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Stormwater Runoff Analysis
Proposed Development
16 Walpole Road, Haydenville, MA

T Reynolds Engineering (TRE) has been retained by Valley View Farm to design and perform stormwater flow calculations for the existing and proposed conditions at 16 Walpole Road in Haydenville, MA. The purpose of this analysis is to evaluate the proposed stormwater design with regard to potential increases in stormwater flows associated with the development of the property.

Project Summary

Valley View Farm is proposing to build a new Limited Event Building and associated Pavilion on what was the previous previously undeveloped farm land. In addition, an associated gravel parking area and associated utilities are proposed. The intent of this report is to show that the project will meet the general performance standards for town approval.

The project has been designed so that existing stormwater drainage patterns and volumes will generally not be changed. Stormwater runoff from the proposed buildings and gravel area areas around them will collected and routed to a stormwater swale to the north. Peak discharges for the storm events will be reduced for all storm events. Stormwater runoff from the parking area will be collected, routed to and infiltrated in a rain garden. Peak discharges from this area for the storm events will also be reduced during all storm events.

Soil Conditions

Review of the Soil Conservation Service (SCS), now Natural Resource Conservation Service (NRCS), Soil Survey Manual of Hampshire County, Massachusetts, Central Part, indicates soils located within the area of concern are considered to be 310B/C—Woodbridge fine sandy loam and are classified as hydrologic group C/D. See the attached soils report for additional soils information

Method of Drainage Analysis

The program HydroCAD was utilized to perform stormwater modeling for this project. HydroCAD uses the NRCS method of analysis TR-20. The TR-20 method is a widely accepted, standard engineering practice within the civil engineering profession. The NRCS method of hydrology analysis utilizes the drainage area, hydraulic length, terrain slope, and soil conditions of a watershed or catchment as input to calculate peak flows and total volume of runoff for specific synthetic rain events.

The model analyzes approximately 0.55 acres of the site area contributing stormwater runoff flows to two design points. TRE modeled the 2-year, 10-year and 100-year statistical rain events for the existing and proposed condition. The total rainfall per a 24-hour period for the 2, 10 and 100-year statistical rain events are 3.0-inches, 4.5-inches and 6.5-inches respectively.

Limitations

The stormwater analysis was performed in accordance with standard civil engineering practice and relies on information provided by other parties as well as published information. Potential runoff analysis was limited to areas within the bounds of property owned and areas immediately adjacent and interpreted to drain toward the areas of concern.

It shall also be understood that the NRCS Method of drainage analyses was originally formulated to assist with the development of farmland and crop production. Although the NRCS method has become one of the standard methods of hydrologic analysis within civil engineering community, it may be conservative for use on very small areas of modern development and provide runoff results that are greater than actual conditions.

Model Results

The following tables summarize the results of the drainage analysis using HydroCad. Three design points were selected to evaluate the potential stormwater impacts from the proposed development of the site.

Table 1: Rainfall Runoff Results
Existing and Proposed Peak Discharge

DESIGN POINT	2-year (cfs)	10-year (cfs)	100-year (cfs)
Pre-Construction			
Northern Perimeter	2.31	4.63	7.91
Eastern Perimeter	3.56	7.13	12.18
Southern Perimeter	1.82	3.56	6.02
Post-Construction			
Northern Perimeter	1.59	3.15	6.50
Eastern Perimeter	3.58	7.16	12.24
Southern Perimeter	1.08	3.22	5.16

Conclusions

As can be seen from the above results, stormwater runoff from the 2, 10, and 100-year storm events are not expected to increase the run-off to the adjacent areas from the pre-construction conditions to the post construction condition. Flows for the Eastern Perimeter do show a slight increase, but are generally considered within the tolerance of the computer model and should be considered insignificant. Flows have either been reduced or remain the same during the 100-year storm event and should be expected to result in a reduction in overall flooding.

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 Hampshire County, Massachusetts, Central Part

June 8, 2016

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 (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map

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 1:15,800.

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: http://websoilsurvey.nrcs.usda.gov
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: Hampshire County, Massachusetts, Central Part
Survey Area Data: Version 10, Sep 28, 2015

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

Date(s) aerial images were photographed: Apr 9, 2011—May 12, 2011

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

Hampshire County, Massachusetts, Central Part (MA609)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
1	Water	0.0	0.1%
70B	Ridgebury fine sandy loam, 3 to 8 percent slopes	2.6	14.7%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	0.7	4.0%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	3.8	21.3%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	7.0	39.7%
310C	Woodbridge fine sandy loam, 8 to 15 percent slopes	3.6	20.2%
Totals for Area of Interest		**17.7**	**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.

Hampshire County, Massachusetts, Central Part

1—Water

Map Unit Setting

National map unit symbol: 9b24
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

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

70B—Ridgebury fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9b1k
Elevation: 50 to 1,000 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Ridgebury

Setting

Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Friable loamy eolian deposits over dense loamy lodgment till derived from granite and gneiss

Typical profile

H1 - 0 to 2 inches: gravelly fine sandy loam
H2 - 2 to 15 inches: gravelly sandy loam
H3 - 15 to 60 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 10 to 25 inches to densic material
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.9 inches)

Minor Components

Whitman
Percent of map unit: 5 percent
Landform: Depressions

Woodbridge
Percent of map unit: 5 percent

Scituate
Percent of map unit: 5 percent

305C—Paxton fine sandy loam, 8 to 15 percent slopes

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

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

Description of Paxton

Setting
Landform: Drumlins, 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 lodgment till derived from gneiss, granite, and/or schist

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

Properties and qualities
Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material

Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

Minor Components

Charlton

Percent of map unit: 7 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Woodbridge

Percent of map unit: 6 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Footslope, summit, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear

Ridgebury

Percent of map unit: 2 percent
Landform: Depressions, drainageways, drumlins, hills, ground moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear

305D—Paxton fine sandy loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2w67j
Elevation: 0 to 1,450 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

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

Description of Paxton

Setting

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

Typical profile

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

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Minor Components

Charlton

Percent of map unit: 8 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Woodbridge

Percent of map unit: 6 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave

Across-slope shape: Linear

Ridgebury

Percent of map unit: 1 percent
Landform: Drainageways, hills, ground moraines, depressions, drumlins
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear

310B—Woodbridge fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2ql
Elevation: 0 to 1,470 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: All areas are prime farmland

Map Unit Composition

Woodbridge, fine sandy loam, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Fine Sandy Loam

Setting

Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None

Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 3.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D

Minor Components

Paxton
Percent of map unit: 10 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex

Ridgebury
Percent of map unit: 8 percent
Landform: Hills, ground moraines, depressions, drainageways
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave

310C—Woodbridge fine sandy loam, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: 2w689
Elevation: 0 to 1,370 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

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

Description of Woodbridge

Setting
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D

Minor Components

Paxton

Percent of map unit: 10 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex

Ridgebury

Percent of map unit: 4 percent
Landform: Drumlins, drainageways, hills, ground moraines, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave

Sutton

Percent of map unit: 1 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear

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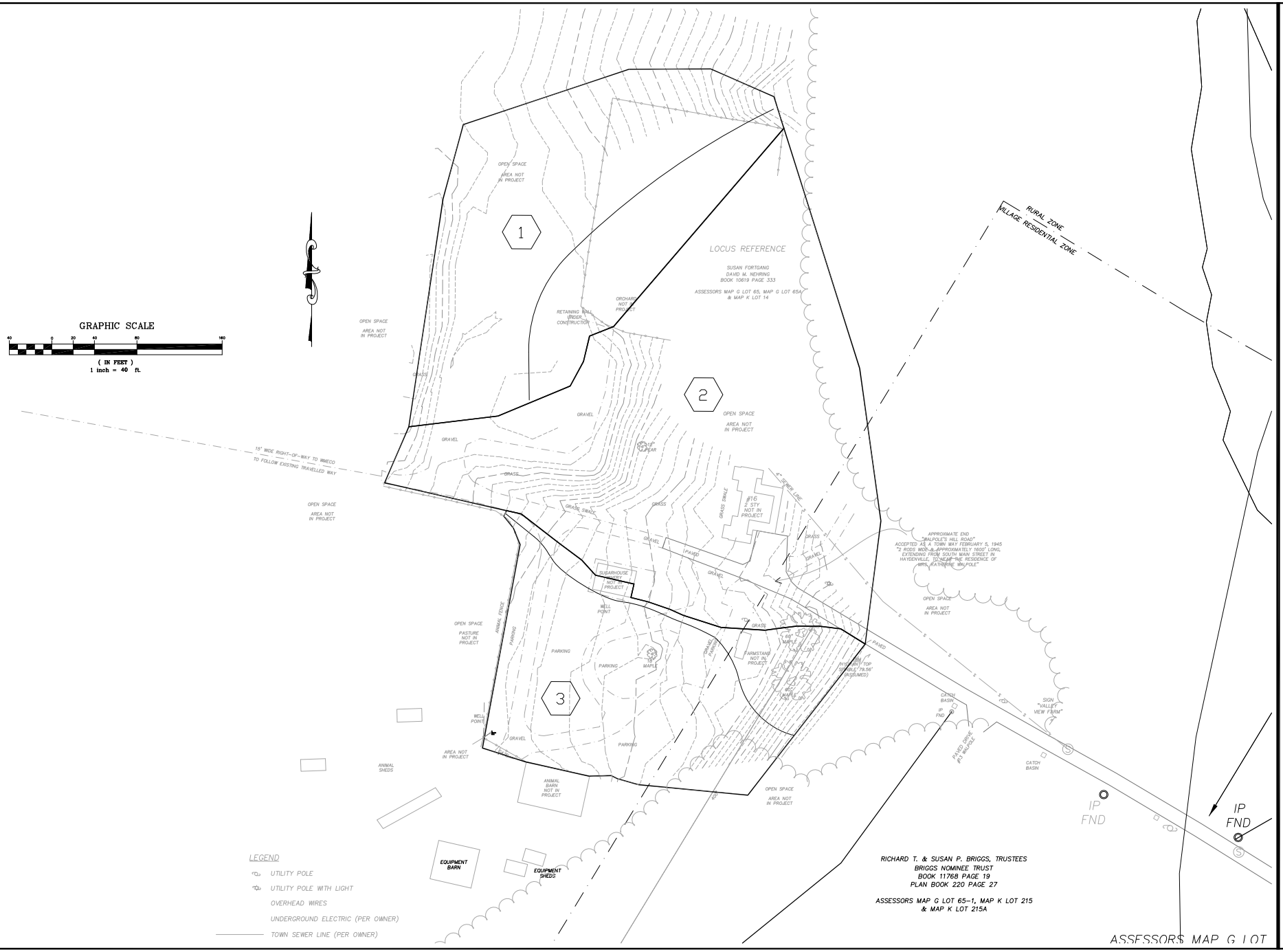

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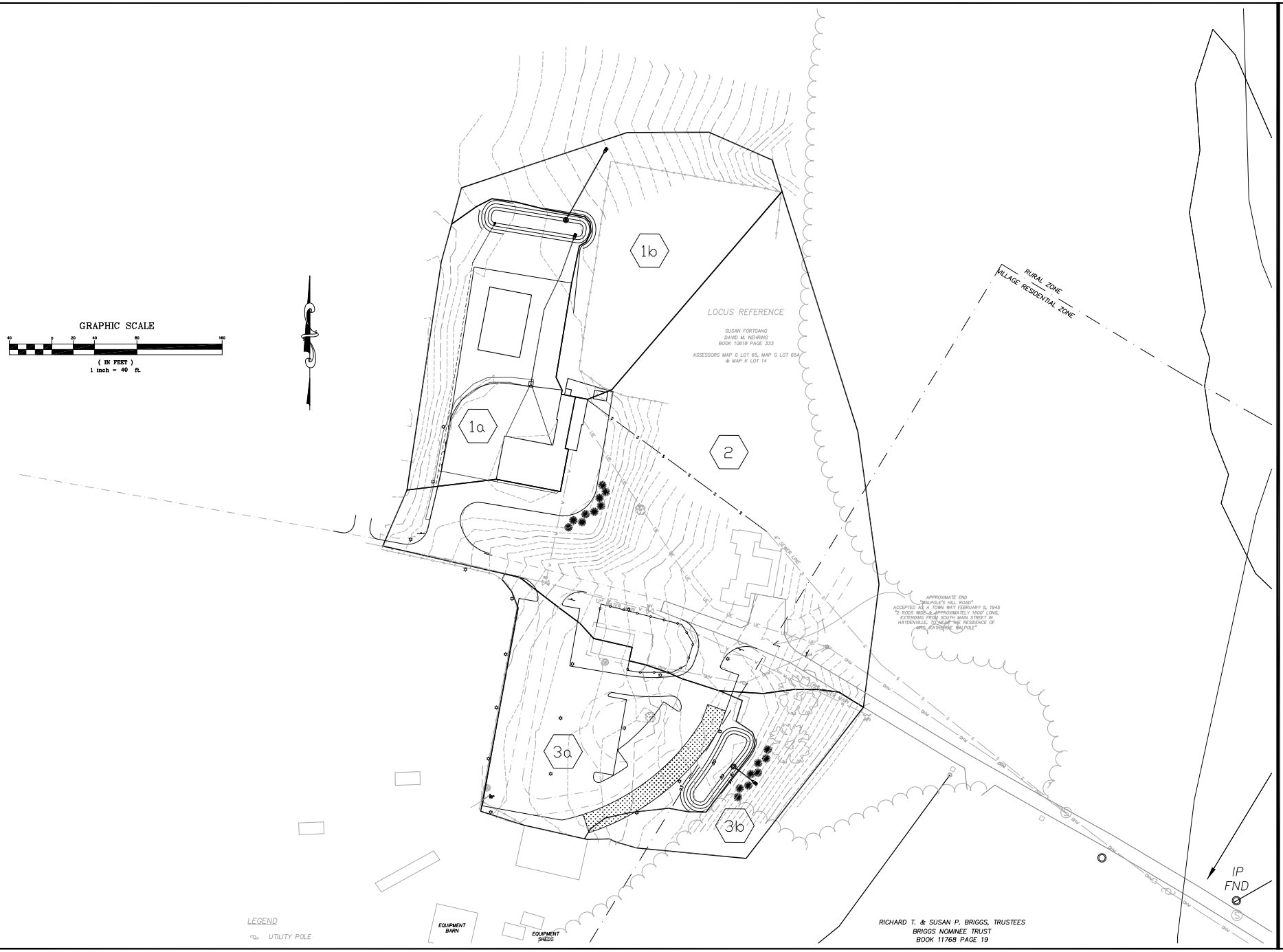
Existing Conditions Drainage Area Plan

Valley View Farm, 16 Walpole Road
Haydenville, MA

PREPARED FOR:
Valley View Farm
16 Walpole Road
Haydenville, MA 01039

REVISIONS:	DATE:

PROJECT NO: 16-0602
DRAWING: Site Eng.dwg
DATE: 6/23/16
SCALE: 1" = 40'
SHEET NO.
1 OF 2



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Florence, MA 01062

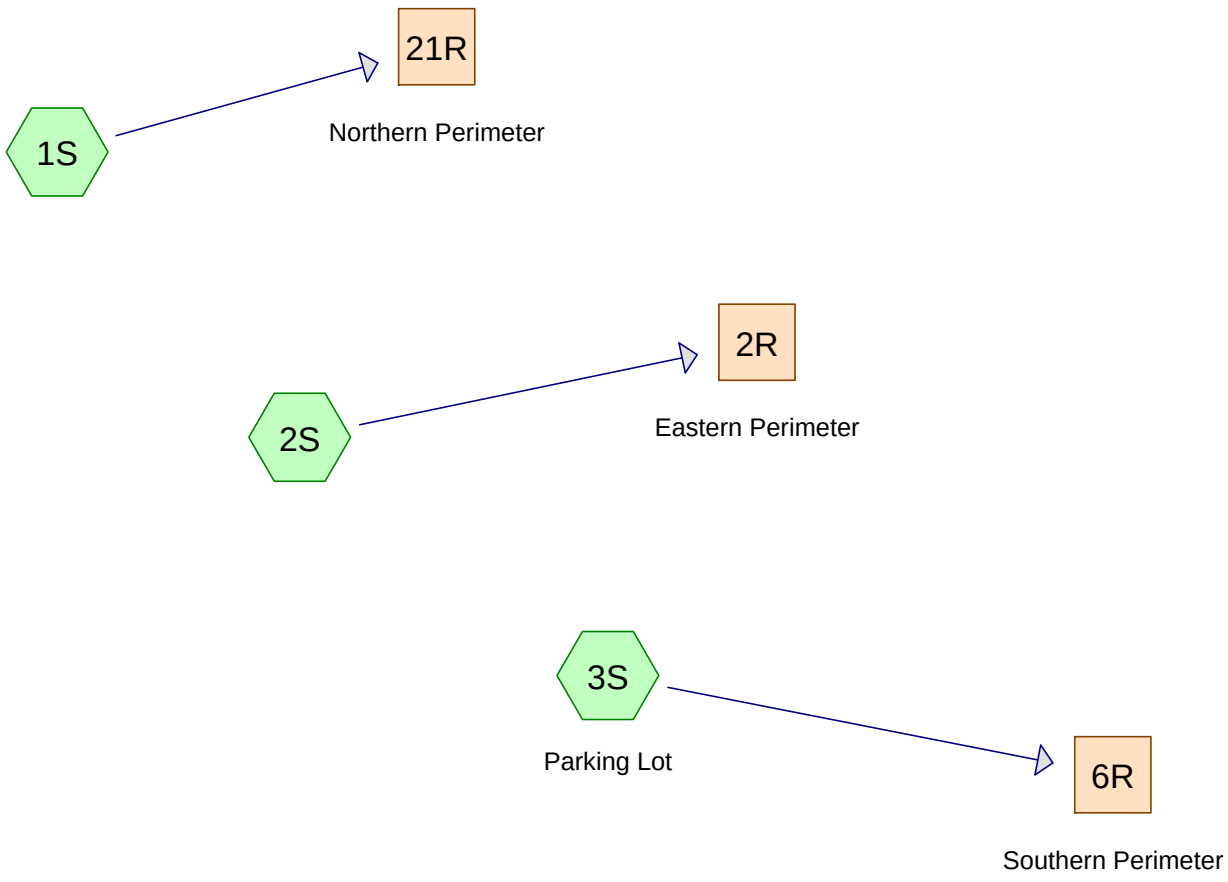
Proposed Conditions Drainage Area Plan

Valley View Farm, 16 Walpole Road
Haydenville, MA

PREPARED FOR:
Valley View Farm
16 Walpole Road
Haydenville, MA 01039

REVISIONS:	DATE:

PROJECT NO: 16-0602
DRAWING: Site Eng.dwg
DATE: 6/23/16
SCALE: 1" = 40'
SHEET NO.
2 OF 2



Subcat Reach Pond Link

Routing Diagram for Pre-Dev
Prepared by Microsoft, Printed 7/12/2016

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
189,747	77	>75% Grass cover, Good, HSG C/D (1S, 2S, 3S)
34,538	96	Gravel surface, HSG C/D (1S, 2S, 3S)
3,969	98	Paved parking, HSG C/D (2S)
3,167	98	Roofs, HSG C/D (2S, 3S)
231,421	**80**	**TOTAL AREA**

Time span=5.00-72.00 hrs, dt=0.04 hrs, 1676 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 1S: Runoff Area=70,493 sf 0.00% Impervious Runoff Depth=1.25"
Tc=6.0 min CN=80 Runoff=2.31 cfs 7,343 cf

Subcatchment 2S: Runoff Area=108,509 sf 5.90% Impervious Runoff Depth=1.25"
Tc=6.0 min CN=80 Runoff=3.56 cfs 11,303 cf

Subcatchment 3S: Parking Lot Runoff Area=52,419 sf 1.40% Impervious Runoff Depth=1.31"
Tc=6.0 min CN=81 Runoff=1.82 cfs 5,738 cf

Reach 2R: Eastern Perimeter Inflow=3.56 cfs 11,303 cf
Outflow=3.56 cfs 11,303 cf

Reach 6R: Southern Perimeter Inflow=1.82 cfs 5,738 cf
Outflow=1.82 cfs 5,738 cf

Reach 21R: Northern Perimeter Inflow=2.31 cfs 7,343 cf
Outflow=2.31 cfs 7,343 cf

Total Runoff Area = 231,421 sf Runoff Volume = 24,384 cf Average Runoff Depth = 1.26"
96.92% Pervious = 224,285 sf 3.08% Impervious = 7,136 sf

Summary for Subcatchment 1S:

Runoff = 2.31 cfs @ 12.09 hrs, Volume= 7,343 cf, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Event Rainfall=3.00"

	Area (sf)	CN	Description
*	59,011	77	>75% Grass cover, Good, HSG C/D
*	11,482	96	Gravel surface, HSG C/D
	70,493	80	Weighted Average
	70,493		100.00% Pervious Area

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

Summary for Subcatchment 2S:

Runoff = 3.56 cfs @ 12.09 hrs, Volume= 11,303 cf, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Event Rainfall=3.00"

	Area (sf)	CN	Description
*	89,381	77	>75% Grass cover, Good, HSG C/D
*	12,724	96	Gravel surface, HSG C/D
*	3,969	98	Paved parking, HSG C/D
*	2,435	98	Roofs, HSG C/D
	108,509	80	Weighted Average
	102,105		94.10% Pervious Area
	6,404		5.90% Impervious Area

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

Summary for Subcatchment 3S: Parking Lot

Runoff = 1.82 cfs @ 12.09 hrs, Volume= 5,738 cf, Depth= 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Event Rainfall=3.00"

	Area (sf)	CN	Description
*	41,355	77	>75% Grass cover, Good, HSG C/D
*	10,332	96	Gravel surface, HSG C/D
*	732	98	Roofs, HSG C/D
	52,419	81	Weighted Average
	51,687		98.60% Pervious Area
	732		1.40% Impervious Area

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

Summary for Reach 2R: Eastern Perimeter

Inflow Area = 108,509 sf, 5.90% Impervious, Inflow Depth = 1.25" for 2-Year Event event
Inflow = 3.56 cfs @ 12.09 hrs, Volume= 11,303 cf
Outflow = 3.56 cfs @ 12.09 hrs, Volume= 11,303 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Reach 6R: Southern Perimeter

Inflow Area = 52,419 sf, 1.40% Impervious, Inflow Depth = 1.31" for 2-Year Event event
Inflow = 1.82 cfs @ 12.09 hrs, Volume= 5,738 cf
Outflow = 1.82 cfs @ 12.09 hrs, Volume= 5,738 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Reach 21R: Northern Perimeter

Inflow Area = 70,493 sf, 0.00% Impervious, Inflow Depth = 1.25" for 2-Year Event event
Inflow = 2.31 cfs @ 12.09 hrs, Volume= 7,343 cf
Outflow = 2.31 cfs @ 12.09 hrs, Volume= 7,343 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Time span=5.00-72.00 hrs, dt=0.04 hrs, 1676 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 1S: Runoff Area=70,493 sf 0.00% Impervious Runoff Depth=2.46"
Tc=6.0 min CN=80 Runoff=4.63 cfs 14,460 cf

Subcatchment 2S: Runoff Area=108,509 sf 5.90% Impervious Runoff Depth=2.46"
Tc=6.0 min CN=80 Runoff=7.13 cfs 22,258 cf

Subcatchment 3S: Parking Lot Runoff Area=52,419 sf 1.40% Impervious Runoff Depth=2.55"
Tc=6.0 min CN=81 Runoff=3.56 cfs 11,131 cf

Reach 2R: Eastern Perimeter Inflow=7.13 cfs 22,258 cf
Outflow=7.13 cfs 22,258 cf

Reach 6R: Southern Perimeter Inflow=3.56 cfs 11,131 cf
Outflow=3.56 cfs 11,131 cf

Reach 21R: Northern Perimeter Inflow=4.63 cfs 14,460 cf
Outflow=4.63 cfs 14,460 cf

Total Runoff Area = 231,421 sf Runoff Volume = 47,849 cf Average Runoff Depth = 2.48"
96.92% Pervious = 224,285 sf 3.08% Impervious = 7,136 sf

Summary for Subcatchment 1S:

Runoff = 4.63 cfs @ 12.09 hrs, Volume= 14,460 cf, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Event Rainfall=4.50"

	Area (sf)	CN	Description
*	59,011	77	>75% Grass cover, Good, HSG C/D
*	11,482	96	Gravel surface, HSG C/D
	70,493	80	Weighted Average
	70,493		100.00% Pervious Area

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

Summary for Subcatchment 2S:

Runoff = 7.13 cfs @ 12.09 hrs, Volume= 22,258 cf, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Event Rainfall=4.50"

	Area (sf)	CN	Description
*	89,381	77	>75% Grass cover, Good, HSG C/D
*	12,724	96	Gravel surface, HSG C/D
*	3,969	98	Paved parking, HSG C/D
*	2,435	98	Roofs, HSG C/D
	108,509	80	Weighted Average
	102,105		94.10% Pervious Area
	6,404		5.90% Impervious Area

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

Summary for Subcatchment 3S: Parking Lot

Runoff = 3.56 cfs @ 12.09 hrs, Volume= 11,131 cf, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Event Rainfall=4.50"

	Area (sf)	CN	Description
*	41,355	77	>75% Grass cover, Good, HSG C/D
*	10,332	96	Gravel surface, HSG C/D
*	732	98	Roofs, HSG C/D
	52,419	81	Weighted Average
	51,687		98.60% Pervious Area
	732		1.40% Impervious Area

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

Summary for Reach 2R: Eastern Perimeter

Inflow Area = 108,509 sf, 5.90% Impervious, Inflow Depth = 2.46" for 10-Year Event event
Inflow = 7.13 cfs @ 12.09 hrs, Volume= 22,258 cf
Outflow = 7.13 cfs @ 12.09 hrs, Volume= 22,258 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Reach 6R: Southern Perimeter

Inflow Area = 52,419 sf, 1.40% Impervious, Inflow Depth = 2.55" for 10-Year Event event
Inflow = 3.56 cfs @ 12.09 hrs, Volume= 11,131 cf
Outflow = 3.56 cfs @ 12.09 hrs, Volume= 11,131 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Reach 21R: Northern Perimeter

Inflow Area = 70,493 sf, 0.00% Impervious, Inflow Depth = 2.46" for 10-Year Event event
Inflow = 4.63 cfs @ 12.09 hrs, Volume= 14,460 cf
Outflow = 4.63 cfs @ 12.09 hrs, Volume= 14,460 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Time span=5.00-72.00 hrs, dt=0.04 hrs, 1676 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 1S: Runoff Area=70,493 sf 0.00% Impervious Runoff Depth=4.24"
Tc=6.0 min CN=80 Runoff=7.91 cfs 24,880 cf

Subcatchment 2S: Runoff Area=108,509 sf 5.90% Impervious Runoff Depth=4.24"
Tc=6.0 min CN=80 Runoff=12.18 cfs 38,297 cf

Subcatchment 3S: Parking Lot Runoff Area=52,419 sf 1.40% Impervious Runoff Depth=4.34"
Tc=6.0 min CN=81 Runoff=6.02 cfs 18,967 cf

Reach 2R: Eastern Perimeter Inflow=12.18 cfs 38,297 cf
Outflow=12.18 cfs 38,297 cf

Reach 6R: Southern Perimeter Inflow=6.02 cfs 18,967 cf
Outflow=6.02 cfs 18,967 cf

Reach 21R: Northern Perimeter Inflow=7.91 cfs 24,880 cf
Outflow=7.91 cfs 24,880 cf

Total Runoff Area = 231,421 sf Runoff Volume = 82,144 cf Average Runoff Depth = 4.26"
96.92% Pervious = 224,285 sf 3.08% Impervious = 7,136 sf

Summary for Subcatchment 1S:

Runoff = 7.91 cfs @ 12.09 hrs, Volume= 24,880 cf, Depth= 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Event Rainfall=6.50"

	Area (sf)	CN	Description
*	59,011	77	>75% Grass cover, Good, HSG C/D
*	11,482	96	Gravel surface, HSG C/D
	70,493	80	Weighted Average
	70,493		100.00% Pervious Area

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

Summary for Subcatchment 2S:

Runoff = 12.18 cfs @ 12.09 hrs, Volume= 38,297 cf, Depth= 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Event Rainfall=6.50"

	Area (sf)	CN	Description
*	89,381	77	>75% Grass cover, Good, HSG C/D
*	12,724	96	Gravel surface, HSG C/D
*	3,969	98	Paved parking, HSG C/D
*	2,435	98	Roofs, HSG C/D
	108,509	80	Weighted Average
	102,105		94.10% Pervious Area
	6,404		5.90% Impervious Area

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

Summary for Subcatchment 3S: Parking Lot

Runoff = 6.02 cfs @ 12.09 hrs, Volume= 18,967 cf, Depth= 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Event Rainfall=6.50"

	Area (sf)	CN	Description
*	41,355	77	>75% Grass cover, Good, HSG C/D
*	10,332	96	Gravel surface, HSG C/D
*	732	98	Roofs, HSG C/D
	52,419	81	Weighted Average
	51,687		98.60% Pervious Area
	732		1.40% Impervious Area

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

Summary for Reach 2R: Eastern Perimeter

Inflow Area = 108,509 sf, 5.90% Impervious, Inflow Depth = 4.24" for 100-Year Event event
Inflow = 12.18 cfs @ 12.09 hrs, Volume= 38,297 cf
Outflow = 12.18 cfs @ 12.09 hrs, Volume= 38,297 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Reach 6R: Southern Perimeter

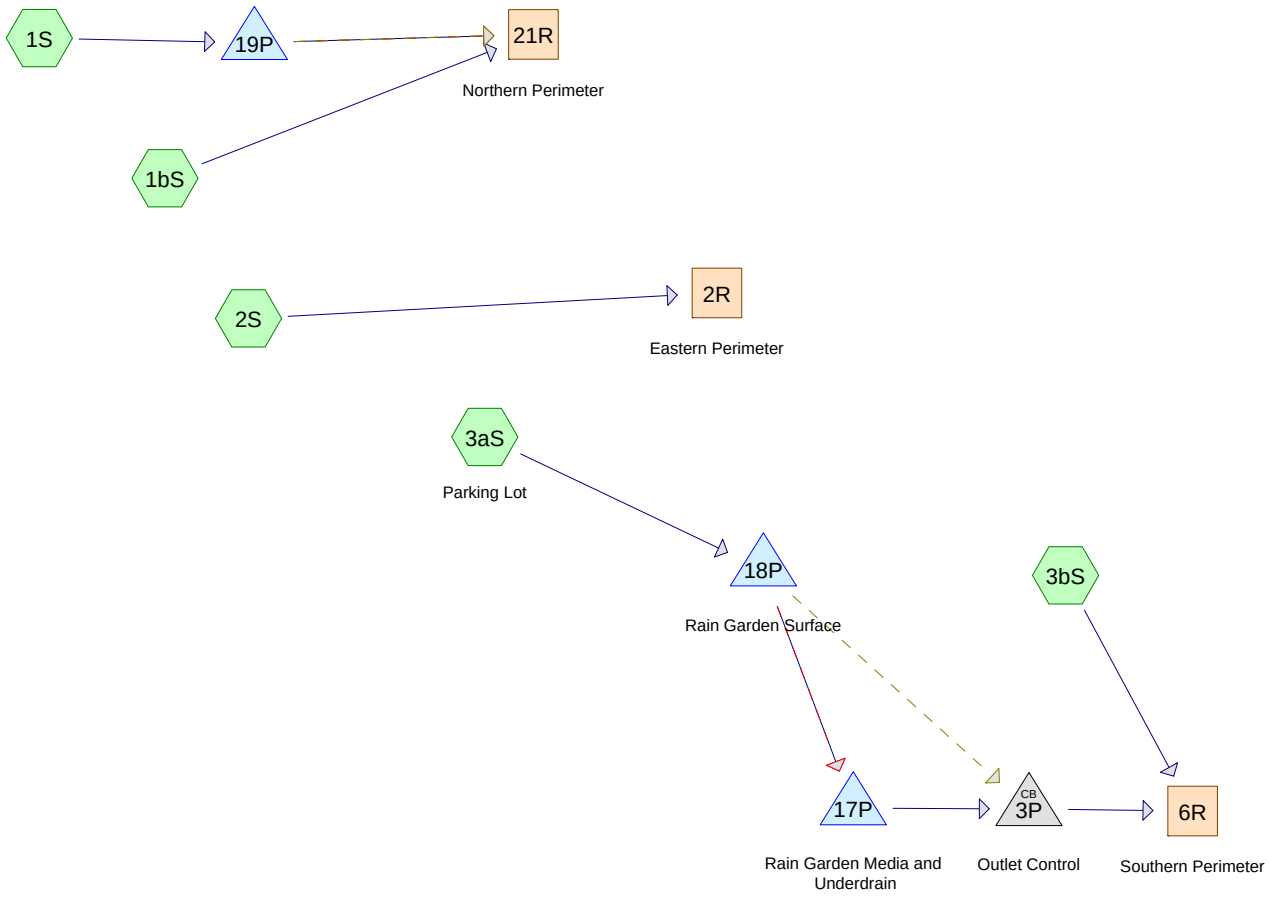
Inflow Area = 52,419 sf, 1.40% Impervious, Inflow Depth = 4.34" for 100-Year Event event
Inflow = 6.02 cfs @ 12.09 hrs, Volume= 18,967 cf
Outflow = 6.02 cfs @ 12.09 hrs, Volume= 18,967 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Reach 21R: Northern Perimeter

Inflow Area = 70,493 sf, 0.00% Impervious, Inflow Depth = 4.24" for 100-Year Event event
Inflow = 7.91 cfs @ 12.09 hrs, Volume= 24,880 cf
Outflow = 7.91 cfs @ 12.09 hrs, Volume= 24,880 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs



Subcat Reach Pond Link

Routing Diagram for Post-Dev
Prepared by Microsoft, Printed 7/12/2016

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
38,895	74	>75% Grass cover, Good, HSG C/D (1bS)
124,536	77	>75% Grass cover, Good, HSG C/D (1S, 2S, 3aS, 3bS)
53,702	96	Gravel surface, HSG C/D (1S, 2S, 3aS)
3,969	98	Paved parking, HSG C/D (2S)
9,319	98	Roofs, HSG C/D (1S, 2S, 3aS)
1,000	98	Water Surface, HSG C/D (3aS)
231,421	**82**	**TOTAL AREA**

Time span=5.00-72.00 hrs, dt=0.04 hrs, 1676 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 1bS: Runoff Area=38,895 sf 0.00% Impervious Runoff Depth=0.91"
Tc=6.0 min CN=74 Runoff=0.88 cfs 2,944 cf

Subcatchment 1S: Runoff Area=31,034 sf 17.98% Impervious Runoff Depth=2.16"
Tc=6.0 min CN=92 Runoff=1.75 cfs 5,589 cf

Subcatchment 2S: Runoff Area=109,073 sf 6.40% Impervious Runoff Depth=1.25"
Tc=6.0 min CN=80 Runoff=3.58 cfs 11,362 cf

Subcatchment 3aS: Parking Lot Runoff Area=40,939 sf 4.23% Impervious Runoff Depth=1.90"
Tc=6.0 min CN=89 Runoff=2.07 cfs 6,481 cf

Subcatchment 3bS: Runoff Area=11,480 sf 0.00% Impervious Runoff Depth=1.07"
Tc=6.0 min CN=77 Runoff=0.32 cfs 1,025 cf

Reach 2R: Eastern Perimeter Inflow=3.58 cfs 11,362 cf
Outflow=3.58 cfs 11,362 cf

Reach 6R: Southern Perimeter Inflow=1.27 cfs 7,505 cf
Outflow=1.27 cfs 7,505 cf

Reach 21R: Northern Perimeter Inflow=1.59 cfs 8,531 cf
Outflow=1.59 cfs 8,531 cf

Pond 3P: Outlet Control Peak Elev=86.64' Inflow=1.13 cfs 6,480 cf
12.0" Round Culvert n=0.011 L=20.0' S=0.0250 '/' Outflow=1.13 cfs 6,480 cf

Pond 17P: Rain Garden Media and Underdrain Peak Elev=87.36' Storage=597 cf Inflow=1.33 cfs 6,483 cf
8.0" Round Culvert n=0.013 L=10.0' S=0.0000 '/' Outflow=1.13 cfs 6,480 cf

Pond 18P: Rain Garden Surface Peak Elev=89.92' Storage=1,217 cf Inflow=2.07 cfs 6,481 cf
Primary=0.11 cfs 3,630 cf Secondary=1.22 cfs 2,853 cf Tertiary=0.00 cfs 0 cf Outflow=1.33 cfs 6,483 cf

Pond 19P: Peak Elev=106.01' Storage=1,337 cf Inflow=1.75 cfs 5,589 cf
Primary=0.86 cfs 5,587 cf Secondary=0.00 cfs 0 cf Outflow=0.86 cfs 5,587 cf

Total Runoff Area = 231,421 sf Runoff Volume = 27,401 cf Average Runoff Depth = 1.42"
93.83% Pervious = 217,133 sf 6.17% Impervious = 14,288 sf

Summary for Subcatchment 1bS:

Runoff = 0.88 cfs @ 12.10 hrs, Volume= 2,944 cf, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Event Rainfall=3.00"

	Area (sf)	CN	Description
*	38,895	74	>75% Grass cover, Good, HSG C/D
	38,895		100.00% Pervious Area

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

Summary for Subcatchment 1S:

Runoff = 1.75 cfs @ 12.09 hrs, Volume= 5,589 cf, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Event Rainfall=3.00"

	Area (sf)	CN	Description
*	7,870	77	>75% Grass cover, Good, HSG C/D
*	17,585	96	Gravel surface, HSG C/D
*	5,579	98	Roofs, HSG C/D
	31,034	92	Weighted Average
	25,455		82.02% Pervious Area
	5,579		17.98% Impervious Area

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

Summary for Subcatchment 2S:

Runoff = 3.58 cfs @ 12.09 hrs, Volume= 11,362 cf, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Event Rainfall=3.00"

	Area (sf)	CN	Description
*	90,619	77	>75% Grass cover, Good, HSG C/D
*	11,477	96	Gravel surface, HSG C/D
*	3,969	98	Paved parking, HSG C/D
*	3,008	98	Roofs, HSG C/D
	109,073	80	Weighted Average
	102,096		93.60% Pervious Area
	6,977		6.40% Impervious Area

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

Summary for Subcatchment 3aS: Parking Lot

Runoff = 2.07 cfs @ 12.09 hrs, Volume= 6,481 cf, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Event Rainfall=3.00"

	Area (sf)	CN	Description
*	14,567	77	>75% Grass cover, Good, HSG C/D
*	24,640	96	Gravel surface, HSG C/D
*	732	98	Roofs, HSG C/D
*	1,000	98	Water Surface, HSG C/D
	40,939	89	Weighted Average
	39,207		95.77% Pervious Area
	1,732		4.23% Impervious Area

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

Summary for Subcatchment 3bS:

Runoff = 0.32 cfs @ 12.10 hrs, Volume= 1,025 cf, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Event Rainfall=3.00"

	Area (sf)	CN	Description
*	11,480	77	>75% Grass cover, Good, HSG C/D
	11,480		100.00% Pervious Area

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

Summary for Reach 2R: Eastern Perimeter

Inflow Area = 109,073 sf, 6.40% Impervious, Inflow Depth = 1.25" for 2-Year Event event
Inflow = 3.58 cfs @ 12.09 hrs, Volume= 11,362 cf
Outflow = 3.58 cfs @ 12.09 hrs, Volume= 11,362 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Reach 6R: Southern Perimeter

Inflow Area = 52,419 sf, 3.30% Impervious, Inflow Depth = 1.72" for 2-Year Event event
Inflow = 1.27 cfs @ 12.32 hrs, Volume= 7,505 cf
Outflow = 1.27 cfs @ 12.32 hrs, Volume= 7,505 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Reach 21R: Northern Perimeter

Inflow Area = 69,929 sf, 7.98% Impervious, Inflow Depth = 1.46" for 2-Year Event event
Inflow = 1.59 cfs @ 12.13 hrs, Volume= 8,531 cf
Outflow = 1.59 cfs @ 12.13 hrs, Volume= 8,531 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Pond 3P: Outlet Control

Inflow Area = 40,939 sf, 4.23% Impervious, Inflow Depth = 1.90" for 2-Year Event event
Inflow = 1.13 cfs @ 12.36 hrs, Volume= 6,480 cf
Outflow = 1.13 cfs @ 12.36 hrs, Volume= 6,480 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.13 cfs @ 12.36 hrs, Volume= 6,480 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Peak Elev= 86.64' @ 12.36 hrs
Flood Elev= 90.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 86.00' / 85.50' S= 0.0250 '/' Cc= 0.900 n= 0.011 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.13 cfs @ 12.36 hrs HW=86.64' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 1.13 cfs @ 2.14 fps)

Summary for Pond 17P: Rain Garden Media and Underdrain

Inflow Area = 40,939 sf, 4.23% Impervious, Inflow Depth = 1.90" for 2-Year Event event
Inflow = 1.33 cfs @ 12.19 hrs, Volume= 6,483 cf
Outflow = 1.13 cfs @ 12.36 hrs, Volume= 6,480 cf, Atten= 15%, Lag= 10.4 min
Primary = 1.13 cfs @ 12.36 hrs, Volume= 6,480 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Peak Elev= 87.36' @ 12.37 hrs Surf.Area= 1,071 sf Storage= 597 cf
Flood Elev= 89.00' Surf.Area= 1,071 sf Storage= 1,300 cf

Plug-Flow detention time= 18.5 min calculated for 6,480 cf (100% of inflow)
Center-of-Mass det. time= 18.0 min (875.1 - 857.0)

Volume	Invert	Avail.Storage	Storage Description
#1	86.00'	1,275 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 3,213 cf Overall - 25 cf Embedded = 3,188 cf x 40.0% Voids
#2	86.00'	25 cf	**6.0" Round Pipe Storage** Inside #1 L= 126.0'
		1,300 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
86.00	1,071	0	0
86.25	1,071	268	268
86.75	1,071	536	803
89.00	1,071	2,410	3,213

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**8.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 86.00' / 86.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.13 cfs @ 12.36 hrs HW=87.36' TW=86.64' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.13 cfs @ 3.23 fps)

Summary for Pond 18P: Rain Garden Surface

Inflow Area = 40,939 sf, 4.23% Impervious, Inflow Depth = 1.90" for 2-Year Event event
Inflow = 2.07 cfs @ 12.09 hrs, Volume= 6,481 cf
Outflow = 1.33 cfs @ 12.19 hrs, Volume= 6,483 cf, Atten= 35%, Lag= 6.0 min
Primary = 0.11 cfs @ 12.19 hrs, Volume= 3,630 cf
Secondary = 1.22 cfs @ 12.19 hrs, Volume= 2,853 cf
Tertiary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Peak Elev= 89.92' @ 12.19 hrs Surf.Area= 1,572 sf Storage= 1,217 cf
Flood Elev= 91.00' Surf.Area= 2,208 sf Storage= 3,260 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 43.4 min (857.0 - 813.7)

Volume	Invert	Avail.Storage	Storage Description
#1	89.00'	3,260 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
89.00	1,079	0	0
90.00	1,616	1,348	1,348
91.00	2,208	1,912	3,260

Device	Routing	Invert	Outlet Devices
#1	Primary	89.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 86.00'
#2	Secondary	89.50'	**6.0" Horiz. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Tertiary	90.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Tertiary	90.50'	**40.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.11 cfs @ 12.19 hrs HW=89.92' TW=87.10' (Dynamic Tailwater)
└**1=Exfiltration** (Controls 0.11 cfs)

Secondary OutFlow Max=1.22 cfs @ 12.19 hrs HW=89.92' TW=87.10' (Dynamic Tailwater)
└**2=Orifice/Grate** (Orifice Controls 1.22 cfs @ 3.11 fps)

Tertiary OutFlow Max=0.00 cfs @ 5.00 hrs HW=89.00' TW=86.00' (Dynamic Tailwater)
└**3=Orifice/Grate** (Controls 0.00 cfs)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 19P:

Inflow Area = 31,034 sf, 17.98% Impervious, Inflow Depth = 2.16" for 2-Year Event event
Inflow = 1.75 cfs @ 12.09 hrs, Volume= 5,589 cf
Outflow = 0.86 cfs @ 12.25 hrs, Volume= 5,587 cf, Atten= 51%, Lag= 9.6 min
Primary = 0.86 cfs @ 12.25 hrs, Volume= 5,587 cf
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Peak Elev= 106.01' @ 12.25 hrs Surf.Area= 1,632 sf Storage= 1,337 cf
Flood Elev= 107.00' Surf.Area= 2,285 sf Storage= 3,285 cf

Plug-Flow detention time= 43.3 min calculated for 5,583 cf (100% of inflow)
Center-of-Mass det. time= 44.0 min (844.1 - 800.1)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	3,285 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	1,028	0	0
106.00	1,628	1,328	1,328
107.00	2,285	1,957	3,285

Device	Routing	Invert	Outlet Devices
#1	Primary	105.00'	**12.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 105.00' / 102.07' S= 0.0293 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	105.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	105.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	106.25'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	106.80'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.86 cfs @ 12.25 hrs HW=106.00' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.86 cfs of 2.69 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.38 cfs @ 4.41 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.48 cfs @ 2.43 fps)
  └─**4=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=105.00' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=5.00-72.00 hrs, dt=0.04 hrs, 1676 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 1bS: Runoff Area=38,895 sf 0.00% Impervious Runoff Depth=1.97"
Tc=6.0 min CN=74 Runoff=2.02 cfs 6,393 cf

Subcatchment 1S: Runoff Area=31,034 sf 17.98% Impervious Runoff Depth>3.60"
Tc=6.0 min CN=92 Runoff=2.85 cfs 9,300 cf

Subcatchment 2S: Runoff Area=109,073 sf 6.40% Impervious Runoff Depth=2.46"
Tc=6.0 min CN=80 Runoff=7.16 cfs 22,374 cf

Subcatchment 3aS: Parking Lot Runoff Area=40,939 sf 4.23% Impervious Runoff Depth>3.30"
Tc=6.0 min CN=89 Runoff=3.52 cfs 11,242 cf

Subcatchment 3bS: Runoff Area=11,480 sf 0.00% Impervious Runoff Depth=2.21"
Tc=6.0 min CN=77 Runoff=0.68 cfs 2,115 cf

Reach 2R: Eastern Perimeter Inflow=7.16 cfs 22,374 cf
Outflow=7.16 cfs 22,374 cf

Reach 6R: Southern Perimeter Inflow=3.16 cfs 13,358 cf
Outflow=3.16 cfs 13,358 cf

Reach 21R: Northern Perimeter Inflow=3.15 cfs 15,691 cf
Outflow=3.15 cfs 15,691 cf

Pond 3P: Outlet Control Peak Elev=87.22' Inflow=2.54 cfs 11,243 cf
12.0" Round Culvert n=0.011 L=20.0' S=0.0250 '/' Outflow=2.54 cfs 11,243 cf

Pond 17P: Rain Garden Media and Underdrain Peak Elev=88.05' Storage=894 cf Inflow=1.65 cfs 10,485 cf
8.0" Round Culvert n=0.013 L=10.0' S=0.0000 '/' Outflow=1.50 cfs 10,482 cf

Pond 18P: Rain Garden Surface Peak Elev=90.15' Storage=1,599 cf Inflow=3.52 cfs 11,242 cf
Primary=0.12 cfs 4,728 cf Secondary=1.53 cfs 5,757 cf Tertiary=1.53 cfs 761 cf Outflow=3.18 cfs 11,246 cf

Pond 19P: Peak Elev=106.40' Storage=2,036 cf Inflow=2.85 cfs 9,300 cf
Primary=1.61 cfs 9,298 cf Secondary=0.00 cfs 0 cf Outflow=1.61 cfs 9,298 cf

Total Runoff Area = 231,421 sf Runoff Volume = 51,424 cf Average Runoff Depth = 2.67"
93.83% Pervious = 217,133 sf 6.17% Impervious = 14,288 sf

Summary for Subcatchment 1bS:

Runoff = 2.02 cfs @ 12.09 hrs, Volume= 6,393 cf, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Event Rainfall=4.50"

	Area (sf)	CN	Description
*	38,895	74	>75% Grass cover, Good, HSG C/D
	38,895		100.00% Pervious Area

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

Summary for Subcatchment 1S:

Runoff = 2.85 cfs @ 12.09 hrs, Volume= 9,300 cf, Depth> 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Event Rainfall=4.50"

	Area (sf)	CN	Description
*	7,870	77	>75% Grass cover, Good, HSG C/D
*	17,585	96	Gravel surface, HSG C/D
*	5,579	98	Roofs, HSG C/D
	31,034	92	Weighted Average
	25,455		82.02% Pervious Area
	5,579		17.98% Impervious Area

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

Summary for Subcatchment 2S:

Runoff = 7.16 cfs @ 12.09 hrs, Volume= 22,374 cf, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Event Rainfall=4.50"

	Area (sf)	CN	Description
*	90,619	77	>75% Grass cover, Good, HSG C/D
*	11,477	96	Gravel surface, HSG C/D
*	3,969	98	Paved parking, HSG C/D
*	3,008	98	Roofs, HSG C/D
	109,073	80	Weighted Average
	102,096		93.60% Pervious Area
	6,977		6.40% Impervious Area

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

Summary for Subcatchment 3aS: Parking Lot

Runoff = 3.52 cfs @ 12.09 hrs, Volume= 11,242 cf, Depth> 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Event Rainfall=4.50"

	Area (sf)	CN	Description
*	14,567	77	>75% Grass cover, Good, HSG C/D
*	24,640	96	Gravel surface, HSG C/D
*	732	98	Roofs, HSG C/D
*	1,000	98	Water Surface, HSG C/D
	40,939	89	Weighted Average
	39,207		95.77% Pervious Area
	1,732		4.23% Impervious Area

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

Summary for Subcatchment 3bS:

Runoff = 0.68 cfs @ 12.09 hrs, Volume= 2,115 cf, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Event Rainfall=4.50"

	Area (sf)	CN	Description
*	11,480	77	>75% Grass cover, Good, HSG C/D
	11,480		100.00% Pervious Area

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

Summary for Reach 2R: Eastern Perimeter

Inflow Area = 109,073 sf, 6.40% Impervious, Inflow Depth = 2.46" for 10-Year Event event
Inflow = 7.16 cfs @ 12.09 hrs, Volume= 22,374 cf
Outflow = 7.16 cfs @ 12.09 hrs, Volume= 22,374 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Reach 6R: Southern Perimeter

Inflow Area = 52,419 sf, 3.30% Impervious, Inflow Depth = 3.06" for 10-Year Event event
Inflow = 3.16 cfs @ 12.13 hrs, Volume= 13,358 cf
Outflow = 3.16 cfs @ 12.13 hrs, Volume= 13,358 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Reach 21R: Northern Perimeter

Inflow Area = 69,929 sf, 7.98% Impervious, Inflow Depth = 2.69" for 10-Year Event event
Inflow = 3.15 cfs @ 12.12 hrs, Volume= 15,691 cf
Outflow = 3.15 cfs @ 12.12 hrs, Volume= 15,691 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Pond 3P: Outlet Control

Inflow Area = 40,939 sf, 4.23% Impervious, Inflow Depth = 3.30" for 10-Year Event event
Inflow = 2.54 cfs @ 12.13 hrs, Volume= 11,243 cf
Outflow = 2.54 cfs @ 12.13 hrs, Volume= 11,243 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.54 cfs @ 12.13 hrs, Volume= 11,243 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Peak Elev= 87.22' @ 12.13 hrs
Flood Elev= 90.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 86.00' / 85.50' S= 0.0250 '/' Cc= 0.900 n= 0.011 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.46 cfs @ 12.13 hrs HW=87.18' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 2.46 cfs @ 3.13 fps)

Summary for Pond 17P: Rain Garden Media and Underdrain

Inflow Area = 40,939 sf, 4.23% Impervious, Inflow Depth > 3.07" for 10-Year Event event
Inflow = 1.65 cfs @ 12.13 hrs, Volume= 10,485 cf
Outflow = 1.50 cfs @ 12.39 hrs, Volume= 10,482 cf, Atten= 9%, Lag= 15.5 min
Primary = 1.50 cfs @ 12.39 hrs, Volume= 10,482 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Peak Elev= 88.05' @ 12.34 hrs Surf.Area= 1,071 sf Storage= 894 cf
Flood Elev= 89.00' Surf.Area= 1,071 sf Storage= 1,300 cf

Plug-Flow detention time= 15.1 min calculated for 10,476 cf (100% of inflow)
Center-of-Mass det. time= 15.5 min (859.9 - 844.3)

Volume	Invert	Avail.Storage	Storage Description
#1	86.00'	1,275 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 3,213 cf Overall - 25 cf Embedded = 3,188 cf x 40.0% Voids
#2	86.00'	25 cf	**6.0" Round Pipe Storage** Inside #1 L= 126.0'
		1,300 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
86.00	1,071	0	0
86.25	1,071	268	268
86.75	1,071	536	803
89.00	1,071	2,410	3,213

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**8.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 86.00' / 86.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.50 cfs @ 12.39 hrs HW=88.04' TW=86.76' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.50 cfs @ 4.30 fps)

Summary for Pond 18P: Rain Garden Surface

Inflow Area = 40,939 sf, 4.23% Impervious, Inflow Depth > 3.30" for 10-Year Event event
Inflow = 3.52 cfs @ 12.09 hrs, Volume= 11,242 cf
Outflow = 3.18 cfs @ 12.13 hrs, Volume= 11,246 cf, Atten= 9%, Lag= 2.8 min
Primary = 0.12 cfs @ 12.13 hrs, Volume= 4,728 cf
Secondary = 1.53 cfs @ 12.13 hrs, Volume= 5,757 cf
Tertiary = 1.53 cfs @ 12.13 hrs, Volume= 761 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Peak Elev= 90.15' @ 12.13 hrs Surf.Area= 1,706 sf Storage= 1,599 cf
Flood Elev= 91.00' Surf.Area= 2,208 sf Storage= 3,260 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 38.4 min (836.6 - 798.1)

Volume	Invert	Avail.Storage	Storage Description
#1	89.00'	3,260 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
89.00	1,079	0	0
90.00	1,616	1,348	1,348
91.00	2,208	1,912	3,260

Device	Routing	Invert	Outlet Devices
#1	Primary	89.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 86.00'
#2	Secondary	89.50'	**6.0" Horiz. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Tertiary	90.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Tertiary	90.50'	**40.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.12 cfs @ 12.13 hrs HW=90.14' TW=87.55' (Dynamic Tailwater)
└**1=Exfiltration** (Controls 0.12 cfs)

Secondary OutFlow Max=1.52 cfs @ 12.13 hrs HW=90.14' TW=87.55' (Dynamic Tailwater)
└**2=Orifice/Grate** (Orifice Controls 1.52 cfs @ 3.86 fps)

Tertiary OutFlow Max=1.43 cfs @ 12.13 hrs HW=90.14' TW=87.16' (Dynamic Tailwater)
├**3=Orifice/Grate** (Weir Controls 1.43 cfs @ 1.24 fps)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 19P:

Inflow Area = 31,034 sf, 17.98% Impervious, Inflow Depth > 3.60" for 10-Year Event event
Inflow = 2.85 cfs @ 12.09 hrs, Volume= 9,300 cf
Outflow = 1.61 cfs @ 12.21 hrs, Volume= 9,298 cf, Atten= 43%, Lag= 7.5 min
Primary = 1.61 cfs @ 12.21 hrs, Volume= 9,298 cf
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Peak Elev= 106.40' @ 12.21 hrs Surf.Area= 1,892 sf Storage= 2,036 cf
Flood Elev= 107.00' Surf.Area= 2,285 sf Storage= 3,285 cf

Plug-Flow detention time= 37.2 min calculated for 9,292 cf (100% of inflow)
Center-of-Mass det. time= 37.8 min (824.7 - 786.9)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	3,285 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	1,028	0	0
106.00	1,628	1,328	1,328
107.00	2,285	1,957	3,285

Device	Routing	Invert	Outlet Devices
#1	Primary	105.00'	**12.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 105.00' / 102.07' S= 0.0293 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	105.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	105.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	106.25'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	106.80'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=1.60 cfs @ 12.21 hrs HW=106.40' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.60 cfs of 3.59 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.47 cfs @ 5.35 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.76 cfs @ 3.88 fps)
  └─**4=Orifice/Grate** (Orifice Controls 0.37 cfs @ 1.24 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=105.00' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=5.00-72.00 hrs, dt=0.04 hrs, 1676 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 1bS: Runoff Area=38,895 sf 0.00% Impervious Runoff Depth=3.61"
Tc=6.0 min CN=74 Runoff=3.75 cfs 11,700 cf

Subcatchment 1S: Runoff Area=31,034 sf 17.98% Impervious Runoff Depth>5.53"
Tc=6.0 min CN=92 Runoff=4.29 cfs 14,300 cf

Subcatchment 2S: Runoff Area=109,073 sf 6.40% Impervious Runoff Depth=4.24"
Tc=6.0 min CN=80 Runoff=12.24 cfs 38,496 cf

Subcatchment 3aS: Parking Lot Runoff Area=40,939 sf 4.23% Impervious Runoff Depth>5.21"
Tc=6.0 min CN=89 Runoff=5.44 cfs 17,780 cf

Subcatchment 3bS: Runoff Area=11,480 sf 0.00% Impervious Runoff Depth=3.92"
Tc=6.0 min CN=77 Runoff=1.20 cfs 3,749 cf

Reach 2R: Eastern Perimeter Inflow=12.24 cfs 38,496 cf
Outflow=12.24 cfs 38,496 cf

Reach 6R: Southern Perimeter Inflow=5.16 cfs 21,530 cf
Outflow=5.16 cfs 21,530 cf

Reach 21R: Northern Perimeter Inflow=6.50 cfs 25,997 cf
Outflow=6.50 cfs 25,997 cf

Pond 3P: Outlet Control Peak Elev=88.26' Inflow=3.97 cfs 17,781 cf
12.0" Round Culvert n=0.011 L=20.0' S=0.0250 '/' Outflow=3.97 cfs 17,781 cf

Pond 17P: Rain Garden Media and Peak Elev=88.99' Storage=1,295 cf Inflow=1.78 cfs 15,084 cf
8.0" Round Culvert n=0.013 L=10.0' S=0.0000 '/' Outflow=1.76 cfs 15,082 cf

Pond 18P: Rain Garden Surface Peak Elev=90.26' Storage=1,785 cf Inflow=5.44 cfs 17,780 cf
Primary=0.13 cfs 5,754 cf Secondary=1.65 cfs 9,331 cf Tertiary=3.43 cfs 2,699 cf Outflow=5.21 cfs 17,784 cf

Pond 19P: Peak Elev=106.67' Storage=2,574 cf Inflow=4.29 cfs 14,300 cf
Primary=3.19 cfs 14,297 cf Secondary=0.00 cfs 0 cf Outflow=3.19 cfs 14,297 cf

Total Runoff Area = 231,421 sf Runoff Volume = 86,025 cf Average Runoff Depth = 4.46"
93.83% Pervious = 217,133 sf 6.17% Impervious = 14,288 sf

Summary for Subcatchment 1bS:

Runoff = 3.75 cfs @ 12.09 hrs, Volume= 11,700 cf, Depth= 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Event Rainfall=6.50"

	Area (sf)	CN	Description
*	38,895	74	>75% Grass cover, Good, HSG C/D
	38,895		100.00% Pervious Area

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

Summary for Subcatchment 1S:

Runoff = 4.29 cfs @ 12.08 hrs, Volume= 14,300 cf, Depth> 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Event Rainfall=6.50"

	Area (sf)	CN	Description
*	7,870	77	>75% Grass cover, Good, HSG C/D
*	17,585	96	Gravel surface, HSG C/D
*	5,579	98	Roofs, HSG C/D
	31,034	92	Weighted Average
	25,455		82.02% Pervious Area
	5,579		17.98% Impervious Area

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

Summary for Subcatchment 2S:

Runoff = 12.24 cfs @ 12.09 hrs, Volume= 38,496 cf, Depth= 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Event Rainfall=6.50"

	Area (sf)	CN	Description
*	90,619	77	>75% Grass cover, Good, HSG C/D
*	11,477	96	Gravel surface, HSG C/D
*	3,969	98	Paved parking, HSG C/D
*	3,008	98	Roofs, HSG C/D
	109,073	80	Weighted Average
	102,096		93.60% Pervious Area
	6,977		6.40% Impervious Area

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

Summary for Subcatchment 3aS: Parking Lot

Runoff = 5.44 cfs @ 12.09 hrs, Volume= 17,780 cf, Depth> 5.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Event Rainfall=6.50"

	Area (sf)	CN	Description
*	14,567	77	>75% Grass cover, Good, HSG C/D
*	24,640	96	Gravel surface, HSG C/D
*	732	98	Roofs, HSG C/D
*	1,000	98	Water Surface, HSG C/D
	40,939	89	Weighted Average
	39,207		95.77% Pervious Area
	1,732		4.23% Impervious Area

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

Summary for Subcatchment 3bS:

Runoff = 1.20 cfs @ 12.09 hrs, Volume= 3,749 cf, Depth= 3.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Event Rainfall=6.50"

	Area (sf)	CN	Description
*	11,480	77	>75% Grass cover, Good, HSG C/D
	11,480		100.00% Pervious Area

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

Summary for Reach 2R: Eastern Perimeter

Inflow Area = 109,073 sf, 6.40% Impervious, Inflow Depth = 4.24" for 100-Year Event event
Inflow = 12.24 cfs @ 12.09 hrs, Volume= 38,496 cf
Outflow = 12.24 cfs @ 12.09 hrs, Volume= 38,496 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Reach 6R: Southern Perimeter

Inflow Area = 52,419 sf, 3.30% Impervious, Inflow Depth = 4.93" for 100-Year Event event
Inflow = 5.16 cfs @ 12.10 hrs, Volume= 21,530 cf
Outflow = 5.16 cfs @ 12.10 hrs, Volume= 21,530 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Reach 21R: Northern Perimeter

Inflow Area = 69,929 sf, 7.98% Impervious, Inflow Depth = 4.46" for 100-Year Event event
Inflow = 6.50 cfs @ 12.12 hrs, Volume= 25,997 cf
Outflow = 6.50 cfs @ 12.12 hrs, Volume= 25,997 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs

Summary for Pond 3P: Outlet Control

Inflow Area = 40,939 sf, 4.23% Impervious, Inflow Depth = 5.21" for 100-Year Event event
Inflow = 3.97 cfs @ 12.10 hrs, Volume= 17,781 cf
Outflow = 3.97 cfs @ 12.10 hrs, Volume= 17,781 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.97 cfs @ 12.10 hrs, Volume= 17,781 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Peak Elev= 88.26' @ 12.10 hrs
Flood Elev= 90.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 86.00' / 85.50' S= 0.0250 '/' Cc= 0.900 n= 0.011 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.87 cfs @ 12.10 hrs HW=88.18' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 3.87 cfs @ 4.93 fps)

Summary for Pond 17P: Rain Garden Media and Underdrain

Inflow Area = 40,939 sf, 4.23% Impervious, Inflow Depth > 4.42" for 100-Year Event event
Inflow = 1.78 cfs @ 12.11 hrs, Volume= 15,084 cf
Outflow = 1.76 cfs @ 12.43 hrs, Volume= 15,082 cf, Atten= 1%, Lag= 18.9 min
Primary = 1.76 cfs @ 12.43 hrs, Volume= 15,082 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Peak Elev= 88.99' @ 12.27 hrs Surf.Area= 1,071 sf Storage= 1,295 cf
Flood Elev= 89.00' Surf.Area= 1,071 sf Storage= 1,300 cf

Plug-Flow detention time= 14.2 min calculated for 15,072 cf (100% of inflow)
Center-of-Mass det. time= 14.5 min (851.3 - 836.8)

Volume	Invert	Avail.Storage	Storage Description
#1	86.00'	1,275 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc) 3,213 cf Overall - 25 cf Embedded = 3,188 cf x 40.0% Voids
#2	86.00'	25 cf	**6.0" Round Pipe Storage** Inside #1 L= 126.0'
		1,300 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
86.00	1,071	0	0
86.25	1,071	268	268
86.75	1,071	536	803
89.00	1,071	2,410	3,213

Device	Routing	Invert	Outlet Devices
#1	Primary	86.00'	**8.0" Round Culvert** L= 10.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 86.00' / 86.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.80 cfs @ 12.43 hrs HW=88.78' TW=86.95' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.80 cfs @ 5.14 fps)

Summary for Pond 18P: Rain Garden Surface

Inflow Area = 40,939 sf, 4.23% Impervious, Inflow Depth > 5.21" for 100-Year Event event
Inflow = 5.44 cfs @ 12.09 hrs, Volume= 17,780 cf
Outflow = 5.21 cfs @ 12.11 hrs, Volume= 17,784 cf, Atten= 4%, Lag= 1.6 min
Primary = 0.13 cfs @ 12.11 hrs, Volume= 5,754 cf
Secondary = 1.65 cfs @ 12.11 hrs, Volume= 9,331 cf
Tertiary = 3.43 cfs @ 12.11 hrs, Volume= 2,699 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Peak Elev= 90.26' @ 12.11 hrs Surf.Area= 1,769 sf Storage= 1,785 cf
Flood Elev= 91.00' Surf.Area= 2,208 sf Storage= 3,260 cf

Plug-Flow detention time= 33.9 min calculated for 17,773 cf (100% of inflow)
Center-of-Mass det. time= 34.0 min (820.5 - 786.5)

Volume	Invert	Avail.Storage	Storage Description
#1	89.00'	3,260 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
89.00	1,079	0	0
90.00	1,616	1,348	1,348
91.00	2,208	1,912	3,260

Device	Routing	Invert	Outlet Devices
#1	Primary	89.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 86.00'
#2	Secondary	89.50'	**6.0" Horiz. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Tertiary	90.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Tertiary	90.50'	**40.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.13 cfs @ 12.11 hrs HW=90.25' TW=88.23' (Dynamic Tailwater)
└**1=Exfiltration** (Controls 0.13 cfs)

Secondary OutFlow Max=1.64 cfs @ 12.11 hrs HW=90.25' TW=88.22' (Dynamic Tailwater)
└**2=Orifice/Grate** (Orifice Controls 1.64 cfs @ 4.18 fps)

Tertiary OutFlow Max=3.36 cfs @ 12.11 hrs HW=90.25' TW=88.17' (Dynamic Tailwater)
├**3=Orifice/Grate** (Weir Controls 3.36 cfs @ 1.65 fps)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 19P:

Inflow Area = 31,034 sf, 17.98% Impervious, Inflow Depth > 5.53" for 100-Year Event event
Inflow = 4.29 cfs @ 12.08 hrs, Volume= 14,300 cf
Outflow = 3.19 cfs @ 12.16 hrs, Volume= 14,297 cf, Atten= 26%, Lag= 4.6 min
Primary = 3.19 cfs @ 12.16 hrs, Volume= 14,297 cf
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 5.00-72.00 hrs, dt= 0.04 hrs
Peak Elev= 106.67' @ 12.16 hrs Surf.Area= 2,071 sf Storage= 2,574 cf
Flood Elev= 107.00' Surf.Area= 2,285 sf Storage= 3,285 cf

Plug-Flow detention time= 33.2 min calculated for 14,296 cf (100% of inflow)
Center-of-Mass det. time= 32.6 min (810.4 - 777.9)

Volume	Invert	Avail.Storage	Storage Description
#1	105.00'	3,285 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
105.00	1,028	0	0
106.00	1,628	1,328	1,328
107.00	2,285	1,957	3,285

Device	Routing	Invert	Outlet Devices
#1	Primary	105.00'	**12.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 105.00' / 102.07' S= 0.0293 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	105.00'	**4.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	105.50'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	106.25'	**24.0" W x 24.0" H Vert. Orifice/Grate** C= 0.600
#5	Secondary	106.80'	**10.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=3.19 cfs @ 12.16 hrs HW=106.67' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 3.19 cfs of 4.09 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.52 cfs @ 5.91 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.91 cfs @ 4.62 fps)
  └─**4=Orifice/Grate** (Orifice Controls 1.76 cfs @ 2.09 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=105.00' TW=0.00' (Dynamic Tailwater)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)