STORMWATER MANAGEMENT REPORT

CABRINI OF WESTCHESTER
PARKING AREA ADDITION
115 BROADWAY
VILLAGE OF DOBBS FERRY, NEW YORK

Applicant/Owner

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Revision History		
Rev. No.	Date	Description
1	10/23/19	Revised per Village comments
2	8/3/2020	Revised per BOT special meeting held on 7/27/2020

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Section I

Project Information

1.1 Project Description

The purpose of this report is to present the Stormwater Management Report (SWR) for the for the Application for site plan approval to construct a new parking area to accommodate a total of 25 parking spaces which includes eighteen (18) parking spaces in the new parking area to be constructed in the southeasterly corner of the property; two (2) new parking spaces to be constructed adjacent to the existing dumpster pad; and five (5) parking spaces gained by re-striping of four of the existing parking bays to a minimum stall width of 8'-6".

This SWR presents the methodology and design for controlling stormwater runoff from the Project in accordance with the applicable provisions of Chapter 262 Stormwater Management and Erosion and Sediment Control of the Village Code.

1.2 Soil Characteristics

A review of the USDA Web Soil Survey indicates that there are three (3) soil types present on the site (Appendix A). Table No. 1 below summarizes the characteristics of these soil types.

Table No. 1
Soil Characteristics

Map Unit	Area (acres)	Soil Names	Depth to Water Table (ft)	Depth to Restrictive feature	Hydrologic Group	Erosion Hazard
KnB	2.67	Knickerbocker fine sandy loam, 2 to 8 percent slopes	>80 inches	>80 inches	A	
RhE	2.93	Riverhead loam, 25 to 50 percent slopes	>80 inches	>80 inches	A	
Ub	6.09	Udorthents, smoothed	18 to 48 inches	40 to 60 inches	B	Variable

Source: Soil Survey of Westchester and Putnam Counties, New York Soil Conservation Service.
Natural Resource Conservation Center Web Soil Survey
USDA Web Soil Survey (https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx)

Section 2

Storm Water Management

2.1 Methodology

The measures in this SWR Report have been designed to assure that post-development peak runoff rates will be equal to or less than pre-development peak runoff rates for the 2, 10 and 100-year storm events. These measures have been designed in accordance with the following publications:

- "Urban Hydrology for Small Watersheds" (Technical Release No. 55), published by the United States Department of Agriculture, Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service, SCS), dated June 1986.
- *New York State Storm Water Management Design Manual* (DEC Design Manual), January 2015.

The 24-hour rainfall data value used in the hydrologic analysis and computations is based on the updated isohyetal maps from the Northeast Regional Climate Center (NRCC). Current 24-hour NRCC rainfall precipitation and distribution data were used to compute runoff hydrographs for the 2, 10 and 100-year storm events. The pre and post development runoff rates for the specified storm events were calculated using HydroCAD® Version 10.0 computer software program. HydroCAD® incorporates the methodology used in NRCS TR-20 and TR-55 to compute and route flood hydrographs.

2.2 Subsurface Investigations

Test Pit Excavations

Two (2) test pits were excavated on October 18, 2018 and witnessed by PDE personnel. The test pit locations are shown on Drawing C-201, "Grading and Utility Plan" prepared by PDE. PDE personnel measured the depths of the contrasting soil layers, performed visual inspections of the excavated material at each layer encountered to determine generalized soil classifications, and logged the measurements and observations.

As shown in the photos and on the test pit log sheets provided in Appendix B, bedrock was not encountered at TP-1 or TP-2. Observations revealed a 12-inch-thick layer of topsoil on top of layers of fine to medium brown sands. The test pits were excavated to a depth of 84 inches below existing grade without encountering ground water.

Infiltration Testing

Based on the investigation results discussed above, two (2) soil infiltration tests were set up on October 18, 2018. A 6" PVC casing was placed adjacent to each test pit as shown on PDE Drawing C-201, with the bottom of the casing set within the existing sand layer at a depth of about 6-feet below existing grade. The casing was filled with 24 inches of water, capped and allowed to pre-soak overnight. PDE personnel returned to the residence on October 19, 2018 and found no water in the casing, thereby allowing the infiltration testing to proceed.

The casing was refilled with 24 inches of water and an initial reading was taken. A "final" reading of the water level was taken after a duration of 1 hour. This procedure was repeated two (2) additional times for a total of three (3) observations at each test pit to obtain the infiltration rate. The data sheet of test results provided in Appendix B shows that the existing subsoils possess a consistent infiltration rate of 18 inches per hour (in/hr.) for TP-1 and 16 in/hr. for TP-2 which are much greater than the minimum rate of 0.5 in/hr. required by the standards in the DEC Design Manual for infiltration SMPs.

2.3 Pre-Development Conditions

Under pre-development conditions, one drainage area (EX-DA-1) was identified on the site. The pre-development drainage areas are shown on Figure #2, Pre-Development Drainage Area Map in Appendix A. The drainage area totals 0.58-acres.

One Design Point was identified for the existing drainage area. The Design Point represent the location where the majority of runoff from an area exits the site. The same design points are identified in post-development conditions so that a comparison can be made between the pre and post development conditions. The area drains to an existing inlet connected to the site's storm drain system.

2.4 Post Development Conditions

Under post development conditions the same design point was identified, however the area was divided into four separate drainage areas. Drainage areas PR-DA-1, and PR-DA-4 will direct discharge in to the storm drain system without being detained. The runoff from PR-DA-2 will be collected by the proposed storm drain system and directed to the proposed stormwater management practice (SMP). The runoff from Drainage area PR-DA-3 will discharge toward the southern property line, however this runoff from this area will not negatively impact the adjacent property. The post development drainage areas are shown on Figure #3, Post Development Drainage Area Map in Appendix A.

In order to assure that post-development peak runoff rates will be equal to or less than pre-development peak runoff rates, a SMP is required. Based on the results of the subsurface investigation summarized in Section 2.2 above, it is the professional opinion of PDE that a subsurface infiltration/recharge SMP can be provided to attenuate post-construction runoff associated with the construction of the new parking area.

Runoff from the new parking lot in drainage area PR-DA-2 will be collected by the proposed storm drain system and directed to a subsurface gravel bed with 15-inch perforated pipes for infiltration. Table 2, SMP Summary Table, indicates the inflow, outflow, storage volume, water surface elevation, and freeboard of the SMP for the 2, 10 and 100-year design storms.

Table No. 2 – Stormwater Management Summary Table					
Design Year	Peak Inflow (cfs)	Peak Outflow (cfs)	Volume (ft^3)	Water Surface Elevation (ft.)	Freeboard (ft.)
2	0.65	0.00	166	95.82	3.61
10	1.05	0.00	507	96.97	2.46
100	1.83	0.91	1,245	99.22	0.21
Notes: (1) Freeboard is the difference between the top of the infiltration bed and the water surface elevation. The top of the infiltration bed is elev. 99.43. (i.e. 99.43 – 98.93 = 0.50)					

A summary of the pre-development and post-development runoff rates is presented in Table 3, Peak Discharge Rate Comparison Table. Based on the implementation of the stormwater management measures, the peak runoff rates under the post-development conditions will be less than the peak runoff rates for the pre-development conditions.

Table No. 3 - Peak Discharge Rate Comparison Table			
Design Year Storm Event	24-Hour Rainfall (inches)	Pre-Development Peak Runoff Rate (cfs)	Post-Development Peak Runoff Rate (cfs)
2	3.42	0.25	0.12
10	5.06	0.83	0.38
100	8.90	2.49	1.41

The calculations for pre-development and post-development drainage conditions have been included in Appendix C.

2.5 Erosion & Sediment Control Measures

During construction, the potential for soil erosion and sedimentation will be controlled through the use of temporary soil erosion and sediment control devices and measures. These devices and measures shall be installed and maintained in accordance with the *New York State Standards and Specifications for Erosion and Sediment Control* dated November 2016 ("Blue Book"). The soil erosion and sediment control (E&SC) measures that will be applied to the site during construction are as follows:

- Install E&SC devices and perform construction in accordance with the construction sequence and design notes;
- Retain existing vegetation where feasible and minimize the amount of land disturbance at any one time;
- Trap sediment on-site prior to discharge from the site;
- Stabilize disturbed areas that will not require further earthwork operations within the required periods specified in the Blue Book, and;
- Implement soil restoration to all disturbed and compacted areas that will be remain unpaved, vegetated and/or landscaped in the post-construction condition in accordance with the requirements in Table 4.6 in the Blue Book, prior to final seeding, landscaping, and mulching.

Section 3

Storm Water Management Practice Maintenance

3.1 Long Term Maintenance and Operations

Periodic long-term inspection and maintenance of the Stormwater Management Practices (SMPs) is essential to ensure that the facilities will function as designed. The facility operator, its successors and assigns, shall be responsible for maintaining all onsite SMP components. These components consist of the two drywells and the storm drainage collection system (pipes, drain inlets and manholes).

Comprehensive descriptions of recommended inspection and required maintenance items and intervals for the SMP are provided in the following publications:

- *New York State Stormwater Management Design Manual*, January 2015.
- “Maintenance Program Guidance”, NYSDEC.
- "Reducing the Impacts from Stormwater Runoff from New Development", NYSDEC, Second Edition, April 1993, Chapter 7.
- "Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs", by Thomas R. Schueler, Department of Environmental Programs, Metropolitan Washington Council of Governments (MWCOG), July 1987, Chapters 3, 4, 5 and 9.

These descriptions are applicable to the selected facilities and provide the foundation for an effective facilities maintenance plan. Descriptions of the facility maintenance for this Project are provided in the following paragraphs:

A. Subsurface Stormwater Detention System

Long term preventative maintenance of subsurface storm water detention systems is essential to the continued effectiveness of the system.

Inspections. The water quality facility should be inspected on an annual basis to ensure that the structure operates in the manner originally intended. When possible, inspections should be conducted during wet weather (minimum 1.0” rainfall in 24 hours) to determine if the facility is meeting the targeted detention times. In particular, the outlet structure should be inspected once every six (6) months for evidence of clogging, or conversely, for too rapid a release. Other problems that should be checked for include: subsidence, the accumulation of sediment around the inlet and/or outlet and the adequacy of upstream/downstream storm pipe system. Inspections should be carried out with as-built plans in hand.

Debris and Litter Removal. Debris, leaves, grass clippings and litter may accumulate near the upstream drain inlets, which convey runoff to the facility and should be removed during regular mowing/maintenance operations. Attention should also be paid to debris that may collect at the outlet control orifice and the debris should be removed regularly.

Structural Repairs and Replacement. Repair or replace as necessary inlet/outlet devices that show signs of deterioration, seepage or failure.

Section 4

Summary and Conclusion

Based on the information presented in this report, the implementation of the proposed Storm Water Management Plan for the Project will meet the design objectives stated in this Report.

Respectfully submitted,

Provident Design Engineering, PLLC

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Under New York State Education Law Article 145 (Engineering), Section 7209 (2), it is a violation of this law for any person, unless acting under the direction of a Licensed Professional Engineer, to alter this document.

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APPENDIX A - FIGURES

1. **USDA SOIL SURVEY MAP AND UNIT DESCRIPTION**
2. **PRE-DEVELOPMENT DRAINAGE AREA MAP**
3. **POST-DEVELOPMENT DRAINAGE AREA MAP**

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

Cabrini of Westchester

October 5, 2018

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.

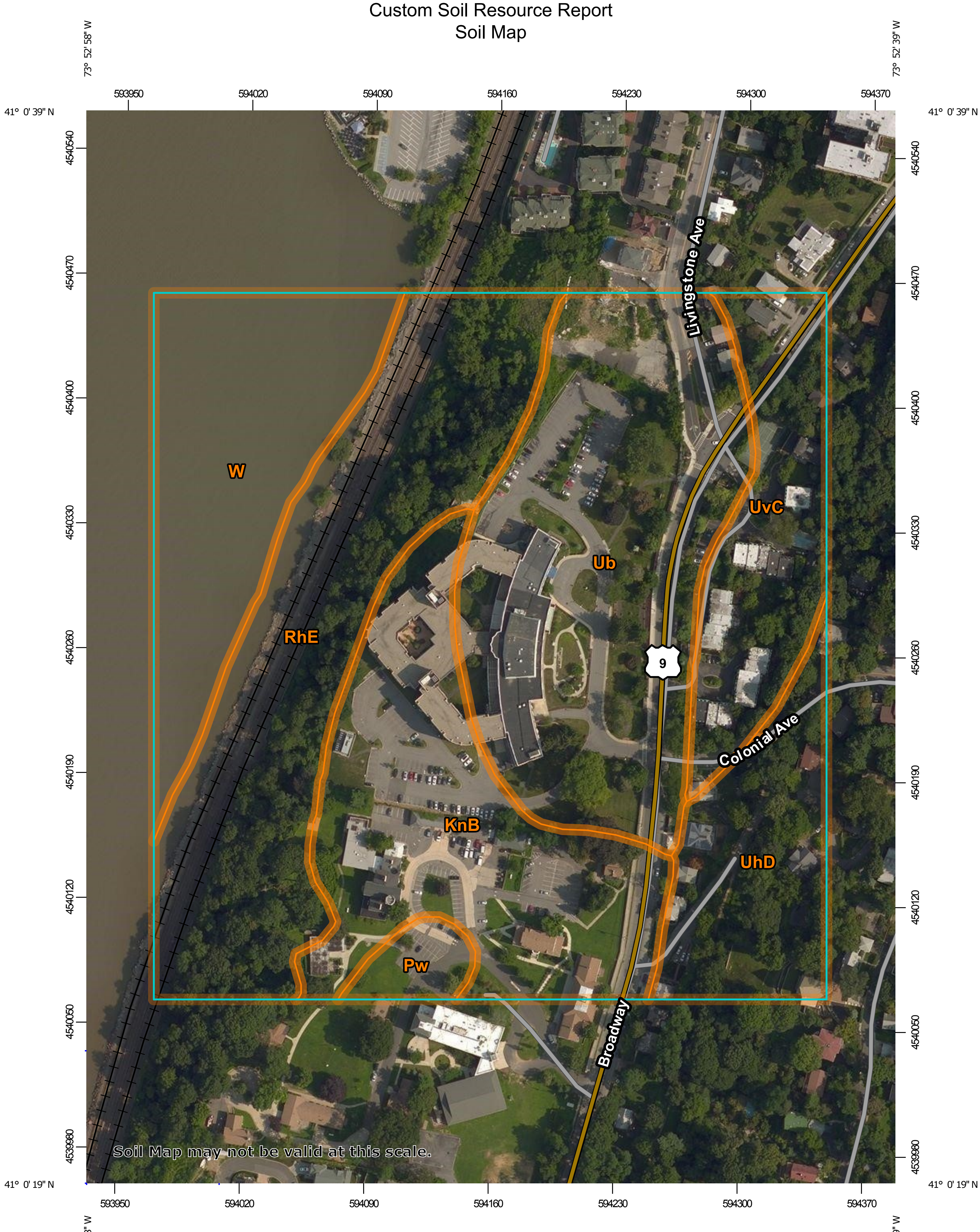
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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.

Soil Map



Map Scale: 1:2,930 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0, 40, 80, 160, 240

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 14, Sep 3, 2018

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

Date(s) aerial images were photographed: Jul 21, 2014—Aug 27, 2014

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
KnB	Knickerbocker fine sandy loam, 2 to 8 percent slopes	6.9	18.6%
Pw	Pompton silt loam, loamy substratum	0.6	1.6%
RhE	Riverhead loam, 25 to 50 percent slopes	8.4	22.5%
Ub	Udorthents, smoothed	9.3	24.9%
UhD	Urban land-Charlton complex, 15 to 25 percent slopes	3.3	8.9%
UvC	Urban land-Riverhead complex, 8 to 15 percent slopes	3.5	9.5%
W	Water	5.2	14.0%
Totals for Area of Interest		**37.2**	**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

KnB—Knickerbocker fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: bd8s
Elevation: 100 to 800 feet
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Knickerbocker

Setting

Landform: Deltas, terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy glaciofluvial deposits or deltaic deposits

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 19 inches: fine sandy loam
H3 - 19 to 31 inches: loamy fine sand
H4 - 31 to 60 inches: loamy fine sand

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Hinckley

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

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

Pompton
Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed soils, occasionally flooded
Percent of map unit: 1 percent
Hydric soil rating: No

Pw—Pompton silt loam, loamy substratum

Map Unit Setting

National map unit symbol: bd98
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Pompton, Loamy Substratum

Setting
Landform: Terraces, valley trains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy over sandy and gravelly glaciofluvial deposits

Typical profile
H1 - 0 to 8 inches: silt loam
H2 - 8 to 26 inches: gravelly fine sandy loam
2C - 26 to 50 inches: very gravelly loamy sand
3C - 50 to 60 inches: gravelly loam

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None

Available water storage in profile: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Knickerbocker

Percent of map unit: 3 percent
Hydric soil rating: No

Hinckley

Percent of map unit: 3 percent
Hydric soil rating: No

Riverhead

Percent of map unit: 3 percent
Hydric soil rating: No

Udifluvents

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

Fredon

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

Fluvaquents

Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: Yes

RhE—Riverhead loam, 25 to 50 percent slopes

Map Unit Setting

National map unit symbol: bd9k
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Riverhead

Setting

Landform: Terraces, deltas
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits overlying stratified sand and gravel

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 25 inches: sandy loam
H3 - 25 to 30 inches: loamy sand
H4 - 30 to 60 inches: loamy sand

Properties and qualities

Slope: 25 to 50 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Pompton

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

Charlton

Percent of map unit: 4 percent
Hydric soil rating: No

Knickerbocker

Percent of map unit: 3 percent
Hydric soil rating: No

Hinckley

Percent of map unit: 3 percent
Hydric soil rating: No

Ub—Udorthents, smoothed

Map Unit Setting

National map unit symbol: bd7f
Elevation: 50 to 2,400 feet
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, smoothed, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Smoothed

Typical profile

H1 - 0 to 4 inches: gravelly loam
H2 - 4 to 70 inches: very gravelly loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 5.95 in/hr)
Depth to water table: About 18 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Low (about 4.6 inches)

Minor Components

Udorthents, wet substratum

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

Urban land

Percent of map unit: 5 percent
Hydric soil rating: Unranked

Leicester

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

Hollis

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

Charlton

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

Riverhead

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

Sun

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

UhD—Urban land-Charlton complex, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2wh1n
Elevation: 20 to 470 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

Urban land: 40 percent
Charlton and similar soils: 35 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Typical profile

M - 0 to 10 inches: cemented material

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water storage in profile: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Description of Charlton

Setting

Landform: Ridges, hills, ground moraines
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 gneiss, granite, 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
Natural 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
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Leicester

Percent of map unit: 8 percent
Landform: Depressions, drainageways, ground moraines, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

Chatfield

Percent of map unit: 7 percent
Landform: Hills, ridges
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Udorthents

Percent of map unit: 5 percent

Landform: Ridges
Landform position (three-dimensional): Tread
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Sutton

Percent of map unit: 5 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

UvC—Urban land-Riverhead complex, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: bd7x
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 50 percent
Riverhead and similar soils: 25 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riverhead

Setting

Landform: Deltas, terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits overlying stratified sand and gravel

Typical profile

H1 - 0 to 6 inches: loam
H2 - 6 to 25 inches: sandy loam
H3 - 25 to 30 inches: loamy sand
H4 - 30 to 60 inches: loamy sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.4 inches)

Minor Components

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

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

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

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

Charlton
Percent of map unit: 3 percent
Hydric soil rating: No

Fluvaquents
Percent of map unit: 1 percent
Landform: Flood plains
Hydric soil rating: Yes

Udifluvents
Percent of map unit: 1 percent
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: bd7z
Mean annual precipitation: 46 to 50 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 115 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Erosion

This folder contains a collection of tabular reports that present soil erosion factors and groupings. The reports (tables) include all selected map units and components for each map unit. Soil erosion factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factors Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic surface layer. .

Report—RUSLE2 Related Attributes

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed. Organic surface horizons are not displayed.

RUSLE2 Related Attributes–Westchester County, New York								
Map symbol and soil name	**Pct. of map unit**	**Slope length (ft)**	**Hydrologic group**	**Kf**	**T factor**	**Representative value**		
						% Sand	**% Silt**	**% Clay**
KnB—Knickerbocker fine sandy loam, 2 to 8 percent slopes								
Knickerbocker	85	—	A	.17	2	64.6	25.4	10.0
Pw—Pompton silt loam, loamy substratum								
Pompton, loamy substratum	85	—	B/D	.37	5	30.7	57.3	12.0
RhE—Riverhead loam, 25 to 50 percent slopes								
Riverhead	85	—	A	.28	3	47.9	40.1	12.0
Ub—Udorthents, smoothed								
Udorthents, smoothed	80	—	B	.32	3	42.1	45.9	12.0
UhD—Urban land-Charlton complex, 15 to 25 percent slopes								
Urban land	40	69	D	—	—	—	—	—
Charlton	35	49	B	.24	5	57.0	34.0	9.0
UvC—Urban land-Riverhead complex, 8 to 15 percent slopes								
Riverhead	25	—	A	.28	3	47.9	40.1	12.0

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.

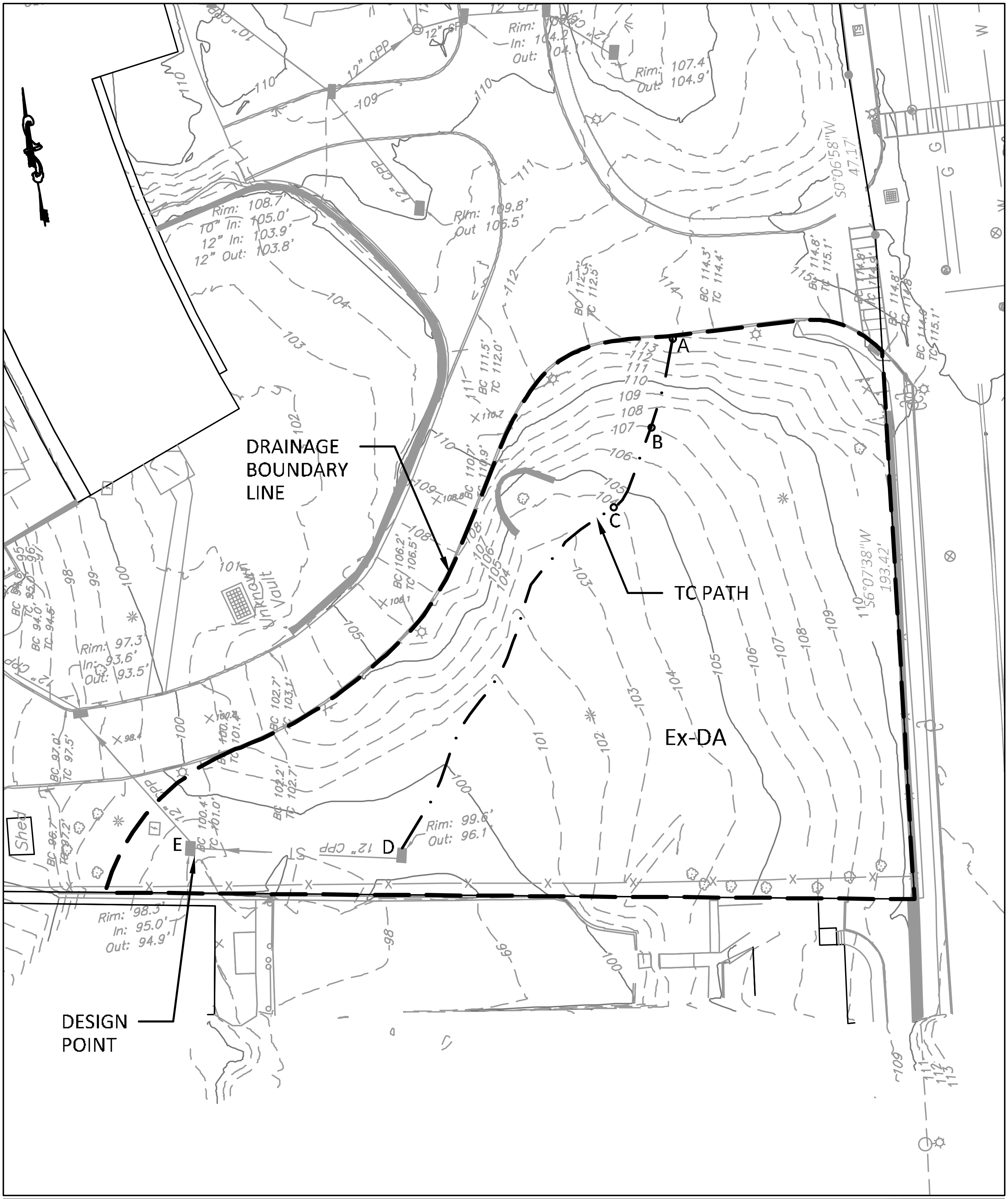
United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

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



Provident design engineering

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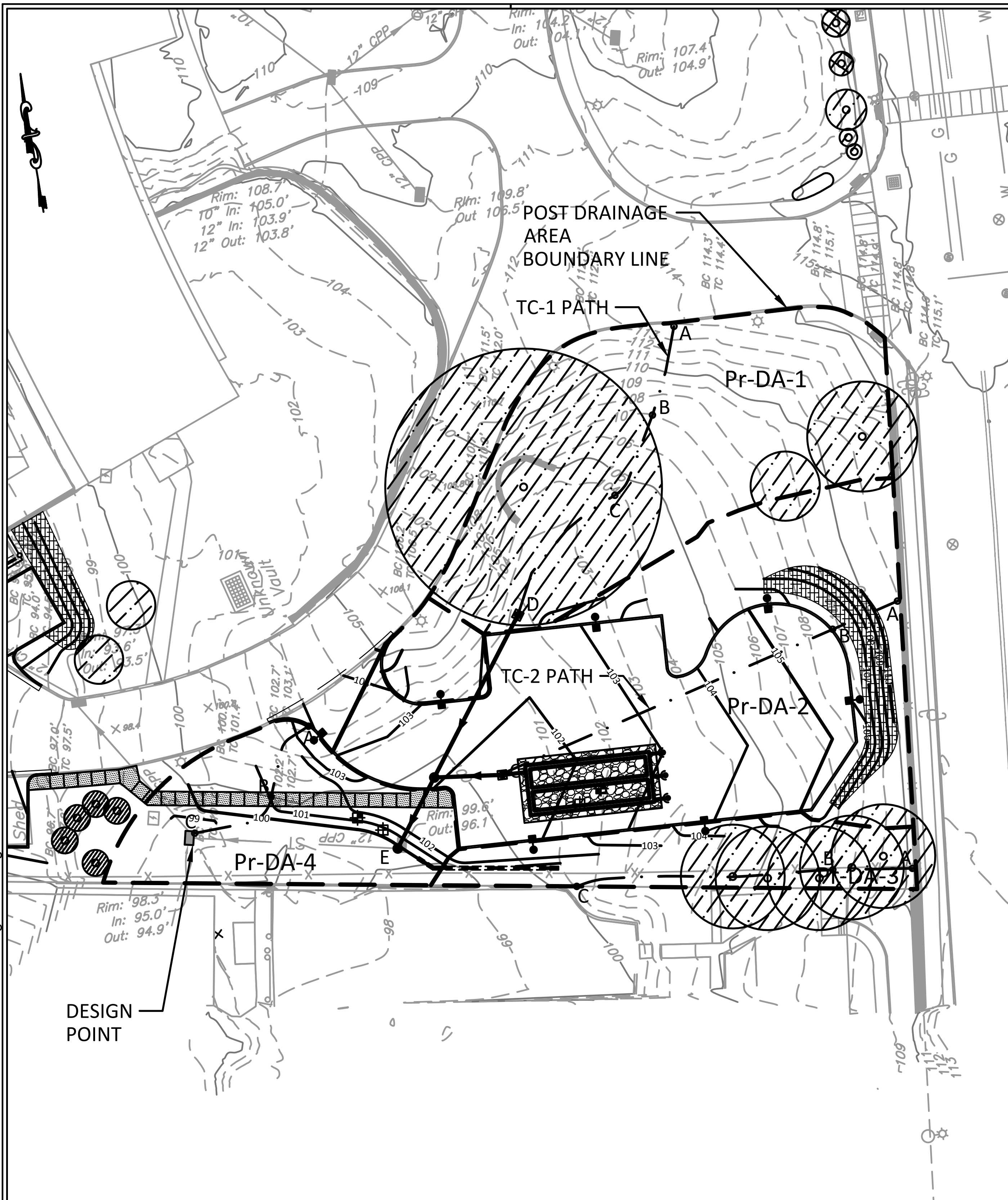
Pre-Development Drainage Area Map

Cabrini of Westchester
115 Broadway
Village of Dobbs Ferry, NY

Project No. 18-022
Scale: 1"=40'

Figure No. 2

Q:\PROJECTS-18\18-022 Cabrini Westchester\AutoCAD\SPA\DrainagePlan.dwg



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Post-Development Drainage Area Map

Cabrini of Westcheater
115 Broadway
Village of Dobbs Ferry, NY

Project No. 18-022
Scale: 1"=40'

Figure No. 3

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APPENDIX B - SUBSURFACE INVESTIGATION

TEST PIT LOGS

INFILTRATION TESTING DATA SHEETS

Provident design engineering	7 Skyline Drive Hawthorne, New York 10532 Phone 914-592-4040	**TEST PIT LOG**	**TEST PIT: TP- 1** **SHEET: 1 OF 2**

JOB NAME/ CLIENT Cabrini of Westchester	**PROJECT NO.** 18-022		
ADDRESS 115 Broadway, Dobbs Ferry, NY 10522		**INSPECTOR** C. Hanzlik, K. Murphy	**EXCAVATOR** Carmine Giuliano
START DATE 10/18/2018	**END DATE** 10/18/2018	**Depth to Groundwater** N/A	**Depth to Bedrock** N/A

DEPTH (ft)	USCS SYMBOL	**DESCRIPTION OF SOILS** (SAA = Same As Above) f - fine m - medium c - coarse lt - light dk - dark tr - trace ltl - little	**REMARKS** (PID, STAINING, ODORS, ETC.) FP = Free Product N/S = No Staining, N/O = No odors SO = Slight Odor, MO = Moderate Odor STO = Strong Odor
0.0–1.0		Dk Brown to Black Topsoil w/organics	N/S, N/O
1.0–7.0	SM	Lt Brown m-f SAND, w/silt, moist	N/S, N/O
7.0		End of Test Pit at 7.0' bgs - backfilled	

Provident design engineering
7 Skyline Drive
Hawthorne, New York 10532
Phone 914-592-4040

TEST PIT LOG

TEST PIT: TP- 2
SHEET: 2 OF 2

JOB NAME/ CLIENT Cabrini of Westchester	**PROJECT NO.** 18-022		
ADDRESS 115 Broadway, Dobbs Ferry, NY 10522		**INSPECTOR** C. Hanzlik, K. Murphy	**EXCAVATOR** Carmine Giuliano
START DATE 10/18/2018	**END DATE** 10/18/2018	**Depth to Groundwater** N/A	**Depth to Bedrock** N/A

DEPTH (ft)	USCS SYMBOL	DESCRIPTION OF SOILS (SAA = Same As Above) f - fine m - medium c - coarse lt - light dk - dark tr - trace ltl - little	REMARKS (PID, STAINING, ODORS, ETC.) FP = Free Product N/S = No Staining, N/O = No odors SO = Slight Odor, MO = Moderate Odor STO = Strong Odor
0.0–1.0		Dk Brown to Black Topsoil w/organics	N/S, N/O
1.0–7.0	SM	Dk Brown m-f SAND, w/silt, moist	N/S, N/O
7.0		End of Test Pit at 7.0' bgs - backfilled	

TEST PIT DATA TABLE		
TEST DATE	OCTOBER 18, 2018	
DEEP TEST NO.	SOIL PROFILE BGS	DESCRIPTION
TP-1	0 TO 1'	DK BROWN TO BLACK TOPSOIL
	1' TO 7'	LT BROWN M-F SAND, W/SILT, MOIST
TP-2	0 TO 1'	DK BROWN TO BLACK TOPSOIL W/ORGANICS
	1' TO 7'	LT BROWN M-F SAND, W/SILT, MOIST
BGS - BELOW GROUND SURFACE		

INFILTRATION TEST DATA TABLE	
TEST DATE	OCTOBER 19, 2018
TEST NO.	INFILTRATION DESIGN RATE
PT-1	3.30 MIN./INCH
PT-2	3.75 MIN./INCH

Provident Design Engineering, PLLC
DESIGN DATA SHEET – STORMWATER INFILTRATION TESTING

Project Name: Cabrini of Westchester Nursing Home			
Owner: Cabrini of Westchester	Address: 115 Broadway, Dobbs Ferry, NY 10522		
Located at (Street): 115 Broadway Dobbs Ferry, NY	Sec. 0	Block: 0	Lot: 00
(Indicate nearest cross street): N/A			
Municipality: Dobbs Ferry (V)	County: Westchester	Watershed: Hudson River	

Pre-Soak Date: 10.18.2018 **Run Date: 10.19.2018**

CLOCK TIME				INFILTRATION (Test Hole Depth @ 84 inches bgs)			
Run No.	Start	Stop	Elapsed Time (Min.)	Depth to Water from Top of PVC Casing Start Inches	Stop Inches	Water Level Drop (Inches)	Soil Rate Min/In Drop
HOLE NUMBER – PT-1							
1	10:38A	11:38A	60	72	94(1)	22	2.72
2	11:30A	12:39P	60	72	90	18	3.33
3	12:40P	1:40P	60	72	90	18	3.33
4							
HOLE NUMBER – PT-2							
1	10:50A	11:50A	60	66	88(2)	22	2.72
2	11:50A	12:50P	60	66	83	17	3.53
3	12:50P	1:50P	60	66	82	16	3.75
4							
HOLE NUMBER – ____							
1							
2							
3							
4							
HOLE NUMBER – ____							
1							
2							
3							
4							

Note:
1. Overall depth of PVC casing – 96 inches.
2. Overall depth of PVC casing – 90 inches.

Witnessed by: Ken Murphy - Provident Design Engineering, PLLC (PDE)

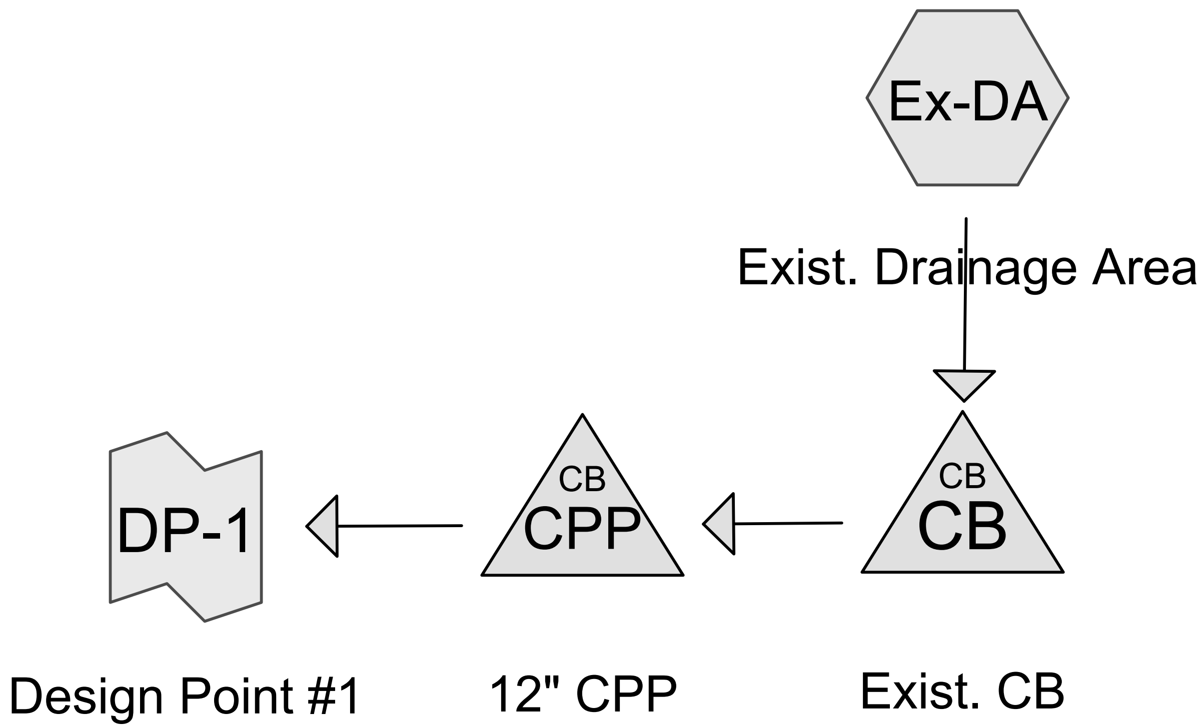
Reviewed by: Ralph P. Peragine, P.E., PDE

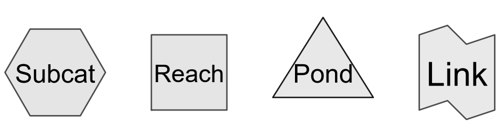
APPENDIX C

STORM WATER MANAGEMENT CALCULATIONS

APPENDIX C-1

PRE-DEVELOPMENT CALCULATIONS





Routing Diagram for Cabrini SWM-PRE-06-19
Prepared by Provident Design Engineering, PLLC, Printed 6/25/2019

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Ex-DA: Exist. Drainage Area Runoff Area=25,166 sf 0.00% Impervious Runoff Depth=0.54"
Flow Length=172' Tc=6.0 min CN=61 Runoff=0.25 cfs 1,127 cf

Pond CB: Exist. CB Peak Elev=96.35' Inflow=0.25 cfs 1,127 cf
Outflow=0.25 cfs 1,127 cf

Pond CPP: 12" CPP Peak Elev=96.35' Inflow=0.25 cfs 1,127 cf
12.0" Round Culvert n=0.013 L=59.5' S=0.0202 '/' Outflow=0.25 cfs 1,127 cf

Link DP-1: Design Point #1 Inflow=0.25 cfs 1,127 cf
Primary=0.25 cfs 1,127 cf

Total Runoff Area = 25,166 sf Runoff Volume = 1,127 cf Average Runoff Depth = 0.54"
100.00% Pervious = 25,166 sf 0.00% Impervious = 0 sf

Summary for Subcatchment Ex-DA: Exist. Drainage Area

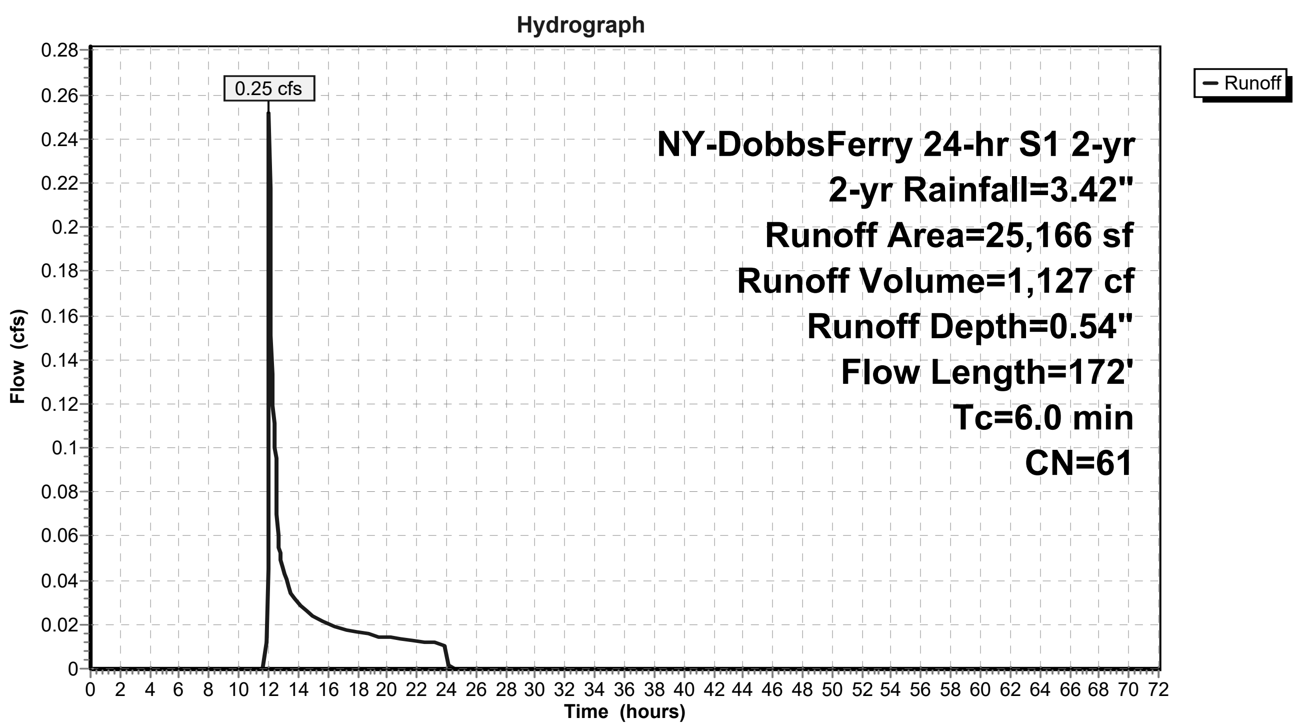
Runoff = 0.25 cfs @ 12.06 hrs, Volume= 1,127 cf, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 2-yr 2-yr Rainfall=3.42"

Area (sf)	CN	Description
25,166	61	>75% Grass cover, Good, HSG B
25,166		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	27	0.2600	0.26		**Sheet Flow, AB**
					Grass: Dense n= 0.240 P2= 3.50"
0.1	26	0.1150	5.09		**Shallow Concentrated Flow, BC**
					Grassed Waterway Kv= 15.0 fps
0.7	119	0.0370	2.89		**Shallow Concentrated Flow, CD**
					Grassed Waterway Kv= 15.0 fps
2.5	172	Total, Increased to minimum Tc = 6.0 min			

Subcatchment Ex-DA: Exist. Drainage Area



Summary for Pond CB: Exist. CB

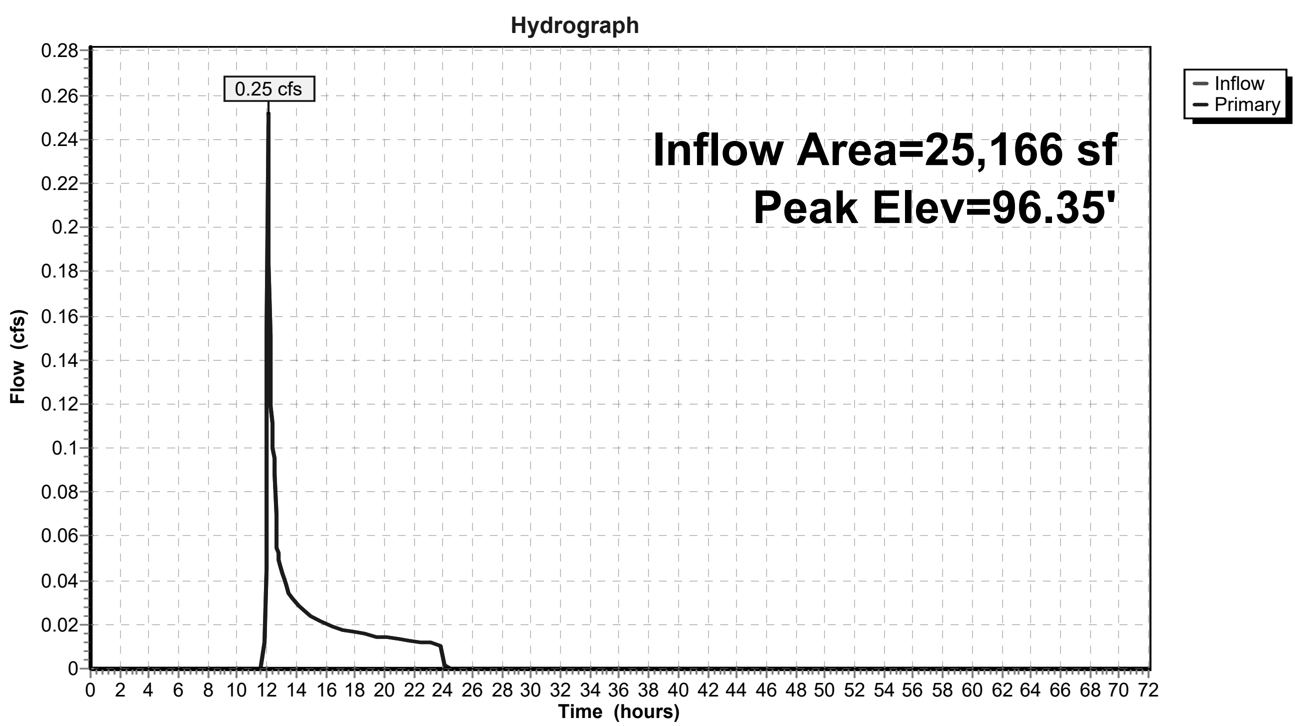
Inflow Area = 25,166 sf, 0.00% Impervious, Inflow Depth = 0.54" for 2-yr event
Inflow = 0.25 cfs @ 12.06 hrs, Volume= 1,127 cf
Outflow = 0.25 cfs @ 12.06 hrs, Volume= 1,127 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 12.06 hrs, Volume= 1,127 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 96.35' @ 12.06 hrs
Flood Elev= 99.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.10'	**12.0" Round Culvert** L= 59.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.10' / 94.90' S= 0.0202 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	99.50'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.24 cfs @ 12.06 hrs HW=96.34' (Free Discharge)
1=Culvert (Inlet Controls 0.24 cfs @ 1.66 fps)
2=Orifice/Grate (Controls 0.00 cfs)

Pond CB: Exist. CB



Summary for Pond CPP: 12" CPP

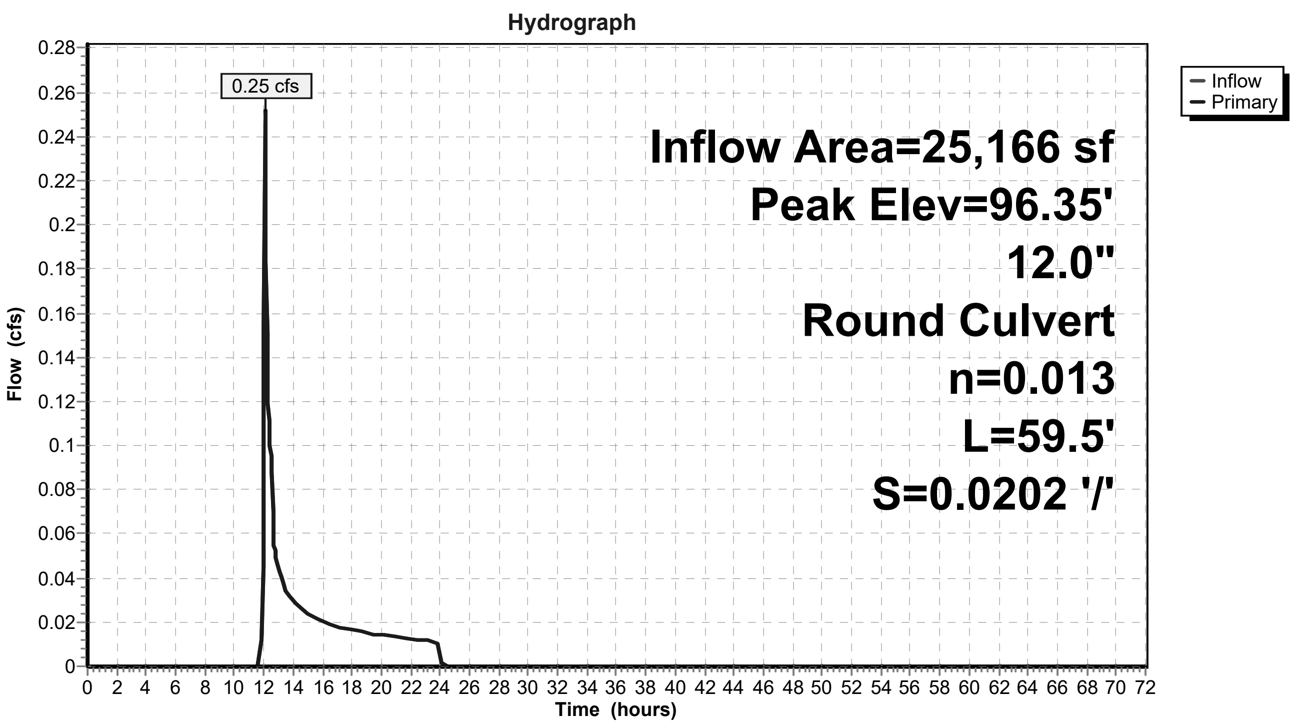
Inflow Area = 25,166 sf, 0.00% Impervious, Inflow Depth = 0.54" for 2-yr event
Inflow = 0.25 cfs @ 12.06 hrs, Volume= 1,127 cf
Outflow = 0.25 cfs @ 12.06 hrs, Volume= 1,127 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 12.06 hrs, Volume= 1,127 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 96.35' @ 12.06 hrs
Flood Elev= 98.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.10'	**12.0" Round Culvert** L= 59.5' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 96.10' / 94.90' S= 0.0202 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.24 cfs @ 12.06 hrs HW=96.34' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.24 cfs @ 1.66 fps)

Pond CPP: 12" CPP

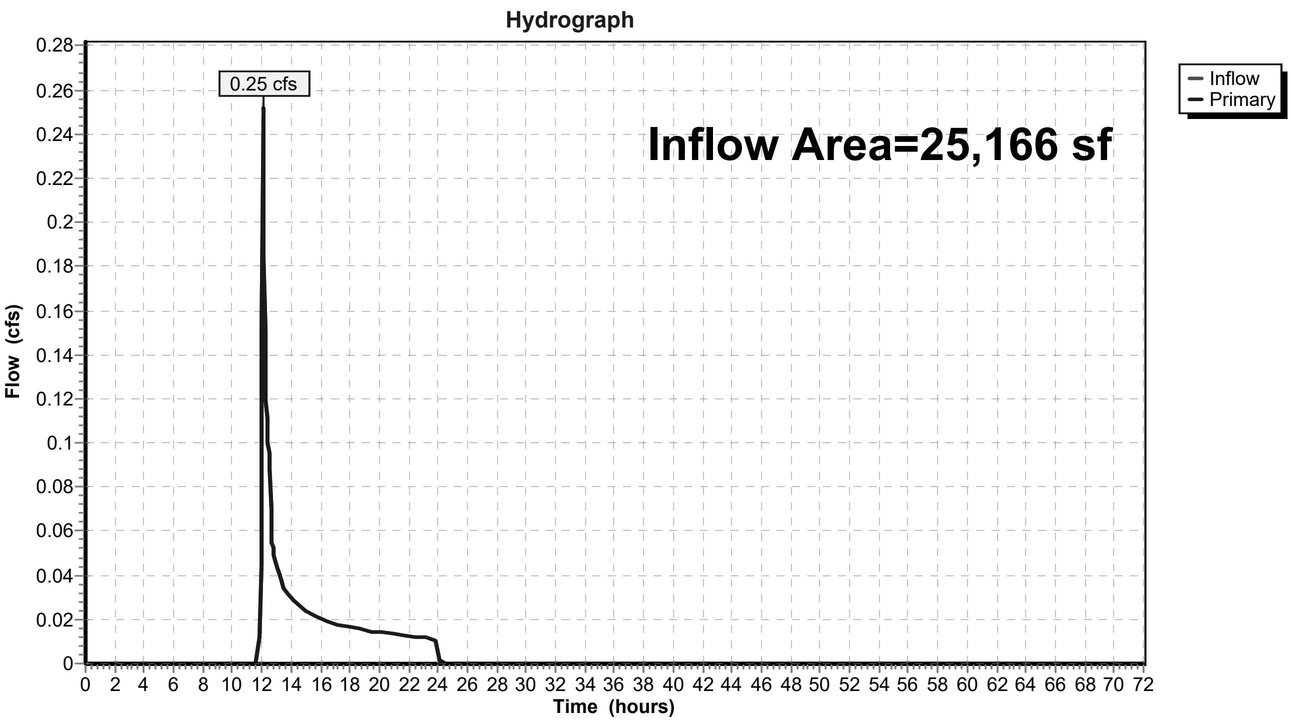


Summary for Link DP-1: Design Point #1

Inflow Area = 25,166 sf, 0.00% Impervious, Inflow Depth = 0.54" for 2-yr event
Inflow = 0.25 cfs @ 12.06 hrs, Volume= 1,127 cf
Primary = 0.25 cfs @ 12.06 hrs, Volume= 1,127 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link DP-1: Design Point #1



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Ex-DA: Exist. Drainage Area Runoff Area=25,166 sf 0.00% Impervious Runoff Depth=1.41"
Flow Length=172' Tc=6.0 min CN=61 Runoff=0.83 cfs 2,947 cf

Pond CB: Exist. CB Peak Elev=96.57' Inflow=0.83 cfs 2,947 cf
Outflow=0.83 cfs 2,947 cf

Pond CPP: 12" CPP Peak Elev=96.57' Inflow=0.83 cfs 2,947 cf
12.0" Round Culvert n=0.013 L=59.5' S=0.0202 '/' Outflow=0.83 cfs 2,947 cf

Link DP-1: Design Point #1 Inflow=0.83 cfs 2,947 cf
Primary=0.83 cfs 2,947 cf

Total Runoff Area = 25,166 sf Runoff Volume = 2,947 cf Average Runoff Depth = 1.41"
100.00% Pervious = 25,166 sf 0.00% Impervious = 0 sf

Summary for Subcatchment Ex-DA: Exist. Drainage Area

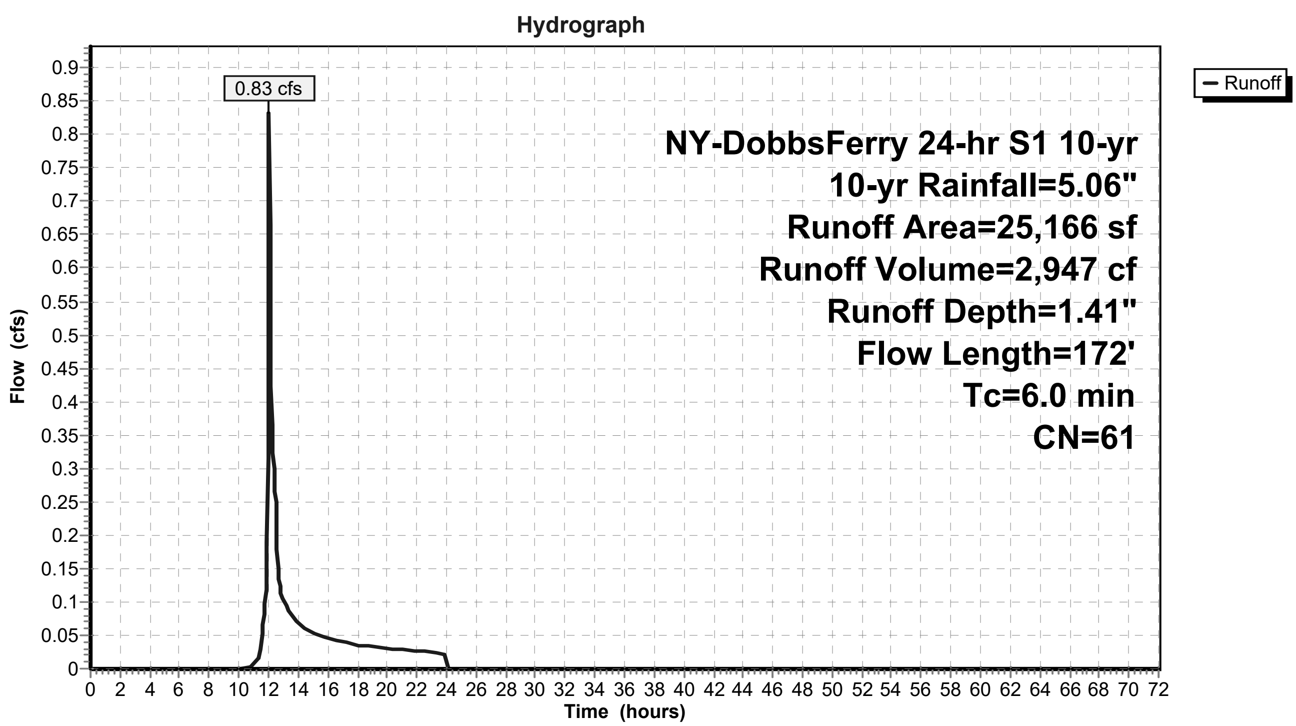
Runoff = 0.83 cfs @ 12.05 hrs, Volume= 2,947 cf, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 10-yr 10-yr Rainfall=5.06"

Area (sf)	CN	Description
25,166	61	>75% Grass cover, Good, HSG B
25,166		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	27	0.2600	0.26		**Sheet Flow, AB**
					Grass: Dense n= 0.240 P2= 3.50"
0.1	26	0.1150	5.09		**Shallow Concentrated Flow, BC**
					Grassed Waterway Kv= 15.0 fps
0.7	119	0.0370	2.89		**Shallow Concentrated Flow, CD**
					Grassed Waterway Kv= 15.0 fps
2.5	172	Total, Increased to minimum Tc = 6.0 min			

Subcatchment Ex-DA: Exist. Drainage Area



Summary for Pond CB: Exist. CB

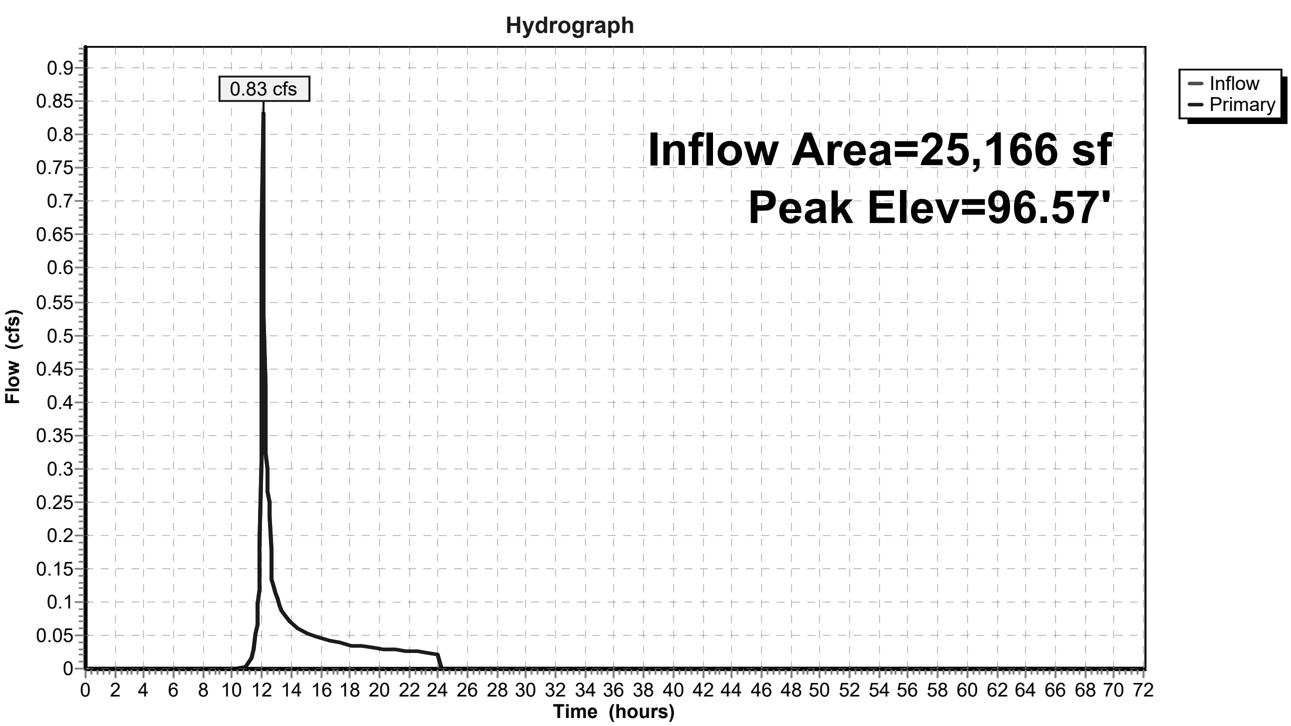
Inflow Area = 25,166 sf, 0.00% Impervious, Inflow Depth = 1.41" for 10-yr event
Inflow = 0.83 cfs @ 12.05 hrs, Volume= 2,947 cf
Outflow = 0.83 cfs @ 12.05 hrs, Volume= 2,947 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.05 hrs, Volume= 2,947 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 96.57' @ 12.05 hrs
Flood Elev= 99.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.10'	**12.0" Round Culvert** L= 59.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.10' / 94.90' S= 0.0202 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	99.50'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.83 cfs @ 12.05 hrs HW=96.56' (Free Discharge)
—**1=Culvert** (Inlet Controls 0.83 cfs @ 2.32 fps)
—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond CB: Exist. CB



Summary for Pond CPP: 12" CPP

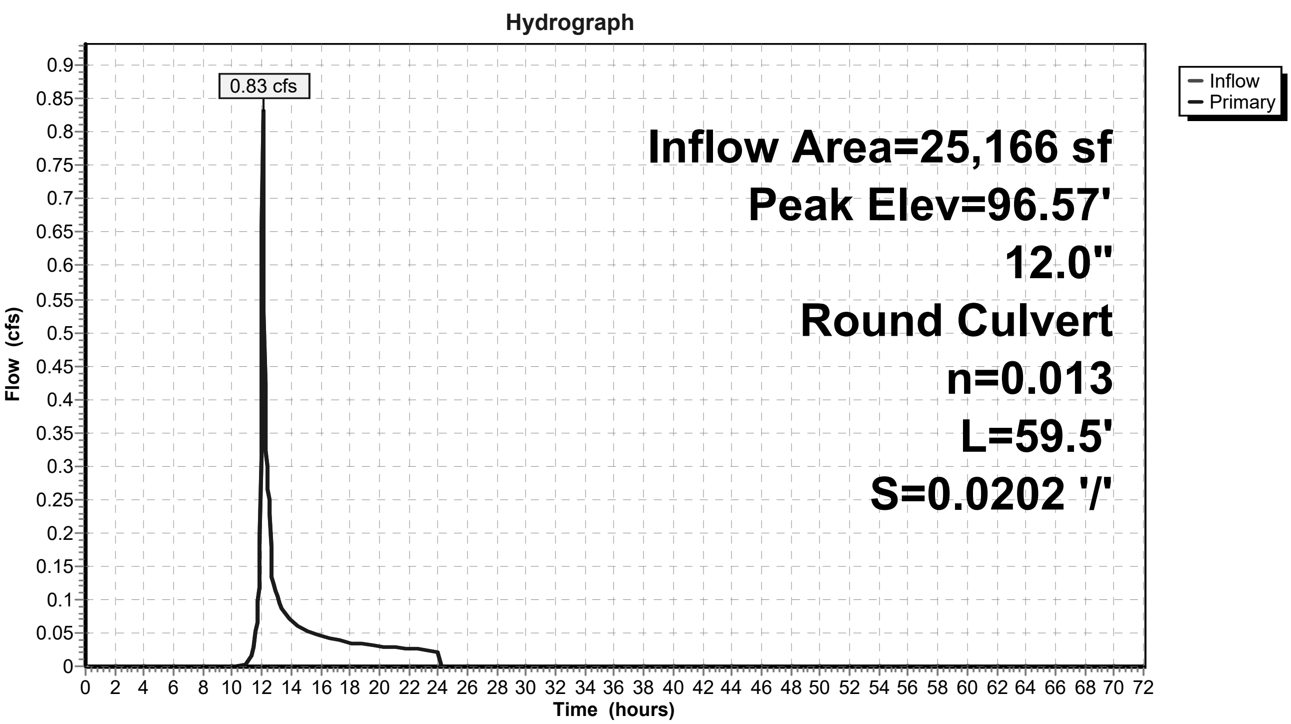
Inflow Area = 25,166 sf, 0.00% Impervious, Inflow Depth = 1.41" for 10-yr event
Inflow = 0.83 cfs @ 12.05 hrs, Volume= 2,947 cf
Outflow = 0.83 cfs @ 12.05 hrs, Volume= 2,947 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.83 cfs @ 12.05 hrs, Volume= 2,947 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 96.57' @ 12.05 hrs
Flood Elev= 98.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.10'	**12.0" Round Culvert** L= 59.5' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 96.10' / 94.90' S= 0.0202 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.05 hrs HW=96.56' (Free Discharge)
↑**1=Culvert** (Inlet Controls 0.83 cfs @ 2.32 fps)

Pond CPP: 12" CPP

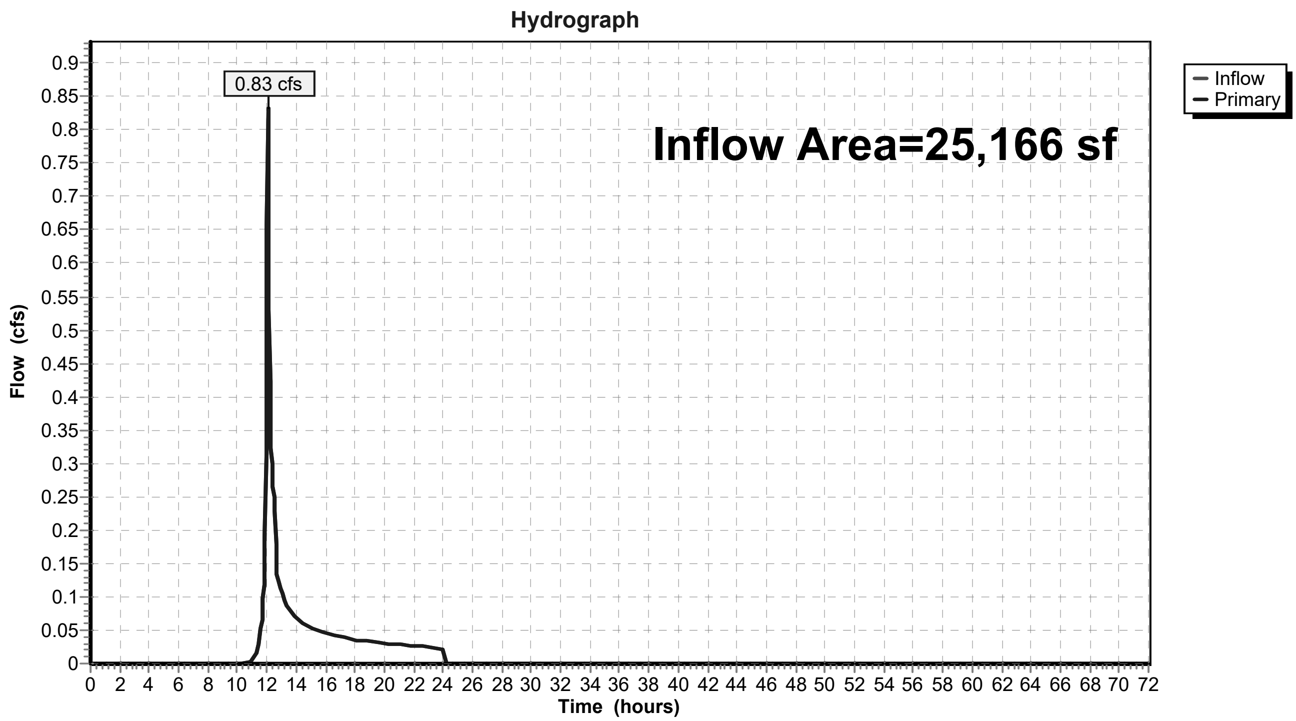


Summary for Link DP-1: Design Point #1

Inflow Area =	25,166 sf,	0.00% Impervious, Inflow Depth = 1.41"	for 10-yr event
Inflow =	0.83 cfs @	12.05 hrs, Volume=	2,947 cf
Primary =	0.83 cfs @	12.05 hrs, Volume=	2,947 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link DP-1: Design Point #1



Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment Ex-DA: Exist. Drainage Area Runoff Area=25,166 sf 0.00% Impervious Runoff Depth=4.14"
Flow Length=172' Tc=6.0 min CN=61 Runoff=2.49 cfs 8,692 cf

Pond CB: Exist. CB Peak Elev=97.03' Inflow=2.49 cfs 8,692 cf
Outflow=2.49 cfs 8,692 cf

Pond CPP: 12" CPP Peak Elev=97.03' Inflow=2.49 cfs 8,692 cf
12.0" Round Culvert n=0.013 L=59.5' S=0.0202 '/' Outflow=2.49 cfs 8,692 cf

Link DP-1: Design Point #1 Inflow=2.49 cfs 8,692 cf
Primary=2.49 cfs 8,692 cf

Total Runoff Area = 25,166 sf Runoff Volume = 8,692 cf Average Runoff Depth = 4.14"
100.00% Pervious = 25,166 sf 0.00% Impervious = 0 sf

Summary for Subcatchment Ex-DA: Exist. Drainage Area

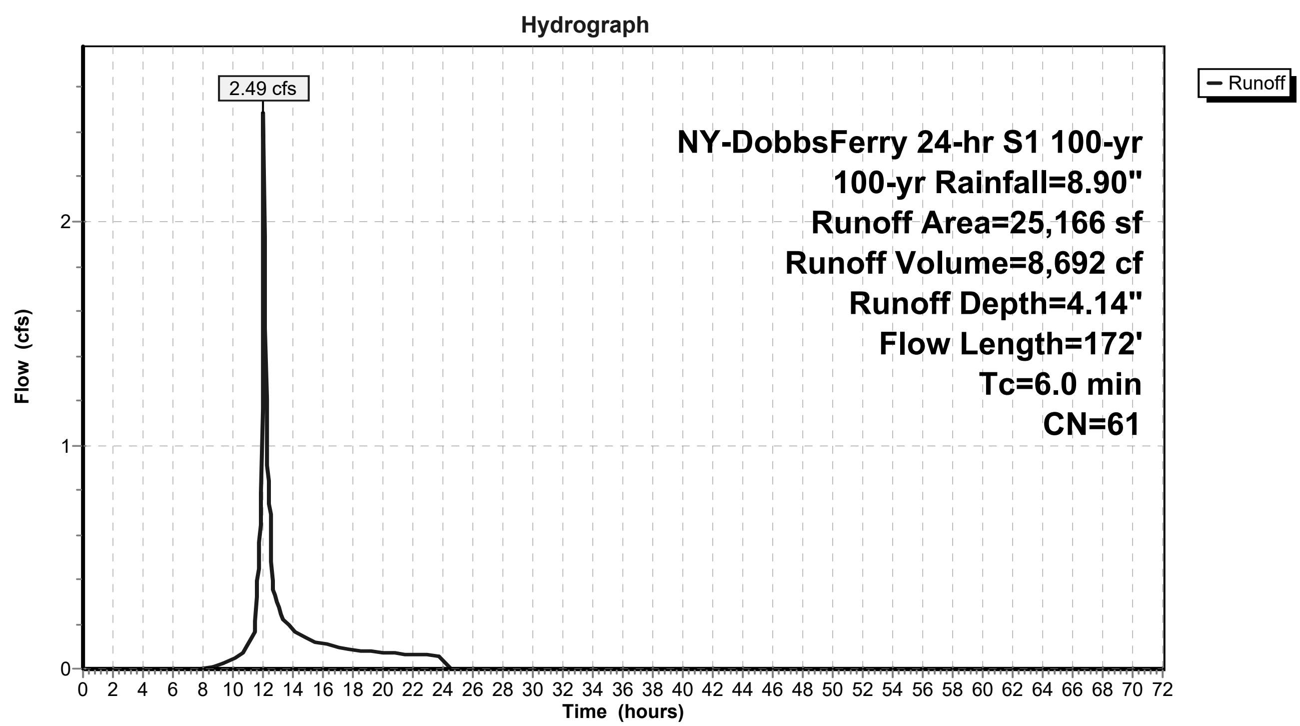
Runoff = 2.49 cfs @ 12.05 hrs, Volume= 8,692 cf, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 100-yr 100-yr Rainfall=8.90"

Area (sf)	CN	Description
25,166	61	>75% Grass cover, Good, HSG B
25,166		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	27	0.2600	0.26		**Sheet Flow, AB**
					Grass: Dense n= 0.240 P2= 3.50"
0.1	26	0.1150	5.09		**Shallow Concentrated Flow, BC**
					Grassed Waterway Kv= 15.0 fps
0.7	119	0.0370	2.89		**Shallow Concentrated Flow, CD**
					Grassed Waterway Kv= 15.0 fps
2.5	172	Total, Increased to minimum Tc = 6.0 min			

Subcatchment Ex-DA: Exist. Drainage Area



Summary for Pond CB: Exist. CB

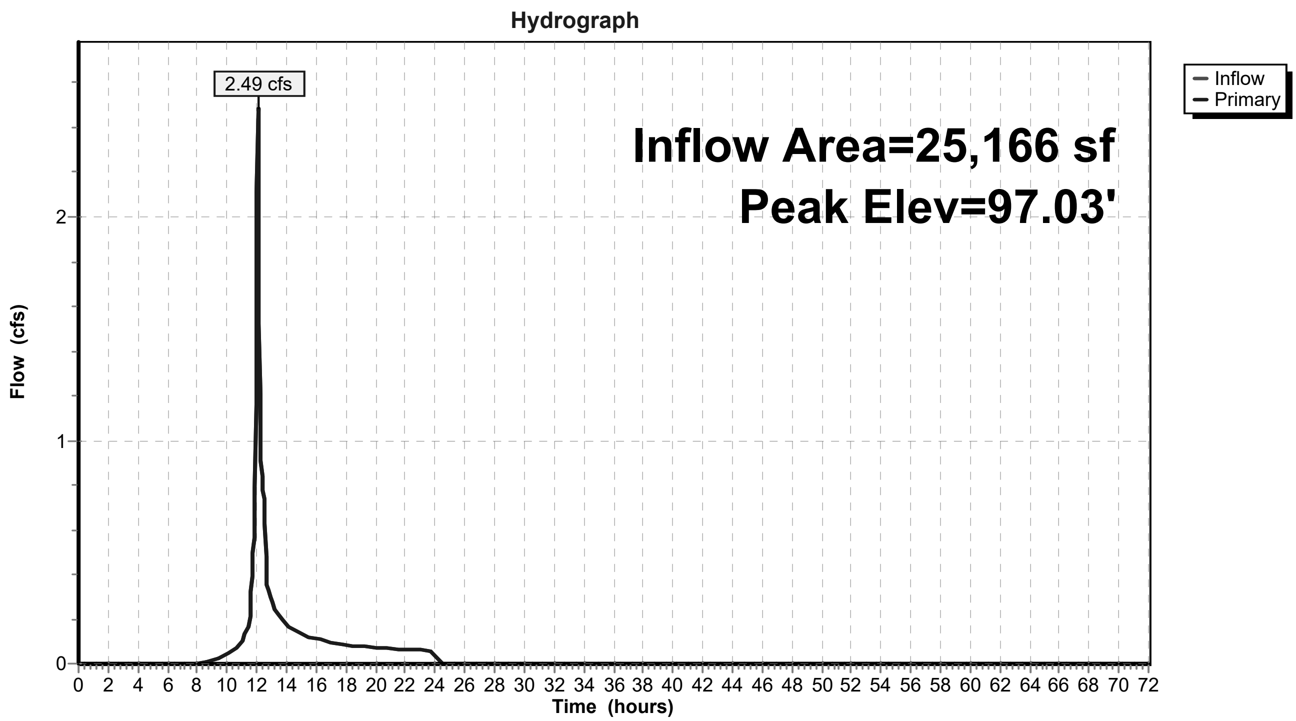
Inflow Area = 25,166 sf, 0.00% Impervious, Inflow Depth = 4.14" for 100-yr event
Inflow = 2.49 cfs @ 12.05 hrs, Volume= 8,692 cf
Outflow = 2.49 cfs @ 12.05 hrs, Volume= 8,692 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.49 cfs @ 12.05 hrs, Volume= 8,692 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 97.03' @ 12.05 hrs
Flood Elev= 99.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.10'	**12.0" Round Culvert** L= 59.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.10' / 94.90' S= 0.0202 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Primary	99.50'	**24.0" x 36.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.45 cfs @ 12.05 hrs HW=97.01' (Free Discharge)
└**1=Culvert** (Inlet Controls 2.45 cfs @ 3.26 fps)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond CB: Exist. CB



Summary for Pond CPP: 12" CPP

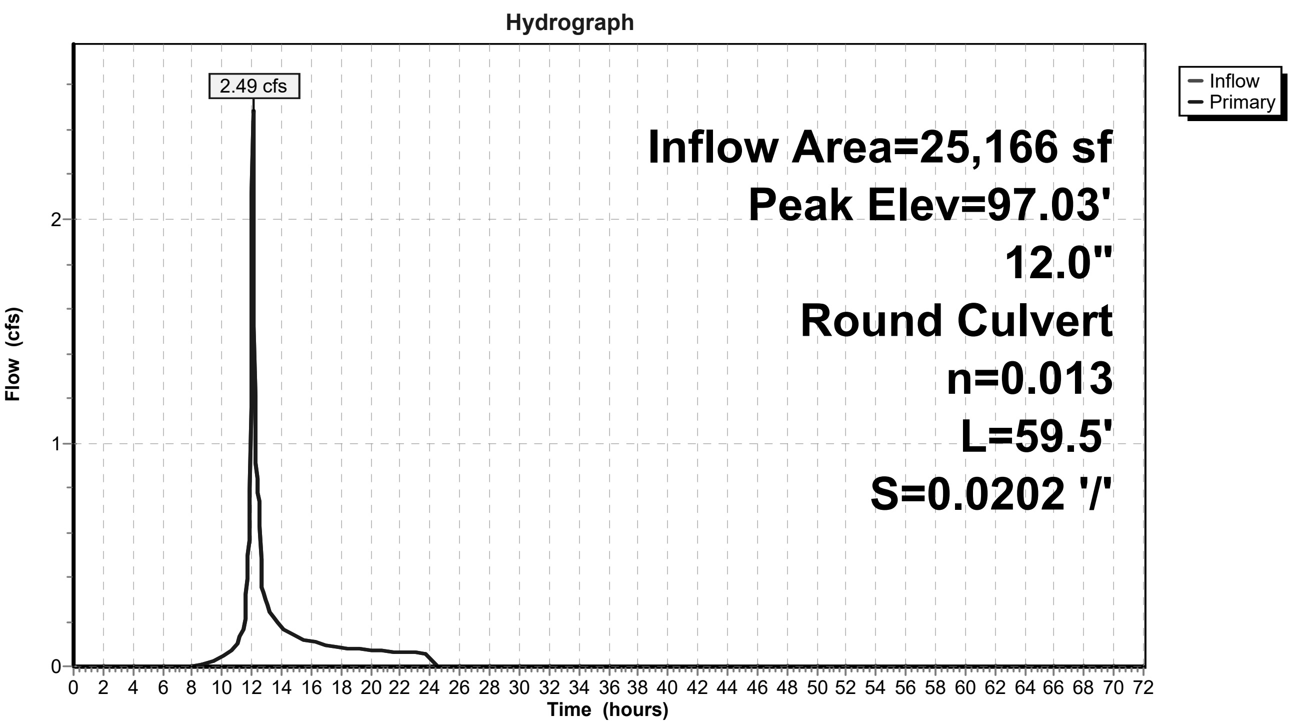
Inflow Area = 25,166 sf, 0.00% Impervious, Inflow Depth = 4.14" for 100-yr event
Inflow = 2.49 cfs @ 12.05 hrs, Volume= 8,692 cf
Outflow = 2.49 cfs @ 12.05 hrs, Volume= 8,692 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.49 cfs @ 12.05 hrs, Volume= 8,692 cf

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 97.03' @ 12.05 hrs
Flood Elev= 98.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.10'	**12.0" Round Culvert** L= 59.5' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 96.10' / 94.90' S= 0.0202 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.45 cfs @ 12.05 hrs HW=97.01' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 2.45 cfs @ 3.26 fps)

Pond CPP: 12" CPP

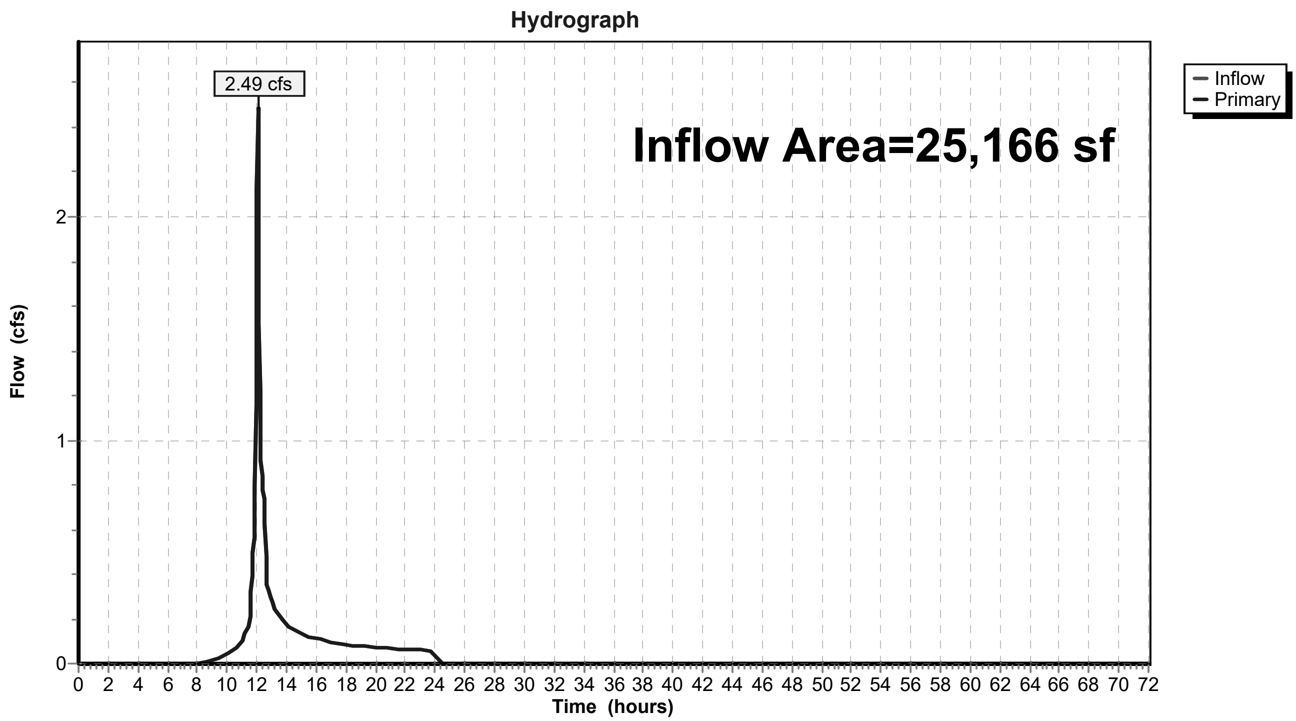


Summary for Link DP-1: Design Point #1

Inflow Area = 25,166 sf, 0.00% Impervious, Inflow Depth = 4.14" for 100-yr event
Inflow = 2.49 cfs @ 12.05 hrs, Volume= 8,692 cf
Primary = 2.49 cfs @ 12.05 hrs, Volume= 8,692 cf, Atten= 0%, Lag= 0.0 min

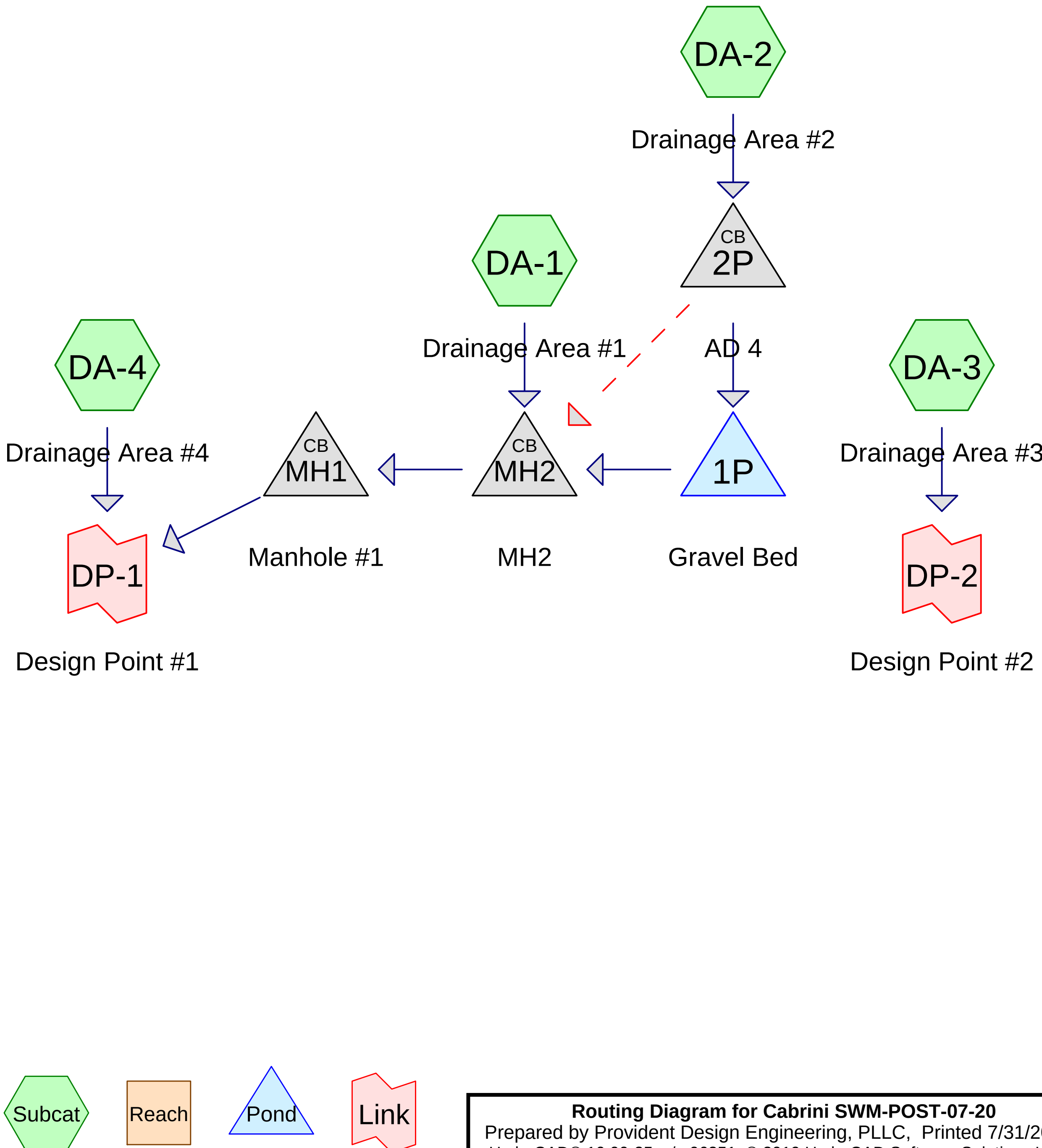
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link DP-1: Design Point #1



APPENDIX C-2

POST-DEVELOPMENT CALCULATIONS



Routing Diagram for Cabrini SWM-POST-07-20
Prepared by Provident Design Engineering, PLLC, Printed 7/31/2020
HydroCAD® 10.00-25 s/n 06251 © 2019 HydroCAD Software Solutions LLC

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1: Drainage Area #1
Runoff Area=7,576 sf 0.00% Impervious Runoff Depth=0.54"
Flow Length=175' Tc=6.0 min CN=61 Runoff=0.08 cfs 339 cf

Subcatchment DA-2: Drainage Area #2
Runoff Area=11,973 sf 62.60% Impervious Runoff Depth=1.87"
Flow Length=149' Tc=6.0 min CN=84 Runoff=0.65 cfs 1,864 cf

Subcatchment DA-3: Drainage Area #3
Runoff Area=2,275 sf 0.00% Impervious Runoff Depth=0.54"
Flow Length=99' Tc=6.0 min CN=61 Runoff=0.02 cfs 102 cf

Subcatchment DA-4: Drainage Area #4
Runoff Area=3,343 sf 10.95% Impervious Runoff Depth=0.62"
Flow Length=51' Tc=6.0 min UI Adjusted CN=63 Runoff=0.04 cfs 173 cf

Pond 1P: Gravel Bed
Peak Elev=95.82' Storage=166 cf Inflow=0.65 cfs 1,864 cf
Outflow=0.27 cfs 1,874 cf

Pond 2P: AD 4
Peak Elev=98.05' Inflow=0.65 cfs 1,864 cf
Primary=0.65 cfs 1,864 cf Secondary=0.00 cfs 0 cf Outflow=0.65 cfs 1,864 cf

Pond MH1: Manhole #1
Peak Elev=96.83' Inflow=0.08 cfs 339 cf
12.0" Round Culvert n=0.013 L=59.5' S=0.0286 '/' Outflow=0.08 cfs 339 cf

Pond MH2: MH2
Peak Elev=97.29' Inflow=0.08 cfs 339 cf
12.0" Round Culvert n=0.013 L=23.0' S=0.0200 '/' Outflow=0.08 cfs 339 cf

Link DP-1: Design Point #1
Inflow=0.12 cfs 512 cf
Primary=0.12 cfs 512 cf

Link DP-2: Design Point #2
Inflow=0.02 cfs 102 cf
Primary=0.02 cfs 102 cf

Total Runoff Area = 25,167 sf Runoff Volume = 2,478 cf Average Runoff Depth = 1.18"
68.76% Pervious = 17,306 sf 31.24% Impervious = 7,861 sf

Summary for Subcatchment DA-1: Drainage Area #1

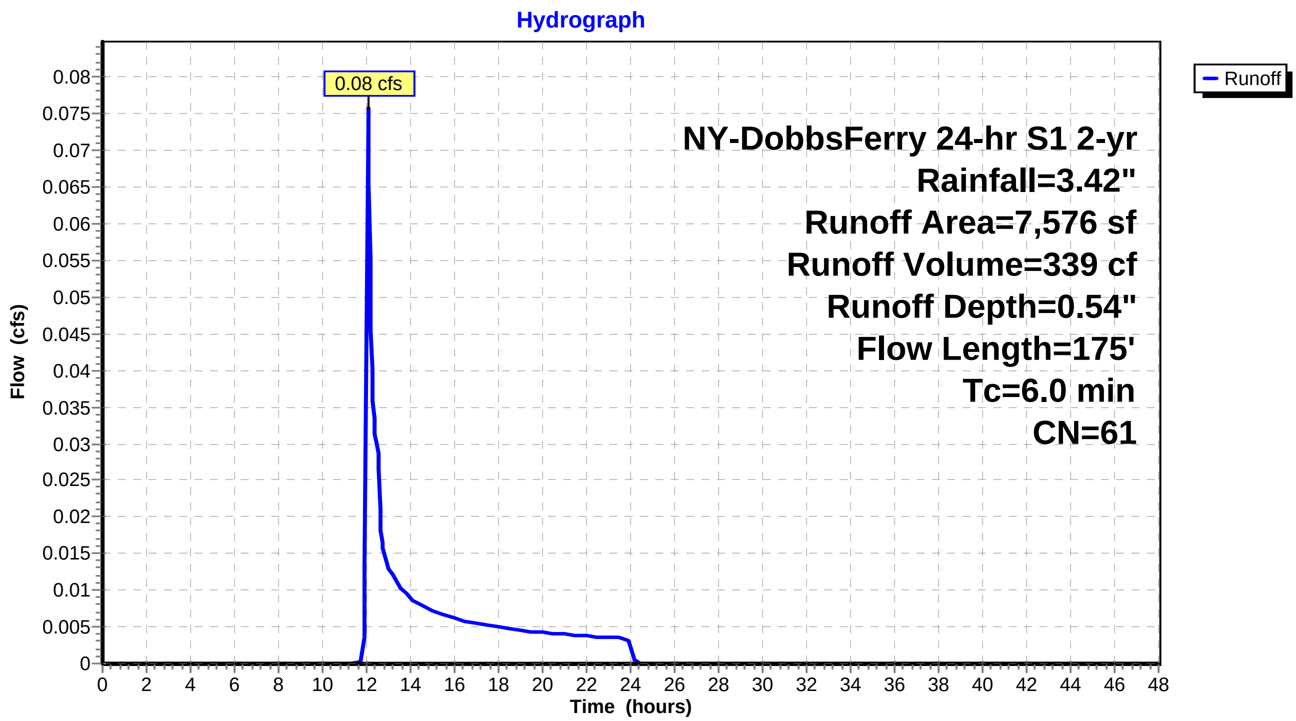
Runoff = 0.08 cfs @ 12.06 hrs, Volume= 339 cf, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 2-yr Rainfall=3.42"

Area (sf)	CN	Description
7,576	61	>75% Grass cover, Good, HSG B
7,576		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	27	0.2600	0.26		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.50"
0.1	26	0.1150	5.09		**Shallow Concentrated Flow, BC** Grassed Waterway Kv= 15.0 fps
0.2	51	0.0540	3.49		**Shallow Concentrated Flow, CD** Grassed Waterway Kv= 15.0 fps
0.1	71	0.0570	14.08	11.06	**Pipe Channel, DE** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
2.1	175	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-1: Drainage Area #1



Summary for Subcatchment DA-2: Drainage Area #2

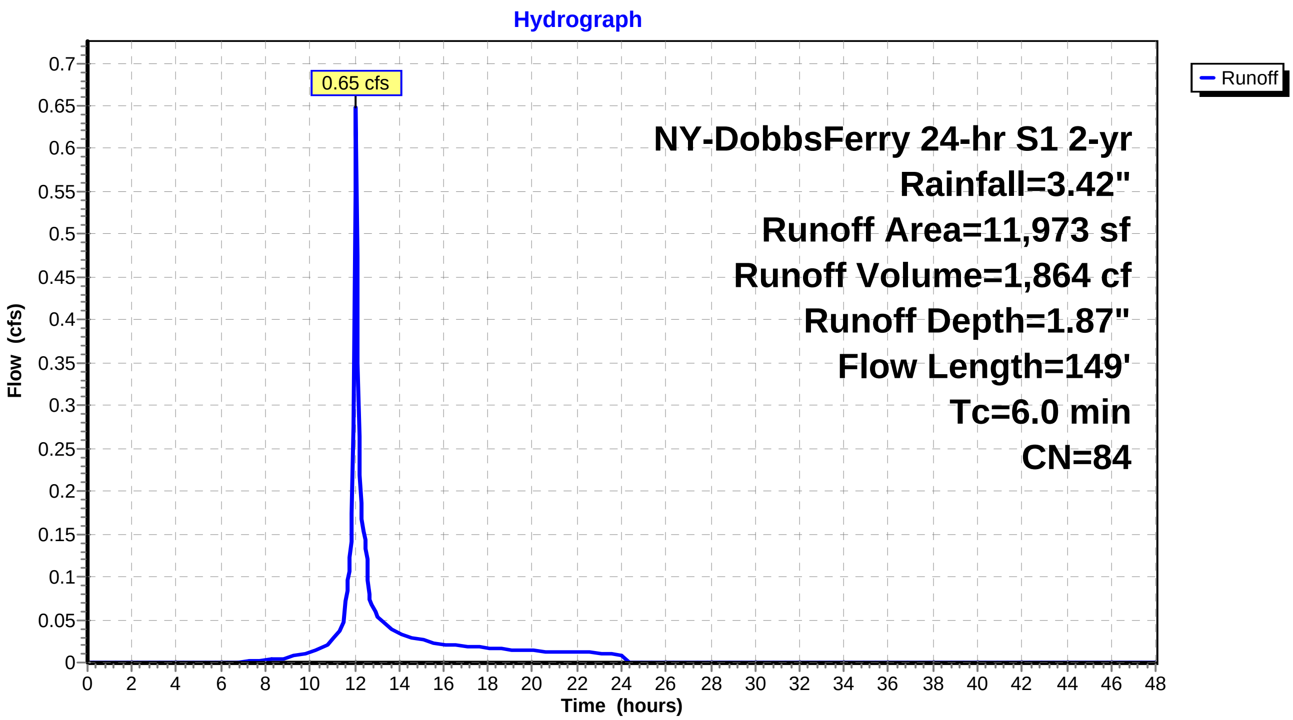
Runoff = 0.65 cfs @ 12.04 hrs, Volume= 1,864 cf, Depth= 1.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 2-yr Rainfall=3.42"

Area (sf)	CN	Description
4,478	61	>75% Grass cover, Good, HSG B
7,495	98	Paved parking, HSG B
11,973	84	Weighted Average
4,478		37.40% Pervious Area
7,495		62.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	21	0.1400	0.19		**Sheet Flow, AB**
					Grass: Dense n= 0.240 P2= 3.50"
0.5	128	0.0500	4.54		**Shallow Concentrated Flow, BC**
					Paved Kv= 20.3 fps
2.3	149	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-2: Drainage Area #2



Summary for Subcatchment DA-3: Drainage Area #3

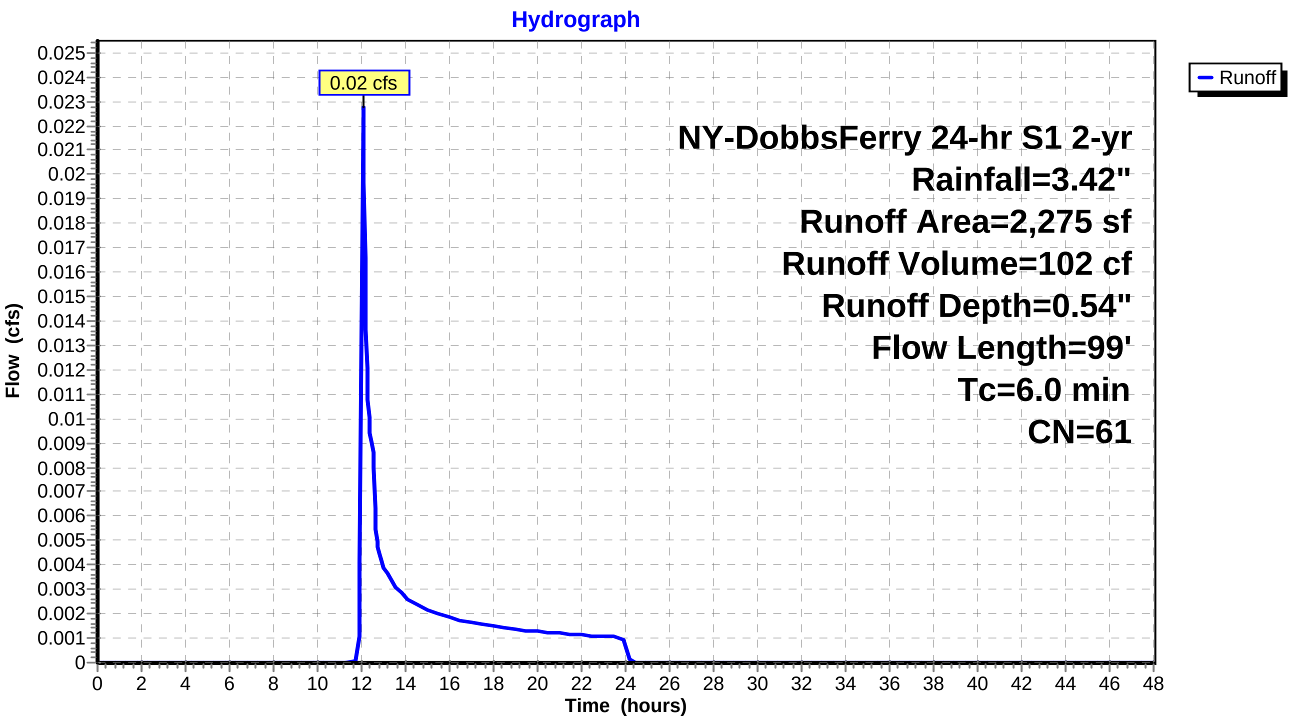
Runoff = 0.02 cfs @ 12.06 hrs, Volume= 102 cf, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 2-yr Rainfall=3.42"

Area (sf)	CN	Description
2,275	61	>75% Grass cover, Good, HSG B
2,275		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	24	0.1700	0.22		**Sheet Flow, AB**
					Grass: Dense n= 0.240 P2= 3.50"
0.3	75	0.0670	3.88		**Shallow Concentrated Flow, BC**
					Grassed Waterway Kv= 15.0 fps
2.2	99	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-3: Drainage Area #3



Summary for Subcatchment DA-4: Drainage Area #4

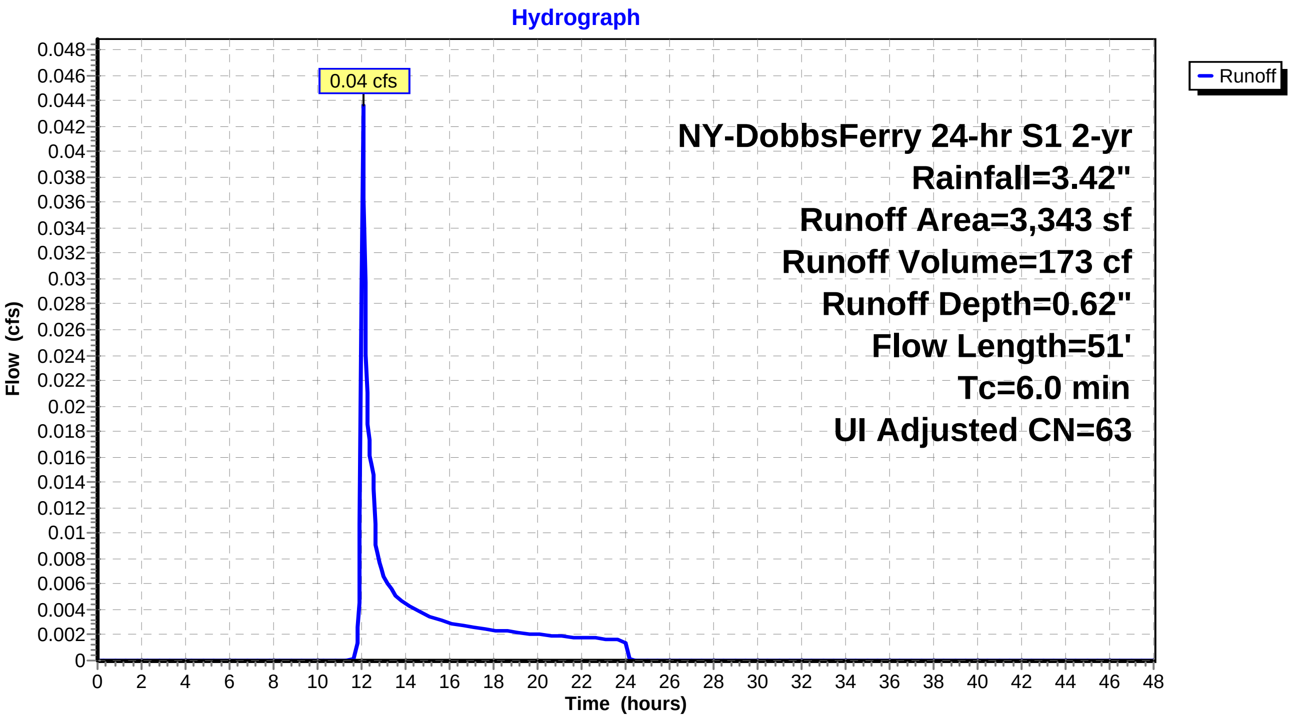
Runoff = 0.04 cfs @ 12.06 hrs, Volume= 173 cf, Depth= 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 2-yr Rainfall=3.42"

Area (sf)	CN	Adj	Description
2,977	61		>75% Grass cover, Good, HSG B
366	98		Unconnected pavement, HSG B
3,343	65	63	Weighted Average, UI Adjusted
2,977			89.05% Pervious Area
366			10.95% Impervious Area
366			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	25	0.1200	0.19		**Sheet Flow, AB**
					Grass: Dense n= 0.240 P2= 3.50"
0.1	26	0.0650	3.82		**Shallow Concentrated Flow, BC**
					Grassed Waterway Kv= 15.0 fps
2.3	51	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-4: Drainage Area #4



Summary for Pond 1P: Gravel Bed

Inflow Area = 11,973 sf, 62.60% Impervious, Inflow Depth = 1.87" for 2-yr event
Inflow = 0.65 cfs @ 12.04 hrs, Volume= 1,864 cf
Outflow = 0.27 cfs @ 12.00 hrs, Volume= 1,874 cf, Atten= 58%, Lag= 0.0 min
Discarded = 0.27 cfs @ 12.00 hrs, Volume= 1,874 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 95.82' @ 12.20 hrs Surf.Area= 740 sf Storage= 166 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.3 min (845.6 - 843.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	95.26'	1,151 cf	**18.50'W x 40.00'L x 4.17'H Field A**
			3,083 cf Overall - 204 cf Embedded = 2,878 cf x 40.0% Voids
#2A	97.26'	154 cf	**ADS N-12 15"** x 3 Inside #1
			Inside= 14.8"W x 14.8"H => 1.20 sf x 20.00'L = 24.0 cf
			Outside= 18.0"W x 18.0"H => 1.60 sf x 20.00'L = 31.9 cf
			Row Length Adjustment= +13.00' x 1.20 sf x 3 rows
			14.50' Header x 1.20 sf x 2 = 34.8 cf Inside
		1,305 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	95.26'	**16.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.27 cfs @ 12.00 hrs HW=95.35' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Pond 1P: Gravel Bed - Chamber Wizard Field A

Chamber Model = ADS N-12 15" (ADS N-12® Pipe)
Inside= 14.8"W x 14.8"H => 1.20 sf x 20.00'L = 24.0 cf
Outside= 18.0"W x 18.0"H => 1.60 sf x 20.00'L = 31.9 cf
Row Length Adjustment= +13.00' x 1.20 sf x 3 rows

18.0" Wide + 60.0" Spacing = 78.0" C-C Row Spacing

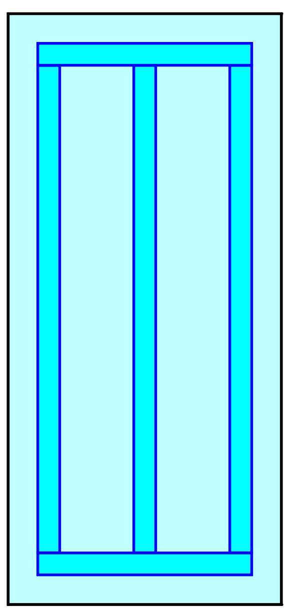
1 Chambers/Row x 20.00' Long +13.00' Row Adjustment +1.50' Header x 2 = 36.00' Row Length +24.0" End Stone x 2 = 40.00' Base Length
3 Rows x 18.0" Wide + 60.0" Spacing x 2 + 24.0" Side Stone x 2 = 18.50' Base Width
24.0" Base + 18.0" Chamber Height + 8.0" Cover = 4.17' Field Height

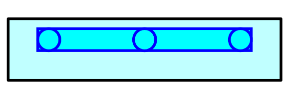
3 Chambers x 24.0 cf +13.00' Row Adjustment x 1.20 sf x 3 Rows + 14.50' Header x 1.20 sf x 2 = 153.6 cf Chamber Storage
3 Chambers x 31.9 cf +13.00' Row Adjustment x 1.60 sf x 3 Rows + 14.50' Header x 1.60 sf x 2 = 204.3 cf Displacement

3,082.5 cf Field - 204.3 cf Chambers = 2,878.2 cf Stone x 40.0% Voids = 1,151.3 cf Stone Storage

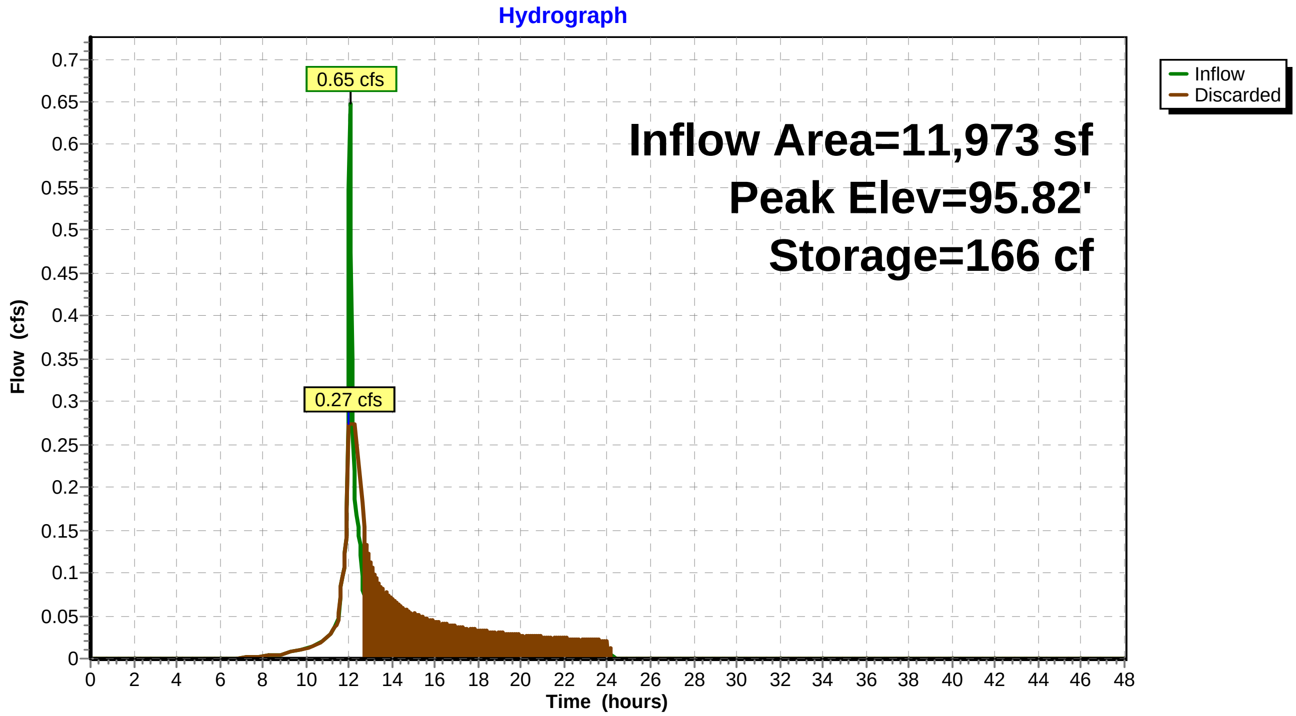
Chamber Storage + Stone Storage = 1,304.9 cf = 0.03 af
Overall Storage Efficiency = 42.3%
Overall System Size = 40.00' x 18.50' x 4.17'

3 Chambers
114.2 cy Field
106.6 cy Stone





Pond 1P: Gravel Bed



Summary for Pond 2P: AD 4

Inflow Area = 11,973 sf, 62.60% Impervious, Inflow Depth = 1.87" for 2-yr event
Inflow = 0.65 cfs @ 12.04 hrs, Volume= 1,864 cf
Outflow = 0.65 cfs @ 12.04 hrs, Volume= 1,864 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.65 cfs @ 12.04 hrs, Volume= 1,864 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

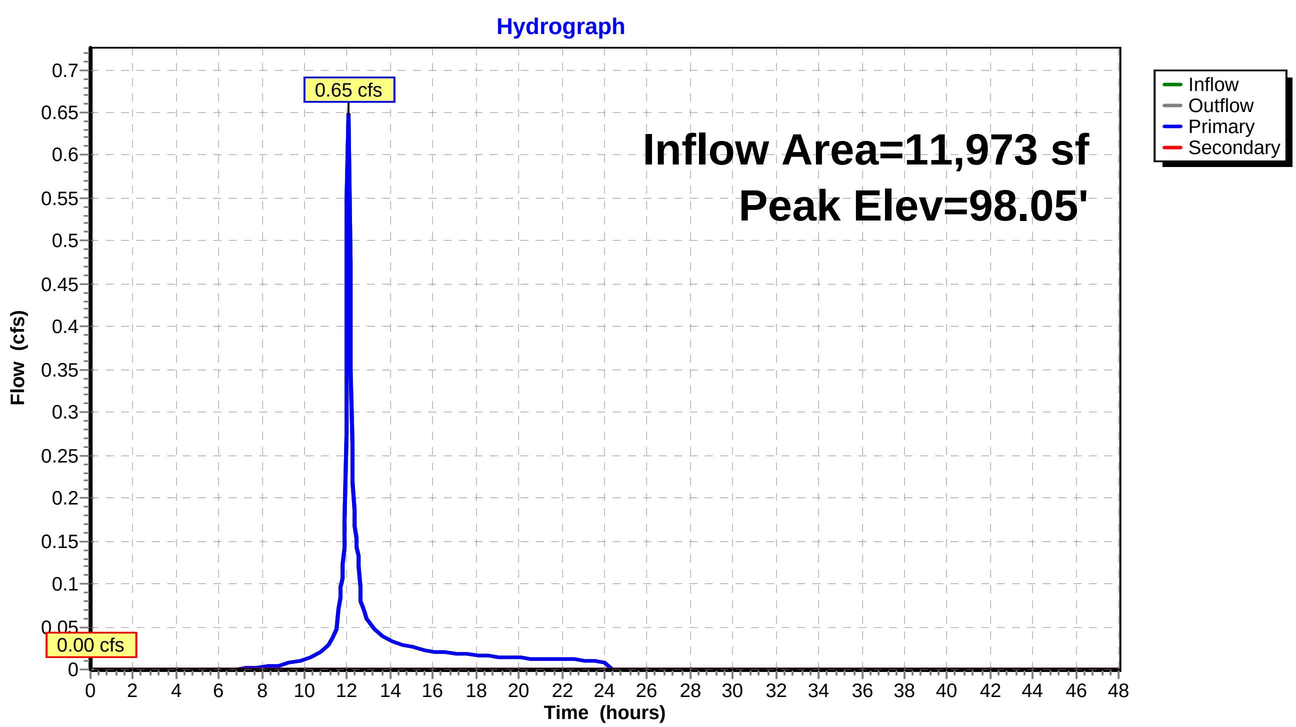
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 98.05' @ 12.04 hrs
Flood Elev= 101.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	97.48'	**10.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 97.48' / 97.48' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	98.43'	**12.0" Round Culvert** L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 98.43' / 98.22' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.63 cfs @ 12.04 hrs HW=98.04' TW=95.52' (Dynamic Tailwater)
↑**1=Culvert** (Barrel Controls 0.63 cfs @ 2.30 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=97.48' TW=97.16' (Dynamic Tailwater)
↑**2=Culvert** (Controls 0.00 cfs)

Pond 2P: AD 4



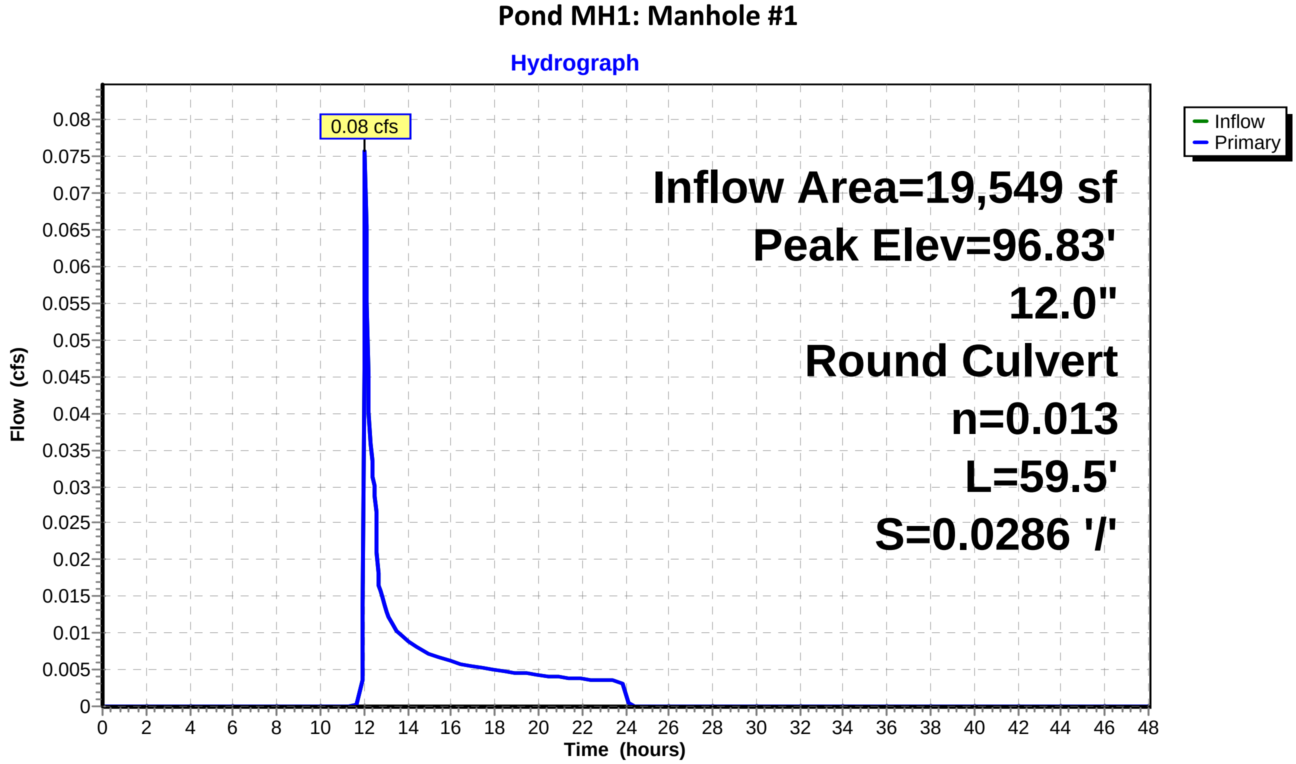
Summary for Pond MH1: Manhole #1

Inflow Area = 19,549 sf, 38.34% Impervious, Inflow Depth = 0.21" for 2-yr event
Inflow = 0.08 cfs @ 12.06 hrs, Volume= 339 cf
Outflow = 0.08 cfs @ 12.06 hrs, Volume= 339 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.08 cfs @ 12.06 hrs, Volume= 339 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 96.83' @ 12.06 hrs
Flood Elev= 101.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.70'	**12.0" Round Culvert** L= 59.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.70' / 95.00' S= 0.0286 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.07 cfs @ 12.06 hrs HW=96.83' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.07 cfs @ 1.22 fps)



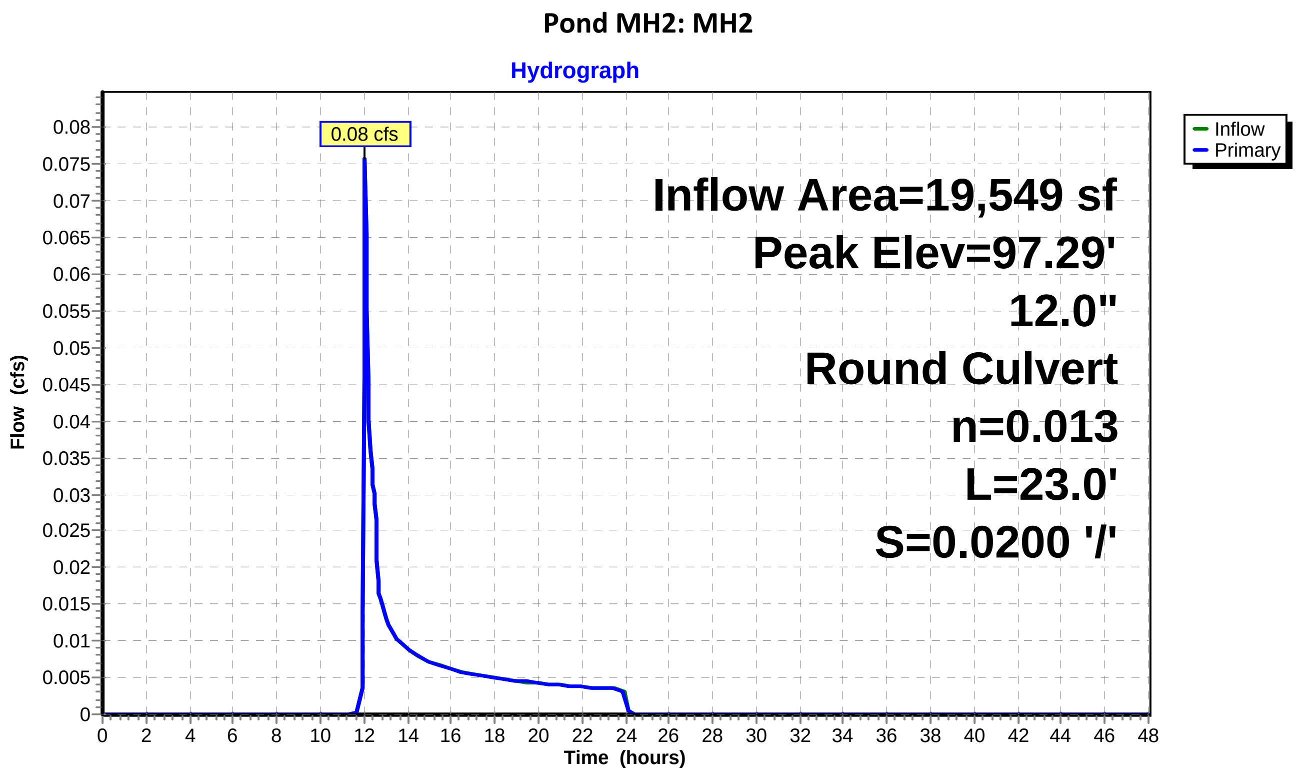
Summary for Pond MH2: MH2

Inflow Area = 19,549 sf, 38.34% Impervious, Inflow Depth = 0.21" for 2-yr event
Inflow = 0.08 cfs @ 12.06 hrs, Volume= 339 cf
Outflow = 0.08 cfs @ 12.06 hrs, Volume= 339 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.08 cfs @ 12.06 hrs, Volume= 339 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 97.29' @ 12.06 hrs
Flood Elev= 102.76'

Device	Routing	Invert	Outlet Devices
#1	Primary	97.16'	**12.0" Round Culvert** L= 23.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 97.16' / 96.70' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.07 cfs @ 12.06 hrs HW=97.29' TW=96.83' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.07 cfs @ 1.22 fps)

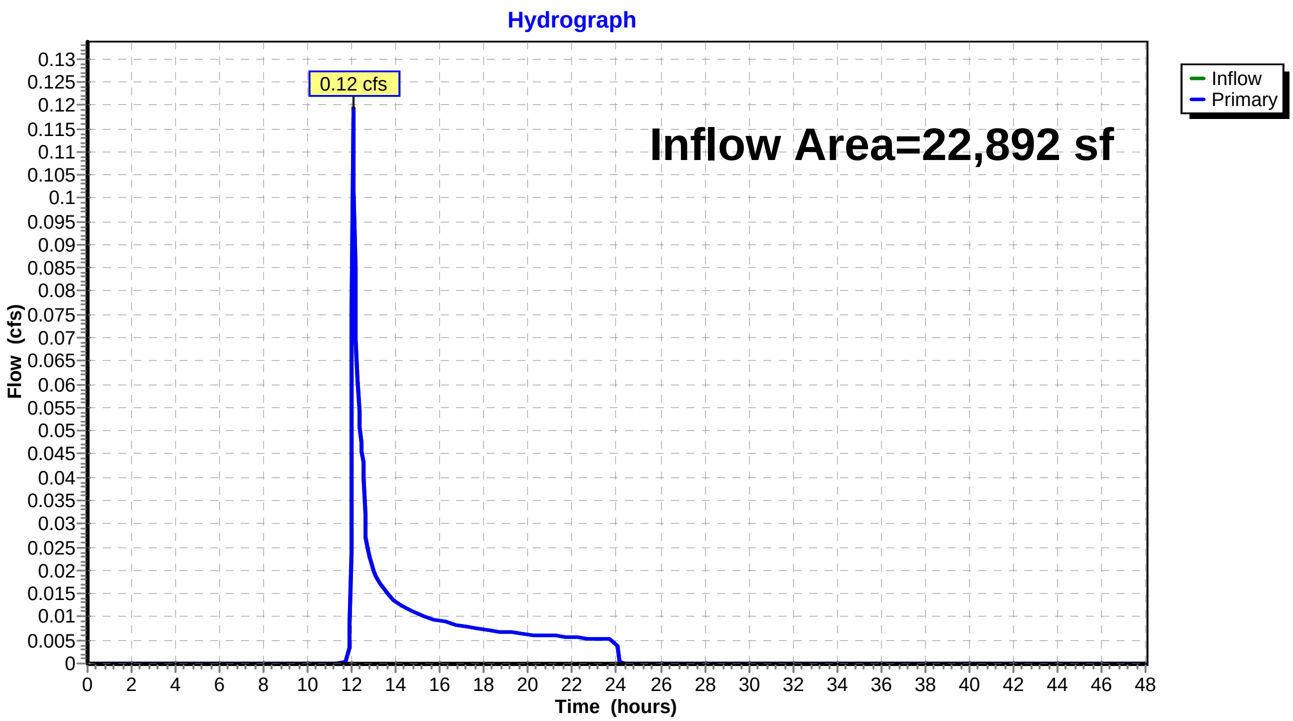


Summary for Link DP-1: Design Point #1

Inflow Area = 22,892 sf, 34.34% Impervious, Inflow Depth = 0.27" for 2-yr event
Inflow = 0.12 cfs @ 12.06 hrs, Volume= 512 cf
Primary = 0.12 cfs @ 12.06 hrs, Volume= 512 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-1: Design Point #1

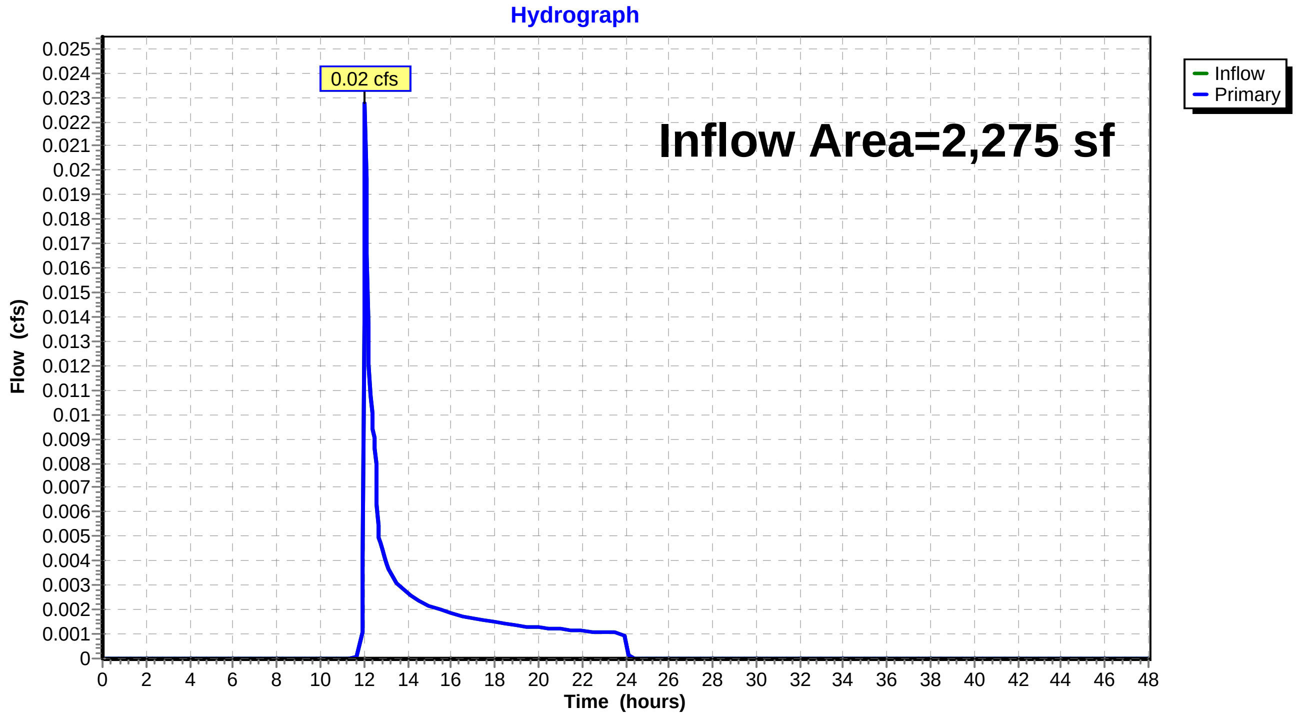


Summary for Link DP-2: Design Point #2

Inflow Area = 2,275 sf, 0.00% Impervious, Inflow Depth = 0.54" for 2-yr event
Inflow = 0.02 cfs @ 12.06 hrs, Volume= 102 cf
Primary = 0.02 cfs @ 12.06 hrs, Volume= 102 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-2: Design Point #2



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1: Drainage Area #1 Runoff Area=7,576 sf 0.00% Impervious Runoff Depth=1.41"
Flow Length=175' Tc=6.0 min CN=61 Runoff=0.25 cfs 887 cf

Subcatchment DA-2: Drainage Area #2 Runoff Area=11,973 sf 62.60% Impervious Runoff Depth=3.33"
Flow Length=149' Tc=6.0 min CN=84 Runoff=1.05 cfs 3,318 cf

Subcatchment DA-3: Drainage Area #3 Runoff Area=2,275 sf 0.00% Impervious Runoff Depth=1.41"
Flow Length=99' Tc=6.0 min CN=61 Runoff=0.08 cfs 266 cf

Subcatchment DA-4: Drainage Area #4 Runoff Area=3,343 sf 10.95% Impervious Runoff Depth=1.55"
Flow Length=51' Tc=6.0 min UI Adjusted CN=63 Runoff=0.13 cfs 431 cf

Pond 1P: Gravel Bed Peak Elev=96.97' Storage=507 cf Inflow=1.05 cfs 3,318 cf
Outflow=0.27 cfs 3,334 cf

Pond 2P: AD 4 Peak Elev=98.23' Inflow=1.05 cfs 3,318 cf
Primary=1.05 cfs 3,318 cf Secondary=0.00 cfs 0 cf Outflow=1.05 cfs 3,318 cf

Pond MH1: Manhole #1 Peak Elev=96.94' Inflow=0.25 cfs 887 cf
12.0" Round Culvert n=0.013 L=59.5' S=0.0286 '/' Outflow=0.25 cfs 887 cf

Pond MH2: MH2 Peak Elev=97.40' Inflow=0.25 cfs 887 cf
12.0" Round Culvert n=0.013 L=23.0' S=0.0200 '/' Outflow=0.25 cfs 887 cf

Link DP-1: Design Point #1 Inflow=0.38 cfs 1,318 cf
Primary=0.38 cfs 1,318 cf

Link DP-2: Design Point #2 Inflow=0.08 cfs 266 cf
Primary=0.08 cfs 266 cf

Total Runoff Area = 25,167 sf Runoff Volume = 4,902 cf Average Runoff Depth = 2.34"
68.76% Pervious = 17,306 sf 31.24% Impervious = 7,861 sf

Summary for Subcatchment DA-1: Drainage Area #1

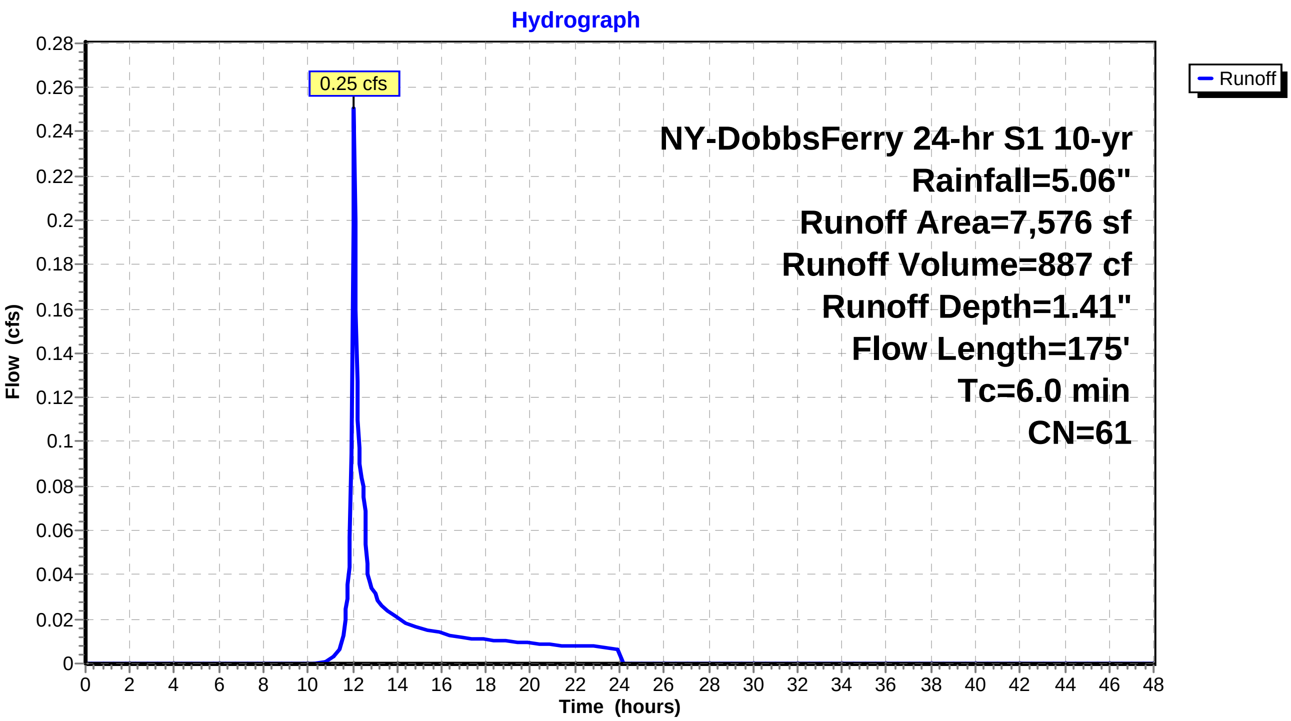
Runoff = 0.25 cfs @ 12.05 hrs, Volume= 887 cf, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 10-yr Rainfall=5.06"

Area (sf)	CN	Description
7,576	61	>75% Grass cover, Good, HSG B
7,576		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	27	0.2600	0.26		**Sheet Flow, AB**
					Grass: Dense n= 0.240 P2= 3.50"
0.1	26	0.1150	5.09		**Shallow Concentrated Flow, BC**
					Grassed Waterway Kv= 15.0 fps
0.2	51	0.0540	3.49		**Shallow Concentrated Flow, CD**
					Grassed Waterway Kv= 15.0 fps
0.1	71	0.0570	14.08	11.06	**Pipe Channel, DE**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.010 PVC, smooth interior
2.1	175	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-1: Drainage Area #1



Summary for Subcatchment DA-2: Drainage Area #2

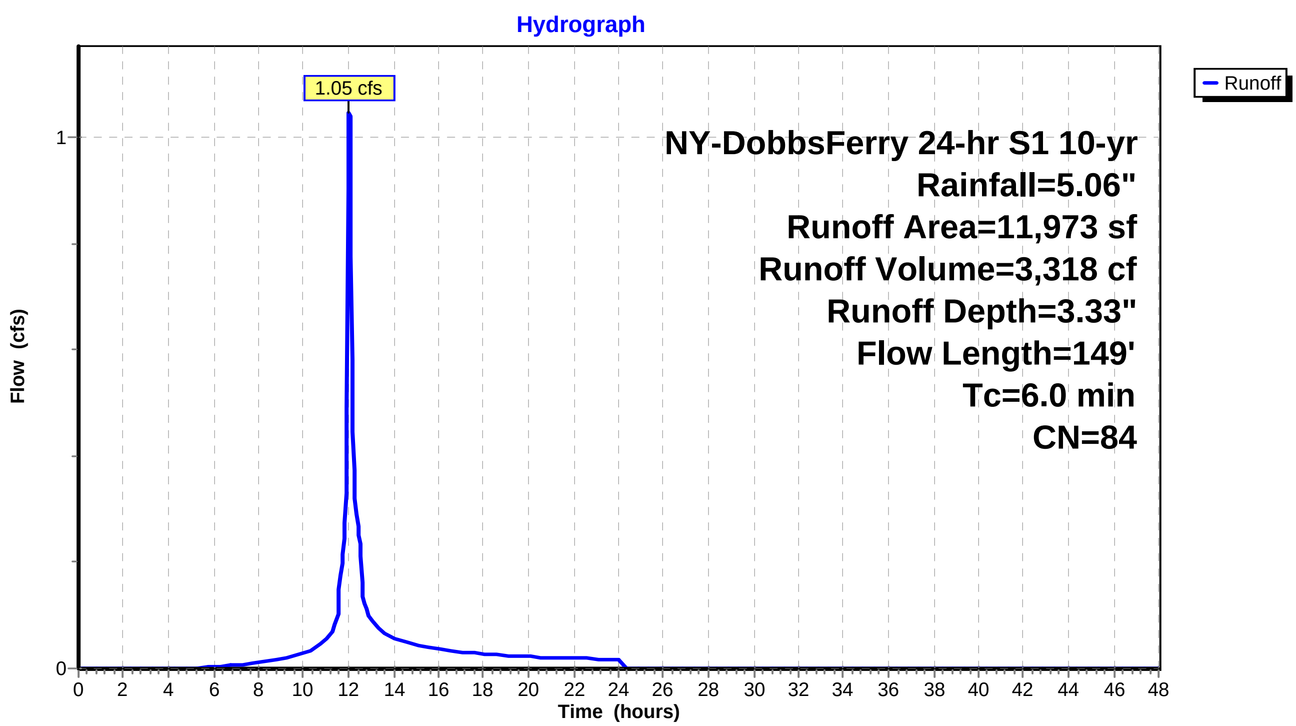
Runoff = 1.05 cfs @ 12.04 hrs, Volume= 3,318 cf, Depth= 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 10-yr Rainfall=5.06"

Area (sf)	CN	Description
4,478	61	>75% Grass cover, Good, HSG B
7,495	98	Paved parking, HSG B
11,973	84	Weighted Average
4,478		37.40% Pervious Area
7,495		62.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	21	0.1400	0.19		**Sheet Flow, AB**
					Grass: Dense n= 0.240 P2= 3.50"
0.5	128	0.0500	4.54		**Shallow Concentrated Flow, BC**
					Paved Kv= 20.3 fps
2.3	149	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-2: Drainage Area #2



Summary for Subcatchment DA-3: Drainage Area #3

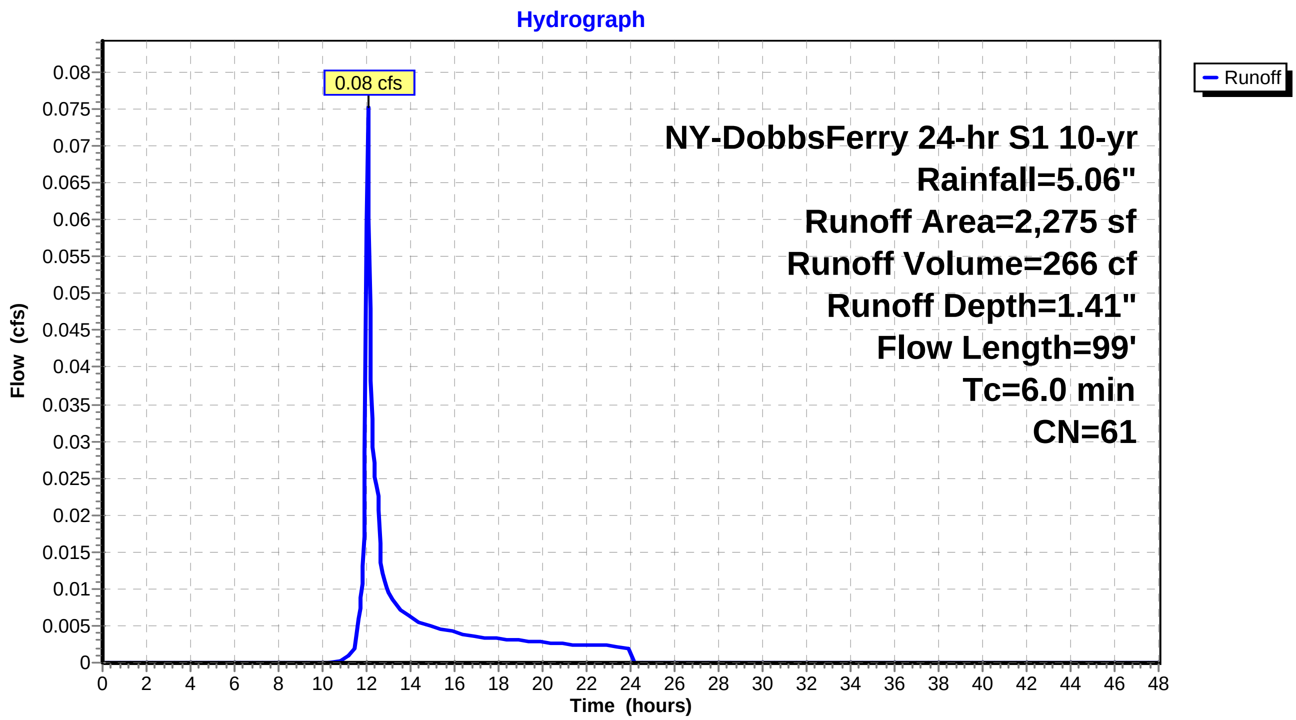
Runoff = 0.08 cfs @ 12.05 hrs, Volume= 266 cf, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 10-yr Rainfall=5.06"

Area (sf)	CN	Description
2,275	61	>75% Grass cover, Good, HSG B
2,275		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	24	0.1700	0.22		**Sheet Flow, AB**
					Grass: Dense n= 0.240 P2= 3.50"
0.3	75	0.0670	3.88		**Shallow Concentrated Flow, BC**
					Grassed Waterway Kv= 15.0 fps
2.2	99	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-3: Drainage Area #3



Summary for Subcatchment DA-4: Drainage Area #4

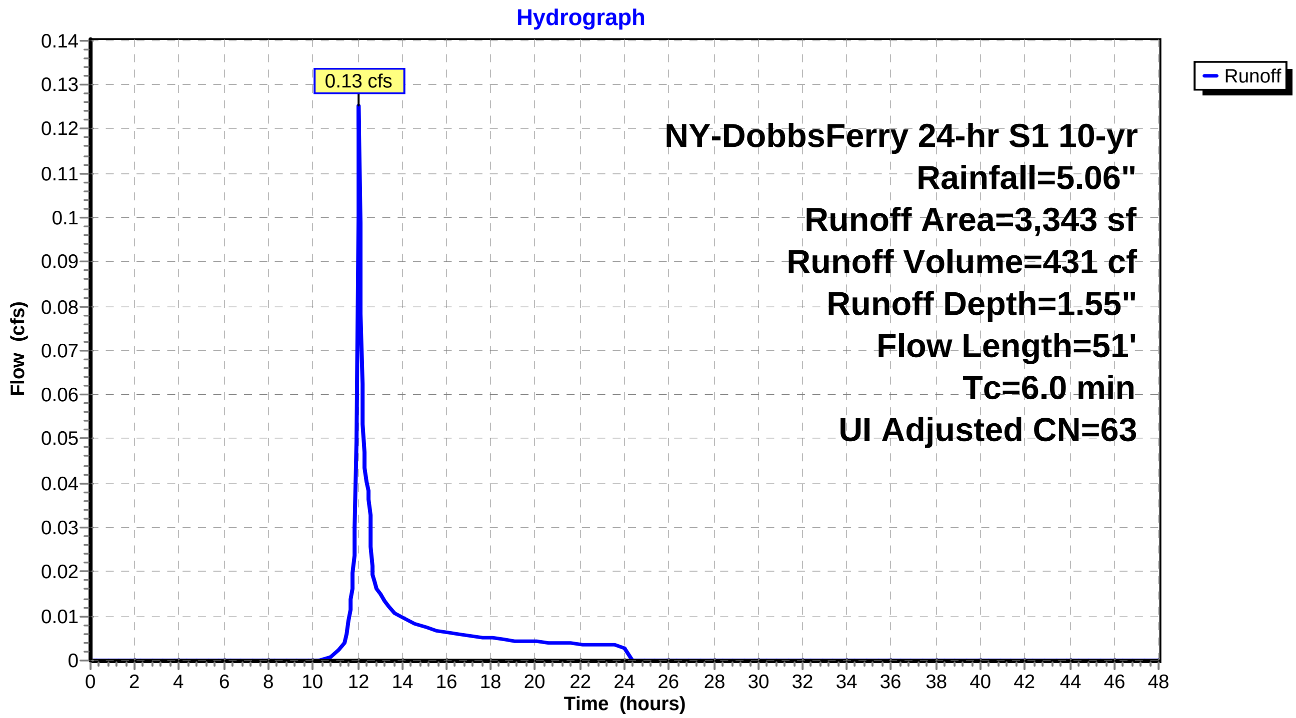
Runoff = 0.13 cfs @ 12.05 hrs, Volume= 431 cf, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 10-yr Rainfall=5.06"

Area (sf)	CN	Adj	Description
2,977	61		>75% Grass cover, Good, HSG B
366	98		Unconnected pavement, HSG B
3,343	65	63	Weighted Average, UI Adjusted
2,977			89.05% Pervious Area
366			10.95% Impervious Area
366			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	25	0.1200	0.19		**Sheet Flow, AB**
					Grass: Dense n= 0.240 P2= 3.50"
0.1	26	0.0650	3.82		**Shallow Concentrated Flow, BC**
					Grassed Waterway Kv= 15.0 fps
2.3	51	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-4: Drainage Area #4



Summary for Pond 1P: Gravel Bed

Inflow Area = 11,973 sf, 62.60% Impervious, Inflow Depth = 3.33" for 10-yr event
Inflow = 1.05 cfs @ 12.04 hrs, Volume= 3,318 cf
Outflow = 0.27 cfs @ 11.95 hrs, Volume= 3,334 cf, Atten= 74%, Lag= 0.0 min
Discarded = 0.27 cfs @ 11.95 hrs, Volume= 3,334 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 96.97' @ 12.39 hrs Surf.Area= 740 sf Storage= 507 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 8.6 min (832.9 - 824.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	95.26'	1,151 cf	**18.50'W x 40.00'L x 4.17'H Field A**
			3,083 cf Overall - 204 cf Embedded = 2,878 cf x 40.0% Voids
#2A	97.26'	154 cf	**ADS N-12 15"** x 3 Inside #1
			Inside= 14.8"W x 14.8"H => 1.20 sf x 20.00'L = 24.0 cf
			Outside= 18.0"W x 18.0"H => 1.60 sf x 20.00'L = 31.9 cf
			Row Length Adjustment= +13.00' x 1.20 sf x 3 rows
			14.50' Header x 1.20 sf x 2 = 34.8 cf Inside
		1,305 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	95.26'	**16.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.27 cfs @ 11.95 hrs HW=95.36' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Pond 1P: Gravel Bed - Chamber Wizard Field A

Chamber Model = ADS N-12 15" (ADS N-12® Pipe)
Inside= 14.8"W x 14.8"H => 1.20 sf x 20.00'L = 24.0 cf
Outside= 18.0"W x 18.0"H => 1.60 sf x 20.00'L = 31.9 cf
Row Length Adjustment= +13.00' x 1.20 sf x 3 rows

18.0" Wide + 60.0" Spacing = 78.0" C-C Row Spacing

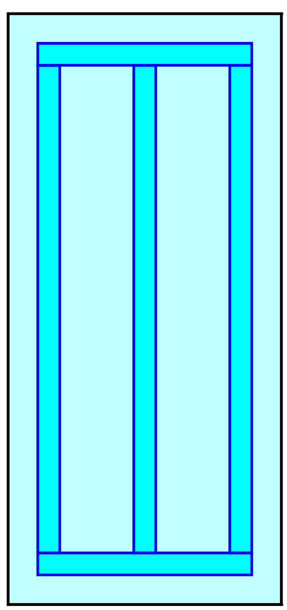
1 Chambers/Row x 20.00' Long +13.00' Row Adjustment +1.50' Header x 2 = 36.00' Row Length +24.0" End Stone x 2 = 40.00' Base Length
3 Rows x 18.0" Wide + 60.0" Spacing x 2 + 24.0" Side Stone x 2 = 18.50' Base Width
24.0" Base + 18.0" Chamber Height + 8.0" Cover = 4.17' Field Height

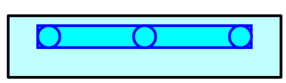
3 Chambers x 24.0 cf +13.00' Row Adjustment x 1.20 sf x 3 Rows + 14.50' Header x 1.20 sf x 2 = 153.6 cf Chamber Storage
3 Chambers x 31.9 cf +13.00' Row Adjustment x 1.60 sf x 3 Rows + 14.50' Header x 1.60 sf x 2 = 204.3 cf Displacement

3,082.5 cf Field - 204.3 cf Chambers = 2,878.2 cf Stone x 40.0% Voids = 1,151.3 cf Stone Storage

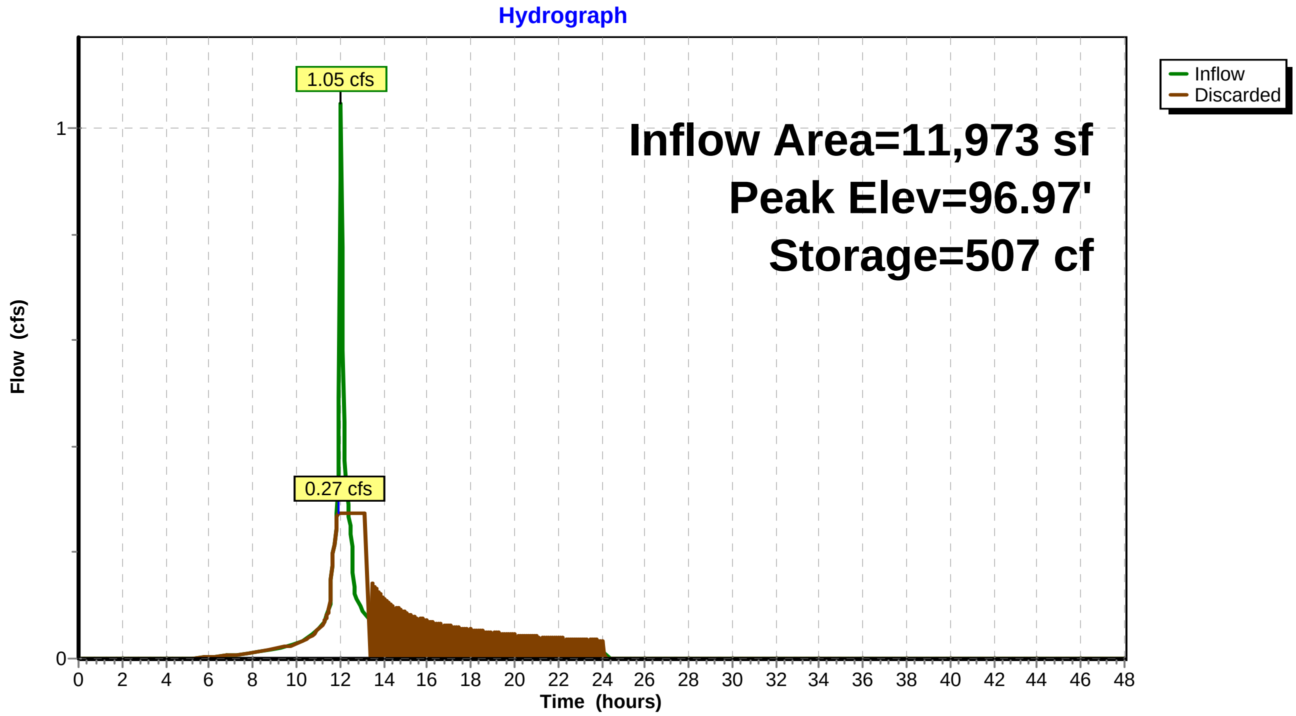
Chamber Storage + Stone Storage = 1,304.9 cf = 0.03 af
Overall Storage Efficiency = 42.3%
Overall System Size = 40.00' x 18.50' x 4.17'

3 Chambers
114.2 cy Field
106.6 cy Stone





Pond 1P: Gravel Bed



Summary for Pond 2P: AD 4

Inflow Area = 11,973 sf, 62.60% Impervious, Inflow Depth = 3.33" for 10-yr event
Inflow = 1.05 cfs @ 12.04 hrs, Volume= 3,318 cf
Outflow = 1.05 cfs @ 12.04 hrs, Volume= 3,318 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.05 cfs @ 12.04 hrs, Volume= 3,318 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

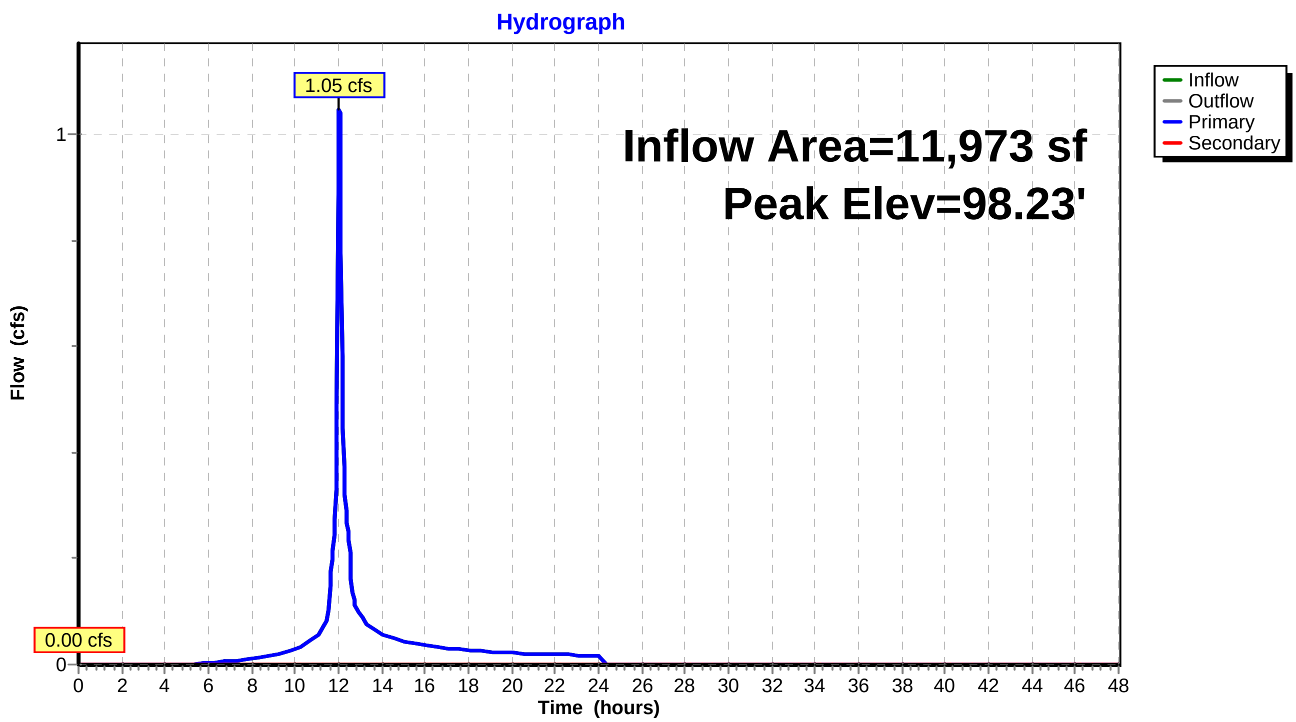
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 98.23' @ 12.04 hrs
Flood Elev= 101.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	97.48'	**10.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 97.48' / 97.48' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	98.43'	**12.0" Round Culvert** L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 98.43' / 98.22' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.02 cfs @ 12.04 hrs HW=98.21' TW=95.98' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.02 cfs @ 2.66 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=97.48' TW=97.16' (Dynamic Tailwater)
└**2=Culvert** (Controls 0.00 cfs)

Pond 2P: AD 4



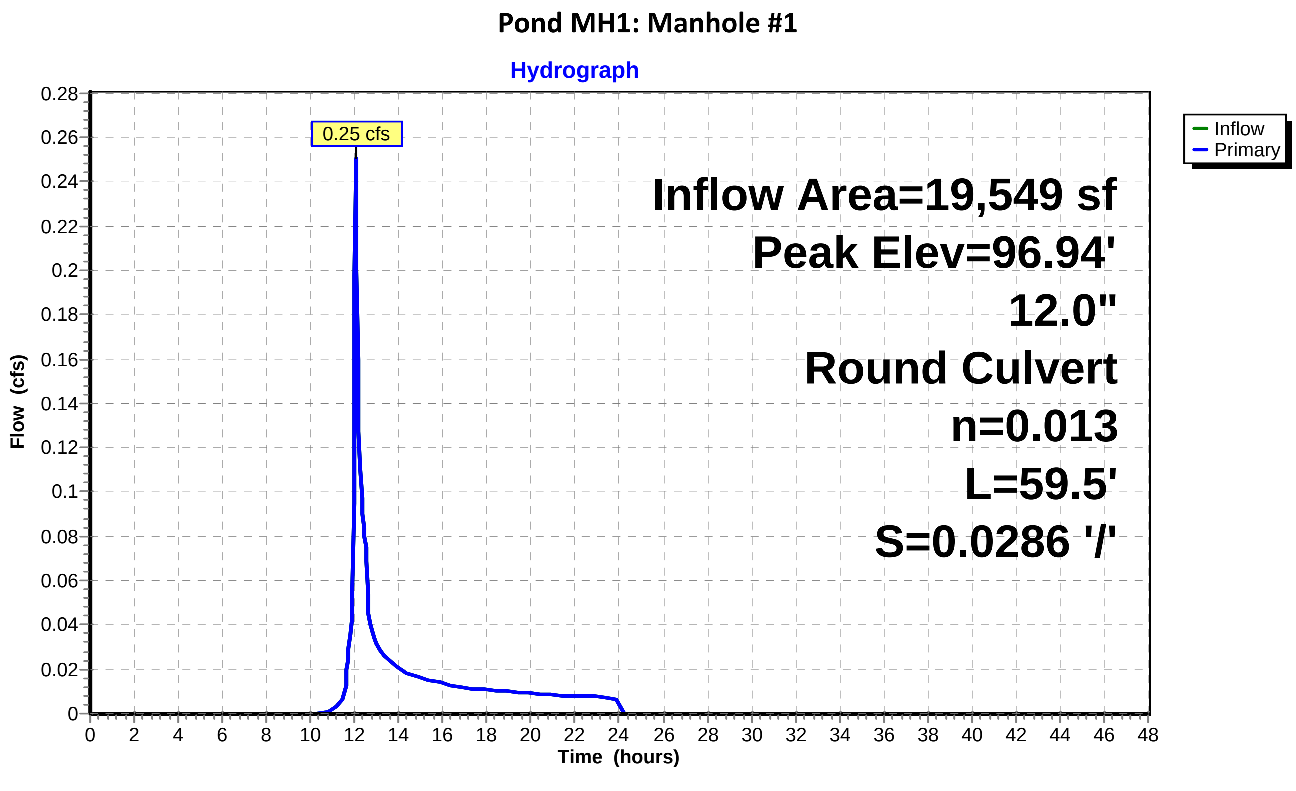
Summary for Pond MH1: Manhole #1

Inflow Area = 19,549 sf, 38.34% Impervious, Inflow Depth = 0.54" for 10-yr event
Inflow = 0.25 cfs @ 12.05 hrs, Volume= 887 cf
Outflow = 0.25 cfs @ 12.05 hrs, Volume= 887 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 12.05 hrs, Volume= 887 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 96.94' @ 12.05 hrs
Flood Elev= 101.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.70'	**12.0" Round Culvert** L= 59.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.70' / 95.00' S= 0.0286 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.25 cfs @ 12.05 hrs HW=96.94' TW=0.00' (Dynamic Tailwater)
↑**1=Culvert** (Inlet Controls 0.25 cfs @ 1.68 fps)



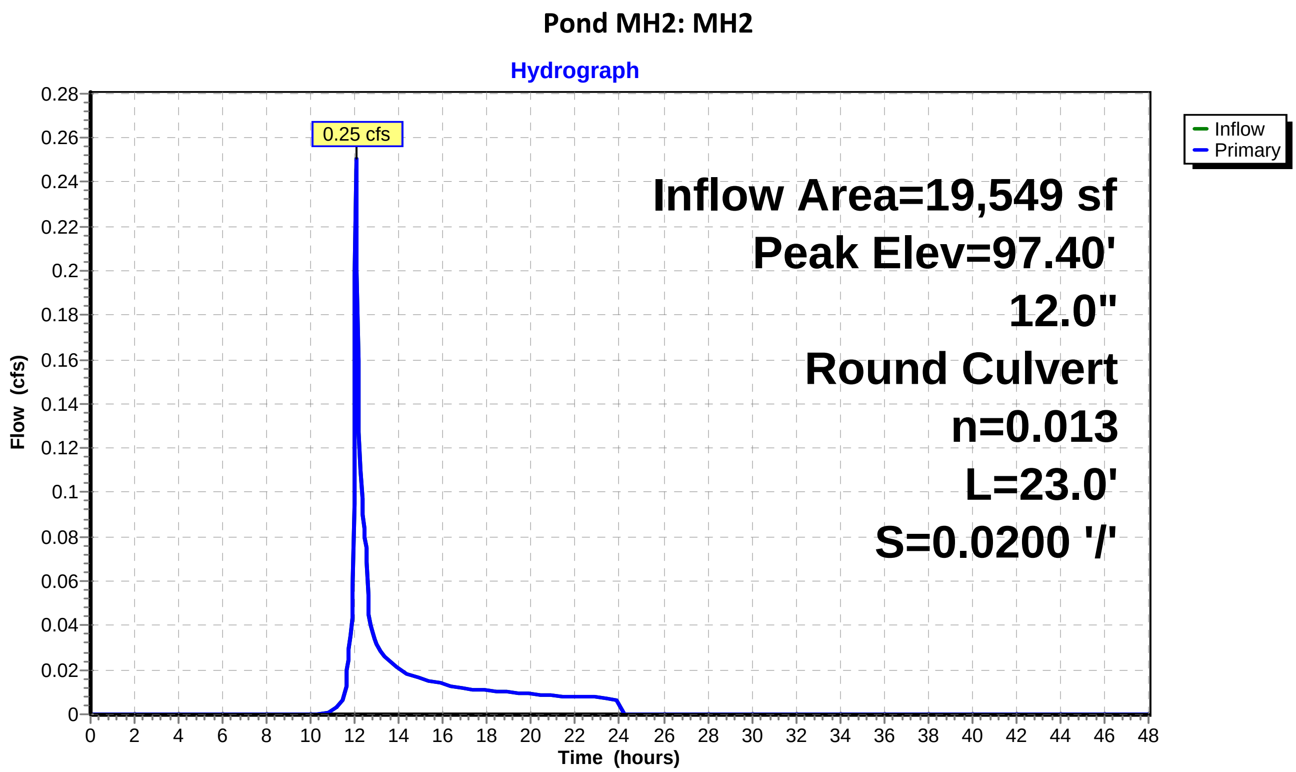
Summary for Pond MH2: MH2

Inflow Area = 19,549 sf, 38.34% Impervious, Inflow Depth = 0.54" for 10-yr event
Inflow = 0.25 cfs @ 12.05 hrs, Volume= 887 cf
Outflow = 0.25 cfs @ 12.05 hrs, Volume= 887 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.25 cfs @ 12.05 hrs, Volume= 887 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 97.40' @ 12.05 hrs
Flood Elev= 102.76'

Device	Routing	Invert	Outlet Devices
#1	Primary	97.16'	**12.0" Round Culvert** L= 23.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 97.16' / 96.70' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.25 cfs @ 12.05 hrs HW=97.40' TW=96.94' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.25 cfs @ 1.68 fps)

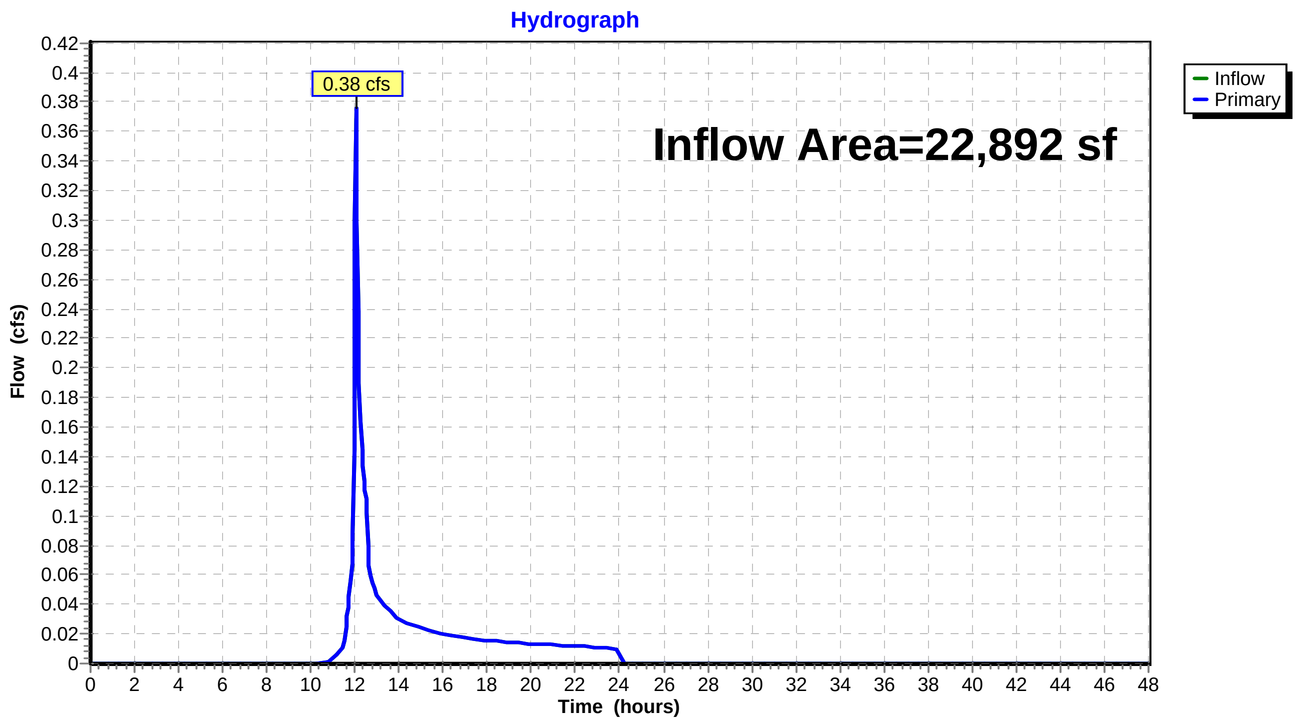


Summary for Link DP-1: Design Point #1

Inflow Area = 22,892 sf, 34.34% Impervious, Inflow Depth = 0.69" for 10-yr event
Inflow = 0.38 cfs @ 12.05 hrs, Volume= 1,318 cf
Primary = 0.38 cfs @ 12.05 hrs, Volume= 1,318 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-1: Design Point #1

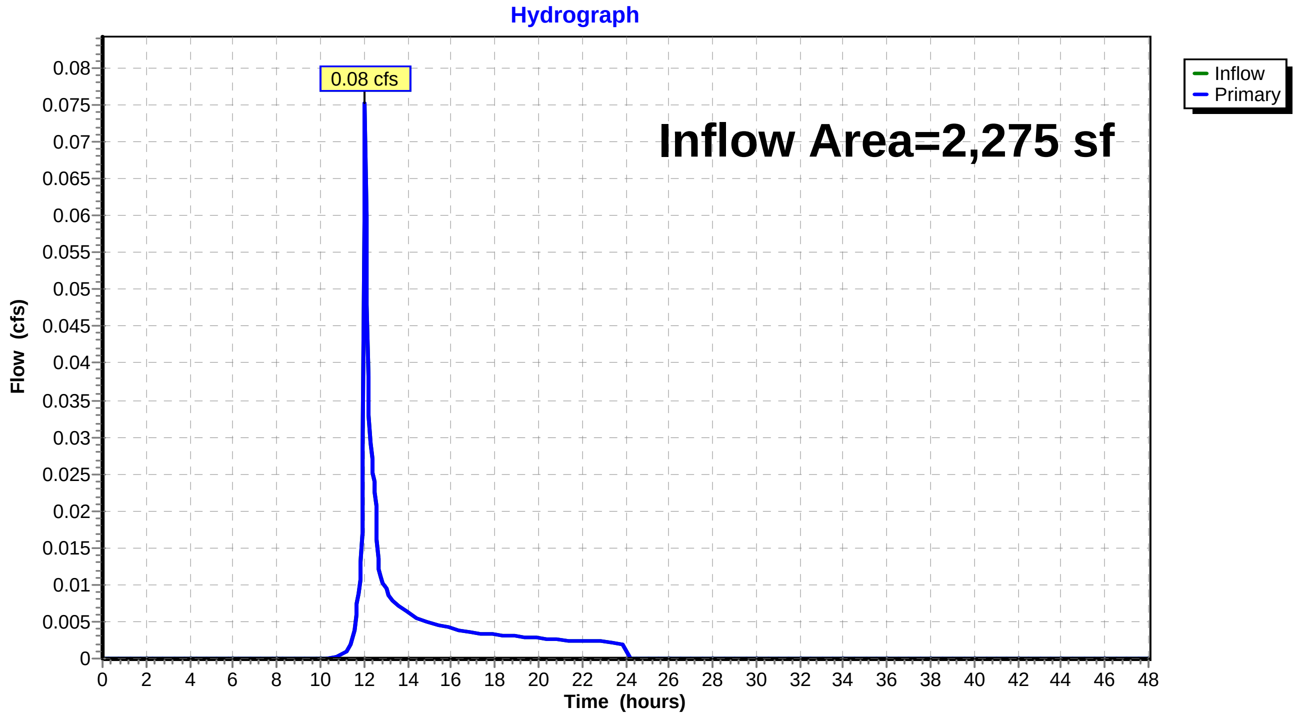


Summary for Link DP-2: Design Point #2

Inflow Area = 2,275 sf, 0.00% Impervious, Inflow Depth = 1.41" for 10-yr event
Inflow = 0.08 cfs @ 12.05 hrs, Volume= 266 cf
Primary = 0.08 cfs @ 12.05 hrs, Volume= 266 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-2: Design Point #2



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment DA-1: Drainage Area #1
Runoff Area=7,576 sf 0.00% Impervious Runoff Depth=4.14"
Flow Length=175' Tc=6.0 min CN=61 Runoff=0.75 cfs 2,617 cf

Subcatchment DA-2: Drainage Area #2
Runoff Area=11,973 sf 62.60% Impervious Runoff Depth=6.96"
Flow Length=149' Tc=6.0 min CN=84 Runoff=1.95 cfs 6,947 cf

Subcatchment DA-3: Drainage Area #3
Runoff Area=2,275 sf 0.00% Impervious Runoff Depth=4.14"
Flow Length=99' Tc=6.0 min CN=61 Runoff=0.22 cfs 786 cf

Subcatchment DA-4: Drainage Area #4
Runoff Area=3,343 sf 10.95% Impervious Runoff Depth=4.39"
Flow Length=51' Tc=6.0 min UI Adjusted CN=63 Runoff=0.35 cfs 1,223 cf

Pond 1P: Gravel Bed
Peak Elev=99.22' Storage=1,245 cf Inflow=1.83 cfs 6,171 cf
Outflow=0.27 cfs 6,186 cf

Pond 2P: AD 4
Peak Elev=98.97' Inflow=1.95 cfs 6,947 cf
Primary=1.83 cfs 6,171 cf Secondary=0.91 cfs 776 cf Outflow=1.95 cfs 6,947 cf

Pond MH1: Manhole #1
Peak Elev=97.29' Inflow=1.25 cfs 3,392 cf
12.0" Round Culvert n=0.013 L=59.5' S=0.0286 '/' Outflow=1.25 cfs 3,392 cf

Pond MH2: MH2
Peak Elev=97.75' Inflow=1.25 cfs 3,392 cf
12.0" Round Culvert n=0.013 L=23.0' S=0.0200 '/' Outflow=1.25 cfs 3,392 cf

Link DP-1: Design Point #1
Inflow=1.41 cfs 4,615 cf
Primary=1.41 cfs 4,615 cf

Link DP-2: Design Point #2
Inflow=0.22 cfs 786 cf
Primary=0.22 cfs 786 cf

Total Runoff Area = 25,167 sf Runoff Volume = 11,572 cf Average Runoff Depth = 5.52"
68.76% Pervious = 17,306 sf 31.24% Impervious = 7,861 sf

Summary for Subcatchment DA-1: Drainage Area #1

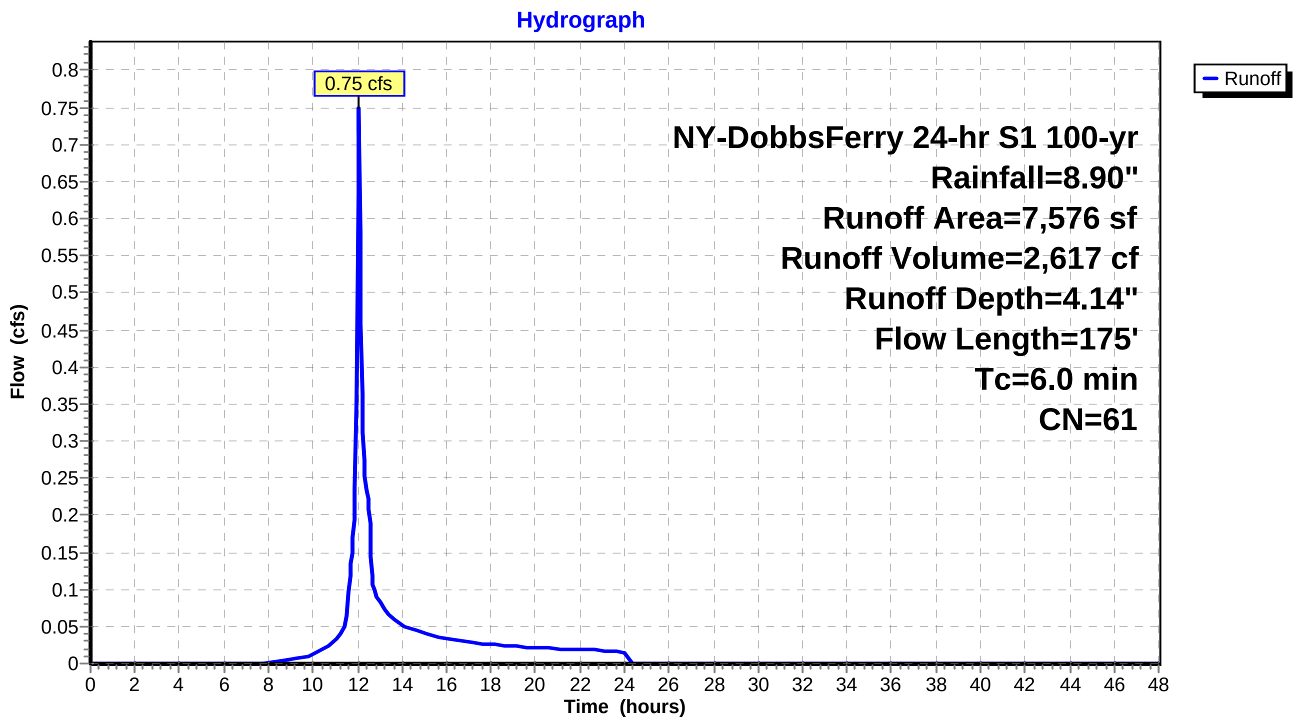
Runoff = 0.75 cfs @ 12.05 hrs, Volume= 2,617 cf, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 100-yr Rainfall=8.90"

Area (sf)	CN	Description
7,576	61	>75% Grass cover, Good, HSG B
7,576		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	27	0.2600	0.26		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.50"
0.1	26	0.1150	5.09		**Shallow Concentrated Flow, BC** Grassed Waterway Kv= 15.0 fps
0.2	51	0.0540	3.49		**Shallow Concentrated Flow, CD** Grassed Waterway Kv= 15.0 fps
0.1	71	0.0570	14.08	11.06	**Pipe Channel, DE** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
2.1	175	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-1: Drainage Area #1



Summary for Subcatchment DA-2: Drainage Area #2

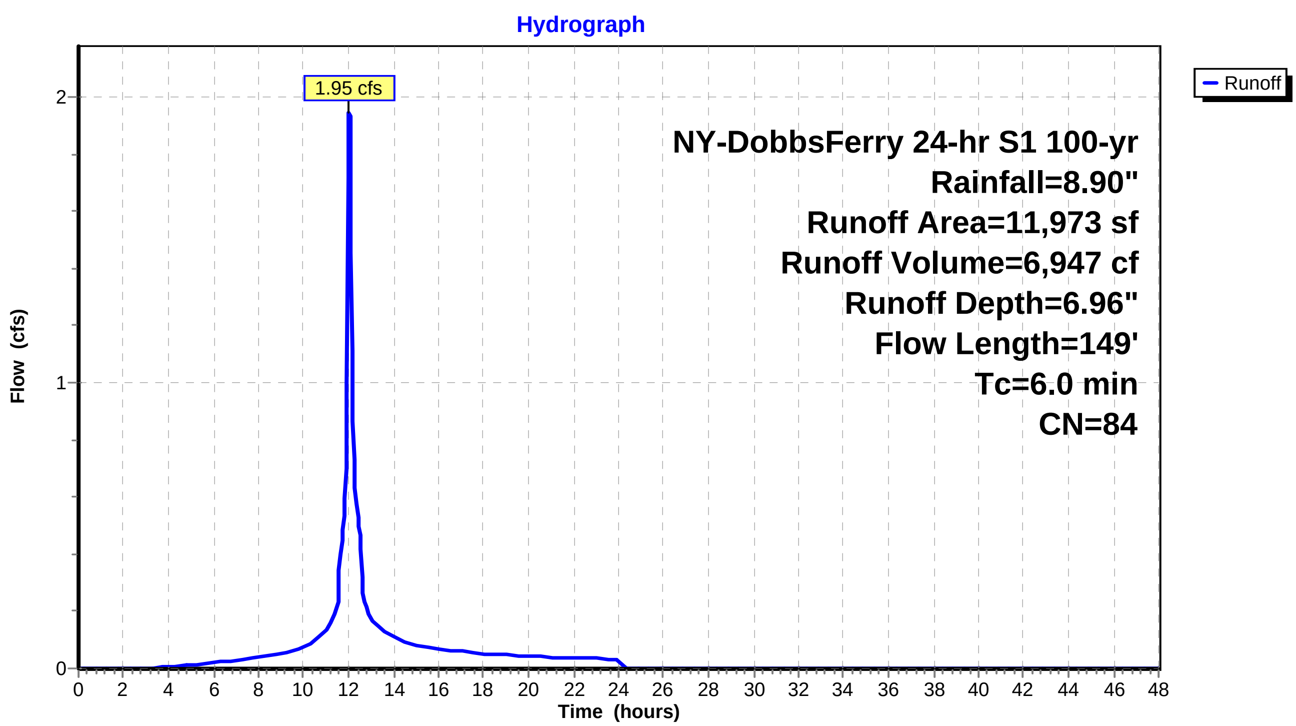
Runoff = 1.95 cfs @ 12.04 hrs, Volume= 6,947 cf, Depth= 6.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 100-yr Rainfall=8.90"

Area (sf)	CN	Description
4,478	61	>75% Grass cover, Good, HSG B
7,495	98	Paved parking, HSG B
11,973	84	Weighted Average
4,478		37.40% Pervious Area
7,495		62.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	21	0.1400	0.19		**Sheet Flow, AB**
					Grass: Dense n= 0.240 P2= 3.50"
0.5	128	0.0500	4.54		**Shallow Concentrated Flow, BC**
					Paved Kv= 20.3 fps
2.3	149	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-2: Drainage Area #2



Summary for Subcatchment DA-3: Drainage Area #3

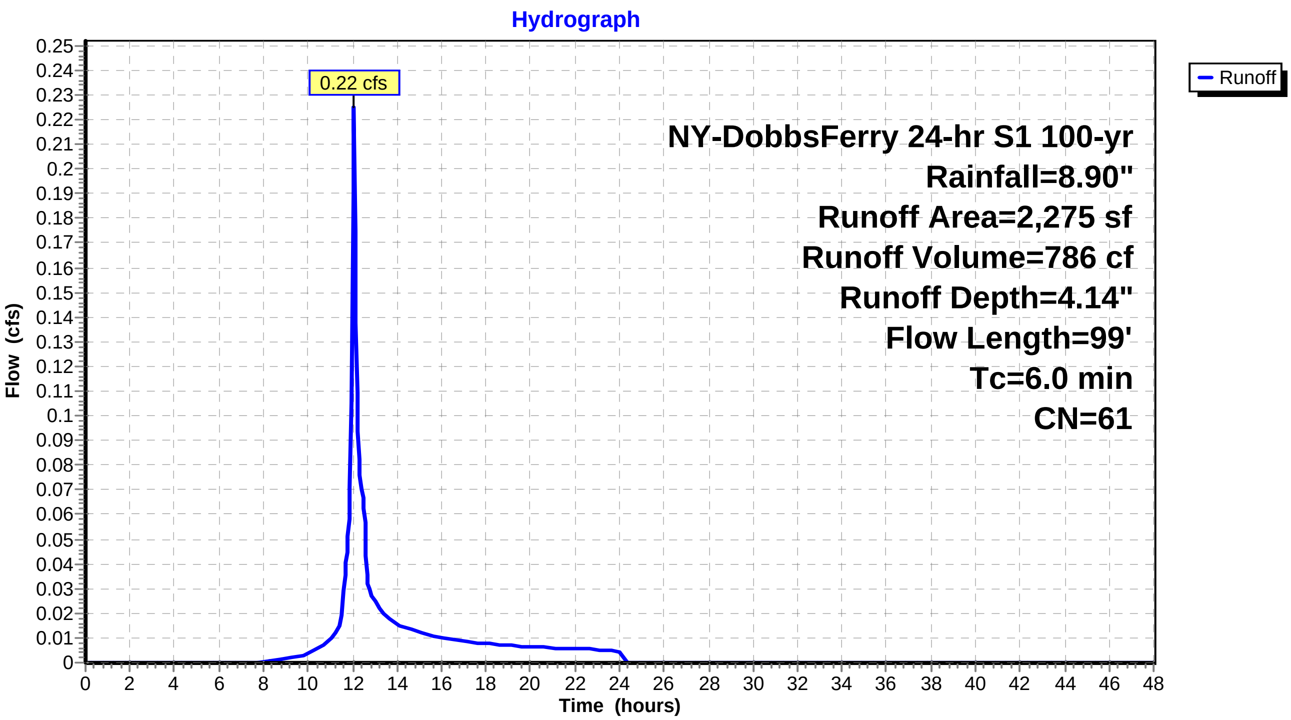
Runoff = 0.22 cfs @ 12.05 hrs, Volume= 786 cf, Depth= 4.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 100-yr Rainfall=8.90"

Area (sf)	CN	Description
2,275	61	>75% Grass cover, Good, HSG B
2,275		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	24	0.1700	0.22		**Sheet Flow, AB**
					Grass: Dense n= 0.240 P2= 3.50"
0.3	75	0.0670	3.88		**Shallow Concentrated Flow, BC**
					Grassed Waterway Kv= 15.0 fps
2.2	99	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-3: Drainage Area #3



Summary for Subcatchment DA-4: Drainage Area #4

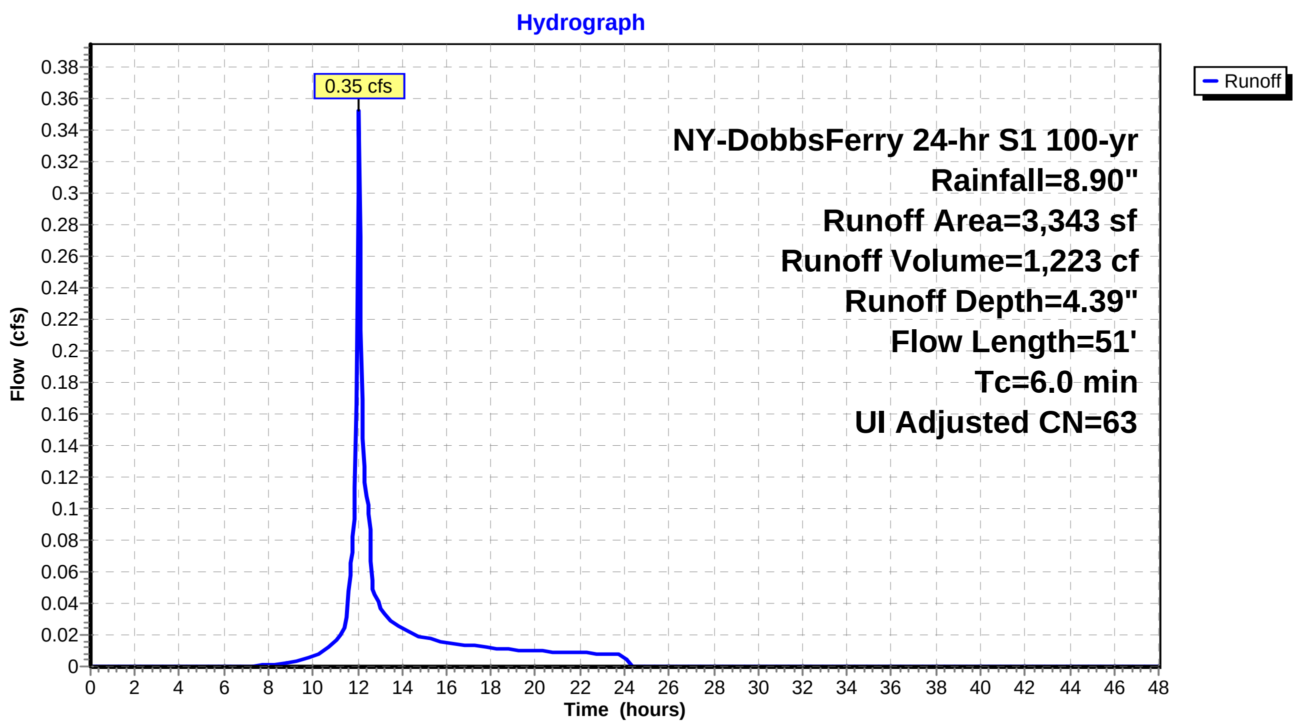
Runoff = 0.35 cfs @ 12.04 hrs, Volume= 1,223 cf, Depth= 4.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NY-DobbsFerry 24-hr S1 100-yr Rainfall=8.90"

Area (sf)	CN	Adj	Description
2,977	61		>75% Grass cover, Good, HSG B
366	98		Unconnected pavement, HSG B
3,343	65	63	Weighted Average, UI Adjusted
2,977			89.05% Pervious Area
366			10.95% Impervious Area
366			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	25	0.1200	0.19		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.50"
0.1	26	0.0650	3.82		**Shallow Concentrated Flow, BC** Grassed Waterway Kv= 15.0 fps
2.3	51	Total, Increased to minimum Tc = 6.0 min			

Subcatchment DA-4: Drainage Area #4



Summary for Pond 1P: Gravel Bed

Inflow Area = 11,973 sf, 62.60% Impervious, Inflow Depth = 6.18" for 100-yr event
Inflow = 1.83 cfs @ 12.04 hrs, Volume= 6,171 cf
Outflow = 0.27 cfs @ 11.65 hrs, Volume= 6,186 cf, Atten= 85%, Lag= 0.0 min
Discarded = 0.27 cfs @ 11.65 hrs, Volume= 6,186 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 99.22' @ 12.19 hrs Surf.Area= 740 sf Storage= 1,245 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 19.7 min (827.0 - 807.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	95.26'	1,151 cf	**18.50'W x 40.00'L x 4.17'H Field A**
			3,083 cf Overall - 204 cf Embedded = 2,878 cf x 40.0% Voids
#2A	97.26'	154 cf	**ADS N-12 15"** x 3 Inside #1
			Inside= 14.8"W x 14.8"H => 1.20 sf x 20.00'L = 24.0 cf
			Outside= 18.0"W x 18.0"H => 1.60 sf x 20.00'L = 31.9 cf
			Row Length Adjustment= +13.00' x 1.20 sf x 3 rows
			14.50' Header x 1.20 sf x 2 = 34.8 cf Inside
		1,305 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	95.26'	**16.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.27 cfs @ 11.65 hrs HW=95.34' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Pond 1P: Gravel Bed - Chamber Wizard Field A

Chamber Model = ADS N-12 15" (ADS N-12® Pipe)
Inside= 14.8"W x 14.8"H => 1.20 sf x 20.00'L = 24.0 cf
Outside= 18.0"W x 18.0"H => 1.60 sf x 20.00'L = 31.9 cf
Row Length Adjustment= +13.00' x 1.20 sf x 3 rows

18.0" Wide + 60.0" Spacing = 78.0" C-C Row Spacing

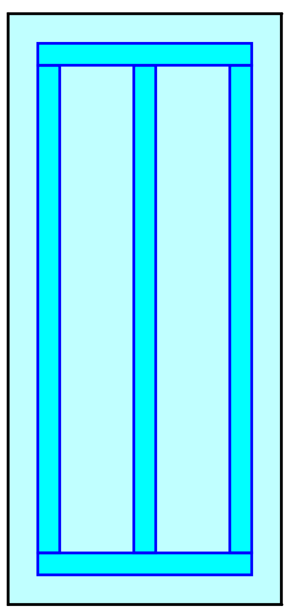
1 Chambers/Row x 20.00' Long +13.00' Row Adjustment +1.50' Header x 2 = 36.00' Row Length +24.0" End Stone x 2 = 40.00' Base Length
3 Rows x 18.0" Wide + 60.0" Spacing x 2 + 24.0" Side Stone x 2 = 18.50' Base Width
24.0" Base + 18.0" Chamber Height + 8.0" Cover = 4.17' Field Height

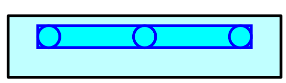
3 Chambers x 24.0 cf +13.00' Row Adjustment x 1.20 sf x 3 Rows + 14.50' Header x 1.20 sf x 2 = 153.6 cf Chamber Storage
3 Chambers x 31.9 cf +13.00' Row Adjustment x 1.60 sf x 3 Rows + 14.50' Header x 1.60 sf x 2 = 204.3 cf Displacement

3,082.5 cf Field - 204.3 cf Chambers = 2,878.2 cf Stone x 40.0% Voids = 1,151.3 cf Stone Storage

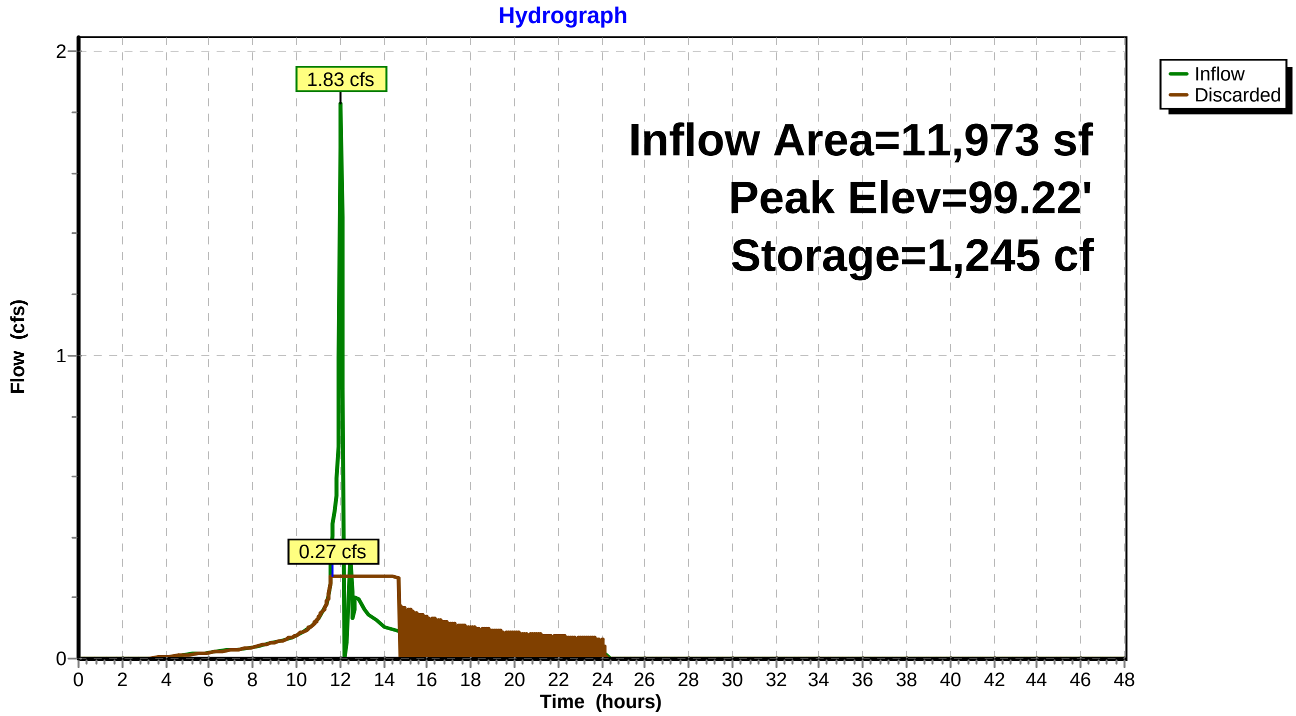
Chamber Storage + Stone Storage = 1,304.9 cf = 0.03 af
Overall Storage Efficiency = 42.3%
Overall System Size = 40.00' x 18.50' x 4.17'

3 Chambers
114.2 cy Field
106.6 cy Stone





Pond 1P: Gravel Bed



Summary for Pond 2P: AD 4

Inflow Area = 11,973 sf, 62.60% Impervious, Inflow Depth = 6.96" for 100-yr event
Inflow = 1.95 cfs @ 12.04 hrs, Volume= 6,947 cf
Outflow = 1.95 cfs @ 12.04 hrs, Volume= 6,947 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.83 cfs @ 12.04 hrs, Volume= 6,171 cf
Secondary = 0.91 cfs @ 12.22 hrs, Volume= 776 cf

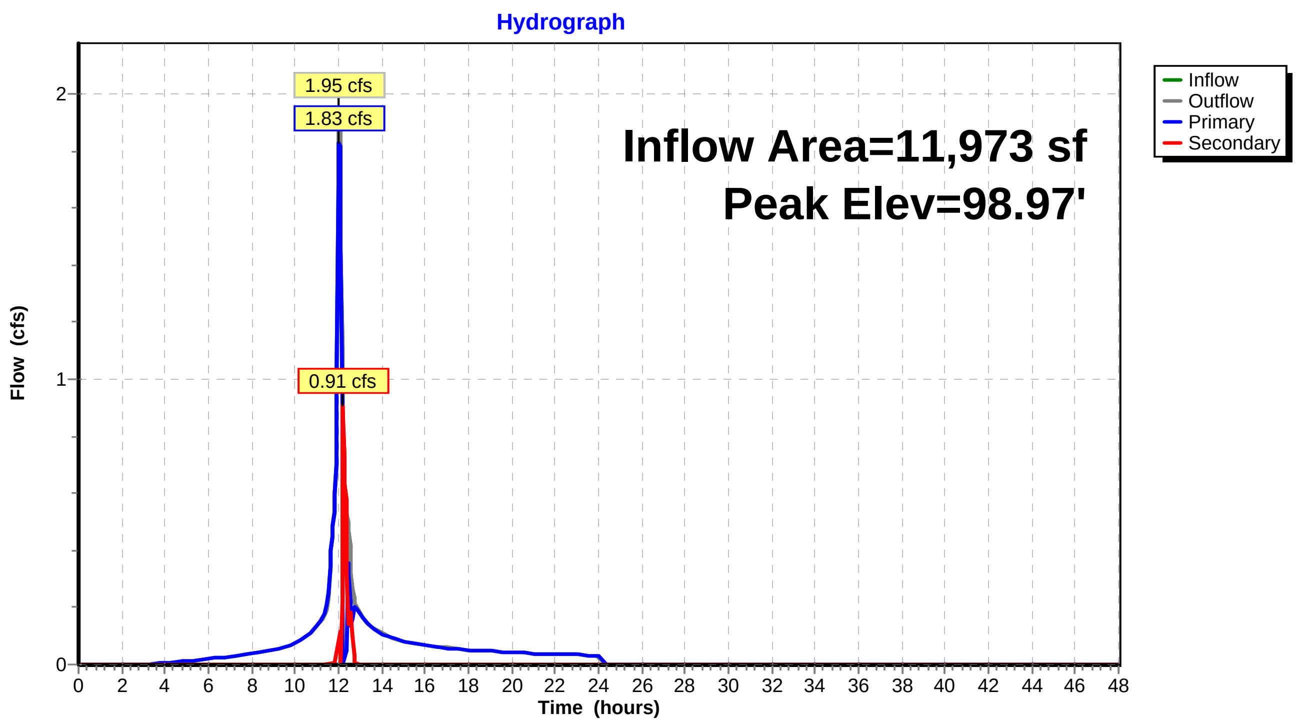
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 98.97' @ 12.22 hrs
Flood Elev= 101.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	97.48'	**10.0" Round Culvert** L= 5.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 97.48' / 97.48' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf
#2	Secondary	98.43'	**12.0" Round Culvert** L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 98.43' / 98.22' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.77 cfs @ 12.04 hrs HW=98.59' TW=97.71' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 1.77 cfs @ 3.25 fps)

Secondary OutFlow Max=0.82 cfs @ 12.22 hrs HW=98.93' TW=97.73' (Dynamic Tailwater)
└**2=Culvert** (Barrel Controls 0.82 cfs @ 3.03 fps)

Pond 2P: AD 4



Summary for Pond MH1: Manhole #1

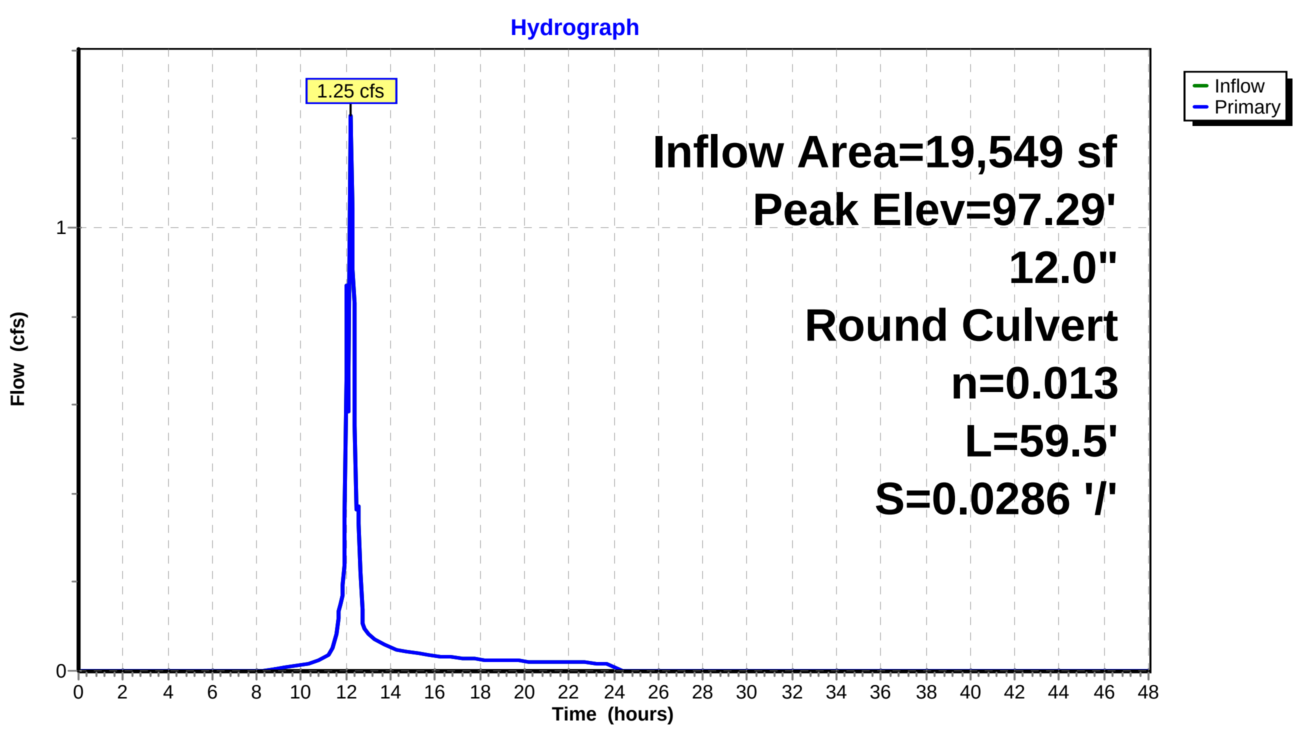
Inflow Area = 19,549 sf, 38.34% Impervious, Inflow Depth = 2.08" for 100-yr event
Inflow = 1.25 cfs @ 12.21 hrs, Volume= 3,392 cf
Outflow = 1.25 cfs @ 12.21 hrs, Volume= 3,392 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.25 cfs @ 12.21 hrs, Volume= 3,392 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 97.29' @ 12.21 hrs
Flood Elev= 101.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.70'	**12.0" Round Culvert** L= 59.5' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 96.70' / 95.00' S= 0.0286 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.18 cfs @ 12.21 hrs HW=97.27' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.18 cfs @ 2.57 fps)

Pond MH1: Manhole #1



Summary for Pond MH2: MH2

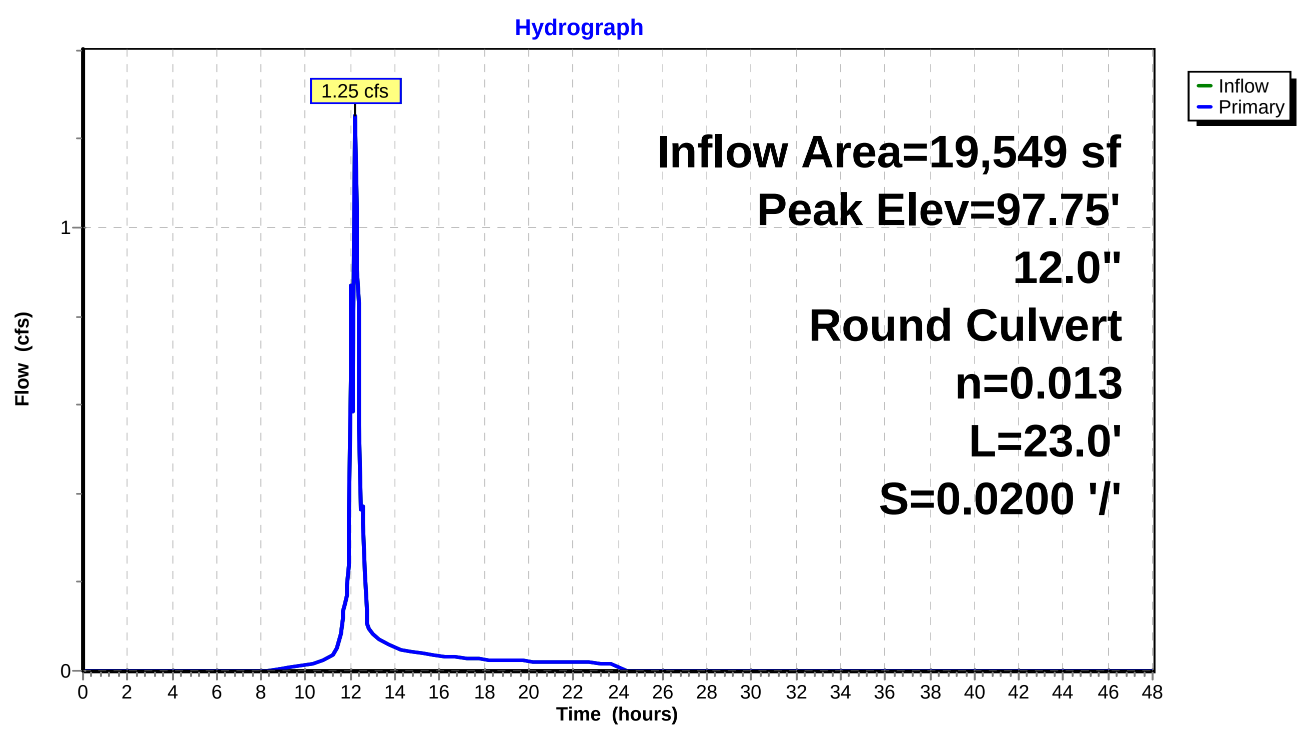
Inflow Area = 19,549 sf, 38.34% Impervious, Inflow Depth = 2.08" for 100-yr event
Inflow = 1.25 cfs @ 12.21 hrs, Volume= 3,392 cf
Outflow = 1.25 cfs @ 12.21 hrs, Volume= 3,392 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.25 cfs @ 12.21 hrs, Volume= 3,392 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 97.75' @ 12.22 hrs
Flood Elev= 102.76'

Device	Routing	Invert	Outlet Devices
#1	Primary	97.16'	**12.0" Round Culvert** L= 23.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 97.16' / 96.70' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.16 cfs @ 12.21 hrs HW=97.73' TW=97.27' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.16 cfs @ 3.59 fps)

Pond MH2: MH2

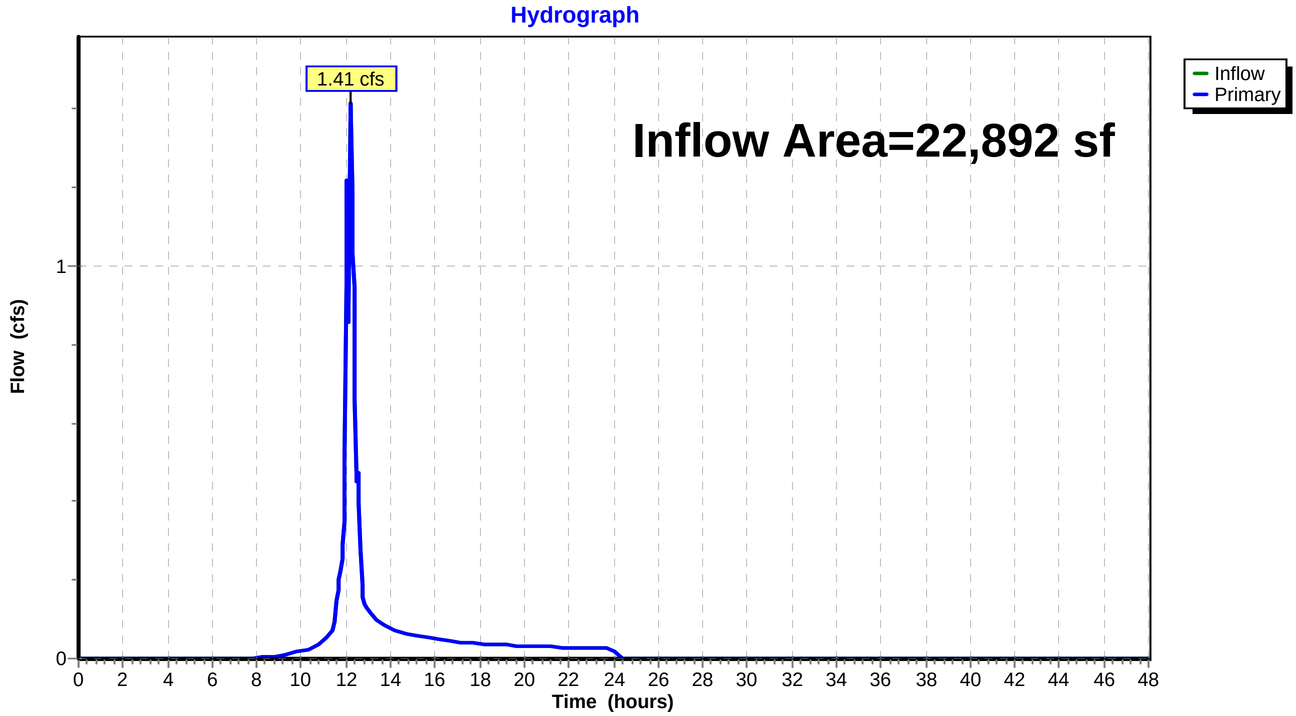


Summary for Link DP-1: Design Point #1

Inflow Area = 22,892 sf, 34.34% Impervious, Inflow Depth = 2.42" for 100-yr event
Inflow = 1.41 cfs @ 12.21 hrs, Volume= 4,615 cf
Primary = 1.41 cfs @ 12.21 hrs, Volume= 4,615 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-1: Design Point #1



Summary for Link DP-2: Design Point #2

Inflow Area =	2,275 sf,	0.00% Impervious,	Inflow Depth = 4.14"	for 100-yr event	
Inflow =	0.22 cfs @	12.05 hrs,	Volume=	786 cf	
Primary =	0.22 cfs @	12.05 hrs,	Volume=	786 cf,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link DP-2: Design Point #2