# JUDD RD DEVELOPMENT

# ONEIDA COUNTY, NEW YORK

## *Stormwater Analysis*

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# SCHUYLER BUSINESS PARK STORMWATER ANALYSIS

## INTRODUCTION

This report is written to determine the changes in storm water runoff from pre to post developed conditions for the development of 3 industrial / manufacturing parcel in the Town of Whitestown, Oneida County NY. This document can be used in the development of Storm Water Pollution Prevention Plans the follow the guidelines set forth in New York State Dept. of Environmental Conservation SPDES General Permit for Storm Water Discharges from Construction Activities Phase II, Permit No. GP-0-20-002, Dated: January 2020.

## I. PROJECT DESCRIPTION

A. BACKGROUND INFORMATION

This project consists of the subdivision and development of a 245,000 sf building with 150,000sf expansion with associated site amenities on a 20ac parcel on Judd Rd.

SOILS (refer to the Soils map in Appendix I)
Soil survey report is attached. Soils present on the site are a Coneseus silt loam 3 to 8 percent slopes. Depth to restrictive layer is approximately 6.5ft and depth to water table is 18 to 24 inches. Infiltration practices may not be appropriate for this site given the anticipated shallow ground water. Infiltration tests should be performed for the next phase of development.

## II. EXISTING (PRE-DEVELOPED) CONDITIONS

Presently the property is an open field with areas of mature trees. Topography generally runs from South to North at 3 to 8 % slopes with steeper mounds in the North corner and along Judd Rd. See Calculations in Appendix II

## III. PROPOSED CONDITIONS

The property will be developed for manufacturing or distribution center. Total increase in impervious on the entire property which includes buildings and paving is approximately 12.7 Ac. Increase in impervious coverage over a site generates a large increase in runoff as shown in the chart below and in calculations in appendix II.

**Mitigation:** The increase in stormwater runoff will be mitigated using storm water detention ponds and where appropriate underground infiltration practices. Using green infrastructure practices such as dryswales will also help meet the NYSDEC design guideline requirements.

**B. CALCULATIONS**

1. Curve Numbers: See Appendix II for HydroCAD Report

2. Pre and Post calculations- refer to Appendix II for detailed Calculations and

printouts. Below is a summary table.

**Table 1: Pre-Development Calculations (in cfs)**

| STORM EVENT | 1 YR. | 10 YR. | 100 YR. |
|---|---|---|---|
| Watershed 1 | 0.27 | 5.63 | 25.90 |

**Table 2: Post-Development Calculations (in cfs)**

| STORM EVENT | 1 YR. | 10 YR. | 100 YR. |
|---|---|---|---|
| Watershed 1 | 26.89 | 61.0 | 122.70 |
| Increase from Pre W1 | 26.62 | 55.37 | 96.80 |

# ***APPENDICES***

# ***APPENDIX I***

- ***Soil Report***

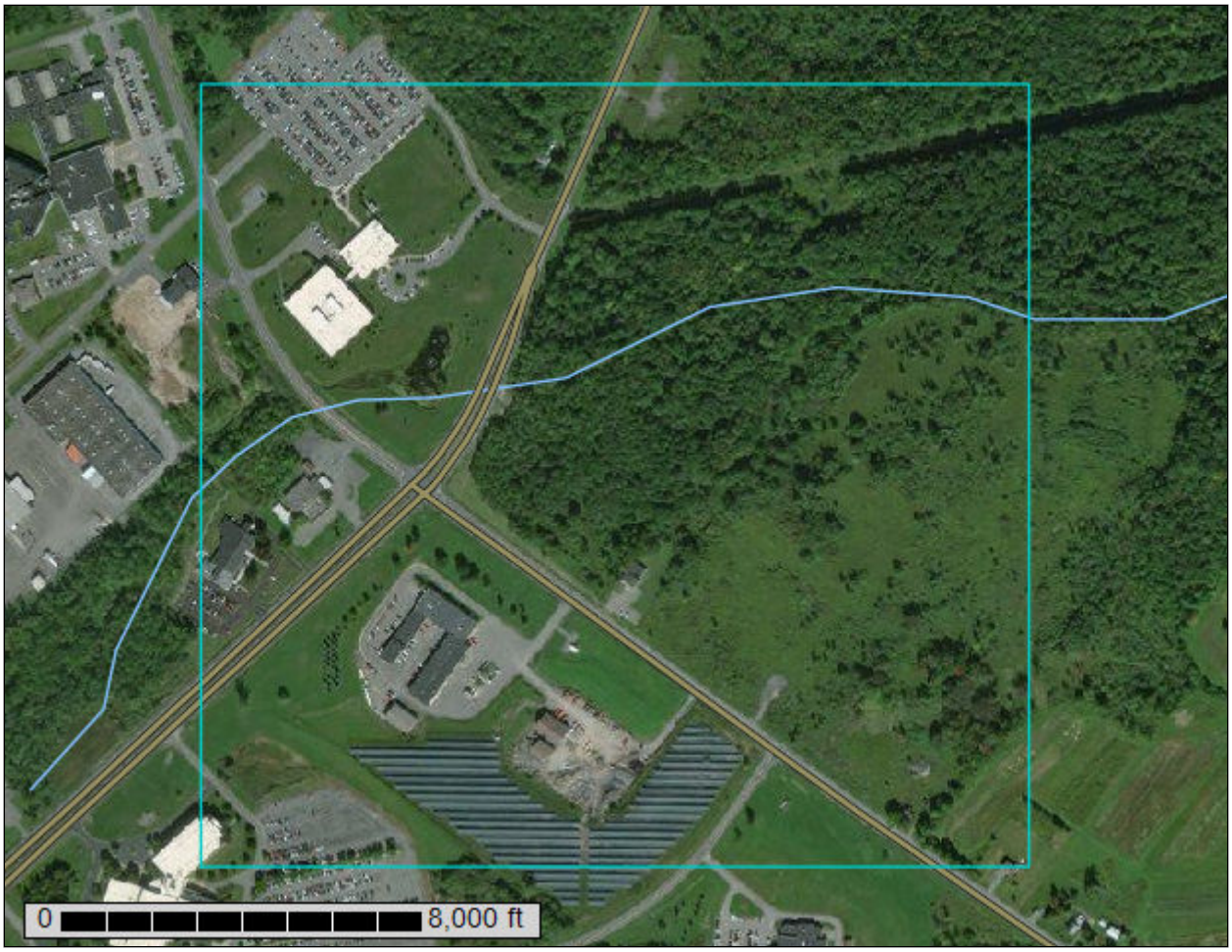
United States Department of Agriculture

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 Oneida County, New York

## 5990 Judd Rd




October 23, 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

# Contents

# How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

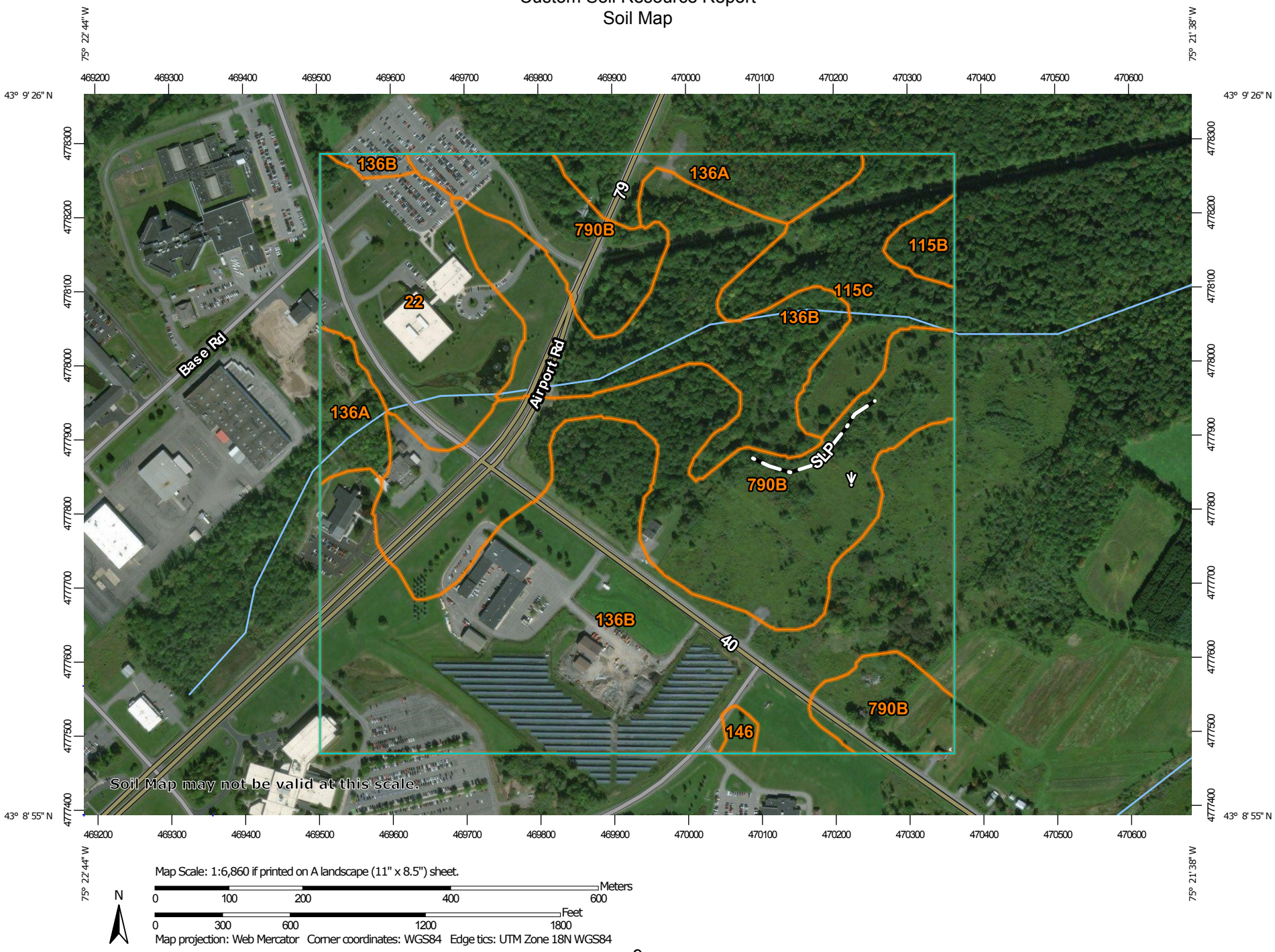
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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

# Soil Map

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

# Custom Soil Resource Report
## Soil Map




Map Scale: 1:6,860 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 300 600 1200 1800

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 1:24,000.

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: Oneida County, New York
Survey Area Data: Version 20, 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: Nov 3, 2013—Sep 27, 2016

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 |
|---|---|---|---|
| 22 | Udorthents, smoothed | 17.6 | 10.2% |
| 115B | Chadakoin silt loam, 3 to 8 percent slopes | 1.8 | 1.0% |
| 115C | Chadakoin silt loam, 8 to 15 percent slopes | 13.2 | 7.7% |
| 136A | Kendaia silt loam, 0 to 3 percent slopes | 9.9 | 5.7% |
| 136B | Kendaia silt loam, 3 to 8 percent slopes | 82.2 | 47.6% |
| 146 | Lyons soils, 0 to 3 percent slopes | 0.6 | 0.4% |
| 790B | Conesus silt loam, 3 to 8 percent slopes | 47.2 | 27.4% |
| **Totals for Area of Interest** | | **172.6** | **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.

# Oneida County, New York

## 22—Udorthents, smoothed

### Map Unit Setting

*National map unit symbol:* 9v8n
*Elevation:* 300 to 1,200 feet
*Mean annual precipitation:* 30 to 45 inches
*Mean annual air temperature:* 45 to 50 degrees F
*Frost-free period:* 120 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Udorthents, smoothed, and similar soils:* 75 percent
*Minor components:* 25 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Udorthents, Smoothed

#### Typical profile

*H1 - 0 to 6 inches:* gravelly loam
*H2 - 6 to 72 inches:* gravelly sandy loam

#### Properties and qualities

*Slope:* 0 to 15 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Runoff class:* Very low
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to very high (0.57 to 19.98 in/hr)
*Depth to water table:* About 36 to 72 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 5 percent
*Available water storage in profile:* Low (about 5.4 inches)

### Minor Components

#### Udorthents, wet substratum

*Percent of map unit:* 6 percent
*Hydric soil rating:* No

#### Urban land

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

#### Alton

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

#### Chenango

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

#### Wakeville

*Percent of map unit:* 3 percent
*Landform:* Depressions

*Hydric soil rating:* No

**Lamson**

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

**Wayland**

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

**Otego**

*Percent of map unit:* 1 percent
*Landform:* Depressions
*Hydric soil rating:* No

**Hamlin**

*Percent of map unit:* 1 percent
*Landform:* Depressions
*Hydric soil rating:* No

**Canandaigua**

*Percent of map unit:* 1 percent
*Landform:* Depressions
*Hydric soil rating:* Yes

## 115B—Chadakoin silt loam, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 9v6n
*Elevation:* 800 to 1,000 feet
*Mean annual precipitation:* 30 to 45 inches
*Mean annual air temperature:* 45 to 48 degrees F
*Frost-free period:* 110 to 150 days
*Farmland classification:* All areas are prime farmland

### Map Unit Composition

*Chadakoin and similar soils:* 75 percent
*Minor components:* 25 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Chadakoin

#### Setting

*Landform:* Drumlinoid ridges, hills, till plains
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Loamy till derived from siltstone, sandstone, and smaller amounts of shale

**Typical profile**

*Oa - 0 to 1 inches:* highly decomposed plant material
*A - 1 to 6 inches:* silt loam
*Bw1 - 6 to 10 inches:* silt loam
*Bw2 - 10 to 27 inches:* channery silt loam
*Bw3 - 27 to 32 inches:* channery silt loam
*BC - 32 to 43 inches:* channery loam
*CB - 43 to 60 inches:* very channery loam
*C - 60 to 72 inches:* very channery silt loam

**Properties and qualities**

*Slope:* 3 to 8 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 high to high (0.20 to 1.98 in/hr)
*Depth to water table:* About 42 to 72 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Moderate (about 7.0 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* B
*Hydric soil rating:* No

## Minor Components

**Mardin**

*Percent of map unit:* 6 percent
*Hydric soil rating:* No

**Pittsfield**

*Percent of map unit:* 6 percent
*Hydric soil rating:* No

**Unnamed soils**

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

**Manlius**

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

**Venango**

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

## 115C—Chadakoin silt loam, 8 to 15 percent slopes

### Map Unit Setting

*National map unit symbol:* 9v6p
*Elevation:* 800 to 1,000 feet
*Mean annual precipitation:* 30 to 45 inches
*Mean annual air temperature:* 45 to 48 degrees F
*Frost-free period:* 110 to 150 days
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

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

### Description of Chadakoin

#### Setting

*Landform:* Drumlinoid ridges, hills, till plains
*Landform position (two-dimensional):* Shoulder
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Loamy till derived from siltstone, sandstone, and smaller amounts of shale

#### Typical profile

*Oa - 0 to 1 inches:* highly decomposed plant material
*A - 1 to 6 inches:* silt loam
*Bw1 - 6 to 10 inches:* silt loam
*Bw2 - 10 to 27 inches:* channery silt loam
*Bw3 - 27 to 32 inches:* channery silt loam
*BC - 32 to 43 inches:* channery loam
*CB - 43 to 60 inches:* very channery loam
*C - 60 to 72 inches:* very channery silt loam

#### Properties and qualities

*Slope:* 8 to 15 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 high to high (0.20 to 1.98 in/hr)
*Depth to water table:* About 42 to 72 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Moderate (about 7.0 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 3e
*Hydrologic Soil Group:* B
*Hydric soil rating:* No

### Minor Components

#### Mardin
*Percent of map unit:* 5 percent
*Hydric soil rating:* No

#### Manlius
*Percent of map unit:* 4 percent
*Hydric soil rating:* No

#### Pittsfield
*Percent of map unit:* 4 percent
*Hydric soil rating:* No

#### Unnamed soils
*Percent of map unit:* 4 percent
*Hydric soil rating:* No

#### Venango
*Percent of map unit:* 3 percent
*Hydric soil rating:* No

## 136A—Kendaia silt loam, 0 to 3 percent slopes

### Map Unit Setting
*National map unit symbol:* 2w5j0
*Elevation:* 460 to 1,640 feet
*Mean annual precipitation:* 31 to 57 inches
*Mean annual air temperature:* 41 to 50 degrees F
*Frost-free period:* 100 to 190 days
*Farmland classification:* Prime farmland if drained

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

### Description of Kendaia

#### Setting
*Landform:* Drumlins, ridges, till plains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Parent material:* Calcareous loamy lodgment till derived from limestone, sandstone, and shale

**Typical profile**

*Ap - 0 to 8 inches:* silt loam
*Bw - 8 to 15 inches:* silt loam
*Bg - 15 to 20 inches:* gravelly silt loam
*BCg - 20 to 24 inches:* gravelly loam
*C - 24 to 79 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
*Runoff class:* Very high
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 1.42 in/hr)
*Depth to water table:* About 6 to 18 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 40 percent
*Available water storage in profile:* Moderate (about 7.8 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 3w
*Hydrologic Soil Group:* B/D
*Hydric soil rating:* No

**Minor Components**

**Lima**

*Percent of map unit:* 6 percent
*Landform:* Drumlins, till plains
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Lyons**

*Percent of map unit:* 5 percent
*Landform:* Depressions, drainageways
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Churchville**

*Percent of map unit:* 2 percent
*Landform:* Lake plains, till plains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope, rise, talf
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Ovid**

*Percent of map unit:* 2 percent

*Landform:* Reworked lake plains, till plains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

## 136B—Kendaia silt loam, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 2w5j4
*Elevation:* 430 to 1,610 feet
*Mean annual precipitation:* 31 to 57 inches
*Mean annual air temperature:* 41 to 50 degrees F
*Frost-free period:* 100 to 190 days
*Farmland classification:* Prime farmland if drained

### Map Unit Composition

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

### Description of Kendaia

#### Setting

*Landform:* Drumlins, ridges, till plains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Parent material:* Calcareous loamy lodgment till derived from limestone, sandstone, and shale

#### Typical profile

*Ap - 0 to 8 inches:* silt loam
*Bw - 8 to 15 inches:* silt loam
*Bg - 15 to 20 inches:* gravelly silt loam
*BCg - 20 to 24 inches:* gravelly loam
*C - 24 to 79 inches:* gravelly loam

#### Properties and qualities

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Somewhat poorly drained
*Runoff class:* Very high
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 1.42 in/hr)
*Depth to water table:* About 6 to 18 inches
*Frequency of flooding:* None
*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 40 percent
*Available water storage in profile:* Moderate (about 7.8 inches)

**Interpretive groups**
*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 3w
*Hydrologic Soil Group:* B/D
*Hydric soil rating:* No

**Minor Components**

**Lima**
*Percent of map unit:* 7 percent
*Landform:* Drumlins, till plains
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Lyons**
*Percent of map unit:* 4 percent
*Landform:* Depressions, drainageways
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Churchville**
*Percent of map unit:* 2 percent
*Landform:* Lake plains, till plains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope, rise, talf
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Ovid**
*Percent of map unit:* 2 percent
*Landform:* Reworked lake plains, till plains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

## 146—Lyons soils, 0 to 3 percent slopes

**Map Unit Setting**
*National map unit symbol:* 2spjy

*Elevation:* 250 to 1,900 feet
*Mean annual precipitation:* 31 to 57 inches
*Mean annual air temperature:* 41 to 50 degrees F
*Frost-free period:* 100 to 190 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Lyons and similar soils:* 75 percent
*Lyons, frequently ponded, and similar soils:* 15 percent
*Minor components:* 10 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Lyons**

**Setting**

*Landform:* Depressions, drainageways
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Parent material:* Calcareous loamy lodgment till derived from limestone and shale

**Typical profile**

*Ap - 0 to 10 inches:* silt loam
*Bg1 - 10 to 19 inches:* silt loam
*Bg2 - 19 to 25 inches:* silty clay loam
*BCg - 25 to 34 inches:* gravelly silt loam
*C - 34 to 79 inches:* gravelly loam

**Properties and qualities**

*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained
*Runoff class:* Negligible
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 1.42 in/hr)
*Depth to water table:* About 0 to 6 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 40 percent
*Available water storage in profile:* Moderate (about 8.9 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 5w
*Hydrologic Soil Group:* C/D
*Hydric soil rating:* Yes

**Description of Lyons, Frequently Ponded**

**Setting**

*Landform:* Depressions, drainageways
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Parent material:* Calcareous loamy lodgment till derived from limestone and shale

**Typical profile**

*Ap - 0 to 10 inches:* mucky silt loam
*Bg1 - 10 to 19 inches:* silt loam
*Bg2 - 19 to 25 inches:* silty clay loam
*BCg - 25 to 34 inches:* gravelly silt loam
*C - 34 to 79 inches:* gravelly loam

**Properties and qualities**

*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Very poorly drained
*Runoff class:* Negligible
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 1.42 in/hr)
*Depth to water table:* About 0 inches
*Frequency of flooding:* None
*Frequency of ponding:* Frequent
*Calcium carbonate, maximum in profile:* 40 percent
*Available water storage in profile:* High (about 9.1 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 5w
*Hydrologic Soil Group:* C/D
*Hydric soil rating:* Yes

## Minor Components

**Appleton**

*Percent of map unit:* 3 percent
*Landform:* Drumlins, till plains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Canandaigua**

*Percent of map unit:* 3 percent
*Landform:* Depressions
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Kendaia**

*Percent of map unit:* 2 percent
*Landform:* Drumlins, till plains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Palms**

*Percent of map unit:* 1 percent

*Landform:* Swamps, marshes
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Ilion**

*Percent of map unit:* 1 percent
*Landform:* Depressions
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

## 790B—Conesus silt loam, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 2w3jl
*Elevation:* 390 to 1,970 feet
*Mean annual precipitation:* 31 to 57 inches
*Mean annual air temperature:* 41 to 50 degrees F
*Frost-free period:* 100 to 190 days
*Farmland classification:* All areas are prime farmland

### Map Unit Composition

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

### Description of Conesus

#### Setting

*Landform:* Drumlins, hills, till plains
*Landform position (two-dimensional):* Summit, shoulder
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Linear
*Across-slope shape:* Convex
*Parent material:* Calcareous loamy lodgment till derived from limestone, sandstone, and shale

#### Typical profile

*Ap - 0 to 9 inches:* silt loam
*E/B - 9 to 14 inches:* gravelly silt loam
*Bt/E - 14 to 19 inches:* gravelly silt loam
*Bt1 - 19 to 25 inches:* gravelly silt loam
*Bt2 - 25 to 36 inches:* gravelly silt loam
*C - 36 to 79 inches:* gravelly loam

**Properties and qualities**

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Runoff class:* Medium
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.01 to 1.42 in/hr)
*Depth to water table:* About 18 to 24 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 40 percent
*Available water storage in profile:* Moderate (about 7.6 inches)

**Interpretive groups**

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

## Minor Components

**Lansing**

*Percent of map unit:* 7 percent
*Landform:* Drumlins, hills, till plains
*Landform position (two-dimensional):* Summit, shoulder, backslope
*Landform position (three-dimensional):* Crest, side slope
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Kendaia**

*Percent of map unit:* 3 percent
*Landform:* Drumlins, till plains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Nunda**

*Percent of map unit:* 2 percent
*Landform:* Drumlinoid ridges, hills
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Crest
*Down-slope shape:* Concave
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Appleton**

*Percent of map unit:* 2 percent
*Landform:* Drumlins, till plains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Lyons**

*Percent of map unit:* 1 percent
*Landform:* Depressions, drainageways
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Base slope
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

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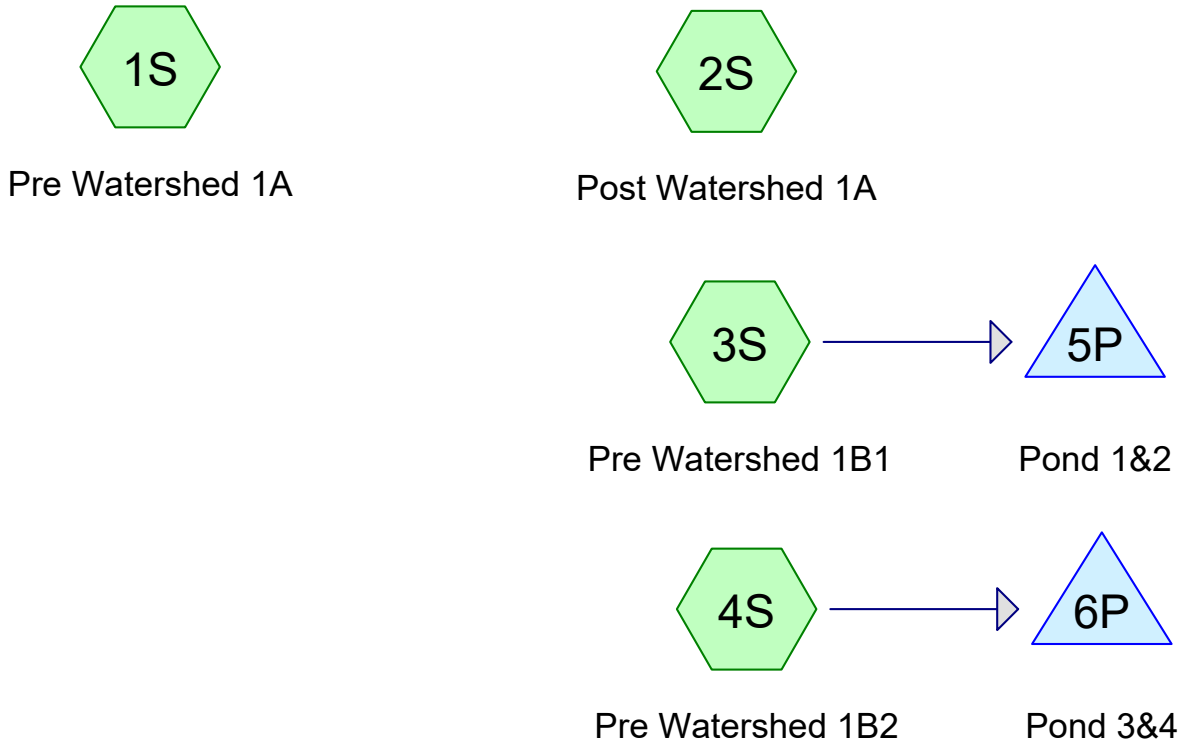
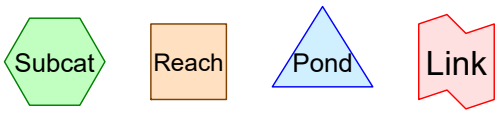
# ***APPENDIX II***

# *CALCULATIONS & WORKSHEETS*

## *Drainage Calculations*




**Routing Diagram for 3428-MVEDGE-JuddRd_HydroCAD**
Prepared by Maxian + Horst, Printed 2/26/2020
HydroCAD® 10.00-24 s/n 09092 © 2018 HydroCAD Software Solutions LLC

## Area Listing (selected nodes)

| Area (sq-ft) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 309,270 | 61 | >75% Grass cover, Good, HSG B (3S, 4S) |
| 556,529 | 98 | Paved parking, HSG B (1S, 3S, 4S) |
| 837,913 | 58 | Woods and Brush - B soil (1S) |
| 12,722 | 60 | Woods/Brush - B Soil (2S) |
| **1,716,434** | **72** | **TOTAL AREA** |

## Summary for Subcatchment 1S: Pre Watershed 1A

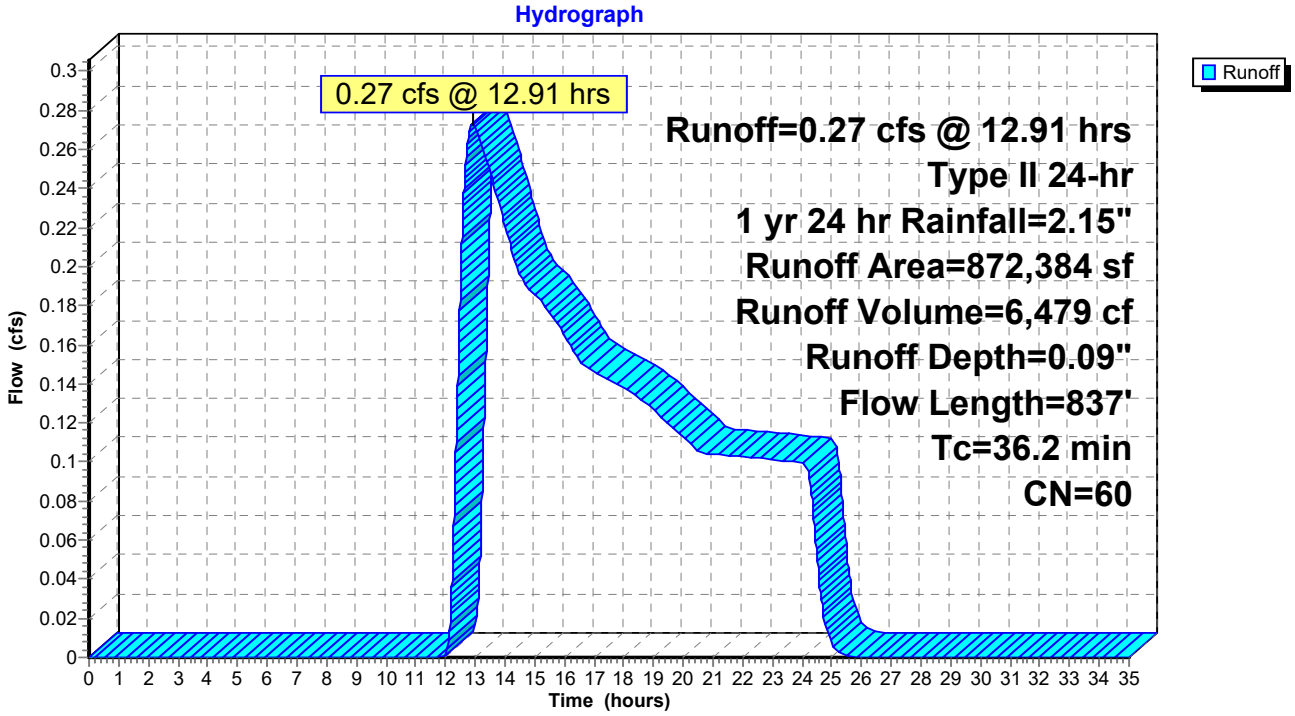
Runoff = 0.27 cfs @ 12.91 hrs, Volume= 6,479 cf, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 yr 24 hr Rainfall=2.15"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 34,471 | 98 | Paved parking, HSG B |
| * | 837,913 | 58 | Woods and Brush - B soil |
| | 872,384 | 60 | Weighted Average |
| | 837,913 | | 96.05% Pervious Area |
| | 34,471 | | 3.95% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.1 | 100 | 0.0230 | 0.07 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.48" |
| 13.1 | 737 | 0.0180 | 0.94 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 36.2 | 837 | Total | | | |

## Subcatchment 1S: Pre Watershed 1A



## Summary for Subcatchment 2S: Post Watershed 1A

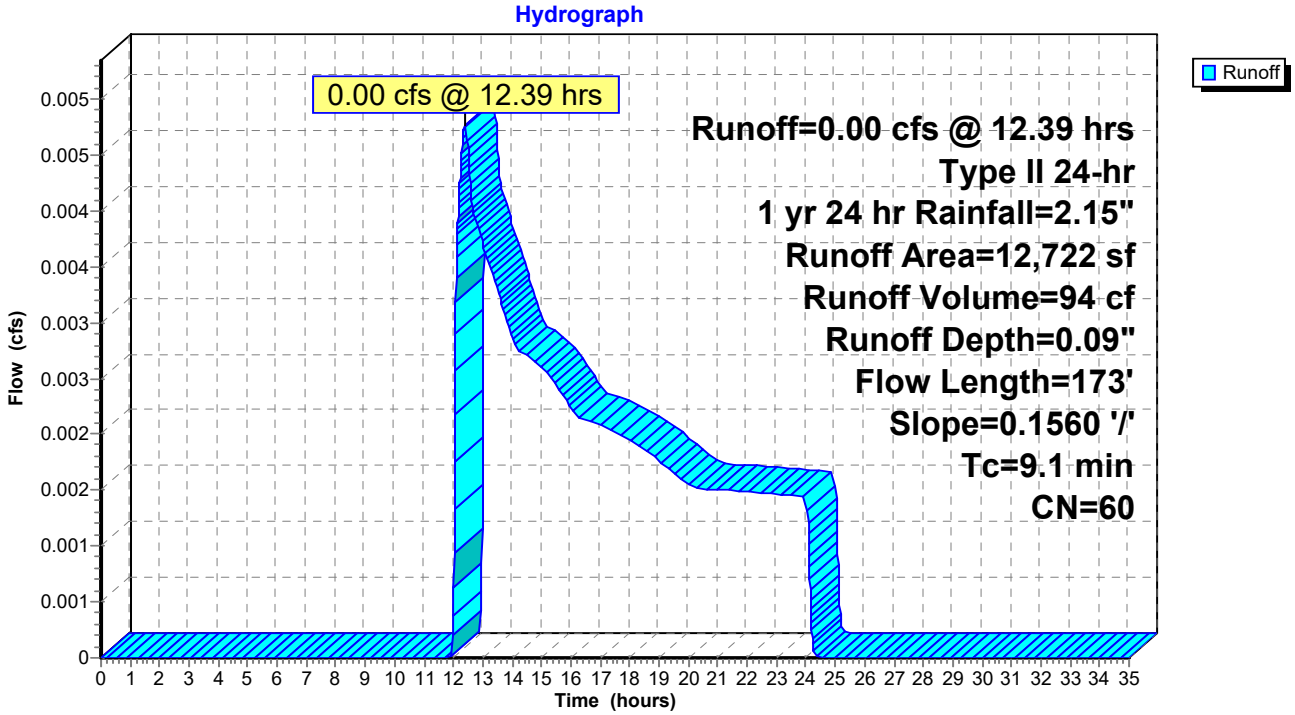
Runoff = 0.00 cfs @ 12.39 hrs, Volume= 94 cf, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 yr 24 hr Rainfall=2.15"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 12,722 | 60 | Woods/Brush - B Soil |
| | 12,722 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.3 | 73 | 0.1560 | 0.15 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.48" |
| 0.8 | 100 | 0.1560 | 1.97 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 9.1 | 173 | Total | | | |

## Subcatchment 2S: Post Watershed 1A



## Summary for Subcatchment 3S: Pre Watershed 1B1

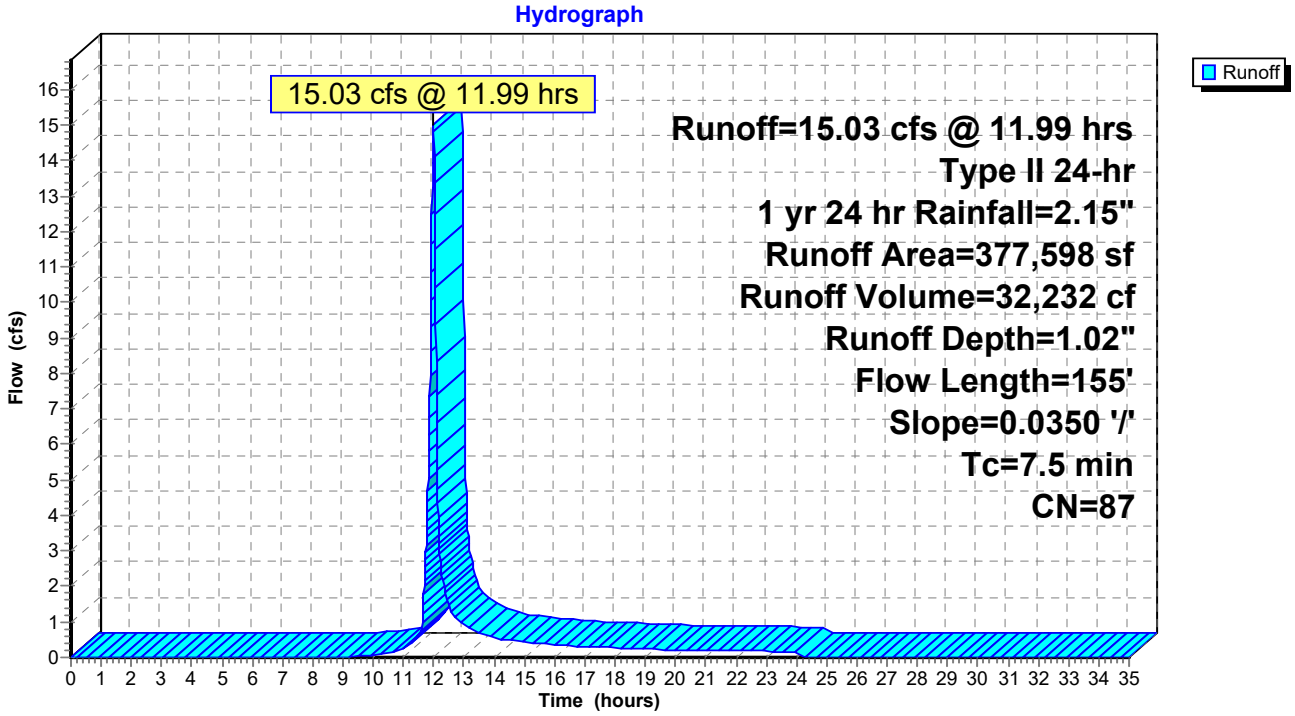
Runoff = 15.03 cfs @ 11.99 hrs, Volume= 32,232 cf, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 yr 24 hr Rainfall=2.15"

| Area (sf) | CN | Description |
|---|---|---|
| 269,116 | 98 | Paved parking, HSG B |
| 108,482 | 61 | >75% Grass cover, Good, HSG B |
| 377,598 | 87 | Weighted Average |
| 108,482 | | 28.73% Pervious Area |
| 269,116 | | 71.27% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.1 | 75 | 0.0350 | 0.18 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 2.48" |
| 0.4 | 80 | 0.0350 | 3.01 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 7.5 | 155 | Total | | | |

## Subcatchment 3S: Pre Watershed 1B1



## Summary for Subcatchment 4S: Pre Watershed 1B2

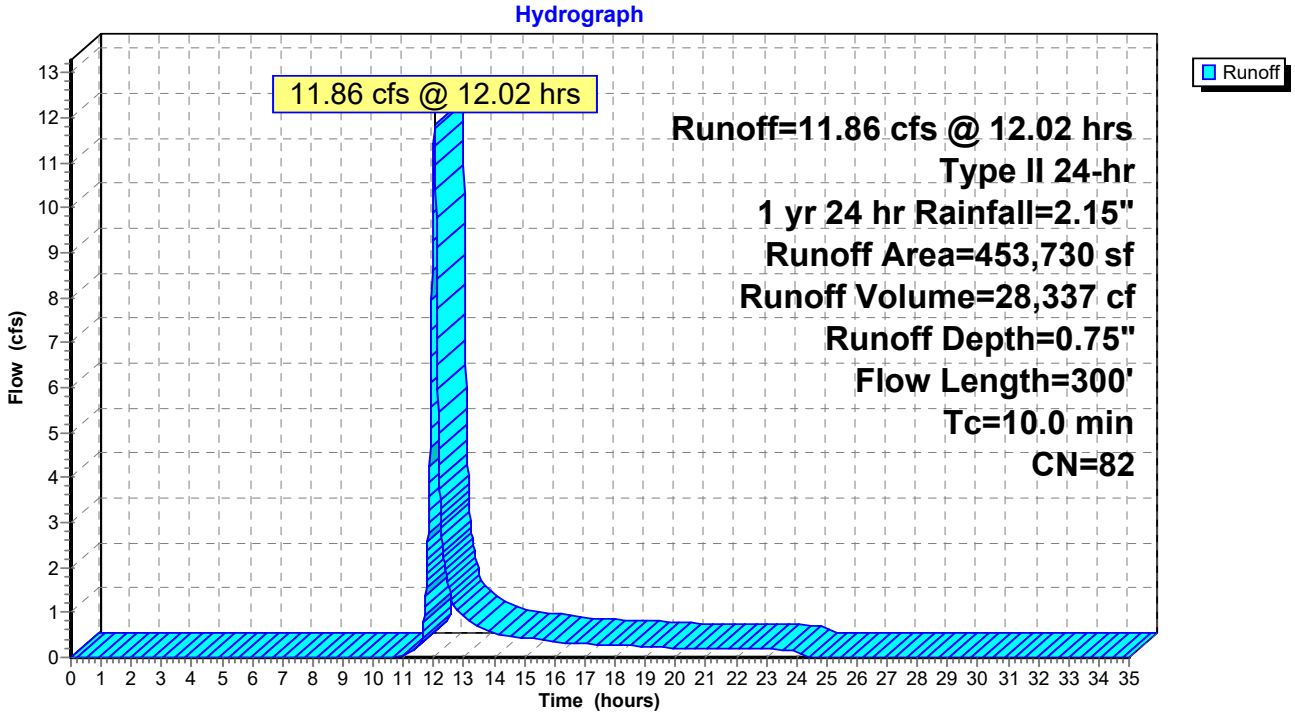
Runoff = 11.86 cfs @ 12.02 hrs, Volume= 28,337 cf, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 yr 24 hr Rainfall=2.15"

| Area (sf) | CN | Description |
|---|---|---|
| 252,942 | 98 | Paved parking, HSG B |
| 200,788 | 61 | >75% Grass cover, Good, HSG B |
| 453,730 | 82 | Weighted Average |
| 200,788 | | 44.25% Pervious Area |
| 252,942 | | 55.75% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.9 | 100 | 0.0350 | 0.19 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 2.48" |
| 1.1 | 200 | 0.0330 | 2.92 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 10.0 | 300 | Total | | | |

## Subcatchment 4S: Pre Watershed 1B2



## Summary for Pond 5P: Pond 1&2

Inflow Area = 377,598 sf, 71.27% Impervious, Inflow Depth = 1.02" for 1 yr 24 hr event
Inflow = 15.03 cfs @ 11.99 hrs, Volume= 32,232 cf
Outflow = 0.51 cfs @ 14.26 hrs, Volume= 30,598 cf, Atten= 97%, Lag= 135.9 min
Primary = 0.51 cfs @ 14.26 hrs, Volume= 30,598 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 689.61' @ 14.26 hrs Surf.Area= 15,263 sf Storage= 18,704 cf

Plug-Flow detention time= 460.2 min calculated for 30,598 cf (95% of inflow)
Center-of-Mass det. time= 431.7 min ( 1,266.8 - 835.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 688.00' | 42,308 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |
| #2 | 688.00' | 54,178 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |
| | | 96,485 cf | Total Available Storage |

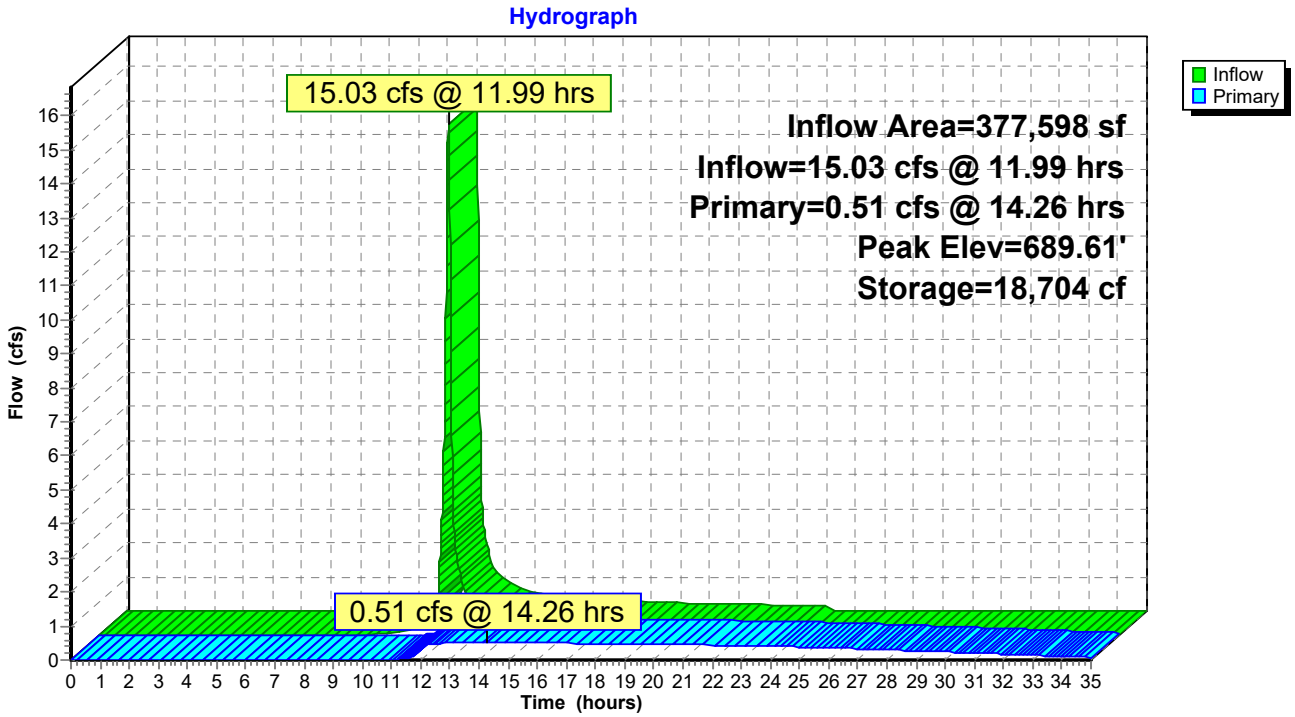
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 688.00 | 3,413 | 0 | 0 |
| 693.00 | 13,510 | 42,308 | 42,308 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 688.00 | 4,495 | 0 | 0 |
| 693.00 | 17,176 | 54,178 | 54,178 |

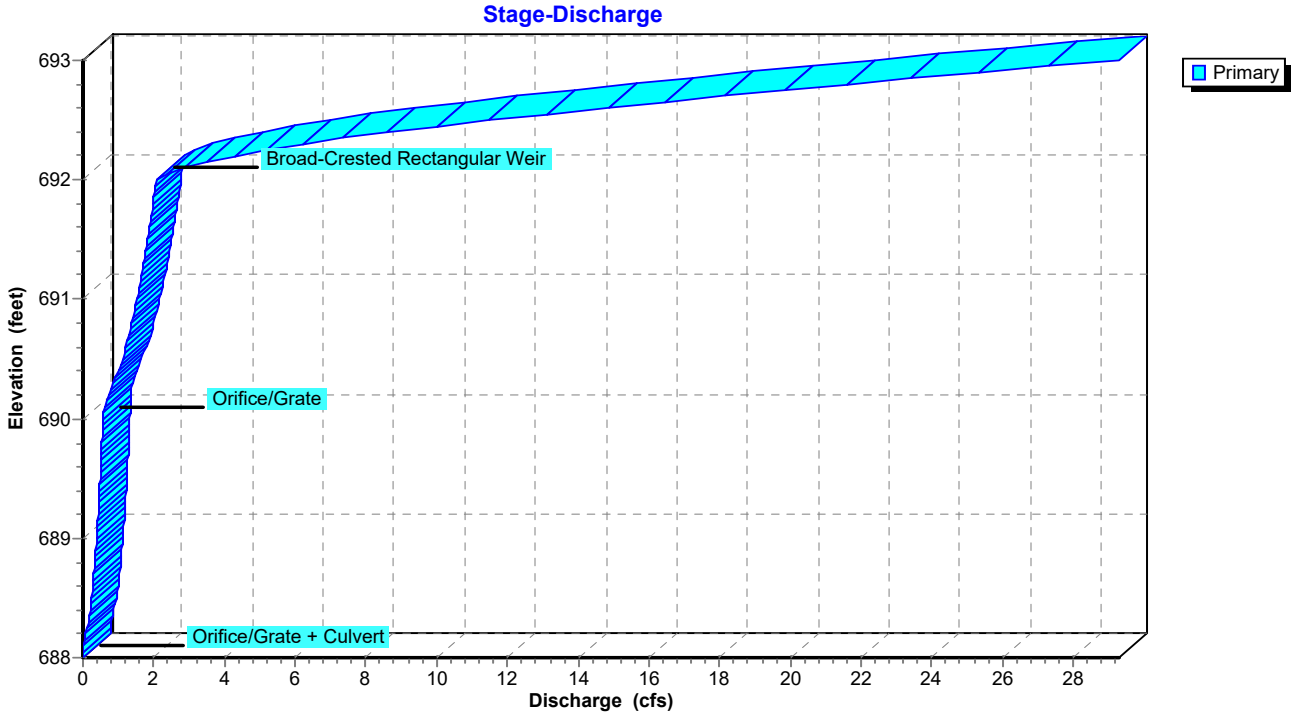
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 692.00' | **10.0' long Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83 |
| #2 | Device 4 | 688.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |
| #3 | Device 4 | 690.00' | **6.0" Vert. Orifice/Grate** C= 0.600 |
| #4 | Primary | 688.00' | **10.0" Round Culvert**<br>L= 20.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 688.00' / 687.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.55 sf |

**Primary OutFlow** Max=0.51 cfs @ 14.26 hrs HW=689.61' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)
- **4=Culvert** (Passes 0.51 cfs of 2.23 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.51 cfs @ 5.79 fps)
  - **3=Orifice/Grate** ( Controls 0.00 cfs)

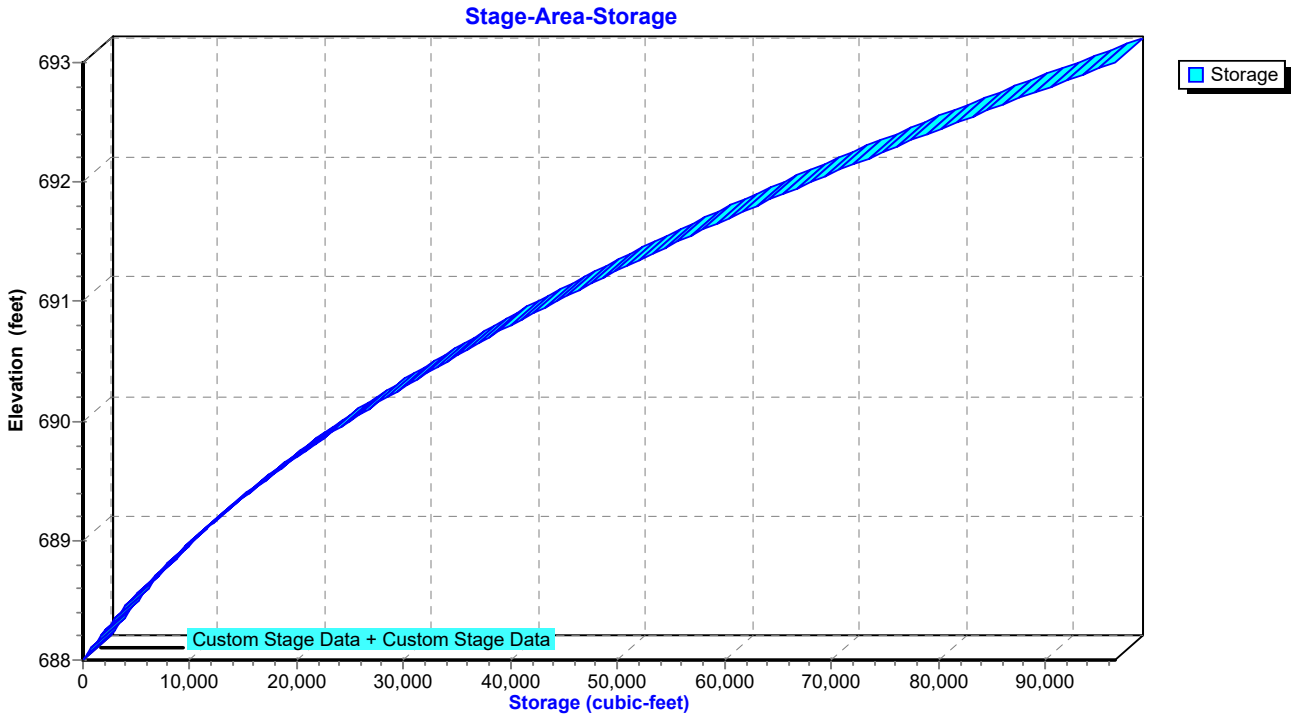
## Pond 5P: Pond 1&2




## Pond 5P: Pond 1&2



## Pond 5P: Pond 1&2



## Summary for Pond 6P: Pond 3&4

Inflow Area = 453,730 sf, 55.75% Impervious, Inflow Depth = 0.75" for 1 yr 24 hr event
Inflow = 11.86 cfs @ 12.02 hrs, Volume= 28,337 cf
Outflow = 0.42 cfs @ 15.16 hrs, Volume= 26,236 cf, Atten= 96%, Lag= 188.0 min
Primary = 0.42 cfs @ 15.16 hrs, Volume= 26,236 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 675.19' @ 15.16 hrs Surf.Area= 16,853 sf Storage= 15,805 cf

Plug-Flow detention time= 466.7 min calculated for 26,229 cf (93% of inflow)
Center-of-Mass det. time= 427.3 min ( 1,285.3 - 857.9 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 674.00' | 41,796 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |
| #2 | 674.00' | 44,958 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |
| | | 86,754 cf | Total Available Storage |

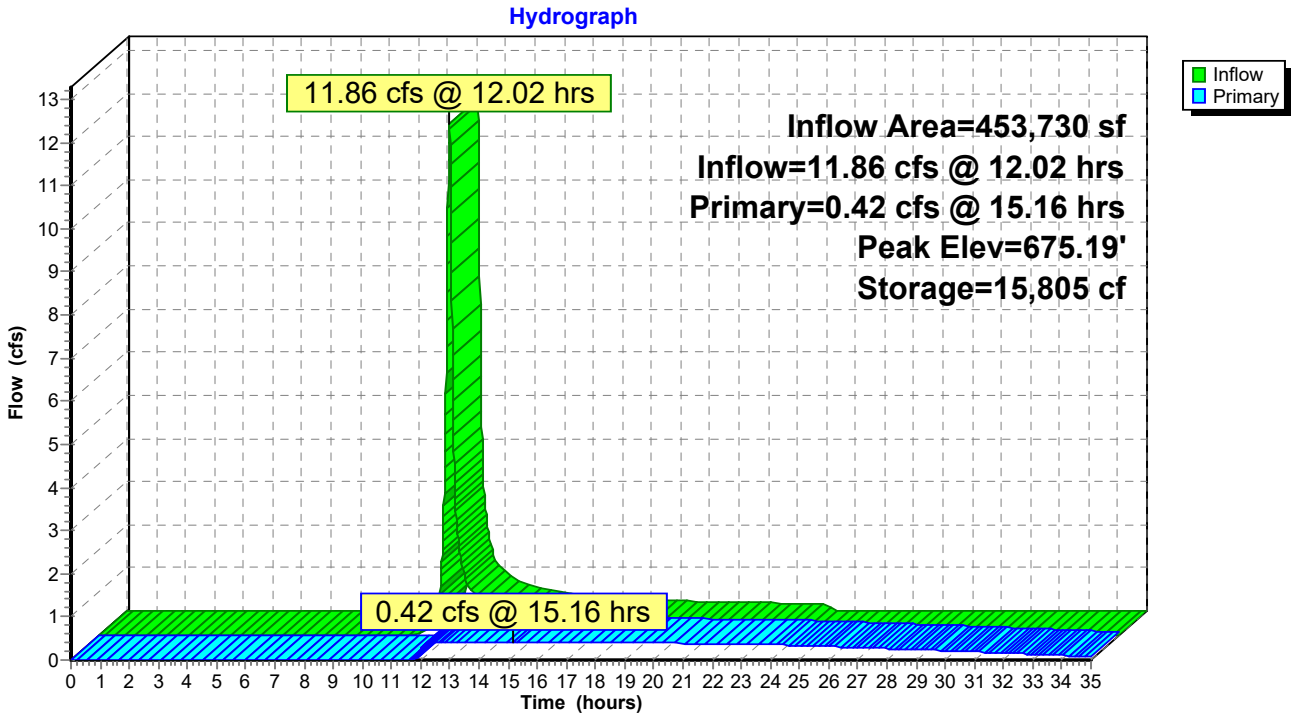
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 674.00 | 6,253 | 0 | 0 |
| 678.00 | 14,645 | 41,796 | 41,796 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 674.00 | 3,569 | 0 | 0 |
| 678.00 | 18,910 | 44,958 | 44,958 |

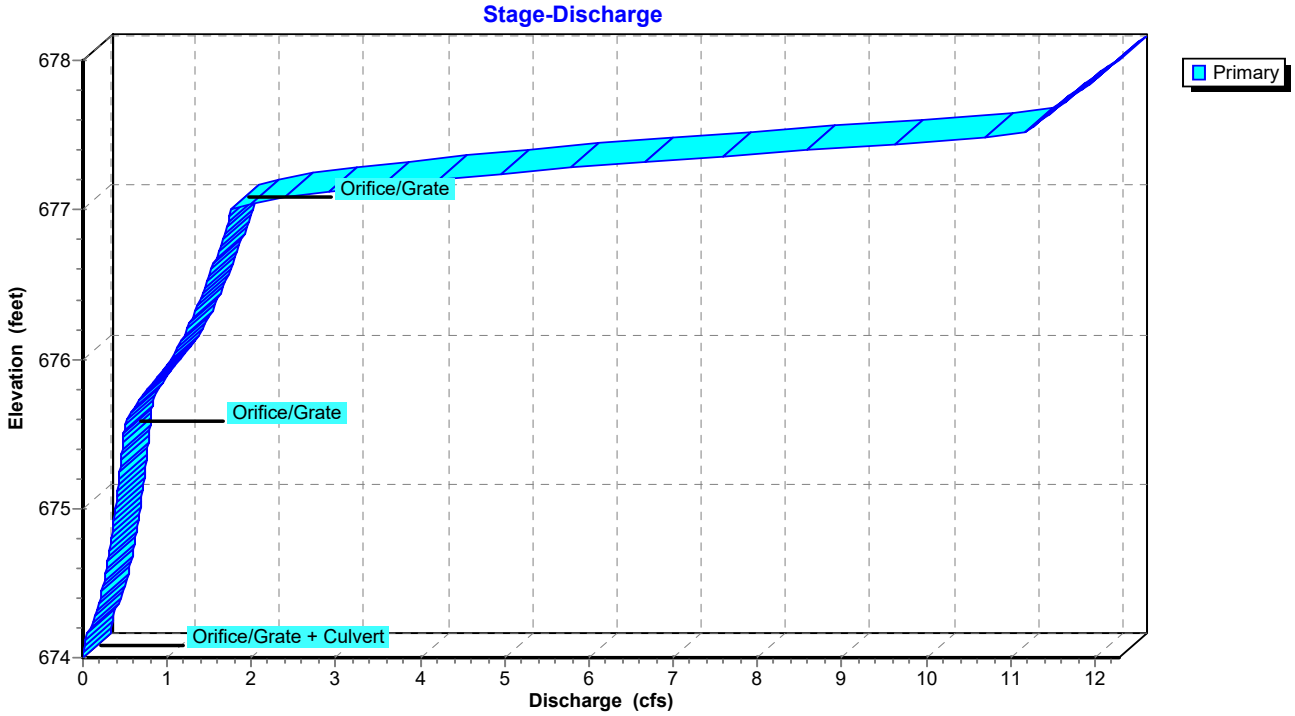
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Device 4 | 674.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |
| #2 | Device 4 | 675.50' | **6.0" Vert. Orifice/Grate** C= 0.600 |
| #3 | Device 4 | 677.00' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |
| #4 | Primary | 674.00' | **18.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 674.00' / 673.75' S= 0.0050 '/' Cc= 0.900<br>n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.77 sf |

**Primary OutFlow** Max=0.42 cfs @ 15.16 hrs HW=675.19' (Free Discharge)
└─**4=Culvert** (Passes 0.42 cfs of 3.51 cfs potential flow)
  ├─**1=Orifice/Grate** (Orifice Controls 0.42 cfs @ 4.86 fps)
  ├─**2=Orifice/Grate** ( Controls 0.00 cfs)
  └─**3=Orifice/Grate** ( Controls 0.00 cfs)

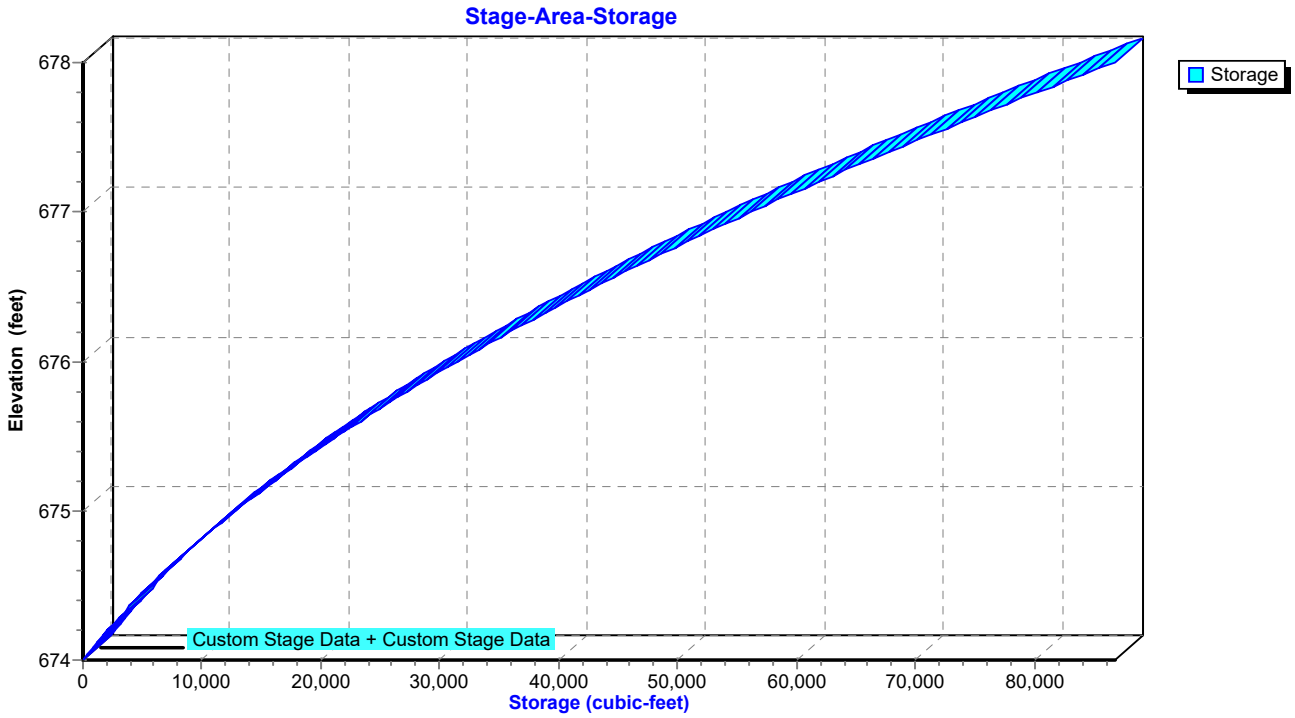
## Pond 6P: Pond 3&4




## Pond 6P: Pond 3&4



## Pond 6P: Pond 3&4



## Summary for Subcatchment 1S: Pre Watershed 1A

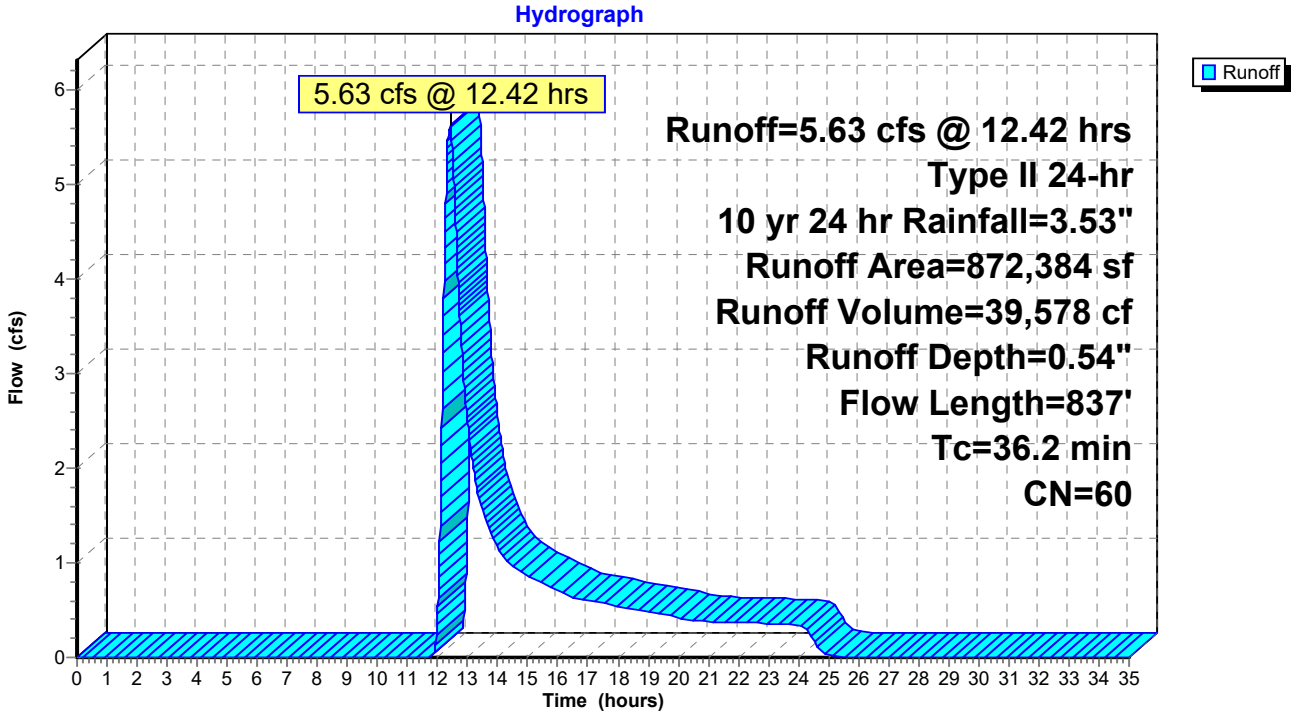
Runoff = 5.63 cfs @ 12.42 hrs, Volume= 39,578 cf, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 yr 24 hr Rainfall=3.53"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 34,471 | 98 | Paved parking, HSG B |
| * | 837,913 | 58 | Woods and Brush - B soil |
| | 872,384 | 60 | Weighted Average |
| | 837,913 | | 96.05% Pervious Area |
| | 34,471 | | 3.95% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.1 | 100 | 0.0230 | 0.07 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.48" |
| 13.1 | 737 | 0.0180 | 0.94 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 36.2 | 837 | Total | | | |

## Subcatchment 1S: Pre Watershed 1A



## Summary for Subcatchment 2S: Post Watershed 1A

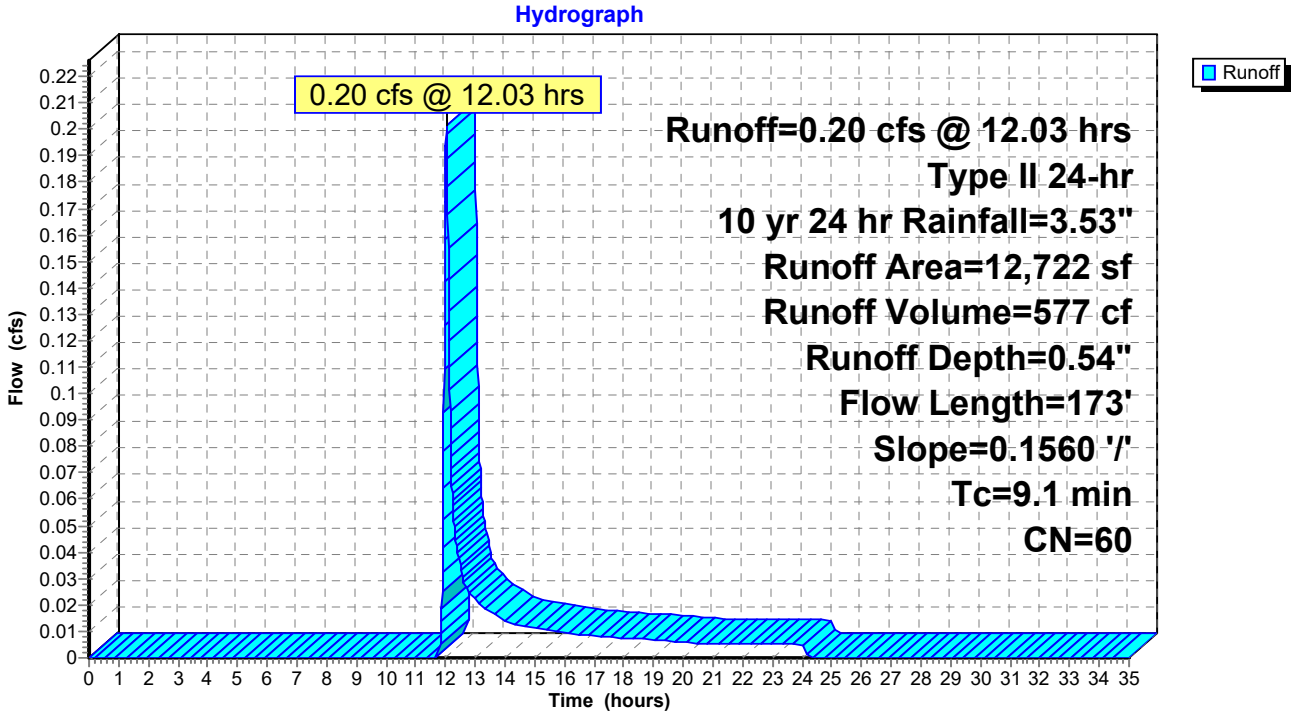
Runoff = 0.20 cfs @ 12.03 hrs, Volume= 577 cf, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 yr 24 hr Rainfall=3.53"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 12,722 | 60 | Woods/Brush - B Soil |
| | 12,722 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.3 | 73 | 0.1560 | 0.15 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.48" |
| 0.8 | 100 | 0.1560 | 1.97 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 9.1 | 173 | Total | | | |

## Subcatchment 2S: Post Watershed 1A



## Summary for Subcatchment 3S: Pre Watershed 1B1

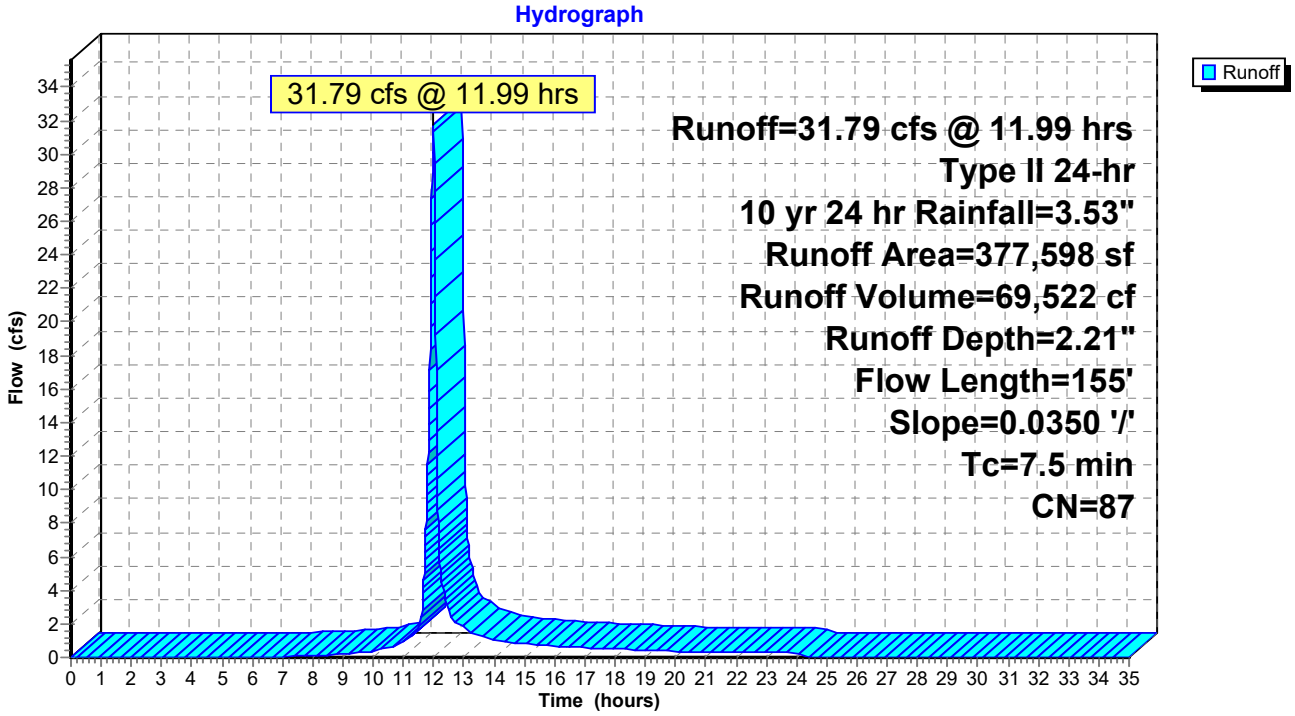
Runoff = 31.79 cfs @ 11.99 hrs, Volume= 69,522 cf, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 yr 24 hr Rainfall=3.53"

| Area (sf) | CN | Description |
|---|---|---|
| 269,116 | 98 | Paved parking, HSG B |
| 108,482 | 61 | >75% Grass cover, Good, HSG B |
| 377,598 | 87 | Weighted Average |
| 108,482 | | 28.73% Pervious Area |
| 269,116 | | 71.27% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.1 | 75 | 0.0350 | 0.18 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 2.48" |
| 0.4 | 80 | 0.0350 | 3.01 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 7.5 | 155 | Total | | | |

## Subcatchment 3S: Pre Watershed 1B1



## Summary for Subcatchment 4S: Pre Watershed 1B2

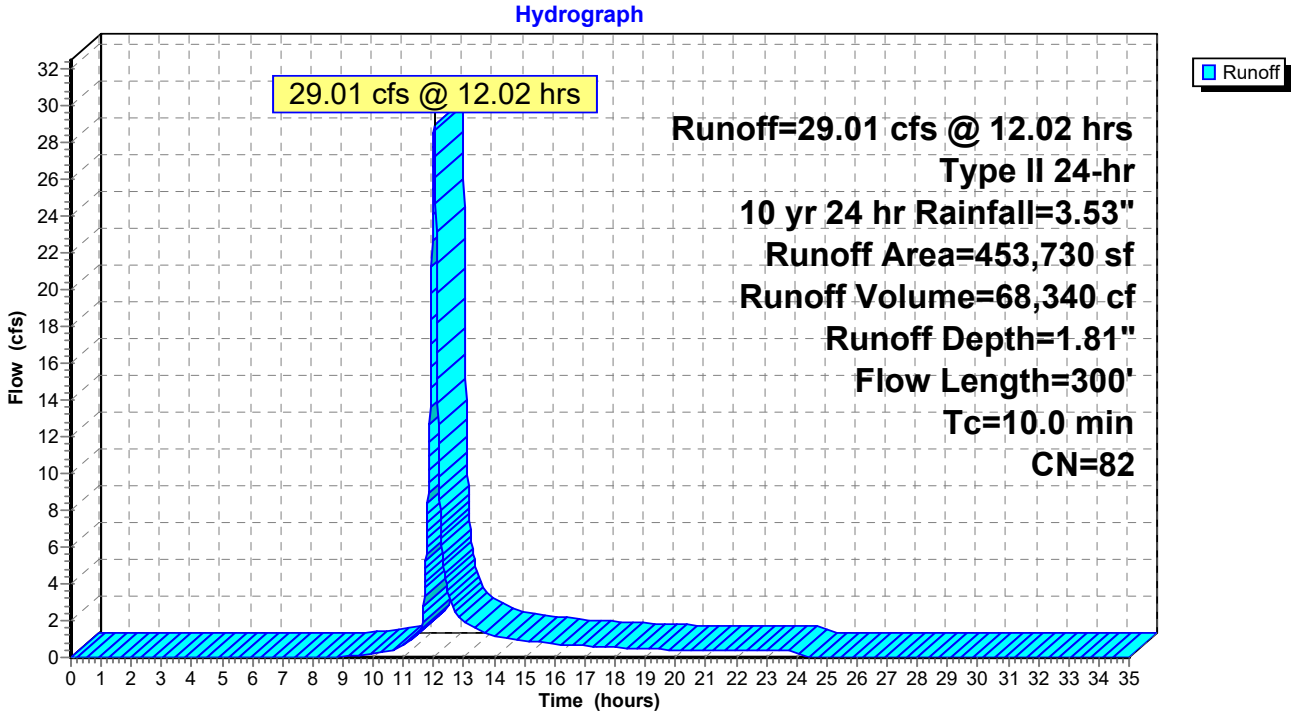
Runoff = 29.01 cfs @ 12.02 hrs, Volume= 68,340 cf, Depth= 1.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 yr 24 hr Rainfall=3.53"

| Area (sf) | CN | Description |
|---|---|---|
| 252,942 | 98 | Paved parking, HSG B |
| 200,788 | 61 | >75% Grass cover, Good, HSG B |
| 453,730 | 82 | Weighted Average |
| 200,788 | | 44.25% Pervious Area |
| 252,942 | | 55.75% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.9 | 100 | 0.0350 | 0.19 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 2.48" |
| 1.1 | 200 | 0.0330 | 2.92 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 10.0 | 300 | Total | | | |

## Subcatchment 4S: Pre Watershed 1B2



## Summary for Pond 5P: Pond 1&2

Inflow Area = 377,598 sf, 71.27% Impervious, Inflow Depth = 2.21" for 10 yr 24 hr event
Inflow = 31.79 cfs @ 11.99 hrs, Volume= 69,522 cf
Outflow = 1.40 cfs @ 13.41 hrs, Volume= 62,456 cf, Atten= 96%, Lag= 85.2 min
Primary = 1.40 cfs @ 13.41 hrs, Volume= 62,456 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 690.82' @ 13.41 hrs Surf.Area= 20,767 sf Storage= 40,470 cf

Plug-Flow detention time= 454.9 min calculated for 62,456 cf (90% of inflow)
Center-of-Mass det. time= 403.2 min ( 1,216.3 - 813.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 688.00' | 42,308 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |
| #2 | 688.00' | 54,178 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |
| | | 96,485 cf | Total Available Storage |

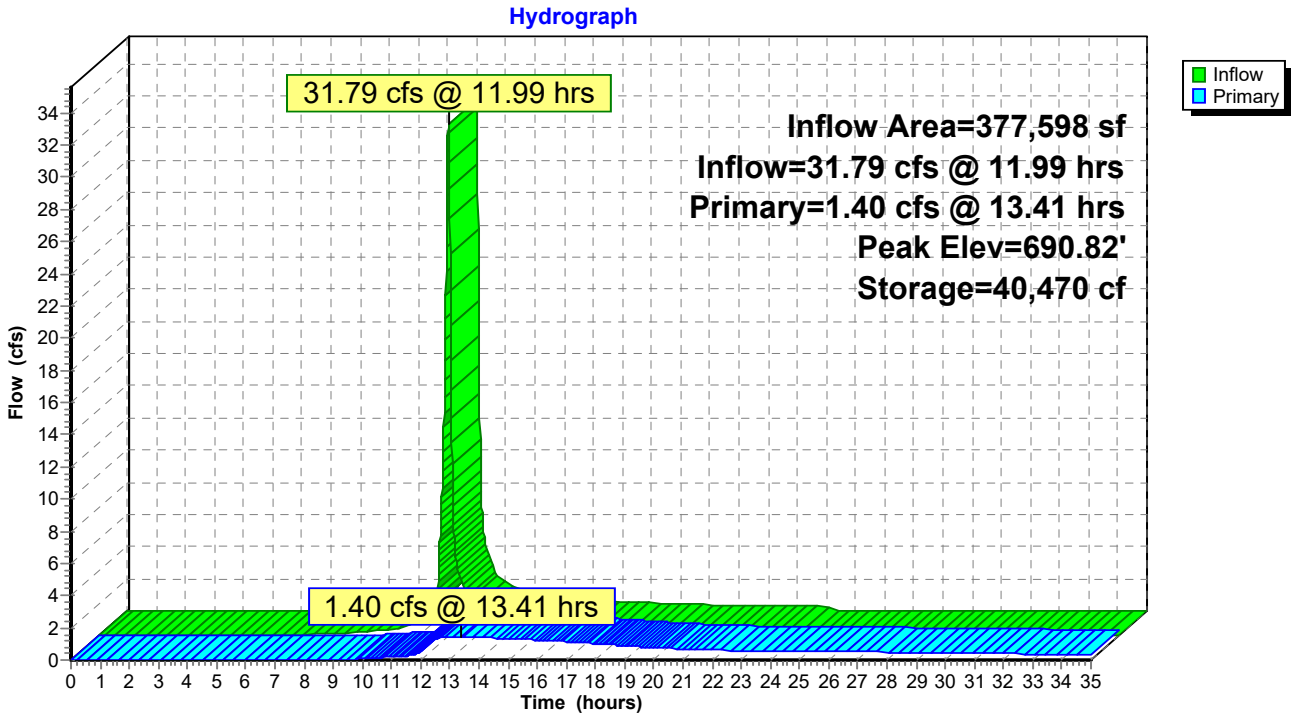
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 688.00 | 3,413 | 0 | 0 |
| 693.00 | 13,510 | 42,308 | 42,308 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 688.00 | 4,495 | 0 | 0 |
| 693.00 | 17,176 | 54,178 | 54,178 |

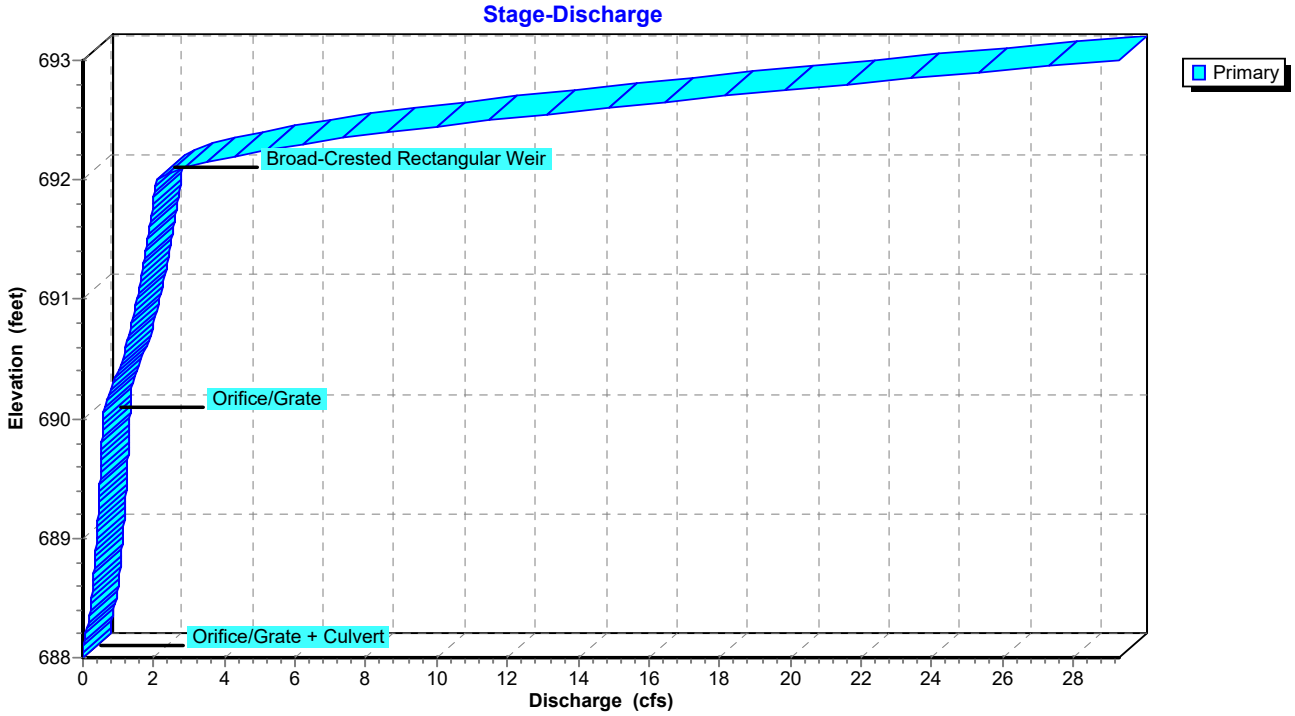
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 692.00' | **10.0' long Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83 |
| #2 | Device 4 | 688.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |
| #3 | Device 4 | 690.00' | **6.0" Vert. Orifice/Grate** C= 0.600 |
| #4 | Primary | 688.00' | **10.0" Round Culvert**<br>L= 20.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 688.00' / 687.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.55 sf |

**Primary OutFlow** Max=1.40 cfs @ 13.41 hrs HW=690.82' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)
- **4=Culvert** (Passes 1.40 cfs of 3.43 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.68 cfs @ 7.85 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.72 cfs @ 3.64 fps)

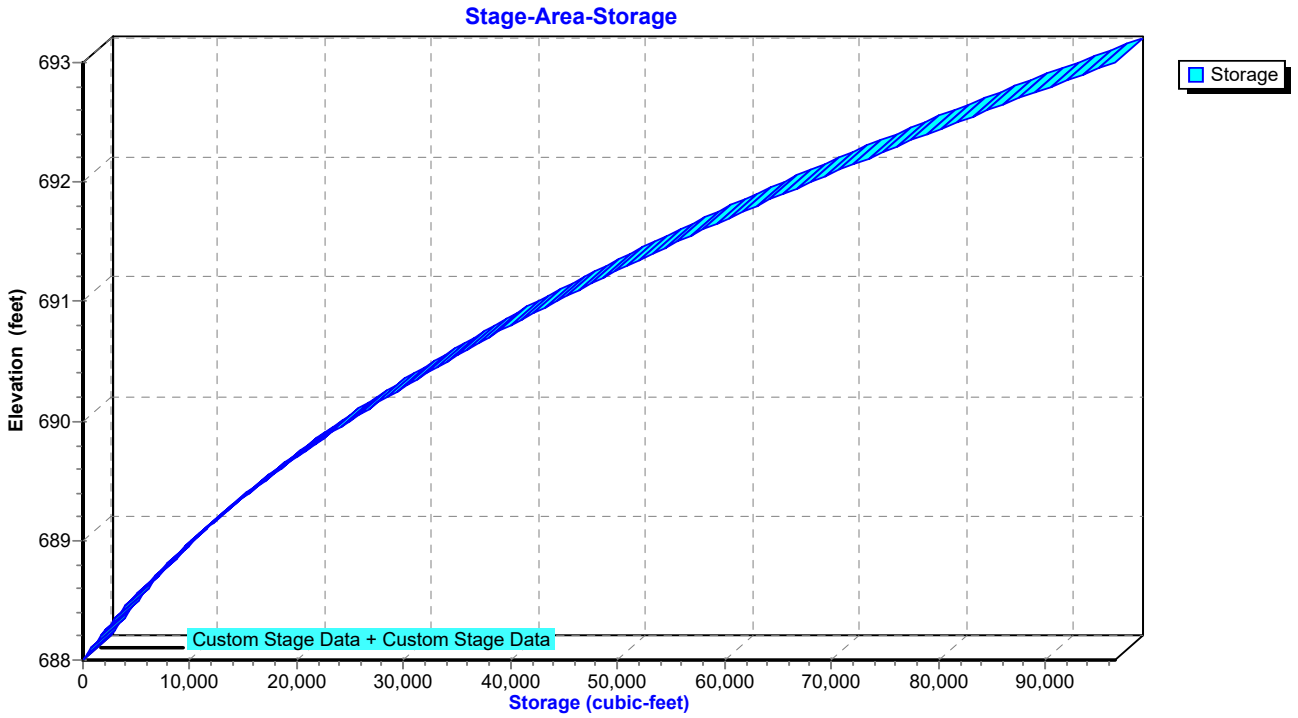
## Pond 5P: Pond 1&2




## Pond 5P: Pond 1&2



## Pond 5P: Pond 1&2



## Summary for Pond 6P: Pond 3&4

Inflow Area = 453,730 sf, 55.75% Impervious, Inflow Depth = 1.81" for 10 yr 24 hr event
Inflow = 29.01 cfs @ 12.02 hrs, Volume= 68,340 cf
Outflow = 1.33 cfs @ 13.68 hrs, Volume= 60,478 cf, Atten= 95%, Lag= 99.6 min
Primary = 1.33 cfs @ 13.68 hrs, Volume= 60,478 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 676.32' @ 13.68 hrs Surf.Area= 23,609 sf Storage= 38,840 cf

Plug-Flow detention time= 442.8 min calculated for 60,460 cf (88% of inflow)
Center-of-Mass det. time= 385.9 min ( 1,218.0 - 832.1 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 674.00' | 41,796 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |
| #2 | 674.00' | 44,958 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |
| | | 86,754 cf | Total Available Storage |

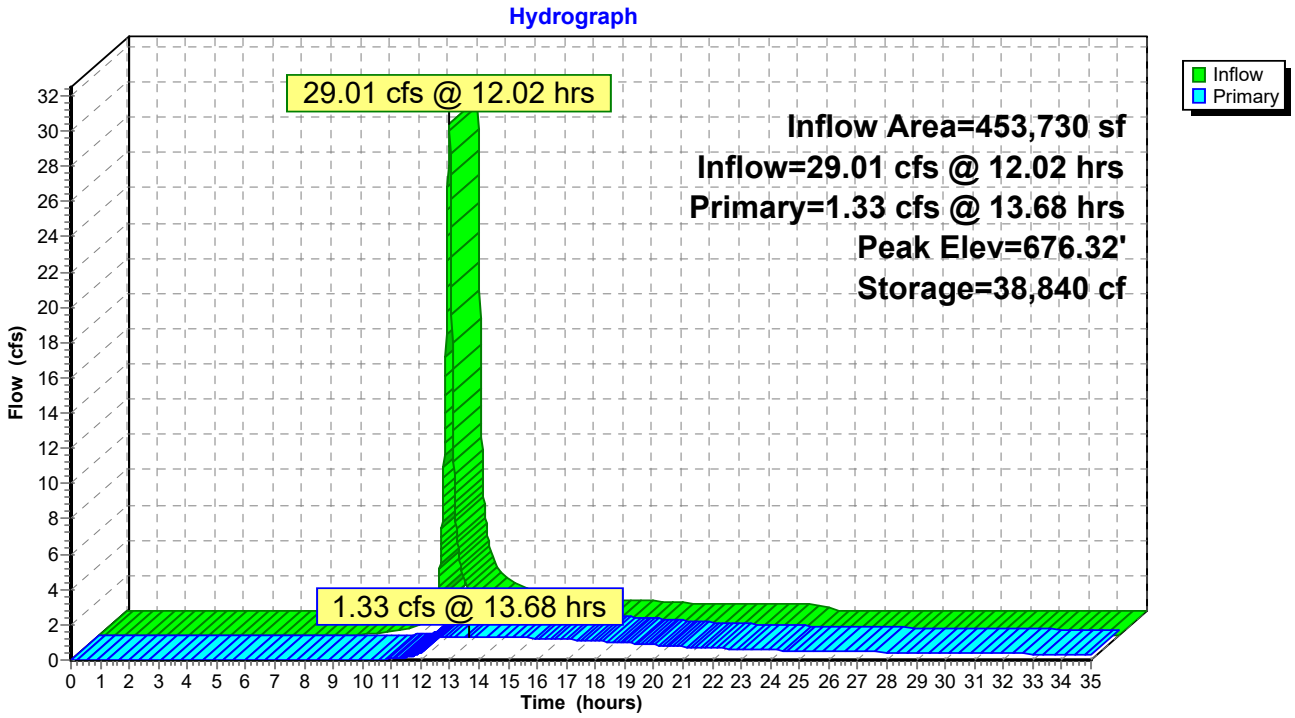
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 674.00 | 6,253 | 0 | 0 |
| 678.00 | 14,645 | 41,796 | 41,796 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 674.00 | 3,569 | 0 | 0 |
| 678.00 | 18,910 | 44,958 | 44,958 |

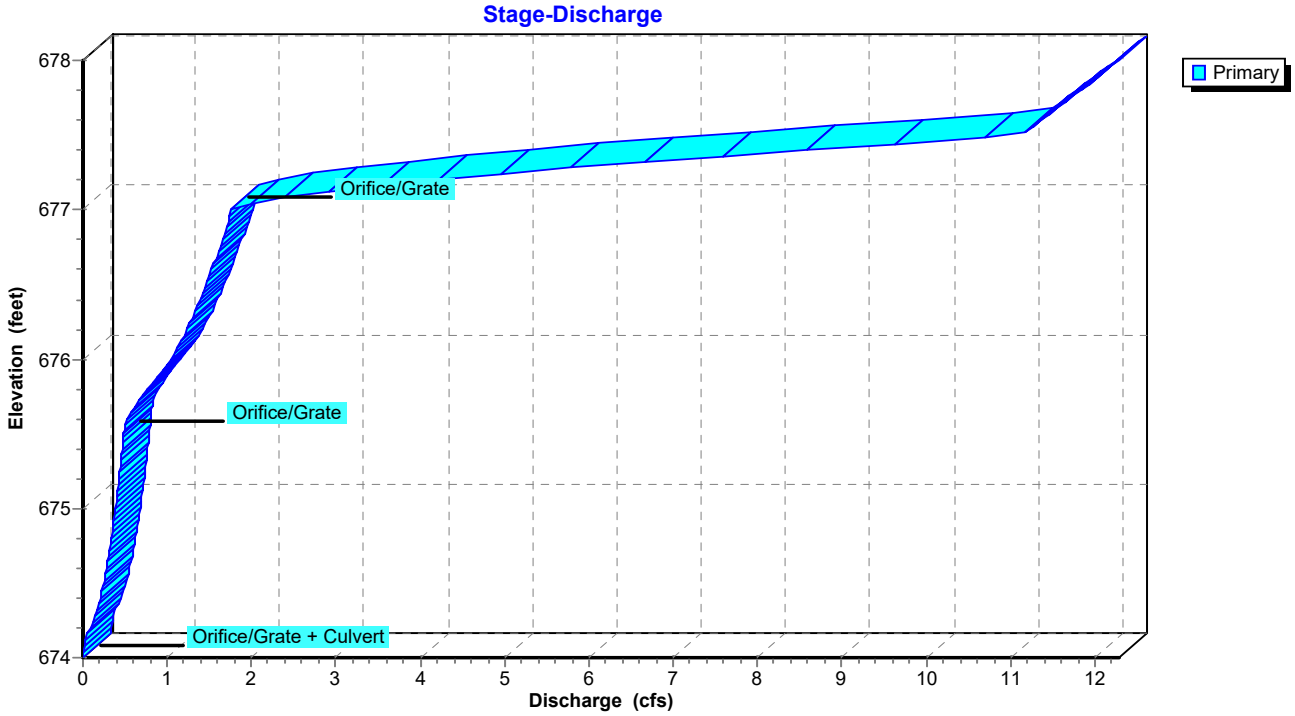
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Device 4 | 674.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |
| #2 | Device 4 | 675.50' | **6.0" Vert. Orifice/Grate** C= 0.600 |
| #3 | Device 4 | 677.00' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |
| #4 | Primary | 674.00' | **18.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 674.00' / 673.75' S= 0.0050 '/' Cc= 0.900<br>n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.77 sf |

**Primary OutFlow** Max=1.33 cfs @ 13.68 hrs HW=676.32' (Free Discharge)
└─**4=Culvert** (Passes 1.33 cfs of 7.68 cfs potential flow)
  ├─**1=Orifice/Grate** (Orifice Controls 0.62 cfs @ 7.07 fps)
  ├─**2=Orifice/Grate** (Orifice Controls 0.72 cfs @ 3.65 fps)
  └─**3=Orifice/Grate** ( Controls 0.00 cfs)

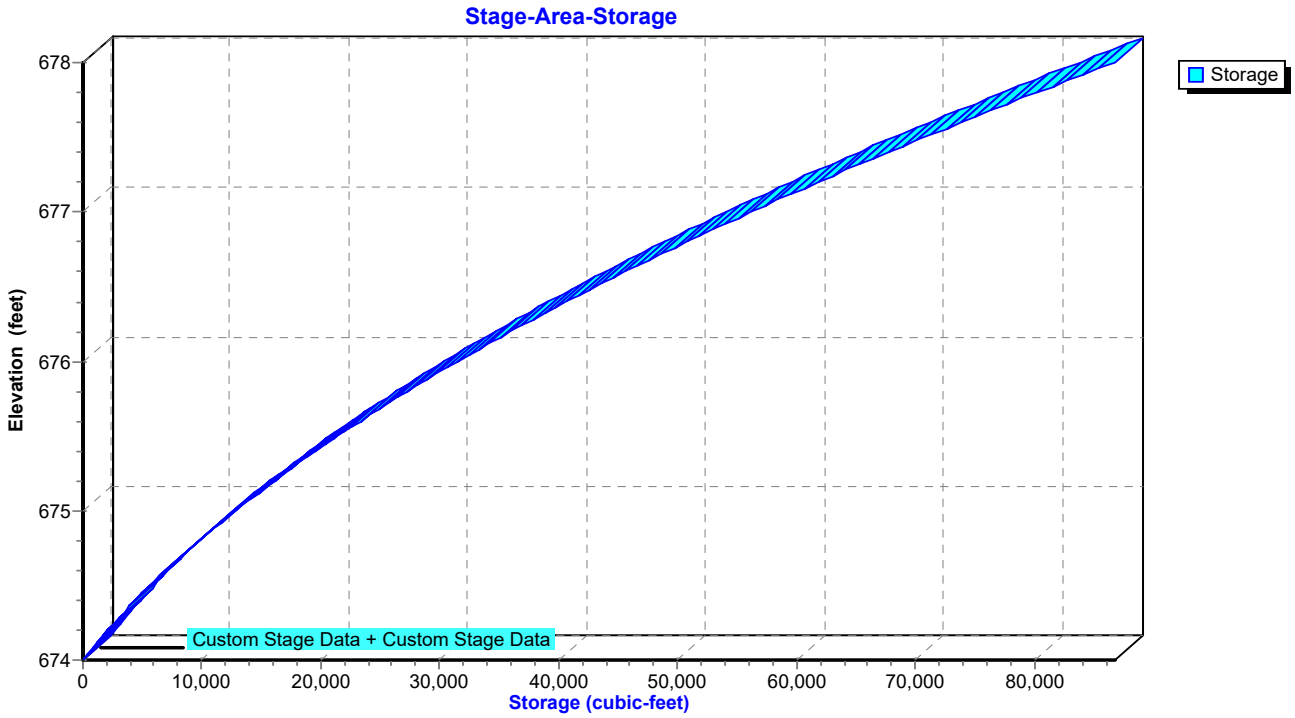
## Pond 6P: Pond 3&4




## Pond 6P: Pond 3&4



## Pond 6P: Pond 3&4



## Summary for Subcatchment 1S: Pre Watershed 1A

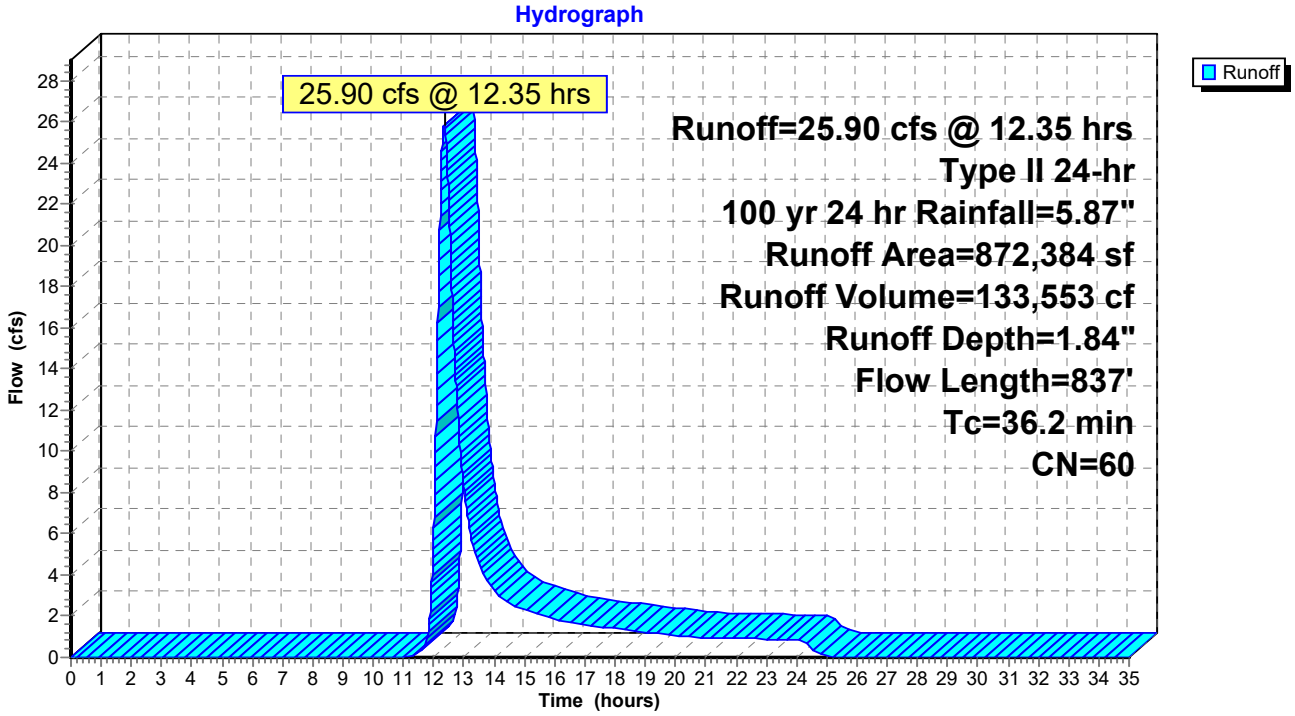
Runoff = 25.90 cfs @ 12.35 hrs, Volume= 133,553 cf, Depth= 1.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 yr 24 hr Rainfall=5.87"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 34,471 | 98 | Paved parking, HSG B |
| * | 837,913 | 58 | Woods and Brush - B soil |
| | 872,384 | 60 | Weighted Average |
| | 837,913 | | 96.05% Pervious Area |
| | 34,471 | | 3.95% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 23.1 | 100 | 0.0230 | 0.07 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.48" |
| 13.1 | 737 | 0.0180 | 0.94 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 36.2 | 837 | Total | | | |

## Subcatchment 1S: Pre Watershed 1A



## Summary for Subcatchment 2S: Post Watershed 1A

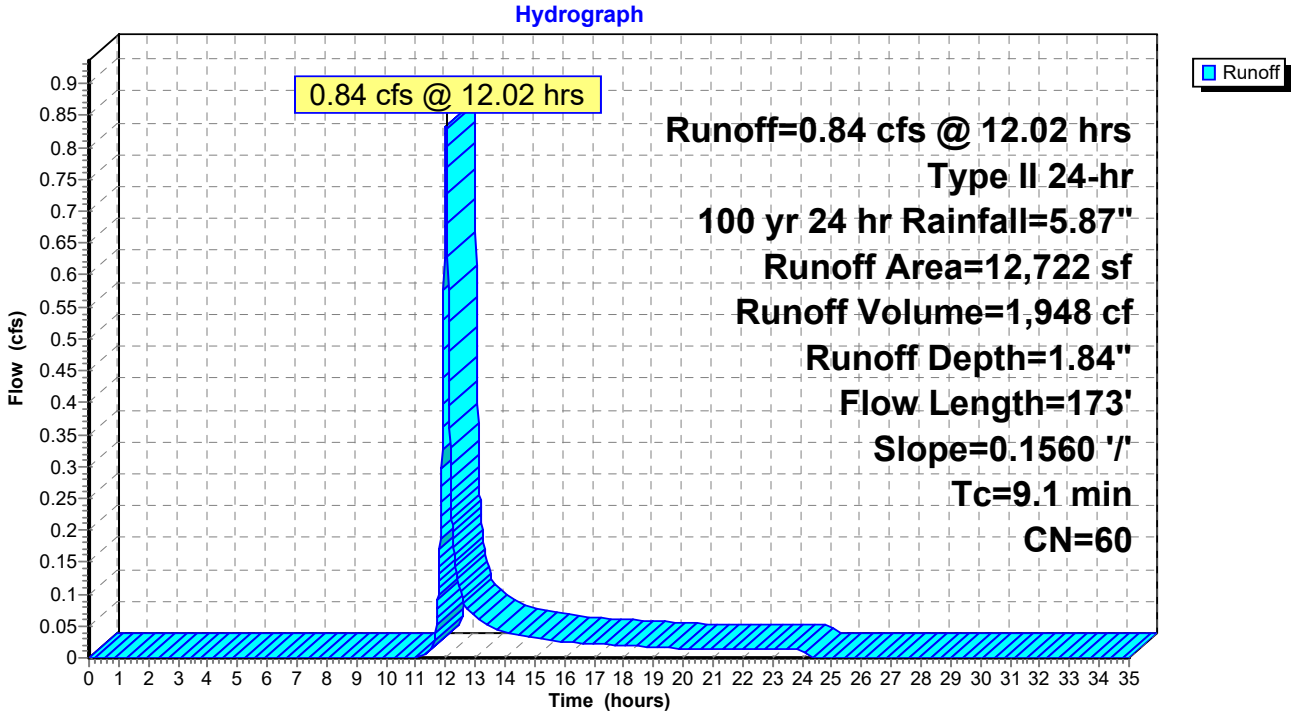
Runoff = 0.84 cfs @ 12.02 hrs, Volume= 1,948 cf, Depth= 1.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 yr 24 hr Rainfall=5.87"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 12,722 | 60 | Woods/Brush - B Soil |
| | 12,722 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.3 | 73 | 0.1560 | 0.15 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.48" |
| 0.8 | 100 | 0.1560 | 1.97 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 9.1 | 173 | Total | | | |

## Subcatchment 2S: Post Watershed 1A



## Summary for Subcatchment 3S: Pre Watershed 1B1

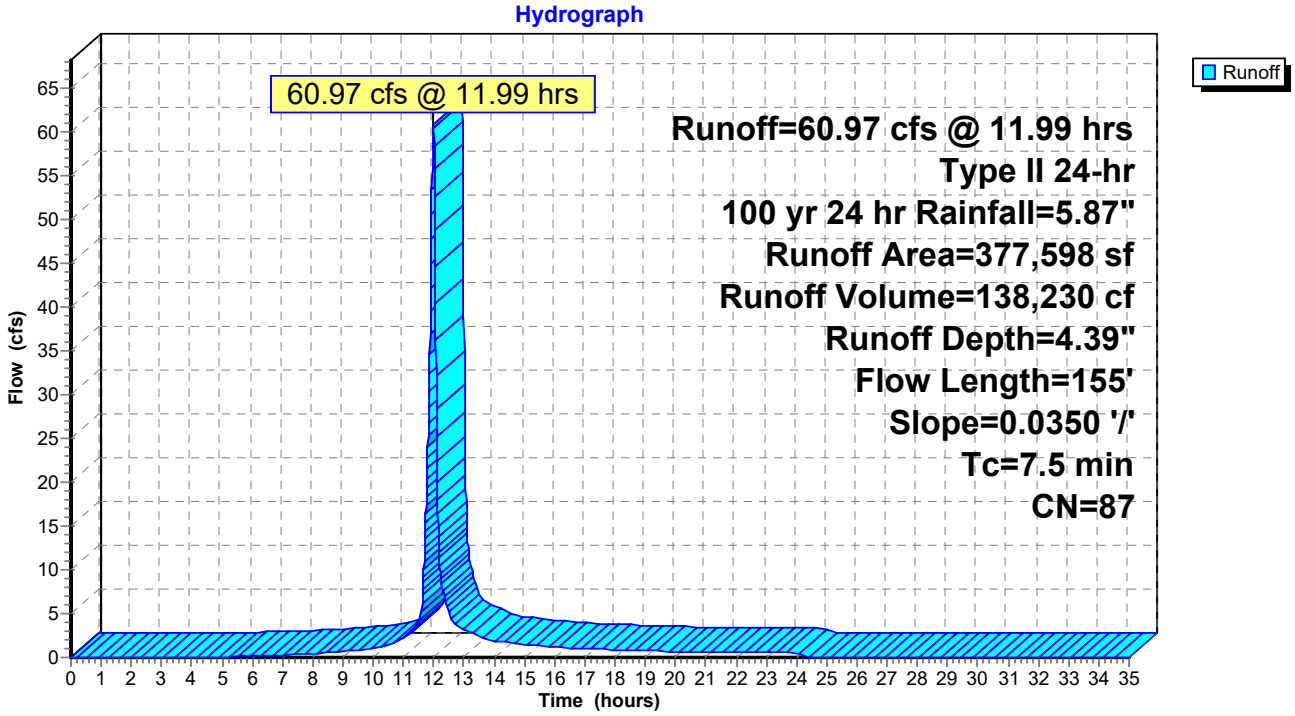
Runoff = 60.97 cfs @ 11.99 hrs, Volume= 138,230 cf, Depth= 4.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 yr 24 hr Rainfall=5.87"

| Area (sf) | CN | Description |
|---|---|---|
| 269,116 | 98 | Paved parking, HSG B |
| 108,482 | 61 | >75% Grass cover, Good, HSG B |
| 377,598 | 87 | Weighted Average |
| 108,482 | | 28.73% Pervious Area |
| 269,116 | | 71.27% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.1 | 75 | 0.0350 | 0.18 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 2.48" |
| 0.4 | 80 | 0.0350 | 3.01 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 7.5 | 155 | Total | | | |

## Subcatchment 3S: Pre Watershed 1B1



## Summary for Subcatchment 4S: Pre Watershed 1B2

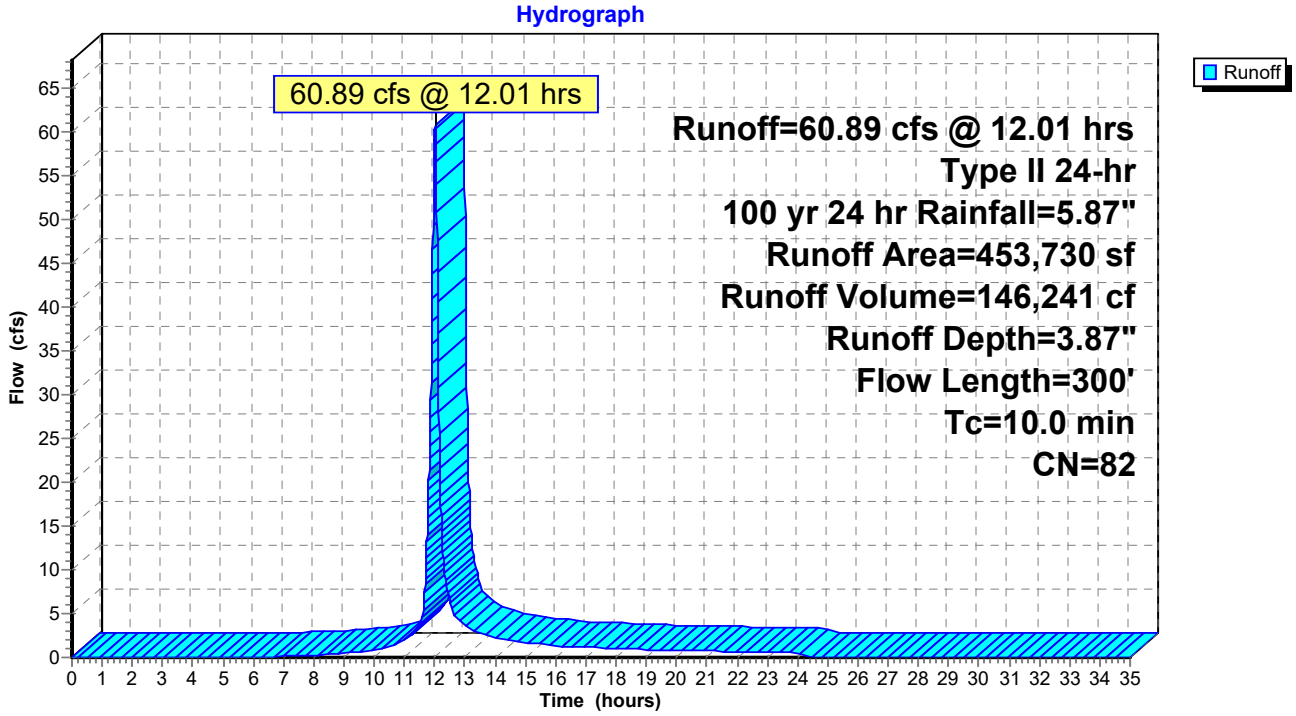
Runoff = 60.89 cfs @ 12.01 hrs, Volume= 146,241 cf, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 yr 24 hr Rainfall=5.87"

| Area (sf) | CN | Description |
|---|---|---|
| 252,942 | 98 | Paved parking, HSG B |
| 200,788 | 61 | >75% Grass cover, Good, HSG B |
| 453,730 | 82 | Weighted Average |
| 200,788 | | 44.25% Pervious Area |
| 252,942 | | 55.75% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.9 | 100 | 0.0350 | 0.19 | | **Sheet Flow,** Grass: Short n= 0.150 P2= 2.48" |
| 1.1 | 200 | 0.0330 | 2.92 | | **Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps |
| 10.0 | 300 | Total | | | |

## Subcatchment 4S: Pre Watershed 1B2



## Summary for Pond 5P: Pond 1&2

Inflow Area = 377,598 sf, 71.27% Impervious, Inflow Depth = 4.39" for 100 yr 24 hr event
Inflow = 60.97 cfs @ 11.99 hrs, Volume= 138,230 cf
Outflow = 6.29 cfs @ 12.42 hrs, Volume= 125,564 cf, Atten= 90%, Lag= 25.7 min
Primary = 6.29 cfs @ 12.42 hrs, Volume= 125,564 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 692.30' @ 12.42 hrs Surf.Area= 27,511 sf Storage= 76,206 cf

Plug-Flow detention time= 385.0 min calculated for 125,528 cf (91% of inflow)
Center-of-Mass det. time= 337.3 min ( 1,130.9 - 793.6 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 688.00' | 42,308 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |
| #2 | 688.00' | 54,178 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |
| | | 96,485 cf | Total Available Storage |

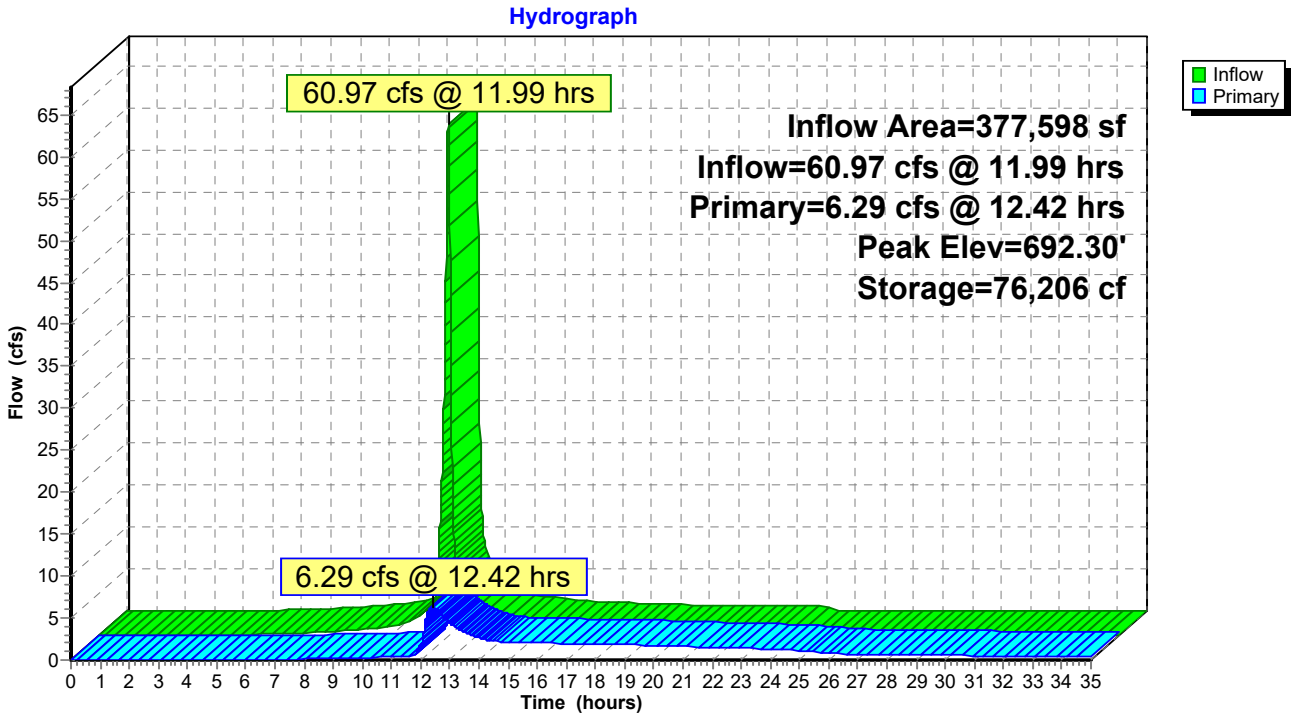
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 688.00 | 3,413 | 0 | 0 |
| 693.00 | 13,510 | 42,308 | 42,308 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 688.00 | 4,495 | 0 | 0 |
| 693.00 | 17,176 | 54,178 | 54,178 |

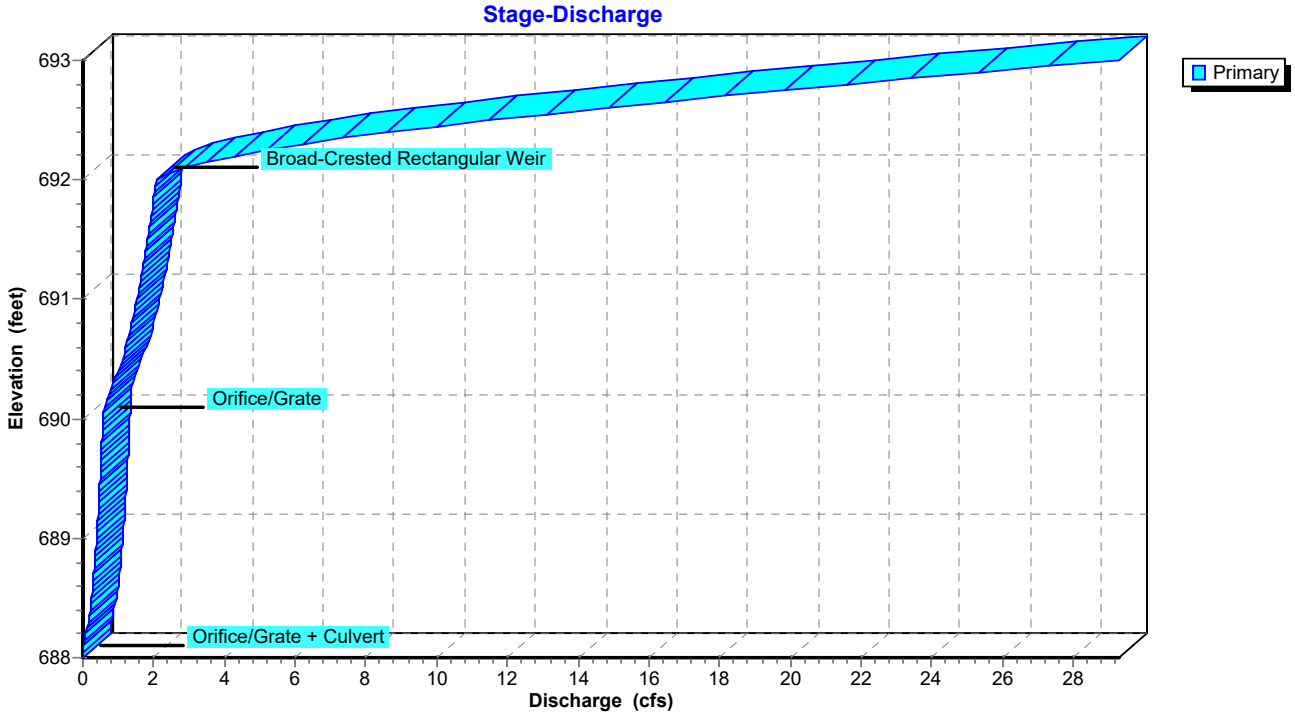
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 692.00' | **10.0' long Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50<br>Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83 |
| #2 | Device 4 | 688.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |
| #3 | Device 4 | 690.00' | **6.0" Vert. Orifice/Grate** C= 0.600 |
| #4 | Primary | 688.00' | **10.0" Round Culvert**<br>L= 20.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 688.00' / 687.90' S= 0.0050 '/' Cc= 0.900<br>n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.55 sf |

**Primary OutFlow** Max=6.28 cfs @ 12.42 hrs HW=692.30' (Free Discharge)
- **1=Broad-Crested Rectangular Weir** (Weir Controls 4.07 cfs @ 1.34 fps)
- **4=Culvert** (Passes 2.21 cfs of 4.49 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.85 cfs @ 9.79 fps)
  - **3=Orifice/Grate** (Orifice Controls 1.35 cfs @ 6.90 fps)

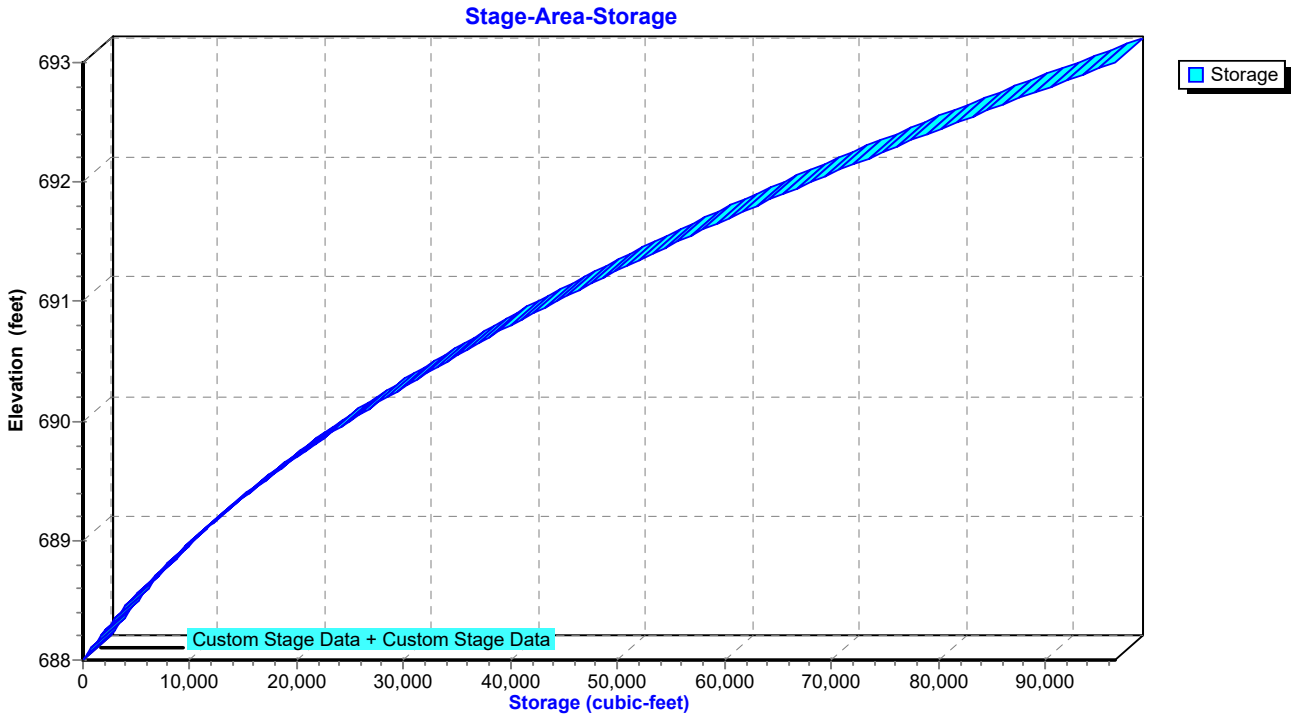
## Pond 5P: Pond 1&2




## Pond 5P: Pond 1&2



## Pond 5P: Pond 1&2



## Summary for Pond 6P: Pond 3&4

Inflow Area = 453,730 sf, 55.75% Impervious, Inflow Depth = 3.87" for 100 yr 24 hr event
Inflow = 60.89 cfs @ 12.01 hrs, Volume= 146,241 cf
Outflow = 11.25 cfs @ 12.28 hrs, Volume= 133,675 cf, Atten= 82%, Lag= 16.1 min
Primary = 11.25 cfs @ 12.28 hrs, Volume= 133,675 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs
Peak Elev= 677.56' @ 12.28 hrs Surf.Area= 30,916 sf Storage= 72,416 cf

Plug-Flow detention time= 322.5 min calculated for 133,675 cf (91% of inflow)
Center-of-Mass det. time= 277.2 min ( 1,087.6 - 810.4 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 674.00' | 41,796 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |
| #2 | 674.00' | 44,958 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |
| | | 86,754 cf | Total Available Storage |

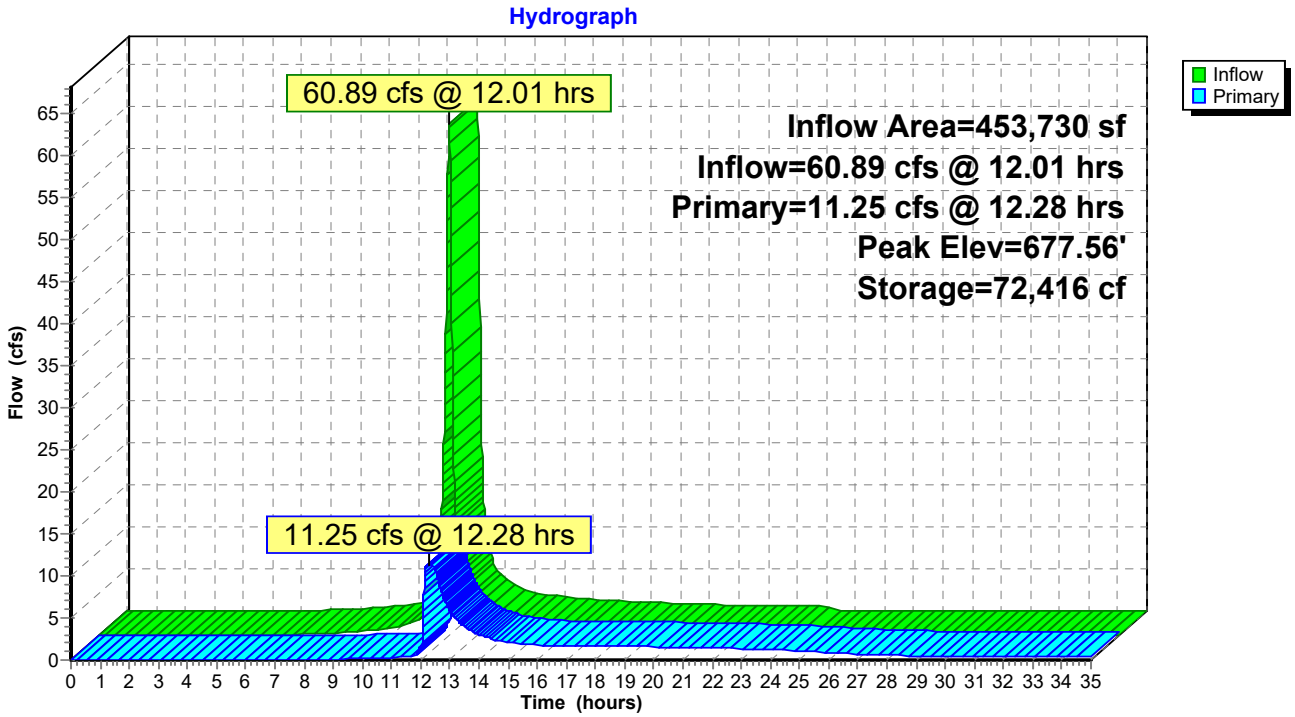
| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 674.00 | 6,253 | 0 | 0 |
| 678.00 | 14,645 | 41,796 | 41,796 |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 674.00 | 3,569 | 0 | 0 |
| 678.00 | 18,910 | 44,958 | 44,958 |

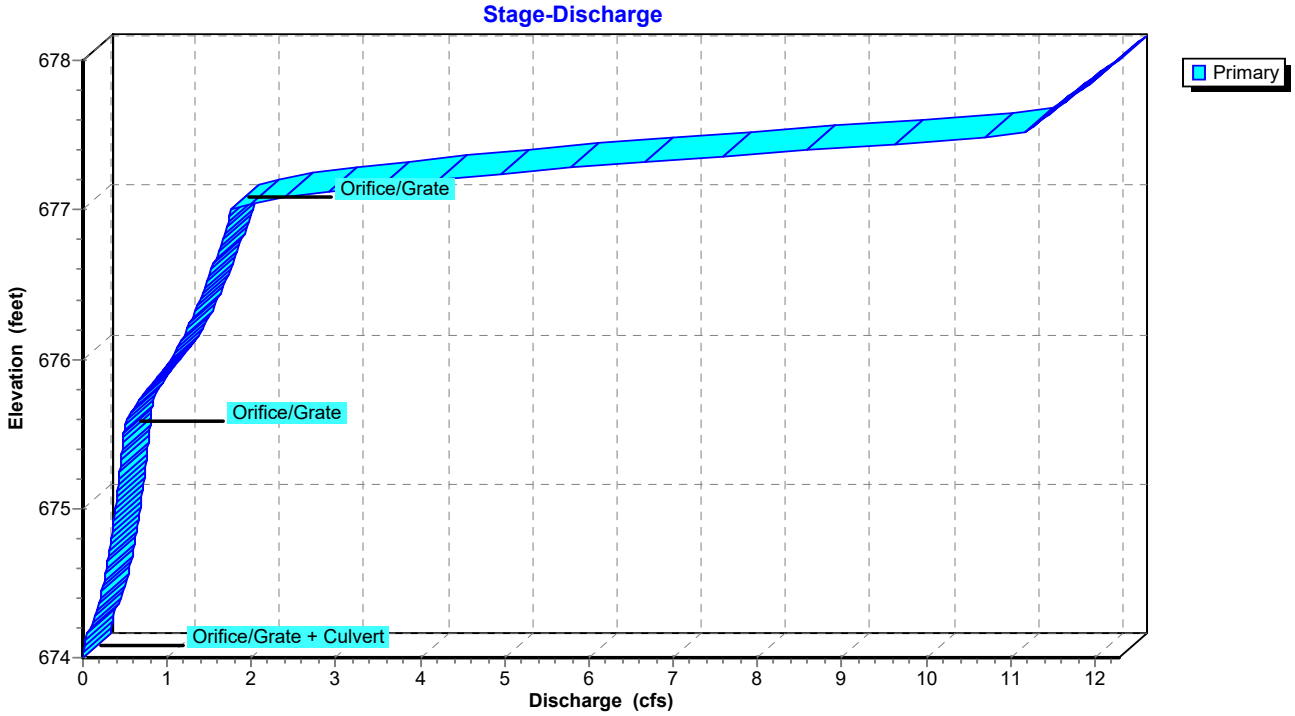
| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Device 4 | 674.00' | **4.0" Vert. Orifice/Grate** C= 0.600 |
| #2 | Device 4 | 675.50' | **6.0" Vert. Orifice/Grate** C= 0.600 |
| #3 | Device 4 | 677.00' | **24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600<br>Limited to weir flow at low heads |
| #4 | Primary | 674.00' | **18.0" Round Culvert**<br>L= 50.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 674.00' / 673.75' S= 0.0050 '/' Cc= 0.900<br>n= 0.020 Corrugated PE, corrugated interior, Flow Area= 1.77 sf |

**Primary OutFlow** Max=11.25 cfs @ 12.28 hrs HW=677.56' (Free Discharge)
└─**4=Culvert** (Barrel Controls 11.25 cfs @ 6.37 fps)
  ├─**1=Orifice/Grate** (Passes < 0.77 cfs potential flow)
  ├─**2=Orifice/Grate** (Passes < 1.27 cfs potential flow)
  └─**3=Orifice/Grate** (Passes < 10.82 cfs potential flow)

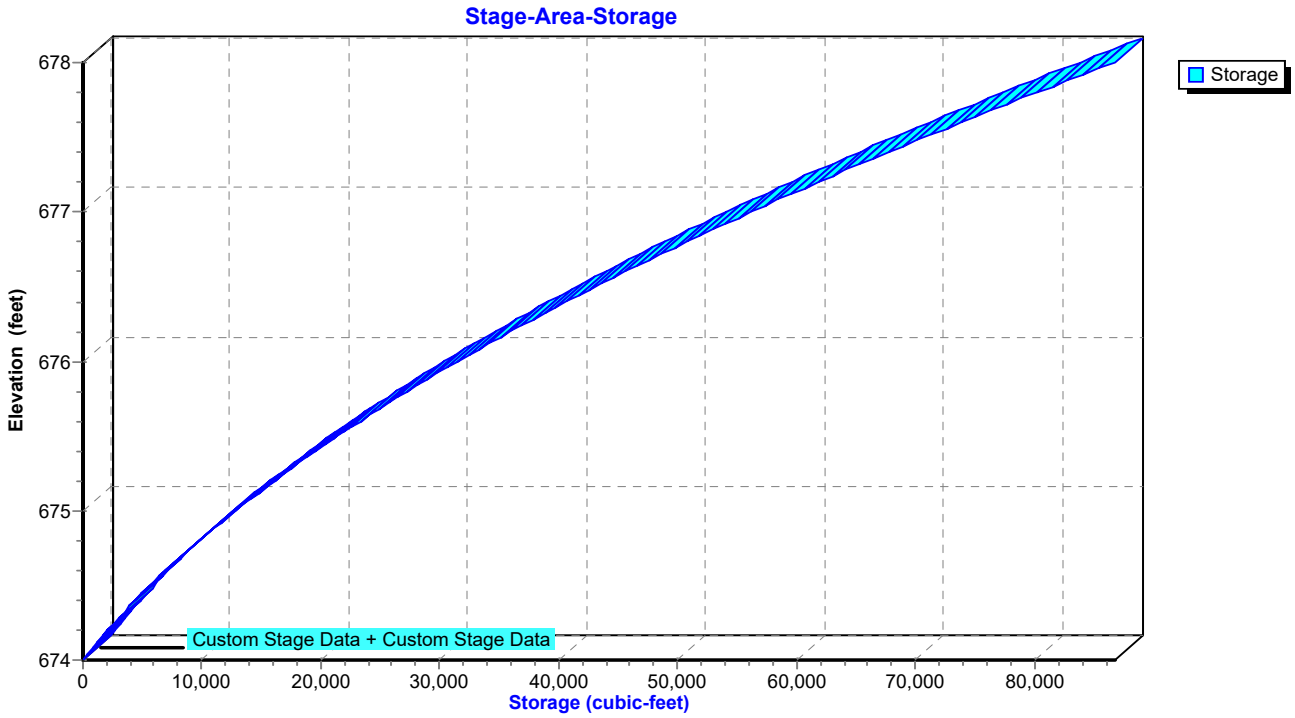
## Pond 6P: Pond 3&4




## Pond 6P: Pond 3&4



## Pond 6P: Pond 3&4



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