STORMWATER MANAGEMENT REPORT

for

Altera 769, LLC

Proposed Office Building
Block 166.15, Lot 9
769 Northfield Avenue (CR 508)
Township of West Orange
Essex County, New Jersey

Prepared by:

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I. INTRODUCTION

The intention of this study is to analyze the stormwater drainage conditions that will occur as a result of the proposed office building renovation which includes modifications to the existing parking lot to satisfy current ADA regulations and other associated site improvements. The proposed improvements are a part of a two-phased development. The Phase 1 improvements consist of upgrading the building façade and modifications to the existing parking lot to provide a drop off lane and to satisfy current ADA regulations in addition to other associated site improvements. The Phase 2 improvements consist of the expansion of the rear parking area which is dependent on the needs of future building tenant(s). The subject site is located at 769 Northfield Avenue (CR 508) in the Township of West Orange, Essex County, New Jersey and is identified as Block 166.15, Lot 9 on the Township of West Orange Tax Maps.

The scope of this study focuses on the overall drainage conditions that will result from the proposed improvements. The proposed site improvements shall result in a total increase in impervious coverage of 20,045 SF (9.4%) which can be further broken down to an increase in impervious coverage of 9,704 SF (4.5%) for Phase 1 and an increase in impervious coverage of 10,341 SF (4.9%) for Phase 2.

The primary design constraints for this project are based on requirements established in the Township of West Orange Land Use Ordinance, State of New Jersey Soil Conservation Requirements, and the State of New Jersey Stormwater Regulations outlined in NJAC 7:8. More specifically, the stormwater management design will serve to maintain existing drainage patterns and will not have a negative impact on downstream facilities.

More specifically, under Phase 1 of the proposed improvements, the project does not meet the definition of a "major development" under N.J.A.C. 7:8, since there will be less than an acre of disturbance, less than an acre of additional impervious coverage proposed, and less than a quarter acre of newly collected motor vehicle surface by the existing stormwater conveyance system. As part of the Phase 2 improvements, the limit of disturbance for the development will exceed one (1) acre; therefore, the project meets the definition of a "major development" under NJAC 7:8. As such, the project has been designed to meet the applicable standards set forth by the Township of West Orange and NJAC 7:8.

II. EXISTING SITE CONDITIONS

The subject site consists of 212,742 SF (4.88 acres) of which is partially developed with one (3) three-story office building and associated paved parking areas and drive aisles. The site currently consists of 57.4% impervious surface area including building and pavement areas. Currently, stormwater runoff generated by the rear wooded area of the site sheet flows overland in a westerly direction where it is collected by on-site stormwater management structures (POI-1 & POI-2) and is tributary to the stormwater conveyance system located within the rear paved parking area. The majority of stormwater runoff generated by the pavement

areas sheet flows in a westerly direction where it is collected by on-site inlets and conveyed to an on-site underground stormwater management structure (POI-3). Ultimately stormwater runoff is tributary to the existing underground stormwater conveyance system within Northfield Avenue.

Based upon the Essex County Soil Survey the soil types native to the site include:

SOIL TYPE	SOIL TYPE NAME	HYDRAULIC SOIL GROUP*
BogB	Boonton Loam, 3 to 8 percent slopes	C
BogBc	Boonton Loam, 0 to 8 percent slopes, extremely stony	C
BouB	Boonton – Urban Land, Boonton Substratum Complex, 0 to 8 percent slopes	C
URBONB	Urban Land, Boonton Substratum, 0 to 8 percent slopes	C

*A field investigation of the existing on-site soils was performed by Dynamic Earth, LLC to evaluate subsoil conditions to estimate depth to the seasonal high groundwater levels and permeability rates. Based on laboratory testing, permeability rates were less than 0.06 inches per hour, which is consistent with a hydrologic soil group (HSG) D. For the purposes of the design, the site has been modeled as HSG D in the Runoff Curve Number calculations. A copy of the Runoff Curve Number calculations as well as the Stormwater Basin Area Investigation Report prepared by Dynamic Earth, LLC are provided within the Appendix of this report.

The existing site conditions have been evaluated using the following drainage sub-watershed areas as depicted on the Existing Drainage Area Map included within the Appendix within this report:

Existing DA-1: This area consists of the wooded area at the northern most part of the site. Stormwater runoff generated by this area sheet flows overland in a westerly direction, where it is collected by an existing stormwater pipe (POI-1) along the western property line. A time of concertation of 18.5 minutes has been calculated and utilized for this drainage area.

Existing DA-2: This area consists of a portion of the rear wooded area to the north of the rear parking area. Stormwater runoff generated by this area sheet flows overland in a westerly direction where it is collected by an existing inlet (POI-2) located near the western property line. A time of concentration of 16.1 minutes has been calculated and utilized for this drainage area.

Existing DA-3: This area consists of the northern portion of the existing rear parking area and a small portion of the wooded areas. The stormwater runoff generated by this area sheet flows overland to the west and is collected by a series of existing inlets where is it ultimately conveyed to the existing stormwater management

structure (POI-3). A time of concentration of 10.6 minutes has been calculated and utilized for this drainage area.

Existing DA-4: This area consists of the remainder of the subject site which includes the existing office building, remaining parking areas and open space (lawn) areas. Stormwater runoff generated by this area sheet flows overland in a southerly direction where it is collected by a series of existing inlets. Ultimately, stormwater runoff is conveyed to the existing stormwater conveyance system within Northfield Avenue (CR 508) (POI-4). A minimum time of concentration of six (6) minutes has been utilized for this drainage area.

III. PROPOSED SITE CONDITIONS

The proposed site improvements are a part of a two-phased development. The Phase 1 improvements include the renovation of the existing building, upgrades to the existing parking lot to satisfy current ADA regulations and associated site improvements. The Phase 2 improvements include the further expansion of the northwestern parking area to the rear of the property, and other associated site improvements. The proposed site improvements shall result in an increase in impervious coverage of 20,045 SF (0.46 Ac), which can be further broken down to an increase of 9,704 SF (0.22 Ac) for Phase I, and 10,341 SF (0.24 Ac) for Phase II.

The existing drainage patterns on-site shall remain relatively unchanged. Stormwater runoff generated by the roof of the renovated building will remain relatively unchanged. Runoff generated by the portions of the site that are not covered with building shall continue to sheet flow west and be collected by various on-site inlets. A stormwater management basin consisting of a network of underground pipes has been designed for Phase 1 to accommodate the stormwater runoff generated by the minor parking addition in the rear of the lot and an aboveground bioretention basin has been designed for Phase 2 to detain stormwater runoff generated by the parking lot and surrounding wooded areas in accordance with the stormwater reduction requirements set forth under NJAC 7:8 and by the Township of West Orange.

The proposed site conditions have been evaluated using the following drainage sub-watershed areas as depicted on the Proposed Drainage Area Maps included within the Appendix of this report:

PHASE I:

DA-1: This area consists of the wooded area to the northeast of the parking lot expansion. Stormwater runoff generated by this area sheet flows overland where it is ultimately collected by an existing stormwater pipe (POI-1). A time of concentration of 18.5 minutes has been calculated and utilized for this drainage area.

DA-2 Detained: This area consists of a portion of the rear wooded area and the majority of the rear parking lot expansion. Stormwater runoff generated by this area sheet flows overland in a westerly direction, where it is

collected by a proposed inlet and discharged directly into the proposed underground stormwater management basin. Stormwater runoff is then detained and released at a controlled rate to the existing stormwater management structure (POI-2). A time of concentration of 13.7 minutes has been calculated and utilized for this drainage area.

DA-3: This area consists of the remaining rear parking lot expansion, a portion of the existing rear parking area and a portion of the rear wooded area. Stormwater runoff generated by this area sheet flows overland to the west and is collected by an existing inlet, where is it ultimately conveyed to the existing stormwater management structure (POI-3). A time of concentration of 15.6 minutes has been calculated and utilized for this drainage area.

DA-4: This area consists of the remainder of the subject site which includes the remodeled office building, remaining parking areas and open space (lawn) areas. Stormwater runoff generated by the roof of the renovated building will remain relatively unchanged. Stormwater runoff generated by this area sheet flows overland in a southerly direction where it is collected by a series of existing inlets. Ultimately, stormwater runoff is conveyed to the existing stormwater conveyance system within Northfield Avenue (CR 508) (POI-4). A minimum time of concentration of six (6) minutes has been utilized for this drainage area.

PHASE II:

DA-1: This area consists of the wooded area to the northeast of the parking lot expansion. Stormwater runoff generated by this area sheet flows overland where it is ultimately collected by a proposed yard inlet, and conveyed to the proposed aboveground stormwater management basin, where it is detained and released at a controlled rate to the existing stormwater management structure (POI-3). A time of concentration of 18.8 minutes has been calculated and utilized for this drainage area.

DA-2 Detained: This area consists of a portion of the rear wooded area and a portion of the parking lot expansion that is associated with the Phase I site improvements. Stormwater runoff generated by this area is collected by a proposed inlet and discharged directly into the proposed Phase 1 underground stormwater management basin. Stormwater runoff is then temporarily detained within the basin before being released at a controlled rate to the proposed aboveground stormwater management basin. Stormwater runoff is then detained and released at a controlled rate to the existing stormwater management structure (POI-3). A time of concentration of 14.6 minutes has been calculated and utilized for this drainage area.

DA-3 Undetained: This area consists of a portion of the existing rear northern parking area. Stormwater runoff generated by this area sheet flows overland to the west and is collected by a proposed inlet, where is it ultimately conveyed to the existing stormwater management structure (POI-3). A minimum time of concentration of 6 minutes has been utilized for this drainage area.

DA-3A Detained: This area consists of a majority of the Phase 2 rear parking lot expansion area and a portion of the rear wooded area. Stormwater runoff generated by this area sheet flows overland to the west and is collected by proposed inlets and conveyed to the proposed aboveground stormwater management basin. Stormwater runoff is then detained and released at a controlled rate to the existing stormwater management structure (POI-3). A time of concentration of 7.7 minutes has been calculated and utilized for this drainage area.

DA-3B Detained: This area consists of the remaining portion of the proposed parking lot expansion that is not collected by the proposed Phase I underground stormwater management basin and a portion of the rear eastern wooded areas. Stormwater runoff generated by this area sheet flows overland in a westerly direction, where it is collected by a proposed inlet and conveyed to the proposed aboveground stormwater management basin. Stormwater runoff is then detained and released at a controlled rate to the existing stormwater management structure (POI-3). A minimum time of concentration of 6 minutes has been utilized for this drainage area.

DA-3C Detained: This area consists of a portion of the Phase 1 rear parking lot expansion area, the aboveground stormwater management basin and portion of the rear wooded areas. Stormwater runoff generated by this area sheet flows overland to the west and is collected by a proposed inlet and conveyed to the proposed aboveground stormwater management basin. Stormwater runoff is then detained and released at a controlled rate to the existing stormwater management structure (POI-3). A time of concentration of 13.3 minutes has been calculated and utilized for this drainage area.

DA-4: This area consists of the remainder of the subject site which includes the existing office building, remaining parking areas and open space (lawn) areas. Stormwater runoff generated by this area sheet flows overland in a southerly direction where it is collected by a series of existing inlets. Ultimately, stormwater runoff is conveyed to the existing stormwater conveyance system within Northfield Avenue (CR 508) (POI-4). A minimum time of concentration of 6 minutes has been utilized for this drainage area.

IV. DESIGN METHODOLOGY

The intention of the design of the proposed stormwater management facilities is to provide measures as required to address applicable aspects of the Township of West Orange Land Use Ordinance, NJAC 7:8, and the New Jersey SESC standards. In order to prepare the stormwater management design for the subject project, an extensive initial investigation of the property and a topographic survey were performed. On-site review of the tract was performed by Dynamic Engineering Consultants, PC to verify existing site conditions

and land cover characteristics. A Boundary, Location & Topographic Survey of the subject site was also prepared by Dynamic Survey, LLC, to depict the existing site conditions.

The calculations were established through an examination of the existing site conditions, a review of the topographical survey, and establishing our drainage area maps. The plans were designed to ensure that runoff from the proposed development could be directed to the proposed stormwater management facilities, and designed to meet applicable stormwater quantity and quality requirements. Phases 1 and 2 were both designed such that there would be a reduction in stormwater runoff tributary to the existing stormwater management structures and existing underground detention system on-site. Phase 2 was further designed to meet the required stormwater quantity reductions governed by the Township of West Orange and NJAC 7:8.

Based on our review of the existing site conditions, review of the survey, and establishment of the Drainage Area Maps for the existing and proposed site conditions, the calculations of this Report were established. Grading plans were also developed for the proposed site improvements with consideration to the existing drainage patterns. The plan was designed to ensure that runoff from the proposed development could be directed to the proposed stormwater management facilities and reduce peak flow rates when compared to existing conditions.

The site has been evaluated using the TR-55 'Urban Hydrology for Small Watersheds' standards. Stormwater runoff rates for the subject site were modeled using Hydrology Studio. The 2-, 10-, and 100-year design storms are based upon the New Jersey 24-Hour Rainfall Frequency Data for Essex County as published by the USDA NRCS utilizing a Type D rainfall distribution. Pervious and impervious areas were modeled separately as per the NJ Stormwater Management Best Practices (BMP) Manual.

V. SUBSURFACE STORMWATER MANAGEMENT BASIN DESIGN

The stormwater management basin proposed under the Phase 1 improvements has been designed to accommodate the increase in impervious coverage associated with the minor rear parking lot addition. The remainder of the proposed site improvements outside of this area will result in a decrease in impervious coverage through the addition of various landscaped areas. By maintaining existing drainage patterns and tributary stormwater to the existing on-site stormwater structures/conveyance system outside of the parking addition through reductions in impervious coverage, there will be a decrease in in peak flows for design storms when compared to existing conditions.

The proposed basin has been designed to maintain existing stormwater runoff tributary to POI-1, reduce tributary stormwater runoff to POI-2 as well as over detain runoff to accommodate the increased tributary area associated with POI-3, thereby decreasing runoff to the existing stormwater detention system when compared

to existing conditions. Specifically, the subsurface basin has been designed to accommodate the 100-yr design storm while maintaining post-development peak runoff rates at or below pre-development conditions. Therefore, there will be no negative impacts to the on-site stormwater management system or downstream facilities. As such, the stormwater management basin has been designed to meet the applicable standards set forth by NJAC 7:8 and the Township of West Orange. Associated calculations are included within the Appendix of this report and details have been provided on the accompanying engineering drawings.

VI. ABOVEGROUND STORMWATER MANAGEMENT BASIN DESIGN

The stormwater management basin under the Phase 2 improvements has been designed to meet the applicable standards set forth by NJAC 7:8, the Township of West Orange, and NJ SESC through the use of an aboveground stormwater bioretention basin. Specifically, the basin has been designed to accommodate the 100-yr design storm while providing the requisite stormwater quantity reductions without negatively impacting downstream conditions. Associated calculations are included within the Appendix of this report and details have been provided on the accompanying engineering drawings.

The proposed basin has been designed as a small-scale Bioretention Basin with an underdrain which will provide treatment of runoff generated by the Water Quality Design Storm. The design of the bioretention basin complies with the standards set forth by the NJ Best Management Practices Manual, thereby providing a TSS Removal Rate of 80%, thereby satisfying the water quality aspect of NJAC 7:8. The area above the Bioretention Basin will be used to utilized to store and attenuate runoff generated by the larger storm events and provide water quantity control for same.

The bottom of the gravel storage bed for the proposed basin is at elevation 459.50 ft. As noted in the Stormwater Basin Area Investigation Report provided within the Appendix of this report, two (2) test pits were dug in the vicinity of the proposed bioretention basin location. The pits were excavated to depths at elevation 458.00 where the test was terminated at bedrock and no seasonal high-water table was observed. Therefore the proposed basin has been designed such that the underdrain system is set a minimum of one (1') foot above the seasonal high-water table or bedrock.

As noted in the hydrograph summary included within the appendix, the volume of the runoff generated by the water quality design storm that is tributary to the bioretention basin is equal to approximately 6,171 CF. This equates to an elevation of 461.95 within the basin. The lowest quantity control orifice in the outlet control structure is proposed at elevation 461.95 in order to allow the entirety of the Water Quality Design Storm to infiltrate through the proposed soil bed and sand layer before being collected by the proposed underdrain system. Runoff generated by larger design storms will be discharged through an outlet control structure and ultimately conveyed to the existing underground stormwater management basin (POI-3).

In accordance with the New Jersey Stormwater Best Management Practices Manual, the following design considerations have been satisfied:

- Filter fabric is proposed along the sides and the bottom of the system to prevent migration of fines from the surrounding soil.
- The proposed underdrain component consists of three parts – the sand layer, the gravel layer and the network of pipes that collect runoff and transport it to the outflow section of the system.
- The capacity of the proposed underdrain is designed to allow the system to drain within 72 hours.
- The system has been designed so the seasonal high-water table (SHWT) or bedrock is at least 1 foot below the bottom of the underdrain component.
- At least one inspection port, with a removable cap, is proposed in the storage bed at least 3 feet from any edge.
- Points of access are designed in such a way as to prevent sediment or other material from entering the system and to prevent the accumulation of standing water, which could lead to mosquito breeding.

VII. RUNOFF RATES

The following is a comparison of pre and post development runoff rates:

PHASE 1:

PEAK RUNOFF RATES (POI-1)			
Design Storm	Existing Runoff	Proposed Runoff	Difference
2-yr	0.88 CFS	0.88 CFS	-0.00 CFS
10-yr	1.83 CFS	1.83 CFS	-0.00 CFS
100-yr	3.78 CFS	3.78 CFS	-0.00 CFS

PEAK RUNOFF RATES (POI-2)			
Design Storm	Existing Runoff	Proposed Runoff	Difference
2-yr	1.61 CFS	1.26 CFS	-0.35 CFS
10-yr	3.31 CFS	2.77 CFS	-0.54 CFS
100-yr	6.83 CFS	5.38 CFS	-1.45 CFS

PEAK RUNOFF RATES (POI-3)			
Design Storm	Existing Runoff	Proposed Runoff	Difference
2-yr	4.29 CFS	3.81 CFS	-0.48 CFS
10-yr	7.57 CFS	6.81 CFS	-0.76 CFS
100-yr	14.20 CFS	12.54 CFS	-1.66 CFS

PEAK RUNOFF RATES (POI-4)			
Design Storm	Existing Runoff	Proposed Runoff	Difference
2-yr	9.48 CFS	8.87 CFS	-0.61 CFS
10-yr	15.56 CFS	14.25 CFS	-1.31 CFS
100-yr	27.60 CFS	25.34 CFS	-2.26 CFS

PHASE 2:

PEAK RUNOFF RATES (POI-3)					
Design Storm	Existing Runoff	Reduction Required	Allowable Runoff	Proposed Runoff	Difference
2-yr	4.29 CFS	50%	2.15 CFS	1.34 CFS	-2.95 CFS
10-yr	7.57 CFS	75%	5.68 CFS	3.59 CFS	-3.98 CFS
100-yr	14.20 CFS	80%	11.36 CFS	9.22 CFS	-4.98 CFS

PEAK RUNOFF RATES (POI-4)			
Design Storm	Existing Runoff	Proposed Runoff	Difference
2-yr	9.48 CFS	7.03 CFS	-2.45 CFS
10-yr	15.56 CFS	12.65 CFS	-2.91 CFS
100-yr	27.60 CFS	21.72 CFS	-5.88 CFS

As can be seen above, the stormwater management system has been designed to not exceed the existing tributary runoff rates for the given design storms.

VIII. WATER QUALITY

Phase 1

The proposed development will have less than an acre of disturbance and will not increase regulated motor vehicular surfaces on-site by more than ¼ acre. Therefore, compliance with the stormwater quality standards under NJAC 7:8-5.5 and the Township of West Orange Ordinance is not required.

Phase 2

The TSS removal rate requirement set for the Township of West Orange Land Use Ordinance and NJAC 7:8 is 80% for the net increase of motor vehicle surface. Under the proposed conditions, the runoff from the proposed rear parking lot expansion within drainage areas DA-1, DA-2, DA-3A and DA-3B will be collected via a series of proposed inlets and conveyed to the proposed aboveground bioretention basin. The bioretention basin has been designed with an 18" soil bed and mainly site tolerant vegetation; therefore providing 80% TSS removal rate in accordance with the NJDEP BMP Guidelines for the tributary areas.

IX. GROUNDWATER RECHARGE

According to the Stormwater Basin Area Investigation Report, prepared by Dynamic Earth, LLC, dated January 14, 2022, enclosed within the Appendix of this report, the on-site soils do not exhibit permeability to allow for proper infiltration. Therefore, this project is exempt from the Groundwater Recharge requirements of the Township of West Orange and NJAC 7:8.

X. CONCLUSION

The proposed project has been designed in a manner that will not adversely impact the existing drainage patterns, adjacent roadways or adjacent parcels. Stormwater runoff rates for the 2, 10, and 100-year design storms will comply with the runoff rate requirements of NJAC 7:8 and the Township of West Orange. Additionally, stormwater runoff rates to the points of interests shall be reduced compared to existing conditions. Furthermore, the proposed bioretention basin has been designed in accordance with the NJ BMP Manual requirements thereby providing the required 80% TSS removal rate for the net increase in vehicular surface study area. With that stated, it is evident that the proposed development will not have a negative impact on the existing stormwater management system within the vicinity of the subject parcel.

APPENDIX

NRCS WEB SOIL SURVEY

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,170 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Essex County, New Jersey
Survey Area Data: Version 17, Aug 30, 2021

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

Date(s) aerial images were photographed: May 9, 2020—Oct 15, 2020

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
BogB	Boonton loam, 3 to 8 percent slopes	1.9	26.0%
BogBc	Boonton loam, 0 to 8 percent slopes, extremely stony	1.2	16.7%
BouB	Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes	0.6	8.1%
URBONB	Urban land, Boonton substratum, 0 to 8 percent slopes	3.6	49.2%
Totals for Area of Interest		**7.3**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Essex County, New Jersey

BogB—Boonton loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: b066
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: All areas are prime farmland

Map Unit Composition

Boonton and similar soils: 80 percent
Minor components: 20 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

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: 3 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 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Haledon

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

Boonton, moderately well drained

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

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
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

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
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

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factor Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic layer.

Report—RUSLE2 Related Attributes

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed or the first mineral horizon below an organic surface horizon. Organic horizons are not displayed.

RUSLE2 Related Attributes–Essex County, New Jersey

Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
BogB—Boonton loam, 3 to 8 percent slopes								
Boonton	80	492	C	.32	3	46.1	43.8	10.1
Boonton, moderately well drained	10	492	C	.32	3	46.1	43.8	10.1
Haledon	10	492	C	.37	3	30.8	56.4	12.8
BogBc—Boonton loam, 0 to 8 percent slopes, extremely stony								
Boonton, extremely stony	85	492	C	.32	3	46.1	43.8	10.1
Boonton, moderately well drained, extremely stony	10	492	C	.32	3	46.1	43.8	10.1
Haledon, extremely stony	5	492	C	.37	3	30.8	56.4	12.8
BouB—Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes								
Boonton	50	492	C	.32	4	46.1	43.8	10.1
Urban land, Boonton substratum	40	656	—	.49	—	30.9	53.6	15.5
Udorthents, Boonton substratum	10	492	D	.28	5	46.0	44.0	10.0

RUSLE2 Related Attributes–Essex County, New Jersey								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
URBONB—Urban land, Boonton substratum, 0 to 8 percent slopes								
Urban land, Boonton substratum	90	656	—	.49	—	30.9	53.6	15.5
Boonton	5	492	C	.32	4	46.1	43.8	10.1
Udorthents, Boonton substratum	5	492	D	.28	5	46.0	44.0	10.0

Data Source Information

Soil Survey Area: Essex County, New Jersey
Survey Area Data: Version 16, Jun 1, 2020

PHASE I - RUNOFF CURVE NUMBER (CN) CALCULATION

DYNAMIC ENGINEERING

Existing and Proposed Drainage Area Summary and Average Curve Number(CN) Calculations

Project:	Altera Development Company, LLC PH. I	Computed By:	SDP
Job #:	2530-99-006	Checked By:	PAF
Location:	Township of West Orange, Essex County, NJ	Date:	1/18/2022

Drainage Area	Impervious Area (acre)	Curve Number (CN) Used	HSG D - Open Space Area (acre)	Curve Number (CN) Used	HSG D - Wooded Area (acre)	Curve Number (CN) Used	Avg. Curve Number	Total Area (acres)	TC (Min.)
[POI-1] - EX DA-1	0.00	98	0.00	80	0.88	77	77	0.88	18.5
[POI-2] - EX DA-2	0.00	98	0.00	80	0.68	77	77	0.68	16.1
[POI-3] - EX DA-3	0.97	98	0.00	80	0.26	77	94	1.24	10.6
[POI-4] - EX DA-4	1.83	98	0.24	80	0.00	77	96	2.08	6.0
								4.88	

[POI-1] - DA-1	0.00	98	0.00	80	0.88	77	77	0.88	18.5
[POI-2] - DA-2 Detained	0.24	98	0.00	80	0.30	77	86	0.54	13.7
[POI-3] - DA-3	0.97	98	0.03	80	0.37	77	92	1.38	15.6
[POI-4] - DA-4	1.82	98	0.26	80	0.00	77	96	2.08	6.0
								4.88	

Per Essex County Soil Survey & Report Prepared by Dynamic Earth	BogB	D*	Soil	Boonton Loam, 3 to 8 percent slopes
	BogBc	D*	Soil	Boonton Loam, 0 to 8 percent slopes, extremely stony
	BouB	D*	Soil	Boonton – Urban Land, Boonton Substratum Complex, 0 to 8 percent slopes
	URBONB	D*	Soil	Urban Land, Boonton Substratum, 0 to 8 percent slopes

Description	Runoff Curve Number (CN)
Impervious Surface	98
Open Space (lawn) (good)	80
Woods	77

* Based on laboratory testing performed by Dynamic Earth, LLC, permeability rates were less that 0.01 inches per hour which is consistent with a hydrologic soil group (HSG) D. For the purposese of the design, the site has been modeled as HSG D in the Runoff Curve Number calculations.

PHASE 2 - RUNOFF CURVE NUMBER (CN) CALCULATIONS

DYNAMIC ENGINEERING

Existing and Proposed Drainage Area Summary and Average Curve Number(CN) Calculations

Project: Altera Development Company, LLC PH. 2
Job #: 2530-99-006
Location: Township of West Orange, Essex County, NJ

Computed By: SDP
Checked By: PAF
Date: 1/18/2022

Drainage Area	Impervious Area (acre)	Curve Number (CN) Used	HSG D - Open Space Area (acre)	Curve Number (CN) Used	HSG D - Wooded Area (acre)	Curve Number (CN) Used	Avg. Curve Number	Total Area (acres)	TC (Min.)
[POI-3] - EX DA-1	0.00	98	0.00	80	0.88	77	77	0.88	18.5
[POI-3] - EX DA-2	0.00	98	0.00	80	0.68	77	77	0.68	16.1
[POI-3] - EX DA-3	0.97	98	0.00	80	0.26	77	94	1.24	10.6
[POI-4] - EX DA-4	1.83	98	0.24	80	0.00	77	96	2.08	6.0
								4.88	

[POI-3] - DA-1	0.00	98	0.20	80	0.29	77	78	0.50	18.8
[POI-3] - DA 2 DET	0.21	98	0.08	80	0.00	77	93	0.29	14.6
[POI-3] - DA-3 UNDET	0.31	98	0.03	80	0.00	77	96	0.34	6.0
[POI-3] - DA-3A DET	0.59	98	0.09	80	0.12	77	93	0.80	7.7
[POI-3] - DA-3B DET	0.13	98	0.02	80	0.00	77	95	0.15	6.0
[POI-3] - DA-3C DET	0.22	98	0.34	80	0.17	77	85	0.73	13.3
[POI-4] - DA-4	1.82	98	0.26	80	0.00	77	96	2.08	6.0
								4.88	

Per Essex County Soil Survey & Dynamic Earth Report	BogB	D*	Soil	Boonton Loam, 3 to 8 percent slopes
	BogBc	D*	Soil	Boonton Loam, 0 to 8 percent slopes, extremely stony
	BouB	D*	Soil	Boonton – Urban Land, Boonton Substratum Complex, 0 to 8 percent slopes
	URBONB	D*	Soil	Urban Land, Boonton Substratum, 0 to 8 percent slopes

Description	Runoff Curve Number (CN)
Impervious Surface	98
Open Space (lawn) (good)	80
Woods	77

* Based on laboratory testing performed by Dynamic Earth, LLC, permeability rates were less that 0.01 inches per hour which is consistent with a hydrologic soil group (HSG) D. For the purposese of the design, the site has been modeled as HSG D in the Runoff Curve Number calculations.

EXISTING TIME OF CONCENTRATION (Tc) CALCULATIONS

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 1/7/2022
Project: Altera Development
Project No: 2530-99-006

Calculated By: SDP
Checked By: RJC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Existing
Drainage Area: DA-1

- ***Sheet Flow*** **:**

	AB	BC				
1. Surface Description	Woods, Light Underbrush	Woods, Light Underbrush				
2. Manning's Roughness Coefficient, n	0.4	0.4				
3. Flow Length, L { *total* $L \le 100$ *ft* }	50.0 ft	50.0 ft				
4. Two-Year 24-hour Rainfall, p_2 for . . . Essex County	3.44 in	3.44 in	3.44 in			
5. Land Slope, s *(ft/ft)*	0.029 ft/ft	0.057 ft/ft				
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.171 hr	+ 0.130 hr	+ 0.000 hr	=	0.301 hr	

- ***Shallow Concentrated Flow*** **:**

	BC	CD	EF			
7. Surface Description	Unpaved	Unpaved	Unpaved			
8. Flow Length, L	25.0 ft	37.0 ft	20.0 ft			
9. Watercourse Slope, s	0.050 ft/ft	0.027 ft/ft	0.167 ft/ft			
10. Average velocity, V { *see Figure 3.1)*	3.61 ft/s	2.65 ft/s	6.59 ft/s			
11. Travel Time, $T_t = \frac{L}{3600\,V}$	0.002 hr	+ 0.004 hr	+ 0.001 hr	=	0.007 hr	

- ***Channel Flow*** **:**

12. Pipe Diameter, D						
13. Cross-Sectional Flow Area, A						
14. Wetted Perimeter, p_w						
15. Hydraulic Radius, $r = A / p_w$						
16. Channel Slope, s						
17. Pipe Material						
18. Manning's Roughness Coefficient, n						
19. Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$						
20. Flow Length, L						
21. Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+ 0.000 hr	+ 0.000 hr	=	0.000 hr	

22. Watershed or subarea Time of Concentration, T_c { *add* T_t *in steps 6, 11 and 21* } . . . . . 0.308 hr

18.5 min

DYNAMIC ENGINEERING
1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 1/7/2022
Project: Altera Development
Project No: 2530-99-006

Calculated By: SDP
Checked By: PAF

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Existing
Drainage Area: DA-2

• Sheet Flow:

	AB	BC	CD		
1. Surface Description	Woods, Light Underbrush	Woods, Light Underbrush	Woods, Light Underbrush		
2. Manning's Roughness Coefficient, n	0.4	0.4	0.4		
3. Flow Length, L { *total* $L \le 100$ *ft* }	25.0 ft	43.0 ft	32.0 ft		
4. Two-Year 24-hour Rainfall, p_2 for . . . Essex County	3.44 in	3.44 in	3.44 in		
5. Land Slope, s *(ft/ft)*	0.220 ft/ft	0.023 ft/ft	0.188 ft/ft		
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.044 hr	+ 0.166 hr	+ 0.057 hr	=	0.266 hr

• Shallow Concentrated Flow:

	DE	EF	FG		
7. Surface Description	Unpaved	Unpaved	Unpaved		
8. Flow Length, L	36.0 ft	15.0 ft	12.0 ft		
9. Watercourse Slope, s	0.250 ft/ft	0.133 ft/ft	0.083 ft/ft		
10. Average velocity, V { *see Figure 3.1)*	8.07 ft/s	5.89 ft/s	4.65 ft/s		
11. Travel Time, $T_t = \frac{L}{3600\,V}$	0.001 hr	+ 0.001 hr	+ 0.001 hr	=	0.003 hr

• Channel Flow:

12. Pipe Diameter, D					
13. Cross-Sectional Flow Area, A					
14. Wetted Perimeter, p_w					
15. Hydraulic Radius, $r = A / p_w$					
16. Channel Slope, s					
17. Pipe Material					
18. Manning's Roughness Coefficient, n					
19. Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$					
20. Flow Length, L					
21. Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+ 0.000 hr	+ 0.000 hr	=	0.000 hr
22. Watershed or subarea Time of Concentration, T_c { *add* T_t *in steps 6, 11 and 21* }					0.269 hr
					16.1 min

DYNAMIC ENGINEERING
1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 1/7/2022
Project: Altera Development
Project No: 2530-99-006

Calculated By: SDP
Checked By: RJC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Existing
Drainage Area: DA-3

• Sheet Flow:

	AB	BC	CD		
1. Surface Description	Dense Grasses	Dense Grasses	Dense Grasses		
2. Manning's Roughness Coefficient, n	0.24	0.24	0.24		
3. Flow Length, L { total $L \le 100$ ft }	26.0 ft	62.0 ft	12.0 ft		
4. Two-Year 24-hour Rainfall, p_2 for Essex County	3.44 in	3.44 in	3.44 in		
5. Land Slope, s (ft/ft)	0.150 ft/ft	0.065 ft/ft	0.050 ft/ft		
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.035 hr	+ 0.098 hr	+ 0.029 hr	=	0.162 hr

• Shallow Concentrated Flow:

	DE	EF	FG		
7. Surface Description	Unpaved	Paved	Paved		
8. Flow Length, L	50.0 ft	40.0 ft	145.0 ft		
9. Watercourse Slope, s	0.090 ft/ft	0.075 ft/ft	0.090 ft/ft		
10. Average velocity, V { see Figure 3.1)	4.84 ft/s	5.57 ft/s	6.10 ft/s		
11. Travel Time, $T_t = \frac{L}{3600\,V}$	0.003 hr	+ 0.002 hr	+ 0.007 hr	=	0.011 hr

• Channel Flow:

	GH	HI			
12. Pipe Diameter, D	18 in	24 in			
13. Cross-Sectional Flow Area, A	1.767 sf	3.142 sf			
14. Wetted Perimeter, p_w	4.7 ft	6.3 ft			
15. Hydraulic Radius, $r = A / p_w$	0.4 ft	0.5 ft			
16. Channel Slope, s	0.058 ft/ft	0.030 ft/ft			
17. Pipe Material	RCP	RCP			
18. Manning's Roughness Coefficient, n	0.013	0.013			
19. Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$	14.35 ft/s	12.51 ft/s			
20. Flow Length, L	150.7	56.0			
21. Travel Time, $T_t = \frac{L}{3600\,V}$	0.003 hr	+ 0.001 hr	+ 0.000 hr	=	0.004 hr
22. Watershed or subarea Time of Concentration, T_c { add T_t in steps 6, 11 and 21 }					0.177 hr
					10.6 min

PHASE 1 - TIME OF CONCENTRATION (Tc) CALCULATIONS

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 1/7/2022
Project: Altera Development
Project No: 2530-99-006

Calculated By: SDP
Checked By: RJC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Proposed
Drainage Area: DA-1

• Sheet Flow:

	AB	BC			
1. Surface Description	Woods, Light Underbrush	Woods, Light Underbrush			
2. Manning's Roughness Coefficient, n	0.4	0.4			
3. Flow Length, L { total $L \le 100$ ft }	50.0 ft	50.0 ft			
4. Two-Year 24-hour Rainfall, p_2 for Essex County	3.44 in	3.44 in	3.44 in		
5. Land Slope, s (ft/ft)	0.029 ft/ft	0.057 ft/ft			
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.171 hr	+ 0.130 hr	+ 0.000 hr	=	0.301 hr

• Shallow Concentrated Flow:

	BC	CD	EF		
7. Surface Description	Unpaved	Unpaved	Unpaved		
8. Flow Length, L	25.0 ft	37.0 ft	20.0 ft		
9. Watercourse Slope, s	0.050 ft/ft	0.027 ft/ft	0.167 ft/ft		
10. Average velocity, V { see Figure 3.1)	3.61 ft/s	2.65 ft/s	6.59 ft/s		
11. Travel Time, $T_t = \frac{L}{3600\,V}$	0.002 hr	+ 0.004 hr	+ 0.001 hr	=	0.007 hr

• Channel Flow:

12. Pipe Diameter, D					
13. Cross-Sectional Flow Area, A					
14. Wetted Perimeter, p_w					
15. Hydraulic Radius, $r = A / p_w$					
16. Channel Slope, s					
17. Pipe Material					
18. Manning's Roughness Coefficient, n					
19. Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$					
20. Flow Length, L					
21. Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+ 0.000 hr	+ 0.000 hr	=	0.000 hr
22. Watershed or subarea Time of Concentration, T_c { add T_t in steps 6, 11 and 21 }					0.308 hr
					18.5 min

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 1/7/2022
Project: Altera
Project No: 2530-99-006

Calculated By: SDP
Checked By: RJC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Proposed
Drainage Area: DA-2 DET

- ***Sheet Flow*** **:**

		AB	BC		
1.	Surface Description	Woods, Dense Underbrush	Smooth Surfaces		
2.	Manning's Roughness Coefficient, n	0.8	0.011		
3.	Flow Length, L { *total L ≤ 100 ft* }	55.0 ft	45.0 ft		
4.	Two-Year 24-hour Rainfall, p_2 for Essex County	3.44 in	3.44 in	3.44 in	
5.	Land Slope, s *(ft/ft)*	0.080 ft/ft	0.071 ft/ft		
6.	Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.214 hr	+ 0.006 hr	+ 0.000 hr	= 0.220 hr

- ***Shallow Concentrated Flow*** **:**

		CD	DE		
7.	Surface Description	Paved	Paved		
8.	Flow Length, L	23.0 ft	95.0 ft		
9.	Watercourse Slope, s	0.071 ft/ft	0.040 ft/ft		
10.	Average velocity, V { *see Figure 3.1)*	5.42 ft/s	4.07 ft/s		
11.	Travel Time, $T_t = \frac{L}{3600\,V}$	0.001 hr	+ 0.006 hr	+ 0.000 hr	= 0.008 hr

- ***Channel Flow*** **:**

12.	Pipe Diameter, D				
13.	Cross-Sectional Flow Area, A				
14.	Wetted Perimeter, p_w				
15.	Hydraulic Radius, $r = A / p_w$				
16.	Channel Slope, s				
17.	Pipe Material				
18.	Manning's Roughness Coefficient, n				
19.	Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$				
20.	Flow Length, L				
21.	Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+ 0.000 hr	+ 0.000 hr	= 0.000 hr
22.	Watershed or subarea Time of Concentration, T_c { *add T_t in steps 6, 11 and 21* }				0.228 hr
					13.7 min

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 1/7/2022
Project: Altera
Project No: 2530-99-006

Calculated By: SDP
Checked By: RJC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Proposed
Drainage Area: DA-3

• Sheet Flow:

	AB	BC		
1. Surface Description	Woods, Dense Underbrush	Woods, Light Underbrush		
2. Manning's Roughness Coefficient, n	0.8	0.4		
3. Flow Length, L { total $L \le 100$ ft }	16.0 ft	84.0 ft		
4. Two-Year 24-hour Rainfall, p_2 for Essex County	3.44 in	3.44 in	3.44 in	
5. Land Slope, s (ft/ft)	0.200 ft/ft	0.060 ft/ft		
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.055 hr	+ 0.194 hr	+ 0.000 hr	= 0.249 hr

• Shallow Concentrated Flow:

	CD	DE	EF	
7. Surface Description	Unpaved	Unpaved	Paved	
8. Flow Length, L	24.0 ft	12.0 ft	95.0 ft	
9. Watercourse Slope, s	0.042 ft/ft	0.125 ft/ft	0.090 ft/ft	
10. Average velocity, V { see Figure 3.1)	3.31 ft/s	5.70 ft/s	6.08 ft/s	
11. Travel Time, $T_t = \frac{L}{3600\,V}$	0.002 hr	+ 0.001 hr	+ 0.004 hr	= 0.007 hr

• Channel Flow:

	FG	GH		
12. Pipe Diameter, D	18 in	24 in		
13. Cross-Sectional Flow Area, A	1.767 sf	3.142 sf		
14. Wetted Perimeter, p_w	4.7 ft	6.3 ft		
15. Hydraulic Radius, $r = A / p_w$	0.4 ft	0.5 ft		
16. Channel Slope, s	0.058 ft/ft	0.360 ft/ft		
17. Pipe Material	RCP	RCP		
18. Manning's Roughness Coefficient, n	0.013	0.013		
19. Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$	14.35 ft/s	43.32 ft/s		
20. Flow Length, L	150.7	56.0		
21. Travel Time, $T_t = \frac{L}{3600\,V}$	0.003 hr	+ 0.000 hr	+ 0.000 hr	= 0.003 hr
22. Watershed or subarea Time of Concentration, T_c { add T_t in steps 6, 11 and 21 }				0.260 hr
				15.6 min

PHASE 2 - TIME OF CONCENTRATION (Tc) CALCULATIONS

DYNAMIC ENGINEERING
1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 1/7/2022
Project: Altera Development
Project No: 2530-99-006

Calculated By: SDP
Checked By: RJC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Proposed
Drainage Area: DA-1

• Sheet Flow:

	AB	BC					
1. Surface Description	Woods, Light Underbrush	Woods, Light Underbrush					
2. Manning's Roughness Coefficient, n	0.4	0.4					
3. Flow Length, L { total $L \le 100$ ft }	50.0 ft	50.0 ft					
4. Two-Year 24-hour Rainfall, p_2 for Essex County	3.44 in	3.44 in	3.44 in				
5. Land Slope, s (ft/ft)	0.029 ft/ft	0.057 ft/ft					
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.171 hr	+ 0.130 hr	+ 0.000 hr	=	0.301 hr		

• Shallow Concentrated Flow:

	CD	DE	EF				
7. Surface Description	Unpaved	Unpaved	Unpaved				
8. Flow Length, L	25.0 ft	37.0 ft	20.0 ft				
9. Watercourse Slope, s	0.050 ft/ft	0.027 ft/ft	0.167 ft/ft				
10. Average velocity, V { see Figure 3.1)	3.61 ft/s	2.65 ft/s	6.59 ft/s				
11. Travel Time, $T_t = \frac{L}{3600\,V}$	0.002 hr	+ 0.004 hr	+ 0.001 hr	=	0.007 hr		

• Channel Flow:

	FG	GH					
12. Pipe Diameter, D	18 in	18 in					
13. Cross-Sectional Flow Area, A	1.767 sf	1.767 sf					
14. Wetted Perimeter, p_w	4.7 ft	4.7 ft					
15. Hydraulic Radius, $r = A / p_w$	0.4 ft	0.4 ft					
16. Channel Slope, s	0.020 ft/ft	0.020 ft/ft					
17. Pipe Material	HDPE	HDPE					
18. Manning's Roughness Coefficient, n	0.010	0.010					
19. Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$	10.96 ft/s	10.96 ft/s					
20. Flow Length, L	134.0	89.0					
21. Travel Time, $T_t = \frac{L}{3600\,V}$	0.003 hr	+ 0.002 hr	+ 0.000 hr	=	0.006 hr		
22. Watershed or subarea Time of Concentration, T_c { add T_t in steps 6, 11 and 21 }					0.314 hr		
					18.8 min		

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 1/7/2022
Project: Altera
Project No: 2530-99-006

Calculated By: SDP
Checked By: RJC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Proposed
Drainage Area: DA-2 DET

- ***Sheet Flow*** **:**

		AB	BC	CD	
1.	Surface Description	Woods, Dense Underbrush	Woods, Light Underbrush	Woods, Light Underbrush	
2.	Manning's Roughness Coefficient, n	0.8	0.4	0.4	
3.	Flow Length, L { *total* $L \le 100$ *ft* }	12.0 ft	75.0 ft	13.0 ft	
4.	Two-Year 24-hour Rainfall, p_2 for Essex County	3.44 in	3.44 in	3.44 in	
5.	Land Slope, s *(ft/ft)*	0.333 ft/ft	0.067 ft/ft	0.154 ft/ft	
6.	Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.036 hr	+ 0.169 hr	+ 0.030 hr	= 0.235 hr

- ***Shallow Concentrated Flow*** **:**

		DE	EF		
7.	Surface Description	Unpaved	Paved		
8.	Flow Length, L	13.0 ft	145.0 ft		
9.	Watercourse Slope, s	0.154 ft/ft	0.076 ft/ft		
10.	Average velocity, V { *see Figure 3.1)*	6.33 ft/s	5.60 ft/s		
11.	Travel Time, $T_t = \frac{L}{3600\,V}$	0.001 hr	+ 0.007 hr	+ 0.000 hr	= 0.008 hr

- ***Channel Flow*** **:**

12.	Pipe Diameter, D				
13.	Cross-Sectional Flow Area, A				
14.	Wetted Perimeter, p_w				
15.	Hydraulic Radius, $r = A / p_w$				
16.	Channel Slope, s				
17.	Pipe Material				
18.	Manning's Roughness Coefficient, n				
19.	Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$				
20.	Flow Length, L				
21.	Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+ 0.000 hr	+ 0.000 hr	= 0.000 hr
22.	Watershed or subarea Time of Concentration, T_c { *add* T_t *in steps 6, 11 and 21* }				0.243 hr
					14.6 min

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 1/7/2022
Project: Altera
Project No: 2530-99-006

Calculated By: SDP
Checked By: RJC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Proposed
Drainage Area: DA-3A DET

- ***Sheet Flow*:**

	AB	BC	CD		
1. Surface Description	Woods, Light Underbrush	Short Grass, Prairie	Smooth Surfaces		
2. Manning's Roughness Coefficient, n	0.4	0.15	0.011		
3. Flow Length, L { total $L \le 100$ ft }	48.0 ft	32.0 ft	20.0 ft		
4. Two-Year 24-hour Rainfall, p_2 for Essex County	3.44 in	3.44 in	3.44 in		
5. Land Slope, s (ft/ft)	0.135 ft/ft	0.172 ft/ft	0.071 ft/ft		
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.089 hr	+ 0.027 hr	+ 0.003 hr	=	0.119 hr

- ***Shallow Concentrated Flow*:**

	DE	EF			
7. Surface Description	Paved	Paved			
8. Flow Length, L	107.0 ft	67.0 ft			
9. Watercourse Slope, s	0.075 ft/ft	0.045 ft/ft			
10. Average velocity, V { see Figure 3.1)	5.56 ft/s	4.31 ft/s			
11. Travel Time, $T_t = \frac{L}{3600\,V}$	0.005 hr	+ 0.004 hr	+ 0.000 hr	=	0.010 hr

- ***Channel Flow*:**

12. Pipe Diameter, D					
13. Cross-Sectional Flow Area, A					
14. Wetted Perimeter, p_w					
15. Hydraulic Radius, $r = A / p_w$					
16. Channel Slope, s					
17. Pipe Material					
18. Manning's Roughness Coefficient, n					
19. Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$					
20. Flow Length, L					
21. Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+ 0.000 hr	+ 0.000 hr	=	0.000 hr
22. Watershed or subarea Time of Concentration, T_c { add T_t in steps 6, 11 and 21 }					0.129 hr
					7.7 min

DYNAMIC ENGINEERING

1904 Main Street, Lake Como, NJ 07719
(732) 974-0198

Date: 1/7/2022
Project: Altera
Project No: 2530-99-006

Calculated By: SDP
Checked By: RJC

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Proposed
Drainage Area: DA-3C DET

• Sheet Flow:

	AB	BC				
1. Surface Description	Woods, Light Underbrush	Woods, Light Underbrush				
2. Manning's Roughness Coefficient, n	0.4	0.4				
3. Flow Length, L { total $L \le 100$ ft }	12.0 ft	88.0 ft				
4. Two-Year 24-hour Rainfall, p_2 for Essex County	3.44 in	3.44 in	3.44 in			
5. Land Slope, s (ft/ft)	0.333 ft/ft	0.068 ft/ft				
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.021 hr	+ 0.191 hr	+ 0.000 hr	=	0.211 hr	

• Shallow Concentrated Flow:

	CD	DE	EF			
7. Surface Description	Unpaved	Paved	Paved			
8. Flow Length, L	45.0 ft	105.0 ft	35.0 ft			
9. Watercourse Slope, s	0.068 ft/ft	0.086 ft/ft	0.057 ft/ft			
10. Average velocity, V { see Figure 3.1)	4.21 ft/s	5.95 ft/s	4.86 ft/s			
11. Travel Time, $T_t = \frac{L}{3600\,V}$	0.003 hr	+ 0.005 hr	+ 0.002 hr	=	0.010 hr	

• Channel Flow:

12. Pipe Diameter, D						
13. Cross-Sectional Flow Area, A						
14. Wetted Perimeter, p_w						
15. Hydraulic Radius, $r = A / p_w$						
16. Channel Slope, s						
17. Pipe Material						
18. Manning's Roughness Coefficient, n						
19. Velocity, $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$						
20. Flow Length, L						
21. Travel Time, $T_t = \frac{L}{3600\,V}$	0.000 hr	+ 0.000 hr	+ 0.000 hr	=	0.000 hr	
22. Watershed or subarea Time of Concentration, T_c { add T_t in steps 6, 11 and 21 }					0.221 hr	
					13.3 min	

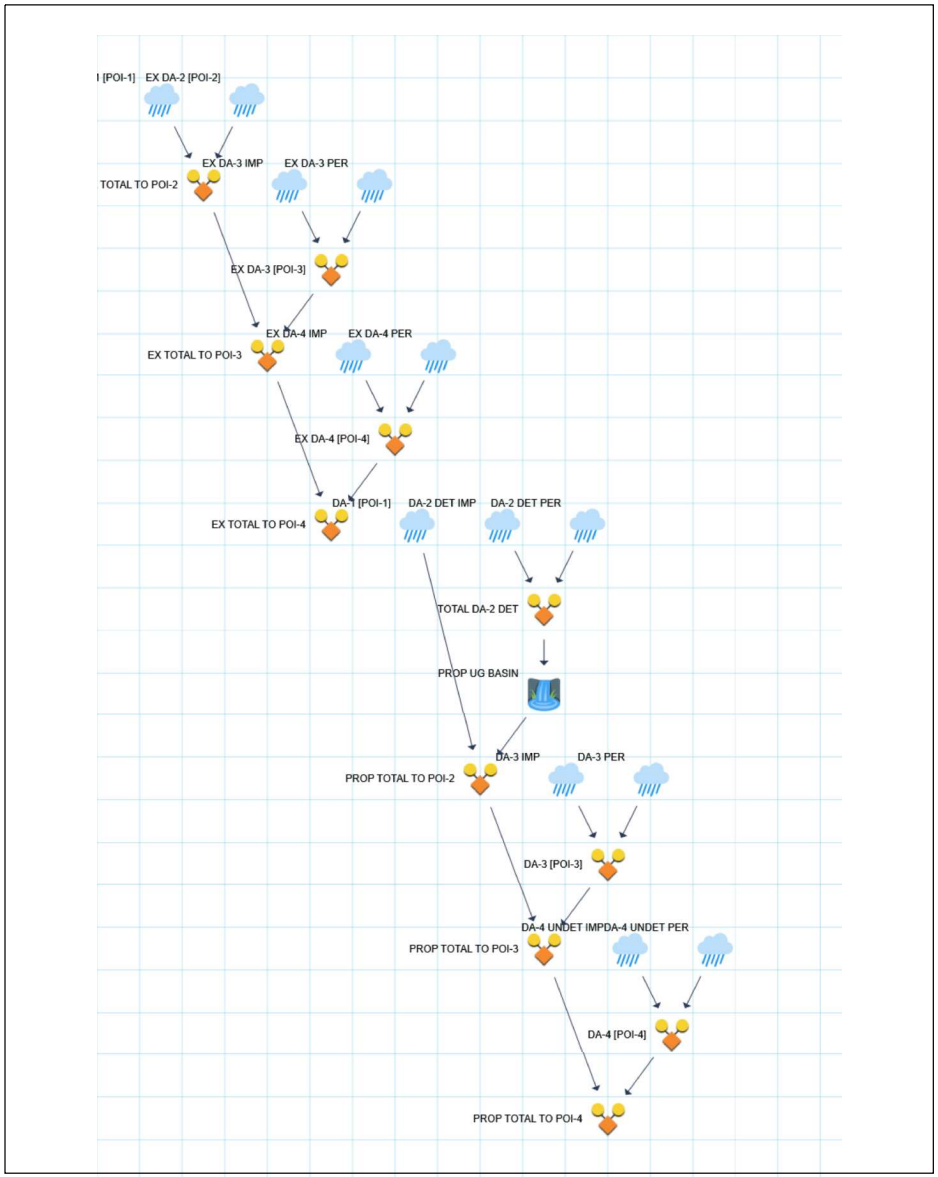
PHASE I - EXISTING & PROPOSED CONDITIONS FOR 2YR, 10YR & 100YR STORM EVENTS (HYDROGRAPHS CREATED USING HYDROLOGY STUDIO 2020 COMPUTER SOFTWARE)

Basin Model

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022



Hydrograph by Return Period

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)							
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1	NRCS Runoff	EX DA-1 [POI-1]		0.884			1.380			3.777
3	NRCS Runoff	EX DA-2 [POI-2]		0.736			1.147			3.130
5	Junction	EX TOTAL TO POI-2		1.612			2.509			6.826
7	NRCS Runoff	EX DA-3 IMP		2.471			3.174			6.280
8	NRCS Runoff	EX DA-3 PER		0.319			0.498			1.357
9	Junction	EX DA-3 [POI-3]		2.790			3.671			7.637
11	Junction	EX TOTAL TO POI-3		4.289			6.036			14.20
13	NRCS Runoff	EX DA-4 IMP		5.543			7.118			14.08
14	NRCS Runoff	EX DA-4 PER		0.422			0.631			1.602
15	Junction	EX DA-4 [POI-4]		5.964			7.749			15.68
17	Junction	EX TOTAL TO POI-4		9.477			12.73			27.60
19	NRCS Runoff	DA-1 [POI-1]		0.884			1.380			3.777
21	NRCS Runoff	DA-2 DET IMP		0.539			0.693			1.371
22	NRCS Runoff	DA-2 DET PER		0.319			0.498			1.358
23	Junction	TOTAL DA-2 DET		0.859			1.191			2.729
24	Pond Route	PROP UG BASIN		0.446			0.777			1.741
26	Junction	PROP TOTAL TO POI-2		1.262			2.052			5.379
28	NRCS Runoff	DA-3 IMP		2.180			2.801			5.542
29	NRCS Runoff	DA-3 PER		0.438			0.681			1.848
30	Junction	DA-3 [POI-3]		2.618			3.482			7.391
32	Junction	PROP TOTAL TO POI-3		3.808			5.336			12.54
34	NRCS Runoff	DA-4 UNDET IMP		5.499			7.062			13.97
35	NRCS Runoff	DA-4 UNDET PER		0.449			0.671			1.704
36	Junction	DA-4 [POI-4]		5.948			7.733			15.67

Hydrograph by Return Period

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)							
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
38	Junction	PROP TOTAL TO POI-4		8.874			11.76			25.34

Hydrograph 2-yr Summary

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX DA-1 [POI-1]	0.884	12.23	4,428	---		
3	NRCS Runoff	EX DA-2 [POI-2]	0.736	12.20	3,336	---		
5	Junction	EX TOTAL TO POI-2	1.612	12.23	7,764	1, 3		
7	NRCS Runoff	EX DA-3 IMP	2.471	12.17	11,644	---		
8	NRCS Runoff	EX DA-3 PER	0.319	12.17	1,349	---		
9	Junction	EX DA-3 [POI-3]	2.790	12.17	12,993	7, 8		
11	Junction	EX TOTAL TO POI-3	4.289	12.20	20,756	5, 9		
13	NRCS Runoff	EX DA-4 IMP	5.543	12.10	20,019	---		
14	NRCS Runoff	EX DA-4 PER	0.422	12.10	1,322	---		
15	Junction	EX DA-4 [POI-4]	5.964	12.10	21,340	13, 14		
17	Junction	EX TOTAL TO POI-4	9.477	12.13	42,097	11, 15		
19	NRCS Runoff	DA-1 [POI-1]	0.884	12.23	4,428	---		
21	NRCS Runoff	DA-2 DET IMP	0.539	12.20	2,724	---		
22	NRCS Runoff	DA-2 DET PER	0.319	12.20	1,447	---		
23	Junction	TOTAL DA-2 DET	0.859	12.20	4,171	21, 22		
24	Pond Route	PROP UG BASIN	0.446	12.40	4,170	23	474.95	568
26	Junction	PROP TOTAL TO POI-2	1.262	12.27	8,598	19, 24		
28	NRCS Runoff	DA-3 IMP	2.180	12.20	11,009	---		
29	NRCS Runoff	DA-3 PER	0.438	12.20	1,983	---		
30	Junction	DA-3 [POI-3]	2.618	12.20	12,991	28, 29		
32	Junction	PROP TOTAL TO POI-3	3.808	12.20	21,589	26, 30		
34	NRCS Runoff	DA-4 UNDET IMP	5.499	12.10	19,861	---		
35	NRCS Runoff	DA-4 UNDET PER	0.449	12.10	1,406	---		
36	Junction	DA-4 [POI-4]	5.948	12.10	21,267	34, 35		

Hydrograph 2-yr Summary

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	Junction	PROP TOTAL TO POI-4	8.874	12.10	42,856	32, 36		

Hydrograph Report

Project Name:

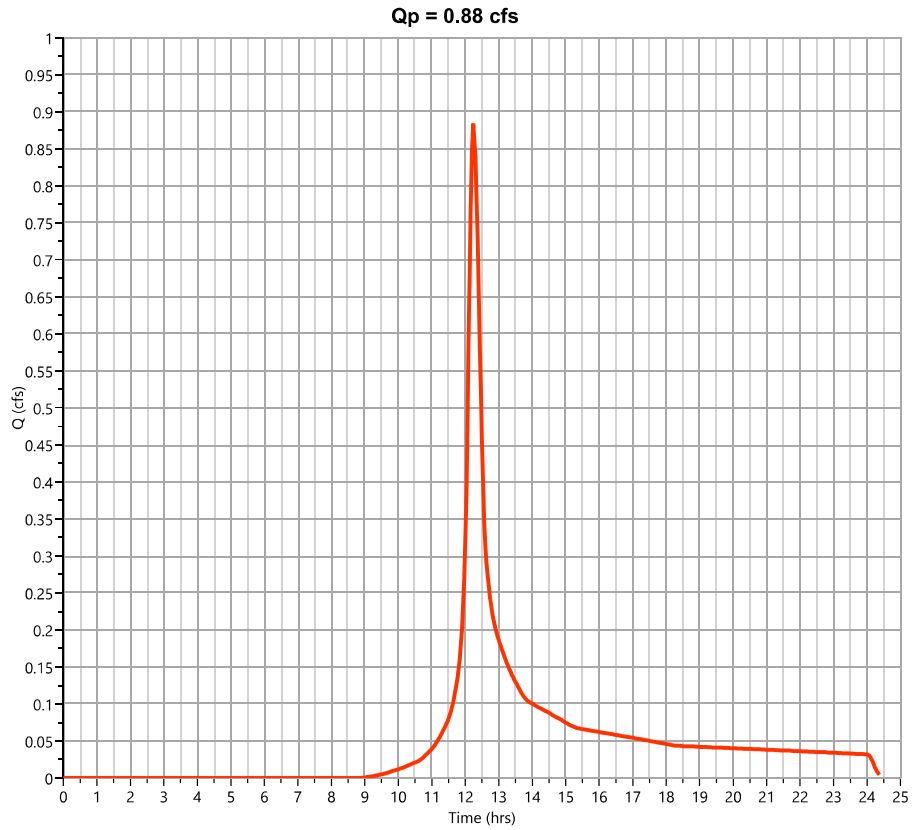
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-1 [POI-1]

Hyd. No. 1

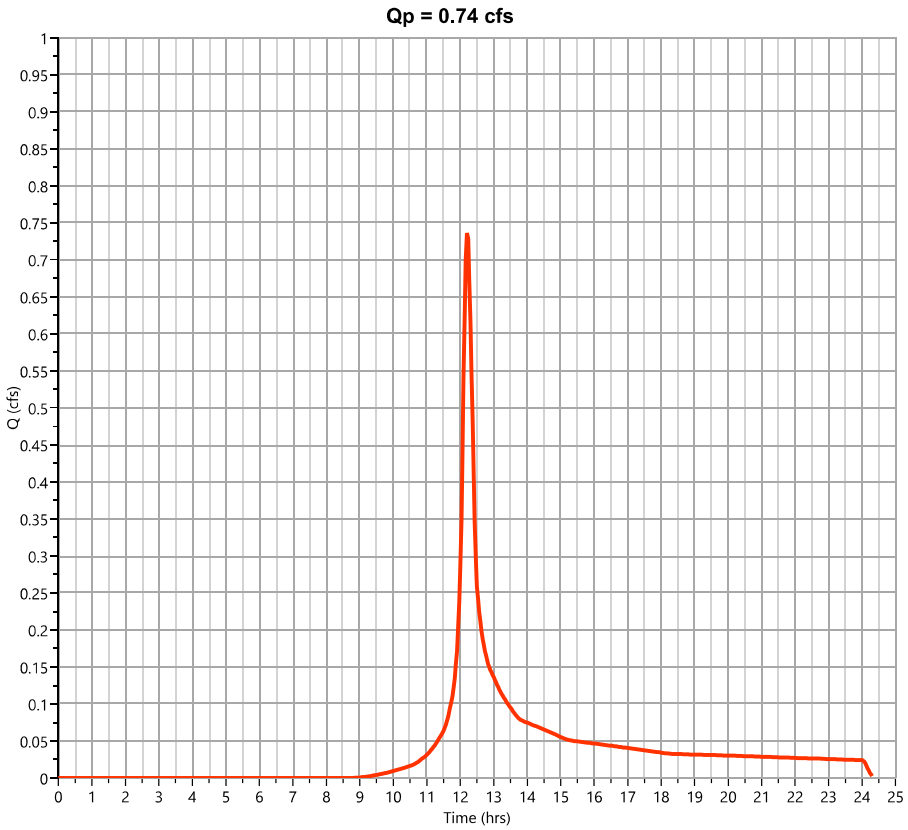
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.884 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 4,428 cuft
Drainage Area	= 0.88 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 18.5 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



EX DA-2 [POI-2]

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.736 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 3,336 cuft
Drainage Area	= 0.68 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

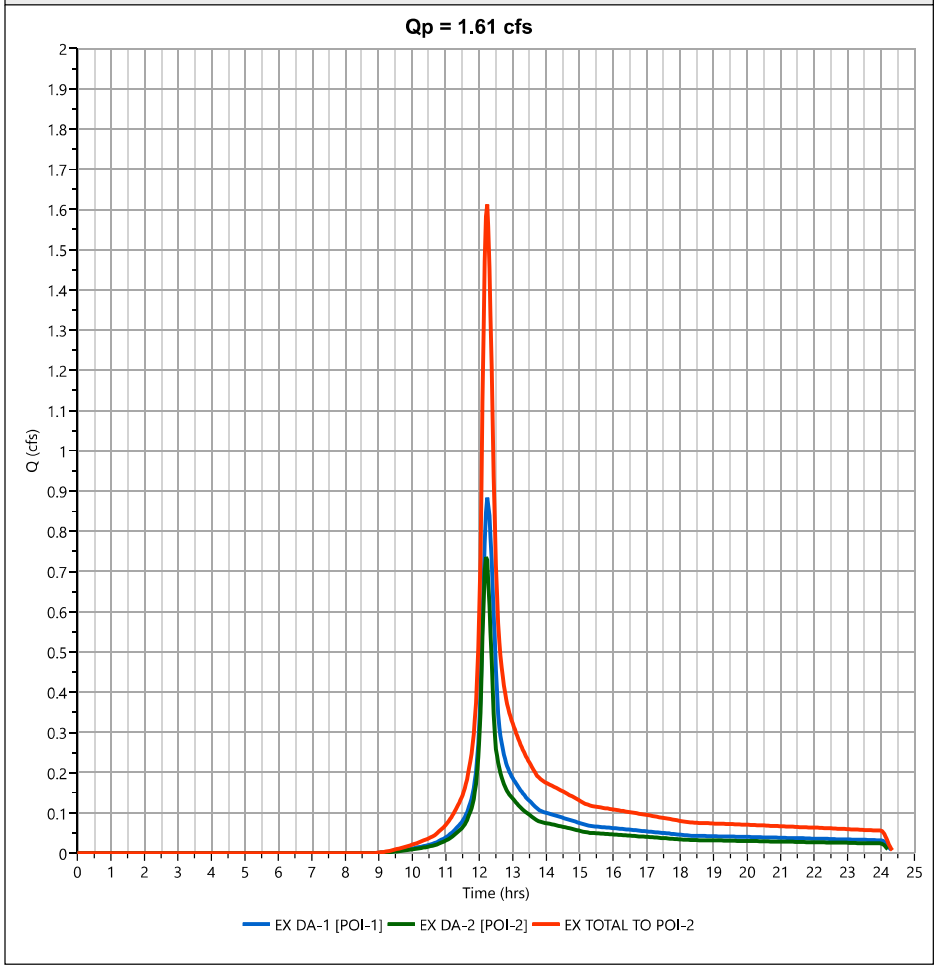
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-2

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 1.612 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Hydrograph Volume	= 7,764 cuft
Inflow Hydrographs	= 1, 3	Total Contrib. Area	= 1.56 ac



Hydrograph Report

Project Name:

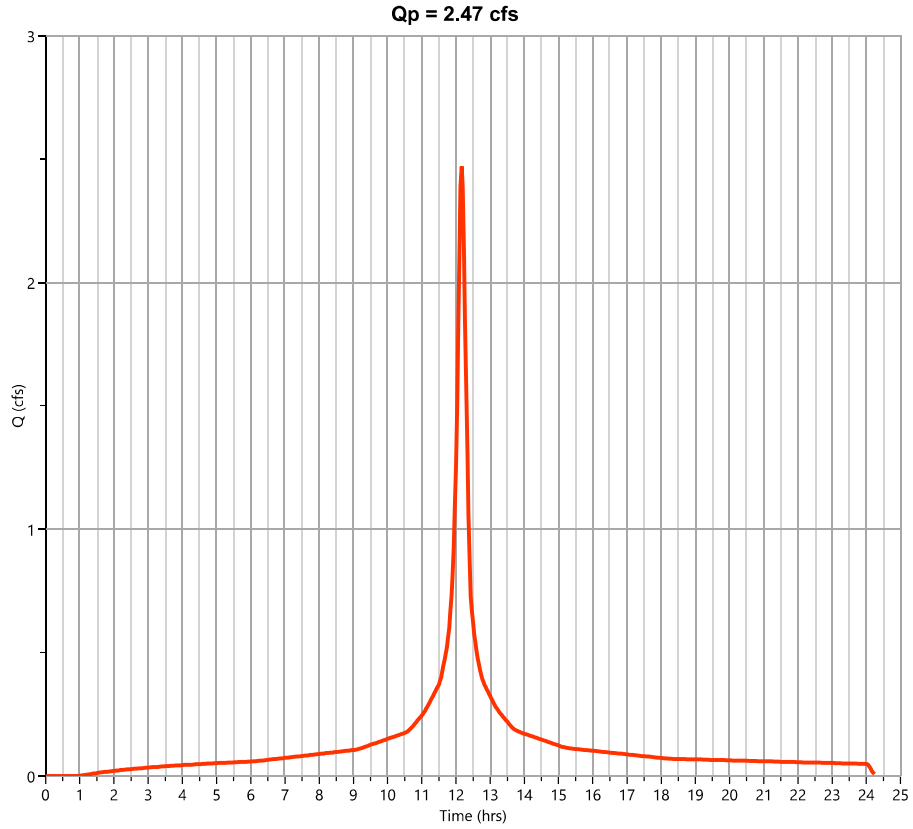
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 IMP

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.471 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 11,644 cuft
Drainage Area	= 0.97 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.6 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

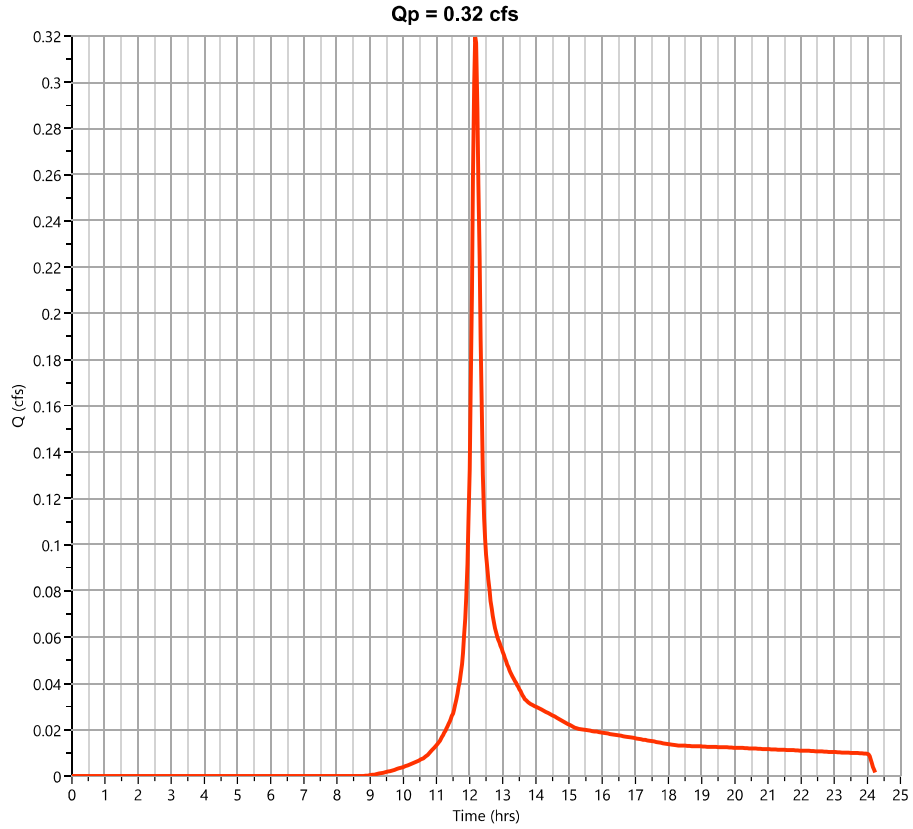
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 PER

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.319 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 1,349 cuft
Drainage Area	= 0.26 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 10.6 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

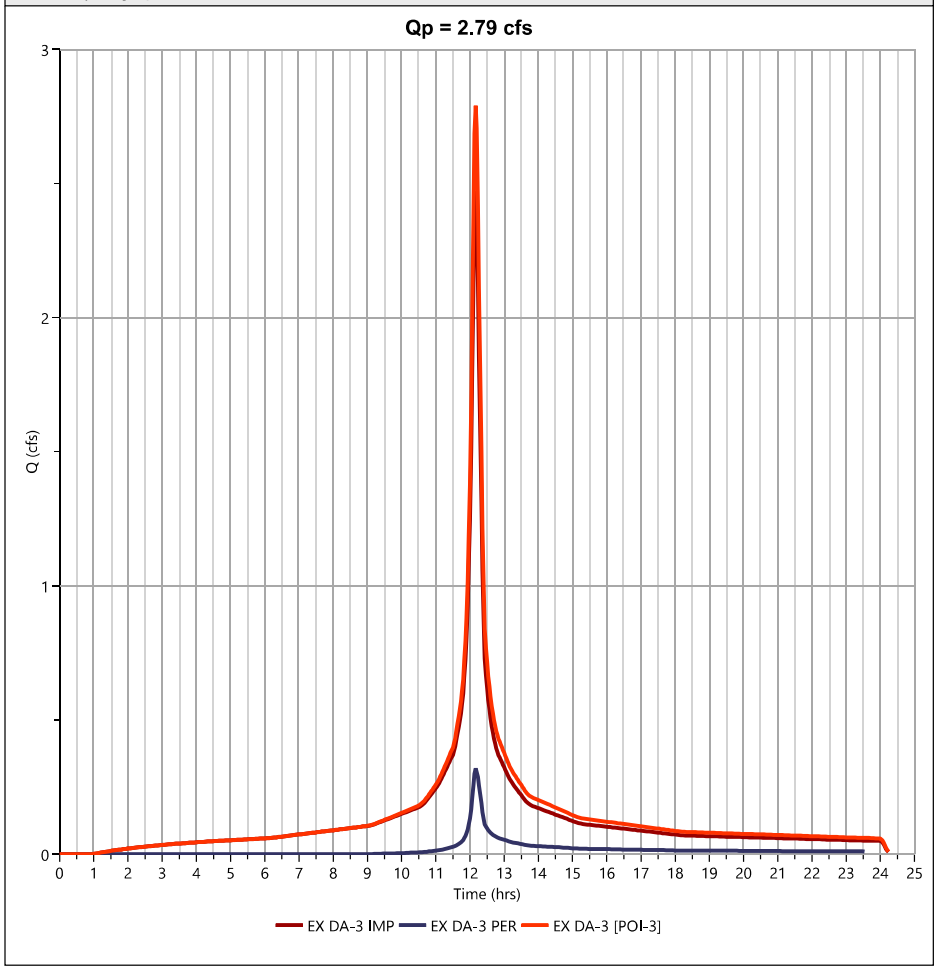
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 [POI-3]

Hyd. No. 9

Hydrograph Type	= Junction	Peak Flow	= 2.790 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 12,993 cuft
Inflow Hydrographs	= 7, 8	Total Contrib. Area	= 1.23 ac



Hydrograph Report

Project Name:

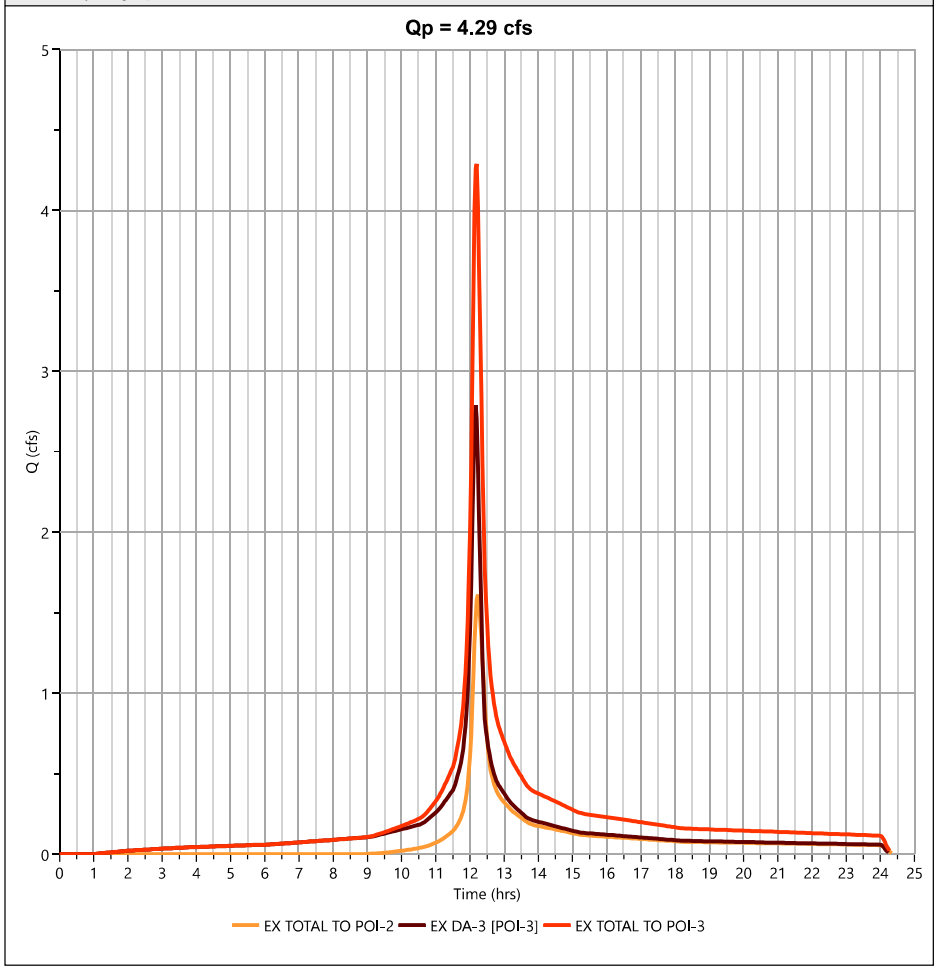
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-3

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 4.289 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 20,756 cuft
Inflow Hydrographs	= 5, 9	Total Contrib. Area	= 2.79 ac



Hydrograph Report

Project Name:

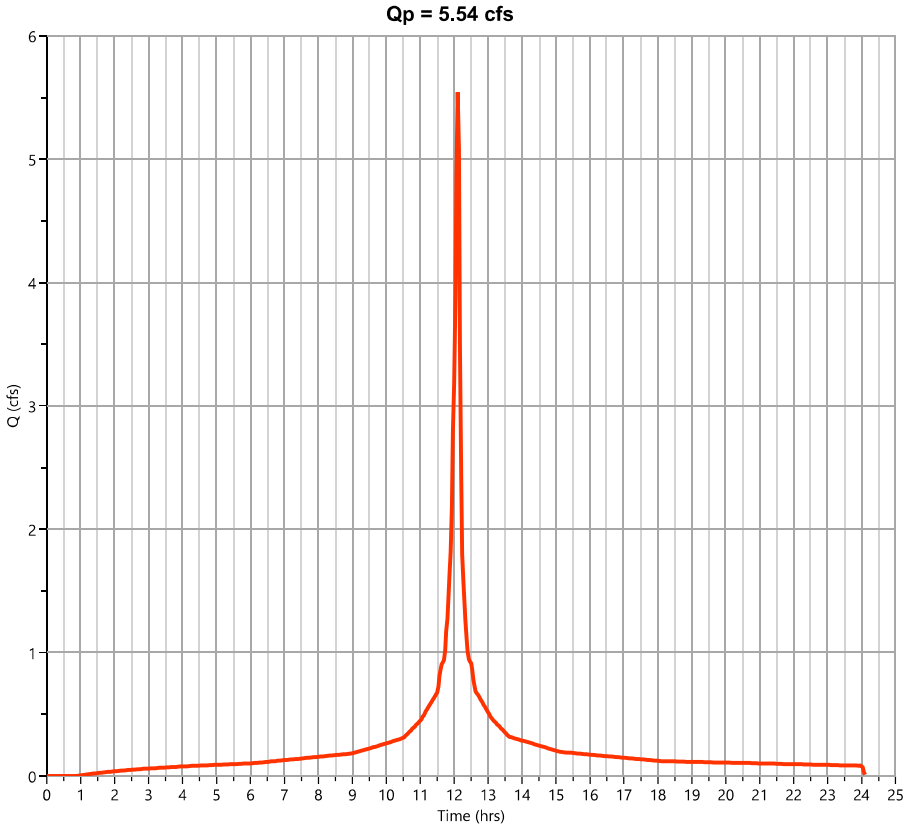
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 IMP

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.543 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 20,019 cuft
Drainage Area	= 1.834 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

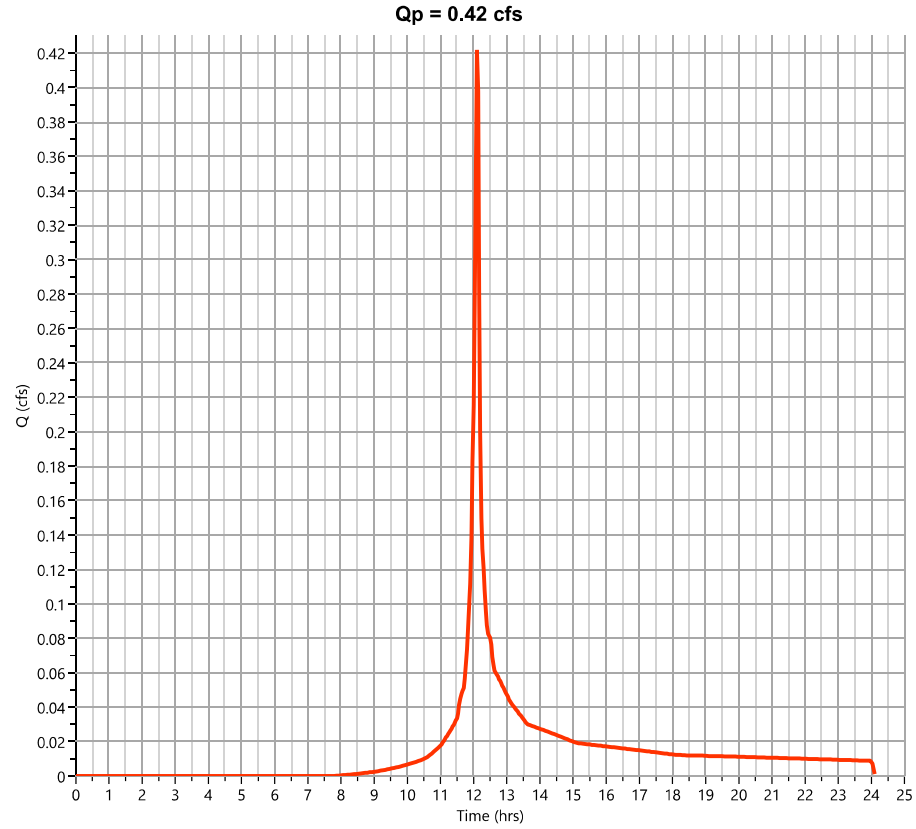
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 PER

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.422 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 1,322 cuft
Drainage Area	= 0.244 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

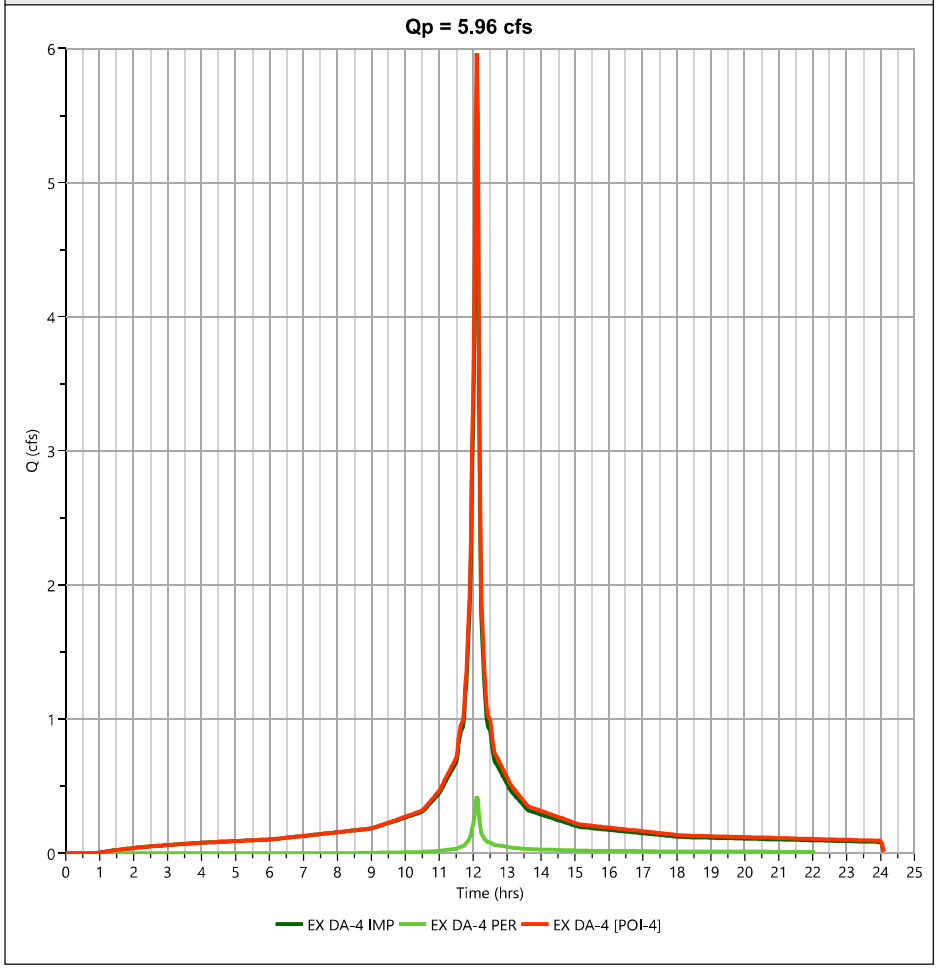
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 [POI-4]

Hyd. No. 15

Hydrograph Type	= Junction	Peak Flow	= 5.964 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 21,340 cuft
Inflow Hydrographs	= 13, 14	Total Contrib. Area	= 2.079 ac



Hydrograph Report

Project Name:

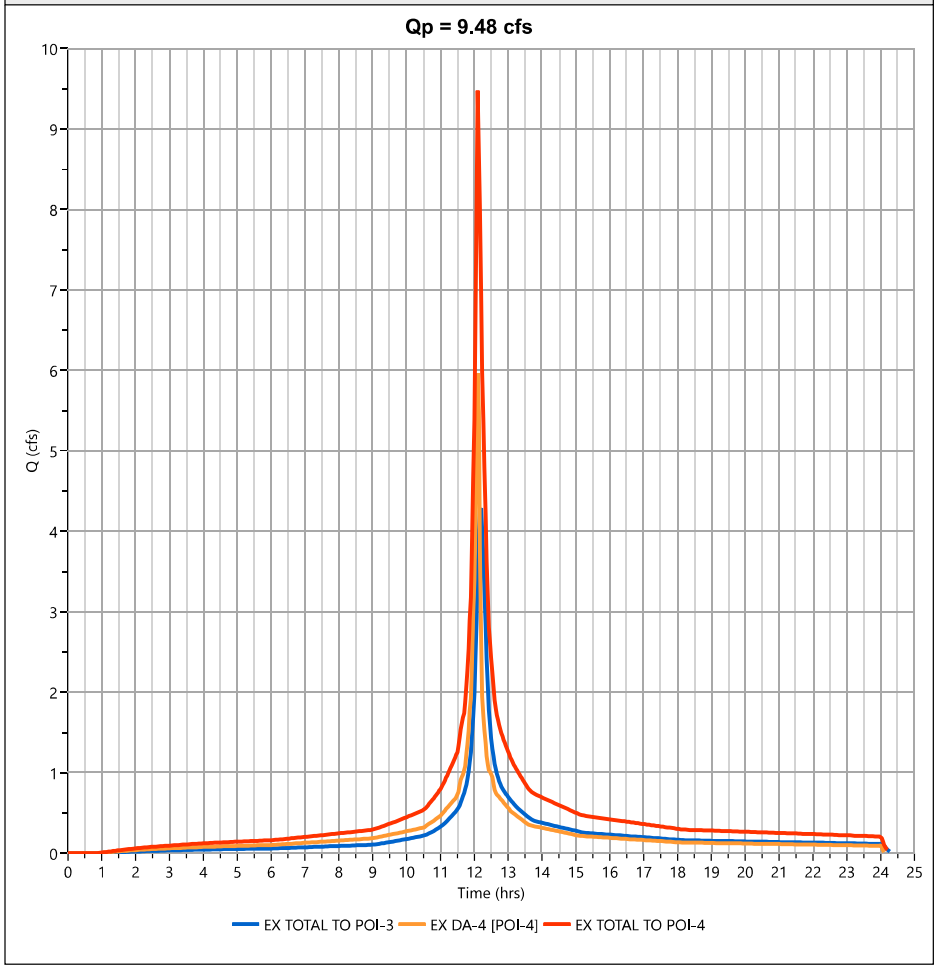
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-4

Hyd. No. 17

Hydrograph Type	= Junction	Peak Flow	= 9.477 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 42,097 cuft
Inflow Hydrographs	= 11, 15	Total Contrib. Area	= 4.869 ac



Hydrograph Report

Project Name:

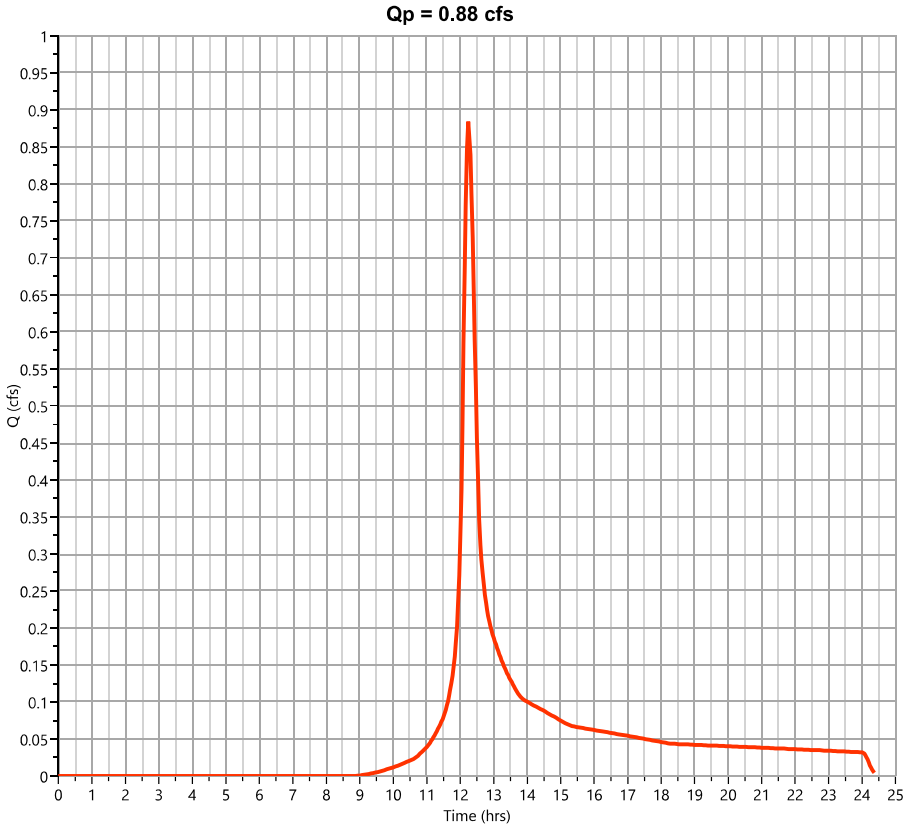
Hydrology Studio v 3.0.0.21

01-26-2022

DA-1 [POI-1]

Hyd. No. 19

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.884 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 4,428 cuft
Drainage Area	= 0.88 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 18.5 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

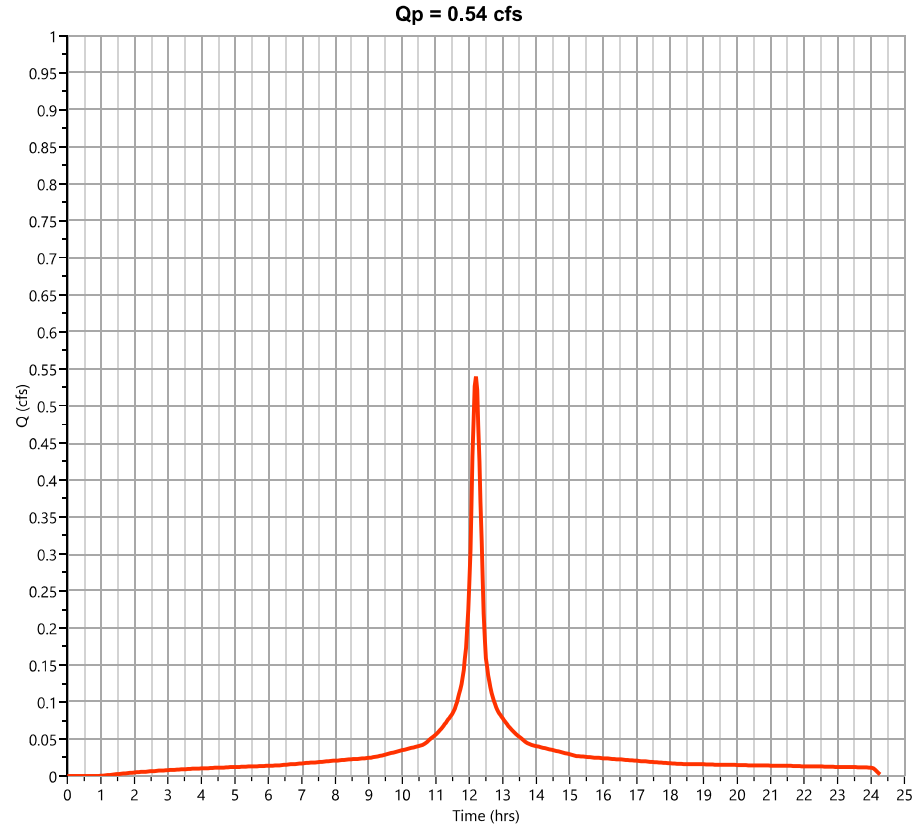
Hydrology Studio v 3.0.0.21

01-26-2022

DA-2 DET IMP

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.539 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 2,724 cuft
Drainage Area	= 0.24 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 13.7 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

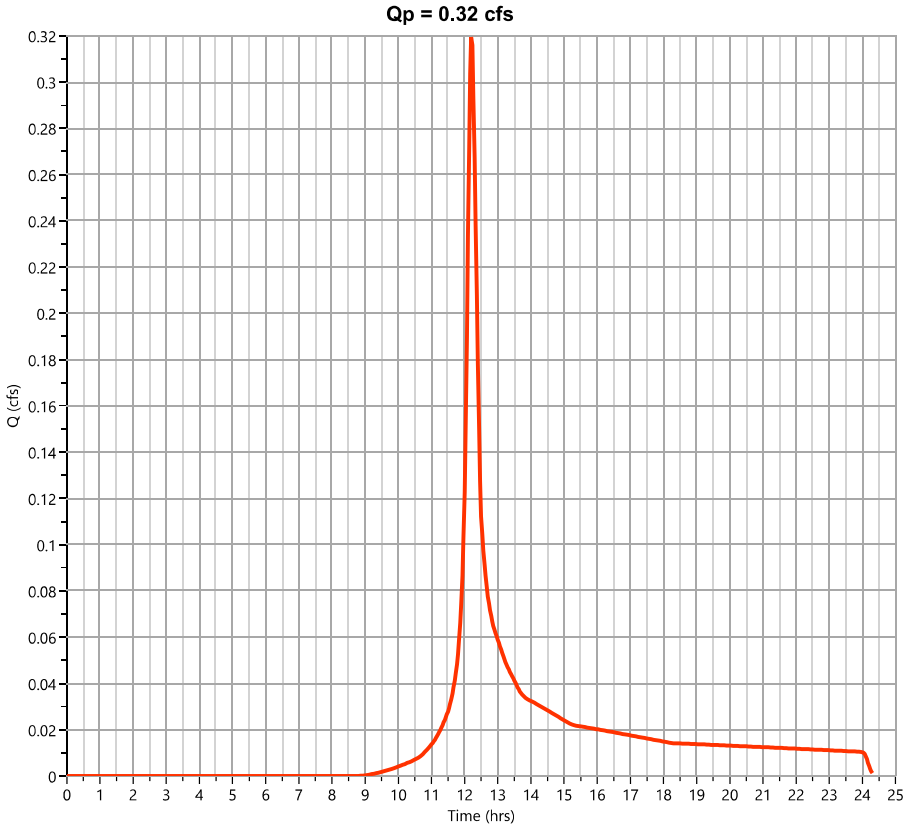
Hydrology Studio v 3.0.0.21

01-26-2022

DA-2 DET PER

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.319 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 1,447 cuft
Drainage Area	= 0.295 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 13.7 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

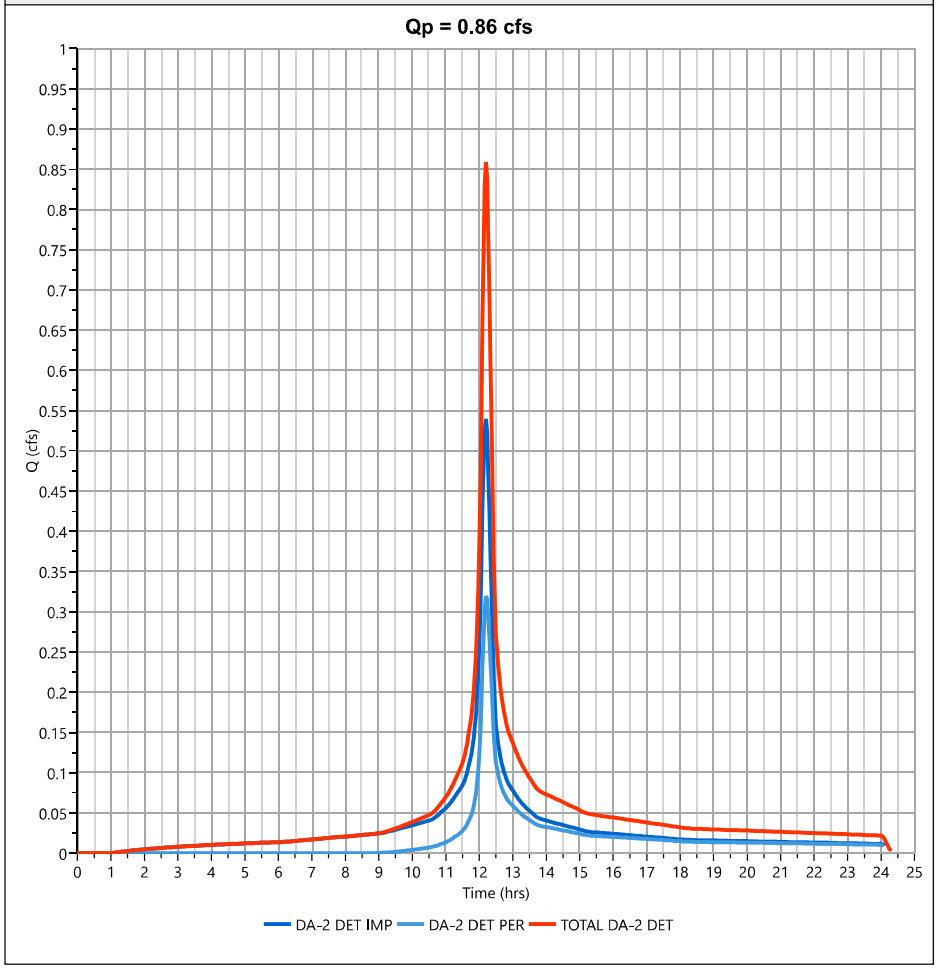
Hydrology Studio v 3.0.0.21

01-26-2022

TOTAL DA-2 DET

Hyd. No. 23

Hydrograph Type	= Junction	Peak Flow	= 0.859 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 4,171 cuft
Inflow Hydrographs	= 21, 22	Total Contrib. Area	= 0.535 ac



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

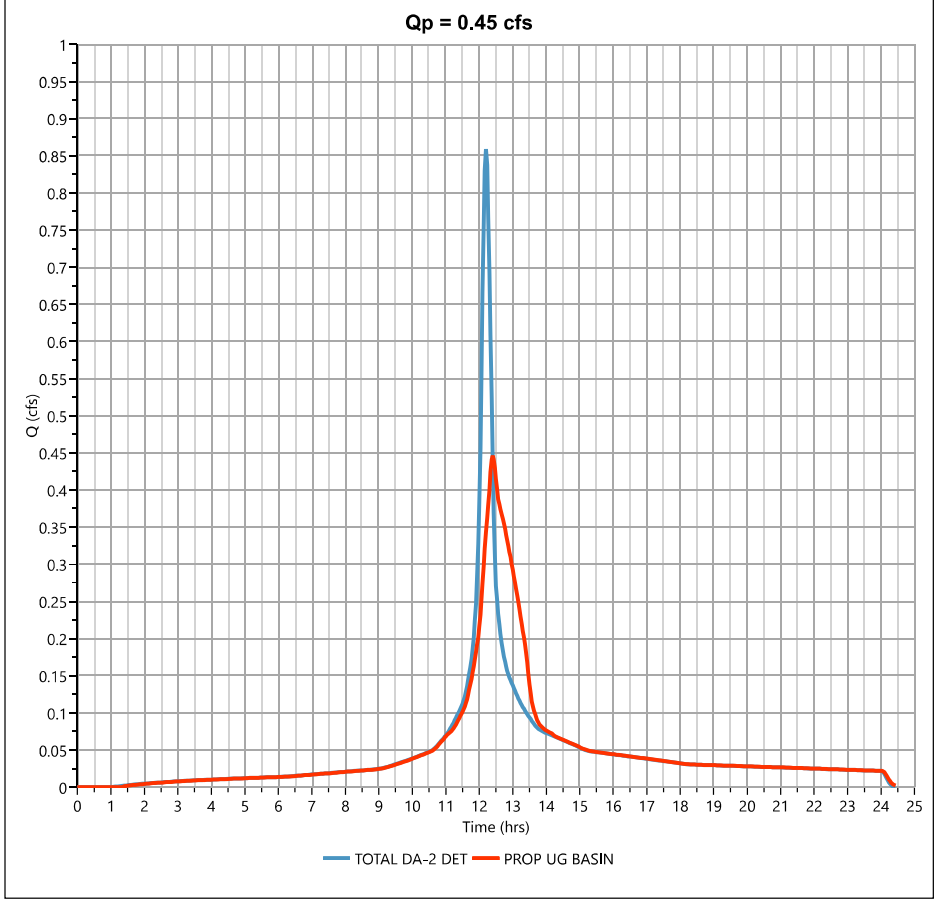
PROP UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 0.446 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Hydrograph Volume	= 4,170 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 474.95 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 568 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 9 min



Pond Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

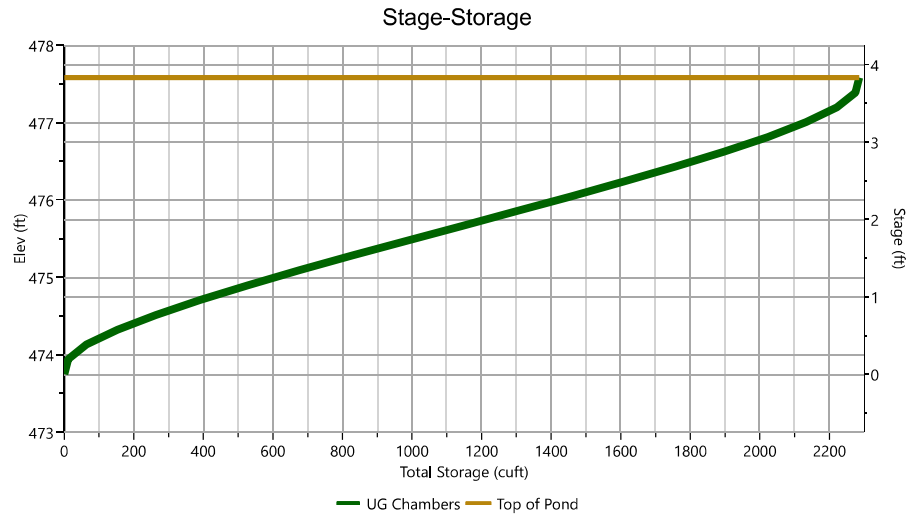
PROP UG BASIN

Stage-Storage

Underground Chambers	
Description	**Input**
Invert Elev Down, ft	473.75
Chamber Rise, ft	3.50
Chamber Shape	Circular
Chamber Span, ft	3.50
Barrel Length, ft	110.00
No. Barrels	2
Barrel Slope, %	0.30
Headers, y/n	Yes
Stone Encasement, y/n	No
Encasement Bottom Elevation, ft	0.00
Encasement Width per Chamber, ft	0.00
Encasement Depth, ft	0.00
Encasement Voids, %	100.00

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	473.75	n/a	0.000	0.000
0.19	473.94	n/a	10.9	10.9
0.38	474.13	n/a	53.0	63.9
0.57	474.32	n/a	88.9	153
0.77	474.52	n/a	111	264
0.96	474.71	n/a	126	390
1.15	474.90	n/a	138	528
1.34	475.09	n/a	147	675
1.53	475.28	n/a	153	828
1.72	475.47	n/a	157	985
1.92	475.67	n/a	158	1,143
2.11	475.86	n/a	158	1,301
2.30	476.05	n/a	157	1,458
2.49	476.24	n/a	153	1,611
2.68	476.43	n/a	147	1,758
2.87	476.62	n/a	138	1,896
3.06	476.81	n/a	126	2,022
3.26	477.01	n/a	111	2,133
3.45	477.20	n/a	88.8	2,222
3.64	477.39	n/a	52.9	2,275
3.83	477.58	n/a	10.9	2,285



Pond Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PROP UG BASIN

Stage-Discharge

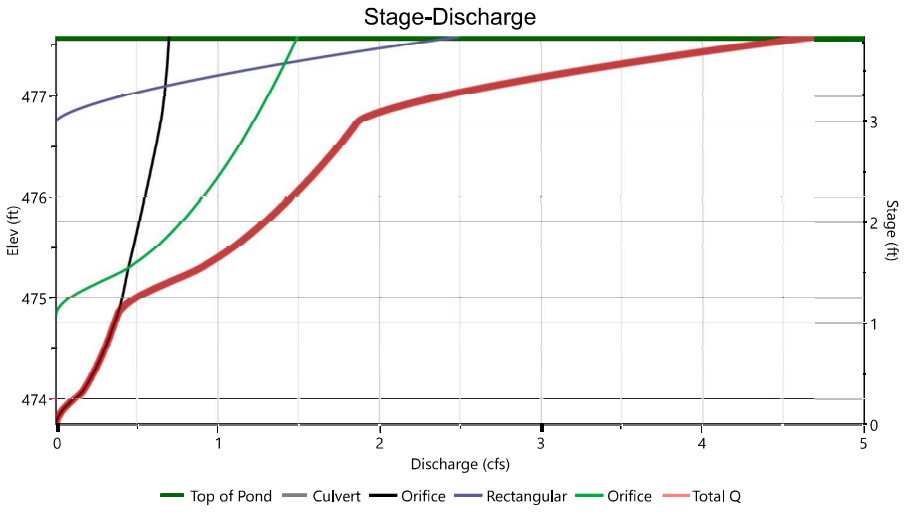
Culvert / Orifices	Culvert	Orifices		
		1*	2*	3
Rise, in	18	4	6	
Span, in	18	4	6	
No. Barrels	1	1	1	
Invert Elevation, ft	473.75	473.75	474.83	
Orifice Coefficient, Co	0.60	0.60	0.60	
Length, ft	65			
Barrel Slope, %	5.9			
N-Value, n	0.013			

Weirs	Riser*	Weirs		
		1*	2	3
Shape / Type		Rectangular		
Crest Elevation, ft		476.75		
Crest Length, ft		1		
Angle, deg				
Weir Coefficient, Cw		3.3		

Perforated Riser	
Hole Diameter, in	
No. holes	
Invert Elevation, ft	
Height, ft	
Orifice Coefficient, Co	

Ancillary	
Exfiltration, in/hr	

*Routes through Culvert.



Pond Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PROP UG BASIN

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	473.75	0.000	0.000	0.000	0.000			0.000						0.000
0.19	473.94	10.9	0.072 ic	0.072	0.000			0.000						0.072
0.38	474.13	63.9	0.187 ic	0.187	0.000			0.000						0.187
0.57	474.32	153	0.252 ic	0.252	0.000			0.000						0.252
0.77	474.52	264	0.306 ic	0.306	0.000			0.000						0.306
0.96	474.71	390	0.352 ic	0.352	0.000			0.000						0.352
1.15	474.90	528	0.408 ic	0.393	0.015			0.000						0.408
1.34	475.09	675	0.601 ic	0.421	0.181			0.000						0.601
1.53	475.28	828	0.873 ic	0.445	0.428			0.000						0.873
1.72	475.47	985	1.066 ic	0.473	0.593			0.000						1.066
1.92	475.67	1,143	1.224 ic	0.500	0.723			0.000						1.224
2.11	475.86	1,301	1.362 ic	0.529	0.833			0.000						1.362
2.30	476.05	1,458	1.486 ic	0.556	0.930			0.000						1.486
2.49	476.24	1,611	1.600 ic	0.582	1.018			0.000						1.600
2.68	476.43	1,758	1.707 ic	0.608	1.099			0.000						1.707
2.87	476.62	1,896	1.806 ic	0.632	1.174			0.000						1.806
3.06	476.81	2,022	1.953 ic	0.655	1.245			0.053						1.953
3.26	477.01	2,133	2.408 ic	0.670	1.312			0.426						2.408
3.45	477.20	2,222	3.043 ic	0.681	1.375			0.986						3.043
3.64	477.39	2,275	3.811 ic	0.691	1.436			1.684						3.811
3.83	477.58	2,285	4.689 ic	0.699	1.495			2.495						4.689

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

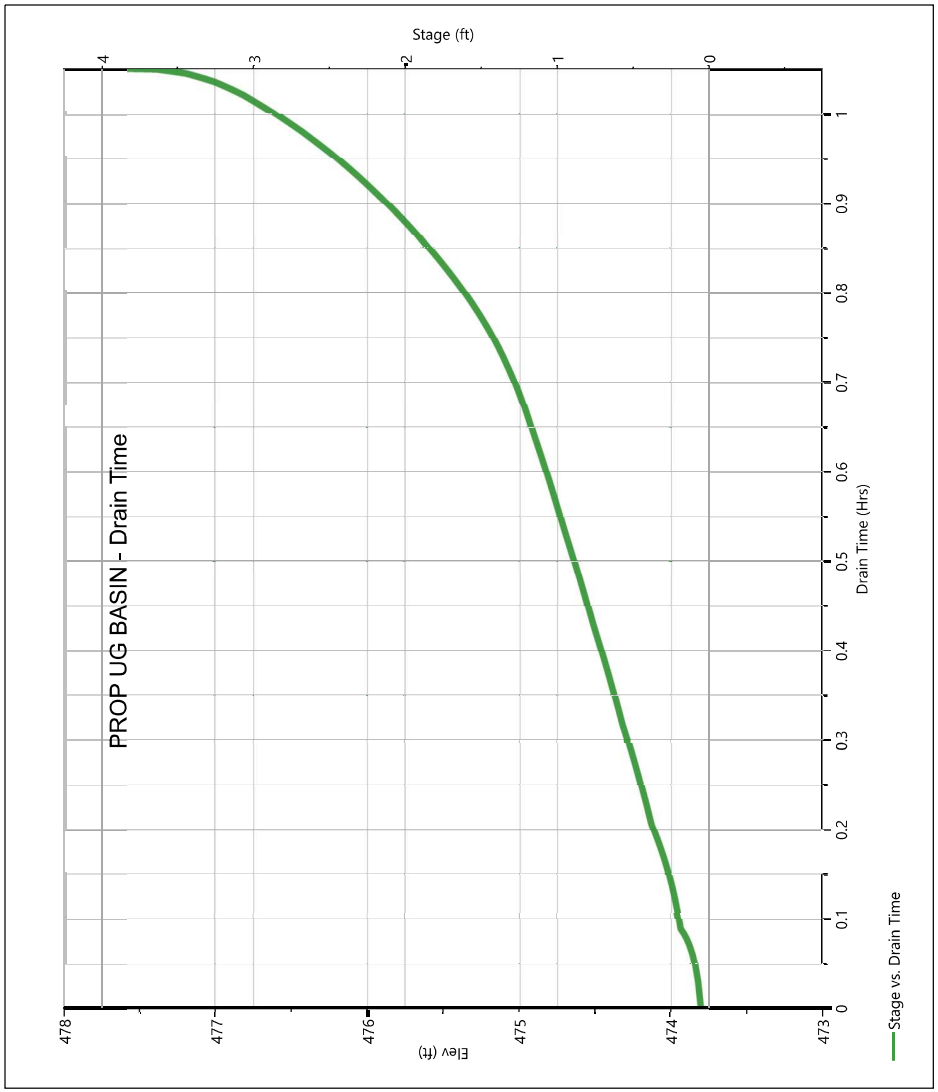
Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PROP UG BASIN

Pond Drawdown



Hydrograph Report

Project Name:

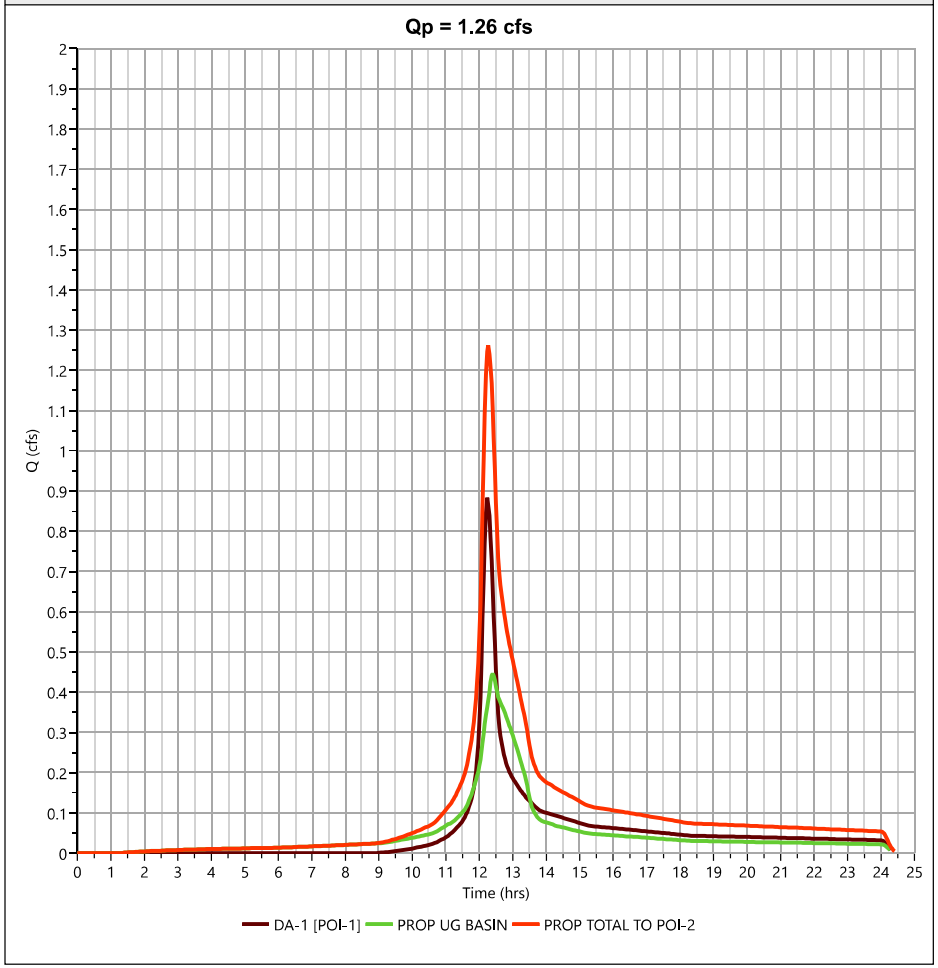
Hydrology Studio v 3.0.0.21

01-26-2022

PROP TOTAL TO POI-2

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 1.262 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 8,598 cuft
Inflow Hydrographs	= 19, 24	Total Contrib. Area	= 0.88 ac



Hydrograph Report

Project Name:

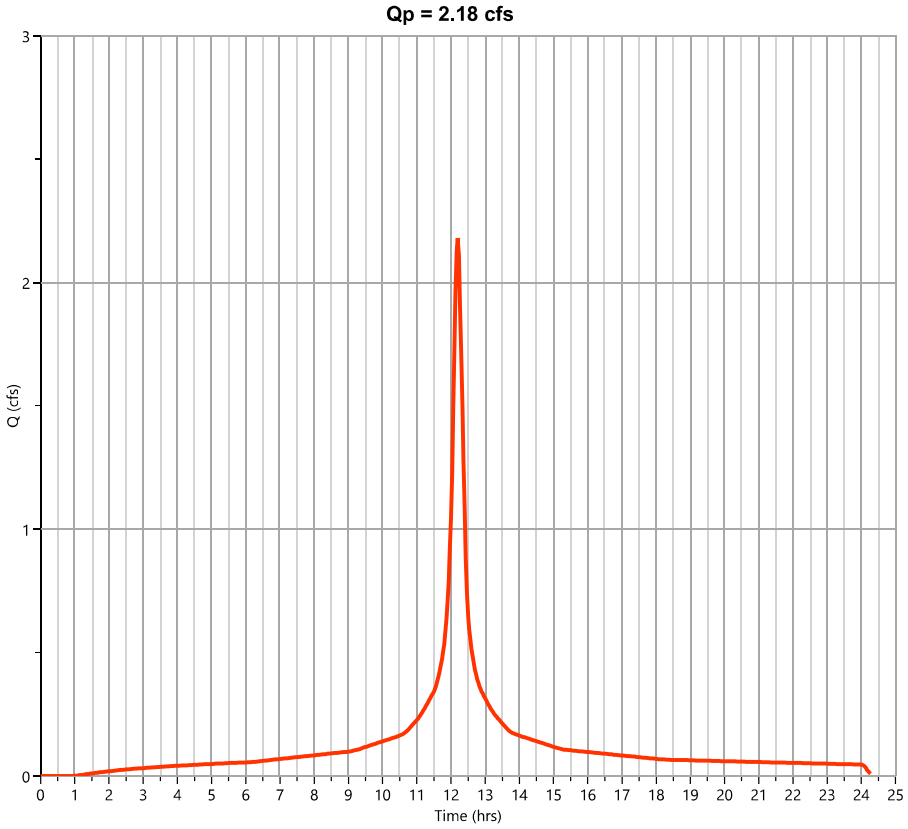
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 IMP

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.180 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 11,009 cuft
Drainage Area	= 0.97 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 15.6 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

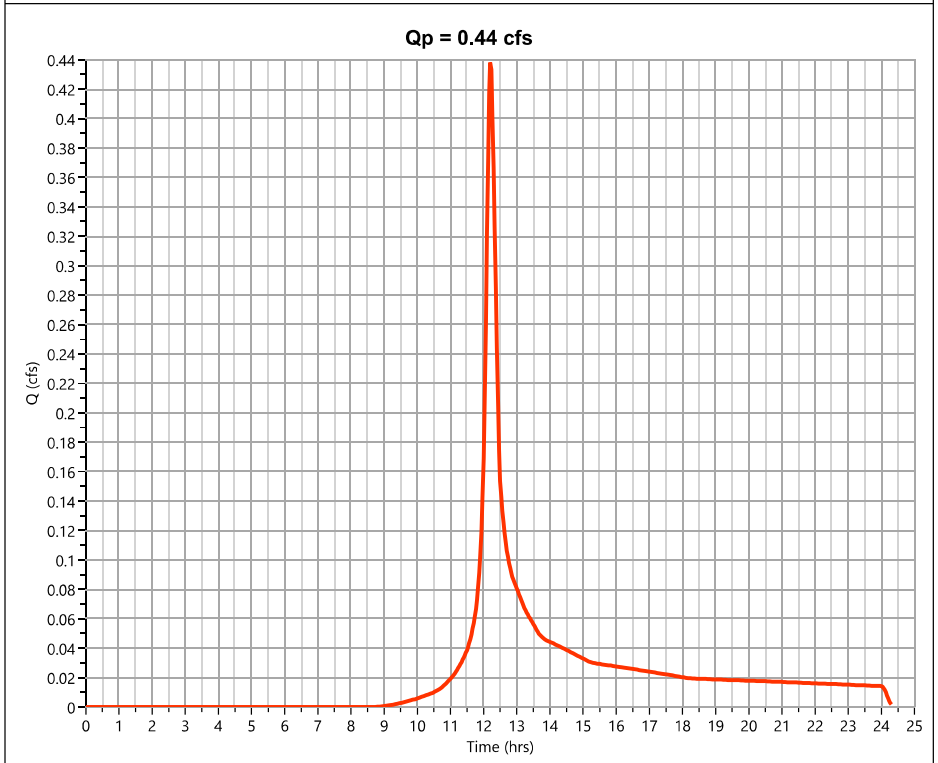
DA-3 PER

Hyd. No. 29

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.438 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 1,983 cuft
Drainage Area	= 0.4 ac	Curve Number	= 77.22*
Tc Method	= User	Time of Conc. (Tc)	= 15.6 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0,03	80	Open Space
0.37	77	Woods
0.4	**77**	Weighted CN Method Employed



Hydrograph Report

Project Name:

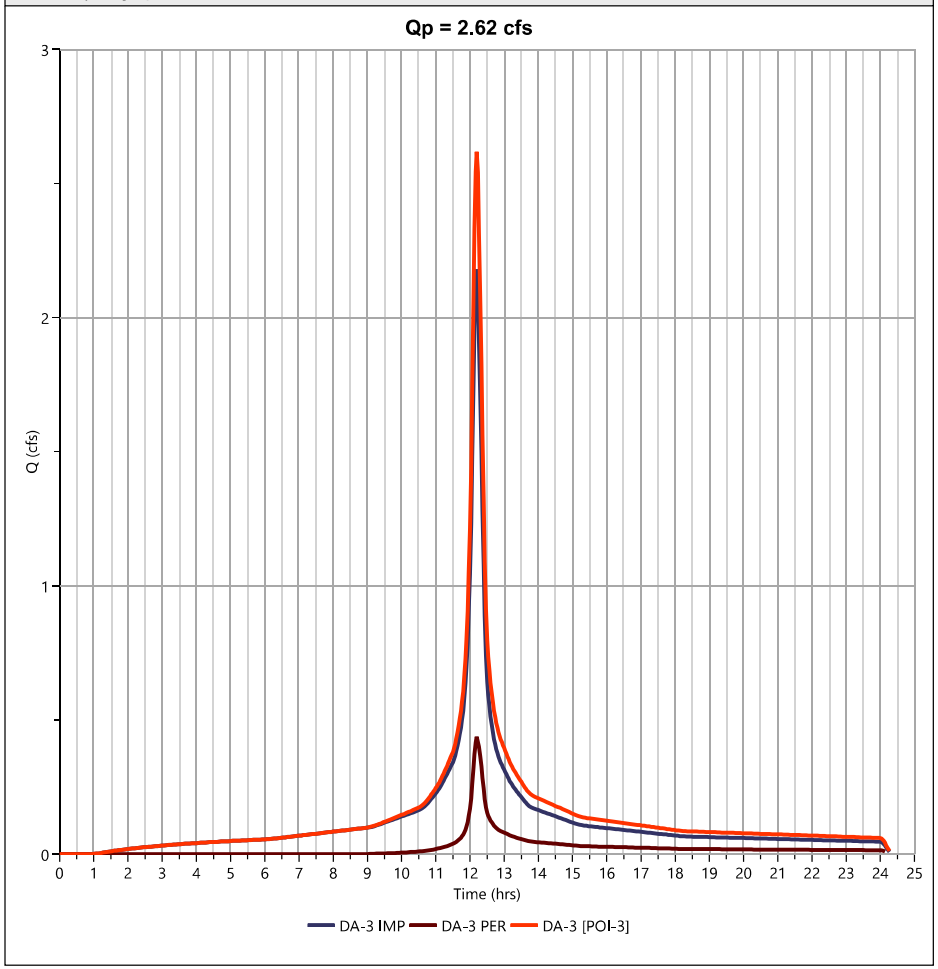
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 [POI-3]

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 2.618 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 12,991 cuft
Inflow Hydrographs	= 28, 29	Total Contrib. Area	= 1.37 ac



Hydrograph Report

Project Name:

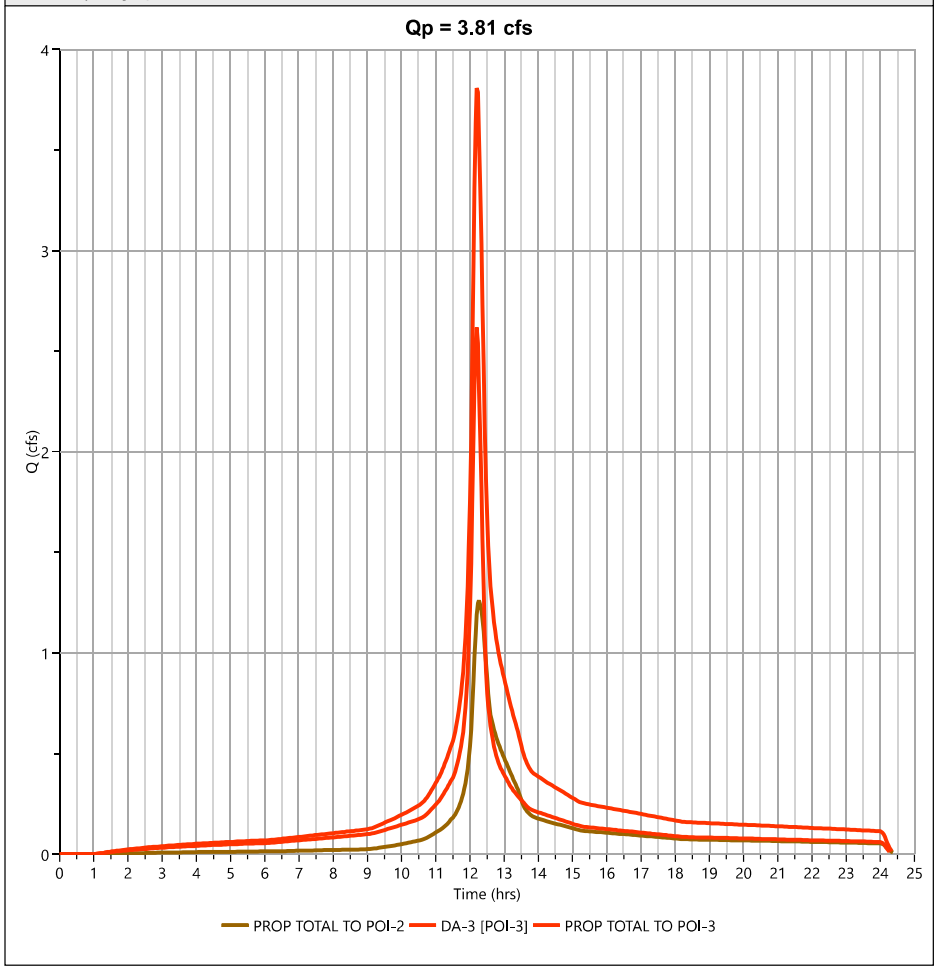
Hydrology Studio v 3.0.0.21

01-26-2022

PROP TOTAL TO POI-3

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 3.808 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 21,589 cuft
Inflow Hydrographs	= 26, 30	Total Contrib. Area	= 2.25 ac



Hydrograph Report

Project Name:

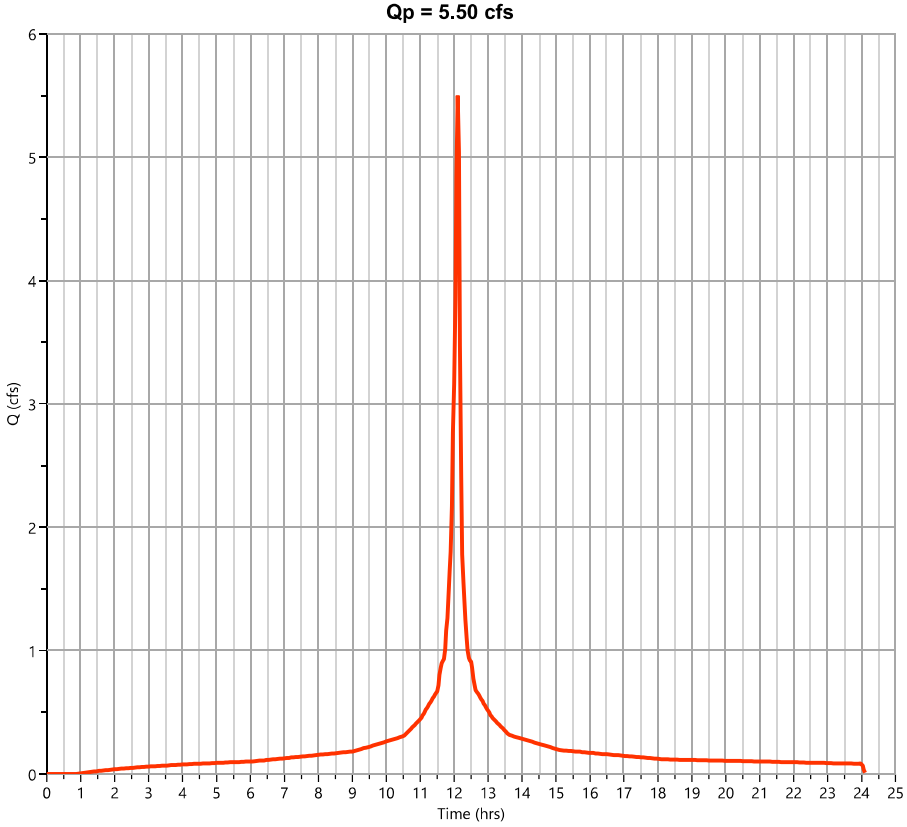
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 UNDET IMP

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.499 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 19,861 cuft
Drainage Area	= 1.82 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

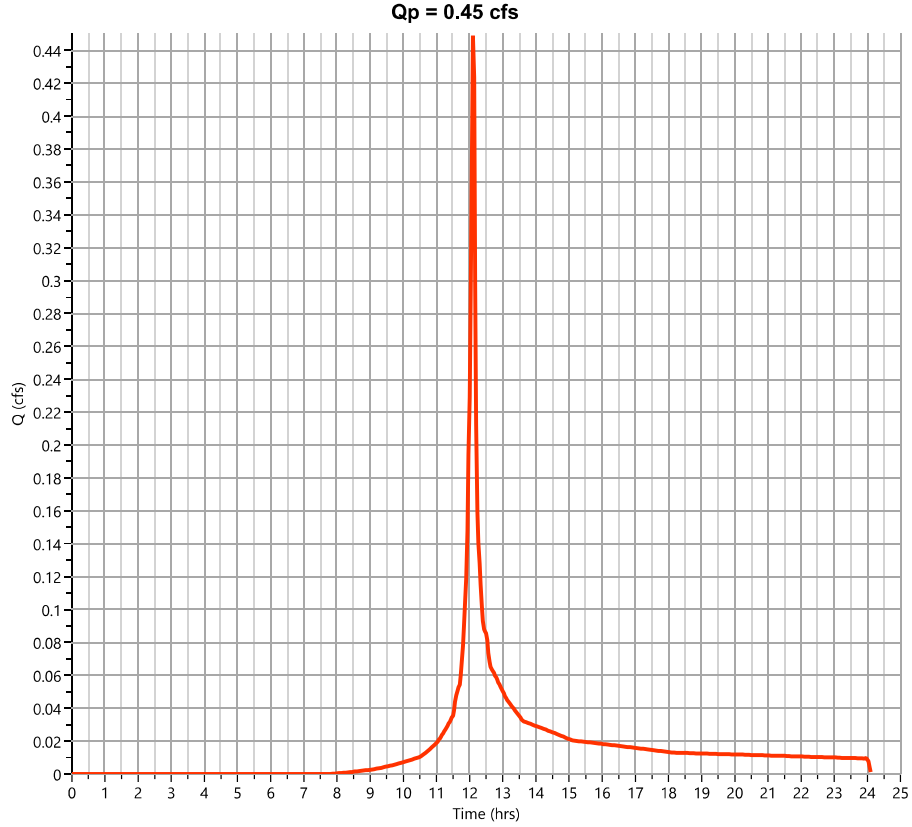
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 UNDET PER

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.449 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 1,406 cuft
Drainage Area	= 0.26 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

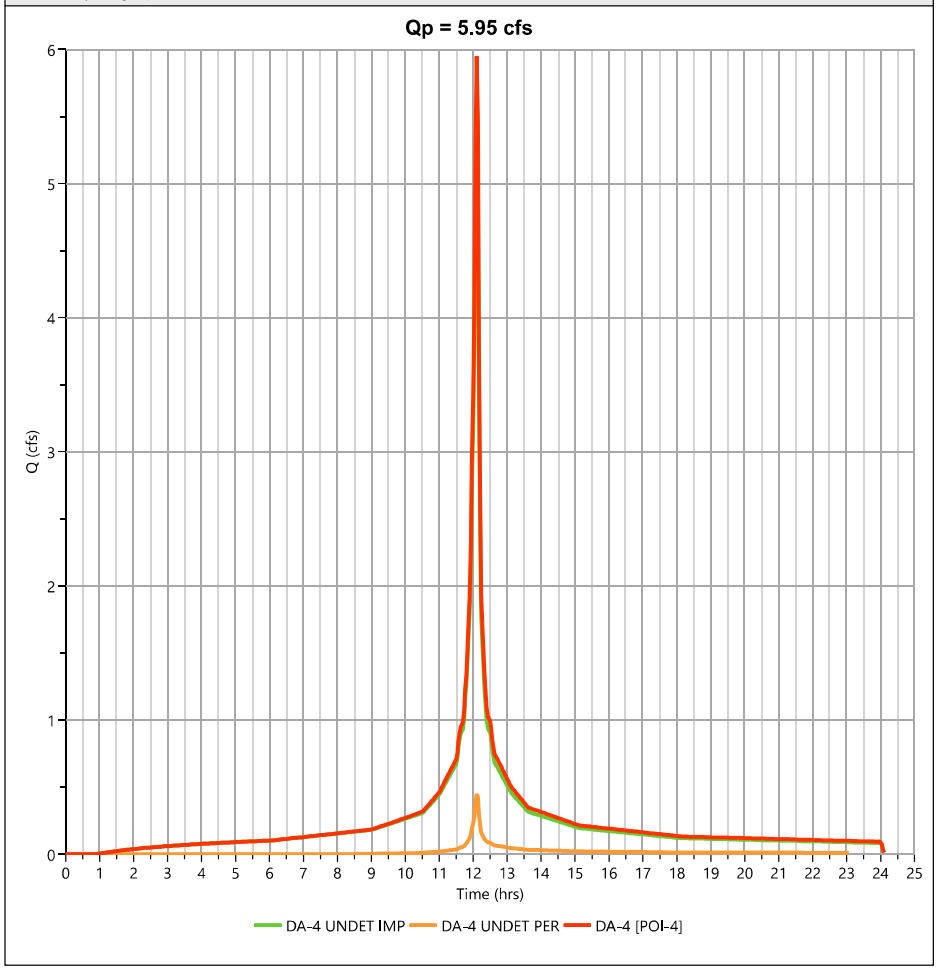
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 [POI-4]

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 5.948 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 21,267 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 2.08 ac



Hydrograph Report

Project Name:

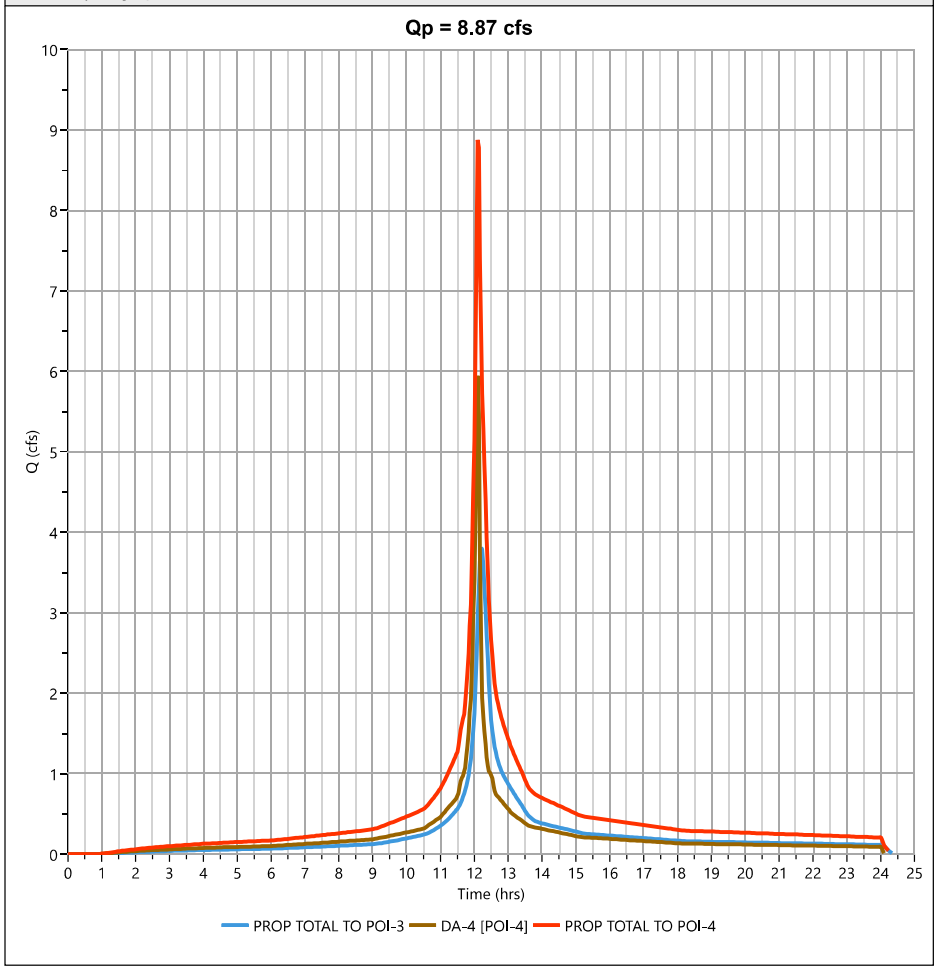
Hydrology Studio v 3.0.0.21

01-26-2022

PROP TOTAL TO POI-4

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 8.874 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 42,856 cuft
Inflow Hydrographs	= 32, 36	Total Contrib. Area	= 4.33 ac



Design Storm Report

Custom Storm filename:

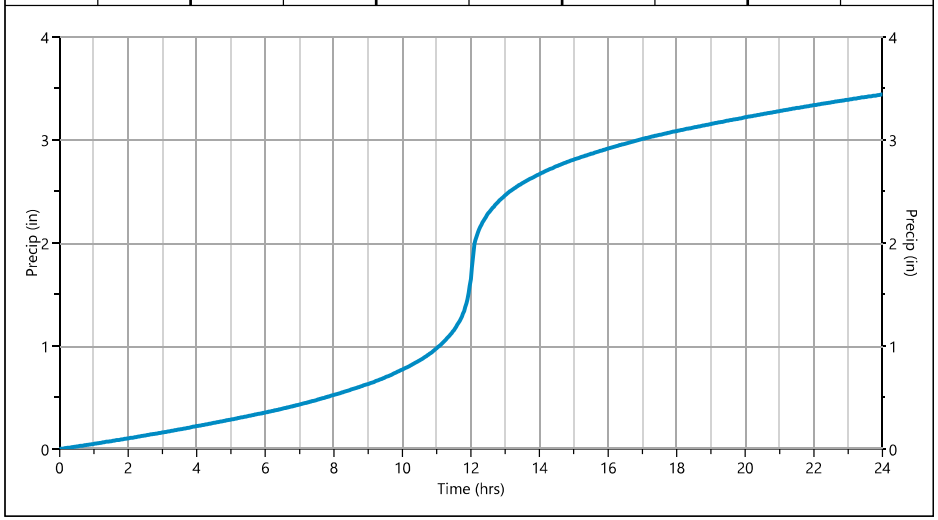
Hydrology Studio v 3.0.0.21

01-26-2022

Storm Distribution: Custom - NRCC-D

Storm Duration	Total Rainfall Volume (in)								
	1-yr	✔ 2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
24 hrs	0.00	3.44	0.00	0.00	4.40	0.00	0.00	8.66	

Incremental Rainfall Distribution, 2-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.07	0.009884	11.43	0.013450	11.80	0.025961	12.17	0.036968	12.53	0.013450
11.10	0.009884	11.47	0.013450	11.83	0.036969	12.20	0.036969	12.57	0.013450
11.13	0.010779	11.50	0.013451	11.87	0.036968	12.23	0.025960	12.60	0.013450
11.17	0.010779	11.53	0.017624	11.90	0.036969	12.27	0.025961	12.63	0.012602
11.20	0.010779	11.57	0.017624	11.93	0.066059	12.30	0.025960	12.67	0.012602
11.23	0.011696	11.60	0.017624	11.97	0.066060	12.33	0.018553	12.70	0.012602
11.27	0.011696	11.63	0.018553	12.00	0.066059	12.37	0.018553	12.73	0.011696
11.30	0.011696	11.67	0.018553	12.03	0.114128	12.40	0.018554	12.77	0.011696
11.33	0.012602	11.70	0.018553	**12.07**	**0.114128**	12.43	0.017624	12.80	0.011696
11.37	0.012602	11.73	0.025961	12.10	0.114128	12.47	0.017624	12.83	0.010779
11.40	0.012602	11.77	0.025961	12.13	0.036969	12.50	0.017624	12.87	0.010779



Hydrograph 10-yr Summary

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX DA-1 [POI-1]	1.380	12.23	6,803	---		
3	NRCS Runoff	EX DA-2 [POI-2]	1.147	12.20	5,125	---		
5	Junction	EX TOTAL TO POI-2	2.509	12.23	11,929	1, 3		
7	NRCS Runoff	EX DA-3 IMP	3.174	12.17	15,121	---		
8	NRCS Runoff	EX DA-3 PER	0.498	12.17	2,073	---		
9	Junction	EX DA-3 [POI-3]	3.671	12.17	17,194	7, 8		
11	Junction	EX TOTAL TO POI-3	6.036	12.20	29,122	5, 9		
13	NRCS Runoff	EX DA-4 IMP	7.118	12.10	25,997	---		
14	NRCS Runoff	EX DA-4 PER	0.631	12.10	1,977	---		
15	Junction	EX DA-4 [POI-4]	7.749	12.10	27,974	13, 14		
17	Junction	EX TOTAL TO POI-4	12.73	12.13	57,096	11, 15		
19	NRCS Runoff	DA-1 [POI-1]	1.380	12.23	6,803	---		
21	NRCS Runoff	DA-2 DET IMP	0.693	12.20	3,537	---		
22	NRCS Runoff	DA-2 DET PER	0.498	12.20	2,224	---		
23	Junction	TOTAL DA-2 DET	1.191	12.20	5,761	21, 22		
24	Pond Route	PROP UG BASIN	0.777	12.37	5,760	23	475.22	772
26	Junction	PROP TOTAL TO POI-2	2.052	12.27	12,563	19, 24		
28	NRCS Runoff	DA-3 IMP	2.801	12.20	14,296	---		
29	NRCS Runoff	DA-3 PER	0.681	12.20	3,040	---		
30	Junction	DA-3 [POI-3]	3.482	12.20	17,336	28, 29		
32	Junction	PROP TOTAL TO POI-3	5.336	12.23	29,899	26, 30		
34	NRCS Runoff	DA-4 UNDET IMP	7.062	12.10	25,792	---		
35	NRCS Runoff	DA-4 UNDET PER	0.671	12.10	2,103	---		
36	Junction	DA-4 [POI-4]	7.733	12.10	27,895	34, 35		

Hydrograph 10-yr Summary

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	Junction	PROP TOTAL TO POI-4	11.76	12.10	57,793	32, 36		

Hydrograph Report

Project Name:

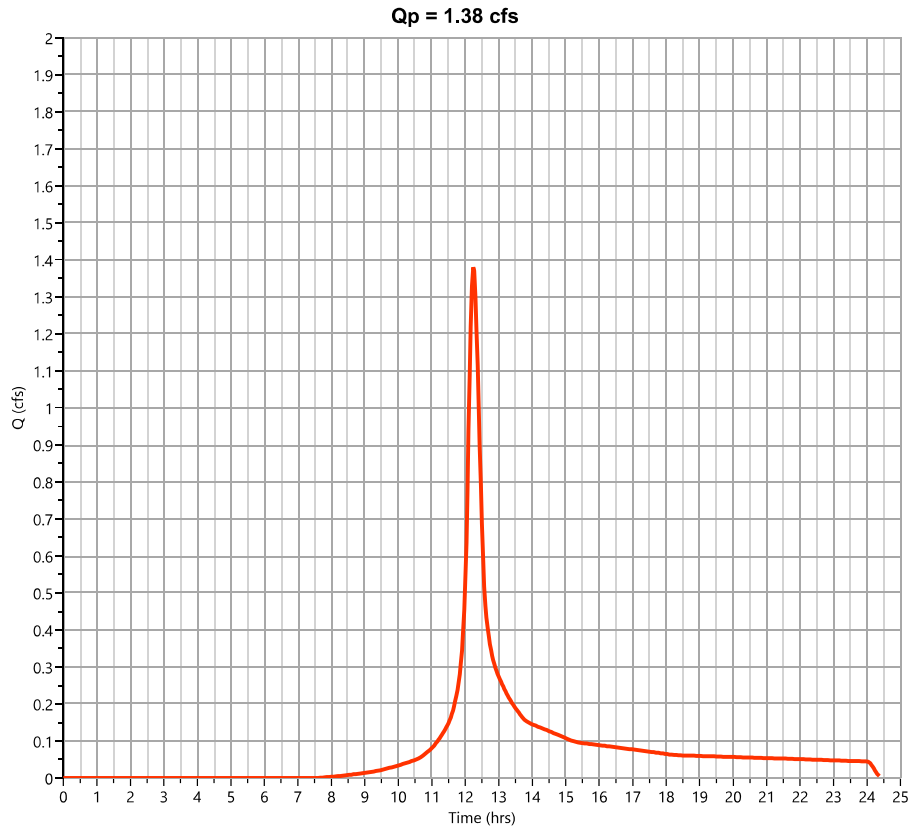
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-1 [POI-1]

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.380 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 6,803 cuft
Drainage Area	= 0.88 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 18.5 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

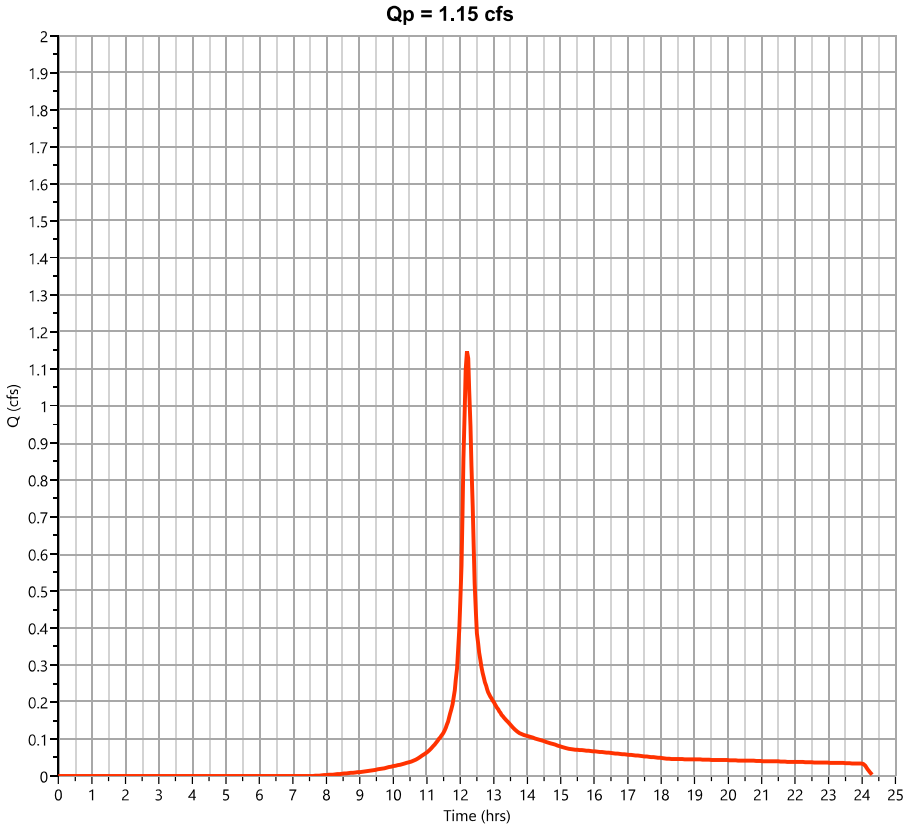
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-2 [POI-2]

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.147 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 5,125 cuft
Drainage Area	= 0.68 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

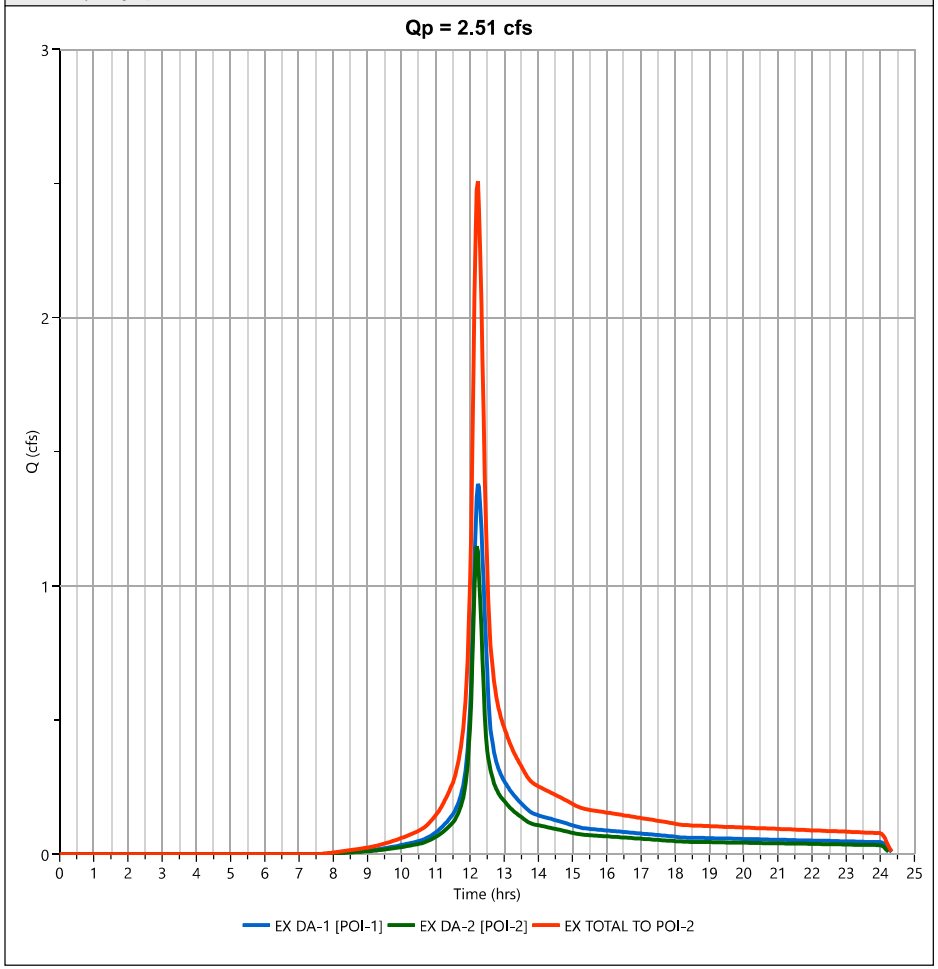
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-2

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 2.509 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Hydrograph Volume	= 11,929 cuft
Inflow Hydrographs	= 1, 3	Total Contrib. Area	= 1.56 ac



Hydrograph Report

Project Name:

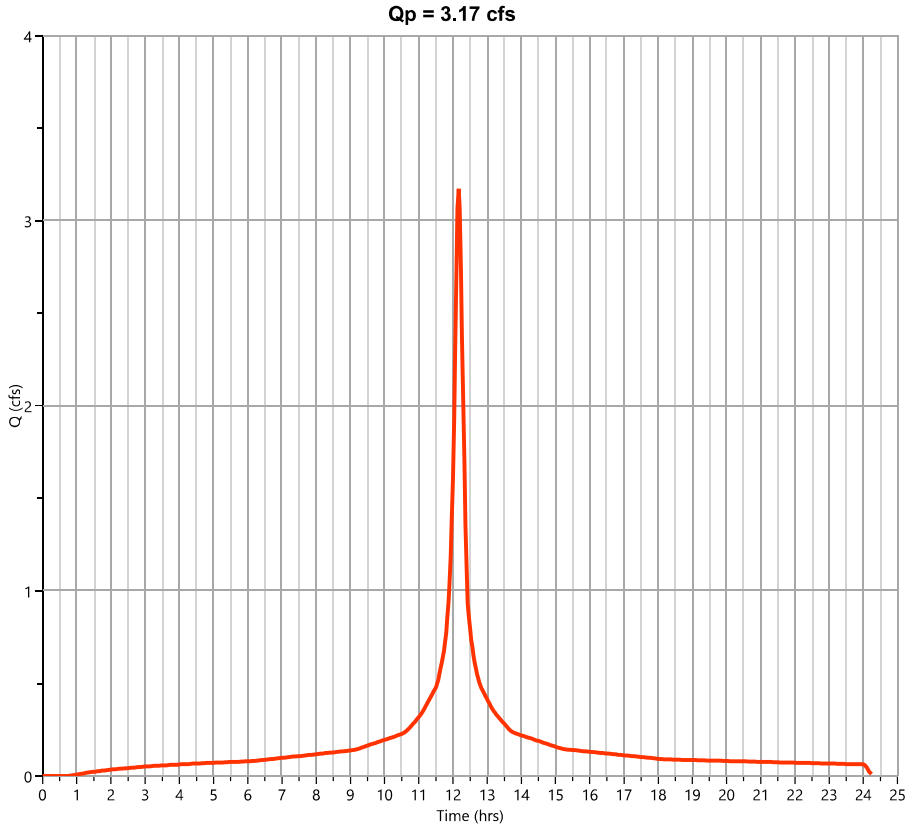
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 IMP

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.174 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 15,121 cuft
Drainage Area	= 0.97 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.6 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

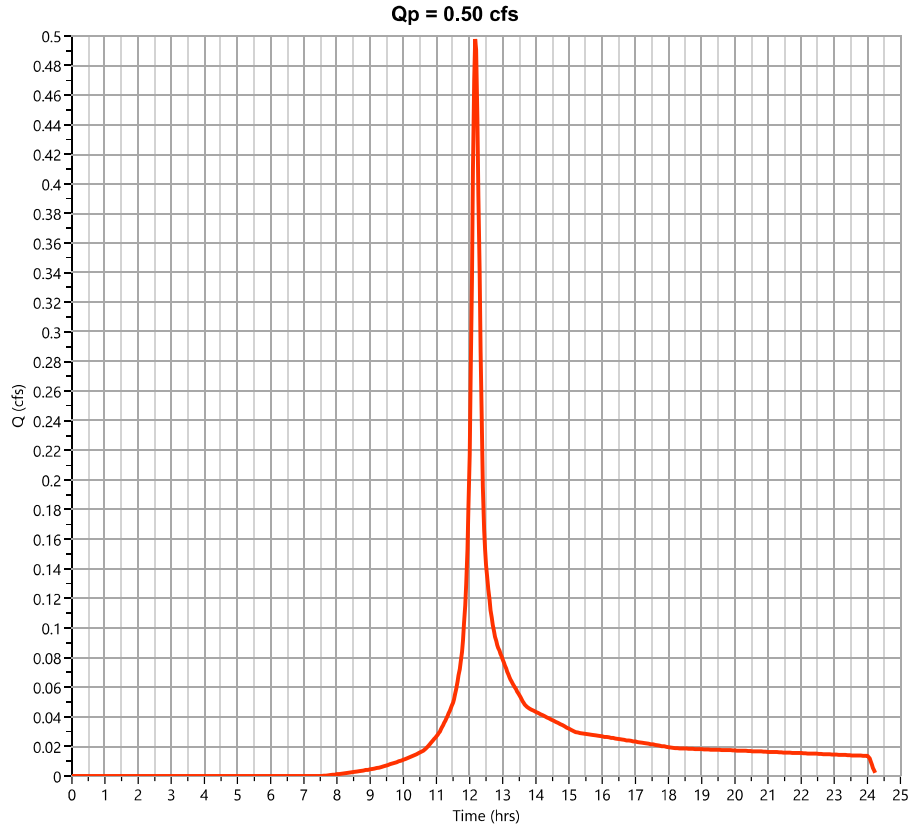
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 PER

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.498 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 2,073 cuft
Drainage Area	= 0.26 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 10.6 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

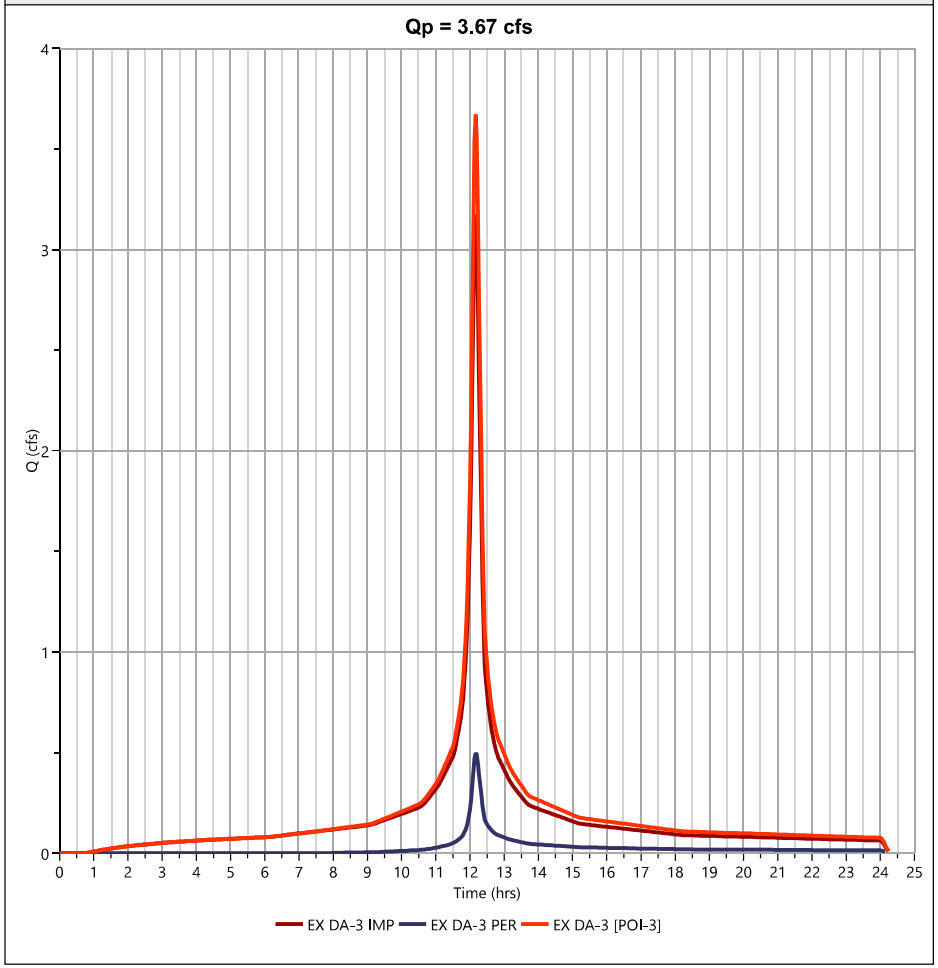
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 [POI-3]

Hyd. No. 9

Hydrograph Type	= Junction	Peak Flow	= 3.671 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 17,194 cuft
Inflow Hydrographs	= 7, 8	Total Contrib. Area	= 1.23 ac



Hydrograph Report

Project Name:

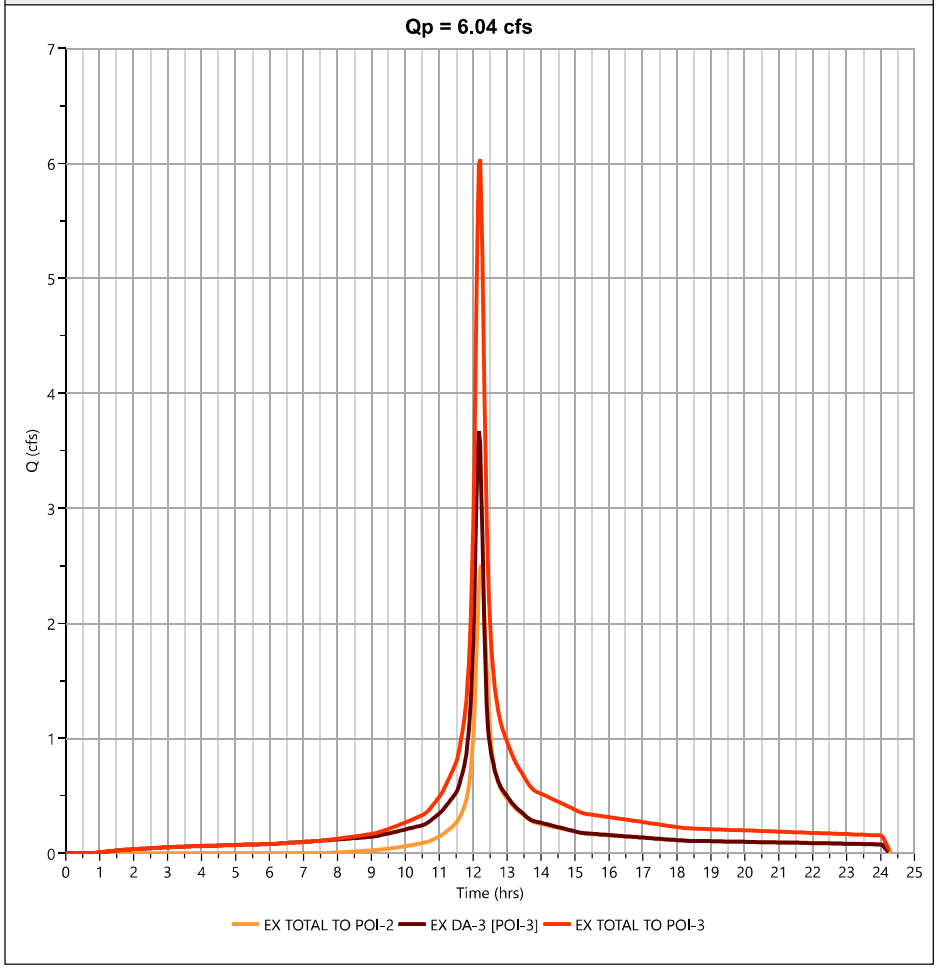
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-3

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 6.036 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 29,122 cuft
Inflow Hydrographs	= 5, 9	Total Contrib. Area	= 2.79 ac



Hydrograph Report

Project Name:

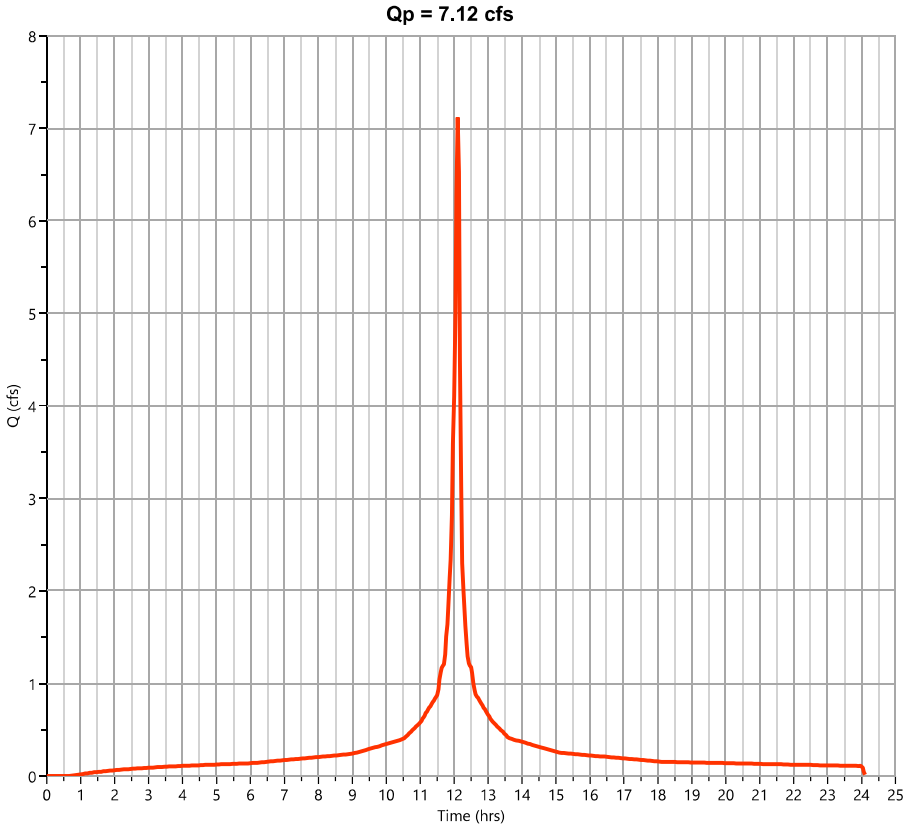
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 IMP

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 7.118 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 25,997 cuft
Drainage Area	= 1.834 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

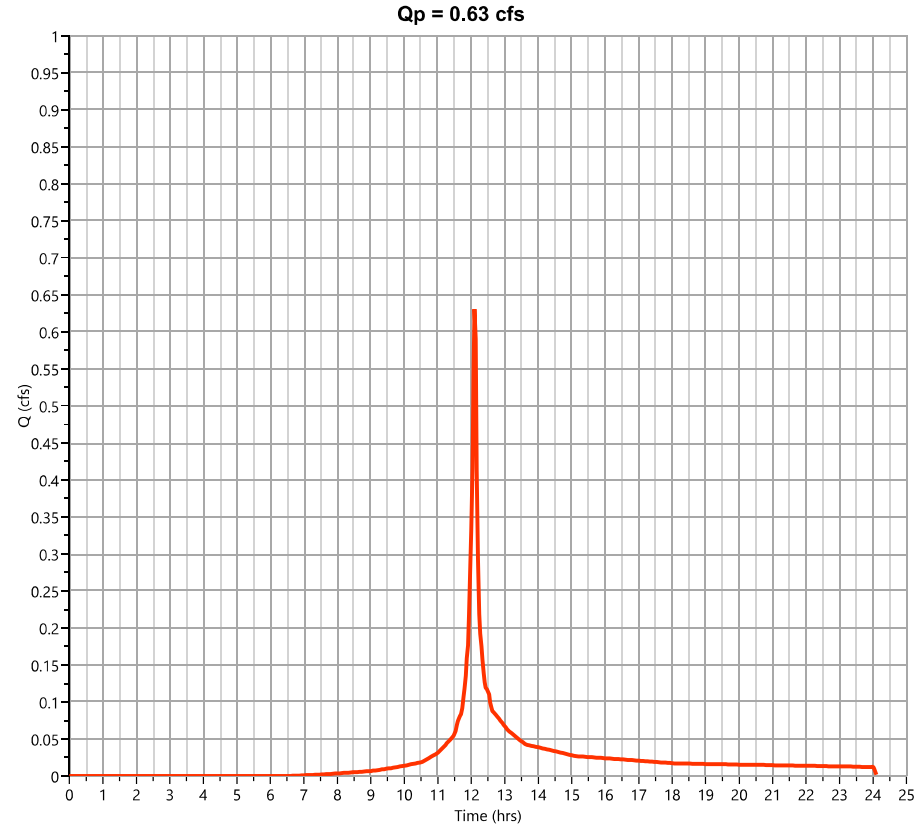
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 PER

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.631 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 1,977 cuft
Drainage Area	= 0.244 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

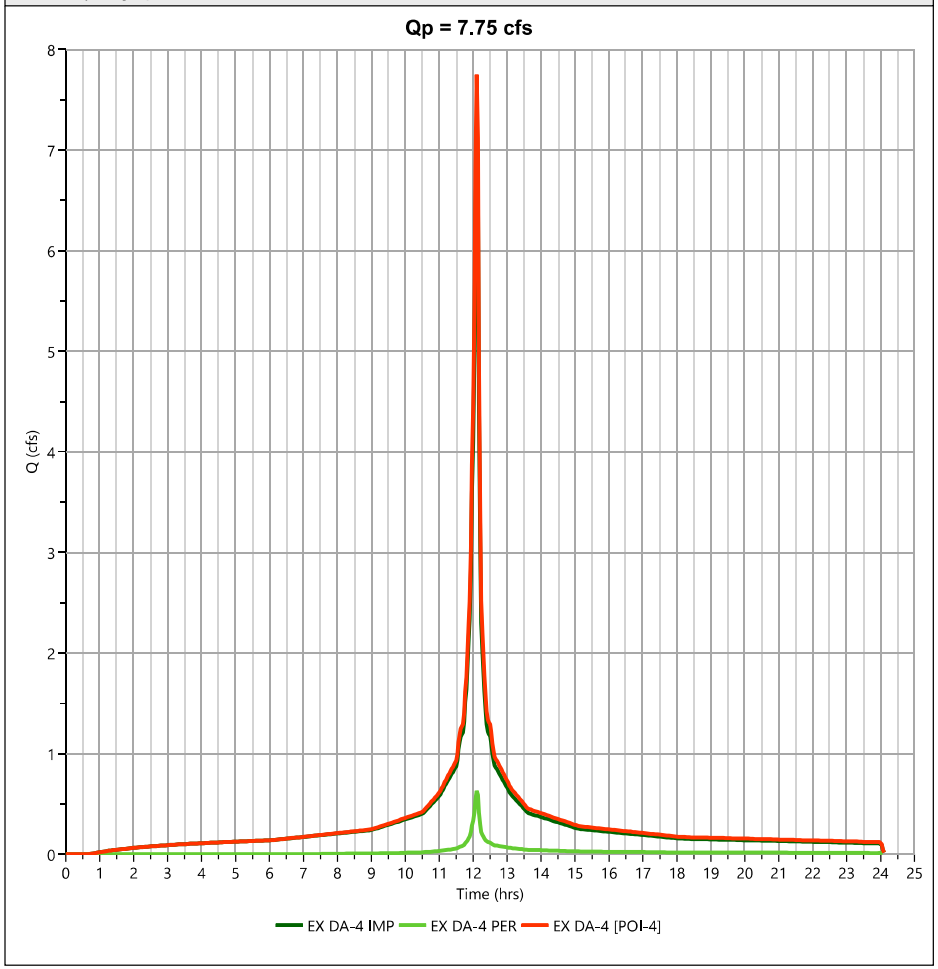
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 [POI-4]

Hyd. No. 15

Hydrograph Type	= Junction	Peak Flow	= 7.749 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 27,974 cuft
Inflow Hydrographs	= 13, 14	Total Contrib. Area	= 2.079 ac



Hydrograph Report

Project Name:

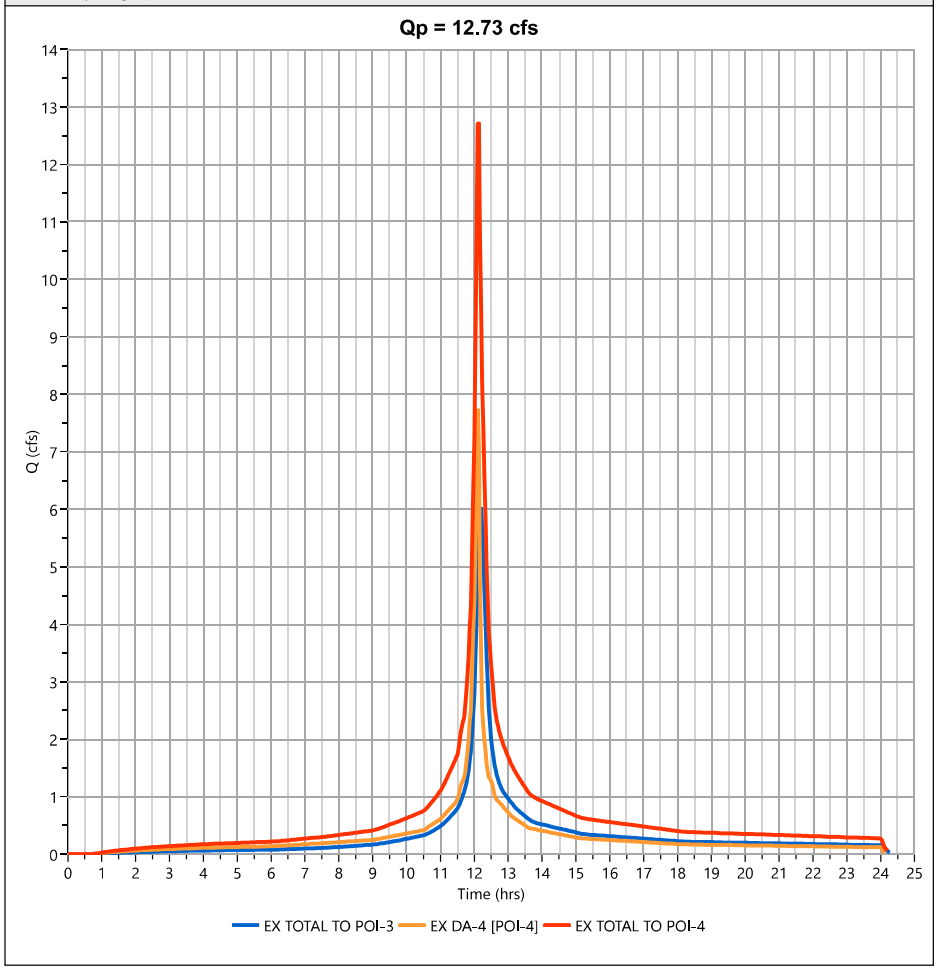
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-4

Hyd. No. 17

Hydrograph Type	= Junction	Peak Flow	= 12.73 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 57,096 cuft
Inflow Hydrographs	= 11, 15	Total Contrib. Area	= 4.869 ac



Hydrograph Report

Project Name:

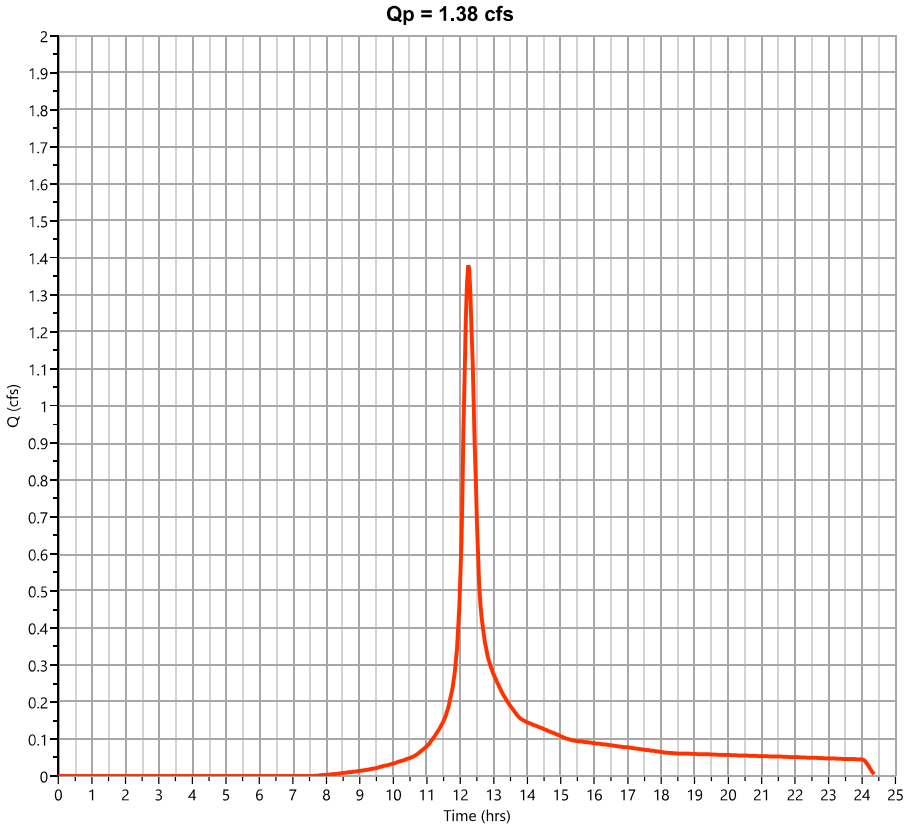
Hydrology Studio v 3.0.0.21

01-26-2022

DA-1 [POI-1]

Hyd. No. 19

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.380 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 6,803 cuft
Drainage Area	= 0.88 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 18.5 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

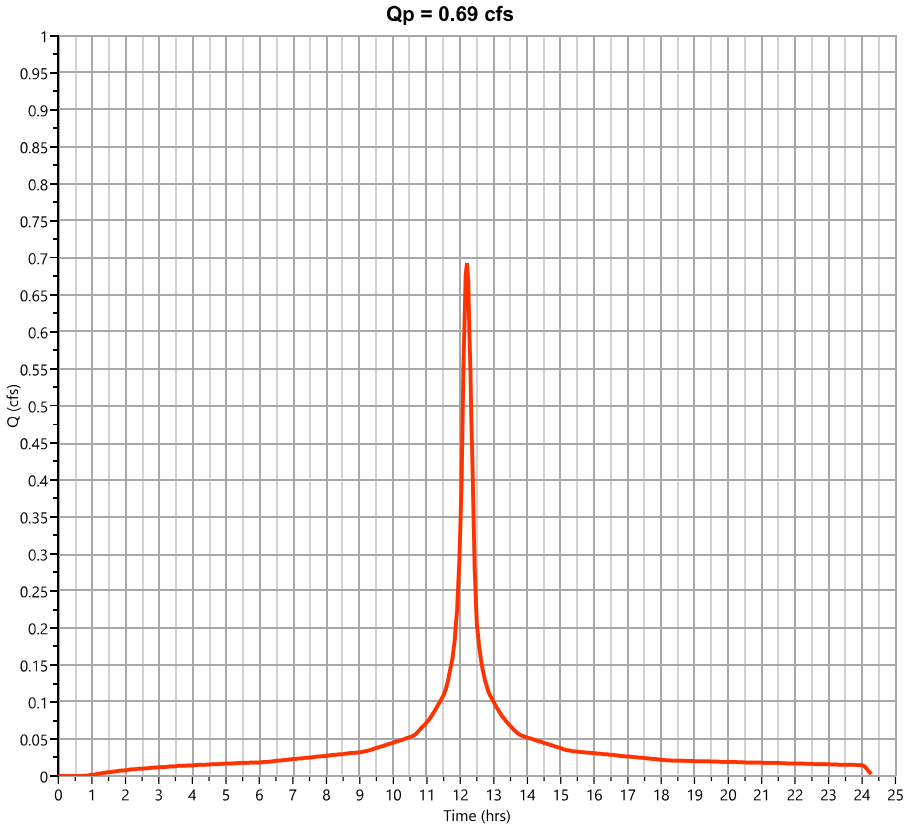
Hydrology Studio v 3.0.0.21

01-26-2022

DA-2 DET IMP

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.693 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 3,537 cuft
Drainage Area	= 0.24 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 13.7 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

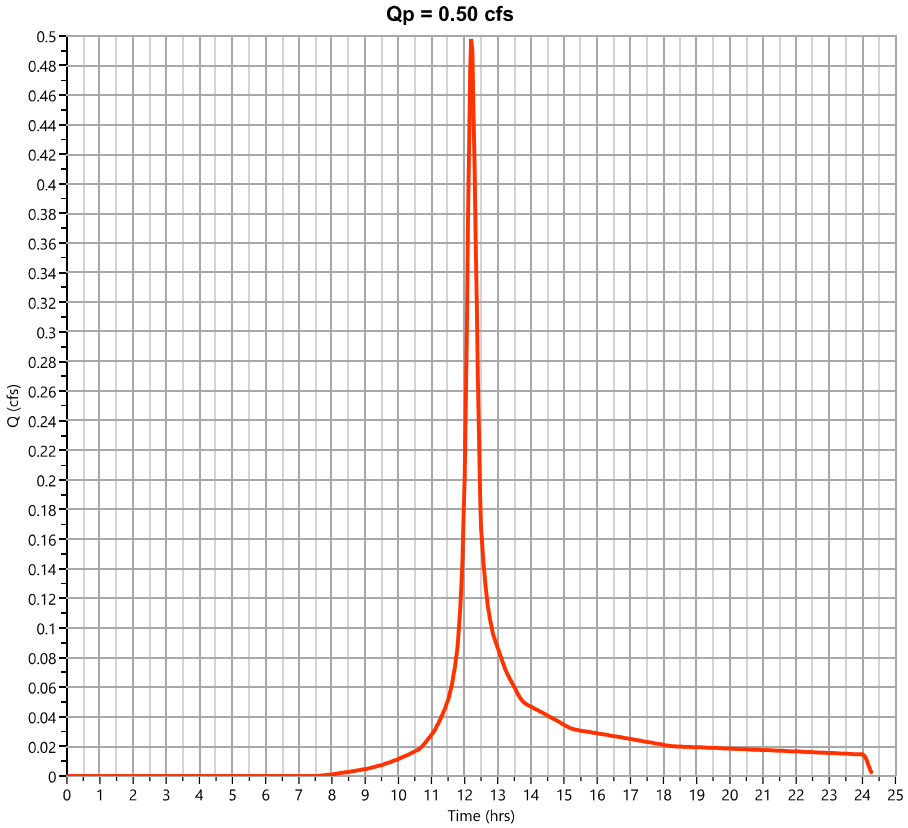
Hydrology Studio v 3.0.0.21

01-26-2022

DA-2 DET PER

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.498 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 2,224 cuft
Drainage Area	= 0.295 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 13.7 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

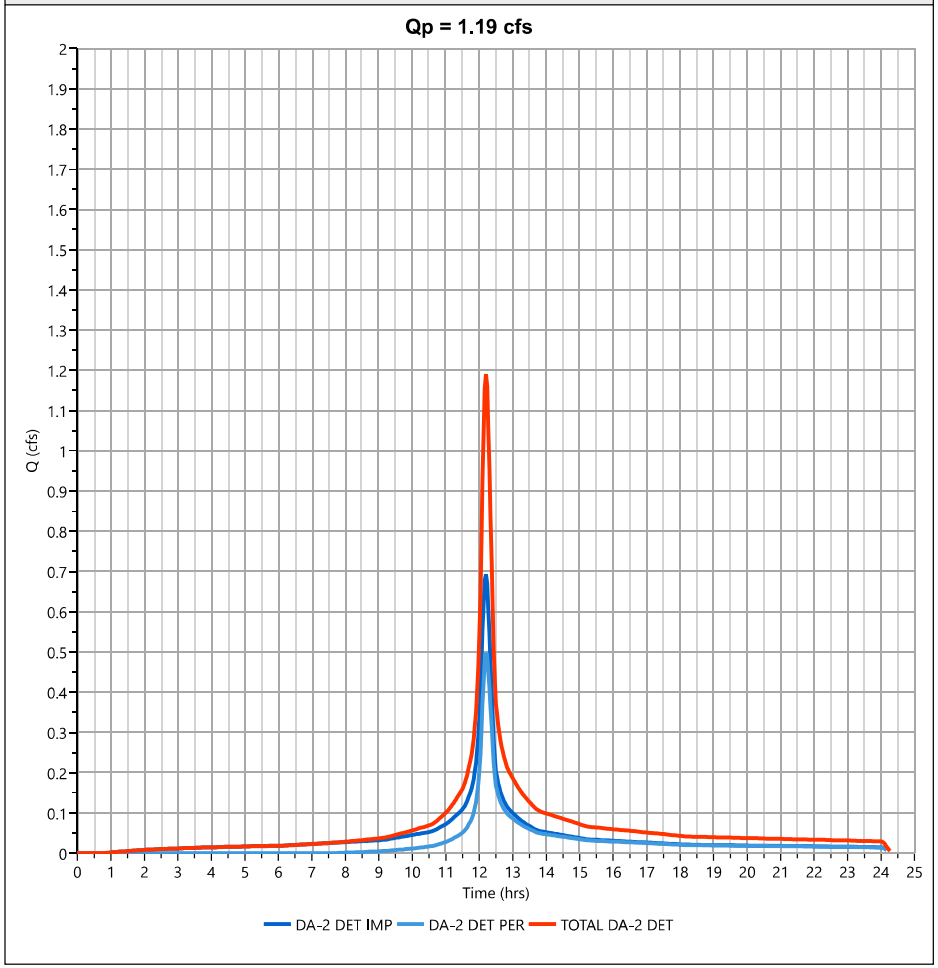
Hydrology Studio v 3.0.0.21

01-26-2022

TOTAL DA-2 DET

Hyd. No. 23

Hydrograph Type	= Junction	Peak Flow	= 1.191 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 5,761 cuft
Inflow Hydrographs	= 21, 22	Total Contrib. Area	= 0.535 ac

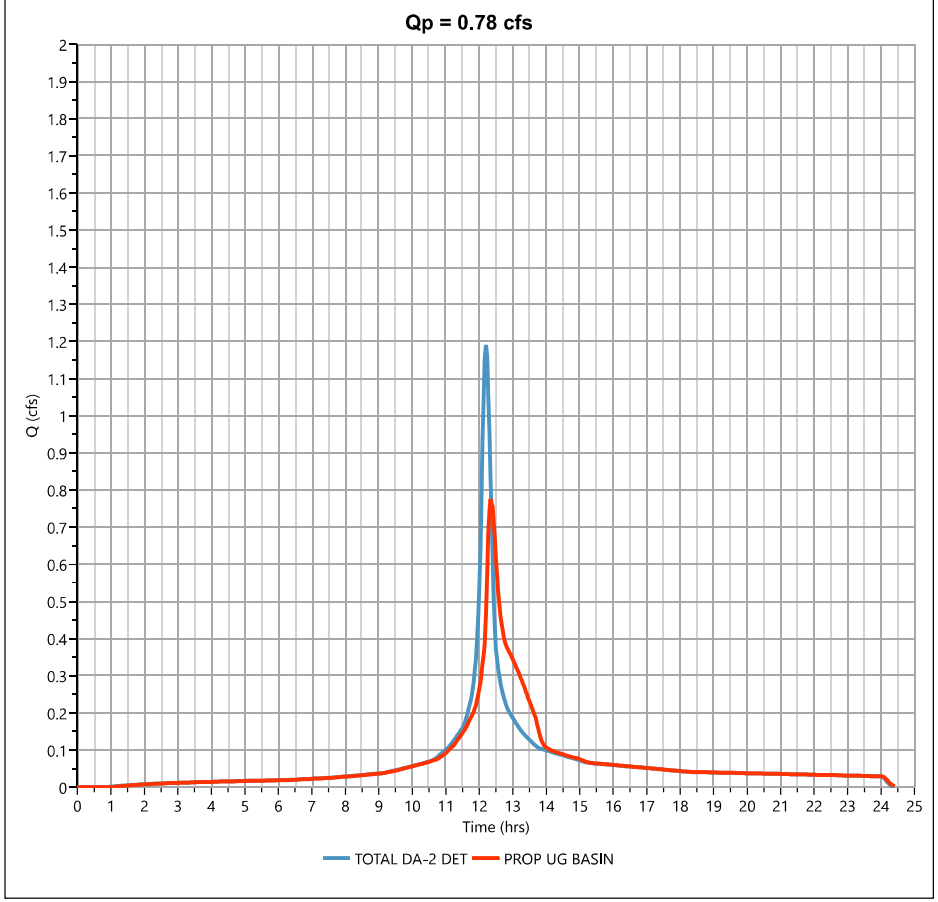


PROP UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 0.777 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Hydrograph Volume	= 5,760 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 475.22 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 772 cuft

Pond Routing by Storage Indication Method *Center of mass detention time = 9 min*

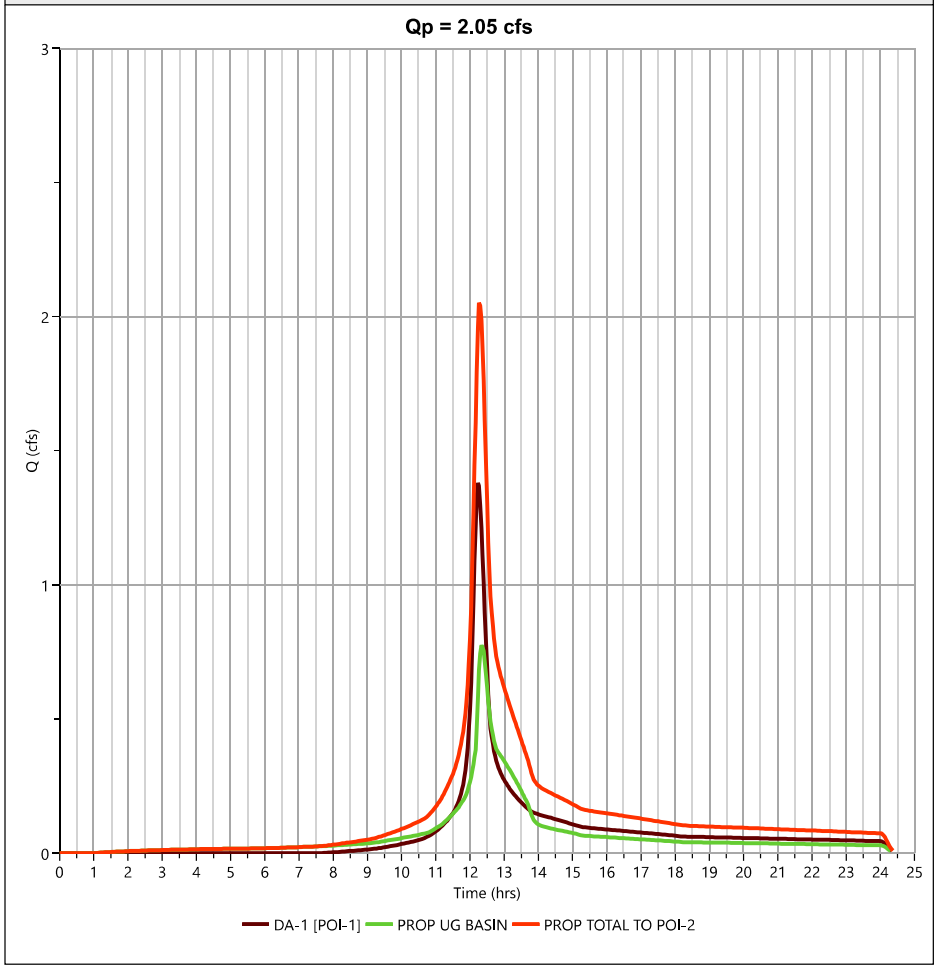


Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

PROP TOTAL TO POI-2

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 2.052 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 12,563 cuft
Inflow Hydrographs	= 19, 24	Total Contrib. Area	= 0.88 ac



Hydrograph Report

Project Name:

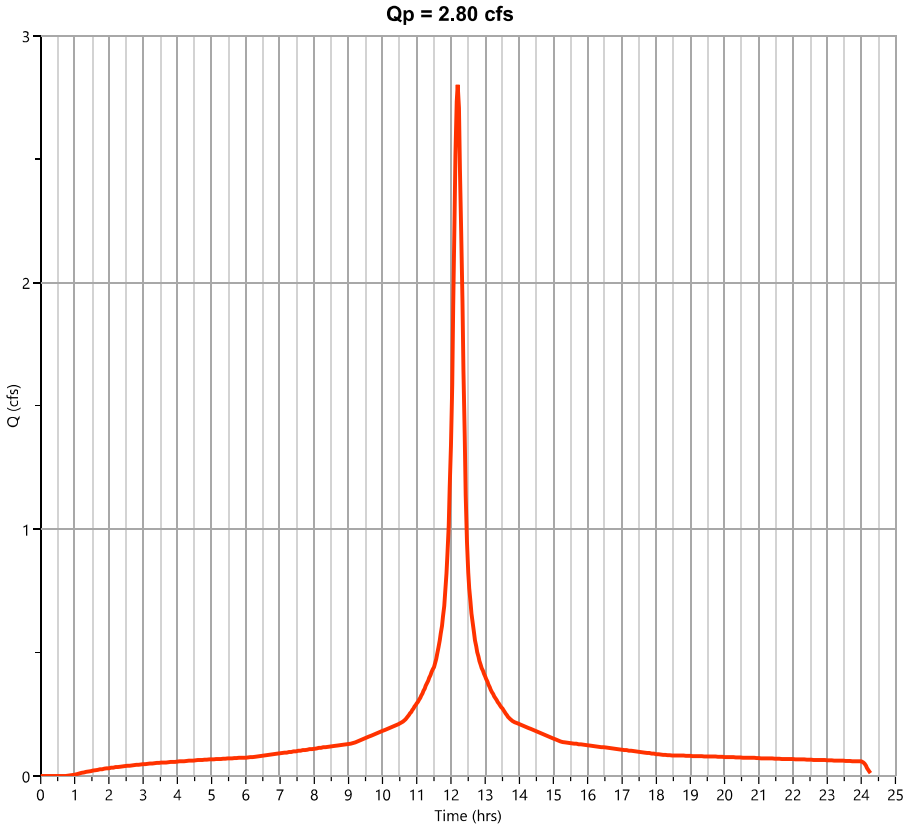
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 IMP

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.801 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 14,296 cuft
Drainage Area	= 0.97 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 15.6 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

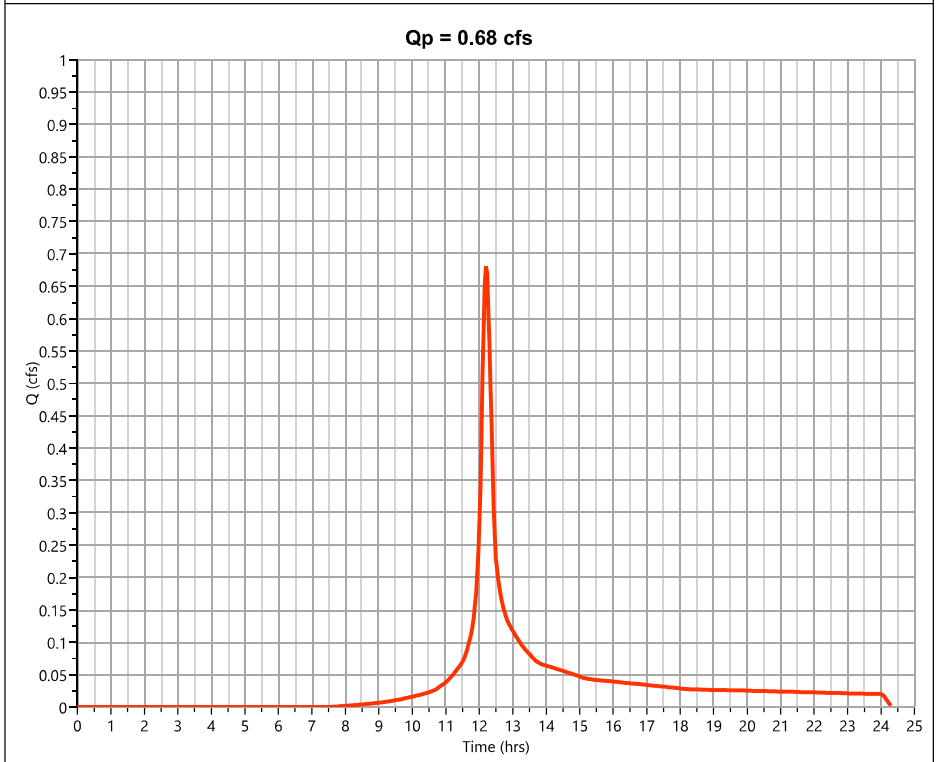
DA-3 PER

Hyd. No. 29

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.681 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 3,040 cuft
Drainage Area	= 0.4 ac	Curve Number	= 77.22*
Tc Method	= User	Time of Conc. (Tc)	= 15.6 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0,03	80	Open Space
0.37	77	Woods
0.4	**77**	Weighted CN Method Employed



Hydrograph Report

Project Name:

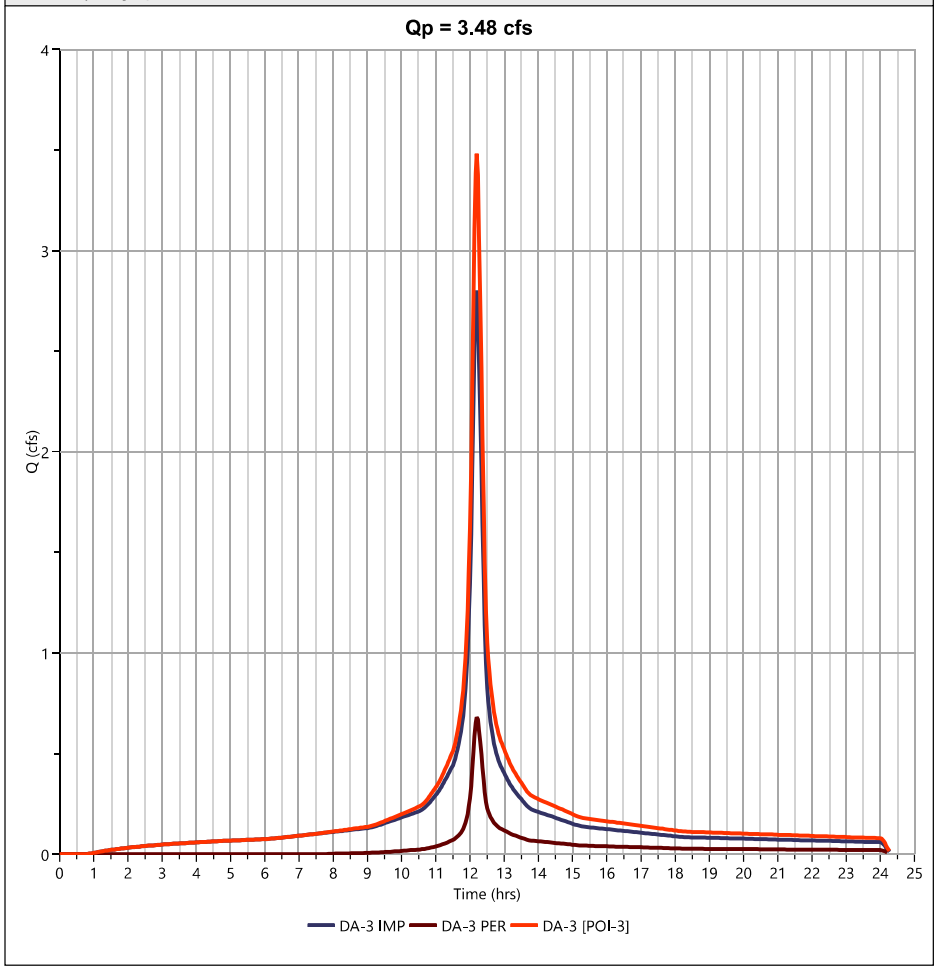
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 [POI-3]

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 3.482 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 17,336 cuft
Inflow Hydrographs	= 28, 29	Total Contrib. Area	= 1.37 ac



Hydrograph Report

Project Name:

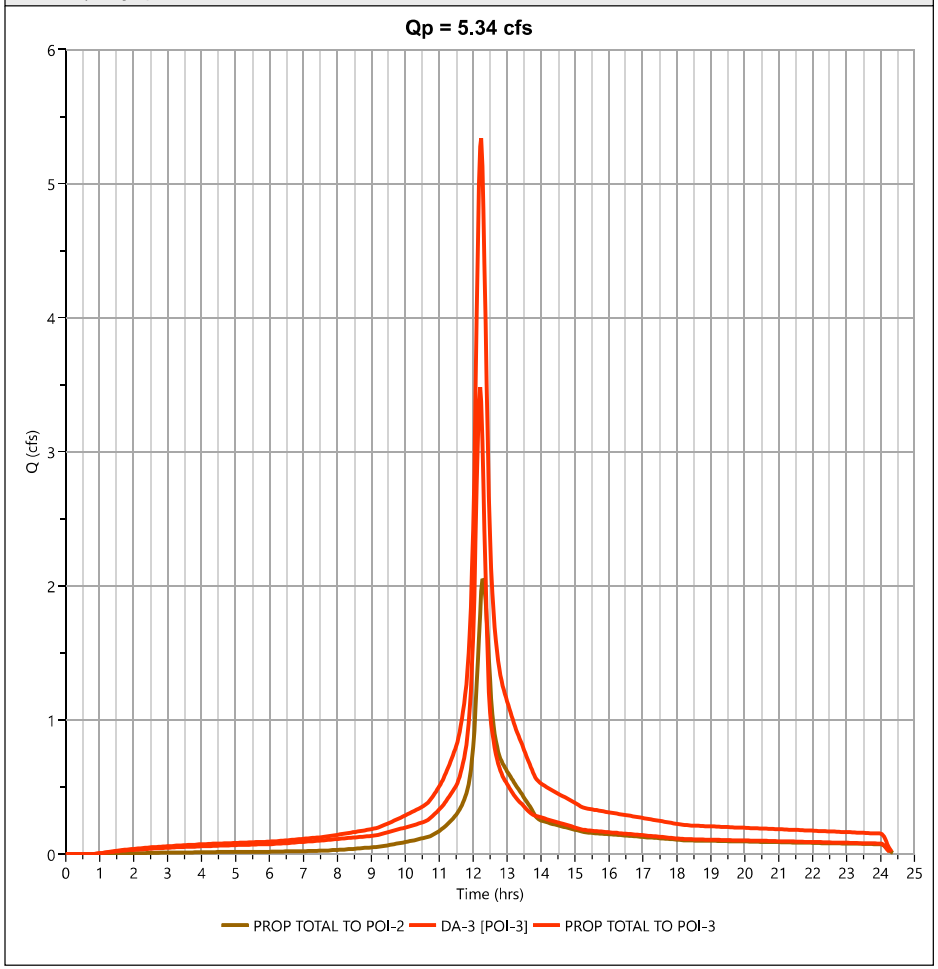
Hydrology Studio v 3.0.0.21

01-26-2022

PROP TOTAL TO POI-3

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 5.336 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Hydrograph Volume	= 29,899 cuft
Inflow Hydrographs	= 26, 30	Total Contrib. Area	= 2.25 ac



Hydrograph Report

Project Name:

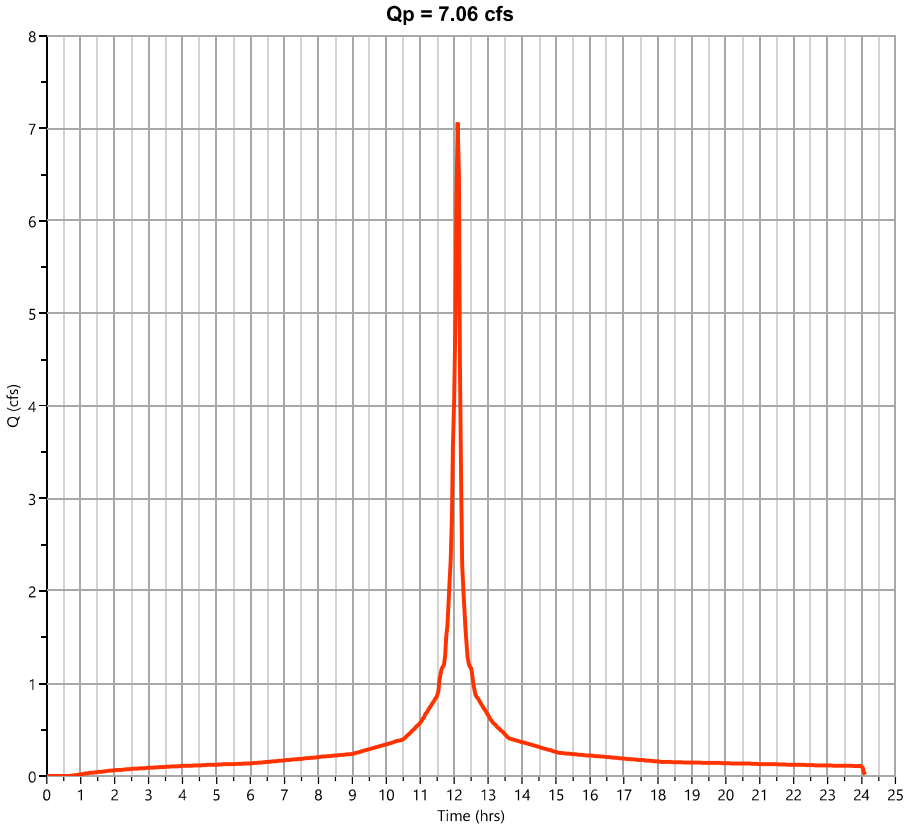
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 UNDET IMP

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 7.062 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 25,792 cuft
Drainage Area	= 1.82 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

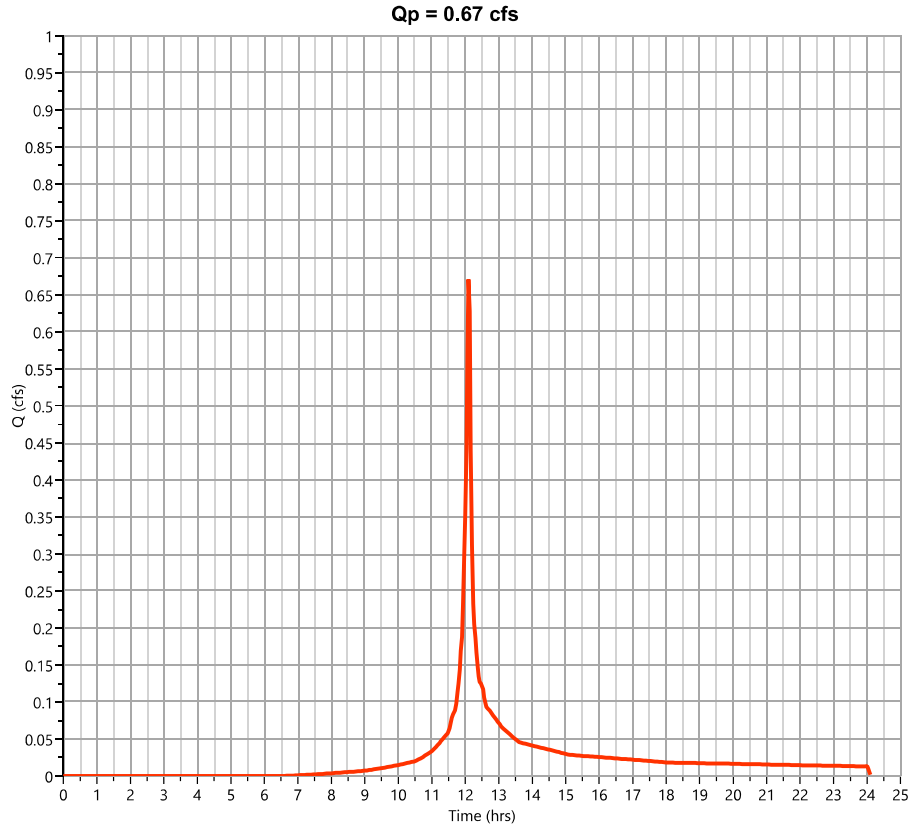
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 UNDET PER

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.671 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 2,103 cuft
Drainage Area	= 0.26 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 4.40 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

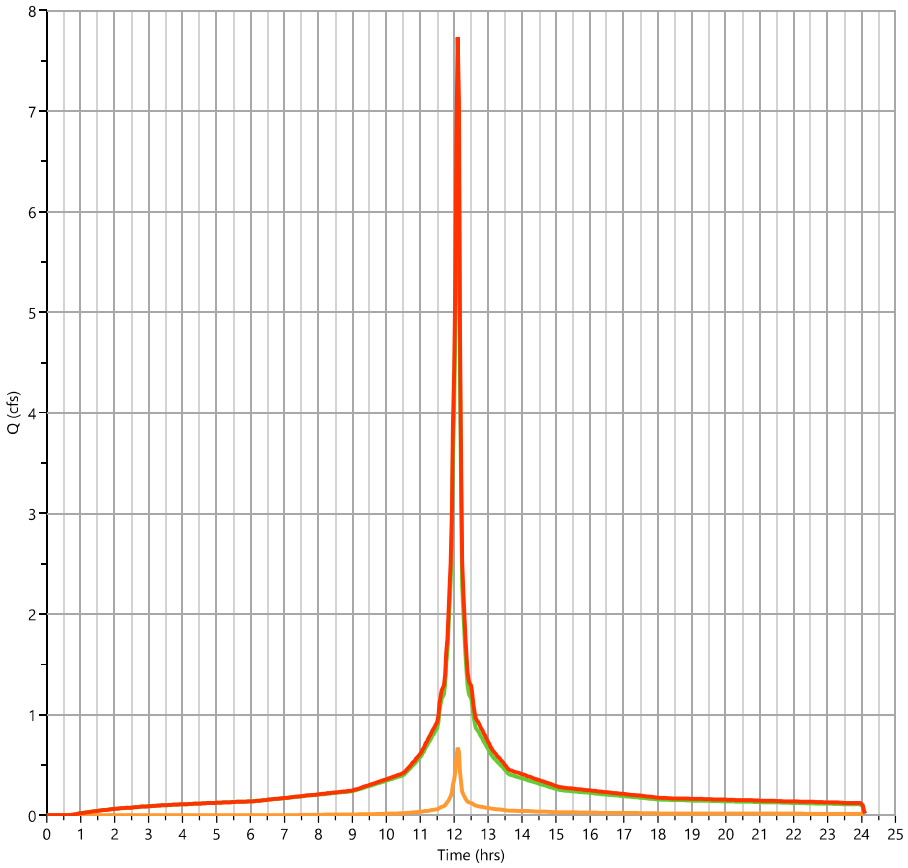
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 [POI-4]

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 7.733 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 27,895 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 2.08 ac



Hydrograph Report

Project Name:

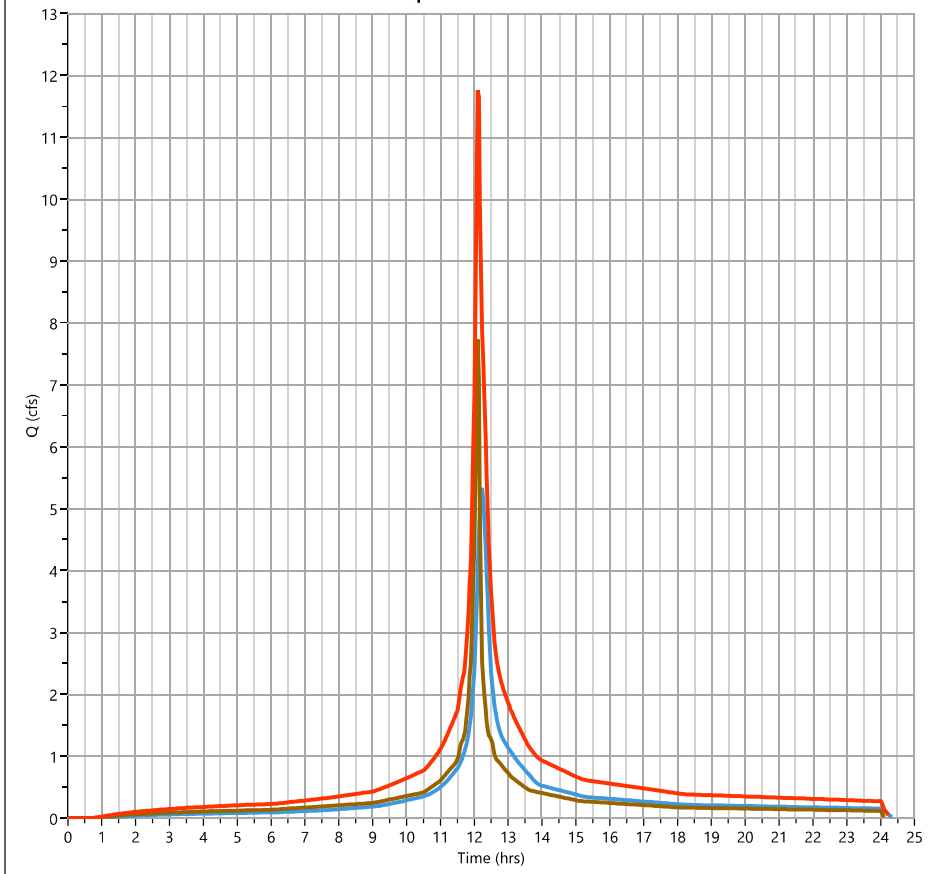
Hydrology Studio v 3.0.0.21

01-26-2022

PROP TOTAL TO POI-4

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 11.76 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 57,793 cuft
Inflow Hydrographs	= 32, 36	Total Contrib. Area	= 4.33 ac



Design Storm Report

Custom Storm filename:

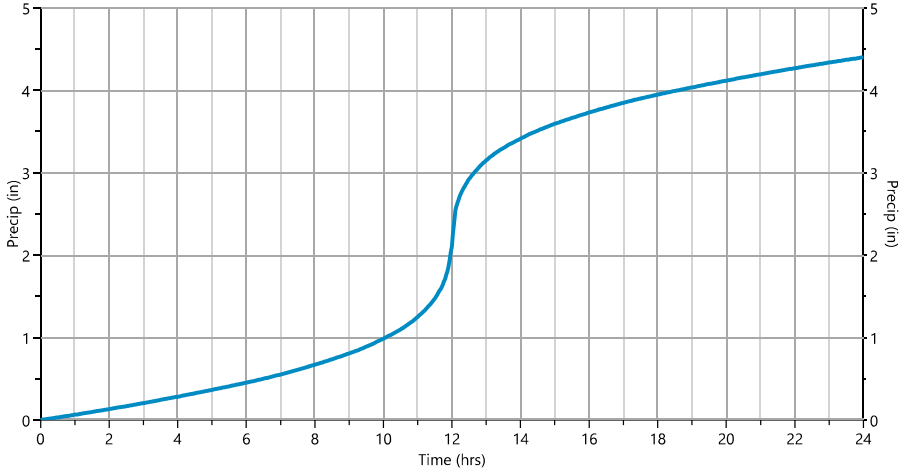
Hydrology Studio v 3.0.0.21

01-26-2022

Storm Distribution: Custom - NRCC-D

Storm Duration	Total Rainfall Volume (in)								
	1-yr	2-yr	3-yr	5-yr	✔ 10-yr	25-yr	50-yr	100-yr	
24 hrs	0.00	3.44	0.00	0.00	4.40	0.00	0.00	8.66	

Incremental Rainfall Distribution, 10-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.07	0.012643	11.43	0.017204	11.80	0.033206	12.17	0.047284	12.53	0.017204
11.10	0.012643	11.47	0.017204	11.83	0.047285	12.20	0.047285	12.57	0.017204
11.13	0.013787	11.50	0.017205	11.87	0.047284	12.23	0.033205	12.60	0.017204
11.17	0.013787	11.53	0.022543	11.90	0.047286	12.27	0.033206	12.63	0.016119
11.20	0.013787	11.57	0.022542	11.93	0.084495	12.30	0.033205	12.67	0.016119
11.23	0.014960	11.60	0.022543	11.97	0.084495	12.33	0.023731	12.70	0.016119
11.27	0.014960	11.63	0.023731	12.00	0.084494	12.37	0.023731	12.73	0.014960
11.30	0.014960	11.67	0.023731	12.03	0.145978	12.40	0.023731	12.77	0.014960
11.33	0.016119	11.70	0.023731	**12.07**	**0.145978**	12.43	0.022543	12.80	0.014960
11.37	0.016119	11.73	0.033205	12.10	0.145978	12.47	0.022542	12.83	0.013787
11.40	0.016119	11.77	0.033206	12.13	0.047285	12.50	0.022543	12.87	0.013787



Hydrograph 100-yr Summary

Project Name:

01-26-2022

Hydrology Studio v 3.0.0.21

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX DA-1 [POI-1]	3.777	12.23	18,793	---		
3	NRCS Runoff	EX DA-2 [POI-2]	3.130	12.20	14,159	---		
5	Junction	EX TOTAL TO POI-2	6.826	12.23	32,952	1, 3		
7	NRCS Runoff	EX DA-3 IMP	6.280	12.17	30,574	---		
8	NRCS Runoff	EX DA-3 PER	1.357	12.17	5,726	---		
9	Junction	EX DA-3 [POI-3]	7.637	12.17	36,299	7, 8		
11	Junction	EX TOTAL TO POI-3	14.20	12.20	69,251	5, 9		
13	NRCS Runoff	EX DA-4 IMP	14.08	12.10	52,564	---		
14	NRCS Runoff	EX DA-4 PER	1.602	12.10	5,196	---		
15	Junction	EX DA-4 [POI-4]	15.68	12.10	57,760	13, 14		
17	Junction	EX TOTAL TO POI-4	27.60	12.13	127,011	11, 15		
19	NRCS Runoff	DA-1 [POI-1]	3.777	12.23	18,793	---		
21	NRCS Runoff	DA-2 DET IMP	1.371	12.20	7,152	---		
22	NRCS Runoff	DA-2 DET PER	1.358	12.20	6,142	---		
23	Junction	TOTAL DA-2 DET	2.729	12.20	13,294	21, 22		
24	Pond Route	PROP UG BASIN	1.741	12.37	13,293	23	476.51	1,805
26	Junction	PROP TOTAL TO POI-2	5.379	12.27	32,086	19, 24		
28	NRCS Runoff	DA-3 IMP	5.542	12.20	28,906	---		
29	NRCS Runoff	DA-3 PER	1.848	12.20	8,366	---		
30	Junction	DA-3 [POI-3]	7.391	12.20	37,272	28, 29		
32	Junction	PROP TOTAL TO POI-3	12.54	12.20	69,358	26, 30		
34	NRCS Runoff	DA-4 UNDET IMP	13.97	12.10	52,150	---		
35	NRCS Runoff	DA-4 UNDET PER	1.704	12.10	5,527	---		
36	Junction	DA-4 [POI-4]	15.67	12.10	57,677	34, 35		

Hydrograph 100-yr Summary

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	Junction	PROP TOTAL TO POI-4	25.34	12.10	127,035	32, 36		

Hydrograph Report

Project Name:

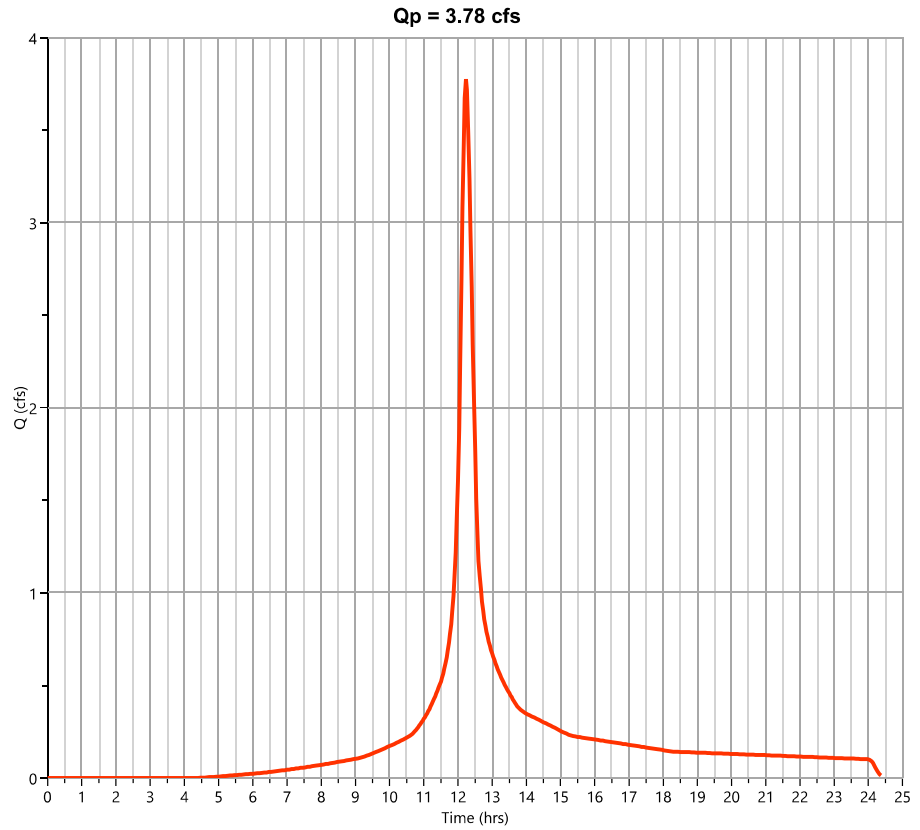
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-1 [POI-1]

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.777 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 18,793 cuft
Drainage Area	= 0.88 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 18.5 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

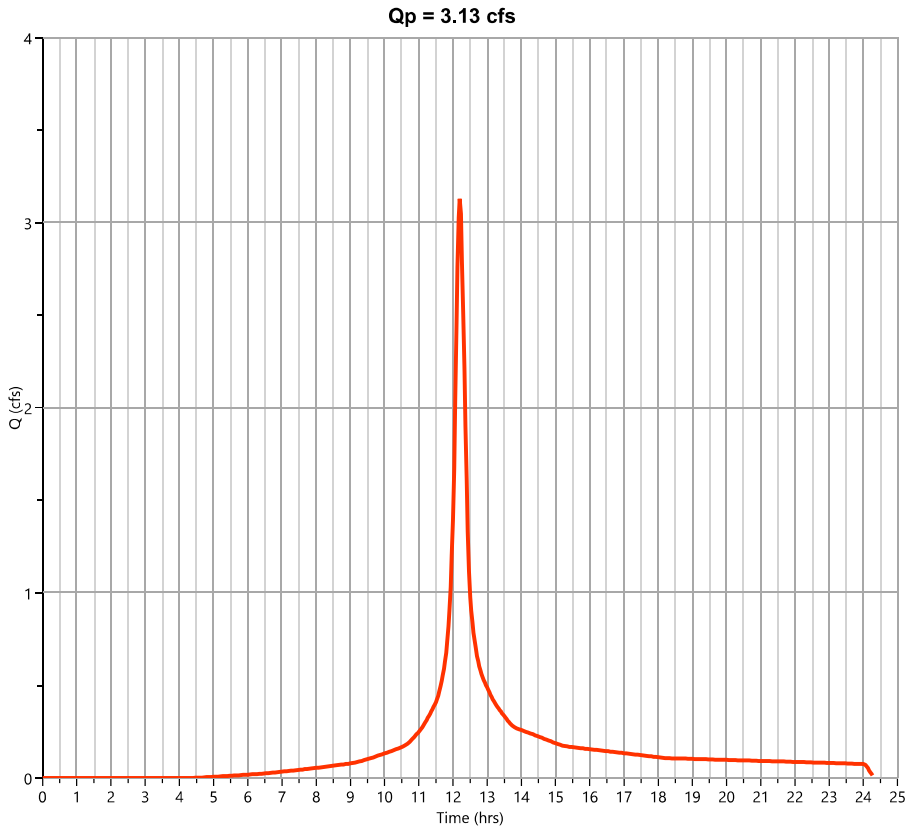
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-2 [POI-2]

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.130 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 14,159 cuft
Drainage Area	= 0.68 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

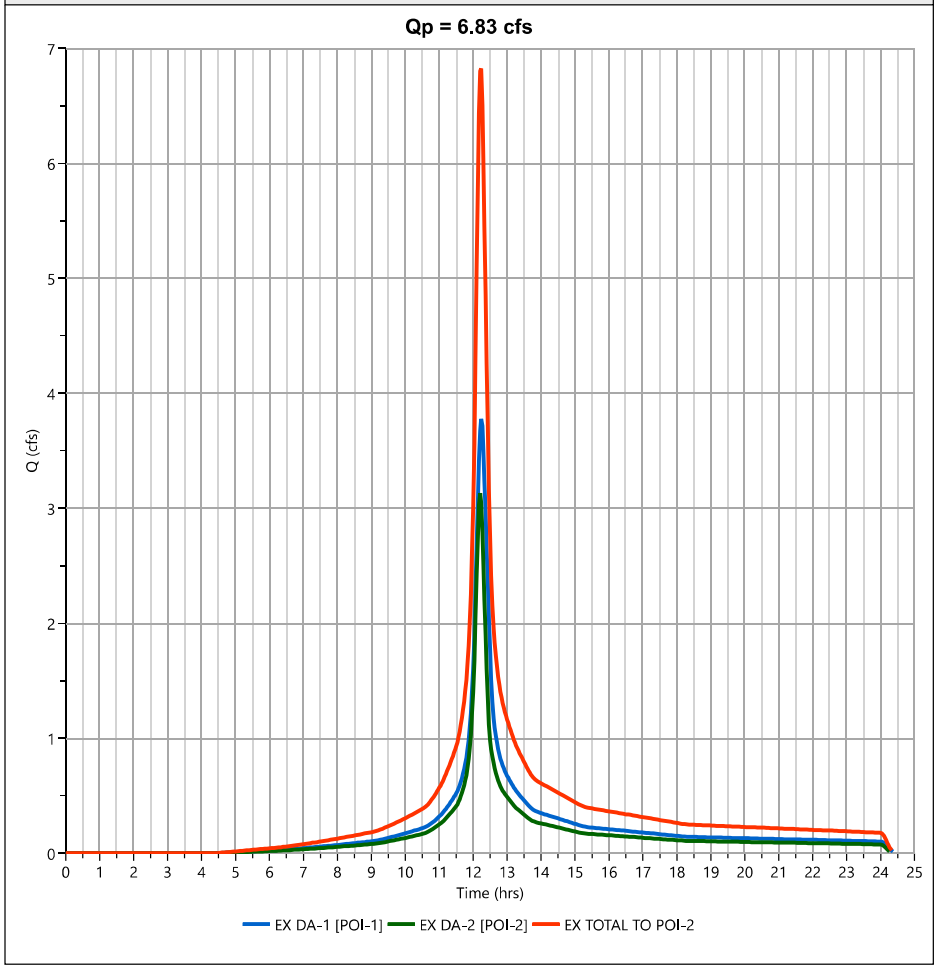
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-2

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 6.826 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Hydrograph Volume	= 32,952 cuft
Inflow Hydrographs	= 1, 3	Total Contrib. Area	= 1.56 ac



Hydrograph Report

Project Name:

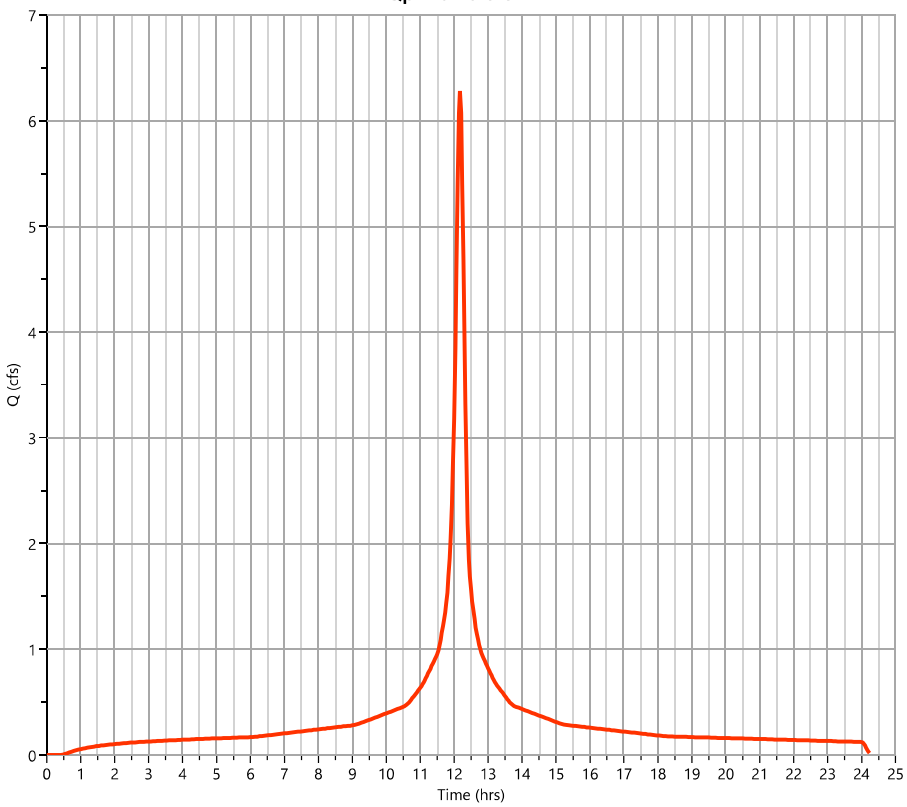
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 IMP

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.280 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 30,574 cuft
Drainage Area	= 0.97 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.6 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

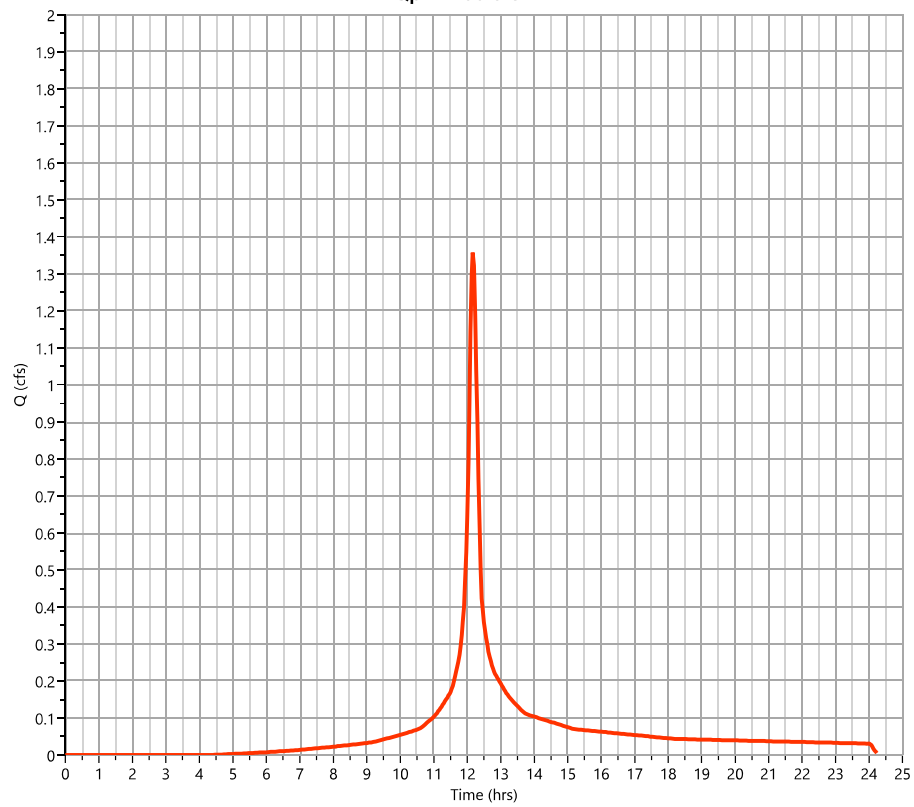
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 PER

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.357 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 5,726 cuft
Drainage Area	= 0.26 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 10.6 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

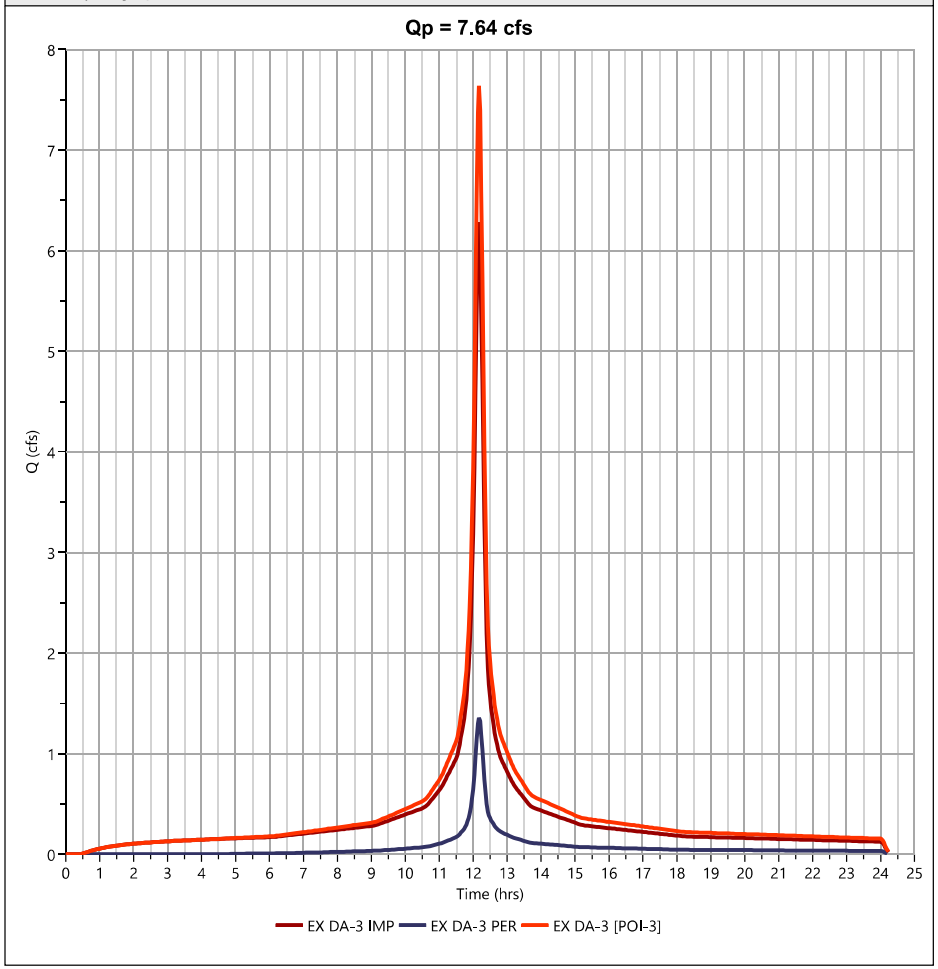
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 [POI-3]

Hyd. No. 9

Hydrograph Type	= Junction	Peak Flow	= 7.637 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 36,299 cuft
Inflow Hydrographs	= 7, 8	Total Contrib. Area	= 1.23 ac



Hydrograph Report

Project Name:

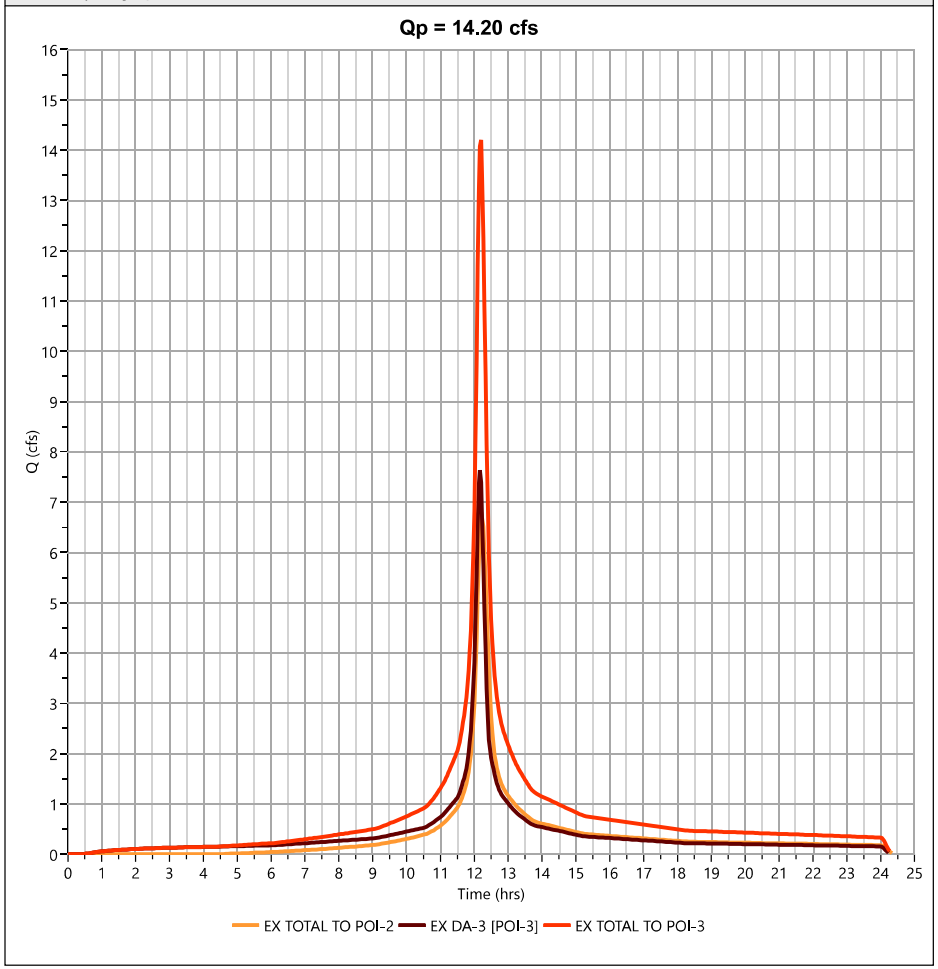
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-3

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 14.20 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 69,251 cuft
Inflow Hydrographs	= 5, 9	Total Contrib. Area	= 2.79 ac



Hydrograph Report

Project Name:

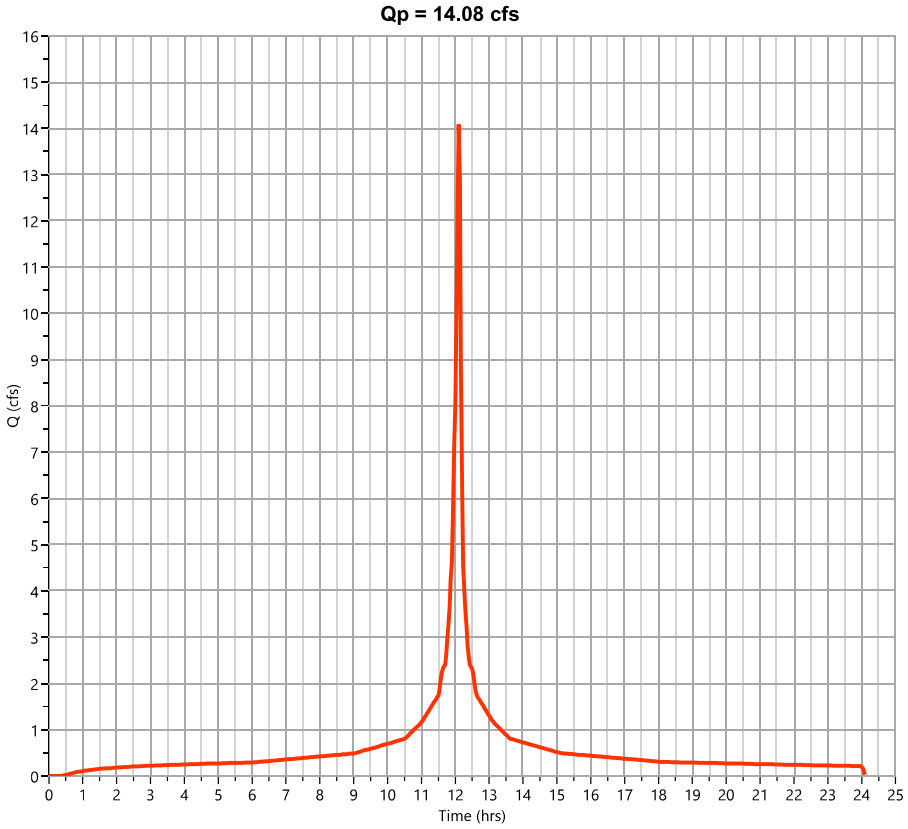
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 IMP

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 14.08 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 52,564 cuft
Drainage Area	= 1.834 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

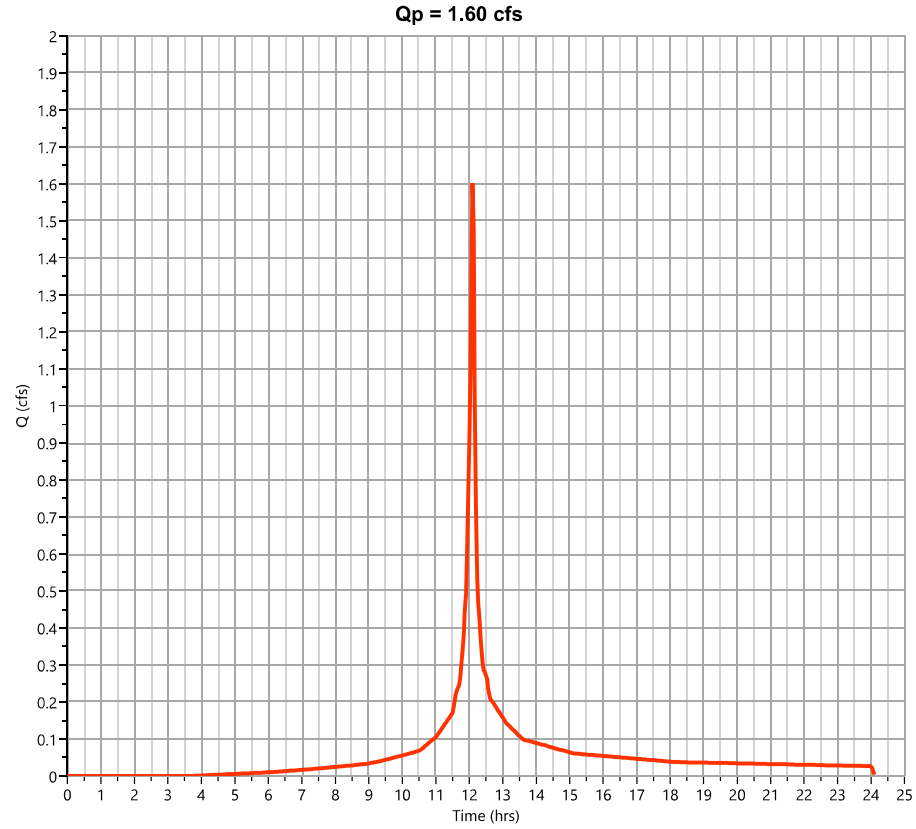
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 PER

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.602 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 5,196 cuft
Drainage Area	= 0.244 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

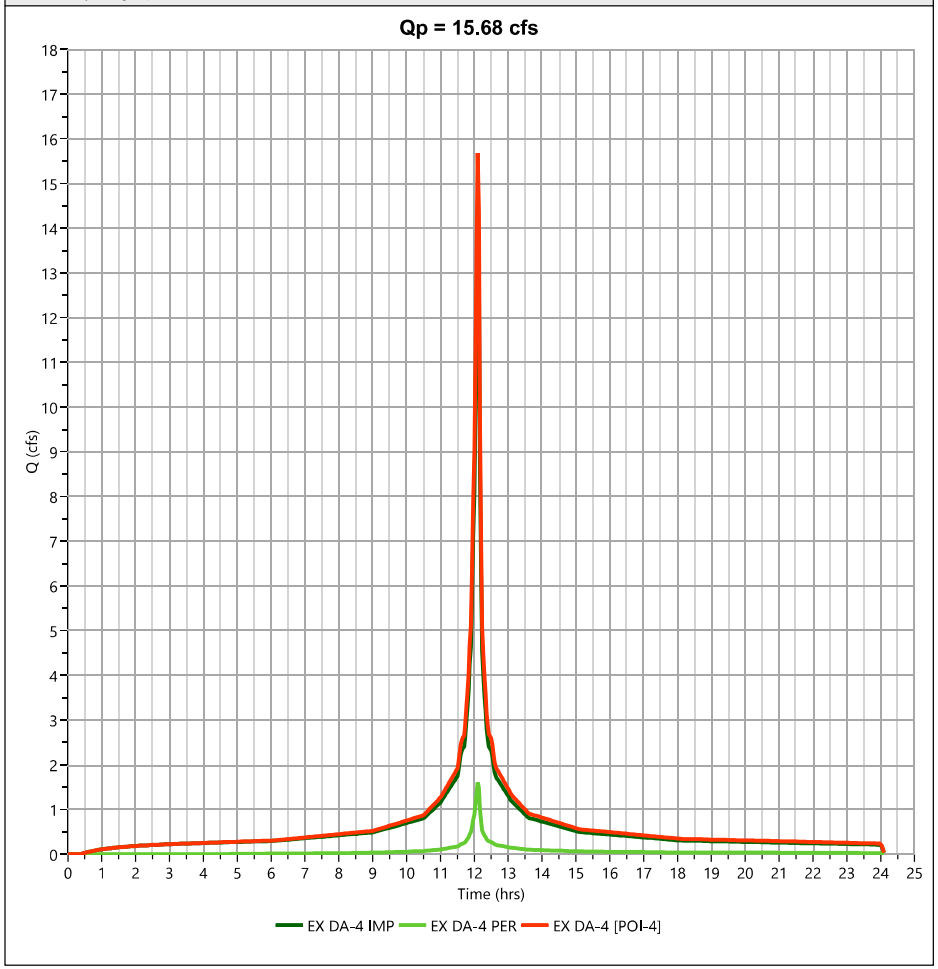
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 [POI-4]

Hyd. No. 15

Hydrograph Type	= Junction	Peak Flow	= 15.68 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 57,760 cuft
Inflow Hydrographs	= 13, 14	Total Contrib. Area	= 2.079 ac



Hydrograph Report

Project Name:

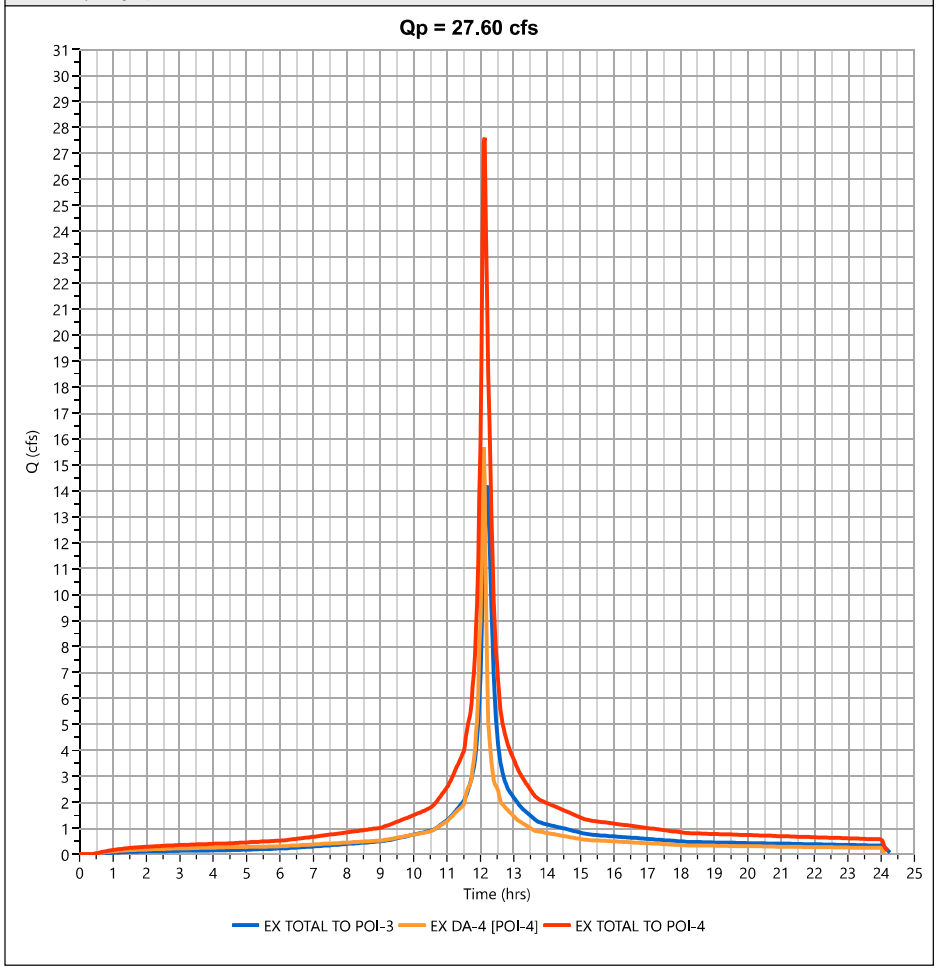
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-4

Hyd. No. 17

Hydrograph Type	= Junction	Peak Flow	= 27.60 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 127,011 cuft
Inflow Hydrographs	= 11, 15	Total Contrib. Area	= 4.869 ac



Hydrograph Report

Project Name:

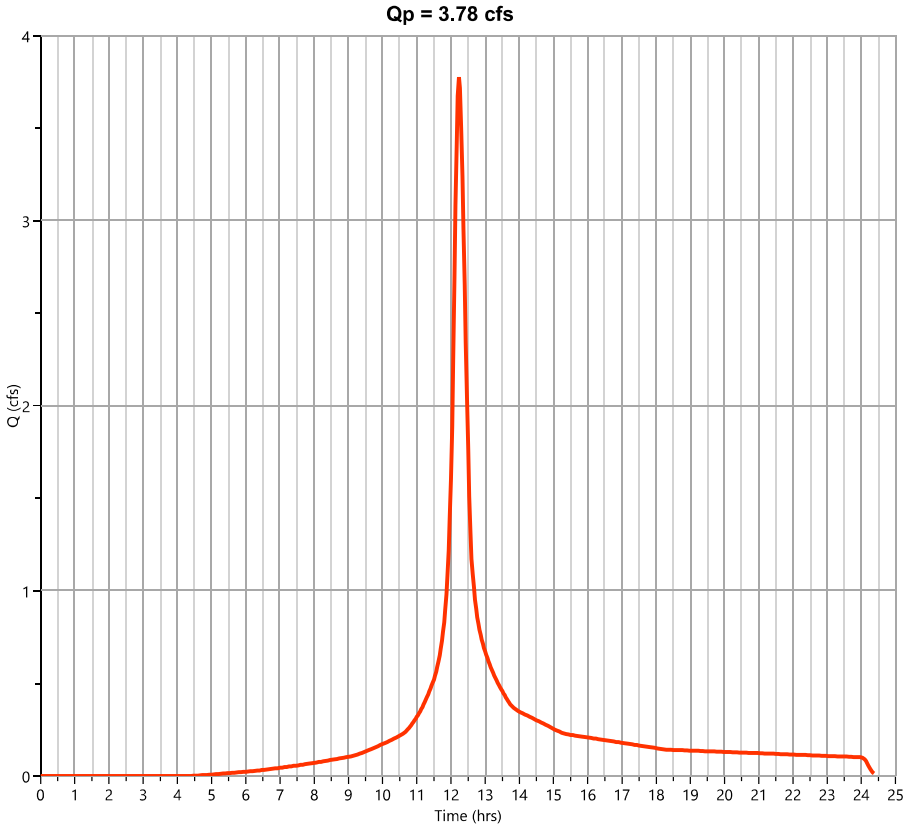
Hydrology Studio v 3.0.0.21

01-26-2022

DA-1 [POI-1]

Hyd. No. 19

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.777 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 18,793 cuft
Drainage Area	= 0.88 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 18.5 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

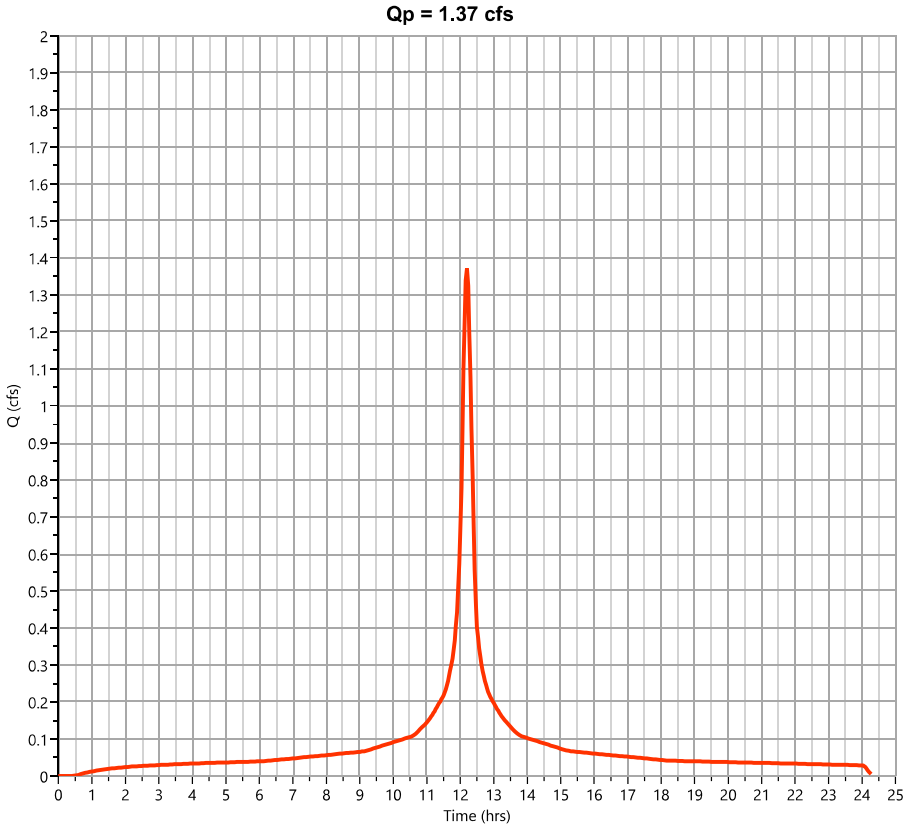
Hydrology Studio v 3.0.0.21

01-26-2022

DA-2 DET IMP

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.371 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 7,152 cuft
Drainage Area	= 0.24 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 13.7 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

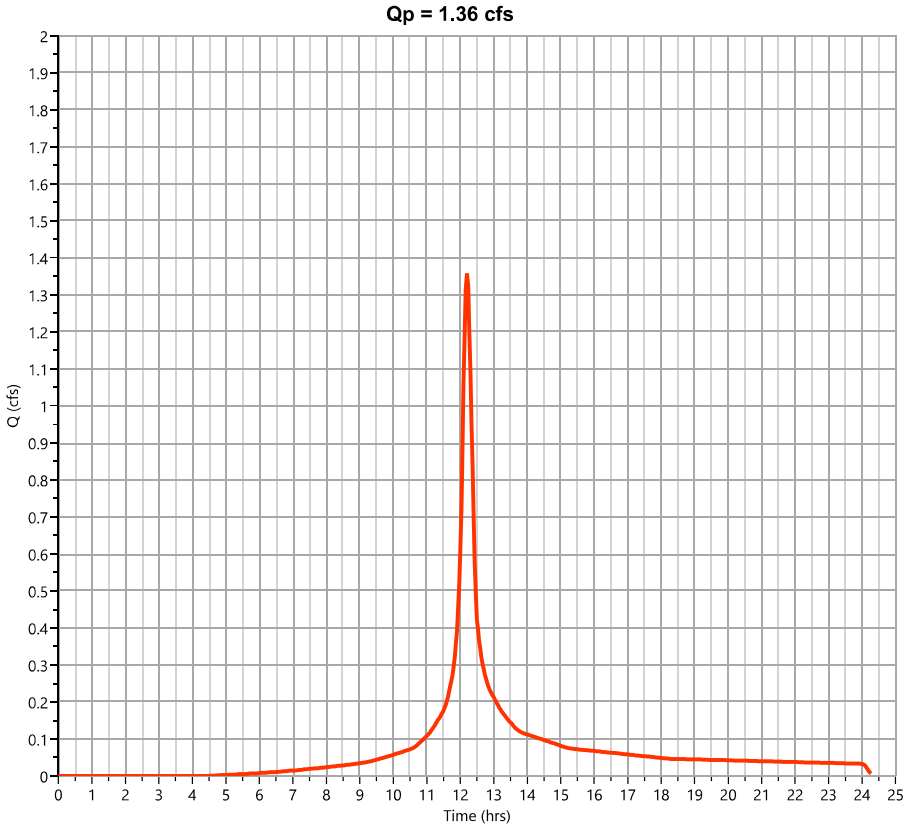
Hydrology Studio v 3.0.0.21

01-26-2022

DA-2 DET PER

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.358 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 6,142 cuft
Drainage Area	= 0.295 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 13.7 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

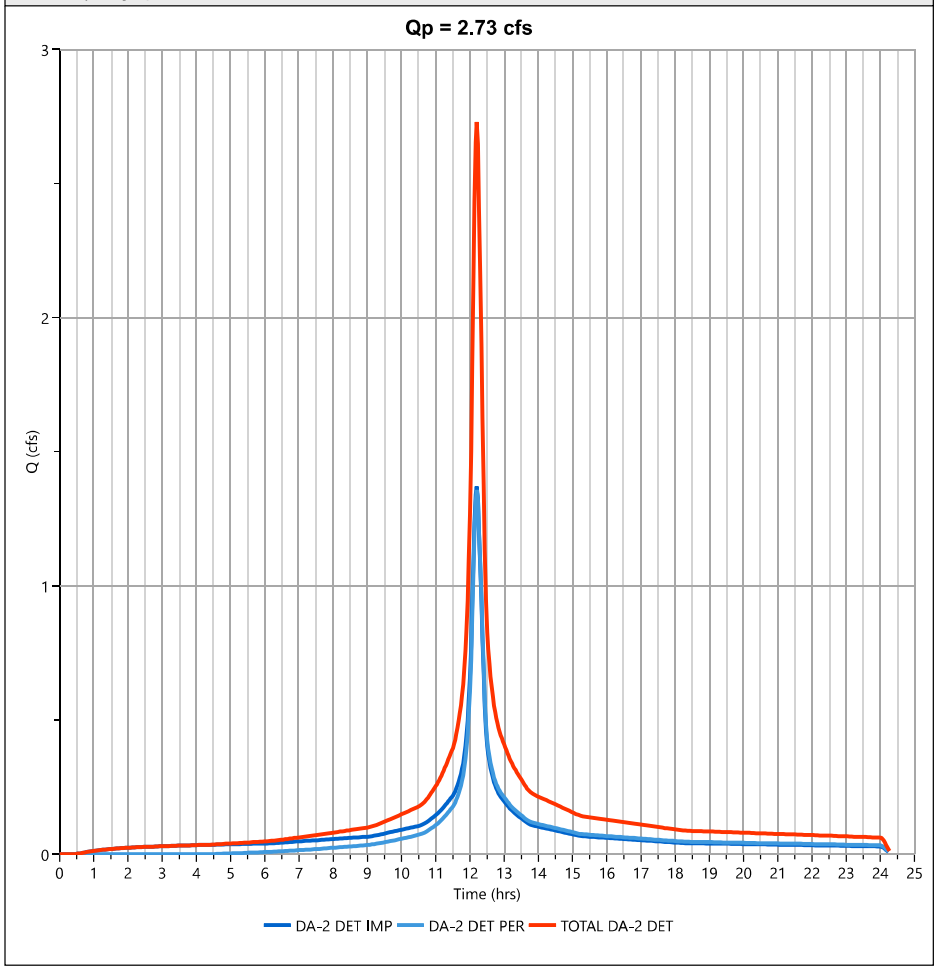
Hydrology Studio v 3.0.0.21

01-26-2022

TOTAL DA-2 DET

Hyd. No. 23

Hydrograph Type	= Junction	Peak Flow	= 2.729 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 13,294 cuft
Inflow Hydrographs	= 21, 22	Total Contrib. Area	= 0.535 ac

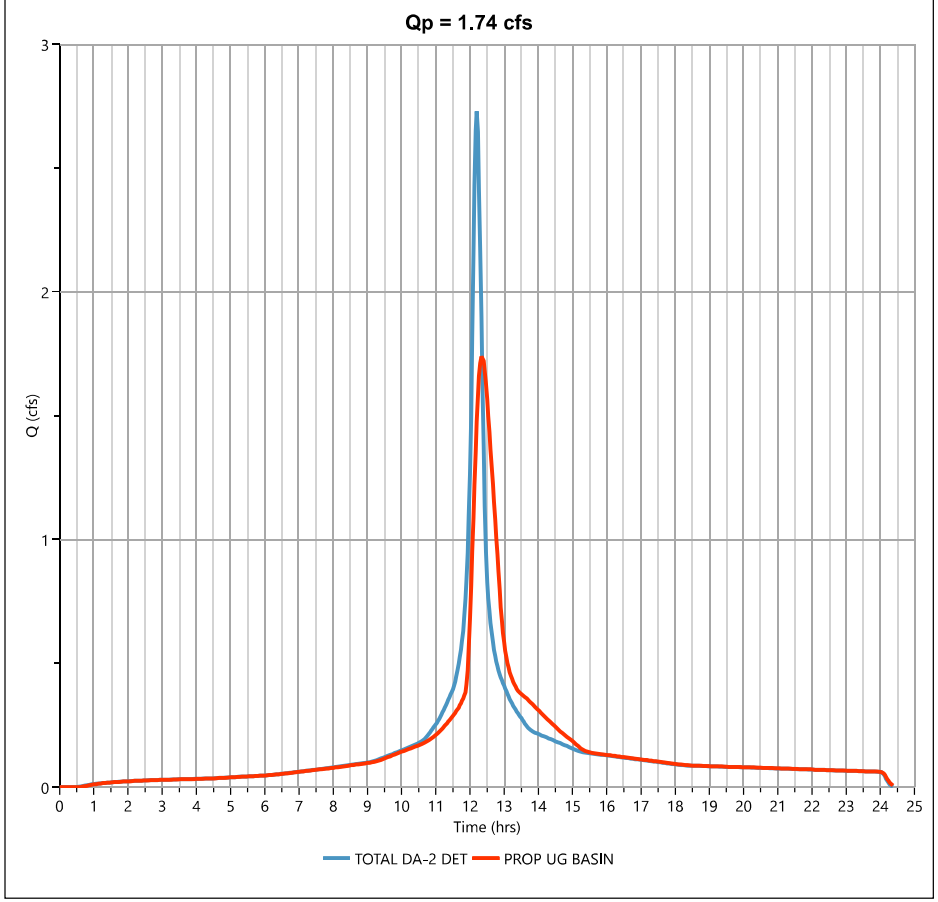


PROP UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 1.741 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Hydrograph Volume	= 13,293 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 476.51 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 1,805 cuft

Pond Routing by Storage Indication Method *Center of mass detention time = 11 min*

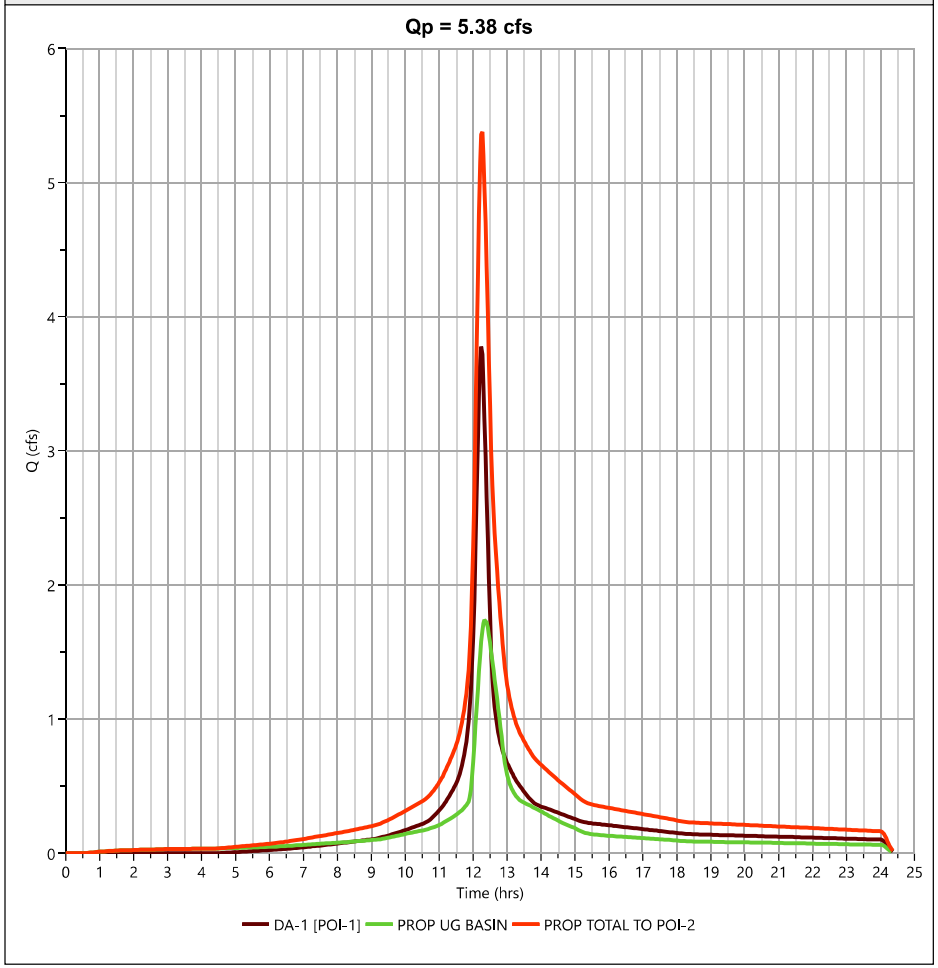


Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

PROP TOTAL TO POI-2

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 5.379 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 32,086 cuft
Inflow Hydrographs	= 19, 24	Total Contrib. Area	= 0.88 ac



Hydrograph Report

Project Name:

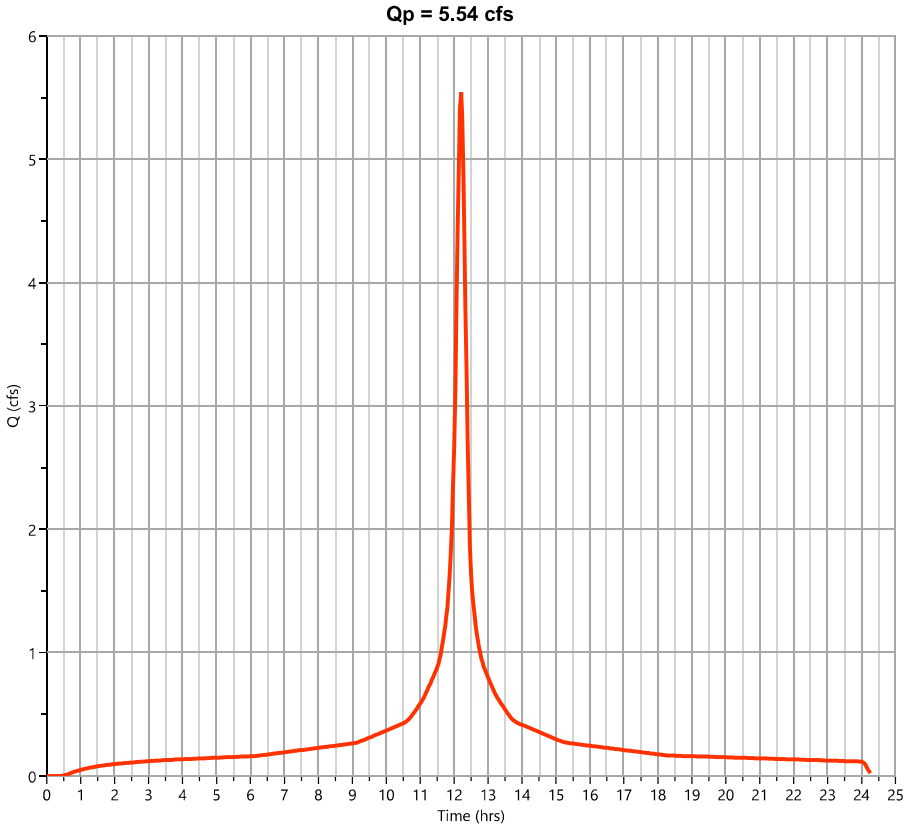
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 IMP

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.542 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 28,906 cuft
Drainage Area	= 0.97 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 15.6 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

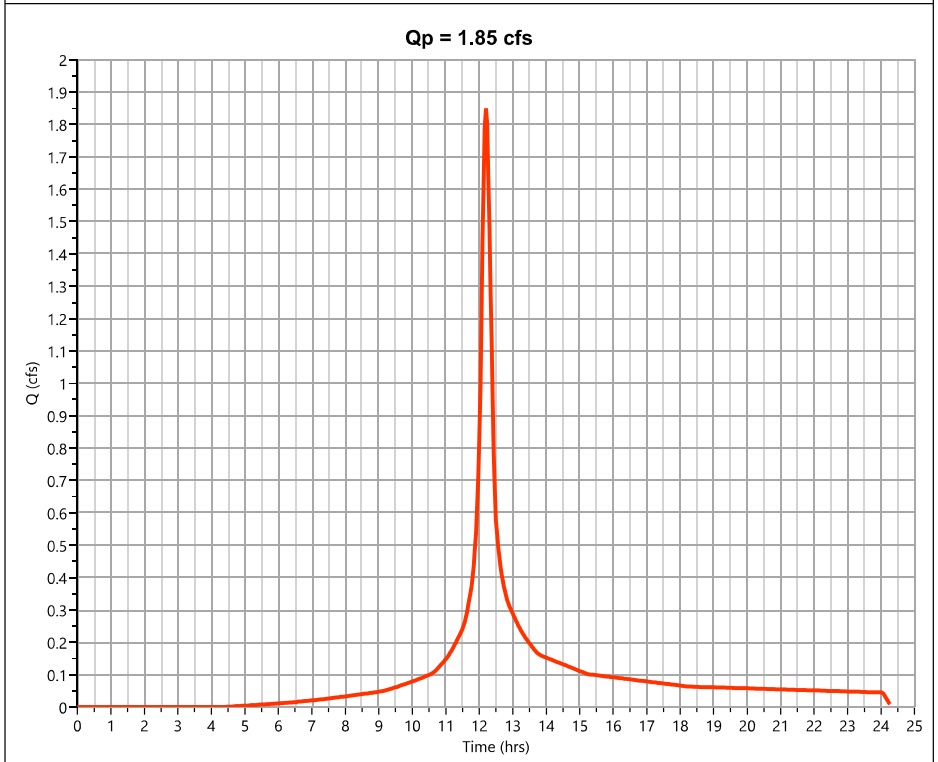
DA-3 PER

Hyd. No. 29

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.848 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 8,366 cuft
Drainage Area	= 0.4 ac	Curve Number	= 77.22*
Tc Method	= User	Time of Conc. (Tc)	= 15.6 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0,03	80	Open Space
0.37	77	Woods
0.4	**77**	Weighted CN Method Employed



Hydrograph Report

Project Name:

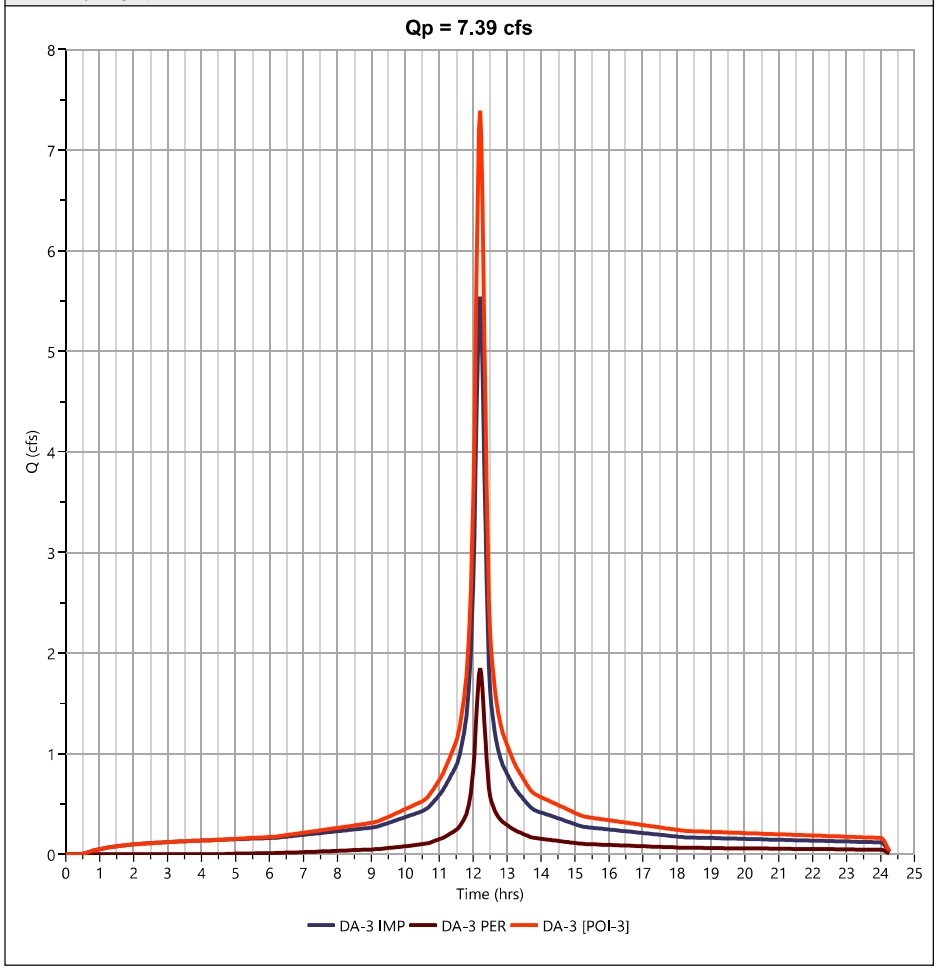
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 [POI-3]

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 7.391 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 37,272 cuft
Inflow Hydrographs	= 28, 29	Total Contrib. Area	= 1.37 ac



Hydrograph Report

Project Name:

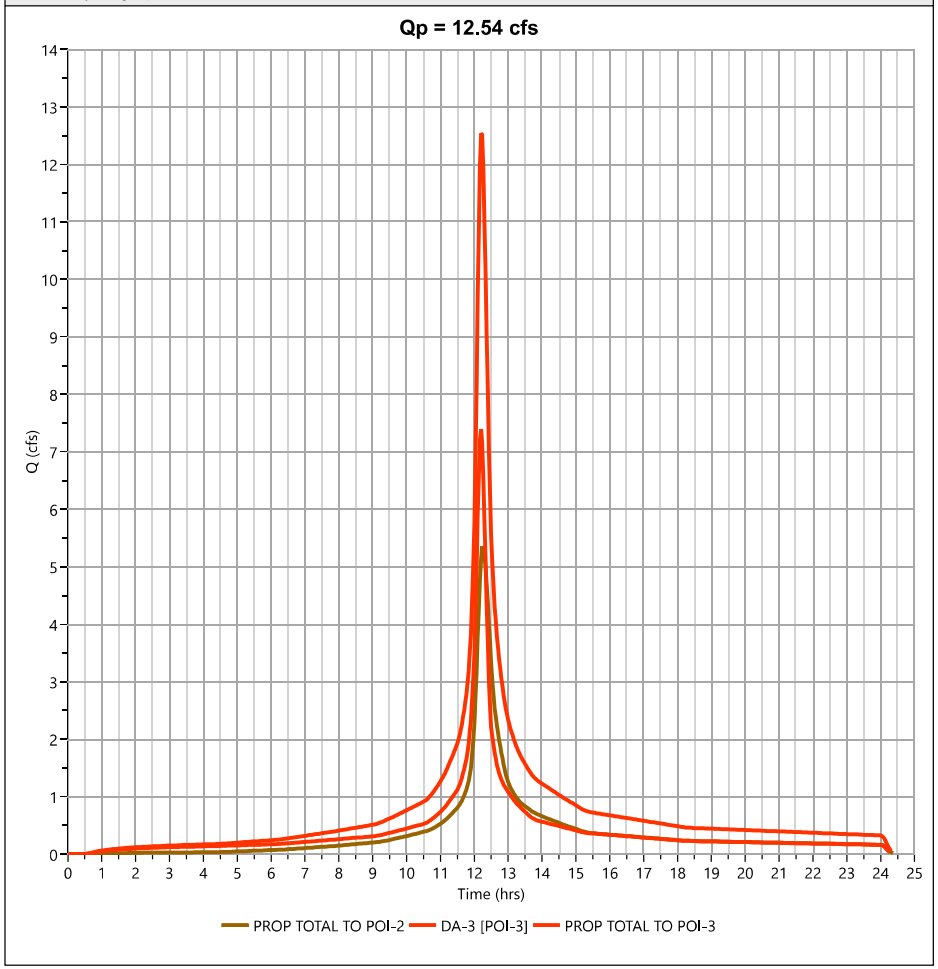
Hydrology Studio v 3.0.0.21

01-26-2022

PROP TOTAL TO POI-3

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 12.54 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 69,358 cuft
Inflow Hydrographs	= 26, 30	Total Contrib. Area	= 2.25 ac



Hydrograph Report

Project Name:

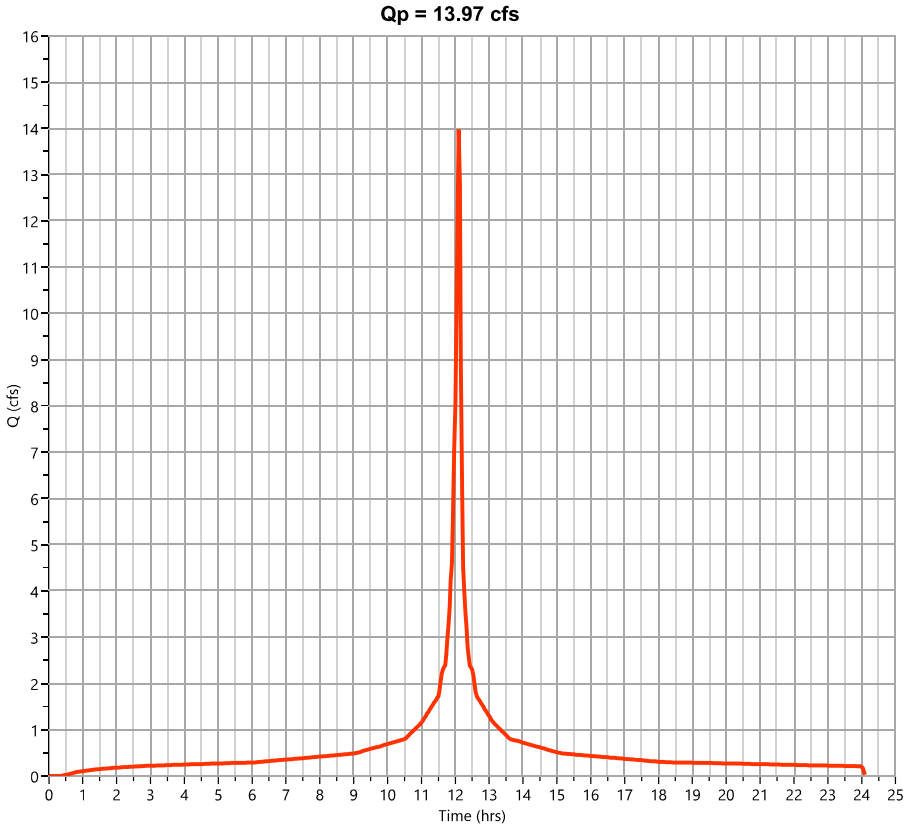
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 UNDET IMP

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.97 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 52,150 cuft
Drainage Area	= 1.82 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

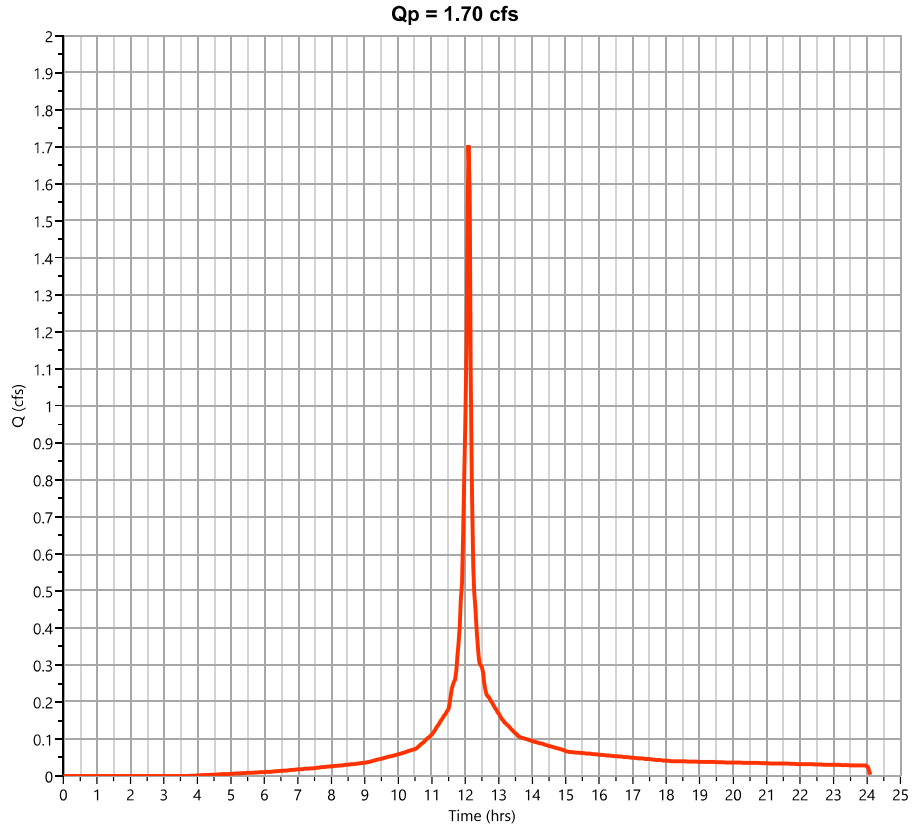
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 UNDET PER

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.704 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 5,527 cuft
Drainage Area	= 0.26 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

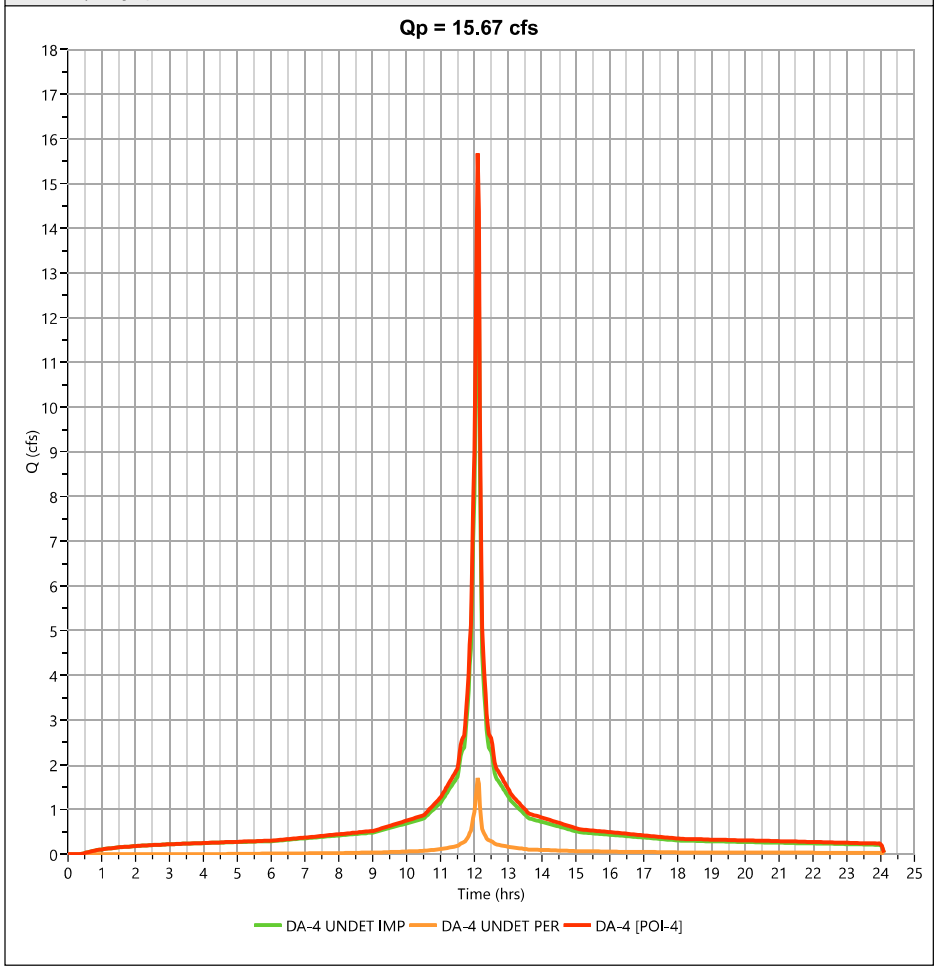
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 [POI-4]

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 15.67 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 57,677 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 2.08 ac



Hydrograph Report

Project Name:

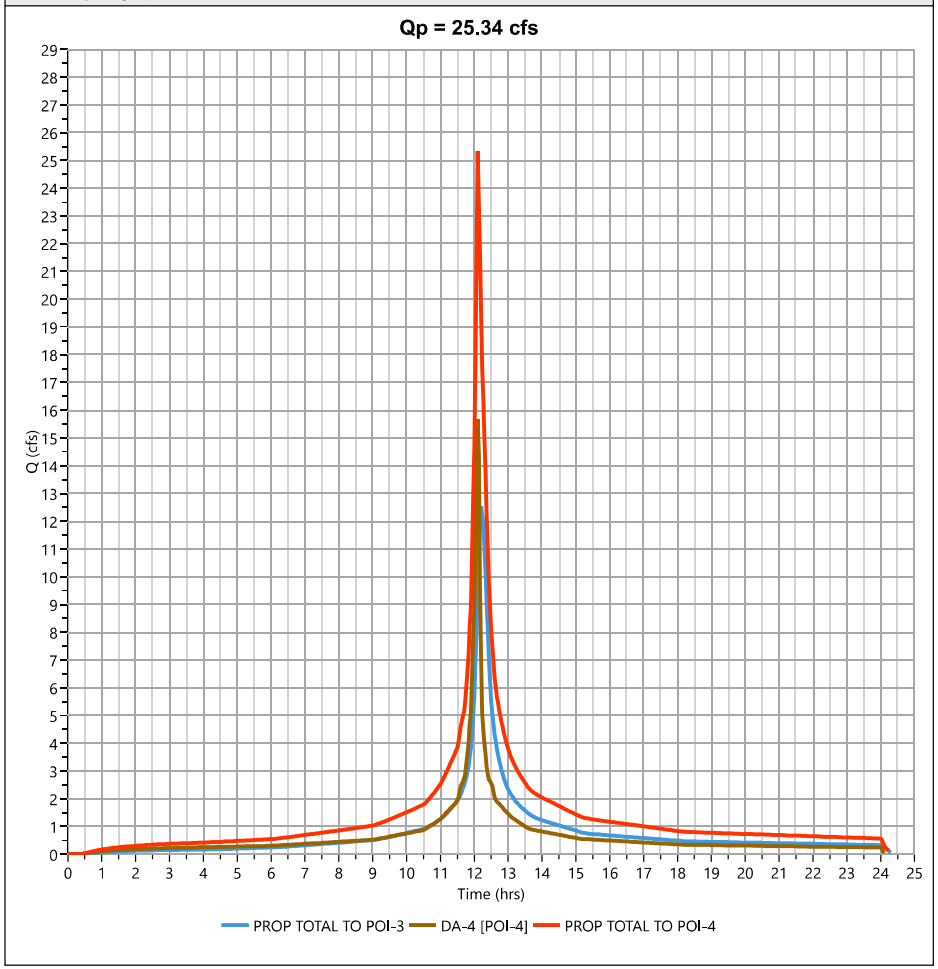
Hydrology Studio v 3.0.0.21

01-26-2022

PROP TOTAL TO POI-4

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 25.34 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 127,035 cuft
Inflow Hydrographs	= 32, 36	Total Contrib. Area	= 4.33 ac



Design Storm Report

Custom Storm filename:

Hydrology Studio v 3.0.0.21

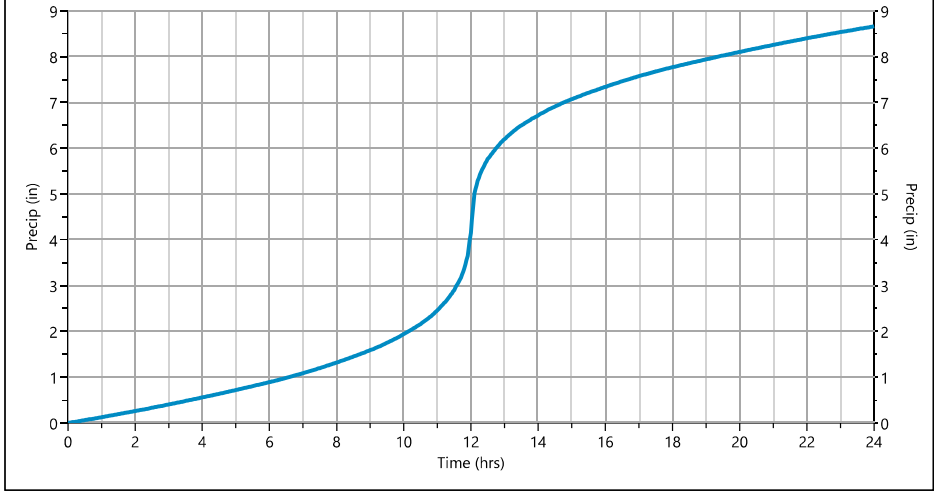
01-26-2022

Storm Distribution: Custom - NRCC-D

Storm Duration	Total Rainfall Volume (in)								
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	✔ 100-yr	
24 hrs	0.00	3.44	0.00	0.00	4.40	0.00	0.00	8.66	

Incremental Rainfall Distribution, 100-yr

Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.07	0.024883	11.43	0.033861	11.80	0.065356	12.17	0.093064	12.53	0.033860
11.10	0.024883	11.47	0.033860	11.83	0.093066	12.20	0.093066	12.57	0.033861
11.13	0.027135	11.50	0.033862	11.87	0.093064	12.23	0.065353	12.60	0.033860
11.17	0.027135	11.53	0.044368	11.90	0.093067	12.27	0.065354	12.63	0.031724
11.20	0.027135	11.57	0.044367	11.93	0.166301	12.30	0.065354	12.67	0.031725
11.23	0.029444	11.60	0.044368	11.97	0.166301	12.33	0.046706	12.70	0.031725
11.27	0.029444	11.63	0.046706	12.00	0.166300	12.37	0.046707	12.73	0.029444
11.30	0.029444	11.67	0.046707	12.03	0.287311	12.40	0.046707	12.77	0.029443
11.33	0.031724	11.70	0.046706	**12.07**	**0.287311**	12.43	0.044368	12.80	0.029444
11.37	0.031724	11.73	0.065354	12.10	0.287311	12.47	0.044367	12.83	0.027134
11.40	0.031724	11.77	0.065354	12.13	0.093066	12.50	0.044368	12.87	0.027134



Precipitation Report Cont'd

Precipitation filename: Essex County NRCS.pcp

Rainfall totals in Inches

01-26-2022

	Active	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Active			✔			✔			✔
NRCS Storms	**> NRCS Dimensionless Storms**								
NRCS MSE1, 24-hr		0	0	0	0	0	0	0	0
NRCS MSE2, 24-hr		0	0	0	0	0	0	0	0
NRCS MSE3, 24-hr		0	0	0	0	0	0	0	0
NRCS MSE4, 24-hr		0	0	0	0	0	0	0	0
NRCS MSE5, 24-hr		0	0	0	0	0	0	0	0
NRCS MSE6, 24-hr		0	0	0	0	0	0	0	0
NOAA-A, 24-hr		0	0	0	0	0	0	0	0
NOAA-B, 24-hr		0	0	0	0	0	0	0	0
NOAA-C, 24-hr		0	0	0	0	0	0	0	0
NOAA-D, 24-hr		0	0	0	0	0	0	0	0
NRCC-A, 24-hr		0	0	0	0	0	0	0	0
NRCC-B, 24-hr		0	0	0	0	0	0	0	0
NRCC-C, 24-hr		0	0	0	0	0	0	0	0
NRCC-D, 24-hr	✔	0	3.44	0	0	4.40	0	0	8.66
CA-1, 24-hr		0	0	0	0	0	0	0	0
CA-2, 24-hr		0	0	0	0	0	0	0	0
CA-3, 24-hr		0	0	0	0	0	0	0	0
CA-4, 24-hr		0	0	0	0	0	0	0	0
CA-5, 24-hr		0	0	0	0	0	0	0	0
CA-6, 24-hr		0	0	0	0	0	0	0	0

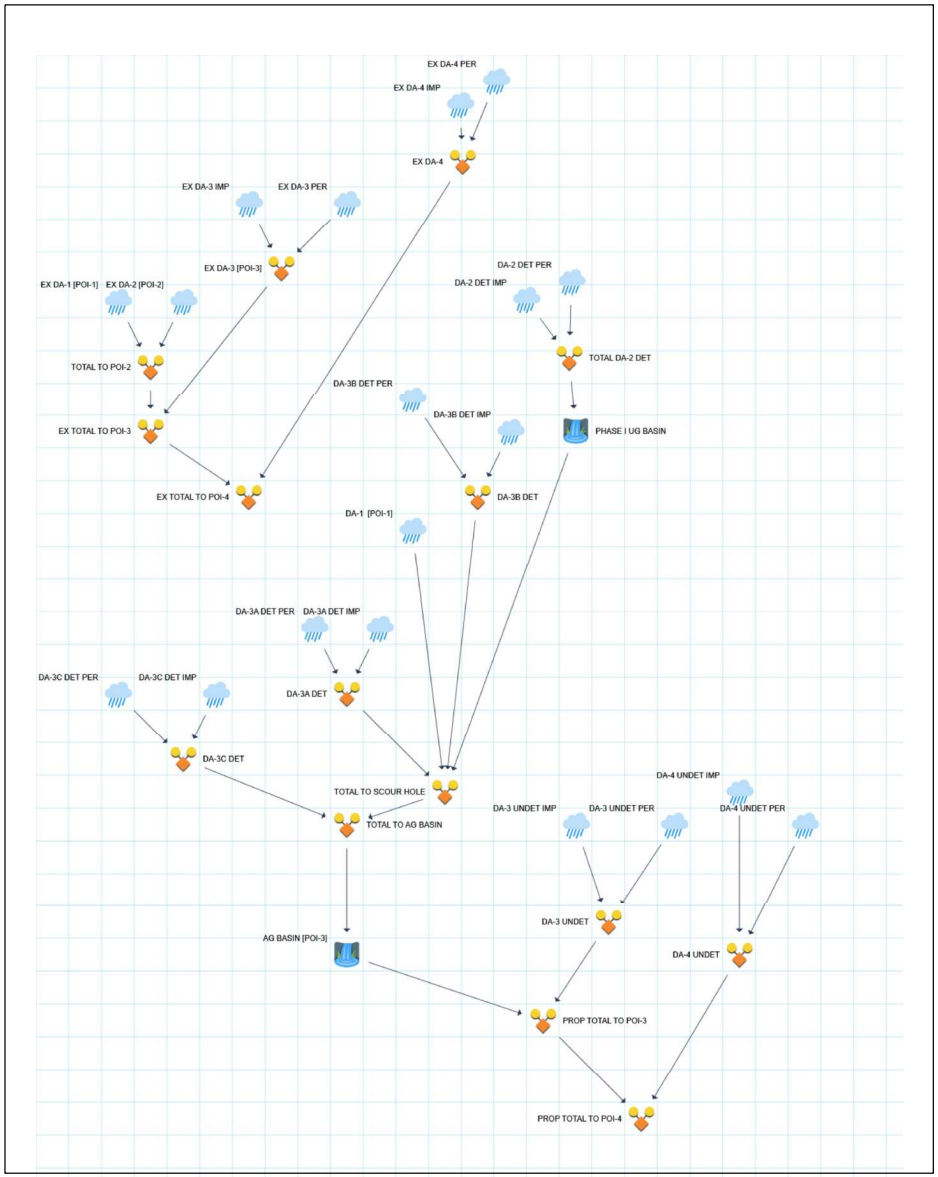
PHASE II - EXISTING & PROPOSED CONDITIONS FOR 2YR, 10YR & 100YR STORM EVENTS (HYDROGRAPHS CREATED USING HYDROLOGY STUDIO 2020 COMPUTER SOFTWARE)

Basin Model

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022



Hydrograph by Return Period

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)							
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1	NRCS Runoff	EX DA-1 [POI-1]		0.884			1.826	2.509		3.777
3	NRCS Runoff	EX DA-2 [POI-2]		0.736			1.516	2.081		3.130
5	Junction	TOTAL TO POI-2		1.612			3.312	4.543		6.826
7	NRCS Runoff	EX DA-3 IMP		2.471			3.773	4.663		6.280
8	NRCS Runoff	EX DA-3 PER		0.319			0.658	0.903		1.357
9	Junction	EX DA-3 [POI-3]		2.790			4.431	5.565		7.637
11	Junction	EX TOTAL TO POI-3		4.289			7.574	9.904		14.20
13	NRCS Runoff	EX DA-4 IMP		5.542			8.461	10.46		14.08
14	NRCS Runoff	EX DA-4 PER		0.421			0.813	1.091		1.599
15	Junction	EX DA-4		5.964			9.274	11.55		15.68
17	Junction	EX TOTAL TO POI-4		9.476			15.56	19.81		27.60
19	NRCS Runoff	DA-1 [POI-1]		0.518			1.050	1.432		2.141
21	NRCS Runoff	DA-2 DET IMP		0.472			0.721	0.891		1.200
22	NRCS Runoff	DA-2 DET PER		0.100			0.196	0.263		0.387
23	Junction	TOTAL DA-2 DET		0.572			0.916	1.154		1.587
24	Pond Route	PHASE I UG BASIN		0.323			0.505	0.752		1.097
26	NRCS Runoff	DA-3 UNDET IMP		0.937			1.430	1.767		2.379
27	NRCS Runoff	DA-3 UNDET PER		0.052			0.100	0.134		0.197
28	Junction	DA-3 UNDET		0.988			1.530	1.901		2.576
30	NRCS Runoff	DA-3A DET IMP		1.646			2.513	3.106		4.183
31	NRCS Runoff	DA-3A DET PER		0.305			0.610	0.828		1.232
32	Junction	DA-3A DET		1.951			3.123	3.934		5.414
34	NRCS Runoff	DA-3B DET IMP		0.393			0.600	0.741		0.998
35	NRCS Runoff	DA-3B DET PER		0.035			0.067	0.089		0.131
36	Junction	DA-3B DET		0.427			0.666	0.830		1.129

Hydrograph by Return Period

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)							
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
38	NRCS Runoff	DA-3C DET IMP		0.560			0.856	1.058		1.424
39	NRCS Runoff	DA-3C DET PER		0.693			1.373	1.859		2.754
40	Junction	DA-3C DET		1.253			2.229	2.916		4.178
42	Junction	TOTAL TO SCOUR HOLE		2.992			4.892	6.215		8.773
44	Junction	TOTAL TO AG BASIN		4.186			7.024	9.011		12.79
45	Pond Route	AG BASIN [POI-3]		1.186			3.056	4.372		8.546
47	Junction	PROP TOTAL TO POI-3		1.337			3.587	4.754		9.218
49	NRCS Runoff	DA-4 UNDET IMP		5.499			8.394	10.37		13.97
50	NRCS Runoff	DA-4 UNDET PER		0.449			0.866	1.162		1.704
51	Junction	DA-4 UNDET		5.948			9.261	11.54		15.67
53	Junction	PROP TOTAL TO POI-4		7.027			12.65	16.09		21.72

Hydrograph 2-yr Summary

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX DA-1 [POI-1]	0.884	12.23	4,428	—		
3	NRCS Runoff	EX DA-2 [POI-2]	0.736	12.20	3,336	—		
5	Junction	TOTAL TO POI-2	1.612	12.23	7,764	1, 3		
7	NRCS Runoff	EX DA-3 IMP	2.471	12.17	11,644	—		
8	NRCS Runoff	EX DA-3 PER	0.319	12.17	1,349	—		
9	Junction	EX DA-3 [POI-3]	2.790	12.17	12,993	7, 8		
11	Junction	EX TOTAL TO POI-3	4.289	12.20	20,756	5, 9		
13	NRCS Runoff	EX DA-4 IMP	5.542	12.10	20,018	—		
14	NRCS Runoff	EX DA-4 PER	0.421	12.10	1,319	—		
15	Junction	EX DA-4	5.964	12.10	21,338	13, 14		
17	Junction	EX TOTAL TO POI-4	9.476	12.13	42,094	11, 15		
19	NRCS Runoff	DA-1 [POI-1]	0.518	12.23	2,583	—		
21	NRCS Runoff	DA-2 DET IMP	0.472	12.20	2,383	—		
22	NRCS Runoff	DA-2 DET PER	0.100	12.20	450	—		
23	Junction	TOTAL DA-2 DET	0.572	12.20	2,833	21, 22		
24	Pond Route	PHASE I UG BASIN	0.323	12.37	2,832	23	474.59	310
26	NRCS Runoff	DA-3 UNDET IMP	0.937	12.10	3,383	—		
27	NRCS Runoff	DA-3 UNDET PER	0.052	12.10	162	—		
28	Junction	DA-3 UNDET	0.988	12.10	3,545	26, 27		
30	NRCS Runoff	DA-3A DET IMP	1.646	12.13	6,868	—		
31	NRCS Runoff	DA-3A DET PER	0.305	12.13	1,122	—		
32	Junction	DA-3A DET	1.951	12.13	7,989	30, 31		
34	NRCS Runoff	DA-3B DET IMP	0.393	12.10	1,419	—		
35	NRCS Runoff	DA-3B DET PER	0.035	12.10	108	—		
36	Junction	DA-3B DET	0.427	12.10	1,527	34, 35		

Hydrograph 2-yr Summary

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	NRCS Runoff	DA-3C DET IMP	0.560	12.17	2,641	---		
39	NRCS Runoff	DA-3C DET PER	0.693	12.17	2,901	---		
40	Junction	DA-3C DET	1.253	12.17	5,542	38, 39		
42	Junction	TOTAL TO SCOUR HOLE	2.992	12.13	14,931	19, 24, 32, 36		
44	Junction	TOTAL TO AG BASIN	4.186	12.13	20,473	40, 42		
45	Pond Route	AG BASIN [POI-3]	1.186	12.57	14,599	44	462.52	9,847
47	Junction	PROP TOTAL TO POI-3	1.337	12.53	18,144	28, 45		
49	NRCS Runoff	DA-4 UNDET IMP	5.499	12.10	19,861	---		
50	NRCS Runoff	DA-4 UNDET PER	0.449	12.10	1,406	---		
51	Junction	DA-4 UNDET	5.948	12.10	21,267	49, 50		
53	Junction	PROP TOTAL TO POI-4	7.027	12.10	39,411	47, 51		

Hydrograph Report

Project Name:

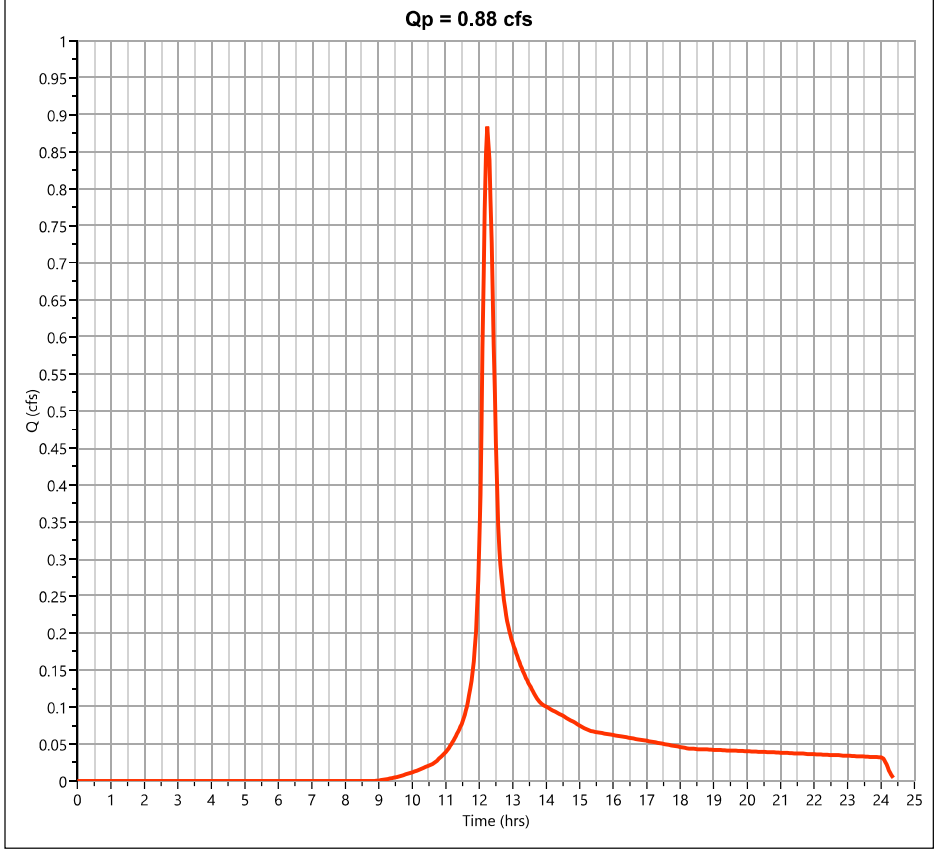
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-1 [POI-1]

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.884 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 4,428 cuft
Drainage Area	= 0.88 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 18.5 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

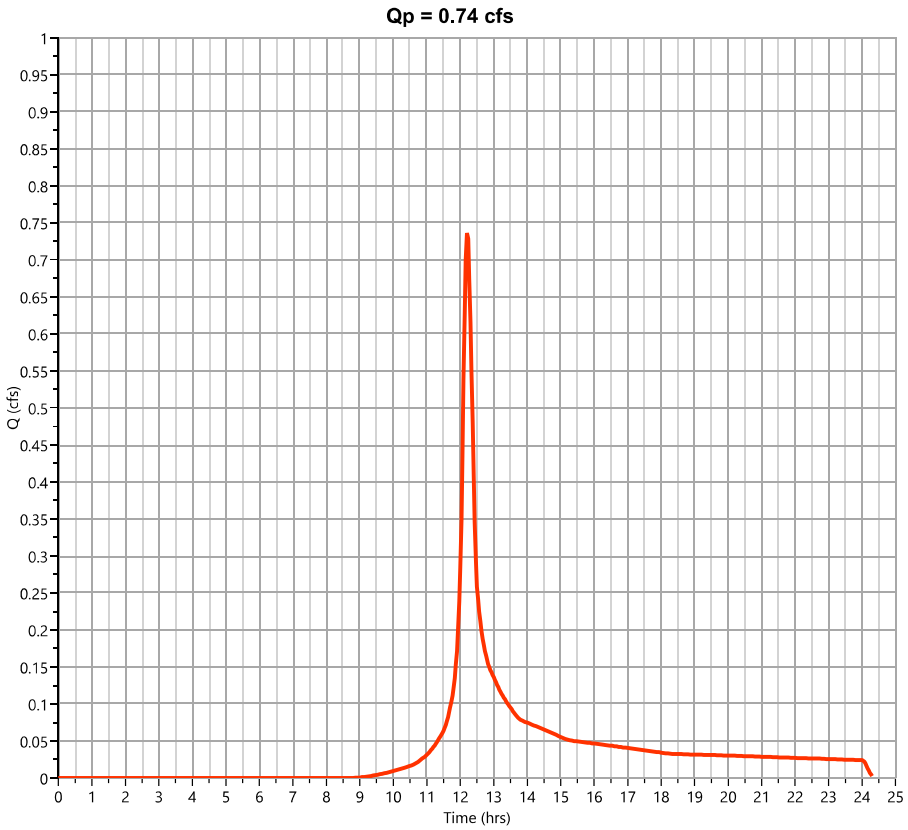
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-2 [POI-2]

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.736 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 3,336 cuft
Drainage Area	= 0.68 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

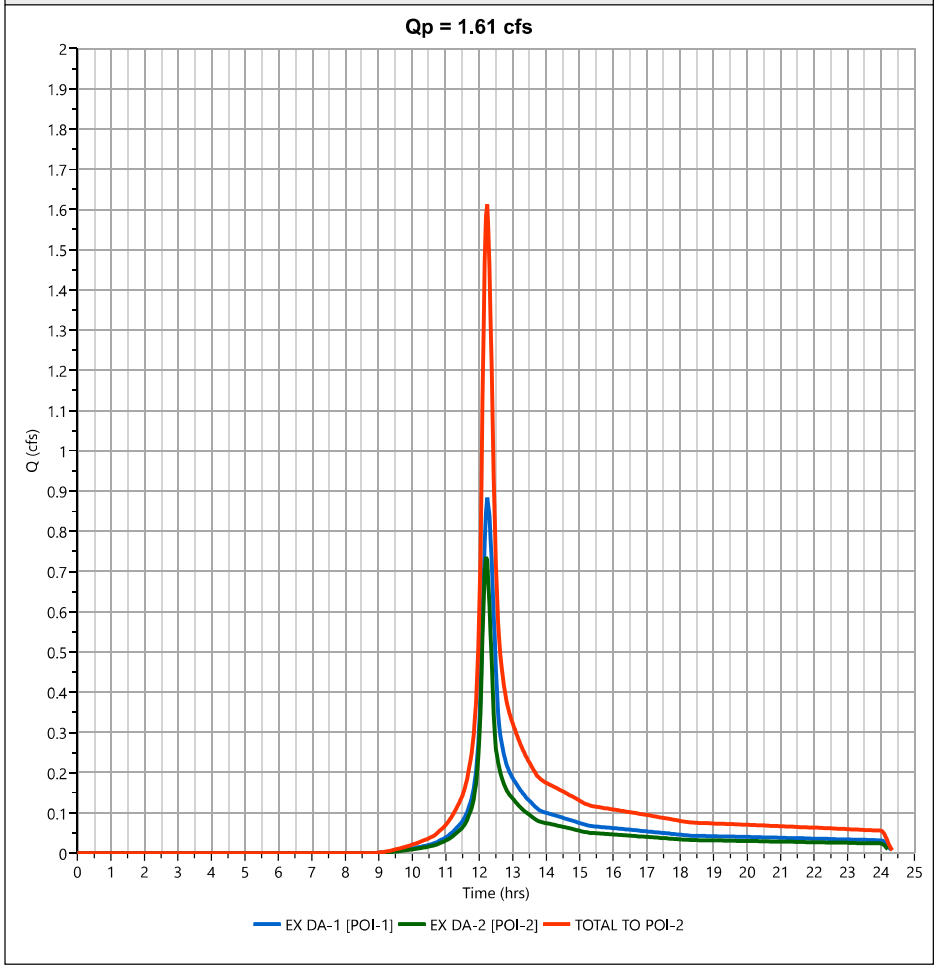
Hydrology Studio v 3.0.0.21

01-26-2022

TOTAL TO POI-2

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 1.612 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Hydrograph Volume	= 7,764 cuft
Inflow Hydrographs	= 1, 3	Total Contrib. Area	= 1.56 ac



Hydrograph Report

Project Name:

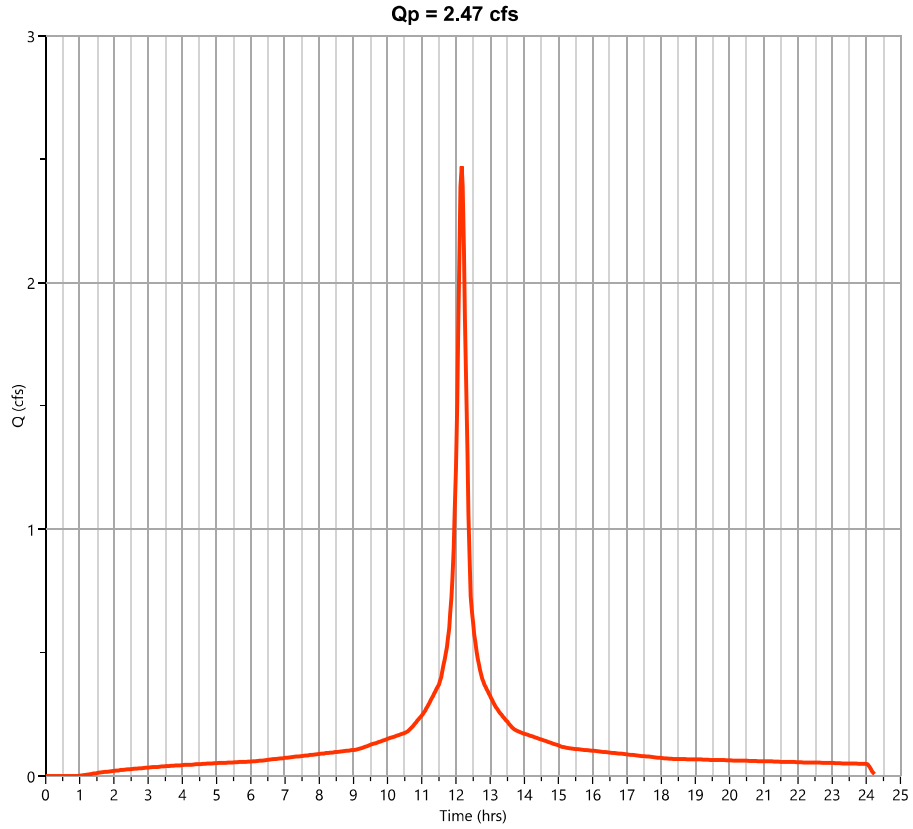
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 IMP

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.471 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 11,644 cuft
Drainage Area	= 0.97 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.6 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

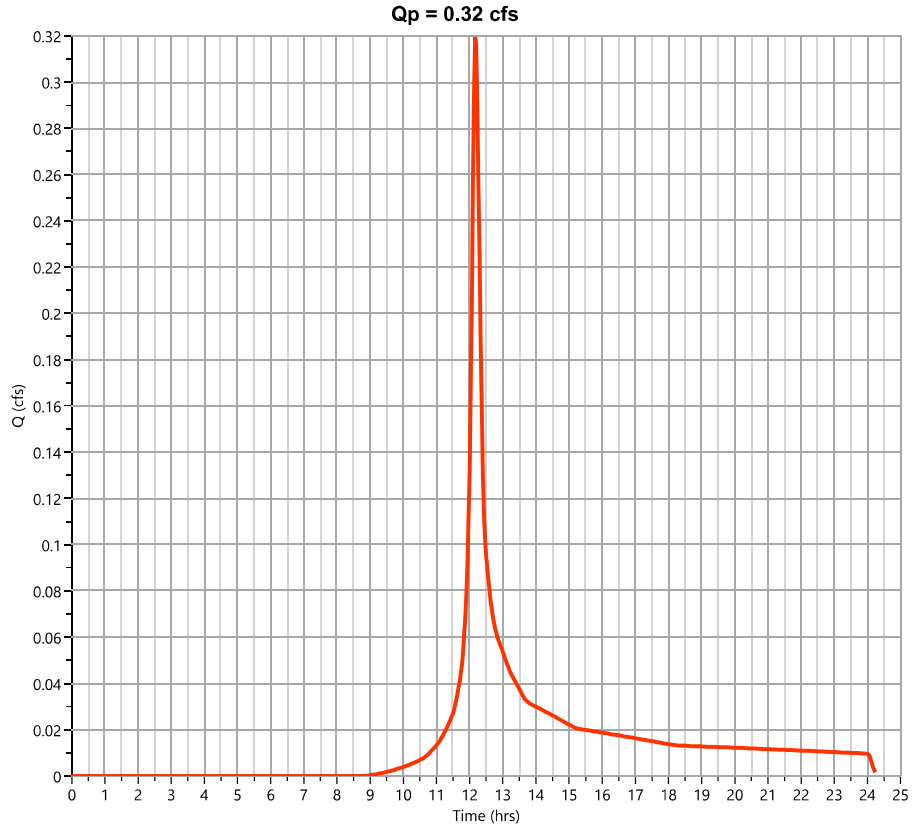
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 PER

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.319 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 1,349 cuft
Drainage Area	= 0.26 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 10.6 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

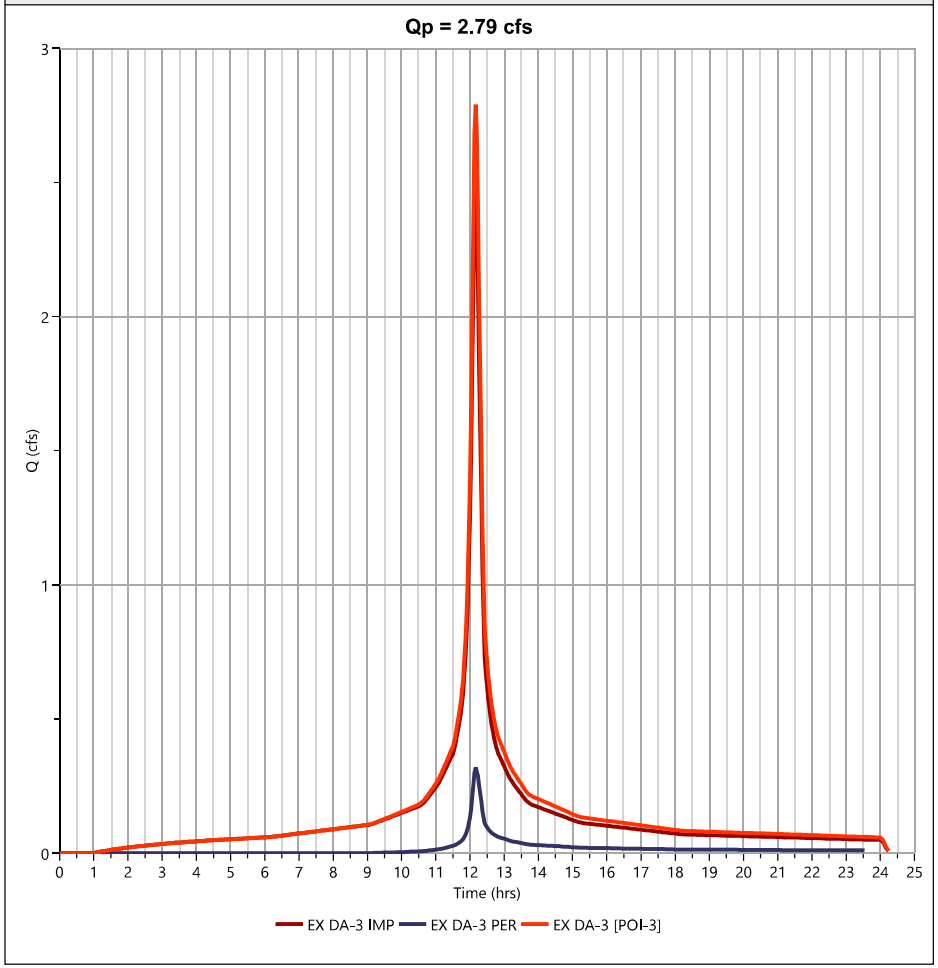
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 [POI-3]

Hyd. No. 9

Hydrograph Type	= Junction	Peak Flow	= 2.790 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 12,993 cuft
Inflow Hydrographs	= 7, 8	Total Contrib. Area	= 1.23 ac



Hydrograph Report

Project Name:

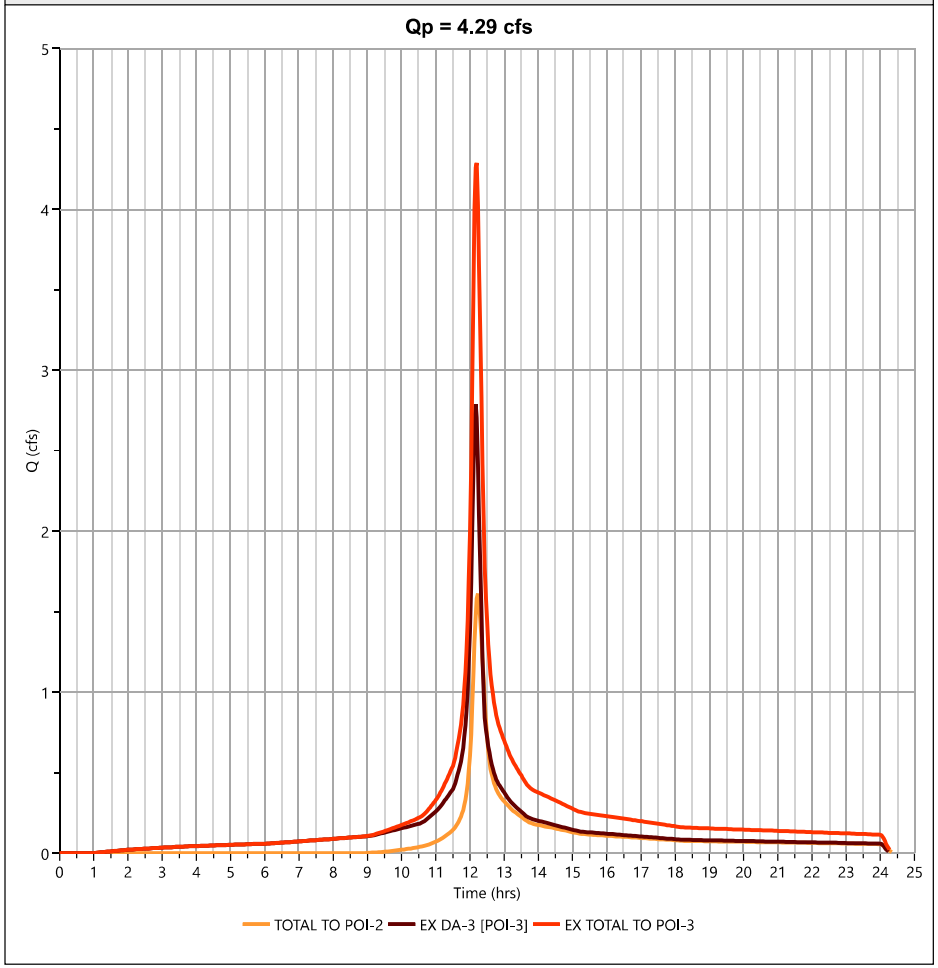
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-3

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 4.289 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 20,756 cuft
Inflow Hydrographs	= 5, 9	Total Contrib. Area	= 2.79 ac



Hydrograph Report

Project Name:

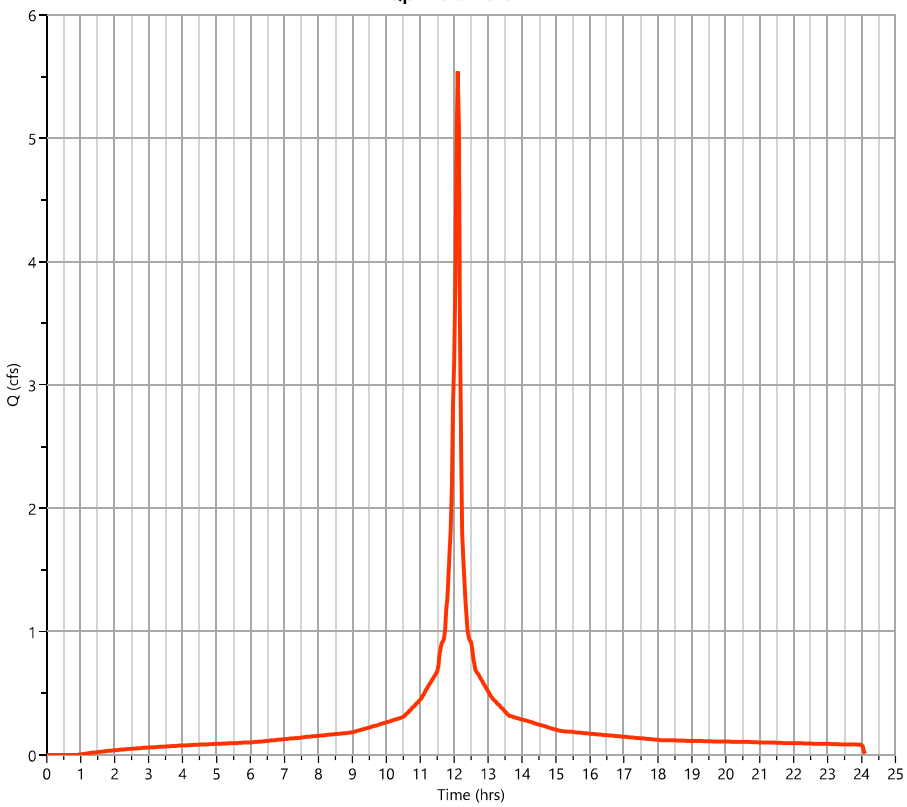
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 IMP

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.542 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 20,018 cuft
Drainage Area	= 1.834 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

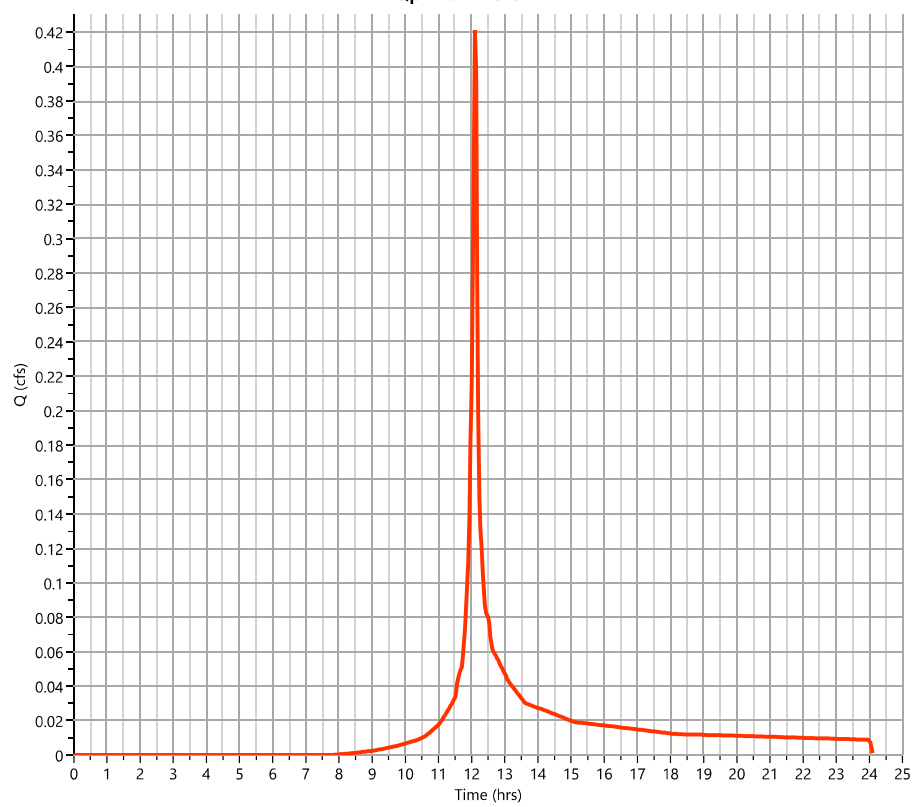
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 PER

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.421 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 1,319 cuft
Drainage Area	= 0.244 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

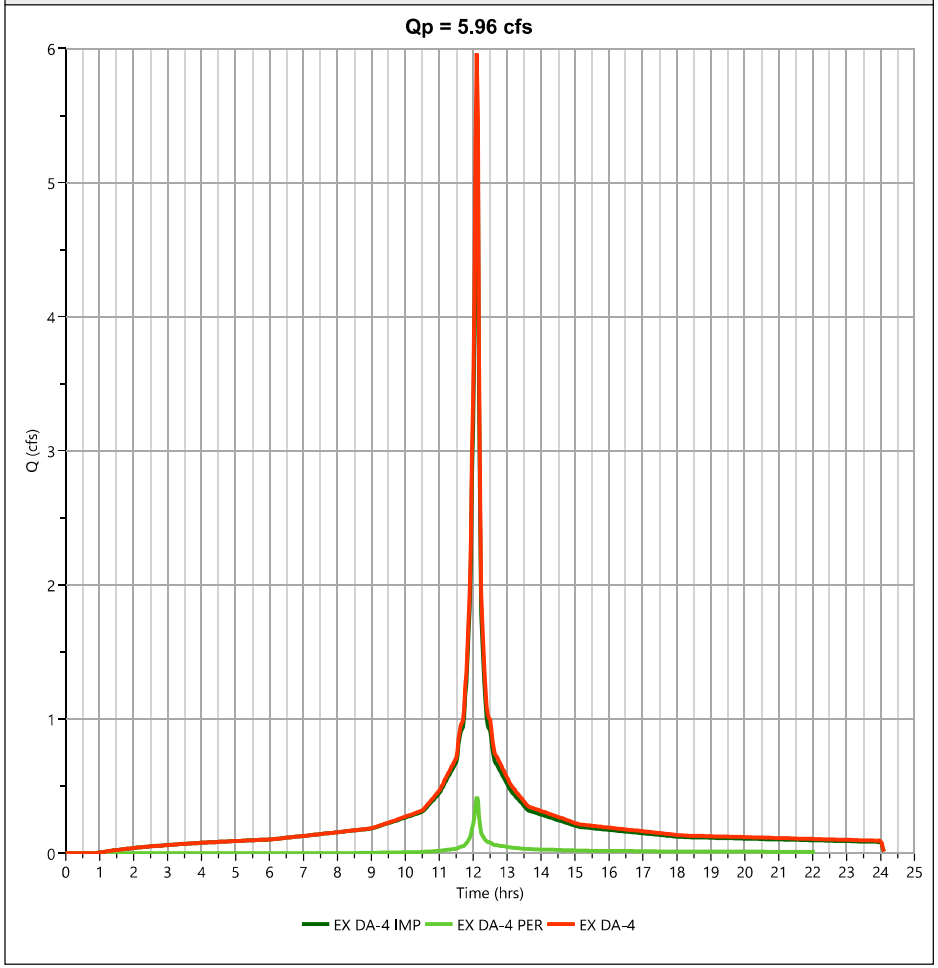
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4

Hyd. No. 15

Hydrograph Type	= Junction	Peak Flow	= 5.964 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 21,338 cuft
Inflow Hydrographs	= 13, 14	Total Contrib. Area	= 2.078 ac



Hydrograph Report

Project Name:

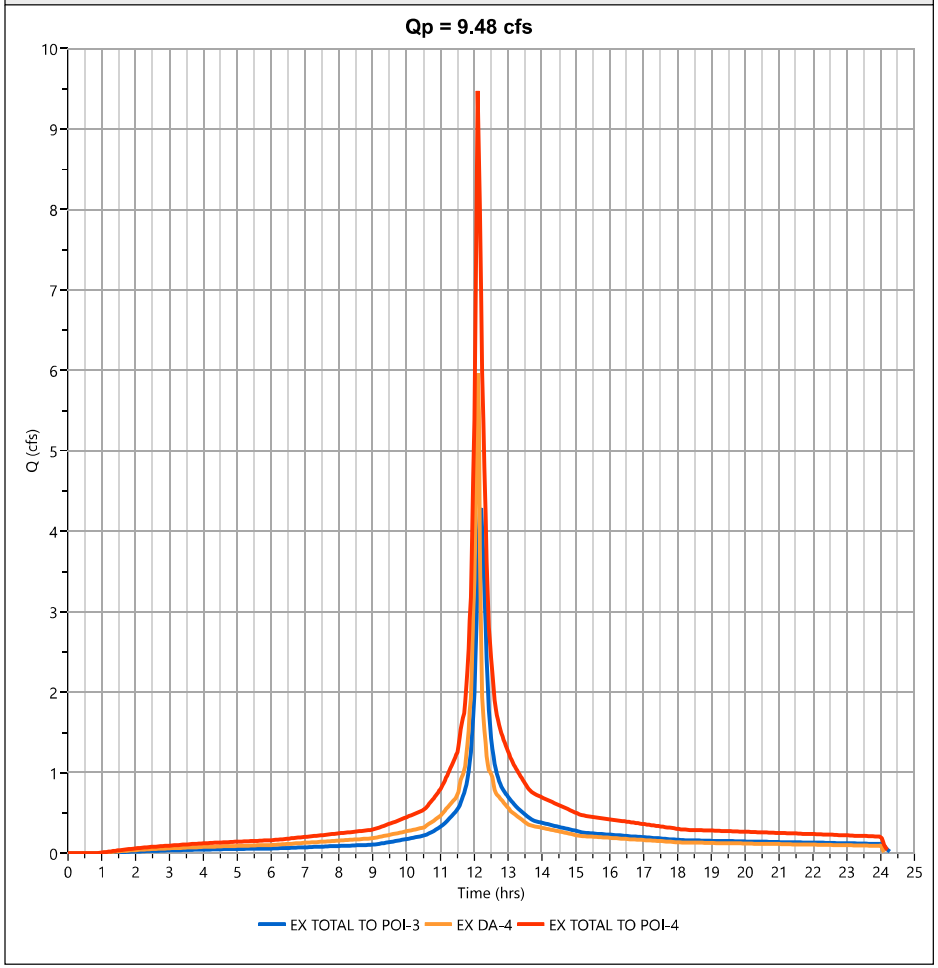
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-4

Hyd. No. 17

Hydrograph Type	= Junction	Peak Flow	= 9.476 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 42,094 cuft
Inflow Hydrographs	= 11, 15	Total Contrib. Area	= 4.868 ac



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

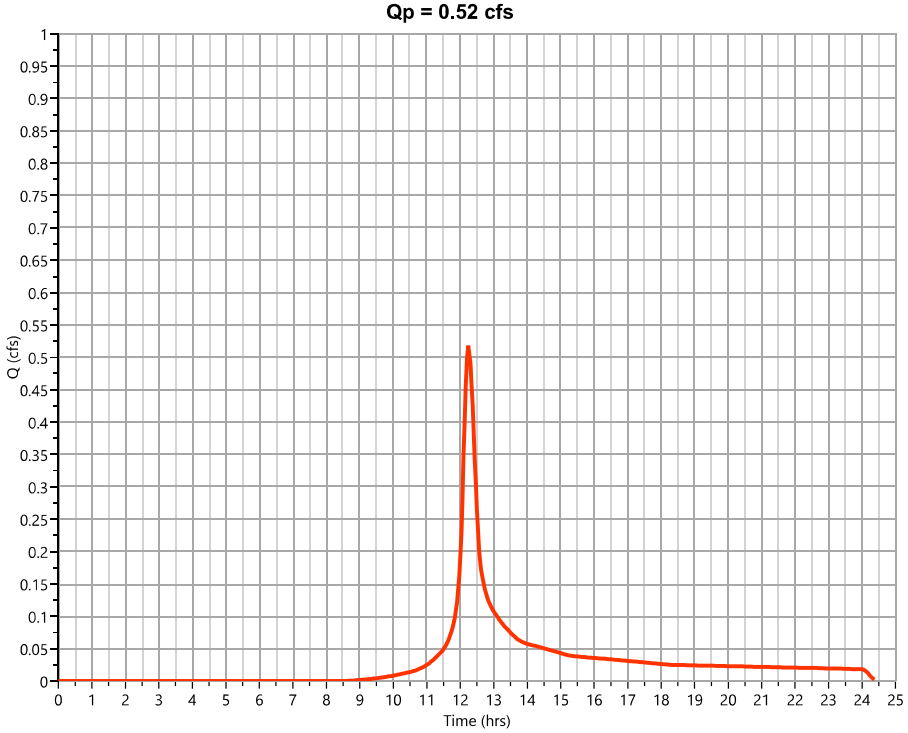
DA-1 [POI-1]

Hyd. No. 19

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.518 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 2,583 cuft
Drainage Area	= 0.49 ac	Curve Number	= 78*
Tc Method	= User	Time of Conc. (Tc)	= 18.8 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.29	77	WOODED
0.2	80	OPEN SPACE
0.49	**78**	Weighted CN Method Employed



Hydrograph Report

Project Name:

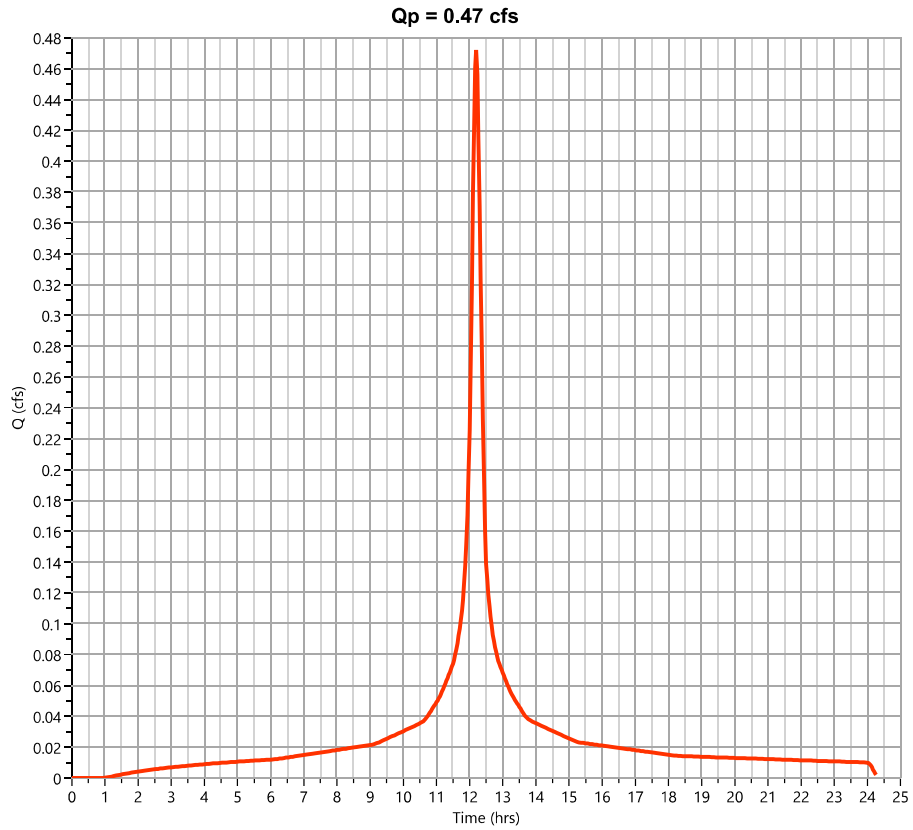
Hydrology Studio v 3.0.0.21

01-26-2022

DA-2 DET IMP

Hyd. No. 21

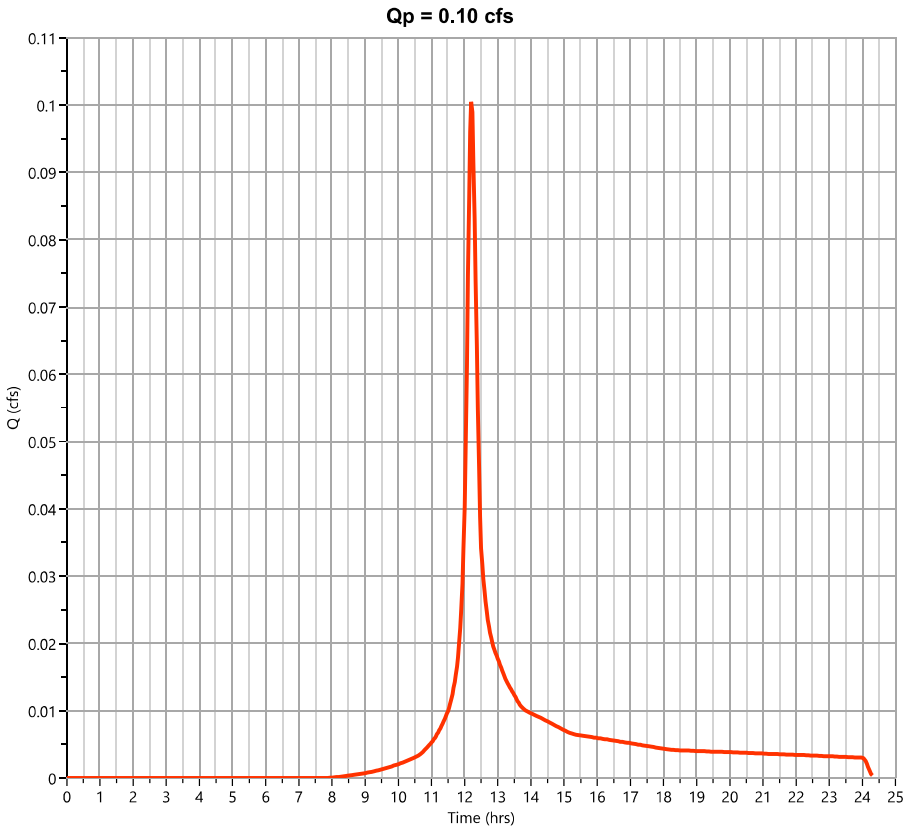
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.472 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 2,383 cuft
Drainage Area	= 0.21 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 14.6 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



DA-2 DET PER

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.100 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 450 cuft
Drainage Area	= 0.08 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 14.6 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

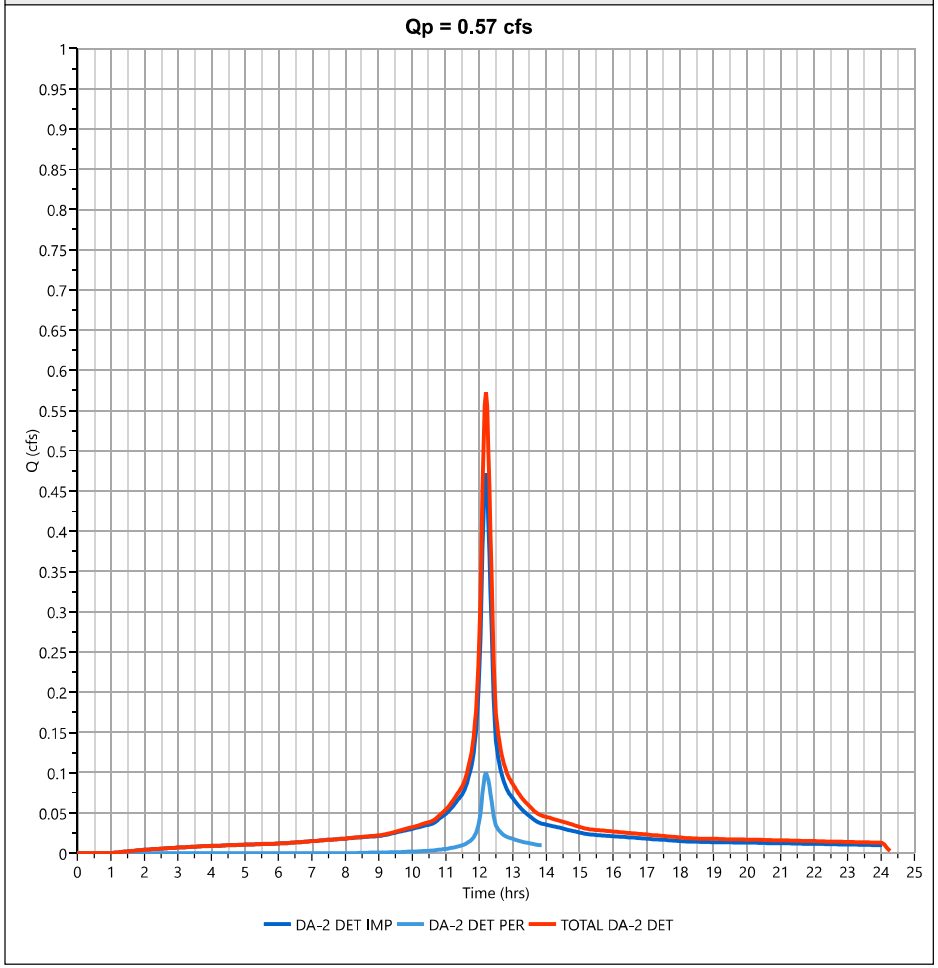


Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

TOTAL DA-2 DET

Hyd. No. 23

Hydrograph Type	= Junction	Peak Flow	= 0.572 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 2,833 cuft
Inflow Hydrographs	= 21, 22	Total Contrib. Area	= 0.29 ac



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

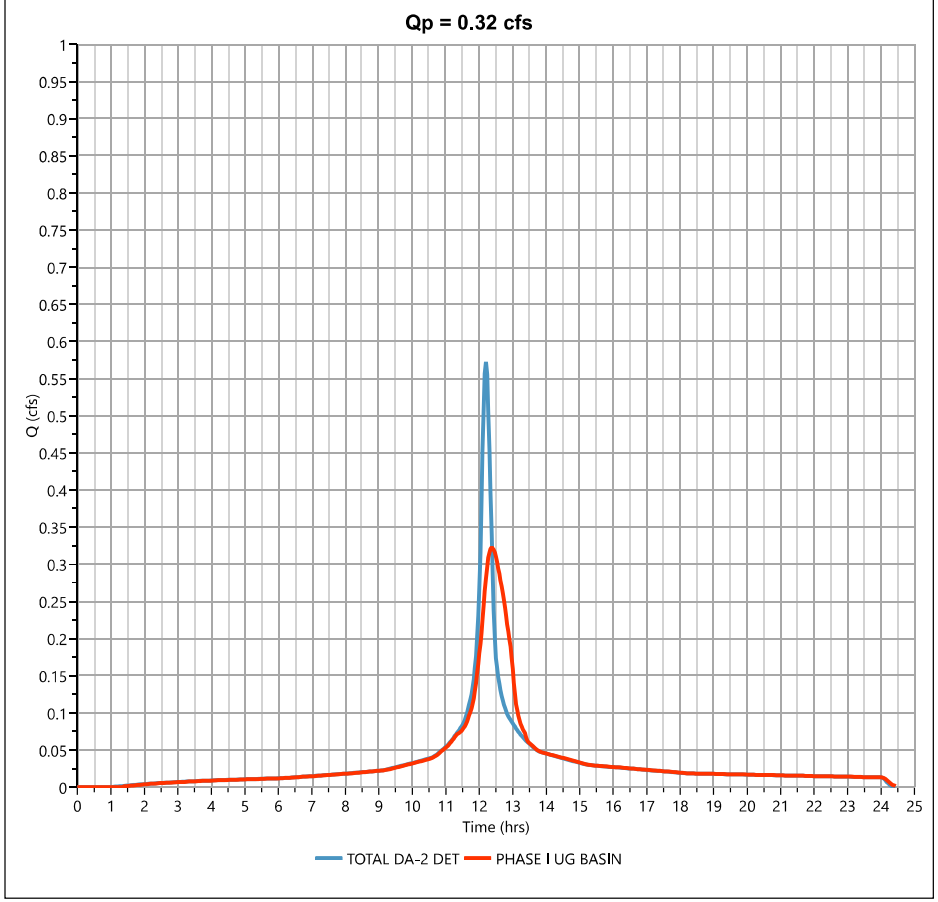
PHASE I UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 0.323 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Hydrograph Volume	= 2,832 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 474.59 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 310 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 7 min



Pond Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

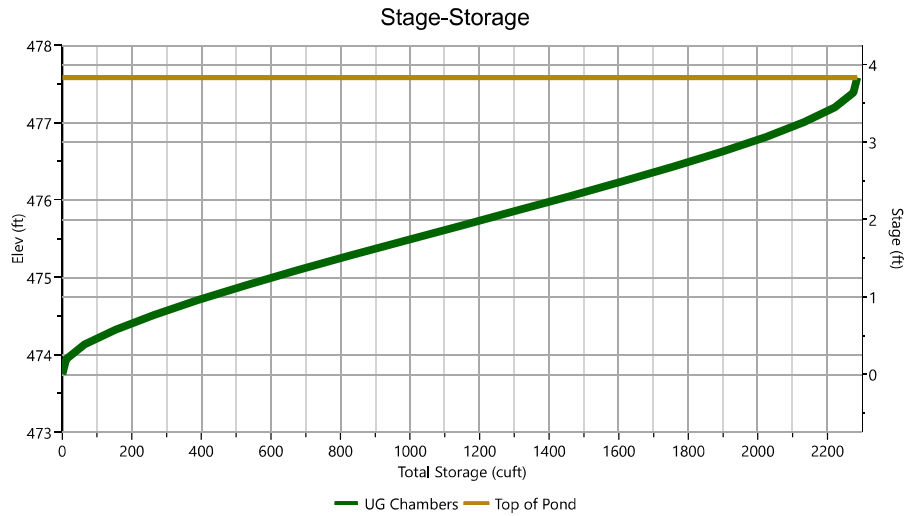
PROP UG BASIN

Stage-Storage

Underground Chambers	
Description	**Input**
Invert Elev Down, ft	473.75
Chamber Rise, ft	3.50
Chamber Shape	Circular
Chamber Span, ft	3.50
Barrel Length, ft	110.00
No. Barrels	2
Barrel Slope, %	0.30
Headers, y/n	Yes
Stone Encasement, y/n	No
Encasement Bottom Elevation, ft	0.00
Encasement Width per Chamber, ft	0.00
Encasement Depth, ft	0.00
Encasement Voids, %	100.00

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	473.75	n/a	0.000	0.000
0.19	473.94	n/a	10.9	10.9
0.38	474.13	n/a	53.0	63.9
0.57	474.32	n/a	88.9	153
0.77	474.52	n/a	111	264
0.96	474.71	n/a	126	390
1.15	474.90	n/a	138	528
1.34	475.09	n/a	147	675
1.53	475.28	n/a	153	828
1.72	475.47	n/a	157	985
1.92	475.67	n/a	158	1,143
2.11	475.86	n/a	158	1,301
2.30	476.05	n/a	157	1,458
2.49	476.24	n/a	153	1,611
2.68	476.43	n/a	147	1,758
2.87	476.62	n/a	138	1,896
3.06	476.81	n/a	126	2,022
3.26	477.01	n/a	111	2,133
3.45	477.20	n/a	88.8	2,222
3.64	477.39	n/a	52.9	2,275
3.83	477.58	n/a	10.9	2,285



Pond Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PROP UG BASIN

Stage-Discharge

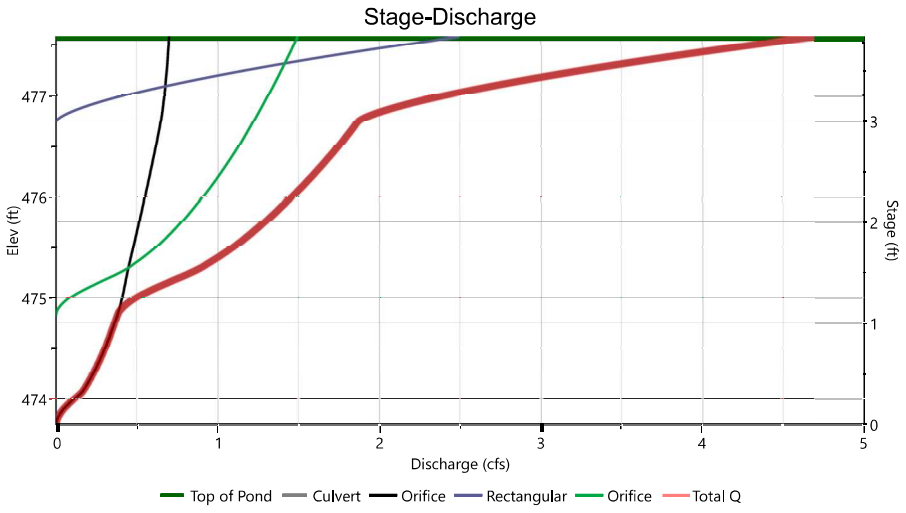
Culvert / Orifices	Culvert	Orifices		
		1*	2*	3
Rise, in	18	4	6	
Span, in	18	4	6	
No. Barrels	1	1	1	
Invert Elevation, ft	473.75	473.75	474.83	
Orifice Coefficient, Co	0.60	0.60	0.60	
Length, ft	65			
Barrel Slope, %	2			
N-Value, n	0.012			

Weirs	Riser*	Weirs		
		1*	2	3
Shape / Type		Rectangular		
Crest Elevation, ft		476.75		
Crest Length, ft		1		
Angle, deg				
Weir Coefficient, Cw		3.3		

Perforated Riser	
Hole Diameter, in	
No. holes	
Invert Elevation, ft	
Height, ft	
Orifice Coefficient, Co	

Ancillary	
Exfiltration, in/hr	

*Routes through Culvert.



Pond Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PROP UG BASIN

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	473.75	0.000	0.000	0.000	0.000			0.000						0.000
0.19	473.94	10.9	0.072 ic	0.072	0.000			0.000						0.072
0.38	474.13	63.9	0.187 ic	0.187	0.000			0.000						0.187
0.57	474.32	153	0.252 ic	0.252	0.000			0.000						0.252
0.77	474.52	264	0.306 ic	0.306	0.000			0.000						0.306
0.96	474.71	390	0.352 ic	0.352	0.000			0.000						0.352
1.15	474.90	528	0.408 ic	0.393	0.015			0.000						0.408
1.34	475.09	675	0.601 ic	0.421	0.181			0.000						0.601
1.53	475.28	828	0.873 ic	0.445	0.428			0.000						0.873
1.72	475.47	985	1.066 ic	0.473	0.593			0.000						1.066
1.92	475.67	1,143	1.224 ic	0.500	0.723			0.000						1.224
2.11	475.86	1,301	1.362 ic	0.529	0.833			0.000						1.362
2.30	476.05	1,458	1.486 ic	0.556	0.930			0.000						1.486
2.49	476.24	1,611	1.600 ic	0.582	1.018			0.000						1.600
2.68	476.43	1,758	1.707 ic	0.608	1.099			0.000						1.707
2.87	476.62	1,896	1.806 ic	0.632	1.174			0.000						1.806
3.06	476.81	2,022	1.953 ic	0.655	1.245			0.053						1.953
3.26	477.01	2,133	2.408 ic	0.670	1.312			0.426						2.408
3.45	477.20	2,222	3.043 ic	0.681	1.375			0.986						3.043
3.64	477.39	2,275	3.811 ic	0.691	1.436			1.684						3.811
3.83	477.58	2,285	4.689 ic	0.699	1.495			2.495						4.689

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

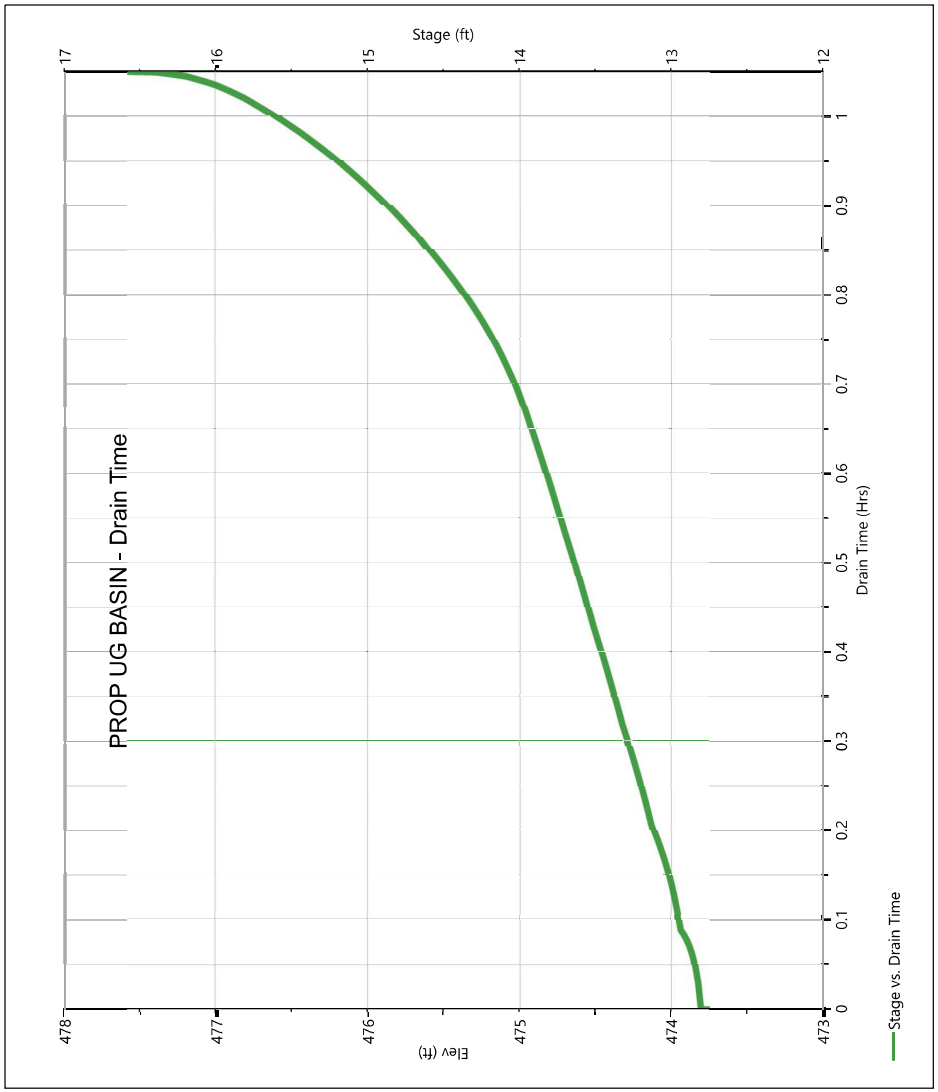
Pond Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PROP UG BASIN **Pond Drawdown**



Hydrograph Report

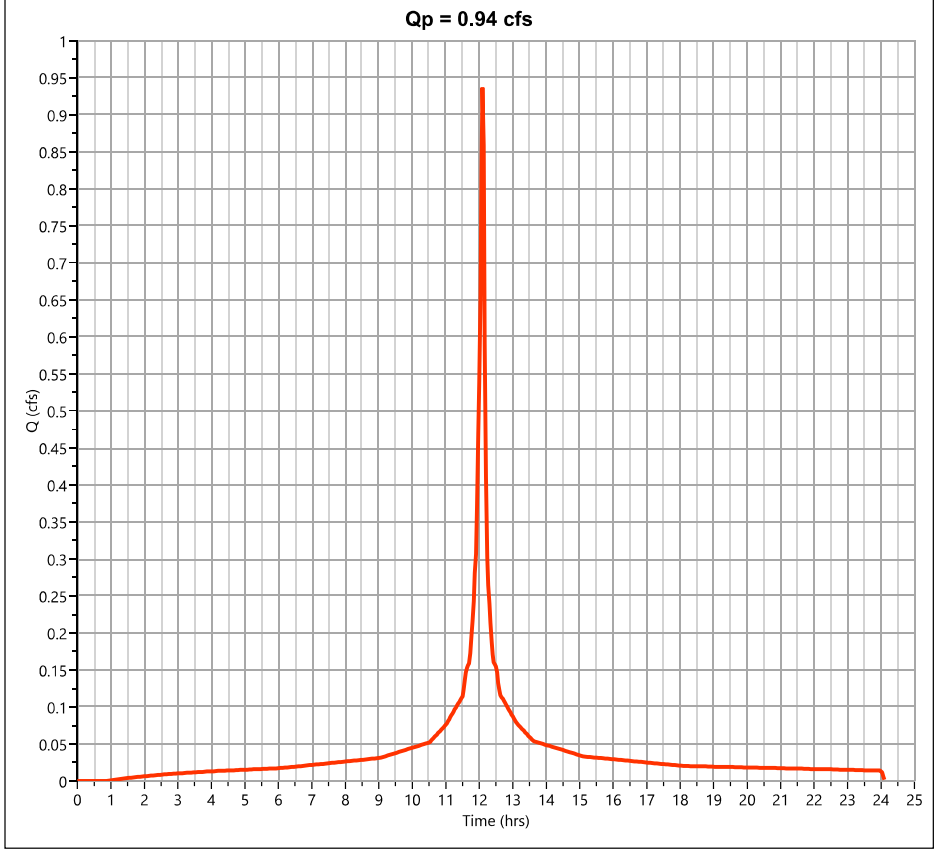
Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 UNDET IMP **Hyd. No. 26**

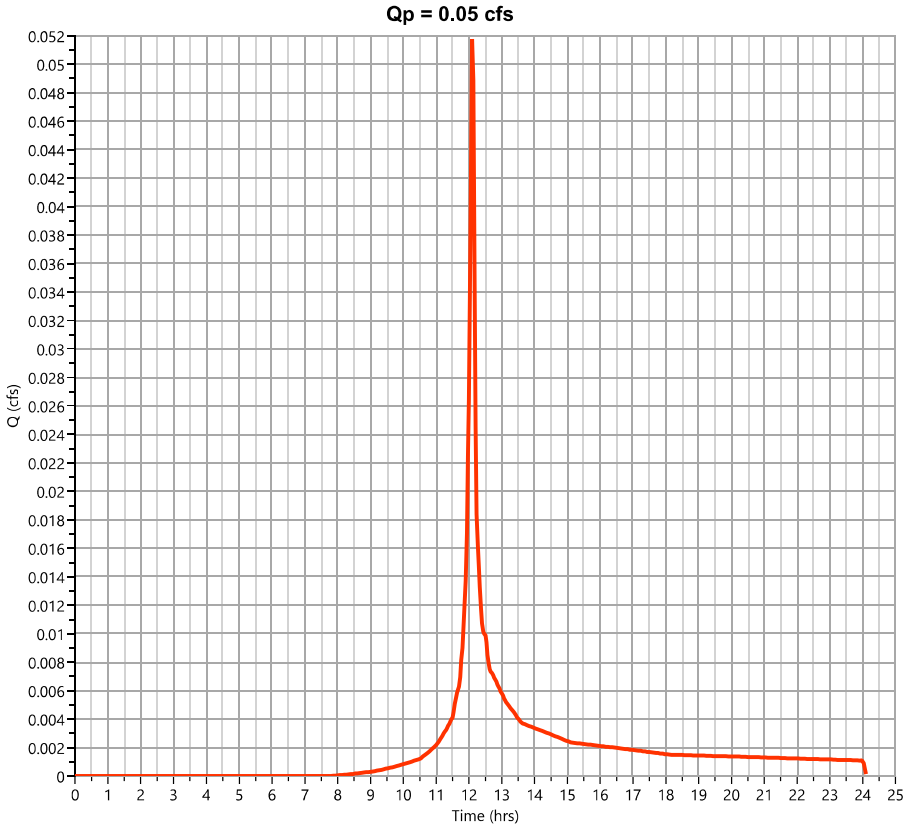
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.937 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 3,383 cuft
Drainage Area	= 0.31 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



DA-3 UNDET PER

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.052 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 162 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

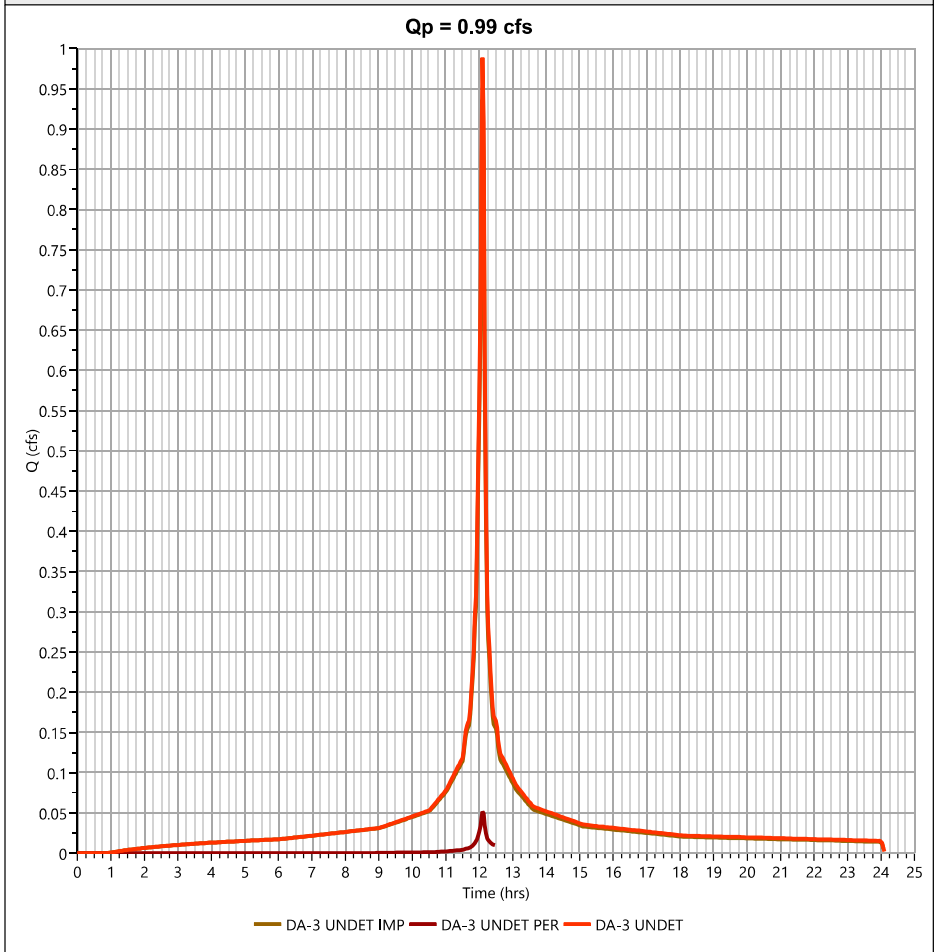


Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

DA-3 UNDET

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 0.988 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 3,545 cuft
Inflow Hydrographs	= 26, 27	Total Contrib. Area	= 0.34 ac



Hydrograph Report

Project Name:

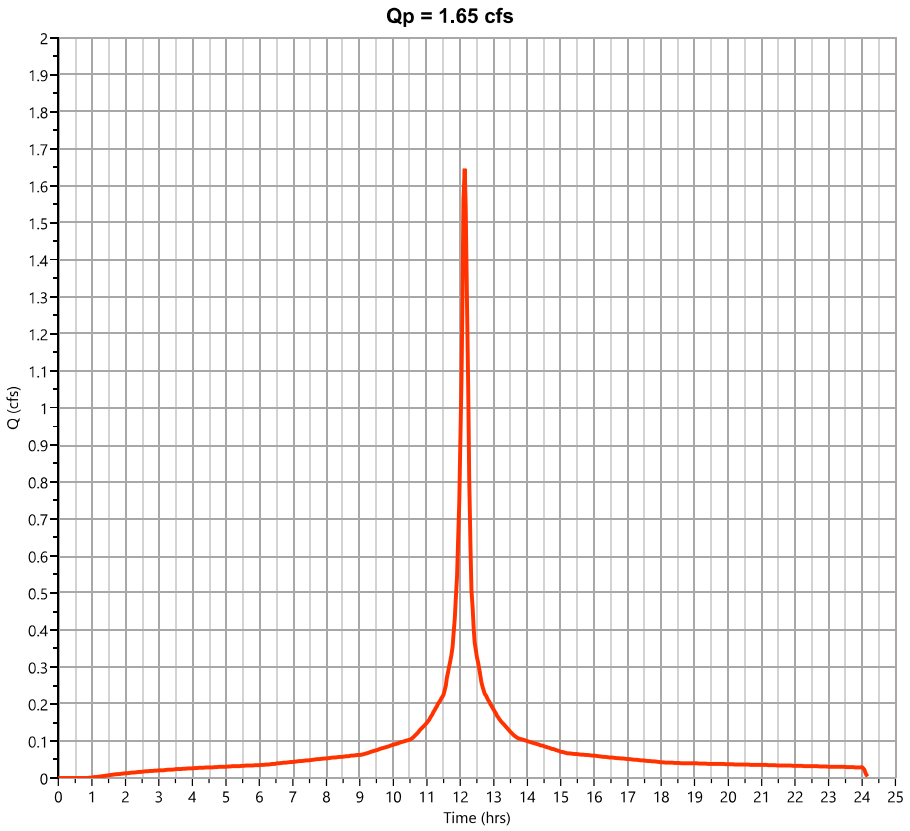
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3A DET IMP

Hyd. No. 30

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.646 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 6,868 cuft
Drainage Area	= 0.59 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 7.7 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

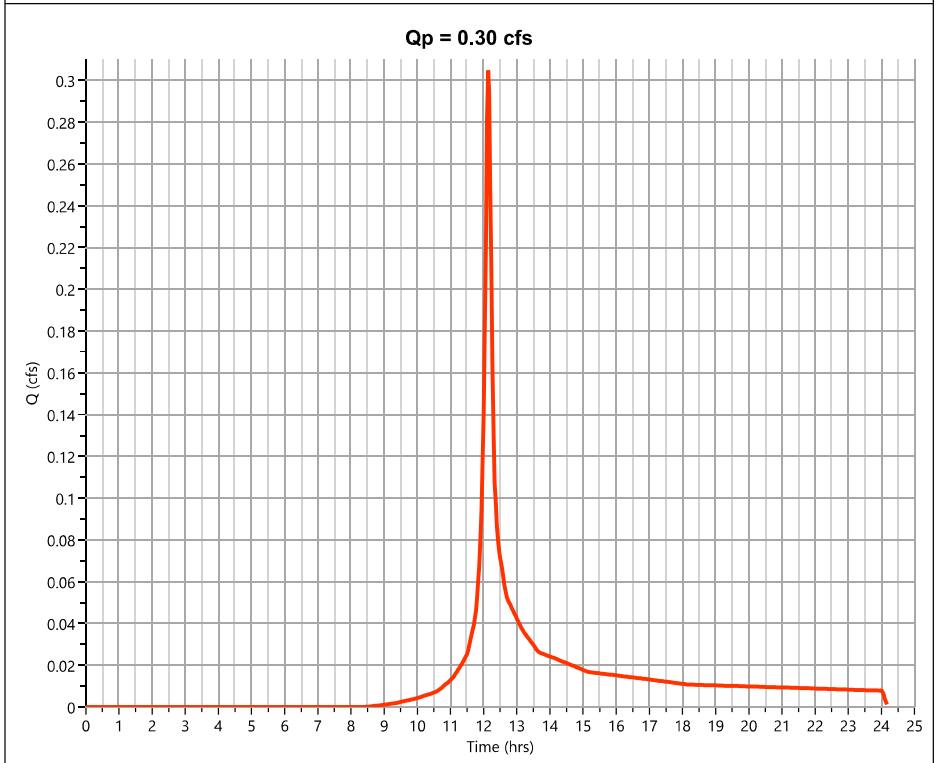
DA-3A DET PER

Hyd. No. 31

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.305 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 1,122 cuft
Drainage Area	= 0.21 ac	Curve Number	= 78.29*
Tc Method	= User	Time of Conc. (Tc)	= 7.7 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0,09	80	OPEN SPACE
0.12	77	WOODED
0.21	**78**	Weighted CN Method Employed



Hydrograph Report

Project Name:

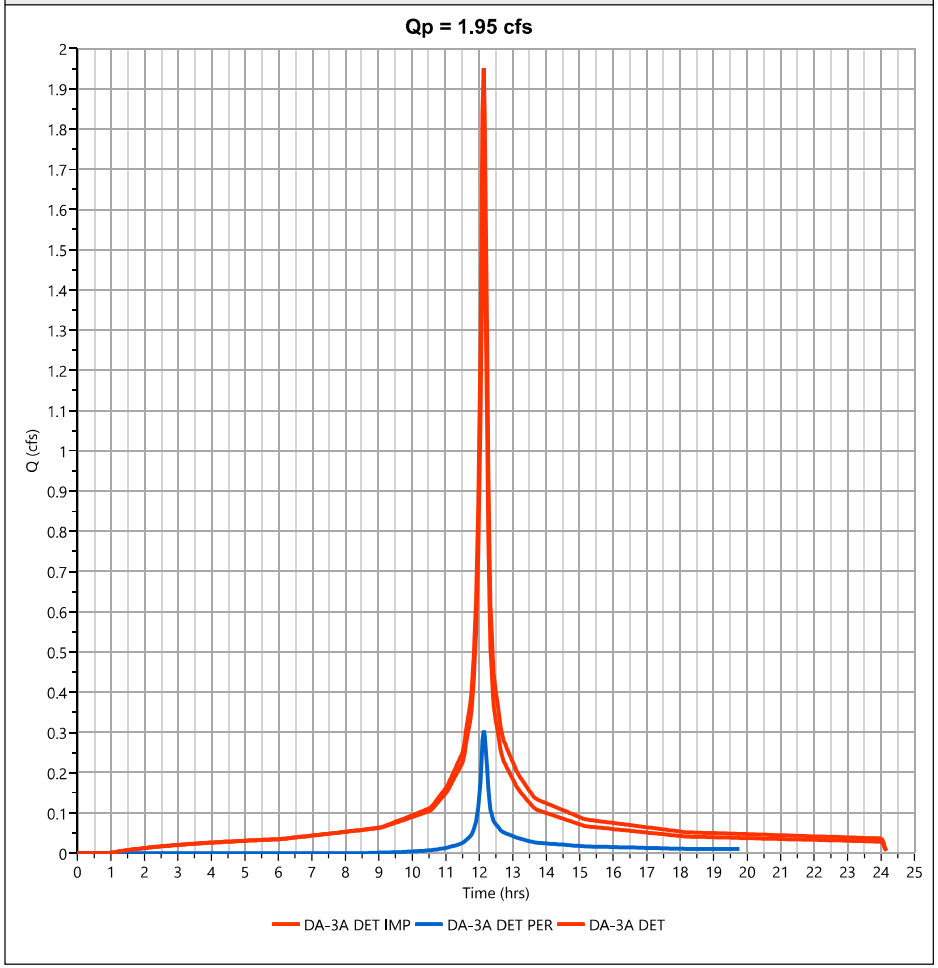
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3A DET

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 1.951 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 7,989 cuft
Inflow Hydrographs	= 30, 31	Total Contrib. Area	= 0.8 ac



Hydrograph Report

Project Name:

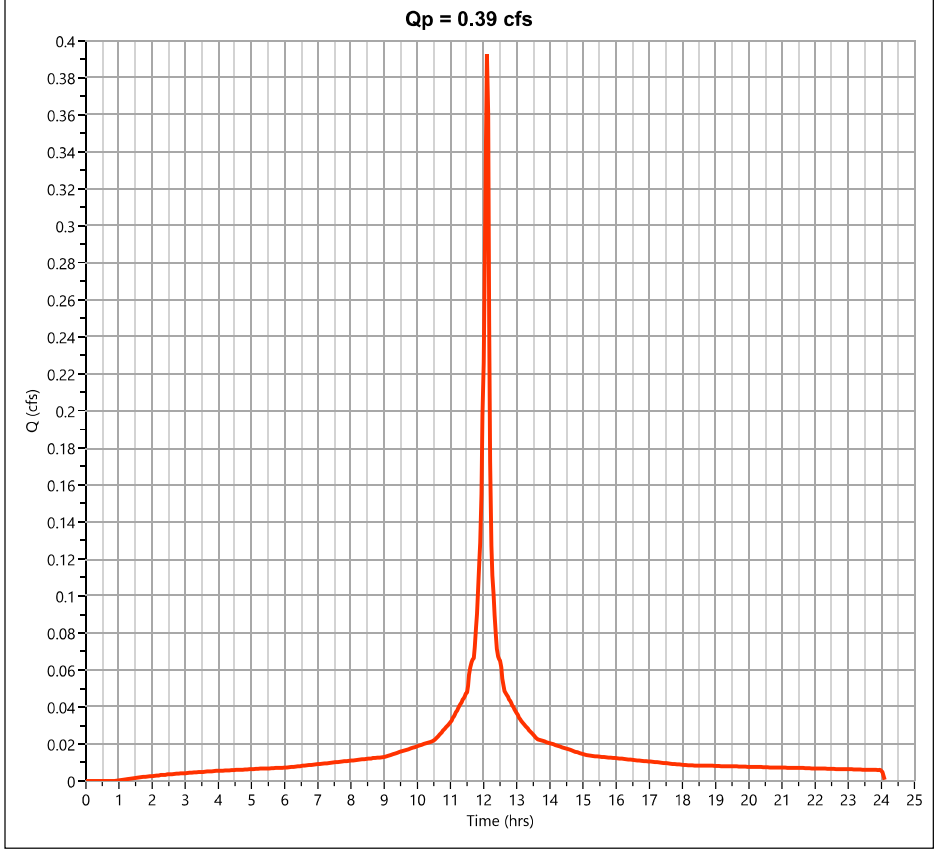
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3B DET IMP

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.393 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 1,419 cuft
Drainage Area	= 0.13 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

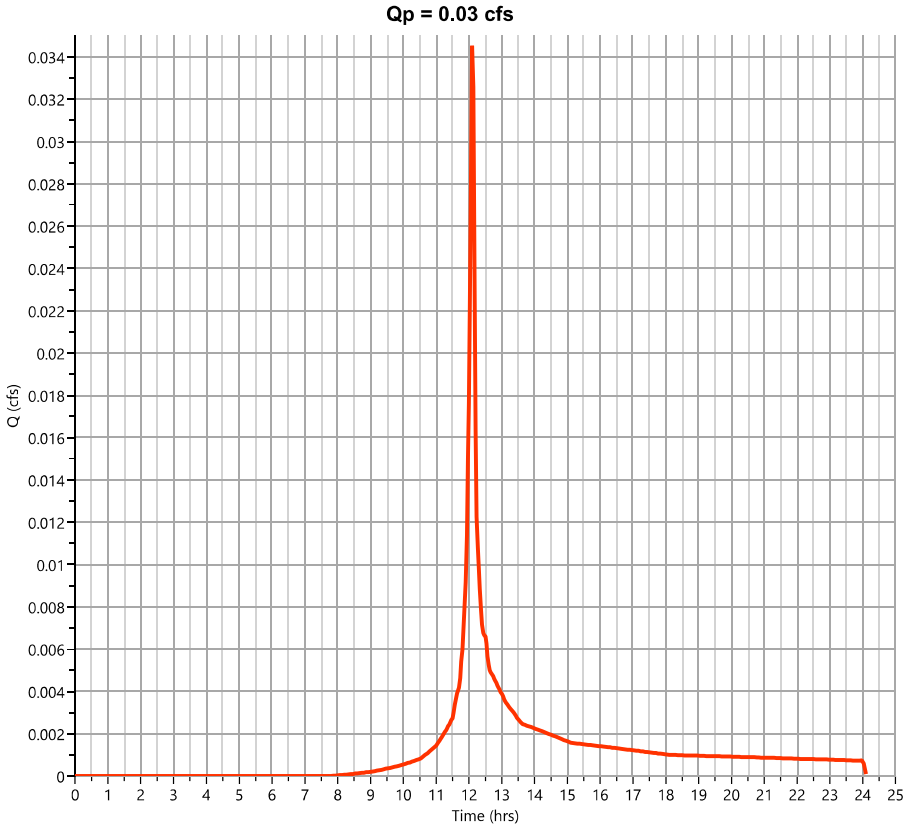
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3B DET PER

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.035 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 108 cuft
Drainage Area	= 0.02 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

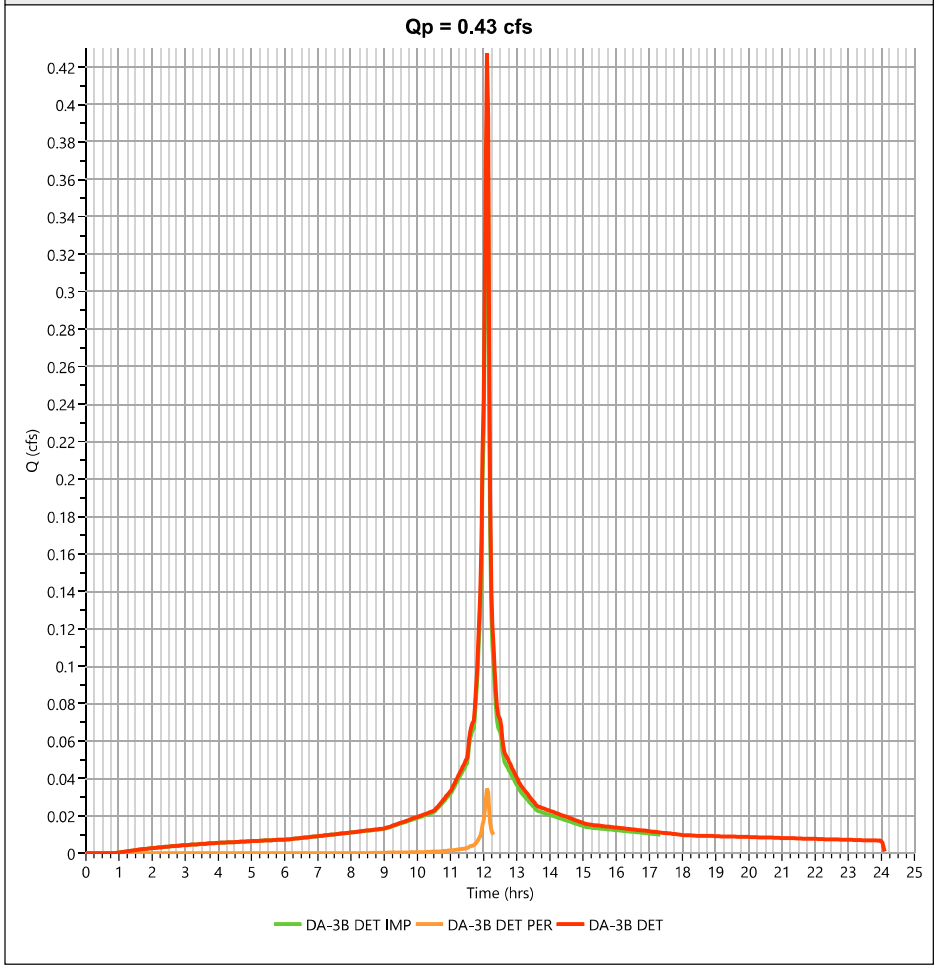
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3B DET

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 0.427 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 1,527 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 0.15 ac



Hydrograph Report

Project Name:

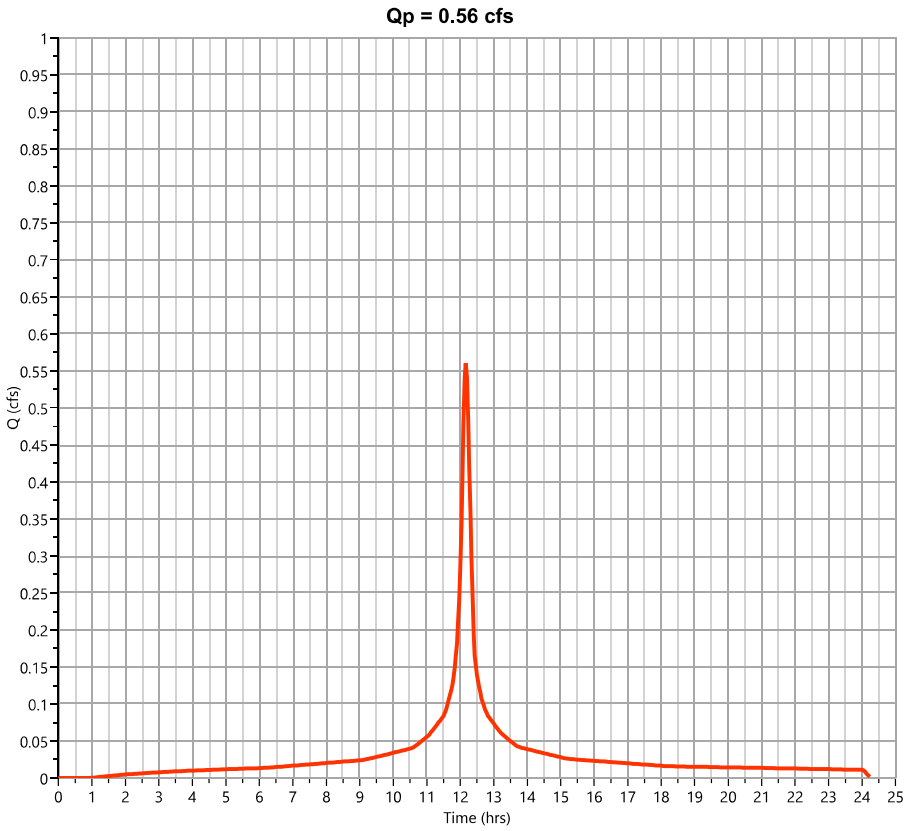
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3C DET IMP

Hyd. No. 38

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.560 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 2,641 cuft
Drainage Area	= 0.22 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

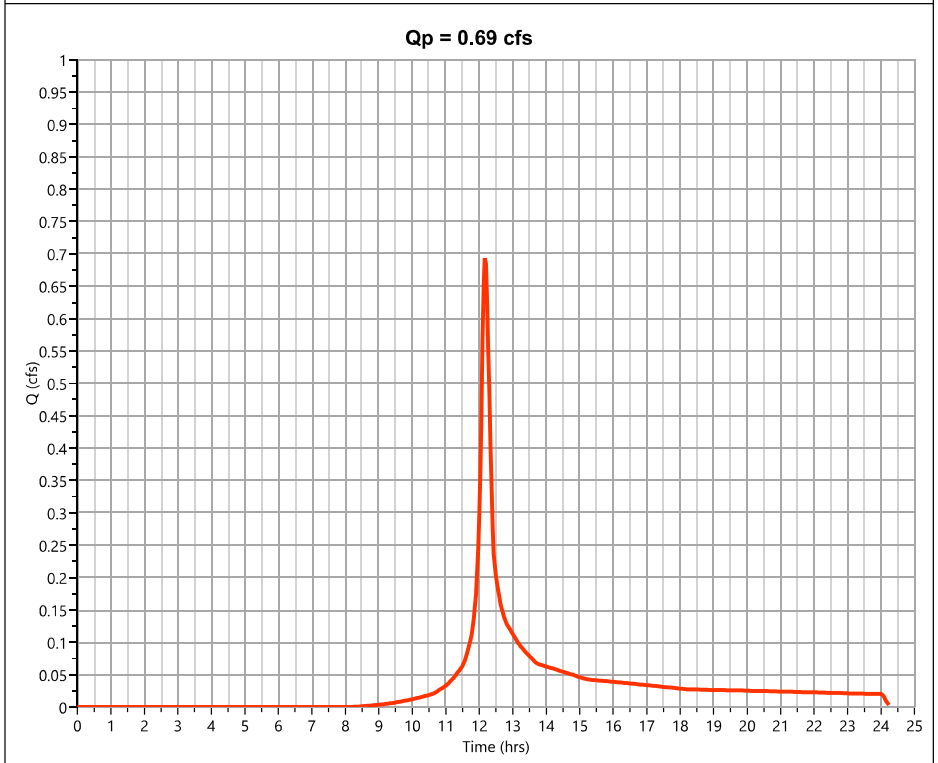
DA-3C DET PER

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.693 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 2,901 cuft
Drainage Area	= 0.51 ac	Curve Number	= 79*
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.17	77	WOODED
0.34	80	OPEN SPACE
0.51	**79**	Weighted CN Method Employed



Hydrograph Report

Project Name:

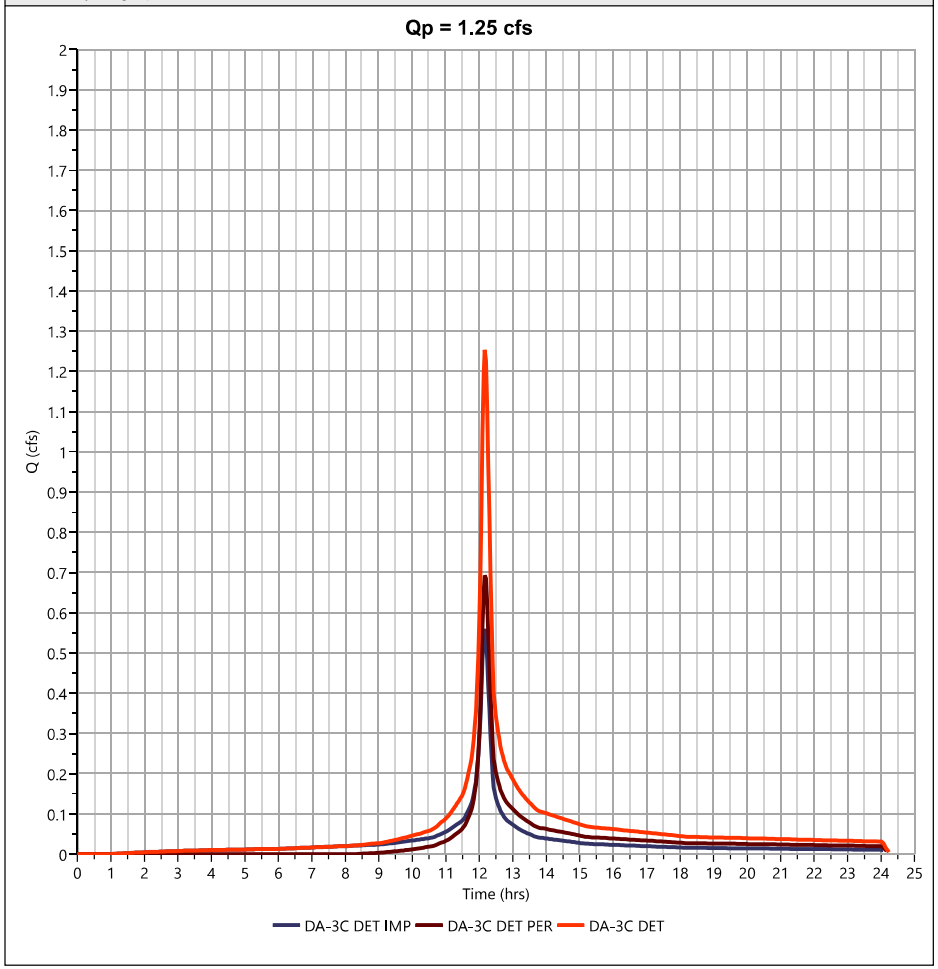
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3C DET

Hyd. No. 40

Hydrograph Type	= Junction	Peak Flow	= 1.253 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 5,542 cuft
Inflow Hydrographs	= 38, 39	Total Contrib. Area	= 0.73 ac



Hydrograph Report

Project Name:

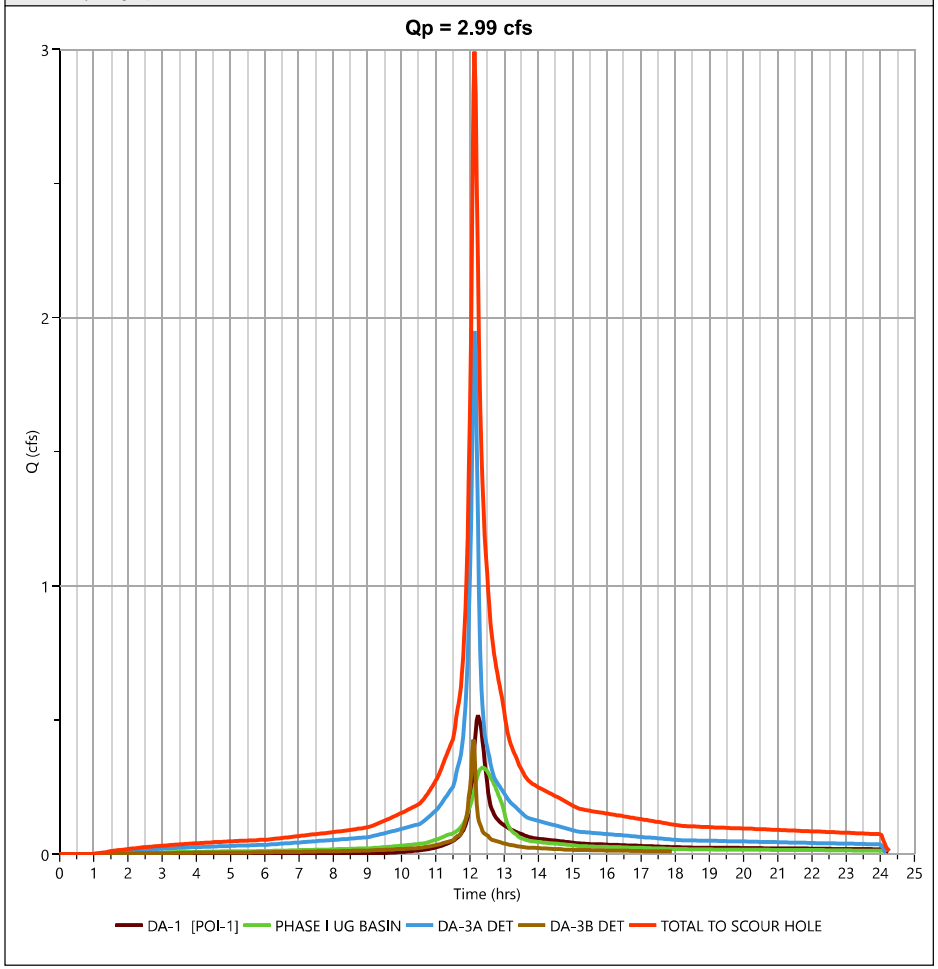
Hydrology Studio v 3.0.0.21

01-26-2022

TOTAL TO SCOUR HOLE

Hyd. No. 42

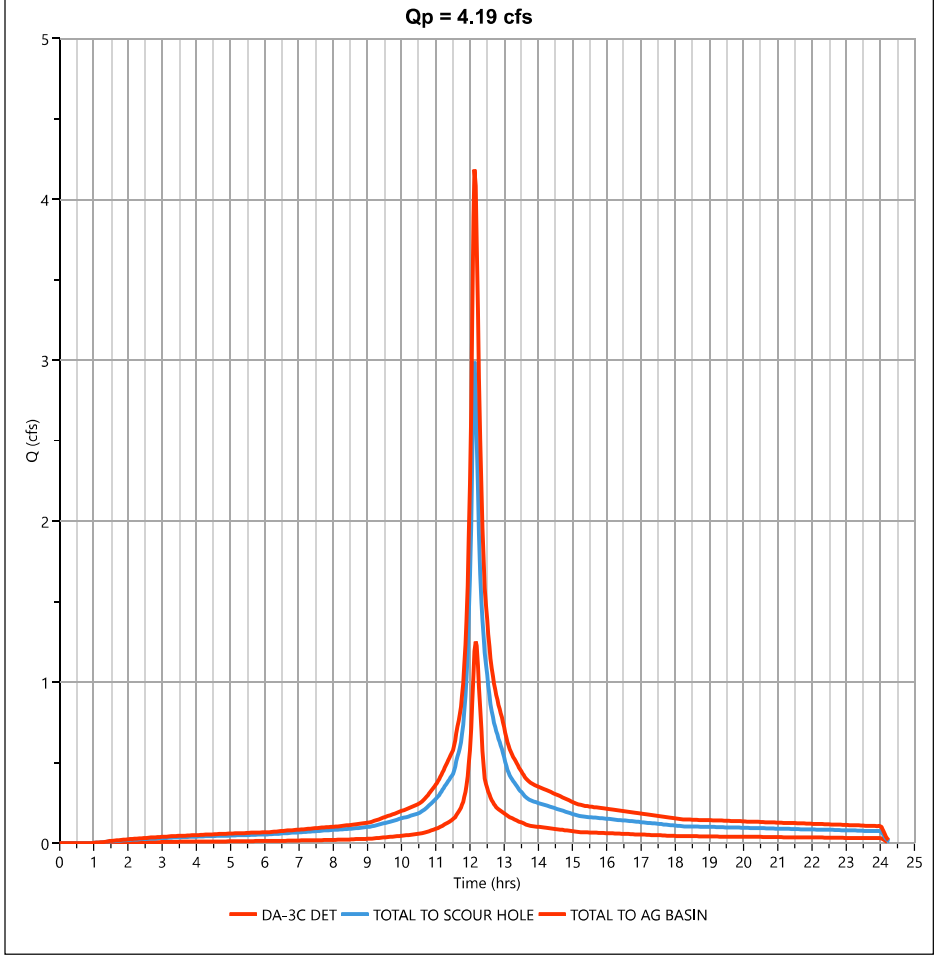
Hydrograph Type	= Junction	Peak Flow	= 2.992 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 14,931 cuft
Inflow Hydrographs	= 19, 24, 32, 36	Total Contrib. Area	= 1.44 ac



TOTAL TO AG BASIN

Hyd. No. 44

Hydrograph Type	= Junction	Peak Flow	= 4.186 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 20,473 cuft
Inflow Hydrographs	= 40, 42	Total Contrib. Area	= 2.17 ac



Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

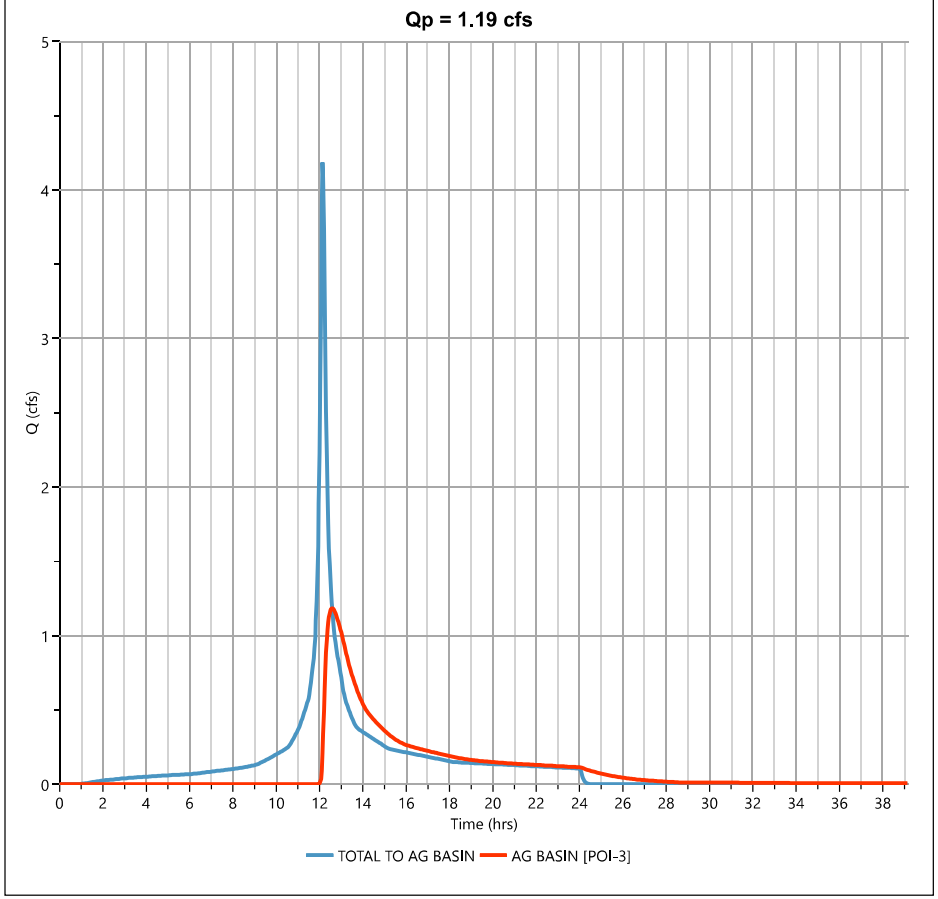
AG BASIN [POI-3]

Hyd. No. 45

Hydrograph Type	= Pond Route	Peak Flow	= 1.186 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.57 hrs
Time Interval	= 2 min	Hydrograph Volume	= 14,599 cuft
Inflow Hydrograph	= 44 - TOTAL TO AG BASIN	Max. Elevation	= 462.52 ft
Pond Name	= AG BASIN	Max. Storage	= 9,847 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.85 hrs



Pond Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

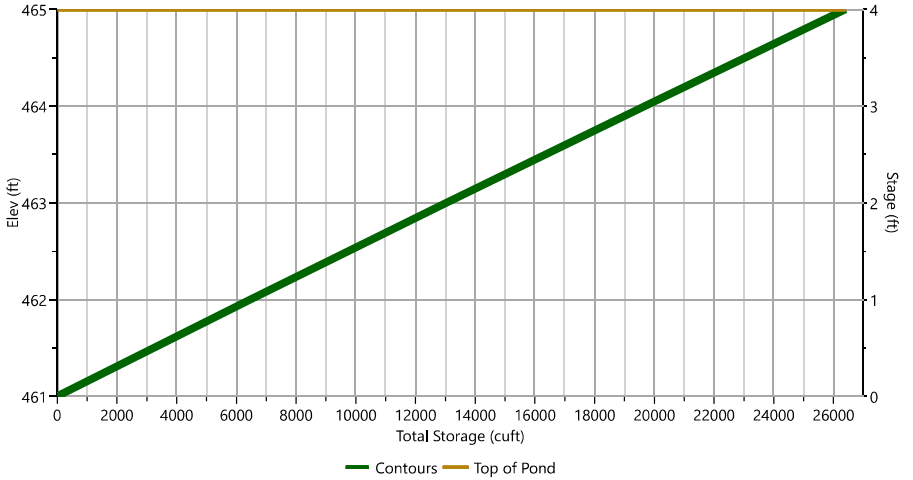
AG BASIN

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	461.00
Voids (%)	100.00
Volume Calc	None

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	461.00	6,414	0.000	0.000
1.00	462.00	6,514	6,464	6,464
2.00	463.00	6,614	6,564	13,028
3.00	464.00	6,714	6,664	19,692
4.00	465.00	6,714	6,714	26,406



Pond Report

Project Name:

Hydrology Studio v 3.0.0.21

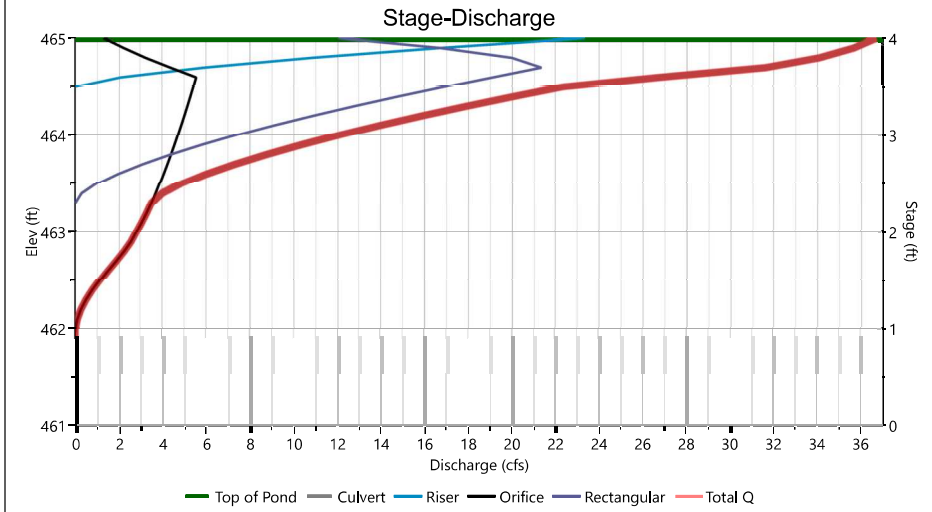
01-26-2022

AG BASIN

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Orifice Plate	
		1*	2	3		
Rise, in	24	12			Orifice Dia, in	
Span, in	24	12			No. Orifices	
No. Barrels	1	1			Invert Elevation, ft	
Invert Elevation, ft	458.00	461.95			Height, ft	
Orifice Coefficient, Co	0.60	0.60			Orifice Coefficient, Co	
Length, ft	15					
Barrel Slope, %	1					
N-Value, n	0.012					
Weirs	**Riser***	**Weirs**			**Ancillary**	
		1*	2	3		
Shape / Type	Box	Rectangular			Exfiltration, in/hr	
Crest Elevation, ft	464.5	463.32				
Crest Length, ft	20	4				
Angle, deg						
Weir Coefficient, Cw	3.3	3.3				

**Routes through Culvert.*



Pond Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

AG BASIN

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	461.00	0.000	0.000	0.000			0.000	0.000						0.000
1.00	462.00	6,464	0.012 oc	0.012			0.000	0.000						0.012
2.00	463.00	13,028	2.804 oc	2.804			0.000	0.000						2.804
3.00	464.00	19,692	12.11 oc	4.708			0.000	7.402						12.11
4.00	465.00	26,406	36.67 ic	1.304			23.33	12.04 s						36.67

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

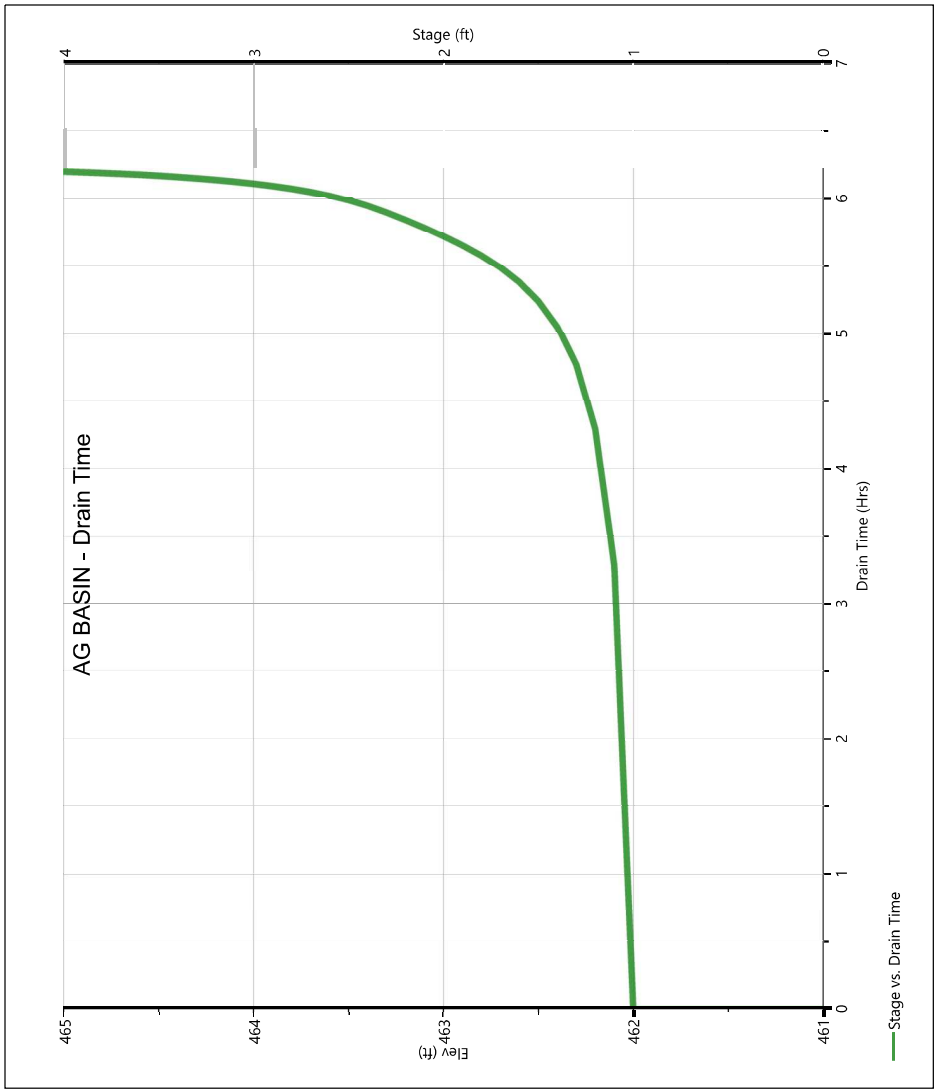
Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

AG BASIN

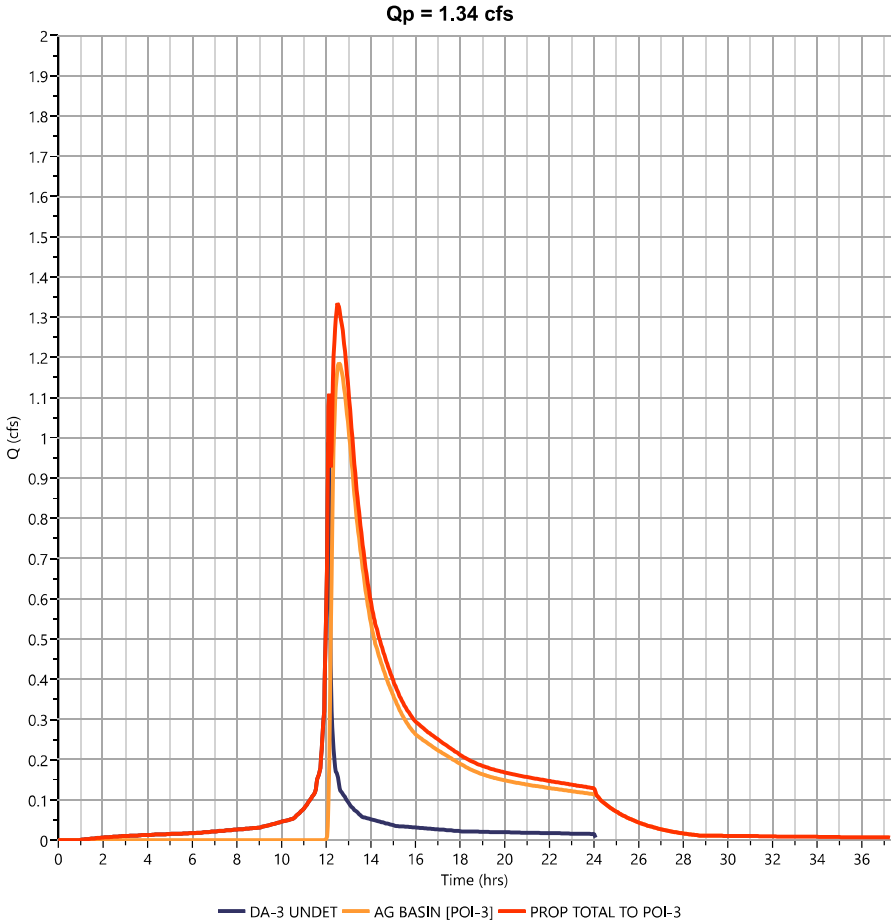
Pond Drawdown



PROP TOTAL TO POI-3

Hyd. No. 47

Hydrograph Type	= Junction	Peak Flow	= 1.337 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.53 hrs
Time Interval	= 2 min	Hydrograph Volume	= 18,144 cuft
Inflow Hydrographs	= 28, 45	Total Contrib. Area	= 0.34 ac

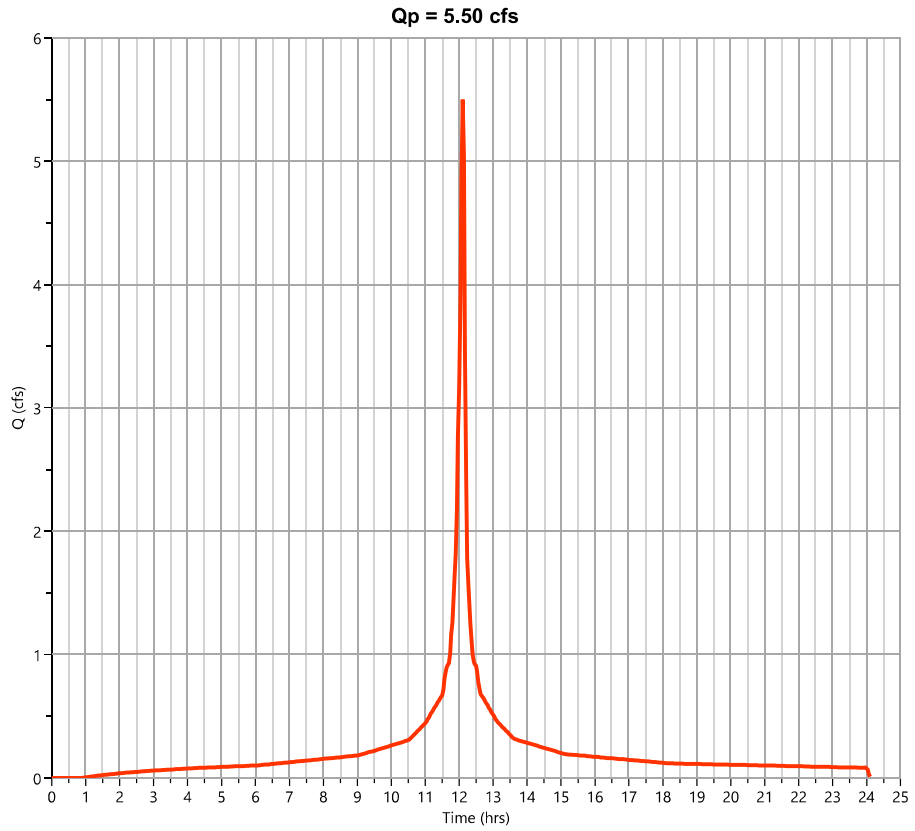


Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

DA-4 UNDET IMP

Hyd. No. 49

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.499 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 19,861 cuft
Drainage Area	= 1.82 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

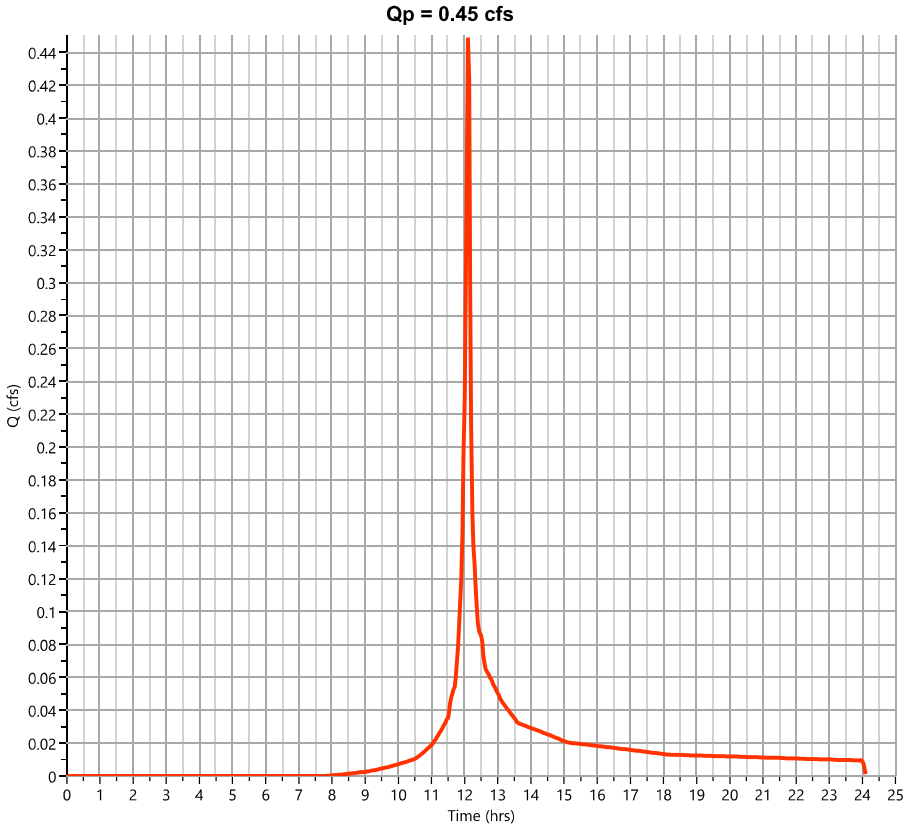
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 UNDET PER

Hyd. No. 50

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.449 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 1,406 cuft
Drainage Area	= 0.26 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.44 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

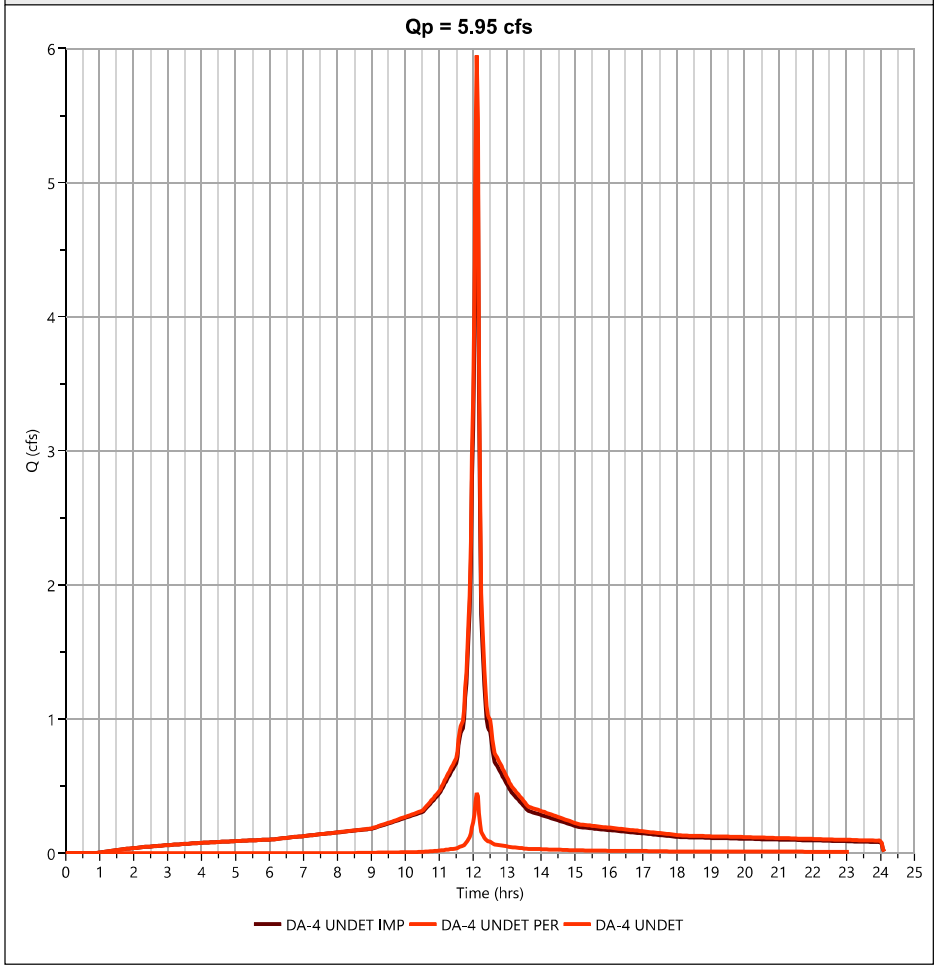
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 UNDET

Hyd. No. 51

Hydrograph Type	= Junction	Peak Flow	= 5.948 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 21,267 cuft
Inflow Hydrographs	= 49, 50	Total Contrib. Area	= 2.08 ac



Hydrograph Report

Project Name:

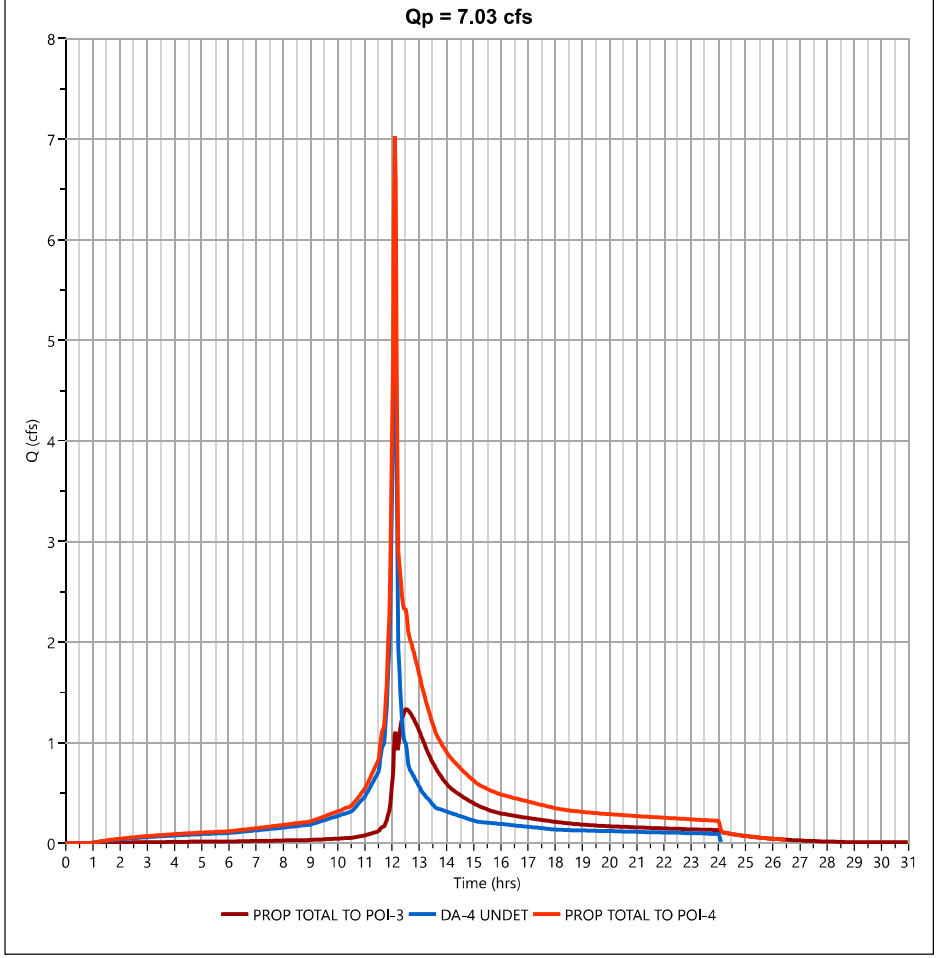
Hydrology Studio v 3.0.0.21

01-26-2022

PROP TOTAL TO POI-4

Hyd. No. 53

Hydrograph Type	= Junction	Peak Flow	= 7.027 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 39,411 cuft
Inflow Hydrographs	= 47, 51	Total Contrib. Area	= 2.42 ac



Design Storm Report

Custom Storm filename:

Hydrology Studio v 3.0.0.21

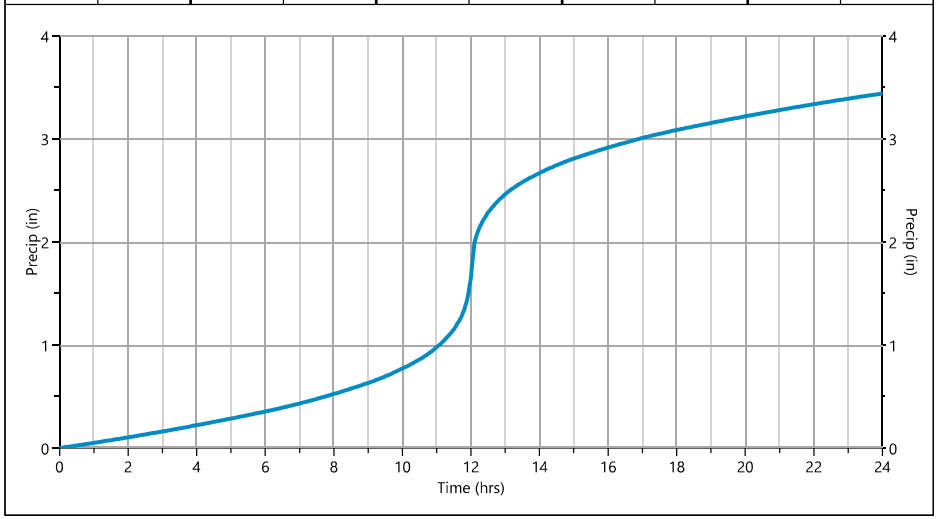
01-26-2022

Storm Distribution: Custom - NRCC-D

Storm Duration	Total Rainfall Volume (in)								
	1-yr	✔ 2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
24 hrs	0.00	3.44	0.00	0.00	5.22	6.44	0.00	8.66	

Incremental Rainfall Distribution, 2-yr

Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.07	0.009884	11.43	0.013450	11.80	0.025961	12.17	0.036968	12.53	0.013450
11.10	0.009884	11.47	0.013450	11.83	0.036969	12.20	0.036969	12.57	0.013450
11.13	0.010779	11.50	0.013451	11.87	0.036968	12.23	0.025960	12.60	0.013450
11.17	0.010779	11.53	0.017624	11.90	0.036969	12.27	0.025961	12.63	0.012602
11.20	0.010779	11.57	0.017624	11.93	0.066059	12.30	0.025960	12.67	0.012602
11.23	0.011696	11.60	0.017624	11.97	0.066060	12.33	0.018553	12.70	0.012602
11.27	0.011696	11.63	0.018553	12.00	0.066059	12.37	0.018553	12.73	0.011696
11.30	0.011696	11.67	0.018553	12.03	0.114128	12.40	0.018554	12.77	0.011696
11.33	0.012602	11.70	0.018553	**12.07**	**0.114128**	12.43	0.017624	12.80	0.011696
11.37	0.012602	11.73	0.025961	12.10	0.114128	12.47	0.017624	12.83	0.010779
11.40	0.012602	11.77	0.025961	12.13	0.036969	12.50	0.017624	12.87	0.010779



Hydrograph 10-yr Summary

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX DA-1 [POI-1]	1.826	12.23	8,970	---		
3	NRCS Runoff	EX DA-2 [POI-2]	1.516	12.20	6,758	---		
5	Junction	TOTAL TO POI-2	3.312	12.23	15,728	1, 3		
7	NRCS Runoff	EX DA-3 IMP	3.773	12.17	18,093	---		
8	NRCS Runoff	EX DA-3 PER	0.658	12.17	2,733	---		
9	Junction	EX DA-3 [POI-3]	4.431	12.17	20,826	7, 8		
11	Junction	EX TOTAL TO POI-3	7.574	12.20	36,555	5, 9		
13	NRCS Runoff	EX DA-4 IMP	8.461	12.10	31,106	---		
14	NRCS Runoff	EX DA-4 PER	0.813	12.10	2,562	---		
15	Junction	EX DA-4	9.274	12.10	33,669	13, 14		
17	Junction	EX TOTAL TO POI-4	15.56	12.13	70,223	11, 15		
19	NRCS Runoff	DA-1 [POI-1]	1.050	12.23	5,157	---		
21	NRCS Runoff	DA-2 DET IMP	0.721	12.20	3,703	---		
22	NRCS Runoff	DA-2 DET PER	0.196	12.20	874	---		
23	Junction	TOTAL DA-2 DET	0.916	12.20	4,577	21, 22		
24	Pond Route	PHASE I UG BASIN	0.505	12.37	4,576	23	475.02	615
26	NRCS Runoff	DA-3 UNDET IMP	1.430	12.10	5,257	---		
27	NRCS Runoff	DA-3 UNDET PER	0.100	12.10	315	---		
28	Junction	DA-3 UNDET	1.530	12.10	5,572	26, 27		
30	NRCS Runoff	DA-3A DET IMP	2.513	12.13	10,672	---		
31	NRCS Runoff	DA-3A DET PER	0.610	12.13	2,231	---		
32	Junction	DA-3A DET	3.123	12.13	12,902	30, 31		
34	NRCS Runoff	DA-3B DET IMP	0.600	12.10	2,204	---		
35	NRCS Runoff	DA-3B DET PER	0.067	12.10	210	---		
36	Junction	DA-3B DET	0.666	12.10	2,414	34, 35		

Hydrograph 10-yr Summary

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	NRCS Runoff	DA-3C DET IMP	0.856	12.17	4,104	---		
39	NRCS Runoff	DA-3C DET PER	1.373	12.17	5,712	---		
40	Junction	DA-3C DET	2.229	12.17	9,816	38, 39		
42	Junction	TOTAL TO SCOUR HOLE	4.892	12.13	25,050	19, 24, 32, 36		
44	Junction	TOTAL TO AG BASIN	7.024	12.13	34,866	40, 42		
45	Pond Route	AG BASIN [POI-3]	3.056	12.40	28,992	44	463.10	13,717
47	Junction	PROP TOTAL TO POI-3	3.587	12.13	34,564	28, 45		
49	NRCS Runoff	DA-4 UNDET IMP	8.394	12.10	30,862	---		
50	NRCS Runoff	DA-4 UNDET PER	0.866	12.10	2,730	---		
51	Junction	DA-4 UNDET	9.261	12.10	33,592	49, 50		
53	Junction	PROP TOTAL TO POI-4	12.65	12.10	68,156	47, 51		

Hydrograph Report

Project Name:

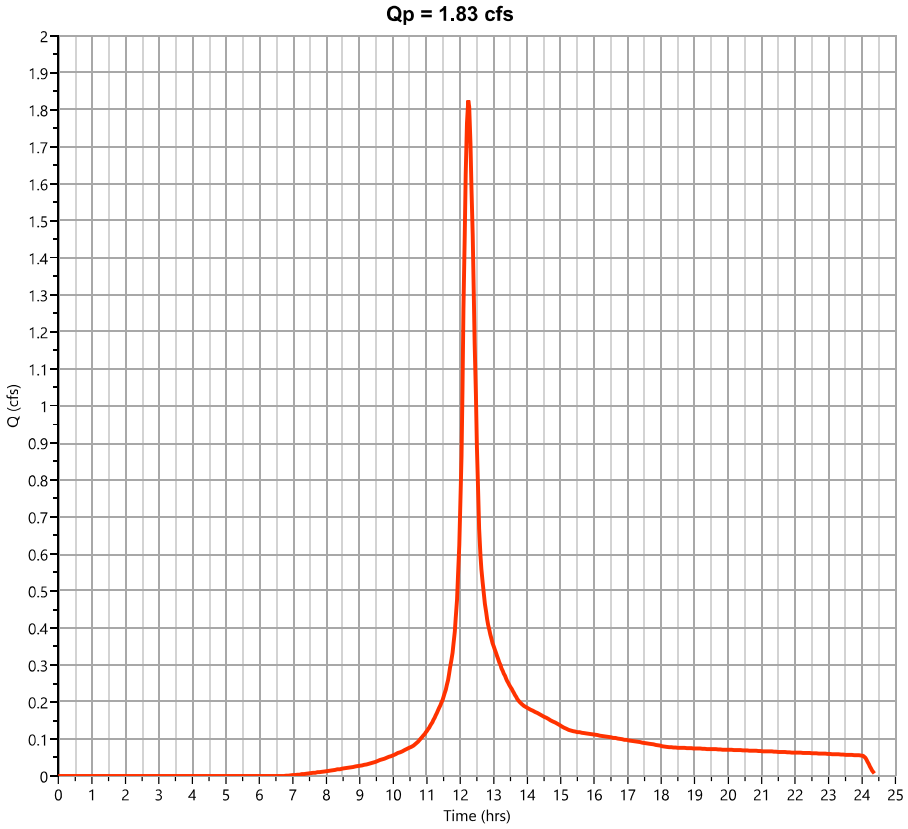
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-1 [POI-1]

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.826 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 8,970 cuft
Drainage Area	= 0.88 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 18.5 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

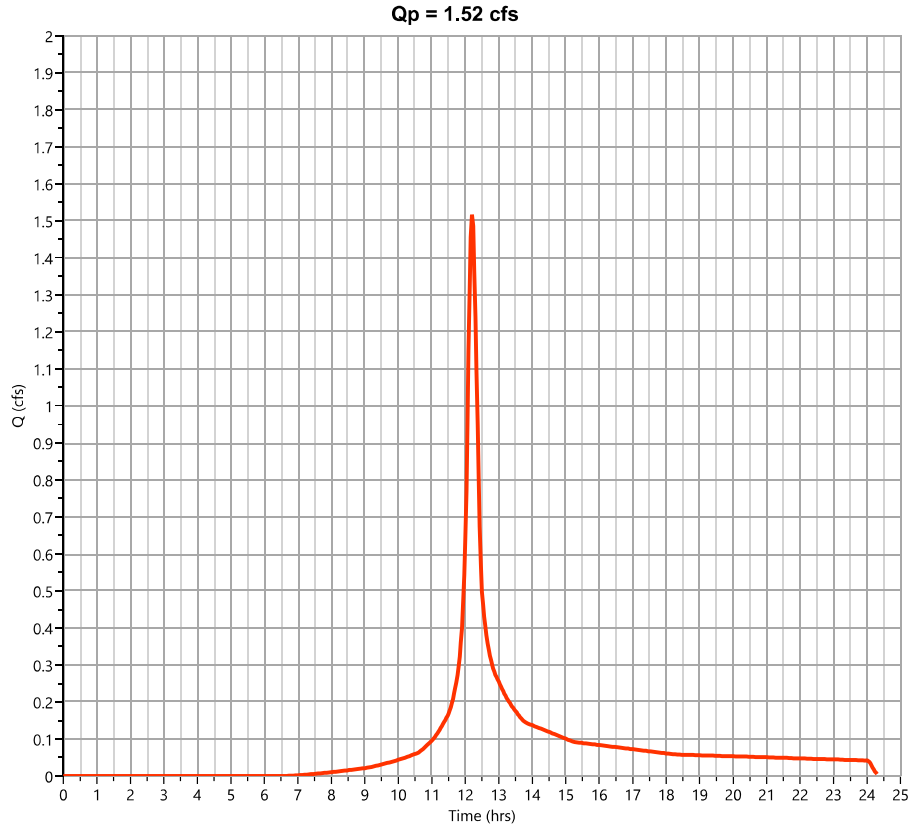
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-2 [POI-2]

Hyd. No. 3

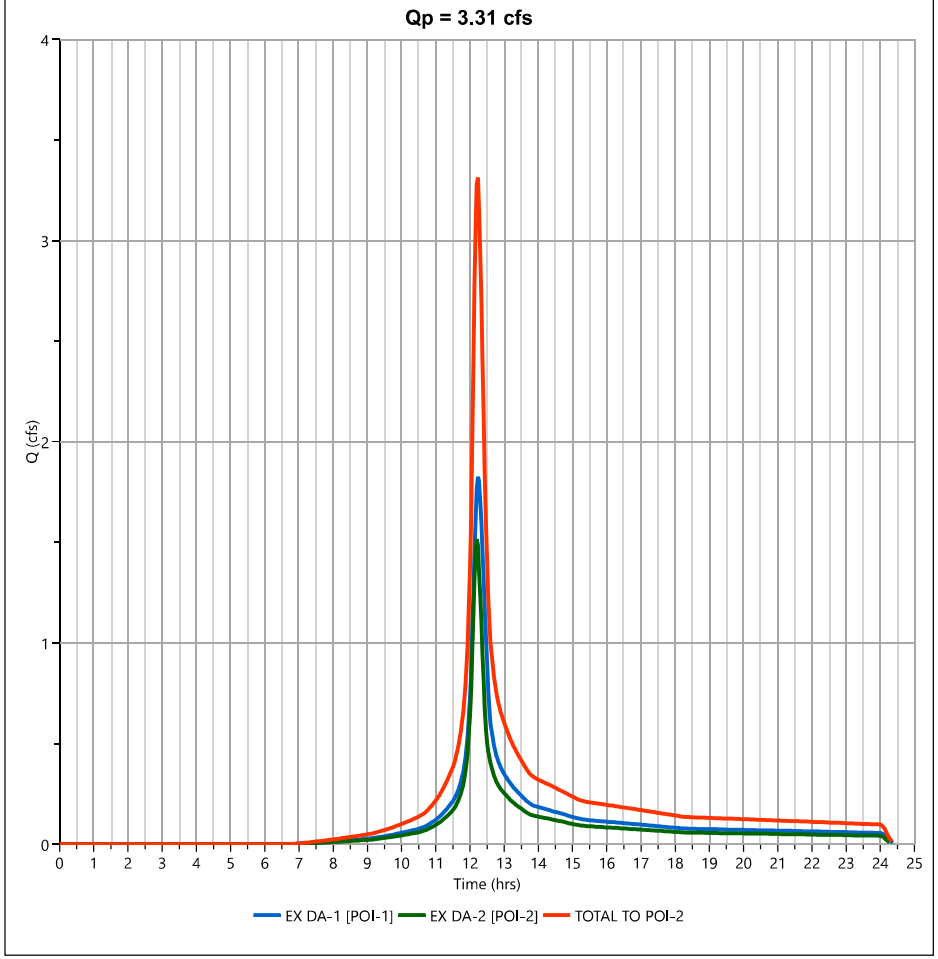
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.516 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 6,758 cuft
Drainage Area	= 0.68 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



TOTAL TO POI-2

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 3.312 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Hydrograph Volume	= 15,728 cuft
Inflow Hydrographs	= 1, 3	Total Contrib. Area	= 1.56 ac

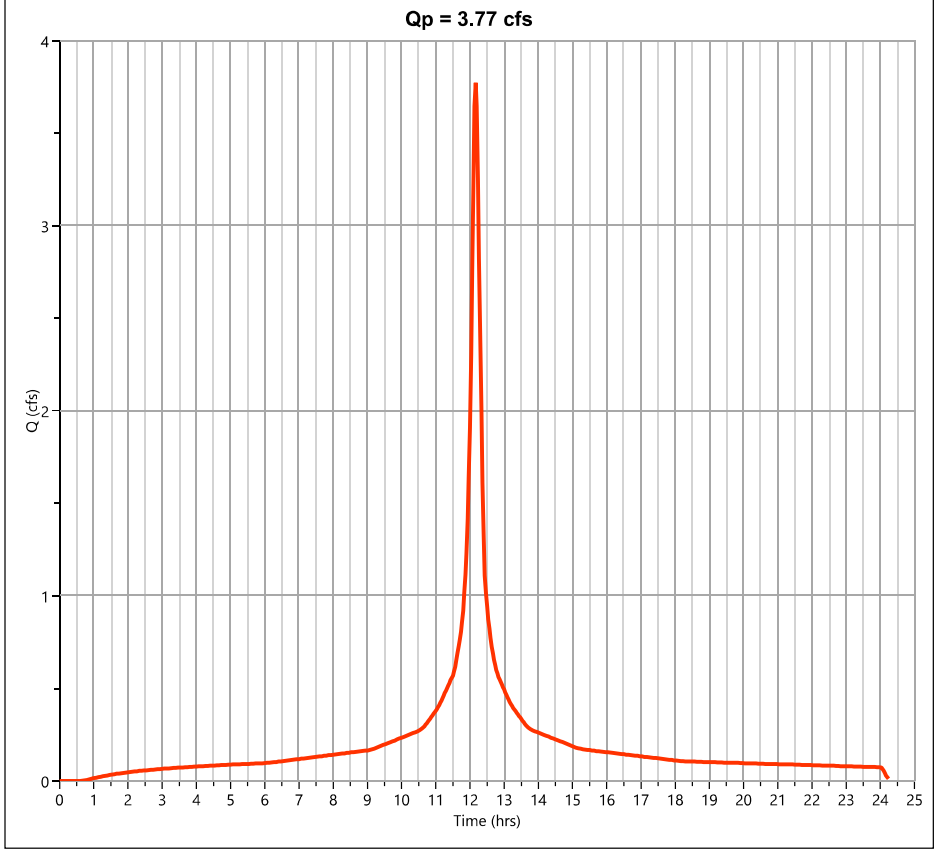


Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

EX DA-3 IMP

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.773 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 18,093 cuft
Drainage Area	= 0.97 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.6 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

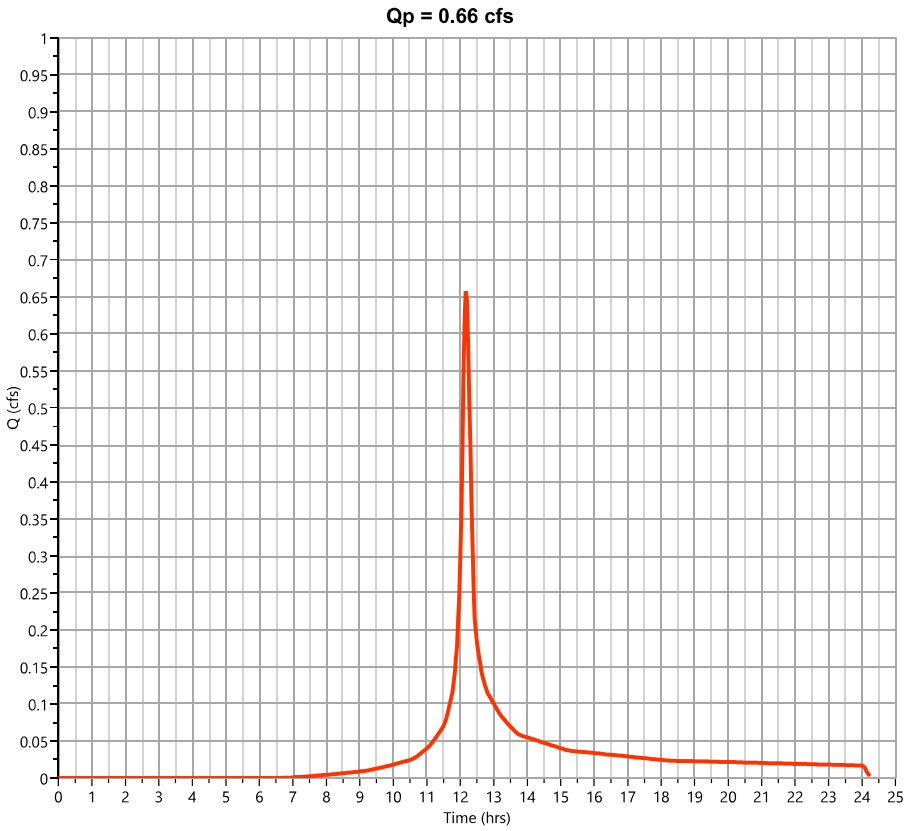
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 PER

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.658 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 2,733 cuft
Drainage Area	= 0.26 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 10.6 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

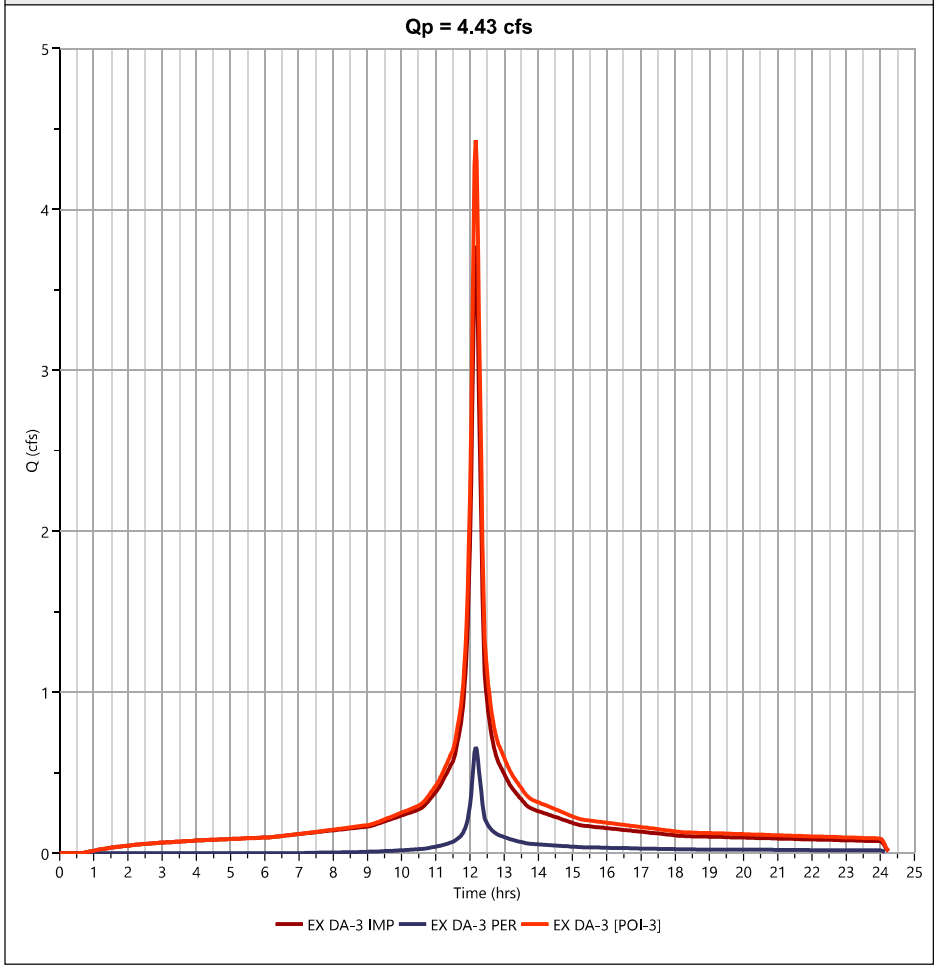
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 [POI-3]

Hyd. No. 9

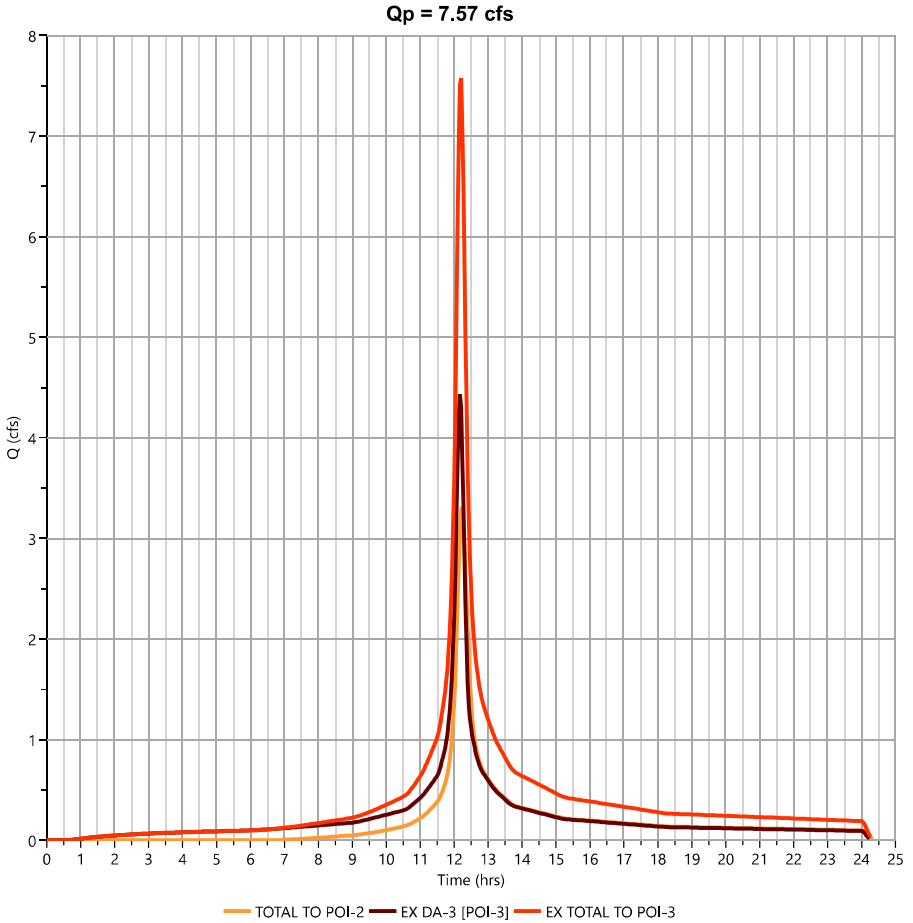
Hydrograph Type	= Junction	Peak Flow	= 4.431 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 20,826 cuft
Inflow Hydrographs	= 7, 8	Total Contrib. Area	= 1.23 ac



EX TOTAL TO POI-3

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 7.574 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 36,555 cuft
Inflow Hydrographs	= 5, 9	Total Contrib. Area	= 2.79 ac

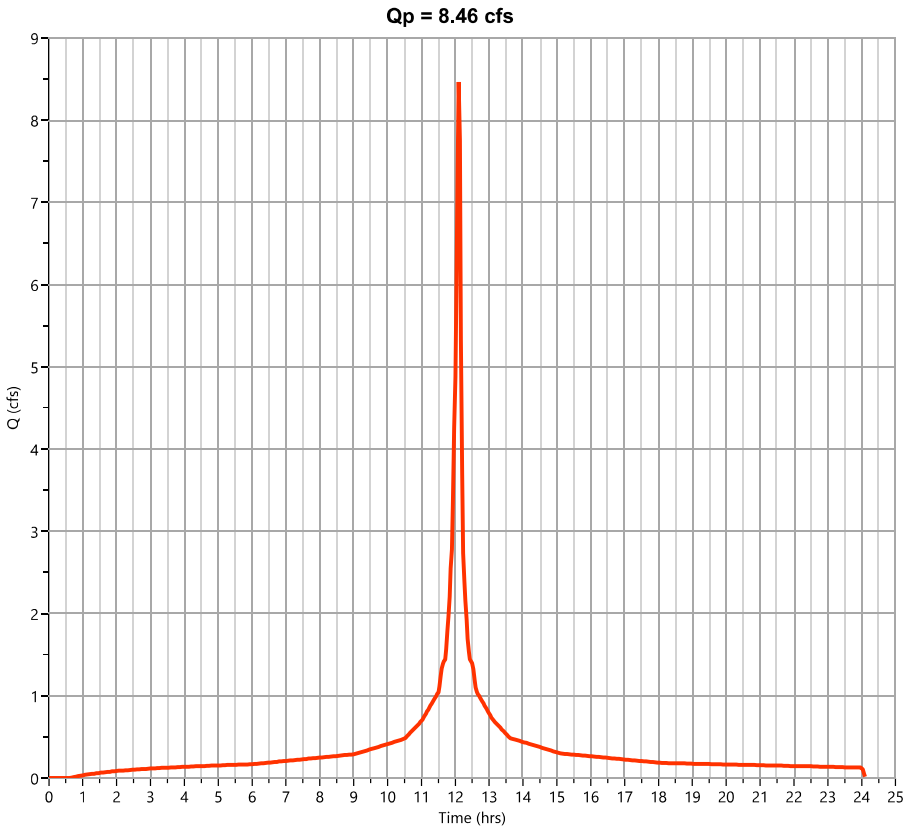


Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

EX DA-4 IMP

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.461 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 31,106 cuft
Drainage Area	= 1.834 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

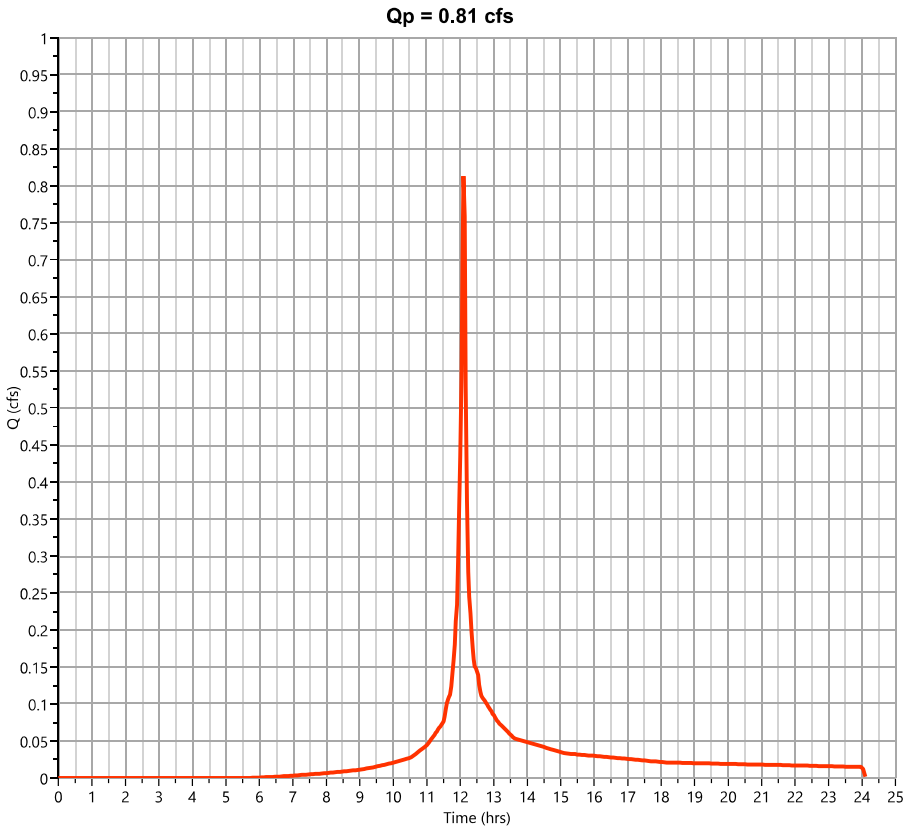
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 PER

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.813 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 2,562 cuft
Drainage Area	= 0.244 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

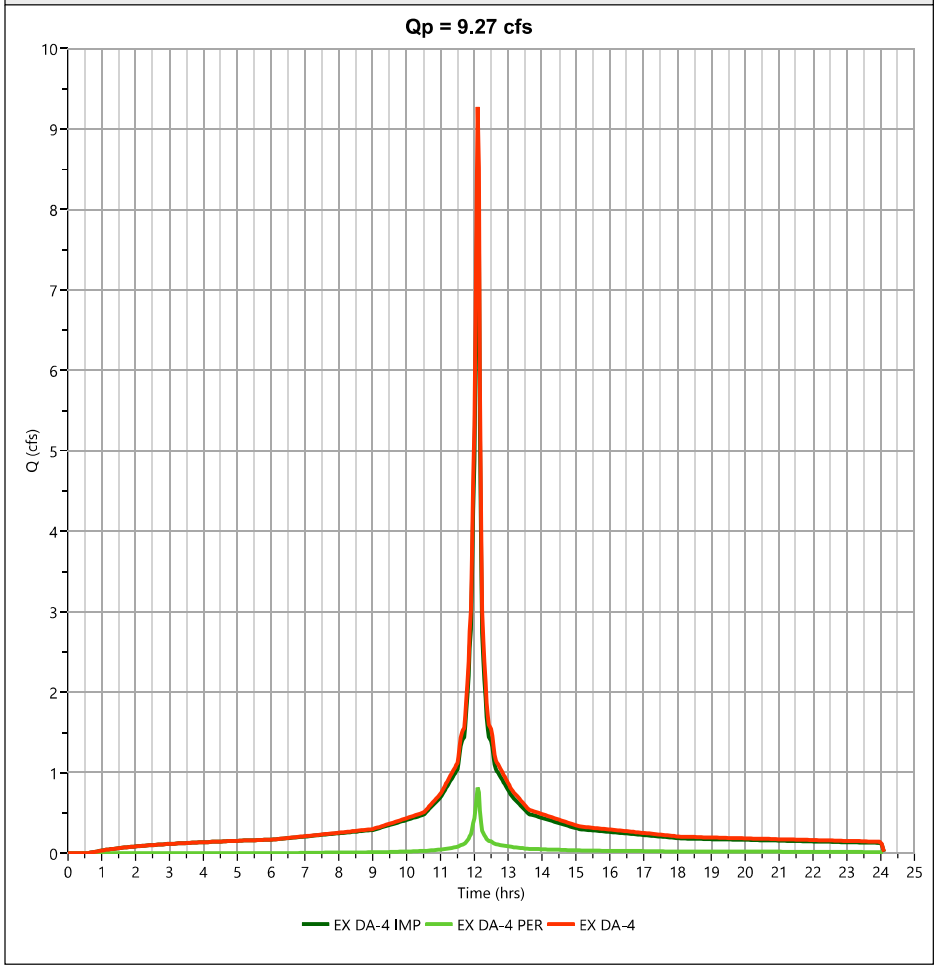
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4

Hyd. No. 15

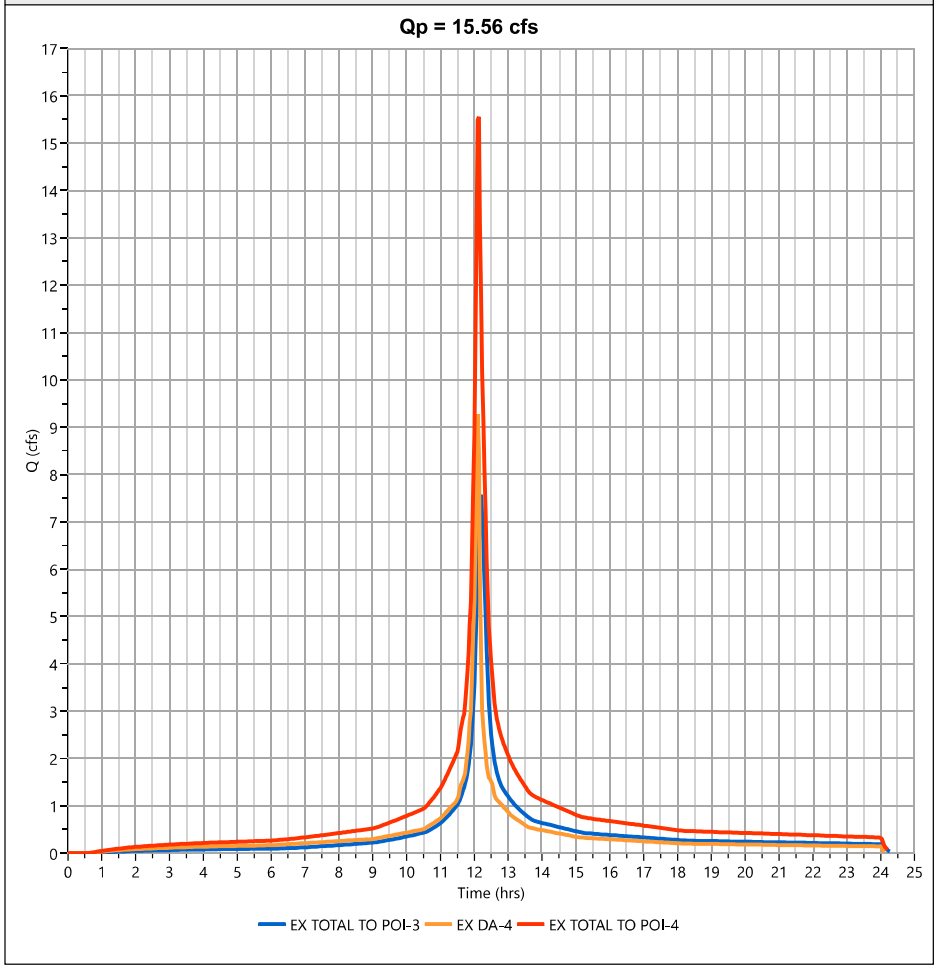
Hydrograph Type	= Junction	Peak Flow	= 9.274 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 33,669 cuft
Inflow Hydrographs	= 13, 14	Total Contrib. Area	= 2.078 ac



EX TOTAL TO POI-4

Hyd. No. 17

Hydrograph Type	= Junction	Peak Flow	= 15.56 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 70,223 cuft
Inflow Hydrographs	= 11, 15	Total Contrib. Area	= 4.868 ac



Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

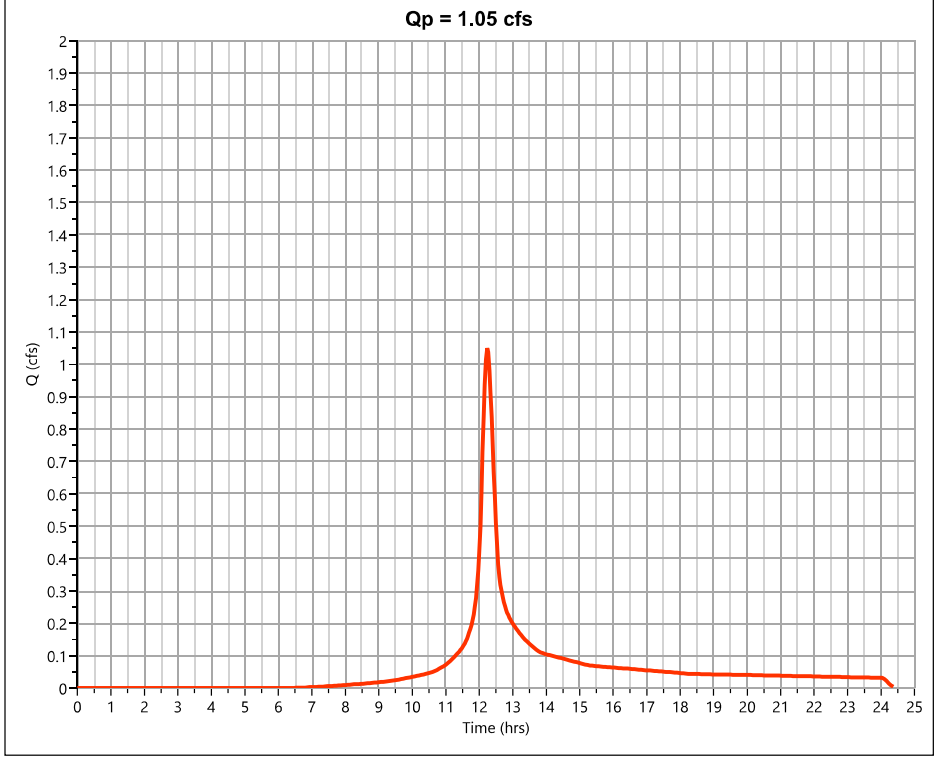
DA-1 [POI-1]

Hyd. No. 19

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.050 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 5,157 cuft
Drainage Area	= 0.49 ac	Curve Number	= 78*
Tc Method	= User	Time of Conc. (Tc)	= 18.8 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.29	77	WOODED
0.2	80	OPEN SPACE
0.49	**78**	Weighted CN Method Employed



Hydrograph Report

Project Name:

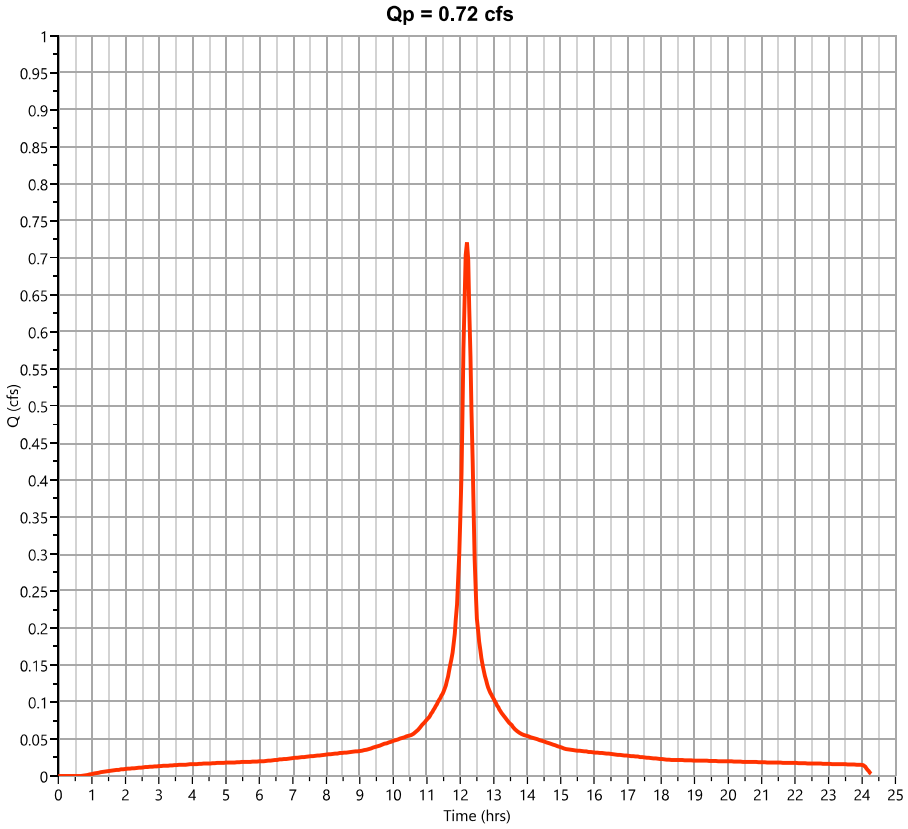
Hydrology Studio v 3.0.0.21

01-26-2022

DA-2 DET IMP

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.721 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 3,703 cuft
Drainage Area	= 0.21 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 14.6 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

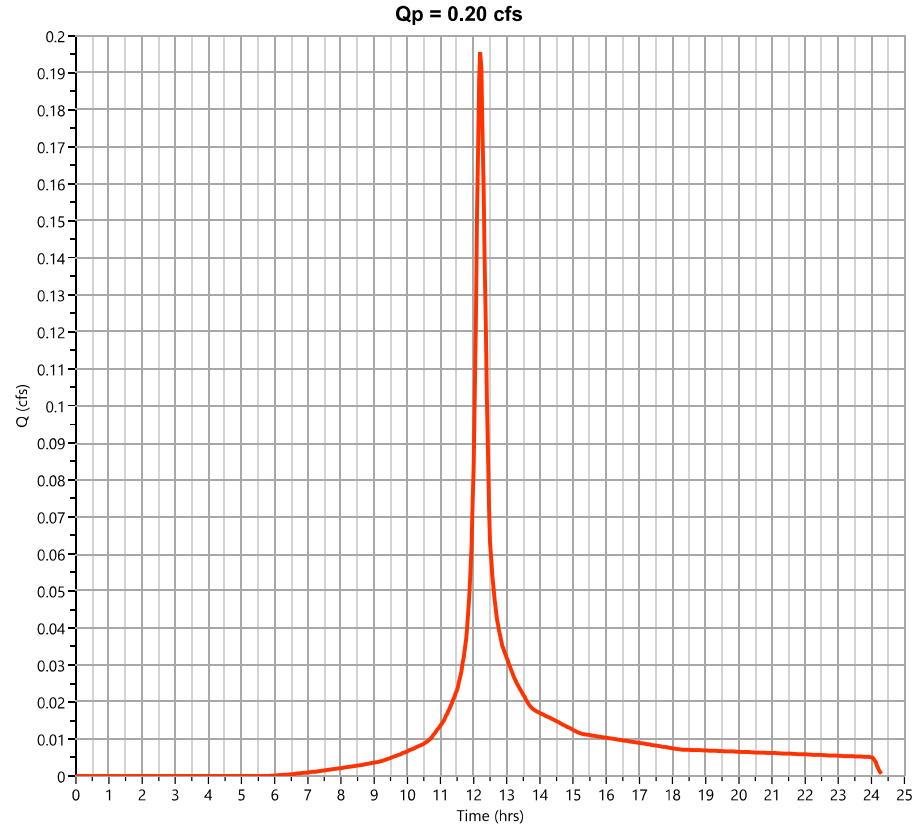
Hydrology Studio v 3.0.0.21

01-26-2022

DA-2 DET PER

Hyd. No. 22

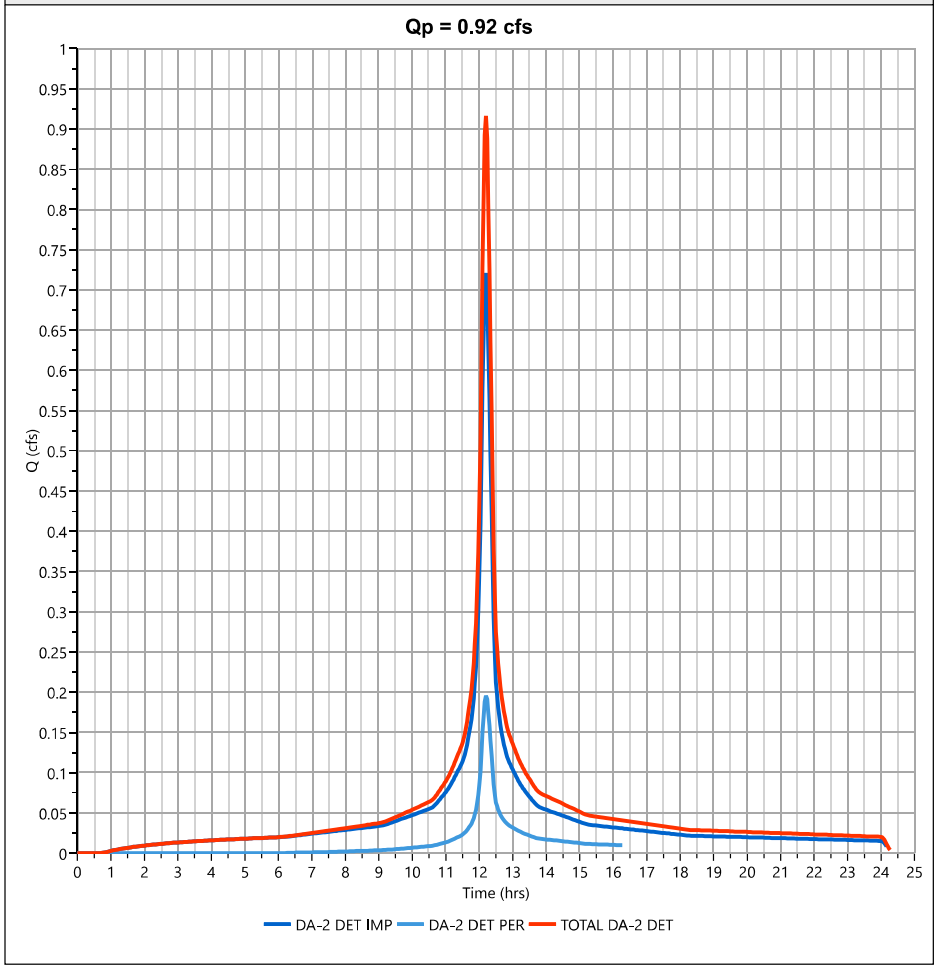
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.196 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 874 cuft
Drainage Area	= 0.08 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 14.6 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



TOTAL DA-2 DET

Hyd. No. 23

Hydrograph Type	= Junction	Peak Flow	= 0.916 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 4,577 cuft
Inflow Hydrographs	= 21, 22	Total Contrib. Area	= 0.29 ac



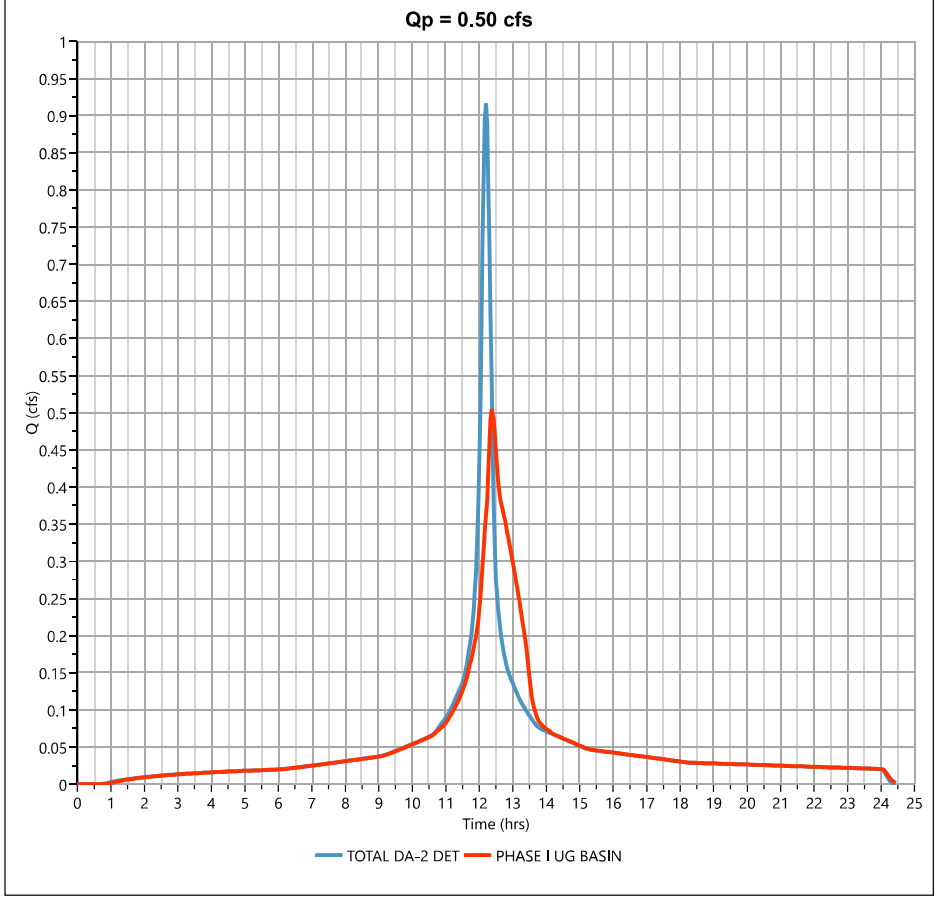
Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

PHASE I UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 0.505 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Hydrograph Volume	= 4,576 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 475.02 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 615 cuft

Pond Routing by Storage Indication Method *Center of mass detention time = 9 min*



Hydrograph Report

Project Name:

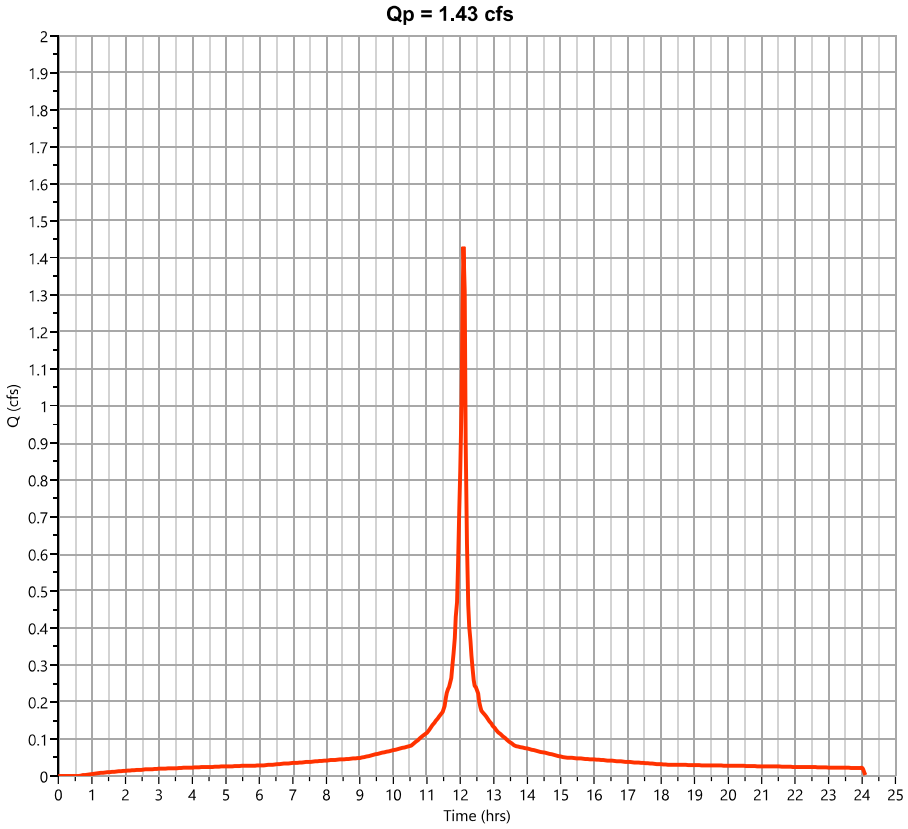
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 UNDET IMP

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.430 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 5,257 cuft
Drainage Area	= 0.31 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

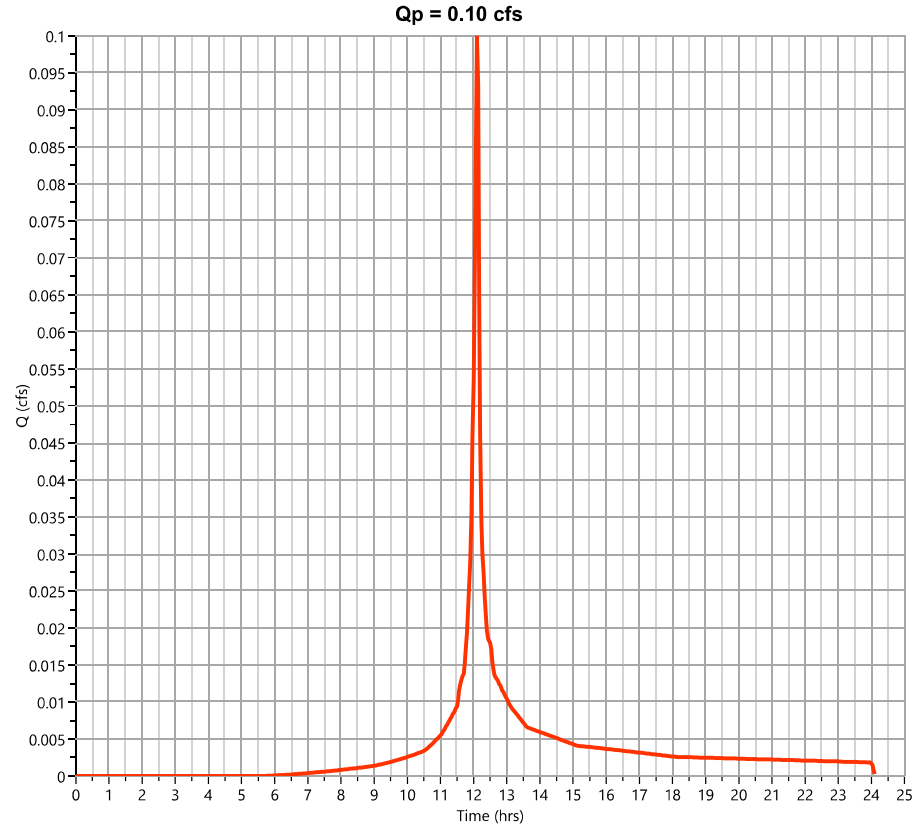
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 UNDET PER

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.100 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 315 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

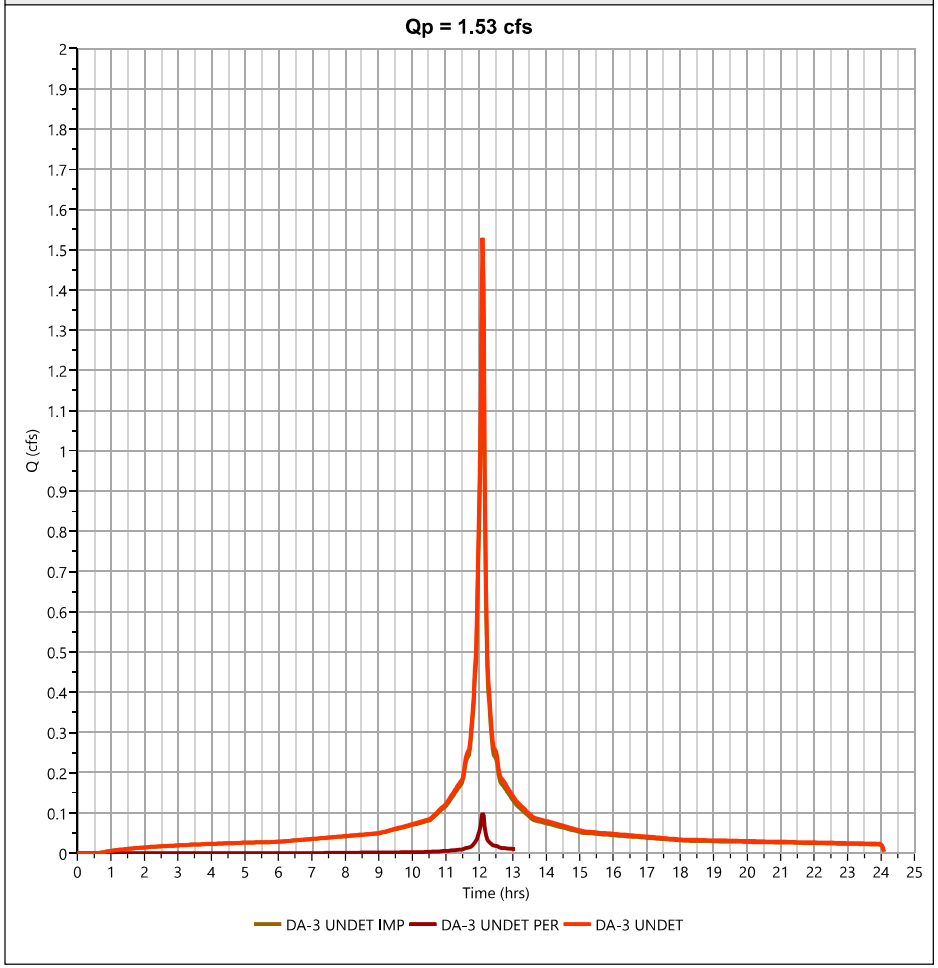
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 UNDET

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 1.530 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 5,572 cuft
Inflow Hydrographs	= 26, 27	Total Contrib. Area	= 0.34 ac



Hydrograph Report

Project Name:

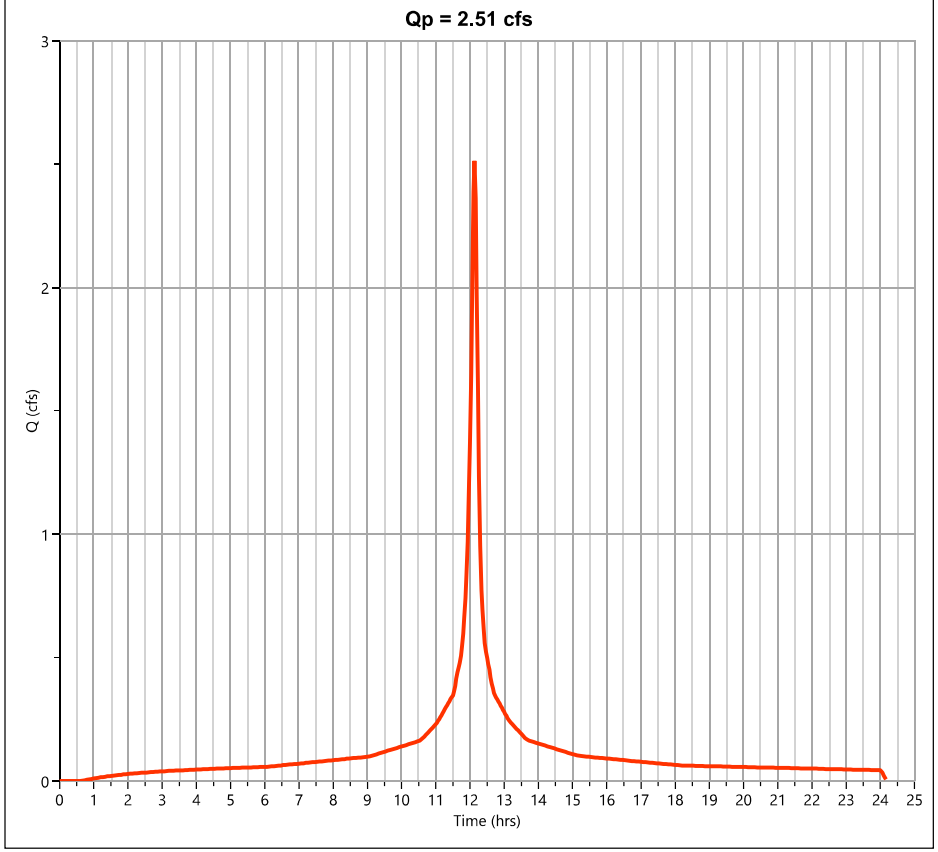
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3A DET IMP

Hyd. No. 30

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.513 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 10,672 cuft
Drainage Area	= 0.59 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 7.7 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

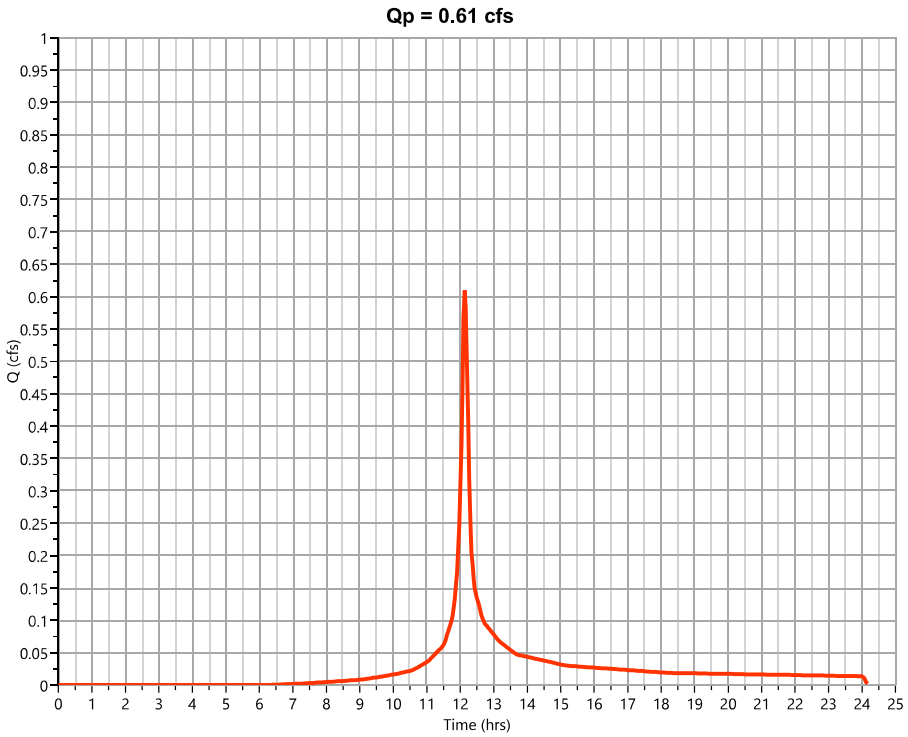
DA-3A DET PER

Hyd. No. 31

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.610 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 2,231 cuft
Drainage Area	= 0.21 ac	Curve Number	= 78.29*
Tc Method	= User	Time of Conc. (Tc)	= 7.7 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.09	80	OPEN SPACE
0.12	77	WOODED
0.21	**78**	Weighted CN Method Employed



Hydrograph Report

Project Name:

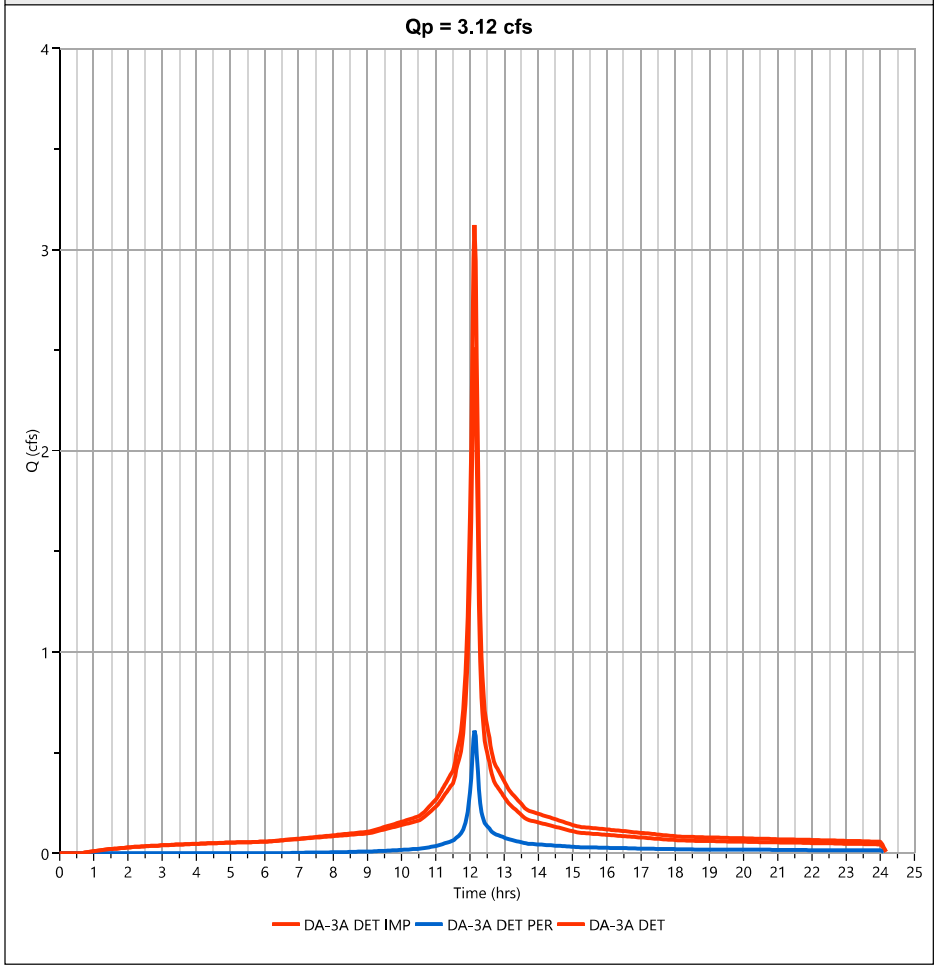
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3A DET

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 3.123 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 12,902 cuft
Inflow Hydrographs	= 30, 31	Total Contrib. Area	= 0.8 ac



Hydrograph Report

Project Name:

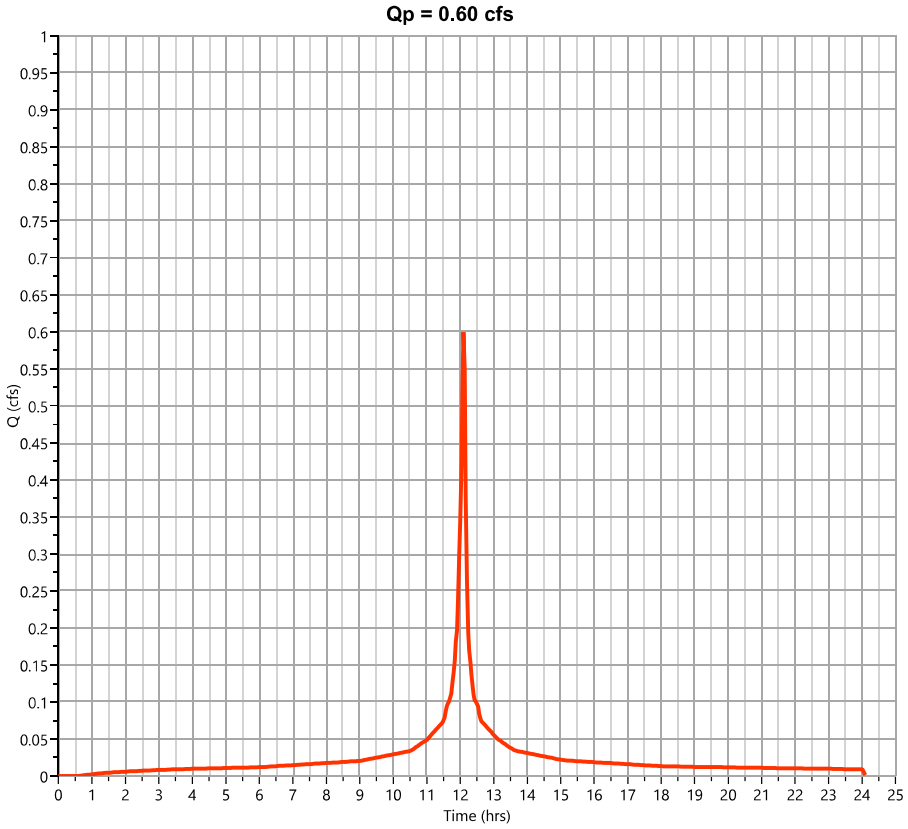
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3B DET IMP

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.600 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 2,204 cuft
Drainage Area	= 0.13 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

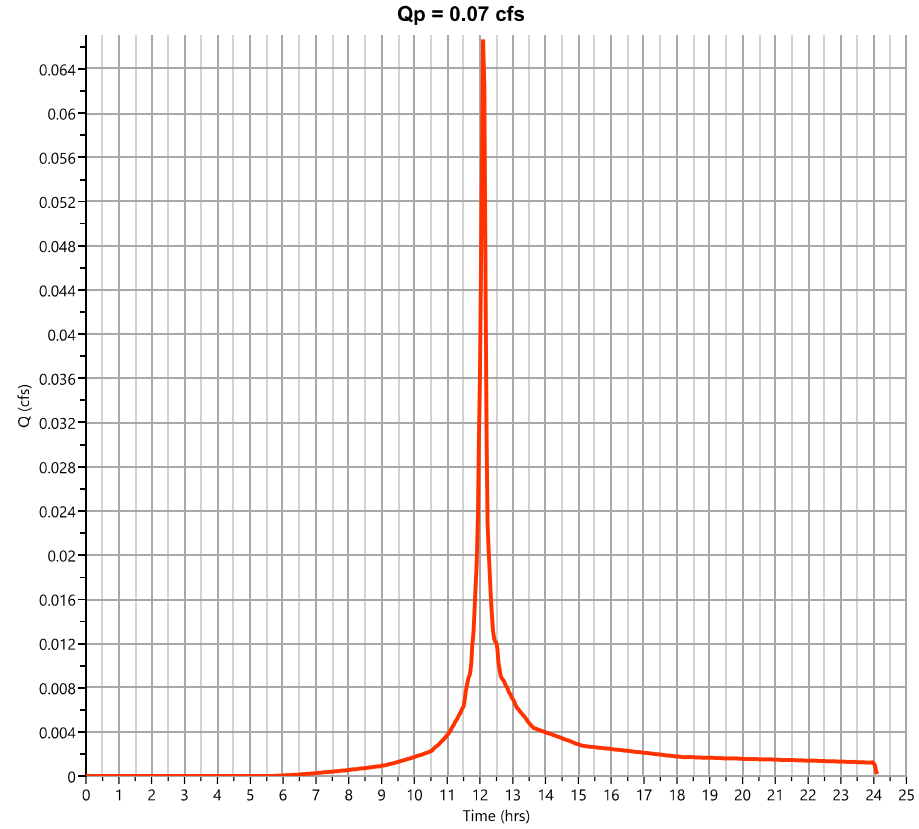
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3B DET PER

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.067 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 210 cuft
Drainage Area	= 0.02 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

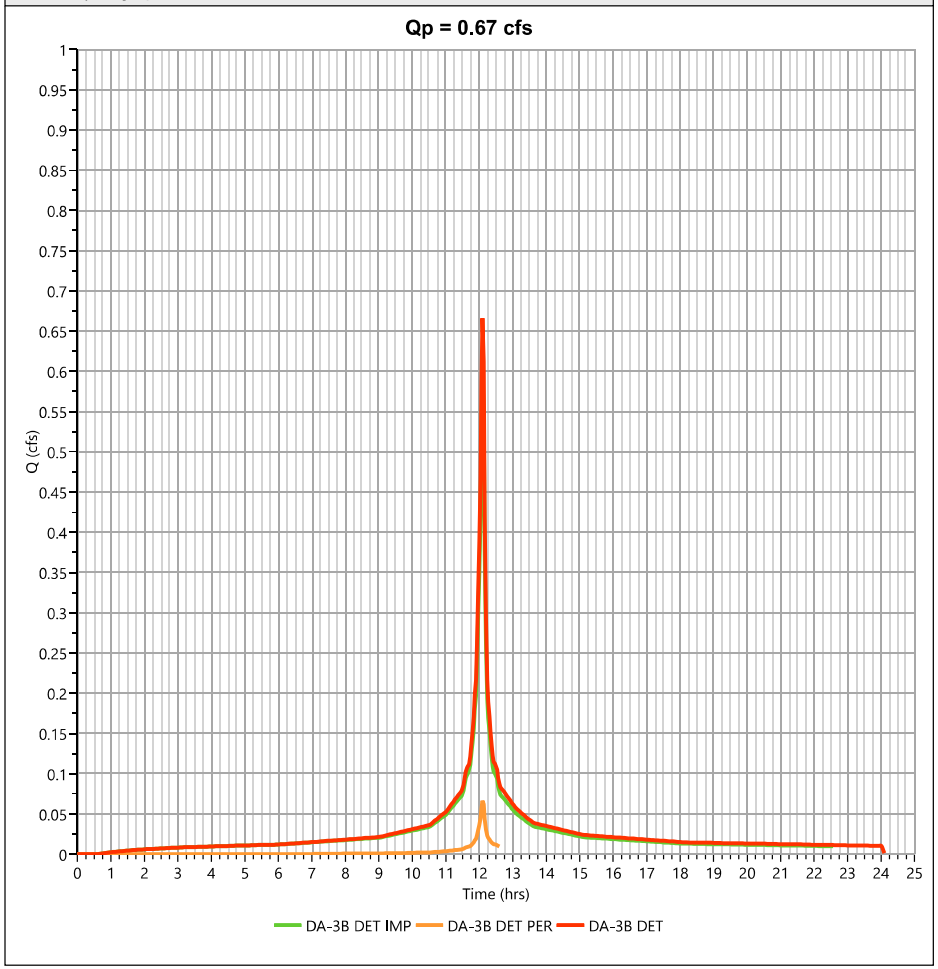
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3B DET

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 0.666 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 2,414 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 0.15 ac



Hydrograph Report

Project Name:

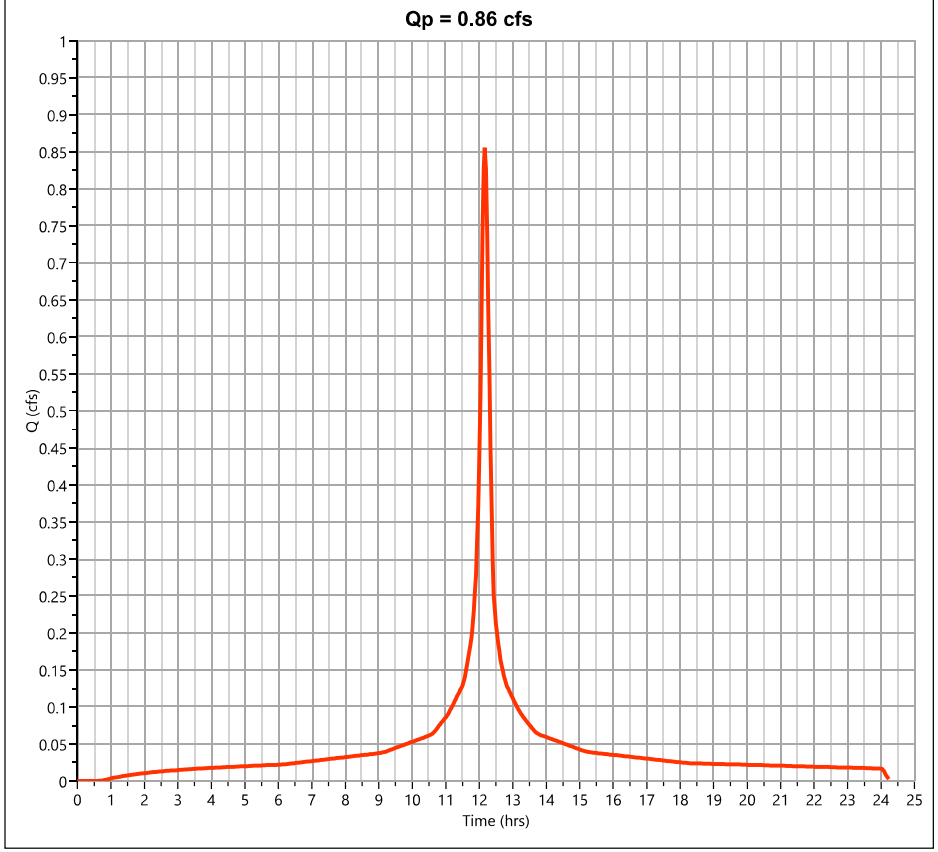
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3C DET IMP

Hyd. No. 38

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.856 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 4,104 cuft
Drainage Area	= 0.22 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

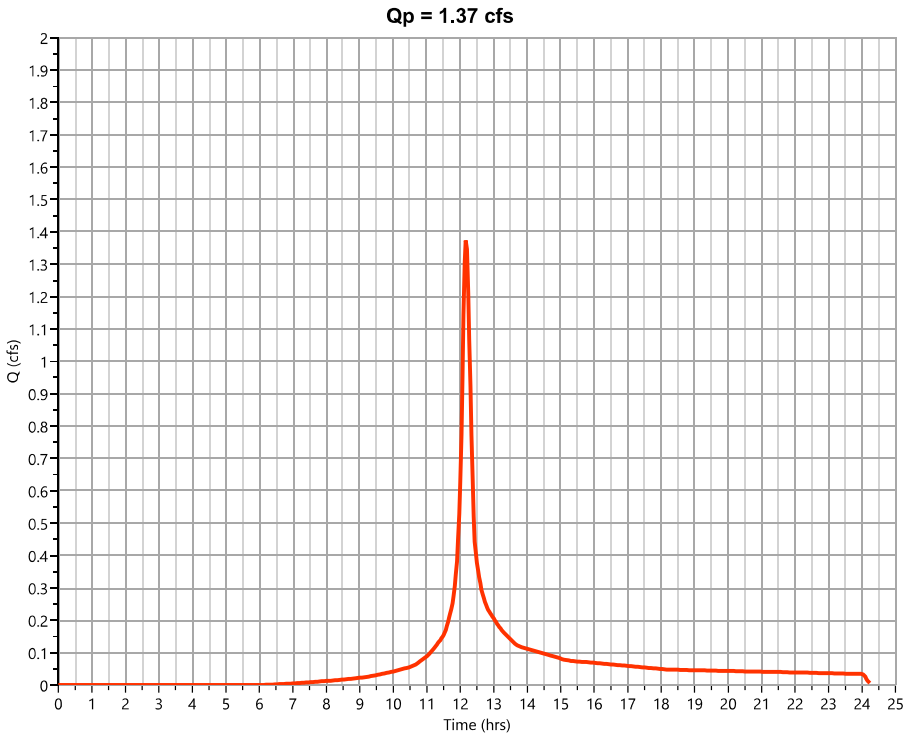
DA-3C DET PER

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.373 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 5,712 cuft
Drainage Area	= 0.51 ac	Curve Number	= 79*
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.17	77	WOODED
0.34	80	OPEN SPACE
0.51	**79**	Weighted CN Method Employed



Hydrograph Report

Project Name:

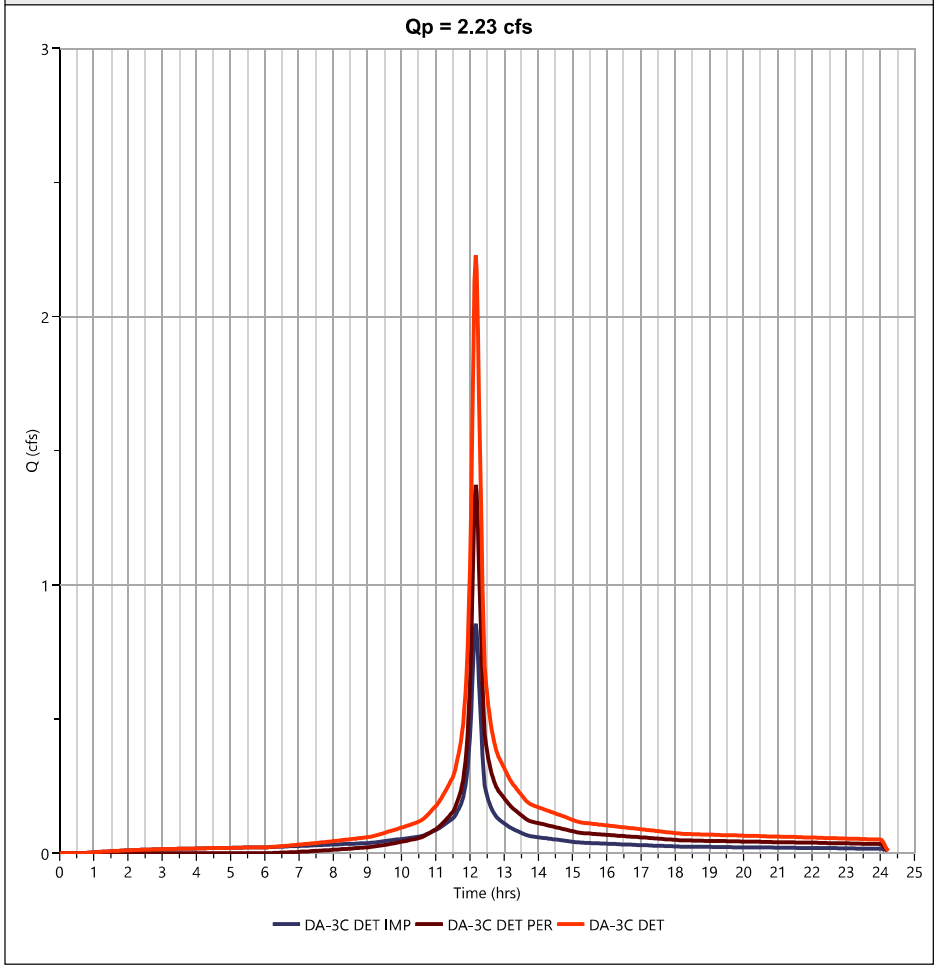
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3C DET

Hyd. No. 40

Hydrograph Type	= Junction	Peak Flow	= 2.229 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 9,816 cuft
Inflow Hydrographs	= 38, 39	Total Contrib. Area	= 0.73 ac



Hydrograph Report

Project Name:

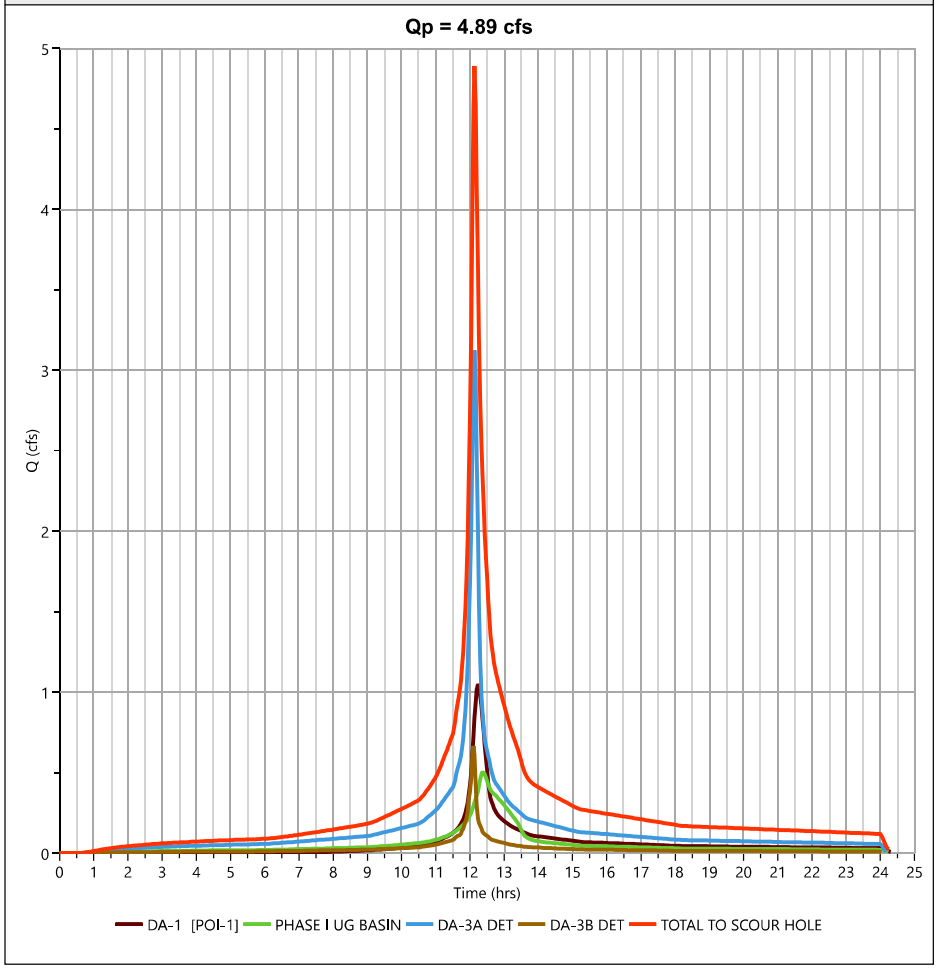
Hydrology Studio v 3.0.0.21

01-26-2022

TOTAL TO SCOUR HOLE

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 4.892 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 25,050 cuft
Inflow Hydrographs	= 19, 24, 32, 36	Total Contrib. Area	= 1.44 ac



Hydrograph Report

Project Name:

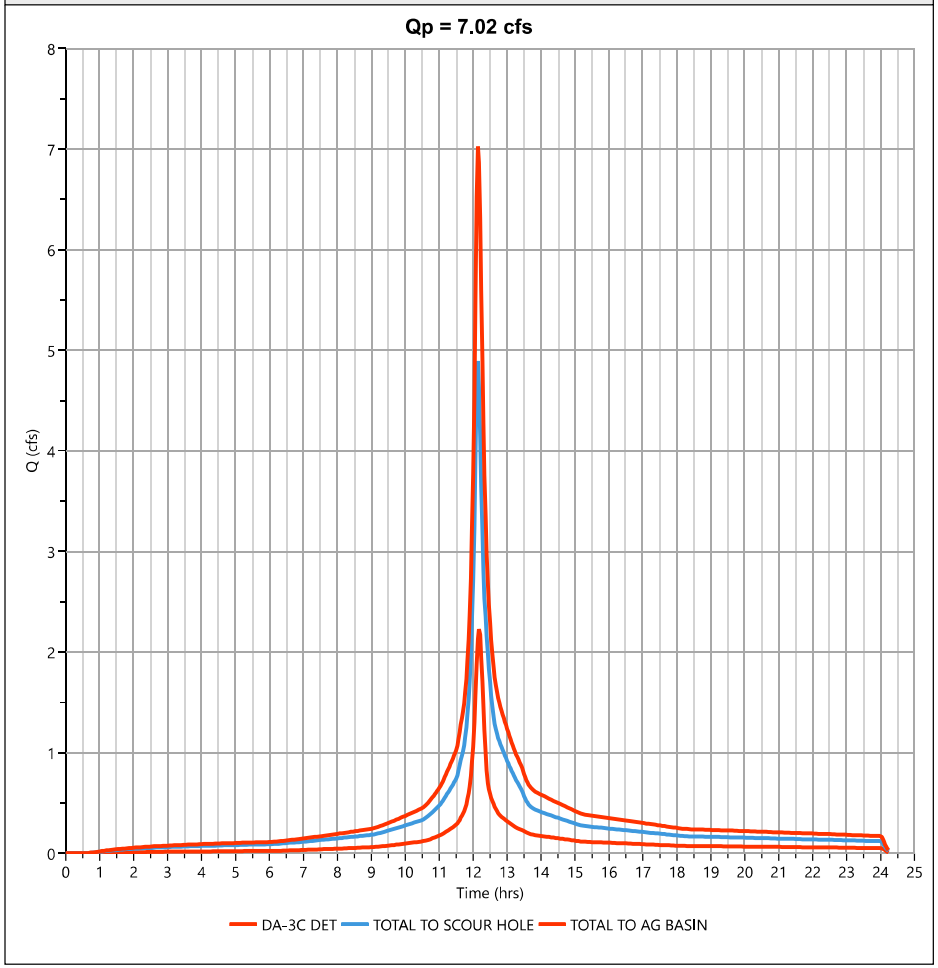
Hydrology Studio v 3.0.0.21

01-26-2022

TOTAL TO AG BASIN

Hyd. No. 44

Hydrograph Type	= Junction	Peak Flow	= 7.024 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 34,866 cuft
Inflow Hydrographs	= 40, 42	Total Contrib. Area	= 2.17 ac

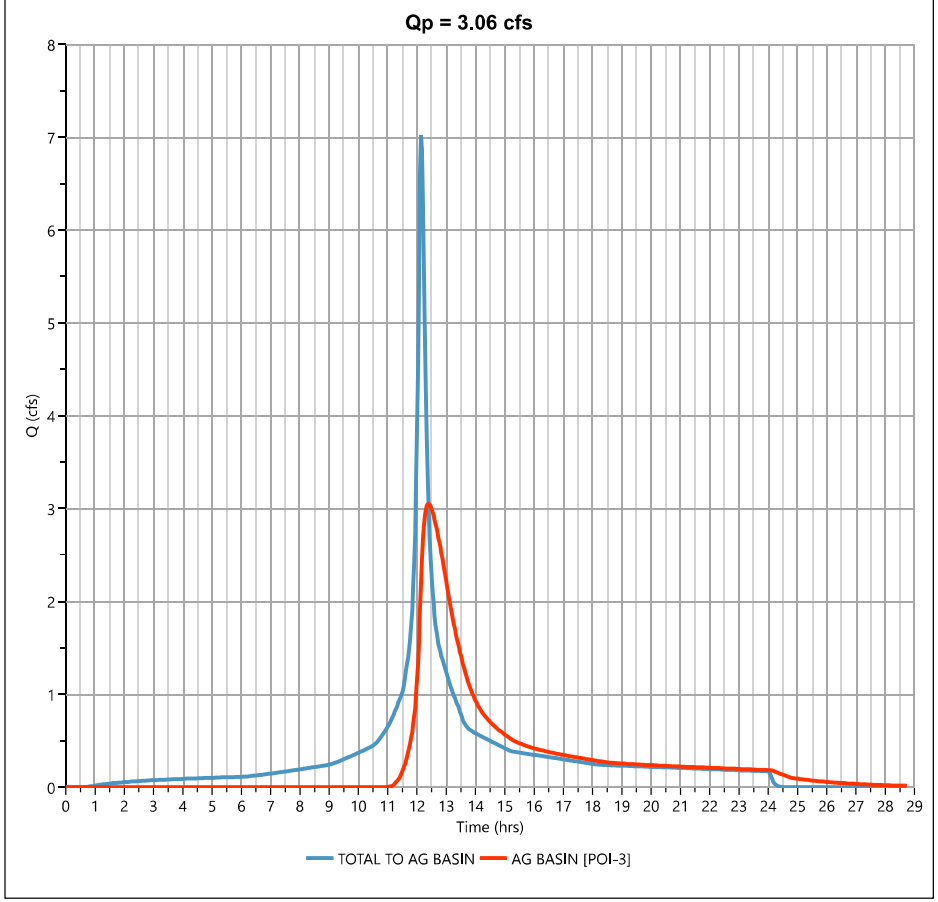


AG BASIN [POI-3]

Hyd. No. 45

Hydrograph Type	= Pond Route	Peak Flow	= 3.056 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Hydrograph Volume	= 28,992 cuft
Inflow Hydrograph	= 44 - TOTAL TO AG BASIN	Max. Elevation	= 463.10 ft
Pond Name	= AG BASIN	Max. Storage	= 13,717 cuft

Pond Routing by Storage Indication Method *Center of mass detention time = 2.05 hrs*

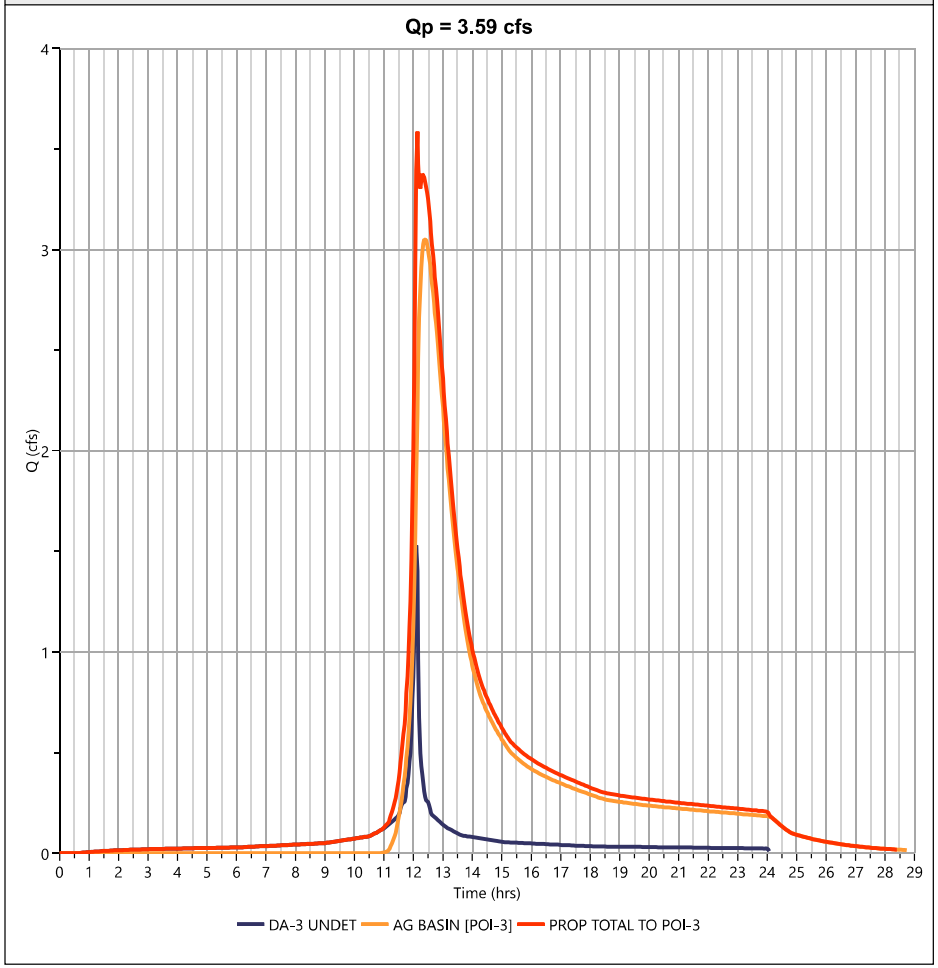


Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

PROP TOTAL TO POI-3

Hyd. No. 47

Hydrograph Type	= Junction	Peak Flow	= 3.587 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 34,564 cuft
Inflow Hydrographs	= 28, 45	Total Contrib. Area	= 0.34 ac



Hydrograph Report

Project Name:

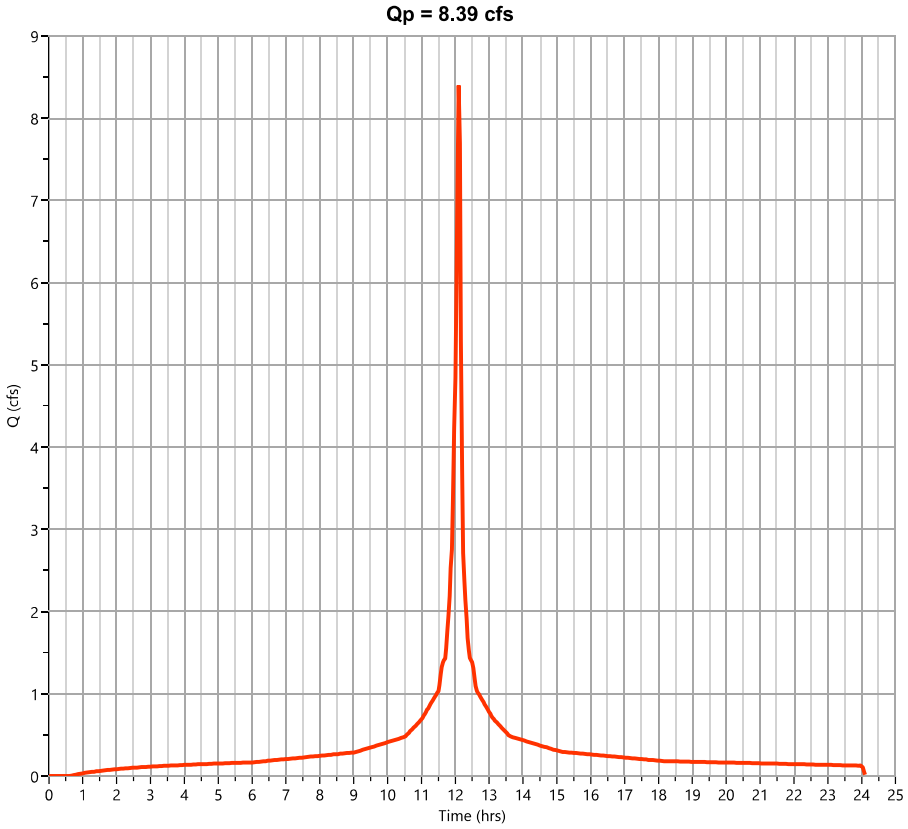
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 UNDET IMP

Hyd. No. 49

Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.394 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 30,862 cuft
Drainage Area	= 1.82 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

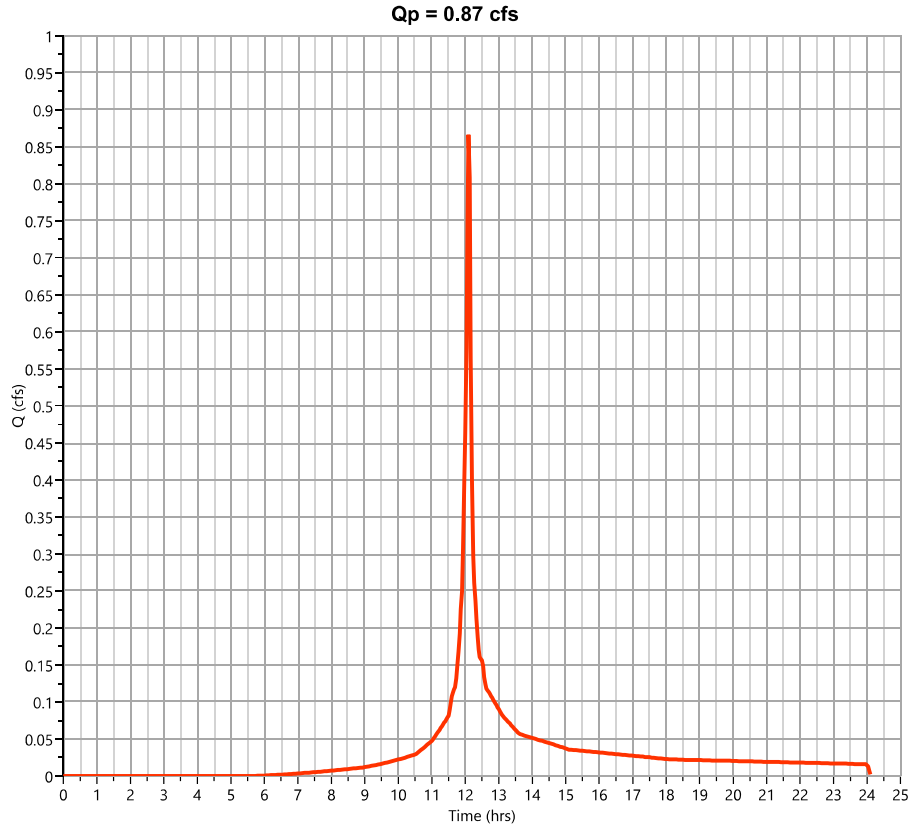
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 UNDET PER

Hyd. No. 50

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.866 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 2,730 cuft
Drainage Area	= 0.26 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.22 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

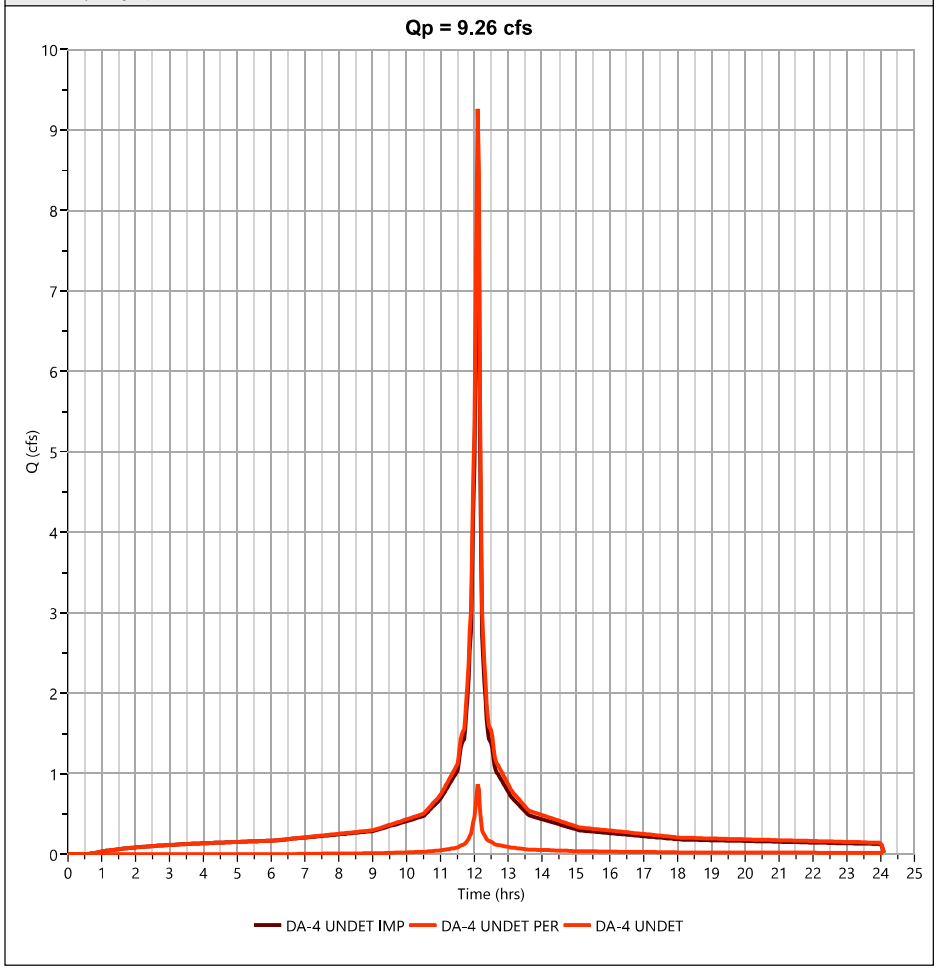
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 UNDET

Hyd. No. 51

Hydrograph Type	= Junction	Peak Flow	= 9.261 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 33,592 cuft
Inflow Hydrographs	= 49, 50	Total Contrib. Area	= 2.08 ac



Hydrograph Report

Project Name:

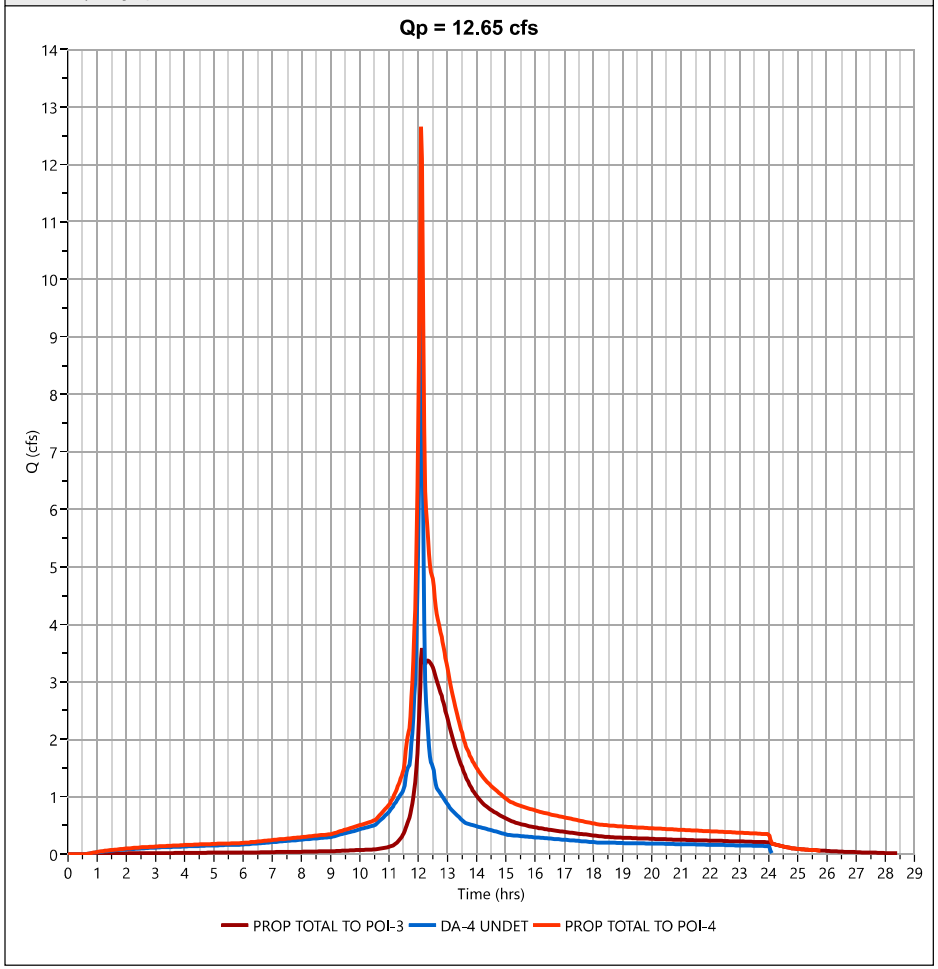
Hydrology Studio v 3.0.0.21

01-26-2022

PROP TOTAL TO POI-4

Hyd. No. 53

Hydrograph Type	= Junction	Peak Flow	= 12.65 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 68,156 cuft
Inflow Hydrographs	= 47, 51	Total Contrib. Area	= 2.42 ac



Design Storm Report

Custom Storm filename:

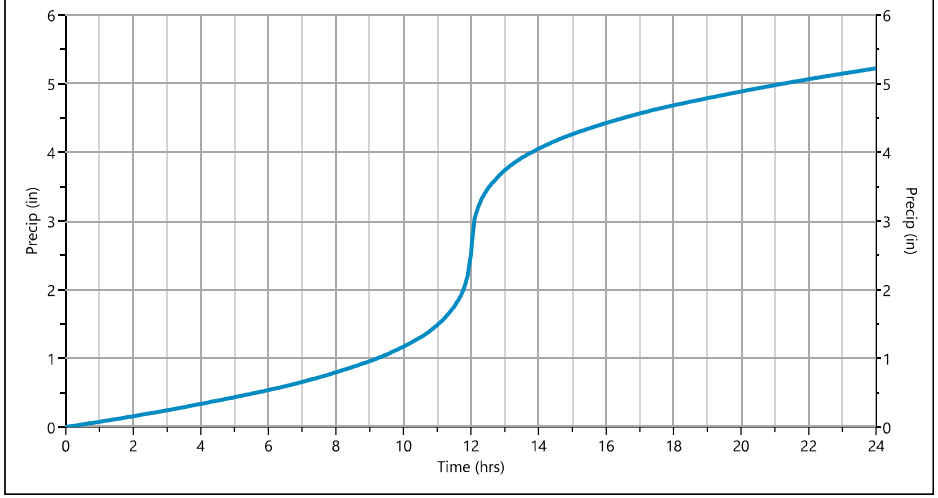
Hydrology Studio v 3.0.0.21

01-26-2022

Storm Distribution: Custom - NRCC-D

Storm Duration	Total Rainfall Volume (in)								
	1-yr	2-yr	3-yr	5-yr	✔ 10-yr	25-yr	50-yr	100-yr	
24 hrs	0.00	3.44	0.00	0.00	5.22	6.44	0.00	8.66	

Incremental Rainfall Distribution, 10-yr									
Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.07	0.014999	11.43	0.020410	11.80	0.039395	12.17	0.056096	12.53	0.020410
11.10	0.014999	11.47	0.020410	11.83	0.056098	12.20	0.056098	12.57	0.020410
11.13	0.016356	11.50	0.020411	11.87	0.056096	12.23	0.039393	12.60	0.020410
11.17	0.016356	11.53	0.026744	11.90	0.056098	12.27	0.039394	12.63	0.019123
11.20	0.016356	11.57	0.026743	11.93	0.100241	12.30	0.039393	12.67	0.019123
11.23	0.017748	11.60	0.026744	11.97	0.100242	12.33	0.028153	12.70	0.019123
11.27	0.017748	11.63	0.028153	12.00	0.100241	12.37	0.028153	12.73	0.017748
11.30	0.017748	11.67	0.028153	12.03	0.173183	12.40	0.028154	12.77	0.017747
11.33	0.019122	11.70	0.028153	**12.07**	**0.173183**	12.43	0.026744	12.80	0.017748
11.37	0.019123	11.73	0.039394	12.10	0.173183	12.47	0.026743	12.83	0.016356
11.40	0.019122	11.77	0.039394	12.13	0.056098	12.50	0.026744	12.87	0.016356



Hydrograph 100-yr Summary

Project Name:

01-26-2022

Hydrology Studio v 3.0.0.21

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX DA-1 [POI-1]	3.777	12.23	18,793	—		
3	NRCS Runoff	EX DA-2 [POI-2]	3.130	12.20	14,159	—		
5	Junction	TOTAL TO POI-2	6.826	12.23	32,952	1, 3		
7	NRCS Runoff	EX DA-3 IMP	6.280	12.17	30,574	—		
8	NRCS Runoff	EX DA-3 PER	1.357	12.17	5,726	—		
9	Junction	EX DA-3 [POI-3]	7.637	12.17	36,299	7, 8		
11	Junction	EX TOTAL TO POI-3	14.20	12.20	69,251	5, 9		
13	NRCS Runoff	EX DA-4 IMP	14.08	12.10	52,562	—		
14	NRCS Runoff	EX DA-4 PER	1.599	12.10	5,187	—		
15	Junction	EX DA-4	15.68	12.10	57,749	13, 14		
17	Junction	EX TOTAL TO POI-4	27.60	12.13	127,000	11, 15		
19	NRCS Runoff	DA-1 [POI-1]	2.141	12.23	10,680	—		
21	NRCS Runoff	DA-2 DET IMP	1.200	12.20	6,258	—		
22	NRCS Runoff	DA-2 DET PER	0.387	12.20	1,769	—		
23	Junction	TOTAL DA-2 DET	1.587	12.20	8,027	21, 22		
24	Pond Route	PHASE I UG BASIN	1.097	12.33	8,025	23	475.51	1,014
26	NRCS Runoff	DA-3 UNDET IMP	2.379	12.10	8,883	—		
27	NRCS Runoff	DA-3 UNDET PER	0.197	12.10	638	—		
28	Junction	DA-3 UNDET	2.576	12.10	9,520	26, 27		
30	NRCS Runoff	DA-3A DET IMP	4.183	12.13	18,033	—		
31	NRCS Runoff	DA-3A DET PER	1.232	12.13	4,604	—		
32	Junction	DA-3A DET	5.414	12.13	22,636	30, 31		
34	NRCS Runoff	DA-3B DET IMP	0.998	12.10	3,725	—		
35	NRCS Runoff	DA-3B DET PER	0.131	12.10	425	—		
36	Junction	DA-3B DET	1.129	12.10	4,150	34, 35		

Hydrograph 100-yr Summary

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	NRCS Runoff	DA-3C DET IMP	1.424	12.17	6,934	---		
39	NRCS Runoff	DA-3C DET PER	2.754	12.17	11,694	---		
40	Junction	DA-3C DET	4.178	12.17	18,628	38, 39		
42	Junction	TOTAL TO SCOUR HOLE	8.773	12.13	45,492	19, 24, 32, 36		
44	Junction	TOTAL TO AG BASIN	12.79	12.13	64,120	40, 42		
45	Pond Route	AG BASIN [POI-3]	8.546	12.30	58,246	44	463.79	18,251
47	Junction	PROP TOTAL TO POI-3	9.218	12.27	67,766	28, 45		
49	NRCS Runoff	DA-4 UNDET IMP	13.97	12.10	52,150	---		
50	NRCS Runoff	DA-4 UNDET PER	1.704	12.10	5,527	---		
51	Junction	DA-4 UNDET	15.67	12.10	57,677	49, 50		
53	Junction	PROP TOTAL TO POI-4	21.72	12.10	125,443	47, 51		

Hydrograph Report

Project Name:

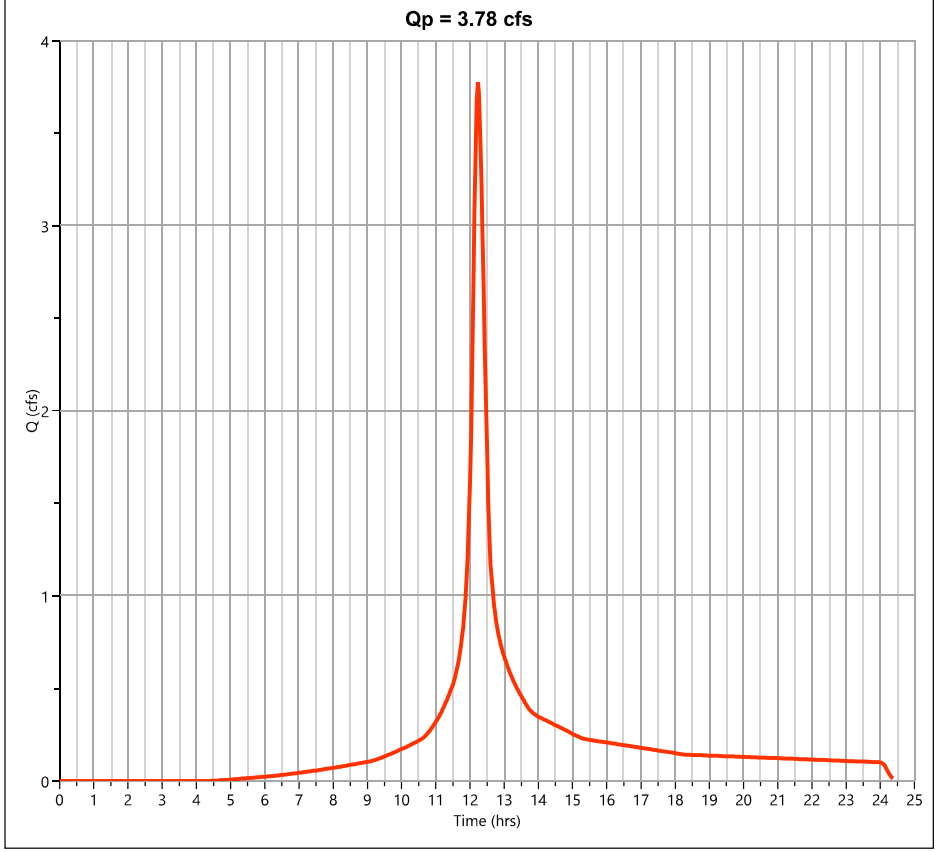
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-1 [POI-1]

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.777 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 18,793 cuft
Drainage Area	= 0.88 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 18.5 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

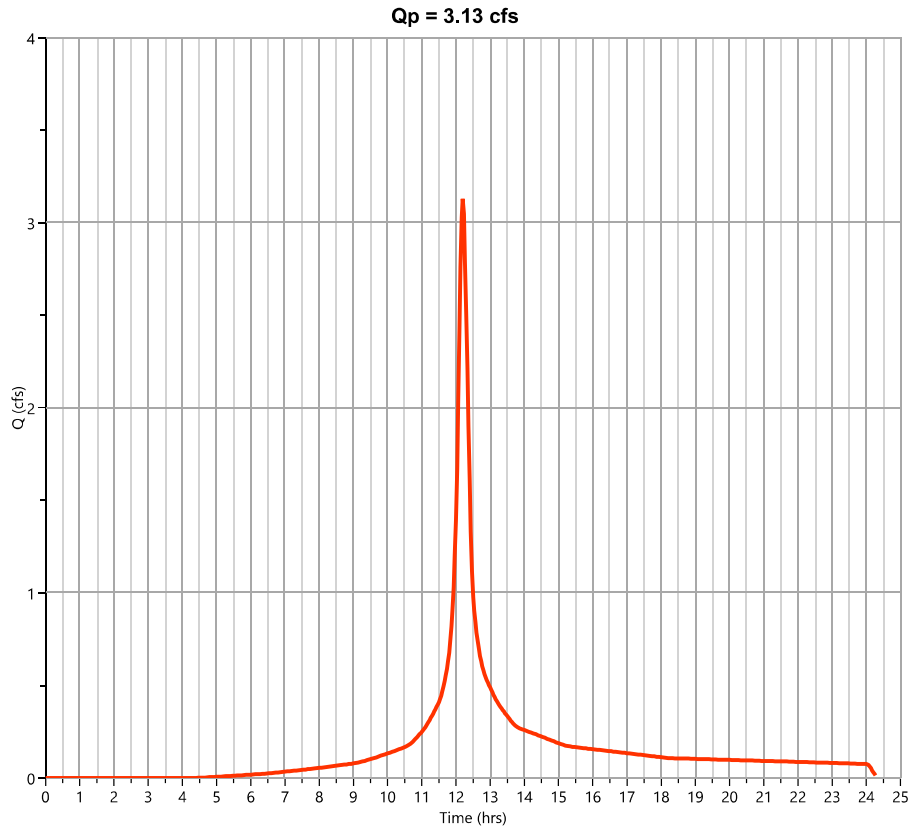
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-2 [POI-2]

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.130 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 14,159 cuft
Drainage Area	= 0.68 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 16.1 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

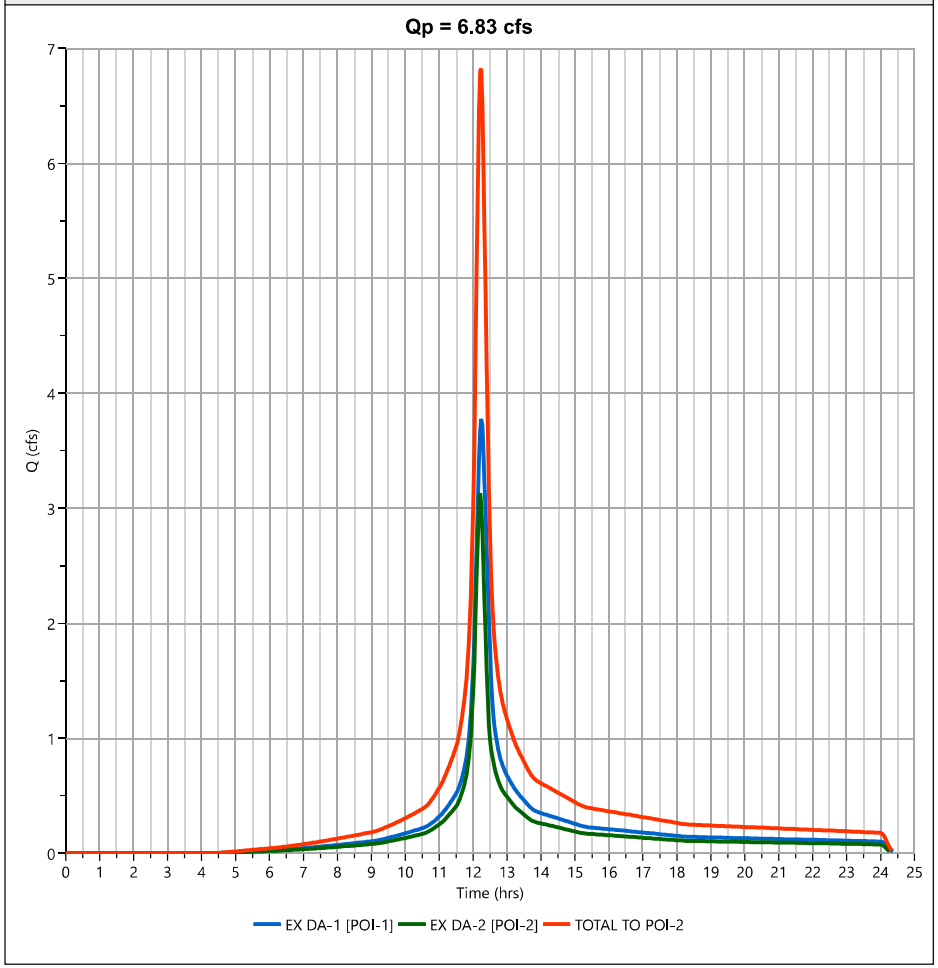
Hydrology Studio v 3.0.0.21

01-26-2022

TOTAL TO POI-2

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 6.826 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Hydrograph Volume	= 32,952 cuft
Inflow Hydrographs	= 1, 3	Total Contrib. Area	= 1.56 ac



Hydrograph Report

Project Name:

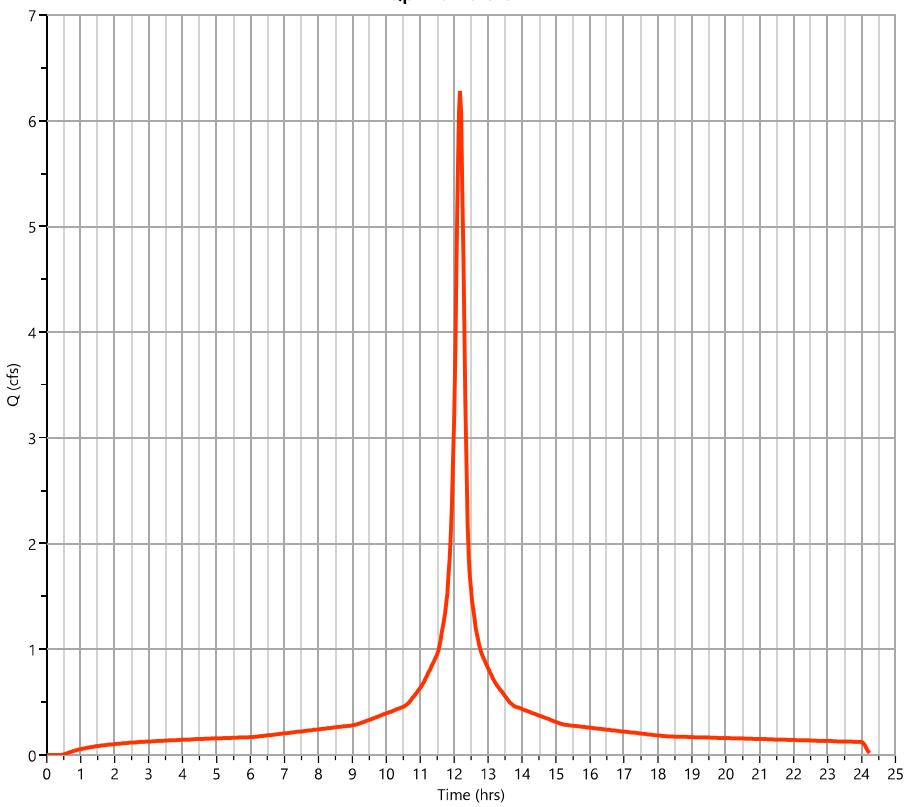
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 IMP

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.280 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 30,574 cuft
Drainage Area	= 0.97 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.6 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

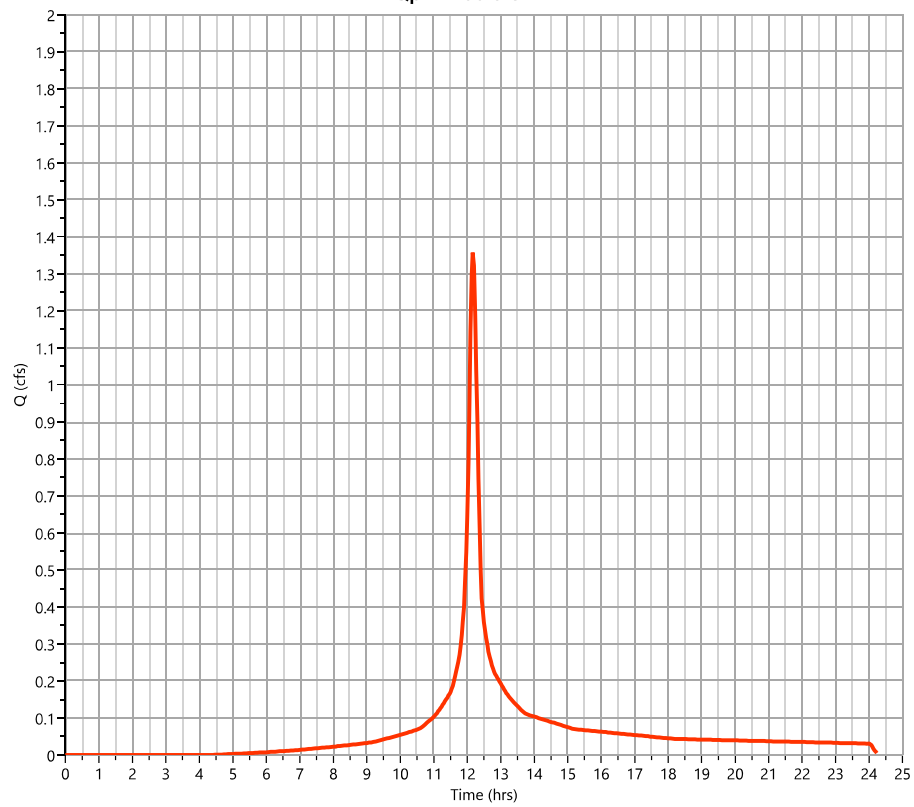
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 PER

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.357 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 5,726 cuft
Drainage Area	= 0.26 ac	Curve Number	= 77
Tc Method	= User	Time of Conc. (Tc)	= 10.6 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

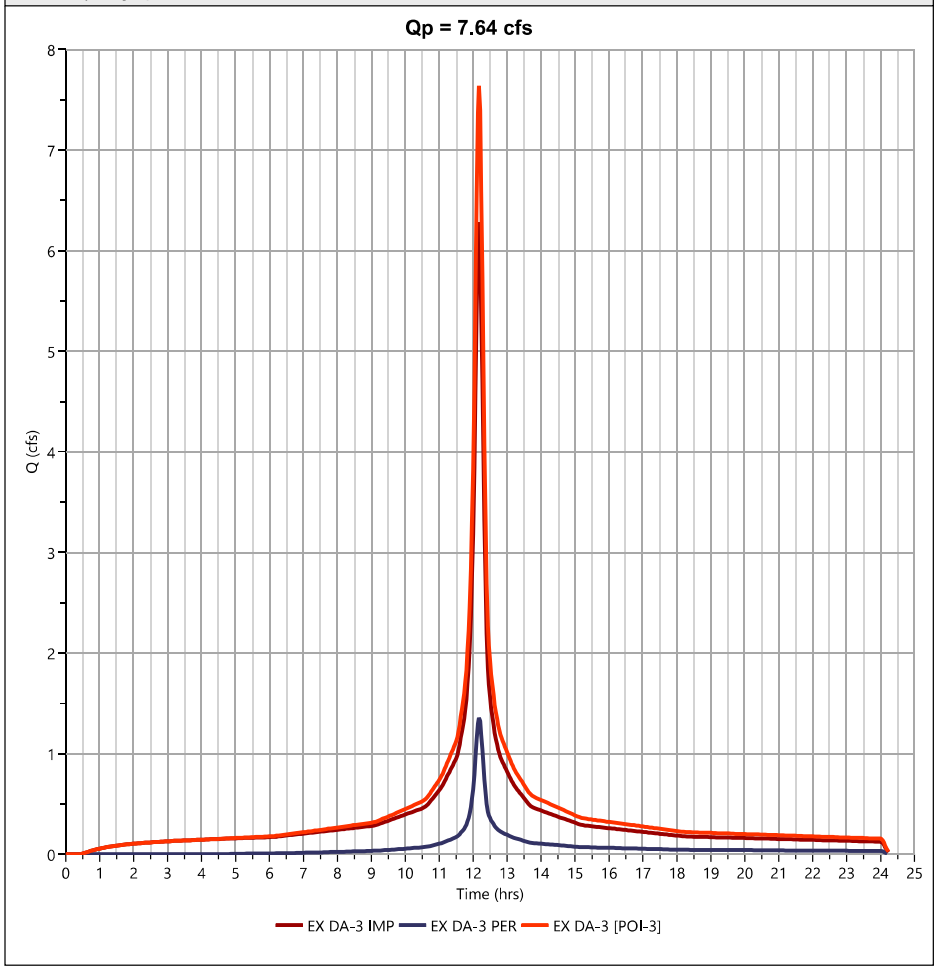
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-3 [POI-3]

Hyd. No. 9

Hydrograph Type	= Junction	Peak Flow	= 7.637 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 36,299 cuft
Inflow Hydrographs	= 7, 8	Total Contrib. Area	= 1.23 ac



Hydrograph Report

Project Name:

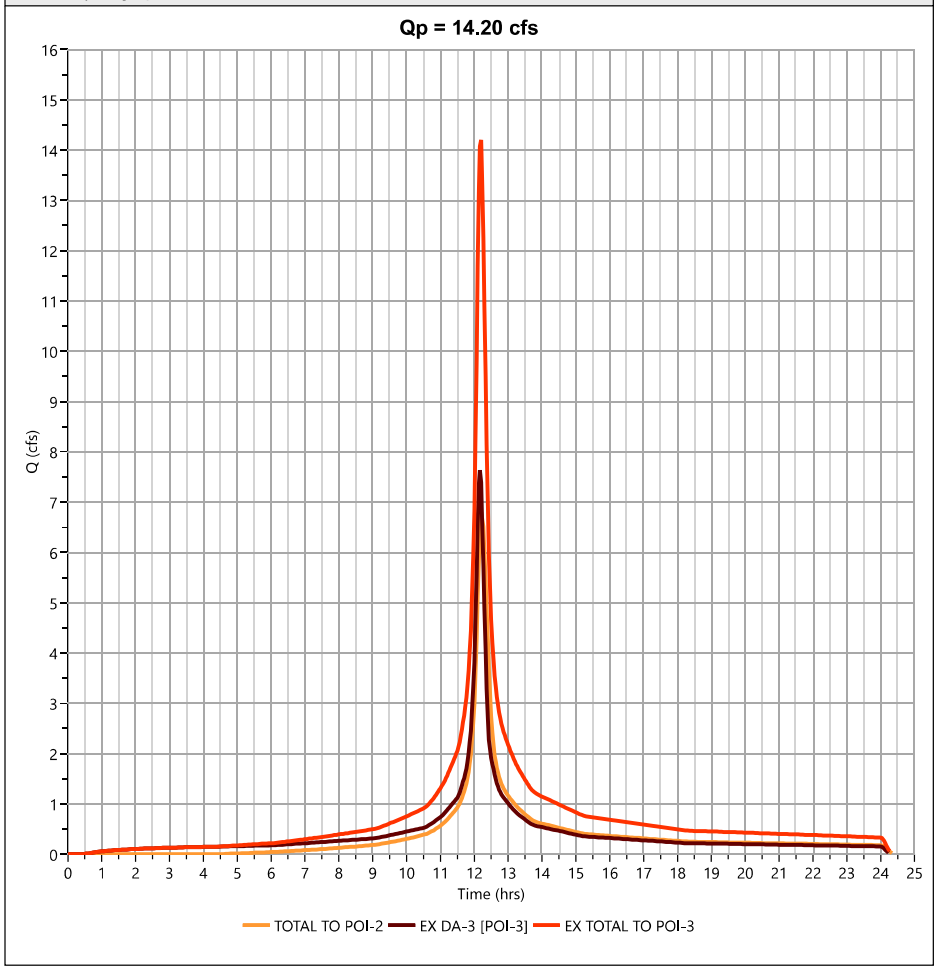
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-3

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 14.20 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 69,251 cuft
Inflow Hydrographs	= 5, 9	Total Contrib. Area	= 2.79 ac



Hydrograph Report

Project Name:

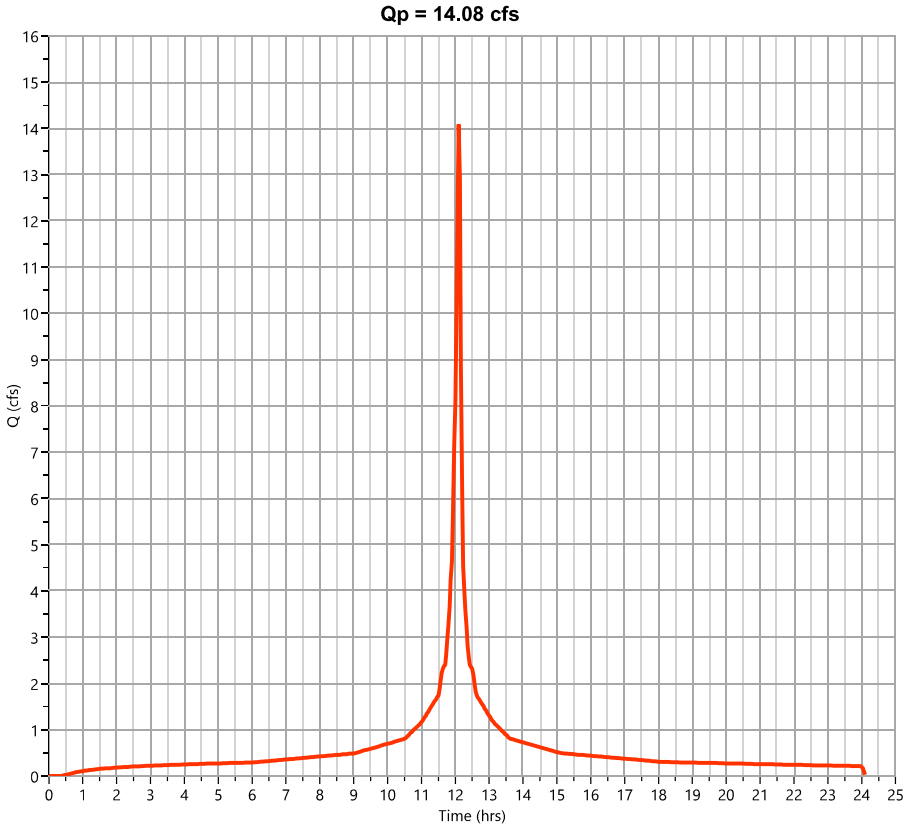
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 IMP

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 14.08 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 52,562 cuft
Drainage Area	= 1.834 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

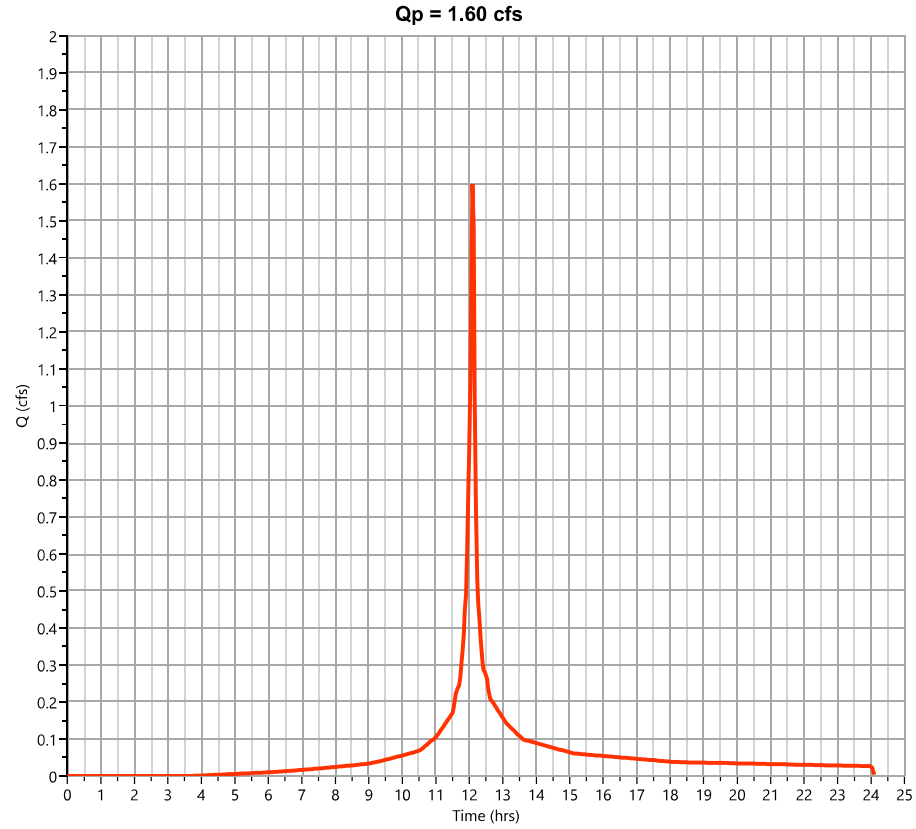
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4 PER

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.599 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 5,187 cuft
Drainage Area	= 0.244 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

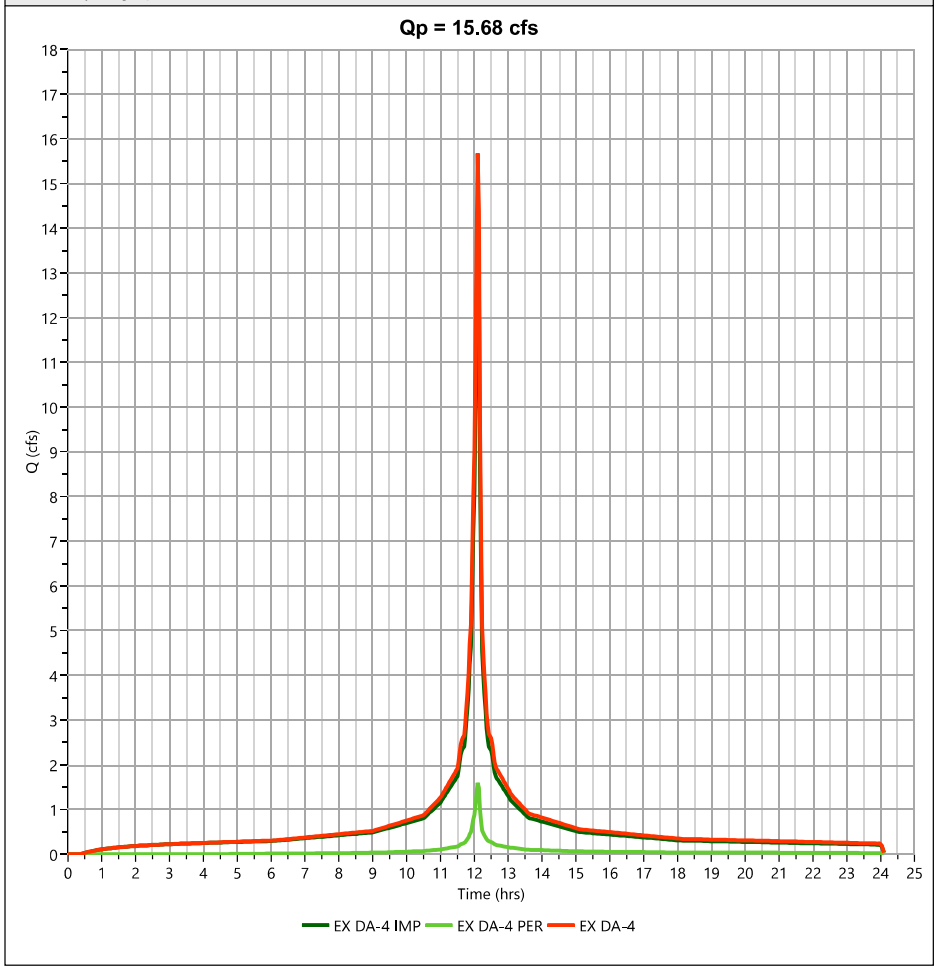
Hydrology Studio v 3.0.0.21

01-26-2022

EX DA-4

Hyd. No. 15

Hydrograph Type	= Junction	Peak Flow	= 15.68 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 57,749 cuft
Inflow Hydrographs	= 13, 14	Total Contrib. Area	= 2.078 ac



Hydrograph Report

Project Name:

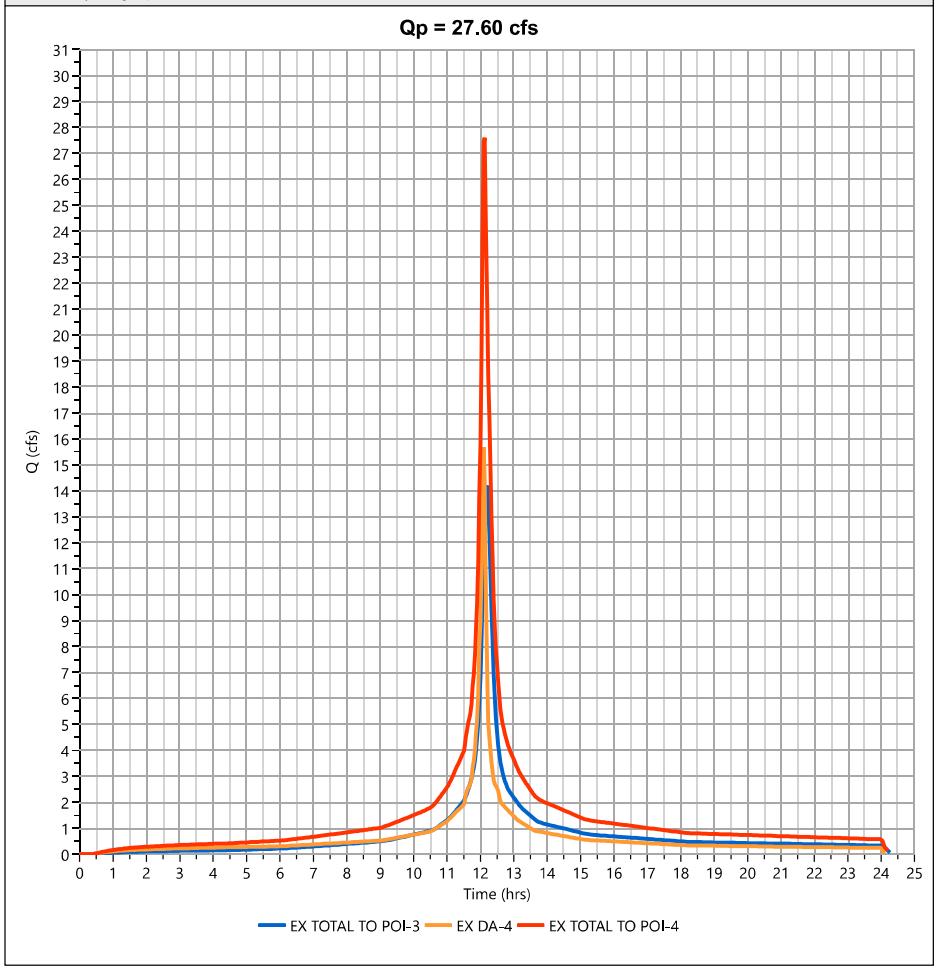
Hydrology Studio v 3.0.0.21

01-26-2022

EX TOTAL TO POI-4

Hyd. No. 17

Hydrograph Type	= Junction	Peak Flow	= 27.60 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 127,000 cuft
Inflow Hydrographs	= 11, 15	Total Contrib. Area	= 4.868 ac



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

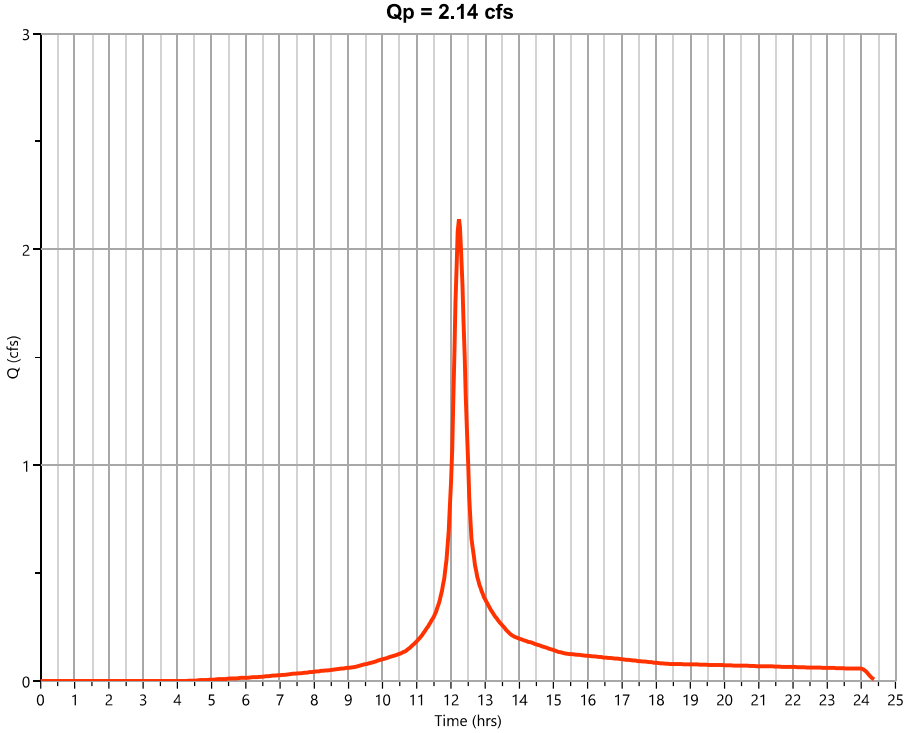
DA-1 [POI-1]

Hyd. No. 19

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.141 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 10,680 cuft
Drainage Area	= 0.49 ac	Curve Number	= 78*
Tc Method	= User	Time of Conc. (Tc)	= 18.8 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.29	77	WOODED
0.2	80	OPEN SPACE
0.49	**78**	Weighted CN Method Employed



Hydrograph Report

Project Name:

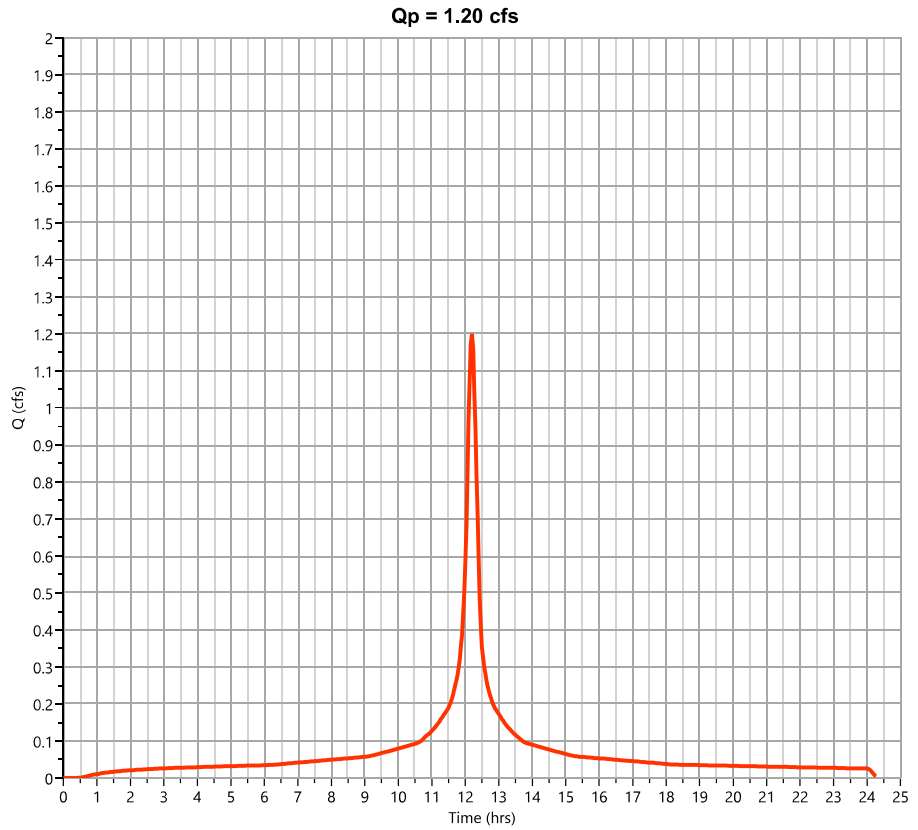
Hydrology Studio v 3.0.0.21

01-26-2022

DA-2 DET IMP

Hyd. No. 21

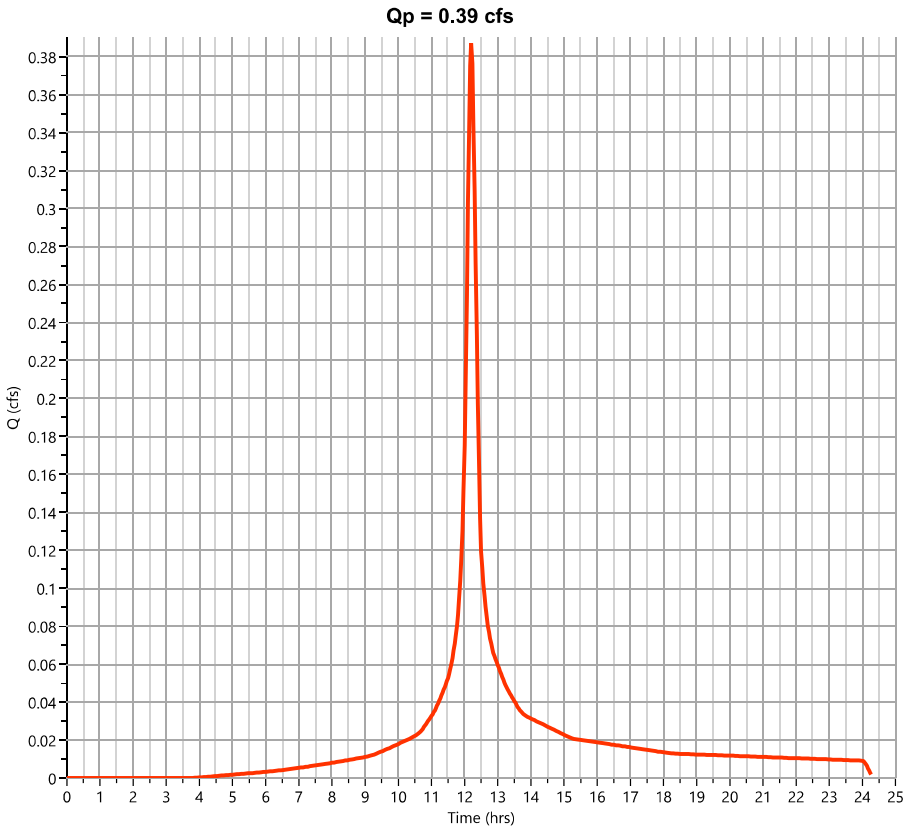
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.200 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 6,258 cuft
Drainage Area	= 0.21 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 14.6 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



DA-2 DET PER

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.387 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 1,769 cuft
Drainage Area	= 0.08 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 14.6 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

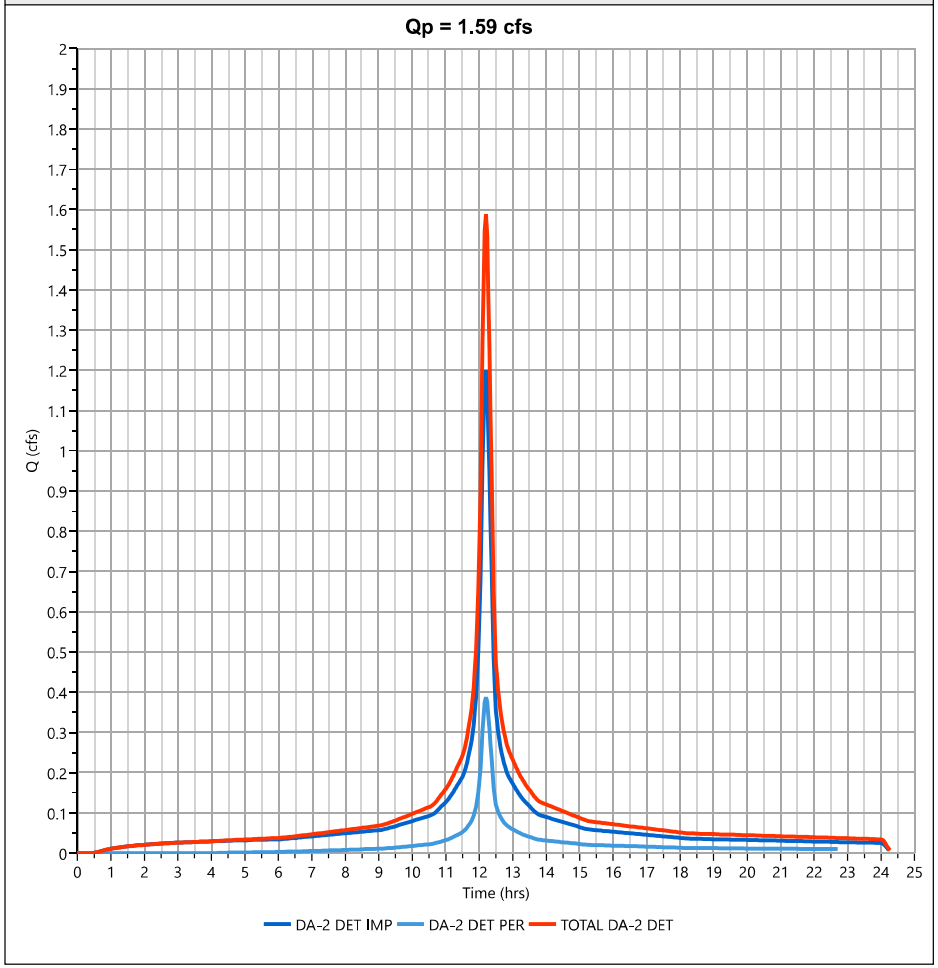


Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

TOTAL DA-2 DET

Hyd. No. 23

Hydrograph Type	= Junction	Peak Flow	= 1.587 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 8,027 cuft
Inflow Hydrographs	= 21, 22	Total Contrib. Area	= 0.29 ac

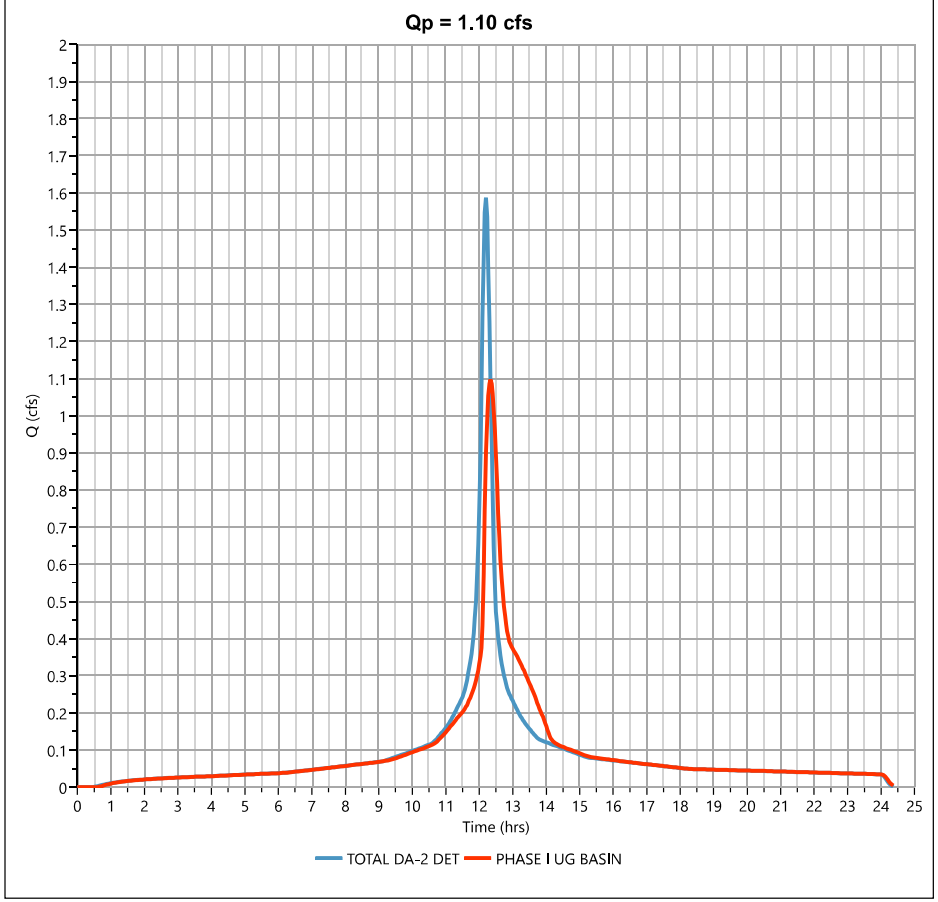


PHASE I UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 1.097 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 8,025 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 475.51 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 1,014 cuft

Pond Routing by Storage Indication Method *Center of mass detention time = 9 min*



Hydrograph Report

Project Name:

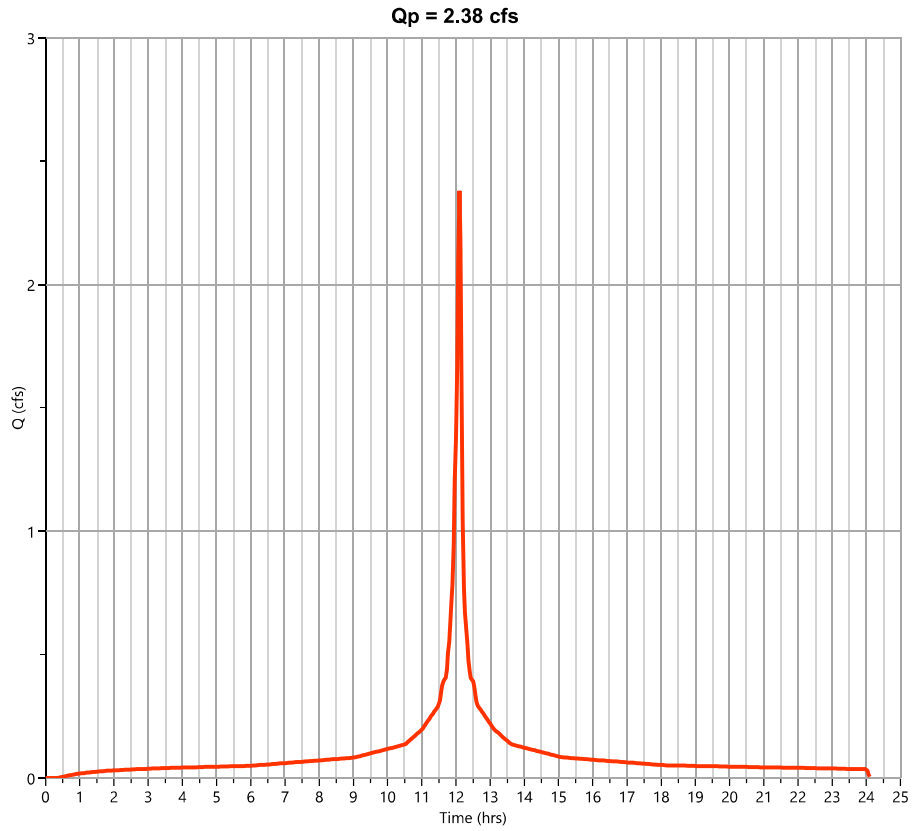
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 UNDET IMP

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.379 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 8,883 cuft
Drainage Area	= 0.31 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

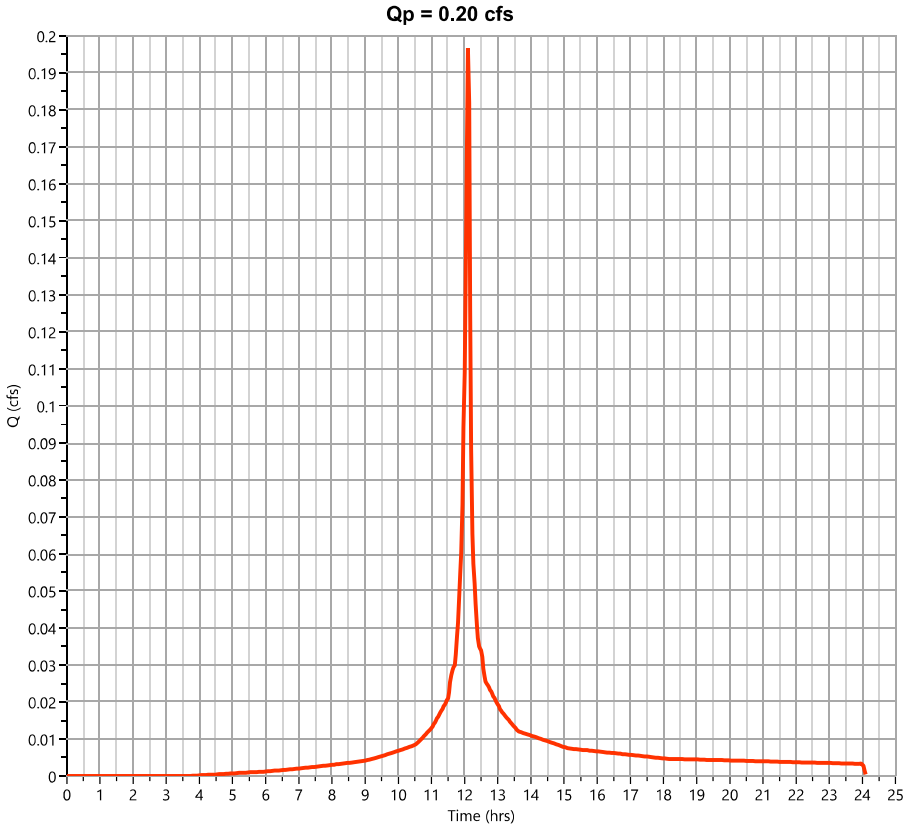
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 UNDET PER

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.197 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 638 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

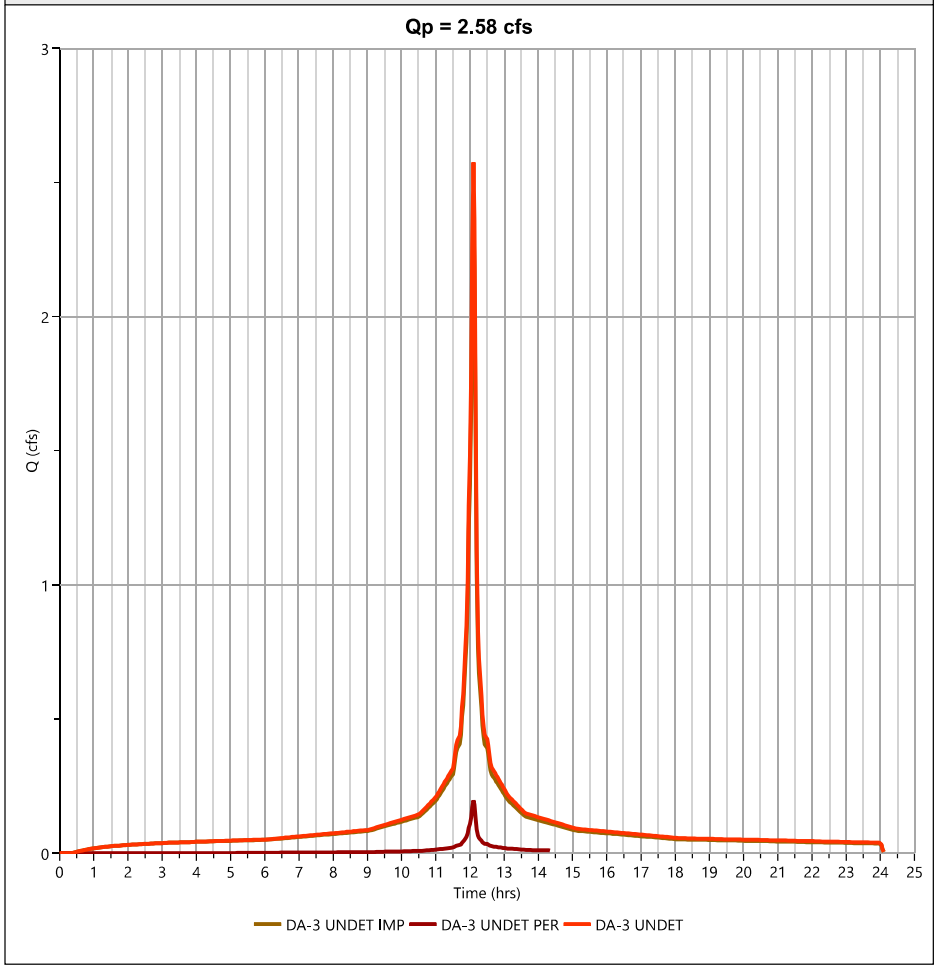
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3 UNDET

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 2.576 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 9,520 cuft
Inflow Hydrographs	= 26, 27	Total Contrib. Area	= 0.34 ac



Hydrograph Report

Project Name:

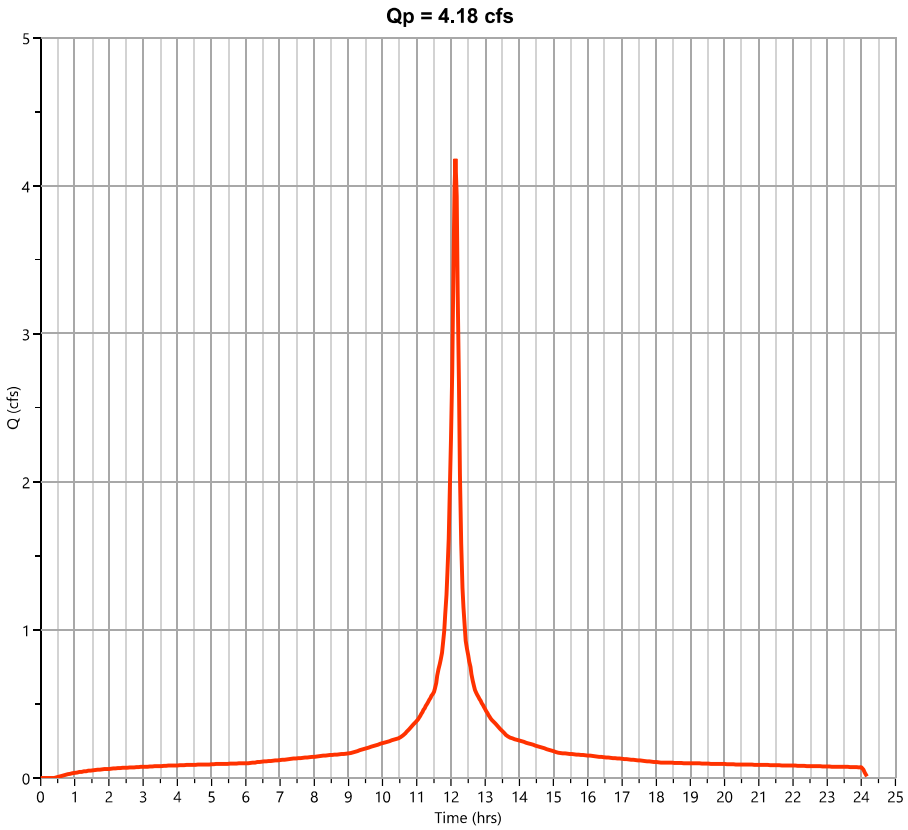
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3A DET IMP

Hyd. No. 30

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.183 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 18,033 cuft
Drainage Area	= 0.59 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 7.7 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

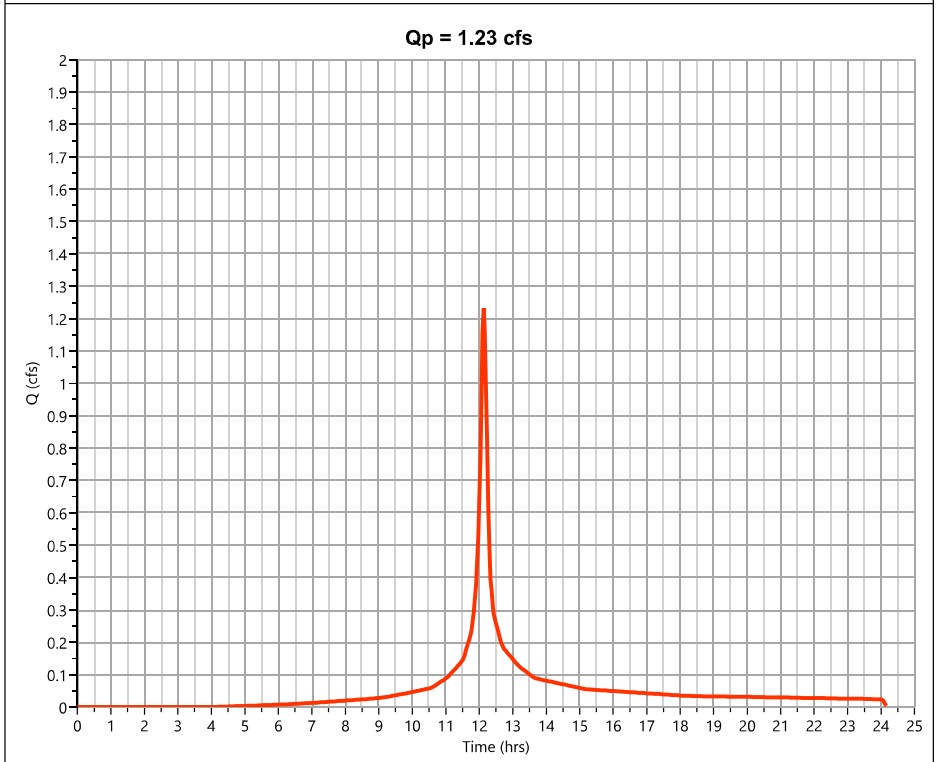
DA-3A DET PER

Hyd. No. 31

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.232 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 4,604 cuft
Drainage Area	= 0.21 ac	Curve Number	= 78.29*
Tc Method	= User	Time of Conc. (Tc)	= 7.7 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0,09	80	OPEN SPACE
0.12	77	WOODED
0.21	**78**	Weighted CN Method Employed



Hydrograph Report

Project Name:

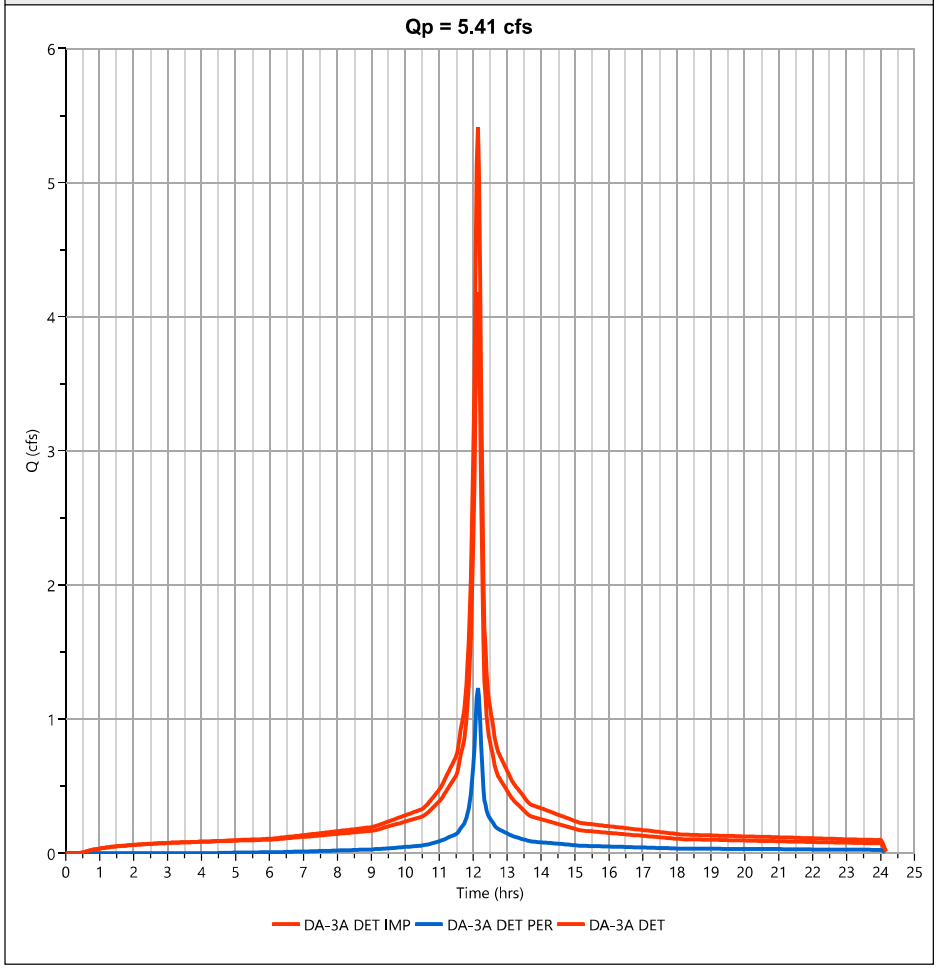
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3A DET

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 5.414 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 22,636 cuft
Inflow Hydrographs	= 30, 31	Total Contrib. Area	= 0.8 ac



Hydrograph Report

Project Name:

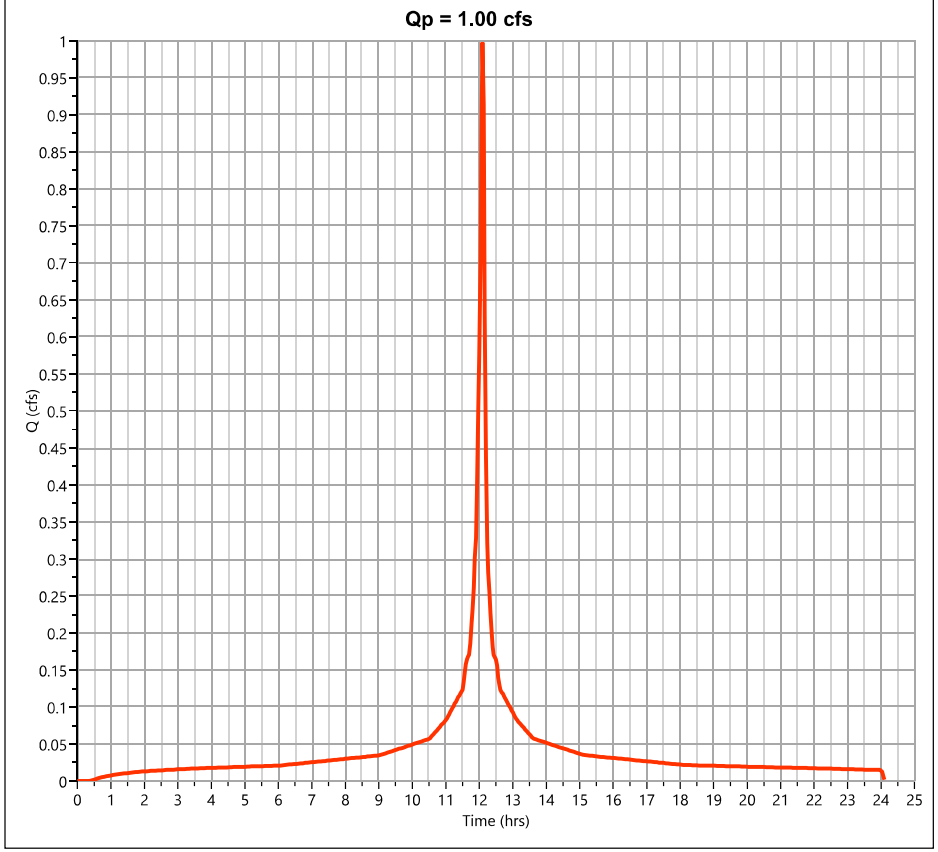
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3B DET IMP

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.998 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 3,725 cuft
Drainage Area	= 0.13 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

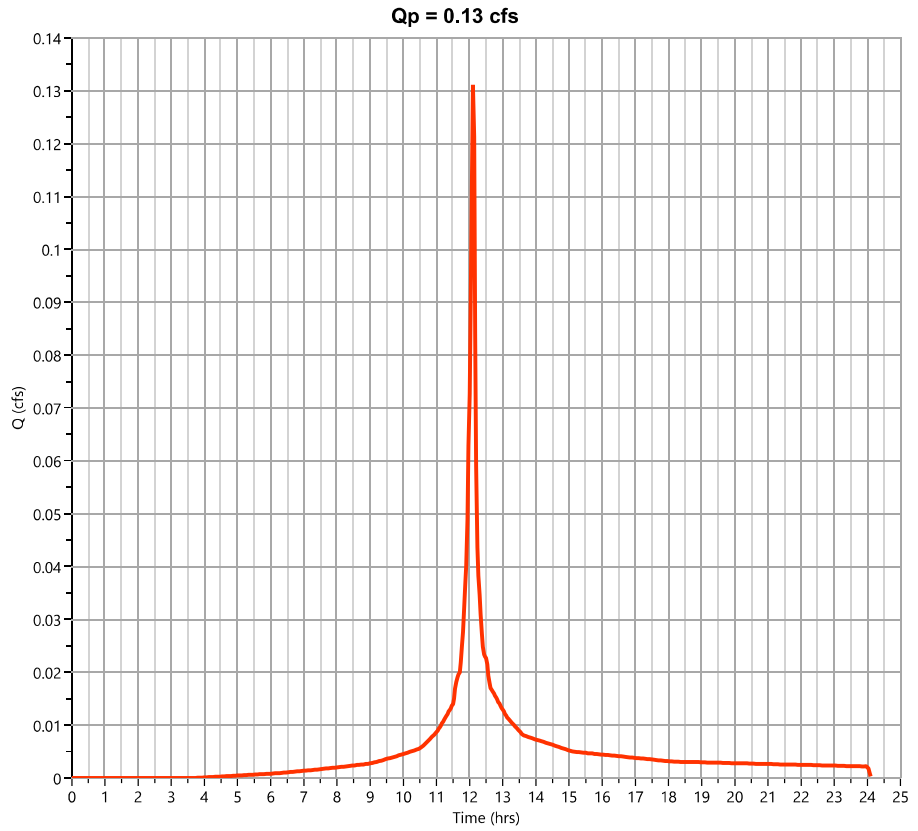
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3B DET PER

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.131 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 425 cuft
Drainage Area	= 0.02 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

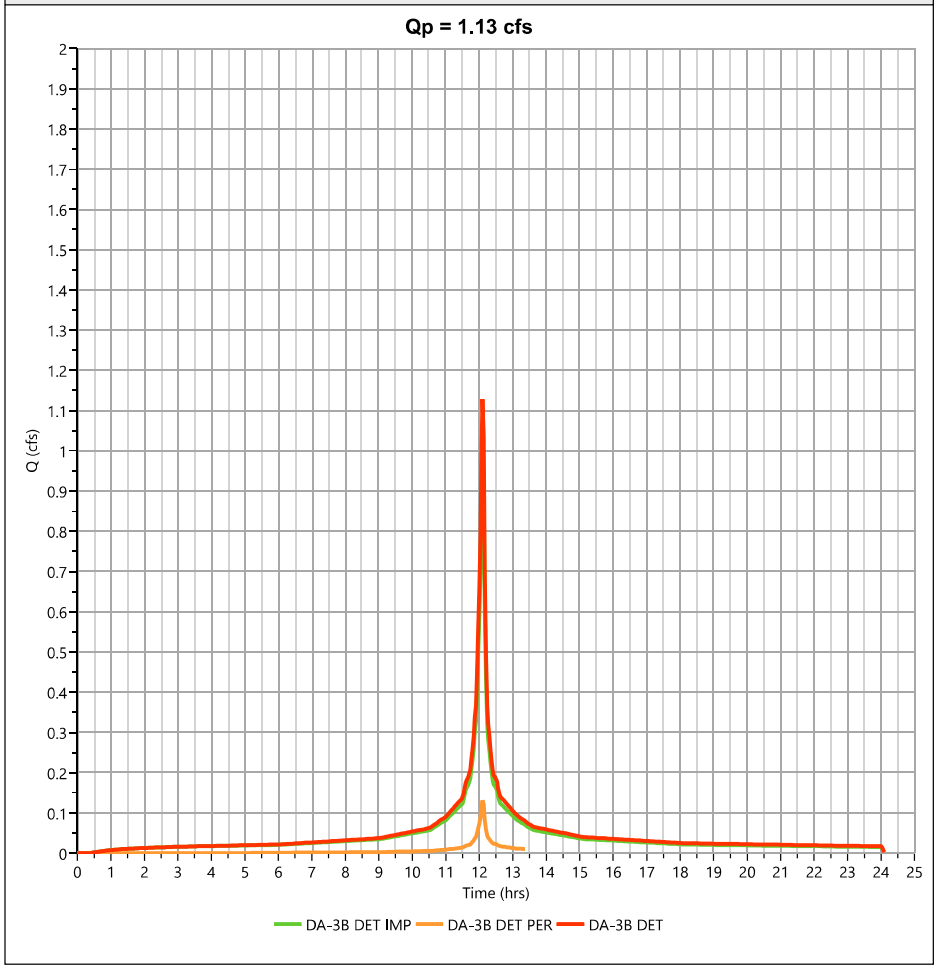
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3B DET

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 1.129 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 4,150 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 0.15 ac



Hydrograph Report

Project Name:

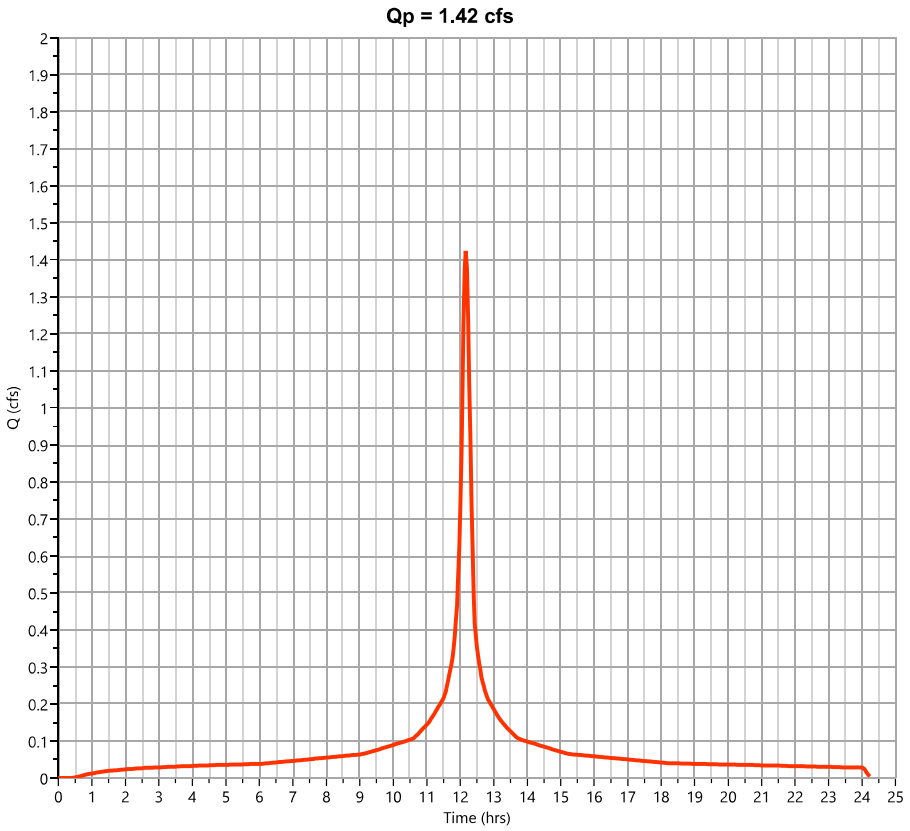
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3C DET IMP

Hyd. No. 38

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.424 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 6,934 cuft
Drainage Area	= 0.22 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

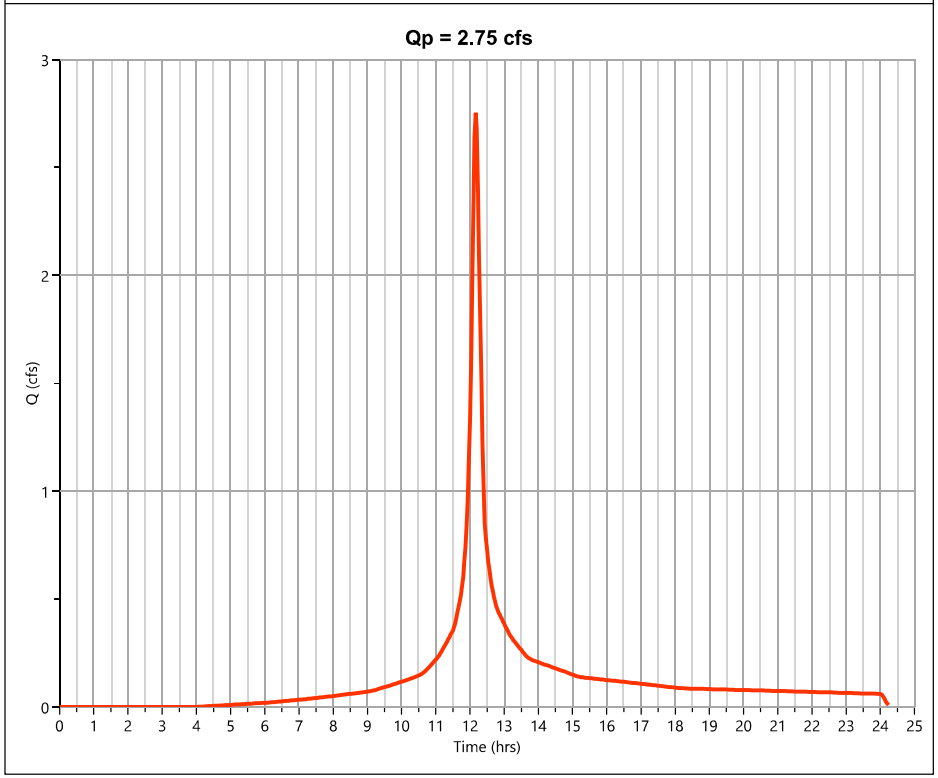
DA-3C DET PER

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.754 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 11,694 cuft
Drainage Area	= 0.51 ac	Curve Number	= 79*
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

*** Composite CN Worksheet**

AREA (ac)	CN	DESCRIPTION
0.17	77	WOODED
0.34	80	OPEN SPACE
0.51	**79**	Weighted CN Method Employed



Hydrograph Report

Project Name:

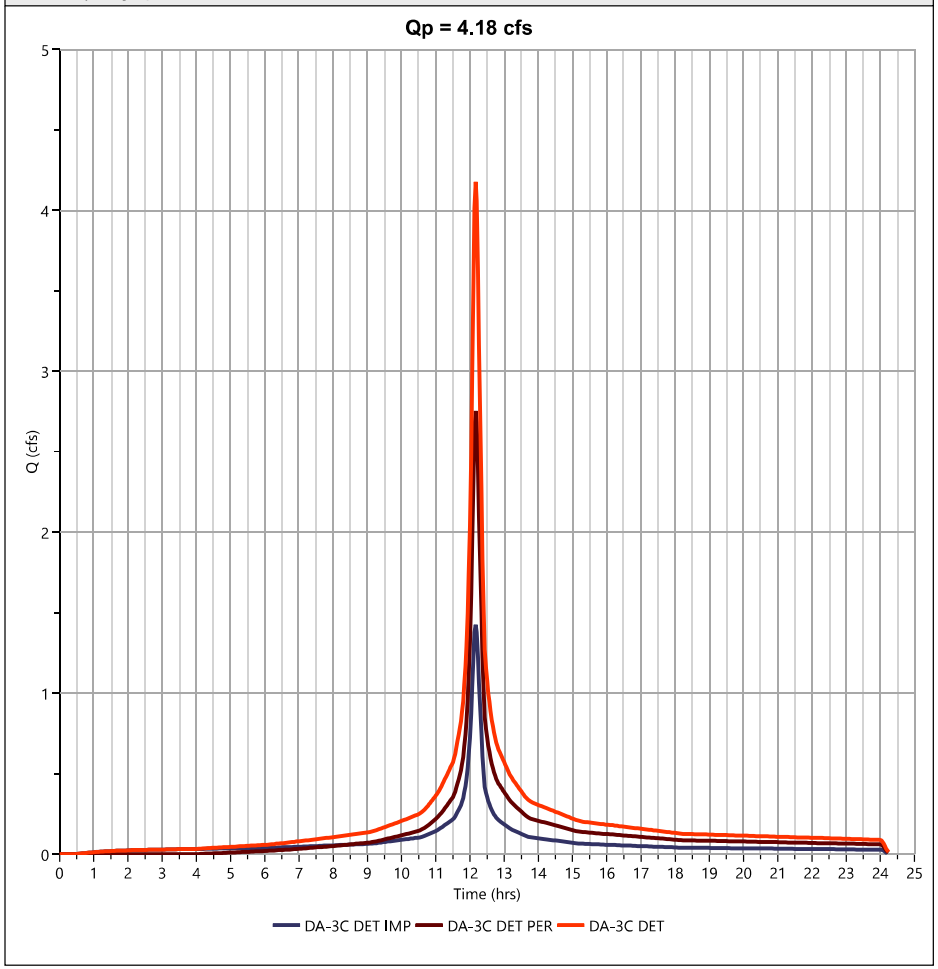
Hydrology Studio v 3.0.0.21

01-26-2022

DA-3C DET

Hyd. No. 40

Hydrograph Type	= Junction	Peak Flow	= 4.178 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 18,628 cuft
Inflow Hydrographs	= 38, 39	Total Contrib. Area	= 0.73 ac



Hydrograph Report

Project Name:

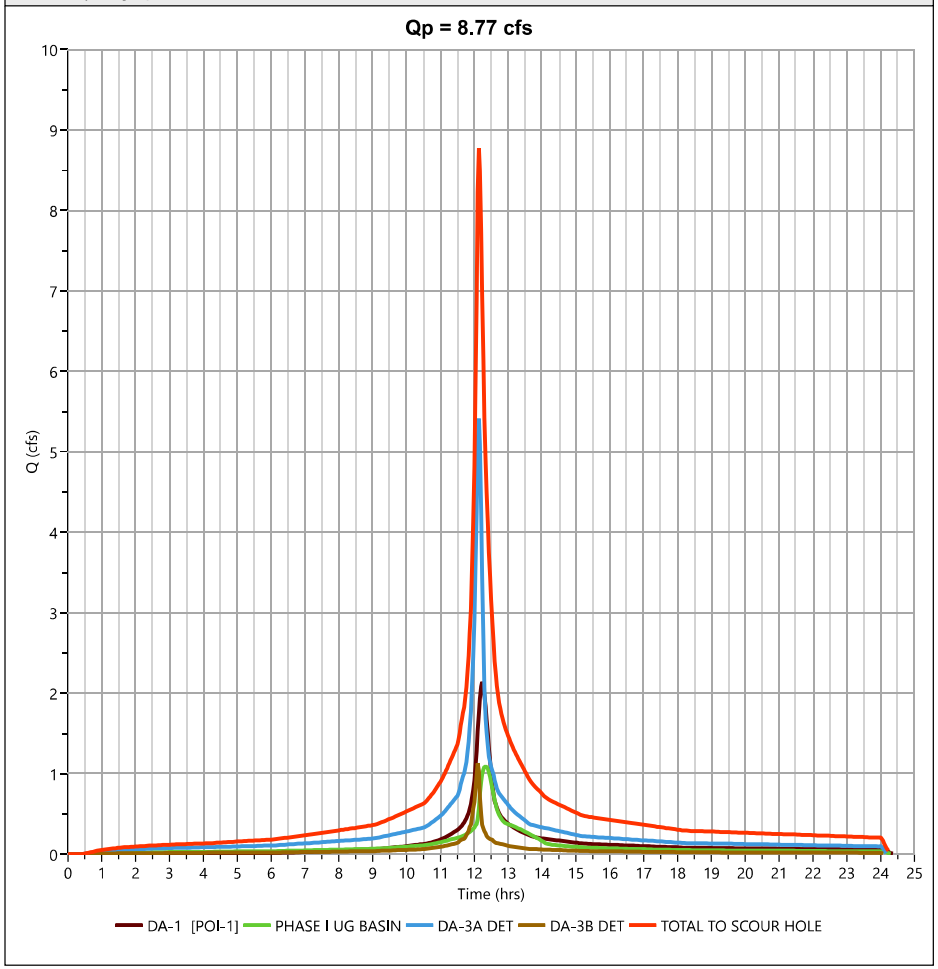
Hydrology Studio v 3.0.0.21

01-26-2022

TOTAL TO SCOUR HOLE

Hyd. No. 42

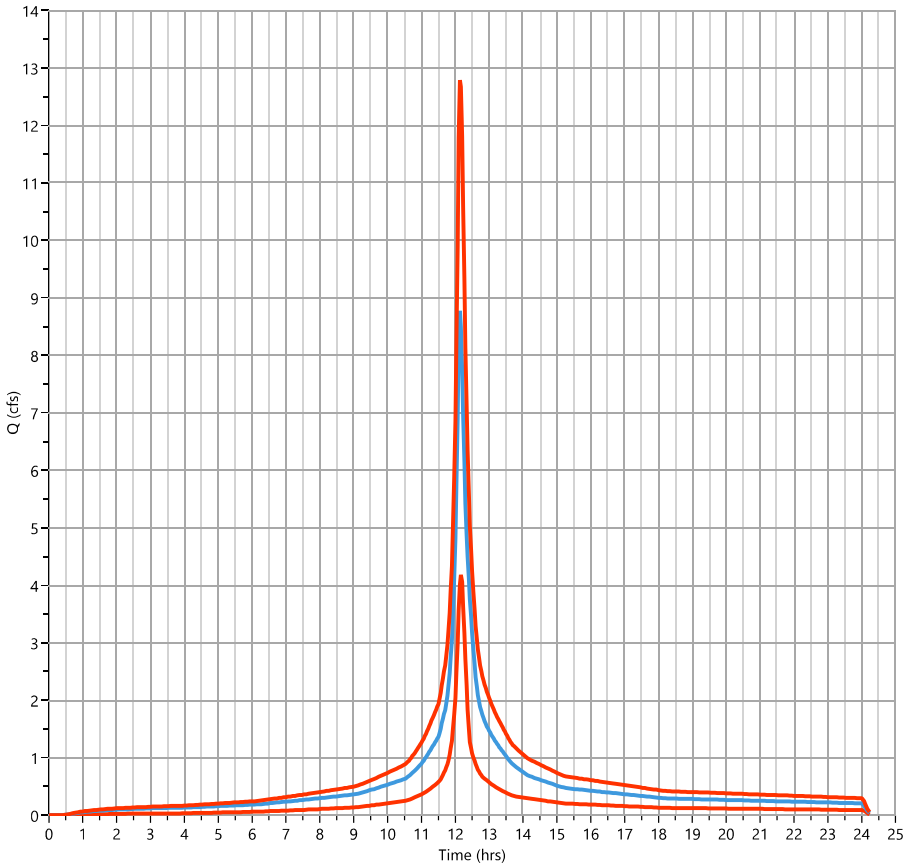
Hydrograph Type	= Junction	Peak Flow	= 8.773 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 45,492 cuft
Inflow Hydrographs	= 19, 24, 32, 36	Total Contrib. Area	= 1.44 ac



TOTAL TO AG BASIN

Hyd. No. 44

Hydrograph Type	= Junction	Peak Flow	= 12.79 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 64,120 cuft
Inflow Hydrographs	= 40, 42	Total Contrib. Area	= 2.17 ac



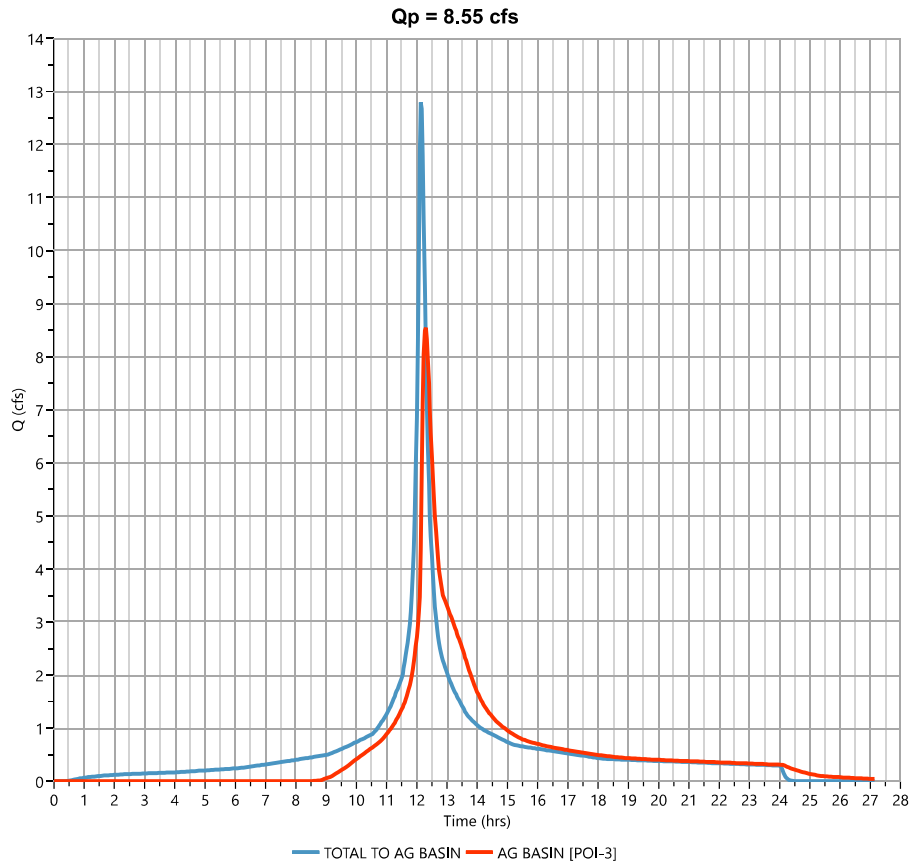
Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

AG BASIN [POI-3]

Hyd. No. 45

Hydrograph Type	= Pond Route	Peak Flow	= 8.546 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Hydrograph Volume	= 58,246 cuft
Inflow Hydrograph	= 44 - TOTAL TO AG BASIN	Max. Elevation	= 463.79 ft
Pond Name	= AG BASIN	Max. Storage	= 18,251 cuft

Pond Routing by Storage Indication Method — *Center of mass detention time = 1.48 hrs*



Hydrograph Report

Project Name:

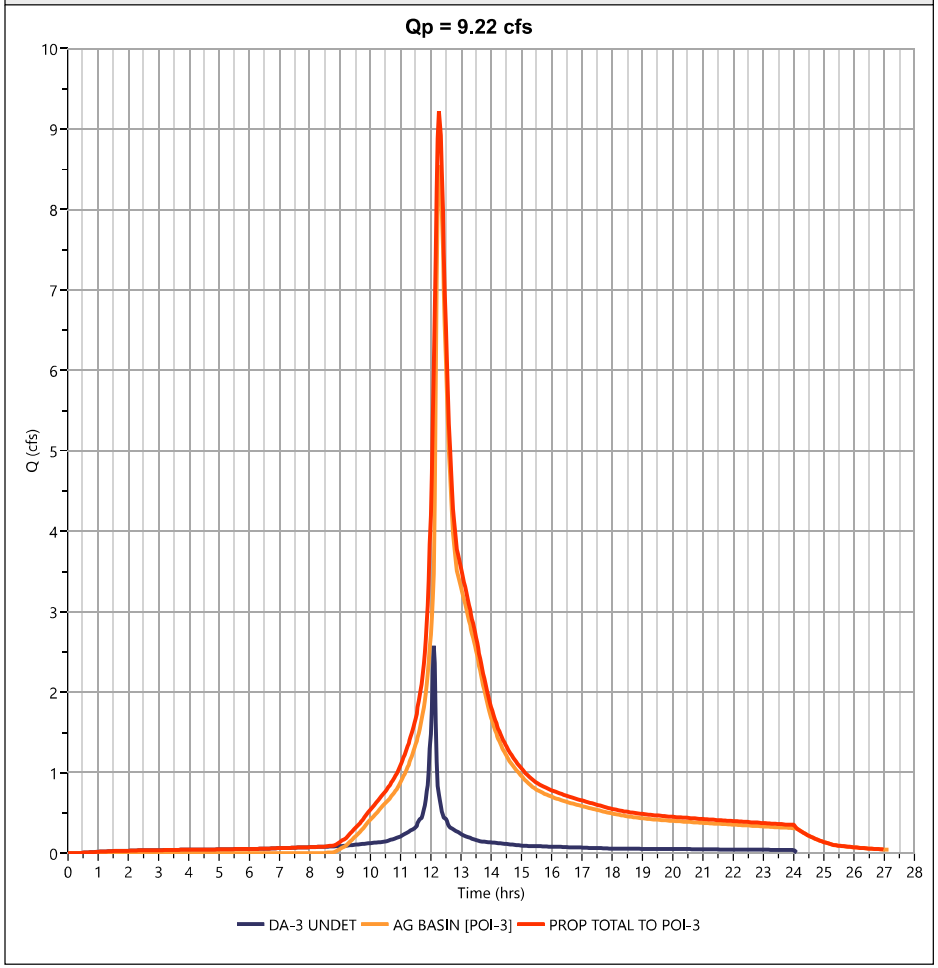
Hydrology Studio v 3.0.0.21

01-26-2022

PROP TOTAL TO POI-3

Hyd. No. 47

Hydrograph Type	= Junction	Peak Flow	= 9.218 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 67,766 cuft
Inflow Hydrographs	= 28, 45	Total Contrib. Area	= 0.34 ac



Hydrograph Report

Project Name:

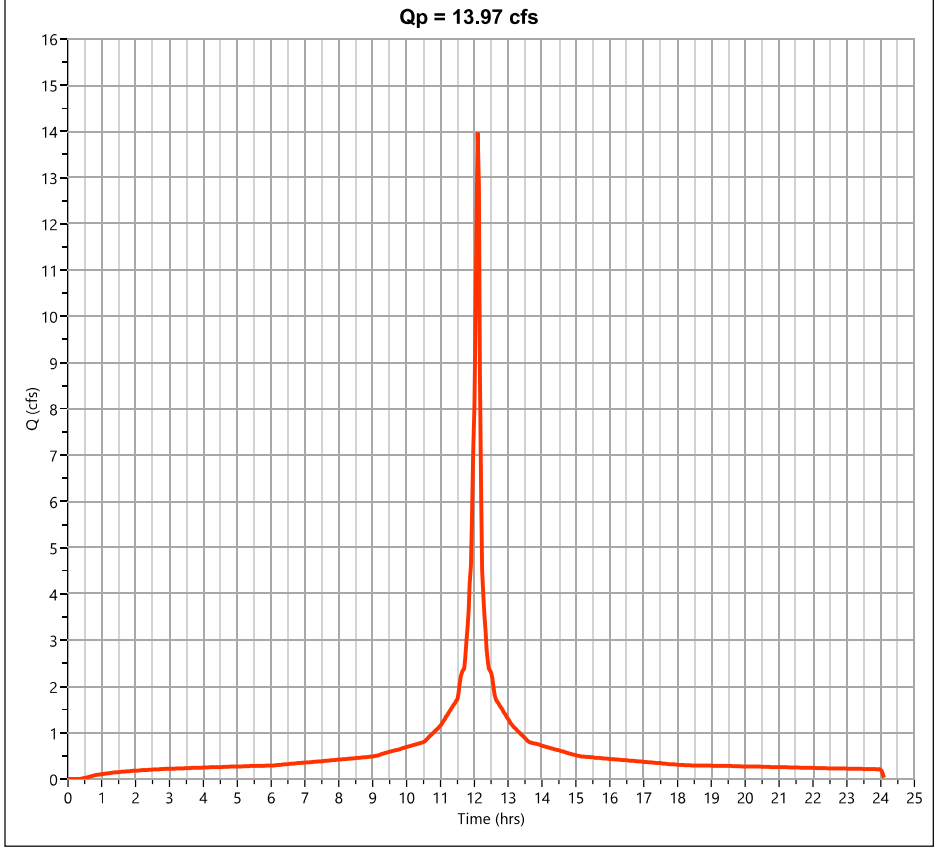
Hydrology Studio v 3.0.0.21

01-26-2022

DA-4 UNDET IMP

Hyd. No. 49

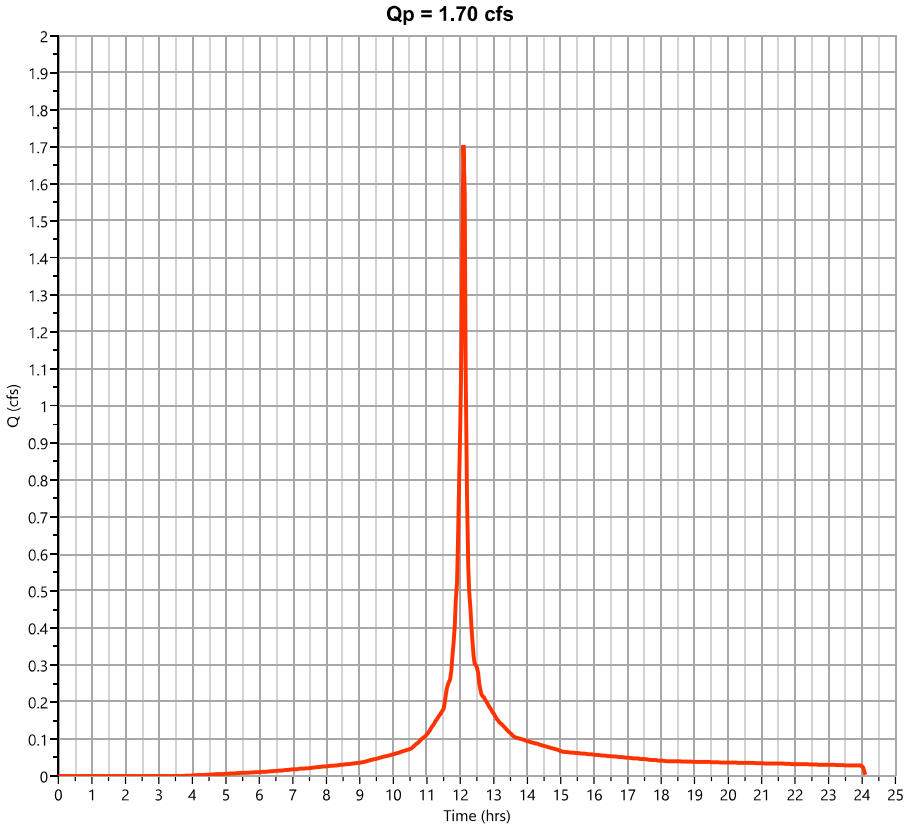
Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.97 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 52,150 cuft
Drainage Area	= 1.82 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484



DA-4 UNDET PER

Hyd. No. 50

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.704 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 5,527 cuft
Drainage Area	= 0.26 ac	Curve Number	= 80
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.66 in	Design Storm	= NRCC-D
Storm Duration	= 24 hrs	Shape Factor	= 484

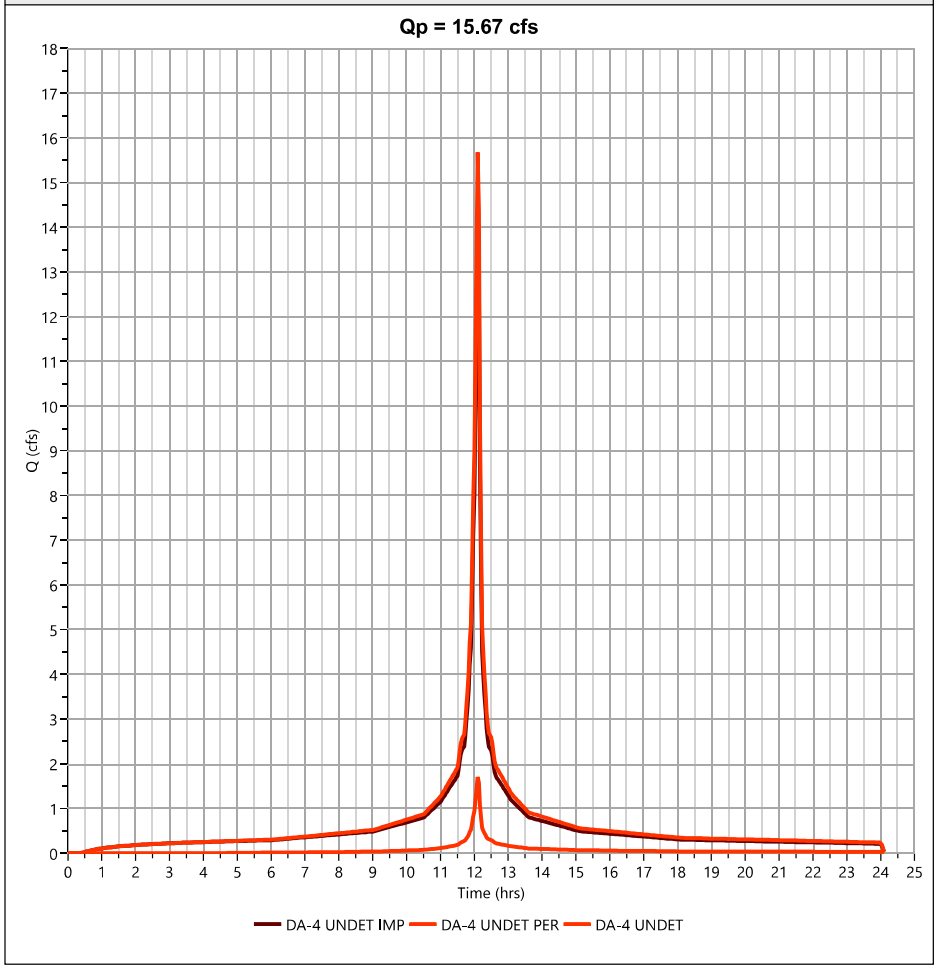


Hydrograph Report
Project Name:
Hydrology Studio v 3.0.0.21
01-26-2022

DA-4 UNDET

Hyd. No. 51

Hydrograph Type	= Junction	Peak Flow	= 15.67 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 57,677 cuft
Inflow Hydrographs	= 49, 50	Total Contrib. Area	= 2.08 ac



Hydrograph Report

Project Name:

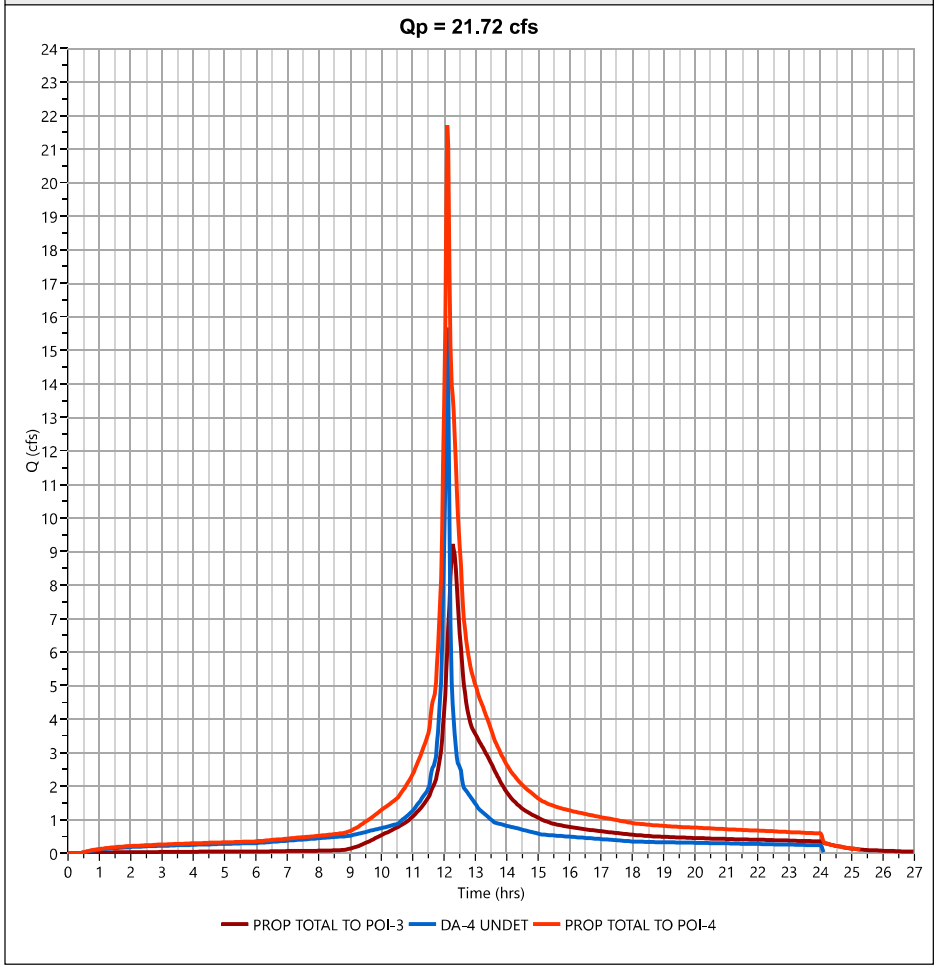
Hydrology Studio v 3.0.0.21

01-26-2022

PROP TOTAL TO POI-4

Hyd. No. 53

Hydrograph Type	= Junction	Peak Flow	= 21.72 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 125,443 cuft
Inflow Hydrographs	= 47, 51	Total Contrib. Area	= 2.42 ac



Design Storm Report

Custom Storm filename:

Hydrology Studio v 3.0.0.21

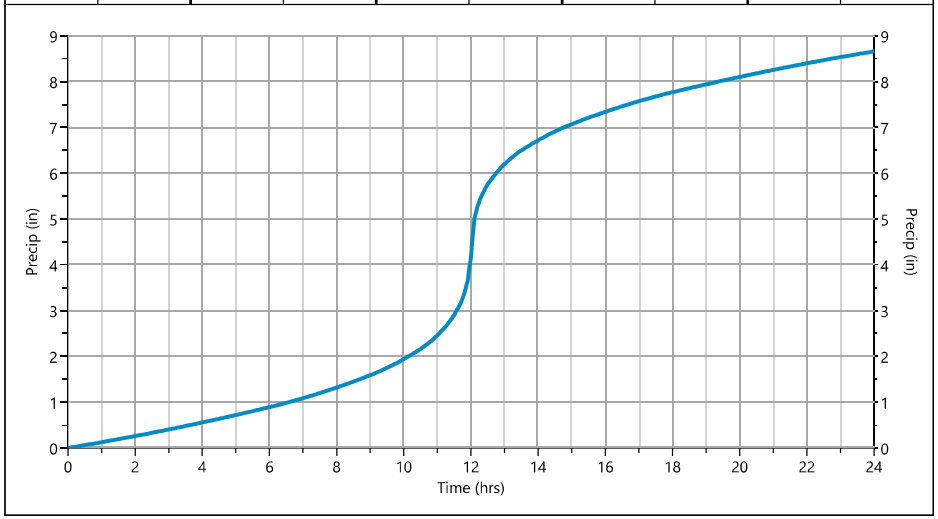
01-26-2022

Storm Distribution: Custom - NRCC-D

Storm Duration	Total Rainfall Volume (in)								
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	✔ 100-yr	
24 hrs	0.00	3.44	0.00	0.00	5.22	6.44	0.00	8.66	

Incremental Rainfall Distribution, 100-yr

Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)	Time (hrs)	Precip (in)
11.07	0.024883	11.43	0.033861	11.80	0.065356	12.17	0.093064	12.53	0.033860
11.10	0.024883	11.47	0.033860	11.83	0.093066	12.20	0.093066	12.57	0.033861
11.13	0.027135	11.50	0.033862	11.87	0.093064	12.23	0.065353	12.60	0.033860
11.17	0.027135	11.53	0.044368	11.90	0.093067	12.27	0.065354	12.63	0.031724
11.20	0.027135	11.57	0.044367	11.93	0.166301	12.30	0.065354	12.67	0.031725
11.23	0.029444	11.60	0.044368	11.97	0.166301	12.33	0.046706	12.70	0.031725
11.27	0.029444	11.63	0.046706	12.00	0.166300	12.37	0.046707	12.73	0.029444
11.30	0.029444	11.67	0.046707	12.03	0.287311	12.40	0.046707	12.77	0.029443
11.33	0.031724	11.70	0.046706	**12.07**	**0.287311**	12.43	0.044368	12.80	0.029444
11.37	0.031724	11.73	0.065354	12.10	0.287311	12.47	0.044367	12.83	0.027134
11.40	0.031724	11.77	0.065354	12.13	0.093066	12.50	0.044368	12.87	0.027134



Precipitation Report Cont'd

Precipitation filename: Essex County NRCS.pcp

Rainfall totals in Inches

01-26-2022

	Active	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Active			✔			✔	✔		✔
NRCS Storms	**> NRCS Dimensionless Storms**								
NRCS MSE1, 24-hr		0	0	0	0	0	0	0	0
NRCS MSE2, 24-hr		0	0	0	0	0	0	0	0
NRCS MSE3, 24-hr		0	0	0	0	0	0	0	0
NRCS MSE4, 24-hr		0	0	0	0	0	0	0	0
NRCS MSE5, 24-hr		0	0	0	0	0	0	0	0
NRCS MSE6, 24-hr		0	0	0	0	0	0	0	0
NOAA-A, 24-hr		0	0	0	0	0	0	0	0
NOAA-B, 24-hr		0	0	0	0	0	0	0	0
NOAA-C, 24-hr		0	0	0	0	0	0	0	0
NOAA-D, 24-hr		0	0	0	0	0	0	0	0
NRCC-A, 24-hr		0	0	0	0	0	0	0	0
NRCC-B, 24-hr		0	0	0	0	0	0	0	0
NRCC-C, 24-hr		0	0	0	0	0	0	0	0
NRCC-D, 24-hr	✔	0	3.44	0	0	5.22	6.44	0	8.66
CA-1, 24-hr		0	0	0	0	0	0	0	0
CA-2, 24-hr		0	0	0	0	0	0	0	0
CA-3, 24-hr		0	0	0	0	0	0	0	0
CA-4, 24-hr		0	0	0	0	0	0	0	0
CA-5, 24-hr		0	0	0	0	0	0	0	0
CA-6, 24-hr		0	0	0	0	0	0	0	0

PHASE 2 - EXISTING & PROPOSED HYDROGRAPHS
1YR WATER QUALITY DESIGN STORM
(HYDROGRAPHS CREATED USING HYDROLOGY STUDIO 2020 COMPUTER SOFTWARE)

Hydrograph 1-yr Summary

Project Name:

01-26-2022

Hydrology Studio v 3.0.0.21

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (min)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	EX DA-1 [POI-1]	0.162	80	373	----		
3	NRCS Runoff	EX DA-2 [POI-2]	0.137	78	281	----		
5	Junction	TOTAL TO POI-2	0.295	80	654	1, 3		
7	NRCS Runoff	EX DA-3 IMP	2.396	68	3,757	----		
8	NRCS Runoff	EX DA-3 PER	0.060	76	114	----		
9	Junction	EX DA-3 [POI-3]	2.441	70	3,870	7, 8		
11	Junction	TOTAL TO POI-3	2.601	70	4,524	5, 9		
13	NRCS Runoff	EX DA-4 IMP	5.175	64	6,458	----		
14	NRCS Runoff	EX DA-4 PER	0.115	68	144	----		
15	Junction	EX DA-4	5.252	64	6,602	13, 14		
17	Junction	TOTAL TO POI-4	7.368	66	11,126	11, 15		
19	NRCS Runoff	DA-1 [POI-1]	0.106	80	237	----		
21	NRCS Runoff	DA-2 DET IMP	0.456	70	769	----		
22	NRCS Runoff	DA-2 DET PER	0.026	76	49.0	----		
23	Junction	TOTAL DA-2 DET	0.477	72	818	21, 22		
24	Pond Route	PHASE I UG BASIN	0.285	80	817	23	474.44	218
26	NRCS Runoff	DA-3 UNDET IMP	0.874	64	1,091	----		
27	NRCS Runoff	DA-3 UNDET PER	0.014	68	17.7	----		
28	Junction	DA-3 UNDET	0.884	64	1,109	26, 27		
30	NRCS Runoff	DA-3A DET IMP	1.603	66	2,216	----		
31	NRCS Runoff	DA-3A DET PER	0.067	72	106	----		
32	Junction	DA-3A DET	1.643	66	2,322	30, 31		
34	NRCS Runoff	DA-3B DET IMP	0.367	64	458	----		
35	NRCS Runoff	DA-3B DET PER	0.009	68	11.8	----		
36	Junction	DA-3B DET	0.373	64	469	34, 35		

Hydrograph 1-yr Summary

Project Name:

01-26-2022

Hydrology Studio v 3.0.0.21

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (min)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	NRCS Runoff	DA-3C DET IMP	0.543	68	852	----		
39	NRCS Runoff	DA-3C DET PER	0.163	74	292	----		
40	Junction	DA-3C DET	0.684	70	1,144	38, 39		
42	Junction	TOTAL TO SCOUR HOLE	2.220	66	3,845	19, 24, 32, 36		
44	Junction	TOTAL TO AG BASIN	2.821	68	4,989	40, 42		
45	Pond Route	AG BASIN [POI-3]	0.000	0	0.000	44	461.77	4,989
47	Junction	PROP TOTAL TO POI-3	0.884	64	1,109	28, 45		
49	NRCS Runoff	DA-4 UNDET IMP	5.134	64	6,408	----		
50	NRCS Runoff	DA-4 UNDET PER	0.123	68	153	----		
51	Junction	DA-4 UNDET	5.216	64	6,561	49, 50		
53	Junction	PROP TOTAL TO POI-4	6.100	64	7,670	47, 51		

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

AG BASIN [POI-3]

Hyd. No. 45

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 1-yr	Time to Peak	= 0 min
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 44 - TOTAL TO AG BASIN	Max. Elevation	= 461.77 ft
Pond Name	= AG BASIN	Max. Storage	= 4,989 cuft

Pond Routing by Storage Indication Method

Qp = 0.00 cfs

RIP RAP CALCULATIONS

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 1/20/2022
Project: Altera
Project No: 2530-99-006

Calculated By: SDP
Checked By: PAF

Conduit Outlet Protection Calculations

Rip Rap Pad # A

Design Parameters:

Design Storm Flow for 25 Year, Q	2.92	cfs
Vertical Dimension of Outlet Pipe, D_o	18	in
Horizontal Dimension of Outlet Pipe, W_o	18	in
Tailwater Depth, TW[1]	0.25	ft

Apron Dimension Calculations:

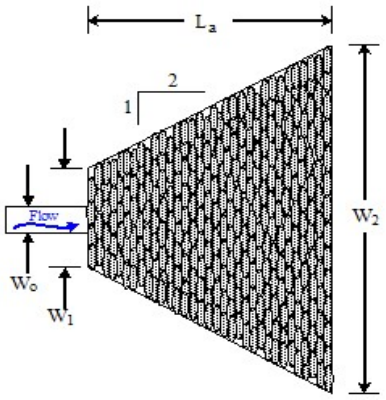
Unit Dicharge, $q = Q/D_o$ = 1.95 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = 13.36 ft or **L_a = 14 ft**

Width, $W_1 = 3W_o$ = 4.5 ft or **W_1 = 5 ft**

Width, $W_2 = 3W_o + L_a$ = 17.86 ft or **W_2 = 18 ft**

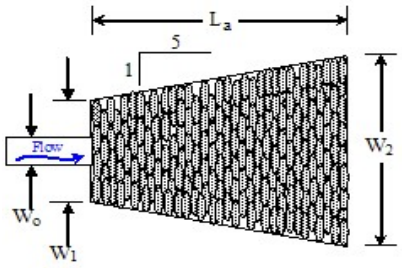


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = **L_a =**

Width, $W_1 = 3W_o$ = **W_1 =**

Width, $W_2 = 3W_o + 0.4L_a$ = **W_2 =**



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 2.33 in **d_{50} = 6 in**

Notes:

1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

DYNAMIC ENGINEERING

245 Main Street, Suite 110, Chester, NJ 07930
(908) 879-9229

Date: 1/20/2022
Project: Altera
Project No: 2530-99-006

Calculated By: SDP
Checked By: PAF

Conduit Outlet Protection Calculations

Rip Rap Pad # B

Design Parameters:

Design Storm Flow for 25 Year, Q	6.22	cfs
Vertical Dimension of Outlet Pipe, D_o	18	in
Horizontal Dimension of Outlet Pipe, W_o	18	in
Tailwater Depth, TW[1]	0.40	ft

Apron Dimension Calculations:

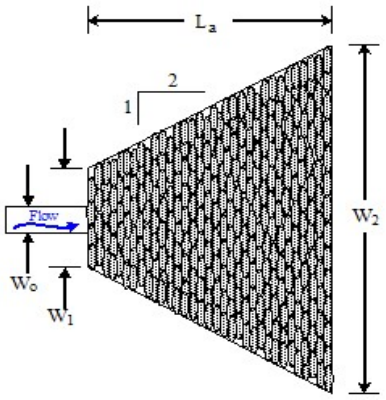
Unit Dicharge, $q = Q/D_o$ = 4.14 cfs per foot

- **Case I: $TW < 1/2\ D_o$**

Apron Length, $L_a = \frac{1.8q}{D_o^{1/2}} + 7D_o$ = 16.59 ft or **L_a = 17 ft**

Width, $W_1 = 3W_o$ = 4.5 ft or **W_1 = 5 ft**

Width, $W_2 = 3W_o + L_a$ = 21.09 ft or **W_2 = 22 ft**

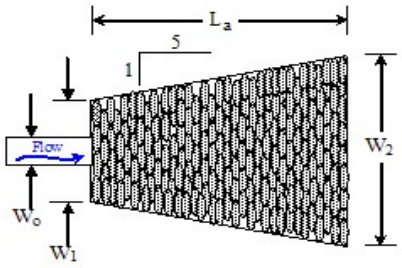


- **Case II: $TW \geq 1/2\ D_o$**

Apron Length, $L_a = \frac{3q}{D_o^{1/2}}$ = **L_a =**

Width, $W_1 = 3W_o$ = **W_1 =**

Width, $W_2 = 3W_o + 0.4L_a$ = **W_2 =**



Rip Rap Stone Size Calculations:

Median Stone, $d_{50} = \frac{0.02q^{1.33}}{TW}$ = 3.97 in **d_{50} = 6 in**

Notes:

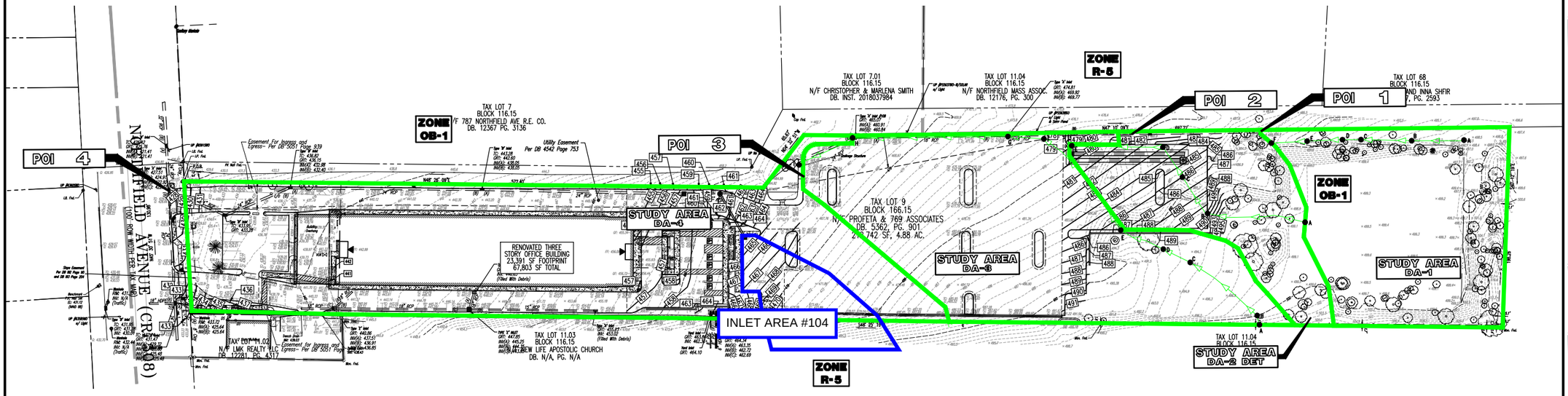
1. Where there is a well-defined channel downstream of the apron, the bottom width of the apron shall be at least equal to the bottom width of the channel and the structural lining shall extend at least one foot above the tailwater elevation, but no lower than two-thirds of the vertical conduit dimension above the conduit invert.
2. The side slopes shall be 2:1 or flatter.
3. The bottom grade shall be 0.0% (level).
4. There shall be no overfall at the end of the apron or at the end of the culvert.
5. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
6. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
7. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
8. No bends or curves at the intersection of the conduit and apron will be permitted.

Footnote:

1. Tailwater depth shall be the 2-year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.
2. For multiple pipes, increase rip-rap sizes by 25% when pipe spacing is greater than or equal to $1/4W_o$.

INLET AREA CALCULATIONS AND STORMWATER COLLECTION SYSTEM CALCULATIONS (PIPE SIZING)

THIS PLAN TO BE UTILIZED FOR STORMWATER/DRAINAGE ANALYSIS PURPOSES ONLY



GRAPHIC SCALE

−50 0 25 50 100 200

(IN FEET)
1 INCH = 50 FT.

REV.	DATE	COMMENTS	BY
1	01/24/22	REVISED PER TOWNSHIP COMMENTS & PHASED DEVELOPMENT	RRR

THIS PLAN SET IS FOR PERMITTING PURPOSES ONLY AND MAY NOT BE USED FOR CONSTRUCTION

DESIGNED BY: RJC
DRAWN BY: SDP
CHECKED BY: JCS
CHECKED BY: –

PROJECT: **ALTERA 769, LLC**
PROPOSED SITE IMPROVEMENTS
BLOCK 166.15, LOT 9
769 NORTHFIELD AVENUE (CR 508)
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ

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ROBERT J. COLUCCO III
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 55851

JOSEPH C. SPARONE
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

TITLE: **INLET AREA MAP (PHASE 1)**

SCALE: (H) 1"=50'
(V)
DATE: 08/06/2021
PROJECT No: 2530-99-006

SHEET No: 2 OF 4
Rev. #: 1

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Plotted: 01/06/22 – 10:34 AM By: sjolshop
File: P:\DEC20\PROJECTS\2530 Altera Development\99-006 West Orange\Dwg\DA Maps\D2530990006P1PDAM1.dwg, ----> 02 PROPOSED CONDITIONS DRAINAGE AREA MAP (PHASE 1)

DYNAMIC ENGINEERING

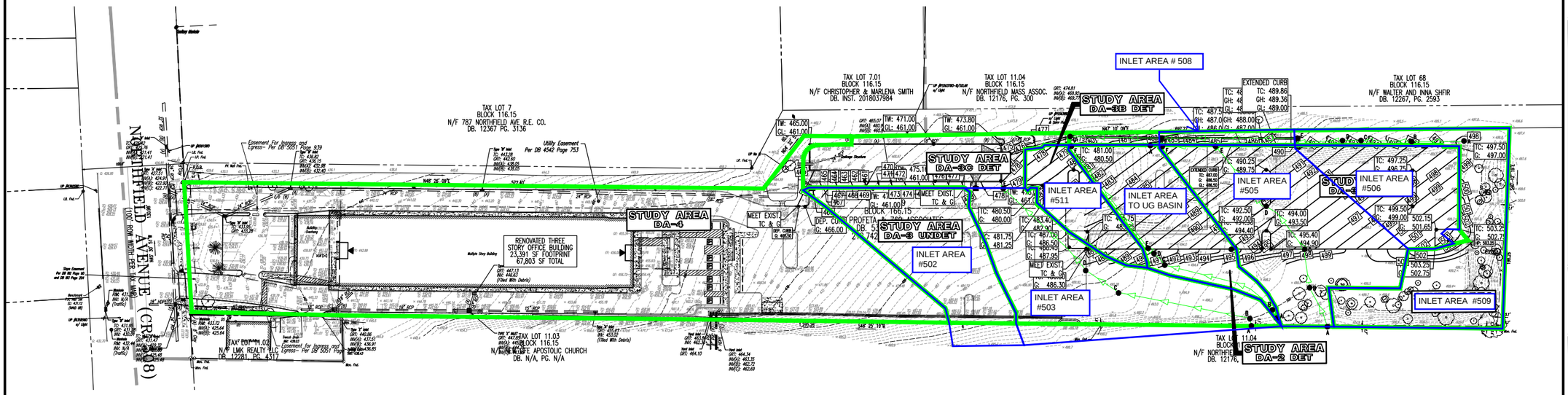
Stormwater Collection System Calculations

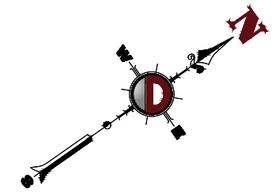
Project: Altera - West Orange
Job #: 2530-99-006
Location: West Orange, NJ
Design Storm: 100-yr

Computed By: SDP
Checked By: RJC
Date: 1/24/2022

NOTES:
1) Design method used is Rational Method, unless otherwise noted.
2) Refer to Weighted Runoff Coefficient table for calculation of incremental areas and C values

PIPE SECTION		SUBCATCHMENT AREA	INCREMENTAL		CUMULATIVE	TIME OF CONCENTRATION			I	PEAK RUNOFF		PIPING INPUT			PIPING DATA		
FROM	TO	Area (Acres)	"C"	A x C Ac	A x C (acres)	Tc to Inlet (min)	Tc in Pipe (min.)	Final Tc (min)	(In/Hr)	Q to Inlet (CFS)	Q cum. for Pipe (CFS)	Dia. (In)	Length (Ft)	Man. "n"	Slope (ft/ft)	Pipe Capacity (cfs)	Pipe Velocity (fps)
INLET-104	MH #106	0.22	0.95	0.21	0.21	6.00	0.13	6.00	9.10	1.91	1.91	18	49.0	0.012	0.0100	11.38	6.44





GRAPHIC SCALE

-50 0 25 50 100 200

(IN FEET)
1 INCH = 50 FT.

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REV.	DATE	COMMENTS	BY
1	01/24/22	REVISED PER TOWNSHIP COMMENTS & PHASED DEVELOPMENT	RRR

DRAWN BY: SDP
DESIGNED BY: RJC
CHECKED BY: JCS
CHECKED BY: -

PROJECT: ALTERA 769, LLC
PROPOSED SITE IMPROVEMENTS
BLOCK 166.15, LOT 9
769 NORTHFIELD AVENUE (CR 508)
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ

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ROBERT J. COLUCCO III
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 55851

JOSEPH C. SPARONE
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

TITLE: INLET AREA MAP (PHASE 2)

SCALE: (H) 1"=50' (V).
DATE: 08/06/2021
PROJECT No: 2530-99-006

SHEET No: 3 OF 4
Rev. #: 1

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DYNAMIC ENGINEERING

Stormwater Collection System Calculations

Project: Altera
Job #: 2530-99-006
Location: West Orange, NJ
Design Storm: 100 Year

Computed By: SDP
Checked By: RJC
Date: 1/24/2022

NOTES:
1) Design method used is Rational Method, unless otherwise noted.
2) Refer to Weighted Runoff Coefficient table for calculation of incremental areas and C values

PIPE SECTION		SUBCATCHMENT AREA	INCREMENTAL		CUMULATIVE	TIME OF CONCENTRATION			I	PEAK RUNOFF		PIPING INPUT			PIPING DATA		
FROM	TO	Area (Acres)	"C"	A x C Ac	A x C (acres)	Tc to Inlet (min)	Tc in Pipe (min.)	Final Tc (min)	(In/Hr)	Q to Inlet (CFS)	Q cum. for Pipe (CFS)	Dia. (In)	Length (Ft)	Man. "n"	Slope (ft/ft)	Pipe Capacity (cfs)	Pipe Velocity (fps)
INLET 511	Outflow 1	0.15	0.95	0.14	1.43	6.00	0.05	19.29	6.18	0.87	8.84	18	27.0	0.012	0.0200	16.09	9.11
OCS #510	INLET 511	0.00	0.00	0.00	1.29	6.00	0.08	19.21	6.18	0.00	7.97	18	45.0	0.012	0.0200	16.09	9.11
UG BASIN	OCS #510	0.18	0.98	0.18	0.18	6.00	0.03	6.00	9.10	1.64	1.64	18	18.0	0.012	0.0200	16.09	9.11
INLET 508	OCS #510	0.04	0.80	0.03	1.11	6.00	0.16	19.05	6.18	0.19	6.86	18	89.0	0.012	0.0200	16.09	9.11
INLET 505	INLET 508	0.55	0.91	0.50	0.50	13.30	0.01	13.30	7.28	3.64	3.64	18	7.0	0.012	0.0200	16.09	9.11
INLET 509	INLET 508	0.44	0.78	0.34	0.58	18.80	0.25	18.80	6.27	2.13	3.64	18	134.0	0.012	0.0200	16.09	9.11
INLET 506	INLET 509	0.25	0.97	0.24	0.24	6.00	0.01	6.00	9.10	2.18	2.18	18	8.0	0.012	0.0200	16.09	9.11
INLET 503	Outflow 2	0.23	0.86	0.20	0.20	7.70	0.01	7.70	8.76	1.75	1.75	18	7.0	0.012	0.0200	16.09	9.11
INLET 502	EX VAULT	0.00	0.95	0.36	0.36	6.00	0.02	6.00	9.10	3.28	3.28	18	12.0	0.012	0.0200	16.09	9.11

PHASE I - BASIN DRAIN TIME

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PROP UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 0.446 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Hydrograph Volume	= 4,170 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 474.95 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 568 cuft

Pond Routing by Storage Indication Method — *Center of mass detention time = 9 min*

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
2.03	0.005	2.87	0.007	3.70	0.009	4.53	0.011	5.37	0.013
2.07	0.005	2.90	0.007	3.73	0.010	4.57	0.011	5.40	0.013
2.10	0.005	2.93	0.008	3.77	0.010	4.60	0.011	5.43	0.013
2.13	0.005	2.97	0.008	3.80	0.010	4.63	0.011	5.47	0.013
2.17	0.005	3.00	0.008	3.83	0.010	4.67	0.011	5.50	0.013
2.20	0.005	3.03	0.008	3.87	0.010	4.70	0.011	5.53	0.013
2.23	0.005	3.07	0.008	3.90	0.010	4.73	0.012	5.57	0.013
2.27	0.005	3.10	0.008	3.93	0.010	4.77	0.012	5.60	0.013
2.30	0.006	3.13	0.008	3.97	0.010	4.80	0.012	5.63	0.013
2.33	0.006	3.17	0.008	4.00	0.010	4.83	0.012	5.67	0.013
2.37	0.006	3.20	0.008	4.03	0.010	4.87	0.012	5.70	0.013
2.40	0.006	3.23	0.008	4.07	0.010	4.90	0.012	5.73	0.013
2.43	0.006	3.27	0.008	4.10	0.010	4.93	0.012	5.77	0.013
2.47	0.006	3.30	0.009	4.13	0.010	4.97	0.012	5.80	0.013
2.50	0.006	3.33	0.009	4.17	0.010	5.00	0.012	5.83	0.013
2.53	0.006	3.37	0.009	4.20	0.011	5.03	0.012	5.87	0.013
2.57	0.006	3.40	0.009	4.23	0.011	5.07	0.012	5.90	0.013
2.60	0.007	3.43	0.009	4.27	0.011	5.10	0.012	5.93	0.014
2.63	0.007	3.47	0.009	4.30	0.011	5.13	0.012	5.97	0.014
2.67	0.007	3.50	0.009	4.33	0.011	5.17	0.012	6.00	0.014
2.70	0.007	3.53	0.009	4.37	0.011	5.20	0.012	6.03	0.014
2.73	0.007	3.57	0.009	4.40	0.011	5.23	0.012	6.07	0.014
2.77	0.007	3.60	0.009	4.43	0.011	5.27	0.012	6.10	0.014
2.80	0.007	3.63	0.009	4.47	0.011	5.30	0.013	6.13	0.014
2.83	0.007	3.67	0.009	4.50	0.011	5.33	0.013	6.17	0.014

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd — *PROP UG BASIN*

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
6.20	0.014	7.40	0.018	8.60	0.023	9.80	0.035	11.00	0.069
6.23	0.014	7.43	0.018	8.63	0.023	9.83	0.036	11.03	0.070
6.27	0.014	7.47	0.019	8.67	0.023	9.87	0.036	11.07	0.072
6.30	0.014	7.50	0.019	8.70	0.023	9.90	0.037	11.10	0.073
6.33	0.014	7.53	0.019	8.73	0.023	9.93	0.037	11.13	0.074
6.37	0.015	7.57	0.019	8.77	0.023	9.97	0.038	11.17	0.075
6.40	0.015	7.60	0.019	8.80	0.024	10.00	0.038	11.20	0.077
6.43	0.015	7.63	0.019	8.83	0.024	10.03	0.039	11.23	0.079
6.47	0.015	7.67	0.019	8.87	0.024	10.07	0.039	11.27	0.081
6.50	0.015	7.70	0.019	8.90	0.024	10.10	0.040	11.30	0.084
6.53	0.015	7.73	0.020	8.93	0.024	10.13	0.041	11.33	0.087
6.57	0.015	7.77	0.020	8.97	0.024	10.17	0.041	11.37	0.090
6.60	0.015	7.80	0.020	9.00	0.025	10.20	0.042	11.40	0.093
6.63	0.016	7.83	0.020	9.03	0.025	10.23	0.042	11.43	0.096
6.67	0.016	7.87	0.020	9.07	0.025	10.27	0.043	11.47	0.099
6.70	0.016	7.90	0.020	9.10	0.025	10.30	0.043	11.50	0.102
6.73	0.016	7.93	0.020	9.13	0.026	10.33	0.044	11.53	0.105
6.77	0.016	7.97	0.020	9.17	0.026	10.37	0.045	11.57	0.108
6.80	0.016	8.00	0.021	9.20	0.026	10.40	0.045	11.60	0.113
6.83	0.016	8.03	0.021	9.23	0.027	10.43	0.046	11.63	0.118
6.87	0.016	8.07	0.021	9.27	0.027	10.47	0.046	11.67	0.124
6.90	0.017	8.10	0.021	9.30	0.027	10.50	0.047	11.70	0.131
6.93	0.017	8.13	0.021	9.33	0.028	10.53	0.048	11.73	0.138
6.97	0.017	8.17	0.021	9.37	0.028	10.57	0.049	11.77	0.146
7.00	0.017	8.20	0.021	9.40	0.029	10.60	0.049	11.80	0.154
7.03	0.017	8.23	0.021	9.43	0.029	10.63	0.050	11.83	0.163
7.07	0.017	8.27	0.022	9.47	0.030	10.67	0.052	11.87	0.171
7.10	0.017	8.30	0.022	9.50	0.030	10.70	0.053	11.90	0.182
7.13	0.017	8.33	0.022	9.53	0.031	10.73	0.054	11.93	0.192
7.17	0.017	8.37	0.022	9.57	0.031	10.77	0.056	11.97	0.202
7.20	0.018	8.40	0.022	9.60	0.032	10.80	0.058	12.00	0.216
7.23	0.018	8.43	0.022	9.63	0.032	10.83	0.059	12.03	0.232
7.27	0.018	8.47	0.022	9.67	0.033	10.87	0.061	12.07	0.253
7.30	0.018	8.50	0.022	9.70	0.033	10.90	0.063	12.10	0.274
7.33	0.018	8.53	0.023	9.73	0.034	10.93	0.065	12.13	0.298
7.37	0.018	8.57	0.023	9.77	0.034	10.97	0.067	12.17	0.321

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd ***PROP UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
12.20	0.343	13.40	0.182	14.60	0.062	15.80	0.046	17.00	0.038
12.23	0.363	13.43	0.168	14.63	0.061	15.83	0.045	17.03	0.038
12.27	0.380	13.47	0.154	14.67	0.060	15.87	0.045	17.07	0.038
12.30	0.400	13.50	0.139	14.70	0.060	15.90	0.045	17.10	0.038
12.33	0.425	13.53	0.126	14.73	0.059	15.93	0.045	17.13	0.038
12.37	0.441	13.57	0.116	14.77	0.059	15.97	0.045	17.17	0.037
12.40	**0.446**	13.60	0.108	14.80	0.058	16.00	0.044	17.20	0.037
12.43	0.442	13.63	0.103	14.83	0.057	16.03	0.044	17.23	0.037
12.47	0.430	13.67	0.098	14.87	0.057	16.07	0.044	17.27	0.037
12.50	0.415	13.70	0.094	14.90	0.056	16.10	0.044	17.30	0.037
12.53	0.401	13.73	0.090	14.93	0.055	16.13	0.044	17.33	0.036
12.57	0.388	13.77	0.087	14.97	0.055	16.17	0.043	17.37	0.036
12.60	0.381	13.80	0.085	15.00	0.054	16.20	0.043	17.40	0.036
12.63	0.374	13.83	0.083	15.03	0.053	16.23	0.043	17.43	0.036
12.67	0.368	13.87	0.081	15.07	0.053	16.27	0.043	17.47	0.036
12.70	0.361	13.90	0.080	15.10	0.052	16.30	0.043	17.50	0.035
12.73	0.355	13.93	0.078	15.13	0.051	16.33	0.042	17.53	0.035
12.77	0.348	13.97	0.077	15.17	0.051	16.37	0.042	17.57	0.035
12.80	0.340	14.00	0.076	15.20	0.050	16.40	0.042	17.60	0.035
12.83	0.333	14.03	0.075	15.23	0.050	16.43	0.042	17.63	0.035
12.87	0.325	14.07	0.075	15.27	0.049	16.47	0.042	17.67	0.034
12.90	0.317	14.10	0.074	15.30	0.049	16.50	0.041	17.70	0.034
12.93	0.310	14.13	0.073	15.33	0.048	16.53	0.041	17.73	0.034
12.97	0.301	14.17	0.072	15.37	0.048	16.57	0.041	17.77	0.034
13.00	0.293	14.20	0.072	15.40	0.048	16.60	0.041	17.80	0.033
13.03	0.284	14.23	0.069	15.43	0.048	16.63	0.041	17.83	0.033
13.07	0.275	14.27	0.068	15.47	0.048	16.67	0.040	17.87	0.033
13.10	0.267	14.30	0.068	15.50	0.047	16.70	0.040	17.90	0.033
13.13	0.258	14.33	0.067	15.53	0.047	16.73	0.040	17.93	0.033
13.17	0.250	14.37	0.066	15.57	0.047	16.77	0.040	17.97	0.032
13.20	0.239	14.40	0.066	15.60	0.047	16.80	0.040	18.00	0.032
13.23	0.230	14.43	0.065	15.63	0.047	16.83	0.039	18.03	0.032
13.27	0.219	14.47	0.064	15.67	0.046	16.87	0.039	18.07	0.032
13.30	0.210	14.50	0.064	15.70	0.046	16.90	0.039	18.10	0.032
13.33	0.201	14.53	0.063	15.73	0.046	16.93	0.039	18.13	0.031
13.37	0.192	14.57	0.062	15.77	0.046	16.97	0.039	18.17	0.031

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd ***PROP UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
18.20	0.031	19.40	0.029	20.60	0.027	21.80	0.025	23.00	0.024
18.23	0.031	19.43	0.029	20.63	0.027	21.83	0.025	23.03	0.023
18.27	0.031	19.47	0.029	20.67	0.027	21.87	0.025	23.07	0.023
18.30	0.031	19.50	0.029	20.70	0.027	21.90	0.025	23.10	0.023
18.33	0.031	19.53	0.029	20.73	0.027	21.93	0.025	23.13	0.023
18.37	0.031	19.57	0.029	20.77	0.027	21.97	0.025	23.17	0.023
18.40	0.030	19.60	0.029	20.80	0.027	22.00	0.025	23.20	0.023
18.43	0.030	19.63	0.029	20.83	0.027	22.03	0.025	23.23	0.023
18.47	0.030	19.67	0.029	20.87	0.027	22.07	0.025	23.27	0.023
18.50	0.030	19.70	0.029	20.90	0.027	22.10	0.025	23.30	0.023
18.53	0.030	19.73	0.028	20.93	0.027	22.13	0.025	23.33	0.023
18.57	0.030	19.77	0.028	20.97	0.027	22.17	0.025	23.37	0.023
18.60	0.030	19.80	0.028	21.00	0.027	22.20	0.025	23.40	0.023
18.63	0.030	19.83	0.028	21.03	0.027	22.23	0.025	23.43	0.023
18.67	0.030	19.87	0.028	21.07	0.026	22.27	0.025	23.47	0.023
18.70	0.030	19.90	0.028	21.10	0.026	22.30	0.025	23.50	0.023
18.73	0.030	19.93	0.028	21.13	0.026	22.33	0.025	23.53	0.023
18.77	0.030	19.97	0.028	21.17	0.026	22.37	0.025	23.57	0.023
18.80	0.030	20.00	0.028	21.20	0.026	22.40	0.024	23.60	0.023
18.83	0.030	20.03	0.028	21.23	0.026	22.43	0.024	23.63	0.023
18.87	0.030	20.07	0.028	21.27	0.026	22.47	0.024	23.67	0.022
18.90	0.030	20.10	0.028	21.30	0.026	22.50	0.024	23.70	0.022
18.93	0.030	20.13	0.028	21.33	0.026	22.53	0.024	23.73	0.022
18.97	0.030	20.17	0.028	21.37	0.026	22.57	0.024	23.77	0.022
19.00	0.030	20.20	0.028	21.40	0.026	22.60	0.024	23.80	0.022
19.03	0.030	20.23	0.028	21.43	0.026	22.63	0.024	23.83	0.022
19.07	0.029	20.27	0.028	21.47	0.026	22.67	0.024	23.87	0.022
19.10	0.029	20.30	0.028	21.50	0.026	22.70	0.024	23.90	0.022
19.13	0.029	20.33	0.028	21.53	0.026	22.73	0.024	23.93	0.022
19.17	0.029	20.37	0.028	21.57	0.026	22.77	0.024	23.97	0.022
19.20	0.029	20.40	0.027	21.60	0.026	22.80	0.024	24.00	0.022
19.23	0.029	20.43	0.027	21.63	0.026	22.83	0.024	24.03	0.022
19.27	0.029	20.47	0.027	21.67	0.026	22.87	0.024	24.07	0.021
19.30	0.029	20.50	0.027	21.70	0.026	22.90	0.024	24.10	0.020
19.33	0.029	20.53	0.027	21.73	0.025	22.93	0.024	24.13	0.018
19.37	0.029	20.57	0.027	21.77	0.025	22.97	0.024	24.17	0.016

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PROP UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 0.777 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Hydrograph Volume	= 5,760 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 475.22 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 772 cuft

Pond Routing by Storage Indication Method *Center of mass detention time = 9 min*

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
2.03	0.008	2.87	0.011	3.70	0.014	4.53	0.016	5.37	0.017
2.07	0.008	2.90	0.011	3.73	0.014	4.57	0.016	5.40	0.017
2.10	0.008	2.93	0.011	3.77	0.014	4.60	0.016	5.43	0.017
2.13	0.008	2.97	0.012	3.80	0.014	4.63	0.016	5.47	0.017
2.17	0.008	3.00	0.012	3.83	0.014	4.67	0.016	5.50	0.018
2.20	0.009	3.03	0.012	3.87	0.014	4.70	0.016	5.53	0.018
2.23	0.009	3.07	0.012	3.90	0.014	4.73	0.016	5.57	0.018
2.27	0.009	3.10	0.012	3.93	0.014	4.77	0.016	5.60	0.018
2.30	0.009	3.13	0.012	3.97	0.014	4.80	0.016	5.63	0.018
2.33	0.009	3.17	0.012	4.00	0.014	4.83	0.016	5.67	0.018
2.37	0.009	3.20	0.012	4.03	0.015	4.87	0.016	5.70	0.018
2.40	0.009	3.23	0.012	4.07	0.015	4.90	0.016	5.73	0.018
2.43	0.010	3.27	0.012	4.10	0.015	4.93	0.016	5.77	0.018
2.47	0.010	3.30	0.013	4.13	0.015	4.97	0.017	5.80	0.018
2.50	0.010	3.33	0.013	4.17	0.015	5.00	0.017	5.83	0.018
2.53	0.010	3.37	0.013	4.20	0.015	5.03	0.017	5.87	0.018
2.57	0.010	3.40	0.013	4.23	0.015	5.07	0.017	5.90	0.018
2.60	0.010	3.43	0.013	4.27	0.015	5.10	0.017	5.93	0.018
2.63	0.010	3.47	0.013	4.30	0.015	5.13	0.017	5.97	0.018
2.67	0.010	3.50	0.013	4.33	0.015	5.17	0.017	6.00	0.018
2.70	0.011	3.53	0.013	4.37	0.015	5.20	0.017	6.03	0.018
2.73	0.011	3.57	0.013	4.40	0.015	5.23	0.017	6.07	0.019
2.77	0.011	3.60	0.013	4.43	0.015	5.27	0.017	6.10	0.019
2.80	0.011	3.63	0.014	4.47	0.016	5.30	0.017	6.13	0.019
2.83	0.011	3.67	0.014	4.50	0.016	5.33	0.017	6.17	0.019

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd ***PROP UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
6.20	0.019	7.40	0.024	8.60	0.033	9.80	0.052	11.00	0.092
6.23	0.019	7.43	0.025	8.63	0.033	9.83	0.052	11.03	0.095
6.27	0.019	7.47	0.025	8.67	0.034	9.87	0.053	11.07	0.098
6.30	0.019	7.50	0.025	8.70	0.034	9.90	0.054	11.10	0.100
6.33	0.019	7.53	0.025	8.73	0.034	9.93	0.055	11.13	0.103
6.37	0.020	7.57	0.025	8.77	0.035	9.97	0.055	11.17	0.106
6.40	0.020	7.60	0.025	8.80	0.035	10.00	0.056	11.20	0.109
6.43	0.020	7.63	0.026	8.83	0.035	10.03	0.057	11.23	0.113
6.47	0.020	7.67	0.026	8.87	0.035	10.07	0.058	11.27	0.117
6.50	0.020	7.70	0.026	8.90	0.036	10.10	0.059	11.30	0.121
6.53	0.020	7.73	0.026	8.93	0.036	10.13	0.059	11.33	0.125
6.57	0.021	7.77	0.027	8.97	0.036	10.17	0.060	11.37	0.129
6.60	0.021	7.80	0.027	9.00	0.036	10.20	0.061	11.40	0.133
6.63	0.021	7.83	0.027	9.03	0.037	10.23	0.062	11.43	0.138
6.67	0.021	7.87	0.027	9.07	0.037	10.27	0.063	11.47	0.142
6.70	0.021	7.90	0.028	9.10	0.037	10.30	0.063	11.50	0.146
6.73	0.021	7.93	0.028	9.13	0.038	10.33	0.064	11.53	0.151
6.77	0.021	7.97	0.028	9.17	0.038	10.37	0.065	11.57	0.155
6.80	0.022	8.00	0.028	9.20	0.039	10.40	0.066	11.60	0.161
6.83	0.022	8.03	0.029	9.23	0.039	10.43	0.067	11.63	0.166
6.87	0.022	8.07	0.029	9.27	0.040	10.47	0.068	11.67	0.171
6.90	0.022	8.10	0.029	9.30	0.041	10.50	0.068	11.70	0.178
6.93	0.022	8.13	0.029	9.33	0.041	10.53	0.069	11.73	0.185
6.97	0.022	8.17	0.030	9.37	0.042	10.57	0.070	11.77	0.190
7.00	0.023	8.20	0.030	9.40	0.043	10.60	0.072	11.80	0.196
7.03	0.023	8.23	0.030	9.43	0.043	10.63	0.072	11.83	0.203
7.07	0.023	8.27	0.030	9.47	0.044	10.67	0.073	11.87	0.212
7.10	0.023	8.30	0.031	9.50	0.045	10.70	0.074	11.90	0.221
7.13	0.023	8.33	0.031	9.53	0.046	10.73	0.075	11.93	0.235
7.17	0.023	8.37	0.031	9.57	0.046	10.77	0.077	11.97	0.250
7.20	0.023	8.40	0.031	9.60	0.047	10.80	0.078	12.00	0.265
7.23	0.024	8.43	0.032	9.63	0.048	10.83	0.080	12.03	0.283
7.27	0.024	8.47	0.032	9.67	0.049	10.87	0.082	12.07	0.306
7.30	0.024	8.50	0.032	9.70	0.049	10.90	0.085	12.10	0.331
7.33	0.024	8.53	0.033	9.73	0.050	10.93	0.087	12.13	0.358
7.37	0.024	8.57	0.033	9.77	0.051	10.97	0.090	12.17	0.385

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd **PROP UG BASIN**

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
12.20	0.464	13.40	0.256	14.60	0.086	15.80	0.061	17.00	0.052
12.23	0.580	13.43	0.249	14.63	0.085	15.83	0.061	17.03	0.051
12.27	0.681	13.47	0.239	14.67	0.084	15.87	0.061	17.07	0.051
12.30	0.744	13.50	0.231	14.70	0.083	15.90	0.061	17.10	0.051
12.33	0.776	13.53	0.222	14.73	0.082	15.93	0.060	17.13	0.051
12.37	**0.777**	13.57	0.215	14.77	0.082	15.97	0.060	17.17	0.050
12.40	0.754	13.60	0.206	14.80	0.081	16.00	0.060	17.20	0.050
12.43	0.715	13.63	0.198	14.83	0.080	16.03	0.060	17.23	0.050
12.47	0.667	13.67	0.190	14.87	0.079	16.07	0.059	17.27	0.049
12.50	0.615	13.70	0.181	14.90	0.078	16.10	0.059	17.30	0.049
12.53	0.568	13.73	0.168	14.93	0.077	16.13	0.059	17.33	0.049
12.57	0.525	13.77	0.156	14.97	0.076	16.17	0.059	17.37	0.049
12.60	0.492	13.80	0.143	15.00	0.075	16.20	0.058	17.40	0.048
12.63	0.463	13.83	0.133	15.03	0.074	16.23	0.058	17.43	0.048
12.67	0.439	13.87	0.124	15.07	0.074	16.27	0.058	17.47	0.048
12.70	0.419	13.90	0.118	15.10	0.073	16.30	0.057	17.50	0.048
12.73	0.402	13.93	0.113	15.13	0.072	16.33	0.057	17.53	0.047
12.77	0.389	13.97	0.110	15.17	0.069	16.37	0.057	17.57	0.047
12.80	0.381	14.00	0.107	15.20	0.068	16.40	0.057	17.60	0.047
12.83	0.375	14.03	0.105	15.23	0.067	16.43	0.056	17.63	0.046
12.87	0.369	14.07	0.103	15.27	0.066	16.47	0.056	17.67	0.046
12.90	0.363	14.10	0.102	15.30	0.066	16.50	0.056	17.70	0.046
12.93	0.358	14.13	0.100	15.33	0.065	16.53	0.056	17.73	0.046
12.97	0.351	14.17	0.099	15.37	0.065	16.57	0.055	17.77	0.045
13.00	0.344	14.20	0.098	15.40	0.065	16.60	0.055	17.80	0.045
13.03	0.337	14.23	0.096	15.43	0.064	16.63	0.055	17.83	0.045
13.07	0.331	14.27	0.095	15.47	0.064	16.67	0.054	17.87	0.044
13.10	0.324	14.30	0.094	15.50	0.064	16.70	0.054	17.90	0.044
13.13	0.317	14.33	0.093	15.53	0.064	16.73	0.054	17.93	0.044
13.17	0.311	14.37	0.092	15.57	0.063	16.77	0.054	17.97	0.044
13.20	0.303	14.40	0.091	15.60	0.063	16.80	0.053	18.00	0.043
13.23	0.295	14.43	0.090	15.63	0.063	16.83	0.053	18.03	0.043
13.27	0.288	14.47	0.089	15.67	0.063	16.87	0.053	18.07	0.043
13.30	0.279	14.50	0.088	15.70	0.062	16.90	0.052	18.10	0.043
13.33	0.272	14.53	0.088	15.73	0.062	16.93	0.052	18.13	0.042
13.37	0.264	14.57	0.087	15.77	0.062	16.97	0.052	18.17	0.042

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd **PROP UG BASIN**

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
18.20	0.042	19.40	0.039	20.60	0.036	21.80	0.034	23.00	0.031
18.23	0.042	19.43	0.039	20.63	0.036	21.83	0.034	23.03	0.031
18.27	0.041	19.47	0.039	20.67	0.036	21.87	0.034	23.07	0.031
18.30	0.041	19.50	0.039	20.70	0.036	21.90	0.034	23.10	0.031
18.33	0.041	19.53	0.039	20.73	0.036	21.93	0.034	23.13	0.031
18.37	0.041	19.57	0.039	20.77	0.036	21.97	0.034	23.17	0.031
18.40	0.041	19.60	0.038	20.80	0.036	22.00	0.034	23.20	0.031
18.43	0.041	19.63	0.038	20.83	0.036	22.03	0.033	23.23	0.031
18.47	0.041	19.67	0.038	20.87	0.036	22.07	0.033	23.27	0.031
18.50	0.041	19.70	0.038	20.90	0.036	22.10	0.033	23.30	0.031
18.53	0.041	19.73	0.038	20.93	0.036	22.13	0.033	23.33	0.031
18.57	0.041	19.77	0.038	20.97	0.036	22.17	0.033	23.37	0.031
18.60	0.040	19.80	0.038	21.00	0.036	22.20	0.033	23.40	0.031
18.63	0.040	19.83	0.038	21.03	0.036	22.23	0.033	23.43	0.031
18.67	0.040	19.87	0.038	21.07	0.035	22.27	0.033	23.47	0.030
18.70	0.040	19.90	0.038	21.10	0.035	22.30	0.033	23.50	0.030
18.73	0.040	19.93	0.038	21.13	0.035	22.33	0.033	23.53	0.030
18.77	0.040	19.97	0.038	21.17	0.035	22.37	0.033	23.57	0.030
18.80	0.040	20.00	0.038	21.20	0.035	22.40	0.033	23.60	0.030
18.83	0.040	20.03	0.038	21.23	0.035	22.43	0.033	23.63	0.030
18.87	0.040	20.07	0.038	21.27	0.035	22.47	0.033	23.67	0.030
18.90	0.040	20.10	0.037	21.30	0.035	22.50	0.032	23.70	0.030
18.93	0.040	20.13	0.037	21.33	0.035	22.53	0.032	23.73	0.030
18.97	0.040	20.17	0.037	21.37	0.035	22.57	0.032	23.77	0.030
19.00	0.040	20.20	0.037	21.40	0.035	22.60	0.032	23.80	0.030
19.03	0.040	20.23	0.037	21.43	0.035	22.63	0.032	23.83	0.030
19.07	0.040	20.27	0.037	21.47	0.035	22.67	0.032	23.87	0.030
19.10	0.039	20.30	0.037	21.50	0.035	22.70	0.032	23.90	0.030
19.13	0.039	20.33	0.037	21.53	0.035	22.73	0.032	23.93	0.029
19.17	0.039	20.37	0.037	21.57	0.034	22.77	0.032	23.97	0.029
19.20	0.039	20.40	0.037	21.60	0.034	22.80	0.032	24.00	0.029
19.23	0.039	20.43	0.037	21.63	0.034	22.83	0.032	24.03	0.029
19.27	0.039	20.47	0.037	21.67	0.034	22.87	0.032	24.07	0.028
19.30	0.039	20.50	0.037	21.70	0.034	22.90	0.032	24.10	0.027
19.33	0.039	20.53	0.037	21.73	0.034	22.93	0.032	24.13	0.024
19.37	0.039	20.57	0.036	21.77	0.034	22.97	0.032	24.17	0.021

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PROP UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 1.741 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Hydrograph Volume	= 13,293 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 476.51 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 1,805 cuft

Pond Routing by Storage Indication Method — *Center of mass detention time = 11 min*

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
1.40	0.018	2.23	0.025	3.07	0.030	3.90	0.033	4.73	0.037
1.43	0.018	2.27	0.026	3.10	0.030	3.93	0.033	4.77	0.038
1.47	0.019	2.30	0.026	3.13	0.030	3.97	0.033	4.80	0.038
1.50	0.019	2.33	0.026	3.17	0.030	4.00	0.034	4.83	0.038
1.53	0.019	2.37	0.026	3.20	0.030	4.03	0.034	4.87	0.038
1.57	0.020	2.40	0.026	3.23	0.031	4.07	0.034	4.90	0.039
1.60	0.020	2.43	0.027	3.27	0.031	4.10	0.034	4.93	0.039
1.63	0.020	2.47	0.027	3.30	0.031	4.13	0.034	4.97	0.039
1.67	0.021	2.50	0.027	3.33	0.031	4.17	0.034	5.00	0.039
1.70	0.021	2.53	0.027	3.37	0.031	4.20	0.034	5.03	0.040
1.73	0.021	2.57	0.027	3.40	0.031	4.23	0.034	5.07	0.040
1.77	0.022	2.60	0.028	3.43	0.031	4.27	0.034	5.10	0.040
1.80	0.022	2.63	0.028	3.47	0.032	4.30	0.035	5.13	0.040
1.83	0.022	2.67	0.028	3.50	0.032	4.33	0.035	5.17	0.041
1.87	0.023	2.70	0.028	3.53	0.032	4.37	0.035	5.20	0.041
1.90	0.023	2.73	0.028	3.57	0.032	4.40	0.035	5.23	0.041
1.93	0.023	2.77	0.028	3.60	0.032	4.43	0.035	5.27	0.041
1.97	0.023	2.80	0.029	3.63	0.032	4.47	0.035	5.30	0.042
2.00	0.024	2.83	0.029	3.67	0.032	4.50	0.035	5.33	0.042
2.03	0.024	2.87	0.029	3.70	0.032	4.53	0.036	5.37	0.042
2.07	0.024	2.90	0.029	3.73	0.033	4.57	0.036	5.40	0.043
2.10	0.024	2.93	0.029	3.77	0.033	4.60	0.036	5.43	0.043
2.13	0.025	2.97	0.029	3.80	0.033	4.63	0.036	5.47	0.043
2.17	0.025	3.00	0.030	3.83	0.033	4.67	0.037	5.50	0.043
2.20	0.025	3.03	0.030	3.87	0.033	4.70	0.037	5.53	0.044

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd — ***PROP UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
5.57	0.044	6.77	0.058	7.97	0.077	9.17	0.101	10.37	0.163
5.60	0.044	6.80	0.059	8.00	0.078	9.20	0.102	10.40	0.164
5.63	0.044	6.83	0.059	8.03	0.079	9.23	0.103	10.43	0.166
5.67	0.045	6.87	0.060	8.07	0.079	9.27	0.105	10.47	0.167
5.70	0.045	6.90	0.060	8.10	0.080	9.30	0.106	10.50	0.169
5.73	0.045	6.93	0.061	8.13	0.081	9.33	0.107	10.53	0.171
5.77	0.045	6.97	0.061	8.17	0.081	9.37	0.109	10.57	0.173
5.80	0.046	7.00	0.062	8.20	0.082	9.40	0.110	10.60	0.175
5.83	0.046	7.03	0.062	8.23	0.082	9.43	0.112	10.63	0.177
5.87	0.046	7.07	0.063	8.27	0.083	9.47	0.114	10.67	0.180
5.90	0.046	7.10	0.064	8.30	0.084	9.50	0.116	10.70	0.182
5.93	0.047	7.13	0.064	8.33	0.084	9.53	0.118	10.73	0.185
5.97	0.047	7.17	0.065	8.37	0.085	9.57	0.119	10.77	0.188
6.00	0.047	7.20	0.065	8.40	0.086	9.60	0.121	10.80	0.190
6.03	0.047	7.23	0.066	8.43	0.086	9.63	0.123	10.83	0.193
6.07	0.048	7.27	0.066	8.47	0.087	9.67	0.125	10.87	0.196
6.10	0.048	7.30	0.067	8.50	0.088	9.70	0.127	10.90	0.199
6.13	0.048	7.33	0.068	8.53	0.088	9.73	0.128	10.93	0.203
6.17	0.049	7.37	0.068	8.57	0.089	9.77	0.130	10.97	0.206
6.20	0.049	7.40	0.069	8.60	0.090	9.80	0.132	11.00	0.211
6.23	0.050	7.43	0.069	8.63	0.090	9.83	0.134	11.03	0.215
6.27	0.050	7.47	0.070	8.67	0.091	9.87	0.136	11.07	0.218
6.30	0.051	7.50	0.071	8.70	0.092	9.90	0.138	11.10	0.222
6.33	0.051	7.53	0.071	8.73	0.092	9.93	0.139	11.13	0.228
6.37	0.052	7.57	0.072	8.77	0.093	9.97	0.141	11.17	0.233
6.40	0.052	7.60	0.072	8.80	0.094	10.00	0.143	11.20	0.237
6.43	0.053	7.63	0.072	8.83	0.094	10.03	0.145	11.23	0.243
6.47	0.053	7.67	0.073	8.87	0.095	10.07	0.147	11.27	0.249
6.50	0.054	7.70	0.073	8.90	0.096	10.10	0.148	11.30	0.254
6.53	0.054	7.73	0.073	8.93	0.096	10.13	0.150	11.33	0.258
6.57	0.055	7.77	0.074	8.97	0.097	10.17	0.152	11.37	0.264
6.60	0.055	7.80	0.075	9.00	0.098	10.20	0.154	11.40	0.270
6.63	0.056	7.83	0.075	9.03	0.098	10.23	0.155	11.43	0.275
6.67	0.056	7.87	0.076	9.07	0.099	10.27	0.157	11.47	0.281
6.70	0.057	7.90	0.076	9.10	0.100	10.30	0.159	11.50	0.288
6.73	0.057	7.93	0.077	9.13	0.100	10.33	0.161	11.53	0.293

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd **PROP UG BASIN**

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.57	0.300	12.77	1.011	13.97	0.315	15.17	0.165	16.37	0.124
11.60	0.307	12.80	0.940	14.00	0.312	15.20	0.161	16.40	0.123
11.63	0.314	12.83	0.873	14.03	0.307	15.23	0.157	16.43	0.122
11.67	0.321	12.87	0.797	14.07	0.301	15.27	0.154	16.47	0.122
11.70	0.330	12.90	0.726	14.10	0.296	15.30	0.151	16.50	0.121
11.73	0.339	12.93	0.671	14.13	0.292	15.33	0.148	16.53	0.121
11.77	0.349	12.97	0.623	14.17	0.288	15.37	0.146	16.57	0.120
11.80	0.359	13.00	0.584	14.20	0.283	15.40	0.144	16.60	0.119
11.83	0.369	13.03	0.551	14.23	0.278	15.43	0.143	16.63	0.119
11.87	0.383	13.07	0.523	14.27	0.274	15.47	0.142	16.67	0.118
11.90	0.415	13.10	0.501	14.30	0.270	15.50	0.141	16.70	0.118
11.93	0.471	13.13	0.482	14.33	0.265	15.53	0.140	16.73	0.117
11.97	0.560	13.17	0.465	14.37	0.261	15.57	0.139	16.77	0.116
12.00	0.677	13.20	0.450	14.40	0.256	15.60	0.138	16.80	0.116
12.03	0.816	13.23	0.437	14.43	0.253	15.63	0.137	16.83	0.115
12.07	0.951	13.27	0.425	14.47	0.249	15.67	0.136	16.87	0.115
12.10	1.086	13.30	0.415	14.50	0.243	15.70	0.136	16.90	0.114
12.13	1.221	13.33	0.406	14.53	0.238	15.73	0.135	16.93	0.113
12.17	1.354	13.37	0.397	14.57	0.235	15.77	0.134	16.97	0.113
12.20	1.476	13.40	0.390	14.60	0.230	15.80	0.134	17.00	0.112
12.23	1.581	13.43	0.385	14.63	0.226	15.83	0.133	17.03	0.112
12.27	1.660	13.47	0.381	14.67	0.221	15.87	0.133	17.07	0.111
12.30	1.713	13.50	0.377	14.70	0.218	15.90	0.132	17.10	0.110
12.33	1.739	13.53	0.373	14.73	0.215	15.93	0.131	17.13	0.110
12.37	**1.741**	13.57	0.369	14.77	0.210	15.97	0.131	17.17	0.109
12.40	1.721	13.60	0.365	14.80	0.207	16.00	0.130	17.20	0.109
12.43	1.682	13.63	0.361	14.83	0.203	16.03	0.130	17.23	0.108
12.47	1.629	13.67	0.358	14.87	0.200	16.07	0.129	17.27	0.108
12.50	1.566	13.70	0.353	14.90	0.197	16.10	0.128	17.30	0.107
12.53	1.500	13.73	0.348	14.93	0.193	16.13	0.128	17.33	0.106
12.57	1.432	13.77	0.343	14.97	0.190	16.17	0.127	17.37	0.106
12.60	1.364	13.80	0.338	15.00	0.186	16.20	0.127	17.40	0.105
12.63	1.294	13.83	0.334	15.03	0.182	16.23	0.126	17.43	0.105
12.67	1.223	13.87	0.329	15.07	0.177	16.27	0.125	17.47	0.104
12.70	1.153	13.90	0.324	15.10	0.173	16.30	0.125	17.50	0.103
12.73	1.081	13.93	0.319	15.13	0.169	16.33	0.124	17.53	0.103

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd **PROP UG BASIN**

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
17.57	0.102	18.77	0.086	19.97	0.081	21.17	0.075	22.37	0.070
17.60	0.102	18.80	0.086	20.00	0.081	21.20	0.075	22.40	0.069
17.63	0.101	18.83	0.086	20.03	0.080	21.23	0.075	22.43	0.069
17.67	0.100	18.87	0.086	20.07	0.080	21.27	0.075	22.47	0.069
17.70	0.100	18.90	0.085	20.10	0.080	21.30	0.075	22.50	0.069
17.73	0.099	18.93	0.085	20.13	0.080	21.33	0.075	22.53	0.069
17.77	0.099	18.97	0.085	20.17	0.080	21.37	0.074	22.57	0.069
17.80	0.098	19.00	0.085	20.20	0.080	21.40	0.074	22.60	0.068
17.83	0.097	19.03	0.085	20.23	0.080	21.43	0.074	22.63	0.068
17.87	0.097	19.07	0.085	20.27	0.079	21.47	0.074	22.67	0.068
17.90	0.096	19.10	0.085	20.30	0.079	21.50	0.074	22.70	0.068
17.93	0.095	19.13	0.084	20.33	0.079	21.53	0.074	22.73	0.068
17.97	0.095	19.17	0.084	20.37	0.079	21.57	0.074	22.77	0.068
18.00	0.094	19.20	0.084	20.40	0.079	21.60	0.073	22.80	0.068
18.03	0.093	19.23	0.084	20.43	0.079	21.63	0.073	22.83	0.067
18.07	0.093	19.27	0.084	20.47	0.079	21.67	0.073	22.87	0.067
18.10	0.092	19.30	0.084	20.50	0.078	21.70	0.073	22.90	0.067
18.13	0.092	19.33	0.084	20.53	0.078	21.73	0.073	22.93	0.067
18.17	0.091	19.37	0.083	20.57	0.078	21.77	0.073	22.97	0.067
18.20	0.091	19.40	0.083	20.60	0.078	21.80	0.072	23.00	0.067
18.23	0.090	19.43	0.083	20.63	0.078	21.83	0.072	23.03	0.066
18.27	0.090	19.47	0.083	20.67	0.078	21.87	0.072	23.07	0.066
18.30	0.089	19.50	0.083	20.70	0.077	21.90	0.072	23.10	0.066
18.33	0.089	19.53	0.083	20.73	0.077	21.93	0.072	23.13	0.066
18.37	0.088	19.57	0.083	20.77	0.077	21.97	0.072	23.17	0.066
18.40	0.088	19.60	0.082	20.80	0.077	22.00	0.071	23.20	0.066
18.43	0.088	19.63	0.082	20.83	0.077	22.03	0.071	23.23	0.066
18.47	0.088	19.67	0.082	20.87	0.077	22.07	0.071	23.27	0.065
18.50	0.087	19.70	0.082	20.90	0.077	22.10	0.071	23.30	0.065
18.53	0.087	19.73	0.082	20.93	0.076	22.13	0.071	23.33	0.065
18.57	0.087	19.77	0.082	20.97	0.076	22.17	0.070	23.37	0.065
18.60	0.087	19.80	0.082	21.00	0.076	22.20	0.070	23.40	0.065
18.63	0.087	19.83	0.081	21.03	0.076	22.23	0.070	23.43	0.065
18.67	0.087	19.87	0.081	21.07	0.076	22.27	0.070	23.47	0.064
18.70	0.086	19.90	0.081	21.10	0.076	22.30	0.070	23.50	0.064
18.73	0.086	19.93	0.081	21.13	0.075	22.33	0.070	23.53	0.064

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd ***PROP UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
23.57	0.064								
23.60	0.064								
23.63	0.064								
23.67	0.064								
23.70	0.063								
23.73	0.063								
23.77	0.063								
23.80	0.063								
23.83	0.063								
23.87	0.063								
23.90	0.063								
23.93	0.062								
23.97	0.062								
24.00	0.062								
24.03	0.062								
24.07	0.059								
24.10	0.055								
24.13	0.049								
24.17	0.041								
24.20	0.033								
24.23	0.026								
24.27	0.020								
24.30	0.014								
...end	*...end*								

Printed values > 1% of Qpeak. nth-point print interval = 1

PHASE II - BASIN DRAIN TIME

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PHASE I UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 0.323 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Hydrograph Volume	= 2,832 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 474.59 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 310 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 7 min

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
1.87	0.003	2.70	0.006	3.53	0.008	4.37	0.010	5.20	0.011
1.90	0.003	2.73	0.006	3.57	0.008	4.40	0.010	5.23	0.011
1.93	0.004	2.77	0.006	3.60	0.008	4.43	0.010	5.27	0.011
1.97	0.004	2.80	0.006	3.63	0.008	4.47	0.010	5.30	0.011
2.00	0.004	2.83	0.006	3.67	0.008	4.50	0.010	5.33	0.011
2.03	0.004	2.87	0.006	3.70	0.008	4.53	0.010	5.37	0.011
2.07	0.004	2.90	0.007	3.73	0.008	4.57	0.010	5.40	0.011
2.10	0.004	2.93	0.007	3.77	0.008	4.60	0.010	5.43	0.011
2.13	0.004	2.97	0.007	3.80	0.009	4.63	0.010	5.47	0.011
2.17	0.004	3.00	0.007	3.83	0.009	4.67	0.010	5.50	0.011
2.20	0.005	3.03	0.007	3.87	0.009	4.70	0.010	5.53	0.011
2.23	0.005	3.07	0.007	3.90	0.009	4.73	0.010	5.57	0.011
2.27	0.005	3.10	0.007	3.93	0.009	4.77	0.010	5.60	0.011
2.30	0.005	3.13	0.007	3.97	0.009	4.80	0.010	5.63	0.011
2.33	0.005	3.17	0.007	4.00	0.009	4.83	0.010	5.67	0.011
2.37	0.005	3.20	0.007	4.03	0.009	4.87	0.010	5.70	0.012
2.40	0.005	3.23	0.007	4.07	0.009	4.90	0.010	5.73	0.012
2.43	0.005	3.27	0.007	4.10	0.009	4.93	0.010	5.77	0.012
2.47	0.005	3.30	0.007	4.13	0.009	4.97	0.010	5.80	0.012
2.50	0.005	3.33	0.008	4.17	0.009	5.00	0.011	5.83	0.012
2.53	0.006	3.37	0.008	4.20	0.009	5.03	0.011	5.87	0.012
2.57	0.006	3.40	0.008	4.23	0.009	5.07	0.011	5.90	0.012
2.60	0.006	3.43	0.008	4.27	0.009	5.10	0.011	5.93	0.012
2.63	0.006	3.47	0.008	4.30	0.009	5.13	0.011	5.97	0.012
2.67	0.006	3.50	0.008	4.33	0.009	5.17	0.011	6.00	0.012

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd

PHASE I UG BASIN

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
6.03	0.012	7.23	0.016	8.43	0.020	9.63	0.028	10.83	0.047
6.07	0.012	7.27	0.016	8.47	0.020	9.67	0.028	10.87	0.048
6.10	0.012	7.30	0.016	8.50	0.020	9.70	0.029	10.90	0.050
6.13	0.012	7.33	0.016	8.53	0.020	9.73	0.029	10.93	0.051
6.17	0.012	7.37	0.016	8.57	0.020	9.77	0.029	10.97	0.052
6.20	0.012	7.40	0.016	8.60	0.020	9.80	0.030	11.00	0.053
6.23	0.012	7.43	0.016	8.63	0.021	9.83	0.030	11.03	0.055
6.27	0.012	7.47	0.016	8.67	0.021	9.87	0.031	11.07	0.056
6.30	0.012	7.50	0.016	8.70	0.021	9.90	0.031	11.10	0.058
6.33	0.013	7.53	0.017	8.73	0.021	9.93	0.031	11.13	0.059
6.37	0.013	7.57	0.017	8.77	0.021	9.97	0.032	11.17	0.061
6.40	0.013	7.60	0.017	8.80	0.021	10.00	0.032	11.20	0.063
6.43	0.013	7.63	0.017	8.83	0.021	10.03	0.032	11.23	0.065
6.47	0.013	7.67	0.017	8.87	0.021	10.07	0.033	11.27	0.067
6.50	0.013	7.70	0.017	8.90	0.022	10.10	0.033	11.30	0.069
6.53	0.013	7.73	0.017	8.93	0.022	10.13	0.034	11.33	0.071
6.57	0.013	7.77	0.017	8.97	0.022	10.17	0.034	11.37	0.072
6.60	0.013	7.80	0.017	9.00	0.022	10.20	0.034	11.40	0.073
6.63	0.014	7.83	0.017	9.03	0.022	10.23	0.035	11.43	0.074
6.67	0.014	7.87	0.018	9.07	0.022	10.27	0.035	11.47	0.076
6.70	0.014	7.90	0.018	9.10	0.022	10.30	0.036	11.50	0.078
6.73	0.014	7.93	0.018	9.13	0.023	10.33	0.036	11.53	0.080
6.77	0.014	7.97	0.018	9.17	0.023	10.37	0.036	11.57	0.082
6.80	0.014	8.00	0.018	9.20	0.023	10.40	0.037	11.60	0.085
6.83	0.014	8.03	0.018	9.23	0.023	10.43	0.037	11.63	0.088
6.87	0.014	8.07	0.018	9.27	0.024	10.47	0.038	11.67	0.092
6.90	0.014	8.10	0.018	9.30	0.024	10.50	0.038	11.70	0.097
6.93	0.015	8.13	0.019	9.33	0.024	10.53	0.039	11.73	0.101
6.97	0.015	8.17	0.019	9.37	0.025	10.57	0.039	11.77	0.106
7.00	0.015	8.20	0.019	9.40	0.025	10.60	0.040	11.80	0.112
7.03	0.015	8.23	0.019	9.43	0.026	10.63	0.040	11.83	0.120
7.07	0.015	8.27	0.019	9.47	0.026	10.67	0.041	11.87	0.129
7.10	0.015	8.30	0.019	9.50	0.026	10.70	0.042	11.90	0.140
7.13	0.015	8.33	0.019	9.53	0.027	10.73	0.043	11.93	0.153
7.17	0.015	8.37	0.019	9.57	0.027	10.77	0.044	11.97	0.166
7.20	0.015	8.40	0.020	9.60	0.027	10.80	0.045	12.00	0.180

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd ***PHASE I UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
12.03	0.193	13.23	0.085	14.43	0.040	15.63	0.028	16.83	0.024
12.07	0.207	13.27	0.081	14.47	0.040	15.67	0.028	16.87	0.024
12.10	0.225	13.30	0.078	14.50	0.039	15.70	0.028	16.90	0.024
12.13	0.245	13.33	0.075	14.53	0.039	15.73	0.028	16.93	0.024
12.17	0.264	13.37	0.073	14.57	0.039	15.77	0.028	16.97	0.023
12.20	0.281	13.40	0.068	14.60	0.038	15.80	0.028	17.00	0.023
12.23	0.296	13.43	0.063	14.63	0.038	15.83	0.028	17.03	0.023
12.27	0.309	13.47	0.061	14.67	0.037	15.87	0.028	17.07	0.023
12.30	0.316	13.50	0.059	14.70	0.037	15.90	0.027	17.10	0.023
12.33	0.321	13.53	0.058	14.73	0.036	15.93	0.027	17.13	0.023
12.37	**0.323**	13.57	0.057	14.77	0.036	15.97	0.027	17.17	0.023
12.40	0.323	13.60	0.055	14.80	0.036	16.00	0.027	17.20	0.023
12.43	0.320	13.63	0.054	14.83	0.035	16.03	0.027	17.23	0.022
12.47	0.316	13.67	0.052	14.87	0.035	16.07	0.027	17.27	0.022
12.50	0.311	13.70	0.051	14.90	0.034	16.10	0.027	17.30	0.022
12.53	0.303	13.73	0.050	14.93	0.034	16.13	0.027	17.33	0.022
12.57	0.295	13.77	0.049	14.97	0.034	16.17	0.027	17.37	0.022
12.60	0.287	13.80	0.048	15.00	0.033	16.20	0.026	17.40	0.022
12.63	0.278	13.83	0.048	15.03	0.033	16.23	0.026	17.43	0.022
12.67	0.270	13.87	0.047	15.07	0.032	16.27	0.026	17.47	0.022
12.70	0.261	13.90	0.047	15.10	0.032	16.30	0.026	17.50	0.021
12.73	0.253	13.93	0.046	15.13	0.031	16.33	0.026	17.53	0.021
12.77	0.241	13.97	0.046	15.17	0.031	16.37	0.026	17.57	0.021
12.80	0.231	14.00	0.045	15.20	0.031	16.40	0.026	17.60	0.021
12.83	0.219	14.03	0.045	15.23	0.030	16.43	0.026	17.63	0.021
12.87	0.209	14.07	0.045	15.27	0.030	16.47	0.025	17.67	0.021
12.90	0.199	14.10	0.044	15.30	0.030	16.50	0.025	17.70	0.021
12.93	0.189	14.13	0.044	15.33	0.030	16.53	0.025	17.73	0.021
12.97	0.175	14.17	0.043	15.37	0.030	16.57	0.025	17.77	0.020
13.00	0.159	14.20	0.043	15.40	0.029	16.60	0.025	17.80	0.020
13.03	0.141	14.23	0.043	15.43	0.029	16.63	0.025	17.83	0.020
13.07	0.124	14.27	0.042	15.47	0.029	16.67	0.025	17.87	0.020
13.10	0.112	14.30	0.042	15.50	0.029	16.70	0.025	17.90	0.020
13.13	0.103	14.33	0.041	15.53	0.029	16.73	0.024	17.93	0.020
13.17	0.097	14.37	0.041	15.57	0.029	16.77	0.024	17.97	0.020
13.20	0.090	14.40	0.041	15.60	0.029	16.80	0.024	18.00	0.020

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd ***PHASE I UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
18.03	0.019	19.23	0.018	20.43	0.016	21.63	0.015	22.83	0.014
18.07	0.019	19.27	0.018	20.47	0.016	21.67	0.015	22.87	0.014
18.10	0.019	19.30	0.018	20.50	0.016	21.70	0.015	22.90	0.014
18.13	0.019	19.33	0.018	20.53	0.016	21.73	0.015	22.93	0.014
18.17	0.019	19.37	0.017	20.57	0.016	21.77	0.015	22.97	0.014
18.20	0.019	19.40	0.017	20.60	0.016	21.80	0.015	23.00	0.014
18.23	0.019	19.43	0.017	20.63	0.016	21.83	0.015	23.03	0.014
18.27	0.019	19.47	0.017	20.67	0.016	21.87	0.015	23.07	0.014
18.30	0.019	19.50	0.017	20.70	0.016	21.90	0.015	23.10	0.014
18.33	0.019	19.53	0.017	20.73	0.016	21.93	0.015	23.13	0.014
18.37	0.018	19.57	0.017	20.77	0.016	21.97	0.015	23.17	0.014
18.40	0.018	19.60	0.017	20.80	0.016	22.00	0.015	23.20	0.014
18.43	0.018	19.63	0.017	20.83	0.016	22.03	0.015	23.23	0.014
18.47	0.018	19.67	0.017	20.87	0.016	22.07	0.015	23.27	0.014
18.50	0.018	19.70	0.017	20.90	0.016	22.10	0.015	23.30	0.014
18.53	0.018	19.73	0.017	20.93	0.016	22.13	0.015	23.33	0.014
18.57	0.018	19.77	0.017	20.97	0.016	22.17	0.015	23.37	0.014
18.60	0.018	19.80	0.017	21.00	0.016	22.20	0.015	23.40	0.014
18.63	0.018	19.83	0.017	21.03	0.016	22.23	0.015	23.43	0.014
18.67	0.018	19.87	0.017	21.07	0.016	22.27	0.015	23.47	0.014
18.70	0.018	19.90	0.017	21.10	0.016	22.30	0.015	23.50	0.014
18.73	0.018	19.93	0.017	21.13	0.016	22.33	0.015	23.53	0.014
18.77	0.018	19.97	0.017	21.17	0.016	22.37	0.015	23.57	0.014
18.80	0.018	20.00	0.017	21.20	0.016	22.40	0.015	23.60	0.013
18.83	0.018	20.03	0.017	21.23	0.016	22.43	0.015	23.63	0.013
18.87	0.018	20.07	0.017	21.27	0.016	22.47	0.015	23.67	0.013
18.90	0.018	20.10	0.017	21.30	0.016	22.50	0.015	23.70	0.013
18.93	0.018	20.13	0.017	21.33	0.016	22.53	0.014	23.73	0.013
18.97	0.018	20.17	0.017	21.37	0.016	22.57	0.014	23.77	0.013
19.00	0.018	20.20	0.017	21.40	0.016	22.60	0.014	23.80	0.013
19.03	0.018	20.23	0.017	21.43	0.016	22.63	0.014	23.83	0.013
19.07	0.018	20.27	0.017	21.47	0.016	22.67	0.014	23.87	0.013
19.10	0.018	20.30	0.017	21.50	0.015	22.70	0.014	23.90	0.013
19.13	0.018	20.33	0.017	21.53	0.015	22.73	0.014	23.93	0.013
19.17	0.018	20.37	0.017	21.57	0.015	22.77	0.014	23.97	0.013
19.20	0.018	20.40	0.017	21.60	0.015	22.80	0.014	24.00	0.013

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd ***PHASE I UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
24.03	0.013								
24.07	0.013								
24.10	0.012								
24.13	0.011								
24.17	0.010								
24.20	0.008								
24.23	0.007								
24.27	0.005								
24.30	0.004								
24.33	0.003								
24.37	0.003								
...end	*...end*								

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PHASE I UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 0.505 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Hydrograph Volume	= 4,576 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 475.02 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 615 cuft

Pond Routing by Storage Indication Method *Center of mass detention time = 9 min*

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
1.37	0.005	2.20	0.010	3.03	0.013	3.87	0.016	4.70	0.017
1.40	0.005	2.23	0.010	3.07	0.013	3.90	0.016	4.73	0.017
1.43	0.006	2.27	0.010	3.10	0.013	3.93	0.016	4.77	0.017
1.47	0.006	2.30	0.011	3.13	0.014	3.97	0.016	4.80	0.018
1.50	0.006	2.33	0.011	3.17	0.014	4.00	0.016	4.83	0.018
1.53	0.006	2.37	0.011	3.20	0.014	4.03	0.016	4.87	0.018
1.57	0.007	2.40	0.011	3.23	0.014	4.07	0.016	4.90	0.018
1.60	0.007	2.43	0.011	3.27	0.014	4.10	0.016	4.93	0.018
1.63	0.007	2.47	0.011	3.30	0.014	4.13	0.016	4.97	0.018
1.67	0.007	2.50	0.011	3.33	0.014	4.17	0.016	5.00	0.018
1.70	0.007	2.53	0.011	3.37	0.014	4.20	0.016	5.03	0.018
1.73	0.008	2.57	0.012	3.40	0.014	4.23	0.016	5.07	0.018
1.77	0.008	2.60	0.012	3.43	0.014	4.27	0.016	5.10	0.018
1.80	0.008	2.63	0.012	3.47	0.015	4.30	0.017	5.13	0.018
1.83	0.008	2.67	0.012	3.50	0.015	4.33	0.017	5.17	0.018
1.87	0.008	2.70	0.012	3.53	0.015	4.37	0.017	5.20	0.018
1.90	0.009	2.73	0.012	3.57	0.015	4.40	0.017	5.23	0.018
1.93	0.009	2.77	0.012	3.60	0.015	4.43	0.017	5.27	0.018
1.97	0.009	2.80	0.012	3.63	0.015	4.47	0.017	5.30	0.018
2.00	0.009	2.83	0.013	3.67	0.015	4.50	0.017	5.33	0.019
2.03	0.009	2.87	0.013	3.70	0.015	4.53	0.017	5.37	0.019
2.07	0.010	2.90	0.013	3.73	0.015	4.57	0.017	5.40	0.019
2.10	0.010	2.93	0.013	3.77	0.015	4.60	0.017	5.43	0.019
2.13	0.010	2.97	0.013	3.80	0.015	4.63	0.017	5.47	0.019
2.17	0.010	3.00	0.013	3.83	0.015	4.67	0.017	5.50	0.019

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd **PHASE I UG BASIN**

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
5.53	0.019	6.73	0.023	7.93	0.030	9.13	0.038	10.33	0.060
5.57	0.019	6.77	0.024	7.97	0.031	9.17	0.039	10.37	0.061
5.60	0.019	6.80	0.024	8.00	0.031	9.20	0.039	10.40	0.061
5.63	0.019	6.83	0.024	8.03	0.031	9.23	0.040	10.43	0.062
5.67	0.019	6.87	0.024	8.07	0.031	9.27	0.040	10.47	0.063
5.70	0.019	6.90	0.024	8.10	0.031	9.30	0.041	10.50	0.063
5.73	0.019	6.93	0.024	8.13	0.032	9.33	0.041	10.53	0.064
5.77	0.019	6.97	0.025	8.17	0.032	9.37	0.042	10.57	0.065
5.80	0.019	7.00	0.025	8.20	0.032	9.40	0.042	10.60	0.066
5.83	0.019	7.03	0.025	8.23	0.032	9.43	0.043	10.63	0.067
5.87	0.019	7.07	0.025	8.27	0.033	9.47	0.044	10.67	0.068
5.90	0.020	7.10	0.025	8.30	0.033	9.50	0.044	10.70	0.070
5.93	0.020	7.13	0.026	8.33	0.033	9.53	0.045	10.73	0.072
5.97	0.020	7.17	0.026	8.37	0.033	9.57	0.045	10.77	0.072
6.00	0.020	7.20	0.026	8.40	0.033	9.60	0.046	10.80	0.073
6.03	0.020	7.23	0.026	8.43	0.034	9.63	0.047	10.83	0.074
6.07	0.020	7.27	0.026	8.47	0.034	9.67	0.047	10.87	0.076
6.10	0.020	7.30	0.027	8.50	0.034	9.70	0.048	10.90	0.077
6.13	0.020	7.33	0.027	8.53	0.034	9.73	0.049	10.93	0.079
6.17	0.020	7.37	0.027	8.57	0.034	9.77	0.049	10.97	0.081
6.20	0.020	7.40	0.027	8.60	0.035	9.80	0.050	11.00	0.083
6.23	0.021	7.43	0.027	8.63	0.035	9.83	0.050	11.03	0.085
6.27	0.021	7.47	0.028	8.67	0.035	9.87	0.051	11.07	0.087
6.30	0.021	7.50	0.028	8.70	0.035	9.90	0.052	11.10	0.089
6.33	0.021	7.53	0.028	8.73	0.035	9.93	0.052	11.13	0.092
6.37	0.021	7.57	0.028	8.77	0.036	9.97	0.053	11.17	0.094
6.40	0.021	7.60	0.028	8.80	0.036	10.00	0.054	11.20	0.097
6.43	0.022	7.63	0.029	8.83	0.036	10.03	0.054	11.23	0.100
6.47	0.022	7.67	0.029	8.87	0.036	10.07	0.055	11.27	0.102
6.50	0.022	7.70	0.029	8.90	0.036	10.10	0.056	11.30	0.105
6.53	0.022	7.73	0.029	8.93	0.037	10.13	0.056	11.33	0.108
6.57	0.022	7.77	0.029	8.97	0.037	10.17	0.057	11.37	0.112
6.60	0.023	7.80	0.030	9.00	0.037	10.20	0.057	11.40	0.115
6.63	0.023	7.83	0.030	9.03	0.037	10.23	0.058	11.43	0.119
6.67	0.023	7.87	0.030	9.07	0.038	10.27	0.059	11.47	0.123
6.70	0.023	7.90	0.030	9.10	0.038	10.30	0.059	11.50	0.126

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd **PHASE I UG BASIN**

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.53	0.130	12.73	0.362	13.93	0.077	15.13	0.049	16.33	0.041
11.57	0.134	12.77	0.355	13.97	0.076	15.17	0.049	16.37	0.040
11.60	0.139	12.80	0.347	14.00	0.075	15.20	0.048	16.40	0.040
11.63	0.144	12.83	0.339	14.03	0.074	15.23	0.048	16.43	0.040
11.67	0.150	12.87	0.332	14.07	0.073	15.27	0.047	16.47	0.040
11.70	0.157	12.90	0.323	14.10	0.072	15.30	0.047	16.50	0.040
11.73	0.163	12.93	0.315	14.13	0.070	15.33	0.047	16.53	0.039
11.77	0.169	12.97	0.308	14.17	0.068	15.37	0.046	16.57	0.039
11.80	0.176	13.00	0.299	14.20	0.068	15.40	0.046	16.60	0.039
11.83	0.184	13.03	0.291	14.23	0.067	15.43	0.046	16.63	0.039
11.87	0.191	13.07	0.281	14.27	0.066	15.47	0.046	16.67	0.039
11.90	0.199	13.10	0.273	14.30	0.066	15.50	0.046	16.70	0.038
11.93	0.208	13.13	0.264	14.33	0.065	15.53	0.045	16.73	0.038
11.97	0.219	13.17	0.255	14.37	0.064	15.57	0.045	16.77	0.038
12.00	0.235	13.20	0.246	14.40	0.064	15.60	0.045	16.80	0.038
12.03	0.253	13.23	0.236	14.43	0.063	15.63	0.045	16.83	0.038
12.07	0.271	13.27	0.225	14.47	0.062	15.67	0.044	16.87	0.037
12.10	0.293	13.30	0.216	14.50	0.062	15.70	0.044	16.90	0.037
12.13	0.317	13.33	0.206	14.53	0.061	15.73	0.044	16.93	0.037
12.17	0.340	13.37	0.197	14.57	0.060	15.77	0.044	16.97	0.037
12.20	0.362	13.40	0.187	14.60	0.060	15.80	0.044	17.00	0.037
12.23	0.382	13.43	0.174	14.63	0.059	15.83	0.043	17.03	0.036
12.27	0.418	13.47	0.160	14.67	0.059	15.87	0.043	17.07	0.036
12.30	0.459	13.50	0.143	14.70	0.058	15.90	0.043	17.10	0.036
12.33	0.490	13.53	0.129	14.73	0.057	15.93	0.043	17.13	0.036
12.37	**0.505**	13.57	0.118	14.77	0.057	15.97	0.043	17.17	0.036
12.40	0.504	13.60	0.109	14.80	0.056	16.00	0.043	17.20	0.035
12.43	0.491	13.63	0.103	14.83	0.055	16.03	0.042	17.23	0.035
12.47	0.470	13.67	0.098	14.87	0.055	16.07	0.042	17.27	0.035
12.50	0.448	13.70	0.093	14.90	0.054	16.10	0.042	17.30	0.035
12.53	0.426	13.73	0.089	14.93	0.053	16.13	0.042	17.33	0.035
12.57	0.408	13.77	0.086	14.97	0.053	16.17	0.042	17.37	0.034
12.60	0.392	13.80	0.083	15.00	0.052	16.20	0.041	17.40	0.034
12.63	0.383	13.83	0.081	15.03	0.051	16.23	0.041	17.43	0.034
12.67	0.375	13.87	0.079	15.07	0.051	16.27	0.041	17.47	0.034
12.70	0.368	13.90	0.078	15.10	0.050	16.30	0.041	17.50	0.034

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd ***PHASE I UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
17.53	0.033	18.73	0.028	19.93	0.027	21.13	0.025	22.33	0.023
17.57	0.033	18.77	0.028	19.97	0.026	21.17	0.025	22.37	0.023
17.60	0.033	18.80	0.028	20.00	0.026	21.20	0.025	22.40	0.023
17.63	0.033	18.83	0.028	20.03	0.026	21.23	0.025	22.43	0.023
17.67	0.033	18.87	0.028	20.07	0.026	21.27	0.025	22.47	0.023
17.70	0.032	18.90	0.028	20.10	0.026	21.30	0.024	22.50	0.023
17.73	0.032	18.93	0.028	20.13	0.026	21.33	0.024	22.53	0.023
17.77	0.032	18.97	0.028	20.17	0.026	21.37	0.024	22.57	0.023
17.80	0.032	19.00	0.028	20.20	0.026	21.40	0.024	22.60	0.023
17.83	0.032	19.03	0.028	20.23	0.026	21.43	0.024	22.63	0.023
17.87	0.031	19.07	0.028	20.27	0.026	21.47	0.024	22.67	0.022
17.90	0.031	19.10	0.028	20.30	0.026	21.50	0.024	22.70	0.022
17.93	0.031	19.13	0.028	20.33	0.026	21.53	0.024	22.73	0.022
17.97	0.031	19.17	0.028	20.37	0.026	21.57	0.024	22.77	0.022
18.00	0.031	19.20	0.028	20.40	0.026	21.60	0.024	22.80	0.022
18.03	0.030	19.23	0.028	20.43	0.026	21.63	0.024	22.83	0.022
18.07	0.030	19.27	0.027	20.47	0.026	21.67	0.024	22.87	0.022
18.10	0.030	19.30	0.027	20.50	0.026	21.70	0.024	22.90	0.022
18.13	0.030	19.33	0.027	20.53	0.026	21.73	0.024	22.93	0.022
18.17	0.030	19.37	0.027	20.57	0.026	21.77	0.024	22.97	0.022
18.20	0.029	19.40	0.027	20.60	0.026	21.80	0.024	23.00	0.022
18.23	0.029	19.43	0.027	20.63	0.025	21.83	0.024	23.03	0.022
18.27	0.029	19.47	0.027	20.67	0.025	21.87	0.024	23.07	0.022
18.30	0.029	19.50	0.027	20.70	0.025	21.90	0.024	23.10	0.022
18.33	0.029	19.53	0.027	20.73	0.025	21.93	0.024	23.13	0.022
18.37	0.029	19.57	0.027	20.77	0.025	21.97	0.023	23.17	0.022
18.40	0.029	19.60	0.027	20.80	0.025	22.00	0.023	23.20	0.022
18.43	0.029	19.63	0.027	20.83	0.025	22.03	0.023	23.23	0.022
18.47	0.029	19.67	0.027	20.87	0.025	22.07	0.023	23.27	0.022
18.50	0.029	19.70	0.027	20.90	0.025	22.10	0.023	23.30	0.021
18.53	0.029	19.73	0.027	20.93	0.025	22.13	0.023	23.33	0.021
18.57	0.029	19.77	0.027	20.97	0.025	22.17	0.023	23.37	0.021
18.60	0.028	19.80	0.027	21.00	0.025	22.20	0.023	23.40	0.021
18.63	0.028	19.83	0.027	21.03	0.025	22.23	0.023	23.43	0.021
18.67	0.028	19.87	0.027	21.07	0.025	22.27	0.023	23.47	0.021
18.70	0.028	19.90	0.027	21.10	0.025	22.30	0.023	23.50	0.021

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd ***PHASE I UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
23.53	0.021								
23.57	0.021								
23.60	0.021								
23.63	0.021								
23.67	0.021								
23.70	0.021								
23.73	0.021								
23.77	0.021								
23.80	0.021								
23.83	0.021								
23.87	0.021								
23.90	0.021								
23.93	0.021								
23.97	0.021								
24.00	0.021								
24.03	0.020								
24.07	0.020								
24.10	0.019								
24.13	0.017								
24.17	0.014								
24.20	0.012								
24.23	0.010								
24.27	0.008								
24.30	0.006								
24.33	0.005								
...end	*...end*								

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PHASE I UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 0.752 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 5,792 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 475.20 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 759 cuft

Pond Routing by Storage Indication Method — *Center of mass detention time = 9 min*

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
1.30	0.008	2.13	0.014	2.97	0.018	3.80	0.020	4.63	0.022
1.33	0.008	2.17	0.014	3.00	0.018	3.83	0.020	4.67	0.022
1.37	0.009	2.20	0.014	3.03	0.018	3.87	0.020	4.70	0.022
1.40	0.009	2.23	0.014	3.07	0.018	3.90	0.020	4.73	0.022
1.43	0.009	2.27	0.015	3.10	0.018	3.93	0.020	4.77	0.022
1.47	0.009	2.30	0.015	3.13	0.018	3.97	0.021	4.80	0.023
1.50	0.010	2.33	0.015	3.17	0.018	4.00	0.021	4.83	0.023
1.53	0.010	2.37	0.015	3.20	0.018	4.03	0.021	4.87	0.023
1.57	0.010	2.40	0.015	3.23	0.018	4.07	0.021	4.90	0.023
1.60	0.010	2.43	0.015	3.27	0.019	4.10	0.021	4.93	0.023
1.63	0.011	2.47	0.016	3.30	0.019	4.13	0.021	4.97	0.023
1.67	0.011	2.50	0.016	3.33	0.019	4.17	0.021	5.00	0.023
1.70	0.011	2.53	0.016	3.37	0.019	4.20	0.021	5.03	0.023
1.73	0.011	2.57	0.016	3.40	0.019	4.23	0.021	5.07	0.023
1.77	0.012	2.60	0.016	3.43	0.019	4.27	0.021	5.10	0.023
1.80	0.012	2.63	0.016	3.47	0.019	4.30	0.021	5.13	0.023
1.83	0.012	2.67	0.016	3.50	0.019	4.33	0.021	5.17	0.024
1.87	0.012	2.70	0.017	3.53	0.019	4.37	0.022	5.20	0.024
1.90	0.013	2.73	0.017	3.57	0.019	4.40	0.022	5.23	0.024
1.93	0.013	2.77	0.017	3.60	0.020	4.43	0.022	5.27	0.024
1.97	0.013	2.80	0.017	3.63	0.020	4.47	0.022	5.30	0.024
2.00	0.013	2.83	0.017	3.67	0.020	4.50	0.022	5.33	0.024
2.03	0.013	2.87	0.017	3.70	0.020	4.53	0.022	5.37	0.024
2.07	0.014	2.90	0.017	3.73	0.020	4.57	0.022	5.40	0.024
2.10	0.014	2.93	0.017	3.77	0.020	4.60	0.022	5.43	0.024

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd — ***PHASE I UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
5.47	0.024	6.67	0.030	7.87	0.039	9.07	0.049	10.27	0.074
5.50	0.025	6.70	0.030	7.90	0.039	9.10	0.049	10.30	0.074
5.53	0.025	6.73	0.031	7.93	0.039	9.13	0.049	10.33	0.075
5.57	0.025	6.77	0.031	7.97	0.040	9.17	0.050	10.37	0.076
5.60	0.025	6.80	0.031	8.00	0.040	9.20	0.050	10.40	0.076
5.63	0.025	6.83	0.031	8.03	0.040	9.23	0.051	10.43	0.077
5.67	0.025	6.87	0.031	8.07	0.041	9.27	0.052	10.47	0.078
5.70	0.025	6.90	0.032	8.10	0.041	9.30	0.052	10.50	0.079
5.73	0.025	6.93	0.032	8.13	0.041	9.33	0.053	10.53	0.080
5.77	0.025	6.97	0.032	8.17	0.041	9.37	0.054	10.57	0.080
5.80	0.025	7.00	0.032	8.20	0.042	9.40	0.055	10.60	0.081
5.83	0.025	7.03	0.033	8.23	0.042	9.43	0.055	10.63	0.082
5.87	0.026	7.07	0.033	8.27	0.042	9.47	0.056	10.67	0.084
5.90	0.026	7.10	0.033	8.30	0.042	9.50	0.057	10.70	0.085
5.93	0.026	7.13	0.033	8.33	0.043	9.53	0.058	10.73	0.087
5.97	0.026	7.17	0.034	8.37	0.043	9.57	0.059	10.77	0.089
6.00	0.026	7.20	0.034	8.40	0.043	9.60	0.059	10.80	0.091
6.03	0.026	7.23	0.034	8.43	0.043	9.63	0.060	10.83	0.094
6.07	0.026	7.27	0.034	8.47	0.044	9.67	0.061	10.87	0.096
6.10	0.026	7.30	0.035	8.50	0.044	9.70	0.062	10.90	0.098
6.13	0.026	7.33	0.035	8.53	0.044	9.73	0.062	10.93	0.101
6.17	0.027	7.37	0.035	8.57	0.044	9.77	0.063	10.97	0.103
6.20	0.027	7.40	0.035	8.60	0.045	9.80	0.064	11.00	0.105
6.23	0.027	7.43	0.036	8.63	0.045	9.83	0.065	11.03	0.108
6.27	0.027	7.47	0.036	8.67	0.045	9.87	0.066	11.07	0.111
6.30	0.027	7.50	0.036	8.70	0.045	9.90	0.066	11.10	0.114
6.33	0.028	7.53	0.036	8.73	0.046	9.93	0.067	11.13	0.117
6.37	0.028	7.57	0.037	8.77	0.046	9.97	0.068	11.17	0.120
6.40	0.028	7.60	0.037	8.80	0.046	10.00	0.069	11.20	0.124
6.43	0.028	7.63	0.037	8.83	0.047	10.03	0.070	11.23	0.128
6.47	0.029	7.67	0.037	8.87	0.047	10.07	0.070	11.27	0.131
6.50	0.029	7.70	0.038	8.90	0.047	10.10	0.071	11.30	0.135
6.53	0.029	7.73	0.038	8.93	0.047	10.13	0.072	11.33	0.139
6.57	0.029	7.77	0.038	8.97	0.048	10.17	0.072	11.37	0.143
6.60	0.030	7.80	0.038	9.00	0.048	10.20	0.072	11.40	0.147
6.63	0.030	7.83	0.039	9.03	0.048	10.23	0.073	11.43	0.152

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd **PHASE I UG BASIN**

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.47	0.155	12.67	0.422	13.87	0.105	15.07	0.063	16.27	0.051
11.50	0.159	12.70	0.404	13.90	0.102	15.10	0.062	16.30	0.051
11.53	0.163	12.73	0.389	13.93	0.099	15.13	0.062	16.33	0.051
11.57	0.167	12.77	0.381	13.97	0.097	15.17	0.061	16.37	0.050
11.60	0.171	12.80	0.374	14.00	0.095	15.20	0.060	16.40	0.050
11.63	0.177	12.83	0.368	14.03	0.093	15.23	0.060	16.43	0.050
11.67	0.182	12.87	0.361	14.07	0.092	15.27	0.059	16.47	0.050
11.70	0.188	12.90	0.356	14.10	0.090	15.30	0.059	16.50	0.049
11.73	0.193	12.93	0.348	14.13	0.089	15.33	0.058	16.53	0.049
11.77	0.198	12.97	0.341	14.17	0.088	15.37	0.058	16.57	0.049
11.80	0.204	13.00	0.335	14.20	0.087	15.40	0.058	16.60	0.049
11.83	0.212	13.03	0.327	14.23	0.086	15.43	0.057	16.63	0.048
11.87	0.219	13.07	0.319	14.27	0.085	15.47	0.057	16.67	0.048
11.90	0.231	13.10	0.313	14.30	0.084	15.50	0.057	16.70	0.048
11.93	0.242	13.13	0.305	14.33	0.083	15.53	0.057	16.73	0.048
11.97	0.256	13.17	0.297	14.37	0.083	15.57	0.056	16.77	0.047
12.00	0.272	13.20	0.290	14.40	0.082	15.60	0.056	16.80	0.047
12.03	0.290	13.23	0.280	14.43	0.081	15.63	0.056	16.83	0.047
12.07	0.312	13.27	0.273	14.47	0.080	15.67	0.056	16.87	0.047
12.10	0.335	13.30	0.265	14.50	0.079	15.70	0.055	16.90	0.046
12.13	0.360	13.33	0.256	14.53	0.079	15.73	0.055	16.93	0.046
12.17	0.388	13.37	0.249	14.57	0.078	15.77	0.055	16.97	0.046
12.20	0.466	13.40	0.238	14.60	0.077	15.80	0.055	17.00	0.046
12.23	0.575	13.43	0.230	14.63	0.076	15.83	0.054	17.03	0.045
12.27	0.669	13.47	0.220	14.67	0.075	15.87	0.054	17.07	0.045
12.30	0.726	13.50	0.212	14.70	0.075	15.90	0.054	17.10	0.045
12.33	**0.752**	13.53	0.203	14.73	0.074	15.93	0.054	17.13	0.045
12.37	0.749	13.57	0.195	14.77	0.073	15.97	0.053	17.17	0.044
12.40	0.725	13.60	0.186	14.80	0.072	16.00	0.053	17.20	0.044
12.43	0.687	13.63	0.174	14.83	0.071	16.03	0.053	17.23	0.044
12.47	0.638	13.67	0.161	14.87	0.068	16.07	0.053	17.27	0.044
12.50	0.588	13.70	0.146	14.90	0.067	16.10	0.052	17.30	0.043
12.53	0.541	13.73	0.133	14.93	0.067	16.13	0.052	17.33	0.043
12.57	0.502	13.77	0.123	14.97	0.066	16.17	0.052	17.37	0.043
12.60	0.470	13.80	0.115	15.00	0.065	16.20	0.052	17.40	0.043
12.63	0.445	13.83	0.109	15.03	0.064	16.23	0.051	17.43	0.042

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd **PHASE I UG BASIN**

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
17.47	0.042	18.67	0.035	19.87	0.033	21.07	0.031	22.27	0.029
17.50	0.042	18.70	0.035	19.90	0.033	21.10	0.031	22.30	0.029
17.53	0.042	18.73	0.035	19.93	0.033	21.13	0.031	22.33	0.029
17.57	0.041	18.77	0.035	19.97	0.033	21.17	0.031	22.37	0.029
17.60	0.041	18.80	0.035	20.00	0.033	21.20	0.031	22.40	0.028
17.63	0.041	18.83	0.035	20.03	0.033	21.23	0.031	22.43	0.028
17.67	0.041	18.87	0.035	20.07	0.033	21.27	0.031	22.47	0.028
17.70	0.040	18.90	0.035	20.10	0.033	21.30	0.030	22.50	0.028
17.73	0.040	18.93	0.035	20.13	0.033	21.33	0.030	22.53	0.028
17.77	0.040	18.97	0.035	20.17	0.033	21.37	0.030	22.57	0.028
17.80	0.040	19.00	0.035	20.20	0.033	21.40	0.030	22.60	0.028
17.83	0.039	19.03	0.035	20.23	0.033	21.43	0.030	22.63	0.028
17.87	0.039	19.07	0.035	20.27	0.032	21.47	0.030	22.67	0.028
17.90	0.039	19.10	0.035	20.30	0.032	21.50	0.030	22.70	0.028
17.93	0.039	19.13	0.035	20.33	0.032	21.53	0.030	22.73	0.028
17.97	0.038	19.17	0.034	20.37	0.032	21.57	0.030	22.77	0.028
18.00	0.038	19.20	0.034	20.40	0.032	21.60	0.030	22.80	0.028
18.03	0.038	19.23	0.034	20.43	0.032	21.63	0.030	22.83	0.028
18.07	0.038	19.27	0.034	20.47	0.032	21.67	0.030	22.87	0.028
18.10	0.037	19.30	0.034	20.50	0.032	21.70	0.030	22.90	0.027
18.13	0.037	19.33	0.034	20.53	0.032	21.73	0.030	22.93	0.027
18.17	0.037	19.37	0.034	20.57	0.032	21.77	0.030	22.97	0.027
18.20	0.037	19.40	0.034	20.60	0.032	21.80	0.030	23.00	0.027
18.23	0.037	19.43	0.034	20.63	0.032	21.83	0.029	23.03	0.027
18.27	0.036	19.47	0.034	20.67	0.032	21.87	0.029	23.07	0.027
18.30	0.036	19.50	0.034	20.70	0.032	21.90	0.029	23.10	0.027
18.33	0.036	19.53	0.034	20.73	0.032	21.93	0.029	23.13	0.027
18.37	0.036	19.57	0.034	20.77	0.031	21.97	0.029	23.17	0.027
18.40	0.036	19.60	0.034	20.80	0.031	22.00	0.029	23.20	0.027
18.43	0.036	19.63	0.034	20.83	0.031	22.03	0.029	23.23	0.027
18.47	0.036	19.67	0.034	20.87	0.031	22.07	0.029	23.27	0.027
18.50	0.036	19.70	0.033	20.90	0.031	22.10	0.029	23.30	0.027
18.53	0.036	19.73	0.033	20.93	0.031	22.13	0.029	23.33	0.027
18.57	0.036	19.77	0.033	20.97	0.031	22.17	0.029	23.37	0.027
18.60	0.036	19.80	0.033	21.00	0.031	22.20	0.029	23.40	0.027
18.63	0.035	19.83	0.033	21.03	0.031	22.23	0.029	23.43	0.027

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd ***PHASE I UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
23.47	0.026								
23.50	0.026								
23.53	0.026								
23.57	0.026								
23.60	0.026								
23.63	0.026								
23.67	0.026								
23.70	0.026								
23.73	0.026								
23.77	0.026								
23.80	0.026								
23.83	0.026								
23.87	0.026								
23.90	0.026								
23.93	0.026								
23.97	0.026								
24.00	0.026								
24.03	0.025								
24.07	0.025								
24.10	0.023								
24.13	0.021								
24.17	0.018								
24.20	0.015								
24.23	0.012								
24.27	0.009								
24.30	0.007								
...end	*...end*								

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

01-26-2022

PHASE I UG BASIN

Hyd. No. 24

Hydrograph Type	= Pond Route	Peak Flow	= 1.097 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 8,025 cuft
Inflow Hydrograph	= 23 - TOTAL DA-2 DET	Max. Elevation	= 475.51 ft
Pond Name	= PROP UG BASIN	Max. Storage	= 1,014 cuft

Pond Routing by Storage Indication Method *Center of mass detention time = 9 min*

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
1.10	0.011	1.93	0.020	2.77	0.025	3.60	0.028	4.43	0.031
1.13	0.012	1.97	0.020	2.80	0.025	3.63	0.028	4.47	0.032
1.17	0.012	2.00	0.021	2.83	0.025	3.67	0.028	4.50	0.032
1.20	0.013	2.03	0.021	2.87	0.025	3.70	0.028	4.53	0.032
1.23	0.013	2.07	0.021	2.90	0.025	3.73	0.028	4.57	0.032
1.27	0.014	2.10	0.021	2.93	0.026	3.77	0.029	4.60	0.032
1.30	0.014	2.13	0.022	2.97	0.026	3.80	0.029	4.63	0.032
1.33	0.015	2.17	0.022	3.00	0.026	3.83	0.029	4.67	0.032
1.37	0.015	2.20	0.022	3.03	0.026	3.87	0.029	4.70	0.033
1.40	0.016	2.23	0.022	3.07	0.026	3.90	0.029	4.73	0.033
1.43	0.016	2.27	0.022	3.10	0.026	3.93	0.029	4.77	0.033
1.47	0.016	2.30	0.023	3.13	0.026	3.97	0.029	4.80	0.033
1.50	0.017	2.33	0.023	3.17	0.026	4.00	0.030	4.83	0.033
1.53	0.017	2.37	0.023	3.20	0.027	4.03	0.030	4.87	0.033
1.57	0.017	2.40	0.023	3.23	0.027	4.07	0.030	4.90	0.033
1.60	0.018	2.43	0.023	3.27	0.027	4.10	0.030	4.93	0.034
1.63	0.018	2.47	0.023	3.30	0.027	4.13	0.030	4.97	0.034
1.67	0.018	2.50	0.024	3.33	0.027	4.17	0.030	5.00	0.034
1.70	0.018	2.53	0.024	3.37	0.027	4.20	0.030	5.03	0.034
1.73	0.019	2.57	0.024	3.40	0.027	4.23	0.031	5.07	0.034
1.77	0.019	2.60	0.024	3.43	0.027	4.27	0.031	5.10	0.034
1.80	0.019	2.63	0.024	3.47	0.028	4.30	0.031	5.13	0.034
1.83	0.020	2.67	0.024	3.50	0.028	4.33	0.031	5.17	0.034
1.87	0.020	2.70	0.025	3.53	0.028	4.37	0.031	5.20	0.035
1.90	0.020	2.73	0.025	3.57	0.028	4.40	0.031	5.23	0.035

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd **PHASE I UG BASIN**

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
5.27	0.035	6.47	0.041	7.67	0.054	8.87	0.067	10.07	0.096
5.30	0.035	6.50	0.042	7.70	0.054	8.90	0.067	10.10	0.098
5.33	0.035	6.53	0.042	7.73	0.054	8.93	0.067	10.13	0.099
5.37	0.035	6.57	0.042	7.77	0.055	8.97	0.068	10.17	0.100
5.40	0.035	6.60	0.043	7.80	0.055	9.00	0.068	10.20	0.101
5.43	0.036	6.63	0.043	7.83	0.055	9.03	0.068	10.23	0.102
5.47	0.036	6.67	0.043	7.87	0.056	9.07	0.069	10.27	0.103
5.50	0.036	6.70	0.044	7.90	0.056	9.10	0.069	10.30	0.104
5.53	0.036	6.73	0.044	7.93	0.056	9.13	0.070	10.33	0.105
5.57	0.036	6.77	0.044	7.97	0.057	9.17	0.071	10.37	0.106
5.60	0.036	6.80	0.045	8.00	0.057	9.20	0.071	10.40	0.107
5.63	0.036	6.83	0.045	8.03	0.057	9.23	0.072	10.43	0.108
5.67	0.036	6.87	0.045	8.07	0.058	9.27	0.072	10.47	0.109
5.70	0.037	6.90	0.046	8.10	0.058	9.30	0.073	10.50	0.110
5.73	0.037	6.93	0.046	8.13	0.059	9.33	0.073	10.53	0.112
5.77	0.037	6.97	0.046	8.17	0.059	9.37	0.074	10.57	0.113
5.80	0.037	7.00	0.047	8.20	0.059	9.40	0.075	10.60	0.115
5.83	0.037	7.03	0.047	8.23	0.060	9.43	0.076	10.63	0.116
5.87	0.037	7.07	0.047	8.27	0.060	9.47	0.077	10.67	0.118
5.90	0.037	7.10	0.048	8.30	0.060	9.50	0.078	10.70	0.120
5.93	0.037	7.13	0.048	8.33	0.061	9.53	0.079	10.73	0.123
5.97	0.038	7.17	0.048	8.37	0.061	9.57	0.080	10.77	0.125
6.00	0.038	7.20	0.049	8.40	0.061	9.60	0.081	10.80	0.128
6.03	0.038	7.23	0.049	8.43	0.062	9.63	0.082	10.83	0.131
6.07	0.038	7.27	0.049	8.47	0.062	9.67	0.083	10.87	0.135
6.10	0.038	7.30	0.050	8.50	0.063	9.70	0.084	10.90	0.138
6.13	0.038	7.33	0.050	8.53	0.063	9.73	0.085	10.93	0.142
6.17	0.039	7.37	0.050	8.57	0.063	9.77	0.086	10.97	0.145
6.20	0.039	7.40	0.051	8.60	0.064	9.80	0.088	11.00	0.148
6.23	0.039	7.43	0.051	8.63	0.064	9.83	0.089	11.03	0.152
6.27	0.039	7.47	0.052	8.67	0.064	9.87	0.090	11.07	0.155
6.30	0.040	7.50	0.052	8.70	0.065	9.90	0.091	11.10	0.159
6.33	0.040	7.53	0.052	8.73	0.065	9.93	0.092	11.13	0.162
6.37	0.040	7.57	0.053	8.77	0.065	9.97	0.093	11.17	0.166
6.40	0.041	7.60	0.053	8.80	0.066	10.00	0.094	11.20	0.169
6.43	0.041	7.63	0.053	8.83	0.066	10.03	0.095	11.23	0.173

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd **PHASE I UG BASIN**

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.27	0.177	12.47	0.959	13.67	0.243	14.87	0.096	16.07	0.072
11.30	0.181	12.50	0.896	13.70	0.235	14.90	0.095	16.10	0.072
11.33	0.185	12.53	0.818	13.73	0.227	14.93	0.093	16.13	0.072
11.37	0.189	12.57	0.738	13.77	0.219	14.97	0.092	16.17	0.071
11.40	0.192	12.60	0.671	13.80	0.211	15.00	0.091	16.20	0.070
11.43	0.195	12.63	0.612	13.83	0.204	15.03	0.090	16.23	0.070
11.47	0.199	12.67	0.563	13.87	0.197	15.07	0.089	16.27	0.069
11.50	0.202	12.70	0.520	13.90	0.190	15.10	0.088	16.30	0.069
11.53	0.206	12.73	0.488	13.93	0.182	15.13	0.087	16.33	0.069
11.57	0.211	12.77	0.461	13.97	0.172	15.17	0.085	16.37	0.068
11.60	0.216	12.80	0.439	14.00	0.164	15.20	0.084	16.40	0.068
11.63	0.220	12.83	0.420	14.03	0.154	15.23	0.084	16.43	0.068
11.67	0.227	12.87	0.405	14.07	0.145	15.27	0.083	16.47	0.067
11.70	0.235	12.90	0.392	14.10	0.138	15.30	0.082	16.50	0.067
11.73	0.241	12.93	0.384	14.13	0.132	15.33	0.081	16.53	0.067
11.77	0.250	12.97	0.378	14.17	0.128	15.37	0.081	16.57	0.066
11.80	0.257	13.00	0.373	14.20	0.124	15.40	0.080	16.60	0.066
11.83	0.266	13.03	0.367	14.23	0.121	15.43	0.080	16.63	0.066
11.87	0.275	13.07	0.362	14.27	0.119	15.47	0.079	16.67	0.065
11.90	0.287	13.10	0.358	14.30	0.117	15.50	0.079	16.70	0.065
11.93	0.300	13.13	0.352	14.33	0.115	15.53	0.078	16.73	0.065
11.97	0.315	13.17	0.345	14.37	0.113	15.57	0.078	16.77	0.064
12.00	0.332	13.20	0.339	14.40	0.112	15.60	0.077	16.80	0.064
12.03	0.353	13.23	0.334	14.43	0.111	15.63	0.077	16.83	0.064
12.07	0.375	13.27	0.327	14.47	0.109	15.67	0.077	16.87	0.063
12.10	0.434	13.30	0.320	14.50	0.108	15.70	0.076	16.90	0.063
12.13	0.572	13.33	0.314	14.53	0.107	15.73	0.076	16.93	0.063
12.17	0.747	13.37	0.308	14.57	0.106	15.77	0.076	16.97	0.062
12.20	0.900	13.40	0.301	14.60	0.105	15.80	0.075	17.00	0.062
12.23	0.991	13.43	0.294	14.63	0.104	15.83	0.075	17.03	0.062
12.27	1.054	13.47	0.287	14.67	0.103	15.87	0.075	17.07	0.061
12.30	1.086	13.50	0.279	14.70	0.102	15.90	0.074	17.10	0.061
12.33	**1.097**	13.53	0.273	14.73	0.101	15.93	0.074	17.13	0.061
12.37	1.087	13.57	0.266	14.77	0.099	15.97	0.073	17.17	0.060
12.40	1.060	13.60	0.258	14.80	0.098	16.00	0.073	17.20	0.060
12.43	1.016	13.63	0.252	14.83	0.097	16.03	0.073	17.23	0.060

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd ***PHASE I UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
17.27	0.059	18.47	0.049	19.67	0.046	20.87	0.043	22.07	0.039
17.30	0.059	18.50	0.049	19.70	0.046	20.90	0.042	22.10	0.039
17.33	0.059	18.53	0.048	19.73	0.045	20.93	0.042	22.13	0.039
17.37	0.058	18.57	0.048	19.77	0.045	20.97	0.042	22.17	0.039
17.40	0.058	18.60	0.048	19.80	0.045	21.00	0.042	22.20	0.039
17.43	0.058	18.63	0.048	19.83	0.045	21.03	0.042	22.23	0.039
17.47	0.057	18.67	0.048	19.87	0.045	21.07	0.042	22.27	0.039
17.50	0.057	18.70	0.048	19.90	0.045	21.10	0.042	22.30	0.039
17.53	0.057	18.73	0.048	19.93	0.045	21.13	0.042	22.33	0.039
17.57	0.056	18.77	0.048	19.97	0.045	21.17	0.042	22.37	0.039
17.60	0.056	18.80	0.048	20.00	0.045	21.20	0.042	22.40	0.039
17.63	0.056	18.83	0.048	20.03	0.045	21.23	0.042	22.43	0.039
17.67	0.055	18.87	0.048	20.07	0.045	21.27	0.042	22.47	0.038
17.70	0.055	18.90	0.048	20.10	0.044	21.30	0.041	22.50	0.038
17.73	0.055	18.93	0.047	20.13	0.044	21.33	0.041	22.53	0.038
17.77	0.054	18.97	0.047	20.17	0.044	21.37	0.041	22.57	0.038
17.80	0.054	19.00	0.047	20.20	0.044	21.40	0.041	22.60	0.038
17.83	0.053	19.03	0.047	20.23	0.044	21.43	0.041	22.63	0.038
17.87	0.053	19.07	0.047	20.27	0.044	21.47	0.041	22.67	0.038
17.90	0.053	19.10	0.047	20.30	0.044	21.50	0.041	22.70	0.038
17.93	0.052	19.13	0.047	20.33	0.044	21.53	0.041	22.73	0.038
17.97	0.052	19.17	0.047	20.37	0.044	21.57	0.041	22.77	0.038
18.00	0.052	19.20	0.047	20.40	0.044	21.60	0.041	22.80	0.038
18.03	0.051	19.23	0.047	20.43	0.044	21.63	0.041	22.83	0.038
18.07	0.051	19.27	0.047	20.47	0.044	21.67	0.041	22.87	0.037
18.10	0.051	19.30	0.046	20.50	0.043	21.70	0.040	22.90	0.037
18.13	0.050	19.33	0.046	20.53	0.043	21.73	0.040	22.93	0.037
18.17	0.050	19.37	0.046	20.57	0.043	21.77	0.040	22.97	0.037
18.20	0.050	19.40	0.046	20.60	0.043	21.80	0.040	23.00	0.037
18.23	0.050	19.43	0.046	20.63	0.043	21.83	0.040	23.03	0.037
18.27	0.049	19.47	0.046	20.67	0.043	21.87	0.040	23.07	0.037
18.30	0.049	19.50	0.046	20.70	0.043	21.90	0.040	23.10	0.037
18.33	0.049	19.53	0.046	20.73	0.043	21.93	0.040	23.13	0.037
18.37	0.049	19.57	0.046	20.77	0.043	21.97	0.040	23.17	0.037
18.40	0.049	19.60	0.046	20.80	0.043	22.00	0.040	23.20	0.037
18.43	0.049	19.63	0.046	20.83	0.043	22.03	0.040	23.23	0.036

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd ***PHASE I UG BASIN***

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
23.27	0.036								
23.30	0.036								
23.33	0.036								
23.37	0.036								
23.40	0.036								
23.43	0.036								
23.47	0.036								
23.50	0.036								
23.53	0.036								
23.57	0.036								
23.60	0.036								
23.63	0.035								
23.67	0.035								
23.70	0.035								
23.73	0.035								
23.77	0.035								
23.80	0.035								
23.83	0.035								
23.87	0.035								
23.90	0.035								
23.93	0.035								
23.97	0.035								
24.00	0.035								
24.03	0.034								
24.07	0.033								
24.10	0.031								
24.13	0.028								
24.17	0.024								
24.20	0.020								
24.23	0.015								
24.27	0.012								
24.30	0.009								
...end	*...end*								

Printed values > 1% of Qpeak. nth-point print interval = 1

STORMWATER BASIN AREA INVESTIGATION REPORT PREPARED BY DYNAMIC EARTH, LLC, DATED JANUARY 14, 2022

STORMWATER BASIN AREA INVESTIGATION REPORT

PROPOSED SITE IMPROVEMENTS
769 Northfield Avenue
Block 166.15, Lot 9
Township of West Orange, Essex County, New Jersey

Prepared for:

ALTERA 769, LLC c/o
ALTERA DEVELOPMENT
5910 N. Central Expressway, Suite 1360
Dallas, Texas 75206

Prepared by:

245 Main Street, Suite 110
Chester, New Jersey 07930

Peter H. Howell, P.E.
Principal
NJ PE License No. 24GE04728700

Patrick J. Granitzki, P.E.
Principal
NJ PE License No. 24GE05355900

Project #2530-99-006E
January 14, 2021

STORMWATER BASIN AREA INVESTIGATION REPORT

Proposed Site Improvements
769 Northfield Avenue
Block 166.15, Lot 9
Township of West Orange, Essex County, New Jersey

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APPENDICES

Test Location Plan
Records of Subsurface Exploration
Laboratory Test Results
Field Infiltration Testing
USDA NRCS Custom Soil Resources Report for Morris County, New Jersey

1.0 LOCATION AND DESCRIPTION

Dynamic Earth, LLC (Dynamic Earth) has completed an exploration and evaluation for the proposed stormwater management facilities located 769 Northfield Avenue in the Township of West Orange, Essex County, New Jersey. The site is further identified as Block 166.15, Lot 9. The site of the proposed construction is shown on the attached *Test Location Plan* within the appendix of this report.

At the time of Dynamic Earth's field investigation, the subject site was developed with an existing three-story office building (occupying a footprint area of approximately 23,391 square feet) with associated pavements, utilities, and landscaped areas. The proposed improvements for the site are anticipated to occur in two phases. The Phase-I improvements consist of upgrading the building façade including the addition of a canopy at the buildings rear (north) entrance, reconfiguration of the existing parking area to provide a drop off lane, and ADA improvements which result in the expansion of parking area in the rear of the site. The Phase-II improvements consist of the further expansion of the rear parking area to provide additional spaces. Additional improvements include construction of utilities, retaining walls and stormwater management facilities within the northwestern portion of the site. The proposed site improvement details were provided on an August 6, 2021 Grading Plan prepared by Dynamic Engineering Consultants, PC (Dynamic).

Dynamic Earth previously completed a preliminary subsurface investigation for the proposed site improvements and the results were provided in a September 23, 2021 *Report of Geotechnical Investigation*. An initial site visit was also performed to review the existing retaining walls on the site and the results were issued in a September 23, 2021 *Existing Retaining Wall Review* letter. The results of the previous investigation are included herein as applicable.

Topographic information was provided on a June 25, 2020 *Boundary Location & Topographic Survey* prepared by Dynamic Survey, LLC. Existing site grades generally slope downward from north to south and range between approximately 510.0 feet within the northern portion of the site and 427.0 feet within the southern portion of the site. The elevations included herein reference the North American Vertical Datum of 1988 (NAVD 1988), unless otherwise noted.

The subject site is bound to the north by a wooded area and a residential neighborhood beyond; to the east by an existing property (The Life Christian Church); to the south by Northfield Avenue; and to the west by an existing commercial property (Stratford Manor Rehabilitation & Care Center).

2.0 SCOPE OF SERVICES

Dynamic Earth's scope of services pertaining to this report included evaluating the subsurface conditions at soil profile pit locations to estimate the apparent seasonal high groundwater level, collecting samples for laboratory permeability testing and performing in-situ basin flood testing.

Four soil profile pits (identified as SPP-1 through SPP-4) were excavated at the site using a track-mounted excavator. Based on results of the initial subsurface investigation, relatively shallow weathered rock and machine refusal on apparent rock was encountered. As such, additional authorized scope of services included in-situ infiltration testing which included basin flood testing. Basin flood testing was performed within locations SPP-1 through SPP-3. Test locations were located within the area of potential stormwater management facilities and were backfilled to the surface with excavated soils at completion. Test locations located within existing pavement areas were backfilled to the surface with excavated soils and restored with asphalt at completion. The test locations are shown on the *Test Location Plan* included within the Appendix of this report. Environmental conditions were not evaluated by Dynamic Earth.

The soils encountered were classified in general conformance with the U.S. Department of Agriculture (USDA) soil classification system. Observations were made for groundwater and/or redoximorphic features indicative of zones of saturation or seasonal high groundwater as indicated in the New Jersey Department of Environmental Protection (N.J.D.E.P) stormwater best management practices (BMP). Soil logs are included in the Appendix of this report.

Undisturbed tube permeameter tests were collected in general accordance with New Jersey Department of Environmental Protection (NJDEP) *Stormwater Best Practices Manual – Chapter 12: Soil Testing Criteria* test methods on representative samples obtained from anticipated stormwater management facility infiltration depths. The results of the permeability testing are included in the Appendix of this report.

Infiltration testing was performed at select soil profile pit locations in general accordance with New Jersey *Stormwater Best Management Practices Manual- Chapter 12* using basin flooding test methods. Detailed results of the in-situ infiltration testing are included in the Appendix of this report.

3.0 UNITES STATES DEPARTMENT FO AGRICULTURE (USDA) SOIL SURVEY

Based on a review of the United States Department of Agriculture – Natural Resources Conservation Services (USDA-NRCS) soil survey the following soil resources are mapped underlying the site within the area of the proposed site improvements and are described below:

Boonton loam, three to eight percent slopes, stony (BogB): This soil series is generally mapped within the northern portion of the site. The parent material is described as coarse-loamy basal till

derived from the underlying basalt. The typical soil profile (as detailed in the survey) consists of slightly decomposed plant material to a depth of three inches; loam to a depth of five inches; silt loam to a depth of 30 inches; sandy loam to a depth of 47 inches; underlain by loamy sand to a depth of 72 inches below the natural ground surface (limit of the report). The depth to the groundwater table is reported to be greater than 72 inches below the natural ground surface (limit of the report).

Boonton-Urban land, Boonton substratum complex, zero to eight percent slopes (BouB): Boonton-Urban land, Boonton substratum complex, zero to eight percent slopes is mapped within the southern portion of the site (within the area of the proposed stormwater management facilities) and is reported to have a similar soil profile to BogB, as detailed above.

Boonton loam, zero to eight percent slopes, extremely stony (BogBc): Boonton loam with zero to eight percent slopes is mapped within a relatively small area within the western and northeastern portions of the site (within the area of the proposed stormwater management facilities) and is reported to have a similar soil profile to BogB, as detailed above.

Urban land-Boonton substratum, zero to eight percent slopes (URBONB): This soil series is generally mapped within the southern and central portions of the site. The parent material is detailed as surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material. The typical soil profile (as detailed in the survey) consists of surficial material to a depth of 12 inches; silt loam to a depth of 47 inches; underlain by loamy sand to a depth of 72 inches below the natural ground surface (limit of the report). The depth to the groundwater table is not reported within the report.

4.0 RESULTS

Detailed descriptions of the subsurface conditions encountered at each location are provided on the *Records of Subsurface Exploration* included herein. A summary of the subsurface conditions encountered within the soil profile pits is included below.

4.1 Subsurface Soil Profile

The soil profile pits were performed within existing undeveloped areas and pavement areas. Test locations performed within existing undeveloped areas encountered approximately 12 inches of topsoil at the surface. Test locations performed within existing asphalt areas encountered approximately six inches of asphalt at the surface. Beneath the surface cover, existing fill material was encountered generally consisting of sandy clay loam, silty clay loam, and sandy loam with various amounts of gravel. The existing fill material was encountered to depths ranging between approximately 2.8 feet and five feet below the ground surface; corresponding to elevations ranging between 476.0 feet and 463.2 feet. Beneath the existing fill material, natural residual soils were

encountered that generally consisted of sandy loam and loamy sand with various amount of gravel. The natural residual soils were encountered to depths ranging between approximately five feet and ten feet below the ground surface; corresponding to elevations ranging between 487.0 feet and 463.2 feet.

The top of weathered rock (basalt) was encountered beneath the residual soils at depths ranging between approximately five feet and ten feet below existing site grades; corresponding to elevations ranging between approximately 487.0 feet and 463.2 feet above the referenced elevation. Each soil profile pit was terminated due to machine refusal on apparent bedrock.

4.2 Seasonal High Groundwater and Permeability

Indicators of seasonal high groundwater (i.e. soil mottling) and groundwater was not encountered within the soil profile pit explorations. Groundwater was not encountered at previous soil boring locations. Groundwater levels are expected to fluctuate seasonally and following significant periods of precipitation.

A summary of the seasonal high groundwater levels and permeability test results is presented in the table below:

SUBSURFACE AND PERMEABILITY SUMMARY							
Location	**Surface Elevation (ft)**	**Estimated Seasonal High Groundwater**		**Sample Depth (Inches)**	**Permeability (Inches/Hour)**		**Comments**
		Depth (ft)	**Elevation (ft)**		**Replicate A**	**Replicate B**	
SPP-1	466.0	Not Encountered[1]		26	<0.06	<0.06	Refusal at ± 8.0 ft. (±el. 458.0 ft.)
SPP-2	475.0			30	<0.06	<0.06	Refusal at ± 10.0 ft. (±el. 465.0 ft.)
SPP-3	481.0			40	<0.06	<0.06	Refusal at ± 10.0 ft (±el. 471.0 ft.).
SPP-4	487.0			36	<0.06	<0.06	Refusal at ± 5.0 ft. (±el. 482.0 ft.)

[1]Since indicators of seasonal high groundwater and groundwater were not encountered, the depth to seasonal high groundwater can be estimated to be below the termination/refusal depth of the soil profile pits

Based on the laboratory testing, permeability rates tested at depths 40 inches or less were less than 0.06 inch/hour which is generally consistent with a hydrologic soil group (HSG) D.

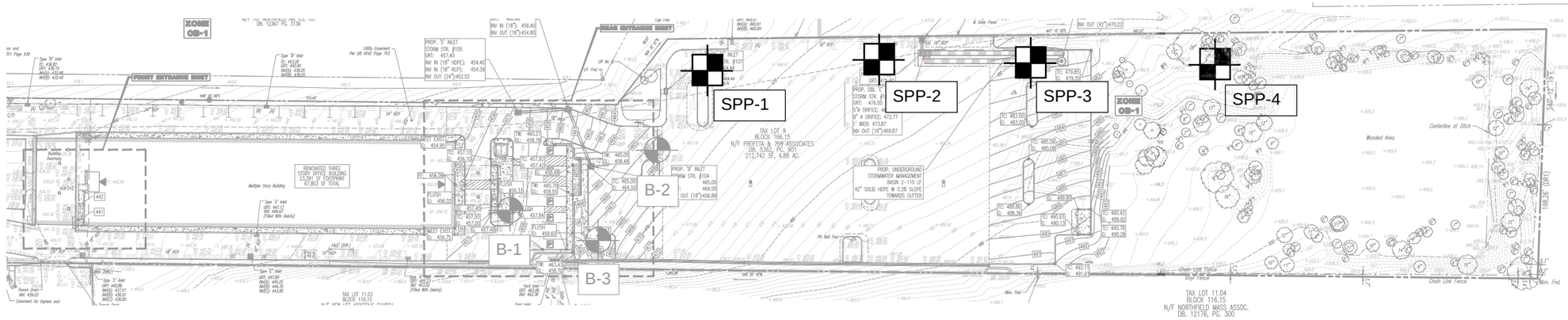
4.3 In-Situ Permeability Testing

A summary of the in-situ permeability test results is presented in the following table:

SUMMARY OF SUPPLEMENTAL PERMEABILITY TESTING						
Location	**Approx. Surface Elevation**	**Groundwater**		**Test Depth (feet)**	**In-situ Test Method**	**Permeability (Inches/hour)**
		Depth	**Elevation**			
SPP-1	± 466.0	Not Encountered		± 8.0	Basin Flood	See below
SPP-2	± 475.0	Not Encountered		± 10.0	Basin Flood	See below
SPP-3	± 481.0	Not Encountered		± 10.0	Basin Flood	See below

The basin flood tests conducted at soil profile pit SPP-2 and SPP-3 did not drain within 24 hours of the initial filling. The basin flood tests conducted at soil profile pit SPP-1 did not drain within 48 hours of the initial filling. Therefore, per the NJ BMP manual, the limiting zone beneath these locations may be considered a massive rock substratum.

Test Pit Location Plan



SCALE: N.T.S.

JOB No: 2530-99-006E

SHEET No: 1 OF 1

DRAWN BY: JSS

DESIGNED BY: XX

CHECKED BY: PG

DATE: 12/27/2021

TITLE:

TEST LOCATION PLAN

PROJECT: **ALTERA 769, LLC c/o ALTERA DEVELOPMENT**

PROPOSED SITE IMPROVEMENTS

BLOCK 166.15, LOT 9

769 NORTHFIELD AVENUE, TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NEW JERSEY

Rev. # 0

DEC Client Code: 2530

LEGEND:

SPP-X — APPROXIMATE LOCATION OF SOIL PROFILE PIT

B-X — APPROXIMATE LOCATION OF PREVIOUS SOIL BORING

NOTES:

1. THIS PLAN IS NOT FOR CONSTRUCTION AND WAS PREPARED TO ILLUSTRATE TEST LOCATIONS ONLY AND MAY NOT REFLECT THE MOST CURRENT REVISION OF THE BASE PLAN.
2. BASE PLAN OBTAINED FROM AN AUGUST 6, 2021 GRADING PLAN PREPARED BY DYNAMIC ENGINEERING CONSULTANTS, P.C. AND A JUNE 25, 2020 BOUNDARY LOCATION & TOPOGRAPHIC SURVEY PREPARED BY DYNAMIC SURVEY, LLC.

DYNAMIC EARTH, LLC

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www.dynamic-earth.com

Records of Subsurface Exploration

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP-1

Project: Proposed Site Improvements
Project No.: 2530-99-006E
Location: 790 Northfield Avenue, West Orange, New Jersey
Client: Altera Development Company

Surface Elevation (ft):	466.0	**Date Started:**	12/14/21	**Groundwater Data**	**Depth (ft)** / **El. (ft)**
Termination Depth (ft):	8.0	**Date Completed:**	12/14/21	**Seepage**	NE / -
Proposed Location:	SWM	**Logged by:**	J. Scardigno	**Groundwater**	NE / -
Excavation / Test Method:	Visual Observation	**Contractor:**	Neighbors Contracting	**Seasonal High Groundwater**	NE / -
		Rig Type:	Bobcat E60		

Groundwater Comments

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
0-6	ASPHALT		GRAVEL 0	COBBLES 0	STONES 0	BOULDERS 0																		
6-34	Dark Grayish Brown (10YR 4/2)	SANDY CLAY LOAM	GRAVEL 0	COBBLES 0	STONES 0	BOULDERS 0	SUBANGULAR BLOCKY	MODERATE	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	NONE			BAG TUBE	26	S-1 T-1	A < 0.06 iph B <0.06 iph
34-96	Dark Brown (7.5YR 3/4)	GRAVELLY LOAMY SAND	GRAVEL 15	COBBLES 0	STONES 0	BOULDERS 0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC			NONE		NONE			BAG TUBE	34 40	S-2 T-2	

Additional Remarks: Asphalt encountered between zero and six inches. Fill encountered between six inches and 34 inches. Soil Profile Pit SPP-1 encountered refusal on apparent weathered rock at approximately eight feet below the ground surface.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP-2

Project: Proposed Site Improvements
Project No.: 2530-99-006E
Location: 790 Northfield Avenue, West Orange, New Jersey
Client: Altera Development Company

Surface Elevation (ft): 475.0
Termination Depth (ft): 10.0
Proposed Location: SWM
Excavation / Test Method: Visual Observation
Date Started: 12/14/21
Date Completed: 12/14/21
Logged by: J. Scardigno
Contractor: Neighbors Contracting
Rig Type: Bobcat E60

Groundwater Data	Depth (ft)	El (ft)
Seepage	NE	-
Groundwater	NE	-
Seasonal High Groundwater	NE	-

Groundwater Comments

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
			GRAVEL	COBBLES	STONES	BOULDERS																		
0-6	ASPHALT		0	0	0	0								CLEAR <2.5"	SMOOTH	NONE		NONE						
6-50	Dark Grayish Brown (10YR 4/2)	SANDY CLAY LOAM	GRAVEL	COBBLES	STONES	BOULDERS																		
			0	0	0	0	SUBANGULAR BLOCKY	MODERATE	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	NONE			BAG TUBE	30	S-1 T-1	A < 0.06 iph B <0.06 iph
50-120	Dark Brown (7.5YR 3/4)	GRAVELLY LOAMY SAND	GRAVEL	COBBLES	STONES	BOULDERS																		
			0	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC			NONE		NONE			BAG TUBE	80	S-2 T-2	

Additional Remarks: Asphalt encountered between zero and six inches. Fill encountered between six and 50 inches. Soil Profile Pit SPP-2 encountered refusal on apparent weathered rock at approximately ten feet below the ground surface.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP-3

Project: Proposed Site Improvements
Project No.: 2530-99-006E
Location: 790 Northfield Avenue, West Orange, New Jersey
Client: Altera Development Company

Surface Elevation (ft): 481.0
Termination Depth (ft): 10.0
Proposed Location: SWM
Excavation / Test Method: Visual Observation
Date Started: 12/14/21
Date Completed: 12/14/21
Logged by: J. Scardigno
Contractor: Neighbors Contracting
Rig Type: Bobcat E60

Groundwater Data	Depth (ft)	El (ft)
Seepage	NE	-
Groundwater	NE	-
Seasonal High Groundwater	NE	-

Groundwater Comments

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
			GRAVEL	COBBLES	STONES	BOULDERS																		
0-12	Dark Yellowish Brown (10YR 3/6)	LOAM	0	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	NONE						
			GRAVEL	COBBLES	STONES	BOULDERS																		
12-60	Dark Grayish Brown (10YR 4/2)	SILTY CLAY LOAM	0	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	NONE			BAG TUBE	50 40	S-1 T-1	A < 0.06 iph B <0.06 iph
			GRAVEL	COBBLES	STONES	BOULDERS																		
60-120	Dark Brown (7.5YR 3/4)	GRAVELLY LOAMY SAND	15	0	0	0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	NONSTICKY	NONPLASTIC			NONE		NONE			BAG TUBE	70	S-2 T-2	

Additional Remarks: Topsoil encountered between zero and 12 inches. Fill encountered between 12 and 60 inches. Soil Profile Pit SPP-3 encountered refusal on apparent weathered rock at approximately ten feet below the ground surface.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP-4

Project: Proposed Site Improvements
Project No.: 2530-99-006E
Location: 790 Northfield Avenue, West Orange, New Jersey
Client: Altera Development Company

Surface Elevation (ft): 487.0
Termination Depth (ft): 5.0
Proposed Location: SWM
Excavation / Test Method: Visual Observation
Date Started: 12/14/21
Date Completed: 12/14/21
Logged by: J. Scardigno
Contractor: Neighbors Contracting
Rig Type: Bobcat E60

Groundwater Data	Depth (ft)	El. (ft)
Seepage	NE	-
Groundwater	NE	-
Seasonal High Groundwater	NE	-

Groundwater Comments

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
			GRAVEL	COBBLES	STONES	BOULDERS																		
0-12	Dark Yellowish Brown (10YR 3/6)	LOAM	0	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	MEDIUM	NONE			BAG	6	S-1	
			GRAVEL	COBBLES	STONES	BOULDERS																		
12-60	Brown (7.5YR 4/3)	GRAVELLY SANDY LOAM	15	0	0	0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	NONSTICKY	NONPLASTIC			NONE		NONE			BAG TUBE	38	S-2 T-1	A < 0.06 iph B <0.06 iph

Additional Remarks: Soil Profile Pit SPP-4 encountered refusal on apparent weathered rock at approximately five feet below the ground surface.

Laboratory Test Results

Tube Permeameter Test Data

Job Number: 2530-99-006E
Project: Proposed Site Redevelopment
Client: Altera Development
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-1 **Sample No.:** T-1 **Depth:** 26"

MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) A Date Collected 12/14/2021

2. Material Tested: x Fill _____ Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --
Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 2530-99-006E
Project: Proposed Site Redevelopment
Client: Altera Development
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-1 **Sample No.:** T-1 **Depth:** 26"

MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) B Date Collected 12/14/2021

2. Material Tested: x Fill _____ Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --
Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 2530-99-006E
Project: Proposed Site Redevelopment
Client: Altera Development
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-2 **Sample No.:** T-1 **Depth:** 30"

MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) A Date Collected 12/14/2021

2. Material Tested: x Fill _____ Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --
Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 2530-99-006E
Project: Proposed Site Redevelopment
Client: Altera Development
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-2 **Sample No.:** T-1 **Depth:** 30"

MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) B Date Collected 12/14/2021

2. Material Tested: x Fill _____ Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --
Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 2530-99-006E
Project: Proposed Site Redevelopment
Client: Altera Development
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-3 **Sample No.:** T-1 **Depth:** 40"

MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) A Date Collected 12/14/2021

2. Material Tested: x Fill _____ Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --
Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 2530-99-006E
Project: Proposed Site Redevelopment
Client: Altera Development
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-3 **Sample No.:** T-1 **Depth:** 40"

MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) B Date Collected 12/14/2021

2. Material Tested: x Fill _____ Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --
Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 2530-99-006E
Project: Proposed Site Redevelopment
Client: Altera Development
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-4 **Sample No.:** T-1 **Depth:** 36"

MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) A Date Collected 12/14/2021

2. Material Tested: ____ Fill x Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed ____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
   Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

   Wt. of Tube Containing Sample --
   Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No ____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

    At the Beginning of Each Test Interval, H1 5.00
    At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= >240

    K = <0.06 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

    x NONE

    ____ Soil/Tube Contact ____Large Gravel ____ Large Roots

    ____ Dry Soil ____Smearing ____ Compaction

    ____ Other - Specify ____

Tube Permeameter Test Data

Job Number: 2530-99-006E
Project: Proposed Site Redevelopment
Client: Altera Development
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-4 **Sample No.:** T-1 **Depth:** 36"

MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) B Date Collected 12/14/2021

2. Material Tested: ____ Fill x Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed ____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --
Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No ____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

x NONE

____ Soil/Tube Contact ____Large Gravel ____ Large Roots

____ Dry Soil ____Smearing ____ Compaction

____ Other - Specify ____

Tube Permeameter Test Data

Job Number: 2530-99-006E
Project: Proposed Site Redevelopment
Client: Altera Development
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-4 **Sample No.:** T-1 **Depth:** 36"

MUNICIPALITY West Orange BLOCK 166.15 LOT 9

1. Test Number T-1 Replicate (letter) C Date Collected 12/14/2021

2. Material Tested: ____ Fill x Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed ____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
Length of Sample, L, in inches 4.50

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams --

Wt. of Tube Containing Sample --
Wt. of Empty Tube --

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 520.9857

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. -- > 1.2

9. Standpipe Used: x No ____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1 5.00
At the End of Each Test Interval, H2 5.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.06 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

x NONE

____ Soil/Tube Contact ____Large Gravel ____ Large Roots

____ Dry Soil ____Smearing ____ Compaction

____ Other - Specify ____

Field Infiltration Testing

DYNAMIC EARTH

Basin Flood Testing

(Stormwater Basin Area Investigation)

Soil Profile Pit #: SPP-1

Date 12/14/2021 - 12/16/2021

Project	Proposed Site Improvements	**Project Number:**	2530-99-006E
Location	790 Northfield Avenue, West Orange, New Jersey	**Client:**	Altera Development Company
Surface Elevation (ft):	466	**Weather:**	Clear, 55°F
Proposed Location:	SWM	**Logged By:**	J. Scardigno

MUNICIPALITY : West Orange **BLOCK:** 166.15 **LOT(s):** 9

Depth of Test Pit: 8.0 Feet **Area of Test Pit:** 50.0 Square Feet
Note: 50 square feet minimum

Description of Rock Stratum:

Type of Rock/Fractured Rock: Basalt
Name of Formation: Rahway Till
Average Fracture Spacing: 0 inches

Type of Fractures:

	Open (wide), Clean, Width of Openings, (___ mm)
	Open (wide), Infilled with Fines, Width of Openings, (approx. 5 mm)
X	Tight (Closed)

Orientation of Fractures:

X	Horizontal (Parallel to Pit Bottom) or Nearly So
	Inclined
	Vertical (Parallel to Sides of Pit) or Nearly So

Hardness of Rock:

	Rippable by Hand Tools
X	Not Rippable by Hand Tools, Rippable by Machine
	Not Rippable by Machine, Explosives Used

Date of First Basin Flooding: 12/14/2021 **Time of First Basin Flooding:** 4:00 PM

Result of First Basin Flooding:

X	Basin Drained within 24 hours	by	3:50 PM	on	####
	Basin Did Not Drain within 24 hours		(Time)		(Date)

Date of Second Flooding: 12/15/2021 7a. Time of Second Flooding: 4:00 PM

Result of Second Basin Flooding:

	Basin Drained within 24 hours	by		on	
	(Drained within 12 hrs?)		(Time)		(Date)
X	Basin Did Not Drain within 24 hours				

Permeability Rate: 0

New Jersey Stormwater Best Management Practices Manual- Appendix E (2020)

DYNAMIC EARTH

Basin Flood Testing

(Stormwater Basin Area Investigation)

Soil Profile Pit #: SPP-2

Date 12/14/2021 - 12/16/2021

Project	Proposed Site Improvements	**Project Number:**	2530-99-006E
Location	790 Northfield Avenue, West Orange, New Jersey	**Client:**	Altera Development Company
Surface Elevation (ft):	475	**Weather:**	Clear, 55°F
Proposed Location:	SWM	**Logged By:**	J. Scardigno

MUNICIPALITY : West Orange **BLOCK:** 166.15 **LOT(s):** 9

Depth of Test Pit: 10.0 Feet **Area of Test Pit:** 50.0 Square Feet
Note: 50 square feet minimum

Description of Rock Stratum:

Type of Rock/Fractured Rock: Basalt
Name of Formation: Rahway Till
Average Fracture Spacing: 0 inches

Type of Fractures:

	Open (wide), Clean, Width of Openings, (___ mm)
	Open (wide), Infilled with Fines, Width of Openings, (approx. 5 mm)
X	Tight (Closed)

Orientation of Fractures:

X	Horizontal (Parallel to Pit Bottom) or Nearly So
	Inclined
	Vertical (Parallel to Sides of Pit) or Nearly So

Hardness of Rock:

	Rippable by Hand Tools
X	Not Rippable by Hand Tools, Rippable by Machine
	Not Rippable by Machine, Explosives Used

Date of First Basin Flooding: 12/14/2021 **Time of First Basin Flooding:** 4:10 PM

Result of First Basin Flooding:

	Basin Drained within 24 hours	by		on
X	Basin Did Not Drain within 24 hours		(Time)	(Date)

Date of Second Flooding: 7a. Time of Second Flooding:

Result of Second Basin Flooding:

	Basin Drained within 24 hours	by		on
	(Drained within 12 hrs?)		(Time)	(Date)
	Basin Did Not Drain within 24 hours			

Permeability Rate: 0

New Jersey Stormwater Best Management Practices Manual- Appendix E (2020)

DYNAMIC EARTH

Basin Flood Testing

(Stormwater Basin Area Investigation)

Soil Profile Pit #: SPP-3

Date 12/14/2021 - 12/16/2021

Project	Proposed Site Improvements	**Project Number:**	2530-99-006E
Location	790 Northfield Avenue, West Orange, New Jersey	**Client:**	Altera Development Company
Surface Elevation (ft):	481	**Weather:**	Clear, 55°F
Proposed Location:	SWM	**Logged By:**	J. Scardigno

MUNICIPALITY : West Orange **BLOCK:** 166.15 **LOT(s):** 9

Depth of Test Pit: 10.0 Feet **Area of Test Pit:** 50.0 Square Feet
Note: 50 square feet minimum

Description of Rock Stratum:

Type of Rock/Fractured Rock: Basalt
Name of Formation: Rahway Till
Average Fracture Spacing: 0 inches

Type of Fractures:

	Open (wide), Clean, Width of Openings, (___ mm)
	Open (wide), Infilled with Fines, Width of Openings, (approx. 5 mm)
X	Tight (Closed)

Orientation of Fractures:

X	Horizontal (Parallel to Pit Bottom) or Nearly So
	Inclined
	Vertical (Parallel to Sides of Pit) or Nearly So

Hardness of Rock:

	Rippable by Hand Tools
X	Not Rippable by Hand Tools, Rippable by Machine
	Not Rippable by Machine, Explosives Used

Date of First Basin Flooding: 12/14/2021 **Time of First Basin Flooding:** 4:30 PM

Result of First Basin Flooding:

	Basin Drained within 24 hours	by		on
X	Basin Did Not Drain within 24 hours		(Time)	(Date)

Date of Second Flooding: 12/15/2021 7a. Time of Second Flooding:

Result of Second Basin Flooding:

	Basin Drained within 24 hours	by		on
	(Drained within 12 hrs?)		(Time)	(Date)
	Basin Did Not Drain within 24 hours			

Permeability Rate: 0

New Jersey Stormwater Best Management Practices Manual- Appendix E (2020)

USDA-NRCS Custom Soil Resource Report for Essex County, New Jersey

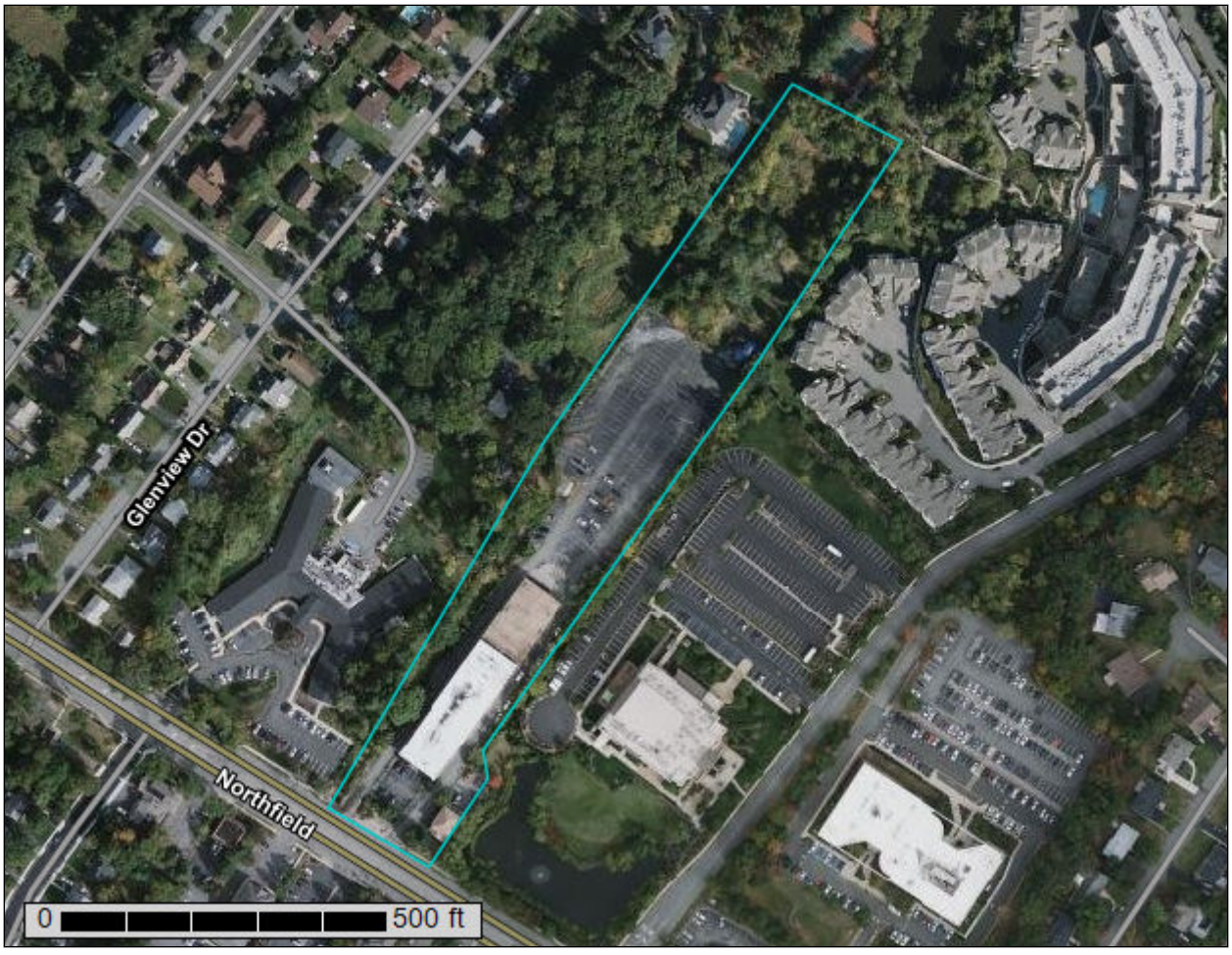
United States Department of Agriculture

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



January 19, 2022

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.

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How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,140 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Essex County, New Jersey
Survey Area Data: Version 17, Aug 30, 2021

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

Date(s) aerial images were photographed: May 9, 2020—Oct 15, 2020

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
BogB	Boonton loam, 3 to 8 percent slopes	1.6	27.8%
BogBc	Boonton loam, 0 to 8 percent slopes, extremely stony	0.5	8.0%
BouB	Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes	0.4	7.1%
URBONB	Urban land, Boonton substratum, 0 to 8 percent slopes	3.3	57.0%
Totals for Area of Interest		**5.7**	**100.0%**

Map Unit Descriptions

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

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

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

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

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

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

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

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

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

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

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Essex County, New Jersey

BogB—Boonton loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: b066
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: All areas are prime farmland

Map Unit Composition

Boonton and similar soils: 80 percent
Minor components: 20 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

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: 3 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 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C

Hydric soil rating: No

Minor Components

Haledon

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

Boonton, moderately well drained

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

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
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

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
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

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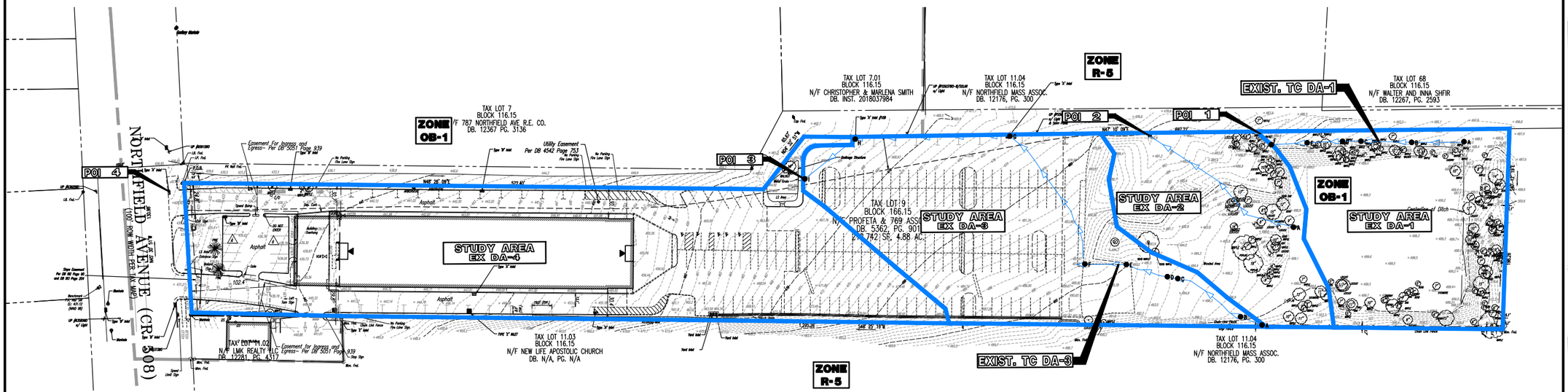
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EXISTING DRAINAGE AREA MAP

THIS PLAN TO BE UTILIZED FOR STORMWATER/DRAINAGE ANALYSIS PURPOSES ONLY



GRAPHIC SCALE

-30 0 15 30 60 120

(IN FEET)
1 INCH = 30 FT.

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Plotted: 01/25/22 – 5:30 PM By: sploshnoy
File: P:\2021\PROJECTS\2530 Altera Development\99-006 West Orange\Dwg\DA Maps\D2530990006EDAM1.dwg, ---> 01 EXISTING CONDITIONS DRAINAGE AREA MAP

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BY	REVISED PER TOWNSHIP COMMENTS & PHASED DEVELOPMENT	01/24/22	1
RRR	COMMENTS	DATE	REV.

THIS PLAN SET IS FOR PERMITTING PURPOSES ONLY AND MAY NOT BE USED FOR CONSTRUCTION

DESIGNED BY: SDP
DRAWN BY: RJC
CHECKED BY: JCS
CHECKED BY: –

PROJECT: ALTERA 769, LLC
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769 NORTHFIELD AVENUE (CR 508)
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NJ

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NEW JERSEY LICENSE No. 55851

JOSEPH C. SPARONE
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

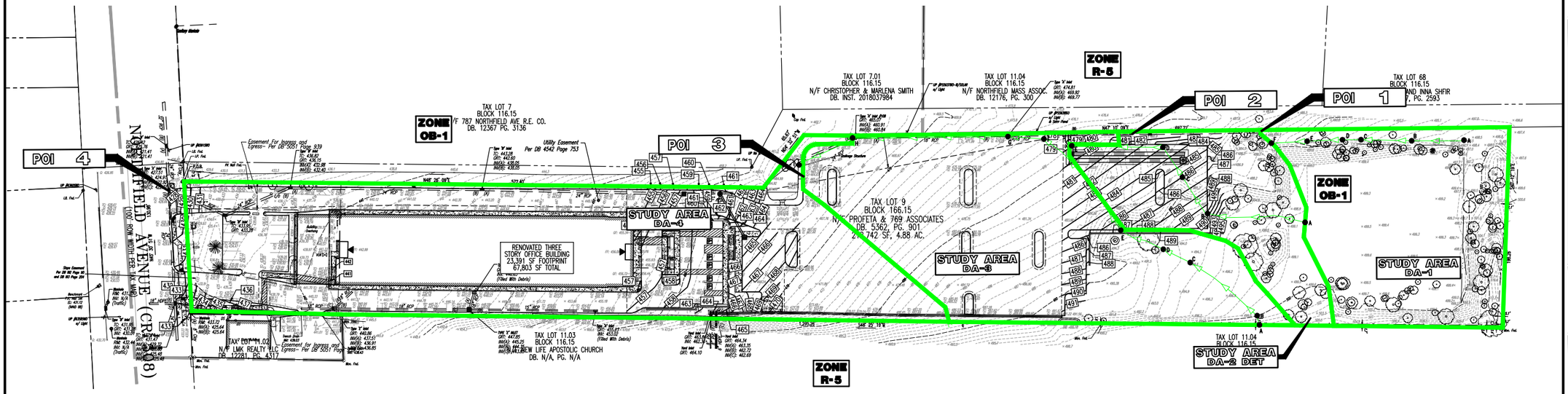
TITLE:
EXISTING CONDITIONS DRAINAGE AREA MAP

SCALE: (H) 1"=30'
(V).
DATE: 08/06/2021
PROJECT No: 2530-99-006

SHEET No: 1 OF 4
Rev. #: 1

PHASE 1 - DRAINAGE AREA MAP

THIS PLAN TO BE UTILIZED FOR STORMWATER/DRAINAGE ANALYSIS PURPOSES ONLY



GRAPHIC SCALE

−50 0 25 50 100 200

(IN FEET)
1 INCH = 50 FT.

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Plotted: 01/06/22 – 10:34 AM By: sjoakley
File: P:\DEC20\PROJECTS\2530 Altera Development\99-006 West Orange\Dwg\DA Maps\D2530990006P1PDAM1.dwg, ----> 02 PROPOSED CONDITIONS DRAINAGE AREA MAP (PHASE 1)

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REV.	DATE	COMMENTS	BY
1	01/24/22	REVISED PER TOWNSHIP COMMENTS & PHASED DEVELOPMENT	RRR

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DESIGNED BY: RJC
DRAWN BY: SDP
CHECKED BY: JCS
CHECKED BY: –

PROJECT: **ALTERA 769, LLC**
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ROBERT J. COLUCCO III
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NEW JERSEY LICENSE No. 55851

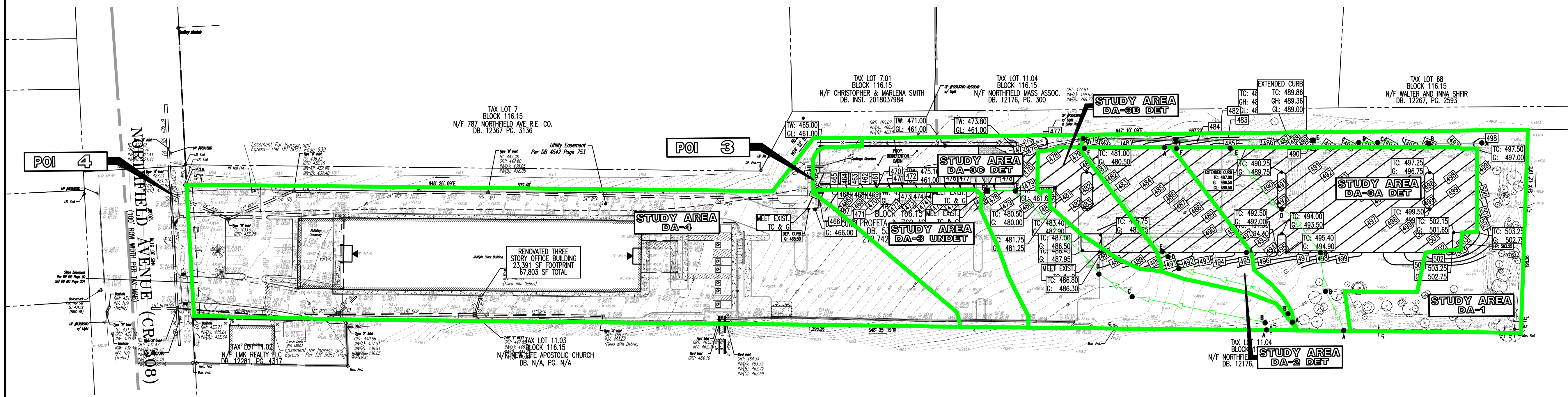
JOSEPH C. SPARONE
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 47204

TITLE: **PROPOSED CONDITIONS DRAINAGE AREA MAP (PHASE 1)**

SCALE: (H) 1"=50'
(V)
DATE: 08/06/2021
PROJECT No: 2530-99-006

SHEET No: 2 OF 4
Rev. #: 1

PHASE 2 - DRAINAGE AREA MAP



GRAPHIC SCALE

-50 0 25 50 100 200

(IN FEET)
1 INCH = 50 FT.

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REV.	DATE	COMMENTS	BY
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TITLE: PROPOSED CONDITIONS DRAINAGE AREA MAP (PHASE 2)

SCALE: (H) 1"=50' (V).
DATE: 08/06/2021
PROJECT No: 2530-99-006

SHEET No: 3 OF 4
Rev. #: 1

Plotted: 01/26/22 – 10:34 AM, By: splokhoy
File: P:\DECPC PROJECTS\2530 Altera Development\99-006 West Orange\Dwg\DA Maps\D253099006P2PDAM1.dwg, ---> 03 PROPOSED CONDITIONS DRAINAGE AREA MAP (PHASE 2)

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