

Stormwater Impact Analysis

**The Learning Center Rolesville
302 South Main St.**

Rolesville, North Carolina
KHA Project ID No. 013031004

Prepared for:
Rolesville, LLC
Submitted: March 2024
Revised: July 2024

STORMWATER IMPACT ANALYSIS

THE LEARNING CENTER ROLESVILLE
302 SOUTH MAIN STREET
ROLESVILLE, NORTH CAROLINA 27571

PREPARED FOR:

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KHA #013031004



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TABLE OF CONTENTS

OVERVIEW

Narrative

APPENDICES

Appendix A – FEMA Flood Insurance Rate Map

Appendix B – Wake County Quadrangle Map

Appendix C – 1970 USDA Soils Map
NCRS WSS Site Soil Map and Information

Appendix D – Pre-Development Drainage Area Map
Post-Development Drainage Area Map

Appendix E – Stormwater Quantity Calculations
Wet Pond Calculations
Headwater Culvert Calculation

Appendix F – Town of Rolesville Rainfall Intensities and Depths Charts
Inlet Drainage Map
2-year Storm Inlet Table for Spread
10-year Storm Pipe Table
10-year Storm Pipe-Inlet HGL Profiles

Appendix G – 10% Rule Drainage Area Map
10% Rule Calculations

Appendix H – Sediment Basin Design Calculations
Rip-Rap Calculations

OVERVIEW

This report contains the approach and results of a stormwater impact analysis conducted for the proposed The Learning Center Rolesville project. The project site consists of the parcel located at 302 South Main Street in Rolesville, North Carolina. The parcel is currently vacant. The stormwater study area encompasses approximately 1.25 acres.

From the NRCS Soil Survey, the near surface soils are classified as 100% Urban Land. Ground cover was assumed to be in good condition for both the pre- and post-development calculations.

The property is not within a defined floodplain area and is not identified under a special flood hazard per FEMA FIRM presented within Appendix A. Per the USGS Quadrangle Map (Appendix B) there is not a “blue line” stream present. There are no streams and wetlands onsite.

Proposed Development

This project proposes the development of a child learning center and associated infrastructure. The proposed development increases the existing impervious coverage in the study area from 0.17 acres to 0.82 acres. Due to the increase in impervious area, detention and water quality treatment are required.

Stormwater Analysis

Stormwater management measures shall be designed in accordance with the Town of Rolesville, Wake County, and NCDEQ Stormwater Guidelines. Per the Town of Rolesville stormwater quantity requirements, the post-development stormwater runoff rate leaving the site shall not exceed pre-development conditions for the local 1-year, 24-hour storm events. Downstream impact analysis must also be performed in accordance with the “ten percent rule” based on the 10-year post-development peak flow rate.

Per the Town of Rolesville stormwater quality requirements, all development projects required to manage storm water shall provide permanent on-site BMPs to lower the nitrogen export amounts. The code further states the measures shall control and treat runoff from the first inch of rain with a runoff volume drawdown time between 48 and 120 hours.

Water Quantity

Three points of analysis (POA-1, POA-2, and POA-3) encompass the impacted site area. The flow rates at the POAs were evaluated using the SCM Method. The calculations for POA-2 and POA-3 indicate that the post-development peak runoff rates will not exceed pre-development rates for the 1-year 24-hour storm event, therefore detention is not required. The calculations for POA-1 indicate that the post-development peak runoff rates will exceed pre-development rates for the 1-year 24-hour storm event, therefore detention is required. A wet detention basin is proposed to achieve the peak-flow attenuation of the 1-year 24-hour storm at POA-1. The time of concentration was assumed to be 5 minutes for the pre-development condition due to the small site area. Post-development areas were assumed to have a time of concentration of 5 minutes. See below for flow summaries.

POA 1

Pre-Development 1 year flow- 1.13 cfs	Post Development 1 year flow- 1.09 cfs
Pre-Development 10 year flow- 2.78 cfs	Post Development 10 year flow- 4.51 cfs
Pre-Development 25 year flow – 3.54 cfs	Post Development 25 year flow- 5.53 cfs
Pre-Development 100-year flow- 4.80 cfs	Post Development 100 year flow- 7.09 cfs

POA 2

Pre-Development 1 year flow- 0.16 cfs	Post Development 1 year flow- 0.17 cfs
Pre-Development 10 year flow- 0.40 cfs	Post Development 10 year flow- 0.40 cfs
Pre-Development 25 year flow – 0.51 cfs	Post Development 25 year flow- 0.50 cfs
Pre-Development 100-year flow- 0.70 cfs	Post Development 100 year flow- 0.67 cfs

POA 3

Pre-Development 1 year flow- 1.09 cfs	Post Development 1 year flow- 1.09 cfs
Pre-Development 10 year flow- 2.68 cfs	Post Development 10 year flow- 2.16 cfs
Pre-Development 25 year flow – 3.42 cfs	Post Development 25 year flow- 2.62 cfs
Pre-Development 100-year flow- 4.63 cfs	Post Development 100 year flow- 3.36 cfs

Downstream Impact Analysis

Per the Town of Rolesville LDO, a downstream impact analysis was performed for the 1-year 24-hour and 10-year storm events. The pre- and post-development peak flow rates calculated were substantially similar and therefore in compliance with Town of Rolesville requirements. Refer to Appendix G for downstream impact analysis calculations.

Pre-Development 10 year flow- 142.75 cfs	Post Development 10 year flow- 144.86 cfs
--	---

Water Quality

The one (1) proposed wet detention basin will be used as a water quality BMP, treating the 1-inch storm. The proposed BMP is in accordance with the NCDEQ Design Manual. Refer to Appendix E for stormwater quality calculations.

Conclusion

The calculations indicate that the proposed development will comply with local and state stormwater requirements. To meet Town of Rolesville stormwater quantity requirements, this site will incorporate a wet detention basin for detention. The proposed wet detention basin will also be utilized as a water quality BMP. Water quality regulation measures are required based on the increase in impervious area to the proposed development.

APPENDIX A

APPENDIX B



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

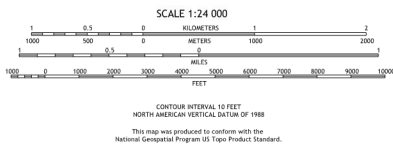
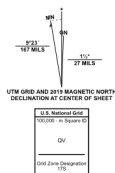


ROLESVILLE QUADRANGLE
NORTH CAROLINA
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84) Projection and
1 000-meter grid/Universal Transverse Mercator, Zone 17S
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Imagery.....NAP, July 2020 - July 2020
Roads.....U.S. Census Bureau, 2016
Names.....GNC, 1983 - 2022
Hydrography.....National Hydrography Dataset, 2001 - 2021
Contours.....National Elevation Dataset, 2008
Boundaries.....Multiple sources; see metadata file 2019 - 2021
Wetlands.....FWS National Wetlands Inventory Not Available



1	2	3
4	5	6
7	8	9

QUADRANGLE LOCATION

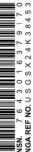
1 Grison
2 Franklin
3 Lenoir
4 Wake Forest
5 Burnsville
6 Raleigh East
7 Farmington
8 Zebulon

ADJACENT QUADRANGLES

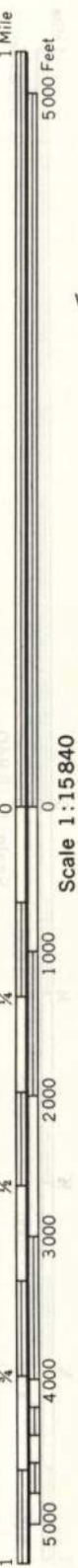
ROAD CLASSIFICATION

Expressway Local Connector
Secondary Hwy Local Road
Bypass US Route
Interstate Route State Route

ROLESVILLE, NC
2022



APPENDIX C

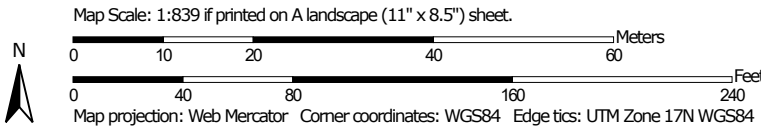


PROJECT SITE

Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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: Wake County, North Carolina
Survey Area Data: Version 25, Oct 2, 2023

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

Date(s) aerial images were photographed: Apr 24, 2022—May 9, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ur	Urban land	1.3	100.0%
Totals for Area of Interest		1.3	100.0%

Map Unit Descriptions

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

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

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

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

Custom Soil Resource Report

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.

Wake County, North Carolina

Ur—Urban land

Map Unit Setting

National map unit symbol: 2qwpc

Elevation: 70 to 1,400 feet

Mean annual precipitation: 39 to 51 inches

Mean annual air temperature: 54 to 63 degrees F

Frost-free period: 190 to 250 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent

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

Description of Urban Land

Setting

Parent material: Impervious layers over human-transported material

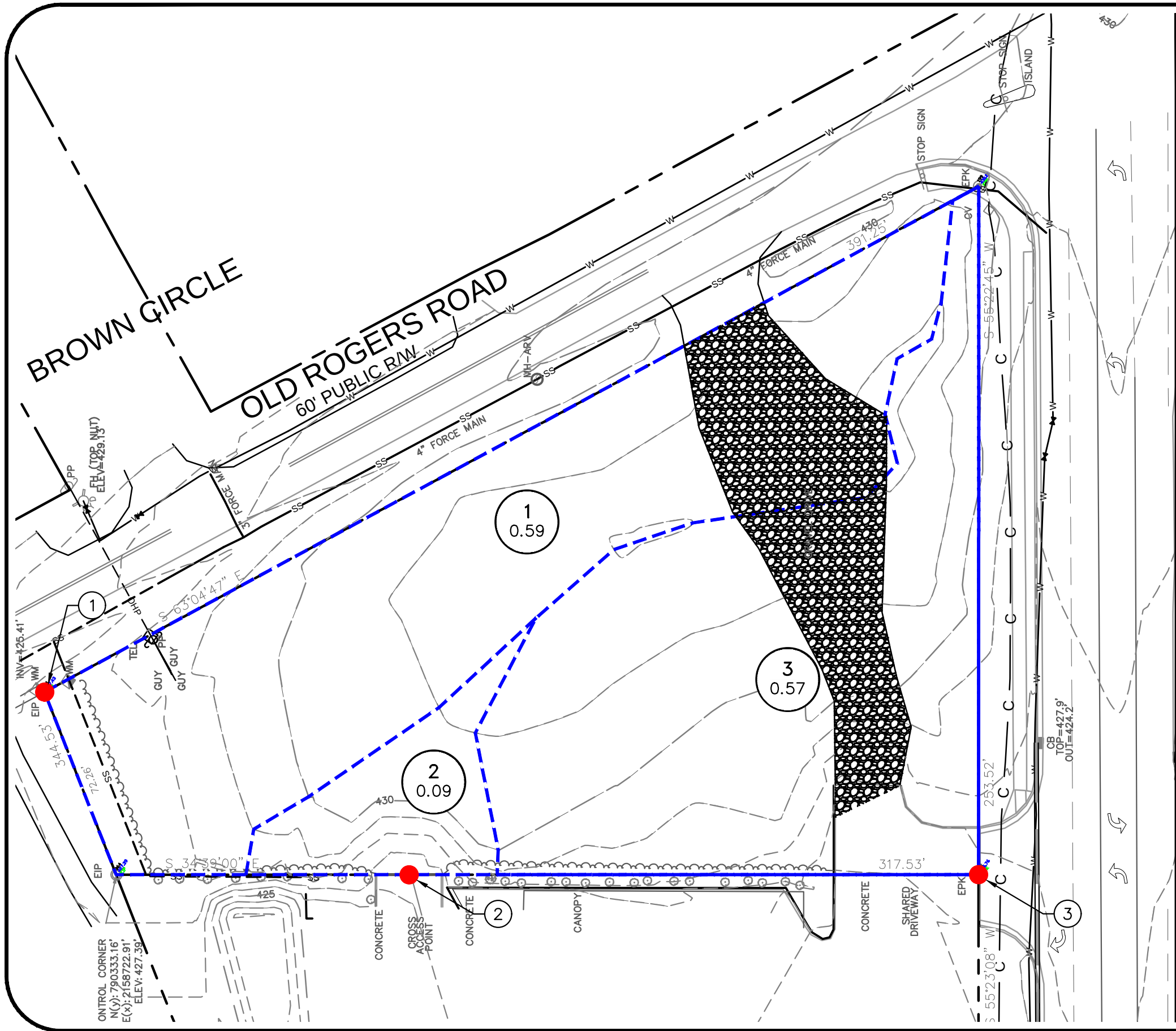
Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydric soil rating: No

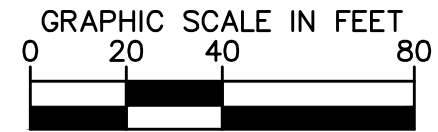
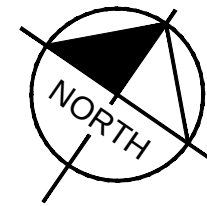
APPENDIX D



ROLESVILLE LEARNING CENTER

DRAINAGE AREA TABLE					
DRAINAGE AREA	PERVIOUS (AC)	IMPERVIOUS (AC)	TOTAL (AC)	T _c (MIN)	OUTFALL NOTES
1	0.50	0.09	0.59	5.0	—
2	0.09	0.00	0.09	5.0	
3	0.49	0.08	0.57	5.0	
TOTAL	1.08	0.17	1.25		

NOTES
1. ASSUMED MINIMUM TIME OF CONCENTRATION = 5 MINUTES



LEGEND

- DRAINAGE AREA OUTLINE
- PROPERTY LINE
- POINT OF ANALYSIS
- SUBAREA ID
SUBAREA SIZE

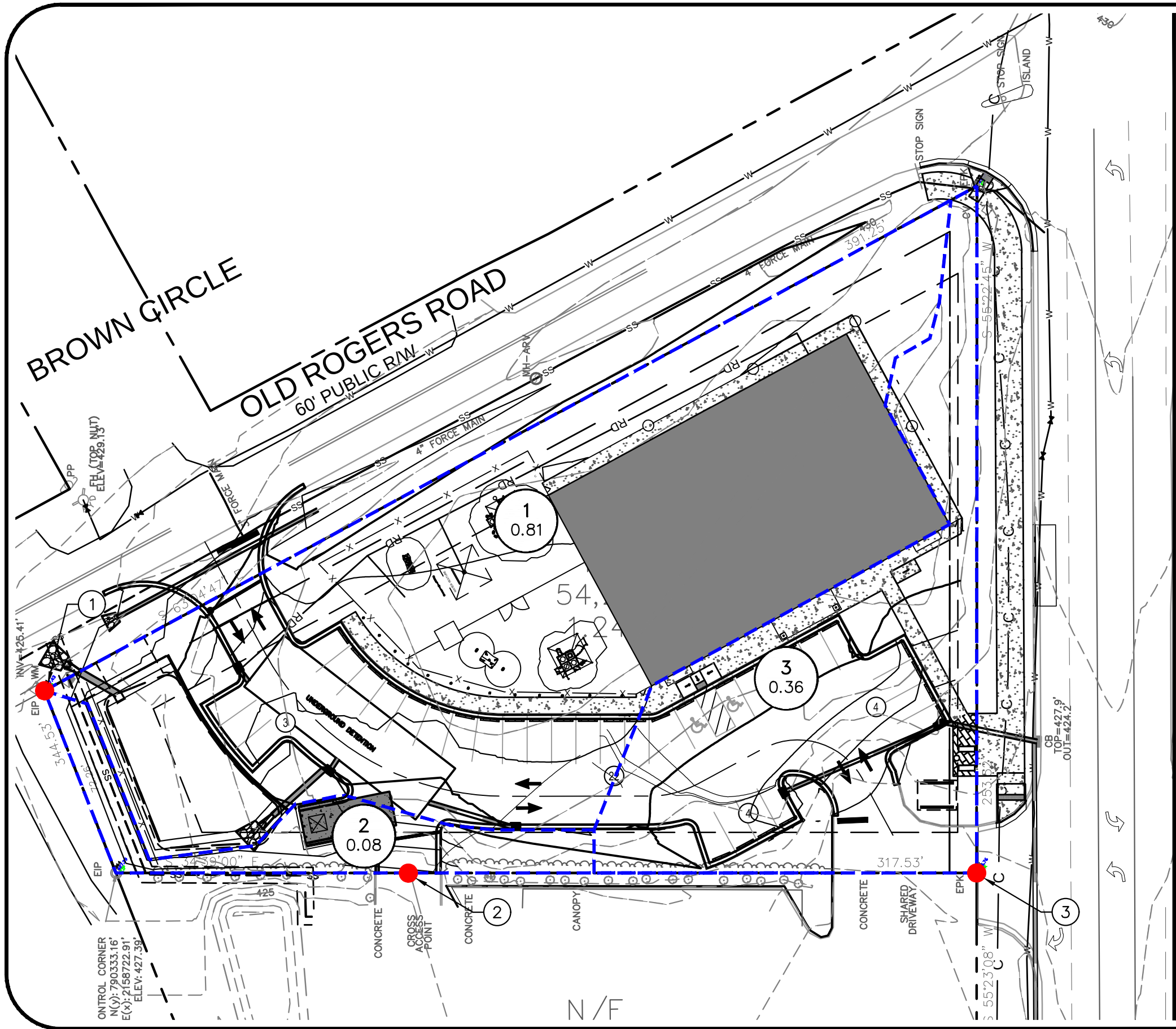
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PRE-DEVELOPMENT DRAINAGE AREA MAP

KHA PROJECT NO: 013031004

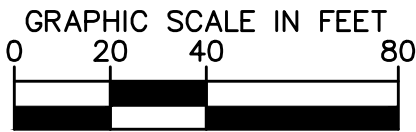
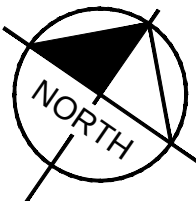
DATE: 02/29/2024



ROLESVILLE LEARNING CENTER

DRAINAGE AREA TABLE					
DRAINAGE AREA	PERVIOUS (AC)	IMPERVIOUS (AC)	TOTAL (AC)	T _c (MIN)	OUTFALL NOTES
1	0.24	0.57	0.81	5.0	—
2	0.06	0.02	0.08	5.0	
3	0.13	0.23	0.36	5.0	
TOTAL	0.43	0.82	1.25		

NOTES
1. ASSUMED MINIMUM TIME OF CONCENTRATION = 5 MINUTES



LEGEND

- DRAINAGE AREA OUTLINE
- PROPERTY LINE
- POINT OF ANALYSIS
- X
AC SUBAREA ID
SUBAREA SIZE

POST-DEVELOPMENT DRAINAGE AREA MAP

KHA PROJECT NO: 013031004
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APPENDIX E

Table of Contents

	Master Network Summary	1
Rolesville		
	Time-Depth Curve, 10 years (10 Year)	4
	Time-Depth Curve, 100 years (100 Year)	6
	Time-Depth Curve, 0 years (1-inch)	8
	Time-Depth Curve, 1 years (1-year 24-hour)	10
	Time-Depth Curve, 25 years (25 Year)	12
POST-POA 1 DA		
	Time of Concentration Calculations, 1 years (1-year 24-hour)	14
POST-POA 2 DA		
	Time of Concentration Calculations, 1 years (1-year 24-hour)	16
POST-POA 3 DA		
	Time of Concentration Calculations, 1 years (1-year 24-hour)	18
PRE-POA 1 DA		
	Time of Concentration Calculations, 1 years (1-year 24-hour)	20
PRE-POA 2 DA		
	Time of Concentration Calculations, 1 years (1-year 24-hour)	22
PRE-POA 3 DA		
	Time of Concentration Calculations, 1 years (1-year 24-hour)	24
POST-POA 1 DA		
	Runoff CN-Area, 1 years (1-year 24-hour)	26
POST-POA 2 DA		
	Runoff CN-Area, 1 years (1-year 24-hour)	27
POST-POA 3 DA		
	Runoff CN-Area, 1 years (1-year 24-hour)	28
PRE-POA 1 DA		
	Runoff CN-Area, 1 years (1-year 24-hour)	29
PRE-POA 2 DA		
	Runoff CN-Area, 1 years (1-year 24-hour)	30
PRE-POA 3 DA		
	Runoff CN-Area, 1 years (1-year 24-hour)	31
POST-POA 1 DA		
	Unit Hydrograph Summary, 0 years (1-inch)	32
	Unit Hydrograph Summary, 1 years (1-year 24-hour)	34

Table of Contents

	Unit Hydrograph Summary, 10 years (10 Year)	36
	Unit Hydrograph Summary, 25 years (25 Year)	38
	Unit Hydrograph Summary, 100 years (100 Year)	40
POST-POA 2 DA		
	Unit Hydrograph Summary, 0 years (1-inch)	42
	Unit Hydrograph Summary, 10 years (10 Year)	44
	Unit Hydrograph Summary, 25 years (25 Year)	46
	Unit Hydrograph Summary, 100 years (100 Year)	48
POST-POA 3 DA		
	Unit Hydrograph Summary, 0 years (1-inch)	50
	Unit Hydrograph Summary, 1 years (1-year 24-hour)	52
	Unit Hydrograph Summary, 10 years (10 Year)	54
	Unit Hydrograph Summary, 25 years (25 Year)	56
	Unit Hydrograph Summary, 100 years (100 Year)	58
PRE-POA 1 DA		
	Unit Hydrograph Summary, 0 years (1-inch)	60
	Unit Hydrograph Summary, 1 years (1-year 24-hour)	62
	Unit Hydrograph Summary, 10 years (10 Year)	64
	Unit Hydrograph Summary, 25 years (25 Year)	66
	Unit Hydrograph Summary, 100 years (100 Year)	68
PRE-POA 2 DA		
	Unit Hydrograph Summary, 0 years (1-inch)	70
	Unit Hydrograph Summary, 1 years (1-year 24-hour)	72
	Unit Hydrograph Summary, 10 years (10 Year)	74
	Unit Hydrograph Summary, 25 years (25 Year)	76
	Unit Hydrograph Summary, 100 years (100 Year)	78
PRE-POA 3 DA		
	Unit Hydrograph Summary, 0 years (1-inch)	80
	Unit Hydrograph Summary, 1 years (1-year 24-hour)	82
	Unit Hydrograph Summary, 10 years (10 Year)	84
	Unit Hydrograph Summary, 25 years (25 Year)	86
	Unit Hydrograph Summary, 100 years (100 Year)	88
WET POND	Time vs. Volume, 1 years (1-year 24-hour)	90
WET POND	Elevation-Area Volume Curve, 1 years (1-year 24-hour)	93

Table of Contents

Composite Outlet Structure - 1	Outlet Input Data, 1 years (1-year 24-hour)	94
WET POND (IN)		
	Pond Inflow Summary, 0 years (1-inch)	98
	Pond Inflow Summary, 1 years (1-year 24-hour)	99
	Pond Inflow Summary, 10 years (10 Year)	100
	Pond Inflow Summary, 25 years (25 Year)	101
	Pond Inflow Summary, 100 years (100 Year)	102

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)
PRE-POA 1 DA	1-inch	0	0.006	12.000	0.08
PRE-POA 1 DA	1-year 24-hour	1	0.062	11.950	1.13
PRE-POA 1 DA	10 Year	10	0.153	11.900	2.78
PRE-POA 1 DA	25 Year	25	0.196	11.900	3.54
PRE-POA 1 DA	100 Year	100	0.267	11.900	4.80
POST-POA 1 DA	1-inch	0	0.030	11.950	0.55
POST-POA 1 DA	1-year 24-hour	1	0.143	11.900	2.55
POST-POA 1 DA	10 Year	10	0.286	11.900	4.93
POST-POA 1 DA	25 Year	25	0.350	11.900	5.97
POST-POA 1 DA	100 Year	100	0.454	11.900	7.64
PRE-POA 2 DA	1-inch	0	0.001	12.000	0.01
PRE-POA 2 DA	1-year 24-hour	1	0.009	11.950	0.16
PRE-POA 2 DA	10 Year	10	0.022	11.900	0.40
PRE-POA 2 DA	25 Year	25	0.028	11.900	0.51
PRE-POA 2 DA	100 Year	100	0.039	11.900	0.70
PRE-POA 3 DA	1-inch	0	0.005	12.000	0.07
PRE-POA 3 DA	1-year 24-hour	1	0.060	11.950	1.09
PRE-POA 3 DA	10 Year	10	0.148	11.900	2.68
PRE-POA 3 DA	25 Year	25	0.189	11.900	3.42
PRE-POA 3 DA	100 Year	100	0.258	11.900	4.63
POST-POA 2 DA	1-inch	0	0.001	12.000	0.02
POST-POA 2 DA	1-year 24-hour	1	0.009	11.950	0.17
POST-POA 2 DA	10 Year	10	0.022	11.900	0.40
POST-POA 2 DA	25 Year	25	0.028	11.900	0.50
POST-POA 2 DA	100 Year	100	0.038	11.900	0.67
POST-POA 3 DA	1-inch	0	0.012	11.950	0.22
POST-POA 3 DA	1-year 24-hour	1	0.061	11.900	1.09
POST-POA 3 DA	10 Year	10	0.124	11.900	2.16
POST-POA 3 DA	25 Year	25	0.152	11.900	2.62
POST-POA 3 DA	100 Year	100	0.198	11.900	3.36

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)
PRE- POA 1	1-inch	0	0.006	12.000	0.08
PRE- POA 1	1-year 24-hour	1	0.062	11.950	1.13
PRE- POA 1	10 Year	10	0.153	11.900	2.78
PRE- POA 1	25 Year	25	0.196	11.900	3.54
PRE- POA 1	100 Year	100	0.267	11.900	4.80
POST-POA 1	1-inch	0	0.010	18.450	0.01
POST-POA 1	1-year 24-hour	1	0.094	12.050	1.09
POST-POA 1	10 Year	10	0.236	11.950	4.51
POST-POA 1	25 Year	25	0.300	11.950	5.53

Subsection: Master Network Summary

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)
POST-POA 1	100 Year	100	0.404	11.950	7.09
PRE-POA 2	1-inch	0	0.001	12.000	0.01
PRE-POA 2	1-year 24-hour	1	0.009	11.950	0.16
PRE-POA 2	10 Year	10	0.022	11.900	0.40
PRE-POA 2	25 Year	25	0.028	11.900	0.51
PRE-POA 2	100 Year	100	0.039	11.900	0.70
PRE-POA 3	1-inch	0	0.005	12.000	0.07
PRE-POA 3	1-year 24-hour	1	0.060	11.950	1.09
PRE-POA 3	10 Year	10	0.148	11.900	2.68
PRE-POA 3	25 Year	25	0.189	11.900	3.42
PRE-POA 3	100 Year	100	0.258	11.900	4.63
POST-POA 2	1-inch	0	0.001	12.000	0.02
POST-POA 2	1-year 24-hour	1	0.009	11.950	0.17
POST-POA 2	10 Year	10	0.022	11.900	0.40
POST-POA 2	25 Year	25	0.028	11.900	0.50
POST-POA 2	100 Year	100	0.038	11.900	0.67
POST-POA 3	1-inch	0	0.012	11.950	0.22
POST-POA 3	1-year 24-hour	1	0.061	11.900	1.09
POST-POA 3	10 Year	10	0.124	11.900	2.16
POST-POA 3	25 Year	25	0.152	11.900	2.62
POST-POA 3	100 Year	100	0.198	11.900	3.36

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
WET POND (IN)	1-inch	0	0.030	11.950	0.55	(N/A)	(N/A)
WET POND (OUT)	1-inch	0	0.010	18.450	0.01	426.66	0.021
WET POND (IN)	1-year 24-hour	1	0.143	11.900	2.55	(N/A)	(N/A)
WET POND (OUT)	1-year 24-hour	1	0.094	12.050	1.09	427.82	0.068
WET POND (IN)	10 Year	10	0.286	11.900	4.93	(N/A)	(N/A)
WET POND (OUT)	10 Year	10	0.236	11.950	4.51	428.21	0.086
WET POND (IN)	25 Year	25	0.350	11.900	5.97	(N/A)	(N/A)
WET POND (OUT)	25 Year	25	0.300	11.950	5.53	428.28	0.090

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
WET POND (IN)	100 Year	100	0.454	11.900	7.64	(N/A)	(N/A)
WET POND (OUT)	100 Year	100	0.404	11.950	7.09	428.39	0.095

Subsection: Time-Depth Curve
Label: Rolesville
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Time-Depth Curve: 10 Year

Label	10 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.2	0.2	0.2
4.000	0.2	0.2	0.3	0.3	0.3
4.500	0.3	0.3	0.3	0.3	0.3
5.000	0.3	0.3	0.3	0.3	0.4
5.500	0.4	0.4	0.4	0.4	0.4
6.000	0.4	0.4	0.4	0.4	0.4
6.500	0.4	0.5	0.5	0.5	0.5
7.000	0.5	0.5	0.5	0.5	0.5
7.500	0.6	0.6	0.6	0.6	0.6
8.000	0.6	0.6	0.6	0.6	0.7
8.500	0.7	0.7	0.7	0.7	0.7
9.000	0.7	0.8	0.8	0.8	0.8
9.500	0.8	0.8	0.9	0.9	0.9
10.000	0.9	0.9	1.0	1.0	1.0
10.500	1.0	1.1	1.1	1.1	1.1
11.000	1.2	1.2	1.3	1.3	1.4
11.500	1.4	1.5	1.8	2.2	2.9
12.000	3.3	3.4	3.5	3.6	3.7
12.500	3.7	3.7	3.8	3.8	3.9
13.000	3.9	3.9	3.9	4.0	4.0
13.500	4.0	4.1	4.1	4.1	4.1
14.000	4.1	4.2	4.2	4.2	4.2
14.500	4.2	4.2	4.3	4.3	4.3
15.000	4.3	4.3	4.3	4.3	4.4
15.500	4.4	4.4	4.4	4.4	4.4
16.000	4.4	4.4	4.5	4.5	4.5
16.500	4.5	4.5	4.5	4.5	4.5
17.000	4.5	4.6	4.6	4.6	4.6

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 10 Year

Return Event: 10 years
 Storm Event: 10 Year

CUMULATIVE RAINFALL (in)
 Output Time Increment = 0.100 hours
 Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	4.6	4.6	4.6	4.6	4.6
18.000	4.6	4.7	4.7	4.7	4.7
18.500	4.7	4.7	4.7	4.7	4.7
19.000	4.7	4.7	4.7	4.7	4.8
19.500	4.8	4.8	4.8	4.8	4.8
20.000	4.8	4.8	4.8	4.8	4.8
20.500	4.8	4.8	4.8	4.8	4.9
21.000	4.9	4.9	4.9	4.9	4.9
21.500	4.9	4.9	4.9	4.9	4.9
22.000	4.9	4.9	4.9	4.9	4.9
22.500	5.0	5.0	5.0	5.0	5.0
23.000	5.0	5.0	5.0	5.0	5.0
23.500	5.0	5.0	5.0	5.0	5.0
24.000	5.0	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 100 Year

Return Event: 100 years
 Storm Event: 100 Year

Time-Depth Curve: 100 Year

Label	100 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.2
2.000	0.2	0.2	0.2	0.2	0.2
2.500	0.2	0.2	0.2	0.2	0.3
3.000	0.3	0.3	0.3	0.3	0.3
3.500	0.3	0.3	0.3	0.3	0.4
4.000	0.4	0.4	0.4	0.4	0.4
4.500	0.4	0.4	0.4	0.5	0.5
5.000	0.5	0.5	0.5	0.5	0.5
5.500	0.5	0.6	0.6	0.6	0.6
6.000	0.6	0.6	0.6	0.6	0.7
6.500	0.7	0.7	0.7	0.7	0.7
7.000	0.7	0.8	0.8	0.8	0.8
7.500	0.8	0.8	0.9	0.9	0.9
8.000	0.9	0.9	0.9	1.0	1.0
8.500	1.0	1.0	1.0	1.1	1.1
9.000	1.1	1.1	1.2	1.2	1.2
9.500	1.2	1.3	1.3	1.3	1.3
10.000	1.4	1.4	1.4	1.5	1.5
10.500	1.5	1.6	1.6	1.7	1.7
11.000	1.8	1.8	1.9	2.0	2.1
11.500	2.1	2.3	2.7	3.3	4.3
12.000	5.0	5.2	5.3	5.4	5.5
12.500	5.6	5.6	5.7	5.7	5.8
13.000	5.8	5.9	5.9	6.0	6.0
13.500	6.0	6.1	6.1	6.1	6.2
14.000	6.2	6.2	6.3	6.3	6.3
14.500	6.3	6.4	6.4	6.4	6.4
15.000	6.5	6.5	6.5	6.5	6.5
15.500	6.6	6.6	6.6	6.6	6.6
16.000	6.7	6.7	6.7	6.7	6.7
16.500	6.7	6.8	6.8	6.8	6.8
17.000	6.8	6.8	6.8	6.9	6.9

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 100 Year

Return Event: 100 years
 Storm Event: 100 Year

CUMULATIVE RAINFALL (in)
 Output Time Increment = 0.100 hours
 Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	6.9	6.9	6.9	6.9	6.9
18.000	7.0	7.0	7.0	7.0	7.0
18.500	7.0	7.0	7.1	7.1	7.1
19.000	7.1	7.1	7.1	7.1	7.1
19.500	7.1	7.2	7.2	7.2	7.2
20.000	7.2	7.2	7.2	7.2	7.2
20.500	7.2	7.3	7.3	7.3	7.3
21.000	7.3	7.3	7.3	7.3	7.3
21.500	7.3	7.3	7.4	7.4	7.4
22.000	7.4	7.4	7.4	7.4	7.4
22.500	7.4	7.4	7.4	7.5	7.5
23.000	7.5	7.5	7.5	7.5	7.5
23.500	7.5	7.5	7.5	7.5	7.6
24.000	7.6	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 1-inch

Return Event: 0 years
 Storm Event: 1-inch

Time-Depth Curve: 1-inch

Label	1-inch
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	0 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.0	0.0	0.0	0.0	0.0
2.000	0.0	0.0	0.0	0.0	0.0
2.500	0.0	0.0	0.0	0.0	0.0
3.000	0.0	0.0	0.0	0.0	0.0
3.500	0.0	0.0	0.0	0.0	0.0
4.000	0.0	0.0	0.1	0.1	0.1
4.500	0.1	0.1	0.1	0.1	0.1
5.000	0.1	0.1	0.1	0.1	0.1
5.500	0.1	0.1	0.1	0.1	0.1
6.000	0.1	0.1	0.1	0.1	0.1
6.500	0.1	0.1	0.1	0.1	0.1
7.000	0.1	0.1	0.1	0.1	0.1
7.500	0.1	0.1	0.1	0.1	0.1
8.000	0.1	0.1	0.1	0.1	0.1
8.500	0.1	0.1	0.1	0.1	0.1
9.000	0.1	0.2	0.2	0.2	0.2
9.500	0.2	0.2	0.2	0.2	0.2
10.000	0.2	0.2	0.2	0.2	0.2
10.500	0.2	0.2	0.2	0.2	0.2
11.000	0.2	0.2	0.3	0.3	0.3
11.500	0.3	0.3	0.4	0.4	0.6
12.000	0.7	0.7	0.7	0.7	0.7
12.500	0.7	0.7	0.8	0.8	0.8
13.000	0.8	0.8	0.8	0.8	0.8
13.500	0.8	0.8	0.8	0.8	0.8
14.000	0.8	0.8	0.8	0.8	0.8
14.500	0.8	0.8	0.8	0.8	0.9
15.000	0.9	0.9	0.9	0.9	0.9
15.500	0.9	0.9	0.9	0.9	0.9
16.000	0.9	0.9	0.9	0.9	0.9
16.500	0.9	0.9	0.9	0.9	0.9
17.000	0.9	0.9	0.9	0.9	0.9

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 1-inch

Return Event: 0 years
 Storm Event: 1-inch

CUMULATIVE RAINFALL (in)
 Output Time Increment = 0.100 hours
 Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	0.9	0.9	0.9	0.9	0.9
18.000	0.9	0.9	0.9	0.9	0.9
18.500	0.9	0.9	0.9	0.9	0.9
19.000	0.9	0.9	0.9	0.9	0.9
19.500	0.9	0.9	0.9	0.9	1.0
20.000	1.0	1.0	1.0	1.0	1.0
20.500	1.0	1.0	1.0	1.0	1.0
21.000	1.0	1.0	1.0	1.0	1.0
21.500	1.0	1.0	1.0	1.0	1.0
22.000	1.0	1.0	1.0	1.0	1.0
22.500	1.0	1.0	1.0	1.0	1.0
23.000	1.0	1.0	1.0	1.0	1.0
23.500	1.0	1.0	1.0	1.0	1.0
24.000	1.0	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time-Depth Curve

Label: Rolesville

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Time-Depth Curve: 1-year 24- Hour

Label	1-year 24- Hour
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	1 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.0	0.0	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.1	0.1	0.1	0.1	0.1
4.000	0.1	0.1	0.1	0.1	0.2
4.500	0.2	0.2	0.2	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.2
5.500	0.2	0.2	0.2	0.2	0.2
6.000	0.2	0.2	0.2	0.2	0.2
6.500	0.3	0.3	0.3	0.3	0.3
7.000	0.3	0.3	0.3	0.3	0.3
7.500	0.3	0.3	0.3	0.3	0.3
8.000	0.3	0.3	0.4	0.4	0.4
8.500	0.4	0.4	0.4	0.4	0.4
9.000	0.4	0.4	0.4	0.4	0.5
9.500	0.5	0.5	0.5	0.5	0.5
10.000	0.5	0.5	0.5	0.6	0.6
10.500	0.6	0.6	0.6	0.6	0.7
11.000	0.7	0.7	0.7	0.7	0.8
11.500	0.8	0.9	1.0	1.2	1.6
12.000	1.9	2.0	2.0	2.0	2.1
12.500	2.1	2.1	2.1	2.2	2.2
13.000	2.2	2.2	2.2	2.3	2.3
13.500	2.3	2.3	2.3	2.3	2.3
14.000	2.3	2.4	2.4	2.4	2.4
14.500	2.4	2.4	2.4	2.4	2.4
15.000	2.4	2.4	2.5	2.5	2.5
15.500	2.5	2.5	2.5	2.5	2.5
16.000	2.5	2.5	2.5	2.5	2.5
16.500	2.5	2.6	2.6	2.6	2.6
17.000	2.6	2.6	2.6	2.6	2.6

Subsection: Time-Depth Curve

Label: Rolesville

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	2.6	2.6	2.6	2.6	2.6
18.000	2.6	2.6	2.6	2.6	2.7
18.500	2.7	2.7	2.7	2.7	2.7
19.000	2.7	2.7	2.7	2.7	2.7
19.500	2.7	2.7	2.7	2.7	2.7
20.000	2.7	2.7	2.7	2.7	2.7
20.500	2.7	2.7	2.7	2.8	2.8
21.000	2.8	2.8	2.8	2.8	2.8
21.500	2.8	2.8	2.8	2.8	2.8
22.000	2.8	2.8	2.8	2.8	2.8
22.500	2.8	2.8	2.8	2.8	2.8
23.000	2.8	2.8	2.8	2.8	2.8
23.500	2.8	2.8	2.9	2.9	2.9
24.000	2.9	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time-Depth Curve
Label: Rolesville
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

Time-Depth Curve: 25 Year

Label	25 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	25 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.2	0.2
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.3	0.3	0.3	0.3
4.000	0.3	0.3	0.3	0.3	0.3
4.500	0.3	0.3	0.3	0.4	0.4
5.000	0.4	0.4	0.4	0.4	0.4
5.500	0.4	0.4	0.4	0.5	0.5
6.000	0.5	0.5	0.5	0.5	0.5
6.500	0.5	0.5	0.6	0.6	0.6
7.000	0.6	0.6	0.6	0.6	0.6
7.500	0.7	0.7	0.7	0.7	0.7
8.000	0.7	0.7	0.7	0.8	0.8
8.500	0.8	0.8	0.8	0.8	0.9
9.000	0.9	0.9	0.9	0.9	1.0
9.500	1.0	1.0	1.0	1.0	1.1
10.000	1.1	1.1	1.1	1.2	1.2
10.500	1.2	1.3	1.3	1.3	1.4
11.000	1.4	1.5	1.5	1.6	1.6
11.500	1.7	1.8	2.1	2.6	3.4
12.000	4.0	4.1	4.2	4.3	4.4
12.500	4.4	4.5	4.5	4.6	4.6
13.000	4.6	4.7	4.7	4.7	4.8
13.500	4.8	4.8	4.8	4.9	4.9
14.000	4.9	4.9	5.0	5.0	5.0
14.500	5.0	5.0	5.1	5.1	5.1
15.000	5.1	5.1	5.2	5.2	5.2
15.500	5.2	5.2	5.2	5.3	5.3
16.000	5.3	5.3	5.3	5.3	5.3
16.500	5.3	5.4	5.4	5.4	5.4
17.000	5.4	5.4	5.4	5.4	5.5

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 25 Year

Return Event: 25 years
 Storm Event: 25 Year

CUMULATIVE RAINFALL (in)
 Output Time Increment = 0.100 hours
 Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	5.5	5.5	5.5	5.5	5.5
18.000	5.5	5.5	5.5	5.6	5.6
18.500	5.6	5.6	5.6	5.6	5.6
19.000	5.6	5.6	5.6	5.7	5.7
19.500	5.7	5.7	5.7	5.7	5.7
20.000	5.7	5.7	5.7	5.7	5.7
20.500	5.8	5.8	5.8	5.8	5.8
21.000	5.8	5.8	5.8	5.8	5.8
21.500	5.8	5.8	5.8	5.8	5.9
22.000	5.9	5.9	5.9	5.9	5.9
22.500	5.9	5.9	5.9	5.9	5.9
23.000	5.9	5.9	5.9	6.0	6.0
23.500	6.0	6.0	6.0	6.0	6.0
24.000	6.0	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time of Concentration Calculations

Label: POST-POA 1 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Time of Concentration Results

Segment #1: User Defined Tc

Time of Concentration	0.083 hours
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Time of Concentration (Composite)

Time of Concentration (Composite)	0.083 hours
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Subsection: Time of Concentration Calculations

Label: POST-POA 1 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

=== User Defined

Tc = Value entered by user

Where: Tc= Time of concentration, hours

Subsection: Time of Concentration Calculations

Label: POST-POA 2 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Time of Concentration Results

Segment #1: User Defined Tc

Time of Concentration	0.083 hours
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Time of Concentration (Composite)

Time of Concentration (Composite)	0.083 hours
--------------------------------------	-------------

Subsection: Time of Concentration Calculations

Label: POST-POA 2 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

=== User Defined

Tc =	Value entered by user
Where:	Tc= Time of concentration, hours

Subsection: Time of Concentration Calculations

Label: POST-POA 3 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Time of Concentration Results

Segment #1: User Defined Tc

Time of Concentration	0.083 hours
-----------------------	-------------

Time of Concentration (Composite)

Time of Concentration (Composite)	0.083 hours
--------------------------------------	-------------

Subsection: Time of Concentration Calculations

Label: POST-POA 3 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

=== User Defined

Tc = Value entered by user

Where: Tc= Time of concentration, hours

Subsection: Time of Concentration Calculations

Label: PRE-POA 1 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Time of Concentration Results

Segment #1: User Defined Tc

Time of Concentration	0.083 hours
-----------------------	-------------

Time of Concentration (Composite)

Time of Concentration (Composite)	0.083 hours
--------------------------------------	-------------

Subsection: Time of Concentration Calculations

Label: PRE-POA 1 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

=== User Defined

Tc = Value entered by user

Where: Tc= Time of concentration, hours

Subsection: Time of Concentration Calculations

Label: PRE-POA 2 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Time of Concentration Results

Segment #1: User Defined Tc

Time of Concentration	0.083 hours
-----------------------	-------------

Time of Concentration (Composite)

Time of Concentration (Composite)	0.083 hours
--------------------------------------	-------------

Subsection: Time of Concentration Calculations

Label: PRE-POA 2 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

=== User Defined

Tc = Value entered by user
Where: Tc= Time of concentration, hours

Subsection: Time of Concentration Calculations

Label: PRE-POA 3 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Time of Concentration Results

Segment #1: User Defined Tc

Time of Concentration	0.083 hours
-----------------------	-------------

Time of Concentration (Composite)

Time of Concentration (Composite)	0.083 hours
--------------------------------------	-------------

Subsection: Time of Concentration Calculations

Label: PRE-POA 3 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

=== User Defined

Tc = Value entered by user
Where: Tc= Time of concentration, hours

Subsection: Runoff CN-Area

Label: POST-POA 1 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	0.570	0.0	0.0	98.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	0.240	0.0	0.0	80.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.810	(N/A)	(N/A)	92.667

Subsection: Runoff CN-Area

Label: POST-POA 2 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	0.060	0.0	0.0	80.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	0.020	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.080	(N/A)	(N/A)	84.500

Subsection: Runoff CN-Area

Label: POST-POA 3 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	0.130	0.0	0.0	80.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	0.230	0.0	0.0	98.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.360	(N/A)	(N/A)	91.500

Subsection: Runoff CN-Area

Label: PRE-POA 1 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	0.500	0.0	0.0	80.000
Impervious Areas - Gravel (w/ right-of- way) - Soil D	91.000	0.090	0.0	0.0	91.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.590	(N/A)	(N/A)	81.678

Subsection: Runoff CN-Area

Label: PRE-POA 2 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	0.090	0.0	0.0	80.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.090	(N/A)	(N/A)	80.000

Subsection: Runoff CN-Area
 Label: PRE-POA 3 DA
 Scenario: 1-year 24-hour

Return Event: 1 years
 Storm Event: 1-year 24- Hour

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	0.490	0.0	0.0	80.000
Impervious Areas - Gravel (w/ right-of-way) - Soil D	91.000	0.080	0.0	0.0	91.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.570	(N/A)	(N/A)	81.544

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

Storm Event	1-inch
Return Event	0 years
Duration	24.000 hours
Depth	1.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.810 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.57 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.55 ft ³ /s
Drainage Area	
SCS CN (Composite)	93.000
Area (User Defined)	0.810 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.5 in
Runoff Volume (Pervious)	0.030 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.030 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	11.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Storm Event	1-year 24- Hour
Return Event	1 years
Duration	24.000 hours
Depth	2.9 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.810 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	2.62 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.55 ft ³ /s
Drainage Area	
SCS CN (Composite)	93.000
Area (User Defined)	0.810 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.1 in
Runoff Volume (Pervious)	0.143 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.143 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	11.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.810 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	5.03 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	4.93 ft ³ /s
Drainage Area	
SCS CN (Composite)	93.000
Area (User Defined)	0.810 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.2 in
Runoff Volume (Pervious)	0.286 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.286 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	11.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.810 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	6.08 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	5.97 ft ³ /s
Drainage Area	
SCS CN (Composite)	93.000
Area (User Defined)	0.810 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.2 in
Runoff Volume (Pervious)	0.350 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.350 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	11.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.810 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	7.78 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	7.64 ft ³ /s
Drainage Area	
SCS CN (Composite)	93.000
Area (User Defined)	0.810 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.7 in
Runoff Volume (Pervious)	0.454 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.454 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	11.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 2 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

Storm Event	1-inch
Return Event	0 years
Duration	24.000 hours
Depth	1.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.080 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	12.011 hours
Flow (Peak, Computed)	0.02 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	0.02 ft ³ /s
Drainage Area	
SCS CN (Composite)	84.000
Area (User Defined)	0.080 acres
Maximum Retention (Pervious)	1.9 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.2 in
Runoff Volume (Pervious)	0.001 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.001 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.09 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 2 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 2 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.080 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.41 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.40 ft ³ /s
Drainage Area	
SCS CN (Composite)	84.000
Area (User Defined)	0.080 acres
Maximum Retention (Pervious)	1.9 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.3 in
Runoff Volume (Pervious)	0.022 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.022 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.09 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 2 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 2 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.080 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.52 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.50 ft ³ /s
Drainage Area	
SCS CN (Composite)	84.000
Area (User Defined)	0.080 acres
Maximum Retention (Pervious)	1.9 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.2 in
Runoff Volume (Pervious)	0.028 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.028 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.09 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 2 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 2 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.080 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.69 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.67 ft ³ /s
Drainage Area	
SCS CN (Composite)	84.000
Area (User Defined)	0.080 acres
Maximum Retention (Pervious)	1.9 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.7 in
Runoff Volume (Pervious)	0.038 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.038 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.09 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 2 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 3 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

Storm Event	1-inch
Return Event	0 years
Duration	24.000 hours
Depth	1.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.360 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.23 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.22 ft ³ /s
Drainage Area	
SCS CN (Composite)	92.000
Area (User Defined)	0.360 acres
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.4 in
Runoff Volume (Pervious)	0.012 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.012 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	4.89 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 3 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 3 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Storm Event	1-year 24- Hour
Return Event	1 years
Duration	24.000 hours
Depth	2.9 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.360 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	1.13 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	1.09 ft ³ /s
Drainage Area	
SCS CN (Composite)	92.000
Area (User Defined)	0.360 acres
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.0 in
Runoff Volume (Pervious)	0.061 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.061 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	4.89 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 3 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 3 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.360 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	2.20 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.16 ft ³ /s
Drainage Area	
SCS CN (Composite)	92.000
Area (User Defined)	0.360 acres
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.1 in
Runoff Volume (Pervious)	0.124 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.124 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	4.89 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 3 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 3 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.360 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	2.67 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.62 ft ³ /s
Drainage Area	
SCS CN (Composite)	92.000
Area (User Defined)	0.360 acres
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.1 in
Runoff Volume (Pervious)	0.152 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.152 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	4.89 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 3 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 3 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.360 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	3.43 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	3.36 ft ³ /s
Drainage Area	
SCS CN (Composite)	92.000
Area (User Defined)	0.360 acres
Maximum Retention (Pervious)	0.9 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.6 in
Runoff Volume (Pervious)	0.198 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.198 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	4.89 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 3 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
 Label: PRE-POA 1 DA
 Scenario: 1-inch

Return Event: 0 years
 Storm Event: 1-inch

Storm Event	1-inch
Return Event	0 years
Duration	24.000 hours
Depth	1.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.590 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	12.022 hours
Flow (Peak, Computed)	0.08 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	0.08 ft ³ /s
Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	0.590 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.1 in
Runoff Volume (Pervious)	0.006 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.006 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	8.02 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Storm Event	1-year 24- Hour
Return Event	1 years
Duration	24.000 hours
Depth	2.9 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.590 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	1.18 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	1.13 ft ³ /s
Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	0.590 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.3 in
Runoff Volume (Pervious)	0.062 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.062 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	8.02 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.590 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	2.88 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.78 ft ³ /s
Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	0.590 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.1 in
Runoff Volume (Pervious)	0.153 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.153 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	8.02 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.590 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	3.66 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	3.54 ft ³ /s
Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	0.590 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.0 in
Runoff Volume (Pervious)	0.196 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.196 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	8.02 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.590 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	4.93 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	4.80 ft ³ /s
Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	0.590 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.4 in
Runoff Volume (Pervious)	0.268 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.267 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	8.02 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 2 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

Storm Event	1-inch
Return Event	0 years
Duration	24.000 hours
Depth	1.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.090 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	12.022 hours
Flow (Peak, Computed)	0.01 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	0.01 ft ³ /s
Drainage Area	
SCS CN (Composite)	80.000
Area (User Defined)	0.090 acres
Maximum Retention (Pervious)	2.5 in
Maximum Retention (Pervious, 20 percent)	0.5 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.1 in
Runoff Volume (Pervious)	0.001 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.001 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.22 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 2 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 2 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Storm Event	1-year 24- Hour
Return Event	1 years
Duration	24.000 hours
Depth	2.9 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.090 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.16 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.16 ft ³ /s
Drainage Area	
SCS CN (Composite)	80.000
Area (User Defined)	0.090 acres
Maximum Retention (Pervious)	2.5 in
Maximum Retention (Pervious, 20 percent)	0.5 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.1 in
Runoff Volume (Pervious)	0.009 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.009 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.22 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 2 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 2 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.090 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.42 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.40 ft ³ /s
Drainage Area	
SCS CN (Composite)	80.000
Area (User Defined)	0.090 acres
Maximum Retention (Pervious)	2.5 in
Maximum Retention (Pervious, 20 percent)	0.5 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.9 in
Runoff Volume (Pervious)	0.022 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.022 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.22 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 2 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 2 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.090 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.53 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.51 ft ³ /s
Drainage Area	
SCS CN (Composite)	80.000
Area (User Defined)	0.090 acres
Maximum Retention (Pervious)	2.5 in
Maximum Retention (Pervious, 20 percent)	0.5 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.8 in
Runoff Volume (Pervious)	0.028 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.028 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.22 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 2 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 2 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.090 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.73 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.70 ft ³ /s
Drainage Area	
SCS CN (Composite)	80.000
Area (User Defined)	0.090 acres
Maximum Retention (Pervious)	2.5 in
Maximum Retention (Pervious, 20 percent)	0.5 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.2 in
Runoff Volume (Pervious)	0.039 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.039 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	1.22 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 2 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 3 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

Storm Event	1-inch
Return Event	0 years
Duration	24.000 hours
Depth	1.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.570 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	12.022 hours
Flow (Peak, Computed)	0.08 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	0.07 ft ³ /s
Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	0.570 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.1 in
Runoff Volume (Pervious)	0.005 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.005 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.75 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 3 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 3 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Storm Event	1-year 24- Hour
Return Event	1 years
Duration	24.000 hours
Depth	2.9 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.570 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	1.14 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	1.09 ft ³ /s
Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	0.570 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	1.3 in
Runoff Volume (Pervious)	0.060 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.060 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.75 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 3 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 3 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.570 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	2.79 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.68 ft ³ /s
Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	0.570 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.1 in
Runoff Volume (Pervious)	0.148 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.148 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.75 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 3 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 3 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.570 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	3.54 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	3.42 ft ³ /s
Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	0.570 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.0 in
Runoff Volume (Pervious)	0.189 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.189 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.75 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 3 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 3 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.570 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	4.77 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	4.63 ft ³ /s
Drainage Area	
SCS CN (Composite)	82.000
Area (User Defined)	0.570 acres
Maximum Retention (Pervious)	2.2 in
Maximum Retention (Pervious, 20 percent)	0.4 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.4 in
Runoff Volume (Pervious)	0.259 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.258 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	7.75 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 3 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Time vs. Volume
Label: WET POND
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Time vs. Volume (ac-ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
0.000	0.000	0.000	0.000	0.000	0.000
0.250	0.000	0.000	0.000	0.000	0.000
0.500	0.000	0.000	0.000	0.000	0.000
0.750	0.000	0.000	0.000	0.000	0.000
1.000	0.000	0.000	0.000	0.000	0.000
1.250	0.000	0.000	0.000	0.000	0.000
1.500	0.000	0.000	0.000	0.000	0.000
1.750	0.000	0.000	0.000	0.000	0.000
2.000	0.000	0.000	0.000	0.000	0.000
2.250	0.000	0.000	0.000	0.000	0.000
2.500	0.000	0.000	0.000	0.000	0.000
2.750	0.000	0.000	0.000	0.000	0.000
3.000	0.000	0.000	0.000	0.000	0.000
3.250	0.000	0.000	0.000	0.000	0.000
3.500	0.000	0.000	0.000	0.000	0.000
3.750	0.000	0.000	0.000	0.000	0.000
4.000	0.000	0.000	0.000	0.000	0.000
4.250	0.000	0.000	0.000	0.000	0.000
4.500	0.000	0.000	0.000	0.000	0.000
4.750	0.000	0.000	0.000	0.000	0.000
5.000	0.000	0.000	0.000	0.000	0.000
5.250	0.000	0.000	0.000	0.000	0.000
5.500	0.000	0.000	0.000	0.000	0.000
5.750	0.000	0.000	0.000	0.000	0.000
6.000	0.000	0.000	0.001	0.001	0.001
6.250	0.001	0.001	0.001	0.001	0.001
6.500	0.001	0.001	0.001	0.001	0.001
6.750	0.001	0.001	0.001	0.001	0.001
7.000	0.001	0.001	0.001	0.001	0.001
7.250	0.002	0.002	0.002	0.002	0.002
7.500	0.002	0.002	0.002	0.002	0.002
7.750	0.002	0.002	0.002	0.002	0.002
8.000	0.002	0.003	0.003	0.003	0.003
8.250	0.003	0.003	0.003	0.003	0.003
8.500	0.003	0.003	0.003	0.004	0.004
8.750	0.004	0.004	0.004	0.004	0.004
9.000	0.004	0.004	0.005	0.005	0.005
9.250	0.005	0.005	0.005	0.005	0.006
9.500	0.006	0.006	0.006	0.006	0.006
9.750	0.006	0.007	0.007	0.007	0.007
10.000	0.007	0.007	0.008	0.008	0.008
10.250	0.008	0.009	0.009	0.009	0.009

Subsection: Time vs. Volume
Label: WET POND
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Time vs. Volume (ac-ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
10.500	0.010	0.010	0.010	0.010	0.011
10.750	0.011	0.011	0.012	0.012	0.012
11.000	0.013	0.013	0.014	0.014	0.015
11.250	0.015	0.016	0.016	0.017	0.018
11.500	0.018	0.019	0.020	0.022	0.025
11.750	0.029	0.034	0.040	0.050	0.058
12.000	0.065	0.068	0.068	0.066	0.063
12.250	0.062	0.060	0.059	0.057	0.056
12.500	0.056	0.055	0.054	0.053	0.053
12.750	0.052	0.052	0.052	0.052	0.052
13.000	0.051	0.051	0.051	0.051	0.051
13.250	0.051	0.051	0.051	0.051	0.051
13.500	0.051	0.051	0.051	0.050	0.050
13.750	0.050	0.050	0.050	0.050	0.050
14.000	0.050	0.050	0.050	0.050	0.050
14.250	0.050	0.050	0.050	0.050	0.050
14.500	0.050	0.050	0.050	0.050	0.050
14.750	0.050	0.050	0.050	0.050	0.050
15.000	0.050	0.050	0.050	0.050	0.050
15.250	0.050	0.050	0.050	0.050	0.050
15.500	0.050	0.050	0.050	0.050	0.050
15.750	0.050	0.050	0.050	0.050	0.050
16.000	0.050	0.050	0.050	0.050	0.050
16.250	0.050	0.050	0.050	0.050	0.050
16.500	0.050	0.050	0.050	0.050	0.050
16.750	0.050	0.050	0.050	0.050	0.050
17.000	0.050	0.050	0.050	0.050	0.050
17.250	0.050	0.050	0.050	0.050	0.050
17.500	0.050	0.050	0.050	0.050	0.050
17.750	0.050	0.050	0.050	0.050	0.050
18.000	0.050	0.050	0.050	0.050	0.050
18.250	0.050	0.050	0.050	0.050	0.050
18.500	0.050	0.050	0.050	0.050	0.049
18.750	0.049	0.049	0.049	0.049	0.049
19.000	0.049	0.049	0.049	0.049	0.049
19.250	0.049	0.049	0.049	0.049	0.049
19.500	0.049	0.049	0.049	0.049	0.049
19.750	0.049	0.049	0.049	0.049	0.049
20.000	0.049	0.049	0.049	0.049	0.049
20.250	0.049	0.049	0.049	0.049	0.049
20.500	0.049	0.049	0.049	0.049	0.049
20.750	0.049	0.049	0.049	0.049	0.049

Subsection: Time vs. Volume
 Label: WET POND
 Scenario: 1-year 24-hour

Return Event: 1 years
 Storm Event: 1-year 24- Hour

Time vs. Volume (ac-ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
21.000	0.049	0.049	0.049	0.049	0.049
21.250	0.049	0.049	0.049	0.049	0.049
21.500	0.049	0.049	0.049	0.049	0.049
21.750	0.049	0.049	0.049	0.049	0.049
22.000	0.049	0.049	0.049	0.049	0.049
22.250	0.049	0.049	0.049	0.049	0.049
22.500	0.049	0.049	0.049	0.049	0.049
22.750	0.049	0.049	0.049	0.049	0.049
23.000	0.049	0.049	0.049	0.049	0.049
23.250	0.049	0.049	0.049	0.049	0.049
23.500	0.049	0.049	0.049	0.049	0.049
23.750	0.049	0.049	0.049	0.049	0.049
24.000	0.049	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Elevation-Area Volume Curve

Label: WET POND

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Elevation (ft)	Planimeter (ft ²)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
426.00	0.0	0.029	0.000	0.000	0.000
427.00	0.0	0.038	0.100	0.033	0.033
428.00	0.0	0.048	0.128	0.043	0.076
429.00	0.0	0.058	0.158	0.053	0.129

Subsection: Outlet Input Data

Label: Composite Outlet Structure - 1

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Requested Pond Water Surface Elevations	
Minimum (Headwater)	426.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	429.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Area	Orifice - 2	Forward	Culvert - 1	427.40	429.00
Inlet Box	Riser - 1	Forward	Culvert - 1	428.00	429.00
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	426.05	429.00
Culvert-Circular	Culvert - 1	Forward	TW	426.05	429.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Subsection: Outlet Input Data

Label: Composite Outlet Structure - 1

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Structure ID: Culvert - 1
Structure Type: Culvert-Circular

Number of Barrels	1
Diameter	15.0 in
Length	22.00 ft
Length (Computed Barrel)	22.01 ft
Slope (Computed)	0.027 ft/ft

Outlet Control Data

Manning's n	0.013
Ke	0.200
Kb	0.023
Kr	0.000
Convergence Tolerance	0.00 ft

Inlet Control Data

Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	0.000
T2 ratio (HW/D)	1.184
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.

Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control, interpolate between flows at T1 & T2...

T1 Elevation	426.05 ft	T1 Flow	4.80 ft ³ /s
T2 Elevation	427.53 ft	T2 Flow	5.49 ft ³ /s

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Structure ID: Riser - 1	
Structure Type: Inlet Box	
Number of Openings	1
Elevation	428.00 ft
Orifice Area	6.0 ft ²
Orifice Coefficient	0.600
Weir Length	10.00 ft
Weir Coefficient	3.00 (ft ^{0.5})/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: Orifice - 1	
Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	426.05 ft
Orifice Diameter	0.8 in
Orifice Coefficient	0.600

Structure ID: Orifice - 2	
Structure Type: Orifice-Area	
Number of Openings	1
Elevation	427.40 ft
Orifice Area	0.4 ft ²
Top Elevation	427.80 ft
Datum Elevation	427.40 ft
Orifice Coefficient	0.600

Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Convergence Tolerances	
Flow Tolerance (Minimum)	0.001 ft ³ /s
Flow Tolerance (Maximum)	10.000 ft ³ /s

Subsection: Pond Inflow Summary
Label: WET POND (IN)
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

Summary for Hydrograph Addition at 'WET POND'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	POST-POA 1 DA

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	POST-POA 1 DA	0.030	11.950	0.55
Flow (In)	WET POND	0.030	11.950	0.55

Subsection: Pond Inflow Summary

Label: WET POND (IN)

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Summary for Hydrograph Addition at 'WET POND'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	POST-POA 1 DA

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft ³ /s)
Flow (From)	POST-POA 1 DA	0.143	11.900	2.55
Flow (In)	WET POND	0.143	11.900	2.55

Subsection: Pond Inflow Summary
Label: WET POND (IN)
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Summary for Hydrograph Addition at 'WET POND'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	POST-POA 1 DA

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft ³ /s)
Flow (From)	POST-POA 1 DA	0.286	11.900	4.93
Flow (In)	WET POND	0.286	11.900	4.93

Subsection: Pond Inflow Summary
Label: WET POND (IN)
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

Summary for Hydrograph Addition at 'WET POND'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	POST-POA 1 DA

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft³/s)
Flow (From)	POST-POA 1 DA	0.350	11.900	5.97
Flow (In)	WET POND	0.350	11.900	5.97

Subsection: Pond Inflow Summary
Label: WET POND (IN)
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

Summary for Hydrograph Addition at 'WET POND'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	POST-POA 1 DA

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft ³ /s)
Flow (From)	POST-POA 1 DA	0.454	11.900	7.64
Flow (In)	WET POND	0.454	11.900	7.64

Index

C

Composite Outlet Structure - 1 (Outlet Input Data, 1 years (1-year 24-hour))...94, 95, 96, 97

M

Master Network Summary...1, 2, 3

P

POST-POA 1 DA (Runoff CN-Area, 1 years (1-year 24-hour))...26

POST-POA 1 DA (Time of Concentration Calculations, 1 years (1-year 24-hour))...14, 15

POST-POA 1 DA (Unit Hydrograph Summary, 0 years (1-inch))...32, 33

POST-POA 1 DA (Unit Hydrograph Summary, 1 years (1-year 24-hour))...34, 35

POST-POA 1 DA (Unit Hydrograph Summary, 10 years (10 Year))...36, 37

POST-POA 1 DA (Unit Hydrograph Summary, 100 years (100 Year))...40, 41

POST-POA 1 DA (Unit Hydrograph Summary, 25 years (25 Year))...38, 39

POST-POA 2 DA (Runoff CN-Area, 1 years (1-year 24-hour))...27

POST-POA 2 DA (Time of Concentration Calculations, 1 years (1-year 24-hour))...16, 17

POST-POA 2 DA (Unit Hydrograph Summary, 0 years (1-inch))...42, 43

POST-POA 2 DA (Unit Hydrograph Summary, 10 years (10 Year))...44, 45

POST-POA 2 DA (Unit Hydrograph Summary, 100 years (100 Year))...48, 49

POST-POA 2 DA (Unit Hydrograph Summary, 25 years (25 Year))...46, 47

POST-POA 3 DA (Runoff CN-Area, 1 years (1-year 24-hour))...28

POST-POA 3 DA (Time of Concentration Calculations, 1 years (1-year 24-hour))...18, 19

POST-POA 3 DA (Unit Hydrograph Summary, 0 years (1-inch))...50, 51

POST-POA 3 DA (Unit Hydrograph Summary, 1 years (1-year 24-hour))...52, 53

POST-POA 3 DA (Unit Hydrograph Summary, 10 years (10 Year))...54, 55

POST-POA 3 DA (Unit Hydrograph Summary, 100 years (100 Year))...58, 59

POST-POA 3 DA (Unit Hydrograph Summary, 25 years (25 Year))...56, 57

PRE-POA 1 DA (Runoff CN-Area, 1 years (1-year 24-hour))...29

PRE-POA 1 DA (Time of Concentration Calculations, 1 years (1-year 24-hour))...20, 21

PRE-POA 1 DA (Unit Hydrograph Summary, 0 years (1-inch))...60, 61

PRE-POA 1 DA (Unit Hydrograph Summary, 1 years (1-year 24-hour))...62, 63

PRE-POA 1 DA (Unit Hydrograph Summary, 10 years (10 Year))...64, 65

PRE-POA 1 DA (Unit Hydrograph Summary, 100 years (100 Year))...68, 69

PRE-POA 1 DA (Unit Hydrograph Summary, 25 years (25 Year))...66, 67

PRE-POA 2 DA (Runoff CN-Area, 1 years (1-year 24-hour))...30

PRE-POA 2 DA (Time of Concentration Calculations, 1 years (1-year 24-hour))...22, 23

PRE-POA 2 DA (Unit Hydrograph Summary, 0 years (1-inch))...70, 71

PRE-POA 2 DA (Unit Hydrograph Summary, 1 years (1-year 24-hour))...72, 73

PRE-POA 2 DA (Unit Hydrograph Summary, 10 years (10 Year))...74, 75

PRE-POA 2 DA (Unit Hydrograph Summary, 100 years (100 Year))...78, 79

PRE-POA 2 DA (Unit Hydrograph Summary, 25 years (25 Year))...76, 77

PRE-POA 3 DA (Runoff CN-Area, 1 years (1-year 24-hour))...31

PRE-POA 3 DA (Time of Concentration Calculations, 1 years (1-year 24-hour))...24, 25

PRE-POA 3 DA (Unit Hydrograph Summary, 0 years (1-inch))...80, 81

PRE-POA 3 DA (Unit Hydrograph Summary, 1 years (1-year 24-hour))...82, 83

PRE-POA 3 DA (Unit Hydrograph Summary, 10 years (10 Year))...84, 85

PRE-POA 3 DA (Unit Hydrograph Summary, 100 years (100 Year))...88, 89

PRE-POA 3 DA (Unit Hydrograph Summary, 25 years (25 Year))...86, 87

R

Rolesville (Time-Depth Curve, 0 years (1-inch))...8, 9

Rolesville (Time-Depth Curve, 1 years (1-year 24-hour))...10, 11

Rolesville (Time-Depth Curve, 10 years (10 Year))...4, 5

Rolesville (Time-Depth Curve, 100 years (100 Year))...6, 7

Rolesville (Time-Depth Curve, 25 years (25 Year))...12, 13

W

WET POND (Elevation-Area Volume Curve, 1 years (1-year 24-hour))...93

WET POND (IN) (Pond Inflow Summary, 0 years (1-inch))...98

WET POND (IN) (Pond Inflow Summary, 1 years (1-year 24-hour))...99

WET POND (IN) (Pond Inflow Summary, 10 years (10 Year))...100

WET POND (IN) (Pond Inflow Summary, 100 years (100 Year))...102

WET POND (IN) (Pond Inflow Summary, 25 years (25 Year))...101

WET POND (Time vs. Volume, 1 years (1-year 24-hour))...90, 91, 92

Water Quality Calculations

Wet Detention Pond

Project Information

Project Name: The Learning Center Rolesville
KHA Project #: 013031004
Designed by: MDB Date: 5/17/2024
Revised by: MDB Date: 6/10/2024
Checked by: COB Date: 6/10/2024

Design Resource:

NCDENR - Stormwater Best Management Practices (Revision 4-18-17)

Site Information

County: Wake
Region: Mtn. & Piedmont
Sub Area Location: Drainage Area to Pond
Drainage Area (DA) = 0.81 Acres
Impervious Area (IA) with FS = 0.57 Acres
Percent Impervious (I) = 70.37 %

actual

Main Pool Average Depth (d_{av}):

d_{av} Option 1 (when shelf is not submerged) = 1.19 ft

d_{av} Option 2 (when shelf is submerged) = 3.18 ft

Option 1	
$d_{av} = V_{perm_pool} / A_{perm_pool}$	
Option 2	
$D_{avg} = \frac{V_{PP} - V_{shelf}}{A_{bottom of shelf}}$	
Where:	D_{avg} = Average depth in feet V_{pp} = Total volume of permanent pool (feet ³) V_{shelf} = Volume over the shelf only (feet ³) $0.5 * Depth_{max over shelf} * Perimeter_{perm pool} * Width_{submerged portion of shelf}$ $A_{bottom of shelf}$ = Area of permanent pool (feet ²)

Required Surface Area (85% TSS):

SA/DA for $d_{av} = 3$ and 70% Impervious = 2.51

SA/DA for $d_{av} = 3$ and 80% Impervious = 2.92

Surface Area to DA Ratio (SA/DA) = 2.53

Req'd Main Pool Surface Area at Perm. Pool = 891 sf

Req'd Total Pond Surface Area at Perm. Pool = Range from 1025 sf to 1069 sf

[\(Taken from Chapter C-3 of NCDEO Stormwater BMP Manual\)](#)

Average depth rounded down to nearest 0.5'

Average depth rounded down to nearest 0.5'

****THIS IS ONLY THE MAIN POOL SURFACE AREA****

This includes minimum 20% forbay surface area

Required Storage Volume (Water Quality):

Design Storm = 1.0 inch

Determine R_v Value = 0.05 + .009 (I) =

Design Storm Storage Volume = 2,009 cf

Storage Volume Required = 2,009 cf

0.68 in/in

Summary of Proposed BMP

Bottom of Pond Elevation = 423.00 ft
Sediment Cleanout Elevation = 424.00 ft
Permanent Pool Elevation = 426.05 ft
Temporary Pool Elevation = 427.40 ft
Top of Berm Elevation = 429.00 ft
Main Pool Surface Area at Permanent Pool = 891 sf
Forebay Volume (FV1) = 393 cf
Permanent Pool Volume (PPV) = 1,062 cf
Temporary Pool Volume (TPV) = 2,056 cf
Total Storage Volume (TSV) = 5,515 cf
Total Pond Volume (PV) = 7,011 cf

(Required Surface Area = 891 sf)

(37% of Main Pool Volume)

(Main Pool Only)

(Required Volume = 2009 cf)



SITE DATA

Project Information		
Project Name:		The Learning Center Rolesville
Applicant:		Rolesville, LLC
Applicant Contact Name:		Marlane Klintworth
Applicant Contact Number:		919-868-4472
Contact Email:		mvkcommercial@gmail.com
Municipal Jurisdiction (Select from dropdown menu):		Rolesville
Last Updated:		Tuesday, July 16, 2024
Site Data:		
Total Site Area (Ac):		1.25
Existing Lake/Pond Area (Ac):		0.00
Proposed Disturbed Area (Ac):		1.24
Impervious Surface Area (acre):		0.82
Type of Development (Select from Dropdown menu):		Non-Residential
Percent Built Upon Area (BUA):		66%
Project Density:		High
Is the proposed project a site expansion?		No
Number of Drainage Areas on Site:		3
NOAA	1-Year, 24-Hour Storm (inches) (See NOAA Website):	2.84
	2-Year, 24-Hour Storm (inches) (See NOAA Website):	3.45
	10-Year, 24-Hour Storm (inches) (See NOAA Website):	5.04
Lot Data (if applicable):		
Total Acreage in Lots:		
Number of Lots:		
Average Lot Size (SF):		
Total Impervious Surface Area on Lots (SF):		
Average Impervious Surface Area Per Lot (SF):		
Stormwater Narrative (limit to 1,200 characters - attach additional pages with submittal if necessary):		
The Learning Center Rolesville is a proposed child learning center in Rolesville, Wake County located at 302 S Main St. The existing site is an undeveloped vacant lot consisting of grass and a gravel driveway. The project will consist of a 10,000 sf building, one (1) stormwater control measure (wet pond), utilities, and other associated infrastructure. For more detail see the Stormwater Impact Analysis.		



Project Name: The Learning Center Rolesville

DRAINAGE AREA 1
STORMWATER PRE-POST CALCULATIONS

LAND USE & SITE DATA	PRE-DEVELOPMENT				POST-DEVELOPMENT			
Drainage Area (Acres)=	0.59				0.81			
Site Acreage within Drainage=	0.59				0.81			
One-year, 24-hour rainfall (in)=	2.84							
Two-year, 24-hour rainfall (in)=	3.45							
Ten-year, 24-hour storm (in)=	5.04							
Total Lake/Pond Area (Acres)=	0.00				0.04			
Lake/Pond Area not in the Tc flow path (Acres)=	0.00				0.00			
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Woods, Poor Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Woods, Fair Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Woods, Good Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Space, Poor Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Space, Fair condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Space, Good Condition	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.24
Reforestation (in dedicated OS)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Connected Impervious	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.57
Disconnected Impervious	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SITE FLOW	PRE-DEVELOPMENT T_c				POST-DEVELOPMENT T_c			
Sheet Flow								
Length (ft)=	189.00				150.00			
Slope (ft/ft)=	0.021				0.010			
Surface Cover:	Paved, Gravel, or Bare Soil				Paved, Gravel, or Bare Soil			
n-value=	0.011				0.011			
T _t (hrs)=	0.035				0.039			
Shallow Flow								
Length (ft)=	0.00				0.00			
Slope (ft/ft)=	0.000				0.000			
Surface Cover:	Unpaved				Unpaved			
Average Velocity (ft/sec)=								
T _t (hrs)=								
Channel Flow 1								
Length (ft)=	0.00				30.00			
Slope (ft/ft)=	0.000				0.005			
Cross Sectional Flow Area (ft ²)=	0.00				0.79			
Wetted Perimeter (ft)=	0.00				3.14			
Channel Lining:	Grass				Concrete, finished			
n-value=	0.035				0.012			
Hydraulic Radius (ft)=					0.25			
Average Velocity (ft/sec)=					3.50			
T _t (hrs)=					0.00			



Project Name: The Learning Center Rolesville

DRAINAGE AREA 1
STORMWATER PRE-POST CALCULATIONS

Channel Flow 2		
Length (ft)=	0.00	0.00
Slope (ft/ft)=	0.000	0.000
Cross Sectional Flow Area (ft ²)=	0.00	0.00
Wetted Perimeter (ft)=	0.00	0.00
Channel Lining:	Grass	Grass
n-value=	0.035	0.035
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T _i (hrs)=		
Channel Flow 3		
Length (ft)=	0.00	0.00
Slope (ft/ft)=	0.000	0.000
Cross Sectional Flow Area (ft ²)=	0.00	0.00
Wetted Perimeter (ft)=	0.00	0.00
Channel Lining:	Grass	
n-value=	0.035	
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T _i (hrs)=		
T _c (hrs)=	0.03	0.04
RESULTS		
	PRE-DEVELOPMENT	POST-DEVELOPMENT
Composite Curve Number=	83	93
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =		
CN _{adjusted (1-year)} =	93	
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft ³) =	2,009	
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = Q* _{1-year} =	1.30	2.07
Volume of runoff (ft ³) =	2,790	6,089
Volume change (ft ³) =	3,299	
Peak Discharge (cfs)= Q _{1-year} =	1.516	3.225
2-year, 24-hour storm (LID)		
Runoff (inches) = Q* _{2-year} =	1.80	2.65
Volume of runoff (ft ³) =	3,850	7,804
Peak Discharge (cfs)= Q _{2-year} =	2.092	4.133
10-year, 24-hour storm (DIA)		
Runoff (inches) = Q* _{10-year} =	3.19	4.20
Volume of runoff (ft ³) =	6,824	8,998
Peak Discharge (cfs)= Q _{10-year} =	3.708	6.542



Project Name: The Learning Center Rolesville

DRAINAGE AREA 2
STORMWATER PRE-POST CALCULATIONS

LAND USE & SITE DATA	PRE-DEVELOPMENT				POST-DEVELOPMENT			
Drainage Area (Acres)=	0.09				0.08			
Site Acreage within Drainage=	0.09				0.08			
One-year, 24-hour rainfall (in)=	2.84							
Two-year, 24-hour rainfall (in)=	3.45							
Ten-year, 24-hour storm (in)=	5.04							
Total Lake/Pond Area (Acres)=	0.00				0.00			
Lake/Pond Area not in the Tc flow path (Acres)=	0.00				0.00			
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Woods, Poor Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Woods, Fair Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Woods, Good Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Space, Poor Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Space, Fair condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Space, Good Condition	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.06
Reforestation (in dedicated OS)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Connected Impervious	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
Disconnected Impervious	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SITE FLOW	PRE-DEVELOPMENT T_c				POST-DEVELOPMENT T_c			
Sheet Flow								
Length (ft)=	50.00				35.00			
Slope (ft/ft)=	0.100				0.118			
Surface Cover:	Paved, Gravel, or Bare Soil				Paved, Gravel, or Bare Soil			
n-value=	0.011				0.011			
T _i (hrs)=	0.006				0.005			
Shallow Flow								
Length (ft)=								
Slope (ft/ft)=								
Surface Cover:								
Average Velocity (ft/sec)=								
T _i (hrs)=								
Channel Flow 1								
Length (ft)=								
Slope (ft/ft)=								
Cross Sectional Flow Area (ft ²)=								
Wetted Perimeter (ft)=								
Channel Lining:								
n-value=								
Hydraulic Radius (ft)=								
Average Velocity (ft/sec)=								
T _i (hrs)=								



Project Name: The Learning Center Rolesville

DRAINAGE AREA 2
STORMWATER PRE-POST CALCULATIONS

Channel Flow 2		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft ²)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T _i (hrs)=		
Channel Flow 3		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft ²)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T _i (hrs)=		
T _c (hrs)=	0.01	0.00
RESULTS	PRE-DEVELOPMENT	POST-DEVELOPMENT
Composite Curve Number=	80	85
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =		
CN _{adjusted (1-year)} =	85	
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft ³) =	80	
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = Q* _{1-year} =	1.13	1.42
Volume of runoff (ft ³) =	370	412
Volume change (ft ³) =	42	
Peak Discharge (cfs)= Q _{1-year} =	0.207	0.220
2-year, 24-hour storm (LID)		
Runoff (inches) = Q* _{2-year} =	1.60	1.93
Volume of runoff (ft ³) =	522	561
Peak Discharge (cfs)= Q _{2-year} =	0.292	0.300
10-year, 24-hour storm (DIA)		
Runoff (inches) = Q* _{10-year} =	2.93	3.36
Volume of runoff (ft ³) =	957	1,096
Peak Discharge (cfs)= Q _{10-year} =	0.535	0.521



Project Name: The Learning Center Rolesville

DRAINAGE AREA 3
STORMWATER PRE-POST CALCULATIONS

LAND USE & SITE DATA	PRE-DEVELOPMENT				POST-DEVELOPMENT			
Drainage Area (Acres)=	0.57				0.36			
Site Acreage within Drainage=	0.57				0.36			
One-year, 24-hour rainfall (in)=	2.84							
Two-year, 24-hour rainfall (in)=	3.45							
Ten-year, 24-hour storm (in)=	5.04							
Total Lake/Pond Area (Acres)=	0.00				0.00			
Lake/Pond Area not in the Tc flow path (Acres)=	0.00				0.00			
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Woods, Poor Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Woods, Fair Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Woods, Good Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Space, Poor Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Space, Fair condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Space, Good Condition	0.00	0.00	0.00	0.49	0.00	0.00	0.00	0.13
Reforestation (in dedicated OS)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Connected Impervious	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.23
Disconnected Impervious	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SITE FLOW	PRE-DEVELOPMENT T_c				POST-DEVELOPMENT T_c			
Sheet Flow								
Length (ft)=	80.00				63.00			
Slope (ft/ft)=	0.063				0.063			
Surface Cover:	Paved, Gravel, or Bare Soil				Paved, Gravel, or Bare Soil			
n-value=	0.011				0.011			
T _t (hrs)=	0.011				0.009			
Shallow Flow								
Length (ft)=								
Slope (ft/ft)=								
Surface Cover:								
Average Velocity (ft/sec)=								
T _t (hrs)=								
Channel Flow 1								
Length (ft)=								
Slope (ft/ft)=								
Cross Sectional Flow Area (ft ²)=								
Wetted Perimeter (ft)=								
Channel Lining:								
n-value=								
Hydraulic Radius (ft)=								
Average Velocity (ft/sec)=								
T _t (hrs)=								



Project Name: The Learning Center Rolesville

DRAINAGE AREA 3
STORMWATER PRE-POST CALCULATIONS

Channel Flow 2		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft ²)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T _i (hrs)=		
Channel Flow 3		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft ²)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T _i (hrs)=		
T _c (hrs)=	0.01	0.01
RESULTS	PRE-DEVELOPMENT	POST-DEVELOPMENT
Composite Curve Number=	83	92
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =		
CN _{adjusted (1-year)} =	92	
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft ³) =	817	
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = Q* _{1-year} =	1.29	1.97
Volume of runoff (ft ³) =	2,665	2,569
Volume change (ft ³) =		
Peak Discharge (cfs)= Q _{1-year} =	1.544	1.478
2-year, 24-hour storm (LID)		
Runoff (inches) = Q* _{2-year} =	1.78	2.54
Volume of runoff (ft ³) =	3,685	3,321
Peak Discharge (cfs)= Q _{2-year} =	2.135	1.911
10-year, 24-hour storm (DIA)		
Runoff (inches) = Q* _{10-year} =	3.17	4.07
Volume of runoff (ft ³) =	6,549	8,430
Peak Discharge (cfs)= Q _{10-year} =	3.795	3.064



Project Name: The Learning Center Rolesville

DA SITE SUMMARY
STORMWATER PRE-POST CALCULATIONS

SITE SUMMARY										
DRAINAGE AREA SUMMARIES										
DRAINAGE AREA:	DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10
Pre-Development (1-year, 24-hour storm)										
Runoff (in) = $Q_{pre,1-year}$ =	1.30	1.13	1.29							
Peak Flow (cfs)= Q_{1-year} =	1.516	0.207	1.544							
Post-Development (1-year, 24-hour storm)										
Proposed Impervious Surface (acre) =	0.57	0.02	0.23							
Runoff (in)= Q_{1-year} =	2.07	1.42	1.97							
Peak Flow (cfs)= Q_{1-year} =	3.225	0.220	1.478							
Increase in volume per DA (ft ³)_1-yr storm=	3,299	42								
Minimum Volume to be Managed for DA HIGH DENSITY REQUIREMENT = (ft ³) =	2,009	80	817							
TARGET CURVE NUMBER (TCN)										
Site Data										
SITE ISOIL COMPOSITION										
HYDROLOGIC SOIL GROUP	Site Area		%		Target CN					
A	0.00		0%		N/A					
B	0.00		0%		N/A					
C	0.00		0%		N/A					
D	1.25		100%		N/A					
Total Site Area (acres) =					1.25					
Percent BUA (Includes Existing Lakes/Pond Areas) =					64%					
Project Density =					High					
Target Curve Number (TCN) =					N/A					
$CN_{adjusted (1-year)}$ =					92					
Minimum Volume to be Managed (Total Site) Per TCN Requirement= ft ³ =					N/A					
Site Nitrogen Loading Data										
HSG	TN export coefficient (lbs/ac/yr)		Site Acreage		N Export					
Pasture	1.2		0.00		0.00					
Woods, Poor Condition	1.6		0.00		0.00					
Woods, Fair Condition	1.2		0.00		0.00					
Woods, Good Condition	0.8		0.00		0.00					
Open Space, Poor Condition	1.0		0.00		0.00					
Open Space, Fair Condition	0.8		0.00		0.00					
Open Space, Good Condition	0.6		0.43		0.26					
Reforestation (in dedicated OS)	0.6		0.00		0.00					
Impervious	21.2		0.82		17.38					
SITE NITROGEN LOADING RATE (lbs/ac/yr)=					14.11					
Nitrogen Load (lbs/yr)=					17.64					
TOTAL SITE NITROGEN TO MITIGATE (lbs/yr)_Wendell Only=					13.14					
Site Nitrogen Loading Data For Expansions Only										
	Existing				New					
Impervious(acres)=	NA				NA					
"Expansion Area" (acres)=										
Nitrogen Load (lbs/yr)=	NA				NA					
SITE NITROGEN LOADING RATE (lbs/ac/yr)=	NA				NA					
Total Site loading rate (lbs/ac/yr)										
TOTAL SITE NITROGEN TO MITIGATE (lbs/yr)=					NA					



Project Name: The Learning Center Rolesville

**DRAINAGE AREA 1
BMP CALCULATIONS**

DRAINAGE AREA 1 - BMP DEVICES AND ADJUSTMENTS										
DA1 Site Acreage=	0.81									
DA1 Off-Site Acreage=										
Total Required Storage Volume for Site TCN Requirement (ft ³)=	N/A									
Total Required Storage Volume for DA1 1" Rainfall for High Density (ft ³)=	2,009									
Will site use underground detention/cistern?	No	Enter % of the year water will be reused=	0%	Note: Supporting information/details should be submitted to demonstrate water usage.						
ENTER ACREAGE FOR ALL SUB-DRAINAGE AREAS IN DA										
HSG	Sub-DA1(a) (Ac)		Sub-DA1(b) (Ac)		Sub-DA1(c) (Ac)		Sub-DA1(d) (Ac)		Sub-DA1(e) (Ac)	
	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site
Pasture	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Woods, Poor Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Woods, Fair Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Woods, Good Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Space, Poor Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Space, Fair Condition	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Open Space, Good Condition	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Reforestation (in dedicated OS)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Impervious	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-DA1(a) BMP(s)										
Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft ³)		Provided Volume that will drawdown 2-5 days (ft ³)		Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)	
Proposed Storm Water Pond	Wet Detention Basin	2,009		2,136		25%	12.23	3.06	66	
	0%					9.17	0.00			
	0%					9.17	0.00			
	0%					9.17	0.00			
	0%					9.17	0.00			
Total Nitrogen remaining leaving the subbasin (lbs):						9.17				
Sub-DA1(b) BMP(s)										
If Sub-DA1(b) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):										
Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft ³)		Provided Volume that will drawdown 2-5 days (ft ³)		Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)	
				0		0%	0.00	0.00		
	0%					0.00	0.00			
	0%					0.00	0.00			
	0%					0.00	0.00			
	0%					0.00	0.00			
Total Nitrogen remaining leaving the subbasin (lbs):										
Sub-DA1 (c) BMP(s)										
If Sub-DA1(c) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):										
Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft ³)		Provided Volume that will drawdown 2-5 days (ft ³)		Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)	
				0		0%	0.00	0.00		
	0%					0.00	0.00			
	0%					0.00	0.00			
	0%					0.00	0.00			
	0%					0.00	0.00			
Total Nitrogen remaining leaving the subbasin (lbs):										



Project Name: The Learning Center Rolesville

**DRAINAGE AREA 1
BMP CALCULATIONS**

Sub-DA1(d) BMP(s)							
If Sub-DA1(d) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):							
Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft ³)	Provided Volume that will <u>drawdown 2-5 days</u> (ft ³)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
			0	0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):							
Sub-DA1(e) BMP(s)							
If Sub-DA1(e) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):							
Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft ³)	Provided Volume that will <u>drawdown 2-5 days</u> (ft ³)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
			0	0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):							
DA1 BMP SUMMARY							
Total Volume Treated (ft ³)=				2,136			
Nitrogen Mitigated(lbs)=				3.06			
1-year, 24-hour storm							
Post BMP Volume of Runoff (ft ³) _(1-year) =				3,953			
Post BMP Runoff (inches) = Q* _(2-year) =				1.34			
Post BMP CN _(1-year) =				83			
Post BMP Peak Discharge (cfs)= Q _{1-year} =				1.090			
2-year, 24-hour storm (LID)							
Post BMP Volume of Runoff (ft ³) _(2-year) =				5,668			
Post BMP Runoff (inches) = Q* _(2-year) =				1.93			
Post BMP CN _(2-year) =				84			
Post BMP Peak Discharge (cfs)= Q _(2-year) =							
10-year, 24-hour storm (DIA)							
Post BMP Volume of Runoff (ft ³) _(10-year) =				6,862			
Post BMP Runoff (inches) = Q* _(10-year) =				2.33			
Post BMP CN _(10-year) =				89			
Post BMP Peak Discharge (cfs)= Q _(10-year) =				4.510			



Project Name: **The Learning Center Rolesville**

DA SITE SUMMARY
BMP CALCULATIONS

BMP SUMMARY										
DRAINAGE AREA SUMMARIES										
DRAINAGE AREA:	DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10
Pre-Development (1-year, 24-hour storm)										
Runoff (in)=Q* _{1-year} =	1.30	1.13	1.29							
Peak Flow (cfs)=Q _{1-year} =	1.516	0.207	1.544							
Post-Development (1-year, 24-hour storm)										
Target Curve Number (TCN) =	NA									
Post BMP Runoff (inches) = Q* _(1-year) =	1.34	1.42	1.97							
Post BMP Peak Discharge (cfs)= Q _{1-year} =	1.090									
Post BMP CN _(1-year) =	85									
Post-BMP Nitrogen Loading										
TOTAL SITE NITROGEN MITIGATED (lbs)=	3.06									
SITE NITROGEN LOADING RATE (lbs/ac/yr)=	11.67									
TOTAL SITE NITROGEN LEFT TO MITIGATE_Wendell Only (lbs)=	10.09									



Project Name: The Learning Center Rolesville

LOW IMPACT DEVELOPMENT SUMMARY

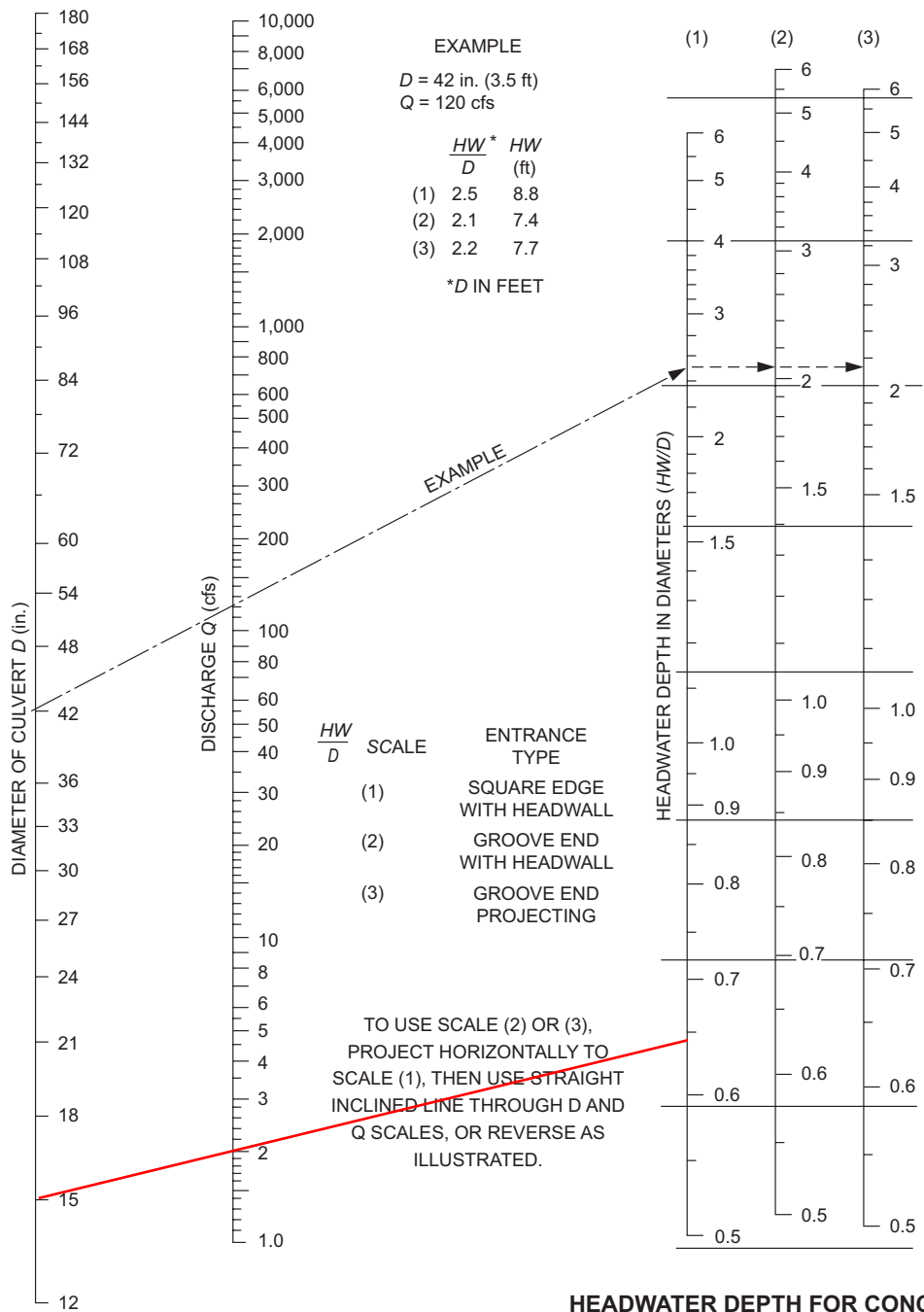
DRAINAGE AREA SUMMARIES											
DRAINAGE AREA:	DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10	
Pre-Development											
Runoff (in) = Q_{pre_2-year} =	1.80	1.60	1.78								
Total Runoff Volume (ft ³) =	3,850	522	3,685								
Peak Flow (cfs) = Q_{2-year} =	2.092	0.292	2.135								
Post-Development											
2-year, 24-hour storm (LID)											
Post BMP Runoff (inches) = $Q_{(2-year)}^*$ =	1.93	1.93	2.54								
Post BMP Peak Discharge (cfs) = $Q_{(2-year)}$ =											
Post BMP Volume of Runoff (ft ³) = $Q_{(2-year)}$ =	5,668	561	3,321								
Does Runoff meet LID requirements?	Yes	No	No								
Does Peak Flow meet LID requirements?	No	Yes	Yes								
Does Runoff Volume meet LID requirements?	No	Yes	Yes								
SITE SUMMARY											
Site Data											
Target CN =	N/A										
Post-Development CN =	86										
Does CN meet LID requirements?											
LID CHECKLIST											
Complete the below checklist if all requirements have been met above:											
LID Narrative (limit to 600 characters - attach additional pages with submittal if necessary): Describe in detail how the proposed development has utilized "Natural Site Design". Narrative should include the location of site buildings, roads and other land disturbances in the least environmentally-sensitive areas, preservation of steep slopes, and preservation of naturally well draining soils and other hydrologically valuable features.											
LID Techniques (check all that apply)											
At least one of the following techniques must be used to achieve LID classification:											
☐	Bioretention										
☐	On-site infiltration										
Additional LID Techniques (check all that apply)											
At least two (one for Wendell) of the following techniques must be used to achieve LID classification:											
☐	Retention of 50% of vegetated area, including open space, landscaping or forests										
☐	Use of permeable pavement for <u>all</u> private driveways, private roads, sidewalks and parking areas										
☐	Installation of one rain cistern per lot or three rain barrels per lot										
☐	Installation of vegetative roofs										
☐	Increasing all buffers in the Riparian buffer zone or the Flood Protection Zone, whichever is greater, by 50 feet										
☐	Use of reclaimed water for all buildings										
☐	Use of innovative LID techniques subject to approval										



DOWNSTREAM IMPACT ANALYSIS SITE SUMMARY

DRAINAGE AREA SUMMARIES										
DRAINAGE AREA:	DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10
Pre-Development										
Peak Discharge (cfs)= $Q_{10\text{-year}}$ =	3.71	0.53	3.79							
Volume of Runoff (ft ³) _(10-year) =	6,824	957	6,549							
Post-Development										
10-year, 24-hour storm (DIA)										
Post BMP Peak Discharge (cfs)= $Q_{(10\text{-year})}$ =	4.51									
Post BMP Volume of Runoff (ft ³) _(10-year) =	6,862	1,096	8,430							

Flowrate
 $C = 0.70$
 i (25-yr, 5 min) = 7.98 in/hr
 $A = 0.37$ ac
 $Q = CiA$
 $= (0.70)(7.98 \text{ in/hr})(0.37 \text{ ac})$
 $= 2.07 \text{ cfs}$



HW/D = 0.64
 15" PIPE
 $HW = 0.64 * 1.25' = 0.81'$

BUREAU OF PUBLIC ROADS
 JANUARY 1963

HEADWATER SCALES 283
 REVISED MAY 1964

Source: Federal Highway Administration. *Hydraulic Design of Highway Culverts: Hydraulic Design Series Number 5*. 3rd ed. FHWA-HIF-12-026. Washington, DC: U.S. Department of Transportation, April 2012, Chart 1B, p. C.9.
<https://www.fhwa.dot.gov/engineering/hydraulics/pubs/12026/hif12026.pdf>.

APPENDIX F



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.84 (4.43-5.29)	5.62 (5.15-6.13)	6.40 (5.87-6.98)	7.19 (6.58-7.85)	7.98 (7.27-8.70)	8.62 (7.81-9.38)	9.18 (8.27-10.0)	9.67 (8.66-10.6)	10.2 (9.08-11.2)	10.7 (9.44-11.7)
10-min	3.86 (3.54-4.22)	4.49 (4.12-4.91)	5.12 (4.70-5.59)	5.75 (5.26-6.27)	6.36 (5.80-6.94)	6.86 (6.22-7.48)	7.29 (6.57-7.94)	7.67 (6.87-8.36)	8.09 (7.19-8.83)	8.44 (7.44-9.24)
15-min	3.22 (2.95-3.52)	3.77 (3.45-4.11)	4.32 (3.96-4.72)	4.85 (4.44-5.29)	5.38 (4.90-5.86)	5.79 (5.25-6.31)	6.14 (5.54-6.69)	6.45 (5.78-7.04)	6.78 (6.03-7.41)	7.06 (6.22-7.73)
30-min	2.21 (2.02-2.41)	2.60 (2.38-2.84)	3.07 (2.81-3.35)	3.51 (3.21-3.83)	3.98 (3.63-4.34)	4.36 (3.95-4.75)	4.70 (4.24-5.12)	5.02 (4.50-5.48)	5.40 (4.80-5.90)	5.72 (5.04-6.26)
60-min	1.38 (1.26-1.50)	1.63 (1.50-1.78)	1.97 (1.80-2.15)	2.29 (2.09-2.50)	2.65 (2.41-2.89)	2.95 (2.68-3.22)	3.24 (2.92-3.53)	3.52 (3.15-3.84)	3.87 (3.44-4.23)	4.18 (3.68-4.57)
2-hr	0.805 (0.732-0.887)	0.957 (0.874-1.05)	1.17 (1.06-1.28)	1.37 (1.24-1.50)	1.61 (1.46-1.76)	1.83 (1.64-2.00)	2.03 (1.81-2.22)	2.24 (1.98-2.45)	2.51 (2.20-2.74)	2.75 (2.40-3.02)
3-hr	0.568 (0.516-0.629)	0.676 (0.617-0.746)	0.827 (0.753-0.913)	0.979 (0.888-1.08)	1.16 (1.05-1.28)	1.33 (1.19-1.46)	1.49 (1.32-1.64)	1.66 (1.47-1.82)	1.89 (1.65-2.07)	2.10 (1.81-2.31)
6-hr	0.341 (0.311-0.377)	0.406 (0.372-0.448)	0.498 (0.454-0.548)	0.590 (0.537-0.648)	0.704 (0.636-0.771)	0.808 (0.725-0.883)	0.911 (0.810-0.995)	1.02 (0.898-1.11)	1.17 (1.02-1.27)	1.30 (1.12-1.42)
12-hr	0.200 (0.183-0.220)	0.238 (0.219-0.261)	0.293 (0.268-0.321)	0.349 (0.319-0.383)	0.420 (0.380-0.458)	0.485 (0.436-0.527)	0.550 (0.489-0.598)	0.621 (0.546-0.674)	0.718 (0.622-0.779)	0.808 (0.689-0.878)
24-hr	0.119 (0.110-0.128)	0.143 (0.134-0.155)	0.180 (0.168-0.194)	0.210 (0.195-0.226)	0.250 (0.231-0.269)	0.282 (0.260-0.303)	0.314 (0.289-0.339)	0.349 (0.319-0.376)	0.396 (0.360-0.427)	0.433 (0.393-0.468)
2-day	0.069 (0.064-0.074)	0.083 (0.077-0.089)	0.103 (0.096-0.111)	0.119 (0.111-0.129)	0.141 (0.131-0.152)	0.159 (0.147-0.171)	0.177 (0.163-0.191)	0.195 (0.179-0.211)	0.221 (0.201-0.239)	0.241 (0.219-0.261)
3-day	0.048 (0.045-0.052)	0.058 (0.054-0.062)	0.072 (0.067-0.078)	0.084 (0.078-0.090)	0.099 (0.092-0.106)	0.111 (0.103-0.119)	0.123 (0.114-0.132)	0.136 (0.125-0.146)	0.154 (0.140-0.166)	0.168 (0.152-0.181)
4-day	0.038 (0.036-0.041)	0.046 (0.043-0.049)	0.057 (0.053-0.061)	0.066 (0.061-0.070)	0.077 (0.072-0.083)	0.087 (0.080-0.093)	0.097 (0.089-0.103)	0.107 (0.098-0.114)	0.120 (0.110-0.129)	0.131 (0.119-0.141)
7-day	0.025 (0.024-0.027)	0.030 (0.028-0.032)	0.037 (0.034-0.039)	0.042 (0.039-0.045)	0.050 (0.046-0.053)	0.055 (0.051-0.059)	0.061 (0.057-0.066)	0.068 (0.062-0.072)	0.076 (0.070-0.082)	0.083 (0.076-0.089)
10-day	0.020 (0.019-0.021)	0.024 (0.022-0.025)	0.029 (0.027-0.031)	0.033 (0.031-0.035)	0.038 (0.035-0.041)	0.042 (0.039-0.045)	0.046 (0.043-0.050)	0.051 (0.047-0.054)	0.056 (0.052-0.061)	0.061 (0.056-0.066)
20-day	0.013 (0.012-0.014)	0.016 (0.015-0.017)	0.019 (0.018-0.020)	0.021 (0.020-0.022)	0.024 (0.023-0.026)	0.027 (0.025-0.029)	0.029 (0.027-0.031)	0.032 (0.030-0.034)	0.035 (0.033-0.038)	0.038 (0.035-0.041)
30-day	0.011 (0.010-0.012)	0.013 (0.012-0.014)	0.015 (0.014-0.016)	0.017 (0.016-0.018)	0.019 (0.018-0.020)	0.021 (0.019-0.022)	0.023 (0.021-0.024)	0.024 (0.023-0.026)	0.027 (0.025-0.028)	0.028 (0.026-0.030)
45-day	0.009 (0.009-0.010)	0.011 (0.010-0.011)	0.012 (0.012-0.013)	0.014 (0.013-0.015)	0.015 (0.015-0.016)	0.017 (0.016-0.018)	0.018 (0.017-0.019)	0.019 (0.018-0.020)	0.021 (0.019-0.022)	0.022 (0.020-0.023)
60-day	0.008 (0.008-0.009)	0.010 (0.009-0.010)	0.011 (0.010-0.012)	0.012 (0.011-0.013)	0.013 (0.013-0.014)	0.014 (0.014-0.015)	0.015 (0.014-0.016)	0.016 (0.015-0.017)	0.018 (0.016-0.019)	0.018 (0.017-0.020)

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

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

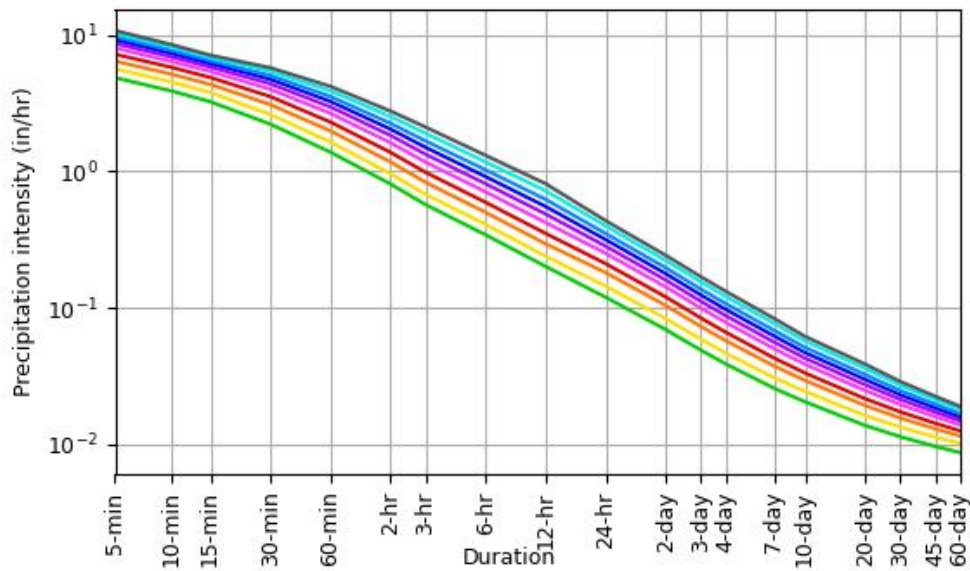
Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

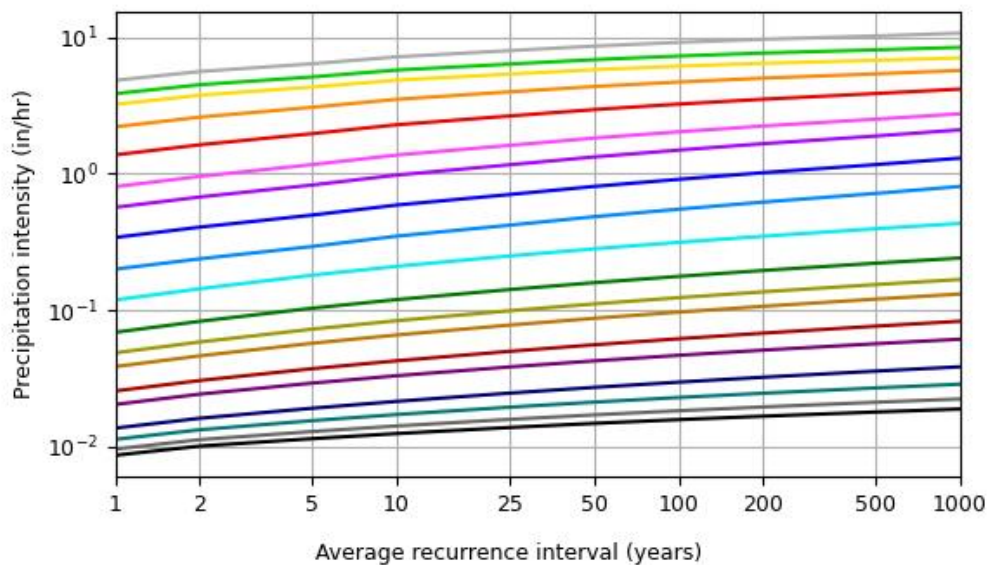
PF graphical

PDS-based intensity-duration-frequency (IDF) curves

Latitude: 35.9246°, Longitude: -78.4558°



Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000

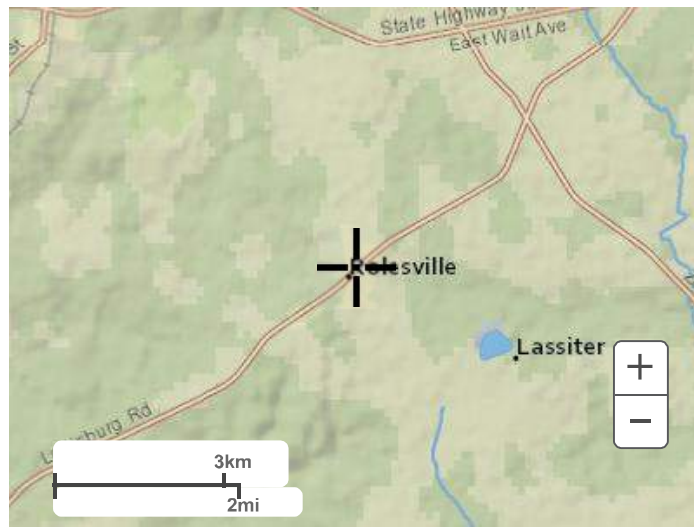


Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

[Back to Top](#)

Maps & aerials

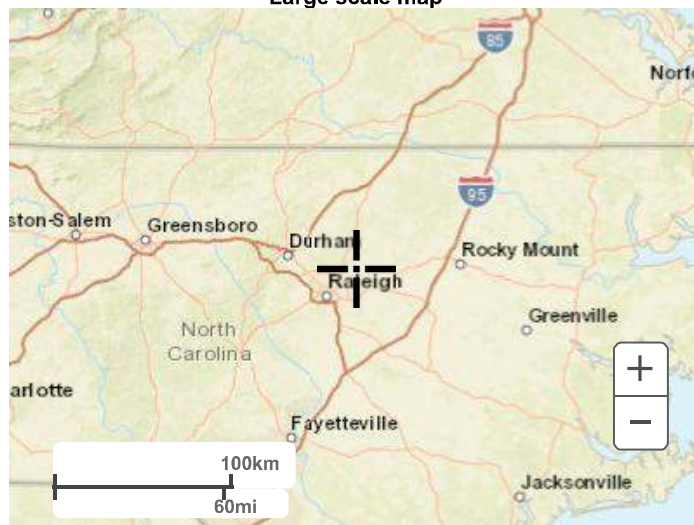
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



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POINT PRECIPITATION FREQUENCY ESTIMATES

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NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.403 (0.369-0.441)	0.468 (0.429-0.511)	0.533 (0.489-0.582)	0.599 (0.548-0.654)	0.665 (0.606-0.725)	0.718 (0.651-0.782)	0.765 (0.689-0.833)	0.806 (0.727-0.880)	0.852 (0.757-0.931)	0.893 (0.787-0.978)
10-min	0.644 (0.590-0.704)	0.749 (0.687-0.818)	0.854 (0.783-0.932)	0.959 (0.877-1.04)	1.06 (0.966-1.16)	1.14 (1.04-1.25)	1.22 (1.10-1.32)	1.28 (1.14-1.39)	1.35 (1.20-1.47)	1.41 (1.24-1.54)
15-min	0.805 (0.738-0.880)	0.942 (0.863-1.03)	1.08 (0.990-1.18)	1.21 (1.11-1.32)	1.34 (1.22-1.46)	1.45 (1.31-1.58)	1.54 (1.38-1.67)	1.61 (1.44-1.76)	1.70 (1.51-1.85)	1.77 (1.56-1.93)
30-min	1.10 (1.01-1.21)	1.30 (1.19-1.42)	1.54 (1.41-1.68)	1.76 (1.61-1.92)	1.99 (1.81-2.17)	2.18 (1.98-2.38)	2.35 (2.12-2.56)	2.51 (2.25-2.74)	2.70 (2.40-2.95)	2.86 (2.52-3.13)
60-min	1.38 (1.26-1.50)	1.63 (1.50-1.78)	1.97 (1.80-2.15)	2.29 (2.09-2.50)	2.65 (2.41-2.89)	2.95 (2.68-3.22)	3.24 (2.92-3.53)	3.52 (3.15-3.84)	3.87 (3.44-4.23)	4.18 (3.68-4.57)
2-hr	1.61 (1.46-1.78)	1.91 (1.75-2.10)	2.34 (2.13-2.56)	2.74 (2.49-3.01)	3.23 (2.91-3.53)	3.65 (3.28-3.99)	4.06 (3.62-4.44)	4.48 (3.97-4.90)	5.03 (4.41-5.49)	5.51 (4.79-6.04)
3-hr	1.71 (1.55-1.89)	2.03 (1.85-2.24)	2.48 (2.26-2.74)	2.94 (2.67-3.24)	3.50 (3.15-3.84)	3.99 (3.57-4.38)	4.48 (3.98-4.91)	4.99 (4.40-5.47)	5.68 (4.95-6.22)	6.31 (5.44-6.93)
6-hr	2.05 (1.87-2.26)	2.44 (2.23-2.68)	2.99 (2.72-3.28)	3.54 (3.22-3.88)	4.22 (3.81-4.62)	4.84 (4.34-5.29)	5.46 (4.86-5.96)	6.11 (5.38-6.66)	6.99 (6.08-7.62)	7.81 (6.70-8.53)
12-hr	2.41 (2.21-2.66)	2.87 (2.64-3.15)	3.54 (3.24-3.88)	4.21 (3.84-4.62)	5.06 (4.59-5.53)	5.84 (5.25-6.36)	6.63 (5.90-7.21)	7.48 (6.58-8.12)	8.65 (7.49-9.40)	9.74 (8.31-10.6)
24-hr	2.86 (2.66-3.08)	3.45 (3.22-3.72)	4.34 (4.04-4.68)	5.04 (4.68-5.43)	6.00 (5.56-6.46)	6.77 (6.24-7.28)	7.56 (6.95-8.14)	8.38 (7.67-9.02)	9.50 (8.66-10.3)	10.4 (9.43-11.2)
2-day	3.32 (3.09-3.57)	3.99 (3.72-4.30)	4.98 (4.64-5.36)	5.76 (5.35-6.20)	6.81 (6.31-7.34)	7.65 (7.07-8.24)	8.52 (7.84-9.17)	9.41 (8.62-10.1)	10.6 (9.69-11.5)	11.6 (10.5-12.6)
3-day	3.52 (3.28-3.77)	4.23 (3.95-4.53)	5.24 (4.89-5.62)	6.05 (5.63-6.48)	7.15 (6.63-7.67)	8.02 (7.42-8.60)	8.92 (8.22-9.57)	9.84 (9.04-10.6)	11.1 (10.1-12.0)	12.1 (11.0-13.1)
4-day	3.72 (3.48-3.98)	4.46 (4.17-4.77)	5.51 (5.15-5.89)	6.34 (5.91-6.77)	7.48 (6.95-8.00)	8.39 (7.77-8.97)	9.32 (8.60-9.98)	10.3 (9.45-11.0)	11.6 (10.6-12.5)	12.7 (11.5-13.6)
7-day	4.31 (4.04-4.60)	5.15 (4.82-5.50)	6.28 (5.88-6.70)	7.18 (6.71-7.66)	8.41 (7.84-8.98)	9.40 (8.72-10.0)	10.4 (9.63-11.1)	11.4 (10.6-12.3)	12.9 (11.8-13.8)	14.0 (12.8-15.0)
10-day	4.91 (4.60-5.24)	5.84 (5.48-6.23)	7.04 (6.59-7.50)	7.97 (7.46-8.49)	9.24 (8.62-9.84)	10.2 (9.53-10.9)	11.2 (10.4-12.0)	12.3 (11.4-13.1)	13.7 (12.6-14.6)	14.8 (13.6-15.8)
20-day	6.59 (6.20-7.01)	7.78 (7.32-8.28)	9.21 (8.66-9.80)	10.3 (9.71-11.0)	11.9 (11.1-12.6)	13.1 (12.2-13.9)	14.3 (13.3-15.2)	15.5 (14.4-16.6)	17.2 (15.9-18.4)	18.5 (17.1-19.9)
30-day	8.18 (7.72-8.68)	9.62 (9.08-10.2)	11.2 (10.6-11.9)	12.4 (11.7-13.2)	14.1 (13.2-15.0)	15.3 (14.4-16.3)	16.6 (15.5-17.6)	17.8 (16.6-19.0)	19.5 (18.1-20.8)	20.8 (19.2-22.2)
45-day	10.4 (9.89-11.0)	12.2 (11.6-12.9)	14.0 (13.3-14.8)	15.4 (14.6-16.2)	17.2 (16.2-18.1)	18.5 (17.5-19.6)	19.9 (18.7-21.0)	21.2 (19.9-22.4)	22.9 (21.4-24.3)	24.2 (22.6-25.7)
60-day	12.5 (11.9-13.1)	14.6 (13.9-15.3)	16.5 (15.7-17.4)	18.0 (17.1-19.0)	20.0 (18.9-21.0)	21.4 (20.3-22.5)	22.8 (21.5-24.0)	24.2 (22.8-25.5)	25.9 (24.4-27.4)	27.3 (25.6-28.9)

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

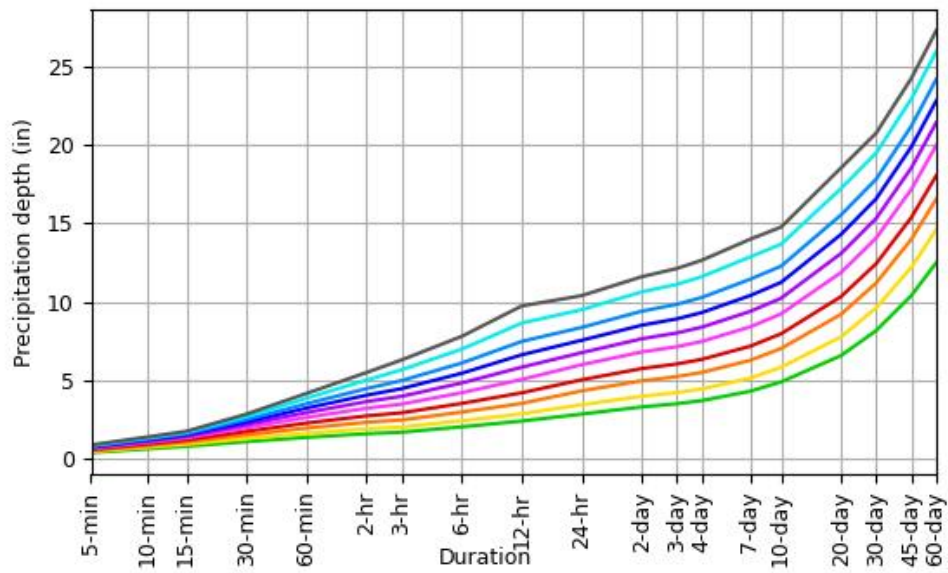
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

Please refer to NOAA Atlas 14 document for more information.

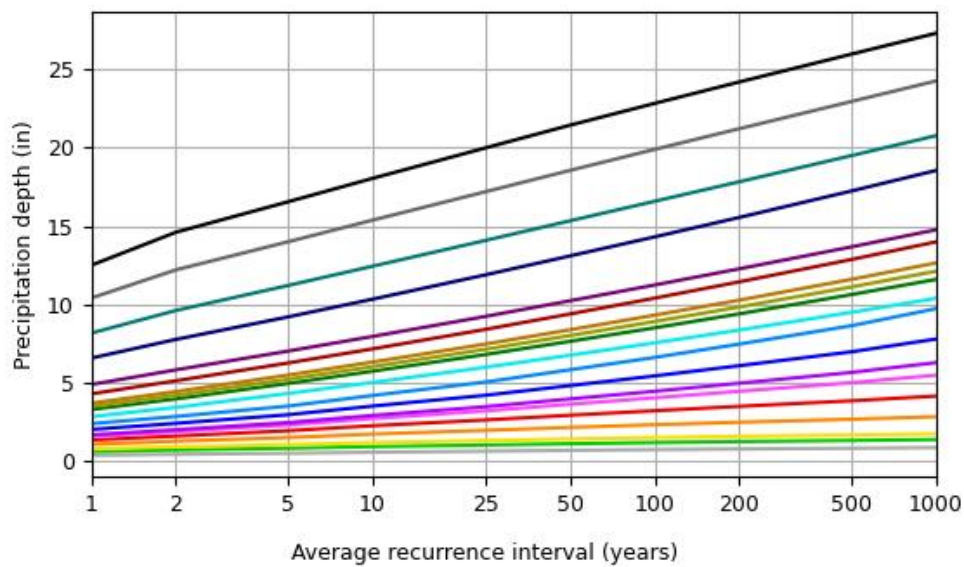
[Back to Top](#)

PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 35.9246°, Longitude: -78.4558°



Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000

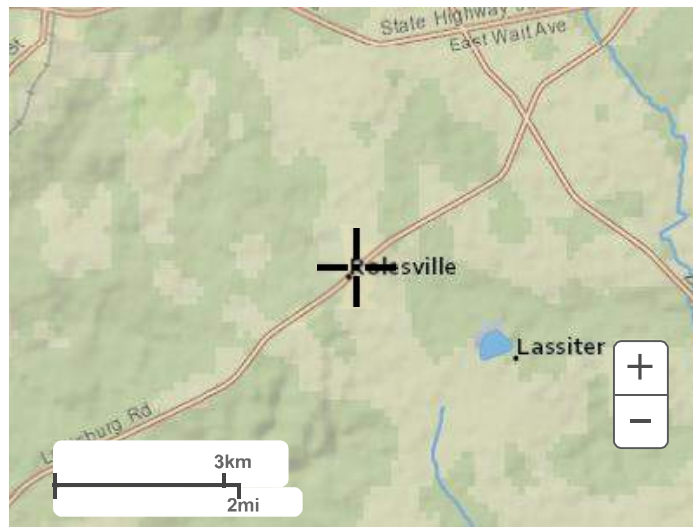


Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

[Back to Top](#)

Maps & aerials

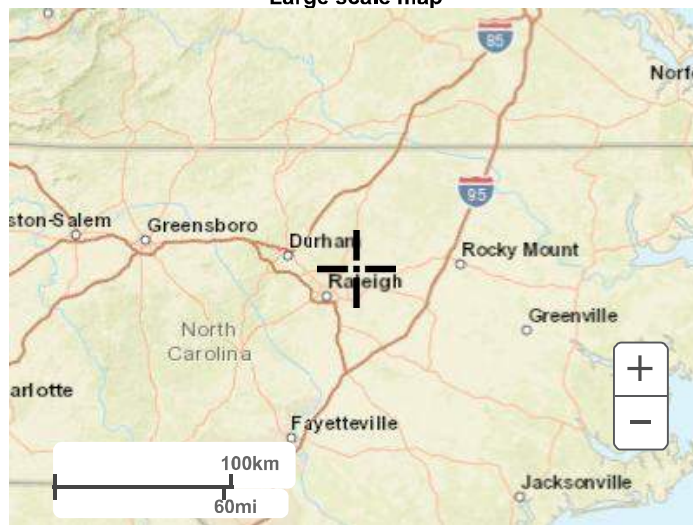
Small scale terrain



Large scale terrain



Large scale map



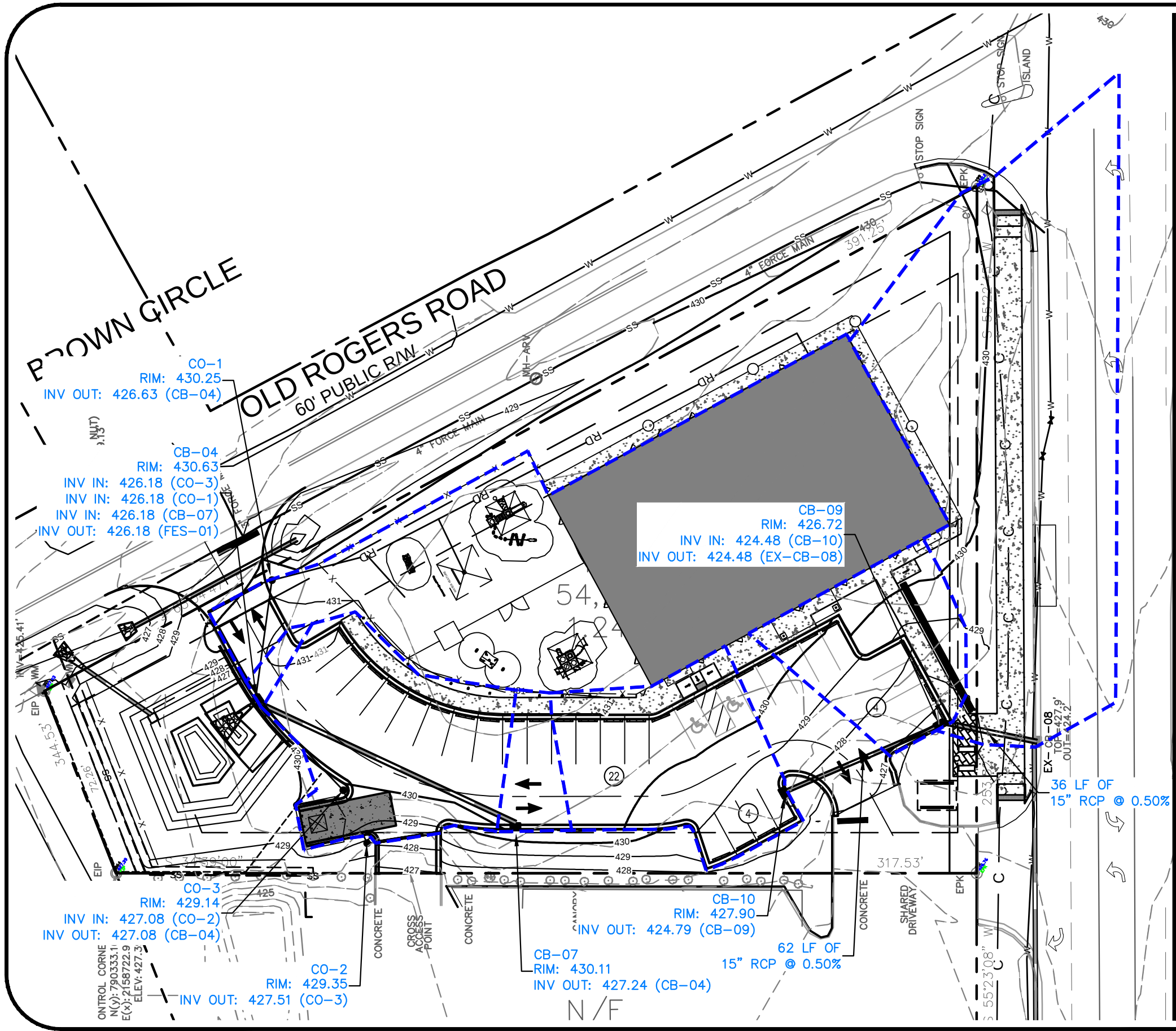
Large scale aerial



[Back to Top](#)

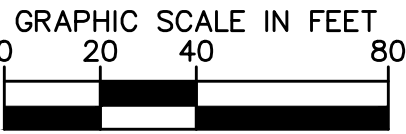
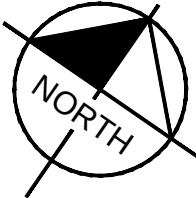
[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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ROLESVILLE LEARNING CENTER

DRAINAGE AREA TABLE	
INLET ID	AREA (AC)
CO-1	0.40
CO-2	0.12
CB-04	0.01
CB-07	0.02
EX-CB-08	0.36
CB-09	0.08
CB-10	0.11



LEGEND

- DRAINAGE AREA OUTLINE
- PROPERTY LINE

INLET DRAINAGE AREA MAP

KHA PROJECT NO: 013031004
DATE: 06/14/2024

2-YEAR

FlexTable: Catch Basin Table

Label	Inlet	Inlet Location	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Inlet C	Inlet Drainage Area (acres)	External CA (acres)	Local CA (acres)	Local Intensity (in/h)	Local Flow Time (min)	Bypassed Rational Flow (cfs)	Flow (Captured) (cfs)	Flow (Total Out) (cfs)	Capture Efficiency (Calculated) (%)	Spread / Top Width (ft)	Hydraulic Grade Line (In) (ft)	Clogging Factor (%)
CB-10	NCDOT-combination inlet	In Sag	427.90	424.99	0.900	0.110	0.000	0.099	5.620	5.000	0.00	0.56	0.56	100.0	3.5	425.29	50.0
CB-09	NCDOT-combination inlet	In Sag	427.30	424.48	0.800	0.080	0.000	0.064	5.620	5.000	0.00	0.36	0.91	100.0	2.0	424.94	50.0
EX-CB-08	NCDOT-combination inlet	On Grade	427.90	424.20	0.750	0.360	0.000	0.270	5.620	5.000	0.51	1.02	1.90	66.8	6.4	424.75	50.0
CB-07	NCDOT-combination inlet	On Grade	430.11	426.91	0.900	0.020	0.000	0.018	5.620	5.000	0.01	0.09	0.09	91.3	3.7	427.03	0.0
CB-04	NCDOT-combination inlet	On Grade	430.63	426.18	0.900	0.010	0.000	0.009	5.620	5.000	0.00	0.05	2.67	97.0	3.0	426.84	0.0
CO-2	<None>	In Sag	429.35	427.51	(N/A)	(N/A)	0.110	0.000	5.620	5.000	0.00	0.00	0.62	100.0	0.0	427.84	
CO-1	<None>	In Sag	430.22	427.04	(N/A)	(N/A)	0.360	0.000	5.620	5.000	0.00	0.00	2.04	100.0	0.0	427.65	
CO-1.1	<None>	In Sag	428.51	426.79	(N/A)	(N/A)	0.000	0.000	5.620	5.000	0.00	0.00	2.04	100.0	0.0	427.40	

10-YEAR

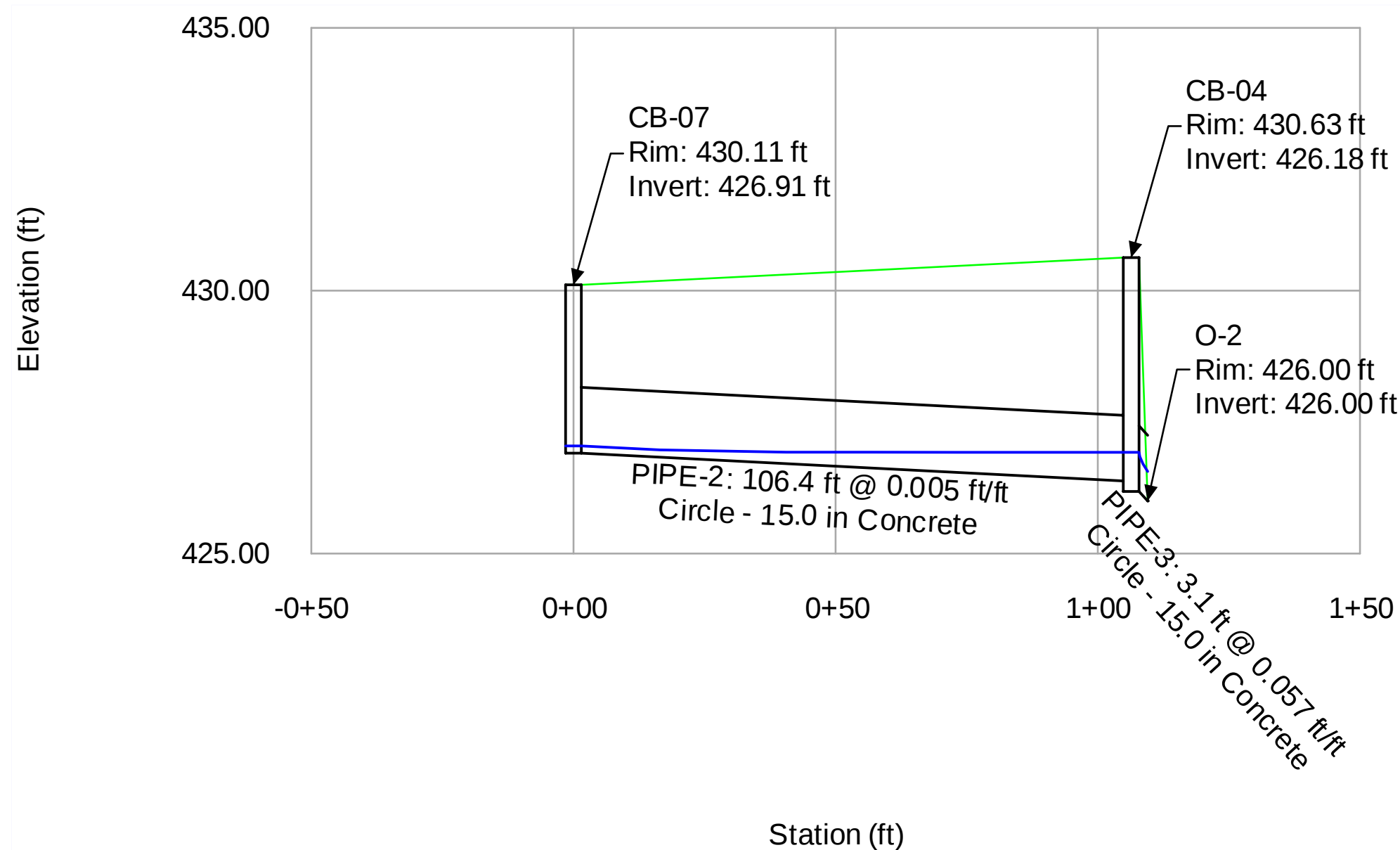
FlexTable: Conduit Table

Label	Start Node	Stop Node	Upstream Inlet C	Upstream Inlet Area (acres)	Velocity (ft/s)	Slope (Calculated) (ft/ft)	Flow (cfs)	Capacity (Full Flow) (cfs)	System Intensity (in/h)	Invert (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Length (Unified) (ft)	Diameter (in)	Manning's n	Material
EX-PIPE -11	EX-CB-08	O-1	0.750	0.360	4.54	0.008	2.36	5.91	7.025	424.20	422.70	424.81	423.25	178.9	15.0	0.013	Concrete
PIPE -01	CB-10	CB-09	0.900	0.110	2.72	0.005	0.72	4.57	7.190	424.99	424.68	425.32	425.01	61.9	15.0	0.013	Concrete
PIPE -02	CB-09	EX-CB-08	0.800	0.080	3.11	0.005	1.16	4.57	7.081	424.48	424.30	424.91	424.81	36.2	15.0	0.013	Concrete
PIPE-2	CB-07	CB-04	0.900	0.020	1.58	0.005	0.12	4.56	7.190	426.91	426.38	427.05	426.93	106.4	15.0	0.013	Concrete
PIPE-3	CB-04	O-2	0.900	0.010	10.12	0.057	3.42	15.46	6.866	426.18	426.00	426.93	426.56	3.1	15.0	0.013	Concrete
PIPE-4	CO-2	CO-3	(N/A)	(N/A)	4.53	0.011	0.80	4.81	7.190	427.51	427.28	427.88	427.56	21.4	12.0	0.010	PVC
PIPE-5	CO-3	CB-04	(N/A)	(N/A)	5.13	0.015	0.79	5.73	7.167	427.08	426.38	427.45	426.93	45.7	12.0	0.010	PVC
PIPE-6(1)	CO-1	CO-1.1	(N/A)	(N/A)	6.20	0.011	2.61	4.76	7.190	427.04	426.99	427.73	427.60	4.7	12.0	0.010	PVC
PIPE-6(2)	CO-1.1	CB-04	(N/A)	(N/A)	6.06	0.010	2.61	4.62	7.186	426.79	426.38	427.48	426.93	41.2	12.0	0.010	PVC

10-YEAR

Profile Report

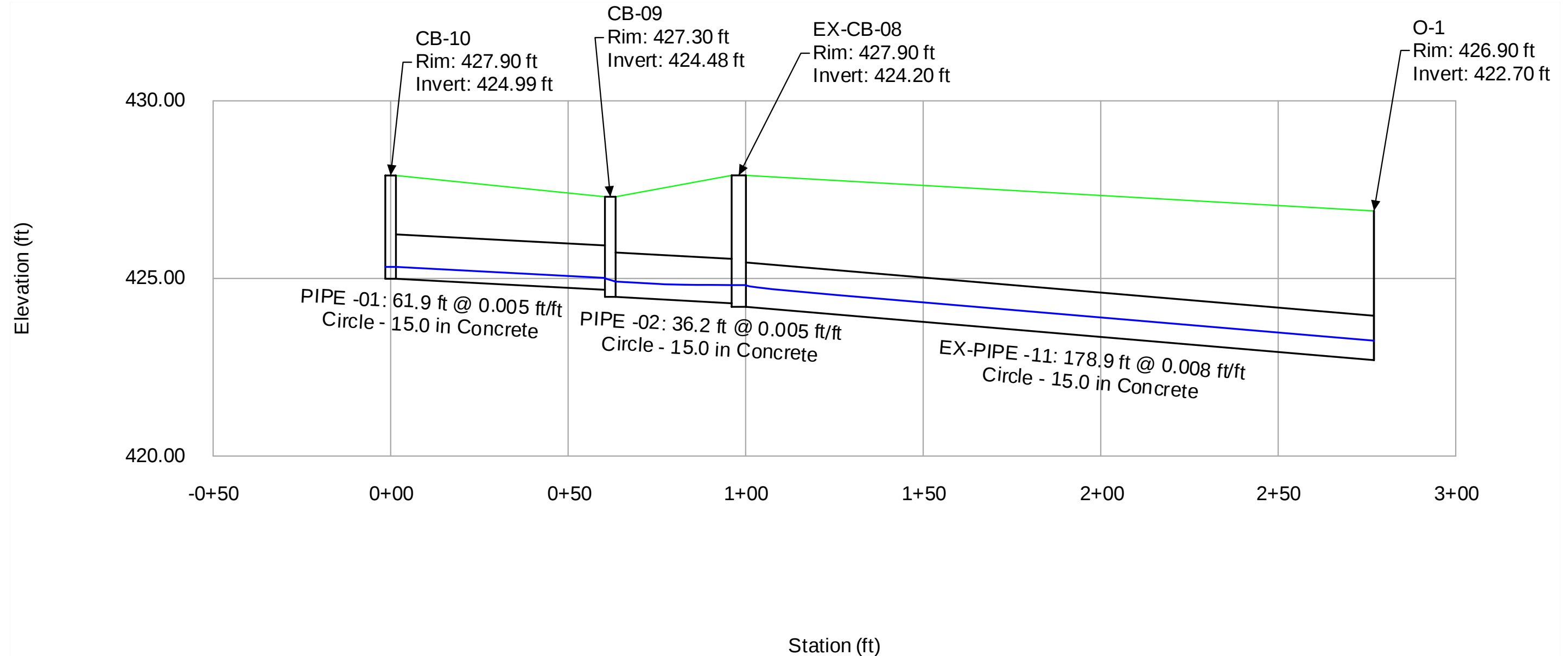
Engineering Profile - CB-04 to O-2 (2024-08-01 TLE Rolesville.stsw)



10-YEAR

Profile Report

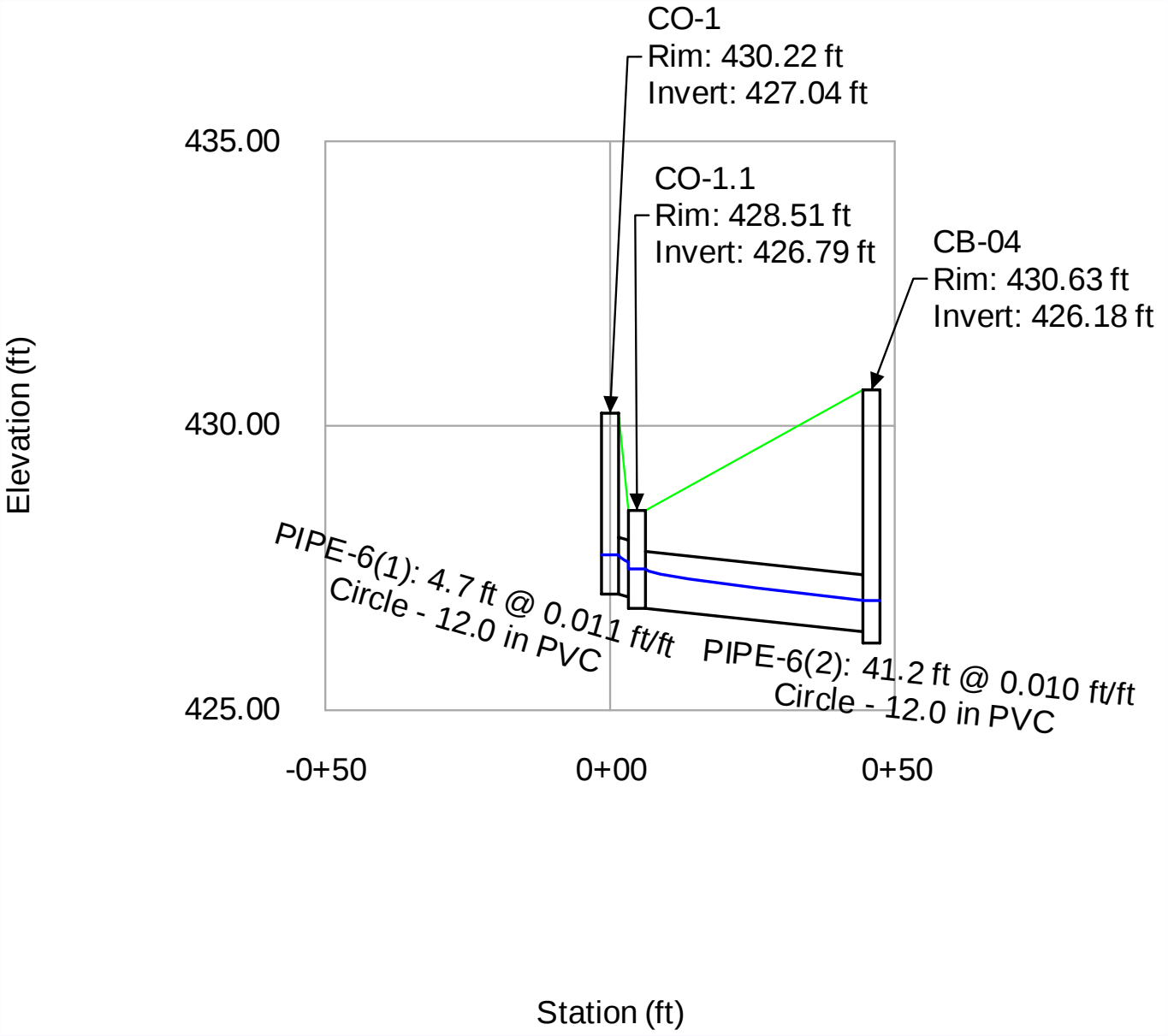
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10-YEAR

Profile Report

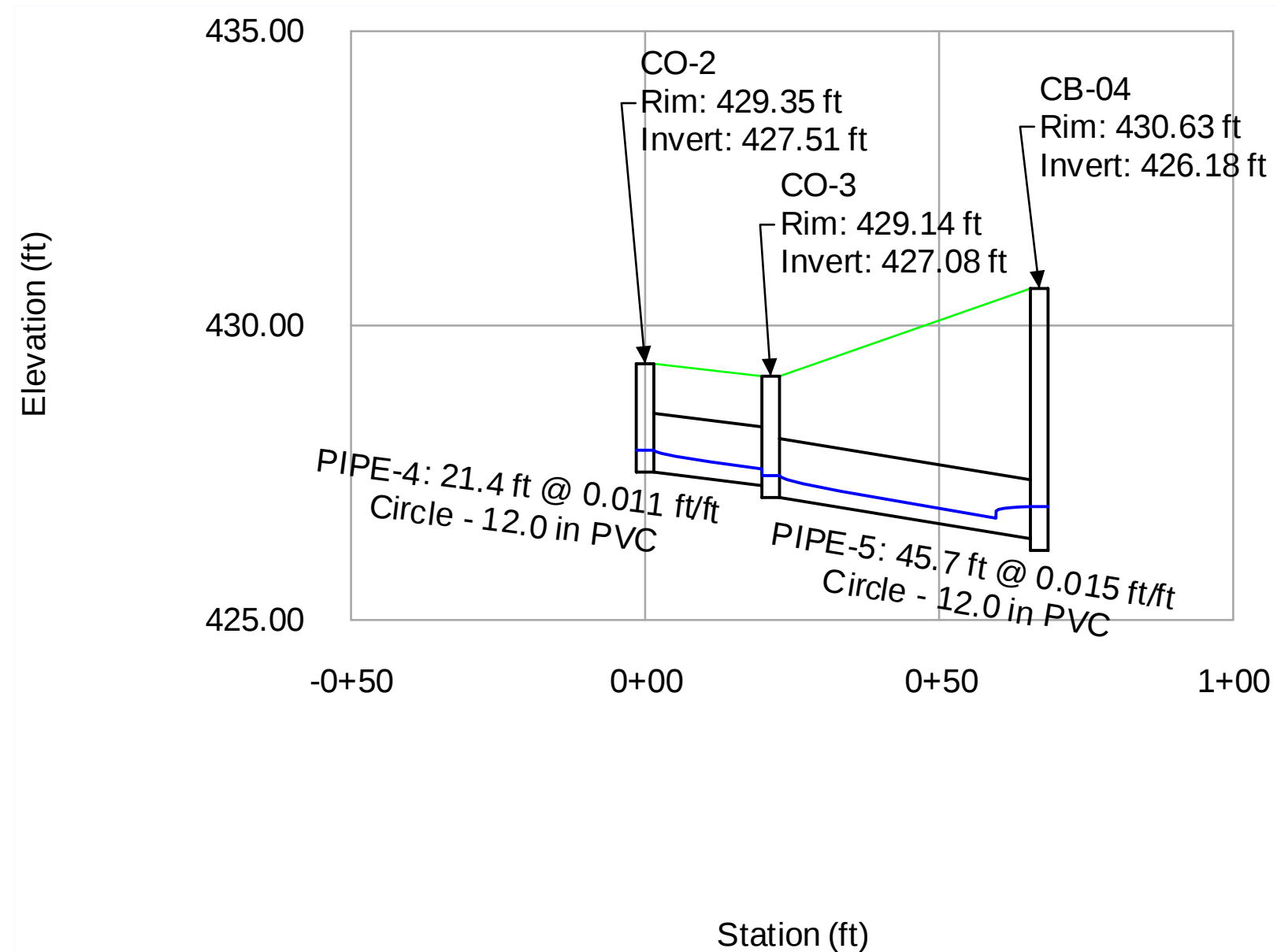
Engineering Profile - CO-1 to CB-5 (2024-08-01 TLE Rolesville.stsw)



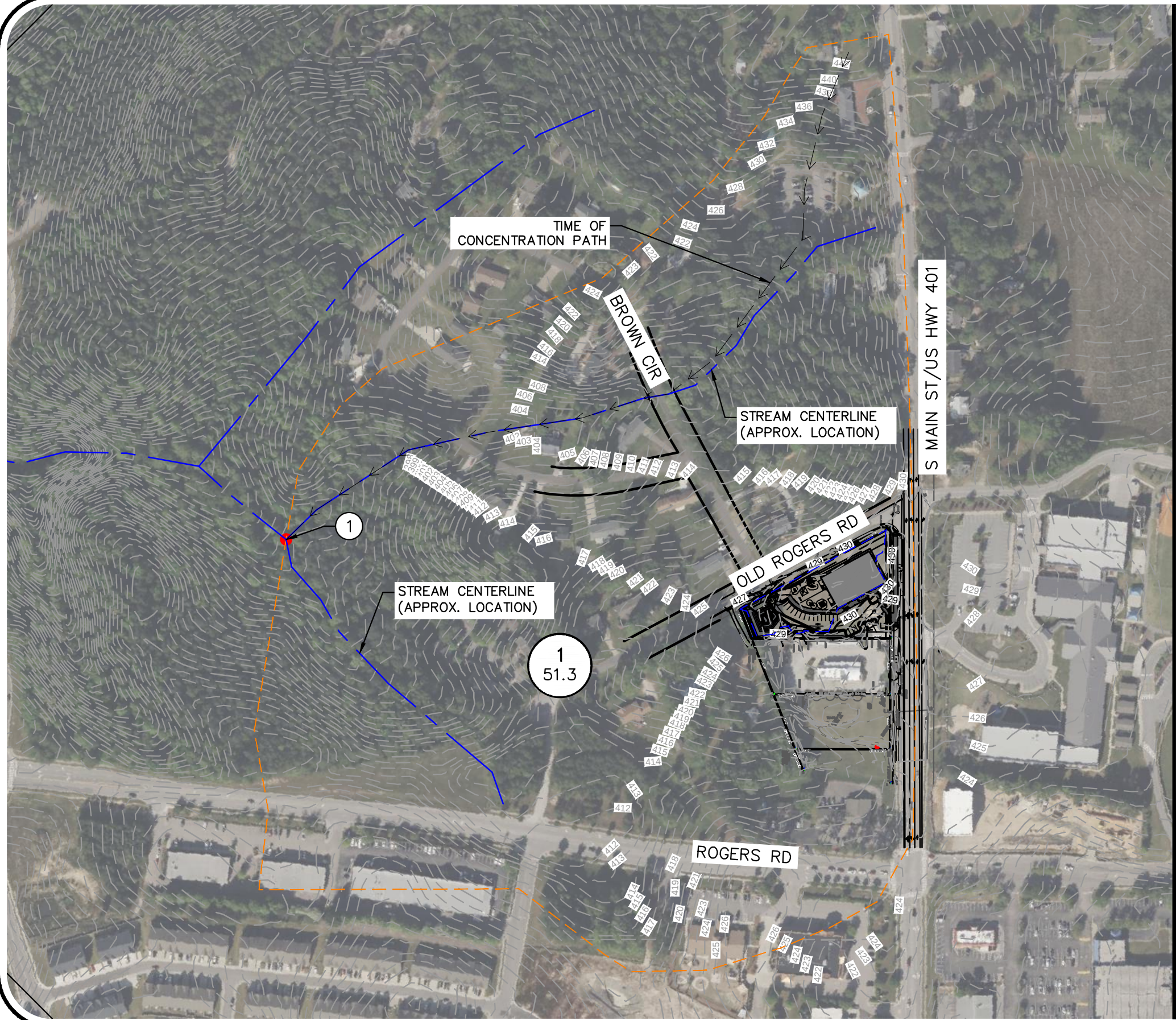
10-YEAR

Profile Report

Engineering Profile - CO-2 to CB-5 (2024-08-01 TLE Rolesville.stsw)

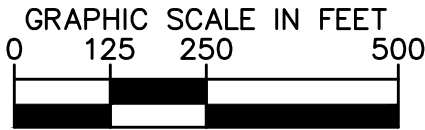
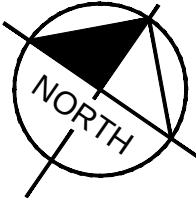


APPENDIX G



ROLESVILLE LEARNING CENTER

DRAINAGE AREA TABLE	
AREA	AREA (AC)
POA-1 (TREATED ONSITE)	0.81
POA-1 (BYPASS)	50.49
TOTAL	51.30



LEGEND

- DRAINAGE AREA OUTLINE
- PROPERTY LINE
- STREAM CENTERLINE
- TIME OF CONCENTRATION PATH
- POINT OF ANALYSIS
- SUBAREA ID
SUBAREA SIZE

Kimley»Horn

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PHONE: 919-677-2000 FAX: 919-677-2050
WWW.KIMLEY-HORN.COM

10% RULE DRAINAGE AREA MAP

KHA PROJECT NO: 013031004
DATE: 07/18/2024

Table of Contents

	Master Network Summary	1
Rolesville		
	Time-Depth Curve, 10 years (10 Year)	3
	Time-Depth Curve, 100 years (100 Year)	5
	Time-Depth Curve, 0 years (1-inch)	7
	Time-Depth Curve, 1 years (1-year 24-hour)	9
	Time-Depth Curve, 25 years (25 Year)	11
POST-POA 1 BYPASS		
	Time of Concentration Calculations, 10 years (10 Year)	13
POST-POA 1 DA		
	Time of Concentration Calculations, 10 years (10 Year)	15
PRE-POA 1 DA		
	Time of Concentration Calculations, 10 years (10 Year)	17
POST-POA 1 BYPASS		
	Runoff CN-Area, 1 years (1-year 24-hour)	19
POST-POA 1 DA		
	Runoff CN-Area, 1 years (1-year 24-hour)	20
PRE-POA 1 DA		
	Runoff CN-Area, 1 years (1-year 24-hour)	21
POST-POA 1 BYPASS		
	Unit Hydrograph Summary, 0 years (1-inch)	22
	Unit Hydrograph Summary, 1 years (1-year 24-hour)	24
	Unit Hydrograph Summary, 10 years (10 Year)	26
	Unit Hydrograph Summary, 25 years (25 Year)	28
	Unit Hydrograph Summary, 100 years (100 Year)	30
POST-POA 1 DA		
	Unit Hydrograph Summary, 0 years (1-inch)	32
	Unit Hydrograph Summary, 1 years (1-year 24-hour)	34
	Unit Hydrograph Summary, 10 years (10 Year)	36
	Unit Hydrograph Summary, 25 years (25 Year)	38
	Unit Hydrograph Summary, 100 years (100 Year)	40
PRE-POA 1 DA		
	Unit Hydrograph Summary, 0 years (1-inch)	42

Table of Contents

	Unit Hydrograph Summary, 1 years (1-year 24-hour)	44
	Unit Hydrograph Summary, 10 years (10 Year)	46
	Unit Hydrograph Summary, 25 years (25 Year)	48
	Unit Hydrograph Summary, 100 years (100 Year)	50
WET POND	Time vs. Volume, 10 years (10 Year)	52
WET POND	Elevation-Area Volume Curve, 10 years (10 Year)	55
Composite Outlet Structure - 1	Outlet Input Data, 10 years (10 Year)	56
WET POND (IN)	Pond Inflow Summary, 10 years (10 Year)	60

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)
PRE-POA 1 DA	1-inch	0	0.019	24.000	0.04
PRE-POA 1 DA	1-year 24-hour	1	2.716	12.050	39.48
PRE-POA 1 DA	10 Year	10	8.805	12.000	142.75
PRE-POA 1 DA	25 Year	25	11.957	12.000	194.97
PRE-POA 1 DA	100 Year	100	17.431	12.000	283.95
POST-POA 1 DA	1-inch	0	0.030	11.950	0.55
POST-POA 1 DA	1-year 24-hour	1	0.143	11.900	2.55
POST-POA 1 DA	10 Year	10	0.286	11.900	4.93
POST-POA 1 DA	25 Year	25	0.350	11.900	5.97
POST-POA 1 DA	100 Year	100	0.454	11.900	7.64
POST-POA 1 BYPASS	1-inch	0	0.019	24.000	0.04
POST-POA 1 BYPASS	1-year 24-hour	1	2.673	12.050	38.86
POST-POA 1 BYPASS	10 Year	10	8.666	12.000	140.49
POST-POA 1 BYPASS	25 Year	25	11.768	12.000	191.90
POST-POA 1 BYPASS	100 Year	100	17.156	12.000	279.47

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)
PRE- POA 1	1-inch	0	0.019	24.000	0.04
PRE- POA 1	1-year 24-hour	1	2.716	12.050	39.48
PRE- POA 1	10 Year	10	8.805	12.000	142.75
PRE- POA 1	25 Year	25	11.957	12.000	194.97
PRE- POA 1	100 Year	100	17.431	12.000	283.95
POST-POA 1	1-inch	0	0.029	24.000	0.05
POST-POA 1	1-year 24-hour	1	2.767	12.050	39.95
POST-POA 1	10 Year	10	8.902	12.000	144.86
POST-POA 1	25 Year	25	12.068	12.000	197.18
POST-POA 1	100 Year	100	17.560	12.000	286.22

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
WET POND (IN)	1-inch	0	0.030	11.950	0.55	(N/A)	(N/A)
WET POND (OUT)	1-inch	0	0.010	18.450	0.01	426.66	0.021
WET POND (IN)	1-year 24-hour	1	0.143	11.900	2.55	(N/A)	(N/A)

Subsection: Master Network Summary

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft ³ /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
WET POND (OUT)	1-year 24-hour	1	0.094	12.050	1.09	427.82	0.068
WET POND (IN)	10 Year	10	0.286	11.900	4.93	(N/A)	(N/A)
WET POND (OUT)	10 Year	10	0.236	11.950	4.51	428.21	0.086
WET POND (IN)	25 Year	25	0.350	11.900	5.97	(N/A)	(N/A)
WET POND (OUT)	25 Year	25	0.300	11.950	5.53	428.28	0.090
WET POND (IN)	100 Year	100	0.454	11.900	7.64	(N/A)	(N/A)
WET POND (OUT)	100 Year	100	0.404	11.950	7.09	428.39	0.095

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 10 Year

Return Event: 10 years
 Storm Event: 10 Year

Time-Depth Curve: 10 Year

Label	10 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	10 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.2	0.2	0.2	0.2
4.000	0.2	0.2	0.3	0.3	0.3
4.500	0.3	0.3	0.3	0.3	0.3
5.000	0.3	0.3	0.3	0.3	0.4
5.500	0.4	0.4	0.4	0.4	0.4
6.000	0.4	0.4	0.4	0.4	0.4
6.500	0.4	0.5	0.5	0.5	0.5
7.000	0.5	0.5	0.5	0.5	0.5
7.500	0.6	0.6	0.6	0.6	0.6
8.000	0.6	0.6	0.6	0.6	0.7
8.500	0.7	0.7	0.7	0.7	0.7
9.000	0.7	0.8	0.8	0.8	0.8
9.500	0.8	0.8	0.9	0.9	0.9
10.000	0.9	0.9	1.0	1.0	1.0
10.500	1.0	1.1	1.1	1.1	1.1
11.000	1.2	1.2	1.3	1.3	1.4
11.500	1.4	1.5	1.8	2.2	2.9
12.000	3.3	3.4	3.5	3.6	3.7
12.500	3.7	3.7	3.8	3.8	3.9
13.000	3.9	3.9	3.9	4.0	4.0
13.500	4.0	4.1	4.1	4.1	4.1
14.000	4.1	4.2	4.2	4.2	4.2
14.500	4.2	4.2	4.3	4.3	4.3
15.000	4.3	4.3	4.3	4.3	4.4
15.500	4.4	4.4	4.4	4.4	4.4
16.000	4.4	4.4	4.5	4.5	4.5
16.500	4.5	4.5	4.5	4.5	4.5
17.000	4.5	4.6	4.6	4.6	4.6

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 10 Year

Return Event: 10 years
 Storm Event: 10 Year

CUMULATIVE RAINFALL (in)
 Output Time Increment = 0.100 hours
 Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	4.6	4.6	4.6	4.6	4.6
18.000	4.6	4.7	4.7	4.7	4.7
18.500	4.7	4.7	4.7	4.7	4.7
19.000	4.7	4.7	4.7	4.7	4.8
19.500	4.8	4.8	4.8	4.8	4.8
20.000	4.8	4.8	4.8	4.8	4.8
20.500	4.8	4.8	4.8	4.8	4.9
21.000	4.9	4.9	4.9	4.9	4.9
21.500	4.9	4.9	4.9	4.9	4.9
22.000	4.9	4.9	4.9	4.9	4.9
22.500	5.0	5.0	5.0	5.0	5.0
23.000	5.0	5.0	5.0	5.0	5.0
23.500	5.0	5.0	5.0	5.0	5.0
24.000	5.0	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time-Depth Curve
Label: Rolesville
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

Time-Depth Curve: 100 Year

Label	100 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	100 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.1	0.1	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.2
2.000	0.2	0.2	0.2	0.2	0.2
2.500	0.2	0.2	0.2	0.2	0.3
3.000	0.3	0.3	0.3	0.3	0.3
3.500	0.3	0.3	0.3	0.3	0.4
4.000	0.4	0.4	0.4	0.4	0.4
4.500	0.4	0.4	0.4	0.5	0.5
5.000	0.5	0.5	0.5	0.5	0.5
5.500	0.5	0.6	0.6	0.6	0.6
6.000	0.6	0.6	0.6	0.6	0.7
6.500	0.7	0.7	0.7	0.7	0.7
7.000	0.7	0.8	0.8	0.8	0.8
7.500	0.8	0.8	0.9	0.9	0.9
8.000	0.9	0.9	0.9	1.0	1.0
8.500	1.0	1.0	1.0	1.1	1.1
9.000	1.1	1.1	1.2	1.2	1.2
9.500	1.2	1.3	1.3	1.3	1.3
10.000	1.4	1.4	1.4	1.5	1.5
10.500	1.5	1.6	1.6	1.7	1.7
11.000	1.8	1.8	1.9	2.0	2.1
11.500	2.1	2.3	2.7	3.3	4.3
12.000	5.0	5.2	5.3	5.4	5.5
12.500	5.6	5.6	5.7	5.7	5.8
13.000	5.8	5.9	5.9	6.0	6.0
13.500	6.0	6.1	6.1	6.1	6.2
14.000	6.2	6.2	6.3	6.3	6.3
14.500	6.3	6.4	6.4	6.4	6.4
15.000	6.5	6.5	6.5	6.5	6.5
15.500	6.6	6.6	6.6	6.6	6.6
16.000	6.7	6.7	6.7	6.7	6.7
16.500	6.7	6.8	6.8	6.8	6.8
17.000	6.8	6.8	6.8	6.9	6.9

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 100 Year

Return Event: 100 years
 Storm Event: 100 Year

CUMULATIVE RAINFALL (in)
 Output Time Increment = 0.100 hours
 Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	6.9	6.9	6.9	6.9	6.9
18.000	7.0	7.0	7.0	7.0	7.0
18.500	7.0	7.0	7.1	7.1	7.1
19.000	7.1	7.1	7.1	7.1	7.1
19.500	7.1	7.2	7.2	7.2	7.2
20.000	7.2	7.2	7.2	7.2	7.2
20.500	7.2	7.3	7.3	7.3	7.3
21.000	7.3	7.3	7.3	7.3	7.3
21.500	7.3	7.3	7.4	7.4	7.4
22.000	7.4	7.4	7.4	7.4	7.4
22.500	7.4	7.4	7.4	7.5	7.5
23.000	7.5	7.5	7.5	7.5	7.5
23.500	7.5	7.5	7.5	7.5	7.6
24.000	7.6	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 1-inch

Return Event: 0 years
 Storm Event: 1-inch

Time-Depth Curve: 1-inch

Label	1-inch
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	0 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.0	0.0	0.0	0.0	0.0
2.000	0.0	0.0	0.0	0.0	0.0
2.500	0.0	0.0	0.0	0.0	0.0
3.000	0.0	0.0	0.0	0.0	0.0
3.500	0.0	0.0	0.0	0.0	0.0
4.000	0.0	0.0	0.1	0.1	0.1
4.500	0.1	0.1	0.1	0.1	0.1
5.000	0.1	0.1	0.1	0.1	0.1
5.500	0.1	0.1	0.1	0.1	0.1
6.000	0.1	0.1	0.1	0.1	0.1
6.500	0.1	0.1	0.1	0.1	0.1
7.000	0.1	0.1	0.1	0.1	0.1
7.500	0.1	0.1	0.1	0.1	0.1
8.000	0.1	0.1	0.1	0.1	0.1
8.500	0.1	0.1	0.1	0.1	0.1
9.000	0.1	0.2	0.2	0.2	0.2
9.500	0.2	0.2	0.2	0.2	0.2
10.000	0.2	0.2	0.2	0.2	0.2
10.500	0.2	0.2	0.2	0.2	0.2
11.000	0.2	0.2	0.3	0.3	0.3
11.500	0.3	0.3	0.4	0.4	0.6
12.000	0.7	0.7	0.7	0.7	0.7
12.500	0.7	0.7	0.8	0.8	0.8
13.000	0.8	0.8	0.8	0.8	0.8
13.500	0.8	0.8	0.8	0.8	0.8
14.000	0.8	0.8	0.8	0.8	0.8
14.500	0.8	0.8	0.8	0.8	0.9
15.000	0.9	0.9	0.9	0.9	0.9
15.500	0.9	0.9	0.9	0.9	0.9
16.000	0.9	0.9	0.9	0.9	0.9
16.500	0.9	0.9	0.9	0.9	0.9
17.000	0.9	0.9	0.9	0.9	0.9

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 1-inch

Return Event: 0 years
 Storm Event: 1-inch

CUMULATIVE RAINFALL (in)
 Output Time Increment = 0.100 hours
 Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	0.9	0.9	0.9	0.9	0.9
18.000	0.9	0.9	0.9	0.9	0.9
18.500	0.9	0.9	0.9	0.9	0.9
19.000	0.9	0.9	0.9	0.9	0.9
19.500	0.9	0.9	0.9	0.9	1.0
20.000	1.0	1.0	1.0	1.0	1.0
20.500	1.0	1.0	1.0	1.0	1.0
21.000	1.0	1.0	1.0	1.0	1.0
21.500	1.0	1.0	1.0	1.0	1.0
22.000	1.0	1.0	1.0	1.0	1.0
22.500	1.0	1.0	1.0	1.0	1.0
23.000	1.0	1.0	1.0	1.0	1.0
23.500	1.0	1.0	1.0	1.0	1.0
24.000	1.0	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time-Depth Curve

Label: Rolesville

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Time-Depth Curve: 1-year 24- Hour

Label	1-year 24- Hour
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	1 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.0
1.000	0.0	0.0	0.0	0.0	0.0
1.500	0.0	0.0	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.1	0.1
2.500	0.1	0.1	0.1	0.1	0.1
3.000	0.1	0.1	0.1	0.1	0.1
3.500	0.1	0.1	0.1	0.1	0.1
4.000	0.1	0.1	0.1	0.1	0.2
4.500	0.2	0.2	0.2	0.2	0.2
5.000	0.2	0.2	0.2	0.2	0.2
5.500	0.2	0.2	0.2	0.2	0.2
6.000	0.2	0.2	0.2	0.2	0.2
6.500	0.3	0.3	0.3	0.3	0.3
7.000	0.3	0.3	0.3	0.3	0.3
7.500	0.3	0.3	0.3	0.3	0.3
8.000	0.3	0.3	0.4	0.4	0.4
8.500	0.4	0.4	0.4	0.4	0.4
9.000	0.4	0.4	0.4	0.4	0.5
9.500	0.5	0.5	0.5	0.5	0.5
10.000	0.5	0.5	0.5	0.6	0.6
10.500	0.6	0.6	0.6	0.6	0.7
11.000	0.7	0.7	0.7	0.7	0.8
11.500	0.8	0.9	1.0	1.2	1.6
12.000	1.9	2.0	2.0	2.0	2.1
12.500	2.1	2.1	2.1	2.2	2.2
13.000	2.2	2.2	2.2	2.3	2.3
13.500	2.3	2.3	2.3	2.3	2.3
14.000	2.3	2.4	2.4	2.4	2.4
14.500	2.4	2.4	2.4	2.4	2.4
15.000	2.4	2.4	2.5	2.5	2.5
15.500	2.5	2.5	2.5	2.5	2.5
16.000	2.5	2.5	2.5	2.5	2.5
16.500	2.5	2.6	2.6	2.6	2.6
17.000	2.6	2.6	2.6	2.6	2.6

Subsection: Time-Depth Curve

Label: Rolesville

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	2.6	2.6	2.6	2.6	2.6
18.000	2.6	2.6	2.6	2.6	2.7
18.500	2.7	2.7	2.7	2.7	2.7
19.000	2.7	2.7	2.7	2.7	2.7
19.500	2.7	2.7	2.7	2.7	2.7
20.000	2.7	2.7	2.7	2.7	2.7
20.500	2.7	2.7	2.7	2.8	2.8
21.000	2.8	2.8	2.8	2.8	2.8
21.500	2.8	2.8	2.8	2.8	2.8
22.000	2.8	2.8	2.8	2.8	2.8
22.500	2.8	2.8	2.8	2.8	2.8
23.000	2.8	2.8	2.8	2.8	2.8
23.500	2.8	2.8	2.9	2.9	2.9
24.000	2.9	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 25 Year

Return Event: 25 years
 Storm Event: 25 Year

Time-Depth Curve: 25 Year

Label	25 Year
Start Time	0.000 hours
Increment	0.100 hours
End Time	24.000 hours
Return Event	25 years

CUMULATIVE RAINFALL (in)

Output Time Increment = 0.100 hours

Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
0.000	0.0	0.0	0.0	0.0	0.0
0.500	0.0	0.0	0.0	0.0	0.1
1.000	0.1	0.1	0.1	0.1	0.1
1.500	0.1	0.1	0.1	0.1	0.1
2.000	0.1	0.1	0.1	0.2	0.2
2.500	0.2	0.2	0.2	0.2	0.2
3.000	0.2	0.2	0.2	0.2	0.2
3.500	0.2	0.3	0.3	0.3	0.3
4.000	0.3	0.3	0.3	0.3	0.3
4.500	0.3	0.3	0.3	0.4	0.4
5.000	0.4	0.4	0.4	0.4	0.4
5.500	0.4	0.4	0.4	0.5	0.5
6.000	0.5	0.5	0.5	0.5	0.5
6.500	0.5	0.5	0.6	0.6	0.6
7.000	0.6	0.6	0.6	0.6	0.6
7.500	0.7	0.7	0.7	0.7	0.7
8.000	0.7	0.7	0.7	0.8	0.8
8.500	0.8	0.8	0.8	0.8	0.9
9.000	0.9	0.9	0.9	0.9	1.0
9.500	1.0	1.0	1.0	1.0	1.1
10.000	1.1	1.1	1.1	1.2	1.2
10.500	1.2	1.3	1.3	1.3	1.4
11.000	1.4	1.5	1.5	1.6	1.6
11.500	1.7	1.8	2.1	2.6	3.4
12.000	4.0	4.1	4.2	4.3	4.4
12.500	4.4	4.5	4.5	4.6	4.6
13.000	4.6	4.7	4.7	4.7	4.8
13.500	4.8	4.8	4.8	4.9	4.9
14.000	4.9	4.9	5.0	5.0	5.0
14.500	5.0	5.0	5.1	5.1	5.1
15.000	5.1	5.1	5.2	5.2	5.2
15.500	5.2	5.2	5.2	5.3	5.3
16.000	5.3	5.3	5.3	5.3	5.3
16.500	5.3	5.4	5.4	5.4	5.4
17.000	5.4	5.4	5.4	5.4	5.5

Subsection: Time-Depth Curve
 Label: Rolesville
 Scenario: 25 Year

Return Event: 25 years
 Storm Event: 25 Year

CUMULATIVE RAINFALL (in)
 Output Time Increment = 0.100 hours
 Time on left represents time for first value in each row.

Time (hours)	Depth (in)	Depth (in)	Depth (in)	Depth (in)	Depth (in)
17.500	5.5	5.5	5.5	5.5	5.5
18.000	5.5	5.5	5.5	5.6	5.6
18.500	5.6	5.6	5.6	5.6	5.6
19.000	5.6	5.6	5.6	5.7	5.7
19.500	5.7	5.7	5.7	5.7	5.7
20.000	5.7	5.7	5.7	5.7	5.7
20.500	5.8	5.8	5.8	5.8	5.8
21.000	5.8	5.8	5.8	5.8	5.8
21.500	5.8	5.8	5.8	5.8	5.9
22.000	5.9	5.9	5.9	5.9	5.9
22.500	5.9	5.9	5.9	5.9	5.9
23.000	5.9	5.9	5.9	6.0	6.0
23.500	6.0	6.0	6.0	6.0	6.0
24.000	6.0	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Time of Concentration Calculations
Label: POST-POA 1 BYPASS
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow

Hydraulic Length	200.00 ft
Manning's n	0.025
Slope	0.045 ft/ft
2 Year 24 Hour Depth	3.5 in
Average Velocity	1.19 ft/s
Segment Time of Concentration	0.047 hours

Segment #2: TR-55 Shallow Concentrated Flow

Hydraulic Length	718.00 ft
Is Paved?	False
Slope	0.030 ft/ft
Average Velocity	2.79 ft/s
Segment Time of Concentration	0.071 hours

Segment #3: TR-55 Channel Flow

Flow Area	2.0 ft ²
Hydraulic Length	959.00 ft
Manning's n	0.025
Slope	0.020 ft/ft
Wetted Perimeter	4.47 ft
Average Velocity	4.93 ft/s
Segment Time of Concentration	0.054 hours

Time of Concentration (Composite)

Time of Concentration (Composite)	0.172 hours
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Subsection: Time of Concentration Calculations
Label: POST-POA 1 BYPASS
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

===== SCS Channel Flow

$$T_c = \frac{R = Q_a / W_p}{V = (1.49 * (R^{2/3}) * (S_f^{-0.5})) / n}$$

Where: $(L_f / V) / 3600$
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

===== SCS TR-55 Shallow Concentration Flow

$$T_c = \frac{\text{Unpaved surface:}}{V = 16.1345 * (S_f^{0.5})}$$

$$\text{Paved Surface:}$$
$$V = 20.3282 * (S_f^{0.5})$$

Where: $(L_f / V) / 3600$
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

===== SCS TR-55 Sheet Flow

$$T_c = \frac{(0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))}{\text{Where:}}$$

Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Subsection: Time of Concentration Calculations

Label: POST-POA 1 DA

Scenario: 10 Year

Return Event: 10 years

Storm Event: 10 Year

Time of Concentration Results

Segment #1: User Defined Tc

Time of Concentration	0.083 hours
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Time of Concentration (Composite)

Time of Concentration (Composite)	0.083 hours
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Subsection: Time of Concentration Calculations
Label: POST-POA 1 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

=== User Defined

Tc = Value entered by user
Where: Tc= Time of concentration, hours

Subsection: Time of Concentration Calculations
Label: PRE-POA 1 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow

Hydraulic Length	200.00 ft
Manning's n	0.025
Slope	0.045 ft/ft
2 Year 24 Hour Depth	3.5 in
Average Velocity	1.19 ft/s
Segment Time of Concentration	0.047 hours

Segment #2: TR-55 Shallow Concentrated Flow

Hydraulic Length	718.00 ft
Is Paved?	False
Slope	0.030 ft/ft
Average Velocity	2.79 ft/s
Segment Time of Concentration	0.071 hours

Segment #3: TR-55 Channel Flow

Flow Area	2.0 ft ²
Hydraulic Length	959.00 ft
Manning's n	0.025
Slope	0.020 ft/ft
Wetted Perimeter	4.47 ft
Average Velocity	4.93 ft/s
Segment Time of Concentration	0.054 hours

Time of Concentration (Composite)

Time of Concentration (Composite)	0.172 hours
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Subsection: Time of Concentration Calculations
Label: PRE-POA 1 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

===== SCS Channel Flow

$$T_c = \frac{R = Q_a / W_p}{V = (1.49 * (R^{2/3}) * (S_f^{-0.5})) / n}$$

Where: $(L_f / V) / 3600$
R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

===== SCS TR-55 Shallow Concentration Flow

$$T_c = \frac{\text{Unpaved surface:}}{V = 16.1345 * (S_f^{0.5})}$$

$$\text{Paved Surface:}$$
$$V = 20.3282 * (S_f^{0.5})$$

Where: $(L_f / V) / 3600$
V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

===== SCS TR-55 Sheet Flow

$$T_c = \frac{(0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))}{\text{Where:}}$$

Tc= Time of concentration, hours
n= Manning's n
Lf= Flow length, feet
P= 2yr, 24hr Rain depth, inches
Sf= Slope, %

Subsection: Runoff CN-Area
Label: POST-POA 1 BYPASS
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	0.190	0.0	0.0	80.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	0.250	0.0	0.0	98.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	14.980	0.0	0.0	61.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	14.830	0.0	0.0	98.000
Woods - good - Soil B	55.000	20.240	0.0	0.0	55.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	50.490	(N/A)	(N/A)	69.717

Subsection: Runoff CN-Area
 Label: POST-POA 1 DA
 Scenario: 1-year 24-hour

Return Event: 1 years
 Storm Event: 1-year 24- Hour

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil D	98.000	0.570	0.0	0.0	98.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	0.240	0.0	0.0	80.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	0.810	(N/A)	(N/A)	92.667

Subsection: Runoff CN-Area

Label: PRE-POA 1 DA

Scenario: 1-year 24-hour

Return Event: 1 years

Storm Event: 1-year 24- Hour

Runoff Curve Number Data

Soil/Surface Description	CN	Area (acres)	C (%)	UC (%)	Adjusted CN
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil D	80.000	1.080	0.0	0.0	80.000
Impervious Areas - Gravel (w/ right-of- way) - Soil D	91.000	0.170	0.0	0.0	91.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	14.830	0.0	0.0	98.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	14.980	0.0	0.0	61.000
Woods - good - Soil B	55.000	20.240	0.0	0.0	55.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	51.300	(N/A)	(N/A)	69.828

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 BYPASS
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

Storm Event	1-inch
Return Event	0 years
Duration	24.000 hours
Depth	1.0 in
Time of Concentration (Composite)	0.172 hours
Area (User Defined)	50.490 acres
Computational Time Increment	0.023 hours
Time to Peak (Computed)	23.980 hours
Flow (Peak, Computed)	0.04 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	24.000 hours
Flow (Peak Interpolated Output)	0.04 ft ³ /s
Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	50.490 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.0 in
Runoff Volume (Pervious)	0.019 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.019 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.172 hours
Computational Time Increment	0.023 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	332.08 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 BYPASS
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.115 hours
Unit receding limb, Tr	0.459 hours
Total unit time, Tb	0.574 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 BYPASS
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Storm Event	1-year 24- Hour
Return Event	1 years
Duration	24.000 hours
Depth	2.9 in
Time of Concentration (Composite)	0.172 hours
Area (User Defined)	50.490 acres
Computational Time Increment	0.023 hours
Time to Peak (Computed)	12.036 hours
Flow (Peak, Computed)	39.83 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.050 hours
Flow (Peak Interpolated Output)	38.86 ft ³ /s
Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	50.490 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.6 in
Runoff Volume (Pervious)	2.684 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.673 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.172 hours
Computational Time Increment	0.023 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	332.08 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 BYPASS
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.115 hours
Unit receding limb, Tr	0.459 hours
Total unit time, Tb	0.574 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 BYPASS
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.172 hours
Area (User Defined)	50.490 acres
Computational Time Increment	0.023 hours
Time to Peak (Computed)	12.013 hours
Flow (Peak, Computed)	140.86 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	140.49 ft ³ /s
Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	50.490 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.1 in
Runoff Volume (Pervious)	8.693 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	8.666 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.172 hours
Computational Time Increment	0.023 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	332.08 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 BYPASS
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.115 hours
Unit receding limb, Tr	0.459 hours
Total unit time, Tb	0.574 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 BYPASS
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.0 in
Time of Concentration (Composite)	0.172 hours
Area (User Defined)	50.490 acres
Computational Time Increment	0.023 hours
Time to Peak (Computed)	11.990 hours
Flow (Peak, Computed)	192.02 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	191.90 ft ³ /s
Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	50.490 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.8 in
Runoff Volume (Pervious)	11.803 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	11.768 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.172 hours
Computational Time Increment	0.023 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	332.08 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 BYPASS
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.115 hours
Unit receding limb, Tr	0.459 hours
Total unit time, Tb	0.574 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 BYPASS
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.172 hours
Area (User Defined)	50.490 acres
Computational Time Increment	0.023 hours
Time to Peak (Computed)	11.990 hours
Flow (Peak, Computed)	280.41 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	279.47 ft ³ /s
Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	50.490 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.1 in
Runoff Volume (Pervious)	17.203 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	17.156 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.172 hours
Computational Time Increment	0.023 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	332.08 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 BYPASS
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.115 hours
Unit receding limb, Tr	0.459 hours
Total unit time, Tb	0.574 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

Storm Event	1-inch
Return Event	0 years
Duration	24.000 hours
Depth	1.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.810 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	0.57 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.55 ft ³ /s
Drainage Area	
SCS CN (Composite)	93.000
Area (User Defined)	0.810 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.5 in
Runoff Volume (Pervious)	0.030 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.030 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	11.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Storm Event	1-year 24- Hour
Return Event	1 years
Duration	24.000 hours
Depth	2.9 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.810 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	2.62 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.55 ft ³ /s
Drainage Area	
SCS CN (Composite)	93.000
Area (User Defined)	0.810 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.1 in
Runoff Volume (Pervious)	0.143 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.143 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	11.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.810 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	5.03 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	4.93 ft ³ /s
Drainage Area	
SCS CN (Composite)	93.000
Area (User Defined)	0.810 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.2 in
Runoff Volume (Pervious)	0.286 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.286 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	11.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.0 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.810 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	6.08 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	5.97 ft ³ /s
Drainage Area	
SCS CN (Composite)	93.000
Area (User Defined)	0.810 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	5.2 in
Runoff Volume (Pervious)	0.350 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.350 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	11.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.083 hours
Area (User Defined)	0.810 acres
Computational Time Increment	0.011 hours
Time to Peak (Computed)	11.922 hours
Flow (Peak, Computed)	7.78 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	7.64 ft ³ /s
Drainage Area	
SCS CN (Composite)	93.000
Area (User Defined)	0.810 acres
Maximum Retention (Pervious)	0.8 in
Maximum Retention (Pervious, 20 percent)	0.2 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	6.7 in
Runoff Volume (Pervious)	0.454 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.454 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.083 hours
Computational Time Increment	0.011 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	11.01 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: POST-POA 1 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.056 hours
Unit receding limb, Tr	0.222 hours
Total unit time, Tb	0.278 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

Storm Event	1-inch
Return Event	0 years
Duration	24.000 hours
Depth	1.0 in
Time of Concentration (Composite)	0.172 hours
Area (User Defined)	51.300 acres
Computational Time Increment	0.023 hours
Time to Peak (Computed)	23.980 hours
Flow (Peak, Computed)	0.04 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	24.000 hours
Flow (Peak Interpolated Output)	0.04 ft ³ /s
Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	51.300 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.0 in
Runoff Volume (Pervious)	0.020 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.019 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.172 hours
Computational Time Increment	0.023 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	337.40 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 1-inch

Return Event: 0 years
Storm Event: 1-inch

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.115 hours
Unit receding limb, Tr	0.459 hours
Total unit time, Tb	0.574 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

Storm Event	1-year 24- Hour
Return Event	1 years
Duration	24.000 hours
Depth	2.9 in
Time of Concentration (Composite)	0.172 hours
Area (User Defined)	51.300 acres
Computational Time Increment	0.023 hours
Time to Peak (Computed)	12.036 hours
Flow (Peak, Computed)	40.47 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.050 hours
Flow (Peak Interpolated Output)	39.48 ft ³ /s
Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	51.300 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.6 in
Runoff Volume (Pervious)	2.727 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.716 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.172 hours
Computational Time Increment	0.023 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	337.40 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 1-year 24-hour

Return Event: 1 years
Storm Event: 1-year 24- Hour

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.115 hours
Unit receding limb, Tr	0.459 hours
Total unit time, Tb	0.574 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.172 hours
Area (User Defined)	51.300 acres
Computational Time Increment	0.023 hours
Time to Peak (Computed)	12.013 hours
Flow (Peak, Computed)	143.12 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	142.75 ft ³ /s
Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	51.300 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.1 in
Runoff Volume (Pervious)	8.832 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	8.805 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.172 hours
Computational Time Increment	0.023 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	337.40 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.115 hours
Unit receding limb, Tr	0.459 hours
Total unit time, Tb	0.574 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.0 in
Time of Concentration (Composite)	0.172 hours
Area (User Defined)	51.300 acres
Computational Time Increment	0.023 hours
Time to Peak (Computed)	11.990 hours
Flow (Peak, Computed)	195.10 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	194.97 ft ³ /s
Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	51.300 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.8 in
Runoff Volume (Pervious)	11.992 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	11.957 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.172 hours
Computational Time Increment	0.023 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	337.40 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 25 Year

Return Event: 25 years
Storm Event: 25 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.115 hours
Unit receding limb, Tr	0.459 hours
Total unit time, Tb	0.574 hours

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.172 hours
Area (User Defined)	51.300 acres
Computational Time Increment	0.023 hours
Time to Peak (Computed)	11.990 hours
Flow (Peak, Computed)	284.91 ft ³ /s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	283.95 ft ³ /s
Drainage Area	
SCS CN (Composite)	70.000
Area (User Defined)	51.300 acres
Maximum Retention (Pervious)	4.3 in
Maximum Retention (Pervious, 20 percent)	0.9 in
Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.1 in
Runoff Volume (Pervious)	17.479 ac-ft
Hydrograph Volume (Area under Hydrograph curve)	
Volume	17.431 ac-ft
SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.172 hours
Computational Time Increment	0.023 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	337.40 ft ³ /s

Subsection: Unit Hydrograph Summary
Label: PRE-POA 1 DA
Scenario: 100 Year

Return Event: 100 years
Storm Event: 100 Year

SCS Unit Hydrograph Parameters	
Unit peak time, Tp	0.115 hours
Unit receding limb, Tr	0.459 hours
Total unit time, Tb	0.574 hours

Subsection: Time vs. Volume
Label: WET POND
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Time vs. Volume (ac-ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
0.000	0.000	0.000	0.000	0.000	0.000
0.250	0.000	0.000	0.000	0.000	0.000
0.500	0.000	0.000	0.000	0.000	0.000
0.750	0.000	0.000	0.000	0.000	0.000
1.000	0.000	0.000	0.000	0.000	0.000
1.250	0.000	0.000	0.000	0.000	0.000
1.500	0.000	0.000	0.000	0.000	0.000
1.750	0.000	0.000	0.000	0.000	0.000
2.000	0.000	0.000	0.000	0.000	0.000
2.250	0.000	0.000	0.000	0.000	0.000
2.500	0.000	0.000	0.000	0.000	0.000
2.750	0.000	0.000	0.000	0.000	0.000
3.000	0.000	0.000	0.000	0.000	0.000
3.250	0.000	0.000	0.000	0.000	0.000
3.500	0.000	0.000	0.000	0.000	0.000
3.750	0.000	0.000	0.000	0.001	0.001
4.000	0.001	0.001	0.001	0.001	0.001
4.250	0.001	0.001	0.001	0.001	0.001
4.500	0.001	0.001	0.001	0.001	0.001
4.750	0.002	0.002	0.002	0.002	0.002
5.000	0.002	0.002	0.002	0.002	0.002
5.250	0.002	0.002	0.003	0.003	0.003
5.500	0.003	0.003	0.003	0.003	0.003
5.750	0.003	0.003	0.004	0.004	0.004
6.000	0.004	0.004	0.004	0.004	0.004
6.250	0.005	0.005	0.005	0.005	0.005
6.500	0.005	0.005	0.005	0.006	0.006
6.750	0.006	0.006	0.006	0.006	0.007
7.000	0.007	0.007	0.007	0.007	0.007
7.250	0.008	0.008	0.008	0.008	0.008
7.500	0.008	0.009	0.009	0.009	0.009
7.750	0.009	0.010	0.010	0.010	0.010
8.000	0.010	0.011	0.011	0.011	0.011
8.250	0.011	0.012	0.012	0.012	0.012
8.500	0.013	0.013	0.013	0.014	0.014
8.750	0.014	0.014	0.015	0.015	0.015
9.000	0.016	0.016	0.016	0.017	0.017
9.250	0.017	0.018	0.018	0.018	0.019
9.500	0.019	0.019	0.020	0.020	0.020
9.750	0.021	0.021	0.021	0.022	0.022
10.000	0.023	0.023	0.024	0.024	0.025
10.250	0.025	0.026	0.026	0.027	0.028

Subsection: Time vs. Volume
Label: WET POND
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Time vs. Volume (ac-ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
10.500	0.028	0.029	0.029	0.030	0.031
10.750	0.032	0.033	0.033	0.034	0.035
11.000	0.036	0.037	0.038	0.039	0.040
11.250	0.041	0.042	0.044	0.045	0.047
11.500	0.048	0.050	0.052	0.055	0.058
11.750	0.063	0.069	0.077	0.083	0.086
12.000	0.086	0.083	0.079	0.075	0.072
12.250	0.070	0.068	0.066	0.064	0.062
12.500	0.061	0.060	0.059	0.058	0.057
12.750	0.056	0.056	0.055	0.055	0.054
13.000	0.054	0.054	0.053	0.053	0.053
13.250	0.053	0.052	0.052	0.052	0.052
13.500	0.052	0.052	0.052	0.052	0.052
13.750	0.052	0.052	0.051	0.051	0.051
14.000	0.051	0.051	0.051	0.051	0.051
14.250	0.051	0.051	0.051	0.051	0.051
14.500	0.051	0.051	0.051	0.051	0.051
14.750	0.051	0.051	0.051	0.051	0.051
15.000	0.051	0.051	0.051	0.051	0.051
15.250	0.051	0.051	0.051	0.051	0.051
15.500	0.051	0.051	0.051	0.050	0.050
15.750	0.050	0.050	0.050	0.050	0.050
16.000	0.050	0.050	0.050	0.050	0.050
16.250	0.050	0.050	0.050	0.050	0.050
16.500	0.050	0.050	0.050	0.050	0.050
16.750	0.050	0.050	0.050	0.050	0.050
17.000	0.050	0.050	0.050	0.050	0.050
17.250	0.050	0.050	0.050	0.050	0.050
17.500	0.050	0.050	0.050	0.050	0.050
17.750	0.050	0.050	0.050	0.050	0.050
18.000	0.050	0.050	0.050	0.050	0.050
18.250	0.050	0.050	0.050	0.050	0.050
18.500	0.050	0.050	0.050	0.050	0.050
18.750	0.050	0.050	0.050	0.050	0.050
19.000	0.050	0.050	0.050	0.050	0.050
19.250	0.050	0.050	0.050	0.050	0.050
19.500	0.050	0.050	0.050	0.050	0.050
19.750	0.050	0.050	0.050	0.050	0.050
20.000	0.050	0.050	0.050	0.050	0.050
20.250	0.050	0.050	0.050	0.050	0.050
20.500	0.050	0.050	0.050	0.050	0.050
20.750	0.050	0.050	0.050	0.050	0.050

Subsection: Time vs. Volume
 Label: WET POND
 Scenario: 10 Year

Return Event: 10 years
 Storm Event: 10 Year

Time vs. Volume (ac-ft)

Output Time increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
21.000	0.050	0.050	0.050	0.050	0.050
21.250	0.050	0.050	0.050	0.050	0.050
21.500	0.050	0.050	0.050	0.050	0.050
21.750	0.050	0.050	0.050	0.050	0.050
22.000	0.050	0.050	0.050	0.050	0.050
22.250	0.050	0.050	0.050	0.050	0.050
22.500	0.050	0.050	0.050	0.050	0.050
22.750	0.050	0.050	0.050	0.050	0.050
23.000	0.050	0.050	0.050	0.050	0.050
23.250	0.050	0.050	0.050	0.050	0.050
23.500	0.050	0.050	0.050	0.050	0.050
23.750	0.050	0.050	0.050	0.050	0.050
24.000	0.050	(N/A)	(N/A)	(N/A)	(N/A)

Subsection: Elevation-Area Volume Curve
 Label: WET POND
 Scenario: 10 Year

Return Event: 10 years
 Storm Event: 10 Year

Elevation (ft)	Planimeter (ft ²)	Area (acres)	A1+A2+sqr (A1*A2) (acres)	Volume (ac-ft)	Volume (Total) (ac-ft)
426.00	0.0	0.029	0.000	0.000	0.000
427.00	0.0	0.038	0.100	0.033	0.033
428.00	0.0	0.048	0.128	0.043	0.076
429.00	0.0	0.058	0.158	0.053	0.129

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Requested Pond Water Surface Elevations	
Minimum (Headwater)	426.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	429.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Area	Orifice - 2	Forward	Culvert - 1	427.40	429.00
Inlet Box	Riser - 1	Forward	Culvert - 1	428.00	429.00
Orifice-Circular	Orifice - 1	Forward	Culvert - 1	426.05	429.00
Culvert-Circular	Culvert - 1	Forward	TW	426.05	429.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Structure ID: Culvert - 1	
Structure Type: Culvert-Circular	
Number of Barrels	1
Diameter	15.0 in
Length	22.00 ft
Length (Computed Barrel)	22.01 ft
Slope (Computed)	0.027 ft/ft
Outlet Control Data	
Manning's n	0.013
Ke	0.200
Kb	0.023
Kr	0.000
Convergence Tolerance	0.00 ft
Inlet Control Data	
Equation Form	Form 1
K	0.0045
M	2.0000
C	0.0317
Y	0.6900
T1 ratio (HW/D)	0.000
T2 ratio (HW/D)	1.184
Slope Correction Factor	-0.500

Use unsubmerged inlet control 0 equation below T1 elevation.

Use submerged inlet control 0 equation above T2 elevation

In transition zone between unsubmerged and submerged inlet control, interpolate between flows at T1 & T2...

T1 Elevation	426.05 ft	T1 Flow	4.80 ft ³ /s
T2 Elevation	427.53 ft	T2 Flow	5.49 ft ³ /s

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Structure ID: Riser - 1	
Structure Type: Inlet Box	
Number of Openings	1
Elevation	428.00 ft
Orifice Area	6.0 ft ²
Orifice Coefficient	0.600
Weir Length	10.00 ft
Weir Coefficient	3.00 (ft ^{0.5})/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	False

Structure ID: Orifice - 1	
Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	426.05 ft
Orifice Diameter	0.8 in
Orifice Coefficient	0.600

Structure ID: Orifice - 2	
Structure Type: Orifice-Area	
Number of Openings	1
Elevation	427.40 ft
Orifice Area	0.4 ft ²
Top Elevation	427.80 ft
Datum Elevation	427.40 ft
Orifice Coefficient	0.600

Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft

Subsection: Outlet Input Data
Label: Composite Outlet Structure - 1
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Convergence Tolerances	
Flow Tolerance (Minimum)	0.001 ft ³ /s
Flow Tolerance (Maximum)	10.000 ft ³ /s

Subsection: Pond Inflow Summary
Label: WET POND (IN)
Scenario: 10 Year

Return Event: 10 years
Storm Event: 10 Year

Summary for Hydrograph Addition at 'WET POND'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	POST-POA 1 DA

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft ³ /s)
Flow (From)	POST-POA 1 DA	0.286	11.900	4.93
Flow (In)	WET POND	0.286	11.900	4.93

Index

C

Composite Outlet Structure - 1 (Outlet Input Data, 10 years (10 Year))...56, 57, 58, 59

M

Master Network Summary...1, 2

P

POST-POA 1 BYPASS (Runoff CN-Area, 1 years (1-year 24-hour))...19

POST-POA 1 BYPASS (Time of Concentration Calculations, 10 years (10 Year))...13, 14

POST-POA 1 BYPASS (Unit Hydrograph Summary, 0 years (1-inch))...22, 23

POST-POA 1 BYPASS (Unit Hydrograph Summary, 1 years (1-year 24-hour))...24, 25

POST-POA 1 BYPASS (Unit Hydrograph Summary, 10 years (10 Year))...26, 27

POST-POA 1 BYPASS (Unit Hydrograph Summary, 100 years (100 Year))...30, 31

POST-POA 1 BYPASS (Unit Hydrograph Summary, 25 years (25 Year))...28, 29

POST-POA 1 DA (Runoff CN-Area, 1 years (1-year 24-hour))...20

POST-POA 1 DA (Time of Concentration Calculations, 10 years (10 Year))...15, 16

POST-POA 1 DA (Unit Hydrograph Summary, 0 years (1-inch))...32, 33

POST-POA 1 DA (Unit Hydrograph Summary, 1 years (1-year 24-hour))...34, 35

POST-POA 1 DA (Unit Hydrograph Summary, 10 years (10 Year))...36, 37

POST-POA 1 DA (Unit Hydrograph Summary, 100 years (100 Year))...40, 41

POST-POA 1 DA (Unit Hydrograph Summary, 25 years (25 Year))...38, 39

PRE-POA 1 DA (Runoff CN-Area, 1 years (1-year 24-hour))...21

PRE-POA 1 DA (Time of Concentration Calculations, 10 years (10 Year))...17, 18

PRE-POA 1 DA (Unit Hydrograph Summary, 0 years (1-inch))...42, 43

PRE-POA 1 DA (Unit Hydrograph Summary, 1 years (1-year 24-hour))...44, 45

PRE-POA 1 DA (Unit Hydrograph Summary, 10 years (10 Year))...46, 47

PRE-POA 1 DA (Unit Hydrograph Summary, 100 years (100 Year))...50, 51

PRE-POA 1 DA (Unit Hydrograph Summary, 25 years (25 Year))...48, 49

R

Rolesville (Time-Depth Curve, 0 years (1-inch))...7, 8

Rolesville (Time-Depth Curve, 1 years (1-year 24-hour))...9, 10

Rolesville (Time-Depth Curve, 10 years (10 Year))...3, 4

Rolesville (Time-Depth Curve, 100 years (100 Year))...5, 6

Rolesville (Time-Depth Curve, 25 years (25 Year))...11, 12

W

WET POND (Elevation-Area Volume Curve, 10 years (10 Year))...55

WET POND (IN) (Pond Inflow Summary, 10 years (10 Year))...60

WET POND (Time vs. Volume, 10 years (10 Year))...52, 53, 54

APPENDIX H

Skimmer Basin 1

1.25 Total Drainage Area, ACRES
 1.25 Disturbed Area, ACRES
 2.82 10 Year Peak Flow, CFS

Q10 = C*I*A (Rational Method)
Q10 = 0.35 * 6.44 * 1.25

2,250.0 Required Volume, CUFT
 915.7 Required Surface Area, SQFT
 30.0 Suggested Width, FT
 60.0 Suggested Length, FT

1800 CUFT / ACRE disturbed area (NC E&SC Manual)
325 SQFT / CFS of peak flow
 Min length to width ratio: 2:1

Basin Feature	Contour	Contour Area	Incremental Volume	Accumulated Volume, S	Stage, Z
		sq ft	cu ft	cu ft	ft
Bottom of Basin:	426.00	1,258	0	0	0.00
Primary Spillway Elevation:	427.50	1,964	2,417	2,417	1.50
Top of Dam:	429.00	2,825	3,592	6,008	3.00

3.00 Trial Side Slope Ratio Z:1
 1.50 Trial Depth, FT (2 to 3.5 feet above grade)
 426.75 Sediment Storage Elevation
 1,258.0 Bottom Area, SQFT
 2,416.5 Actual Volume, CUFT
 1,964.0 Actual Surface Area, SQFT

Okay
 Okay

Weir Design

4 Trial Weir Length, FT (4' min.)
 6.0 Trial Depth of Flow, IN (6" max.)
 4.2 Spillway Capacity, CFS
 10.0 Embankment Width, FT
 1.0 Freeboard, FT (1' min.)

Okay

Skimmer Design

1.5 Skimmer Size, IN
 0.125 Head on Skimmer, FT
 1.00 Orifice Size, IN (1/4 inch increments)
 2.96 Dewatering Time, DAYS
 Suggest about 3 DAYS
 63.5 Skimmer Outlet Elevation, FT

Okay
 Okay

Skimmer Size (Inches)	Head on Skimmer (Feet)
1.5	0.125
2	0.167
2.5	0.208
3	0.250
4	0.333
5	0.417
6	0.500
8	0.667

NOTES:

EROSION CONTROL CALCS (RIP-RAP CALCULATIONS)

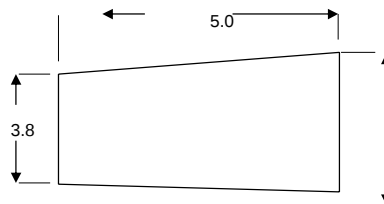
Project Information

Project Name: Learning Center Rolesville
 KHA Project #: 13031004
 Designed by: JAA Date: 1/2/2024
 Revised by: _____ Date: _____
 Checked by: COB Date: 1/2/2024

Driveway Culvert

Pipe Diameter	d=	15 in	
Number of Pipes	#=	1 total	
Pipe Slope	s=	0.52 %	
Manning's number	n=	0.013	
Flow	Q=	4.67 cfs	Assumes Full Flow
Velocity	V=	3.81 ft/s	Velocity of flow entering rip rap apron

Dissipator Dimensions *	Zone =	1
	Stone Filling Class =	A
	D ₀ =	1.25 ft
	Entry Width (3 X D ₀) =	3.8 ft
	Length (4 X D ₀) =	5.0 ft
	Width (La + D ₀) =	6.3 ft
	Min. Thickness =	12 inches
	Min. Stone Diameter=	3 inches



* All units are in feet
 ** Dissipator pad designed for full flow of pipe

EROSION CONTROL CALCS (RIP-RAP CALCULATIONS)

Project Information

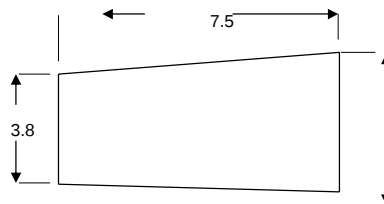
Project Name: Learning Center Rolesville
 KHA Project #: 13031004
 Designed by: JAA Date: 1/2/2024
 Revised by: _____ Date: _____
 Checked by: COB Date: 1/2/2024

FES-1

Storm System Outlet Into Pond

Pipe Diameter	d=	15 in	
Number of Pipes	#=	1 total	
Pipe Slope	s=	5.60 %	
Manning's number	n=	0.013	
Flow	Q=	15.33 cfs	Assumes Full Flow
Velocity	V=	12.49 ft/s	Velocity of flow entering rip rap apron

Dissipator Dimensions *	Zone =	2
	Stone Filling Class =	B
	D ₀ =	1.25 ft
	Entry Width (3 X D ₀) =	3.8 ft
	Length (6 X D ₀) =	7.5 ft
	Width (La + D ₀) =	8.8 ft
	Min. Thickness =	22 inches
	Min. Stone Diameter=	6 inches



* All units are in feet

** Dissipator pad designed for full flow of pipe

EROSION CONTROL CALCS (RIP-RAP CALCULATIONS)

Project Information

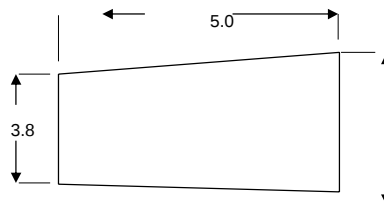
Project Name: Learning Center Rolesville
 KHA Project #: 13031004
 Designed by: JAA Date: 1/2/2024
 Revised by: _____ Date: _____
 Checked by: COB Date: 1/2/2024

FES-2

Pond Outlet to Existing Ditch

Pipe Diameter	d=	15 in	
Number of Pipes	#=	1 total	
Pipe Slope	s=	1.53 %	
Manning's number	n=	0.013	
Flow	Q=	8.01 cfs	Assumes Full Flow
Velocity	V=	6.53 ft/s	Velocity of flow entering rip rap apron

Dissipator Dimensions *	Zone =	1
	Stone Filling Class =	A
	D ₀ =	1.25 ft
	Entry Width (3 X D ₀) =	3.8 ft
	Length (4 X D ₀) =	5.0 ft
	Width (La + D ₀) =	6.3 ft
	Min. Thickness =	12 inches
	Min. Stone Diameter=	3 inches



* All units are in feet

** Dissipator pad designed for full flow of pipe