STORMWATER MANAGEMENT, GROUNDWATER RECHARGE AND WATER QUALITY ANALYSIS

For

AACTFR Property, LLC
Proposed Warehouse Building

401 Cottontail Lane
Block 517.01, Lot 8.06
Franklin Township
Somerset County
New Jersey

Prepared by:

DYNAMIC ENGINEERING

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January 2021
DEC# 3532-99-001

TABLE OF CONTENTS

APPENDIX

I. SITE DESCRIPTION

The project area consists of Block 517.01, Lot 8.06, located at 401 Cottontail Lane in Franklin Township, Somerset County, New Jersey. The site is approximately 6.905 acres and presently vacant. The majority of the stormwater runoff from the existing conditions drains to the drainage ditch along the western property line. The existing conditions of the tract have been verified by the ALTA/NSPS Land Title Survey as prepared by Dynamic Survey, LLC, dated 10/30/2020, last revised 01/19/2021.

II. DESIGN OVERVIEW

This report has been prepared to define and analyze the stormwater drainage conditions that would occur as a result of the development of Block 517.01, Lot 8.06, in the Franklin Township, Somerset County, New Jersey.

The scope of the study includes the proposed 100,125 SF warehouse building and its associated driveways, parking areas, landscaping and other related site improvements as shown on the accompanying Site Plan drawings. Overall, the development proposes a limit of disturbance of approximately 245,090 SF (5.6 AC) and a net increase of impervious surface of approximately 178,859 SF.

Based upon the fact that the proposed improvements will result in more than one (1) acre of land disturbance and an increase in impervious coverage by more than ¼ acre, this project is classified as a "major development"; and therefore, has been designed to meet the stormwater runoff quantity, quality and groundwater recharge standards, set forth by the Franklin Township Land Use Ordinance, NJAC 7:8, and the regulations for the review zone of the Delaware and Raritan Canal State Park (NJAC 7:45). Accordingly, the following items are addressed within this report:

- Non – Structural Stormwater Strategies (7:8-5.3)
- Erosion control, groundwater recharge and runoff quantity standards (7:8-5.4)
- Stormwater runoff quality standards (7:8-5.5)
- Calculation of stormwater runoff and groundwater recharge (7:8-5.6)
- Standards for structural stormwater management measures (7:8-5.7)

A hydrological evaluation is provided for the NJDEP Water Quality, 2, 10, and 100 year storm events utilizing the Urban Hydrology for Small Watershed TR55 method.

The Franklin Township and NJDEP flow reduction requirements are as follows:

2-year:	50% reduction
10-year:	25% reduction
100-year:	20% reduction

It is also the intention of the design of this facility to comply with the Stormwater Management Best Management Practices.

III. EXISTING DRAINAGE CONDITIONS

The tract has been evaluated with the following drainage sub-watershed areas as depicted on the Existing Drainage Area Map:

Existing Drainage Area 1 (Undisturbed): This portion of the tract consists of existing vacant wooded areas. Stormwater runoff from this area is ultimately tributary to the drainage ditch along the western property boundary via overland flow.

Existing Drainage Area 2 (Disturbed): This portion of the tract consists of existing vacant wooded areas. Stormwater runoff from this area is ultimately tributary to the drainage ditch along the western property boundary via overland flow.

Based on the Somerset County soils survey information, the soil types native to the site include:

SOMERSET COUNTY SOIL SURVEY INFORMATION		
SOIL TYPE (SYMBOL)	**SOIL TYPE (NAME)**	**HYDROLOGIC SOIL GROUP**
PenB	Penn silt loam, 2 to 6 percent slopes	C

IV. PROPOSED DRAINAGE CONDITIONS

The tract has been evaluated with the following sub-watershed areas as depicted on the Proposed Drainage Area Map:

Proposed Drainage Area 1 (Undisturbed): This portion of the tract will remain vacant and undisturbed from existing conditions. Stormwater runoff from this area is ultimately tributary to the drainage ditch along the western property boundary.

Proposed Drainage Area 2 (Disturbed): This portion of the tract consists of the proposed 100,125 SF warehouse building, parking, driveway and open space. Stormwater runoff from the pavement area and parts

of the lawn area are collected by onsite conveyance system and routed to aboveground bioretention systems with outlet control structures routed to the proposed underground detention basin, where it is ultimately tributary to the drainage ditch along the western property boundary via the outflow pipe. Stormwater runoff from the warehouse building roof is collected by the proposed roof leaders and routed to the proposed underground detention basin directly.

V. DESIGN METHODOLOGY

The intention of the design of the proposed stormwater management facilities for this project is to provide measures as required to address applicable aspects of the Franklin Township Land Use Ordinance, NJAC 7:8, and DRCC (NJAC 7:45). In order to prepare the stormwater calculations for the subject project, extensive initial investigation of the property and topography was performed. On-site review of the tract was performed by Dynamic Engineering Consultants, PC to verify existing site conditions and land cover characteristics. Dynamic Survey, LLC was contracted to prepare the ALTA/NSPS Land Title Survey with topography for the existing site and surrounding watershed areas.

Based on our review of the existing site conditions and the ALTA/NSPS Land Title Survey, the Drainage Area Maps for the existing and proposed site conditions as defined within this report were established. A grading plan was developed for the proposed site improvements with consideration to the existing drainage patterns. The plan was designed to ensure runoff from the proposed development could be directed to stormwater management facilities in order to address the applicable sections of the Franklin Township Land Development Ordinance and NJAC 7:8. Furthermore, Dynamic Earth, LLC performed test pits within the site to establish seasonal high water table and soil permeability rates. As a result of rock encountered additional in-situ infiltration testing was performed. Based on the results of the basin flood testing, infiltration BMP's onsite are not feasible. A copy of this report can be reviewed under a separate cover.

The Stormwater Management Rules in NJAC 7:8-5.5 require stormwater management measures that are designed to reduce the post-construction load of TSS in stormwater generated from the NJDEP water quality storm by 80% of the anticipated load from the developed site for sites that increase the amount of impervious coverage by one-quarter (0.25) acre. To address the runoff quality requirement, the proposed development utilizes two (2) aboveground bioretention basins with underdrains and with 24 inches of soil bed planted with Site-Tolerant Grasses to provide 80% TSS removal for the proposed impervious travelled areas on site.

The overall stormwater management report for the subject tract has been evaluated by Dynamic Engineering Consultants to ensure that the overall development satisfies the stormwater criteria set forth by the Franklin Township Land Use Ordinance and NJAC 7:8.

VI. NON-STRUCTURAL STORMWATER MANAGEMENT STRATEGIES

The site design has been prepared to implement non-structural stormwater management strategies in accordance with NJAC 7:8-5.3 to the maximum extent practicable. The following is a detailed narrative on how this application addresses each of the nine (9) nonstructural strategies established in NJAC 7:8-5.3 to the maximum extent practicable. The strategies implemented at this site location include the following:

Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss: The existing development area consists of open space and wooded areas. Stormwater runoff traverses the site via sheet flow and shallow concentrated flow to the point of analysis with no detention, thereby subjecting the site to erosion. The proposed development area will consist of a 1-story warehouse building with off-street parking areas and associated site improvements. In proposed conditions, the development is designed with two (2) aboveground bioretention basins and one (1) underground detention basin that collect stormwater runoff from the majority of the tract. The proposed stormwater management system has been designed to meet the water quality standards set forth in NJAC 7:8. Therefore, the proposed stormwater management design provides water quality benefits that are not provided in existing conditions.

Furthermore, the proposed stormwater management system reduces the peak rates of stormwater runoff rates in the post development condition for the 2, 10, and 100-year design storms, thereby reducing the potential for erosion and sediment loss.

Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces: The proposed development has been designed in accordance with the applicable Township requirements for maximum allowable impervious coverage and building coverage.

Maximize the protection of natural drainage features and vegetation: The proposed development was designed with consideration to the existing drainage patterns. The stormwater management system serves to reduce peak rates of runoff in post-development conditions to each point of analysis. In addition, the proposed development has been designed to preserve existing trees on-site to the maximum extent practicable, particularly along the drainage ditch and wetlands area to the west.

Minimize the decrease in the pre-development "time of concentration": The proposed development was designed to minimize the decrease in the pre-development "time of concentration" to the maximum extent feasible. The proposed development is designed with two (2) aboveground bioretention basin which collect stormwater runoff from the driveways, designed to satisfy water quality regulations set forth by NJAC 7:8, and

one (1) underground detention basin which collects stormwater runoff from the aboveground bioretention basins and the proposed warehouse building roof and releases runoff at a controlled rate to satisfy the water quantity regulations set forth by NJAC 7:8. This design assists in mitigating the potential impacts to the decrease of the time of concentration for the subject parcel.

Minimize land disturbance including clearing and grading: The proposed grading was designed to meet existing drainage patterns to the maximum extent practical.

Minimize soil compaction: The proposed development proposes to minimize soil compaction by utilizing lightweight construction equipment for landscaped areas of the site. The project has also been designed with a Soil Management and Preparation Plan in accordance with the New Jersey Standards for Soil Erosion and Sediment Control.

Provide low maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawn fertilizers and pesticides: The proposed landscaping design has been prepared to provide an aesthetic improvement to the interior and perimeter of the site through use of a variety of native tree and shrub species. Furthermore, the bioretention basin are planted with a variety of trees, shrubs, and tall grasses that thrive in intermittent wet environments.

Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas: Vegetated open channel conveyance is not practical for the proposed development due to the presence of steep slopes throughout Lot 8.06 and due to the fact that access throughout the site requires the construction of new driveway and parking areas for cars and trucks. Sheet flowing runoff from impervious surfaces through vegetated swales can create erosion problems due to the steep slopes.

Please note, however, that a majority of the site improvements are routed through the stormwater conveyance system to the proposed aboveground bioretention and underground detention basins. Scour holes are proposed to dissipate erosion potential. In addition, the water quality storm volume will be treated to provide TSS Removal via the bioretention basins in accordance with NJAC 7:8, and pollutants will be captured and safely disposed of in accordance with an Operations and Maintenance Manual.

Provide other source control to prevent or minimize the use or exposure of pollutants at the site in order to prevent or minimize the release of those pollutants into the stormwater: Trash receptacles will be provided within the proposed development. The proposed trash receptacles will help prevent accumulation of trash and debris from entering the proposed drainage system. Furthermore, regularly scheduled maintenance of the

stormwater management facilities as described in an Operations and Maintenance Manual will remove any trash and debris that may have entered the stormwater management facilities.

VII. UNDERGROUND DETENTION BASIN DESIGN

The stormwater management design utilizes one (1) underground box chamber stormwater detention basin to satisfy the stormwater quantity regulations set forth by the Franklin Township Land Development Ordinance and NJAC 7:8 for the developed site. The basins will accept runoff from the proposed roof leaders and two (2) proposed aboveground bioretention basins. Stormwater runoff will be held in the proposed underground box chamber detention basin and released at a controlled rate through an outlet control structure in order to satisfy the runoff peak rate reductions, therefore, meeting the stormwater runoff quantity regulations. Stormwater runoff from the underground box chamber detention basin is ultimately tributary to the drainage ditch along the western property boundary.

VIII. RUNOFF RATE REDUCTION PERFORMANCE

Pre- and Post-Development Peak Runoff Results Summary for Total Tract

EXISTING VS. ALLOWABLE RUNOFF RATES										
DESIGN STORM	EXISTING UNDISTURBED RUNOFF RATE		EXISTING DISTURBED RUNOFF RATE		RUNOFF RATE REQUIRED REDUCTION	ALLOWABLE DISTURBED RUNOFF RATE		TOTAL ALLOWABLE RUNOFF RATE	
2 YEAR	1.52	CFS	3.54	CFS	50%	1.77	CFS	3.29	CFS
10 YEAR	3.32	CFS	8.59	CFS	25%	6.44	CFS	9.65	CFS
100 YEAR	7.15	CFS	19.99	CFS	20%	15.99	CFS	23.28	CFS

EXISTING VS. PROPOSED RUNOFF RATES									
DESIGN STORM	TOTAL ALLOWABLE RUNOFF RATE		ALLOWABLE DISTURBED RUNOFF RATE		PROPOSED DISTURBED RUNOFF RATE		TOTAL PROPOSED RUNOFF RATE	
2 YEAR	3.29	CFS	1.77	CFS	1.59	CFS	3.11	CFS
10 YEAR	9.65	CFS	6.44	CFS	5.73	CFS	8.94	CFS
100 YEAR	23.28	CFS	15.99	CFS	14.80	CFS	22.01	CFS

IX. WATER QUALITY

As noted previously in this report, the TSS removal rate requirement set forth by the Franklin Township Land Use Ordinance and NJAC 7:8 is 80% of the anticipated load from the developed site for sites that increase the amount of impervious coverage by one-quarter (0.25) acre. The stormwater management design for the project satisfies this requirement by utilizing two (2) aboveground bioretention basins with underdrains and with 24 inches of soil bed planted with Site-Tolerant Grasses, certified by the NJDEP to provide a TSS removal rate of 80% for the proposed impervious areas on-site. As a result, the water quality requirements of the Franklin Township Land Use Ordinance and NJAC 7:8 are met.

X. GROUNDWATER RECHARGE

As evidenced in the Stormwater Area Investigation Report prepared by Dynamic Earth, LLC, included within the Appendix of this Report, the field-tested permeability rates did not support infiltration. Therefore, the site conditions and underlying soils are not conducive for groundwater recharge.

XI. CONCLUSION

The proposed overall development has been designed with provisions for the safe and efficient control of stormwater runoff in a manner that will not adversely impact the existing drainage patterns, adjacent roadways, or adjacent parcels. The TSS removal obligations set forth by the Franklin Township Land Use Ordinance, NJAC 7:8, and DRCC (NJAC 7:45). have been satisfied by utilizing two (2) aboveground bioretention basins with 24 inches of soil bed planted with Site-Tolerant Grasses to achieve the 80% TSS required removal rate for the development.

Furthermore, the combined basin system design shall reduce peak flow rates for the proposed development area and meet the minimum peak flow reduction for the 2, 10 and 100-year storm frequencies as dictated by the Franklin Township Land Use Ordinance and NJAC 7:8. With this stated, it is evident that the proposed development will not have a negative impact on the existing drainage pattern, water quality, or groundwater recharge on site or within the vicinity of the subject parcel.

APPENDIX

NRCS WEB SOIL SURVEY

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Somerset County, New Jersey

January 15, 2021

Custom Soil Resource Report
Soil Map

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Somerset County, New Jersey
Survey Area Data: Version 18, Jun 1, 2020

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

Date(s) aerial images were photographed: Jun 22, 2019—Jul 13, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
PenB	Penn silt loam, 2 to 6 percent slopes	7.9	100.0%
Totals for Area of Interest		**7.9**	**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.

Somerset County, New Jersey

PenB—Penn silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2w05z
Elevation: 100 to 250 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

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

Description of Penn

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Fine-loamy residuum weathered from acid reddish shale, siltstone, and fine-grain sandstone

Typical profile

Ap - 0 to 8 inches: silt loam
Bt1 - 8 to 12 inches: silt loam
Bt2 - 12 to 25 inches: channery silt loam
C - 25 to 30 inches: very channery silt loam
R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)

Interpretive groups

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

Minor Components

Readington

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Klinesville

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Norton

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

TIME OF CONCENTRATION CALCULATIONS

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

Date: 11/1/2017
Project: AACTFR Property, LLC
Project No: 3532-99-001

Calculated By: MJS
Checked By: TDF

Worksheet 3: Time of Concentration (T_c) Calculations

Land Condition: Existing
Drainage Area: DA Stream

• Sheet Flow:

	A-B				
1. Surface Description	Woods, Light Underbrush				
2. Manning's Roughness Coefficient, n	0.4				
3. Flow Length, L { total $L \le 100$ ft }	100.0 ft				
4. Two-Year 24-hour Rainfall, p_2 for . . . Somerset County	3.34 in	3.34 in	3.34 in	3.34 in	
5. Land Slope, s (ft/ft)	0.037 ft/ft				
6. Travel Time, $T_t = \frac{0.007\,(n\,L)^{0.8}}{p_2^{0.5}\,s^{0.4}}$	0.274 hr	+ 0.000 hr	+ 0.000 hr	+ 0.000 hr	= 0.274 hr

• Shallow Concentrated Flow:

	B-C	C-D	D-E		
7. Surface Description	Unpaved	Unpaved	Unpaved		
8. Flow Length, L	30.0 ft	359.0 ft	100.0 ft		
9. Watercourse Slope, s	0.078 ft/ft	0.014 ft/ft	0.050 ft/ft		
10. Average velocity, V { see Figure 3.1)	4.51 ft/s	1.91 ft/s	3.61 ft/s		
11. Travel Time, $T_t = \frac{L}{3600\,V}$	0.002 hr	+ 0.052 hr	+ 0.008 hr	= 0.000 hr	= 0.062 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	= 0.000 hr
22. Watershed or subarea Time of Concentration, T_c { add T_t in steps 6, 11 and 21 }					0.336 hr
					20.1 min

RUNOFF COEFFICIENT (CN) CALCULATIONS – EXISTING

DYNAMIC ENGINEERING

EXISTING DRAINAGE AREA SUMMARY AND AVERAGE CURVE NUMBER(CN) CALCULATIONS

Project:	Active Acquisitions Franklin	Computed By:	MJS
Job #:	3532-99-001	Checked By:	TFD
Location:	401 Cottontail Lane, Franklin, NJ	Date:	12/17/2020

Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG C - Open Space Area (acre)	HSG C - Open Space Area (sf)	Curve Number (CN) Used	HSG C - Wooded Area (acre)	HSG C - Wooded Area (sf)	Curve Number (CN) Used	Avg. Perv. Curve Number	Total PerviousArea (acres)	Total Area (acres)	TC (Min.)
EX-DA1 (Disturbed)	0.00	-	98	0.00		74	5.45	237,246	70	70	5.45	5.45	10
EX-DA1 (Undisturbed)	0.00	-	98	0.00		74	1.46	63,537	70	70	1.46	1.46	10
	0.00	-	98	0.00	-	74	0.00	-	70	N/A	0.00	0.00	10
	0.00	-	98	0.00	-	74	0.00	-	70	N/A	0.00	0.00	10
	0.00	-	98	0.00	-	74	0.00	-	70	N/A	0.00	0.00	10
Total	0.00	0.00		0.00	0		6.91	300783.00			6.91	6.91	

Per County Soil Survey -	Soil Abbr	HSG	A	Soil	Soil Name
Per County Soil Survey -	Soil Abbr	HSG	B	Soil	Soil Name
Per County Soil Survey -	Pen B	HSG	C	Soil	Penn silt loam
Per County Soil Survey -	Soil Abbr	HSG	D	Soil	Soil Name

Description	Runoff Curve Number (CN) (HSG A)	Runoff Curve Number (CN) (HSG B)	Runoff Curve Number (CN) (HSG C)	Runoff Curve Number (CN) (HSG D)
Impervious Surface	98	98	98	98
Open Space (lawn) (good)	39	61	74	80
Woods (good)	30	55	70	77

RUNOFF COEFFICIENT (CN) CALCULATIONS – PROPOSED

DYNAMIC ENGINEERING

PROPOSED DRAINAGE AREA SUMMARY AND AVERAGE CURVE NUMBER(CN) CALCULATIONS

Project: Active Acquisitions Franklin
Job #: 3532-99-001
Location: 401 Cottontail Lane, Franklin, NJ

Drainage Area	Impervious Area (acre)	Impervious Area (sf)	Curve Number (CN) Used	HSG C - Open Space Area (acre)	HSG C - Open Space Area (sf)	Curve Number (CN) Used	HSG C - Wooded Area (acre)	HSG C - Wooded Area (sf)	Curve Number (CN) Used	Avg. Perv. Curve Number	Total Pervious Area (acres)	Total Area (acres)	TC (Min.)
Undistrubed Pervious	0.00	-	98	1.46	63,537	74	0.00	-	70	74	1.46	1.46	10
Undetained Pervious	0.00	-	99	0.51	22,287	74	0.00	-	70	74	0.51	0.51	10
Truck Detained Pervious	0.00	-	99	0.33	14,303	74	0.00	-	70	74	0.33	0.33	10
Car Detained Pervious	0.00	-	99	0.58	25,192	74	0.00	-	70	74	0.58	0.58	10
Truck Paved Area	1.21	52,491	98	0.00	-	74	0.00	-	70	N/A	0.00	1.21	10
Car Paved Area	0.53	22,899	98	0.00	-	74	0.00	-	70	N/A	0.00	0.53	10
Building	2.30	100,114	98	0.00	-	74	0.00	-	70	N/A	0.00	2.30	10
	0.00	-	98	0.00	-	74	0.00	-	70	N/A	0.00	0.00	10
Total	4.03	175504.00		2.88	125319.00		0.00	0.00			2.88	6.91	

Per County Soil Survey -	Soil Abbr	HSG
Per County Soil Survey -	Soil Abbr	HSG
Per County Soil Survey -	Pen B	HSG
Per County Soil Survey -	Soil Abbr	HSG

Description	Runoff Curve Number (CN) (HSG A)
Impervious Surface	98
Open Space (lawn) (good)	39
Woods (good)	30

HYDROGRAPH SUMMARY REPORTS – EXISTING & PROPOSED CONDITIONS 2 YR. 10 YR. & 100 YR.

Watershed Model Schematic

Legend

Hyd.	Origin	Description
1	SCS Runoff	Existing Undisturbed DA
2	SCS Runoff	Existing Disturbed DA
3	Combine	Total Existing
5	SCS Runoff	Building
6	SCS Runoff	Prop North AG Basin Imp
7	SCS Runoff	Prop South AG Basin Imp
8	SCS Runoff	Prop Undetained Pervious
9	SCS Runoff	Prop South AG Basin Perv
10	SCS Runoff	Prop North AG Basin Perv
11	Combine	North AG Basin Inflow
12	Reservoir	North AG Basin
13	Diversion1	Underdrain
14	Diversion2	OCS
15	Combine	South AG Basin Inflow
16	Reservoir	South AG Basin
17	Combine	UG Basin Inflow
18	Reservoir	UG Basin
19	Combine	Prop Total (Disturbed)
21	Combine	Prop Total

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	1.522	-------	-------	3.321	-------	-------	7.149	Existing Undisturbed DA
2	SCS Runoff	-------	-------	3.535	-------	-------	8.585	-------	-------	19.99	Existing Disturbed DA
3	Combine	1, 2	-------	4.885	-------	-------	11.53	-------	-------	26.18	Total Existing
5	SCS Runoff	-------	-------	5.928	-------	-------	8.950	-------	-------	14.72	Building
6	SCS Runoff	-------	-------	3.118	-------	-------	4.709	-------	-------	7.744	Prop North AG Basin Imp
7	SCS Runoff	-------	-------	1.366	-------	-------	2.063	-------	-------	3.392	Prop South AG Basin Imp
8	SCS Runoff	-------	-------	0.426	-------	-------	0.930	-------	-------	2.002	Prop Undetained Pervious
9	SCS Runoff	-------	-------	0.589	-------	-------	1.284	-------	-------	2.764	Prop South AG Basin Perv
10	SCS Runoff	-------	-------	0.335	-------	-------	0.731	-------	-------	1.573	Prop North AG Basin Perv
11	Combine	6, 10	-------	3.453	-------	-------	5.439	-------	-------	9.317	North AG Basin Inflow
12	Reservoir	11	-------	2.291	-------	-------	3.606	-------	-------	6.411	North AG Basin
13	Diversion1	12	-------	0.157	-------	-------	0.171	-------	-------	0.192	Underdrain
14	Diversion2	12	-------	2.134	-------	-------	3.435	-------	-------	6.219	OCS
15	Combine	7, 9,	-------	1.954	-------	-------	3.347	-------	-------	6.156	South AG Basin Inflow
16	Reservoir	15	-------	0.734	-------	-------	1.129	-------	-------	6.189	South AG Basin
17	Combine	5, 14, 16	-------	7.665	-------	-------	12.85	-------	-------	24.66	UG Basin Inflow
18	Reservoir	17	-------	1.362	-------	-------	5.308	-------	-------	13.79	UG Basin
19	Combine	8, 13, 18	-------	1.587	-------	-------	5.733	-------	-------	14.80	Prop Total (Disturbed)
21	Combine	1, 19,	-------	3.002	-------	-------	6.694	-------	-------	19.48	Prop Total

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

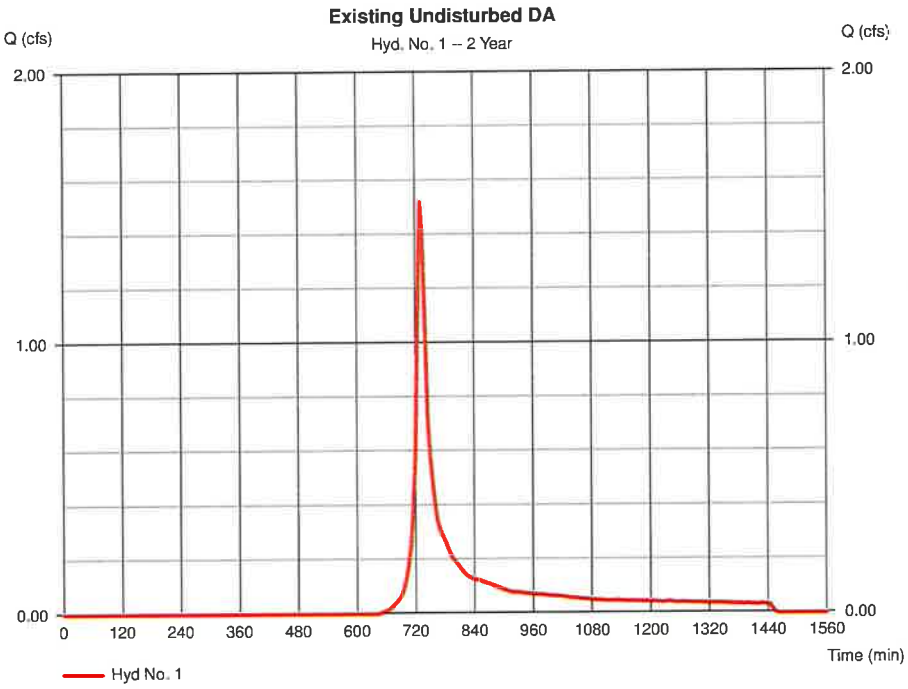
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	1.522	5	730	5,772	----	------	------	Existing Undisturbed DA
2	SCS Runoff	3.535	5	740	17,853	----	------	------	Existing Disturbed DA
3	Combine	4.885	5	735	23,625	1, 2	------	------	Total Existing
5	SCS Runoff	5.928	5	730	24,319	----	------	------	Building
6	SCS Runoff	3.118	5	730	12,794	----	------	------	Prop North AG Basin Imp
7	SCS Runoff	1.366	5	730	5,604	----	------	------	Prop South AG Basin Imp
8	SCS Runoff	0.426	5	730	1,616	----	------	------	Prop Undetained Pervious
9	SCS Runoff	0.589	5	730	2,232	----	------	------	Prop South AG Basin Perv
10	SCS Runoff	0.335	5	730	1,270	----	------	------	Prop North AG Basin Perv
11	Combine	3.453	5	730	14,064	6, 10	------	------	North AG Basin Inflow
12	Reservoir	2.291	5	740	14,045	11	58.93	5,189	North AG Basin
13	Diversion1	0.157	5	740	9,121	12	------	------	Underdrain
14	Diversion2	2.134	5	740	4,924	12	------	------	OCS
15	Combine	1.954	5	730	7,836	7, 9,	------	------	South AG Basin Inflow
16	Reservoir	0.734	5	745	4,848	15	63.26	3,765	South AG Basin
17	Combine	7.665	5	735	34,091	5, 14, 16	------	------	UG Basin Inflow
18	Reservoir	1.362	5	790	34,071	17	58.41	14,537	UG Basin
19	Combine	1.587	5	740	44,808	8, 13, 18	------	------	Prop Total (Disturbed)
21	Combine	3.002	5	730	50,580	1, 19,	------	------	Prop Total

Hydrograph Report

Hyd. No. 1

Existing Undisturbed DA

Hydrograph type	= SCS Runoff	Peak discharge	= 1.522 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 5,772 cuft
Drainage area	= 1.500 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

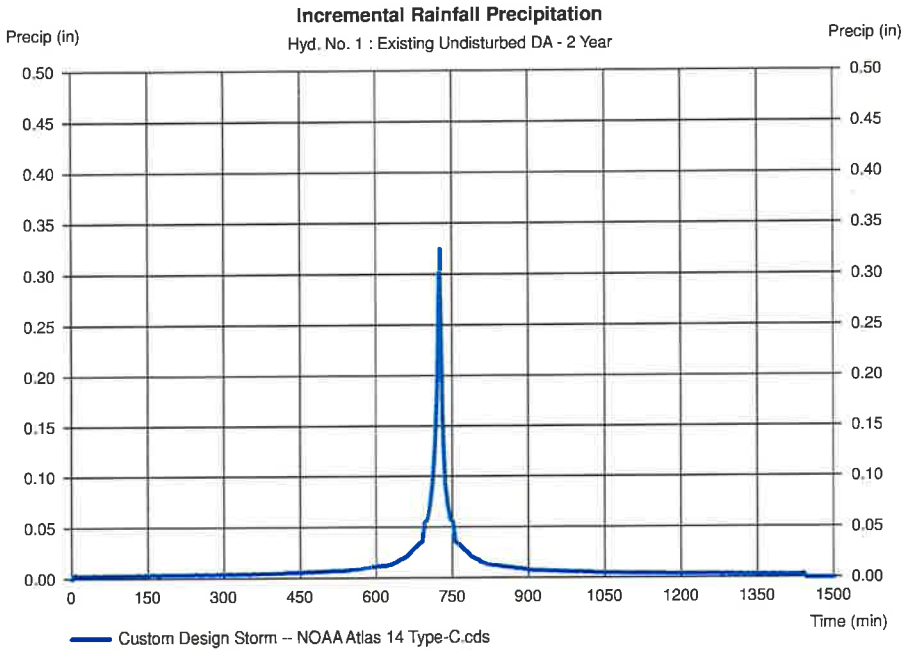


Precipitation Report

Hyd. No. 1

Existing Undisturbed DA

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

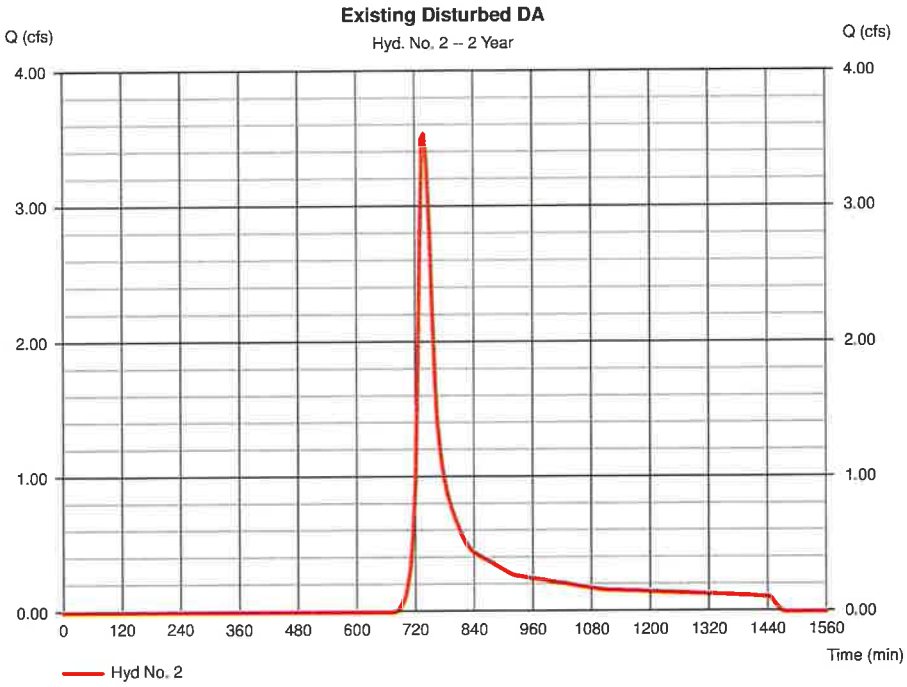


Hydrograph Report

Hyd. No. 2

Existing Disturbed DA

Hydrograph type	= SCS Runoff	Peak discharge	= 3.535 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 17,853 cuft
Drainage area	= 5.400 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 20.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

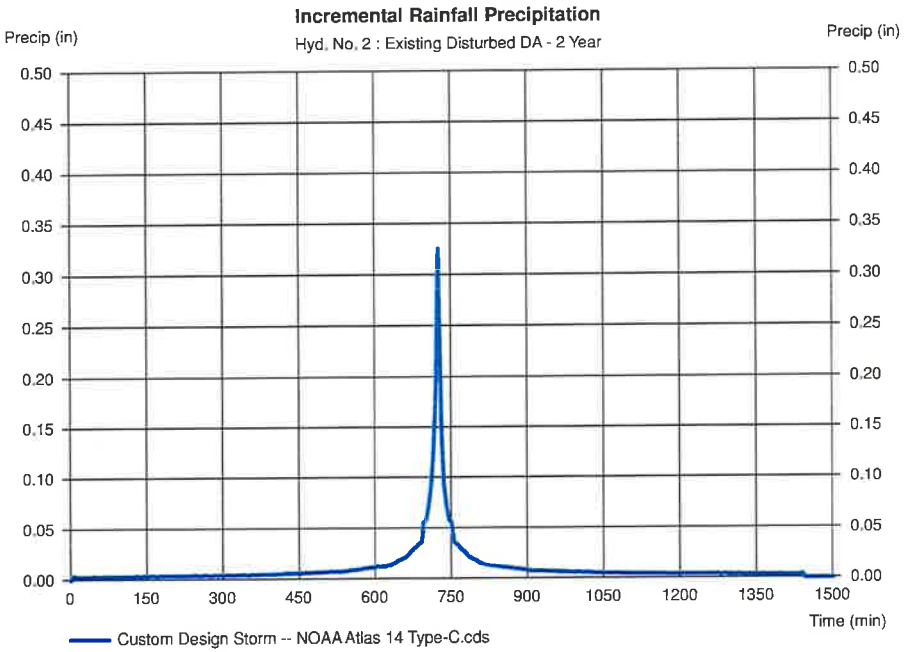


Precipitation Report

Hyd. No. 2

Existing Disturbed DA

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

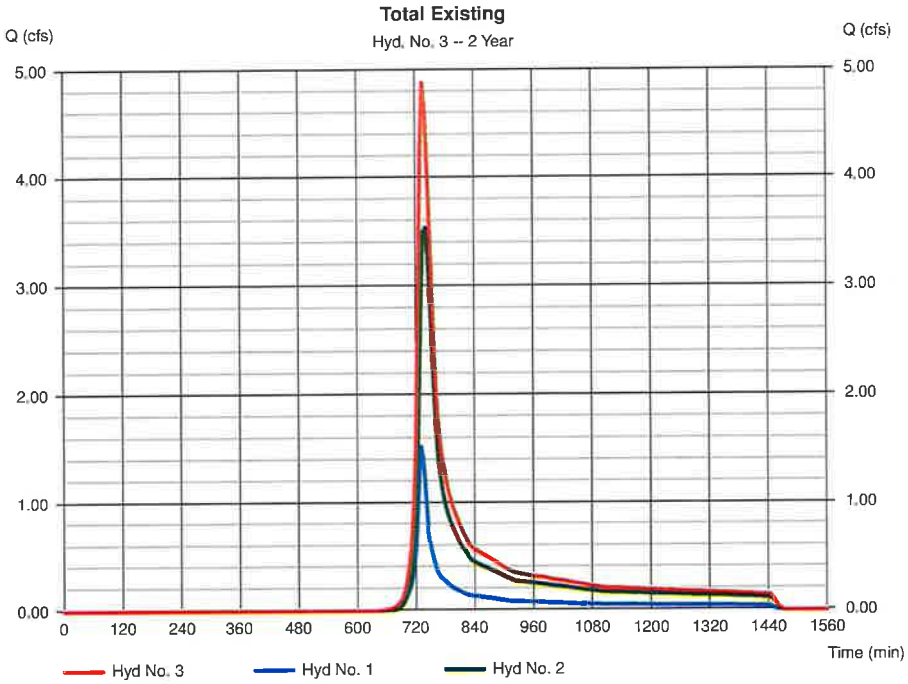


Hydrograph Report

Hyd. No. 3

Total Existing

Hydrograph type	= Combine	Peak discharge	= 4.885 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 23,625 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 6.900 ac

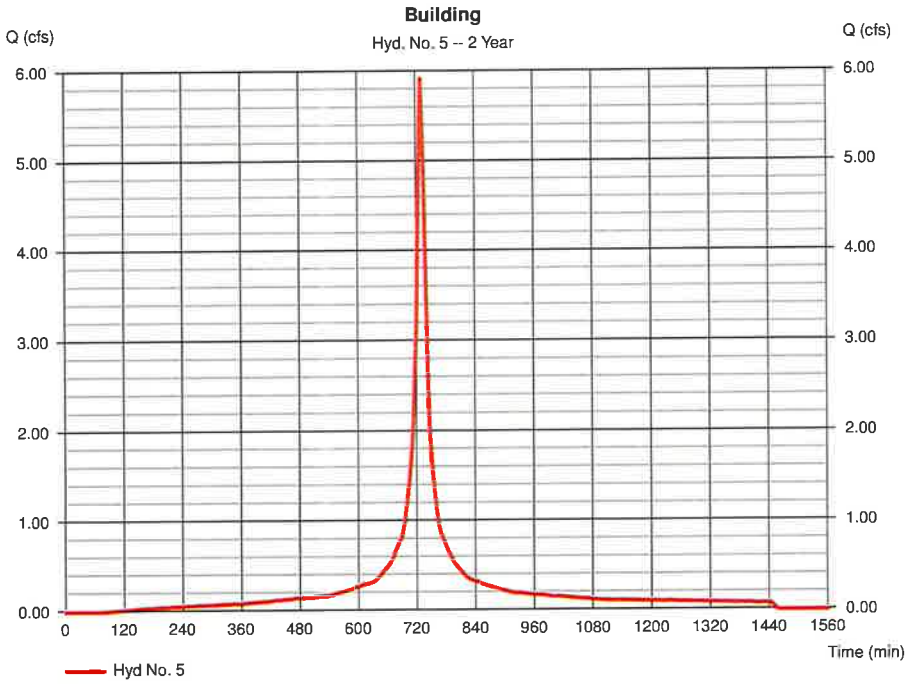


Hydrograph Report

Hyd. No. 5

Building

Hydrograph type	= SCS Runoff	Peak discharge	= 5.928 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 24,319 cuft
Drainage area	= 2.300 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

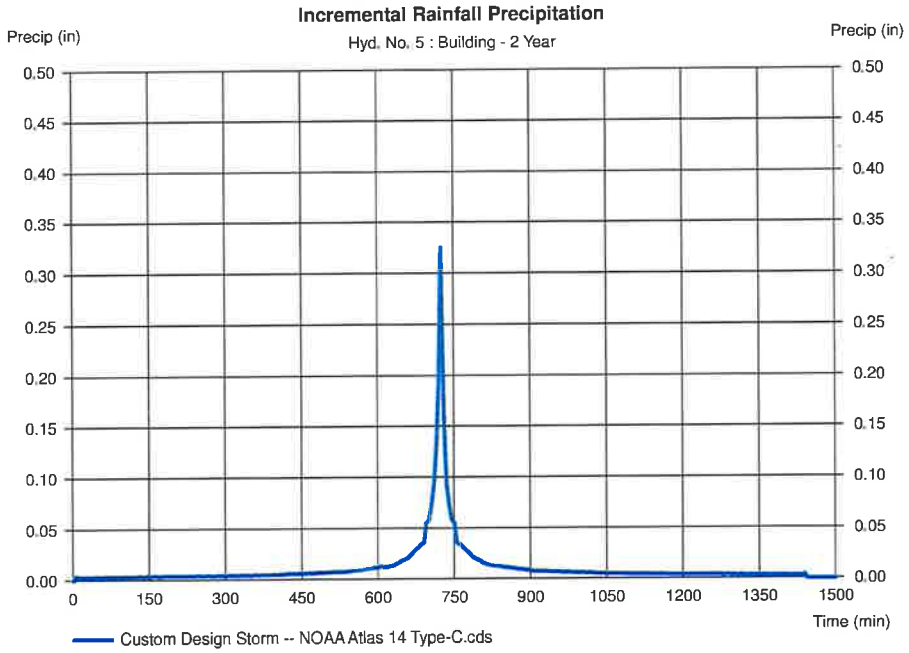


Precipitation Report

Hyd. No. 5

Building

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

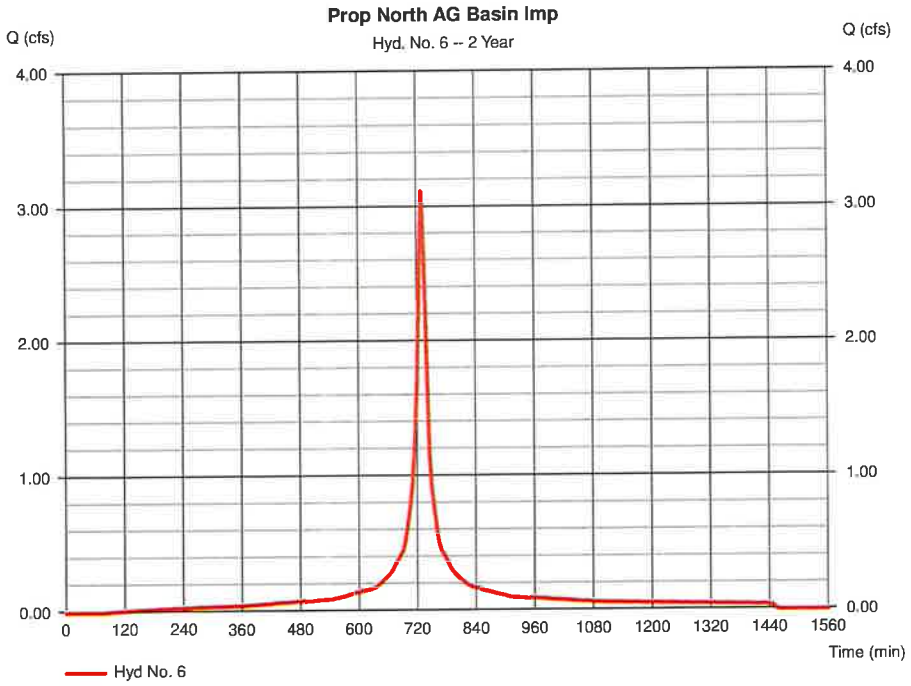


Hydrograph Report

Hyd. No. 6

Prop North AG Basin Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 3.118 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 12,794 cuft
Drainage area	= 1.210 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

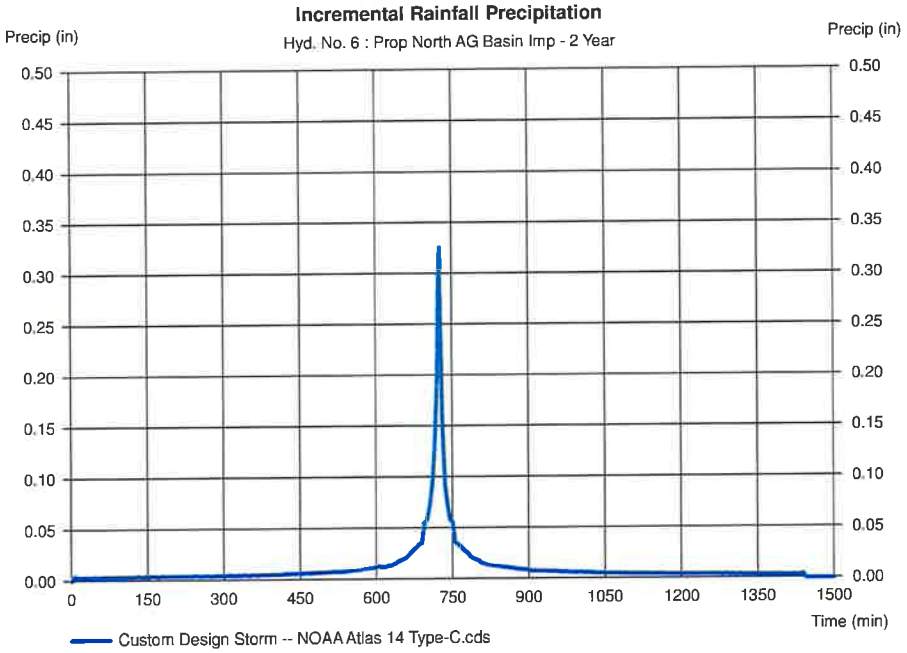


Precipitation Report

Hyd. No. 6

Prop North AG Basin Imp

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

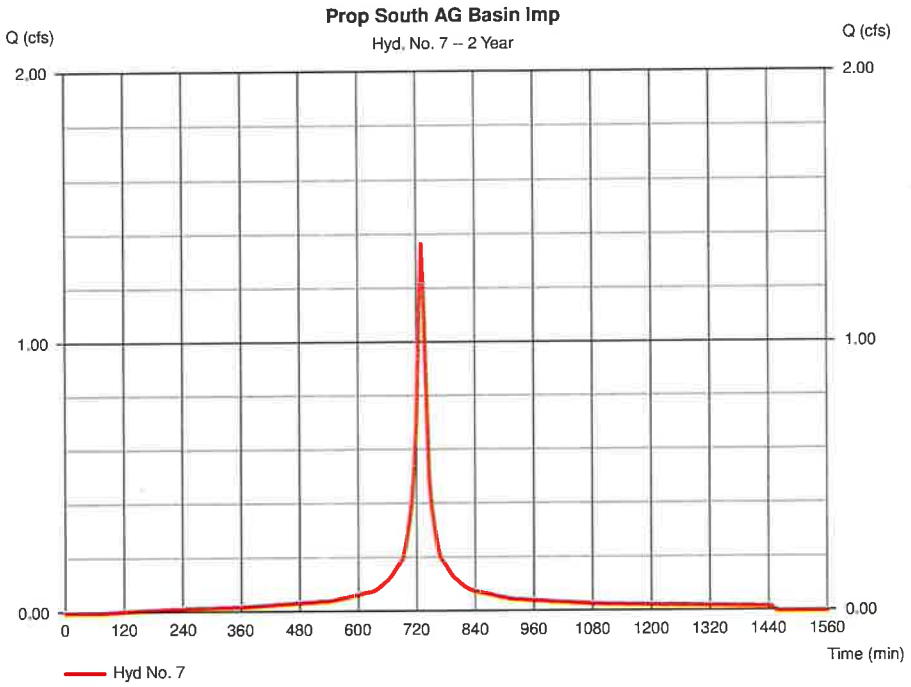


Hydrograph Report

Hyd. No. 7

Prop South AG Basin Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 1.366 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 5,604 cuft
Drainage area	= 0.530 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

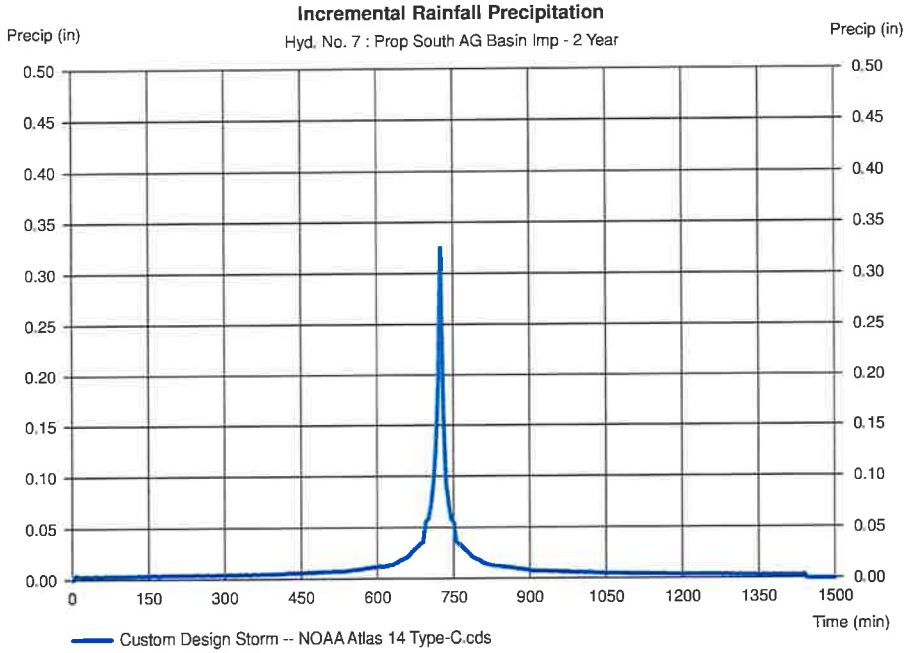


Precipitation Report

Hyd. No. 7

Prop South AG Basin Imp

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

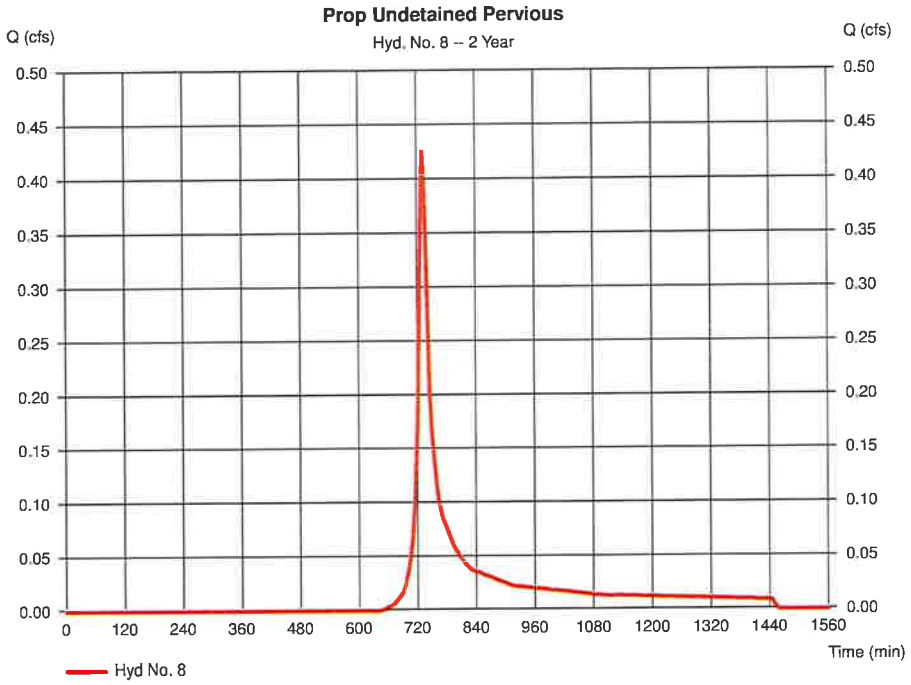


Hydrograph Report

Hyd. No. 8

Prop Undetained Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.426 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,616 cuft
Drainage area	= 0.420 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

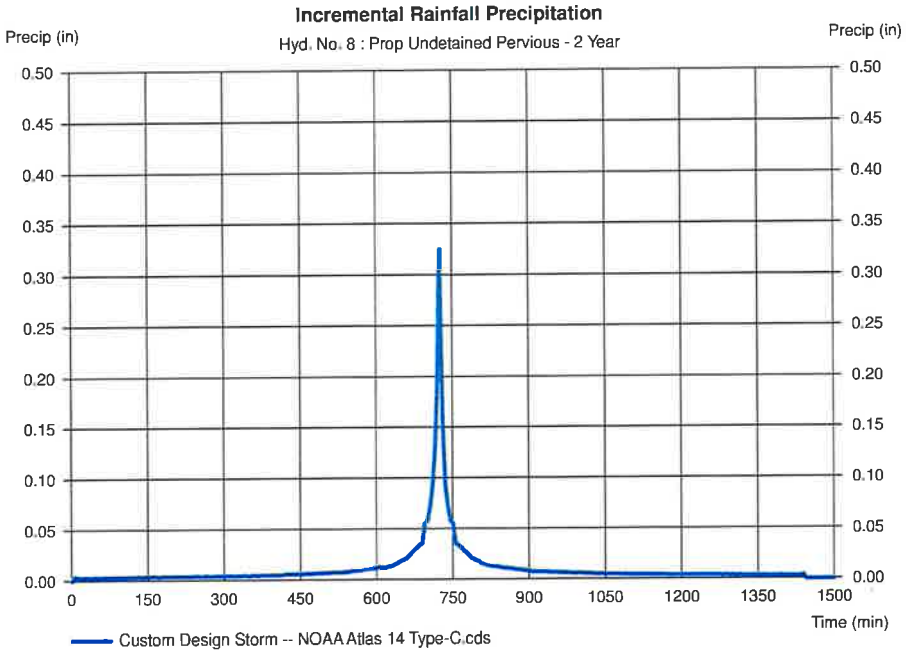


Precipitation Report

Hyd. No. 8

Prop Undetained Pervious

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

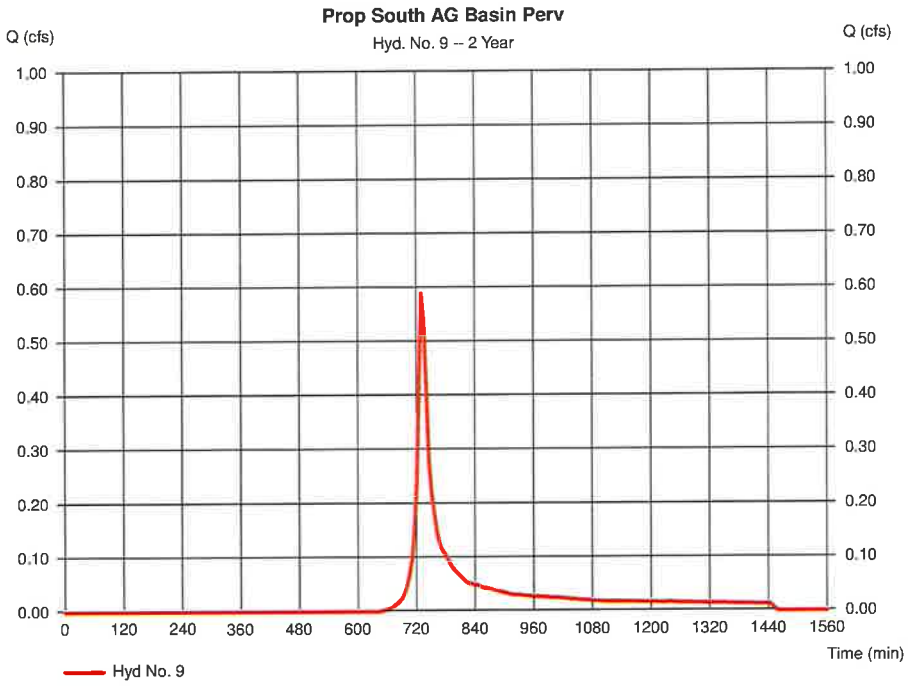


Hydrograph Report

Hyd. No. 9

Prop South AG Basin Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.589 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,232 cuft
Drainage area	= 0.580 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

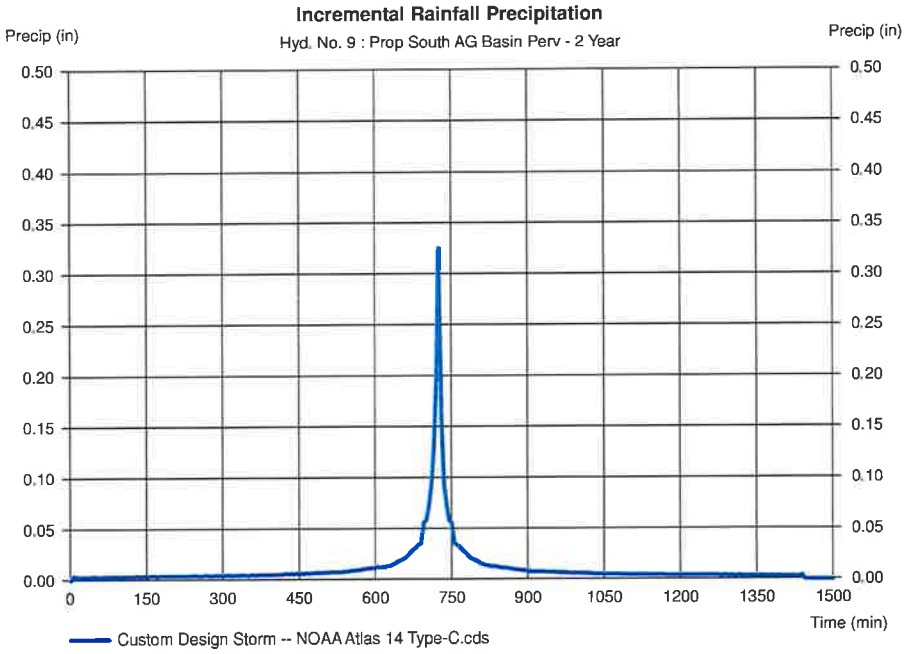


Precipitation Report

Hyd. No. 9

Prop South AG Basin Perv

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

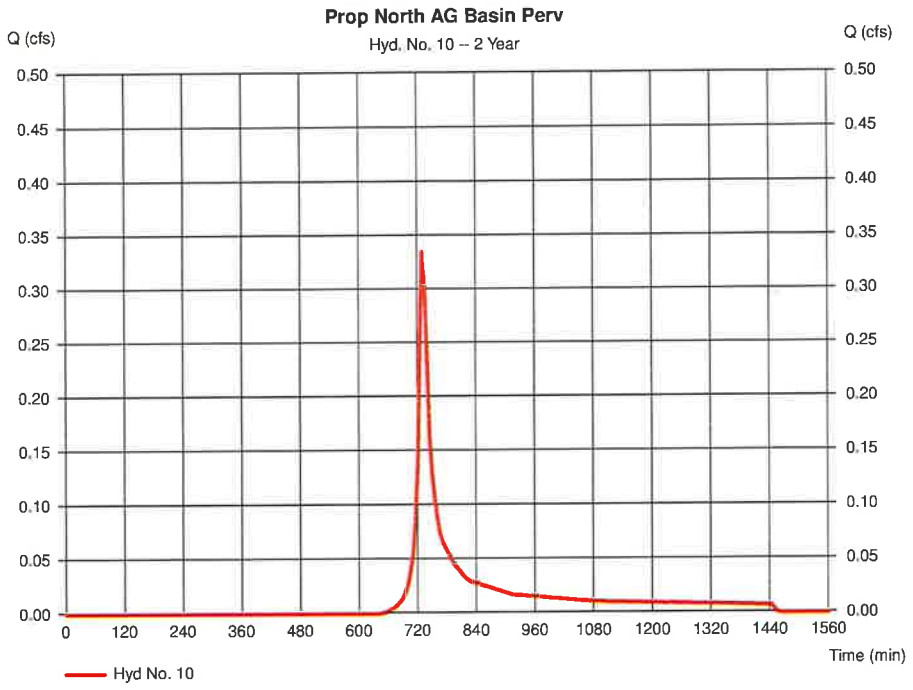


Hydrograph Report

Hyd. No. 10

Prop North AG Basin Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.335 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,270 cuft
Drainage area	= 0.330 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

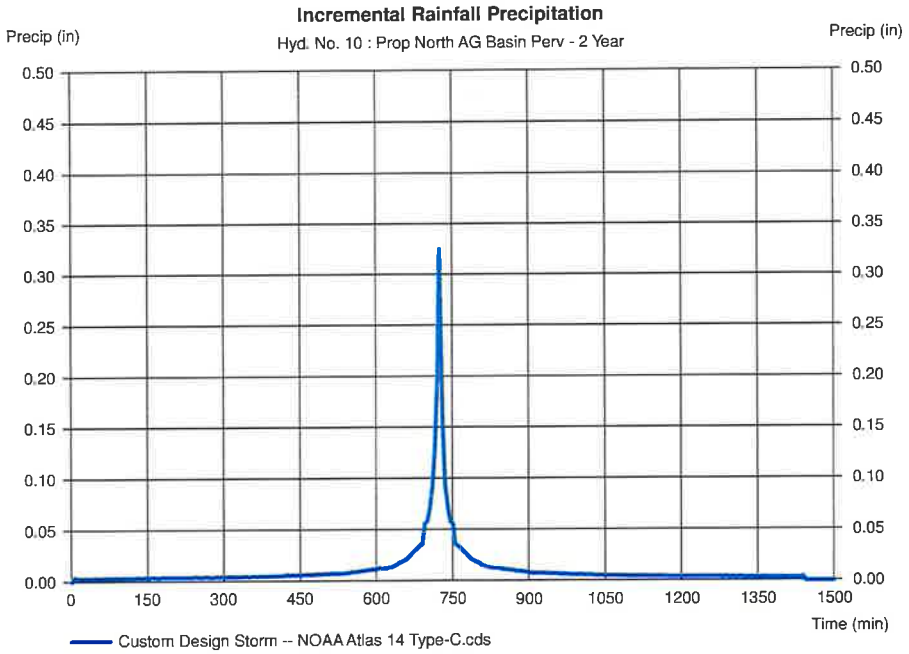


Precipitation Report

Hyd. No. 10

Prop North AG Basin Perv

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

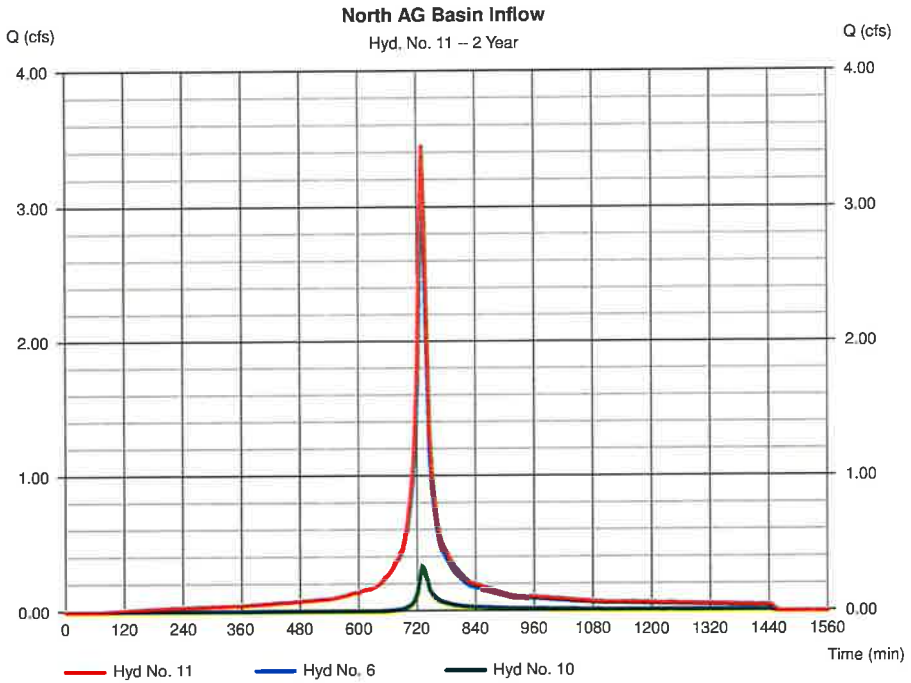


Hydrograph Report

Hyd. No. 11

North AG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 3.453 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 14,064 cuft
Inflow hyds.	= 6, 10	Contrib. drain. area	= 1.540 ac



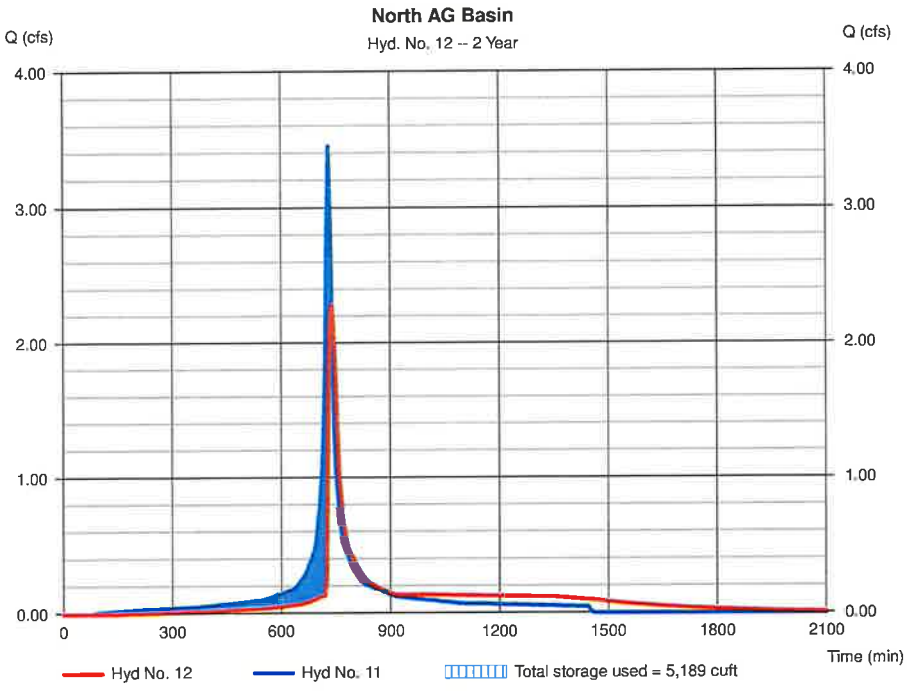
Hydrograph Report

Hyd. No. 12

North AG Basin

Hydrograph type	= Reservoir	Peak discharge	= 2.291 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 14,045 cuft
Inflow hyd. No.	= 11 - North AG Basin Inflow	Max. Elevation	= 58.93 ft
Reservoir name	= North AG Basin	Max. Storage	= 5,189 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Pond No. 3 - North AG Basin

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 57.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	57.00	2,058	0	0
1.00	58.00	2,714	2,378	2,378
2.00	59.00	3,442	3,070	5,449
3.00	60.00	4,267	3,847	9,295

Culvert / Orifice Structures

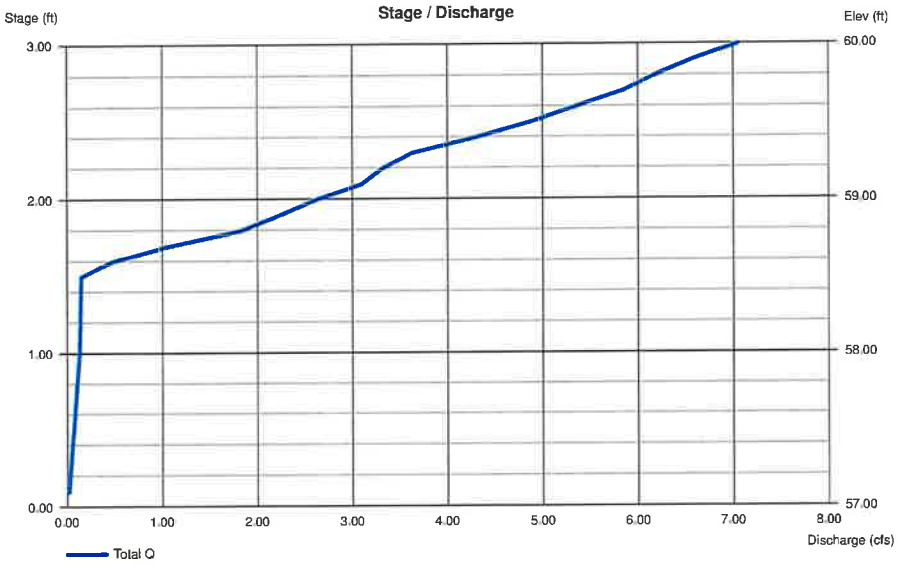
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	6.00	0.00	0.00
Span (in)	= 15.00	36.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 58.00	58.50	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 59.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 2.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

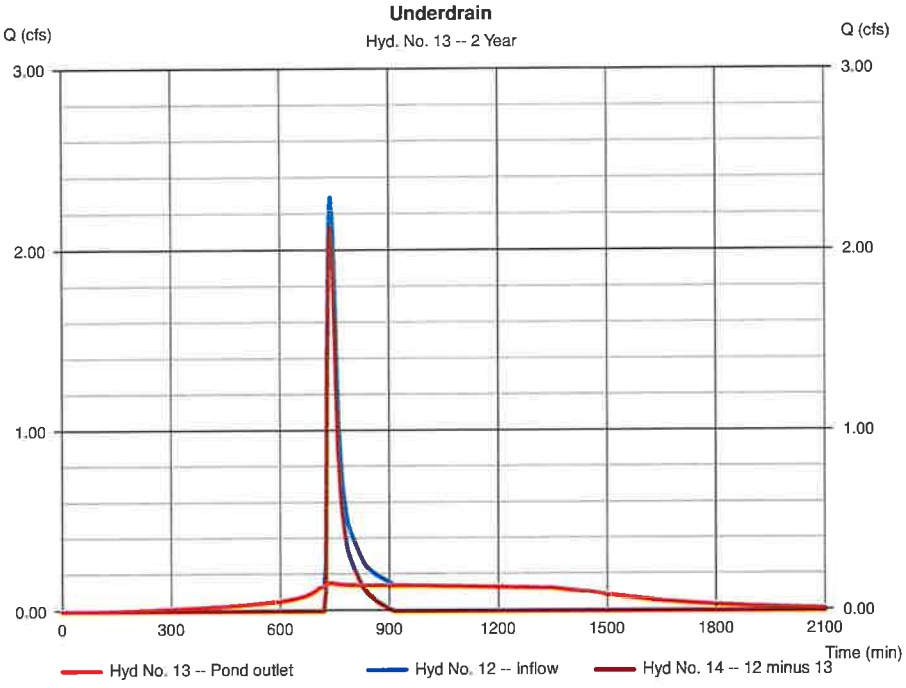


Hydrograph Report

Hyd. No. 13

Underdrain

Hydrograph type	= Diversion1	Peak discharge	= 0.157 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 9,121 cuft
Inflow hydrograph	= 12 - North AG Basin	2nd diverted hyd.	= 14
Diversion method	= Pond - North AG Basin	Pond structure	= Exfiltration

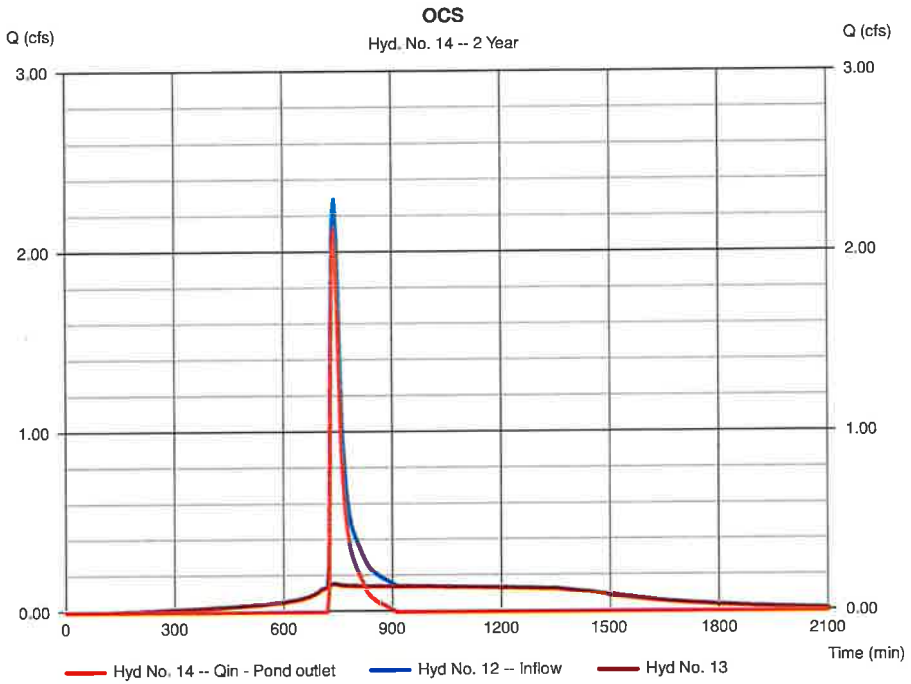


Hydrograph Report

Hyd. No. 14

OCS

Hydrograph type	= Diversion2	Peak discharge	= 2.134 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 4,924 cuft
Inflow hydrograph	= 12 - North AG Basin	2nd diverted hyd.	= 13
Diversion method	= Pond - North AG Basin	Pond structure	= Exfiltration

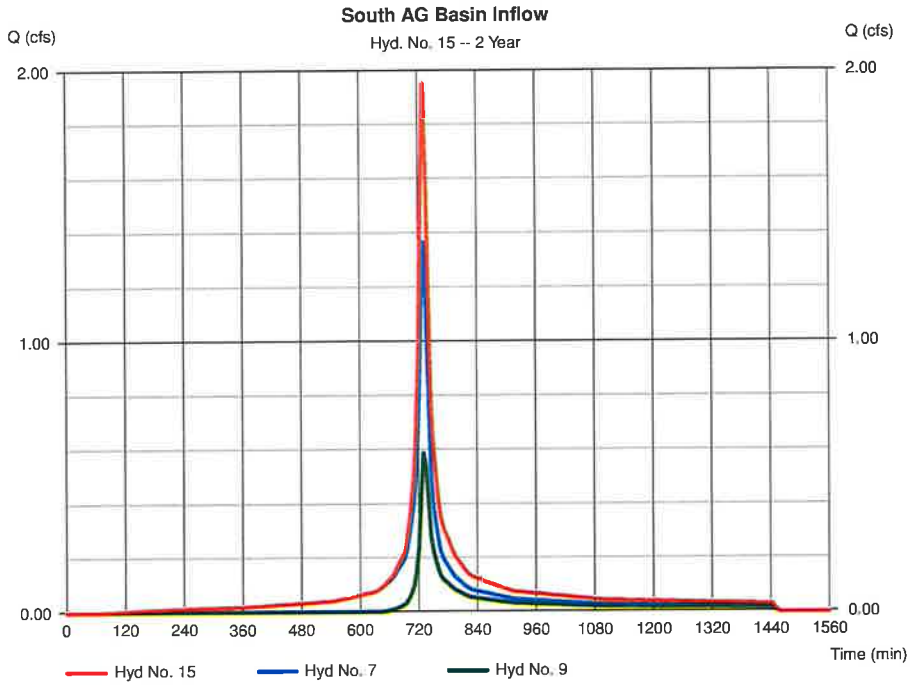


Hydrograph Report

Hyd. No. 15

South AG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 1.954 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 7,836 cuft
Inflow hyds.	= 7, 9	Contrib. drain. area	= 1.110 ac



Hydrograph Report

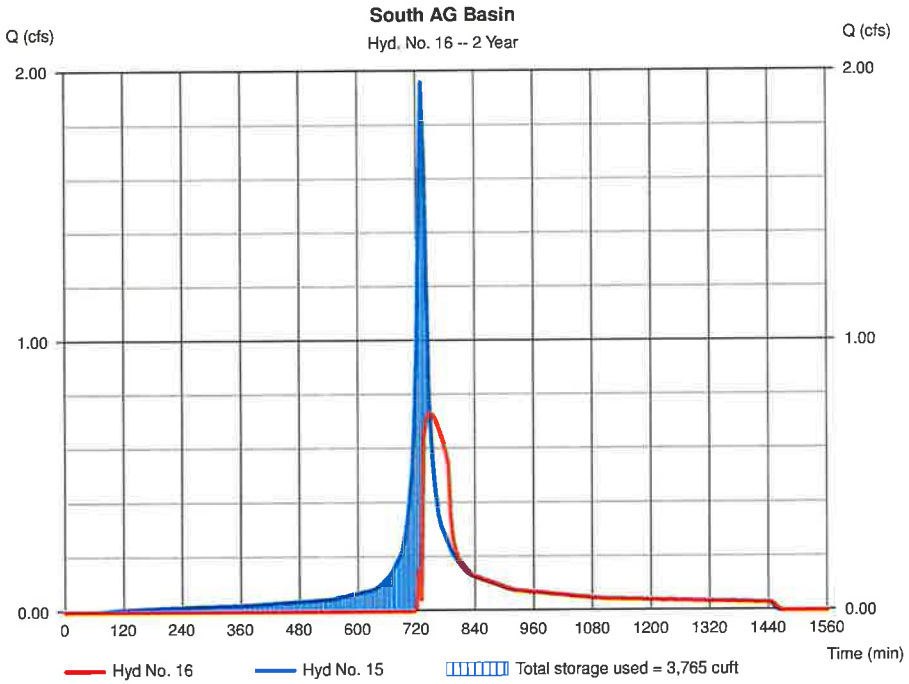
Hydraflow Hydrographs by Intelisolve v9.1 — Tuesday, Jan 19, 2021

Hyd. No. 16

South AG Basin

Hydrograph type	= Reservoir	Peak discharge	= 0.734 cfs
Storm frequency	= 2 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 4,848 cuft
Inflow hyd. No.	= 15 - South AG Basin Inflow	Max. Elevation	= 63.26 ft
Reservoir name	= South AG Basin	Max. Storage	= 3,765 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Tuesday, Jan 19, 2021

Pond No. 2 - South AG Basin

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 61.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	61.00	1,138	0	0
1.00	62.00	1,576	1,351	1,351
2.00	63.00	2,071	1,818	3,169
3.00	64.00	2,622	2,341	5,510
4.00	65.00	3,230	2,920	8,431

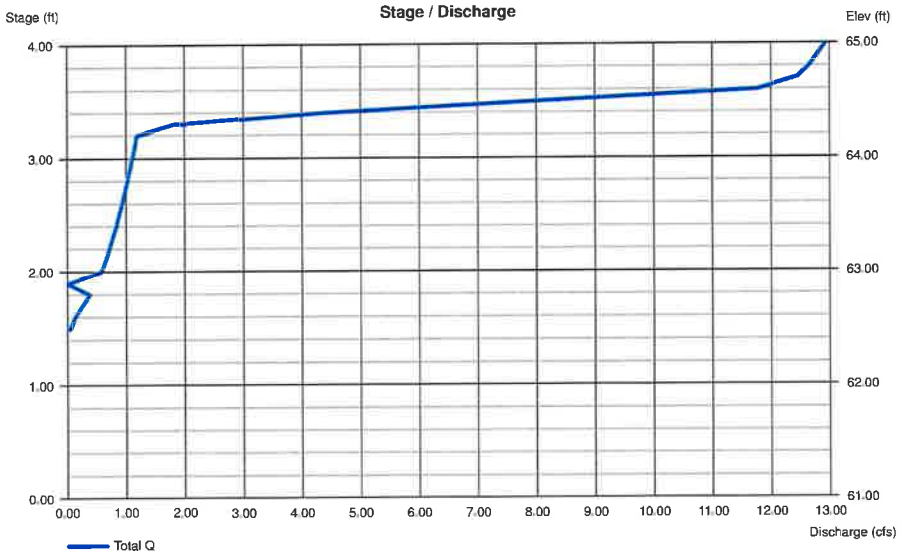
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	6.00	0.00	0.00
Span (in)	= 15.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 58.75	62.40	0.00	0.00
Length (ft)	= 80.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	0.00	0.00	0.00
Crest El. (ft)	= 64.25	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

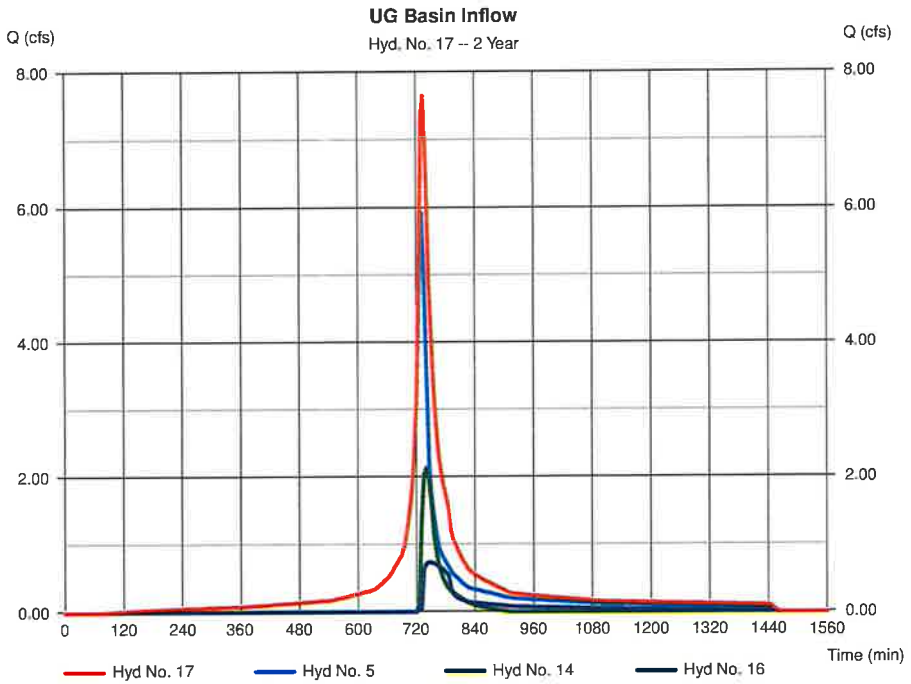


Hydrograph Report

Hyd. No. 17

UG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 7.665 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 34,091 cuft
Inflow hyds.	= 5, 14, 16	Contrib. drain. area	= 2.300 ac



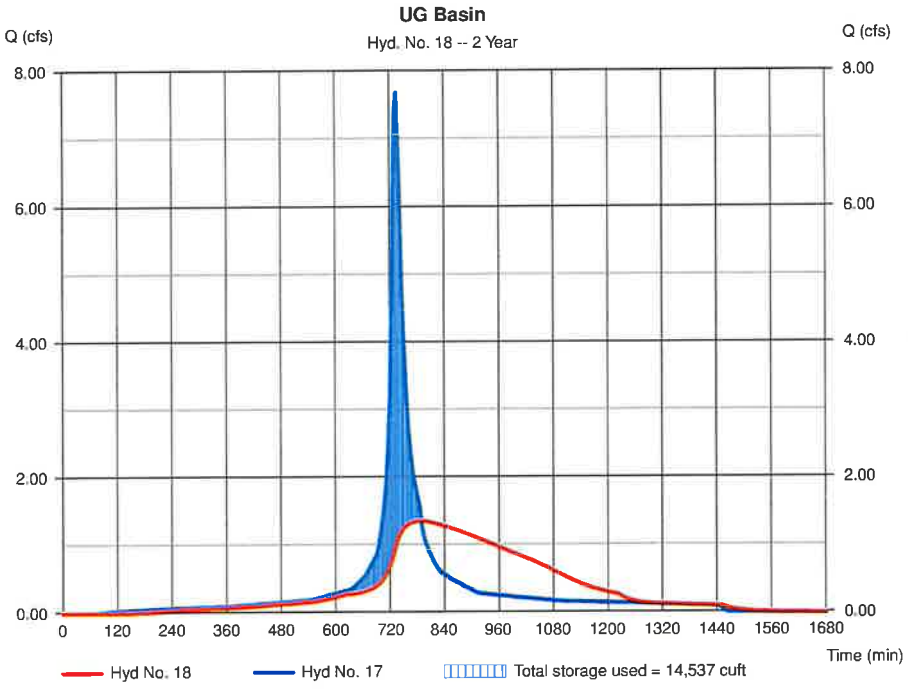
Hydrograph Report

Hyd. No. 18

UG Basin

Hydrograph type	= Reservoir	Peak discharge	= 1.362 cfs
Storm frequency	= 2 yrs	Time to peak	= 790 min
Time interval	= 5 min	Hyd. volume	= 34,071 cuft
Inflow hyd. No.	= 17 - UG Basin Inflow	Max. Elevation	= 58.41 ft
Reservoir name	= UG Basin	Max. Storage	= 14,537 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - UG Basin

Pond Data

UG Chambers - Invert elev. = 57.00 ft, Rise x Span = 2.50 x 62.00 ft, Barrel Len = 215.00 ft, No. Barrels = 1, Slope = 0.30%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	57.00	n/a	0	0
0.31	57.31	n/a	699	699
0.63	57.63	n/a	3,423	4,122
0.94	57.94	n/a	4,158	8,280
1.26	58.26	n/a	4,193	12,473
1.57	58.57	n/a	4,193	16,666
1.89	58.89	n/a	4,193	20,859
2.20	59.20	n/a	4,193	25,052
2.52	59.52	n/a	4,158	29,210
2.83	59.83	n/a	3,423	32,633
3.15	60.15	n/a	699	33,332

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	7.00	6.00	0.00
Span (in)	= 18.00	7.00	48.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 56.00	57.00	58.46	0.00
Length (ft)	= 10.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

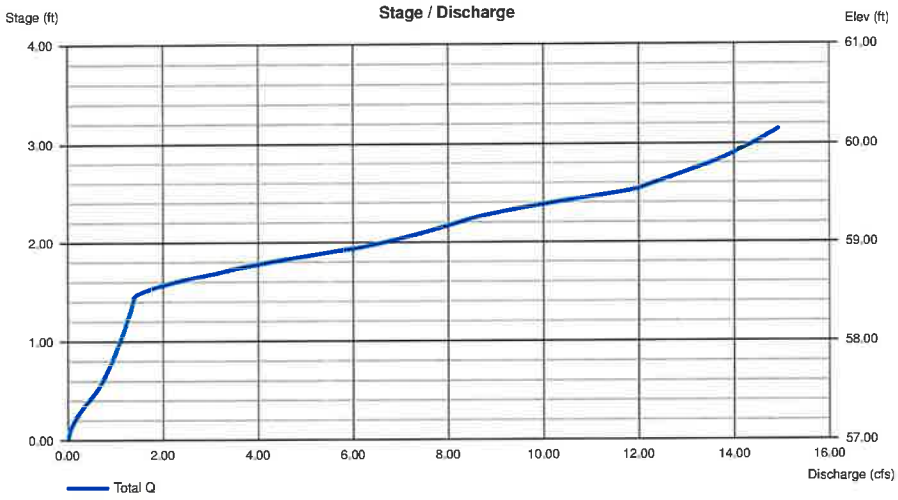
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 59.25	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

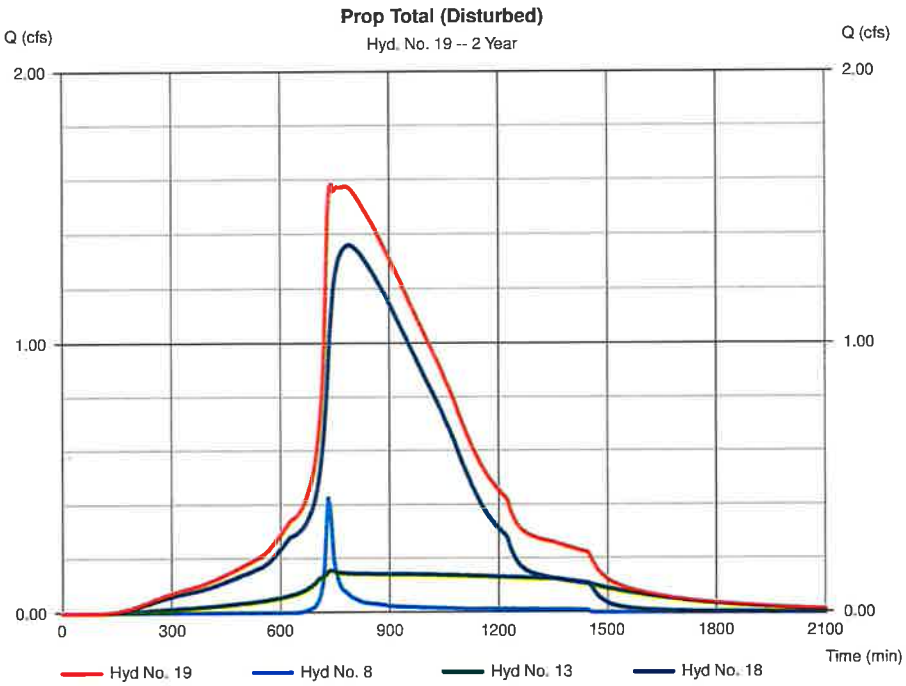


Hydrograph Report

Hyd. No. 19

Prop Total (Disturbed)

Hydrograph type	= Combine	Peak discharge	= 1.587 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 44,808 cuft
Inflow hyds.	= 8, 13, 18	Contrib. drain. area	= 0.420 ac



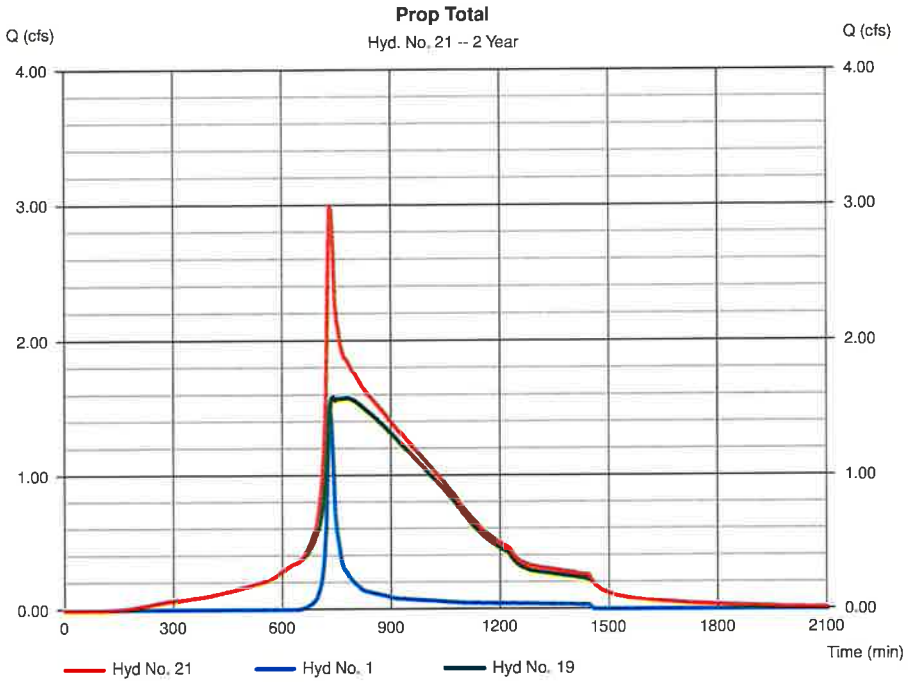
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Tuesday, Jan 19, 2021

Hyd. No. 21

Prop Total

Hydrograph type	= Combine	Peak discharge	= 3.002 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 50,580 cuft
Inflow hyds.	= 1, 19	Contrib. drain. area	= 1.500 ac



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

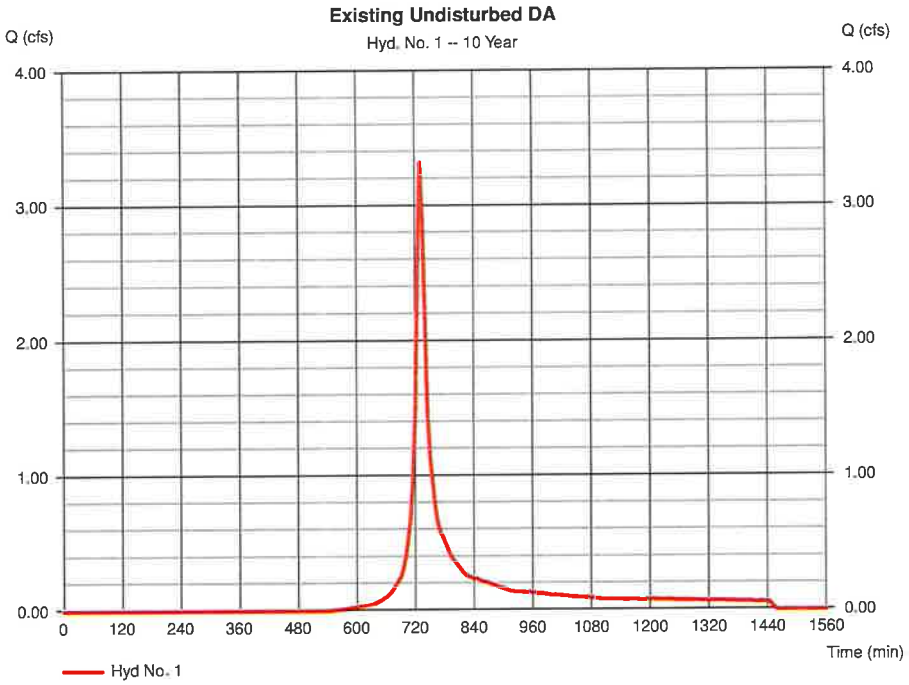
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	3.321	5	730	12,109	----	------	------	Existing Undisturbed DA
2	SCS Runoff	8.585	5	735	40,061	----	------	------	Existing Disturbed DA
3	Combine	11.53	5	735	52,171	1, 2	------	------	Total Existing
5	SCS Runoff	8.950	5	730	37,360	----	------	------	Building
6	SCS Runoff	4.709	5	730	19,655	----	------	------	Prop North AG Basin Imp
7	SCS Runoff	2.063	5	730	8,609	----	------	------	Prop South AG Basin Imp
8	SCS Runoff	0.930	5	730	3,391	----	------	------	Prop Undetained Pervious
9	SCS Runoff	1.284	5	730	4,682	----	------	------	Prop South AG Basin Perv
10	SCS Runoff	0.731	5	730	2,664	----	------	------	Prop North AG Basin Perv
11	Combine	5.439	5	730	22,319	6, 10	------	------	North AG Basin Inflow
12	Reservoir	3.606	5	740	22,300	11	59.31	6,574	North AG Basin
13	Diversion1	0.171	5	740	11,018	12	------	------	Underdrain
14	Diversion2	3.435	5	740	11,282	12	------	------	OCS
15	Combine	3.347	5	730	13,291	7, 9,	------	------	South AG Basin Inflow
16	Reservoir	1.129	5	750	10,304	15	64.08	5,735	South AG Basin
17	Combine	12.85	5	730	58,946	5, 14, 16	------	------	UG Basin Inflow
18	Reservoir	5.308	5	760	58,926	17	58.90	20,924	UG Basin
19	Combine	5.733	5	755	73,334	8, 13, 18	------	------	Prop Total (Disturbed)
21	Combine	6.694	5	755	85,444	1, 19,	------	------	Prop Total

Hydrograph Report

Hyd. No. 1

Existing Undisturbed DA

Hydrograph type	= SCS Runoff	Peak discharge	= 3.321 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 12,109 cuft
Drainage area	= 1.500 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

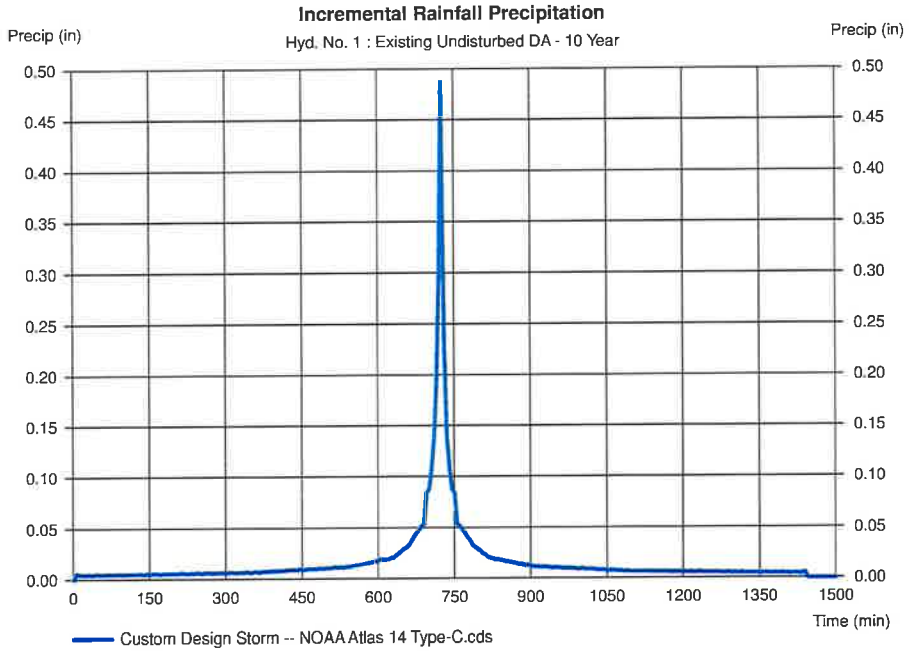


Precipitation Report

Hyd. No. 1

Existing Undisturbed DA

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

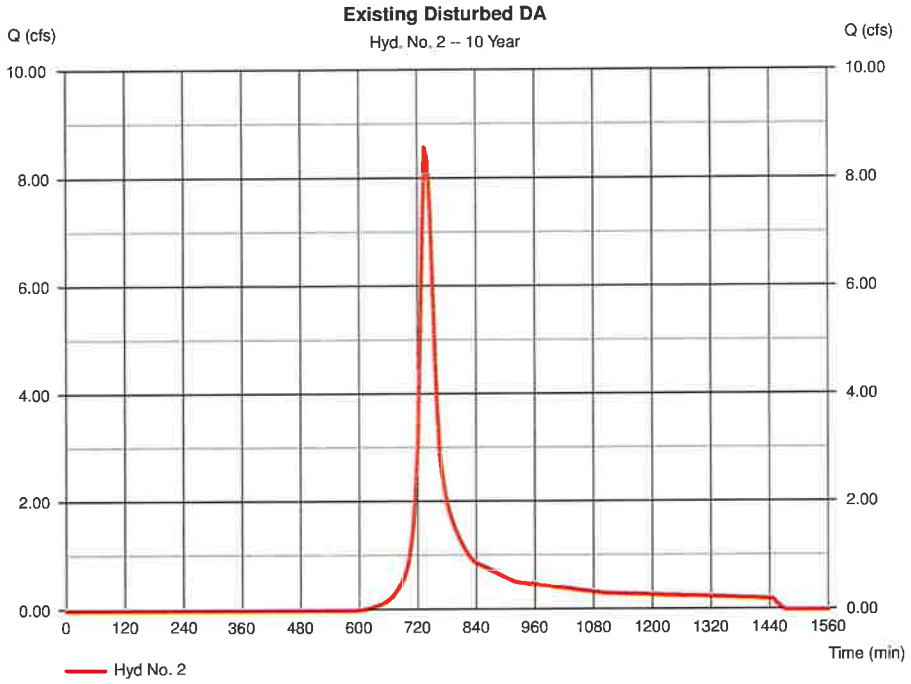


Hydrograph Report

Hyd. No. 2

Existing Disturbed DA

Hydrograph type	= SCS Runoff	Peak discharge	= 8.585 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 40,061 cuft
Drainage area	= 5.400 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 20.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

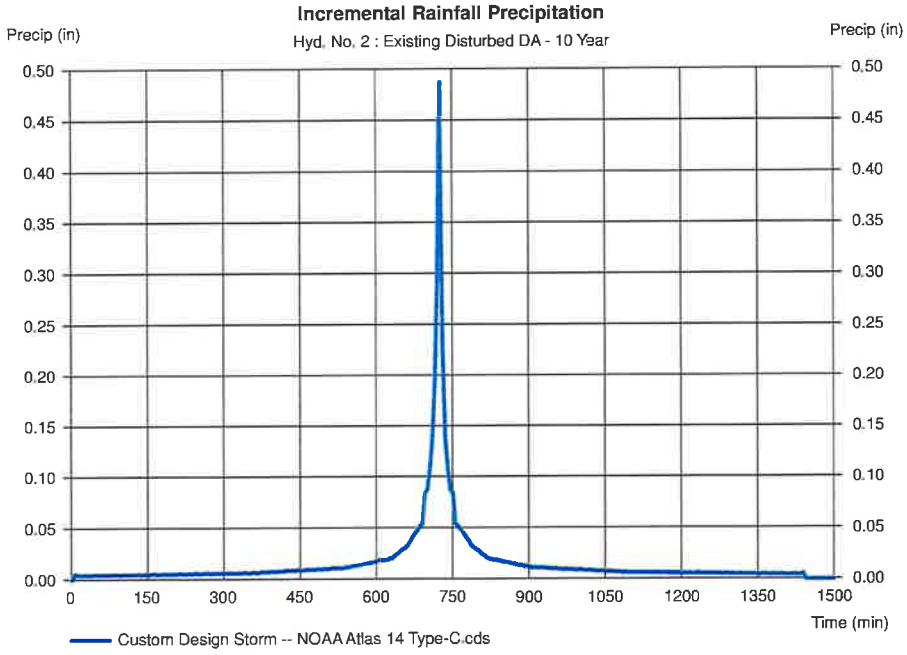


Precipitation Report

Hyd. No. 2

Existing Disturbed DA

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

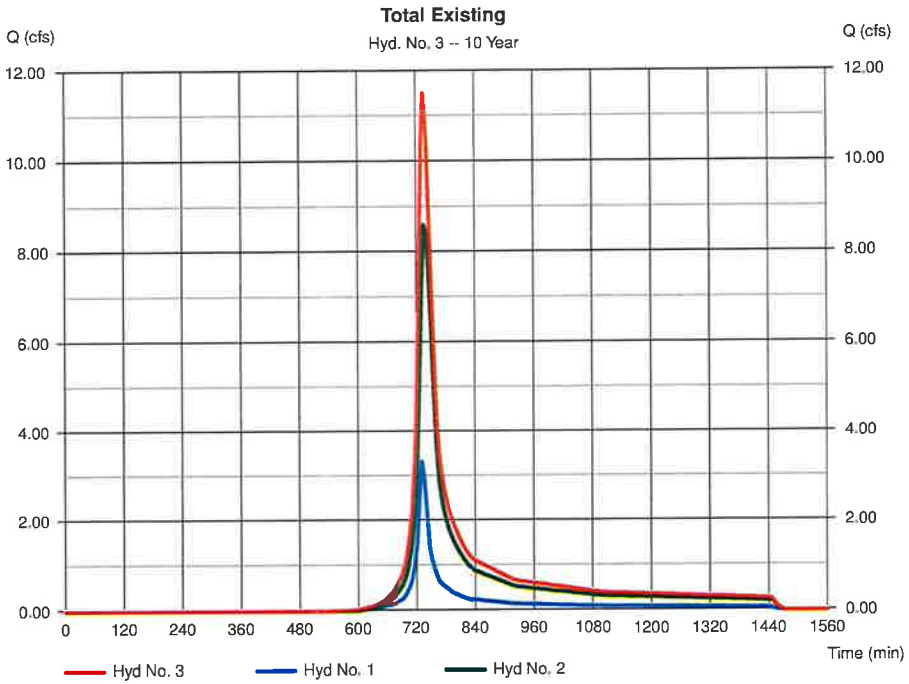


Hydrograph Report

Hyd. No. 3

Total Existing

Hydrograph type	= Combine	Peak discharge	= 11.53 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 52,171 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 6.900 ac

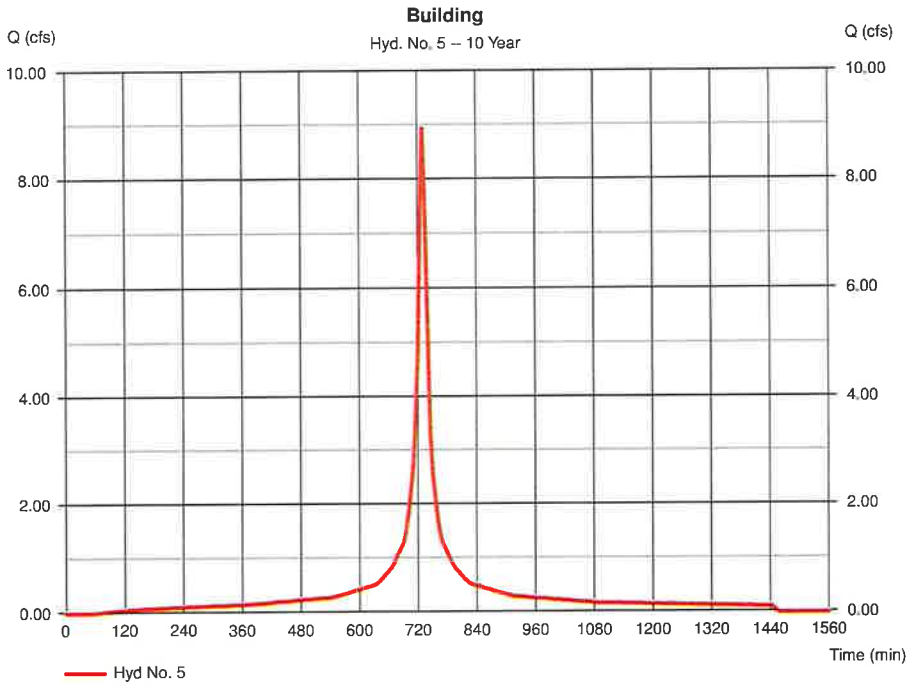


Hydrograph Report

Hyd. No. 5

Building

Hydrograph type	= SCS Runoff	Peak discharge	= 8.950 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 37,360 cuft
Drainage area	= 2.300 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

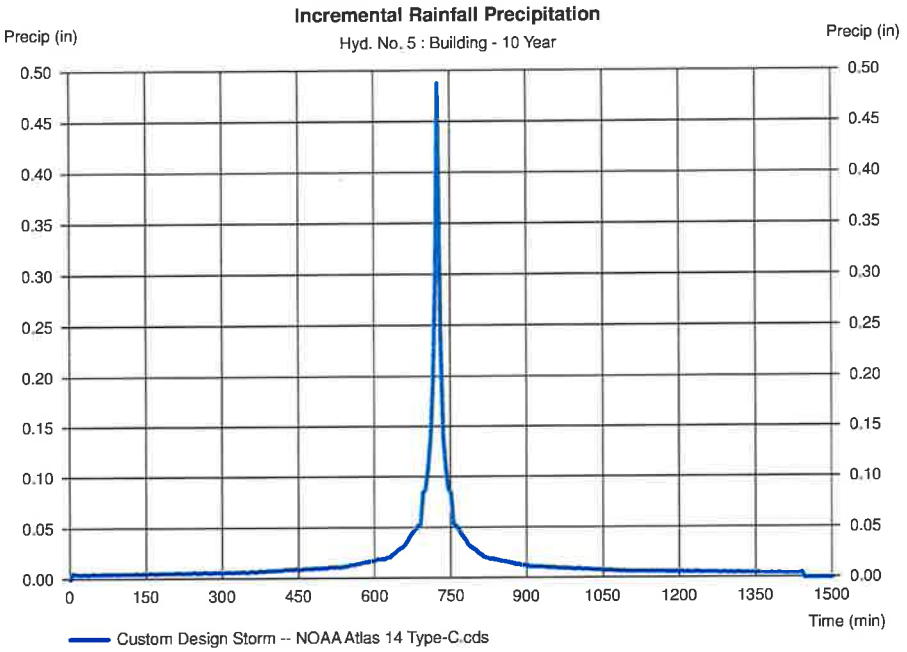


Precipitation Report

Hyd. No. 5

Building

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

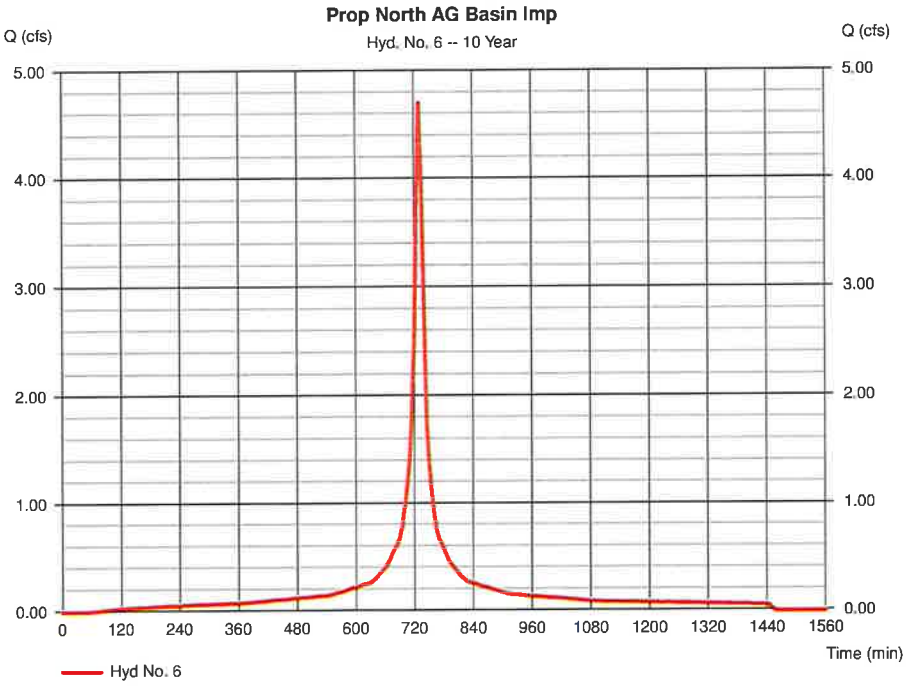


Hydrograph Report

Hyd. No. 6

Prop North AG Basin Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 4.709 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 19,655 cuft
Drainage area	= 1.210 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

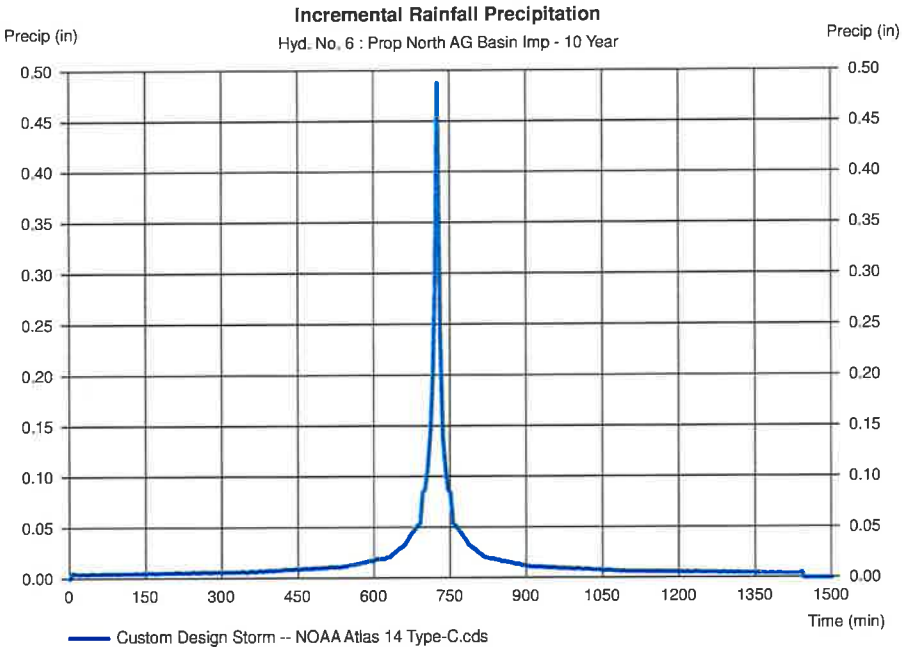


Precipitation Report

Hyd. No. 6

Prop North AG Basin Imp

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

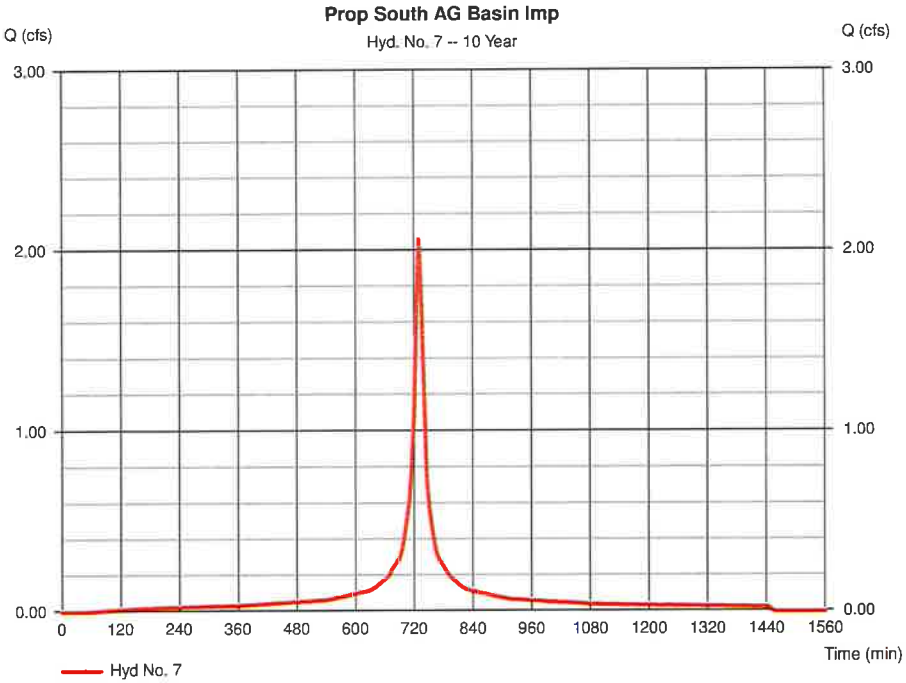


Hydrograph Report

Hyd. No. 7

Prop South AG Basin Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 2.063 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 8,609 cuft
Drainage area	= 0.530 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

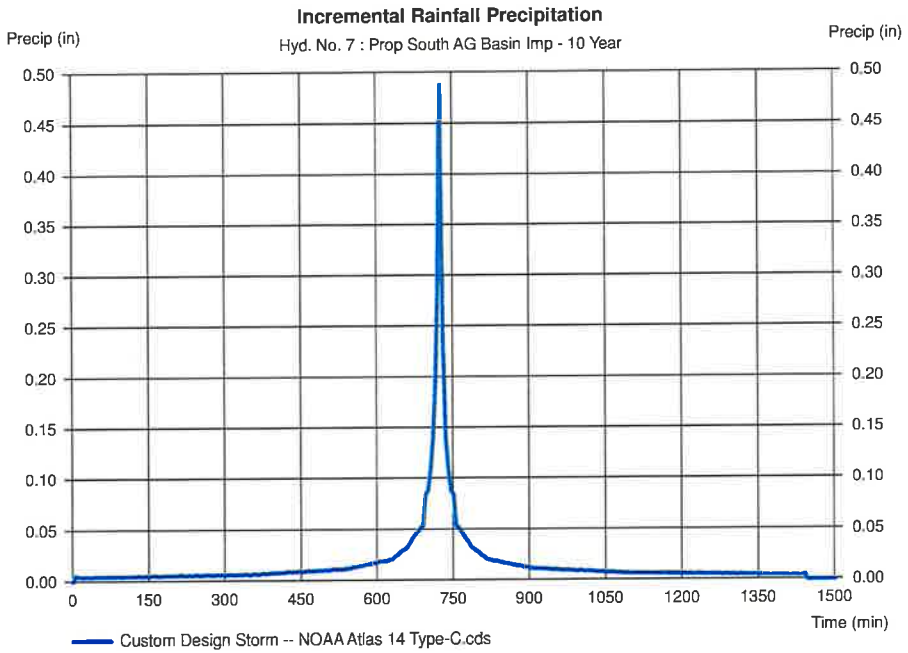


Precipitation Report

Hyd. No. 7

Prop South AG Basin Imp

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

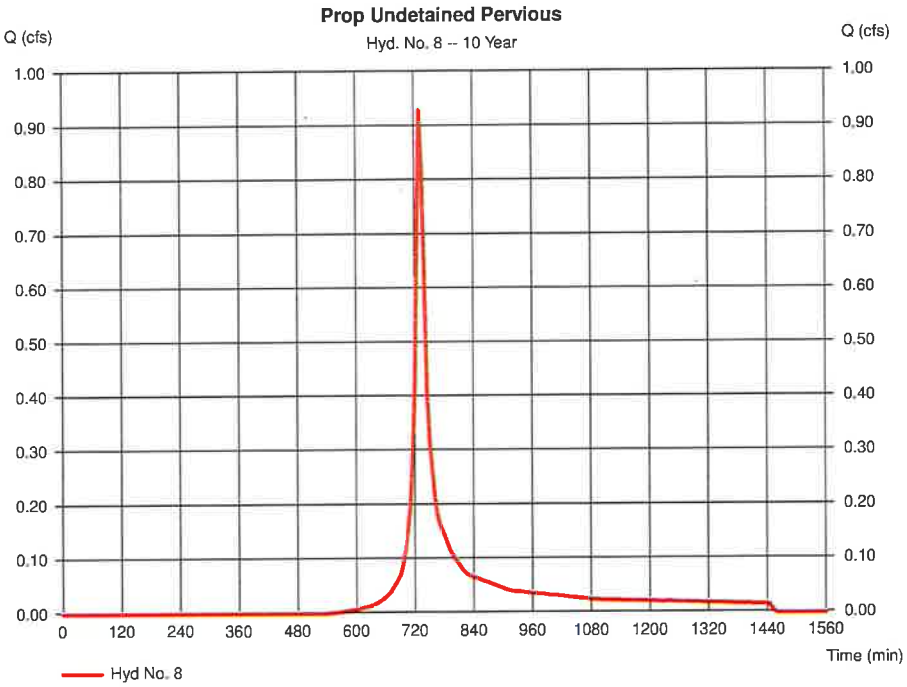


Hydrograph Report

Hyd. No. 8

Prop Undetained Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.930 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 3,391 cuft
Drainage area	= 0.420 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

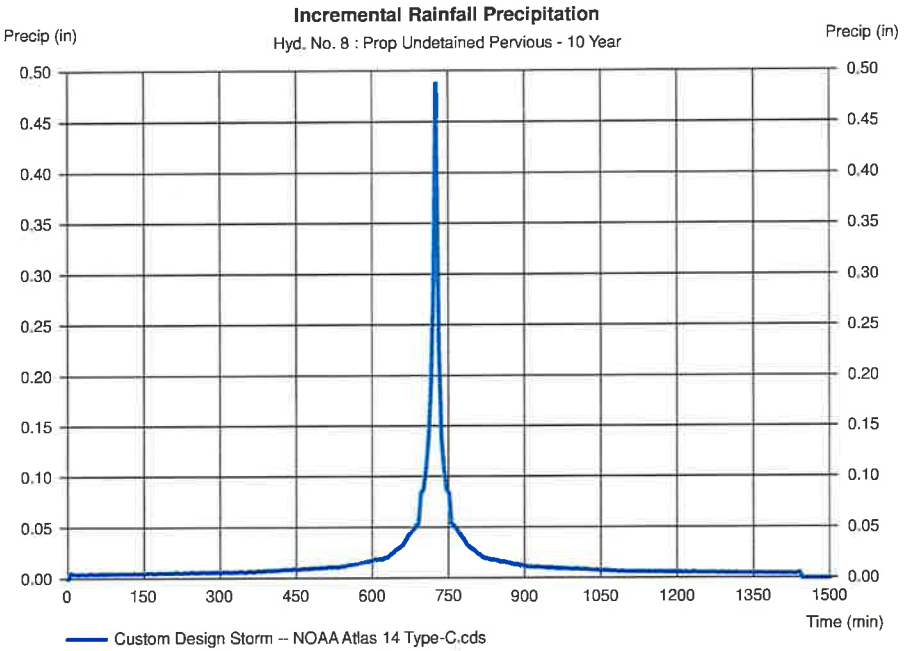


Precipitation Report

Hyd. No. 8

Prop Undetained Pervious

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

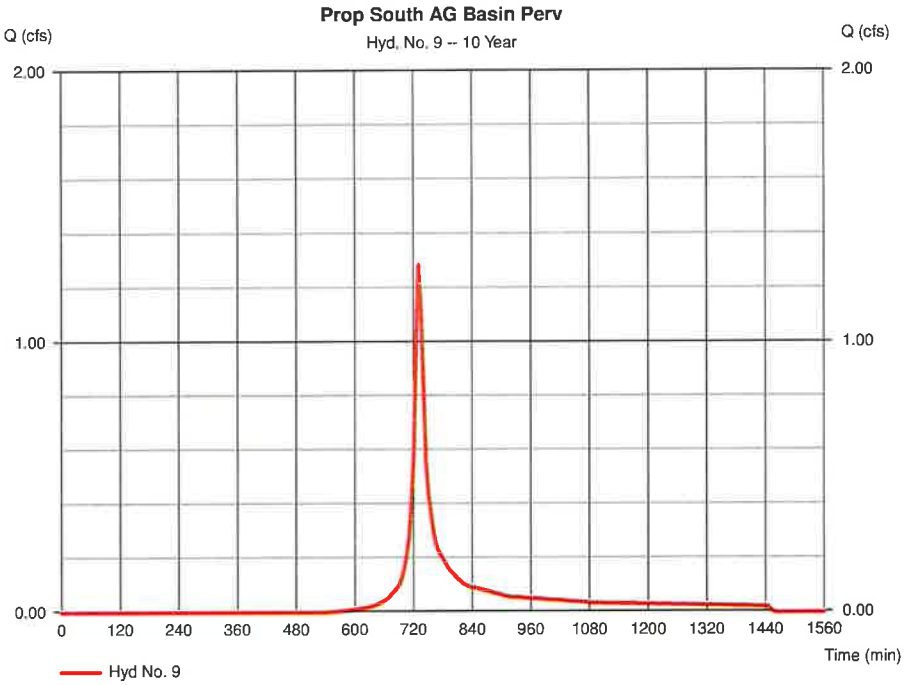


Hydrograph Report

Hyd. No. 9

Prop South AG Basin Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 1.284 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 4,682 cuft
Drainage area	= 0.580 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

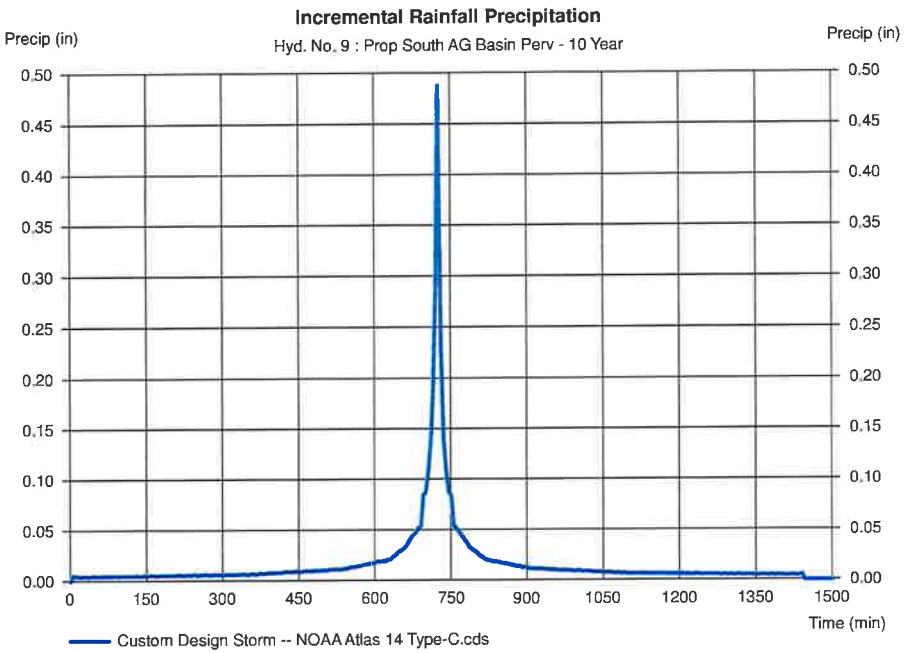


Precipitation Report

Hyd. No. 9

Prop South AG Basin Perv

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

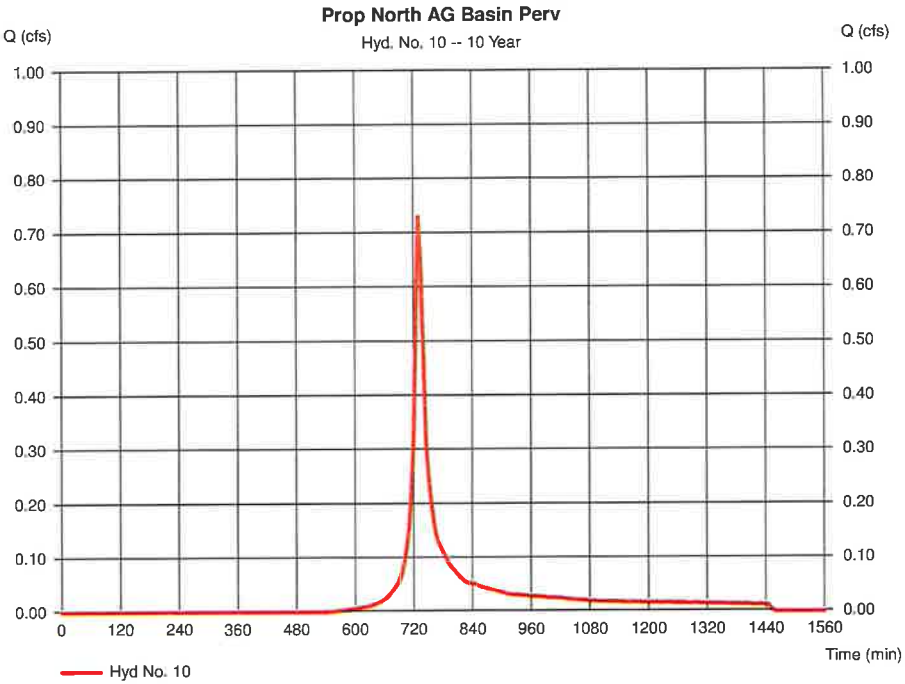


Hydrograph Report

Hyd. No. 10

Prop North AG Basin Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.731 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,664 cuft
Drainage area	= 0.330 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

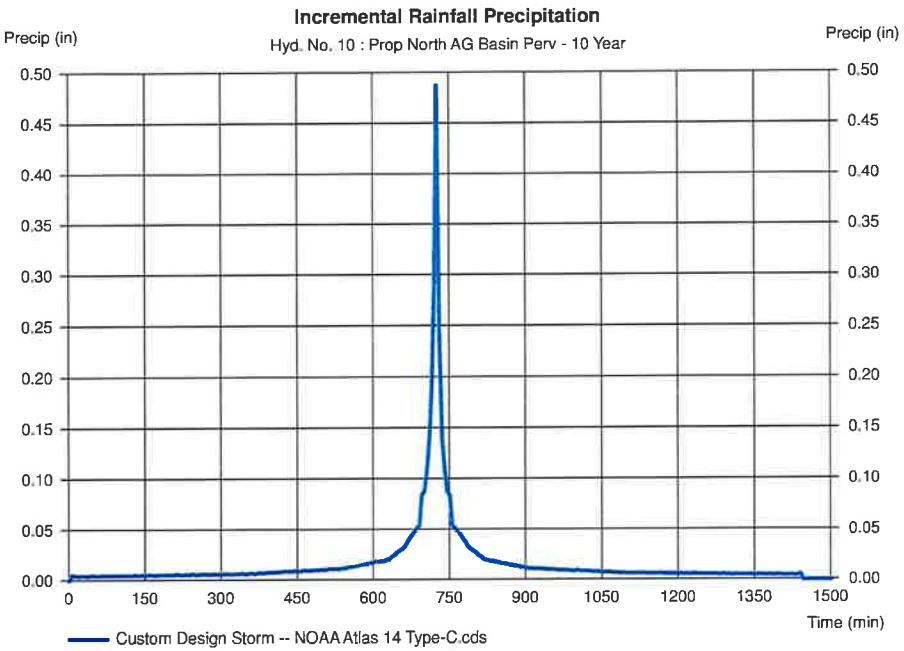


Precipitation Report

Hyd. No. 10

Prop North AG Basin Perv

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

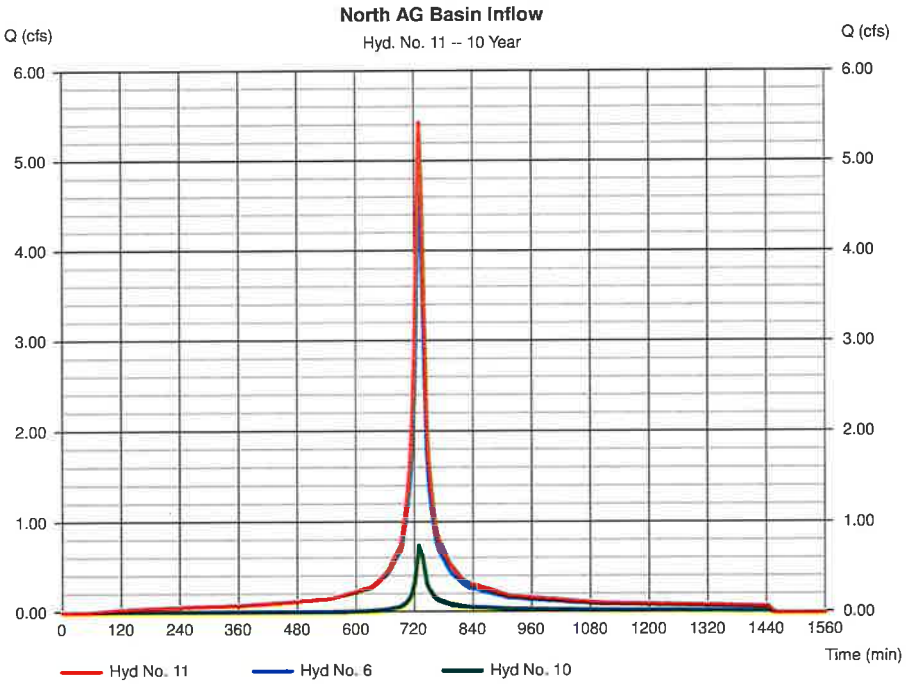


Hydrograph Report

Hyd. No. 11

North AG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 5.439 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 22,319 cuft
Inflow hyds.	= 6, 10	Contrib. drain. area	= 1.540 ac



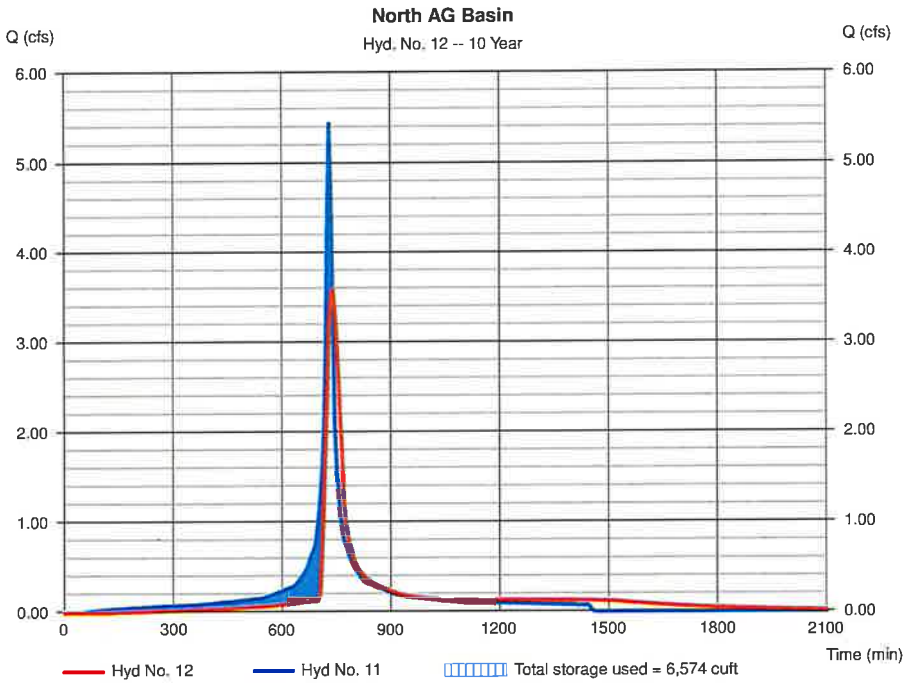
Hydrograph Report

Hyd. No. 12

North AG Basin

Hydrograph type	= Reservoir	Peak discharge	= 3.606 cfs
Storm frequency	= 10 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 22,300 cuft
Inflow hyd. No.	= 11 - North AG Basin Inflow	Max. Elevation	= 59.31 ft
Reservoir name	= North AG Basin	Max. Storage	= 6,574 cuft

Storage Indication method used. Outflow includes exfiltration.

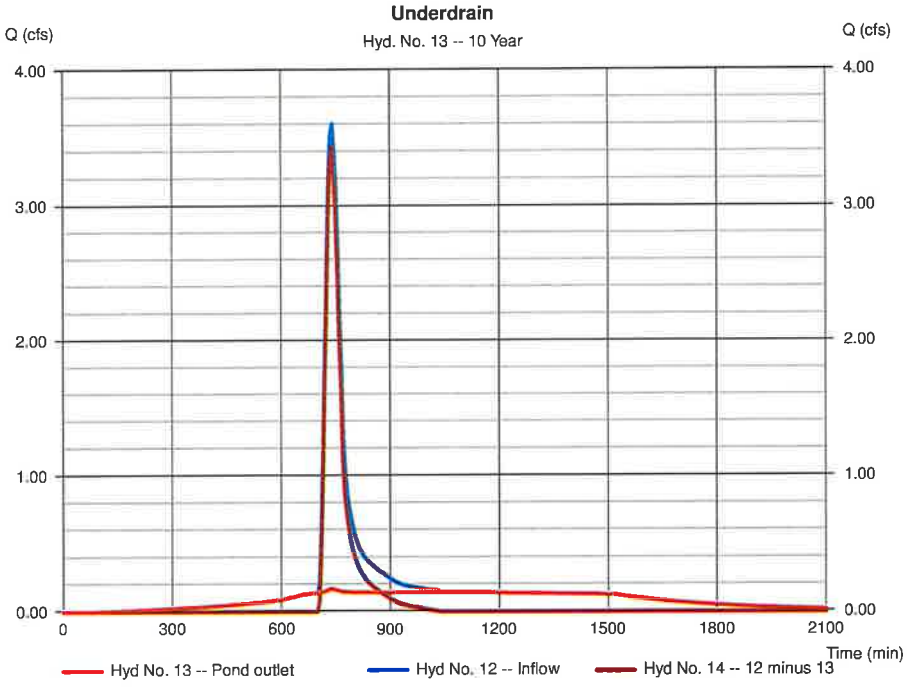


Hydrograph Report

Hyd. No. 13

Underdrain

Hydrograph type	= Diversion1	Peak discharge	= 0.171 cfs
Storm frequency	= 10 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 11,018 cuft
Inflow hydrograph	= 12 - North AG Basin	2nd diverted hyd.	= 14
Diversion method	= Pond - North AG Basin	Pond structure	= Exfiltration

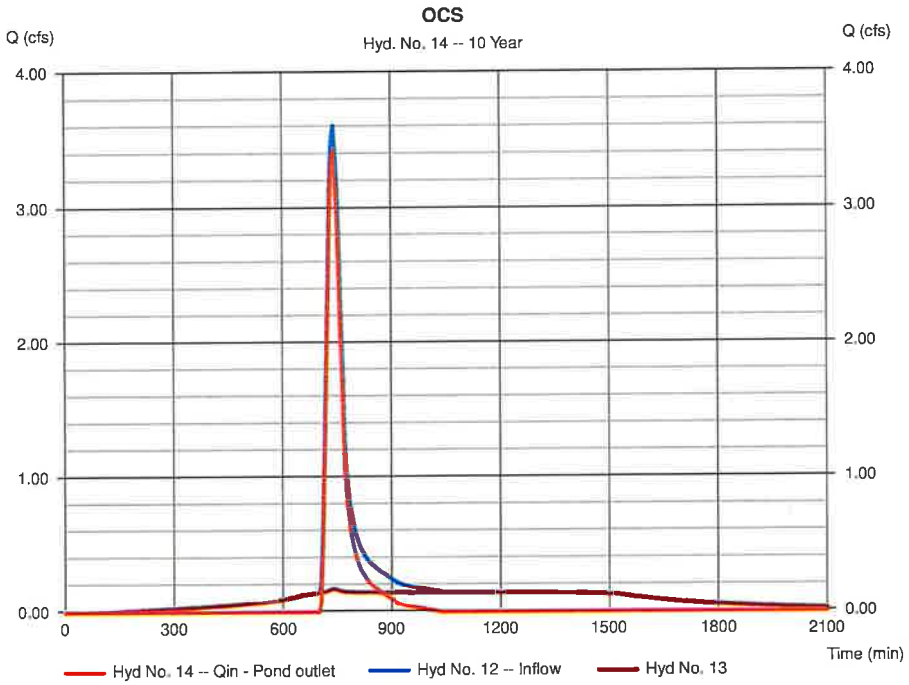


Hydrograph Report

Hyd. No. 14

OCS

Hydrograph type	= Diversion2	Peak discharge	= 3.435 cfs
Storm frequency	= 10 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 11,282 cuft
Inflow hydrograph	= 12 - North AG Basin	2nd diverted hyd.	= 13
Diversion method	= Pond - North AG Basin	Pond structure	= Exfiltration

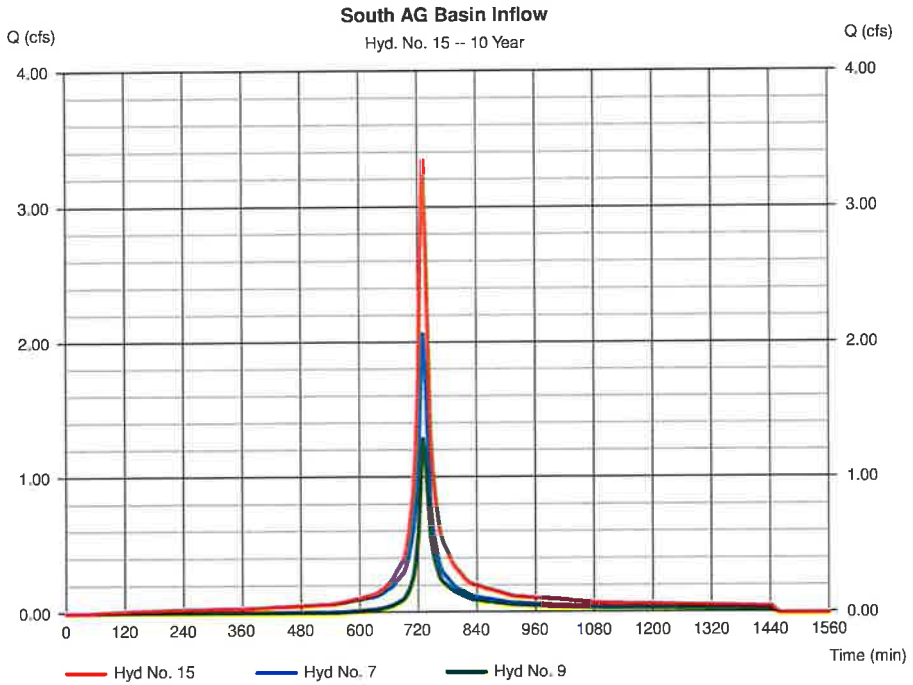


Hydrograph Report

Hyd. No. 15

South AG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 3.347 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 13,291 cuft
Inflow hyds.	= 7, 9	Contrib. drain. area	= 1.110 ac



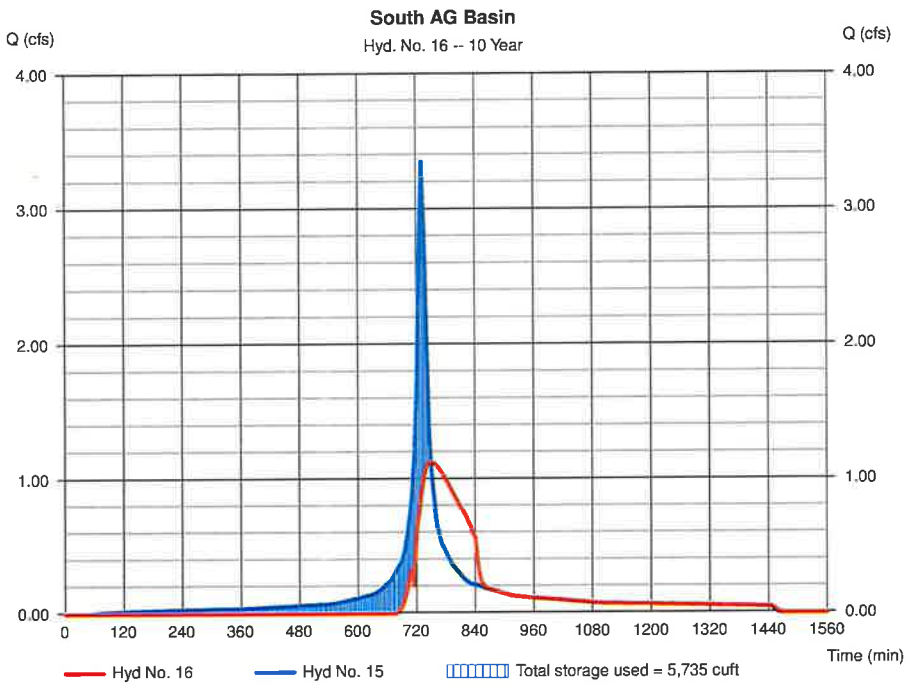
Hydrograph Report

Hyd. No. 16

South AG Basin

Hydrograph type	= Reservoir	Peak discharge	= 1.129 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 5 min	Hyd. volume	= 10,304 cuft
Inflow hyd. No.	= 15 - South AG Basin Inflow	Max. Elevation	= 64.08 ft
Reservoir name	= South AG Basin	Max. Storage	= 5,735 cuft

Storage Indication method used.

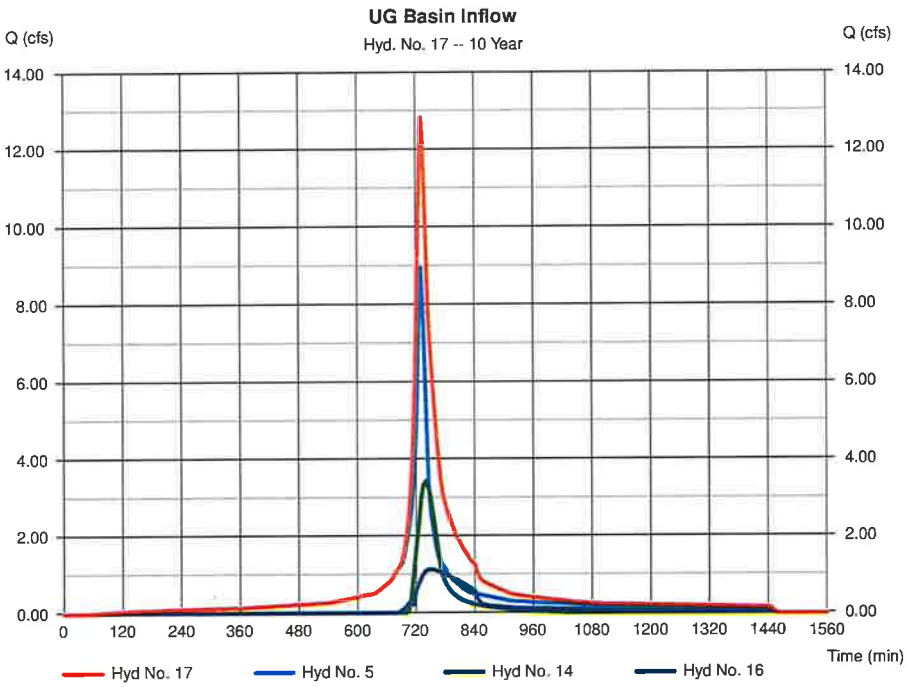


Hydrograph Report

Hyd. No. 17

UG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 12.85 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 58,946 cuft
Inflow hyds.	= 5, 14, 16	Contrib. drain. area	= 2.300 ac



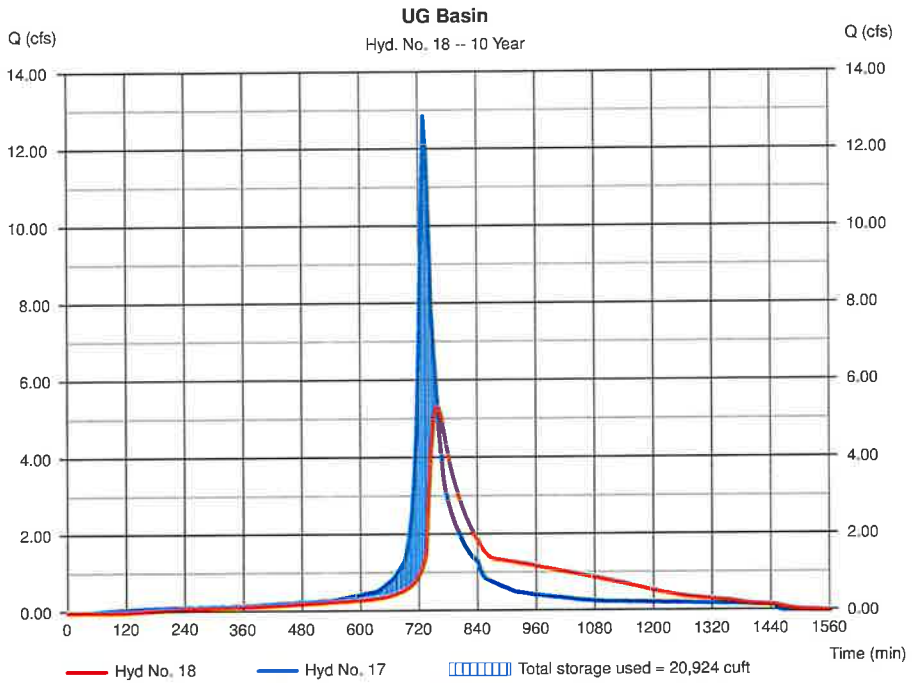
Hydrograph Report

Hyd. No. 18

UG Basin

Hydrograph type	= Reservoir	Peak discharge	= 5.308 cfs
Storm frequency	= 10 yrs	Time to peak	= 760 min
Time interval	= 5 min	Hyd. volume	= 58,926 cuft
Inflow hyd. No.	= 17 - UG Basin Inflow	Max. Elevation	= 58.90 ft
Reservoir name	= UG Basin	Max. Storage	= 20,924 cuft

Storage Indication method used.

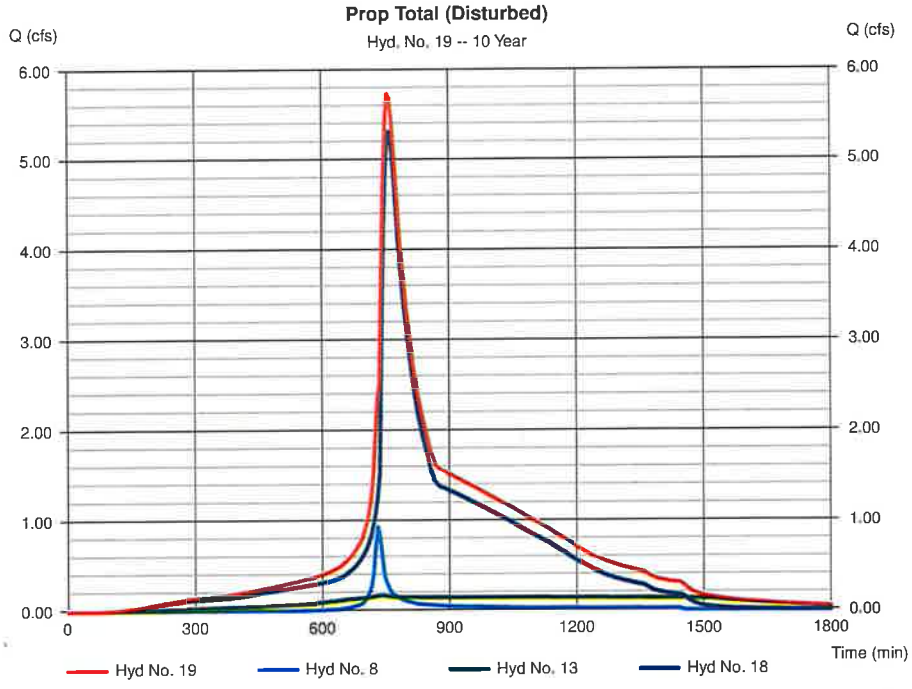


Hydrograph Report

Hyd. No. 19

Prop Total (Disturbed)

Hydrograph type	= Combine	Peak discharge	= 5.733 cfs
Storm frequency	= 10 yrs	Time to peak	= 755 min
Time interval	= 5 min	Hyd. volume	= 73,334 cuft
Inflow hyds.	= 8, 13, 18	Contrib. drain. area	= 0.420 ac



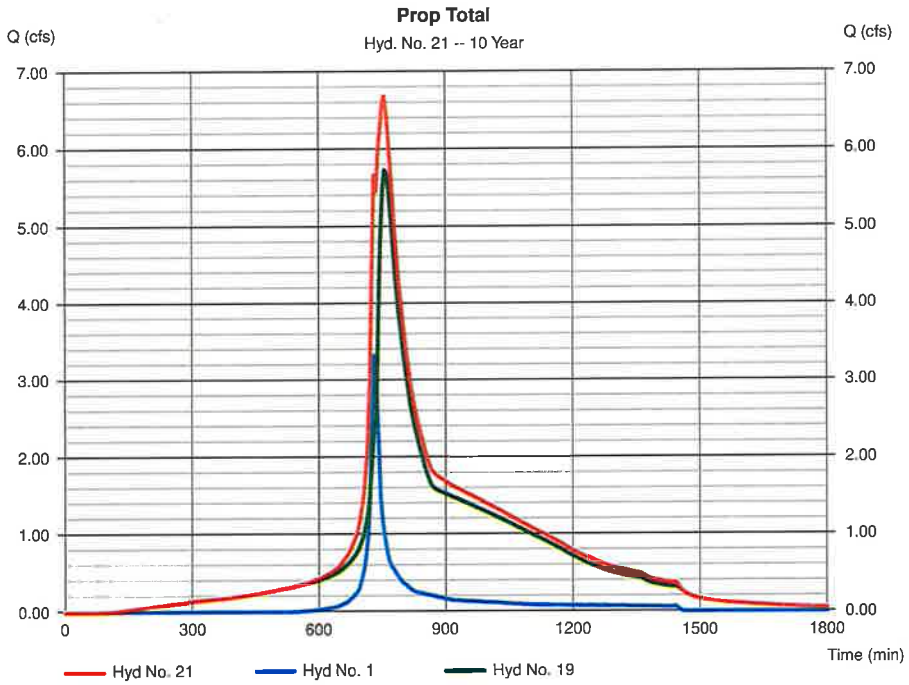
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1 — Tuesday, Jan 19, 2021

Hyd. No. 21

Prop Total

Hydrograph type	= Combine	Peak discharge	= 6.694 cfs
Storm frequency	= 10 yrs	Time to peak	= 755 min
Time interval	= 5 min	Hyd. volume	= 85,444 cuft
Inflow hyds.	= 1, 19	Contrib. drain. area	= 1.500 ac



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

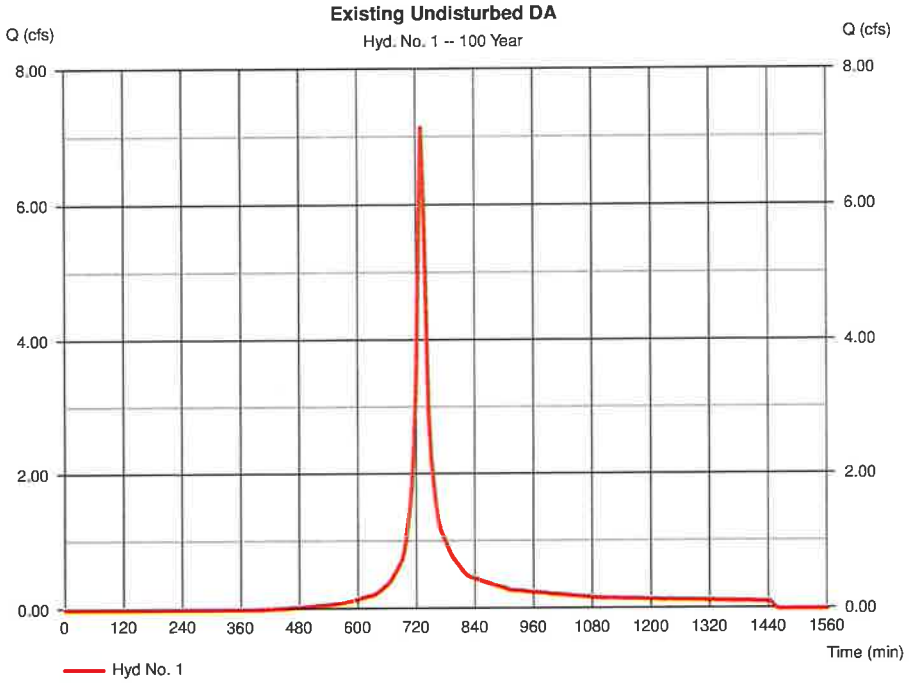
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	7.149	5	730	26,105	----	------	------	Existing Undisturbed DA
2	SCS Runoff	19.99	5	735	91,057	----	------	------	Existing Disturbed DA
3	Combine	26.18	5	735	117,162	1, 2	------	------	Total Existing
5	SCS Runoff	14.72	5	730	62,383	----	------	------	Building
6	SCS Runoff	7.744	5	730	32,819	----	------	------	Prop North AG Basin Imp
7	SCS Runoff	3.392	5	730	14,375	----	------	------	Prop South AG Basin Imp
8	SCS Runoff	2.002	5	730	7,309	----	------	------	Prop Undetained Pervious
9	SCS Runoff	2.764	5	730	10,094	----	------	------	Prop South AG Basin Perv
10	SCS Runoff	1.573	5	730	5,743	----	------	------	Prop North AG Basin Perv
11	Combine	9.317	5	730	38,562	6, 10	------	------	North AG Basin Inflow
12	Reservoir	6.411	5	740	38,543	11	59.89	8,752	North AG Basin
13	Diversion1	0.192	5	740	13,301	12	------	------	Underdrain
14	Diversion2	6.219	5	740	25,242	12	------	------	OCS
15	Combine	6.156	5	730	24,469	7, 9,	------	------	South AG Basin Inflow
16	Reservoir	6.189	5	735	21,481	15	64.50	6,828	South AG Basin
17	Combine	24.66	5	735	109,107	5, 14, 16	------	------	UG Basin Inflow
18	Reservoir	13.79	5	745	109,086	17	59.90	32,709	UG Basin
19	Combine	14.80	5	745	129,697	8, 13, 18	------	------	Prop Total (Disturbed)
21	Combine	19.48	5	735	155,801	1, 19,	------	------	Prop Total

Hydrograph Report

Hyd. No. 1

Existing Undisturbed DA

Hydrograph type	= SCS Runoff	Peak discharge	= 7.149 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 26,105 cuft
Drainage area	= 1.500 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

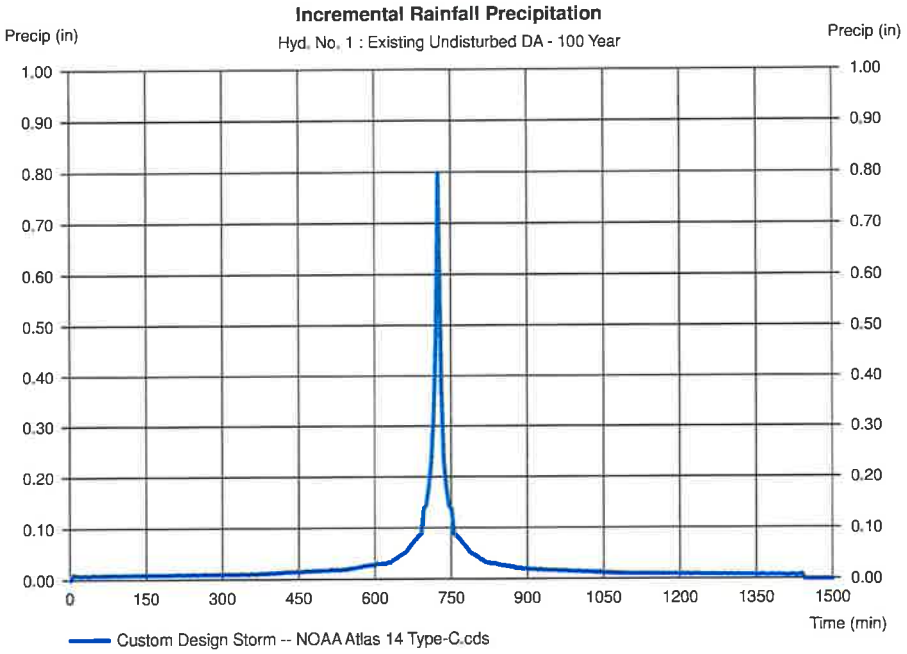


Precipitation Report

Hyd. No. 1

Existing Undisturbed DA

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

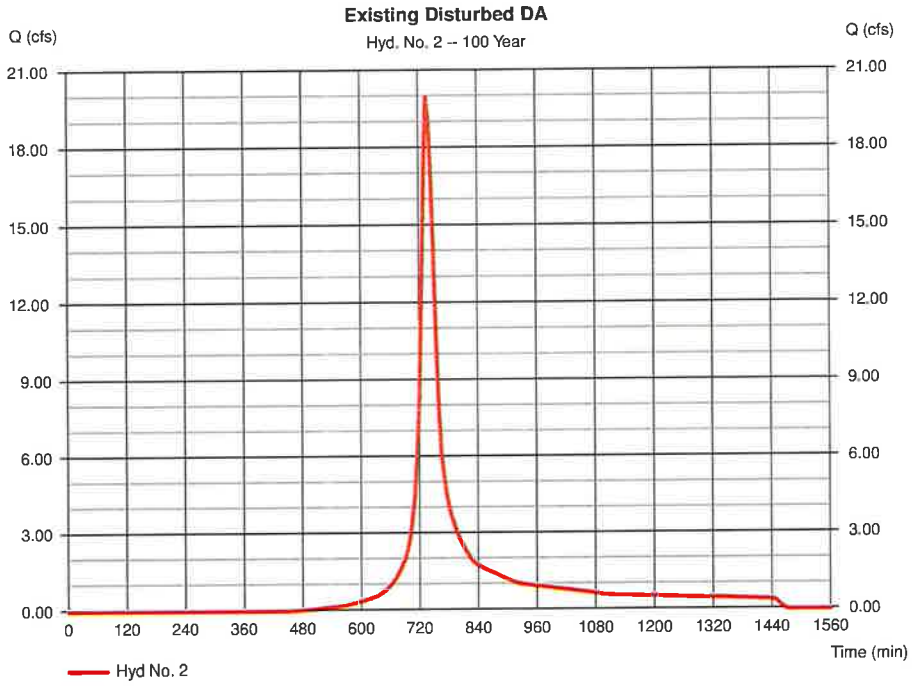


Hydrograph Report

Hyd. No. 2

Existing Disturbed DA

Hydrograph type	= SCS Runoff	Peak discharge	= 19.99 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 91,057 cuft
Drainage area	= 5.400 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 20.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

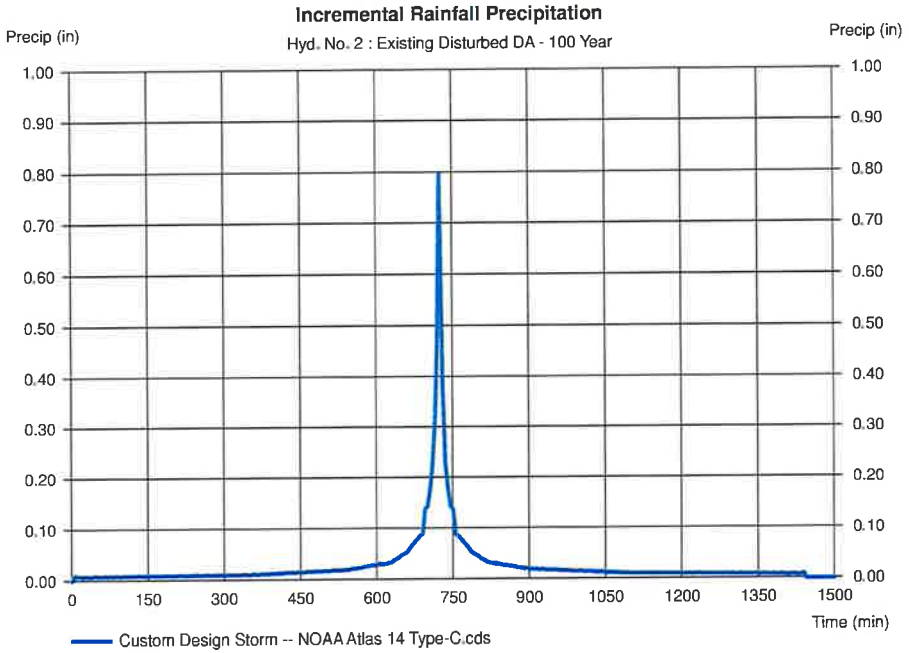


Precipitation Report

Hyd. No. 2

Existing Disturbed DA

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

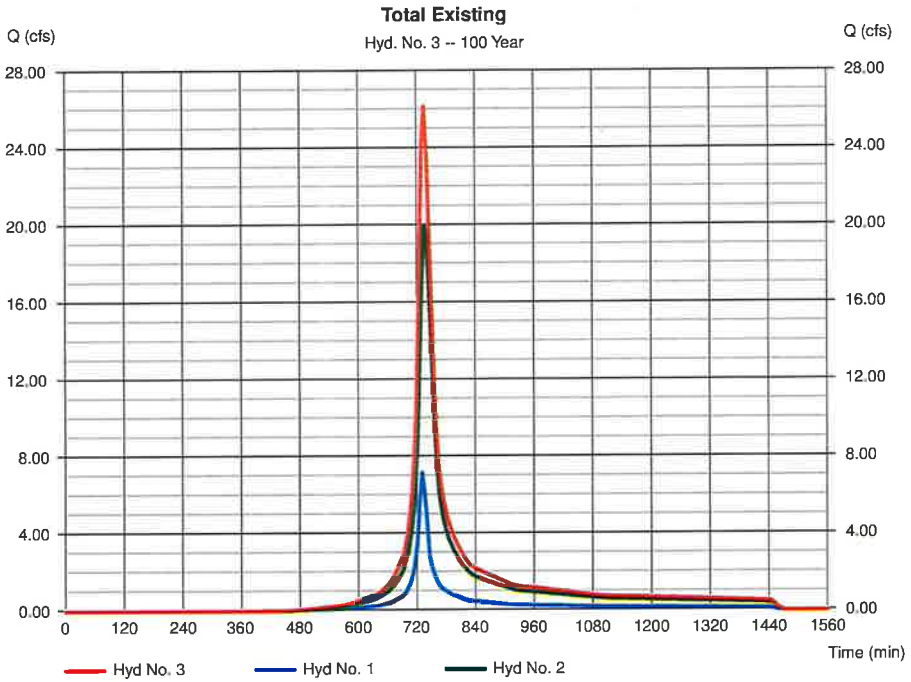


Hydrograph Report

Hyd. No. 3

Total Existing

Hydrograph type	= Combine	Peak discharge	= 26.18 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 117,162 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 6.900 ac

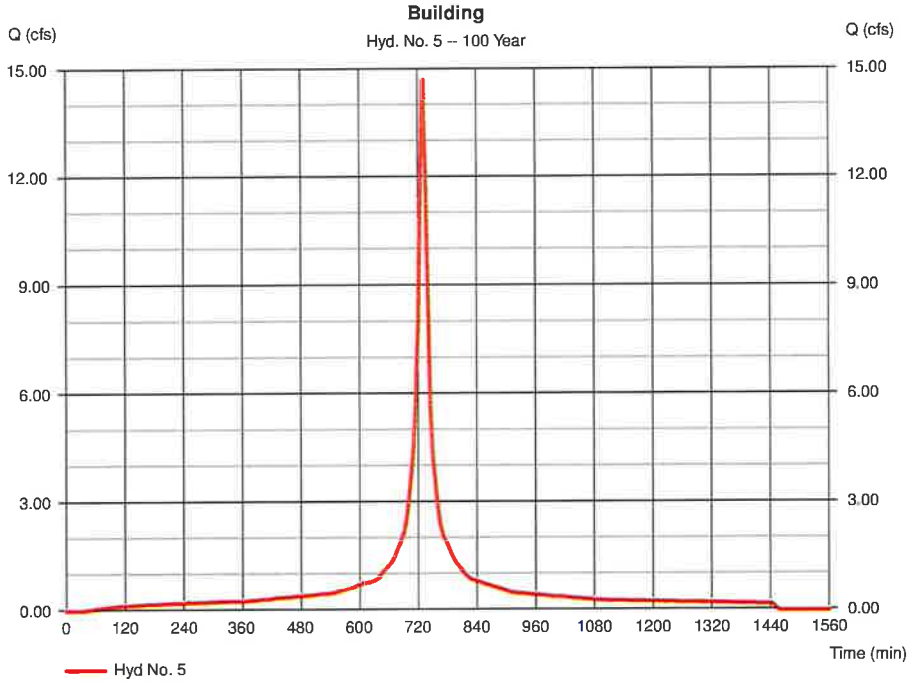


Hydrograph Report

Hyd. No. 5

Building

Hydrograph type	= SCS Runoff	Peak discharge	= 14.72 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 62,383 cuft
Drainage area	= 2.300 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

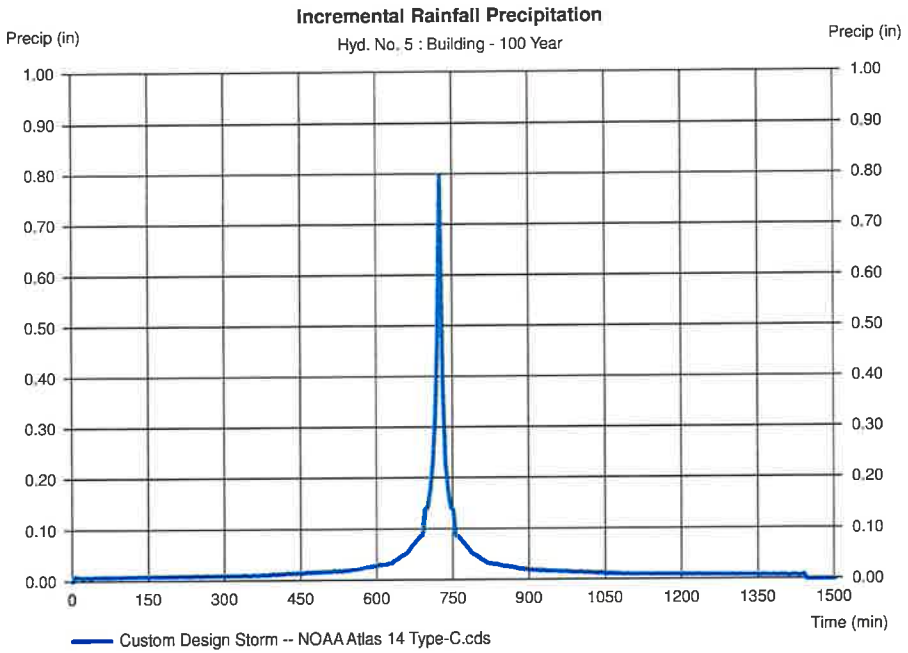


Precipitation Report

Hyd. No. 5

Building

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

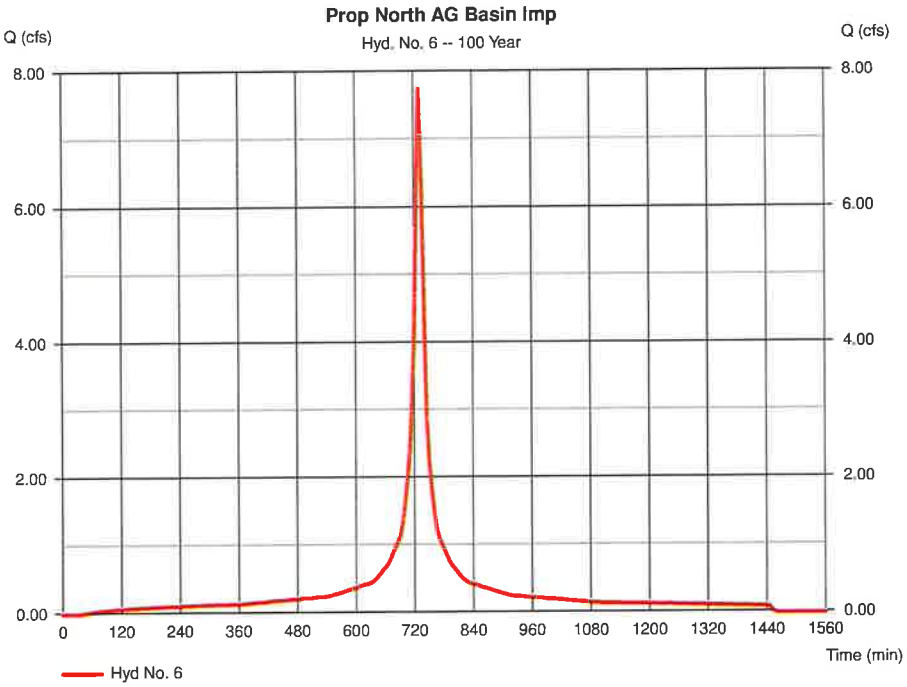


Hydrograph Report

Hyd. No. 6

Prop North AG Basin Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 7.744 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 32,819 cuft
Drainage area	= 1.210 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

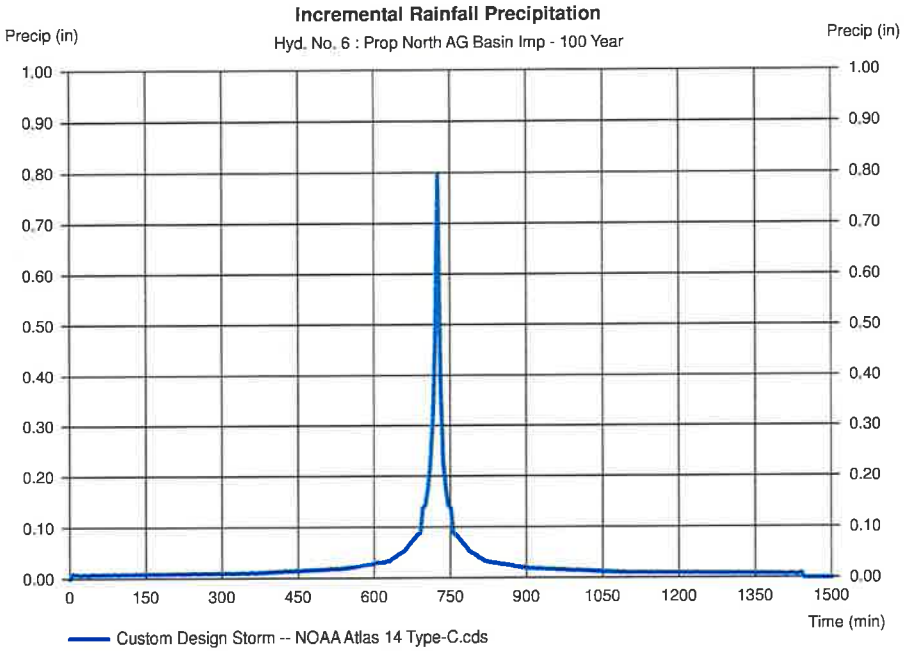


Precipitation Report

Hyd. No. 6

Prop North AG Basin Imp

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

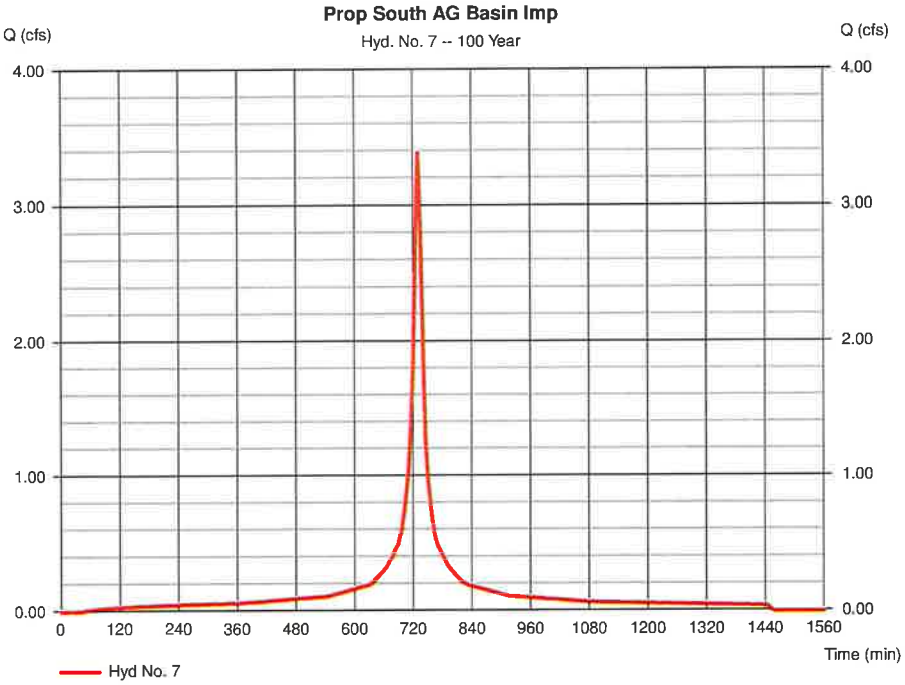


Hydrograph Report

Hyd. No. 7

Prop South AG Basin Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 3.392 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 14,375 cuft
Drainage area	= 0.530 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

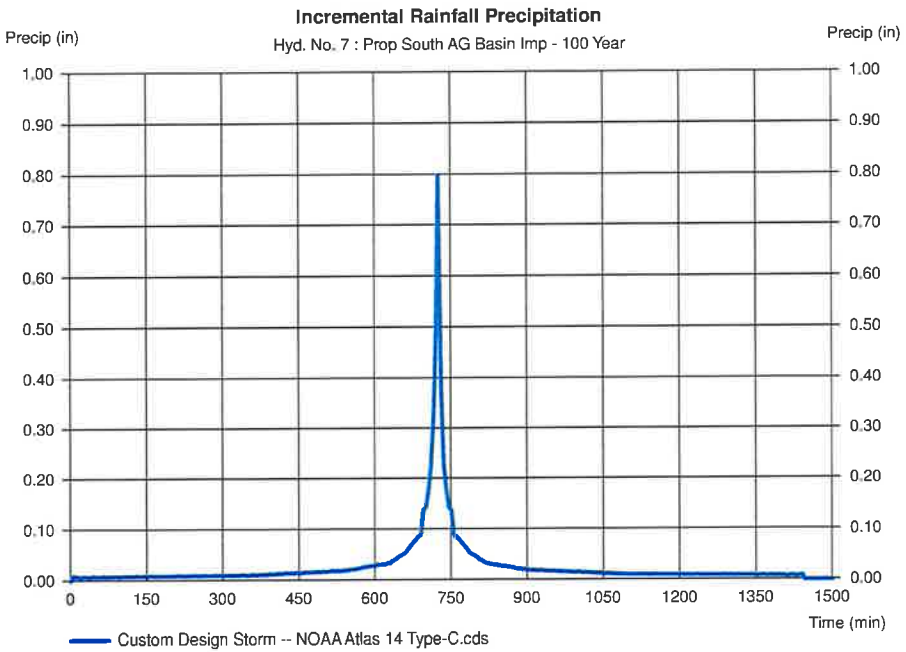


Precipitation Report

Hyd. No. 7

Prop South AG Basin Imp

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

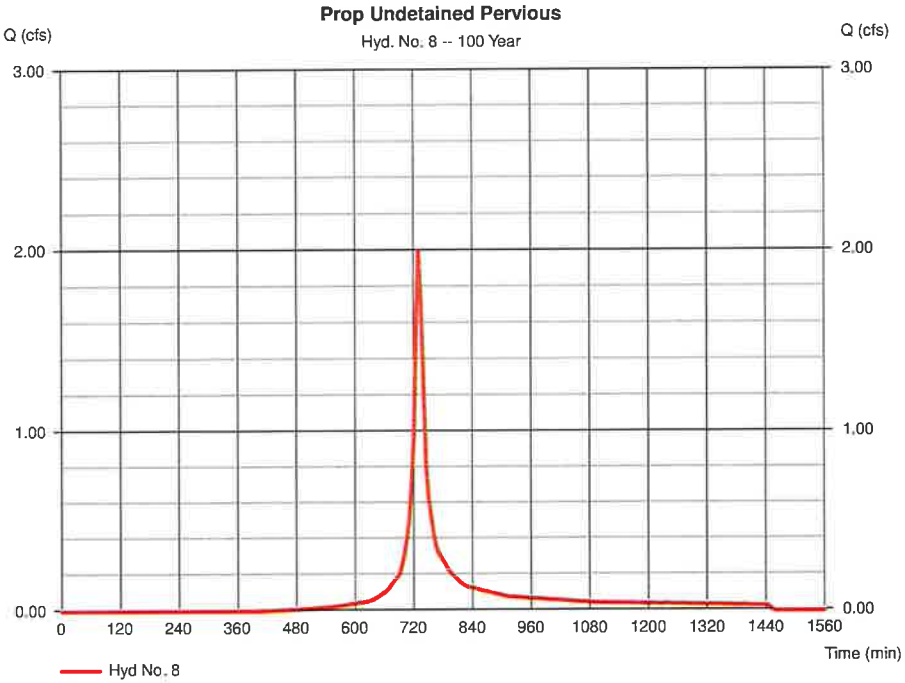


Hydrograph Report

Hyd. No. 8

Prop Undetained Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 2.002 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 7,309 cuft
Drainage area	= 0.420 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

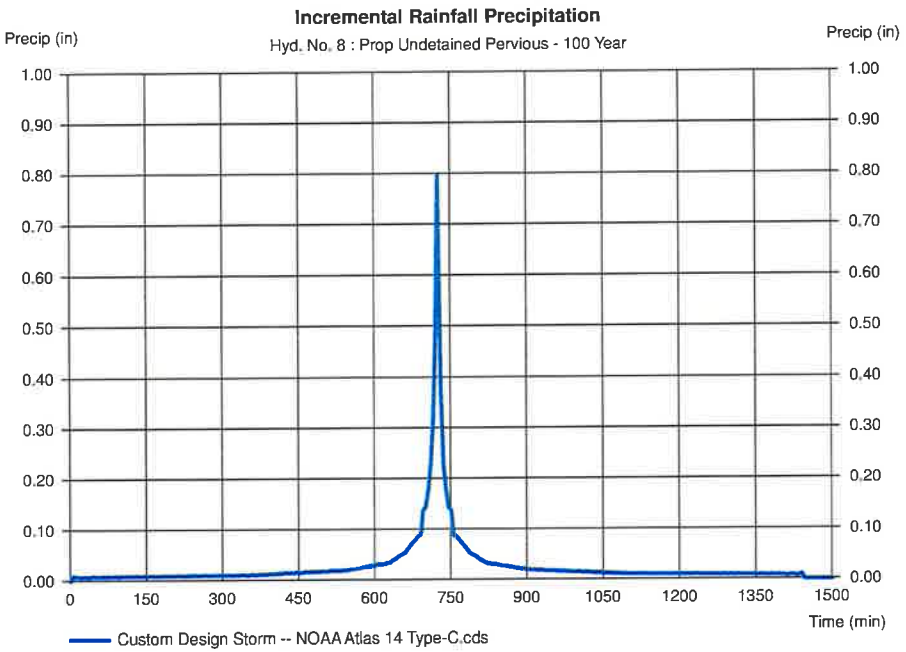


Precipitation Report

Hyd. No. 8

Prop Undetained Pervious

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

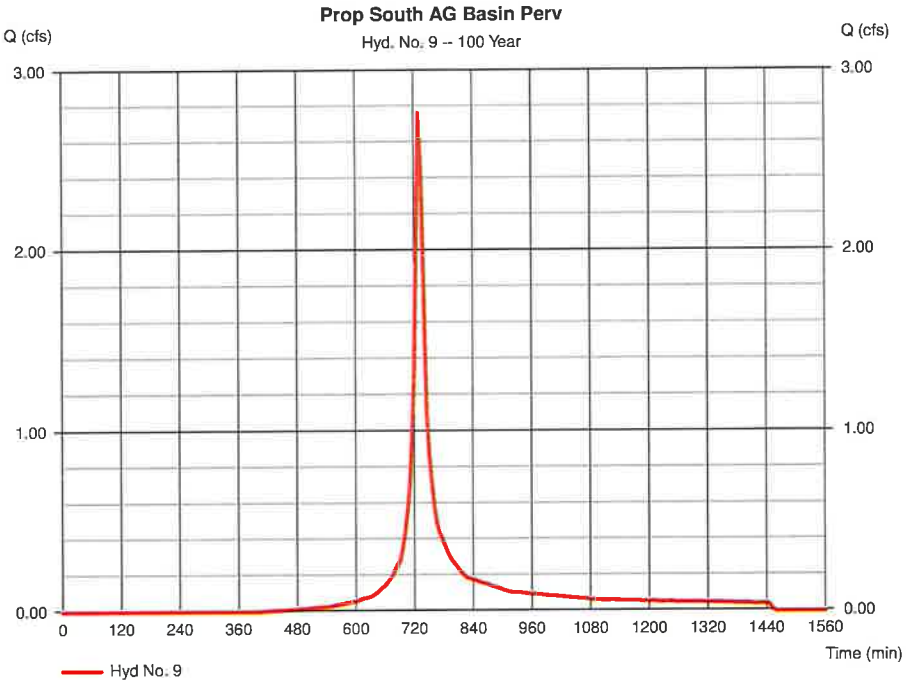


Hydrograph Report

Hyd. No. 9

Prop South AG Basin Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 2.764 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 10,094 cuft
Drainage area	= 0.580 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

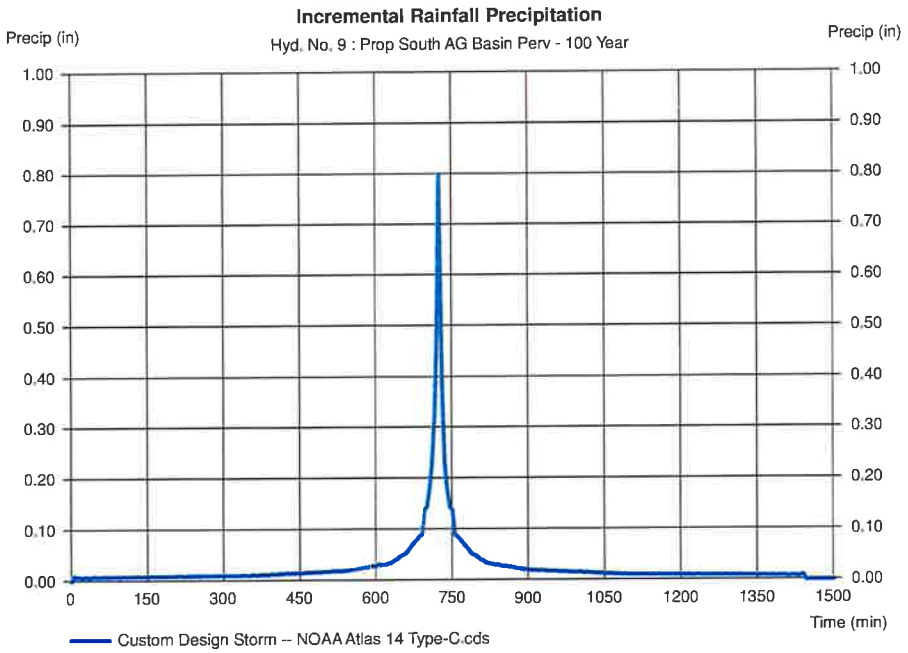


Precipitation Report

Hyd. No. 9

Prop South AG Basin Perv

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

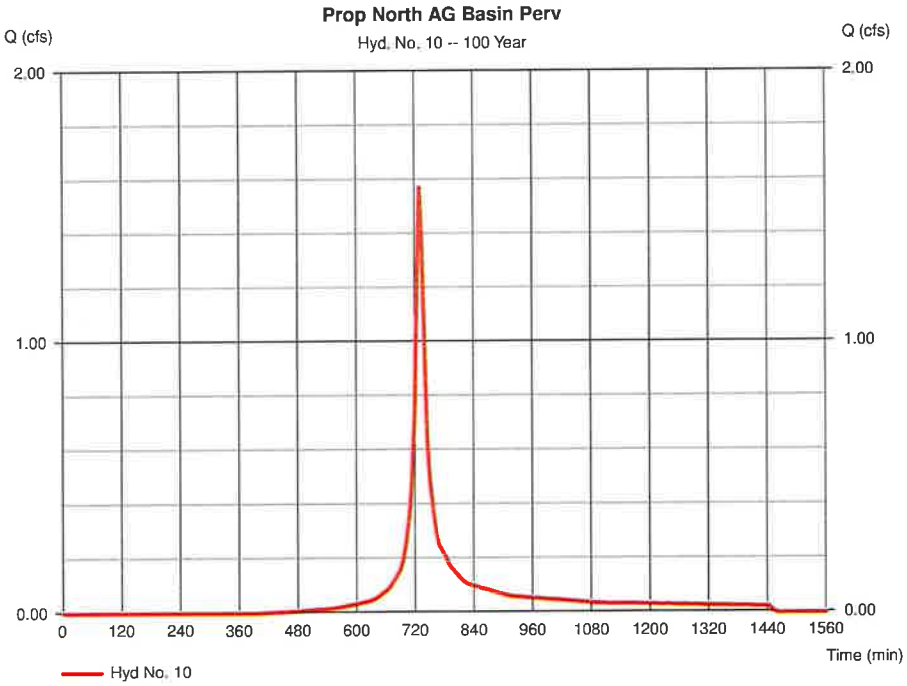


Hydrograph Report

Hyd. No. 10

Prop North AG Basin Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 1.573 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 5,743 cuft
Drainage area	= 0.330 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.21 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

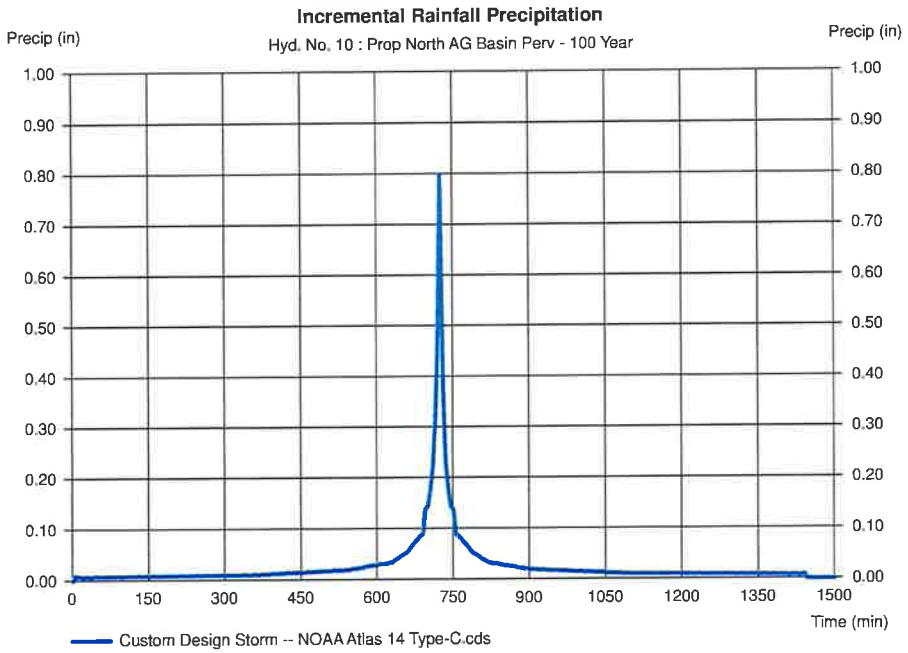


Precipitation Report

Hyd. No. 10

Prop North AG Basin Perv

Storm Frequency	= 100 yrs	Time interval	= 5 min
Total precip.	= 8.2100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

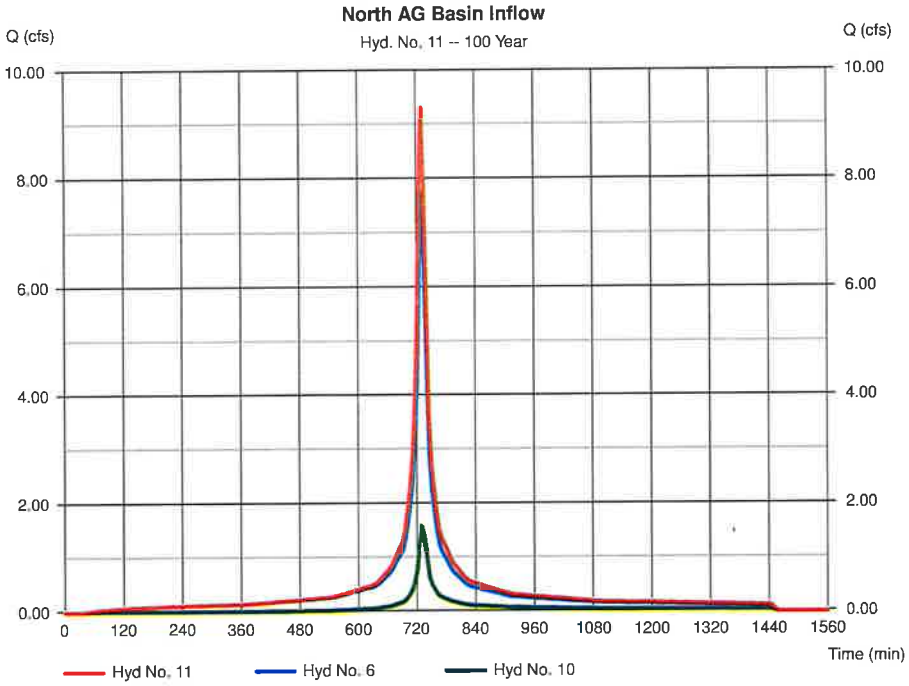


Hydrograph Report

Hyd. No. 11

North AG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 9.317 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 38,562 cuft
Inflow hyds.	= 6, 10	Contrib. drain. area	= 1.540 ac



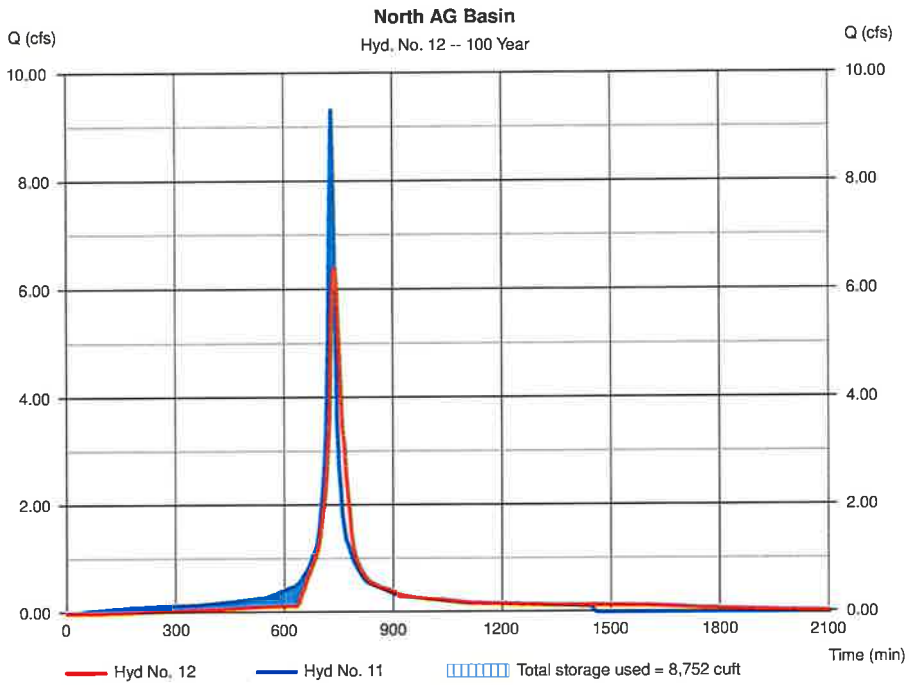
Hydrograph Report

Hyd. No. 12

North AG Basin

Hydrograph type	= Reservoir	Peak discharge	= 6.411 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 38,543 cuft
Inflow hyd. No.	= 11 - North AG Basin Inflow	Max. Elevation	= 59.89 ft
Reservoir name	= North AG Basin	Max. Storage	= 8,752 cuft

Storage Indication method used. Outflow includes exfiltration.

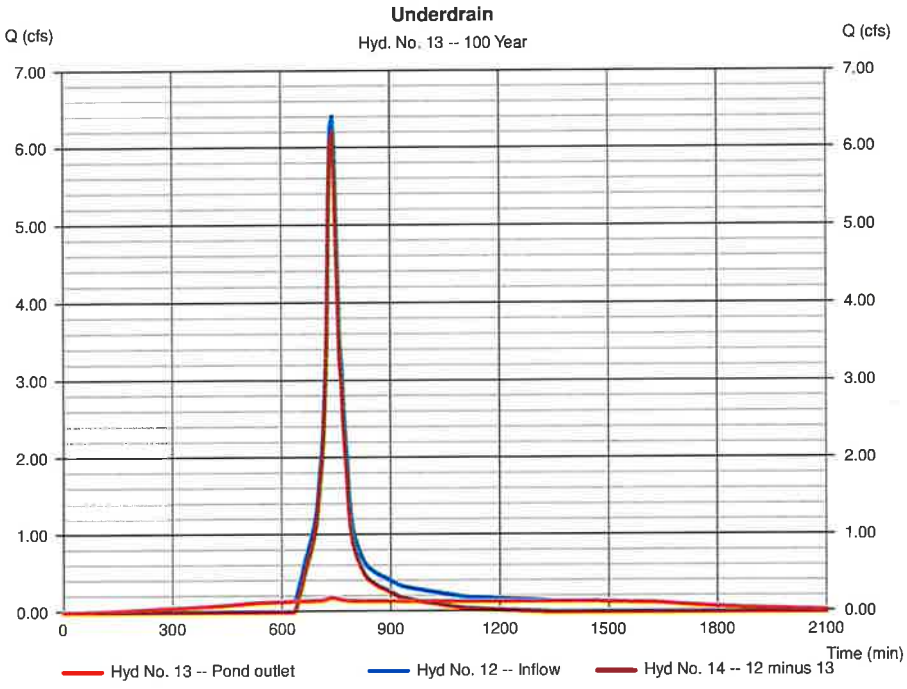


Hydrograph Report

Hyd. No. 13

Underdrain

Hydrograph type	= Diversion1	Peak discharge	= 0.192 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 13,301 cuft
Inflow hydrograph	= 12 - North AG Basin	2nd diverted hyd.	= 14
Diversion method	= Pond - North AG Basin	Pond structure	= Exfiltration

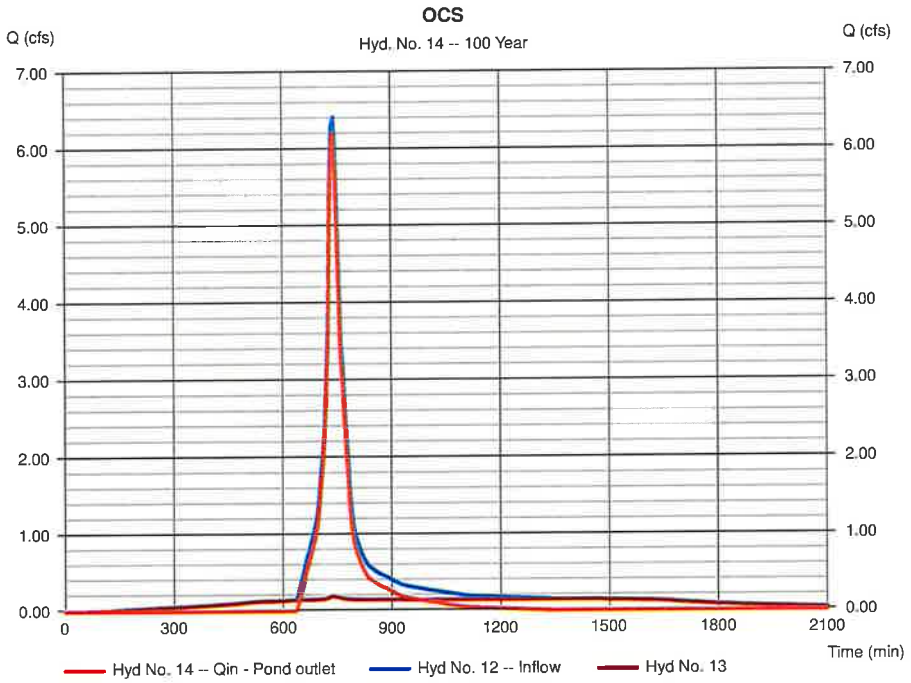


Hydrograph Report

Hyd. No. 14

OCS

Hydrograph type	= Diversion2	Peak discharge	= 6.219 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 25,242 cuft
Inflow hydrograph	= 12 - North AG Basin	2nd diverted hyd.	= 13
Diversion method	= Pond - North AG Basin	Pond structure	= Exfiltration

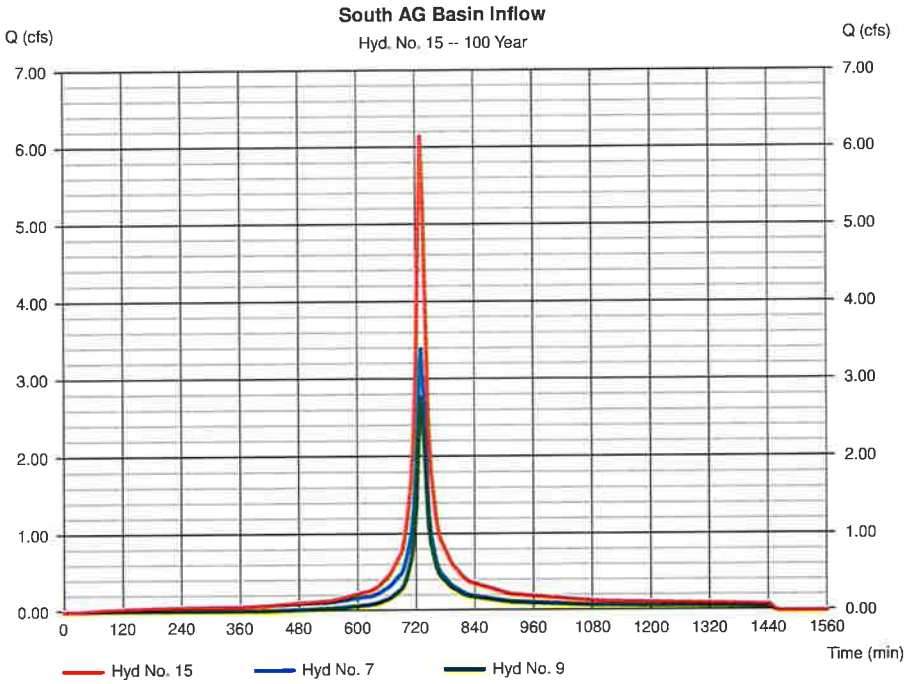


Hydrograph Report

Hyd. No. 15

South AG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 6.156 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 24,469 cuft
Inflow hyds.	= 7, 9	Contrib. drain. area	= 1.110 ac



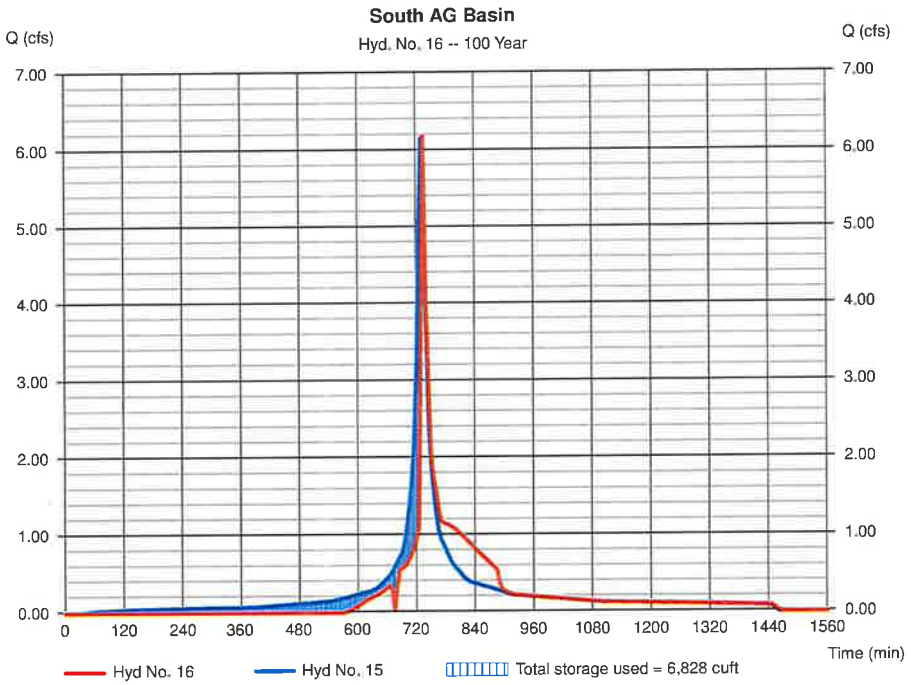
Hydrograph Report

Hyd. No. 16

South AG Basin

Hydrograph type	= Reservoir	Peak discharge	= 6.189 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 21,481 cuft
Inflow hyd. No.	= 15 - South AG Basin Inflow	Max. Elevation	= 64.50 ft
Reservoir name	= South AG Basin	Max. Storage	= 6,828 cuft

Storage Indication method used.

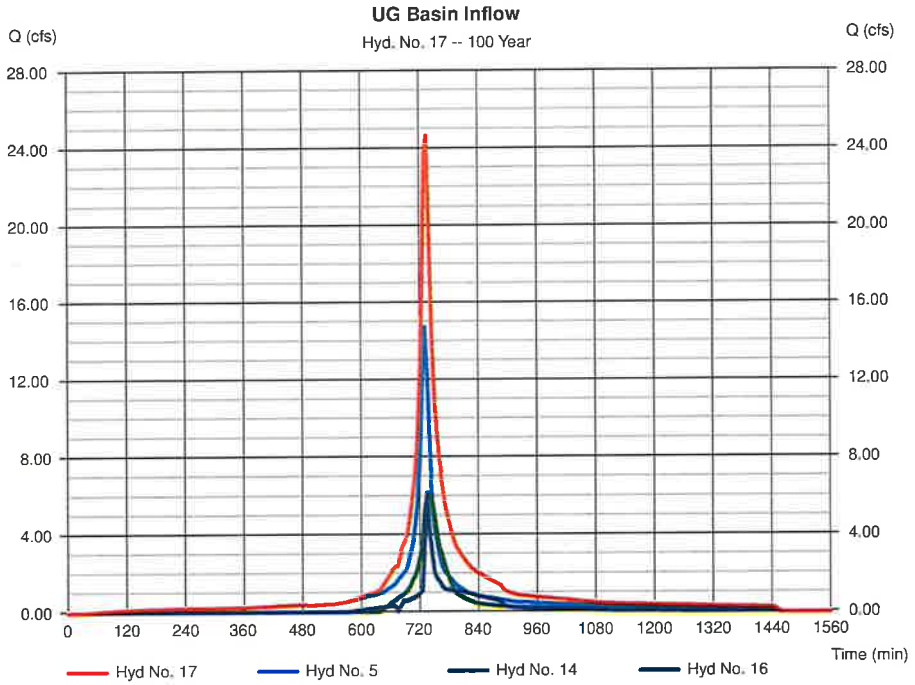


Hydrograph Report

Hyd. No. 17

UG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 24.66 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 109,107 cuft
Inflow hyds.	= 5, 14, 16	Contrib. drain. area	= 2.300 ac



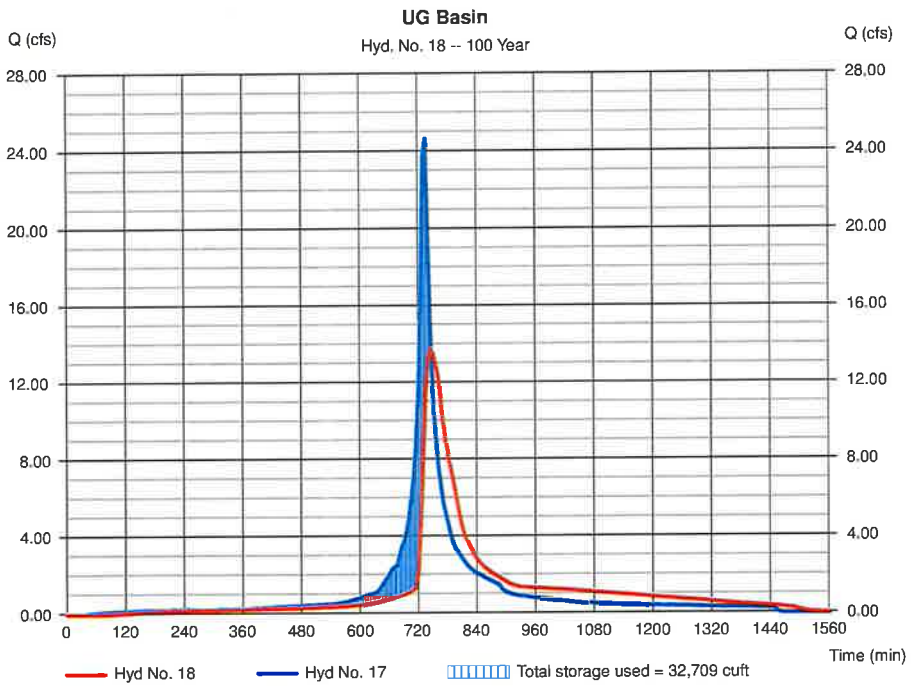
Hydrograph Report

Hyd. No. 18

UG Basin

Hydrograph type	= Reservoir	Peak discharge	= 13.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 109,086 cuft
Inflow hyd. No.	= 17 - UG Basin Inflow	Max. Elevation	= 59.90 ft
Reservoir name	= UG Basin	Max. Storage	= 32,709 cuft

Storage Indication method used.

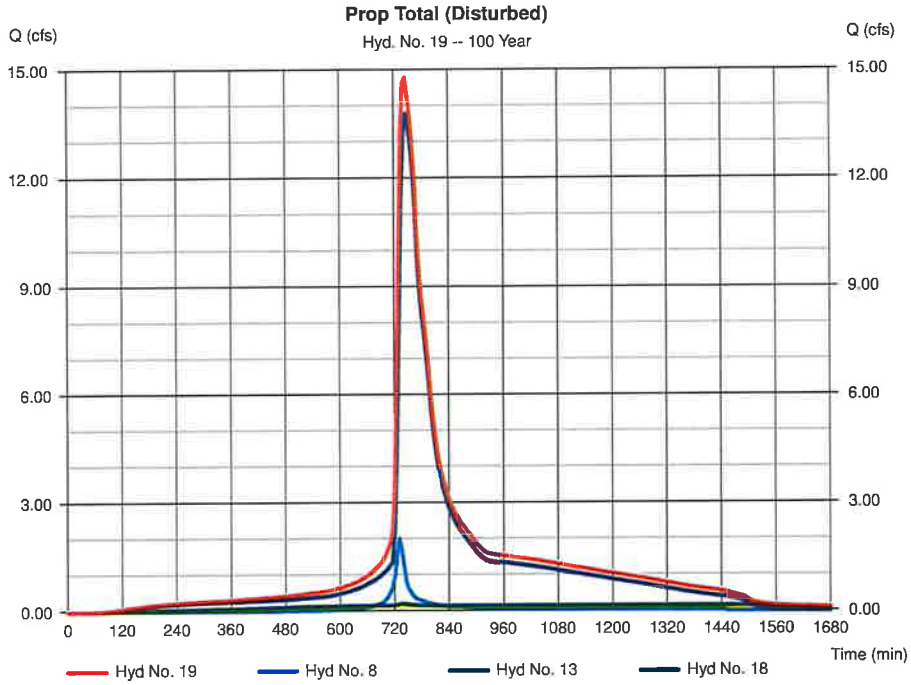


Hydrograph Report

Hyd. No. 19

Prop Total (Disturbed)

Hydrograph type	= Combine	Peak discharge	= 14.80 cfs
Storm frequency	= 100 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 129,697 cuft
Inflow hyds.	= 8, 13, 18	Contrib. drain. area	= 0.420 ac

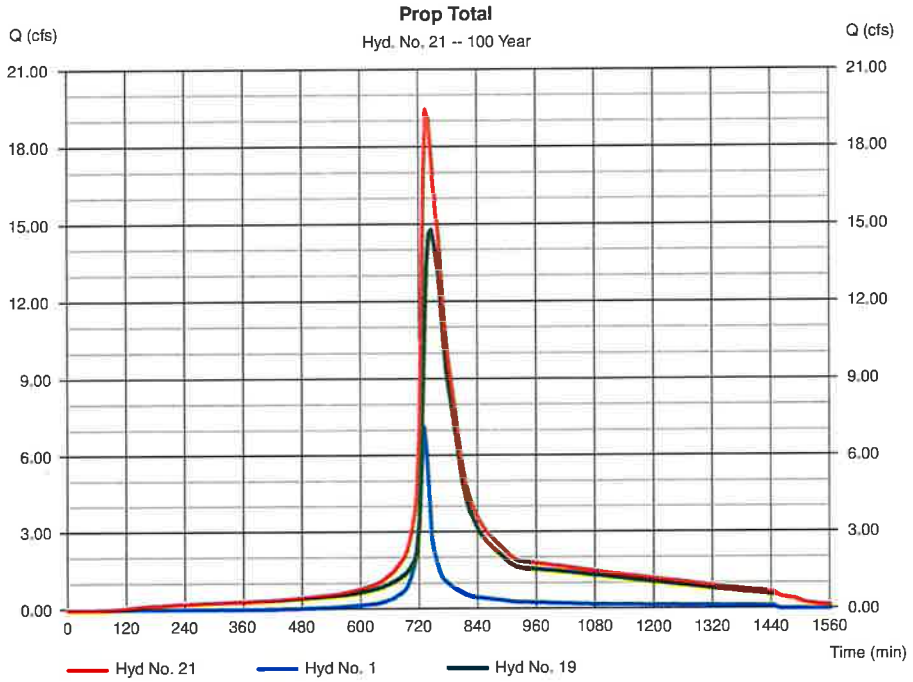


Hydrograph Report

Hyd. No. 21

Prop Total

Hydrograph type	= Combine	Peak discharge	= 19.48 cfs
Storm frequency	= 100 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 155,801 cuft
Inflow hyds.	= 1, 19	Contrib. drain. area	= 1.500 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	39.0824	9.5000	0.8528	------
2	45.6943	10.7000	0.8185	------
3	0.0000	0.0000	0.0000	------
5	99.7061	14.8000	0.9304	------
10	249.7597	21.8001	1.0961	------
25	115.7547	14.9000	0.8980	------
50	7.3699	0.1000	0.2544	------
100	403.8513	25.1001	1.1108	------

File name: TRENTON.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.00	3.10	2.55	2.18	1.91	1.70	1.54	1.40	1.29	1.20	1.12	1.05
2	4.80	3.83	3.21	2.77	2.45	2.20	2.00	1.84	1.70	1.59	1.49	1.40
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.20	5.03	4.24	3.67	3.24	2.90	2.63	2.40	2.22	2.06	1.92	1.80
10	6.80	5.63	4.80	4.17	3.69	3.30	2.98	2.72	2.50	2.31	2.14	2.00
25	7.89	6.45	5.47	4.76	4.23	3.80	3.46	3.17	2.93	2.73	2.55	2.40
50	4.87	4.09	3.69	3.44	3.25	3.10	2.98	2.88	2.80	2.72	2.66	2.60
100	9.20	7.76	6.69	5.87	5.22	4.70	4.27	3.91	3.60	3.33	3.10	2.90

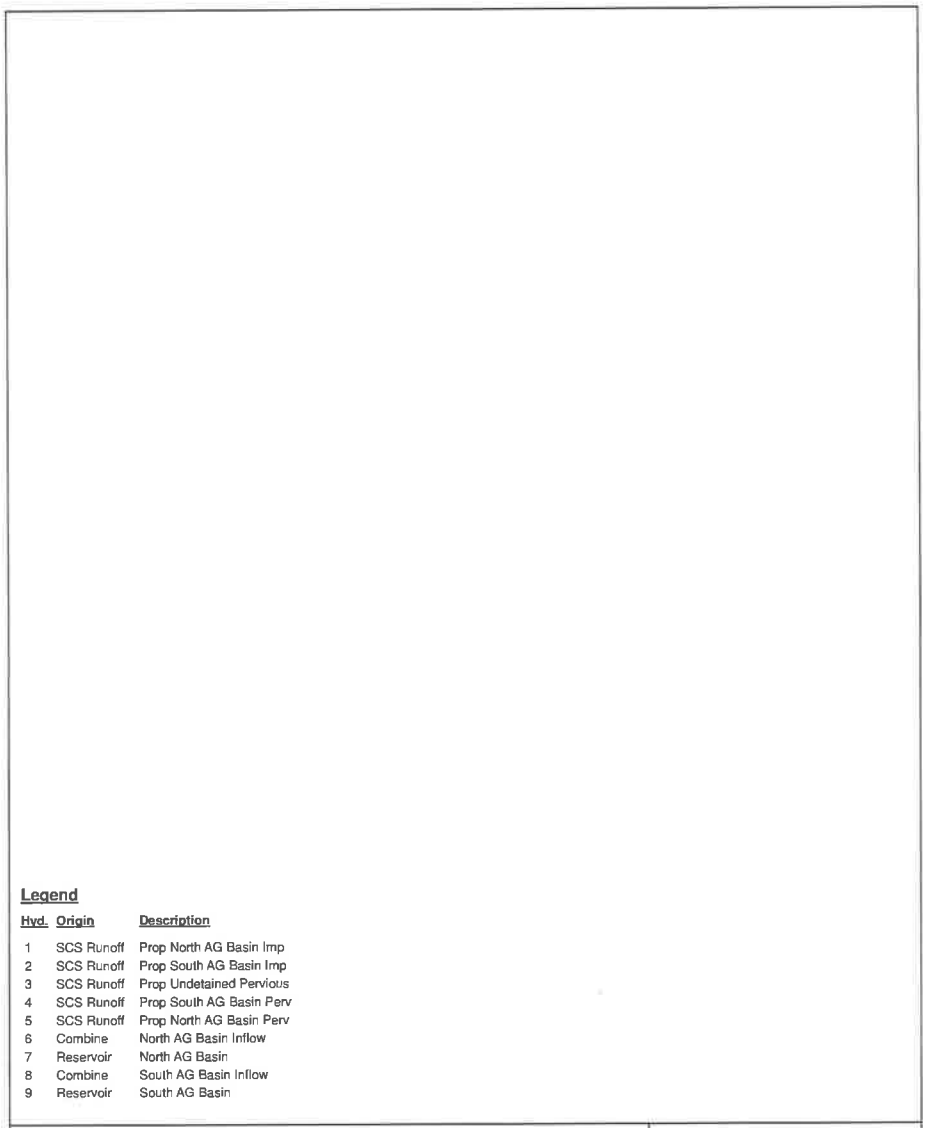
Tc = time in minutes. Values may exceed 60.

Precip. file name: Somerset County.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.34	0.00	0.00	5.01	6.15	0.00	8.21
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	3.34	0.00	0.00	5.01	6.15	0.00	8.21

HYDROGRAPH SUMMARY REPORTS – WATER QUALITY STORM

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	Prop North AG Basin Imp
2	SCS Runoff	Prop South AG Basin Imp
3	SCS Runoff	Prop Undetained Pervious
4	SCS Runoff	Prop South AG Basin Perv
5	SCS Runoff	Prop North AG Basin Perv
6	Combine	North AG Basin Inflow
7	Reservoir	North AG Basin
8	Combine	South AG Basin Inflow
9	Reservoir	South AG Basin

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	------	2.682	------	------	------	------	------	------	------	Prop North AG Basin Imp
2	SCS Runoff	------	1.175	------	------	------	------	------	------	------	Prop South AG Basin Imp
3	SCS Runoff	------	0.044	------	------	------	------	------	------	------	Prop Undetained Pervious
4	SCS Runoff	------	0.061	------	------	------	------	------	------	------	Prop South AG Basin Perv
5	SCS Runoff	------	0.035	------	------	------	------	------	------	------	Prop North AG Basin Perv
6	Combine	1, 5	2.703	------	------	------	------	------	------	------	North AG Basin Inflow
7	Reservoir	6	0.000	------	------	------	------	------	------	------	North AG Basin
8	Combine	2, 4,	1.212	------	------	------	------	------	------	------	South AG Basin Inflow
9	Reservoir	8	0.000	------	------	------	------	------	------	------	South AG Basin

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

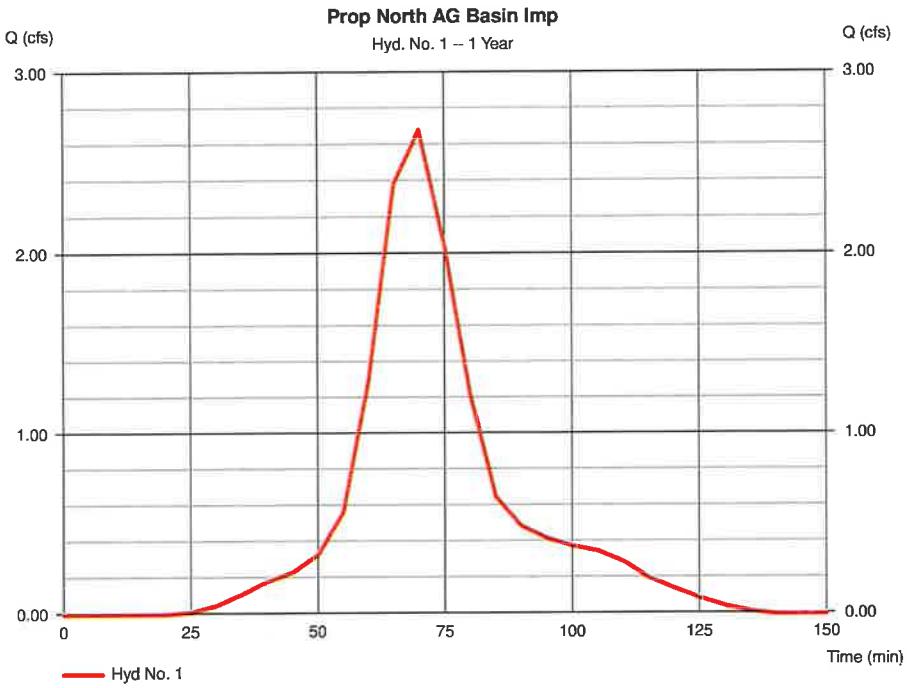
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	2.682	5	70	4,259	---	------	------	Prop North AG Basin Imp
2	SCS Runoff	1.175	5	70	1,865	---	------	------	Prop South AG Basin Imp
3	SCS Runoff	0.044	5	80	103	---	------	------	Prop Undetained Pervious
4	SCS Runoff	0.061	5	80	142	---	------	------	Prop South AG Basin Perv
5	SCS Runoff	0.035	5	80	81	---	------	------	Prop North AG Basin Perv
6	Combine	2.703	5	70	4,339	1, 5	------	------	North AG Basin Inflow
7	Reservoir	0.000	5	475	0	6	58.47	3,806	North AG Basin
8	Combine	1.212	5	70	2,007	2, 4,	------	------	South AG Basin Inflow
9	Reservoir	0.000	5	280	0	8	62.21	1,726	South AG Basin

Hydrograph Report

Hyd. No. 1

Prop North AG Basin Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 2.682 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 4,259 cuft
Drainage area	= 1.210 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 484

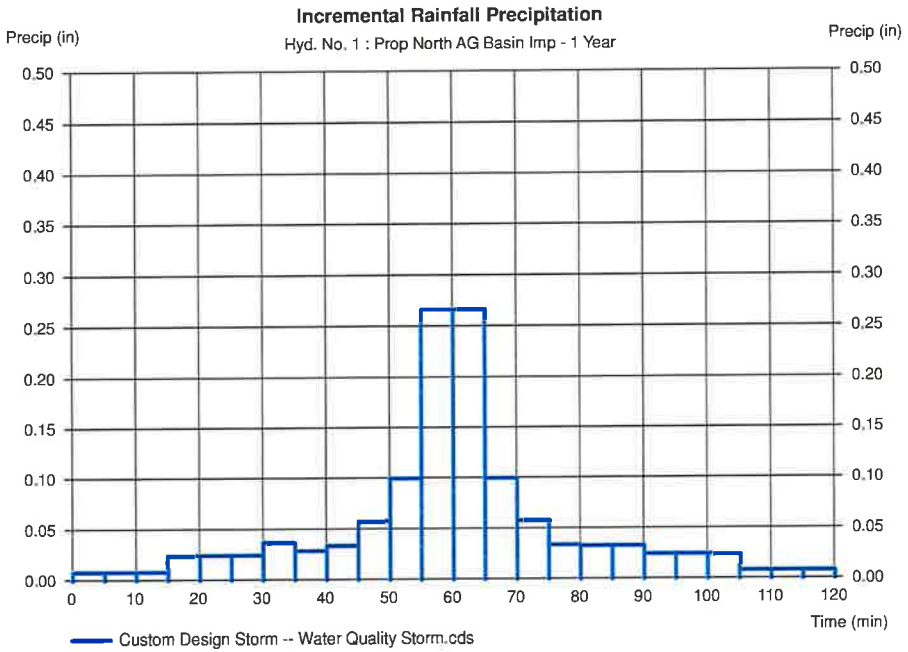


Precipitation Report

Hyd. No. 1

Prop North AG Basin Imp

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds		

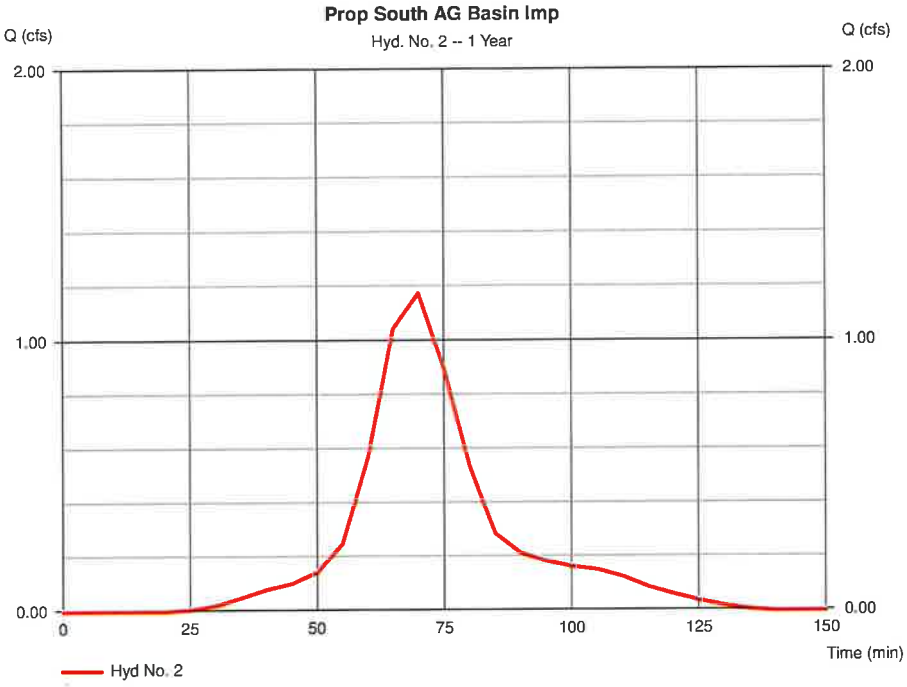


Hydrograph Report

Hyd. No. 2

Prop South AG Basin Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 1.175 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 1,865 cuft
Drainage area	= 0.530 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 484

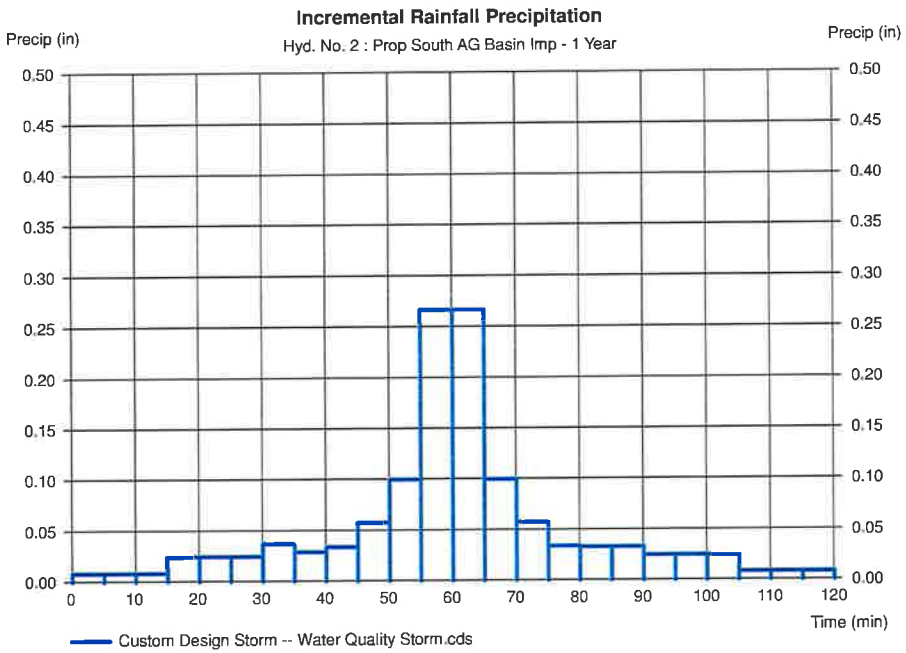


Precipitation Report

Hyd. No. 2

Prop South AG Basin Imp

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds		

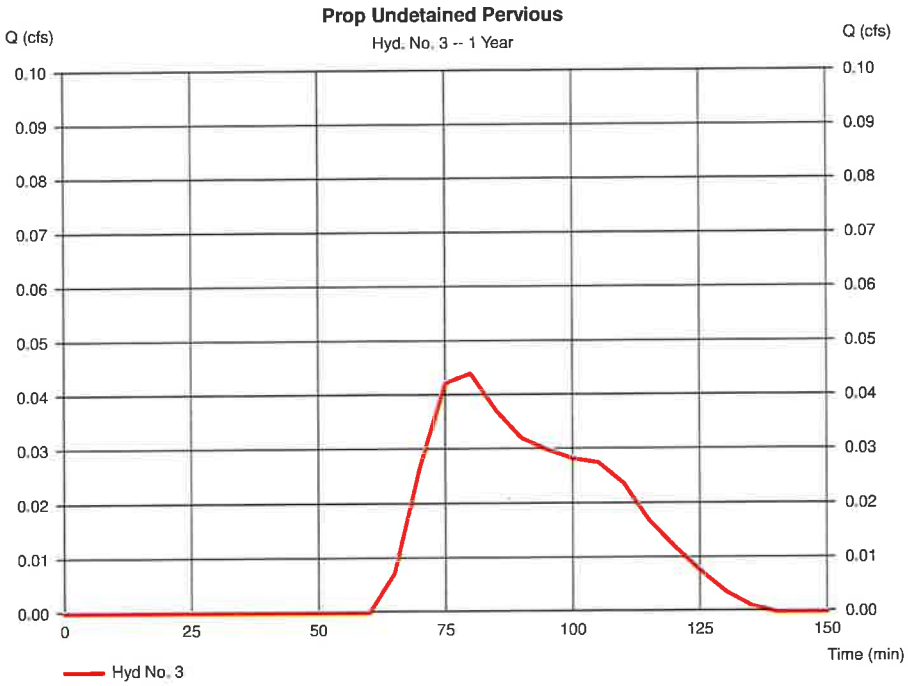


Hydrograph Report

Hyd. No. 3

Prop Undetained Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.044 cfs
Storm frequency	= 1 yrs	Time to peak	= 80 min
Time interval	= 5 min	Hyd. volume	= 103 cuft
Drainage area	= 0.420 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 484

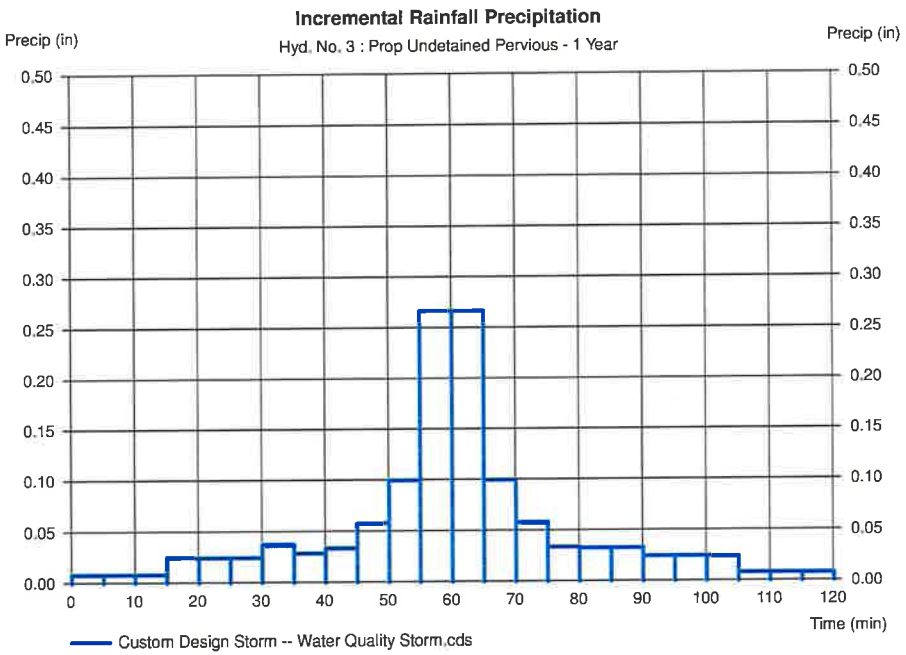


Precipitation Report

Hyd. No. 3

Prop Undetained Pervious

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds		

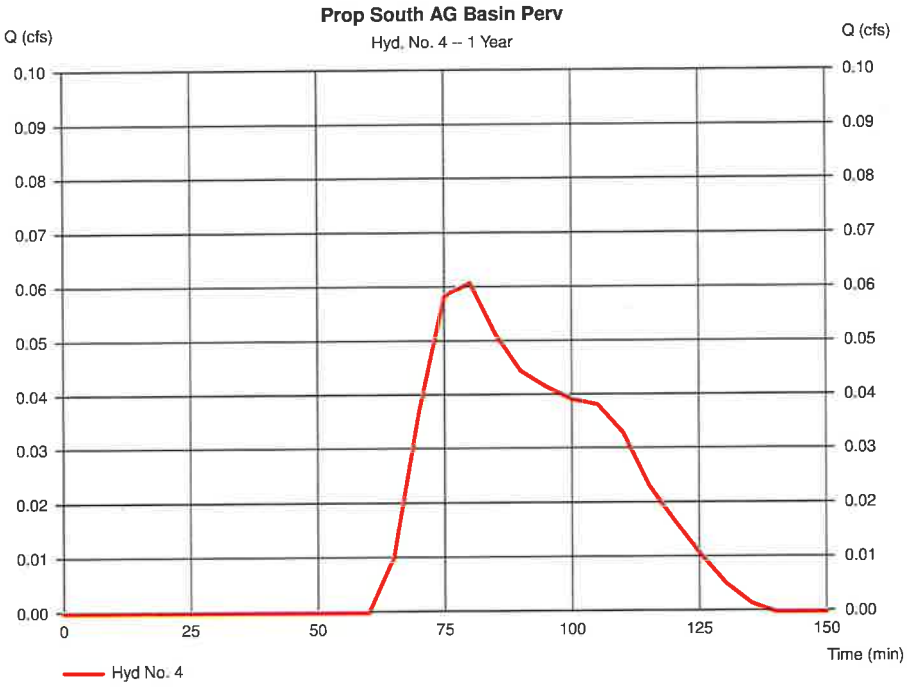


Hydrograph Report

Hyd. No. 4

Prop South AG Basin Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.061 cfs
Storm frequency	= 1 yrs	Time to peak	= 80 min
Time interval	= 5 min	Hyd. volume	= 142 cuft
Drainage area	= 0.580 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 484

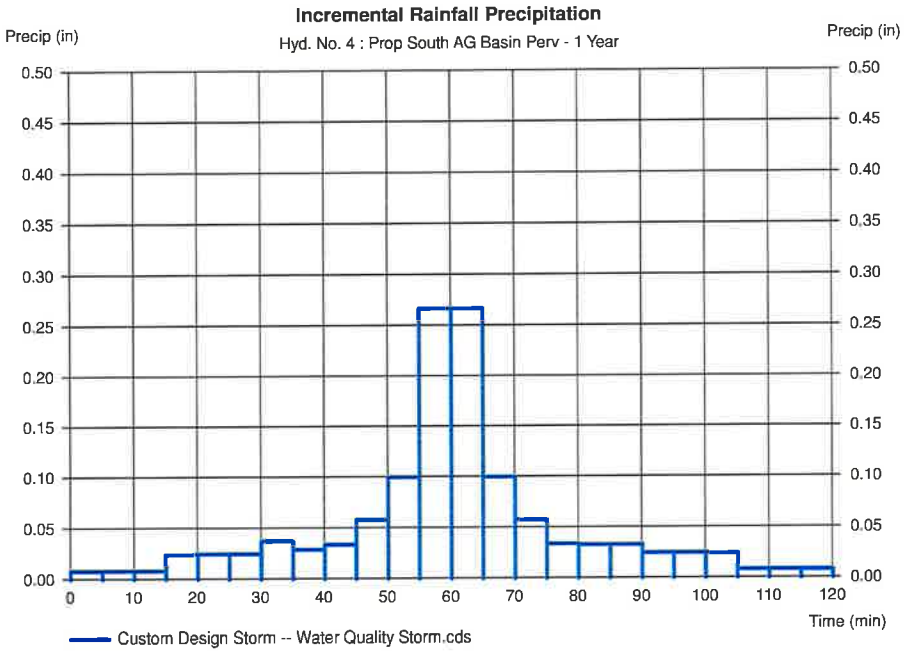


Precipitation Report

Hyd. No. 4

Prop South AG Basin Perv

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds		

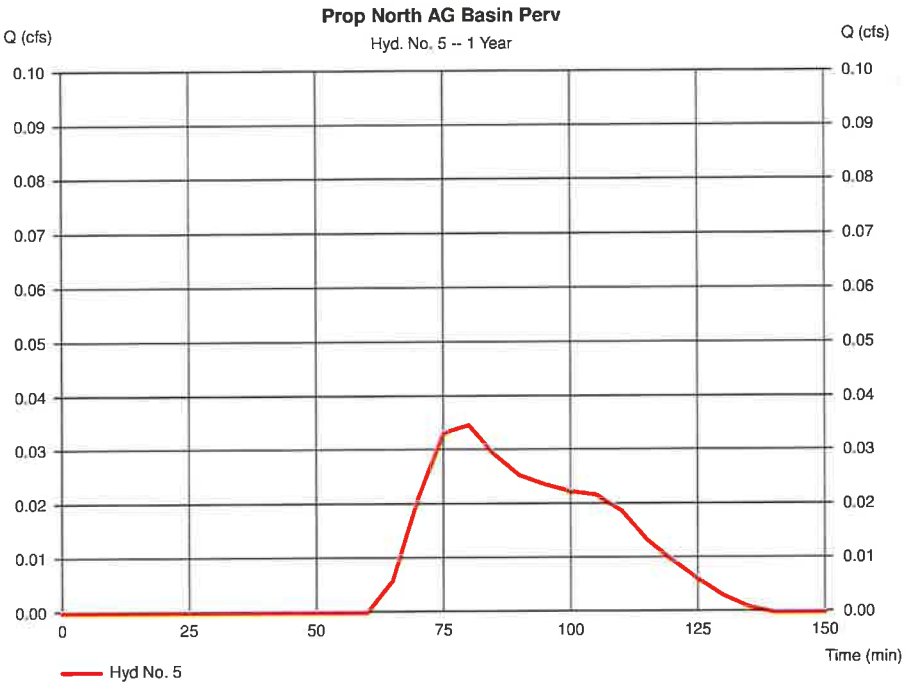


Hydrograph Report

Hyd. No. 5

Prop North AG Basin Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.035 cfs
Storm frequency	= 1 yrs	Time to peak	= 80 min
Time interval	= 5 min	Hyd. volume	= 81 cuft
Drainage area	= 0.330 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds	Shape factor	= 484

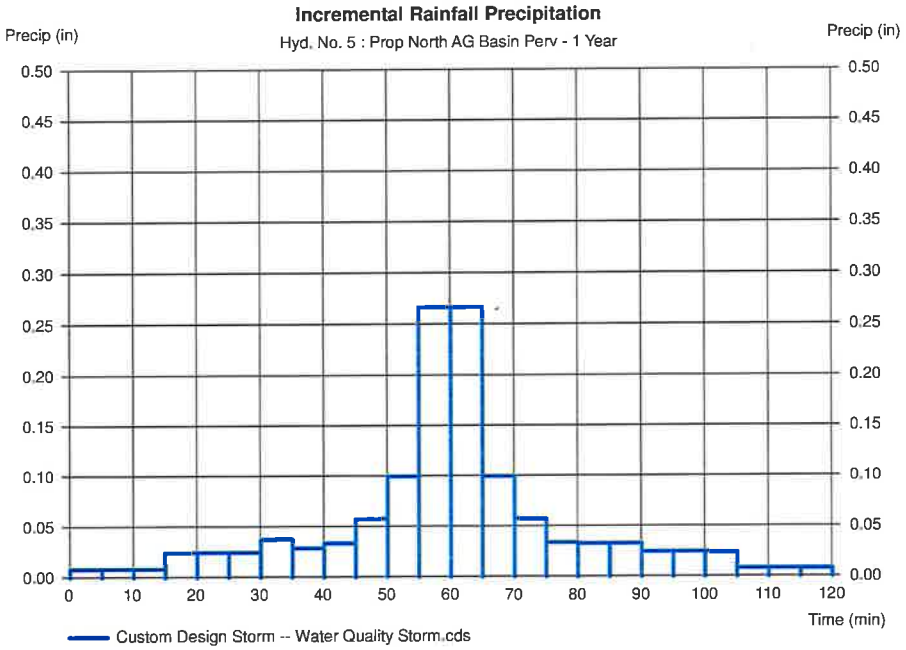


Precipitation Report

Hyd. No. 5

Prop North AG Basin Perv

Storm Frequency	= 1 yrs	Time interval	= 5 min
Total precip.	= 1.2500 in	Distribution	= Custom
Storm duration	= Water Quality Storm.cds		

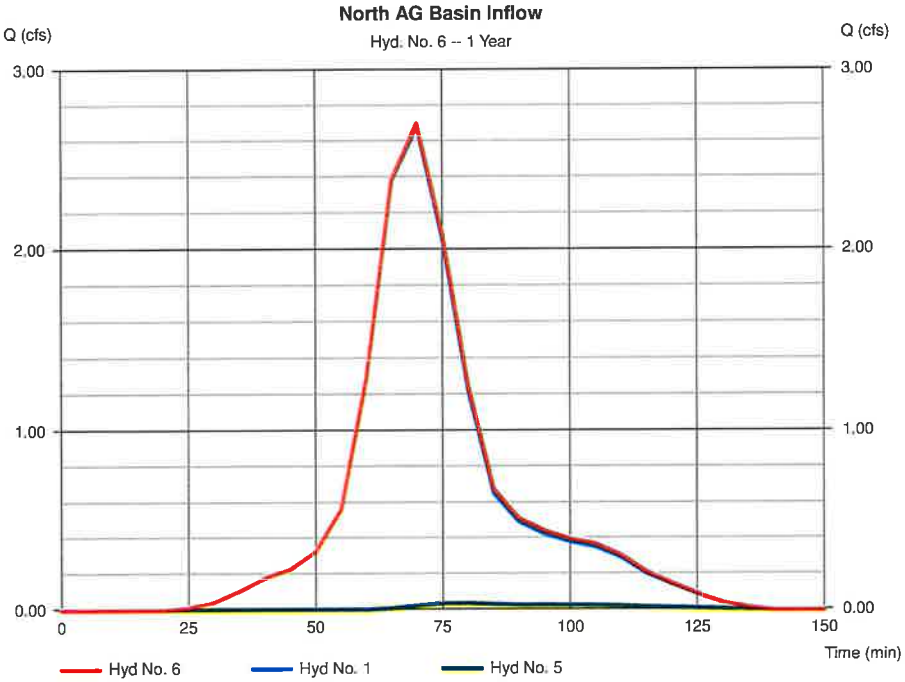


Hydrograph Report

Hyd. No. 6

North AG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 2.703 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 4,339 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 1.540 ac



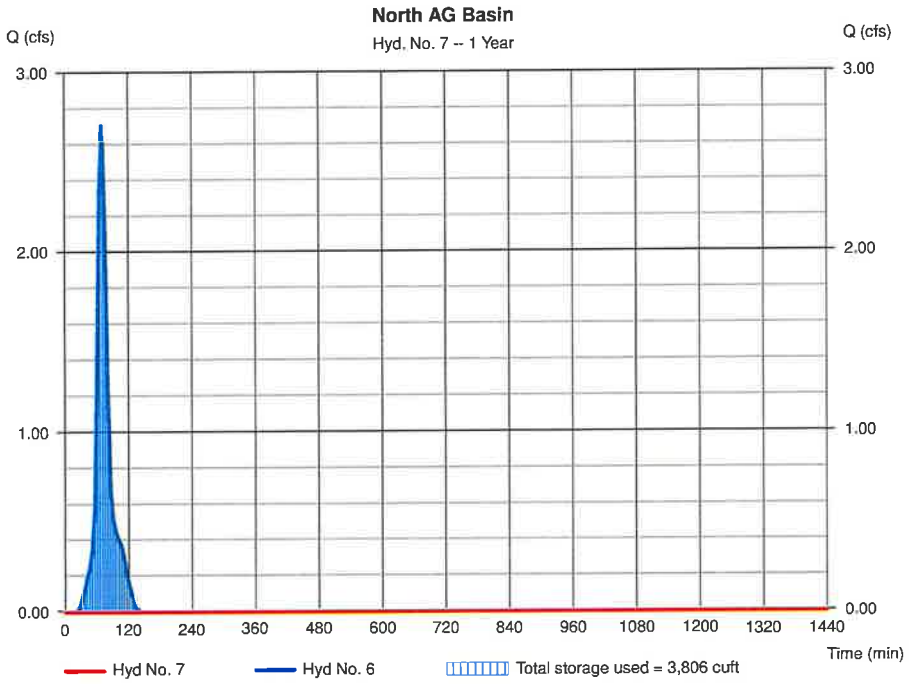
Hydrograph Report

Hyd. No. 7

North AG Basin

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 475 min
Time interval	= 5 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 6 - North AG Basin Inflow	Max. Elevation	= 58.47 ft
Reservoir name	= North AG Basin	Max. Storage	= 3,806 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 3 - North AG Basin

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 57.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	57.00	2,058	0	0
1.00	58.00	2,714	2,378	2,378
2.00	59.00	3,442	3,070	5,449
3.00	60.00	4,267	3,847	9,295

Culvert / Orifice Structures

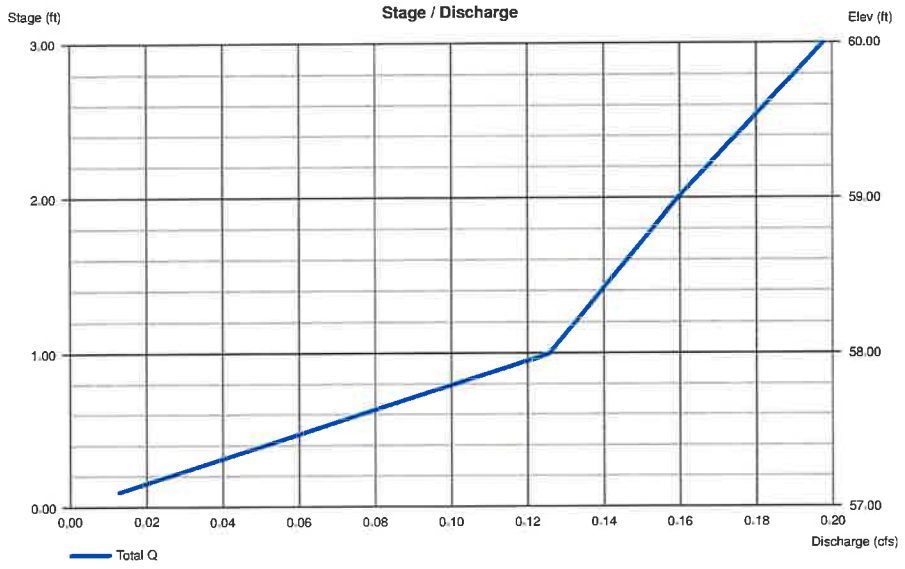
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	0.00	0.00
Span (in)	= 15.00	36.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 58.00	58.50	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	0.00	0.00	0.00
Crest El. (ft)	= 59.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 2.000 (by Contour)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

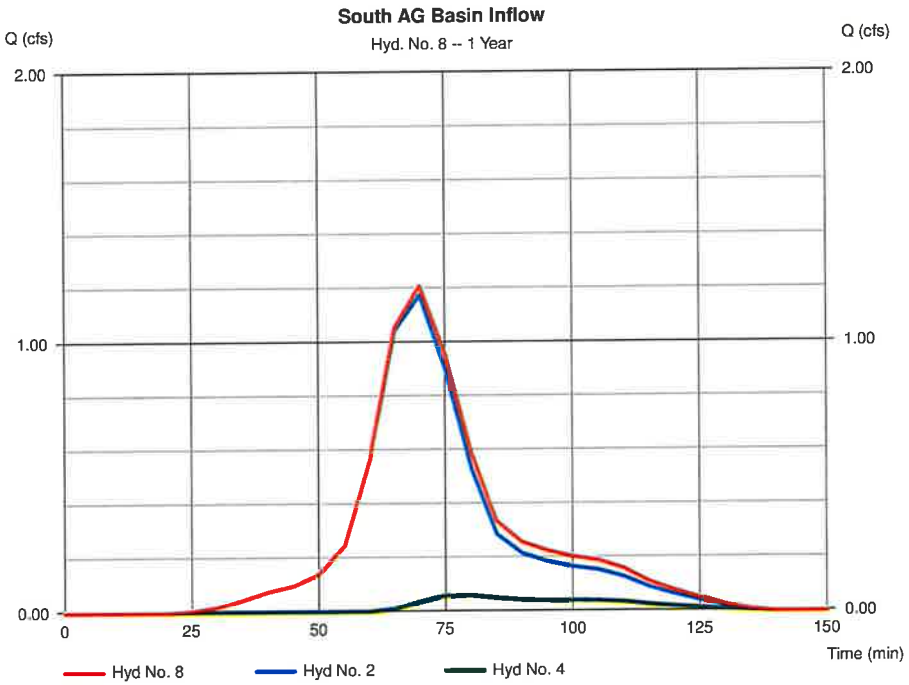


Hydrograph Report

Hyd. No. 8

South AG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 1.212 cfs
Storm frequency	= 1 yrs	Time to peak	= 70 min
Time interval	= 5 min	Hyd. volume	= 2,007 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 1.110 ac



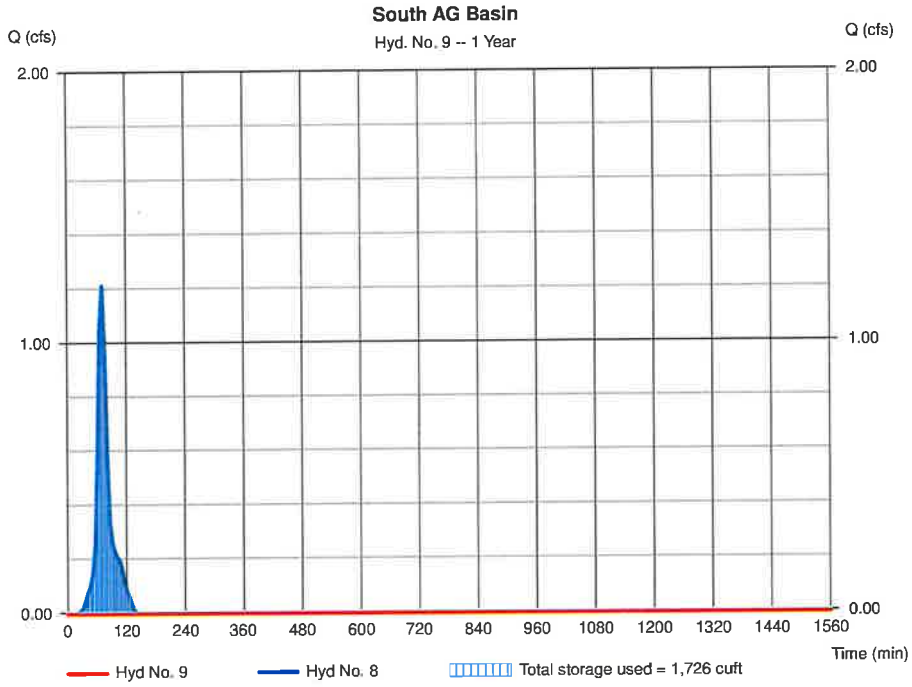
Hydrograph Report

Hyd. No. 9

South AG Basin

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 280 min
Time interval	= 5 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 8 - South AG Basin Inflow	Max. Elevation	= 62.21 ft
Reservoir name	= South AG Basin	Max. Storage	= 1,726 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 2 - South AG Basin

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 61.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	61.00	1,138	0	0
1.00	62.00	1,576	1,351	1,351
2.00	63.00	2,071	1,818	3,169
3.00	64.00	2,622	2,341	5,510
4.00	65.00	3,230	2,920	8,431

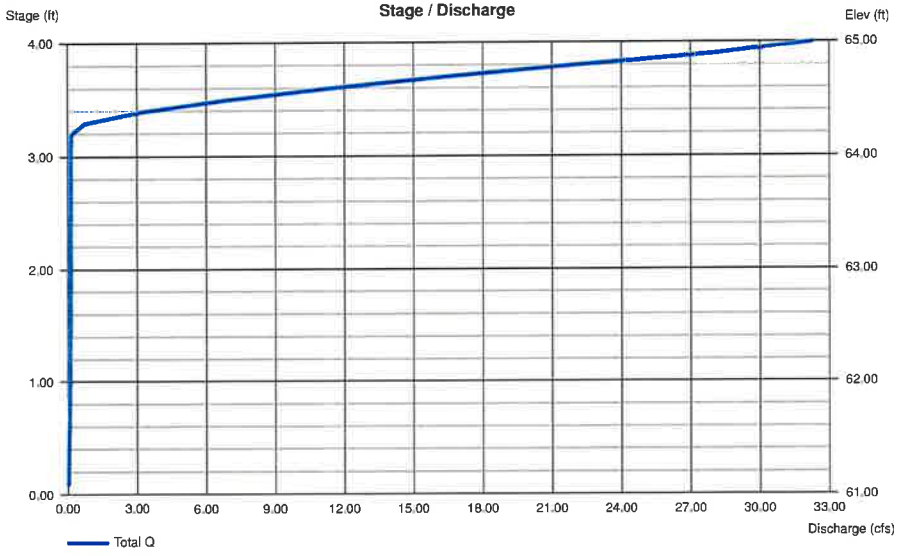
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 59.00	0.00	0.00	0.00
Length (ft)	= 80.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	0.00	0.00	0.00
Crest El. (ft)	= 64.25	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 2.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	39.0824	9.5000	0.8528	--------
2	45.6943	10.7000	0.8185	--------
3	0.0000	0.0000	0.0000	--------
5	99.7061	14.8000	0.9304	--------
10	249.7597	21.8001	1.0961	--------
25	115.7547	14.9000	0.8980	--------
50	7.3699	0.1000	0.2544	--------
100	403.8513	25.1001	1.1108	--------

File name: TRENTON.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.00	3.10	2.55	2.18	1.91	1.70	1.54	1.40	1.29	1.20	1.12	1.05
2	4.80	3.83	3.21	2.77	2.45	2.20	2.00	1.84	1.70	1.59	1.49	1.40
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.20	5.03	4.24	3.67	3.24	2.90	2.63	2.40	2.22	2.06	1.92	1.80
10	6.80	5.63	4.80	4.17	3.69	3.30	2.98	2.72	2.50	2.31	2.14	2.00
25	7.89	6.45	5.47	4.76	4.23	3.80	3.46	3.17	2.93	2.73	2.55	2.40
50	4.87	4.09	3.69	3.44	3.25	3.10	2.98	2.88	2.80	2.72	2.66	2.60
100	9.20	7.76	6.69	5.87	5.22	4.70	4.27	3.91	3.60	3.33	3.10	2.90

Tc = time in minutes. Values may exceed 60.

Precip. file name: Somerset County.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.34	0.00	0.00	5.01	6.15	0.00	8.21
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	3.34	0.00	0.00	5.01	6.15	0.00	8.21

STORMWATER COLLECTION SYSTEM CALCULATIONS (PIPE SIZING)

DYNAMIC ENGINEERING

Stormwater Collection System Calculations

Project: Proposed Warehouse Building
Job #: 3532-99-001
Location: 401 Cottontail Lane, Franklin Township, NJ
Design Storm: 25 YR

Computed By: MG
Checked By: TFD
Date: 1/19/2021

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)
Yard Inlet 27	Yard Inlet 48	0.14	0.35	0.05	0.05	10.00	0.41	10.00	6.80	0.34	0.34	12	102.0	0.010	0.0050	3.27	4.17
Yard Inlet 48	Yard Inlet 28	0.14	0.35	0.05	0.10	10.00	0.47	10.41	6.80	0.34	0.68	12	117.0	0.010	0.0050	3.27	4.17
Yard Inlet 28	B Inlet 20	0.17	0.35	0.06	0.16	10.00	0.41	10.88	6.68	0.40	1.07	15	118.0	0.010	0.0050	5.94	4.84
B Inlet 20	B Inlet 21	0.21	0.92	0.19	0.35	10.00	0.44	11.29	6.56	1.25	2.30	15	127.0	0.010	0.0050	5.94	4.84
B Inlet 21	B Inlet 22	0.21	0.95	0.20	0.55	10.00	0.53	11.73	6.44	1.29	3.54	15	153.0	0.010	0.0050	5.94	4.84
B Inlet 22	AG Basin South	0.13	0.95	0.12	0.67	10.00	0.11	12.26	6.32	0.76	4.23	15	33.0	0.010	0.0050	5.94	4.84
OCS 17	MH 18										6.19	15	35.0	0.010	0.0073	7.17	5.85
MH 18	UG Basin	0.00	0.95	0.00	0.91	10.00	0.19	10.10	6.80	0.00	6.19	15	67.0	0.010	0.0073	7.17	5.85
B Inlet 6	B Inlet 7	0.12	0.86	0.10	0.10	10.00	0.48	10.00	6.80	0.68	0.68	15	195.0	0.010	0.0100	8.39	6.84
B Inlet 7	AG Basin North	0.16	0.87	0.14	0.24	10.00	0.36	10.48	6.80	0.95	1.63	15	149.0	0.010	0.0100	8.39	6.84
B Inlet 15	AG Basin North	0.66	0.89	0.59	0.99	10.00	0.05	10.87	6.68	3.94	6.61	18	17.0	0.010	0.0050	9.65	5.46
OCS 11	UG Basin										6.39	15	18.0	0.010	0.0060	6.50	5.30
B Inlet 14	B Inlet 15	0.48	0.84	0.40	0.40	10.00	0.87	10.00	6.80	2.72	2.72	14	144.0	0.014	0.0035	2.95	2.76
Building Roof 1	UG Basin	0.77	0.95	0.73	0.73	10.00	0.11	10.00	6.80	4.96	4.96	12	56.0	0.010	0.0200	6.55	8.34
Building Roof 2	UG Basin	0.77	0.95	0.73	0.73	10.00	0.11	10.00	6.80	4.96	4.96	12	56.0	0.010	0.0200	6.55	8.34
Building Roof 3	UG Basin	0.77	0.95	0.73	0.73	10.00	0.11	10.00	6.80	4.96	4.96	12	56.0	0.010	0.0200	6.55	8.34
OCS 24	MH 25										13.80	18	75.0	0.013	0.0280	17.57	9.95
MH 25	MH 51	0.00	0.95	0.00	2.03	10.00	0.08	10.13	6.80	0.00	13.80	18	50.0	0.013	0.0327	18.99	10.75
MH 51	HW 26	0.00	0.95	0.00	2.03	10.00	0.20	10.21	6.80	0.00	13.80	18	131.0	0.013	0.0327	18.99	10.75

Note: Basin Outflows designed with 100 year flow

SCOUR HOLE DESIGN CALCULATIONS

DYNAMIC ENGINEERING

SCOUR HOLE DESIGN

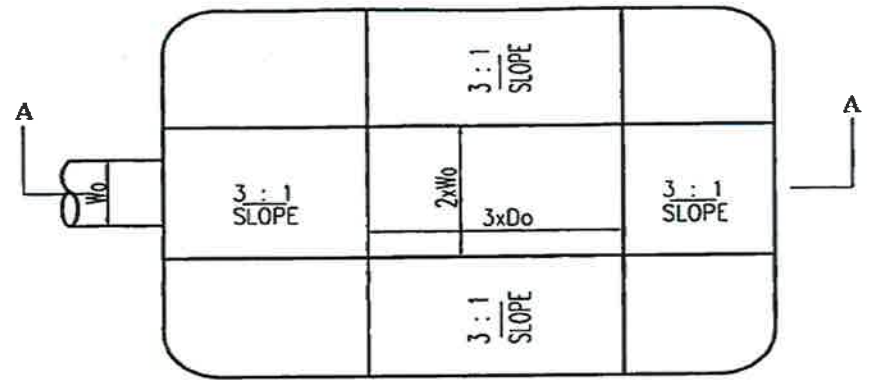
Project:	AACTFR Property, LLC
Job #:	3532-99-001
Location:	Franklin, NJ
Design Storm:	25 YR
Computed By:	MJS
Checked By:	TFD
Date:	1/8/2020

Discharge in Basin, Therefore Tailwater is greater than 0.5 x Do

Discharge Point	North Basin - Drive Inlets
Q (25-yr storm cfs)	1.6
Inside Height of Outlet Culvert, Do (in)	15
Inside Height of Outlet Culvert, Do (ft)	1.3
Tailwater (ft), Tw	0.930
Length of Apron, L (ft)	3.75
Width of Culvert, Wo(in)	15
Width of Culvert, Wo(ft)	1.3
Width of Apron, W(ft)	2.50
Where Y = 1/2 Do, Y(ft)	0.625
Median Stone Diameter, D50 (ft)	0.02
Where Y = Do, Y(ft)	1.250
Median Stone Diameter, D50 (ft)	0.01

Note: Use D50 of 6 inches minimum

Equations used:
L=3*Do
W=2*Wo
Where Y=1/2 Do
D50=(0.0125/Tw)*(q^1.33)
Where Y=Do
D50=(0.0082/Tw)*(q^1.33)



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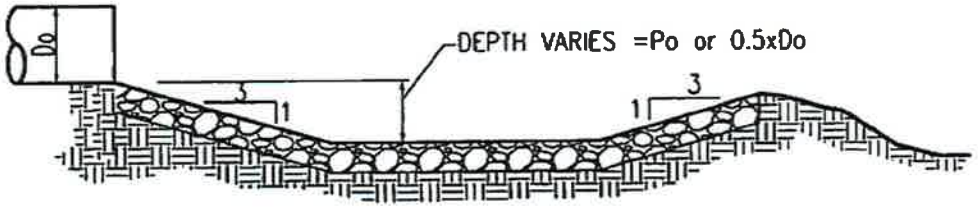


SECTION A–A

Peak Water Surface Elevation for 2 Yr. Storm is 58.93 FES Invert: 58.00 therefore Tailwater: 0.93

Notes:
1. The use of scour holes shall comply with county or local ordinances which would restrict the use of such devices due to the possible problems with mosquito breeding.
2. No bends or curves at the intersection of the conduit and apron or scour hole will be permitted.
3. There shall be no over fall from the end of the apron to the receiving material.
4. The thickness of the riprap lining, filter, and quality shall meet the requirements in the Riprap Standard Section of the Standards for Soil Erosion Control in New Jersey.

DYNAMIC ENGINEERING

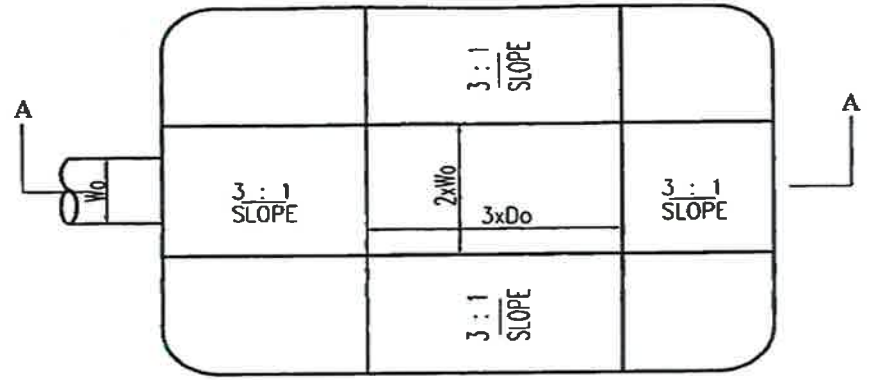
SCOUR HOLE DESIGN

Project:	AACTFR Property, LLC
Job #:	3532-99-001
Location:	Franklin, NJ
Design Storm:	25 YR
Computed By:	MJS
Checked By:	TFD
Date:	1/8/2020

Discharge in Basin, Therefore Tailwater is greater than 0.5 x Do

Discharge Point	North Basin - Truck Inlets
Q (25-yr storm cfs)	6.55
Inside Height of Outlet Culvert, Do (in)	18
Inside Height of Outlet Culvert, Do (ft)	1.5
Tailwater (ft), Tw	1.930
Length of Apron, L (ft)	4.50
Width of Culvert, Wo(in)	15
Width of Culvert, Wo(ft)	1.3
Width of Apron, W(ft)	2.50
Where Y = 1/2 Do, Y(ft)	0.750
Median Stone Diameter, D50 (ft)	0.06
Where Y = Do, Y(ft)	1.500
Median Stone Diameter, D50 (ft)	0.04

Note: Use D50 of 6 inches minimum



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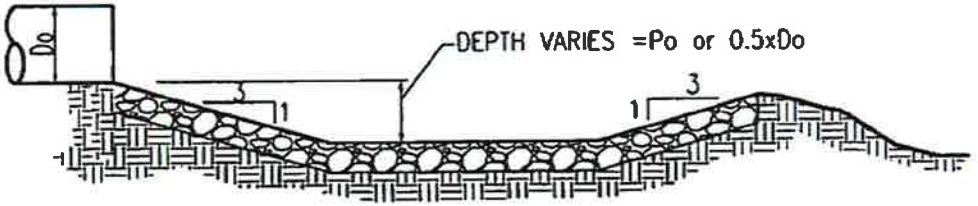


SECTION A–A

Equations used:
L=3*Do
W=2*Wo
Where Y=1/2 Do
D50=(0.0125/Tw)*(q^1.33)
Where Y=Do
D50=(0.0082/Tw)*(q^1.33)

Peak Water Surface Elevation for 2 Yr. Storm is 58.93 FES Invert: 57.00 therefore Tailwater: 1.93

Notes:
1. The use of scour holes shall comply with county or local ordinances which would restrict the use of such devices due to the possible problems with mosquito breeding.
2. No bends or curves at the intersection of the conduit and apron or scour hole will be permitted.
3. There shall be no over fall from the end of the apron to the receiving material.
4. The thickness of the riprap lining, filter, and quality shall meet the requirements in the Riprap Standard Section of the Standards for Soil Erosion Control in New Jersey.

DYNAMIC ENGINEERING

SCOUR HOLE DESIGN

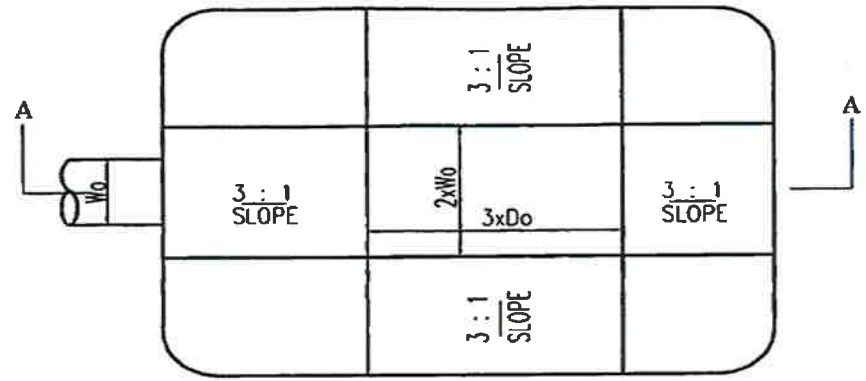
Project:	AACTFR Property, LLC
Job #:	3532-99-001
Location:	Franklin, NJ
Design Storm:	25 YR
Computed By:	MJS
Checked By:	TFD
Date:	1/8/2020

Discharge in Basin, Therefore Tailwater is greater than 0.5 x Do

Discharge Point	South AG Basin
Q (25-yr storm cfs)	4.03
Inside Height of Outlet Culvert, Do (in)	15
Inside Height of Outlet Culvert, Do (ft)	1.3
Tailwater (ft), Tw	1.660
Length of Apron, L (ft)	3.75
Width of Culvert, Wo(in)	15
Width of Culvert, Wo(ft)	1.3
Width of Apron, W(ft)	2.50
Where Y = 1/2 Do, Y(ft)	0.625
Median Stone Diameter, D50 (ft)	0.04
Where Y = Do, Y(ft)	1.250
Median Stone Diameter, D50 (ft)	0.02

Note: Use D50 of 6 inches minimum

Equations used:
L=3*Do
W=2*Wo
Where Y=1/2 Do
D50=(0.0125/Tw)*(q^1.33)
Where Y=Do
D50=(0.0082/Tw)*(q^1.33)



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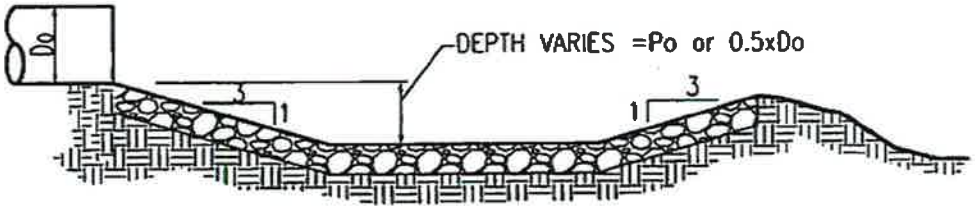


SECTION A–A

Peak Water Surface Elevation for 2 Yr. Storm is 63.26 FES Invert: 61.60 therefore Tailwater: 1.66

Notes:
1. The use of scour holes shall comply with county or local ordinances which would restrict the use of such devices due to the possible problems with mosquito breeding.
2. No bends or curves at the intersection of the conduit and apron or scour hole will be permitted.
3. There shall be no over fall from the end of the apron to the receiving material.
4. The thickness of the riprap lining, filter, and quality shall meet the requirements in the Riprap Standard Section of the Standards for Soil Erosion Control in New Jersey.

DYNAMIC ENGINEERING

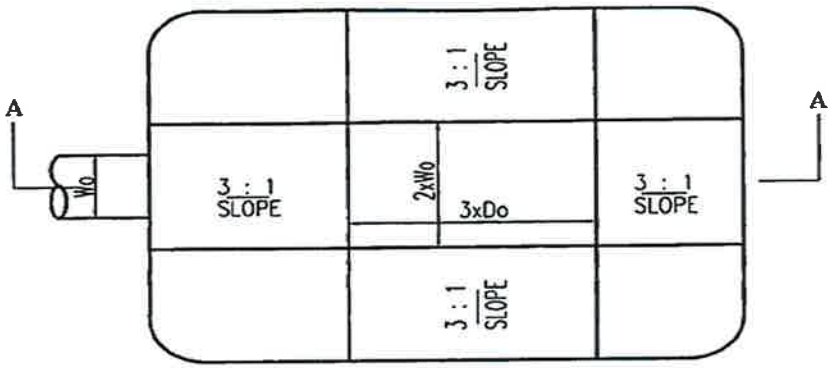
SCOUR HOLE DESIGN

Project:	AACTFR Property, LLC
Job #:	3532-99-001
Location:	Franklin, NJ
Design Storm:	25 YR
Computed By:	MJS
Checked By:	TFD
Date:	1/8/2020

Discharge not in Basin, Therefore Tailwater is less than 0.5 x Do

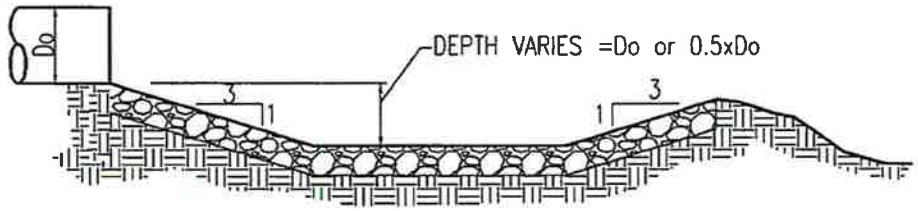
Discharge Point	Randolph Brook
Q (25-yr storm cfs)	9.069
Inside Height of Outlet Culvert, Do (in)	18
Inside Height of Outlet Culvert, Do (ft)	1.5
Tailwater (ft), Tw	0.30
Length of Apron, L (ft)	4.50
Width of Culvert, Wo(in)	18
Width of Culvert, Wo(ft)	1.5
Width of Apron, W(ft)	3.00
Where Y = 1/2 Do, Y(ft)	0.750
Median Stone Diameter, D50 (ft)	0.46
Where Y = Do, Y(ft)	1.500
Median Stone Diameter, D50 (ft)	0.30

Note: Use D50 of 6 inches minimum



PLAN

Equations used:
L=3*Do
W=2*Wo
Tw=0.2*Do (If Tw cannot be computed)
Where Y=1/2 Do
D50=(0.0125/Tw)*(q^1.33)
Where Y=Do
D50=(0.0082/Tw)*(q^1.33)



SECTION A-A

Notes:
1. The use of scour holes shall comply with county or local ordinances which would restrict the use of such devices due to the possible problems with mosquito breeding.
2. No bends or curves at the intersection of the conduit and apron or scour hole will be permitted.
3. There shall be no over fall from the end of the apron to the receiving material.
4. The thickness of the riprap lining, filter, and quality shall meet the requirements in the Riprap Standard Section of the Standards for Soil Erosion Control in New Jersey.

OVERFLOW SPILLWAY CALCULATIONS

DYNAMIC ENGINEERING

Overflow Spillway Calculations

Project:	**AACTFR Property, LLC**
Job #:	3532-99-001
Location:	Franklin, NJ
Computed By:	MJS
Checked By:	JLG
Date:	1/19/2021

SOUTH ABOVE GROUND BASIN

To Size Spillway:

- Assume complete blockage of the outlet control structure and no infiltration
- Route 2 & 10 year storm through basin assuming that the basin is filled with water up to the Emergency Spillway Elevation

	2 Year	10 Year
Spillway Width (ft.)	15.00	15.00
Spillway Elevation (ft.)	64.75	64.75
Flow through Spillway (Q) (cfs)	1.819	3.113
Water Surface Elevation (ft)	64.88	64.95
Depth of Flow (ft)	**0.13**	**0.20**
Area of Flow (A) (sf)*	**1.97**	**3.04**
Velocity (V) = Q / A (ft/sec)	**0.92**	**1.02**

⁂ V = < 2.0 FPS ⁂ Stability Achieved

DYNAMIC ENGINEERING

Overflow Spillway Calculations

Project:	**AACTFR Property, LLC**
Job #:	3532-99-001
Location:	Franklin, NJ
Computed By:	MJS
Checked By:	JLG
Date:	1/19/2021

NORTH ABOVE GROUND BASIN

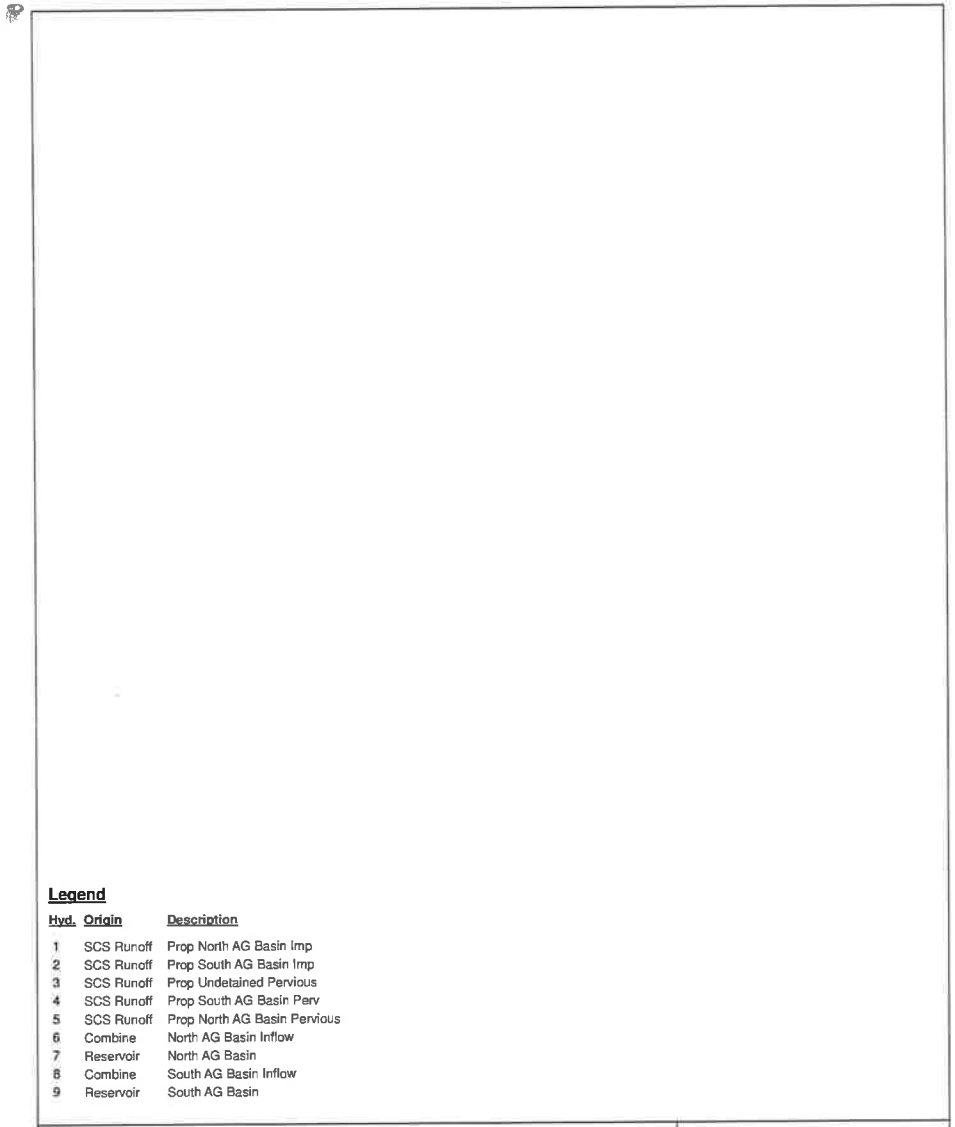
To Size Spillway:

- Assume complete blockage of the outlet control structure and no infiltration
- Route 2 & 10 year storm through basin assuming that the basin is filled with water up to the Emergency Spillway Elevation

	2 Year	10 Year
Spillway Width (ft.)	20.00	20.00
Spillway Elevation (ft.)	60.00	60.00
Flow through Spillway (Q) (cfs)	3.196	5.027
Water Surface Elevation (ft)	60.16	60.22
Depth of Flow (ft)	**0.16**	**0.22**
Area of Flow (A) (sf)*	**3.23**	**4.45**
Velocity (V) = Q / A (ft/sec)	**0.99**	**1.13**

⁂ V = < 2.0 FPS ⁂ Stability Achieved

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	Prop North AG Basin Imp
2	SCS Runoff	Prop South AG Basin Imp
3	SCS Runoff	Prop Undetained Pervious
4	SCS Runoff	Prop South AG Basin Perv
5	SCS Runoff	Prop North AG Basin Pervious
6	Combine	North AG Basin Inflow
7	Reservoir	North AG Basin
8	Combine	South AG Basin Inflow
9	Reservoir	South AG Basin

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	------	------	3.118	------	------	4.709	------	------	------	Prop North AG Basin Imp
2	SCS Runoff	------	------	1.366	------	------	2.063	------	------	------	Prop South AG Basin Imp
3	SCS Runoff	------	------	0.426	------	------	0.930	------	------	------	Prop Undetained Pervious
4	SCS Runoff	------	------	0.589	------	------	1.284	------	------	------	Prop South AG Basin Perv
5	SCS Runoff	------	------	0.335	------	------	0.731	------	------	------	Prop North AG Basin Pervious
6	Combine	1, 5	------	3.453	------	------	5.439	------	------	------	North AG Basin Inflow
7	Reservoir	6	------	3.196	------	------	5.027	------	------	------	North AG Basin
8	Combine	2, 4,	------	1.954	------	------	3.347	------	------	------	South AG Basin Inflow
9	Reservoir	8	------	1.819	------	------	3.113	------	------	------	South AG Basin

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

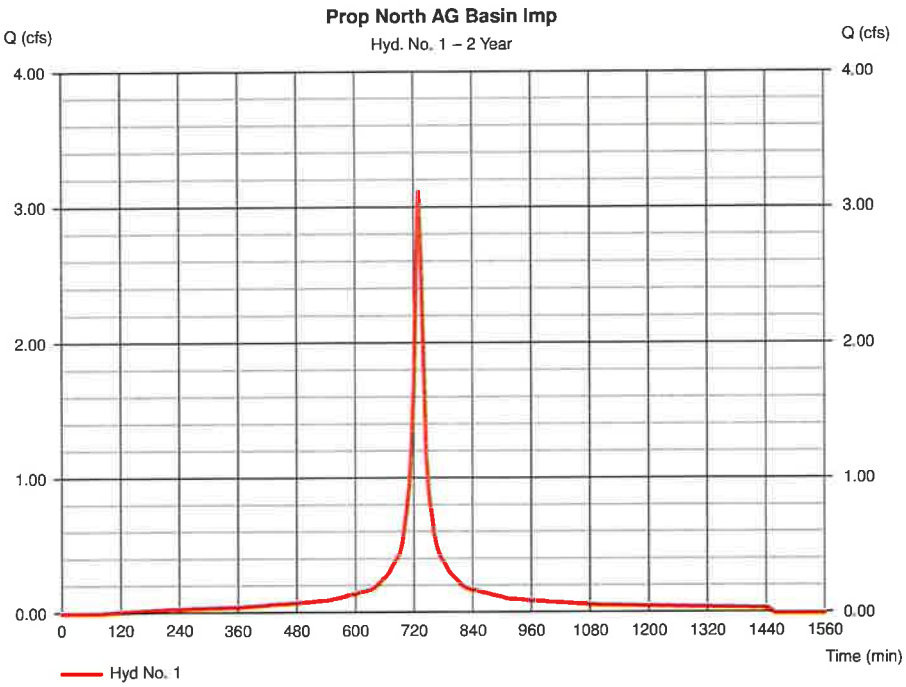
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	3.118	5	730	12,794	---	-----	-----	Prop North AG Basin Imp
2	SCS Runoff	1.366	5	730	5,604	---	-----	-----	Prop South AG Basin Imp
3	SCS Runoff	0.426	5	730	1,616	---	-----	-----	Prop Undetained Pervious
4	SCS Runoff	0.589	5	730	2,232	---	-----	-----	Prop South AG Basin Perv
5	SCS Runoff	0.335	5	730	1,270	---	-----	-----	Prop North AG Basin Pervious
6	Combine	3.453	5	730	14,064	1, 5	-----	-----	North AG Basin Inflow
7	Reservoir	3.196	5	735	14,063	6	60.16	719	North AG Basin
8	Combine	1.954	5	730	7,836	2, 4,	-----	-----	South AG Basin Inflow
9	Reservoir	1.819	5	735	7,836	8	64.88	421	South AG Basin

Hydrograph Report

Hyd. No. 1

Prop North AG Basin Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 3.118 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 12,794 cuft
Drainage area	= 1.210 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

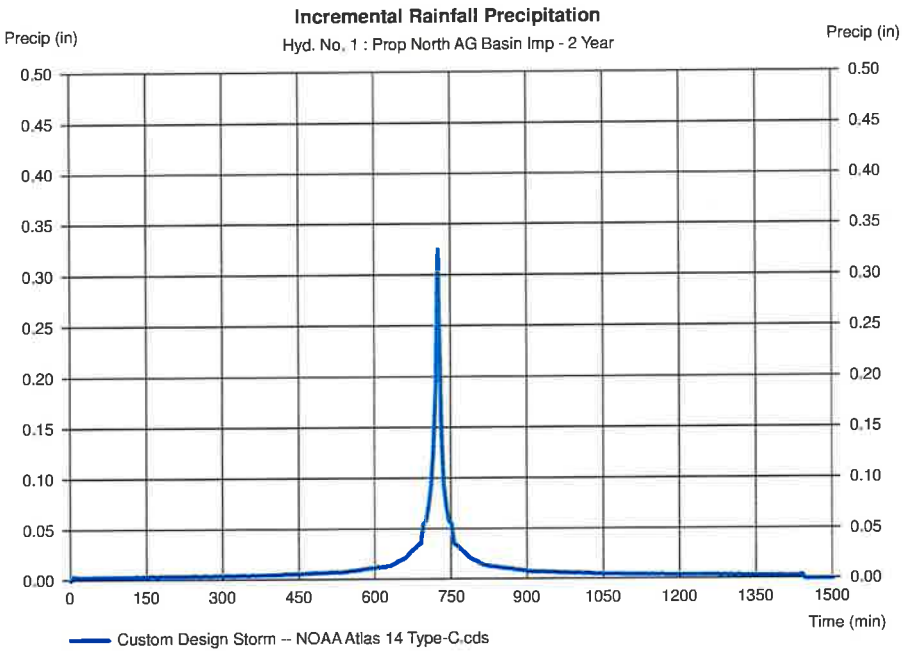


Precipitation Report

Hyd. No. 1

Prop North AG Basin Imp

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

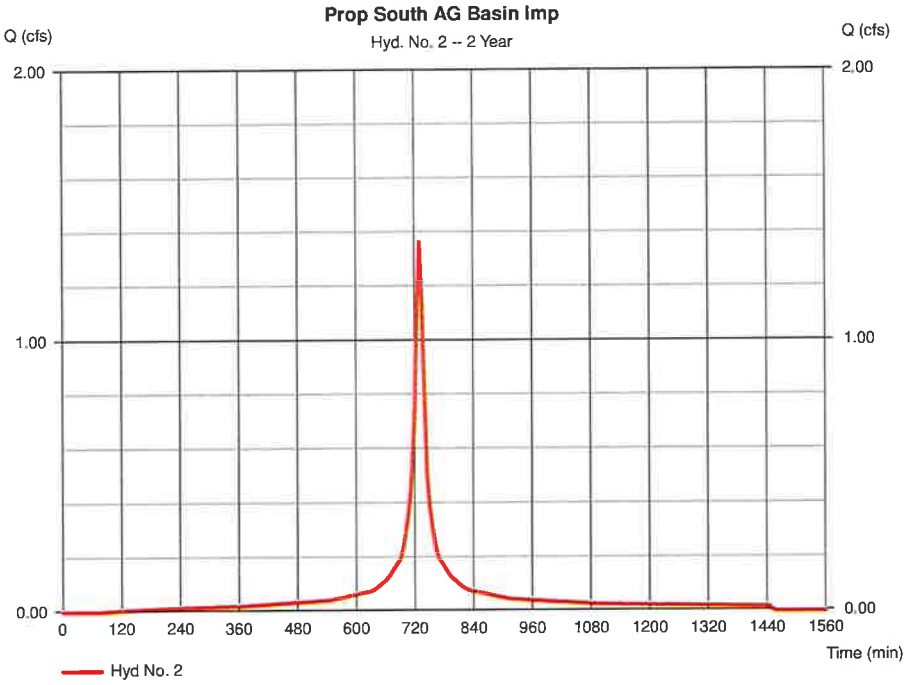


Hydrograph Report

Hyd. No. 2

Prop South AG Basin Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 1.366 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 5,604 cuft
Drainage area	= 0.530 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

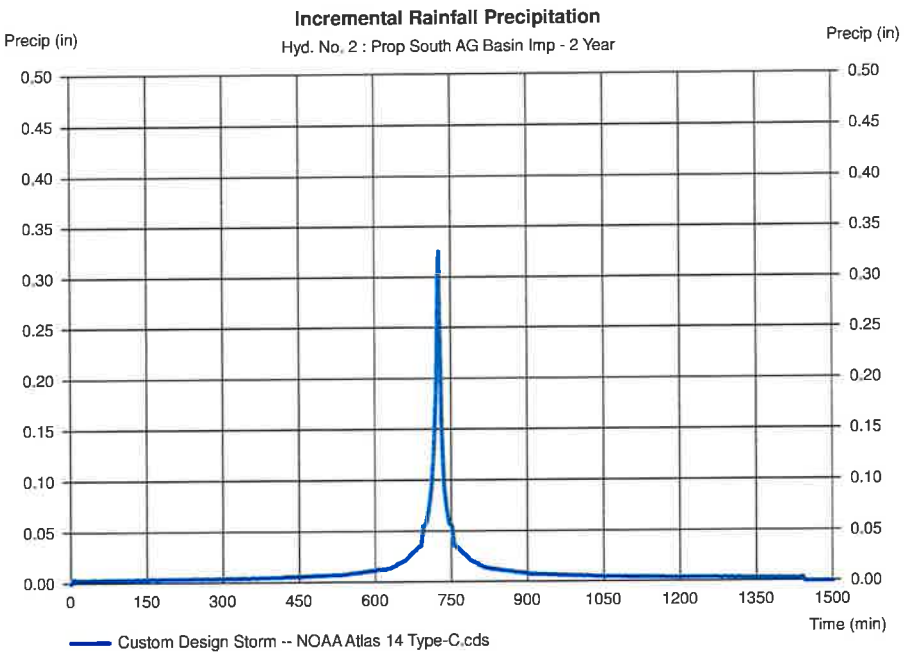


Precipitation Report

Hyd. No. 2

Prop South AG Basin Imp

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

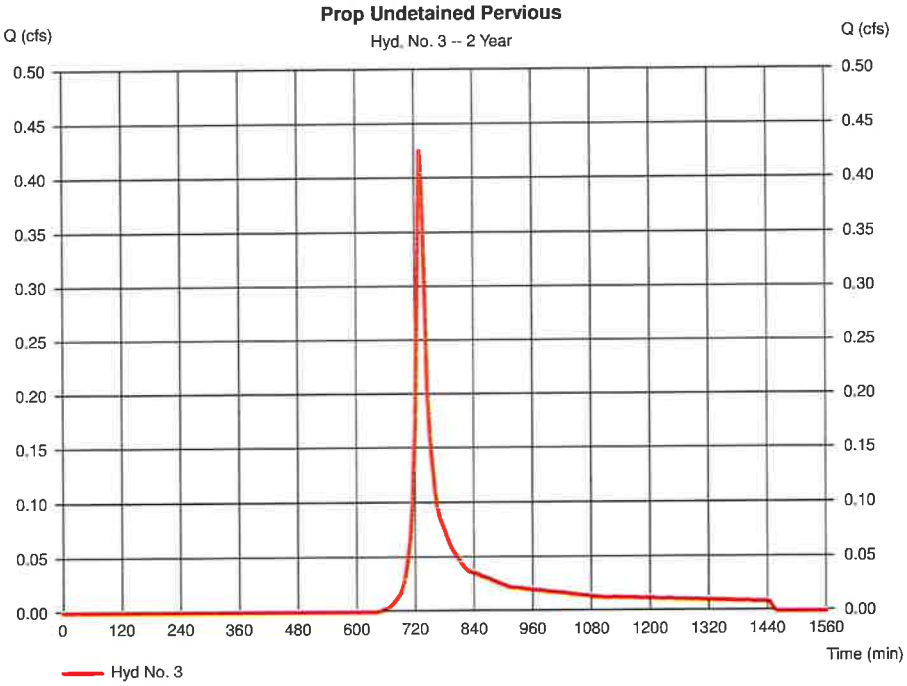


Hydrograph Report

Hyd. No. 3

Prop Undetained Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.426 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,616 cuft
Drainage area	= 0.420 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

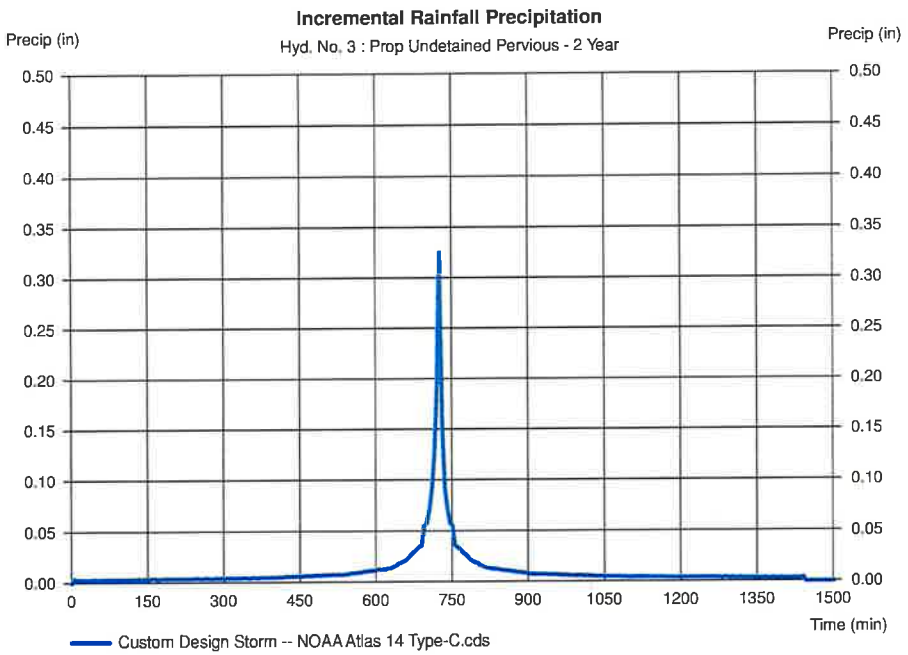


Precipitation Report

Hyd. No. 3

Prop Undetained Pervious

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

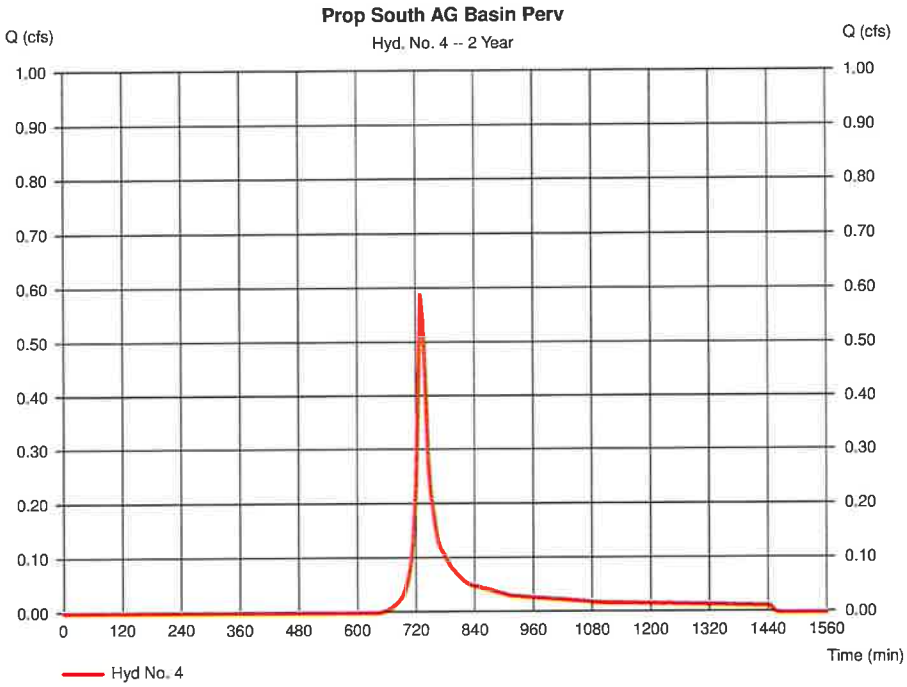


Hydrograph Report

Hyd. No. 4

Prop South AG Basin Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.589 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,232 cuft
Drainage area	= 0.580 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

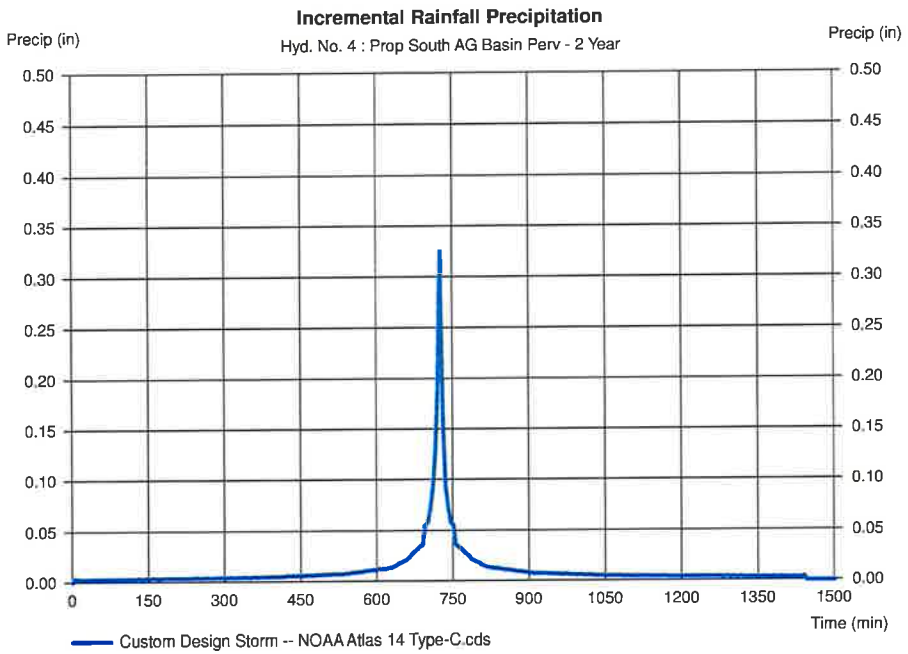


Precipitation Report

Hyd. No. 4

Prop South AG Basin Perv

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

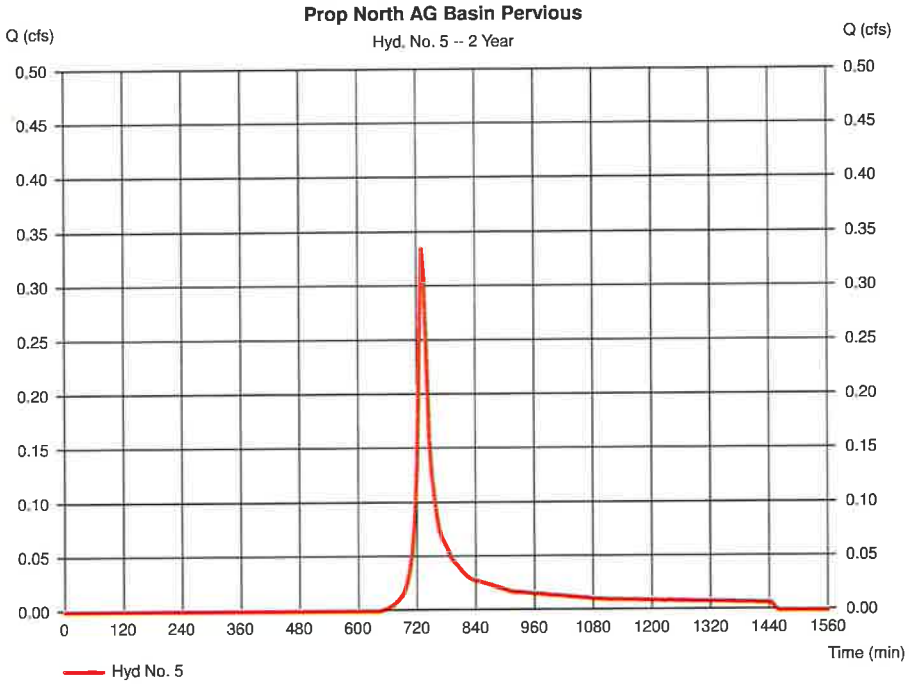


Hydrograph Report

Hyd. No. 5

Prop North AG Basin Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.335 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,270 cuft
Drainage area	= 0.330 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

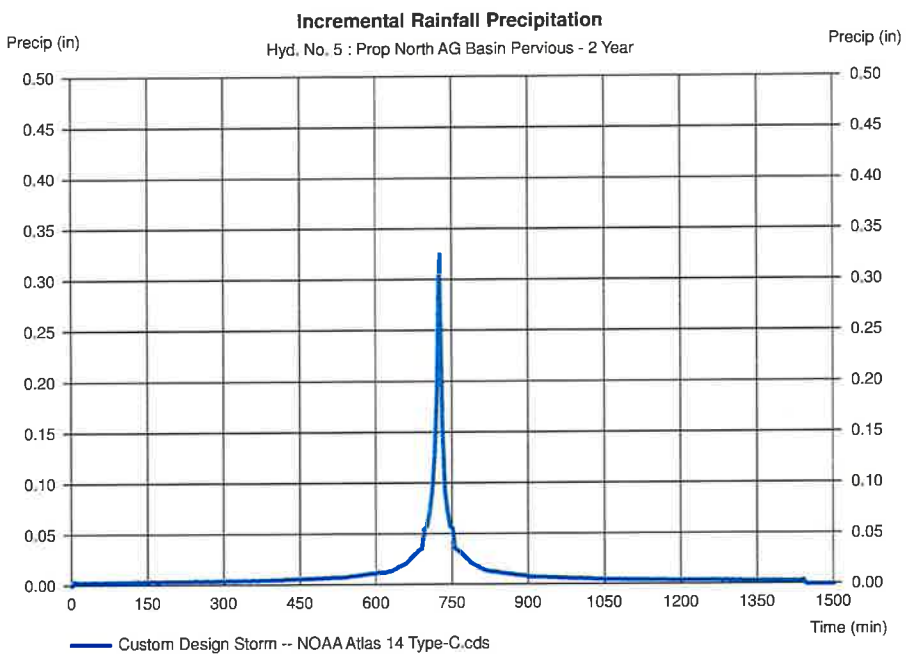


Precipitation Report

Hyd. No. 5

Prop North AG Basin Pervious

Storm Frequency	= 2 yrs	Time interval	= 5 min
Total precip.	= 3.3400 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

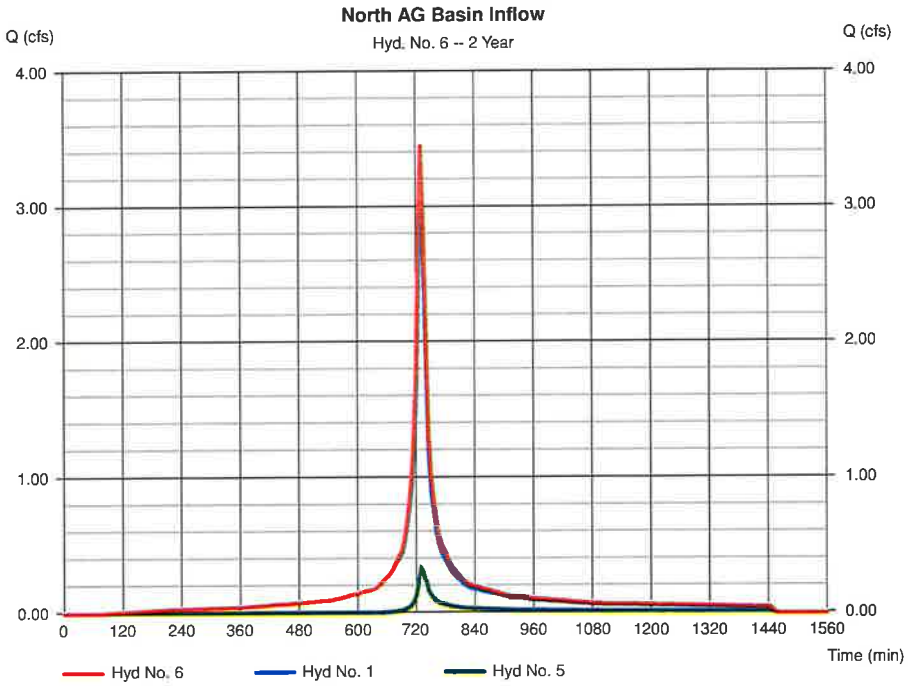


Hydrograph Report

Hyd. No. 6

North AG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 3.453 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 14,064 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 1.540 ac



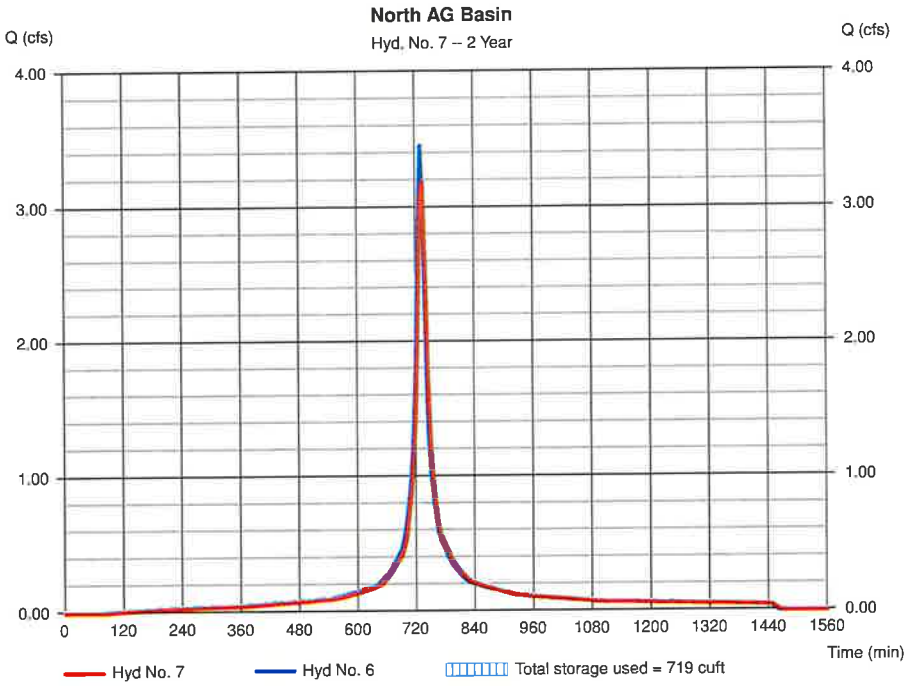
Hydrograph Report

Hyd. No. 7

North AG Basin

Hydrograph type	= Reservoir	Peak discharge	= 3.196 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 14,063 cuft
Inflow hyd. No.	= 6 - North AG Basin Inflow	Max. Elevation	= 60.16 ft
Reservoir name	= ES North Basin	Max. Storage	= 719 cuft

Storage Indication method used.



Pond Report

Pond No. 3 - ES North Basin

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 60.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	60.00	4,267	0	0
0.50	60.50	5,000	2,314	2,314

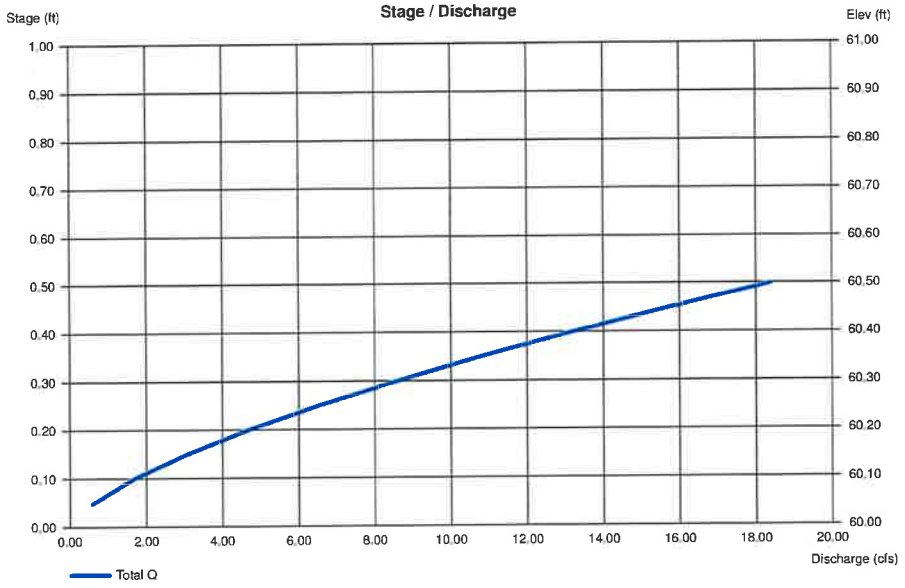
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	0.00	0.00
Span (in)	= 15.00	36.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 58.00	58.50	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 60.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

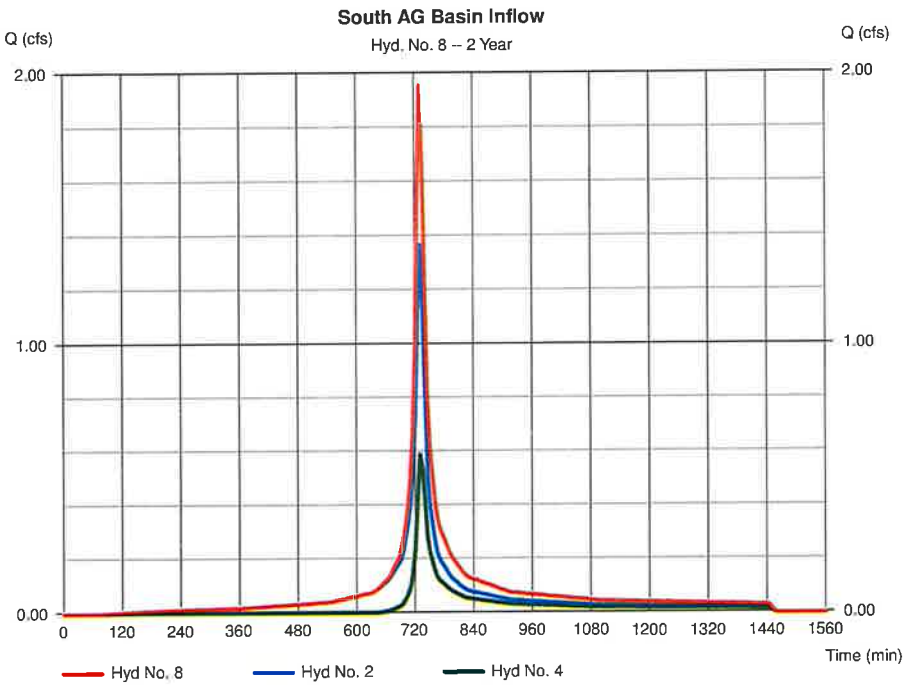


Hydrograph Report

Hyd. No. 8

South AG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 1.954 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 7,836 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 1.110 ac



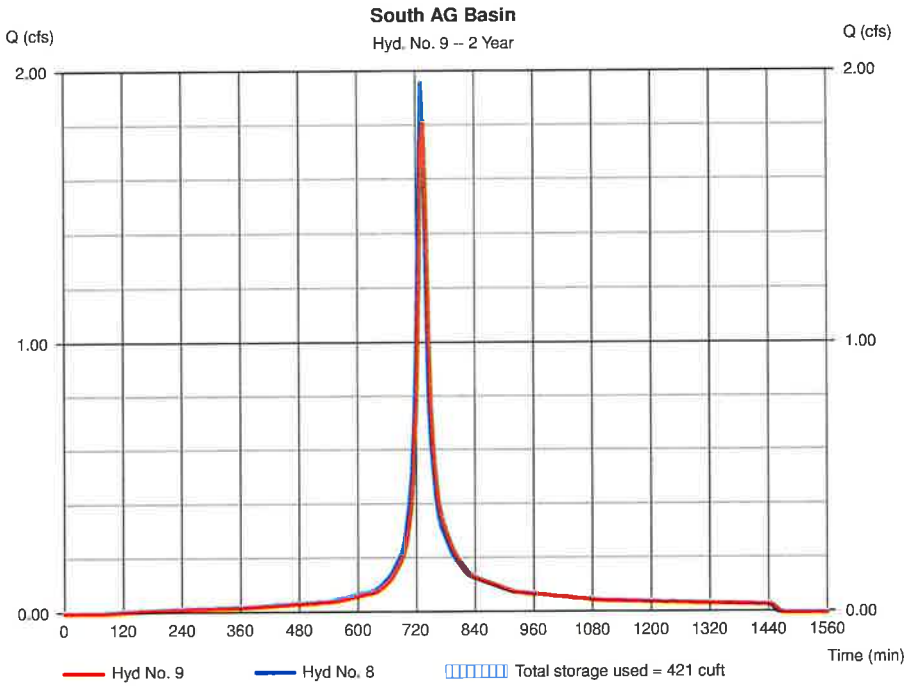
Hydrograph Report

Hyd. No. 9

South AG Basin

Hydrograph type	= Reservoir	Peak discharge	= 1.819 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 7,836 cuft
Inflow hyd. No.	= 8 - South AG Basin Inflow	Max. Elevation	= 64.88 ft
Reservoir name	= ES South Basin	Max. Storage	= 421 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.1 — Tuesday, Jan 19, 2021

Pond No. 2 - ES South Basin

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 64.75 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	64.75	3,256	0	0
0.50	65.25	3,300	1,639	1,639

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	0.00	0.00
Span (in)	= 15.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 58.75	62.40	0.00	0.00
Length (ft)	= 80.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

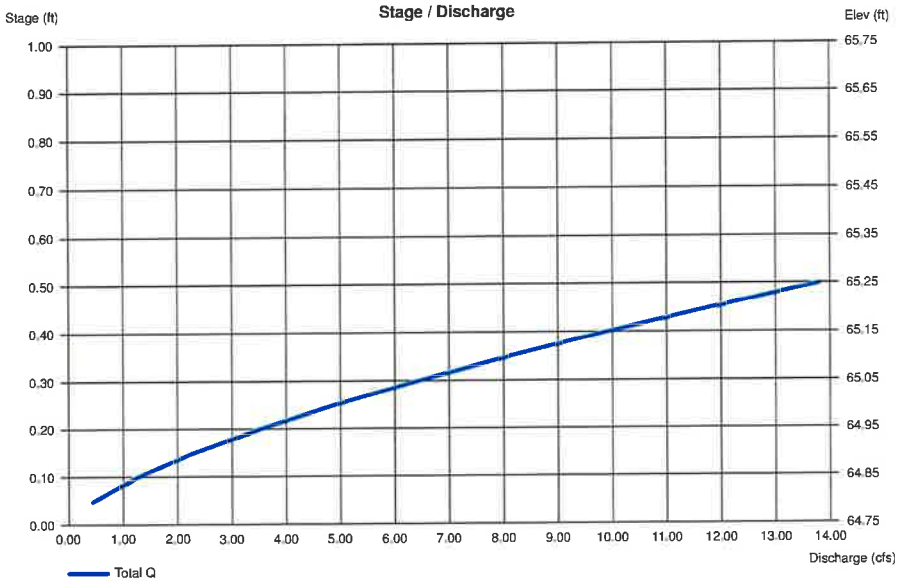
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.00	0.00	0.00	0.00
Crest El. (ft)	= 64.75	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.1

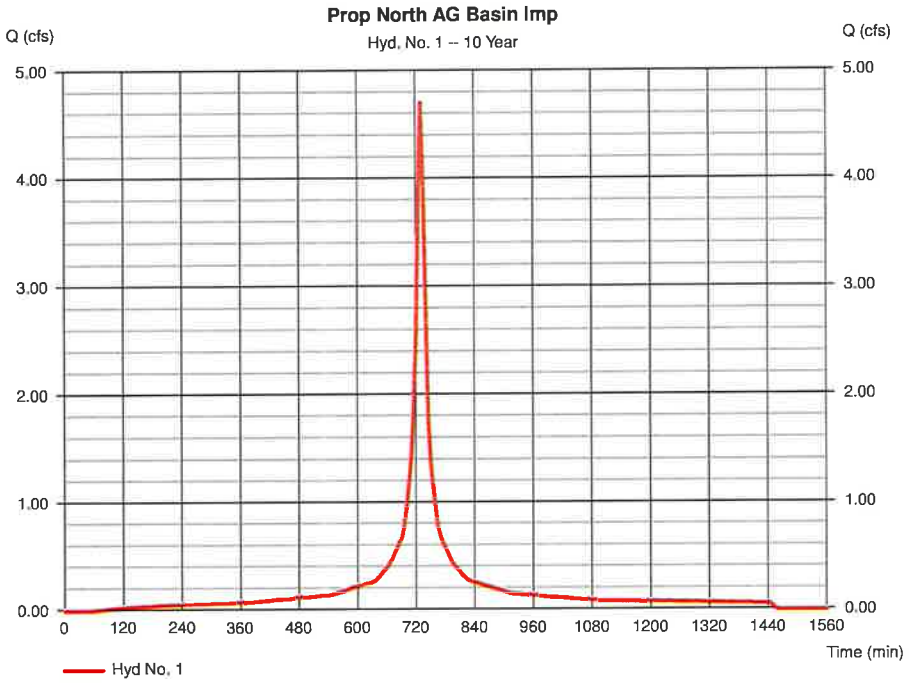
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	4.709	5	730	19,655	---	------	------	Prop North AG Basin Imp
2	SCS Runoff	2.063	5	730	8,609	---	------	------	Prop South AG Basin Imp
3	SCS Runoff	0.930	5	730	3,391	---	------	------	Prop Undetained Pervious
4	SCS Runoff	1.284	5	730	4,682	---	------	------	Prop South AG Basin Perv
5	SCS Runoff	0.731	5	730	2,664	---	------	------	Prop North AG Basin Pervious
6	Combine	5.439	5	730	22,319	1, 5	------	------	North AG Basin Inflow
7	Reservoir	5.027	5	735	22,318	6	60.22	973	North AG Basin
8	Combine	3.347	5	730	13,291	2, 4,	------	------	South AG Basin Inflow
9	Reservoir	3.113	5	735	13,291	8	64.95	605	South AG Basin

Hydrograph Report

Hyd. No. 1

Prop North AG Basin Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 4.709 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 19,655 cuft
Drainage area	= 1.210 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

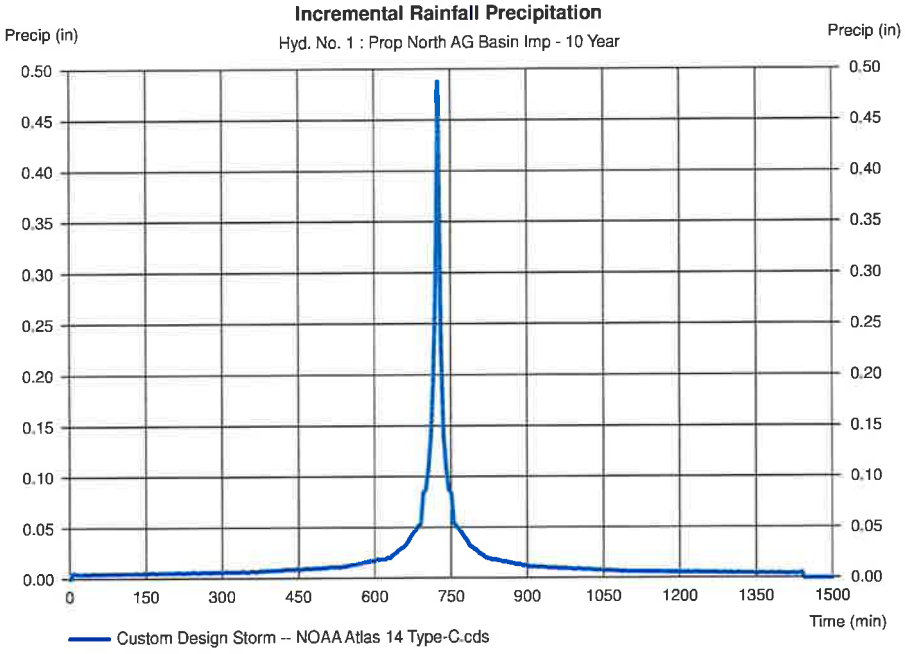


Precipitation Report

Hyd. No. 1

Prop North AG Basin Imp

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

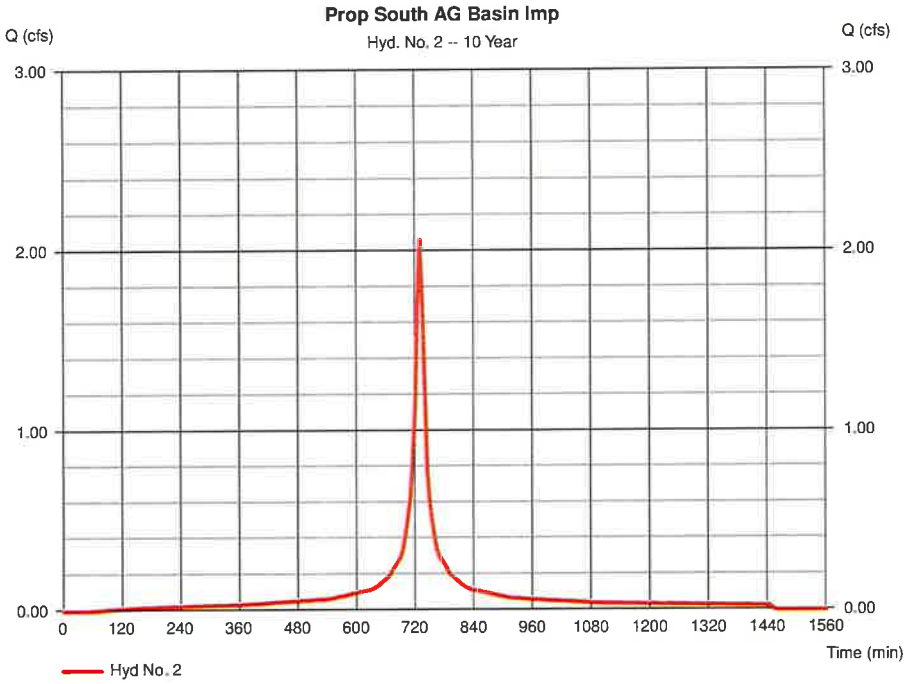


Hydrograph Report

Hyd. No. 2

Prop South AG Basin Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 2.063 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 8,609 cuft
Drainage area	= 0.530 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

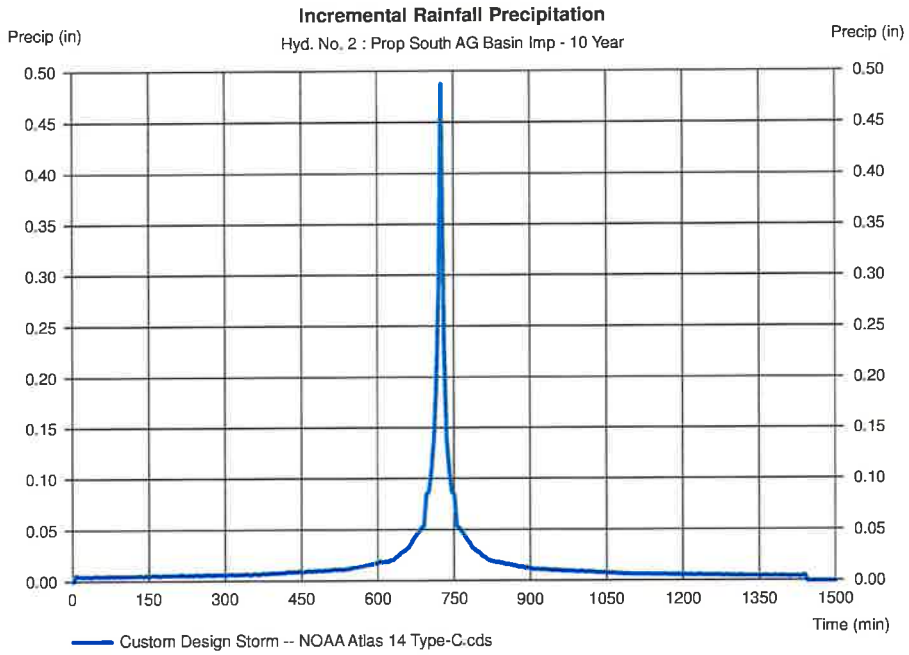


Precipitation Report

Hyd. No. 2

Prop South AG Basin Imp

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

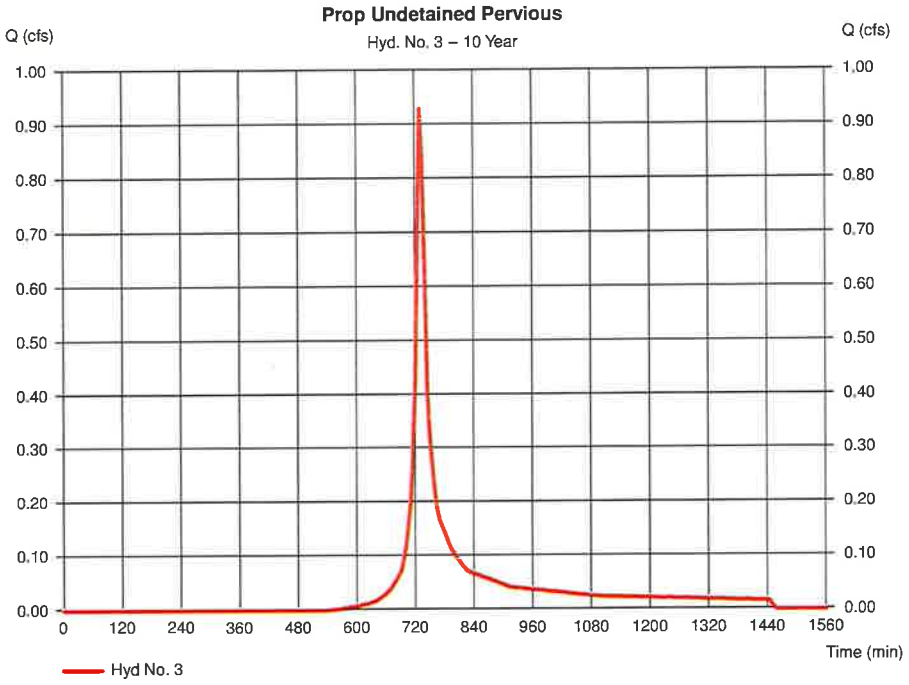


Hydrograph Report

Hyd. No. 3

Prop Undetained Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.930 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 3,391 cuft
Drainage area	= 0.420 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

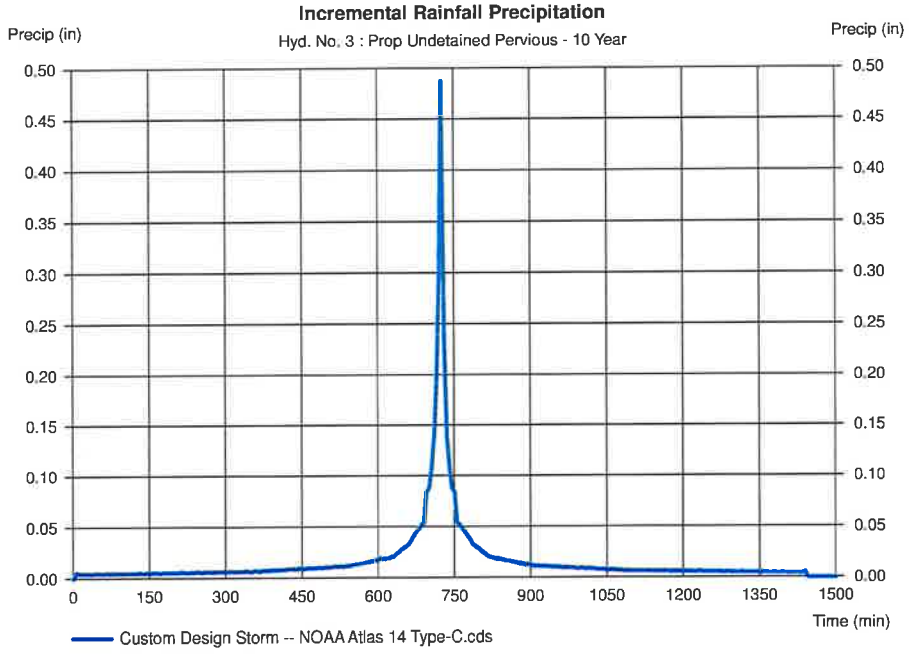


Precipitation Report

Hyd. No. 3

Prop Undetained Pervious

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

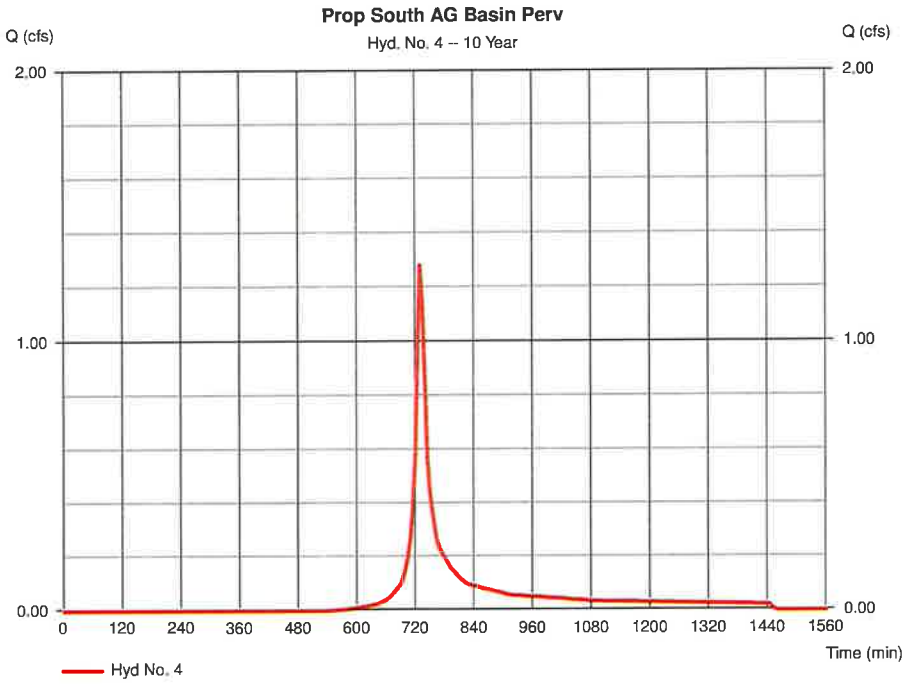


Hydrograph Report

Hyd. No. 4

Prop South AG Basin Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 1.284 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 4,682 cuft
Drainage area	= 0.580 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

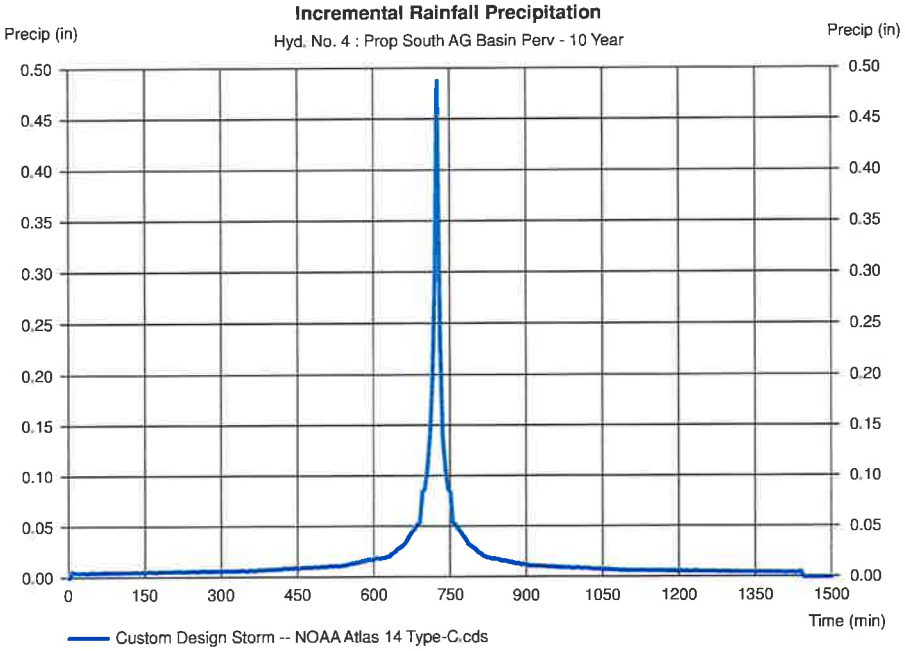


Precipitation Report

Hyd. No. 4

Prop South AG Basin Perv

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

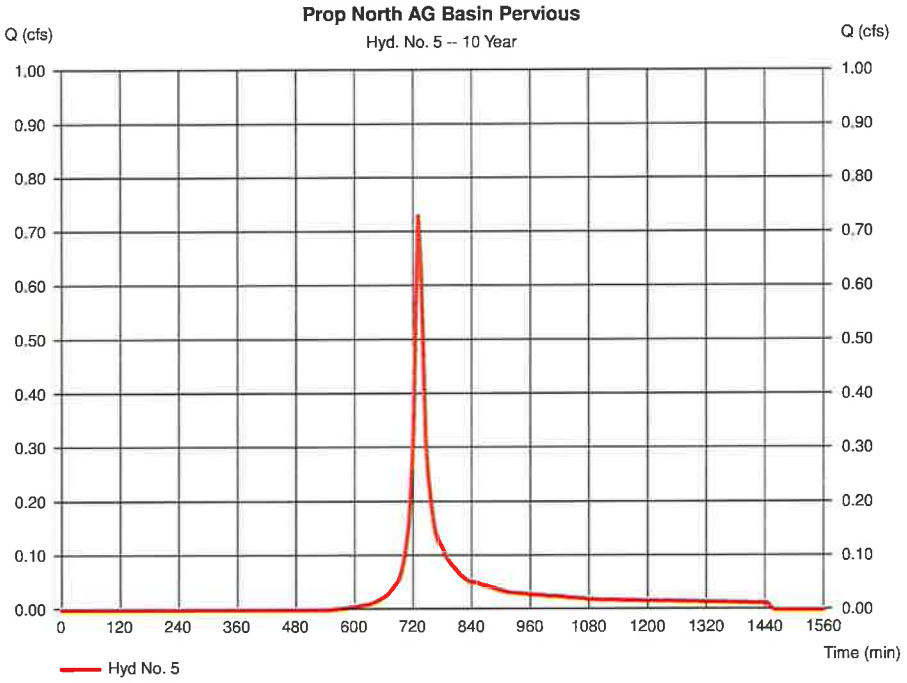


Hydrograph Report

Hyd. No. 5

Prop North AG Basin Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.731 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 2,664 cuft
Drainage area	= 0.330 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.01 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds	Shape factor	= 484

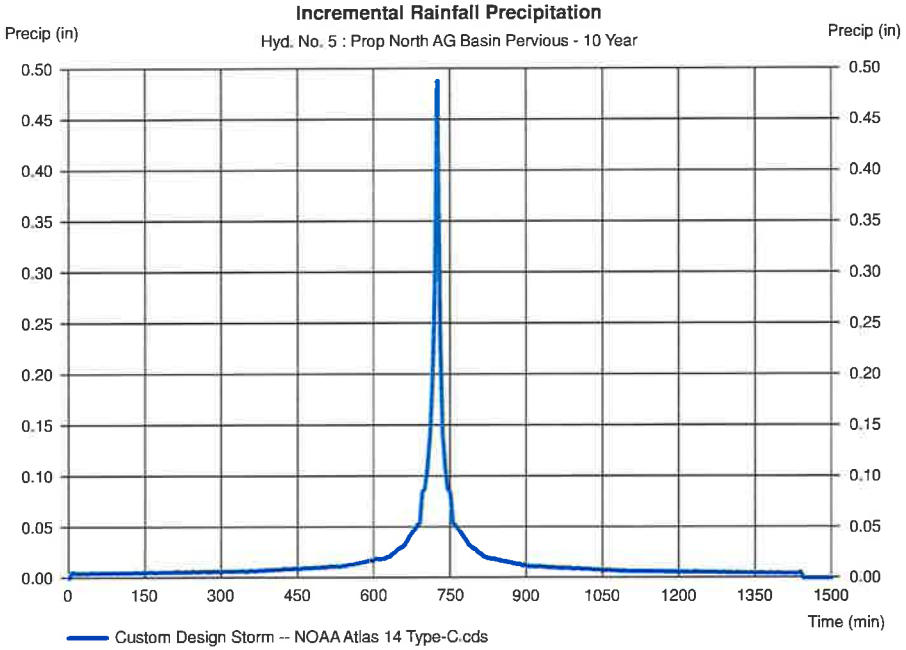


Precipitation Report

Hyd. No. 5

Prop North AG Basin Pervious

Storm Frequency	= 10 yrs	Time interval	= 5 min
Total precip.	= 5.0100 in	Distribution	= Custom
Storm duration	= NOAA Atlas 14 Type-C.cds		

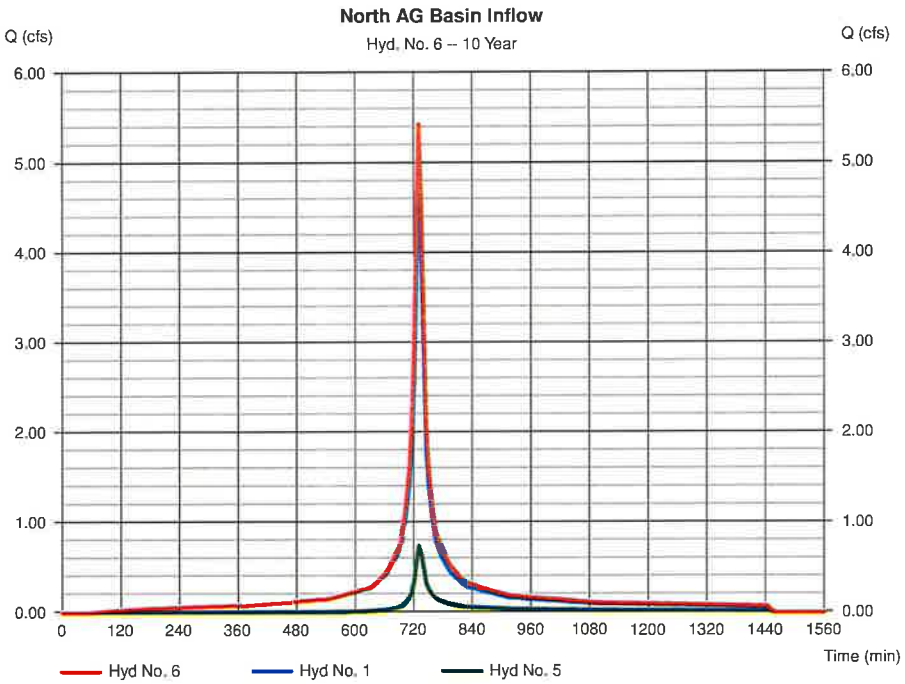


Hydrograph Report

Hyd. No. 6

North AG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 5.439 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 22,319 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 1.540 ac



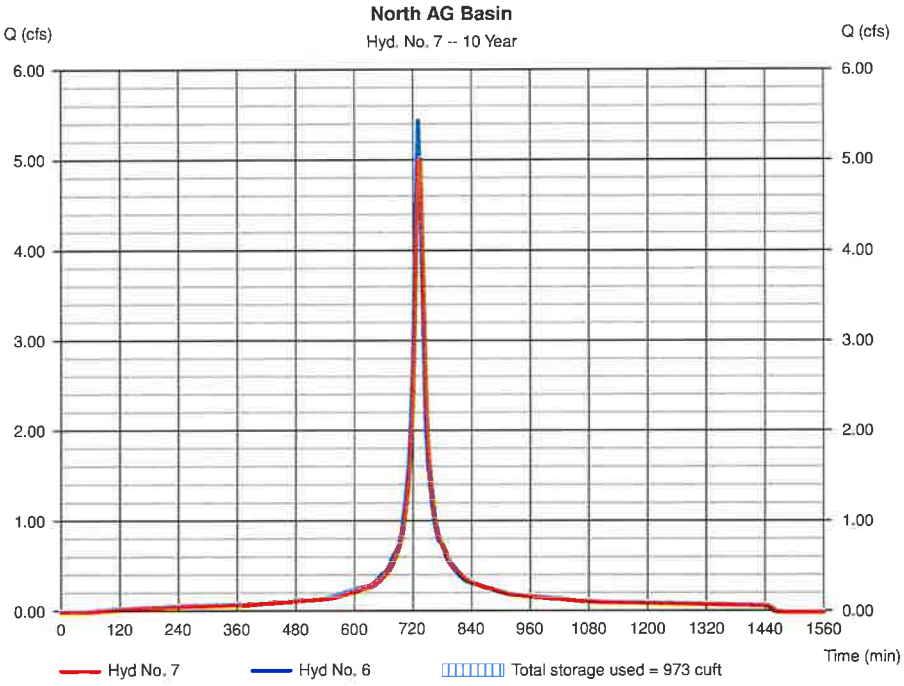
Hydrograph Report

Hyd. No. 7

North AG Basin

Hydrograph type	= Reservoir	Peak discharge	= 5.027 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 22,318 cuft
Inflow hyd. No.	= 6 - North AG Basin Inflow	Max. Elevation	= 60.22 ft
Reservoir name	= ES North Basin	Max. Storage	= 973 cuft

Storage Indication method used.

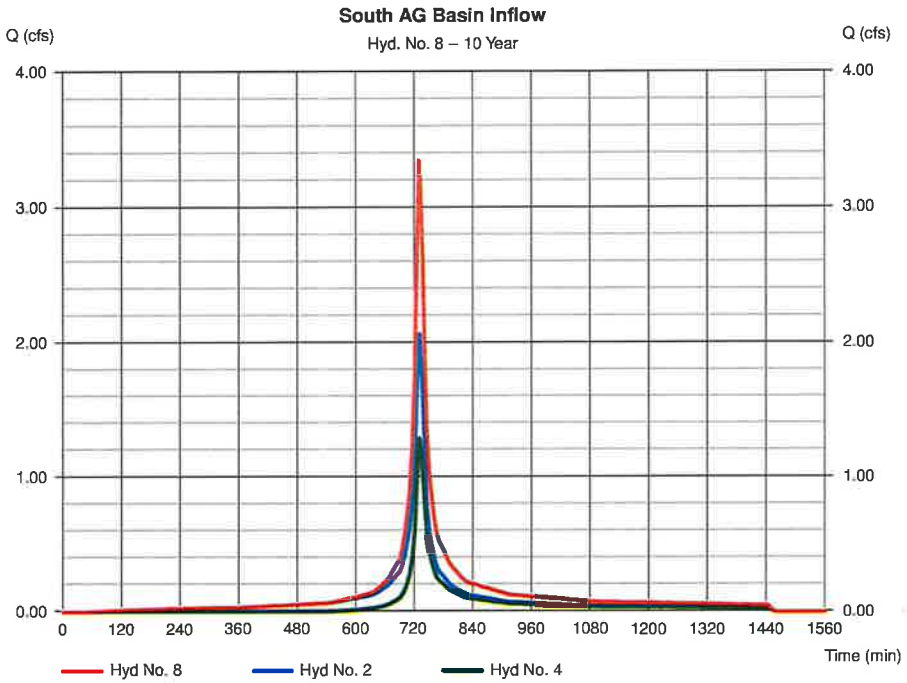


Hydrograph Report

Hyd. No. 8

South AG Basin Inflow

Hydrograph type	= Combine	Peak discharge	= 3.347 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 13,291 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 1.110 ac



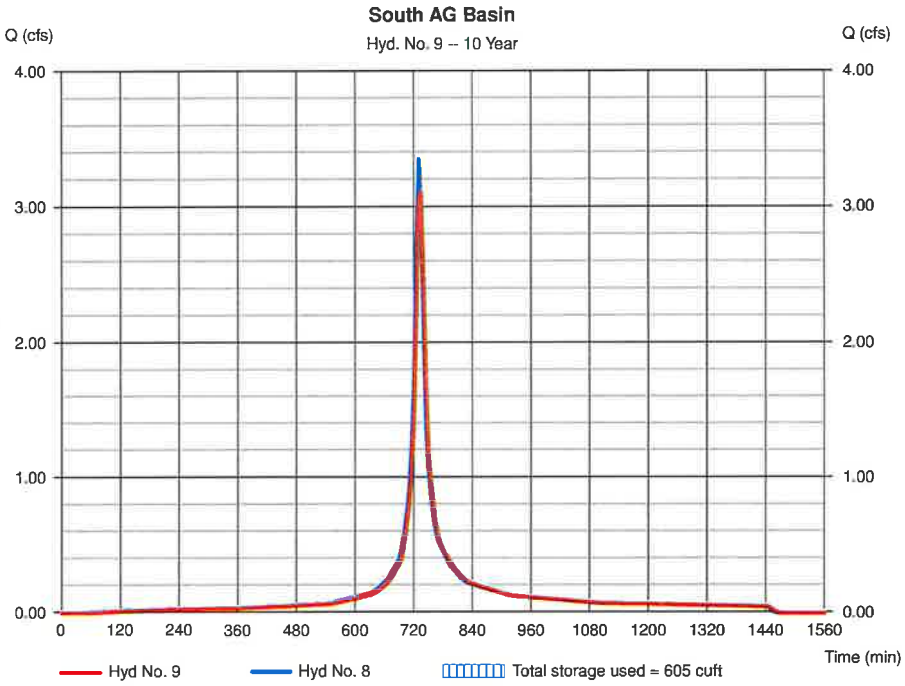
Hydrograph Report

Hyd. No. 9

South AG Basin

Hydrograph type	= Reservoir	Peak discharge	= 3.113 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 5 min	Hyd. volume	= 13,291 cuft
Inflow hyd. No.	= 8 - South AG Basin Inflow	Max. Elevation	= 64.95 ft
Reservoir name	= ES South Basin	Max. Storage	= 605 cuft

Storage Indication method used.



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	39.0824	9.5000	0.8528	----
2	45.6943	10.7000	0.8185	----
3	0.0000	0.0000	0.0000	----
5	99.7061	14.8000	0.9304	----
10	249.7597	21.8001	1.0961	----
25	115.7547	14.9000	0.8980	----
50	7.3699	0.1000	0.2544	----
100	403.8513	25.1001	1.1108	----

File name: TRENTON.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.00	3.10	2.55	2.18	1.91	1.70	1.54	1.40	1.29	1.20	1.12	1.05
2	4.80	3.83	3.21	2.77	2.45	2.20	2.00	1.84	1.70	1.59	1.49	1.40
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.20	5.03	4.24	3.67	3.24	2.90	2.63	2.40	2.22	2.06	1.92	1.80
10	6.80	5.63	4.80	4.17	3.69	3.30	2.98	2.72	2.50	2.31	2.14	2.00
25	7.89	6.45	5.47	4.76	4.23	3.80	3.46	3.17	2.93	2.73	2.55	2.40
50	4.87	4.09	3.69	3.44	3.25	3.10	2.98	2.88	2.80	2.72	2.66	2.60
100	9.20	7.76	6.69	5.87	5.22	4.70	4.27	3.91	3.60	3.33	3.10	2.90

Tc = time in minutes. Values may exceed 60.

Precip. file name: Somerset County.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.34	0.00	0.00	5.01	6.15	0.00	8.21
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	3.34	0.00	0.00	5.01	6.15	0.00	8.21

DELAWARE AND RARITAN CANAL COMMISSION
NON-STRUCTURAL STATEGIES POINTS SYSTEM
(NSPS)

NJDEP Nonstructural Strategies Points System (NSPS)

Version: January 31, 2006

Note: Input Values in Yellow Cells Only

Project: AACTFR Property, LLC

Date: January 21, 2021

User: MJS/JLG

Notes:

Step 1 - Provide Basic Major Development Site Information

A. Specify Total Area in Acres of Development Site Described in Steps 2 and 3 = 6.9 **Acres**

B. Specify by Percent the Various Planning Areas Located within the Development Site:

State Plan Planning Area:	PA-1	PA-2	PA-3	PA-4	PA-4B	PA-5	Total % Area
Percent of Each Planning Area within Site:	100.0%						100.0%

Note: See User's Guide for Equivalent Zones within Designated Centers and the NJ Meadowlands, Pinelands, and Highlands Districts

Step 2 - Describe Existing or Pre-Developed Site Conditions

A. Specify Existing Land Use/Land Cover Descriptions and Areas:

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals	Points
		HSG A	HSG B	HSG C	HSG D		
1	Wetlands and Undisturbed Stream Buffers			1.1		1.1	65
2	Lawn and Open Space					0.0	0
3	Brush and Shrub			1.7		1.7	62
4	Meadow, Pasture, Grassland, or Range					0.0	0
5	Row Crop					0.0	0
6	Small Grain and Legumes					0.0	0
7	Woods - Indigenous			4.1		4.1	192
8	Woods - Planted					0.0	0
9	Woods and Grass Combination					0.0	0
10	Ponds, Lakes, and Other Open Water					0.0	0
11	Gravel and Dirt					0.0	0
12	Porous and Permeable Paving					0.0	0
13	Directly Connected Impervious					0.0	0
14	Unconnected Impervious with Small D/S Pervious					0.0	0
15	Unconnected Impervious with Large D/S Pervious					0.0	0
	HSG Subtotals (Acres):	0.0	0.0	6.9	0.0	**Total Area:**	6.9
	HSG Subtotals (%):	0.0%	0.0%	100.0%	0.0%	**Total % Area:**	100.0%

Points Subtotal: **320**

Total Existing Site Points: **320**

Step 3 - Describe Proposed or Post-Developed Site Conditions

A. Specify Proposed Land Use/Land Cover Descriptions and Areas:

Site Segment	Land Use/Land Cover Description	Specify Land Use/Land Cover in Acres for Each HSG				Use/Cover Subtotals	Points
		HSG A	HSG B	HSG C	HSG D		
1	Wetlands and Undisturbed Stream Buffers			1.0		1.0	59
2	Lawn and Open Space			1.3		1.3	43
3	Brush and Shrub					0.0	0
4	Meadow, Pasture, Grassland, or Range					0.0	0
5	Row Crop					0.0	0
6	Small Grain and Legumes					0.0	0
7	Woods - Indigenous			0.5		0.5	23
8	Woods - Planted					0.0	0
9	Woods and Grass Combination					0.0	0
10	Ponds, Lakes, and Other Open Water					0.0	0
11	Gravel and Dirt					0.0	0
12	Porous and Permeable Paving					0.0	0
13	Directly Connected Impervious			4.1		4.1	0
14	Unconnected Impervious with Small D/S Pervious					0.0	0
15	Unconnected Impervious with Large D/S Pervious					0.0	0
	HSG Subtotals (Acres):	0.0	0.0	6.9	0.0	**Total Area:**	6.9
	HSG Subtotals (%):	0.0%	0.0%	100.0%	0.0%	**Total % Area:**	100.0%
						Points Subtotal:	**126**

B. Compare Proposed Impervious Coverage with Maximum Allowable Impervious Coverage:

Total Directly Connected Impervious Coverage =	59%	% of Site
Total Unconnected Impervious Coverage with Small D/S Pervious =	0%	% of Site
Total Unconnected Impervious Coverage with Large D/S Pervious =	0%	% of Site
Total Site Impervious Coverage =	59%	% of Site
Effective Site Impervious Coverage =	59%	% of Site
Specify Source of Maximum Allowable Impervious Coverage:	Table	(None or Table)
Allowable Site Impervious Cover from Maximum Impervious Cover Table:	72%	

Note: See Maximum Impervious Cover Table Worksheet for Details

Points Subtotal: 8

C. Compare Proposed Site Disturbance with Maximum Allowable Site Disturbance:

Total Proposed Site Disturbance =	81%	% of Site
Maximum Allowable Site Disturbance by Municipal Ordinance =	100%	% of Site

Points Subtotal: 9

D. Describe Proposed Runoff Conveyance System:

Total Length of Runoff Conveyance System =		Feet
Length of Vegetated Runoff Conveyance System =		Feet
% of Total Runoff Conveyance System That is Vegetated =	0%	

Points Subtotal: 0

E. Residential Lot Clustering:

Percent of Total Site Area that will be Clustered =		% of Site
Minimum Standard Lot Size as Per Zoning (Note: 1/2 Acre or Greater) =		Acres
Maximum Proposed Cluster Lot Size (Note:1/4 Acre or Less) =		Acres
Percent of Clustered Portion of Site to be Preserved as Vegetated Open Space =		% of Clustered Site Portion

Points Subtotal: 0

F. Will the Following be Utilized to Minimize Soil Compaction?

Proposed Lawn Areas will be Graded with Lightweight Construction Equipment:	Yes	(Yes or No)
Percent of Proposed Lawn Areas to be Graded with Such Equipment:	80%	% of Lawn Areas

Points Subtotal: 18

G. Are Any of the Following Stormwater Management Standards Met Using Only Nonstructural Strategies and Measures?

Groundwater Recharge Standards (NJAC 7:8-5.4-a-2):	No	(Yes or No)
Stormwater Runoff Quality Standards (NJAC 7:8-5.5):	Yes	(Yes or No)
Stormwater Runoff Quantity Standards (NJAC 7:8-5.4-a-3):	Yes	(Yes or No)

Points Subtotal: 161

Note: If the Answers to All Three Questions at G Above are "Yes", Adequate Nonstructural Measures have been Utilized.

Total Proposed Site Points: 323

Ratio of Proposed to Existing Site Points: 101%

Required Site Points Ratio: 76%

Nonstructural Point System Results: Proposed Nonstructural Measures are Adequate

STORMWATER BASIN AREA INVESTIGATION
PREPARED BY DYNAMIC EARTH, LLC
(PROVIDED UNDER SEPARATE COVER)

DRAINAGE AREA MAPS

TAX LOT 3.20
N/F PAY FOR PLAY INVESTMENTS, LLC
DB. 5154, PG. 2571
438.53' (S)
438.33' (WR1)
N12° 09' 16"W
N09° 02' 23"W
STUDY AREA UNDISTURBED EXISTING DRAINAGE AREA
Chain Link Fence
Flared End Section
Turf Field
Wall
Cap Fnd.
Tree Line
Wooded Area
Isolated Wetlands Area
Watercourse
Somerset County Drainage Easement per Filed Map #1897
Boundary Agreement Line per DB. 7634, PG. 741
Wetland Observation Point, (Typ.) T20P2
Wetlands Flag (Typ.), See General Note
SHALLOW CONCENTRATED FLOW @ 0.5% SL. (100') UNPAVED
Tree Plot #2
T1OP2
T1OP1
E
D
C
B
A
STUDY AREA EXISTING DRAINAGE AREA TO BE DISTURBED
TAX LOT 8.07
N/F M-AFFILIATES & ELKINS ENTERPRISES
DB. 5398, PG. 3403
656.29' (S)
655.36' (WR1)
S07° 42' 30"E
S78° 42' 15"E
741.58' (WR1)
743.54' (S)
TAX LOT 8.05
N/F M-AFFILIATES & ELKINS ENTERPRISES
DB. 5398, PG. 3403
SHALLOW CONCENTRATED FLOW @ 1.4% SL. (359') UNPAVED
TAX LOT 8.06
BLOCK 517.01
N/F M-AFFILIATES & ELKINS ENTERPRISES
DB. 5398, PG. 3403
300,783 SF, 6.905 AC.
1 Story Building
N03° 13' 20"W
N78° 12' 15"W
Chain Link Fence
SHALLOW CONCENTRATED FLOW @ 7.8% SL. (30') UNPAVED
Tree Plot #1
SHEET FLOW @ 3.7% SL. (57') LIGHT UNDERBRUSH
50' Wide Setback per Filed Map #1897
429.80' (WR1)
S06° 16' 40"W
Real Estate Sign
P.O.B.
Generator
Grass
Stone
Elec. Vault
No Parking Sign
Conc. Curb
429.80' (S)
S11° 17' 45"W
COTTONTAIL LANE
(VARIABLE ROW WIDTH PER TAX MAP)
Sanitary Manhole
No Stopping or Standing Sign
Benchmark P.K. Nail Set EL: 65.34
UP #67369
UP #67368FL w/ Light
UP #67367FL
UP #67341F
Dep. Curb
GRAPHIC SCALE
-30 0 15 30 60 120
(IN FEET)
1 INCH = 30 FT.

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

Rev.	Date	Comments	By

DYNAMIC ENGINEERING

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F: 732.974.3521
www.dynamicec.com

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Allen, Texas T: 972.534.2100 | Austin, Texas T:512.646.2646 | Houston, Texas T: 281.789.6400
Newtown, Pennsylvania T: 267.685.0276 | Philadelphia, Pennsylvania T: 215.253.4888 | Delray Beach, Florida T: 561.921.8570

TITLE:

EXISTING DRAINAGE AREA MAP

PROJECT: **AACTFR PROPERTY, LLC**
PROPOSED WAREHOUSE BUILDING
BLOCK 517.01, LOT 8.06
401 COTTONTAIL LANE
FRANKLIN TOWNSHIP, SOMERSET COUNTY, NEW JERSEY

JOB No:	3532-99-001
DATE:	12/18/2020
DRAWN BY:	RAU
DESIGNED BY:	TD
CHECKED BY:	JD
CHECKED BY:	_
SCALE:	(H) 1"=30' (V)
SHEET No:	1 OF 3
Rev. #	0

TIAGO F. DUARTE
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 52588

JACQUELYN GIORDANO
PROFESSIONAL ENGINEER
NEW JERSEY LICENSE No. 53558

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Plotted: 01/25/21 – 11:35 AM, By: runsworth, – Product Ver: 23.1s (LMS Tech)
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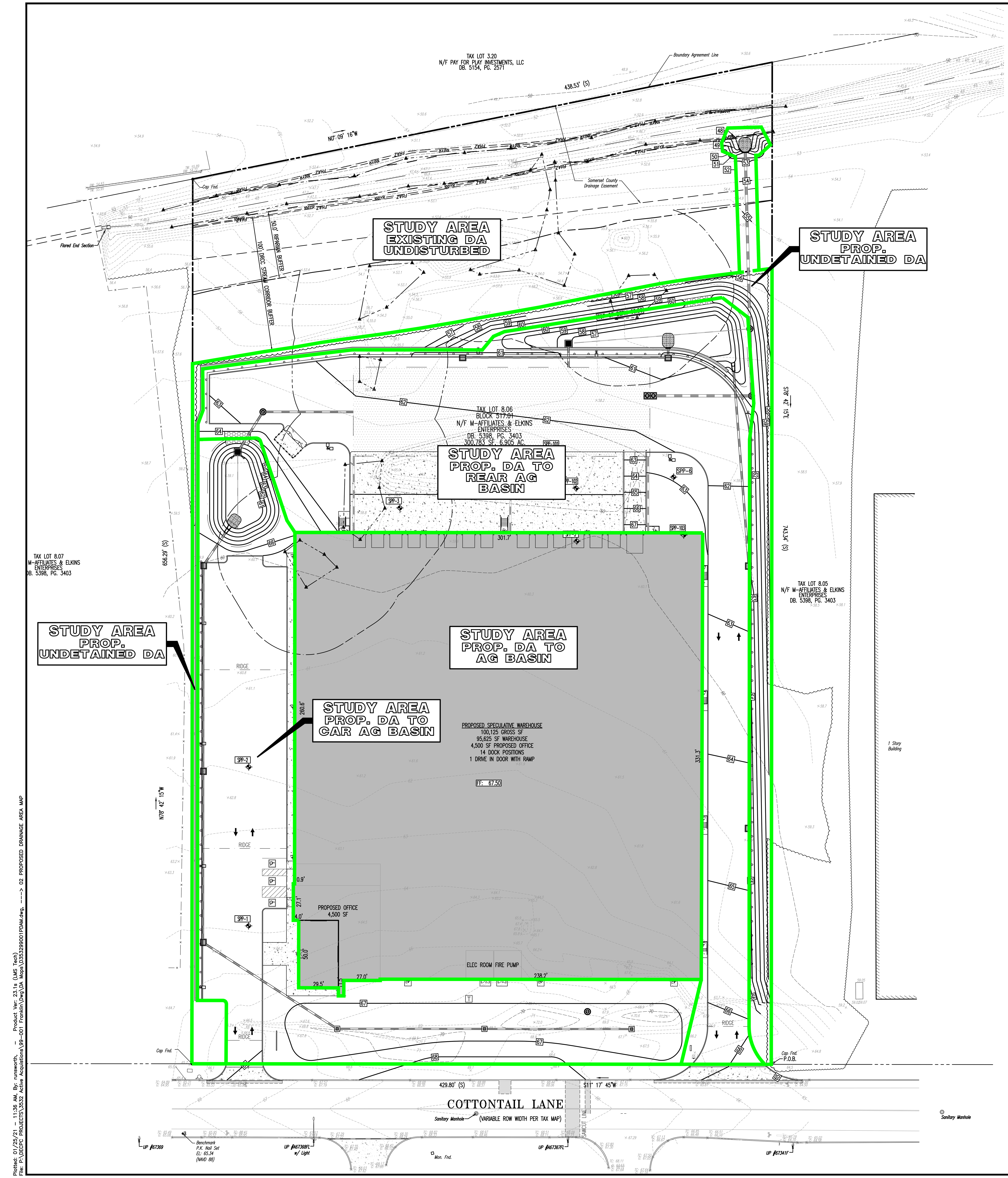

GRAPHIC SCALE

-30 0 15 30 60 120

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TITLE:

PROPOSED DRAINAGE AREA MAP

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PROPOSED WAREHOUSE BUILDING
BLOCK 517.01, LOT 8.06
401 COTTONTAIL LANE
FRANKLIN TOWNSHIP, SOMERSET COUNTY, NEW JERSEY

JOB No: 3532-99-001	DATE: 12/18/2020
DRAWN BY: RAU	SCALE: (H) 1"=30' (V).
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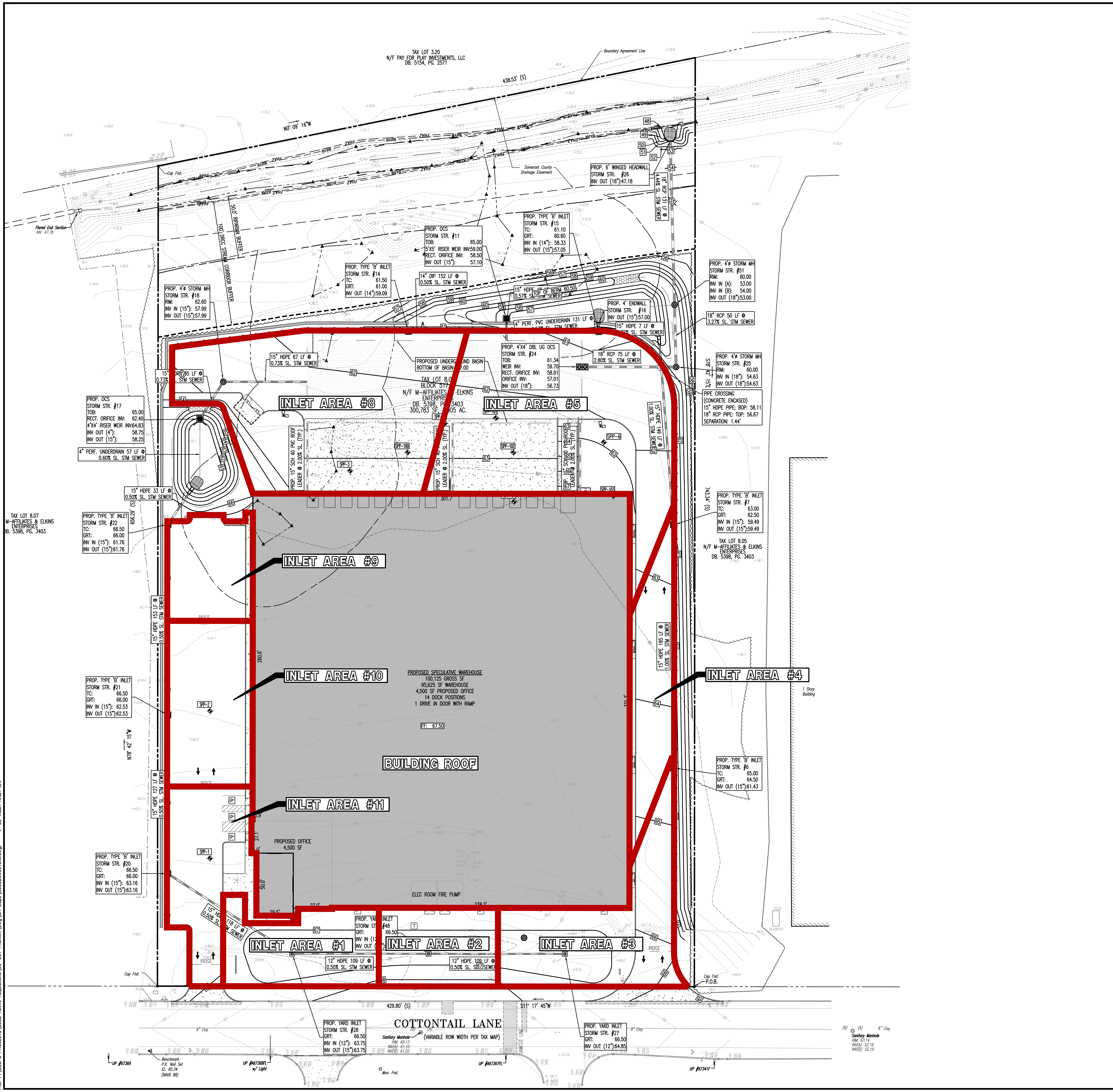

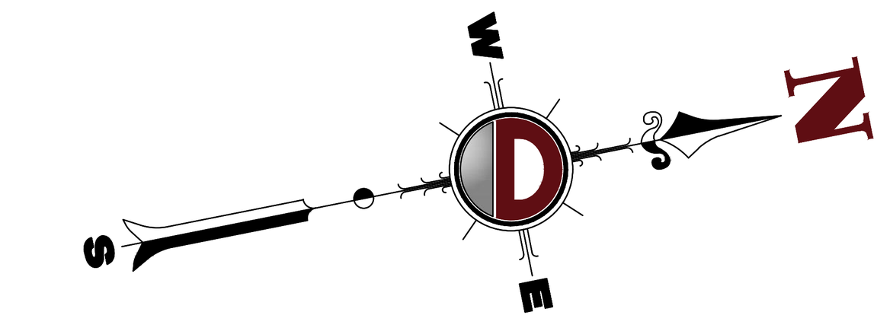

GRAPHIC SCALE

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Newtown, Pennsylvania T: 267.685.0276 | Philadelphia, Pennsylvania T: 215.253.4888 | Delray Beach, Florida T: 561.921.8570

TITLE:

INLET AREA MAP

PROJECT: **AACTFR PROPERTY, LLC**
PROPOSED WAREHOUSE BUILDING
BLOCK 517.01, LOT 8.06
401 COTTONTAIL LANE
FRANKLIN TOWNSHIP, SOMERSET COUNTY, NEW JERSEY

JOB No:	3532-99-001
DATE:	12/18/2020
DRAWN BY:	AJH
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