

STORMWATER MANAGEMENT REPORT

**Essex County Country Club Upgrades
350 Mount Pleasant Avenue, West Orange
Block 156, Lot 1
Essex County New Jersey, 07052**



Prepared by:

Watermen, LLC
3107 Atlantic Avenue
Allenwood, NJ 08720

August 22, 2023

A handwritten signature in blue ink, appearing to read 'P. Calabrese', written over a horizontal line.

Paul Calabrese, PE
NJ Professional Engineer License No. 24GE44805

TABLE OF CONTENTS

	<u>PAGE</u>
1.0 Project Description	1
2.0 Methodology And Software	2
3.0 Green Infrastructure Standards	3
4.0 Stormwater Quantity.....	4
4.1 Pre-Development Site Conditions And Allowable Peak Rates	4
4.2 Post-Development Site Conditions & Proposed Peak Rates.....	5
5.0 Stormwater Quality.....	8
6.0 Groundwater Recharge	9
7.0 Soil Erosion And Sediment Control	10
8.0 Conclusion	11

LIST OF APPENDICES

<u>Appendix</u>	<u>Title</u>
A	Project Location Map
B	NRCS Web Soil Survey Report
C	Pre-Development Flow Calculations
D	Post-Development Flow Calculations
E	Groundwater Recharge Spreadsheet
F	Hantush Groundwater Table Hydraulic Impact
G	Pre-Development Drainage Area Maps
H	Post-Development Drainage Area Maps

1.0 Project Description

The Essex County Country Club is located at 350 Mt. Pleasant Avenue in the Township of West Orange, Essex County, New Jersey. It is identified as Tax Block 156, Lot 1. The site is bounded by Mt. Pleasant Avenue to the north, Prospect Avenue to the east, Francis Byrne Golf Course to the west and Old Indian Road to the south.

The proposed site improvements include the following:

1. 6,144 square foot pre-engineered steel garage for golf cart storage
2. 620 square foot comfort station building
3. Approximately ½ acre of improvements to the existing parking lot, removal of the existing pro shop building, and expansion of the first hole tee area.

The existing site to be utilized by the golf cart storage garage is currently grass used as a golf practice area. The proposed comfort station will be constructed in an undeveloped lawn area of the site.

The existing parking lot area is currently paved, with minor revisions to the parking proposed for traffic flow improvements and the addition of landscape islands proposed. The existing pro shop building, which is currently located adjacent to the parking lot, will be completely removed, and this space will be repurposed into an expanded tee area, with new cart path. The entrance to the parking lot will be rearranged to provide better pedestrian flow around the clubhouse. Other minor modifications to the parking lot are proposed to improve traffic flow and optimize the parking.

Due to the diverse locations of the improvements throughout the large property, each area of improvement has been depicted as an isolated drainage area. The topography at each location indicates that every location can be depicted as a single drainage area: EDA-1 represents the proposed golf cart storage building location, and drains towards the western side of the site into a wooded area; EDA-2, which represents the proposed comfort station, drains towards the east to an existing drainage swale; EDA-3, which is comprised of the first tee area and parking lot, drains towards the west, into a wooded area along the property edge. The sub-area distribution based on land cover and soils has been indicated on the Existing Drainage Area Map enclosed within this report.

According to Web Soil Survey information made available by USDA National Resources Conservation Service (NRCS) the vast majority of the site consists of Udorthents, Boonton substratum, 0 to 8 percent slopes (UdbonB). This soil is classified as Hydrologic Soil Group (HSG) Type A soil. The soil boundary and properties are detailed in the soil survey information provided in Appendix B.

The proposed site improvements are shown on drawings entitled “Site Plan Essex County Country Club, Block 156, Lots 1, Township of West Orange, Essex County, New Jersey” prepared by Watermen, LLC, dated 8/7/23.

2.0 Methodology And Software

A detailed drainage study is described in the following sections of this report. The stormwater runoff flows that were determined for pre- and post-development conditions were calculated using the NRCS Methodology, as described in Technical Release 55 – Urban Hydrology for Small Watersheds (TR-55). Hydrographs and stormwater management basin routings have been developed in accordance with TR-20 methodology. These modeling techniques are incorporated in the HydroCAD V 10.00 software package which was used to analyze the pre- and post-development flows and basin routings.

New Jersey 24-Hour Rainfall Frequency Data for the subject site, made available by National Oceanic and Atmospheric Administration (NOAA), was utilized in the stormwater management design. The pre- and post-development hydrologic characteristics for the design of the stormwater management system are based upon the 2-, 10-, and 100-year frequency storm events. The water quality calculations are based upon the NJDEP 1.25 inch/2-hour variable distribution storm. To adequately demonstrate stormwater management control and compliance, peak reduction factors of 50%, 75%, and 80% were applied to the 2-, 10-, and 100-year pre- development peak runoff rates, respectively.

3.0 Green Infrastructure Standards

In accordance with the green infrastructure requirements specified in NJAC 7:8-5.3, green infrastructure best management practices (BMP) were selected to satisfy groundwater recharge, stormwater runoff quantity and stormwater runoff quantity standards. Several BMPs have been utilized to conform with the requirements, including vegetative filter strips, small-scale bioretention systems and pervious paving systems. In accordance with the NJ Stormwater BMP Manual the small-scale bioretention systems are designed for contributory areas less than 2.5 acres and the pervious paving systems are designed for contributory areas less than 3x the area occupied by the pervious surface.

4.0 Stormwater Quantity

4.1 Pre-Development Site Conditions and Allowable Peak Rates

Please refer to the Pre-Development Drainage Area Map within this report (Appendix G). The total pre-development drainage areas of study are summarized in the following table.

Drainage Area	Total Area (SF)
EDA-1 (Golf Cart Building)	22,380
EDA-2 (Comfort Station)	620
EDA-3 (Parking Lot)	60,748

The pre-development condition of drainage areas EDA-1 and EDA-2 are primarily of grassy areas in good condition. EDA-3 consists of an existing parking lot, buildings, grass and paved walkways.

The summary of pre-development peak flow rates, peak reduction factors, and allowable flow rates for these drainage areas are shown in Tables 1, 2, and 3 below. Please refer to Appendix C for pre-development 2-, 10-, and 100-year storm proposed event calculations.

Table 1: Pre-development and Allowable Peak Flow Rates (EDA-1)

Freq. Storm Event (yr)	Pre-development Peak Flow rate (cfs)	Peak Reduction Factor	Allowable discharge rate (cfs)
2	0.00	50%	0.00
10	0.05	75%	0.0375
100	0.92	80%	0.736

Table 2: Pre-development and Allowable Peak Flow Rates (EDA-2)

Freq. Storm Event (yr)	Pre-development Peak Flow rate (cfs)	Peak Reduction Factor	Allowable discharge rate (cfs)
2	0.00	50%	0.00
10	0.00	75%	0.00
100	0.02	80%	0.016

Table 3: Pre-development Peak Flow Rates (EDA-3)

Freq. Storm Event (yr)	Pre-development Peak Flow rate (cfs)	Peak Reduction Factor	Allowable discharge rate (cfs)
2	4.36	50%	2.18
10	7.12	75%	5.34
100	12.37	80%	9.90

4.2 Post-Development Site Conditions & Proposed Peak Rates

Please refer to the Post-Development Drainage Area Maps within this report (Appendix H). The overall post-development drainage areas of study match those of the pre-development conditions at each location.

In post-development conditions the stormwater runoff is divided into three numbered drainage areas discharging to the same locations as the matching-number pre-development drainage area.

PDA-1 discharges to the wooded area to the west. The design for this area includes the construction of underground detention and pervious pavement. The underground detention manages flow from the proposed building roof, while the pervious pavement collects portions of the proposed cart paths. Any other water travels over existing grassed lawn areas which act as a vegetative filter strip.

PDA-2 discharges to the adjacent grassed area. PDA-2 consists of only roof water from the proposed building, which will be collected and diverted into an underground infiltration drywell, with overflow discharging to the adjacent grass.

Tables 4 and 5 compare the allowable peak flow rate from the site and the resultant post-development peak outflow rates.

Table 4: Allowable & Post-Development Peak Flow Rates (PDA-1)

Freq. Storm Event (yr)	Allowable Post-Development Peak Flow Rate (cfs)	Post-development Peak Flow rate (cfs)
2	0.001	0.0
10	0.038	0.0
100	0.792	0.45

Table 5: Allowable & Post-Development Peak Flow Rates (PDA-2)

Freq. Storm Event (yr)	Allowable Post-Development Peak Flow Rate (cfs)	Proposed Post-Development Peak Flow Rate (cfs)
2	0.22	0.22
10	0.68	0.52
100	1.50	1.32

The post-development condition of drainage area PDA-3 is primarily existing parking lot area and grassy areas in good condition. In addition, small-scale bioretention islands have been added to the existing parking lot. The proposed design removes a significant portion of the existing impervious area, including the removal of buildings, walkways, and pavement. This results in a net decrease in impervious area of roughly 3,000 square feet (5% of the total area) for PDA-3.

Hydrologic conditions are improved or maintained throughout the entire drainage area, with the post-construction hydrograph falling completely below the pre-construction hydrograph, eliminating the need for stormwater quantity controls. As depicted in a table summarizing the pre- and post- construction peak flow rates provided below, the post-construction meets peak flow rate requirements for the 2- and 10-year storm events, and only the 100-year storm event exceeds the peak flow rate with a reduction factor applied.

Table 6: Allowable & Post-Development Peak Flow Rates (PDA-3)

Freq. Storm Event (yr)	Peak Flow Rate with Reduction Factor (cfs)	Proposed Post- Development Peak Flow Rate (cfs)
2	2.18	2.07
10	5.34	3.70
100	9.90	11.91*

Permeability for infiltration basins has been estimated based on the available soils information, but will be confirmed with in-situ testing. Soils mapping indicates that the entire site is within hydrologic soil group A, with infiltration rates suitable for groundwater recharge.

Please refer to Appendix D for post-development 2-, 10-, and 100-year storm proposed event calculations.

5.0 Stormwater Quality

In accordance with NJAC 7:8-5.5(a), runoff quality standards apply if there is an increase in regulated motor surface of 0.25 acres or more. The stormwater rules define regulated motor vehicle surface as the net increase of pervious or impervious surface that is intended to be used by motor vehicles and/or the total area of motor vehicle surface that is currently receiving water quality treatment. For the purposes of this analysis, cart paths were considered to be motor vehicle surfaces, even though the carts are electric.

Proposed areas of increased regulated motor vehicle surface include the proposed cart paths at the golf cart storage building and the small areas of pavement expansion at the existing parking lot. The increase in motor vehicle surface is below the 0.25 acres, negating the requirement to provide water quality controls. However, some stormwater BMPs have been included to improve the existing stormwater quality. Portions of the existing parking lot and entry roadway are directed towards proposed bioretention basin parking islands. In addition, portions of the cart paths at the golf cart storage building will be constructed from pervious pavement systems. Both sets of BMPs provide the 80% TSS removal based on the design guidelines of the BMP Manual.

6.0 Groundwater Recharge

NJAC 7:8-5.4(b) requires that a proposed major land development shall be required to maintain 100 percent of the site's average annual pre-developed groundwater recharge volume after development or to infiltrate 100 percent of the difference between the site's pre- and post-development 2-year runoff volumes.

In PDA-1 and PDA-2, the full 2-year runoff volume is recharged. In PDA-3, the impervious area has been decreased, and some runoff will be infiltrated into the bioretention parking island basins. For the purposes of the groundwater recharge analysis, only the pervious pavement BMP was analyzed, as it provided sufficient recharge to meet the annual recharge deficit. The other BMPs, which have been conservatively omitted from this calculation, would provide additional recharge.

For the analysis, the pervious pavement is 8" thick. Thus the lower surface depth (dEXC) is assigned a value of 20 inches, and the upper level of the BMP surface (dBMPu) is 8.0 in. The BMP Area (ABMP) provided is the average surface area of the pervious asphalt of 2,842 sq.ft. The post-development annual recharge deficit for the site is 6,332 cu ft. The pervious pavement provides this recharge volume utilizing significantly less than its total depth. Calculations are provided in Appendix E.

6.1 Groundwater Table Hydraulic Impact Assessment

NJAC 7:8-5.2(h) requires that the hydraulic impact to the groundwater table of any proposed infiltration BMPs be analyzed. The Hantush Spreadsheet, developed by USGS in cooperation with the NJ DEP has been utilized to perform this analysis. An analysis for each BMP is included in Appendix F. The anticipated mounding at each infiltration system is not expected to have an impact on any of the BMPs analyzed.

7.0 Soil Erosion and Sediment Control

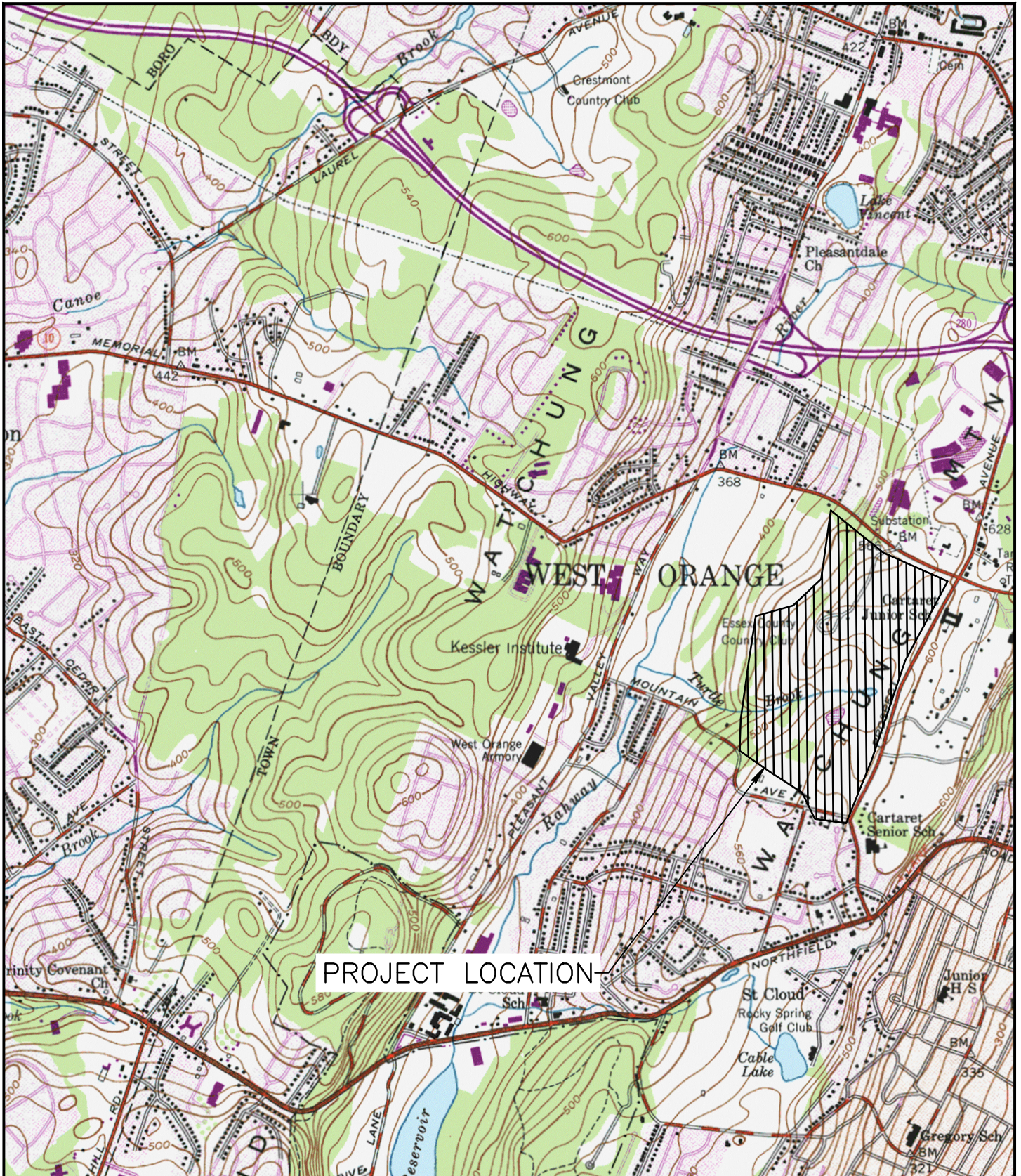
To minimize the effects of erosion, the proposed design and construction concepts and practices incorporate the standards for Soil Erosion and Sediment Control in New Jersey as provided by the New Jersey State Soil Conservation Committee. These erosion deterrents include the use of silt fence or other sediment barriers at downgrade slopes as per SCS standards. In addition, dust control measures, stone tracking mats, and temporary and permanent vegetative cover will be utilized. General notes and guidelines are provided on the Soil Erosion and Sediment Control Plans for the contractor in order to protect against soil erosion throughout the construction process.

8.0 Conclusion

In conclusion, the stormwater runoff quantity requirements have been met with the design of the proposed stormwater management system which reduces the stormwater peak flow runoff in post-development conditions to less than the required 50%, 75%, and 80% of the pre-development 2-, 10-, and 100-year storm events, respectively. Stormwater quality requirements are not required since the project does not propose and increase in regulated motor vehicle surface. Groundwater recharge requirements are met by recharging 100% of the pre-construction annual recharge.

Based on the above, it is Watermen, LLC's opinion that the proposed development will not have any negative impact on the surrounding area or on the existing storm sewer systems.

Appendix A:
Project Location Map



USGS QUAD MAP (CALDWELL)

ESSEX COUNTY COUNTRY CLUB
TOWNSHIP OF WEST ORANGE



WATERMEN
LLC

SCALE:
1"=2000'

PROJECT NO.:

DATE:
08/15/23

FIGURE NO.:
1

Appendix B:

NRCS Web Soil Survey Report



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 **Essex County, New Jersey**



August 22, 2023

Preface

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

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

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

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

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

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

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

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface	2
How Soil Surveys Are Made	5
Soil Map	8
Soil Map.....	9
Legend.....	10
Map Unit Legend.....	11
Map Unit Descriptions.....	11
Essex County, New Jersey.....	14
BogBc—Boonton loam, 0 to 8 percent slopes, extremely stony.....	14
BogCc—Boonton loam, 8 to 15 percent slopes, extremely stony.....	15
BouB—Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes.....	17
DunC—Dunellen sandy loam, 8 to 15 percent slopes.....	18
DuuB—Dunellen - Urban land, Dunellen substratum complex, 0 to 8 percent slopes.....	20
HanBc—Haledon silt loam, 0 to 8 percent slopes, extremely stony.....	21
UdbonB—Udorthents, Boonton substratum, 0 to 8 percent slopes.....	23
UddunB—Udorthents, Dunellen substratum, 0 to 8 percent slopes.....	24
URBONB—Urban land, Boonton substratum, 0 to 8 percent slopes.....	25
USBONB—Urban land, Boonton substratum - Boonton complex, 0 to 8 percent slopes.....	26
WATER—Water.....	28
References	29

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

Custom Soil Resource Report

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



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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: Essex County, New Jersey

Survey Area Data: Version 18, Aug 29, 2022

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

Date(s) aerial images were photographed: Oct 10, 2022—Oct 16, 2022

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
BogBc	Boonton loam, 0 to 8 percent slopes, extremely stony	19.4	10.4%
BogCc	Boonton loam, 8 to 15 percent slopes, extremely stony	2.4	1.3%
BouB	Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes	0.0	0.0%
DunC	Dunellen sandy loam, 8 to 15 percent slopes	0.2	0.1%
DuuB	Dunellen - Urban land, Dunellen substratum complex, 0 to 8 percent slopes	0.2	0.1%
HanBc	Haledon silt loam, 0 to 8 percent slopes, extremely stony	0.4	0.2%
UdbonB	Udorthents, Boonton substratum, 0 to 8 percent slopes	159.4	85.0%
UddunB	Udorthents, Dunellen substratum, 0 to 8 percent slopes	2.6	1.4%
URBONB	Urban land, Boonton substratum, 0 to 8 percent slopes	0.1	0.1%
USBONB	Urban land, Boonton substratum - Boonton complex, 0 to 8 percent slopes	0.2	0.1%
WATER	Water	2.5	1.3%
Totals for Area of Interest		187.6	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without

including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

Custom Soil Resource Report

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.

Essex County, New Jersey

BogBc—Boonton loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: b128

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Boonton, extremely stony, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton, Extremely Stony

Setting

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Coarse-loamy basal till derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

Oa - 1 to 3 inches: highly decomposed plant material

A - 3 to 5 inches: loam

BA - 5 to 8 inches: silt loam

BE - 8 to 17 inches: silt loam

Bt - 17 to 30 inches: silt loam

Btx1 - 30 to 40 inches: gravelly fine sandy loam

Btx2 - 40 to 47 inches: fine sandy loam

CBt1 - 47 to 58 inches: loamy sand

CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent

Surface area covered with cobbles, stones or boulders: 10.0 percent

Depth to restrictive feature: 20 to 36 inches to fragipan

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Custom Soil Resource Report

Hydrologic Soil Group: C

Ecological site: F144AY037MA - Moist Dense Till Uplands

Hydric soil rating: No

Minor Components

Boonton, moderately well drained, extremely stony

Percent of map unit: 10 percent

Landform: Ground moraines

Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Head slope, side slope

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Haledon, extremely stony

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (two-dimensional): Summit, shoulder

Landform position (three-dimensional): Head slope, side slope

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

BogCc—Boonton loam, 8 to 15 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: b120

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Boonton, extremely stony, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton, Extremely Stony

Setting

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Coarse-loamy basal till derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

Custom Soil Resource Report

Oa - 1 to 3 inches: highly decomposed plant material
A - 3 to 5 inches: loam
BA - 5 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt - 17 to 30 inches: silt loam
Btx1 - 30 to 40 inches: gravelly fine sandy loam
Btx2 - 40 to 47 inches: fine sandy loam
CBt1 - 47 to 58 inches: loamy sand
CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 10.0 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Boonton, moderately well drained, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Haledon, extremely stony

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

BouB—Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: b12f
Elevation: 50 to 500 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Boonton and similar soils: 50 percent
Urban land, boonton substratum: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Boonton

Setting

Landform: Ground moraines
Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy basal till derived from basalt

Typical profile

A - 0 to 5 inches: loam
BA - 5 to 8 inches: silt loam
BE - 8 to 17 inches: silt loam
Bt - 17 to 30 inches: silt loam
Btx1 - 30 to 40 inches: gravelly fine sandy loam
Btx2 - 40 to 47 inches: fine sandy loam
CBt1 - 47 to 58 inches: loamy sand
CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 36 inches to fragipan
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Description of Urban Land, Boonton Substratum

Setting

Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material
H2 - 12 to 47 inches: silt loam
2CBt1 - 47 to 58 inches: loamy sand
2CBt2 - 58 to 72 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents, boonton substratum

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

DunC—Dunellen sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: njzb
Elevation: 50 to 2,000 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Dunellen and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dunellen

Setting

Landform: Outwash plains

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Coarse-loamy outwash derived from sandstone

Typical profile

A1 - 0 to 8 inches: sandy loam

A2 - 8 to 14 inches: sandy loam

BA - 14 to 20 inches: sandy loam

Bt - 20 to 31 inches: sandy loam

C - 31 to 42 inches: sandy loam

2C - 42 to 70 inches: loamy sand

Properties and qualities

Slope: 8 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 6.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: A

Hydric soil rating: No

Minor Components

Tunkhannock

Percent of map unit: 10 percent

Landform: Deltas, kames, outwash terraces

Landform position (three-dimensional): Riser, rise

Down-slope shape: Linear, convex

Across-slope shape: Linear, convex

Hydric soil rating: No

Udorthents, dunellen substratum

Percent of map unit: 5 percent

Landform: Outwash plains

Landform position (three-dimensional): Lower third of mountainflank

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

DuuB—Dunellen - Urban land, Dunellen substratum complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: njzf
Elevation: 50 to 150 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Dunellen and similar soils: 60 percent
Urban land, dunellen substratum: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dunellen

Setting

Landform: Outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy outwash derived from sandstone

Typical profile

A1 - 0 to 8 inches: sandy loam
A2 - 8 to 14 inches: sandy loam
BA - 14 to 20 inches: sandy loam
Bt - 20 to 31 inches: sandy loam
C - 31 to 42 inches: sandy loam
2C - 42 to 70 inches: stratified gravelly sand to sand to loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY023CT - Well Drained Outwash

Hydric soil rating: No

Description of Urban Land, Dunellen Substratum

Setting

Landform: Outwash plains

Landform position (three-dimensional): Lower third of mountainflank

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material

H2 - 12 to 31 inches: sandy loam

2C - 31 to 42 inches: sandy loam

3C - 42 to 70 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: Unranked

Minor Components

Udorthents, dunellen substratum

Percent of map unit: 10 percent

Landform: Outwash plains

Landform position (three-dimensional): Lower third of mountainflank

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

HanBc—Haledon silt loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: b12k

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Haledon, extremely stony, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Haledon, Extremely Stony

Setting

Landform: Ground moraines
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy basal till derived from basalt

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
Ap - 2 to 8 inches: silt loam
Bt - 8 to 15 inches: silt loam
Btg - 15 to 22 inches: silt loam
2Bt1 - 22 to 27 inches: loam
2Bt2 - 27 to 30 inches: loam
BCtx - 30 to 60 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 10.0 percent
Depth to restrictive feature: 24 to 36 inches to fragipan
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 7 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Boonton, moderately well drained, extremely stony

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Hasbrouck, extremely stony

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

UdbonB—Udorthents, Boonton substratum, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: w8r1

Elevation: 50 to 660 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, boonton substratum, and similar soils: 95 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Boonton Substratum

Setting

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Loamy material transported by human activity

Typical profile

A - 0 to 12 inches: loam

CBt1 - 12 to 58 inches: loamy sand

CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: A

Hydric soil rating: No

Minor Components

Boonton

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

UddunB—Udorthents, Dunellen substratum, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: w8r5

Elevation: 0 to 570 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, dunellen substratum, and similar soils: 95 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Dunellen Substratum

Setting

Landform: Outwash plains

Landform position (three-dimensional): Lower third of mountainflank

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loamy material transported by human activity

Typical profile

A - 0 to 12 inches: loam

C - 12 to 42 inches: sandy loam

2C - 42 to 70 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: D

Hydric soil rating: No

Minor Components

Dunellen

Percent of map unit: 5 percent

Landform: Outwash plains

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

URBONB—Urban land, Boonton substratum, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: w9cn

Elevation: 50 to 500 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land, boonton substratum: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land, Boonton Substratum

Setting

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank

Down-slope shape: Linear, convex

Across-slope shape: Linear

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Typical profile

H1 - 0 to 12 inches: material

H2 - 12 to 47 inches: silt loam

2CBt1 - 47 to 58 inches: loamy sand

2CBt2 - 58 to 72 inches: loamy sand

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Custom Soil Resource Report

Hydric soil rating: Unranked

Minor Components

Boonton

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Udorthents, boonton substratum

Percent of map unit: 5 percent

Landform: Ground moraines

Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

USBONB—Urban land, Boonton substratum - Boonton complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: w9c1

Elevation: 0 to 520 feet

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 213 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land, boonton substratum: 60 percent

Boonton and similar soils: 30 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land, Boonton Substratum

Setting

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Asphalt over supraglacial meltout till

Typical profile

M - 0 to 12 inches: material

2^C - 12 to 47 inches: gravelly sandy loam

Custom Soil Resource Report

3CBt1 - 47 to 58 inches: loamy sand

3CBt2 - 58 to 72 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Calcium carbonate, maximum content: 10 percent

Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: Unranked

Description of Boonton

Setting

Landform: Ground moraines

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Red coarse-loamy till derived from sedimentary rock

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

A - 2 to 4 inches: loam

Bt - 4 to 28 inches: sandy loam

Btx - 28 to 51 inches: sandy loam

BC - 51 to 72 inches: sandy loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: 20 to 39 inches to fragipan

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)

Depth to water table: About 28 to 59 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2s

Hydrologic Soil Group: B

Ecological site: F144AY037MA - Moist Dense Till Uplands

Hydric soil rating: No

Minor Components

Udorthents, boonton substratum

Percent of map unit: 10 percent

Custom Soil Resource Report

Landform: Ground moraines

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Lower third of mountainflank, upper third of mountainflank, center third of mountainflank

Down-slope shape: Convex

Across-slope shape: Convex, linear

Hydric soil rating: No

WATER—Water

Map Unit Setting

National map unit symbol: b133

Mean annual precipitation: 30 to 64 inches

Mean annual air temperature: 46 to 79 degrees F

Frost-free period: 131 to 178 days

Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. September 18, 2002. Hydric soils of the United States.
- Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix C:

Pre-Development Flow Calculations



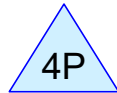
CART BUILDING AREA



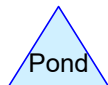
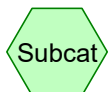
PARKING LOT



COMFORT STATION



TOTAL
PRE-CONSTRUCTION
FLOW



Routing Diagram for PRE

Prepared by {enter your company name here}, Printed 8/22/2023
HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

PRE

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.526	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S)
0.133	98	BUILDINGS (2S)
0.097	98	CART PATHS/CONCRETE (2S)
0.019	96	Gravel surface, HSG A (2S)
0.134	39	MISC LANDSCAPE AREAS (2S)
0.035	98	PAVEMENT (2S)
0.041	77	SAND TRAP (1S)
0.938	98	UNDISTURBED PAVEMENT AREA (2S)
1.923	77	TOTAL AREA

PRE

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.545	HSG A	1S, 2S, 3S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
1.377	Other	1S, 2S
1.923		TOTAL AREA

PRE

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 4

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchm Numbers
0.526	0.000	0.000	0.000	0.000	0.526	>75% Grass cover, Good	
0.000	0.000	0.000	0.000	0.133	0.133	BUILDINGS	
0.000	0.000	0.000	0.000	0.097	0.097	CART PATHS/CONCRETE	
0.019	0.000	0.000	0.000	0.000	0.019	Gravel surface	
0.000	0.000	0.000	0.000	0.134	0.134	MISC LANDSCAPE AREAS	
0.000	0.000	0.000	0.000	0.035	0.035	PAVEMENT	
0.000	0.000	0.000	0.000	0.041	0.041	SAND TRAP	
0.000	0.000	0.000	0.000	0.938	0.938	UNDISTURBED PAVEMENT AREA	
0.545	0.000	0.000	0.000	1.377	1.923	TOTAL AREA	

PRE

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 5

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CART BUILDING AREA Runoff Area=22,380 sf 0.00% Impervious Runoff Depth>0.03"
Flow Length=151' Tc=4.7 min CN=42 Runoff=0.00 cfs 0.001 af

Subcatchment 2S: PARKING LOT Runoff Area=60,748 sf 86.23% Impervious Runoff Depth>2.48"
Flow Length=631' Tc=2.4 min CN=91 Runoff=4.36 cfs 0.289 af

Subcatchment 3S: COMFORT STATION Runoff Area=620 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=44' Slope=0.0200 '/' Tc=4.9 min CN=39 Runoff=0.00 cfs 0.000 af

Pond 4P: TOTAL PRE-CONSTRUCTION FLOW

Total Runoff Area = 1.923 ac Runoff Volume = 0.290 af Average Runoff Depth = 1.81"
37.46% Pervious = 0.720 ac 62.54% Impervious = 1.202 ac

Summary for Subcatchment 1S: CART BUILDING AREA[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.00 cfs @ 21.42 hrs, Volume= 0.001 af, Depth> 0.03"

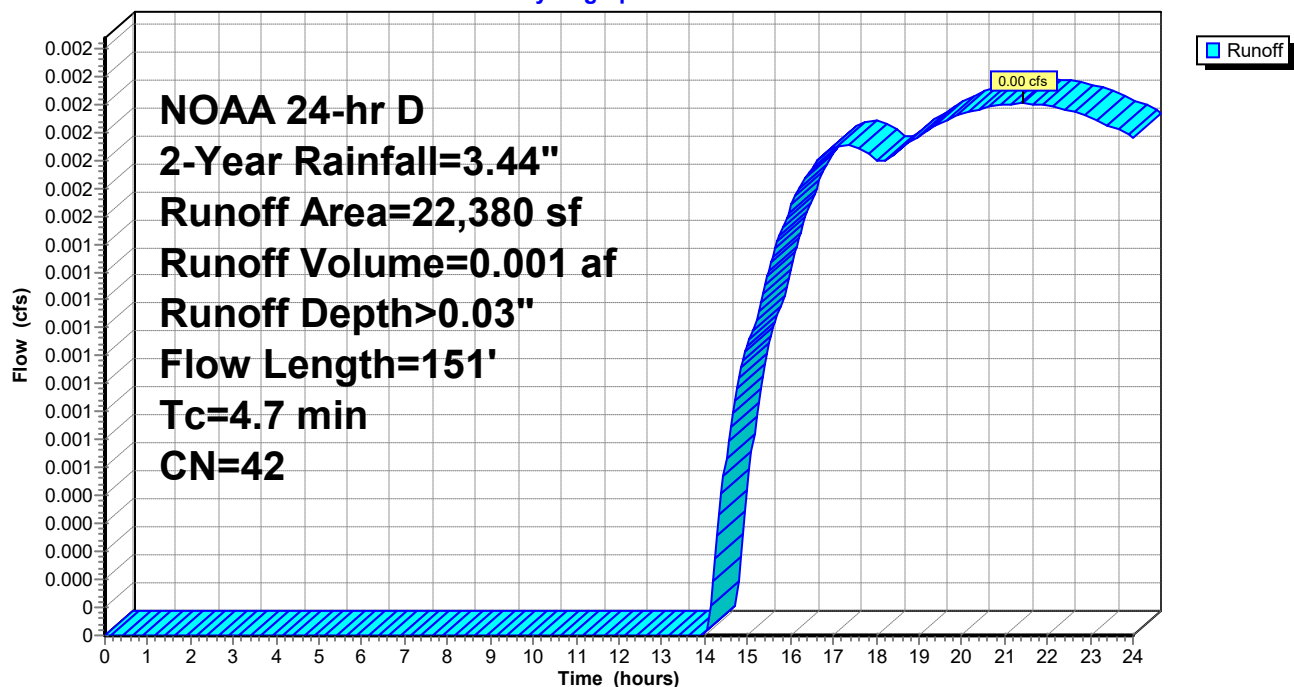
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 2-Year Rainfall=3.44"

	Area (sf)	CN	Description
*	1,780	77	SAND TRAP
	20,600	39	>75% Grass cover, Good, HSG A
	22,380	42	Weighted Average
	22,380		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.1300	0.37		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
0.2	51	0.1000	4.74		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.7	151	Total			

Subcatchment 1S: CART BUILDING AREA

Hydrograph



PRE

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 7

Hydrograph for Subcatchment 1S: CART BUILDING AREA

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	2.55	0.00	0.00
0.25	0.01	0.00	0.00	13.25	2.61	0.00	0.00
0.50	0.02	0.00	0.00	13.50	2.67	0.00	0.00
0.75	0.03	0.00	0.00	13.75	2.72	0.00	0.00
1.00	0.04	0.00	0.00	14.00	2.76	0.00	0.00
1.25	0.05	0.00	0.00	14.25	2.80	0.00	0.00
1.50	0.06	0.00	0.00	14.50	2.83	0.00	0.00
1.75	0.07	0.00	0.00	14.75	2.87	0.00	0.00
2.00	0.08	0.00	0.00	15.00	2.89	0.00	0.00
2.25	0.09	0.00	0.00	15.25	2.92	0.00	0.00
2.50	0.11	0.00	0.00	15.50	2.95	0.00	0.00
2.75	0.12	0.00	0.00	15.75	2.97	0.00	0.00
3.00	0.13	0.00	0.00	16.00	2.99	0.00	0.00
3.25	0.14	0.00	0.00	16.25	3.02	0.00	0.00
3.50	0.15	0.00	0.00	16.50	3.04	0.01	0.00
3.75	0.17	0.00	0.00	16.75	3.06	0.01	0.00
4.00	0.18	0.00	0.00	17.00	3.08	0.01	0.00
4.25	0.19	0.00	0.00	17.25	3.10	0.01	0.00
4.50	0.21	0.00	0.00	17.50	3.11	0.01	0.00
4.75	0.22	0.00	0.00	17.75	3.13	0.01	0.00
5.00	0.24	0.00	0.00	18.00	3.15	0.01	0.00
5.25	0.25	0.00	0.00	18.25	3.16	0.01	0.00
5.50	0.26	0.00	0.00	18.50	3.18	0.01	0.00
5.75	0.28	0.00	0.00	18.75	3.19	0.01	0.00
6.00	0.29	0.00	0.00	19.00	3.20	0.01	0.00
6.25	0.31	0.00	0.00	19.25	3.22	0.01	0.00
6.50	0.33	0.00	0.00	19.50	3.23	0.02	0.00
6.75	0.34	0.00	0.00	19.75	3.25	0.02	0.00
7.00	0.36	0.00	0.00	20.00	3.26	0.02	0.00
7.25	0.38	0.00	0.00	20.25	3.27	0.02	0.00
7.50	0.40	0.00	0.00	20.50	3.29	0.02	0.00
7.75	0.42	0.00	0.00	20.75	3.30	0.02	0.00
8.00	0.45	0.00	0.00	21.00	3.31	0.02	0.00
8.25	0.47	0.00	0.00	21.25	3.32	0.02	0.00
8.50	0.49	0.00	0.00	21.50	3.33	0.02	0.00
8.75	0.52	0.00	0.00	21.75	3.35	0.02	0.00
9.00	0.55	0.00	0.00	22.00	3.36	0.02	0.00
9.25	0.57	0.00	0.00	22.25	3.37	0.03	0.00
9.50	0.61	0.00	0.00	22.50	3.38	0.03	0.00
9.75	0.64	0.00	0.00	22.75	3.39	0.03	0.00
10.00	0.68	0.00	0.00	23.00	3.40	0.03	0.00
10.25	0.72	0.00	0.00	23.25	3.41	0.03	0.00
10.50	0.77	0.00	0.00	23.50	3.42	0.03	0.00
10.75	0.83	0.00	0.00	23.75	3.43	0.03	0.00
11.00	0.89	0.00	0.00	24.00	3.44	0.03	0.00
11.25	0.98	0.00	0.00				
11.50	1.09	0.00	0.00				
11.75	1.26	0.00	0.00				
12.00	1.65	0.00	0.00				
12.25	2.18	0.00	0.00				
12.50	2.35	0.00	0.00				
12.75	2.46	0.00	0.00				

Summary for Subcatchment 2S: PARKING LOT[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 4.36 cfs @ 12.08 hrs, Volume= 0.289 af, Depth> 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 2-Year Rainfall=3.44"

	Area (sf)	CN	Description
*	5,772	98	BUILDINGS
	815	96	Gravel surface, HSG A
*	4,235	98	CART PATHS/CONCRETE
*	1,513	98	PAVEMENT
	1,713	39	>75% Grass cover, Good, HSG A
*	5,840	39	MISC LANDSCAPE AREAS
*	40,860	98	UNDISTURBED PAVEMENT AREA
	60,748	91	Weighted Average
	8,368		13.77% Pervious Area
	52,380		86.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0500	2.06		Sheet Flow, Smooth surfaces $n=0.011$ $P2=3.44"$
1.6	531	0.0750	5.56		Shallow Concentrated Flow, Paved $K_v=20.3$ fps
2.4	631	Total			

PRE

Prepared by {enter your company name here}

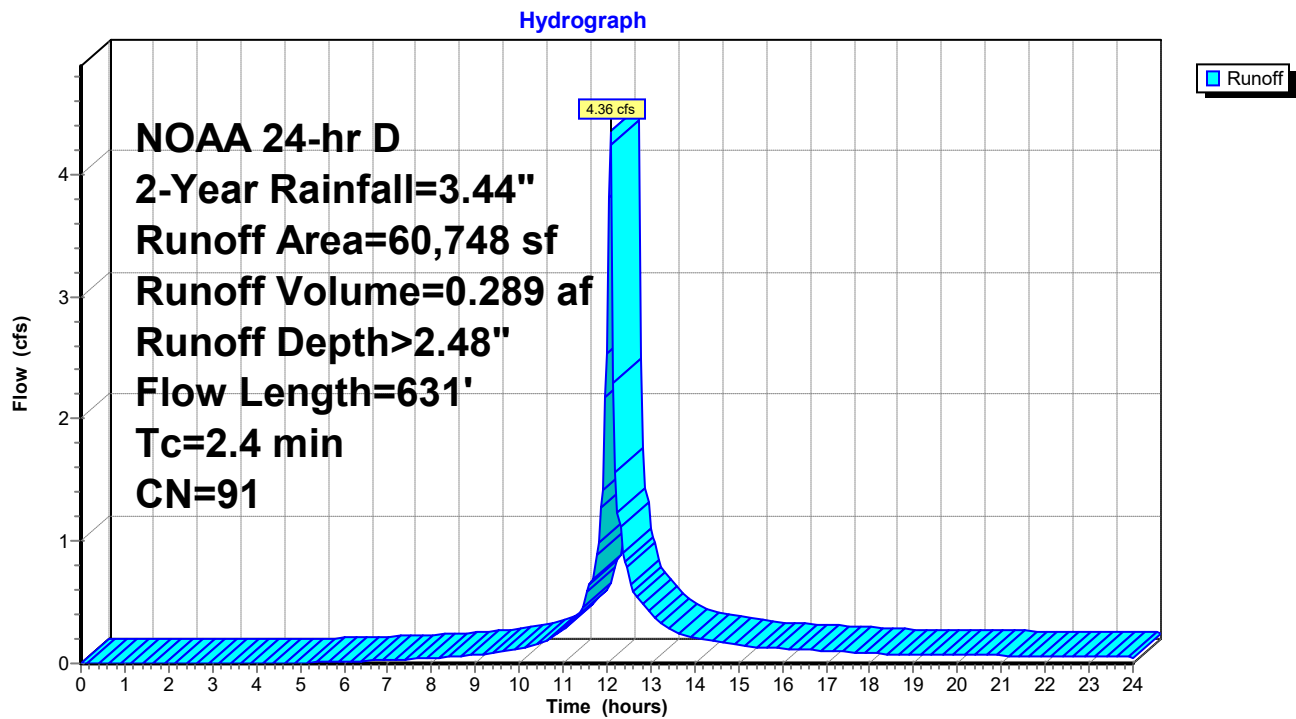
HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 2-Year Rainfall=3.44"

Printed 8/22/2023

Page 9

Subcatchment 2S: PARKING LOT



PRE

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 10

Hydrograph for Subcatchment 2S: PARKING LOT

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	2.55	1.65	0.41
0.25	0.01	0.00	0.00	13.25	2.61	1.71	0.33
0.50	0.02	0.00	0.00	13.50	2.67	1.77	0.27
0.75	0.03	0.00	0.00	13.75	2.72	1.81	0.23
1.00	0.04	0.00	0.00	14.00	2.76	1.85	0.22
1.25	0.05	0.00	0.00	14.25	2.80	1.88	0.20
1.50	0.06	0.00	0.00	14.50	2.83	1.92	0.18
1.75	0.07	0.00	0.00	14.75	2.87	1.95	0.16
2.00	0.08	0.00	0.00	15.00	2.89	1.97	0.15
2.25	0.09	0.00	0.00	15.25	2.92	2.00	0.14
2.50	0.11	0.00	0.00	15.50	2.95	2.02	0.13
2.75	0.12	0.00	0.00	15.75	2.97	2.04	0.13
3.00	0.13	0.00	0.00	16.00	2.99	2.07	0.12
3.25	0.14	0.00	0.00	16.25	3.02	2.09	0.12
3.50	0.15	0.00	0.00	16.50	3.04	2.11	0.11
3.75	0.17	0.00	0.00	16.75	3.06	2.13	0.11
4.00	0.18	0.00	0.00	17.00	3.08	2.14	0.10
4.25	0.19	0.00	0.00	17.25	3.10	2.16	0.10
4.50	0.21	0.00	0.00	17.50	3.11	2.18	0.09
4.75	0.22	0.00	0.00	17.75	3.13	2.19	0.09
5.00	0.24	0.00	0.01	18.00	3.15	2.21	0.08
5.25	0.25	0.00	0.01	18.25	3.16	2.22	0.08
5.50	0.26	0.00	0.01	18.50	3.18	2.24	0.08
5.75	0.28	0.01	0.01	18.75	3.19	2.25	0.08
6.00	0.29	0.01	0.01	19.00	3.20	2.26	0.07
6.25	0.31	0.01	0.02	19.25	3.22	2.28	0.07
6.50	0.33	0.01	0.02	19.50	3.23	2.29	0.07
6.75	0.34	0.02	0.02	19.75	3.25	2.30	0.07
7.00	0.36	0.02	0.03	20.00	3.26	2.31	0.07
7.25	0.38	0.03	0.03	20.25	3.27	2.33	0.07
7.50	0.40	0.04	0.04	20.50	3.29	2.34	0.07
7.75	0.42	0.04	0.04	20.75	3.30	2.35	0.07
8.00	0.45	0.05	0.05	21.00	3.31	2.36	0.07
8.25	0.47	0.06	0.05	21.25	3.32	2.37	0.06
8.50	0.49	0.07	0.06	21.50	3.33	2.38	0.06
8.75	0.52	0.08	0.06	21.75	3.35	2.40	0.06
9.00	0.55	0.09	0.07	22.00	3.36	2.41	0.06
9.25	0.57	0.10	0.08	22.25	3.37	2.42	0.06
9.50	0.61	0.12	0.09	22.50	3.38	2.43	0.06
9.75	0.64	0.14	0.11	22.75	3.39	2.44	0.06
10.00	0.68	0.16	0.12	23.00	3.40	2.45	0.05
10.25	0.72	0.18	0.14	23.25	3.41	2.46	0.05
10.50	0.77	0.21	0.16	23.50	3.42	2.47	0.05
10.75	0.83	0.24	0.21	23.75	3.43	2.48	0.05
11.00	0.89	0.29	0.26	24.00	3.44	2.48	0.05
11.25	0.98	0.35	0.37				
11.50	1.09	0.42	0.47				
11.75	1.26	0.55	0.89				
12.00	1.65	0.86	2.53				
12.25	2.18	1.32	1.23				
12.50	2.35	1.47	0.78				
12.75	2.46	1.57	0.51				

Summary for Subcatchment 3S: COMFORT STATION[49] Hint: $T_c < 2dt$ may require smaller dt

[73] Warning: Peak may fall outside time span

Runoff = 0.00 cfs @ 23.95 hrs, Volume= 0.000 af, Depth> 0.01"

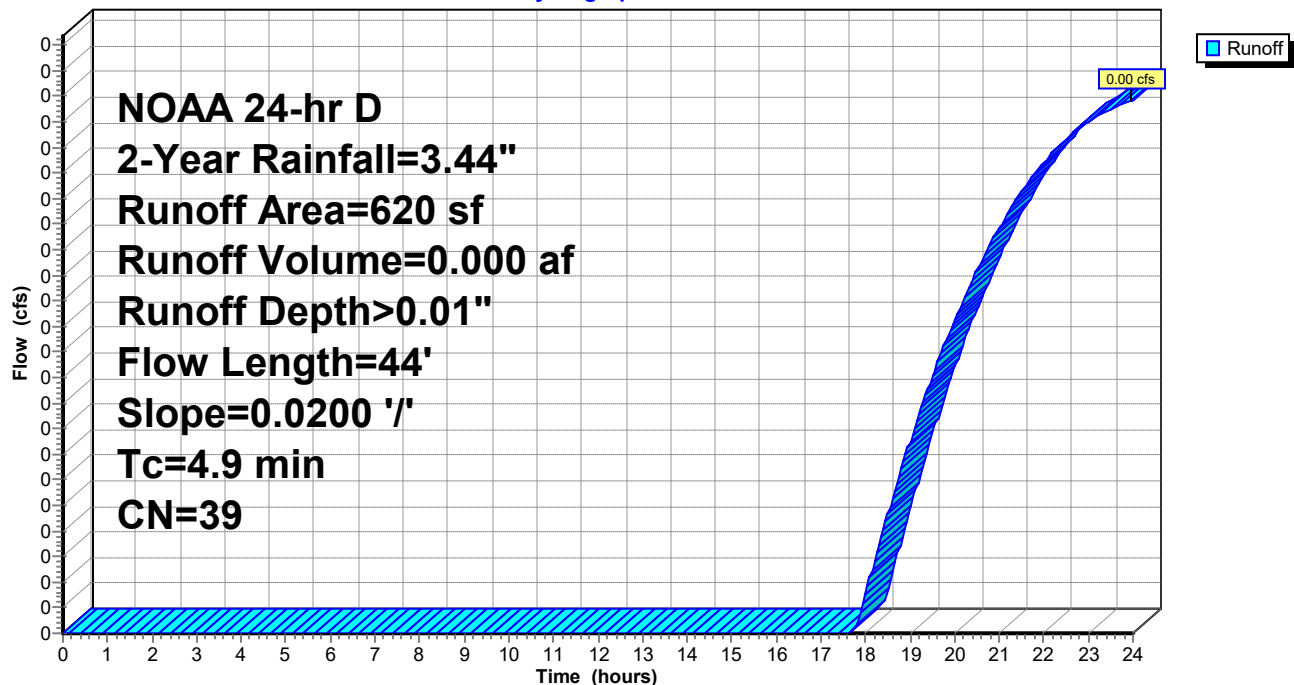
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 2-Year Rainfall=3.44"

Area (sf)	CN	Description
620	39	>75% Grass cover, Good, HSG A
620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	44	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"

Subcatchment 3S: COMFORT STATION

Hydrograph



PRE

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 12

Hydrograph for Subcatchment 3S: COMFORT STATION

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	2.55	0.00	0.00
0.25	0.01	0.00	0.00	13.25	2.61	0.00	0.00
0.50	0.02	0.00	0.00	13.50	2.67	0.00	0.00
0.75	0.03	0.00	0.00	13.75	2.72	0.00	0.00
1.00	0.04	0.00	0.00	14.00	2.76	0.00	0.00
1.25	0.05	0.00	0.00	14.25	2.80	0.00	0.00
1.50	0.06	0.00	0.00	14.50	2.83	0.00	0.00
1.75	0.07	0.00	0.00	14.75	2.87	0.00	0.00
2.00	0.08	0.00	0.00	15.00	2.89	0.00	0.00
2.25	0.09	0.00	0.00	15.25	2.92	0.00	0.00
2.50	0.11	0.00	0.00	15.50	2.95	0.00	0.00
2.75	0.12	0.00	0.00	15.75	2.97	0.00	0.00
3.00	0.13	0.00	0.00	16.00	2.99	0.00	0.00
3.25	0.14	0.00	0.00	16.25	3.02	0.00	0.00
3.50	0.15	0.00	0.00	16.50	3.04	0.00	0.00
3.75	0.17	0.00	0.00	16.75	3.06	0.00	0.00
4.00	0.18	0.00	0.00	17.00	3.08	0.00	0.00
4.25	0.19	0.00	0.00	17.25	3.10	0.00	0.00
4.50	0.21	0.00	0.00	17.50	3.11	0.00	0.00
4.75	0.22	0.00	0.00	17.75	3.13	0.00	0.00
5.00	0.24	0.00	0.00	18.00	3.15	0.00	0.00
5.25	0.25	0.00	0.00	18.25	3.16	0.00	0.00
5.50	0.26	0.00	0.00	18.50	3.18	0.00	0.00
5.75	0.28	0.00	0.00	18.75	3.19	0.00	0.00
6.00	0.29	0.00	0.00	19.00	3.20	0.00	0.00
6.25	0.31	0.00	0.00	19.25	3.22	0.00	0.00
6.50	0.33	0.00	0.00	19.50	3.23	0.00	0.00
6.75	0.34	0.00	0.00	19.75	3.25	0.00	0.00
7.00	0.36	0.00	0.00	20.00	3.26	0.00	0.00
7.25	0.38	0.00	0.00	20.25	3.27	0.00	0.00
7.50	0.40	0.00	0.00	20.50	3.29	0.00	0.00
7.75	0.42	0.00	0.00	20.75	3.30	0.00	0.00
8.00	0.45	0.00	0.00	21.00	3.31	0.00	0.00
8.25	0.47	0.00	0.00	21.25	3.32	0.00	0.00
8.50	0.49	0.00	0.00	21.50	3.33	0.00	0.00
8.75	0.52	0.00	0.00	21.75	3.35	0.00	0.00
9.00	0.55	0.00	0.00	22.00	3.36	0.00	0.00
9.25	0.57	0.00	0.00	22.25	3.37	0.00	0.00
9.50	0.61	0.00	0.00	22.50	3.38	0.00	0.00
9.75	0.64	0.00	0.00	22.75	3.39	0.00	0.00
10.00	0.68	0.00	0.00	23.00	3.40	0.00	0.00
10.25	0.72	0.00	0.00	23.25	3.41	0.01	0.00
10.50	0.77	0.00	0.00	23.50	3.42	0.01	0.00
10.75	0.83	0.00	0.00	23.75	3.43	0.01	0.00
11.00	0.89	0.00	0.00	24.00	3.44	0.01	0.00
11.25	0.98	0.00	0.00				
11.50	1.09	0.00	0.00				
11.75	1.26	0.00	0.00				
12.00	1.65	0.00	0.00				
12.25	2.18	0.00	0.00				
12.50	2.35	0.00	0.00				
12.75	2.46	0.00	0.00				

PRE

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 13

Summary for Pond 4P: TOTAL PRE-CONSTRUCTION FLOW

[40] Hint: Not Described (Outflow=Inflow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Free Discharge)

PRE

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 14

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CART BUILDING AREA Runoff Area=22,380 sf 0.00% Impervious Runoff Depth>0.37"
Flow Length=151' Tc=4.7 min CN=42 Runoff=0.05 cfs 0.016 af

Subcatchment 2S: PARKING LOT Runoff Area=60,748 sf 86.23% Impervious Runoff Depth>4.20"
Flow Length=631' Tc=2.4 min CN=91 Runoff=7.12 cfs 0.488 af

Subcatchment 3S: COMFORT STATION Runoff Area=620 sf 0.00% Impervious Runoff Depth>0.25"
Flow Length=44' Slope=0.0200 '/' Tc=4.9 min CN=39 Runoff=0.00 cfs 0.000 af

Pond 4P: TOTAL PRE-CONSTRUCTION FLOW

Total Runoff Area = 1.923 ac Runoff Volume = 0.504 af Average Runoff Depth = 3.14"
37.46% Pervious = 0.720 ac 62.54% Impervious = 1.202 ac

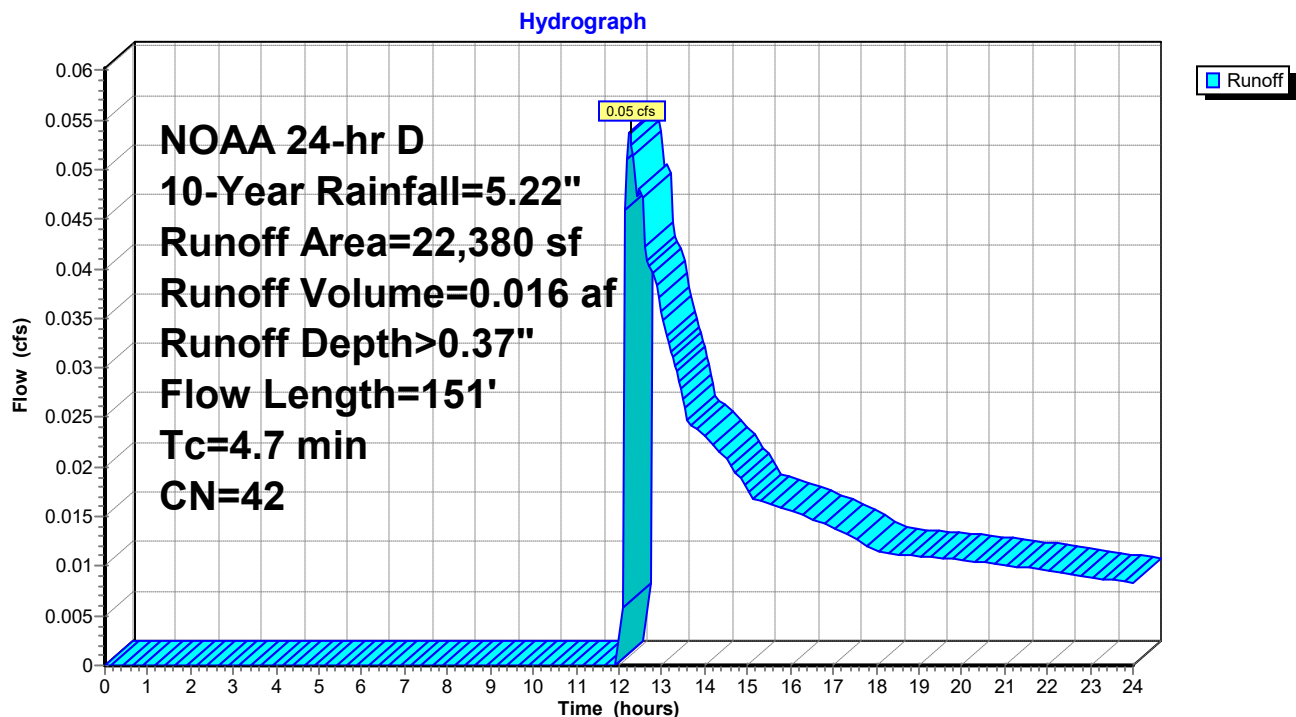
Summary for Subcatchment 1S: CART BUILDING AREA[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.05 cfs @ 12.26 hrs, Volume= 0.016 af, Depth> 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 10-Year Rainfall=5.22"

	Area (sf)	CN	Description
*	1,780	77	SAND TRAP
	20,600	39	>75% Grass cover, Good, HSG A
	22,380	42	Weighted Average
	22,380		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.1300	0.37		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
0.2	51	0.1000	4.74		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.7	151	Total			

Subcatchment 1S: CART BUILDING AREA

PRE

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 16

Hydrograph for Subcatchment 1S: CART BUILDING AREA

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.86	0.08	0.04
0.25	0.01	0.00	0.00	13.25	3.97	0.10	0.03
0.50	0.03	0.00	0.00	13.50	4.05	0.11	0.03
0.75	0.04	0.00	0.00	13.75	4.12	0.12	0.02
1.00	0.06	0.00	0.00	14.00	4.19	0.13	0.02
1.25	0.08	0.00	0.00	14.25	4.24	0.14	0.02
1.50	0.09	0.00	0.00	14.50	4.30	0.15	0.02
1.75	0.11	0.00	0.00	14.75	4.35	0.16	0.02
2.00	0.13	0.00	0.00	15.00	4.39	0.17	0.02
2.25	0.14	0.00	0.00	15.25	4.43	0.18	0.02
2.50	0.16	0.00	0.00	15.50	4.47	0.19	0.02
2.75	0.18	0.00	0.00	15.75	4.51	0.20	0.02
3.00	0.20	0.00	0.00	16.00	4.54	0.20	0.02
3.25	0.22	0.00	0.00	16.25	4.58	0.21	0.02
3.50	0.23	0.00	0.00	16.50	4.61	0.22	0.01
3.75	0.25	0.00	0.00	16.75	4.64	0.22	0.01
4.00	0.27	0.00	0.00	17.00	4.67	0.23	0.01
4.25	0.29	0.00	0.00	17.25	4.70	0.24	0.01
4.50	0.31	0.00	0.00	17.50	4.73	0.24	0.01
4.75	0.34	0.00	0.00	17.75	4.75	0.25	0.01
5.00	0.36	0.00	0.00	18.00	4.77	0.26	0.01
5.25	0.38	0.00	0.00	18.25	4.80	0.26	0.01
5.50	0.40	0.00	0.00	18.50	4.82	0.27	0.01
5.75	0.42	0.00	0.00	18.75	4.84	0.27	0.01
6.00	0.45	0.00	0.00	19.00	4.86	0.28	0.01
6.25	0.47	0.00	0.00	19.25	4.88	0.28	0.01
6.50	0.49	0.00	0.00	19.50	4.91	0.29	0.01
6.75	0.52	0.00	0.00	19.75	4.93	0.29	0.01
7.00	0.55	0.00	0.00	20.00	4.95	0.30	0.01
7.25	0.58	0.00	0.00	20.25	4.97	0.30	0.01
7.50	0.61	0.00	0.00	20.50	4.99	0.31	0.01
7.75	0.64	0.00	0.00	20.75	5.00	0.31	0.01
8.00	0.68	0.00	0.00	21.00	5.02	0.32	0.01
8.25	0.71	0.00	0.00	21.25	5.04	0.32	0.01
8.50	0.75	0.00	0.00	21.50	5.06	0.33	0.01
8.75	0.79	0.00	0.00	21.75	5.08	0.33	0.01
9.00	0.83	0.00	0.00	22.00	5.09	0.34	0.01
9.25	0.87	0.00	0.00	22.25	5.11	0.34	0.01
9.50	0.92	0.00	0.00	22.50	5.13	0.35	0.01
9.75	0.98	0.00	0.00	22.75	5.14	0.35	0.01
10.00	1.03	0.00	0.00	23.00	5.16	0.35	0.01
10.25	1.10	0.00	0.00	23.25	5.18	0.36	0.01
10.50	1.17	0.00	0.00	23.50	5.19	0.36	0.01
10.75	1.25	0.00	0.00	23.75	5.21	0.37	0.01
11.00	1.36	0.00	0.00	24.00	5.22	0.37	0.01
11.25	1.49	0.00	0.00				
11.50	1.65	0.00	0.00				
11.75	1.92	0.00	0.00				
12.00	2.50	0.00	0.00				
12.25	3.30	0.02	0.05				
12.50	3.57	0.04	0.05				
12.75	3.73	0.06	0.04				

Summary for Subcatchment 2S: PARKING LOT

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 7.12 cfs @ 12.08 hrs, Volume= 0.488 af, Depth> 4.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
 NOAA 24-hr D 10-Year Rainfall=5.22"

	Area (sf)	CN	Description
*	5,772	98	BUILDINGS
	815	96	Gravel surface, HSG A
*	4,235	98	CART PATHS/CONCRETE
*	1,513	98	PAVEMENT
	1,713	39	>75% Grass cover, Good, HSG A
*	5,840	39	MISC LANDSCAPE AREAS
*	40,860	98	UNDISTURBED PAVEMENT AREA
	60,748	91	Weighted Average
	8,368		13.77% Pervious Area
	52,380		86.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0500	2.06		Sheet Flow, Smooth surfaces $n=0.011$ $P2=3.44"$
1.6	531	0.0750	5.56		Shallow Concentrated Flow, Paved $K_v=20.3$ fps
2.4	631	Total			

PRE

NOAA 24-hr D 10-Year Rainfall=5.22"

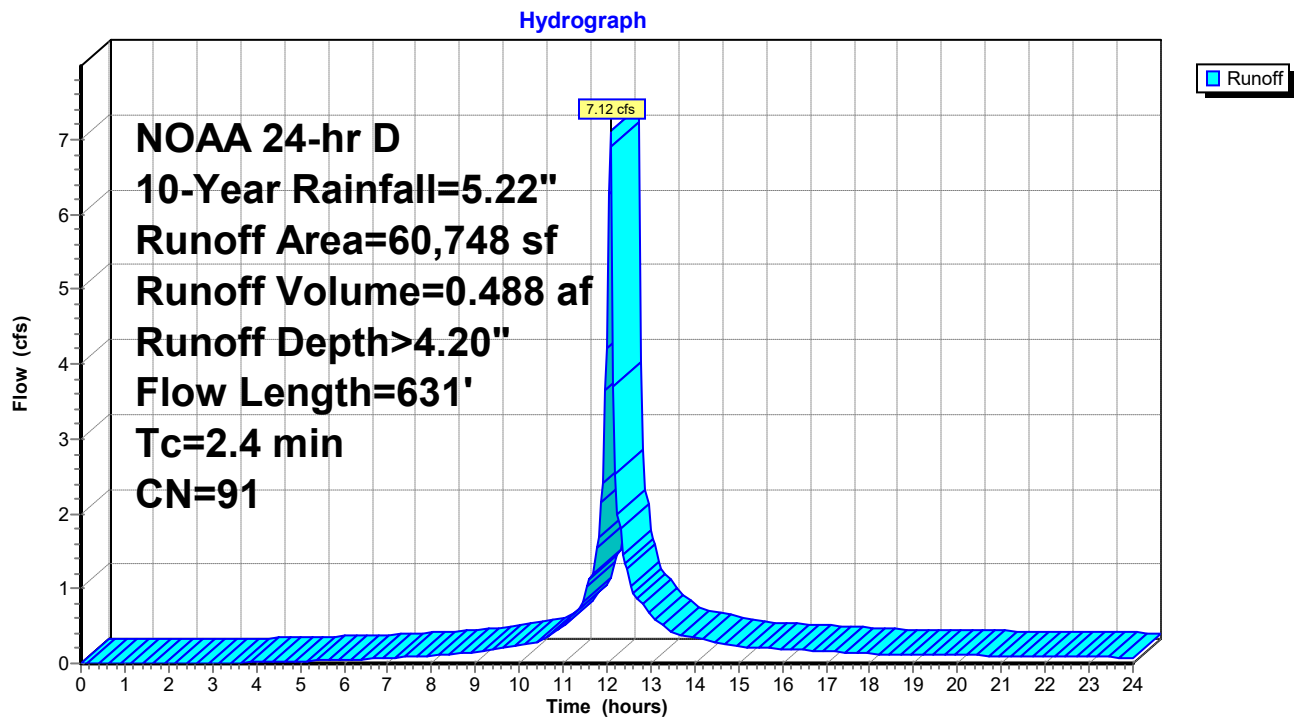
Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 18

Subcatchment 2S: PARKING LOT



PRE

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 19

Hydrograph for Subcatchment 2S: PARKING LOT

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.86	2.89	0.66
0.25	0.01	0.00	0.00	13.25	3.97	2.98	0.52
0.50	0.03	0.00	0.00	13.50	4.05	3.07	0.42
0.75	0.04	0.00	0.00	13.75	4.12	3.13	0.37
1.00	0.06	0.00	0.00	14.00	4.19	3.19	0.34
1.25	0.08	0.00	0.00	14.25	4.24	3.25	0.31
1.50	0.09	0.00	0.00	14.50	4.30	3.30	0.29
1.75	0.11	0.00	0.00	14.75	4.35	3.35	0.26
2.00	0.13	0.00	0.00	15.00	4.39	3.39	0.23
2.25	0.14	0.00	0.00	15.25	4.43	3.43	0.21
2.50	0.16	0.00	0.00	15.50	4.47	3.47	0.21
2.75	0.18	0.00	0.00	15.75	4.51	3.50	0.20
3.00	0.20	0.00	0.00	16.00	4.54	3.54	0.19
3.25	0.22	0.00	0.00	16.25	4.58	3.57	0.18
3.50	0.23	0.00	0.01	16.50	4.61	3.60	0.17
3.75	0.25	0.00	0.01	16.75	4.64	3.63	0.17
4.00	0.27	0.01	0.01	17.00	4.67	3.66	0.16
4.25	0.29	0.01	0.02	17.25	4.70	3.69	0.15
4.50	0.31	0.01	0.02	17.50	4.73	3.72	0.14
4.75	0.34	0.02	0.03	17.75	4.75	3.74	0.14
5.00	0.36	0.02	0.03	18.00	4.77	3.76	0.13
5.25	0.38	0.03	0.03	18.25	4.80	3.79	0.12
5.50	0.40	0.03	0.04	18.50	4.82	3.81	0.12
5.75	0.42	0.04	0.04	18.75	4.84	3.83	0.12
6.00	0.45	0.05	0.05	19.00	4.86	3.85	0.12
6.25	0.47	0.06	0.05	19.25	4.88	3.87	0.12
6.50	0.49	0.07	0.06	19.50	4.91	3.89	0.11
6.75	0.52	0.08	0.07	19.75	4.93	3.91	0.11
7.00	0.55	0.09	0.07	20.00	4.95	3.93	0.11
7.25	0.58	0.11	0.08	20.25	4.97	3.95	0.11
7.50	0.61	0.12	0.09	20.50	4.99	3.97	0.11
7.75	0.64	0.14	0.10	20.75	5.00	3.99	0.10
8.00	0.68	0.16	0.11	21.00	5.02	4.00	0.10
8.25	0.71	0.18	0.11	21.25	5.04	4.02	0.10
8.50	0.75	0.20	0.12	21.50	5.06	4.04	0.10
8.75	0.79	0.22	0.13	21.75	5.08	4.06	0.10
9.00	0.83	0.25	0.14	22.00	5.09	4.07	0.09
9.25	0.87	0.27	0.17	22.25	5.11	4.09	0.09
9.50	0.92	0.31	0.19	22.50	5.13	4.11	0.09
9.75	0.98	0.34	0.22	22.75	5.14	4.12	0.09
10.00	1.03	0.38	0.24	23.00	5.16	4.14	0.09
10.25	1.10	0.43	0.27	23.25	5.18	4.15	0.08
10.50	1.17	0.48	0.30	23.50	5.19	4.17	0.08
10.75	1.25	0.55	0.39	23.75	5.21	4.18	0.08
11.00	1.36	0.63	0.48	24.00	5.22	4.20	0.08
11.25	1.49	0.73	0.66				
11.50	1.65	0.87	0.83				
11.75	1.92	1.09	1.54				
12.00	2.50	1.61	4.21				
12.25	3.30	2.36	1.99				
12.50	3.57	2.60	1.25				
12.75	3.73	2.76	0.82				

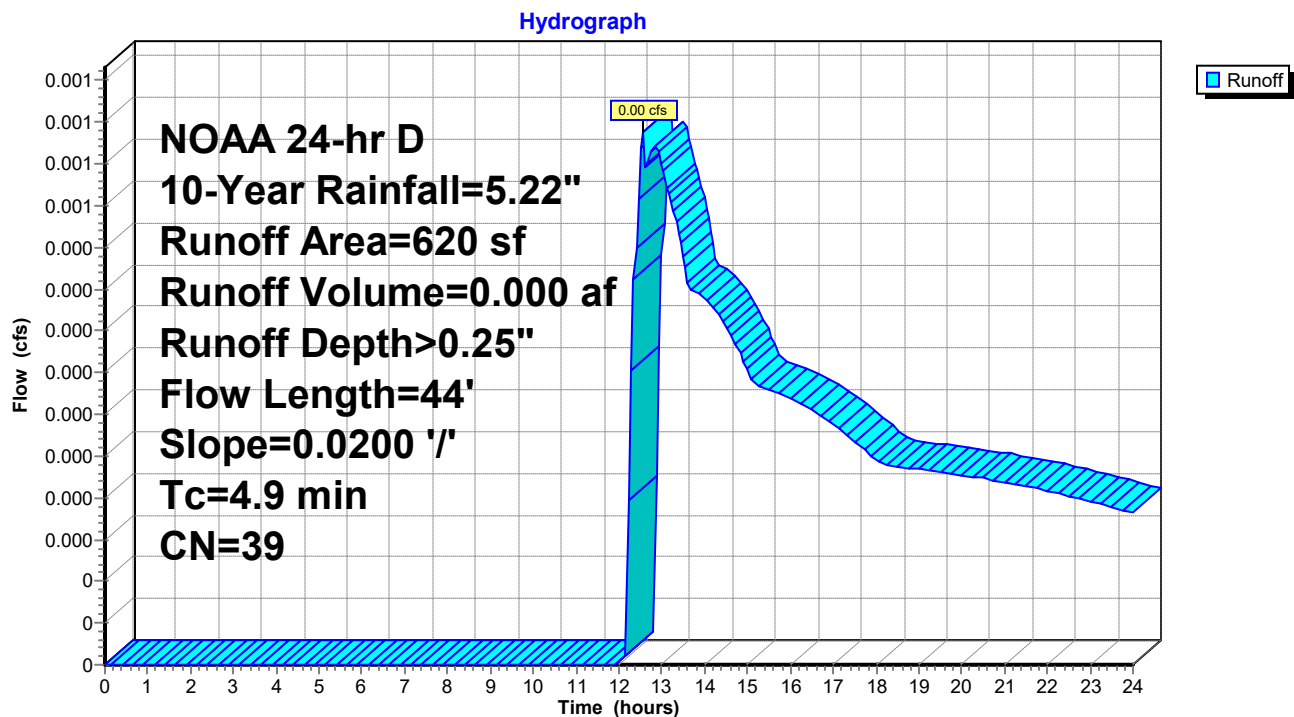
Summary for Subcatchment 3S: COMFORT STATION[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.00 cfs @ 12.54 hrs, Volume= 0.000 af, Depth> 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 10-Year Rainfall=5.22"

Area (sf)	CN	Description
620	39	>75% Grass cover, Good, HSG A
620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	44	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"

Subcatchment 3S: COMFORT STATION

PRE

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 21

Hydrograph for Subcatchment 3S: COMFORT STATION

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.86	0.03	0.00
0.25	0.01	0.00	0.00	13.25	3.97	0.04	0.00
0.50	0.03	0.00	0.00	13.50	4.05	0.05	0.00
0.75	0.04	0.00	0.00	13.75	4.12	0.06	0.00
1.00	0.06	0.00	0.00	14.00	4.19	0.07	0.00
1.25	0.08	0.00	0.00	14.25	4.24	0.07	0.00
1.50	0.09	0.00	0.00	14.50	4.30	0.08	0.00
1.75	0.11	0.00	0.00	14.75	4.35	0.09	0.00
2.00	0.13	0.00	0.00	15.00	4.39	0.09	0.00
2.25	0.14	0.00	0.00	15.25	4.43	0.10	0.00
2.50	0.16	0.00	0.00	15.50	4.47	0.11	0.00
2.75	0.18	0.00	0.00	15.75	4.51	0.11	0.00
3.00	0.20	0.00	0.00	16.00	4.54	0.12	0.00
3.25	0.22	0.00	0.00	16.25	4.58	0.12	0.00
3.50	0.23	0.00	0.00	16.50	4.61	0.13	0.00
3.75	0.25	0.00	0.00	16.75	4.64	0.13	0.00
4.00	0.27	0.00	0.00	17.00	4.67	0.14	0.00
4.25	0.29	0.00	0.00	17.25	4.70	0.14	0.00
4.50	0.31	0.00	0.00	17.50	4.73	0.15	0.00
4.75	0.34	0.00	0.00	17.75	4.75	0.15	0.00
5.00	0.36	0.00	0.00	18.00	4.77	0.16	0.00
5.25	0.38	0.00	0.00	18.25	4.80	0.16	0.00
5.50	0.40	0.00	0.00	18.50	4.82	0.17	0.00
5.75	0.42	0.00	0.00	18.75	4.84	0.17	0.00
6.00	0.45	0.00	0.00	19.00	4.86	0.17	0.00
6.25	0.47	0.00	0.00	19.25	4.88	0.18	0.00
6.50	0.49	0.00	0.00	19.50	4.91	0.18	0.00
6.75	0.52	0.00	0.00	19.75	4.93	0.19	0.00
7.00	0.55	0.00	0.00	20.00	4.95	0.19	0.00
7.25	0.58	0.00	0.00	20.25	4.97	0.19	0.00
7.50	0.61	0.00	0.00	20.50	4.99	0.20	0.00
7.75	0.64	0.00	0.00	20.75	5.00	0.20	0.00
8.00	0.68	0.00	0.00	21.00	5.02	0.20	0.00
8.25	0.71	0.00	0.00	21.25	5.04	0.21	0.00
8.50	0.75	0.00	0.00	21.50	5.06	0.21	0.00
8.75	0.79	0.00	0.00	21.75	5.08	0.22	0.00
9.00	0.83	0.00	0.00	22.00	5.09	0.22	0.00
9.25	0.87	0.00	0.00	22.25	5.11	0.22	0.00
9.50	0.92	0.00	0.00	22.50	5.13	0.23	0.00
9.75	0.98	0.00	0.00	22.75	5.14	0.23	0.00
10.00	1.03	0.00	0.00	23.00	5.16	0.23	0.00
10.25	1.10	0.00	0.00	23.25	5.18	0.24	0.00
10.50	1.17	0.00	0.00	23.50	5.19	0.24	0.00
10.75	1.25	0.00	0.00	23.75	5.21	0.24	0.00
11.00	1.36	0.00	0.00	24.00	5.22	0.25	0.00
11.25	1.49	0.00	0.00				
11.50	1.65	0.00	0.00				
11.75	1.92	0.00	0.00				
12.00	2.50	0.00	0.00				
12.25	3.30	0.00	0.00				
12.50	3.57	0.01	0.00				
12.75	3.73	0.02	0.00				

PRE

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 22

Summary for Pond 4P: TOTAL PRE-CONSTRUCTION FLOW

[40] Hint: Not Described (Outflow=Inflow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Free Discharge)

PRE

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 23

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CART BUILDING AREA Runoff Area=22,380 sf 0.00% Impervious Runoff Depth>1.76"
Flow Length=151' Tc=4.7 min CN=42 Runoff=0.92 cfs 0.075 af

Subcatchment 2S: PARKING LOT Runoff Area=60,748 sf 86.23% Impervious Runoff Depth>7.58"
Flow Length=631' Tc=2.4 min CN=91 Runoff=12.37 cfs 0.880 af

Subcatchment 3S: COMFORT STATION Runoff Area=620 sf 0.00% Impervious Runoff Depth>1.44"
Flow Length=44' Slope=0.0200 '/' Tc=4.9 min CN=39 Runoff=0.02 cfs 0.002 af

Pond 4P: TOTAL PRE-CONSTRUCTION FLOW

Total Runoff Area = 1.923 ac Runoff Volume = 0.958 af Average Runoff Depth = 5.98"
37.46% Pervious = 0.720 ac 62.54% Impervious = 1.202 ac

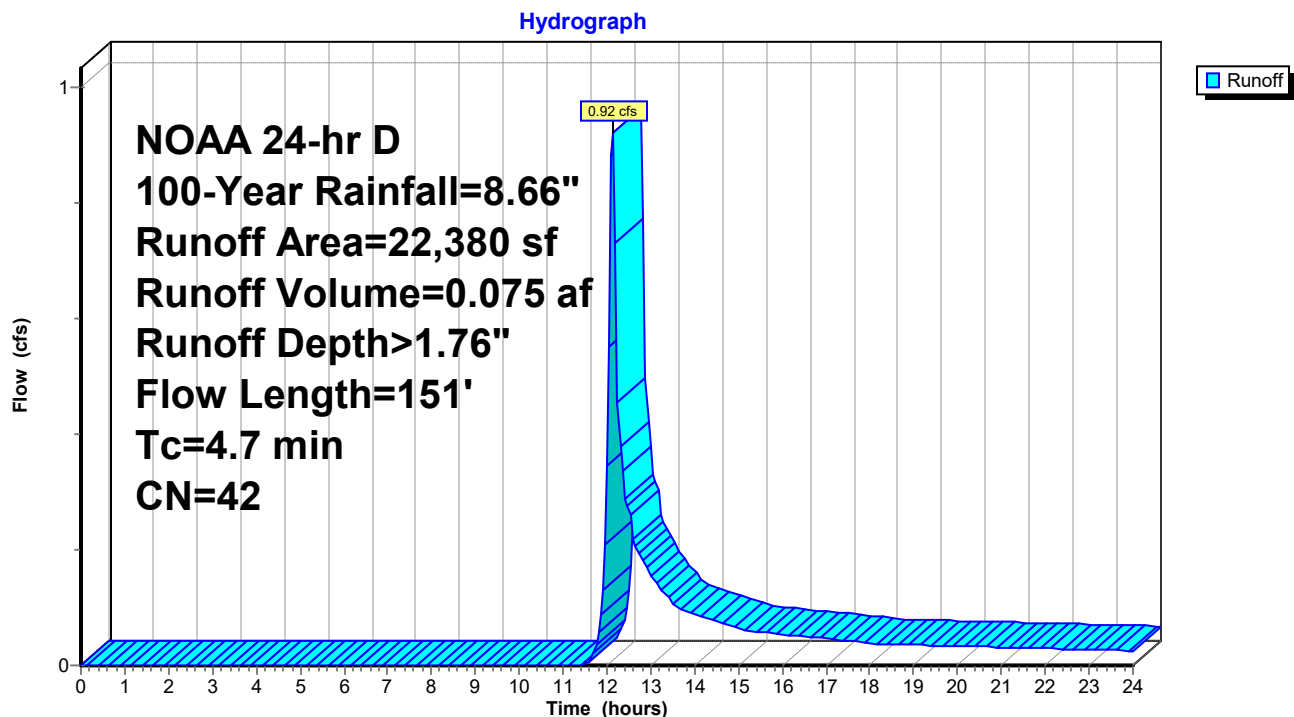
Summary for Subcatchment 1S: CART BUILDING AREA[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.92 cfs @ 12.13 hrs, Volume= 0.075 af, Depth> 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 100-Year Rainfall=8.66"

	Area (sf)	CN	Description
*	1,780	77	SAND TRAP
	20,600	39	>75% Grass cover, Good, HSG A
	22,380	42	Weighted Average
	22,380		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	100	0.1300	0.37		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
0.2	51	0.1000	4.74		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
4.7	151	Total			

Subcatchment 1S: CART BUILDING AREA

PRE

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 25

Hydrograph for Subcatchment 1S: CART BUILDING AREA

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	6.41	0.76	0.16
0.25	0.02	0.00	0.00	13.25	6.58	0.83	0.13
0.50	0.05	0.00	0.00	13.50	6.72	0.88	0.11
0.75	0.07	0.00	0.00	13.75	6.84	0.93	0.09
1.00	0.10	0.00	0.00	14.00	6.94	0.97	0.09
1.25	0.13	0.00	0.00	14.25	7.04	1.01	0.08
1.50	0.15	0.00	0.00	14.50	7.13	1.05	0.08
1.75	0.18	0.00	0.00	14.75	7.21	1.08	0.07
2.00	0.21	0.00	0.00	15.00	7.29	1.12	0.06
2.25	0.24	0.00	0.00	15.25	7.35	1.15	0.06
2.50	0.27	0.00	0.00	15.50	7.42	1.17	0.06
2.75	0.30	0.00	0.00	15.75	7.48	1.20	0.06
3.00	0.33	0.00	0.00	16.00	7.54	1.23	0.05
3.25	0.36	0.00	0.00	16.25	7.59	1.25	0.05
3.50	0.39	0.00	0.00	16.50	7.65	1.28	0.05
3.75	0.42	0.00	0.00	16.75	7.70	1.30	0.05
4.00	0.45	0.00	0.00	17.00	7.75	1.32	0.05
4.25	0.49	0.00	0.00	17.25	7.79	1.34	0.04
4.50	0.52	0.00	0.00	17.50	7.84	1.36	0.04
4.75	0.56	0.00	0.00	17.75	7.88	1.38	0.04
5.00	0.59	0.00	0.00	18.00	7.92	1.40	0.04
5.25	0.63	0.00	0.00	18.25	7.96	1.42	0.04
5.50	0.66	0.00	0.00	18.50	8.00	1.44	0.04
5.75	0.70	0.00	0.00	18.75	8.03	1.46	0.04
6.00	0.74	0.00	0.00	19.00	8.07	1.47	0.04
6.25	0.78	0.00	0.00	19.25	8.10	1.49	0.04
6.50	0.82	0.00	0.00	19.50	8.14	1.51	0.03
6.75	0.87	0.00	0.00	19.75	8.17	1.52	0.03
7.00	0.91	0.00	0.00	20.00	8.21	1.54	0.03
7.25	0.96	0.00	0.00	20.25	8.24	1.56	0.03
7.50	1.01	0.00	0.00	20.50	8.27	1.57	0.03
7.75	1.07	0.00	0.00	20.75	8.30	1.59	0.03
8.00	1.12	0.00	0.00	21.00	8.33	1.60	0.03
8.25	1.18	0.00	0.00	21.25	8.36	1.62	0.03
8.50	1.24	0.00	0.00	21.50	8.39	1.63	0.03
8.75	1.31	0.00	0.00	21.75	8.42	1.65	0.03
9.00	1.37	0.00	0.00	22.00	8.45	1.66	0.03
9.25	1.45	0.00	0.00	22.25	8.48	1.67	0.03
9.50	1.53	0.00	0.00	22.50	8.51	1.69	0.03
9.75	1.62	0.00	0.00	22.75	8.53	1.70	0.03
10.00	1.72	0.00	0.00	23.00	8.56	1.71	0.03
10.25	1.82	0.00	0.00	23.25	8.59	1.73	0.03
10.50	1.94	0.00	0.00	23.50	8.61	1.74	0.03
10.75	2.08	0.00	0.00	23.75	8.64	1.75	0.03
11.00	2.25	0.00	0.00	24.00	8.66	1.77	0.03
11.25	2.47	0.00	0.00				
11.50	2.75	0.00	0.00				
11.75	3.18	0.01	0.04				
12.00	4.15	0.13	0.35				
12.25	5.48	0.45	0.45				
12.50	5.91	0.59	0.27				
12.75	6.19	0.68	0.19				

Summary for Subcatchment 2S: PARKING LOT

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 12.37 cfs @ 12.08 hrs, Volume= 0.880 af, Depth> 7.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
 NOAA 24-hr D 100-Year Rainfall=8.66"

	Area (sf)	CN	Description
*	5,772	98	BUILDINGS
	815	96	Gravel surface, HSG A
*	4,235	98	CART PATHS/CONCRETE
*	1,513	98	PAVEMENT
	1,713	39	>75% Grass cover, Good, HSG A
*	5,840	39	MISC LANDSCAPE AREAS
*	40,860	98	UNDISTURBED PAVEMENT AREA
	60,748	91	Weighted Average
	8,368		13.77% Pervious Area
	52,380		86.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0500	2.06		Sheet Flow, Smooth surfaces $n=0.011$ $P2=3.44"$
1.6	531	0.0750	5.56		Shallow Concentrated Flow, Paved $K_v=20.3$ fps
2.4	631	Total			

PRE

NOAA 24-hr D 100-Year Rainfall=8.66"

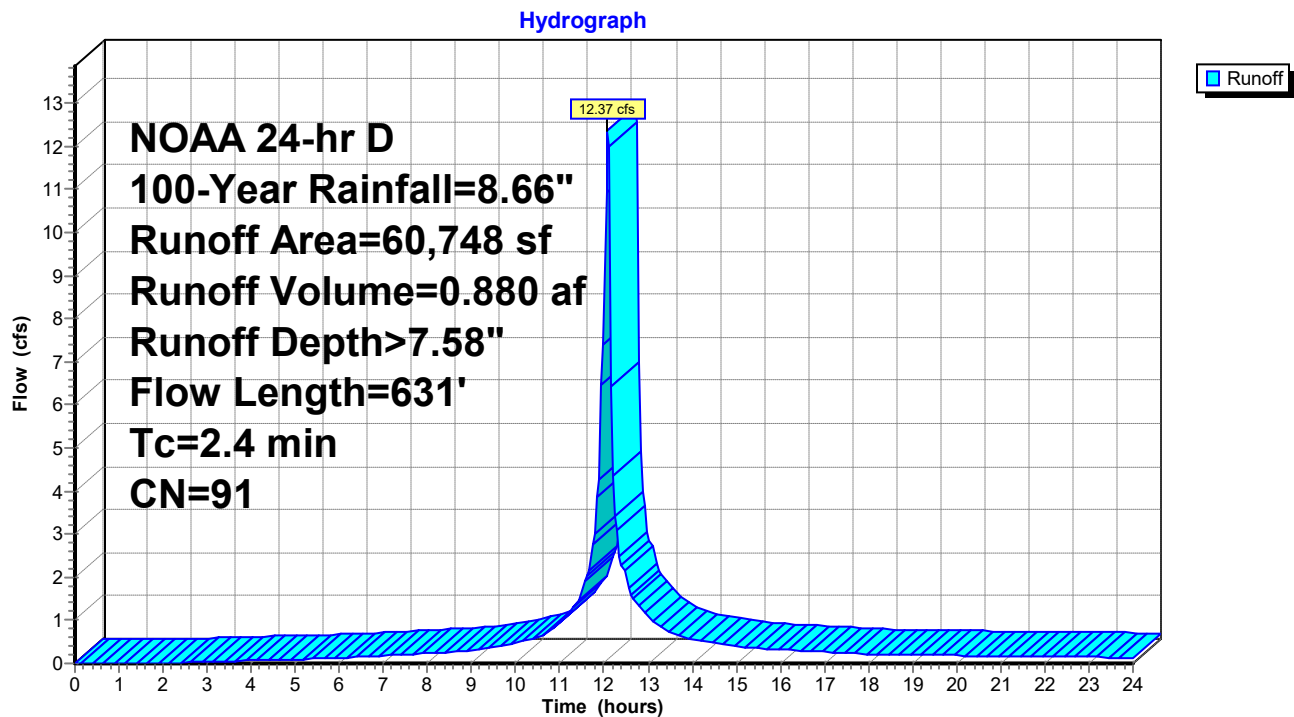
Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 27

Subcatchment 2S: PARKING LOT



PRE

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 28

Hydrograph for Subcatchment 2S: PARKING LOT

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	6.41	5.36	1.12
0.25	0.02	0.00	0.00	13.25	6.58	5.53	0.88
0.50	0.05	0.00	0.00	13.50	6.72	5.66	0.72
0.75	0.07	0.00	0.00	13.75	6.84	5.78	0.62
1.00	0.10	0.00	0.00	14.00	6.94	5.88	0.58
1.25	0.13	0.00	0.00	14.25	7.04	5.98	0.53
1.50	0.15	0.00	0.00	14.50	7.13	6.07	0.48
1.75	0.18	0.00	0.00	14.75	7.21	6.15	0.43
2.00	0.21	0.00	0.00	15.00	7.29	6.22	0.39
2.25	0.24	0.00	0.01	15.25	7.35	6.29	0.36
2.50	0.27	0.00	0.02	15.50	7.42	6.35	0.35
2.75	0.30	0.01	0.03	15.75	7.48	6.41	0.33
3.00	0.33	0.01	0.04	16.00	7.54	6.47	0.32
3.25	0.36	0.02	0.04	16.25	7.59	6.52	0.31
3.50	0.39	0.03	0.05	16.50	7.65	6.58	0.30
3.75	0.42	0.04	0.06	16.75	7.70	6.63	0.28
4.00	0.45	0.05	0.07	17.00	7.75	6.68	0.27
4.25	0.49	0.07	0.08	17.25	7.79	6.72	0.25
4.50	0.52	0.08	0.08	17.50	7.84	6.77	0.24
4.75	0.56	0.10	0.09	17.75	7.88	6.81	0.23
5.00	0.59	0.11	0.10	18.00	7.92	6.85	0.22
5.25	0.63	0.13	0.10	18.25	7.96	6.88	0.21
5.50	0.66	0.15	0.11	18.50	8.00	6.92	0.20
5.75	0.70	0.17	0.12	18.75	8.03	6.96	0.20
6.00	0.74	0.19	0.12	19.00	8.07	6.99	0.20
6.25	0.78	0.22	0.14	19.25	8.10	7.03	0.20
6.50	0.82	0.24	0.15	19.50	8.14	7.06	0.19
6.75	0.87	0.27	0.16	19.75	8.17	7.09	0.19
7.00	0.91	0.30	0.18	20.00	8.21	7.13	0.19
7.25	0.96	0.33	0.19	20.25	8.24	7.16	0.18
7.50	1.01	0.37	0.21	20.50	8.27	7.19	0.18
7.75	1.07	0.41	0.22	20.75	8.30	7.22	0.17
8.00	1.12	0.45	0.24	21.00	8.33	7.25	0.17
8.25	1.18	0.49	0.25	21.25	8.36	7.28	0.17
8.50	1.24	0.54	0.27	21.50	8.39	7.31	0.16
8.75	1.31	0.59	0.28	21.75	8.42	7.34	0.16
9.00	1.37	0.64	0.30	22.00	8.45	7.37	0.16
9.25	1.45	0.70	0.34	22.25	8.48	7.40	0.15
9.50	1.53	0.76	0.39	22.50	8.51	7.43	0.15
9.75	1.62	0.84	0.44	22.75	8.53	7.45	0.15
10.00	1.72	0.92	0.48	23.00	8.56	7.48	0.14
10.25	1.82	1.01	0.53	23.25	8.59	7.50	0.14
10.50	1.94	1.11	0.58	23.50	8.61	7.53	0.14
10.75	2.08	1.23	0.75	23.75	8.64	7.55	0.13
11.00	2.25	1.39	0.91	24.00	8.66	7.58	0.13
11.25	2.47	1.58	1.23				
11.50	2.75	1.83	1.52				
11.75	3.18	2.24	2.76				
12.00	4.15	3.16	7.40				
12.25	5.48	4.45	3.42				
12.50	5.91	4.87	2.14				
12.75	6.19	5.14	1.39				

Summary for Subcatchment 3S: COMFORT STATION[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.02 cfs @ 12.13 hrs, Volume= 0.002 af, Depth> 1.44"

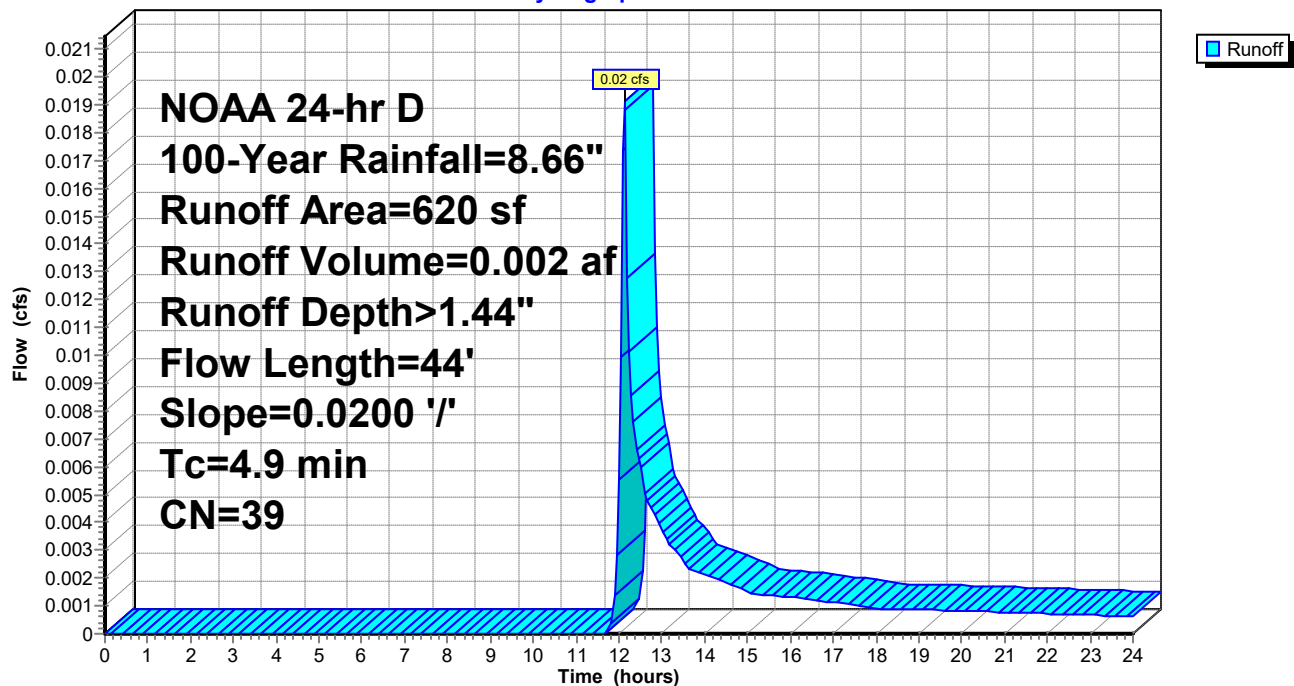
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 100-Year Rainfall=8.66"

Area (sf)	CN	Description
620	39	>75% Grass cover, Good, HSG A
620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	44	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"

Subcatchment 3S: COMFORT STATION

Hydrograph



PRE

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 30

Hydrograph for Subcatchment 3S: COMFORT STATION

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	6.41	0.57	0.00
0.25	0.02	0.00	0.00	13.25	6.58	0.62	0.00
0.50	0.05	0.00	0.00	13.50	6.72	0.67	0.00
0.75	0.07	0.00	0.00	13.75	6.84	0.71	0.00
1.00	0.10	0.00	0.00	14.00	6.94	0.75	0.00
1.25	0.13	0.00	0.00	14.25	7.04	0.78	0.00
1.50	0.15	0.00	0.00	14.50	7.13	0.82	0.00
1.75	0.18	0.00	0.00	14.75	7.21	0.85	0.00
2.00	0.21	0.00	0.00	15.00	7.29	0.87	0.00
2.25	0.24	0.00	0.00	15.25	7.35	0.90	0.00
2.50	0.27	0.00	0.00	15.50	7.42	0.92	0.00
2.75	0.30	0.00	0.00	15.75	7.48	0.95	0.00
3.00	0.33	0.00	0.00	16.00	7.54	0.97	0.00
3.25	0.36	0.00	0.00	16.25	7.59	0.99	0.00
3.50	0.39	0.00	0.00	16.50	7.65	1.01	0.00
3.75	0.42	0.00	0.00	16.75	7.70	1.03	0.00
4.00	0.45	0.00	0.00	17.00	7.75	1.05	0.00
4.25	0.49	0.00	0.00	17.25	7.79	1.07	0.00
4.50	0.52	0.00	0.00	17.50	7.84	1.09	0.00
4.75	0.56	0.00	0.00	17.75	7.88	1.11	0.00
5.00	0.59	0.00	0.00	18.00	7.92	1.12	0.00
5.25	0.63	0.00	0.00	18.25	7.96	1.14	0.00
5.50	0.66	0.00	0.00	18.50	8.00	1.16	0.00
5.75	0.70	0.00	0.00	18.75	8.03	1.17	0.00
6.00	0.74	0.00	0.00	19.00	8.07	1.19	0.00
6.25	0.78	0.00	0.00	19.25	8.10	1.20	0.00
6.50	0.82	0.00	0.00	19.50	8.14	1.22	0.00
6.75	0.87	0.00	0.00	19.75	8.17	1.23	0.00
7.00	0.91	0.00	0.00	20.00	8.21	1.24	0.00
7.25	0.96	0.00	0.00	20.25	8.24	1.26	0.00
7.50	1.01	0.00	0.00	20.50	8.27	1.27	0.00
7.75	1.07	0.00	0.00	20.75	8.30	1.29	0.00
8.00	1.12	0.00	0.00	21.00	8.33	1.30	0.00
8.25	1.18	0.00	0.00	21.25	8.36	1.31	0.00
8.50	1.24	0.00	0.00	21.50	8.39	1.33	0.00
8.75	1.31	0.00	0.00	21.75	8.42	1.34	0.00
9.00	1.37	0.00	0.00	22.00	8.45	1.35	0.00
9.25	1.45	0.00	0.00	22.25	8.48	1.36	0.00
9.50	1.53	0.00	0.00	22.50	8.51	1.38	0.00
9.75	1.62	0.00	0.00	22.75	8.53	1.39	0.00
10.00	1.72	0.00	0.00	23.00	8.56	1.40	0.00
10.25	1.82	0.00	0.00	23.25	8.59	1.41	0.00
10.50	1.94	0.00	0.00	23.50	8.61	1.42	0.00
10.75	2.08	0.00	0.00	23.75	8.64	1.43	0.00
11.00	2.25	0.00	0.00	24.00	8.66	1.45	0.00
11.25	2.47	0.00	0.00				
11.50	2.75	0.00	0.00				
11.75	3.18	0.00	0.00				
12.00	4.15	0.06	0.01				
12.25	5.48	0.31	0.01				
12.50	5.91	0.42	0.01				
12.75	6.19	0.50	0.00				

PRE

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 31

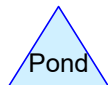
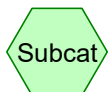
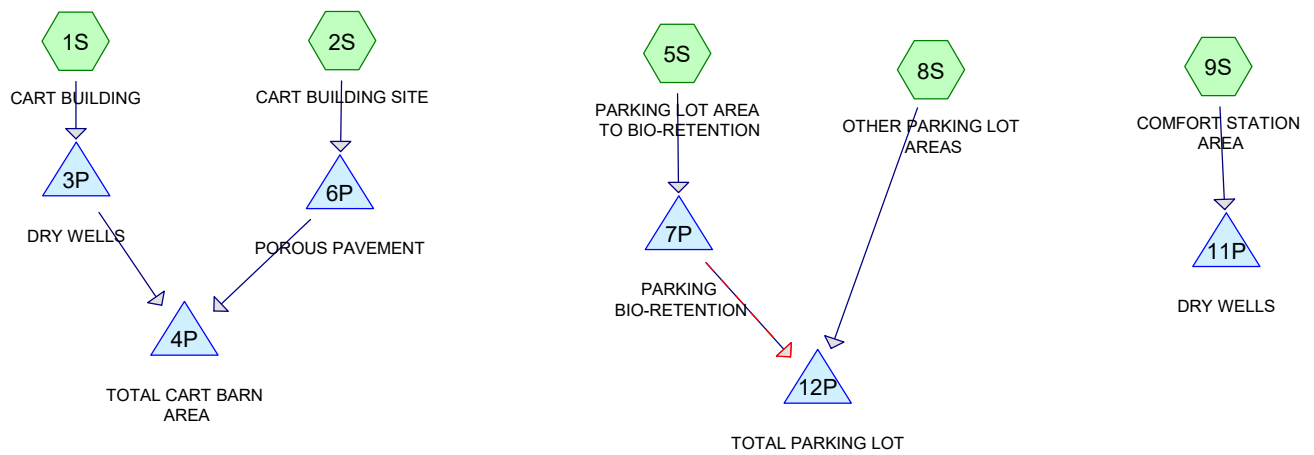
Summary for Pond 4P: TOTAL PRE-CONSTRUCTION FLOW

[40] Hint: Not Described (Outflow=Inflow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Free Discharge)

Appendix D:

Post-Development Flow Calculations



Routing Diagram for POST

Prepared by {enter your company name here}, Printed 8/22/2023
HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

POST

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.512	39	>75% Grass cover, Good, HSG A (2S, 8S)
0.028	76	BIO-RETENTION ISLANDS (5S)
0.141	98	CART BUILDING (1S)
0.065	98	CART PATH (2S, 8S)
0.065	98	CONCRETE (2S)
0.402	98	PARKING LOT TO BIORETENTION (5S)
0.014	98	Roofs, HSG A (9S)
0.695	98	UNDISTURBED PARKING LOT (8S)
1.922	82	TOTAL AREA

POST

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.526	HSG A	2S, 8S, 9S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
1.397	Other	1S, 2S, 5S, 8S
1.922		TOTAL AREA

POST

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 4

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.512	0.000	0.000	0.000	0.000	0.512	>75% Grass cover, Good	
0.000	0.000	0.000	0.000	0.028	0.028	BIO-RETENTION ISLANDS	
0.000	0.000	0.000	0.000	0.141	0.141	CART BUILDING	
0.000	0.000	0.000	0.000	0.065	0.065	CART PATH	
0.000	0.000	0.000	0.000	0.065	0.065	CONCRETE	
0.000	0.000	0.000	0.000	0.402	0.402	PARKING LOT TO BIORETENTION	
0.014	0.000	0.000	0.000	0.000	0.014	Roofs	
0.000	0.000	0.000	0.000	0.695	0.695	UNDISTURBED PARKING LOT	
0.526	0.000	0.000	0.000	1.397	1.922	TOTAL AREA	

POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 5

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CART BUILDING Runoff Area=6,144 sf 100.00% Impervious Runoff Depth>3.21"
Tc=0.0 min CN=98 Runoff=0.51 cfs 0.038 af

Subcatchment 2S: CART BUILDING SITE Runoff Area=16,229 sf 24.79% Impervious Runoff Depth>0.29"
Flow Length=50' Slope=0.2000 '/' Tc=2.2 min CN=54 Runoff=0.06 cfs 0.009 af

Subcatchment 5S: PARKING LOT AREA Runoff Area=18,743 sf 93.38% Impervious Runoff Depth>3.09"
Flow Length=283' Slope=0.0500 '/' Tc=1.5 min CN=97 Runoff=1.52 cfs 0.111 af

Subcatchment 8S: OTHER PARKING LOT Runoff Area=42,005 sf 76.00% Impervious Runoff Depth>1.88"
Flow Length=597' Tc=6.0 min CN=84 Runoff=2.07 cfs 0.151 af

Subcatchment 9S: COMFORT STATION Runoff Area=620 sf 100.00% Impervious Runoff Depth>3.20"
Flow Length=44' Slope=0.0200 '/' Tc=4.9 min CN=98 Runoff=0.05 cfs 0.004 af

Pond 3P: DRY WELLS Peak Elev=1.00' Storage=0.005 af Inflow=0.51 cfs 0.038 af
Discarded=0.18 cfs 0.038 af Primary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.038 af

Pond 4P: TOTAL CART BARN AREA Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond 6P: POROUS PAVEMENT Peak Elev=0.00' Storage=0.000 af Inflow=0.06 cfs 0.009 af
Discarded=0.05 cfs 0.009 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.009 af

Pond 7P: PARKING BIO-RETENTION Peak Elev=2.41' Storage=1,497 cf Inflow=1.52 cfs 0.111 af
Discarded=0.14 cfs 0.111 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.14 cfs 0.111 af

Pond 11P: DRY WELLS Peak Elev=0.22' Storage=0.000 af Inflow=0.05 cfs 0.004 af
Discarded=0.02 cfs 0.004 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.004 af

Pond 12P: TOTAL PARKING LOT Inflow=2.07 cfs 0.151 af
Primary=2.07 cfs 0.151 af

Total Runoff Area = 1.922 ac Runoff Volume = 0.313 af Average Runoff Depth = 1.95"
28.10% Pervious = 0.540 ac 71.90% Impervious = 1.382 ac

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 2-Year Rainfall=3.44"

Printed 8/22/2023

Page 6

Summary for Subcatchment 1S: CART BUILDING

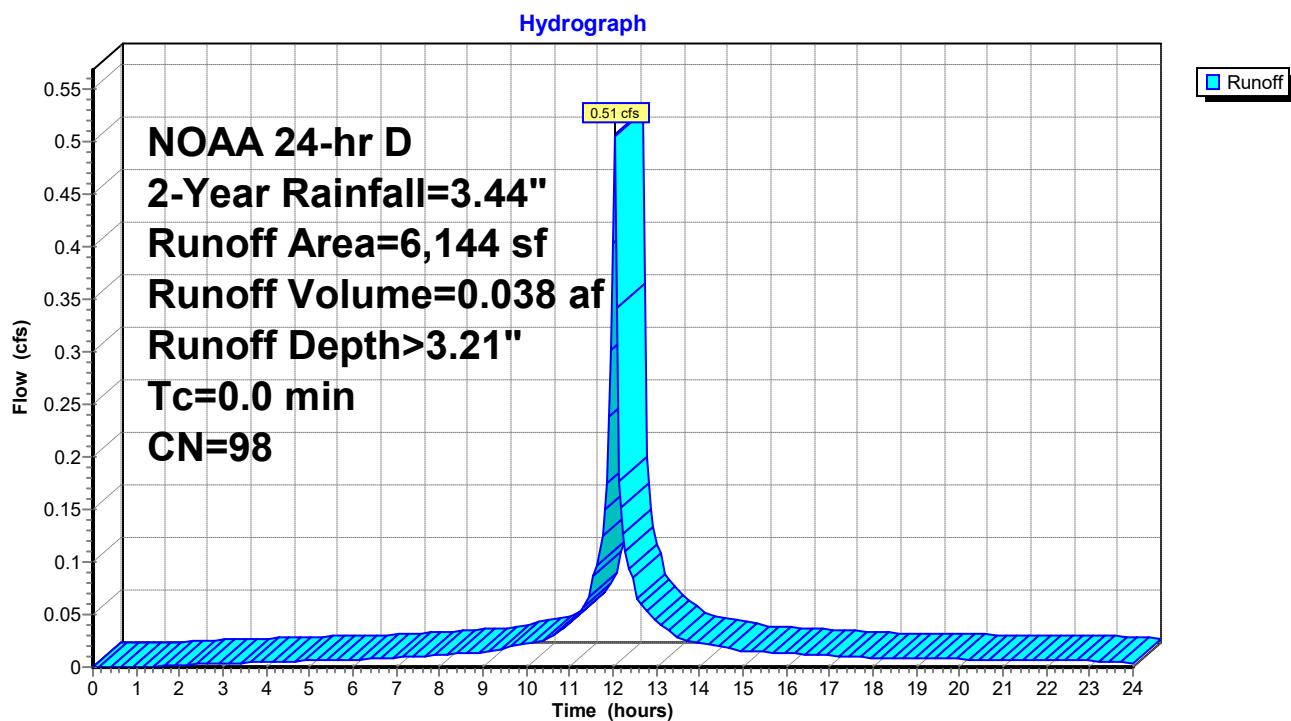
[46] Hint: $T_c=0$ (Instant runoff peak depends on dt)

Runoff = 0.51 cfs @ 12.04 hrs, Volume= 0.038 af, Depth> 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 2-Year Rainfall=3.44"

	Area (sf)	CN	Description
*	6,144	98	CART BUILDING
	6,144		100.00% Impervious Area

Subcatchment 1S: CART BUILDING



POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 7

Hydrograph for Subcatchment 1S: CART BUILDING

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	2.55	2.32	0.04
0.25	0.01	0.00	0.00	13.25	2.61	2.38	0.04
0.50	0.02	0.00	0.00	13.50	2.67	2.44	0.03
0.75	0.03	0.00	0.00	13.75	2.72	2.49	0.03
1.00	0.04	0.00	0.00	14.00	2.76	2.53	0.02
1.25	0.05	0.00	0.00	14.25	2.80	2.57	0.02
1.50	0.06	0.00	0.00	14.50	2.83	2.60	0.02
1.75	0.07	0.00	0.00	14.75	2.87	2.63	0.02
2.00	0.08	0.01	0.00	15.00	2.89	2.66	0.02
2.25	0.09	0.01	0.00	15.25	2.92	2.69	0.01
2.50	0.11	0.02	0.00	15.50	2.95	2.71	0.01
2.75	0.12	0.02	0.00	15.75	2.97	2.74	0.01
3.00	0.13	0.03	0.00	16.00	2.99	2.76	0.01
3.25	0.14	0.03	0.00	16.25	3.02	2.78	0.01
3.50	0.15	0.04	0.00	16.50	3.04	2.81	0.01
3.75	0.17	0.05	0.00	16.75	3.06	2.83	0.01
4.00	0.18	0.06	0.00	17.00	3.08	2.85	0.01
4.25	0.19	0.07	0.01	17.25	3.10	2.86	0.01
4.50	0.21	0.07	0.01	17.50	3.11	2.88	0.01
4.75	0.22	0.08	0.01	17.75	3.13	2.90	0.01
5.00	0.24	0.09	0.01	18.00	3.15	2.91	0.01
5.25	0.25	0.11	0.01	18.25	3.16	2.93	0.01
5.50	0.26	0.12	0.01	18.50	3.18	2.94	0.01
5.75	0.28	0.13	0.01	18.75	3.19	2.96	0.01
6.00	0.29	0.14	0.01	19.00	3.20	2.97	0.01
6.25	0.31	0.15	0.01	19.25	3.22	2.99	0.01
6.50	0.33	0.17	0.01	19.50	3.23	3.00	0.01
6.75	0.34	0.18	0.01	19.75	3.25	3.01	0.01
7.00	0.36	0.20	0.01	20.00	3.26	3.03	0.01
7.25	0.38	0.21	0.01	20.25	3.27	3.04	0.01
7.50	0.40	0.23	0.01	20.50	3.29	3.05	0.01
7.75	0.42	0.25	0.01	20.75	3.30	3.07	0.01
8.00	0.45	0.27	0.01	21.00	3.31	3.08	0.01
8.25	0.47	0.29	0.01	21.25	3.32	3.09	0.01
8.50	0.49	0.31	0.01	21.50	3.33	3.10	0.01
8.75	0.52	0.34	0.01	21.75	3.35	3.11	0.01
9.00	0.55	0.36	0.01	22.00	3.36	3.12	0.01
9.25	0.57	0.39	0.02	22.25	3.37	3.14	0.01
9.50	0.61	0.42	0.02	22.50	3.38	3.15	0.01
9.75	0.64	0.45	0.02	22.75	3.39	3.16	0.01
10.00	0.68	0.49	0.02	23.00	3.40	3.17	0.01
10.25	0.72	0.53	0.02	23.25	3.41	3.18	0.01
10.50	0.77	0.57	0.03	23.50	3.42	3.19	0.01
10.75	0.83	0.62	0.03	23.75	3.43	3.20	0.01
11.00	0.89	0.69	0.04	24.00	3.44	3.21	0.00
11.25	0.98	0.77	0.05				
11.50	1.09	0.88	0.08				
11.75	1.26	1.05	0.13				
12.00	1.65	1.43	0.40				
12.25	2.18	1.95	0.13				
12.50	2.35	2.12	0.08				
12.75	2.46	2.23	0.06				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 2-Year Rainfall=3.44"

Printed 8/22/2023

Page 8

Summary for Subcatchment 2S: CART BUILDING SITE

[49] Hint: $T_c < 2dt$ may require smaller dt

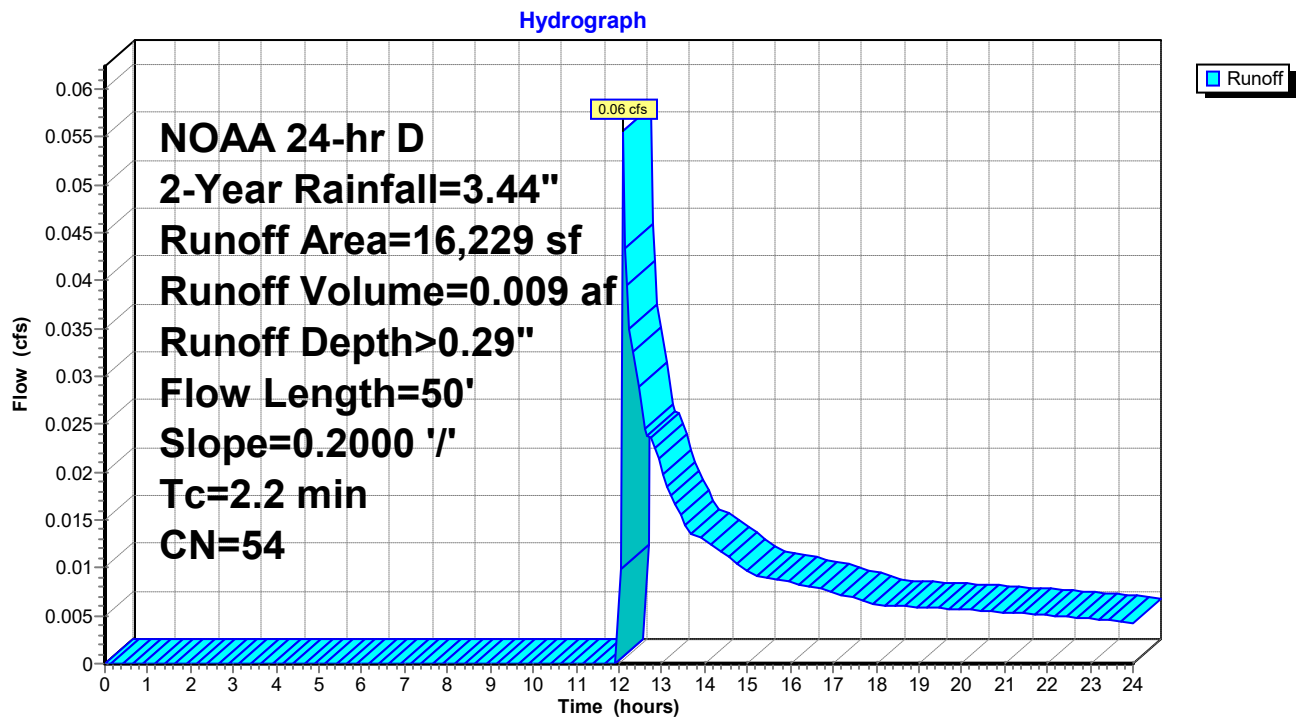
Runoff = 0.06 cfs @ 12.12 hrs, Volume= 0.009 af, Depth> 0.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 2-Year Rainfall=3.44"

	Area (sf)	CN	Description
*	2,842	98	CONCRETE
*	1,181	98	CART PATH
	12,206	39	>75% Grass cover, Good, HSG A
	16,229	54	Weighted Average
	12,206		75.21% Pervious Area
	4,023		24.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	50	0.2000	0.39		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"

Subcatchment 2S: CART BUILDING SITE



POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 9

Hydrograph for Subcatchment 2S: CART BUILDING SITE

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	2.55	0.08	0.02
0.25	0.01	0.00	0.00	13.25	2.61	0.09	0.02
0.50	0.02	0.00	0.00	13.50	2.67	0.10	0.01
0.75	0.03	0.00	0.00	13.75	2.72	0.11	0.01
1.00	0.04	0.00	0.00	14.00	2.76	0.12	0.01
1.25	0.05	0.00	0.00	14.25	2.80	0.12	0.01
1.50	0.06	0.00	0.00	14.50	2.83	0.13	0.01
1.75	0.07	0.00	0.00	14.75	2.87	0.14	0.01
2.00	0.08	0.00	0.00	15.00	2.89	0.15	0.01
2.25	0.09	0.00	0.00	15.25	2.92	0.15	0.01
2.50	0.11	0.00	0.00	15.50	2.95	0.16	0.01
2.75	0.12	0.00	0.00	15.75	2.97	0.16	0.01
3.00	0.13	0.00	0.00	16.00	2.99	0.17	0.01
3.25	0.14	0.00	0.00	16.25	3.02	0.18	0.01
3.50	0.15	0.00	0.00	16.50	3.04	0.18	0.01
3.75	0.17	0.00	0.00	16.75	3.06	0.19	0.01
4.00	0.18	0.00	0.00	17.00	3.08	0.19	0.01
4.25	0.19	0.00	0.00	17.25	3.10	0.20	0.01
4.50	0.21	0.00	0.00	17.50	3.11	0.20	0.01
4.75	0.22	0.00	0.00	17.75	3.13	0.20	0.01
5.00	0.24	0.00	0.00	18.00	3.15	0.21	0.01
5.25	0.25	0.00	0.00	18.25	3.16	0.21	0.01
5.50	0.26	0.00	0.00	18.50	3.18	0.22	0.01
5.75	0.28	0.00	0.00	18.75	3.19	0.22	0.01
6.00	0.29	0.00	0.00	19.00	3.20	0.22	0.01
6.25	0.31	0.00	0.00	19.25	3.22	0.23	0.01
6.50	0.33	0.00	0.00	19.50	3.23	0.23	0.01
6.75	0.34	0.00	0.00	19.75	3.25	0.24	0.01
7.00	0.36	0.00	0.00	20.00	3.26	0.24	0.01
7.25	0.38	0.00	0.00	20.25	3.27	0.24	0.01
7.50	0.40	0.00	0.00	20.50	3.29	0.25	0.01
7.75	0.42	0.00	0.00	20.75	3.30	0.25	0.01
8.00	0.45	0.00	0.00	21.00	3.31	0.25	0.01
8.25	0.47	0.00	0.00	21.25	3.32	0.26	0.01
8.50	0.49	0.00	0.00	21.50	3.33	0.26	0.01
8.75	0.52	0.00	0.00	21.75	3.35	0.27	0.01
9.00	0.55	0.00	0.00	22.00	3.36	0.27	0.01
9.25	0.57	0.00	0.00	22.25	3.37	0.27	0.00
9.50	0.61	0.00	0.00	22.50	3.38	0.28	0.00
9.75	0.64	0.00	0.00	22.75	3.39	0.28	0.00
10.00	0.68	0.00	0.00	23.00	3.40	0.28	0.00
10.25	0.72	0.00	0.00	23.25	3.41	0.28	0.00
10.50	0.77	0.00	0.00	23.50	3.42	0.29	0.00
10.75	0.83	0.00	0.00	23.75	3.43	0.29	0.00
11.00	0.89	0.00	0.00	24.00	3.44	0.29	0.00
11.25	0.98	0.00	0.00				
11.50	1.09	0.00	0.00				
11.75	1.26	0.00	0.00				
12.00	1.65	0.00	0.00				
12.25	2.18	0.02	0.03				
12.50	2.35	0.05	0.03				
12.75	2.46	0.06	0.02				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 2-Year Rainfall=3.44"

Printed 8/22/2023

Page 10

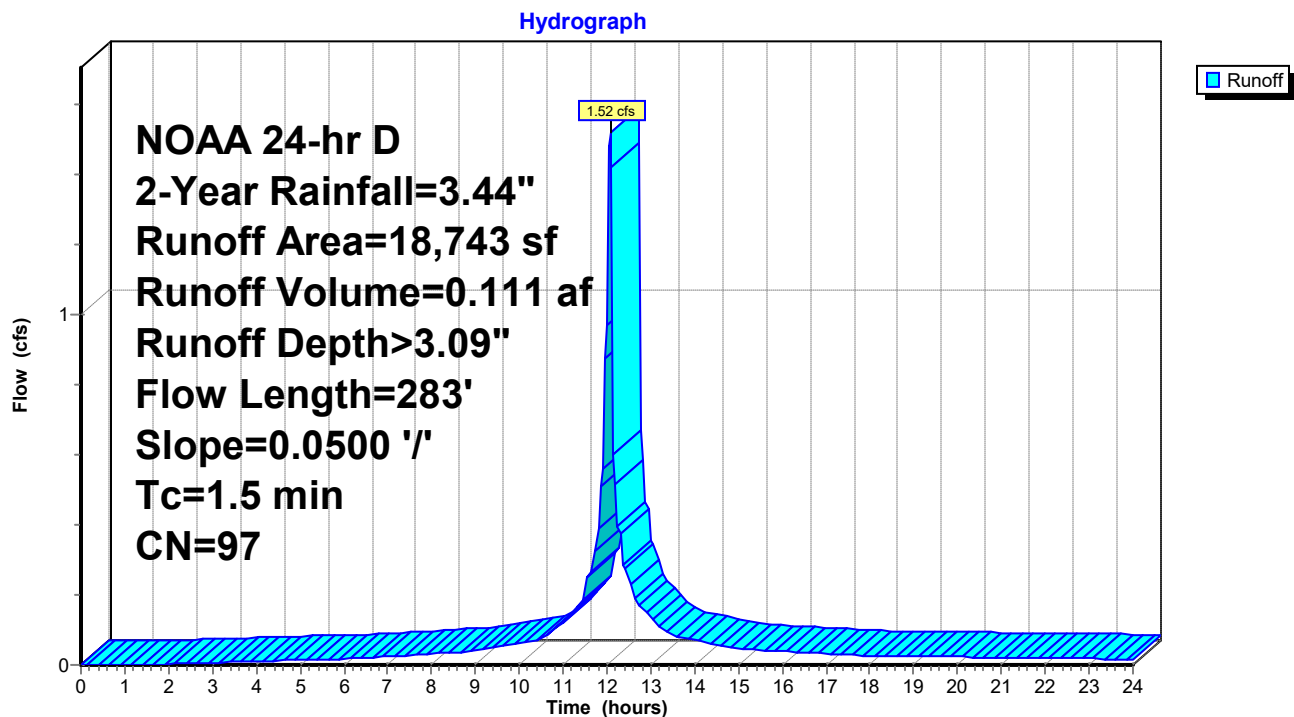
Summary for Subcatchment 5S: PARKING LOT AREA TO BIO-RETENTION[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 1.52 cfs @ 12.07 hrs, Volume= 0.111 af, Depth> 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.44"

	Area (sf)	CN	Description
*	1,240	76	BIO-RETENTION ISLANDS
*	17,503	98	PARKING LOT TO BIORETENTION
	18,743	97	Weighted Average
	1,240		6.62% Pervious Area
	17,503		93.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0500	2.06		Sheet Flow, Pavement Smooth surfaces n= 0.011 P2= 3.44"
0.7	183	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.5	283	Total			

Subcatchment 5S: PARKING LOT AREA TO BIO-RETENTION

POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 11

Hydrograph for Subcatchment 5S: PARKING LOT AREA TO BIO-RETENTION

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	2.55	2.21	0.14
0.25	0.01	0.00	0.00	13.25	2.61	2.28	0.11
0.50	0.02	0.00	0.00	13.50	2.67	2.33	0.09
0.75	0.03	0.00	0.00	13.75	2.72	2.38	0.08
1.00	0.04	0.00	0.00	14.00	2.76	2.42	0.07
1.25	0.05	0.00	0.00	14.25	2.80	2.46	0.06
1.50	0.06	0.00	0.00	14.50	2.83	2.49	0.06
1.75	0.07	0.00	0.00	14.75	2.87	2.52	0.05
2.00	0.08	0.00	0.00	15.00	2.89	2.55	0.05
2.25	0.09	0.00	0.00	15.25	2.92	2.58	0.04
2.50	0.11	0.01	0.00	15.50	2.95	2.60	0.04
2.75	0.12	0.01	0.01	15.75	2.97	2.63	0.04
3.00	0.13	0.01	0.01	16.00	2.99	2.65	0.04
3.25	0.14	0.02	0.01	16.25	3.02	2.67	0.04
3.50	0.15	0.02	0.01	16.50	3.04	2.70	0.04
3.75	0.17	0.03	0.01	16.75	3.06	2.72	0.03
4.00	0.18	0.03	0.01	17.00	3.08	2.74	0.03
4.25	0.19	0.04	0.01	17.25	3.10	2.75	0.03
4.50	0.21	0.05	0.01	17.50	3.11	2.77	0.03
4.75	0.22	0.05	0.01	17.75	3.13	2.79	0.03
5.00	0.24	0.06	0.01	18.00	3.15	2.80	0.03
5.25	0.25	0.07	0.02	18.25	3.16	2.82	0.03
5.50	0.26	0.08	0.02	18.50	3.18	2.83	0.03
5.75	0.28	0.09	0.02	18.75	3.19	2.85	0.02
6.00	0.29	0.10	0.02	19.00	3.20	2.86	0.02
6.25	0.31	0.11	0.02	19.25	3.22	2.88	0.02
6.50	0.33	0.12	0.02	19.50	3.23	2.89	0.02
6.75	0.34	0.13	0.02	19.75	3.25	2.90	0.02
7.00	0.36	0.15	0.02	20.00	3.26	2.92	0.02
7.25	0.38	0.16	0.03	20.25	3.27	2.93	0.02
7.50	0.40	0.18	0.03	20.50	3.29	2.94	0.02
7.75	0.42	0.20	0.03	20.75	3.30	2.95	0.02
8.00	0.45	0.21	0.03	21.00	3.31	2.97	0.02
8.25	0.47	0.23	0.03	21.25	3.32	2.98	0.02
8.50	0.49	0.25	0.04	21.50	3.33	2.99	0.02
8.75	0.52	0.27	0.04	21.75	3.35	3.00	0.02
9.00	0.55	0.30	0.04	22.00	3.36	3.01	0.02
9.25	0.57	0.32	0.05	22.25	3.37	3.02	0.02
9.50	0.61	0.35	0.05	22.50	3.38	3.03	0.02
9.75	0.64	0.38	0.06	22.75	3.39	3.05	0.02
10.00	0.68	0.41	0.06	23.00	3.40	3.06	0.02
10.25	0.72	0.45	0.07	23.25	3.41	3.07	0.02
10.50	0.77	0.49	0.07	23.50	3.42	3.08	0.02
10.75	0.83	0.54	0.10	23.75	3.43	3.09	0.02
11.00	0.89	0.61	0.12	24.00	3.44	3.09	0.01
11.25	0.98	0.69	0.16				
11.50	1.09	0.79	0.20				
11.75	1.26	0.96	0.37				
12.00	1.65	1.33	0.97				
12.25	2.18	1.85	0.39				
12.50	2.35	2.02	0.26				
12.75	2.46	2.12	0.17				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 2-Year Rainfall=3.44"

Printed 8/22/2023

Page 12

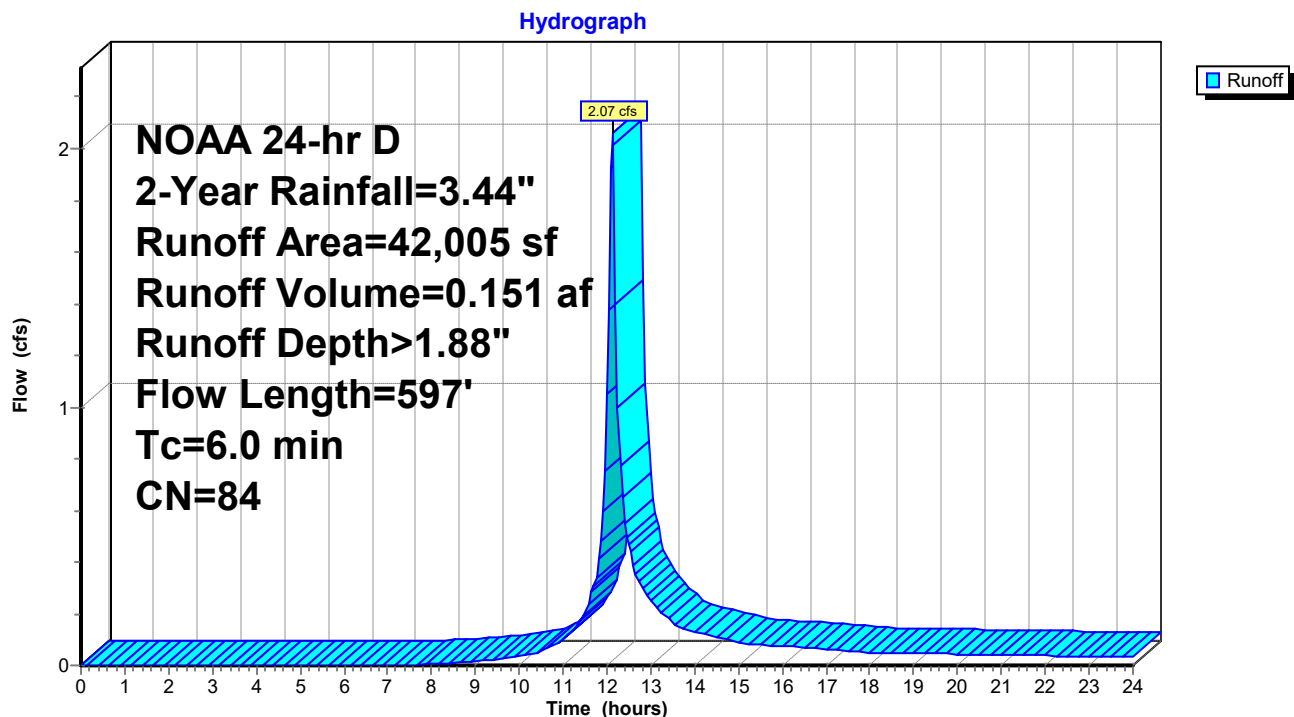
Summary for Subcatchment 8S: OTHER PARKING LOT AREAS

Runoff = 2.07 cfs @ 12.13 hrs, Volume= 0.151 af, Depth> 1.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.44"

Area (sf)	CN	Description
10,082	39	>75% Grass cover, Good, HSG A
* 1,650	98	CART PATH
* 30,273	98	UNDISTURBED PARKING LOT
42,005	84	Weighted Average
10,082		24.00% Pervious Area
31,923		76.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	76	0.0900	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
1.8	521	0.0580	4.89		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.0	597	Total			

Subcatchment 8S: OTHER PARKING LOT AREAS

POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 13

Hydrograph for Subcatchment 8S: OTHER PARKING LOT AREAS

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	2.55	1.15	0.25
0.25	0.01	0.00	0.00	13.25	2.61	1.20	0.20
0.50	0.02	0.00	0.00	13.50	2.67	1.25	0.17
0.75	0.03	0.00	0.00	13.75	2.72	1.29	0.14
1.00	0.04	0.00	0.00	14.00	2.76	1.32	0.13
1.25	0.05	0.00	0.00	14.25	2.80	1.35	0.12
1.50	0.06	0.00	0.00	14.50	2.83	1.38	0.11
1.75	0.07	0.00	0.00	14.75	2.87	1.41	0.10
2.00	0.08	0.00	0.00	15.00	2.89	1.43	0.09
2.25	0.09	0.00	0.00	15.25	2.92	1.45	0.08
2.50	0.11	0.00	0.00	15.50	2.95	1.47	0.08
2.75	0.12	0.00	0.00	15.75	2.97	1.49	0.08
3.00	0.13	0.00	0.00	16.00	2.99	1.51	0.07
3.25	0.14	0.00	0.00	16.25	3.02	1.53	0.07
3.50	0.15	0.00	0.00	16.50	3.04	1.55	0.07
3.75	0.17	0.00	0.00	16.75	3.06	1.56	0.07
4.00	0.18	0.00	0.00	17.00	3.08	1.58	0.06
4.25	0.19	0.00	0.00	17.25	3.10	1.60	0.06
4.50	0.21	0.00	0.00	17.50	3.11	1.61	0.06
4.75	0.22	0.00	0.00	17.75	3.13	1.62	0.05
5.00	0.24	0.00	0.00	18.00	3.15	1.64	0.05
5.25	0.25	0.00	0.00	18.25	3.16	1.65	0.05
5.50	0.26	0.00	0.00	18.50	3.18	1.66	0.05
5.75	0.28	0.00	0.00	18.75	3.19	1.67	0.05
6.00	0.29	0.00	0.00	19.00	3.20	1.69	0.05
6.25	0.31	0.00	0.00	19.25	3.22	1.70	0.05
6.50	0.33	0.00	0.00	19.50	3.23	1.71	0.04
6.75	0.34	0.00	0.00	19.75	3.25	1.72	0.04
7.00	0.36	0.00	0.00	20.00	3.26	1.73	0.04
7.25	0.38	0.00	0.00	20.25	3.27	1.74	0.04
7.50	0.40	0.00	0.00	20.50	3.29	1.75	0.04
7.75	0.42	0.00	0.00	20.75	3.30	1.76	0.04
8.00	0.45	0.00	0.01	21.00	3.31	1.78	0.04
8.25	0.47	0.00	0.01	21.25	3.32	1.79	0.04
8.50	0.49	0.01	0.01	21.50	3.33	1.80	0.04
8.75	0.52	0.01	0.01	21.75	3.35	1.81	0.04
9.00	0.55	0.01	0.01	22.00	3.36	1.82	0.04
9.25	0.57	0.02	0.02	22.25	3.37	1.82	0.04
9.50	0.61	0.02	0.02	22.50	3.38	1.83	0.04
9.75	0.64	0.03	0.03	22.75	3.39	1.84	0.04
10.00	0.68	0.04	0.04	23.00	3.40	1.85	0.03
10.25	0.72	0.05	0.05	23.25	3.41	1.86	0.03
10.50	0.77	0.07	0.05	23.50	3.42	1.87	0.03
10.75	0.83	0.08	0.07	23.75	3.43	1.88	0.03
11.00	0.89	0.11	0.10	24.00	3.44	1.89	0.03
11.25	0.98	0.14	0.14				
11.50	1.09	0.19	0.20				
11.75	1.26	0.28	0.34				
12.00	1.65	0.51	1.05				
12.25	2.18	0.87	0.99				
12.50	2.35	1.00	0.47				
12.75	2.46	1.08	0.32				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 2-Year Rainfall=3.44"

Printed 8/22/2023

Page 14

Summary for Subcatchment 9S: COMFORT STATION AREA

[49] Hint: $T_c < 2dt$ may require smaller dt

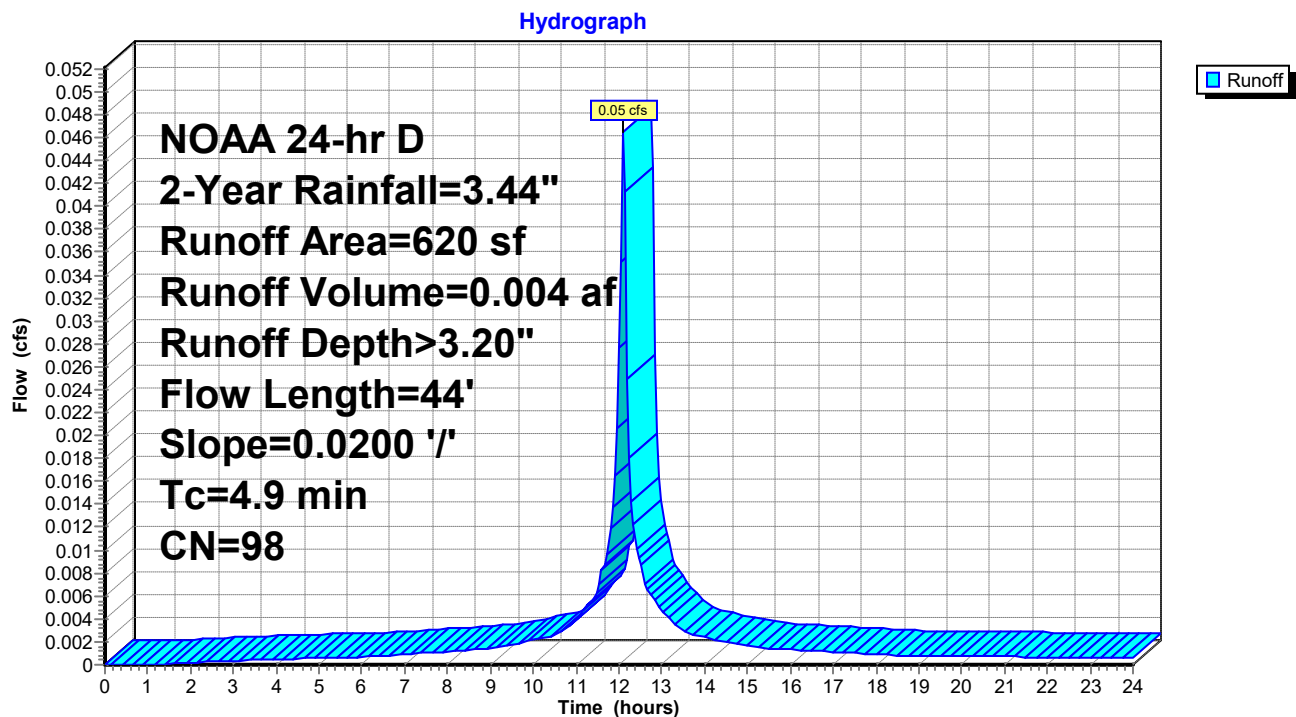
Runoff = 0.05 cfs @ 12.11 hrs, Volume= 0.004 af, Depth> 3.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 2-Year Rainfall=3.44"

Area (sf)	CN	Description
620	98	Roofs, HSG A
620		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	44	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"

Subcatchment 9S: COMFORT STATION AREA



POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 15

Hydrograph for Subcatchment 9S: COMFORT STATION AREA

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	2.55	2.32	0.00
0.25	0.01	0.00	0.00	13.25	2.61	2.38	0.00
0.50	0.02	0.00	0.00	13.50	2.67	2.44	0.00
0.75	0.03	0.00	0.00	13.75	2.72	2.49	0.00
1.00	0.04	0.00	0.00	14.00	2.76	2.53	0.00
1.25	0.05	0.00	0.00	14.25	2.80	2.57	0.00
1.50	0.06	0.00	0.00	14.50	2.83	2.60	0.00
1.75	0.07	0.00	0.00	14.75	2.87	2.63	0.00
2.00	0.08	0.01	0.00	15.00	2.89	2.66	0.00
2.25	0.09	0.01	0.00	15.25	2.92	2.69	0.00
2.50	0.11	0.02	0.00	15.50	2.95	2.71	0.00
2.75	0.12	0.02	0.00	15.75	2.97	2.74	0.00
3.00	0.13	0.03	0.00	16.00	2.99	2.76	0.00
3.25	0.14	0.03	0.00	16.25	3.02	2.78	0.00
3.50	0.15	0.04	0.00	16.50	3.04	2.81	0.00
3.75	0.17	0.05	0.00	16.75	3.06	2.83	0.00
4.00	0.18	0.06	0.00	17.00	3.08	2.85	0.00
4.25	0.19	0.07	0.00	17.25	3.10	2.86	0.00
4.50	0.21	0.07	0.00	17.50	3.11	2.88	0.00
4.75	0.22	0.08	0.00	17.75	3.13	2.90	0.00
5.00	0.24	0.09	0.00	18.00	3.15	2.91	0.00
5.25	0.25	0.11	0.00	18.25	3.16	2.93	0.00
5.50	0.26	0.12	0.00	18.50	3.18	2.94	0.00
5.75	0.28	0.13	0.00	18.75	3.19	2.96	0.00
6.00	0.29	0.14	0.00	19.00	3.20	2.97	0.00
6.25	0.31	0.15	0.00	19.25	3.22	2.99	0.00
6.50	0.33	0.17	0.00	19.50	3.23	3.00	0.00
6.75	0.34	0.18	0.00	19.75	3.25	3.01	0.00
7.00	0.36	0.20	0.00	20.00	3.26	3.03	0.00
7.25	0.38	0.21	0.00	20.25	3.27	3.04	0.00
7.50	0.40	0.23	0.00	20.50	3.29	3.05	0.00
7.75	0.42	0.25	0.00	20.75	3.30	3.07	0.00
8.00	0.45	0.27	0.00	21.00	3.31	3.08	0.00
8.25	0.47	0.29	0.00	21.25	3.32	3.09	0.00
8.50	0.49	0.31	0.00	21.50	3.33	3.10	0.00
8.75	0.52	0.34	0.00	21.75	3.35	3.11	0.00
9.00	0.55	0.36	0.00	22.00	3.36	3.12	0.00
9.25	0.57	0.39	0.00	22.25	3.37	3.14	0.00
9.50	0.61	0.42	0.00	22.50	3.38	3.15	0.00
9.75	0.64	0.45	0.00	22.75	3.39	3.16	0.00
10.00	0.68	0.49	0.00	23.00	3.40	3.17	0.00
10.25	0.72	0.53	0.00	23.25	3.41	3.18	0.00
10.50	0.77	0.57	0.00	23.50	3.42	3.19	0.00
10.75	0.83	0.62	0.00	23.75	3.43	3.20	0.00
11.00	0.89	0.69	0.00	24.00	3.44	3.21	0.00
11.25	0.98	0.77	0.01				
11.50	1.09	0.88	0.01				
11.75	1.26	1.05	0.01				
12.00	1.65	1.43	0.03				
12.25	2.18	1.95	0.02				
12.50	2.35	2.12	0.01				
12.75	2.46	2.23	0.01				

POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 16

Summary for Pond 3P: DRY WELLS

Inflow Area = 0.141 ac, 100.00% Impervious, Inflow Depth > 3.21" for 2-Year event
 Inflow = 0.51 cfs @ 12.04 hrs, Volume= 0.038 af
 Outflow = 0.18 cfs @ 12.17 hrs, Volume= 0.038 af, Atten= 64%, Lag= 7.3 min
 Discarded = 0.18 cfs @ 12.17 hrs, Volume= 0.038 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 1.00' @ 12.17 hrs Surf.Area= 0.012 ac Storage= 0.005 af

Plug-Flow detention time= 5.3 min calculated for 0.038 af (100% of inflow)
 Center-of-Mass det. time= 5.2 min (756.4 - 751.2)

Volume	Invert	Avail.Storage	Storage Description
#1	1.00'	0.009 af	24.0" Round Pipe Storage Inside #2 L= 130.0'
#2	0.00'	0.015 af	4.00'W x 130.00'L x 4.00'H Prismatic 0.048 af Overall - 0.009 af Embedded = 0.038 af x 40.0% Voids
		0.025 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	4.00'	8.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	10.000 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.18 cfs @ 12.17 hrs HW=0.99' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑ **1=Orifice/Grate** (Controls 0.00 cfs)

POST

Prepared by {enter your company name here}

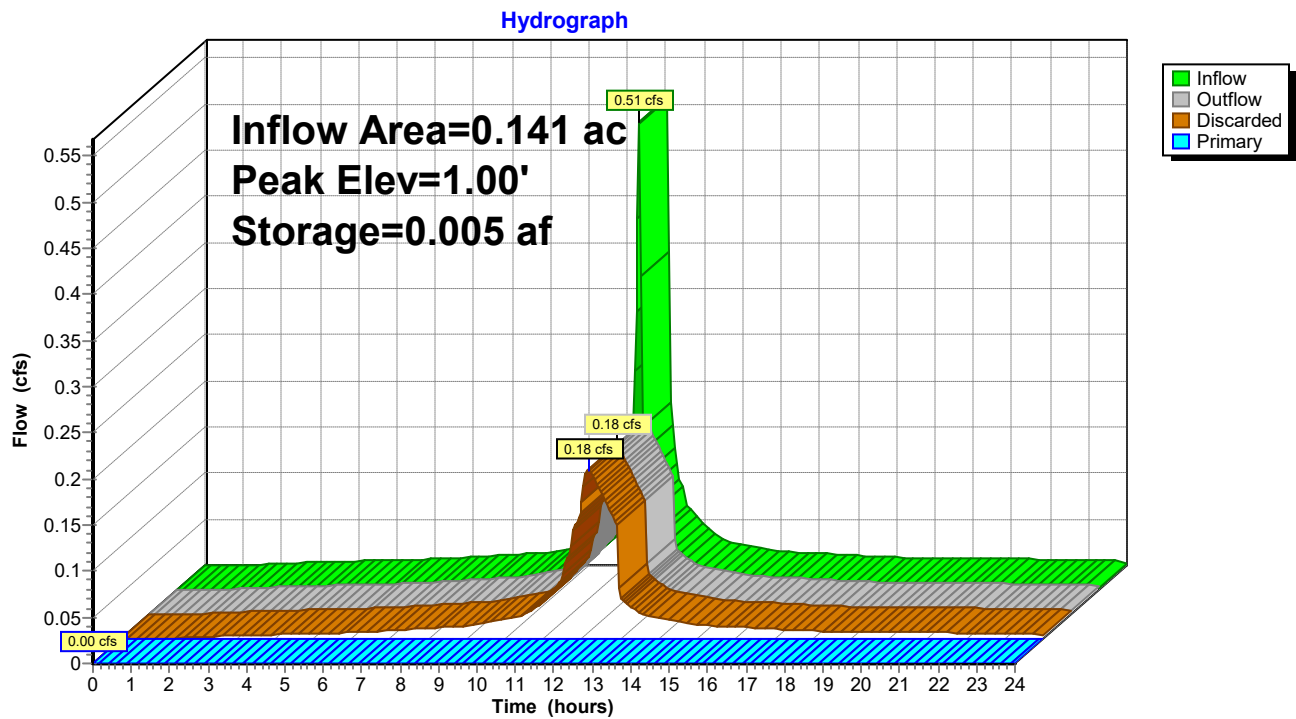
HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 2-Year Rainfall=3.44"

Printed 8/22/2023

Page 17

Pond 3P: DRY WELLS



POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 18

Hydrograph for Pond 3P: DRY WELLS

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	0.00	0.00	0.00	0.00
0.50	0.00	0.000	0.00	0.00	0.00	0.00
1.00	0.00	0.000	0.00	0.00	0.00	0.00
1.50	0.00	0.000	0.00	0.00	0.00	0.00
2.00	0.00	0.000	0.00	0.00	0.00	0.00
2.50	0.00	0.000	0.00	0.00	0.00	0.00
3.00	0.00	0.000	0.00	0.00	0.00	0.00
3.50	0.00	0.000	0.00	0.00	0.00	0.00
4.00	0.00	0.000	0.00	0.00	0.00	0.00
4.50	0.01	0.000	0.00	0.01	0.01	0.00
5.00	0.01	0.000	0.00	0.01	0.01	0.00
5.50	0.01	0.000	0.00	0.01	0.01	0.00
6.00	0.01	0.000	0.00	0.01	0.01	0.00
6.50	0.01	0.000	0.00	0.01	0.01	0.00
7.00	0.01	0.000	0.00	0.01	0.01	0.00
7.50	0.01	0.000	0.00	0.01	0.01	0.00
8.00	0.01	0.000	0.00	0.01	0.01	0.00
8.50	0.01	0.000	0.00	0.01	0.01	0.00
9.00	0.01	0.000	0.01	0.01	0.01	0.00
9.50	0.02	0.000	0.01	0.02	0.02	0.00
10.00	0.02	0.000	0.01	0.02	0.02	0.00
10.50	0.03	0.000	0.01	0.03	0.03	0.00
11.00	0.04	0.000	0.02	0.04	0.04	0.00
11.50	0.08	0.000	0.03	0.07	0.07	0.00
12.00	0.40	0.002	0.46	0.15	0.15	0.00
12.50	0.08	0.003	0.63	0.16	0.16	0.00
13.00	0.04	0.000	0.02	0.04	0.04	0.00
13.50	0.03	0.000	0.01	0.03	0.03	0.00
14.00	0.02	0.000	0.01	0.02	0.02	0.00
14.50	0.02	0.000	0.01	0.02	0.02	0.00
15.00	0.02	0.000	0.01	0.02	0.02	0.00
15.50	0.01	0.000	0.01	0.01	0.01	0.00
16.00	0.01	0.000	0.00	0.01	0.01	0.00
16.50	0.01	0.000	0.00	0.01	0.01	0.00
17.00	0.01	0.000	0.00	0.01	0.01	0.00
17.50	0.01	0.000	0.00	0.01	0.01	0.00
18.00	0.01	0.000	0.00	0.01	0.01	0.00
18.50	0.01	0.000	0.00	0.01	0.01	0.00
19.00	0.01	0.000	0.00	0.01	0.01	0.00
19.50	0.01	0.000	0.00	0.01	0.01	0.00
20.00	0.01	0.000	0.00	0.01	0.01	0.00
20.50	0.01	0.000	0.00	0.01	0.01	0.00
21.00	0.01	0.000	0.00	0.01	0.01	0.00
21.50	0.01	0.000	0.00	0.01	0.01	0.00
22.00	0.01	0.000	0.00	0.01	0.01	0.00
22.50	0.01	0.000	0.00	0.01	0.01	0.00
23.00	0.01	0.000	0.00	0.01	0.01	0.00
23.50	0.01	0.000	0.00	0.01	0.01	0.00
24.00	0.00	0.000	0.00	0.00	0.00	0.00

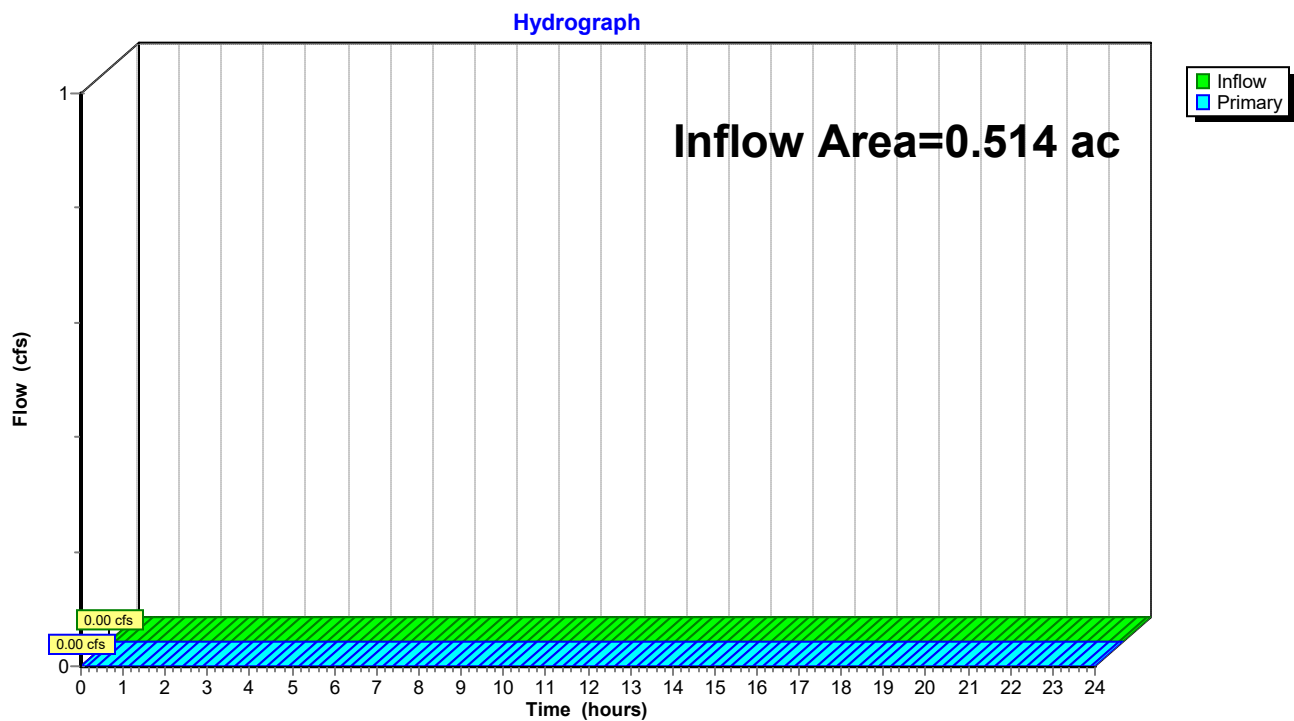
Summary for Pond 4P: TOTAL CART BARN AREA

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.514 ac, 45.44% Impervious, Inflow Depth = 0.00" for 2-Year event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 4P: TOTAL CART BARN AREA



POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 20

Hydrograph for Pond 4P: TOTAL CART BARN AREA

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00	13.00	0.00		0.00
0.25	0.00		0.00	13.25	0.00		0.00
0.50	0.00		0.00	13.50	0.00		0.00
0.75	0.00		0.00	13.75	0.00		0.00
1.00	0.00		0.00	14.00	0.00		0.00
1.25	0.00		0.00	14.25	0.00		0.00
1.50	0.00		0.00	14.50	0.00		0.00
1.75	0.00		0.00	14.75	0.00		0.00
2.00	0.00		0.00	15.00	0.00		0.00
2.25	0.00		0.00	15.25	0.00		0.00
2.50	0.00		0.00	15.50	0.00		0.00
2.75	0.00		0.00	15.75	0.00		0.00
3.00	0.00		0.00	16.00	0.00		0.00
3.25	0.00		0.00	16.25	0.00		0.00
3.50	0.00		0.00	16.50	0.00		0.00
3.75	0.00		0.00	16.75	0.00		0.00
4.00	0.00		0.00	17.00	0.00		0.00
4.25	0.00		0.00	17.25	0.00		0.00
4.50	0.00		0.00	17.50	0.00		0.00
4.75	0.00		0.00	17.75	0.00		0.00
5.00	0.00		0.00	18.00	0.00		0.00
5.25	0.00		0.00	18.25	0.00		0.00
5.50	0.00		0.00	18.50	0.00		0.00
5.75	0.00		0.00	18.75	0.00		0.00
6.00	0.00		0.00	19.00	0.00		0.00
6.25	0.00		0.00	19.25	0.00		0.00
6.50	0.00		0.00	19.50	0.00		0.00
6.75	0.00		0.00	19.75	0.00		0.00
7.00	0.00		0.00	20.00	0.00		0.00
7.25	0.00		0.00	20.25	0.00		0.00
7.50	0.00		0.00	20.50	0.00		0.00
7.75	0.00		0.00	20.75	0.00		0.00
8.00	0.00		0.00	21.00	0.00		0.00
8.25	0.00		0.00	21.25	0.00		0.00
8.50	0.00		0.00	21.50	0.00		0.00
8.75	0.00		0.00	21.75	0.00		0.00
9.00	0.00		0.00	22.00	0.00		0.00
9.25	0.00		0.00	22.25	0.00		0.00
9.50	0.00		0.00	22.50	0.00		0.00
9.75	0.00		0.00	22.75	0.00		0.00
10.00	0.00		0.00	23.00	0.00		0.00
10.25	0.00		0.00	23.25	0.00		0.00
10.50	0.00		0.00	23.50	0.00		0.00
10.75	0.00		0.00	23.75	0.00		0.00
11.00	0.00		0.00	24.00	0.00		0.00
11.25	0.00		0.00				
11.50	0.00		0.00				
11.75	0.00		0.00				
12.00	0.00		0.00				
12.25	0.00		0.00				
12.50	0.00		0.00				
12.75	0.00		0.00				

POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 21

Summary for Pond 6P: POROUS PAVEMENT

Inflow Area = 0.373 ac, 24.79% Impervious, Inflow Depth > 0.29" for 2-Year event
 Inflow = 0.06 cfs @ 12.12 hrs, Volume= 0.009 af
 Outflow = 0.05 cfs @ 12.14 hrs, Volume= 0.009 af, Atten= 9%, Lag= 1.4 min
 Discarded = 0.05 cfs @ 12.14 hrs, Volume= 0.009 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 0.00' @ 12.14 hrs Surf.Area= 0.069 ac Storage= 0.000 af

Plug-Flow detention time= 0.4 min calculated for 0.009 af (100% of inflow)
 Center-of-Mass det. time= 0.3 min (966.0 - 965.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.041 af	30.00'W x 100.00'L x 1.50'H Prismatic 0.103 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	10.000 in/hr Exfiltration over Horizontal area
#2	Primary	1.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.69 cfs @ 12.14 hrs HW=0.00' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.69 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

POST

Prepared by {enter your company name here}

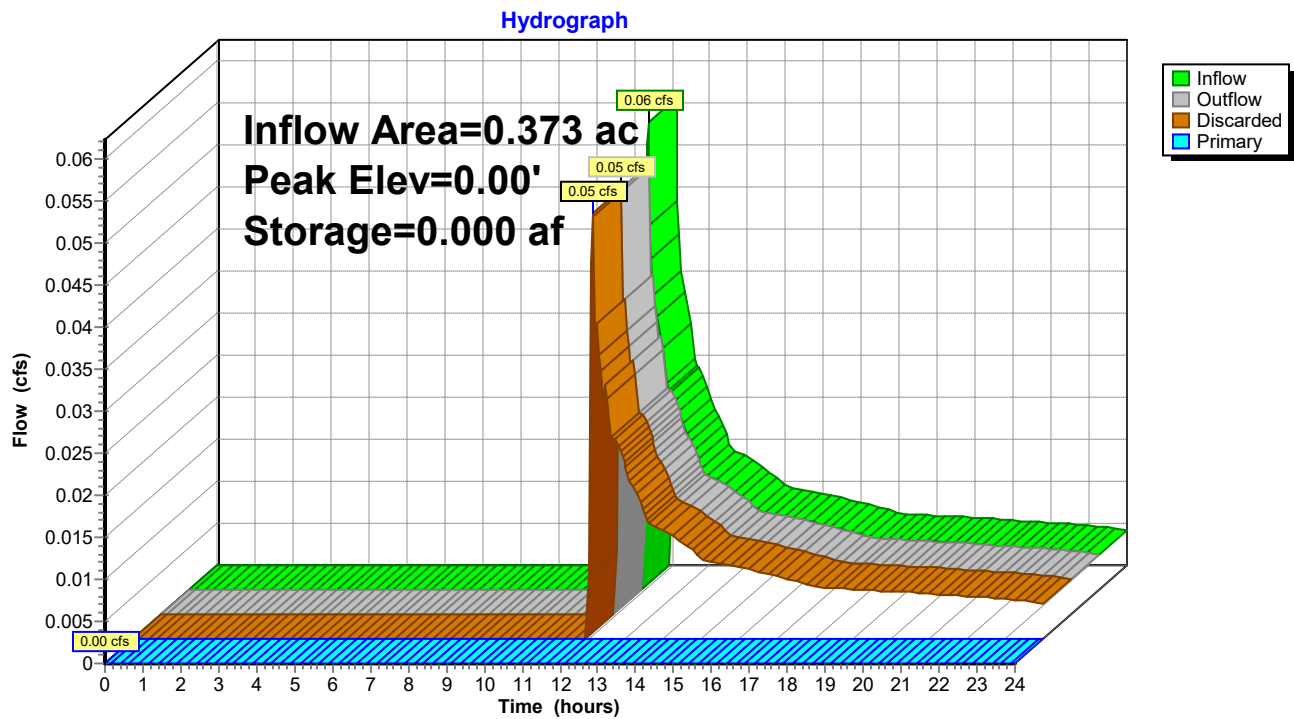
HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 2-Year Rainfall=3.44"

Printed 8/22/2023

Page 22

Pond 6P: POROUS PAVEMENT



POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 23

Hydrograph for Pond 6P: POROUS PAVEMENT

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	0.00	0.00	0.00	0.00
0.50	0.00	0.000	0.00	0.00	0.00	0.00
1.00	0.00	0.000	0.00	0.00	0.00	0.00
1.50	0.00	0.000	0.00	0.00	0.00	0.00
2.00	0.00	0.000	0.00	0.00	0.00	0.00
2.50	0.00	0.000	0.00	0.00	0.00	0.00
3.00	0.00	0.000	0.00	0.00	0.00	0.00
3.50	0.00	0.000	0.00	0.00	0.00	0.00
4.00	0.00	0.000	0.00	0.00	0.00	0.00
4.50	0.00	0.000	0.00	0.00	0.00	0.00
5.00	0.00	0.000	0.00	0.00	0.00	0.00
5.50	0.00	0.000	0.00	0.00	0.00	0.00
6.00	0.00	0.000	0.00	0.00	0.00	0.00
6.50	0.00	0.000	0.00	0.00	0.00	0.00
7.00	0.00	0.000	0.00	0.00	0.00	0.00
7.50	0.00	0.000	0.00	0.00	0.00	0.00
8.00	0.00	0.000	0.00	0.00	0.00	0.00
8.50	0.00	0.000	0.00	0.00	0.00	0.00
9.00	0.00	0.000	0.00	0.00	0.00	0.00
9.50	0.00	0.000	0.00	0.00	0.00	0.00
10.00	0.00	0.000	0.00	0.00	0.00	0.00
10.50	0.00	0.000	0.00	0.00	0.00	0.00
11.00	0.00	0.000	0.00	0.00	0.00	0.00
11.50	0.00	0.000	0.00	0.00	0.00	0.00
12.00	0.00	0.000	0.00	0.00	0.00	0.00
12.50	0.03	0.000	0.00	0.03	0.03	0.00
13.00	0.02	0.000	0.00	0.02	0.02	0.00
13.50	0.01	0.000	0.00	0.01	0.01	0.00
14.00	0.01	0.000	0.00	0.01	0.01	0.00
14.50	0.01	0.000	0.00	0.01	0.01	0.00
15.00	0.01	0.000	0.00	0.01	0.01	0.00
15.50	0.01	0.000	0.00	0.01	0.01	0.00
16.00	0.01	0.000	0.00	0.01	0.01	0.00
16.50	0.01	0.000	0.00	0.01	0.01	0.00
17.00	0.01	0.000	0.00	0.01	0.01	0.00
17.50	0.01	0.000	0.00	0.01	0.01	0.00
18.00	0.01	0.000	0.00	0.01	0.01	0.00
18.50	0.01	0.000	0.00	0.01	0.01	0.00
19.00	0.01	0.000	0.00	0.01	0.01	0.00
19.50	0.01	0.000	0.00	0.01	0.01	0.00
20.00	0.01	0.000	0.00	0.01	0.01	0.00
20.50	0.01	0.000	0.00	0.01	0.01	0.00
21.00	0.01	0.000	0.00	0.01	0.01	0.00
21.50	0.01	0.000	0.00	0.01	0.01	0.00
22.00	0.01	0.000	0.00	0.01	0.01	0.00
22.50	0.00	0.000	0.00	0.00	0.00	0.00
23.00	0.00	0.000	0.00	0.00	0.00	0.00
23.50	0.00	0.000	0.00	0.00	0.00	0.00
24.00	0.00	0.000	0.00	0.00	0.00	0.00

POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 24

Summary for Pond 7P: PARKING BIO-RETENTION

Inflow Area = 0.430 ac, 93.38% Impervious, Inflow Depth > 3.09" for 2-Year event
 Inflow = 1.52 cfs @ 12.07 hrs, Volume= 0.111 af
 Outflow = 0.14 cfs @ 11.25 hrs, Volume= 0.111 af, Atten= 91%, Lag= 0.0 min
 Discarded = 0.14 cfs @ 11.25 hrs, Volume= 0.111 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 2.41' @ 12.94 hrs Surf.Area= 1,240 sf Storage= 1,497 cf

Plug-Flow detention time= 68.1 min calculated for 0.111 af (100% of inflow)
 Center-of-Mass det. time= 67.7 min (830.5 - 762.7)

Volume	Invert	Avail.Storage	Storage Description	
#1	0.00'	2,232 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	1,240	0.0	0	0
2.00	1,240	40.0	992	992
2.01	1,240	100.0	12	1,004
3.00	1,240	100.0	1,228	2,232

Device	Routing	Invert	Outlet Devices	
#1	Primary	4.00'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads	
#2	Secondary	4.50'	100.0' long x 0.5' breadth Broad-Crested Rectangular Weir	
			Head (feet) 0.20 0.40 0.60 0.80 1.00	
			Coef. (English) 2.80 2.92 3.08 3.30 3.32	
#3	Discarded	0.00'	5.000 in/hr Exfiltration over Surface area	

Discarded OutFlow Max=0.14 cfs @ 11.25 hrs HW=0.05' (Free Discharge)
 ↑ **3=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑ **1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

POST

Prepared by {enter your company name here}

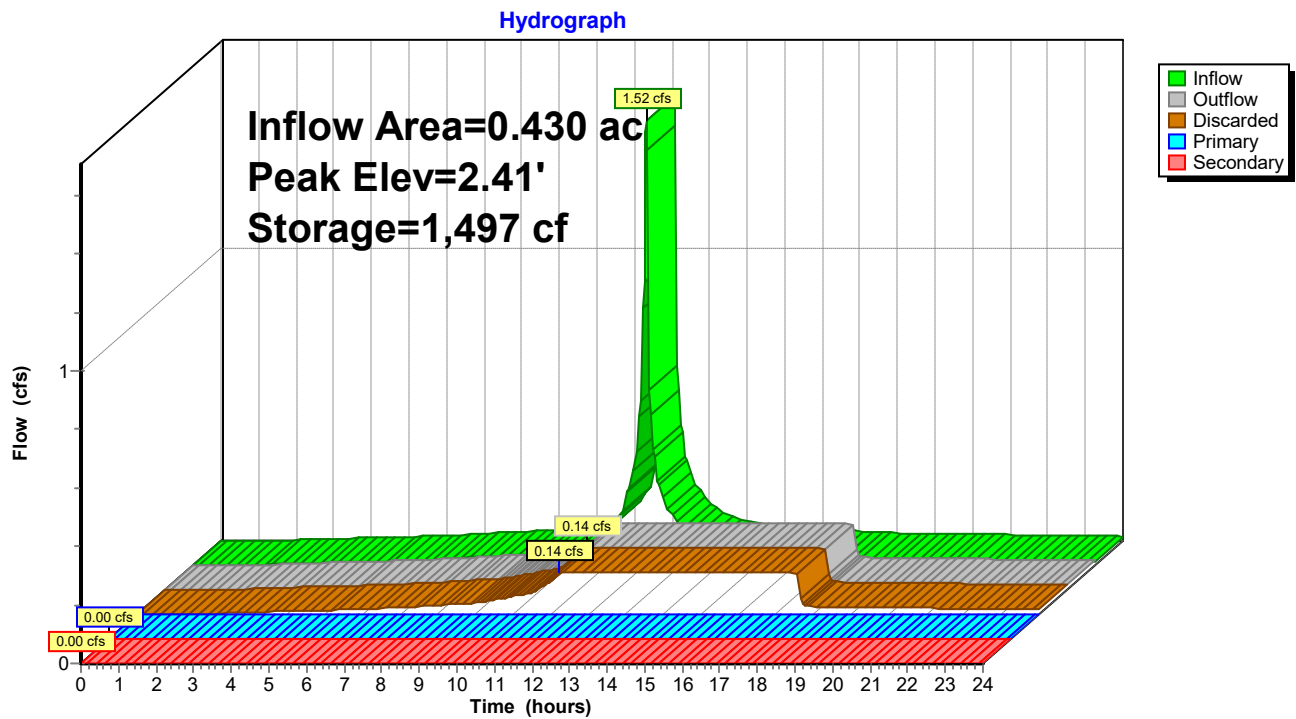
HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 2-Year Rainfall=3.44"

Printed 8/22/2023

Page 25

Pond 7P: PARKING BIO-RETENTION



POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 26

Hydrograph for Pond 7P: PARKING BIO-RETENTION

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	0.00	0.00	0.00	0.00	0.00
0.50	0.00	0	0.00	0.00	0.00	0.00	0.00
1.00	0.00	0	0.00	0.00	0.00	0.00	0.00
1.50	0.00	0	0.00	0.00	0.00	0.00	0.00
2.00	0.00	0	0.00	0.00	0.00	0.00	0.00
2.50	0.00	1	0.00	0.00	0.00	0.00	0.00
3.00	0.01	1	0.00	0.01	0.01	0.00	0.00
3.50	0.01	1	0.00	0.01	0.01	0.00	0.00
4.00	0.01	2	0.00	0.01	0.01	0.00	0.00
4.50	0.01	2	0.00	0.01	0.01	0.00	0.00
5.00	0.01	2	0.00	0.01	0.01	0.00	0.00
5.50	0.02	2	0.00	0.02	0.02	0.00	0.00
6.00	0.02	3	0.01	0.02	0.02	0.00	0.00
6.50	0.02	3	0.01	0.02	0.02	0.00	0.00
7.00	0.02	4	0.01	0.02	0.02	0.00	0.00
7.50	0.03	4	0.01	0.03	0.03	0.00	0.00
8.00	0.03	5	0.01	0.03	0.03	0.00	0.00
8.50	0.04	5	0.01	0.04	0.04	0.00	0.00
9.00	0.04	6	0.01	0.04	0.04	0.00	0.00
9.50	0.05	8	0.02	0.05	0.05	0.00	0.00
10.00	0.06	10	0.02	0.06	0.06	0.00	0.00
10.50	0.07	11	0.02	0.07	0.07	0.00	0.00
11.00	0.12	18	0.04	0.11	0.11	0.00	0.00
11.50	0.20	52	0.11	0.14	0.14	0.00	0.00
12.00	0.97	577	1.16	0.14	0.14	0.00	0.00
12.50	0.26	1,440	2.36	0.14	0.14	0.00	0.00
13.00	0.14	1,496	2.41	0.14	0.14	0.00	0.00
13.50	0.09	1,433	2.36	0.14	0.14	0.00	0.00
14.00	0.07	1,313	2.26	0.14	0.14	0.00	0.00
14.50	0.06	1,171	2.14	0.14	0.14	0.00	0.00
15.00	0.05	1,009	2.01	0.14	0.14	0.00	0.00
15.50	0.04	830	1.67	0.14	0.14	0.00	0.00
16.00	0.04	646	1.30	0.14	0.14	0.00	0.00
16.50	0.04	456	0.92	0.14	0.14	0.00	0.00
17.00	0.03	260	0.52	0.14	0.14	0.00	0.00
17.50	0.03	58	0.12	0.14	0.14	0.00	0.00
18.00	0.03	4	0.01	0.03	0.03	0.00	0.00
18.50	0.03	4	0.01	0.03	0.03	0.00	0.00
19.00	0.02	4	0.01	0.02	0.02	0.00	0.00
19.50	0.02	4	0.01	0.02	0.02	0.00	0.00
20.00	0.02	4	0.01	0.02	0.02	0.00	0.00
20.50	0.02	3	0.01	0.02	0.02	0.00	0.00
21.00	0.02	3	0.01	0.02	0.02	0.00	0.00
21.50	0.02	3	0.01	0.02	0.02	0.00	0.00
22.00	0.02	3	0.01	0.02	0.02	0.00	0.00
22.50	0.02	3	0.01	0.02	0.02	0.00	0.00
23.00	0.02	3	0.01	0.02	0.02	0.00	0.00
23.50	0.02	3	0.01	0.02	0.02	0.00	0.00
24.00	0.01	2	0.00	0.02	0.02	0.00	0.00

POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 27

Summary for Pond 11P: DRY WELLS

Inflow Area = 0.014 ac, 100.00% Impervious, Inflow Depth > 3.20" for 2-Year event
 Inflow = 0.05 cfs @ 12.11 hrs, Volume= 0.004 af
 Outflow = 0.02 cfs @ 12.05 hrs, Volume= 0.004 af, Atten= 47%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 12.05 hrs, Volume= 0.004 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 0.22' @ 12.21 hrs Surf.Area= 0.002 ac Storage= 0.000 af

Plug-Flow detention time= 2.2 min calculated for 0.004 af (100% of inflow)
 Center-of-Mass det. time= 2.0 min (757.3 - 755.3)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.001 af	4.00'W x 4.00'L x 4.00'H Prismatic
#2	0.00'	0.002 af	3.00'W x 30.00'L x 3.00'H Prismatic
			0.006 af Overall - 0.001 af Embedded = 0.006 af x 40.0% Voids
#3	1.00'	0.001 af	12.0" Round Pipe Storage Inside #2
			L= 35.0'
		0.004 af	Total Available Storage

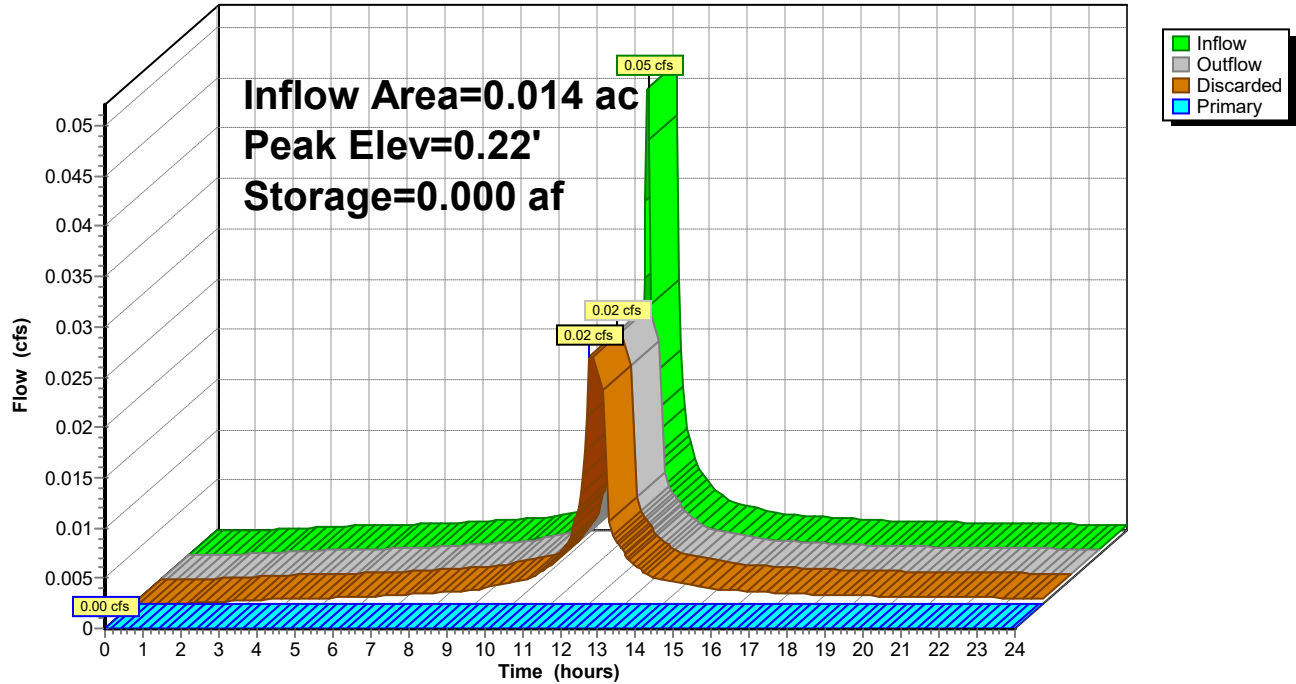
Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	10.000 in/hr Exfiltration over Horizontal area
#2	Primary	4.00'	48.0" x 24.0" Horiz. Orifice/Grate C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 12.05 hrs HW=0.06' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

Pond 11P: DRY WELLS

Hydrograph



POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 29

Hydrograph for Pond 11P: DRY WELLS

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	0.00	0.00	0.00	0.00
0.50	0.00	0.000	0.00	0.00	0.00	0.00
1.00	0.00	0.000	0.00	0.00	0.00	0.00
1.50	0.00	0.000	0.00	0.00	0.00	0.00
2.00	0.00	0.000	0.00	0.00	0.00	0.00
2.50	0.00	0.000	0.00	0.00	0.00	0.00
3.00	0.00	0.000	0.00	0.00	0.00	0.00
3.50	0.00	0.000	0.00	0.00	0.00	0.00
4.00	0.00	0.000	0.00	0.00	0.00	0.00
4.50	0.00	0.000	0.00	0.00	0.00	0.00
5.00	0.00	0.000	0.00	0.00	0.00	0.00
5.50	0.00	0.000	0.00	0.00	0.00	0.00
6.00	0.00	0.000	0.00	0.00	0.00	0.00
6.50	0.00	0.000	0.00	0.00	0.00	0.00
7.00	0.00	0.000	0.00	0.00	0.00	0.00
7.50	0.00	0.000	0.00	0.00	0.00	0.00
8.00	0.00	0.000	0.00	0.00	0.00	0.00
8.50	0.00	0.000	0.00	0.00	0.00	0.00
9.00	0.00	0.000	0.00	0.00	0.00	0.00
9.50	0.00	0.000	0.00	0.00	0.00	0.00
10.00	0.00	0.000	0.00	0.00	0.00	0.00
10.50	0.00	0.000	0.00	0.00	0.00	0.00
11.00	0.00	0.000	0.01	0.00	0.00	0.00
11.50	0.01	0.000	0.01	0.01	0.01	0.00
12.00	0.03	0.000	0.04	0.02	0.02	0.00
12.50	0.01	0.000	0.01	0.01	0.01	0.00
13.00	0.00	0.000	0.01	0.00	0.00	0.00
13.50	0.00	0.000	0.01	0.00	0.00	0.00
14.00	0.00	0.000	0.00	0.00	0.00	0.00
14.50	0.00	0.000	0.00	0.00	0.00	0.00
15.00	0.00	0.000	0.00	0.00	0.00	0.00
15.50	0.00	0.000	0.00	0.00	0.00	0.00
16.00	0.00	0.000	0.00	0.00	0.00	0.00
16.50	0.00	0.000	0.00	0.00	0.00	0.00
17.00	0.00	0.000	0.00	0.00	0.00	0.00
17.50	0.00	0.000	0.00	0.00	0.00	0.00
18.00	0.00	0.000	0.00	0.00	0.00	0.00
18.50	0.00	0.000	0.00	0.00	0.00	0.00
19.00	0.00	0.000	0.00	0.00	0.00	0.00
19.50	0.00	0.000	0.00	0.00	0.00	0.00
20.00	0.00	0.000	0.00	0.00	0.00	0.00
20.50	0.00	0.000	0.00	0.00	0.00	0.00
21.00	0.00	0.000	0.00	0.00	0.00	0.00
21.50	0.00	0.000	0.00	0.00	0.00	0.00
22.00	0.00	0.000	0.00	0.00	0.00	0.00
22.50	0.00	0.000	0.00	0.00	0.00	0.00
23.00	0.00	0.000	0.00	0.00	0.00	0.00
23.50	0.00	0.000	0.00	0.00	0.00	0.00
24.00	0.00	0.000	0.00	0.00	0.00	0.00

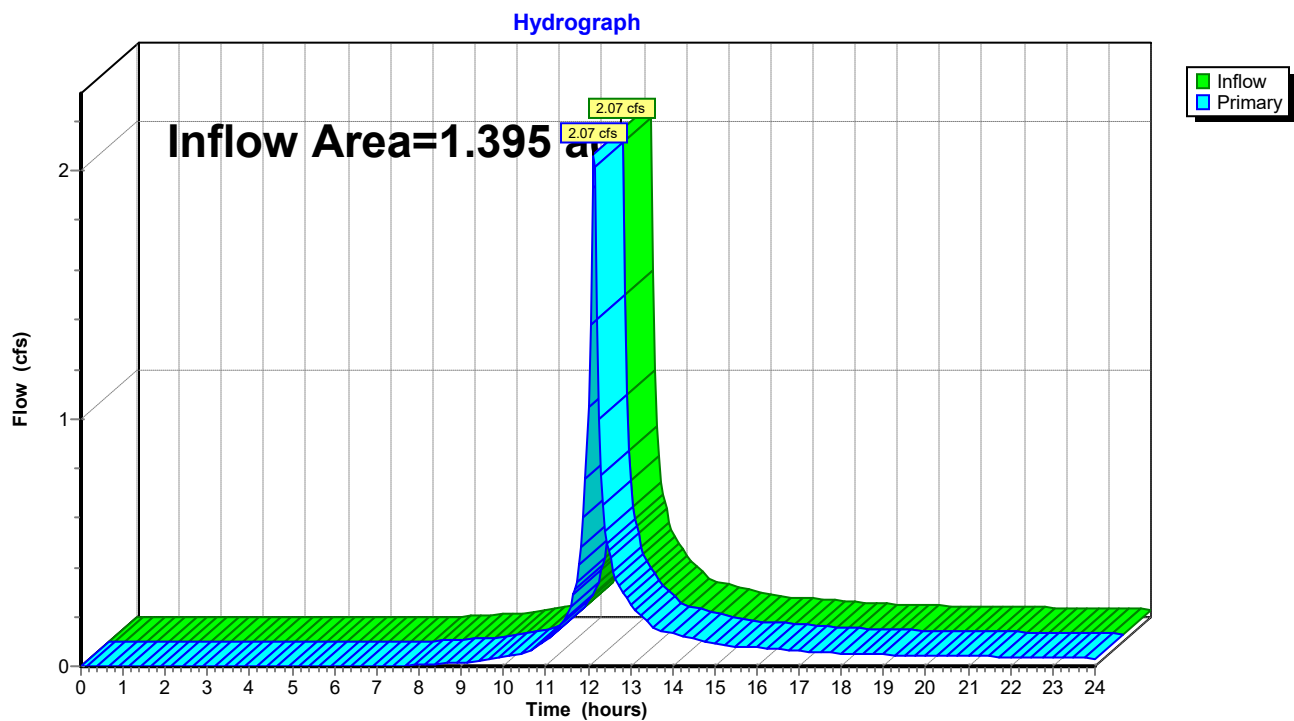
Summary for Pond 12P: TOTAL PARKING LOT

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.395 ac, 81.36% Impervious, Inflow Depth > 1.30" for 2-Year event
 Inflow = 2.07 cfs @ 12.13 hrs, Volume= 0.151 af
 Primary = 2.07 cfs @ 12.13 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 12P: TOTAL PARKING LOT



POST

NOAA 24-hr D 2-Year Rainfall=3.44"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 31

Hydrograph for Pond 12P: TOTAL PARKING LOT

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00	13.00	0.25		0.25
0.25	0.00		0.00	13.25	0.20		0.20
0.50	0.00		0.00	13.50	0.17		0.17
0.75	0.00		0.00	13.75	0.14		0.14
1.00	0.00		0.00	14.00	0.13		0.13
1.25	0.00		0.00	14.25	0.12		0.12
1.50	0.00		0.00	14.50	0.11		0.11
1.75	0.00		0.00	14.75	0.10		0.10
2.00	0.00		0.00	15.00	0.09		0.09
2.25	0.00		0.00	15.25	0.08		0.08
2.50	0.00		0.00	15.50	0.08		0.08
2.75	0.00		0.00	15.75	0.08		0.08
3.00	0.00		0.00	16.00	0.07		0.07
3.25	0.00		0.00	16.25	0.07		0.07
3.50	0.00		0.00	16.50	0.07		0.07
3.75	0.00		0.00	16.75	0.07		0.07
4.00	0.00		0.00	17.00	0.06		0.06
4.25	0.00		0.00	17.25	0.06		0.06
4.50	0.00		0.00	17.50	0.06		0.06
4.75	0.00		0.00	17.75	0.05		0.05
5.00	0.00		0.00	18.00	0.05		0.05
5.25	0.00		0.00	18.25	0.05		0.05
5.50	0.00		0.00	18.50	0.05		0.05
5.75	0.00		0.00	18.75	0.05		0.05
6.00	0.00		0.00	19.00	0.05		0.05
6.25	0.00		0.00	19.25	0.05		0.05
6.50	0.00		0.00	19.50	0.04		0.04
6.75	0.00		0.00	19.75	0.04		0.04
7.00	0.00		0.00	20.00	0.04		0.04
7.25	0.00		0.00	20.25	0.04		0.04
7.50	0.00		0.00	20.50	0.04		0.04
7.75	0.00		0.00	20.75	0.04		0.04
8.00	0.01		0.01	21.00	0.04		0.04
8.25	0.01		0.01	21.25	0.04		0.04
8.50	0.01		0.01	21.50	0.04		0.04
8.75	0.01		0.01	21.75	0.04		0.04
9.00	0.01		0.01	22.00	0.04		0.04
9.25	0.02		0.02	22.25	0.04		0.04
9.50	0.02		0.02	22.50	0.04		0.04
9.75	0.03		0.03	22.75	0.04		0.04
10.00	0.04		0.04	23.00	0.03		0.03
10.25	0.05		0.05	23.25	0.03		0.03
10.50	0.05		0.05	23.50	0.03		0.03
10.75	0.07		0.07	23.75	0.03		0.03
11.00	0.10		0.10	24.00	0.03		0.03
11.25	0.14		0.14				
11.50	0.20		0.20				
11.75	0.34		0.34				
12.00	1.05		1.05				
12.25	0.99		0.99				
12.50	0.47		0.47				
12.75	0.32		0.32				

POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 32

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CART BUILDING Runoff Area=6,144 sf 100.00% Impervious Runoff Depth>4.98"
Tc=0.0 min CN=98 Runoff=0.77 cfs 0.059 af

Subcatchment 2S: CART BUILDING SITE Runoff Area=16,229 sf 24.79% Impervious Runoff Depth>1.03"
Flow Length=50' Slope=0.2000 '/' Tc=2.2 min CN=54 Runoff=0.45 cfs 0.032 af

Subcatchment 5S: PARKING LOT AREA Runoff Area=18,743 sf 93.38% Impervious Runoff Depth>4.87"
Flow Length=283' Slope=0.0500 '/' Tc=1.5 min CN=97 Runoff=2.34 cfs 0.174 af

Subcatchment 8S: OTHER PARKING LOT Runoff Area=42,005 sf 76.00% Impervious Runoff Depth>3.47"
Flow Length=597' Tc=6.0 min CN=84 Runoff=3.73 cfs 0.279 af

Subcatchment 9S: COMFORT STATION Runoff Area=620 sf 100.00% Impervious Runoff Depth>4.98"
Flow Length=44' Slope=0.0200 '/' Tc=4.9 min CN=98 Runoff=0.07 cfs 0.006 af

Pond 3P: DRY WELLS Peak Elev=1.65' Storage=0.009 af Inflow=0.77 cfs 0.059 af
Discarded=0.22 cfs 0.059 af Primary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.059 af

Pond 4P: TOTAL CART BARN AREA Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond 6P: POROUS PAVEMENT Peak Elev=0.01' Storage=0.000 af Inflow=0.45 cfs 0.032 af
Discarded=0.44 cfs 0.032 af Primary=0.00 cfs 0.000 af Outflow=0.44 cfs 0.032 af

Pond 7P: PARKING BIO-RETENTION Peak Elev=4.27' Storage=2,232 cf Inflow=2.34 cfs 0.174 af
Discarded=0.14 cfs 0.159 af Primary=0.86 cfs 0.016 af Secondary=0.00 cfs 0.000 af Outflow=1.00 cfs 0.174 af

Pond 11P: DRY WELLS Peak Elev=0.57' Storage=0.001 af Inflow=0.07 cfs 0.006 af
Discarded=0.02 cfs 0.006 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.006 af

Pond 12P: TOTAL PARKING LOT Inflow=3.70 cfs 0.294 af
Primary=3.70 cfs 0.294 af

Total Runoff Area = 1.922 ac Runoff Volume = 0.550 af Average Runoff Depth = 3.43"
28.10% Pervious = 0.540 ac 71.90% Impervious = 1.382 ac

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 10-Year Rainfall=5.22"

Printed 8/22/2023

Page 33

Summary for Subcatchment 1S: CART BUILDING

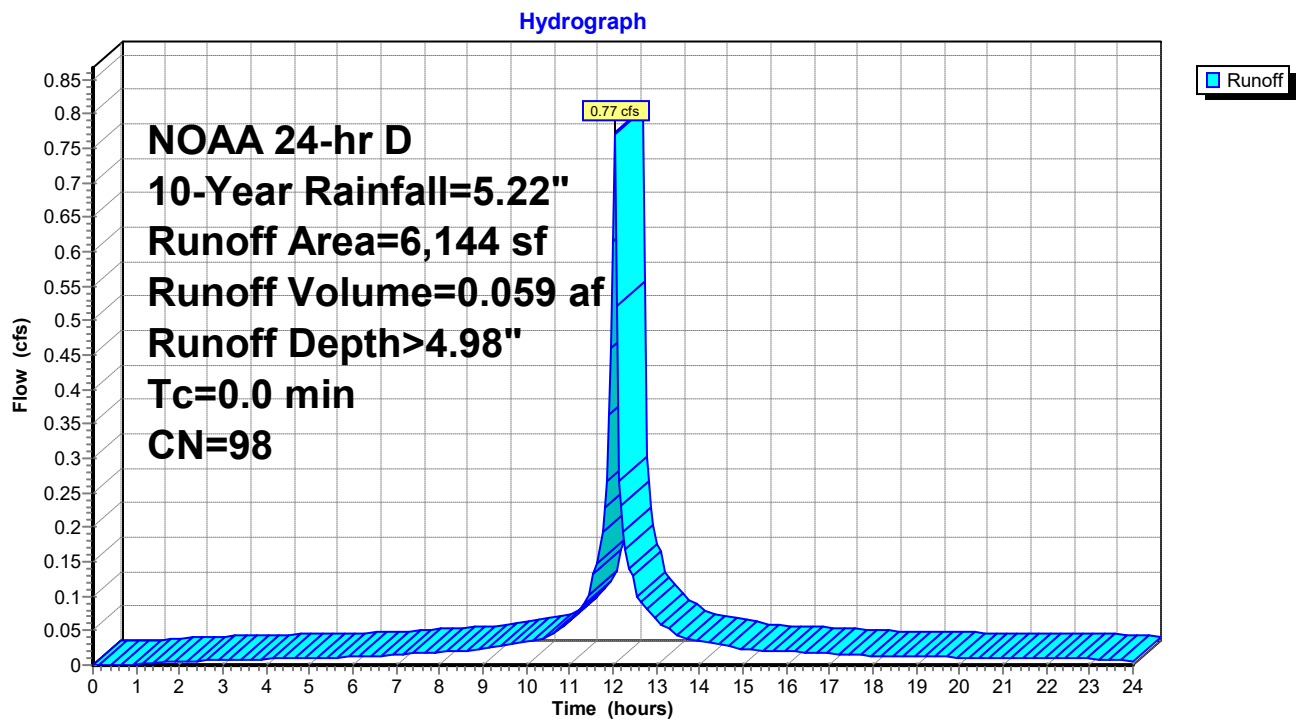
[46] Hint: $T_c=0$ (Instant runoff peak depends on dt)

Runoff = 0.77 cfs @ 12.04 hrs, Volume= 0.059 af, Depth> 4.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.22"

	Area (sf)	CN	Description
*	6,144	98	CART BUILDING
	6,144		100.00% Impervious Area

Subcatchment 1S: CART BUILDING



POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 34

Hydrograph for Subcatchment 1S: CART BUILDING

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.86	3.63	0.07
0.25	0.01	0.00	0.00	13.25	3.97	3.73	0.05
0.50	0.03	0.00	0.00	13.50	4.05	3.82	0.04
0.75	0.04	0.00	0.00	13.75	4.12	3.89	0.04
1.00	0.06	0.00	0.00	14.00	4.19	3.95	0.04
1.25	0.08	0.01	0.00	14.25	4.24	4.01	0.03
1.50	0.09	0.01	0.00	14.50	4.30	4.06	0.03
1.75	0.11	0.02	0.00	14.75	4.35	4.11	0.03
2.00	0.13	0.02	0.00	15.00	4.39	4.16	0.02
2.25	0.14	0.03	0.01	15.25	4.43	4.20	0.02
2.50	0.16	0.04	0.01	15.50	4.47	4.23	0.02
2.75	0.18	0.06	0.01	15.75	4.51	4.27	0.02
3.00	0.20	0.07	0.01	16.00	4.54	4.31	0.02
3.25	0.22	0.08	0.01	16.25	4.58	4.34	0.02
3.50	0.23	0.09	0.01	16.50	4.61	4.37	0.02
3.75	0.25	0.11	0.01	16.75	4.64	4.40	0.02
4.00	0.27	0.12	0.01	17.00	4.67	4.43	0.02
4.25	0.29	0.14	0.01	17.25	4.70	4.46	0.02
4.50	0.31	0.16	0.01	17.50	4.73	4.49	0.01
4.75	0.34	0.17	0.01	17.75	4.75	4.51	0.01
5.00	0.36	0.19	0.01	18.00	4.77	4.54	0.01
5.25	0.38	0.21	0.01	18.25	4.80	4.56	0.01
5.50	0.40	0.23	0.01	18.50	4.82	4.58	0.01
5.75	0.42	0.25	0.01	18.75	4.84	4.60	0.01
6.00	0.45	0.27	0.01	19.00	4.86	4.63	0.01
6.25	0.47	0.29	0.01	19.25	4.88	4.65	0.01
6.50	0.49	0.31	0.01	19.50	4.91	4.67	0.01
6.75	0.52	0.34	0.01	19.75	4.93	4.69	0.01
7.00	0.55	0.36	0.02	20.00	4.95	4.71	0.01
7.25	0.58	0.39	0.02	20.25	4.97	4.73	0.01
7.50	0.61	0.42	0.02	20.50	4.99	4.75	0.01
7.75	0.64	0.45	0.02	20.75	5.00	4.77	0.01
8.00	0.68	0.48	0.02	21.00	5.02	4.79	0.01
8.25	0.71	0.52	0.02	21.25	5.04	4.80	0.01
8.50	0.75	0.55	0.02	21.50	5.06	4.82	0.01
8.75	0.79	0.59	0.02	21.75	5.08	4.84	0.01
9.00	0.83	0.63	0.02	22.00	5.09	4.86	0.01
9.25	0.87	0.67	0.03	22.25	5.11	4.87	0.01
9.50	0.92	0.71	0.03	22.50	5.13	4.89	0.01
9.75	0.98	0.77	0.03	22.75	5.14	4.91	0.01
10.00	1.03	0.82	0.03	23.00	5.16	4.92	0.01
10.25	1.10	0.89	0.04	23.25	5.18	4.94	0.01
10.50	1.17	0.96	0.04	23.50	5.19	4.95	0.01
10.75	1.25	1.04	0.05	23.75	5.21	4.97	0.01
11.00	1.36	1.14	0.06	24.00	5.22	4.98	0.00
11.25	1.49	1.27	0.08				
11.50	1.65	1.43	0.12				
11.75	1.92	1.69	0.19				
12.00	2.50	2.27	0.62				
12.25	3.30	3.07	0.19				
12.50	3.57	3.33	0.12				
12.75	3.73	3.50	0.08				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 10-Year Rainfall=5.22"

Printed 8/22/2023

Page 35

Summary for Subcatchment 2S: CART BUILDING SITE

[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.45 cfs @ 12.09 hrs, Volume= 0.032 af, Depth> 1.03"

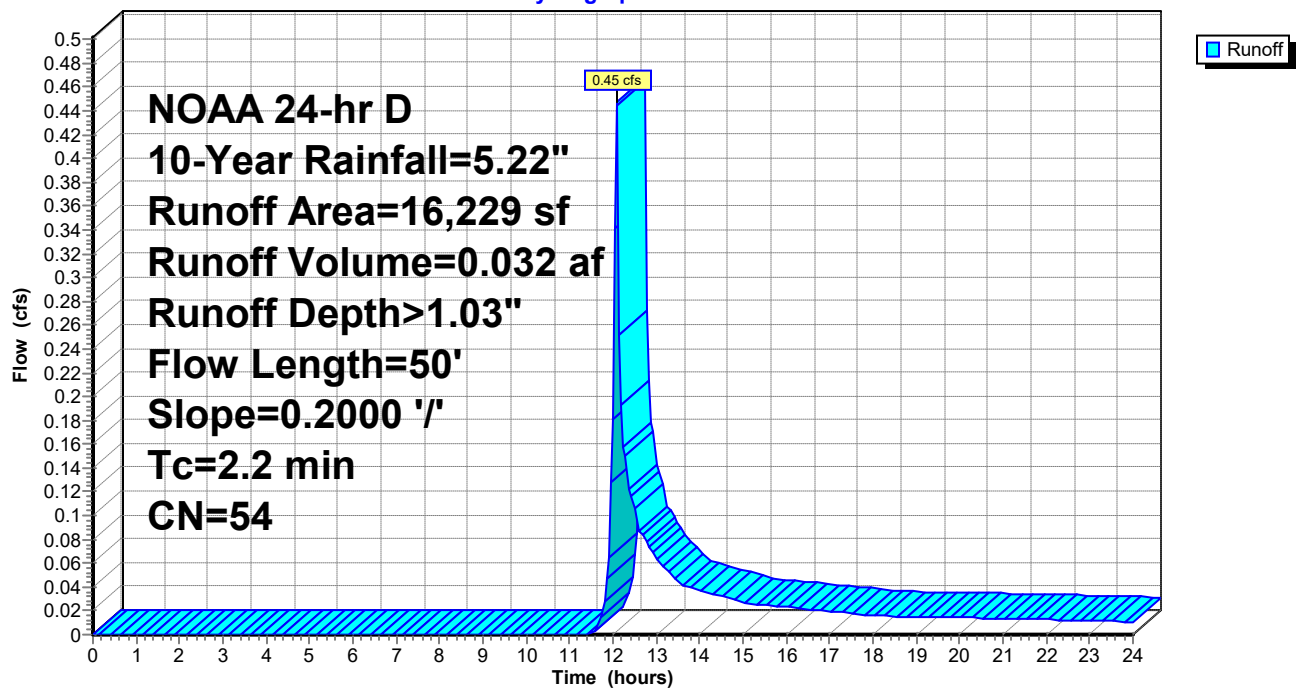
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 10-Year Rainfall=5.22"

	Area (sf)	CN	Description
*	2,842	98	CONCRETE
*	1,181	98	CART PATH
	12,206	39	>75% Grass cover, Good, HSG A
	16,229	54	Weighted Average
	12,206		75.21% Pervious Area
	4,023		24.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	50	0.2000	0.39		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"

Subcatchment 2S: CART BUILDING SITE

Hydrograph



POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 36

Hydrograph for Subcatchment 2S: CART BUILDING SITE

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.86	0.44	0.07
0.25	0.01	0.00	0.00	13.25	3.97	0.47	0.05
0.50	0.03	0.00	0.00	13.50	4.05	0.51	0.05
0.75	0.04	0.00	0.00	13.75	4.12	0.53	0.04
1.00	0.06	0.00	0.00	14.00	4.19	0.56	0.04
1.25	0.08	0.00	0.00	14.25	4.24	0.58	0.03
1.50	0.09	0.00	0.00	14.50	4.30	0.61	0.03
1.75	0.11	0.00	0.00	14.75	4.35	0.63	0.03
2.00	0.13	0.00	0.00	15.00	4.39	0.64	0.03
2.25	0.14	0.00	0.00	15.25	4.43	0.66	0.03
2.50	0.16	0.00	0.00	15.50	4.47	0.68	0.02
2.75	0.18	0.00	0.00	15.75	4.51	0.69	0.02
3.00	0.20	0.00	0.00	16.00	4.54	0.71	0.02
3.25	0.22	0.00	0.00	16.25	4.58	0.72	0.02
3.50	0.23	0.00	0.00	16.50	4.61	0.74	0.02
3.75	0.25	0.00	0.00	16.75	4.64	0.75	0.02
4.00	0.27	0.00	0.00	17.00	4.67	0.77	0.02
4.25	0.29	0.00	0.00	17.25	4.70	0.78	0.02
4.50	0.31	0.00	0.00	17.50	4.73	0.79	0.02
4.75	0.34	0.00	0.00	17.75	4.75	0.80	0.02
5.00	0.36	0.00	0.00	18.00	4.77	0.81	0.02
5.25	0.38	0.00	0.00	18.25	4.80	0.82	0.02
5.50	0.40	0.00	0.00	18.50	4.82	0.83	0.02
5.75	0.42	0.00	0.00	18.75	4.84	0.84	0.02
6.00	0.45	0.00	0.00	19.00	4.86	0.85	0.02
6.25	0.47	0.00	0.00	19.25	4.88	0.86	0.01
6.50	0.49	0.00	0.00	19.50	4.91	0.87	0.01
6.75	0.52	0.00	0.00	19.75	4.93	0.88	0.01
7.00	0.55	0.00	0.00	20.00	4.95	0.89	0.01
7.25	0.58	0.00	0.00	20.25	4.97	0.90	0.01
7.50	0.61	0.00	0.00	20.50	4.99	0.91	0.01
7.75	0.64	0.00	0.00	20.75	5.00	0.92	0.01
8.00	0.68	0.00	0.00	21.00	5.02	0.93	0.01
8.25	0.71	0.00	0.00	21.25	5.04	0.94	0.01
8.50	0.75	0.00	0.00	21.50	5.06	0.95	0.01
8.75	0.79	0.00	0.00	21.75	5.08	0.96	0.01
9.00	0.83	0.00	0.00	22.00	5.09	0.97	0.01
9.25	0.87	0.00	0.00	22.25	5.11	0.97	0.01
9.50	0.92	0.00	0.00	22.50	5.13	0.98	0.01
9.75	0.98	0.00	0.00	22.75	5.14	0.99	0.01
10.00	1.03	0.00	0.00	23.00	5.16	1.00	0.01
10.25	1.10	0.00	0.00	23.25	5.18	1.01	0.01
10.50	1.17	0.00	0.00	23.50	5.19	1.01	0.01
10.75	1.25	0.00	0.00	23.75	5.21	1.02	0.01
11.00	1.36	0.00	0.00	24.00	5.22	1.03	0.01
11.25	1.49	0.00	0.00				
11.50	1.65	0.00	0.00				
11.75	1.92	0.01	0.02				
12.00	2.50	0.07	0.18				
12.25	3.30	0.25	0.16				
12.50	3.57	0.33	0.11				
12.75	3.73	0.39	0.08				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 10-Year Rainfall=5.22"

Printed 8/22/2023

Page 37

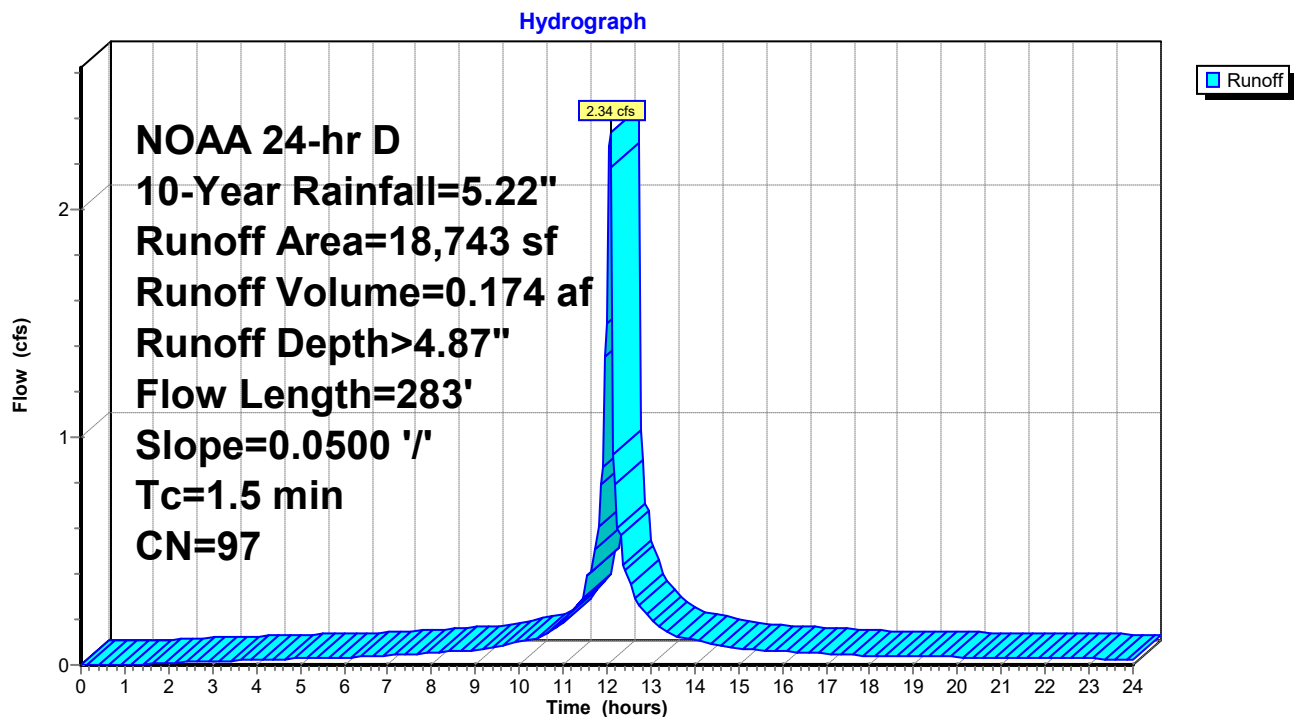
Summary for Subcatchment 5S: PARKING LOT AREA TO BIO-RETENTION[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 2.34 cfs @ 12.07 hrs, Volume= 0.174 af, Depth> 4.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 10-Year Rainfall=5.22"

	Area (sf)	CN	Description
*	1,240	76	BIO-RETENTION ISLANDS
*	17,503	98	PARKING LOT TO BIORETENTION
	18,743	97	Weighted Average
	1,240		6.62% Pervious Area
	17,503		93.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0500	2.06		Sheet Flow, Pavement Smooth surfaces $n=0.011$ $P2=3.44"$
0.7	183	0.0500	4.54		Shallow Concentrated Flow, Paved $K_v=20.3$ fps
1.5	283	Total			

Subcatchment 5S: PARKING LOT AREA TO BIO-RETENTION

POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 38

Hydrograph for Subcatchment 5S: PARKING LOT AREA TO BIO-RETENTION

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.86	3.52	0.21
0.25	0.01	0.00	0.00	13.25	3.97	3.62	0.16
0.50	0.03	0.00	0.00	13.50	4.05	3.70	0.13
0.75	0.04	0.00	0.00	13.75	4.12	3.77	0.12
1.00	0.06	0.00	0.00	14.00	4.19	3.84	0.11
1.25	0.08	0.00	0.00	14.25	4.24	3.89	0.10
1.50	0.09	0.00	0.00	14.50	4.30	3.95	0.09
1.75	0.11	0.01	0.01	14.75	4.35	4.00	0.08
2.00	0.13	0.01	0.01	15.00	4.39	4.04	0.07
2.25	0.14	0.02	0.01	15.25	4.43	4.08	0.07
2.50	0.16	0.02	0.01	15.50	4.47	4.12	0.07
2.75	0.18	0.03	0.01	15.75	4.51	4.16	0.06
3.00	0.20	0.04	0.02	16.00	4.54	4.19	0.06
3.25	0.22	0.05	0.02	16.25	4.58	4.23	0.06
3.50	0.23	0.06	0.02	16.50	4.61	4.26	0.06
3.75	0.25	0.07	0.02	16.75	4.64	4.29	0.05
4.00	0.27	0.09	0.02	17.00	4.67	4.32	0.05
4.25	0.29	0.10	0.02	17.25	4.70	4.35	0.05
4.50	0.31	0.11	0.02	17.50	4.73	4.37	0.05
4.75	0.34	0.13	0.03	17.75	4.75	4.40	0.04
5.00	0.36	0.14	0.03	18.00	4.77	4.42	0.04
5.25	0.38	0.16	0.03	18.25	4.80	4.44	0.04
5.50	0.40	0.18	0.03	18.50	4.82	4.47	0.04
5.75	0.42	0.19	0.03	18.75	4.84	4.49	0.04
6.00	0.45	0.21	0.03	19.00	4.86	4.51	0.04
6.25	0.47	0.23	0.03	19.25	4.88	4.53	0.04
6.50	0.49	0.25	0.04	19.50	4.91	4.55	0.04
6.75	0.52	0.27	0.04	19.75	4.93	4.57	0.04
7.00	0.55	0.30	0.04	20.00	4.95	4.59	0.03
7.25	0.58	0.32	0.05	20.25	4.97	4.61	0.03
7.50	0.61	0.35	0.05	20.50	4.99	4.63	0.03
7.75	0.64	0.38	0.05	20.75	5.00	4.65	0.03
8.00	0.68	0.41	0.05	21.00	5.02	4.67	0.03
8.25	0.71	0.44	0.06	21.25	5.04	4.69	0.03
8.50	0.75	0.47	0.06	21.50	5.06	4.71	0.03
8.75	0.79	0.51	0.06	21.75	5.08	4.72	0.03
9.00	0.83	0.55	0.06	22.00	5.09	4.74	0.03
9.25	0.87	0.59	0.07	22.25	5.11	4.76	0.03
9.50	0.92	0.63	0.08	22.50	5.13	4.77	0.03
9.75	0.98	0.68	0.09	22.75	5.14	4.79	0.03
10.00	1.03	0.74	0.10	23.00	5.16	4.81	0.03
10.25	1.10	0.80	0.11	23.25	5.18	4.82	0.03
10.50	1.17	0.87	0.12	23.50	5.19	4.84	0.03
10.75	1.25	0.95	0.16	23.75	5.21	4.85	0.03
11.00	1.36	1.05	0.18	24.00	5.22	4.87	0.02
11.25	1.49	1.17	0.25				
11.50	1.65	1.33	0.31				
11.75	1.92	1.59	0.57				
12.00	2.50	2.16	1.50				
12.25	3.30	2.96	0.60				
12.50	3.57	3.22	0.40				
12.75	3.73	3.38	0.26				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 10-Year Rainfall=5.22"

Printed 8/22/2023

Page 39

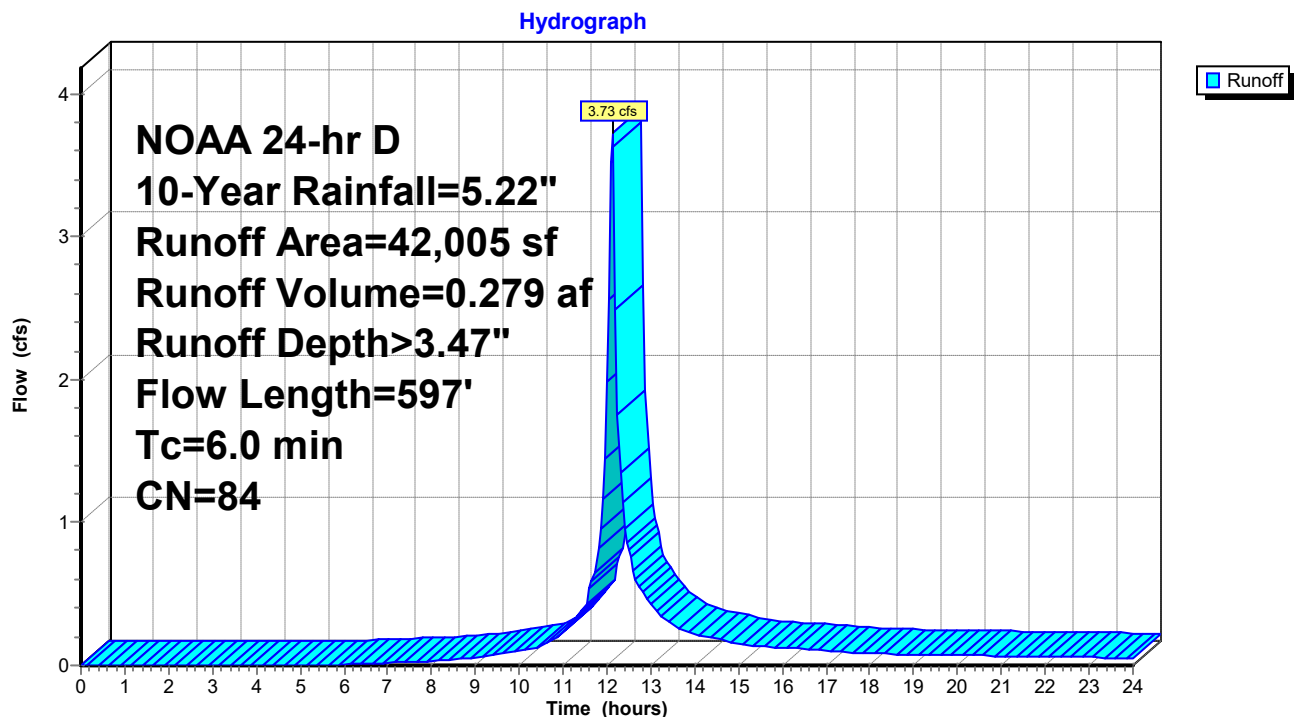
Summary for Subcatchment 8S: OTHER PARKING LOT AREAS

Runoff = 3.73 cfs @ 12.13 hrs, Volume= 0.279 af, Depth> 3.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.22"

Area (sf)	CN	Description
10,082	39	>75% Grass cover, Good, HSG A
* 1,650	98	CART PATH
* 30,273	98	UNDISTURBED PARKING LOT
42,005	84	Weighted Average
10,082		24.00% Pervious Area
31,923		76.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	76	0.0900	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
1.8	521	0.0580	4.89		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.0	597	Total			

Subcatchment 8S: OTHER PARKING LOT AREAS

POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 40

Hydrograph for Subcatchment 8S: OTHER PARKING LOT AREAS

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.86	2.25	0.43
0.25	0.01	0.00	0.00	13.25	3.97	2.34	0.35
0.50	0.03	0.00	0.00	13.50	4.05	2.42	0.28
0.75	0.04	0.00	0.00	13.75	4.12	2.48	0.24
1.00	0.06	0.00	0.00	14.00	4.19	2.53	0.22
1.25	0.08	0.00	0.00	14.25	4.24	2.59	0.20
1.50	0.09	0.00	0.00	14.50	4.30	2.64	0.19
1.75	0.11	0.00	0.00	14.75	4.35	2.68	0.17
2.00	0.13	0.00	0.00	15.00	4.39	2.72	0.15
2.25	0.14	0.00	0.00	15.25	4.43	2.76	0.14
2.50	0.16	0.00	0.00	15.50	4.47	2.79	0.13
2.75	0.18	0.00	0.00	15.75	4.51	2.82	0.13
3.00	0.20	0.00	0.00	16.00	4.54	2.85	0.12
3.25	0.22	0.00	0.00	16.25	4.58	2.89	0.12
3.50	0.23	0.00	0.00	16.50	4.61	2.92	0.11
3.75	0.25	0.00	0.00	16.75	4.64	2.94	0.11
4.00	0.27	0.00	0.00	17.00	4.67	2.97	0.10
4.25	0.29	0.00	0.00	17.25	4.70	3.00	0.10
4.50	0.31	0.00	0.00	17.50	4.73	3.02	0.09
4.75	0.34	0.00	0.00	17.75	4.75	3.04	0.09
5.00	0.36	0.00	0.00	18.00	4.77	3.06	0.08
5.25	0.38	0.00	0.00	18.25	4.80	3.09	0.08
5.50	0.40	0.00	0.00	18.50	4.82	3.11	0.08
5.75	0.42	0.00	0.00	18.75	4.84	3.13	0.08
6.00	0.45	0.00	0.01	19.00	4.86	3.15	0.08
6.25	0.47	0.00	0.01	19.25	4.88	3.16	0.08
6.50	0.49	0.01	0.01	19.50	4.91	3.18	0.07
6.75	0.52	0.01	0.01	19.75	4.93	3.20	0.07
7.00	0.55	0.01	0.02	20.00	4.95	3.22	0.07
7.25	0.58	0.02	0.02	20.25	4.97	3.24	0.07
7.50	0.61	0.02	0.02	20.50	4.99	3.26	0.07
7.75	0.64	0.03	0.03	20.75	5.00	3.27	0.07
8.00	0.68	0.04	0.03	21.00	5.02	3.29	0.07
8.25	0.71	0.05	0.04	21.25	5.04	3.31	0.07
8.50	0.75	0.06	0.04	21.50	5.06	3.33	0.06
8.75	0.79	0.07	0.05	21.75	5.08	3.34	0.06
9.00	0.83	0.09	0.05	22.00	5.09	3.36	0.06
9.25	0.87	0.10	0.06	22.25	5.11	3.37	0.06
9.50	0.92	0.12	0.07	22.50	5.13	3.39	0.06
9.75	0.98	0.14	0.09	22.75	5.14	3.40	0.06
10.00	1.03	0.17	0.10	23.00	5.16	3.42	0.06
10.25	1.10	0.20	0.12	23.25	5.18	3.43	0.06
10.50	1.17	0.23	0.13	23.50	5.19	3.45	0.05
10.75	1.25	0.27	0.17	23.75	5.21	3.46	0.05
11.00	1.36	0.33	0.23	24.00	5.22	3.47	0.05
11.25	1.49	0.41	0.31				
11.50	1.65	0.51	0.41				
11.75	1.92	0.69	0.69				
12.00	2.50	1.12	1.99				
12.25	3.30	1.77	1.75				
12.50	3.57	1.99	0.81				
12.75	3.73	2.13	0.55				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 10-Year Rainfall=5.22"

Printed 8/22/2023

Page 41

Summary for Subcatchment 9S: COMFORT STATION AREA

[49] Hint: $T_c < 2dt$ may require smaller dt

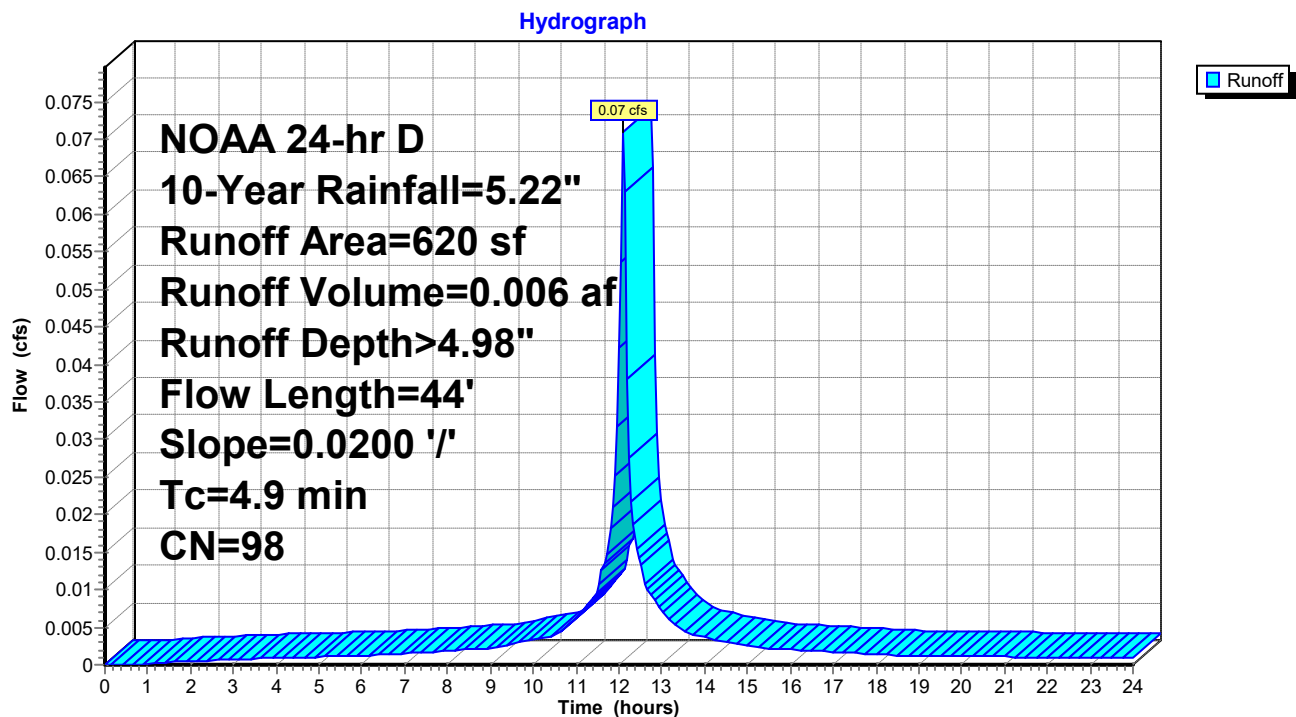
Runoff = 0.07 cfs @ 12.11 hrs, Volume= 0.006 af, Depth> 4.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 10-Year Rainfall=5.22"

Area (sf)	CN	Description
620	98	Roofs, HSG A
620		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	44	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"

Subcatchment 9S: COMFORT STATION AREA



POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 42

Hydrograph for Subcatchment 9S: COMFORT STATION AREA

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	3.86	3.63	0.01
0.25	0.01	0.00	0.00	13.25	3.97	3.73	0.01
0.50	0.03	0.00	0.00	13.50	4.05	3.82	0.00
0.75	0.04	0.00	0.00	13.75	4.12	3.89	0.00
1.00	0.06	0.00	0.00	14.00	4.19	3.95	0.00
1.25	0.08	0.01	0.00	14.25	4.24	4.01	0.00
1.50	0.09	0.01	0.00	14.50	4.30	4.06	0.00
1.75	0.11	0.02	0.00	14.75	4.35	4.11	0.00
2.00	0.13	0.02	0.00	15.00	4.39	4.16	0.00
2.25	0.14	0.03	0.00	15.25	4.43	4.20	0.00
2.50	0.16	0.04	0.00	15.50	4.47	4.23	0.00
2.75	0.18	0.06	0.00	15.75	4.51	4.27	0.00
3.00	0.20	0.07	0.00	16.00	4.54	4.31	0.00
3.25	0.22	0.08	0.00	16.25	4.58	4.34	0.00
3.50	0.23	0.09	0.00	16.50	4.61	4.37	0.00
3.75	0.25	0.11	0.00	16.75	4.64	4.40	0.00
4.00	0.27	0.12	0.00	17.00	4.67	4.43	0.00
4.25	0.29	0.14	0.00	17.25	4.70	4.46	0.00
4.50	0.31	0.16	0.00	17.50	4.73	4.49	0.00
4.75	0.34	0.17	0.00	17.75	4.75	4.51	0.00
5.00	0.36	0.19	0.00	18.00	4.77	4.54	0.00
5.25	0.38	0.21	0.00	18.25	4.80	4.56	0.00
5.50	0.40	0.23	0.00	18.50	4.82	4.58	0.00
5.75	0.42	0.25	0.00	18.75	4.84	4.60	0.00
6.00	0.45	0.27	0.00	19.00	4.86	4.63	0.00
6.25	0.47	0.29	0.00	19.25	4.88	4.65	0.00
6.50	0.49	0.31	0.00	19.50	4.91	4.67	0.00
6.75	0.52	0.34	0.00	19.75	4.93	4.69	0.00
7.00	0.55	0.36	0.00	20.00	4.95	4.71	0.00
7.25	0.58	0.39	0.00	20.25	4.97	4.73	0.00
7.50	0.61	0.42	0.00	20.50	4.99	4.75	0.00
7.75	0.64	0.45	0.00	20.75	5.00	4.77	0.00
8.00	0.68	0.48	0.00	21.00	5.02	4.79	0.00
8.25	0.71	0.52	0.00	21.25	5.04	4.80	0.00
8.50	0.75	0.55	0.00	21.50	5.06	4.82	0.00
8.75	0.79	0.59	0.00	21.75	5.08	4.84	0.00
9.00	0.83	0.63	0.00	22.00	5.09	4.86	0.00
9.25	0.87	0.67	0.00	22.25	5.11	4.87	0.00
9.50	0.92	0.71	0.00	22.50	5.13	4.89	0.00
9.75	0.98	0.77	0.00	22.75	5.14	4.91	0.00
10.00	1.03	0.82	0.00	23.00	5.16	4.92	0.00
10.25	1.10	0.89	0.00	23.25	5.18	4.94	0.00
10.50	1.17	0.96	0.00	23.50	5.19	4.95	0.00
10.75	1.25	1.04	0.00	23.75	5.21	4.97	0.00
11.00	1.36	1.14	0.01	24.00	5.22	4.98	0.00
11.25	1.49	1.27	0.01				
11.50	1.65	1.43	0.01				
11.75	1.92	1.69	0.02				
12.00	2.50	2.27	0.04				
12.25	3.30	3.07	0.03				
12.50	3.57	3.33	0.01				
12.75	3.73	3.50	0.01				

POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 43

Summary for Pond 3P: DRY WELLS

Inflow Area = 0.141 ac, 100.00% Impervious, Inflow Depth > 4.98" for 10-Year event
 Inflow = 0.77 cfs @ 12.04 hrs, Volume= 0.059 af
 Outflow = 0.22 cfs @ 12.21 hrs, Volume= 0.059 af, Atten= 71%, Lag= 10.0 min
 Discarded = 0.22 cfs @ 12.21 hrs, Volume= 0.059 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 1.65' @ 12.21 hrs Surf.Area= 0.012 ac Storage= 0.009 af

Plug-Flow detention time= 9.5 min calculated for 0.059 af (100% of inflow)
 Center-of-Mass det. time= 9.4 min (752.4 - 743.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1.00'	0.009 af	24.0" Round Pipe Storage Inside #2 L= 130.0'
#2	0.00'	0.015 af	4.00'W x 130.00'L x 4.00'H Prismatic 0.048 af Overall - 0.009 af Embedded = 0.038 af x 40.0% Voids
		0.025 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	4.00'	8.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	10.000 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.22 cfs @ 12.21 hrs HW=1.65' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑ **1=Orifice/Grate** (Controls 0.00 cfs)

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

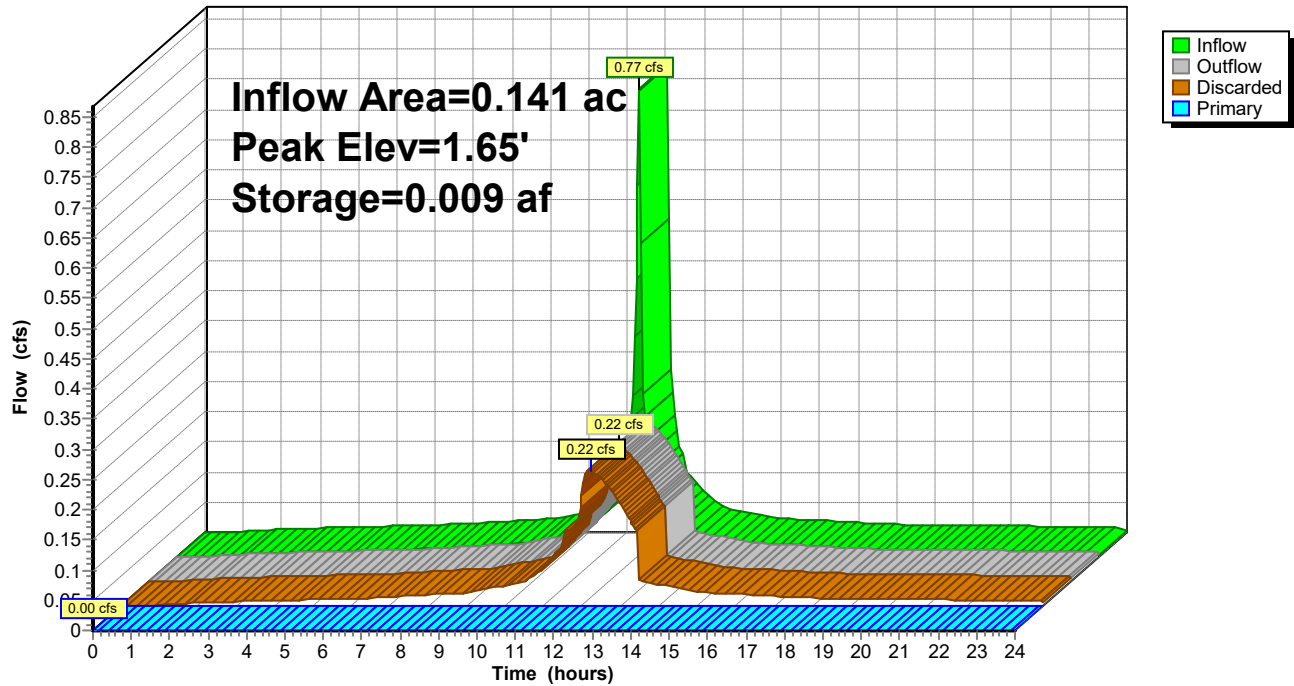
NOAA 24-hr D 10-Year Rainfall=5.22"

Printed 8/22/2023

Page 44

Pond 3P: DRY WELLS

Hydrograph



POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 45

Hydrograph for Pond 3P: DRY WELLS

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	0.00	0.00	0.00	0.00
0.50	0.00	0.000	0.00	0.00	0.00	0.00
1.00	0.00	0.000	0.00	0.00	0.00	0.00
1.50	0.00	0.000	0.00	0.00	0.00	0.00
2.00	0.00	0.000	0.00	0.00	0.00	0.00
2.50	0.01	0.000	0.00	0.01	0.01	0.00
3.00	0.01	0.000	0.00	0.01	0.01	0.00
3.50	0.01	0.000	0.00	0.01	0.01	0.00
4.00	0.01	0.000	0.00	0.01	0.01	0.00
4.50	0.01	0.000	0.00	0.01	0.01	0.00
5.00	0.01	0.000	0.00	0.01	0.01	0.00
5.50	0.01	0.000	0.00	0.01	0.01	0.00
6.00	0.01	0.000	0.00	0.01	0.01	0.00
6.50	0.01	0.000	0.01	0.01	0.01	0.00
7.00	0.02	0.000	0.01	0.02	0.02	0.00
7.50	0.02	0.000	0.01	0.02	0.02	0.00
8.00	0.02	0.000	0.01	0.02	0.02	0.00
8.50	0.02	0.000	0.01	0.02	0.02	0.00
9.00	0.02	0.000	0.01	0.02	0.02	0.00
9.50	0.03	0.000	0.01	0.03	0.03	0.00
10.00	0.03	0.000	0.01	0.03	0.03	0.00
10.50	0.04	0.000	0.02	0.04	0.04	0.00
11.00	0.06	0.000	0.02	0.06	0.06	0.00
11.50	0.12	0.000	0.04	0.11	0.11	0.00
12.00	0.62	0.005	0.99	0.18	0.18	0.00
12.50	0.12	0.008	1.46	0.21	0.21	0.00
13.00	0.07	0.004	0.75	0.17	0.17	0.00
13.50	0.04	0.000	0.02	0.04	0.04	0.00
14.00	0.04	0.000	0.01	0.04	0.04	0.00
14.50	0.03	0.000	0.01	0.03	0.03	0.00
15.00	0.02	0.000	0.01	0.02	0.02	0.00
15.50	0.02	0.000	0.01	0.02	0.02	0.00
16.00	0.02	0.000	0.01	0.02	0.02	0.00
16.50	0.02	0.000	0.01	0.02	0.02	0.00
17.00	0.02	0.000	0.01	0.02	0.02	0.00
17.50	0.01	0.000	0.01	0.01	0.01	0.00
18.00	0.01	0.000	0.01	0.01	0.01	0.00
18.50	0.01	0.000	0.00	0.01	0.01	0.00
19.00	0.01	0.000	0.00	0.01	0.01	0.00
19.50	0.01	0.000	0.00	0.01	0.01	0.00
20.00	0.01	0.000	0.00	0.01	0.01	0.00
20.50	0.01	0.000	0.00	0.01	0.01	0.00
21.00	0.01	0.000	0.00	0.01	0.01	0.00
21.50	0.01	0.000	0.00	0.01	0.01	0.00
22.00	0.01	0.000	0.00	0.01	0.01	0.00
22.50	0.01	0.000	0.00	0.01	0.01	0.00
23.00	0.01	0.000	0.00	0.01	0.01	0.00
23.50	0.01	0.000	0.00	0.01	0.01	0.00
24.00	0.00	0.000	0.00	0.01	0.01	0.00

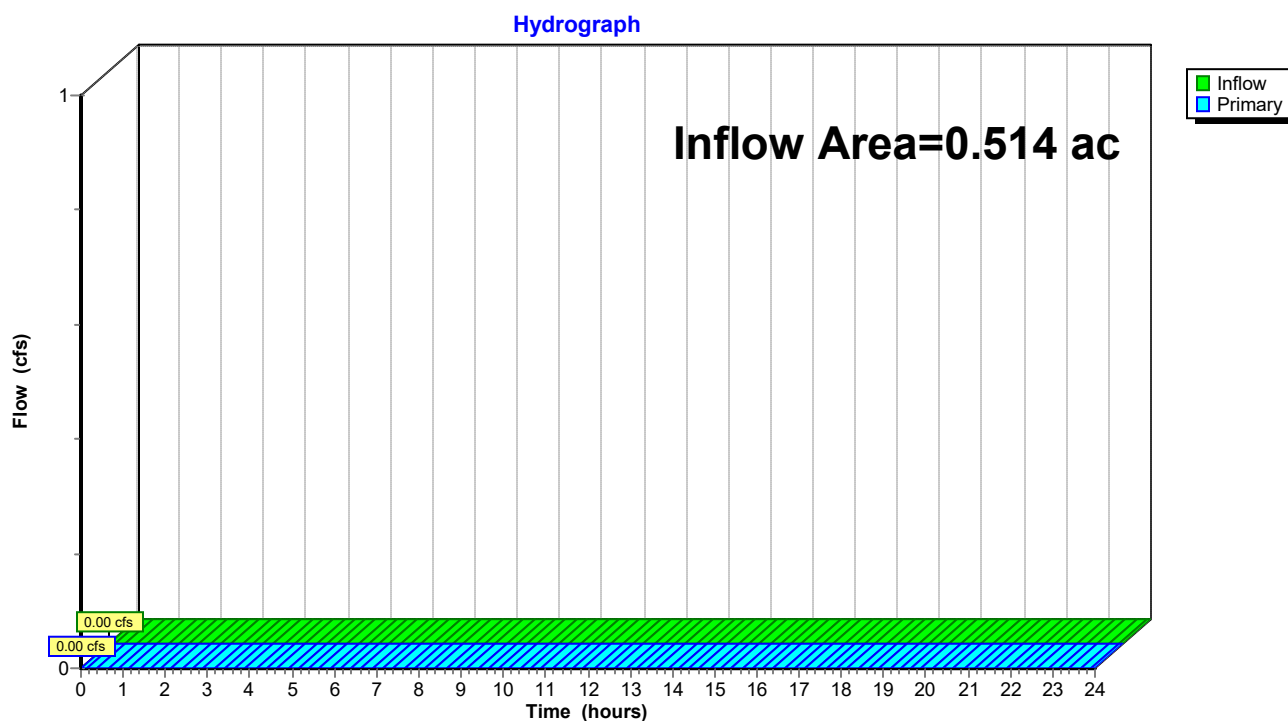
Summary for Pond 4P: TOTAL CART BARN AREA

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.514 ac, 45.44% Impervious, Inflow Depth = 0.00" for 10-Year event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 4P: TOTAL CART BARN AREA



POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 47

Hydrograph for Pond 4P: TOTAL CART BARN AREA

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00	13.00	0.00		0.00
0.25	0.00		0.00	13.25	0.00		0.00
0.50	0.00		0.00	13.50	0.00		0.00
0.75	0.00		0.00	13.75	0.00		0.00
1.00	0.00		0.00	14.00	0.00		0.00
1.25	0.00		0.00	14.25	0.00		0.00
1.50	0.00		0.00	14.50	0.00		0.00
1.75	0.00		0.00	14.75	0.00		0.00
2.00	0.00		0.00	15.00	0.00		0.00
2.25	0.00		0.00	15.25	0.00		0.00
2.50	0.00		0.00	15.50	0.00		0.00
2.75	0.00		0.00	15.75	0.00		0.00
3.00	0.00		0.00	16.00	0.00		0.00
3.25	0.00		0.00	16.25	0.00		0.00
3.50	0.00		0.00	16.50	0.00		0.00
3.75	0.00		0.00	16.75	0.00		0.00
4.00	0.00		0.00	17.00	0.00		0.00
4.25	0.00		0.00	17.25	0.00		0.00
4.50	0.00		0.00	17.50	0.00		0.00
4.75	0.00		0.00	17.75	0.00		0.00
5.00	0.00		0.00	18.00	0.00		0.00
5.25	0.00		0.00	18.25	0.00		0.00
5.50	0.00		0.00	18.50	0.00		0.00
5.75	0.00		0.00	18.75	0.00		0.00
6.00	0.00		0.00	19.00	0.00		0.00
6.25	0.00		0.00	19.25	0.00		0.00
6.50	0.00		0.00	19.50	0.00		0.00
6.75	0.00		0.00	19.75	0.00		0.00
7.00	0.00		0.00	20.00	0.00		0.00
7.25	0.00		0.00	20.25	0.00		0.00
7.50	0.00		0.00	20.50	0.00		0.00
7.75	0.00		0.00	20.75	0.00		0.00
8.00	0.00		0.00	21.00	0.00		0.00
8.25	0.00		0.00	21.25	0.00		0.00
8.50	0.00		0.00	21.50	0.00		0.00
8.75	0.00		0.00	21.75	0.00		0.00
9.00	0.00		0.00	22.00	0.00		0.00
9.25	0.00		0.00	22.25	0.00		0.00
9.50	0.00		0.00	22.50	0.00		0.00
9.75	0.00		0.00	22.75	0.00		0.00
10.00	0.00		0.00	23.00	0.00		0.00
10.25	0.00		0.00	23.25	0.00		0.00
10.50	0.00		0.00	23.50	0.00		0.00
10.75	0.00		0.00	23.75	0.00		0.00
11.00	0.00		0.00	24.00	0.00		0.00
11.25	0.00		0.00				
11.50	0.00		0.00				
11.75	0.00		0.00				
12.00	0.00		0.00				
12.25	0.00		0.00				
12.50	0.00		0.00				
12.75	0.00		0.00				

POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 48

Summary for Pond 6P: POROUS PAVEMENT

Inflow Area = 0.373 ac, 24.79% Impervious, Inflow Depth > 1.03" for 10-Year event
 Inflow = 0.45 cfs @ 12.09 hrs, Volume= 0.032 af
 Outflow = 0.44 cfs @ 12.10 hrs, Volume= 0.032 af, Atten= 2%, Lag= 0.4 min
 Discarded = 0.44 cfs @ 12.10 hrs, Volume= 0.032 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 0.01' @ 12.10 hrs Surf.Area= 0.069 ac Storage= 0.000 af

Plug-Flow detention time= 0.4 min calculated for 0.032 af (100% of inflow)
 Center-of-Mass det. time= 0.3 min (904.9 - 904.6)

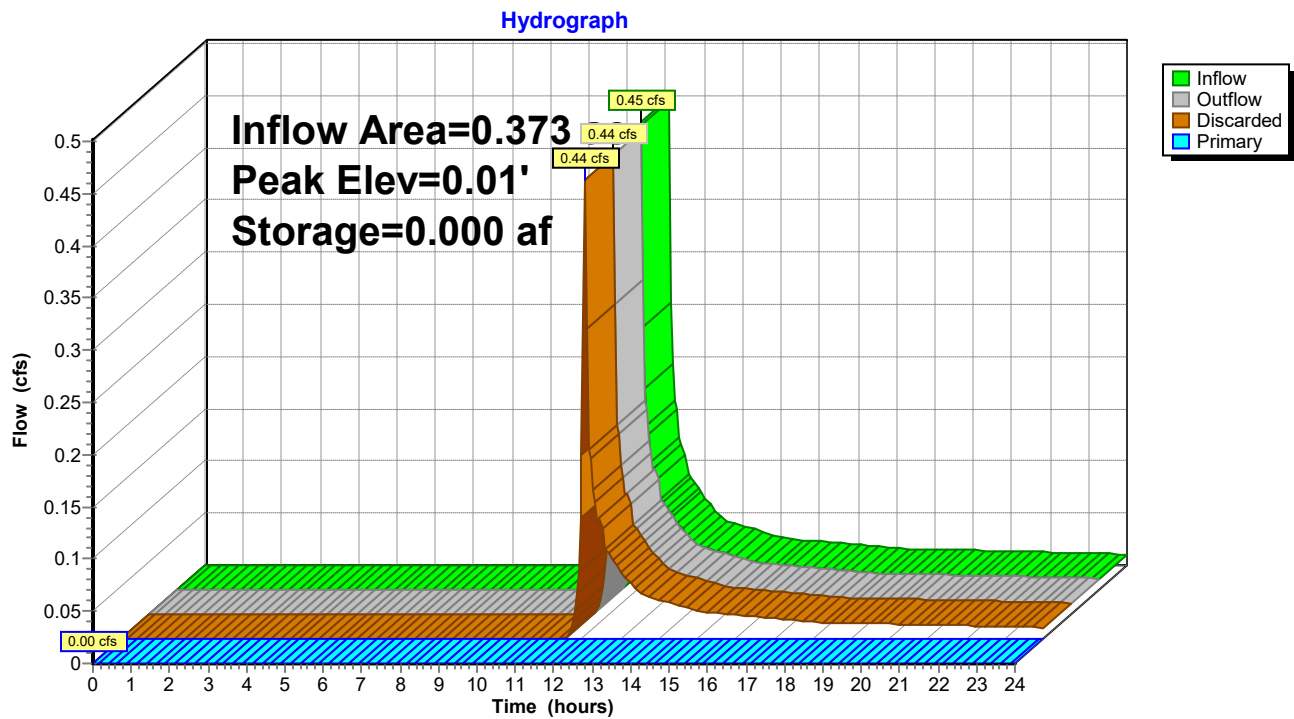
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.041 af	30.00'W x 100.00'L x 1.50'H Prismatic 0.103 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	10.000 in/hr Exfiltration over Horizontal area
#2	Primary	1.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.69 cfs @ 12.10 hrs HW=0.01' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.69 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 6P: POROUS PAVEMENT



POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 50

Hydrograph for Pond 6P: POROUS PAVEMENT

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	0.00	0.00	0.00	0.00
0.50	0.00	0.000	0.00	0.00	0.00	0.00
1.00	0.00	0.000	0.00	0.00	0.00	0.00
1.50	0.00	0.000	0.00	0.00	0.00	0.00
2.00	0.00	0.000	0.00	0.00	0.00	0.00
2.50	0.00	0.000	0.00	0.00	0.00	0.00
3.00	0.00	0.000	0.00	0.00	0.00	0.00
3.50	0.00	0.000	0.00	0.00	0.00	0.00
4.00	0.00	0.000	0.00	0.00	0.00	0.00
4.50	0.00	0.000	0.00	0.00	0.00	0.00
5.00	0.00	0.000	0.00	0.00	0.00	0.00
5.50	0.00	0.000	0.00	0.00	0.00	0.00
6.00	0.00	0.000	0.00	0.00	0.00	0.00
6.50	0.00	0.000	0.00	0.00	0.00	0.00
7.00	0.00	0.000	0.00	0.00	0.00	0.00
7.50	0.00	0.000	0.00	0.00	0.00	0.00
8.00	0.00	0.000	0.00	0.00	0.00	0.00
8.50	0.00	0.000	0.00	0.00	0.00	0.00
9.00	0.00	0.000	0.00	0.00	0.00	0.00
9.50	0.00	0.000	0.00	0.00	0.00	0.00
10.00	0.00	0.000	0.00	0.00	0.00	0.00
10.50	0.00	0.000	0.00	0.00	0.00	0.00
11.00	0.00	0.000	0.00	0.00	0.00	0.00
11.50	0.00	0.000	0.00	0.00	0.00	0.00
12.00	0.18	0.000	0.00	0.18	0.18	0.00
12.50	0.11	0.000	0.00	0.11	0.11	0.00
13.00	0.07	0.000	0.00	0.07	0.07	0.00
13.50	0.05	0.000	0.00	0.05	0.05	0.00
14.00	0.04	0.000	0.00	0.04	0.04	0.00
14.50	0.03	0.000	0.00	0.03	0.03	0.00
15.00	0.03	0.000	0.00	0.03	0.03	0.00
15.50	0.02	0.000	0.00	0.02	0.02	0.00
16.00	0.02	0.000	0.00	0.02	0.02	0.00
16.50	0.02	0.000	0.00	0.02	0.02	0.00
17.00	0.02	0.000	0.00	0.02	0.02	0.00
17.50	0.02	0.000	0.00	0.02	0.02	0.00
18.00	0.02	0.000	0.00	0.02	0.02	0.00
18.50	0.02	0.000	0.00	0.02	0.02	0.00
19.00	0.02	0.000	0.00	0.02	0.02	0.00
19.50	0.01	0.000	0.00	0.01	0.01	0.00
20.00	0.01	0.000	0.00	0.01	0.01	0.00
20.50	0.01	0.000	0.00	0.01	0.01	0.00
21.00	0.01	0.000	0.00	0.01	0.01	0.00
21.50	0.01	0.000	0.00	0.01	0.01	0.00
22.00	0.01	0.000	0.00	0.01	0.01	0.00
22.50	0.01	0.000	0.00	0.01	0.01	0.00
23.00	0.01	0.000	0.00	0.01	0.01	0.00
23.50	0.01	0.000	0.00	0.01	0.01	0.00
24.00	0.01	0.000	0.00	0.01	0.01	0.00

POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 51

Summary for Pond 7P: PARKING BIO-RETENTION

[93] Warning: Storage range exceeded by 1.27'

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=9)

Inflow Area = 0.430 ac, 93.38% Impervious, Inflow Depth > 4.87" for 10-Year event
 Inflow = 2.34 cfs @ 12.07 hrs, Volume= 0.174 af
 Outflow = 1.00 cfs @ 12.25 hrs, Volume= 0.174 af, Atten= 57%, Lag= 10.6 min
 Discarded = 0.14 cfs @ 10.75 hrs, Volume= 0.159 af
 Primary = 0.86 cfs @ 12.25 hrs, Volume= 0.016 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 4.27' @ 12.25 hrs Surf.Area= 1,240 sf Storage= 2,232 cf

Plug-Flow detention time= 102.2 min calculated for 0.174 af (100% of inflow)
 Center-of-Mass det. time= 101.7 min (854.2 - 752.5)

Volume	Invert	Avail.Storage	Storage Description	
#1	0.00'	2,232 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	1,240	0.0	0	0
2.00	1,240	40.0	992	992
2.01	1,240	100.0	12	1,004
3.00	1,240	100.0	1,228	2,232

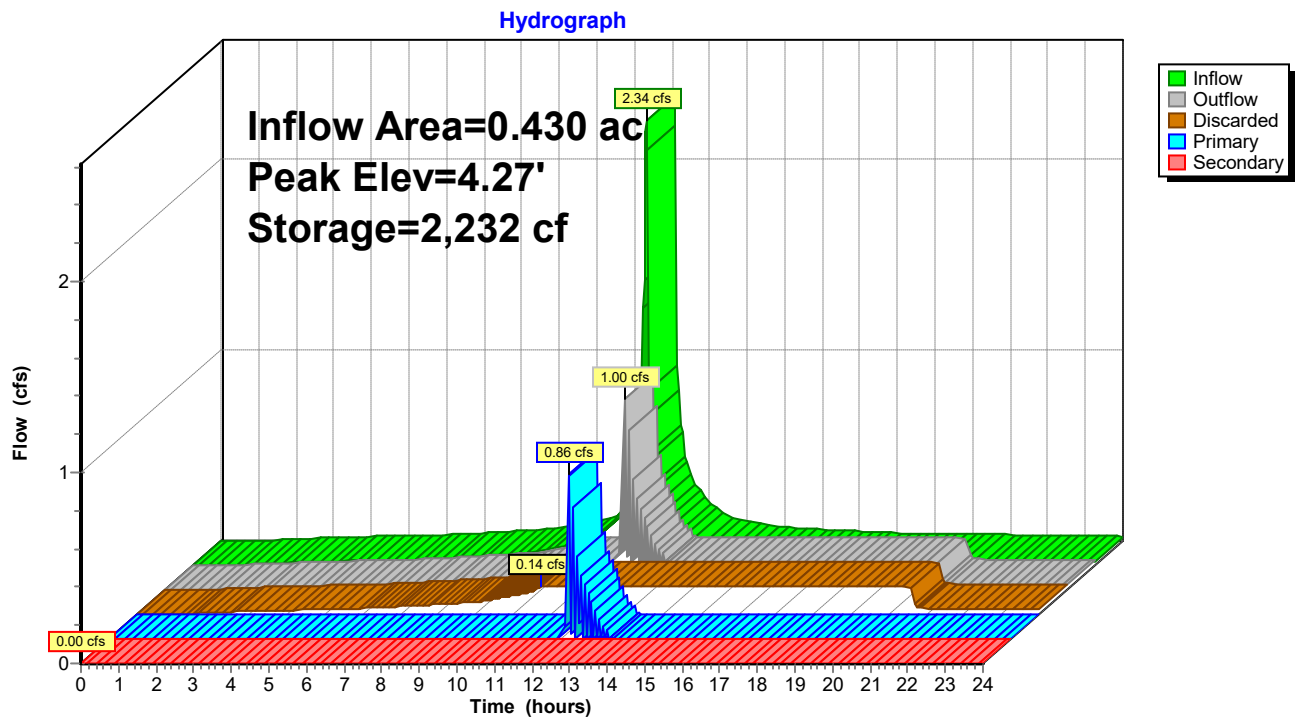
Device	Routing	Invert	Outlet Devices	
#1	Primary	4.00'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads	
#2	Secondary	4.50'	100.0' long x 0.5' breadth Broad-Crested Rectangular Weir	
			Head (feet) 0.20 0.40 0.60 0.80 1.00	
			Coef. (English) 2.80 2.92 3.08 3.30 3.32	
#3	Discarded	0.00'	5.000 in/hr Exfiltration over Surface area	

Discarded OutFlow Max=0.14 cfs @ 10.75 hrs HW=0.05' (Free Discharge)
 ↑ **3=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.85 cfs @ 12.25 hrs HW=4.25' (Free Discharge)
 ↑ **1=Orifice/Grate** (Orifice Controls 0.85 cfs @ 2.43 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: PARKING BIO-RETENTION



POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 53

Hydrograph for Pond 7P: PARKING BIO-RETENTION

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	0.00	0.00	0.00	0.00	0.00
0.50	0.00	0	0.00	0.00	0.00	0.00	0.00
1.00	0.00	0	0.00	0.00	0.00	0.00	0.00
1.50	0.00	1	0.00	0.00	0.00	0.00	0.00
2.00	0.01	1	0.00	0.01	0.01	0.00	0.00
2.50	0.01	2	0.00	0.01	0.01	0.00	0.00
3.00	0.02	3	0.01	0.02	0.02	0.00	0.00
3.50	0.02	3	0.01	0.02	0.02	0.00	0.00
4.00	0.02	3	0.01	0.02	0.02	0.00	0.00
4.50	0.02	4	0.01	0.02	0.02	0.00	0.00
5.00	0.03	4	0.01	0.03	0.03	0.00	0.00
5.50	0.03	5	0.01	0.03	0.03	0.00	0.00
6.00	0.03	5	0.01	0.03	0.03	0.00	0.00
6.50	0.04	6	0.01	0.04	0.04	0.00	0.00
7.00	0.04	7	0.01	0.04	0.04	0.00	0.00
7.50	0.05	7	0.01	0.05	0.05	0.00	0.00
8.00	0.05	8	0.02	0.05	0.05	0.00	0.00
8.50	0.06	9	0.02	0.06	0.06	0.00	0.00
9.00	0.06	10	0.02	0.06	0.06	0.00	0.00
9.50	0.08	13	0.03	0.08	0.08	0.00	0.00
10.00	0.10	15	0.03	0.10	0.10	0.00	0.00
10.50	0.12	18	0.04	0.12	0.12	0.00	0.00
11.00	0.18	47	0.09	0.14	0.14	0.00	0.00
11.50	0.31	230	0.46	0.14	0.14	0.00	0.00
12.00	1.50	1,185	2.16	0.14	0.14	0.00	0.00
12.50	0.40	2,232	4.05	0.23	0.14	0.08	0.00
13.00	0.21	2,231	3.00	0.14	0.14	0.00	0.00
13.50	0.13	2,230	3.00	0.14	0.14	0.00	0.00
14.00	0.11	2,183	2.96	0.14	0.14	0.00	0.00
14.50	0.09	2,103	2.90	0.14	0.14	0.00	0.00
15.00	0.07	1,990	2.81	0.14	0.14	0.00	0.00
15.50	0.07	1,855	2.70	0.14	0.14	0.00	0.00
16.00	0.06	1,709	2.58	0.14	0.14	0.00	0.00
16.50	0.06	1,555	2.45	0.14	0.14	0.00	0.00
17.00	0.05	1,392	2.32	0.14	0.14	0.00	0.00
17.50	0.05	1,220	2.18	0.14	0.14	0.00	0.00
18.00	0.04	1,038	2.04	0.14	0.14	0.00	0.00
18.50	0.04	850	1.71	0.14	0.14	0.00	0.00
19.00	0.04	660	1.33	0.14	0.14	0.00	0.00
19.50	0.04	468	0.94	0.14	0.14	0.00	0.00
20.00	0.03	273	0.55	0.14	0.14	0.00	0.00
20.50	0.03	76	0.15	0.14	0.14	0.00	0.00
21.00	0.03	5	0.01	0.03	0.03	0.00	0.00
21.50	0.03	5	0.01	0.03	0.03	0.00	0.00
22.00	0.03	5	0.01	0.03	0.03	0.00	0.00
22.50	0.03	4	0.01	0.03	0.03	0.00	0.00
23.00	0.03	4	0.01	0.03	0.03	0.00	0.00
23.50	0.03	4	0.01	0.03	0.03	0.00	0.00
24.00	0.02	4	0.01	0.02	0.02	0.00	0.00

POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 54

Summary for Pond 11P: DRY WELLS

Inflow Area = 0.014 ac, 100.00% Impervious, Inflow Depth > 4.98" for 10-Year event
 Inflow = 0.07 cfs @ 12.11 hrs, Volume= 0.006 af
 Outflow = 0.02 cfs @ 11.95 hrs, Volume= 0.006 af, Atten= 65%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 11.95 hrs, Volume= 0.006 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 0.57' @ 12.28 hrs Surf.Area= 0.002 ac Storage= 0.001 af

Plug-Flow detention time= 5.1 min calculated for 0.006 af (100% of inflow)
 Center-of-Mass det. time= 4.9 min (752.0 - 747.1)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.001 af	4.00'W x 4.00'L x 4.00'H Prismatic
#2	0.00'	0.002 af	3.00'W x 30.00'L x 3.00'H Prismatic
			0.006 af Overall - 0.001 af Embedded = 0.006 af x 40.0% Voids
#3	1.00'	0.001 af	12.0" Round Pipe Storage Inside #2
			L= 35.0'
		0.004 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	10.000 in/hr Exfiltration over Horizontal area
#2	Primary	4.00'	48.0" x 24.0" Horiz. Orifice/Grate C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 11.95 hrs HW=0.05' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

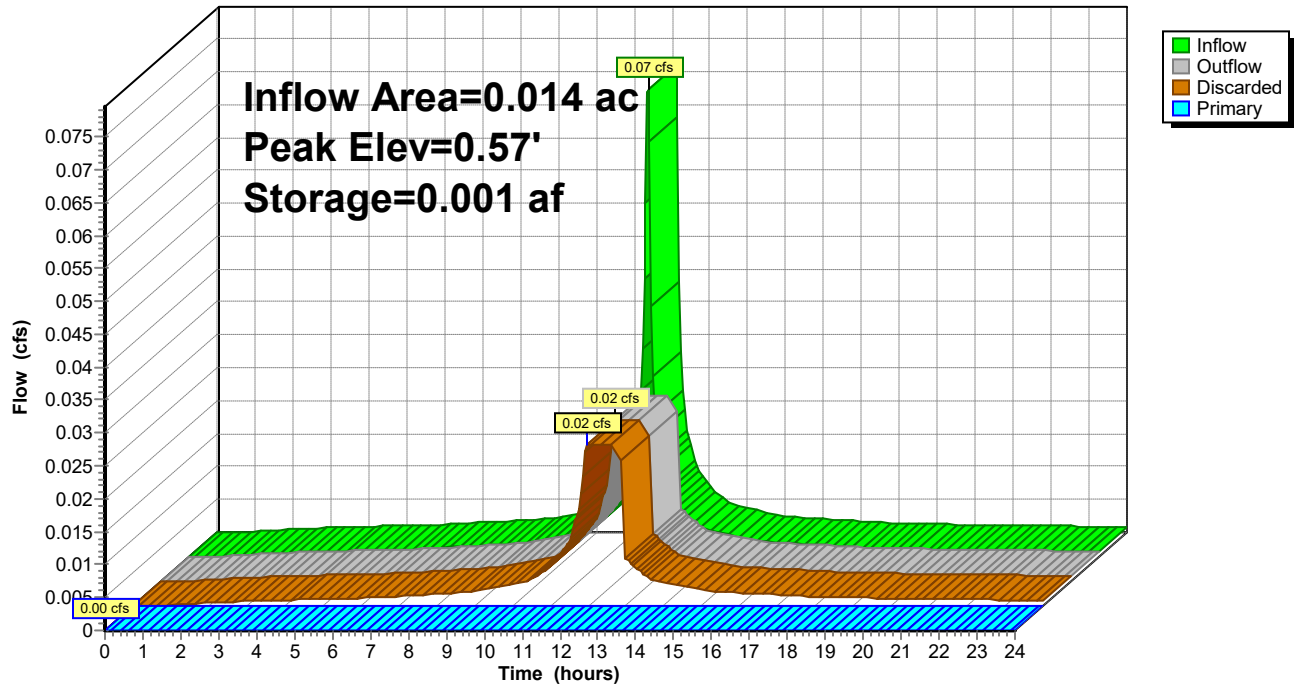
NOAA 24-hr D 10-Year Rainfall=5.22"

Printed 8/22/2023

Page 55

Pond 11P: DRY WELLS

Hydrograph



POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 56

Hydrograph for Pond 11P: DRY WELLS

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	0.00	0.00	0.00	0.00
0.50	0.00	0.000	0.00	0.00	0.00	0.00
1.00	0.00	0.000	0.00	0.00	0.00	0.00
1.50	0.00	0.000	0.00	0.00	0.00	0.00
2.00	0.00	0.000	0.00	0.00	0.00	0.00
2.50	0.00	0.000	0.00	0.00	0.00	0.00
3.00	0.00	0.000	0.00	0.00	0.00	0.00
3.50	0.00	0.000	0.00	0.00	0.00	0.00
4.00	0.00	0.000	0.00	0.00	0.00	0.00
4.50	0.00	0.000	0.00	0.00	0.00	0.00
5.00	0.00	0.000	0.00	0.00	0.00	0.00
5.50	0.00	0.000	0.00	0.00	0.00	0.00
6.00	0.00	0.000	0.00	0.00	0.00	0.00
6.50	0.00	0.000	0.00	0.00	0.00	0.00
7.00	0.00	0.000	0.00	0.00	0.00	0.00
7.50	0.00	0.000	0.00	0.00	0.00	0.00
8.00	0.00	0.000	0.00	0.00	0.00	0.00
8.50	0.00	0.000	0.00	0.00	0.00	0.00
9.00	0.00	0.000	0.00	0.00	0.00	0.00
9.50	0.00	0.000	0.00	0.00	0.00	0.00
10.00	0.00	0.000	0.01	0.00	0.00	0.00
10.50	0.00	0.000	0.01	0.00	0.00	0.00
11.00	0.01	0.000	0.01	0.01	0.01	0.00
11.50	0.01	0.000	0.02	0.01	0.01	0.00
12.00	0.04	0.000	0.10	0.02	0.02	0.00
12.50	0.01	0.001	0.46	0.02	0.02	0.00
13.00	0.01	0.000	0.01	0.01	0.01	0.00
13.50	0.00	0.000	0.01	0.00	0.00	0.00
14.00	0.00	0.000	0.01	0.00	0.00	0.00
14.50	0.00	0.000	0.01	0.00	0.00	0.00
15.00	0.00	0.000	0.00	0.00	0.00	0.00
15.50	0.00	0.000	0.00	0.00	0.00	0.00
16.00	0.00	0.000	0.00	0.00	0.00	0.00
16.50	0.00	0.000	0.00	0.00	0.00	0.00
17.00	0.00	0.000	0.00	0.00	0.00	0.00
17.50	0.00	0.000	0.00	0.00	0.00	0.00
18.00	0.00	0.000	0.00	0.00	0.00	0.00
18.50	0.00	0.000	0.00	0.00	0.00	0.00
19.00	0.00	0.000	0.00	0.00	0.00	0.00
19.50	0.00	0.000	0.00	0.00	0.00	0.00
20.00	0.00	0.000	0.00	0.00	0.00	0.00
20.50	0.00	0.000	0.00	0.00	0.00	0.00
21.00	0.00	0.000	0.00	0.00	0.00	0.00
21.50	0.00	0.000	0.00	0.00	0.00	0.00
22.00	0.00	0.000	0.00	0.00	0.00	0.00
22.50	0.00	0.000	0.00	0.00	0.00	0.00
23.00	0.00	0.000	0.00	0.00	0.00	0.00
23.50	0.00	0.000	0.00	0.00	0.00	0.00
24.00	0.00	0.000	0.00	0.00	0.00	0.00

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 10-Year Rainfall=5.22"

Printed 8/22/2023

Page 57

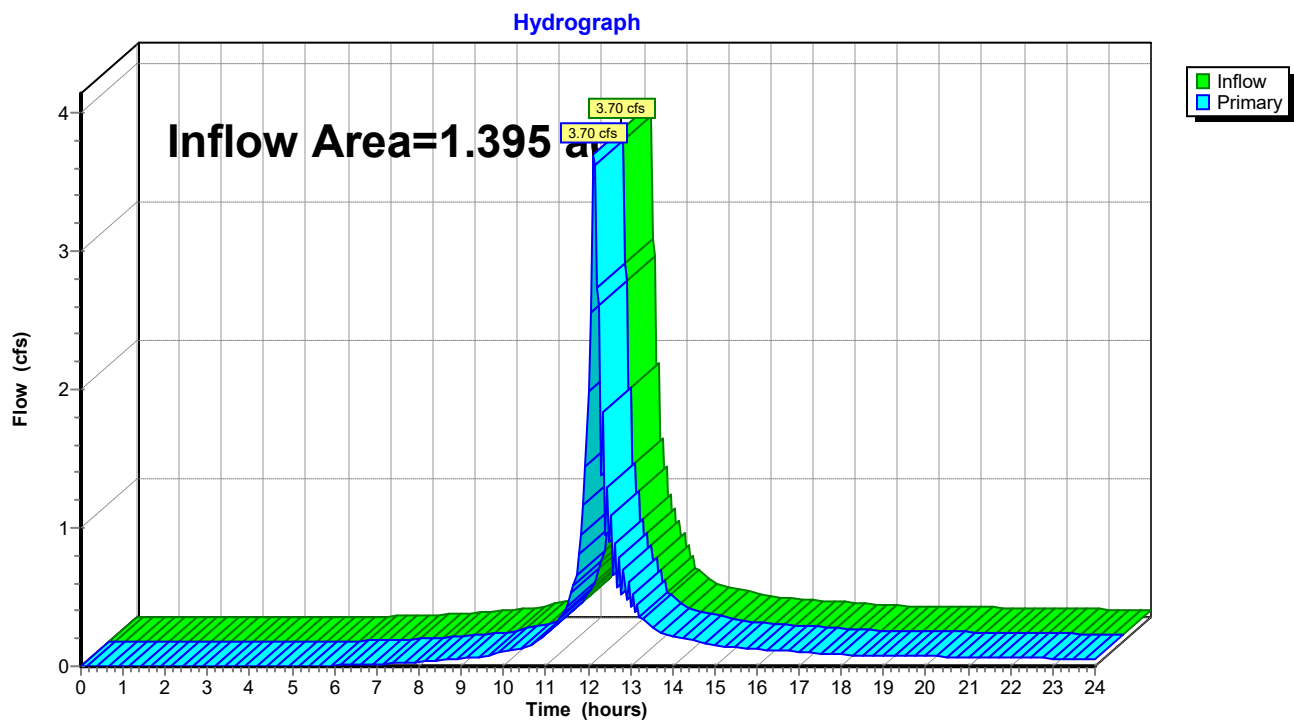
Summary for Pond 12P: TOTAL PARKING LOT

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.395 ac, 81.36% Impervious, Inflow Depth > 2.53" for 10-Year event
Inflow = 3.70 cfs @ 12.13 hrs, Volume= 0.294 af
Primary = 3.70 cfs @ 12.13 hrs, Volume= 0.294 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 12P: TOTAL PARKING LOT



POST

NOAA 24-hr D 10-Year Rainfall=5.22"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 58

Hydrograph for Pond 12P: TOTAL PARKING LOT

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00	13.00	0.43		0.43
0.25	0.00		0.00	13.25	0.39		0.39
0.50	0.00		0.00	13.50	0.28		0.28
0.75	0.00		0.00	13.75	0.24		0.24
1.00	0.00		0.00	14.00	0.22		0.22
1.25	0.00		0.00	14.25	0.20		0.20
1.50	0.00		0.00	14.50	0.19		0.19
1.75	0.00		0.00	14.75	0.17		0.17
2.00	0.00		0.00	15.00	0.15		0.15
2.25	0.00		0.00	15.25	0.14		0.14
2.50	0.00		0.00	15.50	0.13		0.13
2.75	0.00		0.00	15.75	0.13		0.13
3.00	0.00		0.00	16.00	0.12		0.12
3.25	0.00		0.00	16.25	0.12		0.12
3.50	0.00		0.00	16.50	0.11		0.11
3.75	0.00		0.00	16.75	0.11		0.11
4.00	0.00		0.00	17.00	0.10		0.10
4.25	0.00		0.00	17.25	0.10		0.10
4.50	0.00		0.00	17.50	0.09		0.09
4.75	0.00		0.00	17.75	0.09		0.09
5.00	0.00		0.00	18.00	0.08		0.08
5.25	0.00		0.00	18.25	0.08		0.08
5.50	0.00		0.00	18.50	0.08		0.08
5.75	0.00		0.00	18.75	0.08		0.08
6.00	0.01		0.01	19.00	0.08		0.08
6.25	0.01		0.01	19.25	0.08		0.08
6.50	0.01		0.01	19.50	0.07		0.07
6.75	0.01		0.01	19.75	0.07		0.07
7.00	0.02		0.02	20.00	0.07		0.07
7.25	0.02		0.02	20.25	0.07		0.07
7.50	0.02		0.02	20.50	0.07		0.07
7.75	0.03		0.03	20.75	0.07		0.07
8.00	0.03		0.03	21.00	0.07		0.07
8.25	0.04		0.04	21.25	0.07		0.07
8.50	0.04		0.04	21.50	0.06		0.06
8.75	0.05		0.05	21.75	0.06		0.06
9.00	0.05		0.05	22.00	0.06		0.06
9.25	0.06		0.06	22.25	0.06		0.06
9.50	0.07		0.07	22.50	0.06		0.06
9.75	0.09		0.09	22.75	0.06		0.06
10.00	0.10		0.10	23.00	0.06		0.06
10.25	0.12		0.12	23.25	0.06		0.06
10.50	0.13		0.13	23.50	0.05		0.05
10.75	0.17		0.17	23.75	0.05		0.05
11.00	0.23		0.23	24.00	0.05		0.05
11.25	0.31		0.31				
11.50	0.41		0.41				
11.75	0.69		0.69				
12.00	1.99		1.99				
12.25	2.61		2.61				
12.50	0.89		0.89				
12.75	0.78		0.78				

POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 59

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CART BUILDING Runoff Area=6,144 sf 100.00% Impervious Runoff Depth>8.42"
Tc=0.0 min CN=98 Runoff=1.29 cfs 0.099 af

Subcatchment 2S: CART BUILDING SITE Runoff Area=16,229 sf 24.79% Impervious Runoff Depth>3.13"
Flow Length=50' Slope=0.2000 '/' Tc=2.2 min CN=54 Runoff=1.54 cfs 0.097 af

Subcatchment 5S: PARKING LOT AREA Runoff Area=18,743 sf 93.38% Impervious Runoff Depth>8.30"
Flow Length=283' Slope=0.0500 '/' Tc=1.5 min CN=97 Runoff=3.91 cfs 0.298 af

Subcatchment 8S: OTHER PARKING LOT Runoff Area=42,005 sf 76.00% Impervious Runoff Depth>6.72"
Flow Length=597' Tc=6.0 min CN=84 Runoff=6.98 cfs 0.540 af

Subcatchment 9S: COMFORT STATION Runoff Area=620 sf 100.00% Impervious Runoff Depth>8.41"
Flow Length=44' Slope=0.0200 '/' Tc=4.9 min CN=98 Runoff=0.12 cfs 0.010 af

Pond 3P: DRY WELLS Peak Elev=3.03' Storage=0.020 af Inflow=1.29 cfs 0.099 af
Discarded=0.31 cfs 0.099 af Primary=0.00 cfs 0.000 af Outflow=0.31 cfs 0.099 af

Pond 4P: TOTAL CART BARN AREA Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond 6P: POROUS PAVEMENT Peak Elev=0.25' Storage=0.007 af Inflow=1.54 cfs 0.097 af
Discarded=0.69 cfs 0.097 af Primary=0.00 cfs 0.000 af Outflow=0.69 cfs 0.097 af

Pond 7P: PARKING BIO-RETENTION Peak Elev=4.74' Storage=2,232 cf Inflow=3.91 cfs 0.298 af
Discarded=0.14 cfs 0.208 af Primary=1.39 cfs 0.053 af Secondary=4.03 cfs 0.037 af Outflow=5.47 cfs 0.297 af

Pond 11P: DRY WELLS Peak Elev=1.40' Storage=0.002 af Inflow=0.12 cfs 0.010 af
Discarded=0.02 cfs 0.010 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.010 af

Pond 12P: TOTAL PARKING LOT Inflow=11.91 cfs 0.630 af
Primary=11.91 cfs 0.630 af

Total Runoff Area = 1.922 ac Runoff Volume = 1.044 af Average Runoff Depth = 6.52"
28.10% Pervious = 0.540 ac 71.90% Impervious = 1.382 ac

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 100-Year Rainfall=8.66"

Printed 8/22/2023

Page 60

Summary for Subcatchment 1S: CART BUILDING

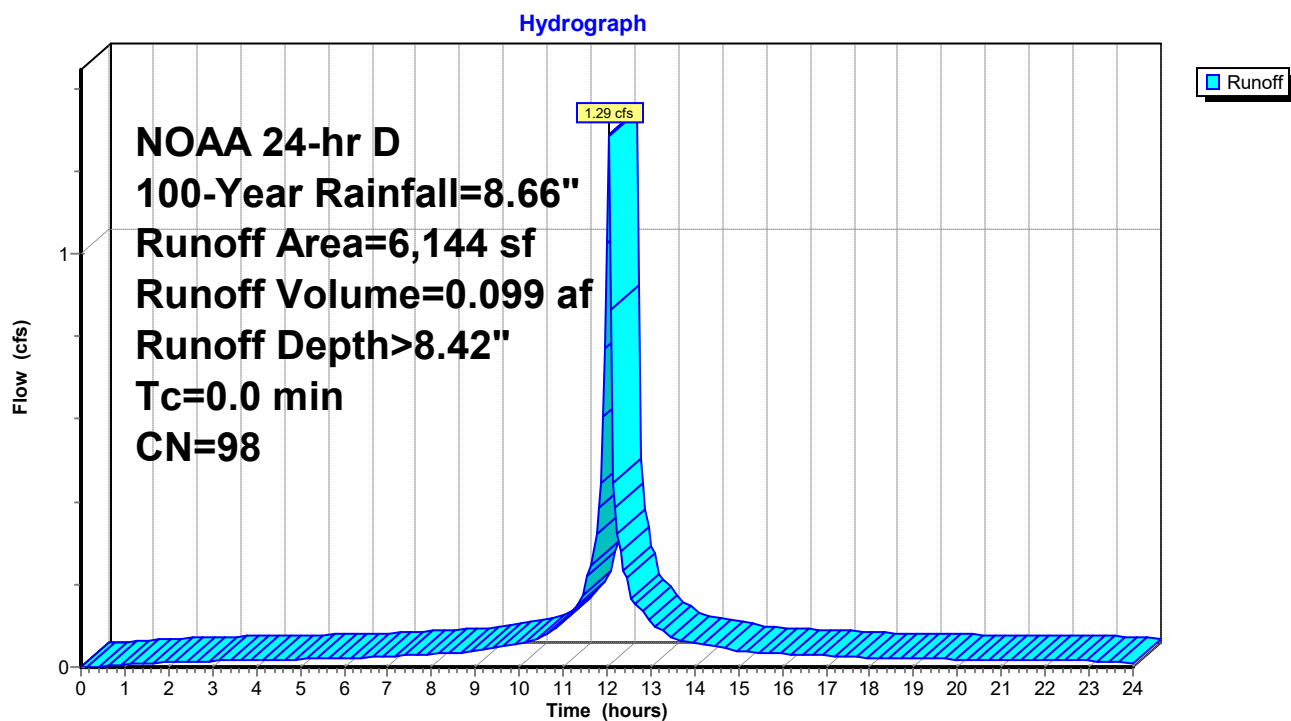
[46] Hint: $T_c=0$ (Instant runoff peak depends on dt)

Runoff = 1.29 cfs @ 12.04 hrs, Volume= 0.099 af, Depth> 8.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 100-Year Rainfall=8.66"

	Area (sf)	CN	Description
*	6,144	98	CART BUILDING
	6,144		100.00% Impervious Area

Subcatchment 1S: CART BUILDING



POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 61

Hydrograph for Subcatchment 1S: CART BUILDING

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	6.41	6.17	0.11
0.25	0.02	0.00	0.00	13.25	6.58	6.34	0.09
0.50	0.05	0.00	0.00	13.50	6.72	6.48	0.07
0.75	0.07	0.00	0.00	13.75	6.84	6.60	0.06
1.00	0.10	0.01	0.01	14.00	6.94	6.70	0.06
1.25	0.13	0.02	0.01	14.25	7.04	6.80	0.05
1.50	0.15	0.04	0.01	14.50	7.13	6.89	0.05
1.75	0.18	0.06	0.01	14.75	7.21	6.97	0.04
2.00	0.21	0.08	0.01	15.00	7.29	7.05	0.04
2.25	0.24	0.10	0.01	15.25	7.35	7.11	0.04
2.50	0.27	0.12	0.01	15.50	7.42	7.18	0.04
2.75	0.30	0.14	0.01	15.75	7.48	7.24	0.03
3.00	0.33	0.17	0.01	16.00	7.54	7.30	0.03
3.25	0.36	0.19	0.02	16.25	7.59	7.35	0.03
3.50	0.39	0.22	0.02	16.50	7.65	7.41	0.03
3.75	0.42	0.25	0.02	16.75	7.70	7.46	0.03
4.00	0.45	0.28	0.02	17.00	7.75	7.51	0.03
4.25	0.49	0.31	0.02	17.25	7.79	7.55	0.03
4.50	0.52	0.34	0.02	17.50	7.84	7.60	0.02
4.75	0.56	0.37	0.02	17.75	7.88	7.64	0.02
5.00	0.59	0.40	0.02	18.00	7.92	7.68	0.02
5.25	0.63	0.44	0.02	18.25	7.96	7.72	0.02
5.50	0.66	0.47	0.02	18.50	8.00	7.76	0.02
5.75	0.70	0.50	0.02	18.75	8.03	7.79	0.02
6.00	0.74	0.54	0.02	19.00	8.07	7.83	0.02
6.25	0.78	0.58	0.02	19.25	8.10	7.86	0.02
6.50	0.82	0.62	0.02	19.50	8.14	7.90	0.02
6.75	0.87	0.66	0.02	19.75	8.17	7.93	0.02
7.00	0.91	0.71	0.03	20.00	8.21	7.97	0.02
7.25	0.96	0.75	0.03	20.25	8.24	8.00	0.02
7.50	1.01	0.80	0.03	20.50	8.27	8.03	0.02
7.75	1.07	0.86	0.03	20.75	8.30	8.06	0.02
8.00	1.12	0.91	0.03	21.00	8.33	8.09	0.02
8.25	1.18	0.97	0.03	21.25	8.36	8.12	0.02
8.50	1.24	1.03	0.03	21.50	8.39	8.15	0.02
8.75	1.31	1.09	0.04	21.75	8.42	8.18	0.02
9.00	1.37	1.16	0.04	22.00	8.45	8.21	0.02
9.25	1.45	1.23	0.04	22.25	8.48	8.24	0.02
9.50	1.53	1.31	0.05	22.50	8.51	8.27	0.02
9.75	1.62	1.40	0.05	22.75	8.53	8.29	0.02
10.00	1.72	1.49	0.06	23.00	8.56	8.32	0.01
10.25	1.82	1.60	0.06	23.25	8.59	8.35	0.01
10.50	1.94	1.71	0.07	23.50	8.61	8.37	0.01
10.75	2.08	1.85	0.09	23.75	8.64	8.40	0.01
11.00	2.25	2.02	0.11	24.00	8.66	8.42	0.01
11.25	2.47	2.24	0.14				
11.50	2.75	2.51	0.19				
11.75	3.18	2.95	0.32				
12.00	4.15	3.91	1.03				
12.25	5.48	5.24	0.32				
12.50	5.91	5.68	0.19				
12.75	6.19	5.95	0.14				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 100-Year Rainfall=8.66"

Printed 8/22/2023

Page 62

Summary for Subcatchment 2S: CART BUILDING SITE

[49] Hint: $T_c < 2dt$ may require smaller dt

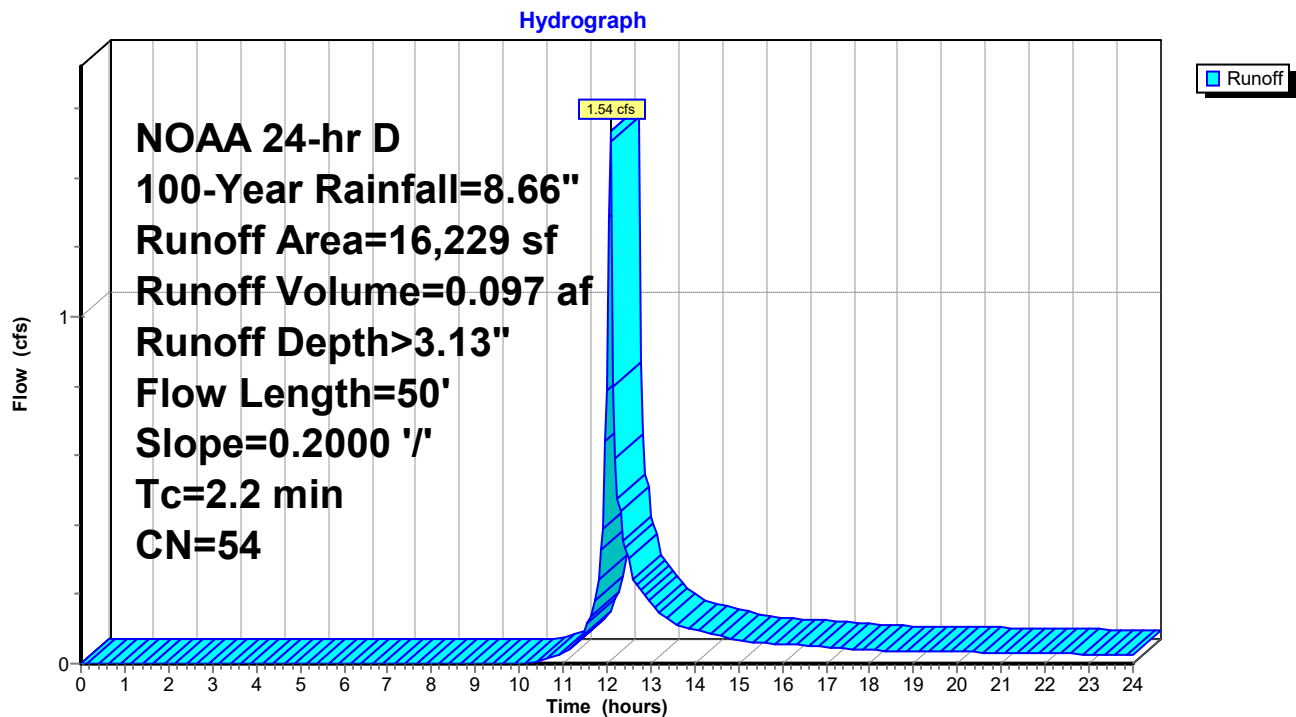
Runoff = 1.54 cfs @ 12.09 hrs, Volume= 0.097 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 100-Year Rainfall=8.66"

	Area (sf)	CN	Description
*	2,842	98	CONCRETE
*	1,181	98	CART PATH
	12,206	39	>75% Grass cover, Good, HSG A
	16,229	54	Weighted Average
	12,206		75.21% Pervious Area
	4,023		24.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	50	0.2000	0.39		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"

Subcatchment 2S: CART BUILDING SITE



POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 63

Hydrograph for Subcatchment 2S: CART BUILDING SITE

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	6.41	1.67	0.18
0.25	0.02	0.00	0.00	13.25	6.58	1.78	0.14
0.50	0.05	0.00	0.00	13.50	6.72	1.86	0.12
0.75	0.07	0.00	0.00	13.75	6.84	1.93	0.10
1.00	0.10	0.00	0.00	14.00	6.94	2.00	0.10
1.25	0.13	0.00	0.00	14.25	7.04	2.06	0.09
1.50	0.15	0.00	0.00	14.50	7.13	2.11	0.08
1.75	0.18	0.00	0.00	14.75	7.21	2.16	0.07
2.00	0.21	0.00	0.00	15.00	7.29	2.21	0.07
2.25	0.24	0.00	0.00	15.25	7.35	2.25	0.06
2.50	0.27	0.00	0.00	15.50	7.42	2.29	0.06
2.75	0.30	0.00	0.00	15.75	7.48	2.33	0.06
3.00	0.33	0.00	0.00	16.00	7.54	2.37	0.06
3.25	0.36	0.00	0.00	16.25	7.59	2.41	0.05
3.50	0.39	0.00	0.00	16.50	7.65	2.44	0.05
3.75	0.42	0.00	0.00	16.75	7.70	2.48	0.05
4.00	0.45	0.00	0.00	17.00	7.75	2.51	0.05
4.25	0.49	0.00	0.00	17.25	7.79	2.54	0.05
4.50	0.52	0.00	0.00	17.50	7.84	2.57	0.04
4.75	0.56	0.00	0.00	17.75	7.88	2.60	0.04
5.00	0.59	0.00	0.00	18.00	7.92	2.62	0.04
5.25	0.63	0.00	0.00	18.25	7.96	2.65	0.04
5.50	0.66	0.00	0.00	18.50	8.00	2.67	0.04
5.75	0.70	0.00	0.00	18.75	8.03	2.70	0.04
6.00	0.74	0.00	0.00	19.00	8.07	2.72	0.04
6.25	0.78	0.00	0.00	19.25	8.10	2.75	0.04
6.50	0.82	0.00	0.00	19.50	8.14	2.77	0.04
6.75	0.87	0.00	0.00	19.75	8.17	2.79	0.03
7.00	0.91	0.00	0.00	20.00	8.21	2.81	0.03
7.25	0.96	0.00	0.00	20.25	8.24	2.84	0.03
7.50	1.01	0.00	0.00	20.50	8.27	2.86	0.03
7.75	1.07	0.00	0.00	20.75	8.30	2.88	0.03
8.00	1.12	0.00	0.00	21.00	8.33	2.90	0.03
8.25	1.18	0.00	0.00	21.25	8.36	2.92	0.03
8.50	1.24	0.00	0.00	21.50	8.39	2.94	0.03
8.75	1.31	0.00	0.00	21.75	8.42	2.96	0.03
9.00	1.37	0.00	0.00	22.00	8.45	2.98	0.03
9.25	1.45	0.00	0.00	22.25	8.48	3.00	0.03
9.50	1.53	0.00	0.00	22.50	8.51	3.02	0.03
9.75	1.62	0.00	0.00	22.75	8.53	3.04	0.03
10.00	1.72	0.00	0.00	23.00	8.56	3.06	0.03
10.25	1.82	0.00	0.00	23.25	8.59	3.08	0.03
10.50	1.94	0.01	0.01	23.50	8.61	3.09	0.03
10.75	2.08	0.02	0.02	23.75	8.64	3.11	0.03
11.00	2.25	0.03	0.03	24.00	8.66	3.13	0.02
11.25	2.47	0.06	0.06				
11.50	2.75	0.11	0.09				
11.75	3.18	0.22	0.21				
12.00	4.15	0.55	0.79				
12.25	5.48	1.16	0.47				
12.50	5.91	1.39	0.32				
12.75	6.19	1.55	0.22				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 100-Year Rainfall=8.66"

Printed 8/22/2023

Page 64

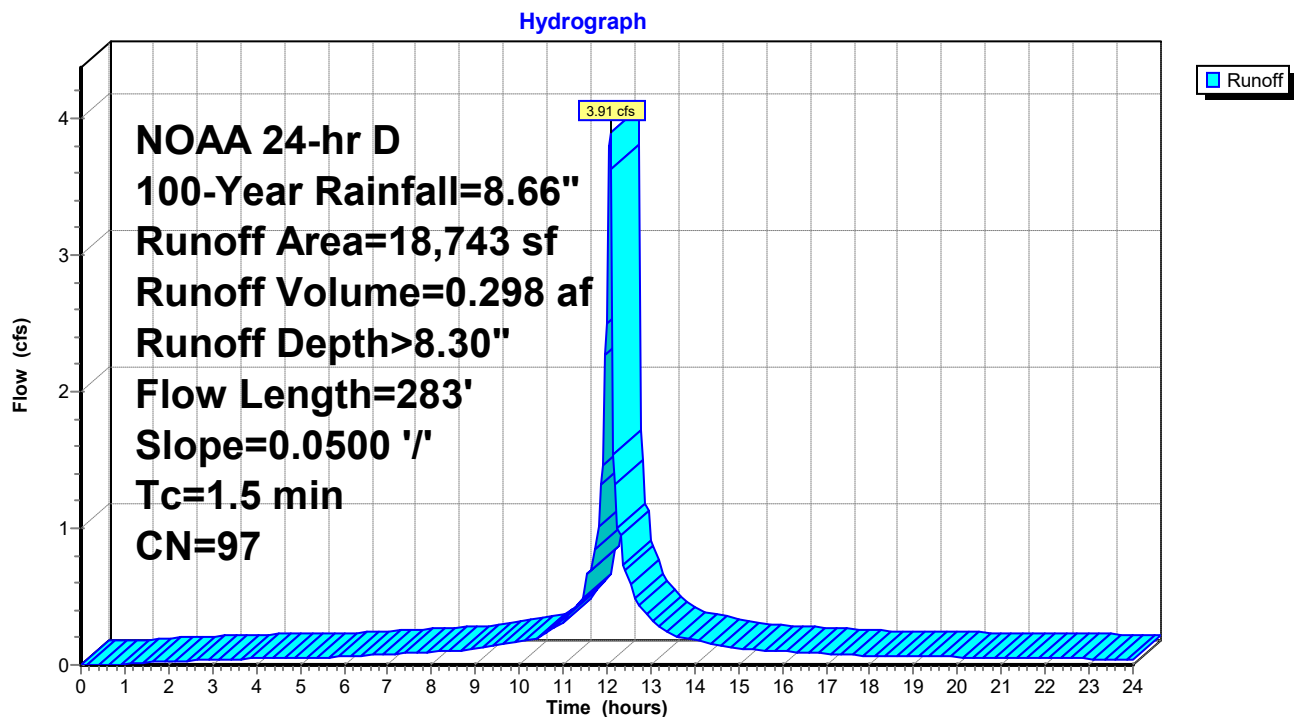
Summary for Subcatchment 5S: PARKING LOT AREA TO BIO-RETENTION[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 3.91 cfs @ 12.07 hrs, Volume= 0.298 af, Depth> 8.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 100-Year Rainfall=8.66"

	Area (sf)	CN	Description
*	1,240	76	BIO-RETENTION ISLANDS
*	17,503	98	PARKING LOT TO BIORETENTION
	18,743	97	Weighted Average
	1,240		6.62% Pervious Area
	17,503		93.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0500	2.06		Sheet Flow, Pavement
					Smooth surfaces $n=0.011$ $P2=3.44"$
0.7	183	0.0500	4.54		Shallow Concentrated Flow,
					Paved $K_v=20.3$ fps
1.5	283	Total			

Subcatchment 5S: PARKING LOT AREA TO BIO-RETENTION

POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 65

Hydrograph for Subcatchment 5S: PARKING LOT AREA TO BIO-RETENTION

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	6.41	6.05	0.35
0.25	0.02	0.00	0.00	13.25	6.58	6.22	0.27
0.50	0.05	0.00	0.00	13.50	6.72	6.36	0.22
0.75	0.07	0.00	0.00	13.75	6.84	6.48	0.19
1.00	0.10	0.00	0.01	14.00	6.94	6.59	0.18
1.25	0.13	0.01	0.01	14.25	7.04	6.68	0.16
1.50	0.15	0.02	0.02	14.50	7.13	6.77	0.15
1.75	0.18	0.03	0.02	14.75	7.21	6.85	0.13
2.00	0.21	0.05	0.03	15.00	7.29	6.93	0.12
2.25	0.24	0.06	0.03	15.25	7.35	6.99	0.11
2.50	0.27	0.08	0.03	15.50	7.42	7.06	0.11
2.75	0.30	0.10	0.04	15.75	7.48	7.12	0.10
3.00	0.33	0.12	0.04	16.00	7.54	7.18	0.10
3.25	0.36	0.14	0.04	16.25	7.59	7.23	0.10
3.50	0.39	0.17	0.04	16.50	7.65	7.29	0.09
3.75	0.42	0.19	0.04	16.75	7.70	7.34	0.09
4.00	0.45	0.22	0.05	17.00	7.75	7.39	0.08
4.25	0.49	0.25	0.05	17.25	7.79	7.44	0.08
4.50	0.52	0.28	0.05	17.50	7.84	7.48	0.08
4.75	0.56	0.30	0.05	17.75	7.88	7.52	0.07
5.00	0.59	0.33	0.05	18.00	7.92	7.56	0.07
5.25	0.63	0.37	0.06	18.25	7.96	7.60	0.06
5.50	0.66	0.40	0.06	18.50	8.00	7.64	0.06
5.75	0.70	0.43	0.06	18.75	8.03	7.67	0.06
6.00	0.74	0.47	0.06	19.00	8.07	7.71	0.06
6.25	0.78	0.50	0.06	19.25	8.10	7.74	0.06
6.50	0.82	0.54	0.07	19.50	8.14	7.78	0.06
6.75	0.87	0.58	0.07	19.75	8.17	7.81	0.06
7.00	0.91	0.62	0.08	20.00	8.21	7.85	0.06
7.25	0.96	0.67	0.08	20.25	8.24	7.88	0.06
7.50	1.01	0.72	0.09	20.50	8.27	7.91	0.06
7.75	1.07	0.77	0.09	20.75	8.30	7.94	0.05
8.00	1.12	0.82	0.09	21.00	8.33	7.97	0.05
8.25	1.18	0.88	0.10	21.25	8.36	8.00	0.05
8.50	1.24	0.94	0.10	21.50	8.39	8.03	0.05
8.75	1.31	1.00	0.11	21.75	8.42	8.06	0.05
9.00	1.37	1.06	0.11	22.00	8.45	8.09	0.05
9.25	1.45	1.13	0.13	22.25	8.48	8.12	0.05
9.50	1.53	1.21	0.14	22.50	8.51	8.15	0.05
9.75	1.62	1.30	0.16	22.75	8.53	8.17	0.05
10.00	1.72	1.39	0.17	23.00	8.56	8.20	0.05
10.25	1.82	1.50	0.19	23.25	8.59	8.23	0.04
10.50	1.94	1.61	0.20	23.50	8.61	8.25	0.04
10.75	2.08	1.75	0.26	23.75	8.64	8.28	0.04
11.00	2.25	1.92	0.31	24.00	8.66	8.30	0.04
11.25	2.47	2.14	0.42				
11.50	2.75	2.41	0.52				
11.75	3.18	2.84	0.96				
12.00	4.15	3.80	2.50				
12.25	5.48	5.13	1.01				
12.50	5.91	5.56	0.66				
12.75	6.19	5.83	0.43				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 100-Year Rainfall=8.66"

Printed 8/22/2023

Page 66

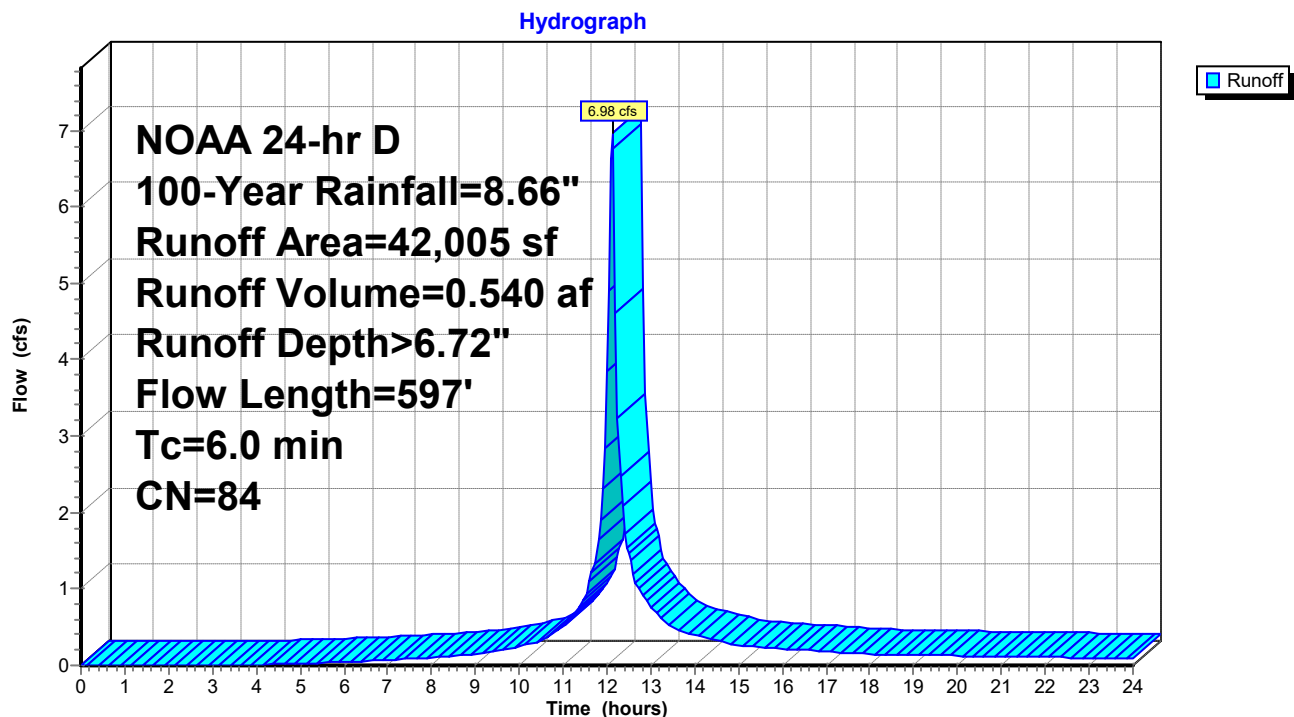
Summary for Subcatchment 8S: OTHER PARKING LOT AREAS

Runoff = 6.98 cfs @ 12.13 hrs, Volume= 0.540 af, Depth> 6.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.66"

Area (sf)	CN	Description
10,082	39	>75% Grass cover, Good, HSG A
* 1,650	98	CART PATH
* 30,273	98	UNDISTURBED PARKING LOT
42,005	84	Weighted Average
10,082		24.00% Pervious Area
31,923		76.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	76	0.0900	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
1.8	521	0.0580	4.89		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.0	597	Total			

Subcatchment 8S: OTHER PARKING LOT AREAS

POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 67

Hydrograph for Subcatchment 8S: OTHER PARKING LOT AREAS

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	6.41	4.58	0.78
0.25	0.02	0.00	0.00	13.25	6.58	4.74	0.62
0.50	0.05	0.00	0.00	13.50	6.72	4.87	0.50
0.75	0.07	0.00	0.00	13.75	6.84	4.98	0.42
1.00	0.10	0.00	0.00	14.00	6.94	5.09	0.39
1.25	0.13	0.00	0.00	14.25	7.04	5.18	0.36
1.50	0.15	0.00	0.00	14.50	7.13	5.27	0.33
1.75	0.18	0.00	0.00	14.75	7.21	5.34	0.30
2.00	0.21	0.00	0.00	15.00	7.29	5.41	0.27
2.25	0.24	0.00	0.00	15.25	7.35	5.48	0.24
2.50	0.27	0.00	0.00	15.50	7.42	5.54	0.24
2.75	0.30	0.00	0.00	15.75	7.48	5.59	0.23
3.00	0.33	0.00	0.00	16.00	7.54	5.65	0.22
3.25	0.36	0.00	0.00	16.25	7.59	5.70	0.21
3.50	0.39	0.00	0.00	16.50	7.65	5.76	0.20
3.75	0.42	0.00	0.00	16.75	7.70	5.81	0.19
4.00	0.45	0.00	0.01	17.00	7.75	5.85	0.18
4.25	0.49	0.01	0.01	17.25	7.79	5.90	0.17
4.50	0.52	0.01	0.02	17.50	7.84	5.94	0.16
4.75	0.56	0.01	0.02	17.75	7.88	5.98	0.16
5.00	0.59	0.02	0.02	18.00	7.92	6.02	0.15
5.25	0.63	0.03	0.03	18.25	7.96	6.06	0.14
5.50	0.66	0.04	0.03	18.50	8.00	6.09	0.14
5.75	0.70	0.05	0.04	18.75	8.03	6.13	0.14
6.00	0.74	0.06	0.04	19.00	8.07	6.16	0.13
6.25	0.78	0.07	0.05	19.25	8.10	6.19	0.13
6.50	0.82	0.08	0.05	19.50	8.14	6.23	0.13
6.75	0.87	0.10	0.06	19.75	8.17	6.26	0.13
7.00	0.91	0.12	0.07	20.00	8.21	6.29	0.13
7.25	0.96	0.14	0.08	20.25	8.24	6.32	0.12
7.50	1.01	0.16	0.09	20.50	8.27	6.36	0.12
7.75	1.07	0.18	0.10	20.75	8.30	6.39	0.12
8.00	1.12	0.21	0.10	21.00	8.33	6.42	0.12
8.25	1.18	0.24	0.11	21.25	8.36	6.45	0.11
8.50	1.24	0.27	0.12	21.50	8.39	6.47	0.11
8.75	1.31	0.30	0.13	21.75	8.42	6.50	0.11
9.00	1.37	0.34	0.14	22.00	8.45	6.53	0.11
9.25	1.45	0.38	0.17	22.25	8.48	6.56	0.11
9.50	1.53	0.43	0.19	22.50	8.51	6.58	0.10
9.75	1.62	0.49	0.22	22.75	8.53	6.61	0.10
10.00	1.72	0.55	0.25	23.00	8.56	6.63	0.10
10.25	1.82	0.62	0.28	23.25	8.59	6.66	0.10
10.50	1.94	0.70	0.31	23.50	8.61	6.68	0.09
10.75	2.08	0.80	0.40	23.75	8.64	6.71	0.09
11.00	2.25	0.93	0.50	24.00	8.66	6.73	0.09
11.25	2.47	1.09	0.67				
11.50	2.75	1.31	0.87				
11.75	3.18	1.67	1.39				
12.00	4.15	2.50	3.84				
12.25	5.48	3.71	3.22				
12.50	5.91	4.12	1.46				
12.75	6.19	4.37	0.98				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 100-Year Rainfall=8.66"

Printed 8/22/2023

Page 68

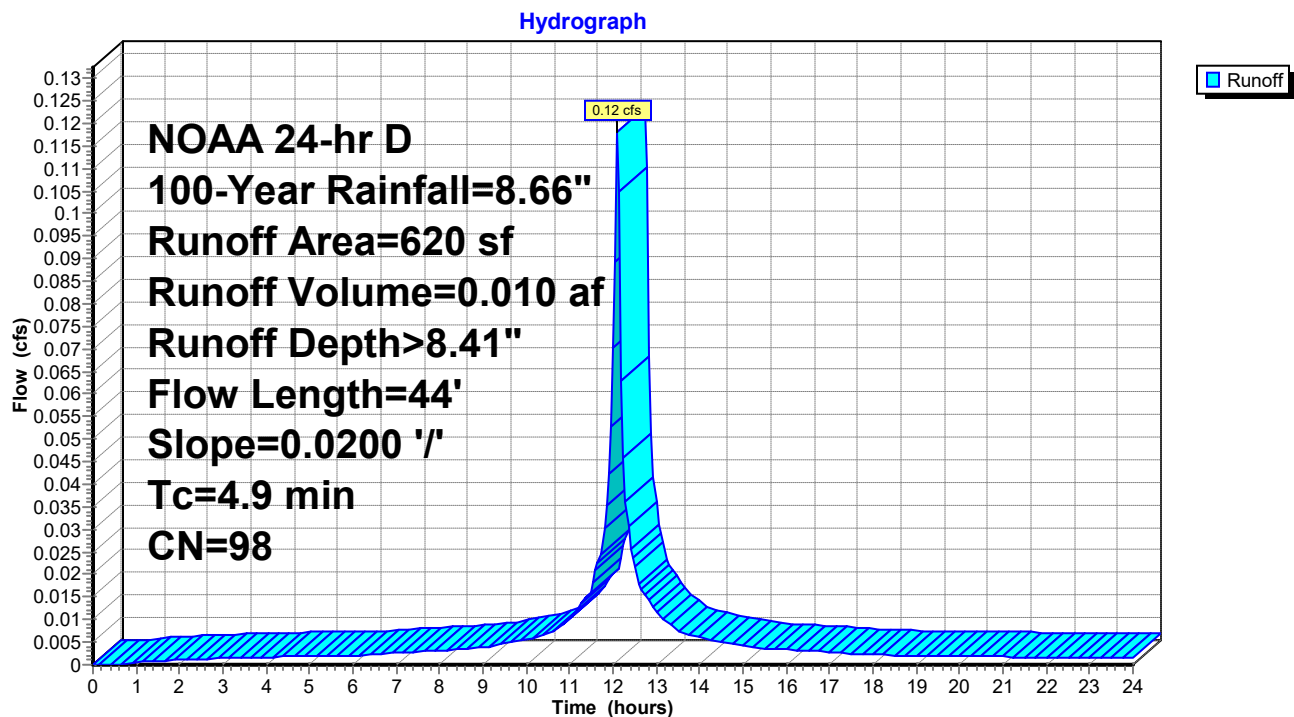
Summary for Subcatchment 9S: COMFORT STATION AREA[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.12 cfs @ 12.11 hrs, Volume= 0.010 af, Depth> 8.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NOAA 24-hr D 100-Year Rainfall=8.66"

Area (sf)	CN	Description
620	98	Roofs, HSG A
620		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	44	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"

Subcatchment 9S: COMFORT STATION AREA

POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 69

Hydrograph for Subcatchment 9S: COMFORT STATION AREA

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	6.41	6.17	0.01
0.25	0.02	0.00	0.00	13.25	6.58	6.34	0.01
0.50	0.05	0.00	0.00	13.50	6.72	6.48	0.01
0.75	0.07	0.00	0.00	13.75	6.84	6.60	0.01
1.00	0.10	0.01	0.00	14.00	6.94	6.70	0.01
1.25	0.13	0.02	0.00	14.25	7.04	6.80	0.01
1.50	0.15	0.04	0.00	14.50	7.13	6.89	0.01
1.75	0.18	0.06	0.00	14.75	7.21	6.97	0.00
2.00	0.21	0.08	0.00	15.00	7.29	7.05	0.00
2.25	0.24	0.10	0.00	15.25	7.35	7.11	0.00
2.50	0.27	0.12	0.00	15.50	7.42	7.18	0.00
2.75	0.30	0.14	0.00	15.75	7.48	7.24	0.00
3.00	0.33	0.17	0.00	16.00	7.54	7.30	0.00
3.25	0.36	0.19	0.00	16.25	7.59	7.35	0.00
3.50	0.39	0.22	0.00	16.50	7.65	7.41	0.00
3.75	0.42	0.25	0.00	16.75	7.70	7.46	0.00
4.00	0.45	0.28	0.00	17.00	7.75	7.51	0.00
4.25	0.49	0.31	0.00	17.25	7.79	7.55	0.00
4.50	0.52	0.34	0.00	17.50	7.84	7.60	0.00
4.75	0.56	0.37	0.00	17.75	7.88	7.64	0.00
5.00	0.59	0.40	0.00	18.00	7.92	7.68	0.00
5.25	0.63	0.44	0.00	18.25	7.96	7.72	0.00
5.50	0.66	0.47	0.00	18.50	8.00	7.76	0.00
5.75	0.70	0.50	0.00	18.75	8.03	7.79	0.00
6.00	0.74	0.54	0.00	19.00	8.07	7.83	0.00
6.25	0.78	0.58	0.00	19.25	8.10	7.86	0.00
6.50	0.82	0.62	0.00	19.50	8.14	7.90	0.00
6.75	0.87	0.66	0.00	19.75	8.17	7.93	0.00
7.00	0.91	0.71	0.00	20.00	8.21	7.97	0.00
7.25	0.96	0.75	0.00	20.25	8.24	8.00	0.00
7.50	1.01	0.80	0.00	20.50	8.27	8.03	0.00
7.75	1.07	0.86	0.00	20.75	8.30	8.06	0.00
8.00	1.12	0.91	0.00	21.00	8.33	8.09	0.00
8.25	1.18	0.97	0.00	21.25	8.36	8.12	0.00
8.50	1.24	1.03	0.00	21.50	8.39	8.15	0.00
8.75	1.31	1.09	0.00	21.75	8.42	8.18	0.00
9.00	1.37	1.16	0.00	22.00	8.45	8.21	0.00
9.25	1.45	1.23	0.00	22.25	8.48	8.24	0.00
9.50	1.53	1.31	0.00	22.50	8.51	8.27	0.00
9.75	1.62	1.40	0.01	22.75	8.53	8.29	0.00
10.00	1.72	1.49	0.01	23.00	8.56	8.32	0.00
10.25	1.82	1.60	0.01	23.25	8.59	8.35	0.00
10.50	1.94	1.71	0.01	23.50	8.61	8.37	0.00
10.75	2.08	1.85	0.01	23.75	8.64	8.40	0.00
11.00	2.25	2.02	0.01	24.00	8.66	8.42	0.00
11.25	2.47	2.24	0.01				
11.50	2.75	2.51	0.02				
11.75	3.18	2.95	0.03				
12.00	4.15	3.91	0.07				
12.25	5.48	5.24	0.05				
12.50	5.91	5.68	0.02				
12.75	6.19	5.95	0.02				

POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 70

Summary for Pond 3P: DRY WELLS

Inflow Area = 0.141 ac, 100.00% Impervious, Inflow Depth > 8.42" for 100-Year event
 Inflow = 1.29 cfs @ 12.04 hrs, Volume= 0.099 af
 Outflow = 0.31 cfs @ 12.27 hrs, Volume= 0.099 af, Atten= 76%, Lag= 13.4 min
 Discarded = 0.31 cfs @ 12.27 hrs, Volume= 0.099 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 3.03' @ 12.27 hrs Surf.Area= 0.012 ac Storage= 0.020 af

Plug-Flow detention time= 17.4 min calculated for 0.099 af (100% of inflow)
 Center-of-Mass det. time= 17.3 min (752.7 - 735.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1.00'	0.009 af	24.0" Round Pipe Storage Inside #2 L= 130.0'
#2	0.00'	0.015 af	4.00'W x 130.00'L x 4.00'H Prismatic 0.048 af Overall - 0.009 af Embedded = 0.038 af x 40.0% Voids
		0.025 af	Total Available Storage

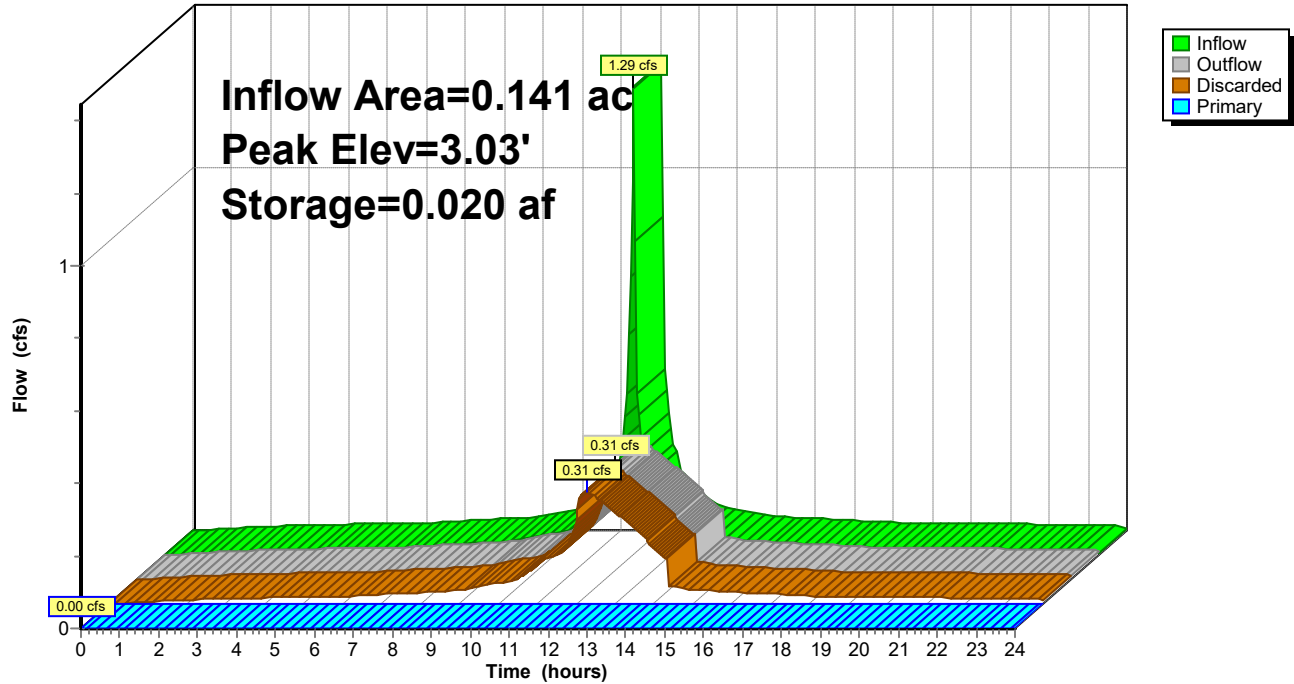
Device	Routing	Invert	Outlet Devices
#1	Primary	4.00'	8.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	10.000 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.31 cfs @ 12.27 hrs HW=3.03' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑ **1=Orifice/Grate** (Controls 0.00 cfs)

Pond 3P: DRY WELLS

Hydrograph



POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 72

Hydrograph for Pond 3P: DRY WELLS

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	0.00	0.00	0.00	0.00
0.50	0.00	0.000	0.00	0.00	0.00	0.00
1.00	0.01	0.000	0.00	0.01	0.01	0.00
1.50	0.01	0.000	0.00	0.01	0.01	0.00
2.00	0.01	0.000	0.00	0.01	0.01	0.00
2.50	0.01	0.000	0.00	0.01	0.01	0.00
3.00	0.01	0.000	0.01	0.01	0.01	0.00
3.50	0.02	0.000	0.01	0.02	0.02	0.00
4.00	0.02	0.000	0.01	0.02	0.02	0.00
4.50	0.02	0.000	0.01	0.02	0.02	0.00
5.00	0.02	0.000	0.01	0.02	0.02	0.00
5.50	0.02	0.000	0.01	0.02	0.02	0.00
6.00	0.02	0.000	0.01	0.02	0.02	0.00
6.50	0.02	0.000	0.01	0.02	0.02	0.00
7.00	0.03	0.000	0.01	0.03	0.03	0.00
7.50	0.03	0.000	0.01	0.03	0.03	0.00
8.00	0.03	0.000	0.01	0.03	0.03	0.00
8.50	0.03	0.000	0.01	0.03	0.03	0.00
9.00	0.04	0.000	0.01	0.04	0.04	0.00
9.50	0.05	0.000	0.02	0.05	0.05	0.00
10.00	0.06	0.000	0.02	0.06	0.06	0.00
10.50	0.07	0.000	0.03	0.07	0.07	0.00
11.00	0.11	0.000	0.04	0.11	0.11	0.00
11.50	0.19	0.001	0.19	0.13	0.13	0.00
12.00	1.03	0.011	1.83	0.23	0.23	0.00
12.50	0.19	0.019	2.83	0.30	0.30	0.00
13.00	0.11	0.013	2.13	0.25	0.25	0.00
13.50	0.07	0.008	1.41	0.21	0.21	0.00
14.00	0.06	0.003	0.55	0.15	0.15	0.00
14.50	0.05	0.000	0.02	0.05	0.05	0.00
15.00	0.04	0.000	0.01	0.04	0.04	0.00
15.50	0.04	0.000	0.01	0.04	0.04	0.00
16.00	0.03	0.000	0.01	0.03	0.03	0.00
16.50	0.03	0.000	0.01	0.03	0.03	0.00
17.00	0.03	0.000	0.01	0.03	0.03	0.00
17.50	0.02	0.000	0.01	0.02	0.02	0.00
18.00	0.02	0.000	0.01	0.02	0.02	0.00
18.50	0.02	0.000	0.01	0.02	0.02	0.00
19.00	0.02	0.000	0.01	0.02	0.02	0.00
19.50	0.02	0.000	0.01	0.02	0.02	0.00
20.00	0.02	0.000	0.01	0.02	0.02	0.00
20.50	0.02	0.000	0.01	0.02	0.02	0.00
21.00	0.02	0.000	0.01	0.02	0.02	0.00
21.50	0.02	0.000	0.01	0.02	0.02	0.00
22.00	0.02	0.000	0.01	0.02	0.02	0.00
22.50	0.02	0.000	0.01	0.02	0.02	0.00
23.00	0.01	0.000	0.01	0.01	0.01	0.00
23.50	0.01	0.000	0.01	0.01	0.01	0.00
24.00	0.01	0.000	0.00	0.01	0.01	0.00

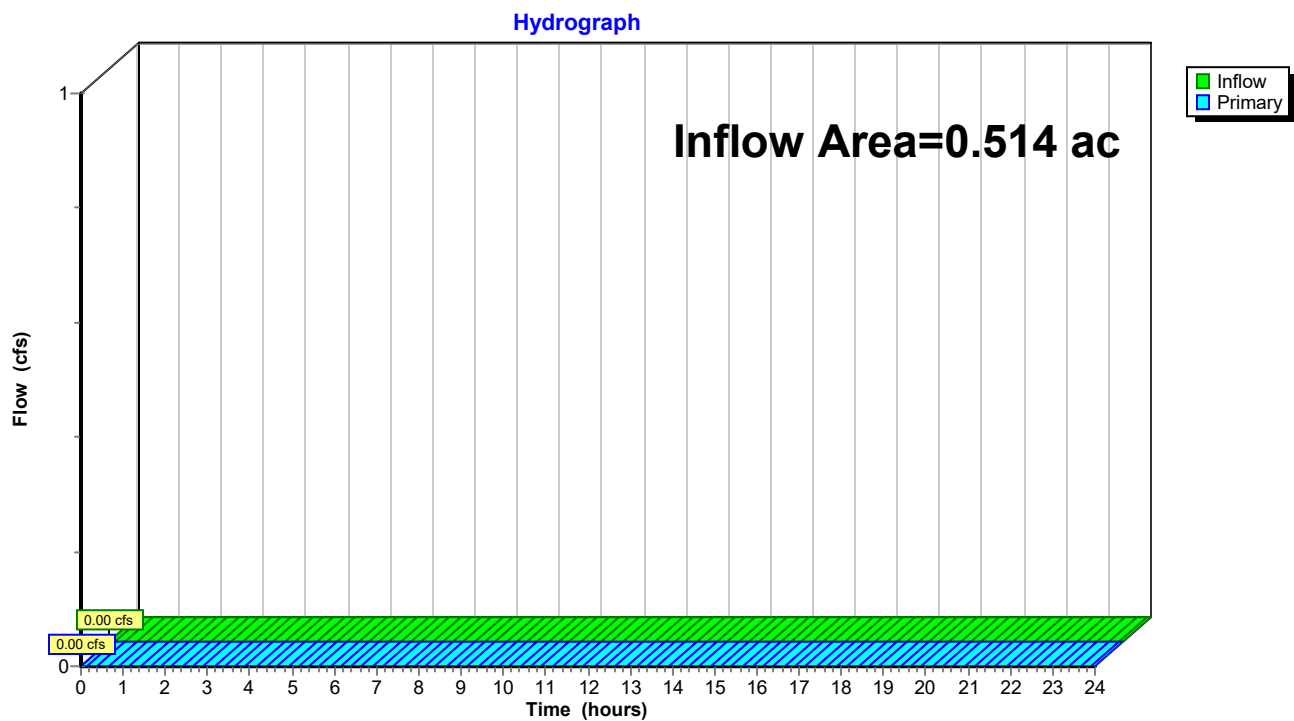
Summary for Pond 4P: TOTAL CART BARN AREA

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.514 ac, 45.44% Impervious, Inflow Depth = 0.00" for 100-Year event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 4P: TOTAL CART BARN AREA



POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 74

Hydrograph for Pond 4P: TOTAL CART BARN AREA

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00	13.00	0.00		0.00
0.25	0.00		0.00	13.25	0.00		0.00
0.50	0.00		0.00	13.50	0.00		0.00
0.75	0.00		0.00	13.75	0.00		0.00
1.00	0.00		0.00	14.00	0.00		0.00
1.25	0.00		0.00	14.25	0.00		0.00
1.50	0.00		0.00	14.50	0.00		0.00
1.75	0.00		0.00	14.75	0.00		0.00
2.00	0.00		0.00	15.00	0.00		0.00
2.25	0.00		0.00	15.25	0.00		0.00
2.50	0.00		0.00	15.50	0.00		0.00
2.75	0.00		0.00	15.75	0.00		0.00
3.00	0.00		0.00	16.00	0.00		0.00
3.25	0.00		0.00	16.25	0.00		0.00
3.50	0.00		0.00	16.50	0.00		0.00
3.75	0.00		0.00	16.75	0.00		0.00
4.00	0.00		0.00	17.00	0.00		0.00
4.25	0.00		0.00	17.25	0.00		0.00
4.50	0.00		0.00	17.50	0.00		0.00
4.75	0.00		0.00	17.75	0.00		0.00
5.00	0.00		0.00	18.00	0.00		0.00
5.25	0.00		0.00	18.25	0.00		0.00
5.50	0.00		0.00	18.50	0.00		0.00
5.75	0.00		0.00	18.75	0.00		0.00
6.00	0.00		0.00	19.00	0.00		0.00
6.25	0.00		0.00	19.25	0.00		0.00
6.50	0.00		0.00	19.50	0.00		0.00
6.75	0.00		0.00	19.75	0.00		0.00
7.00	0.00		0.00	20.00	0.00		0.00
7.25	0.00		0.00	20.25	0.00		0.00
7.50	0.00		0.00	20.50	0.00		0.00
7.75	0.00		0.00	20.75	0.00		0.00
8.00	0.00		0.00	21.00	0.00		0.00
8.25	0.00		0.00	21.25	0.00		0.00
8.50	0.00		0.00	21.50	0.00		0.00
8.75	0.00		0.00	21.75	0.00		0.00
9.00	0.00		0.00	22.00	0.00		0.00
9.25	0.00		0.00	22.25	0.00		0.00
9.50	0.00		0.00	22.50	0.00		0.00
9.75	0.00		0.00	22.75	0.00		0.00
10.00	0.00		0.00	23.00	0.00		0.00
10.25	0.00		0.00	23.25	0.00		0.00
10.50	0.00		0.00	23.50	0.00		0.00
10.75	0.00		0.00	23.75	0.00		0.00
11.00	0.00		0.00	24.00	0.00		0.00
11.25	0.00		0.00				
11.50	0.00		0.00				
11.75	0.00		0.00				
12.00	0.00		0.00				
12.25	0.00		0.00				
12.50	0.00		0.00				
12.75	0.00		0.00				

POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 75

Summary for Pond 6P: POROUS PAVEMENT

Inflow Area = 0.373 ac, 24.79% Impervious, Inflow Depth > 3.13" for 100-Year event
 Inflow = 1.54 cfs @ 12.09 hrs, Volume= 0.097 af
 Outflow = 0.69 cfs @ 12.00 hrs, Volume= 0.097 af, Atten= 55%, Lag= 0.0 min
 Discarded = 0.69 cfs @ 12.00 hrs, Volume= 0.097 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 0.25' @ 12.18 hrs Surf.Area= 0.069 ac Storage= 0.007 af

Plug-Flow detention time= 1.6 min calculated for 0.097 af (100% of inflow)
 Center-of-Mass det. time= 1.5 min (865.6 - 864.1)

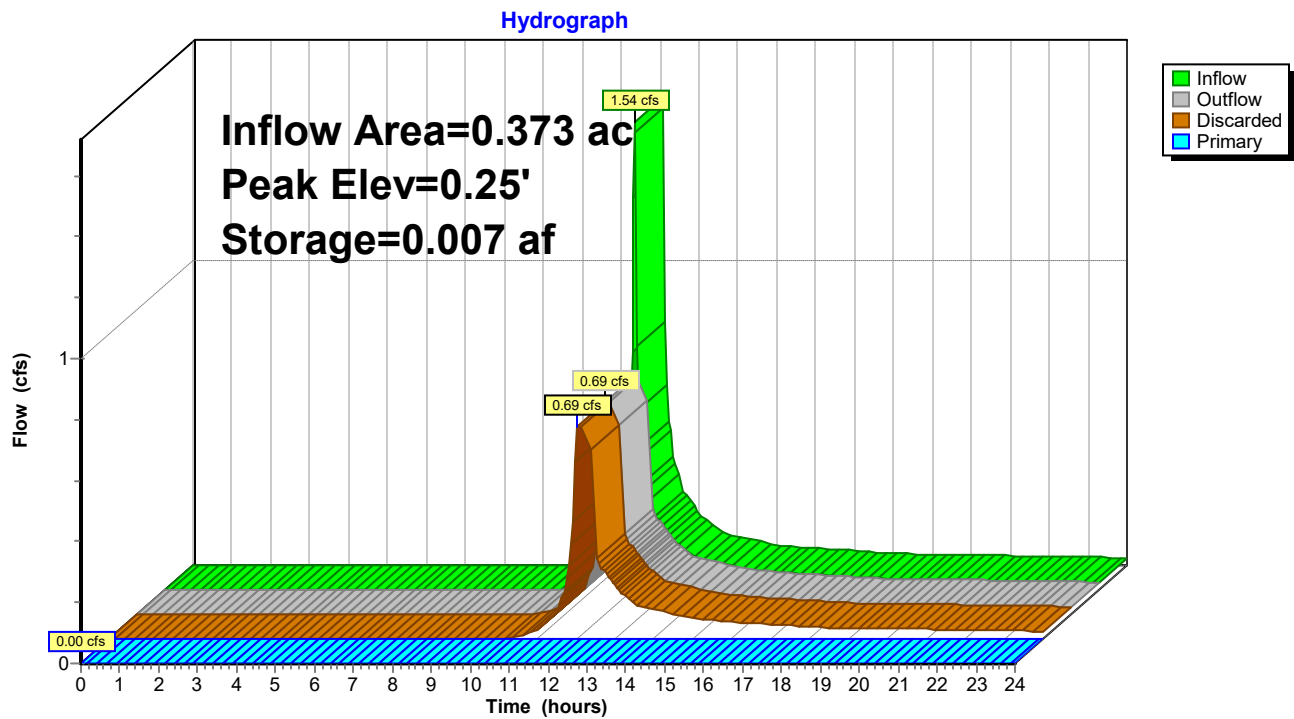
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.041 af	30.00'W x 100.00'L x 1.50'H Prismatic 0.103 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	10.000 in/hr Exfiltration over Horizontal area
#2	Primary	1.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.69 cfs @ 12.00 hrs HW=0.02' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.69 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 6P: POROUS PAVEMENT



POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 77

Hydrograph for Pond 6P: POROUS PAVEMENT

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	0.00	0.00	0.00	0.00
0.50	0.00	0.000	0.00	0.00	0.00	0.00
1.00	0.00	0.000	0.00	0.00	0.00	0.00
1.50	0.00	0.000	0.00	0.00	0.00	0.00
2.00	0.00	0.000	0.00	0.00	0.00	0.00
2.50	0.00	0.000	0.00	0.00	0.00	0.00
3.00	0.00	0.000	0.00	0.00	0.00	0.00
3.50	0.00	0.000	0.00	0.00	0.00	0.00
4.00	0.00	0.000	0.00	0.00	0.00	0.00
4.50	0.00	0.000	0.00	0.00	0.00	0.00
5.00	0.00	0.000	0.00	0.00	0.00	0.00
5.50	0.00	0.000	0.00	0.00	0.00	0.00
6.00	0.00	0.000	0.00	0.00	0.00	0.00
6.50	0.00	0.000	0.00	0.00	0.00	0.00
7.00	0.00	0.000	0.00	0.00	0.00	0.00
7.50	0.00	0.000	0.00	0.00	0.00	0.00
8.00	0.00	0.000	0.00	0.00	0.00	0.00
8.50	0.00	0.000	0.00	0.00	0.00	0.00
9.00	0.00	0.000	0.00	0.00	0.00	0.00
9.50	0.00	0.000	0.00	0.00	0.00	0.00
10.00	0.00	0.000	0.00	0.00	0.00	0.00
10.50	0.01	0.000	0.00	0.01	0.01	0.00
11.00	0.03	0.000	0.00	0.03	0.03	0.00
11.50	0.09	0.000	0.00	0.09	0.09	0.00
12.00	0.79	0.001	0.02	0.69	0.69	0.00
12.50	0.32	0.000	0.01	0.34	0.34	0.00
13.00	0.18	0.000	0.00	0.18	0.18	0.00
13.50	0.12	0.000	0.00	0.12	0.12	0.00
14.00	0.10	0.000	0.00	0.10	0.10	0.00
14.50	0.08	0.000	0.00	0.08	0.08	0.00
15.00	0.07	0.000	0.00	0.07	0.07	0.00
15.50	0.06	0.000	0.00	0.06	0.06	0.00
16.00	0.06	0.000	0.00	0.06	0.06	0.00
16.50	0.05	0.000	0.00	0.05	0.05	0.00
17.00	0.05	0.000	0.00	0.05	0.05	0.00
17.50	0.04	0.000	0.00	0.04	0.04	0.00
18.00	0.04	0.000	0.00	0.04	0.04	0.00
18.50	0.04	0.000	0.00	0.04	0.04	0.00
19.00	0.04	0.000	0.00	0.04	0.04	0.00
19.50	0.04	0.000	0.00	0.04	0.04	0.00
20.00	0.03	0.000	0.00	0.03	0.03	0.00
20.50	0.03	0.000	0.00	0.03	0.03	0.00
21.00	0.03	0.000	0.00	0.03	0.03	0.00
21.50	0.03	0.000	0.00	0.03	0.03	0.00
22.00	0.03	0.000	0.00	0.03	0.03	0.00
22.50	0.03	0.000	0.00	0.03	0.03	0.00
23.00	0.03	0.000	0.00	0.03	0.03	0.00
23.50	0.03	0.000	0.00	0.03	0.03	0.00
24.00	0.02	0.000	0.00	0.02	0.02	0.00

POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 78

Summary for Pond 7P: PARKING BIO-RETENTION

[93] Warning: Storage range exceeded by 1.74'

[88] Warning: Qout>Qin may require smaller dt or Finer Routing

[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=21)

Inflow Area = 0.430 ac, 93.38% Impervious, Inflow Depth > 8.30" for 100-Year event
 Inflow = 3.91 cfs @ 12.07 hrs, Volume= 0.298 af
 Outflow = 5.47 cfs @ 12.09 hrs, Volume= 0.297 af, Atten= 0%, Lag= 1.5 min
 Discarded = 0.14 cfs @ 9.60 hrs, Volume= 0.208 af
 Primary = 1.39 cfs @ 12.08 hrs, Volume= 0.053 af
 Secondary = 4.03 cfs @ 12.10 hrs, Volume= 0.037 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 4.74' @ 12.08 hrs Surf.Area= 1,240 sf Storage= 2,232 cf

Plug-Flow detention time= 85.1 min calculated for 0.297 af (100% of inflow)
 Center-of-Mass det. time= 84.8 min (827.6 - 742.8)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,232 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	1,240	0.0	0	0
2.00	1,240	40.0	992	992
2.01	1,240	100.0	12	1,004
3.00	1,240	100.0	1,228	2,232

Device	Routing	Invert	Outlet Devices
#1	Primary	4.00'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Secondary	4.50'	100.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Discarded	0.00'	5.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.14 cfs @ 9.60 hrs HW=0.05' (Free Discharge)
 ↑ **3=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=1.23 cfs @ 12.08 hrs HW=4.54' (Free Discharge)
 ↑ **1=Orifice/Grate** (Orifice Controls 1.23 cfs @ 3.53 fps)

Secondary OutFlow Max=3.65 cfs @ 12.10 hrs HW=4.56' (Free Discharge)
 ↑ **2=Broad-Crested Rectangular Weir** (Weir Controls 3.65 cfs @ 0.66 fps)

POST

Prepared by {enter your company name here}

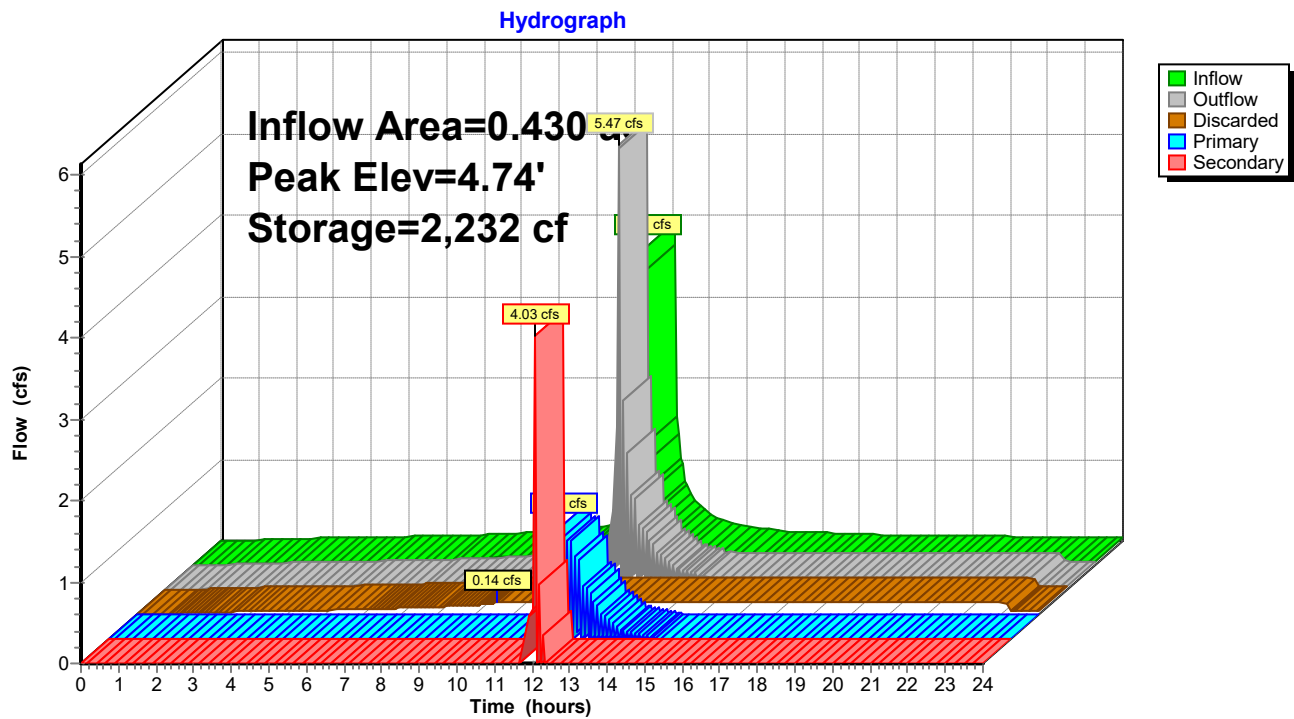
HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 100-Year Rainfall=8.66"

Printed 8/22/2023

Page 79

Pond 7P: PARKING BIO-RETENTION



POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 80

Hydrograph for Pond 7P: PARKING BIO-RETENTION

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	0.00	0.00	0.00	0.00	0.00
0.50	0.00	0	0.00	0.00	0.00	0.00	0.00
1.00	0.01	1	0.00	0.01	0.01	0.00	0.00
1.50	0.02	3	0.01	0.02	0.02	0.00	0.00
2.00	0.03	4	0.01	0.03	0.03	0.00	0.00
2.50	0.03	5	0.01	0.03	0.03	0.00	0.00
3.00	0.04	6	0.01	0.04	0.04	0.00	0.00
3.50	0.04	7	0.01	0.04	0.04	0.00	0.00
4.00	0.05	7	0.01	0.05	0.05	0.00	0.00
4.50	0.05	8	0.02	0.05	0.05	0.00	0.00
5.00	0.05	8	0.02	0.05	0.05	0.00	0.00
5.50	0.06	9	0.02	0.06	0.06	0.00	0.00
6.00	0.06	9	0.02	0.06	0.06	0.00	0.00
6.50	0.07	10	0.02	0.07	0.07	0.00	0.00
7.00	0.08	12	0.02	0.08	0.08	0.00	0.00
7.50	0.09	13	0.03	0.09	0.09	0.00	0.00
8.00	0.09	15	0.03	0.09	0.09	0.00	0.00
8.50	0.10	16	0.03	0.10	0.10	0.00	0.00
9.00	0.11	17	0.04	0.11	0.11	0.00	0.00
9.50	0.14	22	0.04	0.14	0.14	0.00	0.00
10.00	0.17	48	0.10	0.14	0.14	0.00	0.00
10.50	0.20	127	0.26	0.14	0.14	0.00	0.00
11.00	0.31	338	0.68	0.14	0.14	0.00	0.00
11.50	0.52	827	1.67	0.14	0.14	0.00	0.00
12.00	2.50	2,232	4.55	4.29	0.14	1.24	2.90
12.50	0.66	2,232	4.33	1.11	0.14	0.97	0.00
13.00	0.35	2,232	4.15	0.55	0.14	0.41	0.00
13.50	0.22	2,232	4.08	0.29	0.14	0.15	0.00
14.00	0.18	2,232	4.05	0.21	0.14	0.07	0.00
14.50	0.15	2,232	4.01	0.16	0.14	0.02	0.00
15.00	0.12	2,215	2.99	0.14	0.14	0.00	0.00
15.50	0.11	2,161	2.94	0.14	0.14	0.00	0.00
16.00	0.10	2,090	2.89	0.14	0.14	0.00	0.00
16.50	0.09	2,005	2.82	0.14	0.14	0.00	0.00
17.00	0.08	1,905	2.74	0.14	0.14	0.00	0.00
17.50	0.08	1,790	2.64	0.14	0.14	0.00	0.00
18.00	0.07	1,660	2.54	0.14	0.14	0.00	0.00
18.50	0.06	1,518	2.42	0.14	0.14	0.00	0.00
19.00	0.06	1,373	2.31	0.14	0.14	0.00	0.00
19.50	0.06	1,224	2.19	0.14	0.14	0.00	0.00
20.00	0.06	1,072	2.06	0.14	0.14	0.00	0.00
20.50	0.06	915	1.85	0.14	0.14	0.00	0.00
21.00	0.05	755	1.52	0.14	0.14	0.00	0.00
21.50	0.05	591	1.19	0.14	0.14	0.00	0.00
22.00	0.05	423	0.85	0.14	0.14	0.00	0.00
22.50	0.05	252	0.51	0.14	0.14	0.00	0.00
23.00	0.05	77	0.15	0.14	0.14	0.00	0.00
23.50	0.04	7	0.01	0.04	0.04	0.00	0.00
24.00	0.04	6	0.01	0.04	0.04	0.00	0.00

POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 81

Summary for Pond 11P: DRY WELLS

Inflow Area = 0.014 ac, 100.00% Impervious, Inflow Depth > 8.41" for 100-Year event
 Inflow = 0.12 cfs @ 12.11 hrs, Volume= 0.010 af
 Outflow = 0.02 cfs @ 11.75 hrs, Volume= 0.010 af, Atten= 79%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 11.75 hrs, Volume= 0.010 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 1.40' @ 12.43 hrs Surf.Area= 0.002 ac Storage= 0.002 af

Plug-Flow detention time= 15.2 min calculated for 0.010 af (100% of inflow)
 Center-of-Mass det. time= 14.9 min (754.5 - 739.6)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.001 af	4.00'W x 4.00'L x 4.00'H Prismatic
#2	0.00'	0.002 af	3.00'W x 30.00'L x 3.00'H Prismatic
			0.006 af Overall - 0.001 af Embedded = 0.006 af x 40.0% Voids
#3	1.00'	0.001 af	12.0" Round Pipe Storage Inside #2
			L= 35.0'
		0.004 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	10.000 in/hr Exfiltration over Horizontal area
#2	Primary	4.00'	48.0" x 24.0" Horiz. Orifice/Grate C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 11.75 hrs HW=0.04' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

POST

Prepared by {enter your company name here}

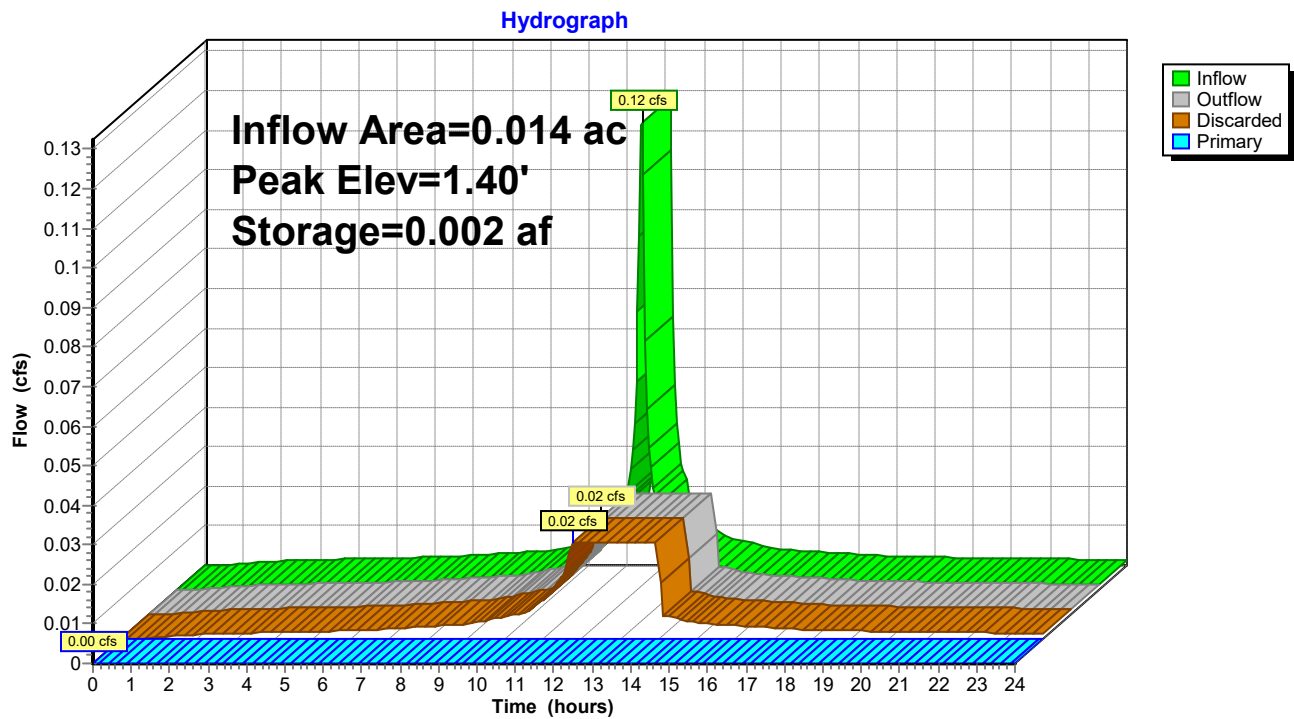
HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr D 100-Year Rainfall=8.66"

Printed 8/22/2023

Page 82

Pond 11P: DRY WELLS



POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 83

Hydrograph for Pond 11P: DRY WELLS

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	0.00	0.00	0.00	0.00
0.50	0.00	0.000	0.00	0.00	0.00	0.00
1.00	0.00	0.000	0.00	0.00	0.00	0.00
1.50	0.00	0.000	0.00	0.00	0.00	0.00
2.00	0.00	0.000	0.00	0.00	0.00	0.00
2.50	0.00	0.000	0.00	0.00	0.00	0.00
3.00	0.00	0.000	0.00	0.00	0.00	0.00
3.50	0.00	0.000	0.00	0.00	0.00	0.00
4.00	0.00	0.000	0.00	0.00	0.00	0.00
4.50	0.00	0.000	0.00	0.00	0.00	0.00
5.00	0.00	0.000	0.00	0.00	0.00	0.00
5.50	0.00	0.000	0.00	0.00	0.00	0.00
6.00	0.00	0.000	0.00	0.00	0.00	0.00
6.50	0.00	0.000	0.00	0.00	0.00	0.00
7.00	0.00	0.000	0.00	0.00	0.00	0.00
7.50	0.00	0.000	0.00	0.00	0.00	0.00
8.00	0.00	0.000	0.01	0.00	0.00	0.00
8.50	0.00	0.000	0.01	0.00	0.00	0.00
9.00	0.00	0.000	0.01	0.00	0.00	0.00
9.50	0.00	0.000	0.01	0.00	0.00	0.00
10.00	0.01	0.000	0.01	0.01	0.01	0.00
10.50	0.01	0.000	0.01	0.01	0.01	0.00
11.00	0.01	0.000	0.02	0.01	0.01	0.00
11.50	0.02	0.000	0.03	0.02	0.02	0.00
12.00	0.07	0.000	0.34	0.02	0.02	0.00
12.50	0.02	0.002	1.39	0.02	0.02	0.00
13.00	0.01	0.001	1.17	0.02	0.02	0.00
13.50	0.01	0.001	0.69	0.02	0.02	0.00
14.00	0.01	0.000	0.07	0.02	0.02	0.00
14.50	0.01	0.000	0.01	0.01	0.01	0.00
15.00	0.00	0.000	0.01	0.00	0.00	0.00
15.50	0.00	0.000	0.01	0.00	0.00	0.00
16.00	0.00	0.000	0.01	0.00	0.00	0.00
16.50	0.00	0.000	0.01	0.00	0.00	0.00
17.00	0.00	0.000	0.00	0.00	0.00	0.00
17.50	0.00	0.000	0.00	0.00	0.00	0.00
18.00	0.00	0.000	0.00	0.00	0.00	0.00
18.50	0.00	0.000	0.00	0.00	0.00	0.00
19.00	0.00	0.000	0.00	0.00	0.00	0.00
19.50	0.00	0.000	0.00	0.00	0.00	0.00
20.00	0.00	0.000	0.00	0.00	0.00	0.00
20.50	0.00	0.000	0.00	0.00	0.00	0.00
21.00	0.00	0.000	0.00	0.00	0.00	0.00
21.50	0.00	0.000	0.00	0.00	0.00	0.00
22.00	0.00	0.000	0.00	0.00	0.00	0.00
22.50	0.00	0.000	0.00	0.00	0.00	0.00
23.00	0.00	0.000	0.00	0.00	0.00	0.00
23.50	0.00	0.000	0.00	0.00	0.00	0.00
24.00	0.00	0.000	0.00	0.00	0.00	0.00

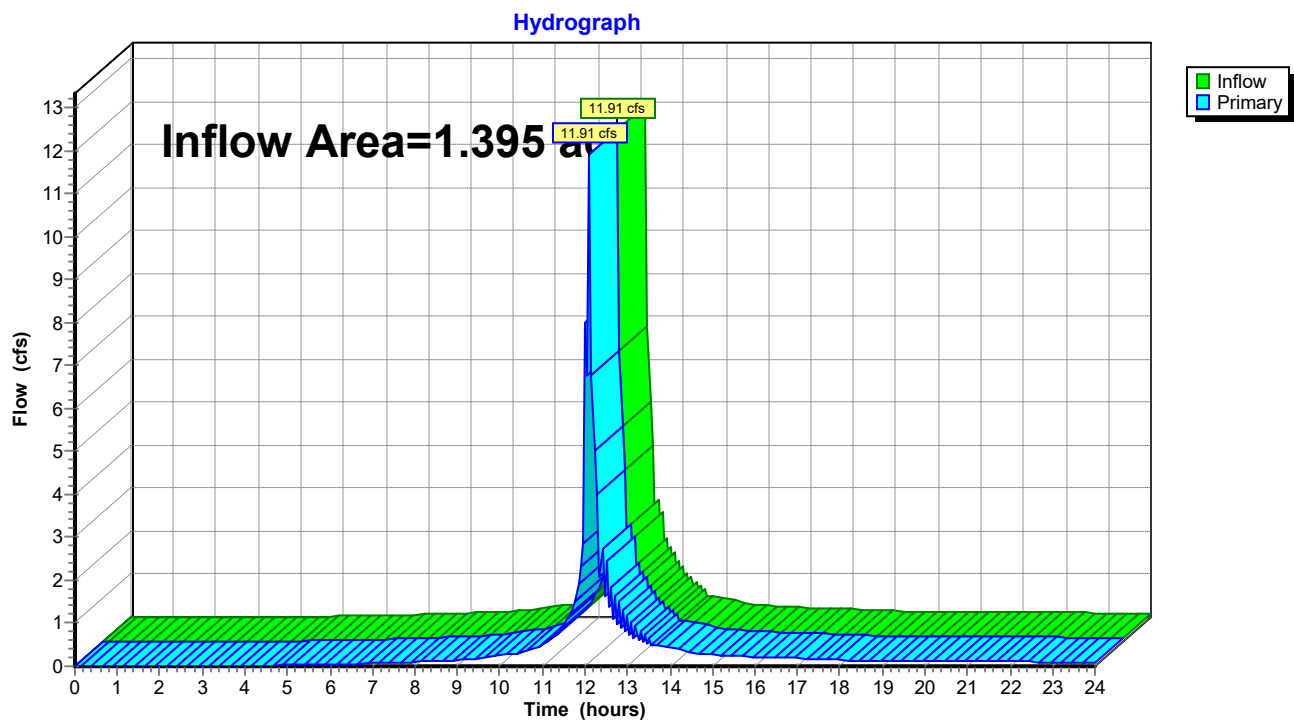
Summary for Pond 12P: TOTAL PARKING LOT

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.395 ac, 81.36% Impervious, Inflow Depth > 5.42" for 100-Year event
 Inflow = 11.91 cfs @ 12.10 hrs, Volume= 0.630 af
 Primary = 11.91 cfs @ 12.10 hrs, Volume= 0.630 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 12P: TOTAL PARKING LOT



POST

NOAA 24-hr D 100-Year Rainfall=8.66"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 85

Hydrograph for Pond 12P: TOTAL PARKING LOT

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00	13.00	1.18		1.18
0.25	0.00		0.00	13.25	0.62		0.62
0.50	0.00		0.00	13.50	0.65		0.65
0.75	0.00		0.00	13.75	0.42		0.42
1.00	0.00		0.00	14.00	0.46		0.46
1.25	0.00		0.00	14.25	0.36		0.36
1.50	0.00		0.00	14.50	0.34		0.34
1.75	0.00		0.00	14.75	0.30		0.30
2.00	0.00		0.00	15.00	0.27		0.27
2.25	0.00		0.00	15.25	0.24		0.24
2.50	0.00		0.00	15.50	0.24		0.24
2.75	0.00		0.00	15.75	0.23		0.23
3.00	0.00		0.00	16.00	0.22		0.22
3.25	0.00		0.00	16.25	0.21		0.21
3.50	0.00		0.00	16.50	0.20		0.20
3.75	0.00		0.00	16.75	0.19		0.19
4.00	0.01		0.01	17.00	0.18		0.18
4.25	0.01		0.01	17.25	0.17		0.17
4.50	0.02		0.02	17.50	0.16		0.16
4.75	0.02		0.02	17.75	0.16		0.16
5.00	0.02		0.02	18.00	0.15		0.15
5.25	0.03		0.03	18.25	0.14		0.14
5.50	0.03		0.03	18.50	0.14		0.14
5.75	0.04		0.04	18.75	0.14		0.14
6.00	0.04		0.04	19.00	0.13		0.13
6.25	0.05		0.05	19.25	0.13		0.13
6.50	0.05		0.05	19.50	0.13		0.13
6.75	0.06		0.06	19.75	0.13		0.13
7.00	0.07		0.07	20.00	0.13		0.13
7.25	0.08		0.08	20.25	0.12		0.12
7.50	0.09		0.09	20.50	0.12		0.12
7.75	0.10		0.10	20.75	0.12		0.12
8.00	0.10		0.10	21.00	0.12		0.12
8.25	0.11		0.11	21.25	0.11		0.11
8.50	0.12		0.12	21.50	0.11		0.11
8.75	0.13		0.13	21.75	0.11		0.11
9.00	0.14		0.14	22.00	0.11		0.11
9.25	0.17		0.17	22.25	0.11		0.11
9.50	0.19		0.19	22.50	0.10		0.10
9.75	0.22		0.22	22.75	0.10		0.10
10.00	0.25		0.25	23.00	0.10		0.10
10.25	0.28		0.28	23.25	0.10		0.10
10.50	0.31		0.31	23.50	0.09		0.09
10.75	0.40		0.40	23.75	0.09		0.09
11.00	0.50		0.50	24.00	0.09		0.09
11.25	0.67		0.67				
11.50	0.87		0.87				
11.75	1.39		1.39				
12.00	7.99		7.99				
12.25	3.22		3.22				
12.50	2.43		2.43				
12.75	0.98		0.98				

POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 86

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: CART BUILDING Runoff Area=6,144 sf 100.00% Impervious Runoff Depth=1.03"
Tc=0.0 min CN=98 Runoff=0.46 cfs 0.012 af

Subcatchment 2S: CART BUILDING SITE Runoff Area=16,229 sf 24.79% Impervious Runoff Depth=0.00"
Flow Length=50' Slope=0.2000 '/' Tc=2.2 min CN=54 Runoff=0.00 cfs 0.000 af

Subcatchment 5S: PARKING LOT AREA Runoff Area=18,743 sf 93.38% Impervious Runoff Depth=0.94"
Flow Length=283' Slope=0.0500 '/' Tc=1.5 min CN=97 Runoff=1.26 cfs 0.034 af

Subcatchment 8S: OTHER PARKING LOT Runoff Area=42,005 sf 76.00% Impervious Runoff Depth=0.27"
Flow Length=597' Tc=6.0 min CN=84 Runoff=0.77 cfs 0.022 af

Subcatchment 9S: COMFORT STATION Runoff Area=620 sf 100.00% Impervious Runoff Depth=1.03"
Flow Length=44' Slope=0.0200 '/' Tc=4.9 min CN=98 Runoff=0.04 cfs 0.001 af

Pond 3P: DRY WELLS Peak Elev=0.84' Storage=0.004 af Inflow=0.46 cfs 0.012 af
Discarded=0.17 cfs 0.012 af Primary=0.00 cfs 0.000 af Outflow=0.17 cfs 0.012 af

Pond 4P: TOTAL CART BARN AREA Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond 6P: POROUS PAVEMENT Peak Elev=0.00' Storage=0.000 af Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 7P: PARKING BIO-RETENTION Peak Elev=1.78' Storage=885 cf Inflow=1.26 cfs 0.034 af
Discarded=0.14 cfs 0.034 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.14 cfs 0.034 af

Pond 11P: DRY WELLS Peak Elev=0.18' Storage=0.000 af Inflow=0.04 cfs 0.001 af
Discarded=0.02 cfs 0.001 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.001 af

Pond 12P: TOTAL PARKING LOT Inflow=0.77 cfs 0.022 af
Primary=0.77 cfs 0.022 af

Total Runoff Area = 1.922 ac Runoff Volume = 0.069 af Average Runoff Depth = 0.43"
28.10% Pervious = 0.540 ac 71.90% Impervious = 1.382 ac

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NJ DEP 2-hr NJDEP Rainfall=1.25"

Printed 8/22/2023

Page 87

Summary for Subcatchment 1S: CART BUILDING

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

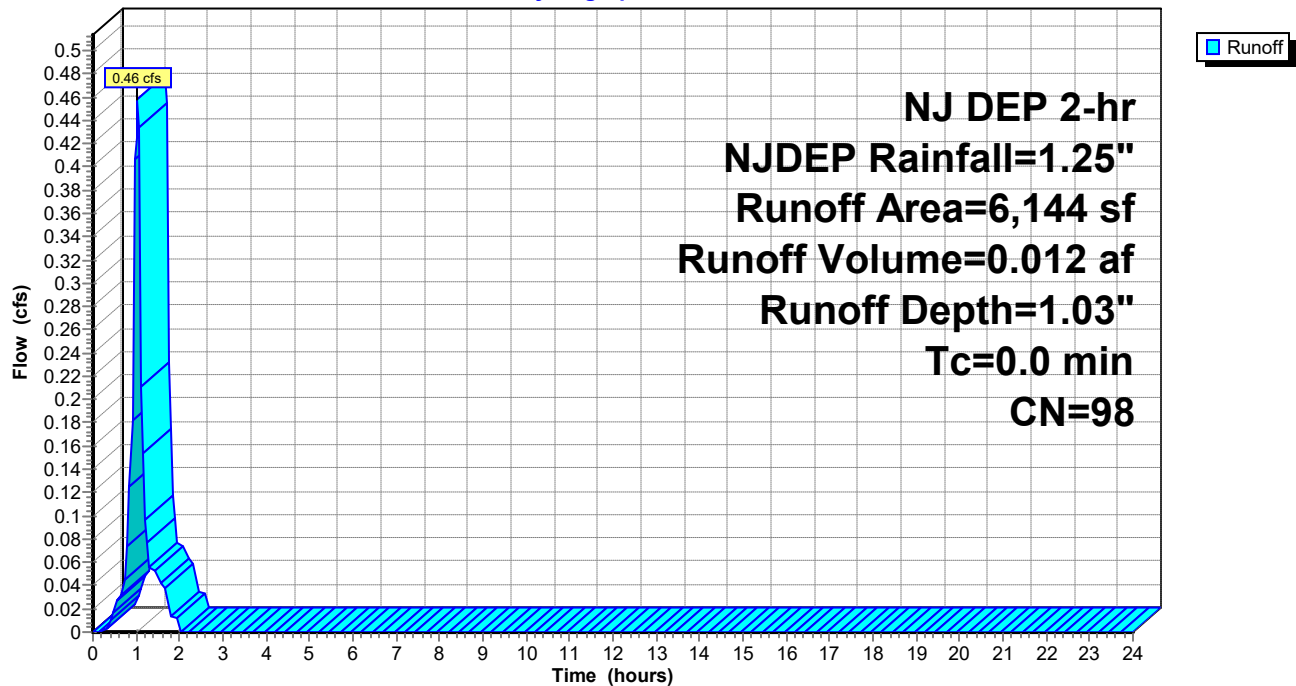
Runoff = 0.46 cfs @ 1.03 hrs, Volume= 0.012 af, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr NJDEP Rainfall=1.25"

	Area (sf)	CN	Description
*	6,144	98	CART BUILDING
	6,144		100.00% Impervious Area

Subcatchment 1S: CART BUILDING

Hydrograph



POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 88

Hydrograph for Subcatchment 1S: CART BUILDING

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	1.25	1.03	0.00
0.25	0.03	0.00	0.00	13.25	1.25	1.03	0.00
0.50	0.10	0.01	0.02	13.50	1.25	1.03	0.00
0.75	0.20	0.07	0.05	13.75	1.25	1.03	0.00
1.00	0.63	0.43	0.42	14.00	1.25	1.03	0.00
1.25	1.05	0.84	0.08	14.25	1.25	1.03	0.00
1.50	1.15	0.94	0.05	14.50	1.25	1.03	0.00
1.75	1.23	1.01	0.03	14.75	1.25	1.03	0.00
2.00	1.25	1.03	0.01	15.00	1.25	1.03	0.00
2.25	1.25	1.03	0.00	15.25	1.25	1.03	0.00
2.50	1.25	1.03	0.00	15.50	1.25	1.03	0.00
2.75	1.25	1.03	0.00	15.75	1.25	1.03	0.00
3.00	1.25	1.03	0.00	16.00	1.25	1.03	0.00
3.25	1.25	1.03	0.00	16.25	1.25	1.03	0.00
3.50	1.25	1.03	0.00	16.50	1.25	1.03	0.00
3.75	1.25	1.03	0.00	16.75	1.25	1.03	0.00
4.00	1.25	1.03	0.00	17.00	1.25	1.03	0.00
4.25	1.25	1.03	0.00	17.25	1.25	1.03	0.00
4.50	1.25	1.03	0.00	17.50	1.25	1.03	0.00
4.75	1.25	1.03	0.00	17.75	1.25	1.03	0.00
5.00	1.25	1.03	0.00	18.00	1.25	1.03	0.00
5.25	1.25	1.03	0.00	18.25	1.25	1.03	0.00
5.50	1.25	1.03	0.00	18.50	1.25	1.03	0.00
5.75	1.25	1.03	0.00	18.75	1.25	1.03	0.00
6.00	1.25	1.03	0.00	19.00	1.25	1.03	0.00
6.25	1.25	1.03	0.00	19.25	1.25	1.03	0.00
6.50	1.25	1.03	0.00	19.50	1.25	1.03	0.00
6.75	1.25	1.03	0.00	19.75	1.25	1.03	0.00
7.00	1.25	1.03	0.00	20.00	1.25	1.03	0.00
7.25	1.25	1.03	0.00	20.25	1.25	1.03	0.00
7.50	1.25	1.03	0.00	20.50	1.25	1.03	0.00
7.75	1.25	1.03	0.00	20.75	1.25	1.03	0.00
8.00	1.25	1.03	0.00	21.00	1.25	1.03	0.00
8.25	1.25	1.03	0.00	21.25	1.25	1.03	0.00
8.50	1.25	1.03	0.00	21.50	1.25	1.03	0.00
8.75	1.25	1.03	0.00	21.75	1.25	1.03	0.00
9.00	1.25	1.03	0.00	22.00	1.25	1.03	0.00
9.25	1.25	1.03	0.00	22.25	1.25	1.03	0.00
9.50	1.25	1.03	0.00	22.50	1.25	1.03	0.00
9.75	1.25	1.03	0.00	22.75	1.25	1.03	0.00
10.00	1.25	1.03	0.00	23.00	1.25	1.03	0.00
10.25	1.25	1.03	0.00	23.25	1.25	1.03	0.00
10.50	1.25	1.03	0.00	23.50	1.25	1.03	0.00
10.75	1.25	1.03	0.00	23.75	1.25	1.03	0.00
11.00	1.25	1.03	0.00	24.00	1.25	1.03	0.00
11.25	1.25	1.03	0.00				
11.50	1.25	1.03	0.00				
11.75	1.25	1.03	0.00				
12.00	1.25	1.03	0.00				
12.25	1.25	1.03	0.00				
12.50	1.25	1.03	0.00				
12.75	1.25	1.03	0.00				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NJ DEP 2-hr NJDEP Rainfall=1.25"

Printed 8/22/2023

Page 89

Summary for Subcatchment 2S: CART BUILDING SITE[49] Hint: $T_c < 2dt$ may require smaller dt

[45] Hint: Runoff=Zero

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

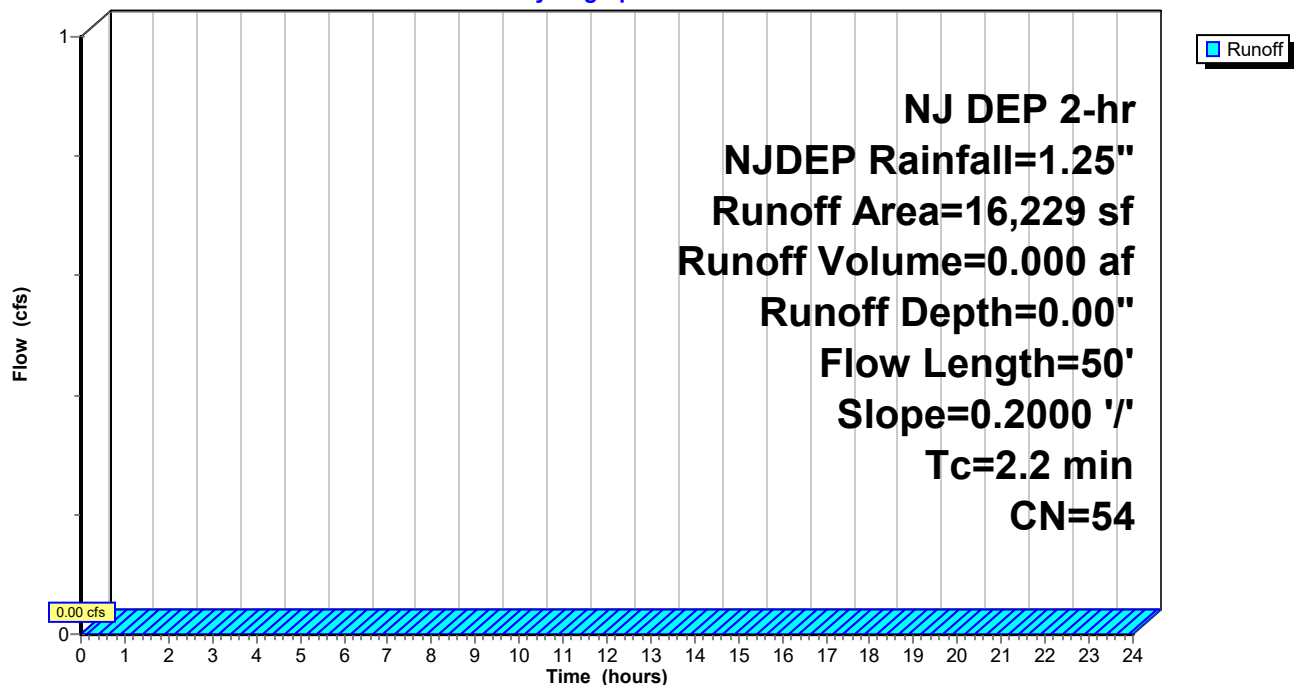
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NJ DEP 2-hr NJDEP Rainfall=1.25"

	Area (sf)	CN	Description
*	2,842	98	CONCRETE
*	1,181	98	CART PATH
	12,206	39	>75% Grass cover, Good, HSG A
	16,229	54	Weighted Average
	12,206		75.21% Pervious Area
	4,023		24.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.2	50	0.2000	0.39		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"

Subcatchment 2S: CART BUILDING SITE

Hydrograph



POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 90

Hydrograph for Subcatchment 2S: CART BUILDING SITE

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	1.25	0.00	0.00
0.25	0.03	0.00	0.00	13.25	1.25	0.00	0.00
0.50	0.10	0.00	0.00	13.50	1.25	0.00	0.00
0.75	0.20	0.00	0.00	13.75	1.25	0.00	0.00
1.00	0.63	0.00	0.00	14.00	1.25	0.00	0.00
1.25	1.05	0.00	0.00	14.25	1.25	0.00	0.00
1.50	1.15	0.00	0.00	14.50	1.25	0.00	0.00
1.75	1.23	0.00	0.00	14.75	1.25	0.00	0.00
2.00	1.25	0.00	0.00	15.00	1.25	0.00	0.00
2.25	1.25	0.00	0.00	15.25	1.25	0.00	0.00
2.50	1.25	0.00	0.00	15.50	1.25	0.00	0.00
2.75	1.25	0.00	0.00	15.75	1.25	0.00	0.00
3.00	1.25	0.00	0.00	16.00	1.25	0.00	0.00
3.25	1.25	0.00	0.00	16.25	1.25	0.00	0.00
3.50	1.25	0.00	0.00	16.50	1.25	0.00	0.00
3.75	1.25	0.00	0.00	16.75	1.25	0.00	0.00
4.00	1.25	0.00	0.00	17.00	1.25	0.00	0.00
4.25	1.25	0.00	0.00	17.25	1.25	0.00	0.00
4.50	1.25	0.00	0.00	17.50	1.25	0.00	0.00
4.75	1.25	0.00	0.00	17.75	1.25	0.00	0.00
5.00	1.25	0.00	0.00	18.00	1.25	0.00	0.00
5.25	1.25	0.00	0.00	18.25	1.25	0.00	0.00
5.50	1.25	0.00	0.00	18.50	1.25	0.00	0.00
5.75	1.25	0.00	0.00	18.75	1.25	0.00	0.00
6.00	1.25	0.00	0.00	19.00	1.25	0.00	0.00
6.25	1.25	0.00	0.00	19.25	1.25	0.00	0.00
6.50	1.25	0.00	0.00	19.50	1.25	0.00	0.00
6.75	1.25	0.00	0.00	19.75	1.25	0.00	0.00
7.00	1.25	0.00	0.00	20.00	1.25	0.00	0.00
7.25	1.25	0.00	0.00	20.25	1.25	0.00	0.00
7.50	1.25	0.00	0.00	20.50	1.25	0.00	0.00
7.75	1.25	0.00	0.00	20.75	1.25	0.00	0.00
8.00	1.25	0.00	0.00	21.00	1.25	0.00	0.00
8.25	1.25	0.00	0.00	21.25	1.25	0.00	0.00
8.50	1.25	0.00	0.00	21.50	1.25	0.00	0.00
8.75	1.25	0.00	0.00	21.75	1.25	0.00	0.00
9.00	1.25	0.00	0.00	22.00	1.25	0.00	0.00
9.25	1.25	0.00	0.00	22.25	1.25	0.00	0.00
9.50	1.25	0.00	0.00	22.50	1.25	0.00	0.00
9.75	1.25	0.00	0.00	22.75	1.25	0.00	0.00
10.00	1.25	0.00	0.00	23.00	1.25	0.00	0.00
10.25	1.25	0.00	0.00	23.25	1.25	0.00	0.00
10.50	1.25	0.00	0.00	23.50	1.25	0.00	0.00
10.75	1.25	0.00	0.00	23.75	1.25	0.00	0.00
11.00	1.25	0.00	0.00	24.00	1.25	0.00	0.00
11.25	1.25	0.00	0.00				
11.50	1.25	0.00	0.00				
11.75	1.25	0.00	0.00				
12.00	1.25	0.00	0.00				
12.25	1.25	0.00	0.00				
12.50	1.25	0.00	0.00				
12.75	1.25	0.00	0.00				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NJ DEP 2-hr NJDEP Rainfall=1.25"

Printed 8/22/2023

Page 91

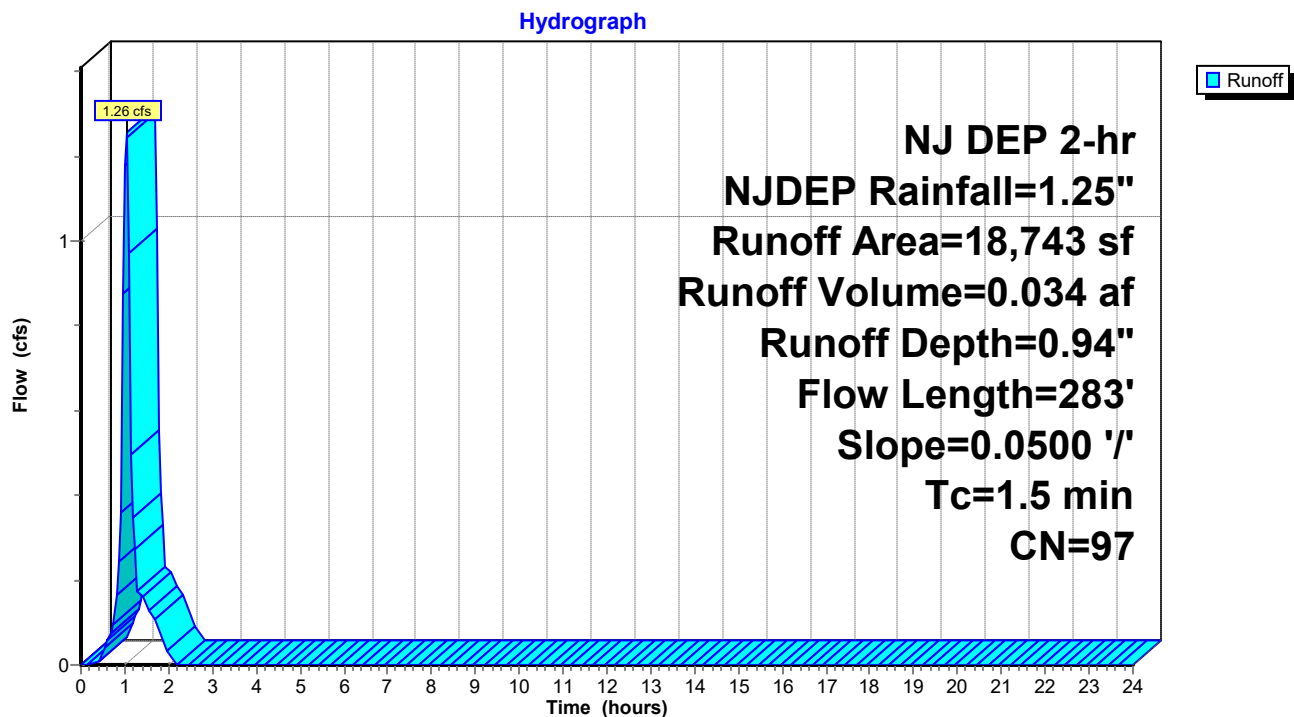
Summary for Subcatchment 5S: PARKING LOT AREA TO BIO-RETENTION[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 1.26 cfs @ 1.03 hrs, Volume= 0.034 af, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NJ DEP 2-hr NJDEP Rainfall=1.25"

	Area (sf)	CN	Description
*	1,240	76	BIO-RETENTION ISLANDS
*	17,503	98	PARKING LOT TO BIORETENTION
	18,743	97	Weighted Average
	1,240		6.62% Pervious Area
	17,503		93.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0500	2.06		Sheet Flow, Pavement
					Smooth surfaces $n=0.011$ $P2=3.44"$
0.7	183	0.0500	4.54		Shallow Concentrated Flow,
					Paved $K_v=20.3$ fps
1.5	283	Total			

Subcatchment 5S: PARKING LOT AREA TO BIO-RETENTION

POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 92

Hydrograph for Subcatchment 5S: PARKING LOT AREA TO BIO-RETENTION

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	1.25	0.94	0.00
0.25	0.03	0.00	0.00	13.25	1.25	0.94	0.00
0.50	0.10	0.00	0.02	13.50	1.25	0.94	0.00
0.75	0.20	0.04	0.10	13.75	1.25	0.94	0.00
1.00	0.63	0.36	1.18	14.00	1.25	0.94	0.00
1.25	1.05	0.75	0.27	14.25	1.25	0.94	0.00
1.50	1.15	0.85	0.16	14.50	1.25	0.94	0.00
1.75	1.23	0.92	0.12	14.75	1.25	0.94	0.00
2.00	1.25	0.94	0.04	15.00	1.25	0.94	0.00
2.25	1.25	0.94	0.00	15.25	1.25	0.94	0.00
2.50	1.25	0.94	0.00	15.50	1.25	0.94	0.00
2.75	1.25	0.94	0.00	15.75	1.25	0.94	0.00
3.00	1.25	0.94	0.00	16.00	1.25	0.94	0.00
3.25	1.25	0.94	0.00	16.25	1.25	0.94	0.00
3.50	1.25	0.94	0.00	16.50	1.25	0.94	0.00
3.75	1.25	0.94	0.00	16.75	1.25	0.94	0.00
4.00	1.25	0.94	0.00	17.00	1.25	0.94	0.00
4.25	1.25	0.94	0.00	17.25	1.25	0.94	0.00
4.50	1.25	0.94	0.00	17.50	1.25	0.94	0.00
4.75	1.25	0.94	0.00	17.75	1.25	0.94	0.00
5.00	1.25	0.94	0.00	18.00	1.25	0.94	0.00
5.25	1.25	0.94	0.00	18.25	1.25	0.94	0.00
5.50	1.25	0.94	0.00	18.50	1.25	0.94	0.00
5.75	1.25	0.94	0.00	18.75	1.25	0.94	0.00
6.00	1.25	0.94	0.00	19.00	1.25	0.94	0.00
6.25	1.25	0.94	0.00	19.25	1.25	0.94	0.00
6.50	1.25	0.94	0.00	19.50	1.25	0.94	0.00
6.75	1.25	0.94	0.00	19.75	1.25	0.94	0.00
7.00	1.25	0.94	0.00	20.00	1.25	0.94	0.00
7.25	1.25	0.94	0.00	20.25	1.25	0.94	0.00
7.50	1.25	0.94	0.00	20.50	1.25	0.94	0.00
7.75	1.25	0.94	0.00	20.75	1.25	0.94	0.00
8.00	1.25	0.94	0.00	21.00	1.25	0.94	0.00
8.25	1.25	0.94	0.00	21.25	1.25	0.94	0.00
8.50	1.25	0.94	0.00	21.50	1.25	0.94	0.00
8.75	1.25	0.94	0.00	21.75	1.25	0.94	0.00
9.00	1.25	0.94	0.00	22.00	1.25	0.94	0.00
9.25	1.25	0.94	0.00	22.25	1.25	0.94	0.00
9.50	1.25	0.94	0.00	22.50	1.25	0.94	0.00
9.75	1.25	0.94	0.00	22.75	1.25	0.94	0.00
10.00	1.25	0.94	0.00	23.00	1.25	0.94	0.00
10.25	1.25	0.94	0.00	23.25	1.25	0.94	0.00
10.50	1.25	0.94	0.00	23.50	1.25	0.94	0.00
10.75	1.25	0.94	0.00	23.75	1.25	0.94	0.00
11.00	1.25	0.94	0.00	24.00	1.25	0.94	0.00
11.25	1.25	0.94	0.00				
11.50	1.25	0.94	0.00				
11.75	1.25	0.94	0.00				
12.00	1.25	0.94	0.00				
12.25	1.25	0.94	0.00				
12.50	1.25	0.94	0.00				
12.75	1.25	0.94	0.00				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NJ DEP 2-hr NJDEP Rainfall=1.25"

Printed 8/22/2023

Page 93

Summary for Subcatchment 8S: OTHER PARKING LOT AREAS

Runoff = 0.77 cfs @ 1.14 hrs, Volume= 0.022 af, Depth= 0.27"

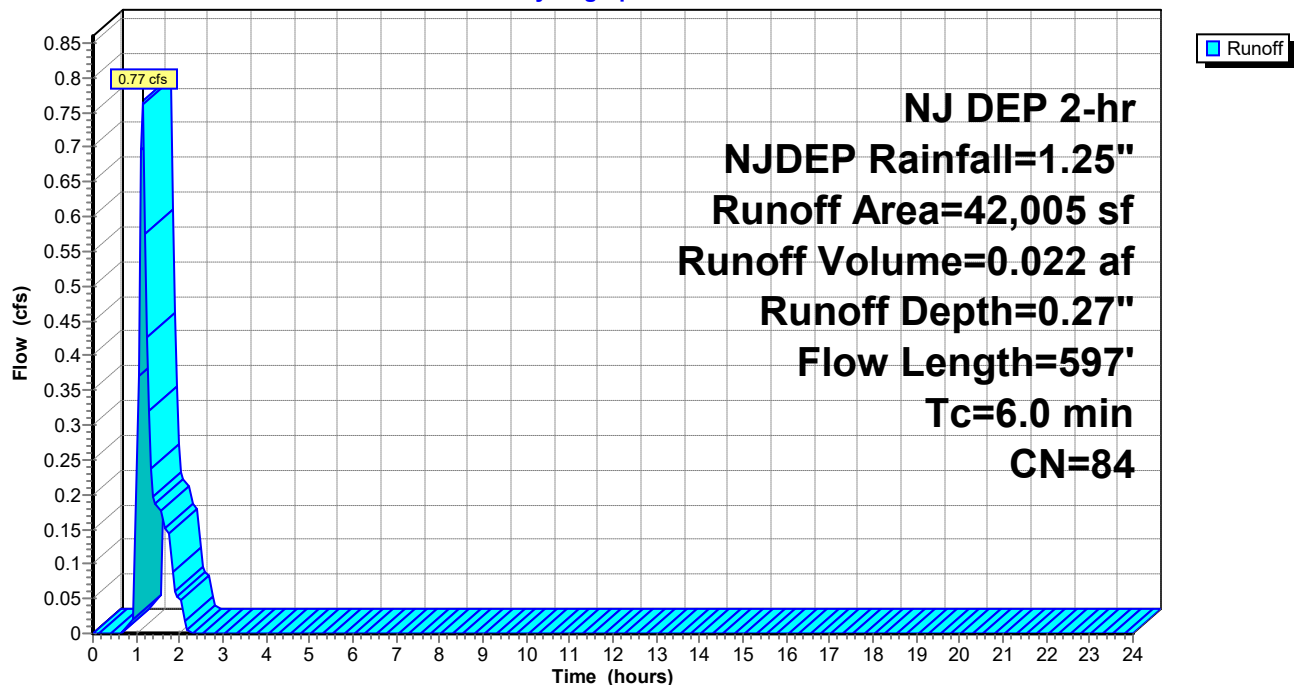
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr NJDEP Rainfall=1.25"

Area (sf)	CN	Description
10,082	39	>75% Grass cover, Good, HSG A
* 1,650	98	CART PATH
* 30,273	98	UNDISTURBED PARKING LOT
42,005	84	Weighted Average
10,082		24.00% Pervious Area
31,923		76.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	76	0.0900	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"
1.8	521	0.0580	4.89		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.0	597	Total			

Subcatchment 8S: OTHER PARKING LOT AREAS

Hydrograph



POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 94

Hydrograph for Subcatchment 8S: OTHER PARKING LOT AREAS

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	1.25	0.27	0.00
0.25	0.03	0.00	0.00	13.25	1.25	0.27	0.00
0.50	0.10	0.00	0.00	13.50	1.25	0.27	0.00
0.75	0.20	0.00	0.00	13.75	1.25	0.27	0.00
1.00	0.63	0.03	0.09	14.00	1.25	0.27	0.00
1.25	1.05	0.17	0.42	14.25	1.25	0.27	0.00
1.50	1.15	0.22	0.19	14.50	1.25	0.27	0.00
1.75	1.23	0.26	0.15	14.75	1.25	0.27	0.00
2.00	1.25	0.27	0.05	15.00	1.25	0.27	0.00
2.25	1.25	0.27	0.00	15.25	1.25	0.27	0.00
2.50	1.25	0.27	0.00	15.50	1.25	0.27	0.00
2.75	1.25	0.27	0.00	15.75	1.25	0.27	0.00
3.00	1.25	0.27	0.00	16.00	1.25	0.27	0.00
3.25	1.25	0.27	0.00	16.25	1.25	0.27	0.00
3.50	1.25	0.27	0.00	16.50	1.25	0.27	0.00
3.75	1.25	0.27	0.00	16.75	1.25	0.27	0.00
4.00	1.25	0.27	0.00	17.00	1.25	0.27	0.00
4.25	1.25	0.27	0.00	17.25	1.25	0.27	0.00
4.50	1.25	0.27	0.00	17.50	1.25	0.27	0.00
4.75	1.25	0.27	0.00	17.75	1.25	0.27	0.00
5.00	1.25	0.27	0.00	18.00	1.25	0.27	0.00
5.25	1.25	0.27	0.00	18.25	1.25	0.27	0.00
5.50	1.25	0.27	0.00	18.50	1.25	0.27	0.00
5.75	1.25	0.27	0.00	18.75	1.25	0.27	0.00
6.00	1.25	0.27	0.00	19.00	1.25	0.27	0.00
6.25	1.25	0.27	0.00	19.25	1.25	0.27	0.00
6.50	1.25	0.27	0.00	19.50	1.25	0.27	0.00
6.75	1.25	0.27	0.00	19.75	1.25	0.27	0.00
7.00	1.25	0.27	0.00	20.00	1.25	0.27	0.00
7.25	1.25	0.27	0.00	20.25	1.25	0.27	0.00
7.50	1.25	0.27	0.00	20.50	1.25	0.27	0.00
7.75	1.25	0.27	0.00	20.75	1.25	0.27	0.00
8.00	1.25	0.27	0.00	21.00	1.25	0.27	0.00
8.25	1.25	0.27	0.00	21.25	1.25	0.27	0.00
8.50	1.25	0.27	0.00	21.50	1.25	0.27	0.00
8.75	1.25	0.27	0.00	21.75	1.25	0.27	0.00
9.00	1.25	0.27	0.00	22.00	1.25	0.27	0.00
9.25	1.25	0.27	0.00	22.25	1.25	0.27	0.00
9.50	1.25	0.27	0.00	22.50	1.25	0.27	0.00
9.75	1.25	0.27	0.00	22.75	1.25	0.27	0.00
10.00	1.25	0.27	0.00	23.00	1.25	0.27	0.00
10.25	1.25	0.27	0.00	23.25	1.25	0.27	0.00
10.50	1.25	0.27	0.00	23.50	1.25	0.27	0.00
10.75	1.25	0.27	0.00	23.75	1.25	0.27	0.00
11.00	1.25	0.27	0.00	24.00	1.25	0.27	0.00
11.25	1.25	0.27	0.00				
11.50	1.25	0.27	0.00				
11.75	1.25	0.27	0.00				
12.00	1.25	0.27	0.00				
12.25	1.25	0.27	0.00				
12.50	1.25	0.27	0.00				
12.75	1.25	0.27	0.00				

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NJ DEP 2-hr NJDEP Rainfall=1.25"

Printed 8/22/2023

Page 95

Summary for Subcatchment 9S: COMFORT STATION AREA[49] Hint: $T_c < 2dt$ may require smaller dt

Runoff = 0.04 cfs @ 1.08 hrs, Volume= 0.001 af, Depth= 1.03"

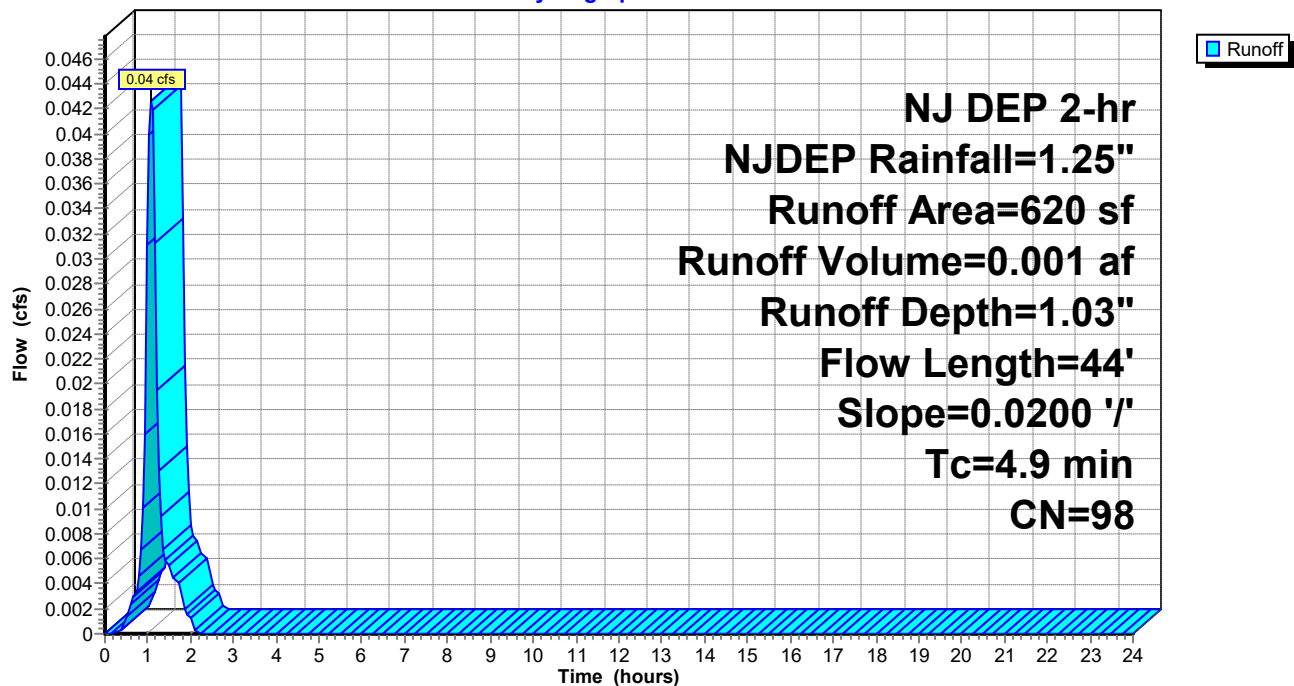
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, $dt=0.05$ hrs
NJ DEP 2-hr NJDEP Rainfall=1.25"

Area (sf)	CN	Description
620	98	Roofs, HSG A
620		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	44	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.44"

Subcatchment 9S: COMFORT STATION AREA

Hydrograph



POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 96

Hydrograph for Subcatchment 9S: COMFORT STATION AREA

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	13.00	1.25	1.03	0.00
0.25	0.03	0.00	0.00	13.25	1.25	1.03	0.00
0.50	0.10	0.01	0.00	13.50	1.25	1.03	0.00
0.75	0.20	0.07	0.00	13.75	1.25	1.03	0.00
1.00	0.63	0.43	0.03	14.00	1.25	1.03	0.00
1.25	1.05	0.84	0.01	14.25	1.25	1.03	0.00
1.50	1.15	0.94	0.01	14.50	1.25	1.03	0.00
1.75	1.23	1.01	0.00	14.75	1.25	1.03	0.00
2.00	1.25	1.03	0.00	15.00	1.25	1.03	0.00
2.25	1.25	1.03	0.00	15.25	1.25	1.03	0.00
2.50	1.25	1.03	0.00	15.50	1.25	1.03	0.00
2.75	1.25	1.03	0.00	15.75	1.25	1.03	0.00
3.00	1.25	1.03	0.00	16.00	1.25	1.03	0.00
3.25	1.25	1.03	0.00	16.25	1.25	1.03	0.00
3.50	1.25	1.03	0.00	16.50	1.25	1.03	0.00
3.75	1.25	1.03	0.00	16.75	1.25	1.03	0.00
4.00	1.25	1.03	0.00	17.00	1.25	1.03	0.00
4.25	1.25	1.03	0.00	17.25	1.25	1.03	0.00
4.50	1.25	1.03	0.00	17.50	1.25	1.03	0.00
4.75	1.25	1.03	0.00	17.75	1.25	1.03	0.00
5.00	1.25	1.03	0.00	18.00	1.25	1.03	0.00
5.25	1.25	1.03	0.00	18.25	1.25	1.03	0.00
5.50	1.25	1.03	0.00	18.50	1.25	1.03	0.00
5.75	1.25	1.03	0.00	18.75	1.25	1.03	0.00
6.00	1.25	1.03	0.00	19.00	1.25	1.03	0.00
6.25	1.25	1.03	0.00	19.25	1.25	1.03	0.00
6.50	1.25	1.03	0.00	19.50	1.25	1.03	0.00
6.75	1.25	1.03	0.00	19.75	1.25	1.03	0.00
7.00	1.25	1.03	0.00	20.00	1.25	1.03	0.00
7.25	1.25	1.03	0.00	20.25	1.25	1.03	0.00
7.50	1.25	1.03	0.00	20.50	1.25	1.03	0.00
7.75	1.25	1.03	0.00	20.75	1.25	1.03	0.00
8.00	1.25	1.03	0.00	21.00	1.25	1.03	0.00
8.25	1.25	1.03	0.00	21.25	1.25	1.03	0.00
8.50	1.25	1.03	0.00	21.50	1.25	1.03	0.00
8.75	1.25	1.03	0.00	21.75	1.25	1.03	0.00
9.00	1.25	1.03	0.00	22.00	1.25	1.03	0.00
9.25	1.25	1.03	0.00	22.25	1.25	1.03	0.00
9.50	1.25	1.03	0.00	22.50	1.25	1.03	0.00
9.75	1.25	1.03	0.00	22.75	1.25	1.03	0.00
10.00	1.25	1.03	0.00	23.00	1.25	1.03	0.00
10.25	1.25	1.03	0.00	23.25	1.25	1.03	0.00
10.50	1.25	1.03	0.00	23.50	1.25	1.03	0.00
10.75	1.25	1.03	0.00	23.75	1.25	1.03	0.00
11.00	1.25	1.03	0.00	24.00	1.25	1.03	0.00
11.25	1.25	1.03	0.00				
11.50	1.25	1.03	0.00				
11.75	1.25	1.03	0.00				
12.00	1.25	1.03	0.00				
12.25	1.25	1.03	0.00				
12.50	1.25	1.03	0.00				
12.75	1.25	1.03	0.00				

POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 97

Summary for Pond 3P: DRY WELLS

Inflow Area = 0.141 ac, 100.00% Impervious, Inflow Depth = 1.03" for NJDEP event
 Inflow = 0.46 cfs @ 1.03 hrs, Volume= 0.012 af
 Outflow = 0.17 cfs @ 1.13 hrs, Volume= 0.012 af, Atten= 62%, Lag= 6.4 min
 Discarded = 0.17 cfs @ 1.13 hrs, Volume= 0.012 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 0.84' @ 1.13 hrs Surf.Area= 0.012 ac Storage= 0.004 af

Plug-Flow detention time= 9.0 min calculated for 0.012 af (100% of inflow)
 Center-of-Mass det. time= 9.0 min (73.7 - 64.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1.00'	0.009 af	24.0" Round Pipe Storage Inside #2 L= 130.0'
#2	0.00'	0.015 af	4.00'W x 130.00'L x 4.00'H Prismatic 0.048 af Overall - 0.009 af Embedded = 0.038 af x 40.0% Voids
		0.025 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	4.00'	8.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	0.00'	10.000 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.17 cfs @ 1.13 hrs HW=0.83' (Free Discharge)
 ↑ **2=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑ **1=Orifice/Grate** (Controls 0.00 cfs)

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

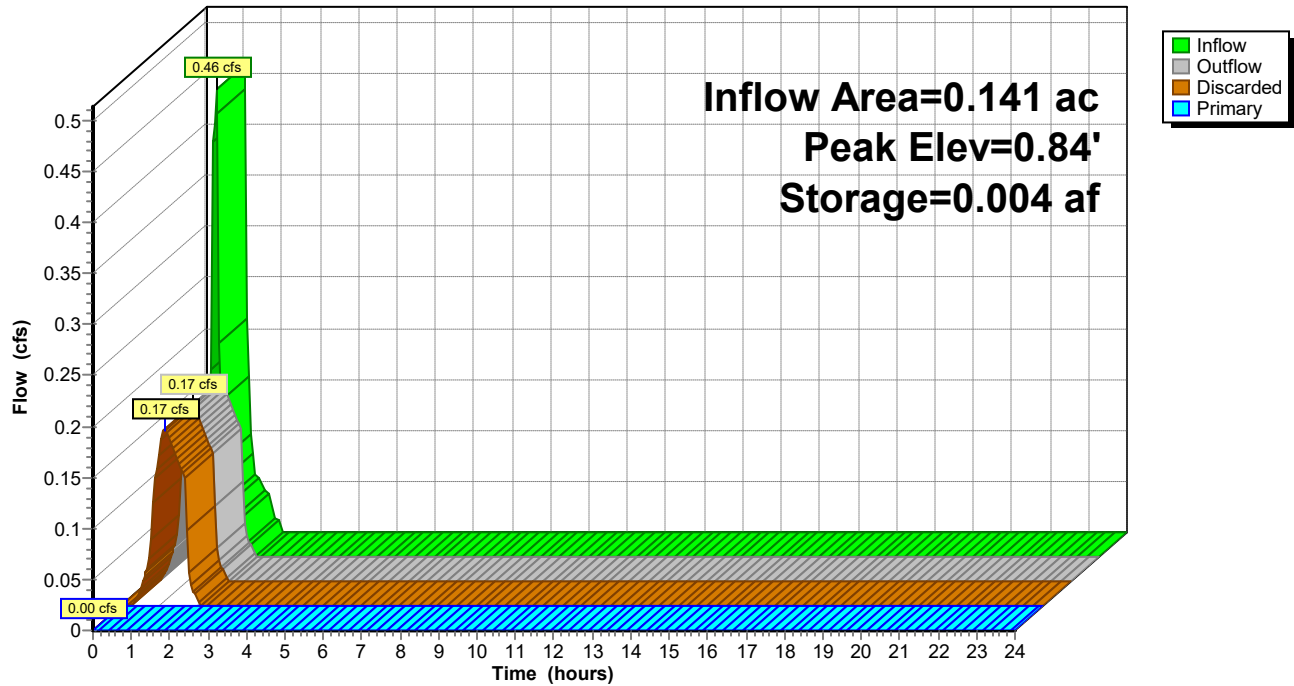
NJ DEP 2-hr NJDEP Rainfall=1.25"

Printed 8/22/2023

Page 98

Pond 3P: DRY WELLS

Hydrograph



POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 99

Hydrograph for Pond 3P: DRY WELLS

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	0.00	0.00	0.00	0.00
0.50	0.02	0.000	0.01	0.02	0.02	0.00
1.00	0.42	0.002	0.45	0.15	0.15	0.00
1.50	0.05	0.001	0.31	0.14	0.14	0.00
2.00	0.01	0.000	0.00	0.01	0.01	0.00
2.50	0.00	0.000	0.00	0.00	0.00	0.00
3.00	0.00	0.000	0.00	0.00	0.00	0.00
3.50	0.00	0.000	0.00	0.00	0.00	0.00
4.00	0.00	0.000	0.00	0.00	0.00	0.00
4.50	0.00	0.000	0.00	0.00	0.00	0.00
5.00	0.00	0.000	0.00	0.00	0.00	0.00
5.50	0.00	0.000	0.00	0.00	0.00	0.00
6.00	0.00	0.000	0.00	0.00	0.00	0.00
6.50	0.00	0.000	0.00	0.00	0.00	0.00
7.00	0.00	0.000	0.00	0.00	0.00	0.00
7.50	0.00	0.000	0.00	0.00	0.00	0.00
8.00	0.00	0.000	0.00	0.00	0.00	0.00
8.50	0.00	0.000	0.00	0.00	0.00	0.00
9.00	0.00	0.000	0.00	0.00	0.00	0.00
9.50	0.00	0.000	0.00	0.00	0.00	0.00
10.00	0.00	0.000	0.00	0.00	0.00	0.00
10.50	0.00	0.000	0.00	0.00	0.00	0.00
11.00	0.00	0.000	0.00	0.00	0.00	0.00
11.50	0.00	0.000	0.00	0.00	0.00	0.00
12.00	0.00	0.000	0.00	0.00	0.00	0.00
12.50	0.00	0.000	0.00	0.00	0.00	0.00
13.00	0.00	0.000	0.00	0.00	0.00	0.00
13.50	0.00	0.000	0.00	0.00	0.00	0.00
14.00	0.00	0.000	0.00	0.00	0.00	0.00
14.50	0.00	0.000	0.00	0.00	0.00	0.00
15.00	0.00	0.000	0.00	0.00	0.00	0.00
15.50	0.00	0.000	0.00	0.00	0.00	0.00
16.00	0.00	0.000	0.00	0.00	0.00	0.00
16.50	0.00	0.000	0.00	0.00	0.00	0.00
17.00	0.00	0.000	0.00	0.00	0.00	0.00
17.50	0.00	0.000	0.00	0.00	0.00	0.00
18.00	0.00	0.000	0.00	0.00	0.00	0.00
18.50	0.00	0.000	0.00	0.00	0.00	0.00
19.00	0.00	0.000	0.00	0.00	0.00	0.00
19.50	0.00	0.000	0.00	0.00	0.00	0.00
20.00	0.00	0.000	0.00	0.00	0.00	0.00
20.50	0.00	0.000	0.00	0.00	0.00	0.00
21.00	0.00	0.000	0.00	0.00	0.00	0.00
21.50	0.00	0.000	0.00	0.00	0.00	0.00
22.00	0.00	0.000	0.00	0.00	0.00	0.00
22.50	0.00	0.000	0.00	0.00	0.00	0.00
23.00	0.00	0.000	0.00	0.00	0.00	0.00
23.50	0.00	0.000	0.00	0.00	0.00	0.00
24.00	0.00	0.000	0.00	0.00	0.00	0.00

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NJ DEP 2-hr NJDEP Rainfall=1.25"

Printed 8/22/2023

Page 100

Summary for Pond 4P: TOTAL CART BARN AREA

[40] Hint: Not Described (Outflow=Inflow)

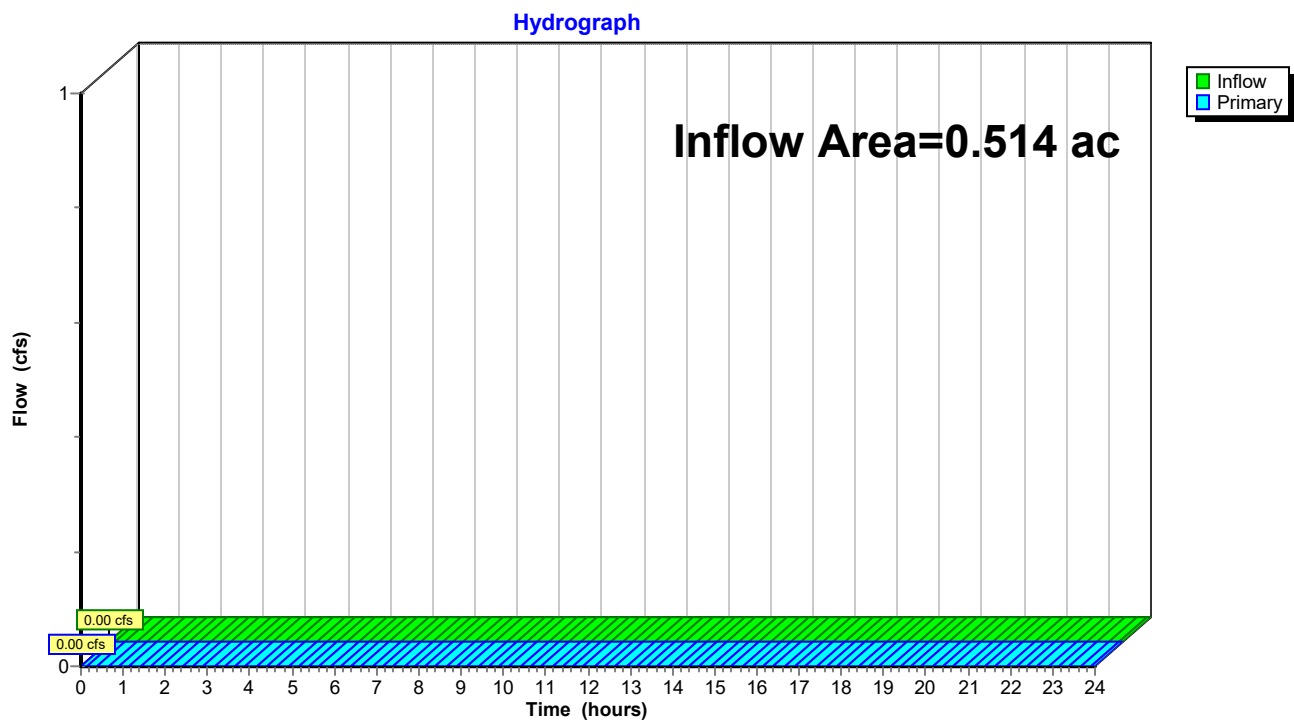
Inflow Area = 0.514 ac, 45.44% Impervious, Inflow Depth = 0.00" for NJDEP event

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 4P: TOTAL CART BARN AREA



POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 101

Hydrograph for Pond 4P: TOTAL CART BARN AREA

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00	13.00	0.00		0.00
0.25	0.00		0.00	13.25	0.00		0.00
0.50	0.00		0.00	13.50	0.00		0.00
0.75	0.00		0.00	13.75	0.00		0.00
1.00	0.00		0.00	14.00	0.00		0.00
1.25	0.00		0.00	14.25	0.00		0.00
1.50	0.00		0.00	14.50	0.00		0.00
1.75	0.00		0.00	14.75	0.00		0.00
2.00	0.00		0.00	15.00	0.00		0.00
2.25	0.00		0.00	15.25	0.00		0.00
2.50	0.00		0.00	15.50	0.00		0.00
2.75	0.00		0.00	15.75	0.00		0.00
3.00	0.00		0.00	16.00	0.00		0.00
3.25	0.00		0.00	16.25	0.00		0.00
3.50	0.00		0.00	16.50	0.00		0.00
3.75	0.00		0.00	16.75	0.00		0.00
4.00	0.00		0.00	17.00	0.00		0.00
4.25	0.00		0.00	17.25	0.00		0.00
4.50	0.00		0.00	17.50	0.00		0.00
4.75	0.00		0.00	17.75	0.00		0.00
5.00	0.00		0.00	18.00	0.00		0.00
5.25	0.00		0.00	18.25	0.00		0.00
5.50	0.00		0.00	18.50	0.00		0.00
5.75	0.00		0.00	18.75	0.00		0.00
6.00	0.00		0.00	19.00	0.00		0.00
6.25	0.00		0.00	19.25	0.00		0.00
6.50	0.00		0.00	19.50	0.00		0.00
6.75	0.00		0.00	19.75	0.00		0.00
7.00	0.00		0.00	20.00	0.00		0.00
7.25	0.00		0.00	20.25	0.00		0.00
7.50	0.00		0.00	20.50	0.00		0.00
7.75	0.00		0.00	20.75	0.00		0.00
8.00	0.00		0.00	21.00	0.00		0.00
8.25	0.00		0.00	21.25	0.00		0.00
8.50	0.00		0.00	21.50	0.00		0.00
8.75	0.00		0.00	21.75	0.00		0.00
9.00	0.00		0.00	22.00	0.00		0.00
9.25	0.00		0.00	22.25	0.00		0.00
9.50	0.00		0.00	22.50	0.00		0.00
9.75	0.00		0.00	22.75	0.00		0.00
10.00	0.00		0.00	23.00	0.00		0.00
10.25	0.00		0.00	23.25	0.00		0.00
10.50	0.00		0.00	23.50	0.00		0.00
10.75	0.00		0.00	23.75	0.00		0.00
11.00	0.00		0.00	24.00	0.00		0.00
11.25	0.00		0.00				
11.50	0.00		0.00				
11.75	0.00		0.00				
12.00	0.00		0.00				
12.25	0.00		0.00				
12.50	0.00		0.00				
12.75	0.00		0.00				

POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 102

Summary for Pond 6P: POROUS PAVEMENT

Inflow Area = 0.373 ac, 24.79% Impervious, Inflow Depth = 0.00" for NJDEP event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 0.00' @ 0.00 hrs Surf.Area= 0.069 ac Storage= 0.000 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

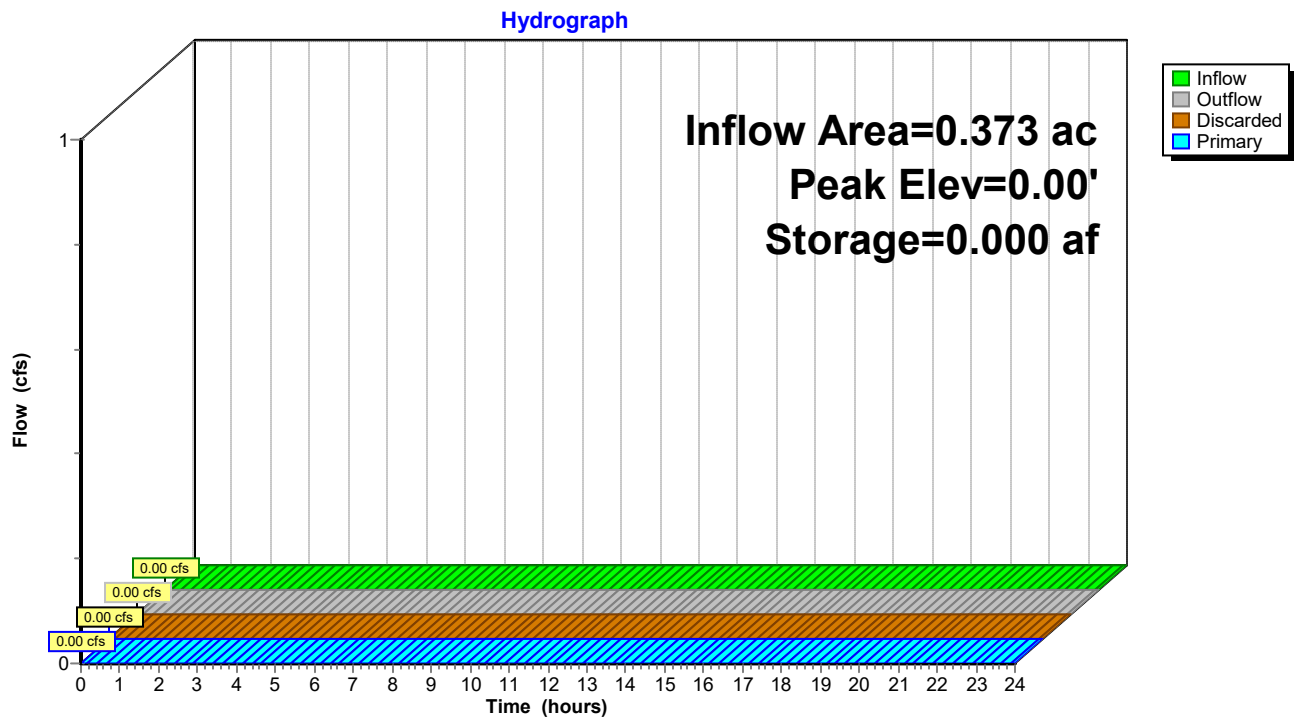
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.041 af	30.00'W x 100.00'L x 1.50'H Prismatic 0.103 af Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	10.000 in/hr Exfiltration over Horizontal area
#2	Primary	1.00'	20.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑1=Exfiltration (Passes 0.00 cfs of 0.69 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 6P: POROUS PAVEMENT



POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 104

Hydrograph for Pond 6P: POROUS PAVEMENT

Time (hours)	Inflow (cfs)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.00	0.00	0.00	0.00
0.50	0.00	0.00	0.00	0.00	0.00
1.00	0.00	0.00	0.00	0.00	0.00
1.50	0.00	0.00	0.00	0.00	0.00
2.00	0.00	0.00	0.00	0.00	0.00
2.50	0.00	0.00	0.00	0.00	0.00
3.00	0.00	0.00	0.00	0.00	0.00
3.50	0.00	0.00	0.00	0.00	0.00
4.00	0.00	0.00	0.00	0.00	0.00
4.50	0.00	0.00	0.00	0.00	0.00
5.00	0.00	0.00	0.00	0.00	0.00
5.50	0.00	0.00	0.00	0.00	0.00
6.00	0.00	0.00	0.00	0.00	0.00
6.50	0.00	0.00	0.00	0.00	0.00
7.00	0.00	0.00	0.00	0.00	0.00
7.50	0.00	0.00	0.00	0.00	0.00
8.00	0.00	0.00	0.00	0.00	0.00
8.50	0.00	0.00	0.00	0.00	0.00
9.00	0.00	0.00	0.00	0.00	0.00
9.50	0.00	0.00	0.00	0.00	0.00
10.00	0.00	0.00	0.00	0.00	0.00
10.50	0.00	0.00	0.00	0.00	0.00
11.00	0.00	0.00	0.00	0.00	0.00
11.50	0.00	0.00	0.00	0.00	0.00
12.00	0.00	0.00	0.00	0.00	0.00
12.50	0.00	0.00	0.00	0.00	0.00
13.00	0.00	0.00	0.00	0.00	0.00
13.50	0.00	0.00	0.00	0.00	0.00
14.00	0.00	0.00	0.00	0.00	0.00
14.50	0.00	0.00	0.00	0.00	0.00
15.00	0.00	0.00	0.00	0.00	0.00
15.50	0.00	0.00	0.00	0.00	0.00
16.00	0.00	0.00	0.00	0.00	0.00
16.50	0.00	0.00	0.00	0.00	0.00
17.00	0.00	0.00	0.00	0.00	0.00
17.50	0.00	0.00	0.00	0.00	0.00
18.00	0.00	0.00	0.00	0.00	0.00
18.50	0.00	0.00	0.00	0.00	0.00
19.00	0.00	0.00	0.00	0.00	0.00
19.50	0.00	0.00	0.00	0.00	0.00
20.00	0.00	0.00	0.00	0.00	0.00
20.50	0.00	0.00	0.00	0.00	0.00
21.00	0.00	0.00	0.00	0.00	0.00
21.50	0.00	0.00	0.00	0.00	0.00
22.00	0.00	0.00	0.00	0.00	0.00
22.50	0.00	0.00	0.00	0.00	0.00
23.00	0.00	0.00	0.00	0.00	0.00
23.50	0.00	0.00	0.00	0.00	0.00
24.00	0.00	0.00	0.00	0.00	0.00

POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 105

Summary for Pond 7P: PARKING BIO-RETENTION

Inflow Area = 0.430 ac, 93.38% Impervious, Inflow Depth = 0.94" for NJDEP event
 Inflow = 1.26 cfs @ 1.03 hrs, Volume= 0.034 af
 Outflow = 0.14 cfs @ 0.85 hrs, Volume= 0.034 af, Atten= 89%, Lag= 0.0 min
 Discarded = 0.14 cfs @ 0.85 hrs, Volume= 0.034 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 1.78' @ 1.52 hrs Surf.Area= 1,240 sf Storage= 885 cf

Plug-Flow detention time= 58.6 min calculated for 0.034 af (100% of inflow)
 Center-of-Mass det. time= 58.7 min (126.1 - 67.4)

Volume	Invert	Avail.Storage	Storage Description	
#1	0.00'	2,232 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	1,240	0.0	0	0
2.00	1,240	40.0	992	992
2.01	1,240	100.0	12	1,004
3.00	1,240	100.0	1,228	2,232

Device	Routing	Invert	Outlet Devices	
#1	Primary	4.00'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads	
#2	Secondary	4.50'	100.0' long x 0.5' breadth Broad-Crested Rectangular Weir	
			Head (feet) 0.20 0.40 0.60 0.80 1.00	
			Coef. (English) 2.80 2.92 3.08 3.30 3.32	
#3	Discarded	0.00'	5.000 in/hr Exfiltration over Surface area	

Discarded OutFlow Max=0.14 cfs @ 0.85 hrs HW=0.06' (Free Discharge)
 ↑ **3=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑ **1=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

POST

Prepared by {enter your company name here}

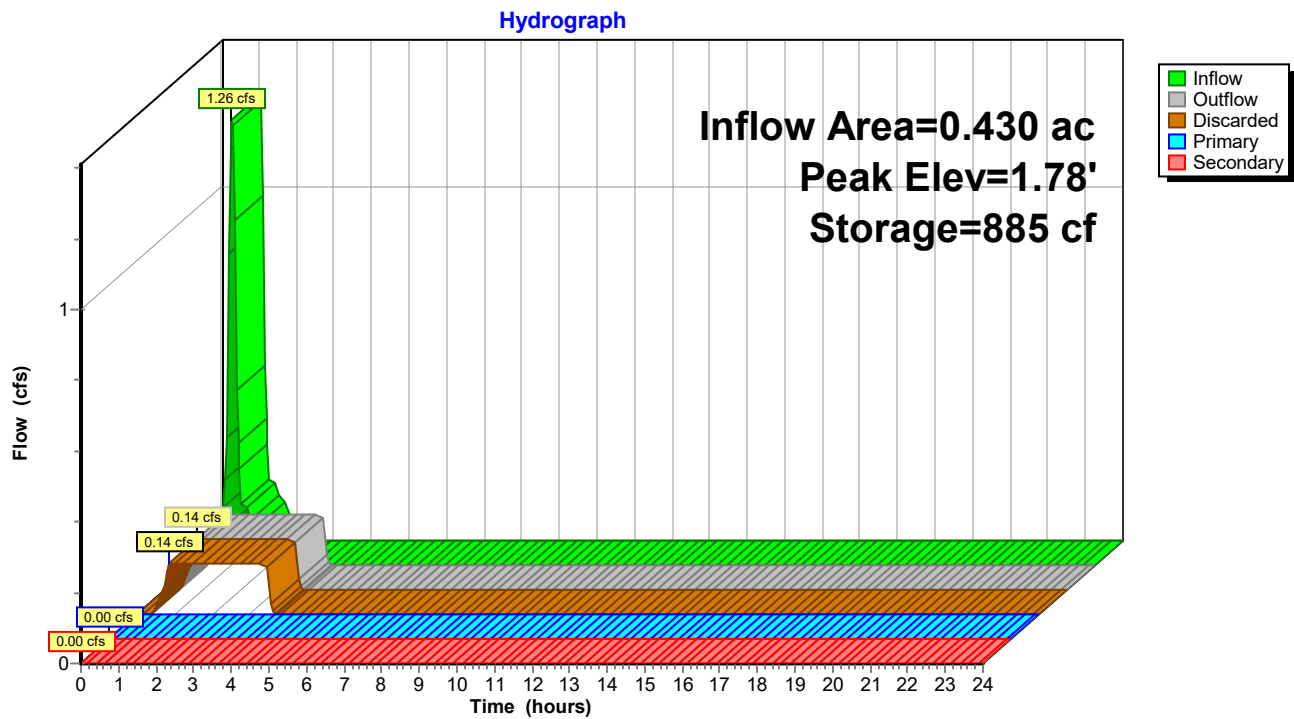
HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NJ DEP 2-hr NJDEP Rainfall=1.25"

Printed 8/22/2023

Page 106

Pond 7P: PARKING BIO-RETENTION



POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 107

Hydrograph for Pond 7P: PARKING BIO-RETENTION

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0	0.00	0.00	0.00	0.00	0.00
0.50	0.02	2	0.00	0.01	0.01	0.00	0.00
1.00	1.18	304	0.61	0.14	0.14	0.00	0.00
1.50	0.16	885	1.78	0.14	0.14	0.00	0.00
2.00	0.04	786	1.58	0.14	0.14	0.00	0.00
2.50	0.00	531	1.07	0.14	0.14	0.00	0.00
3.00	0.00	273	0.55	0.14	0.14	0.00	0.00
3.50	0.00	17	0.04	0.11	0.11	0.00	0.00
4.00	0.00	0	0.00	0.00	0.00	0.00	0.00
4.50	0.00	0	0.00	0.00	0.00	0.00	0.00
5.00	0.00	0	0.00	0.00	0.00	0.00	0.00
5.50	0.00	0	0.00	0.00	0.00	0.00	0.00
6.00	0.00	0	0.00	0.00	0.00	0.00	0.00
6.50	0.00	0	0.00	0.00	0.00	0.00	0.00
7.00	0.00	0	0.00	0.00	0.00	0.00	0.00
7.50	0.00	0	0.00	0.00	0.00	0.00	0.00
8.00	0.00	0	0.00	0.00	0.00	0.00	0.00
8.50	0.00	0	0.00	0.00	0.00	0.00	0.00
9.00	0.00	0	0.00	0.00	0.00	0.00	0.00
9.50	0.00	0	0.00	0.00	0.00	0.00	0.00
10.00	0.00	0	0.00	0.00	0.00	0.00	0.00
10.50	0.00	0	0.00	0.00	0.00	0.00	0.00
11.00	0.00	0	0.00	0.00	0.00	0.00	0.00
11.50	0.00	0	0.00	0.00	0.00	0.00	0.00
12.00	0.00	0	0.00	0.00	0.00	0.00	0.00
12.50	0.00	0	0.00	0.00	0.00	0.00	0.00
13.00	0.00	0	0.00	0.00	0.00	0.00	0.00
13.50	0.00	0	0.00	0.00	0.00	0.00	0.00
14.00	0.00	0	0.00	0.00	0.00	0.00	0.00
14.50	0.00	0	0.00	0.00	0.00	0.00	0.00
15.00	0.00	0	0.00	0.00	0.00	0.00	0.00
15.50	0.00	0	0.00	0.00	0.00	0.00	0.00
16.00	0.00	0	0.00	0.00	0.00	0.00	0.00
16.50	0.00	0	0.00	0.00	0.00	0.00	0.00
17.00	0.00	0	0.00	0.00	0.00	0.00	0.00
17.50	0.00	0	0.00	0.00	0.00	0.00	0.00
18.00	0.00	0	0.00	0.00	0.00	0.00	0.00
18.50	0.00	0	0.00	0.00	0.00	0.00	0.00
19.00	0.00	0	0.00	0.00	0.00	0.00	0.00
19.50	0.00	0	0.00	0.00	0.00	0.00	0.00
20.00	0.00	0	0.00	0.00	0.00	0.00	0.00
20.50	0.00	0	0.00	0.00	0.00	0.00	0.00
21.00	0.00	0	0.00	0.00	0.00	0.00	0.00
21.50	0.00	0	0.00	0.00	0.00	0.00	0.00
22.00	0.00	0	0.00	0.00	0.00	0.00	0.00
22.50	0.00	0	0.00	0.00	0.00	0.00	0.00
23.00	0.00	0	0.00	0.00	0.00	0.00	0.00
23.50	0.00	0	0.00	0.00	0.00	0.00	0.00
24.00	0.00	0	0.00	0.00	0.00	0.00	0.00

POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 108

Summary for Pond 11P: DRY WELLS

Inflow Area = 0.014 ac, 100.00% Impervious, Inflow Depth = 1.03" for NJDEP event
 Inflow = 0.04 cfs @ 1.08 hrs, Volume= 0.001 af
 Outflow = 0.02 cfs @ 1.05 hrs, Volume= 0.001 af, Atten= 43%, Lag= 0.0 min
 Discarded = 0.02 cfs @ 1.05 hrs, Volume= 0.001 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 0.18' @ 1.18 hrs Surf.Area= 0.002 ac Storage= 0.000 af

Plug-Flow detention time= 3.1 min calculated for 0.001 af (100% of inflow)
 Center-of-Mass det. time= 3.1 min (72.4 - 69.3)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	0.001 af	4.00'W x 4.00'L x 4.00'H Prismatic
#2	0.00'	0.002 af	3.00'W x 30.00'L x 3.00'H Prismatic
			0.006 af Overall - 0.001 af Embedded = 0.006 af x 40.0% Voids
#3	1.00'	0.001 af	12.0" Round Pipe Storage Inside #2
			L= 35.0'
		0.004 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	10.000 in/hr Exfiltration over Horizontal area
#2	Primary	4.00'	48.0" x 24.0" Horiz. Orifice/Grate C= 0.600
			Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 1.05 hrs HW=0.08' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.00 cfs)

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

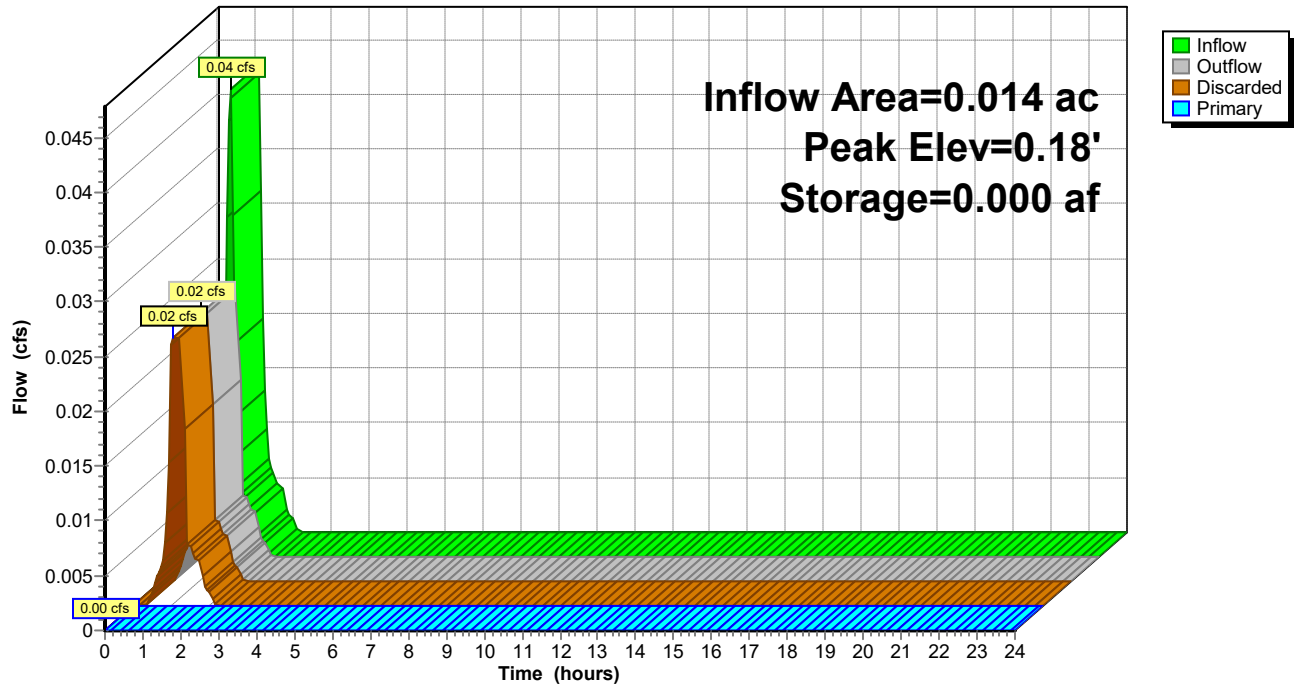
NJ DEP 2-hr NJDEP Rainfall=1.25"

Printed 8/22/2023

Page 109

Pond 11P: DRY WELLS

Hydrograph



POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 110

Hydrograph for Pond 11P: DRY WELLS

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0.000	0.00	0.00	0.00	0.00
0.50	0.00	0.000	0.00	0.00	0.00	0.00
1.00	0.03	0.000	0.04	0.02	0.02	0.00
1.50	0.01	0.000	0.01	0.01	0.01	0.00
2.00	0.00	0.000	0.00	0.00	0.00	0.00
2.50	0.00	0.000	0.00	0.00	0.00	0.00
3.00	0.00	0.000	0.00	0.00	0.00	0.00
3.50	0.00	0.000	0.00	0.00	0.00	0.00
4.00	0.00	0.000	0.00	0.00	0.00	0.00
4.50	0.00	0.000	0.00	0.00	0.00	0.00
5.00	0.00	0.000	0.00	0.00	0.00	0.00
5.50	0.00	0.000	0.00	0.00	0.00	0.00
6.00	0.00	0.000	0.00	0.00	0.00	0.00
6.50	0.00	0.000	0.00	0.00	0.00	0.00
7.00	0.00	0.000	0.00	0.00	0.00	0.00
7.50	0.00	0.000	0.00	0.00	0.00	0.00
8.00	0.00	0.000	0.00	0.00	0.00	0.00
8.50	0.00	0.000	0.00	0.00	0.00	0.00
9.00	0.00	0.000	0.00	0.00	0.00	0.00
9.50	0.00	0.000	0.00	0.00	0.00	0.00
10.00	0.00	0.000	0.00	0.00	0.00	0.00
10.50	0.00	0.000	0.00	0.00	0.00	0.00
11.00	0.00	0.000	0.00	0.00	0.00	0.00
11.50	0.00	0.000	0.00	0.00	0.00	0.00
12.00	0.00	0.000	0.00	0.00	0.00	0.00
12.50	0.00	0.000	0.00	0.00	0.00	0.00
13.00	0.00	0.000	0.00	0.00	0.00	0.00
13.50	0.00	0.000	0.00	0.00	0.00	0.00
14.00	0.00	0.000	0.00	0.00	0.00	0.00
14.50	0.00	0.000	0.00	0.00	0.00	0.00
15.00	0.00	0.000	0.00	0.00	0.00	0.00
15.50	0.00	0.000	0.00	0.00	0.00	0.00
16.00	0.00	0.000	0.00	0.00	0.00	0.00
16.50	0.00	0.000	0.00	0.00	0.00	0.00
17.00	0.00	0.000	0.00	0.00	0.00	0.00
17.50	0.00	0.000	0.00	0.00	0.00	0.00
18.00	0.00	0.000	0.00	0.00	0.00	0.00
18.50	0.00	0.000	0.00	0.00	0.00	0.00
19.00	0.00	0.000	0.00	0.00	0.00	0.00
19.50	0.00	0.000	0.00	0.00	0.00	0.00
20.00	0.00	0.000	0.00	0.00	0.00	0.00
20.50	0.00	0.000	0.00	0.00	0.00	0.00
21.00	0.00	0.000	0.00	0.00	0.00	0.00
21.50	0.00	0.000	0.00	0.00	0.00	0.00
22.00	0.00	0.000	0.00	0.00	0.00	0.00
22.50	0.00	0.000	0.00	0.00	0.00	0.00
23.00	0.00	0.000	0.00	0.00	0.00	0.00
23.50	0.00	0.000	0.00	0.00	0.00	0.00
24.00	0.00	0.000	0.00	0.00	0.00	0.00

POST

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

NJ DEP 2-hr NJDEP Rainfall=1.25"

Printed 8/22/2023

Page 111

Summary for Pond 12P: TOTAL PARKING LOT

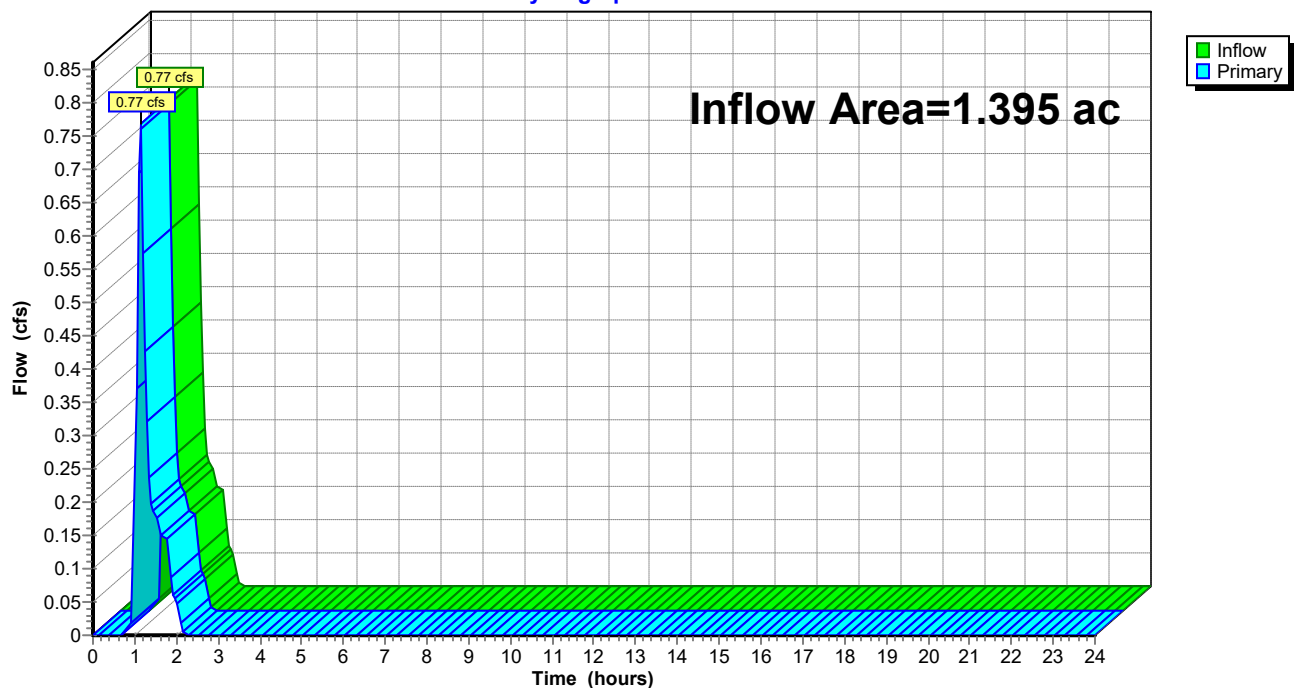
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.395 ac, 81.36% Impervious, Inflow Depth = 0.19" for NJDEP event
Inflow = 0.77 cfs @ 1.14 hrs, Volume= 0.022 af
Primary = 0.77 cfs @ 1.14 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 12P: TOTAL PARKING LOT

Hydrograph



POST

NJ DEP 2-hr NJDEP Rainfall=1.25"

Prepared by {enter your company name here}

Printed 8/22/2023

HydroCAD® 10.00-22 s/n 03376 © 2018 HydroCAD Software Solutions LLC

Page 112

Hydrograph for Pond 12P: TOTAL PARKING LOT

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00		0.00	13.00	0.00		0.00
0.25	0.00		0.00	13.25	0.00		0.00
0.50	0.00		0.00	13.50	0.00		0.00
0.75	0.00		0.00	13.75	0.00		0.00
1.00	0.09		0.09	14.00	0.00		0.00
1.25	0.42		0.42	14.25	0.00		0.00
1.50	0.19		0.19	14.50	0.00		0.00
1.75	0.15		0.15	14.75	0.00		0.00
2.00	0.05		0.05	15.00	0.00		0.00
2.25	0.00		0.00	15.25	0.00		0.00
2.50	0.00		0.00	15.50	0.00		0.00
2.75	0.00		0.00	15.75	0.00		0.00
3.00	0.00		0.00	16.00	0.00		0.00
3.25	0.00		0.00	16.25	0.00		0.00
3.50	0.00		0.00	16.50	0.00		0.00
3.75	0.00		0.00	16.75	0.00		0.00
4.00	0.00		0.00	17.00	0.00		0.00
4.25	0.00		0.00	17.25	0.00		0.00
4.50	0.00		0.00	17.50	0.00		0.00
4.75	0.00		0.00	17.75	0.00		0.00
5.00	0.00		0.00	18.00	0.00		0.00
5.25	0.00		0.00	18.25	0.00		0.00
5.50	0.00		0.00	18.50	0.00		0.00
5.75	0.00		0.00	18.75	0.00		0.00
6.00	0.00		0.00	19.00	0.00		0.00
6.25	0.00		0.00	19.25	0.00		0.00
6.50	0.00		0.00	19.50	0.00		0.00
6.75	0.00		0.00	19.75	0.00		0.00
7.00	0.00		0.00	20.00	0.00		0.00
7.25	0.00		0.00	20.25	0.00		0.00
7.50	0.00		0.00	20.50	0.00		0.00
7.75	0.00		0.00	20.75	0.00		0.00
8.00	0.00		0.00	21.00	0.00		0.00
8.25	0.00		0.00	21.25	0.00		0.00
8.50	0.00		0.00	21.50	0.00		0.00
8.75	0.00		0.00	21.75	0.00		0.00
9.00	0.00		0.00	22.00	0.00		0.00
9.25	0.00		0.00	22.25	0.00		0.00
9.50	0.00		0.00	22.50	0.00		0.00
9.75	0.00		0.00	22.75	0.00		0.00
10.00	0.00		0.00	23.00	0.00		0.00
10.25	0.00		0.00	23.25	0.00		0.00
10.50	0.00		0.00	23.50	0.00		0.00
10.75	0.00		0.00	23.75	0.00		0.00
11.00	0.00		0.00	24.00	0.00		0.00
11.25	0.00		0.00				
11.50	0.00		0.00				
11.75	0.00		0.00				
12.00	0.00		0.00				
12.25	0.00		0.00				
12.50	0.00		0.00				
12.75	0.00		0.00				

Appendix E:

Groundwater Recharge Spreadsheet

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
ESSEX CO., WEST ORANGE TOWN	49.0	1.67

Project Name:	Essex County Country Club
Description:	Golf Course Improvements
Analysis Date:	08/22/23

Pre-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.48714	Open space	Boonton	14.9	26,433
2	0.05957	Gravel, dirt	Boonton	6.9	1,481
3	0.13407	Woods-grass combination	Boonton	16.1	7,847
4	1.20248	Impervious areas	Boonton	0.0	-
5					
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.9			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				5.2	35,761

Post-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	1.3823	Impervious areas	Boonton	0.0	-
2	0.02847	Woods-grass combination	Boonton	16.1	1,666
3	0.51166	Open space	Boonton	14.9	27,764
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.9	Warning: make total area equal to Pre-Developed Conditions		Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				4.3	29,430

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Annual Recharge Requirements Calculation ↓			
% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	60,213
Post-Development Annual Recharge Deficit=		6,332	(cubic feet)
Recharge Efficiency Parameters Calculations (area averages)			
RWC=	3.43	(in)	DRWC= 1.61 (in)
ERWC =	0.57	(in)	EDRWC= 0.27 (in)

Project Name	Description	Analysis Date	BMP or LID Type
Essex County Country Club	Golf Course Improvements	08/22/23	Pervious Pavement

Recharge BMP Input Parameters				Root Zone Water capacity Calculated Parameters				Recharge Design Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
BMP Area	ABMP	2842.0	sq.ft	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.57	in	Inches of Runoff to capture	Qdesign	0.05	in
BMP Effective Depth, this is the design variable	dBMP	0.5	in	ERWC Modified to consider dEXC	EDRWC	0.27	in	Inches of Rainfall to capture	Pdesign	0.10	in
Upper level of the BMP surface (negative if above ground)	dBMPu	8.0	in	Empty Portion of RWC under Infiltr. BMP	RERWC	0.21	in	Recharge Provided Avg. over Imp. Area		1.3	in
Depth of lower surface of BMP, must be >= dBMPu	dEXC	20.0	in					Runoff Captured Avg. over imp. Area		2.0	in
Post-development Land Segment Location of BMP, Input Zero if Location is distributed or undetermined	SegBMP	0	unitless								

BMP Calculated Size Parameters				CALCULATION CHECK MESSAGES	
ABMP/Aimp	Aratio	0.05	unitless	Volume Balance--> OK	
BMP Volume	VBMP	129	cu.ft	dBMP Check----> OK	
				dEXC Check----> OK	
				BMP Location----> Location is selected as distributed or undetermined	

Parameters from Annual Recharge Worksheet				System Performance Calculated Parameters			
Post-D Deficit Recharge (or desired recharge volume)	Vdef	6,332	cu.ft	Annual BMP Recharge Volume		6,332	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	60,213	sq.ft	Avg BMP Recharge Efficiency		62.0%	Represents % Infiltration Recharged
Root Zone Water Capacity	RWC	3.43	in	%Rainfall became Runoff		78.5%	%
RWC Modified to consider dEXC	DRWC	1.61	in	%Runoff Infiltrated		5.3%	%
Climatic Factor	C-factor	1.67	no units	%Runoff Recharged		3.3%	%
Average Annual P	Pavg	49.0	in	%Rainfall Recharged		2.6%	%
Recharge Requirement over Imp. Area	dr	1.3	in				

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.

Appendix F:

Hantush Groundwater Table Hydraulic
Impact Spreadsheets

Input Values

5.00	R	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
5.00	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
4.000	x	1/2 length of basin (x direction, in feet)
20.000	y	1/2 width of basin (y direction, in feet)
4.00	t	Duration of infiltration period (hours)
6.67	hi(0)	Initial thickness of saturated zone (feet)

10.758	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
4.091	$\Delta h(\max)$	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

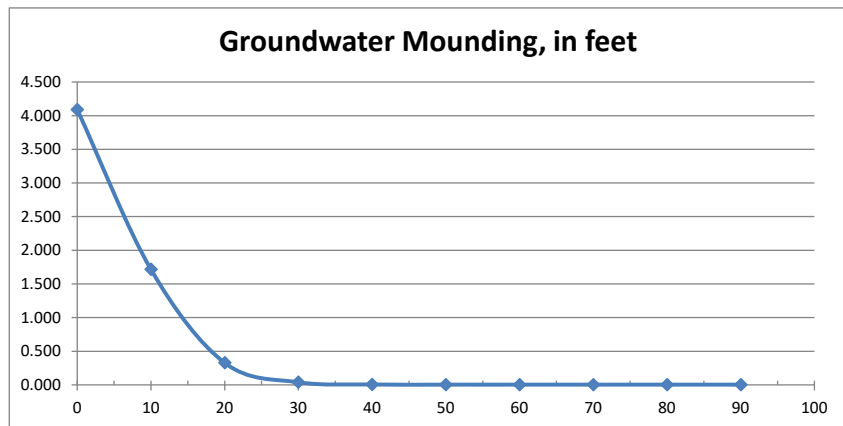
Ground-water Mounding, in feet

Distance from center of basin in x direction, in feet

4.091	0
1.716	10
0.328	20
0.039	30
0.006	40
0.004	50
0.004	60
0.004	70
0.004	80
0.004	90



Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Input Values

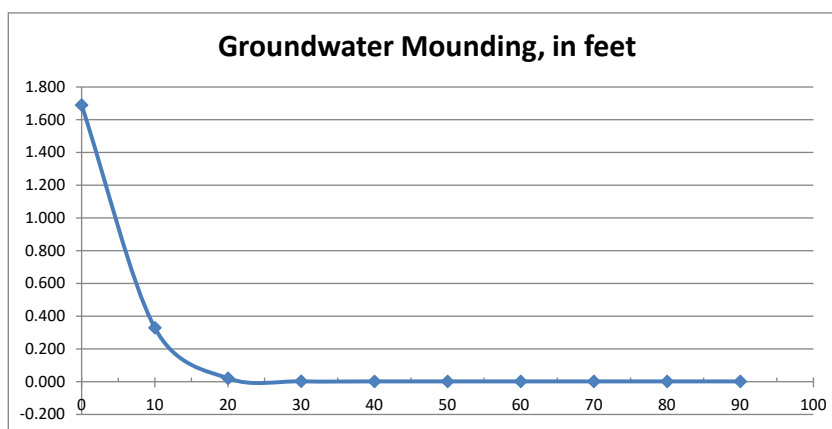
5.00	R	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
5.00	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
2.000	x	1/2 length of basin (x direction, in feet)
65.000	y	1/2 width of basin (y direction, in feet)
2.00	t	Duration of infiltration period (hours)
6.67	hi(0)	Initial thickness of saturated zone (feet)

8.357	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.690	$\Delta h(\max)$	Maximum groundwater mounding (beneath center of basin at end of infiltration period)
Distance from		
Ground-water	center of basin in x	
Mounding, in feet	direction, in feet	

1.690	0
0.329	10
0.021	20
0.002	30
0.002	40
0.002	50
0.002	60
0.002	70
0.002	80
0.002	90



Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Input Values

5.00	R	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
5.00	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
1.500	x	1/2 length of basin (x direction, in feet)
17.500	y	1/2 width of basin (y direction, in feet)
2.00	t	Duration of infiltration period (hours)
6.67	hi(0)	Initial thickness of saturated zone (feet)

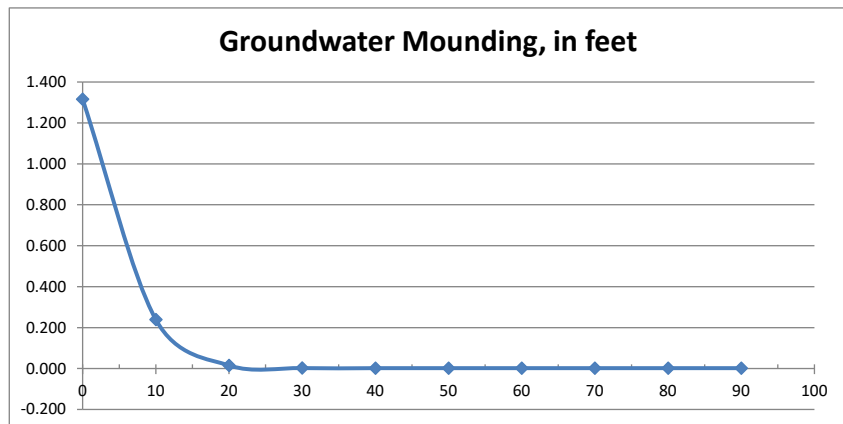
7.983	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.316	$\Delta h(\max)$	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Distance from
center of basin in x
direction, in feet

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.316	0
0.239	10
0.015	20
0.002	30
0.002	40
0.002	50
0.002	60
0.002	70
0.002	80
0.002	90



Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Appendix G:

Pre-Development Drainage Area Maps







Appendix H:

Post-Development Drainage Area Maps





539
532.56

CLEANOUT
GR 545.00
4" PVC INV. IN: 540.94
4" PVC INV. OUT: 540.56

CLEANOUT
GR 546.25
4" PVC INV. IN: 541.88
4" PVC INV. OUT: 541.88

CLEANOUT
GR 548.00
4" PVC INV. IN: 543.18
4" PVC INV. OUT: 543.18

CLEANOUT
GR 548.00
4" PVC INV. IN: 543.96
4" PVC INV. OUT: 543.96

CLEANOUT
GR 548.00
4" PVC INV. IN: 544.21
4" PVC INV. OUT: 544.21

CLEANOUT
GR 548.00
4" PVC INV. IN: 545
4" PVC INV. OUT: 545

SCS SHEET FLOW
44 FT @ 2.0%
Tc = 4.9 MIN.

PDA-2

