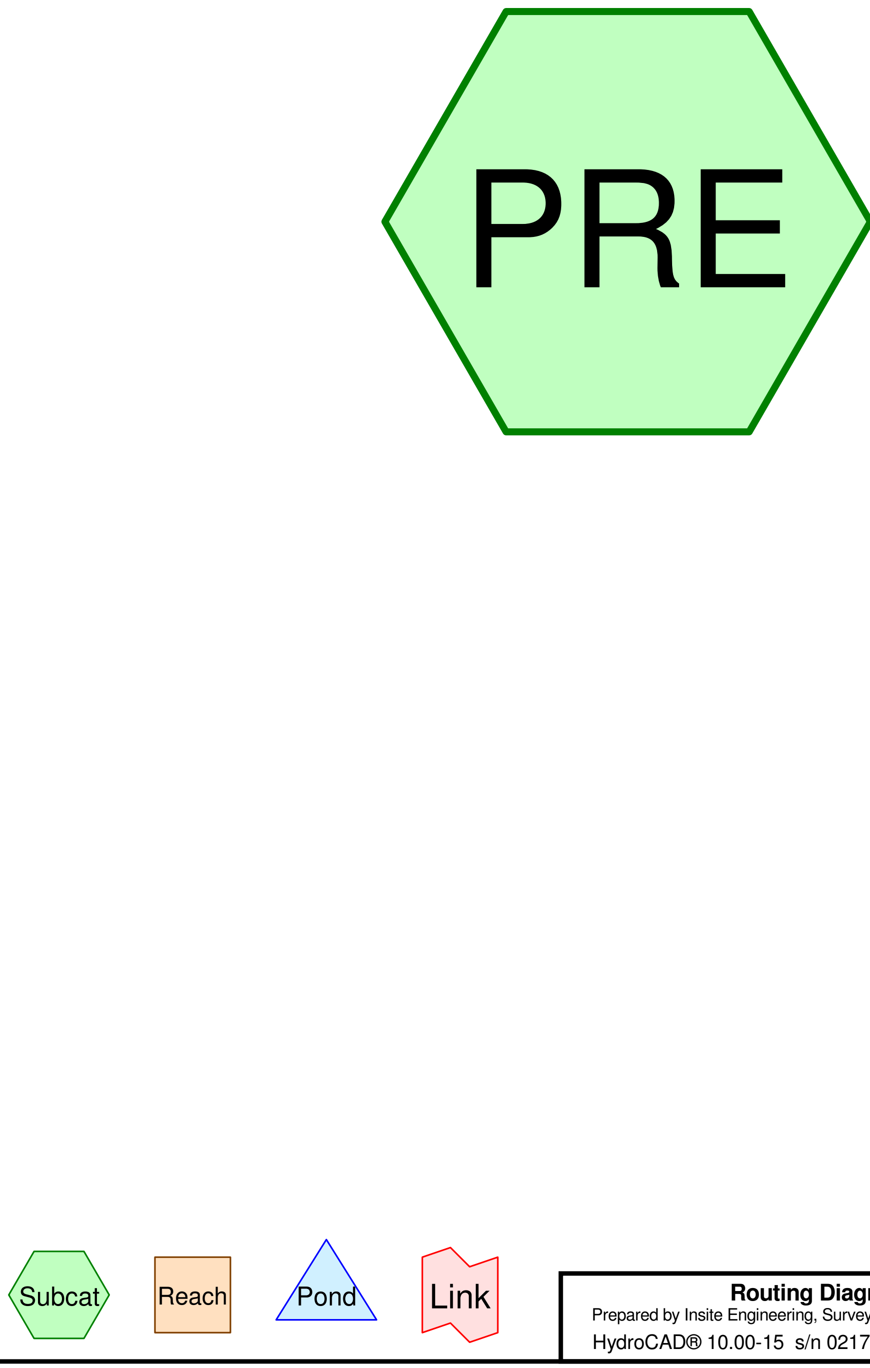
5. Summary

RRv Initial	=	12,599 c.f.	
RRv Required	=	12,599 c.f.	
RRv Minimum	=	2,414 c.f.	
RRv Provided	=	3,856 c.f.	
WQv Required for Downstream SMP	=	8,743 c.f.	(= RRv Required - RRv Provided)

Is RRv Provided greater than or equal to RRv Minimum? Yes

APPENDIX B

Pre-Development Computer Data



Routing Diagram for Pre Development

Prepared by Insite Engineering, Surveying & Landscape Architecture, P.C., Printed 8/26/2019

Summary for Subcatchment PRE:

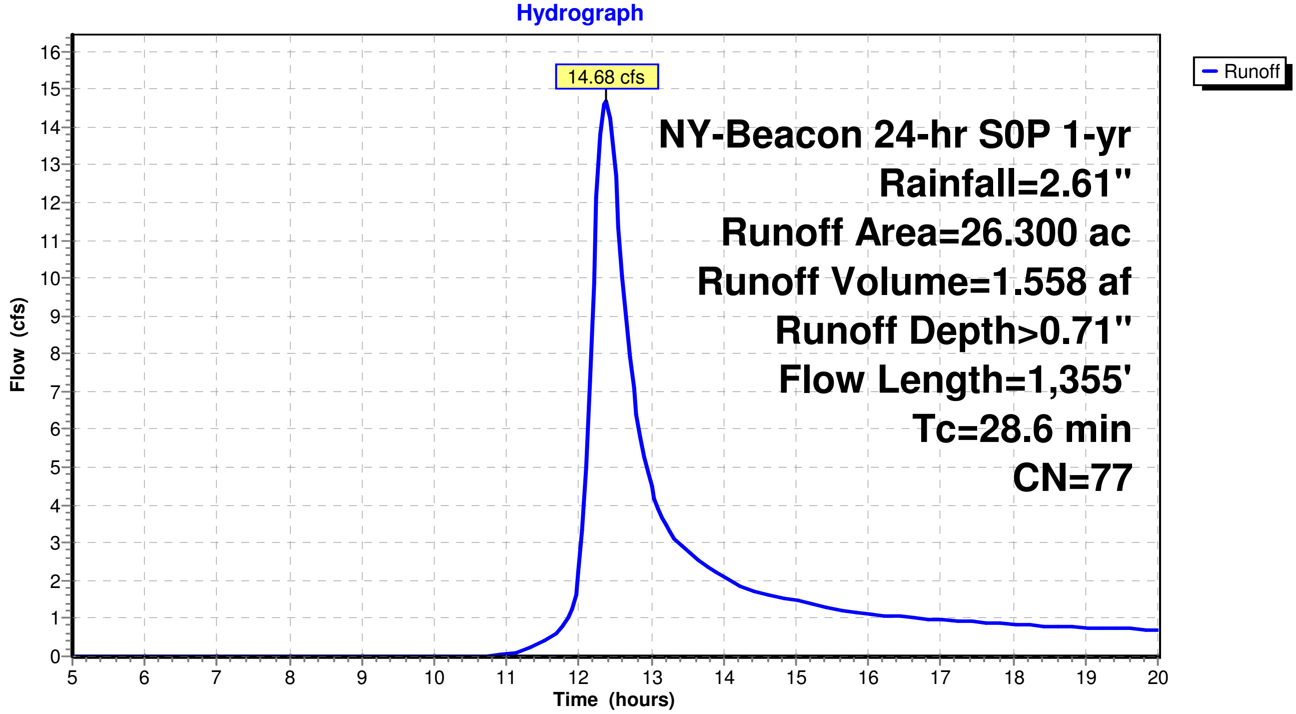
Runoff = 14.68 cfs @ 12.37 hrs, Volume= 1.558 af, Depth> 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 1-yr Rainfall=2.61"

Area (ac)	CN	Description
8.900	78	Meadow, non-grazed, HSG D
17.200	77	Woods, Good, HSG D
0.200	98	Paved parking, HSG D
26.300	77	Weighted Average
26.100		99.24% Pervious Area
0.200		0.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0600	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.7	345	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.4	170	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.6	340	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.0	400	0.0700	1.32		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
28.6	1,355	Total			

Subcatchment PRE:



Summary for Subcatchment PRE:

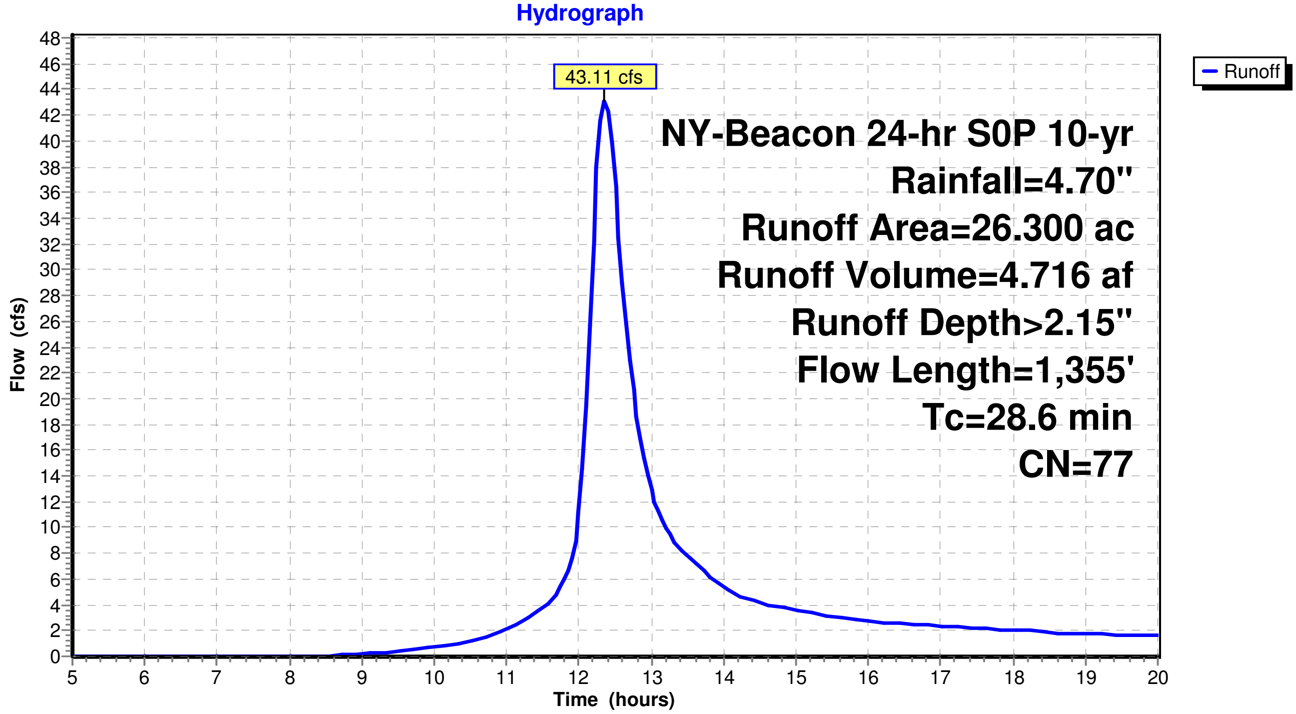
Runoff = 43.11 cfs @ 12.36 hrs, Volume= 4.716 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 10-yr Rainfall=4.70"

Area (ac)	CN	Description
8.900	78	Meadow, non-grazed, HSG D
17.200	77	Woods, Good, HSG D
0.200	98	Paved parking, HSG D
26.300	77	Weighted Average
26.100		99.24% Pervious Area
0.200		0.76% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0600	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.7	345	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.4	170	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.6	340	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.0	400	0.0700	1.32		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
28.6	1,355	Total			

Subcatchment PRE:



Summary for Subcatchment PRE:

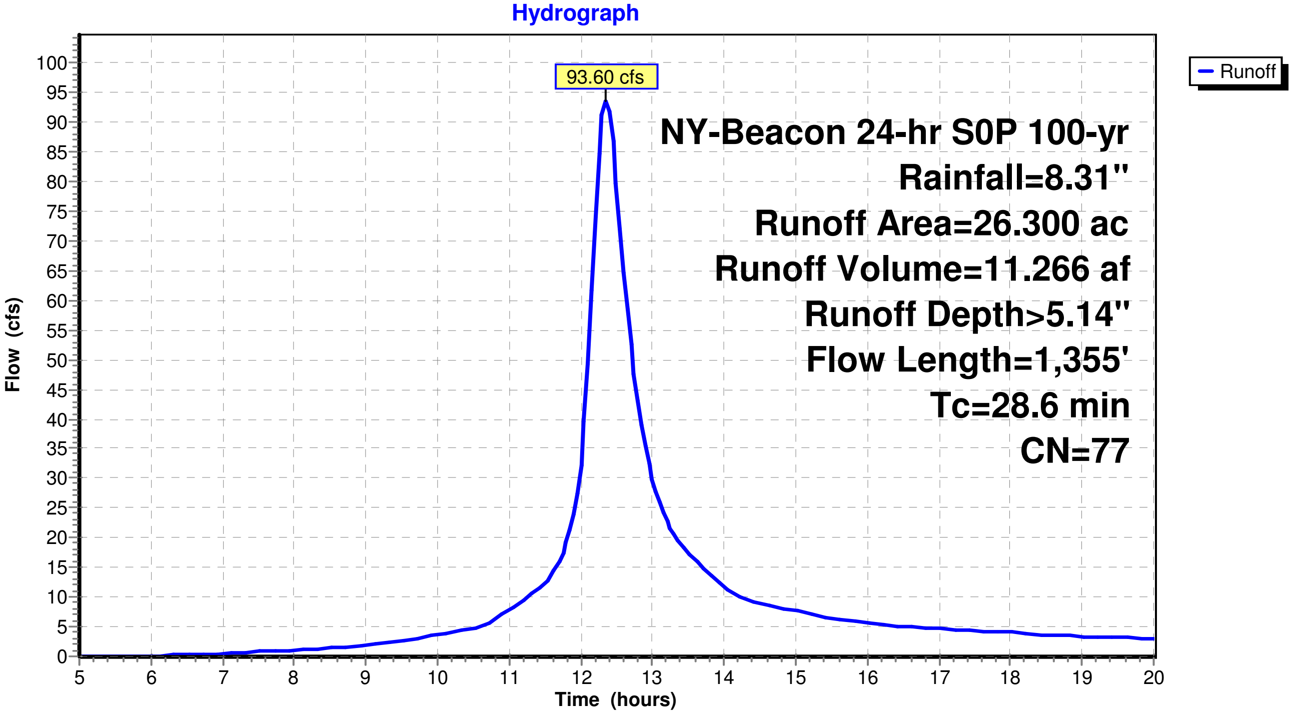
Runoff = 93.60 cfs @ 12.35 hrs, Volume= 11.266 af, Depth> 5.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 100-yr Rainfall=8.31"

Area (ac)	CN	Description
8.900	78	Meadow, non-grazed, HSG D
17.200	77	Woods, Good, HSG D
0.200	98	Paved parking, HSG D
26.300	77	Weighted Average
26.100		99.24% Pervious Area
0.200		0.76% Impervious Area

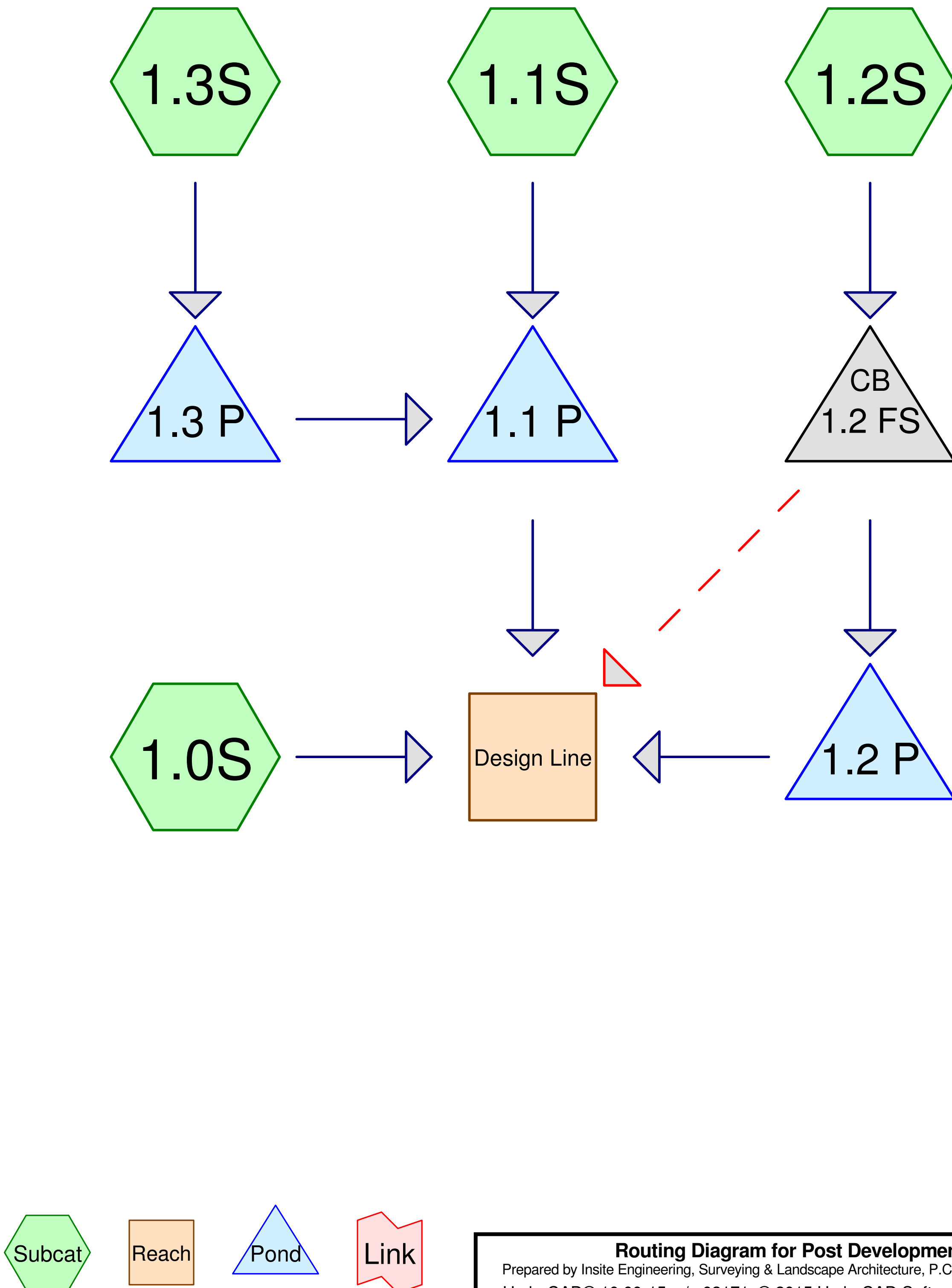
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0600	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.7	345	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.4	170	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.6	340	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.0	400	0.0700	1.32		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
28.6	1,355	Total			

Subcatchment PRE:



APPENDIX C

Post-Development Computer Data



Routing Diagram for Post Development

Prepared by Insite Engineering, Surveying & Landscape Architecture, P.C., Printed 4/28/2020

Summary for Subcatchment 1.0S:

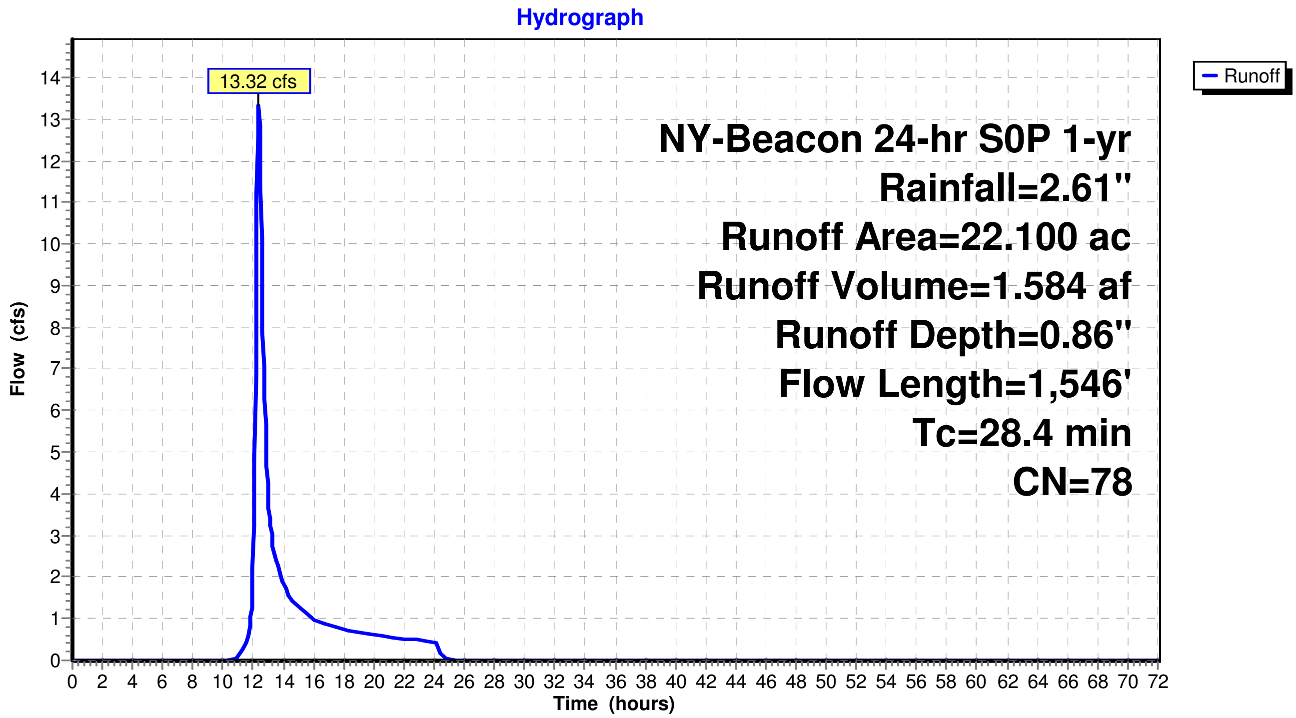
Runoff = 13.32 cfs @ 12.37 hrs, Volume= 1.584 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 1-yr Rainfall=2.61"

Area (ac)	CN	Description
8.700	78	Meadow, non-grazed, HSG D
13.200	77	Woods, Good, HSG D
0.200	98	Paved parking, HSG D
22.100	78	Weighted Average
21.900		99.10% Pervious Area
0.200		0.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0600	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.7	345	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.4	170	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.1	280	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.5	225		7.50		**Direct Entry, Channel Flow**
0.0	36				**Direct Entry, Pipe Flow**
0.5	360		12.00		**Direct Entry, Channel Flow**
4.3	30	0.1000	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
28.4	1,546	Total			

Subcatchment 1.0S:



Summary for Subcatchment 1.1S:

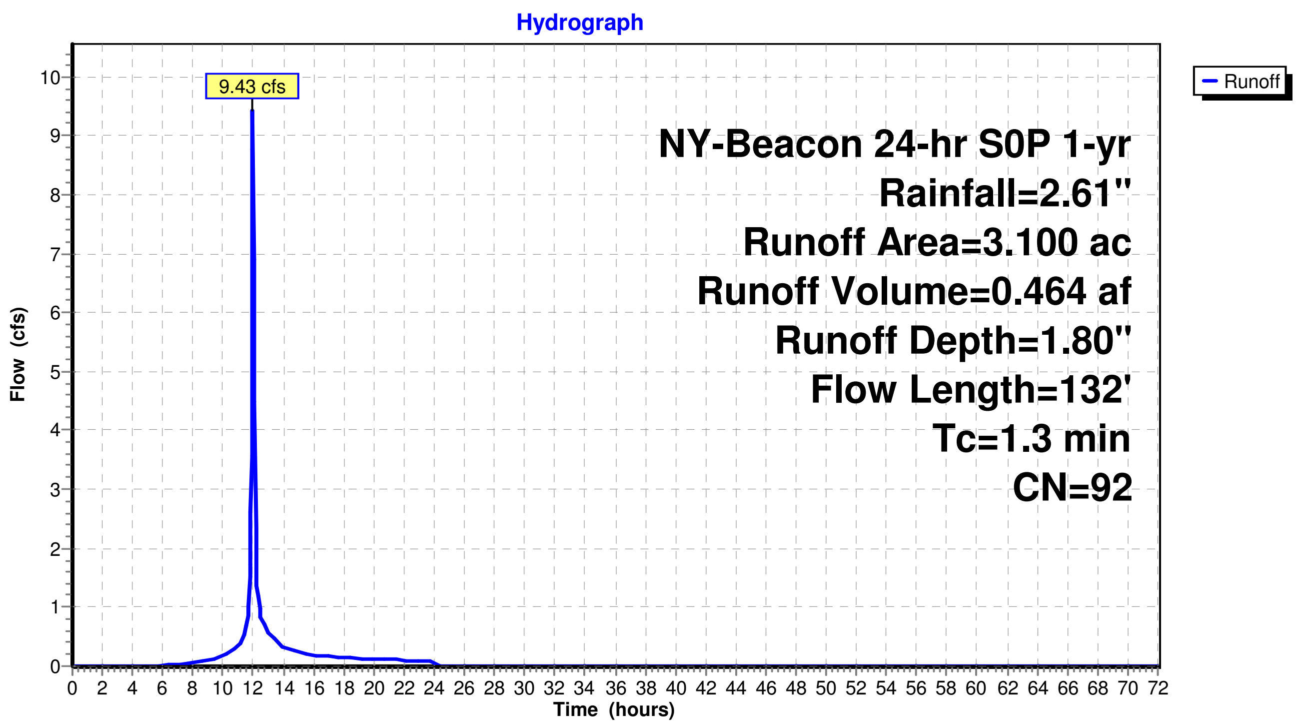
Runoff = 9.43 cfs @ 11.97 hrs, Volume= 0.464 af, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 1-yr Rainfall=2.61"

Area (ac)	CN	Description
2.000	98	Paved parking, HSG D
1.100	80	>75% Grass cover, Good, HSG D
3.100	92	Weighted Average
1.100		35.48% Pervious Area
2.000		64.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	6	0.0200	0.78		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.16"
0.7	6	0.0500	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.16"
0.5	120	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	132	Total			

Subcatchment 1.1S:



Summary for Subcatchment 1.2S:

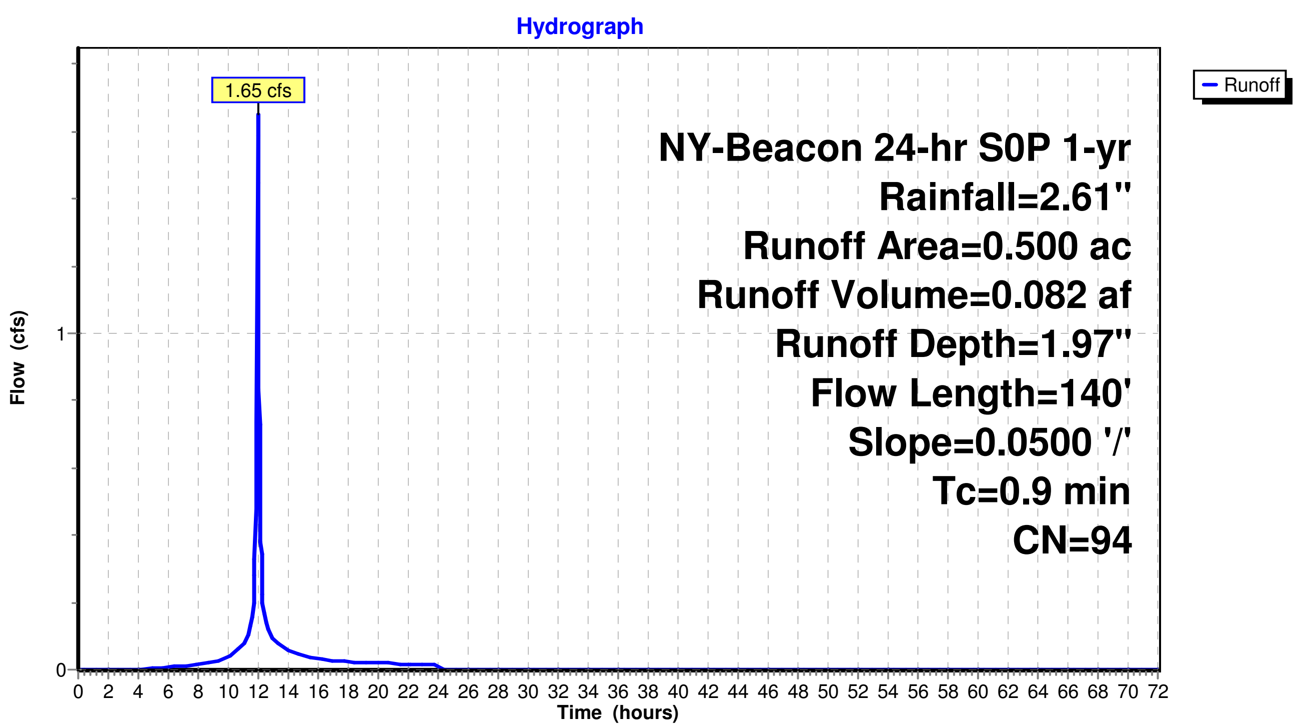
Runoff = 1.65 cfs @ 11.97 hrs, Volume= 0.082 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 1-yr Rainfall=2.61"

Area (ac)	CN	Description
0.380	98	Paved parking, HSG D
0.120	80	>75% Grass cover, Good, HSG D
0.500	94	Weighted Average
0.120		24.00% Pervious Area
0.380		76.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0500	1.97		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.16"
0.1	40	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	140	Total			

Subcatchment 1.2S:



Summary for Subcatchment 1.3S:

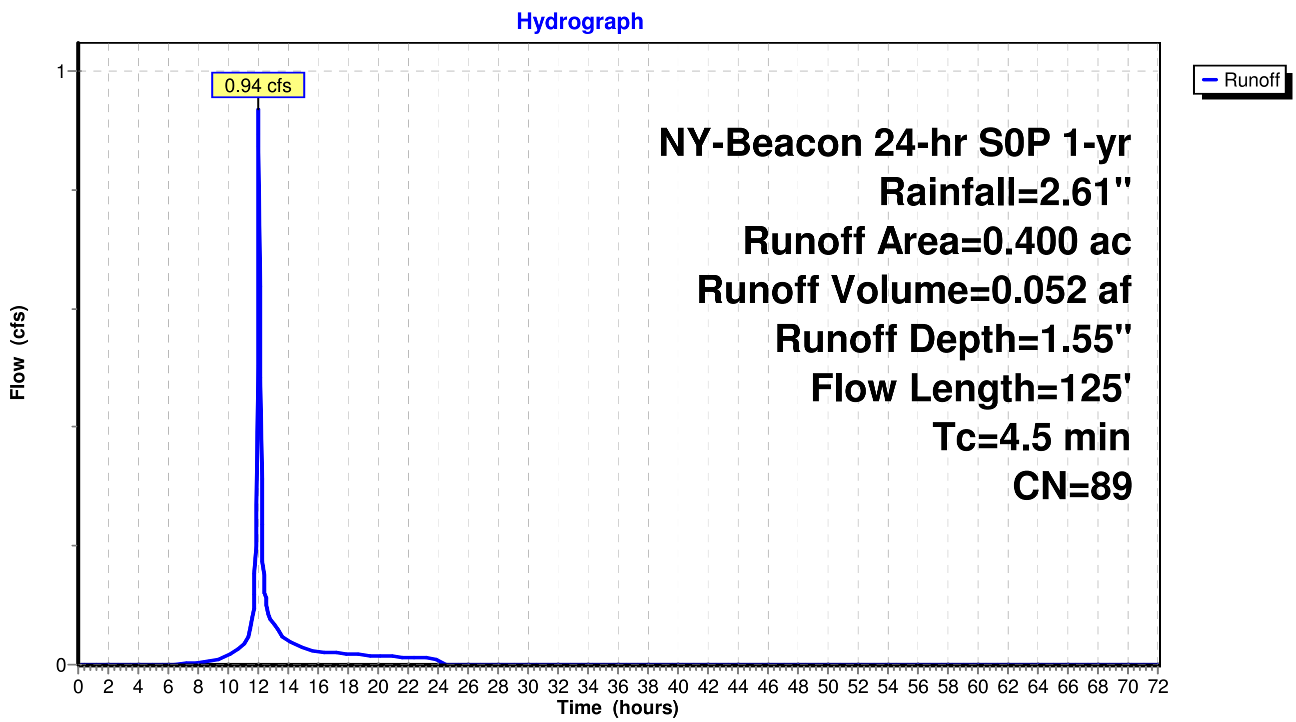
Runoff = 0.94 cfs @ 12.02 hrs, Volume= 0.052 af, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 1-yr Rainfall=2.61"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG D
0.200	80	>75% Grass cover, Good, HSG D
0.400	89	Weighted Average
0.200		50.00% Pervious Area
0.200		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	85	0.1100	0.32		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.16"
0.1	40	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.5	125	Total			

Subcatchment 1.3S:

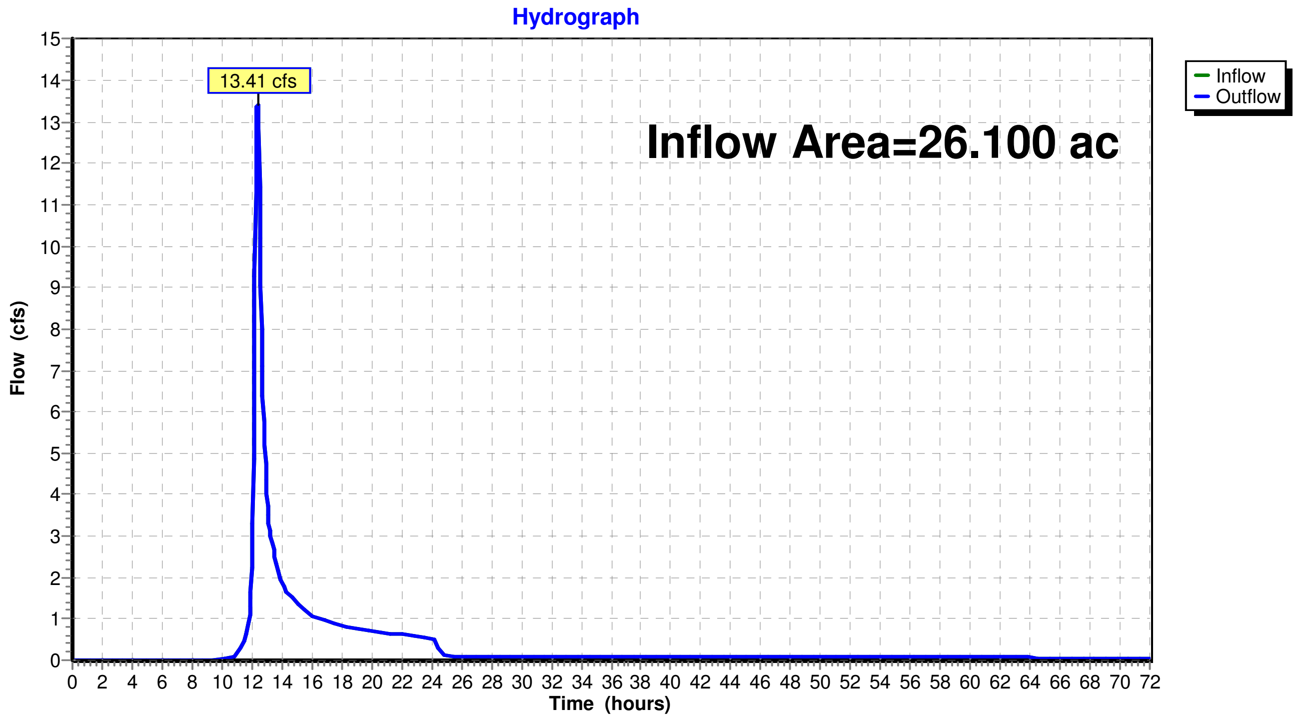


Summary for Reach Design Line:

Inflow Area = 26.100 ac, 10.65% Impervious, Inflow Depth > 0.92" for 1-yr event
Inflow = 13.41 cfs @ 12.37 hrs, Volume= 1.993 af
Outflow = 13.41 cfs @ 12.37 hrs, Volume= 1.993 af, Atten= 0%, Lag= 0.0 min

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

Reach Design Line:



Summary for Pond 1.1 P:

Inflow Area = 3.500 ac, 62.86% Impervious, Inflow Depth = 1.77" for 1-yr event
Inflow = 9.43 cfs @ 11.97 hrs, Volume= 0.515 af
Outflow = 0.10 cfs @ 23.95 hrs, Volume= 0.409 af, Atten= 99%, Lag= 718.8 min
Primary = 0.10 cfs @ 23.95 hrs, Volume= 0.409 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 180.00' Surf.Area= 7,640 sf Storage= 10,715 cf
Peak Elev= 182.12' @ 23.95 hrs Surf.Area= 13,277 sf Storage= 28,048 cf (17,333 cf above start)
Flood Elev= 183.50' Surf.Area= 16,210 sf Storage= 45,265 cf (34,550 cf above start)

Plug-Flow detention time= 2,749.4 min calculated for 0.163 af (32% of inflow)
Center-of-Mass det. time= 1,476.8 min (2,332.7 - 855.9)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	2,050 cf	**Forebay (Prismatic)** Listed below (Recalc)
#2	175.00'	50,435 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		52,485 cf	Total Available Storage

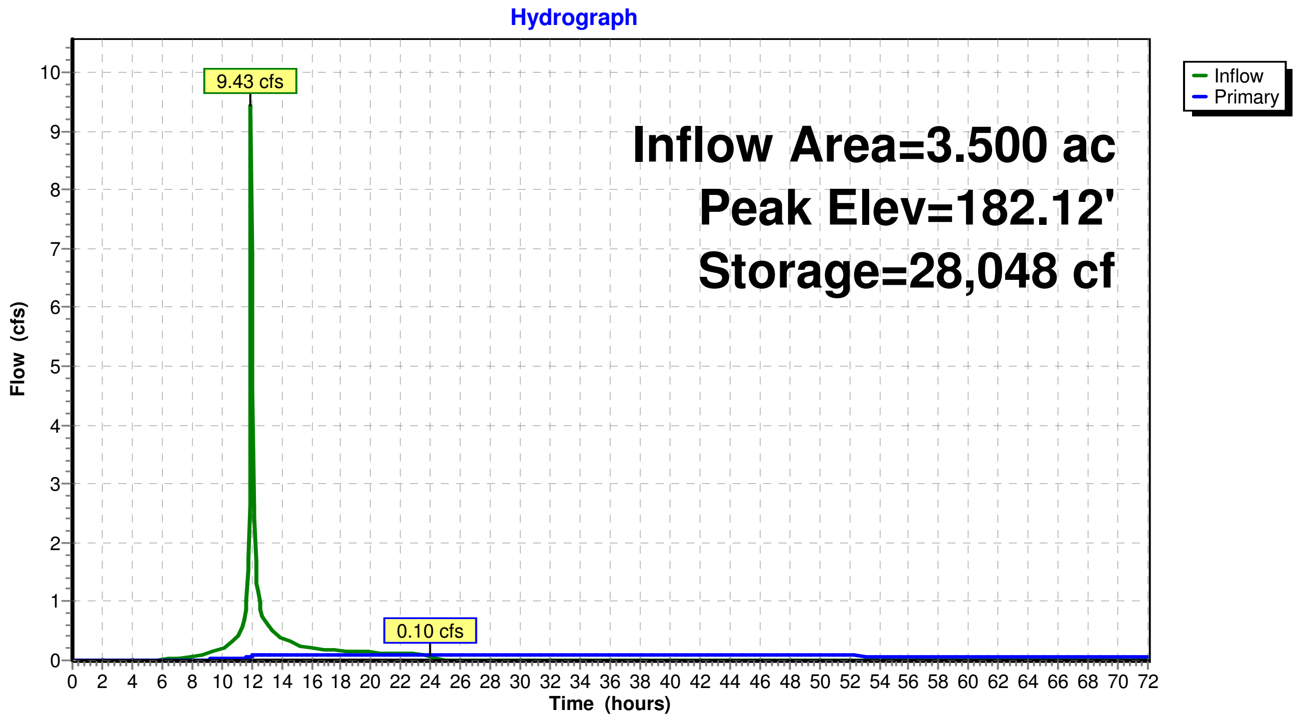
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	5	0	0
177.00	110	115	115
179.00	450	560	675
180.00	2,300	1,375	2,050

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	500	0	0
177.00	1,180	1,680	1,680
179.00	2,090	3,270	4,950
180.00	5,340	3,715	8,665
182.00	10,730	16,070	24,735
184.00	14,970	25,700	50,435

Device	Routing	Invert	Outlet Devices
#1	Primary	179.00'	**24.0" Round Culvert** L= 34.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.00' / 178.50' S= 0.0147 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	180.00'	**1.6" Vert. Orifice/Grate** C= 0.600
#3	Device 1	182.20'	**3.2' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.10 cfs @ 23.95 hrs HW=182.12' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.10 cfs of 22.01 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.10 cfs @ 6.89 fps)
  └─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1.1 P:


Hydrograph
9.43 cfs
0.10 cfs
Inflow
Primary
Inflow Area=3.500 ac
Peak Elev=182.12'
Storage=28,048 cf
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Pond 1.2 FS:

Inflow Area = 0.500 ac, 76.00% Impervious, Inflow Depth = 1.97" for 1-yr event
Inflow = 1.65 cfs @ 11.97 hrs, Volume= 0.082 af
Outflow = 1.65 cfs @ 11.97 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min
Primary = 1.65 cfs @ 11.97 hrs, Volume= 0.082 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

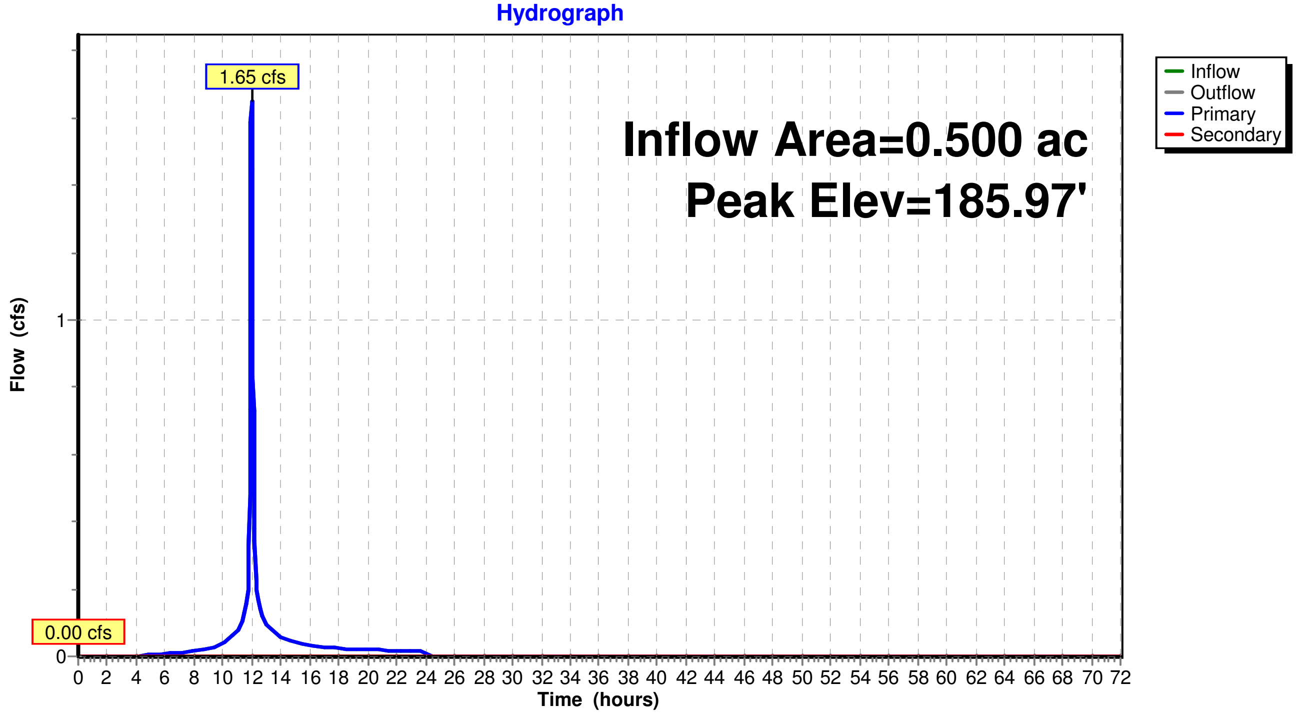
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 185.97' @ 11.97 hrs
Flood Elev= 187.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	184.70'	**8.0" Round Culvert** L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.70' / 184.50' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Secondary	184.70'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.70' / 184.00' S= 0.0233 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	186.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.54 cfs @ 11.97 hrs HW=185.87' TW=183.03' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.54 cfs @ 4.41 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=184.70' TW=0.00' (Dynamic Tailwater)
↑—**2=Culvert** (Controls 0.00 cfs)
  ↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1.2 FS:


Hydrograph
1.65 cfs
0.00 cfs
Inflow Area=0.500 ac
Peak Elev=185.97'
Inflow
Outflow
Primary
Secondary
Flow (cfs)
1
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Summary for Pond 1.2 P:

Inflow Area = 0.500 ac, 76.00% Impervious, Inflow Depth = 1.97" for 1-yr event
Inflow = 1.65 cfs @ 11.97 hrs, Volume= 0.082 af
Outflow = 0.03 cfs @ 10.45 hrs, Volume= 0.082 af, Atten= 98%, Lag= 0.0 min
Discarded = 0.03 cfs @ 10.45 hrs, Volume= 0.082 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 184.28' @ 16.28 hrs Surf.Area= 0.030 ac Storage= 0.047 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 633.5 min (1,428.0 - 794.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	182.00'	0.028 af	**34.75'W x 38.04'L x 3.50'H Field A** 0.106 af Overall - 0.037 af Embedded = 0.069 af x 40.0% Voids
#2A	182.50'	0.037 af	**ADS_StormTech SC-740** x 35 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 7 rows
		0.065 af	Total Available Storage

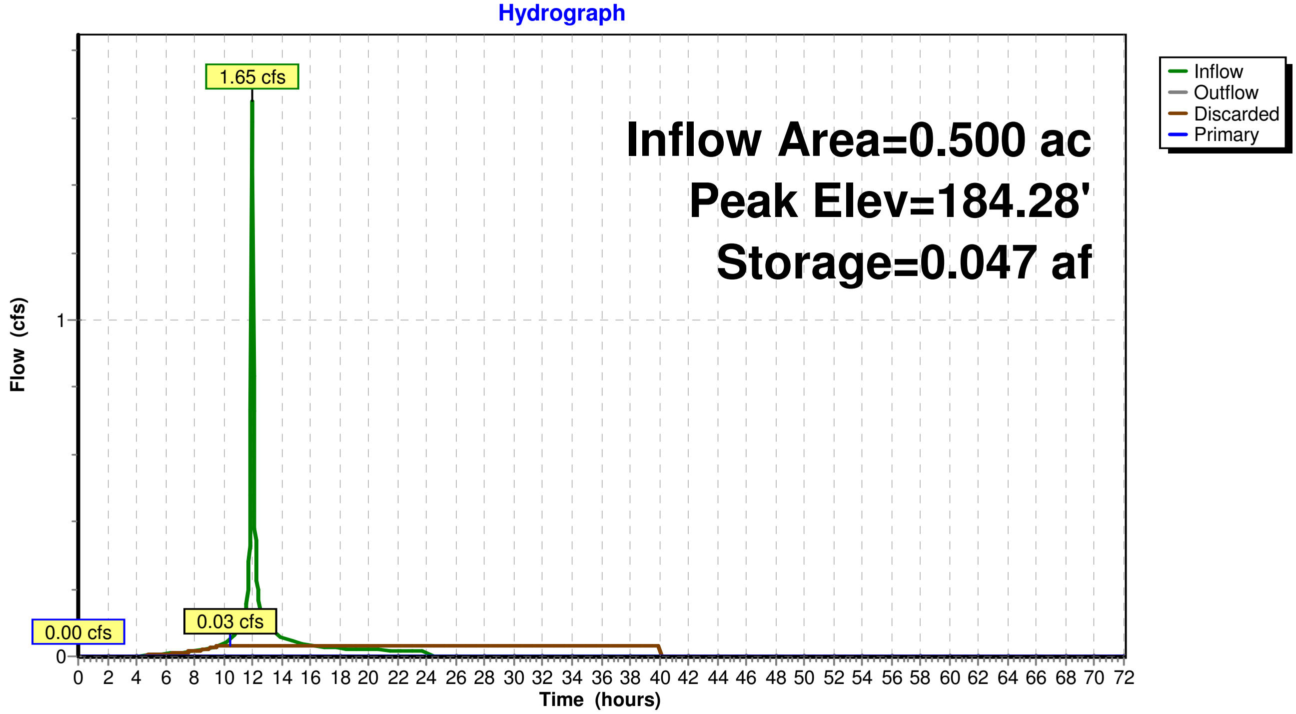
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	182.00'	**1.000 in/hr Exfiltration over Horizontal area**
#2	Primary	184.30'	**8.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.30' / 184.10' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.03 cfs @ 10.45 hrs HW=182.04' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 1.2 P:


Hydrograph
1.65 cfs
0.00 cfs
0.03 cfs
Inflow Area=0.500 ac
Peak Elev=184.28'
Storage=0.047 af
Inflow
Outflow
Discarded
Primary
Flow (cfs)
1
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Summary for Pond 1.3 P:

Inflow Area = 0.400 ac, 50.00% Impervious, Inflow Depth = 1.55" for 1-yr event
Inflow = 0.94 cfs @ 12.02 hrs, Volume= 0.052 af
Outflow = 0.33 cfs @ 12.21 hrs, Volume= 0.052 af, Atten= 65%, Lag= 11.2 min
Primary = 0.33 cfs @ 12.21 hrs, Volume= 0.052 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 192.59' @ 12.21 hrs Surf.Area= 1,620 sf Storage= 858 cf

Plug-Flow detention time= 460.9 min calculated for 0.052 af (100% of inflow)
Center-of-Mass det. time= 461.7 min (1,288.2 - 826.5)

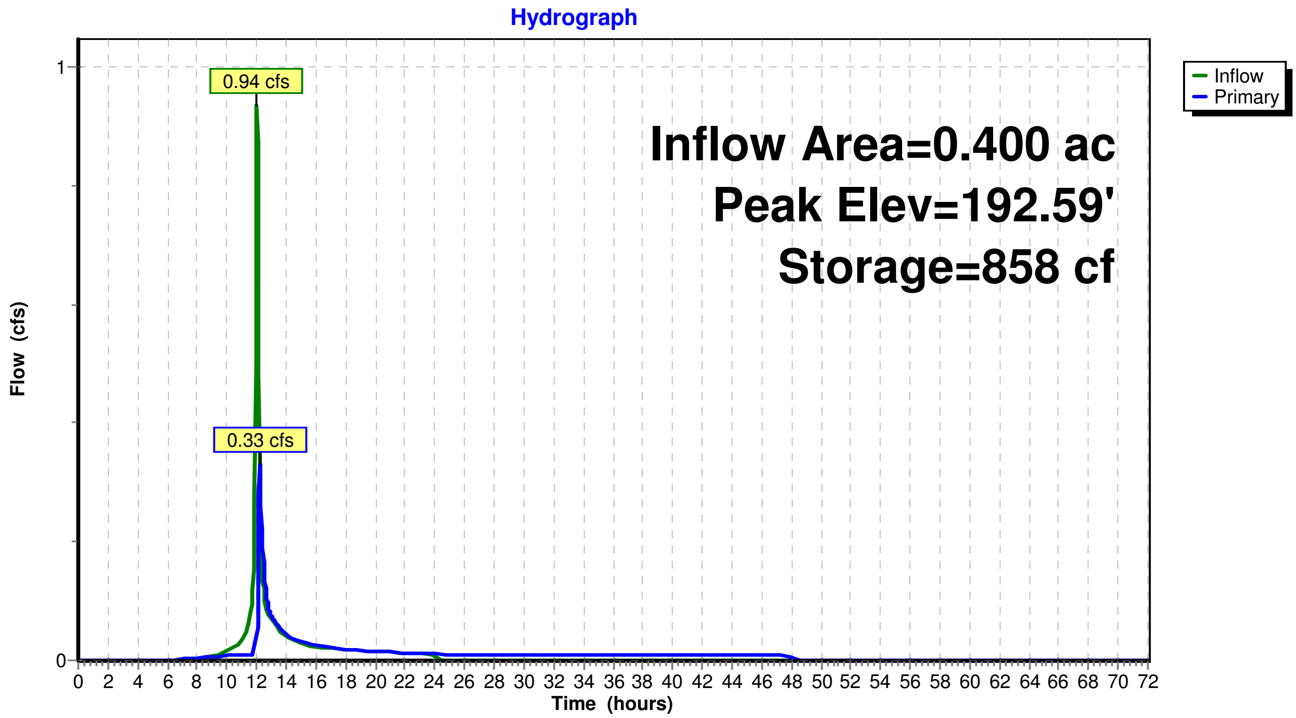
Volume	Invert	Avail.Storage	Storage Description
#1	192.00'	3,720 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.00	1,270	0	0
194.00	2,450	3,720	3,720

Device	Routing	Invert	Outlet Devices
#1	Primary	188.20'	**12.0" Round Culvert** L= 102.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 188.20' / 187.10' S= 0.0108 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	192.00'	**0.250 in/hr Exfiltration over Horizontal area**
#3	Device 1	192.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.33 cfs @ 12.21 hrs HW=192.59' TW=181.46' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.33 cfs of 6.16 cfs potential flow)
  ├─**2=Exfiltration** (Exfiltration Controls 0.01 cfs)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 0.32 cfs @ 0.85 fps)

Pond 1.3 P:


Hydrograph
0.94 cfs
0.33 cfs
Inflow
Primary
Inflow Area=0.400 ac
Peak Elev=192.59'
Storage=858 cf
Flow (cfs)
Time (hours)
1
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Subcatchment 1.0S:

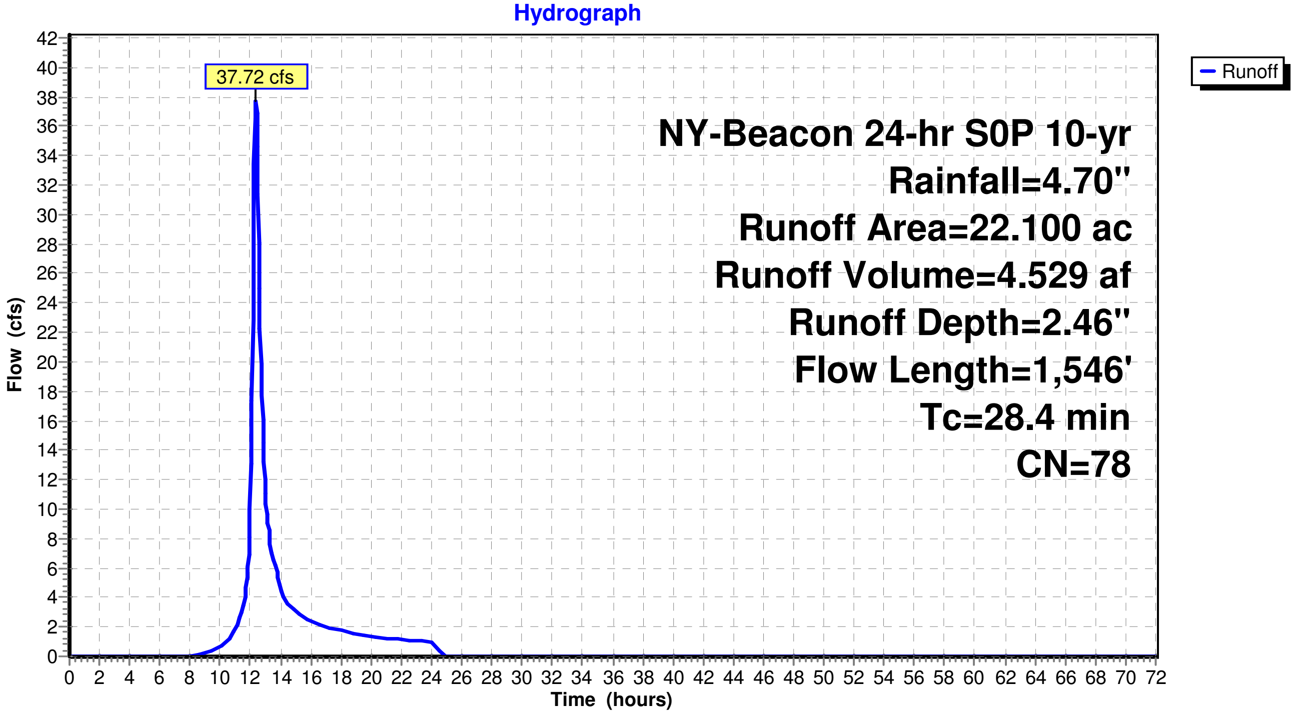
Runoff = 37.72 cfs @ 12.35 hrs, Volume= 4.529 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 10-yr Rainfall=4.70"

Area (ac)	CN	Description
8.700	78	Meadow, non-grazed, HSG D
13.200	77	Woods, Good, HSG D
0.200	98	Paved parking, HSG D
22.100	78	Weighted Average
21.900		99.10% Pervious Area
0.200		0.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0600	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.7	345	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.4	170	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.1	280	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.5	225		7.50		**Direct Entry, Channel Flow**
0.0	36				**Direct Entry, Pipe Flow**
0.5	360		12.00		**Direct Entry, Channel Flow**
4.3	30	0.1000	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
28.4	1,546	Total			

Subcatchment 1.0S:



Summary for Subcatchment 1.1S:

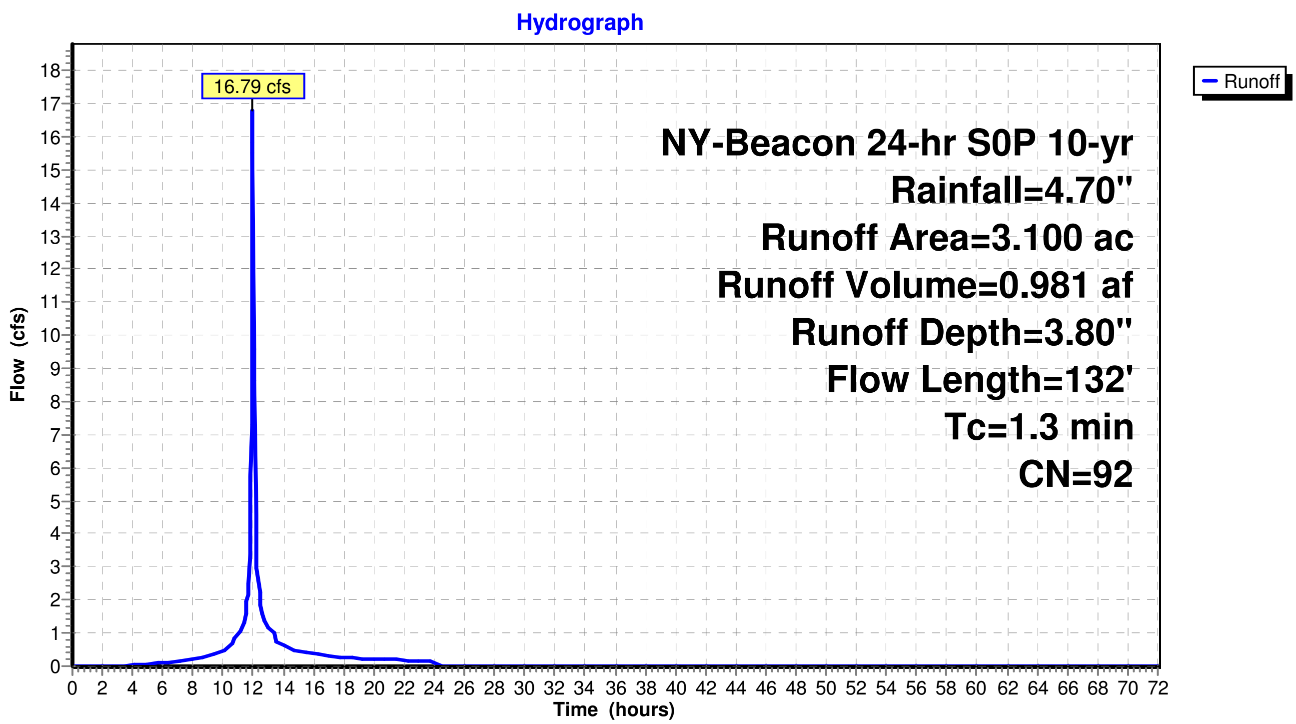
Runoff = 16.79 cfs @ 11.97 hrs, Volume= 0.981 af, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 10-yr Rainfall=4.70"

Area (ac)	CN	Description
2.000	98	Paved parking, HSG D
1.100	80	>75% Grass cover, Good, HSG D
3.100	92	Weighted Average
1.100		35.48% Pervious Area
2.000		64.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	6	0.0200	0.78		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.16"
0.7	6	0.0500	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.16"
0.5	120	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	132	Total			

Subcatchment 1.1S:



Summary for Subcatchment 1.2S:

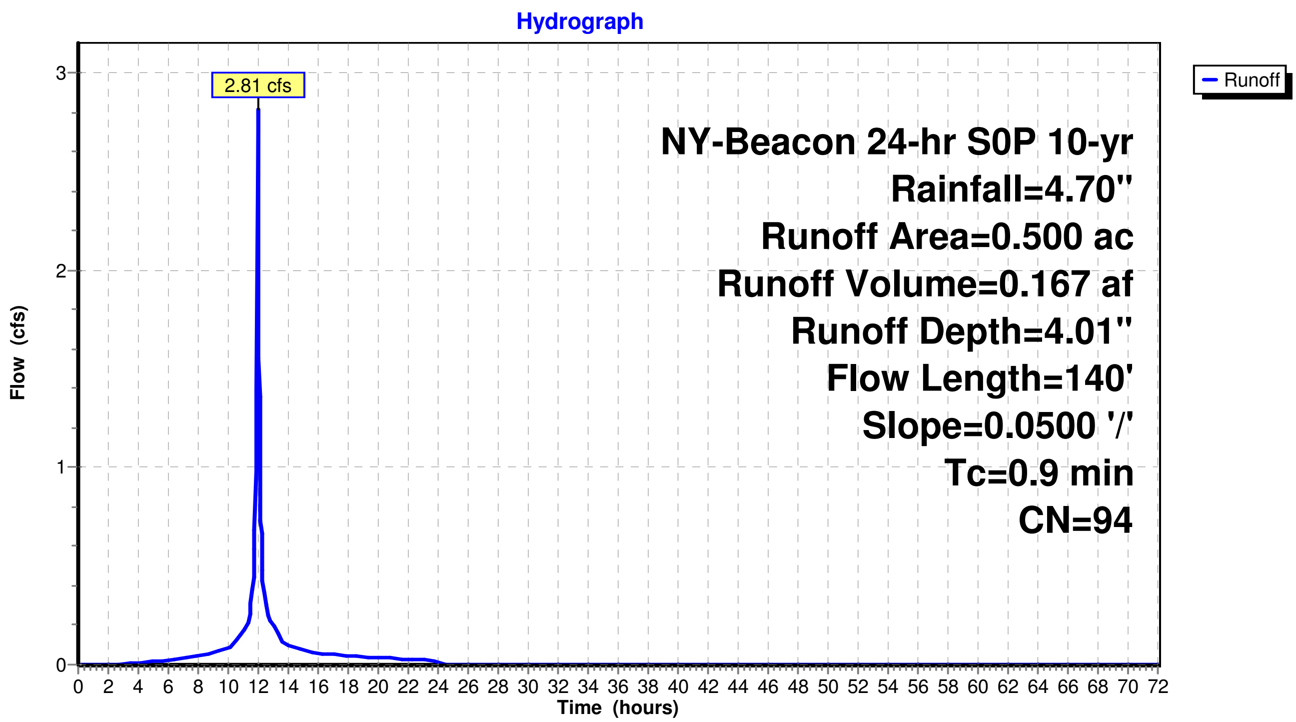
Runoff = 2.81 cfs @ 11.97 hrs, Volume= 0.167 af, Depth= 4.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 10-yr Rainfall=4.70"

Area (ac)	CN	Description
0.380	98	Paved parking, HSG D
0.120	80	>75% Grass cover, Good, HSG D
0.500	94	Weighted Average
0.120		24.00% Pervious Area
0.380		76.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0500	1.97		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.16"
0.1	40	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	140	Total			

Subcatchment 1.2S:



Summary for Subcatchment 1.3S:

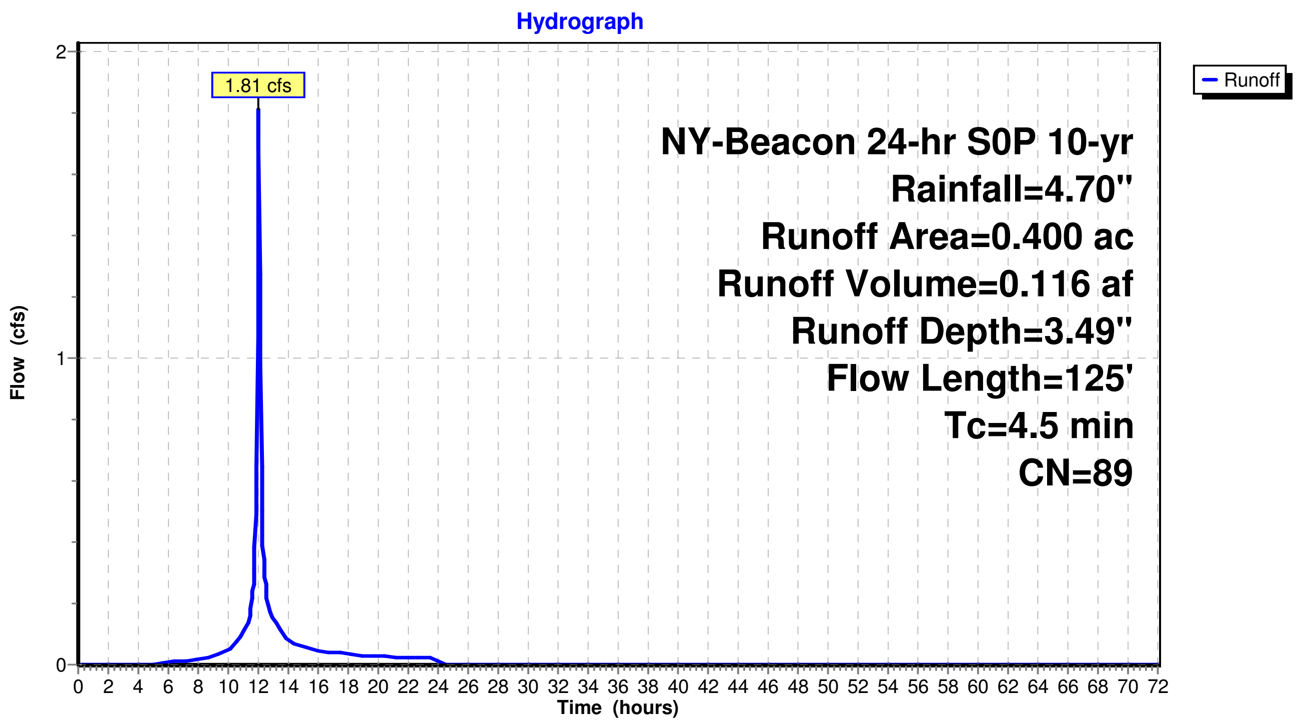
Runoff = 1.81 cfs @ 12.02 hrs, Volume= 0.116 af, Depth= 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 10-yr Rainfall=4.70"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG D
0.200	80	>75% Grass cover, Good, HSG D
0.400	89	Weighted Average
0.200		50.00% Pervious Area
0.200		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	85	0.1100	0.32		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.16"
0.1	40	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.5	125	Total			

Subcatchment 1.3S:

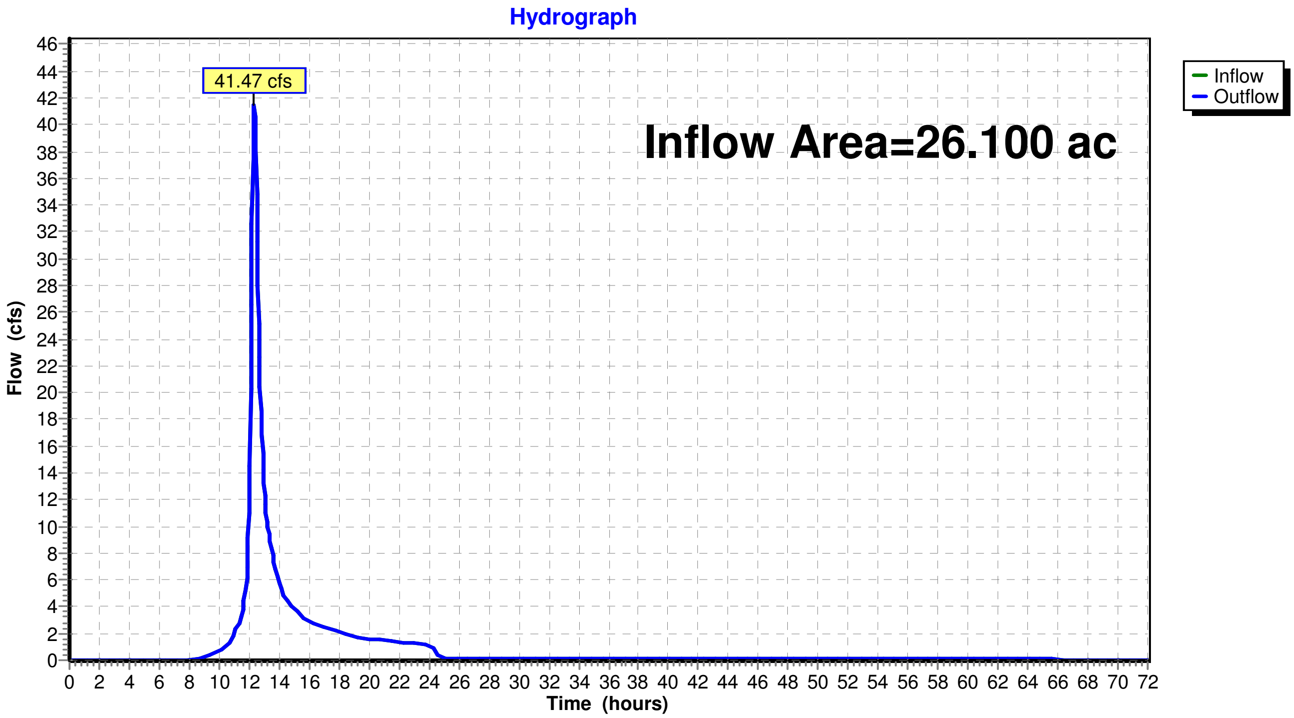


Summary for Reach Design Line:

Inflow Area =	26.100 ac,	10.65% Impervious,	Inflow Depth > 2.56"	for 10-yr event
Inflow =	41.47 cfs @	12.35 hrs,	Volume=	5.572 af
Outflow =	41.47 cfs @	12.35 hrs,	Volume=	5.572 af, Atten= 0%, Lag= 0.0 min

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

Reach Design Line:



Summary for Pond 1.1 P:

Inflow Area =	3.500 ac, 62.86% Impervious,	Inflow Depth = 3.76" for 10-yr event	
Inflow =	17.25 cfs @ 11.98 hrs,	Volume=	1.097 af
Outflow =	3.27 cfs @ 12.31 hrs,	Volume=	0.973 af, Atten= 81%, Lag= 20.2 min
Primary =	3.27 cfs @ 12.31 hrs,	Volume=	0.973 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 180.00' Surf.Area= 7,640 sf Storage= 10,715 cf
Peak Elev= 182.68' @ 12.31 hrs Surf.Area= 14,469 sf Storage= 34,555 cf (23,840 cf above start)
Flood Elev= 183.50' Surf.Area= 16,210 sf Storage= 45,265 cf (34,550 cf above start)

Plug-Flow detention time= 1,098.6 min calculated for 0.727 af (66% of inflow)
Center-of-Mass det. time= 708.9 min (1,517.8 - 809.0)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	2,050 cf	**Forebay (Prismatic)** Listed below (Recalc)
#2	175.00'	50,435 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		52,485 cf	Total Available Storage

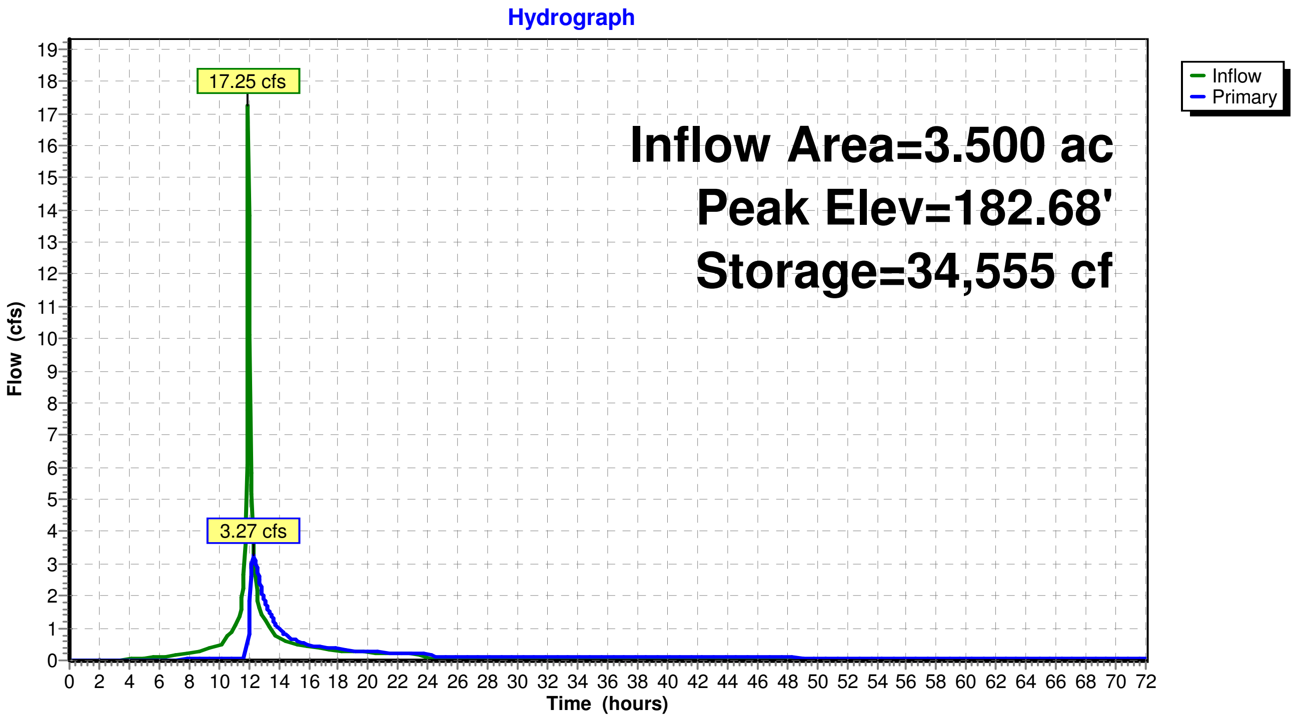
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	5	0	0
177.00	110	115	115
179.00	450	560	675
180.00	2,300	1,375	2,050

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	500	0	0
177.00	1,180	1,680	1,680
179.00	2,090	3,270	4,950
180.00	5,340	3,715	8,665
182.00	10,730	16,070	24,735
184.00	14,970	25,700	50,435

Device	Routing	Invert	Outlet Devices
#1	Primary	179.00'	**24.0" Round Culvert** L= 34.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.00' / 178.50' S= 0.0147 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	180.00'	**1.6" Vert. Orifice/Grate** C= 0.600
#3	Device 1	182.20'	**3.2' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.26 cfs @ 12.31 hrs HW=182.68' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 3.26 cfs of 24.75 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.11 cfs @ 7.78 fps)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 3.15 cfs @ 2.06 fps)

Pond 1.1 P:


Hydrograph
17.25 cfs
3.27 cfs
Inflow Area=3.500 ac
Peak Elev=182.68'
Storage=34,555 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Pond 1.2 FS:

Inflow Area = 0.500 ac, 76.00% Impervious, Inflow Depth = 4.01" for 10-yr event
Inflow = 2.81 cfs @ 11.97 hrs, Volume= 0.167 af
Outflow = 2.81 cfs @ 11.97 hrs, Volume= 0.167 af, Atten= 0%, Lag= 0.0 min
Primary = 1.85 cfs @ 11.97 hrs, Volume= 0.161 af
Secondary = 0.97 cfs @ 11.97 hrs, Volume= 0.007 af

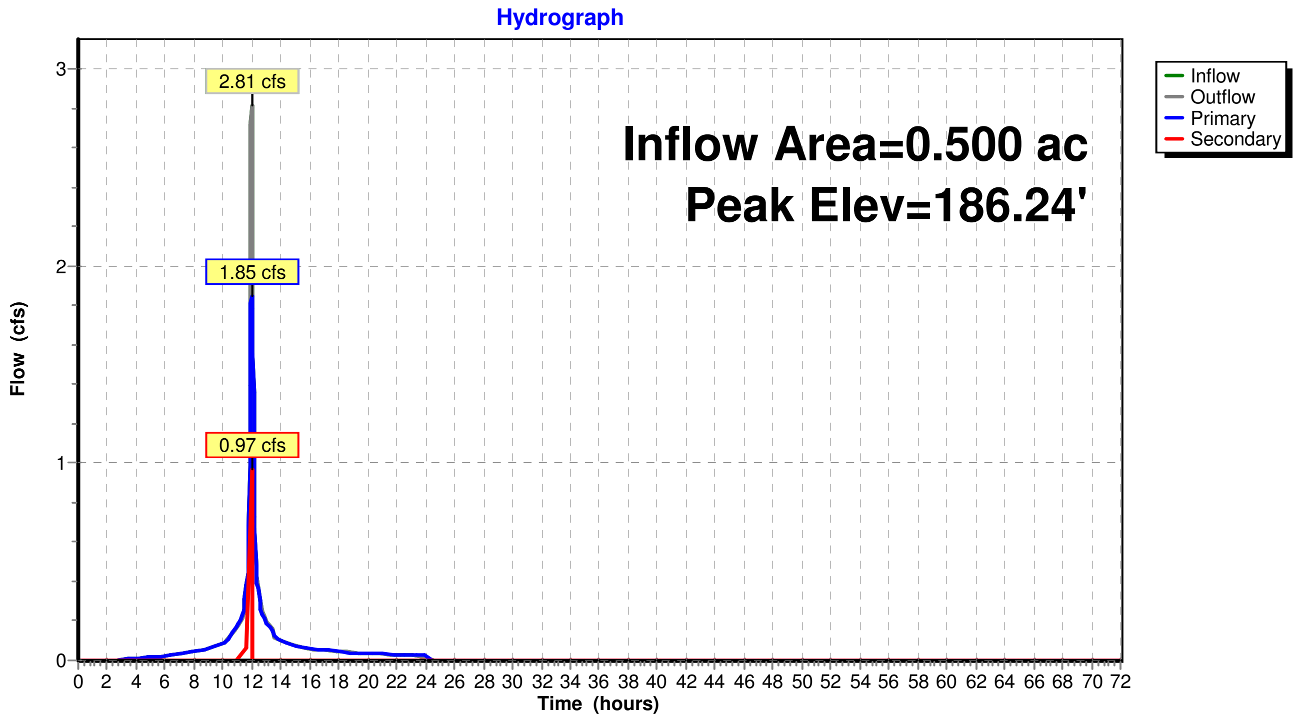
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 186.24' @ 11.97 hrs
Flood Elev= 187.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	184.70'	**8.0" Round Culvert** L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.70' / 184.50' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Secondary	184.70'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.70' / 184.00' S= 0.0233 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	186.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.80 cfs @ 11.97 hrs HW=186.17' TW=184.34' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.80 cfs @ 5.14 fps)

Secondary OutFlow Max=0.84 cfs @ 11.97 hrs HW=186.18' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Passes 0.84 cfs of 3.74 cfs potential flow)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 0.84 cfs @ 1.18 fps)

Pond 1.2 FS:


Hydrograph
2.81 cfs
1.85 cfs
0.97 cfs
Inflow Area=0.500 ac
Peak Elev=186.24'
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0
1
2
3
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Pond 1.2 P:

Inflow Area = 0.500 ac, 76.00% Impervious, Inflow Depth = 3.85" for 10-yr event
Inflow = 1.85 cfs @ 11.97 hrs, Volume= 0.161 af
Outflow = 1.09 cfs @ 12.12 hrs, Volume= 0.161 af, Atten= 41%, Lag= 9.1 min
Discarded = 0.03 cfs @ 7.95 hrs, Volume= 0.096 af
Primary = 1.06 cfs @ 12.12 hrs, Volume= 0.064 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 185.07' @ 12.12 hrs Surf.Area= 0.030 ac Storage= 0.060 af

Plug-Flow detention time= 403.2 min calculated for 0.160 af (100% of inflow)
Center-of-Mass det. time= 403.7 min (1,178.8 - 775.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	182.00'	0.028 af	**34.75'W x 38.04'L x 3.50'H Field A** 0.106 af Overall - 0.037 af Embedded = 0.069 af x 40.0% Voids
#2A	182.50'	0.037 af	**ADS_StormTech SC-740** x 35 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 7 rows
		0.065 af	Total Available Storage

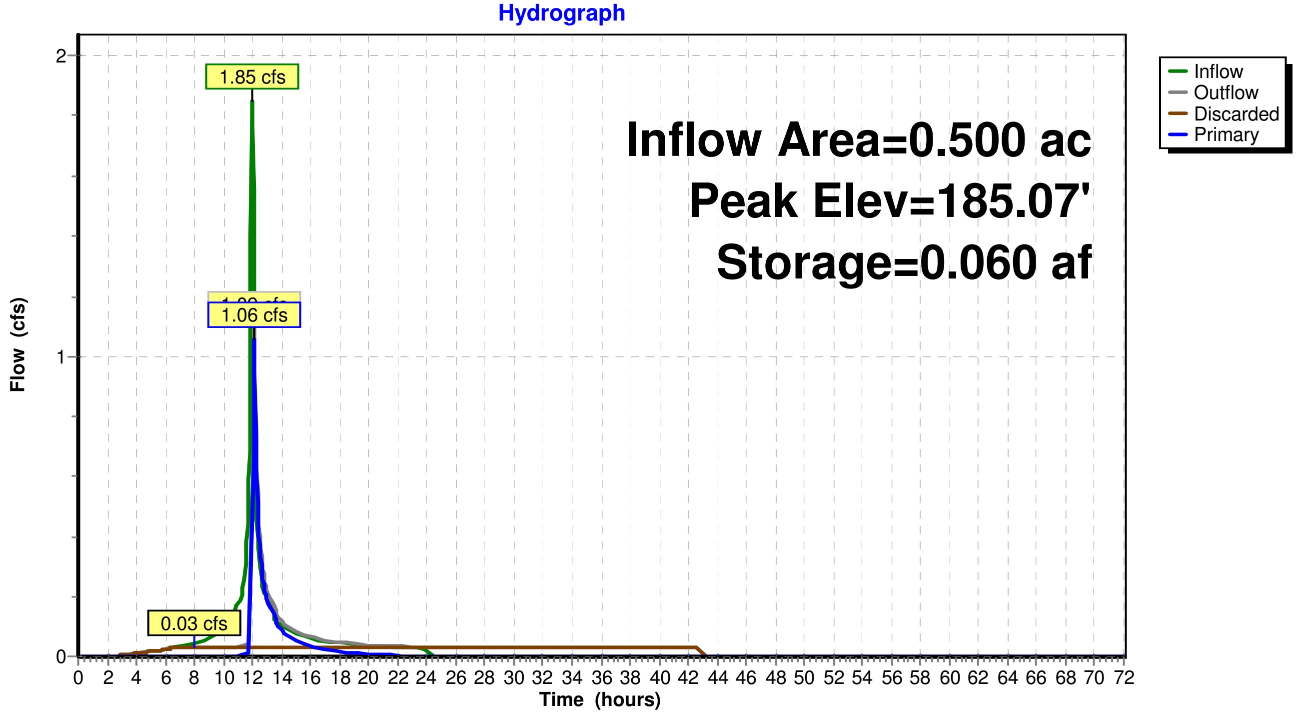
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	182.00'	**1.000 in/hr Exfiltration over Horizontal area**
#2	Primary	184.30'	**8.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.30' / 184.10' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.03 cfs @ 7.95 hrs HW=182.04' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.02 cfs @ 12.12 hrs HW=185.04' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Barrel Controls 1.02 cfs @ 3.26 fps)

Pond 1.2 P:


Hydrograph
1.85 cfs
1.06 cfs
0.03 cfs
Inflow Area=0.500 ac
Peak Elev=185.07'
Storage=0.060 af
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0
1
2
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Pond 1.3 P:

Inflow Area = 0.400 ac, 50.00% Impervious, Inflow Depth = 3.49" for 10-yr event
Inflow = 1.81 cfs @ 12.02 hrs, Volume= 0.116 af
Outflow = 1.50 cfs @ 12.08 hrs, Volume= 0.116 af, Atten= 17%, Lag= 3.3 min
Primary = 1.50 cfs @ 12.08 hrs, Volume= 0.116 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 192.76' @ 12.08 hrs Surf.Area= 1,718 sf Storage= 1,133 cf

Plug-Flow detention time= 221.9 min calculated for 0.116 af (100% of inflow)
Center-of-Mass det. time= 222.7 min (1,022.5 - 799.8)

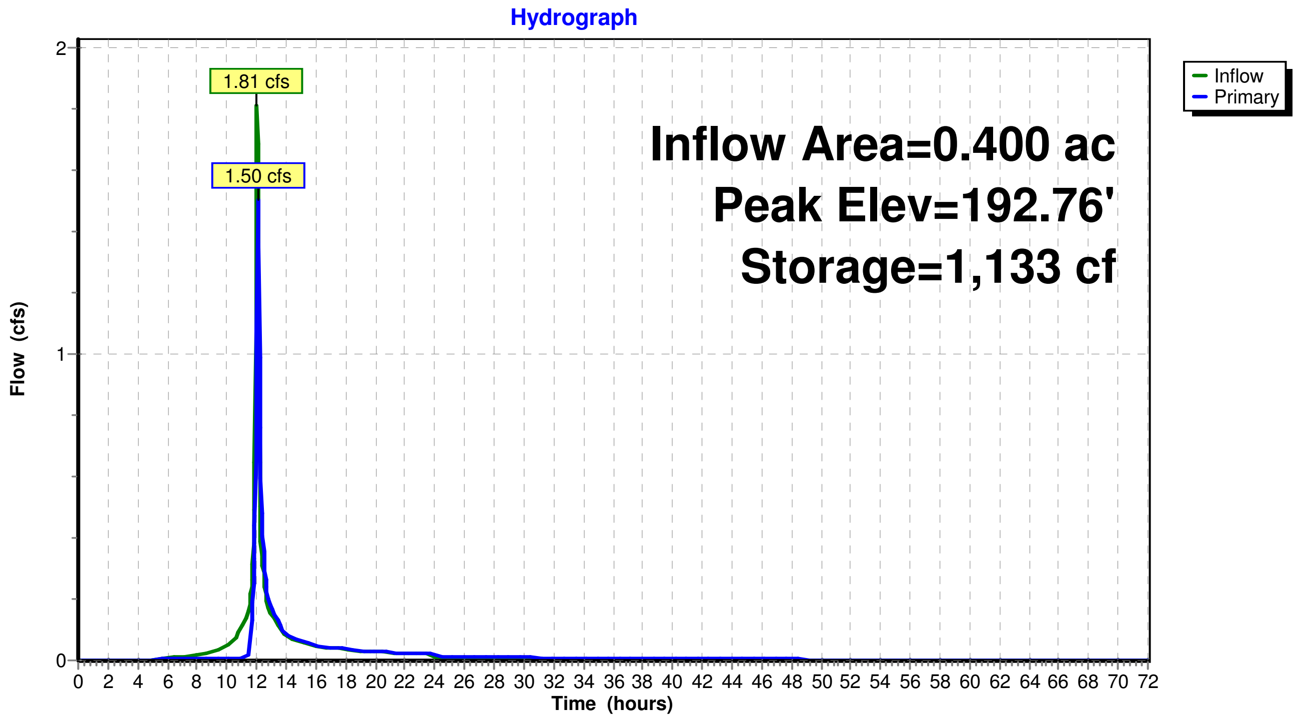
Volume	Invert	Avail.Storage	Storage Description
#1	192.00'	3,720 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.00	1,270	0	0
194.00	2,450	3,720	3,720

Device	Routing	Invert	Outlet Devices
#1	Primary	188.20'	**12.0" Round Culvert** L= 102.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 188.20' / 187.10' S= 0.0108 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	192.00'	**0.250 in/hr Exfiltration over Horizontal area**
#3	Device 1	192.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.47 cfs @ 12.08 hrs HW=192.76' TW=182.46' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.47 cfs of 6.27 cfs potential flow)
  ├─**2=Exfiltration** (Exfiltration Controls 0.01 cfs)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 1.46 cfs @ 1.43 fps)

Pond 1.3 P:


Hydrograph
1.81 cfs
1.50 cfs
Inflow Area=0.400 ac
Peak Elev=192.76'
Storage=1,133 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Subcatchment 1.0S:

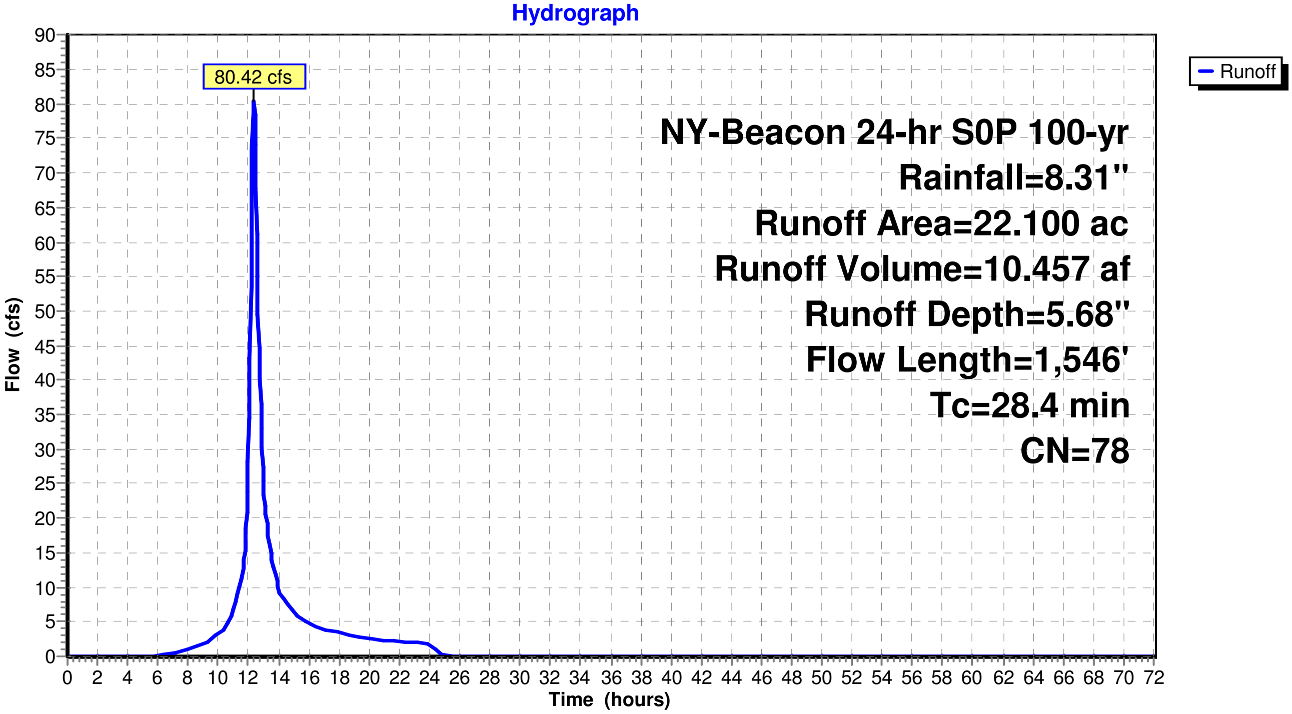
Runoff = 80.42 cfs @ 12.35 hrs, Volume= 10.457 af, Depth= 5.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 100-yr Rainfall=8.31"

Area (ac)	CN	Description
8.700	78	Meadow, non-grazed, HSG D
13.200	77	Woods, Good, HSG D
0.200	98	Paved parking, HSG D
22.100	78	Weighted Average
21.900		99.10% Pervious Area
0.200		0.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0600	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
4.7	345	0.0600	1.22		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.4	170	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.1	280	0.0900	1.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.5	225		7.50		**Direct Entry, Channel Flow**
0.0	36				**Direct Entry, Pipe Flow**
0.5	360		12.00		**Direct Entry, Channel Flow**
4.3	30	0.1000	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.16"
28.4	1,546	Total			

Subcatchment 1.0S:



Summary for Subcatchment 1.1S:

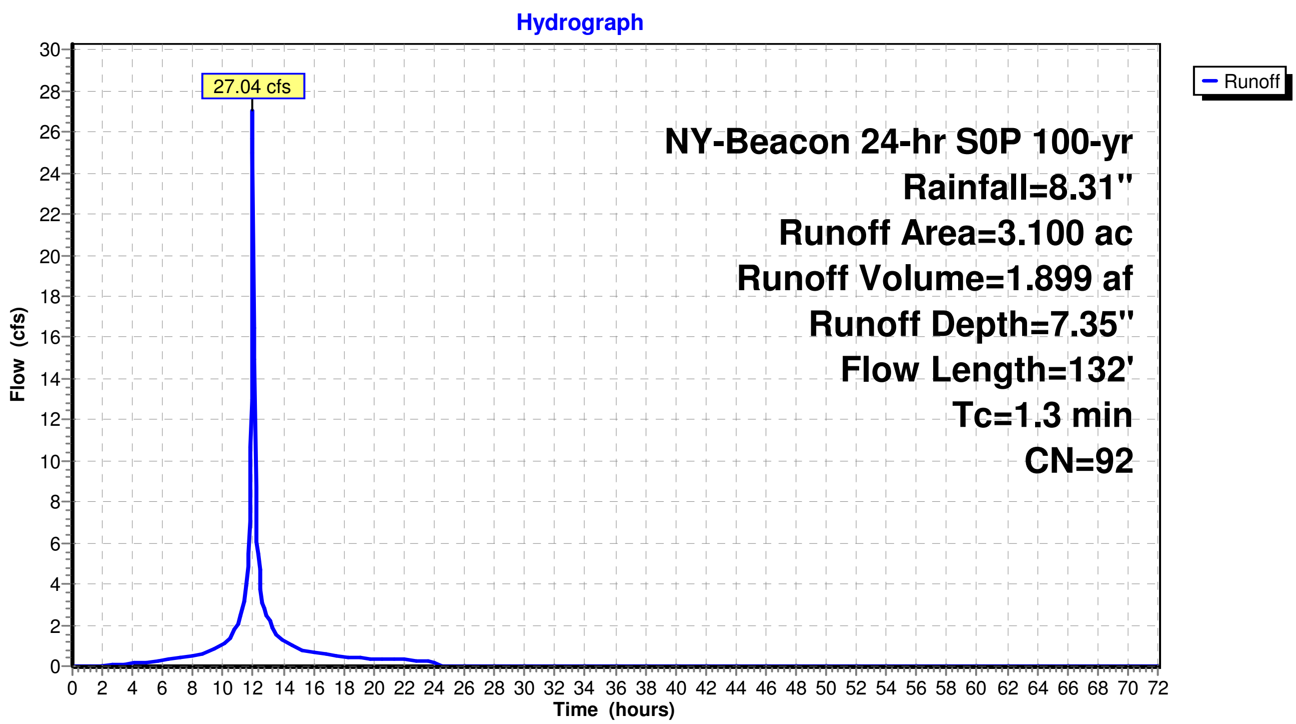
Runoff = 27.04 cfs @ 11.97 hrs, Volume= 1.899 af, Depth= 7.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 100-yr Rainfall=8.31"

Area (ac)	CN	Description
2.000	98	Paved parking, HSG D
1.100	80	>75% Grass cover, Good, HSG D
3.100	92	Weighted Average
1.100		35.48% Pervious Area
2.000		64.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	6	0.0200	0.78		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.16"
0.7	6	0.0500	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.16"
0.5	120	0.0600	3.67		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
1.3	132	Total			

Subcatchment 1.1S:



Summary for Subcatchment 1.2S:

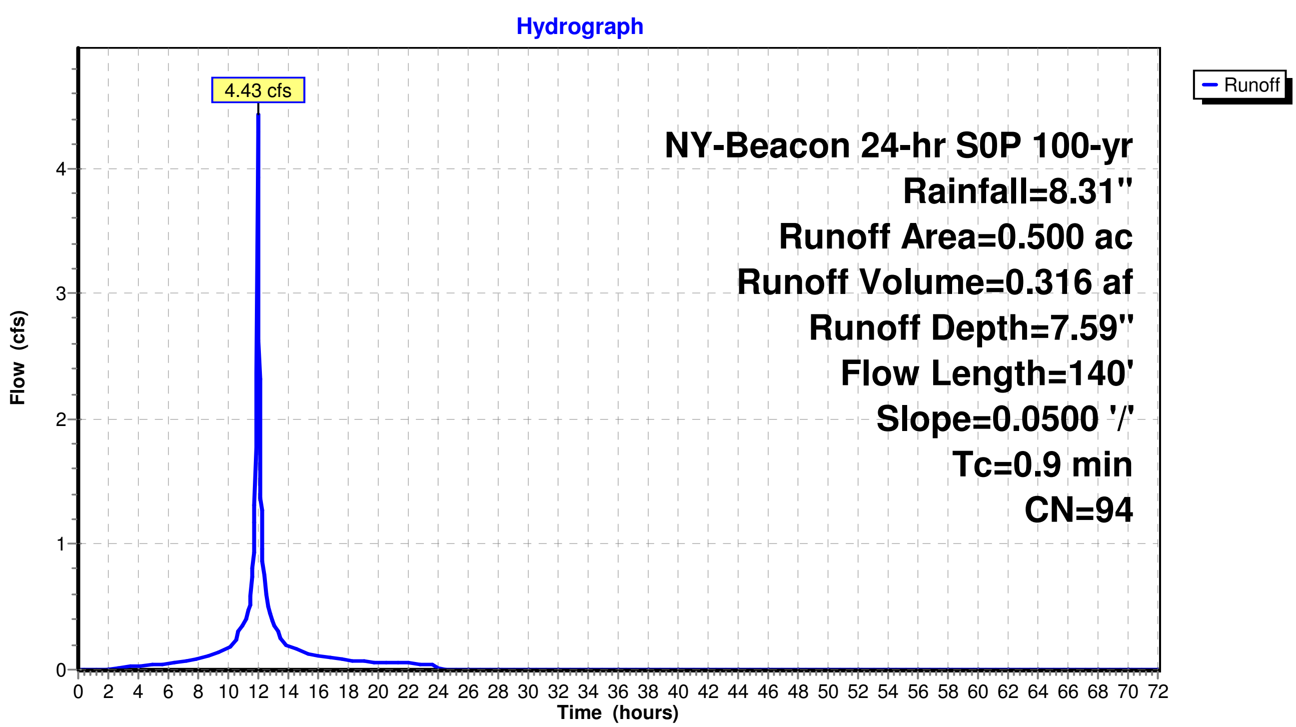
Runoff = 4.43 cfs @ 11.97 hrs, Volume= 0.316 af, Depth= 7.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 100-yr Rainfall=8.31"

Area (ac)	CN	Description
0.380	98	Paved parking, HSG D
0.120	80	>75% Grass cover, Good, HSG D
0.500	94	Weighted Average
0.120		24.00% Pervious Area
0.380		76.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0500	1.97		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.16"
0.1	40	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	140	Total			

Subcatchment 1.2S:



Summary for Subcatchment 1.3S:

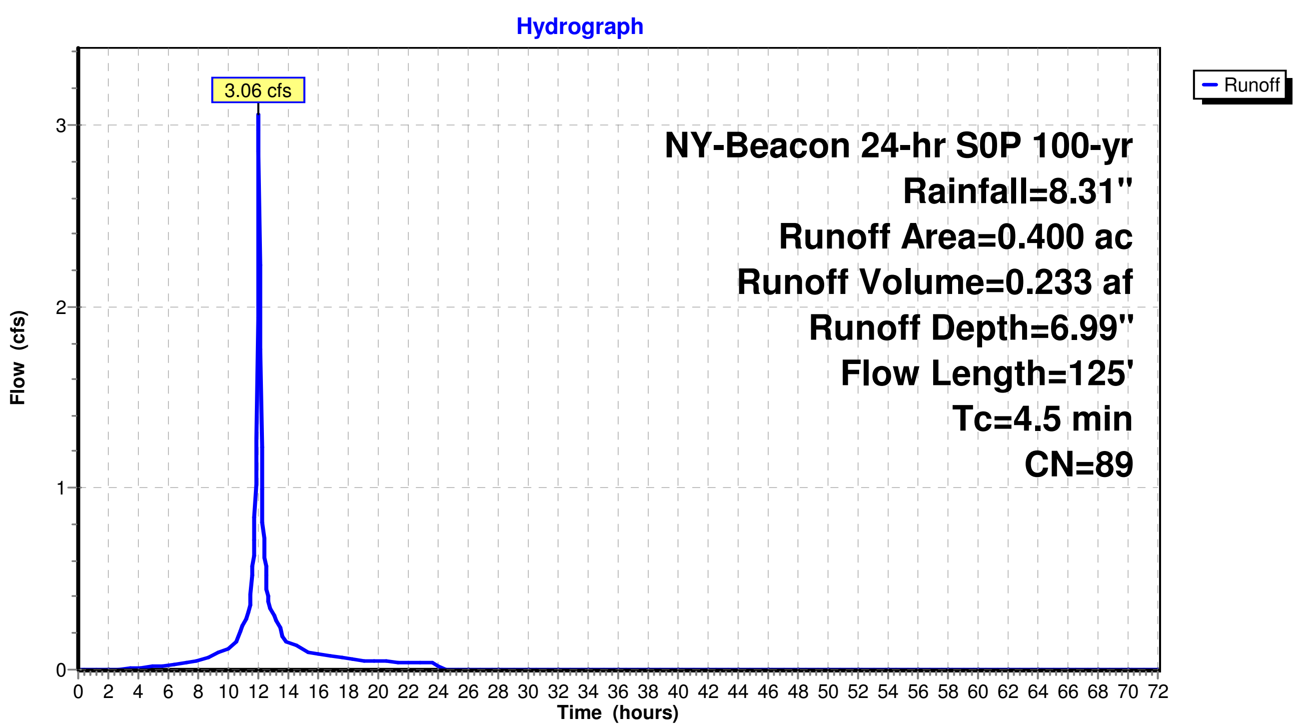
Runoff = 3.06 cfs @ 12.02 hrs, Volume= 0.233 af, Depth= 6.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-Beacon 24-hr S0P 100-yr Rainfall=8.31"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG D
0.200	80	>75% Grass cover, Good, HSG D
0.400	89	Weighted Average
0.200		50.00% Pervious Area
0.200		50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	85	0.1100	0.32		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.16"
0.1	40	0.0500	4.54		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
4.5	125	Total			

Subcatchment 1.3S:

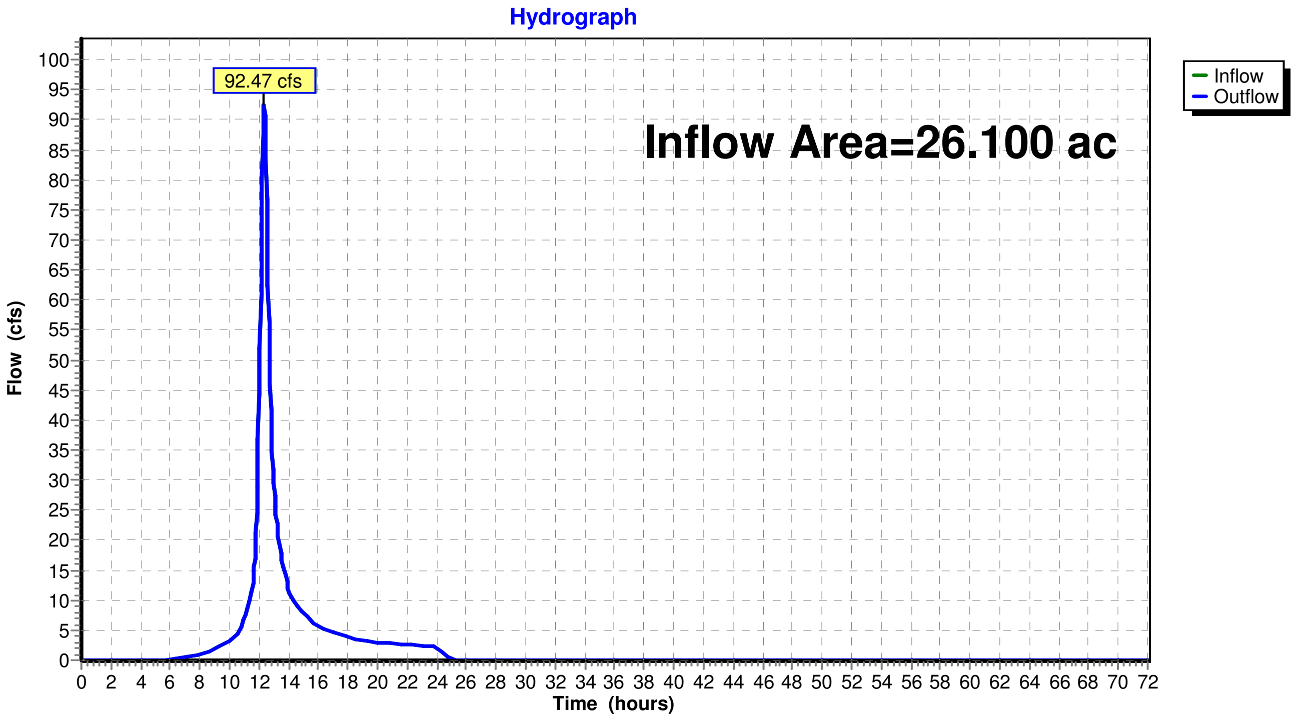


Summary for Reach Design Line:

Inflow Area = 26.100 ac, 10.65% Impervious, Inflow Depth > 5.83" for 100-yr event
Inflow = 92.47 cfs @ 12.33 hrs, Volume= 12.676 af
Outflow = 92.47 cfs @ 12.33 hrs, Volume= 12.676 af, Atten= 0%, Lag= 0.0 min

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

Reach Design Line:



Summary for Pond 1.1 P:

Inflow Area = 3.500 ac, 62.86% Impervious, Inflow Depth = 7.31" for 100-yr event
Inflow = 28.09 cfs @ 11.98 hrs, Volume= 2.132 af
Outflow = 15.45 cfs @ 12.11 hrs, Volume= 2.005 af, Atten= 45%, Lag= 8.2 min
Primary = 15.45 cfs @ 12.11 hrs, Volume= 2.005 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Starting Elev= 180.00' Surf.Area= 7,640 sf Storage= 10,715 cf
Peak Elev= 183.48' @ 12.11 hrs Surf.Area= 16,160 sf Storage= 44,938 cf (34,223 cf above start)
Flood Elev= 183.50' Surf.Area= 16,210 sf Storage= 45,265 cf (34,550 cf above start)

Plug-Flow detention time= 522.0 min calculated for 1.758 af (82% of inflow)
Center-of-Mass det. time= 375.0 min (1,154.7 - 779.7)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	2,050 cf	**Forebay (Prismatic)** Listed below (Recalc)
#2	175.00'	50,435 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)
		52,485 cf	Total Available Storage

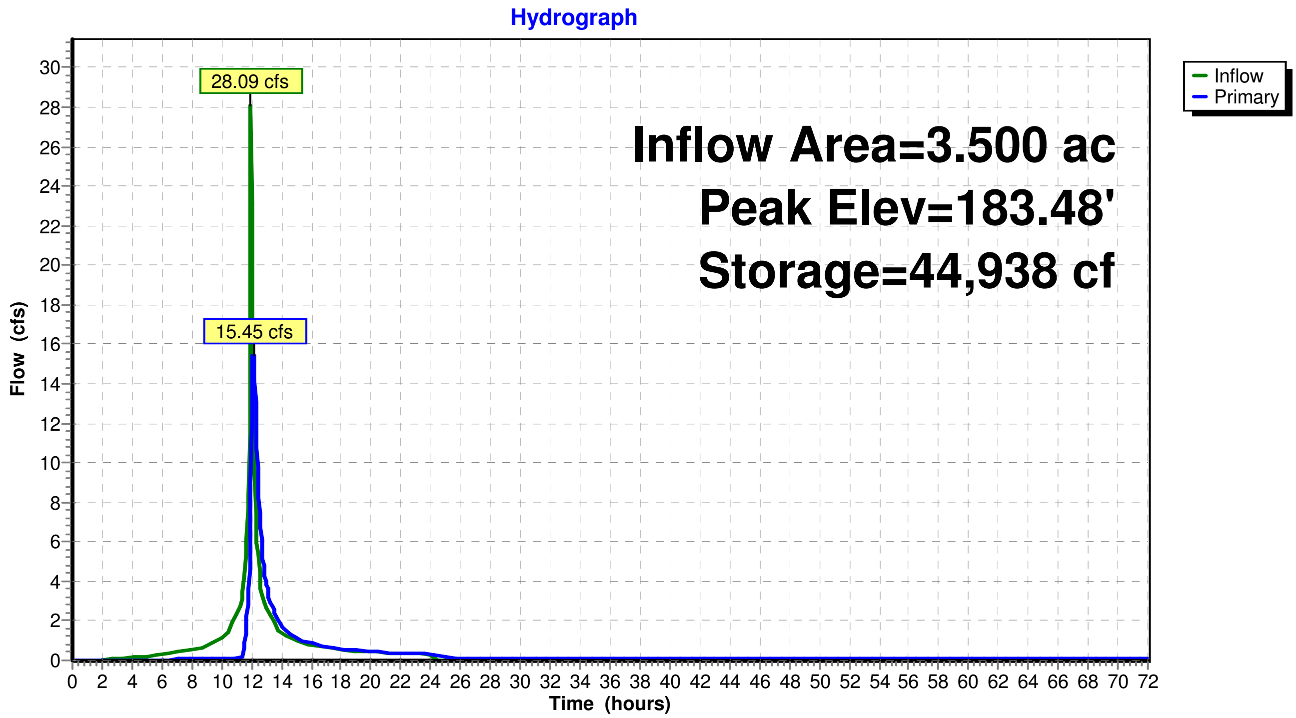
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	5	0	0
177.00	110	115	115
179.00	450	560	675
180.00	2,300	1,375	2,050

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	500	0	0
177.00	1,180	1,680	1,680
179.00	2,090	3,270	4,950
180.00	5,340	3,715	8,665
182.00	10,730	16,070	24,735
184.00	14,970	25,700	50,435

Device	Routing	Invert	Outlet Devices
#1	Primary	179.00'	**24.0" Round Culvert** L= 34.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.00' / 178.50' S= 0.0147 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	180.00'	**1.6" Vert. Orifice/Grate** C= 0.600
#3	Device 1	182.20'	**3.2' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=15.35 cfs @ 12.11 hrs HW=183.47' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Passes 15.35 cfs of 28.18 cfs potential flow)
  ↑—**2=Orifice/Grate** (Orifice Controls 0.12 cfs @ 8.88 fps)
  └—**3=Broad-Crested Rectangular Weir** (Weir Controls 15.23 cfs @ 3.74 fps)

Pond 1.1 P:


Hydrograph
28.09 cfs
15.45 cfs
Inflow Area=3.500 ac
Peak Elev=183.48'
Storage=44,938 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64
66
68
70
72

Summary for Pond 1.2 FS:

Inflow Area = 0.500 ac, 76.00% Impervious, Inflow Depth = 7.59" for 100-yr event
Inflow = 4.43 cfs @ 11.97 hrs, Volume= 0.316 af
Outflow = 4.43 cfs @ 11.97 hrs, Volume= 0.316 af, Atten= 0%, Lag= 0.0 min
Primary = 1.72 cfs @ 11.94 hrs, Volume= 0.284 af
Secondary = 2.73 cfs @ 11.97 hrs, Volume= 0.033 af

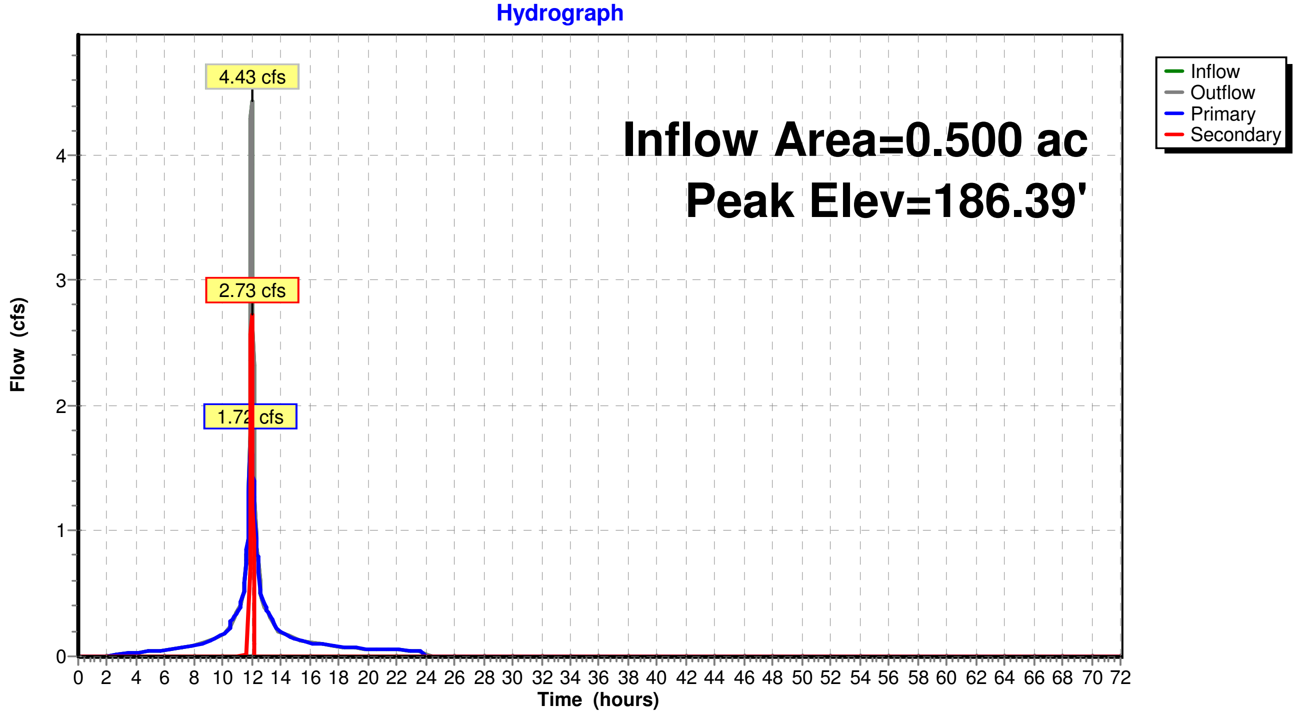
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 186.39' @ 11.97 hrs
Flood Elev= 187.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	184.70'	**8.0" Round Culvert** L= 12.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.70' / 184.50' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf
#2	Secondary	184.70'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.70' / 184.00' S= 0.0233 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#3	Device 2	186.00'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.62 cfs @ 11.94 hrs HW=186.33' TW=185.41' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.62 cfs @ 4.64 fps)

Secondary OutFlow Max=2.48 cfs @ 11.97 hrs HW=186.36' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Passes 2.48 cfs of 4.07 cfs potential flow)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 2.48 cfs @ 1.73 fps)

Pond 1.2 FS:


Hydrograph
4.43 cfs
2.73 cfs
1.72 cfs
Inflow Area=0.500 ac
Peak Elev=186.39'
Inflow
Outflow
Primary
Secondary
Flow (cfs)
Time (hours)
0
1
2
3
4
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72

Summary for Pond 1.2 P:

Inflow Area = 0.500 ac, 76.00% Impervious, Inflow Depth = 6.81" for 100-yr event
Inflow = 1.72 cfs @ 11.94 hrs, Volume= 0.284 af
Outflow = 1.52 cfs @ 12.03 hrs, Volume= 0.284 af, Atten= 12%, Lag= 5.4 min
Discarded = 0.03 cfs @ 5.00 hrs, Volume= 0.103 af
Primary = 1.49 cfs @ 12.03 hrs, Volume= 0.181 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 185.49' @ 12.03 hrs Surf.Area= 0.030 ac Storage= 0.065 af

Plug-Flow detention time= 255.7 min calculated for 0.283 af (100% of inflow)
Center-of-Mass det. time= 256.4 min (1,016.8 - 760.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	182.00'	0.028 af	**34.75'W x 38.04'L x 3.50'H Field A** 0.106 af Overall - 0.037 af Embedded = 0.069 af x 40.0% Voids
#2A	182.50'	0.037 af	**ADS_StormTech SC-740** x 35 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap Row Length Adjustment= +0.44' x 6.45 sf x 7 rows
		0.065 af	Total Available Storage

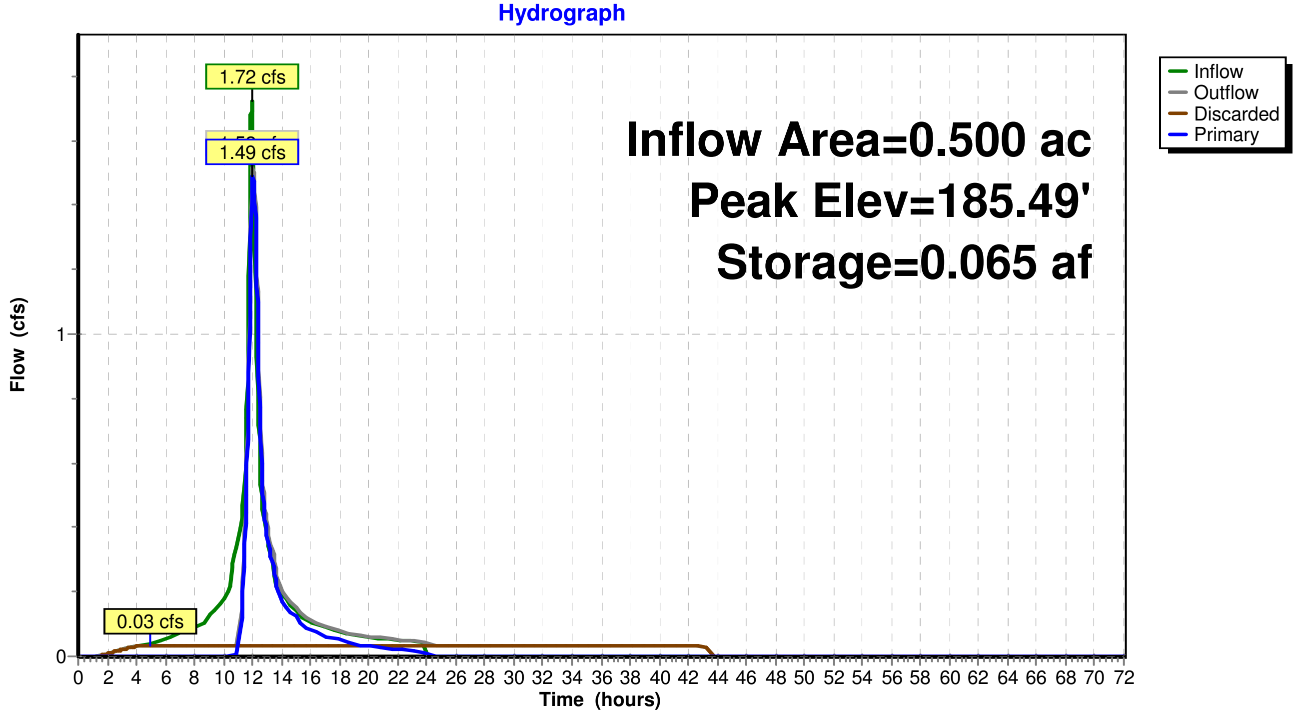
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	182.00'	**1.000 in/hr Exfiltration over Horizontal area**
#2	Primary	184.30'	**8.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 184.30' / 184.10' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Discarded OutFlow Max=0.03 cfs @ 5.00 hrs HW=182.04' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.48 cfs @ 12.03 hrs HW=185.49' TW=0.00' (Dynamic Tailwater)
└─**2=Culvert** (Barrel Controls 1.48 cfs @ 4.25 fps)

Pond 1.2 P:


Hydrograph
1.72 cfs
1.49 cfs
0.03 cfs
Inflow Area=0.500 ac
Peak Elev=185.49'
Storage=0.065 af
Inflow
Outflow
Discarded
Primary
Flow (cfs)
1
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

Summary for Pond 1.3 P:

Inflow Area = 0.400 ac, 50.00% Impervious, Inflow Depth = 6.99" for 100-yr event
Inflow = 3.06 cfs @ 12.02 hrs, Volume= 0.233 af
Outflow = 2.71 cfs @ 12.07 hrs, Volume= 0.233 af, Atten= 11%, Lag= 2.9 min
Primary = 2.71 cfs @ 12.07 hrs, Volume= 0.233 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 192.88' @ 12.07 hrs Surf.Area= 1,788 sf Storage= 1,342 cf

Plug-Flow detention time= 123.9 min calculated for 0.233 af (100% of inflow)
Center-of-Mass det. time= 124.8 min (902.9 - 778.1)

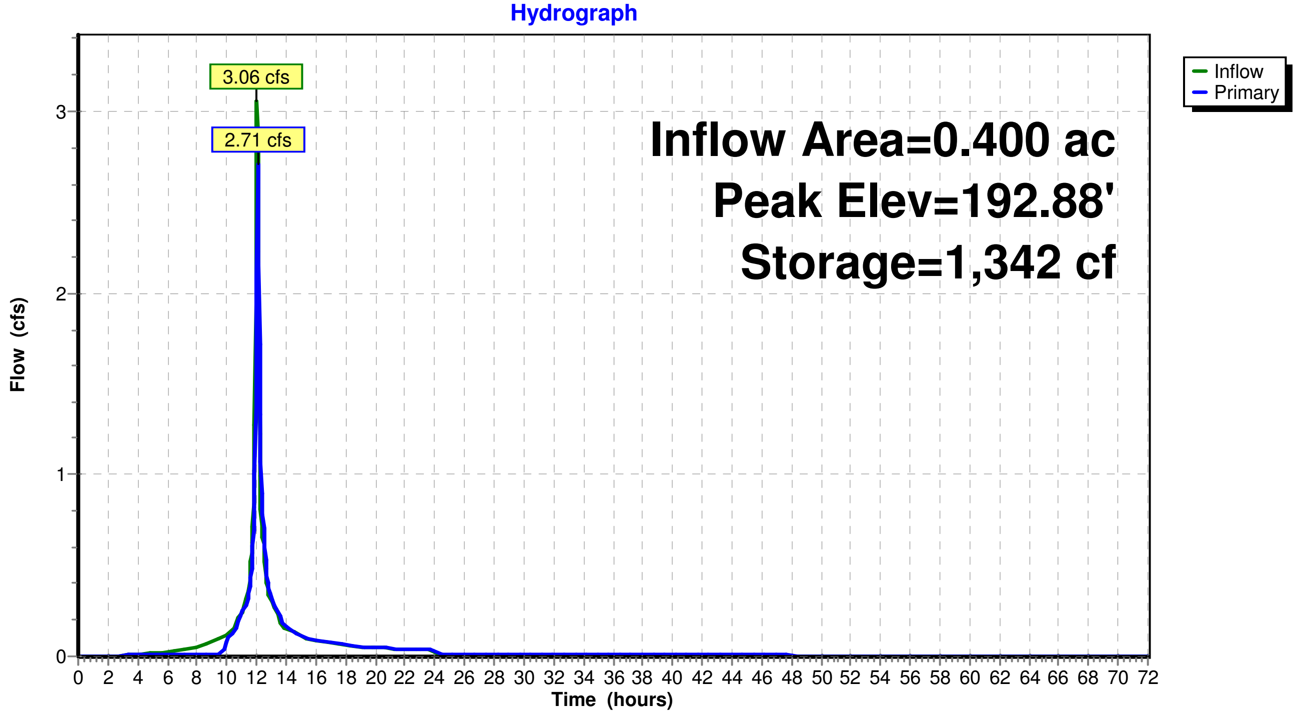
Volume	Invert	Avail.Storage	Storage Description
#1	192.00'	3,720 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
192.00	1,270	0	0
194.00	2,450	3,720	3,720

Device	Routing	Invert	Outlet Devices
#1	Primary	188.20'	**12.0" Round Culvert** L= 102.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 188.20' / 187.10' S= 0.0108 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	192.00'	**0.250 in/hr Exfiltration over Horizontal area**
#3	Device 1	192.50'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=2.63 cfs @ 12.07 hrs HW=192.87' TW=183.45' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.63 cfs of 6.35 cfs potential flow)
  ├─**2=Exfiltration** (Exfiltration Controls 0.01 cfs)
  └─**3=Broad-Crested Rectangular Weir** (Weir Controls 2.62 cfs @ 1.77 fps)

Pond 1.3 P:


Hydrograph
3.06 cfs
2.71 cfs
Inflow Area=0.400 ac
Peak Elev=192.88'
Storage=1,342 cf
Inflow
Primary
Flow (cfs)
0
1
2
3
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72
Time (hours)

APPENDIX D

Project and Owner information

Site Data:

Beacon Views
City of Beacon
Dutchess County, New York

Owner Information:

Highlands @ Beacon, LLC
2847 Church Street
Pine Plains, New York 12567

Applicant Information:

Beacon Views, LLC
500 River Avenue
Wakefield, New Jersey 08701

Party Responsible for Implementation of the Stormwater Pollution Prevention Plan (Including Maintenance During and After Construction):

Beacon Views, LLC
500 River Avenue
Wakefield, New Jersey 08701

Qualified Professional Responsible for Inspection of the Stormwater Pollution Prevention Plan:

Inspector to be determined at time of construction

APPENDIX E

NYSDEC SPDES for Construction Activities Construction Site Log Book

APPENDIX F
CONSTRUCTION SITE INSPECTION AND MAINTENANCE LOG BOOK

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM FOR CONSTRUCTION ACTIVITIES

SAMPLE CONSTRUCTION SITE LOG BOOK

Table of Contents

I. PRE-CONSTRUCTION MEETING DOCUMENTS

Project Name ____

Permit No. ______________________ **Date of Authorization** __________

Name of Operator ____

Prime Contractor ____

a. Preamble to Site Assessment and Inspections

The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified inspector[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements. A preconstruction meeting should be held to review all of the SWPPP requirements with construction personnel.

When construction starts, site inspections shall be conducted by the qualified inspector at least every 7 calendar days. The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified inspector perform a final site inspection. The qualified inspector shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

1 Refer to "Qualified Inspector" inspection requirements in the current SPDES General Permit for Stormwater Discharges from Construction Activity for complete list of inspection requirements.
2 "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.
3 "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

b. Pre-construction Site Assessment Checklist
(NOTE: Provide comments below as necessary)

1. Notice of Intent, SWPPP, and Contractors Certification:

Yes No NA

[ ] [ ] [ ] Has a Notice of Intent been filed with the NYS Department of Conservation?
[ ] [ ] [ ] Is the SWPPP on-site? Where?_______________________________
[ ] [ ] [ ] Is the Plan current? What is the latest revision date?______________
[ ] [ ] [ ] Is a copy of the NOI (with brief description) onsite? Where?______________
[ ] [ ] [ ] Have all contractors involved with stormwater related activities signed a contractor's certification?

2. Resource Protection

Yes No NA

[ ] [ ] [ ] Are construction limits clearly flagged or fenced?
[ ] [ ] [ ] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.
[ ] [ ] [ ] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

Yes No NA

[ ] [ ] [ ] Clean stormwater runoff has been diverted from areas to be disturbed.
[ ] [ ] [ ] Bodies of water located either on site or in the vicinity of the site have been identified and protected.
[ ] [ ] [ ] Appropriate practices to protect on-site or downstream surface water are installed.
[ ] [ ] [ ] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Access

Yes No NA

[ ] [ ] [ ] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.
[ ] [ ] [ ] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.
[ ] [ ] [ ] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Sediment Controls

Yes No NA

[ ] [ ] [ ] Silt fence material and installation comply with the standard drawing and specifications.
[ ] [ ] [ ] Silt fences are installed at appropriate spacing intervals
[ ] [ ] [ ] Sediment/detention basin was installed as first land disturbing activity.
[ ] [ ] [ ] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA

[ ] [ ] [ ] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.
[ ] [ ] [ ] The plan is contained in the SWPPP on page ______
[ ] [ ] [ ] Appropriate materials to control spills are onsite. Where? ___________________

II. CONSTRUCTION DURATION INSPECTIONS

a. Directions:

Inspection Forms will be filled out during the entire construction phase of the project.

Required Elements:

1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

4) Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and

6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

SITE PLAN/SKETCH

______________________________________ ______________________________________

Inspector (print name) **Date of Inspection**

______________________________________ ______________________________________

Qualified Inspector (print name) **Qualified Inspector Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

Maintaining Water Quality

Yes No NA
[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions at the outfalls?
[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease at the outfalls?
[ ] [ ] [ ] All disturbance is within the limits of the approved plans.
[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site Conditions

Yes No NA
[ ] [ ] [ ] Is construction site litter, debris and spoils appropriately managed?
[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?
[ ] [ ] [ ] Is construction impacting the adjacent property?
[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing

Yes No NA
[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.
[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.
[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?
[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

3. Stabilized Construction Access

Yes No NA
[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

Runoff Control Practices

1. Excavation Dewatering

Yes No NA
[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.
[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.
[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.
[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

Runoff Control Practices (continued)

2. Flow Spreader

Yes No NA

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.
[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales

Yes No NA

[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.
[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.
[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

4. Stone Check Dam

Yes No NA

[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection

Yes No NA

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles

Yes No NA

[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation

Yes No NA

[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control Practices

1. Silt Fence and Linear Barriers

Yes No NA

[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
Sediment accumulation is ___% of design capacity.

Sediment Control Practices (continued)

2. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated; Filter Sock or Manufactured practices)

Yes No NA
[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2” x 4” frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.
[ ] [ ] [ ] Manufactured insert fabric is free of tears and punctures.
[ ] [ ] [ ] Filter Sock is not torn or flattened and fill material is contained within the mesh sock.
Sediment accumulation ___% of design capacity.

3. Temporary Sediment Trap

Yes No NA
[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.
[ ] [ ] [ ] Sediment trap slopes and disturbed areas are stabilized.
Sediment accumulation is ___% of design capacity.

4. Temporary Sediment Basin

Yes No NA
[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.
[ ] [ ] [ ] Sediment basin dewatering pool is dewatering at appropriate rate.
Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design. All practices shall be maintained in accordance with their respective standards.

Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

CONSTRUCTION DURATION INSPECTIONS

b. Modifications to the SWPPP (To be completed as described below)

The Operator shall amend the SWPPP whenever:

1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPPP proves to be ineffective in:
   a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
   b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

Modification & Reason:

APPENDIX F

NYSDEC Stormwater Design Manual Chapter 5 Analysis

Table Key: ● = Practice Used in Accordance with Chapter 5 Requirements
o = Practice Not Used
\- = Practice is Not Applicable

NYSDEC Chapter 5 Requirements	Subcatchments			Remarks
	1.1	1.2	1.3	
Chapter 5, Section 5.1: Preservation if Natural Features and Conservation Design				
Practices				
Preservation of Undisturbed Areas	●	●	●	See Note #2
Preservation of Buffers	-	-		
Reduction of Clearing & Grading	●	●	●	See Note #4
Locating Development in Less Sensitive Areas	●	●	●	See Note #4
Open Space Design	-	-		
Soil Restoration	●	●	●	See Note #5
Chapter 5, Section 5.2: Reduction of Impervious Cover				
Practices				
Roadway Reduction	●	-	-	See Note #1
Sidewalk Reduction	●	●	●	
Driveway Reduction	●	●	●	See Note #1
Cul-de-sac Reduction	-	-		
Building Footprint Reduction	●	●	●	See Note #3
Parking Reduction	●	●	●	See Note #4
Conservation of Natural Areas	●	●	●	See Note #2
Sheetflow to Riparian Buffers or Filter Strips	-	-	-	
Vegetated Swale	●	-	-	
Tree Planting / Tree Pit	-	-	-	
Disconnection of Rooftop Runoff	-	-	-	
Stream Daylighting	-	-	-	
Rain Gardens	-	-	-	
Green Roofs	-	-	-	
Stormwater Planters	-	-	-	
Rain Barrels / Cisterns	-	-	-	
Porous Pavement	-	-	-	

Notes:

1. The proposed driveways and road have been designed to provide a minimum width for safe ingress and egress for the development.
2. Although no formal calculations have been provided, the subject project has provided conservation of natural areas to the maximum extent practical.
3. The proposed buildings are multi-story, thus minimize the building footprints.
4. The reduction in clearing and grading, as well as the driveway and parking areas foot print reduction will be enforced with the approval of the project PSWPPP. Notes on the project plans, establish that any changes in the project plans would require an amended approval from the necessary regulatory agencies
5. Soil restoration requirements per NYSDEC stantards shown on project plans.

APPENDIX G

NYSDEC Stormwater Management Practice Construction and Maintenance Inspection Checklist

Stormwater/Wetland Pond Construction Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
Pre-Construction/Materials and Equipment		
Pre-construction meeting		
Pipe and appurtenances on-site prior to construction and dimensions checked		
1. Material (including protective coating, if specified)		
2. Diameter		
3. Dimensions of metal riser or pre-cast concrete outlet structure		
4. Required dimensions between water control structures (orifices, weirs, etc.) are in accordance with approved plans		
5. Barrel stub for prefabricated pipe structures at proper angle for design barrel slope		
6. Number and dimensions of prefabricated anti-seep collars		
7. Watertight connectors and gaskets		
8. Outlet drain valve		
Project benchmark near pond site		
Equipment for temporary de-watering		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
2. Subgrade Preparation		
Area beneath embankment stripped of all vegetation, topsoil, and organic matter		
3. Pipe Spillway Installation		
Method of installation detailed on plans		
A. Bed preparation		
Installation trench excavated with specified side slopes		
Stable, uniform, dry subgrade of relatively impervious material (If subgrade is wet, contractor shall have defined steps before proceeding with installation)		
Invert at proper elevation and grade		
B. Pipe placement		
Metal / plastic pipe		
1. Watertight connectors and gaskets properly installed		
2. Anti-seep collars properly spaced and having watertight connections to pipe		
3. Backfill placed and tamped by hand under “haunches” of pipe		
4. Remaining backfill placed in max. 8 inch lifts using small power tamping equipment until 2 feet cover over pipe is reached		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
3. Pipe Spillway Installation		
Concrete pipe		
1. Pipe set on blocks or concrete slab for pouring of low cradle		
2. Pipe installed with rubber gasket joints with no spalling in gasket interface area		
3. Excavation for lower half of anti-seep collar(s) with reinforcing steel set		
4. Entire area where anti-seep collar(s) will come in contact with pipe coated with mastic or other approved waterproof sealant		
5. Low cradle and bottom half of anti-seep collar installed as monolithic pour and of an approved mix		
6. Upper half of anti-seep collar(s) formed with reinforcing steel set		
7. Concrete for collar of an approved mix and vibrated into place (protected from freezing while curing, if necessary)		
8. Forms stripped and collar inspected for honeycomb prior to backfilling. Parge if necessary.		
C. Backfilling		
Fill placed in maximum 8 inch lifts		
Backfill taken minimum 2 feet above top of anti-seep collar elevation before traversing with heavy equipment		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
4. Riser / Outlet Structure Installation		
Riser located within embankment		
A. Metal riser		
Riser base excavated or formed on stable subgrade to design dimensions		
Set on blocks to design elevations and plumbed		
Reinforcing bars placed at right angles and projecting into sides of riser		
Concrete poured so as to fill inside of riser to invert of barrel		
B. Pre-cast concrete structure		
Dry and stable subgrade		
Riser base set to design elevation		
If more than one section, no spalling in gasket interface area; gasket or approved caulking material placed securely		
Watertight and structurally sound collar or gasket joint where structure connects to pipe spillway		
C. Poured concrete structure		
Footing excavated or formed on stable subgrade, to design dimensions with reinforcing steel set		
Structure formed to design dimensions, with reinforcing steel set as per plan		
Concrete of an approved mix and vibrated into place (protected from freezing while curing, if necessary)		
Forms stripped & inspected for “honeycomb” prior to backfilling; parge if necessary		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
5. Embankment Construction		
Fill material		
Compaction		
Embankment		
1. Fill placed in specified lifts and compacted with appropriate equipment		
2. Constructed to design cross-section, side slopes and top width		
3. Constructed to design elevation plus allowance for settlement		
6. Impounded Area Construction		
Excavated / graded to design contours and side slopes		
Inlet pipes have adequate outfall protection		
Forebay(s)		
Pond benches		
7. Earth Emergency Spillway Construction		
Spillway located in cut or structurally stabilized with riprap, gabions, concrete, etc.		
Excavated to proper cross-section, side slopes and bottom width		
Entrance channel, crest, and exit channel constructed to design grades and elevations		

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
8. Outlet Protection		
A. End section		
Securely in place and properly backfilled		
B. Endwall		
Footing excavated or formed on stable subgrade, to design dimensions and reinforcing steel set, if specified		
Endwall formed to design dimensions with reinforcing steel set as per plan		
Concrete of an approved mix and vibrated into place (protected from freezing, if necessary)		
Forms stripped and structure inspected for “honeycomb” prior to backfilling; parge if necessary		
C. Riprap apron / channel		
Apron / channel excavated to design cross-section with proper transition to existing ground		
Filter fabric in place		
Stone sized as per plan and uniformly place at the thickness specified		
9. Vegetative Stabilization		
Approved seed mixture or sod		
Proper surface preparation and required soil amendments		
Excelsior mat or other stabilization, as per plan		

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
10. Miscellaneous		
Drain for ponds having a permanent pool		
Trash rack / anti-vortex device secured to outlet structure		
Trash protection for low flow pipes, orifices, etc.		
Fencing (when required)		
Access road		
Set aside for clean-out maintenance		
11. Stormwater Wetlands		
Adequate water balance		
Variety of depth zones present		
Approved pondscaping plan in place Reinforcement budget for additional plantings		
Plants and materials ordered 6 months prior to construction		
Construction planned to allow for adequate planting and establishment of plant community (April-June planting window)		
Wetland buffer area preserved to maximum extent possible		

Comments:

Actions to be Taken:

Infiltration Trench Construction Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
1. Pre-Construction		
Pre-construction meeting		
Runoff diverted		
Soil permeability tested		
Groundwater / bedrock sufficient at depth		
2. Excavation		
Size and location		
Side slopes stable		
Excavation does not compact subsoils		
3. Filter Fabric Placement		
Fabric specifications		
Placed on bottom, sides, and top		

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
4. Aggregate Material		
Size as specified		
Clean / washed material		
Placed properly		
5. Observation Well		
Pipe size		
Removable cap / footplate		
Initial depth =______feet		
6. Final Inspection		
Pretreatment facility in place		
Contributing watershed stabilized prior to flow diversion		
Outlet		

Comments:

Actions to be Taken:

Bioretention Construction Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
1. Pre-Construction		
Pre-construction meeting		
Runoff diverted		
Facility area cleared		
If designed as exfilter, soil testing for permeability		
Facility location staked out		
2. Excavation		
Size and location		
Lateral slopes completely level		
If designed as exfilter, ensure that excavation does not compact susoils.		
Longitudinal slopes within design range		

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
3. Structural Components		
Stone diaphragm installed correctly		
Outlets installed correctly		
Underdrain		
Pretreatment devices installed		
Soil bed composition and texture		
4. Vegetation		
Complies with planting specs		
Topsoil adequate in composition and placement		
Adequate erosion control measures in place		
5. Final Inspection		
Dimensions		
Proper stone diaphragm		
Proper outlet		
Soil/ filter bed permeability testing		
Effective stand of vegetation and stabilization		
Construction generated sediments removed		
Contributing watershed stabilized before flow is diverted to the practice		

Comments:

Actions to be Taken:

Stormwater Pond/Wetland Operation, Maintenance and Management Inspection Checklist

Project ______________________________
Location: ______________________________
Site Status: ______________________________

Date: ______________________________
Time: ______________________________

Inspector: ______________________________

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Embankment and emergency spillway (Annual, After Major Storms)		
1. Vegetation and ground cover adequate		
2. Embankment erosion		
3. Animal burrows		
4. Unauthorized planting		
5. Cracking, bulging, or sliding of dam		
a. Upstream face		
b. Downstream face		
c. At or beyond toe		
downstream		
upstream		
d. Emergency spillway		
6.Pond, toe & chimney drains clear and functioning		
7.Seeps/leaks on downstream face		
8.Slope protection or riprap failure		
9. Vertical/horizontal alignment of top of dam “As-Built”		

Maintenance Item	**Satisfactory/ Unsatisfactory**	**Comments**
10. Emergency spillway clear of obstructions and debris		
11. Other (specify)		
2. Riser and principal spillway (Annual)		
Type: Reinforced concrete ______ Corrugated pipe ______ Masonry ______ 1. Low flow orifice obstructed		
2. Low flow trash rack. a. Debris removal necessary		
b. Corrosion control		
3. Weir trash rack maintenance a. Debris removal necessary		
b. corrosion control		
4. Excessive sediment accumulation insider riser		
5. Concrete/masonry condition riser and barrels a. cracks or displacement		
b. Minor spalling (<1")		
c. Major spalling (rebars exposed)		
d. Joint failures		
e. Water tightness		
6. Metal pipe condition		
7. Control valve a. Operational/exercised		
b. Chained and locked		
8. Pond drain valve a. Operational/exercised		
b. Chained and locked		
9. Outfall channels functioning		
10. Other (specify)		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
3. Permanent Pool (Wet Ponds) (monthly)		
1. Undesirable vegetative growth		
2. Floating or floatable debris removal required		
3. Visible pollution		
4. Shoreline problem		
5. Other (specify)		
4. Sediment Forebays		
1.Sedimentation noted		
2. Sediment cleanout when depth < 50% design depth		
5. Dry Pond Areas		
1. Vegetation adequate		
2. Undesirable vegetative growth		
3. Undesirable woody vegetation		
4. Low flow channels clear of obstructions		
5. Standing water or wet spots		
6. Sediment and / or trash accumulation		
7. Other (specify)		
6. Condition of Outfalls (Annual , After Major Storms)		
1. Riprap failures		
2. Slope erosion		
3. Storm drain pipes		
4.Endwalls / Headwalls		
5. Other (specify)		
7. Other (Monthly)		
1. Encroachment on pond, wetland or easement area		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
2. Complaints from residents		
3.Aesthetics a. Grass growing required		
b. Graffiti removal needed		
c. Other (specify)		
4. Conditions of maintenance access routes.		
5. Signs of hydrocarbon build-up		
6. Any public hazards (specify)		
8. Wetland Vegetation (Annual)		
1. Vegetation healthy and growing Wetland maintaining 50% surface area coverage of wetland plants after the second growing season. (If unsatisfactory, reinforcement plantings needed)		
2. Dominant wetland plants: Survival of desired wetland plant species Distribution according to landscaping plan?		
3. Evidence of invasive species		
4. Maintenance of adequate water depths for desired wetland plant species		
5. Harvesting of emergent plantings needed		
6. Have sediment accumulations reduced pool volume significantly or are plants “choked” with sediment		
7. Eutrophication level of the wetland.		
8. Other (specify)		

Comments:

Actions to be Taken:

Infiltration Trench Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Trench surface clear of debris		
Inflow pipes clear of debris		
Overflow spillway clear of debris		
Inlet area clear of debris		
2. Sediment Traps or Forebays (Annual)		
Obviously trapping sediment		
Greater than 50% of storage volume remaining		
3. Dewatering (Monthly)		
Trench dewaters between storms		
4. Sediment Cleanout of Trench (Annual)		
No evidence of sedimentation in trench		
Sediment accumulation doesn't yet require cleanout		
5. Inlets (Annual)		

Maintenance Item	Satisfactory / Unsatisfactory	Comments
Good condition		
No evidence of erosion		
6. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repair		
No evidence of erosion		
7. Aggregate Repairs (Annual)		
Surface of aggregate clean		
Top layer of stone does not need replacement		
Trench does not need rehabilitation		

Comments:

Actions to be Taken:

Bioretention Operation, Maintenance and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Bioretention and contributing areas clean of debris		
No dumping of yard wastes into practice		
Litter (branches, etc.) have been removed		
2. Vegetation (Monthly)		
Plant height not less than design water depth		
Fertilized per specifications		
Plant composition according to approved plans		
No placement of inappropriate plants		
Grass height not greater than 6 inches		
No evidence of erosion		
3. Check Dams/Energy Dissipaters/Sumps (Annual, After Major Storms)		
No evidence of sediment buildup		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Sumps should not be more than 50% full of sediment		
No evidence of erosion at downstream toe of drop structure		
4. Dewatering (Monthly)		
Dewaters between storms		
No evidence of standing water		
5. Sediment Deposition (Annual)		
Swale clean of sediments		
Sediments should not be > 20% of swale design depth		
6. Outlet/Overflow Spillway (Annual, After Major Storms)		
Good condition, no need for repair		
No evidence of erosion		
No evidence of any blockages		
7. Integrity of Filter Bed (Annual)		
Filter bed has not been blocked or filled inappropriately		

Comments:

Actions to be Taken:

APPENDIX H

Hydrodynamic Separator Sizing and Maintenance Manual

State of New Jersey

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Mail Code – 401-02B
Division of Water Quality
Bureau of Nonpoint Pollution Control
P.O. Box 420 – 401 E. State St.
Trenton, NJ 08625-0420
Phone: (609) 633-7021 / Fax: (609) 777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CATHERINE R. MCCABE
Acting Commissioner

March 27, 2018

Graham Bryant, M.Sc., P.E.
President
Hydroworks, LLC
136 Central Avenue
Clark, NJ 07066

Re: MTD Lab Certification
HydroStorm Hydrodynamic Separator by Hydroworks, LLC
Online Installation

TSS Removal Rate 50%

Dear Mr. Bryant:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydroworks, LLC has requested an MTD Laboratory Certification for the Hydroworks HydroStorm Hydrodynamic Separator.

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated February 2018) for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the HydroStorm by Hydroworks, LLC at a TSS removal rate of 50% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The HydroStorm shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in item 6 below.

3. This HydroStorm cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the Hydrostorm. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at http://www.hydroworks.com/hydrostormo&m.pdf for any changes to the maintenance requirements.

6. Sizing Requirement:

   The example below demonstrates the sizing procedure for the Hydrostorm:

   Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using a HydroStorm. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:
   time of concentration = 10 minutes
   i = 3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
   c = 0.99 (runoff coefficient for impervious)
   Q = ciA = 0.99 x 3.2 x 0.25 = 0.79 cfs

   Given the site runoff is 0.79 cfs and based on Table 1 below, the HydroStorm Model HS4 with a MTFR of 0.88 cfs could be used for this site to remove 50% of the TSS from the impervious area without exceeding the MTFR.

   The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1.

Table 1 HydroStorm Sizing Information

HydroStorm Model	NJDEP 50% TSS Maximum Treatment Flow Rate (cfs)	Treatment Area (ft^2)	Hydraulic Loading Rate (gpm/ft^2)	50% Maximum Sediment Storage (ft^3)
HS3	0.50	7.1	31.4	3.6
HS4	0.88	12.6	31.4	6.3
HS5	1.37	19.6	31.4	9.8
HS6	1.98	28.3	31.4	14.2
HS7	2.69	38.5	31.4	19.3
HS8	3.52	50.3	31.4	25.2
HS9	4.45	63.6	31.4	31.8
HS10	5.49	78.5	31.4	39.3
HS11	6.65	95.0	31.4	47.5
HS12	7.91	113.0	31.4	56.5

A detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all of the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Brian Salvo or Nick Grotts of my office at (609) 633-7021.

Sincerely,

James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Brian Salvo, NJDEP – BNPC
Nick Grotts, NJDEP – BNPC

Hydroworks® HydroStorm

Operations & Maintenance Manual

Version 1.0

Please call Hydroworks at 888-290-7900 or email us at support@hydroworks.com if you have any questions regarding the Inspection Checklist. Please fax a copy of the completed checklist to Hydroworks at 888-783-7271 for our records.

Introduction

The HydroStorm is a state of the art hydrodynamic separator. Hydrodynamic separators remove solids, debris and lighter than water (oil, trash, floating debris) pollutants from stormwater. Hydrodynamic separators and other water quality measures are mandated by regulatory agencies (Town/City, State, Federal Government) to protect storm water quality from pollution generated by urban development (traffic, people) as part of new development permitting requirements.

As storm water treatment structures fill up with pollutants they become less and less effective in removing new pollution. Therefore, it is important that storm water treatment structures be maintained on a regular basis to ensure that they are operating at optimum performance. The HydroStorm is no different in this regard and this manual has been assembled to provide the owner/operator with the necessary information to inspect and coordinate maintenance of their HydroStorm.

Hydroworks® HydroStorm Operation

The Hydroworks HydroStorm (HS) separator is a unique hydrodynamic by-pass separator. It incorporates a protected submerged pretreatment zone to collect larger solids, a treatment tank to remove finer solids, and a dual set of weirs to create a high flow bypass. High flows are conveyed directly to the outlet and do not enter the treatment area, however, the submerged pretreatment area still allows removal of coarse solids during high flows.

Under normal or low flows, water enters an inlet area with a horizontal grate. The area underneath the grate is submerged with openings to the main treatment area of the separator. Coarse solids fall through the grate and are either trapped in the pretreatment area or conveyed into the main treatment area depending on the flow rate. Fines are transported into the main treatment area. Openings and weirs in the pretreatment area allow entry of water and solids into the main treatment area and cause water to rotate in the main treatment area creating a vortex motion. Water in the main treatment area is forced to rise along the walls of the separator to discharge from the treatment area to the downstream pipe.

The vortex motion forces solids and floatables to the middle of the inner chamber. Floatables are trapped since the inlet to the treatment area is submerged. The design maximizes the retention of settled solids since solids are forced to the center of the inner chamber by the vortex motion of water while water must flow up the walls of the separator to discharge into the downstream pipe.

A set of high flow weirs near the outlet pipe create a high flow bypass over both the pretreatment area and main treatment chamber. The rate of flow into the treatment area is regulated by the number and size of openings into the treatment chamber and the height of by-pass weirs. High flows flow over the weirs directly to the outlet pipe preventing the scour and resuspension of any fines collected in the treatment chamber.

A central access tube is located in the structure to provide access for cleaning. The arrangement of the inlet area and bypass weirs near the outlet pipe facilitate the use of multiple inlet pipes.

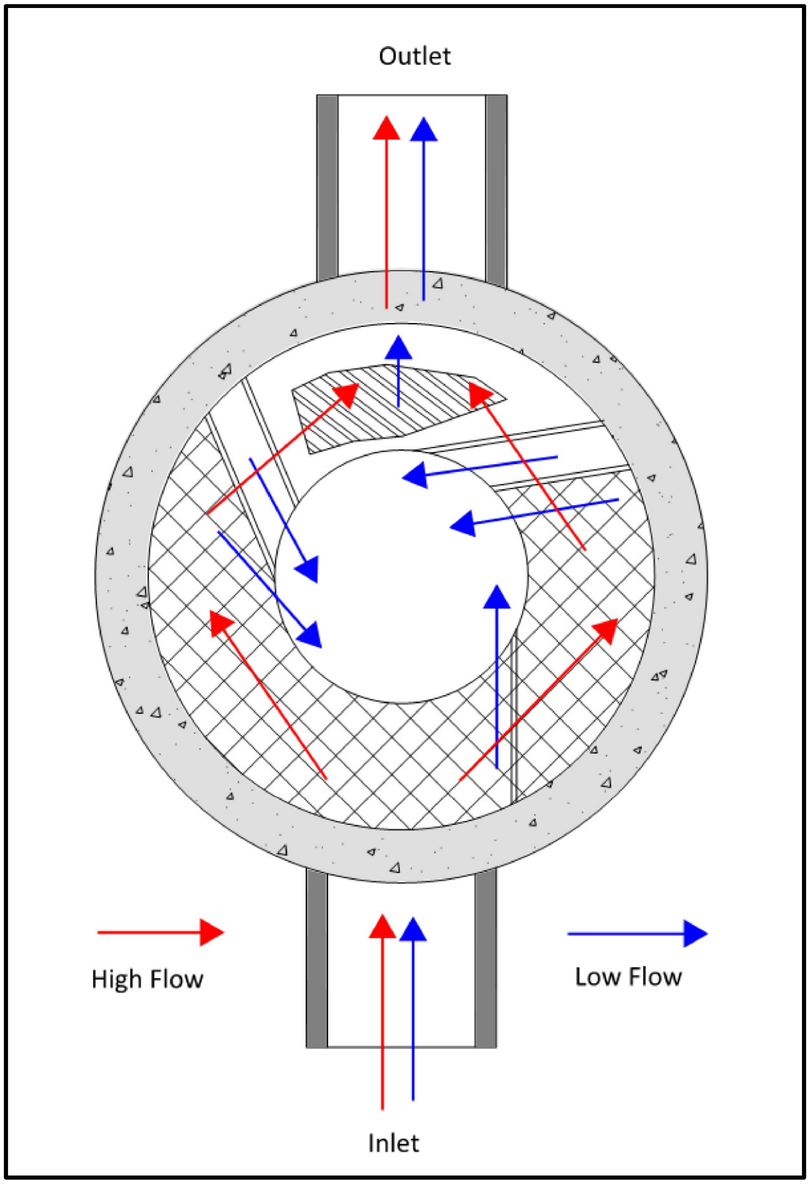


Figure 1. Hydroworks HydroStorm Operation – Plan View

Figure 2 is a profile view of the HydroStorm separator showing the flow patterns for low and high flows.

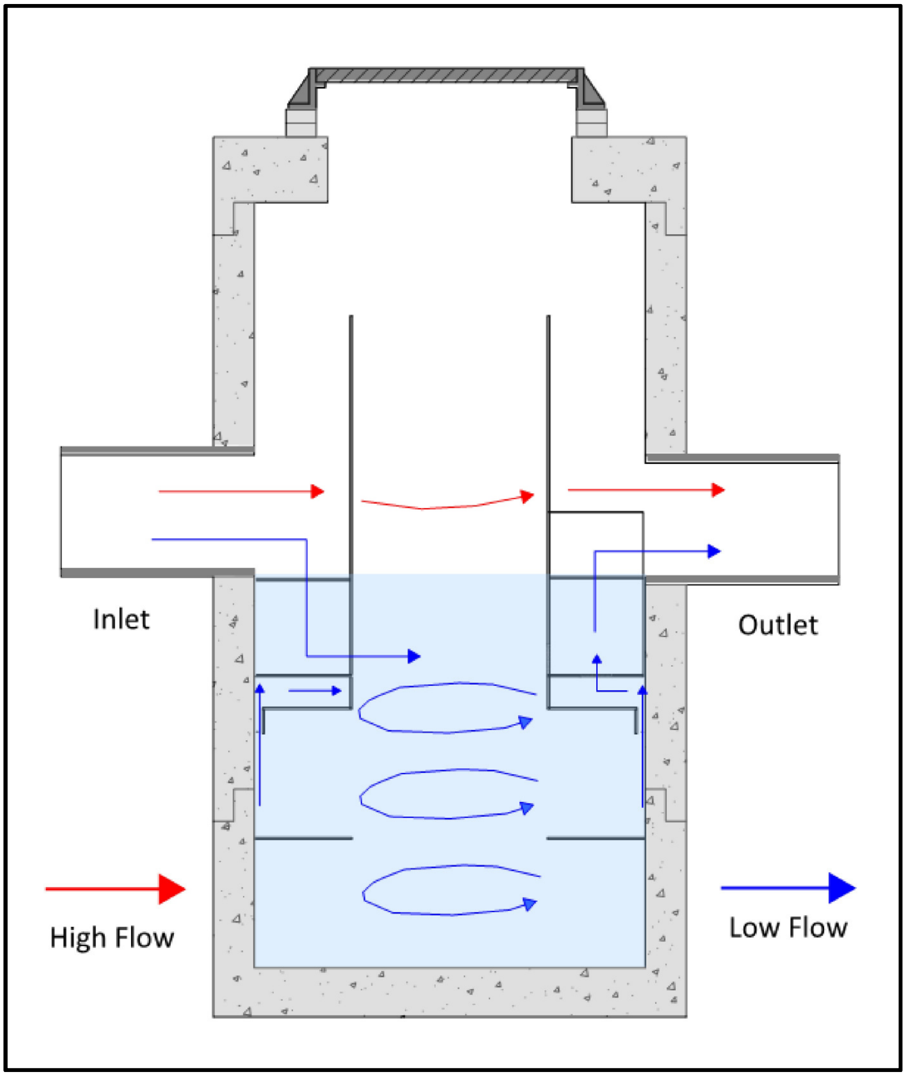


Figure 2. Hydroworks HydroStorm Operation – Profile View

The HS 4i is an inlet version of the HS 4 separator. There is a catch-basin grate on top of the HS 4i. A funnel sits sits underneath the grate on the frame and directs the water to the inlet side of the separator to ensure all lows flows are properly treated. The whole funnel is removed for inspection and cleaning.

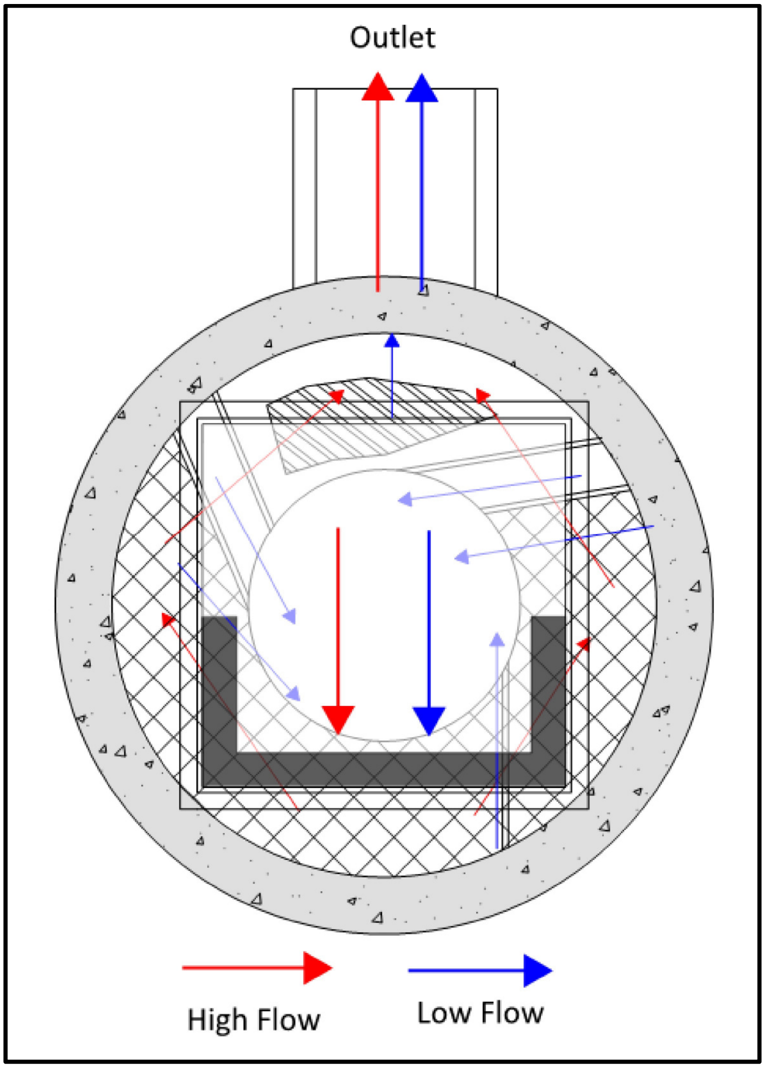


Figure 3. Hydroworks HS 4i Funnel

Inspection

Procedure

Floatables

A visual inspection can be conducted for floatables by removing the covers and looking down into the center access tube of the separator. Separators with an inlet grate (HS 4i or custom separator) will have a plastic funnel located under the grate that must be removed from the frame prior to inspection or maintenance. If you are missing a funnel please contact Hydroworks at the numbers provided at the end of this document.

TSS/Sediment

Inspection for TSS build-up can be conducted using a Sludge Judge®, Core Pro®, AccuSludge® or equivalent sampling device that allows the measurement of the depth of TSS/sediment in the unit. These devices typically have a ball valve at the bottom of the tube that allows water and TSS to flow into the tube when lowering the tube into the unit. Once the unit touches the bottom of the device, it is quickly pulled upward such that the water and TSS in the tube forces the ball valve closed allowing the user to see a full core of water/TSS in the unit. The unit should be inspected for TSS through each of the access covers. Several readings (2 or 3) should be made at each access cover to ensure that an accurate TSS depth measurement is recorded.

Frequency

Construction Period

The HydroStorm separator should be inspected every four weeks and after every large storm (over 0.5" (12.5 mm) of rain) during the construction period.

Post-Construction Period

The Hydroworks HydroStorm separator should be inspected during the first year of operation for normal stabilized sites (grassed or paved areas). If the unit is subject to oil spills or runoff from unstabilized (storage piles, exposed soils) areas the HydroStorm separator should be inspected more frequently (4 times per year). The initial annual inspection will indicate the required future frequency of inspection and maintenance if the unit was maintained after the construction period.

Reporting

Reports should be prepared as part of each inspection and include the following information:

1. Date of inspection
2. GPS coordinates of Hydroworks unit
3. Time since last rainfall
4. Date of last inspection
5. Installation deficiencies (missing parts, incorrect installation of parts)
6. Structural deficiencies (concrete cracks, broken parts)
7. Operational deficiencies (leaks, blockages)
8. Presence of oil sheen or depth of oil layer
9. Estimate of depth/volume of floatables (trash, leaves) captured
10. Sediment depth measured
11. Recommendations for any repairs and/or maintenance for the unit
12. Estimation of time before maintenance is required if not required at time of inspection

A sample inspection checklist is provided at the end of this manual.

Maintenance

Procedure

The Hydroworks HydroStorm unit is typically maintained using a vacuum truck. There are numerous companies that can maintain the HydroStorm separator. Maintenance with a vacuum truck involves removing all of the water and sediment together. The water is then separated from the sediment on the truck or at the disposal facility.

A central access opening (24" or greater) is provided to the gain access to the lower treatment tank of the unit. This is the primary location to maintain by vacuum truck. The pretreatment area can also be vacuumed and/or flushed into the lower treatment tank of the separator for cleaning via the central access once the water level is lowered below the pretreatment floor.

In instances where a vacuum truck is not available other maintenance methods (i.e. clamshell bucket) can be used, but they will be less effective. If a clamshell bucket is used the water must be decanted prior to cleaning since the sediment is under water and typically fine in nature. Disposal of the water will depend on local requirements. Disposal options for the decanted water may include:

1. Discharge into a nearby sanitary sewer manhole
2. Discharge into a nearby LID practice (grassed swale, bioretention)
3. Discharge through a filter bag into a downstream storm drain connection

The local municipality should be consulted for the allowable disposal options for both water and sediments prior to any maintenance operation. Once the water is decanted the sediment can be removed with the clamshell bucket.

Disposal of the contents of the separator depend on local requirements. Maintenance of a Hydroworks HydroStorm unit will typically take 1 to 2 hours based on a vacuum truck and longer for other cleaning methods (i.e. clamshell bucket).

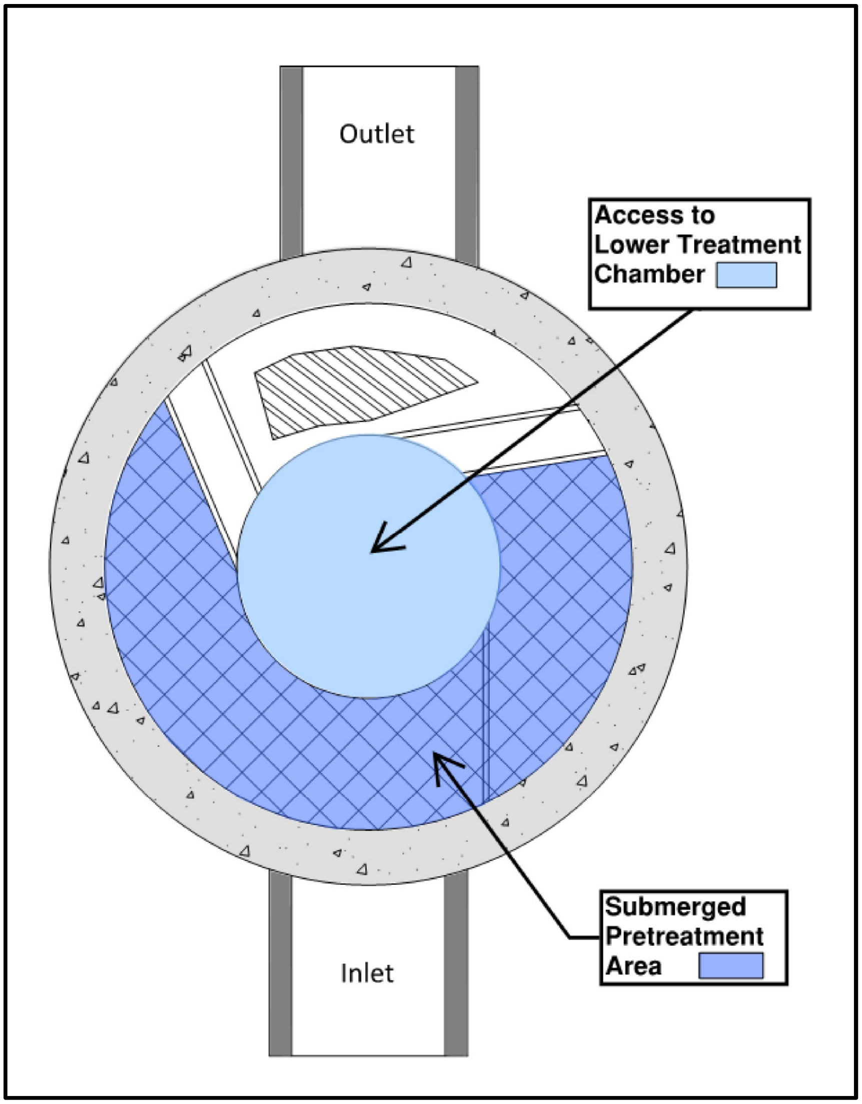


Figure 3. Maintenance Access

Frequency

Construction Period

A HydroStorm separator can fill with construction sediment quickly during the construction period. The HydroStorm must be maintained during the construction period when the depth of TSS/sediment reaches 24" (600 mm). It must also be maintained during the construction period if there is an appreciable depth of oil in the unit (more than a sheen) or if floatables other than oil cover over 50% of the area of the separator

The HydroStorm separator should be maintained at the end of the construction period, prior to operation for the post-construction period.

<u>Post-Construction Period</u>

The HydroStorm was independently tested by Alden Research Laboratory in 2017. A HydroStorm HS 4 was tested for scour with a 50% sediment depth of 0.5 ft. Therefore, maintenance for sediment accumulation is required if the depth of sediment is 1 ft or greater in separators with standard water (sump) depths (Table 1).

There will be designs with increased sediment storage based on specifications or site-specific criteria. A measurement of the total water depth in the separator through the central access tube should be taken and compared to water depth given in Table 1. The standard water depth from Table 1 should be subtracted from the measured water depth and the resulting extra depth should be added to the 1 ft to determine the site-specific sediment maintenance depth for that separator.

For example, if the measured water depth in the HS-7 is 7 feet, then the sediment maintenance depth for that HS-7 is 2 ft (= 1 + 7 – 6) and the separator does not need to be cleaned for sediment accumulation until the measure sediment depth is 2 ft.

The HydroStorm separator must also be maintained if there is an appreciable depth of oil in the unit (more than a sheen) or if floatables other than oil cover over 50% of the water surface of the separator.

Table 1 Standard Dimensions for Hydroworks HydroStorm Models

Model	Diameter (ft)	Total Water Depth (ft)	Sediment Maintenance Depth for Table 1 Total Water Depth(ft)
HS-3	3	3	1
HS-4	4	4	1
HS-5	5	4	1
HS-6	6	4	1
HS-7	7	6	1
HS-8	8	7	1
HS-9	9	7.5	1
HS-10	10	8	1
HS-11	11	9	1
HS-12	12	9.5	1

HYDROSTORM INSPECTION SHEET

Date ______________________________
Date of Last Inspection ______________________________

Site ______________________________
City ______________________________
State ______________________________
Owner ______________________________

GPS Coordinates ______________________________

Date of last rainfall ______________________________

Site Characteristics	**Yes**	**No**
Soil erosion evident	☐	☐
Exposed material storage on site	☐	☐
Large exposure to leaf litter (lots of trees)	☐	☐
High traffic (vehicle) area	☐	☐

HydroStorm	**Yes**	**No**
Obstructions in the inlet or outlet	☐ *	☐
Missing internal components	☐ **	☐
Improperly installed inlet or outlet pipes	☐ ***	☐
Internal component damage (cracked, broken, loose pieces)	☐ **	☐
Floating debris in the separator (oil, leaves, trash)	☐	☐
Large debris visible in the separator	☐ *	☐
Concrete cracks/deficiencies	☐ ***	☐
Exposed rebar	☐ **	☐
Water seepage (water level not at outlet pipe invert)	☐ ***	☐
Water level depth below outlet pipe invert ________“		

Routine Measurements

Floating debris depth	**< 0.5” (13mm)**	☐	**>0.5” 13mm)**	☐ *
Floating debris coverage	**< 50% of surface area**	☐	**> 50% surface area**	☐ *
Sludge depth	**< 12” (300mm)**	☐	**> 12” (300mm)**	☐ *

* Maintenance required
** Repairs required
*** Further investigation is required

Hydroworks

Other Comments: ______________________________

Hydroworks

Hydroworks

Hydroworks® HydroStorm

One Year Limited Warranty

Hydroworks, LLC warrants, to the purchaser and subsequent owner(s) during the warranty period subject to the terms and conditions hereof, the Hydroworks HydroStorm to be free from defects in material and workmanship under normal use and service, when properly installed, used, inspected and maintained in accordance with Hydroworks written instructions, for the period of the warranty. The standard warranty period is 1 year.

The warranty period begins once the separator has been manufactured and is available for delivery. Any components determined to be defective, either by failure or by inspection, in material and workmanship will be repaired, replaced or remanufactured at Hydroworks' option provided, however, that by doing so Hydroworks, LLC will not be obligated to replace an entire insert or concrete section, or the complete unit. This warranty does not cover shipping charges, damages, labor, any costs incurred to obtain access to the unit, any costs to repair/replace any surface treatment/cover after repair/replacement, or other charges that may occur due to product failure, repair or replacement.

This warranty does not apply to any material that has been disassembled or modified without prior approval of Hydroworks, LLC, that has been subjected to misuse, misapplication, neglect, alteration, accident or act of God, or that has not been installed, inspected, operated or maintained in accordance with Hydroworks, LLC instructions and is in lieu of all other warranties expressed or implied. Hydroworks, LLC does not authorize any representative or other person to expand or otherwise modify this limited warranty.

The owner shall provide Hydroworks, LLC with written notice of any alleged defect in material or workmanship including a detailed description of the alleged defect upon discovery of the defect. Hydroworks, LLC should be contacted at 136 Central Ave., Clark, NJ 07066 or any other address as supplied by Hydroworks, LLC. (888-290-7900).

This limited warranty is exclusive. There are no other warranties, express or implied, or merchantability or fitness for a particular purpose and none shall be created whether under the uniform commercial code, custom or usage in the industry or the course of dealings between the parties. Hydroworks, LLC will replace any goods that are defective under this warranty as the sole and exclusive remedy for breach of this warranty.

Subject to the foregoing, all conditions, warranties, terms, undertakings or liabilities (including liability as to negligence), expressed or implied, and howsoever arising, as to the condition, suitability, fitness, safety, or title to the Hydroworks HydroStorm are hereby negated and excluded and Hydroworks, LLC gives and makes no such representation, warranty or undertaking except as expressly set forth herein. Under no circumstances shall Hydroworks, LLC be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the HydroStorm, or the cost of other goods or services related to the purchase and installation of the HydroStorm. For this Limited Warranty to apply, the HydroStorm must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and Hydroworks' written installation instructions.

Hydroworks, LLC expressly disclaims liability for special, consequential or incidental damages (even if it has been advised of the possibility of the same) or breach of expressed or implied warranty. Hydroworks, LLC shall not be liable for penalties or liquidated damages, including loss of production and profits; labor and materials; overhead costs; or other loss or expense incurred by the purchaser or any third party. Specifically excluded from limited warranty coverage are damages to the HydroStorm arising from ordinary wear and tear; alteration, accident, misuse, abuse or neglect; improper maintenance, failure of the product due to improper installation of the concrete sections or improper sizing; or any other event not caused by Hydroworks, LLC. This limited warranty represents Hydroworks' sole liability to the purchaser for claims related to the HydroStorm, whether the claim is based upon contract, tort, or other legal basis.

APPENDIX I

Bioretention Filter Sizing Calculations

SMP 1.3P - NYSDEC Bioretention Filter (Design F-5)

Project: Beacon Views, LLC
Project #: 19131.100
Date: 4/28/2020

INSITE
ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.

1a. WQv Required for Downstream SMP = 0.022 ac-ft 942 c.f.

1b. Subcatchment % Imperviousness = 50.0% %

2. Required Practice Volume

2a. Total required volume = 75% of WQv (in filter) = 707 c.f.

2b. Total volume provided in filter = = 709 c.f.

(Calculated using Stage - Volume information in HydroCAD output. Volume calculated at elevation 194.5)

3. Pretreatment Requirements:

Pretreatment will be provided by a grass filter strip, gravel diaphragm and mulch layer.

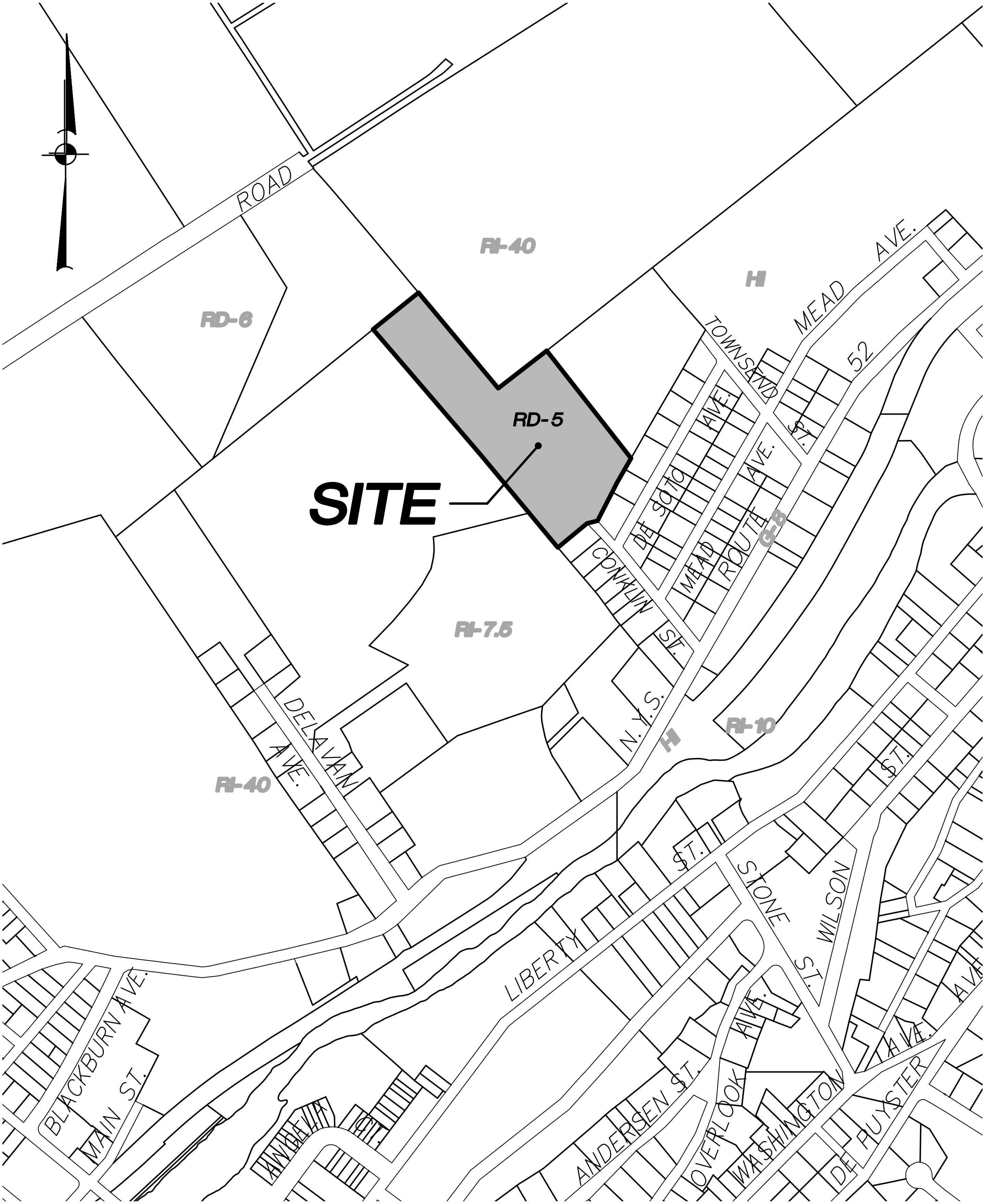
4. Required Filter Area:

4a. Required Filter Area = $\frac{WQv\ (df)}{k\ (hf + df) + tf}$

df=	2.50	ft.
hf=	0.25	ft.
k=	0.50	ft./day
tf=	1.67	days
Required Filter Area=	1026	s.f.

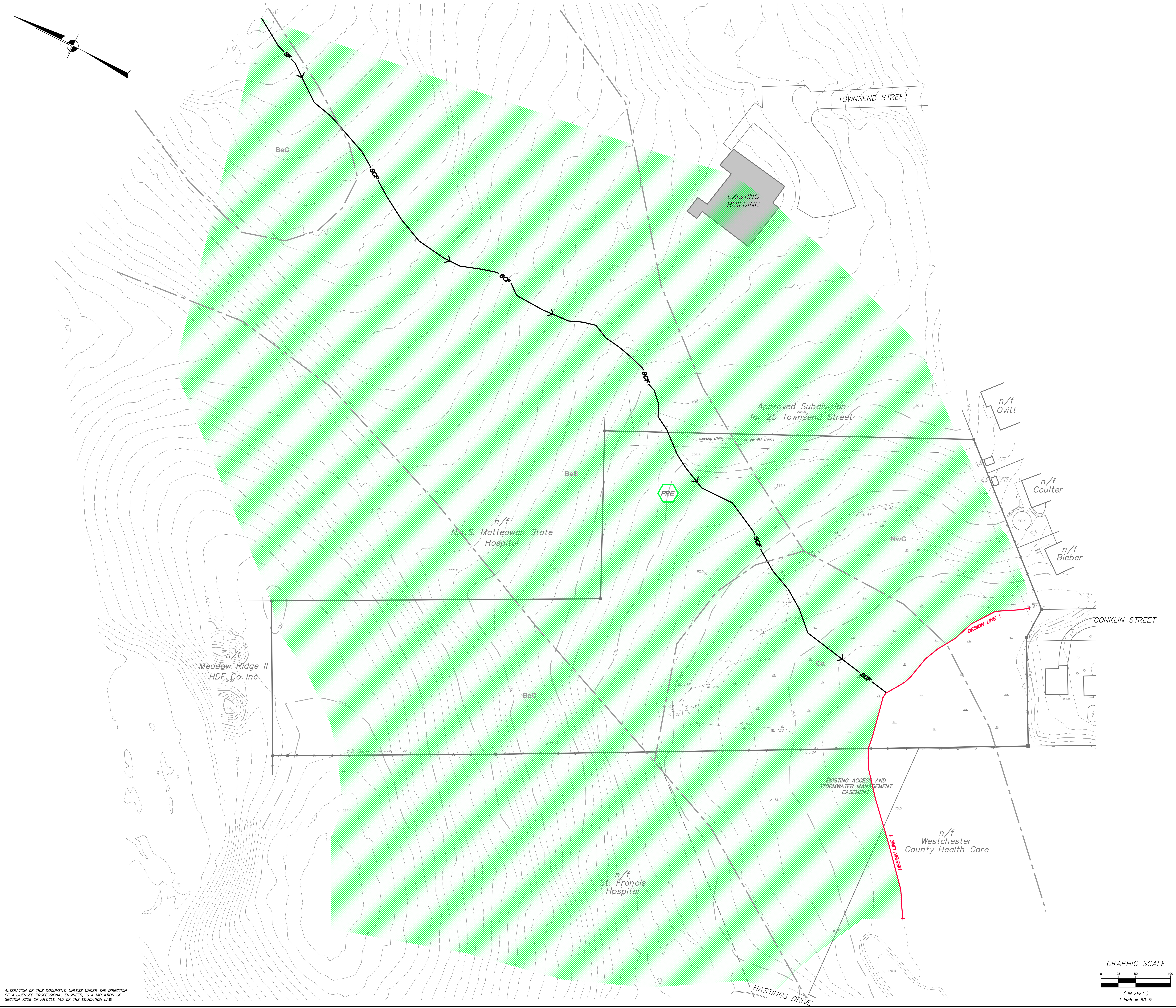
4b. Provided Filter Area = 1,270 s.f.

FIGURES



Z:\E\19131100\Stormwater\Figures\Figure 1 - Location Map.dwg, 8/26/2019 7:56:56 AM, ependleton, 1:1

PROJECT:	PREPARED BY:	DATE: 8-26-19
BEACON VIEWS CITY OF BEACON, DUTCHESS COUNTY, NEW YORK	INSITE ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.	SCALE: 1" = 500'
DRAWING:	3 Garrett Place • Carmel, New York 10512 Phone (845) 225-9690 • Fax (845) 225-9717 www.insite-eng.com	PROJECT NO.: 19131.100
LOCATION MAP		FIGURE: 1



SOILS LEGEND

SOILS	DESCRIPTION	HYDROLOGICAL GROUP
BeB	Bernardston Silt Loam, 3% to 8% slope	C/D
BeC	Bernardston Silt Loam, 8% to 15% slope	C/D
Ca	Canandaigua Silt Loam, Nuetral Substratum	C/D
NwC	Nassau–Cardigan Complex, Rolling, Very Rocky	D

— — — NRCS Soil Boundary Line

LEGEND

PRE	SUBCATCHMENT
SF →	TIME OF CONCENTRATION SHEET FLOW
SCF →	TIME OF CONCENTRATION SHALLOW CONCENTRATED FLOW
DESIGN LINE	DESIGN LINE
(hatched area)	SUBCATCHMENT CONTRIBUTING AREA

NO.	DATE	REVISION	BY

INSITE
ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.
3 Garrett Place
Carmel, NY 10512
(845) 225-9690
(845) 225-9717 fax
www.insite-eng.com

PROJECT:

BEACON VIEWS

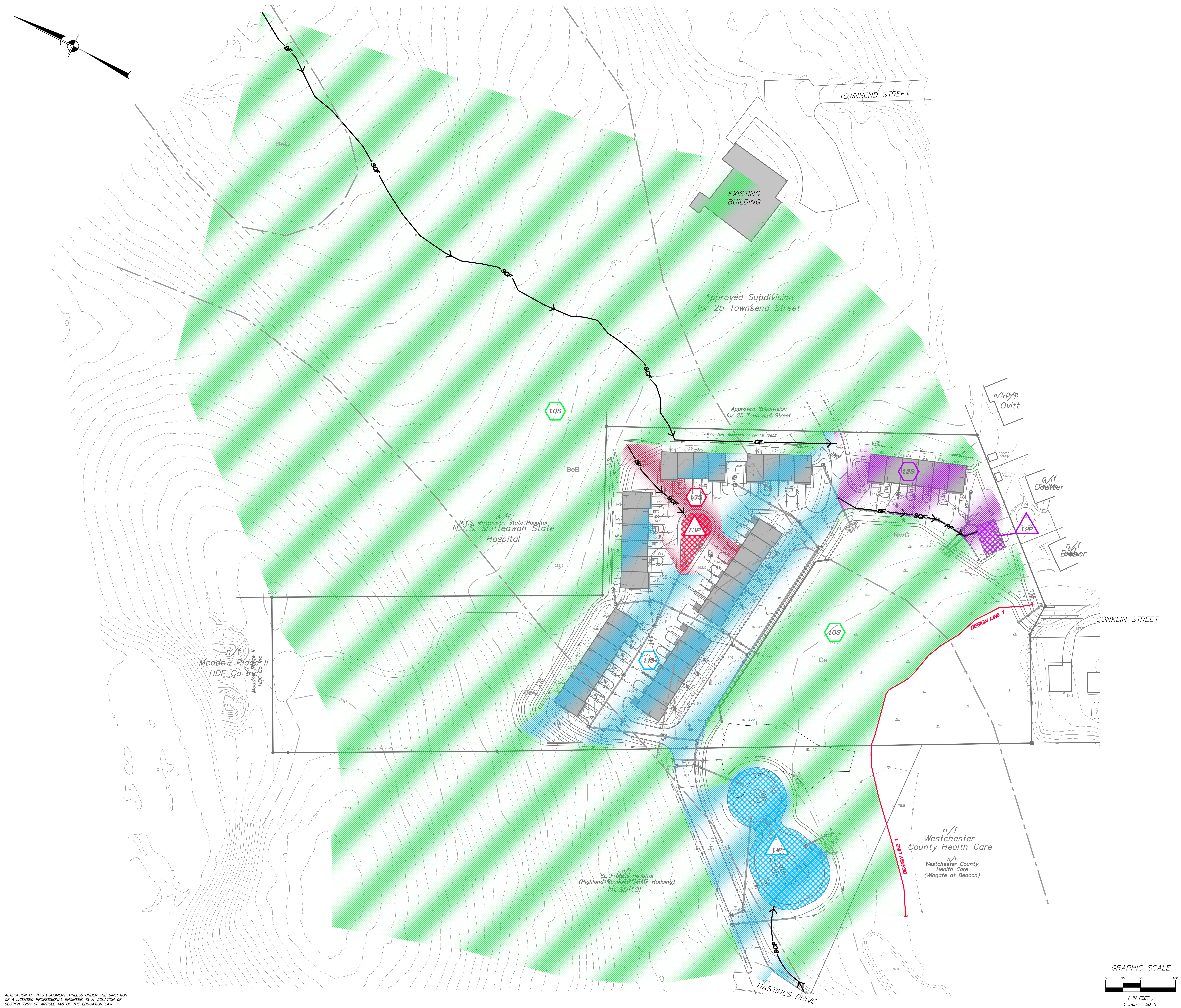
CITY OF BEACON, DUTCHESS COUNTY, NEW YORK

DRAWING:

PRE-DEVELOPMENT DRAINAGE MAP

PROJECT NUMBER	19131.100	PROJECT MANAGER	J.J.C.
DATE	8-26-19	DRAWN BY	E.J.P.
SCALE	1" = 50'	CHECKED BY	Z.M.P.

FIGURE NO. 2



SOILS LEGEND

SOILS	DESCRIPTION	HYDROLOGICAL GROUP
BeB	Bernardston Silt Loam, 3% to 8% slope	C/D
BeC	Bernardston Silt Loam, 8% to 15% slope	C/D
Ca	Canandaigua Silt Loam, Nuetral Substratum	C/D
NwC	Nassau–Cardigan Complex, Rolling, Very Rocky	D

NRCS Soil Boundary Line

LEGEND

1.0S — SUBCATCHMENT
1.1P — STORMWATER MANAGEMENT PRACTICE
SF — TIME OF CONCENTRATION SHEET FLOW
SCF — TIME OF CONCENTRATION SHALLOW CONCENTRATED FLOW
PF — TIME OF CONCENTRATION PIPE FLOW
CF — TIME OF CONCENTRATION CHANNEL FLOW
DESIGN LINE — DESIGN LINE
SUBCATCHMENT CONTRIBUTING AREA
STORMWATER MANAGEMENT PRACTICE AREA

NO.	DATE	REVISION	BY
1	4–28–20	RESUBMISSION TO PLANNING BOARD	EJP

INSITE ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.
3 Garrett Place
Carmel, NY 10512
(845) 225–9690
(845) 225–9717 fax
www.insite–eng.com

PROJECT:

BEACON VIEWS

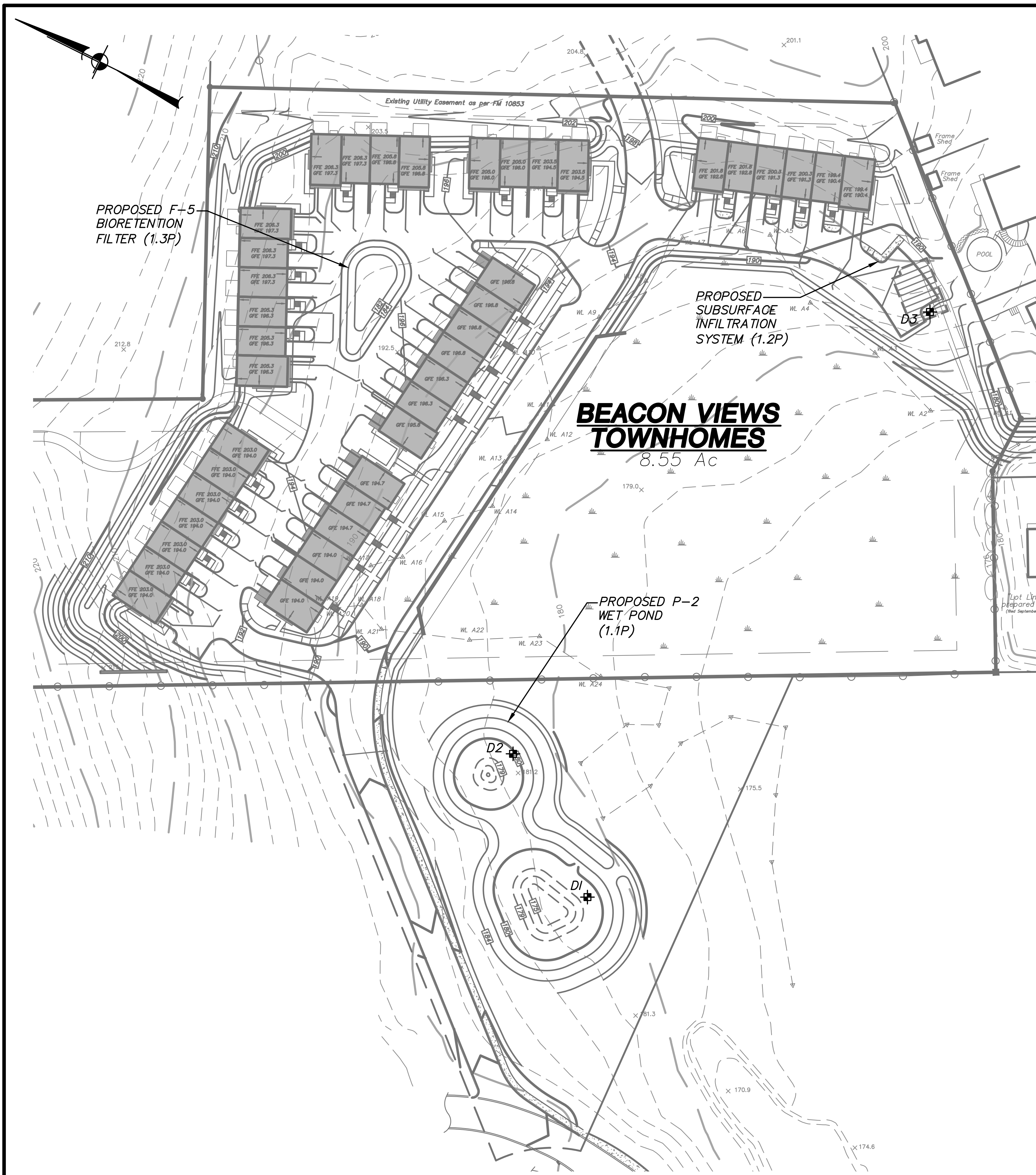
CITY OF BEACON, DUTCHESS COUNTY, NEW YORK

DRAWING:

POST–DEVELOPMENT DRAINAGE MAP

PROJECT NUMBER	19131.100	PROJECT MANAGER	J.J.C.
DATE	8–26–19	DRAWN BY	E.J.P.
SCALE	1" = 50'	CHECKED BY	Z.M.P.

FIGURE NO. 3



DEEP HOLE TEST RESULTS:
DEEP TESTS PERFORMED: 12/16/2019
DEEP TESTS WITNESSED BY:
EVAN PENDLETON (INSITE ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.) & CASSANDRA BIBBO (LANC AND TULLY ENGINEERING AND SURVEYING, P.C.)

D-1:	0"-2"	TOPSOIL
	2"-64"+	BROWN SILTY LOAM
		GROUNDWATER @ 36". NO ROCK.
D-2:	0"-2"	TOPSOIL
	2"-8"+	BROWN SILTY LOAM
		GROUNDWATER @ 18". NO ROCK.
D-3:	0"-2"	TOPSOIL
	2"-84"+	BROWN LOAM
		GROUNDWATER @ 84". NO ROCK.

NOTE: INFILTRATION TESTING FOR THE SUBSURFACE INFILTRATION SYSTEM 1.2P HAS YET TO BE PERFORMED. TESTING WILL BE PERFORMED AT A LATER DATE.

GRAPHIC SCALE
0 40 80 160
(IN FEET)
1 inch = 80 ft.

PROJECT:
BEACON VIEWS
CITY OF BEACON, DUTCHESS COUNTY, NEW YORK

DRAWING:
TESTING PLAN

PREPARED BY:
INSITE
ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.
3 Garrett Place • Carmel, New York 10512
Phone (845) 225-9690 • Fax (845) 225-9717
www.insite-eng.com

DATE:	4-28-20
SCALE:	1" = 80'
PROJECT NO.:	19131.100
FIGURE:	FIG — 4