part of V5 resubmittal for July 2024 TRC review

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: June 2024

STORMWATER IMPACT ANALYSIS

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

PREPARED FOR:

ROLESVILLE, LLC
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CHARLOTTE, NORTH CAROLINA 28277

PREPARED BY:

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NC CERT. OF AUTH: F-0102

SUBMITTED: MARCH 2024
REVISED: JUNE 2024

KHA #013031004

Disclosure Statement:

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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.

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. An 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 summary to 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

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.

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

This digital Flood Insurance Rate Map (FIRM) was produced through a unique cooperative partnership between the State of North Carolina and the Federal Emergency Management Agency (FEMA). The State of North Carolina has implemented a long term approach to floodplain management to decrease the costs associated with flooding. This is demonstrated by the State's commitment to map flood hazard areas at the local level. As a part of this effort, the State of North Carolina has joined in a Cooperating Technical State agreement with FEMA to produce and maintain this digital FIRM.

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://FRIS.NC.GOV/FRIS
HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A,V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with Average Depth Less Than One Foot or With Drainage Areas of Less Than One Square Mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee See Notes *Zone X*
OTHER AREAS	Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
	(012) 18.2 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	(8) Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
OTHER FEATURES	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at https://msc.fema.gov. An accompanying Flood Insurance Study report, Letter of Map Revision (LOMR) or Letter of Map Amendment (LOMA) revising portions of this panel, and digital versions of this FIRM may be available. Visit the North Carolina Floodplain Mapping Program website at https://flood.nc.gov/ncflood, or contact the FEMA Map Service Center.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Flood Insurance Study (FIS) means an examination, evaluation, and determination of flood hazards, corresponding water surface elevations, flood hazard risk zones, and other flood data in a community issued by the North Carolina Floodplain Mapping Program (NCFMP). The Flood Insurance Study (FIS) is comprised of the following products used together: the Digital Flood Hazard Database, the Water Surface Elevation Rasters, the digitally derived, autogenerated Flood Insurance Rate Map and the Flood Insurance Survey Report. A Flood Insurance Survey is a compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community. This report contains detailed flood elevation data, data tables and FIRM indices. When a flood study is completed for the NFIP, the digital information, reports and maps are assembled into an FIS. Information shown on this FIRM is provided in digital format by the NCFMP. Base map information shown on this FIRM was provided in digital format by the NCFMP. The source of this information can be determined from the metadata available in the digital FLOOD database and in the Technical Support Data Notebook (TSDN).

ACCREDITED LEVEE NOTES TO USERS: If an accredited levee note appears on this panel check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at https://www.fema.gov/national-flood-insurance-program.

PROVISIONALLY ACCREDITED LEVEE NOTES TO USERS: If a Provisionally Accredited Levee (PAL) note appears on this panel, check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at https://www.fema.gov/national-flood-insurance-program.

LIMIT OF MODERATE WAVE ACTION NOTES TO USERS: For some coastal flooding zones the AE Zone category has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Limit of Moderate Wave Action (LiMWA)

SCALE

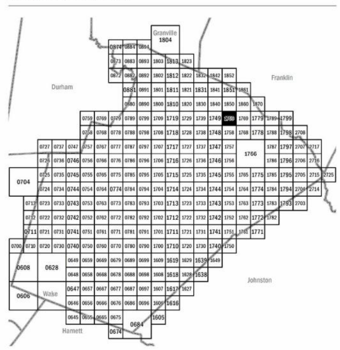
Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet **1:6,000**

0 250 500 1,000 Feet

0 75 150 300 Meters

PANEL LOCATOR



FEMA
National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL **1759**

FEMA

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
ROLESVILLE, TOWN OF	370468	1759	K
WAKE COUNTY	370368	1759	K
WAKE FOREST, TOWN OF	370244	1759	K

VERSION NUMBER
2.3.3.2

MAP NUMBER
3720175900K

MAP REVISED
July 19, 2022

APPENDIX B

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

The National Map
US Topo

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....NAIP, July 2020 - July 2020
Roads....U.S. Census Bureau, 2016
Names....GNIS, 1980 - 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

UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
QV
Grid Zone Designation
17S

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard.

QUADRANGLE LOCATION

1 Grissom
2 Franklinton
3 Louisburg
4 Wake Forest
5 Bunn West
6 Raleigh East
7 Knightdale
8 Zebulon

ADJOINING QUADRANGLES

ROAD CLASSIFICATION

Expressway		Local Connector	
Secondary Hwy		Local Road	
Ramp		4WD	

Interstate Route | US Route | State Route

ROLESVILLE, NC
2022

NSN. 7643016379170
NGA REF NO. USGSX24K38453

APPENDIX C

WAKE COUNTY, NORTH CAROLINA — SHEET NUMBER 22

22

N

Scale 1:15840

1 Mile

5000 Feet

PROJECT SITE

Walkers Crossroads

Rolesville

Rolesville Church

(Joins sheet 15)

(Joins sheet 21)

(Joins sheet 23)

(Joins sheet 31)

Custom Soil Resource Report
Soil Map

Map Scale: 1:839 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 10 20 40 60

Feet
0 40 80 160 240

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: 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.

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

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

LEGEND

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

PRE-DEVELOPMENT DRAINAGE AREA MAP

KHA PROJECT NO: 013031004
DATE: 02/29/2024

Kimley»Horn

421 FAYETTEVILLE STREET, SUITE 600, RALEIGH, NC 27601
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WWW.KIMLEY-HORN.COM

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

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

LEGEND

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

POST-DEVELOPMENT DRAINAGE AREA MAP

KHA PROJECT NO: 013031004

DATE: 02/29/2024

421 FAYETTEVILLE STREET, SUITE 600, RALEIGH, NC 27601
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APPENDIX E

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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)

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

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

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

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.55 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.55 ft³/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 ft³/s

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	4.93 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	5.97 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	7.64 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	0.02 ft³/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 ft³/s

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.40 ft³/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 ft³/s

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.50 ft³/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 ft³/s

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.67 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.22 ft³/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 ft³/s

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	1.09 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.16 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.62 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	3.36 ft³/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 ft³/s

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	0.08 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	1.13 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.78 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	3.54 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	4.80 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	0.01 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.16 ft³/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 ft³/s

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.40 ft³/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 ft³/s

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.51 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	0.70 ft³/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 ft³/s

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	0.07 ft³/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 ft³/s

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	1.09 ft³/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 ft³/s

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.68 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	3.42 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	4.63 ft³/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 ft³/s

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 ft³/s
T2 Elevation	427.53 ft	T2 Flow	5.49 ft³/s

Structure ID: Riser - 1 Structure Type: Inlet Box	
Number of Openings	1
Elevation	428.00 ft
Orifice Area	6.0 ft²
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 ft²
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

Convergence Tolerances	
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

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	0.030	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) (ft³/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) (ft^3/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

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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	actual
Percent Impervious (I) =	70.37	%	

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

$$D_{avg} = \frac{VPP - Vshelf}{Abottomofshelf}$$

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): (Taken from Chapter C-3 of NCDEQ Stormwater BMP Manual)

SA/DA for dav = 3 and 70% Impervious =	2.51	Average depth rounded down to nearest 0.5'
SA/DA for dav = 3 and 80% Impervious =	2.92	Average depth rounded down to nearest 0.5'
Surface Area to DA Ratio (SA/DA) =	2.53	
Req'd Main Pool Surface Area at Perm. Pool =	891 sf	****THIS IS ONLY THE MAIN POOL SURFACE AREA****
Req'd Total Pond Surface Area at Perm. Pool =	Range from 1025 sf to 1069 sf	This includes minimum 20% forbay surface area

Required Storage Volume (Water Quality):

Design Storm =	1.0	inch	
Determine Rv Value =	0.05 + .009 (I) =	0.68	in/in
Design Storm Storage Volume =	2,009	cf	
Storage Volume Required =	2,009	cf	

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	(Required Surface Area = 891 sf)
Forebay Volume (FV1) =	393	cf	(37% of Main Pool Volume)
Permanent Pool Volume (PPV) =	1,062	cf	(Main Pool Only)
Temporary Pool Volume (TPV) =	2,056	cf	(Required Volume = 2009 cf)
Total Storage Volume (TSV) =	5,515	cf	
Total Pond Volume (PV) =	7,011	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:		Thursday, June 6, 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):**	2.86
	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)=	2.86							
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								
Woods, Poor Condition								
Woods, Fair Condition								
Woods, Good Condition								
Open Space, Poor Condition								
Open Space, Fair condition								
Open Space, Good Condition				0.50				0.24
Reforestation (in dedicated OS)								
Connected Impervious				0.09				0.57
Disconnected Impervious								
SITE FLOW	**PRE-DEVELOPMENT T_c**				**POST-DEVELOPMENT Tc**			
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)=								
Slope (ft/ft)=								
Surface Cover:	Unpaved				Unpaved			
Average Velocity (ft/sec)=								
T_t (hrs)=								
Channel Flow 1								
Length (ft)=					30.00			
Slope (ft/ft)=					0.005			
Cross Sectional Flow Area (ft^2)=					0.79			
Wetted Perimeter (ft)=	0.00				3.14			
Channel Lining:					Concrete, finished			
n-value=					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)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=	0.00	0.00
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Channel Flow 3		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		0.00
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Tc (hrs)=	0.03	0.04
RESULTS	**PRE-DEVELOPMENT**	**POST-DEVELOPMENT**
Composite Curve Number=		
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =		
$CN_{adjusted\ (1\text{-}year)}$=		
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =		
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = $Q^*_{1\text{-}year}$=		
Volume of runoff (ft^3) =		
Volume change (ft^3) =		
Peak Discharge (cfs)= $Q_{1\text{-}year}$=		
2-year, 24-hour storm (LID)		
Runoff (inches) = $Q^*_{2\text{-}year}$=		
Volume of runoff (ft^3) =		
Peak Discharge (cfs)= $Q_{2\text{-}year}$=		
10-year, 24-hour storm (DIA)		
Runoff (inches) = $Q^*_{10\text{-}year}$=		
Volume of runoff (ft^3) =		
Peak Discharge (cfs)= $Q_{10\text{-}year}$=		

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)=	2.86							
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								
Woods, Poor Condition								
Woods, Fair Condition								
Woods, Good Condition								
Open Space, Poor Condition								
Open Space, Fair condition								
Open Space, Good Condition				0.09				0.06
Reforestation (in dedicated OS)								
Connected Impervious								0.02
Disconnected Impervious								
SITE FLOW	**PRE-DEVELOPMENT T_c**				**POST-DEVELOPMENT Tc**			
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_t (hrs)=	0.006				0.005			
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 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_t (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_t (hrs)=		
Tc (hrs)=	0.01	0.00
RESULTS	**PRE-DEVELOPMENT**	**POST-DEVELOPMENT**
Composite Curve Number=		
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =		
$CN_{adjusted\ (1\text{-}year)}$=		
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =		
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = $Q^*_{1\text{-}year}$=		
Volume of runoff (ft^3) =		
Volume change (ft^3) =		
Peak Discharge (cfs)= $Q_{1\text{-}year}$=		
2-year, 24-hour storm (LID)		
Runoff (inches) = $Q^*_{2\text{-}year}$=		
Volume of runoff (ft^3) =		
Peak Discharge (cfs)= $Q_{2\text{-}year}$=		
10-year, 24-hour storm (DIA)		
Runoff (inches) = $Q^*_{10\text{-}year}$=		
Volume of runoff (ft^3) =		
Peak Discharge (cfs)= $Q_{10\text{-}year}$=		

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)=	2.86							
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								
Woods, Poor Condition								
Woods, Fair Condition								
Woods, Good Condition								
Open Space, Poor Condition								
Open Space, Fair condition								
Open Space, Good Condition				0.49				0.13
Reforestation (in dedicated OS)								
Connected Impervious				0.08				0.23
Disconnected Impervious								

SITE FLOW	PRE-DEVELOPMENT T_c	POST-DEVELOPMENT Tc
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_t (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_t (hrs)=		
Tc (hrs)=	0.01	0.01
RESULTS	**PRE-DEVELOPMENT**	**POST-DEVELOPMENT**
Composite Curve Number=		
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =		
$CN_{adjusted\ (1\text{-}year)}$=		
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =		
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = $Q^*_{1\text{-}year}$=		
Volume of runoff (ft^3) =		
Volume change (ft^3) =		
Peak Discharge (cfs)= $Q_{1\text{-}year}$=		
2-year, 24-hour storm (LID)		
Runoff (inches) = $Q^*_{2\text{-}year}$=		
Volume of runoff (ft^3) =		
Peak Discharge (cfs)= $Q_{2\text{-}year}$=		
10-year, 24-hour storm (DIA)		
Runoff (inches) = $Q^*_{10\text{-}year}$=		
Volume of runoff (ft^3) =		
Peak Discharge (cfs)= $Q_{10\text{-}year}$=		

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) = $Q_{pre,1\text{-}year}$ =										
Peak Flow (cfs)=$Q_{1\text{-}year}$ =										
Post-Development (1-year, 24-hour storm)										
Proposed Impervious Surface (acre) =	0.57	0.02	0.23							
Runoff (in)=$Q_{1\text{-}year}$ =										
Peak Flow (cfs)=$Q_{1\text{-}year}$ =										
Increase in volume per DA (ft^3)_1-yr storm=										
Minimum Volume to be Managed for DA HIGH DENSITY REQUIREMENT = (ft^3) =										

TARGET CURVE NUMBER (TCN)

Site Data

SITE \SOIL 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
$CN_{adjusted\ (1\text{-}year)}$=	0
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	

WAKE COUNTY
NORTH CAROLINA

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)=				
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										
Woods, Poor Condition										
Woods, Fair Condition										
Woods, Good Condition										
Open Space, Poor Condition										
Open Space, Fair Condition										
Open Space, Good Condition	0.24									
Reforestation (in dedicated OS)										
Impervious	0.57									

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 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(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 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):							

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)$_{(1\text{-}year)}$=	
Post BMP Runoff (inches) = $Q^*_{(1\text{-}year)}$=	0.00
Post BMP $CN_{(1\text{-}year)}$=	
Post BMP Peak Discharge (cfs)= $Q_{1\text{-}year}$=	
2-year, 24-hour storm (LID)	
Post BMP Volume of Runoff (ft3)$_{(2\text{-}year)}$=	
Post BMP Runoff (inches) = $Q^*_{(2\text{-}year)}$=	
Post BMP $CN_{(2\text{-}year)}$=	
Post BMP Peak Discharge (cfs)= $Q_{(2\text{-}year)}$=	
10-year, 24-hour storm (DIA)	
Post BMP Volume of Runoff (ft^3)$_{(10\text{-}year)}$=	
Post BMP Runoff (inches) = $Q^*_{(10\text{-}year)}$=	
Post BMP $CN_{(10\text{-}year)}$=	
Post BMP Peak Discharge (cfs)= $Q_{(10\text{-}year)}$=	

Project Name: The Learning Center Rolesville

DRAINAGE AREA 2
BMP CALCULATIONS

DRAINAGE AREA 1 - BMP DEVICES AND ADJUSTMENTS				
DA2 Site Acreage=	0.08			
DA2 Off-Site Acreage=				
Total Required Storage Volume TCN Requirement (ft^3)=	N/A			
Total Required Storage Volume for DA2 1" Rainfall for High Density (ft3)=				
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-DA2(a) (Ac)		Sub-DA2(b) (Ac)		Sub-DA2(c) (Ac)		Sub-DA2(d) (Ac)		Sub-DA2(e) (Ac)	
	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site
Pasture										
Woods, Poor Condition										
Woods, Fair Condition										
Woods, Good Condition										
Open Space, Poor Condition										
Open Space, Fair Condition										
Open Space, Good Condition										
Reforestation (in dedicated OS)										
Impervious										

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)
				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(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%	0.00	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%	0.00	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 2
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 drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				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 drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				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):							

DA2 BMP SUMMARY	
Total Volume Treated (ft^3)=	
Nitrogen Mitigated(lbs)=	
1-year, 24-hour storm	
Post BMP Volume of Runoff (ft^3)$_{(1\text{-}year)}$=	
Post BMP Runoff (inches) = $Q^*_{(1\text{-}year)}$=	0.00
Post BMP $CN_{(1\text{-}year)}$=	
Post BMP Peak Discharge (cfs)= $Q_{1\text{-}year}$=	
2-year, 24-hour storm (LID)	
Post BMP Volume of Runoff (ft3)$_{(2\text{-}year)}$=	
Post BMP Runoff (inches) = $Q^*_{(2\text{-}year)}$=	
Post BMP $CN_{(2\text{-}year)}$=	
Post BMP Peak Discharge (cfs)= $Q_{(2\text{-}year)}$=	
10-year, 24-hour storm (DIA)	
Post BMP Volume of Runoff (ft^3)$_{(10\text{-}year)}$=	
Post BMP Runoff (inches) = $Q^*_{(10\text{-}year)}$=	
Post BMP $CN_{(10\text{-}year)}$=	
Post BMP Peak Discharge (cfs)= $Q_{(10\text{-}year)}$=	

Project Name: **The Learning Center Rolesville**

DRAINAGE AREA 3
BMP CALCULATIONS

DRAINAGE AREA 1 - BMP DEVICES AND ADJUSTMENTS				
DA3 Site Acreage=	0.36			
DA3 Off-Site Acreage=				
Total Required Storage Volume TCN Requirement (ft^3)=	N/A			
Total Required Storage Volume for DA3 1" Rainfall for High Density (ft3)=				
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-DA3(a) (Ac)		Sub-DA3(b) (Ac)		Sub-DA3(c) (Ac)		Sub-DA3(d) (Ac)		Sub-DA3(e) (Ac)	
	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site
Pasture										
Woods, Poor Condition										
Woods, Fair Condition										
Woods, Good Condition										
Open Space, Poor Condition										
Open Space, Fair Condition										
Open Space, Good Condition										
Reforestation (in dedicated OS)										
Impervious										

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)
				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(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%	0.00	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%	0.00	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 3
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 drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				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 drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				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):							

DA3 BMP SUMMARY	
Total Volume Treated (ft^3)=	
Nitrogen Mitigated(lbs)=	
1-year, 24-hour storm	
Post BMP Volume of Runoff (ft^3)$_{(1\text{-}year)}$=	
Post BMP Runoff (inches) = $Q^*_{(1\text{-}year)}$=	0.00
Post BMP $CN_{(1\text{-}year)}$=	
Post BMP Peak Discharge (cfs)= $Q_{1\text{-}year}$=	
2-year, 24-hour storm (LID)	
Post BMP Volume of Runoff (ft3)$_{(2\text{-}year)}$=	
Post BMP Runoff (inches) = $Q^*_{(2\text{-}year)}$=	
Post BMP $CN_{(2\text{-}year)}$=	
Post BMP Peak Discharge (cfs)= $Q_{(2\text{-}year)}$=	
10-year, 24-hour storm (DIA)	
Post BMP Volume of Runoff (ft^3)$_{(10\text{-}year)}$=	
Post BMP Runoff (inches) = $Q^*_{(10\text{-}year)}$=	
Post BMP $CN_{(10\text{-}year)}$=	
Post BMP Peak Discharge (cfs)= $Q_{(10\text{-}year)}$=	

Project Name: The Learning Center Rolesville

DA SITE SUMMARY
BMP CALCULATIONS

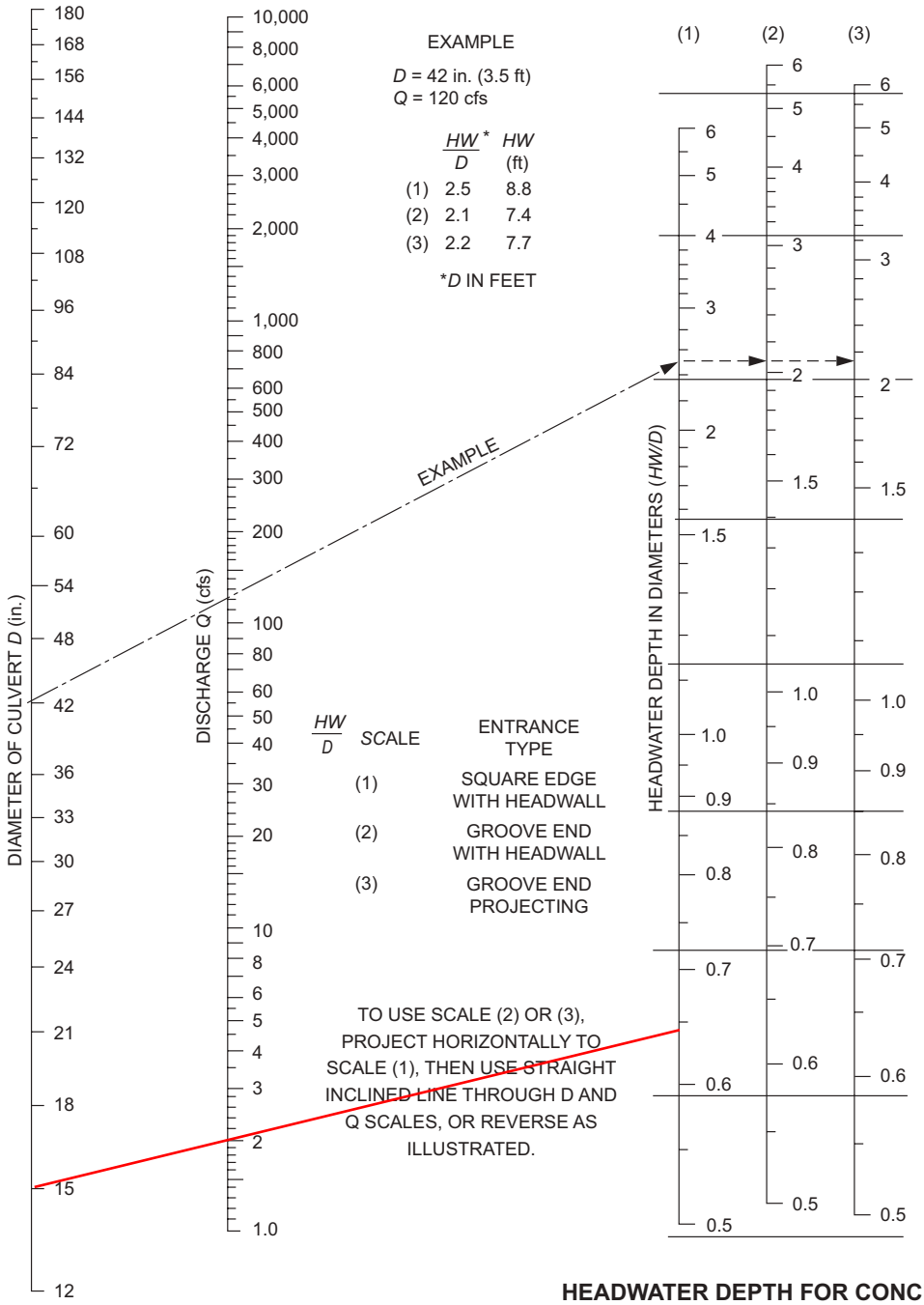
BMP SUMMARY										
DRAINAGE AREA SUMMARIES										
DRAINAGE AREA:	DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10
Pre-Development (1-year, 24-hour storm)										
Runoff (in)=$Q^*_{1\text{-year}}$ =										
Peak Flow (cfs)=$Q_{1\text{-year}}$ =										
Post-Development (1-year, 24-hour storm)										
Target Curve Number (TCN) =	NA									
Post BMP Runoff (inches) = $Q^*_{(1\text{-year})}$=										
Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$=										
Post BMP $CN_{(1\text{-year})}$=										
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

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)=$Q_{10\text{-year}}$ =										
Volume of Runoff (ft^3)$_{(10\text{-year})}$ =										
Post-Development										
10-year, 24-hour storm (DIA)										
Post BMP Peak Discharge (cfs)= $Q_{(10\text{-year})}$=										
Post BMP Volume of Runoff (ft^3)$_{(10\text{-year})}$=										

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



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

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 283
REVISED MAY 1964

BUREAU OF PUBLIC ROADS
JANUARY 1963

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

NOAA Atlas 14, Volume 2, Version 3
Location name: Rolesville, North Carolina, USA*
Latitude: 35.9246°, Longitude: -78.4558°
Elevation: 432 ft**
* source: ESRI Maps
** source: USGS

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_&_aerials

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.

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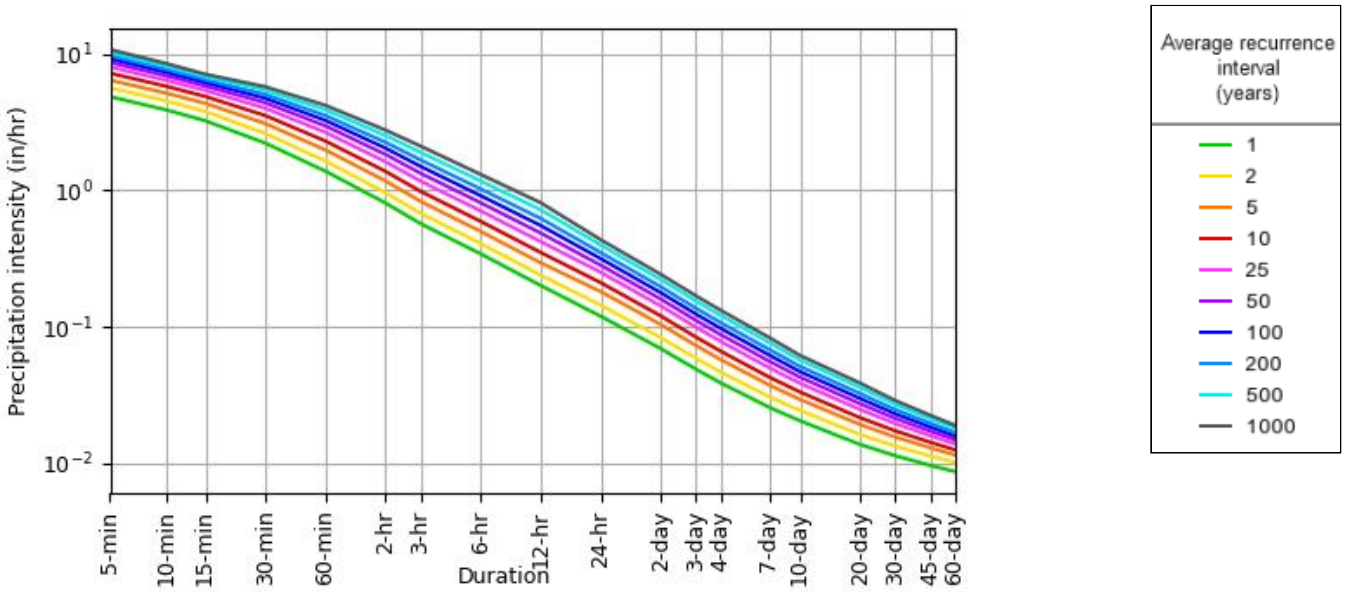
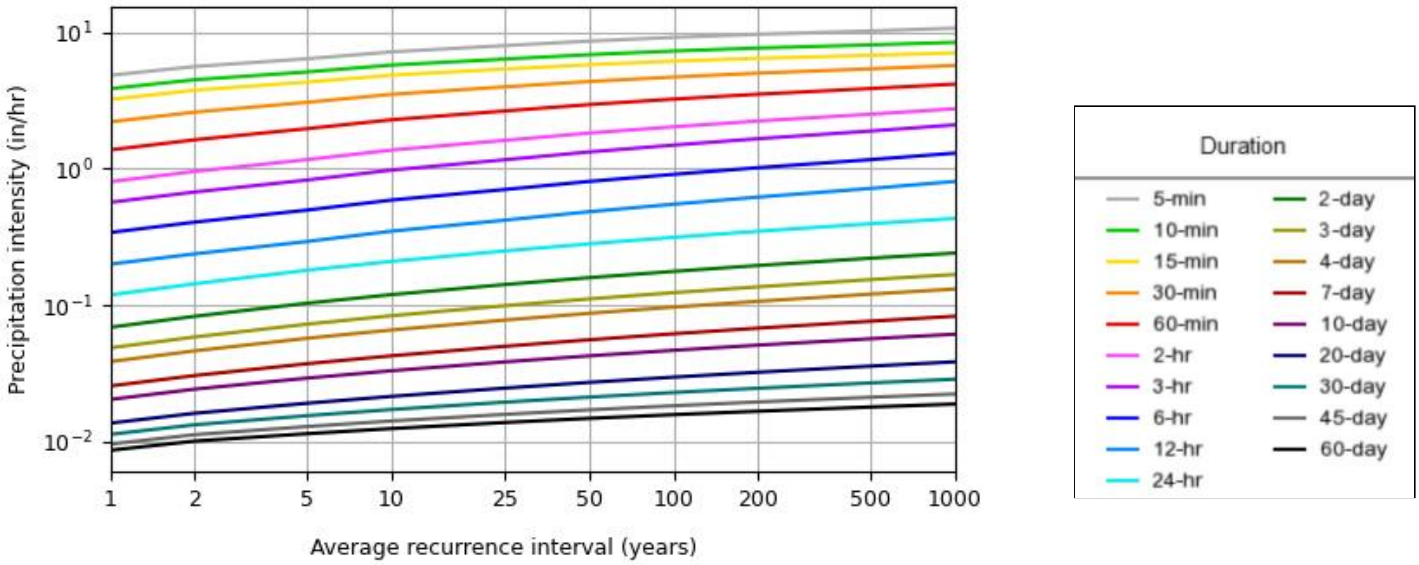
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 35.9246°, Longitude: -78.4558°





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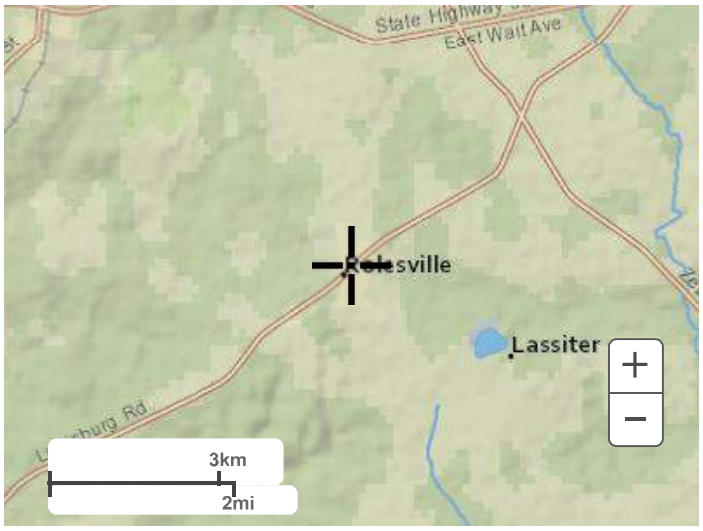
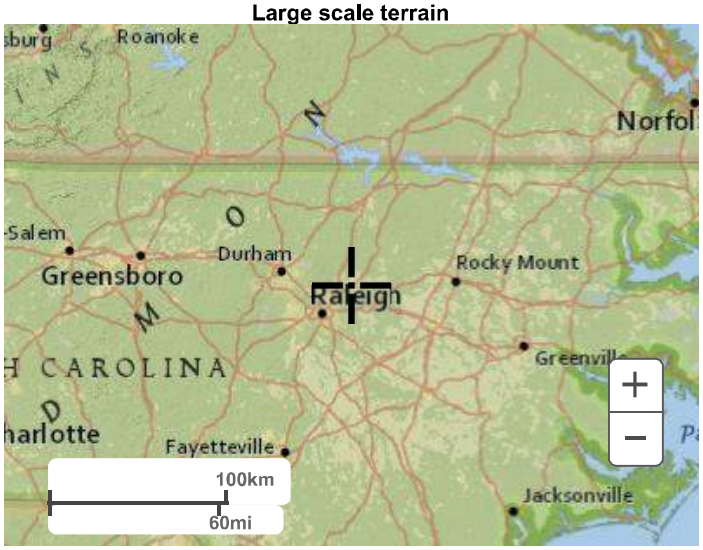
Maps & aerials

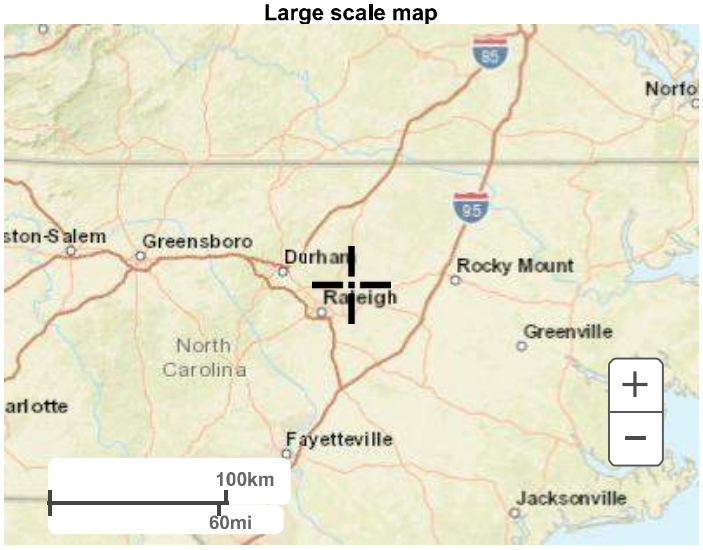
Small scale terrain



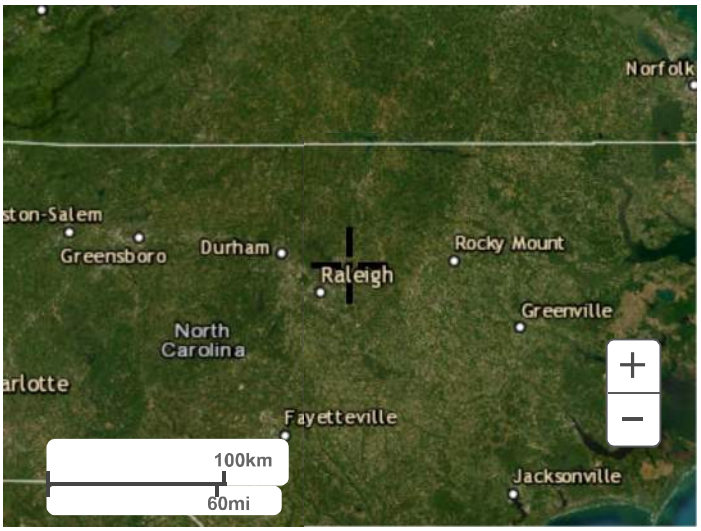
Large scale terrain



Large scale map



Large scale aerial



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National Weather Service
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1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

NOAA Atlas 14, Volume 2, Version 3
Location name: Rolesville, North Carolina, USA*
Latitude: 35.9246°, Longitude: -78.4558°
Elevation: 432 ft**
* source: ESRI Maps
** source: USGS

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_&_aerials

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 (0.722-0.880)	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.

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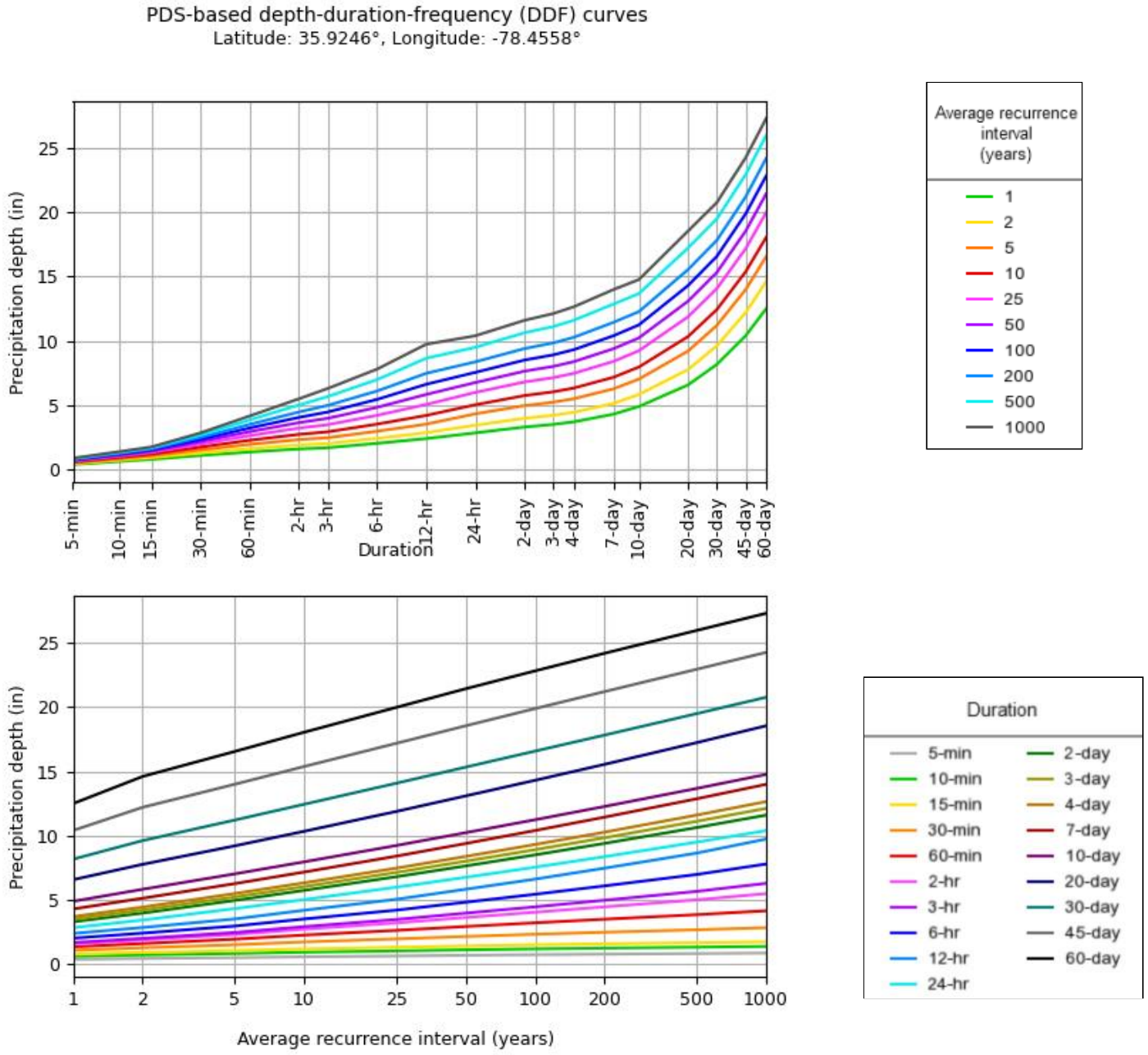
PF graphical



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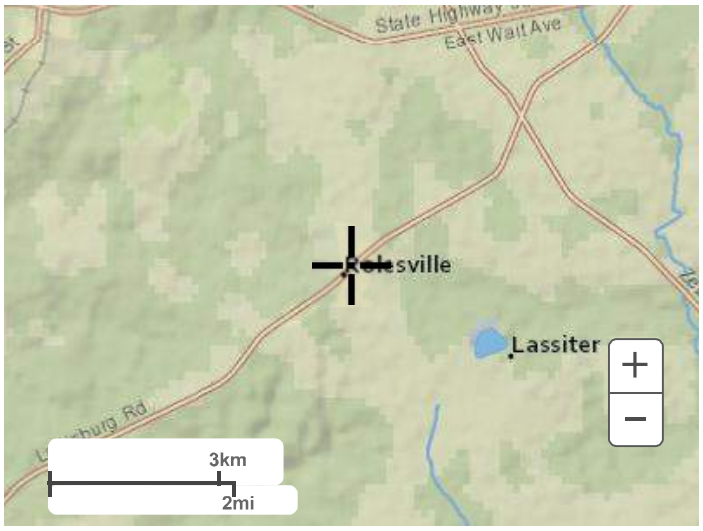
Small scale terrain



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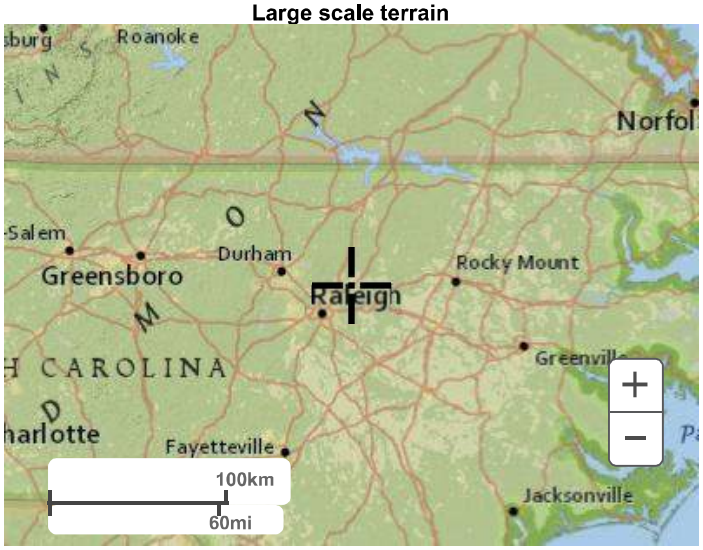

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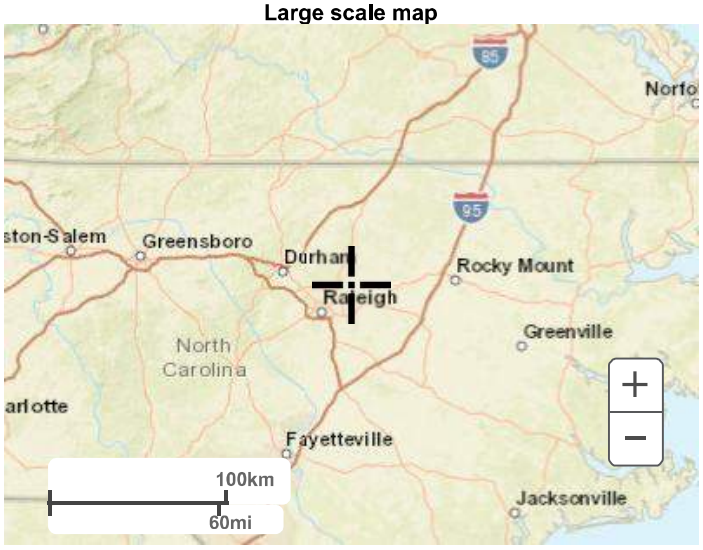
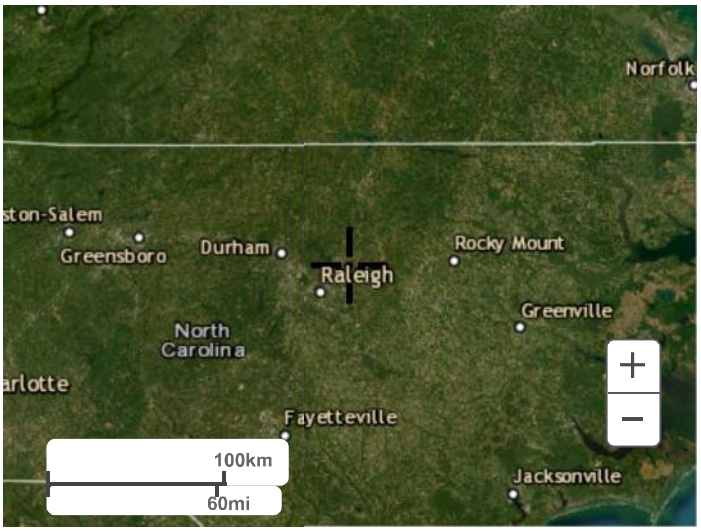


Large scale aerial



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Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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

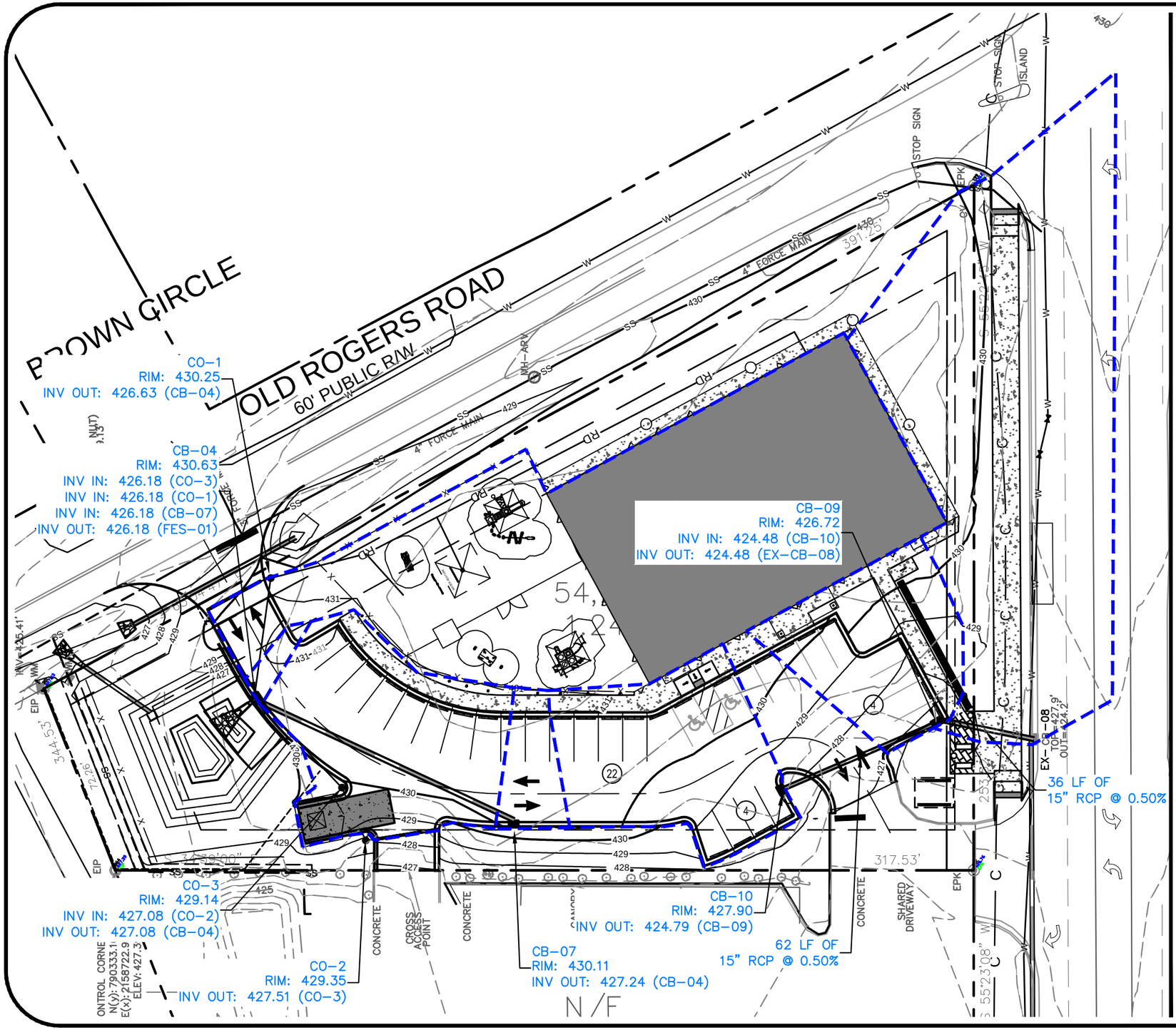
NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

LEGEND

DRAINAGE AREA OUTLINE

PROPERTY LINE



INLET DRAINAGE AREA MAP

KHA PROJECT NO: 013031004

DATE: 06/14/2024

Kimley»Horn

421 FAYETTEVILLE STREET, SUITE 600, RALEIGH, NC 27601
PHONE: 919–677–2000 FAX: 919–677–2050
WWW.KIMLEY–HORN.COM

2-YEAR

FlexTable: Catch Basin Table

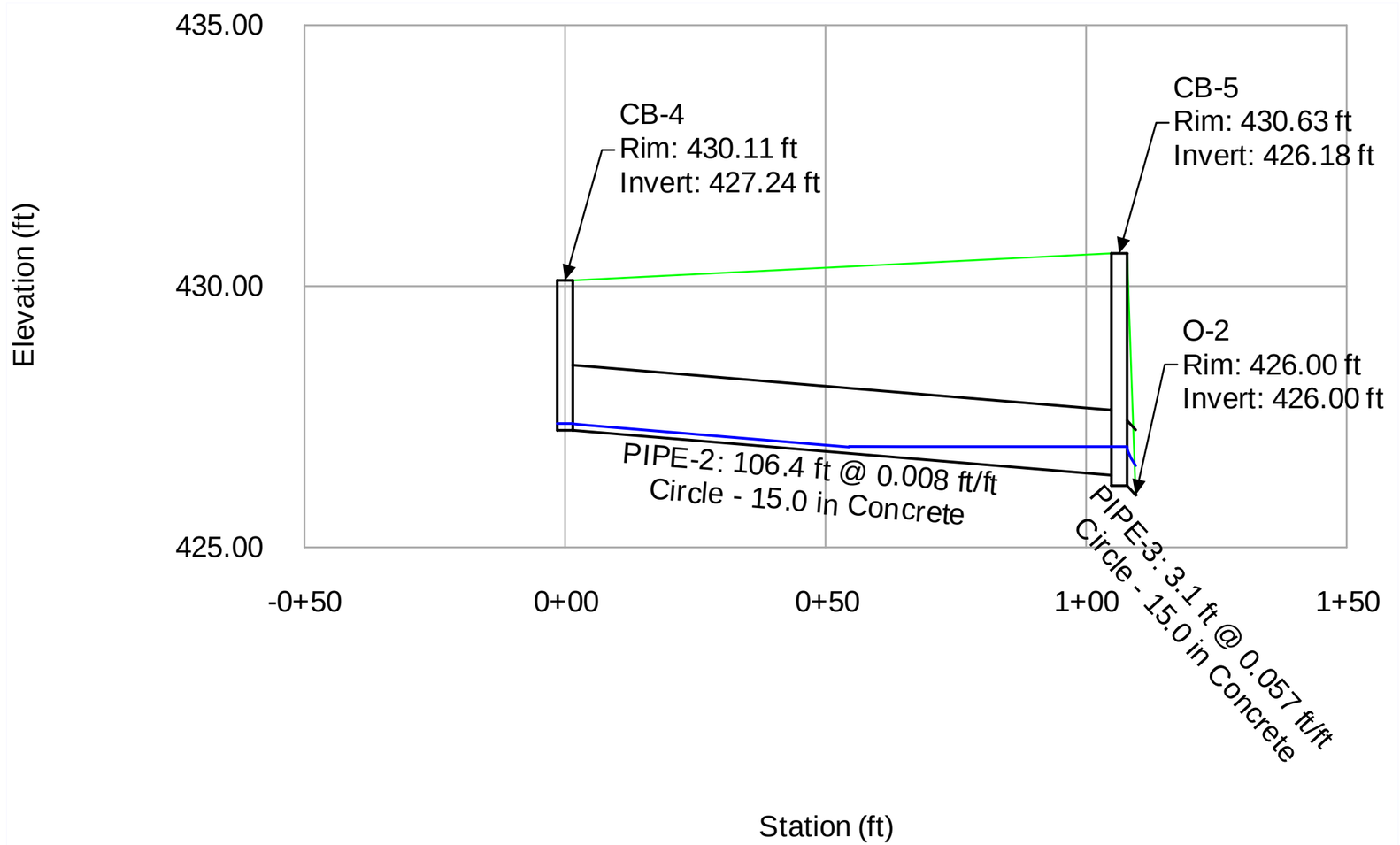
Label	Inlet	Inlet Location	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Inlet C	Inlet Drainage Area (acres)	External CA (acres)	Local CA (acres)	Local Intensity (in/h)	Local Flow Time (min)	Bypassed Rational Flow (cfs)	Flow (Captured) (cfs)	Flow (Total Out) (cfs)	Capture Efficiency (Calculated) (%)	Spread / 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-4	NCDOT-combination inlet	On Grade	430.11	427.24	0.900	0.020	0.000	0.018	5.620	5.000	0.01	0.09	0.09	91.3	3.7	427.36	0.0
CB-5	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	2.69	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	430.25	426.63	(N/A)	(N/A)	0.360	0.000	5.620	5.000	0.00	0.00	2.04	100.0	0.0	427.24	

10-YEAR

FlexTable: Conduit Table

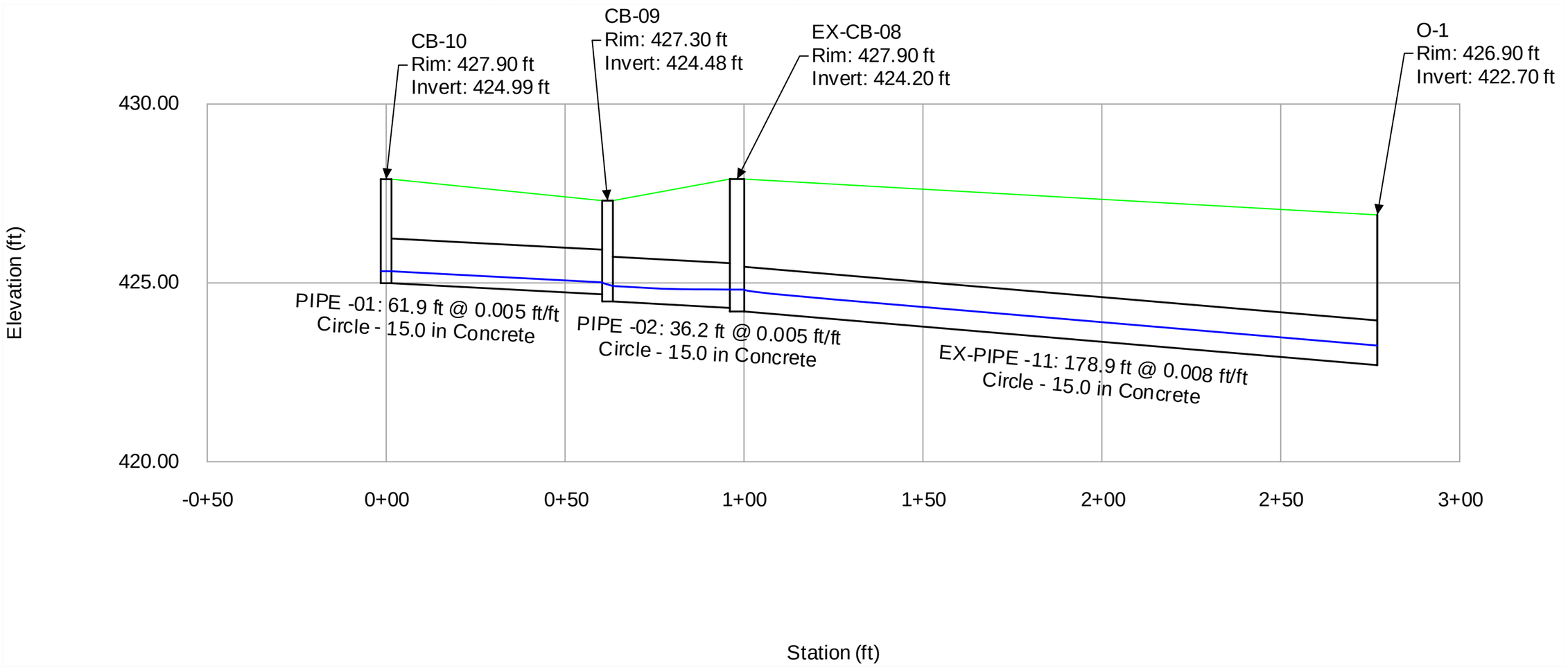
Label	Start Node	Stop Node	Upstream Inlet C	Upstream Inlet Area (acres)	Velocity (ft/s)	Slope (Calculated) (ft/ft)	Flow (cfs)	Capacity (Full Flow) (cfs)	System Intensity (in/h)	Invert (Start) (ft)	Invert (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Length (Unified) (ft)	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-4	CB-5	0.900	0.020	1.87	0.008	0.12	5.81	7.190	427.24	426.38	427.37	426.93	106.4	15.0	0.013	Concrete
PIPE-3	CB-5	O-2	0.900	0.010	10.14	0.057	3.45	15.46	6.917	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-5	(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	CO-1	CB-5	(N/A)	(N/A)	4.82	0.006	2.61	3.44	7.190	426.63	426.38	427.32	427.03	45.3	12.0	0.010	PVC

Profile Report
Engineering Profile - CB-04 to O-2 (2024-06-14 TLE Rolesville.stsw)



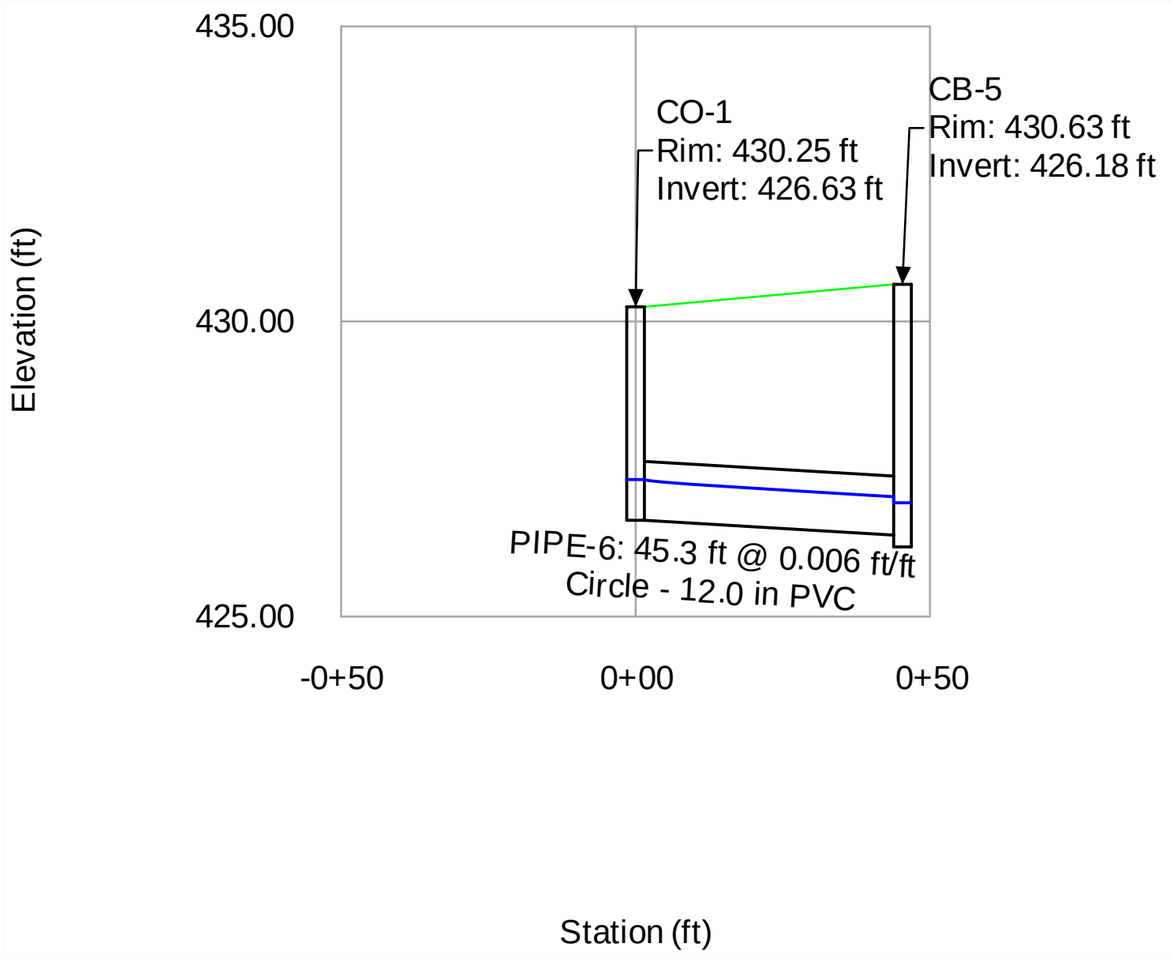
Profile Report

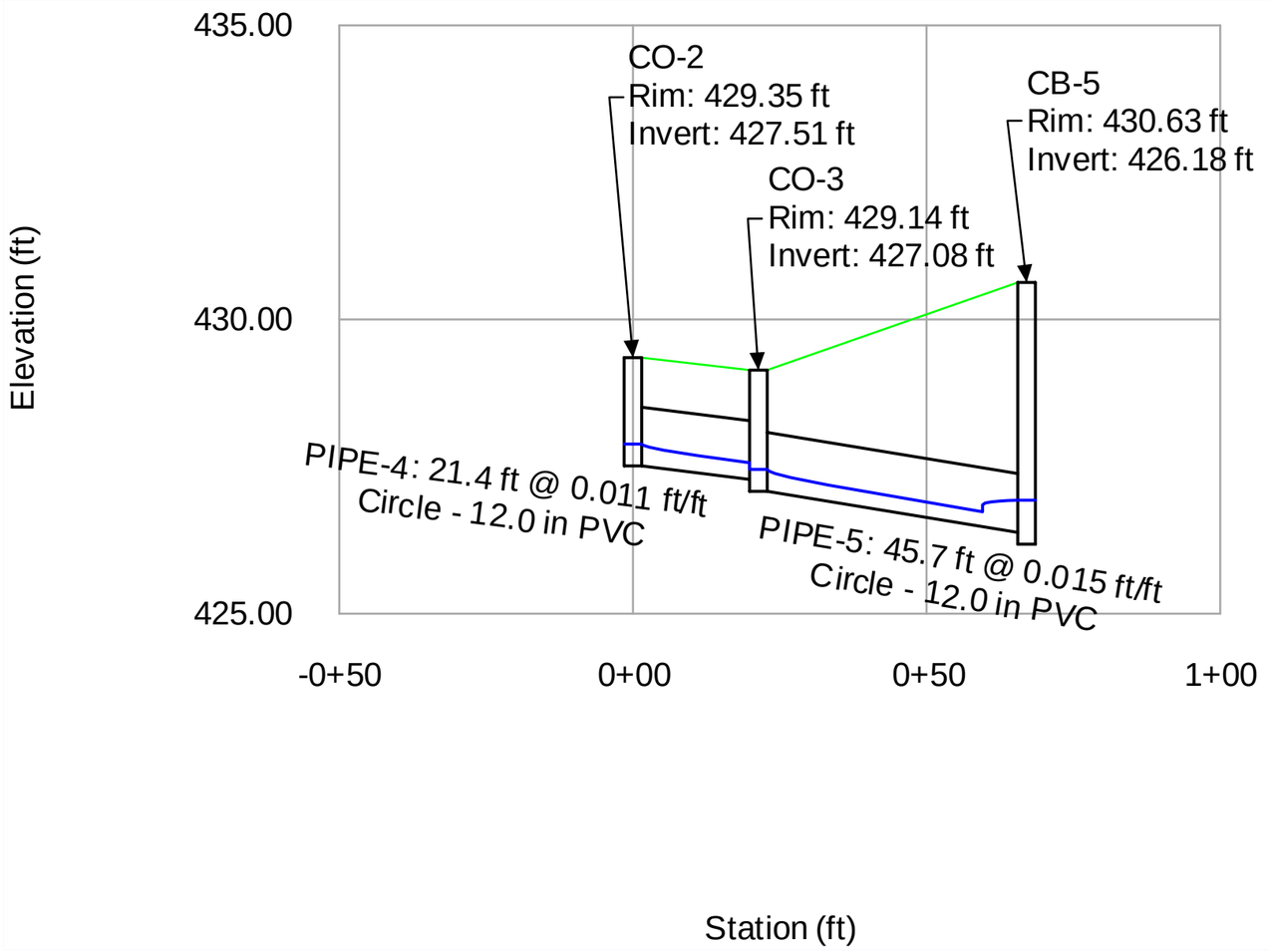
Engineering Profile - CB-10 to O-1 (2024-06-14 TLE Rolesville.stsw)



Profile Report

Engineering Profile - CO-1 to CB-5 (2024-06-14 TLE Rolesville.stsw)

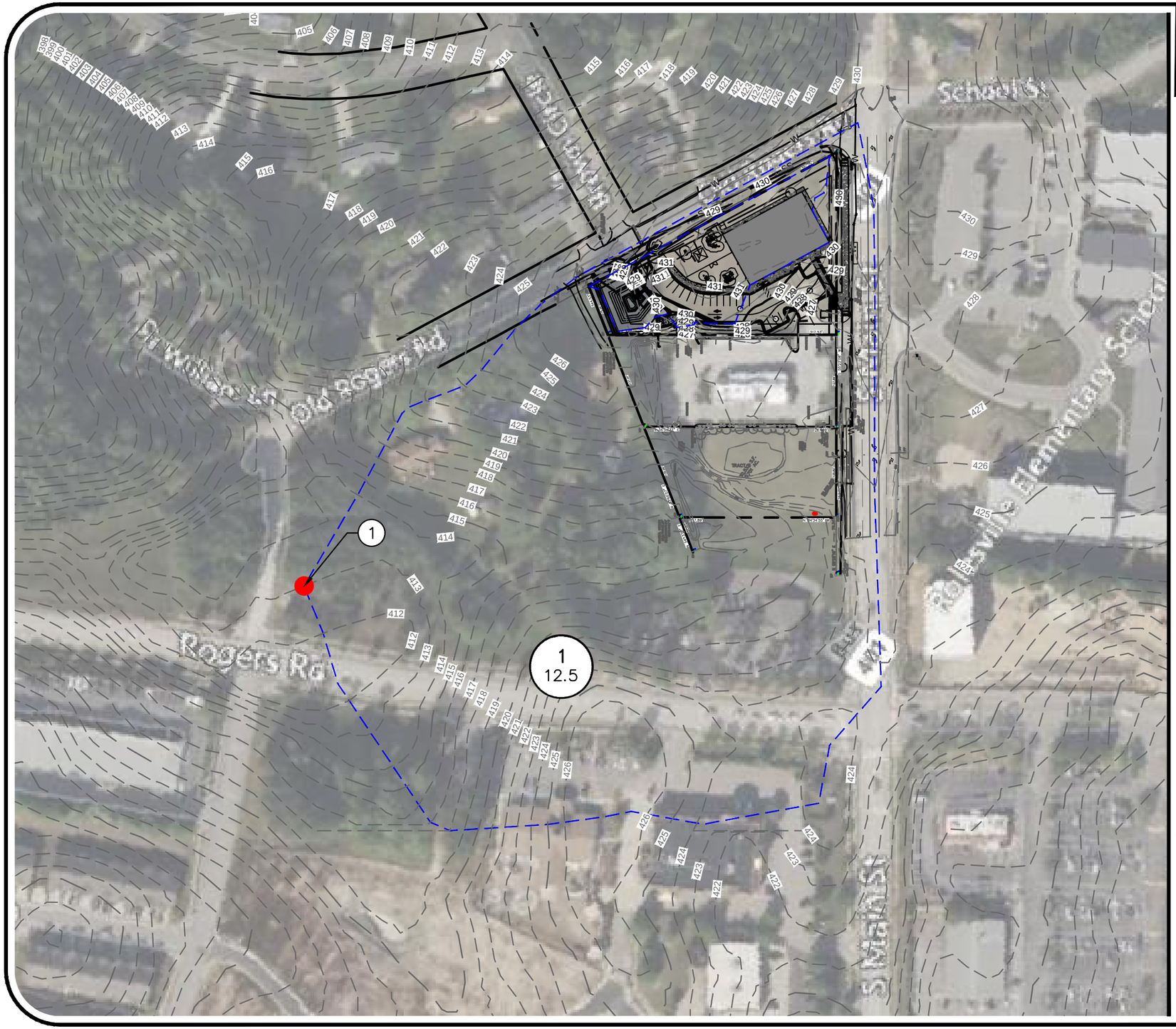


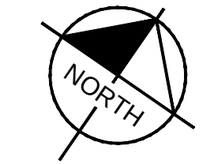

435.00
430.00
425.00
Elevation (ft)
CO-2
Rim: 429.35 ft
Invert: 427.51 ft
CO-3
Rim: 429.14 ft
Invert: 427.08 ft
CB-5
Rim: 430.63 ft
Invert: 426.18 ft
PIPE-4: 21.4 ft @ 0.011 ft/ft
Circle - 12.0 in PVC
PIPE-5: 45.7 ft @ 0.015 ft/ft
Circle - 12.0 in PVC
-0+50
0+00
0+50
1+00
Station (ft)

APPENDIX G

ROLESVILLE LEARNING CENTER

DRAINAGE AREA TABLE	
AREA	AREA (AC)
POA–1 (TREATED ONSITE)	0.81
POA–1 (BYPASS)	11.69
TOTAL	12.50





GRAPHIC SCALE IN FEET
0 75 150 300

LEGEND

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

10% RULE DRAINAGE AREA MAP

KHA PROJECT NO: 013031004

DATE: 06/11/2024

421 FAYETTEVILLE STREET, SUITE 600, RALEIGH, NC 27601
PHONE: 919–677–2000 FAX: 919–677–2050
WWW.KIMLEY–HORN.COM

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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	0.024	13.550	0.03
PRE-POA 1 DA	1-year 24-hour	1	0.852	12.050	12.76
PRE-POA 1 DA	10 Year	10	2.489	12.000	39.74
PRE-POA 1 DA	25 Year	25	3.309	12.000	52.89
PRE-POA 1 DA	100 Year	100	4.711	12.000	74.96
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	0.022	13.550	0.03
POST-POA 1 BYPASS	1-year 24-hour	1	0.797	12.050	11.93
POST-POA 1 BYPASS	10 Year	10	2.328	12.000	37.16
POST-POA 1 BYPASS	25 Year	25	3.094	12.000	49.46
POST-POA 1 BYPASS	100 Year	100	4.406	12.000	70.10

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	0.024	13.550	0.03
PRE- POA 1	1-year 24-hour	1	0.852	12.050	12.76
PRE- POA 1	10 Year	10	2.489	12.000	39.74
PRE- POA 1	25 Year	25	3.309	12.000	52.89
PRE- POA 1	100 Year	100	4.711	12.000	74.96
POST-POA 1	1-inch	0	0.033	13.550	0.04
POST-POA 1	1-year 24-hour	1	0.890	12.050	13.02
POST-POA 1	10 Year	10	2.564	12.000	41.53
POST-POA 1	25 Year	25	3.394	12.000	54.75
POST-POA 1	100 Year	100	4.810	12.000	76.85

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)

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	0.010 ft/ft
2 Year 24 Hour Depth	3.5 in
Average Velocity	0.65 ft/s
Segment Time of Concentration	0.086 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	686.00 ft
Is Paved?	False
Slope	0.014 ft/ft
Average Velocity	1.91 ft/s
Segment Time of Concentration	0.100 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.185 hours

= = = = SCS Channel Flow

Tc =

R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:

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

Tc =

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:

V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

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

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

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	0.010 ft/ft
2 Year 24 Hour Depth	3.5 in
Average Velocity	0.65 ft/s
Segment Time of Concentration	0.086 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	686.00 ft
Is Paved?	False
Slope	0.014 ft/ft
Average Velocity	1.91 ft/s
Segment Time of Concentration	0.100 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.185 hours

= = = = SCS Channel Flow

Tc =

R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:

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

Tc =

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:

V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

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	4.650	0.0	0.0	61.000
Impervious Areas - Paved parking lots, roofs, driveways, Streets and roads - Soil B	98.000	4.240	0.0	0.0	98.000
Woods - good - Soil B	55.000	2.360	0.0	0.0	55.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	11.690	(N/A)	(N/A)	74.309

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	4.240	0.0	0.0	98.000
Open space (Lawns,parks etc.) - Good condition; grass cover > 75% - Soil B	61.000	4.650	0.0	0.0	61.000
Woods - good - Soil B	55.000	2.360	0.0	0.0	55.000
COMPOSITE AREA & WEIGHTED CN --->	(N/A)	12.500	(N/A)	(N/A)	74.467

Storm Event	1-inch
Return Event	0 years
Duration	24.000 hours
Depth	1.0 in
Time of Concentration (Composite)	0.185 hours
Area (User Defined)	11.690 acres

Computational Time Increment	0.025 hours
Time to Peak (Computed)	13.544 hours
Flow (Peak, Computed)	0.03 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	13.550 hours
Flow (Peak Interpolated Output)	0.03 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	11.690 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.0 in
Runoff Volume (Pervious)	0.023 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.022 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.185 hours
Computational Time Increment	0.025 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	71.45 ft³/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	0.124 hours
Unit receding limb, Tr	0.494 hours
Total unit time, Tb	0.618 hours

Storm Event	1-year 24- Hour
Return Event	1 years
Duration	24.000 hours
Depth	2.9 in
Time of Concentration (Composite)	0.185 hours
Area (User Defined)	11.690 acres

Computational Time Increment	0.025 hours
Time to Peak (Computed)	12.037 hours
Flow (Peak, Computed)	12.21 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.050 hours
Flow (Peak Interpolated Output)	11.93 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	11.690 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	0.799 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.797 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.185 hours
Computational Time Increment	0.025 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	71.45 ft³/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	0.124 hours
Unit receding limb, Tr	0.494 hours
Total unit time, Tb	0.618 hours

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.185 hours
Area (User Defined)	11.690 acres

Computational Time Increment	0.025 hours
Time to Peak (Computed)	12.012 hours
Flow (Peak, Computed)	37.39 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	37.16 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	11.690 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.4 in
Runoff Volume (Pervious)	2.334 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.328 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.185 hours
Computational Time Increment	0.025 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	71.45 ft³/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	0.124 hours
Unit receding limb, Tr	0.494 hours
Total unit time, Tb	0.618 hours

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.0 in
Time of Concentration (Composite)	0.185 hours
Area (User Defined)	11.690 acres

Computational Time Increment	0.025 hours
Time to Peak (Computed)	12.012 hours
Flow (Peak, Computed)	49.64 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	49.46 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	11.690 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.2 in
Runoff Volume (Pervious)	3.103 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3.094 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.185 hours
Computational Time Increment	0.025 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	71.45 ft³/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	0.124 hours
Unit receding limb, Tr	0.494 hours
Total unit time, Tb	0.618 hours

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.185 hours
Area (User Defined)	11.690 acres

Computational Time Increment	0.025 hours
Time to Peak (Computed)	12.012 hours
Flow (Peak, Computed)	70.16 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	70.10 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	11.690 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.5 in
Runoff Volume (Pervious)	4.417 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	4.406 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.185 hours
Computational Time Increment	0.025 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	71.45 ft³/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	0.124 hours
Unit receding limb, Tr	0.494 hours
Total unit time, Tb	0.618 hours

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.950 hours
Flow (Peak Interpolated Output)	0.55 ft³/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 ft³/s

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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	2.55 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	4.93 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	5.97 ft³/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 ft³/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

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 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	11.900 hours
Flow (Peak Interpolated Output)	7.64 ft³/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 ft³/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

Storm Event	1-inch
Return Event	0 years
Duration	24.000 hours
Depth	1.0 in
Time of Concentration (Composite)	0.185 hours
Area (User Defined)	12.500 acres

Computational Time Increment	0.025 hours
Time to Peak (Computed)	13.544 hours
Flow (Peak, Computed)	0.03 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	13.550 hours
Flow (Peak Interpolated Output)	0.03 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	12.500 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.0 in
Runoff Volume (Pervious)	0.024 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.024 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.185 hours
Computational Time Increment	0.025 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	76.40 ft³/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	0.124 hours
Unit receding limb, Tr	0.494 hours
Total unit time, Tb	0.618 hours

Storm Event	1-year 24- Hour
Return Event	1 years
Duration	24.000 hours
Depth	2.9 in
Time of Concentration (Composite)	0.185 hours
Area (User Defined)	12.500 acres

Computational Time Increment	0.025 hours
Time to Peak (Computed)	12.037 hours
Flow (Peak, Computed)	13.06 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.050 hours
Flow (Peak Interpolated Output)	12.76 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	12.500 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	0.8 in
Runoff Volume (Pervious)	0.855 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	0.852 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.185 hours
Computational Time Increment	0.025 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	76.40 ft³/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	0.124 hours
Unit receding limb, Tr	0.494 hours
Total unit time, Tb	0.618 hours

Storm Event	10 Year
Return Event	10 years
Duration	24.000 hours
Depth	5.0 in
Time of Concentration (Composite)	0.185 hours
Area (User Defined)	12.500 acres

Computational Time Increment	0.025 hours
Time to Peak (Computed)	12.012 hours
Flow (Peak, Computed)	39.98 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	39.74 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	12.500 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	2.4 in
Runoff Volume (Pervious)	2.496 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	2.489 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.185 hours
Computational Time Increment	0.025 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	76.40 ft³/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	0.124 hours
Unit receding limb, Tr	0.494 hours
Total unit time, Tb	0.618 hours

Storm Event	25 Year
Return Event	25 years
Duration	24.000 hours
Depth	6.0 in
Time of Concentration (Composite)	0.185 hours
Area (User Defined)	12.500 acres

Computational Time Increment	0.025 hours
Time to Peak (Computed)	12.012 hours
Flow (Peak, Computed)	53.08 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	52.89 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	12.500 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	3.2 in
Runoff Volume (Pervious)	3.318 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	3.309 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.185 hours
Computational Time Increment	0.025 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	76.40 ft³/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	0.124 hours
Unit receding limb, Tr	0.494 hours
Total unit time, Tb	0.618 hours

Storm Event	100 Year
Return Event	100 years
Duration	24.000 hours
Depth	7.6 in
Time of Concentration (Composite)	0.185 hours
Area (User Defined)	12.500 acres

Computational Time Increment	0.025 hours
Time to Peak (Computed)	12.012 hours
Flow (Peak, Computed)	75.03 ft³/s
Output Increment	0.050 hours
Time to Flow (Peak Interpolated Output)	12.000 hours
Flow (Peak Interpolated Output)	74.96 ft³/s

Drainage Area	
SCS CN (Composite)	74.000
Area (User Defined)	12.500 acres
Maximum Retention (Pervious)	3.5 in
Maximum Retention (Pervious, 20 percent)	0.7 in

Cumulative Runoff	
Cumulative Runoff Depth (Pervious)	4.5 in
Runoff Volume (Pervious)	4.723 ac-ft

Hydrograph Volume (Area under Hydrograph curve)	
Volume	4.711 ac-ft

SCS Unit Hydrograph Parameters	
Time of Concentration (Composite)	0.185 hours
Computational Time Increment	0.025 hours
Unit Hydrograph Shape Factor	483.432
K Factor	0.749
Receding/Rising, Tr/Tp	1.670
Unit peak, qp	76.40 ft³/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	0.124 hours
Unit receding limb, Tr	0.494 hours
Total unit time, Tb	0.618 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)

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 ft³/s
T2 Elevation	427.53 ft	T2 Flow	5.49 ft³/s

Structure ID: Riser - 1 Structure Type: Inlet Box	
Number of Openings	1
Elevation	428.00 ft
Orifice Area	6.0 ft²
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 ft²
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

Convergence Tolerances	
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/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) (ft³/s)
Flow (From)	POST-POA 1 DA	0.286	11.900	4.93
Flow (In)	WET POND	0.286	11.900	4.93

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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	**1800**	CUFT / ACRE disturbed area (NC E&SC Manual)
915.7	Required Surface Area, SQ	**325**	SQFT / CFS of peak flow
30.0	Suggested Width, FT		Min length to width ratio: 2:1
60.0	Suggested Length, FT		

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	**Okay**
1,964.0	Actual Surface Area, SQFT	**Okay**

Weir Design

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

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	**Okay**
	Suggest about 3 DAYS	**Okay**
63.5	Skimmer Outlet Elevation, FT	

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:

Kimley»Horn

EROSION CONTROL CALCS (RIP-RAP CALCULATIONS)

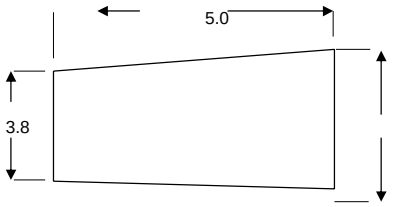
Project Information

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 apror

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 D0) =	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

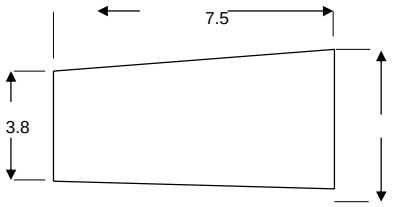
Project Name:	Learning Center Rolesville		
KHA Project #:	13031004		
Designed by:	JAA	Date:	1/2/2024
Revised by:		Date:	
Checked by:	COB	Date:	1/2/2024

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 apror

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 D0) =	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

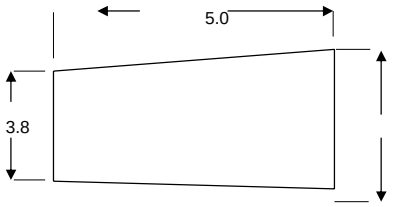
Project Name:	Learning Center Rolesville		
KHA Project #:	13031004		
Designed by:	JAA	Date:	1/2/2024
Revised by:		Date:	
Checked by:	COB	Date:	1/2/2024

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 apror

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 D0) =	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