STONEFIELD

STORMWATER MANAGEMENT REPORT

PROPOSED RETAIL BUILDING
BLOCK 2203, PROPOSED LOT 14.03
1823 US ROUTE 206
SOUTHAMPTON TOWNSHIP
BURLINGTON COUNTY, NEW JERSEY

PREPARED FOR:

SOUTHAMPTON DG, LLC

PREPARED BY:

STONEFIELD ENGINEERING & DESIGN, LLC
AUGUST 11TH 2020
Z-19159

PAUL D. MUTCH JR. (PE)
NEW JERSEY PROFESSIONAL ENGINEER LICENSE # 55094

REPORT CONTENTS

APPENDICIES

1.0 PROJECT DESCRIPTION

Southampton DG, LLC is proposing the construction of a 9,245 SF one-story Dollar General Retail Building. The subject property is designated Block 2203, Lot 14, commonly known as 1283 US Route 206 and bounded by US Route 206 at the front of the property and Red Lion Road (County Route #641) at the rear of the property. The development parcel will be subdivided and referred to as Lot 14.03 The site is under the jurisdiction of Southampton Township within the Highway Commercial (HC) Zone.

The total project area (Lot 14.03) is 135,709 SF (3.11 acres), the total area of new impervious surfaces is 39,914 SF (0.92 acres), and the total area of disturbance is 141,979 SF (3.26 acres). Project Figures can be found in Appendix A of this Report.

This Stormwater Management Report has been prepared to analyze the potential stormwater runoff impacts of the proposed project and discuss the measures proposed to conform to the stormwater management requirements set forth by Southampton Township, Burlington County Soil Conservation District, and the New Jersey Department of Environmental Protection (NJDEP).

2.0 EXISTING CONDITIONS

The project site is currently largely undeveloped with consisting of grass, gravel and wooded areas. The southern portion of the site consists of a mixture of grass and some trees and the northern portion of the site consists of a grass and gravel mix. Access to the site is provide via a gravel access road that runs from US Route 206 at the front of the site to Red Lion Road (County Route 641) at the rear of the site.

2.1 EXISTING DRAINAGE AREAS

Under existing conditions, the site is comprised of 2 drainage areas.

Under pre-development conditions the site consists of 0.00% (0 SF) of impervious surfaces along with a mixture of gravel and grass areas and is comprised of two (2) drainage areas that convey stormwater to two (2) Points of Interests along US Route 206 and Red Lion Road (County Road 641). The site generally slopes from west to east towards US Route 206 with a high point towards the rear of the site that directs runoff to either US Route 206 or Red Lion Road (County Route 614). The site is previously undeveloped and with a mixture of grass and gravel areas.

TABLE 1: EXISTING DRAINAGE AREAS

Drainage Area	Description	Area Extents (SF)	Impervious Area (SF)	Time of Concentration (Min)
E1	Drainage to US Route 206	107,281 SF	0 SF	15.3
E2	Drainage to Red Lion Road	28,248 SF	0 SF	18.8

** The minimum time of concentration was utilized. Refer to Section 4.0 for more information regarding design parameters.*

Detailed information regarding each drainage area can be found on the Existing Drainage Area Map in Appendix E of this Report.

2.2 PROJECT SOILS

Per the National Resource Conservation Service (NRCS) data, the soil underlying the project site consists of:

TABLE 2: NRCS PROJECT SOILS

Soil Unit Code	Soil Description	Approximate Project Coverage	Hydrologic Soil Group
GahB	Galloway Sand, 0% to 5% Slopes	38.3%	A
JdrA	Jade Run fine sandy loam, 0% to 5% Slopes	61.7%	B/D

The hydraulic soil group classifications from the JZN Stormwater Management Investigation Report in Appendix D have been utilized in the landcover data for the stormwater analysis performed on the site based on the NJ Stormwater BPM Manual.

3.0 PROPOSED CONDITIONS

Under the proposed development plan the majority of the existing site will be cleared/disturbed to accommodate the 9,245 SF Dollar General Retail Building with associated walkways and parking facilities. Site access is proposed via a Full Movement driveway along US Route 206. Additional improvements include lighting, utilities, and landscaping. All features within the limit of disturbance are proposed to be demolished.

3.1 PROPOSED DRAINAGE AREAS

Under proposed conditions the site is comprised of 5 drainage areas.

Under proposed drainage conditions, the site is comprised of five (5) drainage areas which convey stormwater runoff to the two (2) Points of Interest along US Route 206 and Red Lion Road (County 614). The proposed uncovered parking area of the site will sheet flow to curb line which gets captured via multiple curb cuts that conveys the runoff via stone swales into the above ground infiltration basin located in the western portion of the site that will overflow into the above ground detention basin. The roof leader drainage and undetained drainage to Route 206 discharge directly to the ROW system. The remainder of the site will be captured in the above ground detention basin. The conveyance system will consist of 6" roof leaders that connect directly to the 12" HDPE outlet pipe and stone swales. The above ground detention basin will consist of an outlet structure with one (1) 12" HDPE pipe that ultimately discharge runoff into the existing drainage ditch along the NJDOT ROW. An emergency overflow spillway was included in the detention basin in the event run-off volume exceeds the capacity of the basin in an emergency situation. A small portion of pervious area at the rear of site will sheet flow undetained to Red Lion Road with remainder discharging to the drainage ditch along US Route 206 either via the 12" HDPE pipe from the above ground basin or via sheet flow undetained.

TABLE 3: PROPOSED DRAINAGE AREAS

Drainage Area	Description	Area Extents (SF)	Impervious Area (SF)	Time of Concentration (Min)
P1-A	Drainage to US Route 206	106,313 SF	39,914 SF	10.0
P1-B	Drainage to Infiltration Basin	36,840 SF	26,230 SF	10.0
P1-C	Undetained Drainage to US Route 206	34,376 SF	2,366 SF	10.0
P1-D	Roof Leader Drainage to US Route 206	9,265 SF	9,265 SF	10.0
P2	Undetained Drainage to Red Lion Road	4,468 SF	0 SF	10.0

** The minimum time of concentration was utilized. Refer to Section 4.0 for more information regarding design parameters.*

Detailed information regarding each drainage area can be found on the Proposed Drainage Area Map in Appendix E of this Report.

4.0 ANALYSIS METHODOLOGY & DESIGN PARAMETERS

4.1 HYDROLOGIC & HYDRAULIC ANALYSES

The existing and proposed drainage areas have been analyzed utilizing a modified version of the NRCS SCS TR-20 method. The analysis program "HydroCAD" Version 9.10 by HydroCAD Software Solutions LLC was used to calculate and plot the runoff hydrographs. The program incorporates the time of concentration, CN values, 24 hour rainfall events, and project drainage areas to calculate the runoff characteristics. Key variables utilized include the SCS Unit Hydrograph, a minimum time of concentration of 10 minutes, separate runoff calculations for impervious and pervious areas, and dynamic storage and conveyance routing to account for any variable tailwater conditions.

Stormwater conveyance for closed conduits has been analyzed utilizing the Rational Method for runoff generation and the Standard Step Method for pipe flow. The analysis program "HydraFlow Storm Sewers" Version 2012 by Autodesk calculates a hydraulic grade line through the proposed conveyance system based on various pipe and junction losses and runoff tributary to each inlet or discharge structure. Key variables utilized include a minimum time of concentration of 10 minutes, IDF curve data obtained from the NJDEP, and drainage structure geometry based on standard NJDOT drainage structure.

4.2 NEW JERSEY STORMWATER DESIGN PARAMETERS

The project is proposing to disturb 3.26 acres of land. Per the applicable stormwater standards, the project is classified as a Major Development and is subject to stormwater quantity and groundwater recharge regulations. Additionally, the project will add 0.92 acres of new impervious areas and will thus be subject to stormwater quality regulations.

TABLE 4: PROJECT STORMWATER DESIGN INTENT SUMMARY TABLE

Design Parameters	Design Intent For Compliance
Stormwater Quantity	Demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the 2, 10, and 100 year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events. Design stormwater management measures so that the post-construction peak runoff rates for the 2, 10, and 100 year storm events are 50%, 75%, and 80%, respectively, of the pre-construction peak runoff rates. The percentages apply only to the post- construction stormwater runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed.
Groundwater Recharge	Demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measure maintain 100% of the average annual pre-construction groundwater recharge volume for the site Demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the two-year storm is infiltrated.
Stormwater Quality	Stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality storm by 80% of the anticipated load from the developed site, expressed as an annual average

4.3 SUBSURFACE STORMWATER INVESTIGATION

A subsurface stormwater investigation was conducted by JZN Engineering on March 31st, 2020. A total of 5 tests were performed in compliance with the soil testing standards outlined within Appendix E of the NJDEP Best Management Practices (BMP) Manual. All proposed stormwater facilities meet or exceed the minimum separation depth from seasonal high groundwater. The full investigation report and testing results can be found in Appendix D of this Report.

Based on the testing results a design infiltration rate of 0.5 inches per hour was utilized in the design of above ground infiltration basin.

5.0 PROJECT ANALYSIS RESULTS

5.1 STORMWATER QUANTITY CONTROL

Runoff is controlled through the implementation of aboveground detention basin B-1, above ground infiltration basin B-2 and outlet structure OS-1. To analyze runoff quantities between the existing and proposed drainage areas, 2 points of interest were selected:

TABLE 5: QUANTITY COMPARISON POINTS OF INTEREST

Point of Interest	Area Description	Existing Tributary Drainage Areas	Proposed Tributary Drainage Areas
POI - 1	Drainage to US Route 206	E1	P1-A, P1-B, P1-C, P1-D
POI - 2	Drainage To Red Lion Road	E2	P2

The following tables summarize the results for the 2-year, 10-year, and 100-year storm events for each project point of interest:

TABLE 6: PEAK DISCHARGE TO US ROUTE 206 EXISTING CONVEYANCE SYSTEM

Storm Event	Pre-Development Peak Discharge	Reduction Required	Post-Development Peak Discharge	Reduction Achieved
2-Year	3.90 CFS	50.0%	1.88 CFS	51.8%
10-Year	7.52 CFS	25.0%	3.85 CFS	48.8%
100-Year	14.96 CFS	20.0%	8.92 CFS	40.4%

TABLE 7: PEAK DISCHARGE TO RED LION ROAD EXISTING CONVEYANCE SYSTEM

Storm Event	Pre-Development Peak Discharge	Reduction Required	Post-Development Peak Discharge	Reduction Achieved
2-Year	0.73 CFS	50.0%	0.20 CFS	72.6%
10-Year	1.56 CFS	25.0%	0.43 CFS	72.4%
100-Year	3.33 CFS	20.0%	0.87 CFS	73.9%

As shown in the tables above, peak stormwater discharge rates are reduced by at least the required amount for each storm event. Project hydrographs and more detailed data can be found in Appendix C of this Report.

5.2 GROUNDWATER RECHARGE

Assuming the undetained runoff condition, 1,503 CF of additional runoff is generated on site. The incorporation of the proposed aboveground infiltration basin reduces the overall site runoff below pre-construction conditions. via infiltration as outlined in the table below.

TABLE 8: TWO-YEAR STORM EVENT RUNOFF VOLUMES

Point of Interest	Pre-Construction Runoff Volume	Post-Construction Runoff Volume (Undetained)	Post-Construction Runoff Volume (After BMPs)	Difference In Volume
POI - 1	14,836 CF	18,998 CF	14,258 CF	4,730 CF
POI - 2	3,127 CF	468 CF	N/A	N/A
Total Site	17,963 CF	19,466 CF	14,258 CF	5,208 CF

5.3 STORMWATER QUALITY CONTROL

The stormwater BMPs proposed on site when incorporated into a runoff treatment train meet the total suspended solids removal (TSS) removal requirements as certified by the NJDEP BMP Manual.

TABLE 9: STORMWATER BMP TSS REMOVAL EFFICIENCIES

Stormwater BMP Facility	NJDEP Certified Removal Efficiency	Treatment Train Removal Efficiency
Aboveground Infiltration Basin	80%	80%

5.4 STORMWATER CONVEYANCE SYSTEMS

The stormwater conveyance system has been sized for the 25-year storm and is able to safely convey runoff to stormwater management facilities without overflowing.

5.5 SOIL EROSION & SEDIMENT CONTROL

A Soil Erosion & Sediment Control Plan has been prepared in accordance with the latest edition of the Standards for Soil Erosion and Sediment Control in New Jersey. Proposed temporary measures during construction include silt fencing, stabilized construction entrances, and cover for soil stabilization. Permanent post-construction measures include conduit outlet projection, native vegetation, and rip-rap lining. No land disturbance will occur until a permit has been obtained from the Burlington County Soil Conservation District.

5.6 STORMWATER OPERATIONS & MAINTENANCE

A Stormwater Operations & Maintenance Manual will be submitted for approval to the Township of Southampton prior to the start construction. Any required easements or covenants associated with the stormwater improvements will be recorded prior to the start of construction.

6.0 CONCLUSIONS

The proposed project complies with all applicable stormwater management regulations and standards. As such, the project is not anticipated to have any adverse impacts or neighboring properties, downstream watercourses, or conveyance systems within the watershed. The implementation on the aboveground detention basin B-1, aboveground infiltration basin B-2 and outlet structure OS-1 along with conveyance system including 6" HDPE roof leaders that connect to a series of stone swales and 12" discharge pipe ensure that the NDJEP requirements of reduction, recharge and water quality standards are satisfied. The implementation of the previously detailed Stormwater Management BMP's reduce the amount of runoff discharged to the DOT and County systems along US Route 206 and Red Lion Road (County Route #614) respectively. The proposed project complies with all applicable stormwater management regulations and standards. As such, the project is not anticipated to have any adverse impacts or neighboring properties, downstream watercourses, or conveyance systems within the watershed.

APPENDIX A
PROJECT FIGURES

INVENTORY

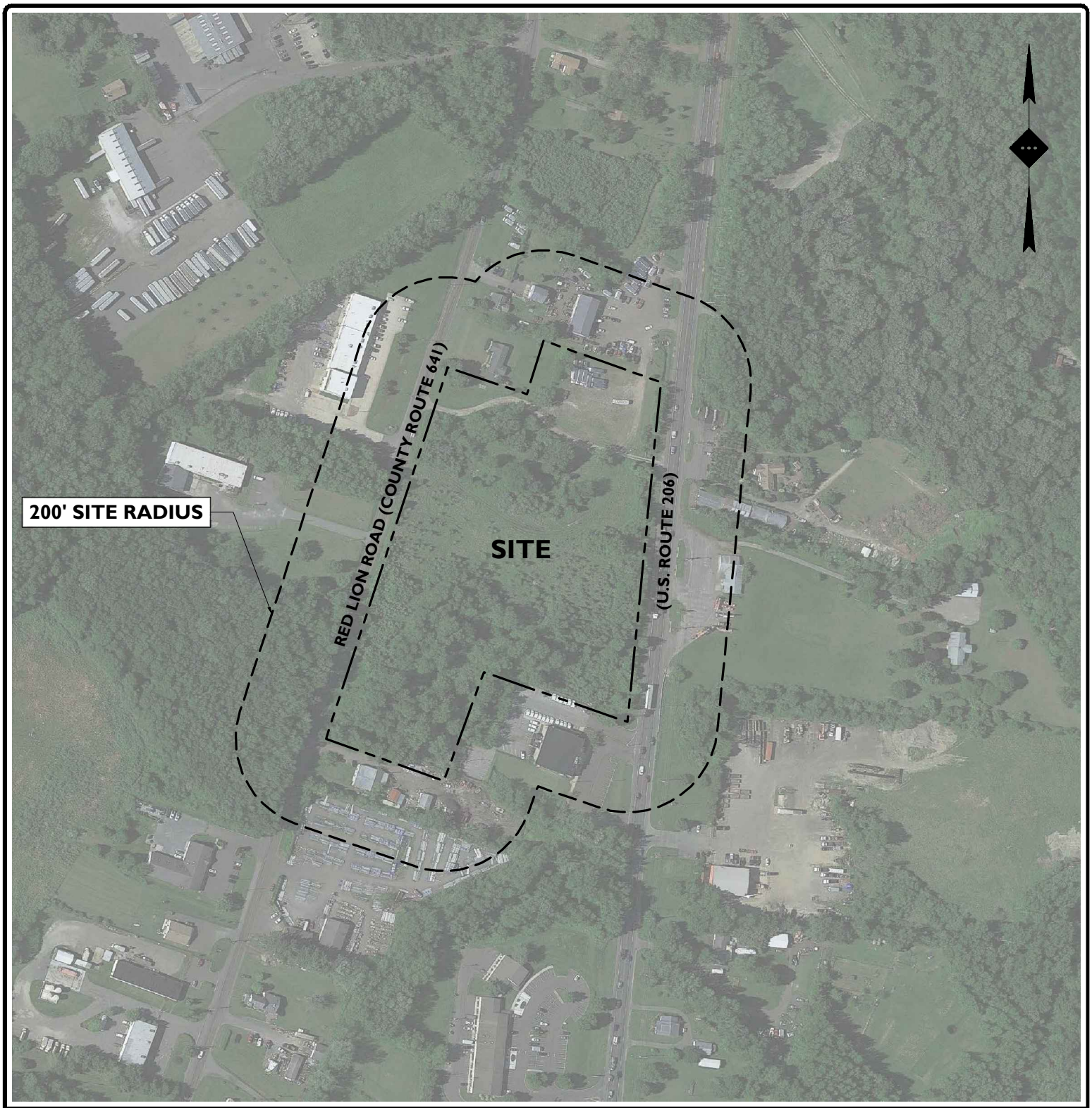
AERIAL MAP

USGS MAP

TAX MAP

FEMA FLOOD RATE MAP

NJ GEOWEB WETLANDS MAP



AERIAL MAP

300' 0' 300' 600'

GRAPHIC SCALE IN FEET

1" = 300'

SOURCE: GOOGLE EARTH PRO RETRIEVED 08/20/2019

PROPOSED DOLLAR GENERAL

BLOCK 2203, LOT 14
1823 ROUTE 206
TOWNSHIP OF SOUTHAMPTON
BURLINGTON COUNTY, NEW JERSEY

DOLLAR GENERAL

DRAWN BY:	OK
CHECKED BY:	PDM
DATE:	07/07/2020
SCALE:	1" = 300'
PROJECT ID:	Z-19159

STONEFIELD engineering & design

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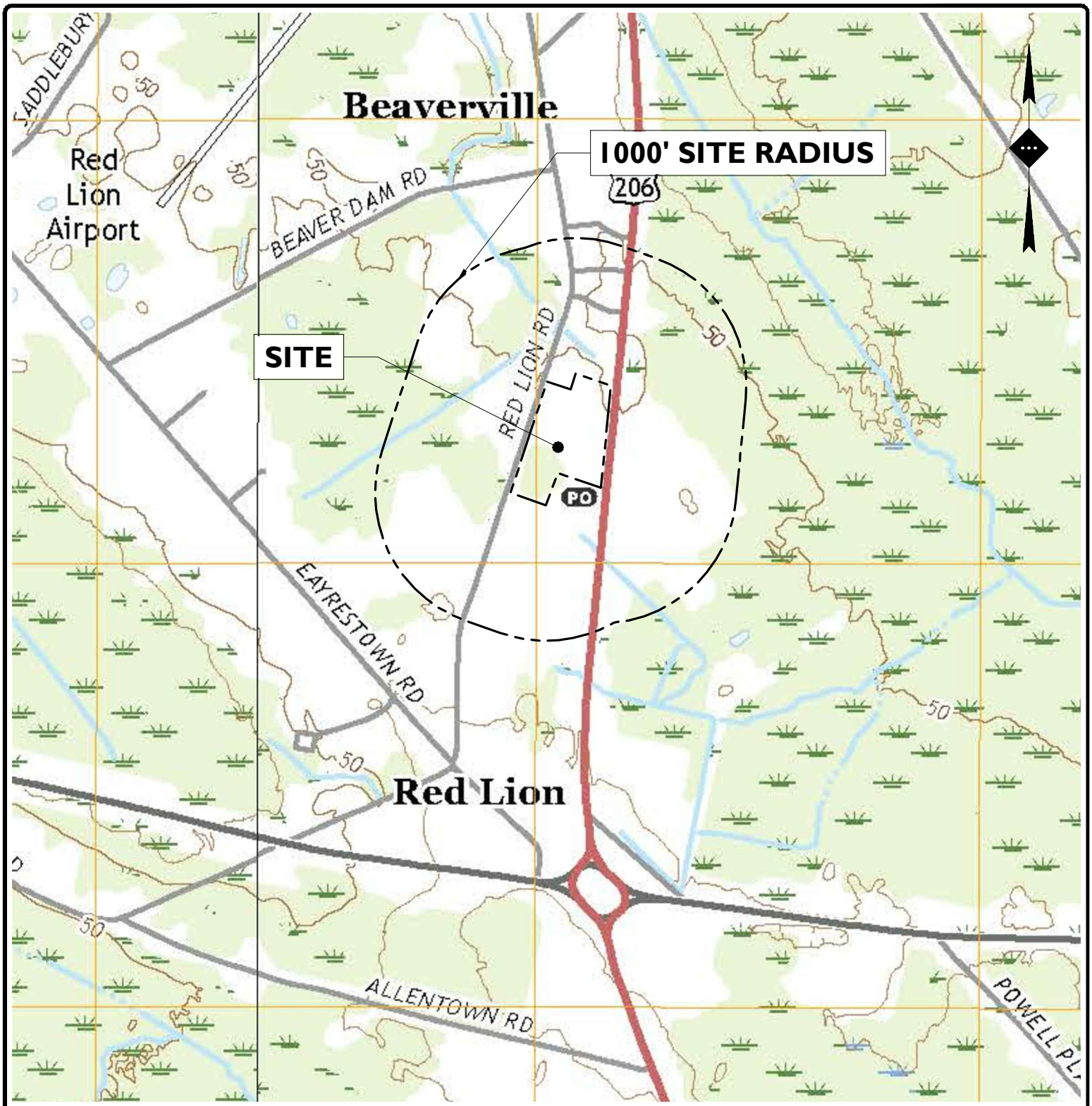

USGS QUADRANGLE MAP

1000' 0' 1000' 2000'

GRAPHIC SCALE IN FEET

1"= 1000'

SOURCE: USGS MOUNT HOLLY QUADRANGLE, NEW JERSEY - BURLINGTON COUNTY - 7.5 MINUTE SERIES, DATED 2019 & USGS PEMBERTON QUADRANGLE, NEW JERSEY - BURLINGTON COUNTY - 7.5 MINUTE SERIES, DATED 2019

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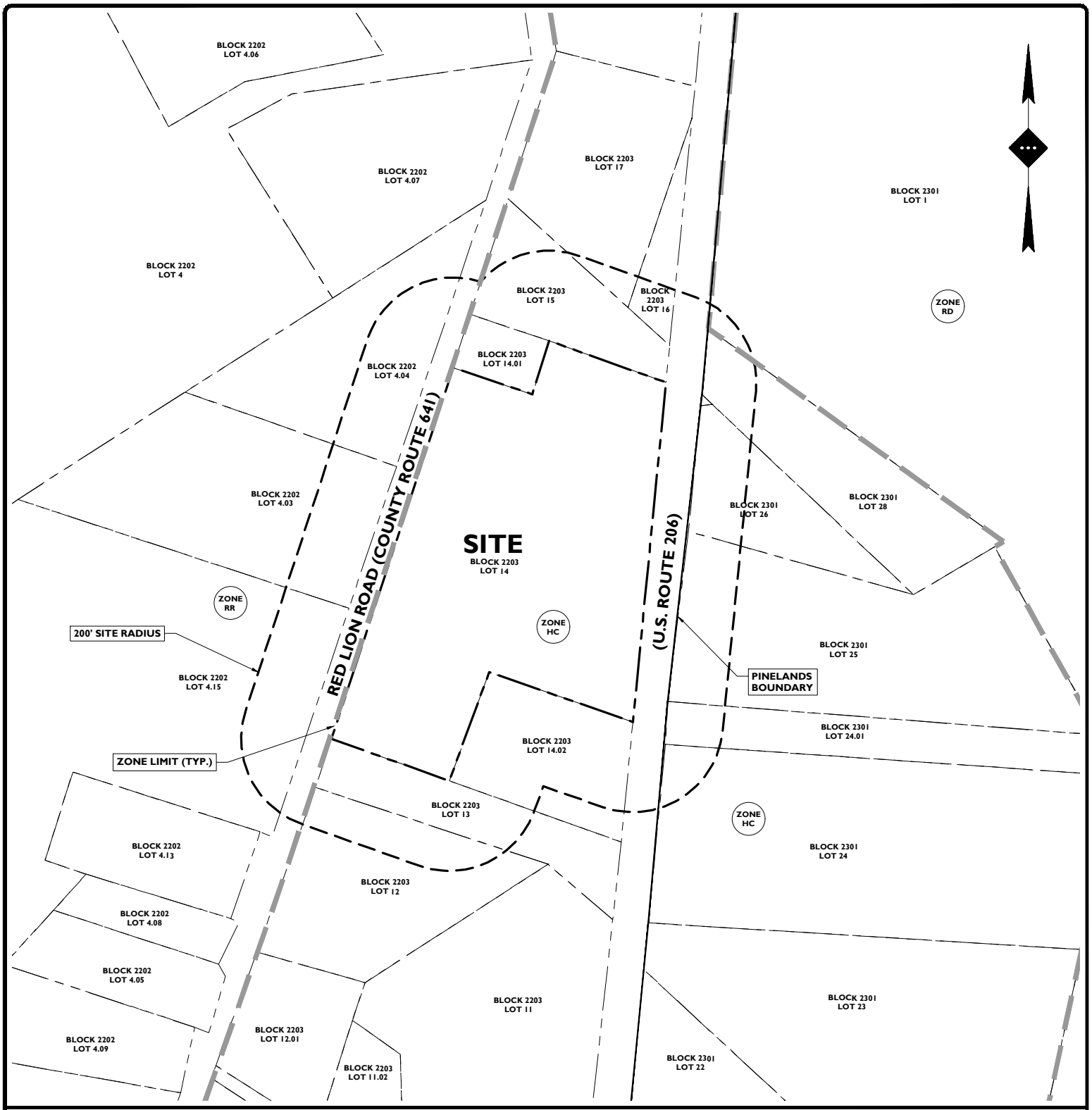

TAX / ZONING MAP

300' 0' 300' 600'

GRAPHIC SCALE IN FEET

1" = 300'

SOURCE: BURLINGTON COUNTY, TOWNSHIP OF SOUTHAMPTON TAX MAP SHEETS 22 & 23 & TOWNSHIP OF SOUTHAMPTON ZONING MAP.

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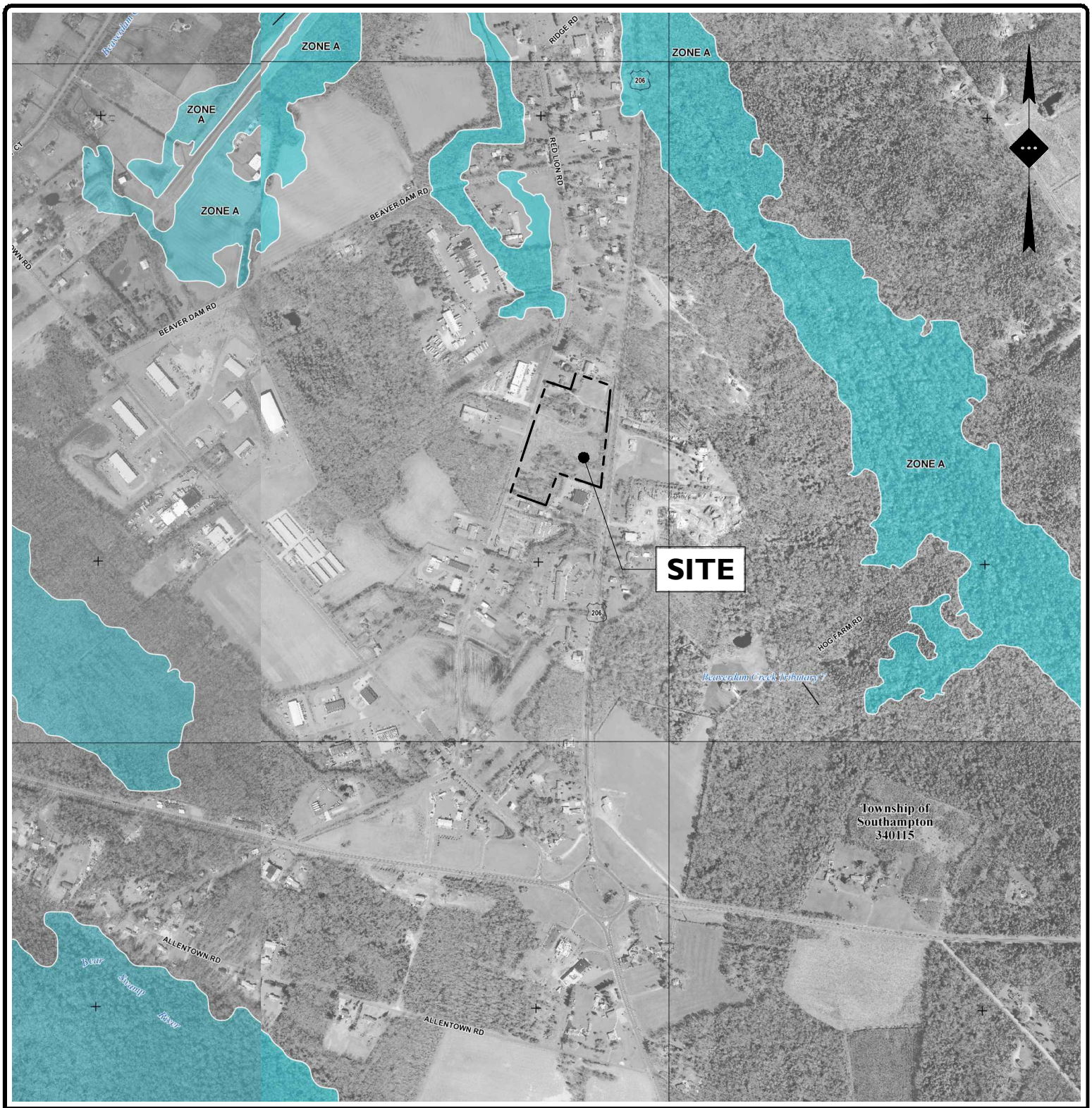

FEMA FLOOD INSURANCE RATE MAP

1000' 0' 1000' 2000'

GRAPHIC SCALE IN FEET

1"= 1000'

SOURCE: FEMA FLOOD INSURANCE RATE MAPS (FIRM), BURLINGTON COUNTY MAP NUMBER 34005C0288F DATED DECEMBER 21, 2017

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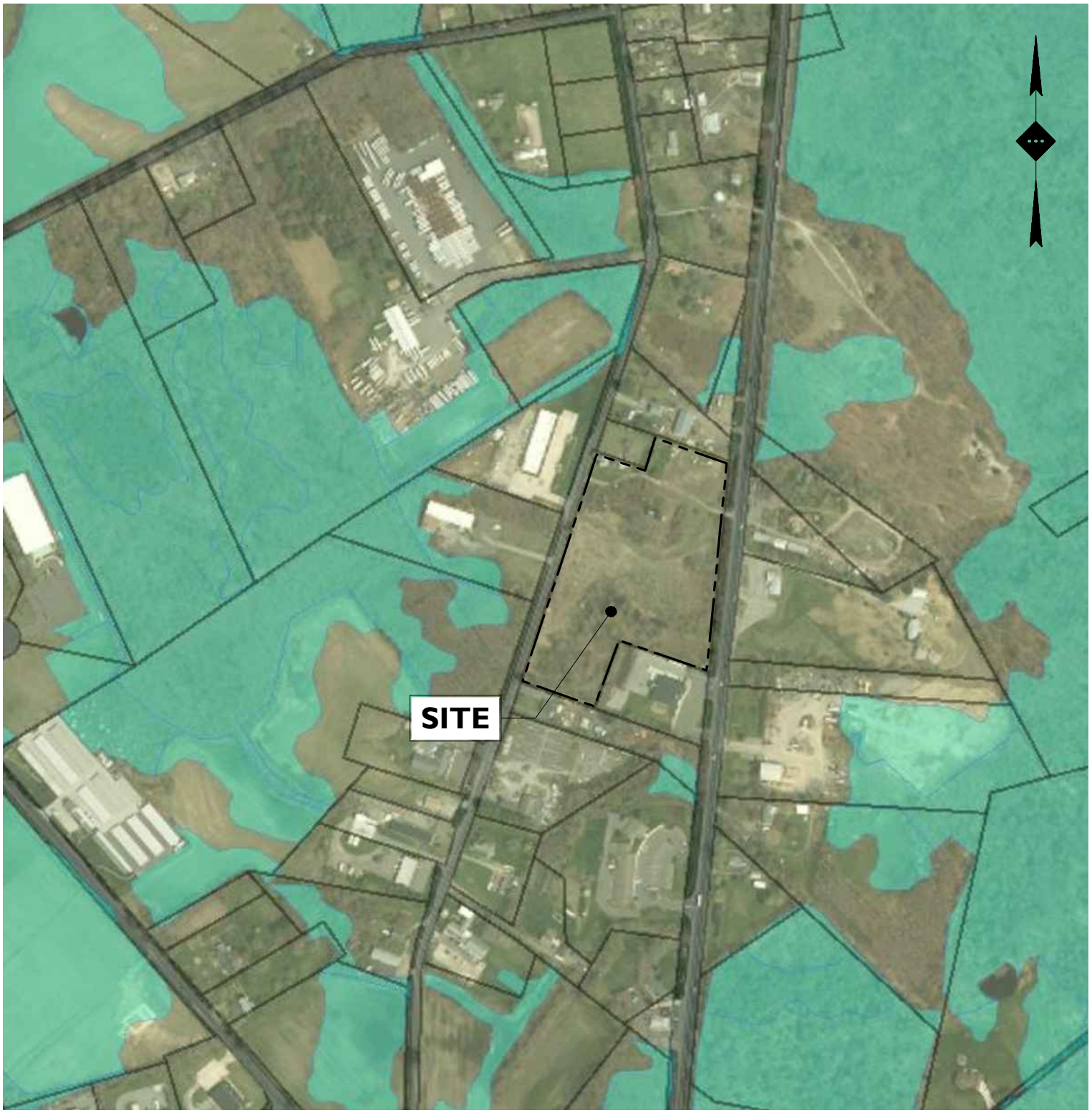

NJDEP GEOWEB WETLANDS LOCATIONS

500' 0' 500' 1000'

GRAPHIC SCALE IN FEET

1"= 500'

SOURCE: STATE OF NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF GIS
MAP RETRIEVED 11/13/2019

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APPENDIX B
NRCS COUNTY SOIL SURVEY

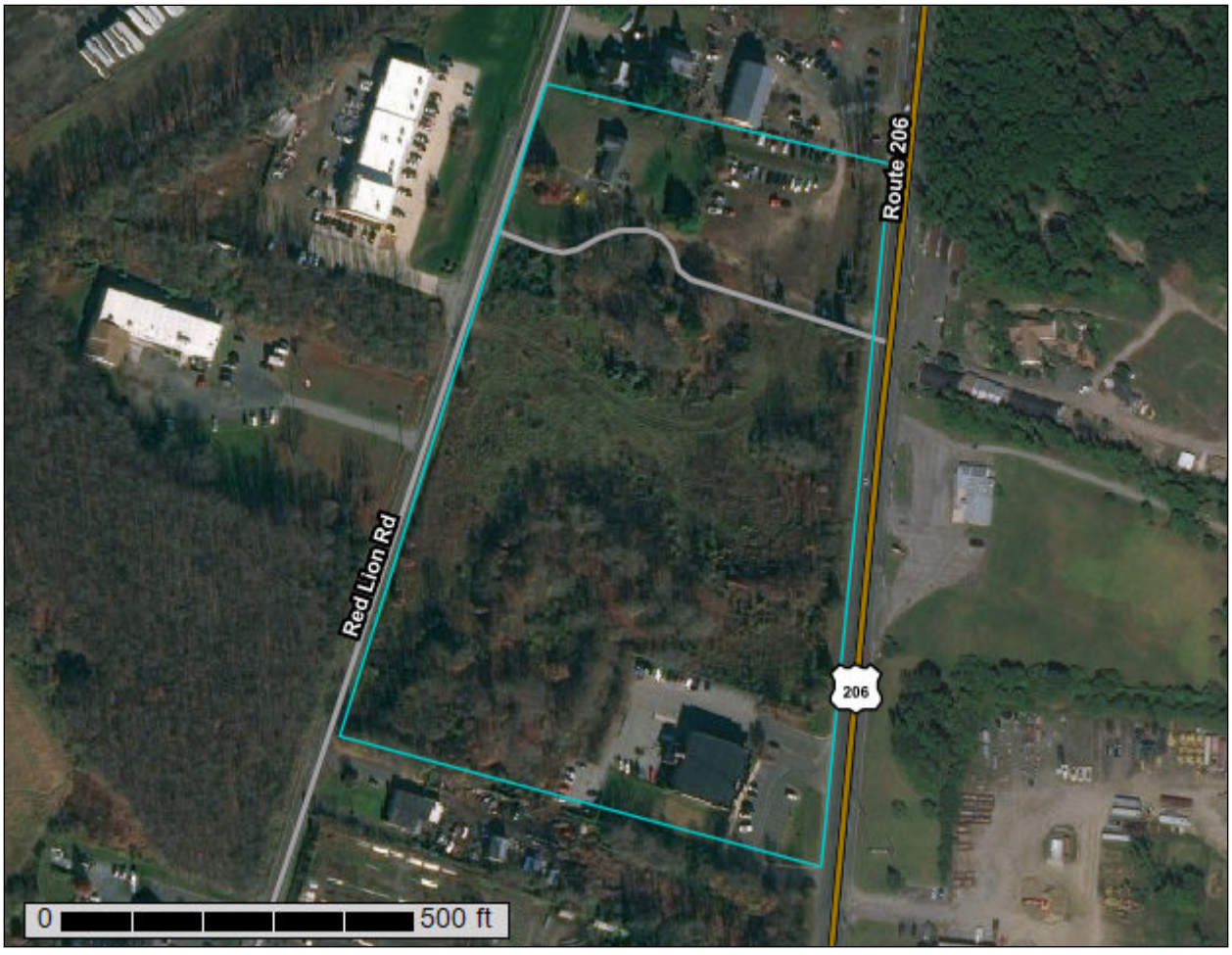
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Burlington County, New Jersey



June 11, 2020

Preface

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

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,970 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 25 50 100 150

Feet
0 50 100 200 300

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: Burlington County, New Jersey
Survey Area Data: Version 15, Sep 16, 2019

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

Date(s) aerial images were photographed: Aug 14, 2015—Apr 2, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GahB	Galloway sand, 0 to 5 percent slopes	5.2	38.3%
JdrA	Jade Run fine sandy loam, 0 to 2 percent slopes	8.3	61.7%
Totals for Area of Interest		**13.5**	**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.

Burlington County, New Jersey

GahB—Galloway sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: rf1t
Elevation: 20 to 150 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Galloway

Setting

Landform: Dunes
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Unconsolidated sandy marine deposits

Typical profile

Ap - 0 to 10 inches: sand
AC - 10 to 20 inches: sand
C1 - 20 to 32 inches: sand
C2 - 32 to 60 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

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

Minor Components

Lakewood

Percent of map unit: 5 percent
Landform: Knolls, flats
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, linear

Across-slope shape: Linear
Hydric soil rating: No

Lakehurst

Percent of map unit: 5 percent
Landform: Flats, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

Atsion

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

JdrA—Jade Run fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: rf2j
Elevation: 0 to 150 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Farmland of statewide importance, if drained

Map Unit Composition

Jade run and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Jade Run

Setting

Landform: Flats, depressions
Landform position (three-dimensional): Dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Loamy eolian deposits and/or loamy fluviomarine deposits

Typical profile

Ap - 0 to 11 inches: fine sandy loam
Bg1 - 11 to 19 inches: very fine sandy loam
Bg2 - 19 to 23 inches: very fine sandy loam
Bg3 - 23 to 28 inches: very fine sandy loam
Bg4 - 28 to 35 inches: very fine sandy loam

BCg - 35 to 52 inches: very fine sandy loam
2Cg - 52 to 65 inches: sand
2C - 65 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural 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 6.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Deptford

Percent of map unit: 5 percent
Landform: Flats
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Mullica

Percent of map unit: 5 percent
Landform: Flood plains, drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

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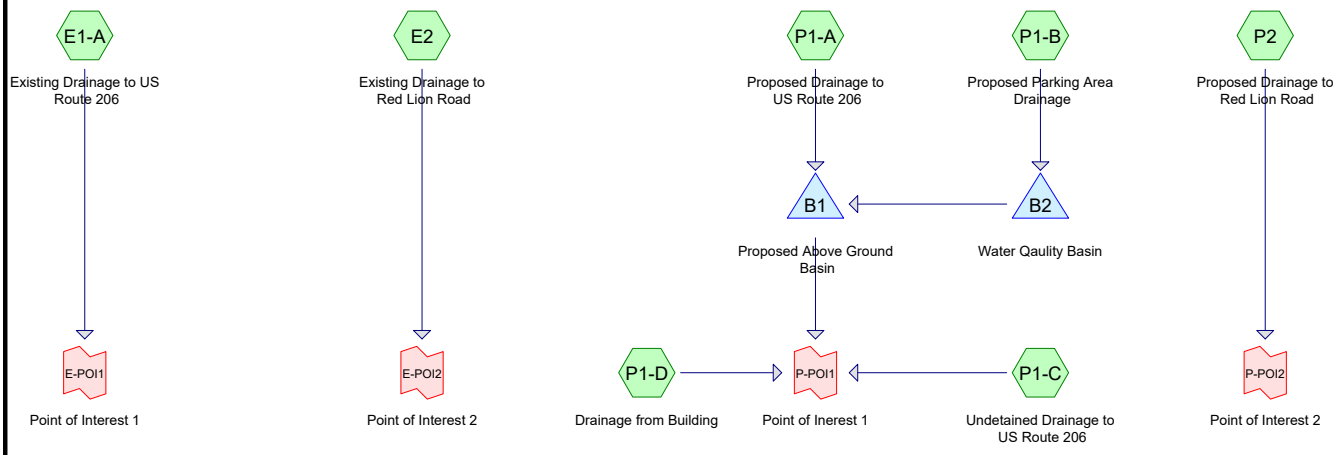
APPENDIX C
DESIGN CALCULATIONS & DIAGRAMS

APPENDIX C-1
HydroCAD Routing Diagram



Subcat Reach Pond Link

Routing Diagram for 2020-08-10_Storm Design
Prepared by {enter your company name here}, Printed 8/12/2020

APPENDIX C-2
2-YEAR STORM EVENT HYDROGRAPHS

Summary for Subcatchment E1-A: Existing Drainage to US Route 206

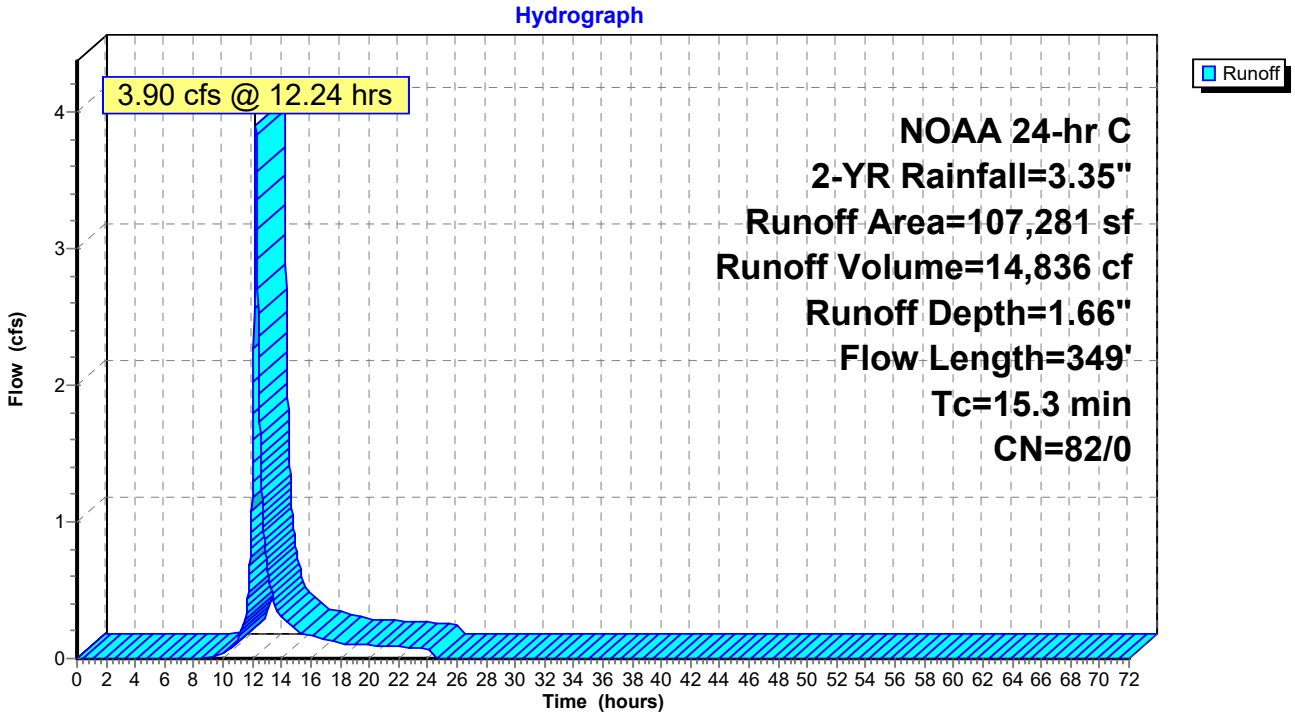
Runoff = 3.90 cfs @ 12.24 hrs, Volume= 14,836 cf, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 2-YR Rainfall=3.35"

Area (sf)	CN	Description
52,064	86	<50% Grass cover, Poor, HSG C
2,709	96	Gravel surface, HSG C
5,596	76	Woods/grass comb., Fair, HSG C
12,324	68	<50% Grass cover, Poor, HSG A
2,062	96	Gravel surface, HSG D
15,342	80	>75% Grass cover, Good, HSG D
17,184	82	Woods/grass comb., Fair, HSG D
107,281	82	Weighted Average
107,281	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	55	0.0180	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.35"
4.9	45	0.0220	0.15		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.35"
2.0	89	0.0110	0.73		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
1.2	64	0.0160	0.89		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
0.3	25	0.0400	1.40		**Shallow Concentrated Flow, F-G** Short Grass Pasture Kv= 7.0 fps
0.7	71	0.0140	1.77		**Shallow Concentrated Flow, G-H** Grassed Waterway Kv= 15.0 fps
15.3	349	Total			

Subcatchment E1-A: Existing Drainage to US Route 206



Summary for Subcatchment E2: Existing Drainage to Red Lion Road

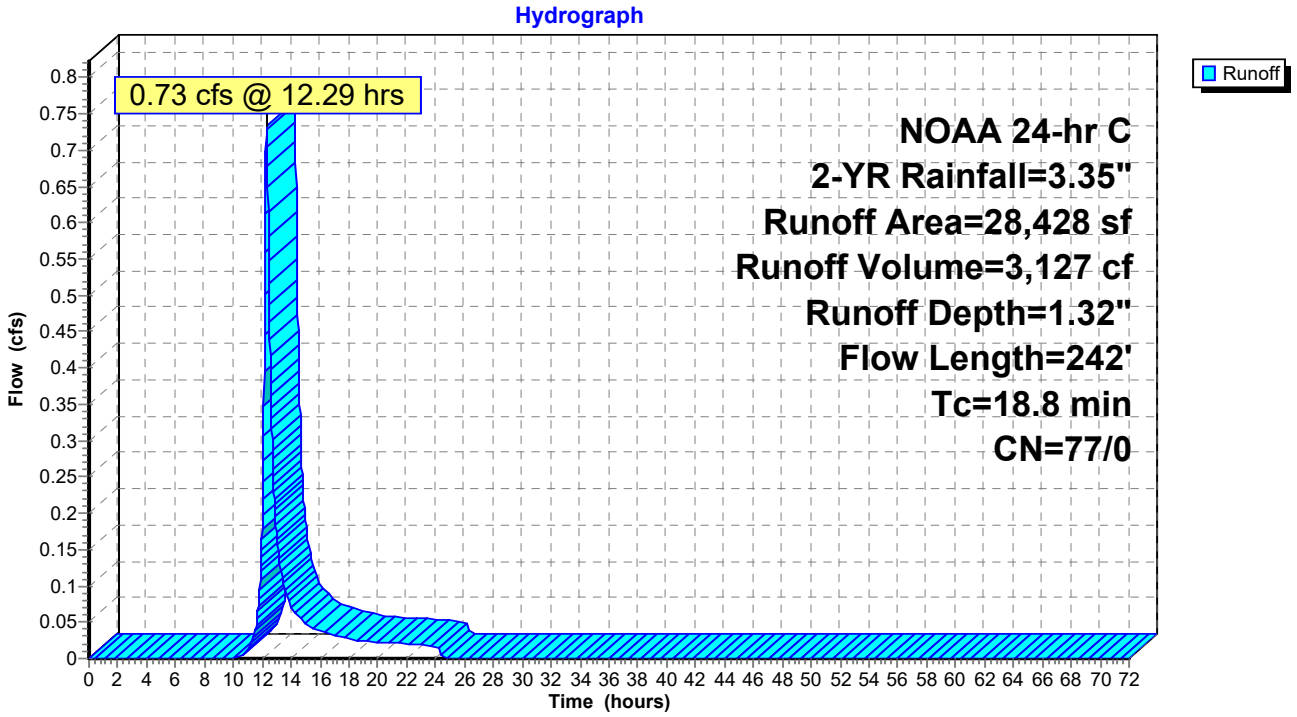
Runoff = 0.73 cfs @ 12.29 hrs, Volume= 3,127 cf, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 2-YR Rainfall=3.35"

Area (sf)	CN	Description
8,966	80	>75% Grass cover, Good, HSG D
1,621	96	Gravel surface, HSG D
17,586	74	>75% Grass cover, Good, HSG C
255	96	Gravel surface, HSG C
28,428	77	Weighted Average
28,428	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	28	0.0070	0.09		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 3.35"
9.4	72	0.0110	0.13		**Sheet Flow, Segment B-C** Grass: Short n= 0.150 P2= 3.35"
2.7	62	0.0030	0.38		**Shallow Concentrated Flow, Segment C-D** Short Grass Pasture Kv= 7.0 fps
1.2	49	0.0100	0.70		**Shallow Concentrated Flow, Segment D-E** Short Grass Pasture Kv= 7.0 fps
0.2	31	0.0160	2.57		**Shallow Concentrated Flow, Segment E-F** Paved Kv= 20.3 fps
18.8	242	Total			

Subcatchment E2: Existing Drainage to Red Lion Road



Summary for Subcatchment P1-A: Proposed Drainage to US Route 206

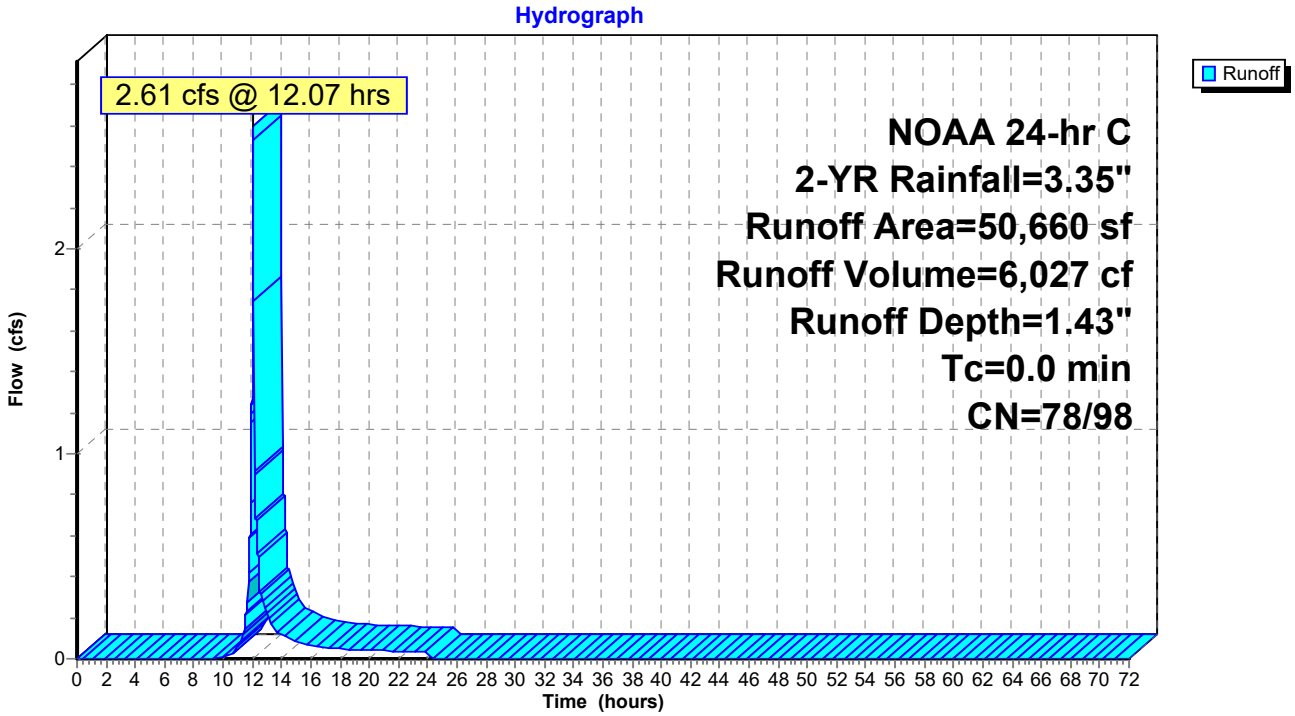
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.61 cfs @ 12.07 hrs, Volume= 6,027 cf, Depth= 1.43"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 2-YR Rainfall=3.35"

Area (sf)	CN	Description
20,130	74	>75% Grass cover, Good, HSG C
29,261	80	>75% Grass cover, Good, HSG D
1,269	98	Paved parking, HSG A
50,660	78	Weighted Average
49,391	78	97.50% Pervious Area
1,269	98	2.50% Impervious Area

Subcatchment P1-A: Proposed Drainage to US Route 206



Summary for Subcatchment P1-B: Proposed Parking Area Drainage

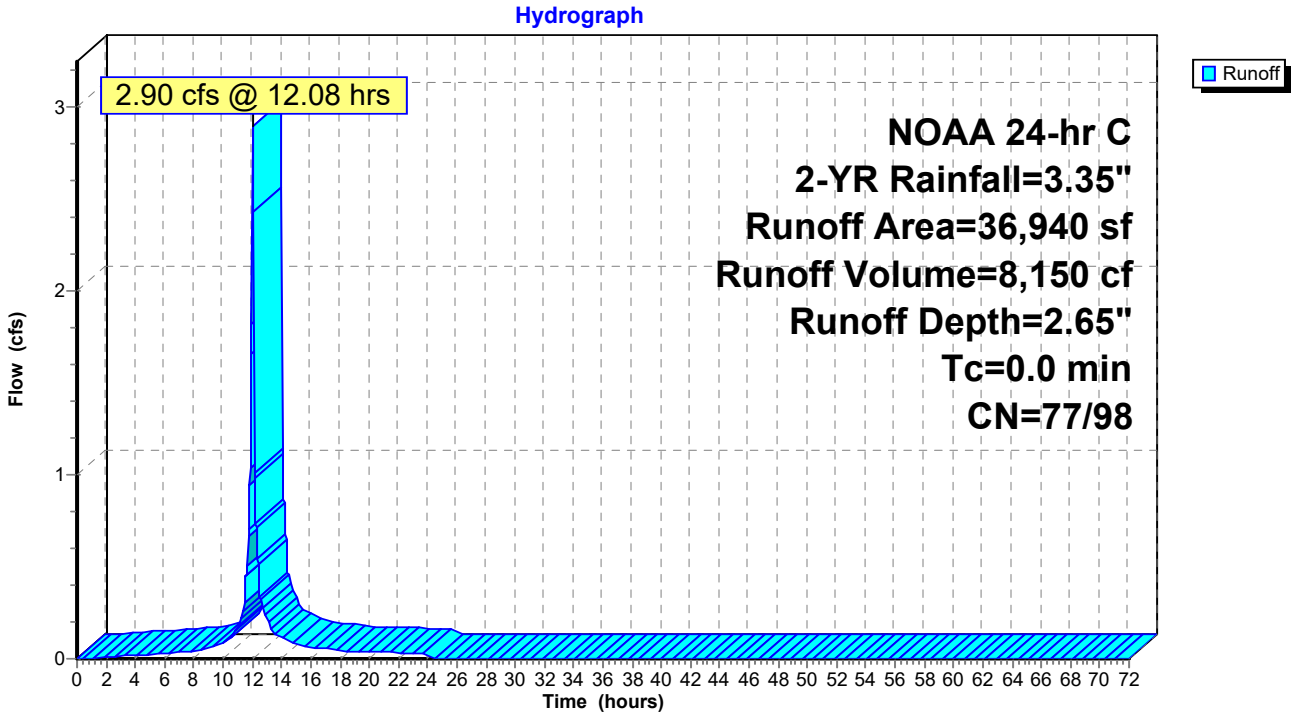
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.90 cfs @ 12.08 hrs, Volume= 8,150 cf, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 2-YR Rainfall=3.35"

Area (sf)	CN	Description
27,292	98	Paved parking, HSG A
5,390	80	>75% Grass cover, Good, HSG D
4,258	74	>75% Grass cover, Good, HSG C
36,940	93	Weighted Average
9,648	77	26.12% Pervious Area
27,292	98	73.88% Impervious Area

Subcatchment P1-B: Proposed Parking Area Drainage



Summary for Subcatchment P1-C: Undetained Drainage to US Route 206

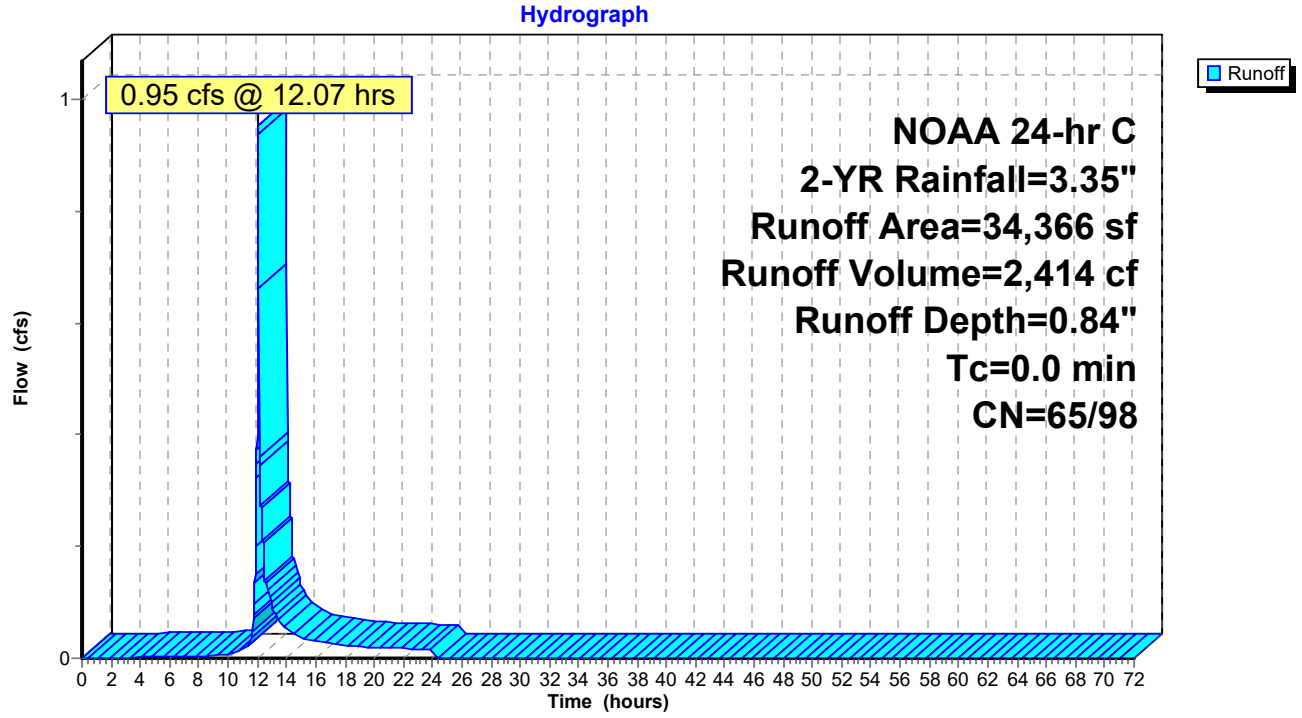
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.95 cfs @ 12.07 hrs, Volume= 2,414 cf, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 2-YR Rainfall=3.35"

Area (sf)	CN	Description
19,537	74	>75% Grass cover, Good, HSG C
8,752	39	>75% Grass cover, Good, HSG A
3,711	80	>75% Grass cover, Good, HSG D
2,366	98	Paved parking, HSG A
34,366	67	Weighted Average
32,000	65	93.12% Pervious Area
2,366	98	6.88% Impervious Area

Subcatchment P1-C: Undetained Drainage to US Route 206



Summary for Subcatchment P1-D: Drainage from Building

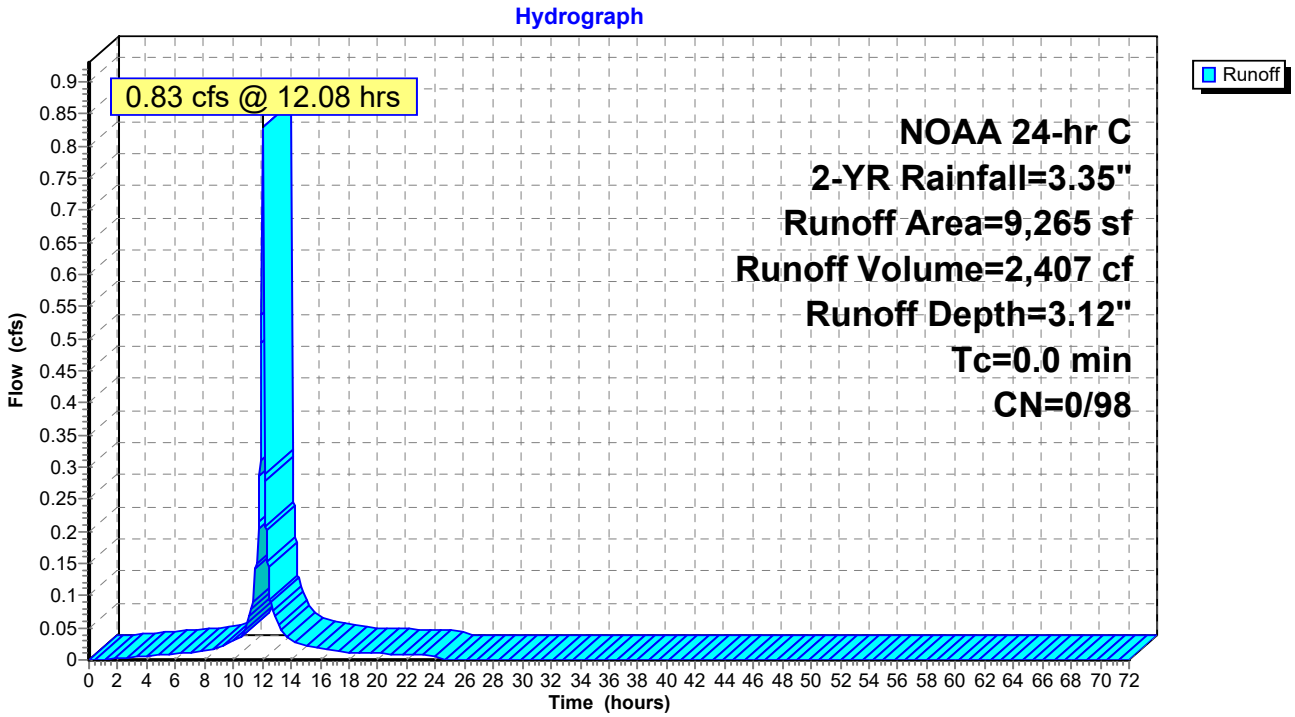
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.83 cfs @ 12.08 hrs, Volume= 2,407 cf, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 2-YR Rainfall=3.35"

Area (sf)	CN	Description
9,265	98	Roofs, HSG A
9,265	98	100.00% Impervious Area

Subcatchment P1-D: Drainage from Building



Summary for Subcatchment P2: Proposed Drainage to Red Lion Road

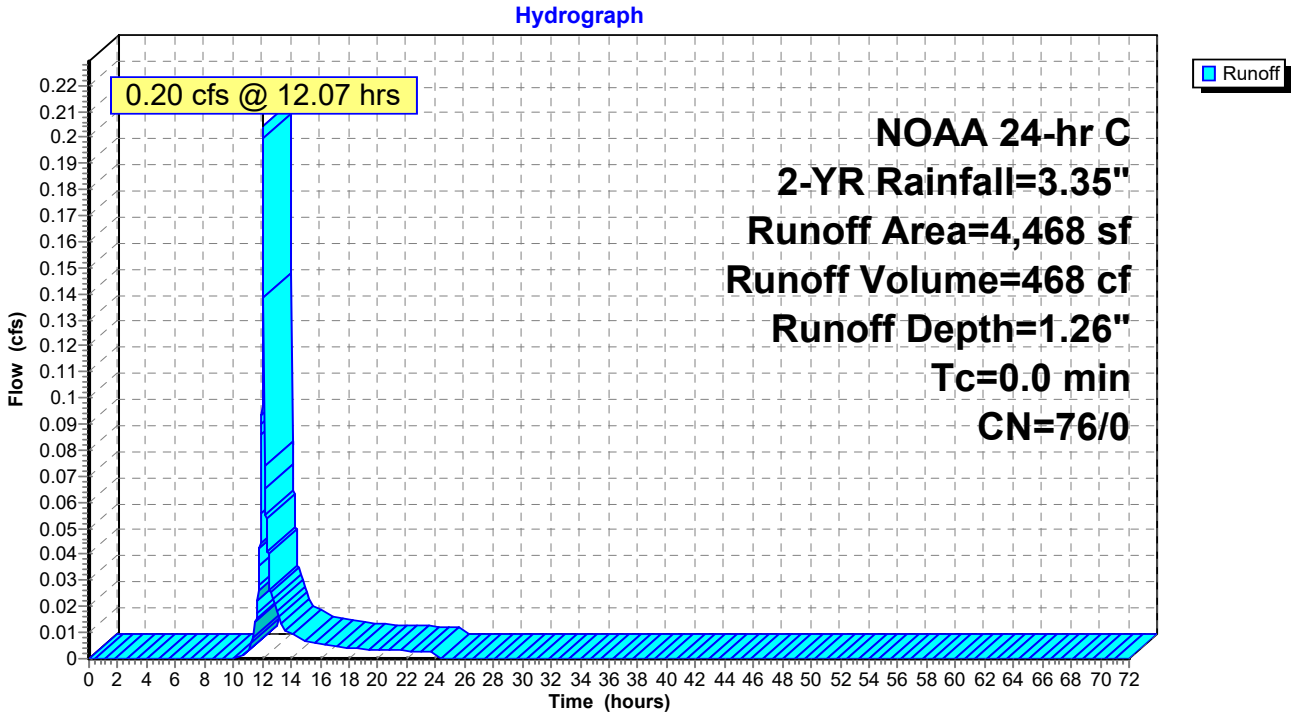
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 468 cf, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 2-YR Rainfall=3.35"

Area (sf)	CN	Description
1,678	80	>75% Grass cover, Good, HSG D
2,790	74	>75% Grass cover, Good, HSG C
4,468	76	Weighted Average
4,468	76	100.00% Pervious Area

Subcatchment P2: Proposed Drainage to Red Lion Road



Summary for Pond B1: Proposed Above Ground Basin

Inflow Area = 87,600 sf, 32.60% Impervious, Inflow Depth = 1.41" for 2-YR event
Inflow = 5.24 cfs @ 12.07 hrs, Volume= 10,328 cf
Outflow = 0.12 cfs @ 15.10 hrs, Volume= 9,437 cf, Atten= 98%, Lag= 181.5 min
Primary = 0.12 cfs @ 15.10 hrs, Volume= 9,437 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 49.88' @ 15.10 hrs Surf.Area= 19,489 sf Storage= 7,295 cf

Plug-Flow detention time= 854.7 min calculated for 9,435 cf (91% of inflow)
Center-of-Mass det. time= 814.7 min (1,625.4 - 810.6)

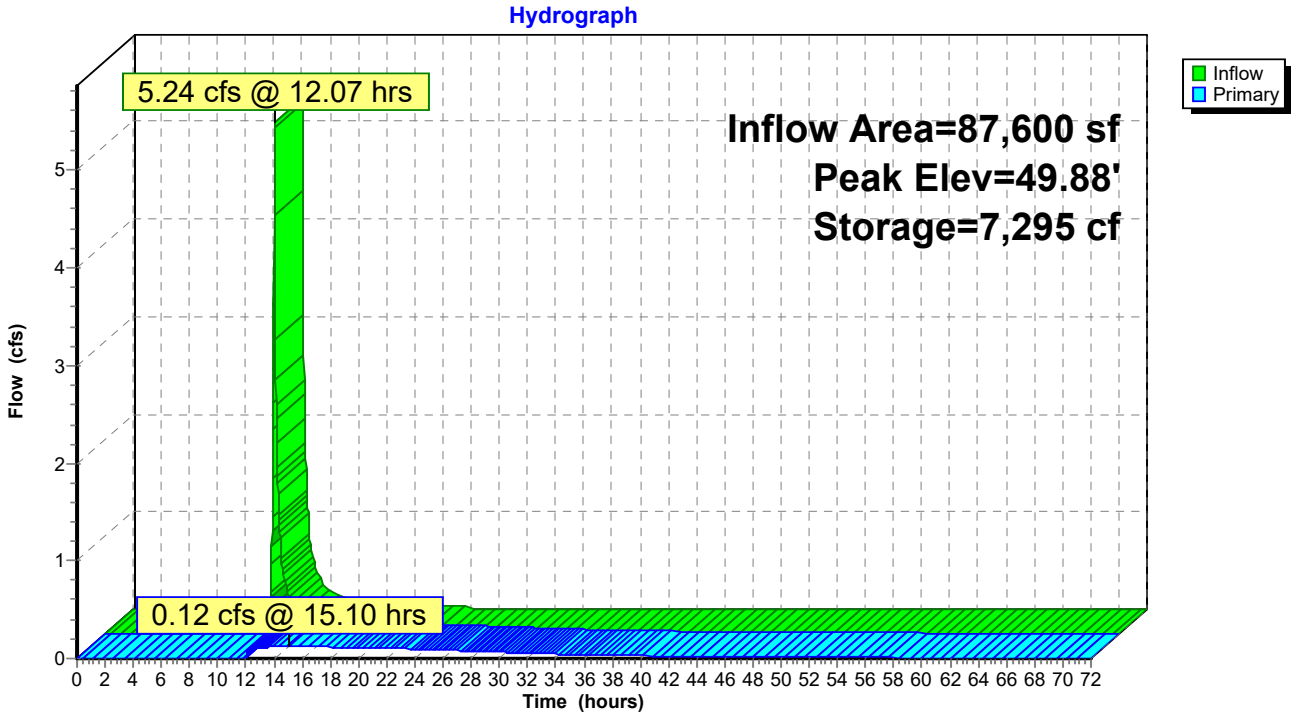
Volume	Invert	Avail.Storage	Storage Description
#1	49.50'	53,832 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
49.50	18,607	765.0	0	0	18,607
50.00	19,762	775.0	9,591	9,591	19,892
50.50	20,931	784.0	10,172	19,763	21,074
51.00	22,115	794.0	10,760	30,523	22,390
52.00	24,524	812.0	23,309	53,832	24,827

Device	Routing	Invert	Outlet Devices
#1	Primary	49.50'	**12.0" Round Culvert** L= 180.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 49.50' / 47.00' S= 0.0139 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	49.50'	**3.0" Vert. 3" orifice** C= 0.600
#3	Device 1	50.30'	**24.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	51.00'	**48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.12 cfs @ 15.10 hrs HW=49.88' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.12 cfs of 0.58 cfs potential flow)
  ├**2=3" orifice** (Orifice Controls 0.12 cfs @ 2.45 fps)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond B1: Proposed Above Ground Basin



Summary for Pond B2: Water Qaulity Basin

Inflow Area = 36,940 sf, 73.88% Impervious, Inflow Depth = 2.65" for 2-YR event
Inflow = 2.90 cfs @ 12.08 hrs, Volume= 8,150 cf
Outflow = 2.69 cfs @ 12.08 hrs, Volume= 8,151 cf, Atten= 7%, Lag= 0.1 min
Discarded = 0.04 cfs @ 12.08 hrs, Volume= 3,851 cf
Primary = 2.65 cfs @ 12.08 hrs, Volume= 4,300 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 51.41' @ 12.08 hrs Surf.Area= 2,559 sf Storage= 2,109 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 238.4 min (1,002.0 - 763.6)

Volume	Invert	Avail.Storage	Storage Description
#1	50.50'	5,237 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

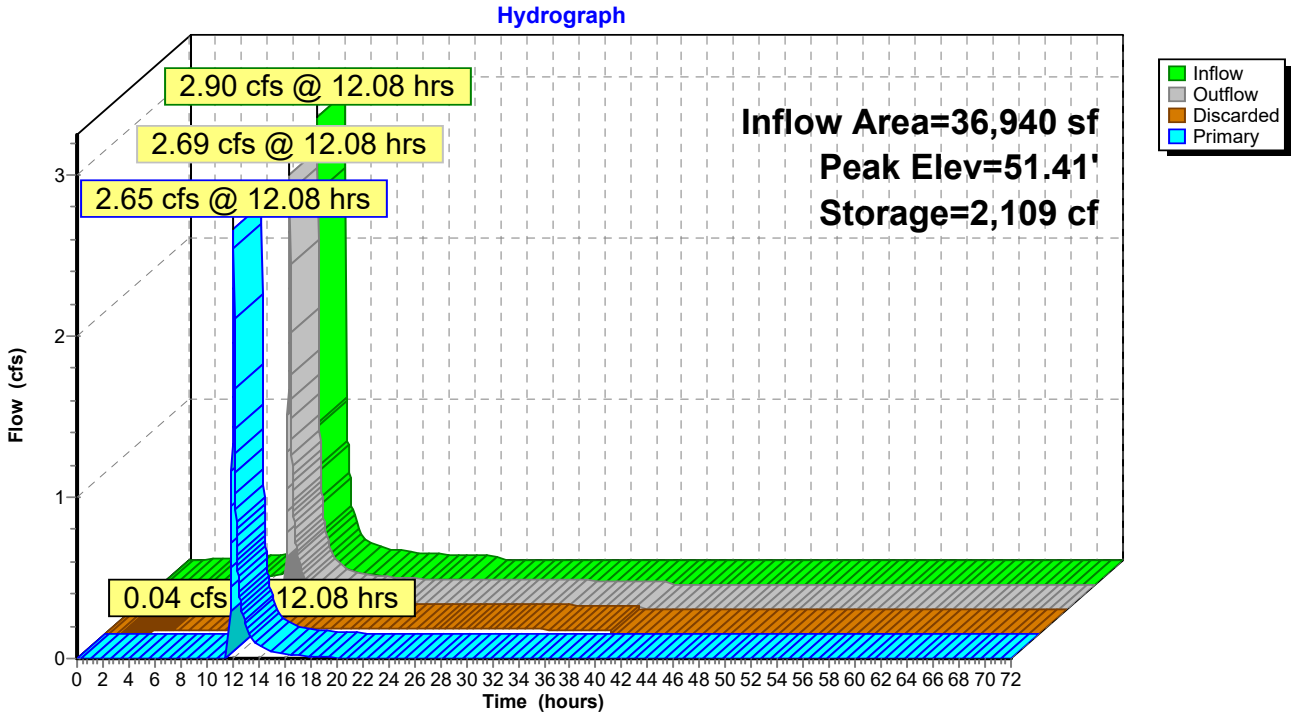
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
50.50	2,067	171.0	0	0	2,067
51.00	2,331	181.0	1,099	1,099	2,361
52.00	2,902	200.0	2,611	3,710	2,967
52.50	3,207	209.0	1,527	5,237	3,278

Device	Routing	Invert	Outlet Devices
#1	Primary	51.20'	**10.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Discarded	50.50'	**0.500 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 47.00'

Discarded OutFlow Max=0.04 cfs @ 12.08 hrs HW=51.41' (Free Discharge)
↑**2=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=2.65 cfs @ 12.08 hrs HW=51.41' TW=49.67' (Dynamic Tailwater)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 2.65 cfs @ 1.24 fps)

Pond B2: Water Qaulity Basin

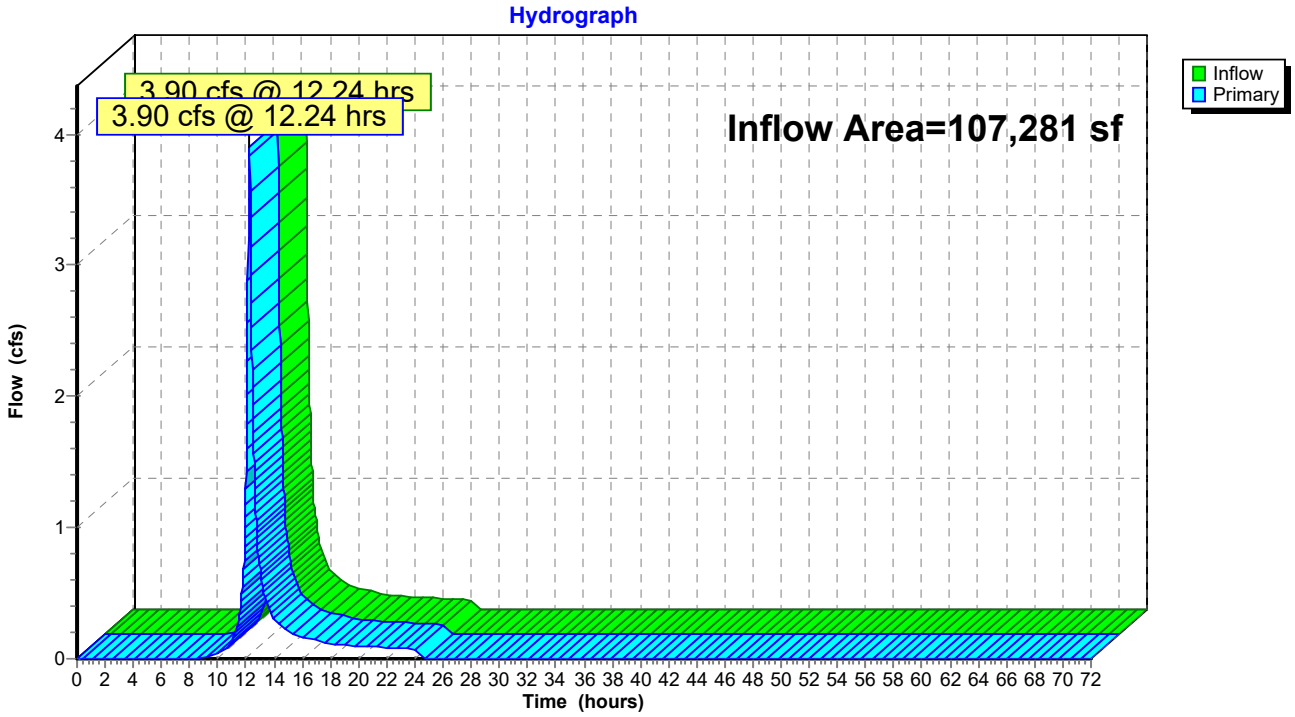


Summary for Link E-POI1: Point of Interest 1

Inflow Area = 107,281 sf, 0.00% Impervious, Inflow Depth = 1.66" for 2-YR event
Inflow = 3.90 cfs @ 12.24 hrs, Volume= 14,836 cf
Primary = 3.90 cfs @ 12.24 hrs, Volume= 14,836 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Link E-POI1: Point of Interest 1

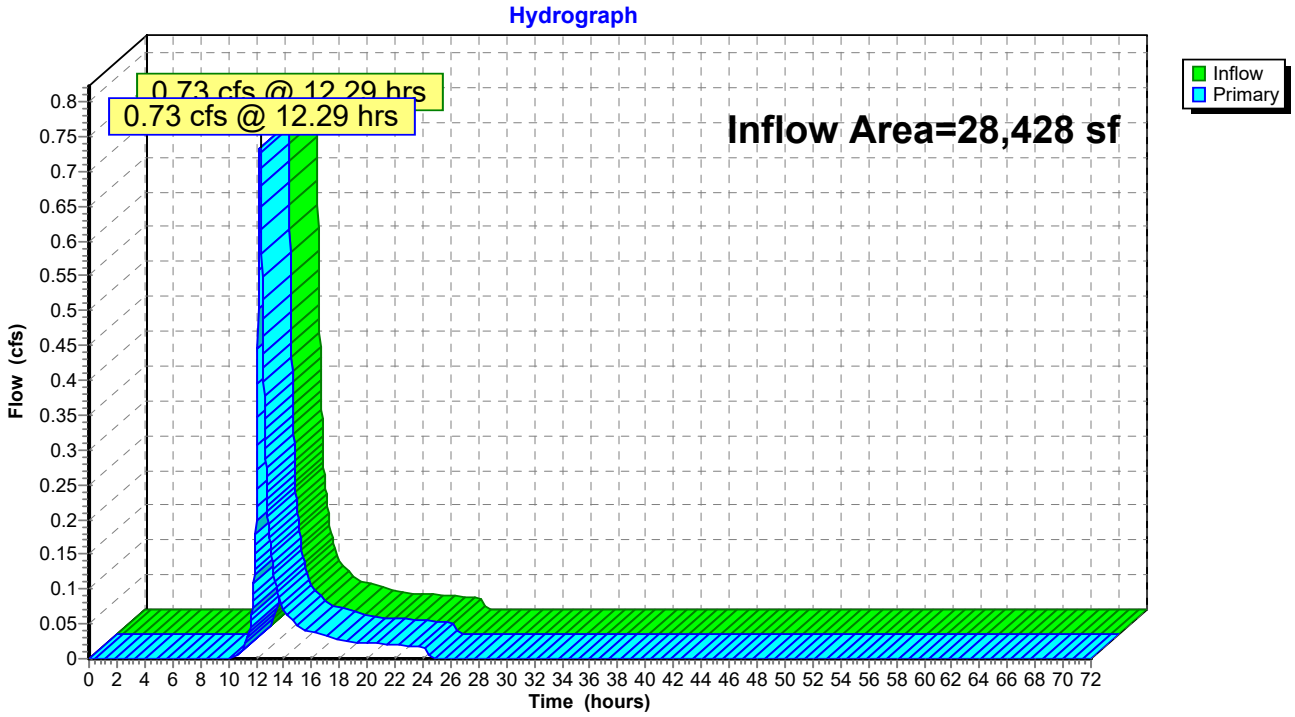


Summary for Link E-POI2: Point of Interest 2

Inflow Area = 28,428 sf, 0.00% Impervious, Inflow Depth = 1.32" for 2-YR event
Inflow = 0.73 cfs @ 12.29 hrs, Volume= 3,127 cf
Primary = 0.73 cfs @ 12.29 hrs, Volume= 3,127 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Link E-POI2: Point of Interest 2

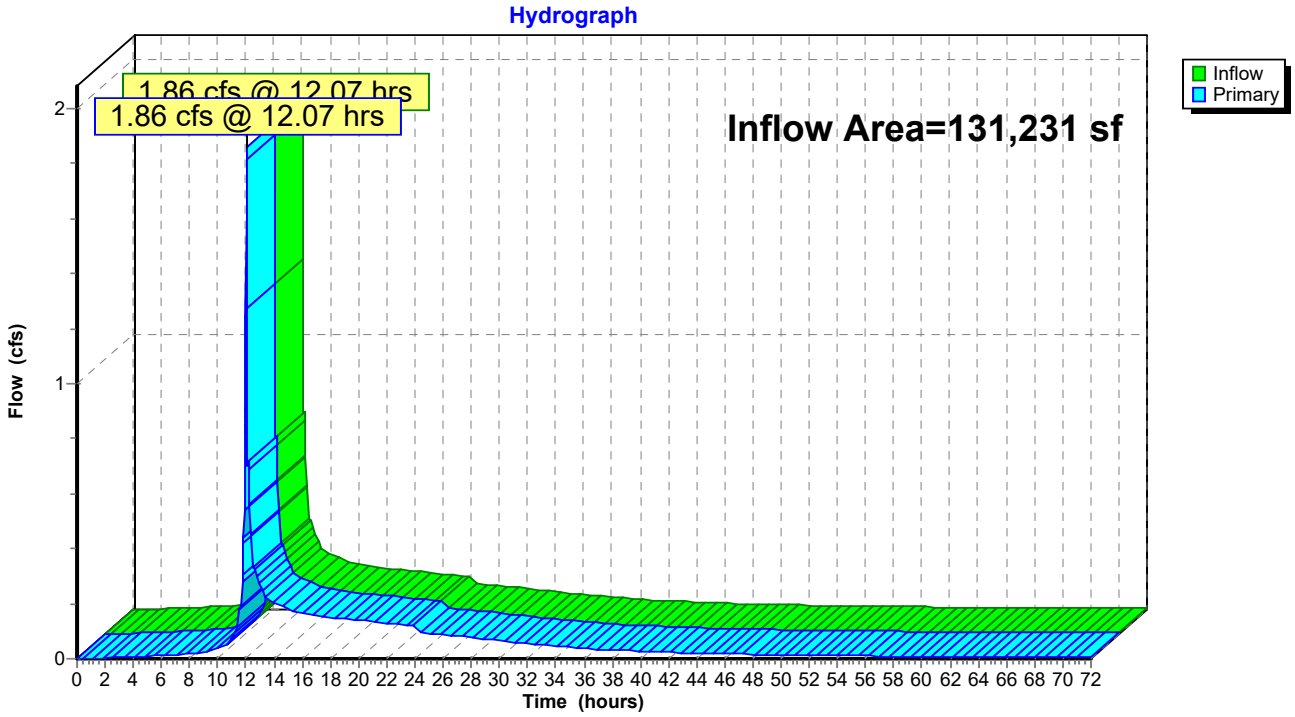


Summary for Link P-POI1: Point of Inerest 1

Inflow Area = 131,231 sf, 30.63% Impervious, Inflow Depth > 1.30" for 2-YR event
Inflow = 1.86 cfs @ 12.07 hrs, Volume= 14,258 cf
Primary = 1.86 cfs @ 12.07 hrs, Volume= 14,258 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Link P-POI1: Point of Inerest 1

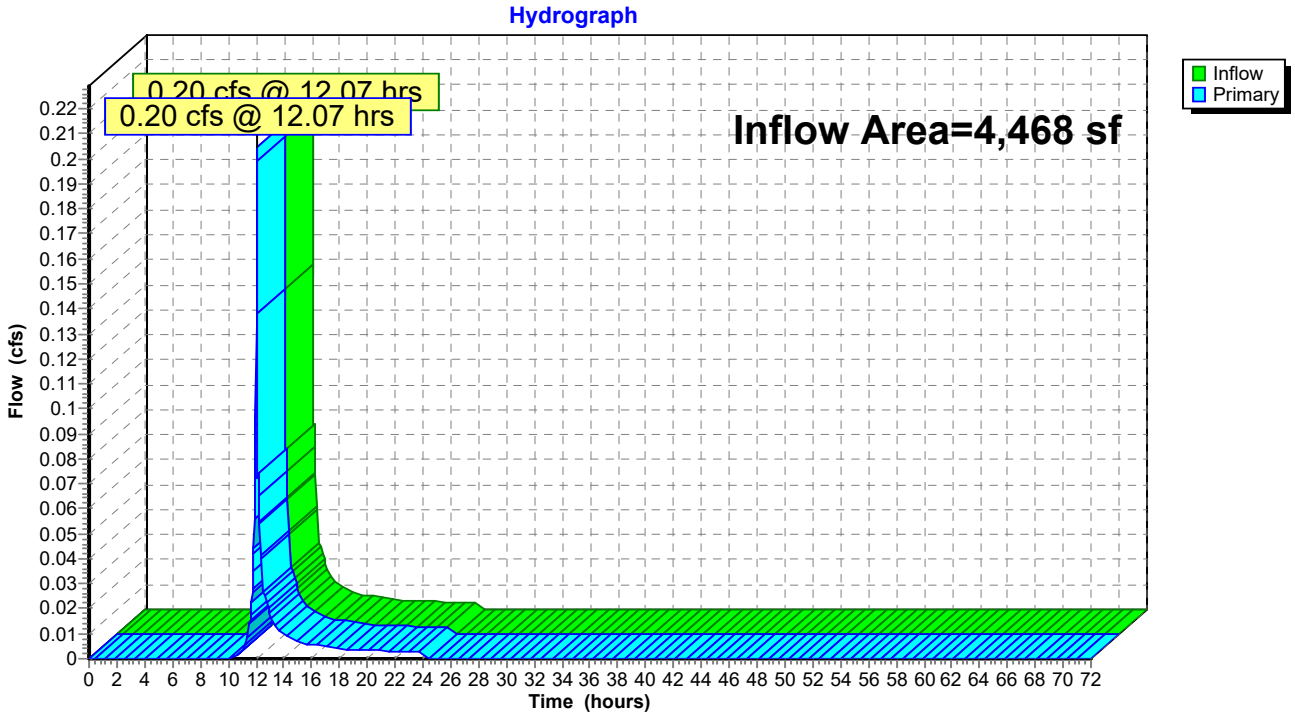


Summary for Link P-POI2: Point of Interest 2

Inflow Area = 4,468 sf, 0.00% Impervious, Inflow Depth = 1.26" for 2-YR event
Inflow = 0.20 cfs @ 12.07 hrs, Volume= 468 cf
Primary = 0.20 cfs @ 12.07 hrs, Volume= 468 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Link P-POI2: Point of Interest 2



APPENDIX C-3
10-YEAR STORM EVENT HYDROGRAPHS

Summary for Subcatchment E1-A: Existing Drainage to US Route 206

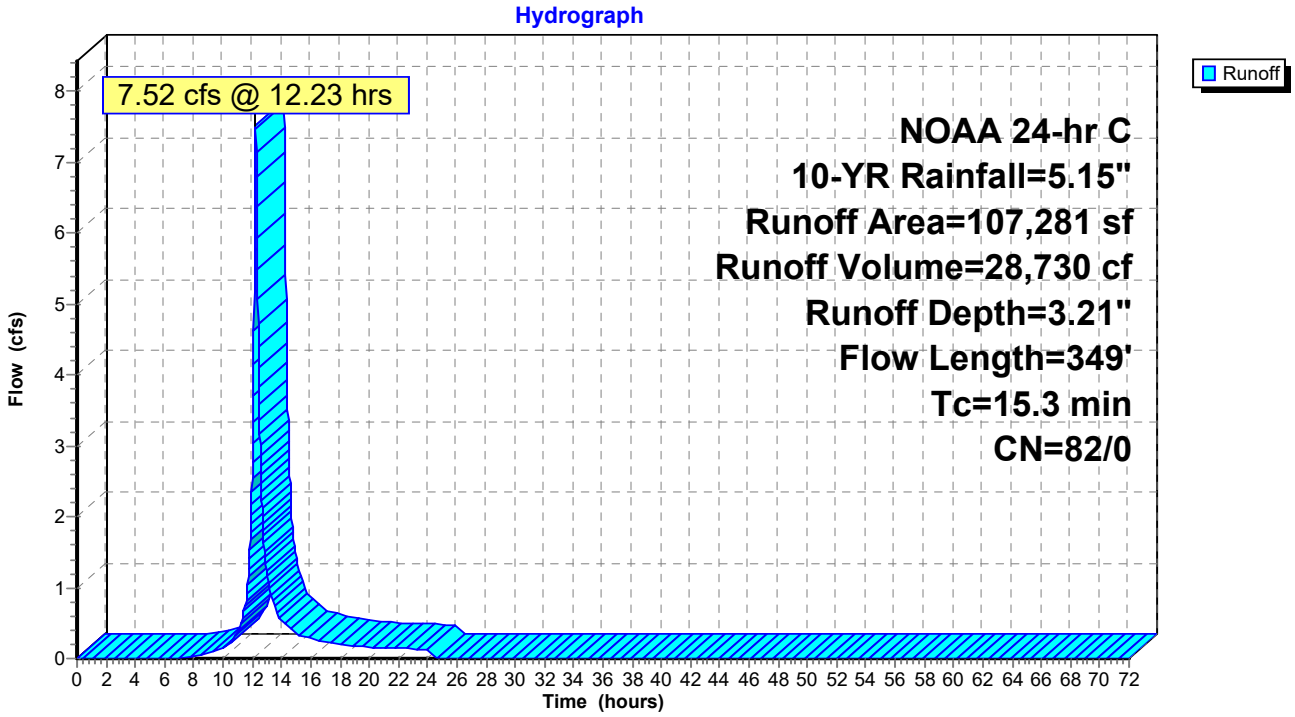
Runoff = 7.52 cfs @ 12.23 hrs, Volume= 28,730 cf, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 10-YR Rainfall=5.15"

Area (sf)	CN	Description
52,064	86	<50% Grass cover, Poor, HSG C
2,709	96	Gravel surface, HSG C
5,596	76	Woods/grass comb., Fair, HSG C
12,324	68	<50% Grass cover, Poor, HSG A
2,062	96	Gravel surface, HSG D
15,342	80	>75% Grass cover, Good, HSG D
17,184	82	Woods/grass comb., Fair, HSG D
107,281	82	Weighted Average
107,281	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	55	0.0180	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.35"
4.9	45	0.0220	0.15		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.35"
2.0	89	0.0110	0.73		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
1.2	64	0.0160	0.89		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
0.3	25	0.0400	1.40		**Shallow Concentrated Flow, F-G** Short Grass Pasture Kv= 7.0 fps
0.7	71	0.0140	1.77		**Shallow Concentrated Flow, G-H** Grassed Waterway Kv= 15.0 fps
15.3	349	Total			

Subcatchment E1-A: Existing Drainage to US Route 206



Summary for Subcatchment E2: Existing Drainage to Red Lion Road

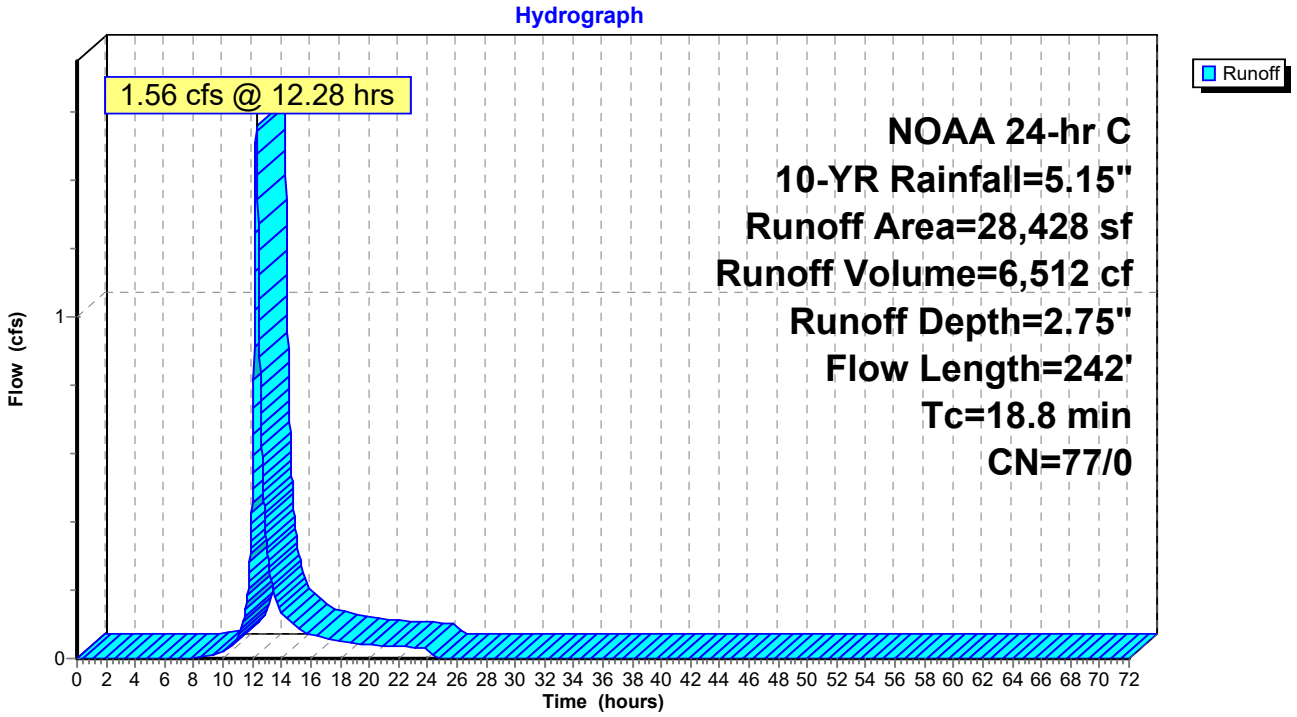
Runoff = 1.56 cfs @ 12.28 hrs, Volume= 6,512 cf, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 10-YR Rainfall=5.15"

Area (sf)	CN	Description
8,966	80	>75% Grass cover, Good, HSG D
1,621	96	Gravel surface, HSG D
17,586	74	>75% Grass cover, Good, HSG C
255	96	Gravel surface, HSG C
28,428	77	Weighted Average
28,428	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	28	0.0070	0.09		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 3.35"
9.4	72	0.0110	0.13		**Sheet Flow, Segment B-C** Grass: Short n= 0.150 P2= 3.35"
2.7	62	0.0030	0.38		**Shallow Concentrated Flow, Segment C-D** Short Grass Pasture Kv= 7.0 fps
1.2	49	0.0100	0.70		**Shallow Concentrated Flow, Segment D-E** Short Grass Pasture Kv= 7.0 fps
0.2	31	0.0160	2.57		**Shallow Concentrated Flow, Segment E-F** Paved Kv= 20.3 fps
18.8	242	Total			

Subcatchment E2: Existing Drainage to Red Lion Road



Summary for Subcatchment P1-A: Proposed Drainage to US Route 206

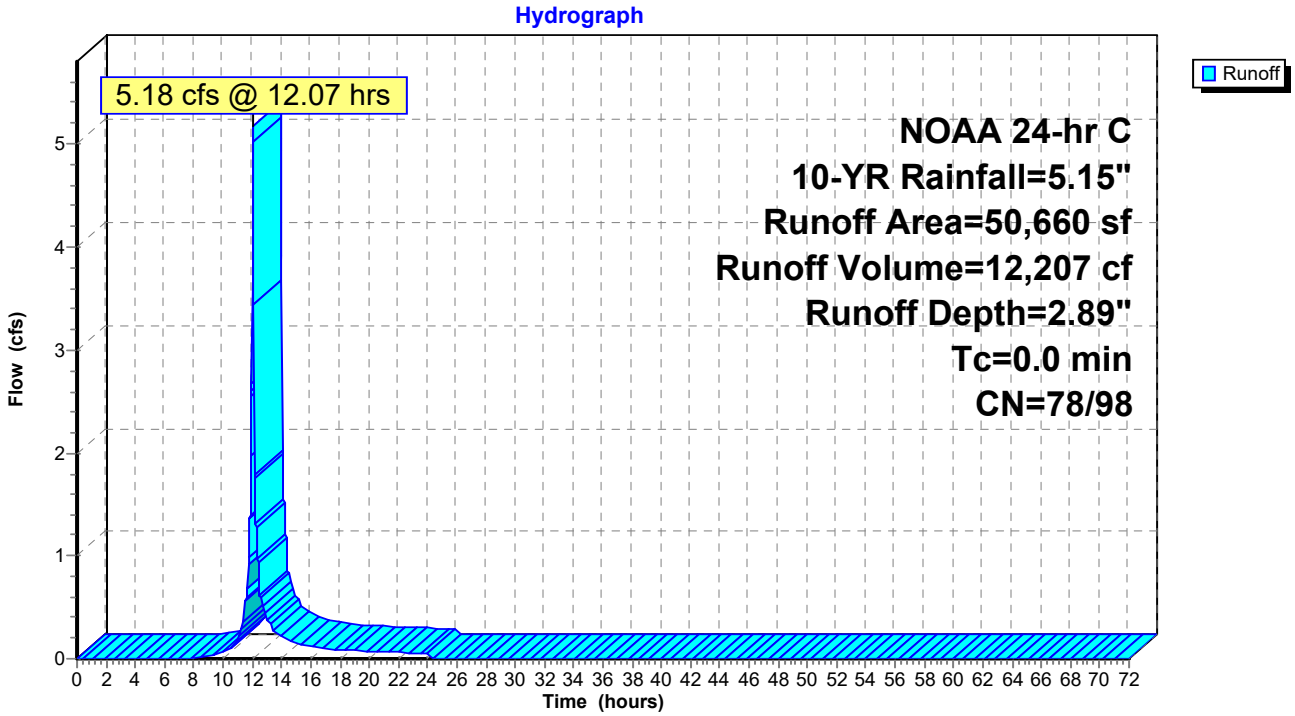
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 5.18 cfs @ 12.07 hrs, Volume= 12,207 cf, Depth= 2.89"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 10-YR Rainfall=5.15"

Area (sf)	CN	Description
20,130	74	>75% Grass cover, Good, HSG C
29,261	80	>75% Grass cover, Good, HSG D
1,269	98	Paved parking, HSG A
50,660	78	Weighted Average
49,391	78	97.50% Pervious Area
1,269	98	2.50% Impervious Area

Subcatchment P1-A: Proposed Drainage to US Route 206



Summary for Subcatchment P1-B: Proposed Parking Area Drainage

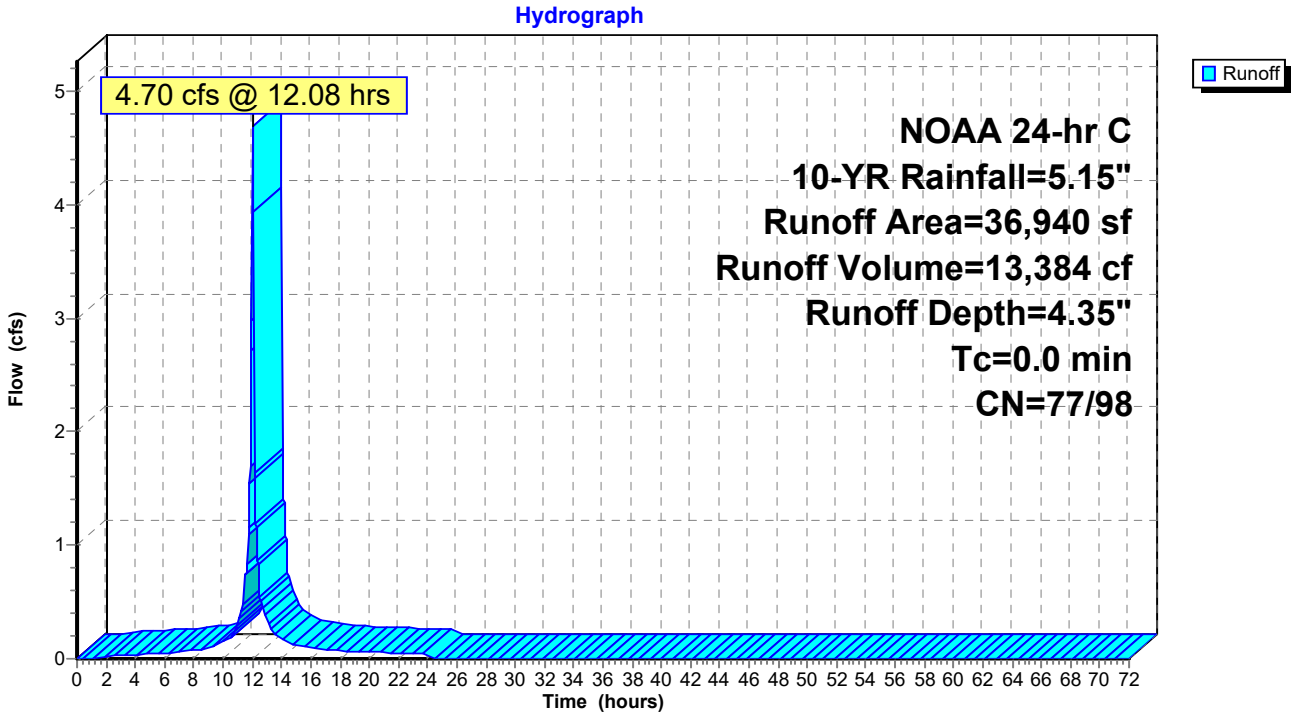
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 4.70 cfs @ 12.08 hrs, Volume= 13,384 cf, Depth= 4.35"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 10-YR Rainfall=5.15"

Area (sf)	CN	Description
27,292	98	Paved parking, HSG A
5,390	80	>75% Grass cover, Good, HSG D
4,258	74	>75% Grass cover, Good, HSG C
36,940	93	Weighted Average
9,648	77	26.12% Pervious Area
27,292	98	73.88% Impervious Area

Subcatchment P1-B: Proposed Parking Area Drainage



Summary for Subcatchment P1-C: Undetained Drainage to US Route 206

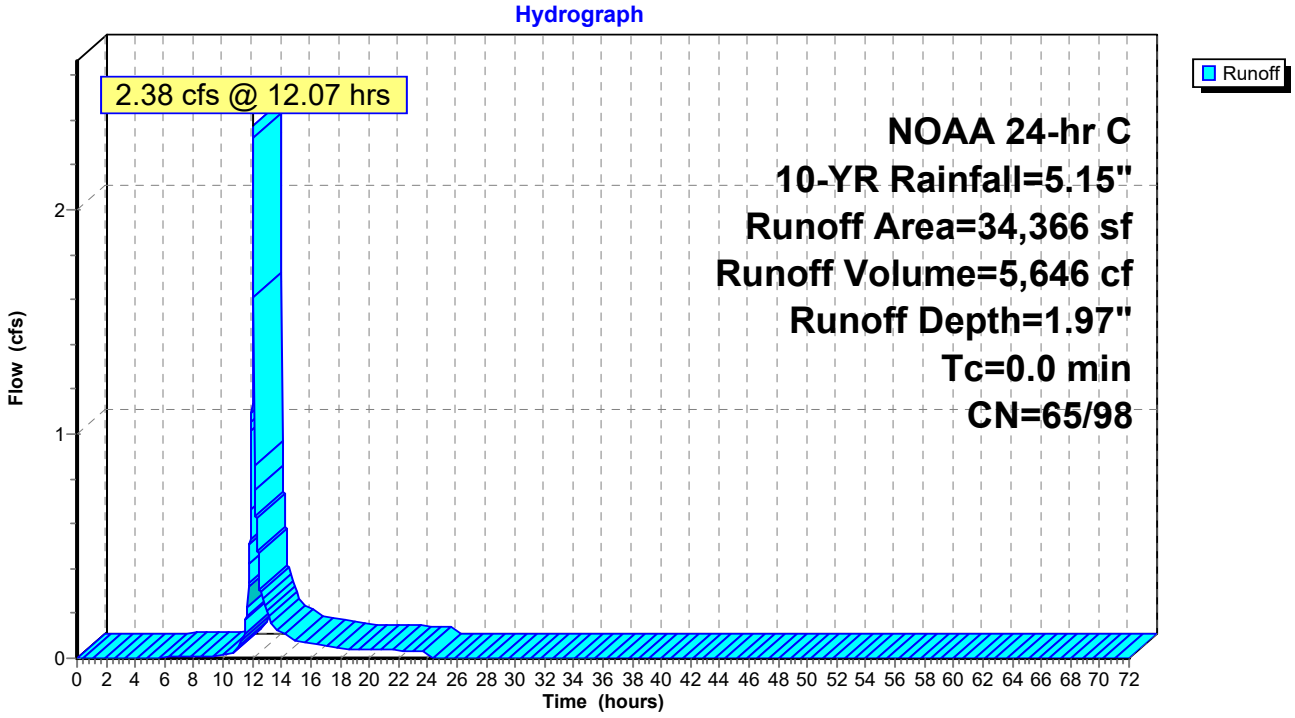
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.38 cfs @ 12.07 hrs, Volume= 5,646 cf, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 10-YR Rainfall=5.15"

Area (sf)	CN	Description
19,537	74	>75% Grass cover, Good, HSG C
8,752	39	>75% Grass cover, Good, HSG A
3,711	80	>75% Grass cover, Good, HSG D
2,366	98	Paved parking, HSG A
34,366	67	Weighted Average
32,000	65	93.12% Pervious Area
2,366	98	6.88% Impervious Area

Subcatchment P1-C: Undetained Drainage to US Route 206



Summary for Subcatchment P1-D: Drainage from Building

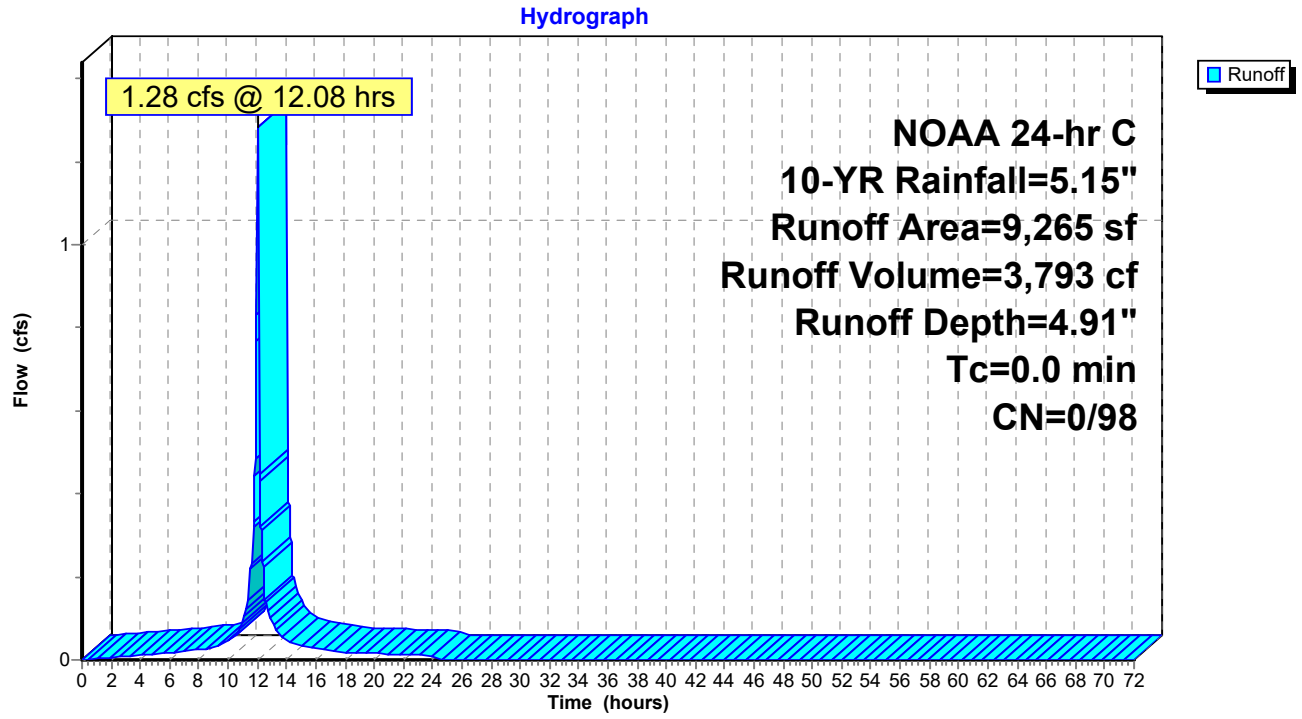
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 1.28 cfs @ 12.08 hrs, Volume= 3,793 cf, Depth= 4.91"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 10-YR Rainfall=5.15"

Area (sf)	CN	Description
9,265	98	Roofs, HSG A
9,265	98	100.00% Impervious Area

Subcatchment P1-D: Drainage from Building



Summary for Subcatchment P2: Proposed Drainage to Red Lion Road

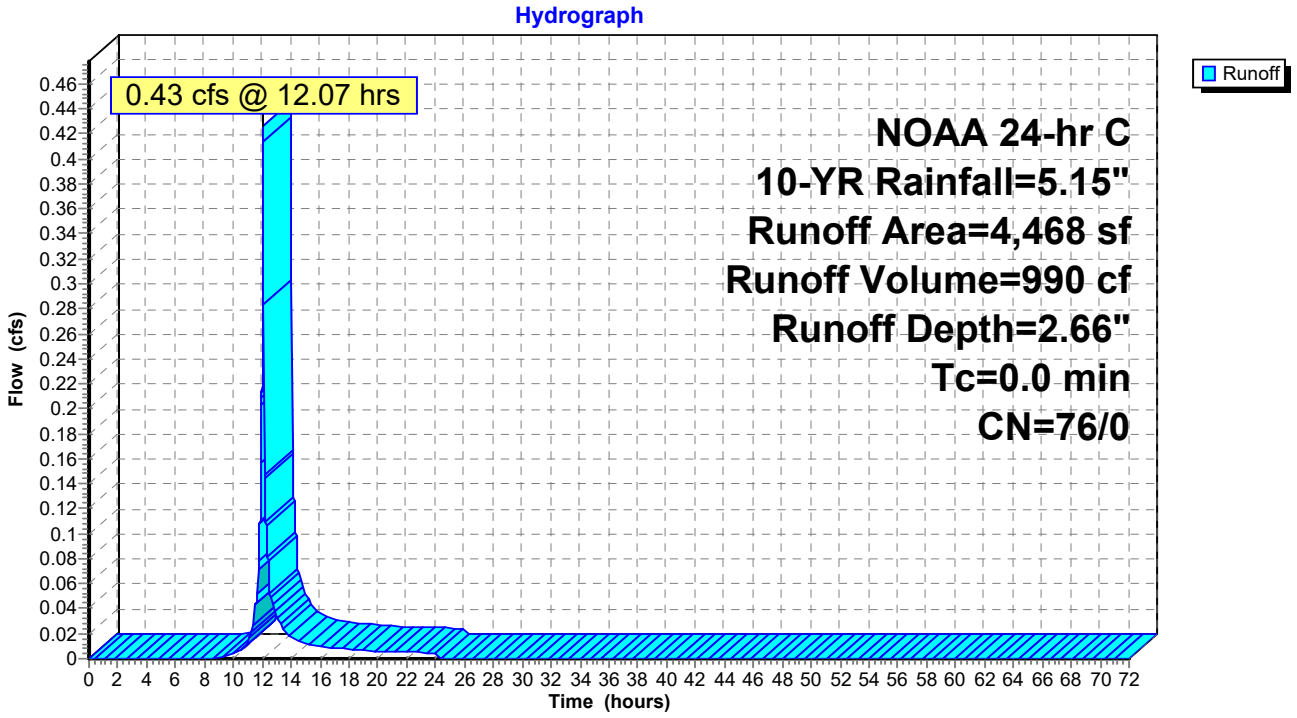
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.43 cfs @ 12.07 hrs, Volume= 990 cf, Depth= 2.66"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 10-YR Rainfall=5.15"

Area (sf)	CN	Description
1,678	80	>75% Grass cover, Good, HSG D
2,790	74	>75% Grass cover, Good, HSG C
4,468	76	Weighted Average
4,468	76	100.00% Pervious Area

Subcatchment P2: Proposed Drainage to Red Lion Road



Summary for Pond B1: Proposed Above Ground Basin

Inflow Area = 87,600 sf, 32.60% Impervious, Inflow Depth = 2.95" for 10-YR event
Inflow = 9.60 cfs @ 12.07 hrs, Volume= 21,507 cf
Outflow = 0.20 cfs @ 15.89 hrs, Volume= 20,227 cf, Atten= 98%, Lag= 229.1 min
Primary = 0.20 cfs @ 15.89 hrs, Volume= 20,227 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 50.30' @ 15.89 hrs Surf.Area= 20,465 sf Storage= 15,675 cf

Plug-Flow detention time= 1,010.7 min calculated for 20,227 cf (94% of inflow)
Center-of-Mass det. time= 979.3 min (1,783.1 - 803.9)

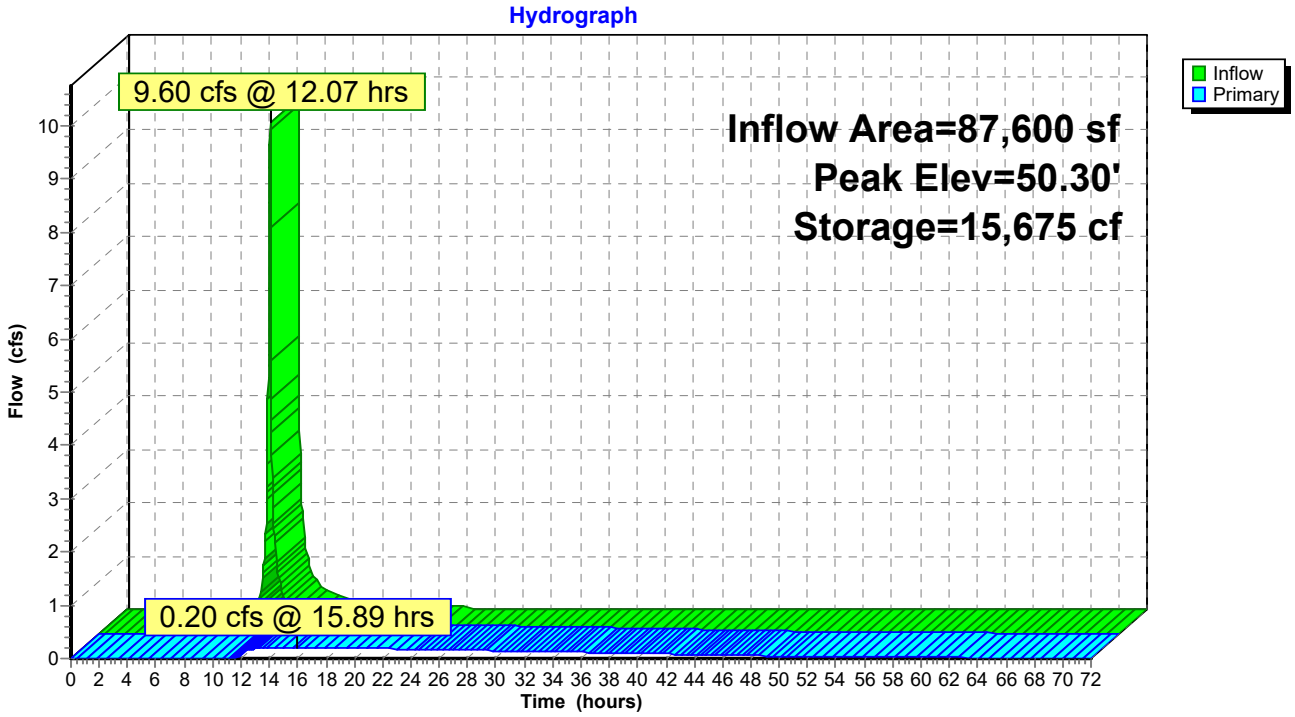
Volume	Invert	Avail.Storage	Storage Description
#1	49.50'	53,832 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
49.50	18,607	765.0	0	0	18,607
50.00	19,762	775.0	9,591	9,591	19,892
50.50	20,931	784.0	10,172	19,763	21,074
51.00	22,115	794.0	10,760	30,523	22,390
52.00	24,524	812.0	23,309	53,832	24,827

Device	Routing	Invert	Outlet Devices
#1	Primary	49.50'	**12.0" Round Culvert** L= 180.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 49.50' / 47.00' S= 0.0139 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	49.50'	**3.0" Vert. 3" orifice** C= 0.600
#3	Device 1	50.30'	**24.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	51.00'	**48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.20 cfs @ 15.89 hrs HW=50.30' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Passes 0.20 cfs of 2.06 cfs potential flow)
  ├**2=3" orifice** (Orifice Controls 0.19 cfs @ 3.96 fps)
  ├**3=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.16 fps)
  └**4=Orifice/Grate** (Controls 0.00 cfs)

Pond B1: Proposed Above Ground Basin



Summary for Pond B2: Water Qaulity Basin

Inflow Area = 36,940 sf, 73.88% Impervious, Inflow Depth = 4.35" for 10-YR event
Inflow = 4.70 cfs @ 12.08 hrs, Volume= 13,384 cf
Outflow = 4.48 cfs @ 12.08 hrs, Volume= 13,385 cf, Atten= 5%, Lag= 0.0 min
Discarded = 0.04 cfs @ 12.08 hrs, Volume= 4,084 cf
Primary = 4.44 cfs @ 12.08 hrs, Volume= 9,300 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 51.50' @ 12.08 hrs Surf.Area= 2,609 sf Storage= 2,333 cf

Plug-Flow detention time= 161.2 min calculated for 13,381 cf (100% of inflow)
Center-of-Mass det. time= 161.5 min (918.0 - 756.5)

Volume	Invert	Avail.Storage	Storage Description
#1	50.50'	5,237 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

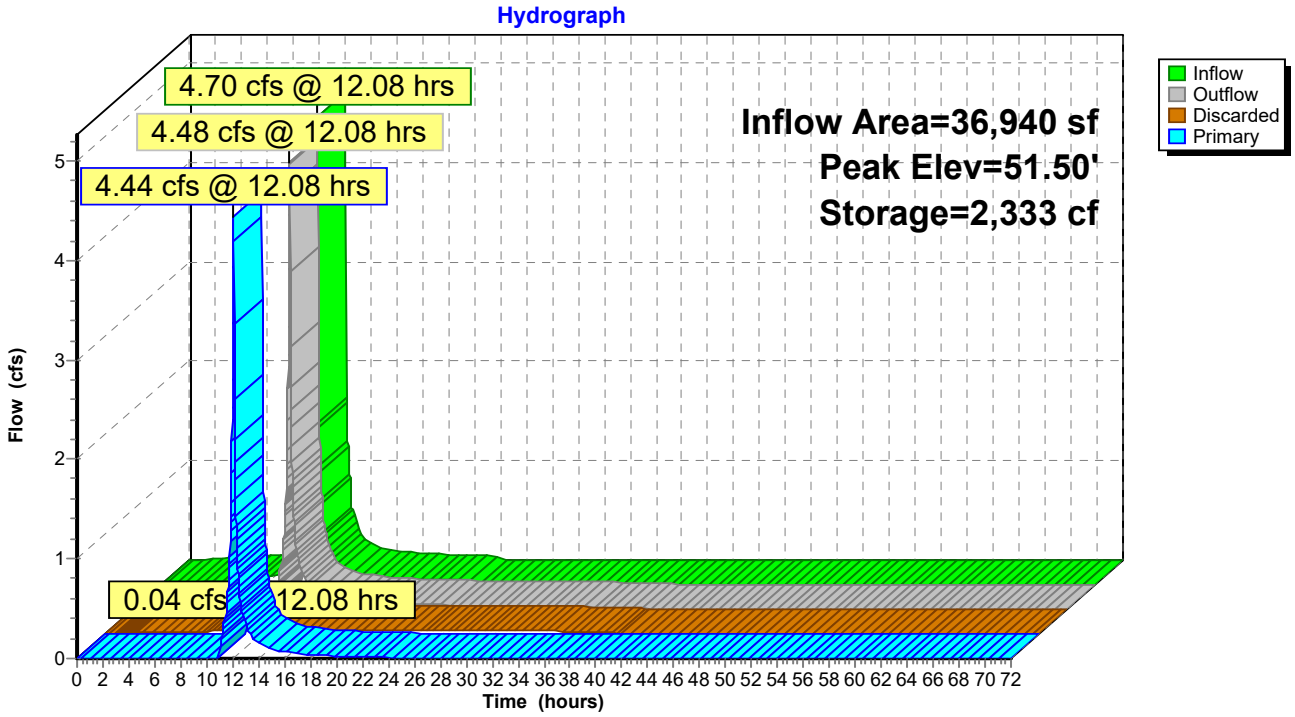
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
50.50	2,067	171.0	0	0	2,067
51.00	2,331	181.0	1,099	1,099	2,361
52.00	2,902	200.0	2,611	3,710	2,967
52.50	3,207	209.0	1,527	5,237	3,278

Device	Routing	Invert	Outlet Devices
#1	Primary	51.20'	**10.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Discarded	50.50'	**0.500 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 47.00'

Discarded OutFlow Max=0.04 cfs @ 12.08 hrs HW=51.50' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=4.43 cfs @ 12.08 hrs HW=51.50' TW=49.93' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 4.43 cfs @ 1.48 fps)

Pond B2: Water Qaulity Basin

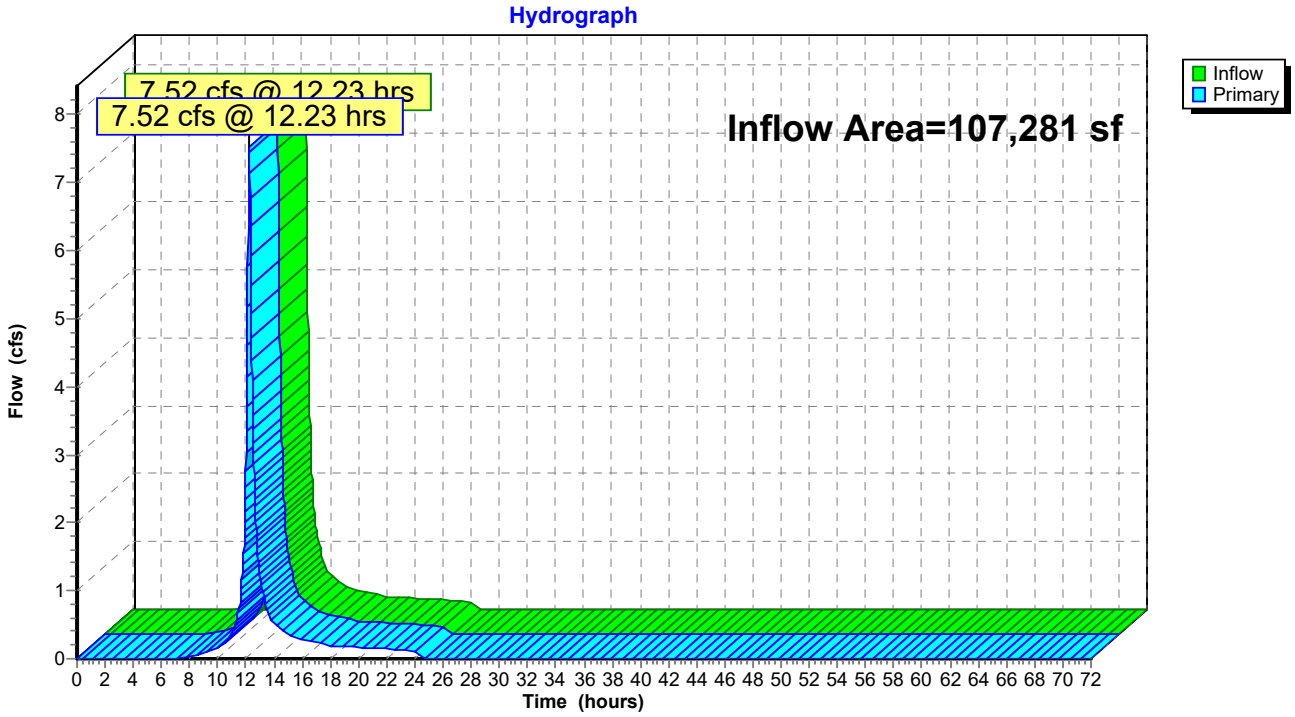


Summary for Link E-POI1: Point of Interest 1

Inflow Area = 107,281 sf, 0.00% Impervious, Inflow Depth = 3.21" for 10-YR event
Inflow = 7.52 cfs @ 12.23 hrs, Volume= 28,730 cf
Primary = 7.52 cfs @ 12.23 hrs, Volume= 28,730 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Link E-POI1: Point of Interest 1

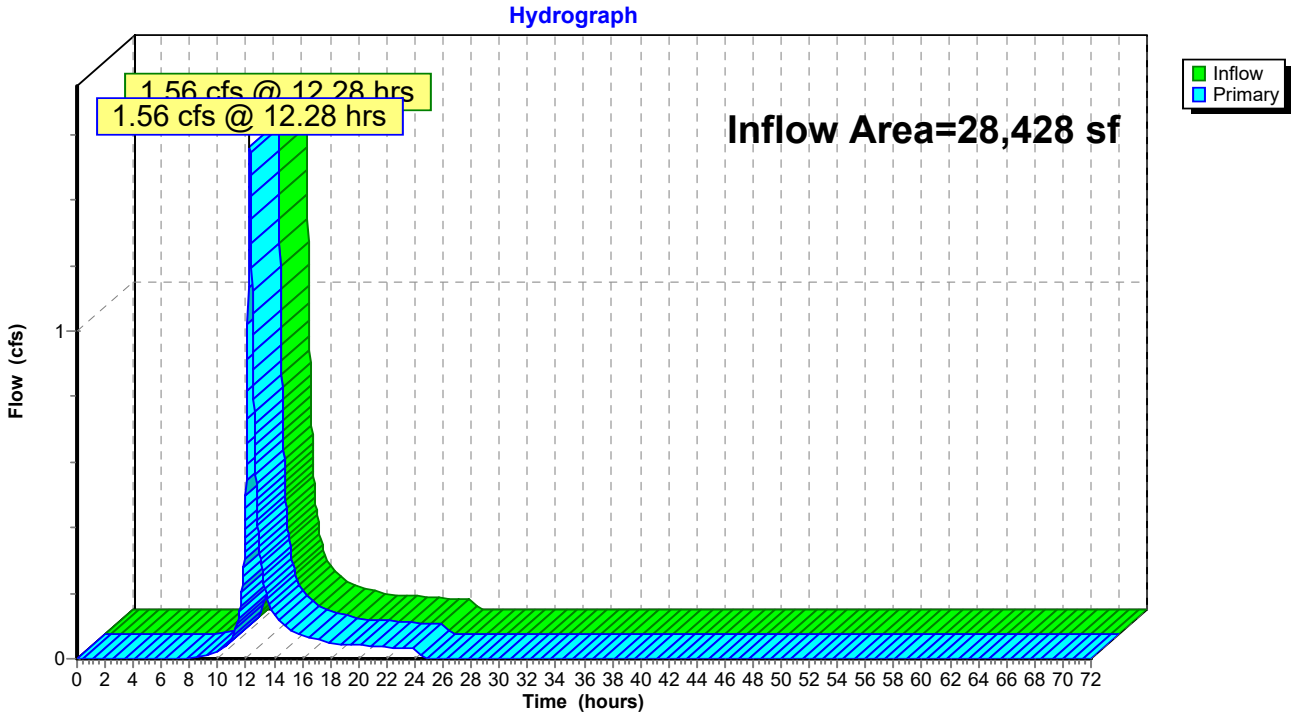


Summary for Link E-POI2: Point of Interest 2

Inflow Area = 28,428 sf, 0.00% Impervious, Inflow Depth = 2.75" for 10-YR event
Inflow = 1.56 cfs @ 12.28 hrs, Volume= 6,512 cf
Primary = 1.56 cfs @ 12.28 hrs, Volume= 6,512 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Link E-POI2: Point of Interest 2

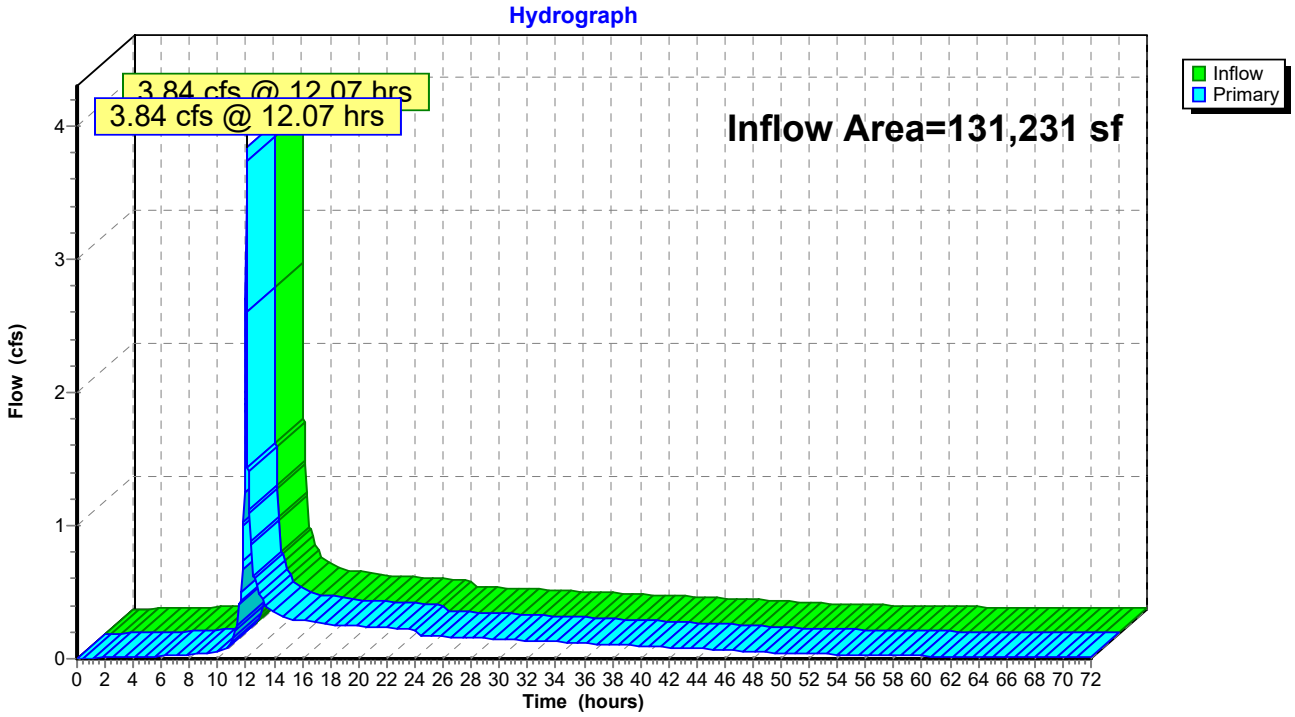


Summary for Link P-POI1: Point of Inerest 1

Inflow Area = 131,231 sf, 30.63% Impervious, Inflow Depth > 2.71" for 10-YR event
Inflow = 3.84 cfs @ 12.07 hrs, Volume= 29,666 cf
Primary = 3.84 cfs @ 12.07 hrs, Volume= 29,666 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Link P-POI1: Point of Inerest 1

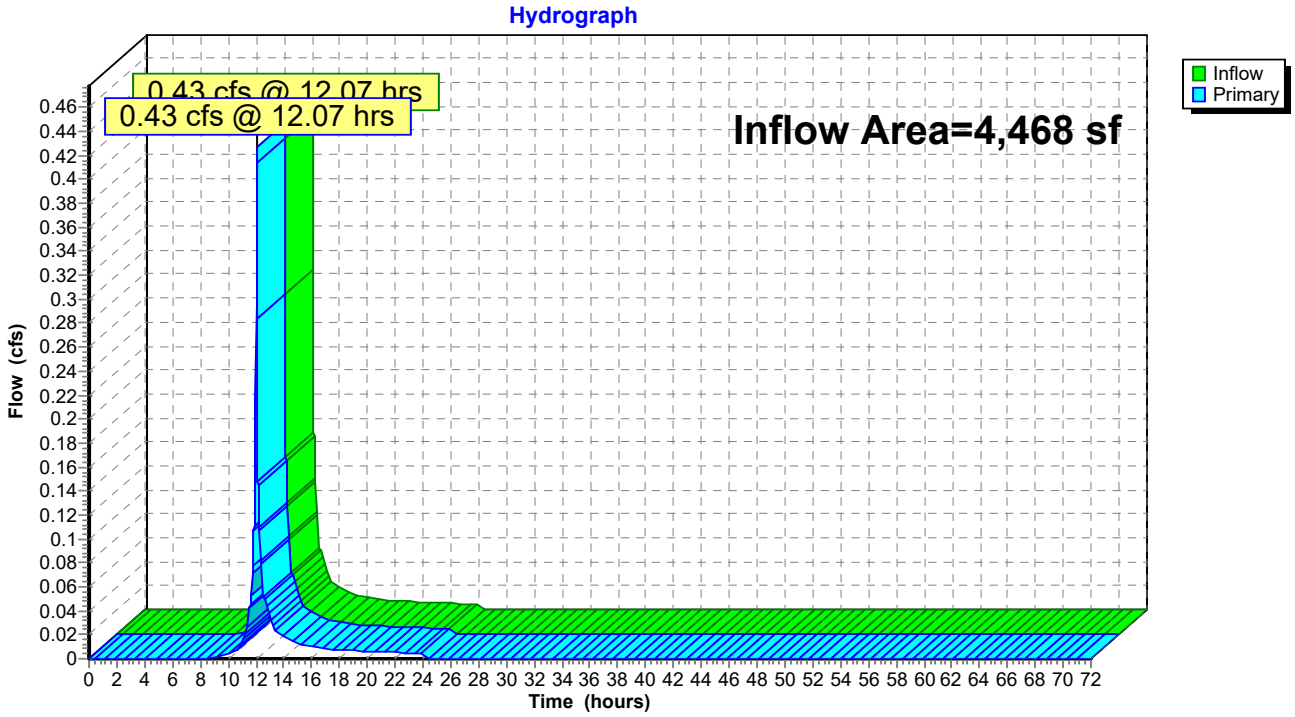


Summary for Link P-POI2: Point of Interest 2

Inflow Area = 4,468 sf, 0.00% Impervious, Inflow Depth = 2.66" for 10-YR event
Inflow = 0.43 cfs @ 12.07 hrs, Volume= 990 cf
Primary = 0.43 cfs @ 12.07 hrs, Volume= 990 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Link P-POI2: Point of Interest 2



APPENDIX C-4
100-YEAR STORM EVENT HYDROGRAPHS

Summary for Subcatchment E1-A: Existing Drainage to US Route 206

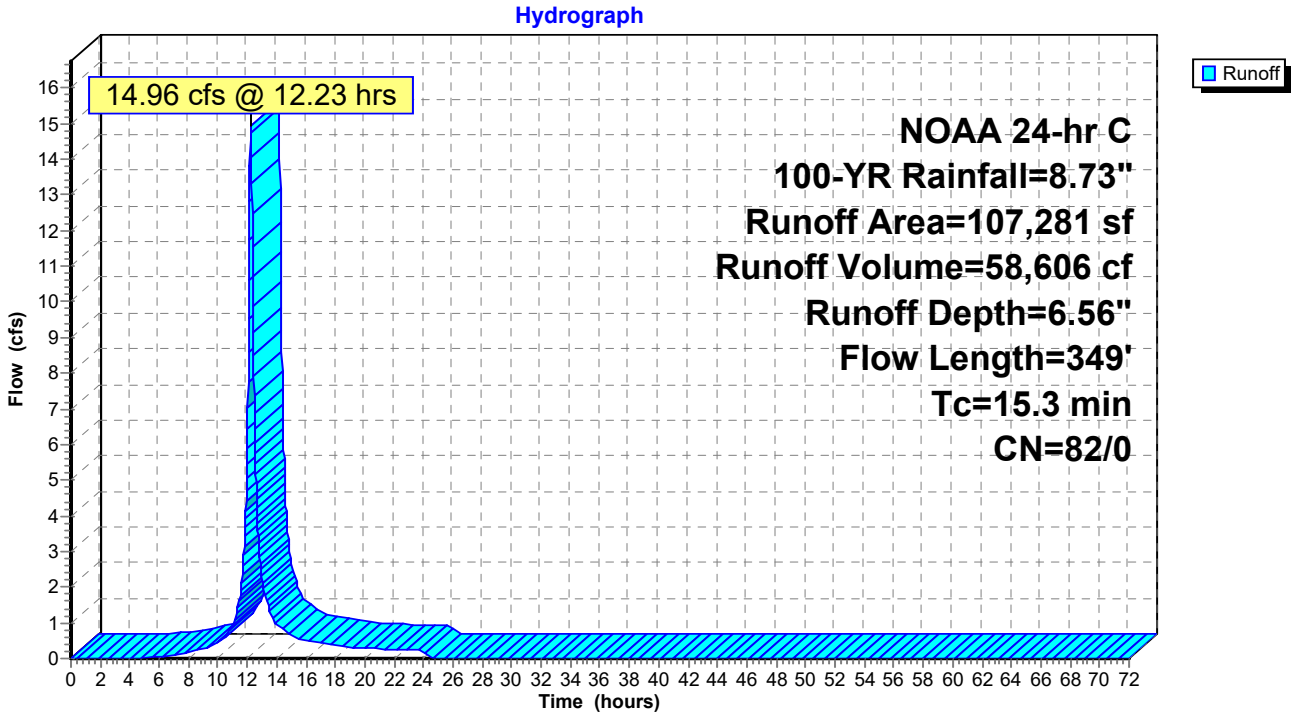
Runoff = 14.96 cfs @ 12.23 hrs, Volume= 58,606 cf, Depth= 6.56"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 100-YR Rainfall=8.73"

Area (sf)	CN	Description
52,064	86	<50% Grass cover, Poor, HSG C
2,709	96	Gravel surface, HSG C
5,596	76	Woods/grass comb., Fair, HSG C
12,324	68	<50% Grass cover, Poor, HSG A
2,062	96	Gravel surface, HSG D
15,342	80	>75% Grass cover, Good, HSG D
17,184	82	Woods/grass comb., Fair, HSG D
107,281	82	Weighted Average
107,281	82	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	55	0.0180	0.15		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.35"
4.9	45	0.0220	0.15		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.35"
2.0	89	0.0110	0.73		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
1.2	64	0.0160	0.89		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
0.3	25	0.0400	1.40		**Shallow Concentrated Flow, F-G** Short Grass Pasture Kv= 7.0 fps
0.7	71	0.0140	1.77		**Shallow Concentrated Flow, G-H** Grassed Waterway Kv= 15.0 fps
15.3	349	Total			

Subcatchment E1-A: Existing Drainage to US Route 206



Summary for Subcatchment E2: Existing Drainage to Red Lion Road

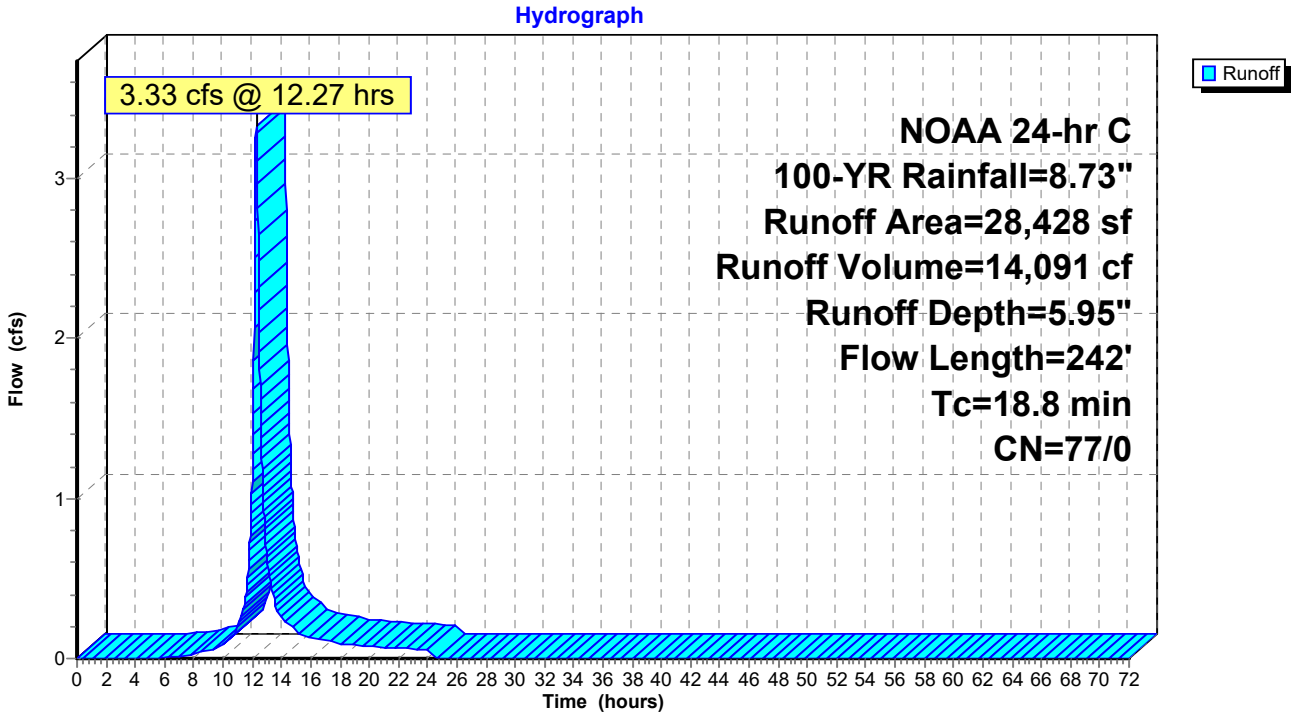
Runoff = 3.33 cfs @ 12.27 hrs, Volume= 14,091 cf, Depth= 5.95"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 100-YR Rainfall=8.73"

Area (sf)	CN	Description
8,966	80	>75% Grass cover, Good, HSG D
1,621	96	Gravel surface, HSG D
17,586	74	>75% Grass cover, Good, HSG C
255	96	Gravel surface, HSG C
28,428	77	Weighted Average
28,428	77	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	28	0.0070	0.09		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 3.35"
9.4	72	0.0110	0.13		**Sheet Flow, Segment B-C** Grass: Short n= 0.150 P2= 3.35"
2.7	62	0.0030	0.38		**Shallow Concentrated Flow, Segment C-D** Short Grass Pasture Kv= 7.0 fps
1.2	49	0.0100	0.70		**Shallow Concentrated Flow, Segment D-E** Short Grass Pasture Kv= 7.0 fps
0.2	31	0.0160	2.57		**Shallow Concentrated Flow, Segment E-F** Paved Kv= 20.3 fps
18.8	242	Total			

Subcatchment E2: Existing Drainage to Red Lion Road



Summary for Subcatchment P1-A: Proposed Drainage to US Route 206

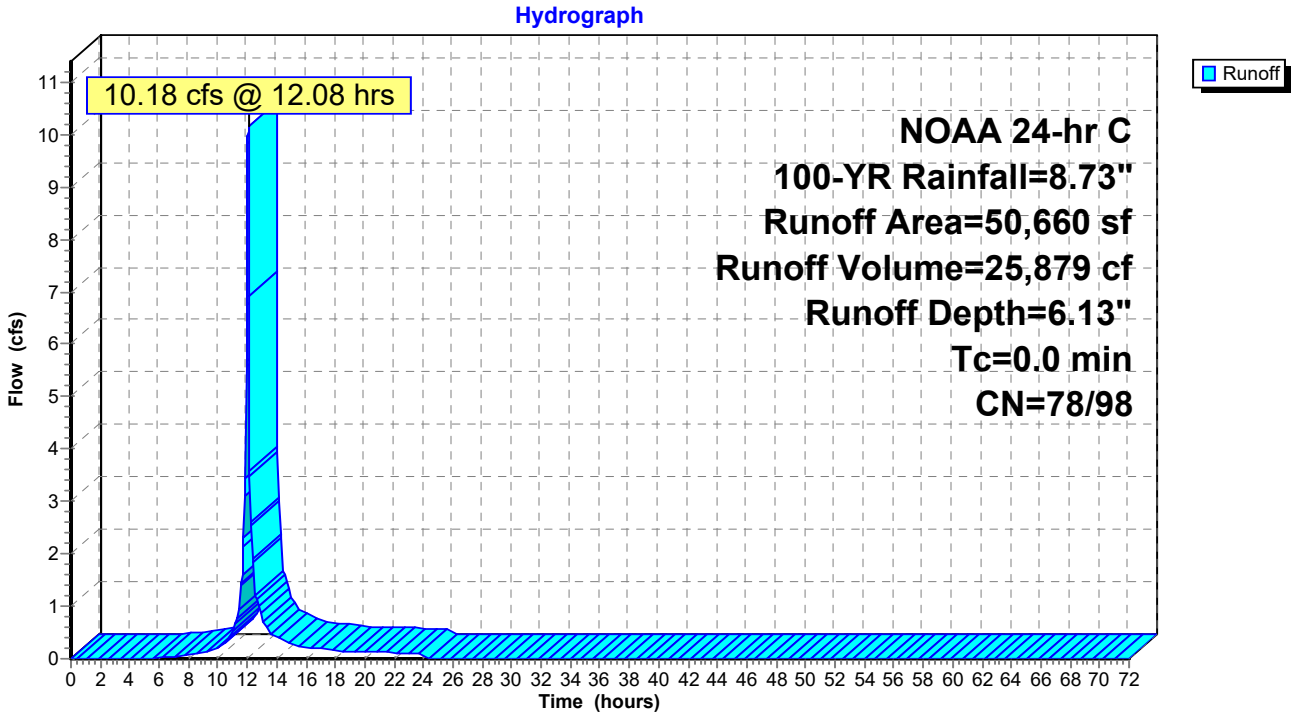
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 10.18 cfs @ 12.08 hrs, Volume= 25,879 cf, Depth= 6.13"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 100-YR Rainfall=8.73"

Area (sf)	CN	Description
20,130	74	>75% Grass cover, Good, HSG C
29,261	80	>75% Grass cover, Good, HSG D
1,269	98	Paved parking, HSG A
50,660	78	Weighted Average
49,391	78	97.50% Pervious Area
1,269	98	2.50% Impervious Area

Subcatchment P1-A: Proposed Drainage to US Route 206



Summary for Subcatchment P1-B: Proposed Parking Area Drainage

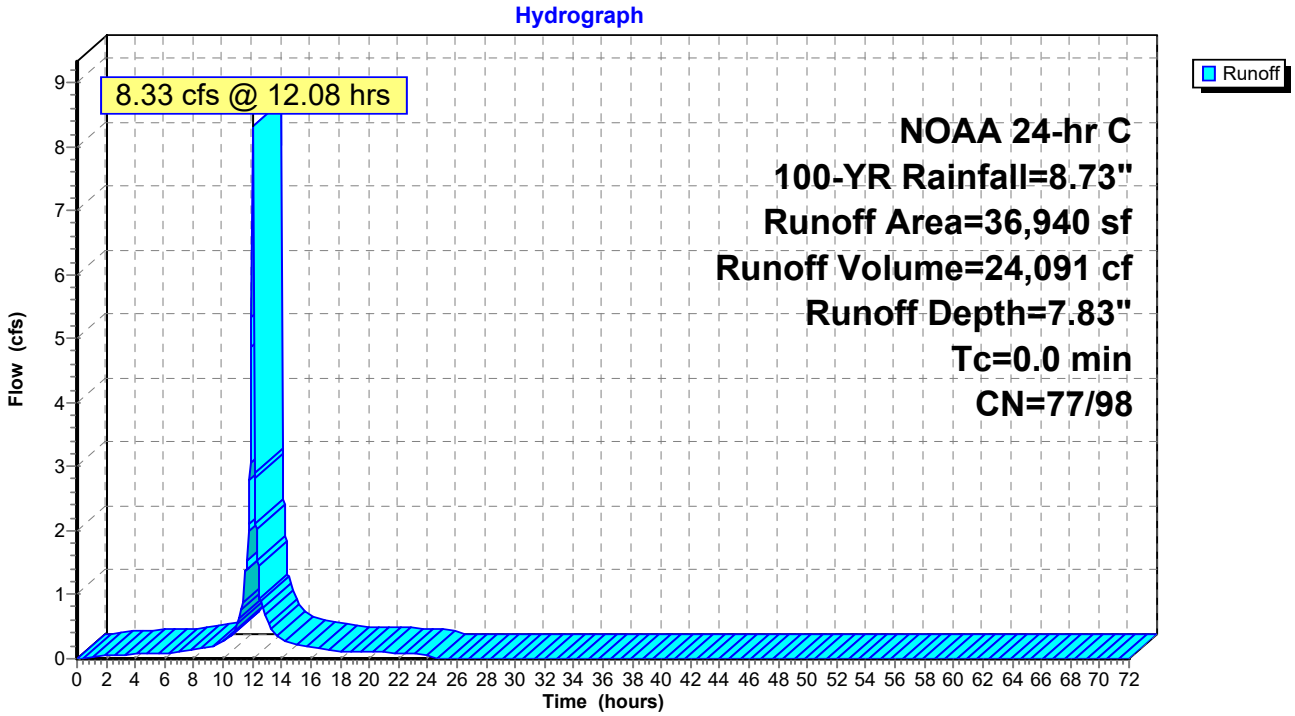
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 8.33 cfs @ 12.08 hrs, Volume= 24,091 cf, Depth= 7.83"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 100-YR Rainfall=8.73"

Area (sf)	CN	Description
27,292	98	Paved parking, HSG A
5,390	80	>75% Grass cover, Good, HSG D
4,258	74	>75% Grass cover, Good, HSG C
36,940	93	Weighted Average
9,648	77	26.12% Pervious Area
27,292	98	73.88% Impervious Area

Subcatchment P1-B: Proposed Parking Area Drainage



Summary for Subcatchment P1-C: Undetained Drainage to US Route 206

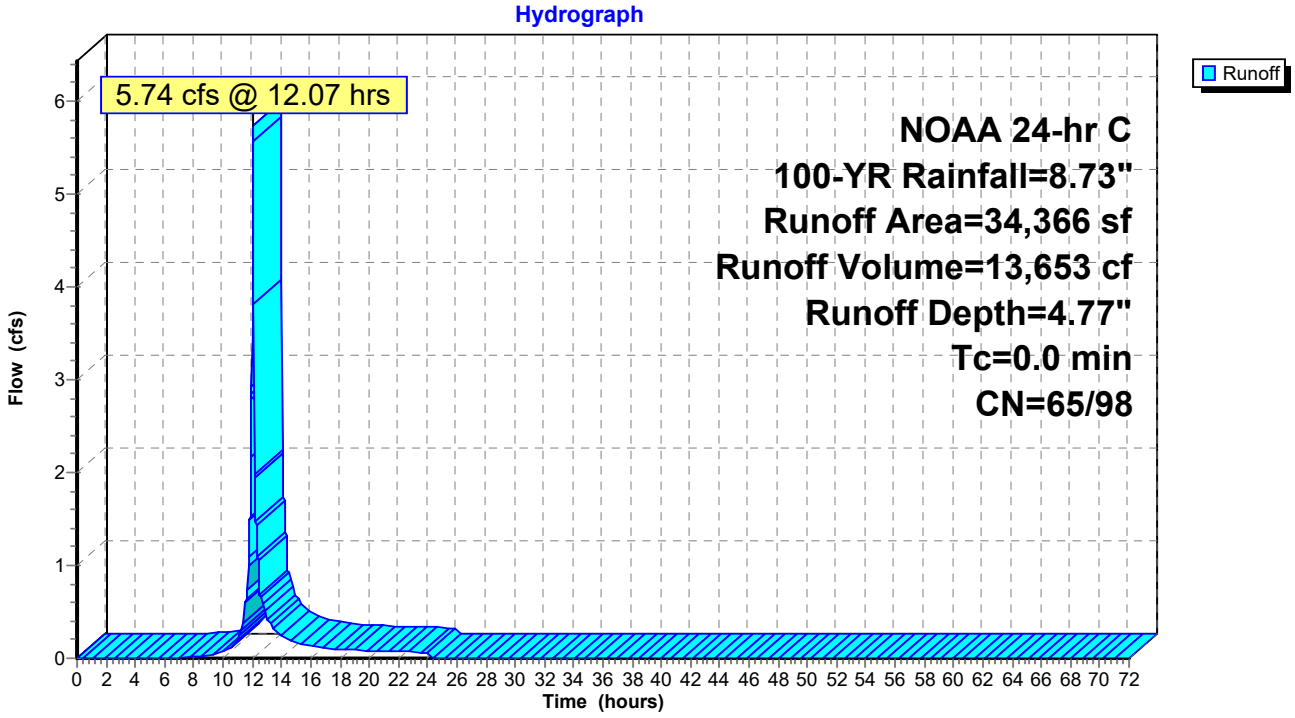
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 5.74 cfs @ 12.07 hrs, Volume= 13,653 cf, Depth= 4.77"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 100-YR Rainfall=8.73"

Area (sf)	CN	Description
19,537	74	>75% Grass cover, Good, HSG C
8,752	39	>75% Grass cover, Good, HSG A
3,711	80	>75% Grass cover, Good, HSG D
2,366	98	Paved parking, HSG A
34,366	67	Weighted Average
32,000	65	93.12% Pervious Area
2,366	98	6.88% Impervious Area

Subcatchment P1-C: Undetained Drainage to US Route 206



Summary for Subcatchment P1-D: Drainage from Building

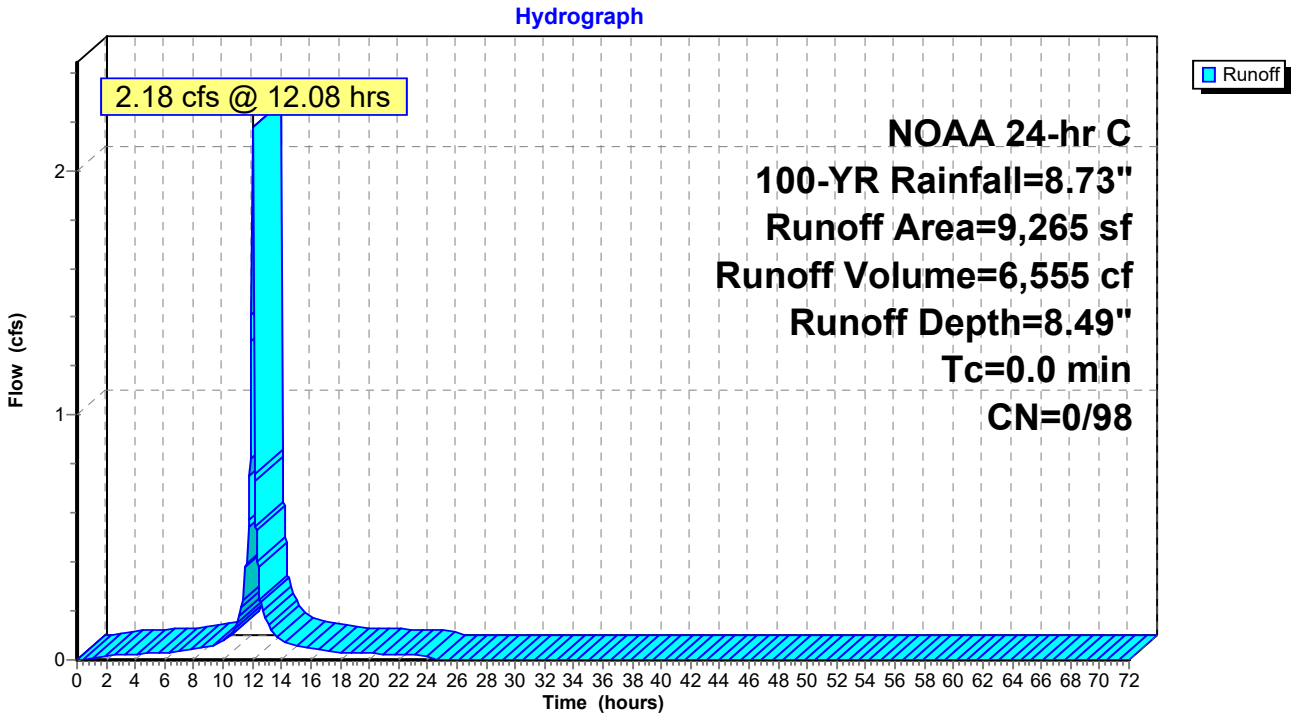
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 2.18 cfs @ 12.08 hrs, Volume= 6,555 cf, Depth= 8.49"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 100-YR Rainfall=8.73"

Area (sf)	CN	Description
9,265	98	Roofs, HSG A
9,265	98	100.00% Impervious Area

Subcatchment P1-D: Drainage from Building



Summary for Subcatchment P2: Proposed Drainage to Red Lion Road

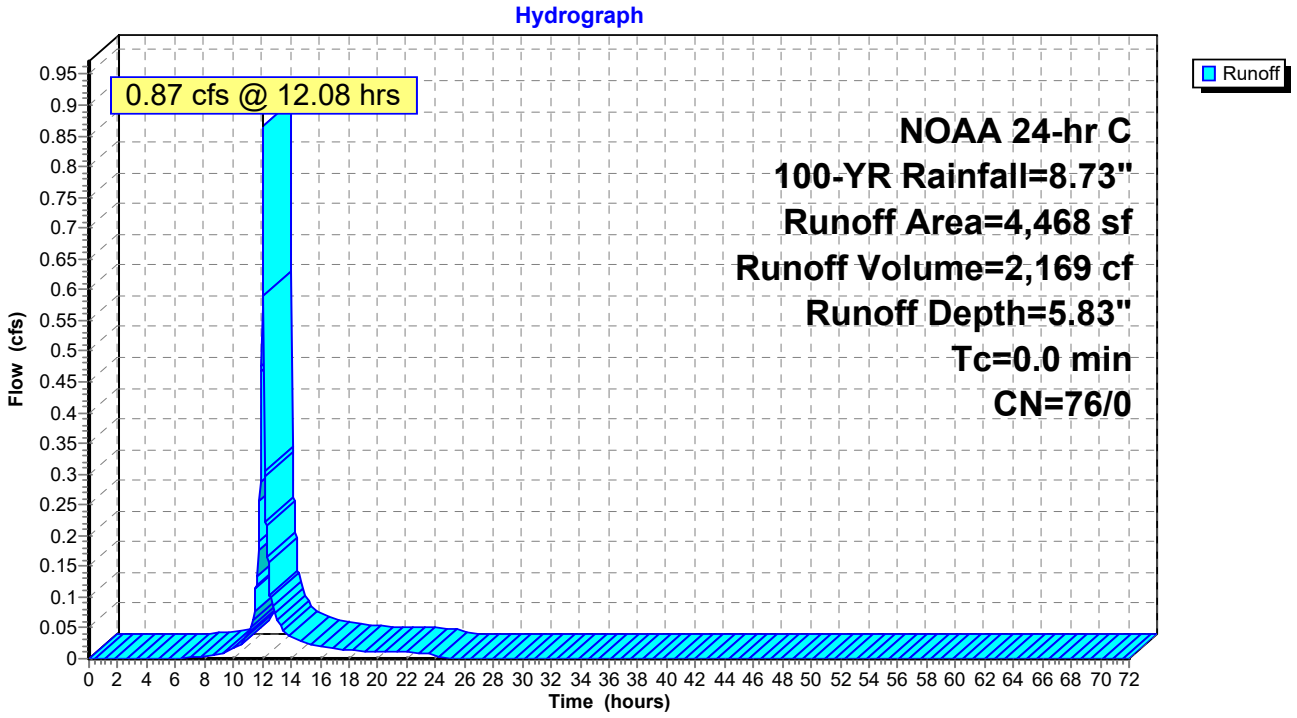
[46] Hint: Tc=0 (Instant runoff peak depends on dt)

Runoff = 0.87 cfs @ 12.08 hrs, Volume= 2,169 cf, Depth= 5.83"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
NOAA 24-hr C 100-YR Rainfall=8.73"

Area (sf)	CN	Description
1,678	80	>75% Grass cover, Good, HSG D
2,790	74	>75% Grass cover, Good, HSG C
4,468	76	Weighted Average
4,468	76	100.00% Pervious Area

Subcatchment P2: Proposed Drainage to Red Lion Road



Summary for Pond B1: Proposed Above Ground Basin

Inflow Area = 87,600 sf, 32.60% Impervious, Inflow Depth = 6.26" for 100-YR event
Inflow = 18.60 cfs @ 12.07 hrs, Volume= 45,683 cf
Outflow = 2.33 cfs @ 12.54 hrs, Volume= 44,257 cf, Atten= 87%, Lag= 28.3 min
Primary = 2.33 cfs @ 12.54 hrs, Volume= 44,257 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 50.77' @ 12.54 hrs Surf.Area= 21,568 sf Storage= 25,516 cf

Plug-Flow detention time= 599.1 min calculated for 44,245 cf (97% of inflow)
Center-of-Mass det. time= 581.3 min (1,371.8 - 790.5)

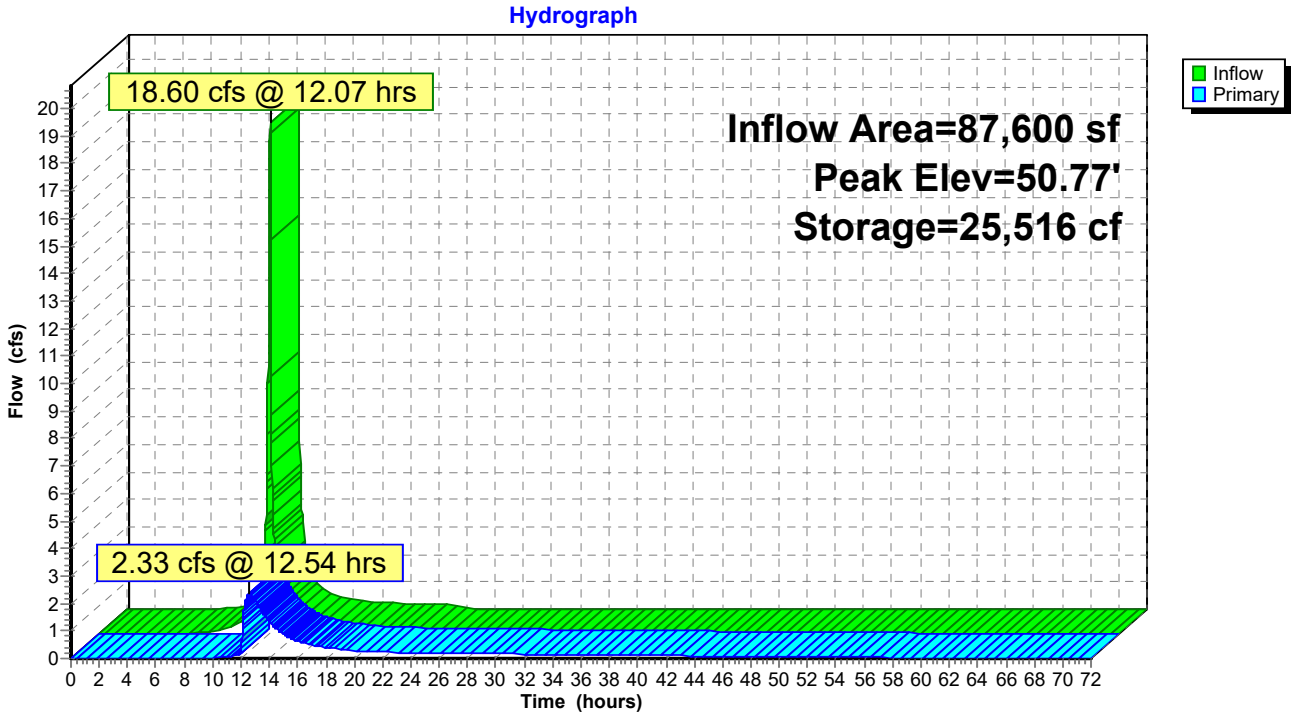
Volume	Invert	Avail.Storage	Storage Description
#1	49.50'	53,832 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
49.50	18,607	765.0	0	0	18,607
50.00	19,762	775.0	9,591	9,591	19,892
50.50	20,931	784.0	10,172	19,763	21,074
51.00	22,115	794.0	10,760	30,523	22,390
52.00	24,524	812.0	23,309	53,832	24,827

Device	Routing	Invert	Outlet Devices
#1	Primary	49.50'	**12.0" Round Culvert** L= 180.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 49.50' / 47.00' S= 0.0139 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	49.50'	**3.0" Vert. 3" orifice** C= 0.600
#3	Device 1	50.30'	**24.0" W x 6.0" H Vert. Orifice/Grate** C= 0.600
#4	Device 1	51.00'	**48.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.33 cfs @ 12.54 hrs HW=50.77' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 2.33 cfs of 3.32 cfs potential flow)
  - **2=3" orifice** (Orifice Controls 0.25 cfs @ 5.15 fps)
  - **3=Orifice/Grate** (Orifice Controls 2.07 cfs @ 2.20 fps)
  - **4=Orifice/Grate** (Controls 0.00 cfs)

Pond B1: Proposed Above Ground Basin



Summary for Pond B2: Water Qaulity Basin

Inflow Area = 36,940 sf, 73.88% Impervious, Inflow Depth = 7.83" for 100-YR event
Inflow = 8.33 cfs @ 12.08 hrs, Volume= 24,091 cf
Outflow = 8.12 cfs @ 12.08 hrs, Volume= 24,091 cf, Atten= 3%, Lag= 0.0 min
Discarded = 0.04 cfs @ 12.08 hrs, Volume= 4,288 cf
Primary = 8.08 cfs @ 12.08 hrs, Volume= 19,804 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs
Peak Elev= 51.64' @ 12.08 hrs Surf.Area= 2,692 sf Storage= 2,716 cf

Plug-Flow detention time= 103.2 min calculated for 24,084 cf (100% of inflow)
Center-of-Mass det. time= 103.4 min (852.2 - 748.8)

Volume	Invert	Avail.Storage	Storage Description
#1	50.50'	5,237 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

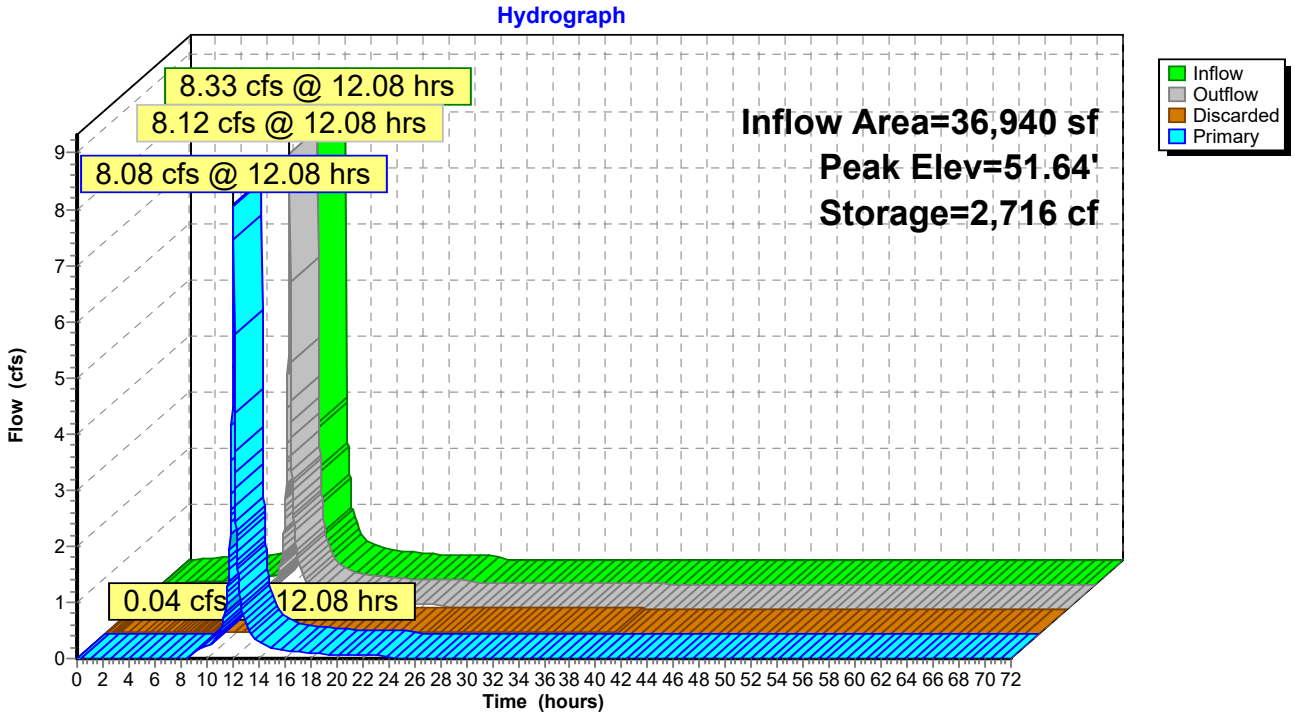
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
50.50	2,067	171.0	0	0	2,067
51.00	2,331	181.0	1,099	1,099	2,361
52.00	2,902	200.0	2,611	3,710	2,967
52.50	3,207	209.0	1,527	5,237	3,278

Device	Routing	Invert	Outlet Devices
#1	Primary	51.20'	**10.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#2	Discarded	50.50'	**0.500 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 47.00'

Discarded OutFlow Max=0.04 cfs @ 12.08 hrs HW=51.64' (Free Discharge)
↑—**2=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=8.01 cfs @ 12.08 hrs HW=51.64' TW=50.49' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 8.01 cfs @ 1.81 fps)

Pond B2: Water Qaulity Basin

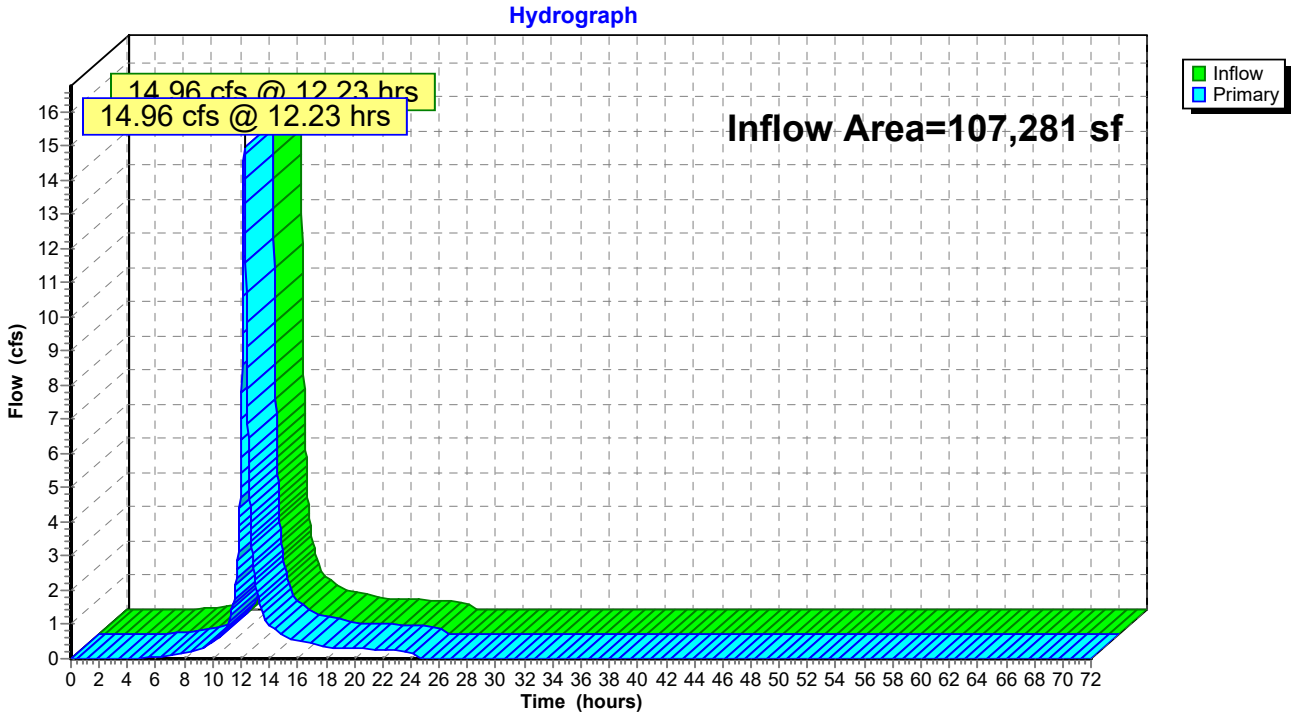


Summary for Link E-POI1: Point of Interest 1

Inflow Area = 107,281 sf, 0.00% Impervious, Inflow Depth = 6.56" for 100-YR event
Inflow = 14.96 cfs @ 12.23 hrs, Volume= 58,606 cf
Primary = 14.96 cfs @ 12.23 hrs, Volume= 58,606 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Link E-POI1: Point of Interest 1

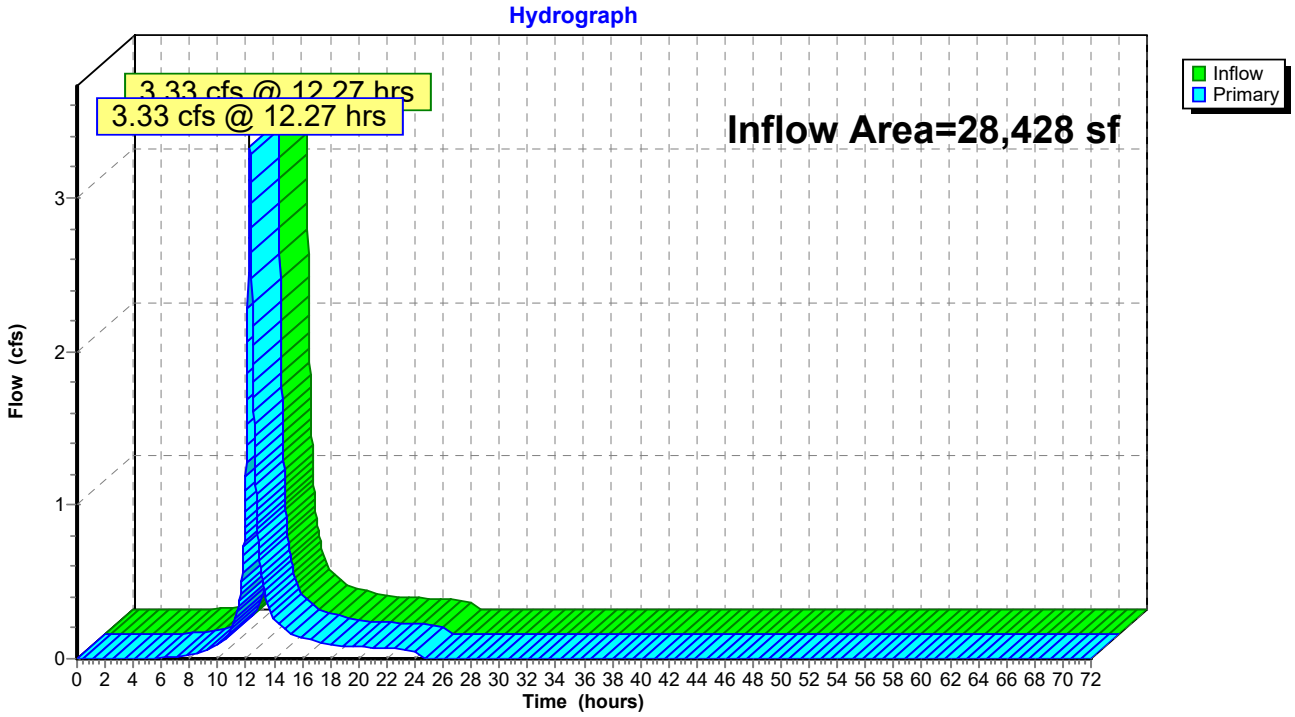


Summary for Link E-POI2: Point of Interest 2

Inflow Area = 28,428 sf, 0.00% Impervious, Inflow Depth = 5.95" for 100-YR event
Inflow = 3.33 cfs @ 12.27 hrs, Volume= 14,091 cf
Primary = 3.33 cfs @ 12.27 hrs, Volume= 14,091 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Link E-POI2: Point of Interest 2

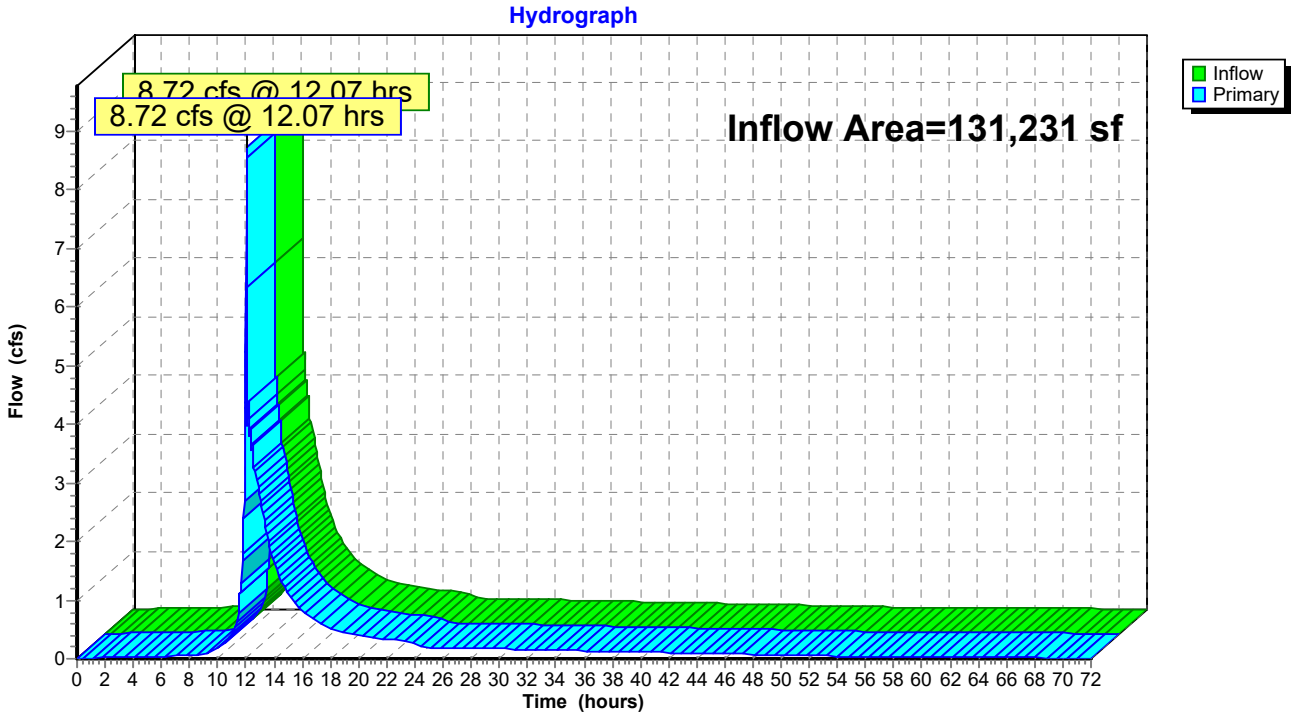


Summary for Link P-POI1: Point of Inerest 1

Inflow Area = 131,231 sf, 30.63% Impervious, Inflow Depth > 5.89" for 100-YR event
Inflow = 8.72 cfs @ 12.07 hrs, Volume= 64,465 cf
Primary = 8.72 cfs @ 12.07 hrs, Volume= 64,465 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Link P-POI1: Point of Inerest 1

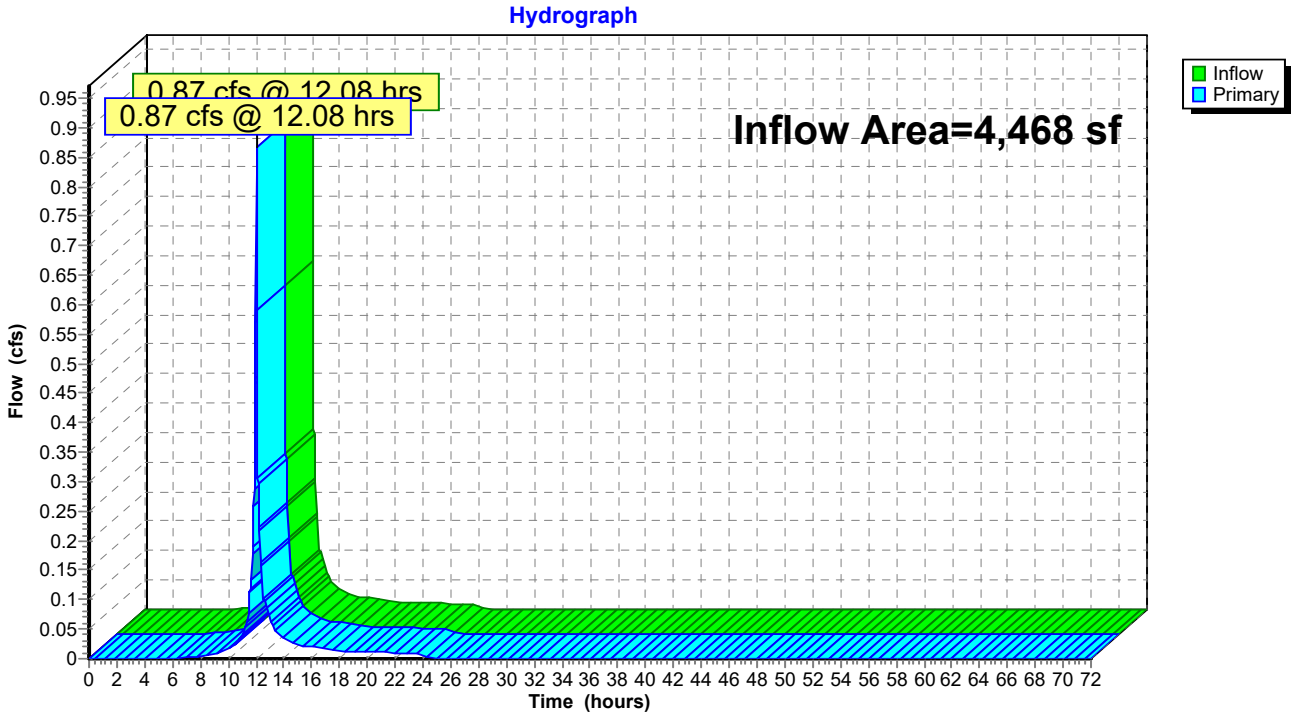


Summary for Link P-POI2: Point of Interest 2

Inflow Area = 4,468 sf, 0.00% Impervious, Inflow Depth = 5.83" for 100-YR event
Inflow = 0.87 cfs @ 12.08 hrs, Volume= 2,169 cf
Primary = 0.87 cfs @ 12.08 hrs, Volume= 2,169 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.02 hrs

Link P-POI2: Point of Interest 2



APPENDIX C-5
BASIN STORAGE AND DISCHARGE TABLES

Stage-Discharge for Pond B1: Proposed Above Ground Basin

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
49.50	0.00	50.03	0.15	50.56	1.08	51.09	3.95
49.51	0.00	50.04	0.15	50.57	1.13	51.10	3.97
49.52	0.00	50.05	0.15	50.58	1.18	51.11	3.98
49.53	0.00	50.06	0.16	50.59	1.23	51.12	4.00
49.54	0.00	50.07	0.16	50.60	1.29	51.13	4.02
49.55	0.01	50.08	0.16	50.61	1.34	51.14	4.04
49.56	0.01	50.09	0.16	50.62	1.40	51.15	4.06
49.57	0.01	50.10	0.16	50.63	1.45	51.16	4.07
49.58	0.01	50.11	0.16	50.64	1.51	51.17	4.09
49.59	0.02	50.12	0.17	50.65	1.57	51.18	4.11
49.60	0.02	50.13	0.17	50.66	1.63	51.19	4.13
49.61	0.02	50.14	0.17	50.67	1.69	51.20	4.14
49.62	0.03	50.15	0.17	50.68	1.75	51.21	4.16
49.63	0.03	50.16	0.17	50.69	1.81	51.22	4.18
49.64	0.04	50.17	0.17	50.70	1.87	51.23	4.19
49.65	0.04	50.18	0.18	50.71	1.93	51.24	4.21
49.66	0.05	50.19	0.18	50.72	1.99	51.25	4.23
49.67	0.05	50.20	0.18	50.73	2.06	51.26	4.24
49.68	0.05	50.21	0.18	50.74	2.12	51.27	4.26
49.69	0.06	50.22	0.18	50.75	2.19	51.28	4.27
49.70	0.06	50.23	0.18	50.76	2.25	51.29	4.27
49.71	0.07	50.24	0.19	50.77	2.32	51.30	4.28
49.72	0.07	50.25	0.19	50.78	2.39	51.31	4.29
49.73	0.08	50.26	0.19	50.79	2.46	51.32	4.29
49.74	0.08	50.27	0.19	50.80	2.53	51.33	4.30
49.75	0.08	50.28	0.19	50.81	2.59	51.34	4.31
49.76	0.09	50.29	0.19	50.82	2.65	51.35	4.31
49.77	0.09	50.30	0.19	50.83	2.70	51.36	4.32
49.78	0.09	50.31	0.20	50.84	2.76	51.37	4.33
49.79	0.10	50.32	0.22	50.85	2.81	51.38	4.33
49.80	0.10	50.33	0.23	50.86	2.86	51.39	4.34
49.81	0.10	50.34	0.25	50.87	2.91	51.40	4.35
49.82	0.10	50.35	0.27	50.88	2.96	51.41	4.35
49.83	0.11	50.36	0.30	50.89	3.00	51.42	4.36
49.84	0.11	50.37	0.32	50.90	3.05	51.43	4.36
49.85	0.11	50.38	0.35	50.91	3.09	51.44	4.37
49.86	0.11	50.39	0.38	50.92	3.14	51.45	4.38
49.87	0.12	50.40	0.41	50.93	3.18	51.46	4.38
49.88	0.12	50.41	0.44	50.94	3.22	51.47	4.39
49.89	0.12	50.42	0.48	50.95	3.26	51.48	4.40
49.90	0.12	50.43	0.51	50.96	3.30	51.49	4.40
49.91	0.13	50.44	0.55	50.97	3.34	51.50	4.41
49.92	0.13	50.45	0.59	50.98	3.38	51.51	4.42
49.93	0.13	50.46	0.63	50.99	3.42	51.52	4.42
49.94	0.13	50.47	0.67	51.00	3.46	51.53	4.43
49.95	0.13	50.48	0.71	51.01	3.55	51.54	4.43
49.96	0.14	50.49	0.75	51.02	3.69	51.55	4.44
49.97	0.14	50.50	0.80	51.03	3.84	51.56	4.45
49.98	0.14	50.51	0.84	51.04	3.86	51.57	4.45
49.99	0.14	50.52	0.89	51.05	3.88	51.58	4.46
50.00	0.14	50.53	0.93	51.06	3.89	51.59	4.47
50.01	0.15	50.54	0.98	51.07	3.91	51.60	4.47
50.02	0.15	50.55	1.03	51.08	3.93	51.61	4.48

Stage-Discharge for Pond B1: Proposed Above Ground Basin (continued)

Elevation (feet)	Primary (cfs)
51.62	4.48
51.63	4.49
51.64	4.50
51.65	4.50
51.66	4.51
51.67	4.52
51.68	4.52
51.69	4.53
51.70	4.53
51.71	4.54
51.72	4.55
51.73	4.55
51.74	4.56
51.75	4.56
51.76	4.57
51.77	4.58
51.78	4.58
51.79	4.59
51.80	4.59
51.81	4.60
51.82	4.61
51.83	4.61
51.84	4.62
51.85	4.62
51.86	4.63
51.87	4.64
51.88	4.64
51.89	4.65
51.90	4.65
51.91	4.66
51.92	4.67
51.93	4.67
51.94	4.68
51.95	4.68
51.96	4.69
51.97	4.70
51.98	4.70
51.99	4.71
52.00	**4.71**

Stage-Area-Storage for Pond B1: Proposed Above Ground Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
49.50	18,607	0	50.03	19,831	10,185
49.51	18,630	186	50.04	19,854	10,383
49.52	18,653	373	50.05	19,877	10,582
49.53	18,675	559	50.06	19,901	10,781
49.54	18,698	746	50.07	19,924	10,980
49.55	18,721	933	50.08	19,947	11,179
49.56	18,744	1,121	50.09	19,970	11,379
49.57	18,767	1,308	50.10	19,993	11,579
49.58	18,789	1,496	50.11	20,016	11,779
49.59	18,812	1,684	50.12	20,039	11,979
49.60	18,835	1,872	50.13	20,063	12,179
49.61	18,858	2,061	50.14	20,086	12,380
49.62	18,881	2,249	50.15	20,109	12,581
49.63	18,904	2,438	50.16	20,132	12,782
49.64	18,927	2,627	50.17	20,156	12,984
49.65	18,950	2,817	50.18	20,179	13,185
49.66	18,973	3,006	50.19	20,202	13,387
49.67	18,996	3,196	50.20	20,226	13,589
49.68	19,019	3,386	50.21	20,249	13,792
49.69	19,042	3,577	50.22	20,272	13,994
49.70	19,065	3,767	50.23	20,296	14,197
49.71	19,088	3,958	50.24	20,319	14,400
49.72	19,111	4,149	50.25	20,342	14,604
49.73	19,134	4,340	50.26	20,366	14,807
49.74	19,157	4,532	50.27	20,389	15,011
49.75	19,180	4,723	50.28	20,413	15,215
49.76	19,203	4,915	50.29	20,436	15,419
49.77	19,226	5,107	50.30	20,459	15,624
49.78	19,250	5,300	50.31	20,483	15,828
49.79	19,273	5,492	50.32	20,506	16,033
49.80	19,296	5,685	50.33	20,530	16,239
49.81	19,319	5,878	50.34	20,553	16,444
49.82	19,342	6,071	50.35	20,577	16,650
49.83	19,365	6,265	50.36	20,600	16,855
49.84	19,389	6,459	50.37	20,624	17,062
49.85	19,412	6,653	50.38	20,647	17,268
49.86	19,435	6,847	50.39	20,671	17,475
49.87	19,458	7,042	50.40	20,695	17,681
49.88	19,482	7,236	50.41	20,718	17,888
49.89	19,505	7,431	50.42	20,742	18,096
49.90	19,528	7,626	50.43	20,765	18,303
49.91	19,552	7,822	50.44	20,789	18,511
49.92	19,575	8,017	50.45	20,813	18,719
49.93	19,598	8,213	50.46	20,836	18,927
49.94	19,622	8,409	50.47	20,860	19,136
49.95	19,645	8,606	50.48	20,884	19,345
49.96	19,668	8,802	50.49	20,907	19,553
49.97	19,692	8,999	50.50	20,931	19,763
49.98	19,715	9,196	50.51	20,954	19,972
49.99	19,739	9,393	50.52	20,978	20,182
50.00	19,762	9,591	50.53	21,001	20,392
50.01	19,785	9,789	50.54	21,025	20,602
50.02	19,808	9,987	50.55	21,048	20,812

Stage-Area-Storage for Pond B1: Proposed Above Ground Basin (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
50.56	21,071	21,023	51.09	22,327	32,523
50.57	21,095	21,234	51.10	22,350	32,746
50.58	21,118	21,445	51.11	22,374	32,970
50.59	21,142	21,656	51.12	22,398	33,194
50.60	21,165	21,867	51.13	22,421	33,418
50.61	21,189	22,079	51.14	22,445	33,642
50.62	21,212	22,291	51.15	22,468	33,867
50.63	21,236	22,503	51.16	22,492	34,091
50.64	21,259	22,716	51.17	22,516	34,316
50.65	21,283	22,929	51.18	22,539	34,542
50.66	21,306	23,142	51.19	22,563	34,767
50.67	21,330	23,355	51.20	22,587	34,993
50.68	21,353	23,568	51.21	22,611	35,219
50.69	21,377	23,782	51.22	22,634	35,445
50.70	21,401	23,996	51.23	22,658	35,672
50.71	21,424	24,210	51.24	22,682	35,898
50.72	21,448	24,424	51.25	22,706	36,125
50.73	21,472	24,639	51.26	22,729	36,352
50.74	21,495	24,854	51.27	22,753	36,580
50.75	21,519	25,069	51.28	22,777	36,807
50.76	21,543	25,284	51.29	22,801	37,035
50.77	21,566	25,500	51.30	22,825	37,263
50.78	21,590	25,715	51.31	22,848	37,492
50.79	21,614	25,931	51.32	22,872	37,720
50.80	21,637	26,148	51.33	22,896	37,949
50.81	21,661	26,364	51.34	22,920	38,178
50.82	21,685	26,581	51.35	22,944	38,408
50.83	21,709	26,798	51.36	22,968	38,637
50.84	21,733	27,015	51.37	22,992	38,867
50.85	21,756	27,232	51.38	23,016	39,097
50.86	21,780	27,450	51.39	23,040	39,327
50.87	21,804	27,668	51.40	23,064	39,558
50.88	21,828	27,886	51.41	23,088	39,789
50.89	21,852	28,105	51.42	23,112	40,020
50.90	21,876	28,323	51.43	23,136	40,251
50.91	21,899	28,542	51.44	23,160	40,482
50.92	21,923	28,761	51.45	23,184	40,714
50.93	21,947	28,981	51.46	23,208	40,946
50.94	21,971	29,200	51.47	23,232	41,178
50.95	21,995	29,420	51.48	23,256	41,411
50.96	22,019	29,640	51.49	23,280	41,643
50.97	22,043	29,860	51.50	23,304	41,876
50.98	22,067	30,081	51.51	23,328	42,109
50.99	22,091	30,302	51.52	23,352	42,343
51.00	22,115	30,523	51.53	23,376	42,576
51.01	22,138	30,744	51.54	23,400	42,810
51.02	22,162	30,966	51.55	23,425	43,044
51.03	22,185	31,187	51.56	23,449	43,279
51.04	22,209	31,409	51.57	23,473	43,513
51.05	22,232	31,631	51.58	23,497	43,748
51.06	22,256	31,854	51.59	23,521	43,983
51.07	22,280	32,077	51.60	23,545	44,219
51.08	22,303	32,300	51.61	23,570	44,454

Stage-Area-Storage for Pond B1: Proposed Above Ground Basin (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
51.62	23,594	44,690
51.63	23,618	44,926
51.64	23,642	45,162
51.65	23,667	45,399
51.66	23,691	45,636
51.67	23,715	45,873
51.68	23,740	46,110
51.69	23,764	46,348
51.70	23,788	46,585
51.71	23,813	46,823
51.72	23,837	47,062
51.73	23,861	47,300
51.74	23,886	47,539
51.75	23,910	47,778
51.76	23,934	48,017
51.77	23,959	48,257
51.78	23,983	48,496
51.79	24,008	48,736
51.80	24,032	48,976
51.81	24,057	49,217
51.82	24,081	49,458
51.83	24,106	49,698
51.84	24,130	49,940
51.85	24,155	50,181
51.86	24,179	50,423
51.87	24,204	50,665
51.88	24,228	50,907
51.89	24,253	51,149
51.90	24,277	51,392
51.91	24,302	51,635
51.92	24,327	51,878
51.93	24,351	52,121
51.94	24,376	52,365
51.95	24,401	52,609
51.96	24,425	52,853
51.97	24,450	53,097
51.98	24,475	53,342
51.99	24,499	53,587
52.00	**24,524**	**53,832**

Stage-Discharge for Pond B2: Water Qaulity Basin

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
50.50	0.00	0.00	0.00	51.03	0.03	0.03	0.00
50.51	0.02	0.02	0.00	51.04	0.03	0.03	0.00
50.52	0.02	0.02	0.00	51.05	0.03	0.03	0.00
50.53	0.02	0.02	0.00	51.06	0.03	0.03	0.00
50.54	0.02	0.02	0.00	51.07	0.03	0.03	0.00
50.55	0.02	0.02	0.00	51.08	0.03	0.03	0.00
50.56	0.02	0.02	0.00	51.09	0.03	0.03	0.00
50.57	0.02	0.02	0.00	51.10	0.03	0.03	0.00
50.58	0.03	0.03	0.00	51.11	0.03	0.03	0.00
50.59	0.03	0.03	0.00	51.12	0.03	0.03	0.00
50.60	0.03	0.03	0.00	51.13	0.03	0.03	0.00
50.61	0.03	0.03	0.00	51.14	0.03	0.03	0.00
50.62	0.03	0.03	0.00	51.15	0.03	0.03	0.00
50.63	0.03	0.03	0.00	51.16	0.03	0.03	0.00
50.64	0.03	0.03	0.00	51.17	0.03	0.03	0.00
50.65	0.03	0.03	0.00	51.18	0.03	0.03	0.00
50.66	0.03	0.03	0.00	51.19	0.03	0.03	0.00
50.67	0.03	0.03	0.00	51.20	0.03	0.03	0.00
50.68	0.03	0.03	0.00	51.21	0.06	0.03	0.03
50.69	0.03	0.03	0.00	51.22	0.11	0.03	0.08
50.70	0.03	0.03	0.00	51.23	0.17	0.03	0.14
50.71	0.03	0.03	0.00	51.24	0.25	0.03	0.22
50.72	0.03	0.03	0.00	51.25	0.34	0.03	0.30
50.73	0.03	0.03	0.00	51.26	0.43	0.03	0.40
50.74	0.03	0.03	0.00	51.27	0.53	0.03	0.50
50.75	0.03	0.03	0.00	51.28	0.64	0.04	0.61
50.76	0.03	0.03	0.00	51.29	0.76	0.04	0.73
50.77	0.03	0.03	0.00	51.30	0.89	0.04	0.85
50.78	0.03	0.03	0.00	51.31	1.02	0.04	0.98
50.79	0.03	0.03	0.00	51.32	1.15	0.04	1.12
50.80	0.03	0.03	0.00	51.33	1.30	0.04	1.26
50.81	0.03	0.03	0.00	51.34	1.45	0.04	1.41
50.82	0.03	0.03	0.00	51.35	1.60	0.04	1.56
50.83	0.03	0.03	0.00	51.36	1.76	0.04	1.72
50.84	0.03	0.03	0.00	51.37	1.92	0.04	1.89
50.85	0.03	0.03	0.00	51.38	2.09	0.04	2.05
50.86	0.03	0.03	0.00	51.39	2.26	0.04	2.23
50.87	0.03	0.03	0.00	51.40	2.44	0.04	2.41
50.88	0.03	0.03	0.00	51.41	2.63	0.04	2.59
50.89	0.03	0.03	0.00	51.42	2.82	0.04	2.78
50.90	0.03	0.03	0.00	51.43	3.01	0.04	2.97
50.91	0.03	0.03	0.00	51.44	3.21	0.04	3.17
50.92	0.03	0.03	0.00	51.45	3.41	0.04	3.37
50.93	0.03	0.03	0.00	51.46	3.62	0.04	3.58
50.94	0.03	0.03	0.00	51.47	3.83	0.04	3.79
50.95	0.03	0.03	0.00	51.48	4.04	0.04	4.00
50.96	0.03	0.03	0.00	51.49	4.26	0.04	4.22
50.97	0.03	0.03	0.00	51.50	4.48	0.04	4.44
50.98	0.03	0.03	0.00	51.51	4.71	0.04	4.67
50.99	0.03	0.03	0.00	51.52	4.94	0.04	4.90
51.00	0.03	0.03	0.00	51.53	5.18	0.04	5.14
51.01	0.03	0.03	0.00	51.54	5.41	0.04	5.37
51.02	0.03	0.03	0.00	51.55	5.66	0.04	5.62

Stage-Discharge for Pond B2: Water Qaulity Basin (continued)

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
51.56	5.90	0.04	5.86
51.57	6.15	0.04	6.11
51.58	6.40	0.04	6.36
51.59	6.66	0.04	6.62
51.60	6.92	0.04	6.88
51.61	7.18	0.04	7.14
51.62	7.45	0.04	7.41
51.63	7.72	0.04	7.68
51.64	8.00	0.04	7.96
51.65	8.27	0.04	8.23
51.66	8.56	0.04	8.51
51.67	8.84	0.04	8.80
51.68	9.13	0.04	9.09
51.69	9.42	0.04	9.38
51.70	9.71	0.04	9.67
51.71	10.01	0.04	9.97
51.72	10.31	0.04	10.27
51.73	10.61	0.04	10.57
51.74	10.92	0.04	10.88
51.75	11.23	0.04	11.19
51.76	11.54	0.04	11.50
51.77	11.86	0.04	11.82
51.78	12.18	0.04	12.13
51.79	12.50	0.04	12.46
51.80	12.82	0.04	12.78
51.81	13.17	0.04	13.13
51.82	13.52	0.04	13.47
51.83	13.87	0.04	13.83
51.84	14.23	0.04	14.18
51.85	14.59	0.04	14.54
51.86	14.95	0.04	14.91
51.87	15.32	0.04	15.27
51.88	15.69	0.04	15.64
51.89	16.06	0.04	16.02
51.90	16.44	0.04	16.40
51.91	16.83	0.05	16.78
51.92	17.21	0.05	17.17
51.93	17.60	0.05	17.56
51.94	18.00	0.05	17.95
51.95	18.39	0.05	18.35
51.96	18.80	0.05	18.75
51.97	19.20	0.05	19.16
51.98	19.61	0.05	19.56
51.99	20.02	0.05	19.98
52.00	20.44	0.05	20.39
52.01	20.87	0.05	20.82
52.02	21.31	0.05	21.26
52.03	21.75	0.05	21.70
52.04	22.19	0.05	22.14
52.05	22.64	0.05	22.59
52.06	23.09	0.05	23.04
52.07	23.54	0.05	23.50
52.08	24.00	0.05	23.96
52.09	24.47	0.05	24.42
52.10	24.94	0.05	24.89
52.11	25.41	0.05	25.36
52.12	25.89	0.05	25.84
52.13	26.37	0.05	26.32
52.14	26.85	0.05	26.80
52.15	27.34	0.05	27.29
52.16	27.83	0.05	27.79
52.17	28.33	0.05	28.28
52.18	28.83	0.05	28.78
52.19	29.34	0.05	29.29
52.20	29.85	0.05	29.80
52.21	30.35	0.05	30.30
52.22	30.85	0.05	30.80
52.23	31.36	0.05	31.31
52.24	31.87	0.05	31.82
52.25	32.38	0.05	32.33
52.26	32.90	0.05	32.85
52.27	33.42	0.05	33.37
52.28	33.95	0.05	33.90
52.29	34.48	0.05	34.42
52.30	35.01	0.05	34.96
52.31	35.54	0.05	35.49
52.32	36.08	0.05	36.03
52.33	36.63	0.05	36.58
52.34	37.18	0.05	37.12
52.35	37.73	0.05	37.68
52.36	38.28	0.05	38.23
52.37	38.84	0.05	38.79
52.38	39.40	0.05	39.35
52.39	39.97	0.05	39.92
52.40	40.54	0.05	40.49
52.41	41.13	0.05	41.07
52.42	41.72	0.05	41.67
52.43	42.31	0.05	42.26
52.44	42.91	0.05	42.86
52.45	43.52	0.05	43.46
52.46	44.13	0.05	44.07
52.47	44.74	0.05	44.68
52.48	45.35	0.05	45.30
52.49	45.97	0.05	45.92
52.50	**46.60**	**0.05**	**46.54**

Stage-Area-Storage for Pond B2: Water Qaulity Basin

Elevation (feet)	Surface (sq-ft)	Wetted (sq-ft)	Storage (cubic-feet)
50.50	2,067	2,067	0
50.51	2,072	2,073	21
50.52	2,077	2,078	41
50.53	2,082	2,084	62
50.54	2,088	2,090	83
50.55	2,093	2,096	104
50.56	2,098	2,101	125
50.57	2,103	2,107	146
50.58	2,108	2,113	167
50.59	2,113	2,119	188
50.60	2,119	2,124	209
50.61	2,124	2,130	230
50.62	2,129	2,136	252
50.63	2,134	2,142	273
50.64	2,139	2,148	294
50.65	2,145	2,153	316
50.66	2,150	2,159	337
50.67	2,155	2,165	359
50.68	2,160	2,171	380
50.69	2,165	2,177	402
50.70	2,171	2,182	424
50.71	2,176	2,188	445
50.72	2,181	2,194	467
50.73	2,186	2,200	489
50.74	2,192	2,206	511
50.75	2,197	2,212	533
50.76	2,202	2,218	555
50.77	2,208	2,223	577
50.78	2,213	2,229	599
50.79	2,218	2,235	621
50.80	2,223	2,241	643
50.81	2,229	2,247	666
50.82	2,234	2,253	688
50.83	2,239	2,259	710
50.84	2,245	2,265	733
50.85	2,250	2,271	755
50.86	2,255	2,277	778
50.87	2,261	2,283	800
50.88	2,266	2,289	823
50.89	2,272	2,295	846
50.90	2,277	2,301	868
50.91	2,282	2,307	891
50.92	2,288	2,313	914
50.93	2,293	2,319	937
50.94	2,298	2,324	960
50.95	2,304	2,330	983
50.96	2,309	2,337	1,006
50.97	2,315	2,343	1,029
50.98	2,320	2,349	1,052
50.99	2,326	2,355	1,076
51.00	2,331	2,361	1,099
51.01	2,336	2,366	1,122
51.02	2,342	2,372	1,146

Stage-Area-Storage for Pond B2: Water Qaulity Basin (continued)

Elevation (feet)	Surface (sq-ft)	Wetted (sq-ft)	Storage (cubic-feet)
51.03	2,347	2,378	1,169
51.04	2,353	2,384	1,193
51.05	2,358	2,390	1,216
51.06	2,363	2,395	1,240
51.07	2,369	2,401	1,263
51.08	2,374	2,407	1,287
51.09	2,380	2,413	1,311
51.10	2,385	2,419	1,335
51.11	2,391	2,424	1,359
51.12	2,396	2,430	1,382
51.13	2,402	2,436	1,406
51.14	2,407	2,442	1,430
51.15	2,413	2,448	1,455
51.16	2,418	2,454	1,479
51.17	2,424	2,459	1,503
51.18	2,429	2,465	1,527
51.19	2,435	2,471	1,552
51.20	2,440	2,477	1,576
51.21	2,446	2,483	1,600
51.22	2,451	2,489	1,625
51.23	2,457	2,495	1,649
51.24	2,462	2,501	1,674
51.25	2,468	2,507	1,699
51.26	2,473	2,513	1,723
51.27	2,479	2,518	1,748
51.28	2,485	2,524	1,773
51.29	2,490	2,530	1,798
51.30	2,496	2,536	1,823
51.31	2,501	2,542	1,848
51.32	2,507	2,548	1,873
51.33	2,513	2,554	1,898
51.34	2,518	2,560	1,923
51.35	2,524	2,566	1,948
51.36	2,529	2,572	1,973
51.37	2,535	2,578	1,999
51.38	2,541	2,584	2,024
51.39	2,546	2,590	2,050
51.40	2,552	2,596	2,075
51.41	2,558	2,602	2,101
51.42	2,563	2,608	2,126
51.43	2,569	2,614	2,152
51.44	2,575	2,620	2,178
51.45	2,580	2,626	2,203
51.46	2,586	2,632	2,229
51.47	2,592	2,638	2,255
51.48	2,597	2,644	2,281
51.49	2,603	2,650	2,307
51.50	2,609	2,656	2,333
51.51	2,614	2,662	2,359
51.52	2,620	2,669	2,385
51.53	2,626	2,675	2,412
51.54	2,632	2,681	2,438
51.55	2,637	2,687	2,464

Stage-Area-Storage for Pond B2: Water Qaulity Basin (continued)

Elevation (feet)	Surface (sq-ft)	Wetted (sq-ft)	Storage (cubic-feet)
51.56	2,643	2,693	2,491
51.57	2,649	2,699	2,517
51.58	2,655	2,705	2,544
51.59	2,660	2,711	2,570
51.60	2,666	2,717	2,597
51.61	2,672	2,724	2,624
51.62	2,678	2,730	2,650
51.63	2,683	2,736	2,677
51.64	2,689	2,742	2,704
51.65	2,695	2,748	2,731
51.66	2,701	2,754	2,758
51.67	2,707	2,760	2,785
51.68	2,712	2,767	2,812
51.69	2,718	2,773	2,839
51.70	2,724	2,779	2,866
51.71	2,730	2,785	2,894
51.72	2,736	2,791	2,921
51.73	2,742	2,798	2,948
51.74	2,748	2,804	2,976
51.75	2,753	2,810	3,003
51.76	2,759	2,816	3,031
51.77	2,765	2,822	3,058
51.78	2,771	2,829	3,086
51.79	2,777	2,835	3,114
51.80	2,783	2,841	3,142
51.81	2,789	2,847	3,170
51.82	2,795	2,854	3,197
51.83	2,801	2,860	3,225
51.84	2,806	2,866	3,253
51.85	2,812	2,872	3,282
51.86	2,818	2,879	3,310
51.87	2,824	2,885	3,338
51.88	2,830	2,891	3,366
51.89	2,836	2,898	3,395
51.90	2,842	2,904	3,423
51.91	2,848	2,910	3,451
51.92	2,854	2,917	3,480
51.93	2,860	2,923	3,508
51.94	2,866	2,929	3,537
51.95	2,872	2,936	3,566
51.96	2,878	2,942	3,595
51.97	2,884	2,948	3,623
51.98	2,890	2,955	3,652
51.99	2,896	2,961	3,681
52.00	2,902	2,967	3,710
52.01	2,908	2,973	3,739
52.02	2,914	2,980	3,768
52.03	2,920	2,986	3,797
52.04	2,926	2,992	3,827
52.05	2,932	2,998	3,856
52.06	2,938	3,004	3,885
52.07	2,944	3,010	3,915
52.08	2,950	3,016	3,944

Stage-Area-Storage for Pond B2: Water Qaulity Basin (continued)

Elevation (feet)	Surface (sq-ft)	Wetted (sq-ft)	Storage (cubic-feet)
52.09	2,956	3,022	3,974
52.10	2,962	3,028	4,003
52.11	2,968	3,034	4,033
52.12	2,974	3,041	4,063
52.13	2,980	3,047	4,092
52.14	2,986	3,053	4,122
52.15	2,992	3,059	4,152
52.16	2,998	3,065	4,182
52.17	3,004	3,071	4,212
52.18	3,010	3,077	4,242
52.19	3,016	3,084	4,272
52.20	3,022	3,090	4,303
52.21	3,028	3,096	4,333
52.22	3,034	3,102	4,363
52.23	3,040	3,108	4,393
52.24	3,046	3,115	4,424
52.25	3,053	3,121	4,454
52.26	3,059	3,127	4,485
52.27	3,065	3,133	4,516
52.28	3,071	3,139	4,546
52.29	3,077	3,146	4,577
52.30	3,083	3,152	4,608
52.31	3,089	3,158	4,639
52.32	3,095	3,164	4,670
52.33	3,102	3,171	4,701
52.34	3,108	3,177	4,732
52.35	3,114	3,183	4,763
52.36	3,120	3,189	4,794
52.37	3,126	3,196	4,825
52.38	3,132	3,202	4,856
52.39	3,139	3,208	4,888
52.40	3,145	3,214	4,919
52.41	3,151	3,221	4,951
52.42	3,157	3,227	4,982
52.43	3,163	3,233	5,014
52.44	3,170	3,240	5,045
52.45	3,176	3,246	5,077
52.46	3,182	3,252	5,109
52.47	3,188	3,259	5,141
52.48	3,195	3,265	5,173
52.49	3,201	3,271	5,205
52.50	**3,207**	**3,278**	**5,237**

APPENDIX D
SUBSURFACE STORMWATER INVESTIGATION RESULTS

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Office Address
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Jersey City, NJ 07302

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JZNengineering.com

April 29, 2020
File No. 22230-000

STONEFIELD ENGINEERING & DESIGN, LLC
15 Spring Street
Princeton, New Jersey 08542

Attention: Mr. Paul Mutch PE
Project Manager

REGARDING: REPORT OF STORMWATER MANAGEMENT INVESTIGATION
Proposed Dollar General Retail Store Development
1823 US-206
Block 1823; Lot 14
Southampton Township, Burlington County, New Jersey

Dear Mr. Mutch:

JZN Engineering, PC. (JZN) is pleased to submit this letter report summarizing the results of our stormwater management investigation in support of the proposed Dollar General Development to be located at 1823 US-206 in the Southampton Township, Burlington County, New Jersey. This work was undertaken in accordance with our March 31, 2020 proposal and your authorization on April 13, 2020.

SCOPE OF WORK

Our scope of work included the following:

- Review available published regional area groundwater and subsurface conditions geological data;
- Prepare a program of subsurface explorations consisting of five (5) soil profile pit explorations;
- Perform laboratory soil permeability tests on the tubes collected from the field investigation; and
- Prepare this letter report.

PROJECT BACKGROUND

This report was prepared based on the information provided to us including at February 20, 2020 *Concept D* plan set prepared by Stonefield Engineering.

At the time of our field investigation, the soil profile pits were excavated within a majority wooded lot. The site is bounded by a single story warehouse commercial development to the north; U.S. Route 206 to

the east; a town post office and storage yard to the south; and Red Lion Road to the west. The location of the project site is shown on the *Project Locus Map* included as Figure 1 in this report.

We understand that the proposed Dollar General development will include the construction of a 9,100 square foot one-story retail building with associated parking lot area, trash enclosure, new utilities, and a stormwater management system. The southern portion of the property will not be developed.

REPORT DATUM

Topographic information was not available at the time of this report. Once a site reference benchmark is provided the ground surface elevation at the boring locations can be estimated, or alternatively they can be surveyed by a licensed land surveyor. All depths in the report are referenced from the existing ground surface at the time of our field investigation.

STORMWATER INVESTIGATION

Geology Review

Regional Geology: The subject site is situated within the Atlantic Coastal Plain Physiographic Province of New Jersey. Specifically, the site is underlain by the Tertiary Aged, Lower member of the Kirkwood Formation. Specifically, the Lower member of the Kirkwood Formation consists of light yellow to white, massive to thick bedded, fine to medium grained sands interbedded with clay. Locally, areas encountered in near-surface beds are very micaceous and extensively stained by iron oxides. The thick bedded strata commonly consists of interbedded fine grained, micaceous sand and gravelly, coarse to fine grained sand.

Surficial Soil Survey Review: The Soil Survey of Atlantic County maps two types of soils within the area where the soil profile pits were excavated. The two soil types consist of:

- Jade Run fine sandy loam (JdrA): This type of soil typically slopes between zero (0) and two (2) percent. A typical profile is described below:
  - Ap – Zero (0) to 11 inches: Fine sandy loam
  - Bg1 – 11 to 19 inches: Very fine sandy loam
  - Bg2 – 19 to 23 inches: Very fine sandy loam
  - Bg3 – 23 to 28 inches: Very fine sandy loam
  - Bg4 – 28 to 35 inches: Very fine sandy loam
  - BCg – 35 to 52 inches: Very fine sandy loam
  - 2Cg – 52 to 65 inches: Sand
  - 2C – 65 to 80 inches: Sand

- Galloway sand (GahB): This type of soil typically slopes between zero (0) and five (5) percent. A typical profile is described below:
  - Ap – Zero (0) to 10 inches: Sand
  - AC – 10 to 20 inches: Sand
  - C1 – 20 to 32 inches: Sand
  - C2 – 32 to 60 inches: Sand

The subject site is shown on the Soil Survey Map attached as Figure 3.

Field Investigation

Field exploration for this project was conducted by means of excavating five (5) soil profile pits (identified as SPP-1 through SPP-5) which were excavated using a rubber tire backhoe. The soil profile pits were excavated to depths of between 6.5 feet and 12 feet below the existing ground surface. The locations of the soil profile pits are shown on the accompanying *Soil Profile Pit Location Plan* included as Figure 2, and records of the soil profile exploration logs are provided in Appendix A.

The field exploration was planned and logged by a representative of JZN Engineering. The soil profile pit explorations were located in the field by a representative of JZN using normal taping procedures and estimated right angles from existing site features and are presumed to be accurate within a few feet. The soil profile pit explorations were excavated using a rubber tire backhoe operated by Pennyweight & Co. of Eatontown, New Jersey in the presence of a JZN representative on April 22, 2020. All soil profile pit exploration locations were backfilled to the surface with soil cuttings generated from the investigation.

In general, the methods used in determining the seasonal high groundwater level consist of evaluating the soil morphology within a test excavation and identifying irregular spots or blotches of different colors or minerals unlike that of the surrounding soil (mottles). Mottling in soil may indicate poor aeration and impeded drainage or also can be the result of natural variable mineralogy and geological processes.

Discussion of Subsurface Conditions Encountered

Surface Cover (USDA - S): Approximately 0.8 feet to 1.3 feet of topsoil consisting of sand with varying amounts of roots, leaves, and occasional debris was encountered at each soil profile pit location.

Stratum I – Coastal Deposits (USDA – LS, L, S, SIC): Underlying the surface cover materials, various soil materials generally consisting of Loamy Sand, Loam, and Sand were encountered and extended to depths of up to 9 feet below the existing ground surface. Soil profile pits SPP-1 through SPP-4 were terminated

in this layer due to cave-in caused by groundwater table. Within soil profile pit SPP-5, silty clay was observed extending from a depth of nine (9) feet and extended to the soil profile pit termination depth of 12 feet below ground surface elevation.

Groundwater conditions were encountered within each soil profile pit exploration at depths ranging between five (5) feet and nine (9) feet below existing ground surface elevation. In addition, seasonal high groundwater is estimated to be between 3.5 feet and 4.1 feet below existing ground surface elevation based on observed mottling and soil coloring variations.

The soil profile pit exploration logs and related information depict subsurface conditions only at the specific exploration locations and at the particular time designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at the soil exploration locations. Also, the passage of time may result in a change in the subsurface conditions at these soil exploration locations. Soil profile pit logs are included in Appendix A. Soil profile pit exploration photos are included in Appendix B.

Laboratory Permeability Test Results

Two (2) soil sample tubes were recovered from each soil profile pit during our field investigation. Each sample was subjected to a tube permeameter test as detailed in *"Procedures for Permeability Testing"* under *Appendix E* of *The New Jersey Stormwater Best Management Practices Manual* which meets the requirements of NJDEP's Stormwater Management Rules *(N.J.A.C. 7:8)*. The results of these tests are included in Table 1 below.

Table 1: Soil Profile Pit and Permeability Tests Summary

Soil Profile Pit #	Tube Permeameter Test No.	Percolation Test			
		Test Depth (ft.)	Stratum	Permeability	
				Class	Rate (in/hr.)
SPP1	A	2.33	Loamy Sand	K2	1.16
SPP1	B	2.33	Loamy Sand	K1	0.26
SPP2	A	2.83	Sandy Loam	K0	0.18
SPP2	B	2.83	Sandy Loam	K0	0.02
SPP3	A	2.25	Sandy Loam	K0	0.04
SPP3	B	2.25	Sandy Loam	K0	0.18
SPP4	A	1.58	Sandy Loam	K1	0.28
SPP4	B	1.58	Sandy Loam	K2	0.71
SPP5	A	1.92	Sand	K3	4.32
SPP5	B	1.92	Sand	K4	7.10

Notes: Permeability class based on September 2012 NJ Stormwater BMP Manual Appendix E

Hydrologic Soil Group

As noted, the surficial soil survey map included as Figure 3 mapped the site to consist of two soil groups: Jade Run fine sandy loam (JdrA), and Galloway sand (GahB). Based on this investigation, the Hydrologic Soil Group was determined based on the soil profile pits including the groundwater conditions, soil morphology, and permeability rates. Based on the NJ Stormwater BMP Manual and the NRCS Soil Survey, the Hydrologic Soil Group based on permeability rates are summarized in Table 2 below.

Table 2: Hydrologic Soil Group Based on Lowest Permeability Rate

Soil Profile Pit #	Hydrologic Soil Group Based on NRCS Soil Survey	Preliminary Hydrologic Soil Group Based on NJ Stormwater BPM Manual
SPP1	HSG A	HSG C
SPP2	HSG A	HSG D
SPP3	HSG A	HSG D
SPP4	HSG B/D	HSG C
SPP5	HSG B/D	HSG A

LIMITATION

The recommendations contained in this report represent our best professional judgment based on available project data provided to us in the referenced documents. Variations in the types of structures and design grading may change from the criteria assumed in preparation of the report. JZN should be advised of changes in the design criteria so that an evaluation can be made to determine if design recommendations should be revised. Conditions may be encountered during construction that may vary from the conditions reported herein. Our work has been performed in accordance with current standards of practice for geotechnical engineering for buildings based on the available project data. No other warranty is made, either expressed or implied.

We appreciate the opportunity to assist you on this project. Please contact us if you wish to discuss this letter report or any aspect of the project.

Sincerely,
JZN ENGINEERING, PC.

Nejm E. Jundi, P.E.
President

Enclosures

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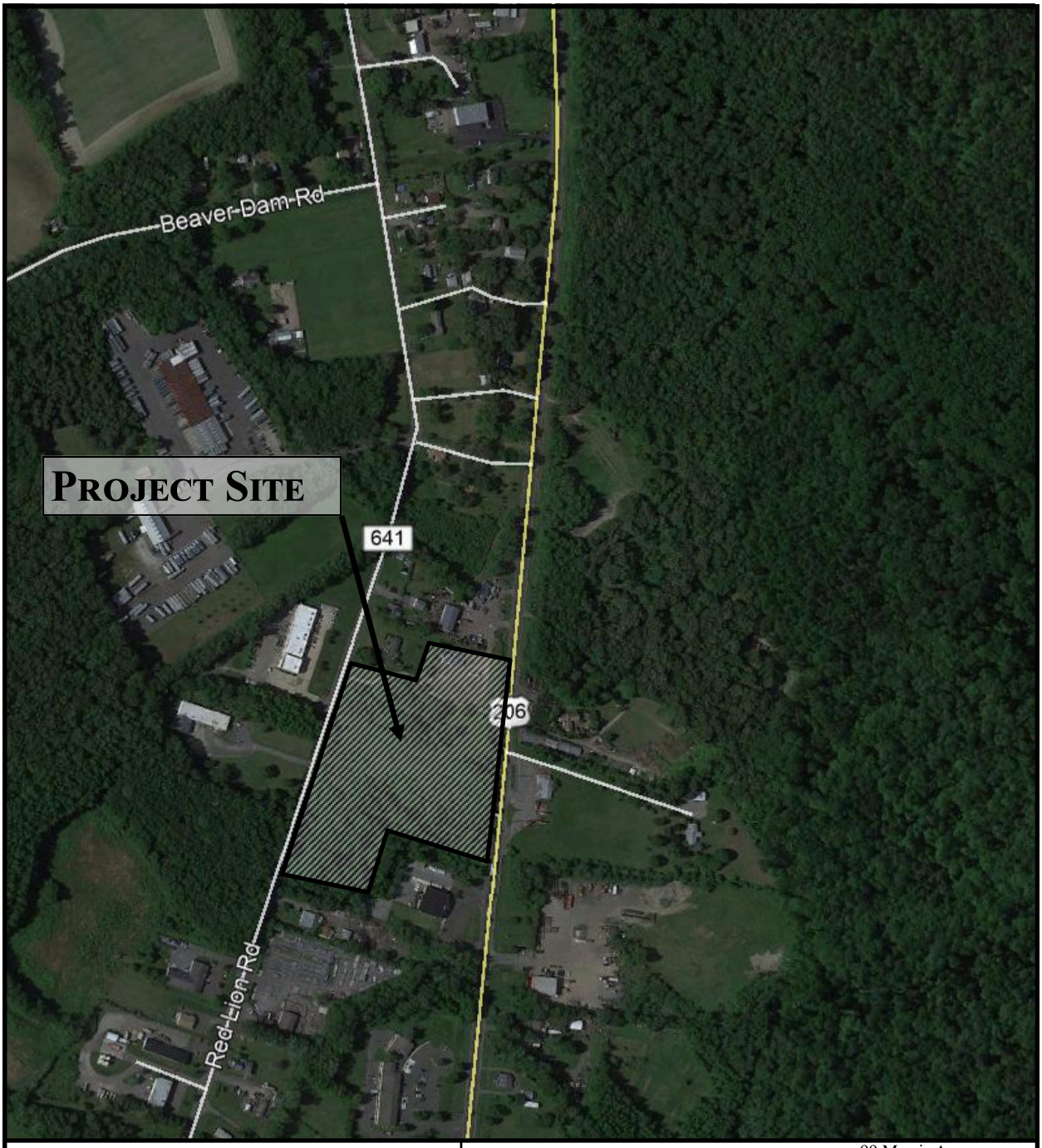
FIGURES



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GOOGLE MAPS 2020

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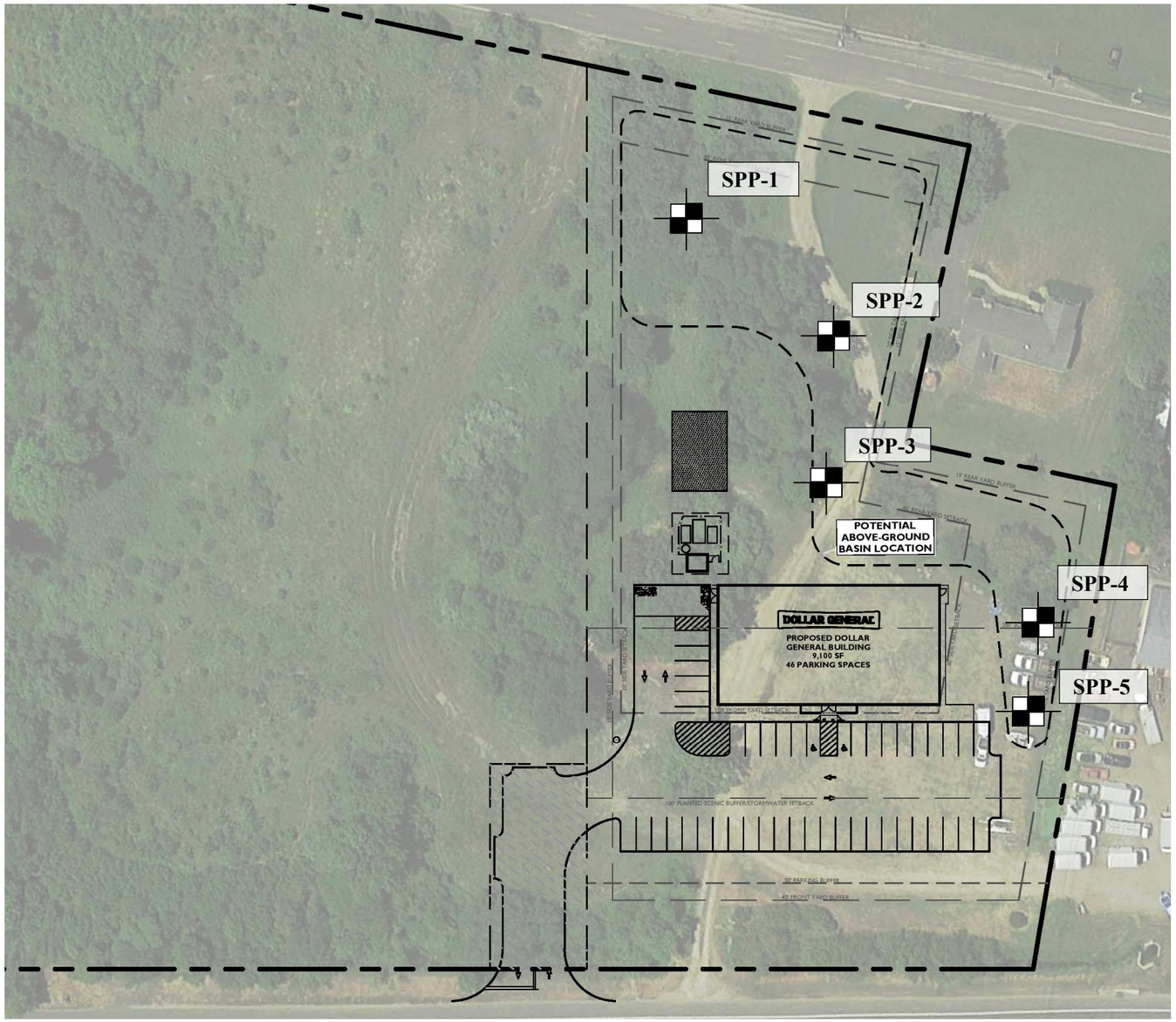
PROPOSED DOLLAR GENERAL RETAIL STORE DEVLEOPMENT
1823 ROUTE 206
SOUTHAMPTOM TOWNSHIP, BURLINGTON COUNTY, NJ
22222-000

PROJECT SITE LOCUS

FIGURE 1



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LEGEND

SPP-1: APPROXIMATE SOIL EXPLORATION TEST PIT LOCATION

NOTES

BASE PLAN OBTAINED FROM AN FEBRUARY 20, 2020 CONCEPT PLAN D PREPARED BY STONEFIELD ENGINEERING & DESIGN.

SOIL EXPLORATIONS WERE LOCATED IN THE FIELD BY A REPRESENTATIVE OF JZN ENGINEERING, PC. USING NORMAL TAPING PROCEDURES AND ESTIMATED RIGHT ANGLES FROM EXISTING SITE FEATURES AND ARE PRESUMED ACCURATE WITHIN FEW FEET.

THE SOIL PROFILE PITS WERE EXCAVATED BY PENNYWEIGHT CO. OF EATONTOWN, NEW JERSEY IN THE PRESENCE OF A JZN ENGINEER ON APRIL 22, 2020.

SOIL PROFILE PIT LOCATIONS WERE BACKFILLED TO THE SURFACE WITH SOIL CUTTINGS GENERATED FROM THE INVESTIGATION.

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PROPOSED DOLLAR GENERAL RETAIL STORE DEVELOPMENT
1823 ROUTE 206
SOUTHAMPTON, BURLINGTON COUNTY, NEW JERSEY
22222-000

SOIL PROFILE PITS LOCATION PLAN

SCALE: NOT TO SCALE

FIGURE 2

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GahB	Galloway sand, 0 to 5 percent slopes	4.5	43.9%
JdrA	Jade Run fine sandy loam, 0 to 2 percent slopes	5.8	56.1%
Totals for Area of Interest		**10.3**	**100.0%**

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

NOTES

SOIL SURVEY MAP OBTAINED FROM UNITED STATES DEPARTMENT OF AGRICULTURE'S NATURAL RESOURCES CONSERVATION SERVICE (NRCS).

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PROPOSED DOLLAR GENERAL RETAIL STORE DEVELOPMENT
1823 ROUTE 206
SOUTHAMPTON TWNSHP, ATLANTIC COUNTY, NEW JERSEY
22230-000

SOIL SURVEY MAP

SCALE: NOT TO SCALE

FIGURE 3

APPENDIX A

SOIL PROFILE PIT EXPLORATION LOGS (SPP-1 THROUGH SPP-5)

JZN Engineering, PC.	**SOIL PROFILE PIT LOG**	**SPP No.**	**SPP-1**
			Page 1 of 1

Project Name	Proposed Dollar General Retail Store Development			**Project Number**	22222-000
Client	Stonefield Engineering & Design, LLC.			**Field Representative**	Guevara/ Potenza
Project Location	1823 US-206; Block 1823; Lot 14			**Contractor**	Penniweight & Co.
	Southampton Township, Burlington County, New Jersey			**Operator**	R. J. Raymond
SPP Location	See Plan	**Ground Surface Elevation** --	**Datum** Not Surveyed	**Date Started**	4/22/2020
				Date Finished	4/22/2020

Weather Condition	Clear 51 °F

Excavation			**Mottling**				**Water Level Data**					
☑ Backhoe	☑ Robber Tieres	☑ Yes	Depth (ft)		Elevation (ft)		Date	Time	Bottom of SPP (ft)	Water (ft)	Cave In (ft)	Est. Seasonal High
☐ Excavator	☐ Track		From	4.0	From	--	4/22/20	11:00	9.0	7.4	7.4	--
☐ Hand Excavated		☐ No	To	4.3	To	--						

Depth (ft)	Sample Elevation/ Depth (ft)	Sample Number	Stratum Change	USCS Symbol	Visual Classification	Remarks
0						
	0- 1.2 ft	S-1	--	Topsoil	TS: 7.5 YR 4/2 Brown SAND; weak angular blocky structure; dry loose soil; 5% coarse fragment	Topsoil with roots
	1.2- 4.0 ft	S-2	--	LS	6LEY 1 7/N Light grey LOAMY SAND; moderate subangular blocky to anguklar blocky structure; moist friable to firm soil; 0% coarse fragment	
	4.0- 4.3 ft	S-3	--	LS	7.5 YR 6/3 Light brown LOAMY SAND; weak angular blocky structure; wet sticky soil; 0% coarse fragment; distinct mottling encountered in this sample	(Perched water at 4.6 ft)
5	4.3- 9.0 ft	S-4	--	S	6LEY 1 7/N Light grey SAND; single grained granular structure; wet nonsticky soil; 10% coarse fragment	
10					Soil Profile Pit SPP-1 Terminated at Approximately 9.0 Feet Below Existing Ground Surface Due to Cave-In	
15						
20						
25						

Summary	Overburden (Linear ft)	9.0'	Rock Depth (ft)	--	Number of Samples	4

JZN Engineering, PC.	**SOIL PROFILE PIT LOG**	**SPP No.**	**SPP-2**
			Page 1 of 1

Project Name	Proposed Dollar General Retail Store Development			**Project Number**	22222-000
Client	Stonefield Engineering & Design, LLC.			**Field Representative**	Guevara/ Potenza
Project Location	1823 US-206; Block 1823; Lot 14			**Contractor**	Penniweight & Co.
	Southampton Township, Burlington County, New Jersey			**Operator**	R. J. Raymond
SPP Location	See Plan	**Ground Surface Elevation** --	**Datum** Not Surveyed	**Date Started**	4/22/2020
				Date Finished	4/22/2020

Weather Condition Clear 51 °F

Excavation		**Mottling**				**Water Level Data**					
☑ Backhoe ☑ Robber Tieres	☑ Yes	Depth (ft)		Elevation (ft)		Date	Time	Bottom of SPP (ft)	Water (ft)	Cave In (ft)	Est. Seasonal High
☐ Excavator ☐ Track		From	1.3	From	--	4/22/20	11:20	9.0	7.0	7.0	--
☐ Hand Excavated	☐ No	To	4.8	To	--						

Depth (ft)	Sample Elevation/ Depth (ft)	Sample Number	Stratum Change	USCS Symbol	Visual Classification	Remarks
0						
	0- 1.3 ft	S-1	--	Topsoil	TS: 7.5 YR 4/2 Brown SAND; weak subangular blocky structure; dry loose soil; 2% coarse fragment	Top soil mixed with fill; contains roots and plastic debris
	1.3- 4.8 ft	S-2	--	SL	6LEY 1 7/N Light grey SANDY LOAM; weak to moderate subangular blocky structure; moist friable to firm soil; 2% coarse fragment; few tan mottling encountered throughout sample	(Perched Water at 4.8')
5	4.8- 9.0 ft	S-3	--	S	6LEY 1 7/N Light grey SAND; single grained granular structure; wet nonsticky soil; 20% coarse fragment	
10					Soil Profile Pit SPP-2 Terminated at Approximately 9.0 Feet Below Existing Ground Surface Due to Cave-In	
15						
20						
25						

Summary	Overburden (Linear ft) 9.0'	Rock Depth (ft) --	Number of Samples 3

JZN Engineering, PC.	**SOIL PROFILE PIT LOG**	**SPP No.**	**SPP-3**
			Page 1 of 1

Project Name	Proposed Dollar General Retail Store Development			**Project Number**	22222-000
Client	Stonefield Engineering & Design, LLC.			**Field Representative**	Guevara/ Potenza
Project Location	1823 US-206; Block 1823; Lot 14			**Contractor**	Penniweight & Co.
	Southampton Township, Burlington County, New Jersey			**Operator**	R. J. Raymond
SPP Location	See Plan	**Ground Surface Elevation** --	**Datum** Not Surveyed	**Date Started**	4/22/2020
				Date Finished	4/22/2020

Weather Condition	Clear 51 °F					**Water Level Data**					
Excavation		**Mottling**				Date	Time	Bottom of SPP (ft)	Water (ft)	Cave In (ft)	Est. Seasonal High
☑ Backhoe ☑ Robber Tieres	☑ Yes	Depth (ft)		Elevation (ft)							
☐ Excavator ☐ Track		From	3.6	From	--	4/22/20	10:00	6.5	5.0	6.5	--
☐ Hand Excavated	☐ No	To	3.9	To	--						

Depth (ft)	Sample Elevation/ Depth (ft)	Sample Number	Stratum Change	USCS Symbol	Visual Classification	Remarks
0						
	0- 1.2 ft	S-1	--	Topsoil	TS: 7.5 YR 4/6 Strong brown SAND; weak subangular blocky structure; dry loose soil; 2% coarse fragment	Topsoil
	1.2- 3.6 ft	S-2	--	SL	6LEY 1 7/N Light grey SANDY LOAM; moderate angular blocky structure; moist friable soil; 0% coarse fragment	
	3.6- 3.9 ft	S-3	--	S	7.5 YR 6/3 Light brown SAND; single grained granular structure; moist loose soil; 2% coarse fragment; distinct mottling encountered in this sample	(Perched water at 3.6')
5	3.9- 6.5 ft	S-4	--	S	6LEY 1 7/N Light grey SAND; single grained granular structure; moist loose to wet nonsticky soil; 20% coarse fragment	
					Soil Profile Pit SPP-3 Terminated at Approximately 6.5 Feet Below Existing Ground Surface Due to Cave-In	
10						
15						
20						
25						

Summary	Overburden (Linear ft) 6.5'	Rock Depth (ft) --	Number of Samples 4

JZN Engineering, PC.	**SOIL PROFILE PIT LOG**	**SPP No.**	**SPP-4**
			Page 1 of 1

Project Name	Proposed Dollar General Retail Store Development			**Project Number**	22222-000
Client	Stonefield Engineering & Design, LLC.			**Field Representative**	Guevara/ Potenza
Project Location	1823 US-206; Block 1823; Lot 14			**Contractor**	Penniweight & Co.
	Southampton Township, Burlington County, New Jersey			**Operator**	R. J. Raymond
SPP Location	See Plan	**Ground Surface Elevation** --	**Datum** Not Surveyed	**Date Started**	4/22/2020
				Date Finished	4/22/2020

Weather Condition Clear 51 °F

Excavation		**Mottling**				**Water Level Data**					
☑ Backhoe ☑ Robber Tieres	☐ Yes	Depth (ft)		Elevation (ft)		Date	Time	Bottom of SPP (ft)	Water (ft)	Cave In (ft)	Est. Seasonal High
☐ Excavator ☐ Track		From	--	From	--	4/22/20	10:30	9.0	7.0	7.0	--
☐ Hand Excavated	☑ No	To	--	To	--						

Depth (ft)	Sample Elevation/ Depth (ft)	Sample Number	Stratum Change	USCS Symbol	Visual Classification	Remarks
0	0- 0.8 ft	S-1	--	Topsoil	TS: 7.5 YR 4/2 Brown SAND; weak subangular blocky structure; dry loose soil; 2% coarse fragment	Topsoil
	0.8- 3.9 ft	S-2	--	SL	7.5 YR 5/6 Strong brown SANDY LOAM; single grained to weak granular to subangular blocky structure; moist loose to very friable soil; 0% coarse fragment	(Perched water at 3.7 ft)
5	3.9- 7.0 ft	S-3	--	SL	6LEY 1 7/N Grey SANDY LOAM; moderate angular blocky structure; moist friable to firm soil; 0% coarse fragments	
	7.0- 9.0 ft	S-4	--	S	6LEY 1 7/N Grey SAND; single grained granular structure; wet nonsticky soil; 20% coarse fragments	
10					Soil Profile Pit SPP-4 Terminated at Approximately 9.0 Feet Below Existing Ground Surface Due to Cave-In	
15						
20						
25						

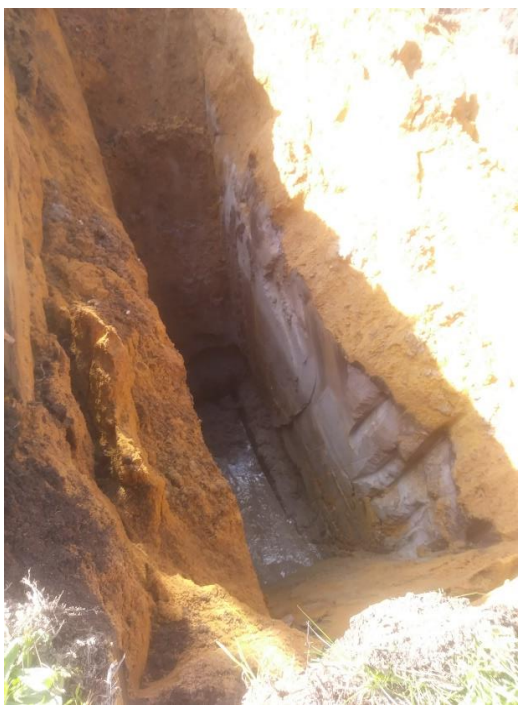
Summary	Overburden (Linear ft) 9.0'	Rock Depth (ft) --	Number of Samples 4

JZN Engineering, PC.	**SOIL PROFILE PIT LOG**	**SPP No.**	**SPP-5**
			Page 1 of 1

Project Name	Proposed Dollar General Retail Store Development			**Project Number**	22222-000
Client	Stonefield Engineering & Design, LLC.			**Field Representative**	Guevara/ Potenza
Project Location	1823 US-206; Block 1823; Lot 14			**Contractor**	Penniweight & Co.
	Southampton Township, Burlington County, New Jersey			**Operator**	R. J. Raymond
SPP Location	See Plan	**Ground Surface Elevation** --	**Datum** Not Surveyed	**Date Started**	4/22/2020
				Date Finished	4/22/2020

Weather Condition Clear 51 °F

Excavation		**Mottling**				**Water Level Data**					
☑ Backhoe ☑ Robber Tieres	☑ Yes	Depth (ft)		Elevation (ft)		Date	Time	Bottom of SPP (ft)	Water (ft)	Cave In (ft)	Est. Seasonal High
☐ Excavator ☐ Track		From	3.6	From	--	4/22/20	8:50	12.0	9.0	3.0	--
☐ Hand Excavated	☐ No	To	3.8	To	--						

Depth (ft)	Sample Elevation/ Depth (ft)	Sample Number	Stratum Change	USCS Symbol	Visual Classification	Remarks
0						
	0- 0.8 ft	S-1	--	Topsoil	TS: 7.5 YR 4/2 Brown SAND; weak subangular blocky structure; moist loose to very friable soil; 2% coarse fragments	Topsoil
	0.8- 3.6 ft	S-2	--	S	7.5 YR 7/8 Reddish yellow SAND; single grained granular structure; dry to moist loose soil; 5% coarse fragments	(Perched water ar 3.3')
	3.6- 3.8 ft	S-3	--	S	6LEY 1 4/N Dark grey SAND; single grained granular structure; moist loose soil; 0% coarse fragments; distinct mottling encountered in this sample	
5	3.8- 8.0 ft	S-4	--	S	6LEY 1 7/N Light grey SAND; single grained to weak granular structure; moist friable soil; 0% coarse fragments	
	8.0- 9.0 ft	S-5	--	S-GR	6LEY 1 7/N Light grey SAND and GRAVEL; single grained structure; wet nonsticky soil; 35% coarse fragments	
10	9.0- 12.0 ft	S-6	--	SIC	6LEY 1 4/N Dark grey SILTY CLAY; massive structure; wet very plastic soil; 0% coarse fragments	
15					Soil Profile Pit SPP-5 Terminated at Approximately 12.0 Feet Below Existing Ground Surface	
20						
25						

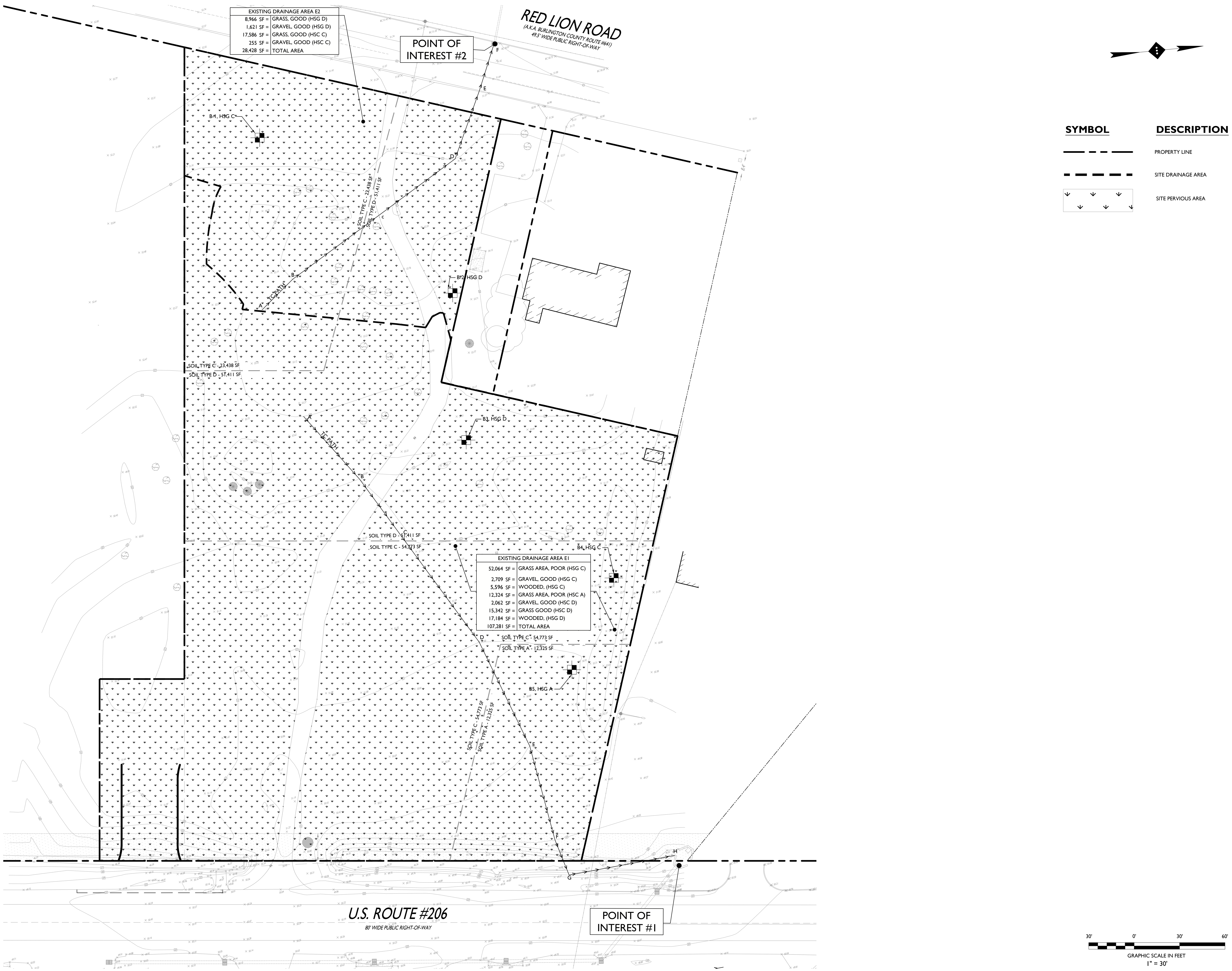
Summary	Overburden (Linear ft) 12.0'	Rock Depth (ft) --	Number of Samples 6

APPENDIX E
DRAINAGE AREA MAPS

INVENTORY

EXISTING DRAINAGE AREA MAP

PROPOSED DRAINAGE AREA MAP



EXISTING DRAINAGE AREA E2	
8,966 SF =	GRASS, GOOD (HSG D)
1,621 SF =	GRAVEL, GOOD (HSG D)
17,586 SF =	GRASS, GOOD (HSC C)
255 SF =	GRAVEL, GOOD (HSC C)
28,428 SF =	TOTAL AREA

EXISTING DRAINAGE AREA E1	
52,064 SF =	GRASS AREA, POOR (HSG C)
2,709 SF =	GRAVEL, GOOD (HSG C)
5,596 SF =	WOODED, (HSG C)
12,324 SF =	GRASS AREA, POOR (HSC A)
2,062 SF =	GRAVEL, GOOD (HSC D)
15,342 SF =	GRASS GOOD (HSC D)
17,184 SF =	WOODED, (HSG D)
107,281 SF =	TOTAL AREA

ISSUE	DATE	BY	DESCRIPTION
1	08/14/2020	JMK	FOR MUNICIPAL SUBMISSION

NOT APPROVED FOR CONSTRUCTION

STONEFIELD engineering & design
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15 Spring Street, Princeton, NJ 08542
Phone 609.362.6900

PRELIMINARY & FINAL MAJOR SITE PLAN/MINOR SUBDIVISION PLAN SET

DOLLAR GENERAL

PROPOSED DOLLAR GENERAL

BLOCK 2203, LOT 14
1823 ROUTE 206
SOUTHAMPTON TOWNSHIP
BURLINGTON COUNTY, NEW JERSEY

PAUL D. MUTCH Jr., P.E.
NEW JERSEY LICENSE No. 55094
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

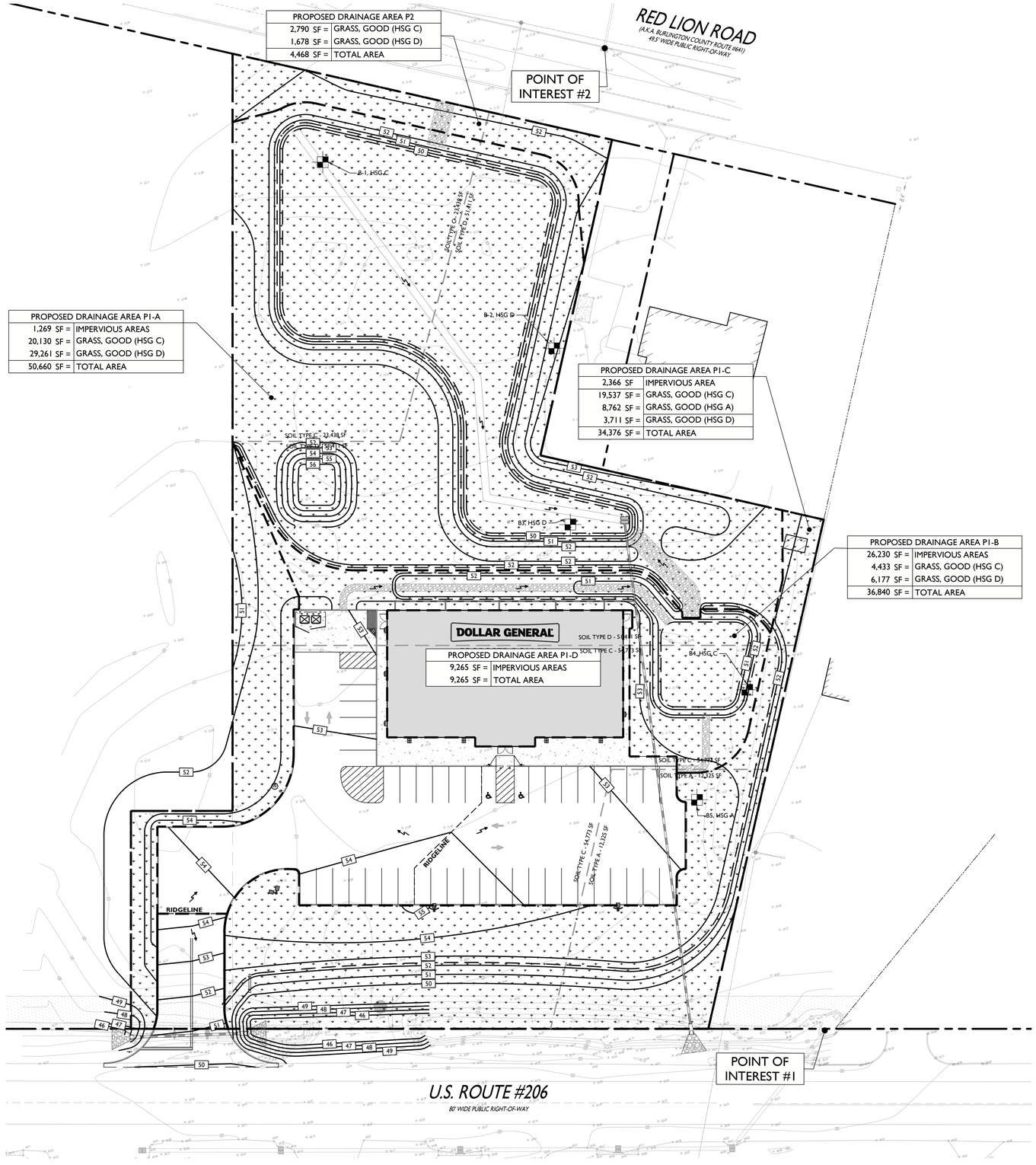
SCALE: 1" = 30' PROJECT ID: Z-19159

TITLE:

EXISTING DRAINAGE AREA MAPS

DRAWING:

1 OF 2



SYMBOL	DESCRIPTION
	PROPERTY LINE
	SITE DRAINAGE AREA
	SITE PERVIOUS AREA

30' 0' 30' 60'

GRAPHIC SCALE IN FEET
1" = 30'

ISSUE	DATE	BY	DESCRIPTION
1	08/14/2020	JMK	FOR MUNICIPAL SUBMISSION

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PRELIMINARY & FINAL MAJOR SITE PLAN/MINOR SUBDIVISION PLAN SET

DOLLAR GENERAL

PROPOSED DOLLAR GENERAL

BLOCK 2303, LOT 14
1823 ROUTE 206
SOUTHAMPTON TOWNSHIP
BURLINGTON COUNTY, NEW JERSEY

PAUL D. MUTCH Jr., P.E.
NEW JERSEY LICENSE No. 55094
LICENSED PROFESSIONAL ENGINEER

STONEFIELD engineering & design

SCALE: 1" = 30' PROJECT ID: Z-19159

TITLE:

PROPOSED DRAINAGE AREA MAPS

DRAWING:

1 OF 2

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