650 PINES BRIDGE ROAD SUBDIVISION

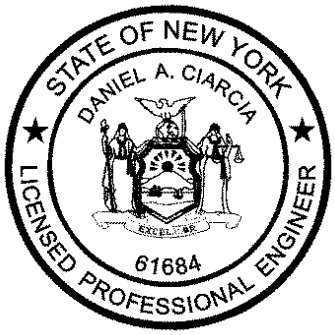
TOWN OF YORKTOWN
WESTCHESTER COUNTY, NEW YORK

STORMWATER POLLUTION PREVENTION PLAN

December 30, 2020

Prepared For:

Pines Bridge Road, LLC



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1. INTRODUCTION

The proposed three (3) lot subdivision is located on Pines Bridge Road, south of New York State Route 134 (Kitchwan Road) in the Town of Yorktown. The property is located at 650 Pines Bridge Road (TM 70.10-1-29). The parcel is comprised of 8.064 acres and is improved with a single-family home, garage, barn, pool, and tennis court. No disturbance of the improved portion of the lot is proposed. Construction of the two (2) proposed residences will disturb 71,075 square feet.

The Federal Government's Clean Water Act (CWA), Section 402 states "Stormwater discharges from certain construction activities are unlawful unless they are authorized by a National Pollutant Discharge Elimination System ("NPDES") permit or by a state permit program." New York State is a NPDES delegated state. The necessary permitting is administered through the State Pollutant Discharge Elimination System (SPDES) under the General Permit, GP-0-15-002, for Stormwater Discharges from Construction Activity.

This Stormwater Pollution Prevention Plan (SWPPP) is prepared to obtain coverage under the general permit. This SWPPP addresses the erosion control required to construct the proposed residences and provides the basis for design of the Stormwater Management Practices (SMPs) utilized for this project. This SWPPP is prepared to comply with the NYSDEC standards and regulations and requirements of the Town of Yorktown. However, due to the limited total soil disturbance of less than two (2) acres, the SWPPP will only be reviewed by the Town of Yorktown.

The technical standards used to design the erosion and sediment control are contained in the document, *"New York Standards and Specifications for Erosion and Sediment Control"* published by the Empire State Chapter of the Soil and Water Conservation Society. For the design of water quantity and water quality controls (post-construction stormwater control practices**)**, the publication prepared by the New York State Department of Environmental Conservation (NYSDEC) entitled *"New York State Stormwater Management Design Manual"* (NYSSMDM) was utilized.

The proposed project could potentially impact streams, wetlands, and water supply reservoirs. Impacts such as higher stream velocities and increased concentrations of pollutants such as total suspended solids, nitrogen, phosphorus, Biochemical Oxygen Demand (BOD) and Fecal Coliform bacteria, could result from development of a site. The mitigation proposed will insure no adverse effects to downstream water resources. This report details the design of the various temporary and permanent BMPs, and describes how potential adverse effects resulting from the development of the site will be mitigated.

2. REGULATORY REQUIREMENTS

Urban stormwater impacts relate to significant changes to stormwater quantity and quality as a result of land development. Urban Development has a profound influence on the quality of New York's waters. This proposed development will change the runoff characteristics of the site, altering the quantity and quality of the surface stormwater. The impacts of this must be mitigated by managing the stormwater prior to discharge. This would be accomplished by the capture and treatment of surface runoff prior to discharge.

This project disturbs more than one (1) acre; therefore, does require the filing a Notice of Intent (NOI) under the New York State Department of Environmental Conservation General Permit 0-15-002.

The 650 Pines Bridge Road project requires the approval of several agencies. The approvals are summarized in Table 1.

Table 1 Approval Summary

Permit	Agency	Status
Site Plan	TOY Planning Board	Pending
Tree / Stormwater	TOY Planning Board	Pending
Stormwater Management	TOY Planning Board	Pending
Subdivision Approval	Westchester County Health Dept,	Pending

3. SITE DESCRIPTION

The was analyzed based on a drainage point (DP-1) located on the upstream end of a culvert located on Pines Bridge Road. A plan illustrating the location of the drainage point and the existing condition watershed is provided in Figure 1.

On-site soils were classified by using the USDA Natural Resources Conservation Service (NRCS) Websoil survey for Westchester County, NY. The soils map for Westchester County indicates five (5) different soil classifications on the property. The location of the various soil types is shown in Figure 2. A complete soil report is provided in the Appendix. A soil map of the project area is provided in Figure 2. Table 2 summarizes the various soils on the property.

TABLE 2 Soil Inventory

Soil Designation	Description	Hydrologic Group	% of Prop.
ChC	Charlton fine sandy loam - Slopes 8% to 15%	B	45.5%
ChD	Charlton fine sandy loam - Slopes 15% to 25%	B	0.3%
CsD	Chatfield-Charlton complex - Slopes 15% to 35%, very rocky	C	4.2%
PnB	Paxton fine sandy loam-Slopes 3% to 8%	C	41.9%
PnC	Paxton fine sandy loam-Slopes 8% to 15%	C	8.0%

The proposed residences are located on lots comprised of the ChC and ChD soils. The areas proposed to be disturbed are within an area of ChC soil. The determination of the curve numbers (CN) utilized in the hydrology analysis are summarized in the appendix.

The flood insurance rate map (FIRM) for this area was examined, and it was determined that the subject property is located in an Area of Minimal Flood Hazard (Zone X).

It is anticipated that construction will be begin in March of 2021 and will be completed by December 2022.

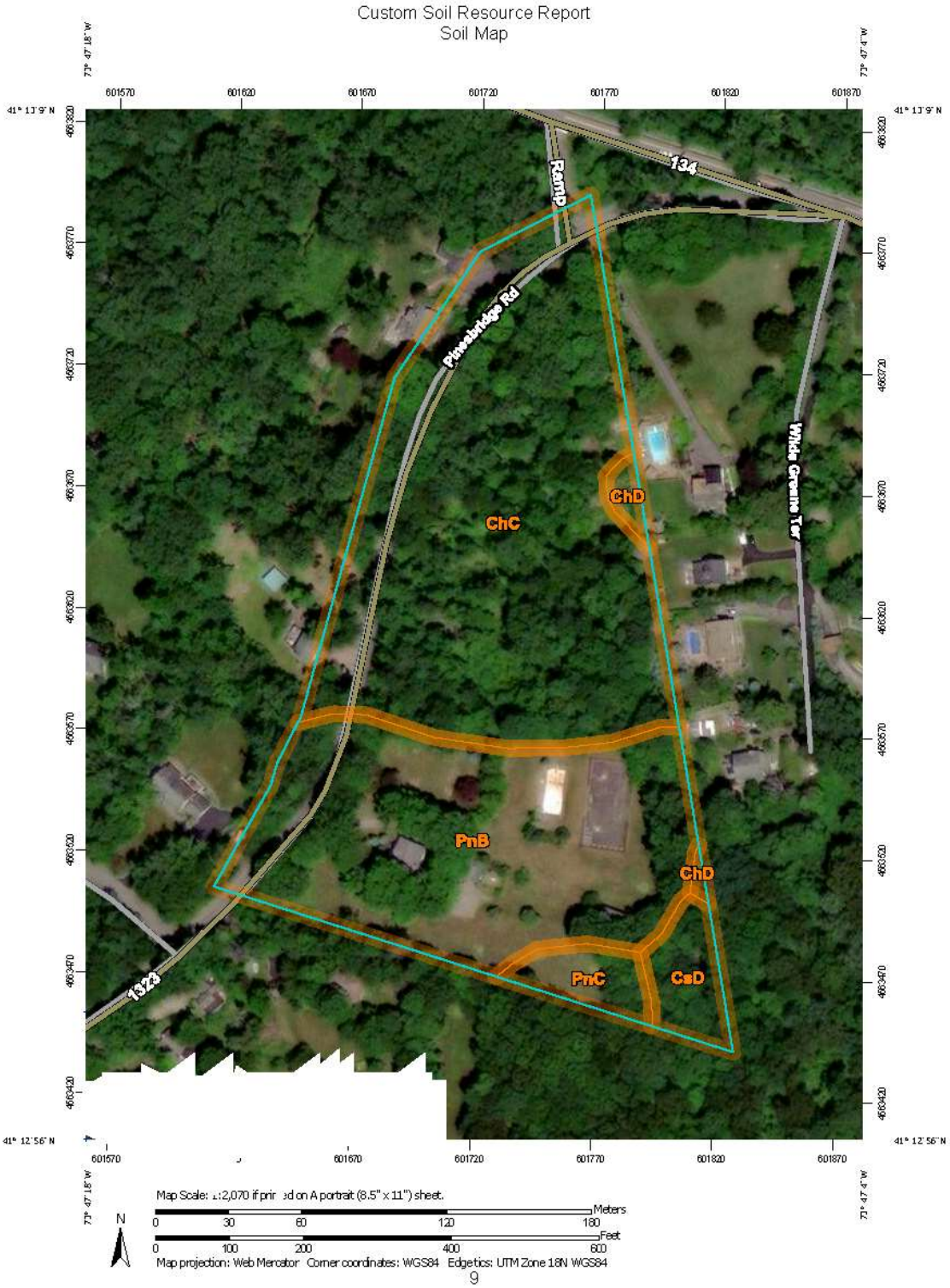


Figure 2 – Soil Map

4. STORMWATER MITIGATION

4.1 Sources of Impacts

For this project, the potential for contamination of stormwater occurs both during construction and after the completion of development. The goal to achieve reduced impacts involves containment and treatment of the various pollutants.

The greatest source of pollutants during the construction phase is the potential of soil erosion. During construction, existing vegetation, pavement and buildings are removed, exposing soils. Also, stockpiling of soils takes place. These conditions, if not stabilized, are subject to erosion during rainfall events and wind conditions. Sediment discharge to a wetland can destroy vegetation and habitat, affecting the function of the wetland. This degradation potential can be irreversible and eliminate its function in the ecosystem. Increase in turbidity to open water bodies such as streams, ponds, etc. are an additional environmental impact.

The implementation of proper erosion control measures and sediment containment along with a planned construction sequence can minimize or eliminate these potential impacts. The selection and implementation of erosion and sediment practices are described in a later section of this report.

The post-development state of this project not only will yield a potential for sediment discharges or Total Suspended Solids (TSS), but also other pollutants which can impact the adjacent water bodies. The contaminants of highest concern are Total Phosphorous (TP), Total Nitrogen (TN), and Biochemical Oxygen Demand (BOD). Modification of the surface conditions of the site, specifically increasing the impervious nature of the ground cover, increases the concentration and potential discharge of these pollutants.

The development of the site reduces the existing vegetative cover, and replaces it with impervious surfaces, such as roads, building and landscaped areas. These increases in imperviousness allow for greater concentrations of contaminants in the runoff from the site. A full listing of the potential pollutants which can be considered in stormwater can be found in Table 2.1 of the New York State Stormwater Management Design Manual (NYS SMDM).

4.2 Temporary Stormwater Measures

During the construction phase of the project, a sediment and erosion control plan shall be implemented in accordance with the New York State Department of Environmental Conservation's Best Management Practices (BMP). The primary goals of the sediment and erosion control plan are to prevent the tracking of dirt and mud onto adjacent roads, to prevent mud and silt from entering into existing and proposed drainage facilities, and to protect the receiving waters from contamination during construction.

The Erosion and Sediment Control Plan will be implemented during all phases of construction until the completion of the project. This will minimize or eliminate the potential short-term adverse impacts which might occur during construction. After completion, the erosion and sediment control will become a maintenance plan to ensure that permanent erosion and sediment controls continue to function and prevent the transport of sediments.

The owner or operator shall assess the site prior to the commencement of construction and verify that the appropriate erosion and sediment controls shown on the plan have been adequately installed and/or implemented to ensure overall preparedness of the site for construction.

The owner or operator shall retain a "Trained Contractor" as per GP-0-15-002 Part III.A.6. Following the commencement of construction, a "Trained Contractor" shall perform the required maintenance inspections of the erosion and sediment controls being implemented within the active work area daily on the site as per GP-0-15-002.

The owner or operator shall have a qualified inspector conduct site inspections in conformance with Part IV.C of the GP-0-15-002. The inspector shall conduct an inspection at least once every seven (7) calendar days when construction is ongoing and the disturbed area is less than five (5) acres. During periods when the disturbed area exceeds five (5) acres, the inspector shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) calendar days. These inspections shall be conducted as per GP-0-15-002 (Part IV.C.2.b).

During each inspection, the representative shall record the following:

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 approximate degree of sediment accumulation as a percentage of the sediment storage volume;

5. Inspect all erosion and sediment control practices and record all maintenance requirements. 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 the barrier. Record the depth of sediment within containment structures and any erosion near outlet and overflow structures;

6. All identified deficiencies.

During construction, the party responsible for implementing the temporary Stormwater Management Facilities Maintenance Program will be the owner's contractor. The name and contact information will be filed with the Town of Yorktown. The temporary sediment and erosion control devices anticipated for this project are as follows:

1. Silt Fence: This fabric barrier is proposed to capture suspended sediments and decrease the velocity of the runoff to protect downstream water bodies and wetlands. Details for construction and locations are shown on the plans. Silt fence shall be inspected every seven (7) days of after a major storm event.

2. Soil Stockpile - All soil/material stripped from the construction area during grubbing and grading shall be stockpiled within the vicinity of the locations illustrated on the approved plans, or in practical locations on-site.

   All stockpiles shall be inspected a minimum of once every seven (7) calendar days for signs of erosion or problems with seed establishment. Soil stockpiles shall be protected from erosion by vegetating the stockpile with a rapidly-germinating grass seed and surrounded with silt fence. If the project is ongoing during the non-growing season, the stockpiles shall be protected with a tarpaulin covering the entire stockpile.

Construction of the project will require several pieces of heavy equipment. Preventative maintenance of the equipment that is hydraulically powered is critical, as this type of equipment is prone to leaking hydraulic cylinders and ruptured hoses. All hoses and pistons should be inspected before the start of each work day. If any leakage is observed, or a hydraulic hose appears to be damaged, the employee shall immediately notify the construction supervisor of the situation. Hydraulic hoses should be replaced if any damage to the outer covering is observed. All efforts should be made to avoid situations that may result in leaks, spills, and other releases of pollutants in stormwater discharged to receiving waters.

In the event of a spill, sorbent pads will be deployed as necessary. If a spill occurs, it must be cleaned up promptly. Spill pans or sorbent pads will be placed under leaking equipment until the appropriate repairs are made. Where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302, occurs during a 24-hour period, you must notify the National Response Center (NRC) at (800) 424-8802 in accordance with the requirements of 40 CFR Part 110, 40 CFR Part 117, and 40 CFR Part 302 as soon as you have knowledge of the discharge. The New York State Department of Environmental Conservation (NYSDEC) also needs to be notified of the spill by calling the NYS Spill Hotline: 1-800-457-7362.

Prior to any construction activities, the Owner, Engineer and any Contractors involved with land-distributing activities shall meet to review this SWPPP to ensure a thorough understanding of its contents and overall intent. Certification to this effect shall be signed by the Owner and Contractor. Certifications are provided in the Appendix.

The initial fieldwork shall consist of surveying and staking for erosion control placement and disturbance limits. Trees to be preserved shall be marked and protected prior to commencement of clearing operations. Erosion controls shall be installed per the erosion control plans and details for the project. A pre-construction meeting will be scheduled, if required.

Areas designed for infiltration practices will be marked and protected for storing fill, parking vehicles, and construction materials. Due to the small amount of work associated with this project, the project will be constructed in a single phase.

As areas are stabilized, collected sediments shall be removed and erosion control devices shall be discarded.

4.4 Hydrologic Analysis

The method used to compute project runoff was the Soil Conservation Service (SCS) TR-20. The modeling of the pre and post development scenarios was performed using HydroCAD software (version 10.10). The basis for the analysis was the Type III, 24-hour storm, for the 1-year, 10-year, and 100-year storm events. The rainfall depths for the respective storm events are 2.9, 5.1, and 9.0 inches. The design storms are summarized in Table 3.

The runoff coefficient "CN" and Time of Concentration for existing and post-development conditions were computed using the methodologies described in the SCS publication "Urban Hydrology for Small Watersheds (TR-55). The existing and proposed watersheds are shown on Figures 1 and 2 respectively.

The proposed development will disturb more than one (1) acre of land; therefore, the project requires the preparation of a SWPPP which contains water quality and quantity control plan components.

Table 3: Design Storm Summary

		Storm	*Rainfall (in.)*
Water Quality Volume	*WQv*	*90%*	*1.4*
Channel Protection Volume	*Cpv*	*1 Year*	*2.9*
Overbank Flood Protection Volume	Q_p	*10 Year*	*5.1*
Extreme Flood Protection Volume	Q_r	*100 Year*	*9.0*

The hydrologic analysis was performed utilizing the following methodology:

1. The watersheds are divided into subareas by topography, land use, and SCS soil hydrologic grouping.
2. The flows from the watersheds in the existing condition are computed to determine undeveloped peak runoff and runoff hydrographs at selected design points. The existing and proposed peak flows are presented in Table 4.
3. In the post-development condition, the flows from the proposed development are computed by using the runoff curve numbers taken from the Soil Conservation Service publication TR-55. The watersheds are adjusted for the proposed grading of the site. The runoff flows are hydraulically routed for runoff diversions and new storage structures as necessary. The resulting, proposed peak flows at each design point are presented in Table 4.

The proposed Stormwater practices have been sized based upon the methodology described in the SDM. According to the New York State Stormwater Management Design manual, Stormwater sizing criteria is as follows:

- Water Quality (WQv) must be captured and treated.
- Channel Protection (Cpv) must be provided by detaining the post developed 1-year, 24-hour storm event for 24 hours.
- Overbank Flood (Qp) protection is provided by controlling the peak runoff from the post developed 10-year storm event to the peak runoff from the pre-developed 10-year storm event.
- Extreme Storm (Qf) protection is provided by controlling the peak runoff from the post developed 100- year storm event to the peak runoff from the pre-developed 10-year storm event.
- Runoff Reduction Volume (RRv) is achieved by removing existing parking areas, providing infiltrators, pervious asphalt, and pervious pavers.

4.5 Water Quality (WQv)

The water quality volume (WQv) based on the 90-percentile storm was calculated by using the following formulas:

$$WQv = ((P)(Rv)(A))/12$$

$$R_v = 0.05 + 0.009(I)$$

I = Impervious Cover (percent)
P = 90% Rainfall Event Number (for Westchester use 1.4)
A = Site Area in acres

This site is located in the Croton Watershed which is an Enhanced Phosphorous Basin. This requires implementation of the enhanced phosphorus standards for the capture and treatment of the runoff from the 1-year, 24-hour storm; therefore, the WQv was also computed pursuant to the NYCDEP Watershed Regulations. These volumes were determined by running the HydroCAD software for the proposed condition. The required water quality volumes for this site were calculated for the watersheds tributary to the proposed infiltration practices using the formula above and HydroCAD. The results of these calculations are presented in Table 4.

Table4: Water Quality Volume Summary

Drainage Area	*WQv cu.ft. 90 percentile*	*WQv cu.ft. 1 Year Storm*
DP1	*968*	*1,577*

Since the 1-year storm criteria requires a larger WQv, the sizing of the infiltrators was based on the 1-year storm. The total storage volume of the infiltrators

proposed is 2,626 cubic feet. The additional storage is provided to attenuate peak flows. A rain garden is also provided to further attenuate peak flows and provide additional water quality treatment.

The existing and proposed watershed scenarios were modeled with HydroCAD. Results from the hydrological modeling are summarized in Table 5. Details of the existing and proposed simulations are provided in Appendix D.

Table 5: Summary Table: Peak flow Comparison at Design Points

Design Point	Storm Event (YR)	Existing Peak Flow (CFS)	Proposed Peak Flow (CFS)	Change (CFS)	% Change
DP-1	1	0.57	0.23	-0.34	-59.6%
	10	4.37	4.06	-0.31	-7.1%
	100	14.59	14.52	-0.07	-0.5%

4. INSPECTION AND REPORTING

Unless notified by NYSDEC, the Owner or Operator shall have a qualified inspector conduct site inspections in accordance with the Permit requirement; for a site with on-going soil disturbance activities, a qualified inspector shall conduct a site inspection at least twice every seven (7) calendar days. If a project has received prior written approval by the NYSDEC for the disturbance of greater than five (5) acres of soils at any one time, the inspection frequency shall be increased to a minimum of two (2) per seven (7) calendar day period separated by two (2) calendar days for as long as the five (5) acre threshold is exceeded. The qualified inspector, as defined in the SPDES General Permit guidelines, shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include an/or address the following:

1. Date and time of inspection.
2. Name and title of person(s) performing inspection.
3. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of inspection.
4. A description the condition of the runoff at all points of discharge from the construction site. This shall include identification of any discharges of sediment from the construction site. Include discharges from conveyance systems (i.e., pipes, culverts, ditches, etc.) and overland flow.
5. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site which receive runoff from disturbed areas.
6. Identification of all erosion and sediment control practices that need repair or maintenance.

7. Identification of all erosion and sediment control practices that were not installed properly or are not functioning as designed and need to be reinstalled or replaced.
8. Description and sketch of areas that are disturbed at the time of the inspection and areas that have been stabilized (temporary and/or final) since the last inspection.
9. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards.
10. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices; and to correct deficiencies identified with the construction of the post-construction stormwater management practices.
11. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The qualified inspector shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed.

The Owner or Operator shall maintain a record of all inspection reports in a site log book until all disturbed areas have achieved final stabilization and the Notice of Termination (NOT) has been submitted to the DEC. The site log book shall be maintained on site and made available to the permitting authority upon request.

Prior to filing of the NOT or the end of permit term, the Owner or Operator shall have the qualified professional perform a final site inspection. The qualified professional shall be provided with a certified final as-built survey. The survey shall locate and provide detailed information for the permanent stormwater facilities. The information provided shall include and not be limited to the following: rim and invert elevations of all structures, outlets, weirs, etc.; pipe material and sizes; basin dimensions, elevations and topography; and any other pertinent information specific to the stormwater practice constructed.

Upon final review of the as-built survey and completed site improvements, the qualified professional shall certify that the site has undergone final stabilization 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.

The qualified professional shall then complete the NOT to be signed by the Owner. The NOT with required supporting documentation shall be submitted to the MS4 for a signature of approval which will then be forwarded to the NYS DEC.

5. MAINTENANCE OF STORMWATER MANAGEMENT PRACTICES

5.1 During Construction

The Operator shall be responsible for the installation and maintenance of all temporary erosion measures. The Operator shall also be responsible for the installation of permanent control measures. The Operator shall be responsible for the maintenance of all permanent control measures. The maintenance of the temporary erosion control measures will be the responsibility of the Owner:

Alexander Cochran
716 Kitchawan Road
Ossining, NY 10562
(914) 602-4005

All temporary erosion control measures installed on the project site shall be observed and maintained to ensure that they are operating as intended as follows:

1. Temporary measures will be inspected by the trained Contractor daily. Any necessary repairs, replacements, or upgrades will be made immediately.
2. Accumulated sediments will be removed as required to keep the measures functional. In the case of silt fencing and haybales (if applicable), remove deposits where accumulations reach half the height of the fence or bale. In the case of sediment basins, remove deposits whenever their capacity has been reduced by fifty percent (50%) from the design capacity.
3. All erosion of the silt fence will be repaired immediately with compacted backfill materials.
4. Disturbed areas, stockpile areas, areas used for storage of materials that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system or downstream.
5. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.
6. Locations where vehicles enter or exit the site shall be inspected for evidence of off-site sediment tracking.
7. The permanent storm drainage system shall be inspected and cleaned of all sediment prior to completion of the project.

5.2 Post Construction

The long-term operation and maintenance of the stormwater management system will be the responsibility of the Owner:

Alexander Cochran
716 Kitchawan Road
Ossining, NY 10562
(914) 602-4005

Infiltration practices shall never serve as a sediment control device during site construction phase. In addition, the Erosion and Sediment Control plan for the site shall clearly indicate how sediment will be prevented from entering an infiltration facility. Normally, the use of diversion berms around the perimeter of the infiltration practice, along with immediate vegetative stabilization and/or mulching can achieve this goal.

The 750 gallon pretreatment tank shall be inspected for any debris that will restrict inlet flow rates, or for large quantity of sediment accumulation twice per year. The inspection port in in the Cultec infiltrators shall be checked twice a year after a major rain event. If water is still observed in the infiltrator more than 72 hours after a rain storm, the infiltration practice may not be draining properly requiring a more thorough inspection. The operator will have to measure the depth of sediment above the gravel layer once all the water percolates into the ground. If it is determined that a layer of sediment has entered the chamber and is causing clogging, the operator shall remove the sediment with vacuum equipment.

6. SUMMARY AND CONCLUSION

Based on the foregoing analysis, the proposed Stormwater management practices have been designed in conformance with the Stormwater Design Manual. The inclusion of stormwater Best Management Practices (BMP) for treatment of runoff will provide a significant amount of treatment of nutrients and sediment. This treatment is possible due to the inclusion of stormwater treatment devices in accordance with the NYSDEC guidelines.

As can be seen in the peak flow comparison table, stormwater runoff is maintained or reduced when compared to existing or pre-construction runoff rates in the existing drainage systems. Therefore, the project has included stormwater mitigation through the use of NYSDEC acceptable practices to reduce and eliminate these potential impacts to stormwater runoff. The proposed mitigation will provide adequate treatment and peak flow reduction for the runoff leaving the site.

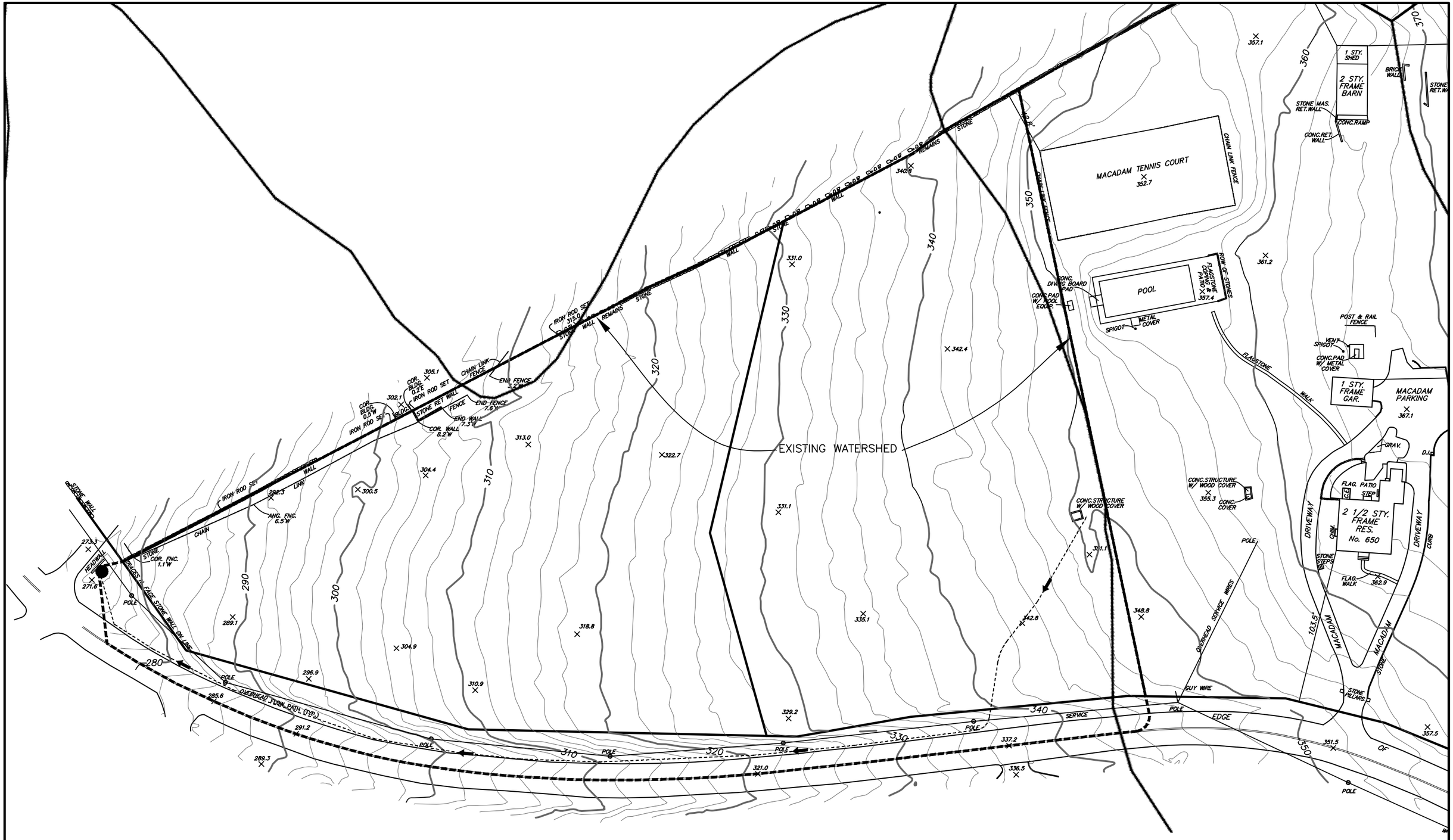


FIGURE 1
EXISTING CONDITIONS

FIGURE 2
PROPOSED CONDITIONS

Appendix A
Contractors Certification

Pines Bridge Road, LLC
716 Kitchawan Road
Ossining, NY 10562

CONTRACTOR'S CERTIFICATION

I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the owner or operator must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I am aware there are significant penalties for submitting false information that I do not believe to be true, including the possibility of time and imprisonment for knowing violations.

Company Name **Pines Bridge Road, LLC**	
Address: **716 Kichawan Road, Ossining, NY 10562**	
Telephone Number **(914) 602-4005**	
Name and Title **Alexander Cochran, Managing Member**	
Signature	Date
Permit Identification No.	
Name and Title of Trained Contractor	
Elements of SWPPP Contractor is Responsible for	

Appendix B
USDA Custom Soil Resource Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Westchester County, New York

650 Pines Bridge Road

December 30, 2020

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

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

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

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

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

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

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

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

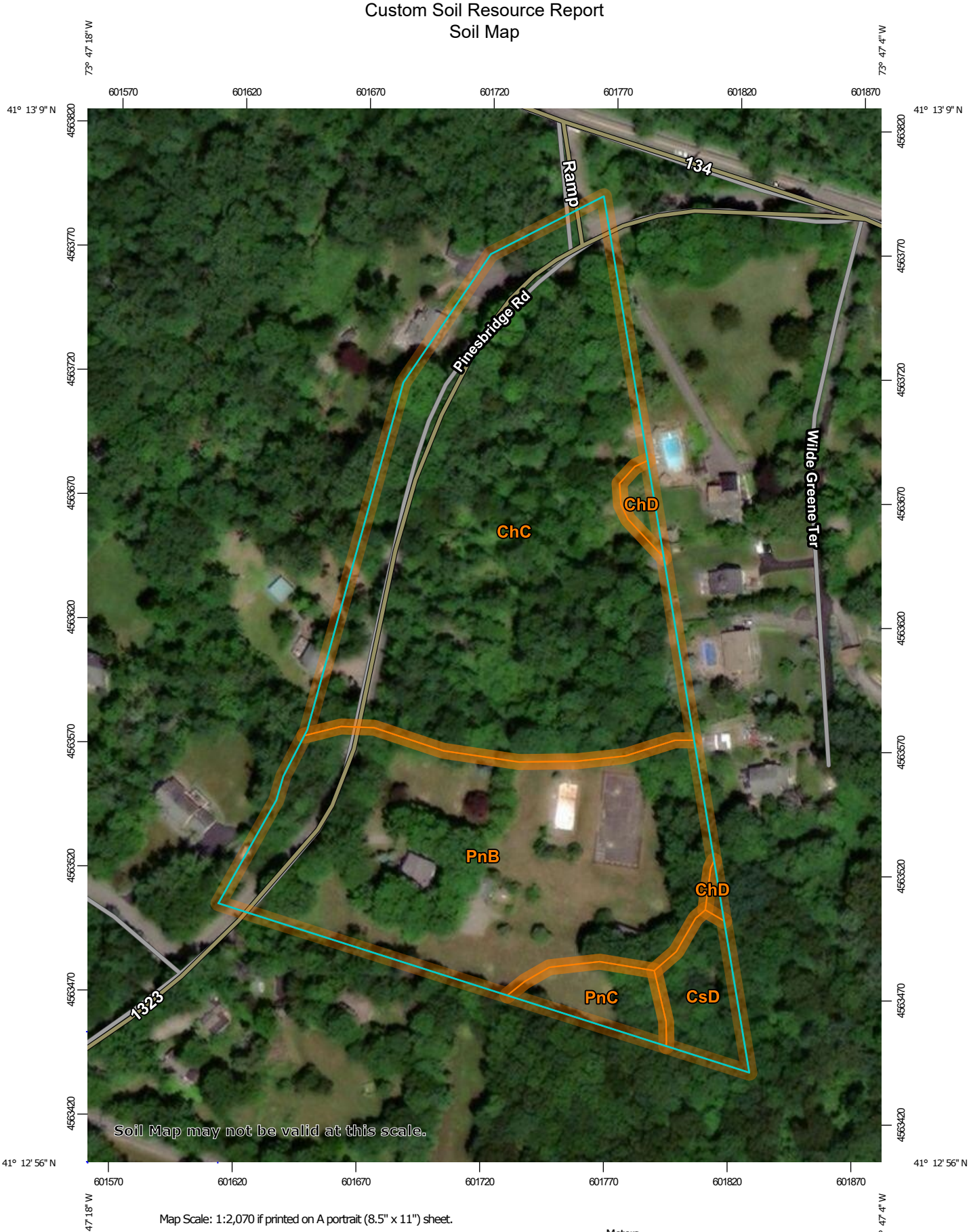
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,070 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

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

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

Soil Survey Area: Westchester County, New York
Survey Area Data: Version 16, Jun 11, 2020

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

Date(s) aerial images were photographed: Dec 31, 2009—Oct 16, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ChC	Charlton fine sandy loam, 8 to 15 percent slopes	5.6	54.7%
ChD	Charlton fine sandy loam, 15 to 25 percent slopes	0.1	1.1%
CsD	Chatfield-Charlton complex, 15 to 35 percent slopes, very rocky	0.4	3.8%
PnB	Paxton fine sandy loam, 3 to 8 percent slopes	3.8	37.4%
PnC	Paxton fine sandy loam, 8 to 15 percent slopes	0.3	3.1%
Totals for Area of Interest		**10.2**	**100.0%**

Map Unit Descriptions

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

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

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

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

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

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

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

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

Westchester County, New York

ChC—Charlton fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2wh0q
Elevation: 0 to 1,440 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Charlton

Setting

Landform: Ground moraines, ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw - 7 to 22 inches: gravelly fine sandy loam
C - 22 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 5 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Sutton, fine sandy loam

Percent of map unit: 5 percent
Landform: Hills, ridges, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Chatfield

Percent of map unit: 3 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Canton

Percent of map unit: 2 percent
Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Side slope, nose slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

ChD—Charlton fine sandy loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2wh0t
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Charlton and similar soils: 85 percent

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

Description of Charlton

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw - 7 to 22 inches: gravelly fine sandy loam
C - 22 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Sutton, fine sandy loam

Percent of map unit: 5 percent
Landform: Ridges, ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Paxton

Percent of map unit: 5 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex

Hydric soil rating: No

Chatfield

Percent of map unit: 3 percent
Landform: Hills, ridges
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Canton

Percent of map unit: 2 percent
Landform: Ridges, hills, moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

CsD—Chatfield-Charlton complex, 15 to 35 percent slopes, very rocky

Map Unit Setting

National map unit symbol: 2w69k
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Chatfield, very stony, and similar soils: 45 percent
Charlton, very stony, and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chatfield, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
Bw - 2 to 30 inches: gravelly fine sandy loam

2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton, Very Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Leicester, very stony
Percent of map unit: 6 percent
Landform: Hills, ground moraines, depressions, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Hollis, very stony
Percent of map unit: 5 percent
Landform: Hills, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Rock outcrop
Percent of map unit: 5 percent
Landform: Ridges, hills
Hydric soil rating: No

Sutton, very stony
Percent of map unit: 4 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

PnB—Paxton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 2t2qp
Elevation: 0 to 1,570 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Paxton and similar soils: 80 percent

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

Description of Paxton

Setting

Landform: Drumlins, ground moraines, hills
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge

Percent of map unit: 9 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 6 percent
Landform: Drainageways, hills, ground moraines, depressions
Landform position (two-dimensional): Backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, base slope, dip
Down-slope shape: Concave

Across-slope shape: Concave
Hydric soil rating: Yes

Charlton

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

PnC—Paxton fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w66y
Elevation: 0 to 1,320 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Paxton

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None

Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 7 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge

Percent of map unit: 6 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 2 percent
Landform: Drumlins, hills, ground moraines, depressions, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix C
FEMA FIRMette

National Flood Hazard Layer FIRMette

FEMA

73°47'30"W 41°13'20"N

73°46'53"W 41°12'53"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

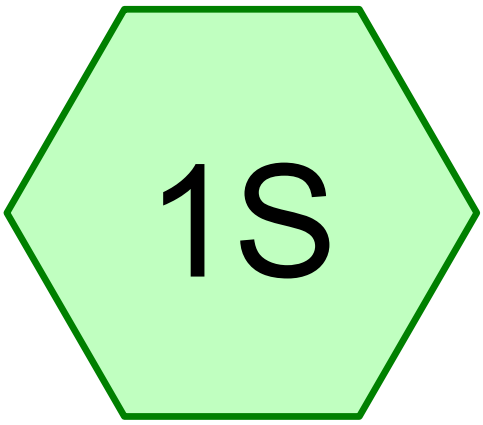
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/4/2021 at 9:46 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix D
HydroCAD Results



Existing

Subcat Reach Pond Link

Routing Diagram for 650 Existing
Prepared by HP, Printed 1/5/2021

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type III 24-hr		Default	24.00	1	2.90	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.10	2
3	100-Year	Type III 24-hr		Default	24.00	1	9.00	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
187,783	60	Woods, Fair, HSG B (1S)
187,783	**60**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
187,783	HSG B	1S
0	HSG C	
0	HSG D	
0	Other	
187,783		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchm Numbers
0	187,783	0	0	0	187,783	Woods, Fair	
0	**187,783**	**0**	**0**	**0**	**187,783**	**TOTAL AREA**	

Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Runoff Area=187,783 sf 0.00% Impervious Runoff Depth=0.30"
Flow Length=794' Tc=17.5 min CN=60 Runoff=0.57 cfs 4,665 cf

Total Runoff Area = 187,783 sf Runoff Volume = 4,665 cf Average Runoff Depth = 0.30"
100.00% Pervious = 187,783 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: Existing

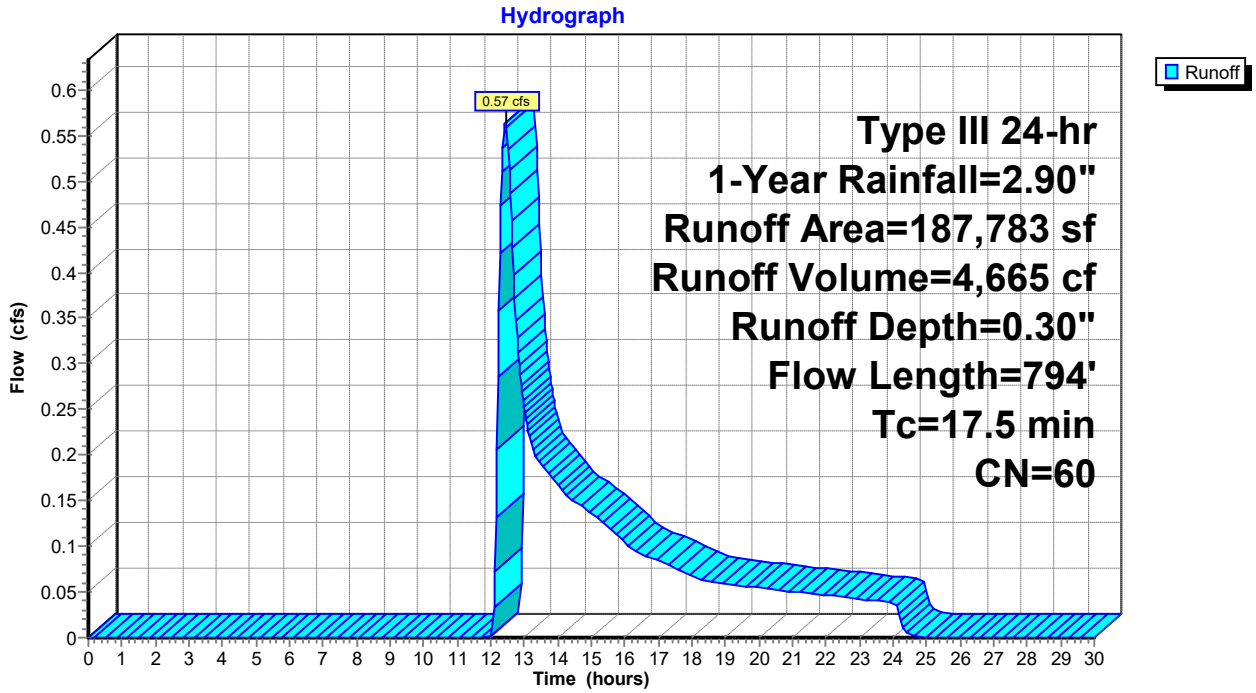
Runoff = 0.57 cfs @ 12.45 hrs, Volume= 4,665 cf, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 1-Year Rainfall=2.90"

Area (sf)	CN	Description
187,783	60	Woods, Fair, HSG B
187,783		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	153	0.0980	0.17		**Sheet Flow, Lot** Woods: Light underbrush n= 0.400 P2= 3.50"
2.2	641	0.1030	4.81		**Shallow Concentrated Flow, PB Swale** Grassed Waterway Kv= 15.0 fps
17.5	794	Total			

Subcatchment 1S: Existing



Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Runoff Area=187,783 sf 0.00% Impervious Runoff Depth=1.36"
Flow Length=794' Tc=17.5 min CN=60 Runoff=4.37 cfs 21,280 cf

Total Runoff Area = 187,783 sf Runoff Volume = 21,280 cf Average Runoff Depth = 1.36"
100.00% Pervious = 187,783 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: Existing

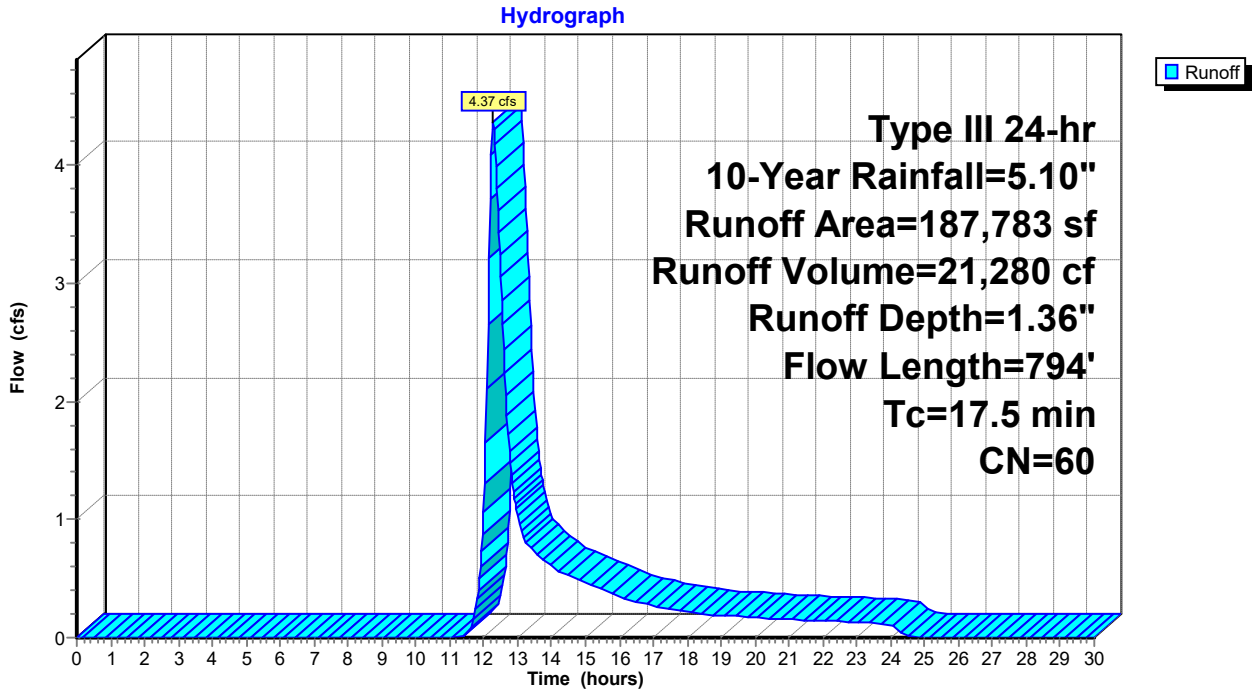
Runoff = 4.37 cfs @ 12.27 hrs, Volume= 21,280 cf, Depth= 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.10"

Area (sf)	CN	Description
187,783	60	Woods, Fair, HSG B
187,783		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	153	0.0980	0.17		**Sheet Flow, Lot** Woods: Light underbrush n= 0.400 P2= 3.50"
2.2	641	0.1030	4.81		**Shallow Concentrated Flow, PB Swale** Grassed Waterway Kv= 15.0 fps
17.5	794	Total			

Subcatchment 1S: Existing



Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Existing Runoff Area=187,783 sf 0.00% Impervious Runoff Depth=4.10"
Flow Length=794' Tc=17.5 min CN=60 Runoff=14.59 cfs 64,171 cf

Total Runoff Area = 187,783 sf Runoff Volume = 64,171 cf Average Runoff Depth = 4.10"
100.00% Pervious = 187,783 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: Existing

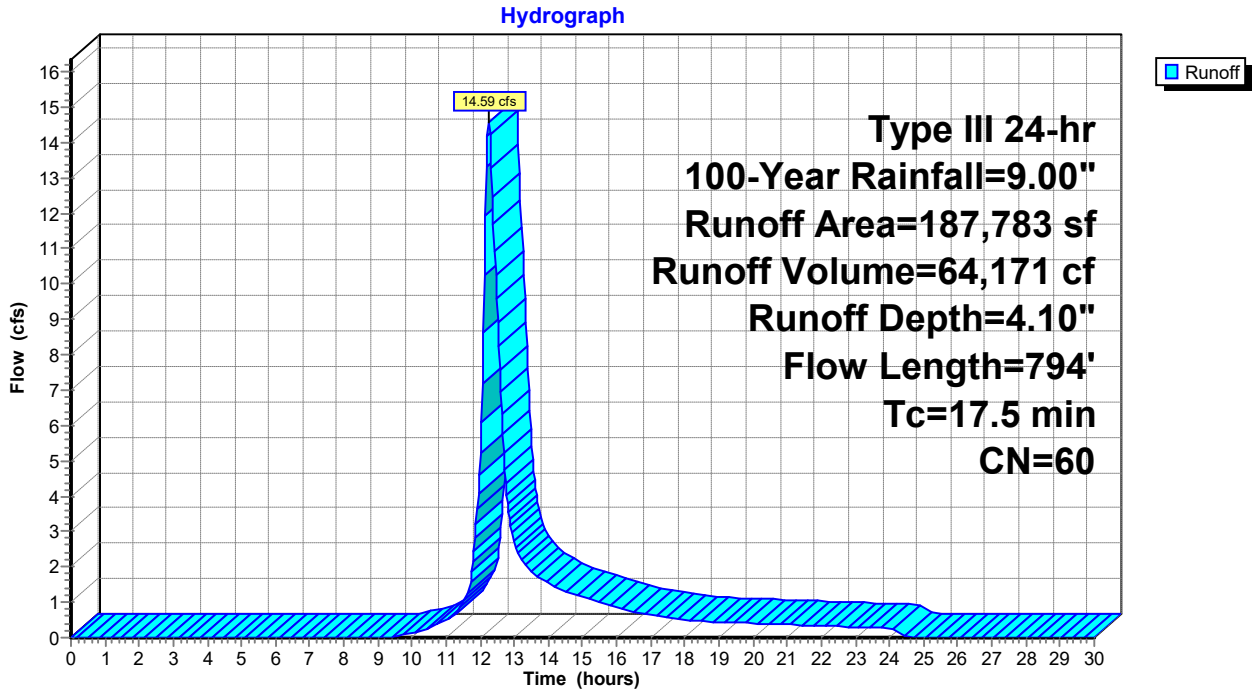
Runoff = 14.59 cfs @ 12.25 hrs, Volume= 64,171 cf, Depth= 4.10"

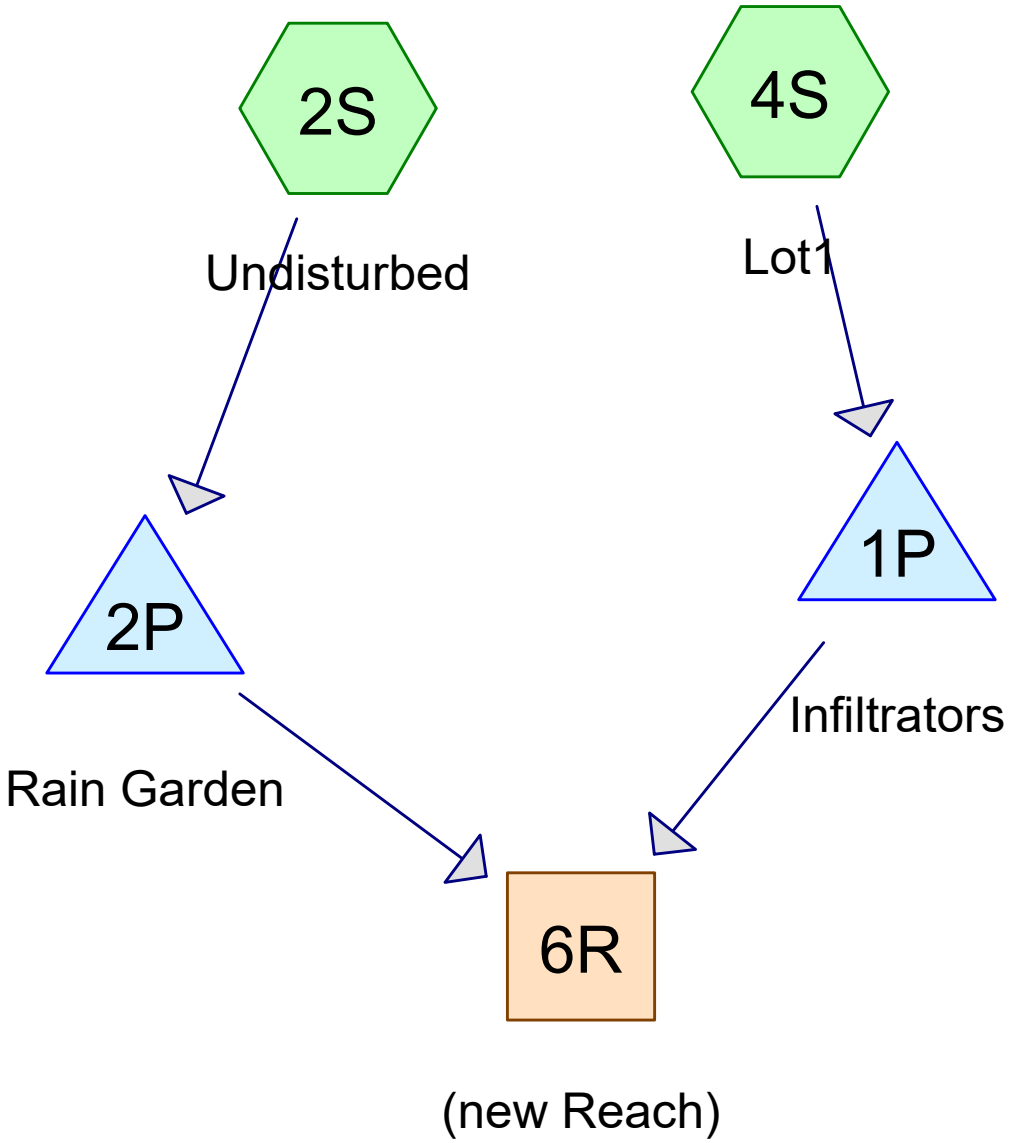
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=9.00"

Area (sf)	CN	Description
187,783	60	Woods, Fair, HSG B
187,783		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.3	153	0.0980	0.17		**Sheet Flow, Lot** Woods: Light underbrush n= 0.400 P2= 3.50"
2.2	641	0.1030	4.81		**Shallow Concentrated Flow, PB Swale** Grassed Waterway Kv= 15.0 fps
17.5	794	Total			

Subcatchment 1S: Existing





Subcat Reach Pond Link

Routing Diagram for 650 Proposed
Prepared by HP, Printed 1/5/2021

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type III 24-hr		Default	24.00	1	2.90	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.10	2
3	100-Year	Type III 24-hr		Default	24.00	1	9.00	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
61,517	61	>75% Grass cover, Good, HSG B (2S, 4S)
9,558	98	Paved parking, HSG B (2S, 4S)
110,543	60	Woods, Fair, HSG B (2S)
6,165	73	Woods, Fair, HSG C (2S)
187,783	**63**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
181,618	HSG B	2S, 4S
6,165	HSG C	2S
0	HSG D	
0	Other	
187,783		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover
0	61,517	0	0	0	61,517	>75% Grass cover, Good
0	9,558	0	0	0	9,558	Paved parking
0	110,543	6,165	0	0	116,708	Woods, Fair
0	**181,618**	**6,165**	**0**	**0**	**187,783**	**TOTAL AREA**

Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: Undisturbed Runoff Area=170,823 sf 0.75% Impervious Runoff Depth=0.33"
Flow Length=210' Slope=0.1330 '/' Tc=17.4 min CN=61 Runoff=0.60 cfs 4,669 cf

Subcatchment 4S: Lot1 Runoff Area=16,960 sf 48.80% Impervious Runoff Depth=1.12"
Flow Length=147' Slope=0.0210 '/' Tc=1.5 min CN=79 Runoff=0.58 cfs 1,577 cf

Reach 6R: (new Reach) Avg. Flow Depth=0.13' Max Vel=1.28 fps Inflow=0.30 cfs 3,513 cf
n=0.080 L=641.0' S=0.1061 '/' Capacity=16.17 cfs Outflow=0.23 cfs 3,513 cf

Pond 1P: Infiltrators Peak Elev=336.41' Storage=1,577 cf Inflow=0.58 cfs 1,577 cf
Outflow=0.00 cfs 0 cf

Pond 2P: Rain Garden Peak Elev=288.03' Storage=1,179 cf Inflow=0.60 cfs 4,669 cf
Outflow=0.30 cfs 3,513 cf

Total Runoff Area = 187,783 sf Runoff Volume = 6,246 cf Average Runoff Depth = 0.40"
94.91% Pervious = 178,225 sf 5.09% Impervious = 9,558 sf

Summary for Subcatchment 2S: Undisturbed

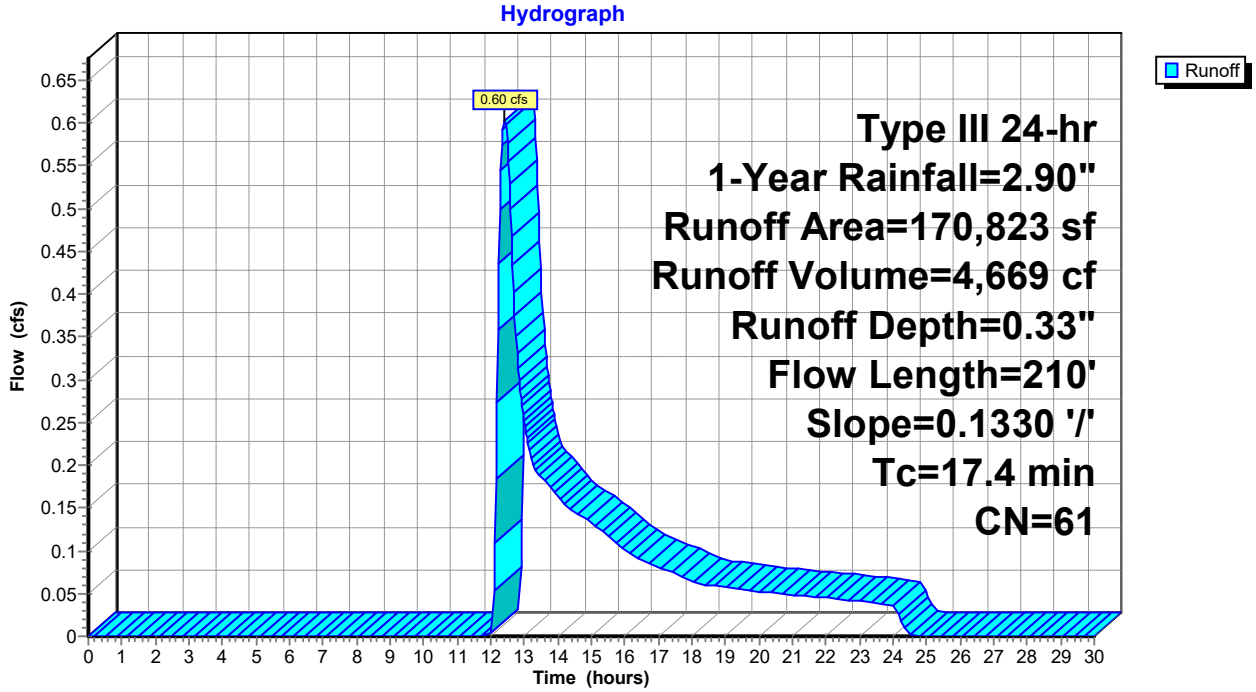
Runoff = 0.60 cfs @ 12.42 hrs, Volume= 4,669 cf, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 1-Year Rainfall=2.90"

Area (sf)	CN	Description
110,543	60	Woods, Fair, HSG B
6,165	73	Woods, Fair, HSG C
1,281	98	Paved parking, HSG B
52,834	61	>75% Grass cover, Good, HSG B
170,823	61	Weighted Average
169,542		99.25% Pervious Area
1,281		0.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	210	0.1330	0.20		**Sheet Flow, Lot** Woods: Light underbrush n= 0.400 P2= 3.50"

Subcatchment 2S: Undisturbed



Summary for Subcatchment 4S: Lot1

[49] Hint: Tc<2dt may require smaller dt

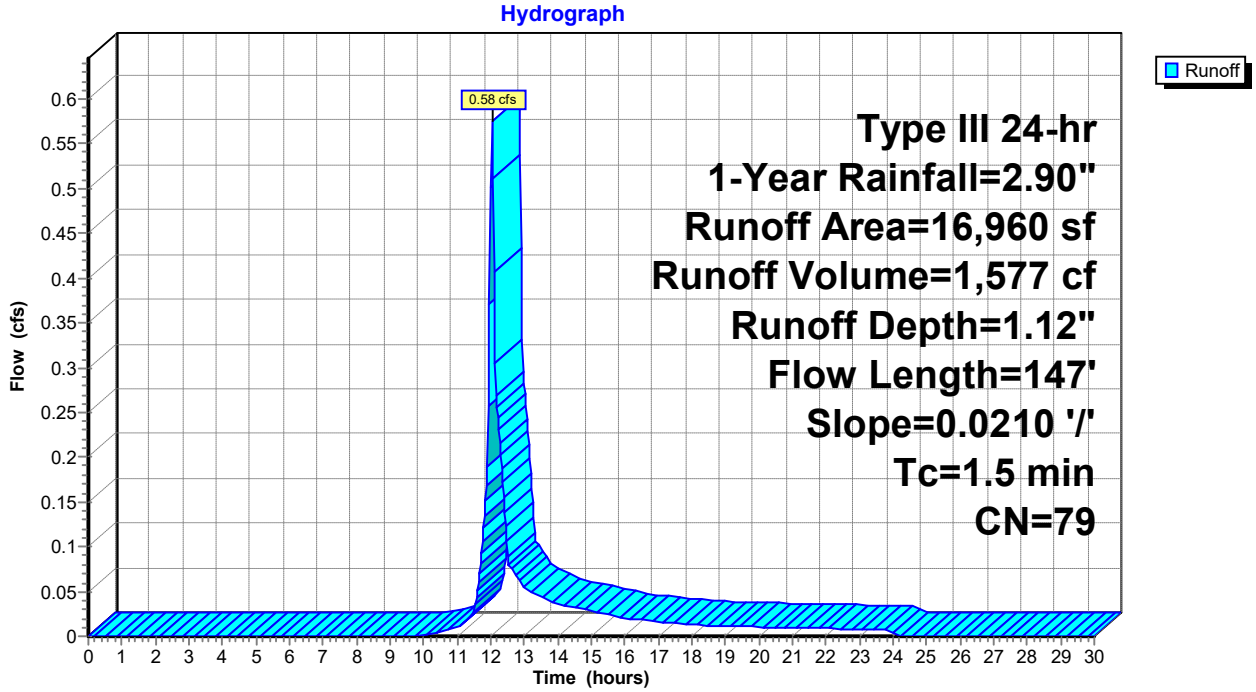
Runoff = 0.58 cfs @ 12.03 hrs, Volume= 1,577 cf, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 1-Year Rainfall=2.90"

Area (sf)	CN	Description
8,277	98	Paved parking, HSG B
8,683	61	>75% Grass cover, Good, HSG B
16,960	79	Weighted Average
8,683		51.20% Pervious Area
8,277		48.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	147	0.0210	1.58		**Sheet Flow, Lot** Smooth surfaces n= 0.011 P2= 3.50"

Subcatchment 4S: Lot1



Summary for Reach 6R: (new Reach)

[81] Warning: Exceeded Pond 1P by 2.45' @ 12.99 hrs
[81] Warning: Exceeded Pond 2P by 52.50' @ 0.00 hrs

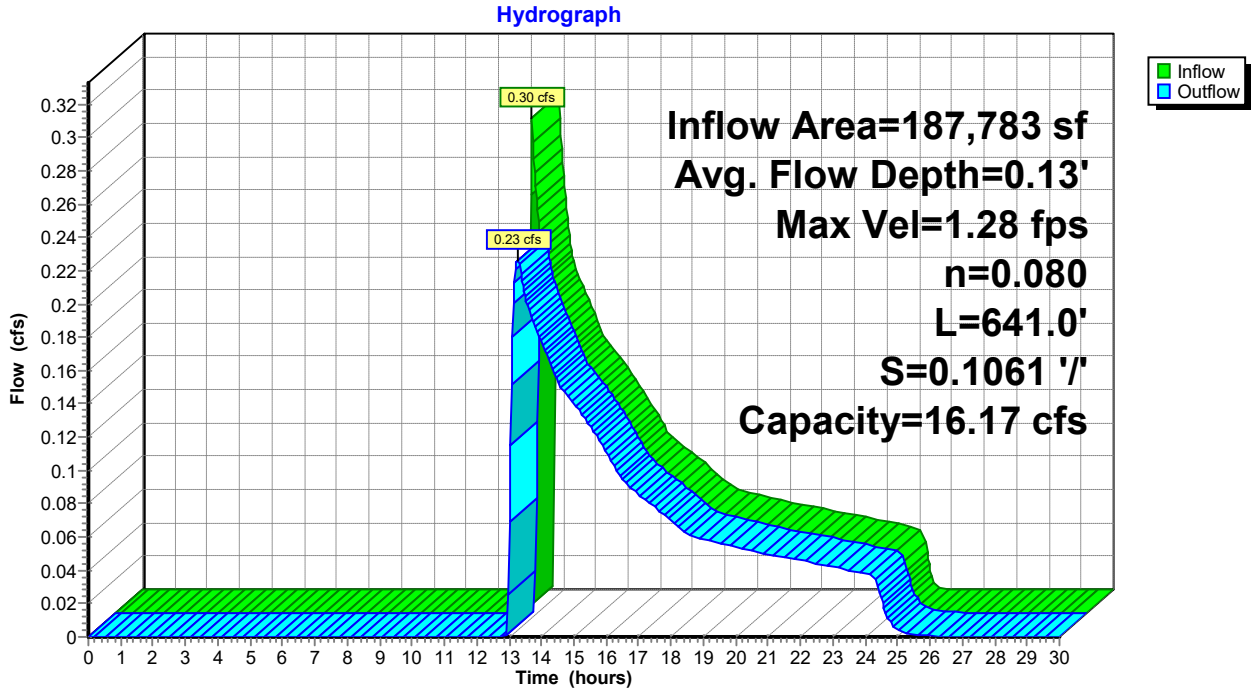
Inflow Area = 187,783 sf, 5.09% Impervious, Inflow Depth = 0.22" for 1-Year event
Inflow = 0.30 cfs @ 12.88 hrs, Volume= 3,513 cf
Outflow = 0.23 cfs @ 13.26 hrs, Volume= 3,513 cf, Atten= 24%, Lag= 23.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Max. Velocity= 1.28 fps, Min. Travel Time= 8.3 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 14.1 min

Peak Storage= 113 cf @ 13.12 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 1.77'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 16.17 cfs

1.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 7.00'
Length= 641.0' Slope= 0.1061 '/'
Inlet Invert= 338.00', Outlet Invert= 270.00'

‡



Summary for Pond 1P: Infiltrators

Inflow Area = 16,960 sf, 48.80% Impervious, Inflow Depth = 1.12" for 1-Year event
Inflow = 0.58 cfs @ 12.03 hrs, Volume= 1,577 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Peak Elev= 336.41' @ 24.12 hrs Surf.Area= 1,168 sf Storage= 1,577 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1A	334.50'	1,006 cf	**25.67'W x 45.50'L x 3.54'H Field A** 4,136 cf Overall - 1,621 cf Embedded = 2,515 cf x 40.0% Voids
#2A	335.00'	1,621 cf	**Cultec R-330XLHD** x 30 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		2,627 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	338.00'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=334.50' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Infiltrators - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

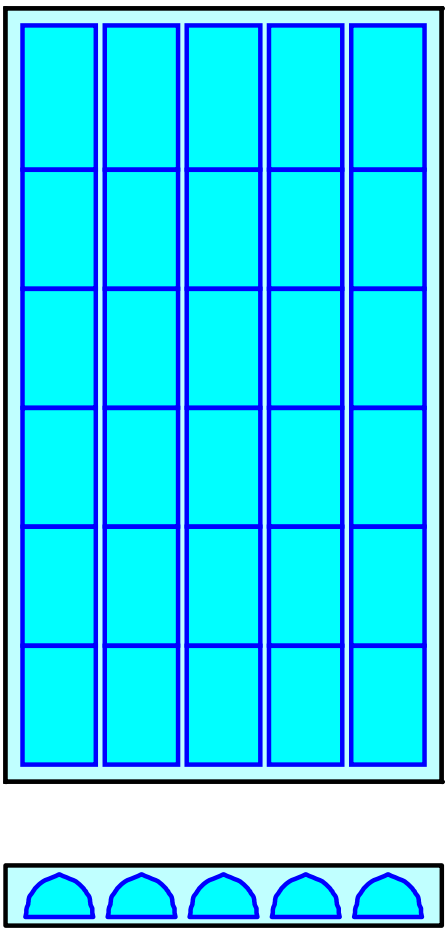
6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

30 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 1,620.6 cf Chamber Storage

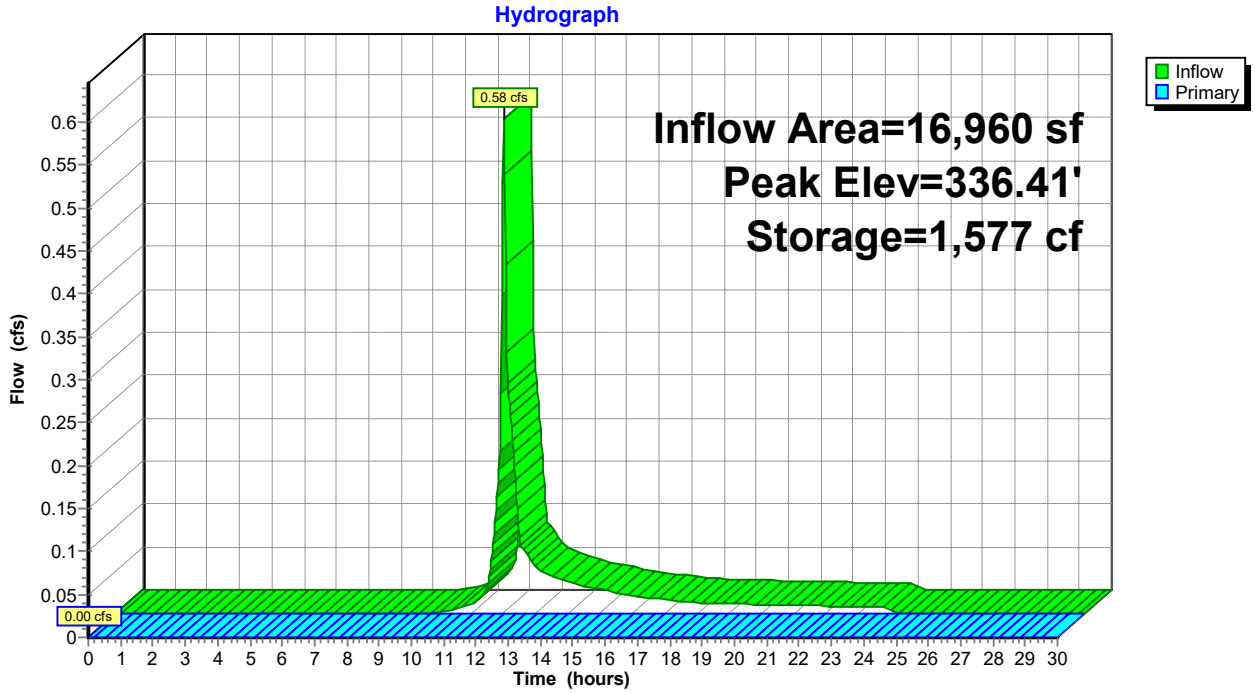
4,136.1 cf Field - 1,620.6 cf Chambers = 2,515.5 cf Stone x 40.0% Voids = 1,006.2 cf Stone Storage

Chamber Storage + Stone Storage = 2,626.8 cf = 0.060 af
Overall Storage Efficiency = 63.5%
Overall System Size = 45.50' x 25.67' x 3.54'

30 Chambers
153.2 cy Field
93.2 cy Stone



Pond 1P: Infiltrators



Summary for Pond 2P: Rain Garden

Inflow Area = 170,823 sf, 0.75% Impervious, Inflow Depth = 0.33" for 1-Year event
Inflow = 0.60 cfs @ 12.42 hrs, Volume= 4,669 cf
Outflow = 0.30 cfs @ 12.88 hrs, Volume= 3,513 cf, Atten= 51%, Lag= 27.6 min
Primary = 0.30 cfs @ 12.88 hrs, Volume= 3,513 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Peak Elev= 288.03' @ 12.88 hrs Surf.Area= 765 sf Storage= 1,179 cf

Plug-Flow detention time= 164.0 min calculated for 3,513 cf (75% of inflow)
Center-of-Mass det. time= 64.6 min (1,003.8 - 939.2)

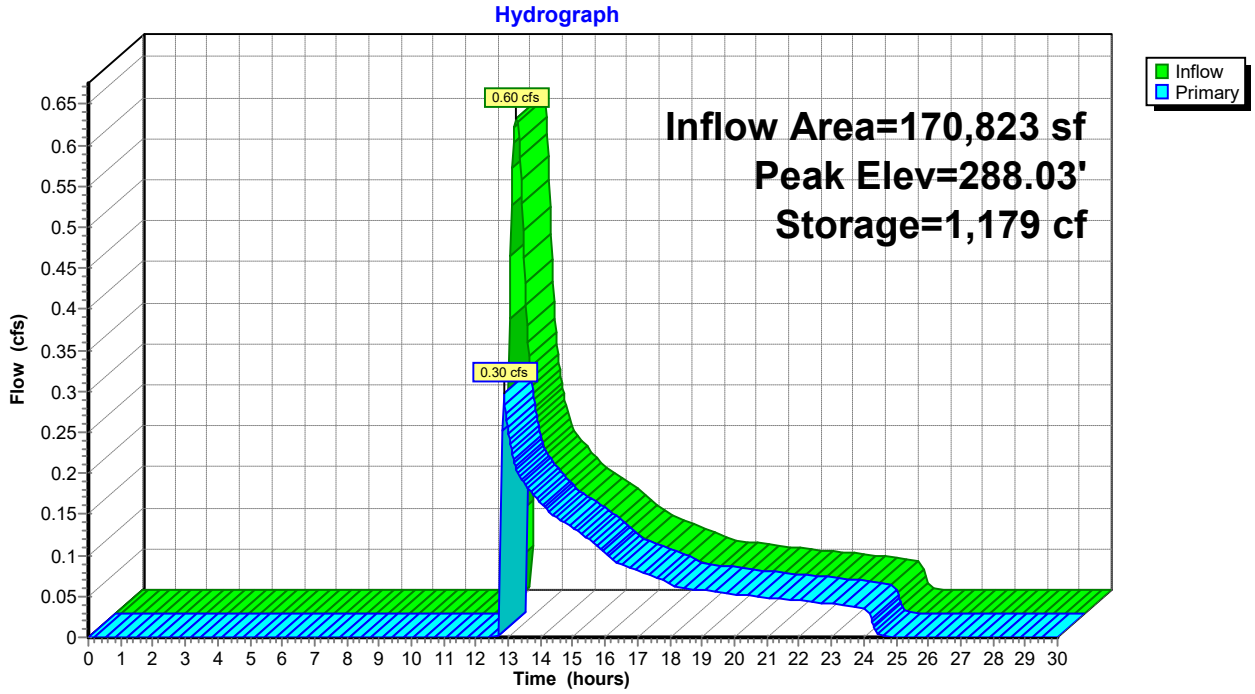
Volume	Invert	Avail.Storage	Storage Description
#1	285.50'	1,553 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
285.50	200	0	0
286.00	276	119	119
288.00	761	1,037	1,156
288.50	825	397	1,553

Device	Routing	Invert	Outlet Devices
#1	Primary	288.00'	**20.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.27 cfs @ 12.88 hrs HW=288.03' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.27 cfs @ 0.46 fps)

Pond 2P: Rain Garden



Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: Undisturbed Runoff Area=170,823 sf 0.75% Impervious Runoff Depth=1.43"
Flow Length=210' Slope=0.1330 '/' Tc=17.4 min CN=61 Runoff=4.25 cfs 20,350 cf

Subcatchment 4S: Lot1 Runoff Area=16,960 sf 48.80% Impervious Runoff Depth=2.89"
Flow Length=147' Slope=0.0210 '/' Tc=1.5 min CN=79 Runoff=1.52 cfs 4,082 cf

Reach 6R: (new Reach) Avg. Flow Depth=0.54' Max Vel=2.84 fps Inflow=4.25 cfs 20,668 cf
n=0.080 L=641.0' S=0.1061 '/' Capacity=16.17 cfs Outflow=4.06 cfs 20,668 cf

Pond 1P: Infiltrators Peak Elev=338.08' Storage=2,627 cf Inflow=1.52 cfs 4,082 cf
Outflow=0.12 cfs 1,474 cf

Pond 2P: Rain Garden Peak Elev=288.18' Storage=1,298 cf Inflow=4.25 cfs 20,350 cf
Outflow=4.25 cfs 19,194 cf

Total Runoff Area = 187,783 sf Runoff Volume = 24,431 cf Average Runoff Depth = 1.56"
94.91% Pervious = 178,225 sf 5.09% Impervious = 9,558 sf

Summary for Subcatchment 2S: Undisturbed

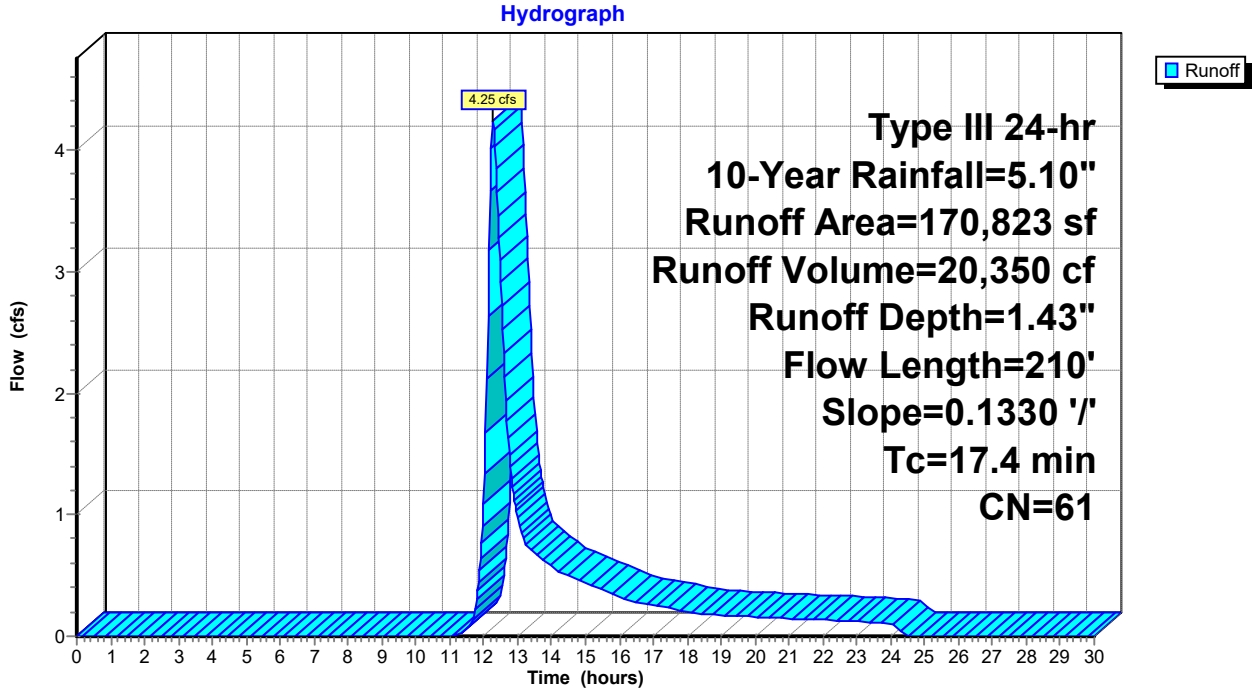
Runoff = 4.25 cfs @ 12.27 hrs, Volume= 20,350 cf, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.10"

Area (sf)	CN	Description
110,543	60	Woods, Fair, HSG B
6,165	73	Woods, Fair, HSG C
1,281	98	Paved parking, HSG B
52,834	61	>75% Grass cover, Good, HSG B
170,823	61	Weighted Average
169,542		99.25% Pervious Area
1,281		0.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	210	0.1330	0.20		**Sheet Flow, Lot** Woods: Light underbrush n= 0.400 P2= 3.50"

Subcatchment 2S: Undisturbed



Summary for Subcatchment 4S: Lot1

[49] Hint: Tc<2dt may require smaller dt

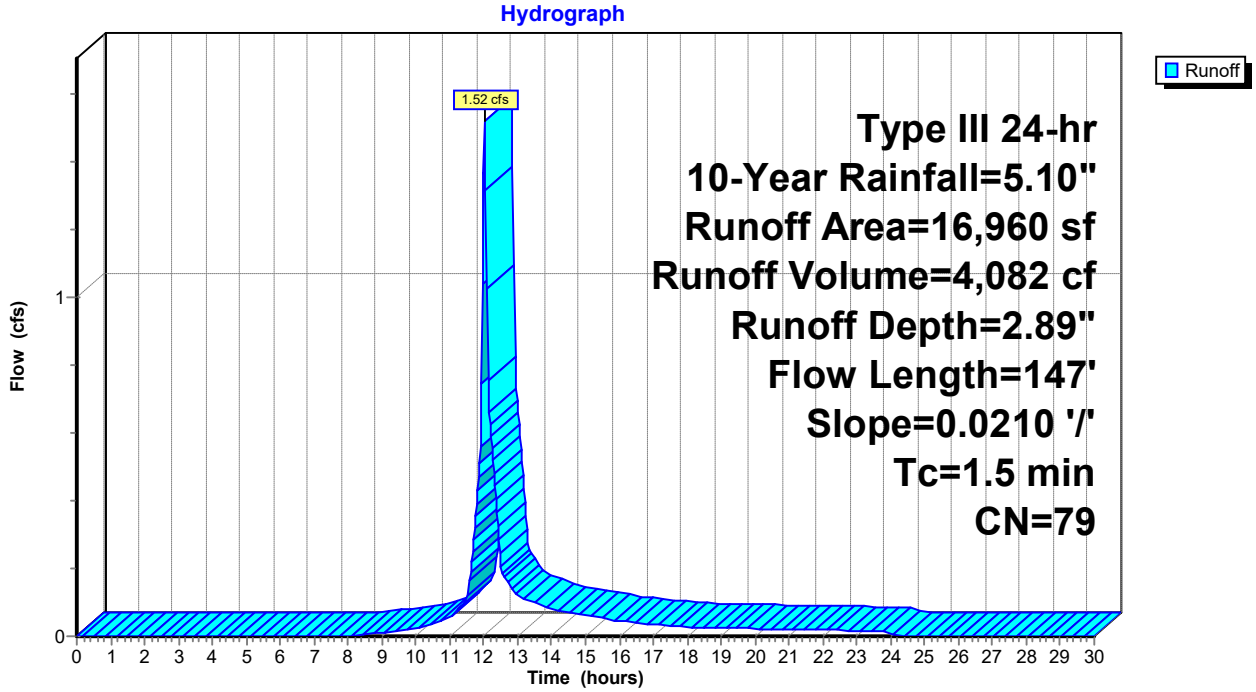
Runoff = 1.52 cfs @ 12.03 hrs, Volume= 4,082 cf, Depth= 2.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.10"

Area (sf)	CN	Description
8,277	98	Paved parking, HSG B
8,683	61	>75% Grass cover, Good, HSG B
16,960	79	Weighted Average
8,683		51.20% Pervious Area
8,277		48.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	147	0.0210	1.58		**Sheet Flow, Lot** Smooth surfaces n= 0.011 P2= 3.50"

Subcatchment 4S: Lot1



Summary for Reach 6R: (new Reach)

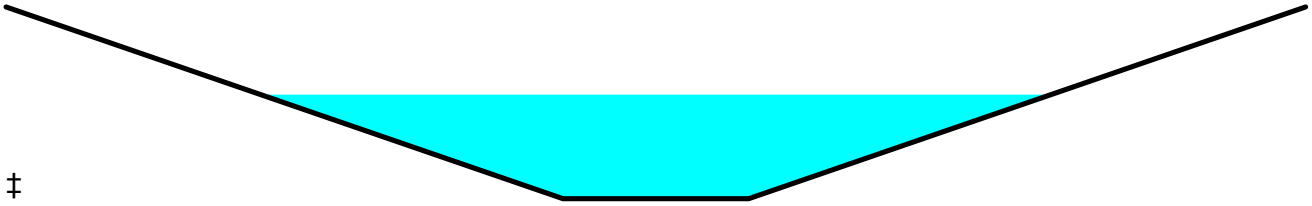
[81] Warning: Exceeded Pond 1P by 1.73' @ 12.18 hrs
[81] Warning: Exceeded Pond 2P by 52.50' @ 0.00 hrs

Inflow Area = 187,783 sf, 5.09% Impervious, Inflow Depth = 1.32" for 10-Year event
Inflow = 4.25 cfs @ 12.27 hrs, Volume= 20,668 cf
Outflow = 4.06 cfs @ 12.40 hrs, Volume= 20,668 cf, Atten= 4%, Lag= 7.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Max. Velocity= 2.84 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 1.16 fps, Avg. Travel Time= 9.2 min

Peak Storage= 915 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.54' , Surface Width= 4.26'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 16.17 cfs

1.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 7.00'
Length= 641.0' Slope= 0.1061 '/'
Inlet Invert= 338.00', Outlet Invert= 270.00'



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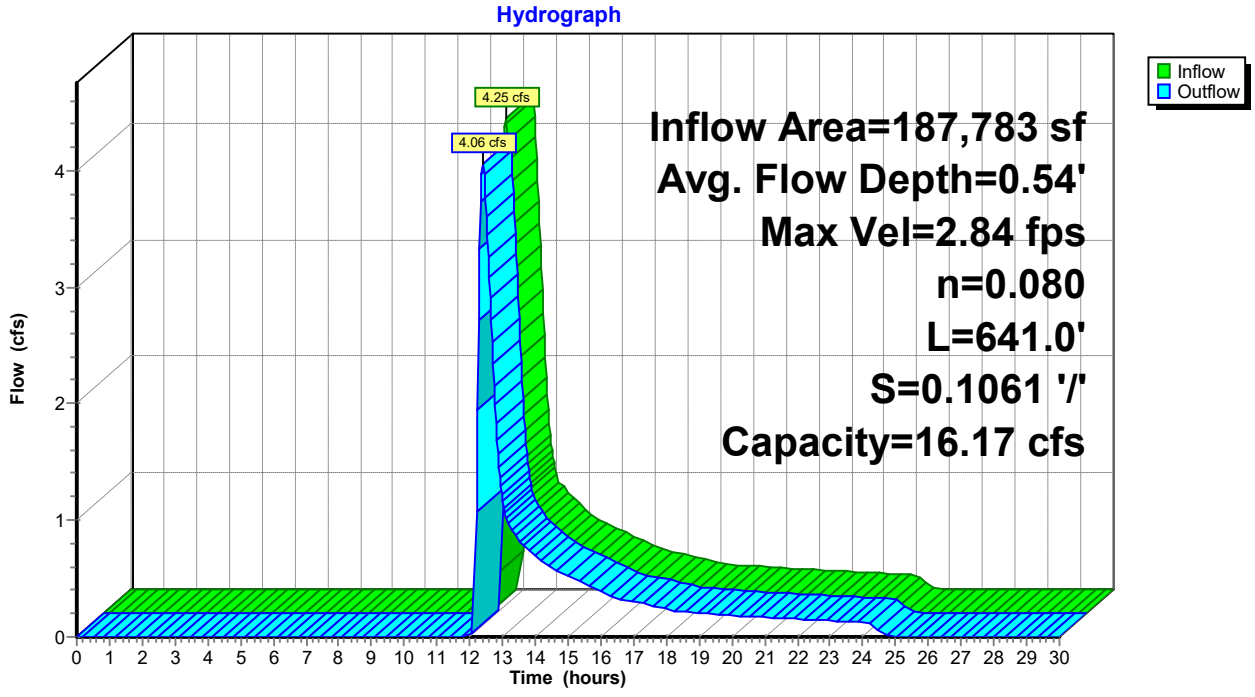
Reach 6R: (new Reach)



Summary for Pond 1P: Infiltrators

[93] Warning: Storage range exceeded by 0.04'
[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=49)

Inflow Area = 16,960 sf, 48.80% Impervious, Inflow Depth = 2.89" for 10-Year event
Inflow = 1.52 cfs @ 12.03 hrs, Volume= 4,082 cf
Outflow = 0.12 cfs @ 13.20 hrs, Volume= 1,474 cf, Atten= 92%, Lag= 70.3 min
Primary = 0.12 cfs @ 13.20 hrs, Volume= 1,474 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Peak Elev= 338.08' @ 13.20 hrs Surf.Area= 1,168 sf Storage= 2,627 cf

Plug-Flow detention time= 315.0 min calculated for 1,473 cf (36% of inflow)
Center-of-Mass det. time= 190.2 min (1,009.6 - 819.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	334.50'	1,006 cf	**25.67'W x 45.50'L x 3.54'H Field A** 4,136 cf Overall - 1,621 cf Embedded = 2,515 cf x 40.0% Voids
#2A	335.00'	1,621 cf	**Cultec R-330XLHD** x 30 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		2,627 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	338.00'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.12 cfs @ 13.20 hrs HW=338.08' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.12 cfs @ 0.95 fps)

Pond 1P: Infiltrators - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

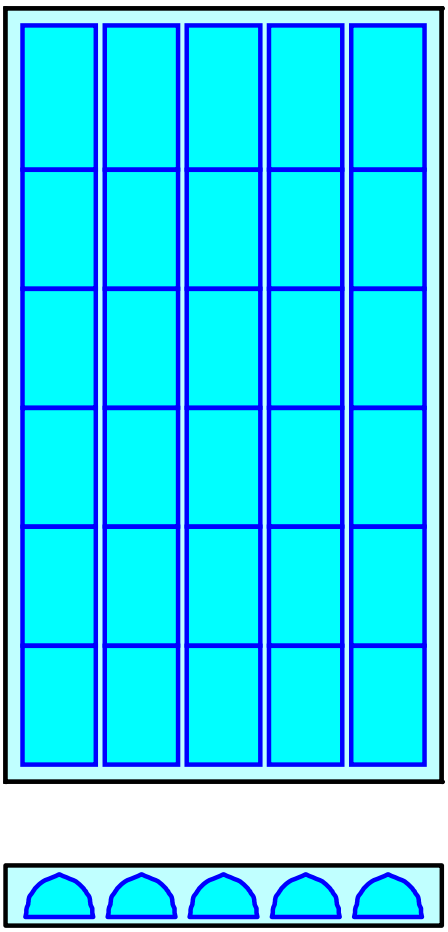
6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

30 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 1,620.6 cf Chamber Storage

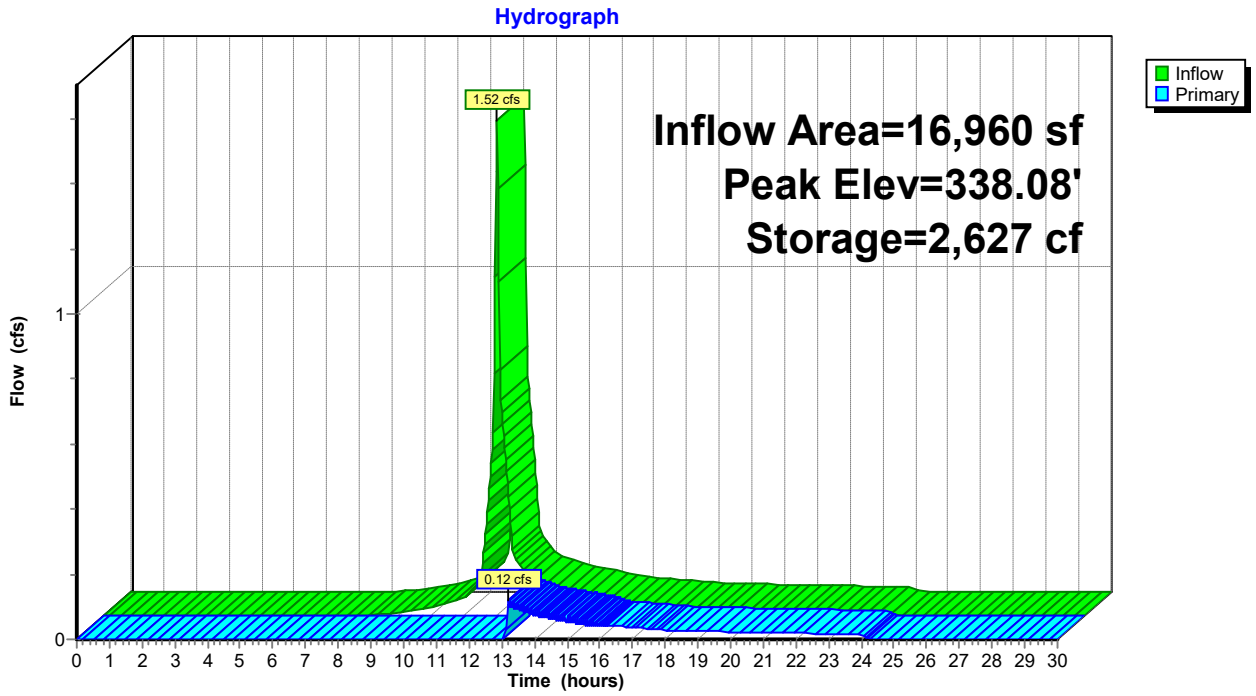
4,136.1 cf Field - 1,620.6 cf Chambers = 2,515.5 cf Stone x 40.0% Voids = 1,006.2 cf Stone Storage

Chamber Storage + Stone Storage = 2,626.8 cf = 0.060 af
Overall Storage Efficiency = 63.5%
Overall System Size = 45.50' x 25.67' x 3.54'

30 Chambers
153.2 cy Field
93.2 cy Stone



Pond 1P: Infiltrators



Summary for Pond 2P: Rain Garden

Inflow Area = 170,823 sf, 0.75% Impervious, Inflow Depth = 1.43" for 10-Year event
Inflow = 4.25 cfs @ 12.27 hrs, Volume= 20,350 cf
Outflow = 4.25 cfs @ 12.27 hrs, Volume= 19,194 cf, Atten= 0%, Lag= 0.4 min
Primary = 4.25 cfs @ 12.27 hrs, Volume= 19,194 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Peak Elev= 288.18' @ 12.27 hrs Surf.Area= 785 sf Storage= 1,298 cf

Plug-Flow detention time= 40.5 min calculated for 19,175 cf (94% of inflow)
Center-of-Mass det. time= 11.0 min (892.5 - 881.5)

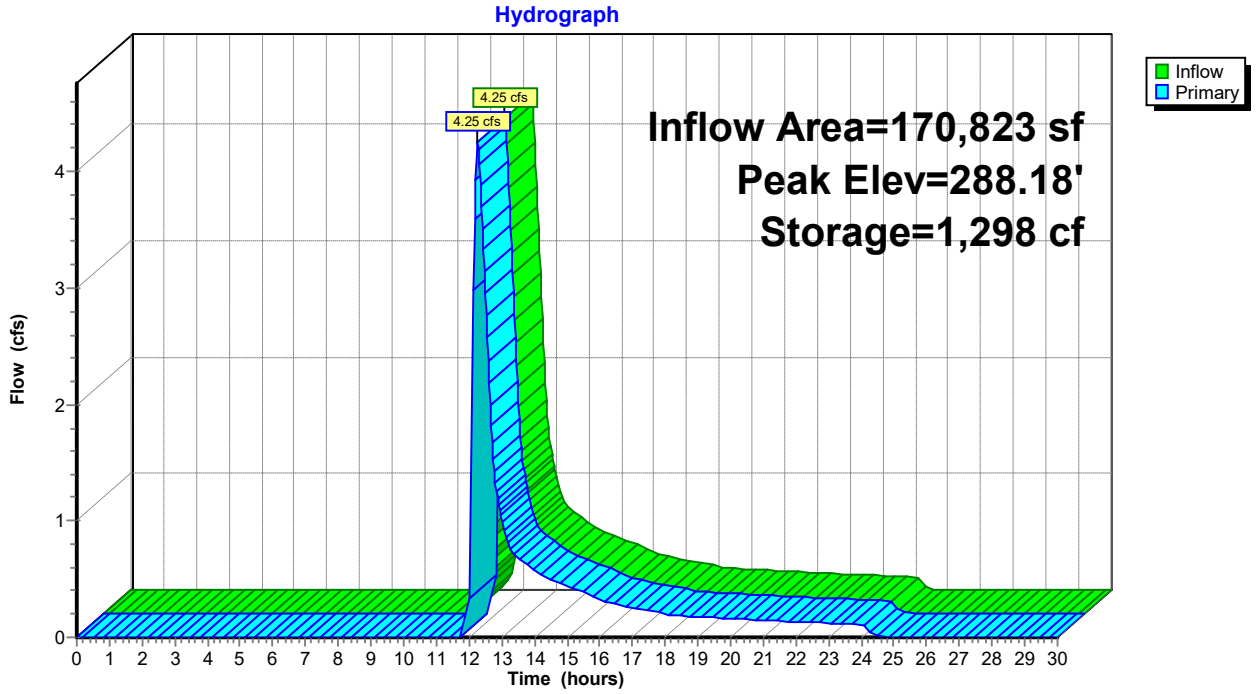
Volume	Invert	Avail.Storage	Storage Description
#1	285.50'	1,553 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
285.50	200	0	0
286.00	276	119	119
288.00	761	1,037	1,156
288.50	825	397	1,553

Device	Routing	Invert	Outlet Devices
#1	Primary	288.00'	**20.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=4.23 cfs @ 12.27 hrs HW=288.18' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 4.23 cfs @ 1.15 fps)

Pond 2P: Rain Garden



Time span=0.00-30.00 hrs, dt=0.03 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: Undisturbed Runoff Area=170,823 sf 0.75% Impervious Runoff Depth=4.22"
Flow Length=210' Slope=0.1330 '/' Tc=17.4 min CN=61 Runoff=13.74 cfs 60,128 cf

Subcatchment 4S: Lot1 Runoff Area=16,960 sf 48.80% Impervious Runoff Depth=6.45"
Flow Length=147' Slope=0.0210 '/' Tc=1.5 min CN=79 Runoff=3.32 cfs 9,109 cf

Reach 6R: (new Reach) Avg. Flow Depth=0.96' Max Vel=3.94 fps Inflow=15.69 cfs 65,473 cf
n=0.080 L=641.0' S=0.1061 '/' Capacity=16.17 cfs Outflow=14.52 cfs 65,473 cf

Pond 1P: Infiltrators Peak Elev=339.01' Storage=2,627 cf Inflow=3.32 cfs 9,109 cf
Outflow=4.30 cfs 6,502 cf

Pond 2P: Rain Garden Peak Elev=288.40' Storage=1,470 cf Inflow=13.74 cfs 60,128 cf
Outflow=13.74 cfs 58,972 cf

Total Runoff Area = 187,783 sf Runoff Volume = 69,237 cf Average Runoff Depth = 4.42"
94.91% Pervious = 178,225 sf 5.09% Impervious = 9,558 sf

Summary for Subcatchment 2S: Undisturbed

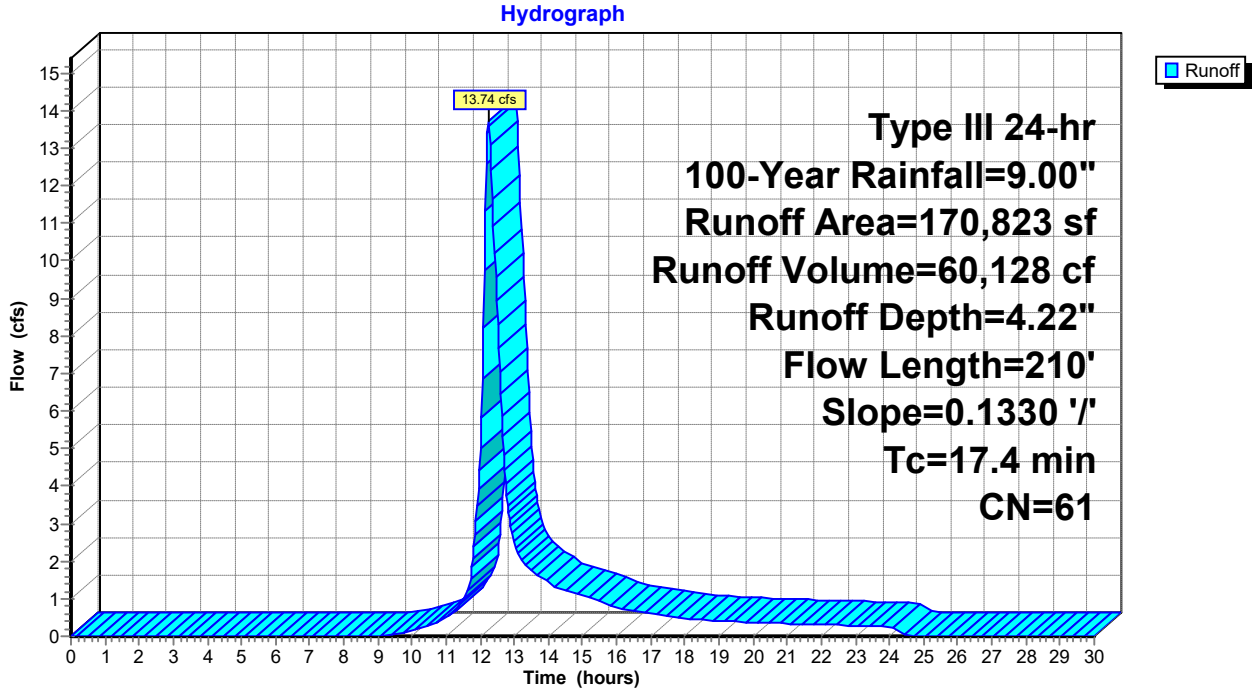
Runoff = 13.74 cfs @ 12.25 hrs, Volume= 60,128 cf, Depth= 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=9.00"

Area (sf)	CN	Description
110,543	60	Woods, Fair, HSG B
6,165	73	Woods, Fair, HSG C
1,281	98	Paved parking, HSG B
52,834	61	>75% Grass cover, Good, HSG B
170,823	61	Weighted Average
169,542		99.25% Pervious Area
1,281		0.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	210	0.1330	0.20		**Sheet Flow, Lot** Woods: Light underbrush n= 0.400 P2= 3.50"

Subcatchment 2S: Undisturbed



Summary for Subcatchment 4S: Lot1

[49] Hint: Tc<2dt may require smaller dt

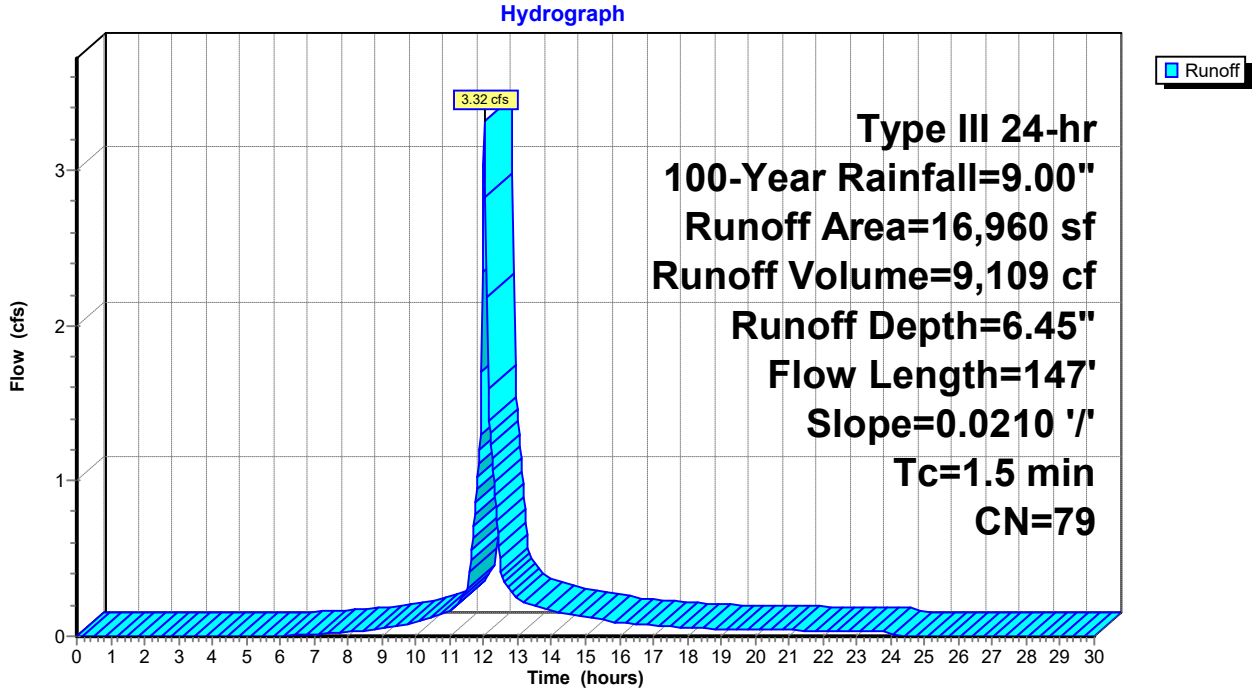
Runoff = 3.32 cfs @ 12.03 hrs, Volume= 9,109 cf, Depth= 6.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=9.00"

Area (sf)	CN	Description
8,277	98	Paved parking, HSG B
8,683	61	>75% Grass cover, Good, HSG B
16,960	79	Weighted Average
8,683		51.20% Pervious Area
8,277		48.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	147	0.0210	1.58		**Sheet Flow, Lot** Smooth surfaces n= 0.011 P2= 3.50"

Subcatchment 4S: Lot1



Summary for Reach 6R: (new Reach)

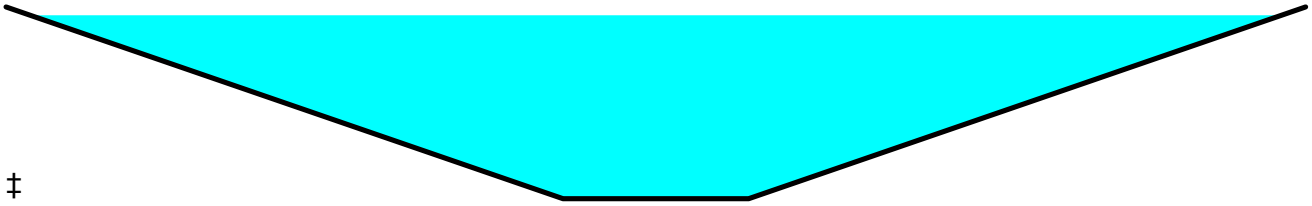
[81] Warning: Exceeded Pond 1P by 2.39' @ 11.04 hrs
[81] Warning: Exceeded Pond 2P by 52.50' @ 0.00 hrs

Inflow Area = 187,783 sf, 5.09% Impervious, Inflow Depth = 4.18" for 100-Year event
Inflow = 15.69 cfs @ 12.27 hrs, Volume= 65,473 cf
Outflow = 14.52 cfs @ 12.33 hrs, Volume= 65,473 cf, Atten= 7%, Lag= 3.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Max. Velocity= 3.94 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 1.51 fps, Avg. Travel Time= 7.1 min

Peak Storage= 2,373 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.96' , Surface Width= 6.74'
Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 16.17 cfs

1.00' x 1.00' deep channel, n= 0.080 Earth, long dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 7.00'
Length= 641.0' Slope= 0.1061 '/'
Inlet Invert= 338.00', Outlet Invert= 270.00'



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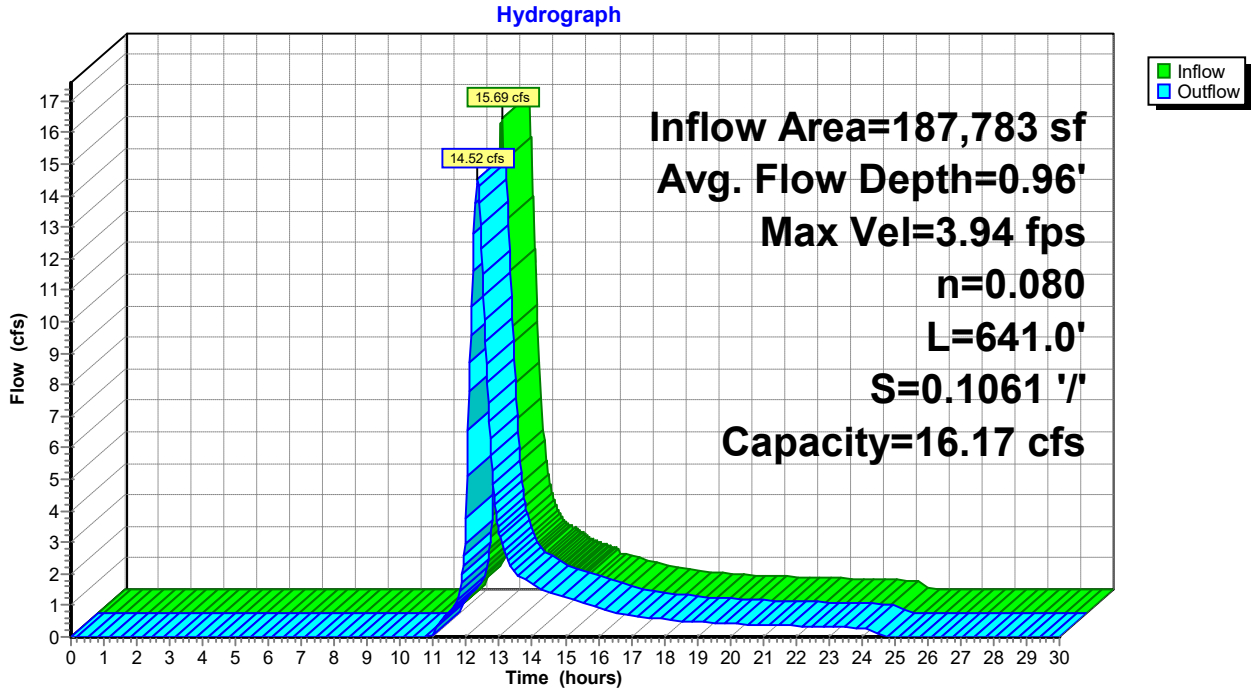
Reach 6R: (new Reach)



Summary for Pond 1P: Infiltrators

[93] Warning: Storage range exceeded by 0.97'
[88] Warning: Qout>Qin may require smaller dt or Finer Routing
[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=101)

Inflow Area = 16,960 sf, 48.80% Impervious, Inflow Depth = 6.45" for 100-Year event
Inflow = 3.32 cfs @ 12.03 hrs, Volume= 9,109 cf
Outflow = 4.30 cfs @ 12.03 hrs, Volume= 6,502 cf, Atten= 0%, Lag= 0.2 min
Primary = 4.30 cfs @ 12.03 hrs, Volume= 6,502 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Peak Elev= 339.01' @ 12.03 hrs Surf.Area= 1,168 sf Storage= 2,627 cf

Plug-Flow detention time= 149.8 min calculated for 6,502 cf (71% of inflow)
Center-of-Mass det. time= 58.9 min (855.5 - 796.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	334.50'	1,006 cf	**25.67'W x 45.50'L x 3.54'H Field A** 4,136 cf Overall - 1,621 cf Embedded = 2,515 cf x 40.0% Voids
#2A	335.00'	1,621 cf	**Cultec R-330XLHD** x 30 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
		2,627 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	338.00'	**1.5' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=4.25 cfs @ 12.03 hrs HW=339.00' (Free Discharge)
↑—**1=Sharp-Crested Rectangular Weir** (Weir Controls 4.25 cfs @ 3.27 fps)

Pond 1P: Infiltrators - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

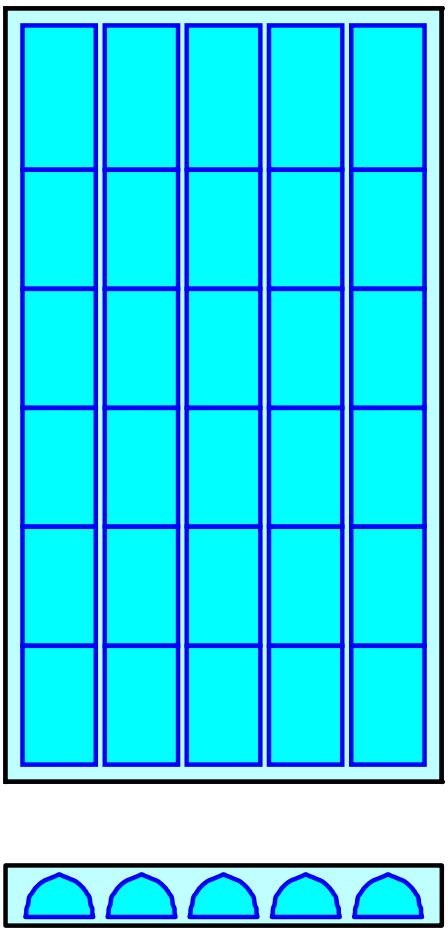
6 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 43.50' Row Length +12.0" End Stone x 2 = 45.50' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.67' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

30 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 1,620.6 cf Chamber Storage

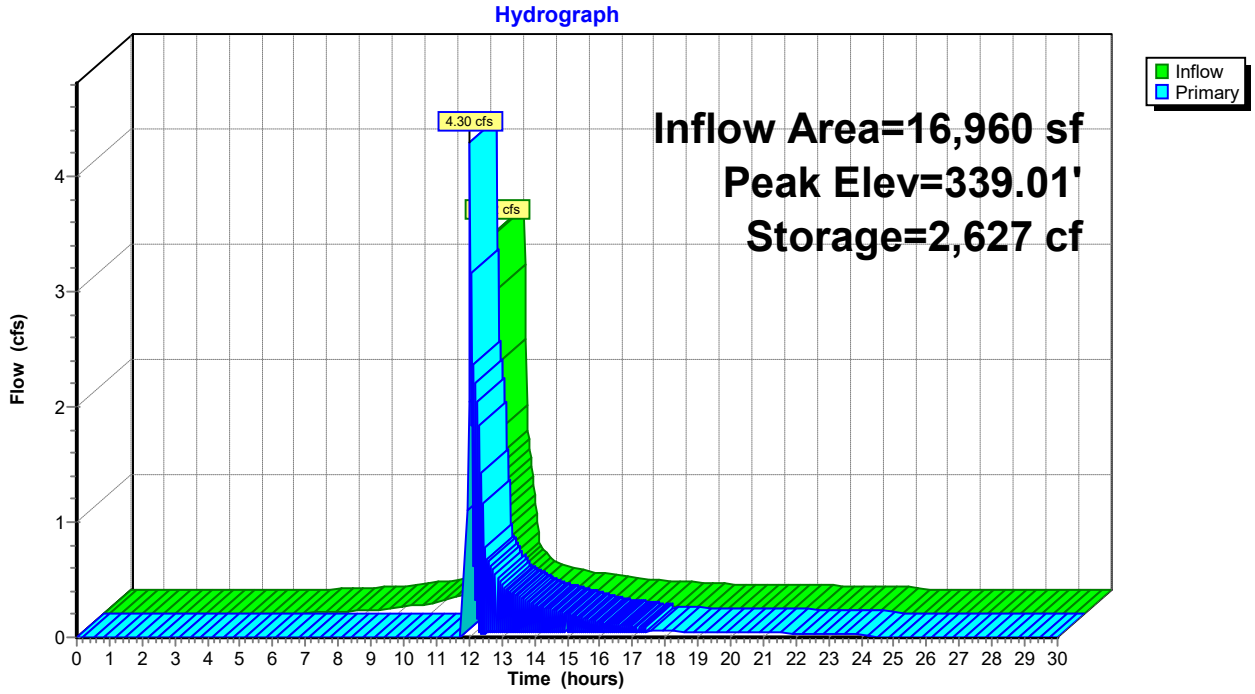
4,136.1 cf Field - 1,620.6 cf Chambers = 2,515.5 cf Stone x 40.0% Voids = 1,006.2 cf Stone Storage

Chamber Storage + Stone Storage = 2,626.8 cf = 0.060 af
Overall Storage Efficiency = 63.5%
Overall System Size = 45.50' x 25.67' x 3.54'

30 Chambers
153.2 cy Field
93.2 cy Stone



Pond 1P: Infiltrators



Summary for Pond 2P: Rain Garden

Inflow Area = 170,823 sf, 0.75% Impervious, Inflow Depth = 4.22" for 100-Year event
Inflow = 13.74 cfs @ 12.25 hrs, Volume= 60,128 cf
Outflow = 13.74 cfs @ 12.25 hrs, Volume= 58,972 cf, Atten= 0%, Lag= 0.2 min
Primary = 13.74 cfs @ 12.25 hrs, Volume= 58,972 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.03 hrs
Peak Elev= 288.40' @ 12.25 hrs Surf.Area= 812 sf Storage= 1,470 cf

Plug-Flow detention time= 16.3 min calculated for 58,972 cf (98% of inflow)
Center-of-Mass det. time= 5.1 min (853.7 - 848.5)

Volume	Invert	Avail.Storage	Storage Description
#1	285.50'	1,553 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
285.50	200	0	0
286.00	276	119	119
288.00	761	1,037	1,156
288.50	825	397	1,553

Device	Routing	Invert	Outlet Devices
#1	Primary	288.00'	**20.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=13.68 cfs @ 12.25 hrs HW=288.40' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 13.68 cfs @ 1.72 fps)

Pond 2P: Rain Garden