1600 Manor Drive, Suite 200
Chalfont, PA 18914

Erosion & Sediment Pollution Control Plan Narrative & Calculations

Project: **Proposed Retail Facility**
Wyncote Road & York Road
Borough of Jenkintown
Montgomery County, Pennsylvania

Client: **Jenkintown Commons Limited Partnership #3**
925 W. Lancaster Ave, Suite 200
Bryn Mawr, PA 19010

Project Number: **PC211006**

Date: **May 13, 2022**

Professional Engineer: John P. Alejnikov
PA License #PE086400

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GENERAL PROJECT DESCRIPTION/STORMWATER MANAGEMENT

GENERAL PROJECT DESCRIPTION

Jenkintown Commons Limited Partnership #3 is proposing to develop a 3.01 acre tract located in the Borough of Jenkintown, Montgomery County, PA. The lot will consist of a proposed grocery store (approximately a 49,940 SF footprint with a 2,870 SF ramp) and an attached parking garage. The project will also include exterior parking, driveways, utilities, landscaping, stormwater management controls, and any necessary measures and amenities to support the development. Pertinent data characterizing the existing and future site conditions are shown on the accompanying Land Development Plans.

The existing condition for the entire tract consists of multiple buildings, asphalt pavement, and concrete curbing. All structures mentioned will be demolished as a part of this construction. The previously submitted Zoning Plan has addressed any variances required for the construction of this project.

The accompanying program is proposed to prevent accelerated erosion of the site soils and subsequent sedimentation of existing streams and wetlands in compliance with 25 Pennsylvania Code Chapter 102 “Erosion and Sediment Control”, Pennsylvania Department of Environmental Protection (PADEP), rules and regulations. The conservation program was developed in accordance with the applicable ordinances of Borough of Jenkintown and the requirements of the Montgomery County Conservation District.

Bohler Engineering PA, LLC trusts this Conservation Program is in compliance with the intent of the Clean Streams Act, Pennsylvania Department of the Environmental Protection rules and regulations, and the provisions set forth in the previously referenced Chapter 102.

E&S Plan Planning & Design
§102.4(b)(4)

The following measures are taken to minimize the extent and duration of earth disturbance:

- Access the site thru designated construction entrance
- Sequence construction activities by limiting disturbances to a specific task such that each task is completed before the next task is initiated

The following measures are taken to maximize protection of existing drainage features and vegetation:

- Access the site thru designated construction entrance

The following measures are taken to minimize soil compaction:

- Access the site thru designated construction entrance
- Use of treaded machinery where practical during earthmoving operations
- Grade site to minimize extent of cut/fills

The following measures are taken to prevent or minimize generation of increased storm water runoff:

- Direct runoff to underground infiltration and detention basins to control runoff rates
- Minimize impervious areas where practical

Past, Present and Proposed Land Uses and Proposed Alteration to Project Site
§102.4(b)(5)(iii)

During the past 5 years, the site has consisted of multiple buildings/structures, asphalt pavement, and concrete curbing.

During the past 50 years, the site has consisted of multiple buildings/structures, asphalt pavement, and concrete curbing.

Narrative Description of the Location and Type of Perimeter and Onsite BMPs §102.4(b)(5)(vi)

The following is a summary of BMPs that will be utilized during and/or proceeding construction of this site.

1. **Dust Control** – Construction traffic must enter and exit the site at the stabilized **Construction Entrance**. The purpose is to trap dust and mud that would otherwise be carried off-site by construction traffic.

   Water trucks will be used as needed during construction to reduce dust generated on the site. Dust control must be provided by the Contractor to a degree that is acceptable to the Local Conservation District. After construction, the site will be stabilized (as described elsewhere), which will reduce the potential for dust generation.

2. **Solid Waste Disposal** – No solid materials, including building materials, are allowed to be discharged from the site with storm water. All solid waste, including disposable materials incidental to the major construction activities, must be collected and placed in containers. The containers will be emptied as necessary by a contract trash disposal service and hauled away from the site.

3. **Sanitary Facilities** – All personnel involved with construction activities must comply with state and local sanitary or septic system regulations. Temporary sanitary facilities will be provided at the site throughout the construction phase. They must be utilized by all construction personnel and will be serviced by a licensed commercial operator.

4. **Water Source** – Non-storm water components of site discharge must be clean water. Water used for construction which discharges from the site must originate from a public water supply or private well approved by the State Health Department. Water used for construction that does not originate from an approved public supply must not discharge from the site. It can be retained in the ponds until it infiltrates and evaporates.

5. **Concrete Waste from Concrete Ready-Mix Trucks** – Discharge of excess or waste concrete and/or wash water from concrete trucks will be allowed on the construction site, but only in specifically designated diked areas prepared to prevent contact between the concrete and/or wash water and storm water that will be discharged from the site.

6. **Soil Stockpile** – These are formed with soil and are either topsoil material or excavated material that will later be used in the grading of land to achieve a specified contour.

7. **Silt sock** – Silt Socks allow water to flow through at a controlled rate while trapping sediment. This is accomplished by a filter fabric filled with organic material. The design of the sock provides intimate contact with the ground preventing water from flowing underneath.

8. **Inlet Protection** – Storm drain inlet protection measures prevent soil and debris from entering storm drainage inlets and then into storm pipes.

9. **Erosion Control Blankets** – These are preformed protective blankets of plastic fibers, straw, or other plant residue designed to protect the soil from the impact of precipitation and overland flow, and retain moisture and facilitiate the establishment of vegetation.

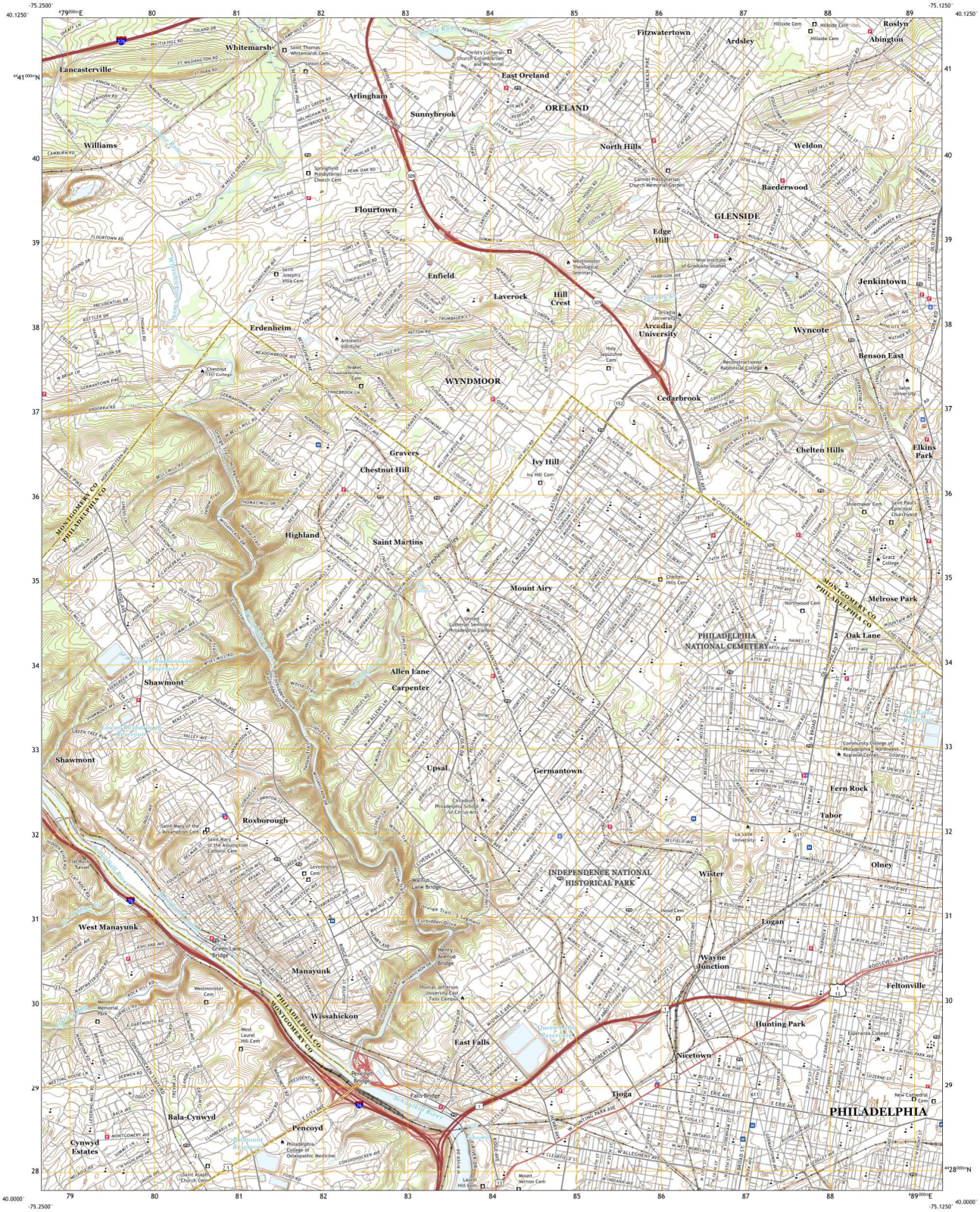
Antidegradation Analysis

The Chapter 93 classification of the receiving stream is not EV (Exceptional Value) or HQ (High Quality) and therefore, an antidegradation analysis is not required to be performed, nor is it required that ABACT BMPs be provided.

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

GERMANTOWN QUADRANGLE
PENNSYLVANIA
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 18T\18S
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Imagery.....NAIP, June 2017 - December 2017
Roads.....U.S. Census Bureau, 2016
Names.....GNIS, 1979 - 2019
Hydrography.....National Hydrography Dataset, 1899 - 2018
Contours.....National Elevation Dataset, 2002 - 2017
Boundaries.....Multiple sources; see metadata file 2017 - 2018

Wetlands.....FWS National Wetlands Inventory 1981

MN
GN
12°7'
216 MILS
0°47'
2 MILS

UTM GRID AND 2019 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
VK
Grid Zone Designation
18T

SCALE 1:24 000

KILOMETERS 0 0.5 1 1 2
METERS 1000 500 0 1000 2000
MILES 0 0.5 1
FEET 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the
National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

PENNSYLVANIA
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 Lansdale
2 Ambler
3 Hatboro
4 Norristown
5 Frankford
6 Lansdowne
7 Philadelphia
8 Camden

ADJOINING QUADRANGLES

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

GERMANTOWN, PA
2019

NSN 7643013089742 34
NGA REF NO. USGS X2K171 18

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 1:12,000.

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

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

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

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

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

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

Soil Survey Area: Montgomery County, Pennsylvania
Survey Area Data: Version 16, Sep 1, 2021

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

Date(s) aerial images were photographed: Jun 1, 2019—Aug 4, 2019

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
GnB	Glenelg silt loam, 3 to 8 percent slopes	3.5	4.1%
GsA	Glenville silt loam, somewhat poorly drained, 0 to 3 percent slopes	0.5	0.6%
Ha	Hatboro silt loam	1.1	1.2%
MaB	Manor loam, 3 to 8 percent slopes	0.8	1.0%
MaC	Manor loam, 8 to 15 percent slopes	0.0	0.0%
UgB	Urban land, 0 to 8 percent slopes	37.3	43.1%
UugB	Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes	28.4	32.7%
UugD	Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes	15.0	17.3%
Totals for Area of Interest		**86.6**	**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.

Montgomery County, Pennsylvania

GnB—Glenelg silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2v7gr
Elevation: 30 to 1,200 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 192 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Glenelg

Setting

Landform: Interfluves, hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear
Across-slope shape: Convex, concave, linear
Parent material: Residuum weathered from mica schist

Typical profile

Ap - 0 to 8 inches: silt loam
Bt1 - 8 to 18 inches: clay loam
Bt2 - 18 to 30 inches: clay loam
BCt - 30 to 42 inches: loam
CBt - 42 to 54 inches: loam
C - 54 to 76 inches: channery fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

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

Minor Components

Gaila

Percent of map unit: 10 percent
Landform: Ridges, hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Glenville

Percent of map unit: 5 percent
Landform: Swales, drainageways
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

GsA—Glenville silt loam, somewhat poorly drained, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2w066
Elevation: 260 to 1,210 feet
Mean annual precipitation: 38 to 51 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 136 to 214 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Glenville, Somewhat Poorly Drained

Setting

Landform: Swales, drainageways
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Interfluve, head slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Schist, gneiss or phyllite colluvium derived from metamorphic rock over schist, gneiss or phyllite residuum weathered from metamorphic rock

Typical profile

Ap - 0 to 11 inches: silt loam
Bt1 - 11 to 20 inches: channery silt loam

Bt2 - 20 to 30 inches: silt loam
Btx - 30 to 40 inches: silt loam
C1 - 40 to 59 inches: loam
C2 - 59 to 80 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 29 to 31 inches to fragipan
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.03 to 0.11 in/hr)
Depth to water table: About 10 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.2 inches)

Interpretive groups

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

Minor Components

Baile

Percent of map unit: 10 percent
Landform: Swales, drainageways
Landform position (two-dimensional): Backslope, footslope, toeslope
Landform position (three-dimensional): Interfluve, head slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Glenelg

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex, concave, linear
Hydric soil rating: No

Ha—Hatboro silt loam

Map Unit Setting

National map unit symbol: l54h
Elevation: 200 to 800 feet
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 140 to 200 days

Farmland classification: Not prime farmland

Map Unit Composition

Hatboro and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hatboro

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Alluvium derived from metamorphic and sedimentary rock

Typical profile

Ap - 0 to 9 inches: silt loam
Bg - 9 to 44 inches: silt loam
Cg - 44 to 56 inches: sandy clay loam
C - 56 to 70 inches: stratified gravelly sand to clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 60 to 99 inches to lithic bedrock
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Glenville

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

MaB—Manor loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2z1vg
Elevation: 250 to 1,000 feet
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 145 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Manor

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist

Typical profile

A1 - 0 to 2 inches: loam
A2 - 2 to 6 inches: sandy loam
Bw1 - 6 to 13 inches: fine sandy loam
Bw2 - 13 to 22 inches: fine sandy loam
C1 - 22 to 30 inches: fine sandy loam
C2 - 30 to 44 inches: channery sand
C3 - 44 to 53 inches: loamy sand
C4 - 53 to 83 inches: channery loamy sand
Cr - 83 to 108 inches: bedrock
R - 108 to 138 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 60 to 100 inches to paralithic bedrock; 100 to 128 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.07 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

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

Minor Components

Glenelg

Percent of map unit: 10 percent
Landform: Hillslopes, interfluves
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Glenville

Percent of map unit: 5 percent
Landform: Drainageways, swales
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Base slope, interfluve, head slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

MaC—Manor loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2tkpw
Elevation: 50 to 1,080 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Manor

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Parent material: Residuum weathered from mica schist

Typical profile

A1 - 0 to 2 inches: loam
A2 - 2 to 6 inches: sandy loam
Bw1 - 6 to 13 inches: fine sandy loam
Bw2 - 13 to 22 inches: fine sandy loam
C1 - 22 to 30 inches: fine sandy loam
C2 - 30 to 44 inches: channery coarse sand
C3 - 44 to 53 inches: loamy sand
C4 - 53 to 83 inches: channery loamy sand
Cr - 83 to 108 inches: bedrock
R - 108 to 138 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 59 to 100 inches to paralithic bedrock; 100 to 128 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.07 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Glenville

Percent of map unit: 5 percent
Landform: Drainageways, swales
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Mt. airy

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Blocktown

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope

Landform position (three-dimensional): Side slope, interfluve, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

UgB—Urban land, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2dtyq
Elevation: 800 to 1,500 feet
Mean annual precipitation: 36 to 46 inches
Mean annual air temperature: 41 to 62 degrees F
Frost-free period: 130 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Pavement, buildings and other artifically covered areas human transported material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Minor Components

Udorthents, unstable fill

Percent of map unit: 10 percent
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

UugB—Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2dtz7
Elevation: 200 to 2,000 feet

Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 235 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Udorthents, schist and gneiss, and similar soils: 15 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Pavement, buildings and other artifically covered areas

Typical profile

C - 0 to 6 inches: variable

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 to 99 inches to lithic bedrock
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Udorthents, Schist And Gneiss

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Graded areas of schist and/or gneiss

Typical profile

Ap - 0 to 6 inches: loam
C - 6 to 40 inches: silty clay loam
R - 40 to 60 inches: bedrock

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 70 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 60 inches
Frequency of flooding: None

Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

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

Minor Components

Glenelg

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Baile

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

Edgemont

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Gladstone

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Glenville

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

UugD—Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2dtz8
Elevation: 200 to 2,000 feet
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 235 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Udorthents, schist and gneiss, and similar soils: 15 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Pavement, buildings and other artifically covered areas

Typical profile

C - 0 to 6 inches: variable

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: 10 to 99 inches to lithic bedrock
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Udorthents, Schist And Gneiss

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Graded areas of schist and/or gneiss

Typical profile

Ap - 0 to 6 inches: loam
C - 6 to 40 inches: silty clay loam
R - 40 to 60 inches: bedrock

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: 20 to 70 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

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

Minor Components

Glenelg

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Baile

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

Edgemont

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Gladstone

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope, side slope

Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Glenville

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

SUPPORTING DESIGN & ENGINEERING CALCULATIONS

STANDARD E&S WORKSHEET # 22

PLAN PREPARER RECORD OF TRAINING AND EXPERIENCE IN EROSION AND SEDIMENT POLLUTION CONTROL METHODS AND TECHNIQUES

NAME OF PLAN PREPARER: John Alejnikov, P.E.

FORMAL EDUCATION:

Name of College or Technical Institute: University of Delaware

Curriculum or Program: Civil Engineering

Dates of Attendance: **From:** September 2007 **To:** May 2011

Degree Received: Bachelor of Civil Engineering

OTHER TRAINING:

Name of Training: _____ **Presented By:** _____

Date: _____ _____

EMPLOYMENT HISTORY:

Current Employer: Bohler Engineering PA, LLC

Telephone: (215) 996-9100

Former Employer: _____

Telephone: _____

RECENT E&S PLANS PREPARED:

Name of Project:	Truck Facility	Wawa Plymouth	Giant Expansion
County:	Bucks	Montgomery	Chester
Municipality:	Bensalem Township	Plymouth Township	Westtown Township
Permit Number:	PAG02000915064	PAG02004615074	PAG02001516023
Approving Agency:	BCCD	MCCD	CCCD

1600 Manor Drive, Suite 200
Chalfont, PA 18914

Post Construction Stormwater Management Calculations

Project:	**Proposed Retail Facility** Wyncote Road & York Road Borough of Jenkintown Montgomery County, Pennsylvania
Client:	**Jenkintown Commons Limited Partnership #3** 925 W. Lancaster Ave, Suite 200 Bryn Mawr, PA 19010
Project Number:	**PC211006**
Date:	January 17, 2022
Revised:	**July 22, 2022**

Professional Engineer: John P. Alejnikov
PA License #PE086400

Table of Contents

General Project Description/Stormwater Management

GENERAL PROJECT DESCRIPTION

Jenkintown Commons Limited Partnership #3 is proposing to develop a 3.01 acre tract located in the Borough of Jenkintown, Montgomery County, PA. The lot will consist of a proposed grocery store (approximately a 49,940 SF footprint with a 2,870 SF ramp) and an attached parking garage. The project will also include exterior parking, driveways, utilities, landscaping, stormwater management controls, and any necessary measures and amenities to support the development. Pertinent data characterizing the existing and future site conditions are shown on the accompanying Land Development Plans.

The existing condition for the entire tract consists of multiple buildings, asphalt pavement, and concrete curbing. All structures mentioned will be demolished as a part of this construction. A two-story residential dwelling is to be demolished as a part of this project. The previously submitted Zoning Plan has addressed any variances required for the construction of this project.

The PCSM Plan is separate from the E&S Plan and is labeled “Post Construction Stormwater Management Plan”.

Documentation is provided that the PCSM Plan was prepared by a person trained and experienced in Post Construction Stormwater Management design methods and techniques applicable to the size and scope of the project.

General PCSM Planning and Design
§102.8(b)

1. The following measures were taken to preserve the integrity of stream channels and to maintain and protect the physical, biological, and chemical qualities of the receiving stream:
   - Direct runoff from impervious surfaces including roadways to BMPs.
   - Maintain generally the same drainage patterns as in the existing condition
   - The installation of water quality filters in each structure

2. The following measures were taken to prevent an increase in the rate of storm water runoff:
   - Direct runoff to an underground storm water basins to control runoff rates.
   - Minimize impervious areas where practical.
   - Maintain generally the same drainage patterns as in the existing condition

3. The following measures were taken to minimize any increase in storm water runoff volume:
   - Provide underground infiltration basin to help reduce runoff volume.
   - Minimize impervious areas where practical.
   - Maintain generally the same drainage patterns as in the existing condition

4. The following measures were taken to minimize impervious areas:
   - Parking areas have been designed to the minimum dimensions per the borough ordinance.

5. The following measures are taken to maximize protection of existing drainage features and vegetation:
   - Access the site thru designated construction entrance.
   - Maintain existing flow paths to the receiving waters

6. The following measures were taken to minimize land clearing and grading:
   - Grade site to minimize extent of cut/fills.

7. The following measures are taken to minimize soil compaction:
   - Access the site thru designated construction entrance.
   - As specified in the construction sequence, use treaded machinery where practical during earthmoving operations.

- Grade site to minimize extent of cuts/fills.

8. The following measures were taken to utilize other structural or nonstructural BMPs that prevent or minimize changes in storm water runoff:
- Direct runoff to an underground storm water basins to control runoff rates.
- Minimize impervious areas where practical.

Types, Depth, Slope, Locations, and Limitations of the Soils and Geologic Formations §102.8(f)(2)

Soil Descriptions:

Soil	Description	Soil Group
UgB	**Urban land, 0 to 8 percent slopes**	**C**
UugB	**Urban land-udorthents, schist and gneiss complex, 0 to 8 percent slopes**	**C**

- **No geologic mapping features were identified.**

Infiltration Testing:

Infiltration testing was conducted on 10/8/21 and 11/8/21 by Whitestone Associates, Inc. The Stormwater Management Area Evaluation Letter, as prepared by Whitestone Associates, Inc., dated 12/1/21, has been included in Appendix A of this report. The investigation includes an evaluation of six soil borings and six in-situ infiltration tests utilizing cased-borehole methodology.

The location for underground basin 1 is conducive for infiltration and therefore an underground basin has been provided at this location. A recommended infiltration rate of 0.75 in/hr has been provided for UG Basin 1 by Whitestone Associates. Due to grading and cover constraints, UG Basin 2 and UG Basin 3 will only function as detention basins.

Past, Present and Proposed Land Uses and Proposed Alteration to Project Site §102.8(f)(3)

During the past 5 years, the site has consisted of multiple buildings/structures, asphalt pavement, and concrete curbing.

During the past 50 years, the site has consisted of multiple buildings/structures, asphalt pavement, and concrete curbing.

Geologic Formations or Soil Conditions §102.8(f)(12)

There are no geologic formations or soil conditions that could cause contaminant pollution during earth disturbance activities.

Potential Thermal Impacts §102.8(f)(13)

A potential for thermal impacts exists in instances where surface runoff is directly conveyed to a receiving stream without adequate attenuation or cooling. To avoid thermal impacts, the following has been employed: underground infiltration basin, underground detention basins, Flexstorm water quality inlet filters, and minimized disturbed grading areas throughout the site. All of these measures will help to control runoff volume and rate and thereby provide additional cooling time, thereby minimizing thermal impacts to the receiving stream.

Riparian Forest Buffer Management Plan
§102.8(f)(14)

There are no existing/proposed riparian forest buffers located within or outside the limits of disturbance for this project.

PA Integrated Water Quality Monitoring and Assessment Report Impairments (Cat. 4 & 5)

Impairments	Cause of Impairment
Urban Runoff/Storm Sewers	Flow regime modification; dewatering; habitat alterations

Stormwater Management

Watershed

The overall property flows to Tacony Creek which is located within the Tookany/Tacony-Frankford Watershed (District B). The Tookany/Tacony-Frankford Watershed has a Chapter 93 Classification of WWF-MF (Warm Water Fishes – Migratory Fishes)

Design Methodology

The method utilized for calculating the peak flow rates and generating hydrographs for the pre- and post-development was the SCS Method as defined in the computer watershed software HydroCAD 10.00-22. Drainage areas to the point of discharges were delineated and curve numbers were calculated based on the values for each type of land use listed in the Borough of Jenkintown Stormwater Management Ordinance. A minimum time of concentration of 6 minutes was used for the Pre-Development and Post-Development drainage areas for a conservative design. Hydrographs for the 1, 2, 10, 25, 50, and 100-yr storms were generated using 24-hr precipitation amounts dictated by the National Weather Service NOAA website for the storm events.

Peak Rates Point of Discharge

The project is located within one (1) watershed and has two (2) Points of Discharge that ultimately reaches Tacony Creek. Point of Discharge 1 is manhole along the southwest corner of the site on Wyncote Road. Point of Discharge 2 is a manhole along the northwest portion of the site on Washington Lane. The two (2) Points of Discharge reconvene in the same stormwater collection system that meets up at the intersection of Wyncote Road and Mather Road.

Runoff Calculations – Rational Peak Flow Rate

- The Soil Conservation Service (SCS) method was used with rainfall intensities obtained from NOAA intensity curves and were generated for the 1-, 2-, 5-, 10-, 25-, 50-, and 100-year storms.
- For pre-development runoff, the site was considered either impervious or meadow for calculations. A minimum time of concentration of 6 minutes was used for conservative calculations.
- For post-development conditions, the site cover was considered either open space/lawns or impervious. A minimum time of concentration of 6 minutes was used for conservative calculations.
- The CN Values provided in Appendix E (Stormwater Management Design Criteria) of the Borough of Jenkintown Stormwater Management Ordinance were used for calculations.

Post-Development

- In order to provide as much water quality benefits and infiltration, various BMPs are proposed and are in 'series' to provide the greatest possible benefit.
- The Peak Flow Summary page lists the various hydrograph peak discharges

- To determine the 2-year volume difference for the NPDES calculations, the net difference in impervious within the limit-of-disturbance was used. Pre-development pervious conditions were calculated as Meadow (with 20% of the impervious area considered meadow as well). Post-development pervious areas were considered Lawn/Open space.
- The development meets the peak rate reduction requirement for the 1- through 100-year events. The post-development peak rate must not exceed the pre-development peak rates for the 2-, 5-, 10-, 25-, 50-, and 100-yr storm events. The post-development 2-year peak rate has also been reduced to be below the 1-year pre-development peak rate. The corresponding peak rates are as follows:

	1-year	2-year	5-year	10-year	25-year	50-year	100-year
Pre-development	12.19	14.89	19.17	22.80	28.18	32.75	37.80
Post-development	4.11	5.30	7.06	8.53	17.49	25.28	31.68

Note that the reduction in post-development flows in compliance with Township requirements should prevent further downstream erosion as a result of this development.

Regarding the calculations, note the following:

a. The Volume Control Worksheets have been provided for the proposed development:
   i. In these Worksheets, the *Total Site Area* that was used is the NPDES boundary for the lot. The *Managed Area* is the total disturbance proposed.

b. The overall development design will result in 3,575 cuft of additional runoff, per Worksheet 4 of the Volume Control Worksheets.

c. The underground basins will account for 8,471 cuft of storage volume, per Worksheet 5 of the Volume Control Worksheets.

Storm Drainage

The stormwater conveyance system has been designed to intercept runoff at topographic low points and areas of significant runoff quantities. Stormwater is then conveyed to the proposed underground infiltration and detention basins, which discharges to the existing storm system and ultimately flows to Tacony Creek. Flexstorm filter bags have been designed for every proposed inlet on site. These filters will provide additional water quality as stormwater is then conveyed to the underground basins, before stormwater ultimately drains to Tacony Creek. Conveyance design precipitation amounts are based on the rainfall intensities specified for the 100-year storm event. The Bentley StormCAD V8i computer program has been utilized for the design of the storm conveyance system.

The proposed stormwater management program described with this report has been designed to comply with the Borough of Jenkintown Stormwater Management Ordinance and the standards set forth by the Pennsylvania Department of Environmental Protection.

Written Description of PCSM BMPs
§102.8(f)(6)

- BMP 6.6.4 – Water Quality Inlets
  - In order to ensure that the runoff leaving the site does not contain sediment, water quality inlets have been proposed.
  - All proposed inlets consist of a Flexstorm filter bag insert.
- BMP 6.4.2 – Underground Infiltration Basins
  - Provides necessary infiltration to meet volume requirements
  - Underground infiltration basin #1 is provided on site.

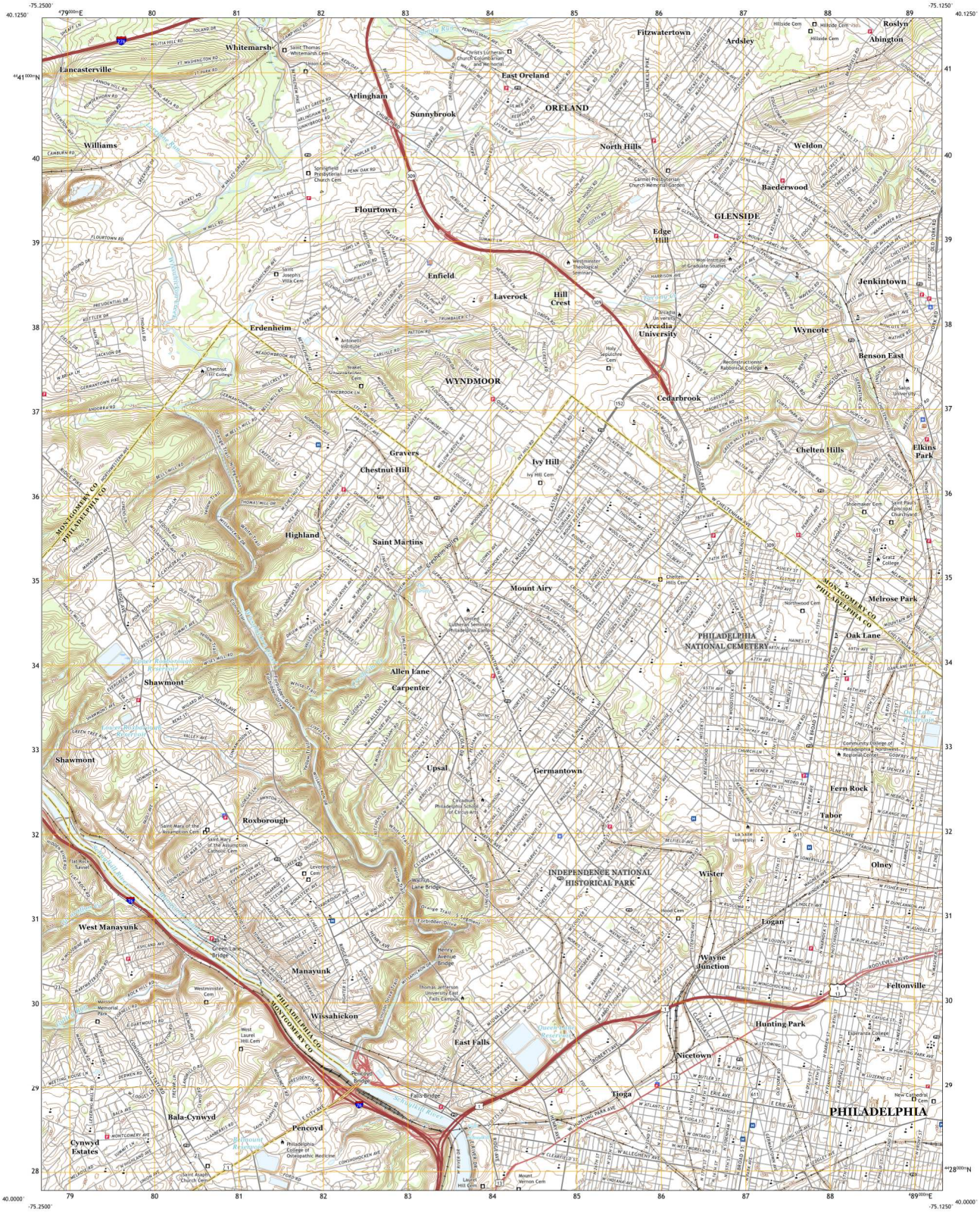
Antidegradation Analysis

The Chapter 93 classification of the receiving stream is not EV (Exceptional Value) or HQ (High Quality) and therefore, an antidegradation analysis is not required to be performed, nor is it required that ABACT BMPs be provided.

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

GERMANTOWN QUADRANGLE
PENNSYLVANIA
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 18T\18S
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Imagery.....NAIP, June 2017 - December 2017
Roads.....U.S. Census Bureau, 2016
Names.....GNIS, 1979 - 2019
Hydrography.....National Hydrography Dataset, 1899 - 2018
Contours.....National Elevation Dataset, 2002 - 2017
Boundaries.....Multiple sources; see metadata file 2017 - 2018

Wetlands.....FWS National Wetlands Inventory 1981

MN
GN
12°7'
216 MILS
0°47'
2 MILS

UTM GRID AND 2019 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
VK
Grid Zone Designation
18T

SCALE 1:24 000

KILOMETERS 1 0.5 0 1 2
METERS 1000 500 0 1000 2000
MILES 1 0.5 0 1
FEET 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the
National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

PENNSYLVANIA
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES
1 Lansdale
2 Ambler
3 Hatboro
4 Norristown
5 Frankford
6 Lansdowne
7 Philadelphia
8 Camden

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

GERMANTOWN, PA
2019

NSN 7643013189742
NGA REF NO. USGS X2K171 8

Custom Soil Resource Report
Soil Map

Map Scale: 1:4,530 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Montgomery County, Pennsylvania
Survey Area Data: Version 16, Sep 1, 2021

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

Date(s) aerial images were photographed: Jun 1, 2019—Aug 4, 2019

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
GnB	Glenelg silt loam, 3 to 8 percent slopes	3.5	4.1%
GsA	Glenville silt loam, somewhat poorly drained, 0 to 3 percent slopes	0.5	0.6%
Ha	Hatboro silt loam	1.1	1.2%
MaB	Manor loam, 3 to 8 percent slopes	0.8	1.0%
MaC	Manor loam, 8 to 15 percent slopes	0.0	0.0%
UgB	Urban land, 0 to 8 percent slopes	37.3	43.1%
UugB	Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes	28.4	32.7%
UugD	Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes	15.0	17.3%
Totals for Area of Interest		**86.6**	**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.

Montgomery County, Pennsylvania

GnB—Glenelg silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2v7gr
Elevation: 30 to 1,200 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 192 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Glenelg

Setting

Landform: Interfluves, hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear
Across-slope shape: Convex, concave, linear
Parent material: Residuum weathered from mica schist

Typical profile

Ap - 0 to 8 inches: silt loam
Bt1 - 8 to 18 inches: clay loam
Bt2 - 18 to 30 inches: clay loam
BCt - 30 to 42 inches: loam
CBt - 42 to 54 inches: loam
C - 54 to 76 inches: channery fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

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

Minor Components

Gaila

Percent of map unit: 10 percent
Landform: Ridges, hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Glenville

Percent of map unit: 5 percent
Landform: Swales, drainageways
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

GsA—Glenville silt loam, somewhat poorly drained, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2w066
Elevation: 260 to 1,210 feet
Mean annual precipitation: 38 to 51 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 136 to 214 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Glenville, Somewhat Poorly Drained

Setting

Landform: Swales, drainageways
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Interfluve, head slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Schist, gneiss or phyllite colluvium derived from metamorphic rock over schist, gneiss or phyllite residuum weathered from metamorphic rock

Typical profile

Ap - 0 to 11 inches: silt loam
Bt1 - 11 to 20 inches: channery silt loam

Bt2 - 20 to 30 inches: silt loam
Btx - 30 to 40 inches: silt loam
C1 - 40 to 59 inches: loam
C2 - 59 to 80 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 29 to 31 inches to fragipan
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.03 to 0.11 in/hr)
Depth to water table: About 10 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.2 inches)

Interpretive groups

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

Minor Components

Baile

Percent of map unit: 10 percent
Landform: Swales, drainageways
Landform position (two-dimensional): Backslope, footslope, toeslope
Landform position (three-dimensional): Interfluve, head slope, base slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Glenelg

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex, concave, linear
Hydric soil rating: No

Ha—Hatboro silt loam

Map Unit Setting

National map unit symbol: l54h
Elevation: 200 to 800 feet
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 140 to 200 days

Farmland classification: Not prime farmland

Map Unit Composition

Hatboro and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hatboro

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Alluvium derived from metamorphic and sedimentary rock

Typical profile

Ap - 0 to 9 inches: silt loam
Bg - 9 to 44 inches: silt loam
Cg - 44 to 56 inches: sandy clay loam
C - 56 to 70 inches: stratified gravelly sand to clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 60 to 99 inches to lithic bedrock
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Glenville

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

MaB—Manor loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2z1vg
Elevation: 250 to 1,000 feet
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 145 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Manor

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist

Typical profile

A1 - 0 to 2 inches: loam
A2 - 2 to 6 inches: sandy loam
Bw1 - 6 to 13 inches: fine sandy loam
Bw2 - 13 to 22 inches: fine sandy loam
C1 - 22 to 30 inches: fine sandy loam
C2 - 30 to 44 inches: channery sand
C3 - 44 to 53 inches: loamy sand
C4 - 53 to 83 inches: channery loamy sand
Cr - 83 to 108 inches: bedrock
R - 108 to 138 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 60 to 100 inches to paralithic bedrock; 100 to 128 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.07 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

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

Minor Components

Glenelg

Percent of map unit: 10 percent
Landform: Hillslopes, interfluves
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Glenville

Percent of map unit: 5 percent
Landform: Drainageways, swales
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Base slope, interfluve, head slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

MaC—Manor loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2tkpw
Elevation: 50 to 1,080 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Manor

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Parent material: Residuum weathered from mica schist

Typical profile

A1 - 0 to 2 inches: loam
A2 - 2 to 6 inches: sandy loam
Bw1 - 6 to 13 inches: fine sandy loam
Bw2 - 13 to 22 inches: fine sandy loam
C1 - 22 to 30 inches: fine sandy loam
C2 - 30 to 44 inches: channery coarse sand
C3 - 44 to 53 inches: loamy sand
C4 - 53 to 83 inches: channery loamy sand
Cr - 83 to 108 inches: bedrock
R - 108 to 138 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 59 to 100 inches to paralithic bedrock; 100 to 128 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.07 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Glenville

Percent of map unit: 5 percent
Landform: Drainageways, swales
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Mt. airy

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Blocktown

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope

Landform position (three-dimensional): Side slope, interfluve, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

UgB—Urban land, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2dtyq
Elevation: 800 to 1,500 feet
Mean annual precipitation: 36 to 46 inches
Mean annual air temperature: 41 to 62 degrees F
Frost-free period: 130 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Pavement, buildings and other artifically covered areas human transported material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Minor Components

Udorthents, unstable fill

Percent of map unit: 10 percent
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

UugB—Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2dtz7
Elevation: 200 to 2,000 feet

Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 235 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Udorthents, schist and gneiss, and similar soils: 15 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Pavement, buildings and other artifically covered areas

Typical profile

C - 0 to 6 inches: variable

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 to 99 inches to lithic bedrock
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Udorthents, Schist And Gneiss

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Graded areas of schist and/or gneiss

Typical profile

Ap - 0 to 6 inches: loam
C - 6 to 40 inches: silty clay loam
R - 40 to 60 inches: bedrock

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 70 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 60 inches
Frequency of flooding: None

Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

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

Minor Components

Glenelg

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Baile

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

Edgemont

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Gladstone

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Glenville

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

UugD—Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2dtz8
Elevation: 200 to 2,000 feet
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 235 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Udorthents, schist and gneiss, and similar soils: 15 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Pavement, buildings and other artifically covered areas

Typical profile

C - 0 to 6 inches: variable

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: 10 to 99 inches to lithic bedrock
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Udorthents, Schist And Gneiss

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Graded areas of schist and/or gneiss

Typical profile

Ap - 0 to 6 inches: loam
C - 6 to 40 inches: silty clay loam
R - 40 to 60 inches: bedrock

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: 20 to 70 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

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

Minor Components

Glenelg

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Baile

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

Edgemont

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Gladstone

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope, side slope

Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Glenville

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

NOAA Atlas 14, Volume 2, Version 3
Location name: Jenkintown, Pennsylvania, USA*
Latitude: 40.0905°, Longitude: -75.1274°
Elevation: 298.63 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.345 (0.315-0.379)	0.412 (0.376-0.452)	0.486 (0.442-0.533)	0.540 (0.490-0.592)	0.605 (0.546-0.662)	0.651 (0.585-0.713)	0.696 (0.623-0.764)	0.736 (0.655-0.812)	0.786 (0.693-0.872)	0.823 (0.720-0.918)
10-min	0.552 (0.504-0.606)	0.659 (0.601-0.723)	0.779 (0.708-0.854)	0.864 (0.784-0.947)	0.964 (0.871-1.06)	1.04 (0.931-1.14)	1.11 (0.989-1.22)	1.17 (1.04-1.29)	1.24 (1.10-1.38)	1.30 (1.13-1.45)
15-min	0.690 (0.629-0.757)	0.828 (0.755-0.909)	0.985 (0.896-1.08)	1.09 (0.992-1.20)	1.22 (1.10-1.34)	1.31 (1.18-1.44)	1.40 (1.25-1.54)	1.47 (1.31-1.63)	1.57 (1.38-1.74)	1.63 (1.42-1.81)
30-min	0.946 (0.863-1.04)	1.14 (1.04-1.25)	1.40 (1.27-1.53)	1.58 (1.44-1.74)	1.81 (1.64-1.98)	1.98 (1.78-2.17)	2.14 (1.92-2.35)	2.29 (2.04-2.53)	2.49 (2.19-2.76)	2.64 (2.30-2.94)
60-min	1.18 (1.08-1.29)	1.44 (1.31-1.58)	1.80 (1.63-1.97)	2.06 (1.87-2.26)	2.41 (2.18-2.64)	2.68 (2.41-2.94)	2.95 (2.64-3.24)	3.22 (2.86-3.55)	3.57 (3.15-3.96)	3.85 (3.36-4.29)
2-hr	1.42 (1.29-1.56)	1.72 (1.57-1.90)	2.16 (1.96-2.38)	2.50 (2.26-2.75)	2.96 (2.65-3.24)	3.32 (2.96-3.64)	3.68 (3.26-4.05)	4.05 (3.57-4.46)	4.56 (3.96-5.05)	4.95 (4.26-5.51)
3-hr	1.55 (1.41-1.72)	1.89 (1.71-2.08)	2.37 (2.15-2.62)	2.75 (2.48-3.03)	3.27 (2.93-3.60)	3.67 (3.28-4.05)	4.10 (3.64-4.53)	4.54 (3.98-5.02)	5.13 (4.45-5.71)	5.61 (4.80-6.27)
6-hr	1.95 (1.77-2.15)	2.36 (2.14-2.61)	2.95 (2.68-3.26)	3.44 (3.10-3.79)	4.12 (3.69-4.54)	4.69 (4.17-5.17)	5.29 (4.66-5.84)	5.93 (5.17-6.55)	6.84 (5.85-7.62)	7.59 (6.39-8.49)
12-hr	2.37 (2.17-2.62)	2.86 (2.62-3.17)	3.61 (3.30-3.99)	4.24 (3.85-4.68)	5.17 (4.64-5.69)	5.96 (5.30-6.56)	6.82 (5.98-7.53)	7.77 (6.71-8.62)	9.17 (7.74-10.2)	10.4 (8.58-11.6)
24-hr	2.74 (2.53-2.97)	3.30 (3.05-3.59)	4.17 (3.85-4.53)	4.90 (4.51-5.31)	5.97 (5.46-6.45)	6.87 (6.25-7.43)	7.86 (7.10-8.49)	8.94 (8.00-9.65)	10.5 (9.30-11.4)	11.9 (10.4-12.9)
2-day	3.15 (2.90-3.43)	3.81 (3.50-4.14)	4.82 (4.43-5.24)	5.65 (5.18-6.13)	6.84 (6.25-7.42)	7.84 (7.12-8.50)	8.92 (8.05-9.66)	10.1 (9.02-10.9)	11.8 (10.4-12.8)	13.2 (11.5-14.3)
3-day	3.33 (3.08-3.62)	4.02 (3.72-4.37)	5.06 (4.67-5.50)	5.92 (5.45-6.41)	7.14 (6.54-7.72)	8.15 (7.44-8.82)	9.24 (8.38-9.99)	10.4 (9.37-11.3)	12.1 (10.8-13.1)	13.5 (11.9-14.6)
4-day	3.52 (3.26-3.81)	4.24 (3.93-4.59)	5.31 (4.92-5.75)	6.19 (5.72-6.69)	7.43 (6.84-8.03)	8.46 (7.76-9.14)	9.56 (8.72-10.3)	10.7 (9.73-11.6)	12.4 (11.1-13.4)	13.8 (12.3-14.9)
7-day	4.11 (3.83-4.43)	4.93 (4.59-5.32)	6.10 (5.68-6.59)	7.07 (6.57-7.63)	8.46 (7.82-9.12)	9.61 (8.86-10.3)	10.8 (9.92-11.7)	12.1 (11.1-13.1)	14.0 (12.6-15.1)	15.5 (13.9-16.8)
10-day	4.67 (4.38-5.01)	5.59 (5.23-5.99)	6.82 (6.37-7.32)	7.82 (7.29-8.38)	9.22 (8.56-9.87)	10.3 (9.58-11.1)	11.5 (10.6-12.3)	12.7 (11.7-13.6)	14.5 (13.2-15.5)	15.9 (14.3-17.1)
20-day	6.32 (5.97-6.71)	7.50 (7.09-7.96)	8.96 (8.46-9.51)	10.1 (9.53-10.7)	11.7 (11.0-12.4)	12.9 (12.1-13.7)	14.1 (13.2-15.0)	15.4 (14.3-16.3)	17.1 (15.8-18.1)	18.4 (16.9-19.5)
30-day	7.87 (7.47-8.28)	9.28 (8.80-9.77)	10.8 (10.3-11.4)	12.1 (11.4-12.7)	13.6 (12.9-14.4)	14.9 (14.0-15.6)	16.1 (15.1-16.9)	17.2 (16.2-18.2)	18.8 (17.5-19.8)	19.9 (18.5-21.1)
45-day	10.0 (9.55-10.5)	11.8 (11.2-12.4)	13.6 (12.9-14.2)	14.9 (14.2-15.6)	16.6 (15.8-17.4)	17.9 (17.0-18.7)	19.1 (18.1-20.0)	20.2 (19.1-21.2)	21.6 (20.4-22.8)	22.7 (21.3-23.9)
60-day	12.0 (11.5-12.6)	14.1 (13.4-14.7)	16.1 (15.3-16.8)	17.5 (16.7-18.4)	19.4 (18.5-20.3)	20.8 (19.8-21.8)	22.0 (20.9-23.1)	23.2 (22.0-24.3)	24.7 (23.4-25.9)	25.7 (24.3-27.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

NOAA Atlas 14, Volume 2, Version 3
Location name: Jenkintown, Pennsylvania, USA*
Latitude: 40.0905°, Longitude: -75.1274°
Elevation: 298.63 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.14 (3.78-4.55)	4.94 (4.51-5.42)	5.83 (5.30-6.40)	6.48 (5.88-7.10)	7.26 (6.55-7.94)	7.81 (7.02-8.56)	8.35 (7.48-9.17)	8.83 (7.86-9.74)	9.43 (8.32-10.5)	9.88 (8.64-11.0)
10-min	3.31 (3.02-3.64)	3.95 (3.61-4.34)	4.67 (4.25-5.12)	5.18 (4.70-5.68)	5.78 (5.23-6.34)	6.22 (5.59-6.82)	6.64 (5.93-7.29)	7.00 (6.23-7.73)	7.46 (6.58-8.27)	7.78 (6.80-8.67)
15-min	2.76 (2.52-3.03)	3.31 (3.02-3.64)	3.94 (3.58-4.32)	4.37 (3.97-4.79)	4.89 (4.42-5.35)	5.25 (4.72-5.76)	5.59 (5.00-6.14)	5.89 (5.24-6.50)	6.26 (5.52-6.94)	6.51 (5.69-7.26)
30-min	1.89 (1.73-2.08)	2.29 (2.09-2.51)	2.80 (2.55-3.07)	3.17 (2.88-3.47)	3.62 (3.27-3.96)	3.95 (3.55-4.33)	4.28 (3.83-4.70)	4.59 (4.08-5.06)	4.98 (4.39-5.52)	5.27 (4.61-5.88)
60-min	1.18 (1.08-1.29)	1.44 (1.31-1.58)	1.80 (1.63-1.97)	2.06 (1.87-2.26)	2.41 (2.18-2.64)	2.68 (2.41-2.94)	2.95 (2.64-3.24)	3.22 (2.86-3.55)	3.57 (3.15-3.96)	3.85 (3.36-4.29)
2-hr	0.708 (0.643-0.780)	0.862 (0.782-0.949)	1.08 (0.981-1.19)	1.25 (1.13-1.37)	1.48 (1.33-1.62)	1.66 (1.48-1.82)	1.84 (1.63-2.02)	2.02 (1.78-2.23)	2.28 (1.98-2.53)	2.48 (2.13-2.76)
3-hr	0.517 (0.469-0.571)	0.628 (0.570-0.693)	0.791 (0.715-0.872)	0.916 (0.827-1.01)	1.09 (0.976-1.20)	1.22 (1.09-1.35)	1.37 (1.21-1.51)	1.51 (1.33-1.67)	1.71 (1.48-1.90)	1.87 (1.60-2.09)
6-hr	0.325 (0.296-0.359)	0.393 (0.358-0.435)	0.493 (0.447-0.544)	0.574 (0.518-0.632)	0.689 (0.617-0.759)	0.783 (0.696-0.863)	0.883 (0.778-0.975)	0.990 (0.863-1.09)	1.14 (0.977-1.27)	1.27 (1.07-1.42)
12-hr	0.196 (0.180-0.218)	0.238 (0.217-0.263)	0.300 (0.273-0.331)	0.352 (0.319-0.389)	0.429 (0.385-0.472)	0.495 (0.440-0.545)	0.566 (0.497-0.625)	0.645 (0.557-0.715)	0.761 (0.643-0.850)	0.859 (0.712-0.965)
24-hr	0.114 (0.105-0.124)	0.138 (0.127-0.150)	0.174 (0.161-0.189)	0.204 (0.188-0.221)	0.249 (0.227-0.269)	0.286 (0.260-0.310)	0.328 (0.296-0.354)	0.373 (0.333-0.402)	0.439 (0.387-0.474)	0.495 (0.431-0.536)
2-day	0.066 (0.060-0.071)	0.079 (0.073-0.086)	0.100 (0.092-0.109)	0.118 (0.108-0.128)	0.142 (0.130-0.154)	0.163 (0.148-0.177)	0.186 (0.168-0.201)	0.210 (0.188-0.228)	0.245 (0.217-0.266)	0.274 (0.240-0.298)
3-day	0.046 (0.043-0.050)	0.056 (0.052-0.061)	0.070 (0.065-0.076)	0.082 (0.076-0.089)	0.099 (0.091-0.107)	0.113 (0.103-0.122)	0.128 (0.116-0.139)	0.145 (0.130-0.156)	0.168 (0.150-0.182)	0.187 (0.165-0.203)
4-day	0.037 (0.034-0.040)	0.044 (0.041-0.048)	0.055 (0.051-0.060)	0.064 (0.060-0.070)	0.077 (0.071-0.084)	0.088 (0.081-0.095)	0.100 (0.091-0.108)	0.112 (0.101-0.121)	0.129 (0.116-0.140)	0.143 (0.128-0.155)
7-day	0.024 (0.023-0.026)	0.029 (0.027-0.032)	0.036 (0.034-0.039)	0.042 (0.039-0.045)	0.050 (0.047-0.054)	0.057 (0.053-0.062)	0.065 (0.059-0.069)	0.072 (0.066-0.078)	0.083 (0.075-0.090)	0.093 (0.083-0.100)
10-day	0.019 (0.018-0.021)	0.023 (0.022-0.025)	0.028 (0.027-0.030)	0.033 (0.030-0.035)	0.038 (0.036-0.041)	0.043 (0.040-0.046)	0.048 (0.044-0.051)	0.053 (0.049-0.057)	0.060 (0.055-0.065)	0.066 (0.060-0.071)
20-day	0.013 (0.012-0.014)	0.016 (0.015-0.017)	0.019 (0.018-0.020)	0.021 (0.020-0.022)	0.024 (0.023-0.026)	0.027 (0.025-0.028)	0.029 (0.027-0.031)	0.032 (0.030-0.034)	0.036 (0.033-0.038)	0.038 (0.035-0.041)
30-day	0.011 (0.010-0.011)	0.013 (0.012-0.014)	0.015 (0.014-0.016)	0.017 (0.016-0.018)	0.019 (0.018-0.020)	0.021 (0.019-0.022)	0.022 (0.021-0.023)	0.024 (0.022-0.025)	0.026 (0.024-0.028)	0.028 (0.026-0.029)
45-day	0.009 (0.009-0.010)	0.011 (0.010-0.011)	0.013 (0.012-0.013)	0.014 (0.013-0.014)	0.015 (0.015-0.016)	0.017 (0.016-0.017)	0.018 (0.017-0.019)	0.019 (0.018-0.020)	0.020 (0.019-0.021)	0.021 (0.020-0.022)
60-day	0.008 (0.008-0.009)	0.010 (0.009-0.010)	0.011 (0.011-0.012)	0.012 (0.012-0.013)	0.013 (0.013-0.014)	0.014 (0.014-0.015)	0.015 (0.015-0.016)	0.016 (0.015-0.017)	0.017 (0.016-0.018)	0.018 (0.017-0.019)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

STANDARD E&S WORKSHEET # 22

PLAN PREPARER RECORD OF TRAINING AND EXPERIENCE IN EROSION AND SEDIMENT POLLUTION CONTROL METHODS AND TECHNIQUES

NAME OF PLAN PREPARER: John Alejnikov, P.E.

FORMAL EDUCATION:

Name of College or Technical Institute: University of Delaware

Curriculum or Program: Civil Engineering

Dates of Attendance: **From:** September 2007 **To:** May 2011

Degree Received: Bachelor of Civil Engineering

OTHER TRAINING:

Name of Training: _____ **Presented By:** _____

Date: _____ _____

EMPLOYMENT HISTORY:

Current Employer: Bohler Engineering PA, LLC

Telephone: (215) 996-9100

Former Employer: _____

Telephone: _____

RECENT E&S PLANS PREPARED:

Name of Project:	Truck Facility	Wawa Plymouth	Giant Expansion
County:	Bucks	Montgomery	Chester
Municipality:	Bensalem Township	Plymouth Township	Westtown Township
Permit Number:	PAG02000915064	PAG02004615074	PAG02001516023
Approving Agency:	BCCD	MCCD	CCCD

Net Change in Volume and Rate of Stormwater & Supporting Calculations

§102.8(f)(4) & §102.8(f)(8)

General Information

Instructions | *General* | Volume | Rate | Quality

Project Name: **Proposed Retail Facility**

Application Type:

County: **Montgomery**

Municipality:

Project Type: **Other**

◉ New Project ○ Minor / Major Amendment

Area: **3.67** acres
(In Watershed)

Total Earth Disturbance: **3.61** acres
(In Watershed)

No. of Post-Construction Discharge Points: **2**

Start DP Numbering at: **001**

Discharge Point (DP) No.	Drainage Area (DA) (acres)	Earth Disturbance in DA (acres)	Existing Impervious in DA (acres)	Proposed Impervious in DA (acres)	Receiving Waters	Ch. 93 Class	Structural BMP(s)
001	1.34	1.34	1.28	1.29	Tacony Creek	WWF, MF	Yes
002	0.98	0.98	0.89	0.87	Tacony Creek	WWF, MF	Yes
Undetained Areas	1.29	1.29	0.98	0.77	Tacony Creek	WWF, MF	
Totals:	**3.61**	**3.61**	**3.15**	**2.93**			

Volume Management

Project: Proposed Retail Facility

Instructions | General | *Volume* | Rate | Quality

2-Year / 24-Hour Storm Event (NOAA Atlas 14): **3.3** inches

Alternative 2-Year / 24-Hour Storm Event: inches

Alternative Source:

Pre-Construction Conditions: *No. Rows:* **3**

☐ *Exempt from Meadow in Good Condition* ☑ *Automatically Calculate CN, Ia, Runoff and Volume*

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Pervious as Meadow	0.46	C	71	0.817	0.94	1,568
Impervious as Meadow	0.63	C	71	0.817	0.94	2,147
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	2.52	C	98	0.041	3.07	28,057
TOTAL (ACRES):	**3.61**				**TOTAL (CF):**	**31,771**

Post-Construction Conditions: *No. Rows:* **2**

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	0.68	C	74	0.703	1.10	2,725
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	2.93	C	98	0.041	3.07	32,622
TOTAL (ACRES):	**3.61**				**TOTAL (CF):**	**35,347**

NET CHANGE IN VOLUME TO MANAGE (CF): **3,575**

Non-Structural BMP Volume Credits:

☐ Tree Planting Credit

☐ Other (attach calculations):

Structural BMP Volume Credits: *No. Structural BMPs:* **3** *Start BMP Numbering at:* **1**

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated Area (SF)	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
001	1	Infiltration Bed	-	Off-Site	1.34	14,595	4,997	0.75	54	No		5,098	**8,471**	
002	2	Dry Extended Detention Basin	-	Off-Site	0.75	7,832	1,826		28	No				
002	3	Dry Extended Detention Basin	-	Off-Site	0.23	2,367	2,608		34	No				
												Totals:	**8,471**	

INFILTRATION & ET CREDITS (CF):	**8,471**
NET CHANGE IN VOLUME TO MANAGE (CF):	**3,575**
TOTAL CREDITS (CF):	**8,471**

VOLUME REQUIREMENT SATISFIED

Rate Control

Project: Proposed Retail Facility

Instructions | General | Volume | *Rate* | Quality

Precipitation Amounts:

NOAA 2-Year 24-Hour Storm Event (in):	**3.3**	Alternative 2-Year 24-Hour Storm Event (in):	
NOAA 10-Year 24-Hour Storm Event (in):		Alternative 10-Year 24-Hour Storm Event (in):	
NOAA 50-Year 24-Hour Storm Event (in):		Alternative 50-Year 24-Hour Storm Event (in):	
NOAA 100-Year 24-Hour Storm Event (in):		Alternative 100-Year 24-Hour Storm Event (in):	

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☑ **Report Summary of Peak Rates Only**

Attach model input and output data or other calculations to support the rates reported below.

	Peak Discharge Rates (cfs)			
	Pre-Construction	**Post-Construction**	**Net Change**	
2-Year Storm:	**14.89**	**5.30**	**-9.59**	***Rate Control Satisfied***
10-Year Storm:	**22.80**	**8.53**	**-14.27**	***Rate Control Satisfied***
50-Year Storm:	**32.75**	**25.28**	**-7.47**	***Rate Control Satisfied***
100-Year Storm:	**37.80**	**31.68**	**-6.12**	***Rate Control Satisfied***

DP No.	BMP No.	BMP Name	MRC?	Inflow to BMP (cfs)				Outflow from BMP (cfs)			
				2-yr	10-yr	50-yr	100-yr	2-yr	10-yr	50-yr	100-yr
001	1	Infiltration Bed	-	6.14	9.22	13.01	14.92	0.41	2.27	10.41	13.33

002	2	Dry Extended Detention Basin	-	3.31	5.03	7.16	8.23	2.09	2.82	3.68	5.85
002	3	Dry Extended Detention Basin	-	1.00	1.53	2.18	2.51	0.42	2.82	5.17	7.24

Water Quality

Project: Proposed Retail Facility

PRINT

Instructions | General | Volume | Rate | *Quality*

Pre-Construction Pollutant Loads:

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Pervious as Meadow	Grassland/Herbaceous	0.46	C	1,568	48.8	0.22	2.30	4.78	0.02	0.23
Impervious as Meadow	Grassland/Herbaceous	0.63	C	2,147	48.8	0.22	2.30	6.54	0.03	0.31
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	Residential	2.52	C	28,057	65.0	0.29	2.05	113.88	0.51	3.59
	TOTAL (ACRES):	**3.61**					**TOTALS:**	**125.20**	**0.56**	**4.12**

Post-Construction Pollutant Loads (without BMPs):

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	Open Space	0.68	C	2,725	78.0	0.25	1.25	13.27	0.04	0.21
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	Residential	2.93	C	32,622	65.0	0.29	2.05	132.40	0.59	4.18

TOTAL (ACRES):	3.61	TOTALS:	145.68	0.63	4.39

POLLUTANT LOAD REDUCTION REQUIREMENTS (LBS):	20.48	0.07	0.26

☐ **Characterize Undetained Areas (for Untreated Stormwater)**

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)

Non-Structural BMP Water Quality Credits:

☐ Pervious Undetained Area Credit

☐ Other (attach calculations)

Structural BMP Water Quality Credits:

☑ *Use default BMP Outflows and Median BMP Outflow Concentrations*

DP No.	BMP No.	BMP Name	MRC?	BMP DA (acres)	Vol. Routed to BMP (CF)	Inf. & ET Credits (CF)	Capture & Buffer Credits (CF)	Outflow (CF)	Outflow Conc. (mg/L)			Pollutant Loads (lbs)		
									TSS	TP	TN	TSS	TP	TN
001	1	Infiltration Bed	-	1.34	14,595	8,471		6,124	22.00	0.10	2.38	8.41	0.04	0.91
002	2	Dry Extended Detention Basin	-	0.75	7,832			7,832	22.00	0.19	1.22	10.76	0.09	0.60
002	3	Dry Extended Detention Basin	-	0.23	2,367			2,367	22.00	0.19	1.22	3.25	0.03	0.18

	TSS	TP	TN
POLLUTANT LOADS FROM STRUCTURAL BMP (TREATED) OUTFLOWS (LBS):	22.42	0.16	1.69
POLLUTANT LOADS FROM UNTREATED STORMWATER (LBS):	43.49	0.19	1.31
NON-STRUCTURAL BMP WATER QUALITY CREDITS (LBS):			

NET POLLUTANT LOADS FROM SITE, POST-CONSTRUCTION (LBS):	**65.91**	**0.35**	**3.00**
POLLUTANT LOADS FROM SITE, PRE-CONSTRUCTION (LBS):	**125.20**	**0.56**	**4.12**

WATER QUALITY REQUIREMENT SATISFIED

CERTIFICATION

I certify under penalty of law and subject to the penalties of 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities) that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that the structure, function, and calculations contained in this spreadsheet have not been modified in comparison to the spreadsheet DEP has posted to its website or, if modifications were made, an explanation of the modifications made is attached to this spreadsheet.

Alex Walsh	5/13/2022
Spreadsheet User Name	Date

Summary of Peak Flow Rates

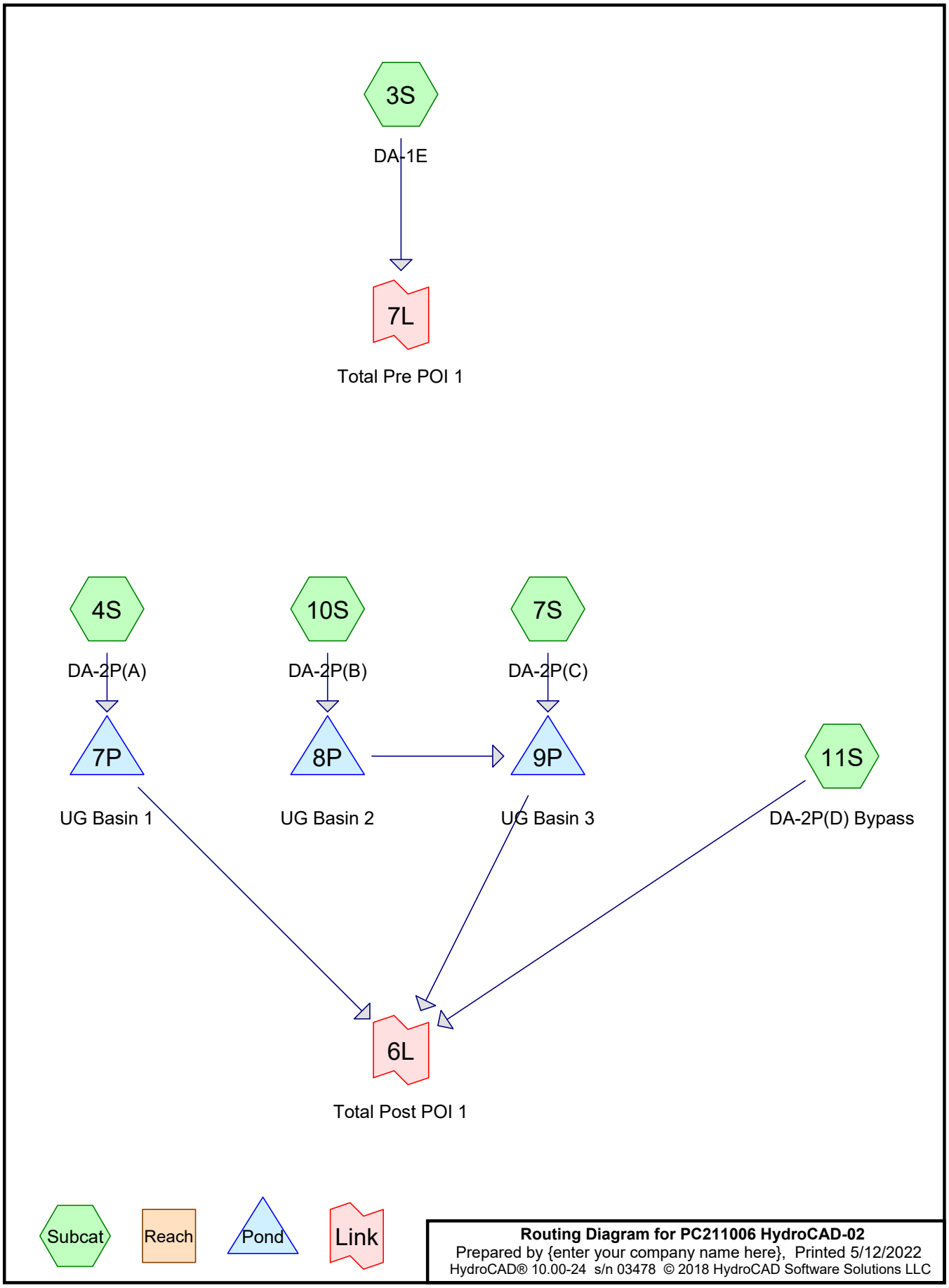
Project: Proposed Retail Facility

Runoff Rates (cfs)

Storm Frequency	1 yr	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
Pre-Development*	12.19	14.89	19.17	22.80	28.18	32.75	37.80
Post Development Allowed**	N/A	12.19	14.89	19.17	22.80	28.18	32.75
Total Post-Development Combined to POI #1	**4.11**	**5.30**	**7.06**	**8.53**	**17.49**	**25.28**	**31.68**
		Good	Good	Good	Good	Good	Good

** - Permitted post-development peak rates are based on the requirements of the Borough of Jenkintown Stormwater Management Ordinance, as follows:

- **2-year storm post-development must be less than 1-year storm pre-development**
- **5-year storm post-development must be less than 2-year storm pre-development**
- **10-year storm post-development must be less than 5-year storm pre-development**
- **25-year storm post-development must be less than 10-year storm pre-development**
- **50-year storm post-development must be less than 25-year storm pre-development**
- **100-year storm post-development must be less than 50-year storm pre-development**


3S
DA-1E
7L
Total Pre POI 1
4S
DA-2P(A)
10S
DA-2P(B)
7S
DA-2P(C)
7P
UG Basin 1
8P
UG Basin 2
9P
UG Basin 3
11S
DA-2P(D) Bypass
6L
Total Post POI 1
Subcat
Reach
Pond
Link
Routing Diagram for PC211006 HydroCAD-02
Prepared by {enter your company name here}, Printed 5/12/2022
HydroCAD® 10.00-24 s/n 03478 © 2018 HydroCAD Software Solutions LLC

Summary for Subcatchment 3S: DA-1E

Runoff = 37.803 cfs @ 11.97 hrs, Volume= 92,162 cf, Depth= 7.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=7.86"

Area (ac)	CN	Description
0.460	58	Meadow, non-grazed, HSG B
3.150	98	Paved parking, HSG B
3.610		Weighted Average
0.460		12.74% Pervious Area
3.150		87.26% Impervious Area

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

Summary for Subcatchment 4S: DA-2P(A)

Runoff = 14.922 cfs @ 11.97 hrs, Volume= 36,618 cf, Depth= 7.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=7.86"

	Area (ac)	CN	Description
*	0.050	77	>75% Grass cover, Good, HSG C
	1.290	98	Paved parking, HSG C
	1.340		Weighted Average
	0.050		3.73% Pervious Area
	1.290		96.27% Impervious Area

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

Summary for Subcatchment 7S: DA-2P(C)

Runoff = 2.512 cfs @ 11.97 hrs, Volume= 6,093 cf, Depth= 7.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=7.86"

	Area (ac)	CN	Description
*	0.030	77	>75% Grass cover, Good, HSG C
	0.200	98	Paved parking, HSG C
	0.230		Weighted Average
	0.030		13.04% Pervious Area
	0.200		86.96% Impervious Area

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

Summary for Subcatchment 10S: DA-2P(B)

Runoff = 8.232 cfs @ 11.97 hrs, Volume= 20,028 cf, Depth= 7.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=7.86"

	Area (ac)	CN	Description
*	0.080	77	>75% Grass cover, Good, HSG C
	0.670	98	Paved parking, HSG C
	0.750		Weighted Average
	0.080		10.67% Pervious Area
	0.670		89.33% Impervious Area

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

Summary for Subcatchment 11S: DA-2P(D) Bypass

Runoff = 13.282 cfs @ 11.97 hrs, Volume= 31,013 cf, Depth= 6.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=7.86"

	Area (ac)	CN	Description
*	0.520	77	>75% Grass cover, Good, HSG C
	0.770	98	Paved parking, HSG C
	1.290		Weighted Average
	0.520		40.31% Pervious Area
	0.770		59.69% Impervious Area

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

Summary for Pond 7P: UG Basin 1

Inflow Area = 58,370 sf, 96.27% Impervious, Inflow Depth = 7.53" for 100-yr event
Inflow = 14.922 cfs @ 11.97 hrs, Volume= 36,618 cf
Outflow = 13.329 cfs @ 12.00 hrs, Volume= 31,494 cf, Atten= 11%, Lag= 2.2 min
Primary = 13.329 cfs @ 12.00 hrs, Volume= 31,494 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 294.18' @ 12.00 hrs Surf.Area= 4,997 sf Storage= 15,384 cf

Plug-Flow detention time= 246.1 min calculated for 31,491 cf (86% of inflow)
Center-of-Mass det. time= 179.9 min (918.9 - 739.0)

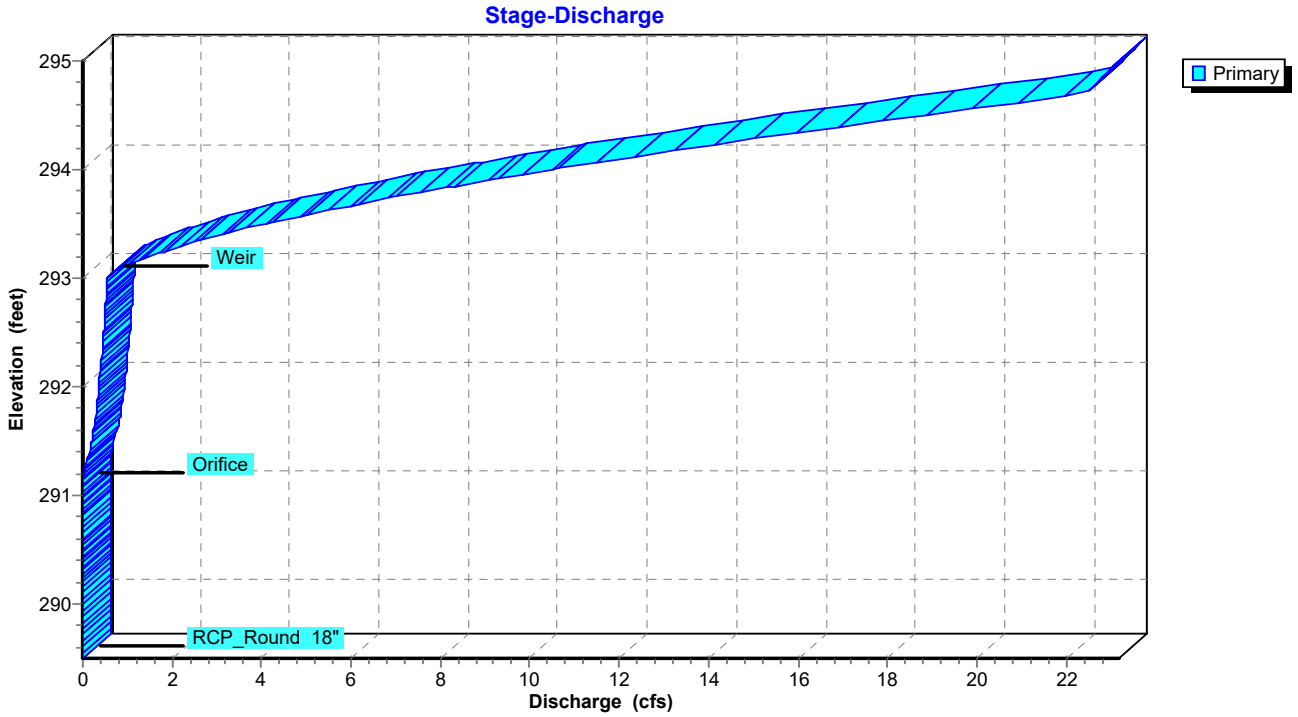
Volume	Invert	Avail.Storage	Storage Description
#1A	289.50'	6,976 cf	**37.08'W x 134.76'L x 5.50'H Field A** 27,485 cf Overall - 10,045 cf Embedded = 17,441 cf x 40.0% Voids
#2A	290.25'	10,045 cf	**ADS_StormTech MC-3500 d +Cap**x 90 Inside #1 Effective Size= 70.4"W x 45.0"H => 15.33 sf x 7.17'L = 110.0 cf Overall Size= 77.0"W x 45.0"H x 7.50'L with 0.33' Overlap 90 Chambers in 5 Rows Cap Storage= +14.9 cf x 2 x 5 rows = 149.0 cf
		17,021 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	289.50'	**18.00" Round RCP_Round 18"** L= 50.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 289.50' / 287.00' S= 0.0500 '/' Cc= 0.900 n= 0.015, Flow Area= 1.77 sf
#2	Device 1	291.10'	**4.00" Vert. Orifice** C= 0.600
#3	Device 1	293.00'	**Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 1.00 2.00 Width (feet) 3.00 3.00 3.00 3.00

Primary OutFlow Max=13.302 cfs @ 12.00 hrs HW=294.18' TW=0.00' (Dynamic Tailwater)
└─**1=RCP_Round 18"** (Passes 13.302 cfs of 21.083 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.717 cfs @ 8.22 fps)
  └─**3=Weir** (Weir Controls 12.585 cfs @ 3.56 fps)

Pond 7P: UG Basin 1



Stage-Area-Storage for Pond 7P: UG Basin 1

Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
289.50	0	291.58	7,061	293.66	14,286
289.54	80	291.62	7,222	293.70	14,379
289.58	160	291.66	7,382	293.74	14,470
289.62	240	291.70	7,542	293.78	14,559
289.66	320	291.74	7,701	293.82	14,646
289.70	400	291.78	7,859	293.86	14,733
289.74	480	291.82	8,017	293.90	14,817
289.78	560	291.86	8,175	293.94	14,900
289.82	640	291.90	8,331	293.98	14,982
289.86	720	291.94	8,488	294.02	15,062
289.90	800	291.98	8,643	294.06	15,142
289.94	880	292.02	8,798	294.10	15,222
289.98	959	292.06	8,953	294.14	15,302
290.02	1,039	292.10	9,106	294.18	15,382
290.06	1,119	292.14	9,259	294.22	15,462
290.10	1,199	292.18	9,412	294.26	15,542
290.14	1,279	292.22	9,563	294.30	15,622
290.18	1,359	292.26	9,714	294.34	15,702
290.22	1,439	292.30	9,864	294.38	15,782
290.26	1,542	292.34	10,013	294.42	15,862
290.30	1,714	292.38	10,162	294.46	15,942
290.34	1,886	292.42	10,310	294.50	16,022
290.38	2,058	292.46	10,457	294.54	16,101
290.42	2,229	292.50	10,603	294.58	16,181
290.46	2,400	292.54	10,748	294.62	16,261
290.50	2,571	292.58	10,892	294.66	16,341
290.54	2,742	292.62	11,035	294.70	16,421
290.58	2,912	292.66	11,178	294.74	16,501
290.62	3,082	292.70	11,319	294.78	16,581
290.66	3,251	292.74	11,460	294.82	16,661
290.70	3,421	292.78	11,599	294.86	16,741
290.74	3,590	292.82	11,737	294.90	16,821
290.78	3,759	292.86	11,874	294.94	16,901
290.82	3,927	292.90	12,010	294.98	**16,981**
290.86	4,096	292.94	12,145		
290.90	4,264	292.98	12,279		
290.94	4,431	293.02	12,411		
290.98	4,599	293.06	12,542		
291.02	4,765	293.10	12,671		
291.06	4,932	293.14	12,800		
291.10	5,098	293.18	12,926		
291.14	5,264	293.22	13,051		
291.18	5,430	293.26	13,175		
291.22	5,595	293.30	13,297		
291.26	5,759	293.34	13,417		
291.30	5,924	293.38	13,535		
291.34	6,087	293.42	13,651		
291.38	6,251	293.46	13,764		
291.42	6,414	293.50	13,875		
291.46	6,576	293.54	13,983		
291.50	6,739	293.58	14,088		
291.54	6,900	293.62	14,189		

Summary for Pond 8P: UG Basin 2

Inflow Area = 32,670 sf, 89.33% Impervious, Inflow Depth = 7.36" for 100-yr event
Inflow = 8.232 cfs @ 11.97 hrs, Volume= 20,028 cf
Outflow = 5.849 cfs @ 12.03 hrs, Volume= 20,027 cf, Atten= 29%, Lag= 3.8 min
Primary = 5.849 cfs @ 12.03 hrs, Volume= 20,027 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 289.05' @ 12.03 hrs Surf.Area= 1,826 sf Storage= 3,547 cf

Plug-Flow detention time= 12.3 min calculated for 20,027 cf (100% of inflow)
Center-of-Mass det. time= 12.1 min (754.6 - 742.4)

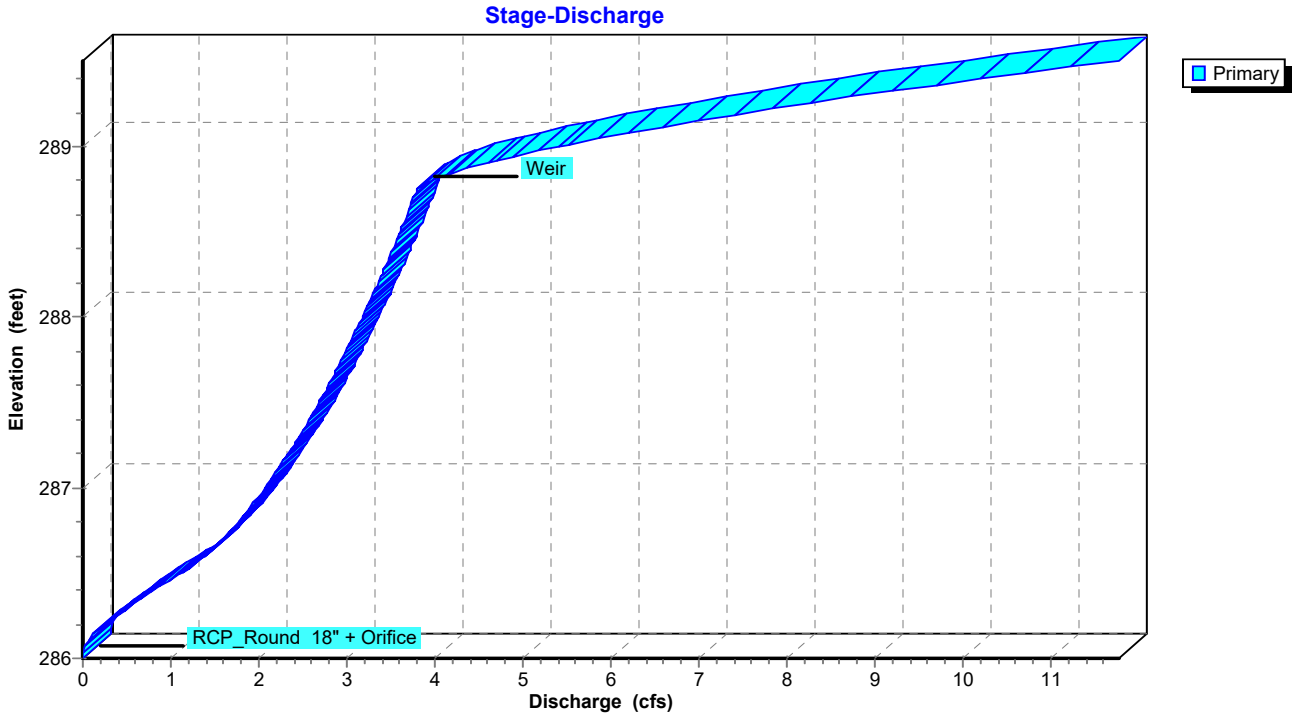
Volume	Invert	Avail.Storage	Storage Description
#1A	286.00'	1,674 cf	**20.50'W x 89.06'L x 3.50'H Field A** 6,390 cf Overall - 2,205 cf Embedded = 4,185 cf x 40.0% Voids
#2A	286.50'	2,205 cf	**ADS_StormTech SC-740 +Cap** x 48 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 48 Chambers in 4 Rows
		3,879 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	286.00'	**18.00" Round RCP_Round 18"** L= 50.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 286.00' / 285.00' S= 0.0200 '/' Cc= 0.900 n= 0.015, Flow Area= 1.77 sf
#2	Device 1	286.00'	**12.00" W x 6.00" H Vert. Orifice** C= 0.600
#3	Device 1	288.75'	**Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.75 Width (feet) 3.50 3.50

Primary OutFlow Max=5.832 cfs @ 12.03 hrs HW=289.04' TW=286.20' (Dynamic Tailwater)
└─**1=RCP_Round 18"** (Passes 5.832 cfs of 14.551 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 3.996 cfs @ 7.99 fps)
  └─**3=Weir** (Weir Controls 1.836 cfs @ 1.78 fps)

Pond 8P: UG Basin 2



Stage-Area-Storage for Pond 8P: UG Basin 2

Elevation (feet)	Storage (cubic-feet)
286.00	0
286.05	37
286.10	73
286.15	110
286.20	146
286.25	183
286.30	219
286.35	256
286.40	292
286.45	329
286.50	365
286.55	440
286.60	514
286.65	589
286.70	663
286.75	737
286.80	811
286.85	885
286.90	958
286.95	1,031
287.00	1,104
287.05	1,176
287.10	1,248
287.15	1,320
287.20	1,392
287.25	1,463
287.30	1,533
287.35	1,604
287.40	1,674
287.45	1,743
287.50	1,812
287.55	1,881
287.60	1,949
287.65	2,017
287.70	2,084
287.75	2,151
287.80	2,217
287.85	2,282
287.90	2,347
287.95	2,411
288.00	2,475
288.05	2,538
288.10	2,600
288.15	2,662
288.20	2,723
288.25	2,782
288.30	2,841
288.35	2,899
288.40	2,956
288.45	3,011
288.50	3,066
288.55	3,119
288.60	3,171
288.65	3,221
288.70	3,270
288.75	3,315
288.80	3,358
288.85	3,399
288.90	3,438
288.95	3,477
289.00	3,514
289.05	3,550
289.10	3,587
289.15	3,623
289.20	3,660
289.25	3,696
289.30	3,733
289.35	3,769
289.40	3,806
289.45	3,842
289.50	**3,879**

Summary for Pond 9P: UG Basin 3

Inflow Area = 42,689 sf, 88.78% Impervious, Inflow Depth = 7.34" for 100-yr event
Inflow = 7.689 cfs @ 12.02 hrs, Volume= 26,120 cf
Outflow = 7.243 cfs @ 12.04 hrs, Volume= 26,118 cf, Atten= 6%, Lag= 1.0 min
Primary = 7.243 cfs @ 12.04 hrs, Volume= 26,118 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 286.21' @ 12.04 hrs Surf.Area= 2,608 sf Storage= 5,276 cf

Plug-Flow detention time= 89.8 min calculated for 26,115 cf (100% of inflow)
Center-of-Mass det. time= 89.9 min (841.9 - 752.0)

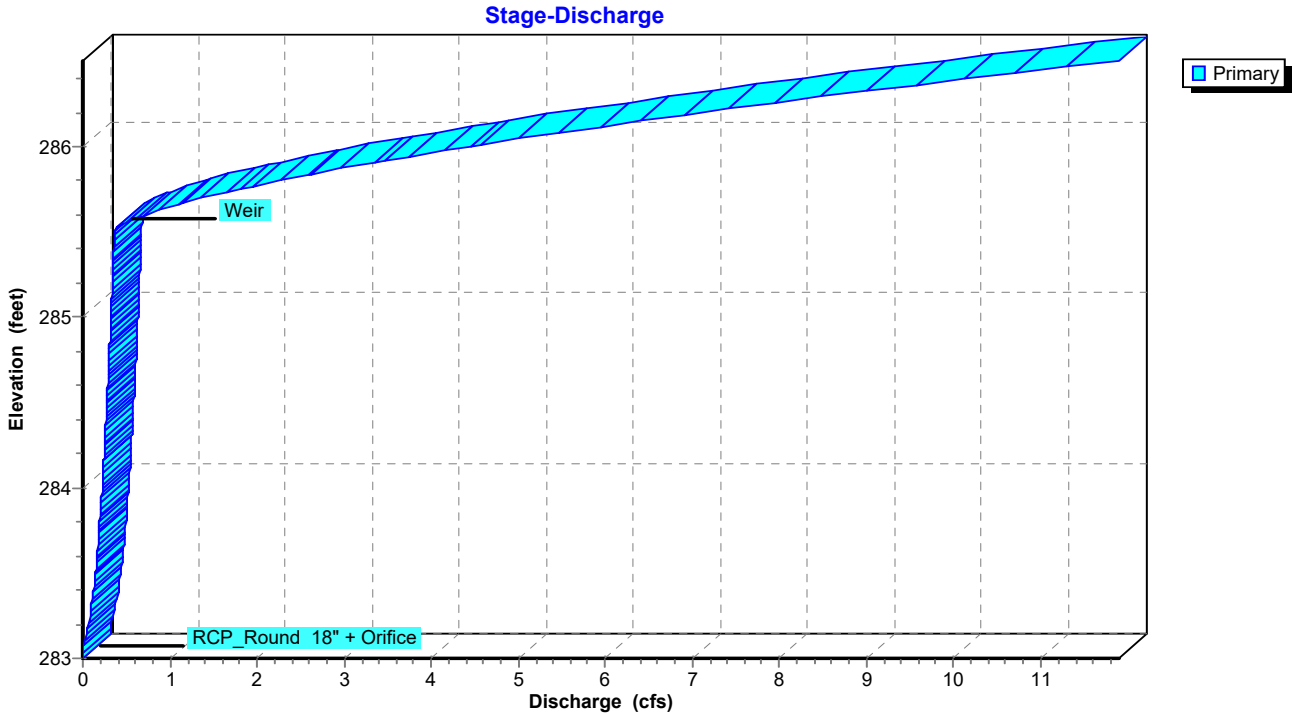
Volume	Invert	Avail.Storage	Storage Description
#1A	283.00'	2,365 cf	**25.25'W x 103.30'L x 3.50'H Field A** 9,129 cf Overall - 3,216 cf Embedded = 5,913 cf x 40.0% Voids
#2A	283.50'	3,216 cf	**ADS_StormTech SC-740 +Cap** x 70 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 70 Chambers in 5 Rows
		5,581 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	283.00'	**18.00" Round RCP_Round 18"** L= 17.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 283.00' / 282.50' S= 0.0294 '/' Cc= 0.900 n= 0.015, Flow Area= 1.77 sf
#2	Device 1	283.00'	**3.00" Vert. Orifice** C= 0.600
#3	Device 1	285.50'	**Weir, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 Width (feet) 3.50 3.50

Primary OutFlow Max=7.229 cfs @ 12.04 hrs HW=286.21' TW=0.00' (Dynamic Tailwater)
└─**1=RCP_Round 18"** (Passes 7.229 cfs of 16.583 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.415 cfs @ 8.45 fps)
  └─**3=Weir** (Weir Controls 6.814 cfs @ 2.75 fps)

Pond 9P: UG Basin 3



Stage-Area-Storage for Pond 9P: UG Basin 3

Elevation (feet)	Storage (cubic-feet)
283.00	0
283.05	52
283.10	104
283.15	156
283.20	209
283.25	261
283.30	313
283.35	365
283.40	417
283.45	469
283.50	522
283.55	629
283.60	737
283.65	845
283.70	952
283.75	1,059
283.80	1,165
283.85	1,272
283.90	1,378
283.95	1,483
284.00	1,588
284.05	1,693
284.10	1,797
284.15	1,900
284.20	2,003
284.25	2,106
284.30	2,208
284.35	2,310
284.40	2,411
284.45	2,511
284.50	2,611
284.55	2,710
284.60	2,808
284.65	2,906
284.70	3,003
284.75	3,099
284.80	3,194
284.85	3,288
284.90	3,382
284.95	3,475
285.00	3,566
285.05	3,657
285.10	3,747
285.15	3,835
285.20	3,923
285.25	4,009
285.30	4,093
285.35	4,176
285.40	4,258
285.45	4,338
285.50	4,417
285.55	4,494
285.60	4,568
285.65	4,641
285.70	4,710
285.75	4,775
285.80	4,837
285.85	4,895
285.90	4,952
285.95	5,006
286.00	5,059
286.05	5,112
286.10	5,164
286.15	5,216
286.20	5,268
286.25	5,320
286.30	5,372
286.35	5,425
286.40	5,477
286.45	5,529
286.50	**5,581**

Summary for Link 6L: Total Post POI 1

Inflow Area = 157,252 sf, 81.16% Impervious, Inflow Depth = 6.76" for 100-yr event
Inflow = 31.679 cfs @ 11.99 hrs, Volume= 88,625 cf
Primary = 31.679 cfs @ 11.99 hrs, Volume= 88,625 cf, Atten= 0%, Lag= 0.0 min

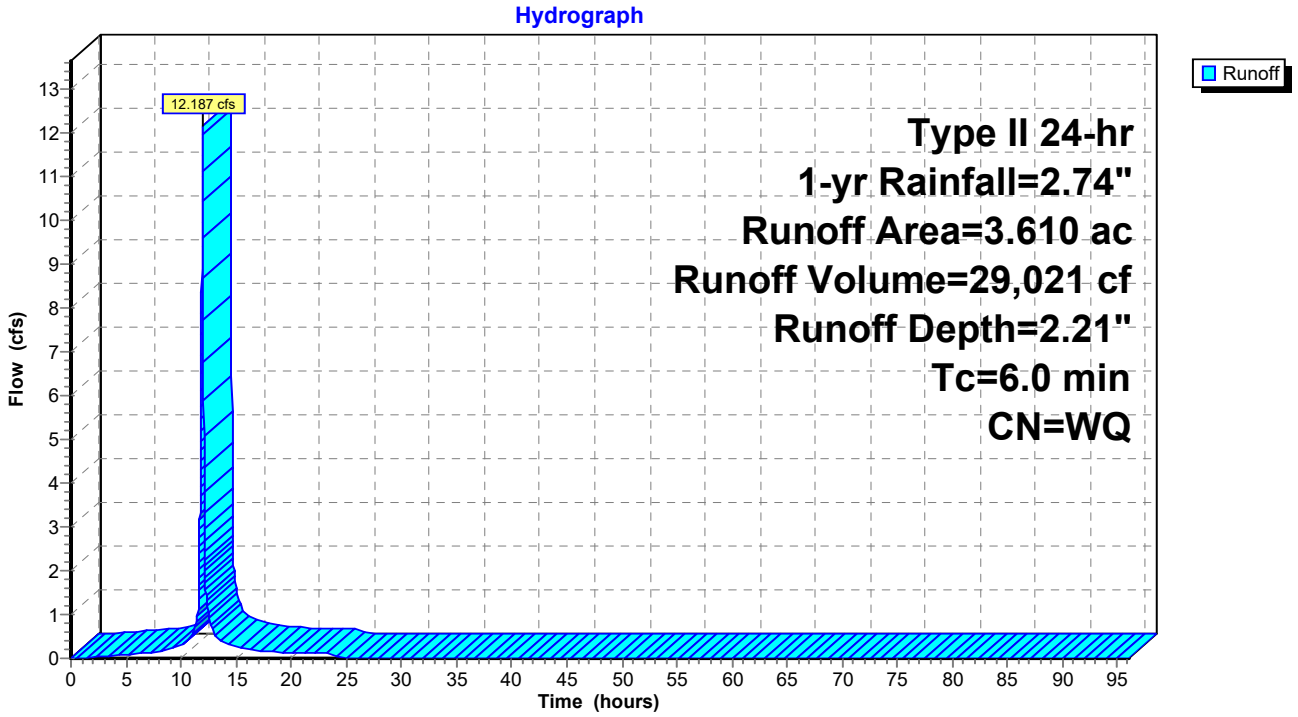
Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

Summary for Link 7L: Total Pre POI 1

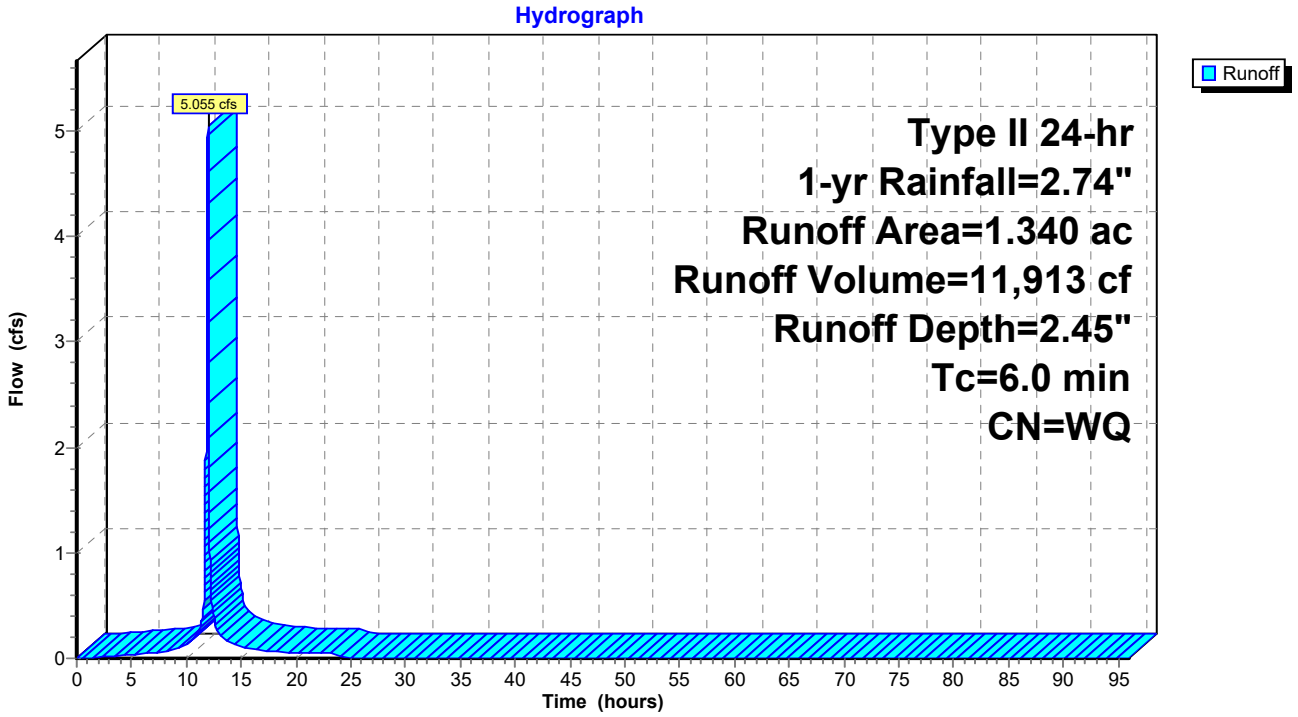
Inflow Area = 157,252 sf, 87.26% Impervious, Inflow Depth = 7.03" for 100-yr event
Inflow = 37.803 cfs @ 11.97 hrs, Volume= 92,162 cf
Primary = 37.803 cfs @ 11.97 hrs, Volume= 92,162 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

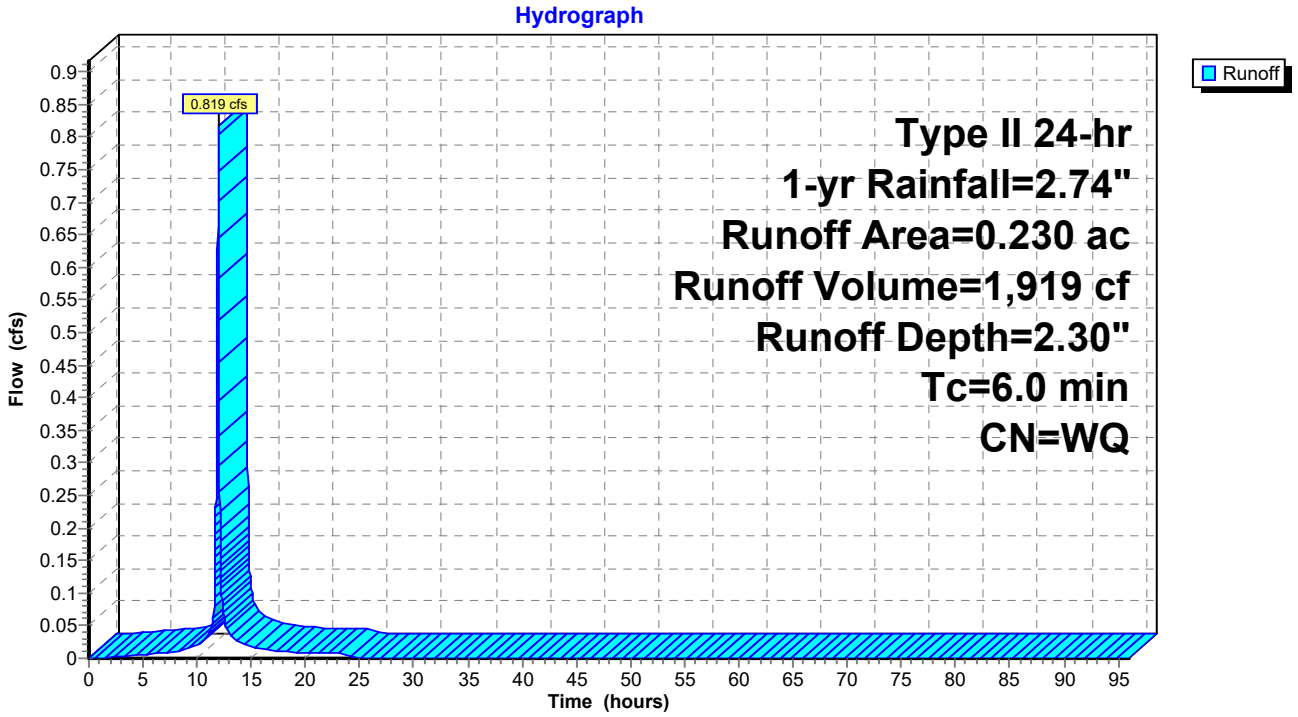
Subcatchment 3S: DA-1E



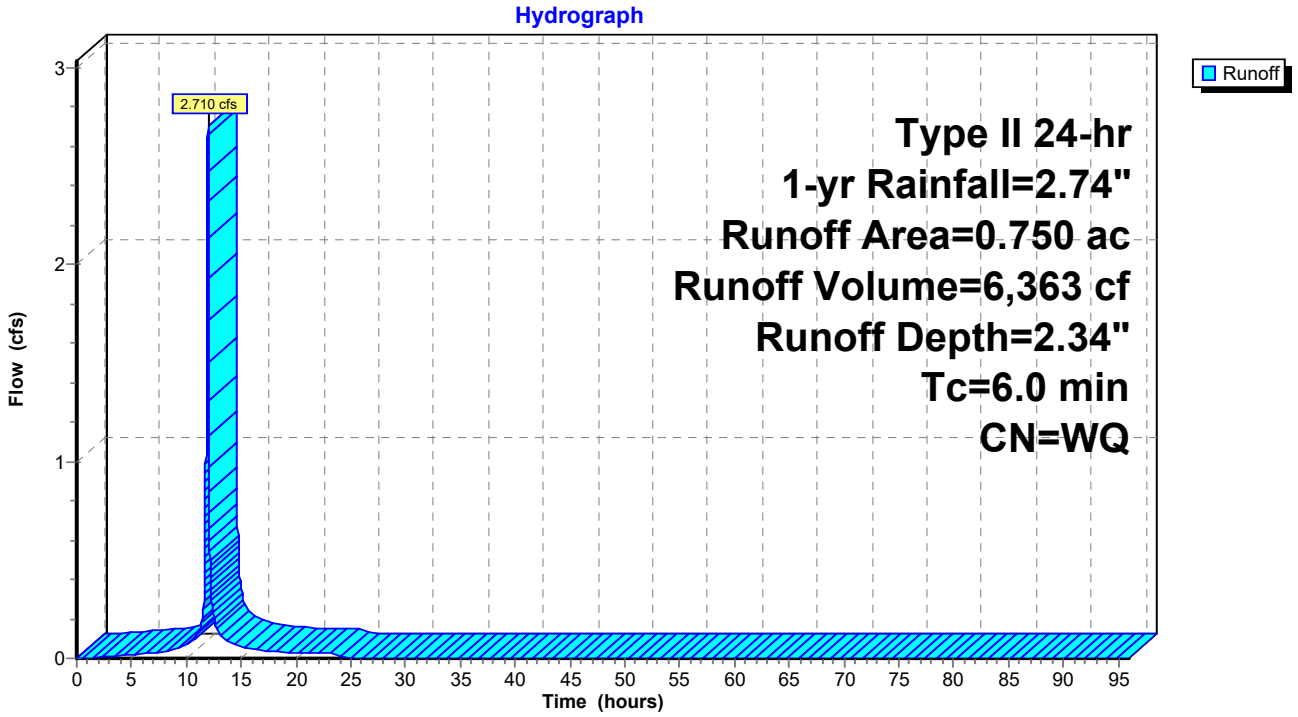
Subcatchment 4S: DA-2P(A)



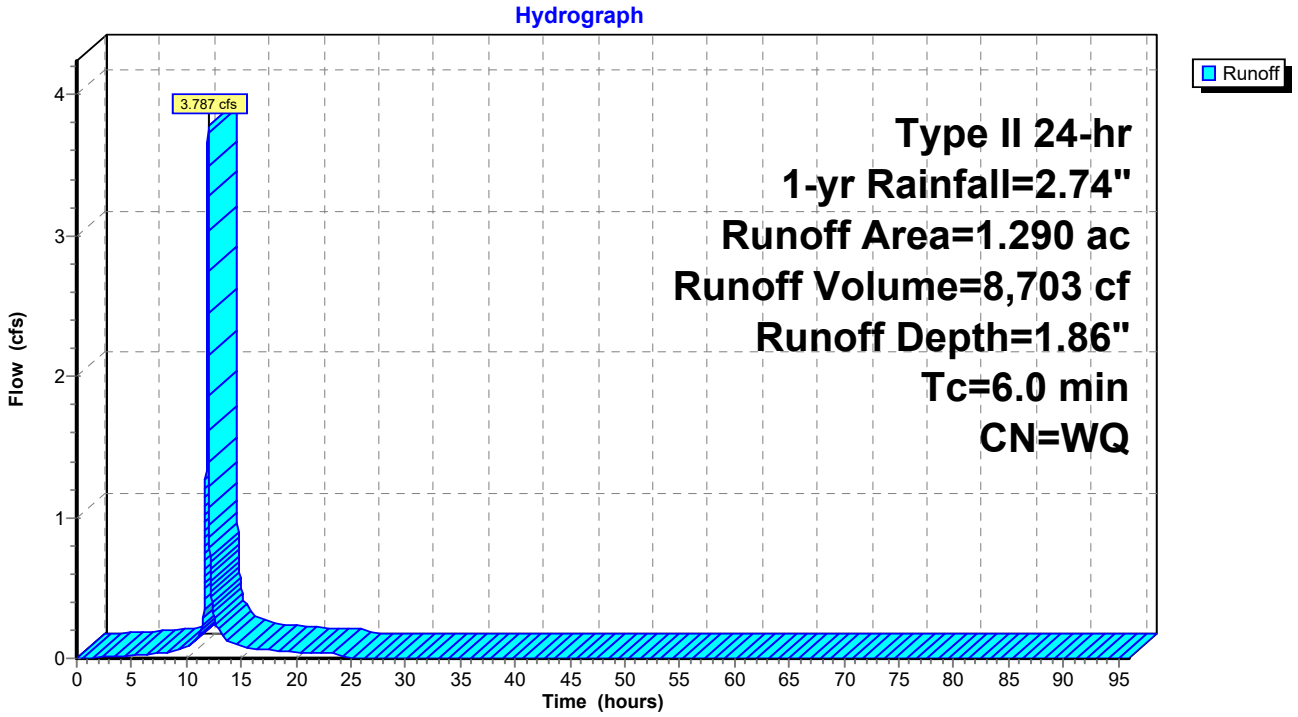
Subcatchment 7S: DA-2P(C)



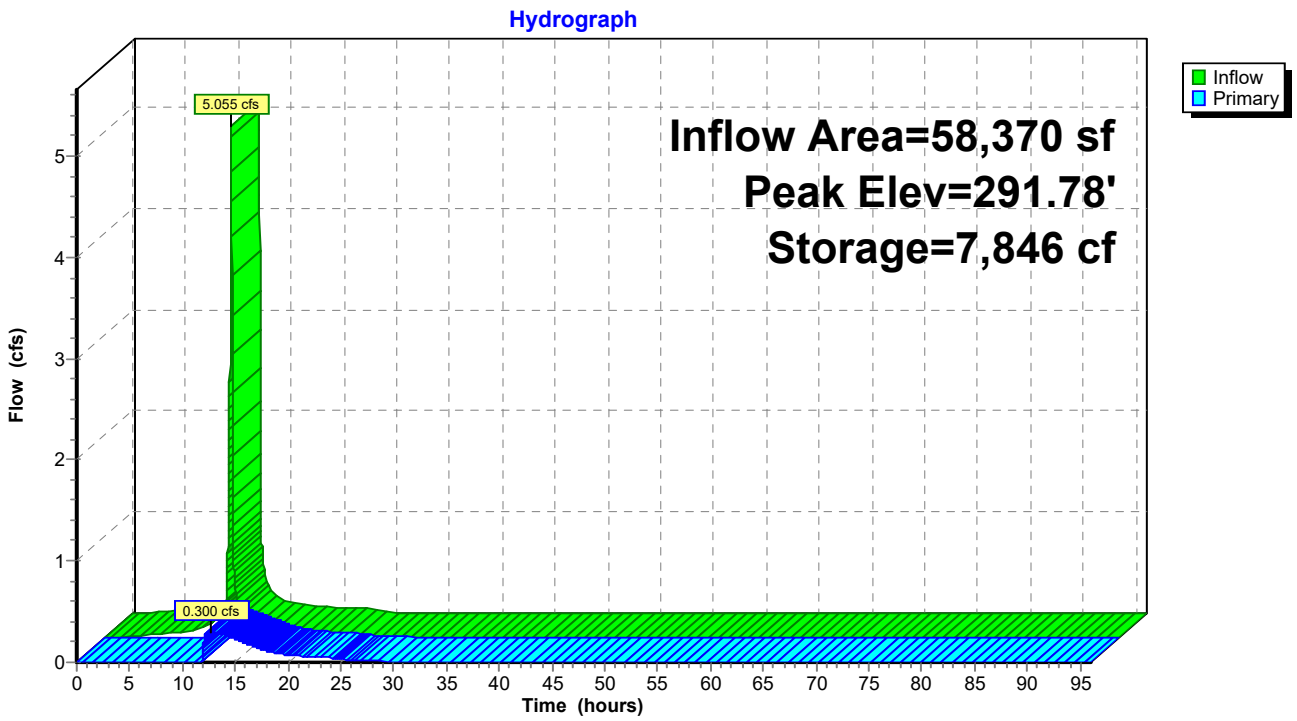
Subcatchment 10S: DA-2P(B)



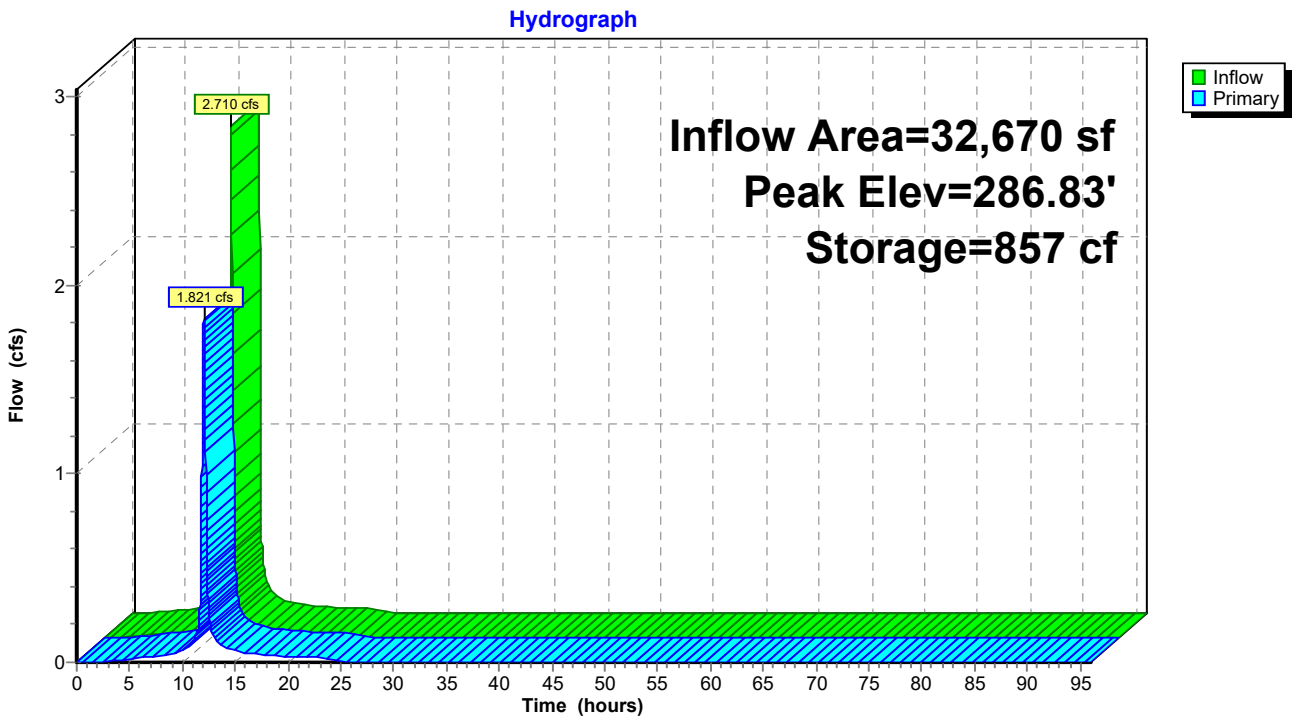
Subcatchment 11S: DA-2P(D) Bypass



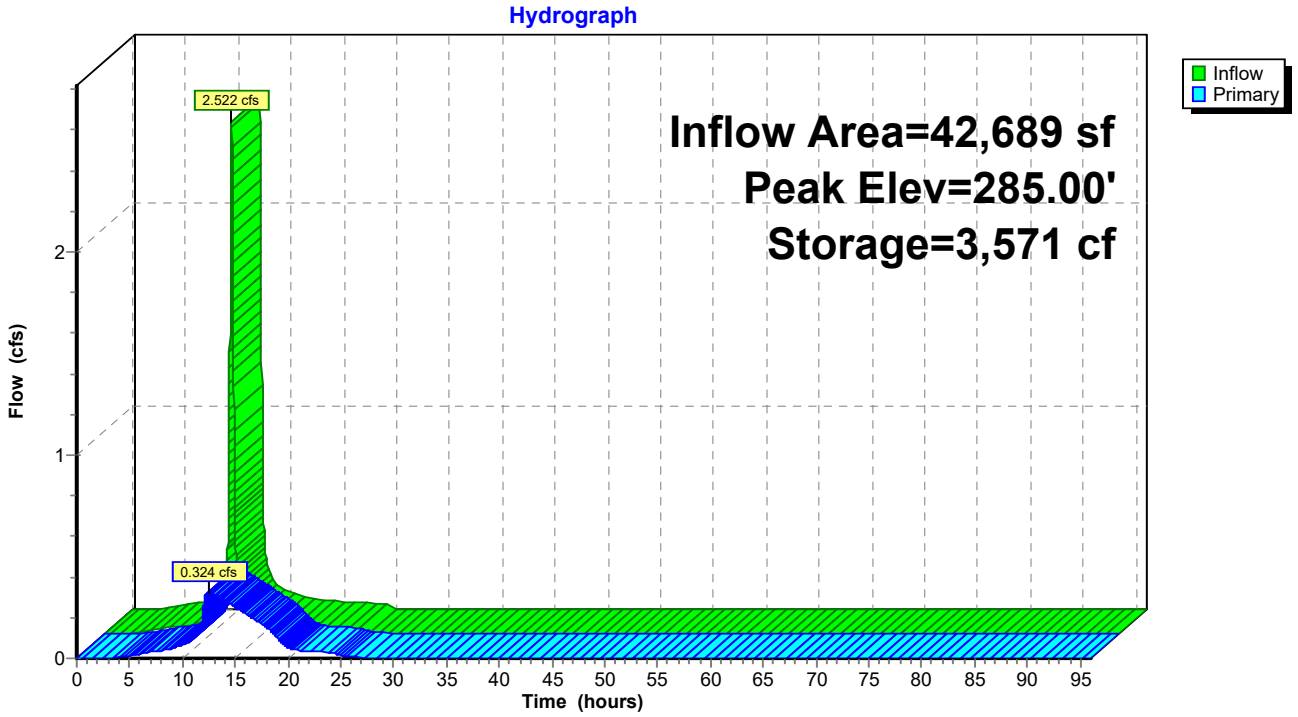
Pond 7P: UG Basin 1



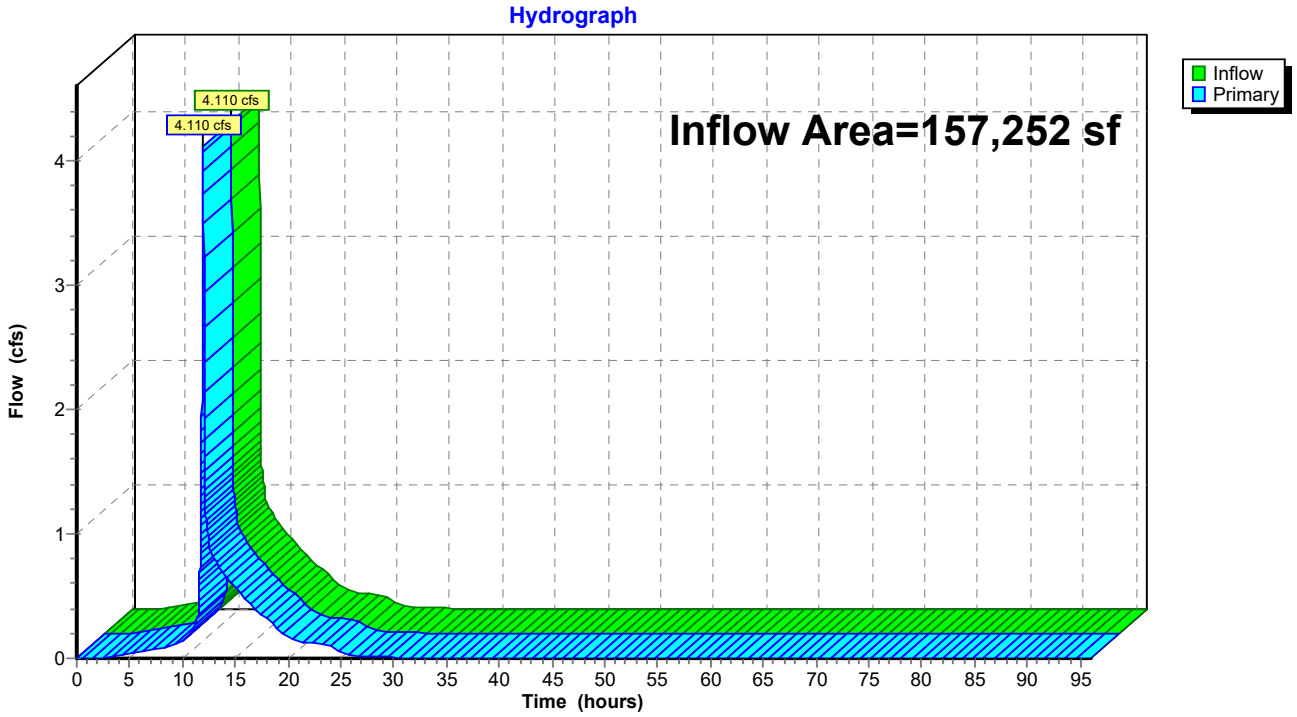
Pond 8P: UG Basin 2



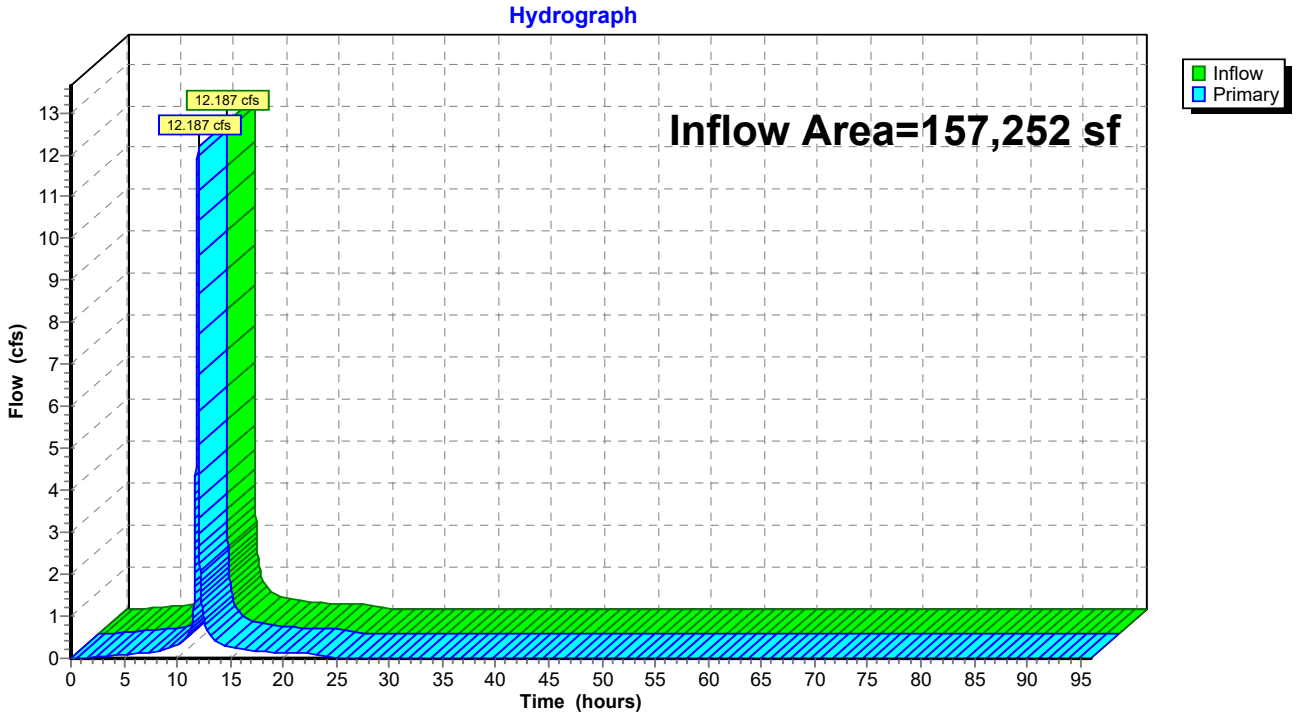
Pond 9P: UG Basin 3



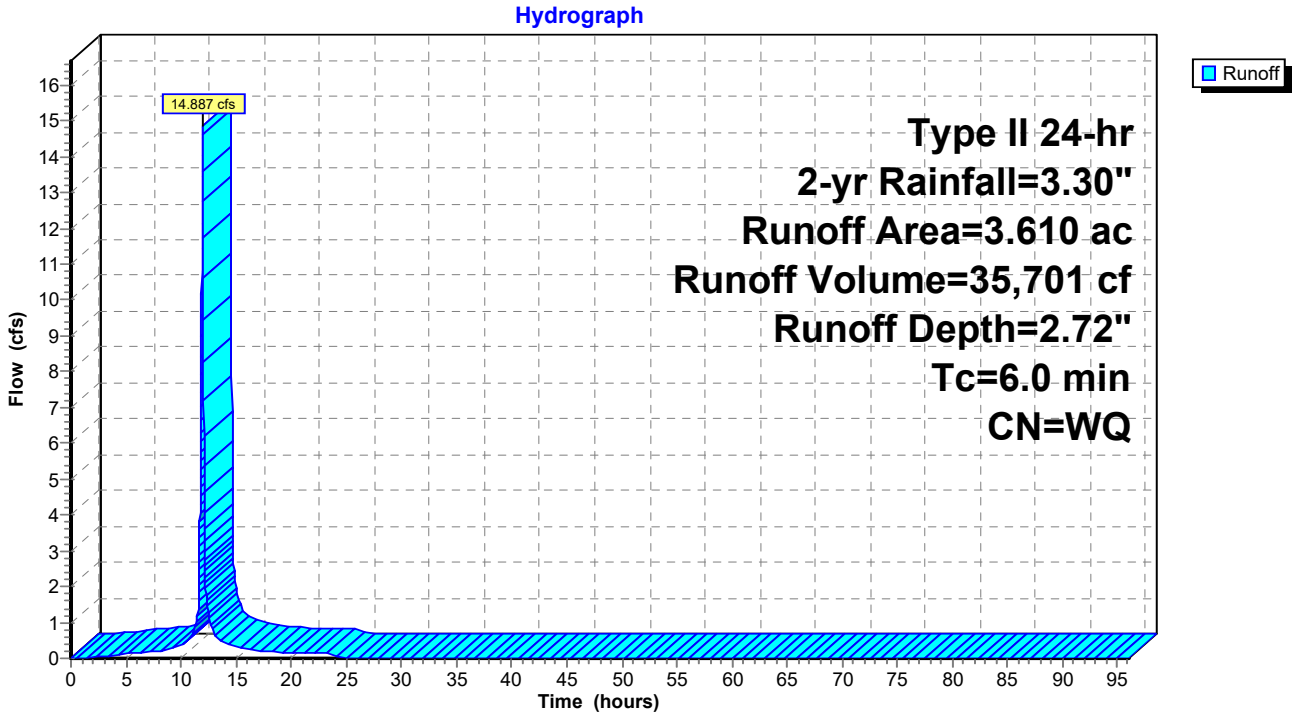
Link 6L: Total Post POI 1



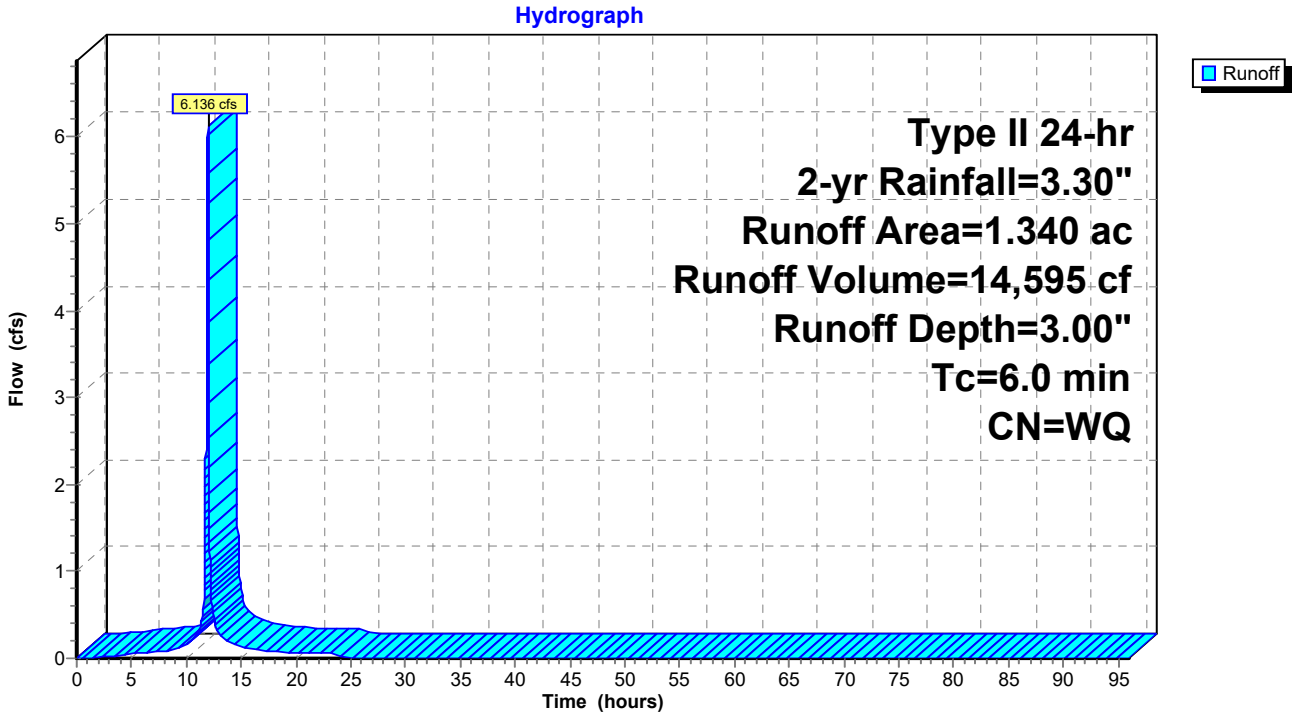
Link 7L: Total Pre POI 1



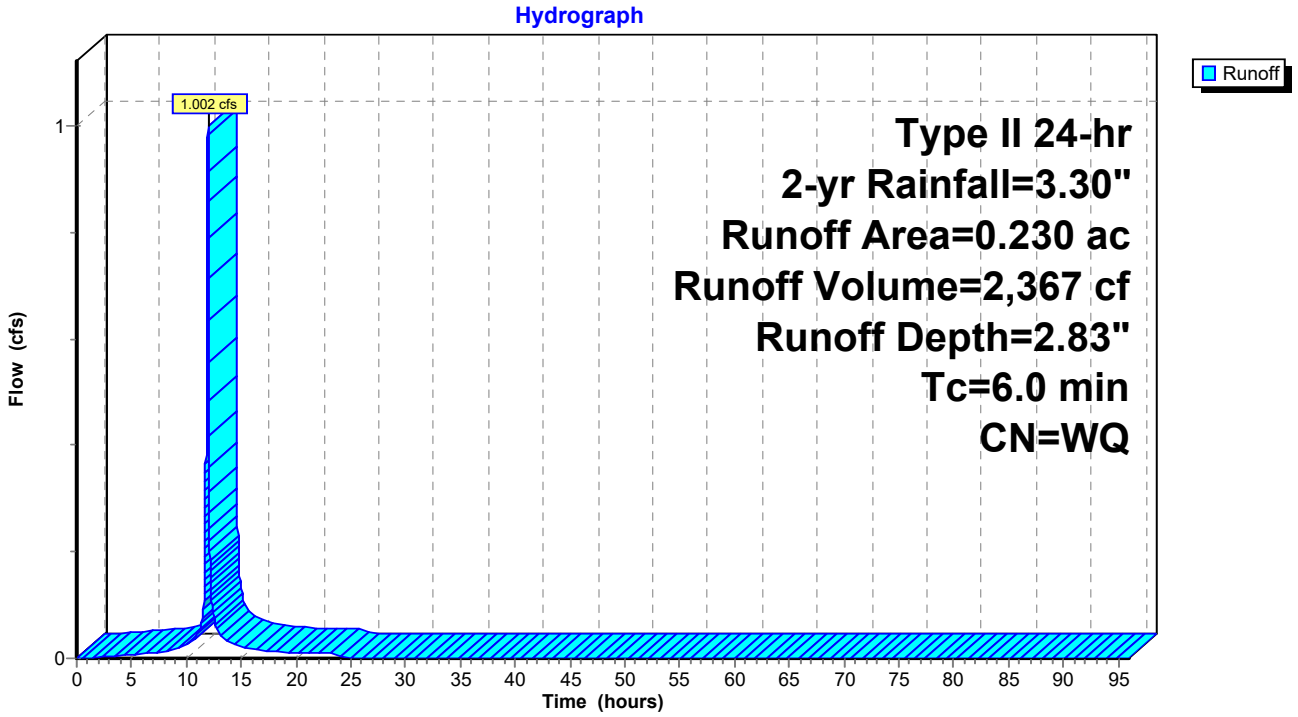
Subcatchment 3S: DA-1E



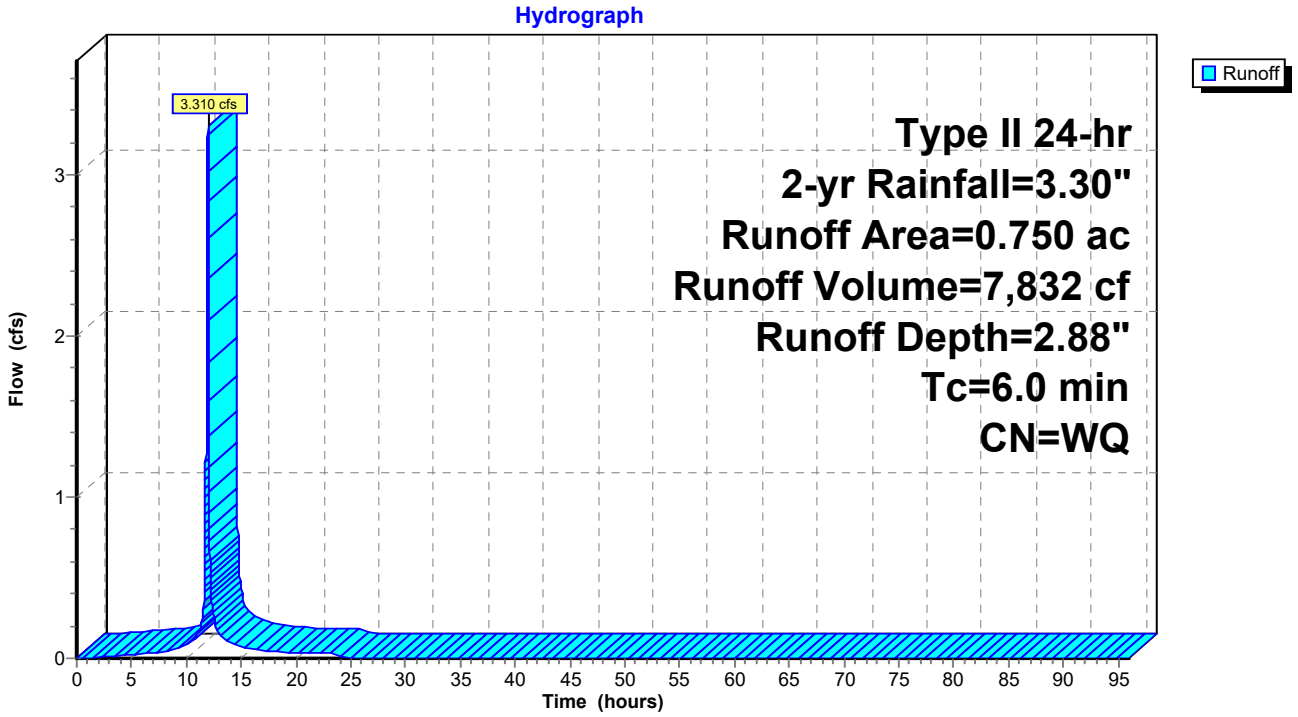
Subcatchment 4S: DA-2P(A)



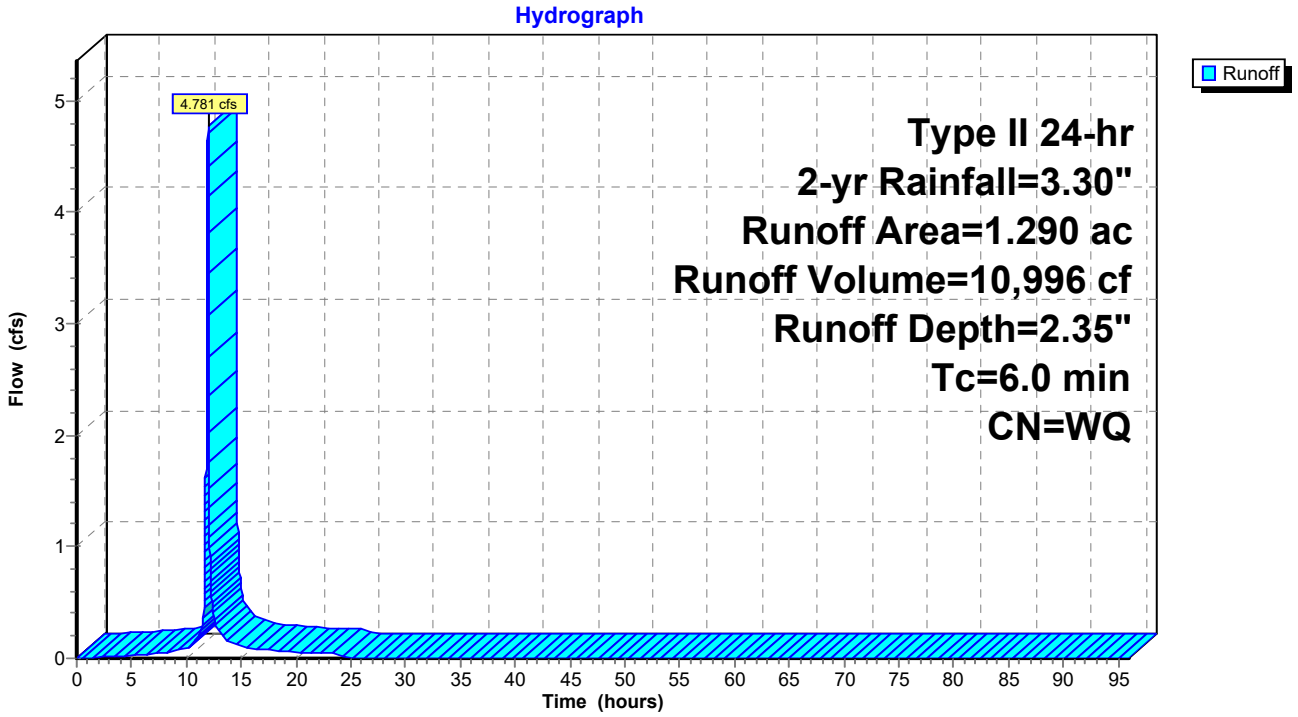
Subcatchment 7S: DA-2P(C)



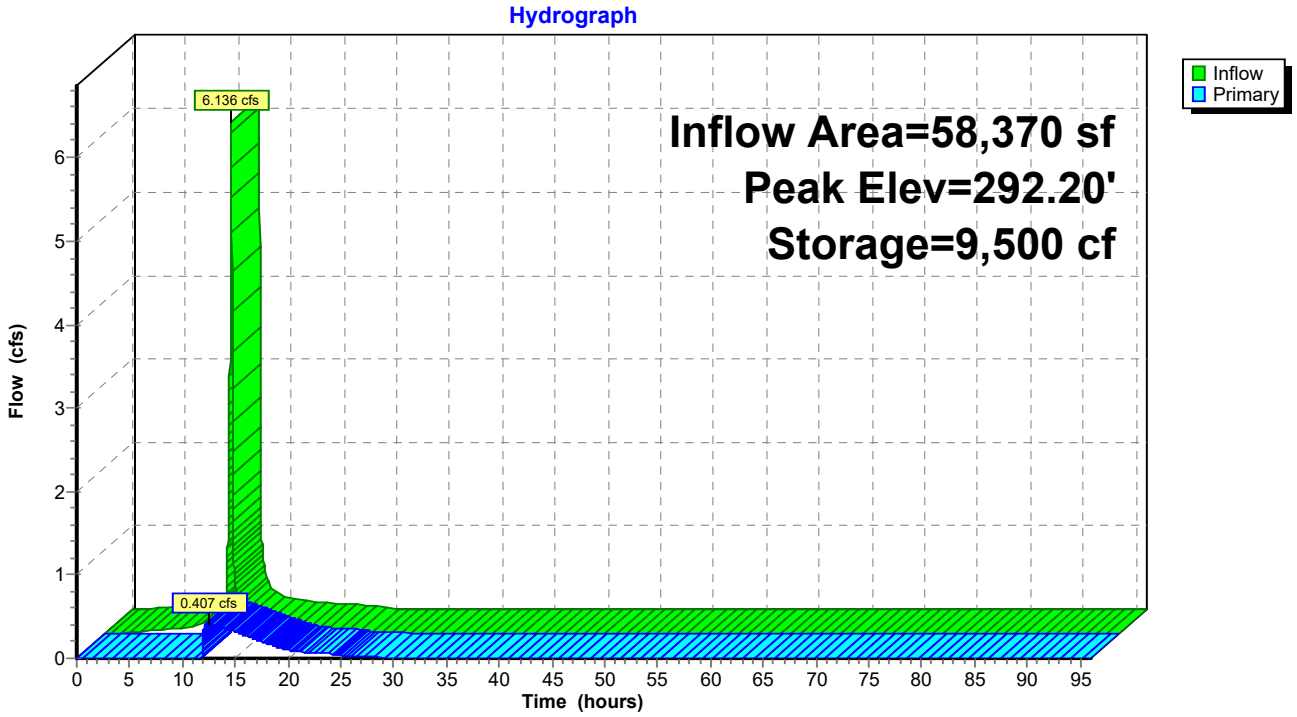
Subcatchment 10S: DA-2P(B)



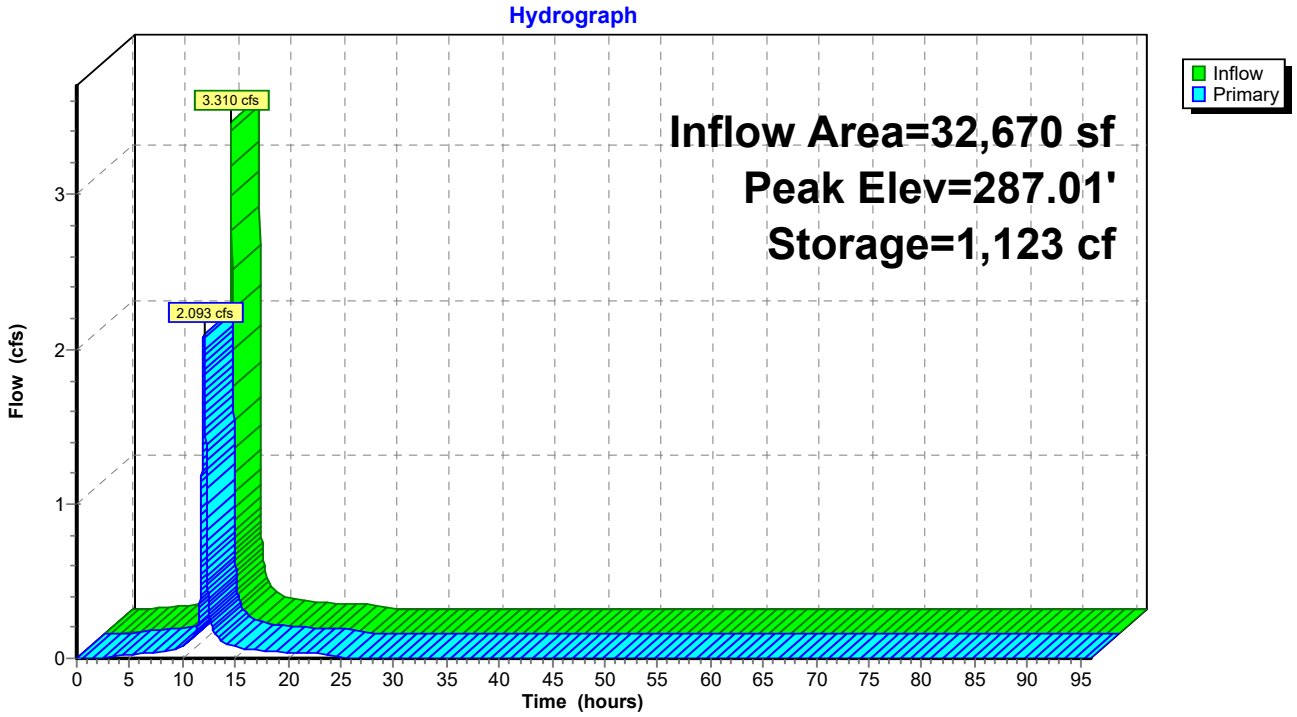
Subcatchment 11S: DA-2P(D) Bypass



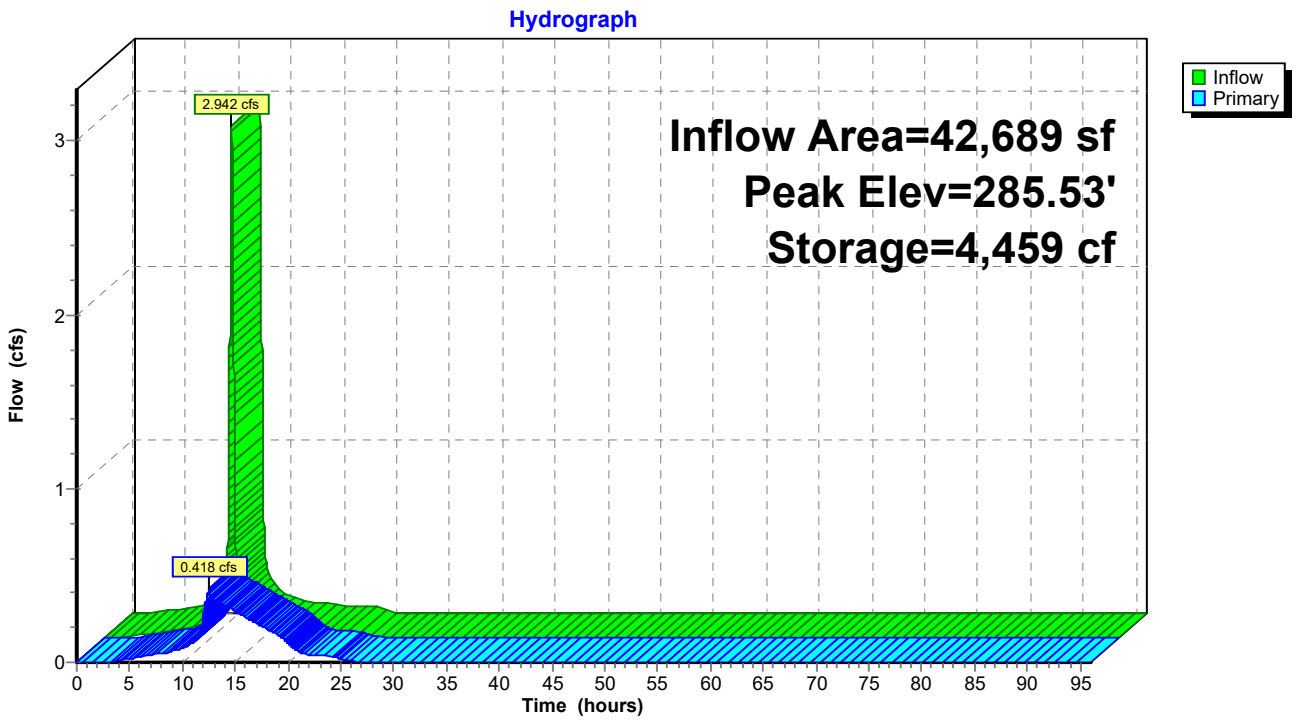
Pond 7P: UG Basin 1



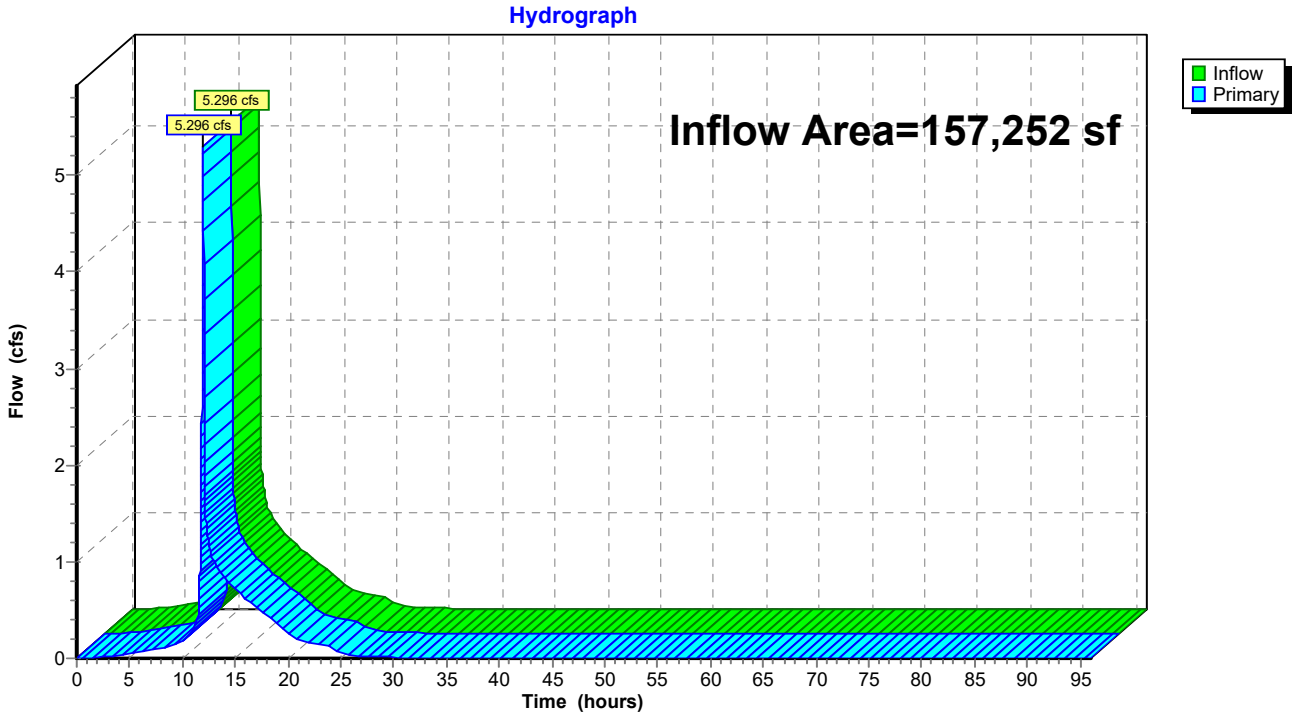
Pond 8P: UG Basin 2



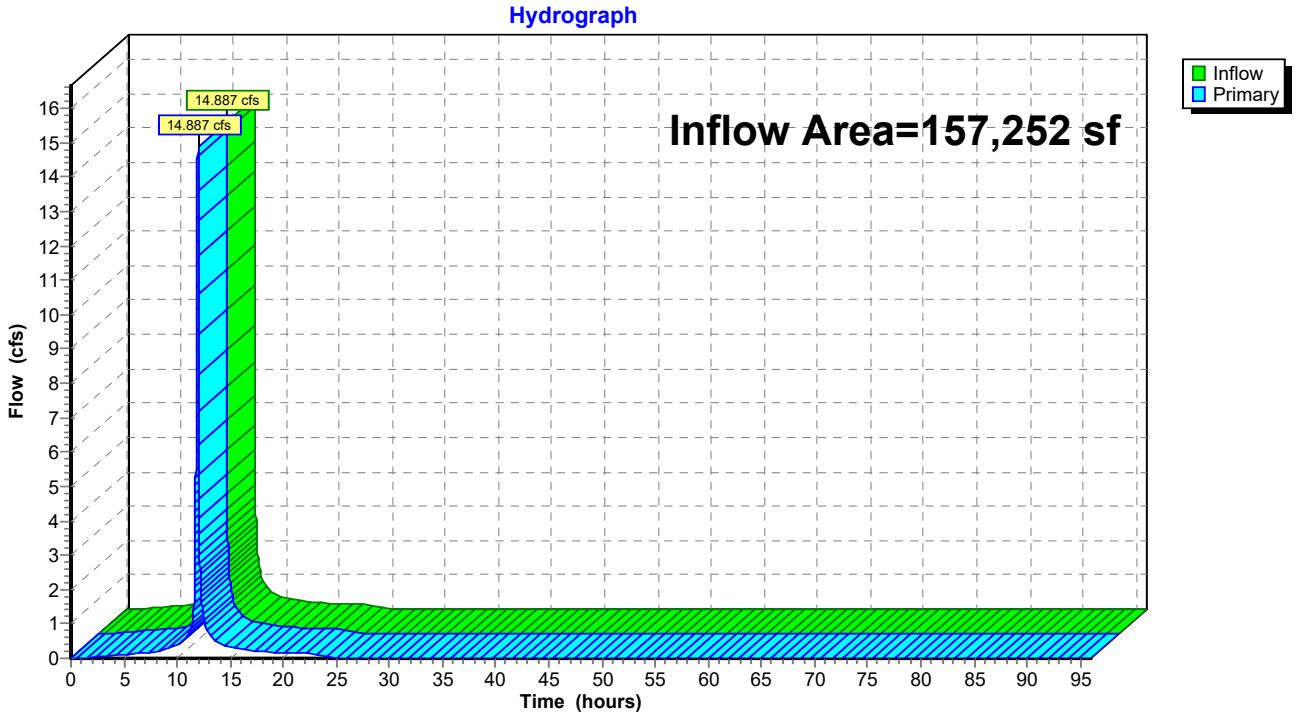
Pond 9P: UG Basin 3



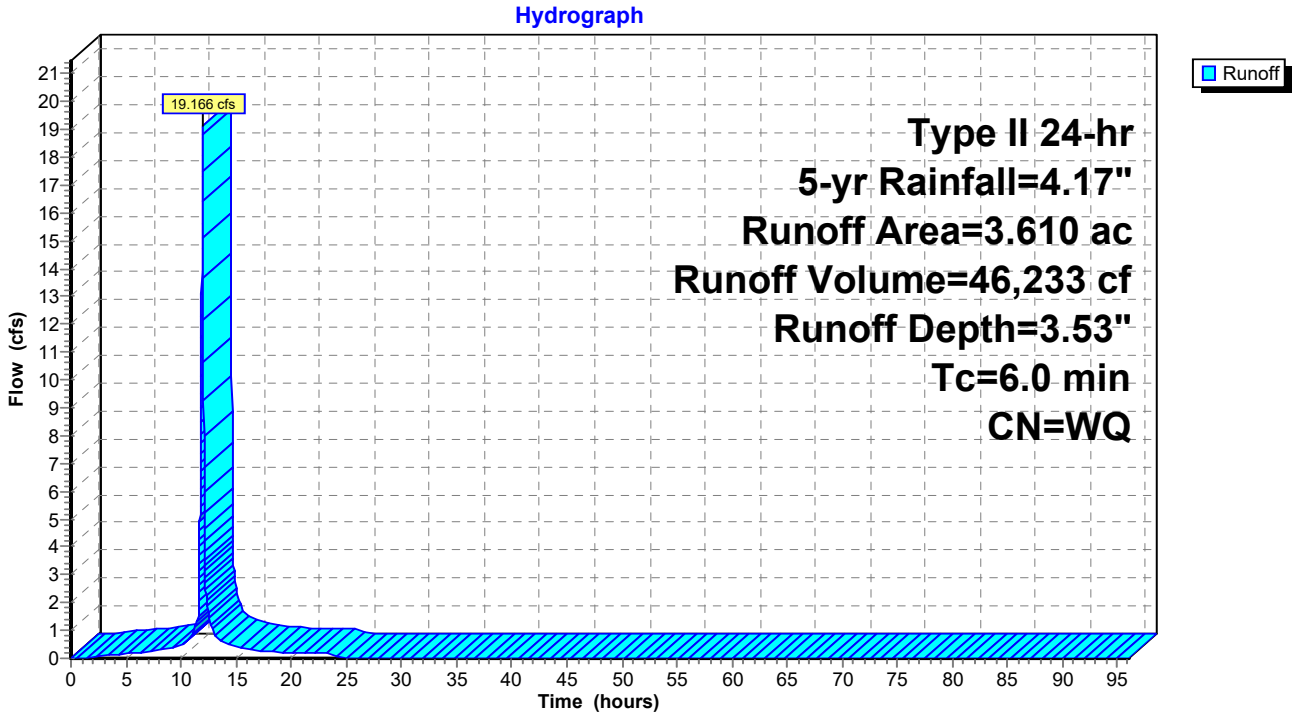
Link 6L: Total Post POI 1



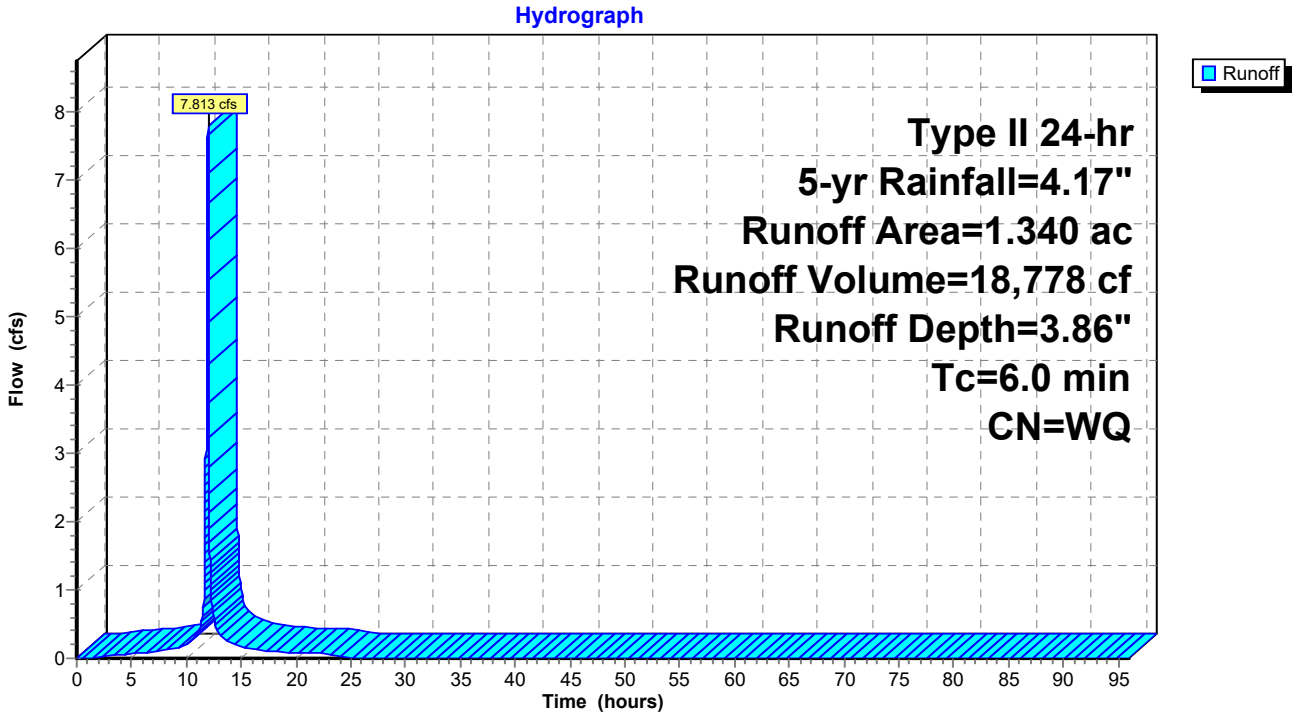
Link 7L: Total Pre POI 1



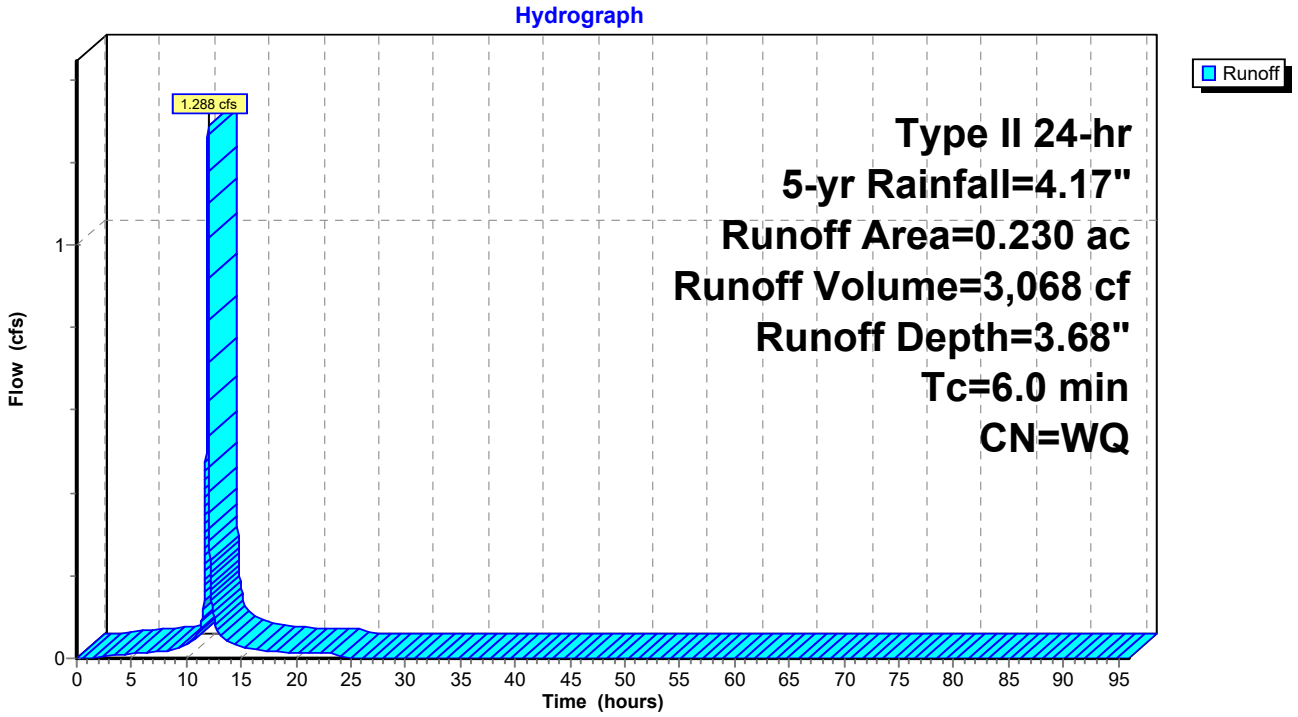
Subcatchment 3S: DA-1E



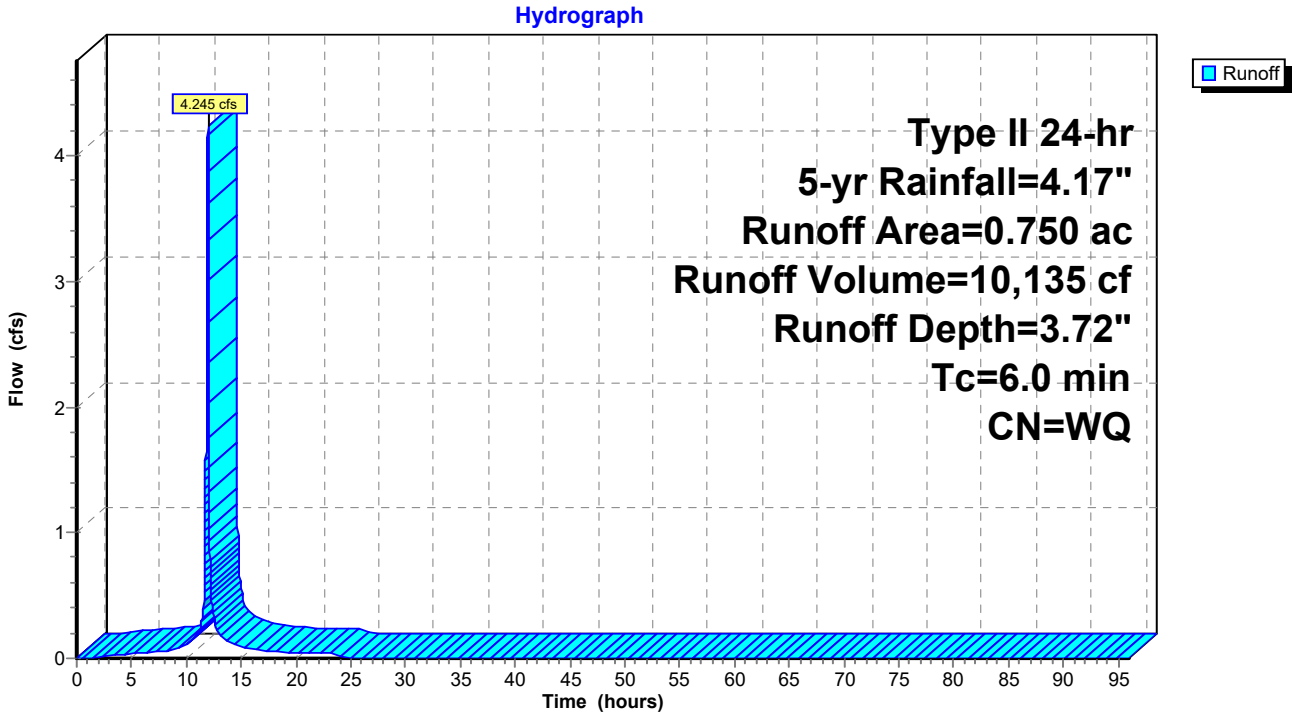
Subcatchment 4S: DA-2P(A)



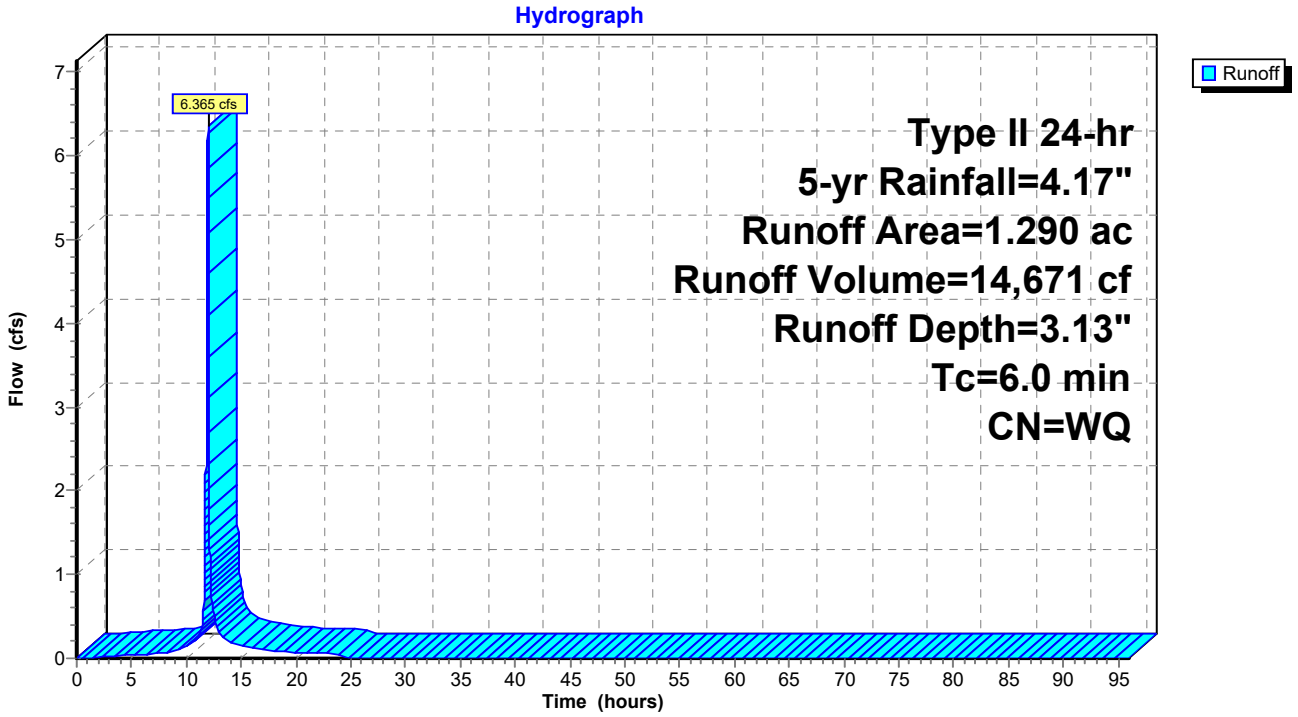
Subcatchment 7S: DA-2P(C)



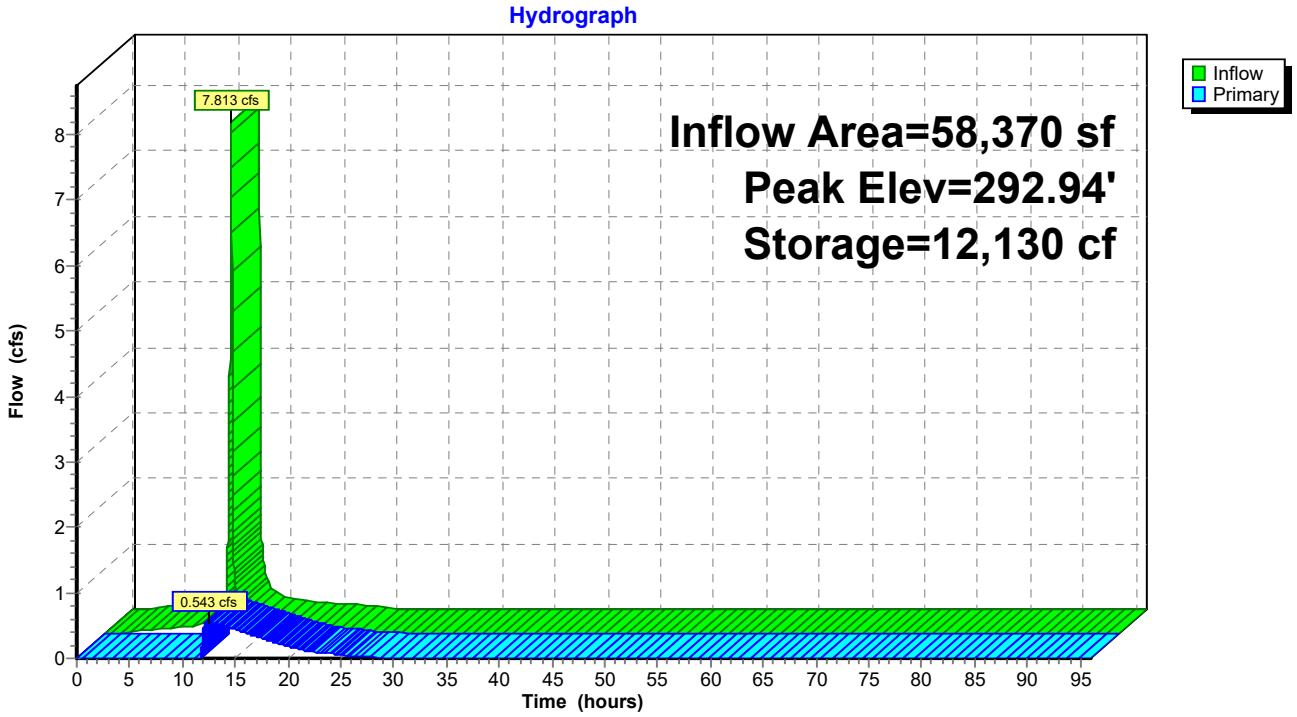
Subcatchment 10S: DA-2P(B)



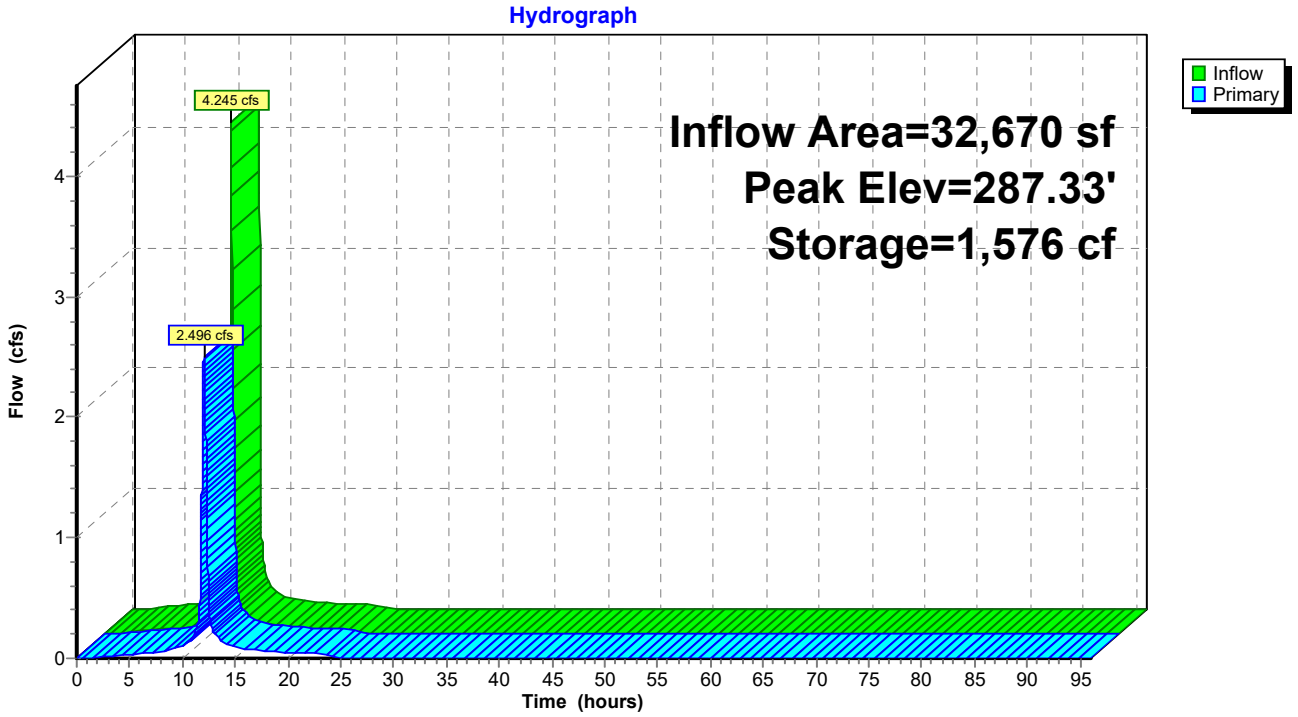
Subcatchment 11S: DA-2P(D) Bypass



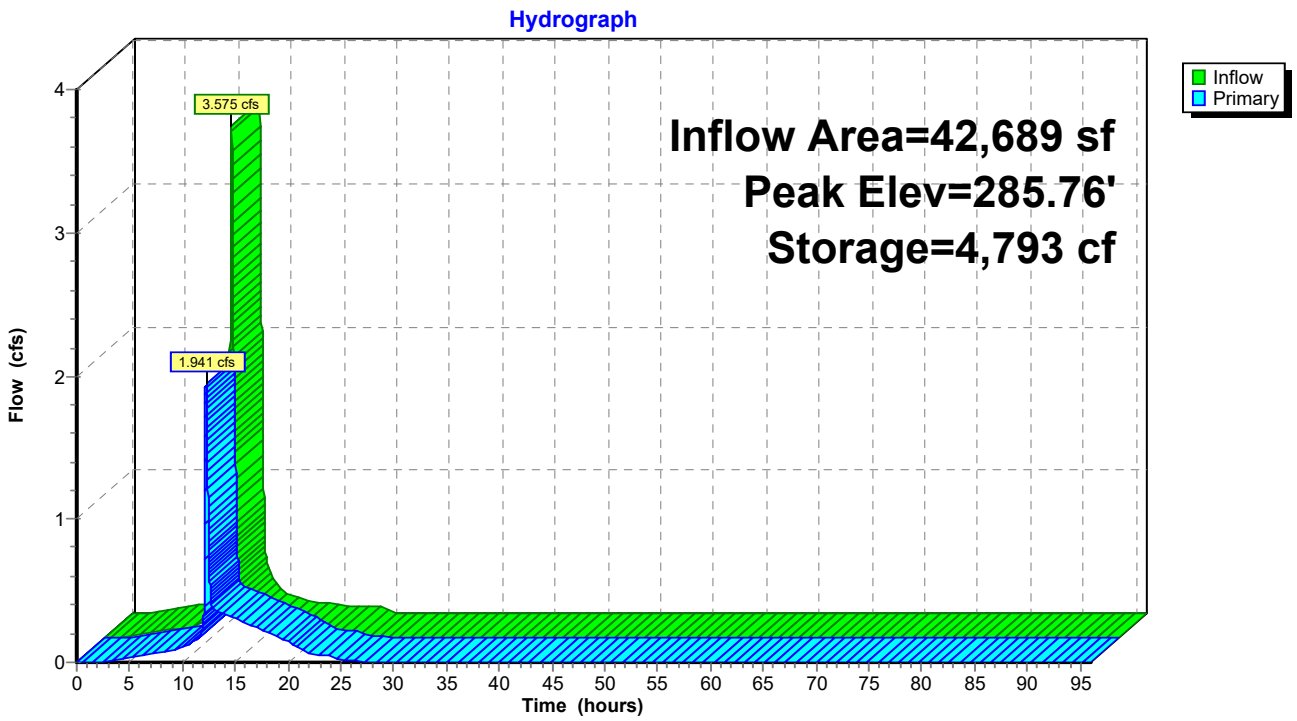
Pond 7P: UG Basin 1



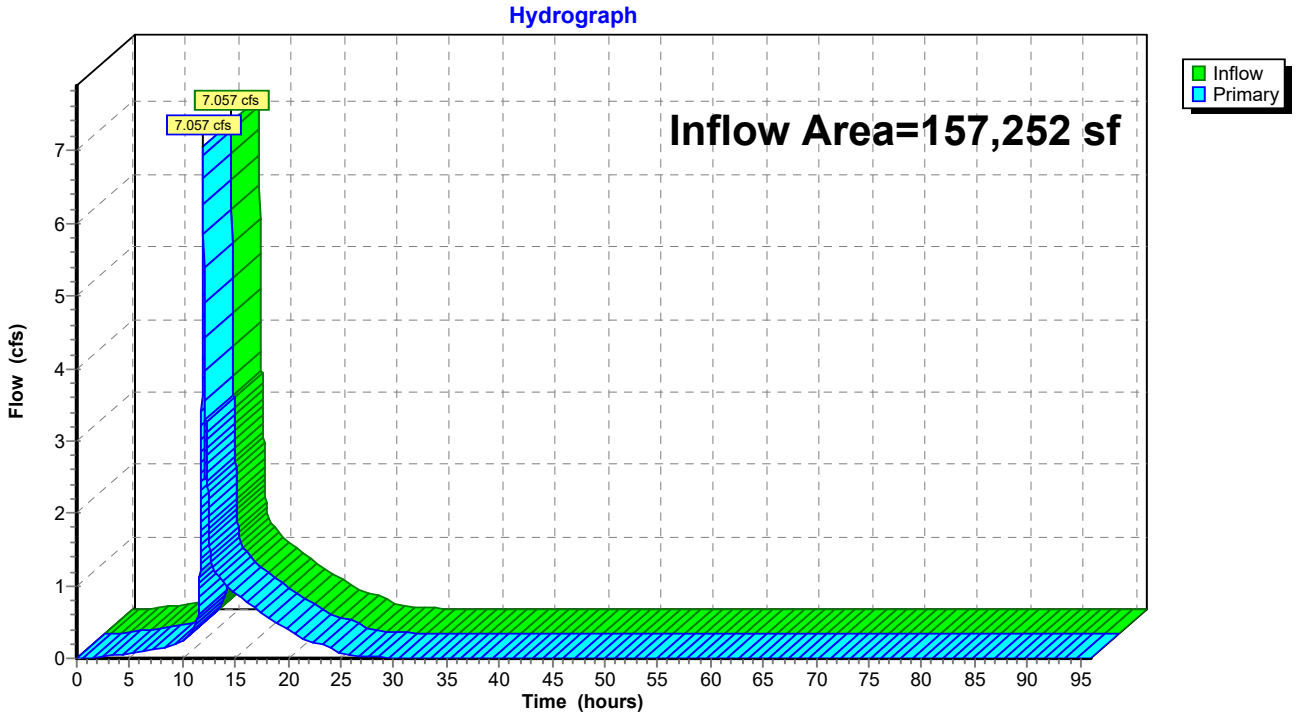
Pond 8P: UG Basin 2



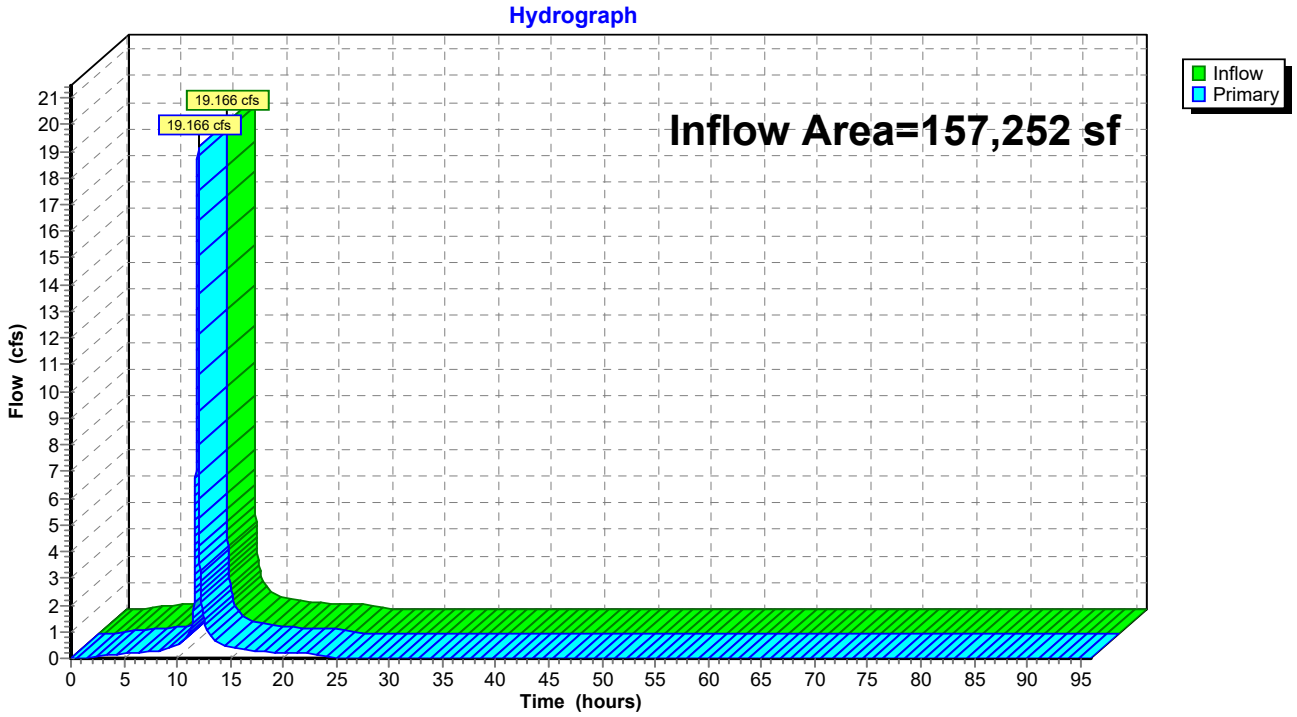
Pond 9P: UG Basin 3



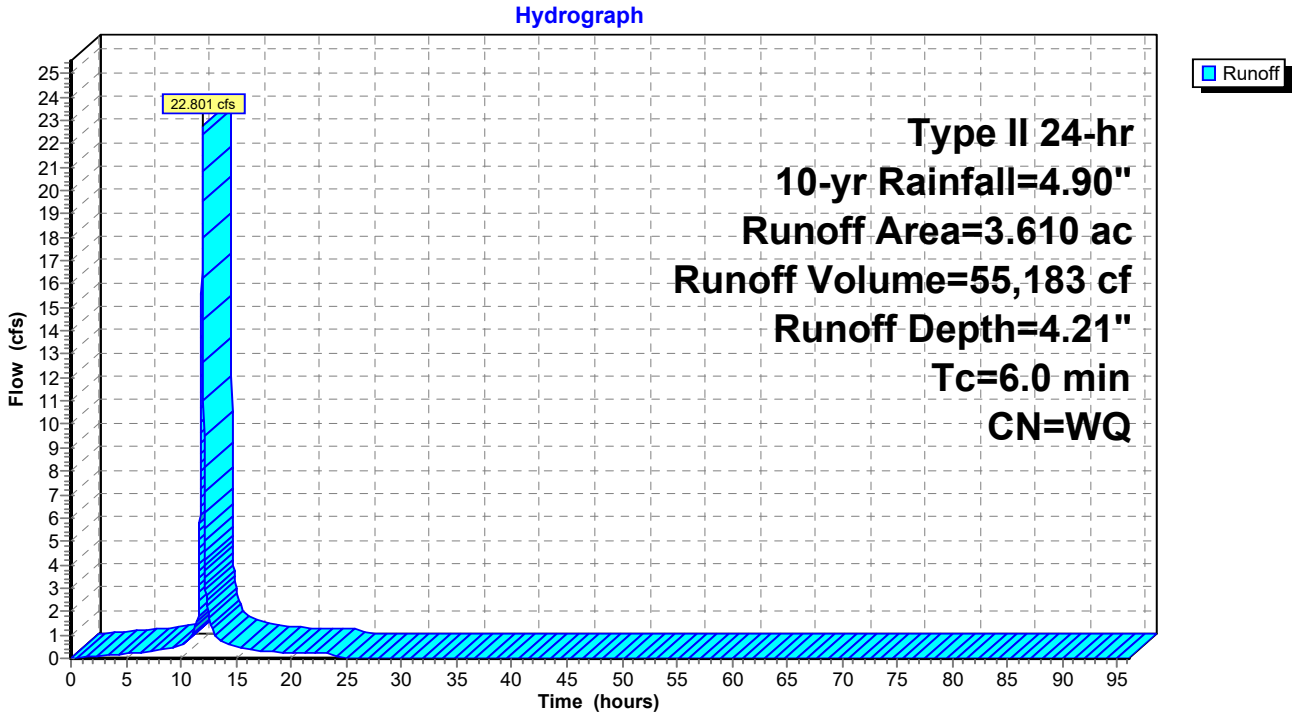
Link 6L: Total Post POI 1



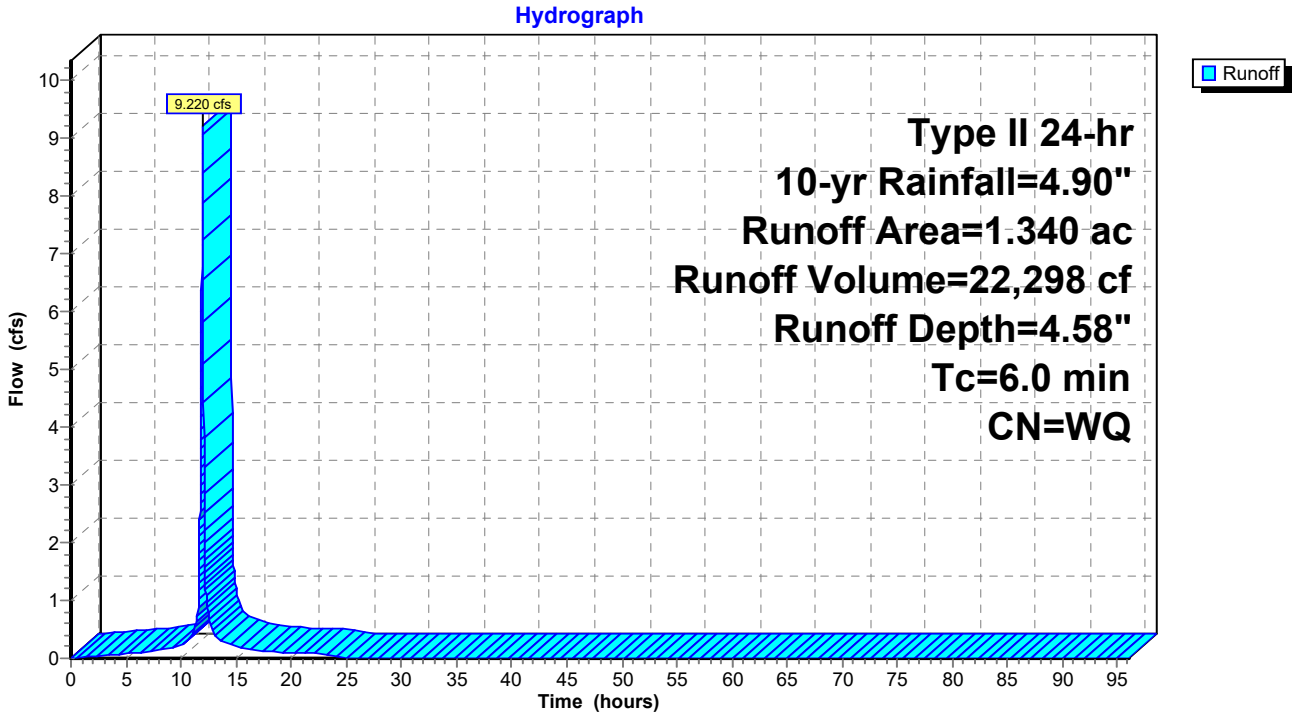
Link 7L: Total Pre POI 1



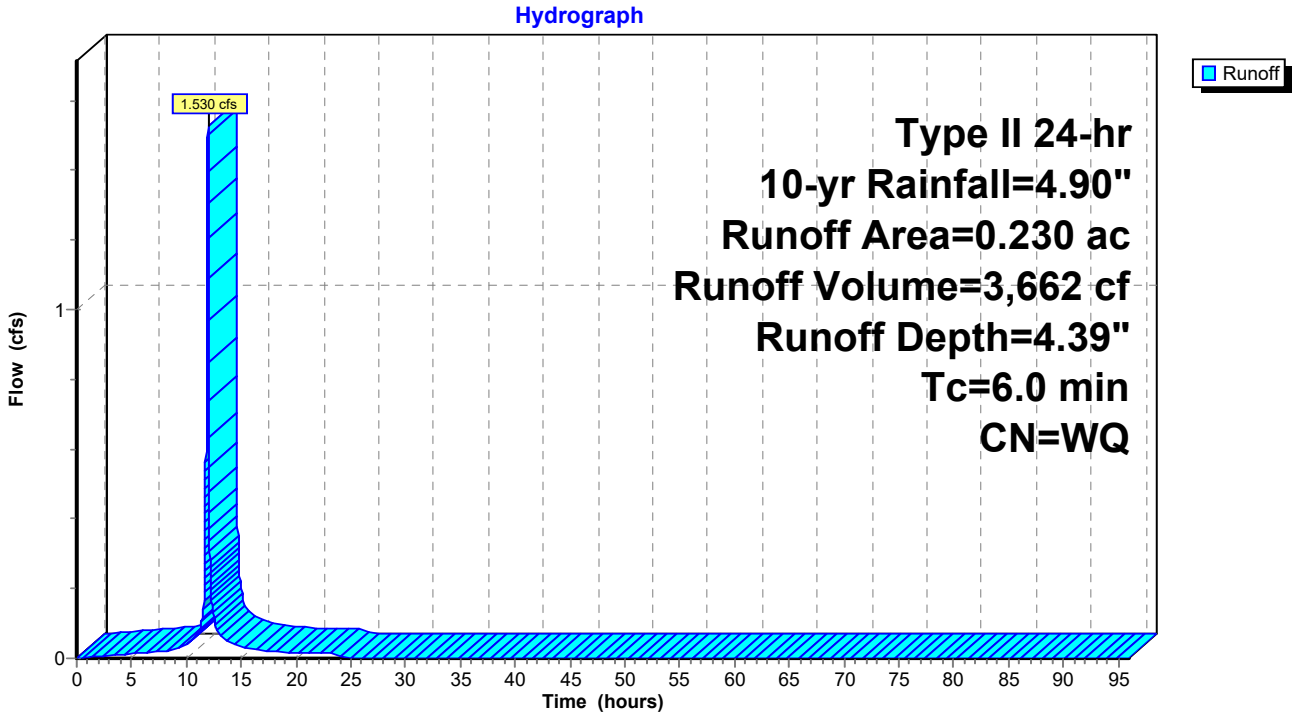
Subcatchment 3S: DA-1E



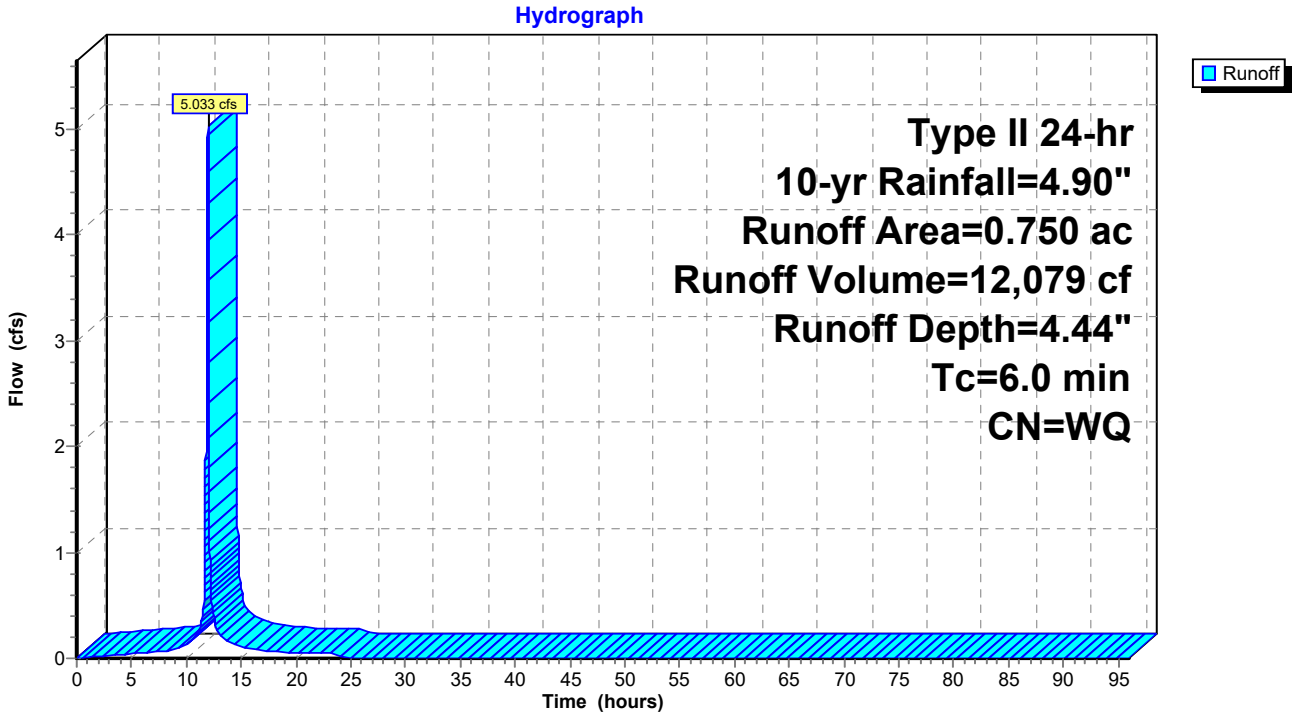
Subcatchment 4S: DA-2P(A)



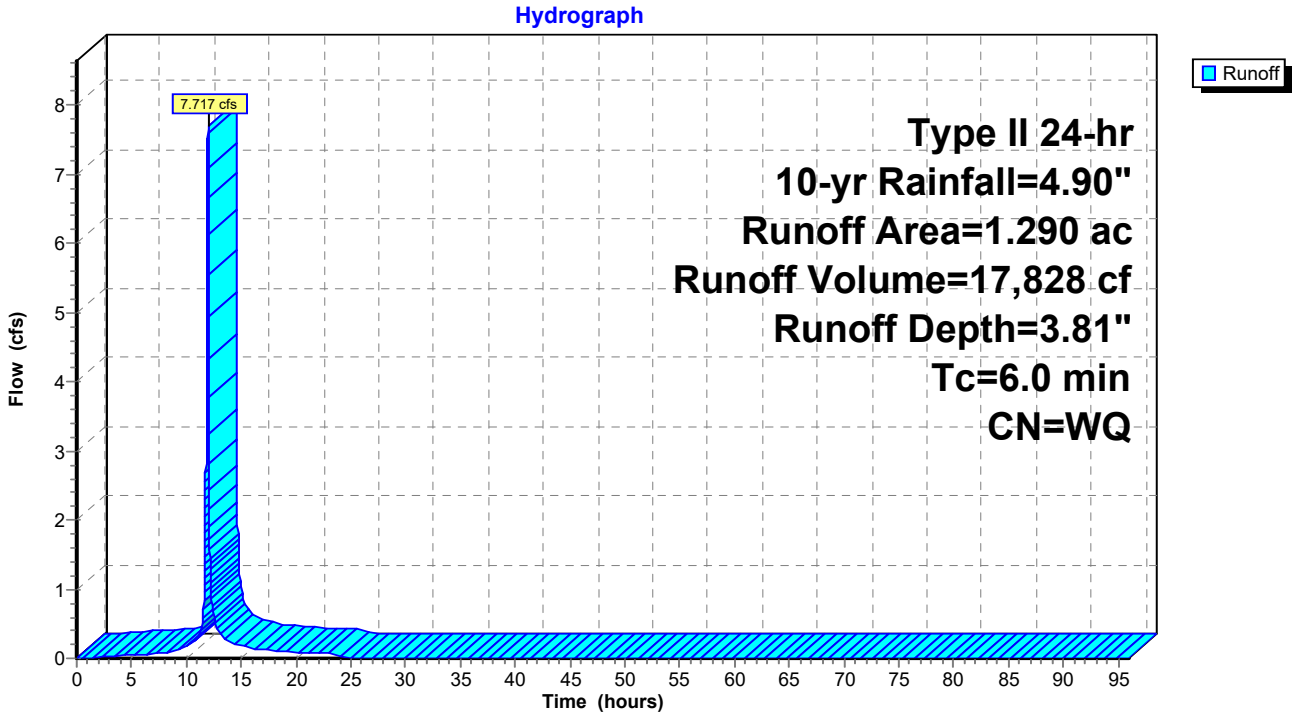
Subcatchment 7S: DA-2P(C)



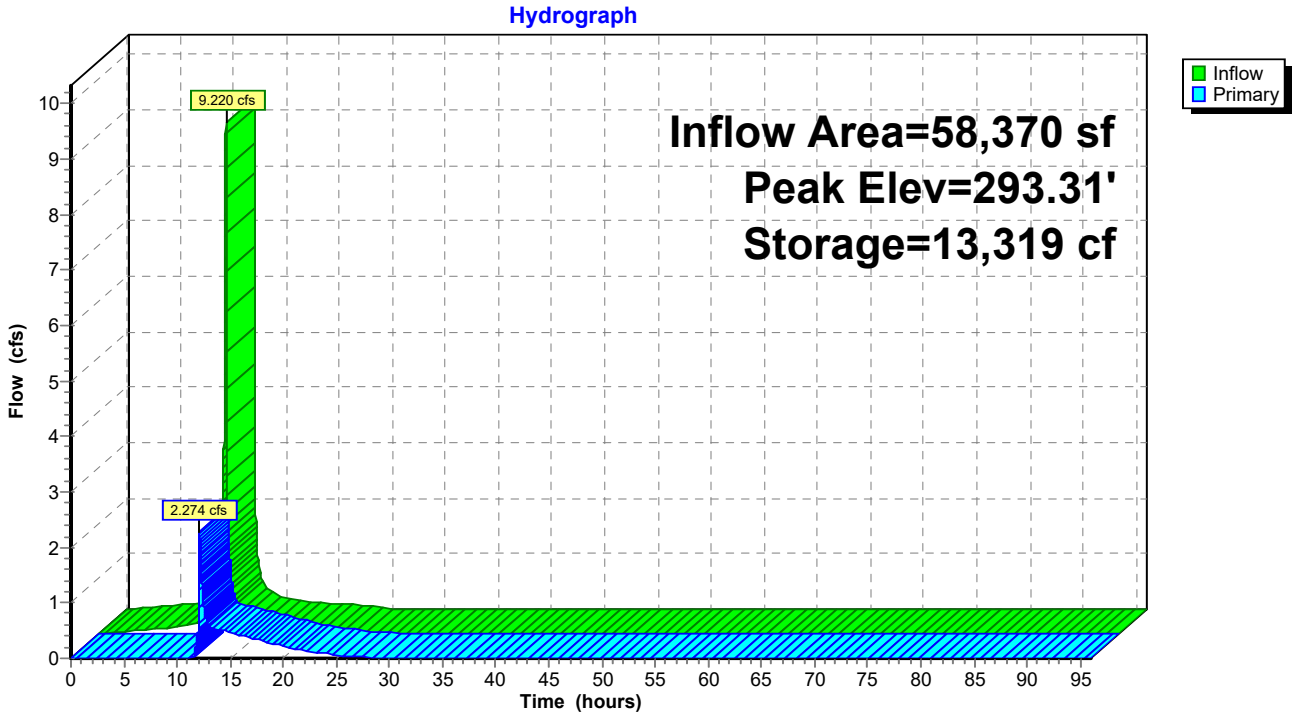
Subcatchment 10S: DA-2P(B)



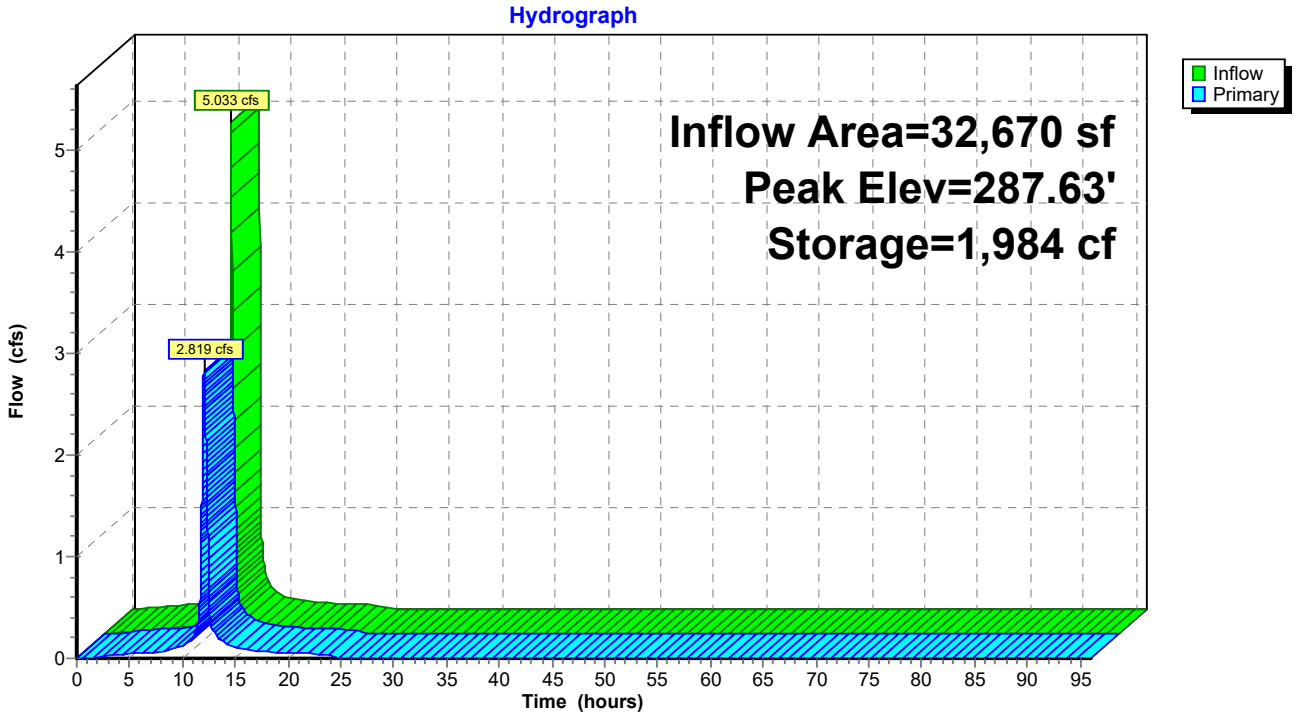
Subcatchment 11S: DA-2P(D) Bypass



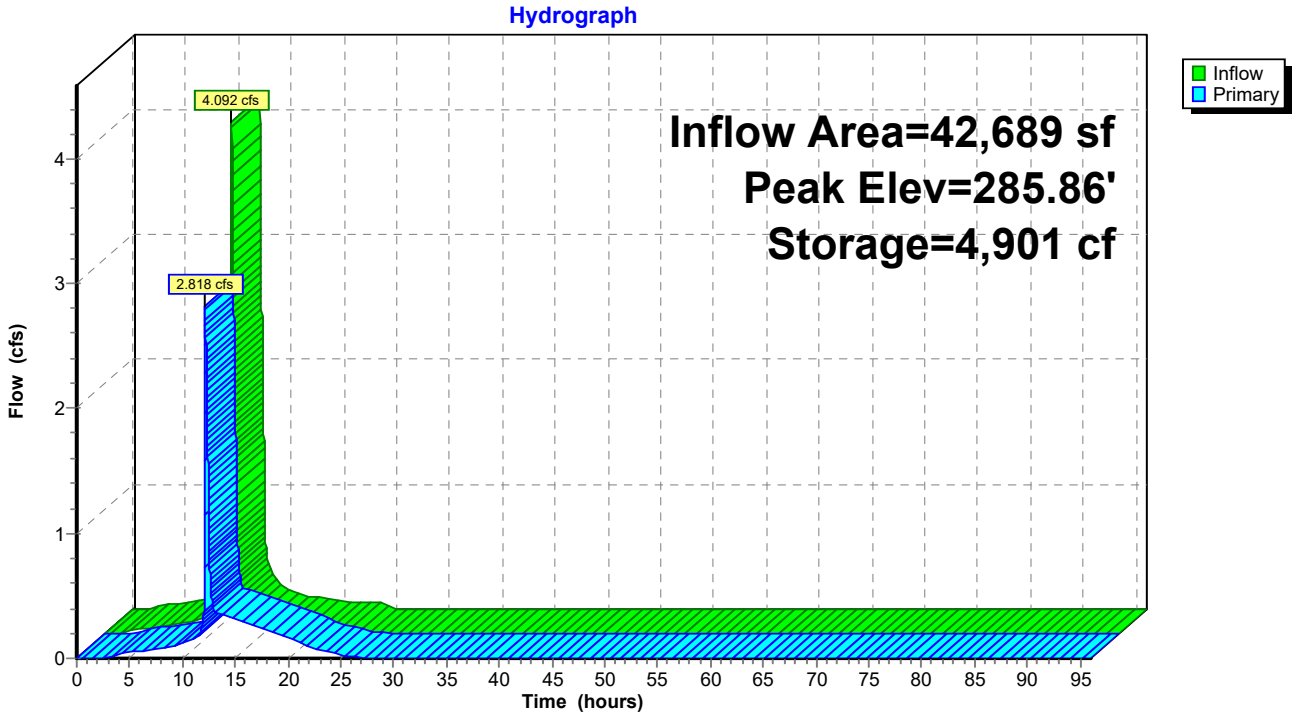
Pond 7P: UG Basin 1



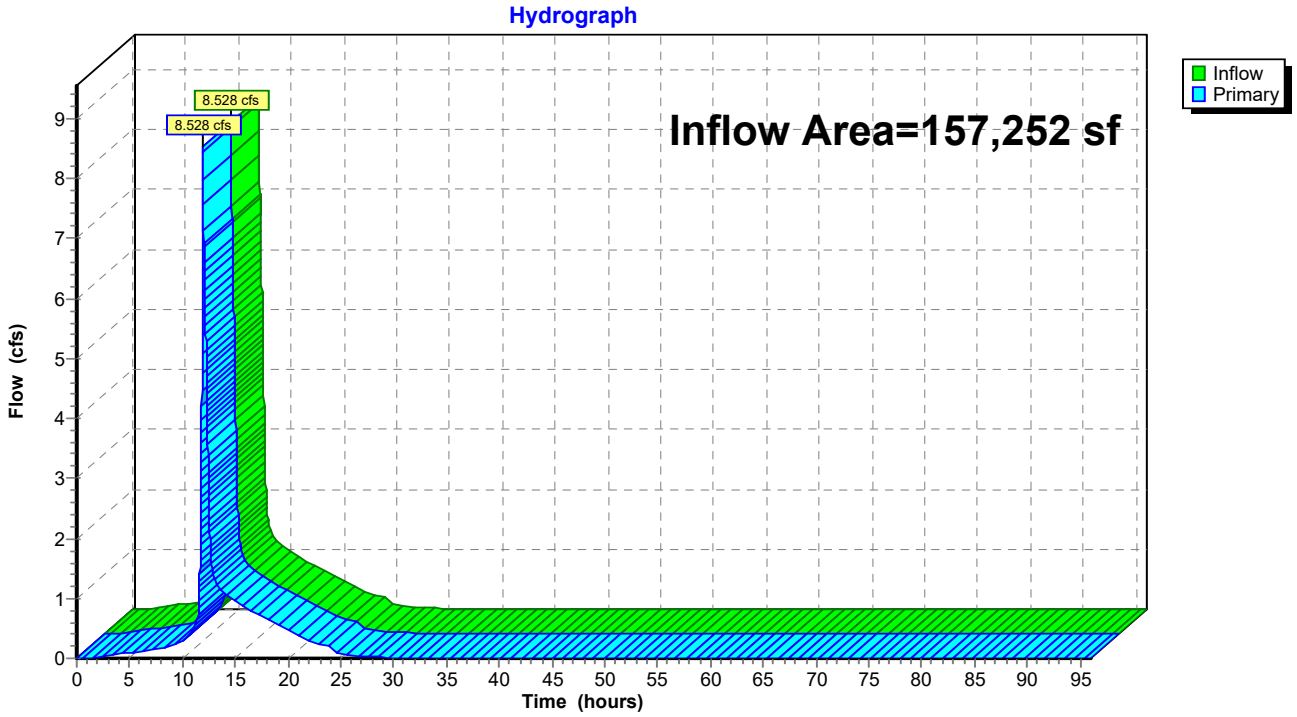
Pond 8P: UG Basin 2



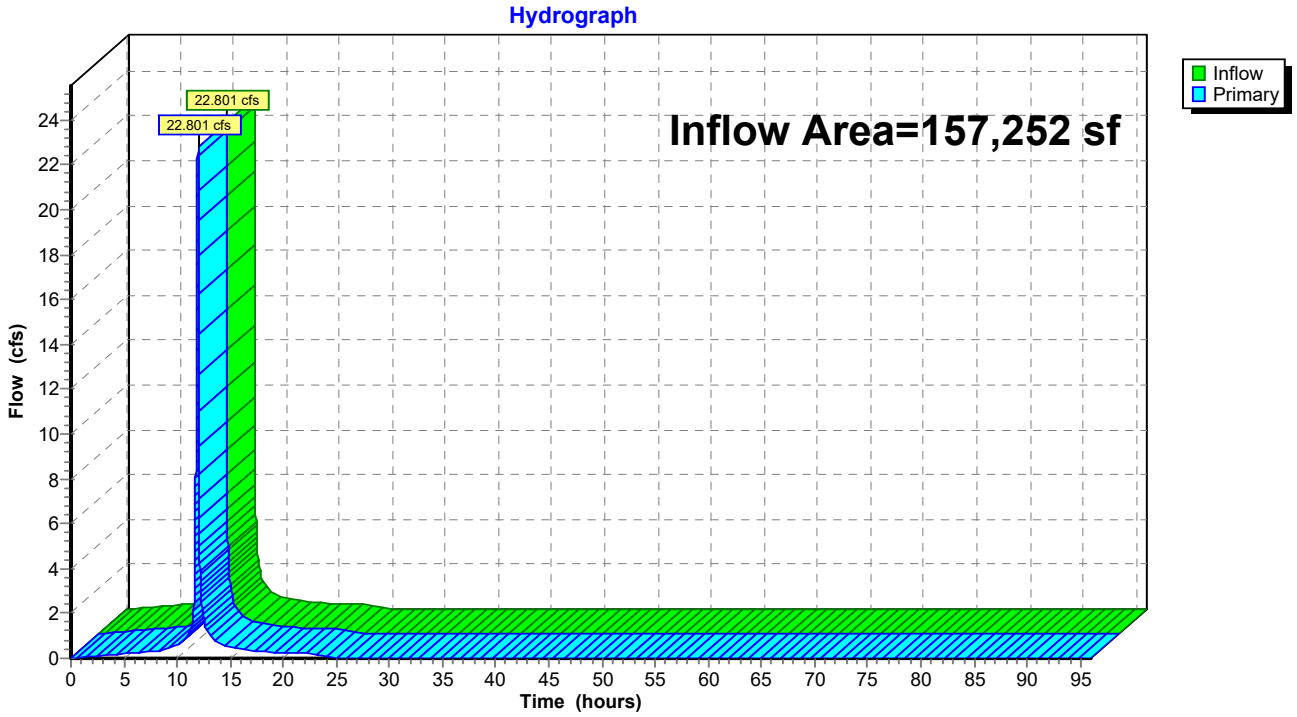
Pond 9P: UG Basin 3



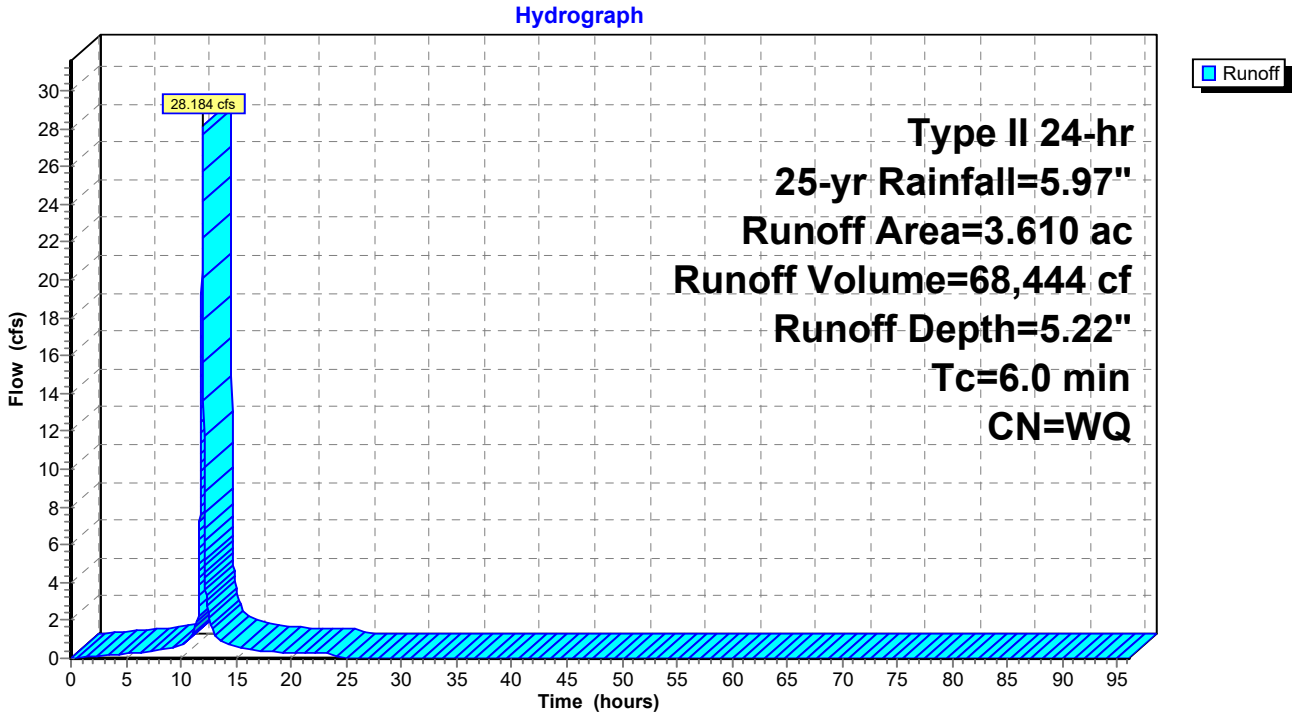
Link 6L: Total Post POI 1



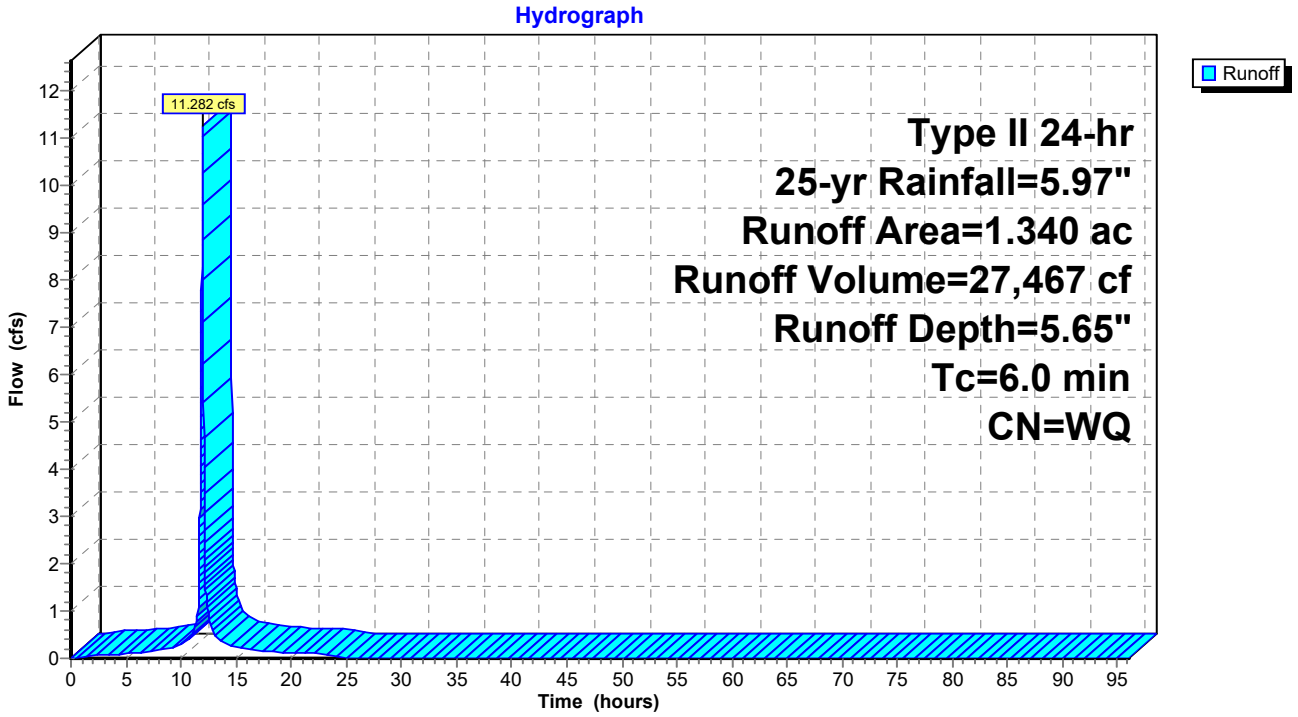
Link 7L: Total Pre POI 1



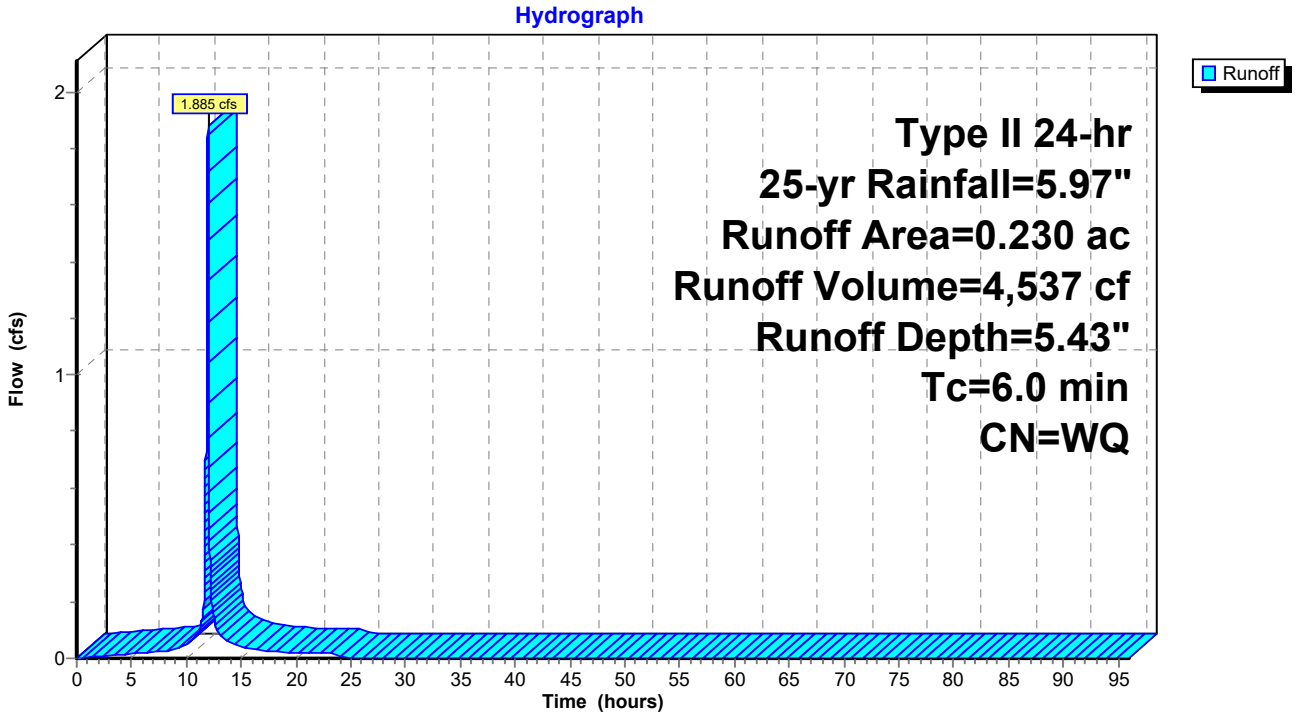
Subcatchment 3S: DA-1E



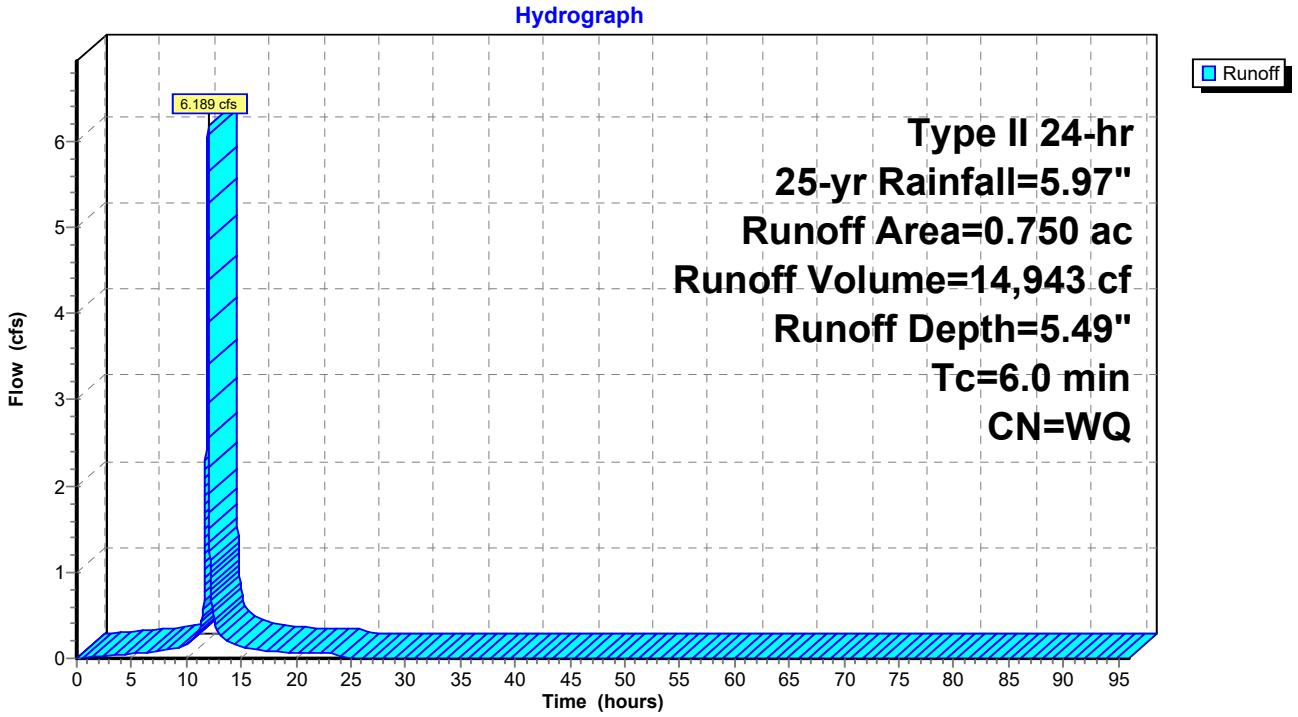
Subcatchment 4S: DA-2P(A)



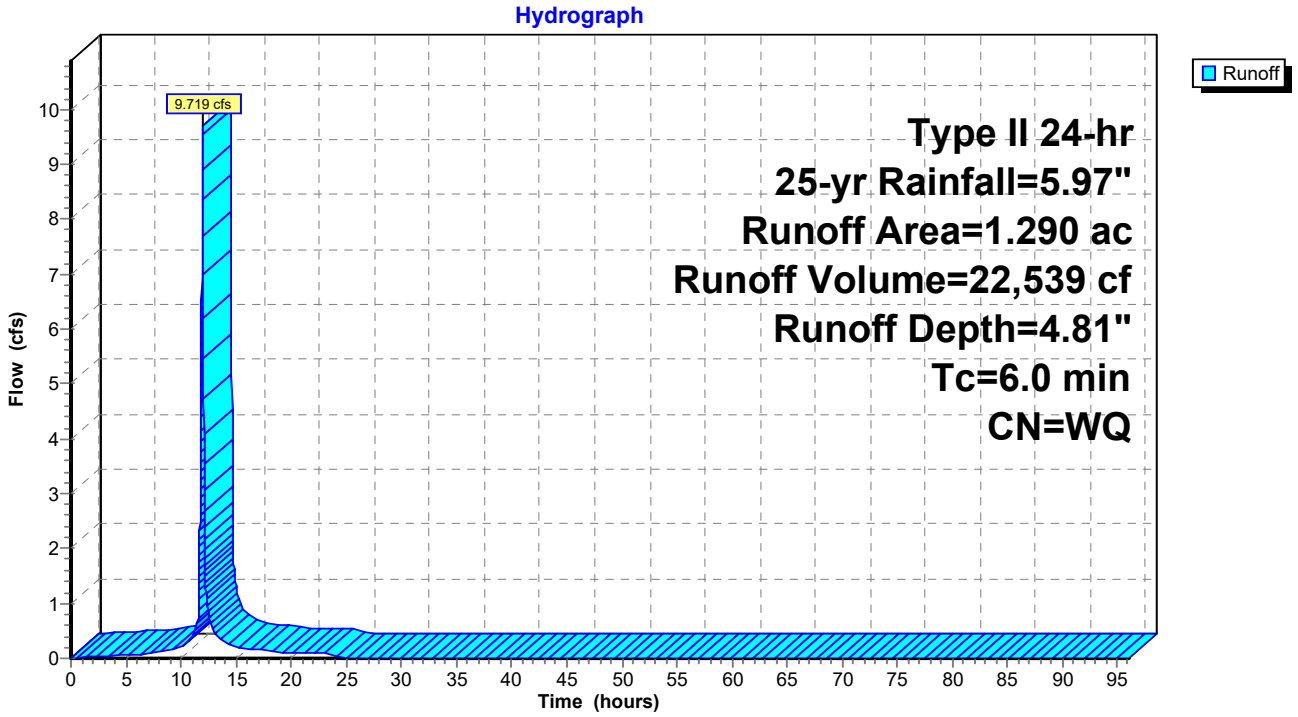
Subcatchment 7S: DA-2P(C)



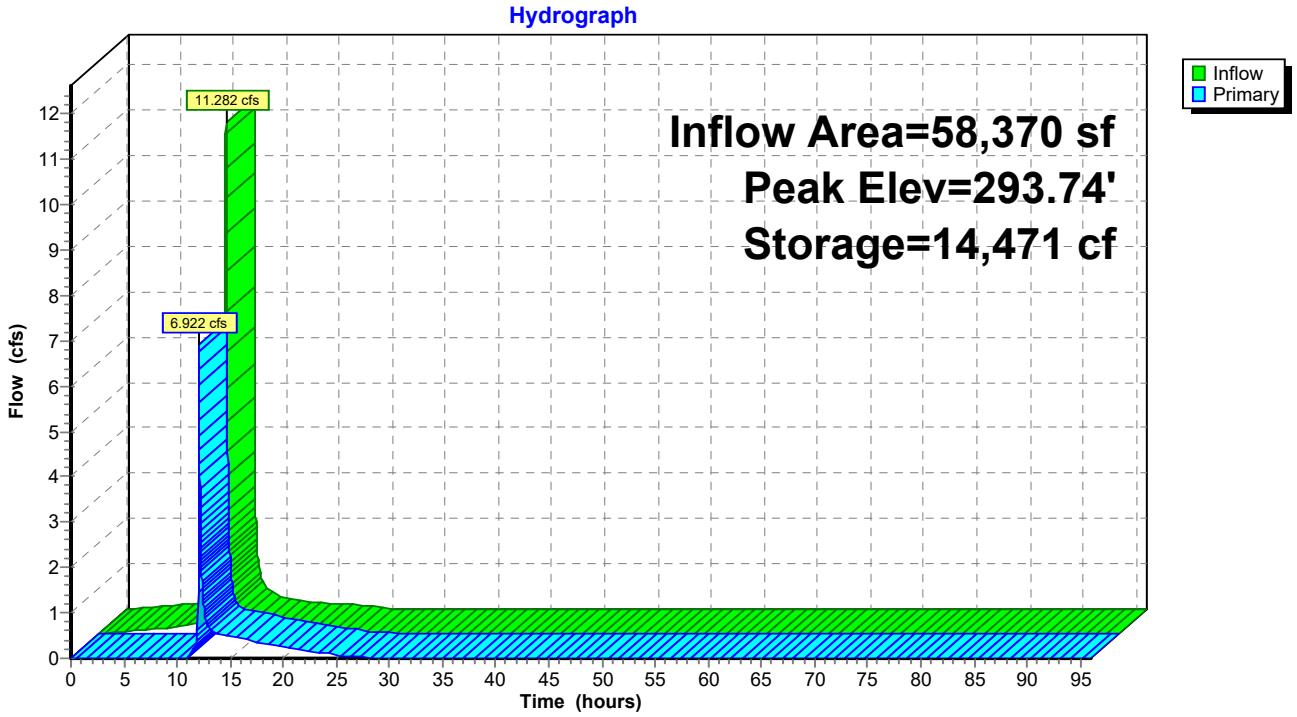
Subcatchment 10S: DA-2P(B)



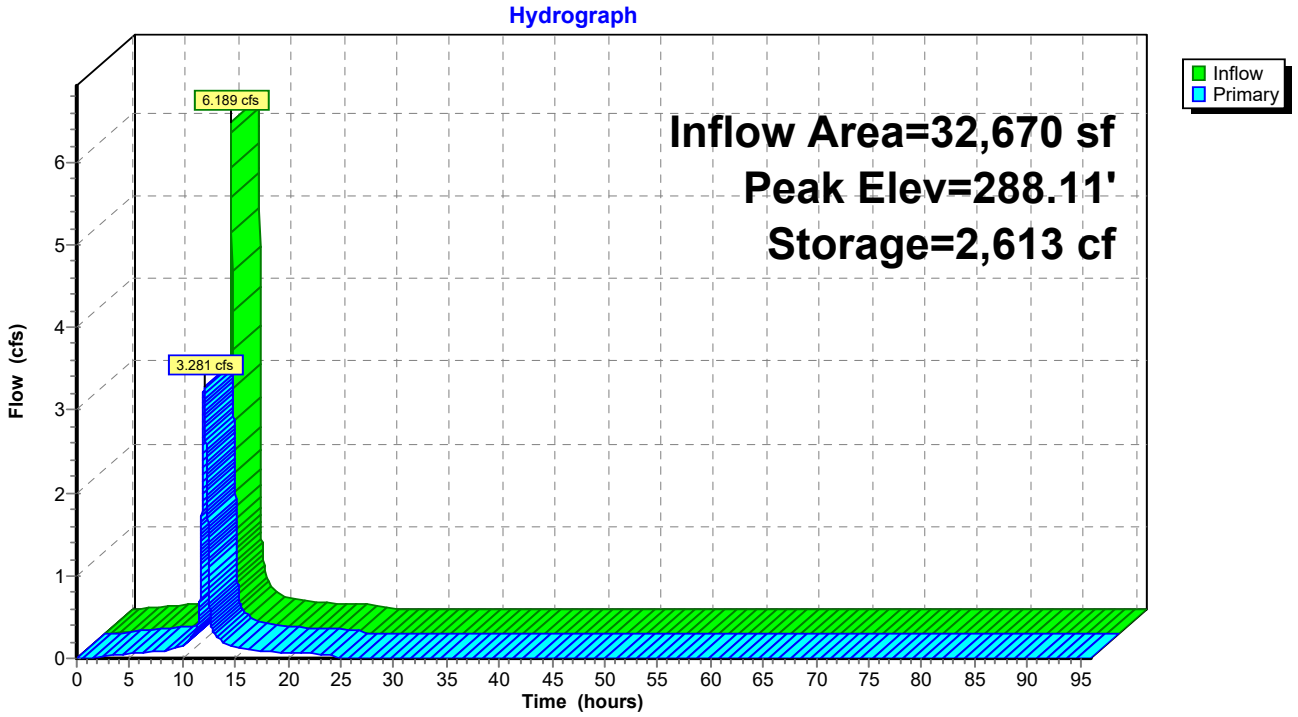
Subcatchment 11S: DA-2P(D) Bypass



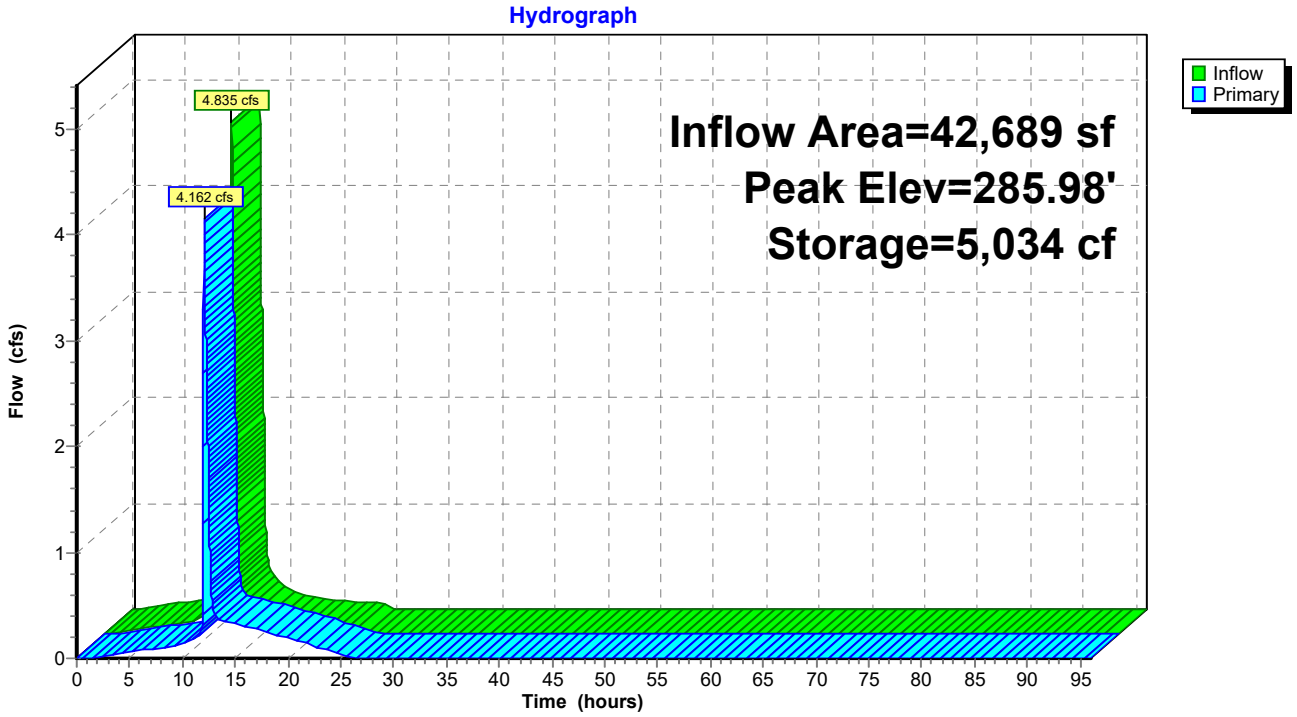
Pond 7P: UG Basin 1



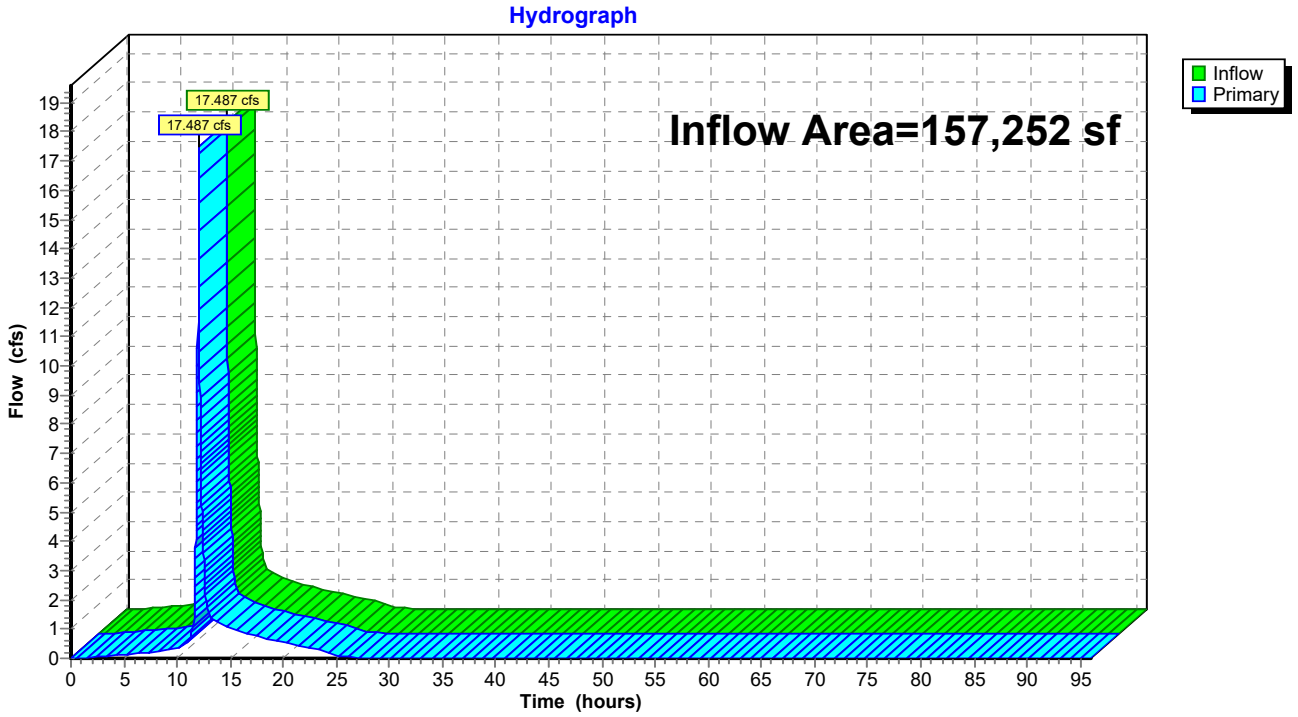
Pond 8P: UG Basin 2



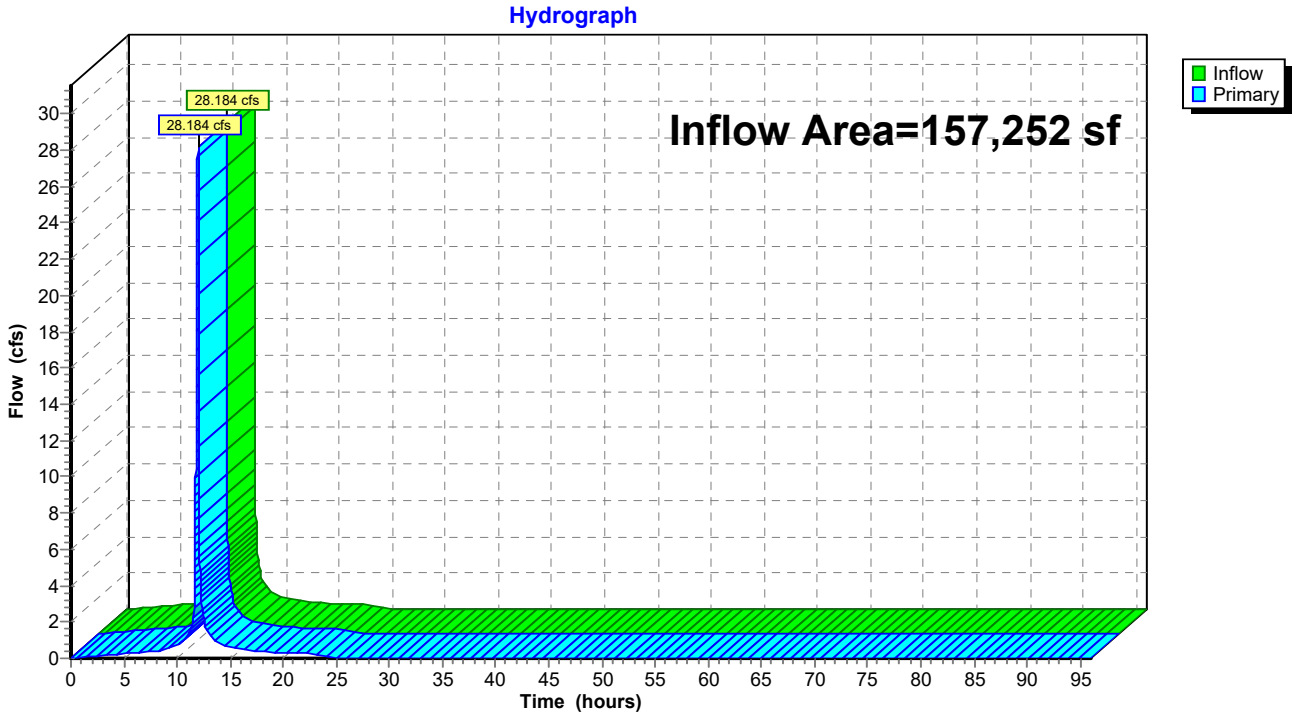
Pond 9P: UG Basin 3



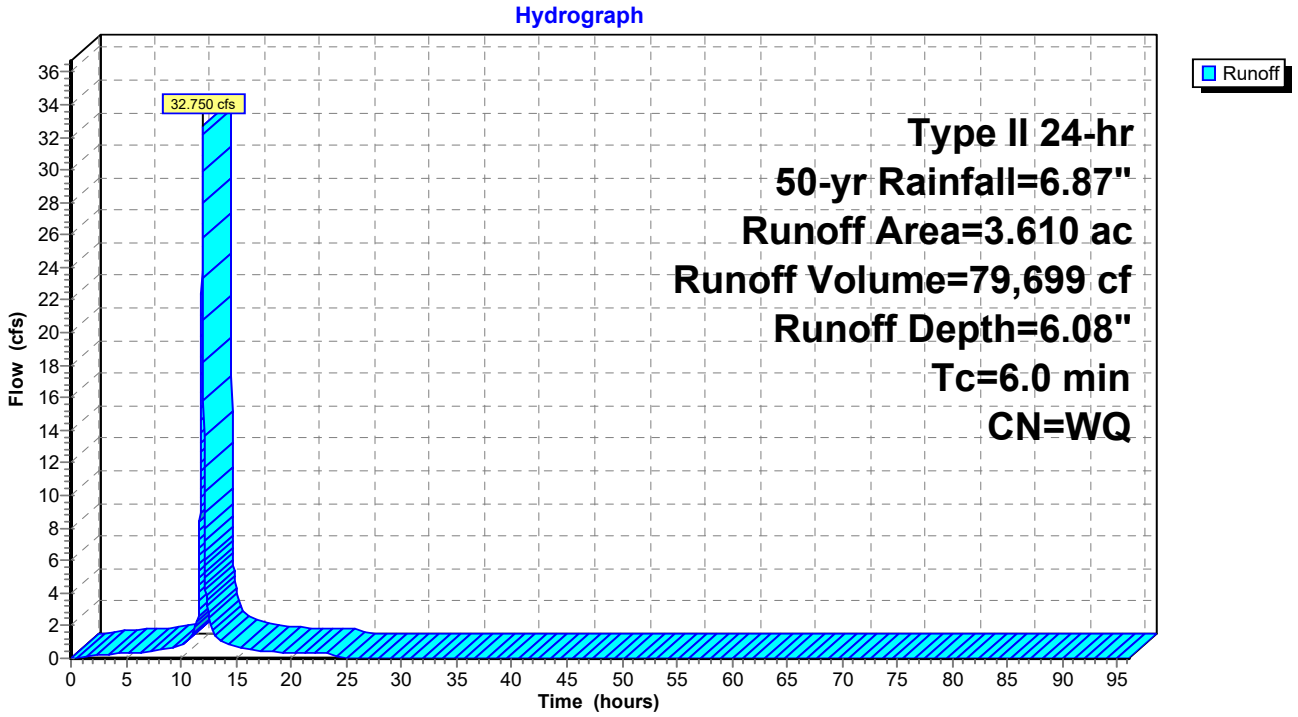
Link 6L: Total Post POI 1



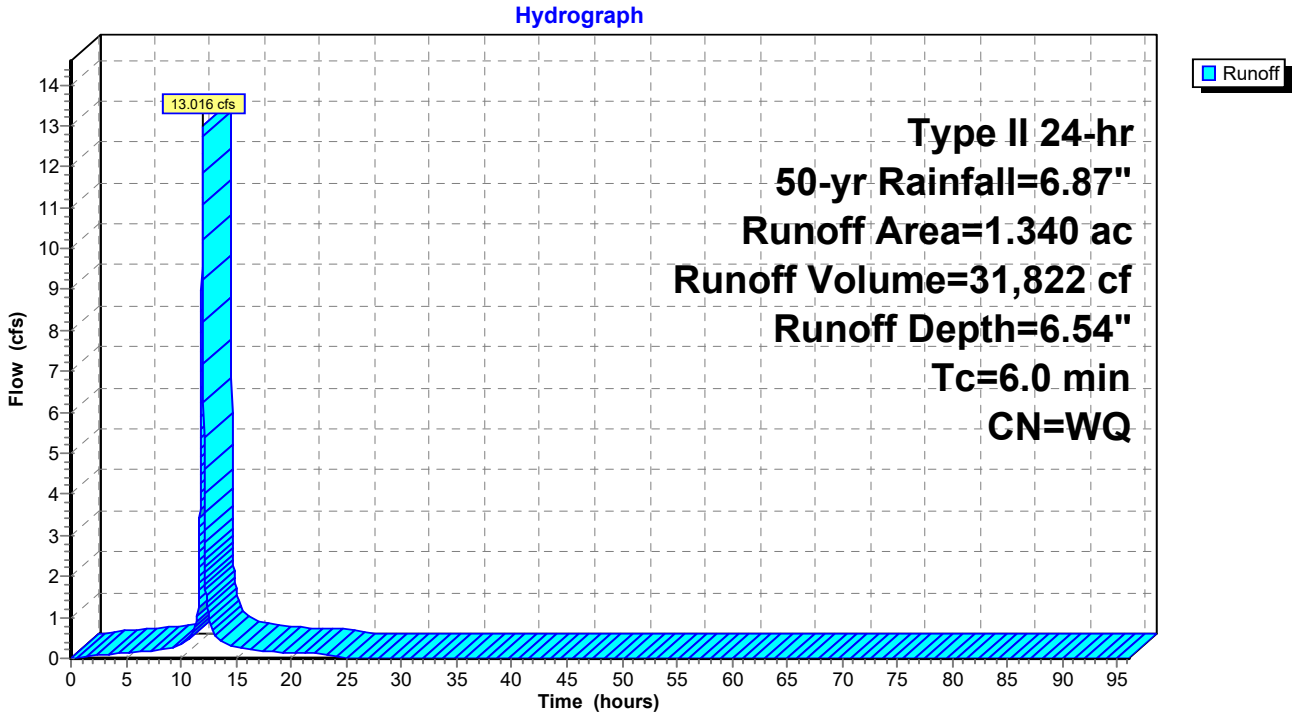
Link 7L: Total Pre POI 1



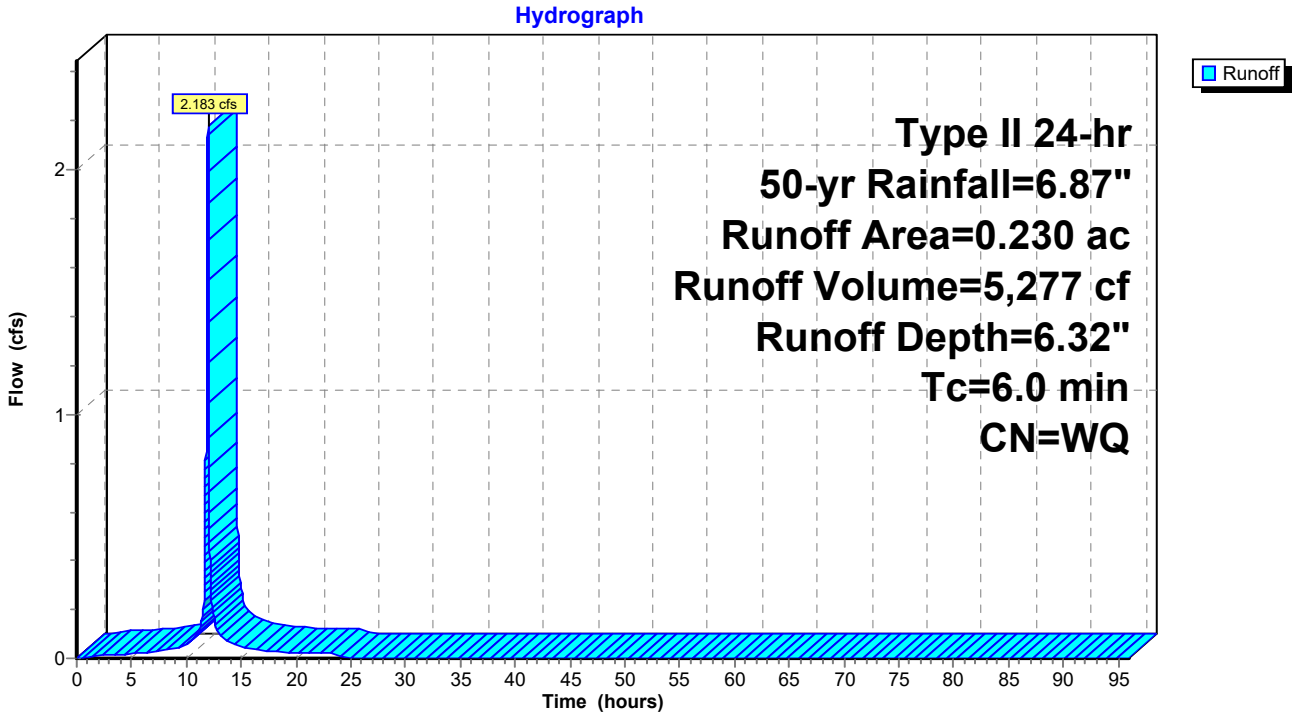
Subcatchment 3S: DA-1E



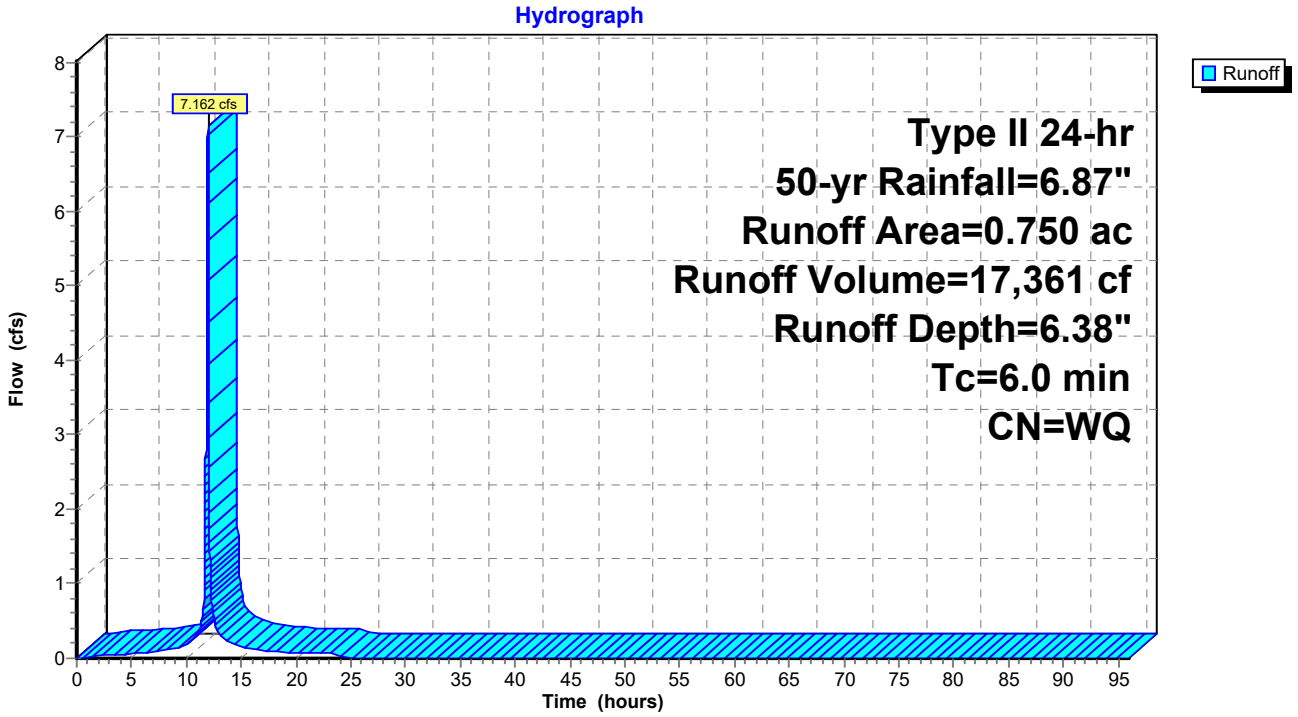
Subcatchment 4S: DA-2P(A)



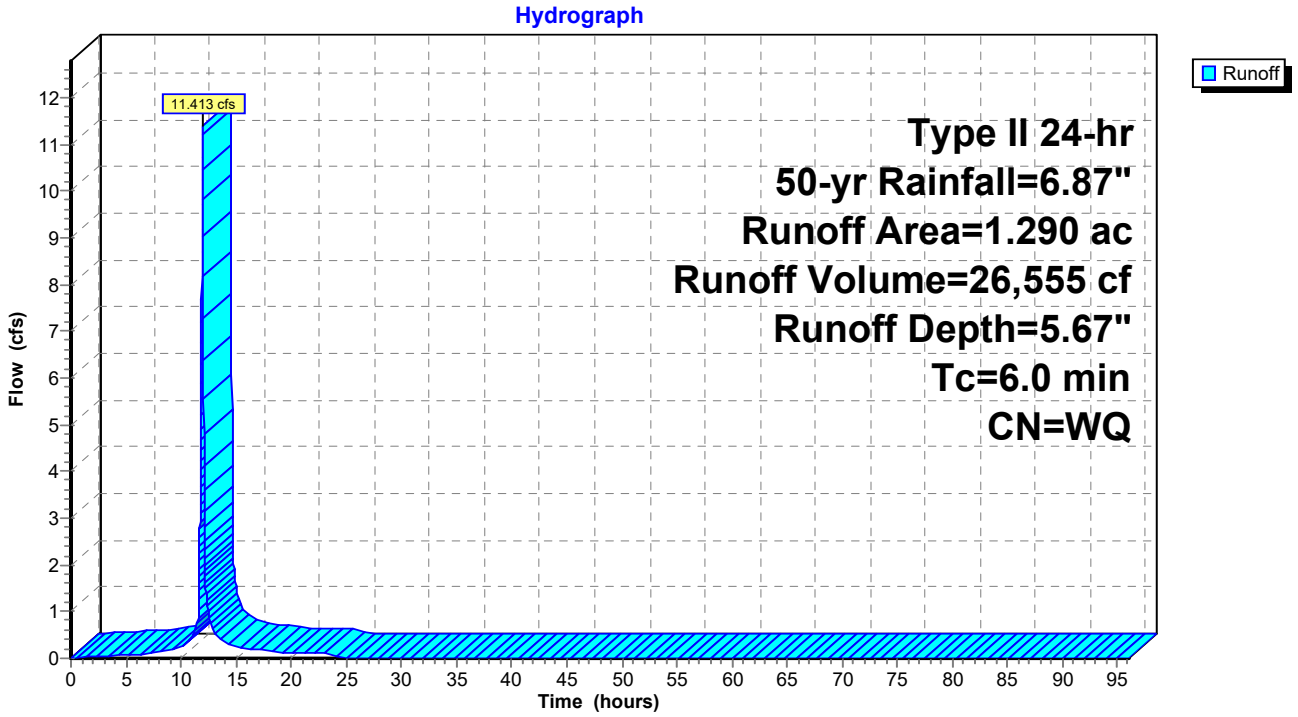
Subcatchment 7S: DA-2P(C)



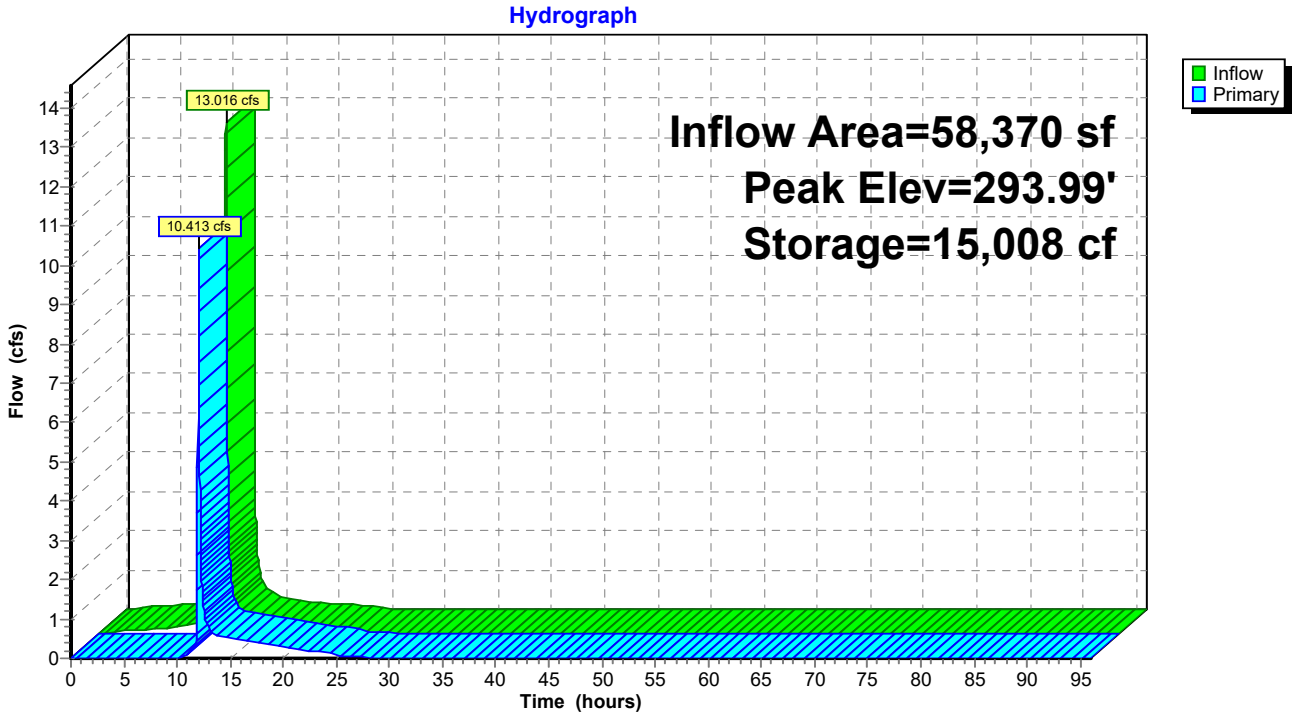
Subcatchment 10S: DA-2P(B)



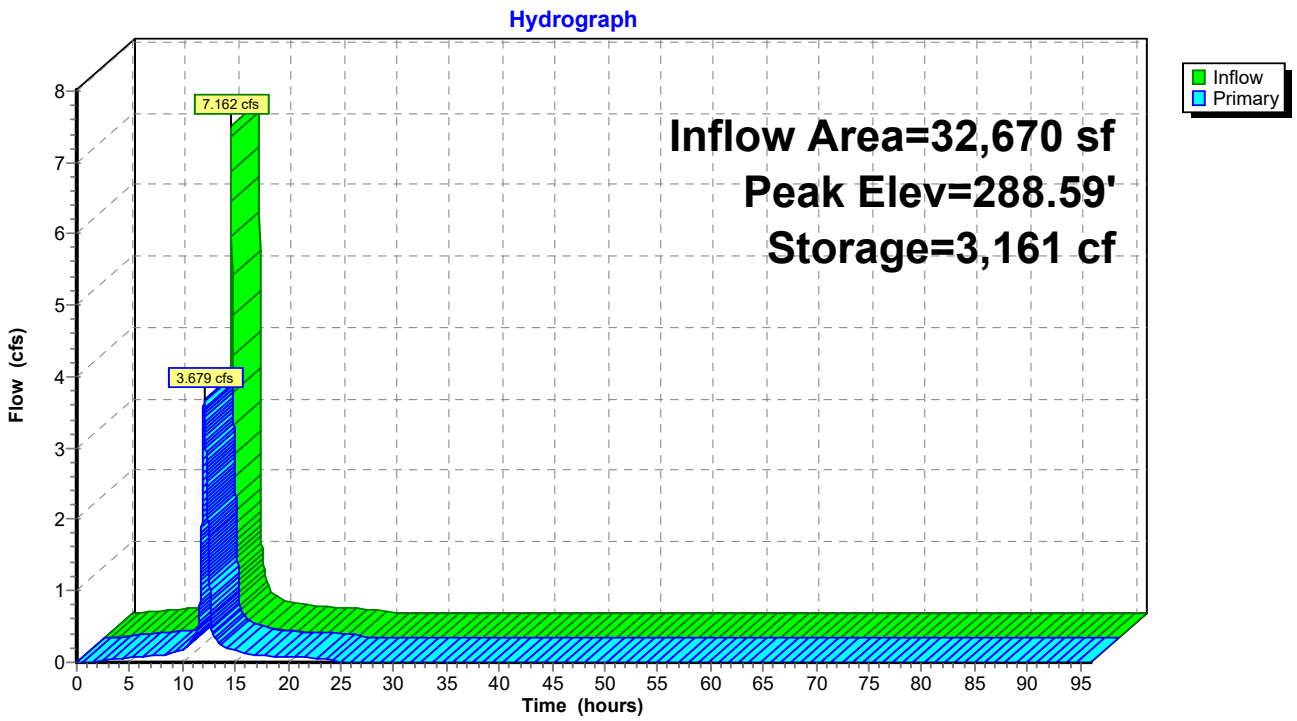
Subcatchment 11S: DA-2P(D) Bypass



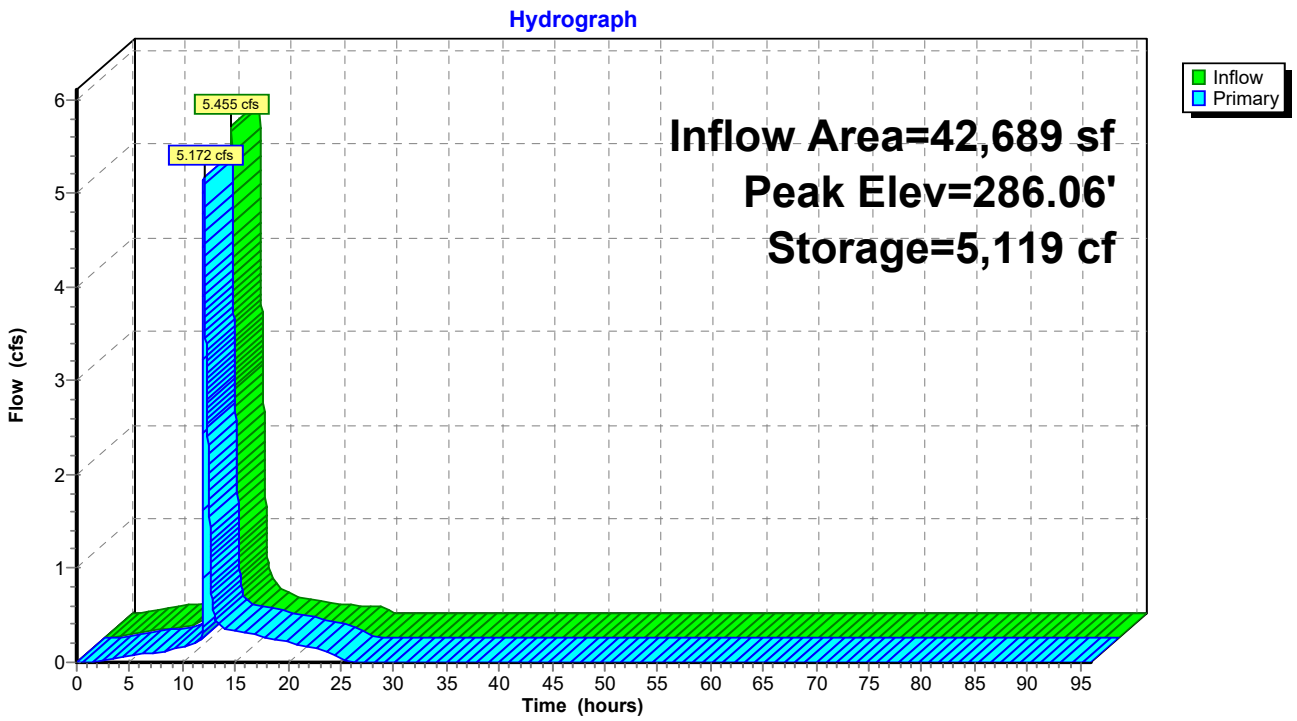
Pond 7P: UG Basin 1



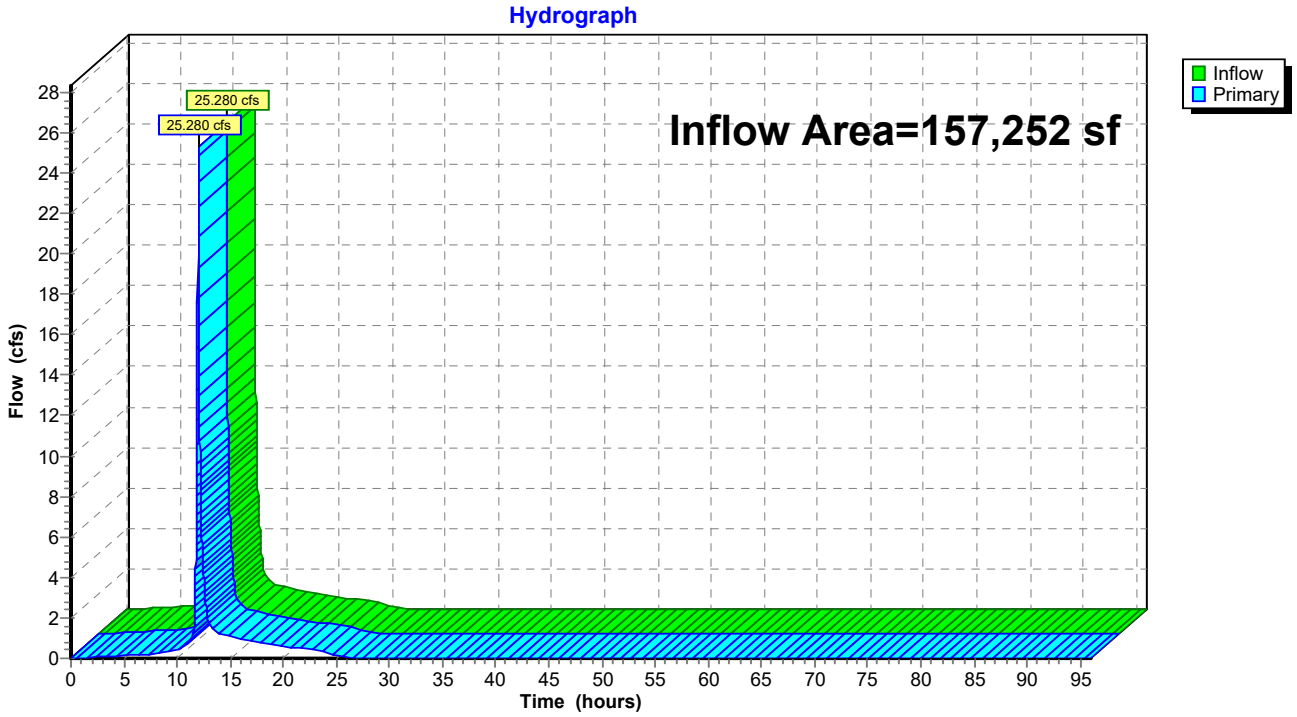
Pond 8P: UG Basin 2



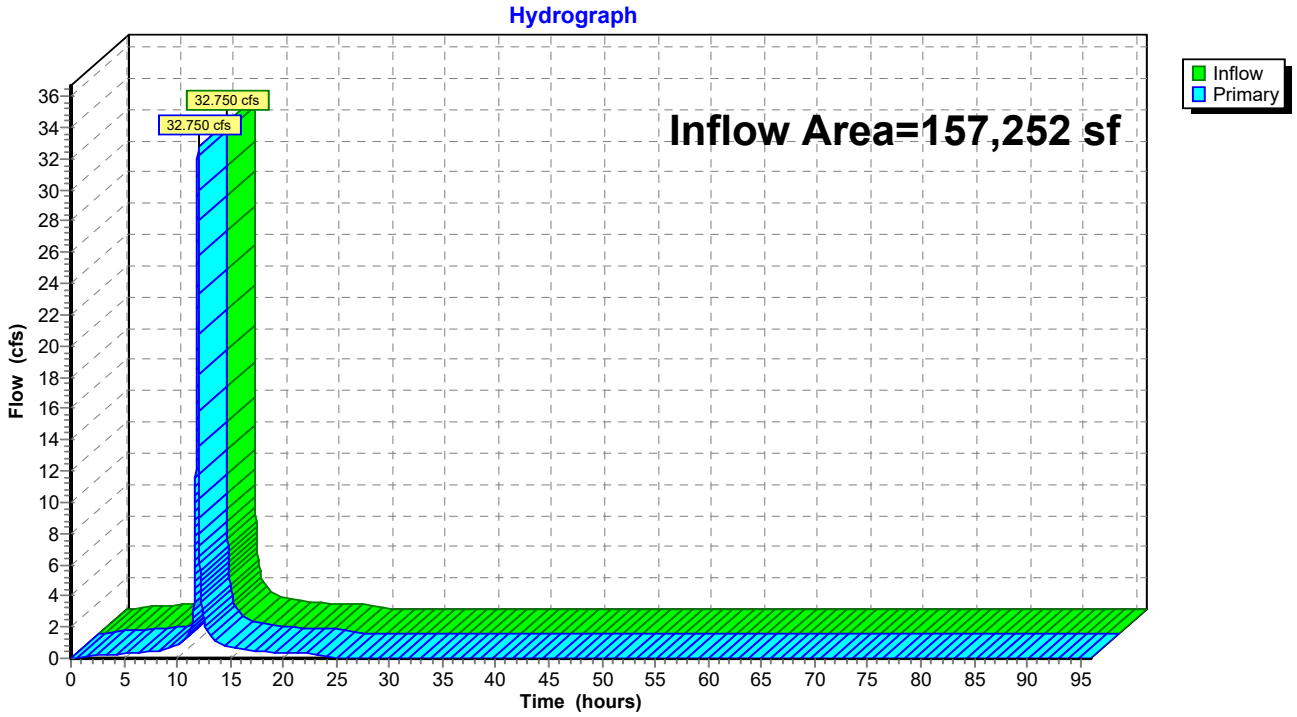
Pond 9P: UG Basin 3



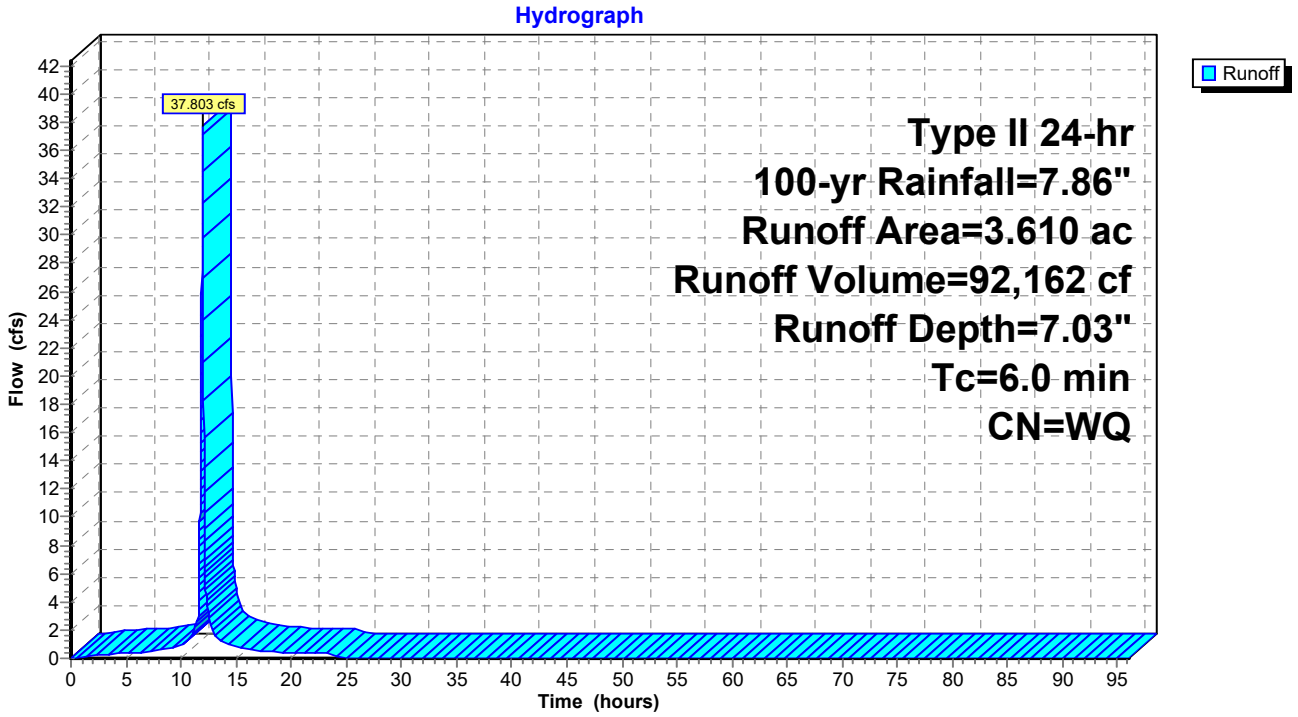
Link 6L: Total Post POI 1



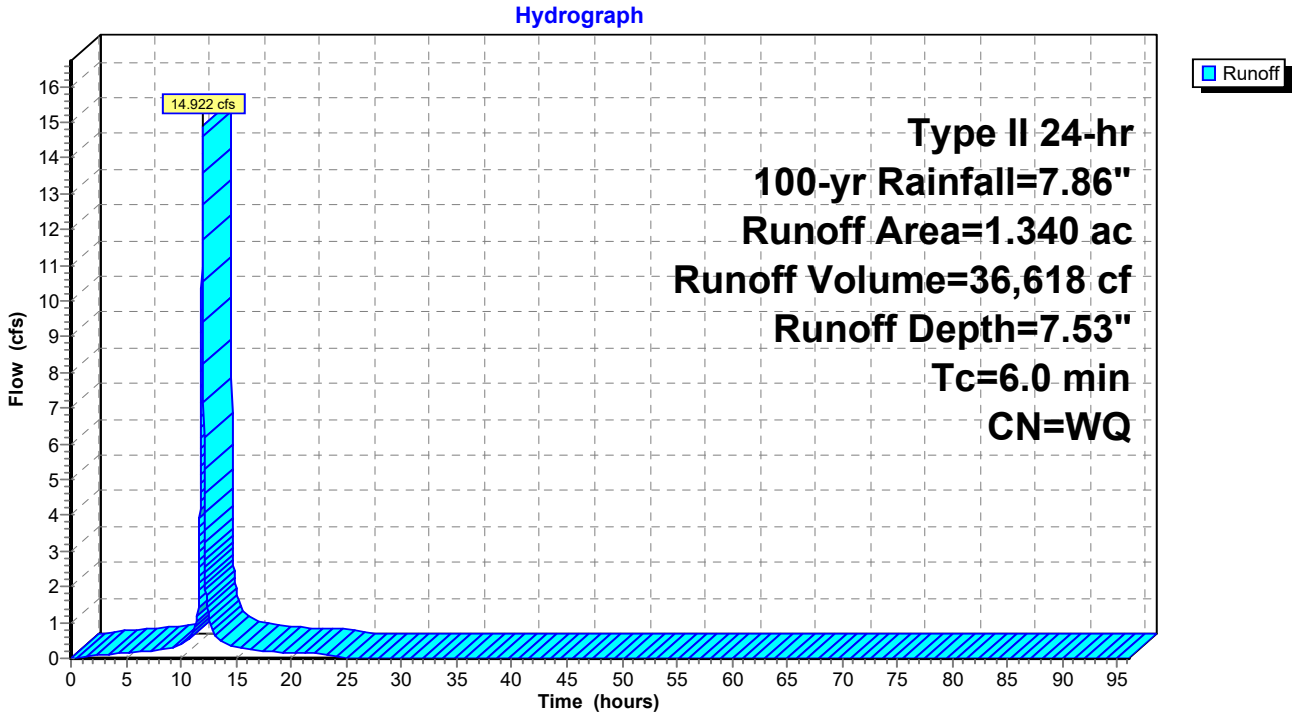
Link 7L: Total Pre POI 1



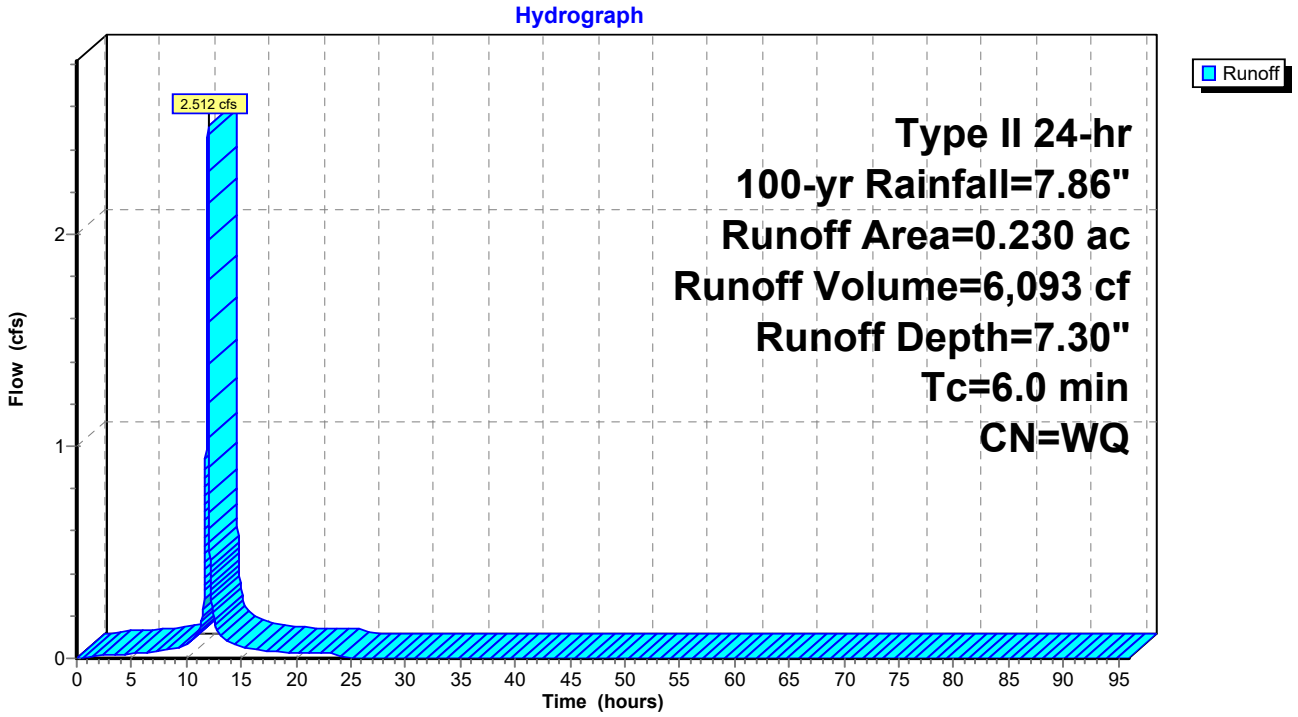
Subcatchment 3S: DA-1E



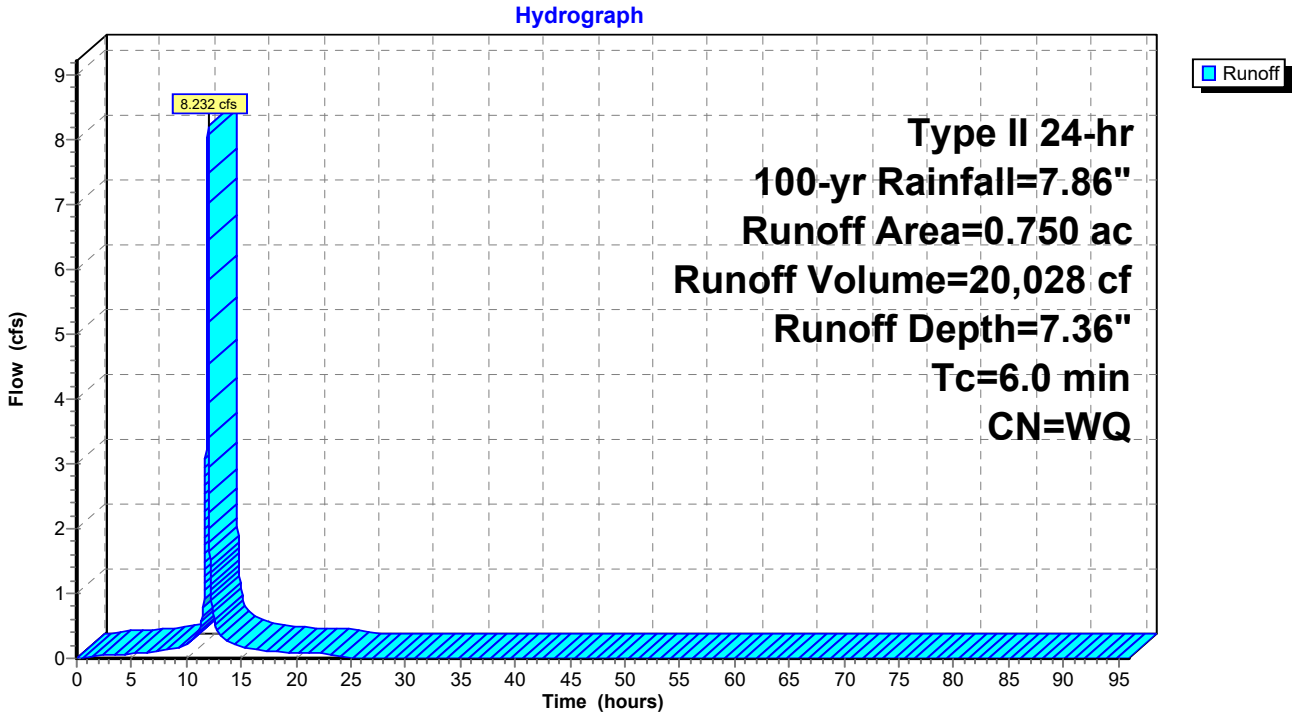
Subcatchment 4S: DA-2P(A)



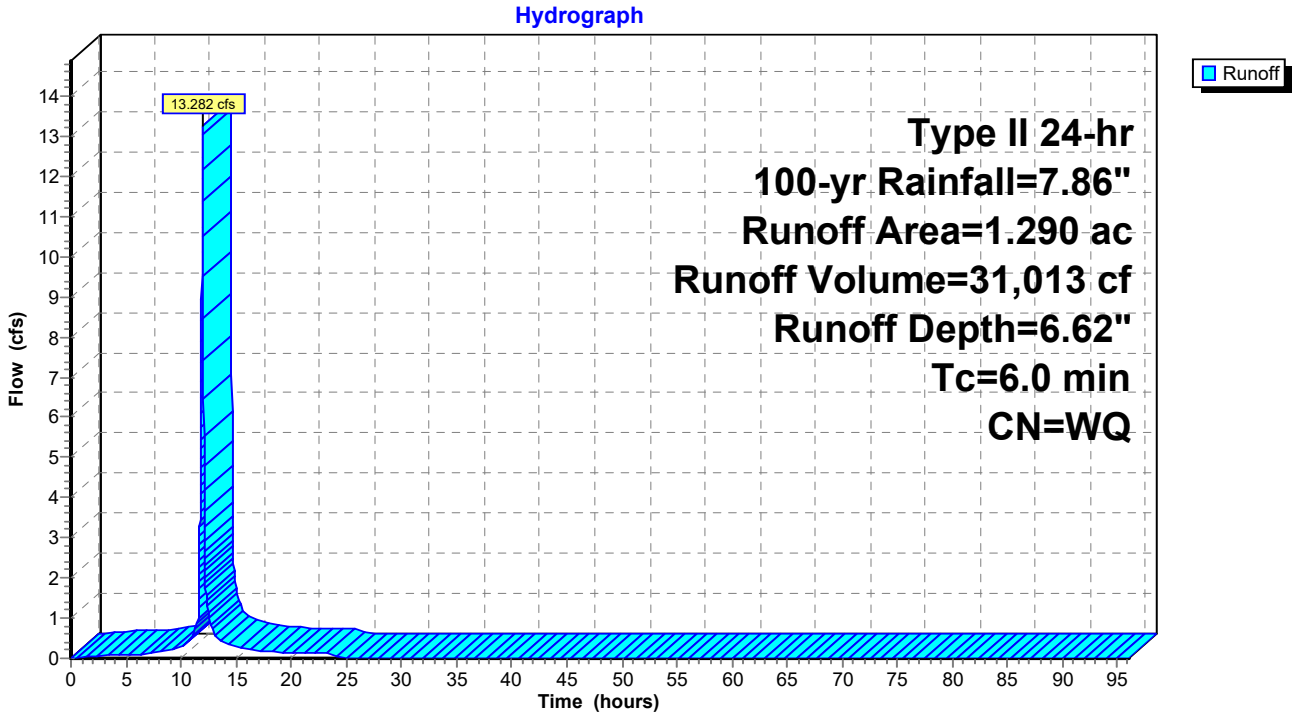
Subcatchment 7S: DA-2P(C)



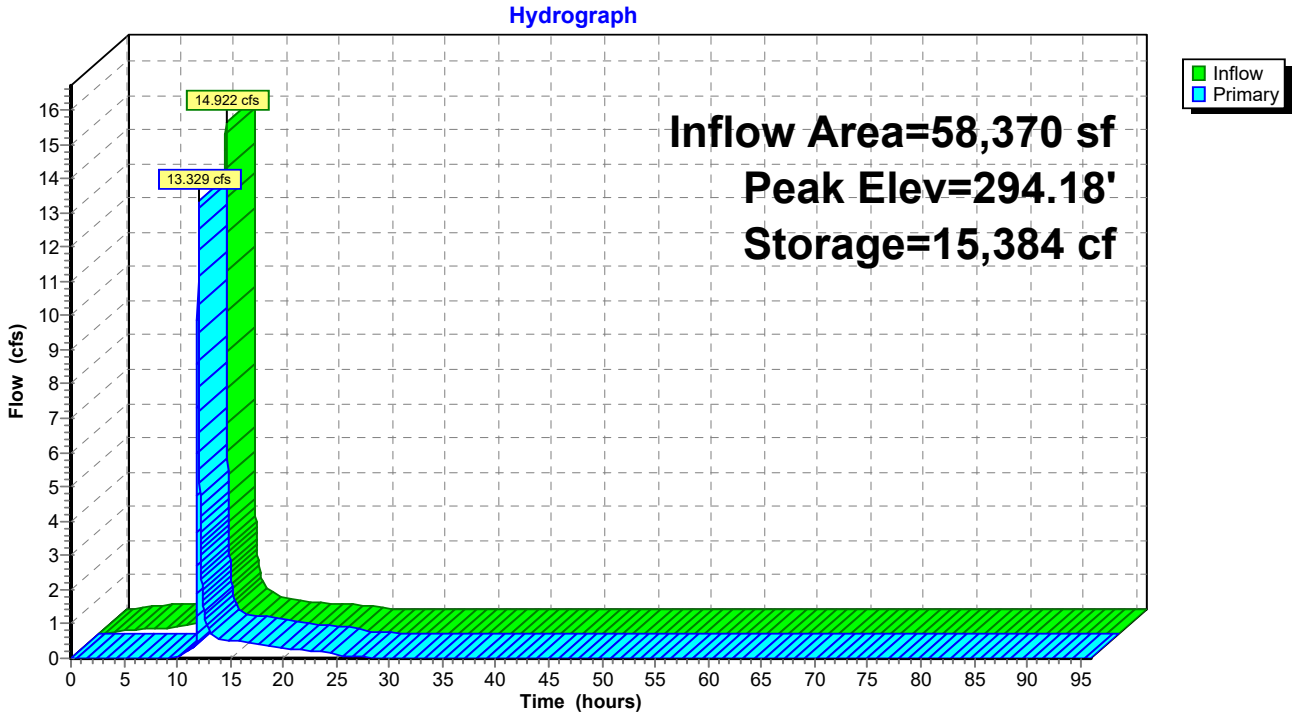
Subcatchment 10S: DA-2P(B)



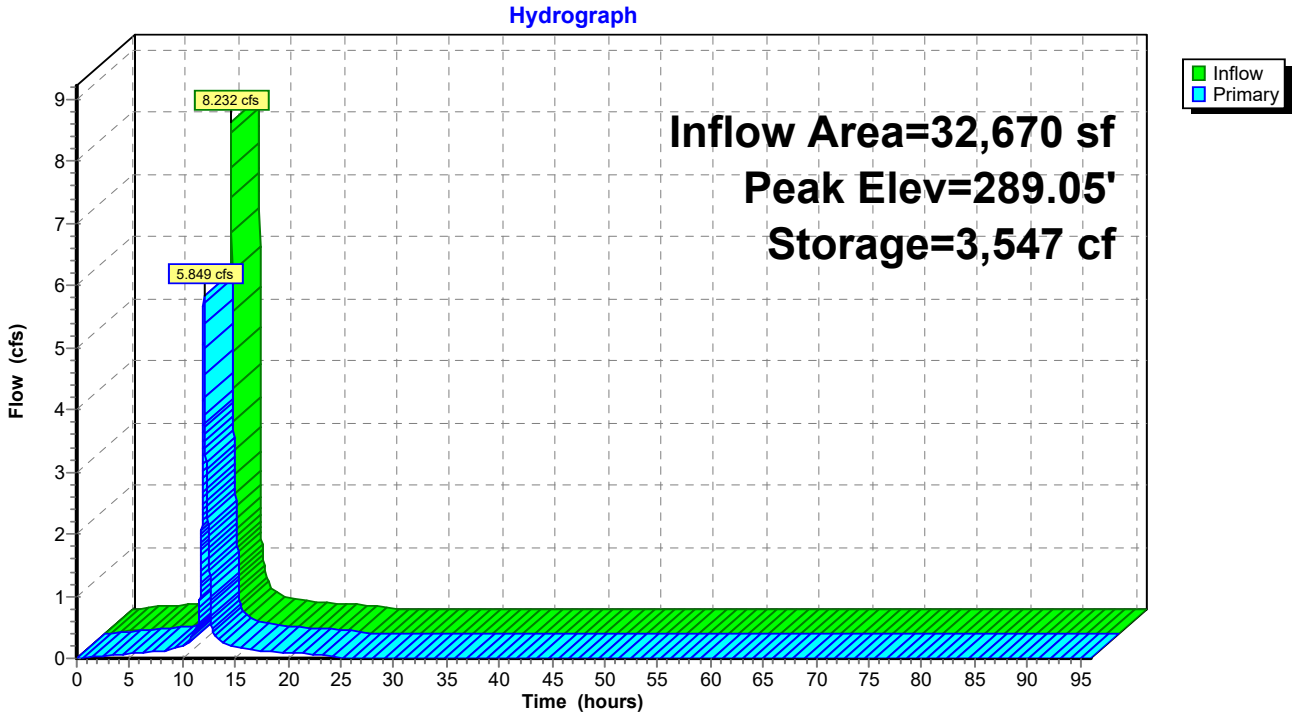
Subcatchment 11S: DA-2P(D) Bypass



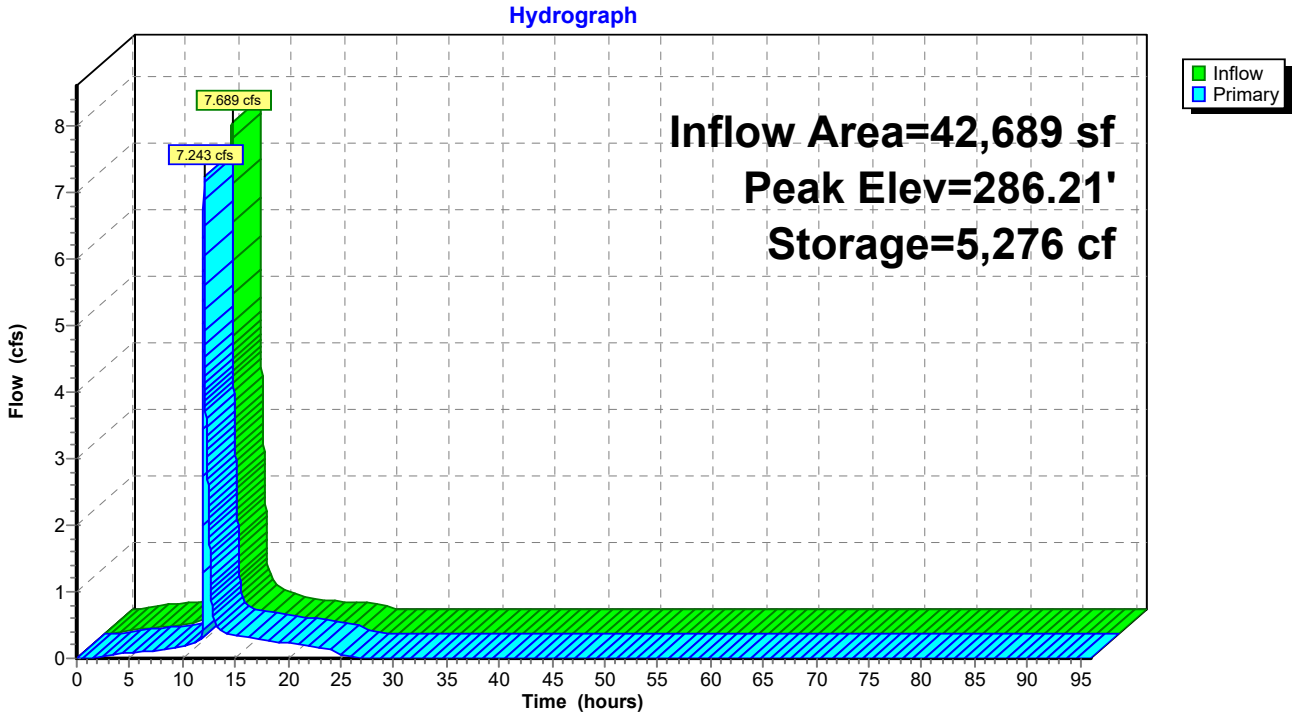
Pond 7P: UG Basin 1



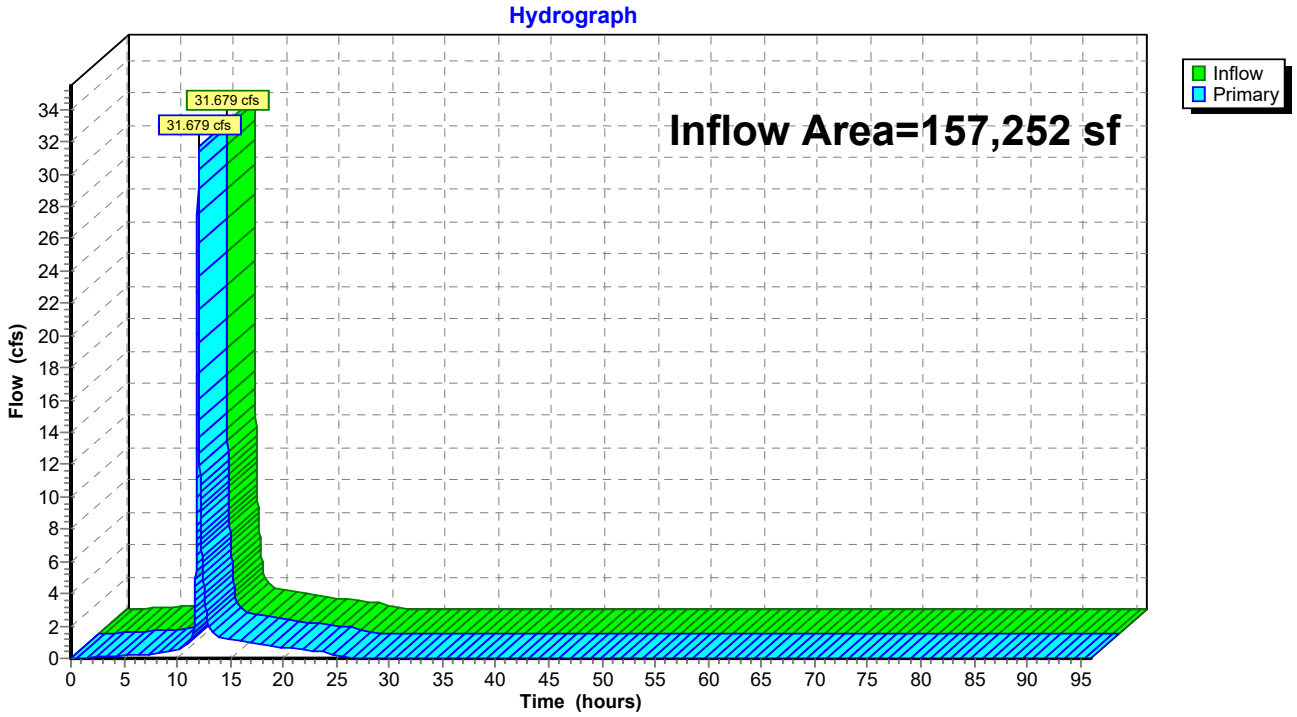
Pond 8P: UG Basin 2



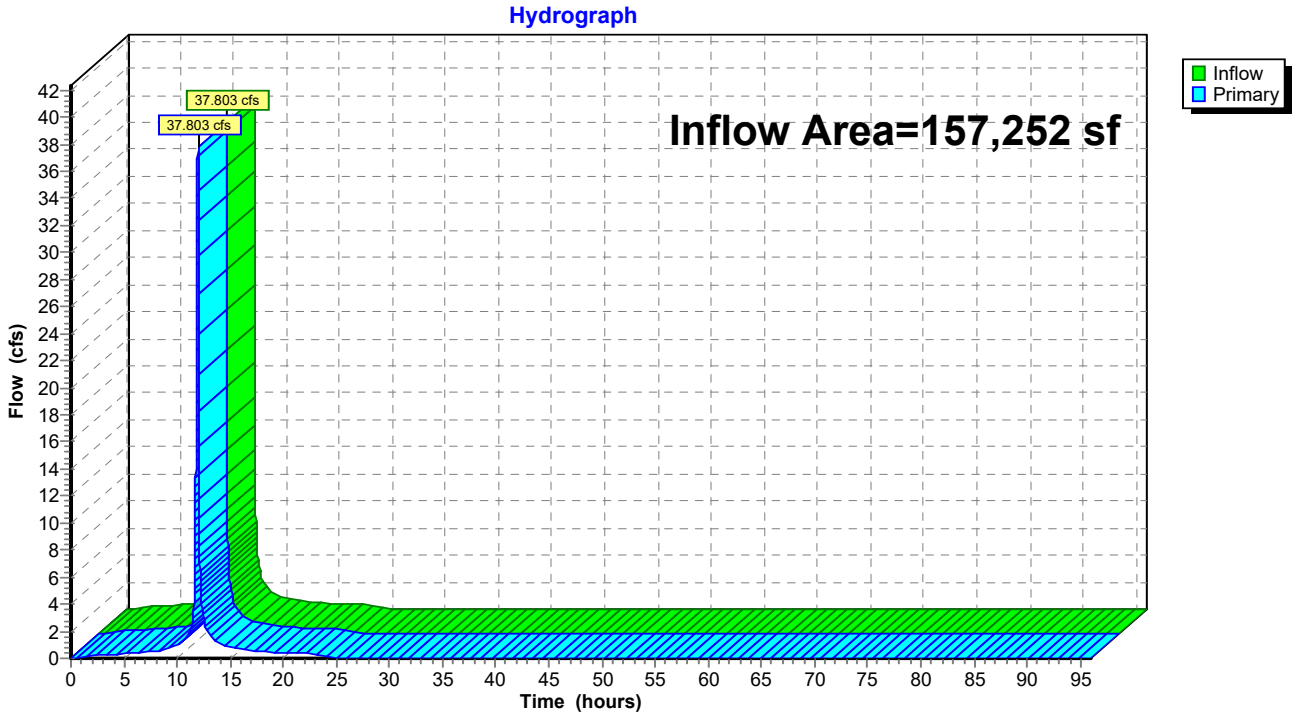
Pond 9P: UG Basin 3



Link 6L: Total Post POI 1



Link 7L: Total Pre POI 1



Hydrograph for Pond 7P: UG Basin 1

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.000	0	289.50	0.000
2.00	0.012	16	289.51	0.000
4.00	0.035	189	289.59	0.000
6.00	0.059	526	289.76	0.000
8.00	0.081	1,029	290.01	0.000
10.00	**0.153**	1,855	290.33	0.000
12.00	**5.592**	**7,853**	**291.78**	**0.301**
14.00	0.170	**8,807**	**292.02**	**0.365**
16.00	0.104	7,478	291.68	0.271
18.00	0.080	6,522	291.45	0.178
20.00	0.058	6,028	291.33	0.102
22.00	0.053	5,836	291.28	0.068
24.00	0.049	5,758	291.26	0.056
26.00	0.000	5,507	291.20	0.023
28.00	0.000	5,387	291.17	0.012
30.00	0.000	5,321	291.15	0.007
32.00	0.000	5,279	291.14	0.005
34.00	0.000	5,250	291.14	0.003
36.00	0.000	5,229	291.13	0.003
38.00	0.000	5,213	291.13	0.002
40.00	0.000	5,200	291.12	0.002
42.00	0.000	5,190	291.12	0.001
44.00	0.000	5,182	291.12	0.001
46.00	0.000	5,175	291.12	0.001
48.00	0.000	5,169	291.12	0.001
50.00	0.000	5,164	291.12	0.001
52.00	0.000	5,160	291.11	0.001
54.00	0.000	5,156	291.11	0.000
56.00	0.000	5,152	291.11	0.000
58.00	0.000	5,149	291.11	0.000
60.00	0.000	5,147	291.11	0.000
62.00	0.000	5,144	291.11	0.000
64.00	0.000	5,142	291.11	0.000
66.00	0.000	5,140	291.11	0.000
68.00	0.000	5,138	291.11	0.000
70.00	0.000	5,137	291.11	0.000
72.00	0.000	5,135	291.11	0.000
74.00	0.000	5,134	291.11	0.000
76.00	0.000	5,132	291.11	0.000
78.00	0.000	5,131	291.11	0.000
80.00	0.000	5,130	291.11	0.000
82.00	0.000	5,129	291.11	0.000
84.00	0.000	5,128	291.11	0.000
86.00	0.000	5,127	291.11	0.000
88.00	0.000	5,126	291.11	0.000
90.00	0.000	5,125	291.11	0.000
92.00	0.000	5,125	291.11	0.000
94.00	0.000	5,124	291.11	0.000
96.00	0.000	5,123	291.11	0.000

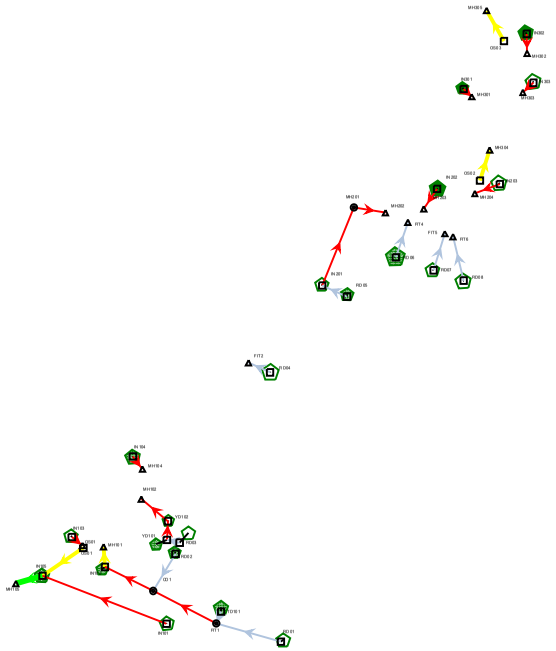
Hydrograph for Pond 8P: UG Basin 2

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.000	0	286.00	0.000
2.00	0.006	8	286.01	0.001
4.00	0.018	39	286.05	0.016
6.00	0.030	52	286.07	0.029
8.00	0.042	61	286.08	0.041
10.00	**0.079**	81	286.11	0.075
12.00	**3.023**	**1,048**	**286.96**	**2.020**
14.00	0.093	**93**	**286.13**	**0.100**
16.00	0.057	72	286.10	0.059
18.00	0.044	63	286.09	0.045
20.00	0.032	55	286.08	0.033
22.00	0.029	52	286.07	0.029
24.00	0.027	50	286.07	0.027
26.00	0.000	12	286.02	0.001
28.00	0.000	7	286.01	0.000
30.00	0.000	5	286.01	0.000
32.00	0.000	4	286.01	0.000
34.00	0.000	3	286.00	0.000
36.00	0.000	3	286.00	0.000
38.00	0.000	2	286.00	0.000
40.00	0.000	2	286.00	0.000
42.00	0.000	2	286.00	0.000
44.00	0.000	2	286.00	0.000
46.00	0.000	2	286.00	0.000
48.00	0.000	2	286.00	0.000
50.00	0.000	1	286.00	0.000
52.00	0.000	1	286.00	0.000
54.00	0.000	1	286.00	0.000
56.00	0.000	1	286.00	0.000
58.00	0.000	1	286.00	0.000
60.00	0.000	1	286.00	0.000
62.00	0.000	1	286.00	0.000
64.00	0.000	1	286.00	0.000
66.00	0.000	1	286.00	0.000
68.00	0.000	1	286.00	0.000
70.00	0.000	1	286.00	0.000
72.00	0.000	1	286.00	0.000
74.00	0.000	1	286.00	0.000
76.00	0.000	1	286.00	0.000
78.00	0.000	1	286.00	0.000
80.00	0.000	1	286.00	0.000
82.00	0.000	1	286.00	0.000
84.00	0.000	1	286.00	0.000
86.00	0.000	1	286.00	0.000
88.00	0.000	1	286.00	0.000
90.00	0.000	1	286.00	0.000
92.00	0.000	1	286.00	0.000
94.00	0.000	1	286.00	0.000
96.00	0.000	1	286.00	0.000

Hydrograph for Pond 9P: UG Basin 3

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.000	0	283.00	0.000
2.00	0.002	3	283.00	0.000
4.00	0.022	70	283.07	0.009
6.00	0.038	135	283.13	0.032
8.00	0.053	175	283.17	0.049
10.00	**0.098**	252	283.24	0.081
12.00	**2.936**	**2,571**	**284.48**	**0.275**
14.00	0.128	**3,653**	**285.05**	**0.328**
16.00	0.077	2,253	284.32	0.259
18.00	0.058	1,115	283.78	0.191
20.00	0.043	355	283.34	0.110
22.00	0.038	162	283.16	0.043
24.00	0.035	147	283.14	0.036
26.00	0.001	62	283.06	0.007
28.00	0.000	35	283.03	0.003
30.00	0.000	25	283.02	0.001
32.00	0.000	19	283.02	0.001
34.00	0.000	15	283.01	0.000
36.00	0.000	13	283.01	0.000
38.00	0.000	11	283.01	0.000
40.00	0.000	10	283.01	0.000
42.00	0.000	9	283.01	0.000
44.00	0.000	8	283.01	0.000
46.00	0.000	7	283.01	0.000
48.00	0.000	7	283.01	0.000
50.00	0.000	6	283.01	0.000
52.00	0.000	6	283.01	0.000
54.00	0.000	5	283.01	0.000
56.00	0.000	5	283.00	0.000
58.00	0.000	5	283.00	0.000
60.00	0.000	4	283.00	0.000
62.00	0.000	4	283.00	0.000
64.00	0.000	4	283.00	0.000
66.00	0.000	4	283.00	0.000
68.00	0.000	4	283.00	0.000
70.00	0.000	3	283.00	0.000
72.00	0.000	3	283.00	0.000
74.00	0.000	3	283.00	0.000
76.00	0.000	3	283.00	0.000
78.00	0.000	3	283.00	0.000
80.00	0.000	3	283.00	0.000
82.00	0.000	3	283.00	0.000
84.00	0.000	3	283.00	0.000
86.00	0.000	3	283.00	0.000
88.00	0.000	3	283.00	0.000
90.00	0.000	2	283.00	0.000
92.00	0.000	2	283.00	0.000
94.00	0.000	2	283.00	0.000
96.00	0.000	2	283.00	0.000

Scenario: 100-Year



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5/12/2022

Bohler Engineering
1600 Manor Drive, Suite 200
Chalfont, PA 18914

Bentley StormCAD V8i (SELECTseries 2)
[08.11.02.35]
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Scenario: 100-Year
Current Time Step: 0.000Hr
Catch Basin FlexTable: Inlet Report

Label	Inlet	Inlet Location	Ground Elevation (ft)	Invert Out (ft)	Inlet Bottom El. (ft)	Inlet Intensity (in/h)	Inlet Tc (min)	Flow (Known) (ft^3/s)	Rim Elevation (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Inlet DA (acres)	Inlet C	Gutter Spread (ft)	Flow (Total Surface) (ft^3/s)
IN101	PADOT Double Type 'M'	In Sag	297.55	294.00	294.00	8.350	5.000	0.00	297.55	294.31	294.31	0.100	0.770	5.1	0.65
IN102	PADOT Type 'C'	In Sag	295.40	289.91	289.91	8.350	5.000	0.00	295.40	294.38	294.24	0.050	0.950	2.8	0.40
IN103	PADOT Type 'C'	In Sag	295.10	290.50	290.50	8.350	5.000	0.00	295.10	294.22	294.22	0.080	0.950	4.1	0.64
IN104	PADOT Type 'C'	In Sag	298.65	290.50	290.50	8.350	5.000	0.00	298.65	294.22	294.22	0.130	0.950	5.8	1.04
IN105	PADOT Double Type 'M'	In Sag	292.77	287.35	287.35	8.350	5.000	0.00	292.77	289.48	289.33	0.110	0.900	5.7	0.83
IN201	PADOT Type 'C'	In Sag	295.83	292.30	292.30	8.350	5.000	0.00	295.83	293.02	292.90	0.220	0.870	7.8	1.61
IN202	PADOT Type 'C'	In Sag	293.94	288.30	288.30	8.350	5.000	0.00	293.94	289.16	289.16	0.130	0.810	5.2	0.89
IN203	PADOT Type 'C'	In Sag	291.62	287.40	287.40	8.350	5.000	0.00	291.62	289.16	289.16	0.100	0.890	4.6	0.75
IN301	PADOT Type 'C'	In Sag	288.88	284.00	284.00	8.350	5.000	0.00	288.88	286.31	286.31	0.030	0.950	1.1	0.24
IN302	PADOT Type 'C'	In Sag	286.95	283.66	283.66	8.350	5.000	0.00	286.95	286.31	286.31	0.080	0.880	3.8	0.59
IN303	PADOT Type 'C'	In Sag	287.35	283.57	283.57	8.350	5.000	0.00	287.35	286.31	286.31	0.120	0.850	5.0	0.86
OS01	PADOT Type 'C'	In Sag	295.50	289.50	289.50	8.350	0.000	0.00	295.50	290.88	290.88	(N/A)	(N/A)	0.0	14.00
OS02	PADOT Type 'C'	In Sag	292.30	286.50	286.50	8.350	0.000	0.00	292.30	287.53	287.53	(N/A)	(N/A)	0.0	7.08
OS03	PADOT Type 'C'	In Sag	287.55	283.50	283.50	8.350	0.000	0.00	287.55	284.65	284.65	(N/A)	(N/A)	0.0	8.80
RD01	PADOT Type 'C'	In Sag	296.50	291.50	291.50	8.350	5.000	0.00	296.50	295.26	295.26	0.220	0.950	8.3	1.76
RD02	PADOT Type 'C'	In Sag	296.50	291.50	291.50	8.350	5.000	0.00	296.50	296.07	296.07	0.220	0.950	8.3	1.76
RD03	PADOT Type 'C'	In Sag	296.50	291.50	291.50	8.350	5.000	0.00	296.50	294.83	294.83	0.220	0.950	8.3	1.76
RD04	PADOT Type 'C'	In Sag	296.50	291.50	291.50	8.350	5.000	0.00	296.50	294.60	294.60	0.220	0.950	8.3	1.76
RD05	PADOT Type 'C'	In Sag	296.50	292.53	292.53	8.350	5.000	0.00	296.50	293.04	293.04	0.080	0.950	4.1	0.64
RD06	PADOT Type 'C'	In Sag	296.50	290.00	290.00	8.350	5.000	0.00	296.50	290.38	290.38	0.080	0.950	4.1	0.64
RD07	PADOT Type 'C'	In Sag	296.50	290.00	290.00	8.350	5.000	0.00	296.50	290.38	290.38	0.080	0.950	4.1	0.64
RD08	PADOT Type 'C'	In Sag	296.50	290.00	290.00	8.350	5.000	0.00	296.50	290.38	290.38	0.080	0.950	4.1	0.64
TD101	Trench Drain	In Sag	292.40	291.60	291.60	8.350	5.000	0.00	292.40	292.40	292.40	0.110	0.900	3.9	0.83
YD101	Grate 15 Nyloplast	In Sag	296.30	289.90	289.90	8.350	5.000	0.00	296.30	294.63	294.31	0.010	0.950	116.1	0.08
YD102	Grate 15 Nyloplast	In Sag	296.50	289.64	289.64	8.350	5.000	0.00	296.50	294.30	294.24	0.050	0.590	1,119.0	0.25

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Scenario: 100-Year
Current Time Step: 0.000Hr
FlexTable: Manhole Table

Label	Station (Calculated) (ft)	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Bolted Cover?	Diameter (in)	Headloss Method
MH201	0+30	296.50	True	296.50	287.33	False	48.0	HEC-22 Energy
CO1	0+65	296.55	True	296.55	290.50	False	48.0	HEC-22 Energy
FIT1	1+30	300.00	True	300.00	290.98	False	48.0	HEC-22 Energy

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Scenario: 100-Year
Current Time Step: 0.000Hr
FlexTable: Outfall Table

Label	Station (ft)	Elevation (Ground) (ft)	Set Rim to Ground Elevation	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (Tailwater) (ft)
MH105	0+00	292.20	True	287.22	Crown	0.00
OS01	0+00	295.50	True	289.50	User Defined Tailwater	294.22
MH101	0+00	296.00	True	289.50	User Defined Tailwater	294.22
MH102	0+00	298.60	True	289.50	User Defined Tailwater	294.22
MH104	0+00	298.60	True	289.50	User Defined Tailwater	294.22
MH202	0+00	296.00	True	286.50	User Defined Tailwater	289.16
MH203	0+00	295.00	True	286.50	User Defined Tailwater	289.16
MH204	0+00	293.00	True	286.50	User Defined Tailwater	289.16
MH304	0+00	291.10	True	284.75	User Defined Tailwater	286.31
MH303	0+00	288.00	True	283.50	User Defined Tailwater	286.31
MH302	0+00	287.85	True	283.50	User Defined Tailwater	286.31
MH305	0+00	283.40	True	282.00	Crown	0.00
FIT2	0+00	297.00	True	289.50	User Defined Tailwater	294.22
FIT4	0+00	295.50	True	286.50	User Defined Tailwater	289.16
FIT5	0+00	295.25	True	286.50	User Defined Tailwater	289.16
FIT6	0+00	294.80	True	286.50	User Defined Tailwater	289.16
MH301	0+00	289.48	True	283.50	User Defined Tailwater	286.31

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Scenario: 100-Year
Current Time Step: 0.000Hr
Conduit FlexTable: Pipe Report

Upstream Struct.	Downstream Struct.	Size	Material	L (ft)	S (ft/ft)	Flow (Link) (ft^3/s)	Q Full (ft^3/s)	Avg. V (ft/s)	Up. Invert (ft)	Up. Cover (ft)	Up. Gr. Elev. (ft)	HGL In (ft)	EGL In (ft)	Down. Invert (ft)	Down. Cover (ft)	Down. Gr. Elev. (ft)	HGL Out (ft)	EGL Out (ft)	Flow / Capacity (Design) (%)
FIT1	CO1	15 inch	HDPE	65.0	0.0074	2.58	6.01	2.11	290.98	7.77	300.00	294.77	294.83	290.50	4.80	296.55	294.68	294.75	42.96
CO1	IN102	15 inch	HDPE	55.0	0.0076	4.25	6.12	3.46	290.50	4.80	296.55	294.58	294.77	290.08	4.07	295.40	294.38	294.57	69.42
TD101	FIT1	8 inch	HDPE	8.0	0.0050	0.83	0.93	2.39	291.60	0.13	292.40	294.91	295.00	291.56	7.77	300.00	294.88	294.97	90.02
OS03	MH305	18 inch	Concrete	33.0	0.0455	8.80	22.39	11.91	283.50	2.55	287.55	284.65	285.22	282.00	-0.10	283.40	283.50	283.89	39.30
OS02	MH304	18 inch	Concrete	27.0	0.0648	7.08	26.74	12.78	286.50	4.30	292.30	287.53	288.00	284.75	4.85	291.10	286.31	286.56	26.48
OS01	IN105	18 inch	Concrete	47.0	0.0351	14.00	19.68	12.09	289.50	4.50	295.50	290.88	291.93	287.85	3.42	292.77	289.48	290.45	71.14
RD08	FIT6	8 inch	HDPE	42.0	0.0833	0.64	3.78	8.07	290.00	5.83	296.50	290.38	290.53	286.50	7.63	294.80	289.16	289.21	16.93
RD07	FIT5	8 inch	HDPE	35.0	0.1000	0.64	4.14	8.60	290.00	5.83	296.50	290.38	290.53	286.50	8.08	295.25	289.16	289.21	15.45
RD06	FIT4	8 inch	HDPE	35.0	0.1000	0.64	4.14	8.60	290.00	5.83	296.50	290.38	290.53	286.50	8.33	295.50	289.16	289.21	15.45
RD05	IN201	8 inch	HDPE	12.0	0.0050	0.64	0.93	2.86	292.53	3.30	296.50	293.04	293.12	292.47	2.69	295.83	293.02	293.09	69.11
RD04	FIT2	8 inch	HDPE	21.0	0.0952	1.76	4.04	5.04	291.50	4.33	296.50	294.60	294.99	289.50	6.83	297.00	294.22	294.61	43.54
RD03	YD101	8 inch	HDPE	11.0	0.0927	1.76	3.99	5.04	291.50	4.33	296.50	294.83	295.23	290.48	5.15	296.30	294.63	295.03	44.13
RD02	CO1	8 inch	HDPE	45.0	0.0222	1.76	1.95	5.04	291.50	4.33	296.50	296.07	296.47	290.50	5.38	296.55	295.26	295.66	90.15
RD01	FIT1	8 inch	HDPE	25.0	0.0208	1.76	1.89	5.04	291.50	4.33	296.50	295.26	295.65	290.98	8.35	300.00	294.80	295.20	93.18
IN105	MH105	24 inch	Concrete	25.0	0.0052	15.46	16.31	5.91	287.35	3.42	292.77	289.33	289.71	287.22	2.98	292.20	289.22	289.60	94.78
IN201	MH201	15 inch	HDPE	79.0	0.0608	2.24	17.25	9.70	292.30	2.28	295.83	292.90	293.13	287.50	7.75	296.50	289.24	289.30	13.01
IN202	MH203	15 inch	HDPE	22.0	0.0818	0.89	20.02	8.19	288.30	4.39	293.94	289.16	289.17	286.50	7.25	295.00	289.16	289.17	4.43
IN203	MH204	15 inch	HDPE	24.0	0.0375	0.75	13.55	0.61	287.40	2.97	291.62	289.16	289.17	286.50	5.25	293.00	289.16	289.17	5.53
IN302	MH302	15 inch	HDPE	19.0	0.0084	0.59	6.42	0.48	283.66	2.04	286.95	286.31	286.31	283.50	3.10	287.85	286.31	286.31	9.23
IN303	MH303	15 inch	HDPE	12.0	0.0058	0.86	5.34	0.70	283.57	2.53	287.35	286.31	286.32	283.50	3.25	288.00	286.31	286.32	16.06
IN301	MH301	15 inch	HDPE	11.0	0.0455	0.24	14.92	0.20	284.00	3.63	288.88	286.31	286.31	283.50	4.73	289.48	286.31	286.31	1.61
MH201	MH202	15 inch	HDPE	30.0	0.0277	2.23	11.64	1.82	287.33	7.92	296.50	289.19	289.24	286.50	8.25	296.00	289.16	289.21	19.17
IN103	OS01	15 inch	HDPE	12.0	0.0833	0.64	20.20	0.52	290.50	3.35	295.10	294.22	294.23	289.50	4.75	295.50	294.22	294.22	3.17
IN104	MH104	15 inch	HDPE	14.0	0.0714	1.04	18.70	0.85	290.50	6.90	298.65	294.22	294.23	289.50	7.85	298.60	294.22	294.23	5.56
YD102	MH102	15 inch	HDPE	28.0	0.0050	2.07	4.95	1.68	289.64	5.61	296.50	294.24	294.29	289.50	7.85	298.60	294.22	294.26	41.78
YD101	YD102	15 inch	HDPE	18.0	0.0050	1.84	4.95	1.50	289.90	5.15	296.30	294.31	294.34	289.81	5.44	296.50	294.30	294.33	37.11
IN101	IN105	15 inch	HDPE	124.0	0.0476	0.65	15.26	6.16	294.00	2.30	297.55	294.31	294.43	288.10	3.42	292.77	289.54	289.55	4.25
IN102	MH101	18 inch	HDPE	10.0	0.0410	4.58	23.04	2.59	289.91	3.99	295.40	294.24	294.34	289.50	5.00	296.00	294.22	294.32	19.89

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Runoff Calculations C Worksheet

Project: **Proposed Grocery Store**

Description: **Inlet Drainage Areas**

Drainage Area	Land Use Description	C	Area (Acres)	Total Area (Acres)	Weighted C
IN101	Impervious	0.95	0.070	0.10	0.77
	Pervious	0.35	0.030		
IN102	Impervious	0.95	0.050	0.05	0.95
	Pervious	0.35			
IN103	Impervious	0.95	0.080	0.08	0.95
	Pervious	0.35			
IN104	Impervious	0.95	0.130	0.13	0.95
	Pervious	0.35			
IN201	Impervious	0.95	0.190	0.22	0.87
	Pervious	0.35	0.030		
IN202	Impervious	0.95	0.100	0.13	0.81
	Pervious	0.35	0.030		
IN203	Impervious	0.95	0.090	0.10	0.89
	Pervious	0.35	0.010		
IN301	Impervious	0.95	0.030	0.03	0.95
	Pervious	0.35			
IN302	Impervious	0.95	0.070	0.08	0.88
	Pervious	0.35	0.010		
IN303	Impervious	0.95	0.100	0.12	0.85
	Pervious	0.35	0.020		
TD101	Impervious	0.95	0.100	0.11	0.90
	Pervious	0.35	0.010		
TD201	Impervious	0.95	0.030	0.03	0.95
	Pervious	0.35			
YD101	Impervious	0.95	0.010	0.01	0.95
	Pervious	0.35			
YD102	Impervious	0.95	0.020	0.05	0.59
	Pervious	0.35	0.030		

Appendix A

WHITESTONE
An Employee-Owned Company

NEW BRITAIN CORPORATE CENTER
1600 MANOR DRIVE
SUITE 220
CHALFONT, PA 18914
215.712.2700
whitestoneassoc.com

REPORT OF GEOTECHNICAL INVESTIGATION

PROPOSED GIANT FOOD STORE
93 YORK ROAD
JENKINTOWN, MONTGOMERY COUNTY, PENNSYLVANIA

Prepared for:

BOHLER ENGINEERING PA, LLC
New Britain Corporate Center
1600 Manor Drive, Suite 200
Chalfont, Pennsylvania 18914

Prepared by:

WHITESTONE ASSOCIATES, INC.
New Britain Corporate Center
1600 Manor Drive, Suite 220
Chalfont, Pennsylvania 18914

James M. Morgan
Senior Associate

Laurence W. Keller, P.E.
Vice President

Whitestone Project No.: GP2117887.000
August 4, 2021

WHITESTONE
An Employee-Owned Company

NEW BRITAIN CORPORATE CENTER
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August 4, 2021

via email

BOHLER ENGINEERING PA, LLC
New Britain Corporate Center
1600 Manor Drive, Suite 200
Chalfont, Pennsylvania 18914

Attention: John Alejnikov, P.E.
Project Manager

Regarding: REPORT OF GEOTECHNICAL INVESTIGATION
PROPOSED GIANT FOOD STORE
93 YORK ROAD
JENKINTOWN, MONTGOMERY COUNTY, PENNSYLVANIA
WHITESTONE PROJECT NO.: GP217887.000

Dear Mr. Alejnikov:

Whitestone Associates, Inc. (Whitestone) is pleased to submit the attached *Report of Geotechnical Investigation* for the above-referenced project. The attached report presents the results of Whitestone's soils exploration efforts and presents recommendations for design of the proposed structural foundations, floor slabs, pavements, and related earthwork associated with the proposed site redevelopment.

Whitestone's Geotechnical Division appreciates the opportunity to be of continued service to Bohler Engineering PA LLC, and Blank Aschkenasy Properties. Please note that Whitestone has the capability to conduct the additional geotechnical engineering services recommended herein.

Please contact us at (215) 712-2700 with any questions regarding the enclosed report.

Sincerely,

WHITESTONE ASSOCIATES, INC.

James M. Morgan
Senior Associate

Laurence W. Keller, P.E.
Vice President

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Enclosures
Copy: Jordyn Strnad, Bohler Engineering PA, LLC
Alex Kreppel, Bohler Engineering PA, LLC

REPORT OF GEOTECHNICAL INVESTIGATION

Proposed Giant Food Store
93 York Road
Jenkintown, Montgomery County, Pennsylvania

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REPORT OF GEOTECHNICAL INVESTIGATION
Proposed Giant Food Store
93 York Road
Jenkintown, Montgomery County, Pennsylvania

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SECTION 1.0
Summary of Findings and Recommendations

Whitestone Associates, Inc. (Whitestone) has conducted an exploration and evaluation of the subsurface conditions on the site of the proposed Giant Food Store at 90 York Road in Jenkintown, Montgomery County, Pennsylvania. The site of the proposed construction is shown on the *Boring Location Plan* included as Figure 1.

At the time of Whitestone's investigation, the subject site was developed with two multi-story buildings with associated pavements, landscaping, and utilities. Based on a review of available historical aerial imagery dating back to 1948, the subject property appeared developed with a single structure and lightly wooded areas. Sometime between 1948 and 1950, the current site development appears; the site has remained relatively unchanged since circa 1950.

Final design plans were not completed at the time of this report. Based on information provided by Bohler Engineering PA, LLC (Bohler) on undated *Conceptual Site Plan*, the proposed site redevelopment is expected to include demolition of the existing buildings and construction of an approximately 40,000-square feet (footprint) Giant Food Store with either rooftop parking or one level of subsurface parking. The proposed development also includes associated pavements, utilities, and stormwater management (SWM) facilities.

Whitestone anticipates less than three feet of earth cuts and fills will be required to attain proposed subgrade elevation, excluding the subsurface parking level and/or SWM facilities which are expected to bear at a depth of approximately 10 fbgs. No site retaining walls were proposed at the time of the investigation and report.

The geotechnical investigation included conducting a reconnaissance of the project site, drilling nine soil borings, and collecting soil samples for laboratory analysis. The data from this exploration and analysis were analyzed by Whitestone in light of the project information provided by Bohler.

A summary of Whitestone's findings is presented below in tabular format and detailed descriptions of the subsurface conditions encountered are presented in Section 4.0.

Subsurface Profile	Description	Bottom of Stratum (fbgs)
Surficial Cover	2.0 inches to 4.0 of asphalt underlain by 2.0 inches to 5.0 inches of gravel subbase.	0.50 to 0.58
Existing Fill	Silty sand with gravel and concrete fragments. Generally encountered in a medium dense condition.	1.0 to 3.0
Residual Soils	Silty sand (USCS: SM) with varying amounts of gravel and silt (USCS: ML) with lesser amounts of sand.	5.0 to 29

Subsurface Profile	Description	Bottom of Stratum (fbgs)
Weathered Rock	Highly weathered schist bedrock, generally friable to silty sand and gravel. The top of weathered rock stratum was encountered at depths ranging from five fbgs to 29 fbgs.	10.5 to +30
*Bedrock**	Competent micaceous schist.	+10.5 to +22
Groundwater	Static groundwater was recorded within the several borings. Groundwater conditions likely will fluctuate seasonally and following periods of precipitation.	+27.5

*inferred with drilling equipment refusal

fbgs: feet below ground surface

Recommendations developed upon consideration of these findings are summarized in the table below and presented in greater detail in the indicated sections of the report.

Geotechnical Consideration	Recommendation	Report Section
Foundation System	The proposed structure may be supported on conventional spread and continuous wall footings bearing within the natural site materials, approved existing fill, and/or imported structural fill placed to raise site grades.	5.5
Foundation System for Subsurface Parking Level	Construction of the conceptual subsurface parking level appears feasible, however, may require some rock removal as competent bedrock, inferred by drilling equipment refusal, was encountered at depths ranging between approximately 10.5 fbgs and 22 fbgs.	5.5
Floor Slabs	Proposed floor slabs may be supported on approved and recompacted site materials and imported structural fill.	5.6
On-Site Soil Reuse	The site soil and weathered rock materials are expected to be suitable for reuse as structural fill/backfill material provided that soil moisture contents are controlled within two percent of optimum moisture level and particle size is less than two inches. Immediate soil reuse should not be expected due to the material's moisture sensitivity, especially if construction occurs during winter or early spring months.	5.3
Groundwater Control	Dewatering for construction primarily is anticipated to consist of removing surface water runoff, infiltrating water, or trapped water at this site with sump pits and pumps.	5.4
Supplemental Evaluation of Inaccessible Areas & Existing Fill	While the soil borings indicate that the existing fill is anticipated to be suitable for structural support and selective reuse, Whitestone recommends conducting supplemental evaluation of the existing fill via proof roll testing and test pits excavated during demolition or early construction phase to confirm the recommendations in this report.	5.11

SECTION 2.0
Introduction

2.1 AUTHORIZATION

John Alejnikov, P.E. of Bohler issued authorization to Whitestone to conduct the geotechnical investigation on this site relevant to the proposed Giant Food Store at 90 York Road in Jenkintown, Montgomery County, Pennsylvania. The geotechnical investigation was conducted in accordance with Whitestone's March 29, 2021 proposal to Bohler, however, an investigation and evaluation for proposed SWM areas was eliminated from Whitestone's scope of work.

2.2 PURPOSE

The purpose of this subsurface exploration and analysis was to:

- ascertain the various soil profile components at boring locations;
- estimate the engineering characteristics of the proposed foundation bearing and subgrade materials;
- provide geotechnical criteria for use by the design engineers in preparing the foundation, slab, and pavement design;
- provide recommendations for required earthwork and subgrade preparation;
- record groundwater and bedrock levels (where encountered) at the time of the investigation and discuss the potential impact on the proposed construction; and
- recommend additional investigation and/or analysis (if warranted).

2.3 SCOPE

The scope of the exploration and analysis included the subsurface exploration; field testing and sampling; laboratory analysis; and an engineering analysis and evaluation of the foundation materials. This *Report of Geotechnical Investigation* is limited to addressing the site conditions related to the physical support of the proposed construction. Any references to suspicious odors, materials, or conditions are provided strictly for the client's information.

2.3.1 Field Exploration

Field exploration of the project site was conducted by means of nine soil borings (identified as B-1 through B-9). The soil borings were advanced with a truck-mounted drill rig equipped with hollow stem augers and utilized split-spoon sampling techniques. The subsurface borings were backfilled with excavated soils generated from the investigation and were surficially patched with asphaltic concrete cold patch, where appropriate. The locations of the subsurface tests are shown on the *Boring Location Plan* included as Figure 1. *Records of Subsurface Exploration* are provided in Appendix A.

The soil borings were conducted in the presence of a Whitestone engineer who conducted field tests, recorded visual classifications, and collected samples of the various strata encountered. The tests were located in the field using normal taping procedures and estimated right angles. These locations are presumed to be accurate within a few feet.

Soil borings and Standard Penetration Tests (SPTs) were conducted in general accordance with American Society for Testing and Materials (ASTM) designation D-1586. The SPT value (N) can be used as an indicator of the consistency of fine-grained soils and the relative density of coarse-grained soils. The N-value for various soil types can be correlated with the engineering behavior of earthworks and foundations.

Groundwater level observations were recorded during and immediately after the completion of field operations prior to backfilling the borings. Seasonal variations, temperature effects, man-made effects, and recent rainfall conditions may influence the levels of the groundwater, and the observed levels will depend on the permeability of the soils. Groundwater elevations derived from sources other than seasonally observed groundwater monitor wells may not be representative of true groundwater levels.

2.3.2 Laboratory Program

In addition to the field investigation, a laboratory program was conducted to determine additional, pertinent engineering characteristics of representative samples of on-site soils. The laboratory program was conducted in general accordance with applicable ASTM standard test methods and included physical/textural testing of representative samples of various strata.

Physical/Textural Analyses: Representative samples of selected strata encountered were subjected to a laboratory program that included Atterberg limits determinations (ASTM D-4318), moisture content determinations (ASTM D-2216) and washed gradation analyses (ASTM D-422) in order to conduct supplementary engineering soil classifications in general accordance with ASTM D-2487. The soil strata tested were classified by the Unified Soil Classification System (USCS) and results of the laboratory testing are summarized in the following table. Quantitative test results are provided in Appendix B.

PHYSICAL/TEXTURAL ANALYSES SUMMARY							
Boring	**Sample**	**Depth (fbgs)**	**% Passing No. 200 Sieve**	**Moisture Content (%)**	**Liquid Limit**	**Plastic Index**	**USCS Classification**
B-1	S-7	18.0 to 20.0	20.9	10.4	Non-Plastic		SM
B-2	S-2	3.0 to 5.0	19.3	11.9	Non-Plastic		SM

The engineering classifications are useful when considered in conjunction with the additional site data to estimate properties of the soil types encountered and to predict the soil's behavior under construction and service loads.

SECTION 3.0
Site Description

3.1 LOCATION AND DESCRIPTION

The subject property is located at 90 York Road (Route 611) in Jenkintown, Montgomery County, Pennsylvania. The site is bordered by the intersection of York Road and Washington Lane to the north; by Wyncote Road to the south; by residential properties to the west followed by Washington Lane; and by York Road to the east. The location of the subject site is shown on the *Boring Location Plan* included as Figure 1.

3.2 EXISTING CONDITIONS

Surface Cover/Development: At the time of Whitestone's investigation, the subject site was developed with two multi-story buildings with associated pavements, landscaping, and utilities.

Previous Site Development: Based on a review of available historical aerial imagery dating back to 1948, the subject property appeared developed with a single structure and lightly wooded areas. Sometime between 1948 and 1950, the current site development appears; the site has remained relatively unchanged since circa 1950.

Topography: Existing topographical information was not available at the time of this report. Based on visual observations during the investigation, the site is relatively flat and gently slopes downward toward York Road.

Utilities: At the time of Whitestone's investigation, the subject site was serviced by public and private utilities including overhead telephone and underground electric, water, natural gas, sanitary and stormwater sewer lines. The utility information contained in this report is presented for general discussion only and is not intended for construction purposes.

Site Drainage: Surface runoff for the site generally consists of sheet flow across the existing ground surface and generally appears to flow in easterly directions towards York Road.

3.3 SITE GEOLOGY

Based on the Geologic Map of Pennsylvania (1980), prepared by the Commonwealth of Pennsylvania, Department of Environmental Resources, Bureau of Topographic and Geologic Survey, the subject property is situated within the Piedmont Geomorphic Province of Southeastern Pennsylvania.

Specifically, the subject property is underlain by the Lower Paleozoic Aged Wissahickon Formation, Oligoclase-Mica Schist Sequence. The Wissahickon Formation is a schist metamorphosed to amphibolite facies. It contains garnet, staurolite, kyanite, and sillimanite. It includes oligoclase-mica schist, some hornblende gneiss, some augen gneiss, and some quartz-rich and feldspar-rich members due to various degrees of granitization. The subsurface conditions encountered during the investigation are consistent with the mapped geology.

3.4 PROPOSED CONSTRUCTION

Final design plans were not completed at the time of this report. Based on information provided by Bohler on undated *Conceptual Site Plan*, the proposed site redevelopment is expected to include demolition of the existing buildings and construction of an approximately 40,000-square feet (footprint) Giant Food Store with either rooftop parking or one level of subsurface parking. The proposed development also includes associated pavements, utilities, and SWM facilities.

Whitestone anticipates less than three feet of earth cuts and fills will be required to attain proposed subgrade elevation, excluding the subsurface parking level and/or SWM facilities which are expected to bear at a depth of approximately 10 fbgs. No site retaining walls were proposed at the time of the investigation and report.

Detailed structural information was not available at the time of this proposal, however, the building is anticipated to be a single-story building constructed with a combination of masonry and steel framing and a ground-supported floor slab. Based on Whitestone's experience with similar projects, the anticipated maximum building loads are expected to be less than the following:

- column loads - 350 kips;
- wall loads - 6.0 kips per lineal foot; and
- floor slab loads – 125 pounds per square foot (live load).

The scope of Whitestone's investigation and the professional advice contained in this report were generated based on the project details and loading noted herein. Any revisions or additions to the design details enumerated in this report should be brought to the attention of Whitestone for additional evaluation as warranted.

SECTION 4.0
Subsurface Conditions

Details of the subsurface materials encountered are presented on the *Records of Subsurface Exploration* presented in Appendix A of this report. The subsurface soil conditions encountered in the subsurface tests consisted of the following generalized strata in order of increasing depth.

4.1 SUBSURFACE SOIL CONDITIONS

Surface Cover Materials: The subsurface borings were conducted within existing paved portions of the site and encountered approximately two inches to four inches of asphalt underlain by approximately two inches to five inches of gravel subbase material.

Existing Fill: Underlying the surficial cover materials, several borings disclosed existing fill consisting of silty sand with gravel and concrete fragments. The existing fill was encountered in a generally medium dense conditions and extended to depths ranging between approximately one fbgs and three fbgs.

Residual Soils: Beneath the surface cover and/or existing fill, the borings encountered natural residual soils consisting of silty sand (USCS: SM) with varying amounts of gravel and silt (USCS: ML) with lesser amounts of sand. The residual soils extended to approximate depths ranging from approximately five fbgs to 29 fbgs. SPT N-values within granular soils of this stratum generally indicated a medium dense relative density.

Weathered Rock: Underlying the residual site soils, the borings encountered a weathered rock stratum consisting of highly weathered schist bedrock, generally friable to silty sand and gravel. The top of weathered rock stratum was encountered at depths ranging from five fbgs to 29 fbgs. SPT N-Values within this stratum consistently were within refusal range, indicating a very dense relative density.

Bedrock: Competent schist bedrock, inferred by drilling equipment refusal, was encountered within six of the nine borings conducted as part of this investigation at depths ranging between approximately 10.5 fbgs and 22 fbgs.

4.2 GROUNDWATER

Static groundwater was encountered recorded within several of the borings at depths ranging between approximately 27.5 fbgs and 28.0 fbgs. Groundwater conditions likely will fluctuate seasonally and following periods of precipitation.

SECTION 5.0
Conclusions and Recommendations

5.1 GENERAL

The results of the subsurface investigation and analyses indicated that the proposed structure may be supported on conventional spread and continuous wall footings with a ground-supported floor slab designed to bear within the natural site materials, approved existing fill, and/or imported structural fill placed to raise site grades provided these materials are properly prepared, compacted, and inspected in accordance with this report. Areas requiring overexcavation and replacement may be required due to moisture sensitivity of the site soils and potential variability of existing fill.

Construction of the conceptual subsurface parking level appears feasible, however, may require some rock removal as competent bedrock, inferred by drilling equipment refusal, was encountered at depths ranging between approximately 10.5 fbgs and 22 fbgs.

Whitestone anticipates that a majority of the natural site soils and existing fill will be suitable for reuse as structural fill/backfill during favorable weather conditions provided that soil moisture contents are controlled within two percent of optimum moisture level and the existing fill is further evaluated during construction as recommended herein. Whitestone recommends conducting supplemental evaluation via test pits and proofroll testing following demolition activities in order to confirm the suitability of the materials below the existing structures that were inaccessible during the subsurface investigation.

5.2 SITE PREPARATION AND EARTHWORK

Surface Cover Stripping and Demolition: Prior to stripping operations, all utilities should be identified and secured. The existing buildings and pavements to be demolished and stripped should be removed from within and at least five feet beyond the limits of the proposed building and pavement areas, where possible. Existing structural elements, such as foundation walls, footings, or slabs encountered during excavations, should be removed entirely from below proposed foundations and associated zones of influence as directed by the owner's geotechnical engineer and excavated to at least two feet below proposed construction subgrade levels elsewhere. Foundations and slabs may remain in place below these depths below proposed pavements and landscaped areas, provided they do not interfere with future construction. Any existing slabs to remain should be thoroughly broken such that maximum particle size is 12 inches to allow vertical drainage of water.

The demolition contractor should be required to conduct all earthwork in accordance with the recommendations in this report including backfilling any excavation with structural fill.

Excavation Difficulties: Weathered rock was encountered at depths as shallow as five fbgs and competent bedrock, inferred by drilling equipment refusal, was encountered at depths ranging between approximately 10.5 fbgs and 22 fbgs. Depending on final grading, excavation difficulties may be encountered. Although the drilling equipment was able to advance several feet into the weathered rock stratum, machinery equipped with pneumatic hammers or rock-ripping buckets will likely be required in excavations for deeper utility trenches and foundations/slabs if a subsurface parking level is constructed.

Surface Preparation/Proofrolling: Following demolition and prior to placing any fill or subbase materials to raise or restore grades to the desired subgrade elevations, the exposed soils should be compacted to a firm surface with several passes in two perpendicular directions of a minimum 10-ton vibratory roller. The surface then should be proofrolled with a loaded tandem axle truck in the presence of the geotechnical engineer to help identify soft or loose pockets which may require removal and replacement or further investigation. Proofrolling should be conducted after a suitable period of dry weather to avoid degrading an otherwise stable subgrade. Any fill or backfill should be placed and compacted in accordance with Section 5.3.

Weather Performance Criteria: Because the site soils contain appreciable amounts of fines, the site soils will soften when exposed to water and repeated construction traffic. Therefore, every effort must be made to maintain drainage of surface water runoff away from construction areas by grading and limiting the exposure of excavations and prepared subgrades to rainfall. Accordingly, excavation and fill placement procedures should be conducted during favorable weather conditions. Overexcavation of saturated soils and replacement with controlled structural fill per Section 5.3 of this report may be required prior to resuming work on disturbed subgrade soils.

Subgrade Protection and Inspection: The site soils contain fine-grained materials that are highly moisture sensitive. Every effort should be made to minimize disturbance of the on-site materials by construction traffic and surface runoff. The on-site soils will deteriorate when subjected to repeated wetting and construction traffic and likely will require extensive drying or overexcavation and replacement. Construction schedules and budgets should account for contingencies, such as importing materials to raise grades or restore overexcavations when construction must occur following wet weather or on an expedited basis. However, if properly protected and maintained during warm, dry weather as recommended herein, the site soils will provide adequate support for the proposed construction. The site contractors should employ necessary means and methods to protect the subgrade including, but not limited to the following:

- leaving the existing pavement in place as long as practical to protect the subgrade from freeze-thaw cycles and exposure to inclement weather;
- sealing exposed subgrade soils on a daily basis with a smooth drum roller operated in static mode;
- regrading the site as needed to maintain positive drainage away from construction areas;

- removing wet surficial soils and ruts immediately; and
- limiting exposure to construction traffic especially following inclement weather and subgrade thawing.

Pavement Subgrade Stabilization and Inspection: Pavement subgrade soils which are exposed to inclement weather and heavy construction traffic will degrade and require either extensive drying time or overexcavation and replacement in order to provide a suitable subgrade for pavements. Overexcavation of unstable soils (existing unsuitable fill materials or natural soils) within pavement areas typically should be limited to approximately 1.5 feet below planned subgrade unless directed otherwise by the owner's geotechnical engineer, provided that a reinforcing geogrid approved by the owner's geotechnical engineer is used. Alternatively, unstable materials may be completely overexcavated and either aerated and recompacted or replaced with imported structural fill per Section 5.3. However, this option is likely least economical.

Geogrids typically are economical when proposed undercut depths exceed approximately 16 inches. The geogrid (Tensar TriAx TX130S, or similar) should be placed directly on a separation geotextile such as Mirafi 160N or equal, pulled tightly and subsequently backfilled. Backfill should consist of a well-graded gravel and sand blend. The services of the geotechnical engineer should be retained to inspect soil conditions during construction and to provide specific recommendations for stabilizing subgrades. Additionally, a geotechnical engineer should be retained to verify the suitability of prepared foundation, floor slab and pavement subgrades for support of design loads.

5.3 STRUCTURAL FILL AND BACKFILL

Imported Fill Material: Any imported material placed as structural fill or backfill to raise elevations or restore design grades should consist of clean, relatively well graded sand or gravel with a maximum particle size of two inches and five percent to 15 percent of material finer than a #200 sieve. Silts, clays, and silty or clayey sands and gravels with higher percentage of fines and with a liquid limit less than 40 and a plasticity index less than 20 may be considered for use beyond the building pad subject to the owner's approval, provided that the required moisture content and compaction controls are met during favorable weather conditions. The material should be free of clay lumps, organics, and deleterious material. Imported structural fill material should be approved by a qualified geotechnical engineer prior to delivery to the site.

On-Site Materials: Based on the conditions disclosed by the soil borings, Whitestone anticipates the majority of the site soils and weathered rock encountered will be suitable for selective reuse as structural fill/backfill material provided that soil moisture contents are controlled within two percent of optimum moisture level and particle size is less than two inches.

The site soils must be properly compacted, proofrolled, and evaluated during the construction phase as described in Section 5.2 and below. Alternatively, imported fill materials may be used to attain the desired grades and expedite earthwork operations during wet weather periods.

Demolition Material: Demolition material, free of environmental restrictions, may be used as fill material provided the material is properly segregated and processed as recommended herein. Concrete masonry materials should be crushed to a well graded blend with a maximum size of two inches in diameter. Deleterious building materials such as wood, insulation, metal, shingles, etc. should not be used as structural fill material. Milled or recycled asphalt pavement (RAP) may be re-used as granular base for pavements provided that the RAP particle size meets Pennsylvania Department of Transportation (PennDOT) standard specifications for granular base and no more than 50% of the pavement granular base contains RAP.

Compaction and Placement Requirements: All fill and backfill should be placed in maximum nine-inch loose lifts and compacted to 95 percent of the maximum dry density within two percent of the optimum moisture content as determined by ASTM D 1557 (Modified Proctor). Whitestone recommends using a vibratory drum roller to compact imported or on-site granular soils and a small hand-held vibratory compactor within excavations.

Structural Fill Testing: A sample of the imported fill material or any on-site material proposed for reuse as structural fill or backfill should be submitted to the geotechnical engineer for analysis and approval at least one week prior to its use. The placement of all structural fill and backfill should be monitored by a qualified engineering technician to ensure that the specified material and lift thicknesses are properly installed. A sufficient number of in-place density tests should be conducted to ensure that the specified compaction is achieved throughout the height of the fill or backfill.

5.4 GROUNDWATER CONTROL

Static groundwater was not encountered during this exploration within anticipated excavation depths for footings and typical utility excavations. As such, Whitestone does not anticipate the need for extensive dewatering or permanent groundwater control. However, perched or trapped water may be encountered within excavations, particularly in early spring and following precipitation events. Therefore, construction phase dewatering of trapped or perched water should be anticipated for this site, which may be controlled through the use of sump pits and mechanical pumps.

5.5 FOUNDATIONS

Shallow Foundation Design Criteria: The results of the exploration indicate that the proposed structure may be supported on conventional spread and continuous wall footings bearing the site soils and/or properly placed structural fill provided these materials are properly evaluated, placed, and compacted in

accordance with Sections 5.2, 5.3, and 5.11 of this report. Foundations bearing within these materials may be designed to impart a maximum allowable net bearing pressure of 3,000 pounds per square foot.

Shallow Foundation Design Criteria for Subsurface Parking Level: If a subsurface parking level is constructed, the footings are expected to bear within a combination of materials including medium dense to very dense residual soils and very dense weathered rock and competent rock. Foundations bearing within these materials may be designed to impart a maximum allowable net bearing pressure of 4,000 pounds per square foot. Footings should not bear partially on rock and partially on soil due to the risk of brittle fracture at hinging points. Any foundation subgrade that would result in partially supported rock conditions should be overexcavated an additional 12 inches and replaced with well graded, compacted structural fill per Section 5.3 to provide a cushion against brittle fracture. Alternatively, isolated spread footings may be extended to bear entirely on solid weathered rock or rock.

All footing bottoms should be improved by in-trench compaction in the presence of the geotechnical engineer. Regardless of loading conditions, proposed foundations should be sized no less than minimum dimensions of 24 inches for continuous wall footings and 36 inches for isolated column footings.

Sign footings should be designed so that the maximum toe pressure due to the combined effect of vertical loads and overturning moment does not exceed the recommended maximum allowable net bearing pressure. In addition, positive contact pressure should be maintained throughout the base of the footings such that no uplift or tension exists between the base of the footings and the supporting soil. Uplift loads should be resisted by the weight of the concrete. Side friction should be neglected when proportioning the footings such that lateral resistance should be provided by friction resistance at the base of the footings. An allowable coefficient of friction against sliding of 0.30 is recommended for use in the design of the foundations bearing within the site soils or imported structural fill soils.

Foundation Inspection/Overexcavation Criteria: Whitestone recommends that the suitability of the bearing soils along and below the footing bottoms be verified by a geotechnical engineer prior to placing concrete for the footings. Where areas of unsuitable materials are encountered in footing excavations, overexcavation and recompaction or replacement may be necessary to provide a suitable footing subgrade in accordance with Section 5.2. Any overexcavation to be restored with structural fill will need to extend at least one foot laterally beyond footing edges for each vertical foot of overexcavation. Lateral overexcavation can be reduced if the grade is restored with lean concrete or approved flowable fill. The bottom of overexcavation should be compacted with vibrating plates or plate tampers ("jumping jacks") to compact locally disturbed materials.

Settlement: Whitestone estimates post construction settlements of proposed foundations to be approximately less than one inch if the recommendations outlined in this report are properly implemented. Differential settlement of new foundations should be less than one-half inch.

Frost Coverage: Footings subject to frost action should be placed at least 36 inches below adjacent exterior grades or the depth required by local building codes to provide protection from frost penetration. Interior footings not subject to frost action may be placed at a minimum depth of 18 inches below the slab subgrade.

5.6 FLOOR SLAB

Whitestone anticipates that majority of the existing fill, the underlying natural soils, and/or compacted structural fill and/or backfill placed to raise or restore design elevations will be suitable for support of the proposed floor slab provided these materials are properly inspected, compacted, and proofrolled in accordance with Sections 5.2, 5.3, and 5.11 of this report during favorable weather conditions.

Areas of overexcavation should be anticipated due to the inherent variability of the existing fill and if the subgrades are exposed to precipitation and repeated construction traffic. Any areas that become softened or disturbed as a result of wetting and/or repeated exposure to construction traffic should be removed and replaced with compacted structural fill. The properly prepared on-site soils are expected to yield a minimum subgrade modulus (k) of 150 psi/in.

A minimum four-inch layer of coarse aggregate, such as three-quarter inch crushed stone, should be placed below ground-supported floor slabs to provide a uniform subgrade and capillary break. An impervious membrane should be provided as a moisture vapor barrier beneath floor slabs, where recommended by the flooring manufacturer.

5.7 PAVEMENT DESIGN CRITERIA

General: Whitestone anticipates that majority of the site soils and/or compacted structural fill and/or backfill placed to raise or restore design elevations will be suitable for support of the proposed pavements provided these materials are properly evaluated, compacted, and proofrolled in accordance with Sections 5.2, 5.3, and 5.11 of this report during favorable weather conditions.

Localized overexcavation and replacement of existing fill may be required due to the moisture sensitive soils and variability that may exist within the existing fill, as evidenced by the debris encountered. Subgrade stabilization with a biaxial geogrid, approved by the owner's geotechnical engineer, may be used to minimize depths of overexcavation as discussed further in Section 5.2.

Design Criteria: A California Bearing Ratio value of 4.0 has been assigned to the properly prepared subgrade soils for pavement design purposes. This value was correlated with pertinent soil support values and assumed traffic loads to prepare flexible and rigid pavement designs per the AASHTO *Guide for the Design of Pavement Structures*.

Design traffic loads were assumed based on typical volumes for similar facilities and correlated with 18-kip equivalent single axle loads (ESALs) for a 20-year life. An estimated maximum load of 25,000 ESALs and 200,000 ESALs was used for standard and heavy duty pavement areas, respectively.

Pavement Sections: The recommended flexible pavement sections are presented below in tabular format:

FLEXIBLE PAVEMENT SECTION DESIGN			
Layer	**Material**	**Standard Duty Thickness (Inches)**	**Heavy Duty Thickness (Inches)**
Asphalt Surface	PennDOT SuperPave 9.5 mm PG 64-22 Surface Course	1.5	1.5
Asphalt Base	PennDOT SuperPave 19.0 mm PG 64-22 Base Course	2.5	3.5
Granular Subbase	PennDOT 2A Stone	6.0	8.0

A rigid concrete pavement should be used to provide suitable support at areas of high traffic or severe turns (such as at trash enclosure, access, and drive lanes). The recommended rigid pavement is presented below in tabular format:

RIGID PAVEMENT SECTION		
Layer	**Material**	**Thickness (Inches)**
Surface	4,000 psi air-entrained concrete	7.0
Base	PennDOT 2A Stone	8.0

Additional Design Considerations: The pavement section thickness designs presented in this report are based on the design parameters detailed herein and are contingent on proper construction, inspection, and maintenance. Additional pavement thickness may be required by local codes. The designs are contingent on achieving the minimum soil support value in the field. To accomplish this requirement, all subgrade soil and supporting fill or backfill must be properly evaluated, placed, and prepared as detailed in Sections 5.2, 5.3, and 5.11 of this report. Proper drainage must be provided for the pavement structure including appropriate grading and surface water control, as well as measures to drain water from the subgrade such as bleeder drains at inlets.

The performance of the pavement also will depend on the quality of materials and workmanship. Whitestone recommends that PennDOT standards for materials, workmanship, and maintenance be applied to this site. Project specifications should include verifying that the installed asphaltic concrete material composition is within tolerance for the specified materials and that the percentage of air voids of the installed pavement is within specified ranges for the respective materials. All rigid concrete pavements should be suitably air-entrained, jointed, and reinforced.

5.8 LATERAL EARTH PRESSURES

No site retaining walls were identified on the *Conceptual Site Plan* prepared by Bohler, however, below-grade walls will be required for the conceptual subsurface parking level.

Retaining walls free to rotate generally can be designed to resist active earth pressures. Retaining walls restrained from movement and with corners need to be designed to resist at-rest earth pressures. Backfill soils adjacent to retaining structures should consist of free draining material consisting of sand and gravel soils in order to prevent hydrostatic forces. Clayey and/or silty soils should not be used as retaining wall backfill. Based on the subsurface conditions encountered, the majority of the granular site soils are expected to be suitable for use as backfill adjacent to retaining structures.

The following soil parameters apply to the anticipated properly compacted imported granular fill or site soils in a well-drained, level backfill condition and may be used for design of the proposed retaining structures:

LATERAL EARTH PRESSURE PARAMETERS			
Parameters	**Site Soils**	**Imported Granular Fill Materials**	**Weathered Rock**
Moist Density (γ_{moist})	135 pcf	140 pcf	145 pcf
Internal Friction Angle (φ)	26°	30°	33°
Active Earth Pressure Coefficient (K_a)	0.36	0.33	0.31
Passive Earth Pressure Coefficient (K_p)	2.79	3.00	3.20
At-Rest Earth Pressure Coefficient (K_o)	0.56	0.50	0.46

Lateral earth pressure will depend on the slope angle of construction phase grades and subgrades. The effect of other surcharges also will need to be included in earth pressure calculations, possibly including the loads imposed by adjacent traffic. Whitestone would be pleased to assist with the calculation of lateral earth pressures based on the soil parameters presented herein, if necessary. The effects of sloped backfill, surface grades, and proposed slopes beyond the toe of the retaining structures, if applicable, must be considered when calculating resultant forces to be resisted by the retaining structures. Below-grade wall footings should be designed so that the combined effect of vertical and horizontal resultants and overturning moment does not exceed the maximum soil bearing capacity provided in Section 5.5.

Acceptable backfill should be approved by the owner's geotechnical engineer and should be placed in maximum nine-inch loose lifts and compacted to 95 percent of the maximum dry density within two percent of the optimum moisture content, as determined by ASTM D 1557 (Modified Proctor). The maximum densities outlined in the table above should not be exceeded in order to avoid creating excessive lateral pressure on the walls during compaction operations.

Whitestone recommends that backfill directly behind the walls be compacted with light, hand-held compactors. Heavy compactors and grading equipment should not be allowed to operate within a zone measured at a 45-degree angle from the base of the walls during backfilling to avoid developing excessive temporary or long-term lateral soil pressures.

Resistance to sliding should be provided by friction resistance at the base of the wall foundation. For mass concrete on existing site soils or imported structural fill materials, an allowable coefficient of friction against sliding of 0.30 should be used in the design of the below-grade walls. Passive earth pressures at the toe of any proposed below-grade walls should be neglected in the design.

Whitestone should be notified if any other retaining structures or design considerations requiring lateral earth pressure estimations are proposed. Specific recommendations for temporary retaining structures are beyond Whitestone's scope of work.

5.9 SEISMIC AND LIQUEFACTION CONSIDERATIONS

The soils encountered during this investigation are most consistent with a Site Class D defined by the *2015 International Building Code.* Based on the seismic zone and soil profile, liquefaction considerations are not expected to have a substantial impact on design. The following spectral accelerations are recommended:

SEISMIC SITE PARAMETERS			
S_s	S_1	F_a	F_v
0.208g	0.062g	1.600	2.400

5.10 EXCAVATIONS

The existing fill and natural soils encountered during this investigation typically are, at a minimum, consistent with Type C Soil Conditions as defined by 29 CFR Part 1926 (OSHA) which require a maximum unbraced excavation angle of 1.5:1 (horizontal:vertical). Actual conditions encountered during construction should be evaluated by a competent person (as defined by OSHA) to ensure that safe excavation methods and/or shoring and bracing requirements are implemented.

5.11 SUPPLEMENTAL POST INVESTIGATION SERVICES

Inaccessible Areas & Supplemental Existing Fill Evaluation: Portions of the proposed building were inaccessible at the time of the investigation due to the existing building structure. The existing fill encountered within the soil borings conducted within accessible areas of the proposed building pad preliminarily appear to be suitable for foundation and slab support. However, there is a potential risk of variability in the existing fill that may not be disclosed solely by soil borings. Therefore, the composition

of the existing fill and areas previously inaccessible should be verified by visual observation and additional test pit excavations prior to, or during early phases of construction, to enable further assessment of the depth, possible presence or absence of voids, uncontrolled conditions, or possible additional deleterious materials. These observations will need to be made by a qualified geotechnical engineer in order to identify the extent of overexcavation required versus areas which may remain. If unfavorable fill conditions are encountered during the test pit evaluation, Whitestone recommendations overexcavation of the unsuitable materials in their entirety (where present) below foundation, floor slab and pavement areas and replacement with appropriate structural fill as defined in Section 5.3. The recommended supplemental and construction phase evaluation should include conducting test pits and proofroll testing throughout the proposed building footprint in order to confirm or revise the recommendations herein prior to construction

Demolition and Construction Inspection and Monitoring: The owner's geotechnical engineer should conduct inspection, testing, and consultation during construction as described in previous sections of this report. Monitoring and testing should also be conducted to verify that the existing structures are properly demolished, any encountered underground structures, such as any existing building foundations to be removed, are properly backfilled, the existing surface cover materials are properly removed, and suitable materials, used for controlled fill, are properly placed and compacted over suitable subgrade soils. The proofrolling of all subgrades prior to foundation, floor slab, and pavement support also should be witnessed and documented by the owner's geotechnical engineer.

SECTION 6.0
General Comments

Supplemental recommendations may be required upon finalization of construction plans or if significant changes are made in the characteristics or location of the proposed structure. Soil bearing conditions should be checked at the appropriate time for consistency with those conditions encountered during Whitestone's geotechnical investigation.

The recommendations presented herein should be utilized by a qualified engineer in preparing the project plans and specifications. The engineer should consider these recommendations as minimum physical standards which may be superseded by local and regional building codes and structural considerations. These recommendations are prepared for the sole use of Bohler Engineering PA, LLC and Blank Aschkenasy Properties for the specific project detailed and should not be used by any third party. These recommendations are relevant to the design phase and should not be substituted for construction specifications.

The possibility exists that conditions between borings may differ from those at specific boring locations, and conditions may not be as anticipated by the designers or contractors. In addition, the construction process may alter soil and rock conditions. Therefore, experienced geotechnical personnel should observe and document the construction procedures used and the conditions encountered.

Whitestone assumes that a qualified contractor will be employed to conduct the construction work, and that the contractor will be required to exercise care to ensure all excavations are conducted in accordance with applicable regulations and good practice. Particular attention should be paid to avoiding damaging or undermining adjacent properties and maintaining slope stability.

Whitestone recommends that the services of the geotechnical engineer be engaged to test and evaluate the soils in the footing excavations prior to concreting in order to determine that the soils will support the bearing capacities. Monitoring and testing also should be conducted to verify that suitable materials are used for controlled fills and that they are properly placed and compacted over suitable subgrade soils.

The exploration and analysis of the foundation conditions reported herein are considered sufficient in detail and scope to form a reasonable basis for the foundation design. The recommendations submitted for the proposed construction are based on the available soil information and the design details furnished by Bohler Engineering PA, LLC. Deviations from the noted subsurface conditions encountered during construction should be brought to the attention of the geotechnical engineer.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been promulgated after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.

WHITESTONE
ASSOCIATES, INC.

FIGURE 1
Boring Location Plan

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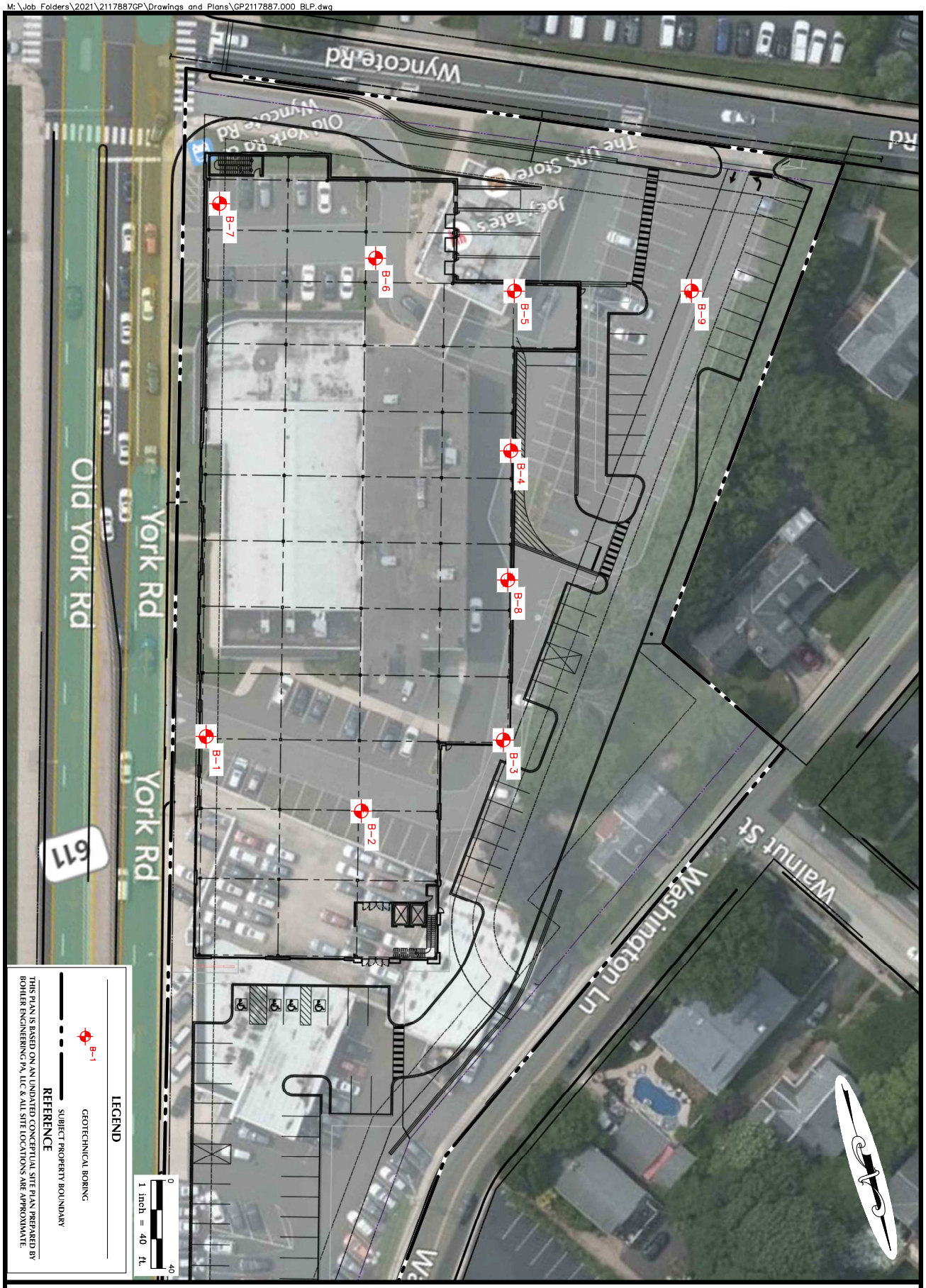


PROJECT #:	GP2117887.000
DESIGNED BY:	GR
DRAWN BY:	JMM
DATE:	4/21/21
SCALE:	1" = 40'
FIGURE:	1

DRAWING TITLE:
BORING LOCATION PLAN

CLIENT:
BOHLER ENGINEERING PA, LLC

PROJECT:
PROPOSED GIANT FOOD STORE
93 YORK ROAD
JENKINTOWN, MONTGOMERY COUNTY, PA

WHITESTONE ASSOCIATES, INC.
Environmental & Geotechnical Engineers & Consultants
1600 MANOR DRIVE, SUITE 220, CHALFONT, PA 18914
215.712.2700 WHITESTONEASSOC.COM

APPENDIX A
Records of Subsurface Exploration

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-1

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.000
Location:	93 York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± NS feet	**Date Started:**	4/19/2021		**Water Depth (feet bgs)**	**Elevation (feet)**	**Cave-In Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	30.0 feet bgs	**Date Completed:**	4/19/2021				
Proposed Location:	Proposed Building	**Logged By:**	TJ	**During:**	28.0	---	
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	28.0	---	**At Completion:** 29.0 / ---
		Equipment:	CME-55	**24 Hours:**	--	--	**24 Hours:** -- / ---

Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0			
						0.5	PAVEMENT	3" Asphalt, 3" Gravelly Subbase	Alligator Cracking in Asphalt
							FILL		
1 - 3	S-1	X	4 - 5 - 12 - 18	16	17	2.0		Brown Silty Sand with Gravel, Moist (FILL)	
							RESIDUAL	Brown Micaceous Silty Sand with Gravel, Moist, Medium Dense (SM)	2.0 fbgs to 7.0 fbgs: Remnant Rock Fabric Apparent (Schist Fragments)
3 - 5	S-2	X	7 - 7 - 7 - 6	19	14			As Above, Brown to Reddish-Brown, Moist, Medium Dense (SM)	
						5.0			
5 - 7	S-3	X	6 - 5 - 6 - 6	16	11			As Above, Moist, Medium Dense (SM)	
7 - 9	S-4	X	7 - 9 - 10 - 12	17	19			As Above, Reddish-Brown to White, Moist, Medium Dense (SM)	7.0 fbgs to 9.0 fbgs: Remnant Rock Fabric
9 - 11	S-5	X	15 - 17 - 18 - 21	12	35	10.0		As Above, Moist, Dense (SM)	Reddish-Brown Micaceous Silty Sand Cuttings @ Surface
13 - 15	S-6	X	17 - 22 - 26 - 27	20	48	15.0		As Above, Moist, Dense (SM)	Slower Auger Advancement 13.0 fbgs to 18.0 fbgs
18 - 20	S-7	X	19 - 26 - 38 - 50/4"	20	64	20.0		As Above, Brown to White, Moist, Very Dense (SM)	As Above: Apparent Rock (Remnant) Fabric Bouncing 19.5 fbgs to 20.0 fbgs Slower Auger Advancement 18.0 fbgs to 25.0 fbgs
23 - 25	S-8	X	16 - 34 - 41 - 50/3"	23	75	25.0		As Above, Damp to Moist, Very Dense (SM)	As Above: Apparent Rock (Remnant) Fabric

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-1

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.000
Location:	93 York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± NS feet	**Date Started:**	4/19/2021		**Water Depth (feet bgs)**	**Elevation (feet)**	**Cave-In Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	30.0 feet bgs	**Date Completed:**	4/19/2021				
Proposed Location:	Proposed Building	**Logged By:**	TJ	**During:**	28.0	---	
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	28.0	---	**At Completion:** 29.0 / ---
		Equipment:	CME-55	**24 Hours:**	--	--	**24 Hours:** -- / ---

SAMPLE INFORMATION						DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)			
						25.0	RESIDUAL		
28 - 30	S-9	X	30 - 30 - 50/3"	24	80/9"	29.0		As Above, Brown Micaceous Silty Sand with Gravel, Wet, Very Dense (SM)	
						30.0	WEATHERED ROCK	Brown/White/Gray Weathered Schist, Moist, Friable to a Silty Sand (WR)	Friable by Hand
						35.0		Boring Log B-1 Terminated at a Depth of 30.0 Feet Below Ground Surface on Weathered Schist	
						40.0			
						45.0			
						50.0			

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-2

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.000
Location:	93 York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± NS feet	**Date Started:**	4/19/2021		**Water Depth (feet bgs) | Elevation (feet)**		**Cave-In Depth (feet bgs) | Elevation (feet)**
Termination Depth:	30.0 feet bgs	**Date Completed:**	4/19/2021				
Proposed Location:	Proposed Building Pad	**Logged By:**	TJ	**During:**	28.0 | ---		
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	28.0 | ---	**At Completion:**	30.0 | ---
		Equipment:	CME-55	**24 Hours:**	--- | ---	**24 Hours:**	--- | ---

SAMPLE INFORMATION Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	PAVEMENT	2" Asphalt, 5" Gravelly Subbase	Signs of Alligator Cracking in Asphalt
						0.6	FILL		
1 - 3	S-1	X	1 - 1 - 2 - 1	12	3	3.0		Brown Silty Sand, Moist (FILL)	
3 - 5	S-2	X	2 - 2 - 3 - 4	12	17	5.0	RESIDUAL	Brown Micaceous Silty Sand with Gravel, Moist, Medium Dense (SM)	
5 - 7	S-3	X	5 - 6 - 7 - 7	15	16			As Above, Brown with White, Moist, Medium Dense (SM)	
7 - 9	S-4	X	8 - 6 - 8 - 10	15	14			As Above, Moist, Dense (SM)	
9 - 11	S-5	X	9 - 12 - 13 - 15	20	25	10.0		As Above, Moist, Medium Dense (SM)	
									Slow Auger Advancement 9.0 fbgs to 12.0 fbgs Silty Sand in Ground Cuttings @ Surface
13 - 15	S-6	X	14 - 20 - 23 - 30	22	43	15.0		As Above, Moist, Dense (SM)	
									Slower Auger Advancement 13.0 fbgs to 18.0 fbgs
18 - 20	S-7	X	17 - 18 - 16 - 14	22	33	20.0		As Above, Brown with Reddish-Brown, Moist, Dense (SM)	
						23.0			
23 - 25	S-8	X	50/5"	5	50/5"	25.0	WEATHERED ROCK	Brown/White/Dark Brown Weathered Schist, Very Weathered, Very Low Strength, Moist, Friable to a Silty Sand (WR)	Friable to SM

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-2

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.000
Location:	93 York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± NS feet	**Date Started:**	4/19/2021		**Water Depth (feet bgs)**	**Elevation (feet)**	**Cave-In Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	30.0 feet bgs	**Date Completed:**	4/19/2021				
Proposed Location:	Proposed Building Pad	**Logged By:**	TJ	**During:**	28.0	---	
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	28.0	---	**At Completion:** 30.0 / ---
		Equipment:	CME-55	**24 Hours:**	--	--	**24 Hours:** -- / ---

SAMPLE INFORMATION						DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)			
						25.0	WEATHERED ROCK		
28 - 30	S-9	X	50/1"	1	50/1"	30.0		As Above, Brown/White/Dark Brown Weathered Schist, Friable to a Silty Sand, Moist (WR)	Friable by Hand
						35.0		Boring Log B-2 Terminated at a Depth of 30.0 Feet Below Ground Surface	
						40.0			
						45.0			
						50.0			

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-3

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.000
Location:	93 York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± NS feet	**Date Started:**	4/19/2021		**Water Depth (feet bgs) | Elevation (feet)**		**Cave-In Depth (feet bgs) | Elevation (feet)**
Termination Depth:	30.0 feet bgs	**Date Completed:**	4/19/2021				
Proposed Location:	Proposed Building Pad	**Logged By:**	TJ	**During:**	27.5 | ---		
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	27.5 | ---	**At Completion:**	28.0 | ---
		Equipment:	CME-55	**24 Hours:**	--- | ---	**24 Hours:**	--- | ---

SAMPLE INFORMATION Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	PAVEMENT	3" Asphalt, 4" Gravelly Subbase	Alligator Cracking in Pavement
						0.6	FILL	Brown/White Silty Sand with Gravel, Moist (FILL)	
						1.0	RESIDUAL		
1 - 3	S-1	X	3 - 2 - 3 - 3	12	5			Brown Sandy Silt, Moist, Firm (ML)	Qu = 0.75 tsf Sandy Silt (ML) Cuttings 0.0 fbgs to 5.0 fbgs
3 - 5	S-2	X	3 - 4 - 4 - 5	18	8			As Above, Moist, Firm (ML)	Qu = 0.75 tsf
						5.0			
5 - 7	S-3	X	5 - 5 - 6 - 6	16	11			Brown Micaceous Silty Sand, Moist, Medium Dense (SM)	
7 - 9	S-4	X	8 - 10 - 12 - 12	18	22			As Above, Brown/Orange/White, Moist, Medium Dense (SM)	
9 - 11	S-5	X	9 - 12 - 12 - 15	17	24	10.0		As Above, Moist, Medium Dense (SM)	
									Slower Auger Advancement 9.0 fbgs to 13.0 fbgs
13 - 15	S-6	X	28 - 30 - 33 - 44	24	63			As Above, Gray/Brown, Moist, Medium Dense (SM)	
						15.0			Silty Sand Cutting @ Surface
18 - 20	S-7	X	15 - 14 - 15 - 17	19	29			As Above, Gray/Brown/White, Moist, Medium Dense (SM)	
						20.0			
23 - 25	S-8	X	17 - 29 - 50/3"	15	79/9"	24.0		As Above, Moist, Dense to Very Dense (SM)	
						25.0	WEATHERED ROCK	Gray/Orange/Brown Weathered Schist, Very Weathered, Very Low Strength, Friable to a Silty Sand (WR)	Slower Auger Advancement 24.0 fbgs to 28.0 fbgs

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-3

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.000
Location:	93 York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± NS feet	**Date Started:**	4/19/2021		**Water Depth (feet bgs)**	**Elevation (feet)**	**Cave-In Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	30.0 feet bgs	**Date Completed:**	4/19/2021				
Proposed Location:	Proposed Building Pad	**Logged By:**	TJ	**During:**	27.5	---	
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	27.5	---	**At Completion:** 28.0 / ---
		Equipment:	CME-55	**24 Hours:**	--	--	**24 Hours:** -- / ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						25.0	RESIDUAL			
28 - 30	S-9	X	39 - 50/4"	6	50/4"	30.0			As Above, Brown/Orange/Gray Weathered Schist, Moist to Wet, Friable to a Silty Sand (WR)	
						35.0			Boring Log B-3 Terminated at a Depth of 30.0 Feet Below Ground Surface	
						40.0				
						45.0				
						50.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-4

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.000
Location:	93 York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± NS feet	**Date Started:**	4/20/2021	**Water Depth | Elevation (feet bgs) | (feet)**		**Cave-In Depth | Elevation (feet bgs) | (feet)**	
Termination Depth:	21.0 feet bgs	**Date Completed:**	4/20/2021				
Proposed Location:	Proposed Building Pad	**Logged By:**	TJ	**During:**	NE | ---		
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	NE | ---	**At Completion:**	18.0 | ---
		Equipment:	CME-55	**24 Hours:**	--- | ---	**24 Hours:**	--- | ---

SAMPLE INFORMATION Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0			
						0.5	PAVEMENT	4" Asphalt, 2" Gravelly Subbase	Severe Alligator Cracking in Asphalt
							RESIDUAL		ML Cuttings @ Surface
1 - 3	S-1	X	3 - 4 - 4 - 5	18	8			Brown Micaceous Sandy Silt, Moist, Stiff (ML)	
3 - 5	S-2	X	3 - 5 - 5 - 6	18	10			As Above, Moist, Stiff (ML)	
						5.0			
5 - 7	S-3	X	5 - 6 - 6 - 7	16	12			Brown/Orange Micaceous Silty Sand, Moist, Medium Dense (SM)	
7 - 9	S-4	X	11 - 13 - 12 - 11	22	25			As Above, with Gravel, Moist, Medium Dense (SM)	
9 - 11	S-5	X	23 - 29 - 50/3"	10	79/9"	10.0		As Above, Moist, Very Dense (SM)	Schist Fragments in Spoon Tip @ 10.0 fbgs (10% to 15%)
									Slower Auger Advancement 9.0 fbgs to 13.0 fbgs
						13.0			SM Cuttings @ Surface
13 - 15	S-6	X	50/4"	4	50/4"		WEATHERED ROCK	Brown/Gray/Orange Weathered Schist, Very Weathered, Very Low Strength, Moist, Friable to a Silty Sand (WR)	Schist Fragments in Spoon (50+%) Friable to SM
						15.0			Slow Augering 13.0 fbgs to 18.0 fbgs
18 - 20	S-7	X	50/1"	1	50/1"			As Above, Moist, Friable to a Silty Sand (WR)	Schist Fragments (60+%)
						20.0			
						21.0		No Recovery, Assumed As Above (WR) or Schist (Competent)	Slow Augering 18.0 fbgs to 21.0 fbgs
21 - 21	S-8	X	50/0"	NR	50/0"			Boring Log B-4 Terminated at a Depth of 21.0 Feet Below Ground Surface Due to Auger Refusal on Apparent Competent Rock (Schist)	Augers Locked Up @ 24.0 fbgs
						25.0			

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-5

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.000
Location:	93 York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± NS feet	**Date Started:**	4/20/2021	**Water Depth (feet bgs) | Elevation (feet)**		**Cave-In Depth (feet bgs) | Elevation (feet)**	
Termination Depth:	20.0 feet bgs	**Date Completed:**	4/20/2021				
Proposed Location:	Proposed Building Pad	**Logged By:**	TJ	**During:**	NE | ---		
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	NE | ---	**At Completion:**	18.0 | ---
		Equipment:	CME-55	**24 Hours:**	--- | ---	**24 Hours:**	--- | ---

SAMPLE INFORMATION Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	PAVEMENT	4" Asphalt, 3" Gravelly Subbase	Excessive Alligator Cracking in Asphalt
						0.6	FILL	Brown Silty Sand, Moist (FILL)	
1 - 3	S-1	X	2 - 2 - 3 - 3	14	5	1.0	RESIDUAL	Brown Sandy Silt, Moist, Firm (ML)	Normal Amount of Surface Cuttings 0.0 fbgs to 10.0 fbgs
						3.0			
3 - 5	S-2	X	3 - 3 - 4 - 5	15	7			Brown Micaceous Silty Sand, Moist, Loose (SM)	
						5.0			
5 - 7	S-3	X	4 - 4 - 5 - 6	12	9			As Above, Moist, Loose (SM)	
7 - 9	S-4	X	6 - 9 - 18 - 23	17	27			As Above, with Gravel, Medium Dense (SM)	Remnant Rock Fabric, Apparent Schist Fragment(s)
9 - 11	S-5	X	31 - 50/2"	8	50/2"	10.0		As Above, Very Dense (SM)	Remnant Rock Fabric, Schist Fragments (15%)
						13.0			Auger Slowed @ 12.0 fbgs
13 - 15	S-6	X	32 - 50/3"	8	50/3"		WEATHERED ROCK	Brown/Orange/White Weathered Schist, Very Weathered, Moist, Friable to a Silty Sand (WR)	Slow Auger Advancement 13.0 fbgs to 20.0 fbgs
						15.0			
									Very Slow Augering 17.0 fbgs to 20.0 fbgs
18 - 20	S-7	X	50/1"	1	50/1"			As Above, Moist, Friable to a Silty Sand (WR)	Schist Fragments (60+%)
						20.0			
								Boring Log B-5 Terminated at a Depth of 20.0 Feet Below Ground Surface Due to Auger Refusal on Apparent Competent Rock (Schist)	Auger Refusal @ 20.0 fbgs Possible Competent Rock @ 20.0 fbgs
						25.0			

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-6

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.000
Location:	93 York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± NS feet	**Date Started:**	4/20/2021	**Water Depth (feet bgs) | Elevation (feet)**		**Cave-In Depth (feet bgs) | Elevation (feet)**	
Termination Depth:	17.0 feet bgs	**Date Completed:**	4/20/2021				
Proposed Location:	Proposed Building Pad	**Logged By:**	TJ	**During:**	NE | ---		
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	NE | ---	**At Completion:**	14.0 | ---
		Equipment:	CME-55	**24 Hours:**	--- | ---	**24 Hours:**	--- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0	PAVEMENT		3" Asphalt, 2" Gravelly Subbase	Alligator Cracking in Pavement
						0.4	RESIDUAL			
1 - 3	S-1	X	3 - 4 - 4 - 4	16	8				Brown Micaceous Silty Sand with Gravel, Moist, Loose (SM)	
3 - 5	S-2	X	11 - 11 - 5 - 5	15	9				As Above, Moist, Loose (SM)	Normal Amount of Silty Sand Cuttings @ Surface
						5.0				
5 - 7	S-3	X	5 - 6 - 6 - 7	18	12				As Above, Moist, Medium Dense (SM)	
7 - 9	S-4	X	12 - 27 - 50/2"	10	77/8"	8.0			As Above, Moist, Dense (SM)	
							WEATHERED ROCK		Brown/Orange/White Weathered Schist, Moist, Friable to a Silty Sand (WR)	8.0 fbgs to 11.0 fbgs: Apparent Remnant Rock Fabric, Schist Fragments (40%)
9 - 11	S-5	X	32 - 50/2"	4	50/2"	10.0			As Above, Moist (WR)	9.0 fbgs to 13.0 fbgs: Slow Augering, Weathered Rock Schist Fragments (50%)
13 - 15	S-6	X	50/3"	3	50/3"				As Above, Moist (WR)	
						15.0				
15 - 17	S-7	X	50/0"	NR	50/0"				No Recovery - No Penetration by Spoon, Presumed As Above (WR) or Apparent Competent Rock	
						17.0				
									Boring Log B-6 Terminated at a Depth of 17.0 Feet Below Ground Surface Due to Auger Refusal on Apparent Competent Rock (Schist)	Auger Refusal @ 17.0 fbgs
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-7

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.000
Location:	93 York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± NS feet	**Date Started:**	4/20/2021		**Water Depth (feet bgs)**	**Elevation (feet)**	**Cave-In Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	10.5 feet bgs	**Date Completed:**	4/20/2021				
Proposed Location:	Proposed Building Pad	**Logged By:**	TJ	**During:**	NE	---	
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	NE	---	**At Completion:** 8.0 / ---
		Equipment:	CME-55	**24 Hours:**	---	---	**24 Hours:** --- / ---

SAMPLE INFORMATION Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	PAVEMENT	3" Asphalt, 2" Gravelly Subbase	Lateral Cracking in Asphalt
						0.4	FILL	Brown Silty Sand with Gravel, Moist (FILL)	
						1.0	RESIDUAL		
1 - 3	S-1	X	5 - 8 - 9 - 13	6	17			Brown Micaceous Silty Sand with Gravel, Moist, Medium Dense (SM)	Schist Fragments (10%)
3 - 5	S-2	X	5 - 12 - 17 - 19	12	29			As Above, Moist, Medium Dense (SM)	Schist Fragments (20%)
						5.0	WEATHERED ROCK		Heavy Auger Grinding 5.0 fbgs to 10.5 fbgs
5 - 7	S-3	X	50/2"	2	50/2"			Gray/Brown/White Weathered Schist, Very Weathered, Very Low Strength, Moist, Friable to a Silty Sand (WR)	Schist Fragments (50+%)
7 - 9	S-4	X	39 - 50/2"	4	50/2"			As Above, Damp to Moist (SM)	Schist Fragments (50+%)
9 - 10.5	S-5	X	50/0.5"	0.5	50/05"	10.0		As Above, Grayish-Brown, Moist (WR)	Augers Stopped in Presumed Competent Rock
						10.5		Boring Log B-7 Terminated at a Depth of 10.5 Feet Below Ground Surface e Due to Auger Refusal on Apparent Competent Rock (Schist)	
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-8

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.000
Location:	93 York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± NS feet	**Date Started:**	4/20/2021	**Water Depth (feet bgs) | Elevation (feet)**		**Cave-In Depth (feet bgs) | Elevation (feet)**	
Termination Depth:	22.0 feet bgs	**Date Completed:**	4/20/2021				
Proposed Location:	Proposed Building	**Logged By:**	TJ	**During:**	NE | ---		
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	NE | ---	**At Completion:**	19.0 | ---
		Equipment:	CME-55	**24 Hours:**	--- | ---	**24 Hours:**	--- | ---

SAMPLE INFORMATION Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0	PAVEMENT	3" Asphalt, 5" Gravelly Subbase	Excessive Alligator Cracking in Pavement
						0.7	FILL	Brown Silty Sand with Gravel, Moist (FILL)	
1 - 3	S-1	X	2 - 2 - 2 - 2	12	4	1.0	RESIDUAL	Brown Micaceous Sandy Silt, Moist, Firm (ML)	
3 - 5	S-2	X	4 - 3 - 3 - 3	12	6	3.0		Brown Micaceous Silty Sand, Moist, Loose (SM)	Normal Amount of Cuttings @ Surface (SM)
5 - 7	S-3	X	4 - 4 - 4 - 4	16	8	5.0		As Above, Moist, Loose (SM)	
7 - 9	S-4	X	6 - 9 - 12 - 16	15	21			As Above, Moist, Medium Dense (SM)	Apparent Remnant Rock Fabric
9 - 11	S-5	X	29 - 50/3"	8	50/3"	10.0		As Above, Moist, Very Dense (SM)	Schist Fragments Friable to a Silty Sand
						13.0			Slow Auger Advancement 9.0 fbgs to 13.0 fbgs; Grinding @ 12.0 fbgs
13 - 15	S-6	X	31 - 50/2"	6	50/2"	15.0	WEATHERED ROCK	Brown/Gray/White Weathered Schist, Friable to a Silty Sand (WR)	Friable by Hand
									Slow Auger Advancement 13.0 fbgs to 18.0 fbgs
18 - 20	S-7	X	50/2"	2	50/2"	20.0		As Above, Moist (WR)	Friable by Hand
						22.0		No Recovery, Assumed As Above (WR) or Apparent Competent Rock (Schist)	
22 - 22	S-8	X	50/0"	NR	50/0"			Boring Log B-8 Terminated at a Depth of 22.0 Feet Below Ground Surface Due to Auger Refusal on Apparent Competent Rock (Schist)	Auger Refusal @ 22.0 fbgs
						25.0			

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE ASSOCIATES, INC.

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-9

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.000
Location:	93 York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

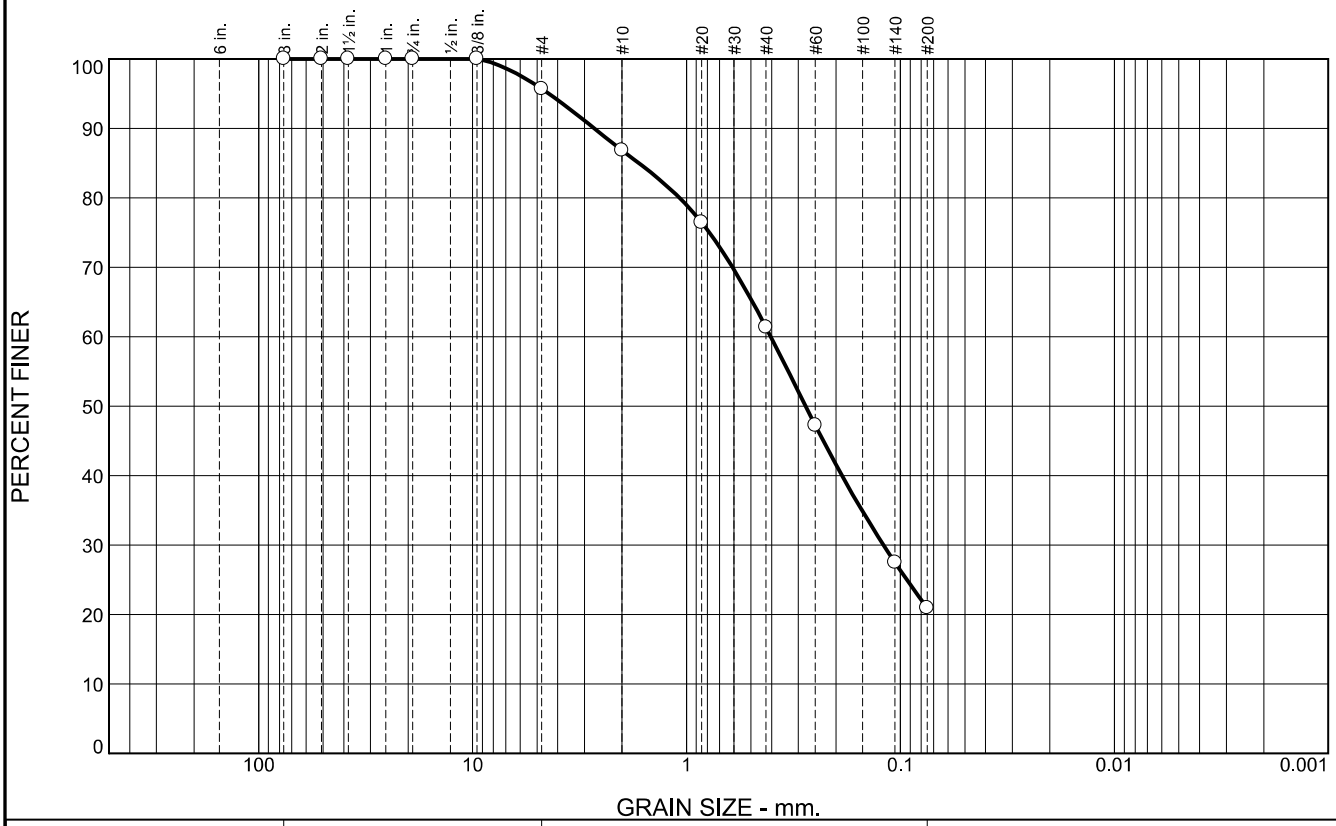
Surface Elevation:	± NS feet	**Date Started:**	4/20/2021		**Water Depth (feet bgs)**	**Elevation (feet)**	**Cave-In Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	11.0 feet bgs	**Date Completed:**	4/20/2021				
Proposed Location:	Parking Lot	**Logged By:**	TJ	**During:**	NE	--	
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	NE	--	**At Completion:** 9.0 / ---
		Equipment:	CME-55	**24 Hours:**	--	--	**24 Hours:** -- / ---

SAMPLE INFORMATION Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0			
							PAVEMENT	3" Asphalt, 4" Gravelly Subbase	
						0.6	FILL		
1 - 3	S-1	X	2 - 2 - 2 - 2	8	4			Brown Sandy Silt with Gravel, Moist to Wet (FILL)	
3 - 5	S-2	X	4 - 4 - 4 - 4	12	8			Gray/Brown Silty Sand with Gravel, Moist (FILL)	Concrete Fragment (5% to 10%)
						5.0	RESIDUAL		
5 - 7	S-3	X	4 - 6 - 8 - 12	14	14			Brown Micaceous Silty Sand with Gravel, Moist, Medium Dense (SM)	Apparent Remnant Rock Fabric
7 - 9	S-4	X	10 - 10 - 12 - 22	16	22			As Above, Moist, Medium Dense (SM)	Apparent Remnant Rock Fabric
9 - 11	S-5	X	28 - 50/2"	3	50/2"	10.0		As Above, Moist, Very Dense (SM)	
						11.0	WEATHERED ROCK	Brown/White/Gray Weathered Schist, Moist, Friable to a Silty Sand (WR)	Schist Fragment, Friable by Hand
								Boring Log B-9 Terminated at a Depth of 11.0 Feet Below Ground Surface in Weathered Rock	
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

APPENDIX B
Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.3	8.9	25.5	40.4	20.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	100.0		
#4	95.7		
#10	86.8		
#20	76.4		
#40	61.3		
#60	47.2		
#140	27.5		
#200	20.9		

* (no specification provided)

Material Description

Silty Sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 2.7021 D_{85}= 1.6732 D_{60}= 0.4036
D_{50}= 0.2776 D_{30}= 0.1200 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

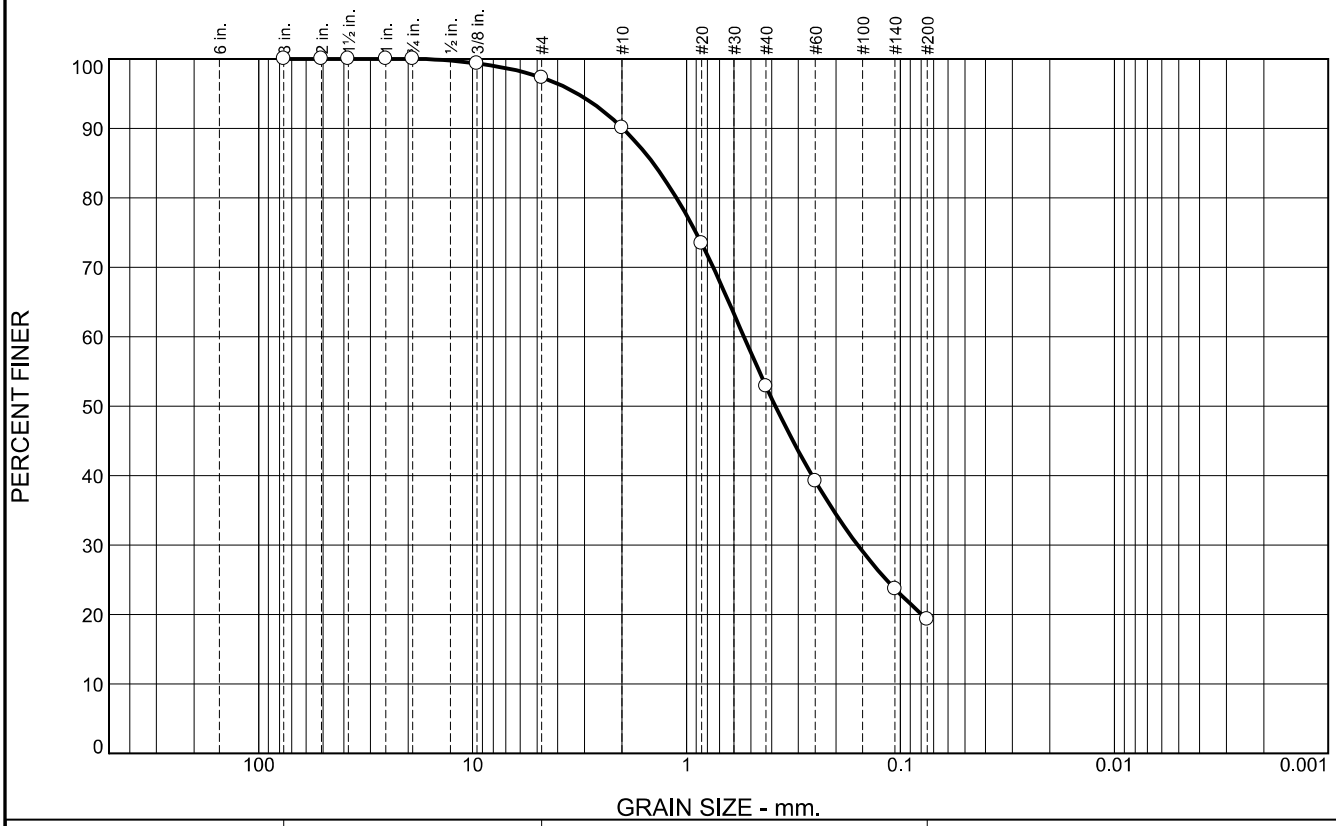
W_n = 10.4 %

Source of Sample: B-1 **Depth:** 18.0' - 20.0'
Sample Number: S-7 **Date:** 04/26/2021

WHITESTONE ASSOCIATES, INC.
Warren, New Jersey

Client: Bohler Engineering PA, LLC
Project: Proposed Giant Food Store
93 Yord Road, Jenkintown, Montgomery County, Pennsylvania
Project No: GP2117887.000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.7	7.2	37.2	33.6	19.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	99.3		
#4	97.3		
#10	90.1		
#20	73.4		
#40	52.9		
#60	39.2		
#140	23.7		
#200	19.3		

* (no specification provided)

Material Description

Silty Sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 1.9864 D_{85}= 1.4351 D_{60}= 0.5389
D_{50}= 0.3840 D_{30}= 0.1583 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

W_n = 11.9 %

Source of Sample: B-6 **Depth:** 3.0' - 5.0'
Sample Number: S-2 **Date:** 04/26/2021

WHITESTONE ASSOCIATES, INC.
Warren, New Jersey

Client: Bohler Engineering PA, LLC
Project: Proposed Giant Food Store
93 Yord Road, Jenkintown, Montgomery County, Pennsylvania
Project No: GP2117887.000 **Figure**

APPENDIX C
Supplemental Information
(USCS, Terms and Symbols)

WHITESTONE
An Employee-Owned Company

NEW BRITAIN CORPORATE CENTER
1600 MANOR DRIVE
SUITE 220
CHALFONT, PA 18914
215.712.2700
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UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMITS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMITS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

GRADATION*

% FINER BY WEIGHT

TRACE..... 1% TO 10%
LITTLE..... 10% TO 20%
SOME..... 20% TO 35%
AND..... 35% TO 50%

COMPACTNESS*
Sand and/or Gravel

RELATIVE DENSITY

LOOSE. ..... 0% TO 40%
MEDIUM DENSE.... 40% TO 70%
DENSE..... 70% TO 90%
VERY DENSE..... 90% TO 100%

CONSISTENCY*
Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

VERY SOFT..... LESS THAN 250
SOFT..... ..... 250 TO 500
MEDIUM..... 500 TO 1000
STIFF..... 1000 TO 2000
VERY STIFF..... 2000 TO 4000
HARD..... GREATER THAN 4000

** VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.*

L:\Geotechnical Forms and References\Reports\USCSTRMSSYM PA.docx

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GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Moisture content, %.
LL: Liquid limit, %.
PI: Plasticity index, %.
δd: Natural dry density, PCF.
▼: Apparent groundwater level at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

NE: Not Encountered (Groundwater was not encountered).
SS: Split-Spoon - 1 ⅜" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
OB: Diamond Bit.
CB: Carbide Bit
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Term (Cohesive Soils)	Qu (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

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WHITESTONE
An Employee-Owned Company

NEW BRITAIN CORPORATE CENTER
1600 MANOR DRIVE
SUITE 220
CHALFONT, PA 18914
215.712.2700
whitestoneassoc.com

December 1, 2021

via email

BOHLER ENGINEERING PA, LLC
New Britain Corporate Center
1600 Manor Drive, Suite 200
Chalfont, Pennsylvania 18914

Attention: John Alejnikov, P.E.
Project Manager

Regarding: STORMWATER MANAGEMENT AREA EVALUATION
PROPOSED GIANT FOOD STORE
93 OLD YORK ROAD
JENKINTOWN, MONTGOMERY COUNTY, PENNSYLVANIA
WHITESTONE PROJECT NO.: GP2117887.000

Dear Mr. Alejnikov:

Whitestone Associates, Inc. (Whitestone) is pleased to submit this *Stormwater Management Area Evaluation* report for the proposed stormwater management (SWM) facilities at the site referenced above. The investigation was performed in general accordance with Whitestone's March 29, 2021 proposal to Bohler Engineering PA, LLC (Bohler). The test locations and elevations were based on information provided by Bohler, including the *Infiltration Testing Exhibit* prepared by Bohler.

PROJECT DESCRIPTION

At the time of the field investigation, the site housed a multi-story office building with associated pavements, utilities, and lawn areas, as well as a multi-story car dealership with associated pavements and utilities. The proposed site improvements pertinent to this report include construction of underground SWM facilities within the areas of the proposed pavements. Based on correspondence with Bohler, the bottom of the proposed SWM facilities range between two feet below existing ground surface (fbgs) and 10.5 fbgs, corresponding to elevations ranging between 287 feet and 289 feet, as reference from the North American Vertical Datum of 1988 (NAVD88).

FIELD INVESTIGATION

The investigation included an evaluation of six soil borings (identified as B-1 through B-6) and conducting six in-situ infiltration tests utilizing cased-borehole methodology. The subsurface investigation and infiltration testing were performed in general accordance with standards presented in the Pennsylvania Department of Environmental Protection (PADEP) *Stormwater Best Management Practices Manual* (BMP Manual).

LABORATORY PROGRAM

In addition to the field investigation, representative samples of the strata encountered were subjected to a laboratory program that included Atterberg limits determination (ASTM D-4318), moisture content determination (ASTM D-2216) and washed gradation analysis (ASTM D-422) in order to perform supplementary engineering soil classification in general accordance with ASTM D-2487. The soil strata tested was classified by the Unified Soil Classification System (USCS). Results of the laboratory testing are summarized in the following table and quantitative test results are provided in Appendix B.

PHYSICAL/TEXTURAL ANALYSES SUMMARY						
Test No.	**Depth (fbgs)**	**% Passing No. 200 Sieve**	**Moisture Content (%)**	**Liquid Limit**	**Plastic Index**	**USCS Classification**
B-1	7.0 to 9.0	11.1	6.5	Non-Plastic		SP-SM
B-4	1.0 to 5.0	18.0	4.5	Non-Plastic		SM
B-5	3.0 to 5.0	44.2	21.3	Non-Plastic		SM

fbgs: feet below ground surface

SUMMARY OF FINDINGS

Subsurface Profile: The subsurface conditions encountered at and below the proposed levels of infiltration included existing fill and natural soils consisting of United States Department of Agriculture (USDA) classifications Loamy Sand and Sandy Loam with varying amounts of gravel. The soil borings were terminated within the natural soil or weathered rock materials at depths ranging between 5.1 fbgs and 13.1 fbgs.

Static groundwater or indications of seasonal high groundwater level, (i.e., continuous soil mottling) were not encountered within the test locations. Detailed subsurface conditions are presented on the enclosed *Records of Subsurface Exploration* included in Appendix A.

Infiltration Test Results: The results of the *in-situ* infiltration testing and limiting zones encountered are summarized in the table below. Detailed infiltration test results are included in Appendix C.

SUMMARY OF INFILTRATION TESTING				
Test Location	**Approximate Test Depth / Elevation (fbgs / feet NAVD 88)**	**Soil Type Tested (USDA)**	**Limiting Zone Depth / Elevation (fbgs / feet)**	**Field Infiltration Rate* (iph)**
I-1 @ B-1	8.0 / 290.0	Loamy Sand	11.2 / 286.8	4.0
I-2 @ B-2	9.0 / 290.5	Loamy Sand	13.1 / 286.4	4.0
I-3 @ B-3	1.0 / 287.0	Loamy Sand	3.0 / 286.0	2.0
I-4 @ B-4	3.0 / 288.0	Loamy Sand	5.0 / 286.0	2.0
I-5 @ B-5	4.5 / 283.0	Loamy Sand	NE	1.5

SUMMARY OF INFILTRATION TESTING				
Test Location	**Approximate Test Depth / Elevation (fbgs / feet NAVD 88)**	**Soil Type Tested (USDA)**	**Limiting Zone Depth / Elevation (fbgs / feet)**	**Field Infiltration Rate* (iph)**
I-6 @ B-6	4.0 / 283.0	Sandy Loam	NE	0.5

iph: inches per hour
NE: not encountered
*Does not include applicable safety factor

CONCLUSION AND RECOMMENDATIONS

Design Infiltration Rates: Based on the subsurface conditions encountered and results obtained from field infiltration testing, the granular site soils encountered at the anticipated infiltration levels for the underground basin generally are suitable for infiltration. Whitestone recommends a design infiltration rate of 0.75 inch per hour (iph) for the granular soils encountered. This design infiltration rate was calculated in accordance with the BMP Manual and includes a safety factor of at least 2.0.

The granular materials were encountered in variable relative densities, (medium dense to slightly cemented). As such, Whitestone recommends observation during basin construction as soil conditions can change over relatively short distances. Where encountered during construction, Whitestone recommends scouring slightly cemented sands with a toothed excavation bucket. Due to the potential variability of the residual site soils, pockets of impermeable cohesive soils may be encountered. If impermeable soils are encountered during construction, Whitestone recommends overexcavation of these soils and restoring design grades with an approved amended soil described below.

Additional Design Considerations: The design infiltration rate presented above should be verified during construction by conducting in-situ infiltration testing at the bottom of the SWM facilities. In accordance with the BMP Manual, the bottom of basins should be at least two feet above the limiting zones identified above (weathered rock). Infiltration rates decrease over time and on-going maintenance, such as preventing the accumulation of sediment, should be performed to extend the capacity of the infiltration system.

Soil Amendment Criteria: Based on criteria presented in the BMP Manual, any resultant overexcavation should be backfilled to design elevation with amended soil that conforms to the following gradation criteria to achieve a design infiltration rate of 2.0 inch per hour:

- Sand: 80%
- Silt: 15%
- Clay: 5%
- Plasticity Index < 8

The amended soils should be placed and lightly compacted with track-mounted equipment. Rubber-tire construction equipment or vehicles should not be permitted in the basins. A representative sample(s) of the proposed amended soil should be submitted for laboratory testing to confirm the soil will achieve the required infiltration rate. In addition, an adequate number of *in-situ* double-ring infiltration tests should be performed during amended soil placement to confirm the design infiltration rate.

Construction Considerations: Any soils encountered at or below the recommended bottom of basin elevation that do not meet the required infiltration rate presented above should be overexcavated and replaced with amended soils meeting the criteria presented above. Construction of the SWM facility should

be overseen by a geotechnical engineer that is familiar with the subsurface investigation and SWM design to ensure that any imported backfill materials will not impede drainage.

During basin construction, compaction/densification of subgrade soils and underlying materials should be avoided. Accordingly, contractors should use track-mounted equipment and excavators with toothed-buckets for basin construction. Additionally, contractors should avoid unnecessarily traversing the basin footprint with large/heavy equipment during basin construction to the extent possible.

Whitestone's geotechnical division appreciates the opportunity to be of continued service to Bohler Engineering PA, LLC and Blank Aschkenasy Properties. Please contact us at (215) 712-2700 with any questions regarding this report.

Sincerely,

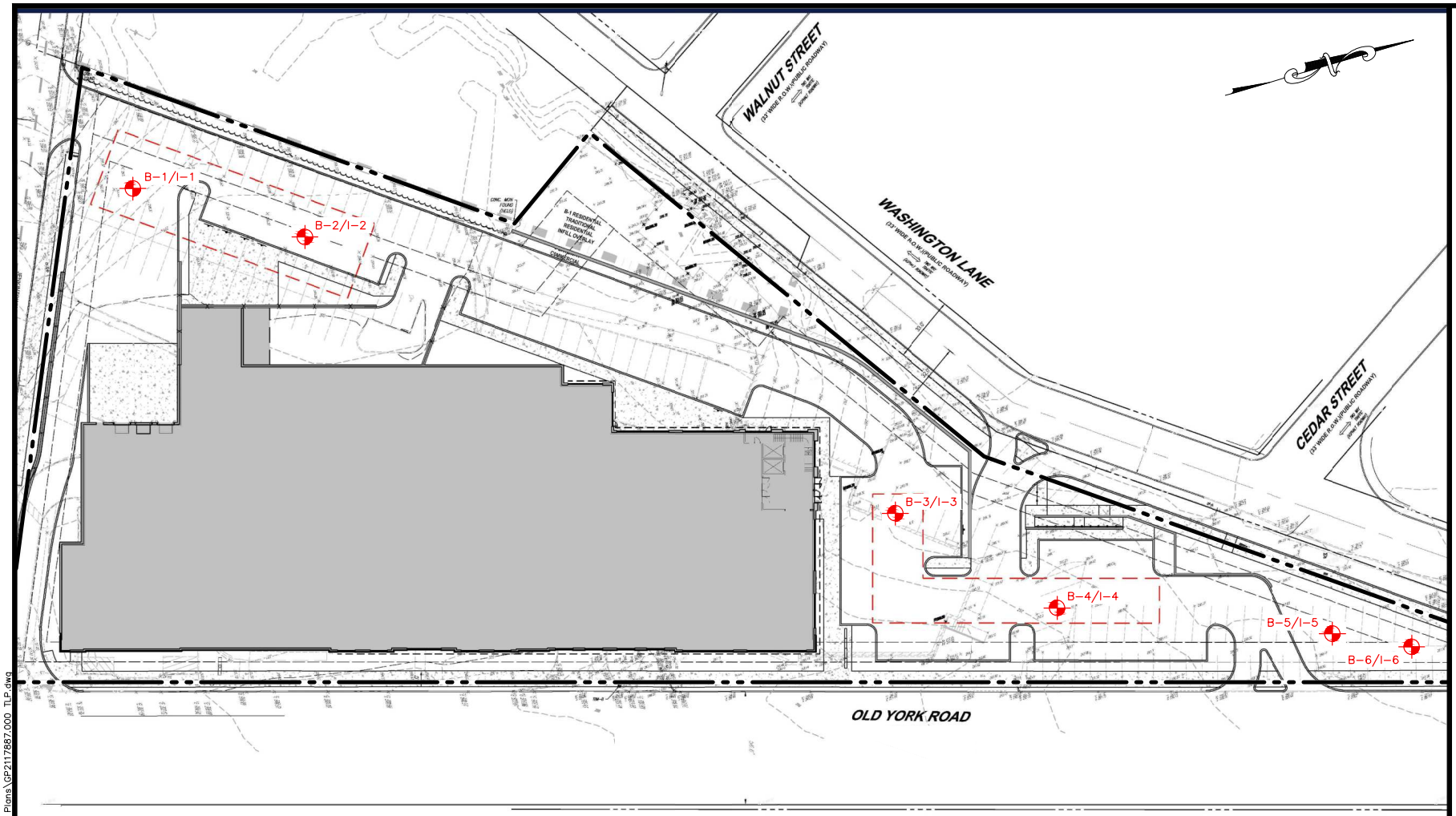
WHITESTONE ASSOCIATES, INC.

James M. Morgan
Senior Associate

Laurence W. Keller, P.E.
Vice President

KRP/JMM/az M:\Job Folders\2021\2117887GP\Reports and Submittals\17887.001_SWM.docx
Enclosures
Copy: Jordyn Strnad, Bohler Engineering PA, LLC
Alex Kreppel, Bohler Engineering PA, LLC

FIGURE 1
Test Location Plan



0 50
1 inch = 50 ft.

LEGEND

B-1/I-1 BORING/INFILTRATION TEST

SUBJECT PROPERTY BOUNDARY

REFERENCE

THIS PLAN IS BASED ON AN OCTOBER 5, 2021 PROPOSED SITE PLAN PREPARED BY BOHLER ENGINEERING PA, LLC & ALL SITE LOCATIONS ARE APPROXIMATE.

WHITESTONE
An Employee-Owned Company
1600 MANOR DRIVE, SUITE 220, CHALFONT, PA 18914
215.712.2700 WHITESTONEASSOC.COM

183

DRAWING TITLE:
TEST LOCATION PLAN

CLIENT:
BOHLER ENGINEERING PA, LLC

PROJECT:
PROPOSED GIANT FOOD STORE
93 YORK ROAD
JENKINTOWN, MONTGOMERY COUNTY, PA

PROJECT #: GP2117887.000	
DESIGNED BY: GR	PROJ. MGR.: JMM
DATE: 10/11/21	FIGURE: 1
SCALE: 1" = 50'	

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APPENDIX A
Records of Subsurface Exploration

RECORD OF SUBSURFACE EXPLORATION

WHITESTONE

Boring No.: B-1

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.001
Location:	93 Old York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± 298.0 feet	**Date Started:**	10/8/2021		**Water Depth (feet bgs)**	**Elevation (feet)**	**Cave-In Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	11.2 feet bgs	**Date Completed:**	10/8/2021				
Proposed Location:	SWM	**Logged By:**	KRP	**During:**	NE	--	
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	--	--	**At Completion:** 8.0 / 290.0
		Equipment:	CME-55	**24 Hours:**	--	--	**24 Hours:** -- / ---

SAMPLE INFORMATION						DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)			
						0.0			
						0.5	PAVEMENT	~3" Asphalt, ~3" Subbase	
							RESIDUAL		
1 - 3	S-1	X	3 - 5 - 5 - 5	11	10			Brown (7.5YR 5/3) Micaceous SILTY SAND with Gravel, Moist, Medium Dense (SM)	
3 - 5	S-2	X	5 - 7 - 8 - 13	15	15			As Above, Moist, Medium Dense (SM)	
						5.0			
5 - 7	S-3	X	50/3"	3	50/3"			As Above, Moist, Very Dense (SM)	Possible Schist Cobble/Boulder; Easily Able to Drill to 7.0 fbgs
7 - 9	S-4	X	20 - 17 - 13 - 13	18	30			As Above, Moist, Dense (SM)	
						10.0			
9 - 11	S-5	X	31 - 50/4"	10	50/4"			As Above, Moist, Very Dense (SM)	Possible Schist Cobble/Boulder; Easily Able to Drill to 11.0 fbgs
							WR	Highly Weathered Mica Schist Friable to Silty Sand with Gravel, Moist, Very Dense (SM/WR)	
11 - 11.2	S-6	X	50/2"	2	50/2"	11.2		Boring Log B-1 Terminated at a Depth of 11.2 Feet Below Ground Surface Due to Auger Refusal	
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

RECORD OF SUBSURFACE EXPLORATION

WHITESTONE

Boring No.: B-2

Project:	Proposed Giant Food Store	**WAI Project No.:**	GP2117887.001
Location:	93 Old York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± 299.5 feet	**Date Started:**	10/8/2021		**Water Depth (feet bgs) | Elevation (feet)**		**Cave-In Depth (feet bgs) | Elevation (feet)**
Termination Depth:	13.1 feet bgs	**Date Completed:**	10/8/2021				
Proposed Location:	SWM	**Logged By:**	KRP	**During:**	NE | ---		
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	--- | ---	**At Completion:**	9.0 | 290.5
		Equipment:	CME-55	**24 Hours:**	--- | ---	**24 Hours:**	--- | ---

SAMPLE INFORMATION Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	DEPTH (feet)	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
						0.0			
						0.5	PAVEMENT	~3" Asphalt, ~3" Subbase	
1 - 3	S-1		4 - 4 - 4 - 4	11	8	3.0	FILL	Strong Brown (7.5YR 5/6) CLAYEY SAND with Gravel, Moist (FILL)	
3 - 5	S-2		5 - 7 - 8 - 12	13	15	5.0	RESIDUAL	Brown (7.5YR 5/3) Micaceous SILTY SAND with Gravel, Moist, Medium Dense (SM)	
5 - 7	S-3		11 - 12 - 11 - 10	19	23			As Above, Moist, Medium Dense (SM)	
7 - 9	S-4		22 - 15 - 17 - 31	17	32			As Above, Moist, Dense (SM)	
9 - 11	S-5		50/4"	4	50/4"	10.0		As Above, Moist, Very Dense (SM)	Possible Schist Cobble/Boulder; Easily Able to Drill to 11.0 fbgs
						11.0	WEATHERED ROCK	Highly Weathered Mica Schist Friable to Silty Sand with Gravel, Moist, Very Dense (SM/WR)	
11 - 13	S-6		50/3"	3	50/3"				
13 - 13.1	S-7		50/1"	NR	50/1"	13.1		No Recovery, Presumed Weathered Rock Based on Blow Counts (WR)	
								Boring Log B-2 Terminated at a Depth of 13.1 Feet Below Ground Surface Due to Auger Refusal	
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-3

Project:	Proposed Giant Food	**WAI Project No.:**	GP2117887.001
Location:	93 Old York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± 289.0 feet	**Date Started:**	11/8/2021		**Water Depth (feet bgs)**	**Elevation (feet)**	**Cave-In Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	5.1 feet bgs	**Date Completed:**	11/8/2021				
Proposed Location:	SWM	**Logged By:**	KRP	**During:**	NE	--	
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	--	--	**At Completion:** 5.0 / 284.0
		Equipment:	CME-55	**24 Hours:**	--	--	**24 Hours:** -- / ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0	PAVEMENT		~4" Asphalt, No Apparent Subbase	
						0.3	RESIDUAL			
1 - 3	S-1	X	50/2"	2	50/2"	3.0			Brown (7.5YR 5/3) SILTY SAND WITH Gravel, Moist, Micaceous, Very Dense (SM)	Infiltration Test @ 1.0 fbgs
3 - 5	S-2	X	50/3"	3	50/3"	5.0	WEATHERED ROCK		Brown (7.5YR 5/3) Highly Weathered Mica Schist, Friable to a Silty Sand with Gravel, Moist, Micaceous, Very Dense (WR)	Easily Able to Drill to 6.0 fbgs
5 - 5.1	S-3	X	50/1"	1	50/1"	5.1			As Above, Moist, Very Dense (WR)	Easily Able to Drill to 5.0 fbgs
									Boring Log B-3 Terminated at a Depth of 5.1 Feet Below Ground Surface Due to Auger Refusal	
						10.0				
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

RECORD OF SUBSURFACE EXPLORATION

WHITESTONE

Boring No.: B-4

Project:	Proposed Giant Food	**WAI Project No.:**	GP2117887.001
Location:	93 Old York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± 291.0 feet	**Date Started:**	11/8/2021		**Water Depth (feet bgs)**	**Elevation (feet)**	**Cave-In Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	5.2 feet bgs	**Date Completed:**	11/8/2021				
Proposed Location:	SWM	**Logged By:**	KRP	**During:**	NE	--	
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	--	--	**At Completion:** 5.0 / 286.0
		Equipment:	CME-55	**24 Hours:**	--	--	**24 Hours:** -- / ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0	PAVEMENT		~4" Asphalt, No Apparent Subbase	
						0.3	RESIDUAL			
1 - 3	S-1		29 - 50/3"	5	50/3"				Brown (7.5YR 5/3) SILTY SAND with Gravel, Moist, Very Dense (SM)	Easily Able to Drill to 3.0 fbgs Infiltration Test @ 3.0 fbgs
3 - 5	S-2		25 - 50/1"	4	50/1"				As Above, Moist, Micaceous, Very Dense (SM)	
						5.0	WR		Brown (7.5YR 5/3) Highly Weathered Mica Schist Friable to a Silty Sand with Gravel, Moist, Micaceous, Very Dense (WR/SM)	
5 - 5.1	S-3		50/2"	2	50/2"	5.2			Boring Log B-4 Terminated at a Depth of 5.2 Feet Below Ground Surface Due to Auger Refusal	
						10.0				
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-5

Project:	Proposed Giant Food	**WAI Project No.:**	GP2117887.001
Location:	93 Old York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

Surface Elevation:	± 287.5 feet	**Date Started:**	11/8/2021	**Water Depth (feet bgs) | Elevation (feet)**		**Cave-In Depth (feet bgs) | Elevation (feet)**	
Termination Depth:	9.0 feet bgs	**Date Completed:**	11/8/2021				
Proposed Location:	SWM	**Logged By:**	KRP	**During:**	NE | ---		
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	--- | ---	**At Completion:**	8.0 | 279.5
		Equipment:	CME-55	**24 Hours:**	--- | ---	**24 Hours:**	--- | ---

SAMPLE INFORMATION						DEPTH	STRATA		DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)				
						0.0	PAVEMENT		~4" Asphalt, No Apparent Subbase	
						0.3	FILL			
1 - 3	S-1		1 - 1 - 3 - 4	12	4				Brown (7.5YR 5/3) CLAYEY SAND, Moist (FILL) (SC)	Reworked Residual
3 - 5	S-2		4 - 4 - 6 - 6	18	10	5.0			Brown (7.5YR 5/3) SILTY SAND with Gravel, Moist, Micaceous, Medium Dense (FILL) (SM)	Reworked Residual Infiltration Test @ 4.5 fbgs
5 - 7	S-3		5 - 5 - 7 - 9	16	12	7.0			Brown (7.5YR 5/3) SANDY CLAY with Gravel, Moist, Stiff (FILL) (CL)	Reworked Residual
							RESIDUAL			
7 - 9	S-4		10 - 12 - 17 - 29	17	29				Brown (7.5YR 5/3) CLAYEY SAND, Moist, Medium Dense (SC)	
						10.0			Boring Log B-5 Terminated at a Depth of 9.0 Feet Below Ground Surface Due to Auger Refusal	
						15.0				
						20.0				
						25.0				

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

WHITESTONE

RECORD OF SUBSURFACE EXPLORATION

Boring No.: B-6

Project:	Proposed Giant Food	**WAI Project No.:**	GP2117887.001
Location:	93 Old York Road; Jenkintown, Montgomery County, PA	**Client:**	Bohler Engineering PA, LLC

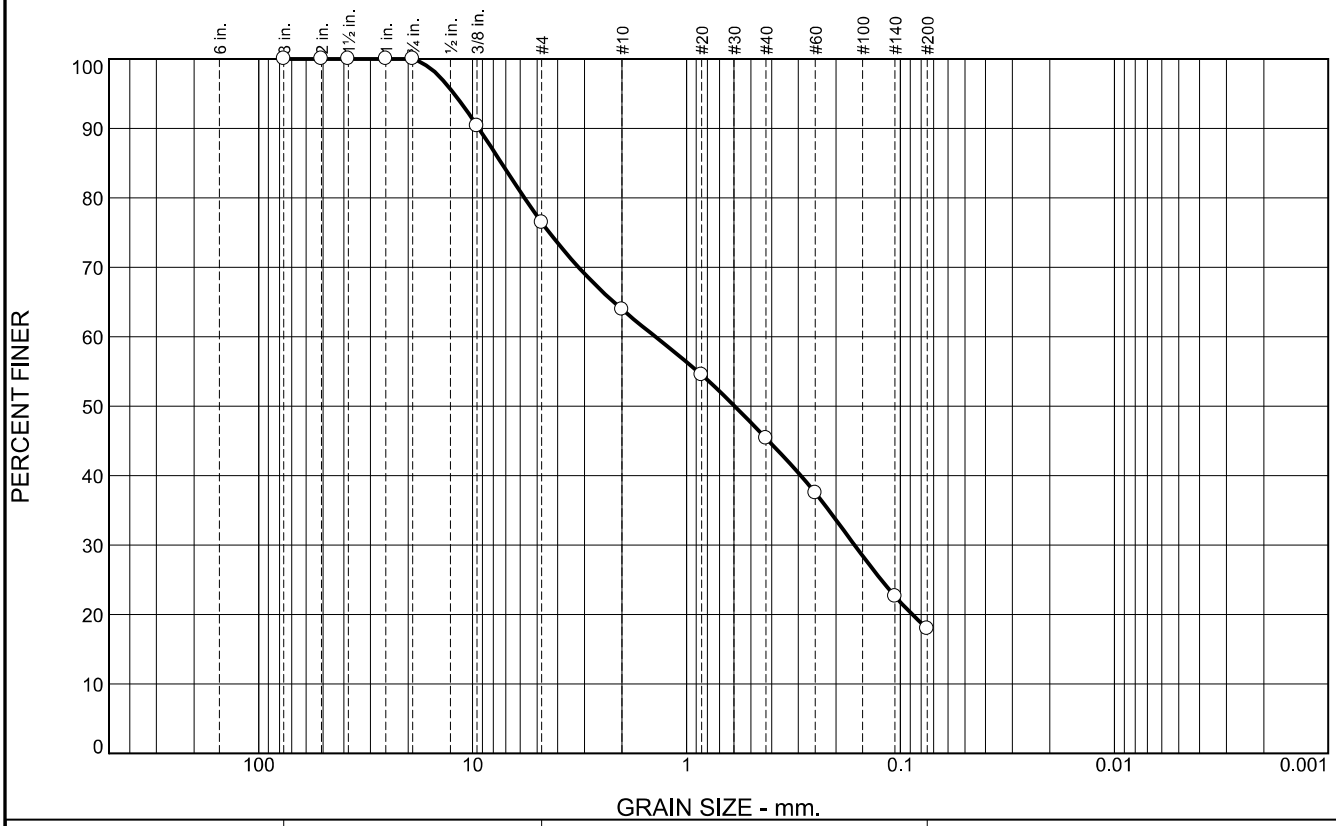
Surface Elevation:	± 287.0 feet	**Date Started:**	11/8/2021		**Water Depth (feet bgs)**	**Elevation (feet)**	**Cave-In Depth (feet bgs)** / **Elevation (feet)**
Termination Depth:	11.0 feet bgs	**Date Completed:**	11/8/2021				
Proposed Location:	SWM	**Logged By:**	KRP	**During:**	NE	--	
Drill / Test Method:	HSA / SPT	**Contractor:**	BW	**At Completion:**	--	--	**At Completion:** -- / --
		Equipment:	CME-55	**24 Hours:**	--	--	**24 Hours:** -- / --

SAMPLE INFORMATION						DEPTH	STRATA	DESCRIPTION OF MATERIALS (Classification)	REMARKS
Depth (feet)	No	Type	Blows Per 6"	Rec. (in.)	N	(feet)			
						0.0	PAVEMENT	~4" Asphalt, No Apparent Subbase	
						0.3	FILL		
1 - 3	S-1	X	3 - 5 - 9 - 17	8	14			Brown (7.5YR 5/3) SILTY SAND with Gravel, Moist (FILL)	
3 - 5	S-2	X	14 - 14 - 17 - 11	7	41			As Above, Crushed Concrete Debris, Moist (FILL)	Infiltration Test @ 4.0 fbgs
						5.0			
5 - 7	S-3	X	9 - 7 - 6 - 6	15	13			White (5YR 8/1) SILTY SAND with Gravel, Moist (FILL)	
7 - 9	S-4	X	6 - 6 - 7 - 7	13	13			As Above, Moist (FILL)	
9 - 11	S-4	X	6 - 8 - 9 - 11	14	17	10.0		As Above, Moist (FILL)	
						11.0		Boring Log B-6 Terminated at a Depth of 11.0 Feet Below Ground Surface Due to Auger Refusal	
						15.0			
						20.0			
						25.0			

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched

APPENDIX B
Laboratory Analysis

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	23.6	12.5	18.5	27.4	18.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	90.4		
#4	76.4		
#10	63.9		
#20	54.5		
#40	45.4		
#60	37.5		
#140	22.6		
#200	18.0		

* (no specification provided)

Material Description

Silty Sand with Gravel

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 9.3571 D_{85}= 7.3295 D_{60}= 1.3986
D_{50}= 0.5955 D_{30}= 0.1638 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

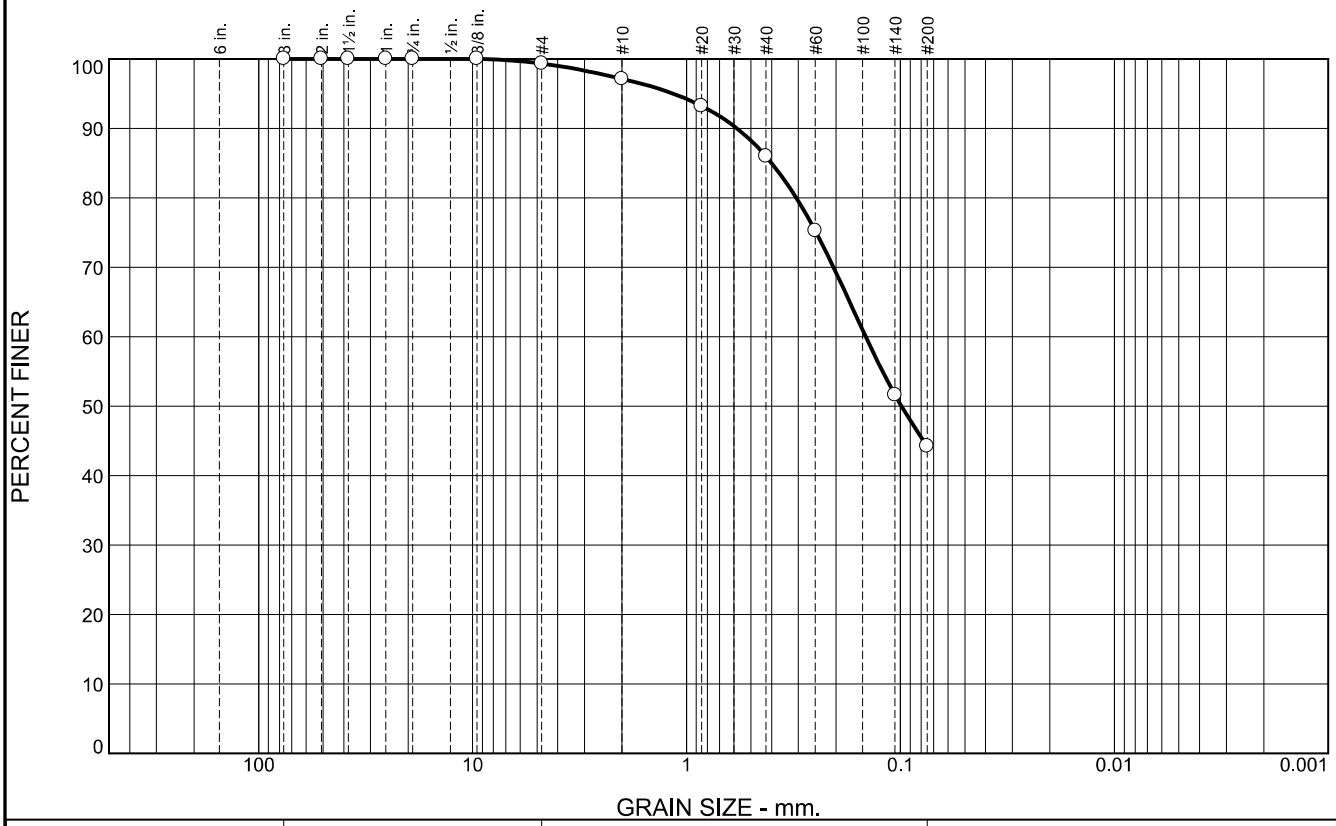
W_n = 4.5 %

Source of Sample: B-4 **Depth:** 1.0' - 5.0'
Sample Number: S-1/S-2 **Date:** 11/22/2021

WHITESTONE ASSOCIATES, INC.
Warren, New Jersey

Client: Bohler Engineering PA, LLC
Project: Proposed Giant Food Store
93 Yord Road, Jenkintown, Montgomery County, Pennsylvania
Project No: GP2117887.000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	2.2	11.2	41.7	44.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	100.0		
#4	99.3		
#10	97.1		
#20	93.2		
#40	85.9		
#60	75.2		
#140	51.6		
#200	44.2		

* (no specification provided)

Material Description

Silty Sand

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 0.5821 D_{85}= 0.4004 D_{60}= 0.1452
D_{50}= 0.0989 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

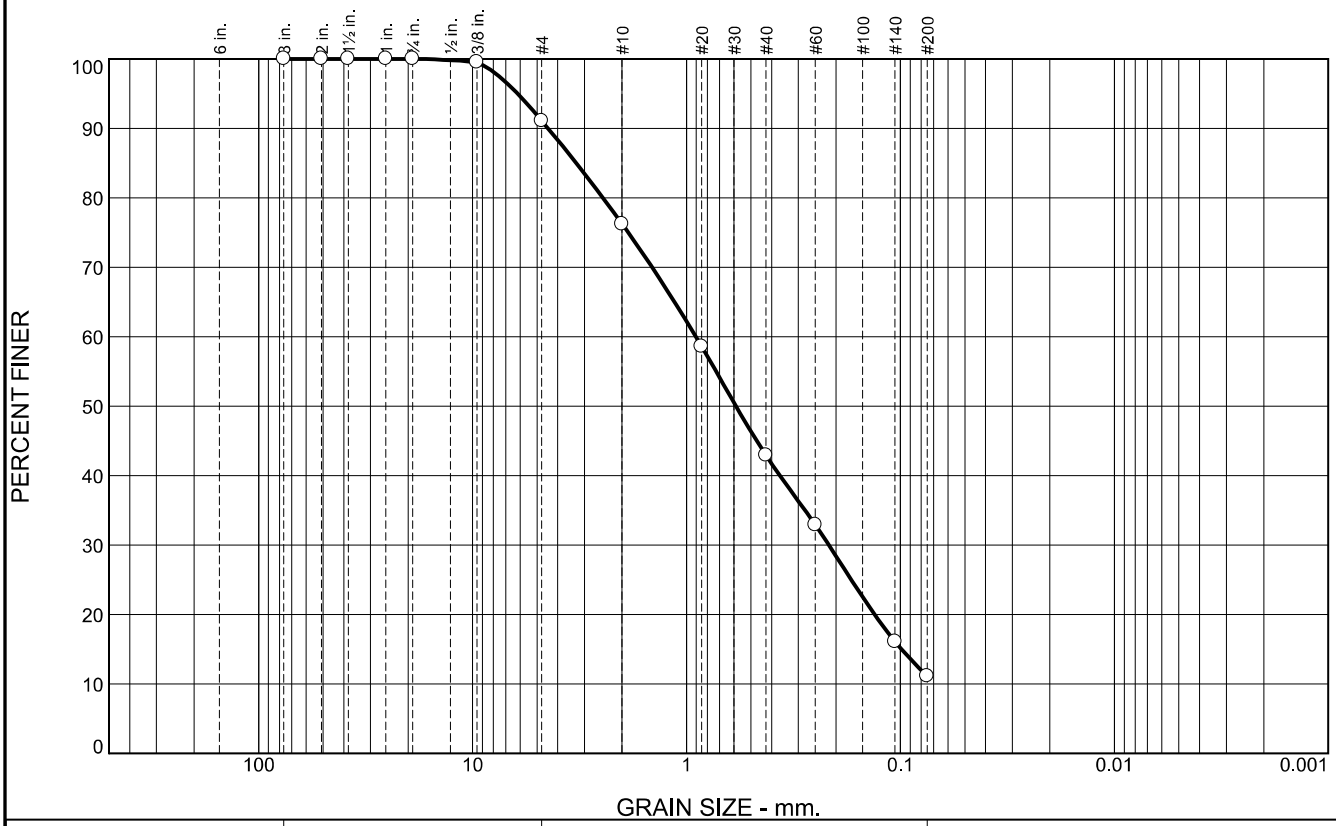
W_n = 21.3 %

Source of Sample: B-5 **Depth:** 3.0' - 5.0'
Sample Number: S-2 **Date:** 11/22/2021

WHITESTONE ASSOCIATES, INC.
Warren, New Jersey

Client: Bohler Engineering PA, LLC
Project: Proposed Giant Food Store
93 Yord Road, Jenkintown, Montgomery County, Pennsylvania
Project No: GP2117887.000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.9	14.9	33.3	31.8	11.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.375	99.5		
#4	91.1		
#10	76.2		
#20	58.6		
#40	42.9		
#60	32.9		
#140	16.1		
#200	11.1		

* (no specification provided)

Material Description

Poorly Graded Sand with Silt

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D_{90}= 4.4421 D_{85}= 3.2777 D_{60}= 0.9043
D_{50}= 0.5869 D_{30}= 0.2161 D_{15}= 0.0989
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

W_n = 6.5 %

Source of Sample: B-1 **Depth:** 7.0' - 9.0'
Sample Number: S-4 **Date:** 10/21/2021

WHITESTONE ASSOCIATES, INC.
Warren, New Jersey

Client: Bohler Engineering PA, LLC
Project: Proposed Giant Food Store
93 Yord Road, Jenkintown, Montgomery County, Pennsylvania
Project No: GP2117887.000 **Figure**

APPENDIX C
Infiltration Test Results

WHITESTONE

INFILTRATION TEST

Client:	Bohler Engineering PA, LLC	**Test Hole No.:**	I-1 @ B-1
Project:	Proposed Giant Food Store	**Date:**	10/8/2021
Location:	93 Old York Road, Jenkintown, Montgom	**Weather:**	Clear/63°F
File No.	GP2117887.001	**Field Engineer:**	KRP
Surf. Elev.	298.00	**Test Depth Ft. | Elev.:**	8.00 | 290.00

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
PS	9:00 AM	9:30 AM	24.0	20.50	3.50	0.5	7.0
PS	9:30 AM	10:00 AM	24.0	21.25	2.75	0.5	5.5
1	10:00 AM	10:30 AM	24.0	22.00	2.00	0.5	4.0
2	10:30 AM	11:00 AM	24.0	22.00	2.00	0.5	4.0
3	11:00 AM	11:30 AM	24.0	22.00	2.00	0.5	4.0
4	11:30 AM	12:00 PM	24.0	22.00	2.00	0.5	4.0

Field i = 4.0 in/hr

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE

INFILTRATION TEST

Client:	Bohler Engineering PA, LLC	**Test Hole No.:**	I-2 @ B-2
Project:	Proposed Giant Food Store	**Date:**	10/8/2021
Location:	93 Old York Road, Jenkintown, Montgom	**Weather:**	Clear/63°F
File No.	GP2117887.001	**Field Engineer:**	KRP
Surf. Elev.	299.50	**Test Depth Ft. | Elev.:**	9.00 | 290.50

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
PS	10:00 AM	10:30 AM	24.0	21.25	2.75	0.5	5.5
PS	10:30 AM	11:00 AM	24.0	21.75	2.25	0.5	4.5
1	11:00 AM	11:30 AM	24.0	22.00	2.00	0.5	4.0
2	11:30 AM	12:00 PM	24.0	22.00	2.00	0.5	4.0
3	12:00 PM	12:30 PM	24.0	22.00	2.00	0.5	4.0
4	12:30 PM	1:00 PM	24.0	22.00	2.00	0.5	4.0

Field i = 4.0 in/hr

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE

INFILTRATION TEST

Client:	Bohler Engineering PA, LLC	**Test Hole No.:**	I-3 @ B-3
Project:	Proposed Giant Food Store	**Date:**	11/8/2021
Location:	93 Old York Road, Jenkintown, Montgom	**Weather:**	Sunny/41°F
File No.	GP2117887.001	**Field Engineer:**	KRP
Surf. Elev.	289.00	**Test Depth Ft. | Elev.:**	1.00 | 288.00

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
PS	7:15 AM	7:45 AM	24.0	22.75	1.25	0.5	2.5
PS	7:45 AM	8:15 AM	24.0	22.875	1.125	0.5	2.25
1	8:15 AM	8:45 AM	24.0	23.00	1.00	0.5	2.0
2	8:45 AM	9:15 AM	24.0	23.00	1.00	0.5	2.0
3	9:15 AM	9:45 AM	24.0	23.00	1.00	0.5	2.0
4	9:45 AM	10:15 AM	24.0	23.00	1.00	0.5	2.0

Field i = 2.0 in/hr

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE

INFILTRATION TEST

Client:	Bohler Engineering PA, LLC	**Test Hole No.:**	I-4 @ B-4
Project:	Proposed Giant Food Store	**Date:**	11/8/2021
Location:	93 Old York Road, Jenkintown, Montgom	**Weather:**	Sunny/41°F
File No.	GP2117887.001	**Field Engineer:**	KRP
Surf. Elev.	291.00	**Test Depth Ft. | Elev.:**	3.00 | 288.00

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
PS	7:45 AM	8:15 AM	24.0	22.50	1.50	0.5	3.0
PS	8:15 AM	8:45 AM	24.0	22.875	1.125	0.5	2.25
1	8:45 AM	9:15 AM	24.0	23.00	1.00	0.5	2.0
2	9:15 AM	9:45 AM	24.0	23.00	1.00	0.5	2.0
3	9:45 AM	10:15 AM	24.0	23.00	1.00	0.5	2.0
4	10:15 AM	10:45 AM	24.0	23.00	1.00	0.5	2.0

Field i = 2.0 in/hr

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE

INFILTRATION TEST

Client:	Bohler Engineering PA, LLC	**Test Hole No.:**	I-5 @ B-5
Project:	Proposed Giant Food Store	**Date:**	11/8/2021
Location:	93 Old York Road, Jenkintown, Montgom	**Weather:**	Sunny/41°F
File No.	GP2117887.001	**Field Engineer:**	KRP
Surf. Elev.	287.50	**Test Depth Ft. | Elev.:**	4.50 | 283.00

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
PS	8:00 AM	8:30 AM	24.0	23.00	1.00	0.5	2.0
PS	8:30 AM	9:00 AM	24.0	23.00	1.00	0.5	2.0
1	9:00 AM	9:30 AM	24.0	23.25	0.75	0.5	1.5
2	9:30 AM	10:00 AM	24.0	23.25	0.75	0.5	1.5
3	10:00 AM	10:30 AM	24.0	23.25	0.75	0.5	1.5
4	10:30 AM	11:00 AM	24.0	23.25	0.75	0.5	1.5

Field i = 1.5 in/hr

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE

INFILTRATION TEST

Client:	Bohler Engineering PA, LLC	**Test Hole No.:**	I-6 @ B-6
Project:	Proposed Giant Food Store	**Date:**	11/8/2021
Location:	93 Old York Road, Jenkintown, Montgom	**Weather:**	Sunny/41°F
File No.	GP2117887.001	**Field Engineer:**	KRP
Surf. Elev.	287.00	**Test Depth Ft. | Elev.:**	4.00 | 283.00

Reading No.	Time		Water Level Reading (inches)		Water Level Fall (Inches)	Time Interval (Hours)	Rate of Flow (Inches/Hour)
	Start	Finish	Start	Finish			
PS	8:30 AM	9:00 AM	24.0	23.25	0.75	0.5	1.5
PS	9:00 AM	9:30 AM	24.0	23.50	0.50	0.5	1.0
1	9:30 AM	10:00 AM	24.0	23.75	0.25	0.5	0.5
2	10:00 AM	10:30 AM	24.0	23.75	0.25	0.5	0.5
3	10:30 AM	11:00 AM	24.0	23.75	0.25	0.5	0.5
4	11:00 AM	11:30 AM	24.0	23.75	0.25	0.5	0.5

Field i = 0.5 in/hr

NOTES: PS = Pre Soak; NS = Not Surveyed

APPENDIX D
Supplemental Information (USCS, Terms & Symbols)

WHITESTONE
An Employee-Owned Company

NEW BRITAIN CORPORATE CENTER
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whitestoneassoc.com

UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMITS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMITS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

GRADATION*

% FINER BY WEIGHT

TRACE..... 1% TO 10%
LITTLE..... 10% TO 20%
SOME..... 20% TO 35%
AND..... 35% TO 50%

COMPACTNESS*
Sand and/or Gravel

RELATIVE DENSITY

LOOSE. ..... 0% TO 40%
MEDIUM DENSE.... 40% TO 70%
DENSE..... 70% TO 90%
VERY DENSE..... 90% TO 100%

CONSISTENCY*
Clay and/or Silt

RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT

VERY SOFT..... LESS THAN 250
SOFT..... ..... 250 TO 500
MEDIUM..... 500 TO 1000
STIFF..... 1000 TO 2000
VERY STIFF..... 2000 TO 4000
HARD..... GREATER THAN 4000

** VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.*

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WHITESTONE
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GEOTECHNICAL TERMS AND SYMBOLS

SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

SOIL PROPERTY SYMBOLS

N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Moisture content, %.
LL: Liquid limit, %.
PI: Plasticity index, %.
δd: Natural dry density, PCF.
▼: Apparent groundwater level at time noted after completion of boring.

DRILLING AND SAMPLING SYMBOLS

NE: Not Encountered (Groundwater was not encountered).
SS: Split-Spoon - 1 ⅜" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
OB: Diamond Bit.
CB: Carbide Bit
WS: Washed Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

Term (Non-Cohesive Soils)	Standard Penetration Resistance
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Term (Cohesive Soils)	Qu (TSF)
Very Soft	0 - 0.25
Soft	0.25 - 0.50
Firm (Medium)	0.50 - 1.00
Stiff	1.00 - 2.00
Very Stiff	2.00 - 4.00
Hard	4.00+

PARTICLE SIZE

Boulders	8 in.+	Coarse Sand	5mm-0.6mm	Silt	0.074mm-0.005mm
Cobbles	8 in.-3 in.	Medium Sand	0.6mm-0.2mm	Clay	-0.005mm
Gravel	3 in.-5mm	Fine Sand	0.2mm-0.074mm		

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