Stormwater Management Design Reports

Carolina Crossroads Phase 3A

Berryhill Road & Burning Tree Drive
Browning Road
Rockland Road
Gale Drive

Richland & Lexington Counties, SC

June 2026

SOUTH CAROLINA
HDR ENGINEERING INC.
OF THE CAROLINAS
No. C0318
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 26549
DUSTIN P. HUGHEY

6/25/26

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-37000

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OUTFALL EXHIBITS

Volume List

1 & 2 BERRYHILL ROAD / BURNING TREE DRIVE

3 BROWNING ROAD

4 ROCKLAND ROAD

5 GALE DRIVE



SURFACE COVER LEGEND

- GRASS / OPEN SPACE
- WOODS
- IMPERVIOUS
- WATER
- RESIDENTIAL
- DENSE RESIDENTIAL
- DENSE COMMERCIAL
- GRAVEL

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CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

SURFACE COVER / LAND USE PRE–DEVELOPED CONDITIONS BERRYHILL ROAD (1 OF 2)

0 125 250

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 250'

FIGURE 1.1–A



SURFACE COVER LEGEND

- GRASS / OPEN SPACE
- IMPERVIOUS
- RESIDENTIAL
- DENSE COMMERCIAL
- WOODS
- WATER
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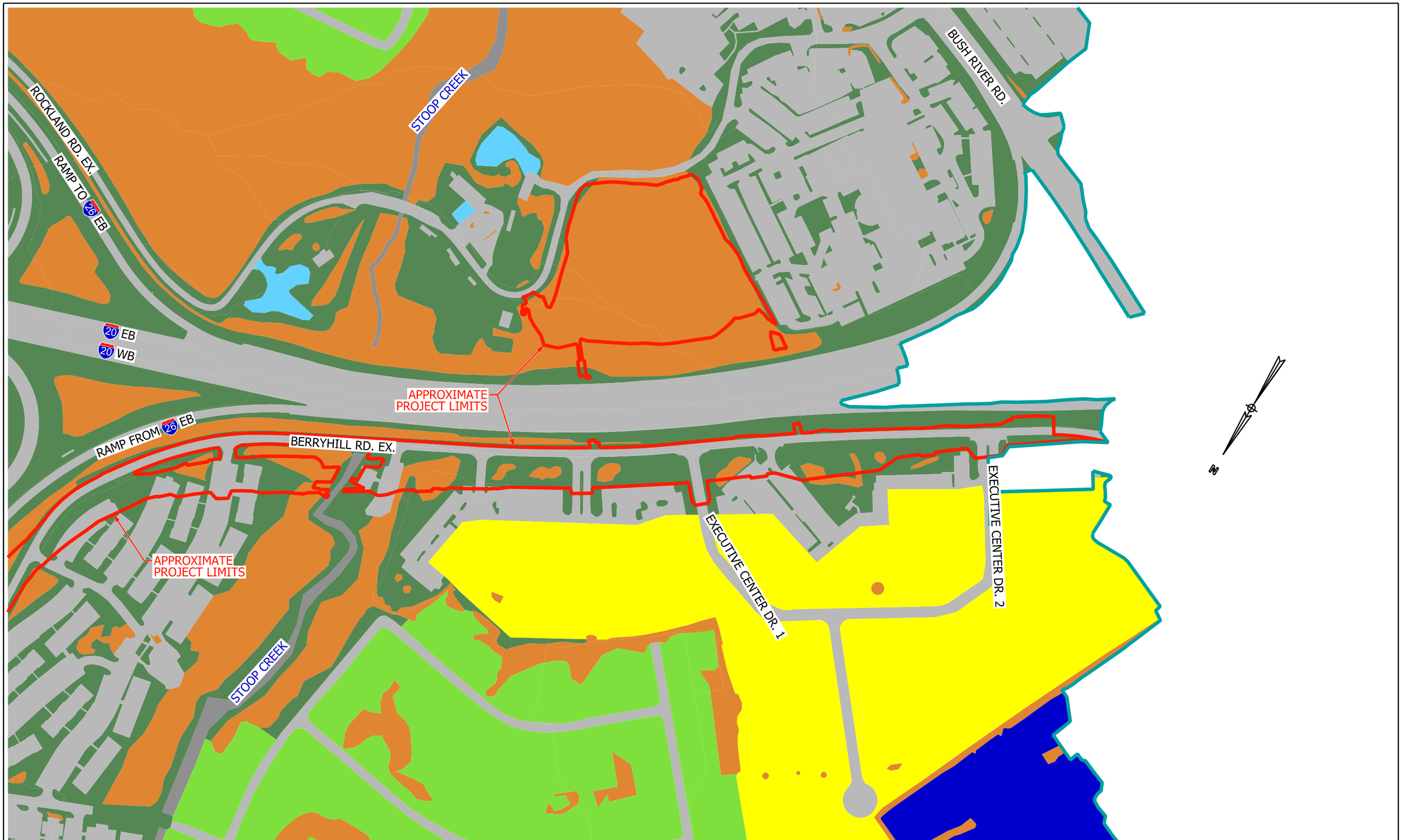
0 125 250

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 250'

FIGURE 1.1–B



SURFACE COVER LEGEND

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SURFACE COVER / LAND USE PRE–DEVELOPED CONDITIONS BERRYHILL ROAD (2 OF 2)

0 125 250

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 250'

FIGURE 2–A

ROCKLAND RD.REL.

STOOP CREEK

BUSH RIVER RD.

RAMP TO 26 EB

RO-DB-21

20 EB

20 WB

APPROXIMATE PROJECT LIMITS

RAMP FROM 26 EB

BERRYHILL RD. REL.

APPROXIMATE PROJECT LIMITS

EXECUTIVE CENTER DR. 1

EXECUTIVE CENTER DR. 2

STOOP CREEK

N

SURFACE COVER LEGEND

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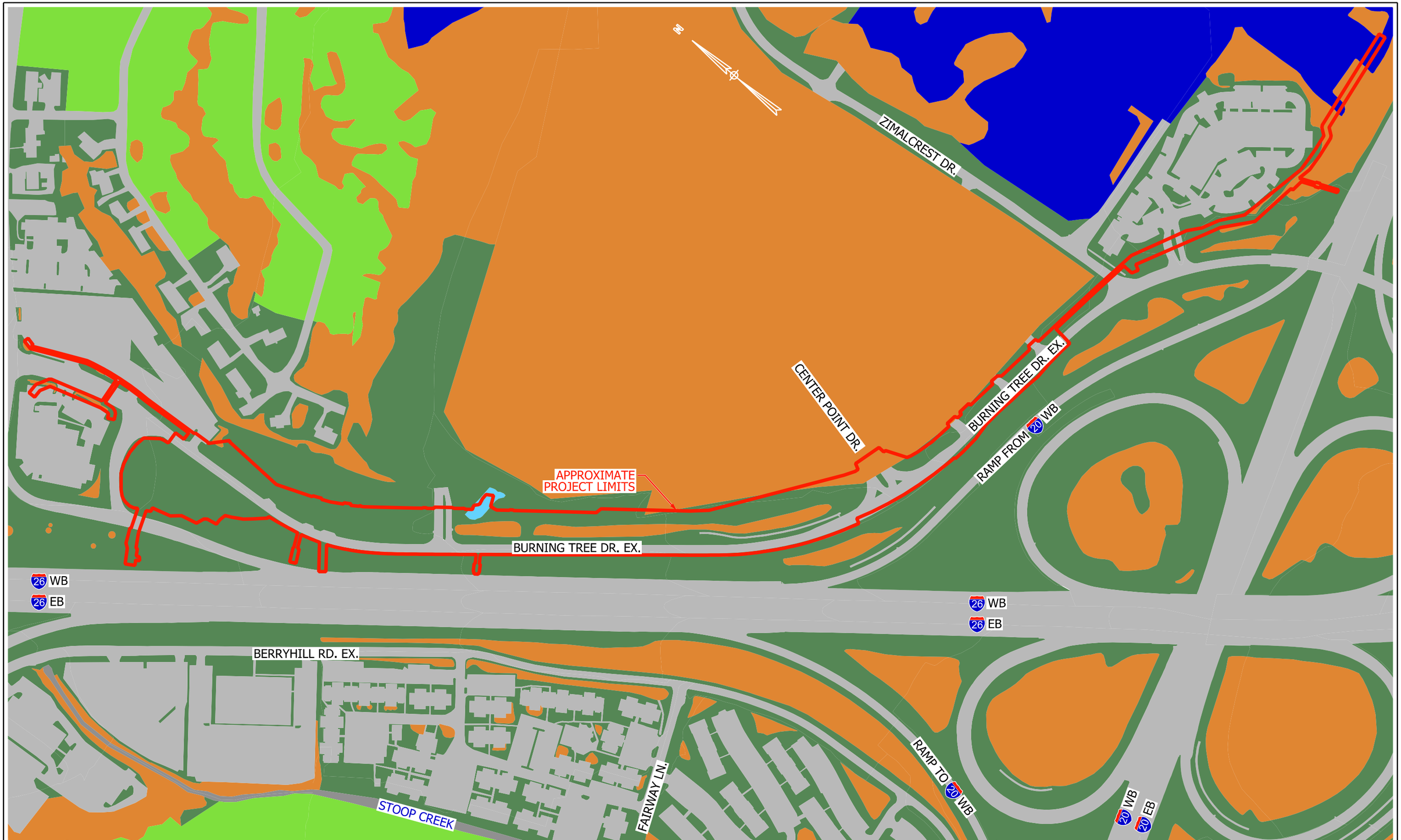
0 125 250

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 250'

FIGURE 1.2–B



SURFACE COVER LEGEND

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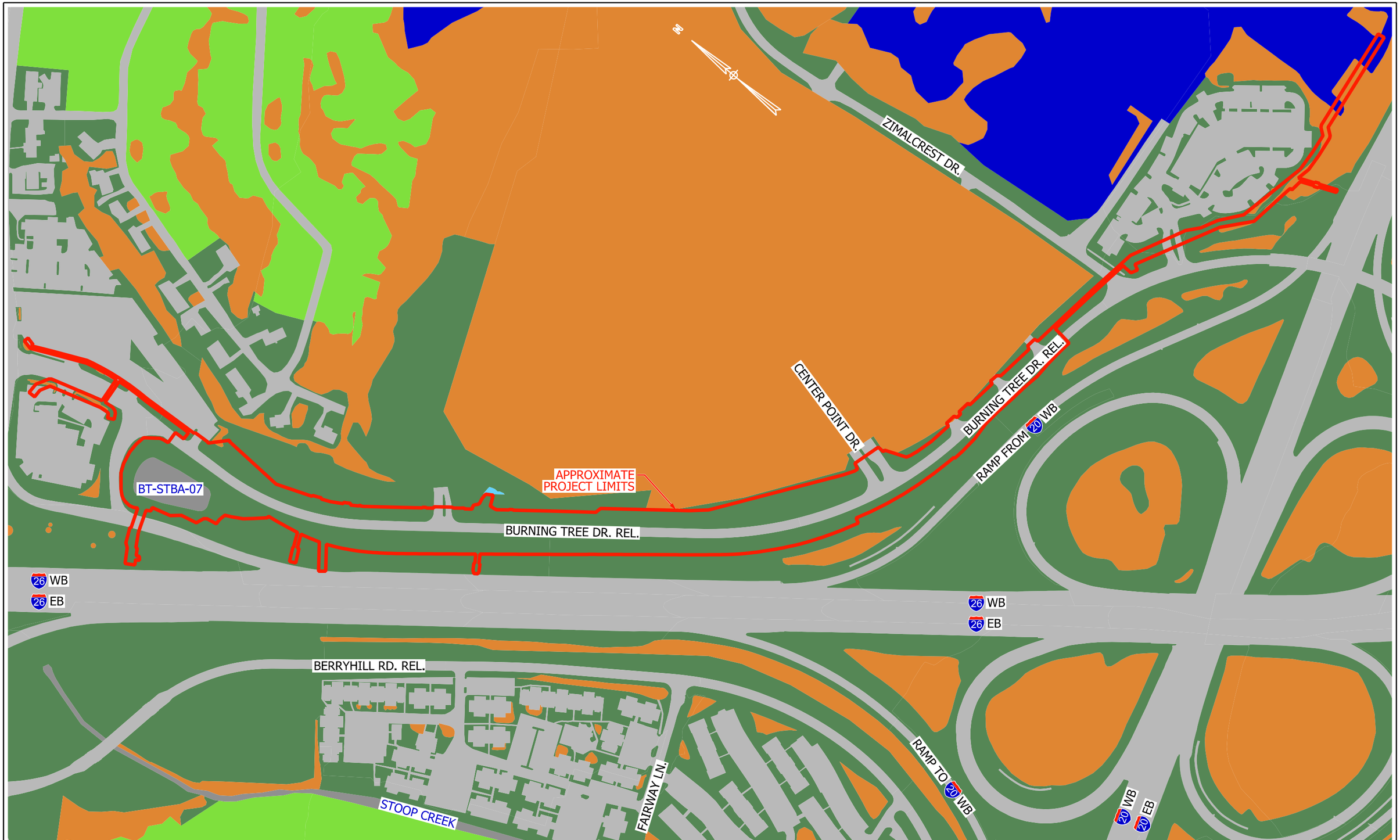
SURFACE COVER / LAND USE PRE–DEVELOPED CONDITIONS BURNING TREE DRIVE

0 125 250

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 250'

FIGURE B–1



SURFACE COVER LEGEND

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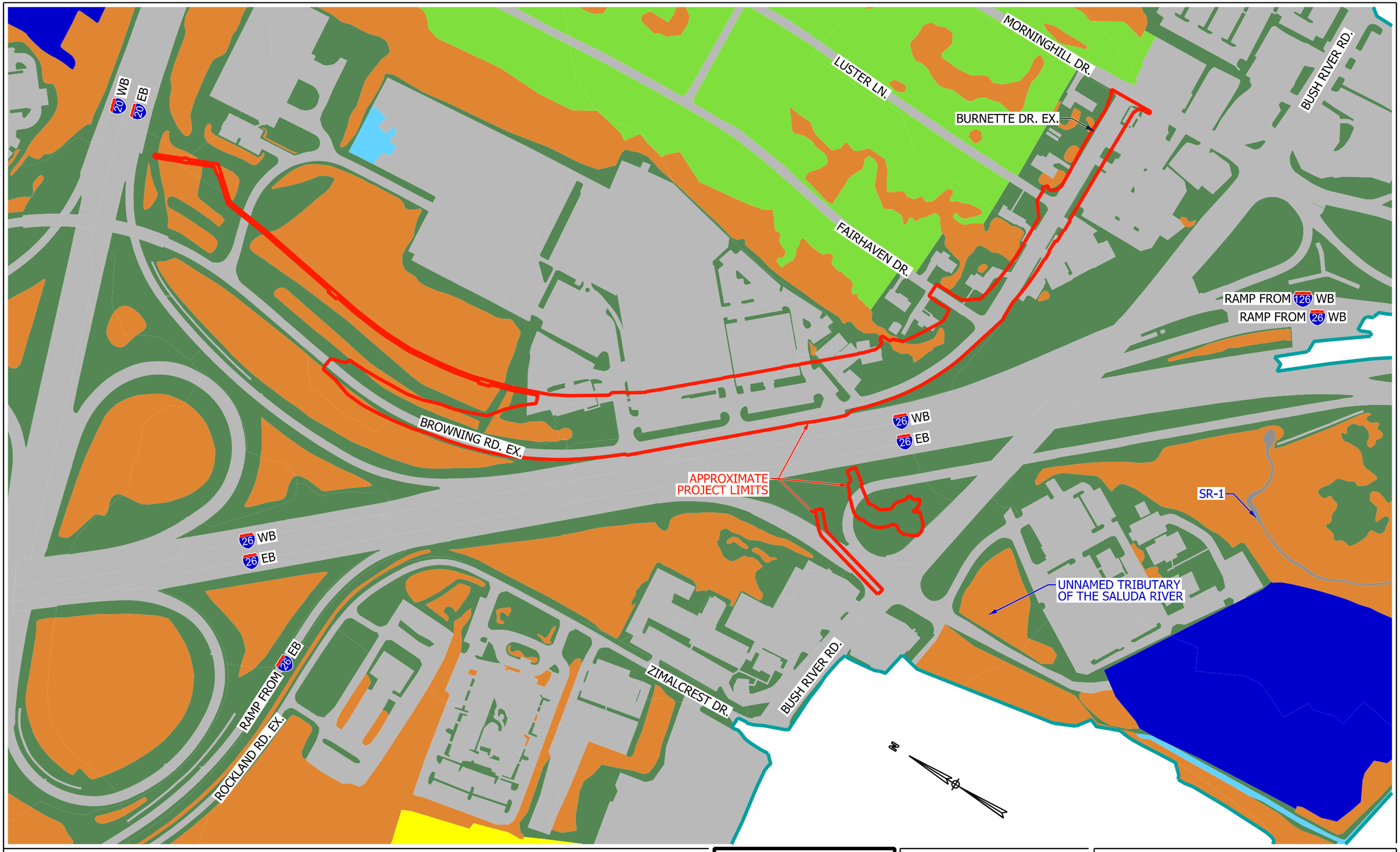
SURFACE COVER / LAND USE POST-DEVELOPED CONDITIONS BURNING TREE DRIVE

0 125 250

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 250'

FIGURE 2–B



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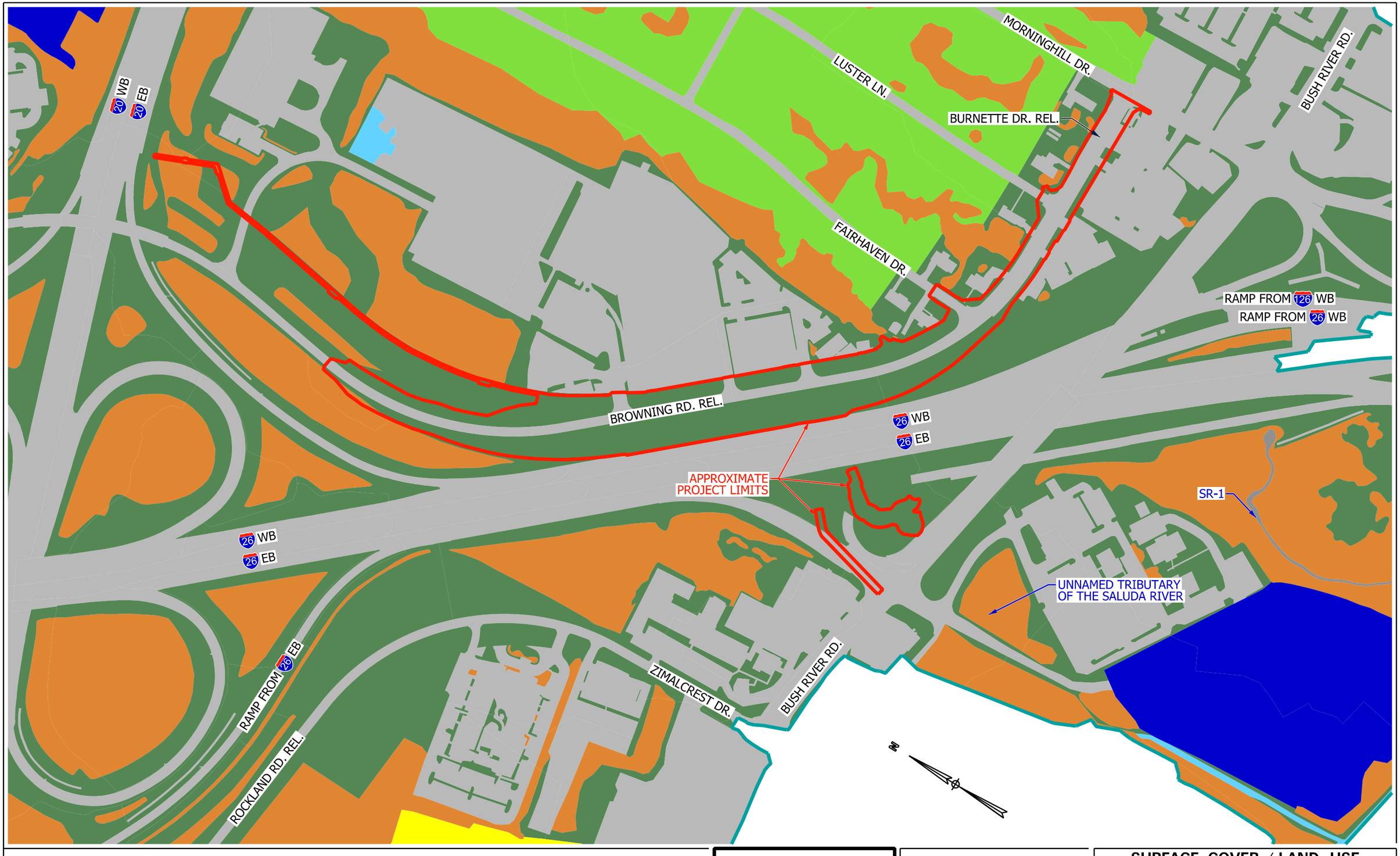
0 125 250

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 250'

FIGURE 3–A



SURFACE COVER LEGEND

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0 125 250

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 250'

FIGURE 3–B



SURFACE COVER LEGEND

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- IMPERVIOUS
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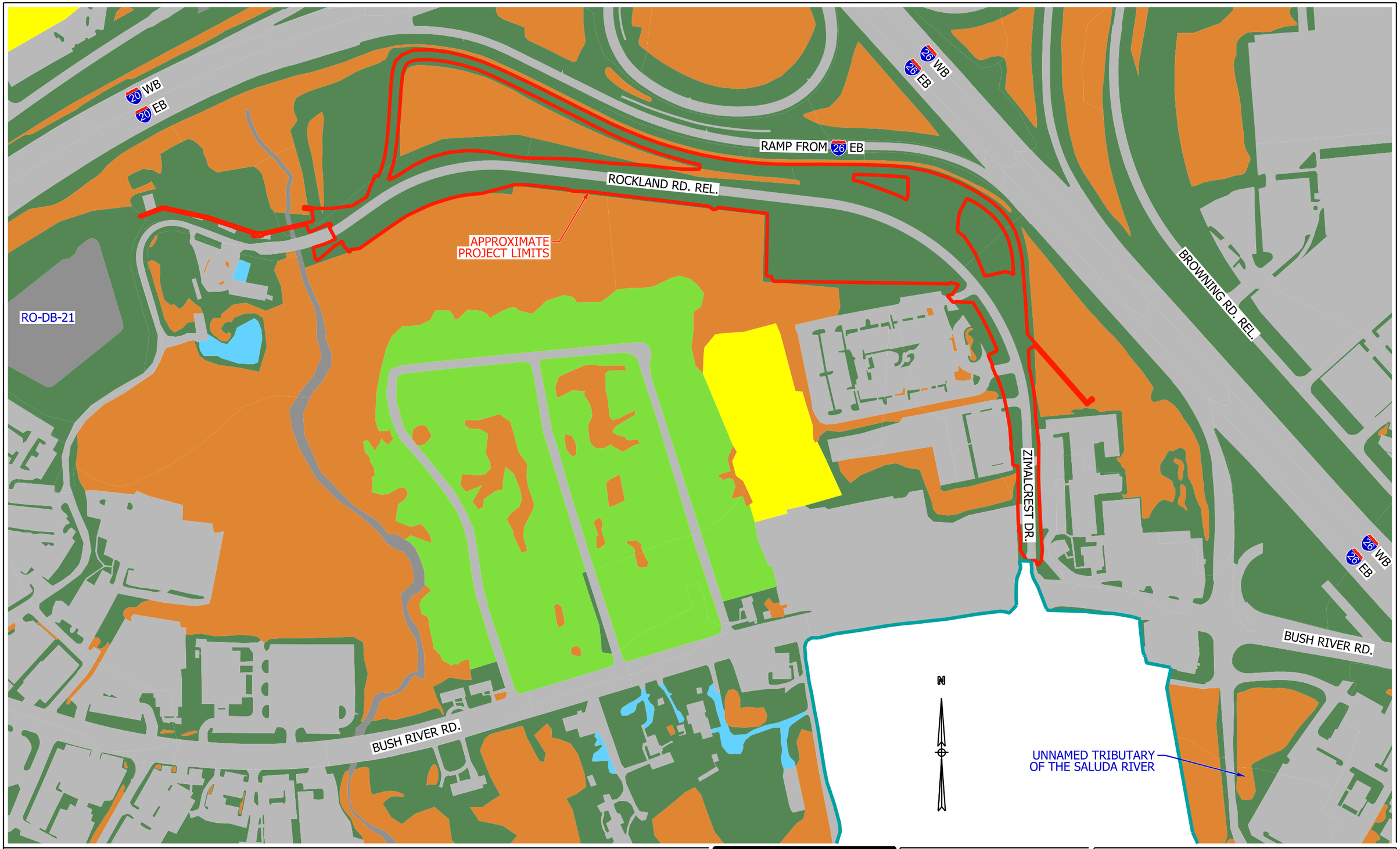
SURFACE COVER / LAND USE PRE–DEVELOPED CONDITIONS ROCKLAND ROAD

0 125 250

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 250'

FIGURE 4–A



SURFACE COVER LEGEND

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0 125 250

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 250'

FIGURE 4–B

CHICOPEE DR.

20 WB

20 EB

APPROXIMATE PROJECT LIMITS

GALE DR. EX.

20 WB

20 EB

FAIRHAVEN DR.

LUSTER LN.

MORNINGHILL DR.

STATLER RD.

N

SURFACE COVER LEGEND

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0 75 150

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 150'

FIGURE 5–A

CHICOPEE DR.

20 WB

20 EB

APPROXIMATE PROJECT LIMITS

20 WB

20 EB

GALE DR. REL.

FAIRHAVEN DR.

LUSTER LN.

MORNINGHILL DR.

STATLER RD.

N

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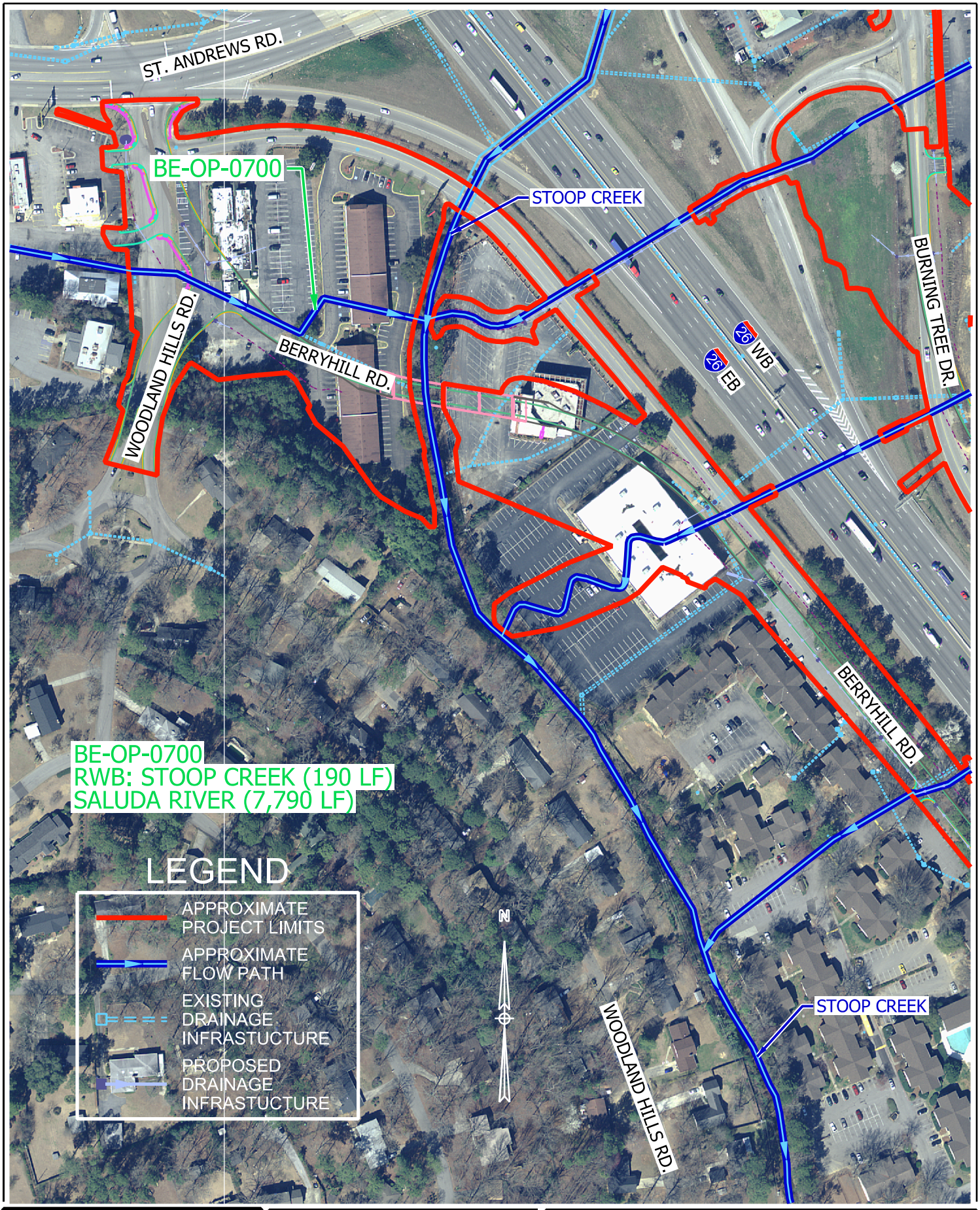
0 75 150

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 150'

FIGURE 5-B



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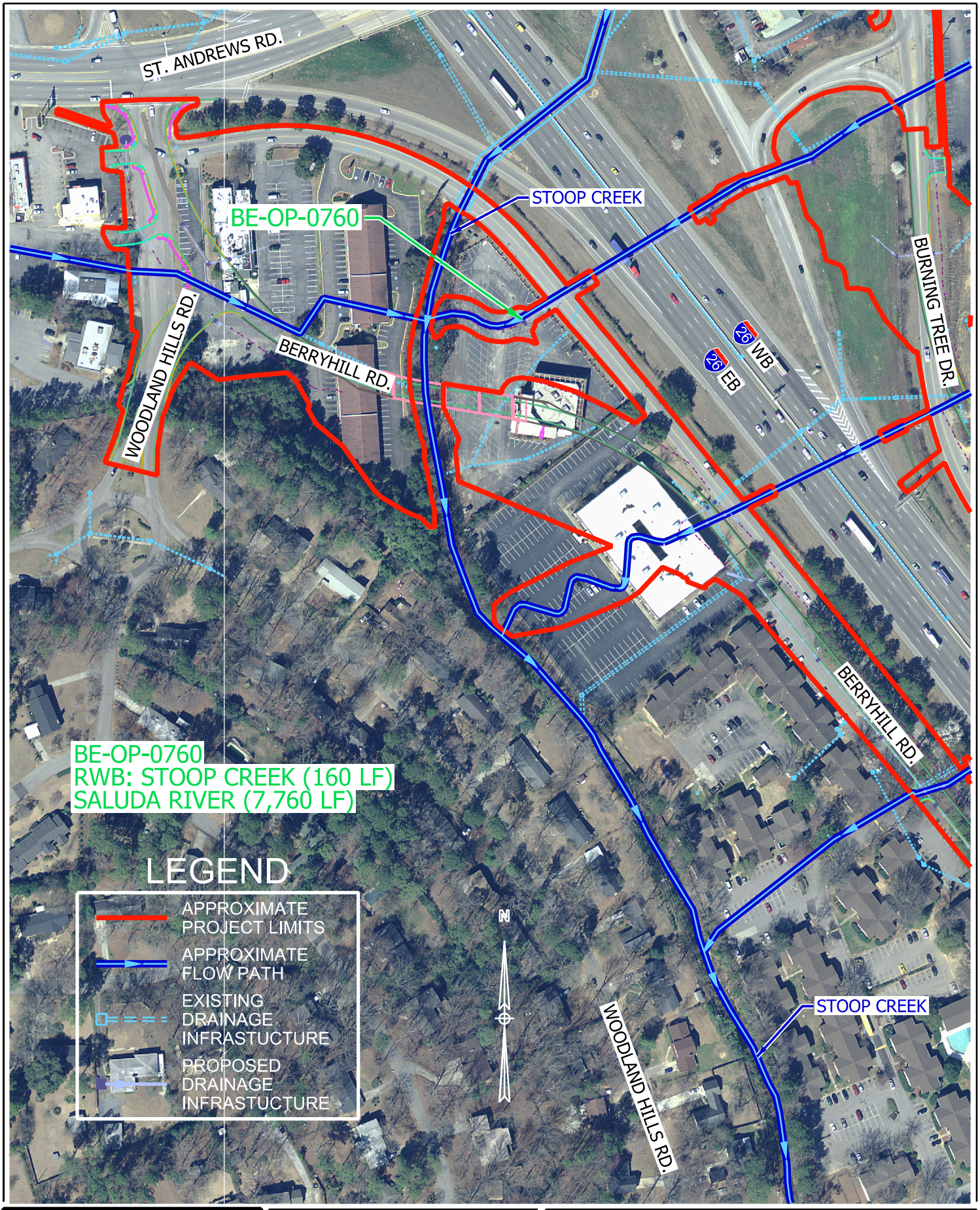
BE–OP–0700
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
BE–OP–0700



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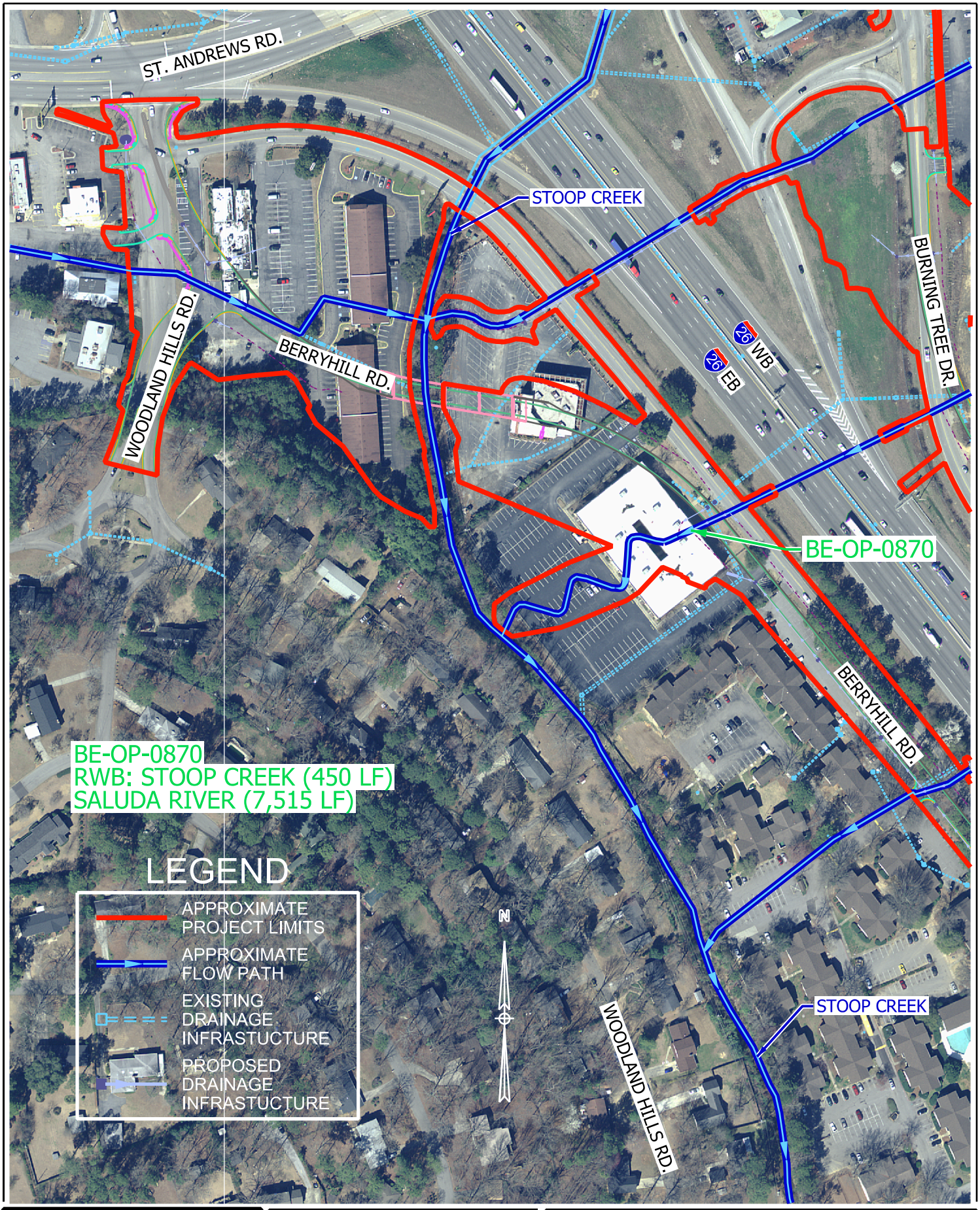
BE–OP–0760
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
BE–OP–0760



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BE–OP–0870
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
BE–OP–0870



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BE–JB–0961
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
BE–JB–0961



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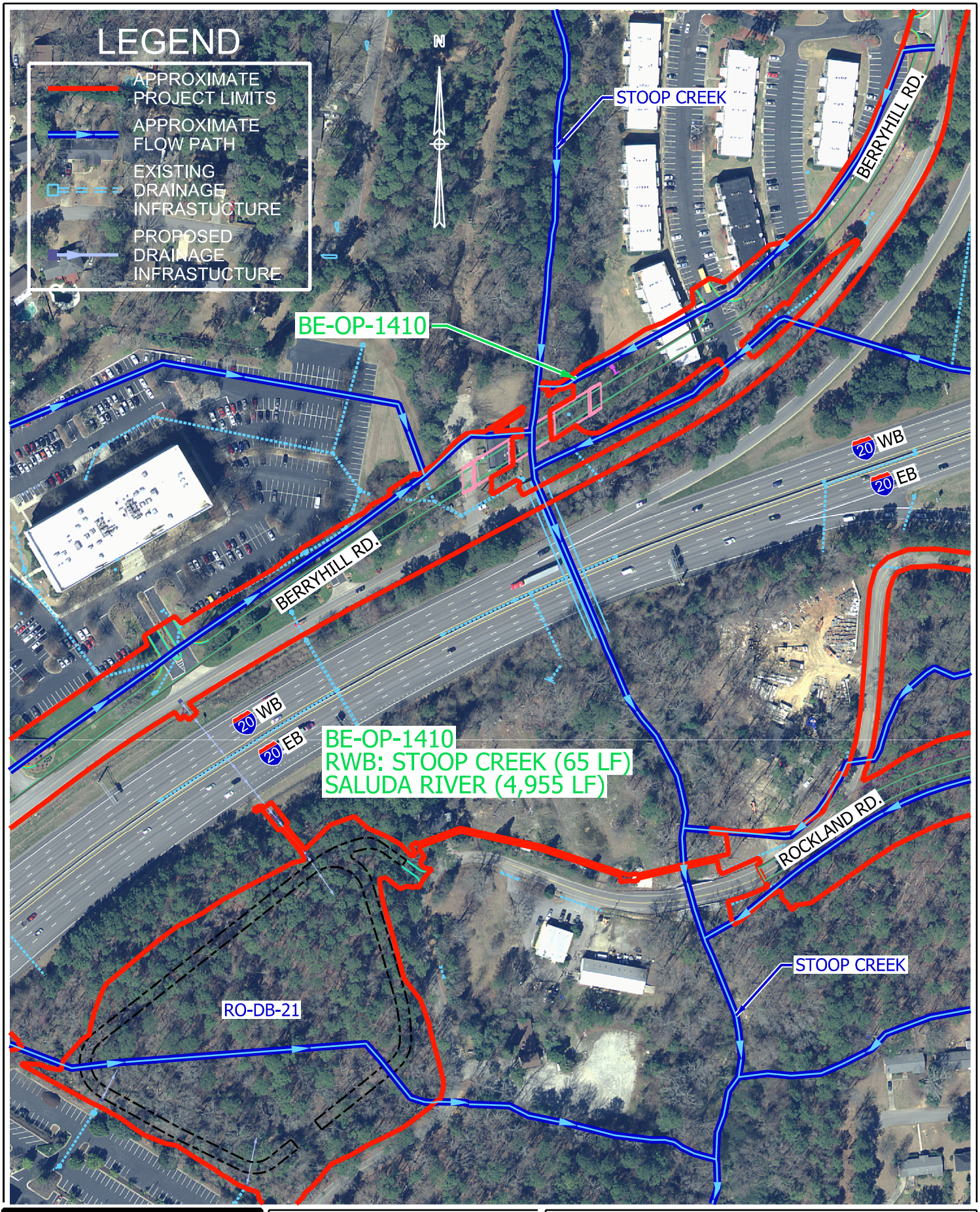
BE–JB–1081
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
BE–JB–1081



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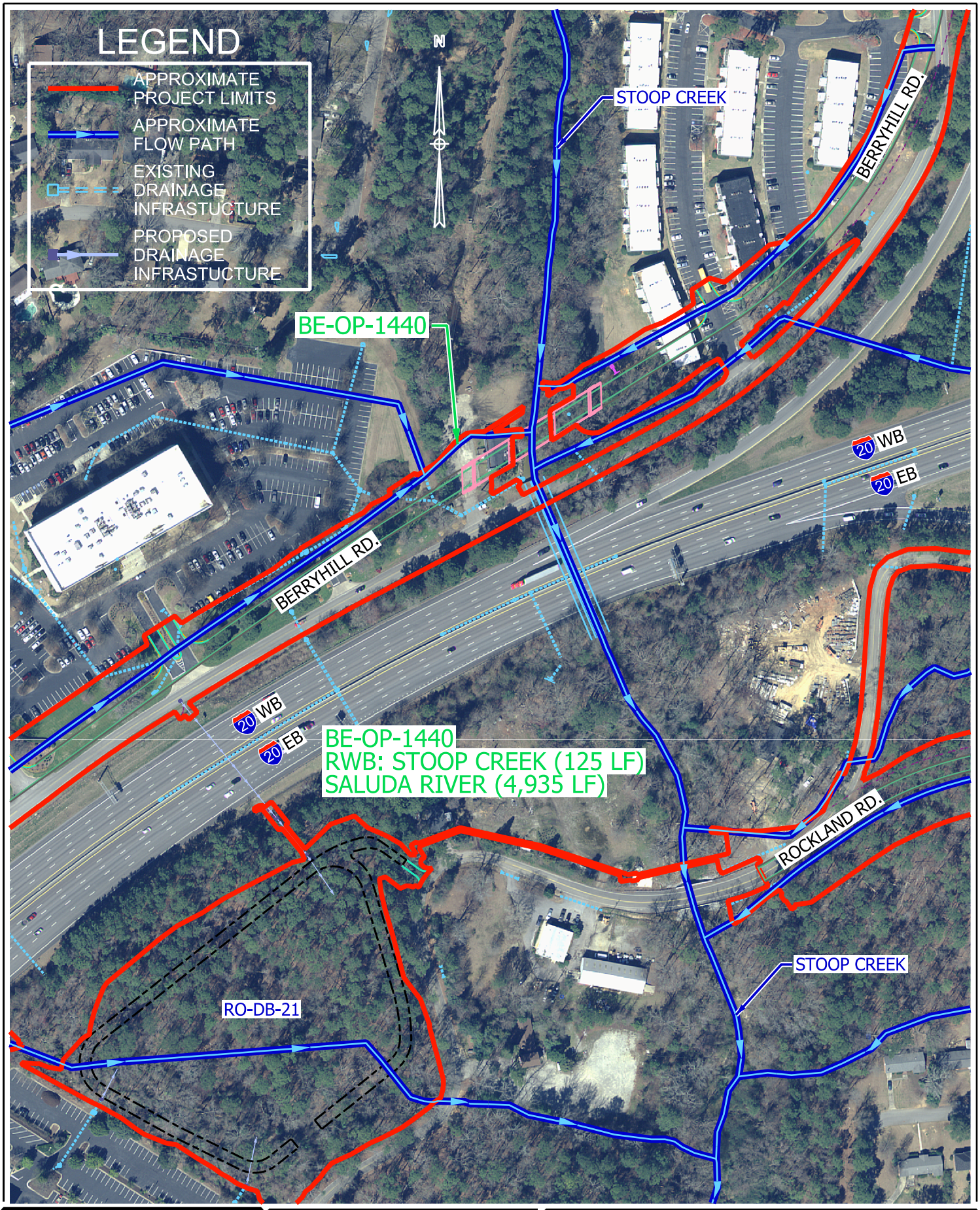
BE–OP–1410
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
BE–OP–1410



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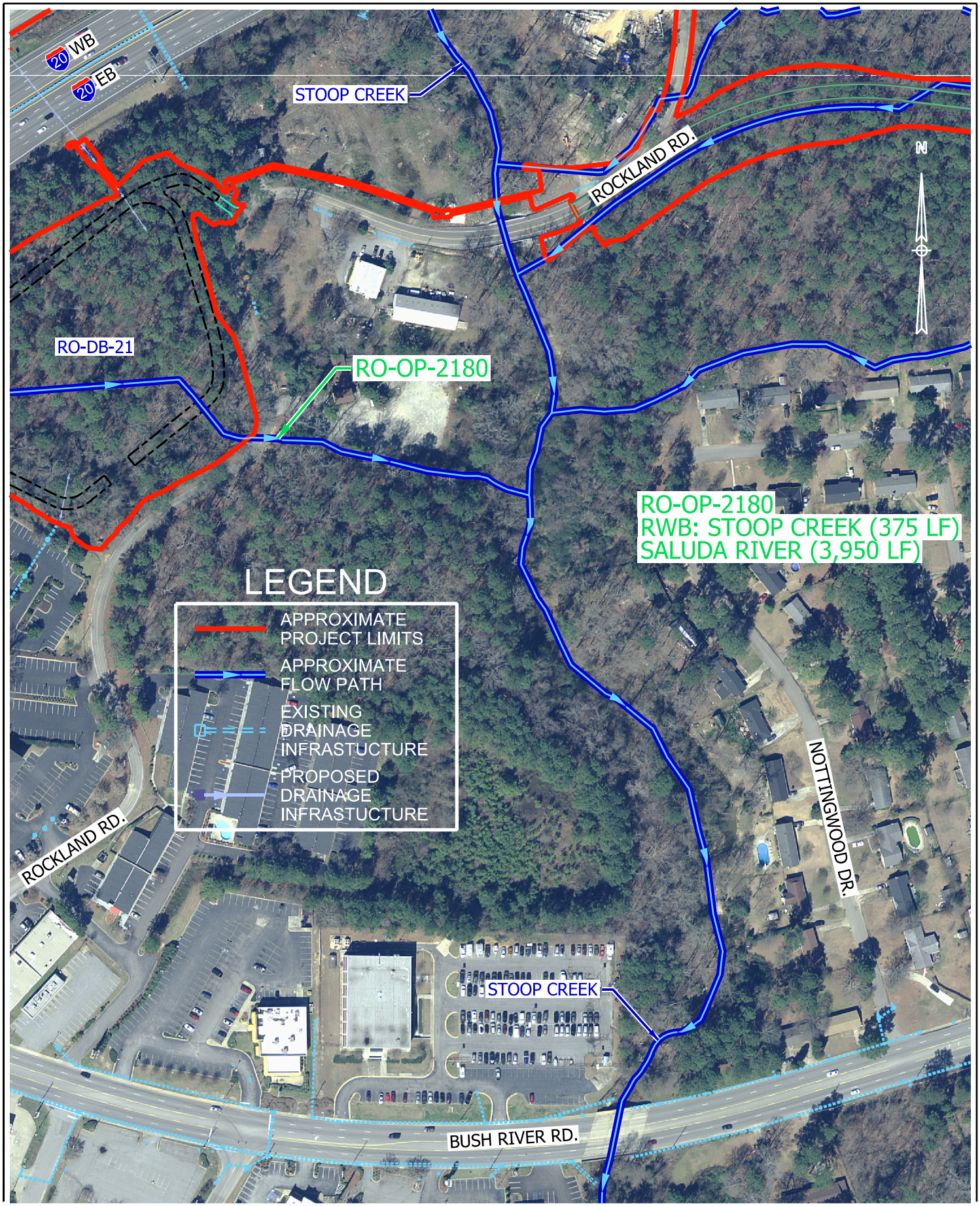
BE–OP–1440
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
BE–OP–1440



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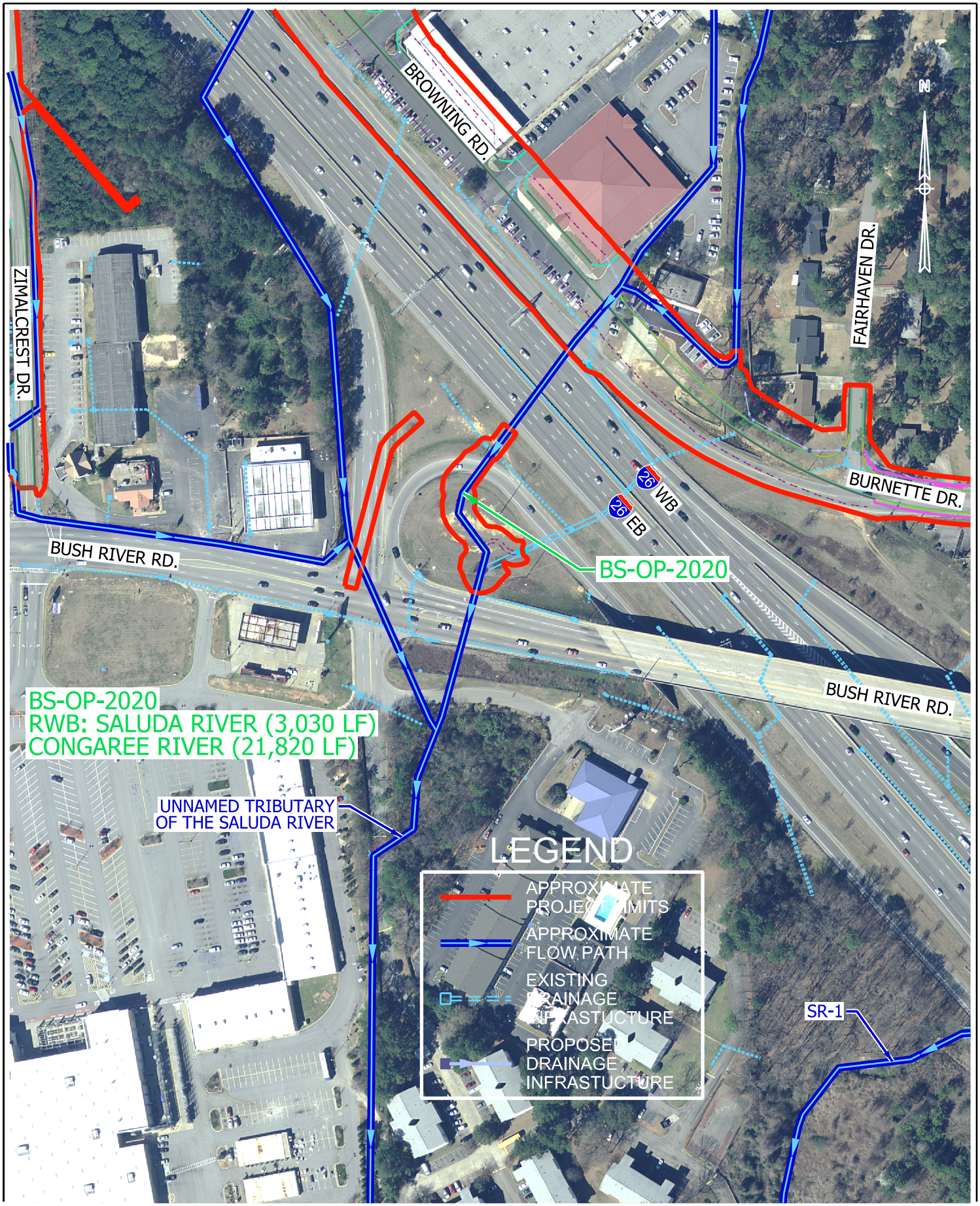
RO–OP–2180
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
RO–OP–2180



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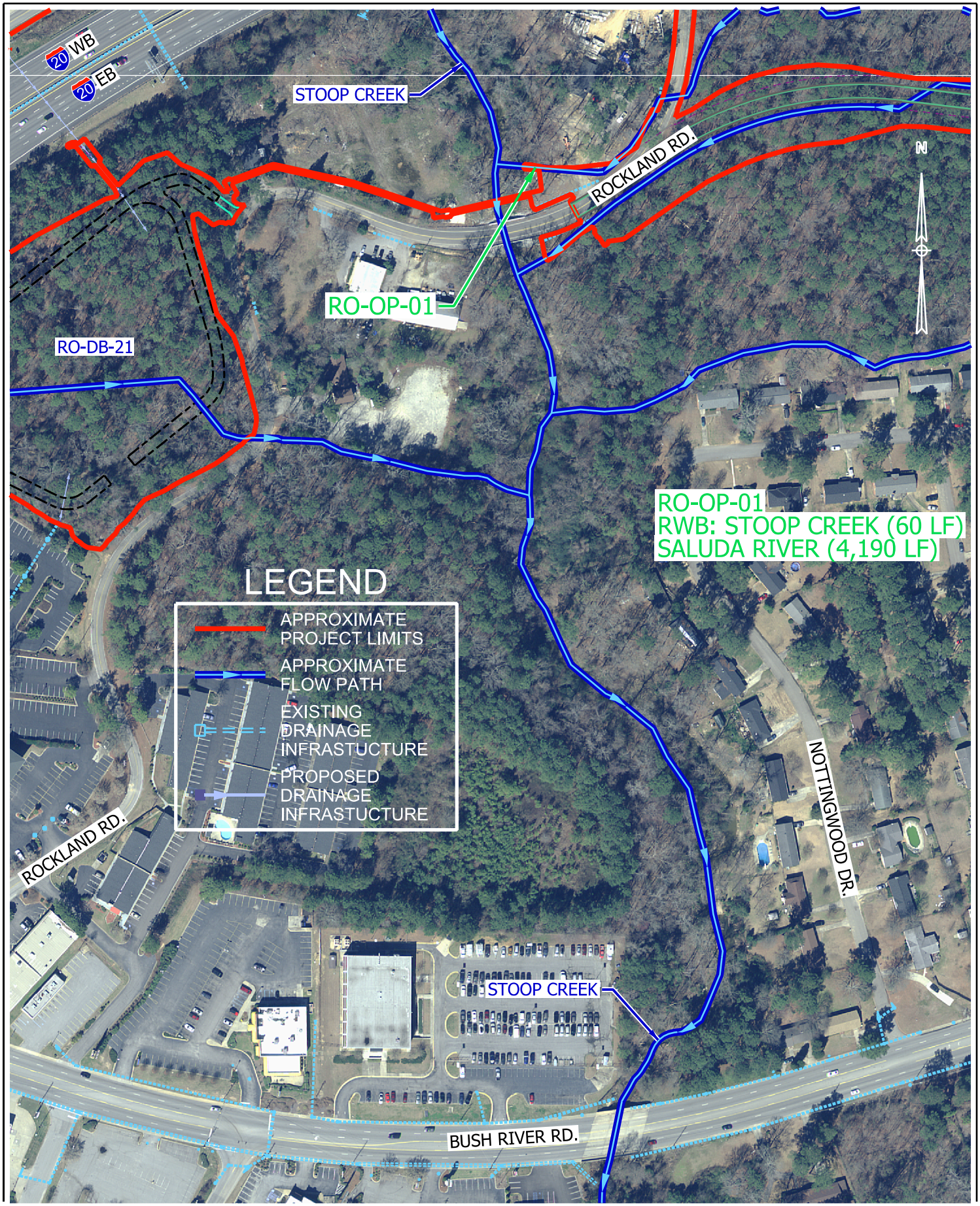
BS–OP–2020
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
BS–OP–2020



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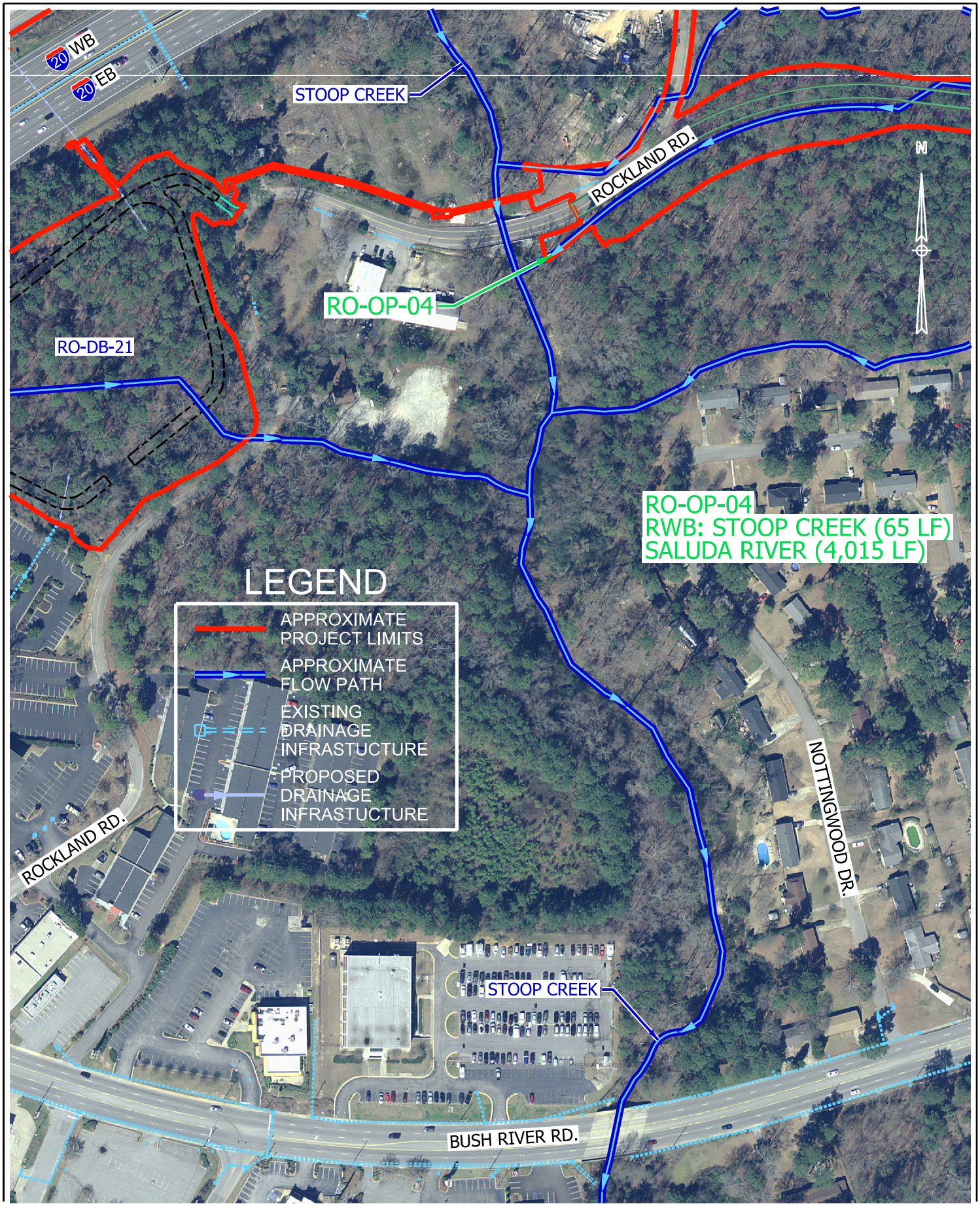
RO–OP–01
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
RO–OP–01



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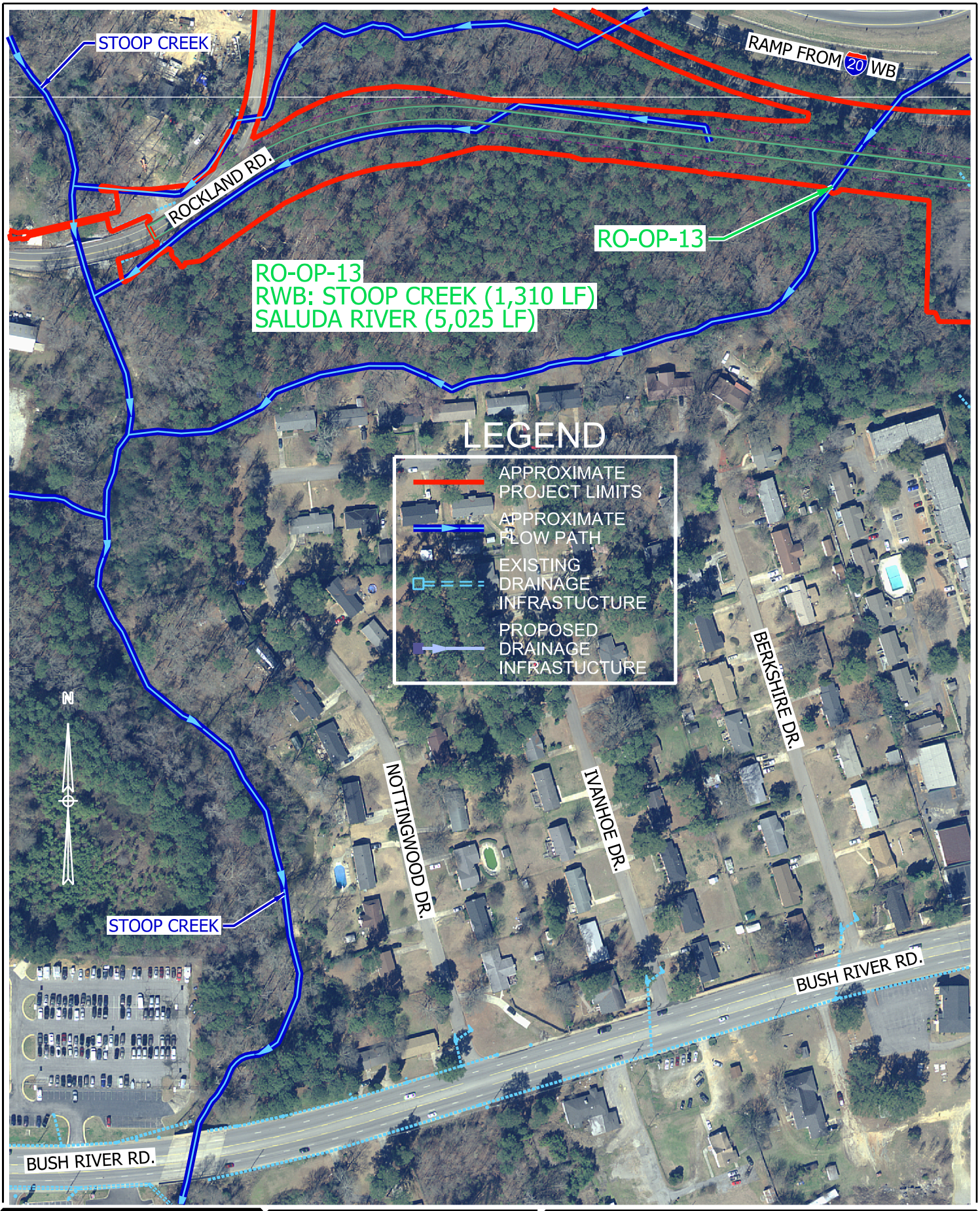
RO–OP–04
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
RO–OP–04



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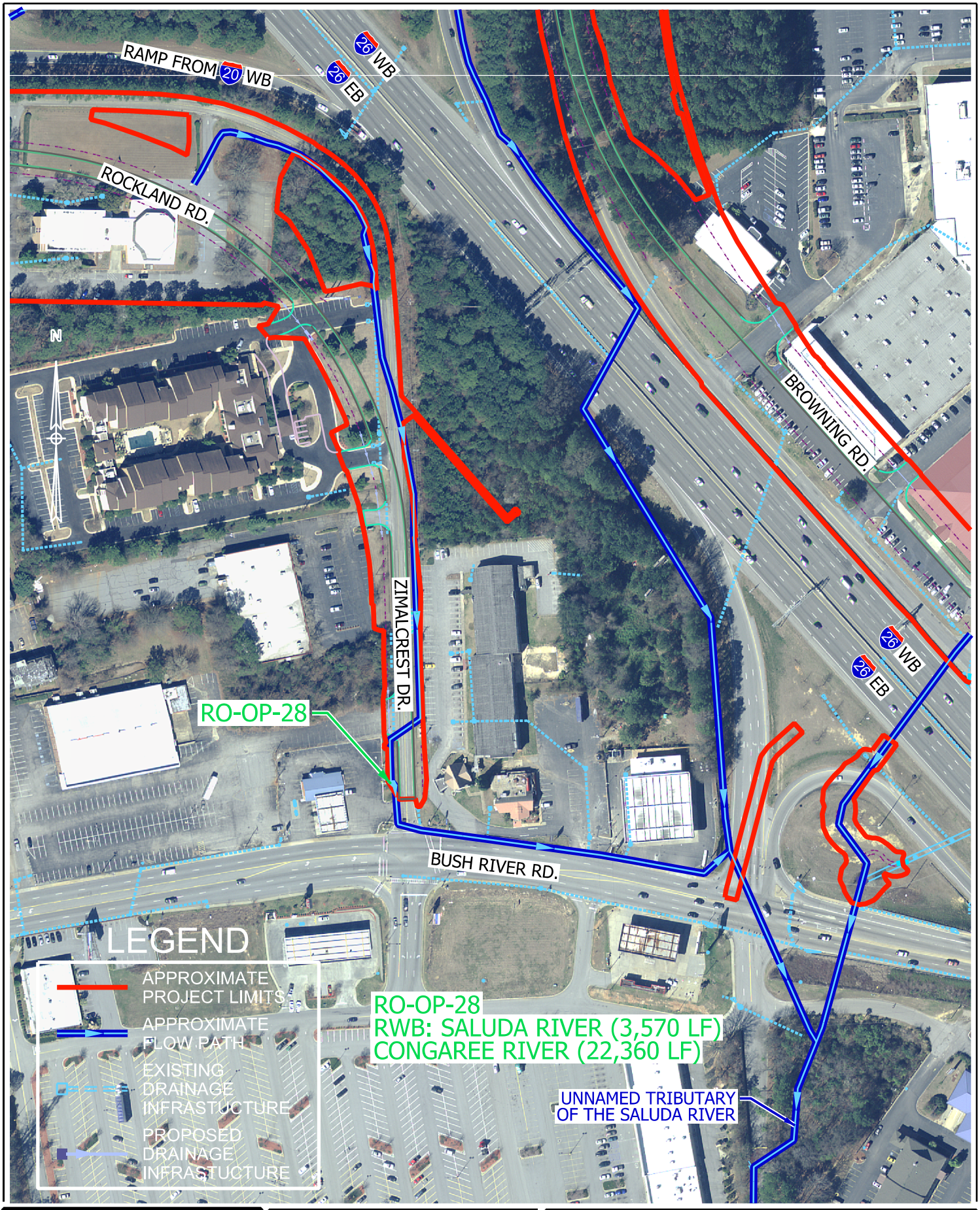
RO–OP–13
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
RO–OP–13



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RO–OP–28
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
RO–OP–28



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GA–OP–01
OUTFALL EXHIBIT

0 100 200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 200'

FIGURE
GA–OP–01

Volumes 1 & 2

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Stormwater Management Design Report

Carolina Crossroads
Phase 3A
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Richland & Lexington Counties, SC

June 2026





6/25/26

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1.0

Project Summary

1.1 Project Summary

The South Carolina Department of Transportation (SCDOT) proposes significant improvements to the I-26 / I-20 / I-126 interchanges as part of the Carolina Crossroads Project, to the northwest of Columbia, SC (see Figures BE.01 & BT.01: Vicinity Maps in Appendix A). The project is located in both Richland and Lexington Counties. The project includes adding a travel lane in each direction to each of the three interstates, adding Collector-Distributer (C-D) lanes, as well as improving various interchanges and side roads.

The three interstates within the project area are all east-west interstate routes. I-26 runs along the western limits of Columbia, I-20 runs along the northern limits of Columbia, and I-126 provides a direct connection from I-26 to downtown Columbia. Within the project limits, the interstates currently range from a four- to ten-lane divided freeway with median barrier walls. The posted speed limits of the interstates vary from 55 mph to 60 mph.

Phase 3A of the overall Carolina Crossroads Project involves the relocation of frontage roads adjacent to the corridor to allow for ease of construction of the final interstate widening (Phase 3E). The five frontage roads associated with Phase 3A are Gale Drive, Berryhill Road, Burning Tree Drive, Browning Road, and Rockland Road. This report focuses on the Berryhill Road and Burning Tree Drive relocations. Stormwater management reports for the other frontage roads are bound under separate cover.

Berryhill Road is a secondary connector road that currently runs from Woodland Hills Road on the North end to Bush River Road on the South end. From the North end, the road approximately parallels the traveled ways of I-26 EB, the ramp from I-26 EB to I-20 WB, and I-20 WB.

Burning Tree Drive is a secondary connector road that runs from Saint Andrews Road on the North end to Browning Road on the South end. An existing bridge over the I-20 corridor connects Burning Tree Drive with Browning Road.

FEMA Flood Insurance Rate Map (FIRM) Panels 45063C0133G, 45063C0134G, 45063C0142G, 45063C0144G, 45063C0161G, 45063C0163G, 45079C0091H, 45079C0210K, 45079C0236K, & 45079C0237K show the various floodplains associated with the project area. They were overlaid onto the project site in CAD, and can be seen in Appendix A as Figures BE.04 & BT.04.

Construction of Phase 3A will result in a net reduction of the total impervious area due to the removal of adjacent parking lots, driveways, roadways, and adjacent buildings, parking lot and driveways. In the vicinity of Burning Tree Drive, Phase 3A construction will result in a net reduction of approximately 1.6 acres of impervious surface. In the vicinity of Berryhill Road, Phase 3A construction will result in a net reduction of approximately 4.8 acres of impervious surface.

Locations of project outfalls can be seen in the Basin Delineation Maps in Appendix E. Phase 3A will result in a net reduction in peak flows at each analysis point. See Section 3.9 for a Pre-Construction versus Post-Construction Analysis.

2.0

Soils Information

2.1 Soils Information Overview

The Carolina Crossroads Project is located in the Sand Hills Region of South Carolina. The land use adjacent to the project corridor is a mix of residential, commercial, and undeveloped. Soil surveys were obtained from the Natural Resources Conservation Service for Richland County (Version 18, Dec 23, 2013) and Lexington County (Version 15, Sep 27, 2016) to determine the predominant soil types along the project corridor.

The Web Soil Survey map and soil descriptions can be found in Figures BE.05 & BT.05 in Appendix A.

2.2 Hydrologic Soil Group Descriptions

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These mainly consist of deep, well-drained to excessively-drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These chiefly consist of moderately deep or deep, moderately well-drained or well-drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These chiefly consist of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These chiefly consist of clays that have a high shrink / swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

3.0

Stormwater Analysis

3.1 Stormwater Analysis Overview

The hydrologic analysis for this project was performed in accordance with SCDOT's *Requirements for Hydraulic Design Studies*, dated May 26, 2009.

Drainage areas were delineated using survey data, Google Earth aerial imaging, and USGS 7.5' Quadrangles (see Figures BE.03 & BT.03: USGS Topographic Quad Maps in Appendix A). The hydrologic methods used to determine peak discharges were selected based upon watershed area and consisted of the Rational Method. Times of concentration were computed using the SCS methodology outlined in the WinTR-55 manual, with a minimum time of concentration of 5 minutes.

For uniformity and ease of calculation, the entire project (including the portions within Richland County) was analyzed using rainfall data for Lexington County. The project was also analyzed as being wholly in the Piedmont Physiographic Region.

Drainage paths, flow lengths, and watercourse slopes were determined using surveyed contours and the USGS Quad maps. Runoff coefficients and Manning's *n* values were estimated from aerial photography and from field investigations.

As there are multiple classifications of roadways throughout this project, a single set of drainage criteria cannot be applied. The primary roadways in the project were broken down into three categories, and are listed below:

Primary Road High Volume Design Speed > 45 mph	**Primary Road High Volume Design Speed ≤ 45 mph**	**Secondary Road Collector Design Speed ≤ 45 mph**
Interstate 26	System Ramps & Loops	Berryhill Rd.
Interstate 20	Service Ramps & Loops	Browning Rd.
Interstate 126	Broad River Rd.	Burning Tree Dr.
Interstate C-Ds	Bush River Rd.	Fernandina Rd. (NE of Beatty Rd.)
	Colonial Life Blvd.	Saturn Pkwy.
	Fernandina Rd. (SW of Beatty Rd.)	
	Harbison Blvd.	
	Jamil Rd.	
	Lake Murray Blvd.	
	Piney Grove Rd.	
	St. Andrews Rd.	

Drainage design criteria for this project are shown in Appendix D.

3.2 Common Abbreviations / Naming Conventions

Common abbreviations associated with the project drainage analysis are listed below in Table 3.1:

BCXT	BOX CULVERT EXTENSION
BE	BERRYHILL RD.
BRDG	BRIDGE
BR	BROWNING RD.
BS	BUSH RIVER RD.
BT	BURNING TREE DRIVE
CB	PROP. CATCH BASIN
CC	PROP. CONCRETE COLLAR
DB	DETENTION BASIN
DI	PROP. DROP INLET
EB	EASTBOUND
EC	EX. BOX CULVERT
EP	EX. PIPE
EX	EXISTING
EXCB	EX. CATCH BASIN
EXDB	EX. DETENTION BASIN
EXDI	EX. DROP INLET
EXHW	EX. HEADWALL
EXJ	EX. JUNCTION
EXJB	EX. JUNCTION BOX
EXMH	EX. MANHOLE
EXOEP	EX. OPEN PIPE END
FE	FERNANDINA ROAD

HW	PROP. HEADWALL
JA	JAMIL ROAD
JB	PROP. JUNCTION BOX
LF	LINEAR FEET
MCB	MEDIAN CATCH BASIN
MH	PROP. MANHOLE
NB	NORTHBOUND
NC	PROP. BOX CULVERT
NP	PROP. PIPE
OC	OPEN CHANNEL
OEP	PROP. OPEN PIPE END
OP	PIPE OUTFALL
PO	POND OUTFALL STRUCTURE
PR	PROPOSED
RCBC	REINFORCED-CONCRETE BOX CULVERT
RCP	REINFORCED-CONCRETE PIPE
RO	ROCKLAND ROAD
SB	SOUTHBOUND
SLP	SLIP-LINE PIPE
STB	STORAGE BASIN
SWP	SMOOTH-WALL PIPE
WB	WESTBOUND
XL	CROSSLINE

Table 3.1: Common Abbreviations

The prefix “BE-” was assigned to all drainage elements associated with the Berryhill Road corridor. Likewise, the prefix “BT-“ was assigned to all elements associated with the Burning Tree Drive corridor. In general, the first two digits in the numeral portion of a drainage elements identifier correspond to the drainage plan sheet number on which that element appears. For instance, proposed catch basin BE-CB-0641 would be visible on Berryhill Road Construction Plan Sheet D06.

3.3 Rainfall Depths (SCS Method)

Rainfall depths used in determining peak discharges through the SCS Method were obtained from the South Carolina DHEC Storm Water Management BMP Handbook. The 24-hour storm event rainfall depths for Lexington County are shown below.

Return Period (years)	Depth (inches)
1	3.1
2	3.6
5	4.5
10	5.3
25	6.4
50	7.3
100	8.3

Table 3.2: 24-Hour Rainfall Depths for Lexington County

3.4 Rainfall Intensity Values (Rational Method)

Coefficients used in the rational method for calculating rainfall intensity values (in/hr) were provided by SCDOT. The coefficients for Lexington County are shown below.

Frequency (years)	a	b	c
2	67.7200	11.5600	0.8440
5	56.5100	9.9040	0.7596
10	50.4500	8.5610	0.7011
25	42.0500	6.6030	0.6240
50	38.1900	5.4160	0.5756
100	34.3300	4.1110	0.5277

Table 3.3: Rainfall Intensity Coefficients for Lexington County, SC

The coefficients are utilized in the following equation to calculate rainfall intensities.

Rainfall intensity equation: $i = \frac{a}{(b+tc)^c}$

3.5 Inlet Spread & Closed Drainage System Analysis

Closed storm drainage systems were analyzed using Geopak drainage software. Systems draining areas less than 40 acres were designed using the 10-year storm event. Systems draining areas greater than 40 acres were designed using the 25-year storm event. Geopak area, link and node calculations are included in Appendix F.

Proposed pipes were designed to have smooth walls, with a minimum grade of 0.3 percent. Some existing pipes will be maintained and connected into the proposed drainage systems where possible. The rational method was used for sizing the closed drainage systems. Proposed pipes were sized to have a maximum 94% flow depth for the 10-year storm event, where possible. Closed drainage system profiles showing the design hydraulic grade lines can be found in Appendix G.

Pipe material shall be selected from those listed in the Engineering Directive Memorandum 24. All smooth-wall pipe culverts will either be reinforced concrete pipe (RCP), high-density polyethylene (HDPE),

or spiral-ribbed aluminum pipe (SRAP). Additionally, corrugated pipe culverts may be used and made of corrugated aluminum alloy pipe (CAAP). A minimum pipe size of 18 inches will be used at all locations for this project. Any pipes to be abandoned will be filled with flowable fill or removed as labeled on the construction plans.

Trenchless installation is required for all pipes under existing interstate travel lanes.

The proposed storm drainage systems will include a variety of structures and conveyance methods. SCDOT Catch Basin Types 1, 16, 17 & 18 are proposed at standard curb sections to collect runoff. 24”x36” Drop Inlets, Type 112 Drop Inlets, Type 9 Catch Basins, concrete flumes & ditches are proposed in various areas to collect both on-site and offsite stormwater runoff. The proposed layout meets gutter spread requirements (see Appendix I for Gutter Spread Calculations).

3.6 Open Channel Analysis

Open channels throughout the project were designed in accordance with the *SCDOT Requirements for Hydraulic Design Studies* (2009). The ditches were designed for stability and for flow depth with the 10-year storm event for areas less than 40 acres and with the 25-year storm event for areas greater than 40 acres. The rational method was used for the open channel analysis.

Where possible, a freeboard height of 1 foot between the design water surface elevation and the road subgrade was implemented for ditches outside of the travel lanes. Manning’s “n” values were iterated by designing for Vegetative Retardant Class C linings. In cases where a Vegetative Class C lining would not withstand the design shear stress, an alternative lining was selected. The open channels that require alternative channel lining will be indicated on the erosion control data sheet (ECDS) to be included in the plans (Appendices B & C). Channels with steeper slopes that require more than a vegetative lining for stability will be lined with turf reinforcement matting or armored with riprap to minimize the occurrence of erosion. The location and quantity of riprap are shown in the plans.

Open channel calculations can be found in Appendix H.

3.7 Bridge Deck Drainage

There are currently two new bridges over Stoop Creek planned for the relocation of Berryhill Road. The northern of the two bridges is just downstream of the crossing of I-26, while the southern of the two is just upstream of the I-20 crossing.

Both proposed bridges are currently designed with very flat grades and / or superelevation transitions. Scuppers have been designed to drain the bridge decks and reduce gutter spread. Flumes are currently proposed on the low end of both bridges. Bridge deck drainage calculations are included as Appendix L.

3.8 Stoop Creek Floodplain Considerations

A study detailing the modeling of the Stoop Creek floodplain is under development. This study will be detailed in a report bound under separate cover. Among the strategies for mitigating the flooding associated with the Stoop Creek basin are extensive floodplain grading on both the upstream and downstream sides of the St. Andrews Road / I-26 interchange. The proposed grading in the Berryhill Road vicinity is shown on sheet GR1 in the Berryhill Road Plan Set (see Appendix B).

Another mitigation strategy is to remove some of the large pipes which currently connect to the existing double box culvert which carries Stoop Creek under the interchange. As part of the Burning Tree Drive project, a 42" RCP that connects to the box culvert will drain to a large storage basin proposed in the southeastern quadrant of the interchange. This basin, designated BT-STBA-07, will provide relief during large storm events. An additional 60" RCP (which currently drains a large offsite area to the North of Fernandina Road to the box culvert) will be routed to the storage basin as part of the construction of Phase 3E. The outflow pipes from the storage basin have been designed to consider the future flows from the 60" RCP. The grading associated with this basin can be seen on Sheet GR3 of the Burning Tree Drive Plan Set (see Appendix C).

3.9 Pre-Vs-Post-Construction Analysis

As part of this report, 4 distinct analysis points were chosen for a Pre-Construction Versus Post-Construction Flow Analysis.

Analysis Point 39.1 (AP-39.1) is located immediately upstream of the 60" CMP outfall into Stoop Creek from the existing 48" closed system crossing Berryhill Road at approximate Station 313+80. The contributing basin includes a large and moderately-developed offsite area to the Northeast of Burning Tree Drive, an existing commercial development to the Southwest of Berryhill Road, and portions of those two frontage roads as well as of I-26. Runoff in this basin generally flows to the Southwest, crossing beneath I-26 through a 42" RCP and eventually outfalling into Stoop Creek.

Construction of Phase 3A will include the installation of a new 54" cross-line pipe (designated XL-02) beneath I-26, to replace the existing cross-line. This pipe will connect to the existing upstream system to the Northeast of Burning Tree Drive. Drainage patterns will remain mostly unchanged, although the downstream end of the existing closed system will be replaced with a winding outfall ditch beyond the relocated Berryhill Road, and this ditch will connect to Stoop Creek. Also, portions of Berryhill Road which previously drained to the basin to the East (see Analysis Point 39.6 section below) will now be routed into a new closed system which will drain back to the West and outfall into the new ditch.

Estimated peak flows at AP-39.1 for both Pre-Construction and Post-Construction conditions are listed in the tables below:

Analysis Point 39.1

Pre-Construction Conditions

Watershed or subarea T_c or T_t, Total = **106** **min**

Intensity & Discharge Calculation

Q = CIAC_f (Rational Equation)
Intensity (i) = a/(b+tc)^c (in/hr)

A = Drainage Area (Acres)	82.65
Composite Rational C Value	0.73

Event	a	b	c	i (in/hr)	C_f	Q (cfs)
2-year	67.7200	11.5600	0.8440	1.21	1.00	73.11
5-year	56.5100	9.9040	0.7596	1.53	1.00	92.22
10-year	50.4500	8.5610	0.7011	1.82	1.00	109.61
25-year	42.0500	6.6030	0.6240	2.21	1.10	146.41
50-year	38.1900	5.4160	0.5756	2.53	1.20	183.43
100-year	34.3300	4.1110	0.5277	2.87	1.25	216.61

Post-Construction Conditions

Watershed or subarea T_c or T_t, Total = **108** **min**

Intensity & Discharge Calculation

Q = CIAC_f (Rational Equation)
Intensity (i) = a/(b+tc)^c (in/hr)

A = Drainage Area (Acres)	80.68
Composite Rational C Value	0.70

Event	a	b	c	i (in/hr)	C_f	Q (cfs)
2-year	67.7200	11.5600	0.8440	1.19	1.00	67.47
5-year	56.5100	9.9040	0.7596	1.51	1.00	85.20
10-year	50.4500	8.5610	0.7011	1.79	1.00	101.36
25-year	42.0500	6.6030	0.6240	2.18	1.10	135.55
50-year	38.1900	5.4160	0.5756	2.51	1.20	169.95
100-year	34.3300	4.1110	0.5277	2.84	1.25	200.84

Runoff reduction due to reduced impervious surface cover associated with the removal of the existing commercial development to the Southwest of Berryhill Road will offset runoff increases from re-routing Berryhill Road areas and result in a net decrease in peak runoff flows during the interim phase.

XL-02 was sized to include flows from the final, widened Interstate 26 condition (Phase 3E). Design of the drainage routing for Phase 3E could potentially increase the size of the basin contributing to AP-39.1. Construction of Phase 3E will likely result in a localized increase of flows in certain areas. However, these flow increases will likely be negligible in comparison to the flows generated from the total upstream watershed of Stoop Creek, and detention in other areas could potentially mitigate the flow increases.

Analysis Point 39.6 (AP-39.6) is located immediately upstream from the 60" RCP outfall into Stoop Creek from the existing 60" closed system crossing Berryhill Road at approximate Station 319+30. The contributing basin includes a large and moderately-developed offsite area to the Northeast of Burning Tree Drive, an existing residential complex (Waters At Berryhill) to the Southwest of Berryhill Road, and portions of those two frontage roads as well as of I-26. Runoff in this basin generally flows to the Southwest. The offsite area to the Northeast generally drains to an existing large detention basin, which outfalls into a riprap-lined channel, then to a 60" RCP crossing beneath Burning Tree Drive, I-26, Berryhill Road, and the residential complex. This 60" system eventually outfalls into Stoop Creek.

Construction of Phase 3A will include the installation of a new 60" cross-line pipe (designated XL-03) beneath I-26. This pipe will replace the existing cross-line, and tie to the existing 60" system before it passes beyond the proposed new right-of-way. Drainage patterns will remain mostly unchanged, although the upstream end (on the Burning Tree Drive side) will require altering the existing riprap-lined channel and constructing a new headwall. Also, as mentioned in the above section, runoff from portions of Berryhill Road (which previously drained to AP-39.6) will be collected in a new closed curb-inlet system that will now drain westward to AP-39.1.

Estimated peak flows at AP-39.6 for both Pre-Construction and Post-Construction conditions are listed in the tables below:

Analysis Point 39.6

Pre-Construction Conditions **Watershed or subarea T_c or T_t, Total =** 107 **min**

Intensity & Discharge Calculation

Q = $CIAC_f$ (Rational Equation)
Intensity (i) = a/(b+tc)^c (in/hr)
A = Drainage Area (Acres) 83.03
Composite Rational C Value 0.73

Event	a	b	c	i (in/hr)	C_f	Q (cfs)
2-year	67.7200	11.5600	0.8440	1.20	1.00	72.92
5-year	56.5100	9.9040	0.7596	1.52	1.00	92.04
10-year	50.4500	8.5610	0.7011	1.81	1.00	109.44
25-year	42.0500	6.6030	0.6240	2.19	1.10	146.27
50-year	38.1900	5.4160	0.5756	2.52	1.20	183.33
100-year	34.3300	4.1110	0.5277	2.86	1.25	216.57

Post-Construction Conditions **Watershed or subarea T_c or T_t, Total =** **106** **min**

Intensity & Discharge Calculation

Q = $CIAC_f$ (Rational Equation)
Intensity (i) = a/(b+tc)^c (in/hr)

A = Drainage Area (Acres)	83.45
Composite Rational C Value	0.72

Event	a	b	c	i (in/hr)	C_f	Q (cfs)
2-year	67.7200	11.5600	0.8440	1.21	1.00	72.81
5-year	56.5100	9.9040	0.7596	1.53	1.00	91.83
10-year	50.4500	8.5610	0.7011	1.82	1.00	109.15
25-year	42.0500	6.6030	0.6240	2.21	1.10	145.80
50-year	38.1900	5.4160	0.5756	2.53	1.20	182.67
100-year	34.3300	4.1110	0.5277	2.87	1.25	215.71

The re-routing of flows to AP-39.1 and the removal of portions the residential complex (and its parking lots and driveways) due to the relocation of Berryhill Road will result in a slight decrease in peak flows during the interim phase.

XL-03 was sized to include flows from the future (widened) condition of I-26. Design of the drainage routing for Phase 3E should consider the current peak flows to the existing system and avoid an increase in flows beyond the right-of-way.

Analysis Point 40.7 (AP-40.7) is located at the outfall of the existing 24” RCP in the Eastbound shoulder of Fairway Lane. The contributing basin includes portions of Burning Tree Drive, Berryhill Road, Fairway Lane, and the Western portion of the existing I-26 / I-20 cloverleaf interchange. Runoff in this basin generally flows to the Southwest, crossing the frontage roads and the I-26 corridor before collecting in a 24” system running parallel with the Fairway Lane shoulder. The outfall ditch of this system drains to Stoop Creek.

Construction of Phase 3A will retain the existing 24” RCP and 18” RCP cross-lines, and a reconstruction of the existing system at the Berryhill / Fairway intersection. The existing runoff discharge is greater than the capacity of the existing downstream 24” RCP closed system. Because of this, a proposed ditch will re-route the 18” RCP (crossing I-26 at approximate Station 329+60) to the East along a roadside ditch adjacent the relocated Berryhill Road. This will still route these flows to Stoop Creek but will give relief to the existing Fairway system. The existing drainage patterns on the Burning Tree Drive side of the basin will remain mostly unchanged.

Estimated peak flows at AP-40.7 for both Pre-Construction and Post-Construction conditions are listed in the tables below:

Analysis Point 40.7

Pre-Construction Conditions **Watershed or subarea T_c or T_t, Total =** **32** **min**

Intensity & Discharge Calculation

Q = $CIAC_f$ (Rational Equation)
Intensity (i) = a/(b+tc)^c (in/hr)

A = Drainage Area (Acres)	16.34
Composite Rational C Value	0.56

Event	a	b	c	i (in/hr)	C_f	Q (cfs)
2-year	67.7200	11.5600	0.8440	2.80	1.00	25.63
5-year	56.5100	9.9040	0.7596	3.31	1.00	30.29
10-year	50.4500	8.5610	0.7011	3.76	1.00	34.42
25-year	42.0500	6.6030	0.6240	4.30	1.10	43.31
50-year	38.1900	5.4160	0.5756	4.75	1.20	52.13
100-year	34.3300	4.1110	0.5277	5.17	1.25	59.16

Post-Construction Conditions **Watershed or subarea T_c or T_t, Total =** **32** **min**

Intensity & Discharge Calculation

Q = $CIAC_f$ (Rational Equation)
Intensity (i) = a/(b+tc)^c (in/hr)

A = Drainage Area (Acres)	7.66
Composite Rational C Value	0.58

Event	a	b	c	i (in/hr)	C_f	Q (cfs)
2-year	67.7200	11.5600	0.8440	2.80	1.00	12.44
5-year	56.5100	9.9040	0.7596	3.31	1.00	14.71
10-year	50.4500	8.5610	0.7011	3.76	1.00	16.71
25-year	42.0500	6.6030	0.6240	4.30	1.10	21.03
50-year	38.1900	5.4160	0.5756	4.75	1.20	25.31
100-year	34.3300	4.1110	0.5277	5.17	1.25	28.73

The re-routing of flows will result in a decrease in peak flows during the interim phase. The interior of the Phase 3E turbine interchange will provide large areas for potential proposed detention ponds. Portions of this basin could potentially be routed into said ponds.

Analysis Point 51.5 (AP-51.5) is located at the outfall of the existing 30" CPP crossing beneath Rockland Road at approximate Station 9137+80. The contributing basin includes a large, mostly-developed residential area and the Synergy Business Park to the Northwest of Berryhill Road. It also includes portions of Berryhill Road, Interstate 20, Rockland Road, the adjacent hotel parking lot along Rockland Road, and

a large undeveloped area between Rockland Road and I-20. Runoff in this basin generally flows to the Southeast, crossing the frontage roads and the I-20 corridor through a 48" RCP. This 48" RCP drains through the existing undeveloped area to the existing 30" CPP crossing Rockland Road. Beyond AP-51.5, the basin drains to Stoop Creek.

Construction of Phase 3A will retain the existing 48" RCP crossline under I-20, and supplement it with another 48" cross-line pipe (designated XL-05). The existing undeveloped area between Rockland Road and I-20 will be converted into a large detention basin (designated RO-DB-21) to mitigate the anticipated flow increases from Phase 3E and to avoid overtopping of Rockland Road during the 100-year storm event. See Section 3.10 for discussion of RO-DB-21.

See Appendix K for HEC-HMS calculations, which include the Pre-Vs-Post analysis for AP-51.5. Estimated peak flows at AP-51.5 are listed in the tables below:

Analysis Point 51.5

Pre-Construction Conditions

Discharge Calculation

Event	Q (cfs)
10-year	99.2
25-year	136.9
50-year	169.9
100-year	206.5

Post-Construction Conditions

Discharge Calculation

Event	Q (cfs)
10-year	43.3
25-year	49.6
50-year	54.3
100-year	59.0

The proposed detention basin will significantly reduce the flows in comparison to the existing condition.

A Pre-Construction Versus Post-Construction Analysis for Stoop Creek through the St. Andrew's interchange was modeled in the HEC-HMS program and is included in the Phase 4 / Phase 5 Report (bound separately). That analysis contains models (existing and proposed) of the Stoop Creek Watershed and assumes Phase 3E conditions for the Post-Construction flows. The models incorporate basins draining to the upstream end of the proposed Berryhill Bridge West crossing of Stoop Creek, including the St. Andrews / Interstate 26 interchange, portions of the relocated Berryhill Road (and its reconstructed intersection with Woodland Hills Drive), and those areas proposed to drain to the Burning Tree Drive Storage Basin (BT-STBA-07). For construction of Phase 3A, these areas will have a net decrease in peak flows due to the removal of existing impervious surfaces associated with the relocation of the frontage roads.

Other areas of Berryhill Road in Phase 3A drain directly to Stoop Creek and will also see a general reduction in peak flows for the interim phase.

3.10 Berryhill Road / Rockland Road Stormwater Detention

The widening of Berryhill Road will impact two areas of existing detention at the Synergy Business Park. The first of these areas is existing detention basin BE-EXDB-14. This basin will be reconstructed by others. Co-ordination between the design teams will be important, as this basin discharges to the SCDOT ROW.

The second area is located upstream of an existing 48-inch RCP cross-line adjacent to the Winthrop and Santee buildings of the business park. The impacts from the widening will render this area incapable of providing storage during storm events. The cross-line under I-20 will be supplemented with a new 48" RCP to prevent upstream flooding. Both the new and existing cross lines will be routed to proposed detention basin RO-DB-21, located on the opposite side of I-20, adjacent Rockland Road. An additional 30" cross-line pipe is proposed to capture additional future runoff from areas of I-20 to the East of the existing crossing. This detention basin can be seen on Sheet GR2 of the Berryhill Road Plan Set (see Appendix B).

The existing 30-inch CPP downstream of the basin is set at a very flat grade, and this limits the hydraulic capacity of the crossing. The outfall structure of the proposed basin was designed to release flow at rate such that Rockland Road will not overtop during a 100-year storm event. The crossing was analyzed in the HY-8 program to determine the overtopping discharge. That flowrate was determined to be 65.6 cfs. The 100-yr discharge from the pond is 59.0 cfs.

There is potential to reduce the size of the proposed basin through design iterations and / or resetting the existing Rockland crossline to a steeper grade to improve the hydraulic capacity. An emergency spillway is proposed as part of the detention basin, though the 100-year storm flows will be contained within the basin. Pond-sizing (HEC-HMS program) and culvert crossing (HY-8 program) calculations are included as Appendix K.

3.11 Cross-Line Culvert Analysis

There are currently three new cross-line locations to be installed under I-26 that will drain from Burning Tree Drive to Berryhill Road, and two that will drain from Berryhill Road to Rockland Road (to RO-DB-21). These cross-lines are shown in plan and profile view on individual sheets included in the plan sets for both Berryhill Road & Burning Tree Drive (see Appendices B & C).

Contributing flows to these cross-lines were calculated using the rational method, except for cross-line XL-01, which will drain the proposed storage basin BT-STBA-07. Flows to this cross-line were estimated using the HEC-HMS program, modeling the Stoop Creek Basin. The associated HEC-HMS model is detailed in the stormwater report for Carolina Crossroads Phase 4 & 5, bound under separate cover.

The flow estimates for the three open-ended culvert cross-lines are shown below:

NRCS Method Flow Estimation

XL-01

A = Drainage Area (Acres)	178.77
Composite Curve Number	77.6
Time of Concentration (min)	116

Event	Q (cfs)
10-year	132.7
25-year	177.7
50-year	216.4
100-year	258.9

Rational Method Flow Estimation

XL-03

A = Drainage Area (Acres)	71.29
Rational C Value	0.68
Time of Concentration (min)	103

Event	a	b	c	i (in/hr)	Cf	Q (cfs)
10-year	50.4500	8.5610	0.7011	1.85	1.00	89.72
25-year	42.0500	6.6030	0.6240	2.24	1.10	119.63
50-year	38.1900	5.4160	0.5756	2.57	1.20	149.72
100-year	34.3300	4.1110	0.5277	2.91	1.25	176.59

Rational Method Flow Estimation

XL-05

A = Drainage Area (Acres)	90.04
Rational C Value	0.63
Time of Concentration (min)	99

Event	a	b	c	i (in/hr)	Cf	Q (cfs)
10-year	50.4500	8.5610	0.7011	1.90	1.00	106.94
25-year	42.0500	6.6030	0.6240	2.30	1.10	142.25
50-year	38.1900	5.4160	0.5756	2.63	1.20	177.74
100-year	34.3300	4.1110	0.5277	2.97	1.25	209.33

A hydraulic analysis was performed on each of the major drainage crossings based on a maximum 1.2 headwater to depth (HW / D) ratio. HY-8 was used to determine the headwater and tail-water effects. The design flow used for analyzing all cross-line pipes under the interstates (and associated loops and ramps)

was the 50-year peak discharge. See Appendix J for cross-line hydraulic analysis calculations. A summary of the HW/D results is listed below.

50-year Storm Event Headwater to Diameter Ratios

Culvert ID	Diameter (ft)	Q_{50} (cfs)	50-yr HW elev.	Invert Elevation	HW_{50} / D
XL-01	(2x) 5	216.40	205.55	200.75	0.96
XL-03	5	149.72	220.89	215.28	1.12
XL-05	4	177.74	218.56	213.80	1.19

4.0

Sediment & Erosion Control

4.1 Sediment & Erosion Control

Inlet protection is to be provided at all existing and proposed inlets that are impacted by the proposed improvements to trap and prevent sediment from entering closed systems. Type D2 inlet filters will be used on all drop inlets and manholes in sump median ditch locations. Type F Inlet Structure Filters will be used at catch basins located in curb and gutter sections. The Type F filters will be unweighted prior to the placement of pavement base course, and weighted afterwards.

Erosion Control Blanket is proposed at all locations where fill slope heights are greater than 5 feet and where concentrated flow is against the fill.

A single row of silt fence will be placed at the outside of construction limits along the length of the project to prevent sediment from leaving construction areas. A double row of silt fence will be placed where construction is adjacent to wetlands or streams. All erosion control measures are proposed according to SCDOT Standard Drawing Sections 804 and 815. The National Pollutant Discharge Elimination System (NPDES) lines will be shown on the construction plans in a later submittal. The location of the silt fence will be 1 foot offset to the outside of the NPDES line.

To provide slope stabilization, all proposed ditches will be lined with temporary erosion control blanket (Class B). Sediment tubes will be placed in all ditches within the project limits. The Drainage Plans and Erosion Control Data Sheet (See Appendices B & C) will provide details as to locations where the temporary erosion control blanket, sediment tubes, and other BMPs will be installed.

Turf reinforcement mats (TRM) will be used where vegetation alone would not provide adequate stability. TRMs will be used on channels with an estimated design shear stress greater than 1.0 PSF and on slopes of 2H:1V or greater. A lining was selected to stabilize each channel and to meet the requirements for sediment and erosion control.

Rock check dams will be employed in smaller open channels when required to reduce concentrated flow velocities and to trap sediment. Areas requiring rock check dams will be indicated on the ECDS in a later submittal.

Riprap aprons and basins will be used at locations of concentrated runoff to reduce velocities below erosive levels. Riprap is shown on the plan sheets at all proposed pipe outlets for stabilization. Riprap will be used for inlet and outlet slope protection at the open end of each pipe according to the SCDOT standard drawings. Riprap is also used in channel sections with steep grades. Geotextile fabric (Class 2) Type C is proposed beneath all riprap.

During earthwork operations, slopes will be roughened by either tracking, stair-step grading, or grooving. In order to reduce erosion, surface roughening will be performed as soon as possible after vegetation has been removed from the existing slope.

Temporary stabilization shall be applied to portions of the site where construction activities have ceased or where construction will not take place within 14 days. Temporary stabilization shall be achieved using

a fast-germinating grass, straw / hay mulch product as described in SCDOT Specification SC-M-810-4 or rolled erosion control product as described in SCDOT Specification SC-M-815-11.

Permanent stabilization shall be applied within 14 days in portions of the site where final grading is complete. Permanent stabilization shall comply with SCDOT Specification SC-M-810-4.

All access points from paved roads shall include a stabilized construction entrance as detailed in the SCDHEC Storm Water Management BMP Handbook Standard Specifications and Drawings to minimize tracking of mud to public roads.

All areas will be permanently stabilized with pavement, turf, or landscaping.

A

Appendix A:
General Project Maps

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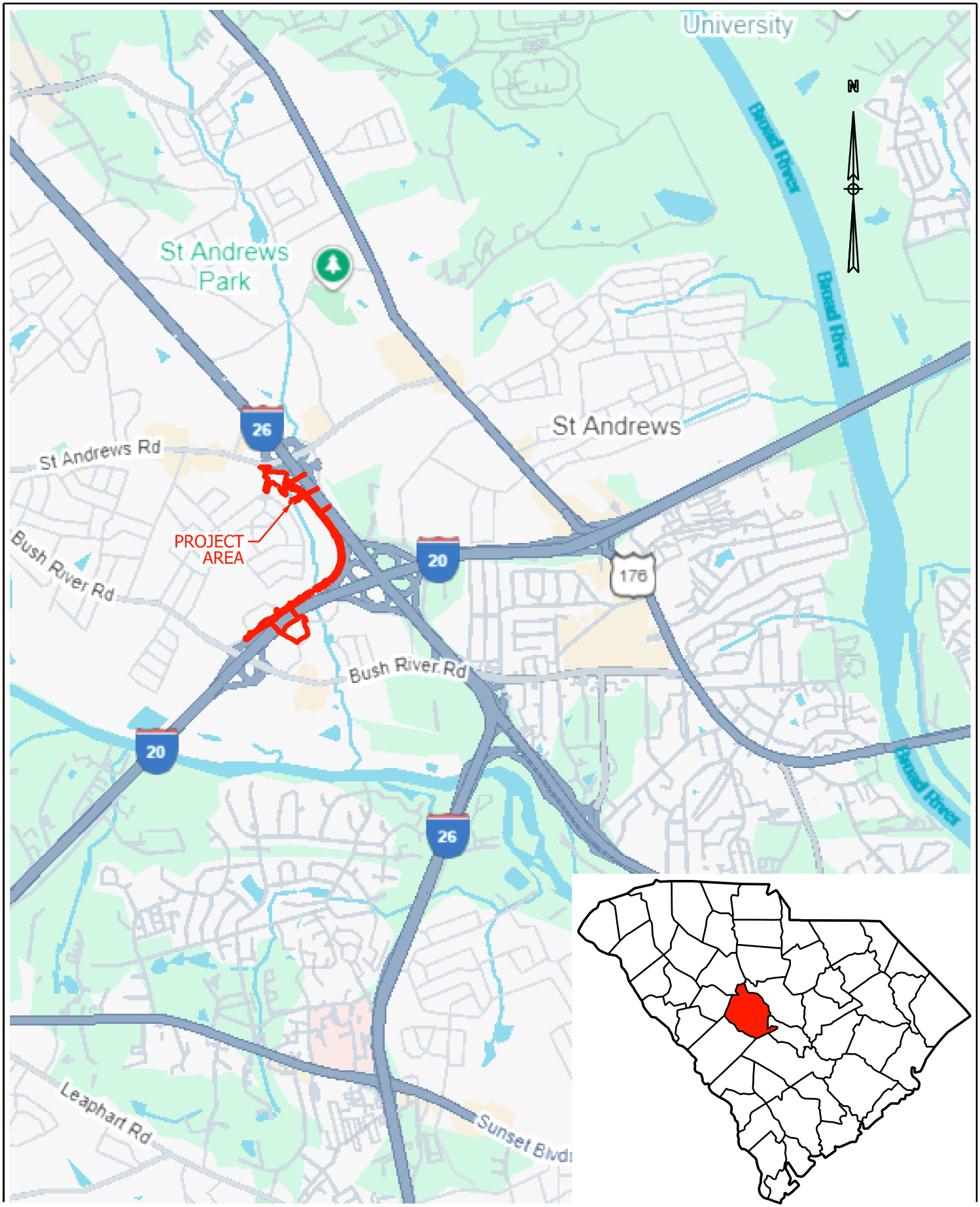

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SOUTH CAROLINA
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CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

BERRYHILL ROAD
VICINITY MAP

0 1,500 3,000

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 3,000'

FIGURE
BE.01



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RICHLAND & LEXINGTON COUNTIES

BERRYHILL ROAD
AERIAL MAP (1 OF 2)

0 125 250

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 250'

FIGURE
BE.02.1



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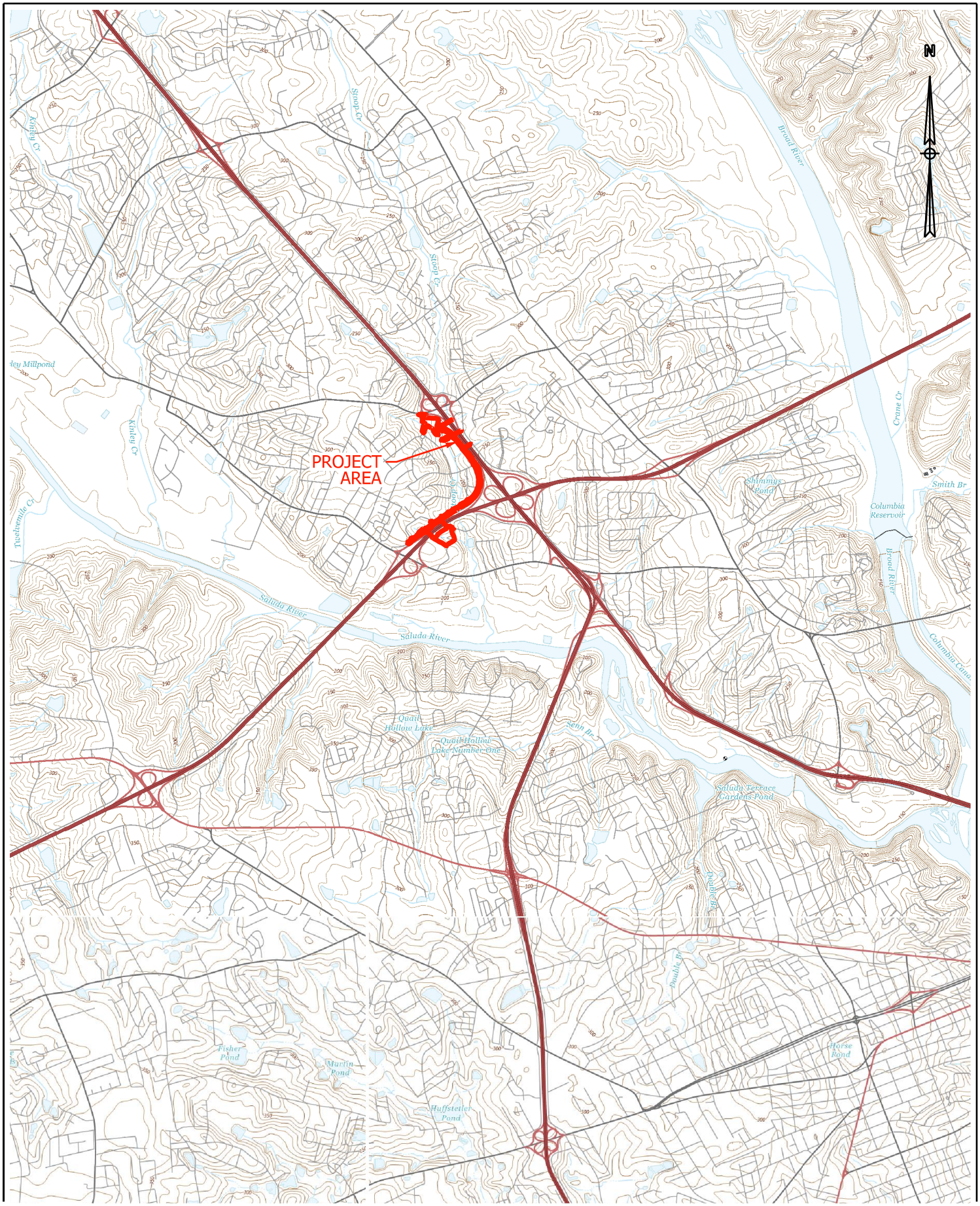
BERRYHILL ROAD
AERIAL MAP (2 OF 2)

0 125 250

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 250'

FIGURE
BE.02.2



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CAROLINA CROSSROADS - P3A

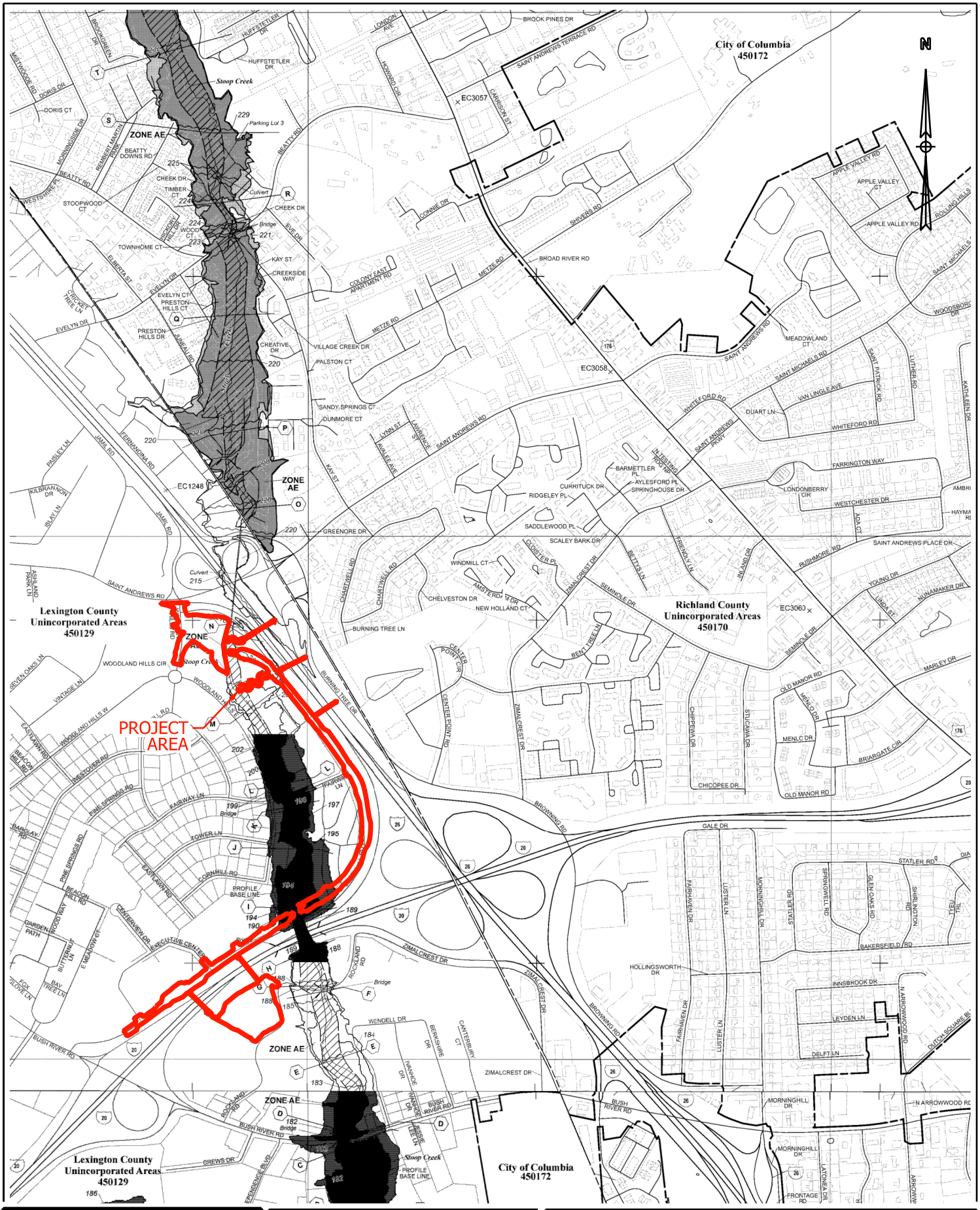
RICHLAND & LEXINGTON COUNTIES

BERRYHILL ROAD
USGS TOPOGRAPHICAL QUAD MAP

0 2,000 4,000

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 4,000'

FIGURE
BE.03



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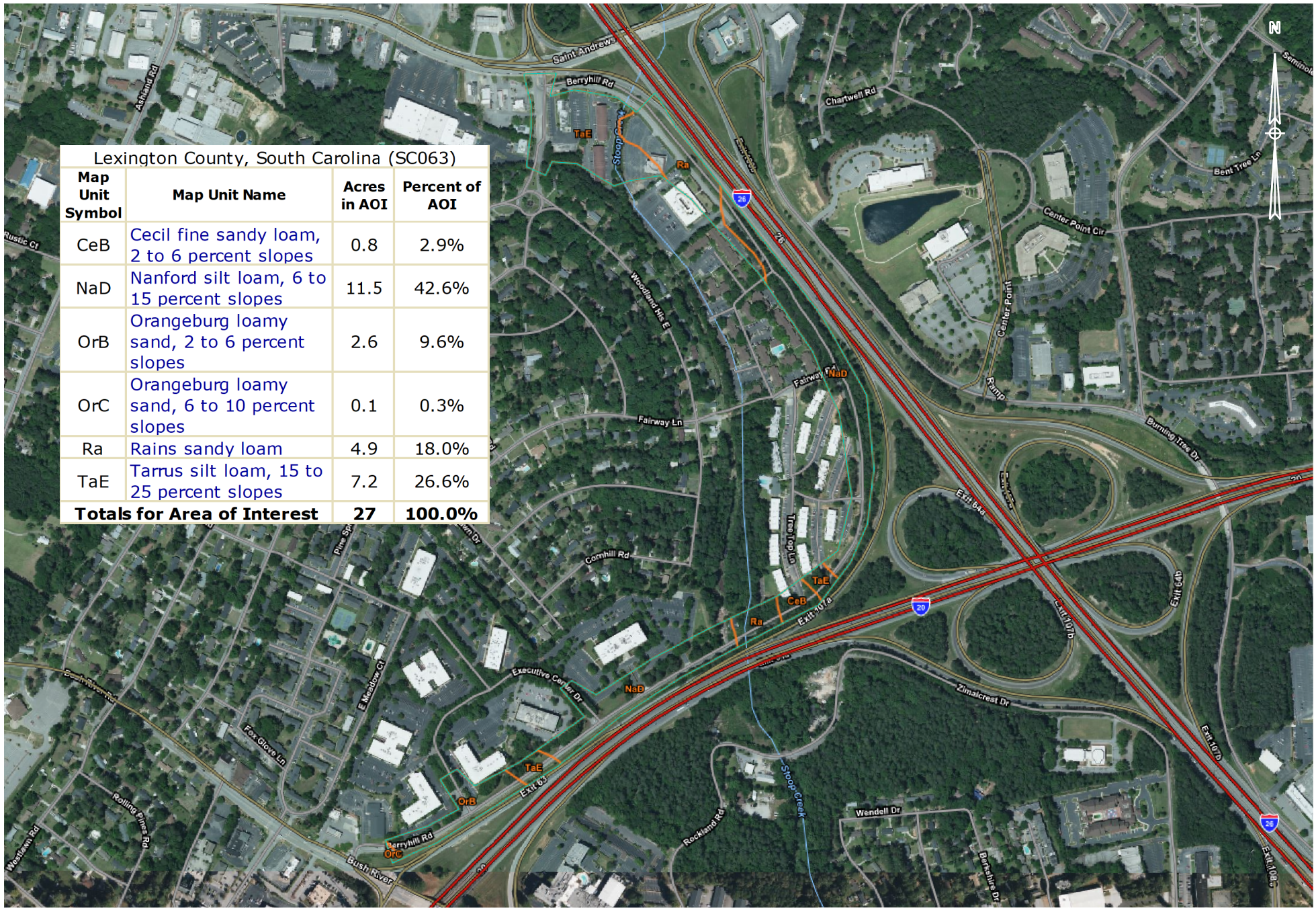
RICHLAND & LEXINGTON COUNTIES

BERRYHILL ROAD
FEMA FLOOD MAP

0 600 1,200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 1,200'

FIGURE
BE.04



Lexington County, South Carolina (SC063)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CeB	Cecil fine sandy loam, 2 to 6 percent slopes	0.8	2.9%
NaD	Nanford silt loam, 6 to 15 percent slopes	11.5	42.6%
OrB	Orangeburg loamy sand, 2 to 6 percent slopes	2.6	9.6%
OrC	Orangeburg loamy sand, 6 to 10 percent slopes	0.1	0.3%
Ra	Rains sandy loam	4.9	18.0%
TaE	Tarrus silt loam, 15 to 25 percent slopes	7.2	26.6%
Totals for Area of Interest		**27**	**100.0%**

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CAROLINA CROSSROADS - P3A

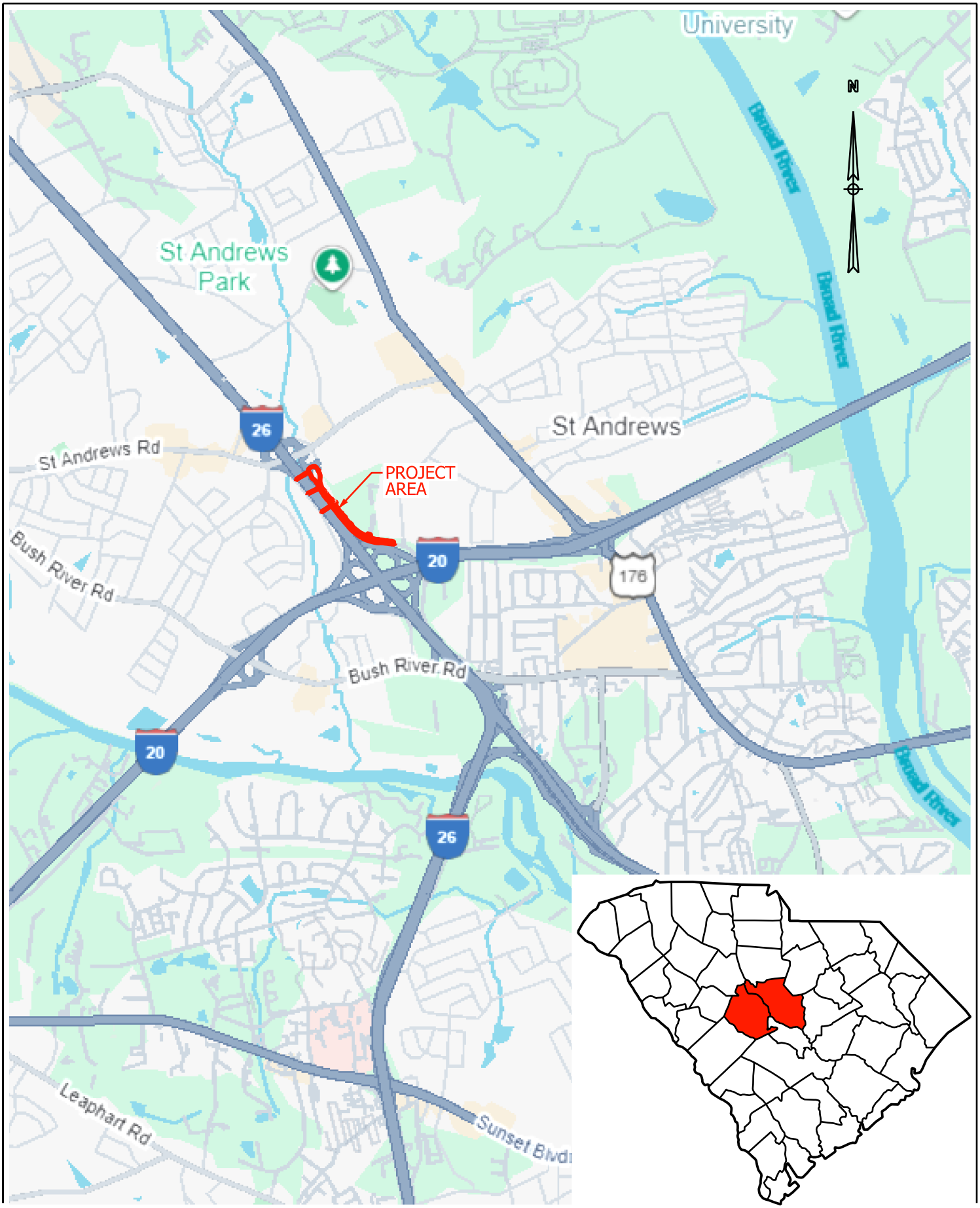
RICHLAND & LEXINGTON COUNTIES

BERRYHILL ROAD
WEB SOIL SURVEY MAP

0 350 700

FILENAME	CCR_drn_exhibits
SCALE	1" = 700'

FIGURE
BE.05



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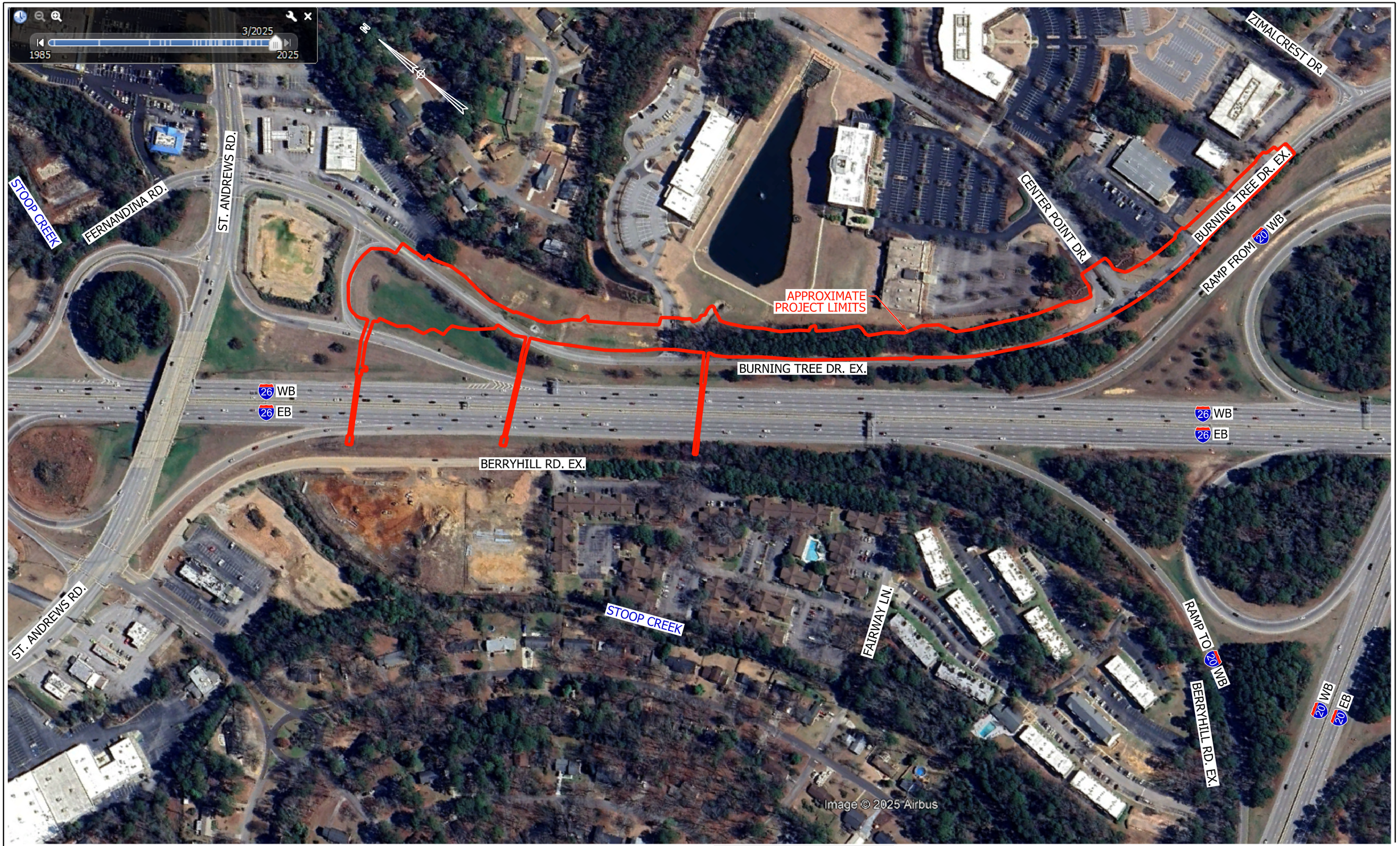
RICHLAND & LEXINGTON COUNTIES

BURNING TREE DR.
VICINITY MAP

0 1,500 3,000

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 3,000'

FIGURE
BT.01



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CAROLINA CROSSROADS - P3A

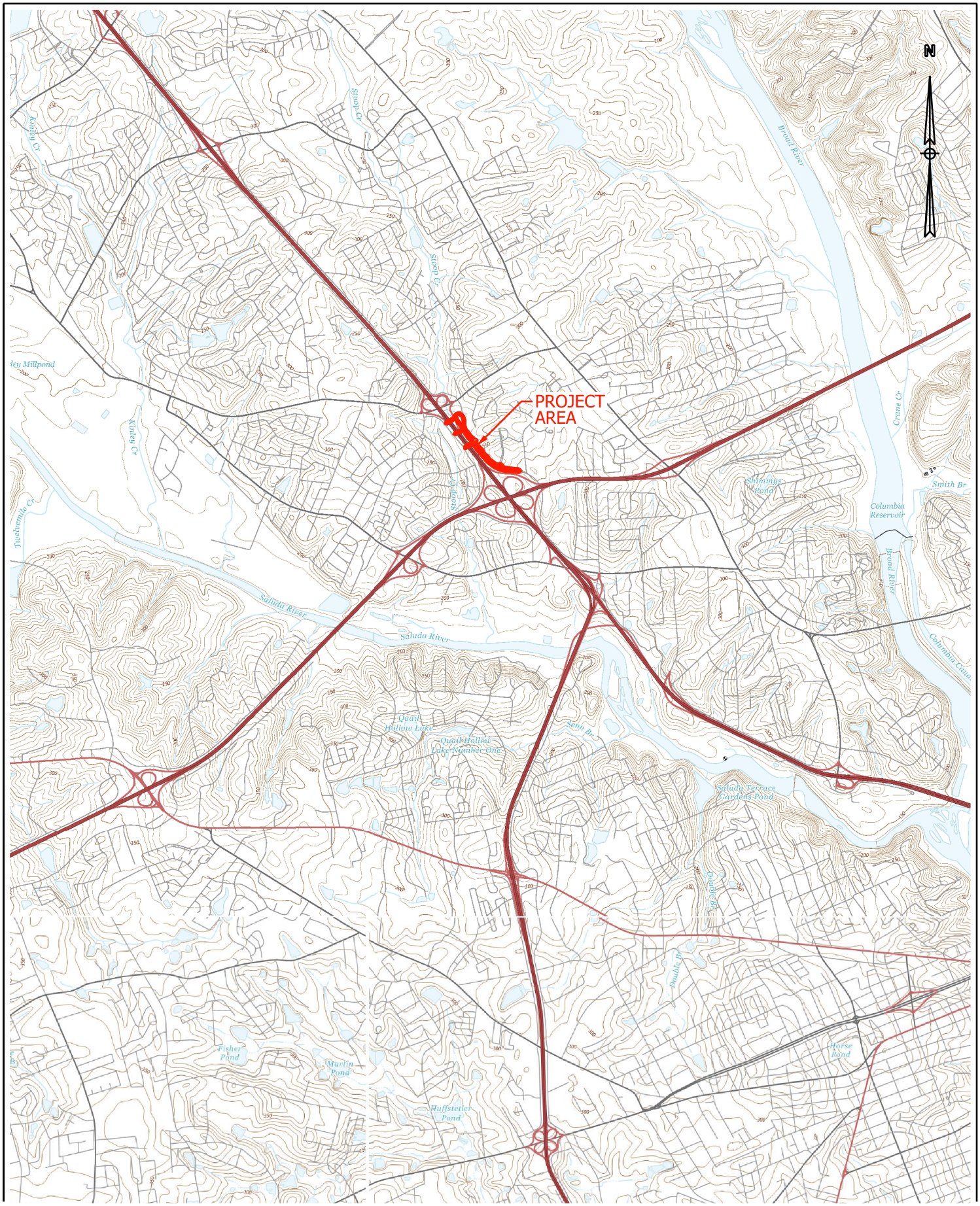
RICHLAND & LEXINGTON COUNTIES

BURNING TREE DRIVE AERIAL MAP

0 125 250

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 250'

FIGURE
BT.02



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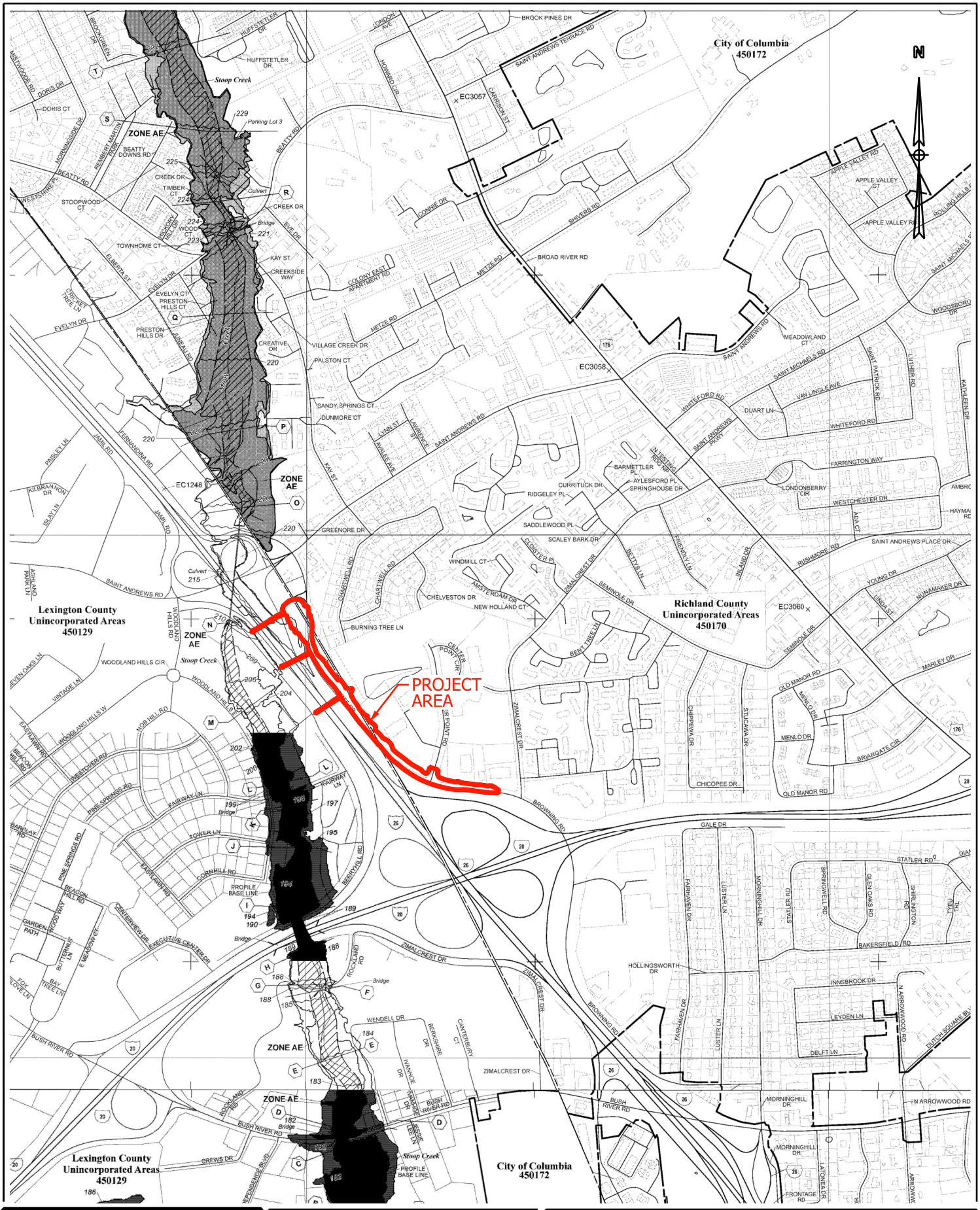
BURNING TREE DRIVE
USGS TOPOGRAPHICAL QUAD MAP

0 2,000 4,000

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 4,000'

FIGURE
BT.03



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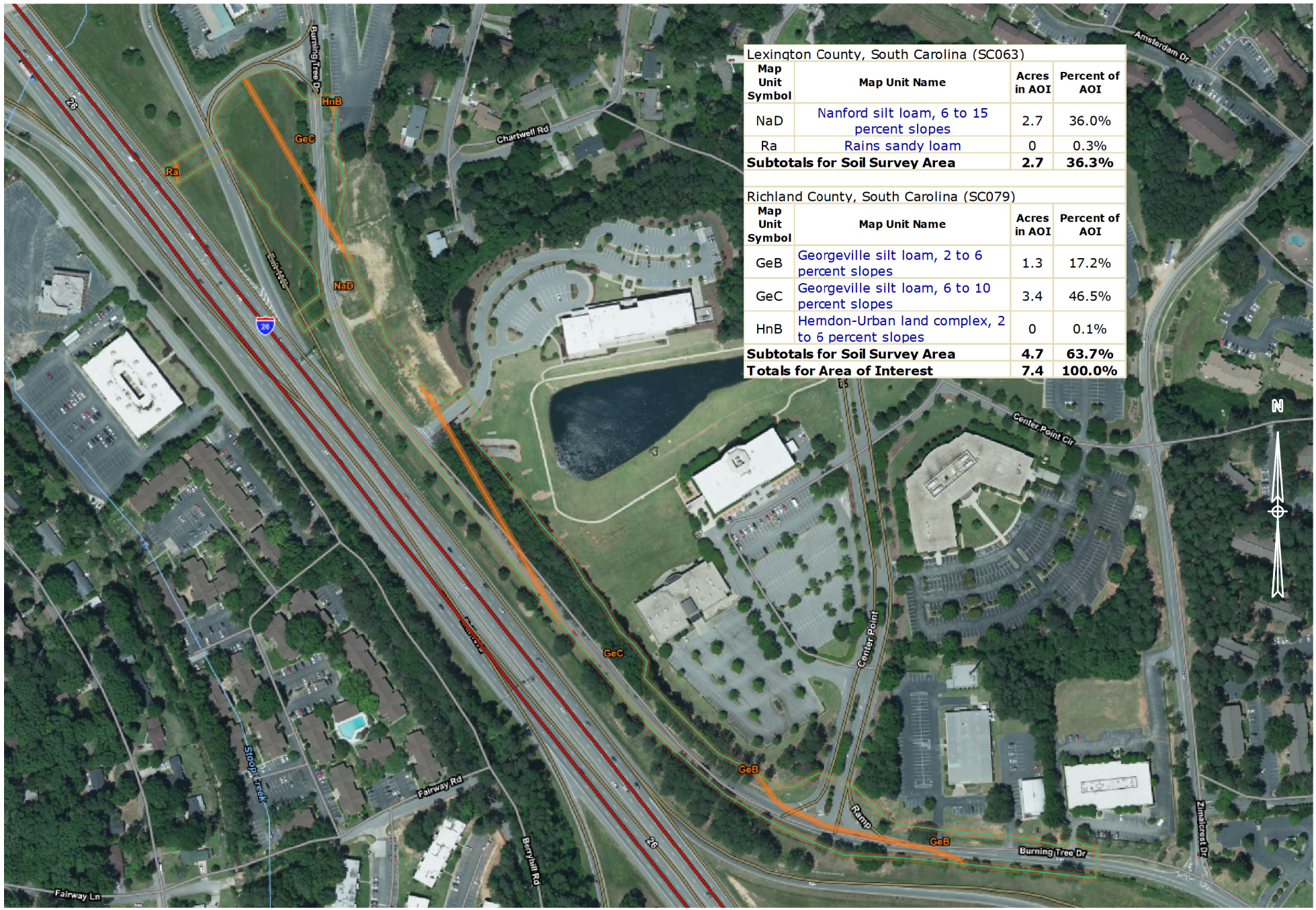
BURNING TREE DRIVE
FEMA FLOOD MAP

0 600 1,200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 1,200'

FIGURE
BT.04



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RICHLAND & LEXINGTON COUNTIES

BURNING TREE DRIVE
WEB SOIL SURVEY MAP

0 150 300

FILENAME	CCR_drn_exhibits
SCALE	1" = 300'

FIGURE
BT.05

B

Appendix B:

Berryhill Road Drainage & Erosion Control Plans

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VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D05

GENERAL DRAINAGE NOTES

1. PIPES TO BE ABANDONED SHALL EITHER BE REMOVED OR FILLED WITH FLOWABLE FILL.

2. REINFORCED-CONCRETE PIPE SHALL BE USED FOR ALL PIPES UNDERNEATH INTERSTATES AND ANY RAMPS WHERE INSTALLATION IS USED UNDER THE EXISTING ROADWAY OR MEDIAN.

3. TRENCHLESS INSTALLATION OF PIPE IS RECOMMENDED FOR EXISTING ROADWAY CROSSINGS FOR ALL NEW PIPE UNDER THE EXISTING INTERSTATE TRAVELED WAY. THE DIAMETER LISTED ON THE PLANS IS REQUIRED FOR HYDRAULIC OPENING OF THE PIPE. LENGTH OF THE TRENCHLESS INSTALLATION IS TO BE DETERMINED BY THE CONTRACTOR. LENGTHS LISTED ON THE PLANS ARE FOR THE ENTIRE LENGTH OF PIPE TO BE INSTALLED.

4. ALL EXISTING MEDIAN AND SIDELINE ASPHALT OR CONCRETE DITCH LININGS WITHIN PROJECT LIMITS ARE TO BE REMOVED AND REPLACED UNLESS NOTED OTHERWISE. FOR ANY THAT ARE TO BE RETAINED, REPAIR IN ACCORDANCE WITH SPECIAL PROVISION 815 EROSION CONTROL.

5. PIPE LENGTHS AS SHOWN IN THE DRAINAGE PLAN SHEETS AND PIPE DATA TABLES INCLUDE END TREATMENTS (BEVELED-END SECTIONS, ETC.) IN THE TOTAL PIPE LENGTH. BEVELED-END SECTIONS SHALL BE INSTALLED IN ACCORDANCE WITH SCDOT STANDARD DRAWING 719-610-00.

6. RIPRAP QUANTITIES SHOWN ON PLAN SHEETS ONLY ACCOUNT FOR OUTLET RIPRAP APRONS, BASINS, AND DITCH LININGS. PIPE PROTECTION AND SLOPE PROTECTION AROUND WING WALLS ARE NOT DETAILED OR QUANTIFIED ON THE PLAN SHEETS.

7. ALL EXISTING PIPE NETWORKS AND CULVERTS WITHIN SCDOT RIGHT OF WAY THAT ARE TO BE RETAINED WILL REQUIRE A VIDEO INSPECTION, IF NOT ALREADY INSPECTED. FOR ALL PIPES OR CULVERTS REQUIRING VIDEO INSPECTION DURING CONSTRUCTION, THE CONTRACTOR SHALL:
   A. LOCATE AND EXCAVATE EACH END OF THE CULVERT AND CLEAN OUT SEDIMENT OR DEBRIS.
   B. PERFORM A FIELD AND VIDEO INSPECTION IN ACCORDANCE WITH SCDOT'S PIPE AND CULVERT INVENTORY AND INSPECTION GUIDELINES (2011).
   C. UPON COMPLETION OF THE VIDEO INSPECTION, PROVIDE PIPE VIDEO AND INSPECTION REPORT TO THE ENGINEER FOR REVIEW. NO CONSTRUCTION ON THE CULVERT SHALL PROCEED UNTIL THE ENGINEER HAS PROVIDED A SIGNED LETTER OR REPORT STATING THE RECOMMENDED ALTERNATIVES TO REPLACEMENT.

8. EXISTING PIPE CULVERT DEFICIENCIES ARE DETAILED ON THE DRAINAGE PLAN SHEETS FOR ALL PIPES REQUIRING REPAIRS. FOR PIPES NOT SPECIFIED AS "LINE EXISTING PIPE" THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF THE CHOSEN METHOD OF REPAIR INVOLVES LINING OR ANY OTHER METHOD OF REPAIR THAT WILL REDUCE THE INSIDE DIAMETER OF THE EXISTING PIPE PRIOR TO REPAIRING.

9. ALL DRAINAGE STRUCTURES OTHER THAN THOSE NOTED IN THE PLANS AS "BLIND" SHALL BE ACCESSIBLE TO THE FINAL SURFACE GRADE BY EITHER MANHOLE OR GRATE ACCESS.

10. BOXES TO BE RETAINED WILL BE REQUIRED TO BE RETROFITTED. DAMAGED BOXES WILL BE REQUIRED TO BE REPLACED.

11. PRECAST MANHOLES AND CATCH BASINS WILL BE USED FOR THE FOLLOWING CONDITIONS:
   A. WHERE THE DEPTH EXCEEDS 12 FEET AS MEASURED FROM RIM TO BOTTOM OF THE BOTTOM SLAB.
   B. WHERE THE FLOW LINE ELEVATION OF THE INLET PIPE IS HIGHER THAN THE SOFFIT OF THE OUTLET PIPE.
   C. AT THE ENGINEER'S DISCRETION.

12. DRIVEWAY PIPES ARE SHOWN IN THE PLANS BUT ARE NOT TABULATED WITHIN THE PIPE TABLES. INVERT LOCATIONS AND ELEVATIONS ARE TO BE SET BASED ON THE FINAL DITCH GRADES AS DETAILED IN THE CROSS SECTIONS.

13. AVOID CONSTRUCTION VEHICLE TRAFFIC OVER INSTALLED PIPE WHERE POSSIBLE. DO NOT DRIVE CONSTRUCTION VEHICLES OVER INSTALLED PIPE DIAMETER LESS THAN THE LARGER OF 3 FEET OR ONE PIPE DIAMETER OF FILL. IF FILL HEIGHT IS SUFFICIENT AND CROSSING IS UNAVOIDABLE, PERIODICALLY CHANGE LOCATION OF EQUIPMENT CROSSING OVER PIPE IN ORDER TO MINIMIZE THE CHANCE OF LATERAL DISPLACEMENT.

14. UPON COMPLETION AND STABILIZATION, ALL TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED AND GRADED FOR POSITIVE DRAINAGE, INCLUDING SEDIMENT DAMS AND TEMPORARY SEDIMENT BASINS. PERMANENT DETENTION OR WATER QUALITY PONDS ARE TO REMAIN.

15. TYPE D2 INLET FILTERS ARE TO BE PLACED AT ALL DROP INLETS AND MANHOLES IN SUMP MEDIAN AND DITCH LOCATIONS. ALL OTHER INLETS ARE TO BE PROTECTED WITH TYPE A INLET FILTERS ONCE INSTALLED. AFTER ROAD BASE COURSE IS PLACED, PLACE WEIGHTED TYPE F INLET TUBES AT ALL INLETS WITHIN THE PAVED AREAS. FOR CURB INLETS, PLACE TYPE F INLET FILTERS ONCE ROAD SURFACE COURSE IS PLACED.

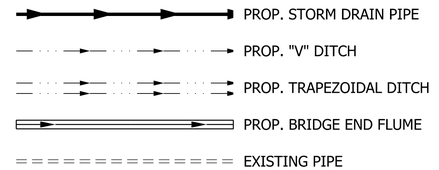
16. THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) LINE IS USED TO DENOTE LAND-DISTURBING ACTIVITIES ONLY WHEN NECESSARY TO GO BEYOND THE CONSTRUCTION LIMITS. SILT FENCE IS TO BE OFFSET 1' TO THE INSIDE OF THE NPDES LOCATION AS SHOWN ON PLANS (PER FIGURE 12.1-B OF THE SCDOT ROADWAY DESIGN MANUAL 2017). IN LOCATIONS WHERE NPDES LINES CROSS EXISTING DITCHES OR STREAM CHANNELS, SILT FENCE IS TO BE INSTALLED UP TO THE CHANNEL BANK BUT IS NOT TO CROSS THE STREAM AND IS NOT TO IMPEDE FLOW.

COMMON ABBREVIATIONS

BCXT	BOX CULVERT EXTENSION
BE	BERRYHILL ROAD
BRDG	BRIDGE
BR	BROWNING ROAD
BS	BUSH RIVER ROAD
BT	BURNING TREE DRIVE
CB	PROP. CATCH BASIN
CC	PROP. CONCRETE COLLAR
DB	DETENTION BASIN
DI	PROP. DROP INLET
EB	EASTBOUND
EC	EX. BOX CULVERT
EP	EX. PIPE
EX	EXISTING
EXCB	EX. CATCH BASIN
EXDB	EX. DETENTION BASIN
EXDI	EX. DROP INLET
EXHW	EX. HEADWALL
EXJ	EX. JUNCTION
EXJB	EX. JUNCTION BOX
EXMH	EX. MANHOLE
EXOEP	EX. OPEN PIPE END

HW	PROP. HEADWALL
JB	PROP. JUNCTION BOX
LF	LINEAR FEET
MCB	MEDIAN CATCH BASIN
MH	PROP. MANHOLE
NB	NORTHBOUND
NC	PROP. BOX CULVERT
NP	PROP. PIPE
OC	OPEN CHANNEL
OEP	PROP. OPEN PIPE END
OP	PIPE OUTFALL
PO	POND OUTFALL STRUCTURE
PR	PROPOSED
RCBC	REINFORCED-CONCRETE BOX CULVERT
RCP	REINFORCED-CONCRETE PIPE
RO	ROCKLAND ROAD
SB	SOUTHBOUND
SLP	SLIP-LINE PIPE
STB	STORAGE BASIN
SWP	SMOOTH-WALL PIPE
WB	WESTBOUND
XL	CROSSLINE

LINE STYLE LEGEND



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SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER No. 26549 — DESTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)

DRAINAGE NOTES

S-32-1551 SHT D-BE-NOTES

PLOT DRIVER: pdf-fullsize202
USER: DHUGHEY
FILE: D-BE-NOTES
DATE: 2026.06.22
PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:38:01 PM

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D06

MATCHLINE SEE SHEET D20

SEE SHEET GR1 FOR GRADING PLAN

MATCHLINE STA 306+00 SEE SHEET D07

MATCHLINE STA 11+50 WOODLAND HILL RELOC. SEE SHEET D19

RAMP FROM ST. ANDREWS RD. TO I-26 EB

RD. S-36 (ST. ANDREWS RD.)

LOOP TO I-26 EB

RAMP FROM I-26 EB

EX. BERRYHILL RD

EX. WOODLAND HILLS RD

S-32-1551 (BERRYHILL RD.) RELOC.

S-32-1302 (WOODLAND HILLS RD.) RELOC.

TOKYO BUFFET

NICK'S GYROS & GRILL SEAFOOD

PROPOSED GRADING

PRES. R/W

NEW R/W

DEDICATED R/W

BEGIN ROADWAY CONSTRUCTION
SURVEY STA 301+77.57
S-32-1551 (BERRYHILL RD.) RELOC.

BEGIN ROADWAY CONSTRUCTION
SURVEY STA 10+26.00
(WOODLAND HILLS RD.) RELOC.

BE-OP-0680 OUTFALL*

BE-NP-0681 PR. 18" SWP

PR. CB T17 (BE-CB-0681)

BE-NP-0682 - PR. 18" SWP

PR. CB T1 (BE-CB-0682)

BE-NP-0683 - PR. 18" SWP

PR. CB T1 (BE-CB-0683)

VERIFY, RETAIN EX. PIPE (BE-EP-0675)

REMOVE EX. DI & STUB PIPE

PR. JB (BE-JB-0675) CONVERT EX. CURB INLET

BE-OC-RT06.2 "V" DITCH SEE XS SHEETS

RETAIN EX. PIPE (BE-EP-0674)

RETAIN EX. PIPE (BE-EP-0673)

PR. JB (BE-JB-0673) CONVERT EX. DROP INLET

PR. DI 24x36 (BE-DI-0674) ADJUST RIM OF EX. DI

RETAIN EX. PIPE (BE-EP-0672)

PR. JB (BE-JB-0672) CONVERT EX. CURB INLET

RETAIN EX. PIPE (BE-EP-0671)

BE-OC-RT07.1 "V" DITCH SEE XS SHEETS

BE-OP-0690 OUTFALL*

PR. CB T17 (BE-CB-0691)

BE-NP-0691 PR. 18" SWP

PR. DI 24x36 (BE-DI-0642)

BE-NP-0641 - PR. 18" SWP

BE-OP-0640 OUTFALL*

PLACE DRIVEWAY PIPE* (BE-DWP-06A) 56 LF - 18" SWP

BE-NP-0642 PR. 18" SWP

PR. CB T16 (BE-CB-0641)

BE-OC-RT06.1 "V" DITCH SEE XS SHEETS

24" RCP

18" RCP

36" RCP PER 324.0 150

CATCH BASIN CURB INLET 6' SUT 228.65

CONCRETE CATCH BASIN FIELD UNABLE TO MEASURE/CORRECT

CONCRETE CURB INLET NE 18 RCP 231.25 E 24" RCP 228.55 W 24" RCP 228.65

CONCRETE CURB INLET 233.54' NE 18 RCP 227.50

SIGN

FOC

WPBS

UNDETERMINED END

NOTE:
1. FOR PIPE DATA TABLE SEE SHEET D23

* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BE-OP-0640	2	B	10	2	C
BE-DWP-06A	2	B	10	2	C
BE-OP-0680	3	B	12	2	C
BE-OP-0690	2	B	10	2	C

HDR ENGINEERING INC. OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA HDR ENGINEERING INC. OF THE CAROLINAS No. C038 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 301+31.08 TO STA. 306+00

S-32-1551 SHT BE-D06

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BE-DRN_SHTS

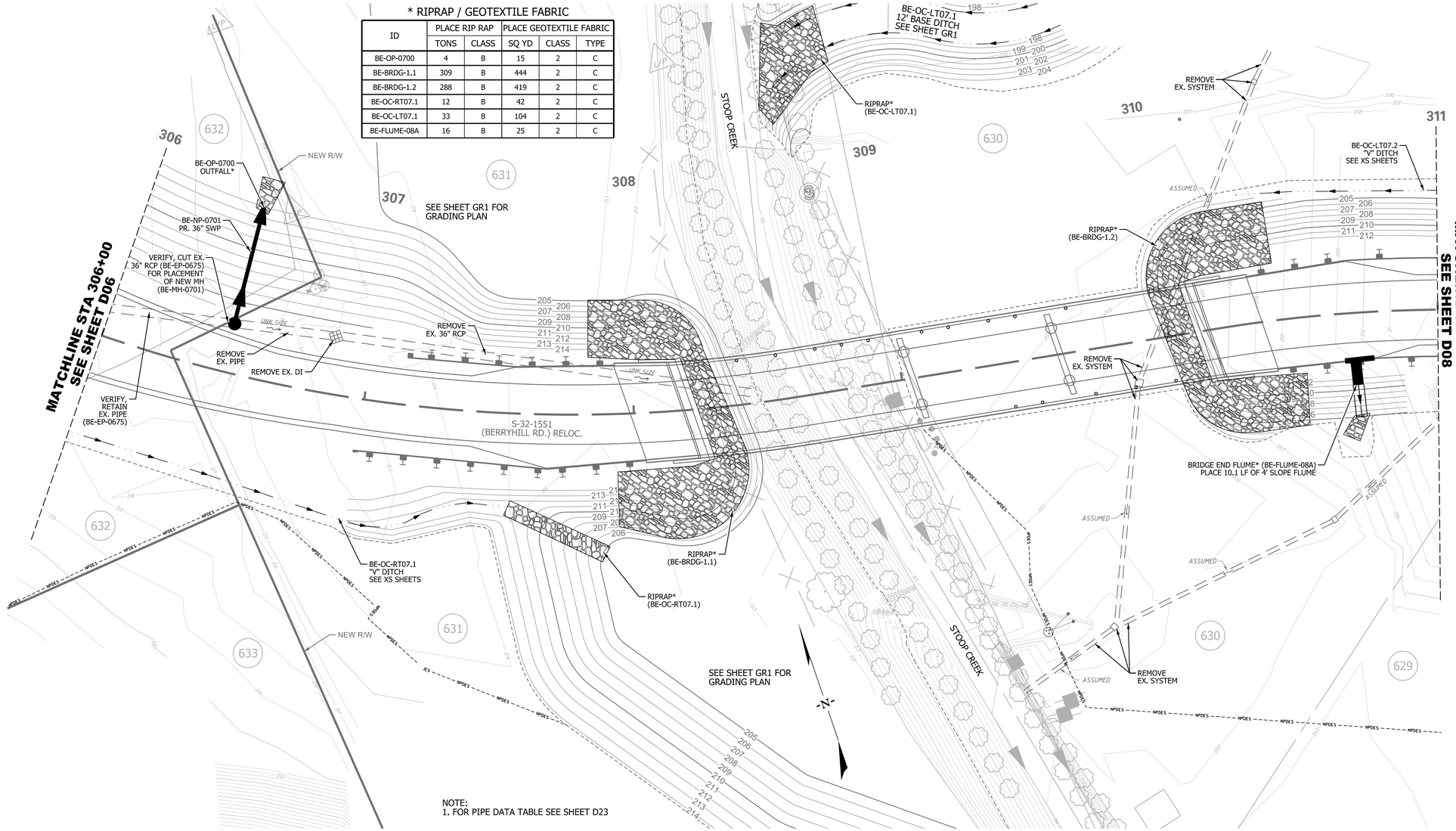
DATE: 2026.06-22
TIME: 12:38:11 PM
PEN TABLE: SCDOT_PenTable_DRAINAGE

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D07

* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BE-OP-0700	4	B	15	2	C
BE-BRDG-1.1	309	B	444	2	C
BE-BRDG-1.2	288	B	419	2	C
BE-OC-RT07.1	12	B	42	2	C
BE-OC-LT07.1	33	B	104	2	C
BE-FLUME-08A	16	B	25	2	C



NOTE:
1. FOR PIPE DATA TABLE SEE SHEET D23

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BE-DRN_SHTS

PEN TABLE: SCDOT_PenTable_DRAINAGE
DATE: 2026.06-22
TIME: 12:38:24 PM

HDR ENGINEERING INC.
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SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS — CERTIFICATE OF AUTHORIZATION — No. C038

SOUTH CAROLINA — REGISTERED PROFESSIONAL ENGINEER — No. 26549 — DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

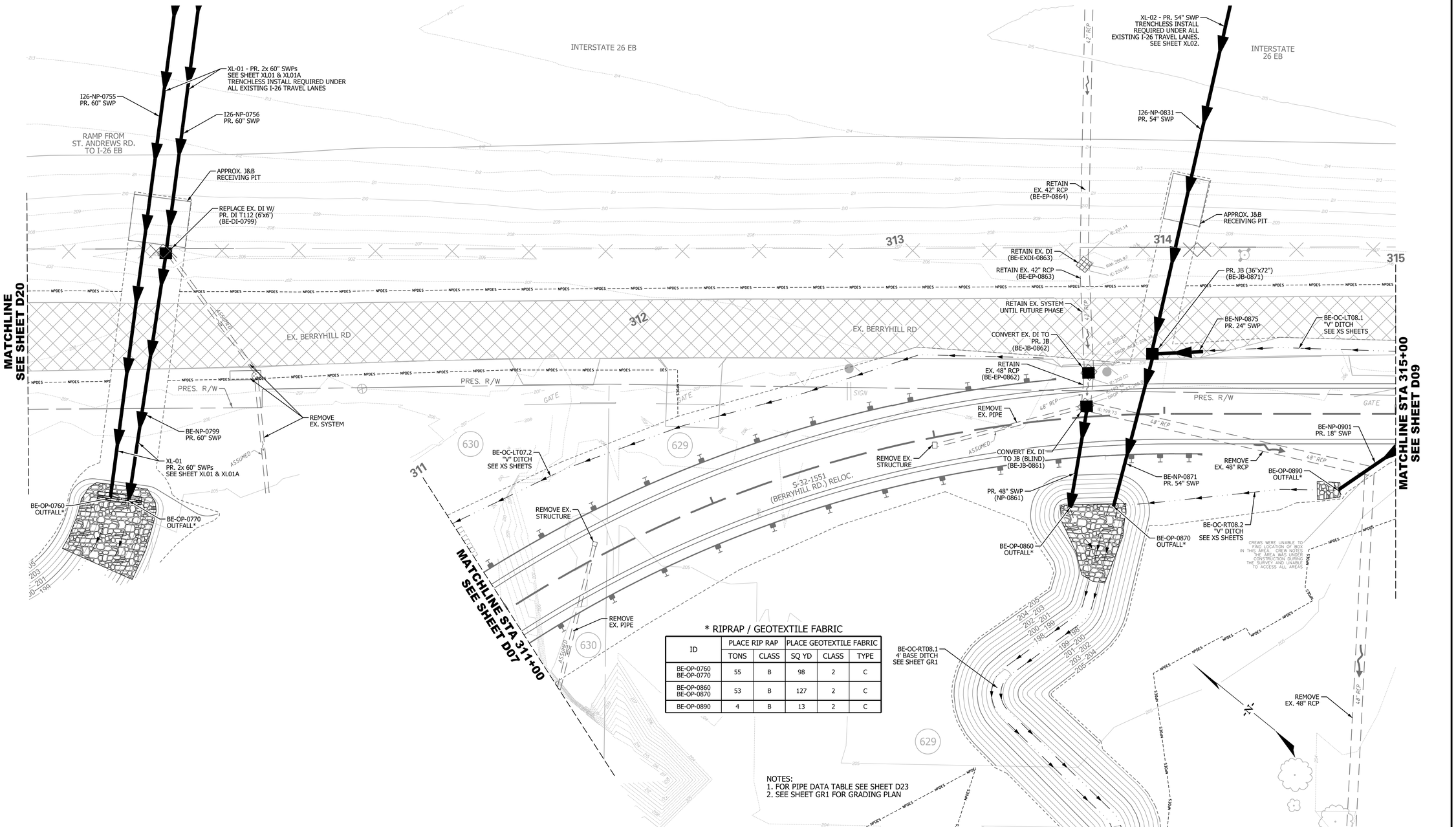
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 306+00 TO STA. 311+00

S-32-1551 SHT BE-D07

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D08



* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BE-OP-0760 BE-OP-0770	55	B	98	2	C
BE-OP-0860 BE-OP-0870	53	B	127	2	C
BE-OP-0890	4	B	13	2	C

NOTES:
1. FOR PIPE DATA TABLE SEE SHEET D23
2. SEE SHEET GR1 FOR GRADING PLAN

HDR ENGINEERING INC. OF THE CAROLINAS
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SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS No. C038 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26549 — JUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 311+00 TO STA. 315+00

S-32-1551 SHT BE-D08

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D:\BE-DRN_SHTS

DATE: 2026.06-22

PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:38:31PM

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D09

INTERSTATE 26 EB

I26-NP-0924
PR. 60" SWP

XL-03 - PR. 60" SWP
TRENCHLESS INSTALL REQUIRED UNDER
ALL EXISTING I-26 TRAVEL LANES
SEE SHEET XL03

RETAIN EX. 60" RCP
(I26-EP-0952)

APPROX. J&B
LAUNCH PIT

RETAIN EX. CB
(BE-EXCB-0951)

PR. JB (72"x72")
(BE-JB-0963)

BE-NP-0963
PR. 60" SWP

BE-NP-0951
PR. 60" SWP

REMOVE EX. 60" RCP

PR. CB T9 (6'x6')
(BE-CB-0962)
W/ WEIR OPEN TO DITCH

BE-OC-LT09.1
"V" DITCH
SEE XS SHEETS

BE-NP-0962
PR. 60" SWP

BE-OC-LT08.1
"V" DITCH
SEE XS SHEETS

EX. BERRYHILL RD

S-32-1551
(BERRYHILL RD.) RELOC.

PRES. R/W

MATCHLINE STA 315+00
SEE SHEET D08

MATCHLINE STA 321+00
SEE SHEET D10

PR. CB T1
(BE-CB-0901)

BE-NP-0921
PR. 18" SWP

PR. CB T1
(BE-CB-0921)

BE-NP-0956
PR. 18" SWP

PR. CB T1
(BE-CB-0956)

BE-NP-0981
PR. 18" SWP

PR. CB T1
(BE-CB-0981)

BE-NP-1008
PR. 18" SWP

CUT EX. 60" RCP FOR PLACEMENT
OF PR. JB (60"x108") (BE-JB-0961)

RETAIN
EX. 60" RCP
(BE-EP-0961)

NEW R/W

18" RCP

8" PVC

6" CLAY

60" RCP

DROP INLET
TOP: 205.92

DROP INLET
TOP: 205.29
(SW 18" RCP
PIPE RECESSED)

DROP INLET
TOP: 206.39
(CROSSPIPE)
BB: 200.05

DROP INLET
TOP: 206.12
BB: 202.54

DROP INLET
TOP: 208.64

DROP INLET
TOP: 207.15
BB: 203.56

DROP INLET
TOP: 207.55

DROP INLET
TOP: 202.61
BOX FILLED WITH DEBRIS

DROP INLET
TOP: 201.19

315 316 317 318 319 320 321

628 629

WATERS AT
BERRYHILL

NOTE:
1. FOR PIPE DATA TABLE SEE SHEET D23

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BE-DRN_SHTS

PEN TABLE: SCDOT_PenTable.DRAINAGE
DATE: 2026.06.22
TIME: 12:38:40 PM

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OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA
HDR ENGINEERING INC.
OF THE CAROLINAS
No. C038
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 26549
DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

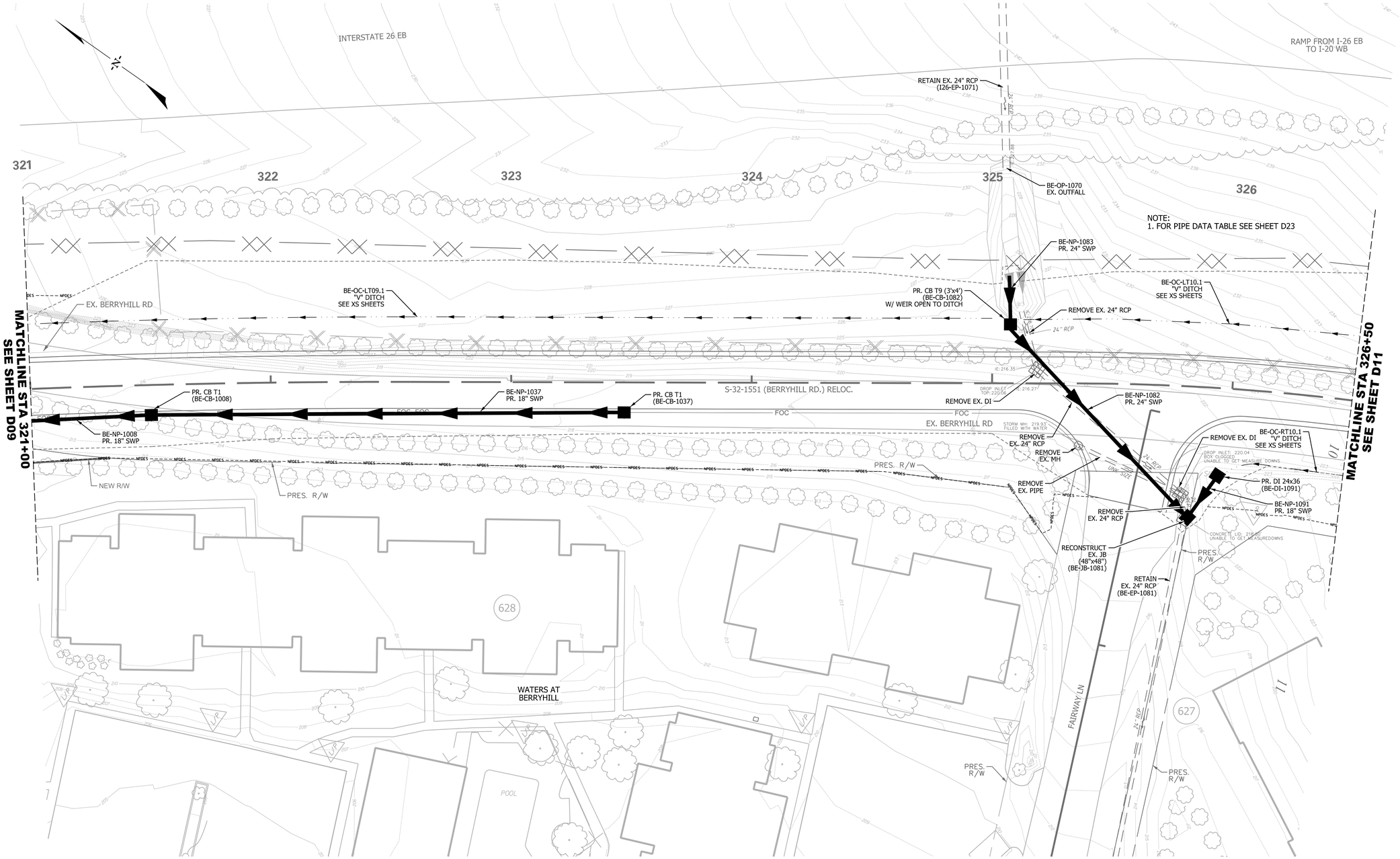
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 315+00 TO STA. 321+00

S-32-1551 SHT BE-D09

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D10



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FILE: D-BE-ORN_SHTS
DATE: 2026_06_22
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TIME: 12:38:50 PM

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OF THE CAROLINAS

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SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS — No. C038 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26549 — JUSTIN P HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

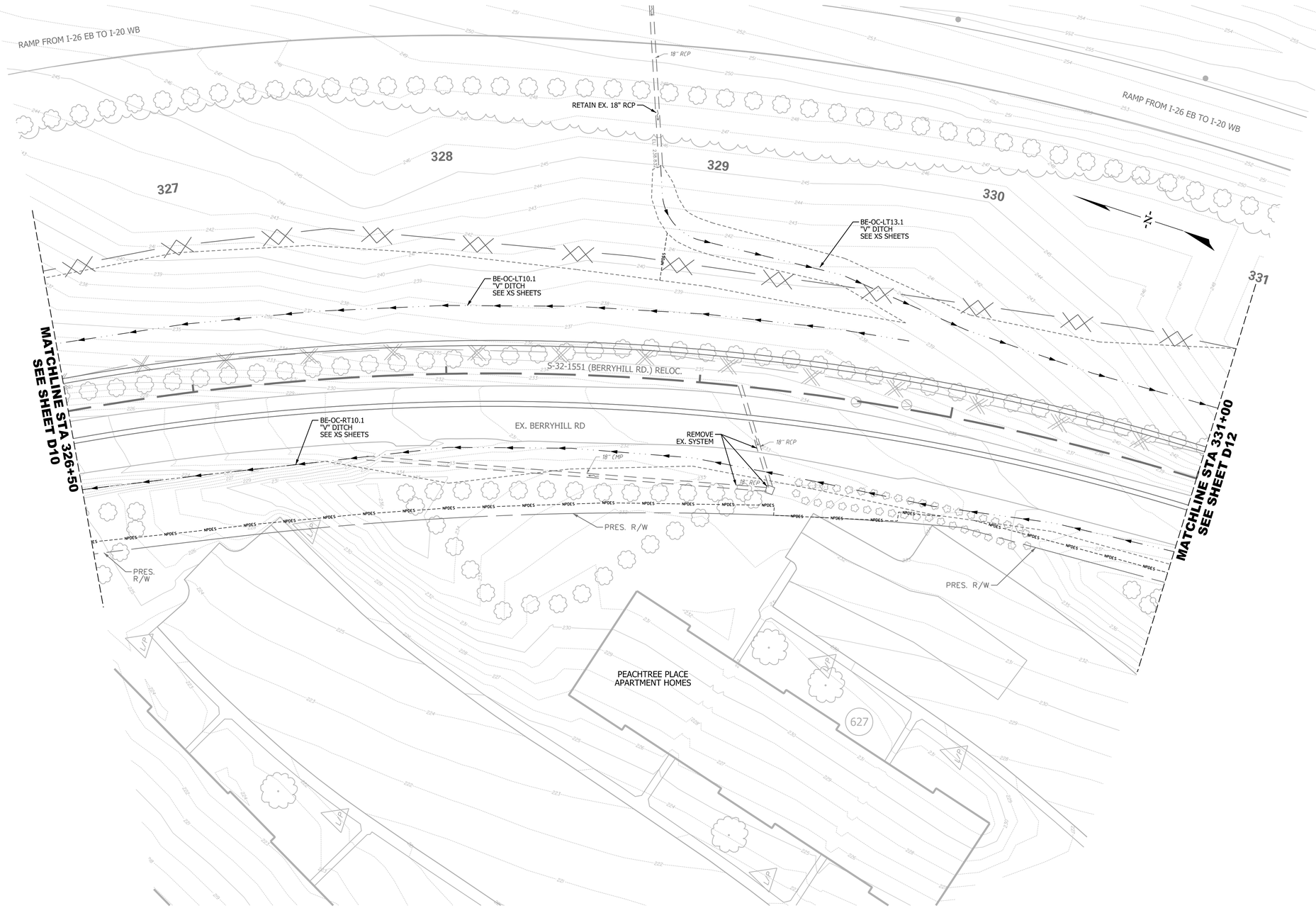
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 321+00 TO STA. 326+50

S-32-1551 SHT BE-D10

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D11



HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C038 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

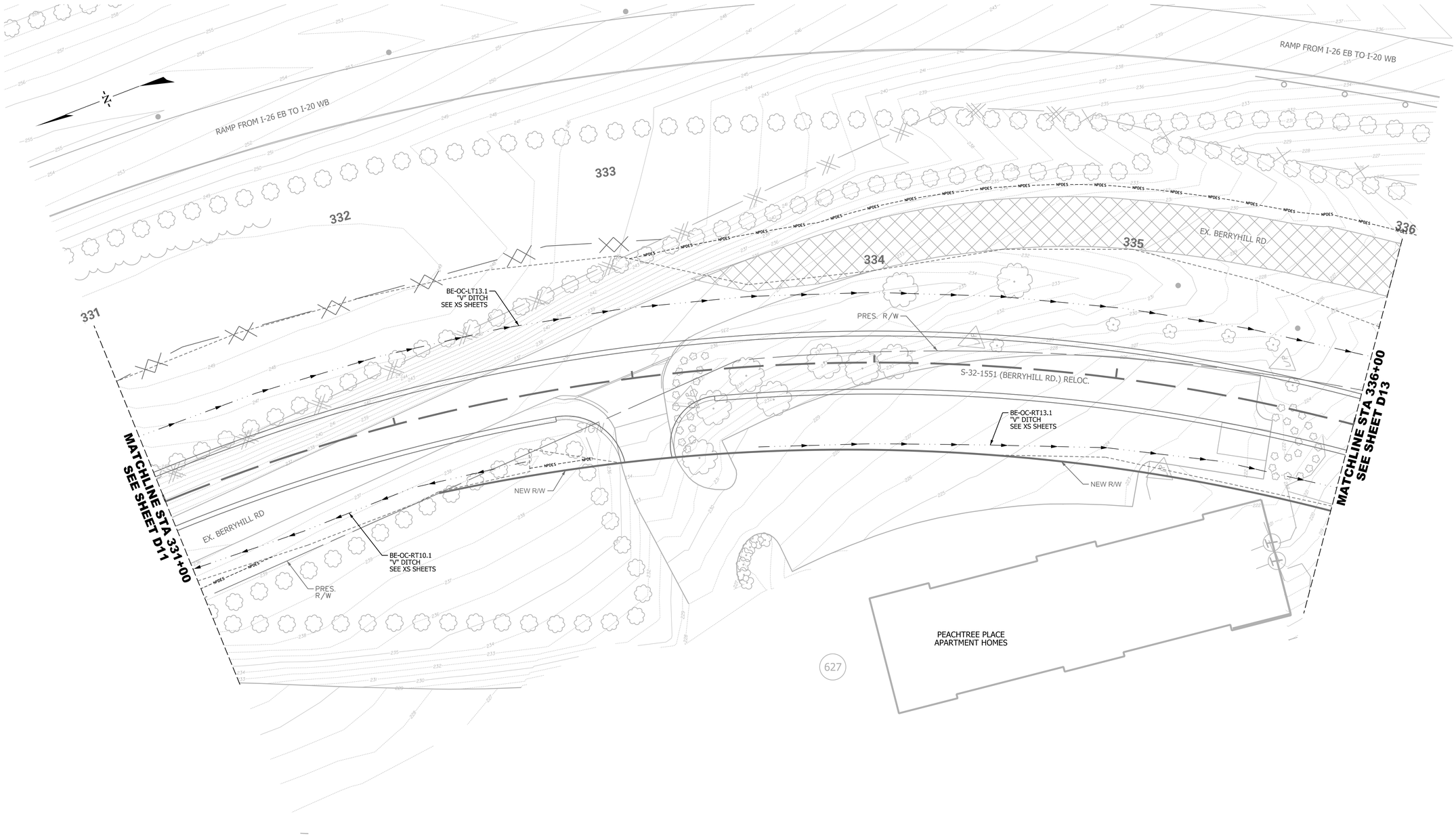
CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 326+50 TO STA. 331+00

S-32-1551 SHT BE-D11

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BE-DRN_SHTS
DATE: 2026.06-22
PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:39:00 PM

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D12



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FILE: D-BE-DRN_SHTS

DATE: 2026.06-22

PEN TABLE: SCDOT_PenTable.DRAINAGE
TIME: 12:39:0 PM

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

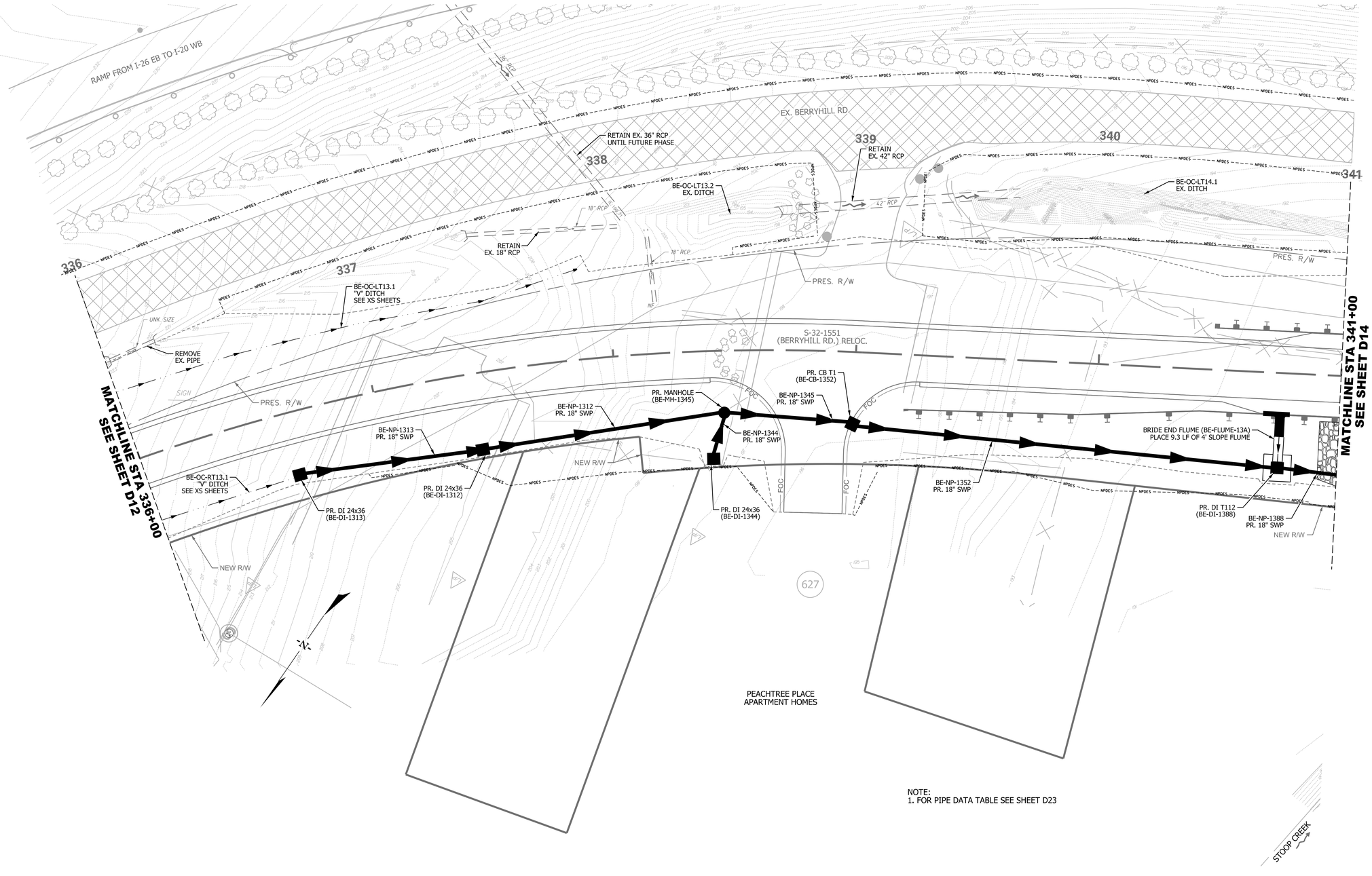
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 331+00 TO STA. 336+00

S-32-1551 SHT BE-D12

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D13



NOTE:
1. FOR PIPE DATA TABLE SEE SHEET D23

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

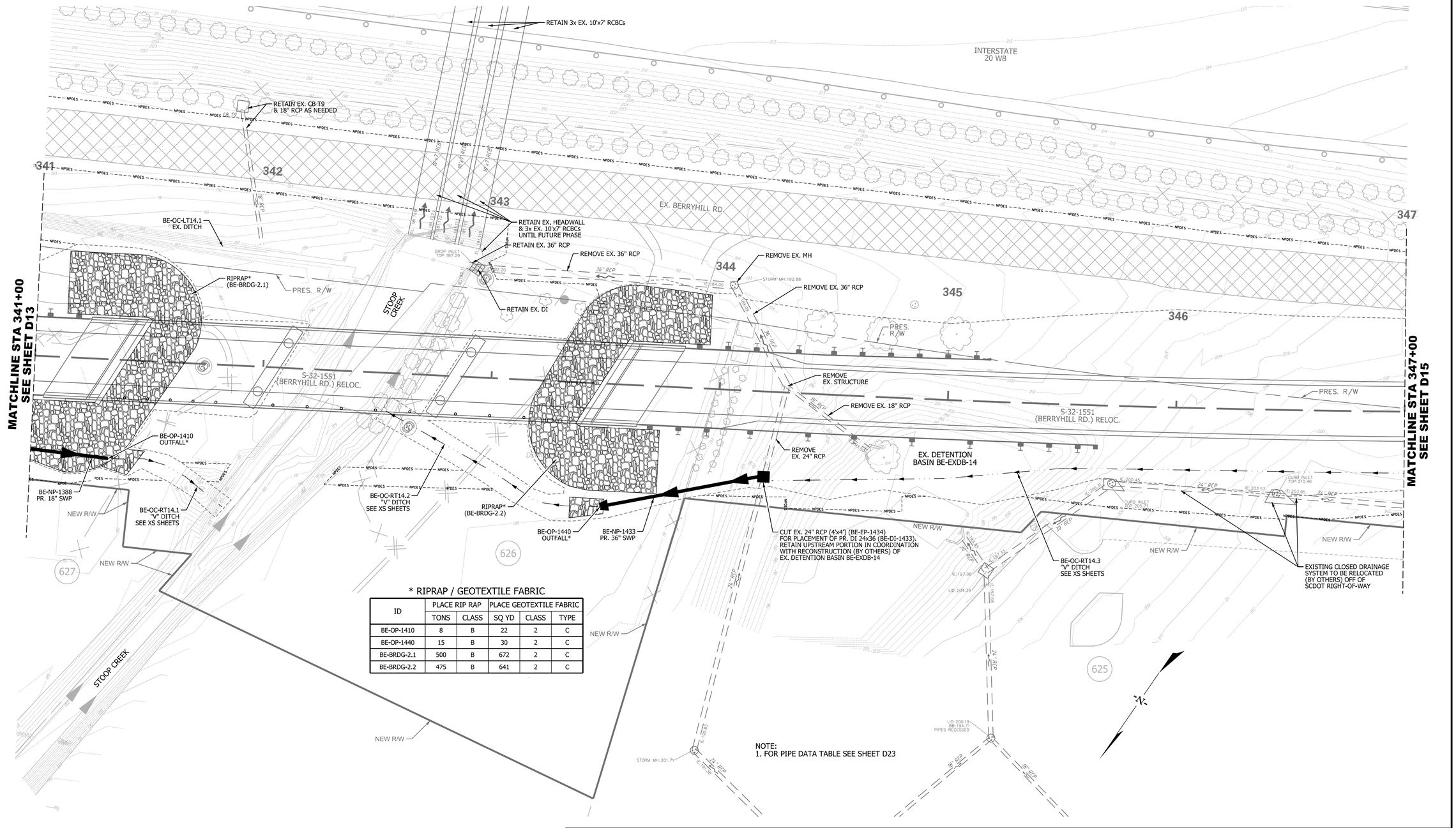
CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 336+00 TO STA. 341+00

S-32-1551 SHT BE-D13

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BE-DRN_SHTS
DATE: 2026.06.22
PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:39:21 PM

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D14



* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BE-OP-1410	8	B	22	2	C
BE-OP-1440	15	B	30	2	C
BE-BRDG-2.1	500	B	672	2	C
BE-BRDG-2.2	475	B	641	2	C

NOTE:
1. FOR PIPE DATA TABLE SEE SHEET D23

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BE-DRN_SHTS
DATE: 2026_06-22
PEN TABLE: SCDOT_PenTable.DRAINAGE
TIME: 12:39:31PM

HDR ENGINEERING INC. OF THE CAROLINAS
1201 MAIN STREET
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HDR ENGINEERING INC. OF THE CAROLINAS — CERTIFICATE OF AUTHORIZATION — No. C038

SOUTH CAROLINA PROFESSIONAL ENGINEER — No. 26549 — DESTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 341+00 TO STA. 347+00

S-32-1551 SHT BE-D14

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D15

MATCHLINE STA 347+00
SEE SHEET D14

MATCHLINE STA 353+00
SEE SHEET D16

18" RCP
36" RCP
WALL
18" RCP
INTERSTATE 20 WB
XL-04 - PR. 30" SWP TRENCHLESS INSTALL REQUIRED UNDER ALL EXISTING I-20 TRAVEL LANES. SEE SHEET XL04
I20-NP-1543 PR. 30" SWP
347
RETAIN EX. SYSTEM UNTIL FUTURE PHASE
BE-OC-LT15.1 EX. DITCH
LID: 204.99' UNABLE TO GET MEASUREDOWNS
APPROX. J&B RECEIVING PIT
PR. CB T9 (BE-CB-1543) W/ WEIR OPEN TO DITCH
DIVERT EX. DITCH TO BE-CB-1543
SIGN
BE-OC-LT15.2 EX. DITCH
353
WW SIDE
REMOVE EX. 18" RCP
EX. BERRYHILL RD
348
349
350
351
352
REMOVE EX. STRUCTURE
LID: 205.94' BOX FILLED DEBRIS
REMOVE EX. CB T9
CB T9
S-32-1551 (BERRYHILL RD.) RELOC.
PR. CB 1T - (BE-CB-1532)
REMOVE EX. SYSTEM
15" RCP
REMOVE EX. 15" RCP
PR. CB T1 (BE-CB-1581)
PR. CB T1 (BE-CB-1582)
BE-NP-1583 PR. 18" SWP
PRES. R/W
BE-OC-RT14.3 "V" DITCH SEE XS SHEETS
BE-NP-1532 - PR. 18" SWP
FOC
CURB INLET TOP: 218.58 BB: 214.31 PIPES RECESSED
PRES. R/W
BE-OP-1580 OUTFALL*
BE-NP-1582 PR. 18" SWP
BE-OC-RT15.2 "V" DITCH SEE XS SHEETS
BE-OP-1530 OUTFALL*
BE-NP-1535 PR. 18" SWP
24" RCP
PR. CB T16 (BE-CB-1535)
BE-NP-1542 PR. 18" SWP
EXISTING CLOSED DRAINAGE SYSTEM TO BE RELOCATED (BY OTHERS) OFF OF SCDOT RIGHT-OF-WAY
BE-OC-RT15.1 "V" DITCH SEE XS SHEETS
BE-NP-1581 PR. 18" SWP
DEDICATED R/W
NEW R/W
101
EXECUTIVE CENTER DR NORTH
623
621
625
12" PVC
24" RCP
EXISTING CLOSED DRAINAGE SYSTEM TO BE RELOCATED (BY OTHERS) OFF OF SCDOT RIGHT-OF-WAY
CURB INLET TOP: 224.52 BB: 217.27

NOTE:
1. FOR PIPE DATA TABLE SEE SHEET D23

BUILDING 250

CCPI UNIVERSITY

* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BE-OP-1530	6	B	17	2	C
BE-OP-1580	3	B	10	2	C

PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:39:41 PM
DATE: 2026.06-22
PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BE-DRN_SHTS

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

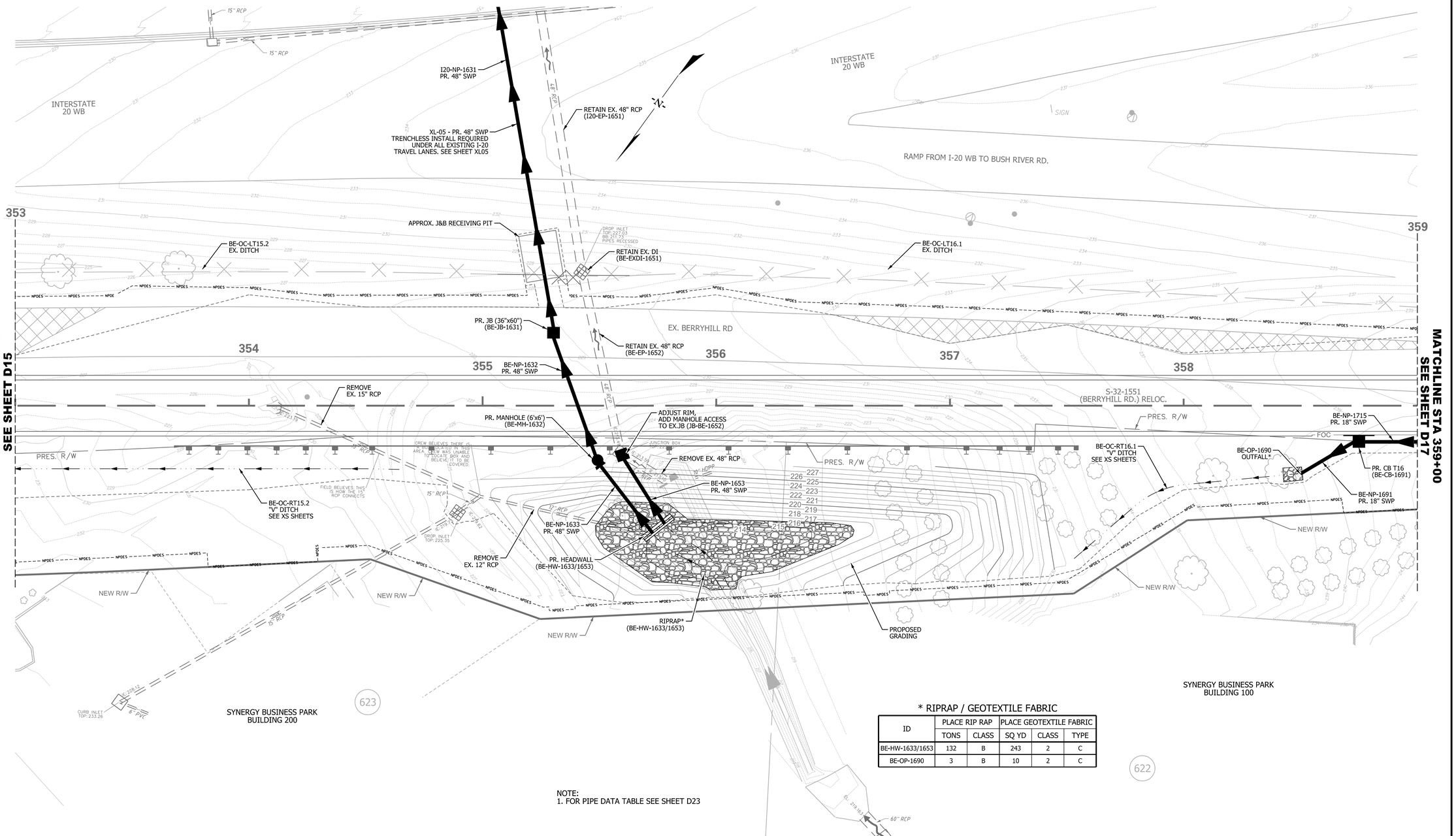
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 353+00 TO STA. 359+00

S-32-1551 SHT BE-D15

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D16



* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BE-HW-1633/1653	132	B	243	2	C
BE-OP-1690	3	B	10	2	C

NOTE:
1. FOR PIPE DATA TABLE SEE SHEET D23

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BE-DRN_SHTS
DATE: 2026.06-22
PEN TABLE: SCDOT_PenTable.DRAINAGE
TIME: 12:39:51 PM

HDR ENGINEERING INC. OF THE CAROLINAS
1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C038 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

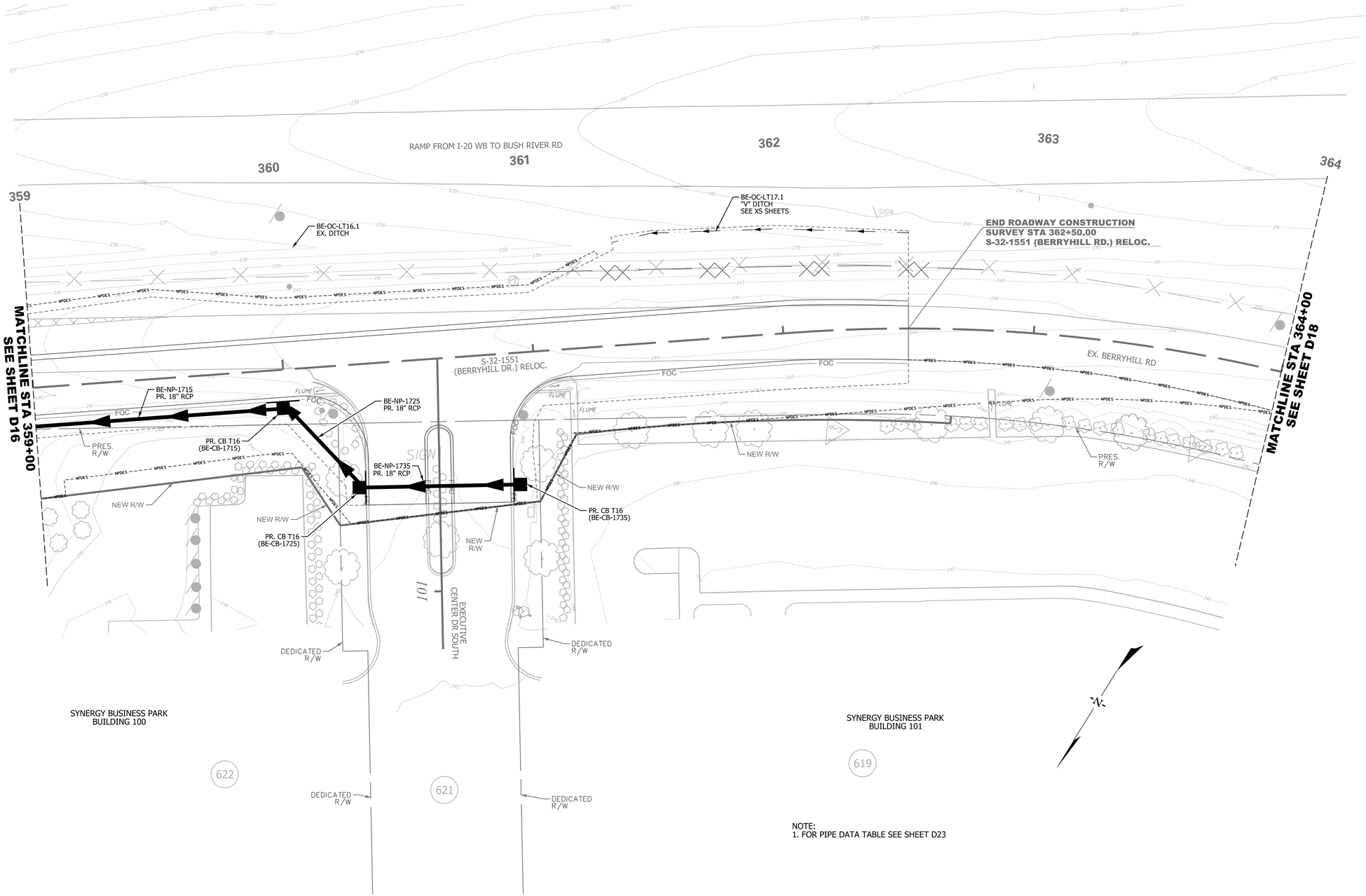
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 353+00 TO STA. 359+00

S-32-1551 SHT BE-D16

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D17



NOTE:
1. FOR PIPE DATA TABLE SEE SHEET D23

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C038 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 JUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 359+00 TO STA. 364+00

S-32-1551 SHT BE-D17

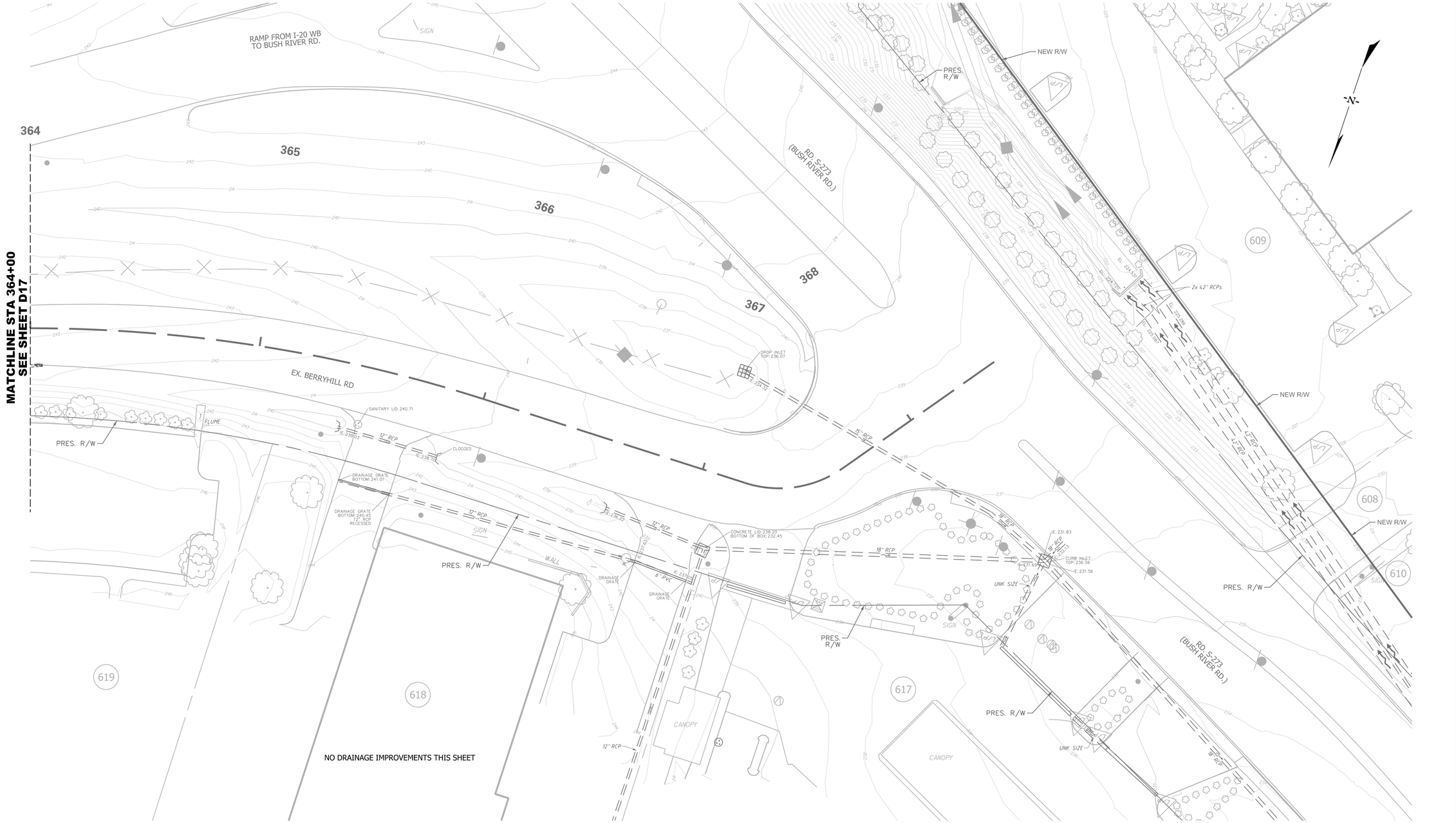
PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D:\BE_DRN_SHTS

DATE: 2026.06.22

PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:40:01PM

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D18



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USER: DHUGHEY
FILE: D-BE-DRN_SHTS

DATE: 2026.06-22

PEN TABLE: SCDOT_PenTable.DRAINAGE
TIME: 12:40:11 PM

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA
HDR ENGINEERING INC. OF THE CAROLINAS
No. C038
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 26549
DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

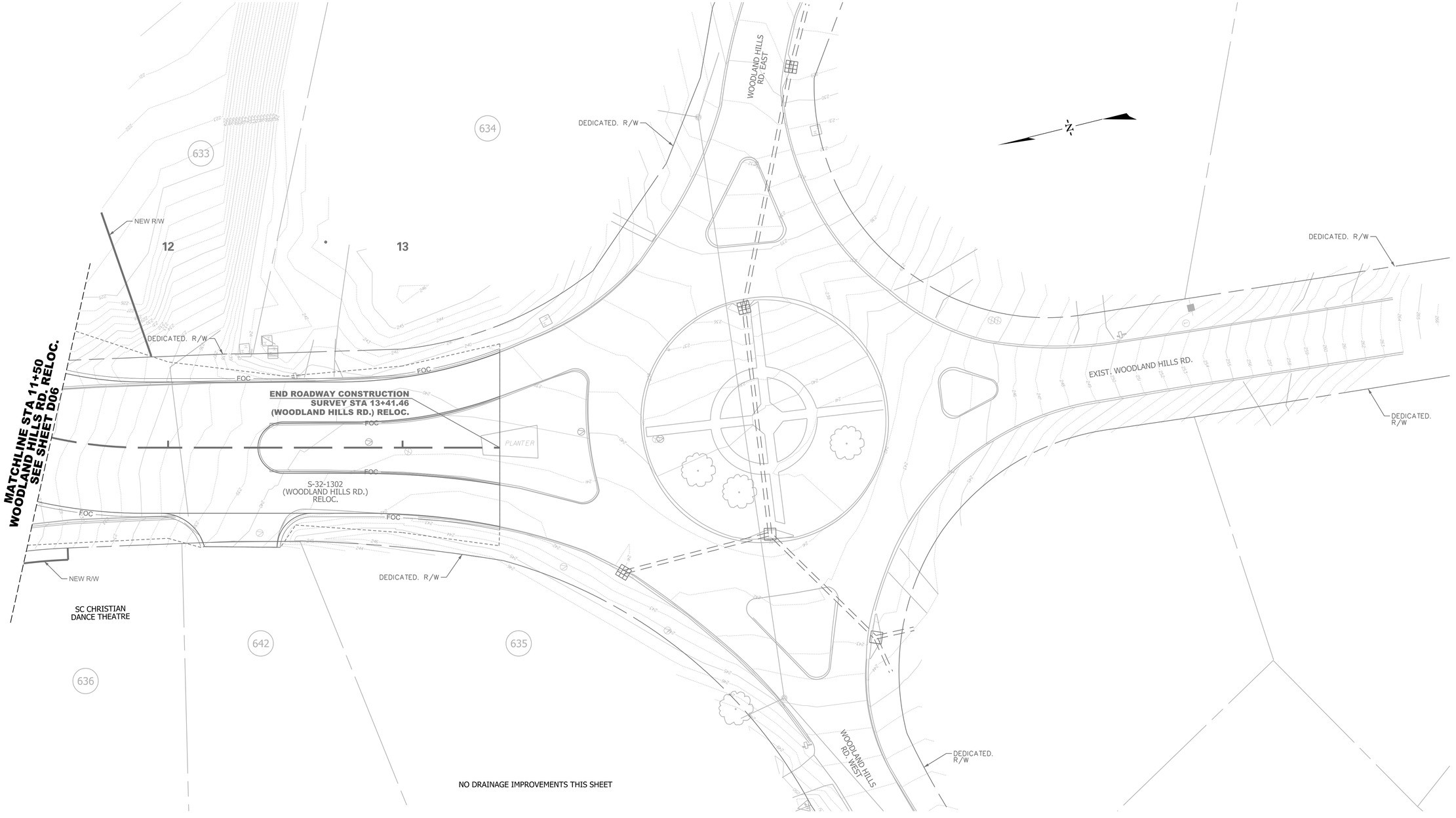
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 364+00 TO STA. 368+45.78

S-32-1551 SHT BE-D18

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D19



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DATE: 2026.06.22
PEN TABLE: SCDOT_PenTable.DRAINAGE
TIME: 12:40:21 PM

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA
HDR ENGINEERING INC. OF THE CAROLINAS No. C0318
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 26549
DESTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

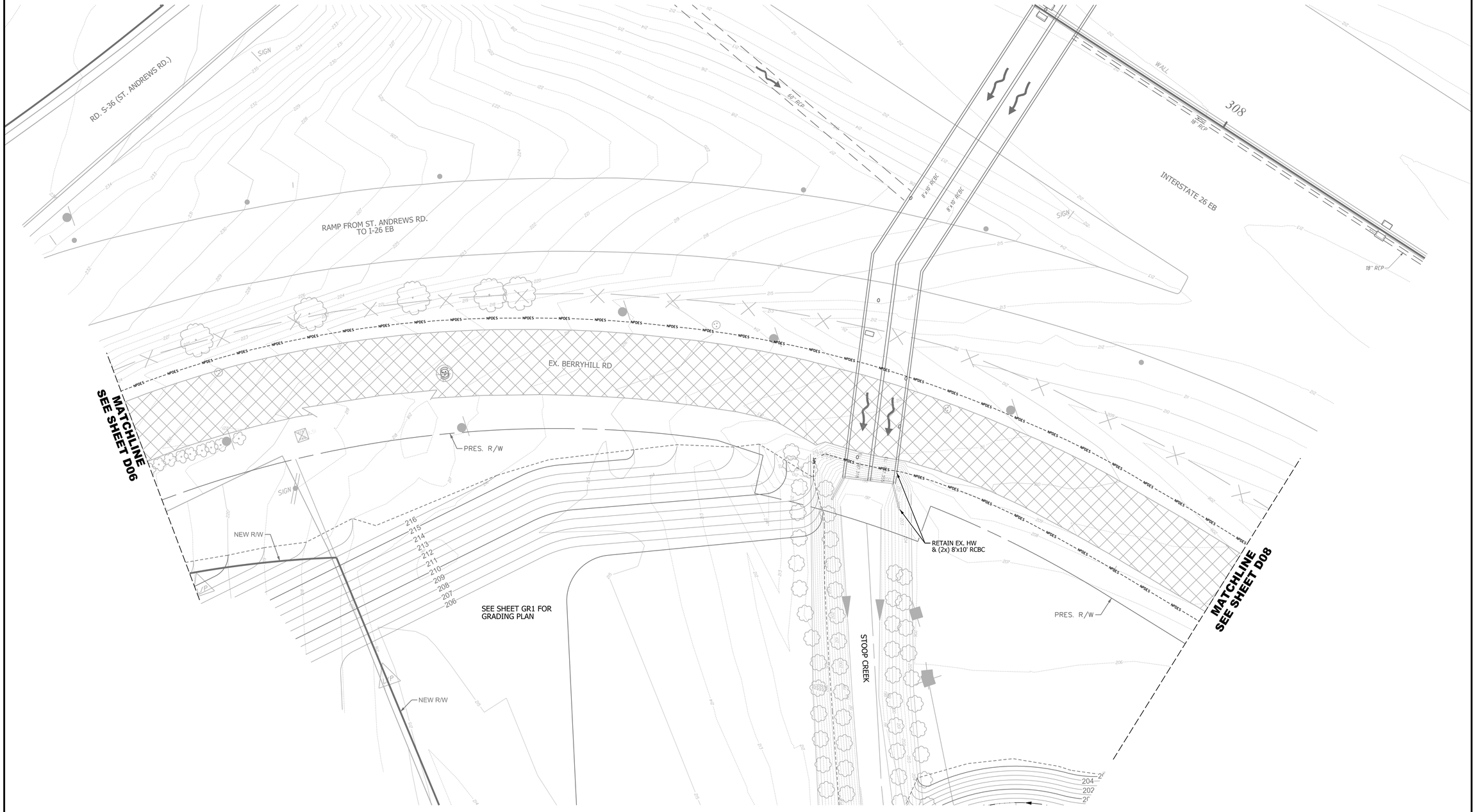
CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)

DRAINAGE PLAN SHEET
WOODLAND HILLS RD. RELOC.
STA. 11+50 TO STA. 13+41.46

S-32-1551 SHT BE-D19

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D20



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USER: DHUGHEY
FILE: D-BE-DRN_SHTS

DATE: 2026_06_22

PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:40:30 PM

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS No. C038 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — REGISTERED PROFESSIONAL ENGINEER — No. 26549 — DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
EXISTING BERRYHILL RD / STOOP CREEK VICINITY

S-32-1551 SHT BE-D20

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D21

RETAIN EX. CB (RO-EXCB-2162)
RETAIN EX. 24" CMP (RO-EP-2162)
CONSTRUCT PR. CB T9 (RO-CB-2124) ON EX. 24" CMP
RO-NP-2124 PR. 24" SWP
RO-OP-2120- OUTFALL SEE SHEET GR2 FOR RIPRAP & GEOTEXTILE QUANTITIES

NOTES:
1. FOR PIPE DATA TABLE SEE SHEET D23
2. SEE SHEET GR2 FOR BASIN GRADING PLAN

MULTI-PURPOSE BASIN
RO-DB-21
TOP AREA: 2.85 ACRES
SIDE SLOPES: 3:1
TOP BERM ELEV.: 206.00
BOTTOM ELEV: 191.75

4:1 ACCESS SLOPE

RO-OP-2190 - OUTFALL SEE SHEET GR2 FOR RIPRAP & GEOTEXTILE QUANTITIES

NEW R/W

19' MAINTENANCE BERM

3:1 SLOPES

EMERGENCY SPILLWAY SEE SHEET GR2 FOR DETAIL AND FOR RIPRAP & GEOTEXTILE QUANTITIES

CONSTRUCT BERM PER SCDOT STD. DWG. 815-305-01, SEE STD. DWG. 815-305-02 TO 815-305-07 FOR ADDITIONAL DESIGN DETAILS

PRIMARY POND OUTLET STRUCTURE (RO-PO-2181) 4'x4' BOX RISER

MULTI-PURPOSE BASIN RO-DB-21

3:1 SLOPES

18' MAINTENANCE BERM

15' MAINTENANCE SHELF

2:1 SLOPES

RO-NP-2181 PR. 30" SWP

PLACE WOVEN WIRE FENCE TYPE 1 WITHOUT BARBED WIRE

ASSUMED

RO-OP-2180 - OUTFALL SEE SHEET GR2 FOR RIPRAP & GEOTEXTILE QUANTITIES

PRES. R/W

S-32-1241 (ROCKLAND RD.) EXIST.

RETAIN EX. 30" CPP (RO-EP-2171)

RO-OP-2170 EX. OUTFALL

RO-OC-RT21.1 EX. OUTFALL CHANNEL

MATCHLINE STA 9141+00 SEE SHEET D22

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BE-ORN_SHTS

DATE: 2026_06_22

PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:40:44 PM

HDR ENGINEERING INC. OF THE CAROLINAS
1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS CERTIFICATE OF AUTHORIZATION No. C038

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER JUSTIN P. HUGHEY No. 26549

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. DATE
DWG. DATE
R/W DATE

PLAN SCALE 1" = 20'
0 10 20 40

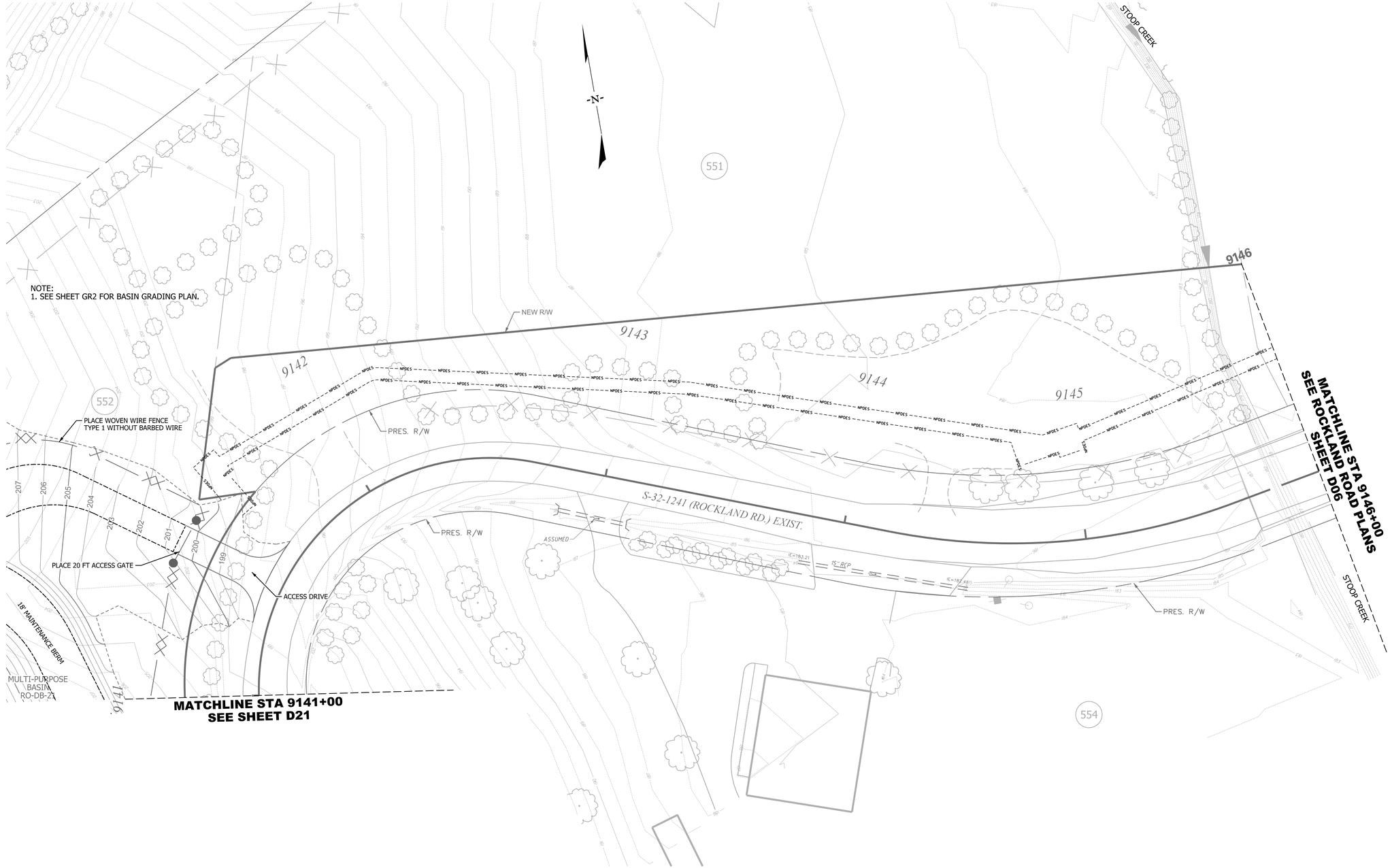
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 9136+00 TO STA. 9141+00

S-32-1551 SHT BE-D21

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D22



PLOT DRIVER: pdf-fullsize2021
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FILE: D-BE-DRN_SHTS

DATE: 2026.06-22

PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:40:57 PM

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE PLAN SHEET
STA. 9141+00 TO STA. 9146+00

S-32-1551 SHT BE-D22

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	D23

GEOMETRY						UPSTREAM					DOWNSTREAM					FILL HEIGHT		MIN. FIELD SPT "N" BELOW INVERT	JOINT PRESSURE (PSI)	SMOOTH WALL OPTIONS					
																				HDPE	BUILT	RCP	BUILT	SRAP	BUILT
SYSTEM ID	LINK ID	DIAMETER (IN)	NO. OF BARRELS	PIPE LENGTH (FT)	SLOPE (%)	NODE	NODE DESCRIPTION	ALIGNMENT	NODE STATION	LINK INVERT (FT)	NODE	NODE DESCRIPTION	ALIGNMENT	NODE STATION	LINK INVERT (FT)	MIN (FT)	MAX (FT)			TYPE	√	HIGHEST CLASS	√	THICKEST GAGE	√
BE_0640	BE-NP-0641	18	1	19.71	9.55	BE-CB-0641	PR. CB T16	BERP	302+67.53	226.88	BE-OP-0640	OUTFALL	BERP	302+90.00	225.00					S		III		16ga	
BE_0640	BE-NP-0642	18	1	39.29	0.30	BE-DI-0642	PR. DI 24x36	BERP	302+30.09	227.00	BE-CB-0641	PR. CB T16	BERP	302+67.53	226.88					N/A		III		N/A	
BE_0700	BE-EP-0671	36	1	29.37	3.54	BE-DN-0671	UPSTREAM SYSTEM	BERP	303+91.33	213.75	BE-JB-0672	PR. JB (CONVERT EX. CB)	BERP	304+06.03	212.71					EP		EP		EP	
BE_0700	BE-EP-0672	36	1	21.01	5.62	BE-JB-0672	PR. JB (CONVERT EX. CB)	BERP	304+06.03	212.50	BE-JB-0673	PR. JB (CONVERT EX. DI)	BERP	304+19.43	211.32					EP		EP		EP	
BE_0700	BE-EP-0673	36	1	18.74	2.67	BE-JB-0673	PR. JB (CONVERT EX. DI)	BERP	304+19.43	211.22	BE-DI-0674	ADJUST EX. DI	BERP	304+30.82	210.72					EP		EP		EP	
BE_0700	BE-EP-0674	36	1	16.61	4.76	BE-DI-0674	ADJUST EX. DI	BERP	304+30.82	210.65	BE-JB-0675	PR. JB (CONVERT EX. CB)	BERP	304+42.47	209.86					EP		EP		EP	
BE_0700	BE-EP-0675	36	1	214.17	0.99	BE-JB-0675	PR. JB (CONVERT EX. CB)	BERP	304+42.47	209.86	BE-MH-0701	PR. MH	BERP	306+46.67	207.75					EP		EP		EP	
BE_0680	BE-NP-0681	18	1	60.07	10.00	BE-CB-0681	PR. CB T17	BERP	304+75.45	213.01	BE-OP-0680	OUTFALL	BERP	305+00.97	207.00					S		III		16ga	
BE_0680	BE-NP-0682	18	1	30.46	7.29	BE-CB-0682	PR. CB T1	BERP	304+59.98	221.12	BE-CB-0681	PR. CB T17	BERP	304+75.45	218.90					N/A		III		N/A	
BE_0680	BE-NP-0683	18	1	70.94	4.10	BE-CB-0683	PR. CB T1	BERP	303+84.99	224.03	BE-CB-0682	PR. CB T1	BERP	304+59.98	221.12					N/A		III		N/A	
BE_0690	BE-NP-0691	18	1	23.66	10.00	BE-CB-0691	PR. CB T17	WOODLANDHILL	10+50.00	219.37	BE-OP-0690	OUTFALL	BERP	305+54.95	217.00					S		III		16ga	
BE_0700	BE-NP-0701	36	1	42.54	4.11	BE-MH-0701	PR. MH	BERP	306+46.67	207.75	BE-OP-0700	OUTFALL	BERP	306+46.72	206.00					S		III		16ga	
BE_0760	I26-NP-0755	60	1	411.15	0.49	BT-JB-0755	PR. JB (72"x72") (BLIND)	BURN_3A	313+66.63	200.00	BE-OP-0760	OUTFALL	BERP	310+02.78	198.00					N/A		III		N/A	
BE_0770	I26-NP-0756	60	1	239.78	0.35	I26-CB-0756	PR. CB T9 (6'x6')	I26000X	309+95.59	199.83	BE-DI-0799	PR. DI T112 (6'x6')	BERP	310+69.47	199.00					N/A		III		N/A	
BE_0770	BE-NP-0799	60	1	106.16	0.94	BE-DI-0799	PR. DI T112 (6'x6')	BERP	310+69.47	199.00	BE-OP-0770	OUTFALL	BERP	310+08.01	198.00					N/A		III		N/A	
BE_0870	I26-NP-0831	54	1	298.80	1.67	BT-CB-0831	PR. CB T9 (6'x6')	BURN_3A	317+41.78	204.50	BE-JB-0871	PR. JB (36"x72")	BERP	313+95.32	199.50					N/A		III		N/A	
BE_0860	BE-NP-0861	48	1	42.43	3.11	BE-JB-0861	PR. JB	BERP	313+66.60	199.32	BE-OP-0860	OUTFALL	BERP	313+55.65	198.00					N/A		III		N/A	
BE_0870	BE-NP-0871	54	1	66.09	2.27	BE-JB-0871	PR. JB (36"x72")	BERP	313+95.32	199.50	BE-OP-0870	OUTFALL	BERP	313+75.97	198.00					N/A		III		N/A	
BE_0870	BE-NP-0875	24	1	19.90	9.05	BE-OEP-0875	PR. OPEN PIPE END	BERP	314+16.76	203.80	BE-JB-0871	PR. JB (36"x72")	BERP	313+95.32	202.00					S		III		16ga	
BE_0890	BE-NP-0901	18	1	36.34	3.00	BE-CB-0901	PR. CB T1	BERP	315+07.00	202.09	BE-OP-0890	OUTFALL	BERP	314+75.00	201.00					S		III		16ga	
BE_0890	BE-NP-0921	18	1	155.00	0.80	BE-CB-0921	PR. CB T1	BERP	316+66.00	203.33	BE-CB-0901	PR. CB T1	BERP	315+07.00	202.09					S		III		16ga	
BE_0960	I26-NP-0924	60	1	194.31	2.23	BT-CB-0924	PR. CB T9 (6'x6')	BURN_3A	322+32.51	208.84	BE-JB-0963	PR. JB (72"x72")	BERP	319+54.50	204.50					N/A		III		N/A	
BE_0950	BE-NP-0951	60	1	11.73	0.60	BE-EXCB-0951	EX. CB	BERP	319+38.98	204.57	BE-JB-0963	PR. JB (72"x72")	BERP	319+54.50	204.50					S		III		16ga	
BE_0950	I26-EP-0952	60	1	109.57	3.08	I26-MCB-0952	EX. MCB	I26000X	319+35.95	207.95	BE-EXCB-0951	EX. CB	BERP	319+38.98	204.57					EP		EP		EP	
BE_0890	BE-NP-0956	18	1	155.00	0.88	BE-CB-0956	PR. CB T1	BERP	318+25.00	204.70	BE-CB-0921	PR. CB T1	BERP	316+66.00	203.33					N/A		III		N/A	
BE_0960	BE-EP-0961	60	1	145.12	4.62	BE-JB-0961	PR. JB (48"x72")	BERP	319+24.86	199.71	BE-EXDI-0960	EX. DI (OP)	BERP	319+04.17	193.00					EP		EP		EP	
BE_0960	BE-NP-0962	60	1	52.92	5.28	BE-CB-0962	PR. CB T9 (6'x6')	BERP	319+50.00	202.50	BE-JB-0961	PR. JB (48"x72")	BERP	319+24.86	199.71					N/A		III		N/A	
BE_0960	BE-NP-0963	60	1	41.23	4.85	BE-JB-0963	PR. JB (72"x72")	BERP	319+54.50	204.50	BE-CB-0962	PR. CB T9 (6'x6')	BERP	319+50.00	202.50					N/A		III		N/A	
BE_0890	BE-NP-0981	18	1	135.00	2.07	BE-CB-0981	PR. CB T1	BERP	319+64.00	207.50	BE-CB-0956	PR. CB T1	BERP	318+25.00	204.70					N/A		III		N/A	
BE_0890	BE-NP-1008	18	1	181.47	2.73	BE-CB-1008	PR. CB T1	BERP	321+50.00	212.46	BE-CB-0981	PR. CB T1	BERP	319+64.00	207.50					S		III		16ga	
BE_1070	I26-EP-1011	24	1	84.13	4.37	I26-EXDI-1011	EX. DI	I26000X	325+15.71	236.58	I26-MCB-1071	EX. MCB	I26000X	325+13.13	232.90					N/A		III		N/A	
BE_0890	BE-NP-1037	18	1	192.63	1.54	BE-CB-1037	PR. CB T1	BERP	323+47.00	215.42	BE-CB-1008	PR. CB T1	BERP	321+50.00	212.46					S		III		16ga	
BE_1070	I26-EP-1064	18	1	314.56	3.07	I26-EXDI-1064	EX. DI	I26000X	328+30.27	246.75	I26-EXDI-1011	EX. DI	I26000X	325+15.71	237.08					S		III		16ga	
BE_1070	I26-EP-1071	24	1	115.45	4.35	I26-MCB-1071	EX. MCB	I26000X	325+13.13	232.90	BE-OP-1070	OUTFALL	BERP	325+05.82	227.88					N/A		III		N/A	
BE_1080	BE-EP-1081	24	1	178.91	6.15	BE-JB-1081	PR. JB (48"x48")	FAIRWAYEX	10+39.05	215.00	BE-EXDI-1080	EX. DI (OP)	BERP	325+47.55	204.00					EP		EP		EP	
BE_1080	BE-NP-1082	24	1	105.45	1.42	BE-CB-1082	PR. CB T9 (3'x4')	BERP	325+07.60	216.50	BE-JB-1081	PR. JB (48"x48")	FAIRWAYEX	10+39.05	215.00					N/A		III		N/A	
BE_1080	BE-NP-1083	24	1	18.26	10.00	BE-OEP-1083	PR. OPEN PIPE END	BERP	325+07.02	218.33	BE-CB-1082	PR. CB T9 (3'x4')	BERP	325+07.60	216.50					S		III		16ga	
BE_1080	BE-NP-1091	18	1	17.39	2.88	BE-DI-1091	PR. DI 24x36	BERP	325+94.80	216.50	BE-JB-1081	PR. JB (48"x48")	FAIRWAYEX	10+39.05	216.00					S		III		16ga	
BE_1410	BE-NP-1312	18	1	96.73	4.55	BE-DI-1312	PR. DI 24x36	BERP	337+40.88	202.40	BE-MH-1345	PR. MH	BERP	338+45.10	198.00					S		III		16ga	
BE_1410	BE-NP-1313	18	1	72.06	6.94	BE-DI-1313	PR. DI 24x36	BERP	336+62.05	207.40	BE-DI-1312	PR. DI 24x36	BERP	337+40.88	202.40					S		III		16ga	
BE_1410	BE-NP-1344	18	1	15.80	0.30	BE-DI-1344	PR. DI 24x36	BERP	338+40.00	195.00	BE-MH-1345	PR. MH	BERP	338+45.10	194.95					S		III		16ga	
BE_1410	BE-NP-1345	18	1	49.29	0.30	BE-MH-1345	PR. MH	BERP	338+45.10	194.95	BE-CB-1352	PR. CB T1	BERP	338+97.50	194.80					N/A		III		N/A	
BE_1410	BE-NP-1352	18	1	171.90	3.96	BE-CB-1352	PR. CB T1	BERP	338+97.50	194.80	BE-DI-1388	PR. DI T112	BERP	340+75.51	188.00					S		III		16ga	
BE_1410	BE-NP-1388	18	1	56.81	3.52	BE-DI-1388	PR. DI T112	BERP	340+75.51	188.00	BE-OP-1410	OUTFALL	BERP	341+34.17	186.00					S		III		16ga	
RO_1440	BE-NP-1433	36	1	70.93	1.41	BE-DI-1433	PR. DI 24x36	BERP	344+21.00	186.00	BE-OP-1440	OUTFALL	BERP	343+50.04	185.00					S		III		16ga	
RO_1440	BE-EP-1434	24	1	121.43	2.74	BE-EXMH-1434	EX. MH	BERP	343+96.63	190.83	BE-DI-1433	PR. DI 24x36	BERP	344+21.00	187.50					EP		EP		EP	
BE_1530	BE-NP-1532	18	1	22.56	4.43	BE-CB-1532	PR. CB T1	BERP	348+76.20	214.00	BE-OP-1530	OUTFALL	BERP	348+50.00	213.00					S		III		16ga	
BE_1530	BE-NP-1535	18	1	29.27	1.71	BE-CB-1535	PR. CB T16	BERP	349+09.85	214.50	BE-CB-1532	PR. CB T1	BERP	348+76.20	214.00					N/A		III		N/A	
BE_1530	BE-NP-1542	18	1	39.19	6.38	BE-OEP-1542	PR. OPEN PIPE END	BERP	349+48.00	217.00	BE-CB-1535	PR. CB T16	BERP	349+09.85	214.50					N/A		III		N/A	
RO_2190	I20-NP-1543	30	1	238.06	2.71	BE-CB-1543	PR. CB T9	BERP	349+44.27	214.18	RO-CB-2192	PR. CB T9	ROCKLANDEX	9141+28.55	207.73					N/A		III		N/A	
BE_1580	BE-NP-1581	18	1	21.66	5.77	BE-CB-1581	PR. CB T1	BERP	352+13.82	224.25	BE-OP-1580	OUTFALL	BERP	351+88.00	223.00					S		III		16ga	
BE_1580	BE-NP-1582	18	1	28.75	0.87	BE-CB-1582	PR. CB T1	BERP	352+46.26	224.50	BE-CB-1581	PR. CB T1	BERP	352+13.82	224.25					N/A		III		N/A	
BE_1580	BE-NP-1583	18	1	18.41	4.89	BE-OEP-1583	PR. OPEN PIPE END	BERP	352+64.20	225.40	BE-CB-1582	PR. CB T1	BERP	352+46.26	224.50					S		III		16ga	
RO_2160	BE-NP-1625	18	1	61.36	0.30	BE-DI-1625	PR. DI 24x36	BERP	354+89.90	221.00	BE-MH-1632	PR. MH	BERP	355+49.20	220.82					S		III		16ga	
RO_2160	I20-NP-1631	48	1	265.10	2.45	BE-JB-1631	PR. JB (36"x60")	BERP	355+30.33	213.00	RO-OP-2160	OUTFALL	ROCKLANDEX	9134+77.31	206.50					N/A		III		N/A	
RO_2160	BE-NP-1632	48	1	54.02	0.74	BE-MH-1632	PR. MH	BERP	355+49.20	213.40	BE-JB-1631	PR. JB (36"x60")	BERP	355+30.33	213.00					N/A		III		N/A	
RO_2160	BE-NP-1633	48	1	37.41	1.07	BE-HW-1633	PR. HEADWALL	BERP	355+72.81	213.80	BE-MH-1632	PR. MH	BERP	355+49.20	213.40					N/A		III		N/A	
RO_2150	I20-EP-1651	48	1	238.06	2.14	BE-EXDI-1651	EX. DI	BERP	355+42.45	211.73	RO-OP-2150	OUTFALL	ROCKLANDEX	9134+72.40	206.63					EP		EP		EP	
RO_2150	BE-EP-1652	48	1	78.08	2.25	BE-JB-1652	ADJUST EX. JB	BERP	355+60.54	213.49	BE-EXDI-1651	EX. DI	BERP	355+42.45	211.73					EP		EP		EP	
RO_2150	BE-NP-1653	48	1	32.80	0.95	BE-HW-1653	PR. HEADWALL	BERP	355+77.91	213.80	BE-JB-1652	ADJUST EX. JB	BERP	355+60.54	213.49					S		III		16ga	
BE_1690	BE-NP-1691	18	1	26.76	3.96	BE-CB-1691	PR. CB T16	BERP	358+75.00	238.00	BE-OP-1690	OUTFALL	BERP	358+50.00	236.94					S		III		16ga	
BE_1690	BE-NP-1715	18	1	120.00	2.44	BE-CB-1715	PR. CB T16	BERP	359+99.00	240.93	BE-CB-1691	PR. CB T16	BERP	358+75.00	238.00					S		III		16ga	
BE_1690	BE-NP-1725	18	1	40.86	0.30	BE-CB-1725	PR. CB T16	EXECUTIVEEX2	100+58.00	241.05	BE-CB-1715	PR. CB T16	BERP	359+99.00	240.93					S		III		16ga	
BE_1690	BE-NP-1735	18	1	60.62	0.30	BE-CB-1735	PR. CB T16	EXECUTIVEEX2	100+58.00	241.23	BE-CB-1725	PR. CB T16	EXECUTIVEEX2	100+58.00	241.05					N/A		III		N/A	
RO_2110	RO-NP-2111	60	1	71.03	7.04	RO-OEP-2111	PR. OPEN PIPE END	ROCKLANDEX	9134+80.34	202.00	RO-OP-2110	OUTFALL	ROCKLANDEX	9134+97.10	197.00					S		III		16ga	
RO_2120	RO-NP-2124	24	1	76.73	10.00	RO-CB-2124	PR. CB T9	ROCKLANDEX	9134+74.92	204.67	RO-OP-2120	OUTFALL	ROCKLANDEX	9135+20.74	197.00					S		III		16ga	
RO_2140	RO-NP-2141	18	1	51.96	10.00	RO-JB-2141	PR. JB	ROCKLANDEX	9134+74.00	202.20	RO-OP-2140	OUTFALL	ROCKLANDEX	9134+94.16	197.00					S		III		16ga	
RO_2140	RO-EP-2142	15	1	20.16	4.81	RO-EXCB-2142	EX. CB	ROCKLANDEX	9134+65.64	210.18	RO-JB-2141	PR. JB	ROCKLANDEX	9134+74.00	209.21					EP		EP		EP	
RO_2120	RO-EP-2162	24	1	29.97	10.01	RO-EXCB-2162	EX. CB	ROCKLANDEX	9134+53.50	210.83	RO-CB-2124	PR. CB T9	ROCKLANDEX	9134+74.92	207.83					EP		EP		EP	
RO_2150	RO-EP-2171	30	1	42.19	0.02	RO-EXOEP-2171	EX. OPEN PIPE END	ROCKLANDEX	9137+69.18	187.78	RO-OP-2170	OUTFALL	ROCKLANDEX	9137+85.82	187.78					EP		EP		EP	
RO_2160	RO-NP-2181	30	1	109.13	4.35	RO-PO-2181	4'x4' RISER	ROCKLANDEX	9139+15.00	193.00	RO-OP-2180	OUTFALL	ROCKLANDEX	9137+35.00	188.25					S		III		16ga	
RO_2190	RO-NP-2191	30	1	75.56	9.82	RO-JB-2191	PR. JB	ROCKLANDEX	9141+19.00	205.42	RO-OP-2190	OUTFALL	ROCKLANDEX	9140+99.46	198.00					S		III		16ga	
RO_2190	RO-NP-2192	30	1	70.52	3.12	RO-CB-2192	PR. CB T9	ROCKLANDEX	9141+28.55	207.62	RO-JB-2191	PR. JB	ROCKLANDEX	9141+19.00	205.42					S		III		16ga	

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HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26549 — DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)

DRAINAGE PIPE DATA TABLE

S-32-1551 SHT D-BE-TBL

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	GR1

EARTHWORK QUANTITIES

ID	EXCAVATION (CU YD)	EMBANKMENT (CU YD)
FLOODPLAIN GRADING	24328	542
BE-OC-LT07.1	1176	5
BE-OC-RT08.1	4004	4

RETAIN EX. I-26 MEDIAN SYSTEM UNTIL FUTURE PHASE

XL-01 2x PR. 60" SWPs SEE SHEET XL01 & XL01A

I26-NP-0755 PR. 60" SWP

I26-NP-0756 PR. 60" SWP

INTERSTATE 26 EB

INTERSTATE 26 WB

RETAIN EX. I-26 MEDIAN SYSTEM & XL CONNECTION UNTIL FUTURE PHASE

XL-02 - PR. 54" SWP SEE SHEET XL02.

RETAIN EX. 42" RCP (I26-EP-0864)

I26-NP-0831 PR. 54" SWP

RETAIN EX. (2x) 8'x10' RCBC

APPROX. J&B RECEIVING PIT

REPLACE EX. DI W/ PR. DI T112 (6'x6') (BE-DI-0799)

RETAIN EX. DI (BE-EXCB-0863)

RETAIN EX. 48" RCP (BE-EP-0863)

APPROX. J&B RECEIVING PIT

CONVERT EX. DI TO JB (BE-JB-0862)

PR. JB (36"x72") (BE-JB-0871)

BE-NP-0799 PR. 60" SWP

BE-OP-0760 OUTFALL

BE-OP-0770 OUTFALL

REMOVE EX. SYSTEM

RETAIN EX. 42" RCP (BE-EP-0862)

BE-NP-0871 PR. 54" SWP

CONVERT EX. DI TO JB (BLIND) (BE-JB-0861)

BE-OC-LT07.1 12' BASE DITCH 2:1 SIDESLOPES

BE-OC-LT07.2 "V" DITCH SEE XS SHEETS

4H:1V SLOPES

PROPOSED GRADING

PRES. R/W

RAMP FROM ST. ANDREWS RD. TO I-26 EB

RD. S-36 (ST. ANDREWS RD)

EX. BERRYHILL RD

S-32-1551 (BERRYHILL RD.) RELOC.

STOOP CREEK

RIPRAP (BE-OC-LT07.1)

RIPRAP (BE-BRDG-07.2)

BRIDGE END FLUME (BE-FLUME-08A) SEE SHEET BE-D07

REMOVE EX. SYSTEM

SEE SHEET D08

PR. 48" SWP (BE-NP-0861)

BE-OP-0870 OUTFALL

BE-OP-0860 OUTFALL

BE-OC-RT08.2 "V" DITCH SEE XS SHEETS

BE-OP-0890 OUTFALL

REMOVE EX. 48" RCP

CREWS WERE UNABLE TO FIND LOCATION OF BOX IN THIS AREA. CREW NOTES THE AREA WAS UNDER CONSTRUCTION DURING THE SURVEY AND UNABLE TO ACCESS.

REMOVE EX. 48" RCP

NEW R/W

BE-OC-RT08.1 4' BASE DITCH 2:1 SIDESLOPES

RIPRAP (BE-OC-RT08.1) PLACE 59 TONS CLASS B RIPRAP PLACE 104 SY CLASS 2 TYPE C GEOTEXTILE

REMOVE EX. CB

REMOVE EX. 60" CMP

APPROXIMATE STOOP CREEK (SKETCHED FROM AERIAL IMAGERY)

BE-OP-0680 OUTFALL

BE-OP-0700 OUTFALL

BE-NP-0701 PR. 36" SWP

PR. CB T17 (BE-CB-0681)

BE-NP-0681 PR. 18" SWP

VERIFY, CUT EX. PIPE (BE-EP-0675) FOR PLACEMENT OF PR. MH (BE-MH-0701)

REMOVE EX. PIPE

REMOVE EX. SYSTEM

RIPRAP (BE-BRDG-07.1)

RIPRAP (BE-OC-RT07.1)

BE-OC-RT07.1 "V" DITCH SEE XS SHEETS

BE-OP-0690 OUTFALL

BE-NP-0691 PR. 18" SWP

PR. CB T17 (BE-CB-0691)

S-32-1302 (WOODLAND HILLS RD.) RELOC.

EX. WOODLAND HILLS RD

SEE SHEET D07

NEW R/W

PRES. R/W

LIMIT OF SURVEY

ASSUMED

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HDR ENGINEERING INC. OF THE CAROLINAS
1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C038 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 JUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 40'
0 20 40 80

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
GRADING PLAN SHEET
GRADING PLAN FOR BERRYHILL ROAD VICINITY

S-32-1551 SHT BE-GR1

VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	GR2

RIPRAP
SEE SHEET XL05

RO-OC-LT21.1
EX. CHANNEL

RETAIN EX. CURB INLET
& EX. 15" RCP AS NEEDED

RO-OEP-2111
OPEN PIPE END*

PROPOSED
GRADING

4:1
SLOPES

RO-NP-2192
PR. 30" RCP

XL-04 - PR. 30" RCP
SEE SHEET XL04

PR. JB
(RO-JB-2191)

PLACE WOVEN WIRE FENCE
TYPE 1 WITHOUT BARBED WIRE

18' MAINTENANCE BERM

RO-NP-2111
PR. 60" SWP

RO-NP-2191
PR. 30" RCP

NEW R/W

3:1
SLOPES

4:1 ACCESS
SLOPE

CONSTRUCT
PR. JB (RO-JB-2141)
ON EX. 15" RCP

RETAIN EX. 15" RCP
(RO-EP-2142)

RO-OP-2110
OUTFALL*

RO-OP-2140
OUTFALL*

RO-NP-2141
PR. 18" SWP

RO-OP-2190
OUTFALL*

12:1 ACCESS
DRIVE SLOPE

PLACE 20 FT ACCESS GATE

RETAIN EX. CB
(RO-EXCB-2132)

2:1
SLOPES

18' MAINTENANCE BERM

MULTI-PURPOSE BASIN
RO-DB-21
TOP AREA: 2.85 ACRES
SIDE SLOPES: 3:1
TOP BERM ELEV.: 206.00
BOTTOM ELEV: 191.75

MULTI-PURPOSE BASIN
RO-DB-21

3:1
SLOPES

18' MAINTENANCE BERM

NEW R/W

PRIMARY POND OUTLET STRUCTURE
(RO-PO-2181)
4'x4' BOX RISER
SEE DETAIL SHEET GR2A

CONSTRUCT BERM PER
SCDOT STD. DWG. 815-305-01,
SEE STD. DWG. 815-305-02 TO
815-305-07 FOR ADDITIONAL
DESIGN DETAILS

RO-OP-2120
OUTFALL*

CONSTRUCT EMERGENCY
SPILLWAY*
SEE DETAIL SHEET GR2A

3:1
SLOPES

NEW R/W

CONSTRUCT
PR. CB T9 (RO-CB-2124)
ON EX. 24" CMP

RETAIN EX. CB
(RO-EXCB-2162)

RO-NP-2124
PR. 24" SWP

18' MAINTENANCE BERM

RO-NP-2181
PR. 30" SWP

2:1
SLOPES

15' MAINTENANCE SHELF

RO-OP-2180
OUTFALL*

RETAIN EX. 24" CMP
(RO-EP-2162)

PROPOSED
GRADING

RETAIN EX. 30" CPP
(RO-EP-2171)

RO-OP-2170
EX. OUTFALL

RO-OC-RT26.1
EX. OUTFALL CHANNEL

S-1241 (ROCKLAND RD.)

EX. ROCKLAND RD

ASSUMED

PRES. R/W

NOTE:
1. FOR PIPE DATA TABLE SEE SHEET D23

* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
RO-OP-2110 RO-OP-2140	100	B	111	2	C
RO-OEP-2111	39	B	47	2	C
RO-OP-2120	6	B	15	2	C
RO-OP-2180	80	B	159	2	C
RO-OP-2190	17	B	36	2	C
SPILLWAY	695	B	480	2	C

EARTHWORK QUANTITIES

ID	EXCAVATION (CU YD)	EMBANKMENT (CU YD)
RO-DB-21	70597	7800

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FILE: D-BE-GRADING

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
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HDR ENGINEERING INC. OF THE CAROLINAS
No. C038
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 26549
DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

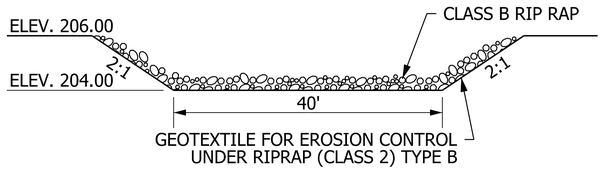
PLAN SCALE 1" = 30'
0 15 30 60

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

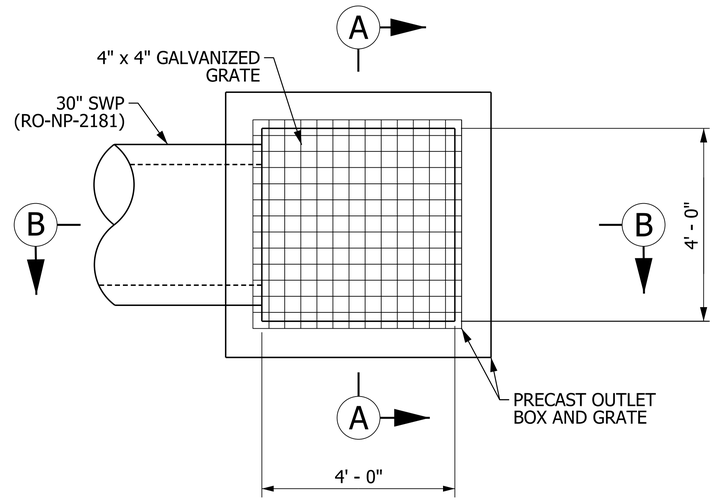
CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
GRADING PLAN SHEET
ROCKLAND RD. DETENTION BASIN
MULTI-PURPOSE BASIN RO-DB-21

S-32-1551 SHT BE-GR2

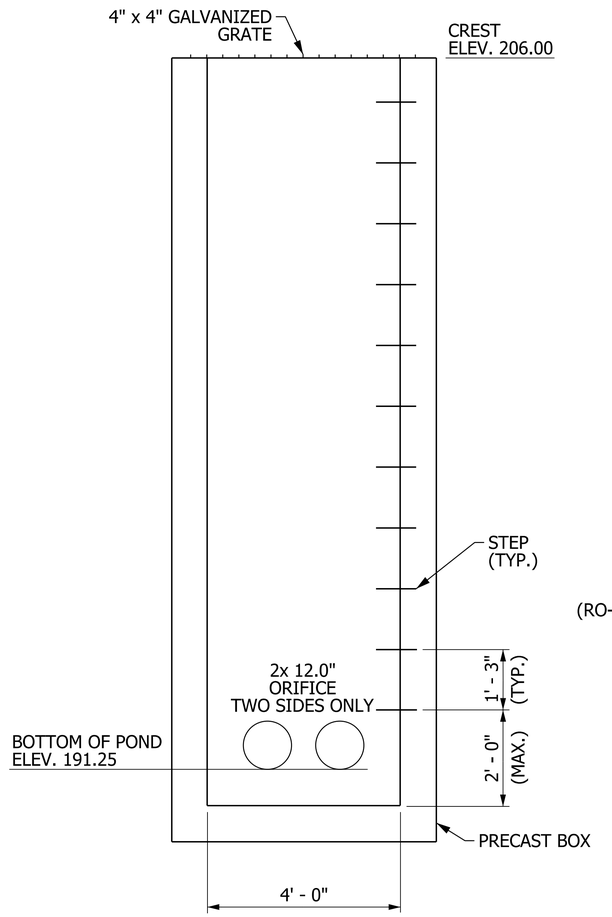
FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	GR2A



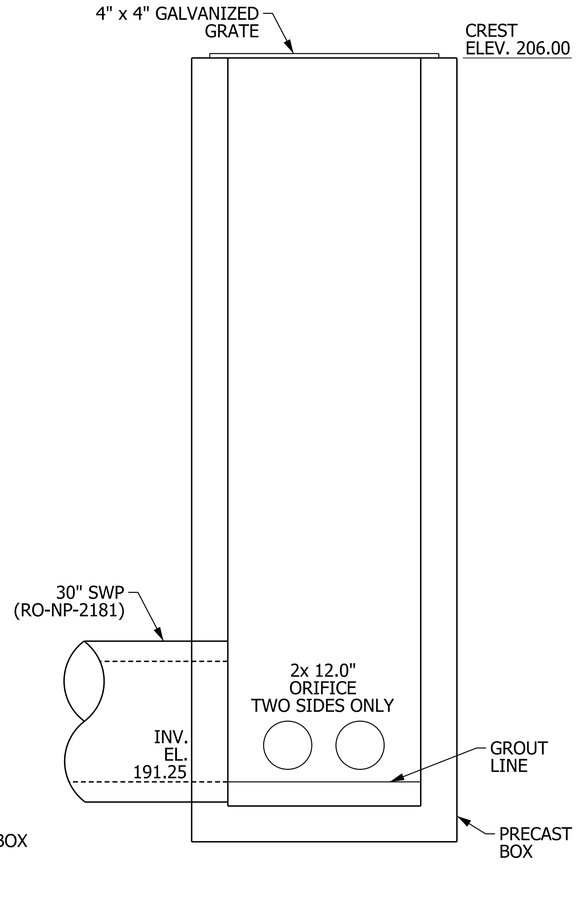
MULTI-PURPOSE BASIN - RO-DB-21
EMERGENCY SPILLWAY DETAIL
N.T.S.



PLAN



SECTION A-A



SECTION B-B

NOTES:
1. OUTLET STRUCTURE SHALL BE PRECAST REINFORCED CONCRETE AND CONFORM TO ASTM C478.
2. OUTLET STRUCTURE SHALL BE DESIGNED USING EITHER THE AASHTO STANDARD SPECIFICATIONS, 17TH EDITION, OR THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (8TH EDITION).
3. ALL APPLICABLE SOIL, WATER PRESSURE, BOUYANCY, TRANSPORTATION, HANDLING, AND INSTALLATION LOAD COMBINATIONS SHALL BE CONSIDERED.
4. DESIGN JUNCTION BOX STRUCTURES TO RESIST FLOATATION UNDER THE MAXIMUM EXPECTED HIGH WATER TABLE CONDITION. THE DESIGN HIGH WATER TABLE ELEVATION SHOULD BE THE 100-YEAR FLOOD ELEVATION AS A MINIMUM. THE MAXIMUM HIGH WATER TABLE ELEVATION SHOULD BE DESIGNED FOR THIS MAXIMUM IF SOILS REPORTS INDICATE THIS CONDITION EXISTS.
5. DESIGN PRECAST MEMBERS FOR HANDLING AND ERECTION WITHOUT CRACKING IN ACCORDANCE WITH THE PCI-DHPPC.
6. FABRICATION DRAWINGS AND CALCULATIONS SHALL BE PREPARED BY AND BEAR THE SEAL OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF SOUTH CAROLINA AND SUBMITTED TO EOR FOR REVIEW AND APPROVAL.
7. OUTLET BOX STEPS SHOULD BE CONSTRUCTED OF COPOLYMER POLYPROPYLENE PLASTIC AND CONFORM TO ASTM C478.
8. OUTLET BOX STEPS SHALL BE ABLE TO RESIST PULL-OUT FORCES OF MINIMUM 1,500 LBS.
9. UNDERCUT ANY EXISTING ORGANIC MATERIAL AND UNSUITABLE SUBGRADE SOILS AND REPLACE WITH A MINIMUM OF 2'-0" THICK LATER OF COMPACTED #57 STONE BEDDING EXTENDING 2'-0" LATERALLY BEYOND THE PROPOSED FOUNDATION LIMITS.

DETAIL RO-PO- 2181
POND OUTLET STRUCTURE DETAIL

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA HDR ENGINEERING INC. OF THE CAROLINAS No. C038 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
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DWG. _____ DATE _____
R/W _____ DATE _____

SCALE = N.T.S.

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DETENTION BASIN DETAILS
ROCKLAND RD. DETENTION BASIN
MULTI-PURPOSE BASIN RO-DB-21

S-32-1551 SHT BE-GR2A

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BE-GRADING
DATE: 2026-06-22
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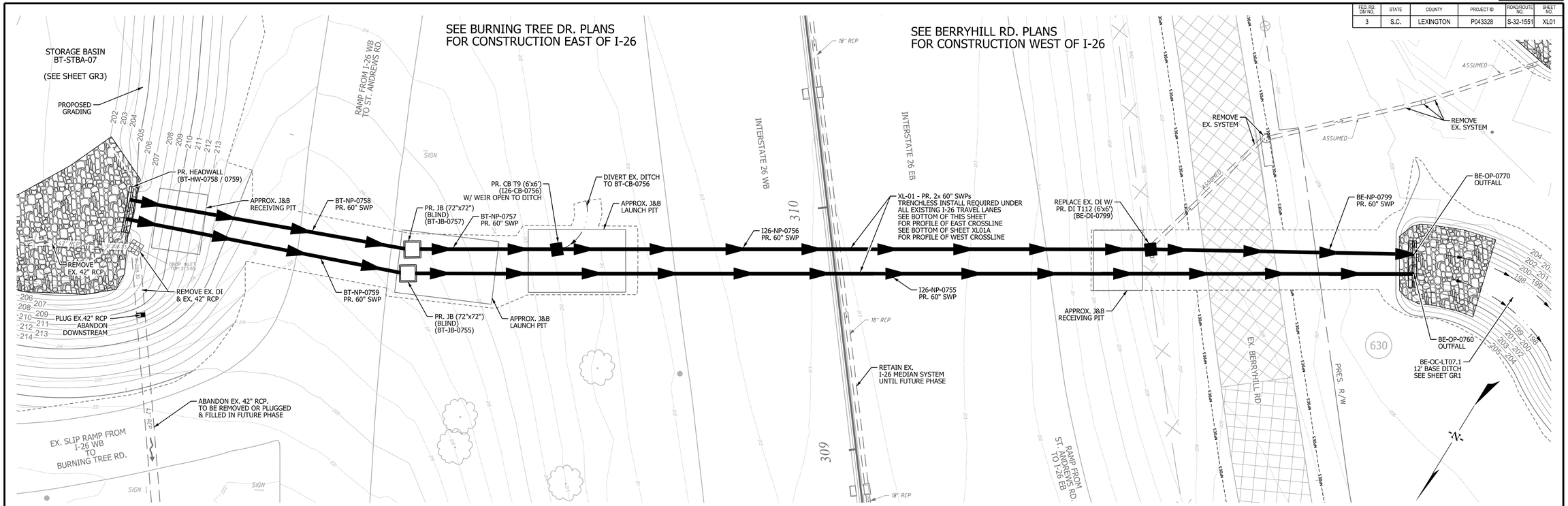
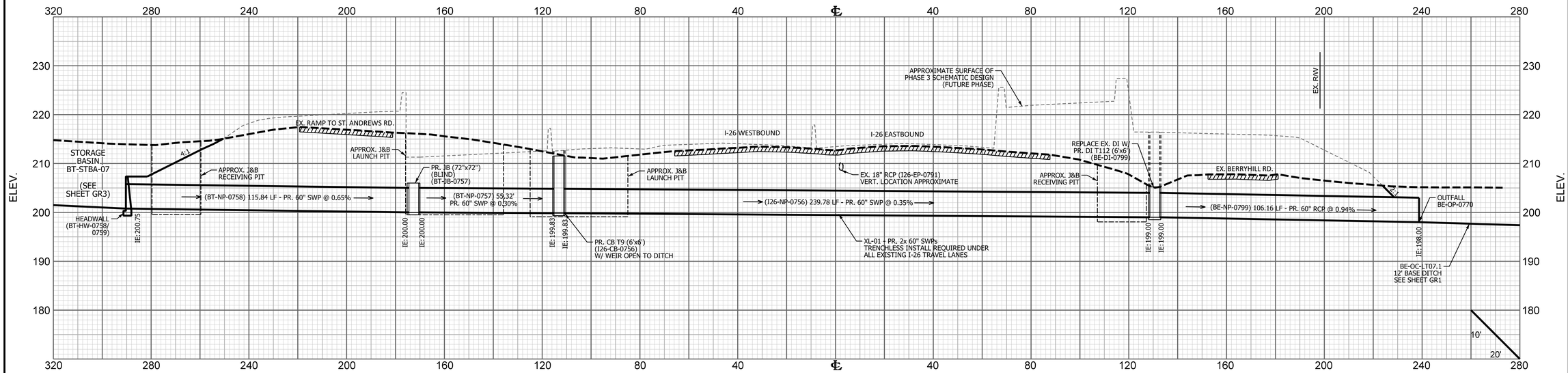
VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	XL01





HDR ENGINEERING INC. OF THE CAROLINAS
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SOUTH CAROLINA HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

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PLAN SCALE 1" = 20'
CROSS-SECTION SCALE: H:1" = 20' V:1" = 10'

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE CROSS-LINE SHEET
XL-01 (JACK & BORE 60" SWP)
CROSSING I-26 AT STA. 309+82.63

S-32-1551 SHT BE-XL01

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VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
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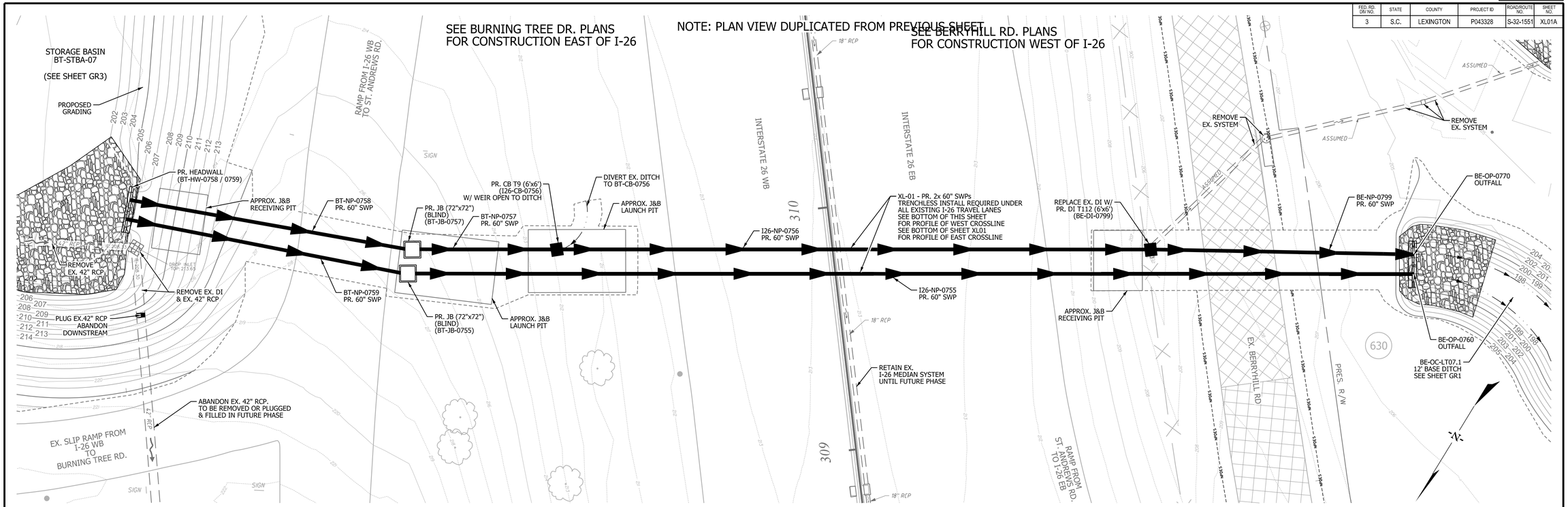

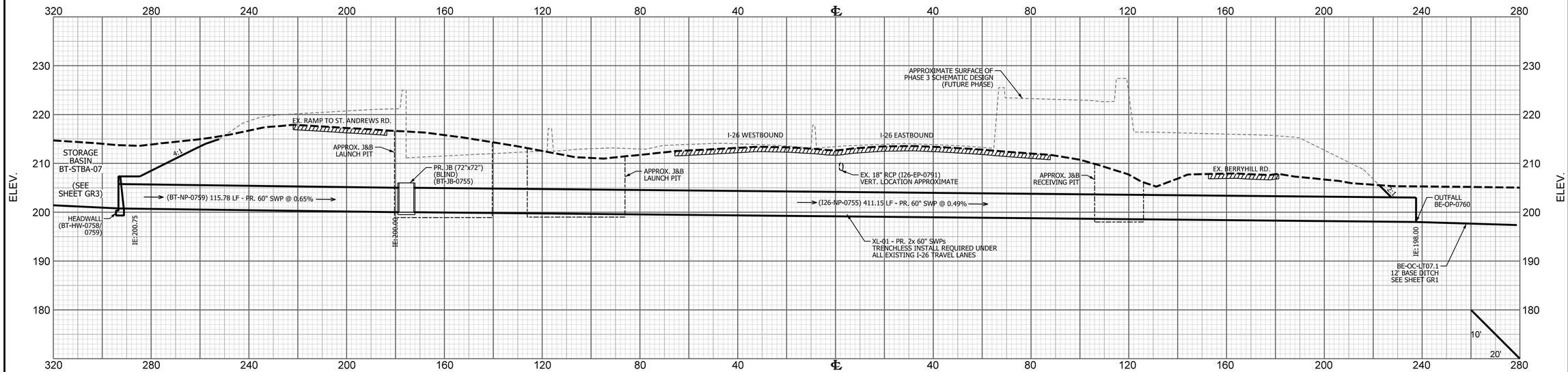

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SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE CROSS-LINE SHEET
XL-01 (JACK & BORE 60" SWP)
CROSSING I-26 AT STA. 309+72.56

S-32-1551 SHT BE-XL01A

PLOT DRIVER: pdf-fullsize2021
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FILE: D-BE-XL
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VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
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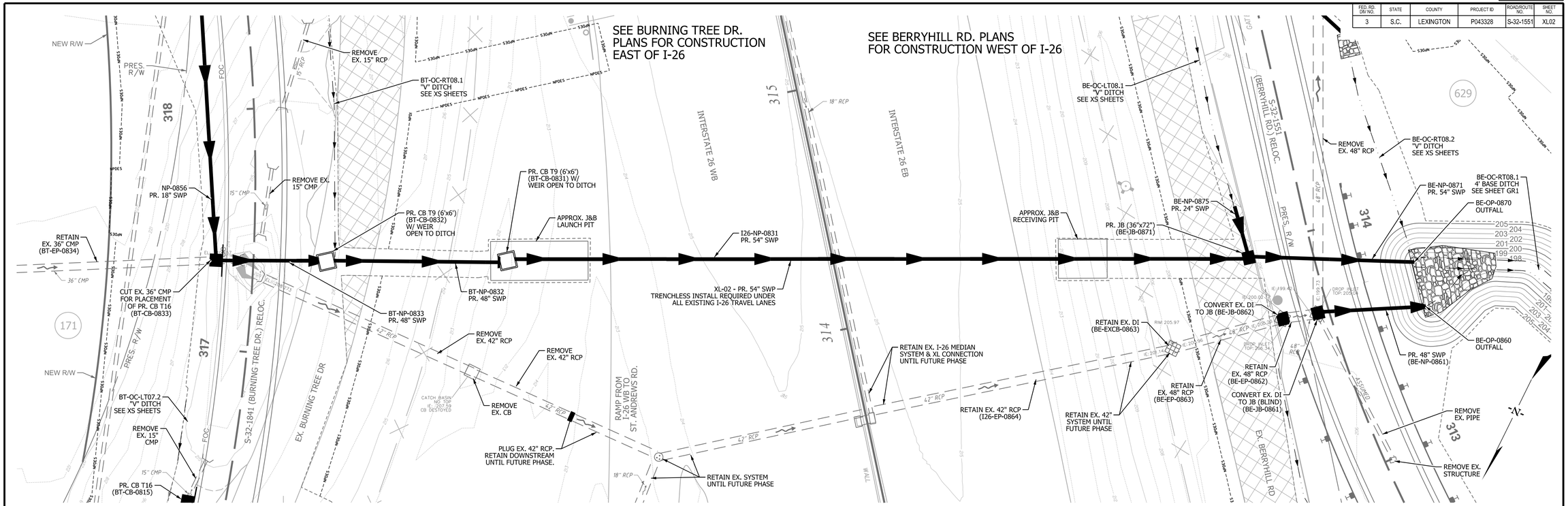

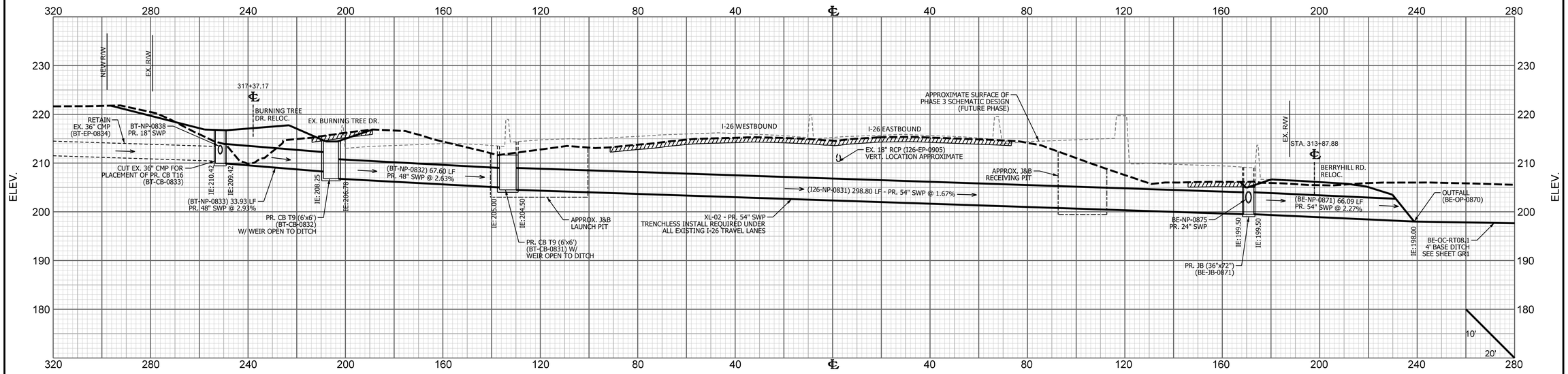

HDR ENGINEERING INC. OF THE CAROLINAS
1201 MAIN STREET
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HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

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CROSS-SECTION SCALE: H:1" = 20' V:1" = 10'

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE CROSS-LINE SHEET
XL-02 (JACK & BORE 54" SWP)
CROSSING I-26 AT STA. 314+29.21

S-32-1551 SHT BE-XL02

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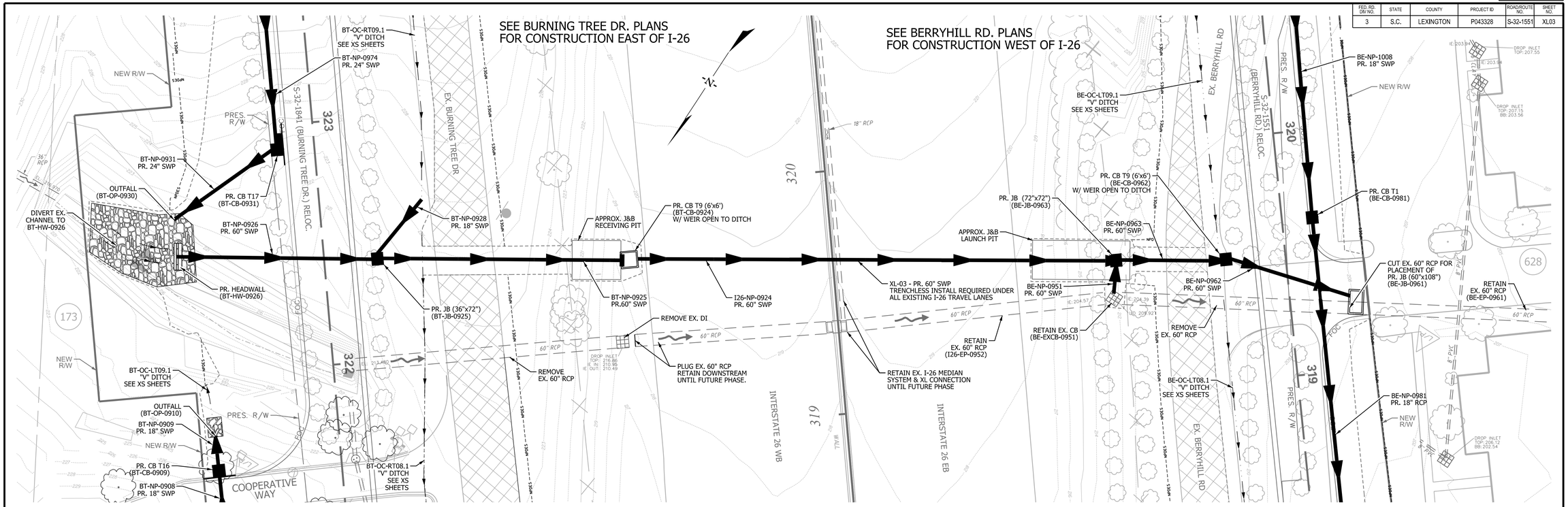
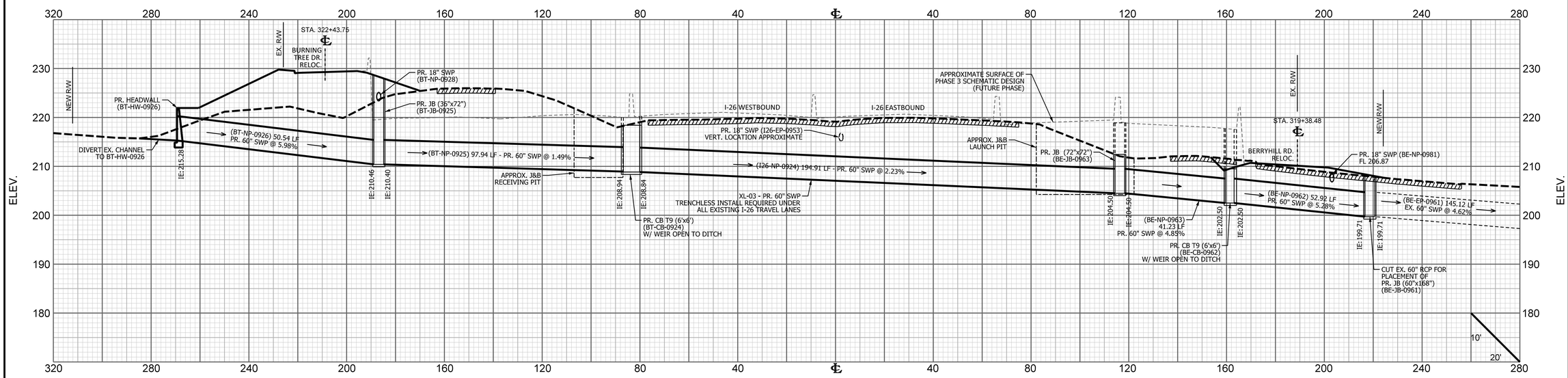
VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	XL03





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803-509-6600

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SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE CROSS-LINE SHEET
XL-03 (JACK & BORE 60" SWP)
CROSSING I-26 AT STA. 319+60.17

S-32-1551 SHT BE-XL03

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VOLUME 1

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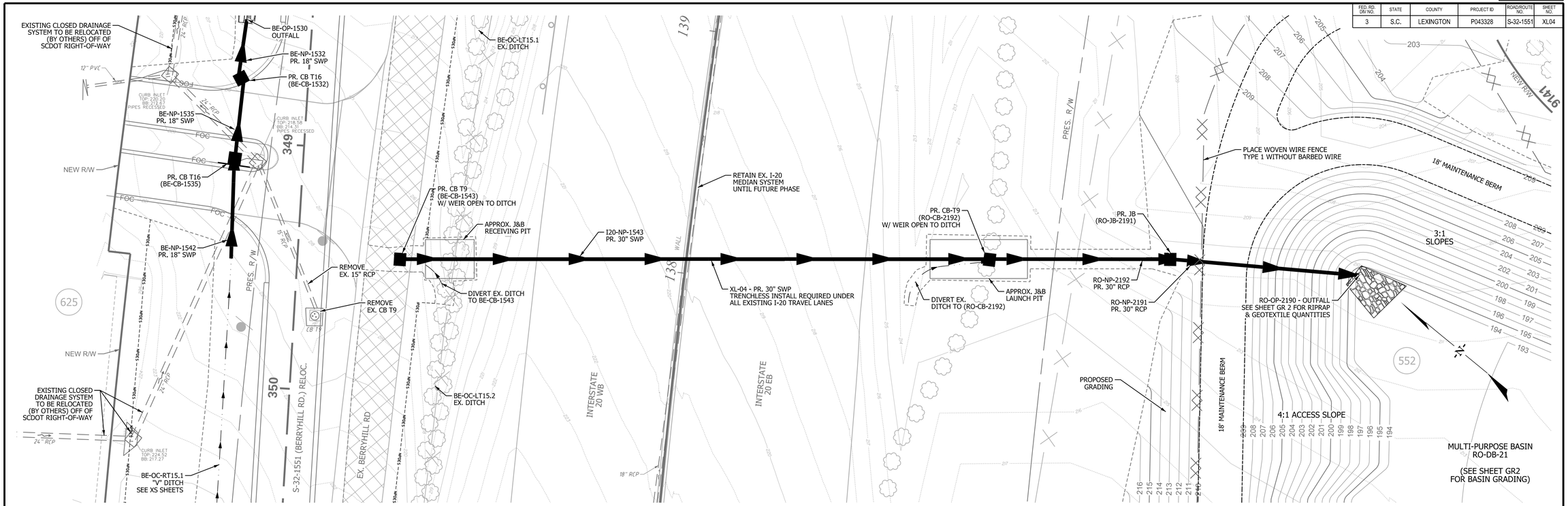

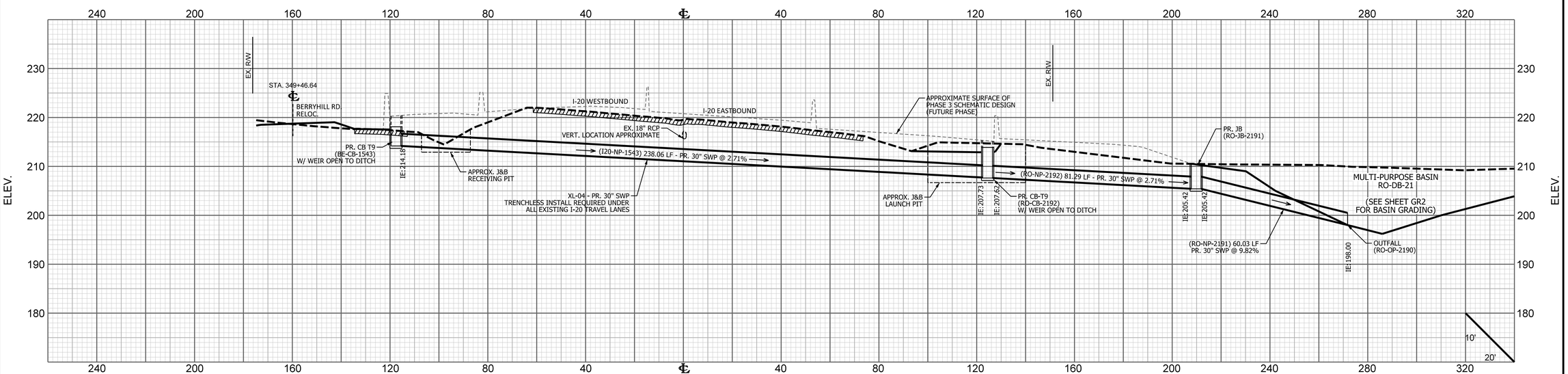

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SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE CROSS-LINE SHEET
XL-04 (JACK & BORE 30" SWP)
CROSSING I-20 AT STA. 138+05.86

S-32-1551 SHT BE-XL04

PLOT DRIVER: pdf-fullsize2021
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FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
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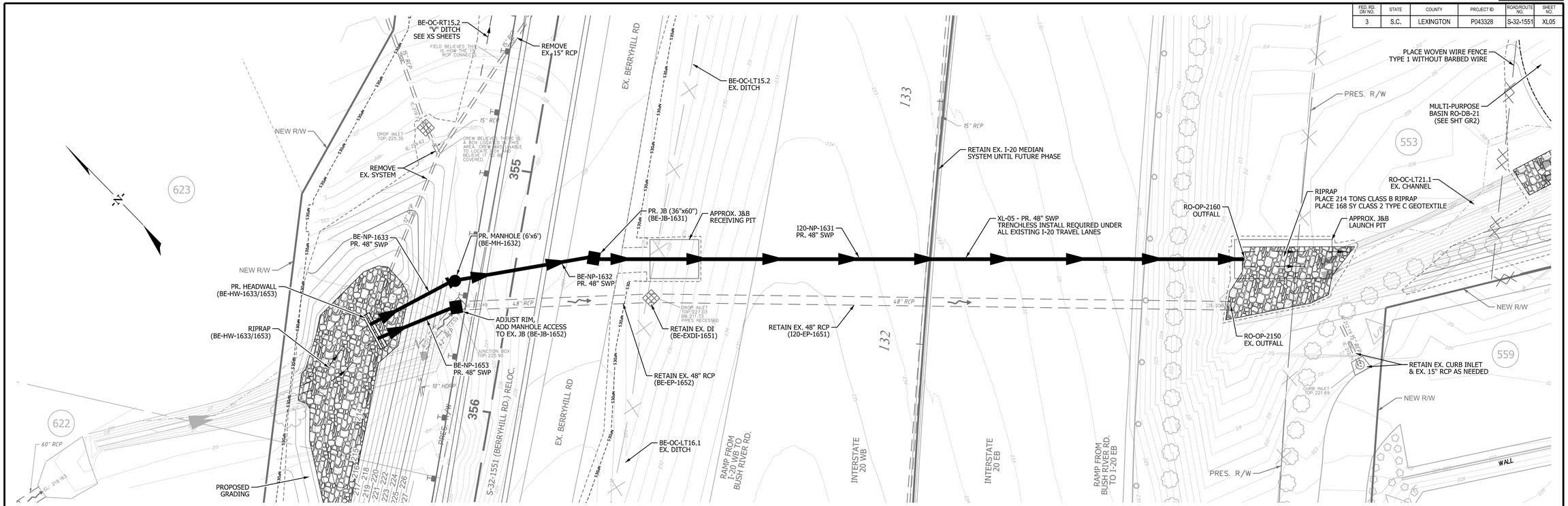

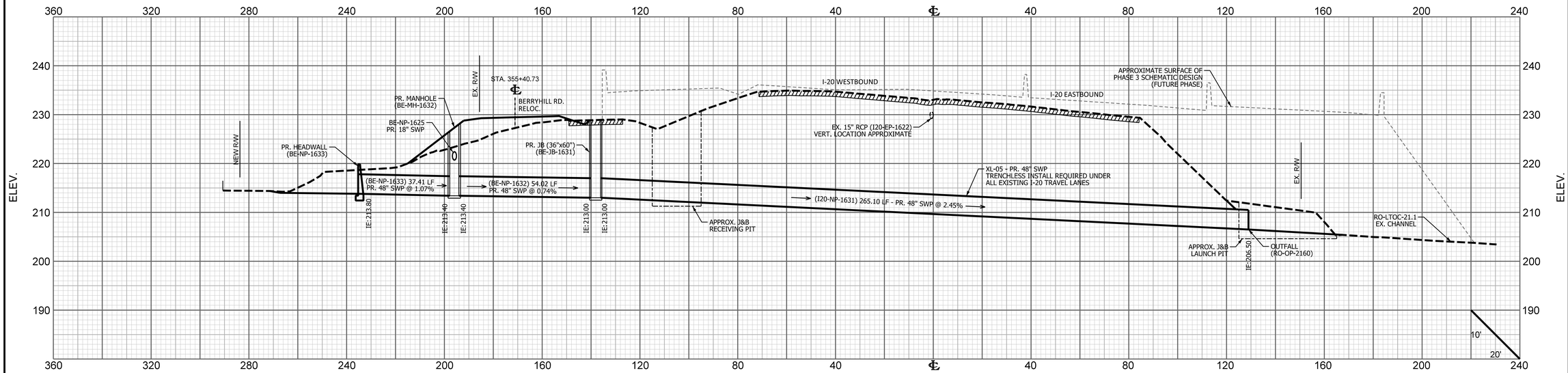

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
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803-509-6600

SOUTH CAROLINA
HDR ENGINEERING INC.
OF THE CAROLINAS
No. C038
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 26549
DUSTIN P. HUGHEY

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SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)
DRAINAGE CROSS-LINE SHEET
XL-05 (JACK & BORE 48" SWP)
CROSSING I-20 AT STA. 132+35.17

S-32-1551 SHT BE-XL05

PLOT DRIVER: pdf-fullsize2021
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VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	EC1

GENERAL CONSTRUCTION NOTES (EROSION CONTROL PLANS)

EROSION CONTROL NOTES

1. IF NECESSARY, SLOPES, WHICH EXCEED EIGHT (8) VERTICAL FEET SHOULD BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS, IN ADDITION TO HYDROSEEDING. IT MAY BE NECESSARY TO INSTALL TEMPORARY SLOPE DRAINS DURING CONSTRUCTION. TEMPORARY BERMS MAY BE NEEDED UNTIL THE SLOPE IS BROUGHT TO GRADE.

2. STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN FOURTEEN (14) DAYS AFTER WORK HAS CEASED, EXCEPT AS STATED BELOW.

   A. WHERE STABILIZATION BY THE 14TH DAY IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS, STABILIZATION MEASURES MUST BE INITIATED AS SOON AS PRACTICABLE.

   B. WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH-DISTURBING ACTIVITIES WILL BE RESUMED WITHIN 14 DAYS, TEMPORARY STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE.

3. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED ONCE EVERY CALENDAR WEEK. IF PERIODIC INSPECTION OR OTHER INFORMATION INDICATES THAT A BMP HAS BEEN INAPPROPRIATELY OR INCORRECTLY INSTALLED, THE PERMITTEE MUST ADDRESS THE NECESSARY REPLACEMENT OR MODIFICATION REQUIRED TO CORRECT THE BMP WITHIN 48 HOURS OF IDENTIFICATION.

4. PROVIDE SILT FENCE AND/OR OTHER CONTROL DEVICES, AS MAY BE REQUIRED, TO CONTROL SOIL EROSION DURING UTILITY CONSTRUCTION. ALL DISTURBED AREAS SHALL BE CLEANED, GRADED, AND STABILIZED WITH GRASSING IMMEDIATELY AFTER THE UTILITY INSTALLATION. FILL, COVER, AND TEMPORARY SEEDING AT THE END OF EACH DAY ARE RECOMMENDED. IF WATER IS ENCOUNTERED WHILE TRENCHING, THE WATER SHOULD BE FILTERED TO REMOVE ANY SEDIMENTS BEFORE BEING PUMPED BACK INTO ANY WATERS OF THE STATE.

5. ALL EROSION CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.

6. THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO PAVED ROADWAY(S) FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM PAVEMENT, AS MAY BE REQUIRED.

7. RESIDENTIAL SUBDIVISIONS REQUIRE EROSION CONTROL FEATURES FOR INFRASTRUCTURE AS WELL AS FOR INDIVIDUAL LOT CONSTRUCTION. INDIVIDUAL PROPERTY OWNERS SHALL FOLLOW THESE PLANS DURING CONSTRUCTION OR OBTAIN APPROVAL OF AN INDIVIDUAL PLAN IN ACCORDANCE WITH S.C REG. 72-300 ET SEQ. AND SCR160000.

8. TEMPORARY DIVERSION BERMS AND/OR DITCHES WILL BE PROVIDED AS NEEDED DURING CONSTRUCTION TO PROTECT WORK AREAS FROM UPSLOPE RUNOFF AND/OR TO DIVERT SEDIMENT-LADEN WATER TO APPROPRIATE TRAPS OR STABLE OUTLETS.

9. ALL WATERS OF THE STATE (WOS), INCLUDING WETLANDS, ARE TO BE FLAGGED OR OTHERWISE CLEARLY MARKED IN THE FIELD. A DOUBLE ROW OF SILT FENCE IS TO BE INSTALLED IN ALL AREAS WHERE A 50-FOOT BUFFER CAN NOT BE MAINTAINED BETWEEN THE DISTURBED AREA AND ALL WOS. A 10-FOOT BUFFER SHOULD BE MAINTAINED BETWEEN THE LAST ROW OF SILT FENCE AND ALL WOS.

10. LITTER, CONSTRUCTION DEBRIS, OILS, FUELS, AND BUILDING PRODUCTS WITH SIGNIFICANT POTENTIAL FOR IMPACT (SUCH AS STOCKPILES OF FRESHLY TREATED LUMBER) AND CONSTRUCTION CHEMICALS THAT COULD BE EXPOSED TO STORM WATER MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE IN STORM WATER DISCHARGES.

11. A COPY OF THE SWPPP, INSPECTIONS RECORDS, AND RAINFALL DATA MUST BE RETAINED AT THE CONSTRUCTION SITE OR A NEARBY LOCATION EASILY ACCESSIBLE DURING NORMAL BUSINESS HOURS, FROM THE DATE OF COMMENCEMENT OF CONSTRUCTION ACTIVITIES TO THE DATE THAT FINAL STABILIZATION IS REACHED.

12. INITIATE STABILIZATION MEASURES ON ANY EXPOSED STEEP SLOPE (3H:1V OR GREATER) WHERE LAND-DISTURBING ACTIVITIES HAVE PERMANENTLY OR TEMPORARILY CEASED, AND WILL NOT RESUME FOR A PERIOD OF 7 CALENDAR DAYS.

13. MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL.

14. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM EQUIPMENT AND VEHICLE WASHING, WHEEL WASH WATER, AND OTHER WASH WATERS. WASH WATERS MUST BE TREATED IN A SEDIMENT BASIN OR ALTERNATIVE CONTROL THAT PROVIDES EQUIVALENT OR BETTER TREATMENTS PRIOR TO DISCHARGE.

15. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM DEWATERING OF TRENCHES AND EXCAVATED AREAS. THESE DISCHARGES ARE TO BE ROUTED THROUGH APPROPRIATE BMPS (SEDIMENT BASIN, FILTER BAG, ETC.).

16. THE FOLLOWING DISCHARGES FROM SITES ARE PROHIBITED:

   A. WASTEWATER FROM WASHOUT OF CONCRETE, UNLESS MANAGED BY AN APPROPRIATE CONTROL;

   B. WASTEWATER FROM WASHOUT AND CLEANOUT OF STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS;

   C. FUELS, OILS, OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE; AND

   D. SOAPS OR SOLVENTS USED IN VEHICLE AND EQUIPMENT WASHING.

17. AFTER CONSTRUCTION ACTIVITIES BEGIN, INSPECTIONS MUST BE CONDUCTED AT A MINIMUM OF AT LEAST ONCE EVERY CALENDAR WEEK AND MUST BE CONDUCTED UNTIL FINAL STABILIZATION IS REACHED ON ALL AREAS OF THE CONSTRUCTION SITE.

18. IF EXISTING BMPS NEED TO BE MODIFIED OR IF ADDITIONAL BMPS ARE NECESSARY TO COMPLY WITH THE REQUIREMENTS OF THIS PERMIT AND/OR SC $^{5}/_{32}$S WATER QUALITY STANDARDS, IMPLEMENTATION MUST BE COMPLETED BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE. IF IMPLEMENTATION BEFORE THE NEXT STORM EVENT IS IMPRACTICABLE, THE SITUATION MUST BE DOCUMENTED IN THE SWPPP AND ALTERNATIVE BMPS MUST BE IMPLEMENTED AS SOON AS REASONABLY POSSIBLE.

19. A PRE-CONSTRUCTION CONFERENCE MUST BE HELD FOR EACH CONSTRUCTION SITE WITH AN APPROVED ON-SITE SWPPP PRIOR TO THE IMPLEMENTATION OF CONSTRUCTION ACTIVITIES. FOR NON-LINEAR PROJECTS THAT DISTURB 10 ACRES OR MORE THIS CONFERENCE MUST BE HELD ON-SITE UNLESS THE DEPARTMENT HAS APPROVED OTHERWISE.

SEDIMENT & EROSION CONTROL CONSTRUCTION SEQUENCE

1. ESTABLISH LIMITS OF DISTUBANCE / CONSTRUCTION.
2. INSTALL TEMPORARY CONSTRUCTION ENTRANCE(S) PER SCDOT STD. 815-505-00.
3. INSTALL SILT FENCE AS SHOWN ON THE EROSION CONTROL PLANS AND PER SCDOT STD. 815-605-00.
4. INSTALL SEDIMENT TUBES IN EXISTING DITCHES PER SCDOT STD. 815-205-00.
5. CLEAR AND GRUB SITE.
6. ROUGH GRADE PROPOSED DITCHES AND INSTALL SEDIMENT TUBES PER SCDOT STD. 815-205-00 AND AS DETAILED ON PLAN SHEET EC1.
7. INSTALL PROPOSED STORM DRAINAGE SYSTEMS AS SHOWN ON THE DRAINAGE PLANS.
8. INSTALL INLET STRUCTURE FILTERS AT ALL STORM DRAINAGE STRUCTURES PER SCDOT STD. 815-002-00 AND 815-006-00 AND AS SHOWN ON THE EROSION CONTROL PLANS.
9. PLACE RIP RAP AT PIPE OUTLETS AS SHOWN IN THE PLANS.
10. FINE GRADE TO PROPOSED GRADES SHOWN IN THE PLANS AND CROSS SECTIONS.
11. TEMPORARY SEED ALL DISTURBED AREAS AS DESCRIBED IN SCDOT STANDARD SPECIFICATION SECTION 810 FOR SEEDING.
12. FINE GRADE ALL DITCHES AND BACK SLOPES.
13. LINE PROPOSED DITCHES WITH TEMPORARY EROSION CONTROL BLANKET AS SHOWN ON SHEET EC1 AND PER SCDOT STANDARD SPECIFICATION 815-605-00.
14. PERMANENT SEED ALL DISTURBED AREAS AS DESCRIBED IN SCDOT STANDARD SPECIFICATION SECTION 810 FOR SEEDING.
15. ONCE THE SITE IS STABILIZED, REMOVE ALL TEMPORARY EROSION CONTROL DEVICES.
16. PERMANENT SEED ALL AREAS WHERE EROSION CONTROL DEVICES WERE REMOVED AS DESCRIBED IN SCDOT STANDARD SPECIFICATION SECTION 810 FOR SEEDING.

CONSTRUCTION SEQUENCE NOTES

IF NPDES COVERAGE IS BEING ISSUED AFTER LAND-DISTURBING ACTIVITIES HAVE ALREADY STARTED (E.G. IN RESPONSE TO A NOTICE TO COMPLY, NOTICE OF VIOLATION, OR ENFORCEMENT ACTION), THEN THE CONSTRUCTION SEQUENCE MUST SPECIFICALLY INDICATE THE ITEMS THAT HAVE ALREADY OCCURRED AND THE ITEMS THAT WILL BE OCCURING AFTER NPDES COVERAGE IS ISSUED.

IF FLOWS FROM OFFSITE AREAS WILL BE DIVERTED AROUND THE SITE AND THE ON-SITE STRUCTURES ARE NOT DESIGNED TO HANDLE FLOWS FROM OFFSITE AREAS, THE DIVERSIONS/PIPING FOR THE OFFSITE FLOWS MUST BE INSTALLED BEFORE LAND-DISTURBING ACTIVITIES BEGIN ON THE SITE. SEDIMENT AND EROSION CONTROL MEASURES FOR THE DISTURBED AREAS FOR THE DIVERSION/PIPING MUST BE INSTALLED BEFORE THOSE AREAS ARE DISTURBED AND SHOULD BE SHOWN ON THE PLANS.

MAINTENANCE OF SEDIMENT AND EROSION CONTROL MEASURES MUST CONTINUE UNTIL THE SITE IS PERMANENTLY STABILIZED AND THE CONTROLS ARE REMOVED.

CONSTRUCTION NOTES

1. CLEARING AND GRUBBING
THE CONTRACTOR WILL BE REQUIRED TO CLEAR ALL AREAS NECESSARY FOR THE CONSTRUCTION OF ANY SEDIMENT CONTROL STRUCTURES AND INSTALL THE SEDIMENT CONTROL STRUCTURES AND ALL OTHER PERIMETER EROSION CONTOL MEASURES PRIOR TO CLEARING AND GRUBBING ACTIVITIES.

2. SEEDING
SEEDING SHALL BE ACCOMPLISHED ACCORDING TO S.C.D.O.T. SUPPLEMENTAL TECHNICAL SPECIFICATION "SEEDING-SC-M-810 (LATEST EDITION)."

3. EROSION CONTROL MEASURES
ALL EROSION CONTROL MEASURES ON THIS PROJECT SHALL BE IMPLEMENTED AS DETAILED ON THE PLANS. SILT FENCE AND OTHER EROSION CONTROL FEATURES SHALL BE IN PLACE PRIOR TO GROUND DISTURBING ACTIVITY BEGINS. EROSION CONTROL MEASURES SHALL BE IMPLEMENTED DURING ALL STAGES OF CONSTRUCTION.

4. PERIMETER EROSION CONTROL DEVICES
SILT FENCE MAY BE PLACED AT LOCATIONS WHERE SEDIMENT LEAVES THE PROJECT LIMITS ESPECIALLY AT THE TOE OF FILL SLOPES THAT SLOPE AWAY FROM THE PROJECT. SILT FENCE SHALL NOT BE PLACED IN A POSITION SUCH THAT IT BLOCKS DRIVEWAYS OR POINTS OF ACCESS TO PROPERTY.

5. INSPECTION AND IMPLEMENTATION
ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE NPDES GENERAL CONSTRUCTION PERMIT. STABILIZATION MEASURES SHALL BE IMPLEMENTED AS SOON AS PRACTICABLE WITHIN THE ALLOWABLE TIME FRAME STATED WITHIN THE NPDES GENERAL CONSTRUCTION PERMIT IN PORTIONS OF THE SITE WHERE ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL FINAL STABILIZATION HAS BEEN OBTAINED.

6. BARRIER FENCE
THE CONSTRACTOR SHALL INSTALL AND MAINTAIN A BARRIER FENCE TO MARK ALL BOUNDARIES OF JURISDICTIONAL WATERS OF THE STATE, CULTURAL RESOURCE AREAS, AND OTHER ENVIRONMENTAL SENSITIVE AREAS WITHIN THE PROJECT CORRIDOR. THE FENCE AND FLAGGING SHALL BE PLACED PRIOR TO ANY LAND DISTURBANCE ACTIVITIES. REFER TO THE PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION. THE CONTRACTOR SHALL MAINTAIN BARRIER FENCE FOR THE DURATION OF THE PROJECT AS DETERMINED BY THE RESIDENT CONSTRUCTION ENGINEER.

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
HDR ENGINEERING INC. OF THE CAROLINAS No. C0318

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
No. 26549
DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)

EROSION CONTROL NOTES

S-32-1551 SHT EC-BE-NOTES

PLOT DRIVER: pdf-fullsize202
USER: DHUGHEY
FILE: EC-BE-NOTES
DATE: 2026.06-22
PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:42:29 PM

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	EC2

SCDOT
South Carolina Department of Transportation

EROSION CONTROL DATA SHEET

RECEIVING WATERS

ROAD / ROUTE	OUTFALL DITCH STATION	SIDE	NAME OF RECEIVING WATERS	NAME OF ULTIMATE RECEIVING WATERS
BERRYHILL RD.	308+75	RT	STOOP CREEK	SALUDA RIVER
S-32-1551				
BERRYHILL RD.	313+75	RT	STOOP CREEK	SALUDA RIVER
S-32-1551				
BERRYHILL RD.	342+30	LT	STOOP CREEK	SALUDA RIVER
S-32-1551				

SOIL TYPES

ROAD / ROUTE	STATION TO STATION		SOIL PARTICLE SIZE (COARSE / FINE)	ZONE
BERRYHILL RD.	301+78	362+50	COARSE	SANDHILLS
S-32-1551				

TEMPORARY EROSION CONTROL BLANKET

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF BLANKET (FT)	DITCH BOTTOM WIDTH (FT)	SLOPES x : 1 FRONT	SLOPES x : 1 BACK	MSY
BERRYHILL	310+30	313+50	LT	1	0	2.0	2.0	0.159
BERRYHILL	314+20	319+30	LT	1	0	2.0	6.0	0.471
BERRYHILL	319+50	325+00	LT	1	0	2.0	6.0	0.508
BERRYHILL	361+50	362+50	LT	1	0	8.0	4.0	0.135
BERRYHILL	313+80	314+85	RT	1.75	0	4.0	2.0	0.130
BERRYHILL	344+25	345+90	RT	1.25	0	2.0	2.0	0.102
BERRYHILL	352+65	354+65	RT	1.5	0	6.0	2.0	0.277
							TOTAL	1.784

TURF REINFORCED MATTING (TRM)

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF MAT (FT)	SLOPES (x : 1) FRONT	SLOPES (x : 1) BACK	DITCH BOTTOM WIDTH (FT)	TYPE	TYPE 1 (MSY)	TYPE 2 (MSY)	TYPE 3 (MSY)
BERRYHILL	308+60	310+10	LT	3.5	2	2	12	1	0.461		
BERRYHILL	325+15	331+20	LT	1.5	2	6	0	1	0.839		
BERRYHILL	331+30	337+85	LT	1	2	6	0	1	0.605		
								TOTALS	1.905		

SEDIMENT TUBES IN DITCHES

ROAD / ROUTE	STATION TO STATION		SIDE	AVERAGE LENGTH	SPACING (FT)	TOTAL	COMMENTS
BERRYHILL	308+68	310+04	LT	26	150	52	
BERRYHILL	310+30	313+50	LT	8	150	32	
BERRYHILL	314+17	319+34	LT	12	150	60	
BERRYHILL	319+53	325+00	LT	12	75	108	
BERRYHILL	325+10	329+79	LT	12	40	156	
BERRYHILL	328+79	337+88	LT	16	40	384	
BERRYHILL	361+35	362+50	LT	18	150	36	
BERRYHILL	302+90	303+45	RT	18	25	72	
BERRYHILL	303+96	304+30	RT	20	50	40	
BERRYHILL	305+55	307+55	RT	8	150	24	
BERRYHILL	311+35	313+75	RT	18	150	72	
BERRYHILL	313+78	314+75	RT	10	150	20	
BERRYHILL	325+99	332+50	RT	12	100	96	
BERRYHILL	333+50	336+60	RT	12	25	168	
BERRYHILL	341+34	341+85	RT	8	75	16	
BERRYHILL	342+55	343+50	RT	10	50	30	
BERRYHILL	344+24	345+75	RT	10	40	50	
BERRYHILL	346+53	348+50	RT	12	50	60	
BERRYHILL	349+48	351+88	RT	12	50	72	
BERRYHILL	352+64	354+64	RT	14	150	42	
BERRYHILL	357+53	358+50	RT	10	50	30	
						TOTAL	1620

SEDIMENT DAM

NO	ROAD / ROUTE	STATION	SIDE	DRAINED OR NOT DRAINED	LENGTH OF SILT BASIN	WIDTH OF SILT BASIN	DAM HEIGHT	SIDE SLOPE OF SILT BASIN	SPILLWAY BOTTOM WIDTH	DAM BOTTOM WIDTH	RIP RAP CLASS	TOTAL STORAGE VOLUME	SEDIMENT STORAGE HEIGHT	OUTFALL CHANNEL WIDTH	OUTFALL CHANNEL DEPTH	OUTFALL CHANNEL LENGTH

HDR ENGINEERING INC.
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803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS — SOUTH CAROLINA — CERTIFICATE OF AUTHORIZATION No. C038

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26549 — JUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)

EROSION CONTROL DATA SHEET

S-32-1551 SHT EC-BE-DATA

PLOT DRIVER: pdf-fullsize2021
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VOLUME 1

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON	P043328	S-32-1551	EC2A

SCDOT
South Carolina Department of Transportation

EROSION CONTROL DATA SHEET

RECEIVING WATERS

ROAD / ROUTE	OUTFALL DITCH STATION	SIDE	NAME OF RECEIVING WATERS	NAME OF ULTIMATE RECEIVING WATERS
BERRYHILL RD.	308+75	RT	STOOP CREEK	SALUDA RIVER
S-32-1551				
BERRYHILL RD.	313+75	RT	STOOP CREEK	SALUDA RIVER
S-32-1551				
BERRYHILL RD.	342+30	LT	STOOP CREEK	SALUDA RIVER
S-32-1551				

SOIL TYPES

ROAD / ROUTE	STATION TO STATION		SOIL PARTICLE SIZE (COARSE / FINE)	ZONE
BERRYHILL RD.	301+78	362+50	COARSE	SANDHILLS
S-32-1551				

TEMPORARY EROSION CONTROL BLANKET

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF BLANKET (FT)	DITCH BOTTOM WIDTH (FT)	SLOPES x : 1 FRONT	SLOPES x : 1 BACK	MSY
BERRYHILL*	310+15	312+05	LT	8	0	2.0		0.378
BERRYHILL*	339+80	341+35	LT	10	0	2.0		0.385
BERRYHILL*	343+55	345+50	LT	7	0	2.0		0.339
BERRYHILL*	361+45	362+35	LT	5	0	4.0		0.206
BERRYHILL*	302+75	304+65	RT	8	0	3.0		0.534
BERRYHILL*	307+00	307+80	RT	5	0	2.0		0.099
BERRYHILL*	310+25	311+90	RT	8	0	2.0		0.328
BERRYHILL*	337+90	338+75	RT	6	0	4.0		0.234
BERRYHILL*	339+75	341+30	RT	8	0	2.0		0.308
BERRYHILL*	343+55	345+20	RT	7	0	2.0		0.287
BERRYHILL*	355+20	357+20	RT	10	0	2.0		0.497
*EC BLANKET FOR FILL SLOPES ONLY							TOTAL	3.595

TURF REINFORCED MATTING (TRM)

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF MAT (FT)	SLOPES (x : 1) FRONT	SLOPES (x : 1) BACK	DITCH BOTTOM WIDTH (FT)	TYPE	TYPE 1 (MSY)	TYPE 2 (MSY)	TYPE 3 (MSY)
BERRYHILL	302+90	303+45	RT	1	3	8	0	1	0.069		
BERRYHILL	303+95	304+30	RT	1	3	12	0	1	0.059		
BERRYHILL	305+55	307+45	RT	1	4	2	0	1	0.134		
BERRYHILL	311+35	313+75	RT	2.5	2	2	4	1	0.405		
BERRYHILL	325+90	332+50	RT	1	5	1	0	1	0.478		
BERRYHILL	333+50	336+65	RT	1	6	2	0	1	0.291		
BERRYHILL	346+45	348+65	RT	1.25	6	2	0	1	0.254		
BERRYHILL	349+45	351+90	RT	1.25	6	2	0	1	0.283		
BERRYHILL	357+55	358+50	RT	1	6	2	0	1	0.088		
								TOTALS	2.061		

SEDIMENT TUBES IN DITCHES

ROAD / ROUTE	STATION TO STATION		SIDE	AVERAGE LENGTH	SPACING (FT)	TOTAL	COMMENTS
						TOTAL	

SEDIMENT DAM

NO	ROAD / ROUTE	STATION	SIDE	DRAINED OR NOT DRAINED	LENGTH OF SILT BASIN	WIDTH OF SILT BASIN	DAM HEIGHT	SIDE SLOPE OF SILT BASIN	SPILLWAY BOTTOM WIDTH	DAM BOTTOM WIDTH	RIP RAP CLASS	TOTAL STORAGE VOLUME	SEDIMENT STORAGE HEIGHT	OUTFALL CHANNEL WIDTH	OUTFALL CHANNEL DEPTH	OUTFALL CHANNEL LENGTH

PLOT DRIVER: pdf-fullsize2021
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TIME: 12:42:38 PM

HDR ENGINEERING INC.
OF THE CAROLINAS
1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA HDR ENGINEERING INC. OF THE CAROLINAS CERTIFICATE OF AUTHORIZATION No. C038

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
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TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1551 (BERRYHILL ROAD)

EROSION CONTROL DATA SHEET

S-32-1551 SHT EC-BE-DATA

C

Appendix C:

Burning Tree Drive Drainage & Erosion Control Plans

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	D05

GENERAL DRAINAGE NOTES

1. PIPES TO BE ABANDONED SHALL EITHER BE REMOVED OR FILLED WITH FLOWABLE FILL.

2. REINFORCED-CONCRETE PIPE SHALL BE USED FOR ALL PIPES UNDERNEATH INTERSTATES AND ANY RAMPS WHERE INSTALLATION IS USED UNDER THE EXISTING ROADWAY OR MEDIAN.

3. TRENCHLESS INSTALLATION OF PIPE IS RECOMMENDED FOR EXISTING ROADWAY CROSSINGS FOR ALL NEW PIPE UNDER THE EXISTING INTERSTATE TRAVELED WAY. THE DIAMETER LISTED ON THE PLANS IS REQUIRED FOR HYDRAULIC OPENING OF THE PIPE. LENGTH OF THE TRENCHLESS INSTALLATION IS TO BE DETERMINED BY THE CONTRACTOR. LENGTHS LISTED ON THE PLANS ARE FOR THE ENTIRE LENGTH OF PIPE TO BE INSTALLED.

4. ALL EXISTING MEDIAN AND SIDELINE ASPHALT OR CONCRETE DITCH LININGS WITHIN PROJECT LIMITS ARE TO BE REMOVED AND REPLACED UNLESS NOTED OTHERWISE. FOR ANY THAT ARE TO BE RETAINED, REPAIR IN ACCORDANCE WITH SPECIAL PROVISION 815 EROSION CONTROL.

5. PIPE LENGTHS AS SHOWN IN THE DRAINAGE PLAN SHEETS AND PIPE DATA TABLES INCLUDE END TREATMENTS (BEVELED-END SECTIONS, ETC.) IN THE TOTAL PIPE LENGTH. BEVELED-END SECTIONS SHALL BE INSTALLED IN ACCORDANCE WITH SCDOT STANDARD DRAWING 719-610-00.

6. RIPRAP QUANTITIES SHOWN ON PLAN SHEETS ONLY ACCOUNT FOR OUTLET RIPRAP APRONS, BASINS, AND DITCH LININGS. PIPE PROTECTION AND SLOPE PROTECTION AROUND WING WALLS ARE NOT DETAILED OR QUANTIFIED ON THE PLAN SHEETS.

7. ALL EXISTING PIPE NETWORKS AND CULVERTS WITHIN SCDOT RIGHT OF WAY THAT ARE TO BE RETAINED WILL REQUIRE A VIDEO INSPECTION, IF NOT ALREADY INSPECTED. FOR ALL PIPES OR CULVERTS REQUIRING VIDEO INSPECTION DURING CONSTRUCTION, THE CONTRACTOR SHALL:
   A. LOCATE AND EXCAVATE EACH END OF THE CULVERT AND CLEAN OUT SEDIMENT OR DEBRIS.
   B. PERFORM A FIELD AND VIDEO INSPECTION IN ACCORDANCE WITH SCDOT'S PIPE AND CULVERT INVENTORY AND INSPECTION GUIDELINES (2011).
   C. UPON COMPLETION OF THE VIDEO INSPECTION, PROVIDE PIPE VIDEO AND INSPECTION REPORT TO THE ENGINEER FOR REVIEW. NO CONSTRUCTION ON THE CULVERT SHALL PROCEED UNTIL THE ENGINEER HAS PROVIDED A SIGNED LETTER OR REPORT STATING THE RECOMMENDED ALTERNATIVES TO REPLACEMENT.

8. EXISTING PIPE CULVERT DEFICIENCIES ARE DETAILED ON THE DRAINAGE PLAN SHEETS FOR ALL PIPES REQUIRING REPAIRS. FOR PIPES NOT SPECIFIED AS "LINE EXISTING PIPE" THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF THE CHOSEN METHOD OF REPAIR INVOLVES LINING OR ANY OTHER METHOD OF REPAIR THAT WILL REDUCE THE INSIDE DIAMETER OF THE EXISTING PIPE PRIOR TO REPAIRING.

9. ALL DRAINAGE STRUCTURES OTHER THAN THOSE NOTED IN THE PLANS AS "BLIND" SHALL BE ACCESSIBLE TO THE FINAL SURFACE GRADE BY EITHER MANHOLE OR GRATE ACCESS.

10. BOXES TO BE RETAINED WILL BE REQUIRED TO BE RETROFITTED. DAMAGED BOXES WILL BE REQUIRED TO BE REPLACED.

11. PRECAST MANHOLES AND CATCH BASINS WILL BE USED FOR THE FOLLOWING CONDITIONS:
   A. WHERE THE DEPTH EXCEEDS 12 FEET AS MEASURED FROM RIM TO BOTTOM OF THE BOTTOM SLAB.
   B. WHERE THE FLOW LINE ELEVATION OF THE INLET PIPE IS HIGHER THAN THE SOFFIT OF THE OUTLET PIPE.
   C. AT THE ENGINEER'S DISCRETION.

12. DRIVEWAY PIPES ARE SHOWN IN THE PLANS BUT ARE NOT TABULATED WITHIN THE PIPE TABLES. INVERT LOCATIONS AND ELEVATIONS ARE TO BE SET BASED ON THE FINAL DITCH GRADES AS DETAILED IN THE CROSS SECTIONS.

13. AVOID CONSTRUCTION VEHICLE TRAFFIC OVER INSTALLED PIPE WHERE POSSIBLE. DO NOT DRIVE CONSTRUCTION VEHICLES OVER INSTALLED PIPE DIAMETER LESS THAN THE LARGER OF 3 FEET OR ONE PIPE DIAMETER OF FILL. IF FILL HEIGHT IS SUFFICIENT AND CROSSING IS UNAVOIDABLE, PERIODICALLY CHANGE LOCATION OF EQUIPMENT CROSSING OVER PIPE IN ORDER TO MINIMIZE THE CHANCE OF LATERAL DISPLACEMENT.

14. UPON COMPLETION AND STABILIZATION, ALL TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED AND GRADED FOR POSITIVE DRAINAGE, INCLUDING SEDIMENT DAMS AND TEMPORARY SEDIMENT BASINS. PERMANENT DETENTION OR WATER QUALITY PONDS ARE TO REMAIN.

15. TYPE D2 INLET FILTERS ARE TO BE PLACED AT ALL DROP INLETS AND MANHOLES IN SUMP MEDIAN AND DITCH LOCATIONS. ALL OTHER INLETS ARE TO BE PROTECTED WITH TYPE A INLET FILTERS ONCE INSTALLED. AFTER ROAD BASE COURSE IS PLACED, PLACE WEIGHTED TYPE F INLET TUBES AT ALL INLETS WITHIN THE PAVED AREAS. FOR CURB INLETS, PLACE TYPE F INLET FILTERS ONCE ROAD SURFACE COURSE IS PLACED.

16. THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) LINE IS USED TO DENOTE LAND-DISTURBING ACTIVITIES ONLY WHEN NECESSARY TO GO BEYOND THE CONSTRUCTION LIMITS. SILT FENCE IS TO BE OFFSET 1' TO THE INSIDE OF THE NPDES LOCATION AS SHOWN ON PLANS (PER FIGURE 12.1-B OF THE SCDOT ROADWAY DESIGN MANUAL 2017). IN LOCATIONS WHERE NPDES LINES CROSS EXISTING DITCHES OR STREAM CHANNELS, SILT FENCE IS TO BE INSTALLED UP TO THE CHANNEL BANK BUT IS NOT TO CROSS THE STREAM AND IS NOT TO IMPEDE FLOW.

COMMON ABBREVIATIONS

BCXT	BOX CULVERT EXTENSION
BE	BERRYHILL ROAD
BRDG	BRIDGE
BR	BROWNING ROAD
BS	BUSH RIVER ROAD
BT	BURNING TREE DRIVE
CB	PROP. CATCH BASIN
CC	PROP. CONCRETE COLLAR
DB	DETENTION BASIN
DI	PROP. DROP INLET
EB	EASTBOUND
EC	EX. BOX CULVERT
EP	EX. PIPE
EX	EXISTING
EXCB	EX. CATCH BASIN
EXDB	EX. DETENTION BASIN
EXDI	EX. DROP INLET
EXHW	EX. HEADWALL
EXJ	EX. JUNCTION
EXJB	EX. JUNCTION BOX
EXMH	EX. MANHOLE
EXOEP	EX. OPEN PIPE END

HW	PROP. HEADWALL
JB	PROP. JUNCTION BOX
LF	LINEAR FEET
MCB	MEDIAN CATCH BASIN
MH	PROP. MANHOLE
NB	NORTHBOUND
NC	PROP. BOX CULVERT
NP	PROP. PIPE
OC	OPEN CHANNEL
OEP	PROP. OPEN PIPE END
OP	PIPE OUTFALL
PO	POND OUTFALL STRUCTURE
PR	PROPOSED
RCBC	REINFORCED-CONCRETE BOX CULVERT
RCP	REINFORCED-CONCRETE PIPE
RO	ROCKLAND ROAD
SB	SOUTHBOUND
SLP	SLIP-LINE PIPE
STB	STORAGE BASIN
SWP	SMOOTH-WALL PIPE
WB	WESTBOUND
XL	CROSSLINE

LINE STYLE LEGEND

PROP. STORM DRAIN PIPE

PROP. "V" DITCH

PROP. TRAPEZOIDAL DITCH

PROP. BRIDGE END FLUME

EXISTING PIPE

HDR ENGINEERING INC.
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SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER No. 26549 — DESTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)

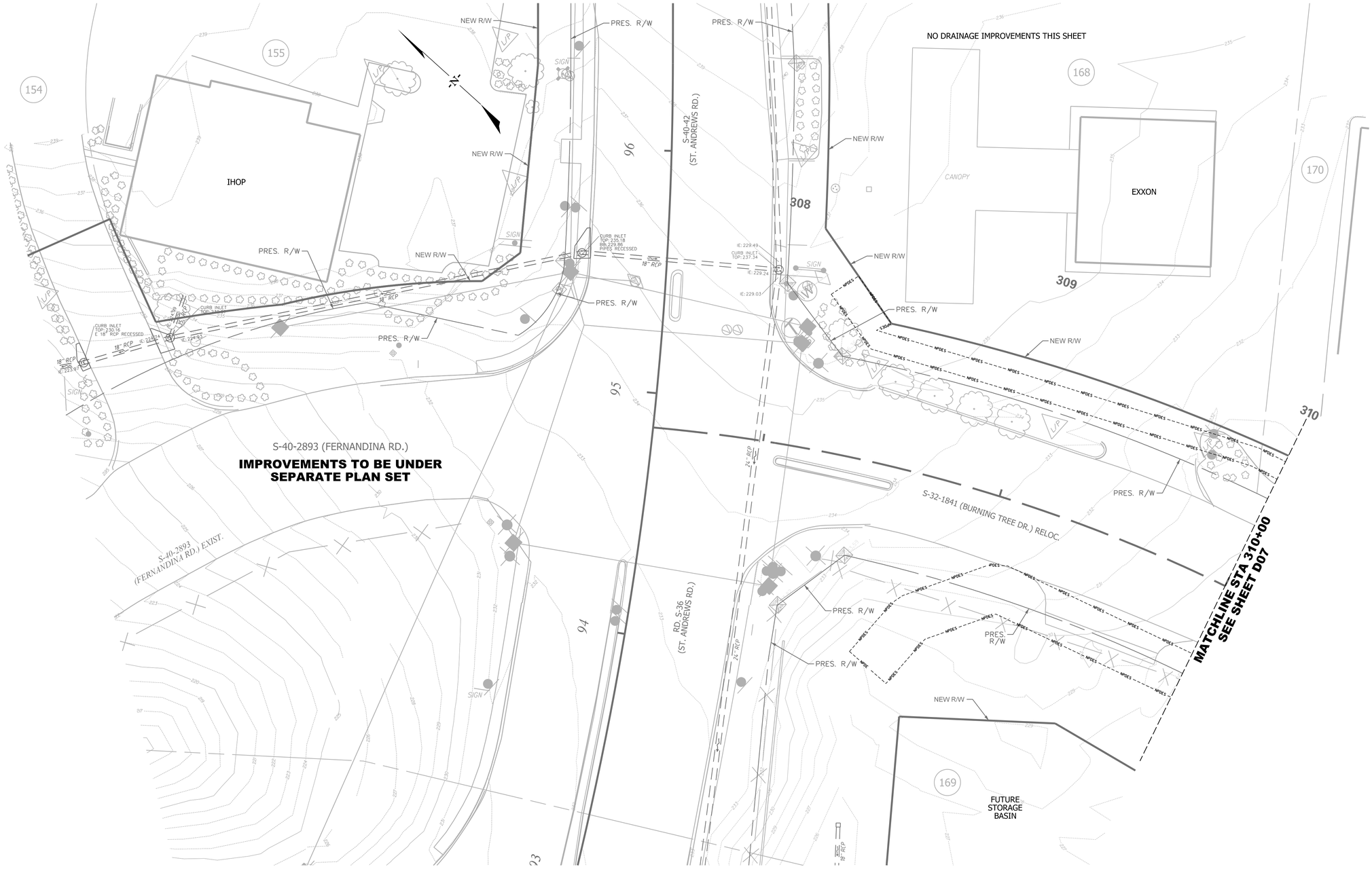
DRAINAGE NOTES

S-32-1842 / S-40-2893 SHT D-BT-NOTES

PLOT DRIVER: pdf-fullsize202
USER: DHUGHEY
FILE: D-BT-NOTES
DATE: 2026.06.22
PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:42:45 PM

VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	D06



PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BT-DRN_SHTS

DATE: 2026.06-22

PEN TABLE: SCDOT_PenTable_DRAINAGE
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HDR ENGINEERING INC. OF THE CAROLINAS
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803-509-6600

SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS No. C038 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26549 — DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
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2			
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R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE PLAN SHEET
STA. 307+60.45 TO STA. 310+00

S-32-1842 / S-40-2893

SHT BT-D06

VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	D07

CHUCK E. CHEESE

NOTE:
1. FOR PIPE DATA TABLE SEE SHEET D15

* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BT-OP-0760	3	B	11	2	C
BT-OP-0780	9	B	21	2	C
BT-STBA-07	285	B	521	2	C

MATCHLINE STA 310+00
SEE SHEET D06

MATCHLINE STA 316+00
SEE SHEET D08

NEW R/W

PRES. R/W

RETAIN EX. 2x 42" RCPs (BT-EP-0752)

RETAIN EX. DI T112 (BT-EXDI-0751)

RETAIN EX. 15" RCP

RETAIN EX. 42" RCP (BT-EP-0751)

BEGIN ROADWAY CONSTRUCTION
SURVEY STA 313+00.00
BURNING TREE DR

PR. DI 24x36 (BT-DI-0761)

BT-NP-0761 - PR. 18" SWP

BT-OP-0760 OUTFALL*

RETAIN EX. 24" RCP

BT-NP-0783 PR. 30" SWP

BT-OC-LT07.1 "V" DITCH SEE XS SHEETS

BT-OC-LT07.2 "V" DITCH SEE XS SHEETS

BT-NP-0797 PR. 18" SWP

S-32-1841 (BURNING TREE DR.) RELOC.

PR. CB T16 (BT-CB-0782)

PR. CB T18 (BT-CB-0797)

BT-NP-0782 PR. 30" SWP

BT-NP-0816 PR. 18" SWP

PR. MANHOLE (BT-MH-0781)

BT-NP-0781 PR. 30" SWP

BT-OP-0780 OUTFALL*

CUT EX. 42" RCP (BT-OP-0750) REMOVE DOWNSTREAM SECTIONS

STORAGE BASIN BT-STBA-07

SEE SHEET GR3 FOR BASIN GRADING

RIPRAP* (BT-STBA-07)

FUTURE STORAGE BASIN

EX. SLIP RAMP FROM I-26 NB TO BURNING TREE DR.

DROP INLET TOP:223.32 BB:221.09 PIPES RECESSED

DROP INLET TOP:221.012 NW 15" RCP RECESSED

STORM LID:224.96 FILLED WITH WATER

STORM LID:225.10

170 171 171A 169

310 311 312 313 314 315 316

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BT-DRN_SHTS

DATE: 2026.06-22

PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:42:58 PM

HDR ENGINEERING INC. OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS No. C038 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26549 — DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE PLAN SHEET
STA. 310+00 TO STA. 316+00

S-32-1842 / S-40-2893 SHT BT-D07

VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	D08

NOTE:
1. FOR PIPE DATA TABLE SEE SHEET D15

MATCHLINE STA 316+00 SEE SHEET D07

MATCHLINE STA 321+00 SEE SHEET D09

RETAIN EX. 36" CMP (BT-EP-0834)

PRES. R/W

EXISTING SYSTEM TO BE RELOCATED (BY OTHERS) OFF OF SCDOT ROW

NEW R/W

BT-NP-0816 PR. 18" SWP

PR. CB T16 (BT-CB-0816)

REMOVE EX. 15" CMP

BT-OC-LT07.2 "V" DITCH SEE XS SHEETS

CUT EX. 36" CMP FOR PLACEMENT OF PR. CB T16 (BT-CB-0833)

EXISTING SYSTEM TO BE RELOCATED (BY OTHERS) OFF OF SCDOT ROW

PR. DI 24x36 (BT-DI-0857)

NEW R/W

EXISTING SYSTEM TO BE RELOCATED (BY OTHERS) OFF OF SCDOT ROW

CONSTRUCT 5' BERM SEE XS SHEETS

BT-NP-0857 PR. 18" SWP

BT-NP-0886 PR. 18" SWP

PRES. R/W

PR. CB T16 (BT-CB-0856)

PR. CB T17 (BT-CB-0886)

PR. CB T9 (6'x6') (BT-CB-0832) W/ WEIR OPEN TO DITCH

BT-NP-0856 PR. 18" SWP

S-32-1841 (BURNING TREE DR.) RELOC.

REMOVE EX. 15" CMP

BT-NP-0833 PR. 42" SWP

REMOVE EX. 15" RCP

BT-OC-RT08.1 "V" DITCH SEE XS SHEETS

BT-NP-0832 PR. 48" SWP

REMOVE EX. 42" RCP

REMOVE EX. CB

REMOVE EX. 42" RCP

EX. BURNING TREE DR

RETAIN EX. 18" RCP UNTIL FUTURE PHASE

PLUG EX. 42" RCP ABANDON DOWNSTREAM

PR. CB T9 (6'x6') (BT-CB-0831) W/ WEIR OPEN TO DITCH

APPROX. J&B LAUNCH PIT

I26-NP-0831 PR. 54" SWP

RAMP FROM I-26 WB TO ST. ANDREWS RD.

RETAIN DOWNSTREAM SYSTEM UNTIL FUTURE PHASE

XL-02 - PR. 54" SWP TRENCHLESS INSTALL REQUIRED UNDER ALL EXISTING I-26 TRAVEL LANES SEE SHEET XL02

INTERSTATE 26 WB

INTERSTATE 26 WB

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BT-DRN_SHTS

PEN TABLE: SCDOT_PenTable_DRAINAGE
DATE: 2026.06-22
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HDR ENGINEERING INC. OF THE CAROLINAS
1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA PROFESSIONAL ENGINEER No. 26549 DESTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE PLAN SHEET
STA. 316+00 TO STA. 321+00

S-32-1842 / S-40-2893

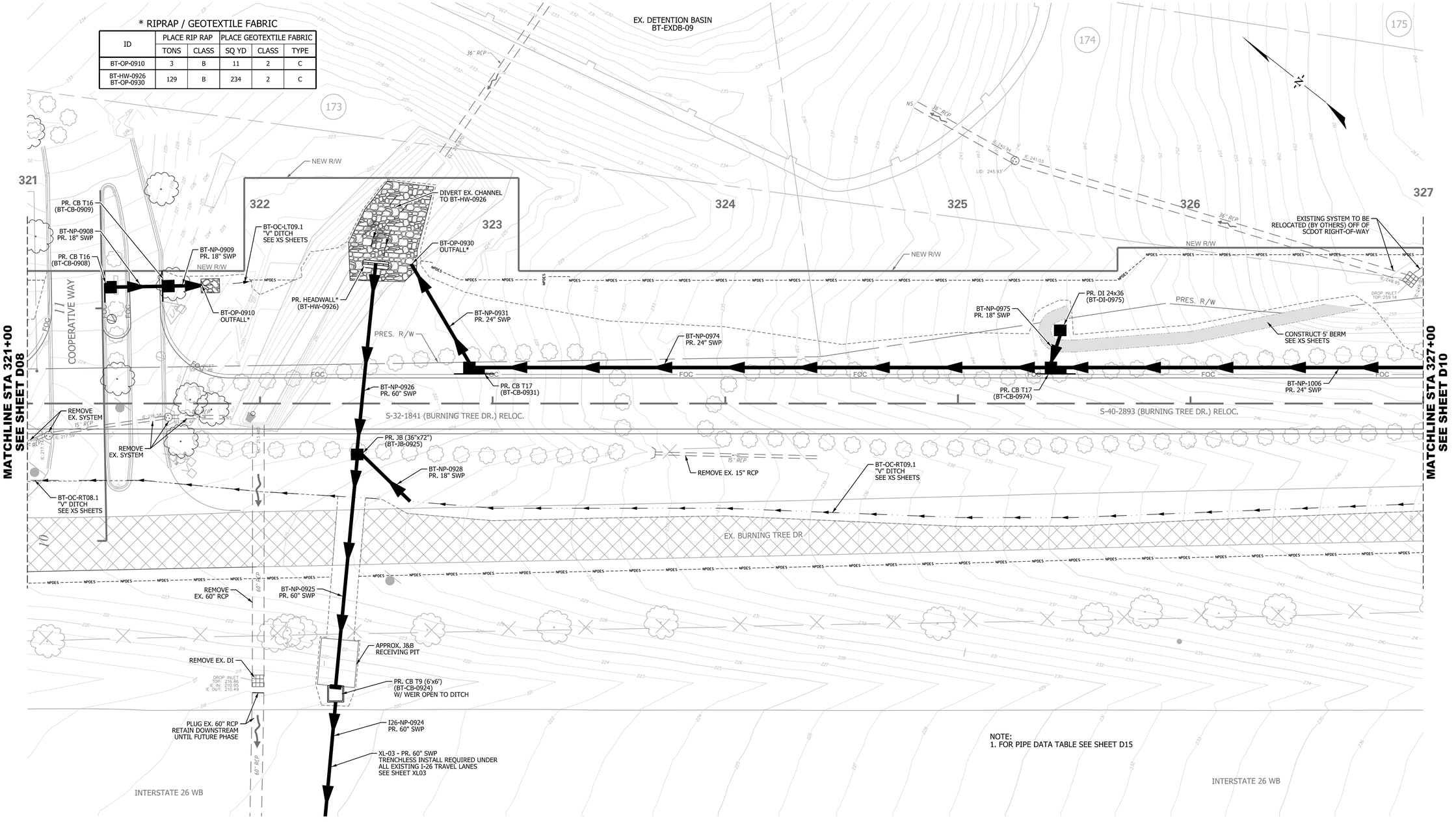
SHT BT-D08

VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	D09

* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BT-OP-0910	3	B	11	2	C
BT-HW-0926 BT-OP-0930	129	B	234	2	C



HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS — CERTIFICATE OF AUTHORIZATION No. C038

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 JUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE PLAN SHEET
STA. 321+00 TO STA. 327+00

S-32-1842 / S-40-2893 SHT BT-D09

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BT-DRN_SHTS
DATE: 2026.06.22
PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:43:06 PM

VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	D10

CENTER POINT
OFFICE PARK
BUILDING 1000

174

175

* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BT-OP-1050	5	B	14	2	C
BT-OP-1060	5	B	14	2	C

MATCHLINE STA 327+00
SEE SHEET D09

MATCHLINE STA 333+00
SEE SHEET D11

327 328 329 330 331 332 333

NEW R/W

PRES. R/W

EXISTING SYSTEM TO BE RELOCATED (BY OTHERS) OFF OF SCDOT RIGHT-OF-WAY

BT-NP-1006
PR. 24" SWP

BT-NP-1007
PR. 24" SWP

PR. CB T17
(BT-CB-1006)

BT-OC-LT10.1
"V" DITCH
SEE XS SHEETS

BT-OP-1050
OUTFALL*

BT-NP-1051
PR. 18" SWP

PR. CB T17
(BT-CB-1051)

BT-OC-LT10.2
"V" DITCH
SEE XS SHEETS

BT-OP-1060
OUTFALL*

BT-NP-1061
PR. 18" SWP

PR. CB T17
(BT-CB-1061)

BT-OC-LT10.3
"V" DITCH
SEE XS SHEETS

REMOVE
EX. 18" RCP

S-40-2893 (BURNING TREE DR.) RELOC.

REMOVE EX. 24" RCP

CUT EX. 24" RCP FOR
PLACEMENT OF PR.
DI T112 (BT-DI-1012)
TO BE REMOVED IN FUTURE PHASE

BT-OC-RT09.1
"V" DITCH
SEE XS SHEETS

BT-OC-RT10.1
"V" DITCH
SEE XS SHEETS

EX. BURNING TREE DR

RETAIN EX. " RCP
(BT-EP-1012)

RETAIN
EX. DI T112
(BT-DI-1011)

RETAIN EX. SYSTEM
UNTIL FUTURE PHASE

RETAIN EX. DI

RAMP FROM I-20 WB TO I-26 WB

15" RCP
18" RCP
24" RCP

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA
HDR ENGINEERING INC.
OF THE CAROLINAS
No. C038
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 26549
DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE PLAN SHEET
STA. 327+00 TO STA. 333+00

S-32-1842 / S-40-2893 SHT BT-D10

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BT-DRN_SHTS
DATE: 2026.06-22
PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:43:10 PM

VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	D11

END CONSTRUCTION
SURVEY STA 101+39.45
CENTER POINT RD

BEGIN CONSTRUCTION
SURVEY STA 100+41.93
CENTER POINT RD

MATCHLINE STA 333+00
SEE SHEET D10

MATCHLINE STA 338+00
SEE SHEET D12

* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BT-OP-1100	8	B	24	2	C
BT-DWP-11A	3	B	11	2	C

BT-OC-LT10.3
"V" DITCH
SEE XS SHEETS

BT-OP-1100
OUTFALL*

REMOVE
EX. 18" RCP

BT-NP-1145
PR. 18" SWP

BT-OC-LT11.1
"V" DITCH
SEE XS SHEETS

BT-OC-LT11.2
"V" DITCH
SEE XS SHEETS

PLACE DRIVEWAY PIPE*
BT-DWP-11A
56 LF - 18" SWP

REMOVE EX. 15" RCP

BT-OC-RT10.1
"V" DITCH
SEE XS SHEETS

SC PHARMACY ASSOCIATION

CENTER POINT RD

EOD

EOT

NEW R/W

DEDICATED R/W

PRES. R/W

NPDES

18" RCP

15" RCP

NF. BURIED

S-40-2893 (BURNING TREE DR.) RELOC.

EX. BROWNING RD

RAMP FROM I-20 WB TO I-26 WB

RAMP FROM I-20 WB TO I-26 WB

333 334 335 336 337 338

175 177 178 179

L/P

N

NOTE:
1. FOR PIPE DATA TABLE SEE SHEET D15

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BT-DRN_SHTS

DATE: 2026-06-22

PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:43:3 PM

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C038 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 26549 JUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE PLAN SHEET
STA. 333+00 TO STA. 338+00

S-32-1842 / S-40-2893 SHT BT-D11

VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	D12

CENTER POINT BUILDING 1370

GPS

THE GROVE APARTMENT HOMES

CROWN POINTE

S-40-492 (ZIMALCREST DR.)

PRES. R/W

338

339

340

342

343

344

179

180

181

184

185

CURB INLET TOP: 300.17

BT-OC-LT11.2
"V" DITCH
SEE XS SHEETS

15" RCP

REMOVE
EX. 15" RCP

PLACE DRIVEWAY PIPE*
BT-DWP-12A
56 LF - 18" SWP

BT-OC-LT12.1
"V" DITCH
SEE XS SHEETS

IE: 298.15

18" RCP

REMOVE
EX. 18" RCP

PLACE DRIVEWAY PIPE*
BT-DWP-12B
48 LF - 18" SWP

IE: 294.65

END ROADWAY CONSTRUCTION
SURVEY STA 340+79.76
BURNING TREE DR

S-40-2893 (BURNING TREE DR.) RELOC.

EX. BROWNING RD

RAMP FROM I-20 WB TO I-26 WB

NPDES

MATCHLINE STA 338+00
SEE SHEET D11

MATCHLINE
SEE SHEET D13

* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BT-DWP-12A	3	B	11	2	C
BT-DWP-12B	3	B	11	2	C

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BT-DRN_SHTS

DATE: 2026.06-22

PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:43:18 PM

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA
HDR ENGINEERING INC.
OF THE CAROLINAS
No. C038
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 26549
DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

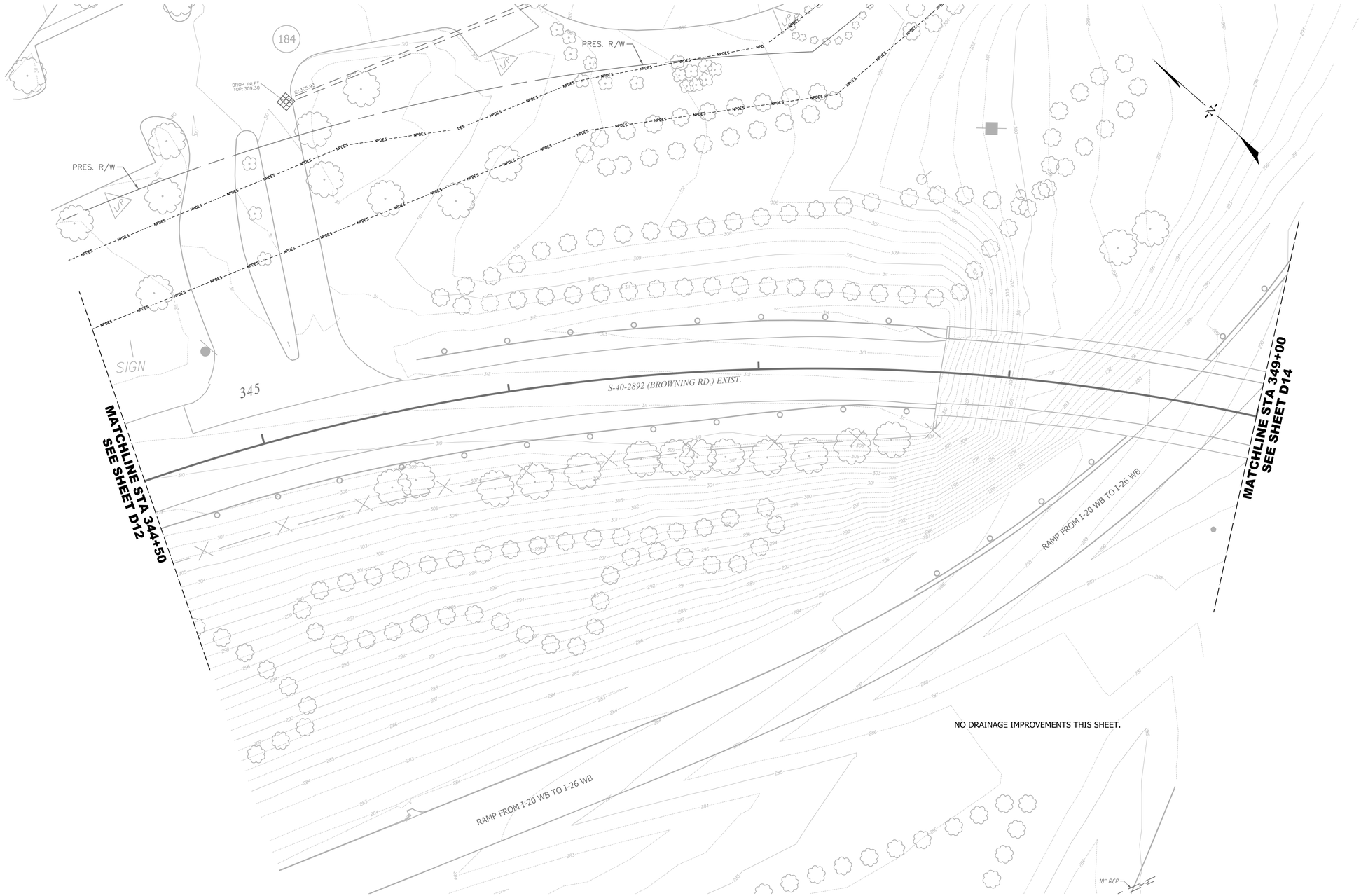
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE PLAN SHEET
STA. 338+00 TO STA. 344+00

S-32-1842 / S-40-2893 SHT BT-D12

VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	D13



PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BT-DRN_SHTS

DATE: 2026.06-22

PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:43:22 PM

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26549 — DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

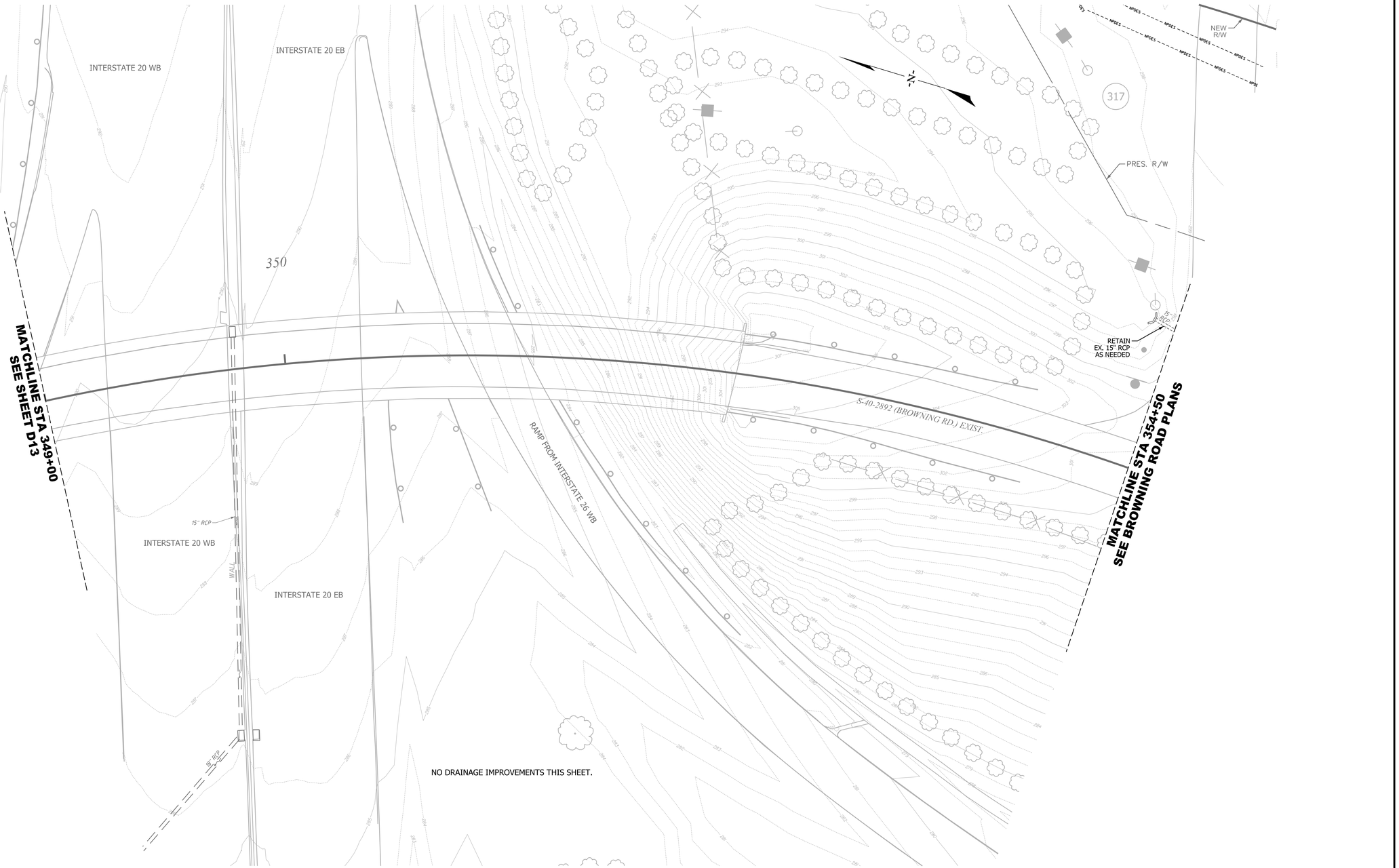
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE PLAN SHEET
STA. 344+00 TO STA. 349+00

S-32-1842 / S-40-2893 SHT BT-D13

VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	D14



NO DRAINAGE IMPROVEMENTS THIS SHEET.

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BT-DRN_SHTS
DATE: 2026.06.22
PEN TABLE: SCDOT_PenTable.DRAINAGE
TIME: 12:43:25 PM

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-8600

SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26549 — DESTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE PLAN SHEET
STA. 349+00 TO STA. 354+00

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	D15

GEOMETRY						UPSTREAM					DOWNSTREAM					FILL HEIGHT		MIN. FIELD SPT "N" BELOW INVERT	JOINT PRESSURE (PSI)	SMOOTH WALL OPTIONS					
SYSTEM ID	LINK ID	DIAMETER (IN)	NO. OF BARRELS	PIPE LENGTH (FT)	SLOPE (%)	NODE	NODE DESCRIPTION	ALIGNMENT	NODE STATION	LINK INVERT (FT)	NODE	NODE DESCRIPTION	ALIGNMENT	NODE STATION	LINK INVERT (FT)	MIN (FT)	MAX (FT)			HDPE TYPE	BUILT √	RCP HIGHEST CLASS	BUILT √	SRAP THICKEST GAGE	BUILT √
BT_0750	BT-EP-0751	42	1	126.04	1.80	BT-EXDI-0751	EX. DI	BURN_3A	312+28.77	212.27	BT-OP-0750	OUTFALL	BURN_3A	312+81.15	210.00					EP		EP		EP	
BE_0760	I26-NP-0755	60	1	411.15	0.49	BT-JB-0755	PR. JB (72"x72") (BLIND)	BURN_3A	313+66.63	200.00	BE-OP-0760	OUTFALL	BERP	310+02.78	198.00					N/A		III		N/A	
BE_0770	I26-NP-0756	60	1	239.78	0.35	I26-CB-0756	PR. CB T9 (6'x6')	I26000X	309+95.59	199.83	BE-DI-0799	PR. DI T112 (6'x6')	BERP	310+69.47	199.00					N/A		III		N/A	
BE_0770	BT-NP-0757	60	1	55.32	0.30	BT-JB-0757	PR. JB (72"x72") (BLIND)	BURN_3A	313+76.40	200.00	I26-CB-0756	PR. CB T9 (6'x6')	I26000X	309+95.59	199.83					N/A		III		N/A	
BE_0770	BT-NP-0758	60	1	115.84	0.65	BT-HW-0758	PR. HEADWALL	BURN_3A	313+39.30	200.75	BT-JB-0757	PR. JB (72"x72") (BLIND)	BURN_3A	313+76.40	200.00					N/A		III		N/A	
BE_0760	BT-NP-0759	60	1	115.75	0.65	BT-HW-0759	PR. HEADWALL	BURN_3A	313+31.65	200.75	BT-JB-0755	PR. JB (72"x72") (BLIND)	BURN_3A	313+66.63	200.00					N/A		III		N/A	
BT_0780	BT-NP-0761	18	1	51.51	2.91	BT-DI-0761	PR. DI 24x36	BURN_3A	313+35.00	216.90	BT-OP-0760	OUTFALL	BURN_3A	313+88.49	215.40					N/A		III		N/A	
BT_0780	BT-NP-0781	30	1	51.53	9.51	BT-MH-0781	PR. MH	BURN_3A	314+99.35	209.00	BT-OP-0780	OUTFALL	BURN_3A	314+63.17	204.10					S		III		16ga	
BT_0780	BT-NP-0782	30	1	53.66	3.76	BT-CB-0782	PR. CB T16	BURN_3A	315+00.00	211.02	BT-MH-0781	PR. MH	BURN_3A	314+99.35	209.00					N/A		III		N/A	
BT_0780	BT-NP-0783	30	1	12.30	10.00	BT-OEP-0783	PR. OPEN PIPE END	BURN_3A	315+00.00	212.25	BT-CB-0782	PR. CB T16	BURN_3A	315+00.00	211.02					S		III		16ga	
BT_0780	BT-NP-0797	18	1	79.13	1.39	BT-CB-0797	PR. CB T18	BURN_3A	315+85.00	212.12	BT-CB-0782	PR. CB T16	BURN_3A	315+00.00	211.02					N/A		III		N/A	
BT_0780	BT-NP-0816	18	1	44.92	2.47	BT-CB-0816	PR. CB T16	BURN_3A	316+35.00	213.23	BT-CB-0797	PR. CB T18	BURN_3A	315+85.00	212.12					N/A		III		N/A	
BE_0870	I26-NP-0831	54	1	298.80	1.67	BT-CB-0831	PR. CB T9 (6'x6')	BURN_3A	317+41.78	204.50	BE-JB-0871	PR. JB (36"x72")	BERP	313+95.32	199.50					N/A		III		N/A	
BE_0870	BT-NP-0832	48	1	67.60	2.63	BT-CB-0832	PR. CB T9 (6'x6')	BURN_3A	317+38.68	206.78	BT-CB-0831	PR. CB T9 (6'x6')	BURN_3A	317+41.78	205.00					S		III		16ga	
BE_0870	BT-NP-0833	48	1	39.93	2.93	BT-CB-0833	PR. CB T16	BURN_3A	317+37.03	209.42	BT-CB-0832	PR. CB T9 (6'x6')	BURN_3A	317+38.68	208.25					N/A		III		N/A	
BE_0870	BT-EP-0834	36	1	139.59	1.64	BT-EXOEP-0834	EX. OPEN PIPE END	BURN_3A	317+20.57	212.71	BT-CB-0833	PR. CB T16	BURN_3A	317+37.03	210.42					EP		EP		EP	
BE_0870	BT-NP-0856	18	1	145.43	1.74	BT-CB-0856	PR. CB T16	BURN_3A	318+90.00	214.45	BT-CB-0833	PR. CB T16	BURN_3A	317+37.03	211.92					N/A		III		N/A	
BE_0870	BT-NP-0857	18	1	22.52	10.00	BT-DI-0857	PR. DI 24x36	BURN_3A	318+95.00	217.70	BT-CB-0856	PR. CB T16	BURN_3A	318+90.00	215.45					N/A		III		N/A	
BE_0870	BT-NP-0886	18	1	130.34	2.03	BT-CB-0886	PR. CB T17	BURN_3A	320+25.00	217.10	BT-CB-0856	PR. CB T16	BURN_3A	318+90.00	214.45					N/A		III		N/A	
BE_0910	BT-NP-0908	18	1	20.84	0.30	BT-CB-0908	PR. CB T16	BURN_DW321	11+09.00	223.30	BT-CB-0909	PR. CB T16	BURN_DW321	11+08.99	223.24					N/A		III		N/A	
BT_0910	BT-NP-0909	18	1	12.28	6.00	BT-CB-0909	PR. CB T16	BURN_DW321	11+08.99	223.24	BT-OP-0910	OUTFALL	BURN_DW321	11+09.00	222.50					S		III		16ga	
BE_0960	I26-NP-0924	60	1	194.31	2.23	BT-CB-0924	PR. CB T9 (6'x6')	BURN_3A	322+32.51	208.84	BE-JB-0963	PR. JB (72"x72")	BERP	319+54.50	204.50					N/A		III		N/A	
BE_0960	BT-NP-0925	60	1	97.94	1.49	BT-JB-0925	PR. JB (36"x72")	BURN_3A	322+41.78	210.40	BT-CB-0924	PR. CB T9 (6'x6')	BURN_3A	322+32.51	208.94					N/A		III		N/A	
BE_0960	BT-NP-0926	60	1	80.54	5.98	BT-HW-0926	PR. HEADWALL	BURN_3A	322+49.76	215.28	BT-JB-0925	PR. JB (36"x72")	BURN_3A	322+41.78	210.46					N/A		III		N/A	
BE_0960	BT-NP-0928	18	1	29.32	1.71	BT-OEP-0928	PR. OPEN PIPE END	BURN_3A	322+65.00	224.00	BT-JB-0925	PR. JB (36"x72")	BURN_3A	322+41.78	223.50					N/A		III		N/A	
BT_0930	BT-NP-0931	24	1	49.31	10.00	BT-CB-0931	PR. CB T17	BURN_3A	322+90.00	223.23	BT-OP-0930	OUTFALL	BURN_3A	322+65.00	218.30					N/A		III		N/A	
BE_0950	I26-EP-0952	60	1	109.57	3.08	I26-MCB-0952	EX. MCB	I26000X	319+35.95	207.95	BE-EXCB-0951	EX. CB	BERP	319+38.98	204.57					EP		EP		EP	
BT_0930	BT-NP-0974	24	1	246.00	5.68	BT-CB-0974	PR. CB T17	BURN_3A	325+40.00	241.06	BT-CB-0931	PR. CB T17	BURN_3A	322+90.00	227.09					N/A		III		N/A	
BT_0930	BT-NP-0975	18	1	12.65	10.00	BT-DI-0975	PR. DI 24x36	BURN_3A	325+44.00	242.82	BT-CB-0974	PR. CB T17	BURN_3A	325+40.00	241.56					N/A		III		N/A	
BT_0930	BT-NP-1006	24	1	206.00	4.34	BT-CB-1006	PR. CB T17	BURN_3A	327+50.00	250.00	BT-CB-0974	PR. CB T17	BURN_3A	325+40.00	241.06					N/A		III		N/A	
BT_0930	BT-NP-1007	24	1	21.36	9.36	BT-OEP-1007	PR. OPEN PIPE END	BURN_3A	327+70.00	252.00	BT-CB-1006	PR. CB T17	BURN_3A	327+50.00	250.00					N/A		III		N/A	
BE_1070	I26-EP-1011	24	1	84.13	4.37	I26-EXDI-1011	EX. DI	I26000X	325+15.71	236.58	I26-MCB-1071	EX. MCB	I26000X	325+13.13	232.90					N/A		III		N/A	
BE_1070	BT-EP-1012	24	1	96.09	7.75	BT-DI-1012	PR. DI T112	BURN_3A	328+23.50	244.03	I26-EXDI-1011	EX. DI	I26000X	325+15.71	236.58					S		III		16ga	
BT_1050	BT-NP-1051	18	1	9.50	8.53	BT-CB-1051	PR. CB T17	BURN_3A	330+00.00	261.83	BT-OP-1050	OUTFALL	BURN_3A	330+00.00	261.02					N/A		III		N/A	
BT_1060	BT-NP-1061	18	1	9.50	8.42	BT-CB-1061	PR. CB T17	BURN_3A	332+00.00	269.84	BT-OP-1060	OUTFALL	BURN_3A	332+00.00	269.04					N/A		III		N/A	
BE_1070	I26-EP-1064	18	1	314.56	3.07	I26-EXDI-1064	EX. DI	I26000X	328+30.27	246.75	I26-EXDI-1011	EX. DI	I26000X	325+15.71	237.08					S		III		16ga	
BE_1070	I26-EP-1071	24	1	115.45	4.35	I26-MCB-1071	EX. MCB	I26000X	325+13.13	232.90	BE-OP-1070	OUTFALL	BERP	325+05.82	227.88					N/A		III		N/A	
BT_1100	BT-NP-1145	18	1	155.33	4.15	BT-OEP-1145	PR. OPEN PIPE END	BURN_3A	335+00.00	279.50	BT-OP-1100	OUTFALL	BURN_3A	333+40.00	273.05					N/A		III		N/A	

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HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS — CERTIFICATE OF AUTHORIZATION No. C038

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER — No. 26549 — AUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)

DRAINAGE PIPE DATA TABLE

S-32-1842 / S-40-2893 SHT D-BT-TBL

VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	GR3

RETAIN EX. DI T112 (BT-JB-0751)

PR. DI 24x36 (BT-DI-0761)

BT-NP-0761 PR. 18" SWP

BT-OP-0760 OUTFALL*

RETAIN EX. 42" RCP (BT-EP-0751)

BT-OC-LT07.1 "V" DITCH SEE XS SHEETS

PR. CB T16 (BT-CB-0782)

BT-NP-0783 PR. 30" SWP

BT-OC-LT07.2 "V" DITCH SEE XS SHEETS

EXISTING SYSTEM TO BE RELOCATED (BY OTHERS) OFF OF SCDOT ROW

PR. CB T16 (BT-CB-0816)

CUT EX. 36" CMP FOR PLACEMENT OF PR. CB T16 (BT-CB-0833)

RETAIN EX. 36" CMP (BT-EP-0834)

BT-NP-0797 PR. 18" SWP

PR. CB T18 (BT-CB-0797)

BT-NP-0816 PR. 18" SWP

BT-NP-0782 PR. 30" SWP

PR. CB T9 (6'x6') (BT-CB-0832) W/ WEIR OPEN TO DITCH

PR. MANHOLE (BT-MH-0781)

BT-NP-0781 PR. 30" SWP

XL-02 PR. 54" SWP SEE SHT. XL02

CUT EX. 48" RCP (BT-OP-0750) REMOVE DOWNSTREAM SECTIONS

4H:1V SLOPES

PROPOSED GRADING

REMOVE EX. 42" RCP

STORAGE BASIN BT-STBA-07

RIPRAP (BT-STBA-07)

BT-OP-0780 OUTFALL

4H:1V SLOPES

2H:1V SLOPES

4H:1V SLOPES

REMOVE EX. DI & EX. 42" RCPs

PLUG EX. 42" RCP ABANDON DOWNSTREAM UNTIL FUTURE PHASE

PR. HEADWALL (BT-HW-0758 / 0759)

ABANDON EX. 42" RCP. TO BE REMOVED OR PLUGGED & FILLED IN FUTURE PHASE

BT-NP-0758 PR. 60" SWP

BT-NP-0759 PR. 60" SWP

PR. JB (72"x72") (BLIND) (BT-JB-0757)

PR. JB (72"x72") (BLIND) (BT-JB-0755)

BT-NP-0757 PR. 60" SWP

BT-NP-0755 PR. 60" SWP

XL-01 - PR. 2x 60" SWPs SEE SHT. XL01 & XL01A

REMOVE EX. 42" RCP

REMOVE EX. CB

REMOVE EX. 42" RCP

PLUG EX. 42" RCP, ABANDON DOWNSTREAM UNTIL FUTURE PHASE

RETAIN EX. DI UNTIL FUTURE PHASE

RETAIN DOWNSTREAM SYSTEM UNTIL FUTURE PHASE

RETAIN EX. 18" RCP UNTIL FUTURE PHASE

RAMP FROM I-26 WB TO ST. ANDREWS RD.

INTERSTATE 26 WB

EX. SLIP RAMP FROM I-26 WB TO BURNING TREE DR.

S-32-1841 (BURNING TREE DR.) RELOC.

PRES. R/W

NEW R/W

FOC

NPDES

SIGN

312 313 314 315 316 317 169 170 171 171A 300 301 302 303 304 305

EARTHWORK QUANTITIES

ID	EXCAVATION (CU YD)	EMBANKMENT (CU YD)
BT-STBA-07	10548	100

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1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C038 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

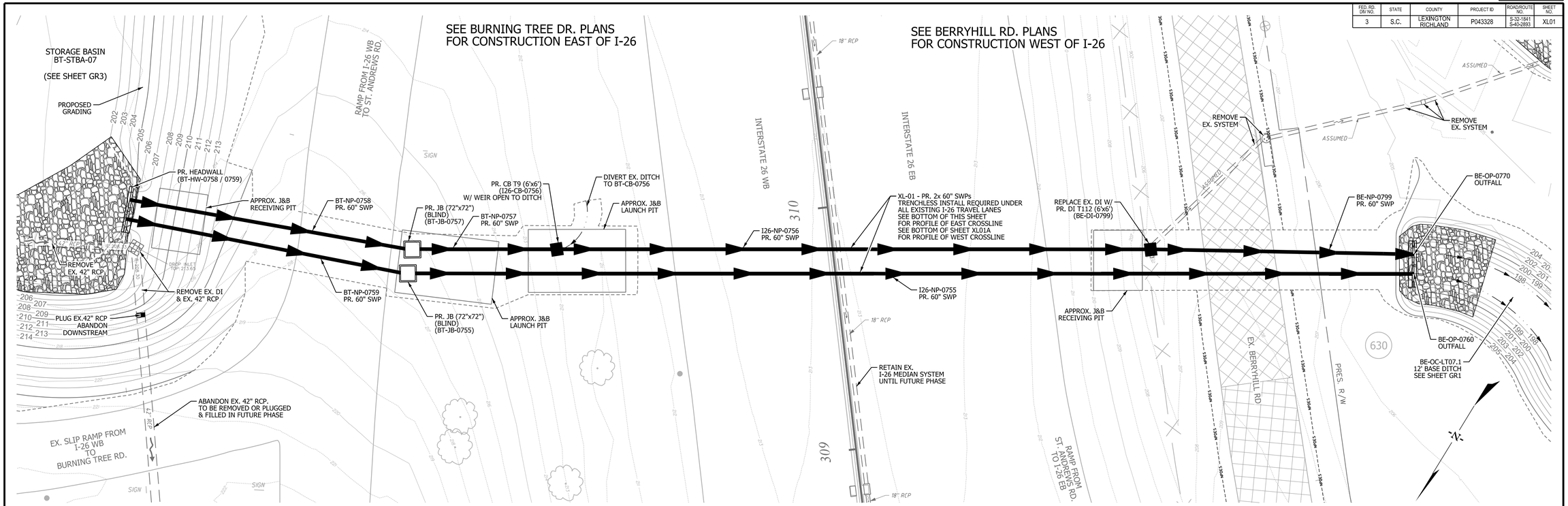
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

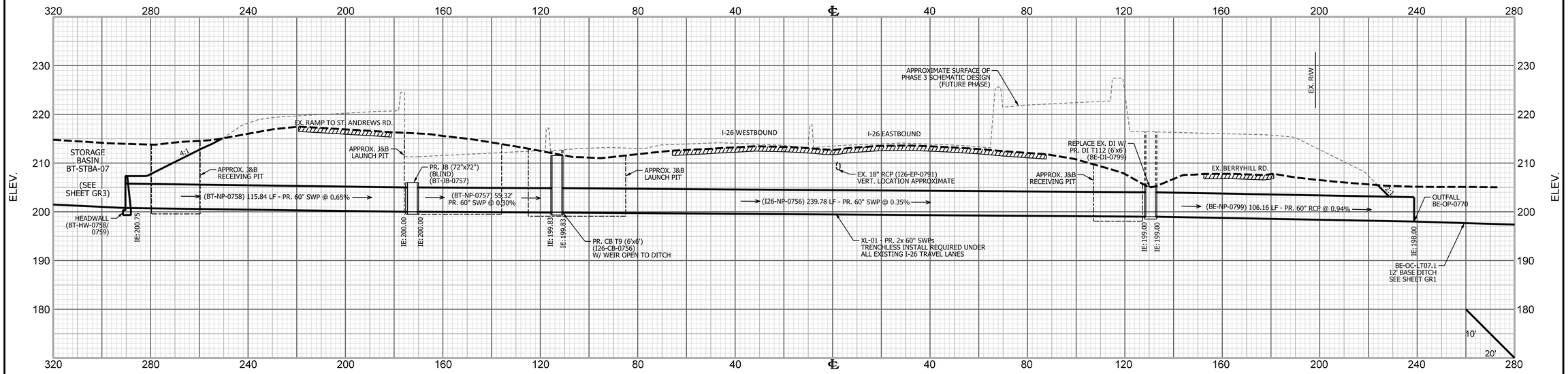
CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
GRADING PLAN SHEET
STOOP CREEK FLOODPLAIN GRADING
BURNING TREE DRIVE VICINITY

S-32-1842 / S-40-2893 SHT BT-GR3

VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	XL01





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1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS — No. C0318 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26549 — DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
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TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
CROSS-SECTION SCALE: H:1" = 20' V:1" = 10'

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE CROSS-LINE SHEET
XL-01 (JACK & BORE 60" SWP)
CROSSING I-26 AT STA. 309+82.63

S-32-1842 / S-40-2893 — SHT BT-XL01

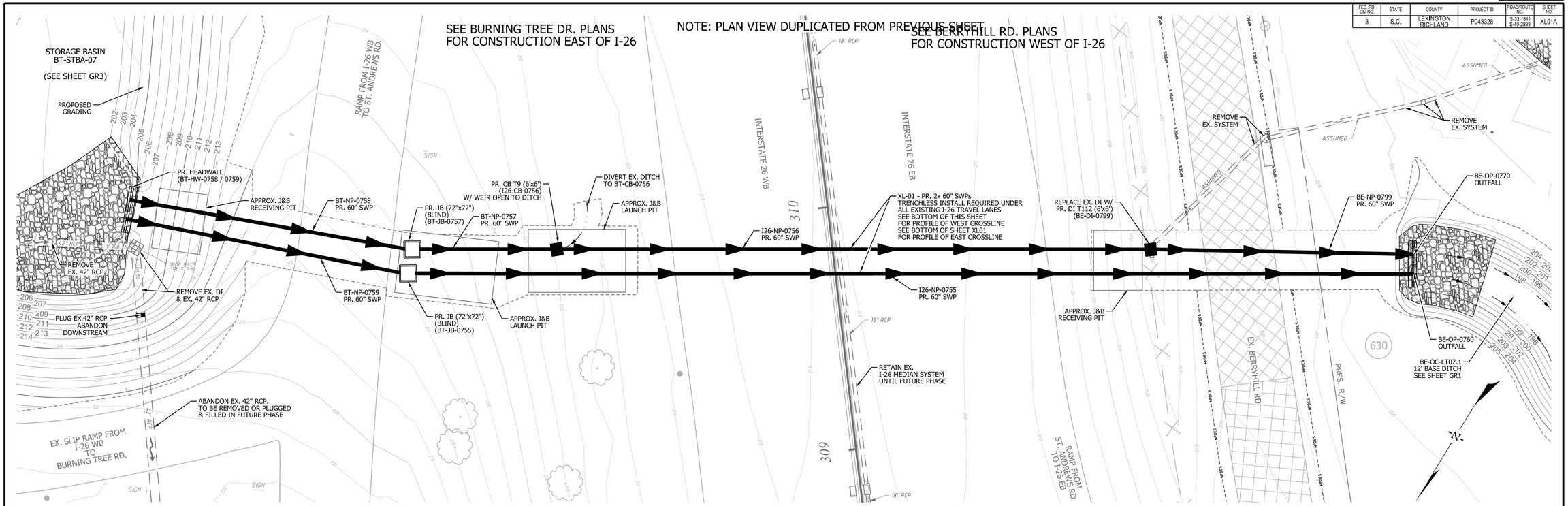
VOLUME 2

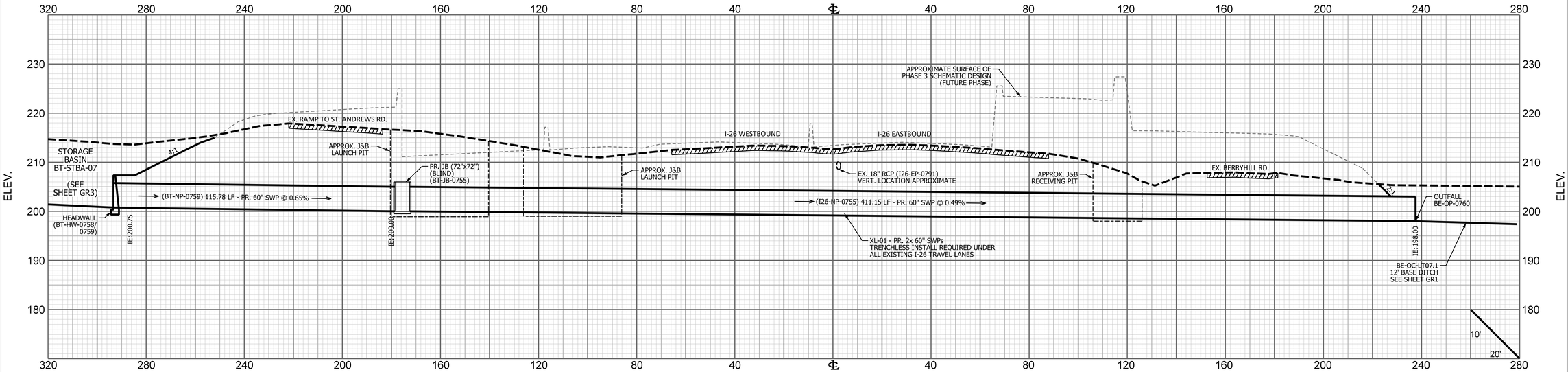
FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	XL01A

SEE BURNING TREE DR. PLANS FOR CONSTRUCTION EAST OF I-26

NOTE: PLAN VIEW DUPLICATED FROM PREVIOUS SHEET

SEE BERRYHILL RD. PLANS FOR CONSTRUCTION WEST OF I-26





HDR ENGINEERING INC. OF THE CAROLINAS
1201 MAIN STREET
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COLUMBIA, SC, 29201
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SOUTH CAROLINA HDR ENGINEERING INC. OF THE CAROLINAS No. C038 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
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TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
CROSS-SECTION SCALE: H:1" = 20' V:1" = 10'

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE CROSS-LINE SHEET
XL-01 (JACK & BORE 60" SWP)
CROSSING I-26 AT STA. 309+72.56

S-32-1842 / S-40-2893 SHT BT-XL01A

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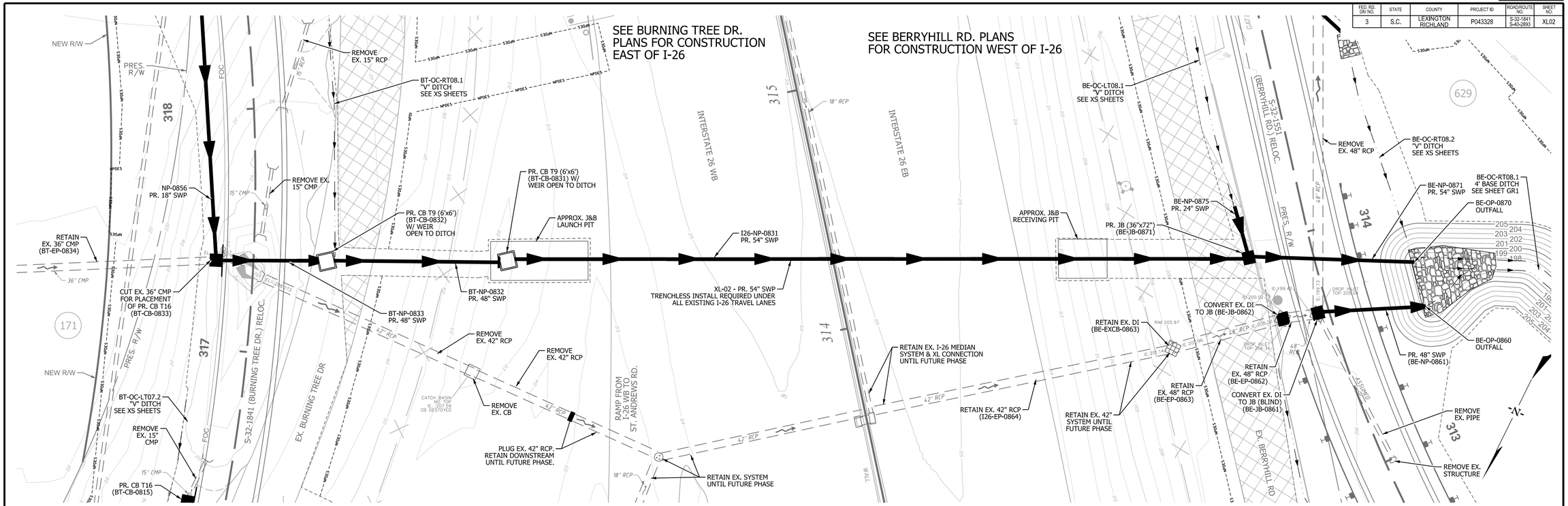
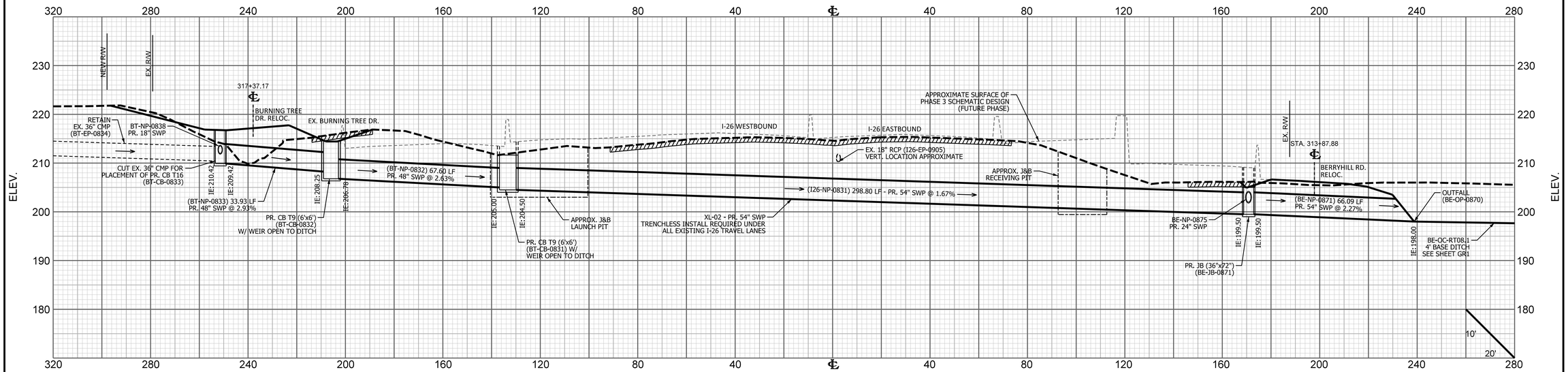
VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	XL02





HDR ENGINEERING INC. OF THE CAROLINAS
1201 MAIN STREET
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COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
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TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
CROSS-SECTION SCALE: H:1" = 20' V:1" = 10'

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE CROSS-LINE SHEET
XL-02 (JACK & BORE 54" SWP)
CROSSING I-26 AT STA. 314+29.21

S-32-1842 / S-40-2893 SHT BT-XL02

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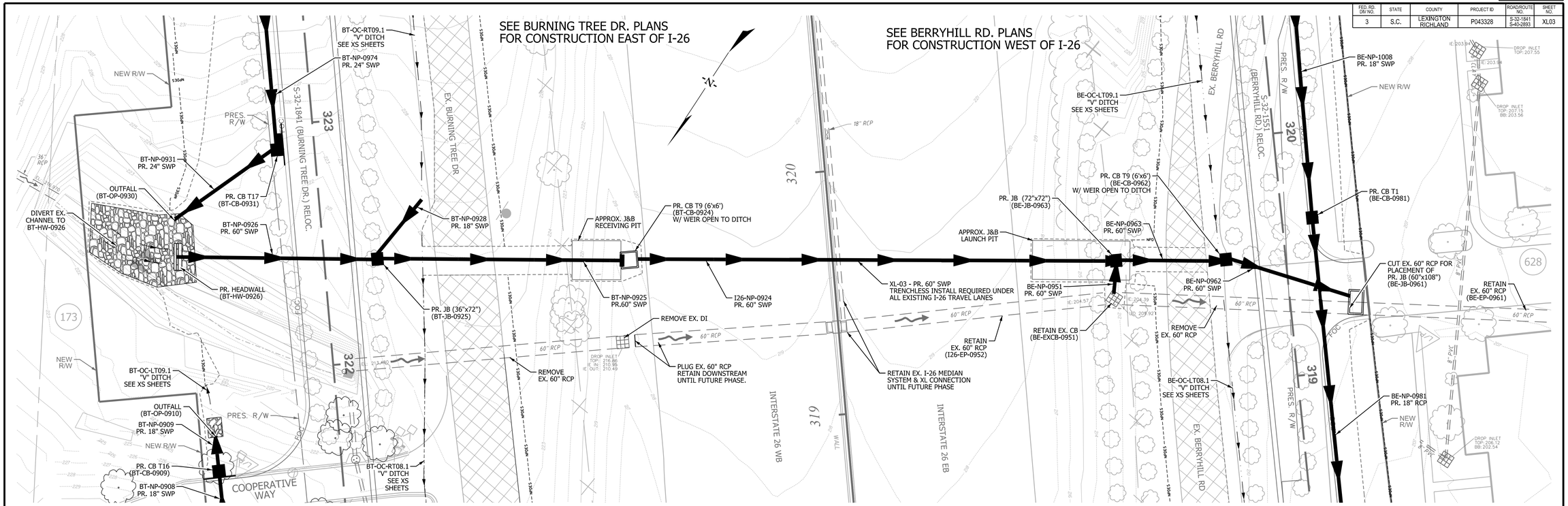
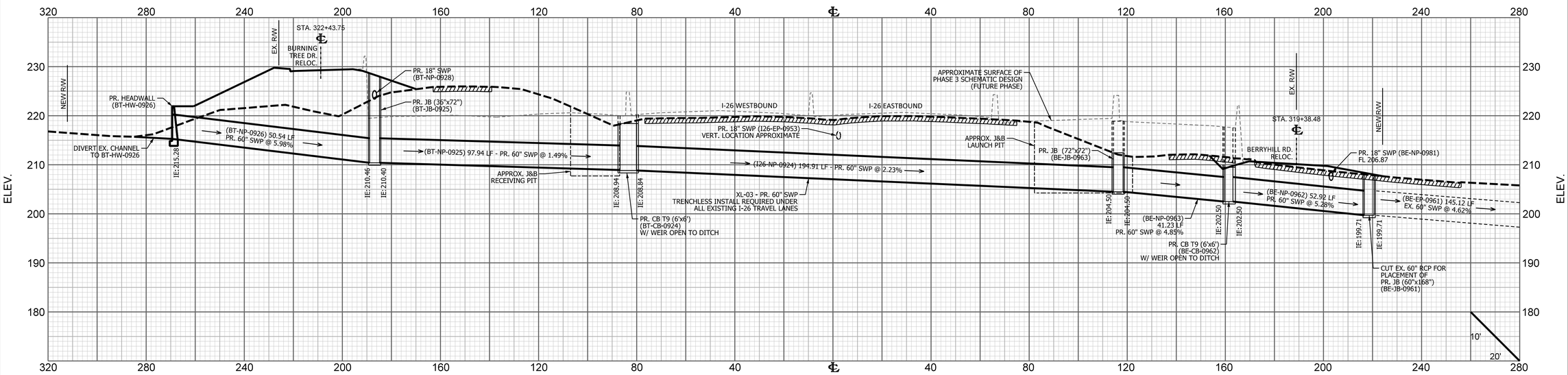
VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	XL03

SEE BURNING TREE DR. PLANS FOR CONSTRUCTION EAST OF I-26

SEE BERRYHILL RD. PLANS FOR CONSTRUCTION WEST OF I-26





HDR ENGINEERING INC. OF THE CAROLINAS

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SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION — HDR ENGINEERING INC. OF THE CAROLINAS No. C038

LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
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R/W _____ DATE _____

PLAN SCALE 1" = 20'
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SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)
DRAINAGE CROSS-LINE SHEET
XL-03 (JACK & BORE 60" SWP)
CROSSING I-26 AT STA. 319+60.17

S-32-1842 / S-40-2893 SHT BT-XL03

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VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	EC1

GENERAL CONSTRUCTION NOTES (EROSION CONTROL PLANS)

EROSION CONTROL NOTES

1. IF NECESSARY, SLOPES, WHICH EXCEED EIGHT (8) VERTICAL FEET SHOULD BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS, IN ADDITION TO HYDROSEEDING. IT MAY BE NECESSARY TO INSTALL TEMPORARY SLOPE DRAINS DURING CONSTRUCTION. TEMPORARY BERMS MAY BE NEEDED UNTIL THE SLOPE IS BROUGHT TO GRADE.

2. STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN FOURTEEN (14) DAYS AFTER WORK HAS CEASED, EXCEPT AS STATED BELOW.

   A. WHERE STABILIZATION BY THE 14TH DAY IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS, STABILIZATION MEASURES MUST BE INITIATED AS SOON AS PRACTICABLE.

   B. WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH-DISTURBING ACTIVITIES WILL BE RESUMED WITHIN 14 DAYS, TEMPORARY STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE.

3. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED ONCE EVERY CALENDAR WEEK. IF PERIODIC INSPECTION OR OTHER INFORMATION INDICATES THAT A BMP HAS BEEN INAPPROPRIATELY OR INCORRECTLY INSTALLED, THE PERMITTEE MUST ADDRESS THE NECESSARY REPLACEMENT OR MODIFICATION REQUIRED TO CORRECT THE BMP WITHIN 48 HOURS OF IDENTIFICATION.

4. PROVIDE SILT FENCE AND/OR OTHER CONTROL DEVICES, AS MAY BE REQUIRED, TO CONTROL SOIL EROSION DURING UTILITY CONSTRUCTION. ALL DISTURBED AREAS SHALL BE CLEANED, GRADED, AND STABILIZED WITH GRASSING IMMEDIATELY AFTER THE UTILITY INSTALLATION. FILL, COVER, AND TEMPORARY SEEDING AT THE END OF EACH DAY ARE RECOMMENDED. IF WATER IS ENCOUNTERED WHILE TRENCHING, THE WATER SHOULD BE FILTERED TO REMOVE ANY SEDIMENTS BEFORE BEING PUMPED BACK INTO ANY WATERS OF THE STATE.

5. ALL EROSION CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.

6. THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO PAVED ROADWAY(S) FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM PAVEMENT, AS MAY BE REQUIRED.

7. RESIDENTIAL SUBDIVISIONS REQUIRE EROSION CONTROL FEATURES FOR INFRASTRUCTURE AS WELL AS FOR INDIVIDUAL LOT CONSTRUCTION. INDIVIDUAL PROPERTY OWNERS SHALL FOLLOW THESE PLANS DURING CONSTRUCTION OR OBTAIN APPROVAL OF AN INDIVIDUAL PLAN IN ACCORDANCE WITH S.C REG. 72-300 ET SEQ. AND SCR160000.

8. TEMPORARY DIVERSION BERMS AND/OR DITCHES WILL BE PROVIDED AS NEEDED DURING CONSTRUCTION TO PROTECT WORK AREAS FROM UPSLOPE RUNOFF AND/OR TO DIVERT SEDIMENT-LADEN WATER TO APPROPRIATE TRAPS OR STABLE OUTLETS.

9. ALL WATERS OF THE STATE (WOS), INCLUDING WETLANDS, ARE TO BE FLAGGED OR OTHERWISE CLEARLY MARKED IN THE FIELD. A DOUBLE ROW OF SILT FENCE IS TO BE INSTALLED IN ALL AREAS WHERE A 50-FOOT BUFFER CAN NOT BE MAINTAINED BETWEEN THE DISTURBED AREA AND ALL WOS. A 10-FOOT BUFFER SHOULD BE MAINTAINED BETWEEN THE LAST ROW OF SILT FENCE AND ALL WOS.

10. LITTER, CONSTRUCTION DEBRIS, OILS, FUELS, AND BUILDING PRODUCTS WITH SIGNIFICANT POTENTIAL FOR IMPACT (SUCH AS STOCKPILES OF FRESHLY TREATED LUMBER) AND CONSTRUCTION CHEMICALS THAT COULD BE EXPOSED TO STORM WATER MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE IN STORM WATER DISCHARGES.

11. A COPY OF THE SWPPP, INSPECTIONS RECORDS, AND RAINFALL DATA MUST BE RETAINED AT THE CONSTRUCTION SITE OR A NEARBY LOCATION EASILY ACCESSIBLE DURING NORMAL BUSINESS HOURS, FROM THE DATE OF COMMENCEMENT OF CONSTRUCTION ACTIVITIES TO THE DATE THAT FINAL STABILIZATION IS REACHED.

12. INITIATE STABILIZATION MEASURES ON ANY EXPOSED STEEP SLOPE (3H:1V OR GREATER) WHERE LAND-DISTURBING ACTIVITIES HAVE PERMANENTLY OR TEMPORARILY CEASED, AND WILL NOT RESUME FOR A PERIOD OF 7 CALENDAR DAYS.

13. MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL.

14. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM EQUIPMENT AND VEHICLE WASHING, WHEEL WASH WATER, AND OTHER WASH WATERS. WASH WATERS MUST BE TREATED IN A SEDIMENT BASIN OR ALTERNATIVE CONTROL THAT PROVIDES EQUIVALENT OR BETTER TREATMENTS PRIOR TO DISCHARGE.

15. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM DEWATERING OF TRENCHES AND EXCAVATED AREAS. THESE DISCHARGES ARE TO BE ROUTED THROUGH APPROPRIATE BMPS (SEDIMENT BASIN, FILTER BAG, ETC.).

16. THE FOLLOWING DISCHARGES FROM SITES ARE PROHIBITED:

   A. WASTEWATER FROM WASHOUT OF CONCRETE, UNLESS MANAGED BY AN APPROPRIATE CONTROL;

   B. WASTEWATER FROM WASHOUT AND CLEANOUT OF STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS;

   C. FUELS, OILS, OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE; AND

   D. SOAPS OR SOLVENTS USED IN VEHICLE AND EQUIPMENT WASHING.

17. AFTER CONSTRUCTION ACTIVITIES BEGIN, INSPECTIONS MUST BE CONDUCTED AT A MINIMUM OF AT LEAST ONCE EVERY CALENDAR WEEK AND MUST BE CONDUCTED UNTIL FINAL STABILIZATION IS REACHED ON ALL AREAS OF THE CONSTRUCTION SITE.

18. IF EXISTING BMPS NEED TO BE MODIFIED OR IF ADDITIONAL BMPS ARE NECESSARY TO COMPLY WITH THE REQUIREMENTS OF THIS PERMIT AND/OR SC $^{5}/_{32}$S WATER QUALITY STANDARDS, IMPLEMENTATION MUST BE COMPLETED BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE. IF IMPLEMENTATION BEFORE THE NEXT STORM EVENT IS IMPRACTICABLE, THE SITUATION MUST BE DOCUMENTED IN THE SWPPP AND ALTERNATIVE BMPS MUST BE IMPLEMENTED AS SOON AS REASONABLY POSSIBLE.

19. A PRE-CONSTRUCTION CONFERENCE MUST BE HELD FOR EACH CONSTRUCTION SITE WITH AN APPROVED ON-SITE SWPPP PRIOR TO THE IMPLEMENTATION OF CONSTRUCTION ACTIVITIES. FOR NON-LINEAR PROJECTS THAT DISTURB 10 ACRES OR MORE THIS CONFERENCE MUST BE HELD ON-SITE UNLESS THE DEPARTMENT HAS APPROVED OTHERWISE.

SEDIMENT & EROSION CONTROL CONSTRUCTION SEQUENCE

1. ESTABLISH LIMITS OF DISTUBANCE / CONSTRUCTION.
2. INSTALL TEMPORARY CONSTRUCTION ENTRANCE(S) PER SCDOT STD. 815-505-00.
3. INSTALL SILT FENCE AS SHOWN ON THE EROSION CONTROL PLANS AND PER SCDOT STD. 815-605-00.
4. INSTALL SEDIMENT TUBES IN EXISTING DITCHES PER SCDOT STD. 815-205-00.
5. CLEAR AND GRUB SITE.
6. ROUGH GRADE PROPOSED DITCHES AND INSTALL SEDIMENT TUBES PER SCDOT STD. 815-205-00 AND AS DETAILED ON PLAN SHEET EC1.
7. INSTALL PROPOSED STORM DRAINAGE SYSTEMS AS SHOWN ON THE DRAINAGE PLANS.
8. INSTALL INLET STRUCTURE FILTERS AT ALL STORM DRAINAGE STRUCTURES PER SCDOT STD. 815-002-00 AND 815-006-00 AND AS SHOWN ON THE EROSION CONTROL PLANS.
9. PLACE RIP RAP AT PIPE OUTLETS AS SHOWN IN THE PLANS.
10. FINE GRADE TO PROPOSED GRADES SHOWN IN THE PLANS AND CROSS SECTIONS.
11. TEMPORARY SEED ALL DISTURBED AREAS AS DESCRIBED IN SCDOT STANDARD SPECIFICATION SECTION 810 FOR SEEDING.
12. FINE GRADE ALL DITCHES AND BACK SLOPES.
13. LINE PROPOSED DITCHES WITH TEMPORARY EROSION CONTROL BLANKET AS SHOWN ON SHEET EC1 AND PER SCDOT STANDARD SPECIFICATION 815-605-00.
14. PERMANENT SEED ALL DISTURBED AREAS AS DESCRIBED IN SCDOT STANDARD SPECIFICATION SECTION 810 FOR SEEDING.
15. ONCE THE SITE IS STABILIZED, REMOVE ALL TEMPORARY EROSION CONTROL DEVICES.
16. PERMANENT SEED ALL AREAS WHERE EROSION CONTROL DEVICES WERE REMOVED AS DESCRIBED IN SCDOT STANDARD SPECIFICATION SECTION 810 FOR SEEDING.

CONSTRUCTION SEQUENCE NOTES

IF NPDES COVERAGE IS BEING ISSUED AFTER LAND-DISTURBING ACTIVITIES HAVE ALREADY STARTED (E.G. IN RESPONSE TO A NOTICE TO COMPLY, NOTICE OF VIOLATION, OR ENFORCEMENT ACTION), THEN THE CONSTRUCTION SEQUENCE MUST SPECIFICALLY INDICATE THE ITEMS THAT HAVE ALREADY OCCURRED AND THE ITEMS THAT WILL BE OCCURING AFTER NPDES COVERAGE IS ISSUED.

IF FLOWS FROM OFFSITE AREAS WILL BE DIVERTED AROUND THE SITE AND THE ON-SITE STRUCTURES ARE NOT DESIGNED TO HANDLE FLOWS FROM OFFSITE AREAS, THE DIVERSIONS/PIPING FOR THE OFFSITE FLOWS MUST BE INSTALLED BEFORE LAND-DISTURBING ACTIVITIES BEGIN ON THE SITE. SEDIMENT AND EROSION CONTROL MEASURES FOR THE DISTURBED AREAS FOR THE DIVERSION/PIPING MUST BE INSTALLED BEFORE THOSE AREAS ARE DISTURBED AND SHOULD BE SHOWN ON THE PLANS.

MAINTENANCE OF SEDIMENT AND EROSION CONTROL MEASURES MUST CONTINUE UNTIL THE SITE IS PERMANENTLY STABILIZED AND THE CONTROLS ARE REMOVED.

CONSTRUCTION NOTES

1. CLEARING AND GRUBBING
THE CONTRACTOR WILL BE REQUIRED TO CLEAR ALL AREAS NECESSARY FOR THE CONSTRUCTION OF ANY SEDIMENT CONTROL STRUCTURES AND INSTALL THE SEDIMENT CONTROL STRUCTURES AND ALL OTHER PERIMETER EROSION CONTOL MEASURES PRIOR TO CLEARING AND GRUBBING ACTIVITIES.

2. SEEDING
SEEDING SHALL BE ACCOMPLISHED ACCORDING TO S.C.D.O.T. SUPPLEMENTAL TECHNICAL SPECIFICATION "SEEDING-SC-M-810 (LATEST EDITION)."

3. EROSION CONTROL MEASURES
ALL EROSION CONTROL MEASURES ON THIS PROJECT SHALL BE IMPLEMENTED AS DETAILED ON THE PLANS. SILT FENCE AND OTHER EROSION CONTROL FEATURES SHALL BE IN PLACE PRIOR TO GROUND DISTURBING ACTIVITY BEGINS. EROSION CONTROL MEASURES SHALL BE IMPLEMENTED DURING ALL STAGES OF CONSTRUCTION.

4. PERIMETER EROSION CONTROL DEVICES
SILT FENCE MAY BE PLACED AT LOCATIONS WHERE SEDIMENT LEAVES THE PROJECT LIMITS ESPECIALLY AT THE TOE OF FILL SLOPES THAT SLOPE AWAY FROM THE PROJECT. SILT FENCE SHALL NOT BE PLACED IN A POSITION SUCH THAT IT BLOCKS DRIVEWAYS OR POINTS OF ACCESS TO PROPERTY.

5. INSPECTION AND IMPLEMENTATION
ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE NPDES GENERAL CONSTRUCTION PERMIT. STABILIZATION MEASURES SHALL BE IMPLEMENTED AS SOON AS PRACTICABLE WITHIN THE ALLOWABLE TIME FRAME STATED WITHIN THE NPDES GENERAL CONSTRUCTION PERMIT IN PORTIONS OF THE SITE WHERE ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL FINAL STABILIZATION HAS BEEN OBTAINED.

6. BARRIER FENCE
THE CONSTRACTOR SHALL INSTALL AND MAINTAIN A BARRIER FENCE TO MARK ALL BOUNDARIES OF JURISDICTIONAL WATERS OF THE STATE, CULTURAL RESOURCE AREAS, AND OTHER ENVIRONMENTAL SENSITIVE AREAS WITHIN THE PROJECT CORRIDOR. THE FENCE AND FLAGGING SHALL BE PLACED PRIOR TO ANY LAND DISTURBANCE ACTIVITIES. REFER TO THE PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION. THE CONTRACTOR SHALL MAINTAIN BARRIER FENCE FOR THE DURATION OF THE PROJECT AS DETERMINED BY THE RESIDENT CONSTRUCTION ENGINEER.

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SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
HDR ENGINEERING INC. OF THE CAROLINAS No. C038

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
No. 26549
DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)

EROSION CONTROL NOTES

S-32-1842 / S-40-2893 SHT EC-BT-NOTES

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VOLUME 2

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1841 S-40-2893	EC2

SCDOT
South Carolina Department of Transportation

EROSION CONTROL DATA SHEET

RECEIVING WATERS

ROAD / ROUTE	OUTFALL DITCH STATION	OUTFALL DITCH SIDE	NAME OF RECEIVING WATERS	NAME OF ULTIMATE RECEIVING WATERS
BERRYHILL RD.	308+75	RT	STOOP CREEK	SALUDA RIVER
S-32-1551				
BERRYHILL RD.	313+75	RT	STOOP CREEK	SALUDA RIVER
S-32-1551				
BERRYHILL RD.	342+30	LT	STOOP CREEK	SALUDA RIVER
S-32-1551				

SOIL TYPES

ROAD / ROUTE	STATION TO STATION		SOIL PARTICLE SIZE (COARSE / FINE)	ZONE
BURNING TREE DR.	313+00	340+80	COARSE	SANDHILLS
S-32-1841				

TEMPORARY EROSION CONTROL BLANKET

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF BLANKET (FT)	DITCH BOTTOM WIDTH (FT)	SLOPES x : 1 FRONT	SLOPES x : 1 BACK	MSY
BURNING TREE	315+00	316+75	LT	1	0	5.0	2.0	0.143
BURNING TREE	321+75	321+95	LT	1	0	5.0	2.0	0.016
BURNING TREE	337+15	338+25	LT	1	0	2.0	6.0	0.102
BURNING TREE	338+85	339+75	LT	1	0	2.0	6.0	0.083
BURNING TREE*	321+75	323+20	LT	8	0	4.0		0.531
BURNING TREE*	322+75	327+00	RT	6	0	4.0		1.168
*EC BLANKET FOR FILL SLOPES							TOTAL	2.043

TURF REINFORCED MATTING (TRM)

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF MAT (FT)	SLOPES (x : 1) FRONT	SLOPES (x : 1) BACK	DITCH BOTTOM WIDTH (FT)	TYPE	TYPE 1 (MSY)	TYPE 2 (MSY)	TYPE 3 (MSY)
BURNING TREE DR.	313+80	315+00	LT	1	5	2	0	1	0.098		
BURNING TREE DR.	327+70	330+00	LT	1.25	4	2	0	1	0.203		
BURNING TREE DR.	330+00	333+40	LT	1.25	2	2	0	1	0.211		
BURNING TREE DR.	335+00	336+60		1	2	4	0	1	0.113		
BURNING TREE DR.	317+40	322+50	RT	1	6	2	0	1	0.471		
BURNING TREE DR.	322+65	328+15	RT	1	4	2	0	1	0.389		
BURNING TREE DR.	328+25	336+40	RT	1	4	2	0	1	0.576		
								TOTALS	2.061		

SEDIMENT TUBES IN DITCHES

ROAD / ROUTE	STATION TO STATION		SIDE	AVERAGE LENGTH	SPACING (FT)	TOTAL	COMMENTS
BURNING TREE	313+89	315+00	LT	14	50	56	
BURNING TREE	315+00	316+75	LT	14	75	56	
BURNING TREE	321+75	321+95	LT	6	100	12	
BURNING TREE	327+70	333+40	LT	10	50	130	
BURNING TREE	335+00	336+60	LT	10	25	80	
BURNING TREE	337+15	338+32	LT	14	75	42	
BURNING TREE	338+85	339+75	LT	14	75	42	
BURNING TREE	317+40	322+50	RT	16	150	80	
BURNING TREE	322+65	328+15	RT	12	30	240	
BURNING TREE	328+25	336+40	RT	12	40	264	
					TOTAL	1002	

SEDIMENT DAM

NO	ROAD / ROUTE	STATION	SIDE	DRAINED OR NOT DRAINED	LENGTH OF SILT BASIN	WIDTH OF SILT BASIN	DAM HEIGHT	SIDE SLOPE OF SILT BASIN	SPILLWAY BOTTOM WIDTH	DAM BOTTOM WIDTH	RIP RAP CLASS	TOTAL STORAGE VOLUME	SEDIMENT STORAGE HEIGHT	OUTFALL CHANNEL WIDTH	OUTFALL CHANNEL DEPTH	OUTFALL CHANNEL LENGTH

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HDR ENGINEERING INC. OF THE CAROLINAS — CERTIFICATE OF AUTHORIZATION — No. C038

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER — No. 26549 — DUSTIN P. HUGHEY

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SOUTH CAROLINA
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COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1842 / S-40-2893 (BURNING TREE DRIVE)

EROSION CONTROL DATA SHEET

S-32-1842 / S-40-2893 SHT EC-BT-DATA

D

Appendix D:
Drainage Design Criteria

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

Drainage Design Criteria for: Primary Road, High Volume, Design Speed > 45 mph

Interstate 26 & Interstate 20

			Design Criteria	Requirements For Hydraulic Design Studies Section
Floodway - Floodplain Requirements	Maximum Elevation Increase		1.0' Above Natural 100-Year Flood Profile	1.1.2
Recommended Freeboard For Road Subgrades			1' Above Design High-Water Level	2.2.1
Cross-Line Pipes	Design Peak Discharge		50-Year Peak Discharge	2.2.2
Storm Drains and Roadside Ditches	Design Storm by Drainage Area	0 - 40 AC	10-Year	2.2.3
		40 AC - 500 AC	25-Year	
		> 500 AC	50-Year	
Type 16, 17, and 18 Inlet On-Grade Spacing		Maximum	900'	2.2.4
		Minimum	150'	
Inlets In Grassed Medians	Maximum Spacing		750'	
	Maximum 10-Year High Water		Below Edge Of Shoulder	
Allowable Spread	Roadway (On-Grade)	Design Storm	10-Year	2.2.4 Table 2
		Spread	Shoulder	
	Roadway (Sag Point)	Design Storm	50-Year	
		Spread	Shoulder + 3 ft	
	Bridge (On-Grade)	Design Storm	10-Year	SCDOT Bridge Design Manual Sec. 18.2.3.4 Figure 18.2-1
		Spread	Shoulder	
	Bridge (Sag Point)	Design Storm	50-Year	
		Spread	Shoulder + 3 ft	
Minimum Grades (%)		Pipe	0.3	2.2.5
		Ditch	0.3	
Minimum Pipe Discharge Velocity (ft/sec)			3	
Minimum Pipe Size (in)	Storm Drainage Systems & Cross-Line Pipes		18	2.2.6
	Yard Drains & Driveway Pipes		15	
Storm Drain System Design Flow Depth			0.94 x Pipe Diameter	2.2.9
Hydrologic Method	Method by Drainage Area	0 - 100 AC	Rational (Minimum T_C = 5 Minutes)	2.2.15.1
		100 AC - 640 AC	NRCS WinTR-55	2.2.15.2
		> 640 AC	USGS Regression Equations	2.2.15.3
Design Ratio of Headwater to Culvert Barrel Height			1.2	2.3 (Step 6, Sec. D, pg. 61)
Minimum Cover (ft)	Yard Drains		1.0	SCDOT Standard Drawings
	Pipes Except Yard Drains		2.0	

Drainage Design Criteria for: Secondary Road, Collector, Design Speed≤ 45 mph

Berryhill Rd., Browning Rd., Burning Tree Rd., Fernandina Rd. (NE of Beatty Rd.)

			Design Criteria	Requirements For Hydraulic Design Studies Section
Floodway - Floodplain Requirements	Maximum Elevation Increase		1.0' Above Natural 100-Year Flood Profile	1.1.2
Recommended Freeboard For Road Subgrades			1' Above Design High-Water Level	2.2.1
Cross-Line Pipes	Design Peak Discharge		25-Year Peak Discharge	2.2.2
Storm Drains and Roadside Ditches	Design Storm by Drainage Area	0 - 40 AC	10-Year	2.2.3
		40 AC - 500 AC	25-Year	
		> 500 AC	50-Year	
Type 16, 17, and 18 Inlet On-Grade Spacing		Maximum	900'	2.2.4
		Minimum	150'	
Inlets In Grassed Medians	Maximum Spacing		750'	
	Maximum 10-Year High Water		Below Edge Of Shoulder	
Allowable Spread	Roadway (On-Grade)	Design Storm	10-Year	2.2.4 Table 2
		Spread	1/2 Driving Lane	
	Roadway (Sag Point)	Design Storm	10-Year	
		Spread	1/2 Driving Lane	
	Bridge (On-Grade)	Design Storm	10-Year	SCDOT Bridge Design Manual Sec. 18.2.3.4 Figure 18.2-1
		Spread	1/2 Driving Lane	
	Bridge (Sag Point)	Design Storm	10-Year	
		Spread	1/2 Driving Lane	
Minimum Grades (%)		Pipe	0.3	2.2.5
		Ditch	0.3	
Minimum Pipe Discharge Velocity (ft/sec)			3	
Minimum Pipe Size (in)	Storm Drainage Systems & Cross-Line Pipes		18	2.2.6
	Yard Drains & Driveway Pipes		15	
Storm Drain System Design Flow Depth			0.94 x Pipe Diameter	2.2.9
Hydrologic Method	Method by Drainage Area	0 - 100 AC	Rational (Minimum T_C = 5 Minutes)	2.2.15.1
		100 AC - 640 AC	NRCS WinTR-55	2.2.15.2
		> 640 AC	USGS Regression Equations	2.2.15.3
Design Ratio of Headwater to Culvert Barrel Height			1.2	2.3 (Step 6, Sec. D, pg. 61)
Minimum Cover (ft)	Yard Drains		1.0	SCDOT Standard Drawings
	Pipes Except Yard Drains		2.0	

E

Appendix E:
Basin Delineation Maps

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STOOP CREEK

AP STP.7

BERRYHILL RD. RELOC.

WOODLAND HILLS RD.

26 WB

26 EB

ST. ANDREWS RD.

JAMIL RD.

BE-DN-0671

BERRYHILL RD. RELOC.

EX. DETENTION BASIN BE-EXDB-14

BE-EXMH-1434

AP 51.5

MULTI-PURPOSE BASIN RO-DB-21

XL-04

ROCKLAND RD.

XL-05

20 WB

20 EB

EXECUTIVE CENTER DR. 1

BE-HW-1633/1653

EXECUTIVE CENTER DR. 2

BUSH RIVER RD.

ST. ANDREWS RD.

ASHLAND RD.

N

AREA TABLE			
ID	Tc (min)	C Value	Area (ac)
BE-DN-0671	96	0.60	42.52
BE-EXMH-1434	22	0.56	8.12

AREA TABLE			
ID	Tc (min)	Curve Number	Area (ac)
BE-HW-1633 / BE-HW-1653	51.67	76.70	91.07

*Modeled in HEC-HMS

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SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

CAROLINA CROSSROADS - P3A

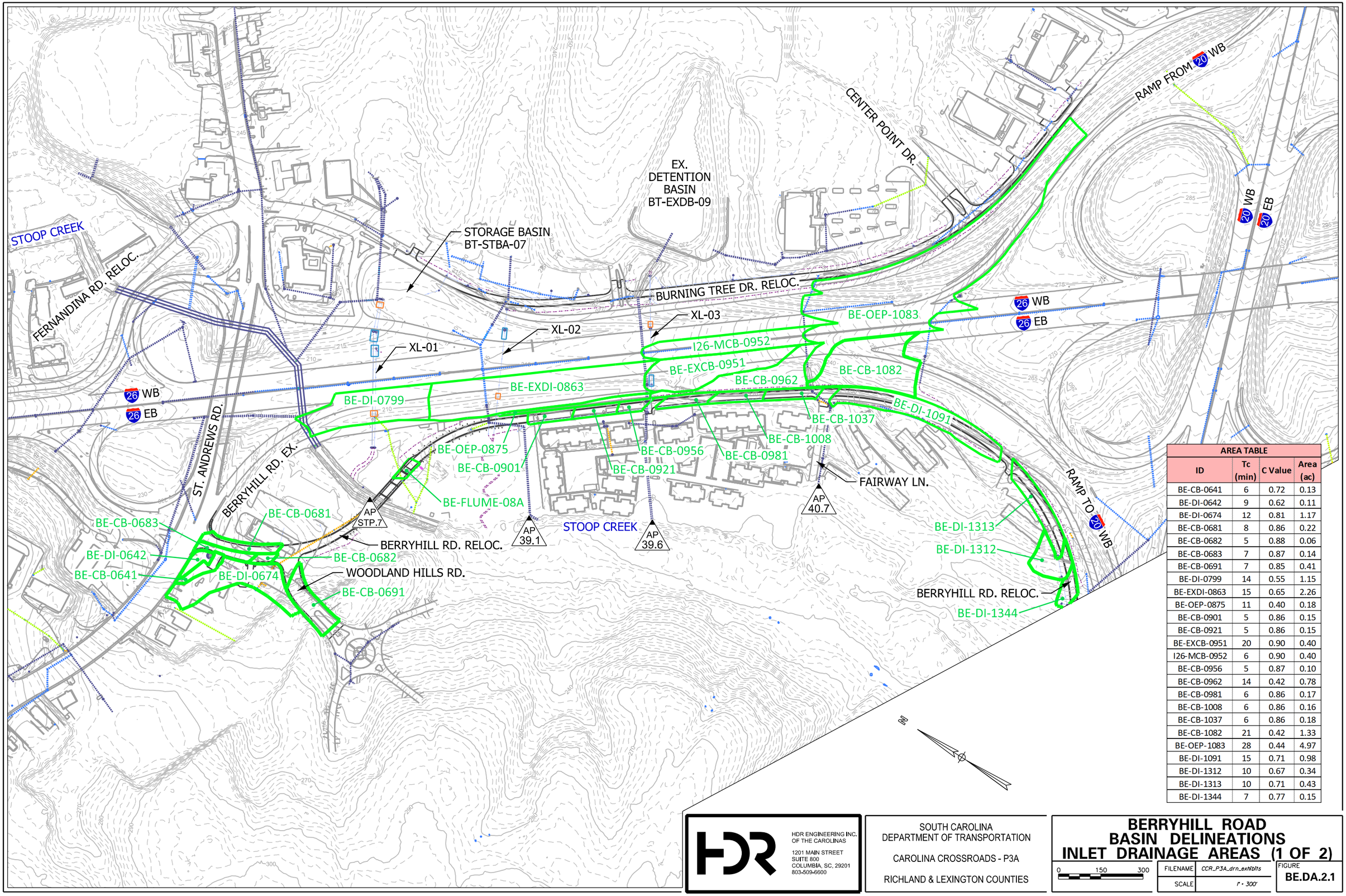
RICHLAND & LEXINGTON COUNTIES

BERRYHILL ROAD MAJOR BASIN DELINEATIONS INLET DRAINAGE AREAS

0 200 400

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 400'

FIGURE BE.DA.1



AREA TABLE			
ID	Tc (min)	C Value	Area (ac)
BE-CB-0641	6	0.72	0.13
BE-DI-0642	9	0.62	0.11
BE-DI-0674	12	0.81	1.17
BE-CB-0681	8	0.86	0.22
BE-CB-0682	5	0.88	0.06
BE-CB-0683	7	0.87	0.14
BE-CB-0691	7	0.85	0.41
BE-DI-0799	14	0.55	1.15
BE-EXDI-0863	15	0.65	2.26
BE-OEP-0875	11	0.40	0.18
BE-CB-0901	5	0.86	0.15
BE-CB-0921	5	0.86	0.15
BE-EXCB-0951	20	0.90	0.40
I26-MCB-0952	6	0.90	0.40
BE-CB-0956	5	0.87	0.10
BE-CB-0962	14	0.42	0.78
BE-CB-0981	6	0.86	0.17
BE-CB-1008	6	0.86	0.16
BE-CB-1037	6	0.86	0.18
BE-CB-1082	21	0.42	1.33
BE-OEP-1083	28	0.44	4.97
BE-DI-1091	15	0.71	0.98
BE-DI-1312	10	0.67	0.34
BE-DI-1313	10	0.71	0.43
BE-DI-1344	7	0.77	0.15

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SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

BERRYHILL ROAD
BASIN DELINEATIONS
INLET DRAINAGE AREAS (1 OF 2)

0 150 300

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 300'

FIGURE
BE.DA.2.1

ROCKLAND RD.
STOOP CREEK
ROCKLAND RD.
RO-CB-2124
RO-EXCB-2162
MULTI-PURPOSE
BASIN RO-DB-21
RO-EXCB-2142
RAMP FROM BUSH RIVER RD.
20 EB
20 WB
RAMP FROM 26 EB
RO-CB-2192
XL-04
20 EB
XL-05
20 WB
RAMP TO BUSH RIVER RD.
BERRYHILL RD. EX.
BE-CB-1543
BE-EXDI-1651
BE-DI-1388
AP
44.3
BERRYHILL RD. RELOC.
BE-DI-1433
BE-OEP-1542
BE-OEP-1583
BE-CB-1691
BE-CB-1715
BE-CB-1735
BERRYHILL RD. RELOC.
BE-CB-1535
BE-CB-1532
BE-CB-1581
BE-CB-1582
BE-DI-1625
BE-CB-1725
EXECUTIVE
CENTER DR. 2
EX. DETENTION
BASIN BE-EXDB-14
STOOP CREEK
EXECUTIVE CENTER DR. 1

AREA TABLE

ID	Tc (min)	C Value	Area (ac)
BE-DI-1388	6	0.90	0.30
BE-DI-1433	12	0.64	2.19
BE-CB-1532	6	0.86	0.09
BE-CB-1535	7	0.79	0.18
BE-OEP-1542	11	0.68	1.11
BE-CB-1543	13	0.66	1.08
BE-CB-1581	6	0.85	0.09
BE-CB-1582	6	0.85	0.10
BE-OEP-1583	9	0.73	0.42
BE-DI-1625	6	0.89	0.34
BE-EXDI-1651	9	0.71	0.56
BE-CB-1691	6	0.84	0.09
BE-CB-1715	5	0.85	0.03
BE-CB-1725	8	0.85	0.19
BE-CB-1735	8	0.86	0.19
RO-CB-2124	14	0.75	0.26
RO-EXCB-2142	10	0.75	0.79
RO-EXCB-2162	14	0.75	3.14
RO-CB-2192	13	0.52	1.26

HDR ENGINEERING INC.
OF THE CAROLINAS
1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

BERRYHILL ROAD
BASIN DELINEATIONS
INLET DRAINAGE AREAS (2 OF 2)

0 ,000 ,000

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 1,000'

FIGURE
BE.DA.2.2

AREA TABLE			
ID	Tc (min)	Curve Number	Area (ac)
BE-OC-LT07.1	95	0.60	182.69

AREA TABLE			
ID	Tc (min)	C Value	Area (ac)
BE-OC-RT08.1	106	0.70	77.95

N

FERNANDINA RD.

STOOP CREEK

I-26 EB

I-26 WB

ST. ANDREWS RD.

BE-OC-LT07.1

BROAD RIVER RD.

STORAGE BASIN
BT-STBA-07

XL-01

AP
STP.7

BERRYHILL RD. EX.

BERRYHILL RD. RELOC.

BE-OC-RT08.1

XL-02

EX. DETENTION
BASIN BE-EXDB-14

AP
39.1

XL-03

BURNING TREE DR. EX.

BURNING TREE DR. RELOC.

AP
39.6

I-26 EB

I-26 WB

STOOP CREEK

FAIRWAY LN.

CENTER POINT DR.

HDR ENGINEERING INC.
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DEPARTMENT OF TRANSPORTATION

CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

BERRYHILL ROAD
MAJOR BASIN DELINEATIONS
DITCH DRAINAGE AREAS

0 200 400

FILENAME	CCR_P3A_drn_exhbits	FIGURE	BE.DA.3
SCALE	1" = 400'		

FERNANDINA RD. RELOC.
FERNANDINA RD. EX.
ST. ANDREWS RD.
BERRYHILL RD. EX.
BERRYHILL RD. RELOC.
STORAGE BASIN BT-STBA-07
EX. DETENTION BASIN BT-EXDB-09
BURNING TREE DR. RELOC.
BURNING TREE DR. EX.
26 WB
26 EB
XL-01
XL-02
XL-03
BE-OC-LT08.1
BE-OC-LT07.2
BE-OC-LT09.1
BE-OC-LT10.1
BE-OC-LT13.1
BE-OC-RT08.2
BE-OC-RT10.1
BERRYHILL RD. EX.
BERRYHILL RD. RELOC.
FAIRWAY LN.
AP STP.7
AP 39.1
AP 39.6
AP 40.7
STOOP CREEK
BE-OC-RT06.1
BE-OC-RT06.2
BE-OC-RT07.1
WOODLAND HILLS RD.
BE-OC-RT13.1
BE-OC-RT14.1
STOOP CREEK

AREA TABLE			
ID	Tc (min)	C Value	Area (ac)
BE-OC-LT07.2	9	0.40	0.27
BE-OC-LT08.1	11	0.40	0.18
BE-OC-LT09.1	14	0.42	0.78
BE-OC-LT10.1	21	0.42	1.33
BE-OC-LT13.1	29	0.51	8.10
BE-OC-RT06.1	11	0.70	0.79
BE-OC-RT06.2	12	0.81	1.17
BE-OC-RT07.1	18	0.52	1.23
BE-OC-RT08.2	11	0.82	1.08
BE-OC-RT10.1	15	0.71	0.98
BE-OC-RT13.1	10	0.71	0.43
BE-OC-RT14.1	14	0.73	1.27

HDR ENGINEERING INC. OF THE CAROLINAS
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CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

BERRYHILL ROAD BASIN DELINEATIONS DITCH DRAINAGE AREAS (1 OF 2)

0 125 250

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 250'

FIGURE BE.DA.4.1

RAMP FROM 26 EB
BE-OC-LT13.1
BE-OC-RT13.1
BE-OC-RT10.1
BE-OC-RT14.1
20 EB
20 WB
STOOP CREEK
ROCKLAND RD.
AP 51.5
ROCKLAND RD.
BERRYHILL RD. EX.
BERRYHILL RD. RELOC.
AP 44.3
MULTI-PURPOSE BASIN RO-DB-21
EX. DETENTION BASIN BE-EXDB-14
STOOP CREEK
BE-OC-RT14.3
XL-04
BE-OC-RT15.1
XL-05
BE-OC-RT15.2
RAMP FROM BUSH RIVER RD.
EXECUTIVE CENTER DR. 1
20 EB
20 WB
BE-OC-RT14.2
BERRYHILL RD. RELOC.
RAMP TO BUSH RIVER RD.
BE-OC-RT16.1
BE-OC-LT17.1
EXECUTIVE CENTER DR. 2

AREA TABLE			
ID	Tc (min)	C Value	Area (ac)
BE-OC-LT13.1	29	0.51	8.10
BE-OC-LT17.1	12	0.48	0.44
BE-OC-RT10.1	15	0.71	0.98
BE-OC-RT13.1	10	0.71	0.43
BE-OC-RT14.1	14	0.73	1.27
BE-OC-RT14.2	23	0.56	11.30
BE-OC-RT14.3	13	0.65	2.19
BE-OC-RT15.1	11	0.68	1.11
BE-OC-RT15.2	9	0.73	0.42
BE-OC-RT16.1	12	0.71	0.44

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CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

BERRYHILL ROAD BASIN DELINEATIONS DITCH DRAINAGE AREAS (2 OF 2)

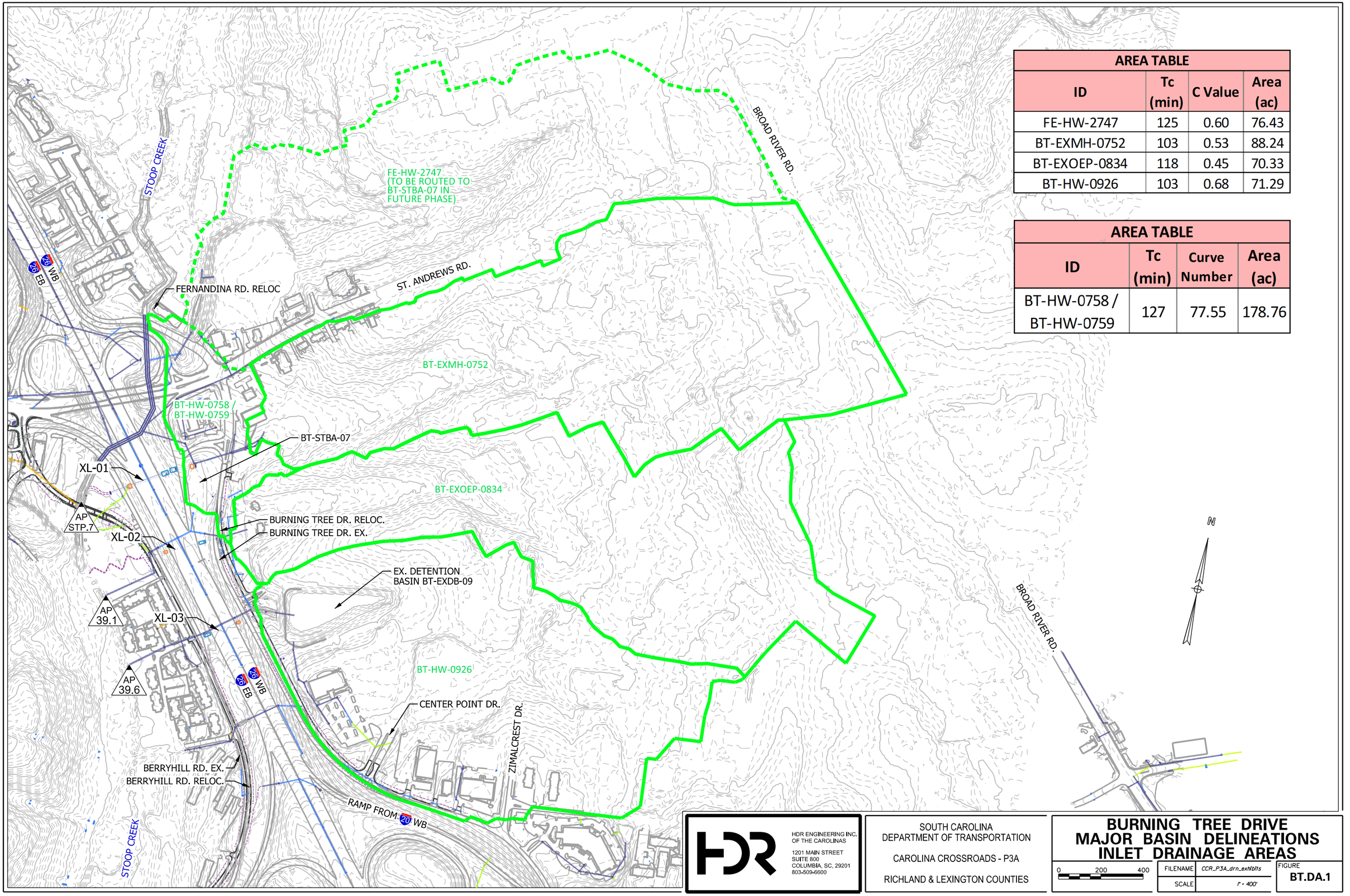
0 100 200

FILENAME CCR_P3A_drn_exhbits
SCALE 1" = 200'

FIGURE BE.DA.4.2

AREA TABLE			
ID	Tc (min)	C Value	Area (ac)
FE-HW-2747	125	0.60	76.43
BT-EXMH-0752	103	0.53	88.24
BT-EXOEP-0834	118	0.45	70.33
BT-HW-0926	103	0.68	71.29

AREA TABLE			
ID	Tc (min)	Curve Number	Area (ac)
BT-HW-0758 / BT-HW-0759	127	77.55	178.76



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DEPARTMENT OF TRANSPORTATION

CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

BURNING TREE DRIVE MAJOR BASIN DELINEATIONS INLET DRAINAGE AREAS

0 200 400

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 400'

FIGURE
BT.DA.1

AREA TABLE			
ID	Tc	C Value	Area
BT-EXDI-0751	12	0.84	1.46
BT-EXMH-0752	103	0.53	88.24
I26-CB-0756	13	0.54	0.93
BT-DI-0761	6	0.81	0.08
BT-CB-0782	6	0.86	0.12
BT-OEP-0783	17	0.63	2.27
BT-CB-0797	5	0.86	0.09
BT-EXDI-0813	10	0.72	0.64
BT-CB-0816	6	0.86	0.08
BT-CB-0831	14	0.65	1.58
BT-CB-0832	14	0.46	0.65
BT-CB-0833	9	0.68	0.20
BT-EXOEP-0834	118	0.45	70.33
BT-CB-0838	7	0.80	0.18
BT-CB-0856	7	0.80	0.17
BT-DI-0857	10	0.45	0.22
BT-CB-0886	8	0.81	0.31

AREA TABLE			
ID	Tc	C Value	Area
BT-CB-0908	5	0.85	0.07
BT-CB-0909	6	0.85	0.08
BT-CB-0924	14	0.62	1.61
BT-HW-0926	84	0.68	71.29
BT-OEP-0928	11	0.40	0.50
BT-CB-0931	6	0.87	0.21
BT-CB-0974	8	0.74	0.27
BT-DI-0975	11	0.40	0.09
BT-CB-1006	6	0.86	0.23
BT-OEP-1007	17	0.65	2.39
I26-EXDI-1011	13	0.61	0.82
BT-DI-1012	14	0.43	0.75
BT-CB-1051	6	0.86	0.18
BT-CB-1061	6	0.86	0.20
I26-EXDI-1064	23	0.48	2.57
BT-OEP-1145	12	0.55	1.30

ST. ANDREWS RD.
FERNANDINA RD. RELOC.
BT-EXDI-0751
BT-OEP-0783
BT-DI-0761
BT-CB-0782
BT-CB-0797
BT-CB-0816
BT-EXDI-0813
I26-CB-0756
BT-CB-0908
BT-DI-0857
BT-CB-0856
BT-CB-0833
BT-CB-0909
EX. DETENTION BASIN BT-EXDB-09
BT-CB-0886
BT-CB-0931
BT-CB-0832
BT-CB-0831
BT-CB-0924
BURNING TREE DR. EX.
BURNING TREE DR. RELOC.
BT-DI-0975
BT-CB-0974
BT-CB-1006
BT-OEP-1007
I26-EXDI-1011
CENTER POINT DR.
BT-CB-1061
BT-DI-1012
I26-EXDI-1064
BT-CB-1051
BT-OEP-1145
ZIMALCREST DR.
RAMP FROM 20 WB
26 WB
26 EB
XL-01
XL-02
XL-03
ST. ANDREWS RD.
BERRYHILL RD. EX.
AP STP.7
STOOP CREEK
BERRYHILL RD. RELOC.
AP 39.1
AP 39.6
AP 40.7
FAIRWAY LN.
RAMP TO 20 WB
BERRYHILL RD. EX.
BERRYHILL RD. RELOC.
STOOP CREEK
20 WB
20 EB
WOODLAND HILLS RD.
N

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CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

BURNING TREE DRIVE BASIN DELINEATIONS INLET DRAINAGE AREAS

0 125 250

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 250'

FIGURE BT.DA.2

AREA TABLE			
ID	Tc (min)	C Value	Area (ac)
BT-OC-LT07.1	17	0.66	1.90
BT-OC-LT07.2	15	0.42	0.37
BT-OC-LT09.1	7	0.69	0.19
BT-OC-LT10.1	17	0.65	2.39
BT-OC-LT10.2	16	0.69	1.88
BT-OC-LT10.3	15	0.72	1.64
BT-OC-LT11.1	12	0.55	1.30
BT-OC-LT11.2	9	0.68	0.73
BT-OC-LT12.1	8	0.68	0.43
BT-OC-RT08.1	14	0.46	0.65
BT-OC-RT09.1	11	0.40	0.50
BT-OC-RT10.1	13	0.43	0.75

BT-OC-LT07.1
BT-OC-LT07.2
BT-OC-LT09.1
BT-OC-RT08.1
BT-OC-RT09.1
BT-OC-RT10.1
BT-OC-LT10.1
BT-OC-LT10.2
BT-OC-LT10.3
BT-OC-LT11.1
BT-OC-LT11.2
BT-OC-LT12.1
STORAGE BASIN BT-STBA-07
EX. DETENTION BASIN BT-EXDB-09
BURNING TREE DR. RELOC.
BURNING TREE DR. EX.
BERRYHILL RD. EX.
BERRYHILL RD. RELOC.
CENTER POINT DR.
ZIMALCREST DR.
FAIRWAY LN.
STOOP CREEK
RAMP FROM 20 WB
RAMP TO 20 WB
26 WB
26 EB
20 WB
20 EB
XL-01
XL-02
XL-03
AP 39.1
AP 39.6
AP 40.7

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CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

BURNING TREE DRIVE BASIN DELINEATIONS DITCH DRAINAGE AREAS

0 100 200

FILENAME: CCR_P3A_drn_exhibits
SCALE: 1" = 200'

FIGURE: BT.DA.3

F

Appendix F:

Geopak Drainage Area, Node & Link Reports

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

GEOPAK AREA TABLE					
ID	Tc	Discharge	Intensity	C Value	Area
BE-CB-0641	6	0.73	7.72	0.72	0.13
BE-DI-0642	9	0.46	6.77	0.62	0.11
BE-DN-0671	96.2	49.34	1.93	0.60	42.52
BE-DI-0674	12	5.74	6.06	0.81	1.17
BE-CB-0681	8	1.36	7.05	0.86	0.22
BE-CB-0682	5	0.45	8.11	0.88	0.06
BE-CB-0683	7	0.89	7.36	0.87	0.14
BE-CB-0691	7	2.54	7.36	0.85	0.41
BT-EXDI-0751	12.4	7.34	5.98	0.84	1.46
BT-EXMH-0752	103.4	86.34	1.85	0.53	88.24
I26-CB-0756	13	2.94	5.86	0.54	0.93
BT-DI-0761	6	0.49	7.72	0.81	0.08
BT-CB-0782	6	0.77	7.72	0.86	0.12
BT-OEP-0783	17.3	7.38	5.16	0.63	2.27
BT-CB-0797	5	0.63	8.11	0.86	0.09
BE-DI-0799	14.4	3.56	5.61	0.55	1.15
BT-EXDI-0813	10	2.98	6.51	0.72	0.64
BT-CB-0816	6	0.50	7.72	0.86	0.08
BT-CB-0831	14	5.83	5.68	0.65	1.58
BT-CB-0832	14	1.69	5.68	0.46	0.65
BT-CB-0833	9	0.92	6.77	0.68	0.20
BT-EXOEP-0834	118.4	53.50	1.69	0.45	70.33
BT-CB-0838	7	1.06	7.36	0.80	0.18
BT-CB-0856	7	1.00	7.36	0.80	0.17
BT-DI-0857	10	0.64	6.51	0.45	0.22
BE-EXDI-0863	15.3	8.00	5.46	0.65	2.26
I26-MCB-0864	5	2.02	8.11	0.90	0.28
BE-OEP-0875	11	0.44	6.27	0.40	0.18
BT-CB-0886	8	1.76	7.05	0.81	0.31
BE-CB-0901	5	1.07	8.11	0.86	0.15
I26-MCB-0905	6	3.93	7.72	0.90	0.57
BT-CB-0908	5	0.45	8.11	0.85	0.07

GEOPAK AREA TABLE					
ID	Tc	Discharge	Intensity	C Value	Area
BT-CB-0909	6	0.52	7.72	0.85	0.08
BE-CB-0921	5	1.03	8.11	0.86	0.15
BT-CB-0924	14.4	5.58	5.61	0.62	1.61
BT-HW-0926	84	102.27	2.11	0.68	71.29
BT-OEP-0928	11	1.25	6.27	0.40	0.50
BT-CB-0931	6	1.41	7.72	0.87	0.21
I26-MCB-0952	6	2.77	7.72	0.90	0.40
BE-CB-0956	5	0.69	8.11	0.87	0.10
BE-CB-0962	14.4	1.84	5.61	0.42	0.78
BT-CB-0974	8	1.42	7.05	0.74	0.27
BT-DI-0975	11	0.23	6.27	0.40	0.09
BE-CB-0981	6	1.13	7.72	0.86	0.17
BT-CB-1006	6	1.52	7.72	0.86	0.23
BT-OEP-1007	17.4	7.98	5.14	0.65	2.39
BE-CB-1008	6	1.09	7.72	0.86	0.16
I26-EXDI-1011	13.4	2.88	5.78	0.61	0.82
BT-DI-1012	14.4	1.81	5.61	0.43	0.75
BE-CB-1037	6	1.17	7.72	0.86	0.18
BT-CB-1051	6	1.19	7.72	0.86	0.18
BT-CB-1061	6	1.31	7.72	0.86	0.20
I26-EXDI-1064	23.4	5.49	4.45	0.48	2.57
I26-MCB-1071	6	4.40	7.72	0.90	0.63
BE-CB-1082	21	2.62	4.70	0.42	1.33
BE-OEP-1083	27.6	8.91	4.08	0.44	4.97
BE-DI-1091	15.3	3.81	5.46	0.71	0.98
BT-OEP-1145	12.4	4.26	5.98	0.55	1.30
BE-DI-1312	10	1.49	6.51	0.67	0.34
BE-DI-1313	10.4	1.96	6.41	0.71	0.43
BE-DI-1344	7	0.87	7.36	0.77	0.15
BE-CB-1352	5	0.30	8.11	0.88	0.04
BE-DI-1388	6	2.10	7.72	0.90	0.30
BE-DI-1433	12.4	8.37	5.98	0.64	2.19

GEOPAK AREA TABLE					
ID	**Tc**	**Discharge**	**Intensity**	**C Value**	**Area**
BE-EXMH-1434	22.2	20.77	4.57	0.56	8.12
BE-CB-1532	6	0.61	7.72	0.86	0.09
BE-CB-1535	7	1.06	7.36	0.79	0.18
BE-OEP-1542	11	4.72	6.27	0.68	1.11
BE-CB-1543	13.4	4.12	5.78	0.66	1.08
BE-CB-1581	6	0.59	7.72	0.85	0.09
BE-CB-1582	6	0.63	7.72	0.85	0.10
BE-OEP-1583	9	2.09	6.77	0.73	0.42
BE-DI-1625	6	2.32	7.72	0.89	0.34
BE-EXDI-1651	9.4	2.66	6.66	0.71	0.56
BE-CB-1691	6	0.59	7.72	0.84	0.09
BE-CB-1715	5	0.24	8.11	0.85	0.03
BE-CB-1725	8	1.14	7.05	0.85	0.19
BE-CB-1735	8	1.16	7.05	0.86	0.19
RO-CB-2124	14.4	1.10	5.61	0.75	0.26
RO-EXCB-2142	10	3.85	6.51	0.75	0.79
RO-EXCB-2162	14.4	13.19	5.61	0.75	3.14
RO-CB-2192	13.4	3.80	5.78	0.52	1.26

AREA TABLE			
ID	**Tc (min)**	**Curve Number**	**Area (ac)**
BE-HW-1633 / BE-HW-1653	51.67	76.70	91.07

*Modeled in HEC-HMS

AREA TABLE			
ID	**Tc (min)**	**Curve Number**	**Area (ac)**
BT-HW-0758 / BT-HW-0759	91	0.58	178.38

GEOPAK NODE TABLE							
ID	Description	Alignment	Station	Offset	Elevation	Depth (ft)	Junction Loss
BE-OP-0640	OUTFALL	BERP	302+90.00	50.00	225.00	0.00	0.00
BE-CB-0641	PR. CB T16	BERP	302+67.53	47.39	231.50	4.62	0.01
BE-DI-0642	PR. DI 24x36	BERP	302+30.09	34.46	230.50	3.50	0.00
BE-DN-0671	UPSTREAM SYSTEM	BERP	303+91.33	127.45	226.00	12.25	0.00
BE-JB-0672	PR. JB (CONVERT EX. CB)	BERP	304+06.03	104.80	220.00	7.50	0.00
BE-JB-0673	PR. JB (CONVERT EX. DI)	BERP	304+19.43	85.41	219.00	7.78	0.06
BE-DI-0674	ADJUST EX. DI	BERP	304+30.82	66.80	218.00	7.35	0.04
BE-JB-0675	PR. JB (CONVERT EX. CB)	BERP	304+42.47	50.78	220.00	10.14	0.29
BE-OP-0680	OUTFALL	BERP	305+00.97	-88.16	207.00	0.00	0.00
BE-CB-0681	PR. CB T17	BERP	304+75.45	-27.50	223.40	10.39	0.01
BE-CB-0682	PR. CB T1	BERP	304+59.98	-2.50	224.62	3.50	0.04
BE-CB-0683	PR. CB T1	BERP	303+84.99	-2.51	227.53	3.50	0.00
BE-OP-0690	OUTFALL	BERP	305+54.95	42.90	217.00	0.00	0.00
BE-CB-0691	PR. CB T17	WOODLANDHILL	10+50.00	-29.50	224.50	5.13	0.00
BE-OP-0700	OUTFALL	BERP	306+46.72	-62.65	206.00	0.00	0.00
BE-MH-0701	PR. MH	BERP	306+46.67	-18.27	217.60	9.85	0.74
BT-OP-0750	OUTFALL	BURN_3A	312+81.15	83.15	210.00	0.00	0.00
BT-EXDI-0751	EX. DI	BURN_3A	312+28.77	-31.49	223.00	10.73	0.20
BT-EXMH-0752	EX. MH	BURN_3A	311+85.19	-113.44	225.10	9.84	0.00
BT-JB-0755	PR. JB (72"x72") (BLIND)	BURN_3A	313+66.63	281.75	206.00	6.00	0.16
I26-CB-0756	PR. CB T9 (6'x6')	I26000X	309+95.59	-109.90	211.00	11.17	0.00
BT-JB-0757	PR. JB (72"x72") (BLIND)	BURN_3A	313+76.40	278.85	206.00	6.00	0.14
BT-HW-0758	PR. HEADWALL	BURN_3A	313+39.30	164.45	200.75	0.00	0.00
BT-HW-0759	PR. HEADWALL	BURN_3A	313+31.65	166.79	200.75	0.00	0.00
BE-OP-0760	OUTFALL	BERP	310+02.78	-143.59	198.00	0.00	0.00
BT-OP-0760	OUTFALL	BURN_3A	313+88.49	-28.74	215.40	0.00	0.00
BT-DI-0761	PR. DI 24x36	BURN_3A	313+35.00	-30.00	219.40	2.50	0.00
BE-OP-0770	OUTFALL	BERP	310+08.01	-137.55	198.00	0.00	0.00
BT-OP-0780	OUTFALL	BURN_3A	314+63.17	80.26	204.10	0.00	0.00
BT-MH-0781	PR. MH	BURN_3A	314+99.35	41.85	214.50	5.50	0.11
BT-CB-0782	PR. CB T16	BURN_3A	315+00.00	-12.50	217.01	5.99	0.09
BT-OEP-0783	PR. OPEN PIPE END	BURN_3A	315+00.00	-29.80	212.25	0.00	0.00
I26-MCB-0790	EX. CB T25 (OP)	I26000X	308+85.35	2.48	212.50	4.38	0.00
I26-MCB-0791	EX. MCB	I26000X	310+45.04	2.16	213.20	4.25	0.00
BT-CB-0797	PR. CB T18	BURN_3A	315+85.00	-12.50	216.62	4.50	0.01
BE-DI-0799	PR. DI T112 (6'x6')	BERP	310+69.47	-208.56	205.00	6.00	0.02
I26-EXMH-0812	EX. MH	I26000X	313+64.55	-86.82	213.20	7.18	0.11
BT-EXDI-0813	EX. DI	BURN_3A	315+94.59	152.50	210.00	2.50	0.00
BT-CB-0816	PR. CB T16	BURN_3A	316+35.00	-12.50	216.73	3.50	0.00
BT-CB-0831	PR. CB T9 (6'x6')	BURN_3A	317+41.78	104.35	211.50	7.00	0.03
BT-CB-0832	PR. CB T9 (6'x6')	BURN_3A	317+38.83	36.51	213.40	6.75	0.04
BT-CB-0833	PR. CB T16	BURN_3A	317+37.03	-12.50	216.75	6.83	0.00
BT-EXOEP-0834	EX. OPEN PIPE END	BURN_3A	317+20.57	-156.35	212.71	0.00	0.00
BT-CB-0856	PR. CB T16	BURN_3A	318+90.00	-12.50	217.95	3.50	0.17

GEOPAK NODE TABLE							
ID	Description	Alignment	Station	Offset	Elevation	Depth (ft)	Junction Loss
BT-DI-0857	PR. DI 24x36	BURN_3A	318+95.00	-44.00	224.00	6.30	0.00
BE-OP-0860	OUTFALL	BERP	313+55.65	38.51	198.00	0.00	0.00
BE-JB-0861	PR. JB	BERP	313+66.60	-2.08	207.00	7.68	0.02
BE-JB-0862	PR. JB (BLIND)	BERP	313+68.38	-16.45	208.00	7.98	0.03
BE-EXDI-0863	EX. DI	BERP	313+69.75	-65.89	205.97	5.01	0.04
I26-MCB-0864	EX. MCB	I26000X	313+64.78	2.42	214.30	10.30	0.25
BE-OP-0870	OUTFALL	BERP	313+75.97	39.30	198.00	0.00	0.00
BE-JB-0871	PR. JB (36"x72")	BERP	313+95.32	-23.49	205.00	5.50	0.02
BE-OEP-0875	PR. OPEN PIPE END	BERP	314+16.76	-26.81	203.80	0.00	0.00
BT-CB-0886	PR. CB T17	BURN_3A	320+25.00	-12.50	220.60	3.50	0.00
BE-OP-0890	OUTFALL	BERP	314+75.00	33.00	201.00	0.00	0.00
BE-CB-0901	PR. CB T1	BERP	315+07.00	15.00	205.59	3.50	0.13
I26-MCB-0905	EX. MCB	I26000X	315+51.11	2.16	215.00	4.25	0.00
BT-CB-0908	PR. CB T16	BURN_DW321	11+09.00	0.87	226.80	3.50	0.00
BT-CB-0909	PR. CB T16	BURN_DW321	11+08.99	25.72	227.30	4.06	0.00
BT-OP-0910	OUTFALL	BURN_DW321	11+09.00	43.00	222.50	0.00	0.00
BE-CB-0921	PR. CB T1	BERP	316+66.00	15.00	206.83	3.50	0.01
BT-CB-0924	PR. CB T9 (6'x6')	BURN_3A	322+32.51	124.83	218.00	9.16	0.01
BT-JB-0925	PR. JB (36"x72")	BURN_3A	322+41.78	24.33	228.33	17.93	0.02
BT-HW-0926	PR. HEADWALL	BURN_3A	322+49.76	-60.31	215.28	0.00	0.00
BT-OEP-0928	PR. OPEN PIPE END	BURN_3A	322+65.00	42.06	224.00	0.00	0.00
BT-OP-0930	OUTFALL	BURN_3A	322+65.00	-60.00	218.30	0.00	0.00
BT-CB-0931	PR. CB T17	BURN_3A	322+90.00	-12.50	232.09	8.86	0.17
BE-EXCB-0951	EX. CB	BERP	319+38.98	-69.23	209.92	5.35	0.00
I26-MCB-0952	EX. MCB	I26000X	319+35.95	2.23	218.60	10.65	0.01
I26-MCB-0953	EX. MCB	I26000X	322+02.20	2.35	227.00	3.50	0.00
BE-CB-0956	PR. CB T1	BERP	318+25.00	15.00	208.20	3.50	0.01
BE-EXDI-0960	EX. DI (OP)	BERP	319+04.17	172.02	201.19	8.19	0.00
BE-JB-0961	PR. JB (48"x72")	BERP	319+24.86	28.89	209.00	9.29	0.26
BE-CB-0962	PR. CB T9 (6'x6')	BERP	319+50.00	-21.97	209.50	7.00	0.26
BE-JB-0963	PR. JB (72"x72")	BERP	319+54.50	-66.95	212.00	7.50	0.01
BT-CB-0974	PR. CB T17	BURN_3A	325+40.00	-12.50	246.06	5.00	0.08
BT-DI-0975	PR. DI 24x36	BURN_3A	325+44.00	-34.00	246.90	4.08	0.00
BE-CB-0981	PR. CB T1	BERP	319+64.00	15.00	211.00	3.50	0.01
BT-CB-1006	PR. CB T17	BURN_3A	327+50.00	-12.50	255.00	5.00	0.10
BT-OEP-1007	PR. OPEN PIPE END	BURN_3A	327+70.00	-27.00	252.00	0.00	0.00
BE-CB-1008	PR. CB T1	BERP	321+50.00	15.00	215.96	3.50	0.01
I26-EXDI-1011	EX. DI	I26000X	325+15.71	-84.68	239.22	2.64	0.38
BT-DI-1012	PR. DI T112	BURN_3A	328+23.50	39.50	253.50	9.47	0.00
BE-CB-1037	PR. CB T1	BERP	323+47.00	15.00	218.92	3.50	0.00
BT-OP-1050	OUTFALL	BURN_3A	330+00.00	-27.00	261.02	0.00	0.00
BT-CB-1051	PR. CB T17	BURN_3A	330+00.00	-12.50	264.83	3.00	0.00
BT-OP-1060	OUTFALL	BURN_3A	332+00.00	-27.00	269.04	0.00	0.00
BT-CB-1061	PR. CB T17	BURN_3A	332+00.00	-12.50	272.84	3.00	0.00

GEOPAK NODE TABLE							
ID	Description	Alignment	Station	Offset	Elevation	Depth (ft)	Junction Loss
I26-EXDI-1064	EX. DI	I26000X	328+30.27	-86.80	251.00	4.25	0.00
BE-OP-1070	OUTFALL	BERP	325+05.82	-89.42	227.88	0.00	0.00
I26-MCB-1071	EX. MCB	I26000X	325+13.13	-0.59	240.00	7.10	0.02
BE-EXDI-1080	EX. DI (OP)	BERP	325+47.55	232.48	209.80	5.80	0.00
BE-JB-1081	PR. JB (48"x48")	FAIRWAYEX	10+39.05	-22.42	219.00	4.00	0.36
BE-CB-1082	PR. CB T9 (3'x4')	BERP	325+07.60	-21.98	219.50	3.00	0.22
BE-OEP-1083	PR. OPEN PIPE END	BERP	325+07.02	-44.74	218.33	0.00	0.00
BE-DI-1091	PR. DI 24x36	BERP	325+94.80	38.60	219.00	2.50	0.00
BT-OP-1100	OUTFALL	BURN_3A	333+40.00	-27.00	273.05	0.00	0.00
BT-OEP-1145	PR. OPEN PIPE END	BURN_3A	335+00.00	-35.00	279.50	0.00	0.00
BE-DI-1312	PR. DI 24x36	BERP	337+40.88	34.05	205.90	3.50	0.01
BE-DI-1313	PR. DI 24x36	BERP	336+62.05	28.48	210.90	3.50	0.00
BE-DI-1344	PR. DI 24x36	BERP	338+40.00	46.92	197.50	2.50	0.00
BE-MH-1345	PR. MH	BERP	338+45.10	25.54	202.50	7.55	0.11
BE-CB-1352	PR. CB T1	BERP	338+97.50	28.69	201.00	6.20	0.01
BE-DI-1388	PR. DI T112	BERP	340+75.51	41.66	192.00	4.00	0.02
BE-OP-1410	OUTFALL	BERP	341+34.17	43.34	186.00	0.00	0.00
BE-DI-1433	PR. DI 24x36	BERP	344+21.00	39.80	192.50	6.50	0.49
BE-EXMH-1434	EX. MH	BERP	343+96.63	158.26	201.71	10.88	0.00
BE-OP-1440	OUTFALL	BERP	343+50.04	53.86	185.00	0.00	0.00
BE-OP-1530	OUTFALL	BERP	348+50.00	26.90	213.00	0.00	0.00
BE-CB-1532	PR. CB T1	BERP	348+76.20	26.24	217.50	3.50	0.01
BE-CB-1535	PR. CB T16	BERP	349+09.85	28.33	218.00	3.50	0.03
BE-OEP-1542	PR. OPEN PIPE END	BERP	349+48.00	27.14	217.00	0.00	0.00
BE-CB-1543	PR. CB T9	BERP	349+44.27	-44.61	220.50	6.32	0.00
BE-OP-1580	OUTFALL	BERP	351+88.00	28.90	223.00	0.00	0.00
BE-CB-1581	PR. CB T1	BERP	352+13.82	26.16	227.75	3.50	0.01
BE-CB-1582	PR. CB T1	BERP	352+46.26	27.81	228.00	3.50	0.01
BE-OEP-1583	PR. OPEN PIPE END	BERP	352+64.20	27.04	225.40	0.00	0.00
BE-DI-1625	PR. DI 24x36	BERP	354+89.90	48.54	225.00	4.00	0.00
BE-JB-1631	PR. JB (36"x60")	BERP	355+30.33	-28.74	228.00	15.00	0.14
BE-MH-1632	PR. MH	BERP	355+49.20	23.30	227.00	13.60	0.26
BE-HW-1633	PR. HEADWALL	BERP	355+72.81	54.62	213.80	0.00	0.00
BE-EXDI-1651	EX. DI	BERP	355+42.45	-57.20	227.03	15.30	0.06
BE-JB-1652	ADJUST EX. JB	BERP	355+60.54	23.34	228.00	14.51	0.32
BE-HW-1653	PR. HEADWALL	BERP	355+77.91	50.59	213.80	0.00	0.00
BE-OP-1690	OUTFALL	BERP	358+50.00	29.18	236.94	0.00	0.00
BE-CB-1691	PR. CB T16	BERP	358+75.00	12.50	241.50	3.50	0.07
BE-CB-1715	PR. CB T16	BERP	359+99.00	12.50	244.73	3.80	0.08
BE-CB-1725	PR. CB T16	EXECUTIVEEX2	100+58.00	29.27	244.73	3.68	0.07
BE-CB-1735	PR. CB T16	EXECUTIVEEX2	100+58.00	-29.35	244.73	3.50	0.00
RO-OP-2110	OUTFALL	ROCKLANDEX	9134+97.10	-392.78	197.00	0.00	0.00
RO-OEP-2111	PR. OPEN PIPE END	ROCKLANDEX	9134+80.34	-445.79	202.00	0.00	0.00
RO-OP-2120	OUTFALL	ROCKLANDEX	9135+20.74	-144.89	197.00	0.00	0.00

GEOPAK NODE TABLE							
ID	**Description**	**Alignment**	**Station**	**Offset**	**Elevation**	**Depth (ft)**	**Junction Loss**
RO-CB-2124	PR. CB T9	ROCKLANDEX	9134+74.92	-113.96	211.00	6.33	0.12
RO-OP-2140	OUTFALL	ROCKLANDEX	9134+94.16	-385.06	197.00	0.00	0.00
RO-JB-2141	PR. JB	ROCKLANDEX	9134+74.00	-381.68	211.50	9.30	0.02
RO-EXCB-2142	EX. CB	ROCKLANDEX	9134+65.64	-379.90	219.30	9.12	0.00
RO-OP-2150	OUTFALL	ROCKLANDEX	9134+72.40	-587.87	206.63	0.00	0.00
RO-OP-2160	OUTFALL	ROCKLANDEX	9134+77.31	-578.21	206.50	0.00	0.00
RO-EXCB-2162	EX. CB	ROCKLANDEX	9134+53.50	-113.63	216.00	5.17	0.00
RO-OP-2170	OUTFALL	ROCKLANDEX	9137+85.82	20.83	187.78	0.00	0.00
RO-EXOEP-2171	EX. OPEN PIPE END	ROCKLANDEX	9137+69.18	-17.97	187.78	0.00	0.00
RO-OP-2180	OUTFALL	ROCKLANDEX	9137+35.00	-57.00	188.25	0.00	0.00
RO-PO-2181	4'x4' RISER	ROCKLANDEX	9139+15.00	-129.86	206.00	13.00	0.00
RO-OP-2190	OUTFALL	ROCKLANDEX	9140+99.46	-133.82	198.00	0.00	0.00
RO-JB-2191	PR. JB	ROCKLANDEX	9141+19.00	-194.00	209.25	3.83	0.01
RO-CB-2192	PR. CB T9	ROCKLANDEX	9141+28.55	-255.73	215.20	7.58	0.02

GEOPAK LINK TABLE																					
ID	Upstream Node	Downstream Node	Shape	Material	# of Barrels	Rise (ft)	Length (ft)	Slope (%)	Discharge (cfs)	Capacity (cfs)	Uniform Depth (ft)	Uniform Velocity (fps)	Soffit Upstream	HGL Upstream	Soffit Downstream	HGL Downstream	Invert Upstream	Invert Downstream	Actual Velocity Upstream (fps)	Actual Velocity Downstream (fps)	Actual Depth Upstream (ft)	Actual Depth Downstream (ft)
BE-NP-0641	BE-CB-0641	BE-OP-0640	Circular	Concrete	1	1.5	19.71	9.55	1.09	37.83	0.18	8.98	228.38	227.48	226.50	225.19	226.88	225.00	1.67	8.63	0.59	0.19
BE-NP-0642	BE-DI-0642	BE-CB-0641	Circular	Concrete	1	1.5	39.29	0.30	0.46	6.70	0.28	2.09	228.50	227.48	228.38	227.48	227.00	226.88	0.95	0.71	0.48	0.59
BE-EP-0671	BE-DN-0671	BE-JB-0672	Circular	Concrete	1	3	29.37	3.54	49.34	146.27	1.25	17.70	216.75	217.70	215.71	214.31	213.75	212.71	6.98	12.88	3.00	1.60
BE-EP-0672	BE-JB-0672	BE-JB-0673	Circular	Concrete	1	3	21.01	5.62	49.34	184.22	1.10	20.94	215.50	215.01	214.32	212.83	212.50	211.32	7.80	13.87	2.51	1.51
BE-EP-0673	BE-JB-0673	BE-DI-0674	Circular	Concrete	1	3	18.74	2.67	49.34	126.97	1.35	15.95	214.22	213.67	213.72	212.47	211.22	210.72	7.97	11.54	2.45	1.75
BE-EP-0674	BE-DI-0674	BE-JB-0675	Circular	Concrete	1	3	16.61	4.76	51.15	169.50	1.18	19.91	213.65	213.21	212.86	211.50	210.65	209.86	7.96	12.97	2.56	1.64
BE-EP-0675	BE-JB-0675	BE-MH-0701	Circular	Concrete	1	3	214.17	0.99	51.15	77.15	1.87	11.04	212.86	212.51	210.75	209.64	209.86	207.75	7.74	10.92	2.65	1.89
BE-NP-0681	BE-CB-0681	BE-OP-0680	Circular	Concrete	1	1.5	60.07	10.00	2.61	38.71	0.27	11.84	214.51	214.03	208.50	207.27	213.01	207.00	2.02	11.76	1.03	0.27
BE-NP-0682	BE-CB-0682	BE-CB-0681	Circular	Concrete	1	1.5	30.46	7.29	1.29	33.05	0.21	8.59	222.62	221.73	220.40	219.11	221.12	218.90	1.89	8.40	0.61	0.21
BE-NP-0683	BE-CB-0683	BE-CB-0682	Circular	Concrete	1	1.5	70.94	4.10	0.89	24.79	0.20	6.29	225.53	224.54	222.62	221.32	224.03	221.12	1.66	6.29	0.51	0.20
BE-NP-0691	BE-CB-0691	BE-OP-0690	Circular	Concrete	1	1.5	23.66	10.00	2.54	38.71	0.27	11.75	220.87	220.37	218.50	217.28	219.37	217.00	2.02	10.91	1.00	0.28
BE-NP-0701	BE-MH-0701	BE-OP-0700	Circular	Concrete	1	3	42.54	4.11	51.15	157.64	1.22	18.87	210.75	210.90	209.00	207.51	207.75	206.00	7.24	14.34	3.00	1.51
BT-EP-0751	BT-EXDI-0751	BT-OP-0750	Circular	Concrete	1	3.5	126.04	1.80	88.55	157.34	1.96	15.94	215.77	215.39	213.50	212.12	212.27	210.00	9.77	14.53	3.12	2.12
I26-NP-0755	BT-JB-0755	BE-OP-0760	Circular	Concrete	1	5	411.15	0.49	100.00	211.68	2.53	10.03	205.00	203.02	203.00	200.53	200.00	198.00	8.07	10.03	3.02	2.53
I26-NP-0756	I26-CB-0756	BE-DI-0799	Circular	Concrete	1	5	239.78	0.35	100.10	179.00	2.79	8.90	204.83	202.70	204.00	201.79	199.83	199.00	8.61	8.90	2.86	2.79
BT-NP-0757	BT-JB-0757	I26-CB-0756	Circular	Concrete	1	5	55.32	0.30	100.00	166.24	2.93	8.35	205.00	203.07	204.83	202.70	200.00	199.83	7.90	8.60	3.07	2.86
BT-NP-0758	BT-HW-0758	BT-JB-0757	Circular	Concrete	1	5	115.84	0.65	100.00	244.21	2.33	11.16	205.75	205.05	205.00	202.41	200.75	200.00	5.57	10.69	4.30	2.41
BT-NP-0759	BT-HW-0759	BT-JB-0755	Circular	Concrete	1	5	115.75	0.65	100.00	244.31	2.33	11.16	205.75	205.05	205.00	202.41	200.75	200.00	5.57	10.69	4.30	2.41
BT-NP-0761	BT-DI-0761	BT-OP-0760	Circular	Concrete	1	1.5	51.51	2.91	0.49	20.89	0.16	4.66	218.40	217.21	216.90	215.56	216.90	215.40	1.81	4.64	0.31	0.16
BT-NP-0781	BT-MH-0781	BT-OP-0780	Circular	Concrete	1	2.5	51.53	9.51	8.62	147.40	0.43	15.58	211.50	210.26	206.60	204.55	209.00	204.10	3.46	14.53	1.26	0.45
BT-NP-0782	BT-CB-0782	BT-MH-0781	Circular	Concrete	1	2.5	53.66	3.76	8.62	92.74	0.53	11.23	213.52	212.24	211.50	209.56	211.02	209.00	3.64	10.49	1.22	0.56
BT-NP-0783	BT-OEP-0783	BT-CB-0782	Circular	Concrete	1	2.5	12.30	10.00	7.38	151.14	0.39	15.13	214.75	213.50	213.52	211.51	212.25	211.02	3.01	10.87	1.25	0.49
BT-NP-0797	BT-CB-0797	BT-CB-0782	Circular	Concrete	1	1.5	79.13	1.39	1.09	14.43	0.29	4.57	213.62	212.58	212.52	211.31	212.12	211.02	2.38	4.56	0.46	0.29
BE-NP-0799	BE-DI-0799	BE-OP-0770	Circular	Concrete	1	5	106.16	0.94	100.20	294.57	2.09	12.88	204.00	201.88	203.00	200.24	199.00	198.00	8.54	11.74	2.88	2.24
BT-NP-0816	BT-CB-0816	BT-CB-0797	Circular	Concrete	1	1.5	44.92	2.47	0.50	19.24	0.17	4.43	214.73	213.58	213.62	212.29	213.23	212.12	1.56	4.43	0.35	0.17
I26-NP-0831	BT-CB-0831	BE-JB-0871	Circular	Concrete	1	4.5	298.80	1.67	56.66	296.44	1.39	13.61	209.00	206.80	204.00	200.90	204.50	199.50	6.91	13.45	2.30	1.40
BT-NP-0832	BT-CB-0832	BT-CB-0831	Circular	Concrete	1	4	61.05	2.70	54.95	275.21	1.26	16.24	210.65	209.11	209.00	206.45	206.65	205.00	6.79	13.35	2.46	1.45
BT-NP-0833	BT-CB-0833	BT-CB-0832	Circular	Concrete	1	3.5	46.60	5.94	54.46	285.86	1.07	21.72	213.42	212.56	210.65	208.47	209.92	207.15	7.00	16.42	2.64	1.32
BT-EP-0834	BT-EXOEP-0834	BT-CB-0833	Circular	Aluminum	1	3	139.59	1.64	53.50	49.74	3.00	7.76	215.71	216.96	213.42	212.80	212.71	210.42	7.57	8.91	3.00	2.38
BT-NP-0856	BT-CB-0856	BT-CB-0833	Circular	Concrete	1	1.5	145.43	1.74	3.14	16.15	0.47	6.71	215.95	215.36	213.42	212.39	214.45	211.92	2.79	6.71	0.91	0.47
BT-NP-0857	BT-DI-0857	BT-CB-0856	Circular	Concrete	1	1.5	22.52	10.00	0.64	38.71	0.14	7.78	219.20	218.39	216.95	215.59	217.70	215.45	0.80	7.67	0.69	0.14
BE-NP-0861	BE-JB-0861	BE-OP-0860	Circular	Concrete	1	4	42.43	3.11	14.74	295.24	0.63	11.63	203.32	200.53	202.00	198.69	199.32	198.00	4.61	10.12	1.21	0.69
BE-NP-0871	BE-JB-0871	BE-OP-0870	Circular	Concrete	1	4.5	66.09	2.27	56.76	345.23	1.28	15.22	204.00	201.76	202.50	199.47	199.50	198.00	7.11	12.61	2.26	1.47
BE-NP-0875	BE-OEP-0875	BE-JB-0871	Circular	Concrete	1	2	19.90	9.05	0.10	79.29	0.06	4.10	205.80	204.11	204.00	202.06	203.80	202.00	0.33	4.10	0.31	0.06
BT-NP-0886	BT-CB-0886	BT-CB-0856	Circular	Concrete	1	1.5	130.34	2.03	1.76	17.45	0.33	6.02	218.60	217.78	215.95	214.78	217.10	214.45	2.27	6.02	0.68	0.33
BE-NP-0901	BE-CB-0901	BE-OP-0890	Circular	Concrete	1	1.5	36.34	3.00	5.43	21.20	0.54	9.52	203.59	203.18	202.50	201.57	202.09	201.00	3.94	8.74	1.09	0.57
BT-NP-0908	BT-CB-0908	BT-CB-0909	Circular	Concrete	1	1.5	20.84	0.30	0.10	6.70	0.13	1.31	224.80	223.55	224.74	223.54	223.30	223.24	0.53	0.38	0.25	0.31
BT-NP-0909	BT-CB-0909	BT-OP-0910	Circular	Concrete	1	1.5	12.28	6.00	0.20	29.99	0.09	4.58	224.74	223.54	224.00	222.59	223.24	222.50	0.77	4.53	0.31	0.09
BE-NP-0921	BE-CB-0921	BE-CB-0901	Circular	Concrete	1	1.5	155.00	0.80	4.61	10.95	0.71	5.60	204.83	204.20	203.59	202.80	203.33	202.09	4.36	5.60	0.87	0.71
I26-NP-0924	BT-CB-0924	BE-JB-0963	Circular	Concrete	1	5	194.31	2.23	104.66	453.59	1.70	17.84	213.84	211.89	209.50	206.30	208.84	204.50	8.36	16.47	3.05	1.80
BT-NP-0925	BT-JB-0925	BT-CB-0924	Circular	Concrete	1	5	97.94	1.49	102.65	370.57	1.87	15.32	215.40	213.38	213.94	211.02	210.40	208.94	8.40	13.28	2.98	2.08
BT-NP-0926	BT-HW-0926	BT-JB-0925	Circular	Concrete	1	5	80.54	5.98	102.27	742.46	1.30	25.19	220.28	219.64	215.46	212.02	215.28	210.46	5.63	19.55	4.36	1.56
BT-NP-0928	BT-OEP-0928	BT-JB-0925	Circular	Concrete	1	1.5	29.32	1.71	1.25	15.99	0.29	5.12	225.50	224.54	225.00	223.80	224.00	223.50	2.17	5.01	0.54	0.30
BT-NP-0931	BT-CB-0931	BT-OP-0930	Circular	Concrete	1	2	49.31	10.00	10.16	83.37	0.49	17.07	225.23	224.94	220.30	218.82	223.23	218.30	3.56	15.61	1.71	0.52
BE-NP-0951	BE-EXCB-0951	BE-JB-0963	Circular	Concrete	1	5	11.73	0.60	0.20	234.43	0.12	1.72	209.57	207.62	209.50	207.62	204.57	204.50	0.02	0.02	3.05	3.12
I26-EP-0952	I26-MCB-0952	BE-EXCB-0951	Circular	Concrete	1	5	109.57	3.08	0.20	533.07	0.08	3.04	212.95	208.14	209.57	204.65	207.95	204.57	0.84	3.04	0.19	0.08
I26-EP-0953	I26-MCB-0953	I26-MCB-0952	Circular	Concrete	1	1.5	266.25	3.25	0.10	22.06	0.08	3.00	225.00	223.67	216.35	214.93	223.50	214.85	0.91	3.00	0.17	0.08
BE-NP-0956	BE-CB-0956	BE-CB-0921	Circular	Concrete	1	1.5	155.00	0.88	3.79	11.51	0.62	5.54	206.20	205.49	204.83	203.95	204.70	203.33	4.04	5.53	0.79	0.62
BE-EP-0961	BE-JB-0961	BE-EXDI-0960	Circular	Concrete	1	5	145.12	4.62	104.78	652.43	1.41	23.12	204.71	202.98	198.00	194.55	199.71	193.00	7.69	20.25	3.27	1.55
BE-NP-0962	BE-CB-0962	BE-JB-0961	Circular	Concrete	1	5	52.92	5.28	104.78	697.35	1.36	24.27	207.50	205.89	204.71	201.44	202.50	199.71	7.39	17.28	3.39	1.74
BE-NP-0963	BE-JB-0963	BE-CB-0962	Circular	Concrete	1	5	41.23	4.85	104.71	668.49	1.39	23.53	209.50	207.62	207.50	204.34	204.50	202.50	8.14	16.01	3.12	1.84
BT-NP-0974	BT-CB-0974	BT-CB-0931	Circular	Concrete	1	2	246.00	5.68	10.14	62.82	0.56	13.95	243.06	242.60	229.09	227.65	241.06	227.09	3.90	13.91	1.54	0.56
BT-NP-0975	BT-DI-0975	BT-CB-0974	Circular	Concrete	1	1.5	12.65	10.00	0.23	38.71	0.09	5.70	244.32	243.61	243.06	241.65	242.82	241.56	0.24	5.64	0.79	0.09

GEOPAK LINK TABLE																					
ID	Upstream Node	Downstream Node	Shape	Material	# of Barrels	Rise (ft)	Length (ft)	Slope (%)	Discharge (cfs)	Capacity (cfs)	Uniform Depth (ft)	Uniform Velocity (fps)	Soffit Upstream	HGL Upstream	Soffit Downstream	HGL Downstream	Invert Upstream	Invert Downstream	Actual Velocity Upstream (fps)	Actual Velocity Downstream (fps)	Actual Depth Upstream (ft)	Actual Depth Downstream (ft)
BE-NP-0981	BE-CB-0981	BE-CB-0956	Circular	Concrete	1	1.5	135.00	2.07	3.22	17.63	0.45	7.21	209.00	208.28	206.20	205.15	207.50	204.70	3.47	7.19	0.78	0.45
BT-NP-1006	BT-CB-1006	BT-CB-0974	Circular	Concrete	1	2	206.00	4.34	8.99	54.92	0.57	12.23	252.00	251.42	243.06	241.63	250.00	241.06	3.77	12.23	1.42	0.57
BT-NP-1007	BT-OEP-1007	BT-CB-1006	Circular	Concrete	1	2	21.36	9.36	7.98	80.67	0.44	15.54	254.00	253.49	252.00	250.52	252.00	250.00	3.19	12.45	1.49	0.52
BE-NP-1008	BE-CB-1008	BE-CB-0981	Circular	Concrete	1	1.5	181.47	2.73	2.19	20.24	0.35	7.11	213.96	213.14	209.00	207.85	212.46	207.50	2.80	7.11	0.68	0.35
I26-EP-1011	I26-EXDI-1011	I26-MCB-1071	Circular	Concrete	1	2	84.13	4.37	9.04	55.12	0.57	12.30	238.58	238.03	234.90	233.49	236.58	232.90	3.70	11.86	1.45	0.58
BT-EP-1012	BT-DI-1012	I26-EXDI-1011	Circular	Concrete	1	2	96.09	7.75	1.81	73.41	0.22	9.37	246.03	244.65	238.58	236.80	244.03	236.58	2.18	9.37	0.62	0.22
BE-NP-1037	BE-CB-1037	BE-CB-1008	Circular	Concrete	1	1.5	192.63	1.54	1.17	15.17	0.29	4.83	216.92	215.94	213.96	212.75	215.42	212.46	2.15	4.83	0.52	0.29
BT-NP-1051	BT-CB-1051	BT-OP-1050	Circular	Concrete	1	1.5	9.50	8.53	1.19	35.74	0.19	8.86	263.33	262.58	262.52	261.23	261.83	261.02	1.35	7.87	0.75	0.21
BT-NP-1061	BT-CB-1061	BT-OP-1060	Circular	Concrete	1	1.5	9.50	8.42	1.31	35.52	0.20	9.08	271.34	270.60	270.54	269.26	269.84	269.04	1.44	7.98	0.76	0.22
I26-EP-1064	I26-EXDI-1064	I26-EXDI-1011	Circular	Concrete	1	1.5	314.56	3.07	5.49	21.46	0.54	9.65	248.25	248.13	238.58	237.62	246.75	237.08	3.23	9.63	1.38	0.54
I26-EP-1071	I26-MCB-1071	BE-OP-1070	Circular	Concrete	1	2	115.45	4.35	11.52	54.98	0.65	13.14	234.90	234.14	229.88	228.54	232.90	227.88	5.63	12.86	1.24	0.66
BE-EP-1081	BE-JB-1081	BE-EXDI-1080	Circular	Concrete	1	2	178.91	6.15	13.97	65.37	0.65	15.70	217.00	216.83	206.00	204.66	215.00	204.00	4.64	15.60	1.83	0.66
BE-NP-1082	BE-CB-1082	BE-JB-1081	Circular	Concrete	1	2	105.45	1.42	11.18	31.44	0.86	8.68	218.50	217.97	217.00	215.87	216.50	215.00	4.51	8.54	1.47	0.87
BE-NP-1083	BE-OEP-1083	BE-CB-1082	Circular	Concrete	1	2	18.26	10.00	8.91	83.36	0.46	16.43	220.33	219.91	218.50	217.06	218.33	216.50	3.33	12.43	1.59	0.56
BE-NP-1091	BE-DI-1091	BE-JB-1081	Circular	Concrete	1	1.5	17.39	2.88	3.81	20.76	0.45	8.49	218.00	217.60	217.50	216.50	216.50	216.00	2.74	7.41	1.10	0.50
BT-NP-1145	BT-OEP-1145	BT-OP-1100	Circular	Concrete	1	1.5	155.33	4.15	4.26	24.94	0.44	10.00	281.00	280.68	274.55	273.49	279.50	273.05	2.86	9.98	1.18	0.44
BE-NP-1312	BE-DI-1312	BE-MH-1345	Circular	Concrete	1	1.5	96.73	4.55	3.41	26.11	0.38	9.69	203.90	203.29	199.50	198.38	202.40	198.00	3.11	9.64	0.89	0.38
BE-NP-1313	BE-DI-1313	BE-DI-1312	Circular	Concrete	1	1.5	72.06	6.94	1.96	32.24	0.26	9.57	208.90	208.20	203.90	202.66	207.40	202.40	2.03	9.52	0.80	0.26
BE-NP-1344	BE-DI-1344	BE-MH-1345	Circular	Concrete	1	1.5	15.80	0.30	0.87	6.70	0.38	2.48	196.50	195.99	196.45	195.99	195.00	194.95	0.70	0.67	0.99	1.04
BE-NP-1345	BE-MH-1345	BE-CB-1352	Circular	Concrete	1	1.5	49.29	0.30	4.14	6.70	0.90	3.73	196.45	195.99	196.30	195.77	194.95	194.80	3.17	3.45	1.04	0.96
BE-NP-1352	BE-CB-1352	BE-DI-1388	Circular	Concrete	1	1.5	171.90	3.96	4.34	24.36	0.44	9.89	196.30	195.77	189.50	188.45	194.80	188.00	3.62	9.86	0.96	0.45
BE-NP-1388	BE-DI-1388	BE-OP-1410	Circular	Concrete	1	1.5	56.81	3.52	5.98	22.97	0.54	10.36	189.50	189.04	187.50	186.56	188.00	186.00	4.59	9.88	1.04	0.56
BE-NP-1433	BE-DI-1433	BE-OP-1440	Circular	Concrete	1	3	70.93	1.41	27.07	92.29	1.16	10.76	189.00	188.20	188.00	186.23	186.00	185.00	4.87	9.89	2.20	1.23
BE-EP-1434	BE-EXMH-1434	BE-DI-1433	Circular	Concrete	1	2	121.43	2.74	20.77	43.66	1.01	12.99	192.83	193.90	189.50	188.54	190.83	187.50	6.61	12.54	2.00	1.04
BE-NP-1532	BE-CB-1532	BE-OP-1530	Circular	Concrete	1	1.5	22.56	4.43	6.09	25.77	0.52	11.32	215.50	215.06	214.50	213.59	214.00	213.00	4.58	9.49	1.06	0.59
BE-NP-1535	BE-CB-1535	BE-CB-1532	Circular	Concrete	1	1.5	29.27	1.71	5.61	16.00	0.64	7.83	216.00	215.51	215.50	214.68	214.50	214.00	4.43	7.26	1.01	0.68
BE-NP-1542	BE-OEP-1542	BE-CB-1535	Circular	Concrete	1	1.5	39.19	6.38	4.72	30.92	0.41	12.00	218.50	218.25	216.00	214.93	217.00	214.50	2.99	11.15	1.25	0.43
I20-NP-1543	BE-CB-1543	RO-CB-2192	Circular	Concrete	1	2.5	238.06	2.71	4.47	78.68	0.42	8.23	216.68	215.08	210.23	208.15	214.18	207.73	2.80	8.23	0.90	0.42
BE-NP-1581	BE-CB-1581	BE-OP-1580	Circular	Concrete	1	1.5	21.66	5.77	2.72	29.41	0.32	9.89	225.75	225.00	224.50	223.35	224.25	223.00	3.10	8.85	0.75	0.35
BE-NP-1582	BE-CB-1582	BE-CB-1581	Circular	Concrete	1	1.5	28.75	0.87	2.64	11.41	0.51	4.99	226.00	225.16	225.75	224.77	224.50	224.25	3.51	4.90	0.66	0.52
BE-NP-1583	BE-OEP-1583	BE-CB-1582	Circular	Concrete	1	1.5	18.41	4.89	2.09	27.07	0.29	8.62	226.90	226.16	226.00	224.81	225.40	224.50	2.34	7.75	0.76	0.31
BE-NP-1625	BE-DI-1625	BE-MH-1632	Circular	Concrete	1	1.5	61.36	0.30	0.10	6.70	0.13	1.31	222.50	221.17	222.32	220.91	221.00	220.82	0.91	2.20	0.17	0.09
I20-NP-1631	BE-JB-1631	RO-OP-2160	Circular	Concrete	1	4	265.10	2.45	88.52	262.12	1.67	17.84	217.00	216.06	210.50	208.22	213.00	206.50	8.59	17.16	3.06	1.72
BE-NP-1632	BE-MH-1632	BE-JB-1631	Circular	Concrete	1	4	54.02	0.74	88.52	144.05	2.38	11.38	217.40	216.57	217.00	215.51	213.40	213.00	8.28	10.66	3.17	2.51
BE-NP-1633	BE-HW-1633	BE-MH-1632	Circular	Concrete	1	4	37.41	1.07	88.42	173.09	2.11	13.14	217.80	218.47	217.40	215.81	213.80	213.40	7.04	11.18	4.00	2.41
I20-EP-1651	BE-EXDI-1651	RO-OP-2150	Circular	Concrete	1	4	238.06	2.14	91.10	245.01	1.76	17.11	215.73	214.68	210.63	208.46	211.73	206.63	9.17	16.30	2.95	1.83
BE-EP-1652	BE-JB-1652	BE-EXDI-1651	Circular	Concrete	1	4	78.08	2.25	91.00	251.32	1.73	17.42	217.49	216.75	215.73	213.74	213.49	211.73	8.30	14.43	3.26	2.01
BE-NP-1653	BE-HW-1653	BE-JB-1652	Circular	Concrete	1	4	32.80	0.95	88.42	162.73	2.20	12.48	217.80	218.47	217.49	215.96	213.80	213.49	7.04	10.85	4.00	2.47
BE-NP-1691	BE-CB-1691	BE-OP-1690	Circular	Concrete	1	1.5	26.76	3.96	2.94	24.36	0.36	8.84	239.50	238.80	238.44	237.33	238.00	236.94	3.06	8.12	0.80	0.39
BE-NP-1715	BE-CB-1715	BE-CB-1691	Circular	Concrete	1	1.5	120.00	2.44	2.44	19.11	0.38	7.06	242.43	241.69	239.50	238.38	240.93	238.00	2.69	7.04	0.77	0.38
BE-NP-1725	BE-CB-1725	BE-CB-1715	Circular	Concrete	1	1.5	40.86	0.30	2.27	6.70	0.63	3.24	242.55	241.81	242.43	241.69	241.05	240.93	2.51	2.50	0.76	0.77
BE-NP-1735	BE-CB-1735	BE-CB-1725	Circular	Concrete	1	1.5	60.62	0.30	1.16	6.70	0.44	2.68	242.73	241.83	242.55	241.81	241.23	241.05	1.77	1.29	0.60	0.76
RO-NP-2111	RO-OEP-2111	RO-OP-2110	Circular	Concrete	1	5	71.03	7.04	140.00	805.25	1.46	29.22	207.00	207.40	202.00	198.87	202.00	197.00	7.13	20.92	5.00	1.87
RO-NP-2124	RO-CB-2124	RO-OP-2120	Circular	Concrete	1	2	76.73	10.00	14.28	83.37	0.58	18.82	206.67	206.36	199.00	197.61	204.67	197.00	5.06	17.71	1.69	0.61
RO-NP-2141	RO-JB-2141	RO-OP-2140	Circular	Concrete	1	1.5	51.96	10.00	3.85	38.71	0.33	13.28	203.70	203.17	198.50	197.34	202.20	197.00	3.17	12.92	0.97	0.34
RO-EP-2142	RO-EXCB-2142	RO-JB-2141	Circular	Concrete	1	1.25	20.16	4.81	3.85	16.51	0.43	10.40	211.43	211.41	210.46	209.69	210.18	209.21	3.15	8.94	1.23	0.48
RO-EP-2162	RO-EXCB-2162	RO-CB-2124	Circular	Concrete	1	2	29.97	10.01	13.19	83.41	0.56	18.40	212.83	212.88	209.83	208.49	210.83	207.83	4.20	14.74	2.00	0.66
RO-EP-2171	RO-EXOEP-2171	RO-OP-2170	Circular	Aluminum	1	2.5	42.19	0.02	1.00	3.49	0.88	0.65	190.28	188.34	190.28	188.10	187.78	187.78	1.25	2.66	0.55	0.33
RO-NP-2181	RO-PO-2181	RO-OP-2180	Circular	Concrete	1	2.5	109.13	4.35	20.00	99.72	0.79	15.07	195.50	195.33	190.75	189.07	193.00	188.25	4.20	14.35	2.33	0.82
RO-NP-2191	RO-JB-2191	RO-OP-2190	Circular	Concrete	1	2.5	75.56	9.82	7.92	149.78	0.40	15.36	207.92	206.57	200.50	198.41	205.42	198.00	3.61	14.98	1.15	0.41
RO-NP-2192	RO-CB-2192	RO-JB-2191	Circular	Concrete	1	2.5	70.52	3.12	7.92	84.42	0.54	10.26	210.12	208.70	207.92	205.97	207.62	205.42	3.91	9.90	1.08	0.55

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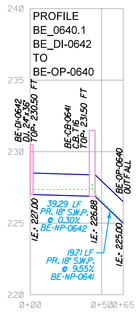
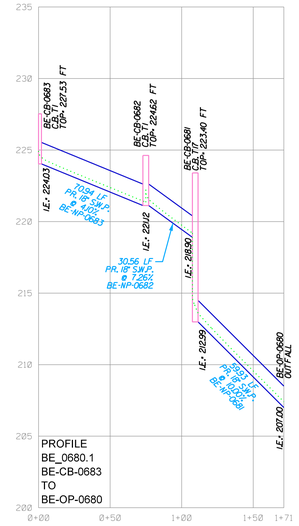
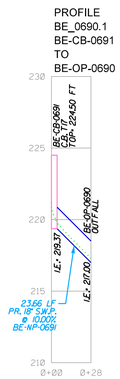
Appendix G:
Drainage Profile Sheets

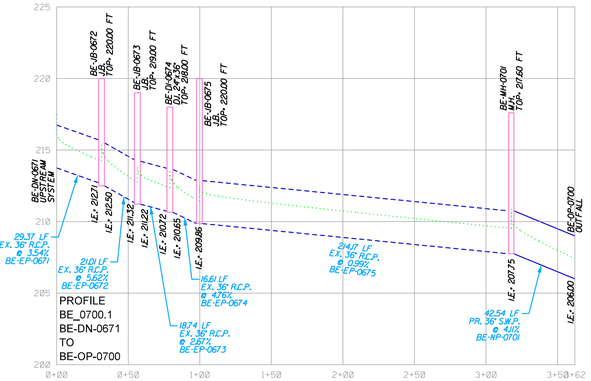
hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

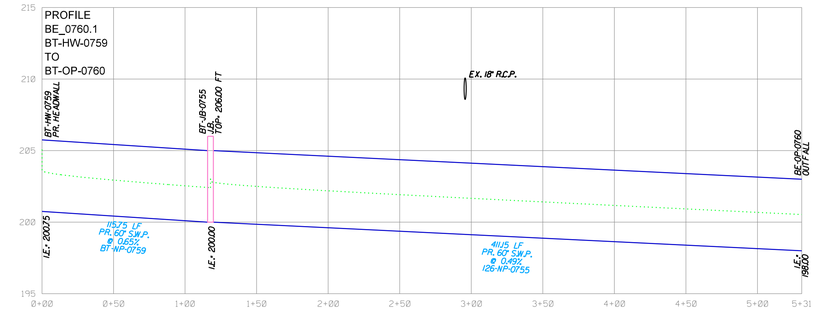
FED. RD. DIV NO.	STATE	COUNTY	SHEET NO.
3	S.C.	LEXINGTON	DPFL1

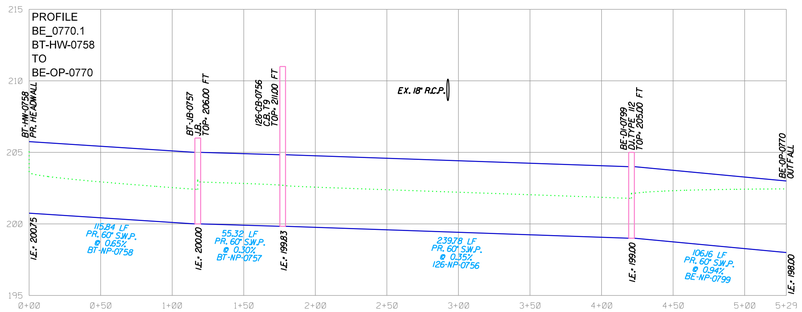


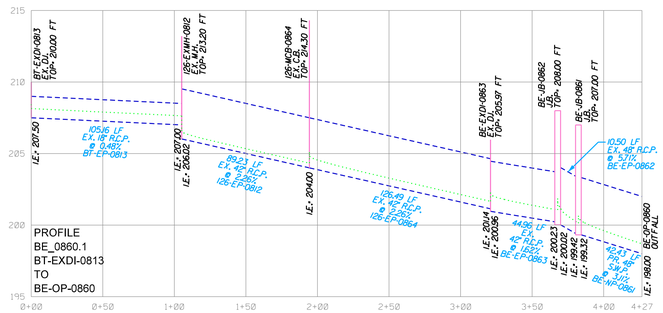


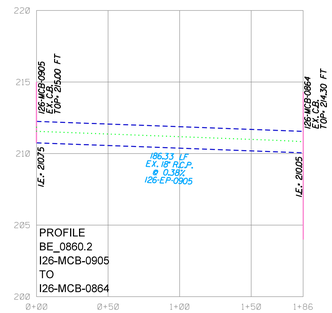












PROFILE LEGEND

PROPOSED PIPE OR CULVERT

EXISTING PIPE OR CULVERT

10-YR HYDRAULIC GRADE LINE

DRAINAGE STRUCTURE

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

PLANS FOR REVIEW

NOT FOR CONSTRUCTION

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

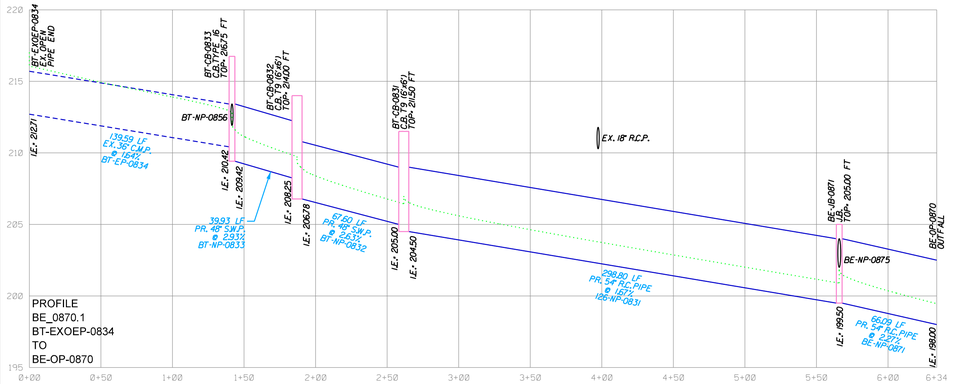
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

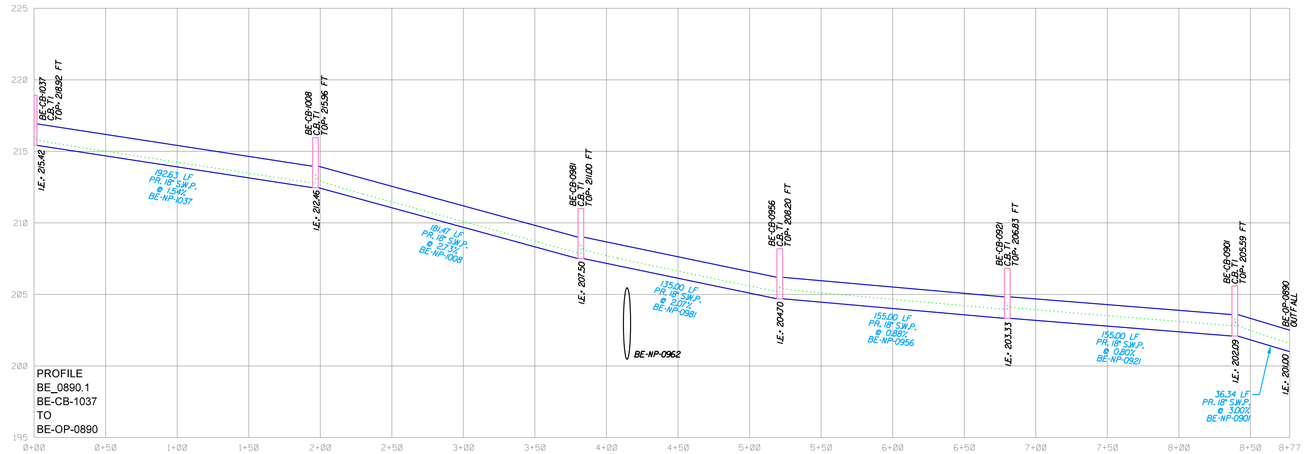
CAROLINA CROSSROADS
PHASE 3A
DRAINAGE PROFILE SHEET
NETWORKS: BE_0640, BE_0680, BE_0690, BE_0700, BE_0760, BE_0770, & BE_0860

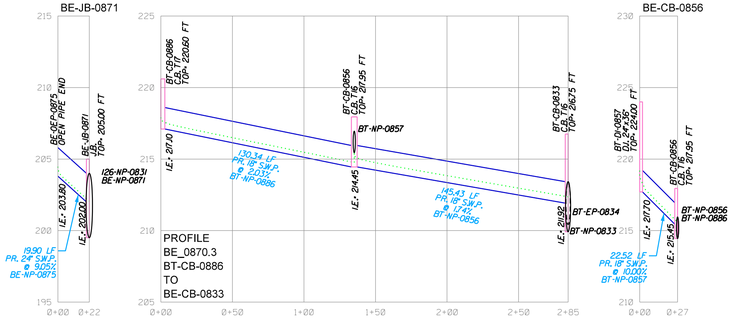
SCALE H:1" = 50' V: 1" = 5' SHT DPFL-1

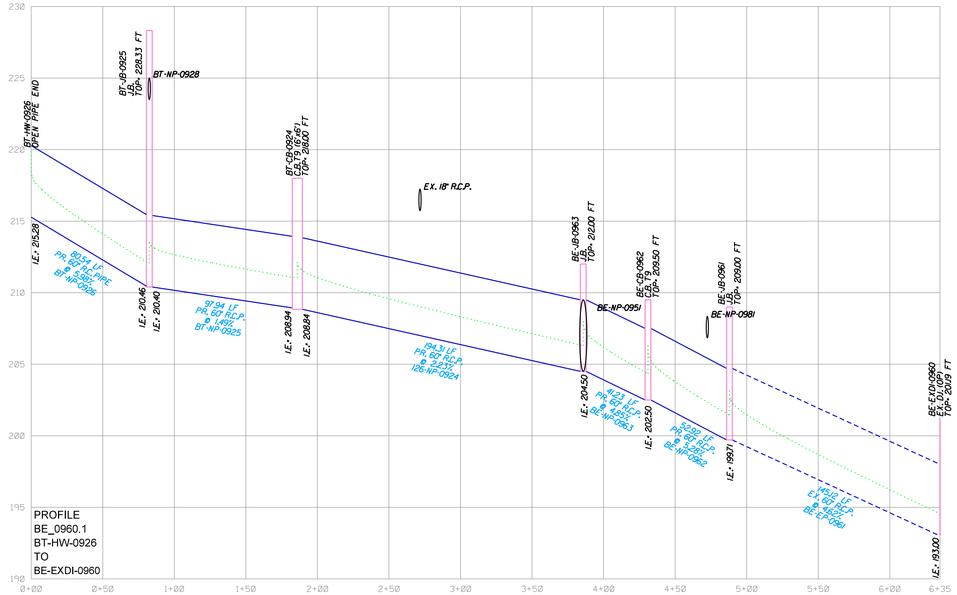
06\22\26

FED. RD. DIV NO.	STATE	COUNTY	SHEET NO.
3	S.C.	LEXINGTON	DPFL02









PROFILE LEGEND

PROPOSED PIPE OR CULVERT	10-YR HYDRAULIC GRADE LINE
EXISTING PIPE OR CULVERT	DRAINAGE STRUCTURE

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

PLANS FOR REVIEW

NOT FOR CONSTRUCTION

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
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2			
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TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

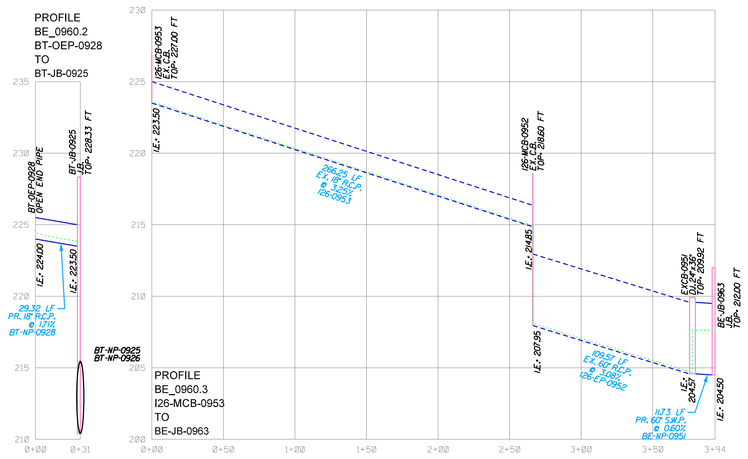
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

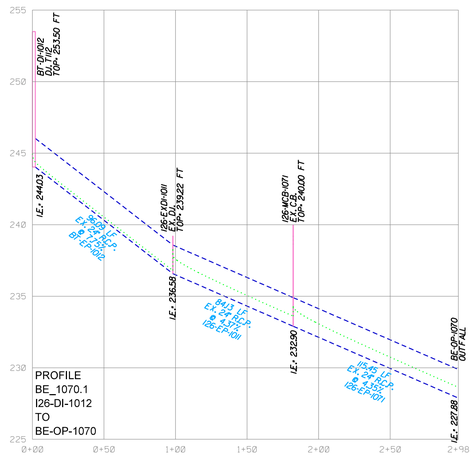
CAROLINA CROSSROADS
PHASE 3A
DRAINAGE PROFILE SHEET
NETWORKS: BE_0870, BE_0890, & BE_0960
BT_

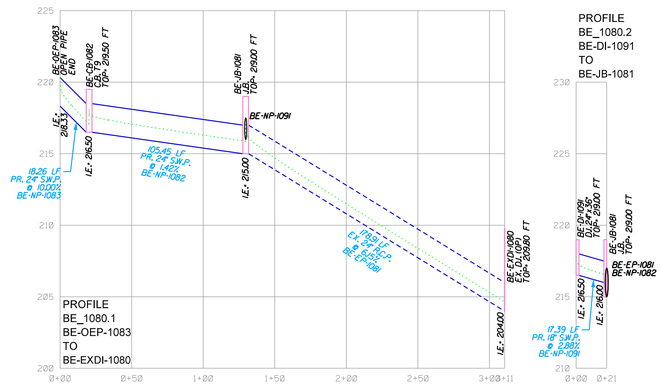
SCALE H:1" = 50' V: 1" = 5' SHT DPFL-2

06/22/26

FED. RD. DIV NO.	STATE	COUNTY	SHEET NO.
3	S.C.	LEXINGTON	DPFL03







PROFILE LEGEND

PROPOSED PIPE OR CULVERT

EXISTING PIPE OR CULVERT

10-YR HYDRAULIC GRADE LINE

DRAINAGE STRUCTURE

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

PLANS FOR REVIEW

NOT FOR CONSTRUCTION

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
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TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

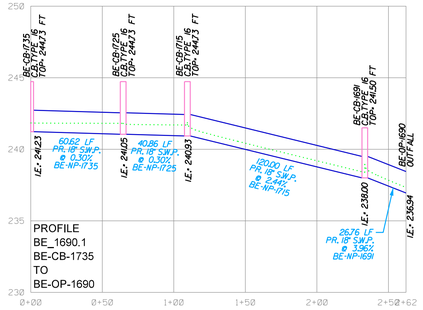
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

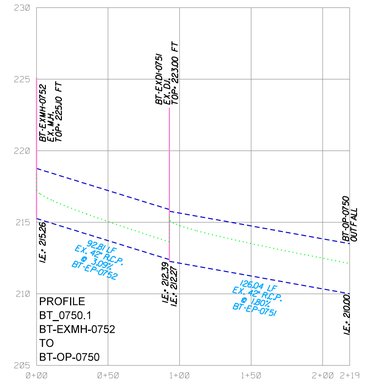
CAROLINA CROSSROADS
PHASE 3A
DRAINAGE PROFILE SHEET
NETWORKS: BE_0960, BE_1070, BE_1080, BE_1410, BE_1440, BE_1530, BE_1580, & BE_1690

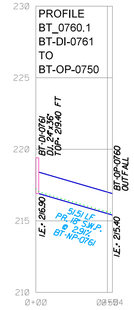
SCALE H:1" = 50' V: 1" = 5' SHT DPFL-3

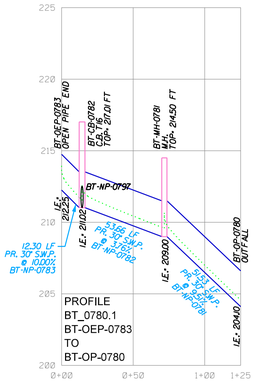
06\22\26

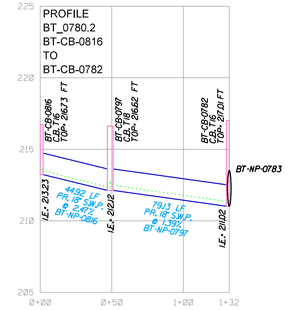
FED. RD. DIV NO.	STATE	COUNTY	SHEET NO.
3	S.C.	LEXINGTON	DPFL04

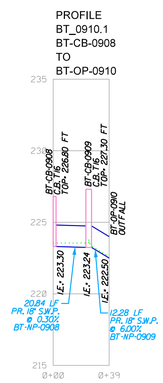


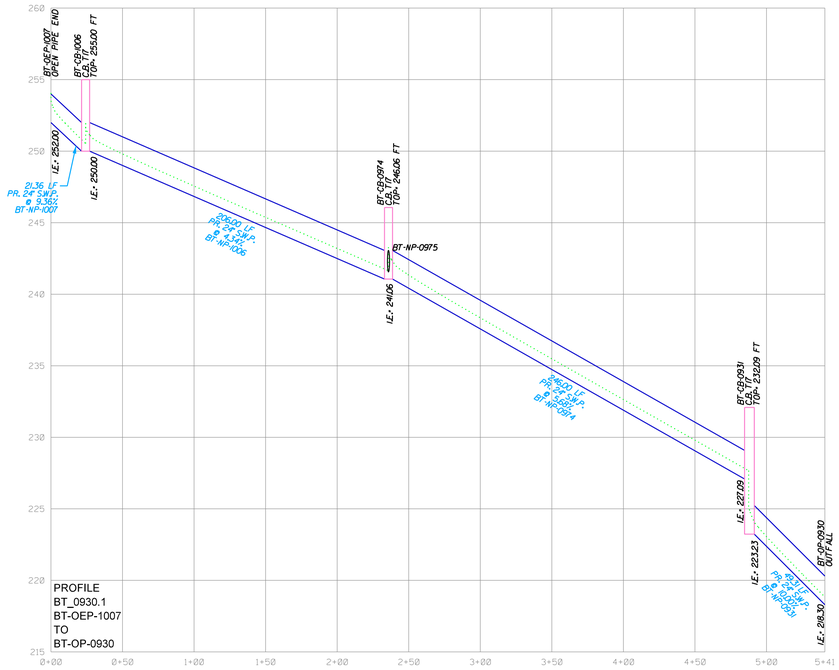


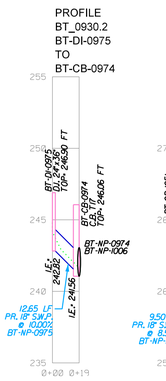


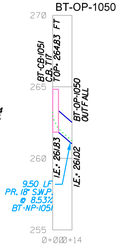


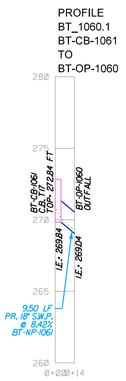


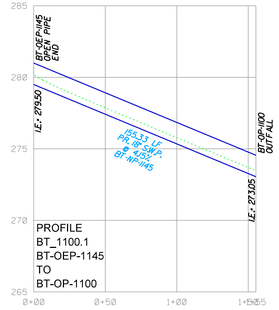












PROFILE LEGEND

PROPOSED PIPE OR CULVERT	10-YR HYDRAULIC GRADE LINE
EXISTING PIPE OR CULVERT	DRAINAGE STRUCTURE

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

PLANS FOR REVIEW

NOT FOR CONSTRUCTION

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R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
PHASE 3A

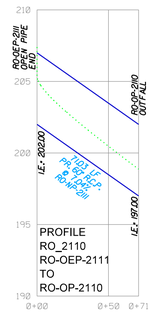
DRAINAGE PROFILE SHEET

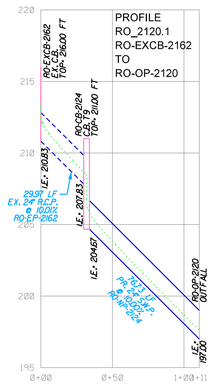
NETWORKS: BE_1690, BT_0750, BT_0760, BT_0780
BT_0910, BT_0930, BT_1050, BT_1060, & BT_1100

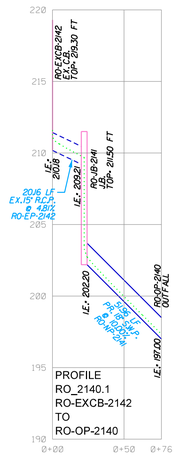
SCALE H:1" = 50' V: 1" = 5' SHT DPFL-4

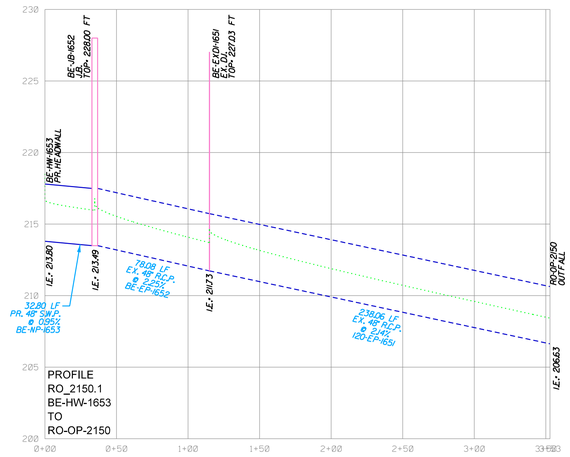
06\22\26

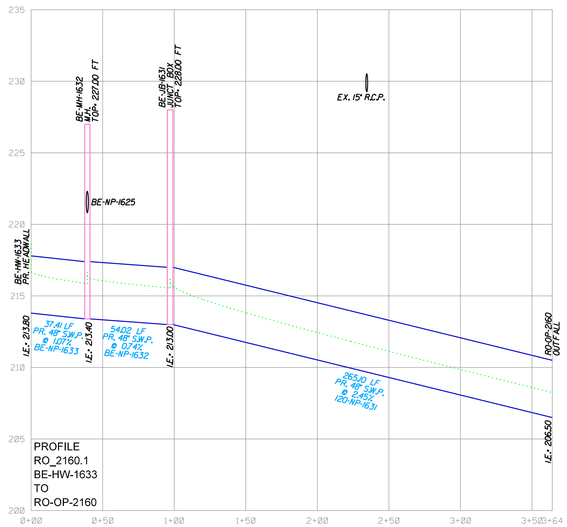
FED. RD. DIV NO.	STATE	COUNTY	SHEET NO.
3	S.C.	LEXINGTON	DPFL05

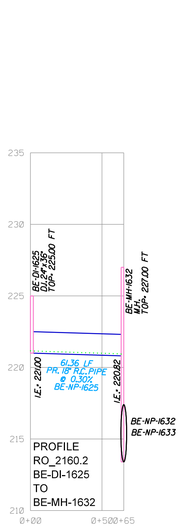


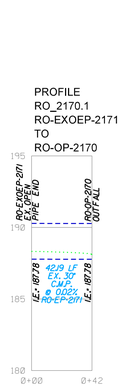


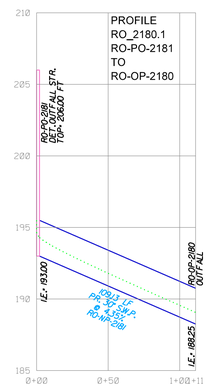


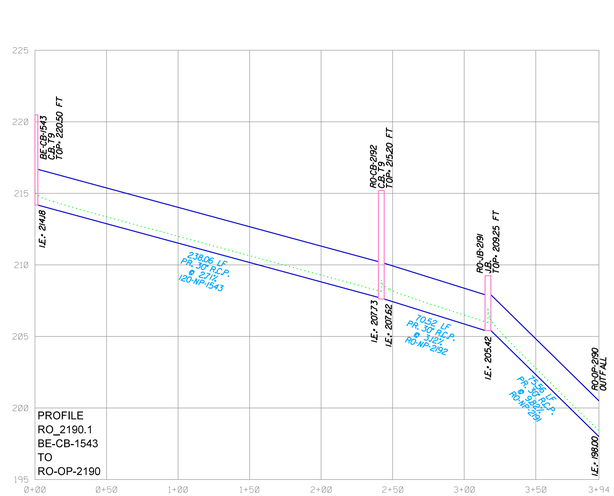












PROFILE LEGEND

PROPOSED PIPE OR CULVERT	———	10-YR HYDRAULIC GRADE LINE	·····
EXISTING PIPE OR CULVERT	- - - - -	DRAINAGE STRUCTURE	———

HDR ENGINEERING INC. OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

PLANS FOR REVIEW

NOT FOR CONSTRUCTION

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
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SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
PHASE 3A
DRAINAGE PROFILE SHEET
NETWORKS: RO_2110, RO_2120, RO_2140, RO_2150
RO_2160, RO_2170, RO_2180, & RO_2190

SCALE H:1" = 50' V: 1" = 5' SHT DPFL-5

06\22\26

H

Appendix H:

Open Channel Analysis Calculations

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

Carolina Crossroads, P3A
Open Channel Calculations

Berryhill Road (S-32-1551)

ID	FROM			TO			$S_{X\,LT}$ (:1)	$S_{X\,RT}$ (:1)	Base Width (ft)	S_L (ft/ft)	Man-ning's n	Lining	A (Ac)	Design Storm	C Value	T_C (min)	I (in/hr)	Q_D (cfs)	Calculated From Hydraulic Toolbox: Depth (ft)	Top Width (ft)	Velo-city (fps)	Max Shear Stress (psf)
	Alignment	Side	Station	Alignment	Side	Station																
BE-OC-LT07.1	BERP	LT	310+04	BERP	LT	308+68	2	2	12	0.010	0.033	TRM	182.69	25-yr	Ref. Hydro Model			290.00	2.53	22.10	6.74	1.58
BE-OC-LT07.2	BERP	LT	313+50	BERP	LT	310+30	2	2	0	0.008	0.075	Vegetation	0.266	10-yr	0.40	9	6.77	0.72	0.67	2.69	0.80	0.34
BE-OC-LT08.1	BERP	LT	319+34	BERP	LT	314+17	2	6	0	0.007	0.089	Vegetation	0.175	10-yr	0.40	11	6.27	0.44	0.46	3.71	0.51	0.20
BE-OC-LT09.1	BERP	LT	325+00	BERP	LT	319+53	2	6	0	0.027	0.051	Vegetation	0.780	10-yr	0.42	14	5.61	1.84	0.50	3.98	1.86	0.84
BE-OC-LT10.1	BERP	LT	329+79	BERP	LT	325+10	2	6	0	0.032	0.032	TRM	1.330	10-yr	0.42	21	4.70	2.62	0.53	4.25	2.32	1.06
BE-OC-LT13.1	BERP	LT	328+79	BERP	LT	337+88	10	6	0	0.052	0.039	TRM	8.099	10-yr	0.51	29	3.96	16.34	0.69	11.05	4.28	2.24
BE-OC-LT17.1	BERP	LT	362+50	BERP	LT	361+35	8	4	0	0.008	0.078	Vegetation	0.444	10-yr	0.48	12	6.06	1.29	0.55	6.60	0.71	0.28
BE-OC-RT06.1	BERP	RT	302+90	BERP	RT	303+45	3	8	0	0.070	0.041	TRM	0.785	10-yr	0.70	11	6.27	3.45	0.43	4.74	3.38	1.88
BE-OC-RT06.2	BERP	RT	303+96	BERP	RT	304+30	3	12	0	0.040	0.042	TRM	1.169	10-yr	0.81	12	6.06	5.74	0.52	7.79	2.84	1.30
BE-OC-RT07.1	BERP	RT	305+55	BERP	RT	307+55	4	2	0	0.040	0.041	TRM	1.226	10-yr	0.52	18	5.06	3.23	0.59	3.53	3.11	1.47
BE-OC-RT08.1	BERP	RT	313+75	BERP	RT	311+35	2	2	4	0.011	0.037	TRM	77.950	25-yr	0.70	106	2.21	120.37	2.48	13.93	5.41	1.70
BE-OC-RT08.2	BERP	RT	314+75	BERP	RT	313+78	4	2	0	0.006	0.065	Vegetation	1.084	10-yr	0.82	11	6.27	5.58	1.23	7.37	1.23	0.46
BE-OC-RT10.1	BERP	RT	332+50	BERP	RT	325+99	5	1	0	0.021	0.049	TRM	0.982	10-yr	0.71	15	5.46	3.80	0.76	4.57	2.18	0.97
BE-OC-RT13.1	BERP	RT	333+50	BERP	RT	336+60	6	2	0	0.067	0.039	TRM	0.430	10-yr	0.71	10	6.41	1.96	0.39	3.11	3.24	1.63
BE-OC-RT14.1	BERP	RT	341+34	BERP	RT	341+85	2	2	0	0.031	0.040	TRM	1.272	10-yr	0.73	14	5.73	5.32	0.87	3.47	3.53	1.68
BE-OC-RT14.2	BERP	RT	343+50	BERP	RT	342+55	2	2	0	0.039	0.038	TRM	11.300	10-yr	0.56	23	4.45	28.13	1.54	6.14	5.97	3.38
BE-OC-RT14.3	BERP	RT	348+50	BERP	RT	344+24	2	2	0	0.005	0.063	Vegetation	2.189	10-yr	0.65	13	5.86	8.34	1.72	6.89	1.41	0.54
BE-OC-RT15.1	BERP	RT	351+88	BERP	RT	349+48	6	2	0	0.039	0.040	TRM	1.106	10-yr	0.68	11	6.27	4.72	0.60	4.83	3.24	1.47
BE-OC-RT15.2	BERP	RT	354+64	BERP	RT	352+64	6	2	0	0.005	0.080	Vegetation	0.423	10-yr	0.73	9	6.77	2.09	0.85	6.81	0.72	0.27
BE-OC-RT16.1	BERP	RT	358+50	BERP	RT	357+53	6	2	0	0.044	0.044	TRM	0.444	10-yr	0.71	12	6.00	1.89	0.43	3.47	2.51	1.19

Carolina Crossroads, P3A
Open Channel Calculations

Burning Tree Drive (S-32-1842 / S-40-2893)

ID	FROM			TO			$S_{X\,LT}$ (:1)	$S_{X\,RT}$ (:1)	Base Width (ft)	S_L (ft/ft)	Man-ning's n	Lining	A (Ac)	Design Storm	C Value	T_C (min)	I (in/hr)	Q_D (cfs)	Calculated From Hydraulic Toolbox			
	Alignment	Side	Station	Alignment	Side	Station													Depth (ft)	Top Width (ft)	Velo-city (fps)	Max Shear Stress (psf)
BT-OC-LT07.1	BURN_3A	LT	313+89	BURN_3A	LT	315+00	5	2	0	0.043	0.024	TRM	1.90	10-yr	0.66	17	5.15	6.45	0.58	4.06	5.47	1.56
BT-OC-LT07.2	BURN_3A	LT	316+75	BURN_3A	LT	315+00	5	2	0	0.032	0.053	Vegetation	0.37	10-yr	0.42	15	5.51	0.86	0.39	2.71	1.64	0.77
BT-OC-LT09.1	BURN_3A	LT	321+75	BURN_3A	LT	321+95	2	2	0	0.020	0.055	Vegetation	0.19	10-yr	0.69	7	7.36	0.95	0.56	2.25	1.50	0.70
BT-OC-LT10.1	BURN_3A	LT	330+00	BURN_3A	LT	327+70	4	2	0	0.040	0.036	TRM	2.39	10-yr	0.65	17	5.20	8.07	0.79	4.75	4.29	1.98
BT-OC-LT10.2	BURN_3A	LT	332+00	BURN_3A	LT	330+00	2	2	0	0.040	0.036	TRM	1.88	10-yr	0.69	16	5.35	6.94	0.88	3.51	4.50	2.19
BT-OC-LT10.3	BURN_3A	LT	333+40	BURN_3A	LT	332+00	2	2	0	0.040	0.036	TRM	1.64	10-yr	0.72	15	5.51	6.48	0.86	3.44	4.39	2.14
BT-OC-LT11.1	BURN_3A	LT	336+60	BURN_3A	LT	335+00	2	4	0	0.070	0.041	TRM	1.30	10-yr	0.55	12	5.98	4.26	0.59	3.54	4.07	2.58
BT-OC-LT11.2	BURN_3A	LT	338+32	BURN_3A	LT	337+15	2	6	0	0.027	0.047	Vegetation	0.73	10-yr	0.68	9	6.71	3.35	0.61	4.87	2.27	1.00
BT-OC-LT12.1	BURN_3A	LT	339+75	BURN_3A	LT	338+85	2	6	0	0.031	0.048	Vegetation	0.43	10-yr	0.68	8	7.05	2.04	0.49	3.95	2.09	0.95
BT-OC-RT08.1	BURN_3A	RT	322+50	BURN_3A	RT	317+40	6	2	0	0.004	0.088	Vegetation	0.65	10-yr	0.46	14	5.68	1.69	0.85	6.78	0.59	0.21
BT-OC-RT09.1	BURN_3A	RT	328+15	BURN_3A	RT	322+65	4	2	0	0.057	0.042	TRM	0.50	10-yr	0.40	11	6.27	1.25	0.39	2.34	2.75	1.39
BT-OC-RT10.1	BURN_3A	RT	336+40	BURN_3A	RT	328+25	4	2	0	0.045	0.044	TRM	0.75	10-yr	0.43	13	5.86	1.89	0.48	2.90	2.69	1.36

Channel Analysis: BE-OC-LT07.1

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Channel Width 12.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0332

Flow 290.0000 cfs

Result Parameters

Depth 2.5254 ft

Area of Flow 43.0598 ft^2

Wetted Perimeter 23.2939 ft

Hydraulic Radius 1.8485 ft

Average Velocity 6.7348 ft/s

Top Width 22.1015 ft

Froude Number: 0.8503

Critical Depth 2.2966 ft

Critical Velocity 7.6101 ft/s

Critical Slope: 0.0142 ft/ft

Critical Top Width 21.19 ft

Calculated Max Shear Stress 1.5758 lb/ft^2

Calculated Avg Shear Stress 1.1535 lb/ft^2

Channel Lining Analysis: BE-OC-LT07.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03 Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-LT07.1

Channel Analysis: BE-OC-LT07.2

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0080 ft/ft

Manning's n: 0.0751 Flow 0.7200 cfs

Result Parameters

Depth 0.6730 ft

Area of Flow 0.9059 ft^2

Wetted Perimeter 3.0098 ft

Hydraulic Radius 0.3010 ft

Average Velocity 0.7948 ft/s

Top Width 2.6921 ft

Froude Number: 0.2414

Critical Depth 0.3812 ft

Critical Velocity 2.4774 ft/s

Critical Slope: 0.1659 ft/ft

Critical Top Width 1.52 ft

Calculated Max Shear Stress 0.3360 lb/ft^2

Calculated Avg Shear Stress 0.1503 lb/ft^2

Channel Lining Analysis: BE-OC-LT07.2

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.150251 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.335971 lb/ft^2

Manning's n: 0.0751063

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.00381179 lb/ft^2

Permissible Shear Stress on Vegetation: 2.87646 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BE-OC-LT07.2

Channel Analysis: BE-OC-LT08.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 6.0000 ft/ft

Longitudinal Slope: 0.0070 ft/ft

Manning's n: 0.0893

Flow 0.4400 cfs

Result Parameters

Depth 0.4637 ft

Area of Flow 0.8599 ft^2

Wetted Perimeter 3.8570 ft

Hydraulic Radius 0.2229 ft

Average Velocity 0.5117 ft/s

Top Width 3.7092 ft

Froude Number: 0.1873

Critical Depth 0.2513 ft

Critical Velocity 1.7419 ft/s

Critical Slope: 0.1836 ft/ft

Critical Top Width 2.68 ft

Calculated Max Shear Stress 0.2025 lb/ft^2

Calculated Avg Shear Stress 0.0974 lb/ft^2

Channel Lining Analysis: BE-OC-LT08.1

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.0973802 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.202522 lb/ft^2

Manning's n: 0.0893335

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.00162414 lb/ft^2

Permissible Shear Stress on Vegetation: 4.06945 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BE-OC-LT08.1

Channel Analysis: BE-OC-LT09.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 6.0000 ft/ft

Longitudinal Slope: 0.0270 ft/ft

Manning's n: 0.0506

Flow 1.8400 cfs

Result Parameters

Depth 0.4975 ft

Area of Flow 0.9898 ft^2

Wetted Perimeter 4.1382 ft

Hydraulic Radius 0.2392 ft

Average Velocity 1.8589 ft/s

Top Width 3.9796 ft

Froude Number: 0.6568

Critical Depth 0.4454 ft

Critical Velocity 2.3190 ft/s

Critical Slope: 0.0487 ft/ft

Critical Top Width 4.75 ft

Calculated Max Shear Stress 0.8381 lb/ft^2

Calculated Avg Shear Stress 0.4030 lb/ft^2

Channel Lining Analysis: BE-OC-LT09.1

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.402995 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.838111 lb/ft^2

Manning's n: 0.0506154

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.020937 lb/ft^2

Permissible Shear Stress on Vegetation: 1.30639 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BE-OC-LT09.1

Channel Analysis: BE-OC-LT10.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 6.0000 ft/ft

Longitudinal Slope: 0.0320 ft/ft

Manning's n: 0.0461

Flow 2.6200 cfs

Result Parameters

Depth 0.5311 ft

Area of Flow 1.1281 ft^2

Wetted Perimeter 4.4178 ft

Hydraulic Radius 0.2554 ft

Average Velocity 2.3225 ft/s

Top Width 4.2485 ft

Froude Number: 0.7943

Critical Depth 0.5130 ft

Critical Velocity 2.4889 ft/s

Critical Slope: 0.0385 ft/ft

Critical Top Width 5.47 ft

Calculated Max Shear Stress 1.0604 lb/ft^2

Calculated Avg Shear Stress 0.5099 lb/ft^2

Channel Lining Analysis: BE-OC-LT10.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-LT10.1

Channel Analysis: BE-OC-LT13.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 10.0000 ft/ft

Side Slope 2 (Z2): 6.0000 ft/ft

Longitudinal Slope: 0.0520 ft/ft

Manning's n: 0.0387

Flow 16.3400 cfs

Result Parameters

Depth 0.6907 ft

Area of Flow 3.8167 ft^2

Wetted Perimeter 11.1430 ft

Hydraulic Radius 0.3425 ft

Average Velocity 4.2812 ft/s

Top Width 11.0514 ft

Froude Number: 1.2838

Critical Depth 0.7732 ft

Critical Velocity 3.4163 ft/s

Critical Slope: 0.0285 ft/ft

Critical Top Width 13.20 ft

Calculated Max Shear Stress 2.2412 lb/ft^2

Calculated Avg Shear Stress 1.1114 lb/ft^2

Channel Lining Analysis: BE-OC-LT13.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-LT13.1

Channel Analysis: BE-OC-LT17.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 8.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Longitudinal Slope: 0.0080 ft/ft

Manning's n: 0.0783

Flow 1.2900 cfs

Result Parameters

Depth 0.5502 ft

Area of Flow 1.8161 ft^2

Wetted Perimeter 6.7039 ft

Hydraulic Radius 0.2709 ft

Average Velocity 0.7103 ft/s

Top Width 6.6019 ft

Froude Number: 0.2387

Critical Depth 0.3176 ft

Critical Velocity 2.1319 ft/s

Critical Slope: 0.1499 ft/ft

Critical Top Width 4.29 ft

Calculated Max Shear Stress 0.2746 lb/ft^2

Calculated Avg Shear Stress 0.1352 lb/ft^2

Channel Lining Analysis: BE-OC-LT17.1

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.135231 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.27464 lb/ft^2

Manning's n: 0.0783379

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.00286418 lb/ft^2

Permissible Shear Stress on Vegetation: 3.12933 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BE-OC-LT17.1

Channel Analysis: BE-OC-RT06.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 8.0000 ft/ft

Longitudinal Slope: 0.0700 ft/ft

Manning's n: 0.0412

Flow 3.4500 cfs

Result Parameters

Depth 0.4306 ft

Area of Flow 1.0198 ft^2

Wetted Perimeter 4.8332 ft

Hydraulic Radius 0.2110 ft

Average Velocity 3.3832 ft/s

Top Width 4.7365 ft

Froude Number: 1.2849

Critical Depth 0.4986 ft

Critical Velocity 2.5236 ft/s

Critical Slope: 0.0320 ft/ft

Critical Top Width 6.91 ft

Calculated Max Shear Stress 1.8808 lb/ft^2

Calculated Avg Shear Stress 0.9216 lb/ft^2

Channel Lining Analysis: BE-OC-RT06.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-RT06.1

Channel Analysis: BE-OC-RT06.2

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 3.0000 ft/ft

Side Slope 2 (Z2): 12.0000 ft/ft

Longitudinal Slope: 0.0400 ft/ft

Manning's n: 0.0422

Flow 5.7400 cfs

Result Parameters

Depth 0.5193 ft

Area of Flow 2.0229 ft^2

Wetted Perimeter 7.8960 ft

Hydraulic Radius 0.2562 ft

Average Velocity 2.8376 ft/s

Top Width 7.7901 ft

Froude Number: 0.9813

Critical Depth 0.5636 ft

Critical Velocity 2.4098 ft/s

Critical Slope: 0.0259 ft/ft

Critical Top Width 13.21 ft

Calculated Max Shear Stress 1.2963 lb/ft^2

Calculated Avg Shear Stress 0.6394 lb/ft^2

Channel Lining Analysis: BE-OC-RT06.2

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-RT06.2

Channel Analysis: BE-OC-RT07.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0400 ft/ft

Manning's n: 0.0407

Flow 3.2300 cfs

Result Parameters

Depth 0.5888 ft

Area of Flow 1.0401 ft^2

Wetted Perimeter 3.7443 ft

Hydraulic Radius 0.2778 ft

Average Velocity 3.1056 ft/s

Top Width 3.5328 ft

Froude Number: 1.0087

Critical Depth 0.6049 ft

Critical Velocity 2.9423 ft/s

Critical Slope: 0.0346 ft/ft

Critical Top Width 4.08 ft

Calculated Max Shear Stress 1.4696 lb/ft^2

Calculated Avg Shear Stress 0.6933 lb/ft^2

Channel Lining Analysis: BE-OC-RT07.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-RT07.1

Channel Analysis: BE-OC-RT08.1

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Channel Width 4.00 ft

Longitudinal Slope: 0.0110 ft/ft

Manning's n: 0.0373

Flow 105.5300 cfs

Result Parameters

Depth 2.3318 ft

Area of Flow 20.2015 ft^2

Wetted Perimeter 14.4280 ft

Hydraulic Radius 1.4002 ft

Average Velocity 5.2239 ft/s

Top Width 13.3271 ft

Froude Number: 0.7477

Critical Depth 2.0069 ft

Critical Velocity 6.5616 ft/s

Critical Slope: 0.0204 ft/ft

Critical Top Width 12.03 ft

Calculated Max Shear Stress 1.6005 lb/ft^2

Calculated Avg Shear Stress 0.9611 lb/ft^2

Channel Lining Analysis: BE-OC-RT08.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is an open weave textile

Manning's n: 0.03 Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-RT08.1

Channel Analysis: BE-OC-RT08.2

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0060 ft/ft

Manning's n: 0.0648

Flow 5.5800 cfs

Result Parameters

Depth 1.2280 ft

Area of Flow 4.5238 ft^2

Wetted Perimeter 7.8089 ft

Hydraulic Radius 0.5793 ft

Average Velocity 1.2335 ft/s

Top Width 7.3679 ft

Froude Number: 0.2774

Critical Depth 0.7528 ft

Critical Velocity 3.2823 ft/s

Critical Slope: 0.0816 ft/ft

Critical Top Width 5.08 ft

Calculated Max Shear Stress 0.4598 lb/ft^2

Calculated Avg Shear Stress 0.2169 lb/ft^2

Channel Lining Analysis: BE-OC-RT08.2

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.216894 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.459755 lb/ft^2

Manning's n: 0.0648491

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.00699679 lb/ft^2

Permissible Shear Stress on Vegetation: 2.14444 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BE-OC-RT08.2

Channel Analysis: BE-OC-RT10.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 1.0000 ft/ft

Longitudinal Slope: 0.0205 ft/ft

Manning's n: 0.0485

Flow 3.8000 cfs

Result Parameters

Depth 0.7617 ft

Area of Flow 1.7407 ft^2

Wetted Perimeter 4.9613 ft

Hydraulic Radius 0.3509 ft

Average Velocity 2.1831 ft/s

Top Width 4.5703 ft

Froude Number: 0.6234

Critical Depth 0.7092 ft

Critical Velocity 2.5186 ft/s

Critical Slope: 0.0300 ft/ft

Critical Top Width 7.66 ft

Calculated Max Shear Stress 0.9744 lb/ft^2

Calculated Avg Shear Stress 0.4488 lb/ft^2

Channel Lining Analysis: BE-OC-RT10.1

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.448809 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.974399 lb/ft^2

Manning's n: 0.0484817

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.0265314 lb/ft^2

Permissible Shear Stress on Vegetation: 1.19857 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BE-OC-RT10.1

Channel Analysis: BE-OC-RT13.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 6.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0670 ft/ft

Manning's n: 0.0388

Flow 1.9600 cfs

Result Parameters

Depth 0.3887 ft

Area of Flow 0.6044 ft^2

Wetted Perimeter 3.2338 ft

Hydraulic Radius 0.1869 ft

Average Velocity 3.2427 ft/s

Top Width 3.1098 ft

Froude Number: 1.2962

Critical Depth 0.4568 ft

Critical Velocity 2.3485 ft/s

Critical Slope: 0.0283 ft/ft

Critical Top Width 4.87 ft

Calculated Max Shear Stress 1.6252 lb/ft^2

Calculated Avg Shear Stress 0.7815 lb/ft^2

Channel Lining Analysis: BE-OC-RT13.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-RT13.1

Channel Analysis: BE-OC-RT14.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0310 ft/ft

Manning's n: 0.0395

Flow 5.3200 cfs

Result Parameters

Depth 0.8682 ft

Area of Flow 1.5075 ft^2

Wetted Perimeter 3.8827 ft

Hydraulic Radius 0.3883 ft

Average Velocity 3.5290 ft/s

Top Width 3.4728 ft

Froude Number: 0.9439

Critical Depth 0.8484 ft

Critical Velocity 3.6958 ft/s

Critical Slope: 0.0351 ft/ft

Critical Top Width 3.39 ft

Calculated Max Shear Stress 1.6794 lb/ft^2

Calculated Avg Shear Stress 0.7511 lb/ft^2

Channel Lining Analysis: BE-OC-RT14.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-RT14.1

Channel Analysis: BE-OC-RT14.2

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0390 ft/ft

Manning's n: 0.0383

Flow 28.1300 cfs

Result Parameters

Depth 1.5354 ft

Area of Flow 4.7147 ft^2

Wetted Perimeter 6.8663 ft

Hydraulic Radius 0.6866 ft

Average Velocity 5.9665 ft/s

Top Width 6.1414 ft

Froude Number: 1.2001

Critical Depth 1.6515 ft

Critical Velocity 5.1565 ft/s

Critical Slope: 0.0264 ft/ft

Critical Top Width 6.61 ft

Calculated Max Shear Stress 3.7365 lb/ft^2

Calculated Avg Shear Stress 1.6710 lb/ft^2

Channel Lining Analysis: BE-OC-RT14.2

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-RT14.2

Channel Analysis: BE-OC-RT14.3

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0628

Flow 8.3400 cfs

Result Parameters

Depth 1.7225 ft

Area of Flow 5.9337 ft^2

Wetted Perimeter 7.7030 ft

Hydraulic Radius 0.7703 ft

Average Velocity 1.4055 ft/s

Top Width 6.8898 ft

Froude Number: 0.2669

Critical Depth 1.0155 ft

Critical Velocity 4.0435 ft/s

Critical Slope: 0.0837 ft/ft

Critical Top Width 4.06 ft

Calculated Max Shear Stress 0.5374 lb/ft^2

Calculated Avg Shear Stress 0.2403 lb/ft^2

Channel Lining Analysis: BE-OC-RT14.3

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.751061 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 1.67942 lb/ft^2

Manning's n: 0.0394578

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.069036 lb/ft^2

Permissible Shear Stress on Vegetation: 0.793911 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-RT14.1

Channel Analysis: BE-OC-RT15.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 6.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0390 ft/ft

Manning's n: 0.0397

Flow 4.7200 cfs

Result Parameters

Depth 0.6034 ft

Area of Flow 1.4563 ft^2

Wetted Perimeter 5.0194 ft

Hydraulic Radius 0.2901 ft

Average Velocity 3.2411 ft/s

Top Width 4.8271 ft

Froude Number: 1.0399

Critical Depth 0.6492 ft

Critical Velocity 2.7998 ft/s

Critical Slope: 0.0264 ft/ft

Critical Top Width 6.92 ft

Calculated Max Shear Stress 1.4684 lb/ft^2

Calculated Avg Shear Stress 0.7061 lb/ft^2

Channel Lining Analysis: BE-OC-RT15.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-RT14.3

Channel Analysis: BE-OC-RT15.2

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 6.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0802

Flow 2.0900 cfs

Result Parameters

Depth 0.8506 ft

Area of Flow 2.8942 ft^2

Wetted Perimeter 7.0762 ft

Hydraulic Radius 0.4090 ft

Average Velocity 0.7221 ft/s

Top Width 6.8050 ft

Froude Number: 0.1951

Critical Depth 0.4687 ft

Critical Velocity 2.3789 ft/s

Critical Slope: 0.1201 ft/ft

Critical Top Width 5.00 ft

Calculated Max Shear Stress 0.2654 lb/ft^2

Calculated Avg Shear Stress 0.1276 lb/ft^2

Channel Lining Analysis: BE-OC-RT15.2

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.798367 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 1.66037 lb/ft^2

Manning's n: 0.0385054

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.0716707 lb/ft^2

Permissible Shear Stress on Vegetation: 0.756049 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-RT14.4

Channel Analysis: BE-OC-RT16.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 6.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0440 ft/ft

Manning's n: 0.0436

Flow 1.8900 cfs

Result Parameters

Depth 0.4336 ft

Area of Flow 0.7521 ft^2

Wetted Perimeter 3.6072 ft

Hydraulic Radius 0.2085 ft

Average Velocity 2.5130 ft/s

Top Width 3.4689 ft

Froude Number: 0.9511

Critical Depth 0.4502 ft

Critical Velocity 2.3315 ft/s

Critical Slope: 0.0360 ft/ft

Critical Top Width 4.80 ft

Calculated Max Shear Stress 1.1905 lb/ft^2

Calculated Avg Shear Stress 0.5725 lb/ft^2

Channel Lining Analysis: BE-OC-RT16.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BE-OC-RT15.1

Channel Analysis: BT-OC-LT07.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0430 ft/ft

Manning's n: 0.0239

Flow 6.4500 cfs

Result Parameters

Depth 0.5803 ft

Area of Flow 1.1784 ft^2

Wetted Perimeter 4.2562 ft

Hydraulic Radius 0.2769 ft

Average Velocity 5.4733 ft/s

Top Width 4.0618 ft

Froude Number: 1.7907

Critical Depth 0.7629 ft

Critical Velocity 3.1665 ft/s

Critical Slope: 0.0100 ft/ft

Critical Top Width 6.54 ft

Calculated Max Shear Stress 1.5569 lb/ft^2

Calculated Avg Shear Stress 0.7429 lb/ft^2

Channel Lining Analysis: BT-OC-LT07.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03 Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BT-OC-LT07.1

Channel Analysis: BT-OC-LT07.2

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 5.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0320 ft/ft

Manning's n: 0.0525

Flow 0.8600 cfs

Result Parameters

Depth 0.3868 ft

Area of Flow 0.5236 ft^2

Wetted Perimeter 2.8370 ft

Hydraulic Radius 0.1846 ft

Average Velocity 1.6425 ft/s

Top Width 2.7074 ft

Froude Number: 0.6582

Critical Depth 0.3407 ft

Critical Velocity 2.1162 ft/s

Critical Slope: 0.0629 ft/ft

Critical Top Width 2.92 ft

Calculated Max Shear Stress 0.7723 lb/ft^2

Calculated Avg Shear Stress 0.3685 lb/ft^2

Channel Lining Analysis: BT-OC-LT07.2

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.368513 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.772308 lb/ft^2

Manning's n: 0.0524592

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.0179609 lb/ft^2

Permissible Shear Stress on Vegetation: 1.4033 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BT-OC-LT07.2

Channel Analysis: BT-OC-LT09.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0200 ft/ft

Manning's n: 0.0559

Flow 0.9500 cfs

Result Parameters

Depth 0.5630 ft

Area of Flow 0.6339 ft^2

Wetted Perimeter 2.5178 ft

Hydraulic Radius 0.2518 ft

Average Velocity 1.4986 ft/s

Top Width 2.2519 ft

Froude Number: 0.4978

Critical Depth 0.4259 ft

Critical Velocity 2.6186 ft/s

Critical Slope: 0.0886 ft/ft

Critical Top Width 1.70 ft

Calculated Max Shear Stress 0.7026 lb/ft^2

Calculated Avg Shear Stress 0.3142 lb/ft^2

Channel Lining Analysis: BT-OC-LT09.1

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.314216 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.702607 lb/ft^2

Manning's n: 0.0559129

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.0143837 lb/ft^2

Permissible Shear Stress on Vegetation: 1.59415 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BT-OC-LT09.1

Channel Analysis: BT-OC-LT10.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0400 ft/ft

Manning's n: 0.0359

Flow 8.0700 cfs

Result Parameters

Depth 0.7919 ft

Area of Flow 1.8815 ft^2

Wetted Perimeter 5.0360 ft

Hydraulic Radius 0.3736 ft

Average Velocity 4.2892 ft/s

Top Width 4.7516 ft

Froude Number: 1.2012

Critical Depth 0.8725 ft

Critical Velocity 3.5336 ft/s

Critical Slope: 0.0239 ft/ft

Critical Top Width 5.89 ft

Calculated Max Shear Stress 1.9767 lb/ft^2

Calculated Avg Shear Stress 0.9325 lb/ft^2

Channel Lining Analysis: BT-OC-LT10.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BT-OC-LT10.1

Channel Analysis: BT-OC-LT10.2

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0400 ft/ft

Manning's n: 0.0355

Flow 6.9400 cfs

Result Parameters

Depth 0.8786 ft

Area of Flow 1.5437 ft^2

Wetted Perimeter 3.9290 ft

Hydraulic Radius 0.3929 ft

Average Velocity 4.4956 ft/s

Top Width 3.5142 ft

Froude Number: 1.1953

Critical Depth 0.9436 ft

Critical Velocity 3.8976 ft/s

Critical Slope: 0.0273 ft/ft

Critical Top Width 3.77 ft

Calculated Max Shear Stress 2.1929 lb/ft^2

Calculated Avg Shear Stress 0.9807 lb/ft^2

Channel Lining Analysis: BT-OC-LT10.2

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BT-OC-LT10.2

Channel Analysis: BT-OC-LT10.3

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0400 ft/ft

Manning's n: 0.0358

Flow 6.4800 cfs

Result Parameters

Depth 0.8591 ft

Area of Flow 1.4762 ft^2

Wetted Perimeter 3.8422 ft

Hydraulic Radius 0.3842 ft

Average Velocity 4.3896 ft/s

Top Width 3.4365 ft

Froude Number: 1.1803

Critical Depth 0.9180 ft

Critical Velocity 3.8445 ft/s

Critical Slope: 0.0281 ft/ft

Critical Top Width 3.67 ft

Calculated Max Shear Stress 2.1444 lb/ft^2

Calculated Avg Shear Stress 0.9590 lb/ft^2

Channel Lining Analysis: BT-OC-LT10.3

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BT-OC-LT10.3

Channel Analysis: BT-OC-LT11.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Longitudinal Slope: 0.0700 ft/ft

Manning's n: 0.0412

Flow 4.2600 cfs

Result Parameters

Depth 0.5905 ft

Area of Flow 1.0462 ft^2

Wetted Perimeter 3.7553 ft

Hydraulic Radius 0.2786 ft

Average Velocity 4.0720 ft/s

Top Width 3.5431 ft

Froude Number: 1.3206

Critical Depth 0.6757 ft

Critical Velocity 3.1098 ft/s

Critical Slope: 0.0341 ft/ft

Critical Top Width 4.56 ft

Calculated Max Shear Stress 2.5794 lb/ft^2

Calculated Avg Shear Stress 1.2169 lb/ft^2

Channel Lining Analysis: BT-OC-LT11.1

Notes:

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is an open weave textile

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BT-OC-LT11.1

Channel Analysis: BT-OC-LT11.2

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 6.0000 ft/ft

Longitudinal Slope: 0.0265 ft/ft

Manning's n: 0.0471

Flow 3.3500 cfs

Result Parameters

Depth 0.6081 ft

Area of Flow 1.4793 ft^2

Wetted Perimeter 5.0589 ft

Hydraulic Radius 0.2924 ft

Average Velocity 2.2646 ft/s

Top Width 4.8650 ft

Froude Number: 0.7238

Critical Depth 0.5660 ft

Critical Velocity 2.6143 ft/s

Critical Slope: 0.0389 ft/ft

Critical Top Width 6.04 ft

Calculated Max Shear Stress 1.0056 lb/ft^2

Calculated Avg Shear Stress 0.4835 lb/ft^2

Channel Lining Analysis: BT-OC-LT11.2

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.483527 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 1.00559 lb/ft^2

Manning's n: 0.0470581

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.0290625 lb/ft^2

Permissible Shear Stress on Vegetation: 1.12921 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BT-OC-LT11.2

Channel Analysis: BT-OC-LT12.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 6.0000 ft/ft

Longitudinal Slope: 0.0310 ft/ft

Manning's n: 0.0480

Flow 2.0400 cfs

Result Parameters

Depth 0.4940 ft

Area of Flow 0.9763 ft^2

Wetted Perimeter 4.1098 ft

Hydraulic Radius 0.2376 ft

Average Velocity 2.0896 ft/s

Top Width 3.9523 ft

Froude Number: 0.7409

Critical Depth 0.4641 ft

Critical Velocity 2.3674 ft/s

Critical Slope: 0.0432 ft/ft

Critical Top Width 4.95 ft

Calculated Max Shear Stress 0.9557 lb/ft^2

Calculated Avg Shear Stress 0.4595 lb/ft^2

Channel Lining Analysis: BT-OC-LT12.1

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.459517 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.955661 lb/ft^2

Manning's n: 0.0480266

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.0265167 lb/ft^2

Permissible Shear Stress on Vegetation: 1.17617 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BT-OC-LT12.1

Channel Analysis: BT-OC-RT08.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 6.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0040 ft/ft

Manning's n: 0.0878

Flow 1.6900 cfs

Result Parameters

Depth 0.8474 ft

Area of Flow 2.8724 ft^2

Wetted Perimeter 7.0495 ft

Hydraulic Radius 0.4075 ft

Average Velocity 0.5884 ft/s

Top Width 6.7793 ft

Froude Number: 0.1593

Critical Depth 0.4305 ft

Critical Velocity 2.2799 ft/s

Critical Slope: 0.1482 ft/ft

Critical Top Width 4.59 ft

Calculated Max Shear Stress 0.2115 lb/ft^2

Calculated Avg Shear Stress 0.1017 lb/ft^2

Channel Lining Analysis: BT-OC-RT08.1

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good

Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.101703 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.211513 lb/ft^2

Manning's n: 0.0877948

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.00175623 lb/ft^2

Permissible Shear Stress on Vegetation: 3.93046 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BT-OC-RT08.1

Channel Analysis: BT-OC-RT09.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0570 ft/ft

Manning's n: 0.0417

Flow 1.2500 cfs

Result Parameters

Depth 0.3894 ft

Area of Flow 0.4549 ft^2

Wetted Perimeter 2.4762 ft

Hydraulic Radius 0.1837 ft

Average Velocity 2.7480 ft/s

Top Width 2.3363 ft

Froude Number: 1.0975

Critical Depth 0.4138 ft

Critical Velocity 2.4335 ft/s

Critical Slope: 0.0412 ft/ft

Critical Top Width 2.79 ft

Calculated Max Shear Stress 1.3850 lb/ft^2

Calculated Avg Shear Stress 0.6534 lb/ft^2

Channel Lining Analysis: BT-OC-RT09.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BT-OC-RT09.1

Channel Analysis: BT-OC-RT10.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0450 ft/ft

Manning's n: 0.0437

Flow 1.8900 cfs

Result Parameters

Depth 0.4836 ft

Area of Flow 0.7016 ft^2

Wetted Perimeter 3.0753 ft

Hydraulic Radius 0.2281 ft

Average Velocity 2.6939 ft/s

Top Width 2.9016 ft

Froude Number: 0.9654

Critical Depth 0.4882 ft

Critical Velocity 2.6432 ft/s

Critical Slope: 0.0428 ft/ft

Critical Top Width 3.30 ft

Calculated Max Shear Stress 1.3579 lb/ft^2

Calculated Avg Shear Stress 0.6406 lb/ft^2

Channel Lining Analysis: BT-OC-RT10.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03

Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BT-OC-RT10.1

Appendix I:
Gutter Spread Calculations

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

Carolina Crossroads, P3A — Designed by: DPH

Gutter Spread Calculations — Design Storm Event: 10 YR — Checked by: AK

Calculated From Hydraulic Toolbox

Alignment	Side	Node	Station	Inlet Type	S_L (ft/ft)	S_X (ft/ft)	A (Ac)	C Value	T_C (min)	I (in/hr)	Q_O (cfs)	US Node	Q_b (cfs)	Q_T (cfs)	T_{MAX} (ft)	T (ft)	Q_i (cfs)	Q_B (cfs)	DS Node
Berryhill Road: Raised concrete median - St. Andrew's to Woodland Hills																			
BERP	RT	BE-CB-0683	303+85	1	0.040	0.040	0.140	0.87	7	7.364	0.897	none	N/A	0.897	7.42	1.871	0.897	0.000	BE-CB-0682
BERP	RT	BE-CB-0682	304+60	1	0.040	0.040	0.060	0.88	5	8.110	0.428	BE-CB-0683	0.000	0.428	7.42	1.418	0.428	0.000	Stoop Cr.
Berryhill Road: Begin left-side curb to 305+05																			
BERP	RT	BE-CB-0681	305+05	17	0.040	0.040	0.220	0.86	8	7.050	1.334	none	N/A	1.334	7.42	3.372	1.174	0.160	Stoop Cr.
Berryhill Road: Sta. 315+00 to Driveway at Sta. 319+50																			
BERP	RT	BE-CB-0901	315+07	1	0.003	0.020	0.153	0.86	5	8.110	1.067	BE-CB-0921	0.105	1.172	7.42	7.016	0.993	0.179	BE-OCRT-08.2
BERP	RT	BE-CB-0921	316+66	1	0.009	0.020	0.147	0.86	5	8.110	1.025	BE-CB-0956	0.003	1.029	7.42	4.562	0.924	0.105	BE-CB-0901
BERP	RT	BE-CB-0956	318+25	1	0.010	0.020	0.097	0.87	5	8.110	0.684	none	N/A	0.684	7.42	2.815	0.681	0.003	BE-CB-0921
Berryhill Road: Driveway at Fairway Lane																			
BERP	RT	BE-CB-0981	319+64	1	0.027	0.020	0.171	0.86	6	7.715	1.135	BE-CB-1008	0.011	1.146	7.42	2.940	1.137	0.009	offsite
BERP	RT	BE-CB-1008	321+50	1	0.027	0.020	0.164	0.86	6	7.715	1.088	BE-CB-1037	0.091	1.179	7.42	3.040	1.168	0.011	BE-CB-0981
BERP	RT	BE-CB-1037	323+47	1	0.009	0.020	0.176	0.86	6	7.715	1.168	none	N/A	1.168	7.42	4.875	1.077	0.091	BE-CB-1008
Berryhill Road: Executive Center Drive to Sta. 358+75																			
BERP	RT	BE-CB-1691	358+75	16	0.037	0.020	0.090	0.84	6	7.715	0.583	BE-CB-0921	0.000	0.583	7.42	3.152	0.428	0.155	BE-OCRT-16.1
BERP	RT	BE-CB-1715	359+99	16	0.012	0.020	0.030	0.85	5	8.110	0.207	none	N/A	0.207	7.42	2.259	0.207	0.000	BE-CB-1691

Carolina Crossroads, P3A

Gutter Spread Calculations

Design Storm Event: 10 YR

Designed by: DPH

Checked by: AK

Calculated From Hydraulic Toolbox

Alignment	Side	Node	Station	Inlet Type	S_L (ft/ft)	S_X (ft/ft)	A (Ac)	C Value	T_C (min)	I (in/hr)	Q_O (cfs)	US Node	Q_b (cfs)	Q_T (cfs)	T_{MAX} (ft)	T (ft)	Q_i (cfs)	Q_B (cfs)	DS Node
Burning Tree Road Segment 1: Project Begin to Center Point																			
BURN	LT	BT-CB-0782	315+00	16	0.011	0.032	0.120	0.86	6	7.715	0.796	none	N/A	0.796	7.42	4.062	0.651	0.145	BT-CB-0797
BURN	LT	BT-CB-0797	315+85	18	sag	0.040	0.091	0.86	5	8.110	0.635	BT-CB-0782 + BT-CB-0816	0.218	0.852	7.42	1.829	0.852	N/A	N/A
BURN	LT	BT-CB-0816	316+35	16	0.004	0.040	0.080	0.86	6	7.715	0.531	BT-CB-0833	0.371	0.902	7.42	4.634	0.829	0.073	BT-CB-0797
BURN	LT	BT-CB-0833	317+37	16	0.004	0.040	0.200	0.68	9	6.766	0.920	BT-CB-0856	0.669	1.589	7.42	5.798	1.218	0.371	BT-CB-0816
BURN	LT	BT-CB-0856	318+90	16	0.012	0.032	0.170	0.80	7	7.364	1.002	BT-CB-0886	0.668	1.670	7.42	5.402	1.001	0.669	BT-CB-0833
BURN	LT	BT-CB-0886	320+25	17	0.027	0.020	0.310	0.81	8	7.050	1.770	BT-CB-0931	0.571	2.341	7.42	6.926	1.673	0.668	BT-CB-0856
BURN	LT	BT-CB-0931	322+90	17	0.051	0.020	0.210	0.87	6	7.715	1.410	BT-CB-0974	0.518	1.928	7.42	5.527	1.357	0.571	BT-CB-0886
BURN	LT	BT-CB-0974	325+40	17	0.053	0.020	0.273	0.74	8	7.050	1.424	BT-CB-1006	0.405	1.829	7.42	5.361	1.311	0.518	BT-CB-0931
BURN	LT	BT-CB-1006	327+50	17	0.043	0.020	0.229	0.86	6	7.715	1.519	BT-CB-1051	0.179	1.698	7.42	5.414	1.293	0.405	BT-CB-0974
BURN	LT	BT-CB-1051	330+00	17	0.043	0.038	0.179	0.86	6	7.715	1.188	BT-CB-1061	0.162	1.350	7.42	3.441	1.171	0.179	BT-CB-1006
BURN	LT	BT-CB-1061	332+00	17	0.043	0.038	0.197	0.86	6	7.715	1.307	none	N/A	1.307	7.42	3.394	1.145	0.162	BT-CB-1051

J

Appendix J:

Cross-Line Hydraulic Analysis Calculations

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 1 - Summary of Culvert Flows at Crossing: XL-01

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	XL-01 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
204.37	10	132.70	132.70	0.00	1
205.01	25	177.70	177.70	0.00	1
205.55	50	216.40	216.40	0.00	1
206.08	100	258.90	258.90	0.00	1
220.00	Overtopping	778.94	778.94	0.00	Overtopping

Table 2 - Culvert Summary Table: XL-01

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10	132.70	132.70	204.37	3.328	3.619	8-H2c	0.000	1.809	1.951	1.951	10.742	4.278
25	177.70	177.70	205.01	3.981	4.255	8-H2c	0.000	1.809	2.293	2.293	11.514	4.673
50	216.40	216.40	205.55	4.506	4.800	8-H2c	0.000	1.809	2.554	2.554	12.058	4.954
100	258.90	258.90	206.08	5.088	5.328	8-H2c	0.000	1.809	2.814	2.814	12.567	5.220

****

Double Broken-back Culvert

Inlet Elevation (invert): 200.75 ft,

Upper Break Elevation (invert): 200.22 ft,

Lower Break Elevation (invert): 199.00 ft,

Culvert Length: 529.01 ft,

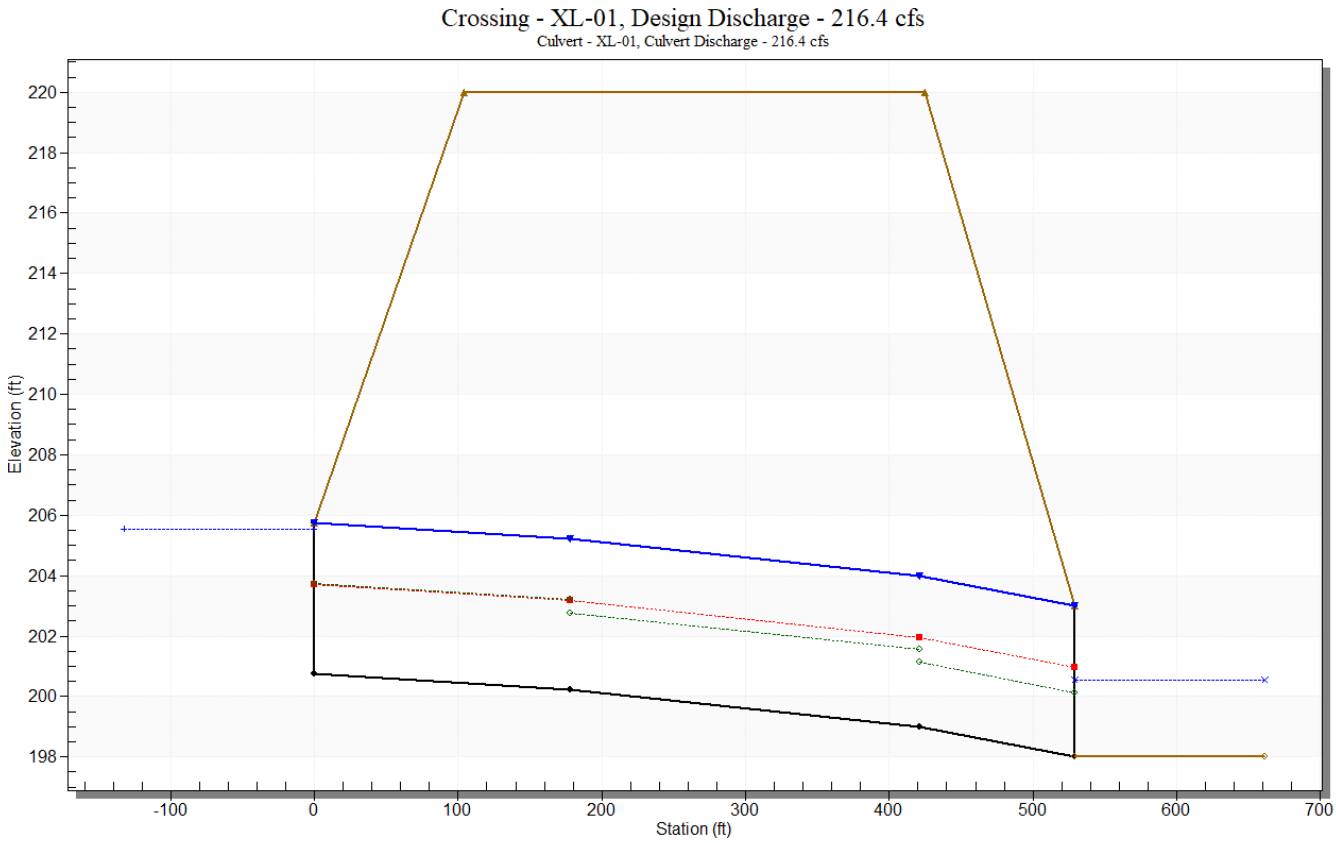
Upper Culvert Section Slope: 0.0030

Steep Culvert Section Slope: 0.0050

Runout Culvert Section Slope: 0.0093

****

Water Surface Profile Plot for Culvert: XL-01



Site Data - XL-01

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft Inlet Elevation: 200.75 ft

Upper Break Station: 178.00 ft Upper Break Elevation: 200.22 ft

Lower Break Station: 421.00 ft Lower Break Elevation: 199.00 ft

Outlet Station: 529.00 ft Outlet Elevation: 198.00 ft

Number of Barrels: 2

Culvert Data Summary - XL-01

Barrel Shape: Circular Barrel Diameter: 5.00 ft

Upper & Middle Section Material: Concrete

Lower Section Material:

Embedment: 0.00 in Upper & Middle Section Manning's n: 0.0120

Lower Section Manning's n: 0.0120 Culvert Type: Double Broken-back

Inlet Configuration: Square Edge with Headwall Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: XL-01)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
132.70	199.95	1.95	4.28	1.19	0.60
177.70	200.29	2.29	4.67	1.40	0.61
216.40	200.55	2.55	4.95	1.56	0.62
258.90	200.81	2.81	5.22	1.72	0.63

Tailwater Channel Data - XL-01

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0098

Channel Manning's n: 0.0450

Channel Invert Elevation: 198.00 ft

Roadway Data for Crossing: XL-01

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 327.00 ft

Crest Elevation: 220.00 ft

Roadway Surface: Paved

Roadway Top Width: 321.00 ft

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 4 - Summary of Culvert Flows at Crossing: XL-03

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10	89.72	89.72	219.21	3.935	0.0*	1-S2n	0.000	1.851	2.219	2.219	21.366	4.790
25	119.63	119.63	220.03	4.746	0.0*	1-S2n	0.000	1.851	2.547	2.547	22.657	5.164
50	149.72	149.72	220.89	5.609	0.0*	5-S2n	0.000	1.851	2.832	2.832	23.657	5.472
100	176.59	176.59	221.77	6.489	0.0*	5-S2n	0.000	1.851	3.058	3.058	24.432	5.709

Table 5 - Culvert Summary Table: XL-03

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	XL-03 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
219.21	10	89.72	89.72	0.00	1
220.03	25	119.63	119.63	0.00	1
220.89	50	149.72	149.72	0.00	1
221.77	100	176.59	176.59	0.00	1
229.80	Overtopping	330.43	330.43	0.00	Overtopping

* Full Flow Headwater elevation is below inlet invert.

****

Double Broken-back Culvert

Inlet Elevation (invert): 215.28 ft,

Upper Break Elevation (invert): 210.43 ft,

Lower Break Elevation (invert): 206.00 ft,

Culvert Length: 468.69 ft,

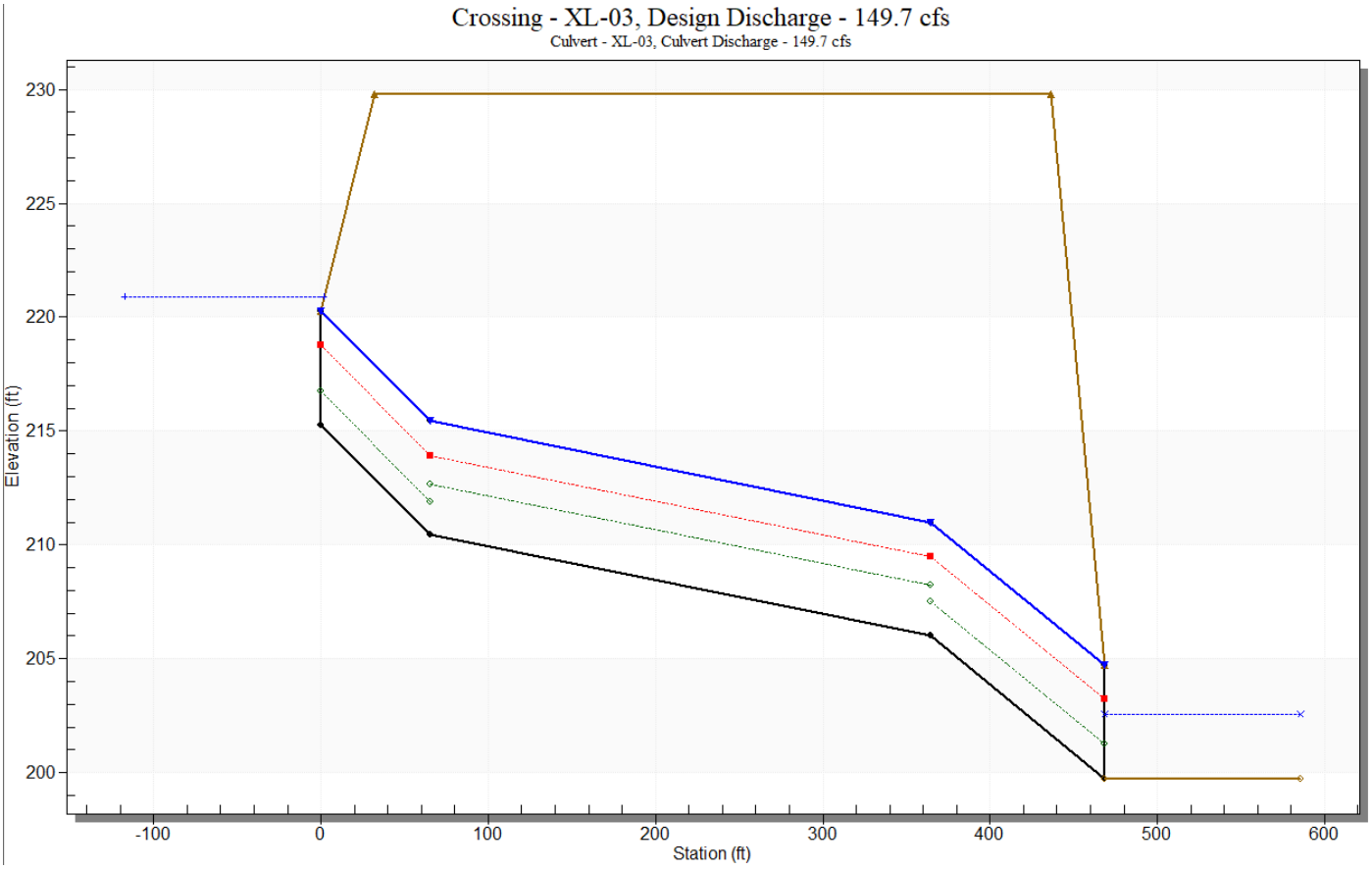
Upper Culvert Section Slope: 0.0740

Steep Culvert Section Slope: 0.0148

Runout Culvert Section Slope: 0.0606

****

Water Surface Profile Plot for Culvert: XL-03



Site Data - XL-03

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft Inlet Elevation: 215.28 ft

Upper Break Station: 65.50 ft Upper Break Elevation: 210.43 ft

Lower Break Station: 364.55 ft Lower Break Elevation: 206.00 ft

Outlet Station: 468.43 ft Outlet Elevation: 199.71 ft

Number of Barrels: 1

Culvert Data Summary - XL-03

Barrel Shape: Circular Barrel Diameter: 5.00 ft

Upper & Middle Section Material: Concrete

Lower Section Material: Embedment: 0.00 in

Upper & Middle Section Manning's n: 0.0120

Lower Section Manning's n: 0.0120 Culvert Type: Double Broken-back

Inlet Configuration: Square Edge with Headwall Inlet Depression: None

Table 6 - Downstream Channel Rating Curve (Crossing: XL-03)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
89.72	201.93	2.22	4.79	1.55	0.70
119.63	202.26	2.55	5.16	1.78	0.71
149.72	202.54	2.83	5.47	1.98	0.72
176.59	202.77	3.06	5.71	2.14	0.73

Tailwater Channel Data - XL-03

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 4.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0112

Channel Manning's n: 0.0400

Channel Invert Elevation: 199.71 ft

Roadway Data for Crossing: XL-03

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 316.00 ft

Crest Elevation: 229.80 ft

Roadway Surface: Paved

Roadway Top Width: 404.00 ft

Crossing Discharge Data

Discharge Selection Method: User Defined

Table 7 - Summary of Culvert Flows at Crossing: XL-05

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10	106.94	49.95	217.19	3.120	3.388	8-H2c	0.000	1.292	1.207	1.191	14.718	6.245
25	142.25	67.54	217.86	3.787	4.063	8-H2c	0.000	1.292	1.415	1.402	15.876	6.853
50	177.74	86.42	218.56	4.544	4.759	8-H2c	0.000	1.292	1.618	1.591	16.839	7.357
100	209.33	104.22	219.22	5.374	5.420	8-H2c	0.000	1.465	1.798	1.745	17.622	7.744

Table 8 - Culvert Summary Table: PR. 48

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	PR. 48 Discharge (cfs)	EX. 48 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
217.19	10	106.94	49.95	56.99	0.00	6
217.86	25	142.25	67.54	74.71	0.00	3
218.56	50	177.74	86.42	91.34	0.00	3
219.22	100	209.33	104.22	105.11	0.00	4
229.00	Overtopping	443.24	221.62	221.62	0.00	Overtopping

****

Double Broken-back Culvert

Inlet Elevation (invert): 213.80 ft,

Upper Break Elevation (invert): 213.40 ft,

Lower Break Elevation (invert): 212.80 ft,

Culvert Length: 364.27 ft,

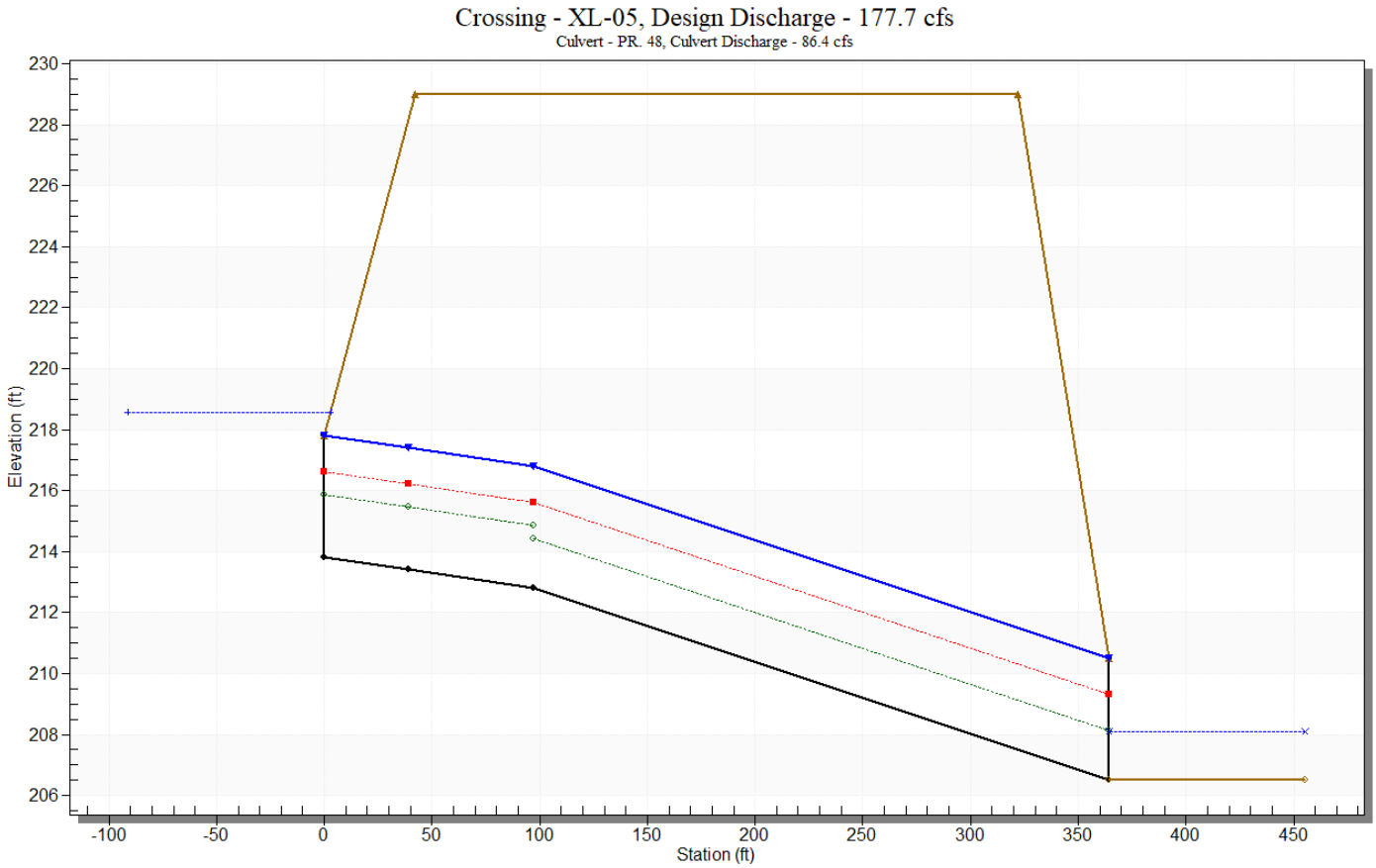
Upper Culvert Section Slope: 0.0102

Steep Culvert Section Slope: 0.0103

Runout Culvert Section Slope: 0.0236

****

Water Surface Profile Plot for Culvert: PR. 48



Site Data - PR. 48

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft Inlet Elevation: 213.80 ft

Upper Break Station: 39.20 ft Upper Break Elevation: 213.40 ft

Lower Break Station: 97.20 ft Lower Break Elevation: 212.80 ft

Outlet Station: 364.20 ft Outlet Elevation: 206.50 ft

Number of Barrels: 1

Culvert Data Summary - PR. 48

Barrel Shape: Circular Barrel Diameter: 4.00 ft

Upper & Middle Section Material: Concrete

Lower Section Material: Embedment: 0.00 in

Upper & Middle Section Manning's n: 0.0120

Lower Section Manning's n: 0.0120 Culvert Type: Double Broken-back

Inlet Configuration: Square Edge with Headwall Inlet Depression: None

Table 9 - Culvert Summary Table: EX. 48

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10	106.94	56.99	217.19	3.388	1.667	1-S2n	0.000	1.292	1.327	1.191	14.893	6.245
25	142.25	74.71	217.86	4.064	2.044	5-S2n	0.000	1.292	1.534	1.402	15.939	6.853
50	177.74	91.34	218.56	4.759	2.490	5-S2n	0.000	1.292	1.714	1.591	16.726	7.357
100	209.33	105.11	219.22	5.419	2.928	5-S2n	0.000	1.465	1.857	1.745	17.272	7.744

****

Double Broken-back Culvert

Inlet Elevation (invert): 213.80 ft,

Upper Break Elevation (invert): 213.49 ft,

Lower Break Elevation (invert): 211.73 ft,

Culvert Length: 353.07 ft,

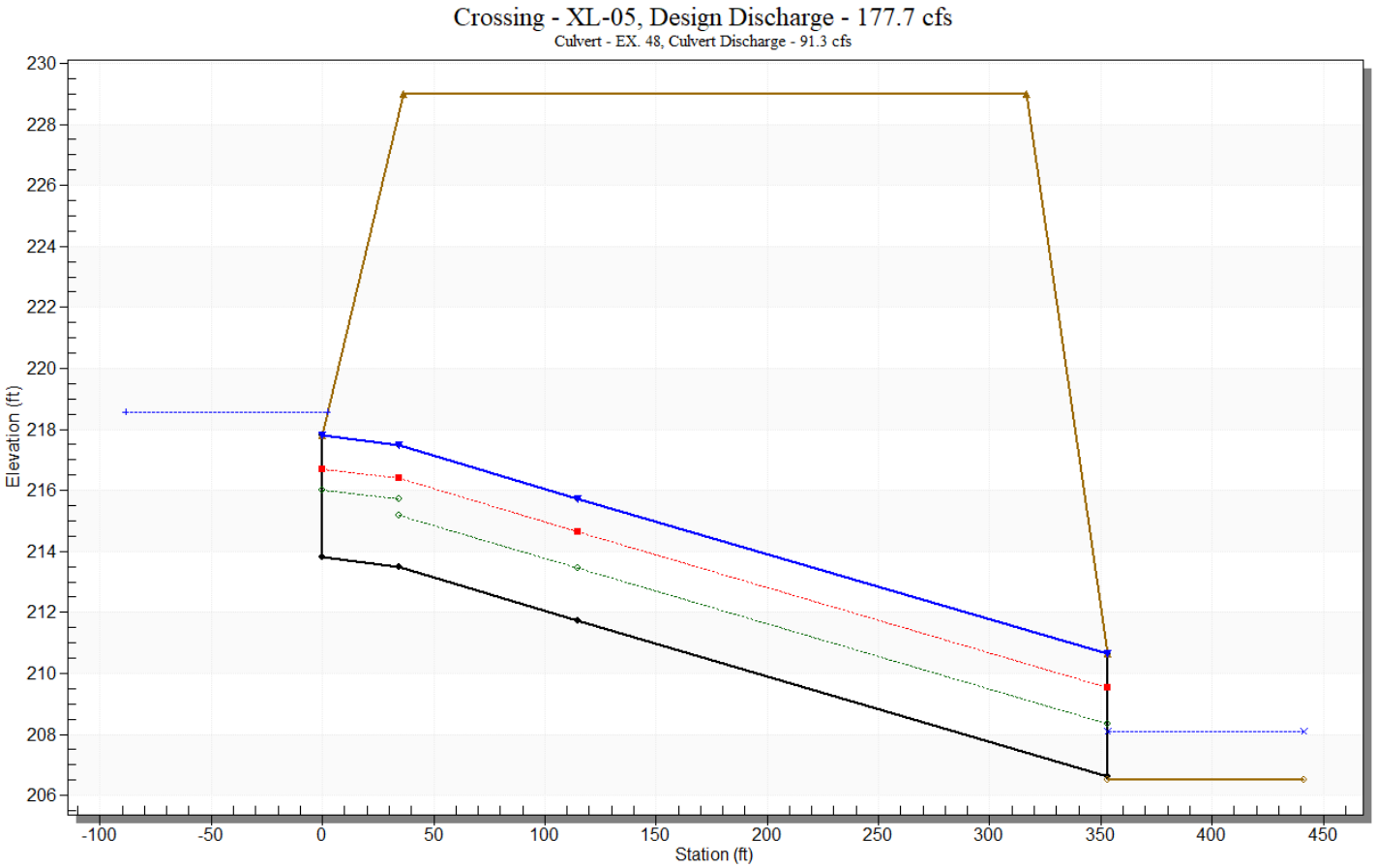
Upper Culvert Section Slope: 0.0090

Steep Culvert Section Slope: 0.0218

Runout Culvert Section Slope: 0.0214

****

Water Surface Profile Plot for Culvert: EX. 48



Site Data - EX. 48

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft Inlet Elevation: 213.80 ft

Upper Break Station: 34.34 ft Upper Break Elevation: 213.49 ft

Lower Break Station: 115.00 ft Lower Break Elevation: 211.73 ft

Outlet Station: 353.00 ft Outlet Elevation: 206.63 ft

Number of Barrels: 1

Culvert Data Summary - EX. 48

Barrel Shape: Circular Barrel Diameter: 4.00 ft

Upper & Middle Section Material: Concrete

Lower Section Material: Embedment: 0.00 in

Upper & Middle Section Manning's n: 0.0120

Lower Section Manning's n: 0.0120 Culvert Type: Double Broken-back

Inlet Configuration: Square Edge with Headwall Inlet Depression: None

Table 10 - Downstream Channel Rating Curve (Crossing: XL-05)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
106.94	207.69	1.19	6.24	2.13	1.09
142.25	207.90	1.40	6.85	2.51	1.11
177.74	208.09	1.59	7.36	2.85	1.13
209.33	208.25	1.75	7.74	3.13	1.14

Tailwater Channel Data - XL-05

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0287

Channel Manning's n: 0.0400

Channel Invert Elevation: 206.50 ft

Roadway Data for Crossing: XL-05

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 313.10 ft

Crest Elevation: 229.00 ft

Roadway Surface: Paved

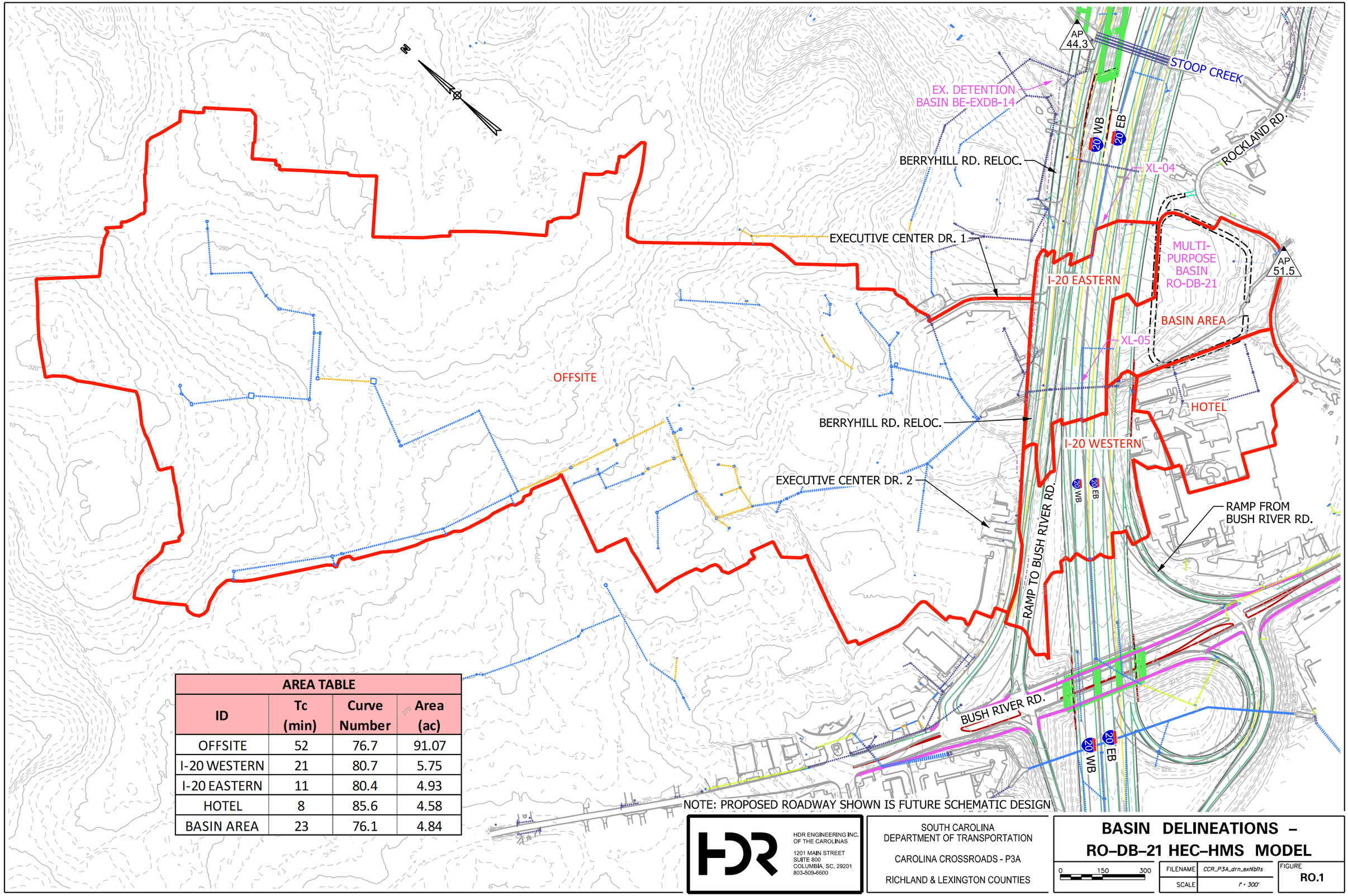
Roadway Top Width: 280.00 ft

K

Appendix K:

Detention Basin HEC-HMS Calculations

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700



AREA TABLE			
ID	Tc (min)	Curve Number	Area (ac)
OFFSITE	52	76.7	91.07
I-20 WESTERN	21	80.7	5.75
I-20 EASTERN	11	80.4	4.93
HOTEL	8	85.6	4.58
BASIN AREA	23	76.1	4.84

NOTE: PROPOSED ROADWAY SHOWN IS FUTURE SCHEMATIC DESIGN

HDR ENGINEERING INC. OF THE CAROLINAS
1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

CAROLINA CROSSROADS - P3A

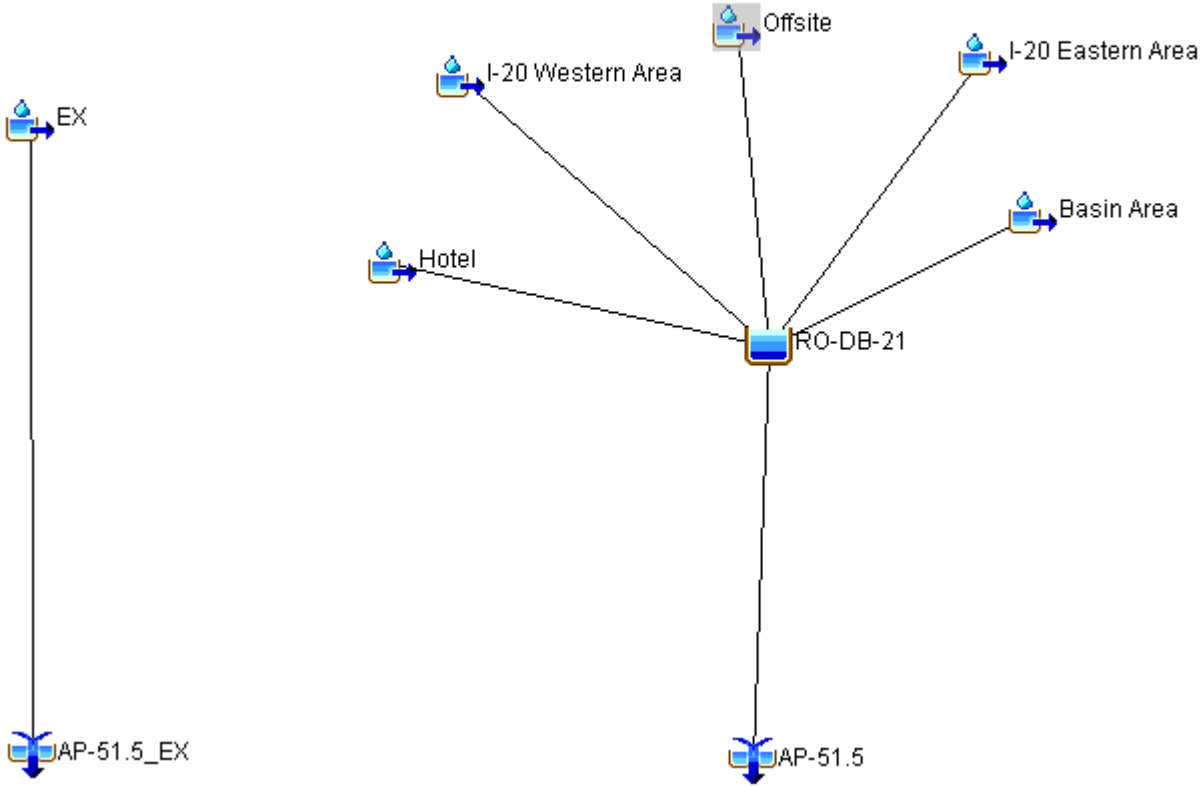
RICHLAND & LEXINGTON COUNTIES

BASIN DELINEATIONS – RO–DB–21 HEC–HMS MODEL

0 150 300

FILENAME	CCR_P3A_drn_exhbits	FIGURE
SCALE	1" = 300'	RO.1

RO-DB-21 HEC-HMS MODEL DIAGRAM



Project: Ro Db 21
Simulation Run: PS 10 Year
Simulation Start: 10 May 2021, 24:00
Simulation End: 12 May 2021, 00:06

HMS Version: 4.10
Executed: 20 May 2026, 22:35

Global Parameter Summary - Subbasin

Area (MI2)

Element Name	Area (MI2)
Ex	0.17
Offsite	0.14
I - 20 Western Area	0.01
I - 20 Eastern Area	0.01
Basin Area	0.01
Hotel	0.01

Downstream

Element Name	Downstream
Ex	AP - 51.5_EX
Offsite	RO - DB - 21
I - 20 Western Area	RO - DB - 21
I - 20 Eastern Area	RO - DB - 21
Basin Area	RO - DB - 21
Hotel	RO - DB - 21

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number	Initial Abstraction
Ex	0	73.2	0.73
Offsite	0	76.7	0.51
I - 20 Western Area	0	80.73	0.48
I - 20 Eastern Area	0	80.43	0.09
Basin Area	0	76.07	0.63
Hotel	0	85.55	0.34

Transform: Scs

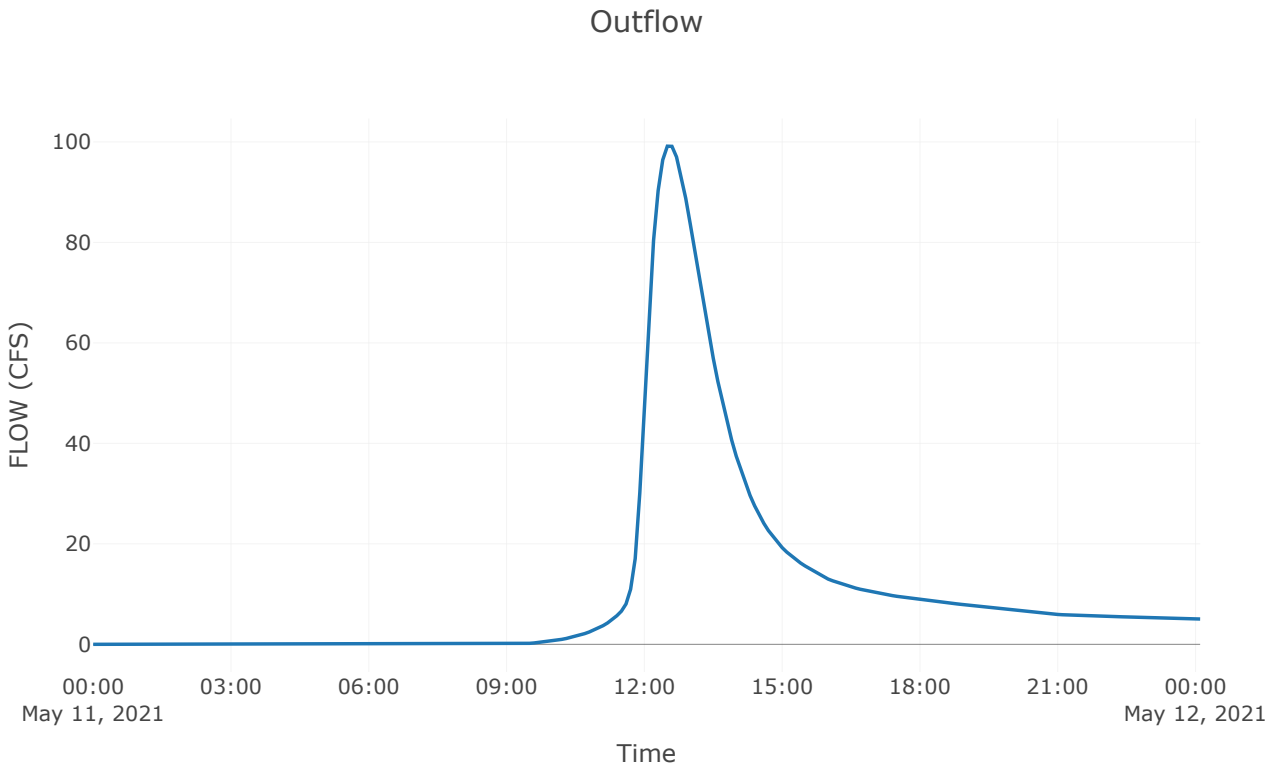
Element Name	Lag	Unitgraph Type
Ex	35	Prf300
Offsite	31	Prf300
I - 20 Western Area	12.59	Prf450
I - 20 Eastern Area	6.64	Prf450
Basin Area	13.71	Prf450
Hotel	4.72	Prf450

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
AP - 51.5_EX	0.17	99.15	11May2021, 12:30	2.46
AP - 51.5	0.17	43.3	11May2021, 13:48	2.93
Ex	0.17	99.15	11May2021, 12:30	2.46
Offsite	0.14	108.87	11May2021, 12:30	2.85
I - 20 Western Area	0.01	17.78	11May2021, 12:06	3.18
I - 20 Eastern Area	0.01	20.47	11May2021, 12:00	3.51
Basin Area	0.01	12.33	11May2021, 12:06	2.75
Hotel	0.01	21.63	11May2021, 12:00	3.66
RO - DB - 21	0.17	43.3	11May2021, 13:48	2.93

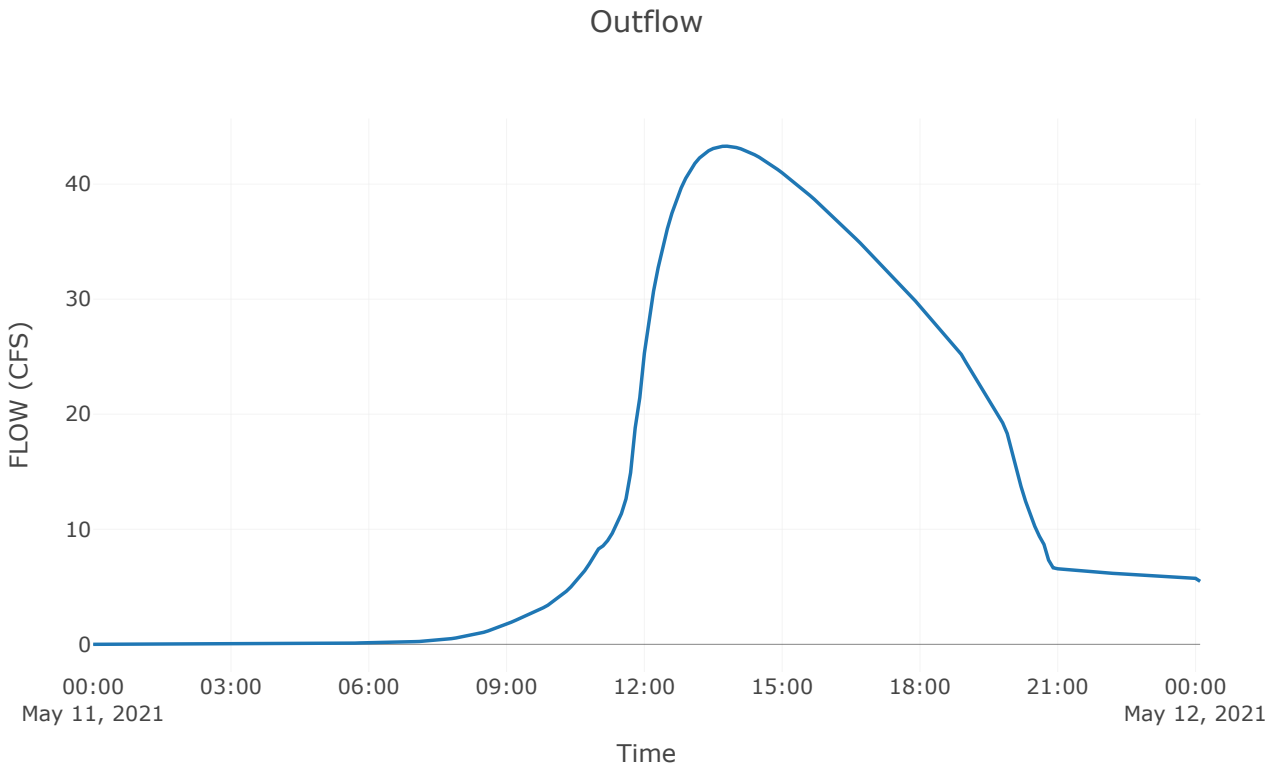
Junction: AP-51.5_EX

Results: AP-51.5_EX	
Peak Discharge (CFS)	99.15
Time of Peak Discharge	11May2021, 12:30
Volume (IN)	2.46



Junction: AP-51.5

Results: AP-51.5	
Peak Discharge (CFS)	43.3
Time of Peak Discharge	11May2021, 13:48
Volume (IN)	2.93



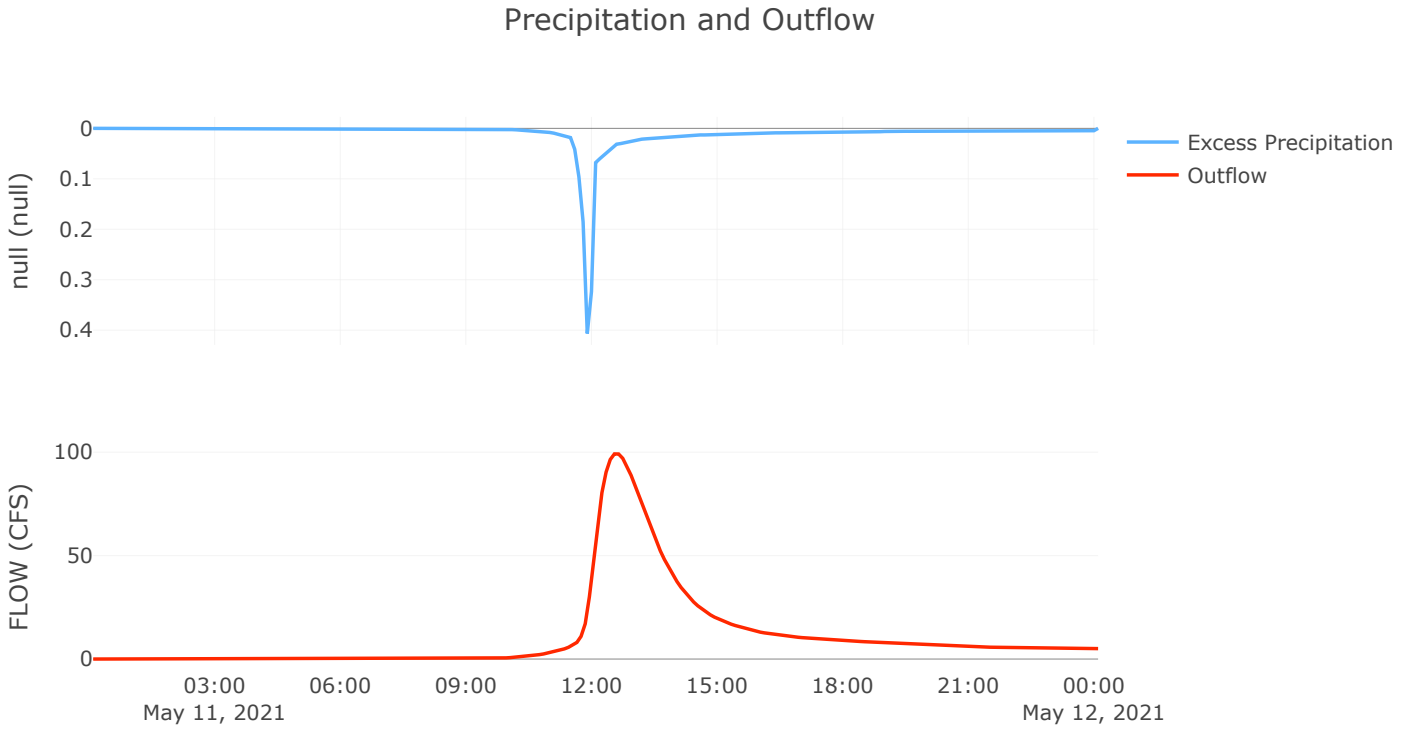
Subbasin: EX

Area (MI2) : 0.17
Downstream : AP - 51.5_EX

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	73.2
Initial Abstraction	0.73

Transform: Scs	
Lag	35
Unitgraph Type	Prf300

Results: EX	
Peak Discharge (CFS)	99.15
Time of Peak Discharge	11May2021, 12:30
Volume (IN)	2.46
Precipitation Volume (AC - FT)	46.3
Loss Volume (AC - FT)	24.27
Excess Volume (AC - FT)	22.03
Direct Runoff Volume (AC - FT)	21.66
Baseflow Volume (AC - FT)	0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0.2
0.3
0.4
FLOW (CFS)
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03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

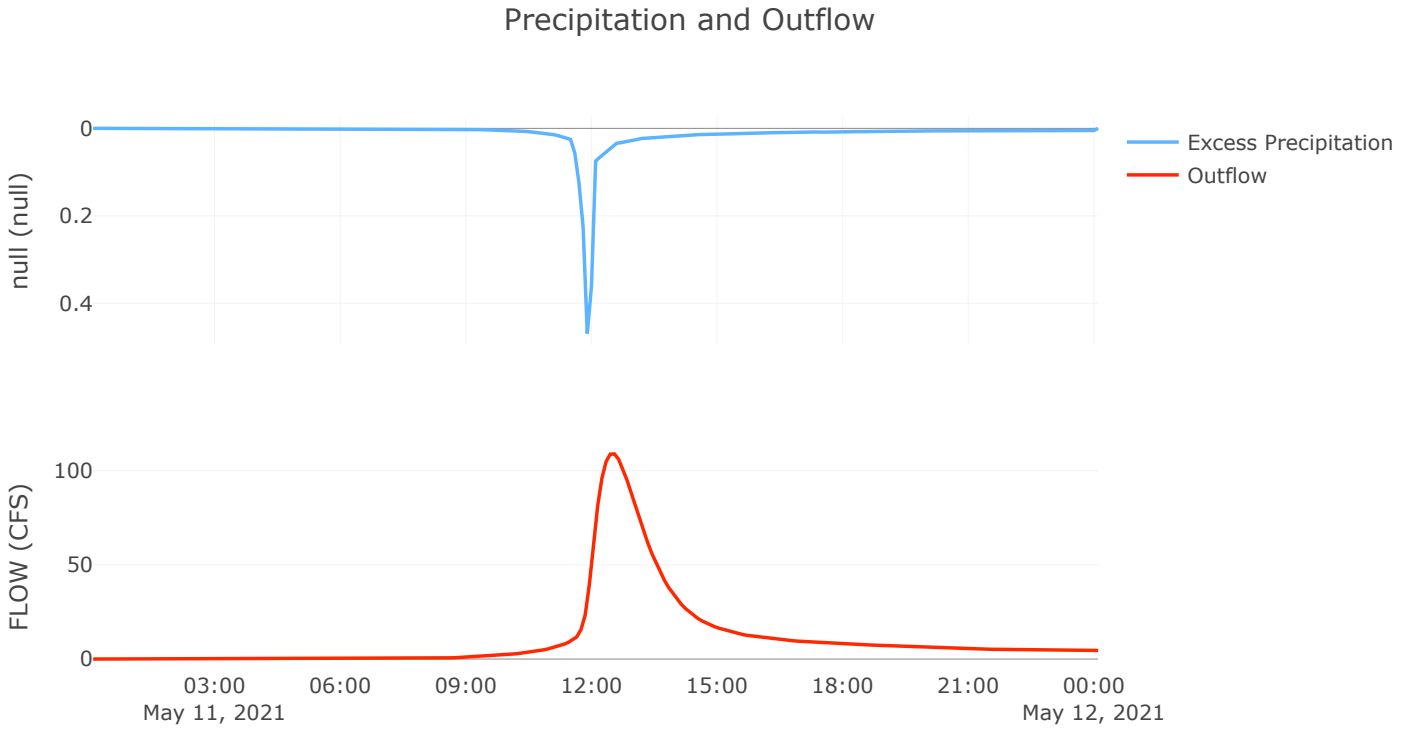
Subbasin: Offsite

Area (MI2) : 0.14
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	76.7
Initial Abstraction	0.51

Transform: Scs	
Lag	31
Unitgraph Type	Prf300

Results: Offsite	
Peak Discharge (CFS)	108.87
Time of Peak Discharge	11May2021, 12:30
Volume (IN)	2.85
Precipitation Volume (AC - FT)	39.92
Loss Volume (AC - FT)	17.96
Excess Volume (AC - FT)	21.96
Direct Runoff Volume (AC - FT)	21.66
Baseflow Volume (AC - FT)	0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03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

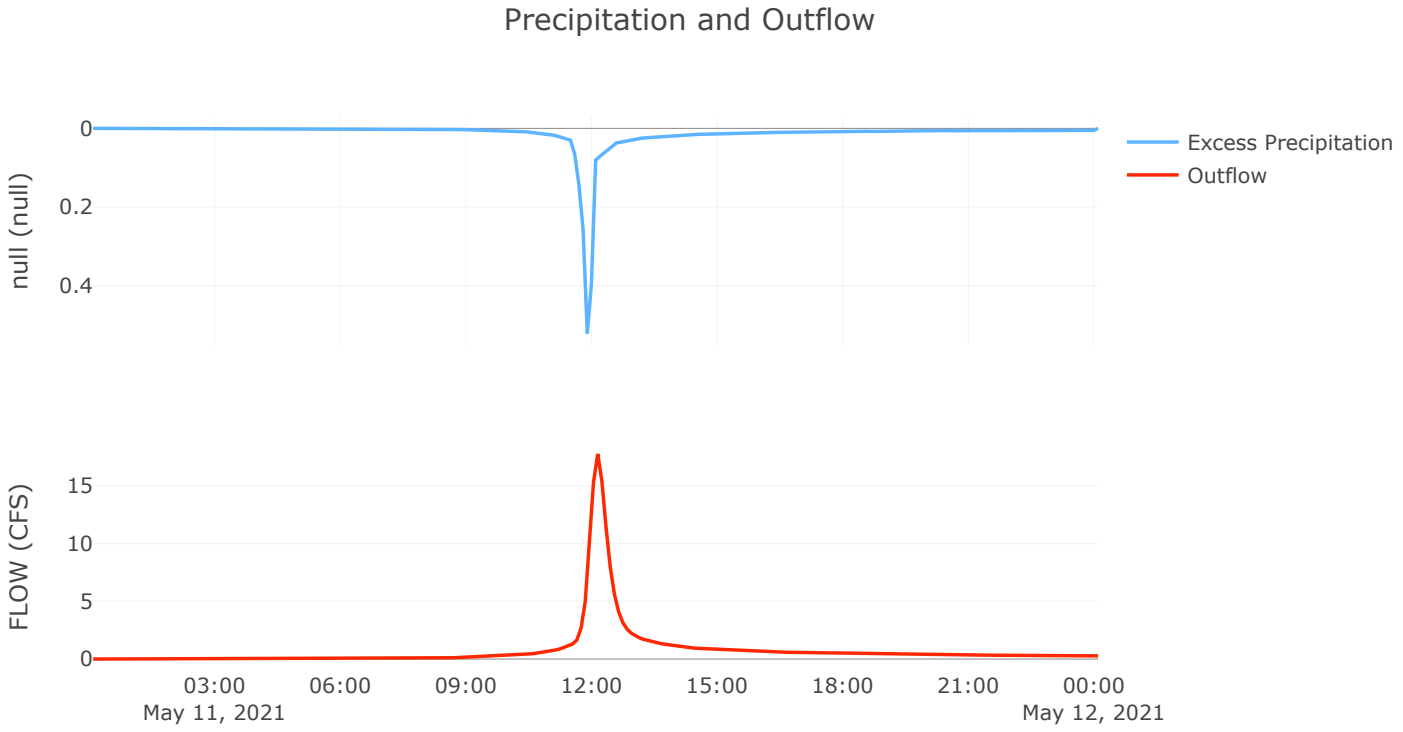
Subbasin: I-20 Western Area

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	80.73
Initial Abstraction	0.48

Transform: Scs	
Lag	12.59
Unitgraph Type	Prf450

Results: I-20 Western Area	
Peak Discharge (CFS)	17.78
Time of Peak Discharge	11May2021, 12:06
Volume (IN)	3.18
Precipitation Volume (AC - FT)	2.52
Loss Volume (AC - FT)	0.99
Excess Volume (AC - FT)	1.53
Direct Runoff Volume (AC - FT)	1.52
Baseflow Volume (AC - FT)	0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15
10
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03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

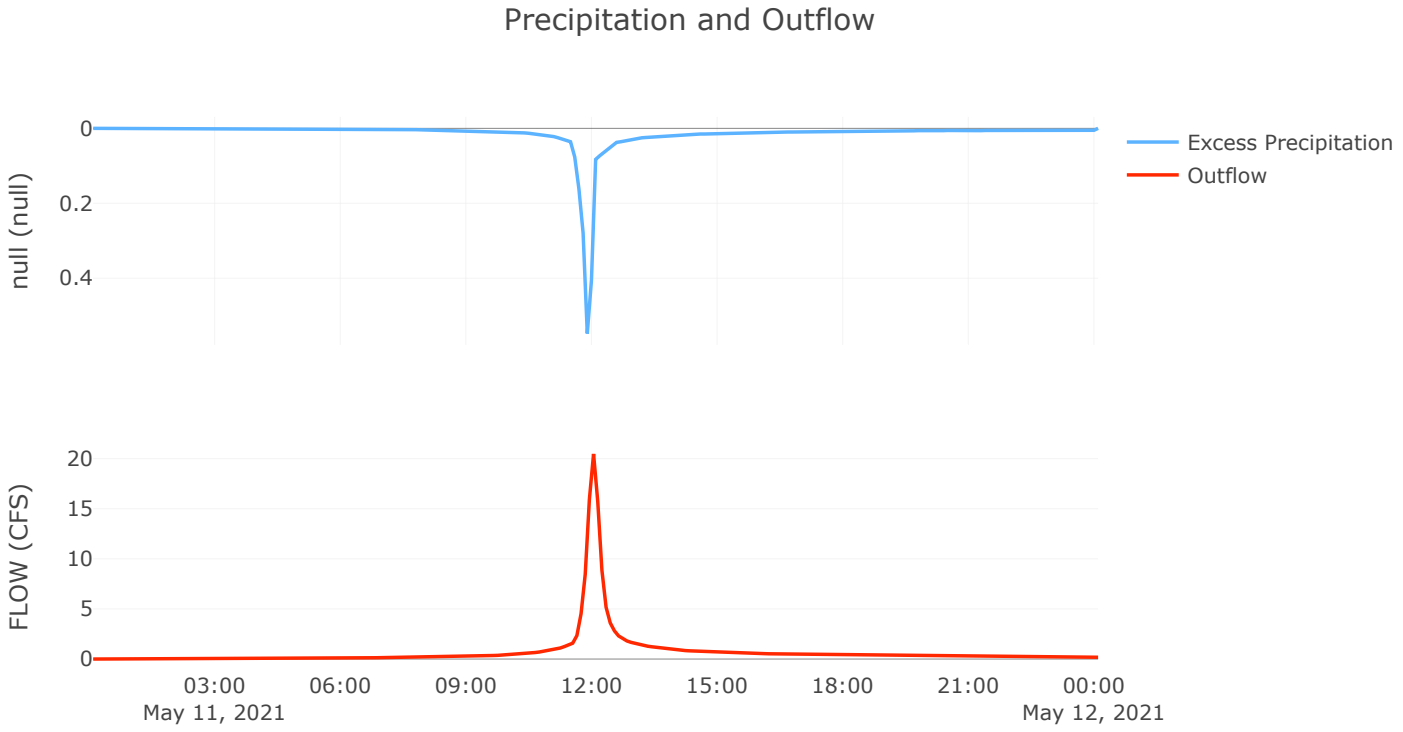
Subbasin: I-20 Eastern Area

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	80.43
Initial Abstraction	0.09

Transform: Scs	
Lag	6.64
Unitgraph Type	Prf450

Results: I-20 Eastern Area	
Peak Discharge (CFS)	20.47
Time of Peak Discharge	11May2021, 12:00
Volume (IN)	3.51
Precipitation Volume (AC - FT)	2.16
Loss Volume (AC - FT)	0.72
Excess Volume (AC - FT)	1.44
Direct Runoff Volume (AC - FT)	1.44
Baseflow Volume (AC - FT)	0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FLOW (CFS)
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03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

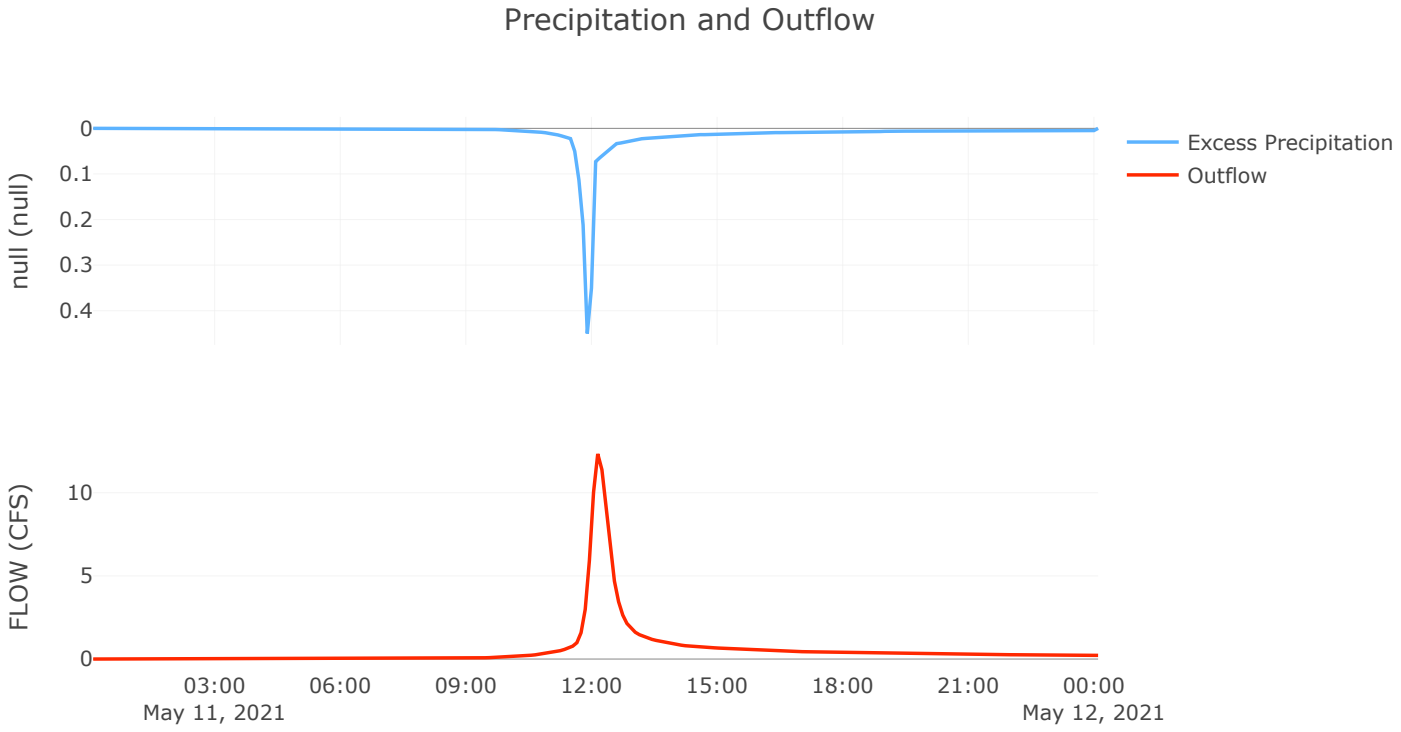
Subbasin: Basin Area

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	76.07
Initial Abstraction	0.63

Transform: Scs	
Lag	13.71
Unitgraph Type	Prf450

Results: Basin Area	
Peak Discharge (CFS)	12.33
Time of Peak Discharge	11May2021, 12:06
Volume (IN)	2.75
Precipitation Volume (AC - FT)	2.12
Loss Volume (AC - FT)	1.01
Excess Volume (AC - FT)	1.11
Direct Runoff Volume (AC - FT)	1.11
Baseflow Volume (AC - FT)	0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0.2
0.3
0.4
Excess Precipitation
Outflow
FLOW (CFS)
10
5
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021

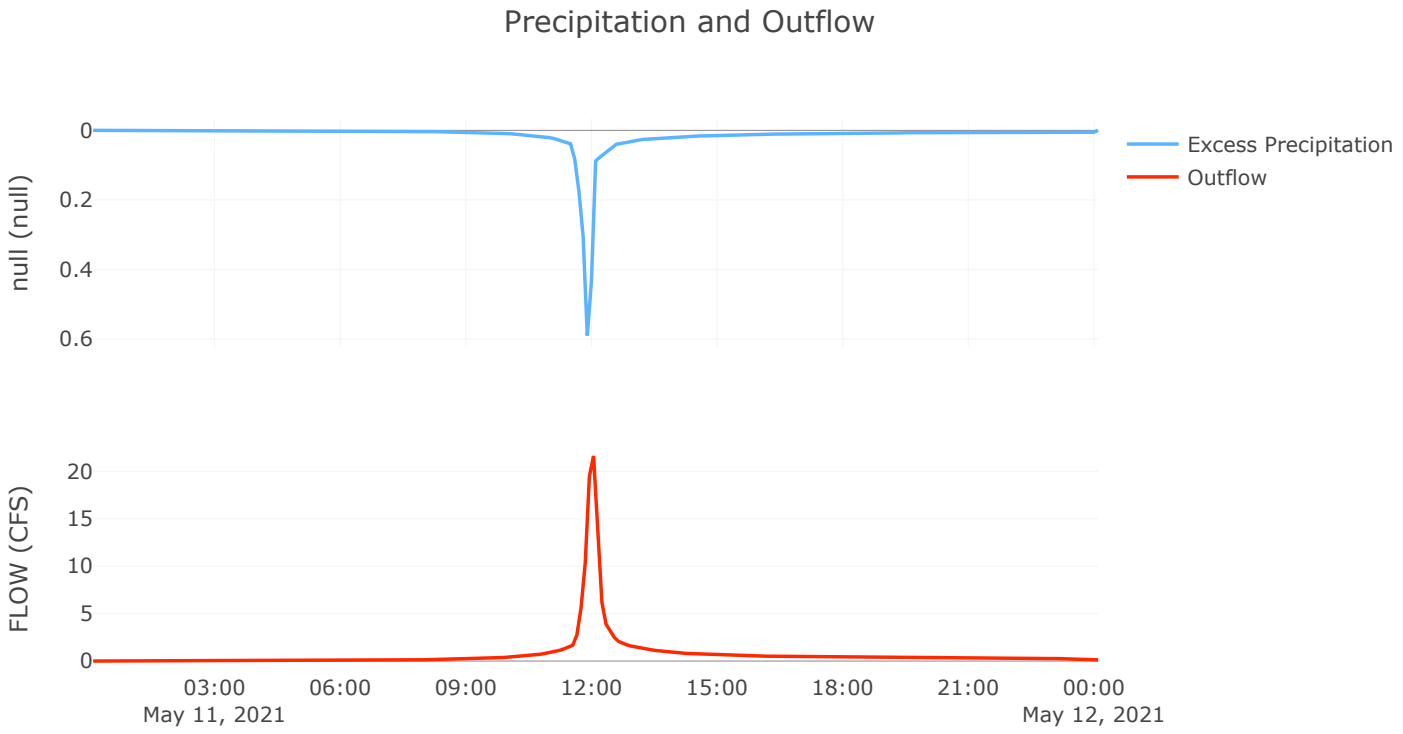
Subbasin: Hotel

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85.55
Initial Abstraction	0.34

Transform: Scs	
Lag	4.72
Unitgraph Type	Prf450

Results: Hotel	
Peak Discharge (CFS)	21.63
Time of Peak Discharge	11May2021, 12:00
Volume (IN)	3.66
Precipitation Volume (AC - FT)	2.01
Loss Volume (AC - FT)	0.61
Excess Volume (AC - FT)	1.4
Direct Runoff Volume (AC - FT)	1.4
Baseflow Volume (AC - FT)	0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0.2
0.4
0.6
FLOW (CFS)
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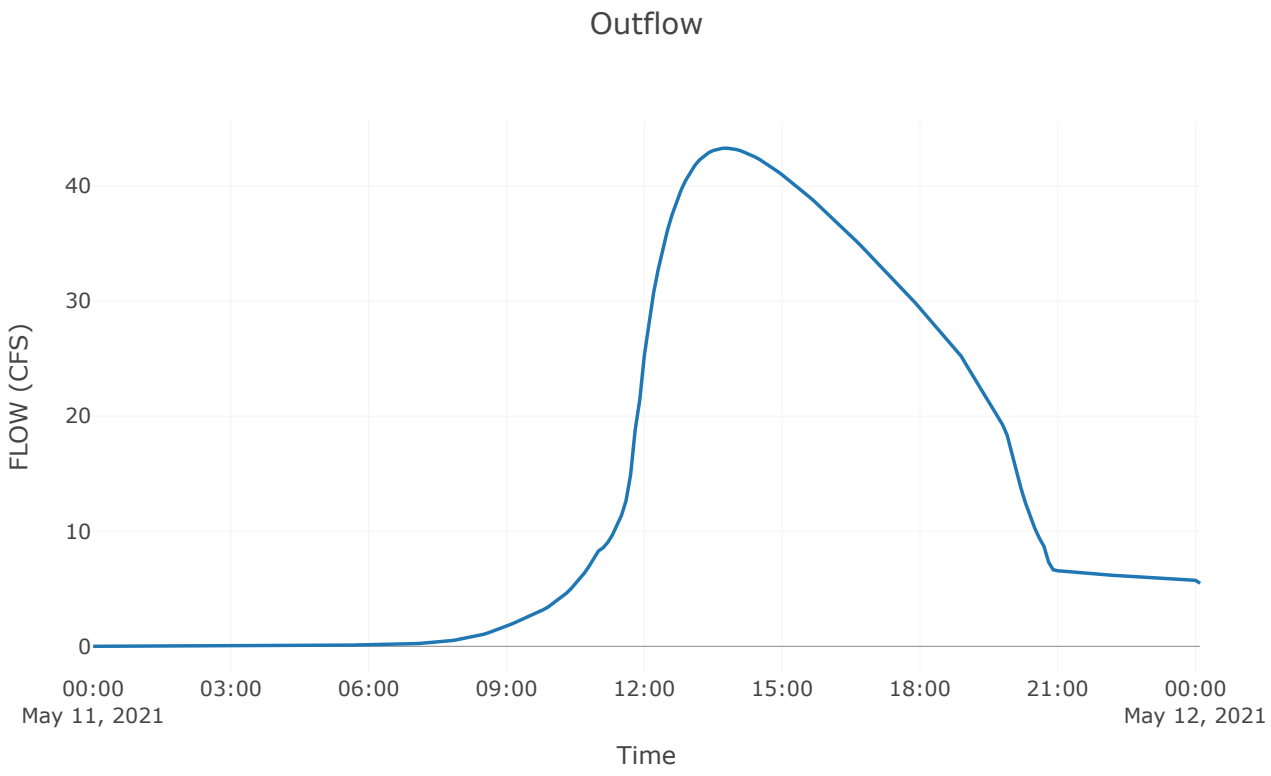
15
10
5
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

Reservoir: RO-DB-21

Downstream : AP - 51.5

Results: RO-DB-21	
Peak Discharge (CFS)	43.3
Time of Peak Discharge	11May2021, 13:48
Volume (IN)	2.93
Peak Inflow (CFS)	140.21
Time of Peak Inflow	11May2021, 12:06
Inflow Volume (AC - FT)	27.13
Maximum Storage (AC - FT)	9.92
Peak Elevation (FT)	198.34
Discharge Volume (AC - FT)	27.1



Project: Ro Db 21
Simulation Run: PS 25 Year
Simulation Start: 10 May 2021, 24:00
Simulation End: 12 May 2021, 00:06

HMS Version: 4.10
Executed: 20 May 2026, 22:35

Global Parameter Summary - Subbasin

Area (MI2)

Element Name	Area (MI2)
Ex	0.17
Offsite	0.14
I - 20 Western Area	0.01
I - 20 Eastern Area	0.01
Basin Area	0.01
Hotel	0.01

Downstream

Element Name	Downstream
Ex	AP - 51.5_EX
Offsite	RO - DB - 21
I - 20 Western Area	RO - DB - 21
I - 20 Eastern Area	RO - DB - 21
Basin Area	RO - DB - 21
Hotel	RO - DB - 21

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number	Initial Abstraction
Ex	0	73.2	0.73
Offsite	0	76.7	0.51
I - 20 Western Area	0	80.73	0.48
I - 20 Eastern Area	0	80.43	0.09
Basin Area	0	76.07	0.63
Hotel	0	85.55	0.34

Transform: Scs

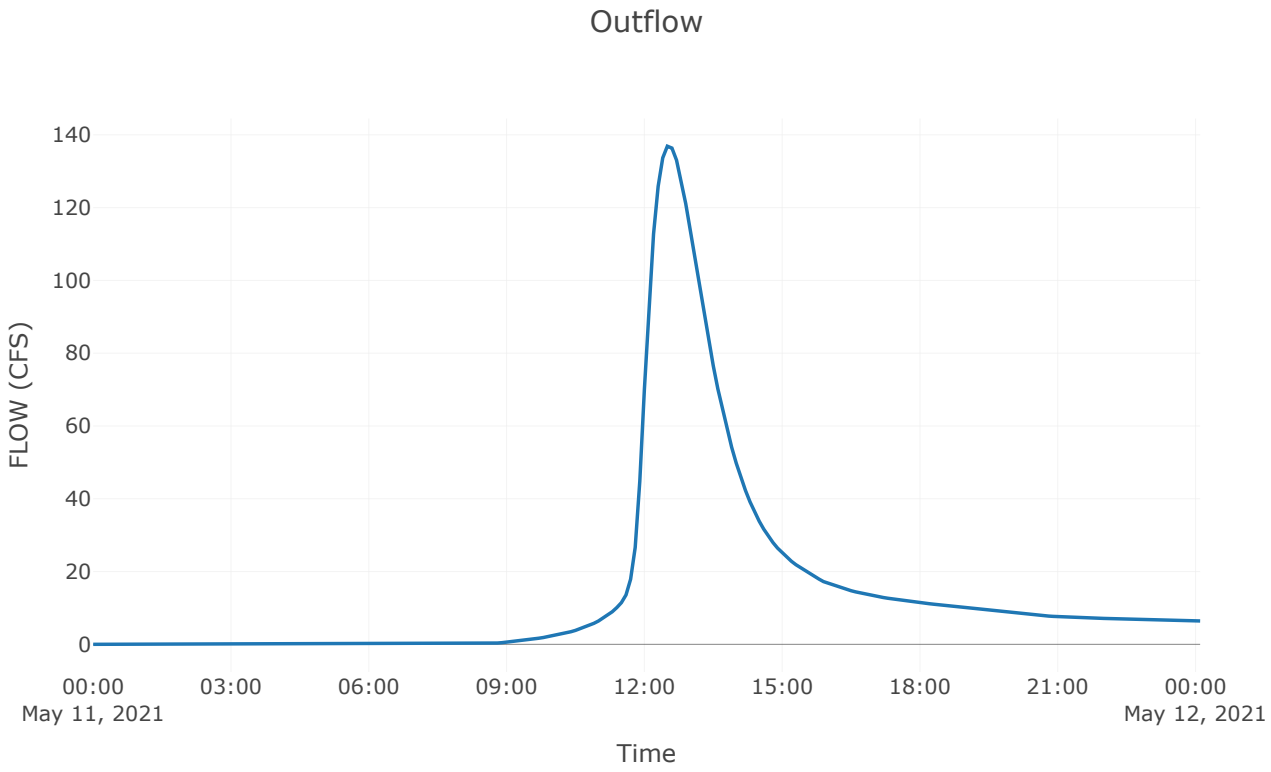
Element Name	Lag	Unitgraph Type
Ex	35	Prf300
Offsite	31	Prf300
I - 20 Western Area	12.59	Prf450
I - 20 Eastern Area	6.64	Prf450
Basin Area	13.71	Prf450
Hotel	4.72	Prf450

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
AP - 51.5_EX	0.17	136.88	11May2021, 12:30	3.35
AP - 51.5	0.17	49.59	11May2021, 13:54	3.87
Ex	0.17	136.88	11May2021, 12:30	3.35
Offsite	0.14	145.29	11May2021, 12:24	3.79
I - 20 Western Area	0.01	23.17	11May2021, 12:06	4.16
I - 20 Eastern Area	0.01	26.16	11May2021, 12:00	4.5
Basin Area	0.01	16.58	11May2021, 12:06	3.68
Hotel	0.01	27.32	11May2021, 12:00	4.69
RO - DB - 21	0.17	49.59	11May2021, 13:54	3.87

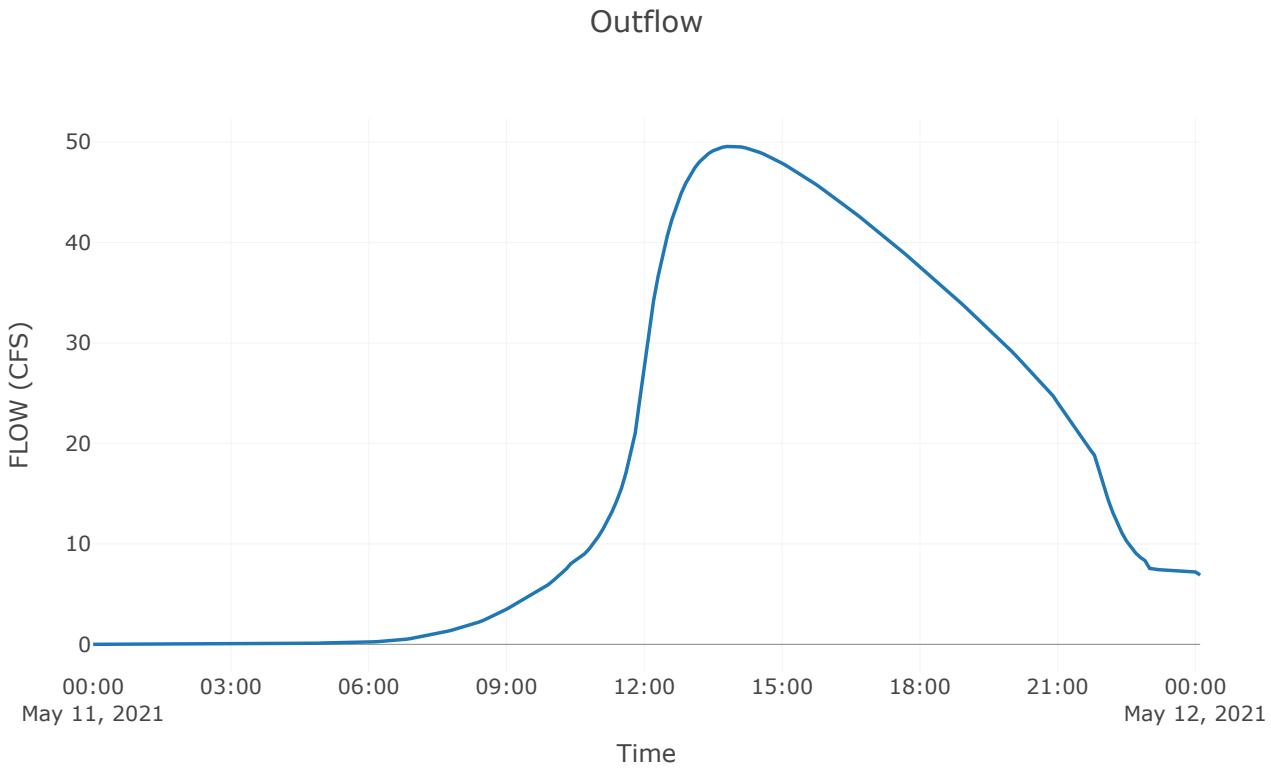
Junction: AP-51.5_EX

Results: AP-51.5_EX	
Peak Discharge (CFS)	136.88
Time of Peak Discharge	11May2021, 12:30
Volume (IN)	3.35



Junction: AP-51.5

Results: AP-51.5	
Peak Discharge (CFS)	49.59
Time of Peak Discharge	11May2021, 13:54
Volume (IN)	3.87



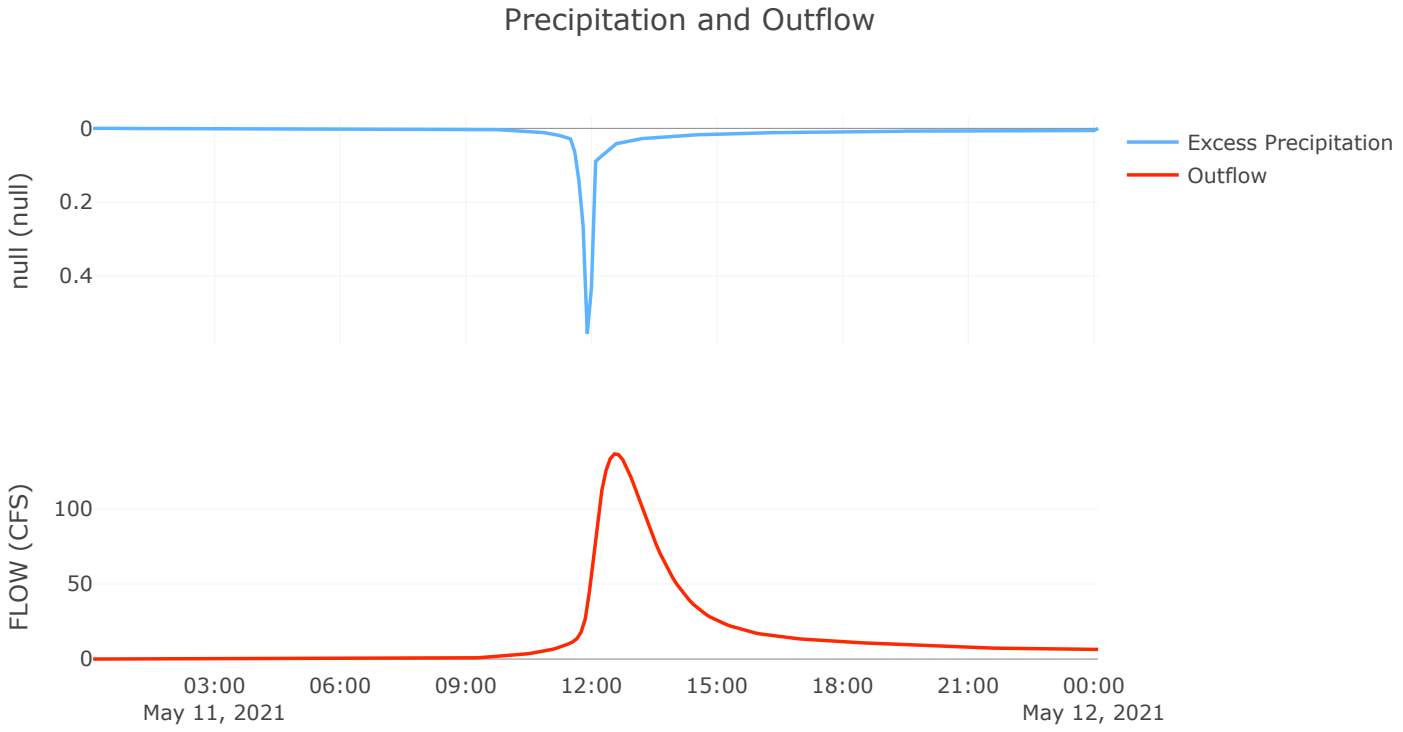
Subbasin: EX

Area (MI2) : 0.17
Downstream : AP - 51.5_EX

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	73.2
Initial Abstraction	0.73

Transform: Scs	
Lag	35
Unitgraph Type	Prf300

Results: EX	
Peak Discharge (CFS)	136.88
Time of Peak Discharge	11May2021, 12:30
Volume (IN)	3.35
Precipitation Volume (AC - FT)	55.9
Loss Volume (AC - FT)	25.96
Excess Volume (AC - FT)	29.93
Direct Runoff Volume (AC - FT)	29.45
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
0
0.2
0.4
null (null)
Excess Precipitation
Outflow
100
50
0
FLOW (CFS)
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021

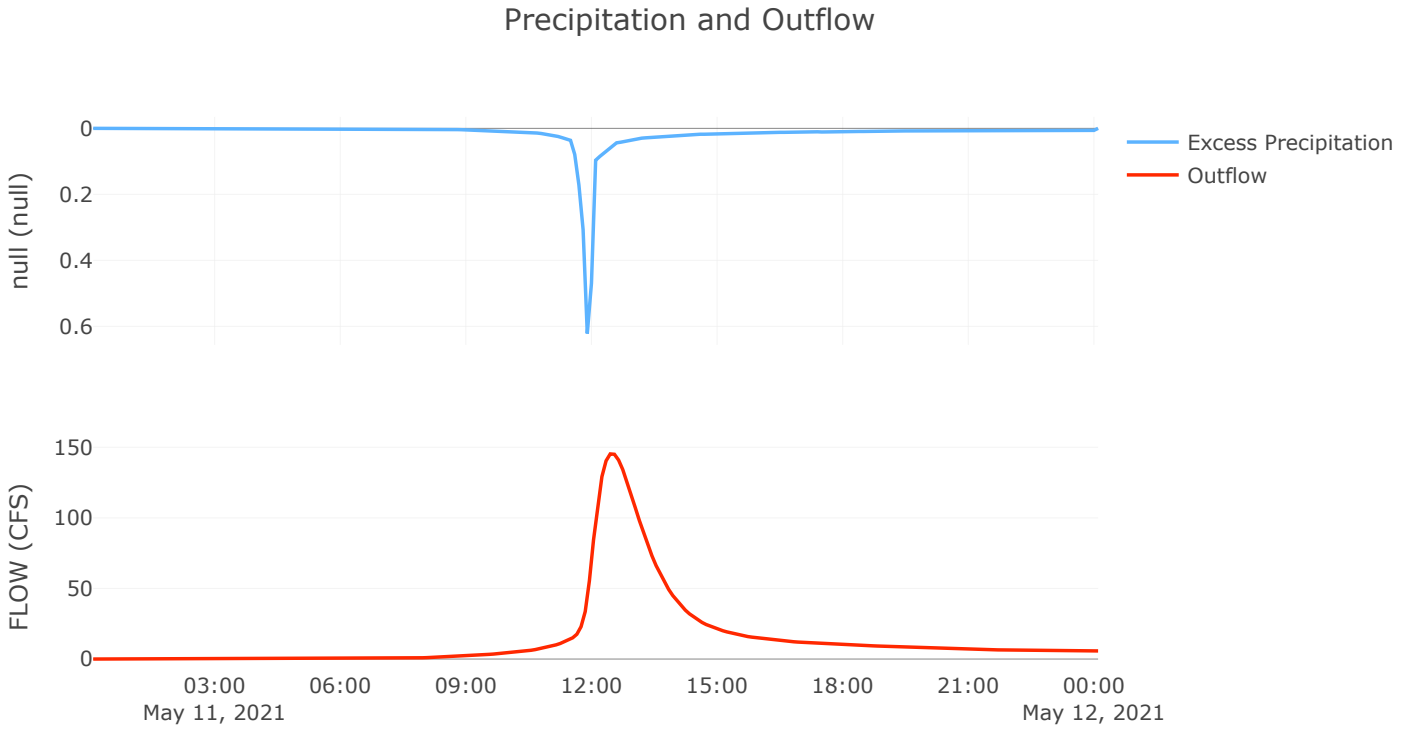
Subbasin: Offsite

Area (MI2) : 0.14
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	76.7
Initial Abstraction	0.51

Transform: Scs	
Lag	31
Unitgraph Type	Prf300

Results: Offsite	
Peak Discharge (CFS)	145.29
Time of Peak Discharge	11May2021, 12:24
Volume (IN)	3.79
Precipitation Volume (AC - FT)	48.19
Loss Volume (AC - FT)	19.06
Excess Volume (AC - FT)	29.13
Direct Runoff Volume (AC - FT)	28.75
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
FLOW (CFS)
150
100
50
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

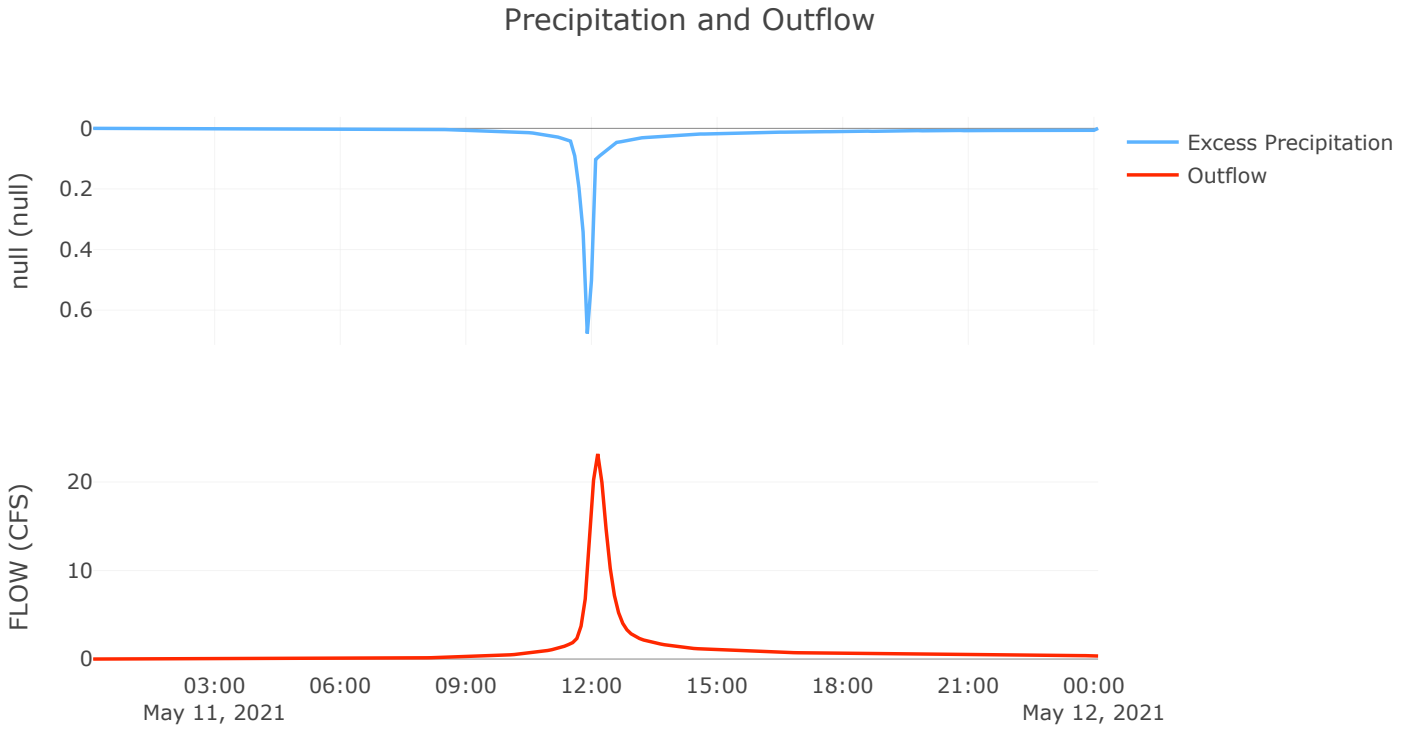
Subbasin: I-20 Western Area

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	80.73
Initial Abstraction	0.48

Transform: Scs	
Lag	12.59
Unitgraph Type	Prf450

Results: I-20 Western Area	
Peak Discharge (CFS)	23.17
Time of Peak Discharge	11May2021, 12:06
Volume (IN)	4.16
Precipitation Volume (AC - FT)	3.04
Loss Volume (AC - FT)	1.04
Excess Volume (AC - FT)	2
Direct Runoff Volume (AC - FT)	1.99
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
FLOW (CFS)
20
10
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

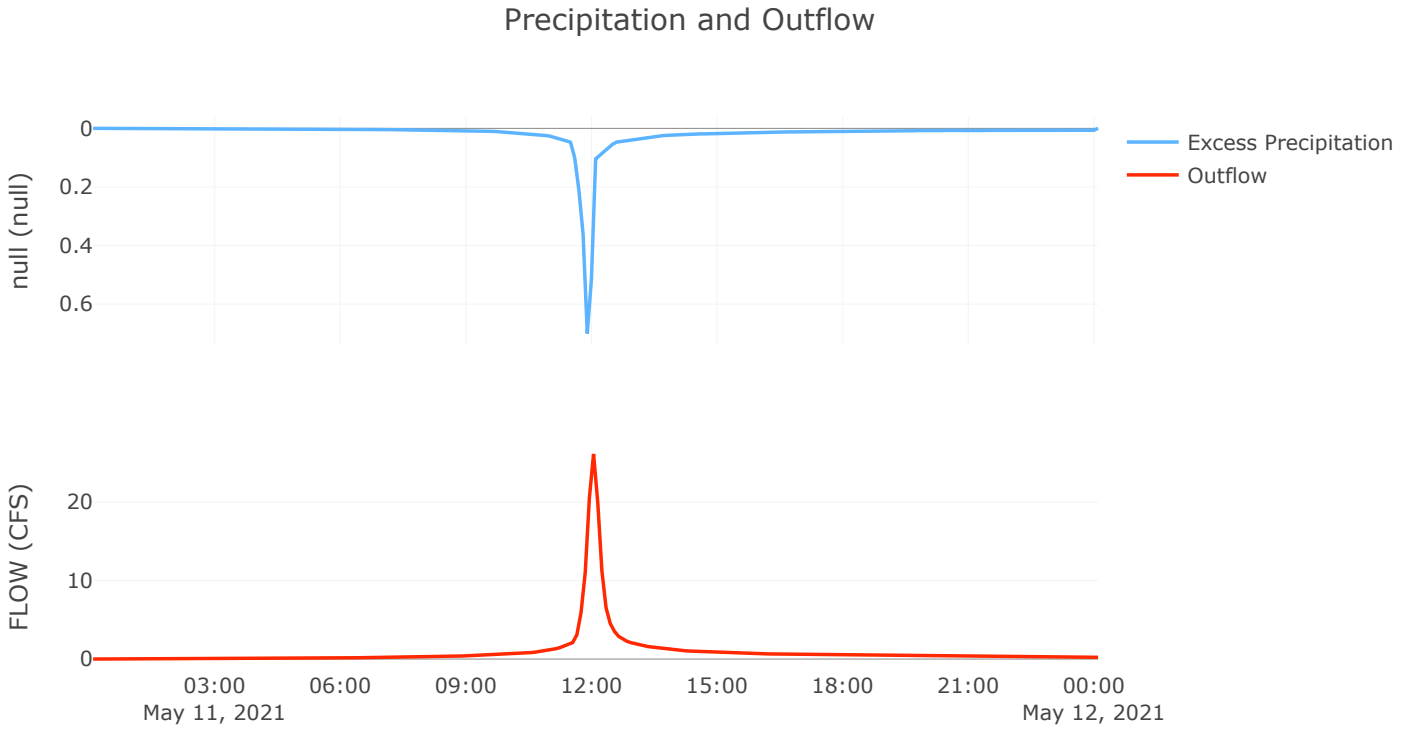
Subbasin: I-20 Eastern Area

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	80.43
Initial Abstraction	0.09

Transform: Scs	
Lag	6.64
Unitgraph Type	Prf450

Results: I-20 Eastern Area	
Peak Discharge (CFS)	26.16
Time of Peak Discharge	11May2021, 12:00
Volume (IN)	4.5
Precipitation Volume (AC - FT)	2.61
Loss Volume (AC - FT)	0.76
Excess Volume (AC - FT)	1.85
Direct Runoff Volume (AC - FT)	1.85
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
FLOW (CFS)
20
10
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

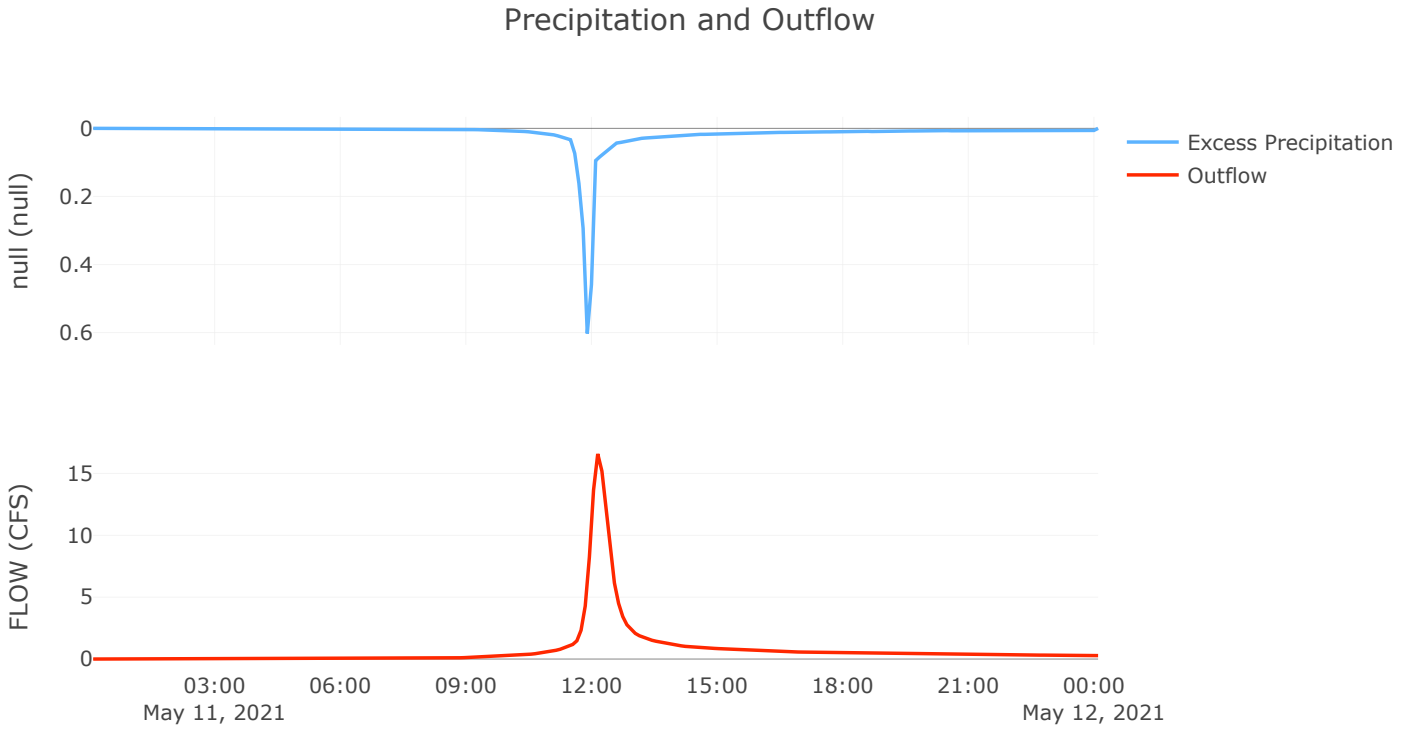
Subbasin: Basin Area

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	76.07
Initial Abstraction	0.63

Transform: Scs	
Lag	13.71
Unitgraph Type	Prf450

Results: Basin Area	
Peak Discharge (CFS)	16.58
Time of Peak Discharge	11May2021, 12:06
Volume (IN)	3.68
Precipitation Volume (AC - FT)	2.56
Loss Volume (AC - FT)	1.07
Excess Volume (AC - FT)	1.49
Direct Runoff Volume (AC - FT)	1.48
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
FLOW (CFS)
15
10
5
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

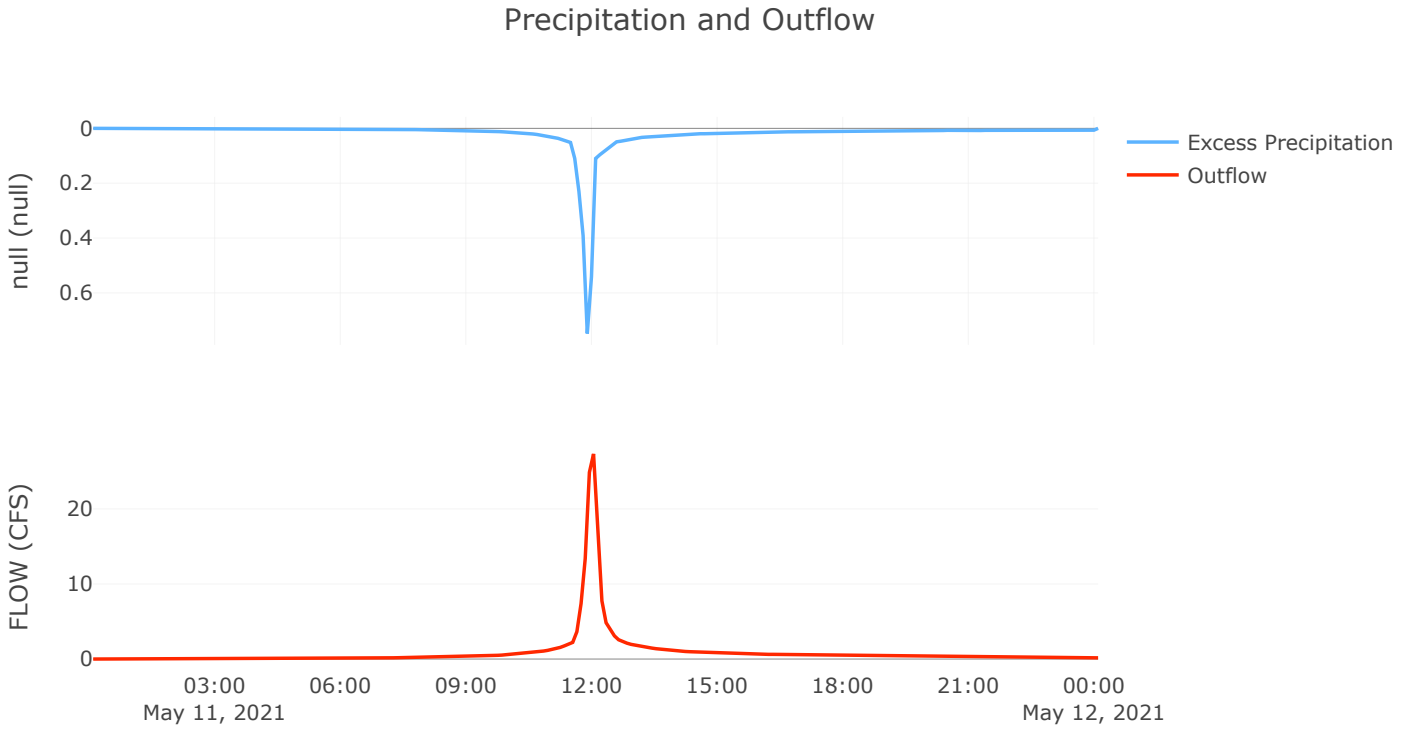
Subbasin: Hotel

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85.55
Initial Abstraction	0.34

Transform: Scs	
Lag	4.72
Unitgraph Type	Prf450

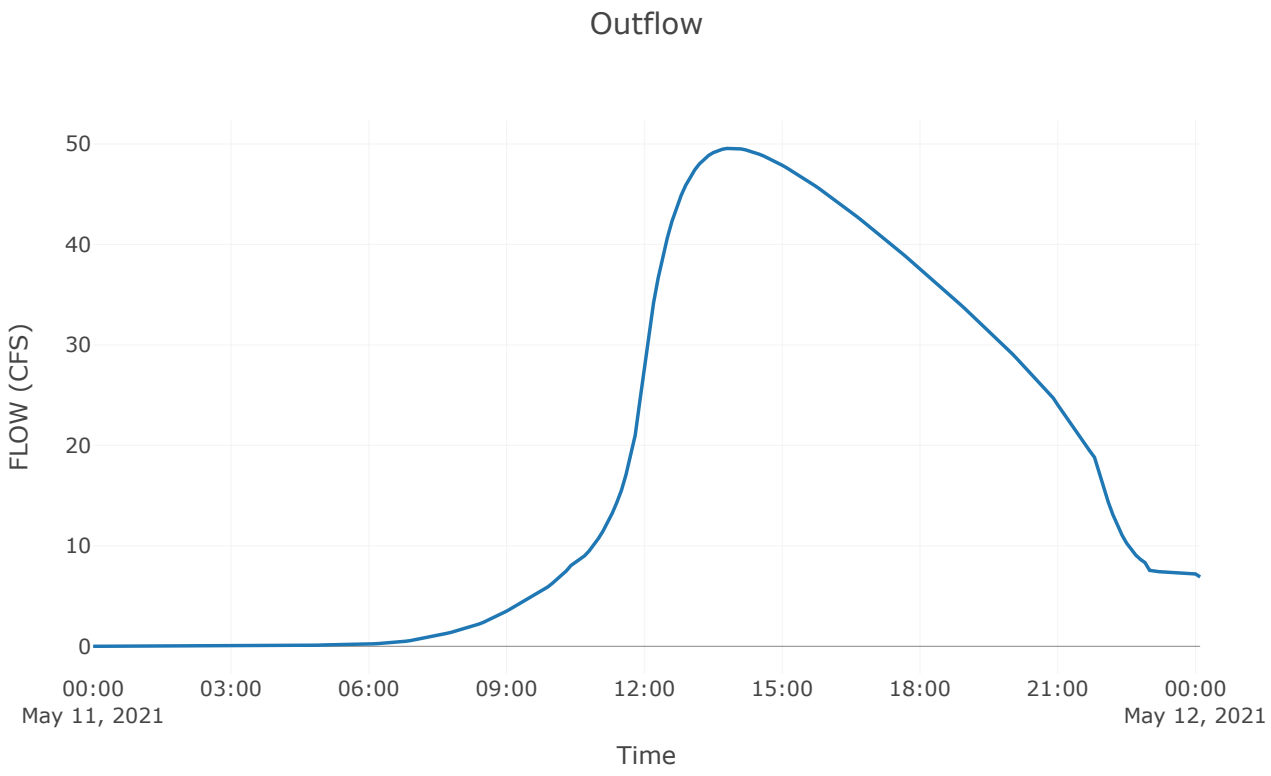
Results: Hotel	
Peak Discharge (CFS)	27.32
Time of Peak Discharge	11May2021, 12:00
Volume (IN)	4.69
Precipitation Volume (AC - FT)	2.42
Loss Volume (AC - FT)	0.63
Excess Volume (AC - FT)	1.79
Direct Runoff Volume (AC - FT)	1.79
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
FLOW (CFS)
20
10
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

Reservoir: RO-DB-21

Downstream : AP - 51.5

Results: RO-DB-21	
Peak Discharge (CFS)	49.59
Time of Peak Discharge	11May2021, 13:54
Volume (IN)	3.87
Peak Inflow (CFS)	186.37
Time of Peak Inflow	11May2021, 12:06
Inflow Volume (AC - FT)	35.87
Maximum Storage (AC - FT)	14.49
Peak Elevation (FT)	200.38
Discharge Volume (AC - FT)	35.85



Project: Ro Db 21
Simulation Run: PS 50 Year
Simulation Start: 10 May 2021, 24:00
Simulation End: 12 May 2021, 00:06

HMS Version: 4.10
Executed: 20 May 2026, 22:35

Global Parameter Summary - Subbasin

Area (MI2)

Element Name	Area (MI2)
Ex	0.17
Offsite	0.14
I - 20 Western Area	0.01
I - 20 Eastern Area	0.01
Basin Area	0.01
Hotel	0.01

Downstream

Element Name	Downstream
Ex	AP - 51.5_EX
Offsite	RO - DB - 21
I - 20 Western Area	RO - DB - 21
I - 20 Eastern Area	RO - DB - 21
Basin Area	RO - DB - 21
Hotel	RO - DB - 21

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number	Initial Abstraction
Ex	0	73.2	0.73
Offsite	0	76.7	0.51
I - 20 Western Area	0	80.73	0.48
I - 20 Eastern Area	0	80.43	0.09
Basin Area	0	76.07	0.63
Hotel	0	85.55	0.34

Transform: Scs

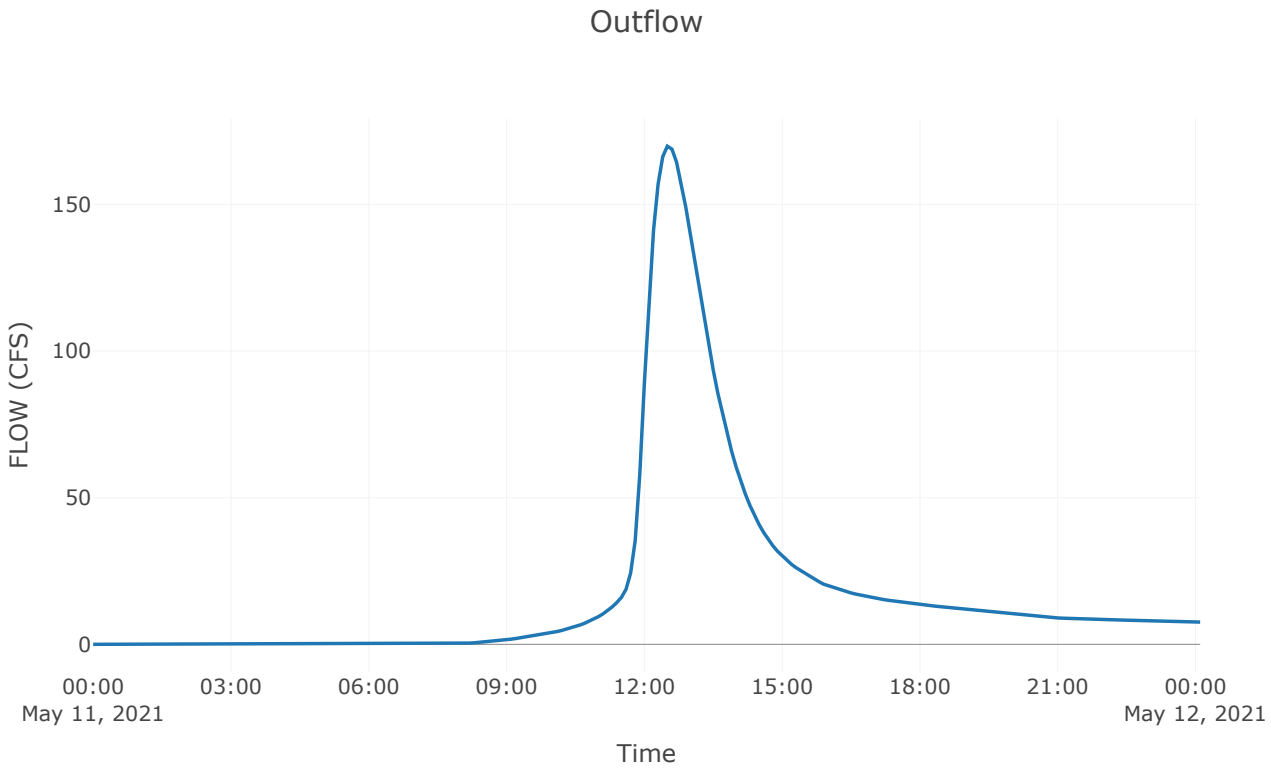
Element Name	Lag	Unitgraph Type
Ex	35	Prf300
Offsite	31	Prf300
I - 20 Western Area	12.59	Prf450
I - 20 Eastern Area	6.64	Prf450
Basin Area	13.71	Prf450
Hotel	4.72	Prf450

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
AP - 51.5_EX	0.17	169.85	11May2021, 12:30	4.13
AP - 51.5	0.17	54.32	11May2021, 14:00	4.68
Ex	0.17	169.85	11May2021, 12:30	4.13
Offsite	0.14	176.88	11May2021, 12:24	4.6
I - 20 Western Area	0.01	27.77	11May2021, 12:06	5.01
I - 20 Eastern Area	0.01	31.01	11May2021, 12:00	5.36
Basin Area	0.01	20.25	11May2021, 12:06	4.49
Hotel	0.01	32.1	11May2021, 12:00	5.57
RO - DB - 21	0.17	54.32	11May2021, 14:00	4.68

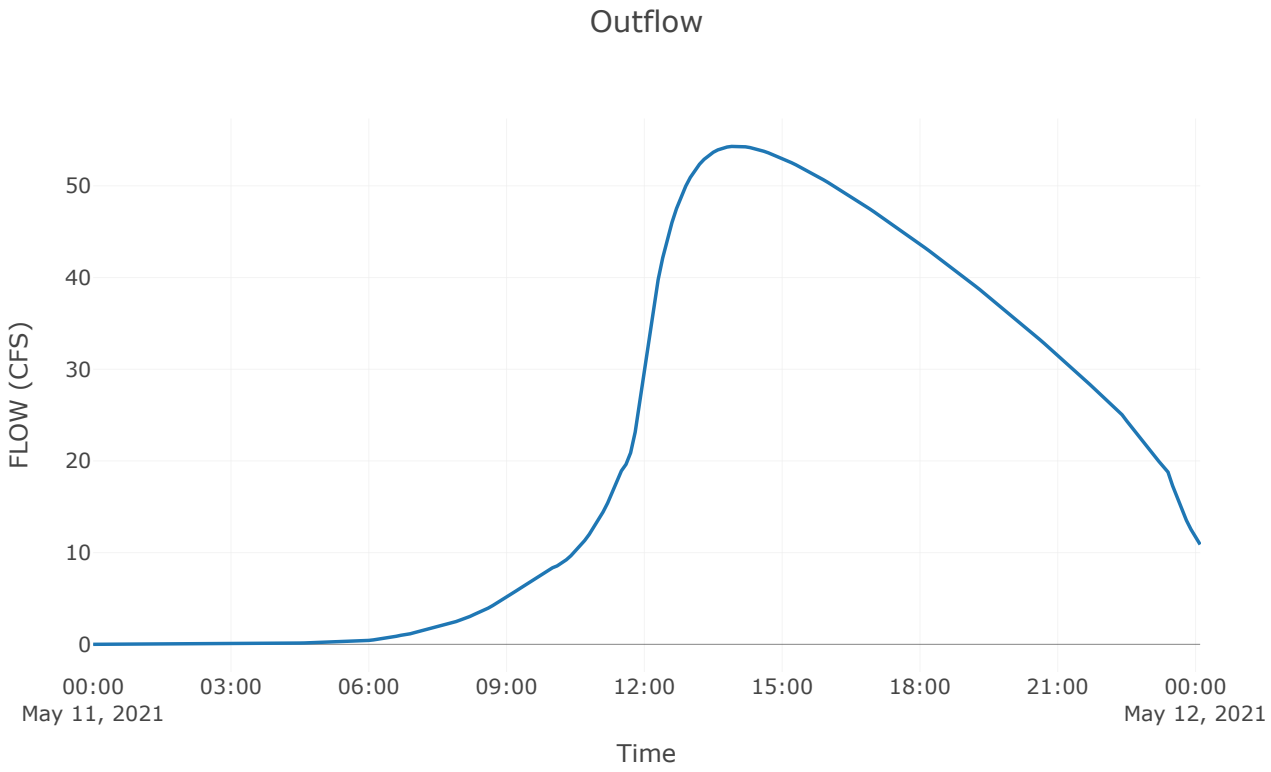
Junction: AP-51.5_EX

Results: AP-51.5_EX	
Peak Discharge (CFS)	169.85
Time of Peak Discharge	11May2021, 12:30
Volume (IN)	4.13



Junction: AP-51.5

Results: AP-51.5	
Peak Discharge (CFS)	54.32
Time of Peak Discharge	11May2021, 14:00
Volume (IN)	4.68



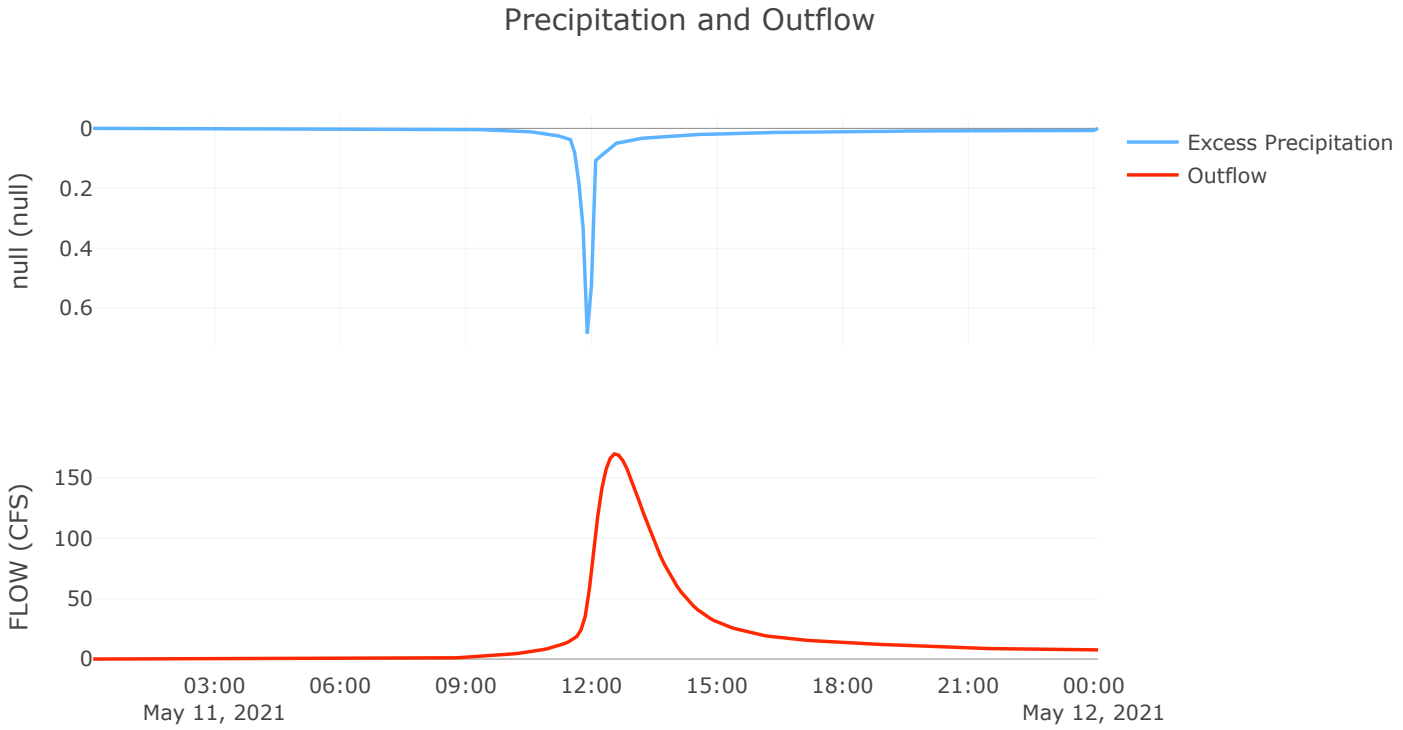
Subbasin: EX

Area (MI2) : 0.17
Downstream : AP - 51.5_EX

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	73.2
Initial Abstraction	0.73

Transform: Scs	
Lag	35
Unitgraph Type	Prf300

Results: EX	
Peak Discharge (CFS)	169.85
Time of Peak Discharge	11May2021, 12:30
Volume (IN)	4.13
Precipitation Volume (AC - FT)	63.99
Loss Volume (AC - FT)	27.11
Excess Volume (AC - FT)	36.88
Direct Runoff Volume (AC - FT)	36.32
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
FLOW (CFS)
150
100
50
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

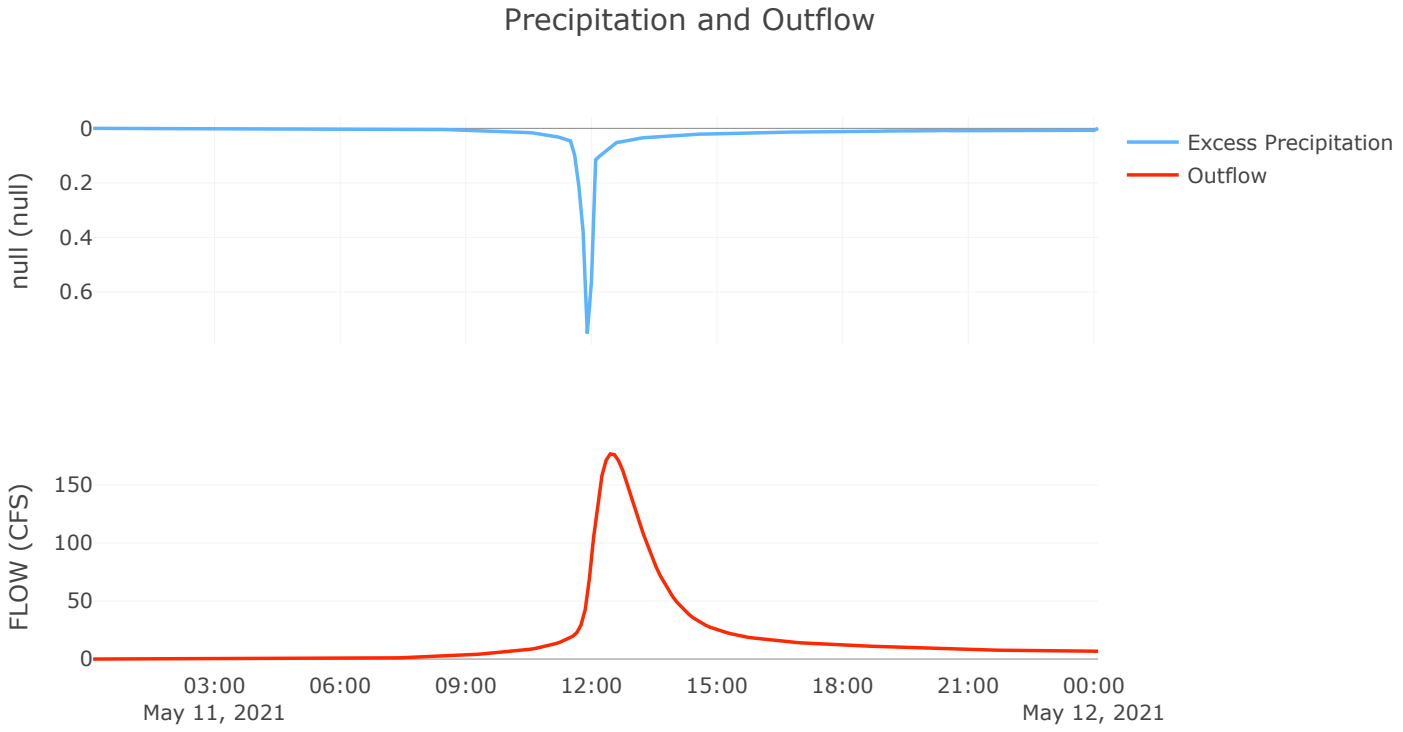
Subbasin: Offsite

Area (MI2) : 0.14
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	76.7
Initial Abstraction	0.51

Transform: Scs	
Lag	31
Unitgraph Type	Prf300

Results: Offsite	
Peak Discharge (CFS)	176.88
Time of Peak Discharge	11May2021, 12:24
Volume (IN)	4.6
Precipitation Volume (AC - FT)	55.17
Loss Volume (AC - FT)	19.8
Excess Volume (AC - FT)	35.37
Direct Runoff Volume (AC - FT)	34.93
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
Excess Precipitation
Outflow
FLOW (CFS)
150
100
50
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021

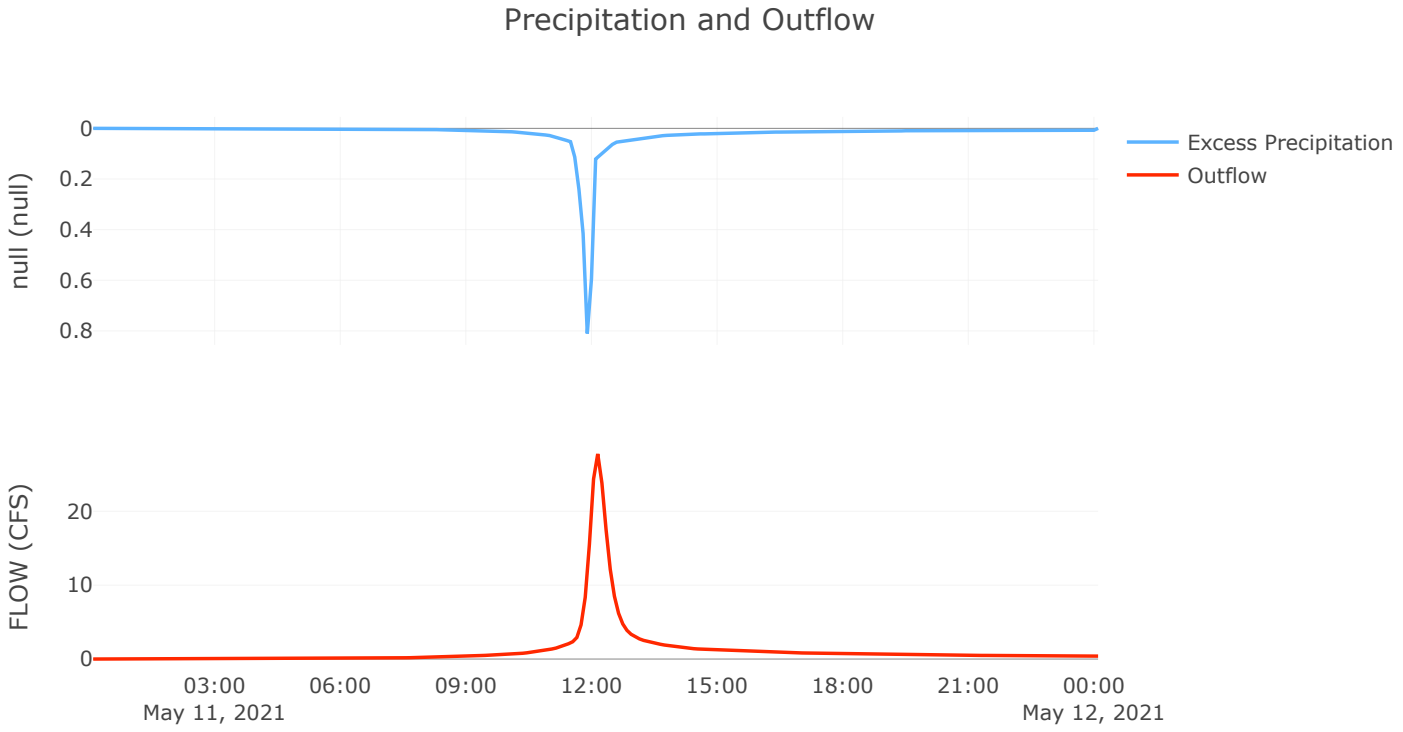
Subbasin: I-20 Western Area

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	80.73
Initial Abstraction	0.48

Transform: Scs	
Lag	12.59
Unitgraph Type	Prf450

Results: I-20 Western Area	
Peak Discharge (CFS)	27.77
Time of Peak Discharge	11May2021, 12:06
Volume (IN)	5.01
Precipitation Volume (AC - FT)	3.48
Loss Volume (AC - FT)	1.07
Excess Volume (AC - FT)	2.41
Direct Runoff Volume (AC - FT)	2.4
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
0.8
Excess Precipitation
Outflow
FLOW (CFS)
20
10
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021

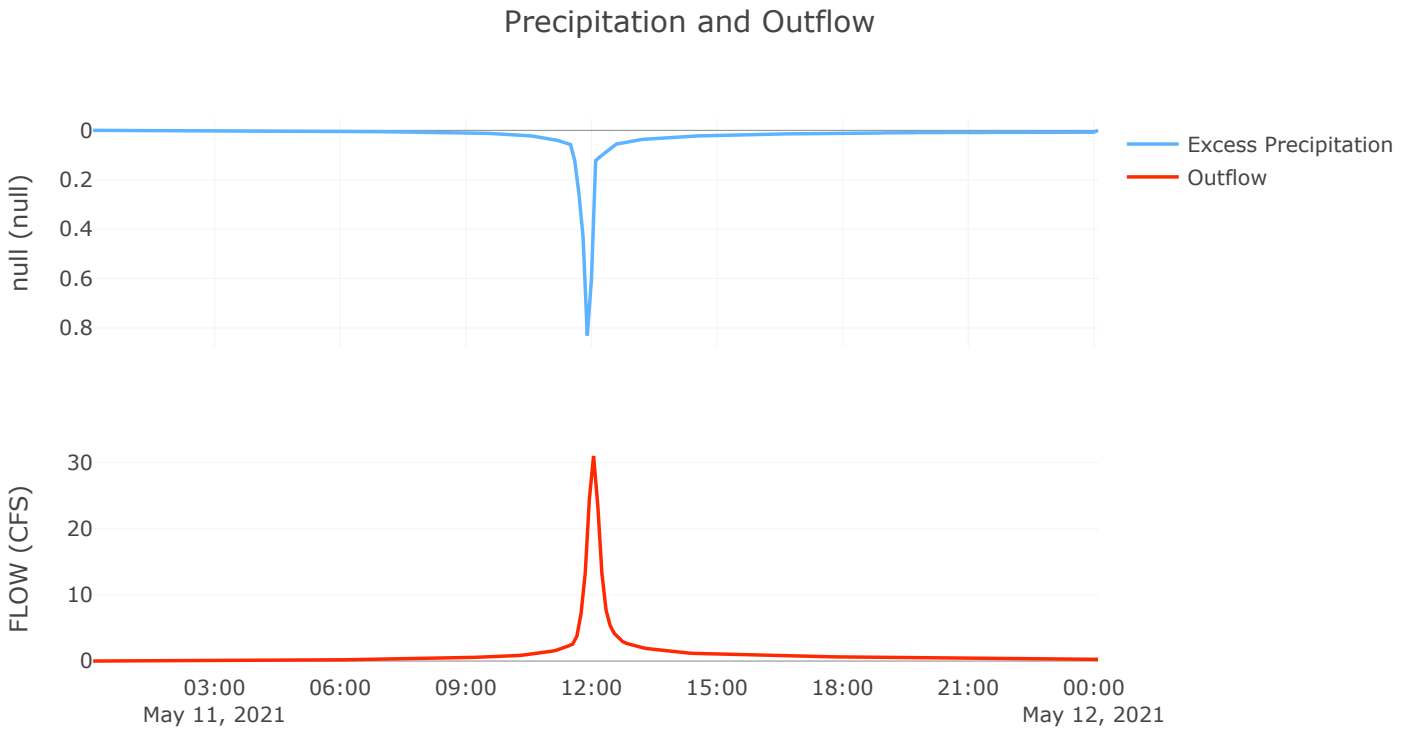
Subbasin: I-20 Eastern Area

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	80.43
Initial Abstraction	0.09

Transform: Scs	
Lag	6.64
Unitgraph Type	Prf450

Results: I-20 Eastern Area	
Peak Discharge (CFS)	31.01
Time of Peak Discharge	11May2021, 12:00
Volume (IN)	5.36
Precipitation Volume (AC - FT)	2.99
Loss Volume (AC - FT)	0.78
Excess Volume (AC - FT)	2.2
Direct Runoff Volume (AC - FT)	2.2
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
0.8
FLOW (CFS)
30
20
10
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

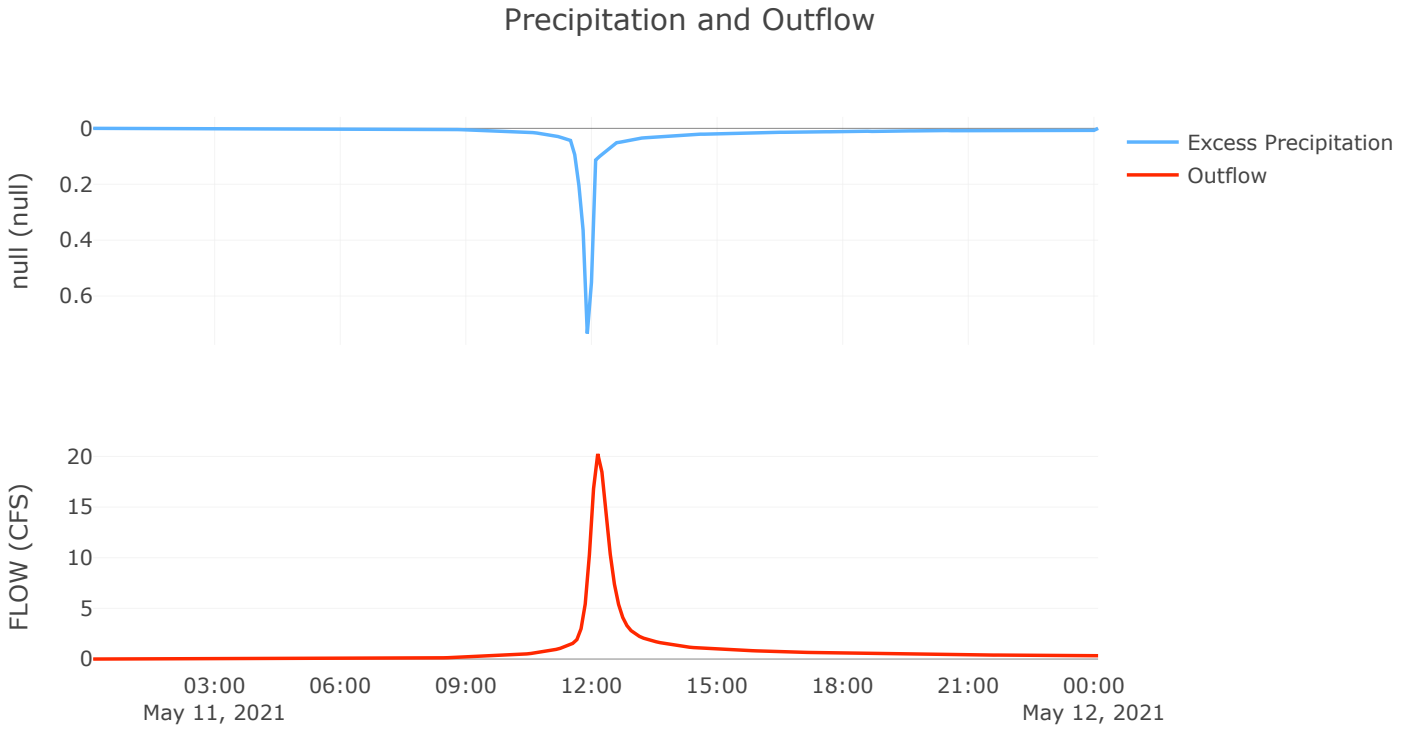
Subbasin: Basin Area

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	76.07
Initial Abstraction	0.63

Transform: Scs	
Lag	13.71
Unitgraph Type	Prf450

Results: Basin Area	
Peak Discharge (CFS)	20.25
Time of Peak Discharge	11May2021, 12:06
Volume (IN)	4.49
Precipitation Volume (AC - FT)	2.93
Loss Volume (AC - FT)	1.11
Excess Volume (AC - FT)	1.82
Direct Runoff Volume (AC - FT)	1.81
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
FLOW (CFS)
20
15
10
5
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

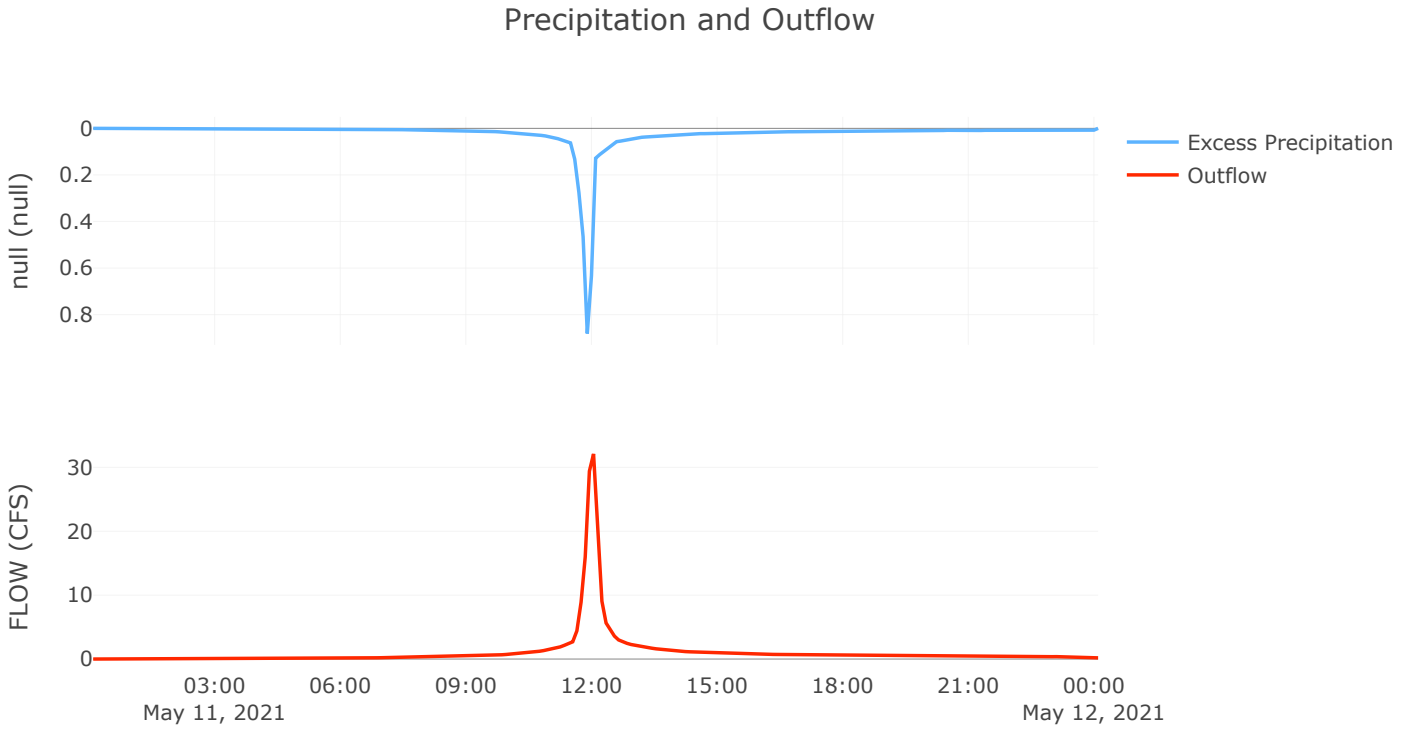
Subbasin: Hotel

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85.55
Initial Abstraction	0.34

Transform: Scs	
Lag	4.72
Unitgraph Type	Prf450

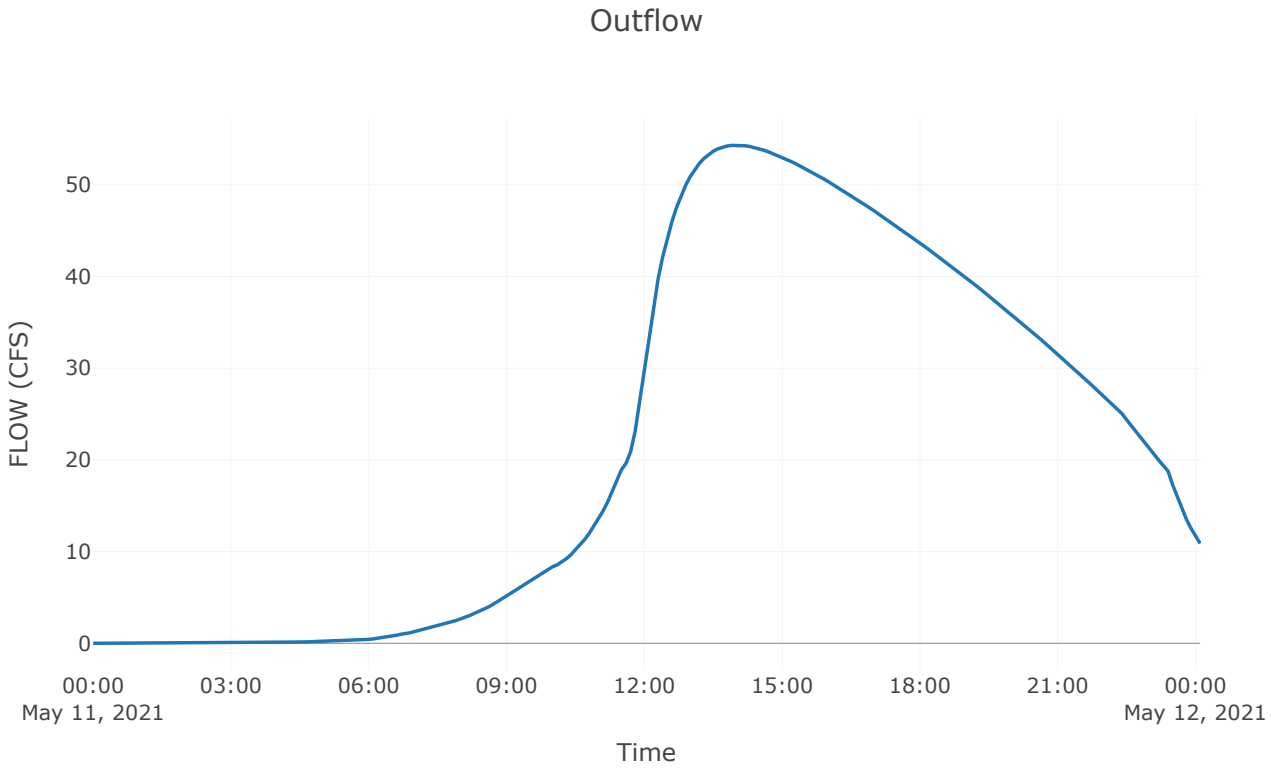
Results: Hotel	
Peak Discharge (CFS)	32.1
Time of Peak Discharge	11May2021, 12:00
Volume (IN)	5.57
Precipitation Volume (AC - FT)	2.77
Loss Volume (AC - FT)	0.65
Excess Volume (AC - FT)	2.13
Direct Runoff Volume (AC - FT)	2.12
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
0.8
FLOW (CFS)
30
20
10
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

Reservoir: RO-DB-21

Downstream : AP - 51.5

Results: RO-DB-21	
Peak Discharge (CFS)	54.32
Time of Peak Discharge	11May2021, 14:00
Volume (IN)	4.68
Peak Inflow (CFS)	226.23
Time of Peak Inflow	11May2021, 12:06
Inflow Volume (AC - FT)	43.46
Maximum Storage (AC - FT)	18.62
Peak Elevation (FT)	202.11
Discharge Volume (AC - FT)	43.36



Project: Ro Db 21
Simulation Run: PS 100 Year
Simulation Start: 10 May 2021, 24:00
Simulation End: 12 May 2021, 00:06

HMS Version: 4.10
Executed: 20 May 2026, 22:35

Global Parameter Summary - Subbasin

Area (MI2)

Element Name	Area (MI2)
Ex	0.17
Offsite	0.14
I - 20 Western Area	0.01
I - 20 Eastern Area	0.01
Basin Area	0.01
Hotel	0.01

Downstream

Element Name	Downstream
Ex	AP - 51.5_EX
Offsite	RO - DB - 21
I - 20 Western Area	RO - DB - 21
I - 20 Eastern Area	RO - DB - 21
Basin Area	RO - DB - 21
Hotel	RO - DB - 21

Loss Rate: Scs

Element Name	Percent Impervious Area	Curve Number	Initial Abstraction
Ex	0	73.2	0.73
Offsite	0	76.7	0.51
I - 20 Western Area	0	80.73	0.48
I - 20 Eastern Area	0	80.43	0.09
Basin Area	0	76.07	0.63
Hotel	0	85.55	0.34

Transform: Scs

Element Name	Lag	Unitgraph Type
Ex	35	Prf300
Offsite	31	Prf300
I - 20 Western Area	12.59	Prf450
I - 20 Eastern Area	6.64	Prf450
Basin Area	13.71	Prf450
Hotel	4.72	Prf450

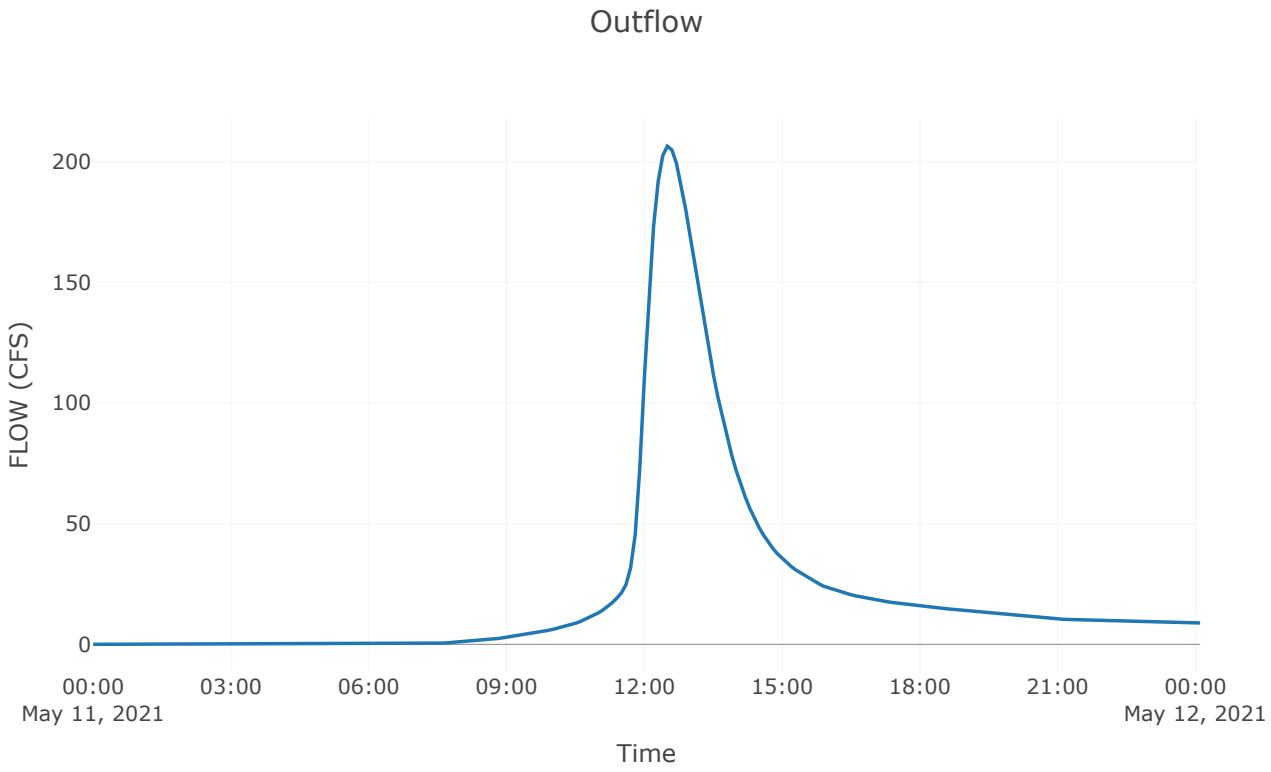
Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
AP - 51.5_EX	0.17	206.45	11May2021, 12:30	5
AP - 51.5	0.17	58.97	11May2021, 14:06	5.44
Ex	0.17	206.45	11May2021, 12:30	5
Offsite	0.14	211.69	11May2021, 12:24	5.51
I - 20 Western Area	0.01	32.77	11May2021, 12:06	5.95
I - 20 Eastern Area	0.01	36.31	11May2021, 12:00	6.3
Basin Area	0.01	24.27	11May2021, 12:06	5.39
Hotel	0.01	37.28	11May2021, 12:00	6.54
RO - DB - 21	0.17	58.97	11May2021, 14:06	5.44

Junction: AP-51.5_EX

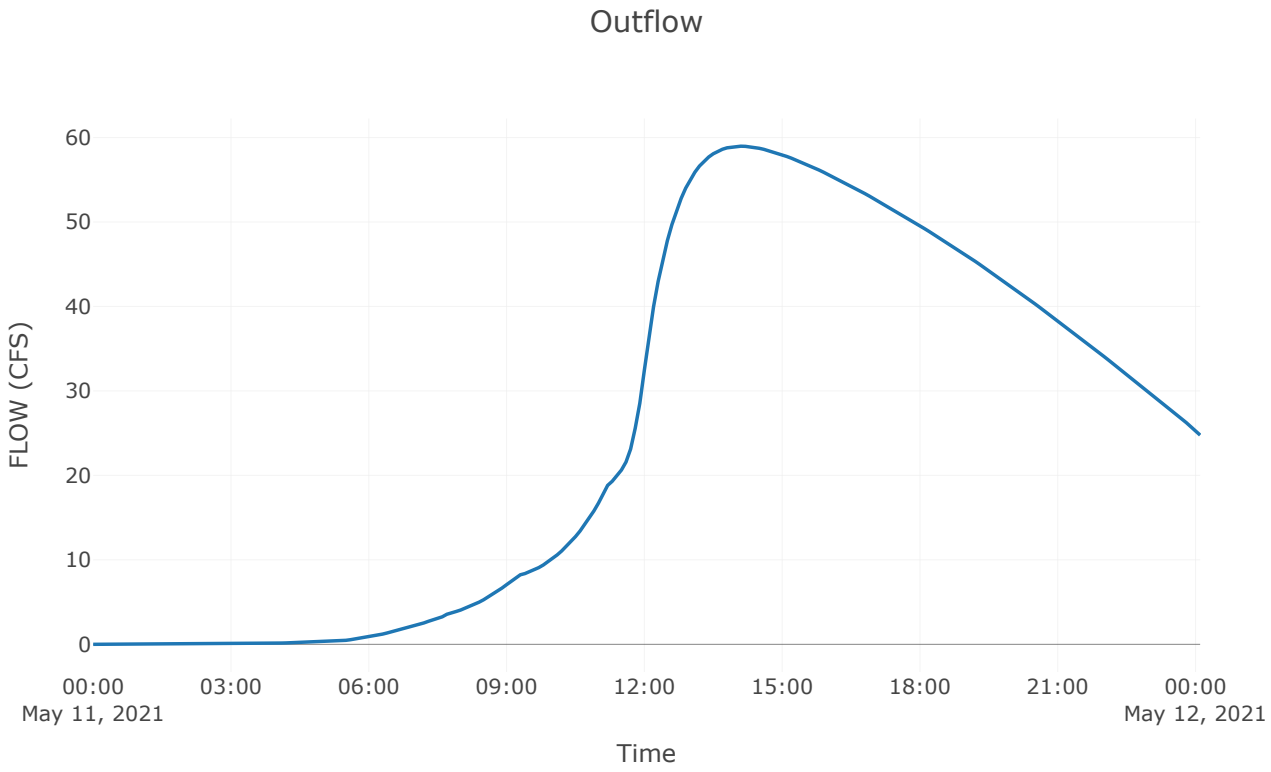
Results: AP-51.5_EX

Peak Discharge (CFS)	206.45
Time of Peak Discharge	11May2021, 12:30
Volume (IN)	5



Junction: AP-51.5

Results: AP-51.5	
Peak Discharge (CFS)	58.97
Time of Peak Discharge	11May2021, 14:06
Volume (IN)	5.44



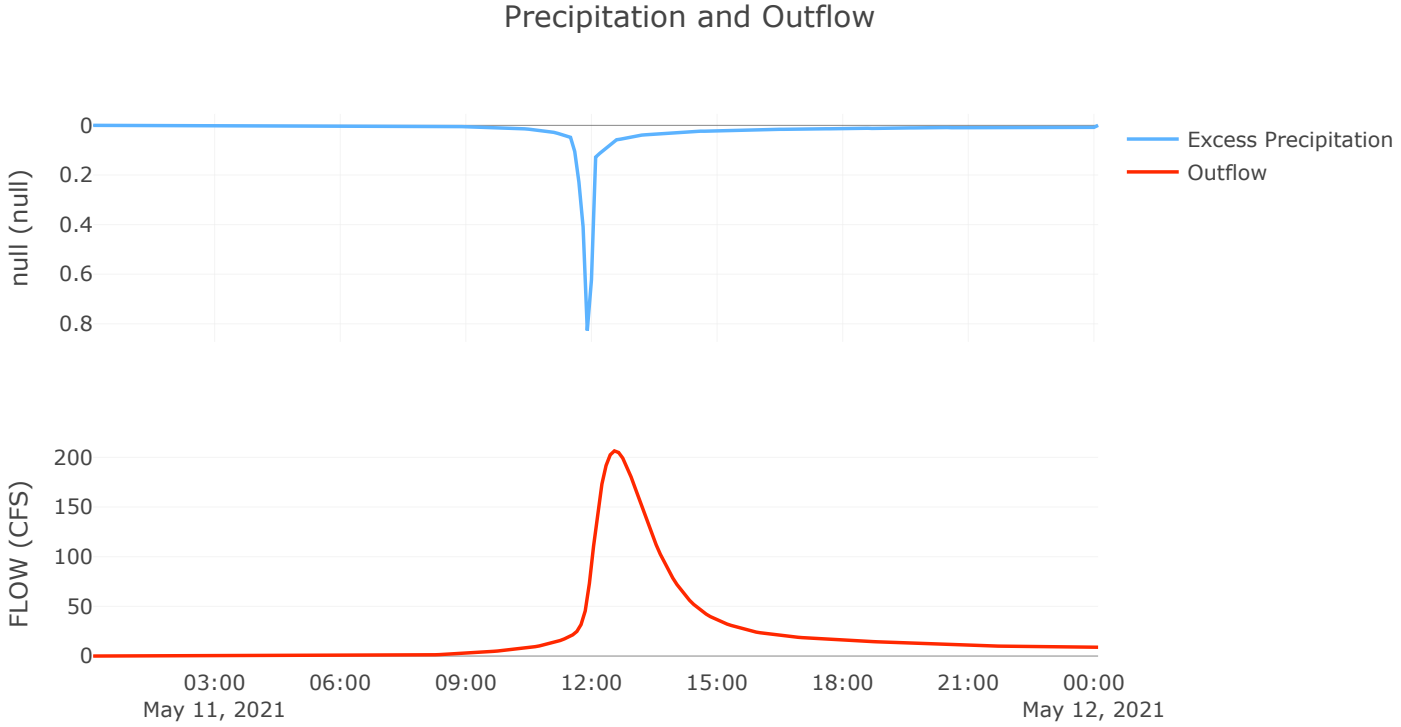
Subbasin: EX

Area (MI2) : 0.17
Downstream : AP - 51.5_EX

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	73.2
Initial Abstraction	0.73

Transform: Scs	
Lag	35
Unitgraph Type	Prf300

Results: EX	
Peak Discharge (CFS)	206.45
Time of Peak Discharge	11May2021, 12:30
Volume (IN)	5
Precipitation Volume (AC - FT)	72.8
Loss Volume (AC - FT)	28.14
Excess Volume (AC - FT)	44.65
Direct Runoff Volume (AC - FT)	43.99
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
0.8
FLOW (CFS)
200
150
100
50
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

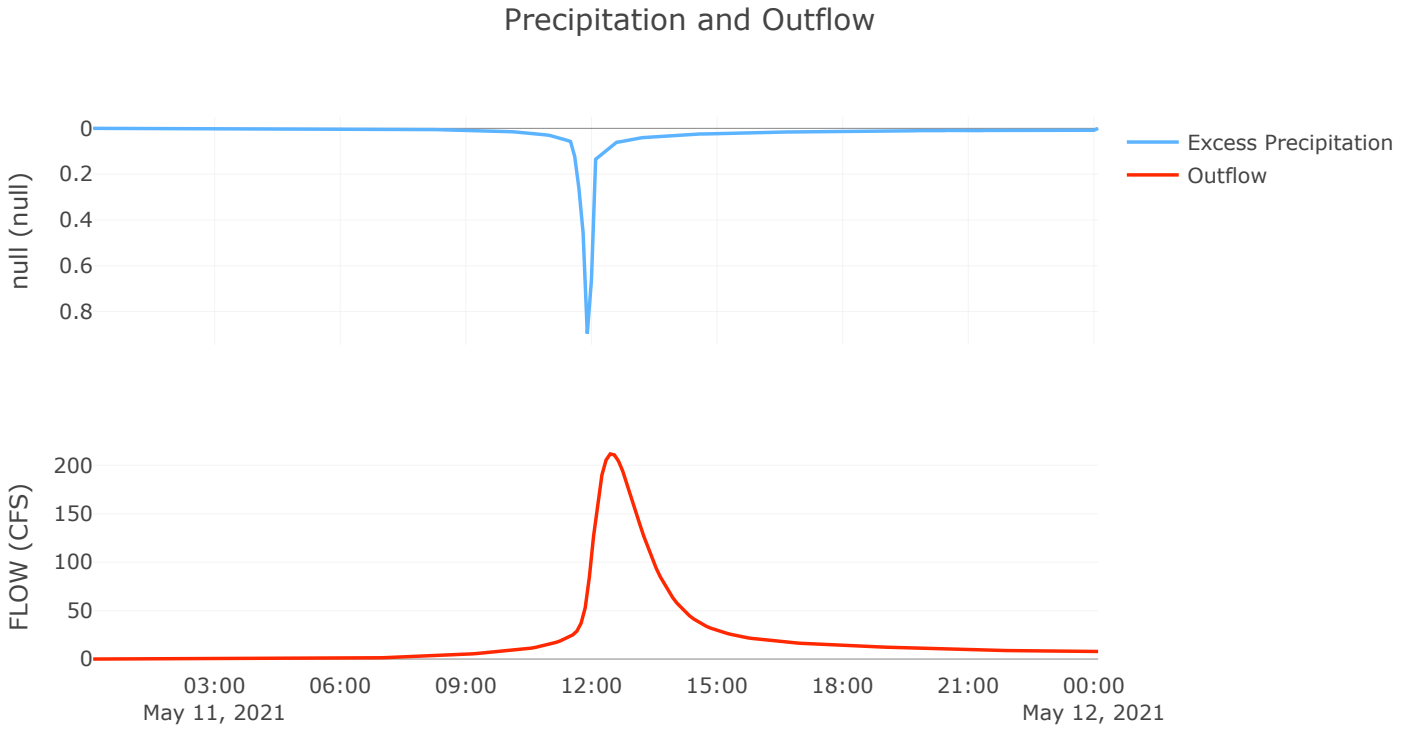
Subbasin: Offsite

Area (MI2) : 0.14
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	76.7
Initial Abstraction	0.51

Transform: Scs	
Lag	31
Unitgraph Type	Prf300

Results: Offsite	
Peak Discharge (CFS)	211.69
Time of Peak Discharge	11May2021, 12:24
Volume (IN)	5.51
Precipitation Volume (AC - FT)	62.76
Loss Volume (AC - FT)	20.47
Excess Volume (AC - FT)	42.3
Direct Runoff Volume (AC - FT)	41.78
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.2
0.4
0.6
0.8
FLOW (CFS)
200
150
100
50
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

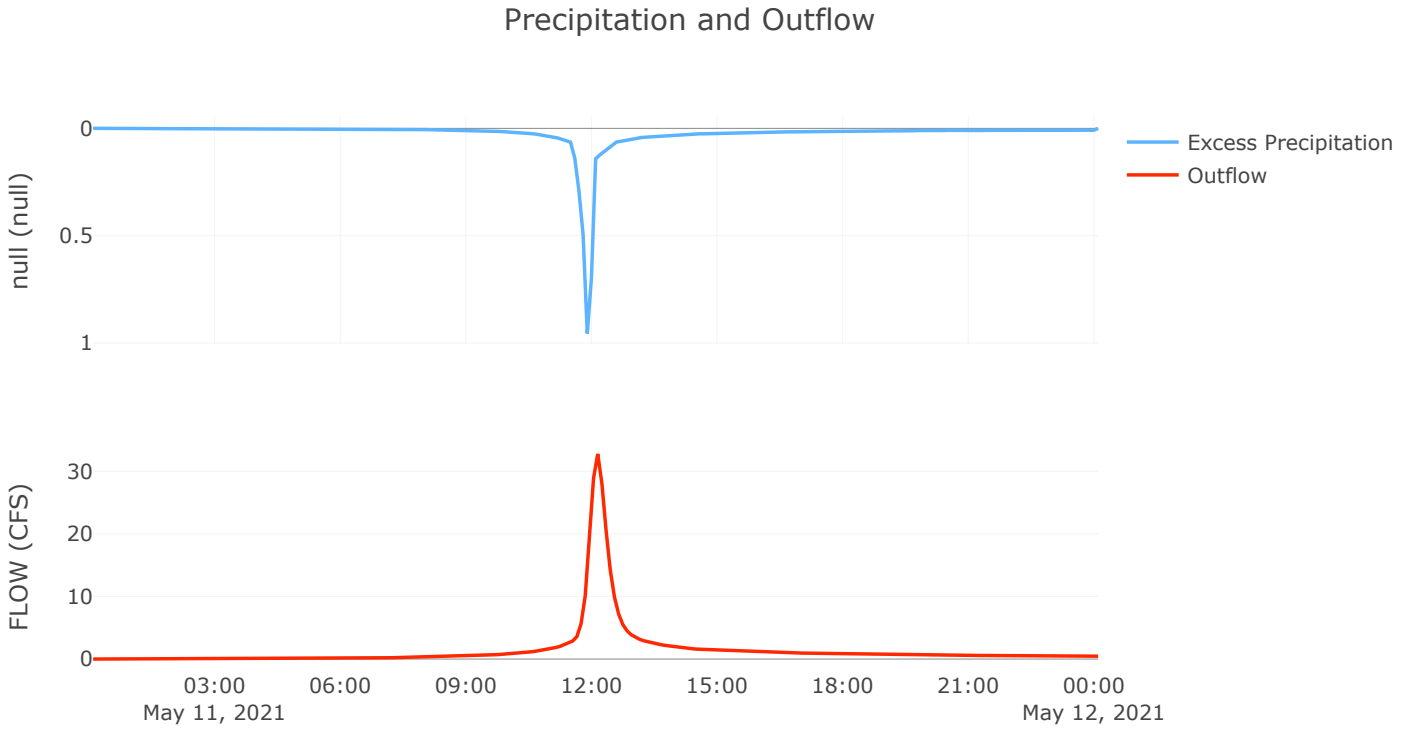
Subbasin: I-20 Western Area

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	80.73
Initial Abstraction	0.48

Transform: Scs	
Lag	12.59
Unitgraph Type	Prf450

Results: I-20 Western Area	
Peak Discharge (CFS)	32.77
Time of Peak Discharge	11May2021, 12:06
Volume (IN)	5.95
Precipitation Volume (AC - FT)	3.96
Loss Volume (AC - FT)	1.1
Excess Volume (AC - FT)	2.86
Direct Runoff Volume (AC - FT)	2.85
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.5
1
FLOW (CFS)
30
20
10
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

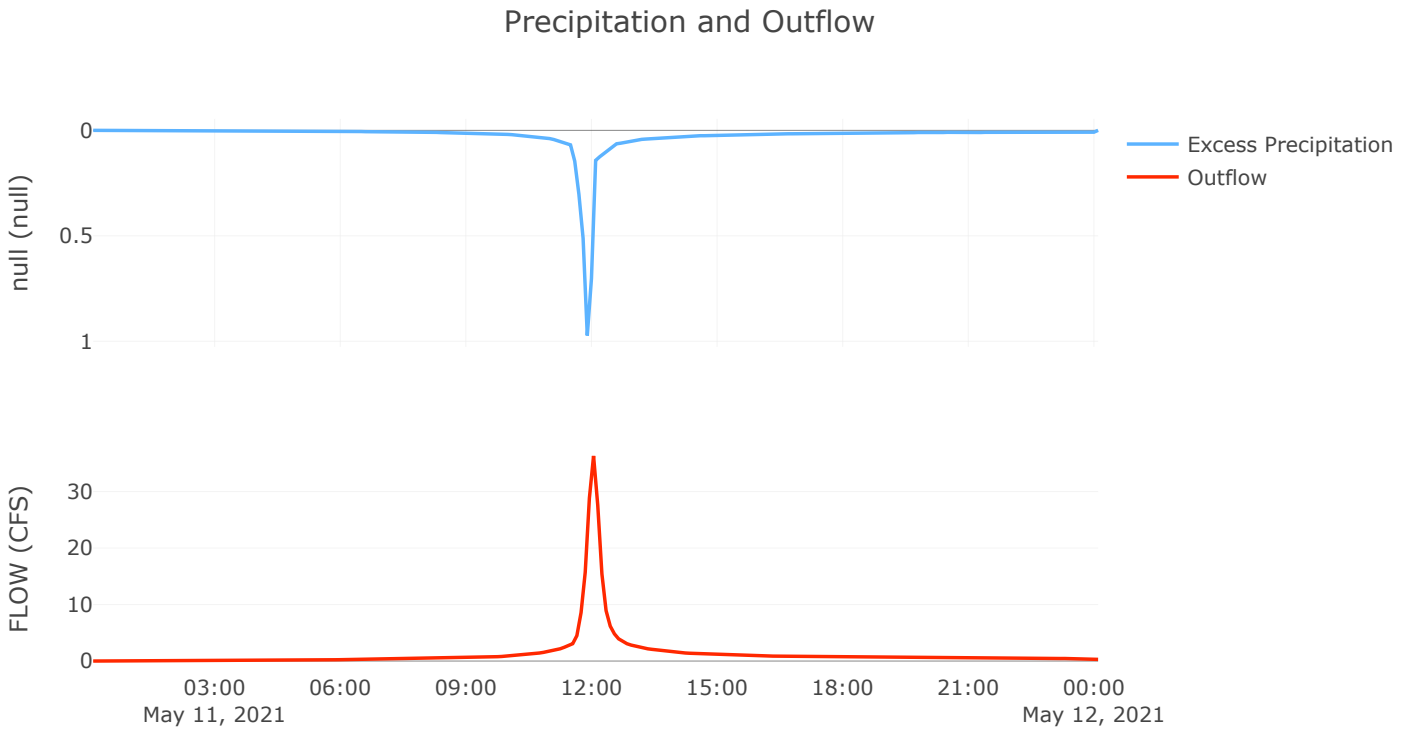
Subbasin: I-20 Eastern Area

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	80.43
Initial Abstraction	0.09

Transform: Scs	
Lag	6.64
Unitgraph Type	Prf450

Results: I-20 Eastern Area	
Peak Discharge (CFS)	36.31
Time of Peak Discharge	11May2021, 12:00
Volume (IN)	6.3
Precipitation Volume (AC - FT)	3.4
Loss Volume (AC - FT)	0.81
Excess Volume (AC - FT)	2.59
Direct Runoff Volume (AC - FT)	2.59
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
null (null)
0
0.5
1
FLOW (CFS)
30
20
10
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

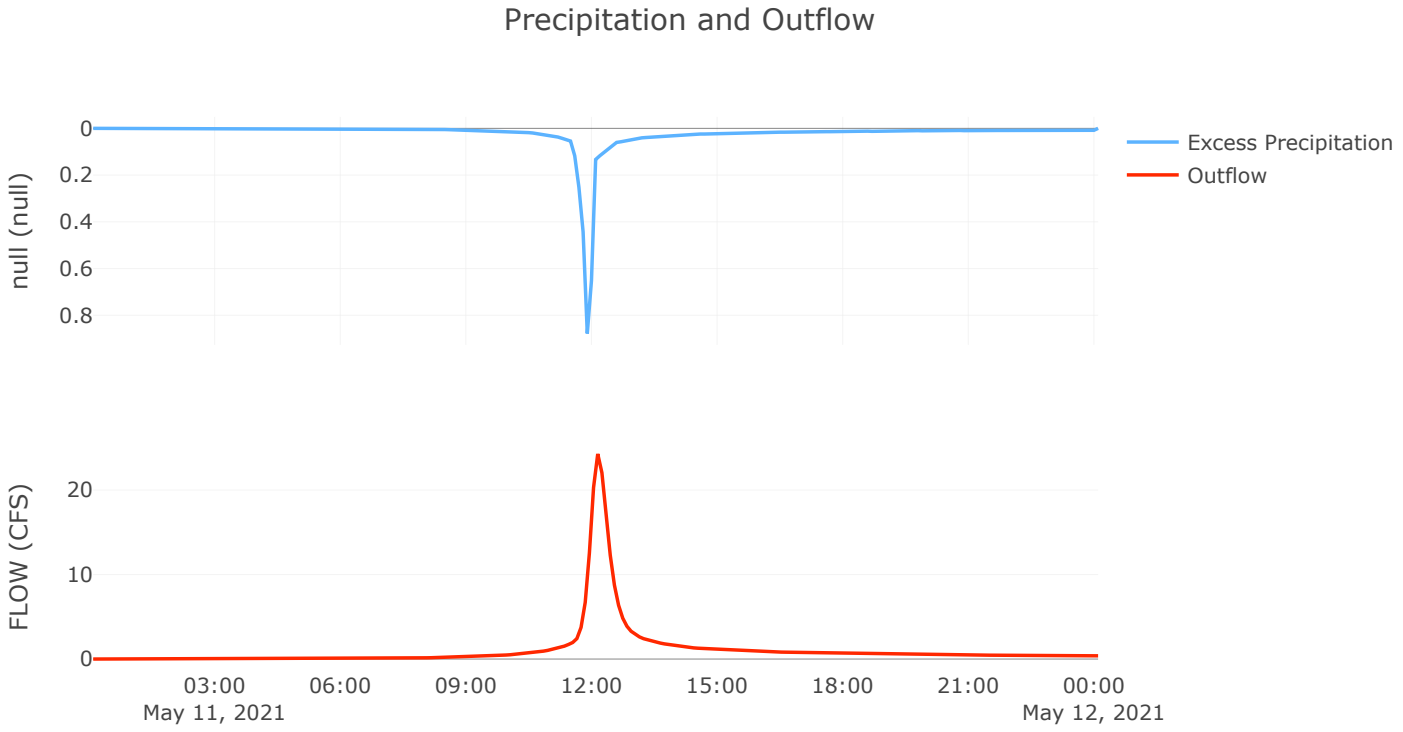
Subbasin: Basin Area

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	76.07
Initial Abstraction	0.63

Transform: Scs	
Lag	13.71
Unitgraph Type	Prf450

Results: Basin Area	
Peak Discharge (CFS)	24.27
Time of Peak Discharge	11May2021, 12:06
Volume (IN)	5.39
Precipitation Volume (AC - FT)	3.33
Loss Volume (AC - FT)	1.15
Excess Volume (AC - FT)	2.18
Direct Runoff Volume (AC - FT)	2.17
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
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0
0.2
0.4
0.6
0.8
FLOW (CFS)
20
10
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

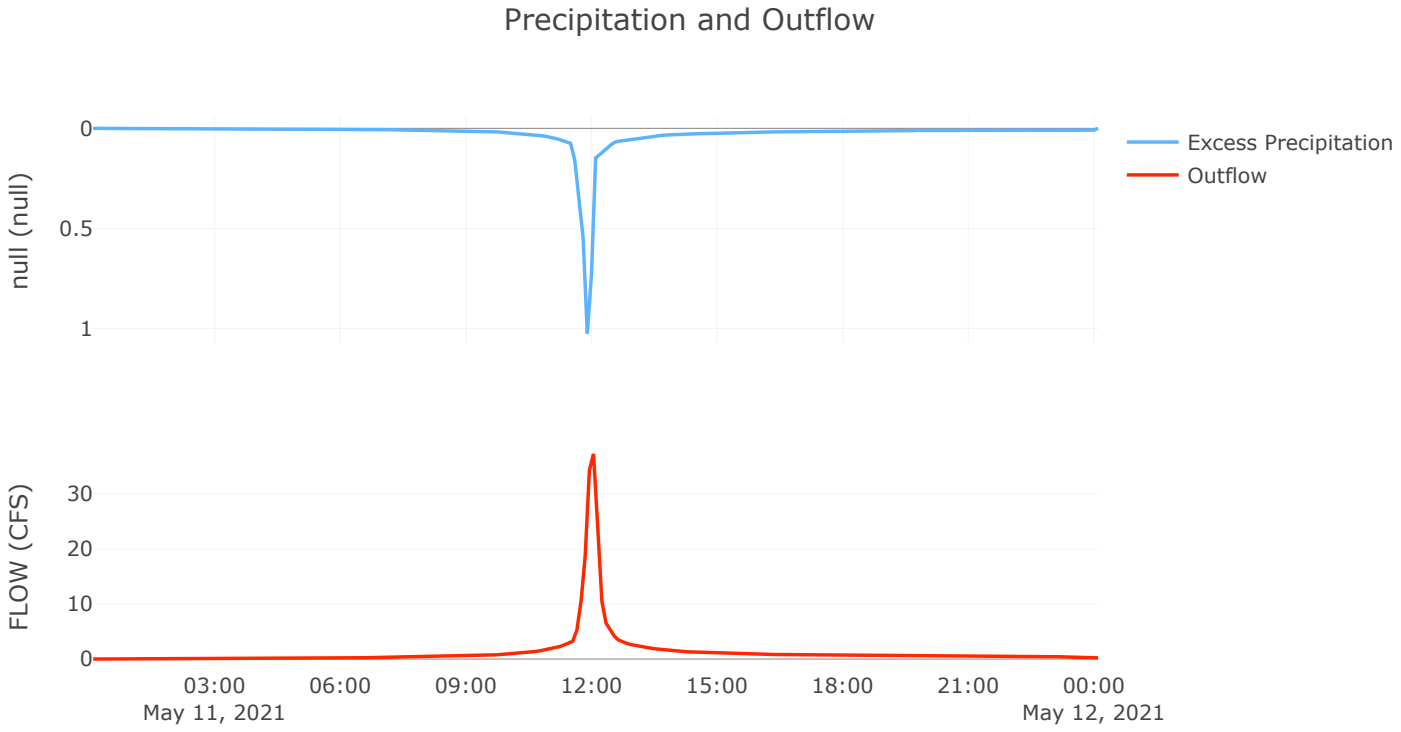
Subbasin: Hotel

Area (MI2) : 0.01
Downstream : RO - DB - 21

Loss Rate: Scs	
Percent Impervious Area	0
Curve Number	85.55
Initial Abstraction	0.34

Transform: Scs	
Lag	4.72
Unitgraph Type	Prf450

Results: Hotel	
Peak Discharge (CFS)	37.28
Time of Peak Discharge	11May2021, 12:00
Volume (IN)	6.54
Precipitation Volume (AC - FT)	3.15
Loss Volume (AC - FT)	0.66
Excess Volume (AC - FT)	2.49
Direct Runoff Volume (AC - FT)	2.49
Baseflow Volume (AC - FT)	0


Precipitation and Outflow
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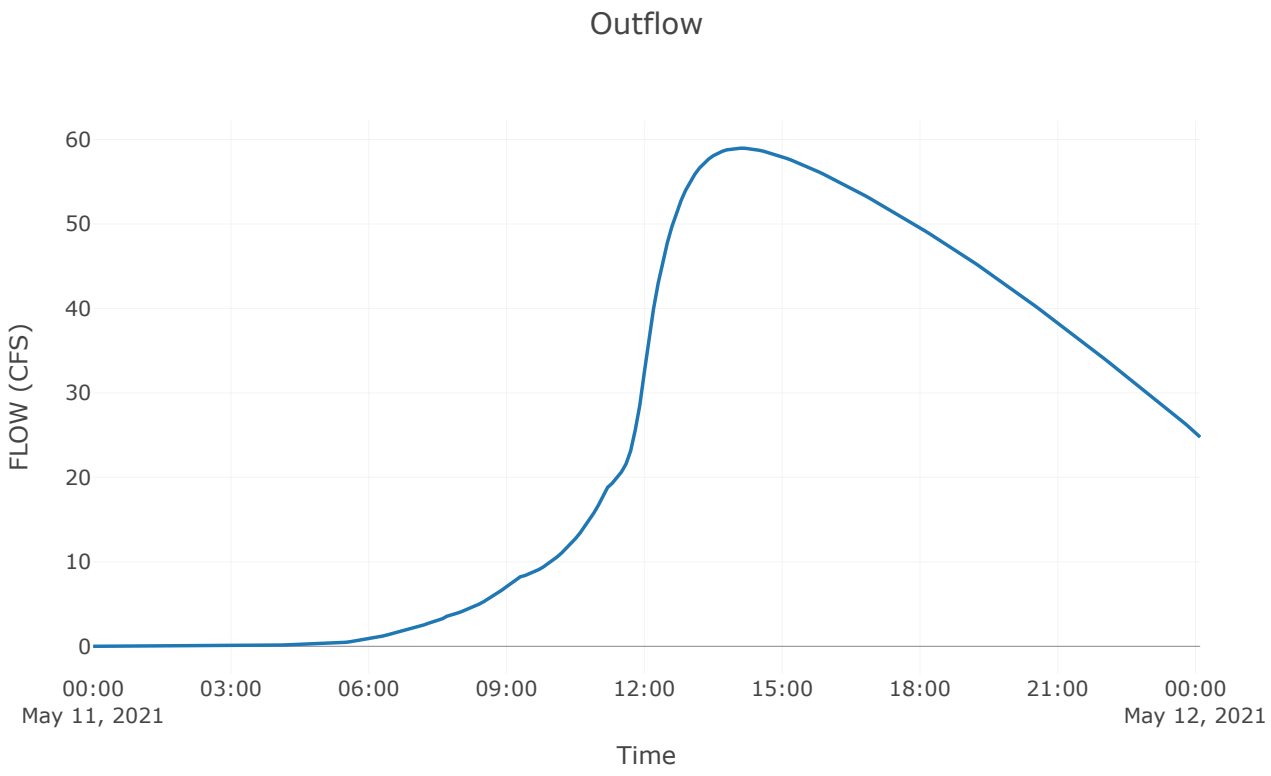
0
0.5
1
FLOW (CFS)
30
20
10
0
03:00
May 11, 2021
06:00
09:00
12:00
15:00
18:00
21:00
00:00
May 12, 2021
Excess Precipitation
Outflow

Reservoir: RO-DB-21

Downstream : AP - 51.5

Results: RO-DB-21	
Peak Discharge (CFS)	58.97
Time of Peak Discharge	11May2021, 14:06
Volume (IN)	5.44
Peak Inflow (CFS)	270.13
Time of Peak Inflow	11May2021, 12:06
Inflow Volume (AC - FT)	51.89
Maximum Storage (AC - FT)	23.36
Peak Elevation (FT)	203.96
Discharge Volume (AC - FT)	50.42



Crossing Discharge Data

Discharge Selection Method: User Defined

Table 1 - Summary of Culvert Flows at Crossing: RO-EP-2171

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10	43.30	43.30	191.96	4.182	3.951	7-H2t	-1.000	2.195	2.195	1.656	9.294	3.654
25	49.60	49.60	192.74	4.961	4.404	7-H2t	-1.000	2.295	2.295	1.790	10.348	3.802
50	54.30	54.30	193.40	5.615	4.782	7-H2t	-1.000	2.345	2.345	1.884	11.179	3.903
100	59.00	59.00	194.11	6.328	5.194	7-H2t	-1.000	2.382	2.382	1.975	12.082	3.997

Table 2 - Culvert Summary Table: RO-EP-2171

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	RO-EP-2171 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
191.96	10	43.30	43.30	0.00	1
192.74	25	49.60	49.60	0.00	1
193.40	50	54.30	54.30	0.00	1
194.11	100	59.00	59.00	0.00	1
195.20	Overtopping	65.61	65.61	0.00	Overtopping

****

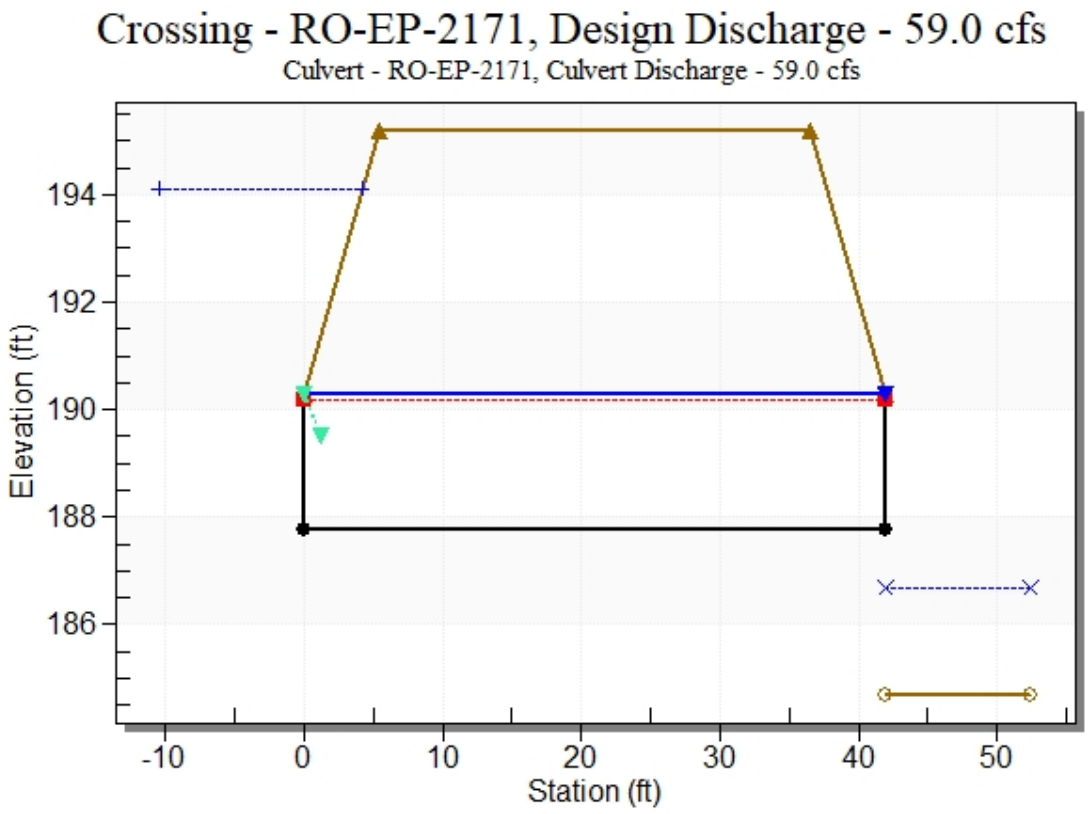
Straight Culvert

Inlet Elevation (invert): 187.78 ft, Outlet Elevation (invert): 187.78 ft

Culvert Length: 41.96 ft, Culvert Slope: 0.0000

****

Water Surface Profile Plot for Culvert: RO-EP-2171



Site Data - RO-EP-2171

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 187.78 ft

Outlet Station: 41.96 ft

Outlet Elevation: 187.78 ft

Number of Barrels: 1

Culvert Data Summary - RO-EP-2171

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0100

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: RO-EP-2171)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
43.30	186.36	1.66	3.65	4.13	0.56
49.60	186.49	1.79	3.80	4.47	0.56
54.30	186.58	1.88	3.90	4.70	0.56
59.00	186.67	1.97	4.00	4.93	0.56

Tailwater Channel Data - RO-EP-2171

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 5.50 ft

Side Slope (H:V): 1.00 (_:1)

Channel Slope: 0.0400

Channel Manning's n: 0.0900

Channel Invert Elevation: 184.70 ft

Roadway Data for Crossing: RO-EP-2171

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 110.00 ft

Crest Elevation: 195.20 ft

Roadway Surface: Paved

Roadway Top Width: 31.00 ft

L

Appendix L:

Bridge Deck Drainage Calculations

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

CCR_P3A_DRN Berryhill Road - West Bridge over Stoop Creek

Allowable Spread, T	6	ft
Manning's 'n'	0.016	
Rainfall Intensity, I (Tc = 5 min)	8.11	in/hr
Bridge Width, W	35	ft

Gutter Slope, S_w	N/A
Inlet Size , L	6" Scupper
Allowable Depth, d	Varies

Berryhill Road - West Bridge over Stoop Creek

Scupper Analysis (Lt.)

Location Station		Area A (ac)	Runoff Coefficient C_w	Rainfall Intensity i	Runoff Q (cfs)	Slope S	Cross Slope S_x	Bypass Flow Q_b (cfs)	Total Flow Q' (cfs)	Scupper Size D (ft)	Spread T (ft)	Flow Depth H (ft)	Weir Flow Q_{IN} (cfs)	Orifice Flow Q_{IN} (cfs)	Efficiency E	Flow Intercepted Q_i (cfs)	Bypass Flow Q_b (cfs)	Station
Drains to Bridge																		
	307+89															0		
-	307+90	Berryhill	0.001	0.90	8.11	0.01	0.0056	0.04	0.00	0.01	0.00	0.8	0.03	0.042	0.085	7.12	0.00	0.01	307.90
-	307+95	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.04	0.01	0.04	0.00	1.5	0.06	0.075	0.132	2.12	0.00	0.04	307.95
-	308+00	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.04	0.04	0.06	0.00	1.9	0.07	0.092	0.153	1.43	0.00	0.06	308.00
-	308+05	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.04	0.06	0.09	0.00	2.1	0.09	0.105	0.168	1.12	0.00	0.09	308.05
-	308+10	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.04	0.09	0.12	0.00	2.4	0.09	0.116	0.179	0.94	0.00	0.12	308.10
-	308+15	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.04	0.12	0.15	0.00	2.6	0.10	0.125	0.189	0.82	0.00	0.15	308.15
-	308+20	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.04	0.15	0.18	0.00	2.7	0.11	0.134	0.197	0.73	0.00	0.18	308.20
-	308+25	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.04	0.18	0.21	0.00	2.9	0.12	0.141	0.205	0.67	0.00	0.21	308.25
-	308+30	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.04	0.21	0.24	0.00	3.1	0.12	0.148	0.211	0.62	0.00	0.24	308.30
-	308+35	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.04	0.24	0.27	0.00	3.2	0.13	0.155	0.217	0.57	0.00	0.27	308.35
Scupper	308+40	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.038	0.27	0.30	0.50	3.4	0.13	0.158	0.220	0.53	0.16	0.14	308.40
-	308+45	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0356	0.14	0.17	0.00	2.9	0.10	0.125	0.189	0.73	0.00	0.17	308.45
-	308+50	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0331	0.17	0.20	0.00	3.2	0.11	0.129	0.193	0.65	0.00	0.20	308.50
Scupper	308+55	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0307	0.20	0.23	0.50	3.5	0.11	0.132	0.196	0.58	0.13	0.10	308.55
-	308+60	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0283	0.10	0.13	0.00	3.0	0.08	0.103	0.166	0.82	0.00	0.13	308.60
-	308+65	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0259	0.13	0.16	0.00	3.4	0.09	0.108	0.171	0.69	0.00	0.16	308.65
Scupper	308+70	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0235	0.16	0.19	0.50	3.9	0.09	0.111	0.174	0.60	0.11	0.07	308.70
-	308+75	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0211	0.07	0.10	0.00	3.3	0.07	0.087	0.147	0.84	0.00	0.10	308.75
Scupper	308+80	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0186	0.10	0.13	0.50	3.9	0.07	0.091	0.152	0.68	0.09	0.04	308.80
-	308+85	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0162	0.04	0.07	0.00	3.4	0.06	0.070	0.126	0.98	0.00	0.07	308.85
Scupper	308+90	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0138	0.07	0.10	0.50	4.3	0.06	0.074	0.132	0.74	0.07	0.03	308.90
-	308+95	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0114	0.03	0.06	0.00	3.9	0.04	0.057	0.109	1.03	0.00	0.06	308.95
-	309+00	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	0.06	0.09	0.00	4.9	0.05	0.063	0.117	0.74	0.00	0.09	309.00
-	309+05	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	0.09	0.11	0.00	5.5	0.05	0.070	0.126	0.61	0.00	0.11	309.05
Scupper	309+10	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	0.11	0.14	0.50	6.0	0.06	0.075	0.133	0.52	0.08	0.07	309.10
-	309+15	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	0.07	0.10	0.00	5.2	0.05	0.066	0.121	0.68	0.00	0.10	309.15
Scupper	309+20	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	0.10	0.13	0.50	5.7	0.06	0.072	0.129	0.57	0.07	0.05	309.20
-	309+25	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	0.05	0.08	0.00	4.9	0.05	0.063	0.117	0.75	0.00	0.08	309.25
-	309+30	Berryhill*	0.002	0.90	8.11	0.01	0.0056	0.01	0.08	0.10	0.00	5.2	0.05	0.066	0.121	0.67	0.00	0.10	309.30
Scupper	309+35	Berryhill*	0.002	0.90	8.11	0.01	0.0056	0.01	0.10	0.11	0.50	5.5	0.05	0.070	0.125	0.61	0.07	0.04	309.35
-	309+40	Berryhill*	0.002	0.90	8.11	0.01	0.0056	0.01	0.04	0.06	0.00	4.3	0.04	0.056	0.107	0.95	0.00	0.06	309.40
Scupper	309+45	Berryhill*	0.002	0.90	8.11	0.01	0.0056	0.0091	0.06	0.07	0.50	4.9	0.04	0.058	0.110	0.79	0.06	0.02	309.45

Rollover to RT side zero station = 309+63.74, see RT side calcs

* Half of bridge width

CCR_P3A_DRN Berryhill Road - West Bridge over Stoop Creek

Allowable Spread, T	6	ft
Manning's 'n'	0.016	
Rainfall Intensity, I (Tc = 5 min)	8.11	in/hr
Bridge Width, W	35	ft

Gutter Slope, S_w	N/A
Inlet Size , L	6" Scupper
Allowable Depth, d	Varies

Berryhill Road - West Bridge over Stoop Creek

Scupper Analysis (Rt.)

Location	Station		Area A (ac)	Runoff Coefficient C_w	Rainfall Intensity i	Runoff Q (cfs)	Slope S	Cross Slope S_x	Bypass Flow Q_b (cfs)	Total Flow Q' (cfs)	Scupper Size D (ft)	Spread T (ft)	Flow Depth H (ft)	Weir Flow Q_{IN} (cfs)	Orifice Flow Q_{IN} (cfs)	Efficiency E	Flow Intercepted Q_i (cfs)	Bypass Flow Q_b (cfs)	Station
Zero Slope RT side 309+18.56																			
	309+39																0		
Scupper	309+40	Berryhill*	0.000	0.90	8.11	0.00	0.0056	0.01	0.00	0.00	0.50	1.4	0.01	0.022	0.051	7.61	0.02	-0.02	309.40
-	309+45	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	-0.02	0.01	0.00	2.2	0.02	0.032	0.069	3.23	0.00	0.01	309.45
Scupper	309+50	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	0.01	0.04	0.50	3.7	0.04	0.049	0.097	1.25	0.05	-0.01	309.50
-	309+55	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	-0.01	0.02	0.00	2.8	0.03	0.039	0.082	2.02	0.00	0.02	309.55
-	309+60	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	0.02	0.05	0.00	4.0	0.04	0.053	0.102	1.08	0.00	0.05	309.60
-	309+65	Berryhill**	0.004	0.90	8.11	0.03	0.0056	0.01	0.06	0.09	0.00	5.1	0.05	0.065	0.119	0.70	0.00	0.09	309.65
Scupper	309+70	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	0.09	0.12	0.50	5.6	0.06	0.071	0.128	0.58	0.07	0.05	309.70
-	309+75	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	0.05	0.08	0.00	4.8	0.05	0.062	0.115	0.77	0.00	0.08	309.75
-	309+80	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.01	0.08	0.11	0.00	5.4	0.05	0.069	0.124	0.63	0.00	0.11	309.80
Scupper	309+85	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0103	0.11	0.14	0.50	5.8	0.06	0.075	0.133	0.54	0.08	0.06	309.85
-	309+90	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0127	0.06	0.09	0.00	4.4	0.06	0.071	0.127	0.76	0.00	0.09	309.90
-	309+95	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0151	0.09	0.12	0.00	4.4	0.07	0.082	0.141	0.67	0.00	0.12	309.95
Scupper	310+00	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0175	0.12	0.15	0.50	4.3	0.08	0.093	0.154	0.61	0.09	0.06	310.00
-	310+05	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0199	0.06	0.09	0.00	3.2	0.06	0.081	0.139	0.91	0.00	0.09	310.05
-	310+10	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0224	0.09	0.12	0.00	3.4	0.08	0.093	0.154	0.79	0.00	0.12	310.10
End Bridge	310+15	Berryhill	0.004	0.90	8.11	0.03	0.0056	0.0248	0.12	0.15	0.00	3.4	0.08	0.104	0.167	0.71	0.00	0.15	310.15
Flume	310+55	Berryhill	0.032	0.90	8.11	0.23	0.0132	0.04	0.15	0.81									

* Half of bridge width

** Includes bypass from Left side rollover

Curb Opening =	4.0	ft
L_t (Length required to accept 100% of gutter flow) =	12.37	ft
Efficiency =	0.50	
Flow Intercepted =	0.41	cfs
Bypass Flow =	0.40	cfs

CCR_P3A_DRN Berryhill Road - East Bridge over Stoop Creek

Allowable Spread, T	6	ft
Manning's 'n'	0.016	
Rainfall Intensity, I (Tc = 5 min)	8.11	in/hr
Bridge Width, W	35	ft

Gutter Slope, S_w	N/A
Inlet Size , L	6" Scupper
Allowable Depth, d	Varies

Berryhill Road - East Bridge over Stoop Creek

Scupper Analysis (Rt.)

Location	Station		Area A (ac)	Runoff Coefficient C_w	Rainfall Intensity i	Runoff Q (cfs)	Slope S	Cross Slope S_x	Bypass Flow Q_b (cfs)	Total Flow Q' (cfs)	Scupper Size D (ft)	Spread T (ft)	Flow Depth H (ft)	Weir Flow Q_{IN} (cfs)	Orifice Flow Q_{IN} (cfs)	Efficiency E	Flow Intercepted Q_i (cfs)	Bypass Flow Q_b (cfs)	Station
Drains to Bridge																			
	305+55																0		
-	343+20	Berryhill	0.001	0.90	8.11	0.01	0.0030	0.02	0.00	0.01	0.00	1.3	0.03	0.018	0.072	3.01	0.00	0.01	343.20
Scupper	343+15	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.01	0.04	0.50	2.6	0.05	0.038	0.114	1.09	0.04	0.00	343.15
-	343+10	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.00	0.03	0.00	2.3	0.05	0.034	0.105	1.29	0.00	0.03	343.10
-	343+05	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.03	0.06	0.00	3.1	0.06	0.047	0.128	0.86	0.00	0.06	343.05
Scupper	343+00	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.06	0.08	0.50	3.6	0.07	0.058	0.143	0.68	0.06	0.03	343.00
-	342+95	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.03	0.06	0.00	3.1	0.06	0.048	0.128	0.85	0.00	0.06	342.95
-	342+90	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.06	0.09	0.00	3.6	0.07	0.058	0.143	0.68	0.00	0.09	342.90
Scupper	342+85	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.09	0.11	0.50	4.0	0.08	0.067	0.154	0.58	0.07	0.05	342.85
-	342+80	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.05	0.08	0.00	3.5	0.07	0.055	0.139	0.72	0.00	0.08	342.80
-	342+75	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.08	0.11	0.00	3.9	0.08	0.064	0.151	0.60	0.00	0.11	342.75
-	342+70	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.11	0.14	0.00	4.3	0.09	0.072	0.161	0.53	0.00	0.14	342.70
Scupper	342+65	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.14	0.17	0.50	4.6	0.09	0.080	0.170	0.48	0.08	0.09	342.65
-	342+60	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.09	0.12	0.00	4.0	0.08	0.067	0.154	0.58	0.00	0.12	342.60
-	342+55	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.12	0.14	0.00	4.4	0.09	0.075	0.164	0.52	0.00	0.14	342.55
Scupper	342+50	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.14	0.17	0.50	4.7	0.09	0.081	0.172	0.47	0.08	0.09	342.50
-	342+45	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.09	0.12	0.00	4.1	0.08	0.069	0.157	0.56	0.00	0.12	342.45
-	342+40	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.12	0.15	0.00	4.4	0.09	0.076	0.166	0.50	0.00	0.15	342.40
Scupper	342+35	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.15	0.18	0.50	4.8	0.10	0.083	0.173	0.46	0.08	0.10	342.35
-	342+30	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.10	0.13	0.00	4.2	0.08	0.070	0.158	0.55	0.00	0.13	342.30
-	342+25	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.13	0.16	0.00	4.5	0.09	0.077	0.167	0.50	0.00	0.16	342.25
Scupper	342+20	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.16	0.19	0.50	4.8	0.10	0.084	0.175	0.45	0.08	0.10	342.20
-	342+15	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.10	0.13	0.00	4.2	0.08	0.071	0.159	0.54	0.00	0.13	342.15
-	342+10	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.13	0.16	0.00	4.5	0.09	0.078	0.168	0.49	0.00	0.16	342.10
Scupper	342+05	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.16	0.19	0.50	4.8	0.10	0.085	0.175	0.45	0.08	0.10	342.05
-	342+00	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.10	0.13	0.00	4.2	0.08	0.072	0.160	0.54	0.00	0.13	342.00
-	341+95	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.13	0.16	0.00	4.6	0.09	0.079	0.169	0.48	0.00	0.16	341.95
-	341+90	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.16	0.19	0.00	4.9	0.10	0.086	0.176	0.45	0.00	0.19	341.90
-	341+85	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.19	0.22	0.00	5.1	0.10	0.092	0.183	0.41	0.00	0.22	341.85
Scupper	341+80	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.22	0.25	0.50	5.4	0.11	0.097	0.189	0.39	0.10	0.15	341.80
-	341+75	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.15	0.18	0.00	4.8	0.10	0.084	0.174	0.46	0.00	0.18	341.75
Scupper	341+70	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.18	0.21	0.50	5.0	0.10	0.090	0.181	0.42	0.09	0.12	341.70
-	341+65	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.12	0.15	0.00	4.5	0.09	0.076	0.166	0.50	0.00	0.15	341.65
Scupper	341+60	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.15	0.18	0.50	4.8	0.10	0.083	0.173	0.46	0.08	0.10	341.60
-	341+55	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.10	0.13	0.00	4.2	0.08	0.070	0.158	0.55	0.00	0.13	341.55
Scupper	341+50	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.13	0.16	0.50	4.5	0.09	0.077	0.167	0.50	0.08	0.08	341.50
-	341+45	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.08	0.11	0.00	3.9	0.08	0.065	0.152	0.60	0.00	0.11	341.45
Scupper	341+40	Berryhill	0.004	0.90	8.11	0.03	0.0030	0.02	0.11	0.14	0.50	4.3	0.09	0.073	0.162	0.53	0.07	0.06	341.40
End Bridge	341+14	Berryhill	0.021	0.90	8.11	0.15	0.0030	0.02	0.06	0.22	0.00	5.1	0.10	0.091	0.182	0.42	0.00	0.22	341.14
Flume	340+80	Berryhill	0.027	0.90	8.11	0.20	0.0030	0.02	0.22	0.42									

Curb Opening =	4.0	ft
L_t (Length required to accept 100% of gutter flow) =	9.09	ft
Efficiency =	0.65	
Flow Intercepted =	0.27	cfs
Bypass Flow =	0.15	cfs

M

Appendix M:

Water Quality Monitoring Station Report

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

SC Department of Environmental Services

Watershed and Water Quality Information

General Information

Applicant Name: SCDOT
Address: Rockland Rd, Columbia, SC, 29210
MS4 Designation: Small MS4
Within Coastal Critical Area: No
Waterbody Name: STOOP CREEK
Permit Type: MS4
Latitude/Longitude: 34.035425 / -81.113994
Monitoring Station: S-507
Water Classification (Provisional): FW
Entered Waterbody Name:

Parameter Description

NH3N	Ammonia	CD	Cadmium	CR	Chromium
CU	Copper	HG	Mercury	NI	Nickel
PB	Lead	ZN	Zinc	DO	Dissolved Oxygen
PH	pH	TURBIDITY	Turbidity	ECOLI	Escherichia coli (Freshwaters)
FC	Fecal Coliform (Shellfish)	BIO	Macroinvertebrates (Bio)	TP	(Lakes) Phosphorus
TN	(Lakes) Nitrogen	CHLA	(Lakes) Chlorophyll a	ENTERO	Enterococcus (Coastal Waters)
HGF	Mercury (Fish Tissue)	PCB	PCB (Fish)		

Impaired Status (downstream sites)

Station	NH3N	CD	CR	CU	HG	NI	PB	ZN	DO	PH	TURBIDITY	ECOLI	FC	BIO	TP	TN	CHLA	ENTERO	HGF	PCB
S-507	X	X	X	X	X	X	X	X	X	X	X	X	X	N	X	X	X	X	X	X
CRK08	X	X	X	X	X	X	X	X	X	X	X	N	X	A	X	X	X	X	X	X

F = Standards full supported
N = Standards not supported
A = Assessed at upstream station
X = Parameter not assessed at station
WnTN = Within TMDL, parameter not supported
InTN = In TMDL, parameter not supported
WnTF = Within TMDL, parameter full supported
InTF = In TMDL, parameter full supported

Parameters to be addressed (those not supporting standards)

BIO - Macroinvertebrates (Bio)

ECOLI - Escherichia coli (Freshwaters)

Fish Consumption Advisory

Waters of Concern (WOC)

TMDL Information - TMDL Parameters to be addressed

In TMDL Watershed: No
TMDL Report No:
TMDL Document Link:
TMDL Site:
TMDL Parameter:

Report Date: July 8, 2025

Vol. 3

Browning Road

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-37000

Stormwater Management Design Report

Carolina Crossroads Phase 3A
(S-40-2892) Browning Road / (S-40-1382) Burnette Drive Relocation

Richland County, SC

April 2026

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6/22/26

1.0

Project Summary

1.1 Project Summary

The South Carolina Department of Transportation (SCDOT) proposes significant improvements to the I-26 / I-20 / I-126 interchanges as part of the Carolina Crossroads Project, to the northwest of Columbia, SC (see Figure BR.01: Vicinity Map in Appendix A). The project is located in both Richland and Lexington Counties. The project includes adding a travel lane in each direction to each of the three interstates, adding Collector-Distributer (C-D) lanes, as well as improving various interchanges and side roads.

The three interstates within the project area are all east-west interstate routes. I-26 runs along the western limits of Columbia, I-20 runs along the northern limits of Columbia, and I-126 provides a direct connection from I-26 to downtown Columbia. Within the project limits, the interstates currently range from a four- to ten-lane divided freeway with median barrier walls. The posted speed limits of the interstates vary from 55 mph to 60 mph.

Phase 3A of the overall Carolina Crossroads Project involves the relocation of frontage roads adjacent to the corridor to allow for ease of construction of the final interstate widening (Phase 3E). The four frontage roads associated with Phase 3A are Berryhill Road, Burning Tree Drive, Browning Road, and Rockland Road. This report focuses on the Browning Road relocation. Stormwater management reports for the other frontage roads will be bound under separate cover.

Browning Road is a secondary connector road that currently runs from I-20 to Morninghill Drive. An existing bridge over the I-20 corridor connects Browning Road with Burning Tree Drive. At the intersection with Fairhaven Drive, Browning Road becomes Burnette Drive. For the purposes of this report, the entire corridor will be referred to as Browning Road.

FEMA Flood Insurance Rate Map (FIRM) Panels 45063C0133G, 45063C0134G, 45063C0142G, 45063C0144G, 45063C0161G, 45063C0163G, 45079C0091H, 45079C0210K, 45079C0236K, & 45079C0237K show the various floodplains associated with the project area. They were overlaid onto the project site in CAD and can be seen in Appendix A as Figure BR.04.

Construction of Phase 3A will result in a net reduction of the total impervious area due to the removal of adjacent parking lot, driveways, roadways, and adjacent buildings, parking lot and driveways. In the vicinity of Browning Road, Phase 3A construction will result in a net reduction of approximately 1.0 acres of impervious surface.

The eastern end of Browning Road (and several upstream acres of residential areas) currently drain to the South away from the DOT ROW and though an offsite property. To remedy this, flows will be re-routed to the West to a new 72” pipe crossing to the new large crossing (designated XL-07).

A Pre-Construction versus Post Construction Analysis was performed at the inlet of the 72” CMP (designated AP-60.0) which drains an Unnamed Tributary of the Saluda River at the driveway to the Lexington Green Condominiums Complex. The results are listed on the table below.

NRCS Method

Basin BR				Peak Flow (cfs)				
Condition	Area	Weighted CN	Tc (hr)	2-yr	10-r	25-yr	50-yr	100-yr
Pre-	210.77	71.4	1.64	115.33	251.32	340.32	418.21	497.40
Post-	217.79	70.7	1.66	114.01	251.45	342.59	422.69	503.81

See Appendix E for NRCS Basin Flow Interpolation Calculations. As a result of Phase 3A construction, there will be a general increase in peak flows during larger storm events. There is potential for upstream flow mitigation in future phases of the project.

2.0

Soils Information

2.1 Soils Information Overview

The Carolina Crossroads Project is located in the Sand Hills Region of South Carolina. The land use adjacent to the project corridor is a mix of residential, commercial, and undeveloped. Soil surveys were obtained from the Natural Resources Conservation Service for Richland County (Version 18, Dec 23, 2013) and Lexington County (Version 15, Sep 27, 2016) to determine the predominate soil types along the project corridor.

The Web Soil Survey map and soil descriptions can be found on Figure BR.05 in Appendix A.

2.2 Hydrologic Soil Group Descriptions

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These mainly consist of deep, well-drained to excessively-drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These chiefly consist of moderately deep or deep, moderately well-drained or well-drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These chiefly consist of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These chiefly consist of clays that have a high shrink / swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

3.0

Stormwater Analysis

3.1 Stormwater Analysis Overview

The hydrologic analysis for this project was performed in accordance with SCDOT's *Requirements for Hydraulic Design Studies*, dated May 26, 2009.

Drainage areas were delineated using survey data, Google Earth aerial imaging, and USGS 7.5' Quadrangles (see Figure BR.03: USGS Topographic Quad Map in Appendix A). The hydrologic methods used to determine peak discharges were selected based upon watershed area and consisted of the Rational Method and the modified NRCS WinTR-55 Method. Times of concentration were computed using the SCS methodology outlined in the WinTR-55 manual, with a minimum time of concentration of 5 minutes.

For uniformity and ease of calculation, the entire project (including the portions within Lexington County) was analyzed using rainfall data for Columbia and for Richland County. The project was also analyzed as being wholly in the Piedmont Physiographic Region. This method is conservative, yielding greater flows than using rainfall data from Lexington County and from the Upper Coastal Plain Physiographic Region.

Drainage paths, flow lengths, and watercourse slopes were determined using surveyed contours and the USGS Quad maps. Runoff coefficients and Manning's *n* values were estimated from aerial photography and from field investigations.

As there are multiple classifications of roadways throughout this project, a single set of drainage criteria cannot be applied. The primary roadways in the project were broken down into three categories, and are listed below:

Primary Road High Volume Design Speed > 45 mph	**Primary Road High Volume Design Speed ≤ 45 mph**	**Secondary Road Collector Design Speed ≤ 45 mph**
Interstate 26	System Ramps & Loops	Berryhill Rd.
Interstate 20	Service Ramps & Loops	Browning Rd.
Interstate 126	Broad River Rd.	Burning Tree Dr.
Interstate C-Ds	Bush River Rd.	Fernandina Rd. (NE of Beatty Rd.)
	Colonial Life Blvd.	Saturn Pkwy.
	Fernandina Rd. (SW of Beatty Rd.)	
	Harbison Blvd.	
	Jamil Rd.	
	Lake Murray Blvd.	
	Piney Grove Rd.	
	St. Andrews Rd.	

Drainage design criteria for this project is shown in Appendix C.

3.2 Common Abbreviations / Naming Conventions

Common abbreviations associated with the project drainage analysis are listed below in Table 3.1:

BCXT	BOX CULVERT EXTENSION
BE	BERRYHILL RD.
BRDG	BRIDGE
BR	BROWNING RD.
BS	BUSH RIVER RD.
BT	BURNING TREE DRIVE
CB	PROP. CATCH BASIN
CC	PROP. CONCRETE COLLAR
DB	DETENTION BASIN
DI	PROP. DROP INLET
EB	EASTBOUND
EC	EX. BOX CULVERT
EP	EX. PIPE
EX	EXISTING
EXCB	EX. CATCH BASIN
EXDB	EX. DETENTION BASIN
EXDI	EX. DROP INLET
EXHW	EX. HEADWALL
EXJ	EX. JUNCTION
EXJB	EX. JUNCTION BOX
EXMH	EX. MANHOLE
EXOEP	EX. OPEN PIPE END
FE	FERNANDINA RD.

HW	PROP. HEADWALL
JA	JAMIL RD.
JB	PROP. JUNCTION BOX
LF	LINEAR FEET
MCB	MEDIAN CATCH BASIN
MH	PROP. MANHOLE
NB	NORTHBOUND
NC	PROP. BOX CULVERT
NP	PROP. PIPE
OC	OPEN CHANNEL
OEP	PROP. OPEN PIPE END
OP	PIPE OUTFALL
PO	POND OUTFALL STRUCTURE
PR	PROPOSED
RCBC	REINFORCED-CONCRETE BOX CULVERT
RCP	REINFORCED-CONCRETE PIPE
RO	ROCKLAND ROAD
SB	SOUTHBOUND
SLP	SLIP-LINE PIPE
STB	STORAGE BASIN
SWP	SMOOTH-WALL PIPE
WB	WESTBOUND
XL	CROSSLINE

Table 3.1: Common Abbreviations

The prefix “BR-” was assigned to all drainage elements associated with the Browning Road. In general, the first two digits in the numeral portion of a drainage elements identifier correspond to the drainage plan sheet number on which that element appears. For instance, proposed catch basin BR-CB-1235 would be visible on Browning Road Construction Plan Sheet D12.

3.3 Rainfall Depths (SCS Method)

Rainfall depths used in determining peak discharges through the SCS Method were obtained from the South Carolina DHEC Storm Water Management BMP Handbook. The 24-hour storm event rainfall depths for Richland County are shown below.

Return Period (years)	Depth (inches)
1	3.1
2	3.6
5	4.5
10	5.3
25	6.4
50	7.3
100	8.3

Table 3.2: 24-Hour Rainfall Depths for Richland County

3.4 Rainfall Intensity Values (Rational Method)

Coefficients used in the rational method for calculating rainfall intensity values (in/hr) were provided by SCDOT. The coefficients for Richland County are shown below.

Frequency (years)	a	b	c
2	63.5900	11.3200	0.8350
5	54.9500	9.9720	0.7593
10	50.0800	8.6690	0.7047
25	41.5400	6.6990	0.6264
50	37.5500	5.4330	0.5759
100	34.0700	4.2260	0.5297

Table 3.3: Rainfall Intensity Coefficients for Richland County, SC

The coefficients are utilized in the following equation to calculate rainfall intensities.

Rainfall intensity equation: $i = \frac{a}{(b+tc)^c}$

3.5 Inlet Spread & Closed Drainage System Analysis

Closed storm drainage systems were analyzed using Geopak drainage software. Systems draining areas less than 40 acres were designed using the 10-year storm event. Systems draining areas greater than 40 acres were designed using the 25-year storm event. Geopak area, link and node calculations are included in Appendix F.

Proposed pipes were designed to have smooth walls, with a minimum grade of 0.3 percent. Some existing pipes will be maintained and connected into the proposed drainage systems where possible. The rational method was used for sizing the closed drainage systems, except for the basin draining to BR-EXMH-1127. This basin extends well to the North of the I-20 corridor and has an area of 122.08 acres. As this is greater than 100 acres, the NRCS method was selected to estimate flows to this node. A table showing the flow estimation results is shown below:

D.A. = 122.08 Acres
NRCS Method Selected

BR-EXMH-1127			Peak Flow (cfs)				
Area	Weighted CN	Tc (hr)	2-yr	10-r	25-yr	50-yr	100-yr
122.08	71.1	1.56	70.90	152.86	206.41	253.54	300.52

See Appendix E for NRCS Basin Flow Interpolation Calculations.

Proposed pipes were sized to have a maximum 94% flow depth for the 10-year storm event, where possible. Closed drainage system profiles showing the design hydraulic grade lines can be found in Appendix G.

Pipe material shall be selected from those listed in the Engineering Directive Memorandum 24. All smooth-wall pipe culverts will either be reinforced concrete pipe (RCP), high-density polyethylene (HDPE), or spiral-ribbed aluminum pipe (SRAP). Additionally, corrugated pipe culverts may be used and made of corrugated aluminum alloy pipe (CAAP). A minimum pipe size of 18 inches will be used at all locations on this project. Any pipes to be abandoned will be filled with flowable fill or removed as labeled on the construction plans.

Trenchless installation is required for all pipes under existing interstate travel lanes. Trenchless installation is also currently proposed in some areas where deep open cuts are not practical.

The proposed storm drainage systems will include a variety of structures and conveyance methods. SCDOT Catch Basin Types 1, 16, 17 & 18 are proposed at standard curb sections to collect runoff. 24”x36” Drop Inlets, Type 112 Drop Inlets, Type 9 Catch Basins, and ditches are proposed in various areas to collect both on-site and offsite stormwater runoff. The proposed layout meets gutter spread requirements (see Appendix I for Gutter Spread Calculations).

3.6 Open Channel Analysis

Open channels throughout the project were designed in accordance with the SCDOT Requirements for Hydraulic Design Studies (2009). The ditches were designed for stability and for flow depth with the 10-year storm event for areas less than 40 acres and with the 25-year storm event for areas greater than 40 acres. The rational method was used for the open channel analysis.

Where possible, a freeboard height of 1 foot between the design water surface elevation and the road subgrade was implemented for ditches outside of the travel lanes. Manning’s “n” values were iterated by designing for Vegetative Retardant Class C linings. In cases where a Vegetative Class C lining would not

withstand the design sheer stress, and alternative lining was selected. The open channels that require alternative channel lining will be indicated on the erosion control data sheet (ECDS) to be included in the plans (Appendix B). Channels with steeper slopes that require more than a vegetative lining for stability will be lined with turf reinforcement matting or armored with riprap to minimize the occurrence of erosion. The location and quantity of riprap is shown in the plans.

Open channel calculations can be found in Appendix H.

3.7 Cross-Line Culvert Analysis

This project includes the replacement of the existing box culvert under I-26 with a new 72-inch cross-line (designated as XL-07). Segments of the existing box culvert will be retained to drain the median of I-26 during the interim phase between construction of Phase 3A and the final condition.

To the West of I-26, a section of the existing box culvert will be removed. A new headwall (designated BS-HW-2001) will be installed on the existing box culvert upstream of its crossing (designated XL-08) under Bush River Road. The new cross-line (XL-07) will outfall to a large open channel draining to the new headwall on XL-08.

A hydraulic analysis was performed on crossing XL-08, using the 50-year peak discharge. The design flow was estimated using the NRCS method. The flows estimated for this crossing are listed below (see Appendix E for NRCS Basin Flow Interpolation Calculations):

NRCS Method

				Peak Flow (cfs)				
ID	Area	Weighted CN	Tc (hr)	2-yr	10-r	25-yr	50-yr	100-yr
BS-HW-2001	179.70	67.9	1.62	81.90	192.37	265.90	331.83	399.08

The HY-8 program was used to determine the headwater and tail-water effects, and to determine the headwater to depth (HW / D) ratio. A summary of the HW/D results is listed below.

50-year Storm Event Headwater to Diameter Ratios

Culvert ID	Dimensions	Q_{50} (cfs)	50-yr HW elev.	Invert Elevation	HW_{50} / D
XL-08	4’ x 8’	331.83	215.20	207.79	1.85

As shown in the table above, this crossing does not meet the HW/D requirement of 1.2 for the 50-year storm, primarily due to the minimal height (4’) of the existing culvert section. However, there is no potential for flooding of the interstate nor of Bush River Road in this area, and thus the crossing is deemed acceptable as proposed.

See Appendix J for cross-line hydraulic analysis calculations.

4.0

Sediment & Erosion Control

4.1 Sediment & Erosion Control

Inlet protection is to be provided at all existing and proposed inlets that are impacted by the proposed improvements to trap and prevent sediment from entering closed systems. Type D2 inlet filters will be used on all drop inlets and manholes in sump median ditch locations. Type F Inlet Structure Filters will be used at catch basins located in curb and gutter sections. The Type F filters will be unweighted prior to the placement of pavement base course, and weighted afterwards.

Erosion Control Blanket is proposed at all locations where fill slope heights are greater than 5 feet and where concentrated flow is against the fill.

A single row of silt fence will be placed at the outside of construction limits along the length of the project to prevent sediment from leaving construction areas. A double row of silt fence will be placed where construction is adjacent to wetlands or streams. All erosion control measures are proposed according to SCDOT Standard Drawing Sections 804 and 815. The National Pollutant Discharge Elimination System (NPDES) lines will be shown on the construction plans in a later submittal. The location of the silt fence will be 1 foot offset to the outside of the NPDES line.

To provide slope stabilization, all proposed ditches will be lined with temporary erosion control blanket (Class B). Sediment tubes will be placed in all ditches within the project limits. The Drainage Plans and Erosion Control Data Sheet (See Appendix B) will provide details as to locations where the temporary erosion control blanket, sediment tubes, and other BMPs will be installed.

Turf reinforcement mats (TRM) will be used where vegetation alone would not provide adequate stability. TRMs will be used on channels with an estimated design shear stress greater than 1.0 PSF and on slopes of 2H:1V or greater. A lining was selected to stabilize each channel and to meet the requirements for sediment and erosion control.

Rock check dams will be employed in smaller open channels when required to reduce concentrated flow velocities and to trap sediment. Areas requiring rock check dams will be indicated on the ECDS in a later submittal.

Riprap aprons and basins will be used at locations of concentrated runoff to reduce velocities below erosive levels. Riprap is shown on the plan sheets at all proposed pipe outlets for stabilization. Riprap will be used for inlet and outlet slope protection at the open end of each pipe according to the SCDOT standard drawings. Riprap is also used in channel sections with steep grades. Geotextile fabric (Class 2) Type B is proposed beneath all riprap. Riprap calculations will be included in a future version of this report.

During earthwork operations, slopes will be roughened by either tracking, stair-step grading, or grooving. In order to reduce erosion, surface roughening will be performed as soon as possible after vegetation has been removed from the existing slope.

Temporary stabilization shall be applied to portions of the site where construction activities have ceased or where construction will not take place within 14 days. Temporary stabilization shall be achieved using

a fast-germinating grass, straw / hay mulch product as described in SCDOT Specification SC-M-810-4 or rolled erosion control product as described in SCDOT Specification SC-M-815-11.

Permanent stabilization shall be applied within 14 days in portions of the site where final grading is complete. Permanent stabilization shall comply with SCDOT Specification SC-M-810-4.

All access points from paved roads shall include a stabilized construction entrance as detailed in the SCDHEC Storm Water Management BMP Handbook Standard Specifications and Drawings to minimize tracking of mud to public roads.

All areas will be permanently stabilized with pavement, turf, or landscaping.

See Appendix K for Water Quality Monitoring Station Report.

A

Appendix A:
General Project Maps

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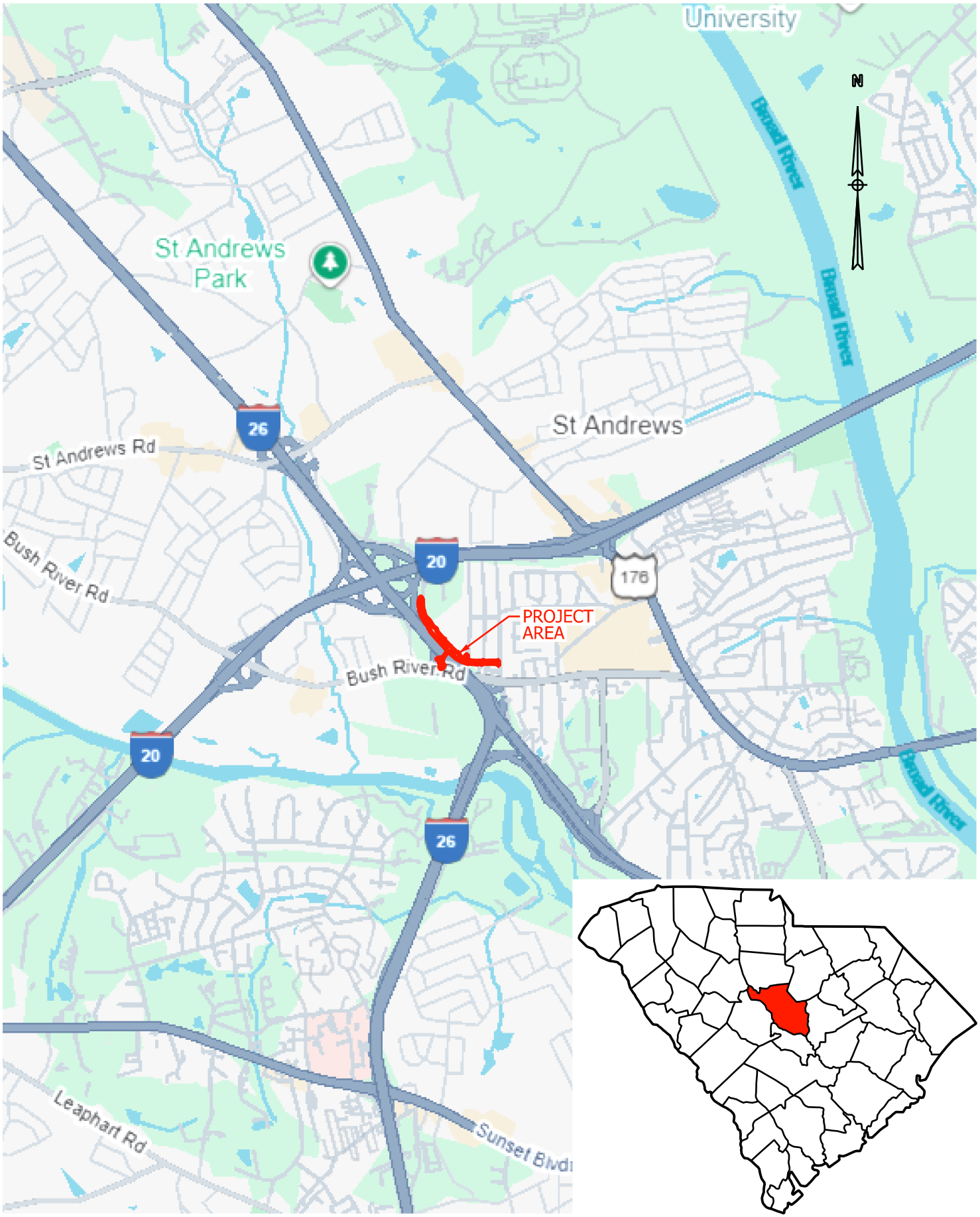

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DEPARTMENT OF TRANSPORTATION

CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

BROWNING ROAD
VICINITY MAP

0 1,500 3,000

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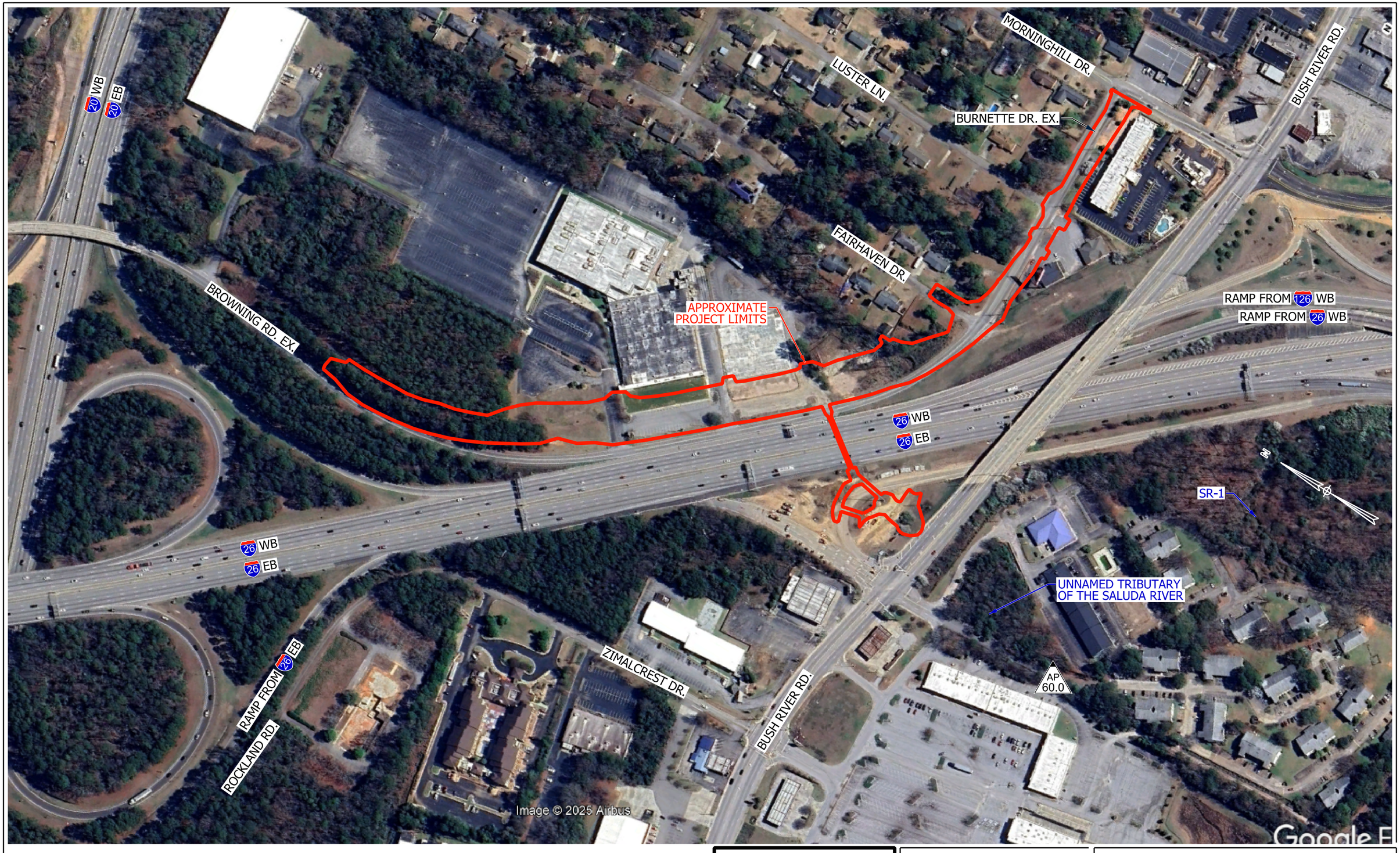
SCALE	1" = 3,000'

FIGURE
BR.01



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CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

BROWNING ROAD
AERIAL MAP

0 125 250

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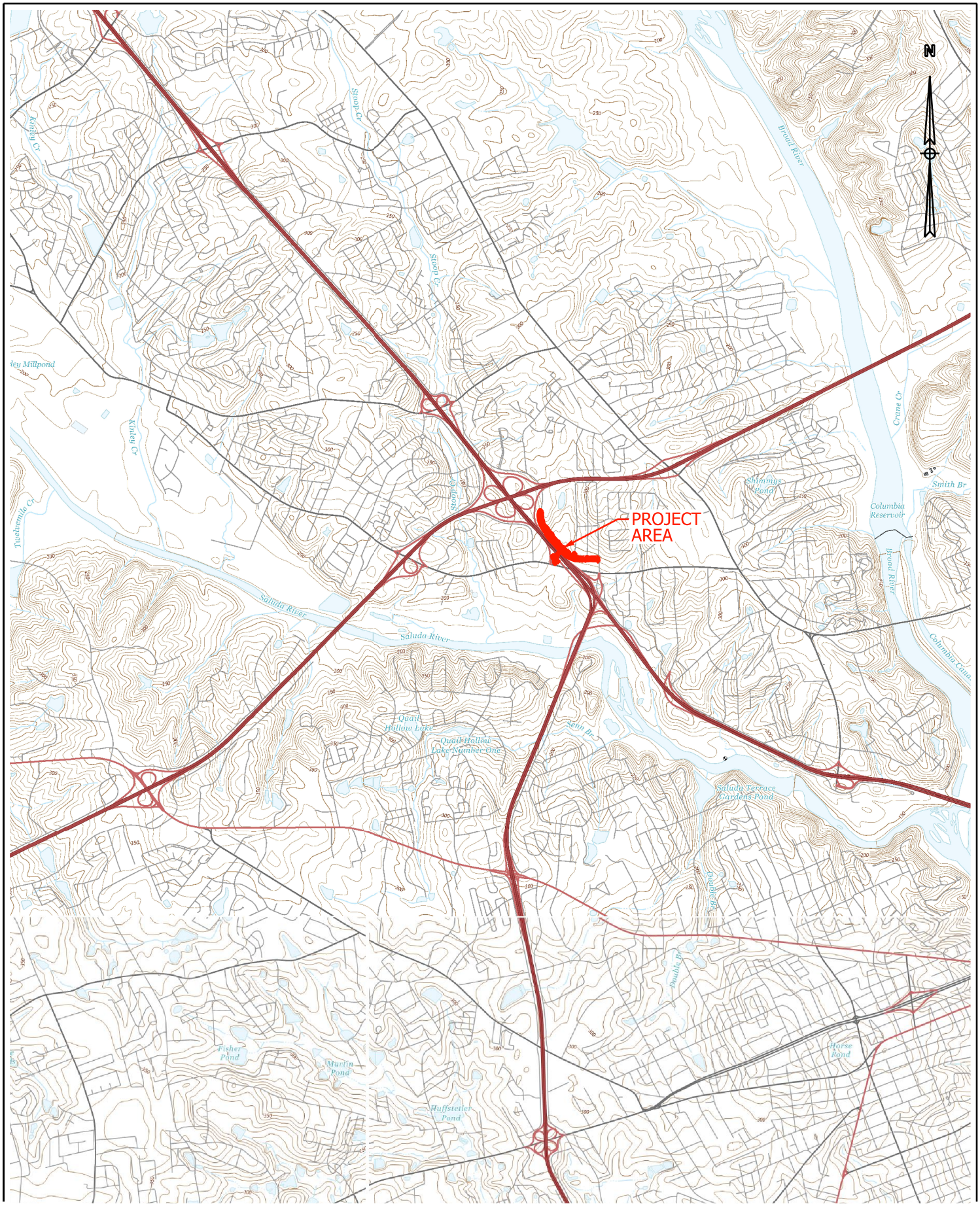
SCALE	1" = 250'

FIGURE
BR.02



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CAROLINA CROSSROADS - P3A

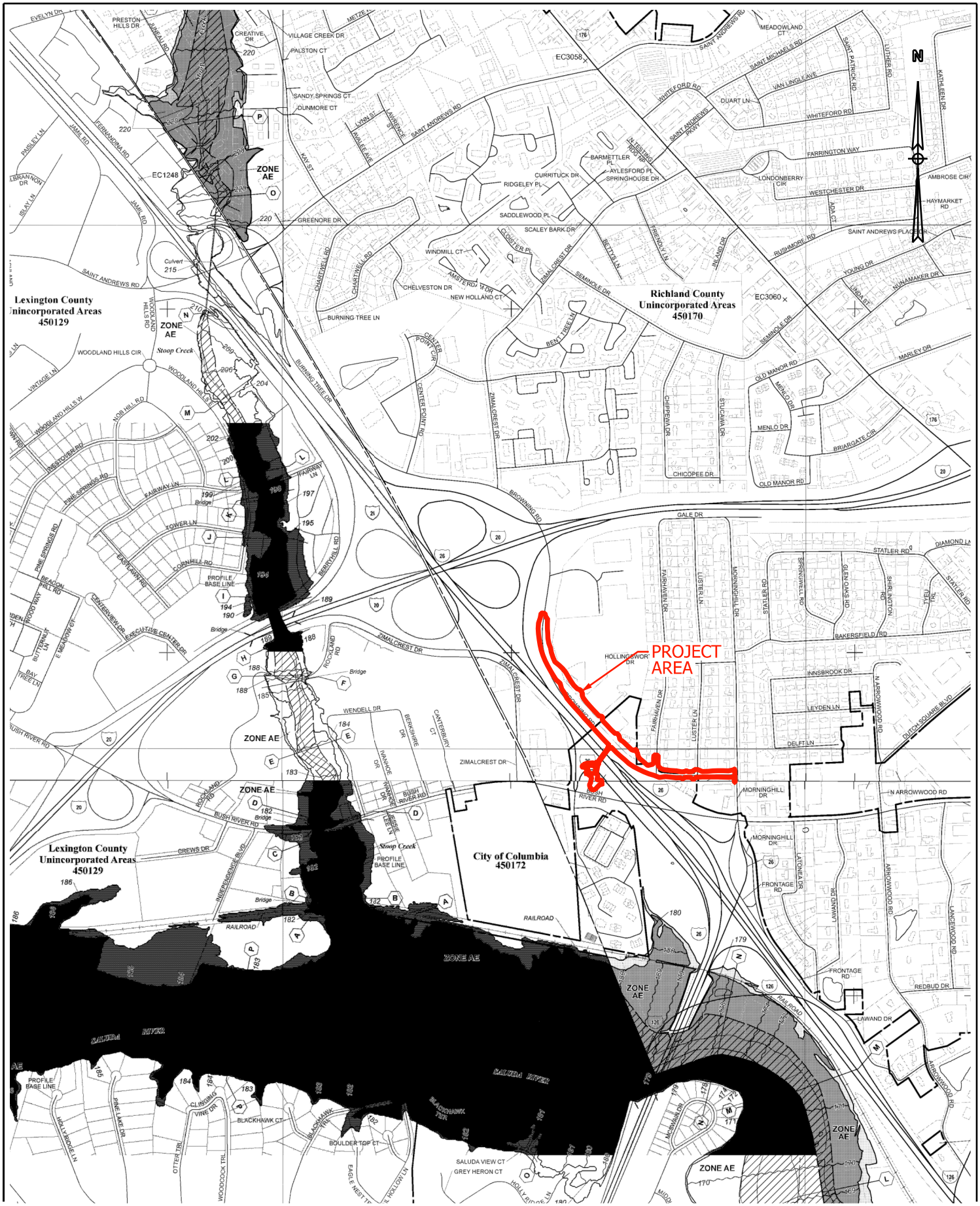
RICHLAND & LEXINGTON COUNTIES

BROWNING ROAD
USGS TOPOGRAPHICAL QUAD MAP

0 2,000 4,000

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 4,000'

FIGURE
BR.03



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CAROLINA CROSSROADS - P3A

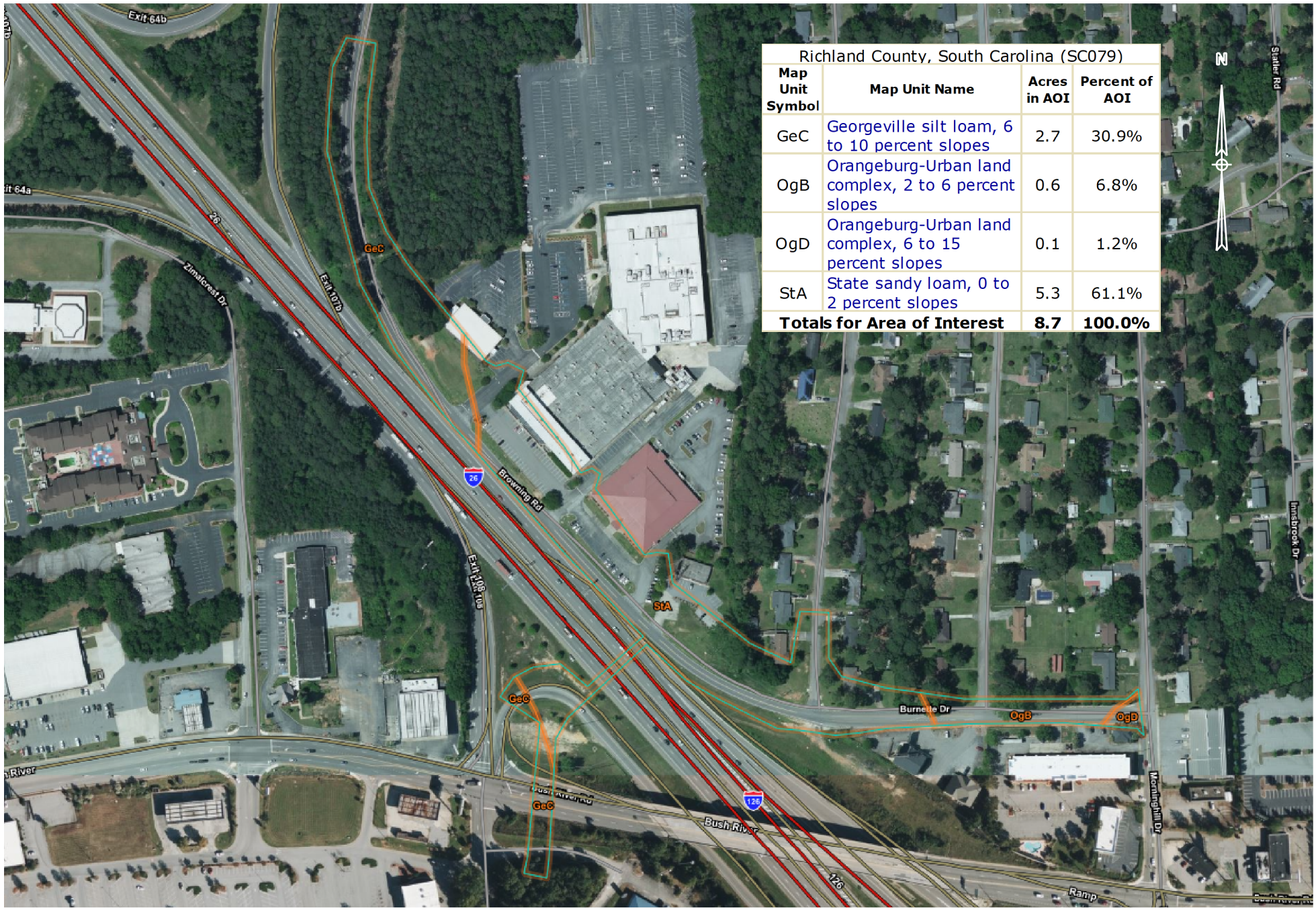
RICHLAND & LEXINGTON COUNTIES

BROWNING ROAD FEMA FLOOD MAP

0 600 1,200

FILENAME	CCR_P3A_drn_exhibits
SCALE	1" = 1,200'

FIGURE BR.04



Richland County, South Carolina (SC079)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GeC	Georgeville silt loam, 6 to 10 percent slopes	2.7	30.9%
OgB	Orangeburg-Urban land complex, 2 to 6 percent slopes	0.6	6.8%
OgD	Orangeburg-Urban land complex, 6 to 15 percent slopes	0.1	1.2%
StA	State sandy loam, 0 to 2 percent slopes	5.3	61.1%
Totals for Area of Interest		**8.7**	**100.0%**

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CAROLINA CROSSROADS - P3A

RICHLAND & LEXINGTON COUNTIES

BROWNING ROAD
WEB SOIL SURVEY MAP

0 150 300

FILENAME	CCR_drn_exhibits
SCALE	1" = 300'

FIGURE
BR.05

B

Appendix B:

Drainage & Erosion Control Plans

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FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	D05

GENERAL DRAINAGE NOTES

1. PIPES TO BE ABANDONED SHALL EITHER BE REMOVED OR FILLED WITH FLOWABLE FILL.

2. REINFORCED-CONCRETE PIPE SHALL BE USED FOR ALL PIPES UNDERNEATH INTERSTATES AND ANY RAMPS WHERE INSTALLATION IS USED UNDER THE EXISTING ROADWAY OR MEDIAN.

3. TRENCHLESS INSTALLATION OF PIPE IS RECOMMENDED FOR EXISTING ROADWAY CROSSINGS FOR ALL NEW PIPE UNDER THE EXISTING INTERSTATE TRAVELED WAY. THE DIAMETER LISTED ON THE PLANS IS REQUIRED FOR HYDRAULIC OPENING OF THE PIPE. LENGTH OF THE TRENCHLESS INSTALLATION IS TO BE DETERMINED BY THE CONTRACTOR. LENGTHS LISTED ON THE PLANS ARE FOR THE ENTIRE LENGTH OF PIPE TO BE INSTALLED.

4. ALL EXISTING MEDIAN AND SIDELINE ASPHALT OR CONCRETE DITCH LININGS WITHIN PROJECT LIMITS ARE TO BE REMOVED AND REPLACED UNLESS NOTED OTHERWISE. FOR ANY THAT ARE TO BE RETAINED, REPAIR IN ACCORDANCE WITH SPECIAL PROVISION 815 EROSION CONTROL.

5. PIPE LENGTHS AS SHOWN IN THE DRAINAGE PLAN SHEETS AND PIPE DATA TABLES INCLUDE END TREATMENTS (BEVELED-END SECTIONS, ETC.) IN THE TOTAL PIPE LENGTH. BEVELED-END SECTIONS SHALL BE INSTALLED IN ACCORDANCE WITH SCDOT STANDARD DRAWING 719-610-00.

6. RIPRAP QUANTITIES SHOWN ON PLAN SHEETS ONLY ACCOUNT FOR OUTLET RIPRAP APRONS, BASINS, AND DITCH LININGS. PIPE PROTECTION AND SLOPE PROTECTION AROUND WING WALLS ARE NOT DETAILED OR QUANTIFIED ON THE PLAN SHEETS.

7. ALL EXISTING PIPE NETWORKS AND CULVERTS WITHIN SCDOT RIGHT OF WAY THAT ARE TO BE RETAINED WILL REQUIRE A VIDEO INSPECTION, IF NOT ALREADY INSPECTED. FOR ALL PIPES OR CULVERTS REQUIRING VIDEO INSPECTION DURING CONSTRUCTION, THE CONTRACTOR SHALL:
   A. LOCATE AND EXCAVATE EACH END OF THE CULVERT AND CLEAN OUT SEDIMENT OR DEBRIS.
   B. PERFORM A FIELD AND VIDEO INSPECTION IN ACCORDANCE WITH SCDOT'S PIPE AND CULVERT INVENTORY AND INSPECTION GUIDELINES (2011).
   C. UPON COMPLETION OF THE VIDEO INSPECTION, PROVIDE PIPE VIDEO AND INSPECTION REPORT TO THE ENGINEER FOR REVIEW. NO CONSTRUCTION ON THE CULVERT SHALL PROCEED UNTIL THE ENGINEER HAS PROVIDED A SIGNED LETTER OR REPORT STATING THE RECOMMENDED ALTERNATIVES TO REPLACEMENT.

8. EXISTING PIPE CULVERT DEFICIENCIES ARE DETAILED ON THE DRAINAGE PLAN SHEETS FOR ALL PIPES REQUIRING REPAIRS. FOR PIPES NOT SPECIFIED AS "LINE EXISTING PIPE" THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF THE CHOSEN METHOD OF REPAIR INVOLVES LINING OR ANY OTHER METHOD OF REPAIR THAT WILL REDUCE THE INSIDE DIAMETER OF THE EXISTING PIPE PRIOR TO REPAIRING.

9. ALL DRAINAGE STRUCTURES OTHER THAN THOSE NOTED IN THE PLANS AS "BLIND" SHALL BE ACCESSIBLE TO THE FINAL SURFACE GRADE BY EITHER MANHOLE OR GRATE ACCESS.

10. BOXES TO BE RETAINED WILL BE REQUIRED TO BE RETROFITTED. DAMAGED BOXES WILL BE REQUIRED TO BE REPLACED.

11. PRECAST MANHOLES AND CATCH BASINS WILL BE USED FOR THE FOLLOWING CONDITIONS:
   A. WHERE THE DEPTH EXCEEDS 12 FEET AS MEASURED FROM RIM TO BOTTOM OF THE BOTTOM SLAB.
   B. WHERE THE FLOW LINE ELEVATION OF THE INLET PIPE IS HIGHER THAN THE SOFFIT OF THE OUTLET PIPE.
   C. AT THE ENGINEER'S DISCRETION.

12. DRIVEWAY PIPES ARE SHOWN IN THE PLANS BUT ARE NOT TABULATED WITHIN THE PIPE TABLES. INVERT LOCATIONS AND ELEVATIONS ARE TO BE SET BASED ON THE FINAL DITCH GRADES AS DETAILED IN THE CROSS SECTIONS.

13. AVOID CONSTRUCTION VEHICLE TRAFFIC OVER INSTALLED PIPE WHERE POSSIBLE. DO NOT DRIVE CONSTRUCTION VEHICLES OVER INSTALLED PIPE DIAMETER LESS THAN THE LARGER OF 3 FEET OR ONE PIPE DIAMETER OF FILL. IF FILL HEIGHT IS SUFFICIENT AND CROSSING IS UNAVOIDABLE, PERIODICALLY CHANGE LOCATION OF EQUIPMENT CROSSING OVER PIPE IN ORDER TO MINIMIZE THE CHANCE OF LATERAL DISPLACEMENT.

14. UPON COMPLETION AND STABILIZATION, ALL TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED AND GRADED FOR POSITIVE DRAINAGE, INCLUDING SEDIMENT DAMS AND TEMPORARY SEDIMENT BASINS. PERMANENT DETENTION OR WATER QUALITY PONDS ARE TO REMAIN.

15. TYPE D2 INLET FILTERS ARE TO BE PLACED AT ALL DROP INLETS AND MANHOLES IN SUMP MEDIAN AND DITCH LOCATIONS. ALL OTHER INLETS ARE TO BE PROTECTED WITH TYPE A INLET FILTERS ONCE INSTALLED. AFTER ROAD BASE COURSE IS PLACED, PLACE WEIGHTED TYPE F INLET TUBES AT ALL INLETS WITHIN THE PAVED AREAS. FOR CURB INLETS, PLACE TYPE F INLET FILTERS ONCE ROAD SURFACE COURSE IS PLACED.

16. THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) LINE IS USED TO DENOTE LAND-DISTURBING ACTIVITIES ONLY WHEN NECESSARY TO GO BEYOND THE CONSTRUCTION LIMITS. SILT FENCE IS TO BE OFFSET 1' TO THE INSIDE OF THE NPDES LOCATION AS SHOWN ON PLANS (PER FIGURE 12.1-B OF THE SCDOT ROADWAY DESIGN MANUAL 2017). IN LOCATIONS WHERE NPDES LINES CROSS EXISTING DITCHES OR STREAM CHANNELS, SILT FENCE IS TO BE INSTALLED UP TO THE CHANNEL BANK BUT IS NOT TO CROSS THE STREAM AND IS NOT TO IMPEDE FLOW.

COMMON ABBREVIATIONS

BCXT	BOX CULVERT EXTENSION
BE	BERRYHILL ROAD
BRDG	BRIDGE
BR	BROWNING ROAD
BS	BUSH RIVER ROAD
BT	BURNING TREE DRIVE
CB	PROP. CATCH BASIN
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EXJB	EX. JUNCTION BOX
EXMH	EX. MANHOLE
EXOEP	EX. OPEN PIPE END

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JB	PROP. JUNCTION BOX
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MCB	MEDIAN CATCH BASIN
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NP	PROP. PIPE
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OEP	PROP. OPEN PIPE END
OP	PIPE OUTFALL
PO	POND OUTFALL STRUCTURE
PR	PROPOSED
RCBC	REINFORCED-CONCRETE BOX CULVERT
RCP	REINFORCED-CONCRETE PIPE
RO	ROCKLAND ROAD
SB	SOUTHBOUND
SLP	SLIP-LINE PIPE
STB	STORAGE BASIN
SWP	SMOOTH-WALL PIPE
WB	WESTBOUND
XL	CROSSLINE

LINE STYLE LEGEND

PROP. STORM DRAIN PIPE

PROP. "V" DITCH

PROP. TRAPEZOIDAL DITCH

PROP. BRIDGE END FLUME

EXISTING PIPE

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No. C0318
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 26549
DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-40-2892/1382 (BROWNING RD. / BURNETTE DR.)

DRAINAGE NOTES

S-40-2892/1382 SHT D-BR-NOTES

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FILE: D-BR-NOTES
DATE: 2026.06.22
PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:44:22 PM

VOLUME 3

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	D06



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FILE: D-BR-DRN_SHTS

DATE: 2026.06-22

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No. C038
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 26549
DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

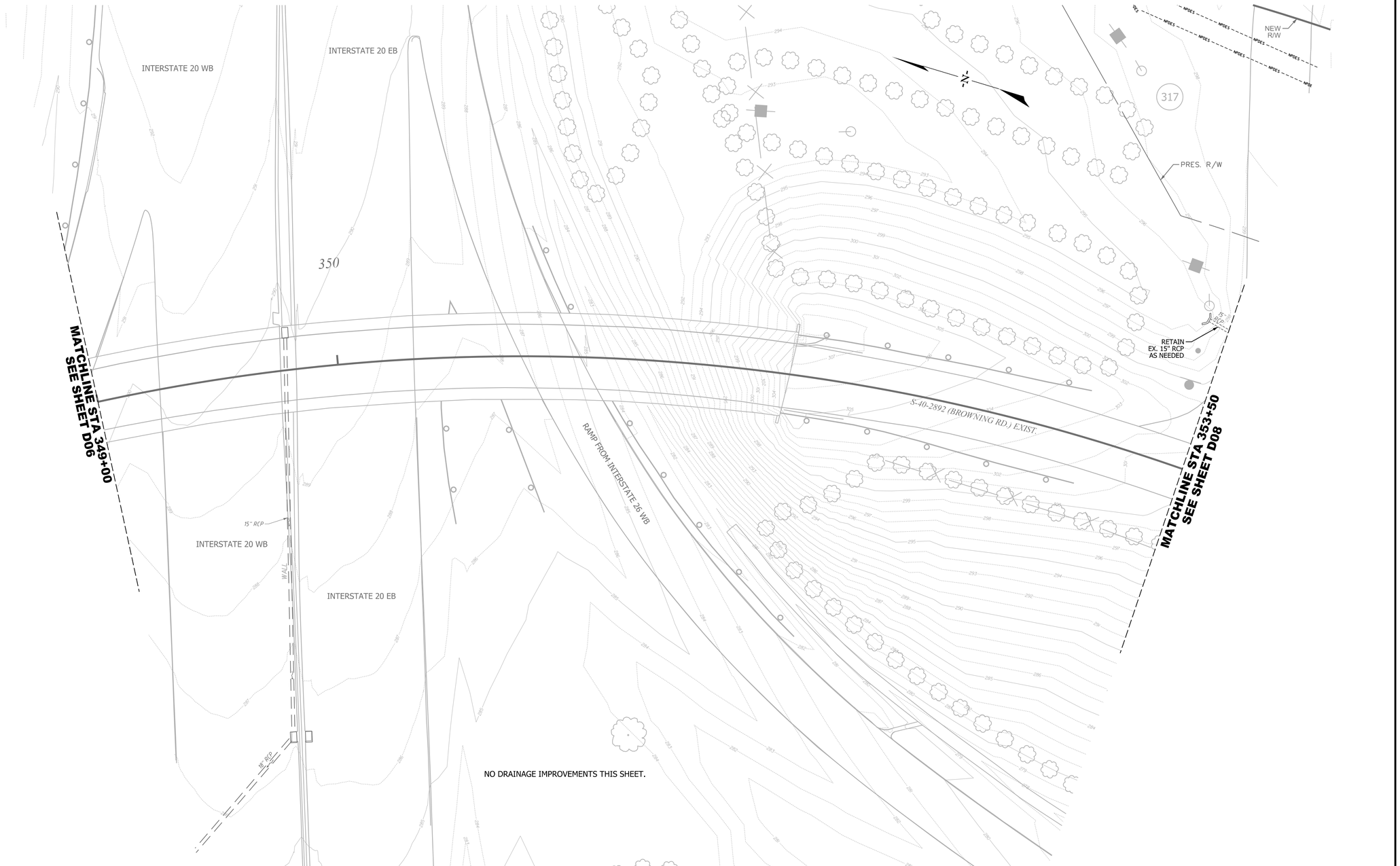
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-40-2892/1382 (BROWNING RD. / BURNETTE DR.)
DRAINAGE PLAN SHEET
STA. 344+50 TO STA. 349+00

S-40-2892/1382 SHT BR-D06

VOLUME 3

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	D07



NO DRAINAGE IMPROVEMENTS THIS SHEET.

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
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DATE: 2026-06-22

PEN TABLE: SCDOT_PenTable_DRAINAGE
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HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS No. C038 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26549 — JUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-40-2892/1382 (BROWNING RD. / BURNETTE DR.)
DRAINAGE PLAN SHEET
STA. 349+00 TO 353+50

VOLUME 3

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	D08

NEW R/W

NEW R/W

317

318A

NEW R/W

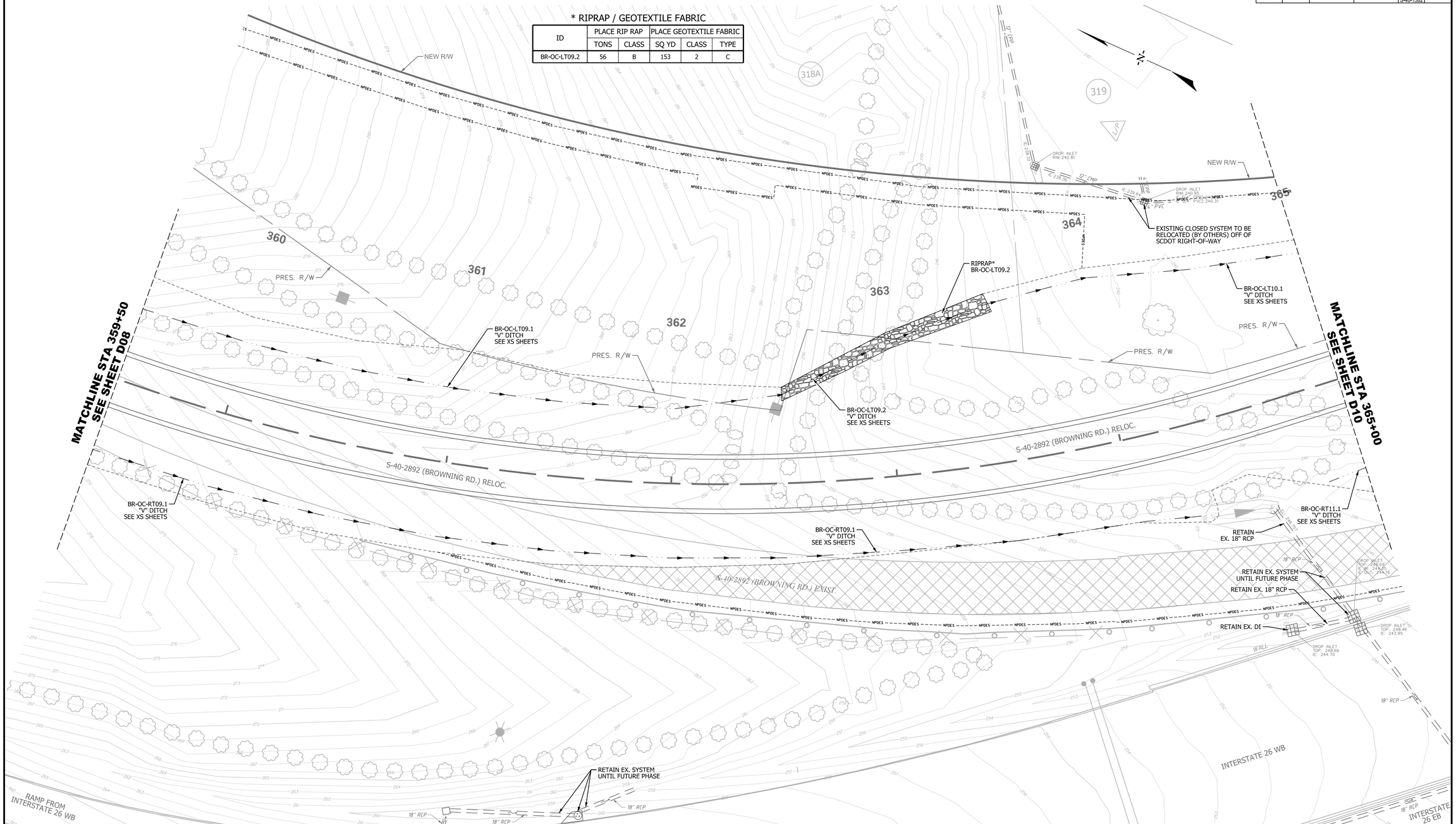
NPDES NPDES NPDES

VOLUME 3

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	D09

* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BR-OC-LT09.2	56	B	153	2	C



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DATE: 2026.06-22
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HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA HDR ENGINEERING INC. OF THE CAROLINAS No. C038 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-40-2892/1382 (BROWNING RD. / BURNETTE DR.)
DRAINAGE PLAN SHEET
STA. 359+50 TO STA. 365+00

S-40-2892/1382 SHT BR-D09

VOLUME 3

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	D10

TO
ACE ACADEMY

BROWNING BUSINESS CENTER

* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BR-DWP-10A	9	B	26	2	C
BR-DWP-10B	9	B	26	2	C

319 318 320

365 366 367 368 369 370 371

NEW R/W

BR-OC-LT10.1
"V" DITCH
SEE XS SHEETS

PLACE
DRIVEWAY PIPE*
BR-DWP-10A
72 LF-18" SWP

BR-OC-LT10.2
"V" DITCH
SEE XS SHEETS

PLACE DRIVEWAY PIPE*
BR-DWP-10B
48 LF - 24" SWP

BR-OC-LT11.1
"V" DITCH
SEE XS SHEETS

PRES. R/W

WALL

REMOVE
EX. CATCH
BASIN

REMOVE
EX. 12" RCP

S-40-2892 (BROWNING RD.) RELOC.

MATCHLINE STA 365+00
SEE SHEET D09

MATCHLINE STA 371+00
SEE SHEET D11

12" RCP

BR-OC-RT11.1
"V" DITCH
SEE XS SHEETS

BR-OC-RT11.1
3' BASE DITCH
SEE XS SHEETS

SIGN

CATCH BASIN
TOP: 235.49
IE: 229.05

18" RCP

RETAIN EX. CB
UNTIL FUTURE PHASE

REMOVE
EX. 18" RCP

GRADE TO DRAIN
TO EX. CB

RETAIN EX. 24" RCP
UNTIL FUTURE PHASE

15" RCP

REMOVE EX. DI
& EX. 18" RCP

REMOVE EX. CB
& EX. 18" RCP

S-40-2892 (BROWNING RD.) EXIST.

24" RCP

RETAIN EX. DI
UNTIL FUTURE PHASE

DROP INLET
TOP: 235.80
IE: 228.20

DROP INLET
TOP: 235.87
IE: 228.21

RETAIN EX. 24" RCP
UNTIL FUTURE PHASE

RETAIN EX. CB T25
UNTIL FUTURE PHASE

RETAIN EX. 18" RCP
UNTIL FUTURE PHASE

INTERSTATE 26 WB

INTERSTATE 26 WB

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PEN TABLE: SCDOT_PenTable_DRAINAGE
DATE: 2026-06-22
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HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C038 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 JUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-40-2892/1382 (BROWNING RD. / BURNETTE DR.)
DRAINAGE PLAN SHEET
STA. 365+00 TO STA. 371+00

S-40-2892/1382 SHT BR-D10

VOLUME 3

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	D11

* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BR-OC-LT11.2	98	B	91	2	C
BR-OP-1170	9	B	26	2	C

NOTE:
FOR PIPE DATA TABLE
SEE SHEET D14

RETAIN EX. 60" CMP
RETAIN EX. MH (BR-EXMH-1127)
RETAIN EX. 60" CMP (BR-EP-1127)
BILLBOARD
BILLBOARD CIRCLE
CATWALK
8" PVC END NF
DROP INLET RIM: 228.47 E NW (18"-BCP) 225.69
CGMH RIM: 229.51 E NE (8" SW) 226.22 E SW (18" RCP) 225.64
6.49% 18" RCP
371
372
373
374
320
321
322
323
324
375
376
NEW R/W
PRES. R/W
FOC
S-40-2892 (BROWNING RD.) RELOC.
S-40-2892 (BROWNING RD.) EXIST.
RIPRAP* (BR-OC-LT11.2)
BR-OC-LT11.2 3' BASE DITCH SS=2:1 US I.E.=222.90 DS I.E.=221.43
BR-OC-LT11.3 "V" DITCH SEE XS SHEETS
BR-OP-1170 OUTFALL*
BR-OC-LT11.4 "V" DITCH SEE XS SHEETS
BR-NP-1205 PR. 30" SWP
BR-NP-1173 PR. 36" SWP
PR. CB T17 (BR-CB-1173)
BR-OC-LT11.1 "V" DITCH SEE XS SHEETS
BR-NP-1108 PR. 24" SWP
BR-NP-1133 PR. 42" SWP
PR. JB (36"x60") (BR-JB-1133)
BR-NP-1134 PR. 42" SWP
PR. CB T9 (3'x5') (BR-CB-1134)
BR-NP-1155 PR. 42" SWP
BR-NP-1137 PR. 18" SWP
CUT EX. 60" CMP FOR PLACEMENT OF PR. JB (60"x72") (BR-JB-1126)
PR. CB T18 (BR-CB-1137)
BR-NP-1138 PR. 18" SWP
PR. CB T16 (BR-CB-1138)
BR-NP-1126 PR. 66" SWP
REMOVE EX. DI
REMOVE EX. 60" CMP
REMOVE EX. DI
BR-OC-RT11.1 "V" DITCH SEE XS SHEETS
REMOVE EX. CB & EX. 15" RCPs
BR-OC-RT11.2 "V" DITCH SEE XS SHEETS
60" CMP
DROP INLET RIM: 225.49 BB: 217.59
15" RCP
APPROX. J&B RECEIVING PIT
BR-OC-RT11.3 "V" DITCH SS=2:1 US I.E.=223.56, DS I.E.=223.40
REMOVE EX. 60" RCP
PR. CB T9 (7'x7') W/ WEIR OPEN TO DITCH (BR-CB-1125)
CB T25 SB: RIM: 230.93 SW:RIM: 230.67 IE: 221.24 RCP IE: 220.05
18" RCP
5'x6' RCBC
PLUG CONNECTION TO REMOVED 60" RCP. ABANDON DOWNSTREAM UNTIL FUTURE PHASE
RETAIN EX. CB T25 UNTIL FUTURE PHASE
RETAIN EX. 18" RCP UNTIL FUTURE PHASE
SIGN
INTERSTATE 26 WB
RETAIN EX. 5'x6' RCBC UNTIL FUTURE PHASE
REMOVE EX. 36" RCP
36" RCP
PLUG EX. 36" RCP. ABANDON DOWNSTREAM UNTIL FUTURE PHASE
RETAIN EX. 36" RCP UNTIL FUTURE PHASE
I26-NP-1125 PR. 72" SWP
XL-07 - PR. 72" SWP TRENCHLESS INSTALL REQUIRED UNDER ALL EXISTING I-26 TRAVEL LANES SEE SHEET XL07

MATCHLINE STA 371+00 SEE SHEET D10

MATCHLINE STA 376+00 SEE SHEET D12

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PEN TABLE: SCDOT_PenTable.DRAINAGE
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HDR ENGINEERING INC. OF THE CAROLINAS
1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS — No. C038 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26549 — DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

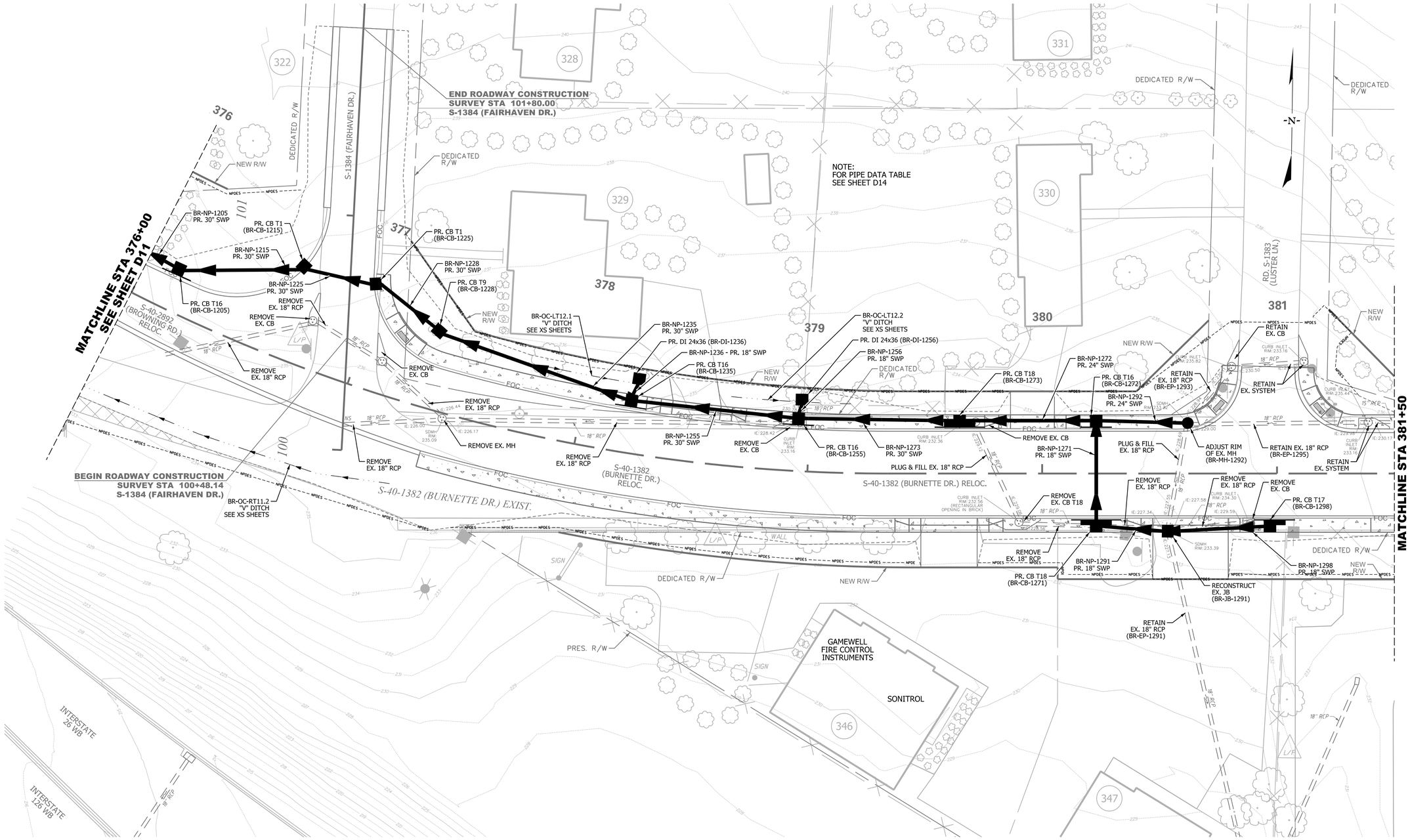
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-40-2892/1382 (BROWNING RD. / BURNETTE DR.)
DRAINAGE PLAN SHEET
STA. 371+00 TO STA. 376+00

S-40-2892/1382 SHT BR-D11

VOLUME 3

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	D12



PEN TABLE: SCDOT_PenTable_DRAINAGE
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DATE: 2026.06.22
PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
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HDR ENGINEERING INC. OF THE CAROLINAS
1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-40-2892/1382 (BROWNING RD. / BURNETTE DR.)
DRAINAGE PLAN SHEET
STA. 376+00 TO STA. 381+50

S-40-2892/1382 SHT BR-D12

VOLUME 3

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	D13

NO DRAINAGE IMPROVEMENTS THIS SHEET.

MATCHLINE STA 381+50
SEE SHEET D12

336
337
382
383
384
348
MORNINGHILL DR.
WALL
DECK
GATE
102
101
100
NEW R/W
DEDICATED R/W
CURB INLET RIM: 235.49
IE: 231.49
15" RCP
SDMH RIM (HIGH): 236.92 RIM (LOW): 236.59
RETAIN EX. SYSTEM
FOC
WALL
CURB INLET RIM: 248.23
18" RCP
SDMH RIM: 245.95
IE: 243.07
CURB INLET RIM: 247.22
IE: 243.96
S-40-1382 (BURNETTE DR.) RELOC.
NPDES
COMFORT INN
END MILL & OVERLAY
SURVEY STA 384+60.35
S-40-1382 (BURNETTE DR.) RELOC.

-N-

PLOT DRIVER: pdf-fullsize2021
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FILE: D:\BR-DRN_SHTS

DATE: 2026-06-22

PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:45:13 PM

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA — HDR ENGINEERING INC. OF THE CAROLINAS No. C038 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — No. 26549 — REGISTERED PROFESSIONAL ENGINEER — JUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-40-2892/1382 (BROWNING RD. / BURNETTE DR.)
DRAINAGE PLAN SHEET
STA. 381+50 TO STA. 384+79.44

S-40-2892/1382 SHT BR-D13

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	D14

GEOMETRY						UPSTREAM					DOWNSTREAM					FILL HEIGHT		MIN. FIELD SPT "N" BELOW INVERT	JOINT PRESSURE (PSI)	SMOOTH WALL OPTIONS					
																				HDPE	BUILT	RCP	BUILT	SRAP	BUILT
SYSTEM ID	LINK ID	DIAMETER (IN)	NO. OF BARRELS	PIPE LENGTH (FT)	SLOPE (%)	NODE	NODE DESCRIPTION	ALIGNMENT	NODE STATION	LINK INVERT (FT)	NODE	NODE DESCRIPTION	ALIGNMENT	NODE STATION	LINK INVERT (FT)	MIN (FT)	MAX (FT)			TYPE	√	HIGHEST CLASS	√	THICKEST GAGE	√
BS_2020	BR-NP-1108	24	1	54.26	0.30	BR-OEP-1108	PR. OPEN PIPE END	BROWN_3A	371+50.00	227.13	BR-JB-1126	PR. JB (60"x72")	BROWN_3A	372+05.00	226.97					N/A		III		N/A	
BS_2020	I26-NP-1125	72	1	300.58	1.67	BR-JB-1125	PR. JB (60"x108")	BROWN_3A	372+20.09	214.02	BS-OP-2020	OUTFALL	BUSH_RIVER2	59+43.24	209.00					N/A		III		N/A	
BS_2020	BR-NP-1126	66	1	108.85	3.05	BR-JB-1126	PR. JB (60"x72")	BROWN_3A	372+05.00	218.79	BR-JB-1125	PR. JB (60"x108")	BROWN_3A	372+20.09	215.47					N/A		III		N/A	
BS_2020	BR-EP-1127	60	1	60.53	1.93	BR-EXMH-1127	EX. MH	BROWN_3A	371+84.00	220.46	BR-JB-1126	PR. JB (60"x72")	BROWN_3A	372+05.00	219.29					EP		EP		EP	
BS_2020	BR-NP-1133	42	1	20.30	0.30	BR-JB-1133	PR. JB (36"x60")	BROWN_3A	372+25.00	220.94	BR-JB-1126	PR. JB (60"x72")	BROWN_3A	372+05.00	220.88					N/A		III		N/A	
BS_2020	BR-NP-1134	42	1	46.27	0.30	BR-CB-1134	PR. CB T9 (3'x5')	BROWN_3A	372+75.00	221.08	BR-JB-1133	PR. JB (36"x60")	BROWN_3A	372+25.00	220.94					N/A		III		N/A	
BS_2020	BR-NP-1137	18	1	18.74	0.30	BR-CB-1137	PR. CB T18	BROWN_3A	372+35.20	227.78	BR-JB-1133	PR. JB (36"x60")	BROWN_3A	372+25.00	227.72					N/A		III		N/A	
BS_2020	BR-NP-1138	18	1	45.80	2.45	BR-CB-1138	PR. CB T16	BROWN_3A	372+85.00	228.90	BR-CB-1137	PR. CB T18	BROWN_3A	372+35.20	227.78					N/A		III		N/A	
BS_2020	BR-NP-1155	42	1	117.84	0.30	BR-OEP-1155	PR. OPEN PIPE END	BROWN_3A	374+00.00	221.43	BR-CB-1134	PR. CB T9 (3'x5')	BROWN_3A	372+75.00	221.08					N/A		III		N/A	
BR_1170	BR-NP-1173	36	1	43.63	1.03	BR-CB-1173	PR. CB T17	BROWN_3A	375+05.00	224.45	BR-OP-1170	OUTFALL	BROWN_3A	374+70.00	224.00					S		III		16ga	
BR_1170	BR-NP-1205	30	1	102.27	0.68	BR-CB-1205	PR. CB T16	BROWN_3A	376+14.00	225.65	BR-CB-1173	PR. CB T17	BROWN_3A	375+05.00	224.95					S		III		16ga	
BR_1170	BR-NP-1215	30	1	49.96	0.90	BR-CB-1215	PR. CB T1	FAIREX	100+79.00	226.10	BR-CB-1205	PR. CB T16	BROWN_3A	376+14.00	225.65					S		III		16ga	
BR_1170	BR-NP-1225	30	1	27.78	1.26	BR-CB-1225	PR. CB T1	FAIREX	100+71.19	226.45	BR-CB-1215	PR. CB T1	FAIREX	100+79.00	226.10					N/A		III		N/A	
BR_1170	BR-NP-1228	30	1	30.13	0.73	BR-CB-1228	PR. CB T9	BROWN_3A	377+30.00	226.67	BR-CB-1225	PR. CB T1	FAIREX	100+71.19	226.45					S		III		16ga	
BR_1170	BR-NP-1235	30	1	83.29	0.30	BR-CB-1235	PR. CB T16	BROWN_3A	378+21.15	226.92	BR-CB-1228	PR. CB T9	BROWN_3A	377+30.00	226.67					N/A		III		N/A	
BR_1170	BR-NP-1236	18	1	5.78	0.30	BR-DI-1236	PR. DI 24x36	BROWN_3A	378+23.00	230.93	BR-CB-1235	PR. CB T16	BROWN_3A	378+21.15	230.91					S		III		16ga	
BR_1170	BR-NP-1255	30	1	67.49	0.30	BR-CB-1255	PR. CB T16	BROWN_3A	378+95.00	227.12	BR-CB-1235	PR. CB T16	BROWN_3A	378+21.15	226.92					N/A		III		N/A	
BR_1170	BR-NP-1256	18	1	4.16	0.30	BR-DI-1256	PR. DI 24x36	BROWN_3A	378+96.00	229.05	BR-CB-1255	PR. CB T16	BROWN_3A	378+95.00	229.04					S		III		16ga	
BR_1170	BR-NP-1271	18	1	41.00	0.30	BR-CB-1271	PR. CB T18	BROWN_3A	380+23.00	228.81	BR-CB-1272	PR. CB T16	BROWN_3A	380+23.00	228.69					N/A		III		N/A	
BR_1170	BR-NP-1272	24	1	54.15	0.55	BR-CB-1272	PR. CB T16	BROWN_3A	380+23.00	228.19	BR-CB-1273	PR. CB T18	BROWN_3A	379+64.85	227.89					N/A		III		N/A	
BR_1170	BR-NP-1273	30	1	64.60	0.41	BR-CB-1273	PR. CB T18	BROWN_3A	379+64.85	227.39	BR-CB-1255	PR. CB T16	BROWN_3A	378+95.00	227.12					N/A		III		N/A	
BR_1170	BR-NP-1291	18	1	26.58	2.94	BR-JB-1291	PR. JB	BROWN_3A	380+56.00	229.59	BR-CB-1271	PR. CB T18	BROWN_3A	380+23.00	228.81					EP		EP		EP	
BR_1170	BR-NP-1292	24	1	35.18	0.71	BR-MH-1292	ADJUST EX. MH	BROWN_3A	380+62.00	228.50	BR-CB-1272	PR. CB T16	BROWN_3A	380+23.00	228.25					N/A		III		N/A	
BR_1170	BR-EP-1293	18	1	27.86	4.20	BR-EXCB-1293	EX. CB	LUSTER	100+44.00	230.11	BR-MH-1292	ADJUST EX. MH	BROWN_3A	380+62.00	228.94					EP		EP		EP	
BR_1170	BR-EP-1295	18	1	74.17	1.32	BR-EXCB-1295	EX. CB	BROWN_3A	381+38.00	229.98	BR-MH-1292	ADJUST EX. MH	BROWN_3A	380+62.00	229.00					EP		EP		EP	
BR_1170	BR-NP-1298	18	1	39.56	0.30	BR-CB-1298	PR. CB T17	BROWN_3A	380+97.00	229.71	BR-JB-1291	PR. JB	BROWN_3A	380+56.00	229.59					N/A		III		N/A	
BS_2000	BS-EC-2001	48	1	238.78	2.01	BS-HW-2001	PR. HEADWALL (4'x8' RCBC)	BROWN_3A	373+67.76	207.79	BS-OP-2000	OUTFALL	BUSH_RIVER2	58+98.61	203.00					N/A		RCBC		N/A	

PLOT DRIVER: pdf-fullsize2021
USER: DHUGHEY
FILE: D-BR-TBL
DATE: 2026.06.22
PEN TABLE: SCDOT_PenTable_DRAINAGE
TIME: 12:45:16 PM

HDR ENGINEERING INC.
OF THE CAROLINAS
1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

HDR ENGINEERING INC. OF THE CAROLINAS No. C0318 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26549 DUSTIN P. HUGHEY

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-40-2892/1382 (BROWNING RD. / BURNETTE DR.)

DRAINAGE PIPE DATA TABLE

S-40-2892/1382 SHT D-BR-TBL

VOLUME 3

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	XL07

NOTES:

1. FOR PIPE DATA TABLE, SEE SHEET D14.

PR. CB T9 (3'x5')
(BR-CB-1134)

PRES. R/W

PR. CB T16
(BT-CB-1138)

BR-NP-1134
PR. 42" SWP

BR-NP-1138
PR. 18" SWP

NEW R/W

BR-NP-1137
PR. 18" SWP

PR. JB (36"x60")
(BR-JB-1133)

BR-NP-1133
PR. 42" SWP

CUT EX. 60" CMP FOR PLACEMENT OF PR. JB (60"x72")
(BR-JB-1126)

RETAIN EX. MH
(BR-EXMH-1127)

RETAIN
EX. 60" CMP
(BR-EP-1127)

BR-NP-1108
PR. 24" SWP

PR. CB T18
(BR-CB-1137)

REMOVE
EX. 60" CMP

REMOVE
EX. DI

BR-NP-1126
PR. 66" SWP

BR-OC-RT11.2
"V" DITCH
SEE XS SHEETS

RETAIN EX. 5'x6' RCBC
UNTIL FUTURE PHASE

REMOVE
EX. 60" RCP

PLUG CONNECTION
TO REMOVED 60" RCP.
ABANDON DOWNSTREAM
UNTIL FUTURE PHASE

RETAIN EX. CB T25
UNTIL FUTURE PHASE

BR-OC-RT11.2
"V" DITCH SS=2:1
US I.E.=223.56
DS I.E.=223.40

BR-NP-1125
PR. 72" SWP

APPROX. J&B
RECEIVING PIT

PR. CB T9 (7'x7')
W/ WEIR OPEN TO DITCH
(BR-CB-1124)

REMOVE EX. CB
& EX. 15" RCPs

RETAIN EX. I-26
MEDIAN SYSTEM
UNTIL FUTURE PHASE

XL-07 - PR. 72" SWP
TRENCHLESS INSTALL
REQUIRED UNDER ALL
EXISTING I-26 TRAVEL LANES

BS-NP-2021
PR. 72" RCP

PLUG EX. 24" RCP.
ABANDON DOWNSTREAM
UNTIL FUTURE PHASE.

APPROX. J&B
LAUNCH PIT

REMOVE
EX. 24" RCP

REMOVE
EX. DI

REMOVE
EX. 24" RCP

REMOVE EX. SYSTEM
GRADE TO DRAIN

PROPOSED
GRADING

BS-OP-2020
OUTFALL*

BS-OP-RT20.0
"V DITCH"

PLAN MATCHLINE
SEE SHEET XL08 TOP LEFT

BR-OC-RT11.1
"V" DITCH
SEE XS SHEETS

BR-OC-LT11.1
"V" DITCH
SEE XS SHEETS

RETAIN EX. 18" RCP
UNTIL FUTURE PHASE

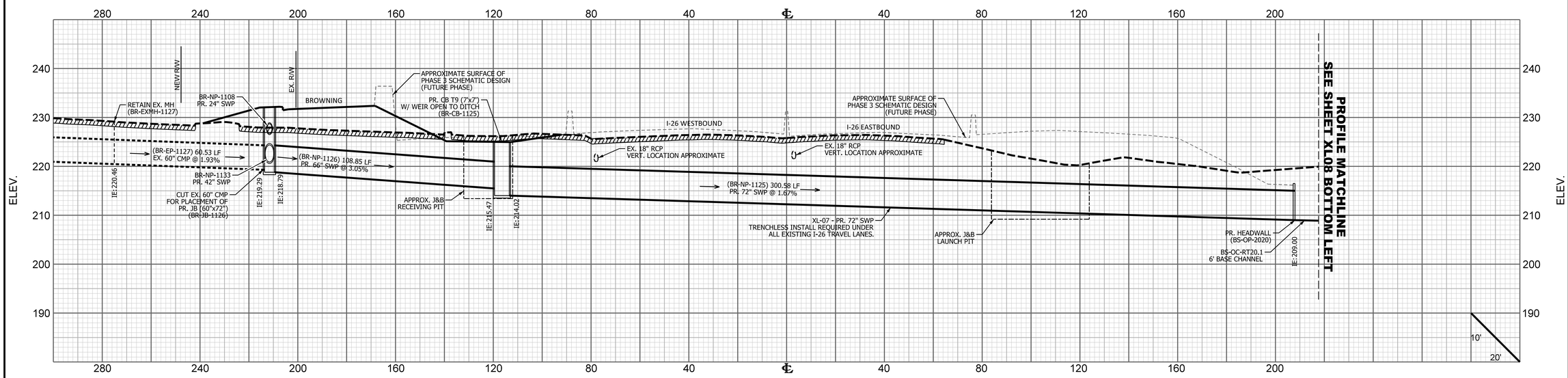
S-40-2893 (BROWNING RD.) RELOC.

EX. BROWNING RD.

INTERSTATE 26 WB

INTERSTATE 26 EB

LOOP FROM
BUSH RIVER RD.
TO I-26 EB



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USER: DHUGHEY
FILE: D-BR-XL

PEN TABLE: SCDOT_PenTable_DRAINAGE
DATE: 2026.06-22
TIME: 12:45:27 PM

HDR ENGINEERING INC.
OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

SOUTH CAROLINA
HDR ENGINEERING INC.
OF THE CAROLINAS
No. C038
CERTIFICATE OF AUTHORIZATION

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PLAN SCALE 1" = 20'
CROSS-SECTION SCALE:
H:1" = 20' V:1" = 10'

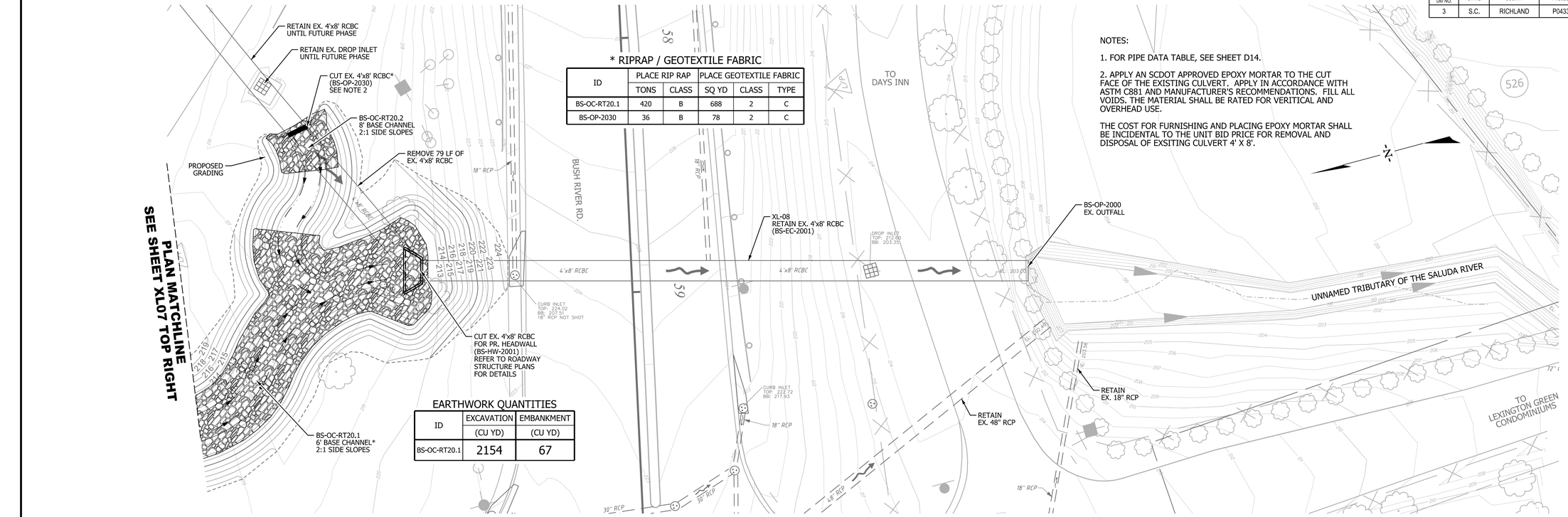
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-40-2892/1382 (BROWNING RD. / BURNETTE DR.)
DRAINAGE CROSS-LINE SHEET
XL-07 (JACK & BORE 72" SWP)
CROSSING I-26 AT STA. 364+41.53

S-40-2892/1382 SHT BR-XL07

VOLUME 3

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	XL08



* RIPRAP / GEOTEXTILE FABRIC

ID	PLACE RIP RAP		PLACE GEOTEXTILE FABRIC		
	TONS	CLASS	SQ YD	CLASS	TYPE
BS-OC-RT20.1	420	B	688	2	C
BS-OP-2030	36	B	78	2	C

EARTHWORK QUANTITIES

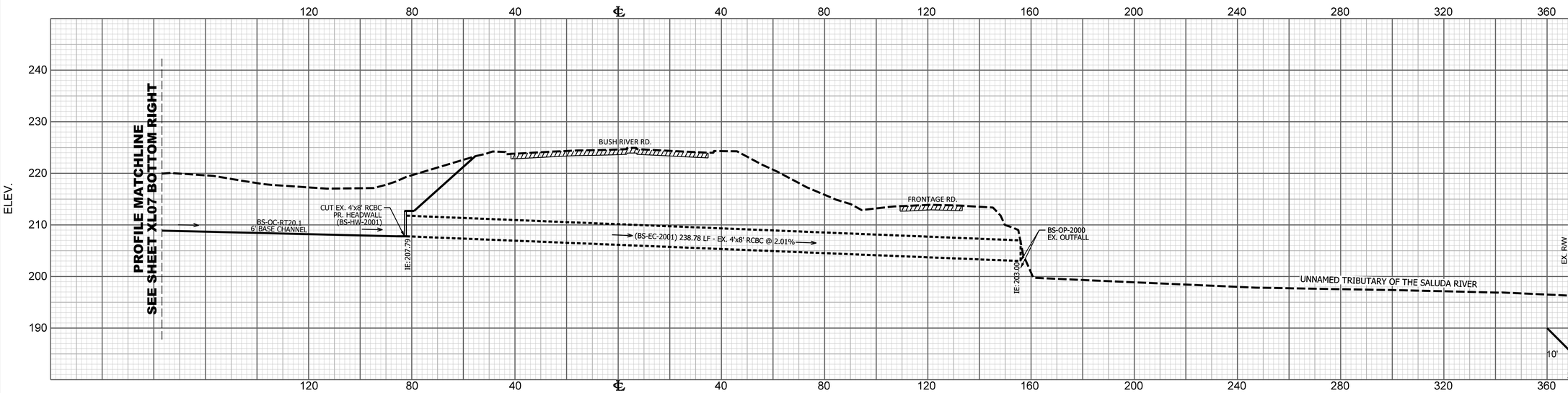
ID	EXCAVATION (CU YD)	EMBANKMENT (CU YD)
BS-OC-RT20.1	2154	67

NOTES:

1. FOR PIPE DATA TABLE, SEE SHEET D14.

2. APPLY AN SCDOT APPROVED EPOXY MORTAR TO THE CUT FACE OF THE EXISTING CULVERT. APPLY IN ACCORDANCE WITH ASTM C881 AND MANUFACTURER'S RECOMMENDATIONS. FILL ALL VOIDS. THE MATERIAL SHALL BE RATED FOR VERITICAL AND OVERHEAD USE.

THE COST FOR FURNISHING AND PLACING EPOXY MORTAR SHALL BE INCIDENTAL TO THE UNIT BID PRICE FOR REMOVAL AND DISPOSAL OF EXSITING CULVERT 4' X 8'.



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SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26549 — DUSTIN P. HUGHEY

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CROSS-SECTION SCALE:
H:1" = 20' V:1" = 10'

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-40-2892/1382 (BROWNING RD. / BURNETTE DR.)
DRAINAGE CROSS-LINE SHEET
XL-08 (RETAIN EX. 4'x8' RCBC)
CROSSING BUSH RIVER RD. AT STA. 58+91.55

S-40-2892/1382 SHT BR-XL08

VOLUME 3

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	EC1

GENERAL CONSTRUCTION NOTES (EROSION CONTROL PLANS)

EROSION CONTROL NOTES

1. IF NECESSARY, SLOPES, WHICH EXCEED EIGHT (8) VERTICAL FEET SHOULD BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS, IN ADDITION TO HYDROSEEDING. IT MAY BE NECESSARY TO INSTALL TEMPORARY SLOPE DRAINS DURING CONSTRUCTION. TEMPORARY BERMS MAY BE NEEDED UNTIL THE SLOPE IS BROUGHT TO GRADE.

2. STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN FOURTEEN (14) DAYS AFTER WORK HAS CEASED, EXCEPT AS STATED BELOW.

   A. WHERE STABILIZATION BY THE 14TH DAY IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS, STABILIZATION MEASURES MUST BE INITIATED AS SOON AS PRACTICABLE.

   B. WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH-DISTURBING ACTIVITIES WILL BE RESUMED WITHIN 14 DAYS, TEMPORARY STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE.

3. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED ONCE EVERY CALENDAR WEEK. IF PERIODIC INSPECTION OR OTHER INFORMATION INDICATES THAT A BMP HAS BEEN INAPPROPRIATELY OR INCORRECTLY INSTALLED, THE PERMITTEE MUST ADDRESS THE NECESSARY REPLACEMENT OR MODIFICATION REQUIRED TO CORRECT THE BMP WITHIN 48 HOURS OF IDENTIFICATION.

4. PROVIDE SILT FENCE AND/OR OTHER CONTROL DEVICES, AS MAY BE REQUIRED, TO CONTROL SOIL EROSION DURING UTILITY CONSTRUCTION. ALL DISTURBED AREAS SHALL BE CLEANED, GRADED, AND STABILIZED WITH GRASSING IMMEDIATELY AFTER THE UTILITY INSTALLATION. FILL, COVER, AND TEMPORARY SEEDING AT THE END OF EACH DAY ARE RECOMMENDED. IF WATER IS ENCOUNTERED WHILE TRENCHING, THE WATER SHOULD BE FILTERED TO REMOVE ANY SEDIMENTS BEFORE BEING PUMPED BACK INTO ANY WATERS OF THE STATE.

5. ALL EROSION CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.

6. THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO PAVED ROADWAY(S) FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM PAVEMENT, AS MAY BE REQUIRED.

7. RESIDENTIAL SUBDIVISIONS REQUIRE EROSION CONTROL FEATURES FOR INFRASTRUCTURE AS WELL AS FOR INDIVIDUAL LOT CONSTRUCTION. INDIVIDUAL PROPERTY OWNERS SHALL FOLLOW THESE PLANS DURING CONSTRUCTION OR OBTAIN APPROVAL OF AN INDIVIDUAL PLAN IN ACCORDANCE WITH S.C REG. 72-300 ET SEQ. AND SCR160000.

8. TEMPORARY DIVERSION BERMS AND/OR DITCHES WILL BE PROVIDED AS NEEDED DURING CONSTRUCTION TO PROTECT WORK AREAS FROM UPSLOPE RUNOFF AND/OR TO DIVERT SEDIMENT-LADEN WATER TO APPROPRIATE TRAPS OR STABLE OUTLETS.

9. ALL WATERS OF THE STATE (WOS), INCLUDING WETLANDS, ARE TO BE FLAGGED OR OTHERWISE CLEARLY MARKED IN THE FIELD. A DOUBLE ROW OF SILT FENCE IS TO BE INSTALLED IN ALL AREAS WHERE A 50-FOOT BUFFER CAN NOT BE MAINTAINED BETWEEN THE DISTURBED AREA AND ALL WOS. A 10-FOOT BUFFER SHOULD BE MAINTAINED BETWEEN THE LAST ROW OF SILT FENCE AND ALL WOS.

10. LITTER, CONSTRUCTION DEBRIS, OILS, FUELS, AND BUILDING PRODUCTS WITH SIGNIFICANT POTENTIAL FOR IMPACT (SUCH AS STOCKPILES OF FRESHLY TREATED LUMBER) AND CONSTRUCTION CHEMICALS THAT COULD BE EXPOSED TO STORM WATER MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE IN STORM WATER DISCHARGES.

11. A COPY OF THE SWPPP, INSPECTIONS RECORDS, AND RAINFALL DATA MUST BE RETAINED AT THE CONSTRUCTION SITE OR A NEARBY LOCATION EASILY ACCESSIBLE DURING NORMAL BUSINESS HOURS, FROM THE DATE OF COMMENCEMENT OF CONSTRUCTION ACTIVITIES TO THE DATE THAT FINAL STABILIZATION IS REACHED.

12. INITIATE STABILIZATION MEASURES ON ANY EXPOSED STEEP SLOPE (3H:1V OR GREATER) WHERE LAND-DISTURBING ACTIVITIES HAVE PERMANENTLY OR TEMPORARILY CEASED, AND WILL NOT RESUME FOR A PERIOD OF 7 CALENDAR DAYS.

13. MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL.

14. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM EQUIPMENT AND VEHICLE WASHING, WHEEL WASH WATER, AND OTHER WASH WATERS. WASH WATERS MUST BE TREATED IN A SEDIMENT BASIN OR ALTERNATIVE CONTROL THAT PROVIDES EQUIVALENT OR BETTER TREATMENTS PRIOR TO DISCHARGE.

15. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM DEWATERING OF TRENCHES AND EXCAVATED AREAS. THESE DISCHARGES ARE TO BE ROUTED THROUGH APPROPRIATE BMPS (SEDIMENT BASIN, FILTER BAG, ETC.).

16. THE FOLLOWING DISCHARGES FROM SITES ARE PROHIBITED:

   A. WASTEWATER FROM WASHOUT OF CONCRETE, UNLESS MANAGED BY AN APPROPRIATE CONTROL;

   B. WASTEWATER FROM WASHOUT AND CLEANOUT OF STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS;

   C. FUELS, OILS, OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE; AND

   D. SOAPS OR SOLVENTS USED IN VEHICLE AND EQUIPMENT WASHING.

17. AFTER CONSTRUCTION ACTIVITIES BEGIN, INSPECTIONS MUST BE CONDUCTED AT A MINIMUM OF AT LEAST ONCE EVERY CALENDAR WEEK AND MUST BE CONDUCTED UNTIL FINAL STABILIZATION IS REACHED ON ALL AREAS OF THE CONSTRUCTION SITE.

18. IF EXISTING BMPS NEED TO BE MODIFIED OR IF ADDITIONAL BMPS ARE NECESSARY TO COMPLY WITH THE REQUIREMENTS OF THIS PERMIT AND/OR SC $^{5}/_{32}$S WATER QUALITY STANDARDS, IMPLEMENTATION MUST BE COMPLETED BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE. IF IMPLEMENTATION BEFORE THE NEXT STORM EVENT IS IMPRACTICABLE, THE SITUATION MUST BE DOCUMENTED IN THE SWPPP AND ALTERNATIVE BMPS MUST BE IMPLEMENTED AS SOON AS REASONABLY POSSIBLE.

19. A PRE-CONSTRUCTION CONFERENCE MUST BE HELD FOR EACH CONSTRUCTION SITE WITH AN APPROVED ON-SITE SWPPP PRIOR TO THE IMPLEMENTATION OF CONSTRUCTION ACTIVITIES. FOR NON-LINEAR PROJECTS THAT DISTURB 10 ACRES OR MORE THIS CONFERENCE MUST BE HELD ON-SITE UNLESS THE DEPARTMENT HAS APPROVED OTHERWISE.

SEDIMENT & EROSION CONTROL CONSTRUCTION SEQUENCE

1. ESTABLISH LIMITS OF DISTUBANCE / CONSTRUCTION.
2. INSTALL TEMPORARY CONSTRUCTION ENTRANCE(S) PER SCDOT STD. 815-505-00.
3. INSTALL SILT FENCE AS SHOWN ON THE EROSION CONTROL PLANS AND PER SCDOT STD. 815-605-00.
4. INSTALL SEDIMENT TUBES IN EXISTING DITCHES PER SCDOT STD. 815-205-00.
5. CLEAR AND GRUB SITE.
6. ROUGH GRADE PROPOSED DITCHES AND INSTALL SEDIMENT TUBES PER SCDOT STD. 815-205-00 AND AS DETAILED ON PLAN SHEET EC1.
7. INSTALL PROPOSED STORM DRAINAGE SYSTEMS AS SHOWN ON THE DRAINAGE PLANS.
8. INSTALL INLET STRUCTURE FILTERS AT ALL STORM DRAINAGE STRUCTURES PER SCDOT STD. 815-002-00 AND 815-006-00 AND AS SHOWN ON THE EROSION CONTROL PLANS.
9. PLACE RIP RAP AT PIPE OUTLETS AS SHOWN IN THE PLANS.
10. FINE GRADE TO PROPOSED GRADES SHOWN IN THE PLANS AND CROSS SECTIONS.
11. TEMPORARY SEED ALL DISTURBED AREAS AS DESCRIBED IN SCDOT STANDARD SPECIFICATION SECTION 810 FOR SEEDING.
12. FINE GRADE ALL DITCHES AND BACK SLOPES.
13. LINE PROPOSED DITCHES WITH TEMPORARY EROSION CONTROL BLANKET AS SHOWN ON SHEET EC1 AND PER SCDOT STANDARD SPECIFICATION 815-605-00.
14. PERMANENT SEED ALL DISTURBED AREAS AS DESCRIBED IN SCDOT STANDARD SPECIFICATION SECTION 810 FOR SEEDING.
15. ONCE THE SITE IS STABILIZED, REMOVE ALL TEMPORARY EROSION CONTROL DEVICES.
16. PERMANENT SEED ALL AREAS WHERE EROSION CONTROL DEVICES WERE REMOVED AS DESCRIBED IN SCDOT STANDARD SPECIFICATION SECTION 810 FOR SEEDING.

CONSTRUCTION SEQUENCE NOTES

IF NPDES COVERAGE IS BEING ISSUED AFTER LAND-DISTURBING ACTIVITIES HAVE ALREADY STARTED (E.G. IN RESPONSE TO A NOTICE TO COMPLY, NOTICE OF VIOLATION, OR ENFORCEMENT ACTION), THEN THE CONSTRUCTION SEQUENCE MUST SPECIFICALLY INDICATE THE ITEMS THAT HAVE ALREADY OCCURRED AND THE ITEMS THAT WILL BE OCCURING AFTER NPDES COVERAGE IS ISSUED.

IF FLOWS FROM OFFSITE AREAS WILL BE DIVERTED AROUND THE SITE AND THE ON-SITE STRUCTURES ARE NOT DESIGNED TO HANDLE FLOWS FROM OFFSITE AREAS, THE DIVERSIONS/PIPING FOR THE OFFSITE FLOWS MUST BE INSTALLED BEFORE LAND-DISTURBING ACTIVITIES BEGIN ON THE SITE. SEDIMENT AND EROSION CONTROL MEASURES FOR THE DISTURBED AREAS FOR THE DIVERSION/PIPING MUST BE INSTALLED BEFORE THOSE AREAS ARE DISTURBED AND SHOULD BE SHOWN ON THE PLANS.

MAINTENANCE OF SEDIMENT AND EROSION CONTROL MEASURES MUST CONTINUE UNTIL THE SITE IS PERMANENTLY STABILIZED AND THE CONTROLS ARE REMOVED.

CONSTRUCTION NOTES

1. CLEARING AND GRUBBING
THE CONTRACTOR WILL BE REQUIRED TO CLEAR ALL AREAS NECESSARY FOR THE CONSTRUCTION OF ANY SEDIMENT CONTROL STRUCTURES AND INSTALL THE SEDIMENT CONTROL STRUCTURES AND ALL OTHER PERIMETER EROSION CONTOL MEASURES PRIOR TO CLEARING AND GRUBBING ACTIVITIES.

2. SEEDING
SEEDING SHALL BE ACCOMPLISHED ACCORDING TO S.C.D.O.T. SUPPLEMENTAL TECHNICAL SPECIFICATION "SEEDING-SC-M-810 (LATEST EDITION)."

3. EROSION CONTROL MEASURES
ALL EROSION CONTROL MEASURES ON THIS PROJECT SHALL BE IMPLEMENTED AS DETAILED ON THE PLANS. SILT FENCE AND OTHER EROSION CONTROL FEATURES SHALL BE IN PLACE PRIOR TO GROUND DISTURBING ACTIVITY BEGINS. EROSION CONTROL MEASURES SHALL BE IMPLEMENTED DURING ALL STAGES OF CONSTRUCTION.

4. PERIMETER EROSION CONTROL DEVICES
SILT FENCE MAY BE PLACED AT LOCATIONS WHERE SEDIMENT LEAVES THE PROJECT LIMITS ESPECIALLY AT THE TOE OF FILL SLOPES THAT SLOPE AWAY FROM THE PROJECT. SILT FENCE SHALL NOT BE PLACED IN A POSITION SUCH THAT IT BLOCKS DRIVEWAYS OR POINTS OF ACCESS TO PROPERTY.

5. INSPECTION AND IMPLEMENTATION
ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE NPDES GENERAL CONSTRUCTION PERMIT. STABILIZATION MEASURES SHALL BE IMPLEMENTED AS SOON AS PRACTICABLE WITHIN THE ALLOWABLE TIME FRAME STATED WITHIN THE NPDES GENERAL CONSTRUCTION PERMIT IN PORTIONS OF THE SITE WHERE ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL FINAL STABILIZATION HAS BEEN OBTAINED.

6. BARRIER FENCE
THE CONSTRACTOR SHALL INSTALL AND MAINTAIN A BARRIER FENCE TO MARK ALL BOUNDARIES OF JURISDICTIONAL WATERS OF THE STATE, CULTURAL RESOURCE AREAS, AND OTHER ENVIRONMENTAL SENSITIVE AREAS WITHIN THE PROJECT CORRIDOR. THE FENCE AND FLAGGING SHALL BE PLACED PRIOR TO ANY LAND DISTURBANCE ACTIVITIES. REFER TO THE PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION. THE CONTRACTOR SHALL MAINTAIN BARRIER FENCE FOR THE DURATION OF THE PROJECT AS DETERMINED BY THE RESIDENT CONSTRUCTION ENGINEER.

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S-40-2892/1382 (BROWNING RD. / BURNETTE DR.)

EROSION CONTROL NOTES

S-40-2892/1382 SHT EC-BR-NOTES

PLOT DRIVER: pdf-fullsize2021
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3	S.C.	RICHLAND	P043328	S-40-2892 S-40-1382	EC2

SCDOT
South Carolina Department of Transportation

EROSION CONTROL DATA SHEET

RECEIVING WATERS

ROAD / ROUTE	OUTFALL DITCH STATION	OUTFALL DITCH SIDE	NAME OF RECEIVING WATERS	NAME OF ULTIMATE RECEIVING WATERS
BROWNING RD	380+87	RT	TRIBUTARY SR-1	SALUDA RIVER
S-40-2892				
BUSH_RIVER RD	59+11	LT	UNNAMED TRIBUTARY	SALUDA RIVER
S-31				

SOIL TYPES

ROAD / ROUTE	STATION TO STATION		SOIL PARTICLE SIZE (COARSE / FINE)	ZONE
BROWNING RD	357+53	384+60	COARSE	SANDHILLS
S-40-2892				

TEMPORARY EROSION CONTROL BLANKET

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF BLANKET (FT)	DITCH BOTTOM WIDTH (FT)	SLOPES x : 1 FRONT	SLOPES x : 1 BACK	MSY
BROWNING	363+50	366+05	LT	2	0	2.0	4.0	0.360
BROWNING	369+80	371+50	LT	2	0	2.0	4.0	0.240
BROWNING	377+45	378+20	LT	1	0	2.0	2.0	0.037
BROWNING	378+55	378+95	LT	1	0	2.0	2.0	0.020
BROWNING	364+80	372+20	RT	1	0	6.0	10.0	1.326
BROWNING	372+20	377+35	RT	1.5	0	4.0	2.0	0.546
BROWNING*	362+80	364+50	LT	10	0	4.0		0.779
BROWNING*	364+50	365+50	LT	7	0	4.0		0.321
BROWNING*	373+00	374+00	LT	6	0	4.0		0.275
BROWNING*	374+00	375+00	LT	8	0	4.0		0.366
BROWNING*	372+00	375+50	RT	8	0	4.0		1.283
*EC BLANKET FOR FILL SLOPES ONLY							TOTAL	5.554

SEDIMENT TUBES IN DITCHES

ROAD / ROUTE	STATION TO STATION		SIDE	AVERAGE LENGTH	SPACING (FT)	TOTAL	COMMENTS
BROWNING	355+00	362+50	LT	12	50	192	
BROWNING	363+50	366+05	LT	12	150	36	
BROWNING	366+75	369+35	LT	10	75	50	
BROWNING	369+80	371+50	LT	12	150	36	
BROWNING	374+00	374+70	LT	12	50	36	
BROWNING	374+70	376+00	LT	12	25	84	
BROWNING	377+45	378+20	LT	8	100	16	
BROWNING	378+55	378+95	LT	8	150	16	
BROWNING	358+50	363+50	RT	12	50	132	
BROWNING	364+80	372+20	RT	24	150	144	
BROWNING	372+19	372+20	RT	10	150	10	
BROWNING	372+20	377+35	RT	10	150	50	

C

Appendix C:
Drainage Design Criteria

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

Drainage Design Criteria for: Primary Road, High Volume, Design Speed > 45 mph

Interstate 26 & Interstate 20

			Design Criteria	Requirements For Hydraulic Design Studies Section
Floodway - Floodplain Requirements	Maximum Elevation Increase		1.0' Above Natural 100-Year Flood Profile	1.1.2
Recommended Freeboard For Road Subgrades			1' Above Design High-Water Level	2.2.1
Cross-Line Pipes	Design Peak Discharge		50-Year Peak Discharge	2.2.2
Storm Drains and Roadside Ditches	Design Storm by Drainage Area	0 - 40 AC	10-Year	2.2.3
		40 AC - 500 AC	25-Year	
		> 500 AC	50-Year	
Type 16, 17, and 18 Inlet On-Grade Spacing		Maximum	900'	2.2.4
		Minimum	150'	
Inlets In Grassed Medians	Maximum Spacing		750'	
	Maximum 10-Year High Water		Below Edge Of Shoulder	
Allowable Spread	Roadway (On-Grade)	Design Storm	10-Year	2.2.4 Table 2
		Spread	Shoulder	
	Roadway (Sag Point)	Design Storm	50-Year	
		Spread	Shoulder + 3 ft	
	Bridge (On-Grade)	Design Storm	10-Year	SCDOT Bridge Design Manual Sec. 18.2.3.4 Figure 18.2-1
		Spread	Shoulder	
	Bridge (Sag Point)	Design Storm	50-Year	
		Spread	Shoulder + 3 ft	
Minimum Grades (%)		Pipe	0.3	2.2.5
		Ditch	0.3	
Minimum Pipe Discharge Velocity (ft/sec)			3	
Minimum Pipe Size (in)	Storm Drainage Systems & Cross-Line Pipes		18	2.2.6
	Yard Drains & Driveway Pipes		15	
Storm Drain System Design Flow Depth			0.94 x Pipe Diameter	2.2.9
Hydrologic Method	Method by Drainage Area	0 - 100 AC	Rational (Minimum T_C = 5 Minutes)	2.2.15.1
		100 AC - 640 AC	NRCS WinTR-55	2.2.15.2
		> 640 AC	USGS Regression Equations	2.2.15.3
Design Ratio of Headwater to Culvert Barrel Height			1.2	2.3 (Step 6, Sec. D, pg. 61)
Minimum Cover (ft)	Yard Drains		1.0	SCDOT Standard Drawings
	Pipes Except Yard Drains		2.0	

Drainage Design Criteria for: Secondary Road, Collector, Design Speed≤ 45 mph

Berryhill Rd., Browning Rd., Burning Tree Dr., Fernandina Rd. (NE of Beatty Rd.)

			Design Criteria	Requirements For Hydraulic Design Studies Section
Floodway - Floodplain Requirements	Maximum Elevation Increase		1.0' Above Natural 100-Year Flood Profile	1.1.2
Recommended Freeboard For Road Subgrades			1' Above Design High-Water Level	2.2.1
Cross-Line Pipes	Design Peak Discharge		25-Year Peak Discharge	2.2.2
Storm Drains and Roadside Ditches	Design Storm by Drainage Area	0 - 40 AC	10-Year	2.2.3
		40 AC - 500 AC	25-Year	
		> 500 AC	50-Year	
Type 16, 17, and 18 Inlet On-Grade Spacing		Maximum	900'	2.2.4
		Minimum	150'	
Inlets In Grassed Medians	Maximum Spacing		750'	
	Maximum 10-Year High Water		Below Edge Of Shoulder	
Allowable Spread	Roadway (On-Grade)	Design Storm	10-Year	2.2.4 Table 2
		Spread	1/2 Driving Lane	
	Roadway (Sag Point)	Design Storm	10-Year	
		Spread	1/2 Driving Lane	
	Bridge (On-Grade)	Design Storm	10-Year	SCDOT Bridge Design Manual Sec. 18.2.3.4 Figure 18.2-1
		Spread	1/2 Driving Lane	
	Bridge (Sag Point)	Design Storm	10-Year	
		Spread	1/2 Driving Lane	
Minimum Grades (%)		Pipe	0.3	2.2.5
		Ditch	0.3	
Minimum Pipe Discharge Velocity (ft/sec)			3	
Minimum Pipe Size (in)	Storm Drainage Systems & Cross-Line Pipes		18	2.2.6
	Yard Drains & Driveway Pipes		15	
Storm Drain System Design Flow Depth			0.94 x Pipe Diameter	2.2.9
Hydrologic Method	Method by Drainage Area	0 - 100 AC	Rational (Minimum T_C = 5 Minutes)	2.2.15.1
		100 AC - 640 AC	NRCS WinTR-55	2.2.15.2
		> 640 AC	USGS Regression Equations	2.2.15.3
Design Ratio of Headwater to Culvert Barrel Height			1.2	2.3 (Step 6, Sec. D, pg. 61)
Minimum Cover (ft)	Yard Drains		1.0	SCDOT Standard Drawings
	Pipes Except Yard Drains		2.0	

D

Appendix D:
Basin Delineation Maps

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ID	A (Ac)	Curve Number	T_c (hr)
BR-EXMH-1127	122.08	71.10	1.56
BS-HW-2001	179.70	679.90	1.62

ID	A (Ac)	C Value	T_c (min)
BR-OEP-1155	38.69	0.42	116

BROAD RIVER RD.
I-20 WB
I-20 EB
GALE DR.
BR-OEP-1155
MORNINGHILL DR.
LUSTER LN.
BURNETTE DR. EX.
BURNETTE DR. RELOC.
FAIRHAVEN DR.
BUSH RIVER RD.
I-126 WB
I-126 EB
BS-HW-2001
SR-1
BR-EXMH-1127
XL-07
XL-08
UNNAMED TRIBUTARY OF THE SALUDA RIVER
BROWNING RD. RELOC.
BROWNING RD. EX.
ZIMALCREST DR.
BUSH RIVER RD.
I-26 WB
I-26 EB
RAMP TO I-26 WB
I-20 EB
I-20 WB
BURNING TREE DR. EX.
BURNING TREE DR. RELOC.
N

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SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

CAROLINA CROSSROADS - P3A

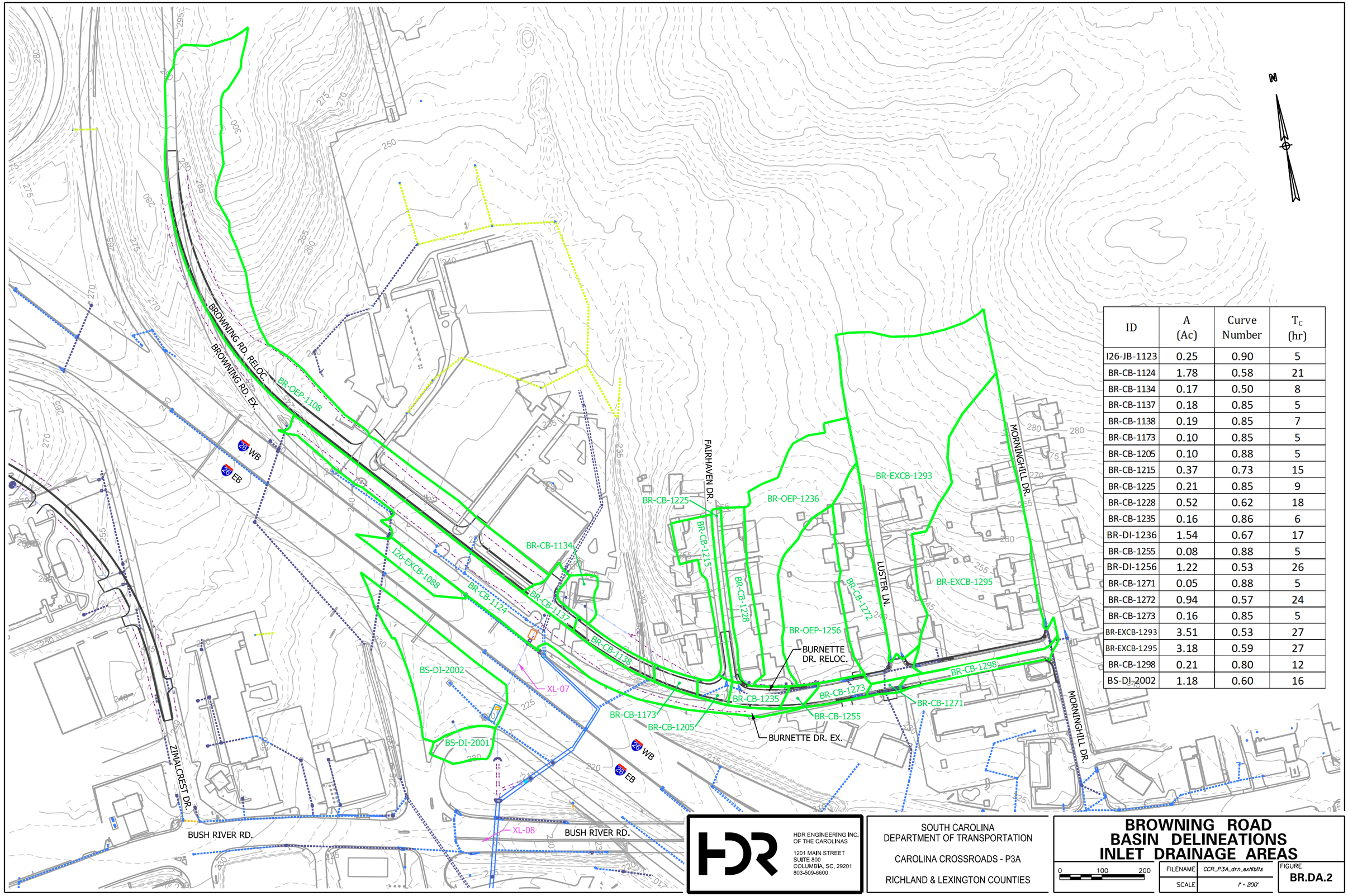
RICHLAND & LEXINGTON COUNTIES

BROWNING ROAD MAJOR BASIN DELINEATIONS INLET DRAINAGE AREAS

0 200 400

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 400'

FIGURE
BR.DA.1



ID	A (Ac)	Curve Number	T_C (hr)
I26-JB-1123	0.25	0.90	5
BR-CB-1124	1.78	0.58	21
BR-CB-1134	0.17	0.50	8
BR-CB-1137	0.18	0.85	5
BR-CB-1138	0.19	0.85	7
BR-CB-1173	0.10	0.85	5
BR-CB-1205	0.10	0.88	5
BR-CB-1215	0.37	0.73	15
BR-CB-1225	0.21	0.85	9
BR-CB-1228	0.52	0.62	18
BR-CB-1235	0.16	0.86	6
BR-DI-1236	1.54	0.67	17
BR-CB-1255	0.08	0.88	5
BR-DI-1256	1.22	0.53	26
BR-CB-1271	0.05	0.88	5
BR-CB-1272	0.94	0.57	24
BR-CB-1273	0.16	0.85	5
BR-EXCB-1293	3.51	0.53	27
BR-EXCB-1295	3.18	0.59	27
BR-CB-1298	0.21	0.80	12
BS-DI-2002	1.18	0.60	16

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BROWNING ROAD BASIN DELINEATIONS INLET DRAINAGE AREAS

0 100 200

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 200'

FIGURE **BR.DA.2**

BROWNING RD. EX.

BROWNING RD. RELOC.

XL-07

BR-OC-LT11.2

BR-OC-LT11.3

BURNETTE DR. RELOC.

BURNETTE DR. EX.

LUSTER LN.

MORNINGHILL DR.

STATLER RD.

FAIRHAVEN DR.

BUSH RIVER RD.

RAMP FROM I-26 WB

RAMP FROM I-26 WB

I-26 EB

I-26 WB

I-20 EB

I-20 WB

ID	A (Ac)	C Value	T_C (min)
BR-OC-LT11.2	33.82	0.42	116
BR-OC-LT11.3	4.87	0.62	26

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BROWNING ROAD MAJOR BASIN DELINEATIONS DITCH DRAINAGE AREAS

0 100 200

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 200'

FIGURE
BR.DA.3

ID	A (Ac)	C Value	T_C (min)
BR-OC-LT09.1	2.08	0.42	12
BR-OC-LT09.2	2.25	0.42	13
BR-OC-LT10.1	2.79	0.58	15
BR-OC-LT10.2	3.36	0.56	16
BR-OC-LT11.1	3.71	0.58	17
BR-OC-LT11.4	0.30	0.42	16
BR-OC-LT12.1	0.05	0.52	7
BR-OC-LT12.2	0.07	0.53	9
BR-OC-RT09.1	0.95	0.41	16
BR-OC-RT11.1	1.00	0.51	19
BR-OC-RT11.2	0.61	0.52	17
BR-OC-RT11.3	1.64	0.52	20
BS-OC-RT20.2	1.67	0.76	12

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BROWNING ROAD BASIN DELINEATIONS DITCH DRAINAGE AREAS

0 100 200

FILENAME	CCR_P3A_drn_exhbits
SCALE	1" = 200'

FIGURE
BR.DA.4

E

Appendix E:

NRCS Basin Flow Interpolation Calculations

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Project:	Carolina Crossroads - Phase 3A	**By:**	DPH	**Date:**	15-Apr-26
Location:	Richland County, SC	**Checked:**	AK	**Date:**	16-Apr-26

NRCS Peak Flow Interpolation Calculations - Browning Road

				Minimum Interpolation Values			Actual Values			Maximum Interpolation Values		
Basin ID		Area (ac)	Time of Concen-tration (hr)	C Value	Design Storm Event	Discharge (cfs)	C Value	Design Storm Event	Discharge (cfs)	C Value	Design Storm Event	Discharge (cfs)
BR-EXMH-1127	POST	122.08	1.56	71.0	2-Year	67.69	71.1	2-Year	70.90	72.0	2-Year	71.26
					5-Year	108.23		5-Year	112.06		5-Year	112.48
					10-Year	148.66		10-Year	152.86		10-Year	153.33
					25-Year	201.72		25-Year	206.41		25-Year	206.93
					50-Year	248.53		50-Year	253.54		50-Year	254.10
					100-Year	296.24		100-Year	300.52		100-Year	301.00
BS-HW-2001	POST	179.70	1.62	67.0	2-Year	77.82	67.9	2-Year	81.90	68.0	2-Year	82.35
					5-Year	131.55		5-Year	137.08		5-Year	137.69
					10-Year	185.96		10-Year	192.37		10-Year	193.08
					25-Year	259.01		25-Year	265.90		25-Year	266.67
					50-Year	324.38		50-Year	331.83		50-Year	332.66
					100-Year	391.18		100-Year	399.08		100-Year	399.96
AP-60.0	PRE	210.77	1.64	71.0	2-Year	112.97	71.4	2-Year	115.33	72.0	2-Year	118.88
					5-Year	181.21		5-Year	184.07		5-Year	188.35
					10-Year	248.17		10-Year	251.32		10-Year	256.04
					25-Year	336.87		25-Year	340.32		25-Year	345.50
					50-Year	414.61		50-Year	418.21		50-Year	423.61
					100-Year	493.57		100-Year	497.40		100-Year	503.14
	POST	217.79	1.66	70.0	2-Year	109.79	70.7	2-Year	114.01	71.0	2-Year	115.82
					5-Year	178.60		5-Year	183.54		5-Year	185.65
					10-Year	246.04		10-Year	251.45		10-Year	253.77
					25-Year	336.27		25-Year	342.59		25-Year	345.30
					50-Year	416.01		50-Year	422.62		50-Year	425.45
					100-Year	496.93		100-Year	503.81		100-Year	506.76

F

Appendix F:

Geopak Drainage Area, Node & Link Reports

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GEOPAK AREA TABLE					
ID	Tc	Discharge	Intensity	C Value	Area
BR-OEP-1108	13	4.59	5.73	0.66	1.21
I26-JB-1123	5	1.76	7.93	0.90	0.25
BR-CB-1124	21	4.74	4.59	0.58	1.78
BR-CB-1134	8	0.59	6.90	0.50	0.17
BR-CB-1137	5	1.23	7.93	0.85	0.18
BR-CB-1138	7	1.15	7.20	0.85	0.19
BR-OEP-1155	116	27.14	1.67	0.42	38.69
BR-CB-1173	5	0.67	7.93	0.85	0.10
BR-CB-1205	5	0.66	7.93	0.88	0.10
BR-CB-1215	15	1.47	5.39	0.73	0.37
BR-CB-1225	9	1.17	6.62	0.85	0.21
BR-CB-1228	18	1.61	4.95	0.62	0.52
BR-CB-1235	6	1.04	7.55	0.86	0.16
BR-DI-1236	17	5.26	5.09	0.67	1.54
BR-CB-1255	5	0.53	7.93	0.88	0.08
BR-DI-1256	26	2.67	4.12	0.53	1.22
BR-CB-1271	5	0.38	7.93	0.88	0.05
BR-CB-1272	24	2.31	4.29	0.57	0.94
BR-CB-1273	5	1.10	7.93	0.85	0.16
BR-EXCB-1293	27	7.51	4.03	0.53	3.51
BR-EXCB-1295	27	7.56	4.03	0.59	3.18
BR-CB-1298	12	1.01	5.93	0.80	0.21
BS-DI-2002	16	3.71	5.23	0.60	1.18

GEOPAK LINK TABLE																					
ID	Upstream Node	Downstream Node	Shape	Material	# of Barrels	Rise (ft)	Length (ft)	Slope (%)	Discharge (cfs)	Capacity (cfs)	Uniform Depth (ft)	Uniform Velocity (fps)	Soffit Upstream	HGL Upstream	Soffit Downstream	HGL Downstream	Invert Upstream	Invert Downstream	Actual Velocity Upstream (fps)	Actual Velocity Downstream (fps)	Actual Depth Upstream (ft)	Actual Depth Downstream (ft)
BR-EP-1127	BR-EXMH-1127	BR-JB-1126	Circular	Aluminum	1	5	60.53	1.93	253.54	210.63	5.00	13.25	225.46	230.25	224.29	224.09	220.46	219.29	12.91	13.09	5.00	0.75
BR-NP-1108	BR-OEP-1108	BR-JB-1126	Circular	Concrete	1	2	54.26	0.30	4.59	14.44	0.81	3.86	229.13	228.18	228.97	227.72	227.13	226.97	2.73	4.24	1.05	2.99
I26-NP-1123	I26-JB-1123	I26-JB-2021	Circular	Concrete	1	6	163.00	2.56	284.67	789.25	2.60	24.29	221.17	219.89	217.00	213.99	215.17	211.00	11.92	20.19	4.72	4.14
BR-NP-1124	BR-CB-1124	I26-JB-1123	Circular	Concrete	1	6	5.72	1.61	284.30	625.68	2.96	20.47	221.32	220.14	221.23	219.37	215.32	215.23	11.69	13.68	4.81	3.63
BR-NP-1125	BR-JB-1125	BR-CB-1124	Circular	Concrete	1	6	63.04	1.57	282.60	617.97	2.97	20.25	222.42	221.21	221.43	219.06	216.42	215.43	11.68	15.79	4.79	3.32
BR-NP-1126	BR-JB-1126	BR-JB-1125	Circular	Concrete	1	5.5	50.05	3.75	282.60	757.88	2.42	28.03	224.29	224.09	222.42	220.24	218.79	216.92	12.03	18.84	5.30	4.80
BR-NP-1133	BR-JB-1133	BR-JB-1126	Circular	Concrete	1	3.5	20.30	0.30	27.73	64.22	1.67	6.13	224.44	224.14	224.38	224.09	220.94	220.88	3.01	3.00	3.20	3.22
BR-NP-1134	BR-CB-1134	BR-JB-1133	Circular	Concrete	1	3.5	46.27	0.30	27.23	64.22	1.67	6.02	224.58	224.17	224.44	224.14	221.08	220.94	3.02	2.95	3.10	3.20
BR-NP-1137	BR-CB-1137	BR-JB-1133	Circular	Concrete	1	1.5	18.74	0.30	2.25	6.70	0.63	3.21	229.28	228.53	229.22	228.29	227.78	227.72	2.54	3.68	0.75	0.57
BR-NP-1138	BR-CB-1138	BR-CB-1137	Circular	Concrete	1	1.5	45.80	2.45	1.15	19.14	0.26	5.66	230.40	229.41	229.28	228.04	228.90	227.78	2.14	5.61	0.51	0.26
BR-NP-1155	BR-OEP-1155	BR-CB-1134	Circular	Concrete	1	3.5	117.84	0.30	27.14	64.22	1.64	6.12	224.93	224.22	224.58	224.17	221.43	221.08	3.30	3.01	2.79	3.10
BR-NP-1173	BR-CB-1173	BR-OP-1170	Circular	Concrete	1	3	43.63	1.03	29.23	78.94	1.31	9.81	227.45	226.63	227.00	225.42	224.45	224.00	5.31	8.88	2.18	1.42
BR-NP-1205	BR-CB-1205	BR-CB-1173	Circular	Concrete	1	2.5	102.27	0.68	29.01	39.54	1.67	8.34	228.15	227.81	227.45	226.63	225.65	224.95	6.43	8.27	2.16	1.68
BR-NP-1215	BR-CB-1215	BR-CB-1205	Circular	Concrete	1	2.5	49.96	0.90	28.74	45.36	1.51	9.25	228.60	228.11	228.15	227.22	226.10	225.65	6.79	8.85	2.01	1.57
BR-NP-1225	BR-CB-1225	BR-CB-1215	Circular	Concrete	1	2.5	27.78	1.26	27.69	53.65	1.33	10.44	228.95	228.54	228.60	227.58	226.45	226.10	6.32	9.18	2.09	1.48
BR-NP-1228	BR-CB-1228	BR-CB-1225	Circular	Concrete	1	2.5	30.13	0.73	27.02	40.96	1.56	8.40	229.17	228.66	228.95	228.05	226.67	226.45	6.44	8.12	1.99	1.60
BR-NP-1235	BR-CB-1235	BR-CB-1228	Circular	Concrete	1	2.5	83.29	0.30	25.88	26.18	2.35	5.41	229.42	229.29	229.17	228.66	226.92	226.67	5.38	6.17	2.37	1.99
BR-NP-1236	BR-DI-1236	BR-CB-1235	Circular	Concrete	1	1.5	5.78	0.30	5.26	6.70	1.06	3.96	232.43	232.27	232.41	231.80	230.93	230.91	3.15	4.86	1.34	0.88
BR-NP-1255	BR-CB-1255	BR-CB-1235	Circular	Concrete	1	2.5	67.49	0.30	21.31	26.18	1.83	5.52	229.62	229.54	229.42	229.29	227.12	226.92	4.39	4.43	2.41	2.37
BR-NP-1256	BR-DI-1256	BR-CB-1255	Circular	Concrete	1	1.5	4.16	0.30	2.67	6.70	0.68	3.42	230.55	229.93	230.54	229.66	229.05	229.04	2.46	3.87	0.88	0.62
BR-NP-1271	BR-CB-1271	BR-CB-1272	Circular	Concrete	1	1.5	41.00	0.30	1.28	6.70	0.46	2.76	230.31	230.17	230.19	230.15	228.81	228.69	0.76	0.73	1.36	1.47
BR-NP-1272	BR-CB-1272	BR-CB-1273	Circular	Concrete	1	2	54.15	0.55	18.02	19.52	1.64	6.53	230.19	230.15	229.89	229.63	228.19	227.89	5.76	6.22	1.97	1.74
BR-NP-1273	BR-CB-1273	BR-CB-1255	Circular	Concrete	1	2.5	64.60	0.41	18.53	30.67	1.47	6.19	229.89	229.63	229.62	229.54	227.39	227.12	4.00	3.82	2.24	2.41
BR-NP-1291	BR-JB-1291	BR-CB-1271	Circular	Concrete	1	1.5	26.58	2.94	1.01	20.99	0.23	5.82	231.09	230.09	230.31	229.05	229.59	228.81	1.98	5.68	0.50	0.24
BR-NP-1292	BR-MH-1292	BR-CB-1272	Circular	Concrete	1	2	35.18	0.71	15.02	22.22	1.26	7.19	230.50	230.43	230.25	230.15	228.50	228.25	4.83	4.87	1.93	1.90
BR-EP-1293	BR-EXCB-1293	BR-MH-1292	Circular	Concrete	1	1.5	27.86	4.20	7.51	25.08	0.59	11.76	231.61	231.84	230.44	229.60	230.11	228.94	4.25	10.05	1.50	0.66
BR-EP-1295	BR-EXCB-1295	BR-MH-1292	Circular	Concrete	1	1.5	74.17	1.32	7.56	14.07	0.82	7.66	231.48	231.72	230.50	229.83	229.98	229.00	4.28	7.55	1.50	0.83
BR-NP-1298	BR-CB-1298	BR-JB-1291	Circular	Concrete	1	1.5	39.56	0.30	1.01	6.70	0.41	2.60	231.21	230.18	231.09	230.09	229.71	229.59	2.11	1.98	0.47	0.50
BS-NP-2002	BS-DI-2002	BS-OP-2010	Circular	Concrete	1	2	79.15	0.51	3.71	18.74	0.62	4.43	218.00	216.92	217.60	216.22	216.00	215.60	2.63	4.42	0.92	0.62
BS-NP-2021	I26-JB-2021	BS-OP-2020	Circular	Concrete	1	6	116.04	1.72	284.67	647.94	2.90	20.99	217.00	216.35	215.00	212.40	211.00	209.00	10.69	17.23	5.35	3.40

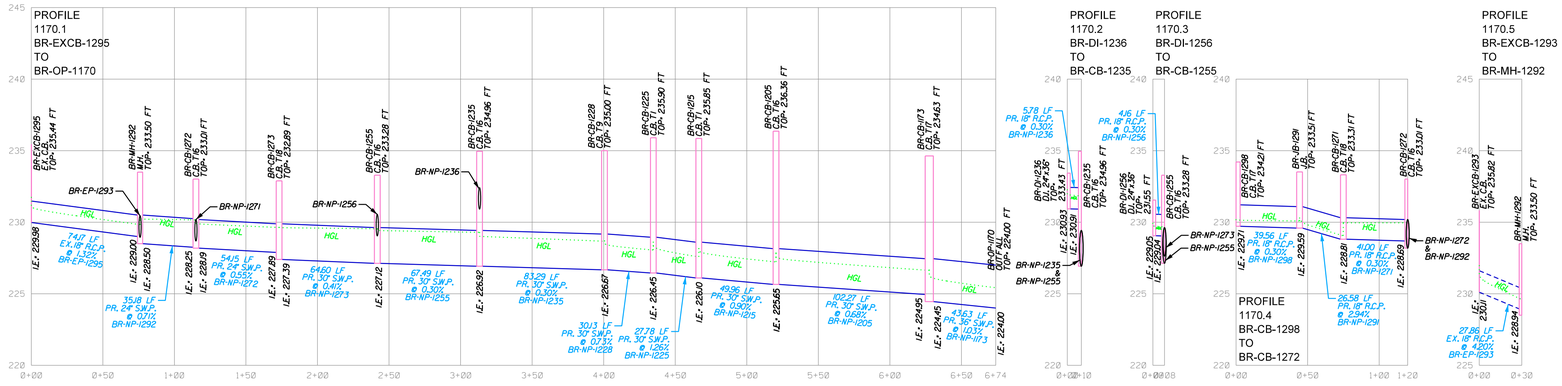
GEOPAK NODE TABLE								
ID	Type	Description	Alignment	Station	Offset	Elevation	Depth (ft)	Junction Loss
BR-OEP-1108	Other	PR. OPEN PIPE END	BROWN_3A	371+50.00	-38.56	227.13	0.00	0.00
I26-JB-1123	Other	PR. JB (60"x60") (BLIND)	I26000X	364+25.28	-72.74	225.61	10.44	0.00
BR-CB-1124	Other	PR. CB T9 (7'x7')	I26000X	364+24.07	-86.33	223.40	8.08	0.11
BR-JB-1125	Junction	PR. JB (60"x108")	BROWN_3A	372+11.92	31.16	226.00	9.58	0.10
BR-JB-1126	Junction	PR. JB (60"x72")	BROWN_3A	372+05.00	-22.43	231.00	12.21	0.50
BR-EXMH-1127	Other	EX. MH	BROWN_3A	371+84.00	-83.97	228.93	8.47	0.00
BR-JB-1133	Junction	PR. JB (36"x60")	BROWN_3A	372+25.00	-38.31	231.00	10.06	0.03
BR-CB-1134	Other	PR. CB T9 (3'x5')	BROWN_3A	372+75.00	-45.00	228.20	7.12	0.02
BR-CB-1137	Other	PR. CB T18	BROWN_3A	372+35.20	-12.50	232.28	4.50	0.12
BR-CB-1138	Other	PR. CB T16	BROWN_3A	372+85.00	-12.50	232.40	3.50	0.00
BR-OEP-1155	Other	PR. OPEN PIPE END	BROWN_3A	374+00.00	-53.25	221.43	0.00	0.00
BR-OP-1170	Outlet	OUTFALL	BROWN_3A	374+70.00	-46.20	224.00	0.00	0.00
BR-CB-1173	Other	PR. CB T17	BROWN_3A	375+05.00	-13.01	234.63	10.18	0.40
BR-CB-1205	Other	PR. CB T16	BROWN_3A	376+14.00	-15.13	236.36	10.71	0.29
BR-CB-1215	Other	PR. CB T1	FAIREX	100+79.00	-21.91	235.85	9.75	0.15
BR-CB-1225	Other	PR. CB T1	FAIREX	100+71.19	8.38	235.90	9.45	0.24
BR-CB-1228	Other	PR. CB T9	BROWN_3A	377+30.00	-31.00	235.00	8.33	0.19
BR-CB-1235	Other	PR. CB T16	BROWN_3A	378+21.15	-19.50	234.96	8.04	0.28
BR-DI-1236	Other	PR. DI 24x36	BROWN_3A	378+23.00	-29.50	233.43	2.50	0.00
BR-CB-1255	Other	PR. CB T16	BROWN_3A	378+95.00	-19.50	233.28	6.16	0.12
BR-DI-1256	Other	PR. DI 24x36	BROWN_3A	378+96.00	-33.00	231.55	2.50	0.00
BR-CB-1271	Other	PR. CB T18	BROWN_3A	380+23.00	19.50	233.31	4.50	0.01
BR-CB-1272	Other	PR. CB T16	BROWN_3A	380+23.00	-19.50	233.01	4.82	0.27
BR-CB-1273	Other	PR. CB T18	BROWN_3A	379+64.85	-19.50	232.89	5.50	0.01
BR-JB-1291	Junction	PR. JB	BROWN_3A	380+56.00	24.61	233.51	3.92	0.01
BR-MH-1292	Junction	ADJUST EX. MH	BROWN_3A	380+62.00	-21.50	233.50	5.00	0.22
BR-EXCB-1293	Other	EX. CB	LUSTER	100+44.00	-15.13	235.82	5.71	0.00
BR-EXCB-1295	Other	EX. CB	BROWN_3A	381+38.00	-21.82	235.44	5.46	0.00
BR-CB-1298	Other	PR. CB T17	BROWN_3A	380+97.00	19.50	234.21	4.50	0.00
BS-DI-2002	Other	PR. DI T112	BUSH_RIVER2	59+98.83	266.55	219.00	3.00	0.00
BS-OP-2010	Outlet	OUTFALL	BUSH_RIVER2	59+64.43	195.82	215.60	0.00	0.00
BS-OP-2020	Outlet	OUTFALL	BUSH_RIVER2	58+92.14	186.25	209.00	0.00	0.00
I26-JB-2021	Junction	PR. JB (60"x108")	BUSH_RIVER2	58+96.28	306.61	218.00	7.00	0.70

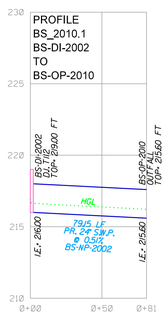
G

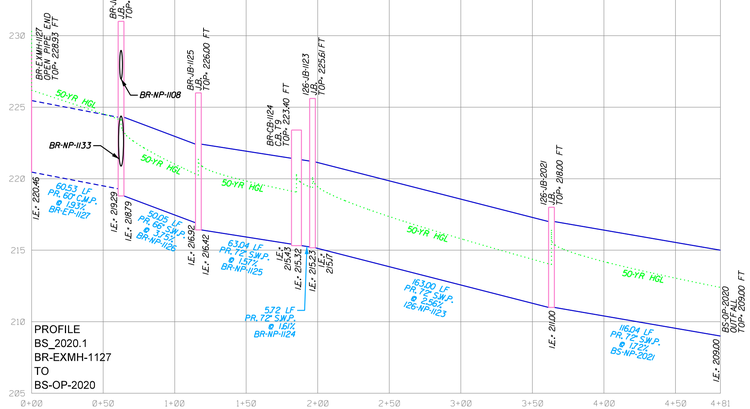
Appendix G:
Drainage Profile Sheet

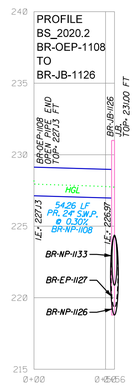
hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

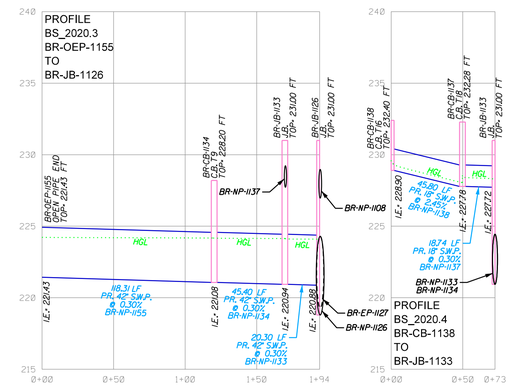
FED. RD. DIV NO.	STATE	COUNTY	SHEET NO.
3	S.C.	LEXINGTON	DPFL











PROFILE LEGEND

PROPOSED PIPE OR CULVERT

EXISTING PIPE OR CULVERT

10-YR HYDRAULIC GRADE LINE

DRAINAGE STRUCTURE

HDR ENGINEERING INC. OF THE CAROLINAS

1201 MAIN STREET
SUITE 800
COLUMBIA, SC, 29201
803-509-6600

PLANS FOR REVIEW

NOT FOR CONSTRUCTION

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
PHASE 3A
DRAINAGE PROFILE SHEET
NETWORKS: BR_1170, BS_2010, & BS_2020

SCALE H:1" = 50' V: 1" = 5'

04\16\26

H

Appendix H:

Open Channel Analysis Calculations

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

Carolina Crossroads, P3A | Browning Road | Date: 4/15/2026

Open Channel Calculations

ID	FROM			TO			$S_{X\,LT}$ (:1)	$S_{X\,RT}$ (:1)	Base Width (ft)	S_L (ft/ft)	Manning's n	Lining	A (Ac)	Design Storm	C Value	T_C (min)	I (in/hr)	Q_D (cfs)	Calculated From Hydraulic Toolbox: Depth (ft)	Top Width (ft)	Velocity (fps)	Max Shear Stress (psf)
	Alignment	Side	Station	Alignment	Side	Station																
BR-OC-LT09.1	BROWN_3A	LT	355+00	BROWN_3A	LT	362+50	2	6	0	0.043	0.039	TRM	2.08	10-yr	0.42	12	6.06	5.29	0.61	4.90	3.53	1.64
BR-OC-LT09.2	BROWN_3A	LT	362+50	BROWN_3A	LT	363+50	2	6	0	0.120	0.028	Riprap	2.25	10-yr	0.42	13	5.86	5.54	0.46	3.68	6.55	3.44
BR-OC-LT10.1	BROWN_3A	LT	363+50	BROWN_3A	LT	366+05	2	4	0	0.004	0.068	Vegetation	2.79	10-yr	0.58	15	5.51	8.90	1.61	9.66	1.14	0.40
BR-OC-LT10.2	BROWN_3A	LT	366+75	BROWN_3A	LT	369+35	2	4	0	0.025	0.040	TRM	3.36	10-yr	0.56	16	5.35	10.06	0.98	5.87	3.50	1.53
BR-OC-LT11.1	BROWN_3A	LT	369+80	BROWN_3A	LT	371+50	2	4	0	0.007	0.057	Vegetation	3.71	10-yr	0.58	17	5.20	11.20	1.47	8.84	1.72	0.64
BR-OC-LT11.2	BROWN_3A	LT	374+15	BROWN_3A	LT	374+00	2	2	3	0.010	0.045	Riprap	33.82	10-yr	0.42	116	1.71	24.33	1.39	8.57	3.02	0.68
BR-OC-LT11.3	BROWN_3A	LT	374+70	BROWN_3A	LT	374+00	6	2	0	0.040	0.036	TRM	4.87	10-yr	0.62	26	4.21	12.71	0.77	7.69	4.30	1.92
BR-OC-LT11.4	BROWN_3A	LT	376+00	BROWN_3A	LT	374+40	10	4	0	0.080	0.045	TRM	0.30	10-yr	0.42	16	5.35	0.67	0.22	3.01	2.08	1.07
BR-OC-LT12.1	BROWN_3A	LT	377+45	BROWN_3A	LT	378+20	2	2	0	0.016	0.074	Vegetation	0.05	10-yr	0.52	7	7.36	0.19	0.36	1.42	0.75	0.36
BR-OC-LT12.2	BROWN_3A	LT	378+55	BROWN_3A	LT	378+95	2	2	0	0.005	0.099	Vegetation	0.07	10-yr	0.53	9	6.77	0.25	0.55	2.19	0.42	0.17
BR-OC-RT09.1	BROWN_3A	RT	358+50	BROWN_3A	RT	363+50	6	2	0	0.043	0.046	TRM	0.95	10-yr	0.41	16	5.35	2.08	0.46	3.68	2.46	1.23
BR-OC-RT11.1	BROWN_3A	RT	364+80	BROWN_3A	RT	372+20	6	20	0	0.012	0.042	Vegetation	1.00	10-yr	0.51	19	4.93	2.52	0.39	10.04	1.30	0.29
BR-OC-RT11.2	BROWN_3A	RT	377+35	BROWN_3A	RT	372+20	4	2	0	0.010	0.066	Vegetation	0.61	10-yr	0.52	17	5.20	1.65	0.71	4.26	1.09	0.44
BR-OC-RT11.3	BROWN_3A	RT	372+20	BROWN_3A	RT	372+19	2	2	0	0.005	0.068	Vegetation	1.64	10-yr	0.52	20	4.81	4.10	1.36	5.45	1.11	0.43
BS-OC-RT20.1	BUSH_RIVER	RT	58+92	BUSH_RIVER	RT	58+88	2	2	6	0.012	0.068	Riprap	0.07	Use NRCS Flows				265.90	4.24	22.95	4.34	3.17
BS-OC-RT20.2	BUSH_RIVER	RT	58+21	BUSH_RIVER	RT	58+83	2	2	6	0.010	0.048	Riprap	1.67	10-yr	0.76	12	6.06	7.69	0.85	9.40	1.17	0.27

Channel Analysis: BR-OC-LT09.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 6.0000 ft/ft

Longitudinal Slope: 0.0430 ft/ft

Manning's n: 0.0387

Flow 5.2900 cfs

Result Parameters

Depth 0.6123 ft

Area of Flow 1.4999 ft^2

Wetted Perimeter 5.0940 ft

Hydraulic Radius 0.2944 ft

Average Velocity 3.5270 ft/s

Top Width 4.8988 ft

Froude Number: 1.1233

Critical Depth 0.6795 ft

Critical Velocity 2.8644 ft/s

Critical Slope: 0.0247 ft/ft

Critical Top Width 7.25 ft

Calculated Max Shear Stress 1.6430 lb/ft^2

Calculated Avg Shear Stress 0.7900 lb/ft^2

Channel Analysis: BR-OC-LT09.2

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 6.0000 ft/ft

Longitudinal Slope: 0.1200 ft/ft

Manning's n: 0.0288

Flow 5.5400 cfs

Result Parameters

Depth 0.4600 ft

Area of Flow 0.8463 ft^2

Wetted Perimeter 3.8264 ft

Hydraulic Radius 0.2212 ft

Average Velocity 6.5463 ft/s

Top Width 3.6797 ft

Froude Number: 2.4056

Critical Depth 0.6922 ft

Critical Velocity 2.8910 ft/s

Critical Slope: 0.0136 ft/ft

Critical Top Width 7.38 ft

Calculated Max Shear Stress 3.4442 lb/ft^2

Calculated Avg Shear Stress 1.6561 lb/ft^2

Channel Analysis: BR-OC-LT10.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Longitudinal Slope: 0.0040 ft/ft

Manning's n: 0.0684

Flow 8.9000 cfs

Result Parameters

Depth 1.6106 ft

Area of Flow 7.7820 ft^2

Wetted Perimeter 10.2420 ft

Hydraulic Radius 0.7598 ft

Average Velocity 1.1437 ft/s

Top Width 9.6636 ft

Froude Number: 0.2246

Critical Depth 0.9073 ft

Critical Velocity 3.6035 ft/s

Critical Slope: 0.0853 ft/ft

Critical Top Width 6.12 ft

Calculated Max Shear Stress 0.4020 lb/ft^2

Calculated Avg Shear Stress 0.1896 lb/ft^2

Channel Analysis: BR-OC-LT10.2

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Longitudinal Slope: 0.0250 ft/ft

Manning's n: 0.0401

Flow 10.0600 cfs

Result Parameters

Depth 0.9790 ft

Area of Flow 2.8751 ft^2

Wetted Perimeter 6.2253 ft

Hydraulic Radius 0.4618 ft

Average Velocity 3.4991 ft/s

Top Width 5.8737 ft

Froude Number: 0.8814

Critical Depth 0.9529 ft

Critical Velocity 3.6929 ft/s

Critical Slope: 0.0289 ft/ft

Critical Top Width 6.43 ft

Calculated Max Shear Stress 1.5272 lb/ft^2

Calculated Avg Shear Stress 0.7205 lb/ft^2

Channel Analysis: BR-OC-LT11.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Longitudinal Slope: 0.0070 ft/ft

Manning's n: 0.0567

Flow 11.2000 cfs

Result Parameters

Depth 1.4730 ft

Area of Flow 6.5095 ft^2

Wetted Perimeter 9.3673 ft

Hydraulic Radius 0.6949 ft

Average Velocity 1.7206 ft/s

Top Width 8.8382 ft

Froude Number: 0.3533

Critical Depth 0.9947 ft

Critical Velocity 3.7730 ft/s

Critical Slope: 0.0568 ft/ft

Critical Top Width 6.71 ft

Calculated Max Shear Stress 0.6434 lb/ft^2

Calculated Avg Shear Stress 0.3035 lb/ft^2

Channel Analysis: BR-OC-LT11.2

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Channel Width 3.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0449

Flow 24.3300 cfs

Result Parameters

Depth 1.3915 ft

Area of Flow 8.0468 ft^2

Wetted Perimeter 9.2228 ft

Hydraulic Radius 0.8725 ft

Average Velocity 3.0236 ft/s

Top Width 8.5659 ft

Froude Number: 0.5498

Critical Depth 1.0081 ft

Critical Velocity 4.8116 ft/s

Critical Slope: 0.0358 ft/ft

Critical Top Width 7.03 ft

Calculated Max Shear Stress 0.8683 lb/ft^2

Calculated Avg Shear Stress 0.5444 lb/ft^2

Channel Analysis: BR-OC-LT11.3

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 6.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Longitudinal Slope: 0.0400 ft/ft

Manning's n: 0.0361

Flow 12.7100 cfs

Result Parameters

Depth 0.7690 ft

Area of Flow 2.9568 ft^2

Wetted Perimeter 7.8483 ft

Hydraulic Radius 0.3767 ft

Average Velocity 4.2986 ft/s

Top Width 7.6900 ft

Froude Number: 1.2217

Critical Depth 0.8399 ft

Critical Velocity 3.6031 ft/s

Critical Slope: 0.0250 ft/ft

Critical Top Width 8.75 ft

Calculated Max Shear Stress 1.9194 lb/ft^2

Calculated Avg Shear Stress 0.9404 lb/ft^2

Channel Analysis: BR-OC-LT11.4

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 10.0000 ft/ft

Side Slope 2 (Z2): 4.0000 ft/ft

Longitudinal Slope: 0.0800 ft/ft

Manning's n: 0.0454

Flow 0.6700 cfs

Result Parameters

Depth 0.2148 ft

Area of Flow 0.3228 ft^2

Wetted Perimeter 3.0437 ft

Hydraulic Radius 0.1061 ft

Average Velocity 2.0753 ft/s

Top Width 3.0066 ft

Froude Number: 1.1161

Critical Depth 0.2337 ft

Critical Velocity 1.7526 ft/s

Critical Slope: 0.0510 ft/ft

Critical Top Width 4.01 ft

Calculated Max Shear Stress 1.0721 lb/ft^2

Calculated Avg Shear Stress 0.5295 lb/ft^2

Channel Analysis: BR-OC-LT12.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0160 ft/ft

Manning's n: 0.0735

Flow 0.1900 cfs

Result Parameters

Depth 0.3556 ft

Area of Flow 0.2530 ft^2

Wetted Perimeter 1.5905 ft

Hydraulic Radius 0.1590 ft

Average Velocity 0.7511 ft/s

Top Width 1.4226 ft

Froude Number: 0.3139

Critical Depth 0.2237 ft

Critical Velocity 1.8979 ft/s

Critical Slope: 0.1895 ft/ft

Critical Top Width 0.89 ft

Calculated Max Shear Stress 0.3551 lb/ft^2

Calculated Avg Shear Stress 0.1588 lb/ft^2

Channel Analysis: BR-OC-LT12.2

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0985

Flow 0.2500 cfs

Result Parameters

Depth 0.5472 ft

Area of Flow 0.5988 ft^2

Wetted Perimeter 2.4471 ft

Hydraulic Radius 0.2447 ft

Average Velocity 0.4175 ft/s

Top Width 2.1887 ft

Froude Number: 0.1407

Critical Depth 0.2497 ft

Critical Velocity 2.0050 ft/s

Critical Slope: 0.3282 ft/ft

Critical Top Width 1.00 ft

Calculated Max Shear Stress 0.1707 lb/ft^2

Calculated Avg Shear Stress 0.0763 lb/ft^2

Channel Analysis: BR-OC-RT09.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 6.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0430 ft/ft

Manning's n: 0.0458

Flow 2.0800 cfs

Result Parameters

Depth 0.4598 ft

Area of Flow 0.8456 ft^2

Wetted Perimeter 3.8247 ft

Hydraulic Radius 0.2211 ft

Average Velocity 2.4599 ft/s

Top Width 3.6782 ft

Froude Number: 0.9041

Critical Depth 0.4678 ft

Critical Velocity 2.3766 ft/s

Critical Slope: 0.0392 ft/ft

Critical Top Width 4.99 ft

Calculated Max Shear Stress 1.2337 lb/ft^2

Calculated Avg Shear Stress 0.5932 lb/ft^2

Channel Analysis: BR-OC-RT11.1

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 6.0000 ft/ft

Side Slope 2 (Z2): 20.0000 ft/ft

Longitudinal Slope: 0.0120 ft/ft

Manning's n: 0.0417

Flow 2.5200 cfs

Result Parameters

Depth 0.3862 ft

Area of Flow 1.9386 ft^2

Wetted Perimeter 10.0819 ft

Hydraulic Radius 0.1923 ft

Average Velocity 1.2999 ft/s

Top Width 10.0403 ft

Froude Number: 0.5213

Critical Depth 0.3187 ft

Critical Velocity 1.9087 ft/s

Critical Slope: 0.0334 ft/ft

Critical Top Width 11.67 ft

Calculated Max Shear Stress 0.2892 lb/ft^2

Calculated Avg Shear Stress 0.1440 lb/ft^2

Channel Analysis: BR-OC-RT11.2

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 4.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0658

Flow 1.6500 cfs

Result Parameters

Depth 0.7105 ft

Area of Flow 1.5142 ft^2

Wetted Perimeter 4.5179 ft

Hydraulic Radius 0.3352 ft

Average Velocity 1.0897 ft/s

Top Width 4.2627 ft

Froude Number: 0.3222

Critical Depth 0.4624 ft

Critical Velocity 2.5724 ft/s

Critical Slope: 0.0988 ft/ft

Critical Top Width 3.12 ft

Calculated Max Shear Stress 0.4433 lb/ft^2

Calculated Avg Shear Stress 0.2091 lb/ft^2

Channel Analysis: BR-OC-RT11.3

Input Parameters

Channel Type: Triangular

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0684

Flow 4.1000 cfs

Result Parameters

Depth 1.3623 ft

Area of Flow 3.7118 ft^2

Wetted Perimeter 6.0924 ft

Hydraulic Radius 0.6092 ft

Average Velocity 1.1046 ft/s

Top Width 5.4492 ft

Froude Number: 0.2359

Critical Depth 0.7644 ft

Critical Velocity 3.5082 ft/s

Critical Slope: 0.1090 ft/ft

Critical Top Width 3.06 ft

Calculated Max Shear Stress 0.4250 lb/ft^2

Calculated Avg Shear Stress 0.1901 lb/ft^2

Channel Analysis: BS-OC-RT20.1

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Channel Width 6.00 ft

Longitudinal Slope: 0.0120 ft/ft

Manning's n: 0.0684

Flow 265.9000 cfs

Result Parameters

Depth 4.2364 ft

Area of Flow 61.3133 ft^2

Wetted Perimeter 24.9459 ft

Hydraulic Radius 2.4579 ft

Average Velocity 4.3367 ft/s

Top Width 22.9457 ft

Froude Number: 0.4675

Critical Depth 2.8727 ft

Critical Velocity 7.8807 ft/s

Critical Slope: 0.0605 ft/ft

Critical Top Width 17.49 ft

Calculated Max Shear Stress 3.1722 lb/ft^2

Calculated Avg Shear Stress 1.8404 lb/ft^2

Channel Analysis: BS-OC-RT20.2

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Channel Width 6.00 ft

Longitudinal Slope: 0.0050 ft/ft

Manning's n: 0.0684

Flow 7.6900 cfs

Result Parameters

Depth 0.8503 ft

Area of Flow 6.5479 ft^2

Wetted Perimeter 9.8027 ft

Hydraulic Radius 0.6680 ft

Average Velocity 1.1744 ft/s

Top Width 9.4012 ft

Froude Number: 0.2480

Critical Depth 0.3559 ft

Critical Velocity 3.2188 ft/s

Critical Slope: 0.1024 ft/ft

Critical Top Width 7.42 ft

Calculated Max Shear Stress 0.2653 lb/ft^2

Calculated Avg Shear Stress 0.2084 lb/ft^2

Channel Lining Analysis: BR-OC-LT09.1

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft Vegetation Condition is good

Growth Form of Vegetation is mixed Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.790035 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 1.64304 lb/ft^2

Manning's n: 0.0386673

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.0703299 lb/ft^2

Permissible Shear Stress on Vegetation: 0.762421 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BR-OC-LT09.1

Channel Lining Analysis: BR-OC-LT09.2

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft Vegetation Condition is good

Growth Form of Vegetation is mixed Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 1.65612 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 3.44424 lb/ft^2

Manning's n: 0.0287585

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.266527 lb/ft^2

Permissible Shear Stress on Vegetation: 0.421734 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BR-OC-LT09.2

Channel Lining Analysis: BR-OC-LT10.1

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3 Height of Vegetation: 0.333 ft

Vegetation Condition is good Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.189649 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.402004 lb/ft^2

Manning's n: 0.0684262

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.00549497 lb/ft^2

Permissible Shear Stress on Vegetation: 2.38754 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BR-OC-LT10.1

Channel Lining Analysis: BR-OC-LT10.2

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft Vegetation Condition is good

Growth Form of Vegetation is mixed Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.720457 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 1.52717 lb/ft^2

Manning's n: 0.0401199

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.0607223 lb/ft^2

Permissible Shear Stress on Vegetation: 0.820778 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BR-OC-LT10.2

Channel Lining Analysis: BR-OC-LT11.1

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft Vegetation Condition is good

Growth Form of Vegetation is mixed Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.303539 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.64342 lb/ft^2

Manning's n: 0.0566913

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.0128127 lb/ft^2

Permissible Shear Stress on Vegetation: 1.63885 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BR-OC-LT11.1

Channel Lining Analysis: BR-OC-LT11.2

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.00 mm Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3 Riprap Shape is Angular

Safety Factor: 1 Calculated Safety Factor: 1

Lining Results

Angle of Repose: 0 degrees

Relative Flow Depth: 0 ft

Manning's n method: Bathurst Manning's n: 0

Channel Bottom Shear Results

V*: 0

Reynold's Number: 0 Shield's Parameter: 0

Shear stress on channel bottom: 0 lb/ft^2

Permissible shear stress for channel bottom: 0 lb/ft^2

Channel bottom is NOT stable

Stable D50: 0 mm

Channel Side Shear Results K1: 0 K2: 0 Kb: 0

Shear stress on side of channel: 0 lb/ft^2

Permissible shear stress for side of channel: 0 lb/ft^2

Stable Side D50: 0 lb/ft^2

Side of channel is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BR-OC-LT11.2

Channel Lining Analysis: BR-OC-LT11.3

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03 Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BR-OC-LT11.3

Channel Lining Analysis: BR-OC-LT11.4

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03 Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive D75: 2.54 mm

Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BR-OC-LT11.4

Channel Lining Analysis: BR-OC-LT12.1

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft Vegetation Condition is good

Growth Form of Vegetation is mixed Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.158794 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.355074 lb/ft^2

Manning's n: 0.0734631

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.00421075 lb/ft^2

Permissible Shear Stress on Vegetation: 2.75198 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BR-OC-LT12.1

Channel Lining Analysis: BR-OC-LT12.2

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft Vegetation Condition is good

Growth Form of Vegetation is mixed Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.0763483 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.17072 lb/ft^2

Manning's n: 0.0984653

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.00112693 lb/ft^2

Permissible Shear Stress on Vegetation: 4.94393 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BR-OC-LT12.2

Channel Lining Analysis: BR-OC-RT09.1

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 0 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value

Manning's n value input as user-supplied n

RECP is a turf reinforcement mat

Manning's n: 0.03 Manning's n range: 0.022-0.028

Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive

D75: 2.54 mm Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0 lb/ft^2

Mean Boundary Shear Stress: 0 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0 lb/ft^2

Effective Shear Stress: 0 lb/ft^2

Permissible Shear Stress on RECP: 0 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is NOT stable

Channel Lining Stability Results 2

The channel is NOT stable

Channel Summary

Name of Selected Channel: BR-OC-LT09.1

Channel Lining Analysis: BR-OC-RT11.1

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft

Vegetation Condition is good Growth Form of Vegetation is mixed

Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive D75: 2.54 mm Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.303539 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.64342 lb/ft^2

Manning's n: 0.0566913

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.0128127 lb/ft^2

Permissible Shear Stress on Vegetation: 1.63885 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BR-OC-LT11.1

Channel Lining Analysis: BR-OC-RT11.2

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft Vegetation Condition is good

Growth Form of Vegetation is mixed Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive

D75: 2.54 mm Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.209141 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.443321 lb/ft^2

Manning's n: 0.0658002

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.00655306 lb/ft^2

Permissible Shear Stress on Vegetation: 2.20781 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BR-OC-RT11.2

Channel Lining Analysis: BR-OC-RT11.3

Lining Input Parameters

Channel Lining Type: Vegetation

Specific Weight of Water: 62.4 lb/ft^3

Height of Vegetation: 0.333 ft Vegetation Condition is good

Growth Form of Vegetation is mixed Cf: 0.75

See HEC-15, Table 4.5 (default: 0.75 for Good cover factor and Mixed growth form)

soil is noncohesive D75: 2.54 mm

Safety Factor: 1

Lining Results

Cn: 0.165205

Permissible Soil Shear Stress: 0.04 lb/ft^2

Mean Boundary Shear Stress: 0.190083 lb/ft^2

Maximum Shear Stress on the Channel Bottom: 0.425039 lb/ft^2

Manning's n: 0.0683636

Soil Grain Roughness: 0.0177136

Effective Shear Stress: 0.00582048 lb/ft^2

Permissible Shear Stress on Vegetation: 2.38318 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability

This value is compared with the maximum shear stress times the safety factor to determine lining stability

Channel bottom is stable

Channel Lining Stability Results 2

The channel is stable

Channel Summary

Name of Selected Channel: BR-OC-RT11.3

Channel Lining Analysis: BS-OC-RT20.1

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.00 mm

Riprap Specific Weight: 165 lb/ft^3 Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular Safety Factor: 1

Calculated Safety Factor: 1

Lining Results

Angle of Repose: 0 degrees

Relative Flow Depth: 4.04944e-315 ft

Manning's n method: Bathurst

Manning's n: 0

Channel Bottom Shear Results

V*: 0

Reynold's Number: 0 Shield's Parameter: 0

Shear stress on channel bottom: 0 lb/ft^2

Permissible shear stress for channel bottom: 0 lb/ft^2

Channel bottom is NOT stable

Stable D50: 0 mm

Channel Side Shear Results K1: 0 K2: 0 Kb: 0

Shear stress on side of channel: 0 lb/ft^2

Permissible shear stress for side of channel: 0 lb/ft^2

Stable Side D50: 0 lb/ft^2 Side of channel is NOT stable

Channel Lining Stability Results 2 The channel is NOT stable

Channel Summary

Name of Selected Channel: BS-OC-RT20.1

Channel Lining Analysis: BS-OC-RT20.2

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 0.00 mm

Riprap Specific Weight: 165 lb/ft^3 Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular Safety Factor: 1 Calculated Safety Factor: 1

Lining Results

Angle of Repose: 0 degrees

Relative Flow Depth: 4.04944e-315 ft

Manning's n method: Bathurst

Manning's n: 0

Channel Bottom Shear Results

V*: 0

Reynold's Number: 0 Shield's Parameter: 0

Shear stress on channel bottom: 0 lb/ft^2

Permissible shear stress for channel bottom: 0 lb/ft^2

Channel bottom is NOT stable

Stable D50: 0 mm

Channel Side Shear Results K1: 0 K2: 0 Kb: 0

Shear stress on side of channel: 0 lb/ft^2

Permissible shear stress for side of channel: 0 lb/ft^2

Stable Side D50: 0 lb/ft^2

Side of channel is NOT stable

Channel Lining Stability Results 2 The channel is NOT stable

Channel Summary

Name of Selected Channel: BS-OC-RT20.2

Appendix I:
Gutter Spread Calculations

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

Carolina Crossroads, P3A — Designed by: DPH

Gutter Spread Calculations — Design Storm Event: 10 YR — Checked by:

Calculated From Hydraulic Toolbox

Alignment	Side	Node	Station	Inlet Type	S_L (ft/ft)	S_X (ft/ft)	A (Ac)	C Value	T_C (min)	I (in/hr)	Q_O (cfs)	US Node	Q_b (cfs)	Q_T (cfs)	T_{MAX} (ft)	T (ft)	Q_i (cfs)	Q_B (cfs)	DS Node
Browning Road: Fairhaven Dr. to Driveway at Sta. 371+80																			
BROWN_3A	LT	BR-CB-1137	372+35	18	sag	0.020	0.182	0.85	5	8.110	1.255	BR-CB-1138	0.318	1.573	7.42	4.604	1.573	N/A	N/A
BROWN_3A	LT	BR-CB-1138	372+85	16	0.006	0.020	0.187	0.85	5	8.110	1.289	BR-CB-1173	0.000	1.289	7.42	7.345	0.971	0.318	BR-CB-1137
BROWN_3A	LT	BR-CB-1173	375+05	17	0.017	0.040	0.099	0.85	6	7.715	0.649	BR-CB-1205	0.299	0.948	7.42	3.497	0.948	0.000	BR-CB-1138
BROWN_3A	LT	BR-CB-1205	376+14	16	0.009	0.040	0.095	0.88	6	7.715	0.645	BR-CB-1215	0.536	1.181	7.42	4.369	0.882	0.299	BR-CB-1173
FAIRHAVEN	LT	BR-CB-1215	100+85	1	0.004	0.020	0.375	0.73	6	7.715	2.112	none	N/A	2.112	7.42	8.865	1.576	0.536	BR-CB-1205
Burnette Drive: Fairhaven Dr. to Morninghill Dr.																			
FAIRHAVEN	RT	BR-CB-1225	100+82	17	0.004	0.020	0.208	0.85	5	8.110	1.434	none	N/A	1.434	7.42	8.365	1.434	0.000	BR-CB-1235
BROWN_3A	LT	BR-CB-1235	378+21	16	0.023	0.040	0.160	0.86	5	8.110	1.116	BR-CB-1225	0.000	1.116	7.42	3.515	0.718	0.398	BR-CB-1255
BROWN_3A	LT	BR-CB-1255	378+95	16	0.017	0.040	0.075	0.88	5	8.110	0.535	BR-CB-1235	0.398	0.933	7.42	3.474	0.681	0.252	BR-CB-1273
BROWN_3A	LT	BR-CB-1273	379+65	18	sag	0.020	0.163	0.85	5	8.110	1.124	BR-CB-1255 + BR-CB-1272 + BR-CB-1271	0.629	1.753	7.42	3.279	1.753	N/A	N/A
BROWN_3A	LT	BR-CB-1272	380+23	16	0.008	0.020	0.163	0.85	5	8.110	1.124	BT-CB-0838	0.101	1.225	7.42	6.754	0.848	0.377	BT-CB-0797
BROWN_3A	LT	BR-EXCB-1295	381+38	17	0.034	0.020	0.163	0.85	5	8.110	1.124	none	N/A	1.124	7.42	4.642	1.124	0.101	BT-CB-0816
BROWN_3A	RT	BR-CB-1271	380+23	18	0.005	0.015	0.099	0.88	5	8.110	0.707	BR-EXCB-1298	0.036	0.743	7.42	7.127	0.743	0.000	BR-CB-1273
BROWN_3A	RT	BR-EXCB-1298	380+97	17	0.023	0.020	0.213	0.80	12	6.057	1.032	none	N/A	1.032	7.42	4.901	0.996	0.036	BR-CB-1271

J

Appendix J:

Cross-Line Hydraulic Analysis Calculations

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

HY-8 Culvert Analysis Report - XL-08

Table 1 - Summary of Culvert Flows at Crossing: XL-08

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10	192.37	192.37	212.24	4.447	0.0*	6-FFc	1.322	2.619	1.322	5.290	18.195	0.000
25	265.90	265.90	213.64	5.855	1.172	6-FFc	1.644	3.249	1.644	5.290	20.218	0.000
50	331.83	331.83	215.20	7.408	2.733	6-FFc	1.914	3.766	1.914	5.290	21.677	0.000
100	399.08	399.08	217.15	9.358	4.474	6-FFc	2.176	4.000	2.176	5.290	22.928	0.000

Table 2 - Culvert Summary Table: XL-08

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	XL-08 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
212.24	10	192.37	192.37	0.00	1
213.64	25	265.90	265.90	0.00	1
215.20	50	331.83	331.83	0.00	1
217.15	100	399.08	399.08	0.00	1
224.00	Overtopping	565.22	565.22	0.00	Overtopping

* Full Flow Headwater elevation is below inlet invert.

****

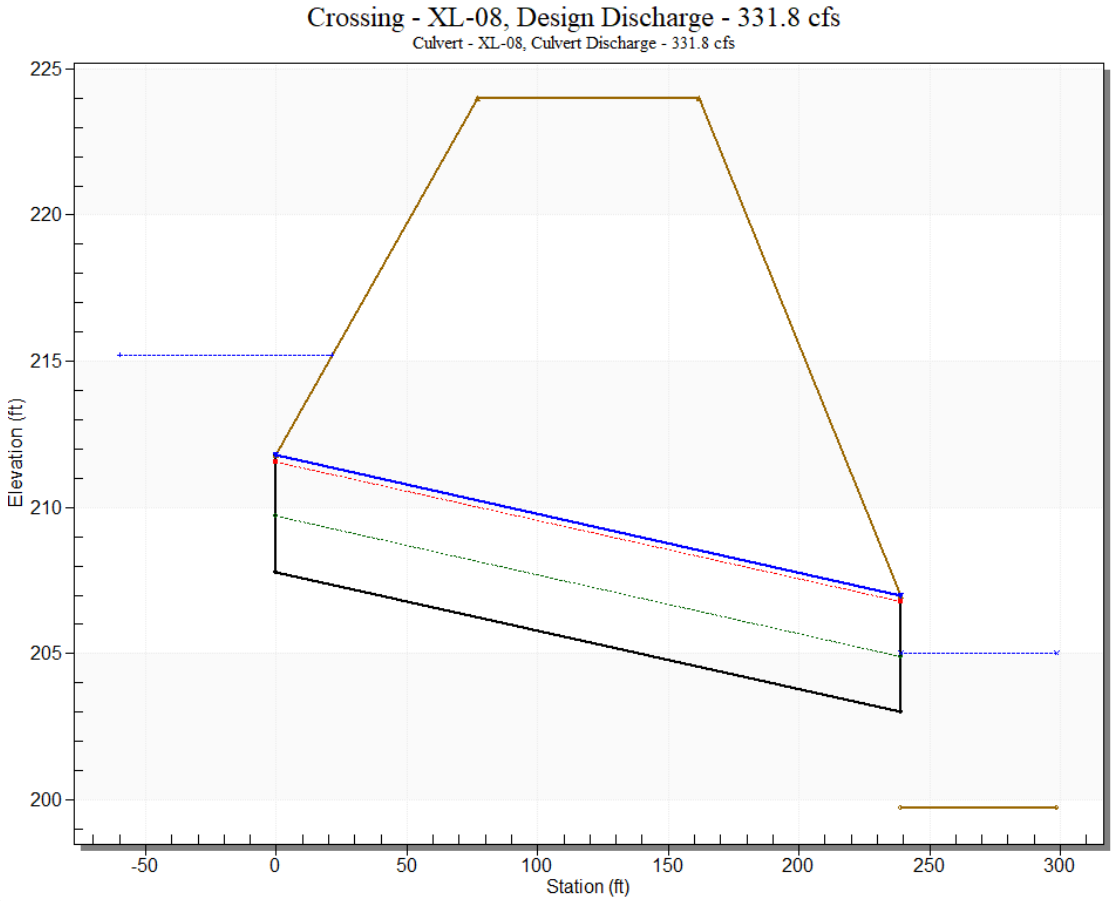
Straight Culvert

Inlet Elevation (invert): 207.79 ft, Outlet Elevation (invert): 203.00 ft

Culvert Length: 238.83 ft, Culvert Slope: 0.0201

****

Water Surface Profile Plot for Culvert: XL-08



Site Data - XL-08

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 207.79 ft

Outlet Station: 238.78 ft

Outlet Elevation: 203.00 ft

Number of Barrels: 1

Culvert Data Summary - XL-08

Barrel Shape: Concrete Box

Barrel Span: 8.00 ft

Barrel Rise: 4.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90 & 15º flare) Wingwall

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: XL-08)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
192.37	205.00	5.29
265.90	205.00	5.29
331.83	205.00	5.29
399.08	205.00	5.29

Tailwater Channel Data - XL-08

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 205.00 ft

Roadway Data for Crossing: XL-08

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 200.00 ft

Crest Elevation: 224.00 ft

Roadway Surface: Paved

Roadway Top Width: 85.00 ft

K

Appendix K:

Water Quality Monitoring Station Report

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-3700

SC Department of Environmental Services

Watershed and Water Quality Information

General Information

Applicant Name: SCDOT
Address: Rockland Rd, Columbia, SC, 29210
MS4 Designation: Small MS4
Within Coastal Critical Area: No
Waterbody Name: STOOP CREEK
Permit Type: MS4
Latitude/Longitude: 34.035425 / -81.113994
Monitoring Station: S-507
Water Classification (Provisional): FW
Entered Waterbody Name:

Parameter Description

NH3N	Ammonia	CD	Cadmium	CR	Chromium
CU	Copper	HG	Mercury	NI	Nickel
PB	Lead	ZN	Zinc	DO	Dissolved Oxygen
PH	pH	TURBIDITY	Turbidity	ECOLI	Escherichia coli (Freshwaters)
FC	Fecal Coliform (Shellfish)	BIO	Macroinvertebrates (Bio)	TP	(Lakes) Phosphorus
TN	(Lakes) Nitrogen	CHLA	(Lakes) Chlorophyll a	ENTERO	Enterococcus (Coastal Waters)
HGF	Mercury (Fish Tissue)	PCB	PCB (Fish)		

Impaired Status (downstream sites)

Station	NH3N	CD	CR	CU	HG	NI	PB	ZN	DO	PH	TURBIDITY	ECOLI	FC	BIO	TP	TN	CHLA	ENTERO	HGF	PCB
S-507	X	X	X	X	X	X	X	X	X	X	X	X	X	N	X	X	X	X	X	X
CRK08	X	X	X	X	X	X	X	X	X	X	X	N	X	A	X	X	X	X	X	X

F = Standards full supported
N = Standards not supported
A = Assessed at upstream station
X = Parameter not assessed at station
WnTN = Within TMDL, parameter not supported
InTN = In TMDL, parameter not supported
WnTF = Within TMDL, parameter full supported
InTF = In TMDL, parameter full supported

Parameters to be addressed (those not supporting standards)

BIO - Macroinvertebrates (Bio)

ECOLI - Escherichia coli (Freshwaters)

Fish Consumption Advisory

Waters of Concern (WOC)

TMDL Information - TMDL Parameters to be addressed

In TMDL Watershed: No
TMDL Report No:
TMDL Document Link:
TMDL Site:
TMDL Parameter:

Report Date: July 8, 2025

Vol. 4

Rockland Road

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(843) 414-37000

Stormwater Management Design Report

Rockland Road / Zimalcrest Drive Relocation

S-32-1241 / S-40-1421

Carolina Crossroads Phase 3A

SCDOT Project ID No. P043328

CARPER
CIVIL CONSULTING

Lexington/Richland County, South Carolina

June 2026





6/22/2026

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1 Project Summary

Rockland Road (S-32-1241) is being relocated in Phase 3A of the Carolna Crossroads Project in preparation for Phase 3E. The project is located in Lexington County, South Carolina (see Section 8.1, Figure 8.1.1 for the project Vicinity Map). At the county line, Rockland Road (Lexington) becomes Zimalcrest Drive (Richland). For the purposes of this report, the entire corridor will be referred to as Rockland Road. Approximately 2,780 ft of Rockland Road will be relocated between the Stoop Creek Bridge and the entrance to the City Gas station (approximately 90 ft North of Bush River Rd).

Rockland Road is a urban secondary road owned and maintained by the South Carolina Department of Transportation (SCDOT). The road currently consists of two paved 9 ft travel lanes with earth shoulders and road-side ditches. Rockland Road approximately parallels the I-20 EB right-of-way, lying south of the I-20/I-26 interchange and north of Bush River Road, between the I-20/Bush River Rd. interchange and the former I-26/Bush River Rd. interchange.

The road serves several commercial businesses and vacant parcels with General Commercial Zoning (see Section 8.1, Figure 8.1.3 for Aerial Map). Aerial and Field surveying of topography, surface structures, and utilities have been provided as part of the Carolina Crossroads Project. Based on the survey and USGS Topographic Maps, the contributory drainage area is estimated to be approximately 15 acres divided across three distinct Points of Interest (POI) (see Section 8.1, Figure 8.1.7 for Drainage Area Exhibit). POI A drains along the existing and proposed roadway to Stoop Creek at the Rockland Rd. Bridge. POI B drains to the South/Southwest to Stoop Creek near Bush River Rd. POI C drains to the Southeast and enters drainage facilities along Bush River Rd. before being discharged to an unnamed tributary of the Saluda River. See Section 8.1, Figure 8.1.4 for USGS Topographic Map.

Rockland Rd. will be relocated South of its current location into previously obtained right-of-way. The total disturbed area is estimated to be 6.2 acres. Overall drainage patterns will remain the same. Impervious areas will be reduced within the study area as a result of a reduction in the length of roadway and the removal of existing buildings and parking surfaces within the project limits. Based on this, there will be no increase in discharge. See Section 7.4 for Pre Vs Post Analysis.

The project area is located in Zone X as shown on Panel No. 45063C0161J effective July 5, 2018 and Panel No. 45079C0236L effective December 21, 2017 (see Section 8.1, Figure 8.1.5 for Firmette).

The drainage design and stormwater management techniques comply with the SCDOT Requirements for Hydraulic Studies, published May 26, 2009.

The information in this report is based on the Construction Plans for the Rockland Road Relocation project completed by HDR, Inc. as of June 2026.

2 Water Quality Considerations

The project lies within the Stoop Creek-Saluda River Watershed. The developed eastern end of the project drains to an unnamed tributary of the Saluda River. The central and western areas of the project site drain to Stoop Creek, and then to the Saluda River. The site is not within an approved TMDL watershed. However, according to the Watershed and Water Quality Report (Section 8.7), Ecoli and Turbidity standards are not supported and need to be addressed. Best management practices will be utilized to limit the transport of sediment off-site. Construction of this project will not have adverse impacts on the downstream water quality.

3 Soils Information

Hydrologic soil groups are established by the Natural Resource Conservation Service (NRCS) and classified based on estimates of the soil's runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils have a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well-drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils have a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well-drained or well-drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils have a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils have a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

The Soil Survey of Lexington and Richland County published by the Natural Resources Conservation Service (NRCS) indicates the presence of three predominant soil types within the project drainage area. These soil types are Cecil fine sandy loam (hydrologic soil group B), Tarrus silt loam (hydrologic soil group C), and Georgeville silt loam (hydrologic soil group B).

The Soil Survey can be seen in Figure 8.1.6 in Section 8.1.

4 Drainage Design Criteria

The hydrologic analysis was performed in accordance with SCDOT's Requirements for Hydraulic Design Studies, dated May 26, 2009. Specific design standards and analysis methods are discussed in Section 7. Table 4-1 below details the drainage design criteria for the project.

Table 4-1 Drainage Design Criteria

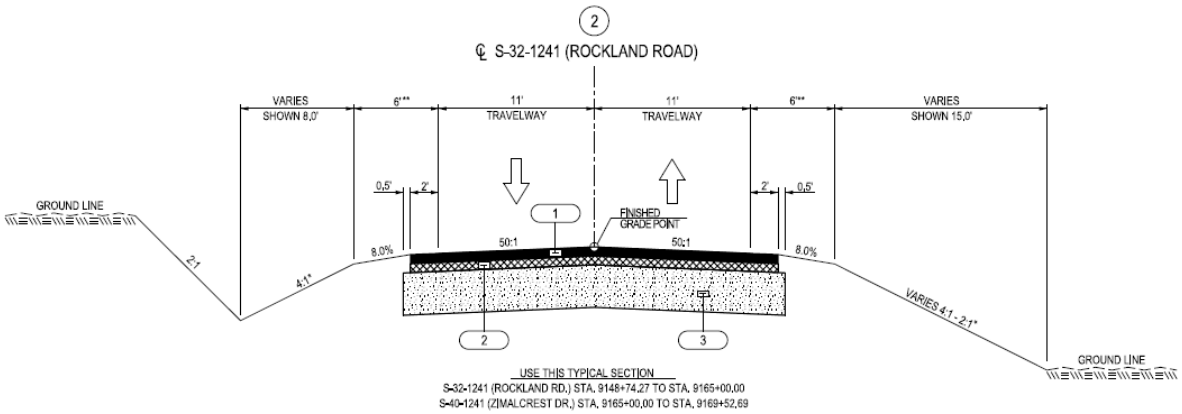
DRAINAGE DESIGN				
DESIGN ELEMENT			**DESIGN CRITERIA**	**SOURCE**
Design Discharge	Cross-Line Pipes		25-year	SCDOT Req. for Hydraulic Design Studies, May 26, 2009 **Section 2.2.2** and **2.2.3**
	Systems and Ditches	0 – 40 AC	10-year	
		40 – 500 AC	25-year	
		> 500 AC	50-year	
Allowable Spread Criteria	Roadway	Design Storm	10-year	SCDOT Req. Hydraulic Design Studies, May 26, 2009 **Section 4.2.2**
		Spread	½ travel lane	
Minimum Grades (%)	Pipe		0.30%	SCDOT Requirements for Hydraulic Design Studies, May 26, 2009 **Section 2.2.5**
	Ditch		0.30%	SCDOT Requirements for Hydraulic Design Studies, May 26, 2009 **Section 2.2.5**
Minimum Velocity			3.0 ft/sec	SCDOT Requirements for Hydraulic Design Studies, May 26, 2009 **Section 2.2.5**
Minimum Pipe Size	Storm Drainage Systems & Cross-Line Pipes		18"	SCDOT Requirements for Hydraulic Design Studies, May 26, 2009 **Section 2.2.6**
	Yard Drains & Driveway Pipes		15"	
Minimum Pipe Cover	Yard Drains		1.0'	SCDOT Standard Drawings
	Pipes Except Yard Drains		2.0' for CB-1	

5 Proposed Conditions

The proposed alignment will tie in beyond the existing Stoop Creek Bridge and will shift approximately 100 ft South parallel to the existing road. The terminus is approximately 90 ft north of the intersection with Bush River Road.

The proposed typical roadway section includes two 11-foot travel lanes (one travel lane in each direction), 6-foot shoulders, and roadside ditches. See Figure 5-1 below for the proposed typical section.

Figure 5-1 Proposed Typical Section



Roadside ditches will convey stormwater to the discharge points. Culverts will be placed at all connecting driveways, cross-drainage, and the discharges at Stoop Creek. An existing 36-inch culvert from I-26 discharges into the proposed right-of-way. Full flow has been assumed and will be conveyed across Rockland Rd. as part of this design.

6 Temporary Sediment and Erosion Control

Rip rap is to be placed on fill slopes at pipe ends per SCDOT's Instructional Bulletin No. 2009-2. Rip rap aprons are to be placed at the outfalls of the closed drainage systems. The aprons at pipe outfalls were sized per HEC-14 and SCDOT's instructional bulletins, and sizing calculations can be found in Section 8.6. Refer to the Drainage & Erosion Control Plan Sheets (Section 8.2) and the calculations for rip rap dimensions and locations.

To achieve slope stabilization during construction, fill slopes that are 5 feet or higher are to be lined with a temporary erosion control blanket (Class B). All proposed ditches are also to be lined with a temporary erosion control blanket (Class B), or turf reinforcement mats (TRM) as indicated in the Ditch Calculations (Section 8.4) and the Erosion Control Data Sheet.

Sediment tubes are to be placed in all ditches within the project limits to reduce flow velocities and to aid in sediment control. The Erosion Control Data Sheet located in the plan set provides details on the proposed locations of erosion control measures.

A single row of silt fence will be placed outside of the construction limits at fill sections. All erosion control measures were proposed according to SCDOT Standard Drawings from Sections 804 and 815 and the SCDES BMP Handbook.

7 Stormwater Analysis

7.1 Stormwater Analysis Overview

Drainage areas, flow paths and lengths, and watercourse slopes were delineated using survey data and the USGS 7.5-minute Quadrangle Map COLUMBIA NORTH, SC (see Section 8.1, Figure 8.1.7 for Drainage Area Exhibit). The Rational Method was used to determine peak discharges for the basins. The time of concentration for each watershed was calculated based on the methodology outlined in the Soil Conservation Service's Urban Hydrology for Small Watersheds (Technical Release 55) "TR-55" publication, dated June 1986, with a minimum time of concentration of five minutes. SCDOT-published rainfall intensity value charts for Lexington County were used to determine rainfall intensities (in/hr). Manning's n values were estimated from survey data and aerial photography.

Survey data and aerial photography were used to determine pervious and impervious areas to calculate runoff coefficients. Pervious surfaces were assigned a C value of 0.35 and 0.90 was used for impervious surfaces. Weighted C values were then calculated for each basin.

The Rational Method Rainfall Intensity Coefficients for Lexington County are shown below in Table 7.1.

Table 7-1 Rainfall Intensity Coefficients

Frequency (Years)	a	b	c
2	67.7200	11.5600	0.8440
5	56.5100	9.9040	0.7596
10	50.4500	8.5610	0.7011
25	42.0500	6.6030	0.6240
50	38.1900	5.4160	0.5756
100	34.3300	4.1110	0.5277

These coefficients were utilized in the following equation to calculate rainfall intensities for various Times of Concentration: $$i = \frac{a}{(b+t_c)^c}$$

7.2 Open Channel Analysis

"V"-shaped ditches are proposed to convey runoff from the road to the project outfalls. The ditches were designed for stability and flow depth with the 10-year storm event. A freeboard

distance of 1 foot between the design water surface elevation and the road subgrade was implemented where possible. Ditch Calculations can be found in Section 8.4.

7.3 Culvert Analysis

A culvert crossing is proposed along the alignment where an existing 36-inch pipe discharges upstream. This crossing has been analyzed utilizing the criteria and procedures outlined in the SCDOT Req. for Hydraulic Design Studies, Section 2. Full-flow capacity based on the calculated slope of the existing pipe was used for the design flow in the analysis. The results indicate the proposed culvert does not meet the required Headwater depth utilizing the assumed flow. Therefore, it is recommended that the upstream discharge be attenuated in the future design of the CCR interchange. The HY-8 computer program results can be found in Section 8.5

7.4 Pre Vs Post Analysis

As part of the relocation effort, approximately 52,300 sq.ft. of impervious area (buildings, parking lots, and roadway) will be removed from the watershed. The comparison of Pre-development Vs Post-development runoff indicates a reduction in runoff.

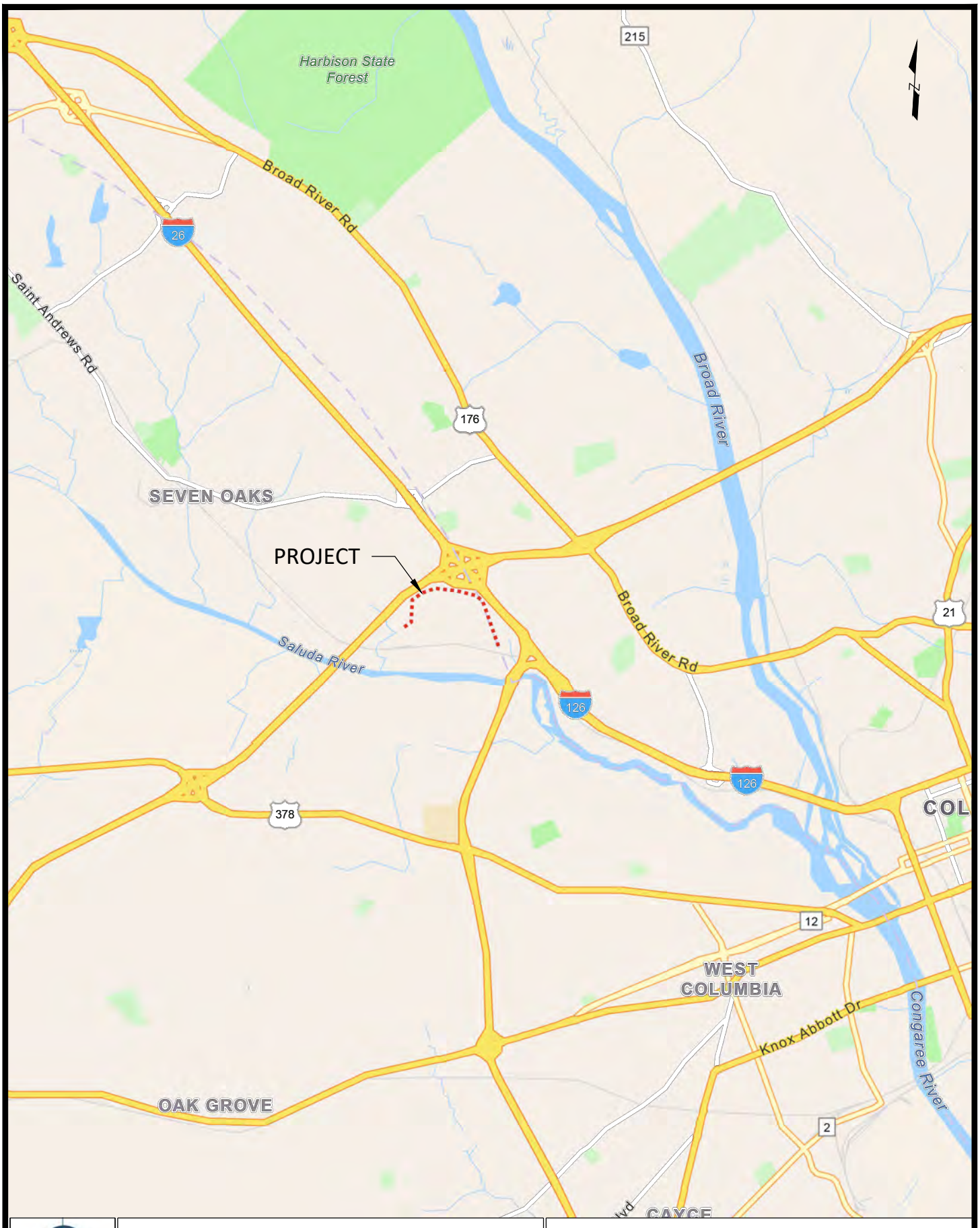
Table 7-2 Pre Vs Post Analysis

					2-yr*		10-yr*		25-yr*		50-yr*		100-yr*	
		Area (ac)	C	Tc (min)	i (in/hr)	Q (cfs)	i (in/hr)	Q (cfs)	i (in/hr)	Q (cfs)	i (in/hr)	Q (cfs)	i (in/hr)	Q (cfs)
POI-A	Pre	6.91	0.42	30	2.91	8.45	3.90	11.32	4.45	14.20	4.90	17.06	5.33	19.34
	Post	6.94	0.40	30	2.91	8.08	3.90	10.83	4.45	13.59	4.90	16.32	5.33	18.50
	%Delta					(4.4)		(4.3)		(4.3)		(4.3)		(4.3)
POI-B	Pre	2.73	0.55	10	5.07	7.61	6.51	9.77	7.28	12.02	7.91	14.25	8.49	15.93
	Post	2.89	0.51	10	5.07	7.47	6.51	9.60	7.28	11.80	7.91	13.99	8.49	15.64
	%Delta					(1.8)		(1.7)		(1.8)		(1.8)		(1.8)
POI-C	Pre	5.81	0.55	30	2.91	9.30	3.90	12.46	4.45	14.22	4.90	15.66	5.33	17.03
	Post	5.54	0.57	30	2.91	9.19	3.90	12.32	4.45	14.06	4.90	15.48	5.33	16.84
	%Delta					(1.2)		(1.1)		(1.1)		(1.2)		(1.1)

*Rational Cf Modification
2yr – 1.0
10yr – 1.0
25yr – 1.1
50yr – 1.2
100yr – 1.25

8 Engineering Appendix Data

8.1 Project Maps



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ROCKLAND ROAD RELOCATION
COLUMBIA, SC
LEXINGTON/RICHLAND COUNTY

VICINITY MAP

0 50 100 Miles

FILE NAME:	drn exhibits	FIGURE
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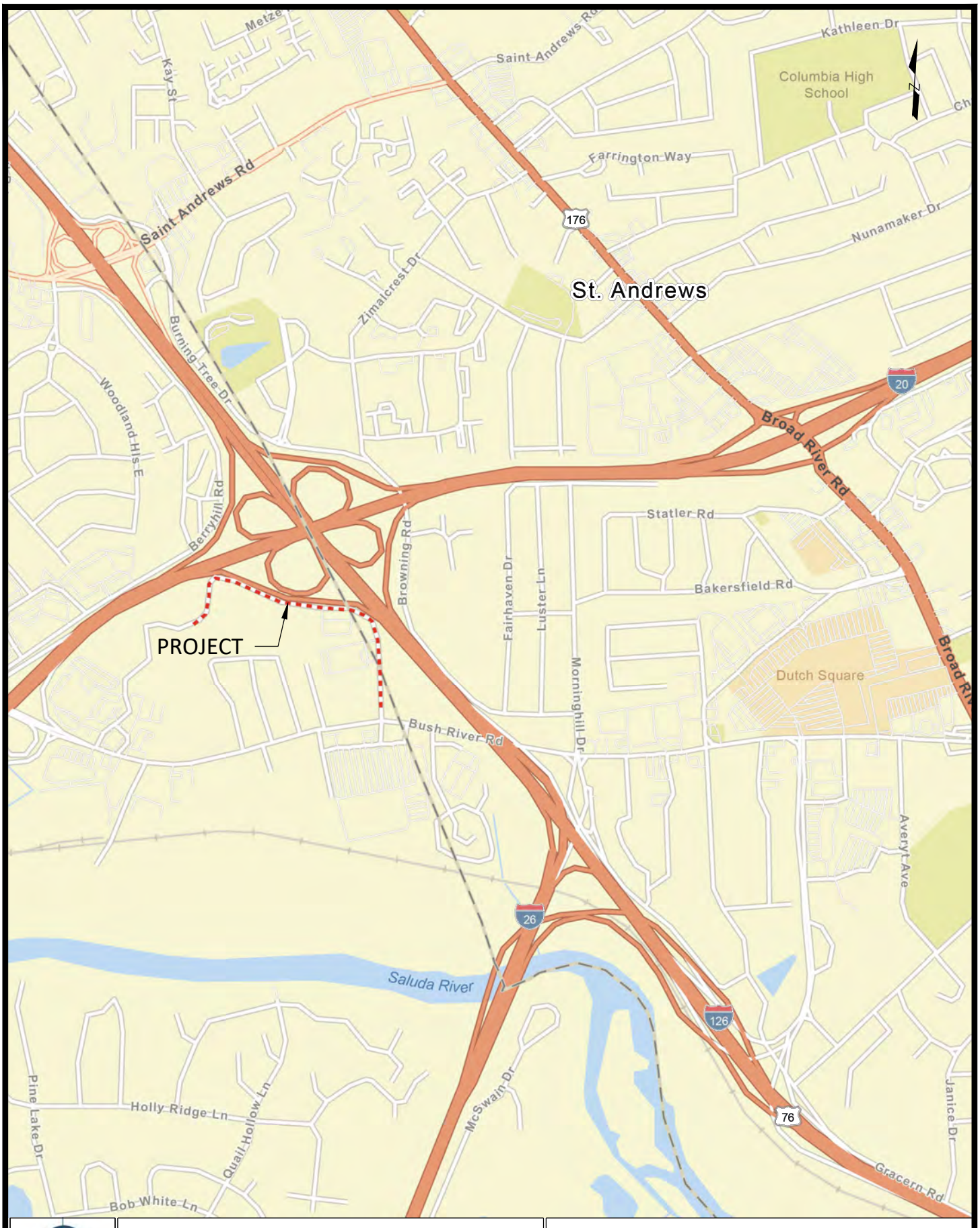

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ROCKLAND ROAD RELOCATION
COLUMBIA, SC
LEXINGTON/RICHLAND COUNTY

LOCATION MAP

0 50 100 Feet

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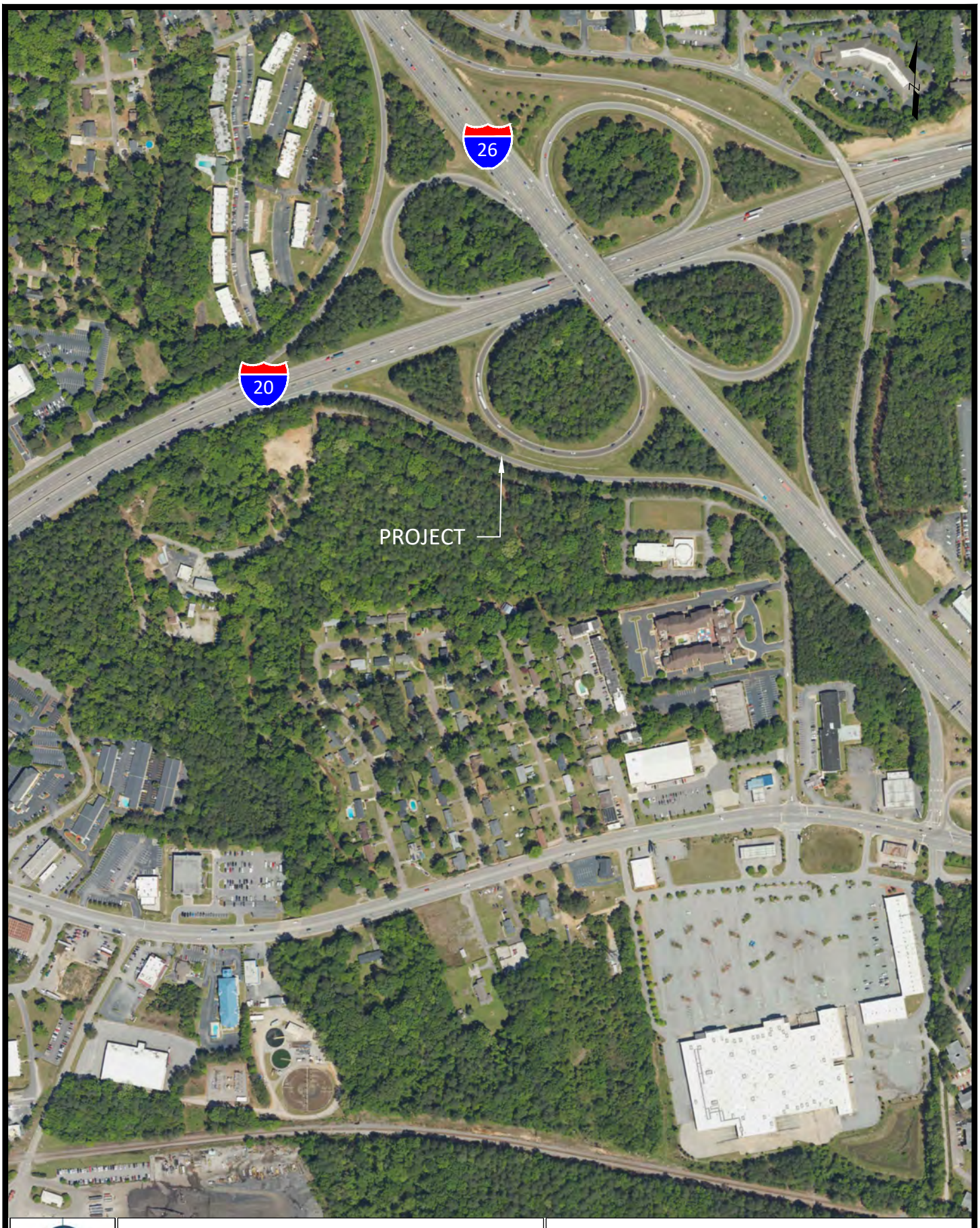

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ROCKLAND ROAD RELOCATION
COLUMBIA, SC
LEXINGTON/RICHLAND COUNTY

AERIAL MAP

0 50 100 Feet

FILE NAME: drn exhibits
SCALE: 1" = 500'

FIGURE
8.1.3

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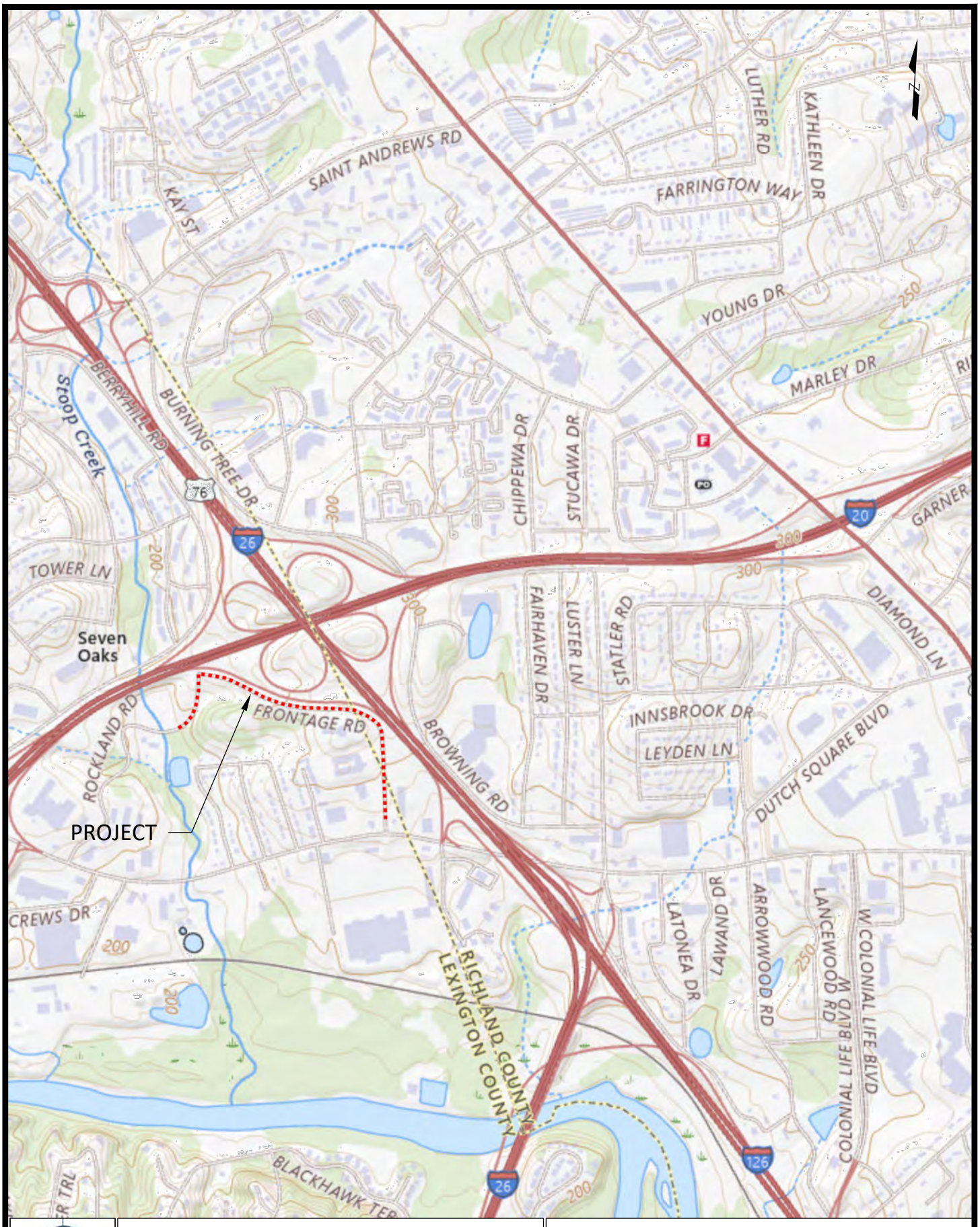

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ROCKLAND ROAD RELOCATION
COLUMBIA, SC
LEXINGTON/RICHLAND COUNTY

USGS TOPOGRAPHIC MAP

0 50 100 Feet

FILE NAME: drn exhibits
SCALE: 1" = 2520'

FIGURE
8.1.4

ational Flood Hazard Layer FIRMette



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ROCKLAND ROAD RELOCATION
COLUMBIA, SC
LEXINGTON/RICHLAND COUNTY

FEMA FIRMETTE

FILE NAME:	drn exhibits	FIGURE
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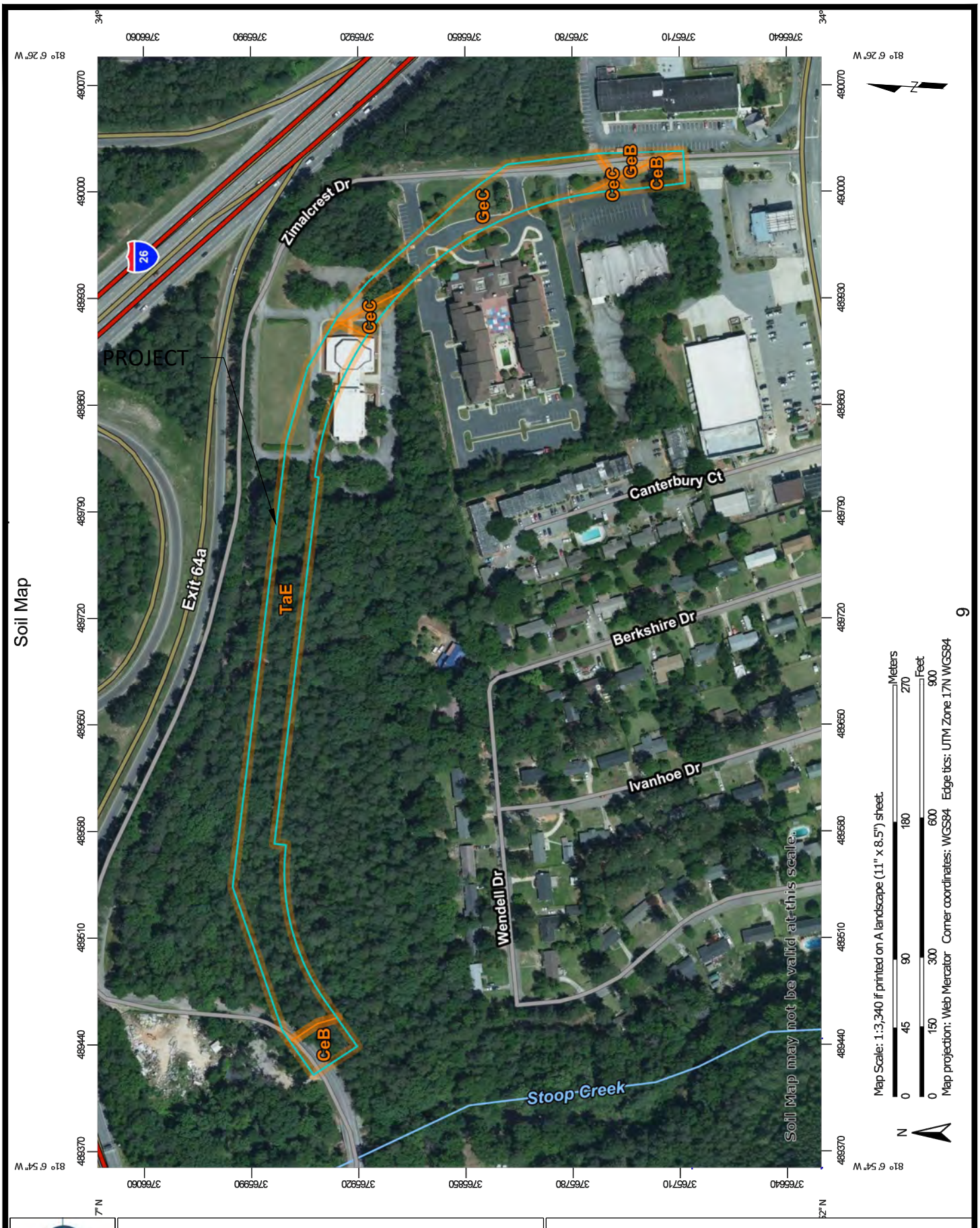

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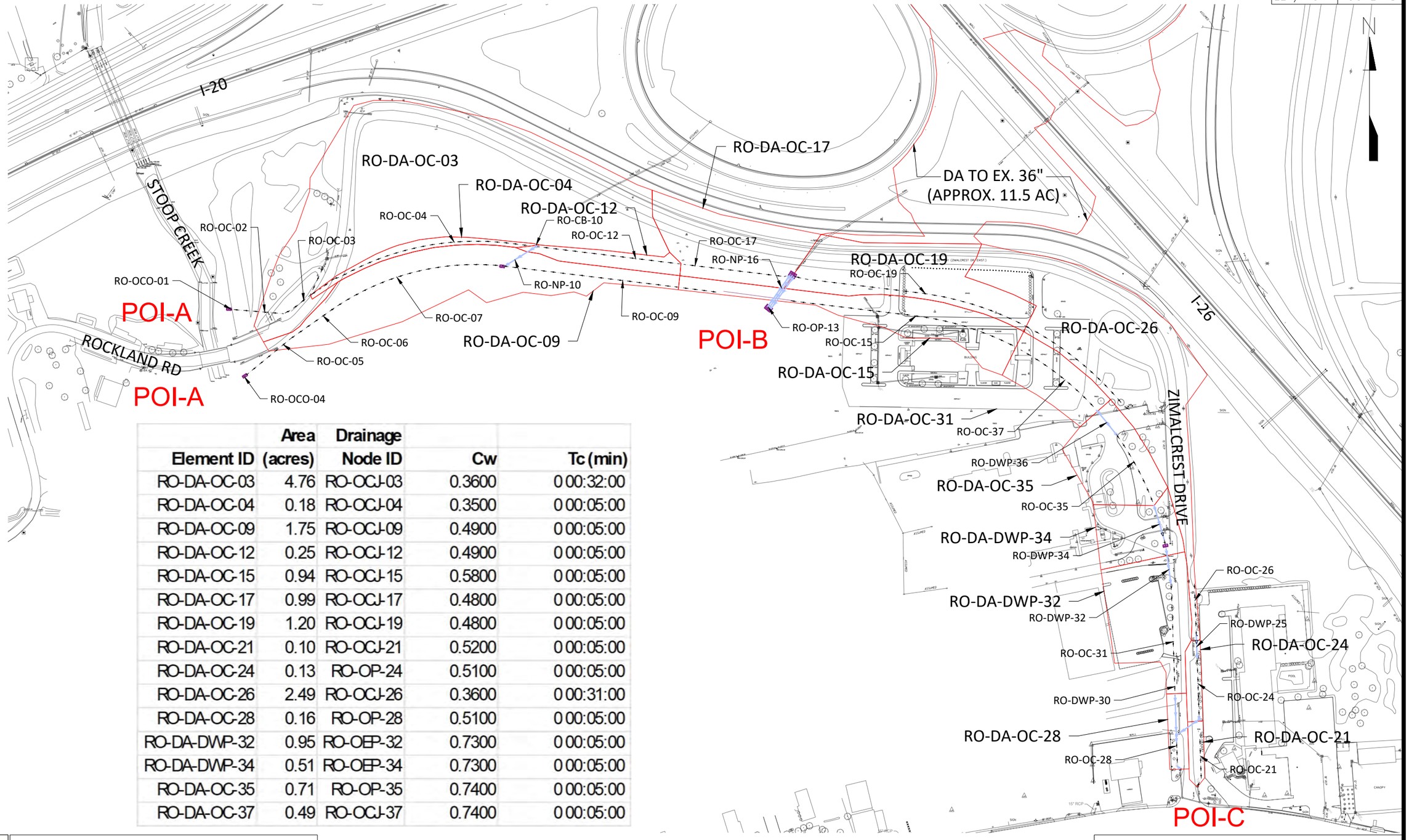
ROCKLAND ROAD RELOCATION
COLUMBIA, SC
LEXINGTON/RICHLAND COUNTY

USDA SOILS MAP

FILE NAME:	drn exhibits	FIGURE
SCALE:	1" = 3,340'	8.1.6

COUNTY	ROUTE
LEX/RICH	ROCKLAND



Element ID	Area (acres)	Drainage Node ID	Cw	Tc (min)
RO-DA-OC-03	4.76	RO-OCJ-03	0.3600	0 00:32:00
RO-DA-OC-04	0.18	RO-OCJ-04	0.3500	0 00:05:00
RO-DA-OC-09	1.75	RO-OCJ-09	0.4900	0 00:05:00
RO-DA-OC-12	0.25	RO-OCJ-12	0.4900	0 00:05:00
RO-DA-OC-15	0.94	RO-OCJ-15	0.5800	0 00:05:00
RO-DA-OC-17	0.99	RO-OCJ-17	0.4800	0 00:05:00
RO-DA-OC-19	1.20	RO-OCJ-19	0.4800	0 00:05:00
RO-DA-OC-21	0.10	RO-OCJ-21	0.5200	0 00:05:00
RO-DA-OC-24	0.13	RO-OP-24	0.5100	0 00:05:00
RO-DA-OC-26	2.49	RO-OCJ-26	0.3600	0 00:31:00
RO-DA-OC-28	0.16	RO-OP-28	0.5100	0 00:05:00
RO-DA-DWP-32	0.95	RO-OEP-32	0.7300	0 00:05:00
RO-DA-DWP-34	0.51	RO-OEP-34	0.7300	0 00:05:00
RO-DA-OC-35	0.71	RO-OP-35	0.7400	0 00:05:00
RO-DA-OC-37	0.49	RO-OCJ-37	0.7400	0 00:05:00

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ROCKLAND ROAD RELOCATION
COLUMBIA, SC
LEXINGTON/RICHLAND COUNTY

DRAINAGE AREA EXHIBIT

0 100 200 Feet	FILE NAME:	drn exhibits	FIGURE
	SCALE:	1" = 200'	8.1.7

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8.2 Drainage & Erosion Control Sheets

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1241 S-40-1421	D05

GENERAL DRAINAGE NOTES

1. PIPES TO BE ABANDONED SHALL EITHER BE REMOVED OR FILLED WITH FLOWABLE FILL.

2. REINFORCED-CONCRETE PIPE SHALL BE USED FOR ALL PIPES UNDERNEATH INTERSTATES AND ANY RAMPS WHERE INSTALLATION IS USED UNDER THE EXISTING ROADWAY OR MEDIAN.

3. TRENCHLESS INSTALLATION OF PIPE IS RECOMMENDED FOR EXISTING ROADWAY CROSSINGS FOR ALL NEW PIPE UNDER THE EXISTING INTERSTATE TRAVELED WAY. THE DIAMETER LISTED ON THE PLANS IS REQUIRED FOR HYDRAULIC OPENING OF THE PIPE. LENGTH OF THE TRENCHLESS INSTALLATION IS TO BE DETERMINED BY THE CONTRACTOR. LENGTHS LISTED ON THE PLANS ARE FOR THE ENTIRE LENGTH OF PIPE TO BE INSTALLED.

4. ALL EXISTING MEDIAN AND SIDELINE ASPHALT OR CONCRETE DITCH LININGS WITHIN PROJECT LIMITS ARE TO BE REMOVED AND REPLACED UNLESS NOTED OTHERWISE. FOR ANY THAT ARE TO BE RETAINED, REPAIR IN ACCORDANCE WITH SPECIAL PROVISION 815 EROSION CONTROL.

5. PIPE LENGTHS AS SHOWN IN THE DRAINAGE PLAN SHEETS AND PIPE DATA TABLES INCLUDE END TREATMENTS (BEVELED-END SECTIONS, ETC.) IN THE TOTAL PIPE LENGTH. BEVELED-END SECTIONS SHALL BE INSTALLED IN ACCORDANCE WITH SCDOT STANDARD DRAWING 719-610-00.

6. RIPRAP QUANTITIES SHOWN ON PLAN SHEETS ONLY ACCOUNT FOR OUTLET RIPRAP APRONS, BASINS, AND DITCH LININGS. PIPE PROTECTION AND SLOPE PROTECTION AROUND WING WALLS ARE NOT DETAILED OR QUANTIFIED ON THE PLAN SHEETS.

7. ALL EXISTING PIPE NETWORKS AND CULVERTS WITHIN SCDOT RIGHT OF WAY THAT ARE TO BE RETAINED WILL REQUIRE A VIDEO INSPECTION, IF NOT ALREADY INSPECTED. FOR ALL PIPES OR CULVERTS REQUIRING VIDEO INSPECTION DURING CONSTRUCTION, THE CONTRACTOR SHALL:
   A. LOCATE AND EXCAVATE EACH END OF THE CULVERT AND CLEAN OUT SEDIMENT OR DEBRIS.
   B. PERFORM A FIELD AND VIDEO INSPECTION IN ACCORDANCE WITH SCDOT'S PIPE AND CULVERT INVENTORY AND INSPECTION GUIDELINES (2011).
   C. UPON COMPLETION OF THE VIDEO INSPECTION, PROVIDE PIPE VIDEO AND INSPECTION REPORT TO THE ENGINEER FOR REVIEW. NO CONSTRUCTION ON THE CULVERT SHALL PROCEED UNTIL THE ENGINEER HAS PROVIDED A SIGNED LETTER OR REPORT STATING THE RECOMMENDED ALTERNATIVES TO REPLACEMENT.

8. EXISTING PIPE CULVERT DEFICIENCIES ARE DETAILED ON THE DRAINAGE PLAN SHEETS FOR ALL PIPES REQUIRING REPAIRS. FOR PIPES NOT SPECIFIED AS "LINE EXISTING PIPE" THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF THE CHOSEN METHOD OF REPAIR INVOLVES LINING OR ANY OTHER METHOD OF REPAIR THAT WILL REDUCE THE INSIDE DIAMETER OF THE EXISTING PIPE PRIOR TO REPAIRING.

9. ALL DRAINAGE STRUCTURES OTHER THAN THOSE NOTED IN THE PLANS AS "BLIND" SHALL BE ACCESSIBLE TO THE FINAL SURFACE GRADE BY EITHER MANHOLE OR GRATE ACCESS.

10. BOXES TO BE RETAINED WILL BE REQUIRED TO BE RETROFITTED. DAMAGED BOXES WILL BE REQUIRED TO BE REPLACED.

11. PRECAST MANHOLES AND CATCH BASINS WILL BE USED FOR THE FOLLOWING CONDITIONS:
   A. WHERE THE DEPTH EXCEEDS 12 FEET AS MEASURED FROM RIM TO BOTTOM OF THE BOTTOM SLAB.
   B. WHERE THE FLOW LINE ELEVATION OF THE INLET PIPE IS HIGHER THAN THE SOFFIT OF THE OUTLET PIPE.
   C. AT THE ENGINEER'S DISCRETION.

12. DRIVEWAY PIPES ARE SHOWN IN THE PLANS BUT ARE NOT TABULATED WITHIN THE PIPE TABLES. INVERT LOCATIONS AND ELEVATIONS ARE TO BE SET BASED ON THE FINAL DITCH GRADES AS DETAILED IN THE CROSS SECTIONS.

13. AVOID CONSTRUCTION VEHICLE TRAFFIC OVER INSTALLED PIPE WHERE POSSIBLE. DO NOT DRIVE CONSTRUCTION VEHICLES OVER INSTALLED PIPE DIAMETER LESS THAN THE LARGER OF 3 FEET OR ONE PIPE DIAMETER OF FILL. IF FILL HEIGHT IS SUFFICIENT AND CROSSING IS UNAVOIDABLE, PERIODICALLY CHANGE LOCATION OF EQUIPMENT CROSSING OVER PIPE IN ORDER TO MINIMIZE THE CHANCE OF LATERAL DISPLACEMENT.

14. UPON COMPLETION AND STABILIZATION, ALL TEMPORARY EROSION CONTROL MEASURES ARE TO BE REMOVED AND GRADED FOR POSITIVE DRAINAGE, INCLUDING SEDIMENT DAMS AND TEMPORARY SEDIMENT BASINS. PERMANENT DETENTION OR WATER QUALITY PONDS ARE TO REMAIN.

15. TYPE D2 INLET FILTERS ARE TO BE PLACED AT ALL DROP INLETS AND MANHOLES IN SUMP MEDIAN AND DITCH LOCATIONS. ALL OTHER INLETS ARE TO BE PROTECTED WITH TYPE A INLET FILTERS ONCE INSTALLED. AFTER ROAD BASE COURSE IS PLACED, PLACE WEIGHTED TYPE F INLET TUBES AT ALL INLETS WITHIN THE PAVED AREAS. FOR CURB INLETS, PLACE TYPE F INLET FILTERS ONCE ROAD SURFACE COURSE IS PLACED.

16. THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) LINE IS USED TO DENOTE LAND-DISTURBING ACTIVITIES ONLY WHEN NECESSARY TO GO BEYOND THE CONSTRUCTION LIMITS. SILT FENCE IS TO BE OFFSET 1' TO THE INSIDE OF THE NPDES LOCATION AS SHOWN ON PLANS (PER FIGURE 12.1-B OF THE SCDOT ROADWAY DESIGN MANUAL 2017). IN LOCATIONS WHERE NPDES LINES CROSS EXISTING DITCHES OR STREAM CHANNELS, SILT FENCE IS TO BE INSTALLED UP TO THE CHANNEL BANK BUT IS NOT TO CROSS THE STREAM AND IS NOT TO IMPEDE FLOW.

COMMON ABBREVIATIONS

BCXT	BOX CULVERT EXTENSION
BE	BERRYHILL ROAD
BRDG	BRIDGE
BR	BROWNING ROAD
BS	BUSH RIVER ROAD
BT	BURNING TREE DRIVE
CB	PROP. CATCH BASIN
CC	PROP. CONCRETE COLLAR
DB	DETENTION BASIN
DI	PROP. DROP INLET
EB	EASTBOUND
EC	EX. BOX CULVERT
EP	EX. PIPE
EX	EXISTING
EXCB	EX. CATCH BASIN
EXDB	EX. DETENTION BASIN
EXDI	EX. DROP INLET
EXHW	EX. HEADWALL
EXJ	EX. JUNCTION
EXJB	EX. JUNCTION BOX
EXMH	EX. MANHOLE
EXOEP	EX. OPEN PIPE END

HW	PROP. HEADWALL
JB	PROP. JUNCTION BOX
LF	LINEAR FEET
MCB	MEDIAN CATCH BASIN
MH	PROP. MANHOLE
NB	NORTHBOUND
NC	PROP. BOX CULVERT
NP	PROP. PIPE
OC	OPEN CHANNEL
OEP	PROP. OPEN PIPE END
OP	PIPE OUTFALL
PO	POND OUTFALL STRUCTURE
PR	PROPOSED
RCBC	REINFORCED-CONCRETE BOX CULVERT
RCP	REINFORCED-CONCRETE PIPE
RO	ROCKLAND ROAD
SB	SOUTHBOUND
SLP	SLIP-LINE PIPE
STB	STORAGE BASIN
SWP	SMOOTH-WALL PIPE
WB	WESTBOUND
XL	CROSSLINE

LINE STYLE LEGEND

PROP. STORM DRAIN PIPE

PROP. "V" DITCH

PROP. TRAPEZOIDAL DITCH

PROP. BRIDGE END FLUME

EXISTING PIPE

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SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION CARPER CIVIL CONSULTING, LLC No. 5672

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26131 JEFFREY BRYSON CARPER

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
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TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1241/S-40-1421 (ROCKLAND RD/ZIMALCREST DR)

DRAINAGE NOTES

S-32-1241/S-40-1421 SHT D-RO-NOTES

PLOT DRIVER: ADOBE PDF
USER: JEFF CARPER
FILE: drn_notes.dwg
DATE: June 22, 2026 TIME: 13:09
PEN TABLE: SCDOT PREALPHA.STB

VOLUME 4

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1241 S-40-1421	D08

NOTES:
1. ALL OPEN PIPE ENDS WILL BE BEVELED UNLESS OTHERWISE INDICATED.
2. UNLESS OTHERWISE NOTED, RETAIN EXIST. DRAINAGE INFRASTRUCTURE OUTSIDE OF PROJECT CONSTRUCTION LIMITS.

BEGIN CONSTRUCTION
SURVEY STA 9147+10.00
S-32-1241 (ROCKLAND RD.) RELOC

MATCHLINE STA 9146+00
SEE SHEET D07

STOOP CREEK

RO-O-01
OUTFALL
PLACE 15 TONS CLASS B RIPRAP
PLACE 19 SY CLASS 2 TYPE C GEOTEXTILE

RO-OC-02
"V" DITCH
SEE XS SHEETS

REMOVE
EX. 18" RCP

RO-OC-03
"V" DITCH
SEE XS SHEETS

REMOVE EX. 15" RCP

REMOVE EX. JB

REMOVE EX. 24" RCP

REMOVE EX. CULVERT

ROCKLAND RD. EXIST

PRES. R/W

NEW R/W

S-32-1241 (ROCKLAND RD. EXIST.)

S-32-1241 (ROCKLAND RD.)

REMOVE EX. 18" RCP

RO-O-04
OUTFALL
PLACE 12 TONS CLASS B RIPRAP
PLACE 15 SY CLASS 2 TYPE C GEOTEXTILE

RO-OC-05
"V" DITCH
SEE XS SHEETS

RO-OC-06
"V" DITCH
SEE XS SHEETS

RO-OC-04
"V" DITCH
SEE XS SHEETS

RO-OC-07
"V" DITCH
SEE XS SHEETS

MATCHLINE STA 9151+00
SEE SHEET D09

550 549 549

PLOT DRIVER: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 PEN TABLE: SCDOT PREALPHA.STB
USER: JEFF CARPER DATE: June 22, 2026 TIME: 13:27
FILE: drn_rocklandrd_r4.dwg

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HDR ENGINEERING INC. OF THE CAROLINAS
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803-509-6600

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
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2			
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TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

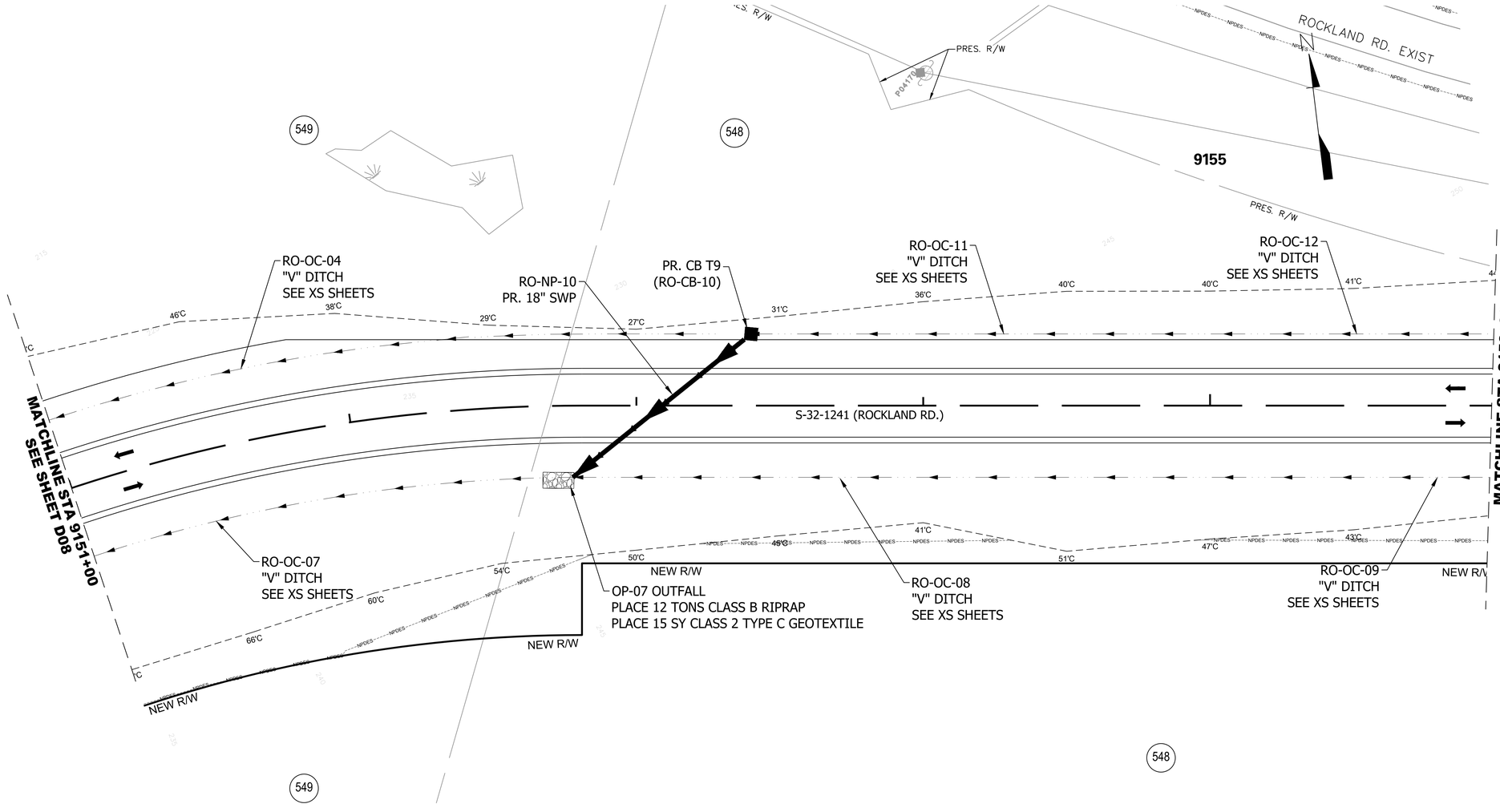
CAROLINA CROSSROADS
S-32-1241/S-40-1421 (ROCKLAND RD/ZIMALCREST DR)
DRAINAGE AND EROSION CONTROL PLAN SHEET
STA 9146+00.00 TO STA 9151+00.00

S-32-1241/S-40-1421

VOLUME 4

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1241 S-40-1421	D09

NOTES:
1. ALL OPEN PIPE ENDS WILL BE BEVELED UNLESS OTHERWISE INDICATED.
2. UNLESS OTHERWISE NOTED, RETAIN EXIST. DRAINAGE INFRASTRUCTURE OUTSIDE OF PROJECT CONSTRUCTION LIMITS.



Smooth

System ID	Link ID	Geometry				Upstream				Downstream				Fill Height		Min Field SPT "N" below invert	Joint Pressure (psi)	Smooth Wall Options					
		Diameter (in)	No. of Barrels	Pipe Length (ft)	Slope (%)	Node	Node Description	Node Station	Link Invert (ft)	Node	Node Description	Node Station	Link Invert (ft)	Min (ft)	Max (ft)			HDPE Type	Built ✓	RCP Highest Class	Built ✓	SRAP Thickest Gage	Built ✓
RO-OP-07	RO-NP-10	18	1	79.77	3.33	RO-CB-10	CATCH BASIN	9153+40.00	232.84	RO-OP-07	PIPE OUTFALL	9152+77.70	230.18	0.00	3.32		10	S		III		16ga	

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SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION — CARPER CIVIL CONSULTING, LLC No. 5672

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER — No. 26131

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
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TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1241/S-40-1421 (ROCKLAND RD/ZIMALCREST DR)
DRAINAGE AND EROSION CONTROL PLAN SHEET
STA 9151+00 TO STA 9156+00

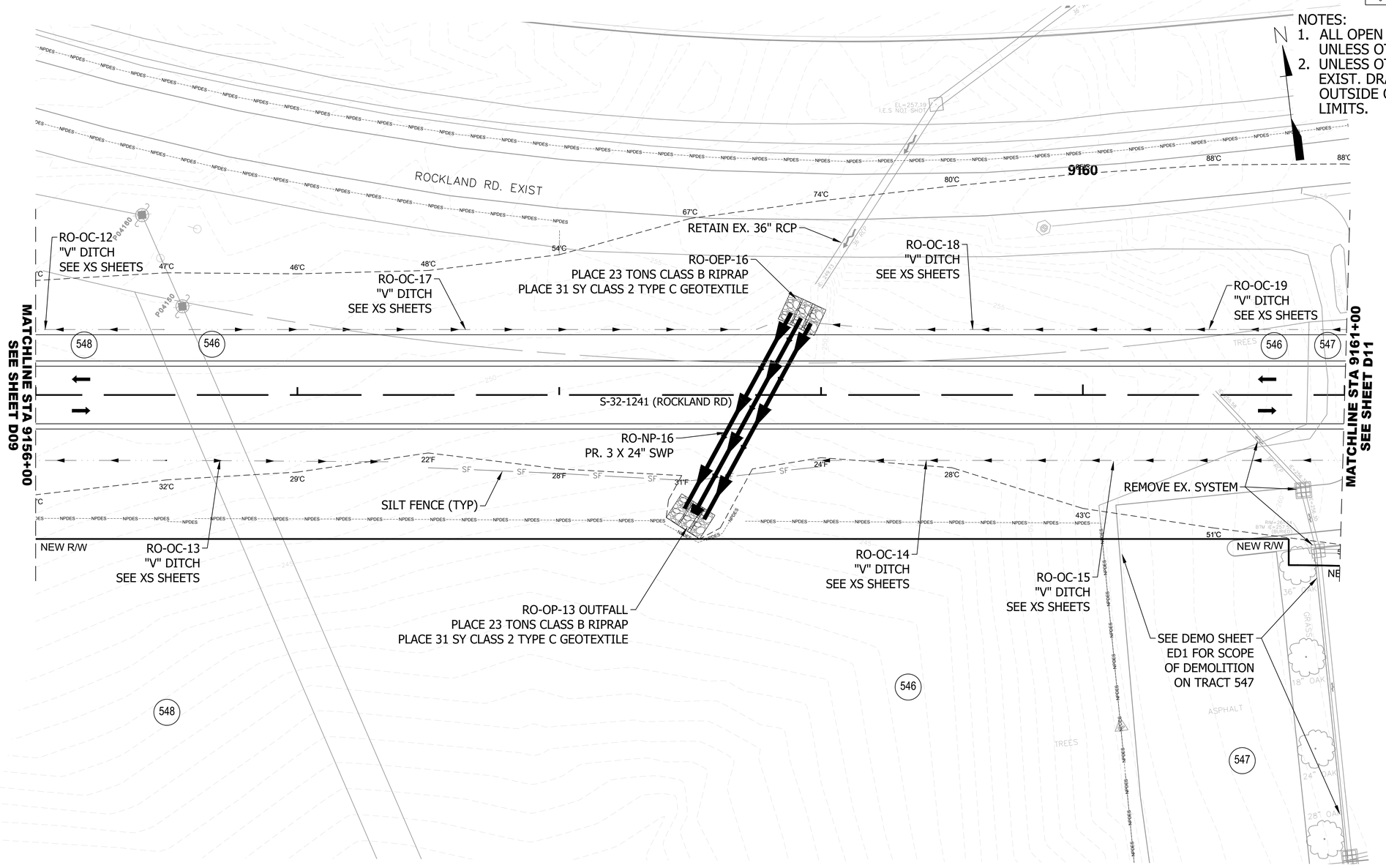
S-32-1241/S-40-1421

PLOT DRIVER: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 PEN TABLE: SCDOT PREALPHA.STB
USER: JEFF CARPER DATE: June 22, 2026 TIME: 13:28
FILE: drn_rocklandrd_r4.dwg

VOLUME 4

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1241 S-40-1421	D10

NOTES:
1. ALL OPEN PIPE ENDS WILL BE BEVELED UNLESS OTHERWISE INDICATED.
2. UNLESS OTHERWISE NOTED, RETAIN EXIST. DRAINAGE INFRASTRUCTURE OUTSIDE OF PROJECT CONSTRUCTION LIMITS.



Smooth																							
		Geometry				Upstream				Downstream				Fill Height		Min Field	Joint	Smooth Wall Options					
System ID	Link ID	Diameter (in)	No. of Barrels	Pipe Length (ft)	Slope (%)	Node	Node Description	Node Station	Link Invert (ft)	Node	Node Description	Node Station	Link Invert (ft)	Min (ft)	Max (ft)	SPT "N" below invert	Pressure (psi)	HDPE Type	Built ✓	RCP Highest Class	Built ✓	SRAP Thickest Gage	Built ✓
RO-OP-13	RO-NP-16	24	3	85.04	2.06	RO-OEP-16	OPEN PIPE	9158+92.29	245.75	RO-OP-13	PIPE OUTFALL	9158+51.59	244.00	0.00	2.57		10	S		III		16ga	

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803-509-6600

NORTH CAROLINA — CARPER CIVIL CONSULTING, LLC — No. 5672 — CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA — PROFESSIONAL ENGINEER — No. 26131 — JOHN CARPER — 11-20-2025

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
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PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

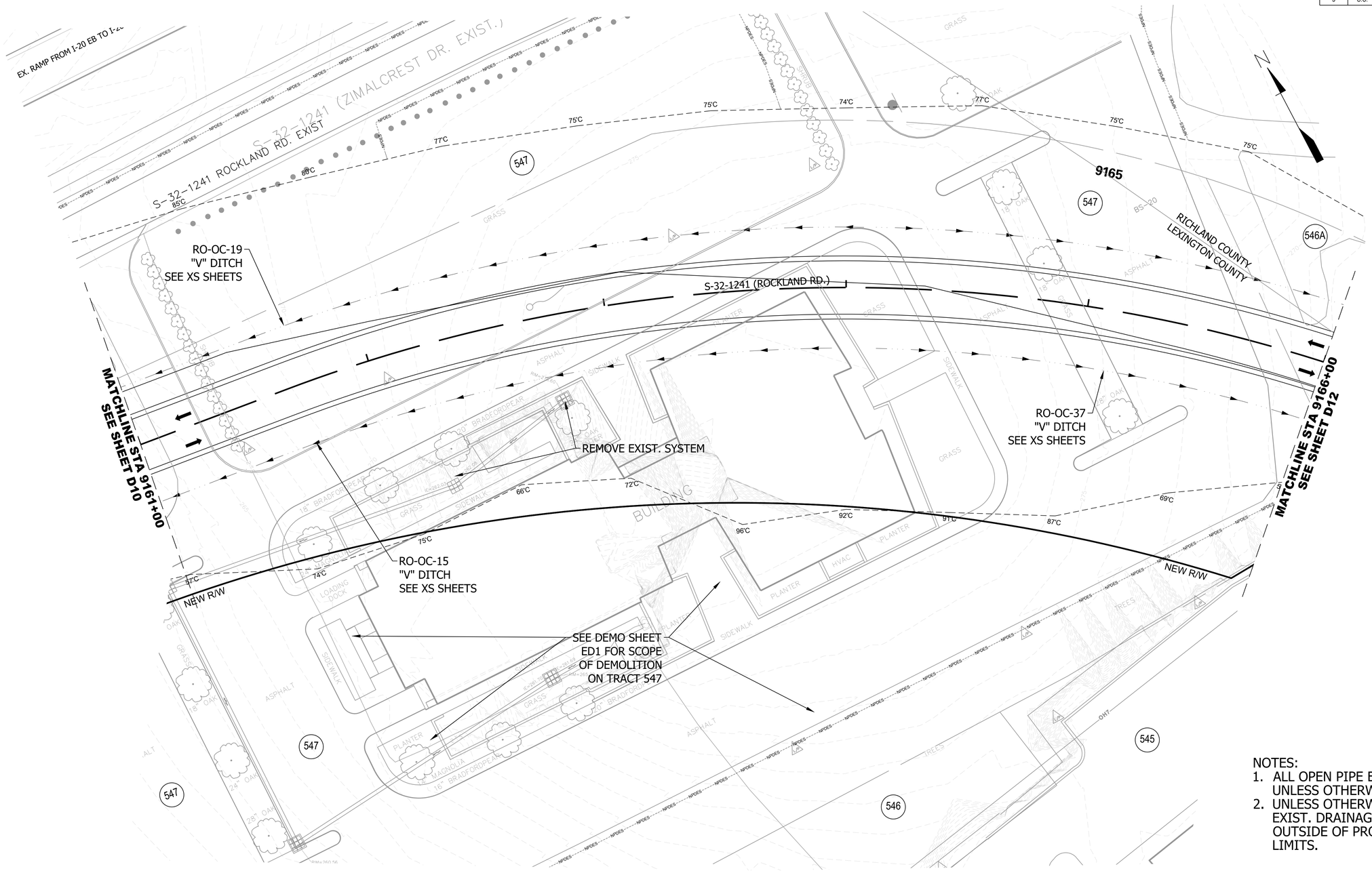
CAROLINA CROSSROADS
S-32-1241/S-40-1421 (ROCKLAND RD/ZIMALCREST DR)
DRAINAGE AND EROSION CONTROL PLAN SHEET
STA 9156+00 TO STA 9161+00

S-32-1241/S-40-1421

PLOT DRIVER: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 PEN TABLE: SCDOT PREALPHA.STB
USER: JEFF CARPER DATE: June 22, 2026 TIME: 13:29
FILE: drn_rockland_r4.dwg

VOLUME 4

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1241 S-40-1421	D11



NOTES:
1. ALL OPEN PIPE ENDS WILL BE BEVELED UNLESS OTHERWISE INDICATED.
2. UNLESS OTHERWISE NOTED, RETAIN EXIST. DRAINAGE INFRASTRUCTURE OUTSIDE OF PROJECT CONSTRUCTION LIMITS.

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CARPER CIVIL CONSULTING, LLC No. 5672 CERTIFICATE OF AUTHORIZATION

No. 26131 REGISTERED PROFESSIONAL ENGINEER

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
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TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1241/S-40-1421 (ROCKLAND RD/ZIMALCREST DR)
DRAINAGE AND EROSION CONTROL PLAN SHEET
STA 9161+00 TO STA 9166+00

S-32-1241/S-40-1421

PLOT DRIVER: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 PEN TABLE: SCDOT PREALPHA.STB
USER: JEFF CARPER DATE: June 22, 2026 TIME: 13:30
FILE: drn_rocklandrd_r4.dwg

VOLUME 4

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1241 S-40-1421	D12

NOTES:
1. ALL OPEN PIPE ENDS WILL BE BEVELED UNLESS OTHERWISE INDICATED.
2. UNLESS OTHERWISE NOTED, RETAIN EXIST. DRAINAGE INFRASTRUCTURE OUTSIDE OF PROJECT CONSTRUCTION LIMITS.

REMOVE EX. CATCH BASINS AND 15" RCPs

UPON REMOVAL OF ZIMALCREST DR EX. AND DRIVEWAY, GRADE AREA TO DRAIN TO ROADSIDE DITCH.

S-40-1241 ZIMALCREST DR. EXIST.

SILT FENCE (TYP)

NEW R/W

REMOVE EX. CATCH BASINS AND 15" RCPs

REMOVE EX. 15" RCP

NEW R/W

RICHLAND COUNTY
LEXINGTON COUNTY

S-32-1241 (ZIMALCREST DR.)

RO-OC-35
"V" DITCH
SEE XS SHEETS

RO-OC-33
"V" DITCH
SEE XS SHEETS

PLACE DRIVEWAY PIPE
RO-DWP-34
77 LF-18" SWP

NEW R/W

PLACE 17 TONS OF CLASS B RIP RAP WITH 20 SY CLASS 2 TYPE C GEOTEXTILE FABRIC

PLACE DRIVEWAY PIPE
RO-DWP-36
67 LF-18" SWP

PLACE DRIVEWAY PIPE
RO-DWP-32
77 LF-18" SWP

MATCHLINE STA 9166+00
SEE SHEET D11

MATCHLINE STA 9171+00
SEE SHEET D13

543

544

545

546A

9170

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NORTH CAROLINA — CARPER CIVIL CONSULTING, LLC — No. 5672 — CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26131 — JOSHUA BRYNSON

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
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R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1241/S-40-1421 (ROCKLAND RD/ZIMALCREST DR)
DRAINAGE AND EROSION CONTROL PLAN SHEET
STA 9166+00 TO STA 9171+00

S-32-1241/S-40-1421

PLOT DRIVER: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 PEN TABLE: SCDOT PREALPHA.STB
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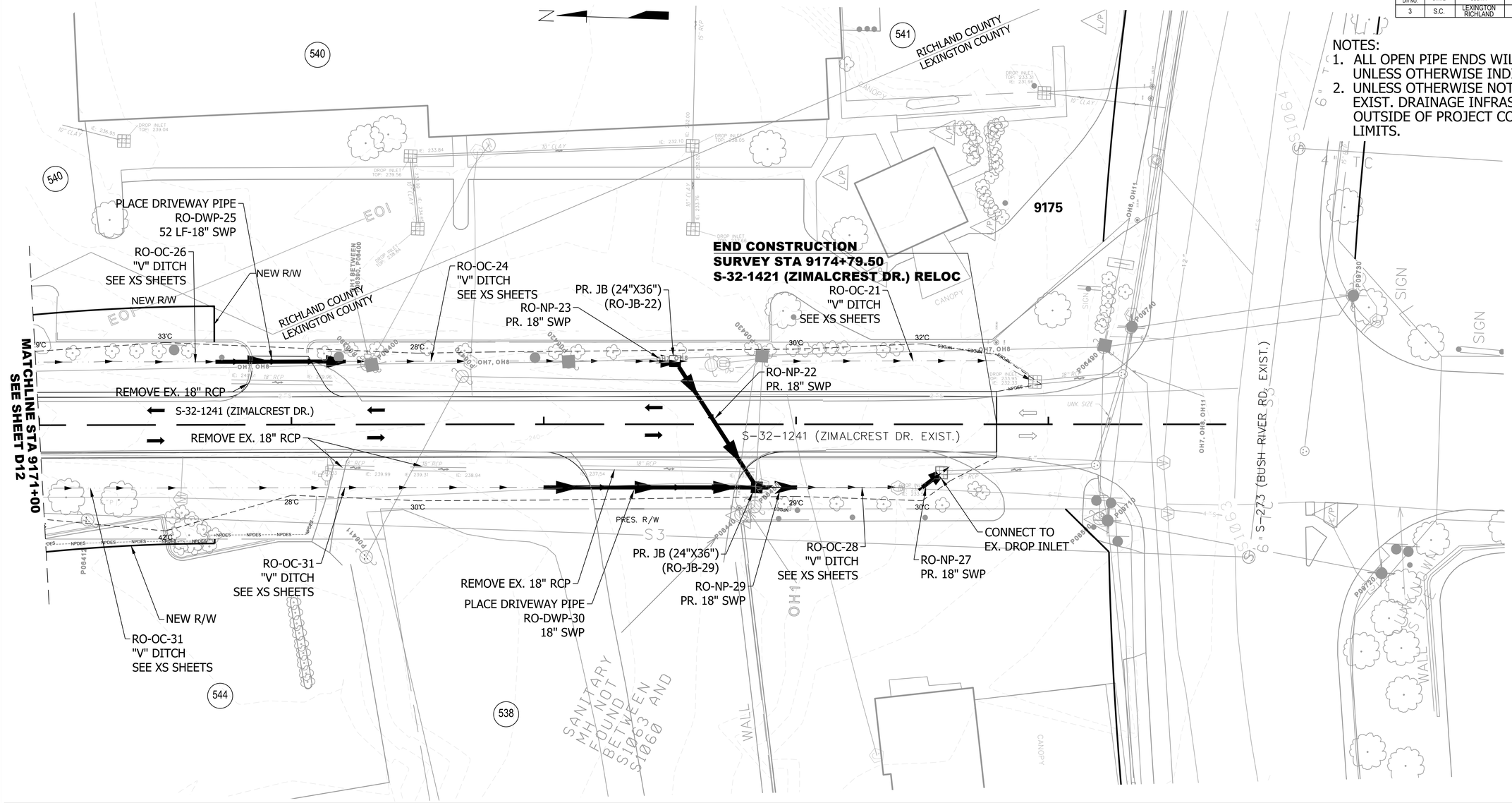
FILE: drn_rocklandrd_r4.dwg

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1241 S-40-1421	D13

NOTES:
1. ALL OPEN PIPE ENDS WILL BE BEVELED UNLESS OTHERWISE INDICATED.
2. UNLESS OTHERWISE NOTED, RETAIN EXIST. DRAINAGE INFRASTRUCTURE OUTSIDE OF PROJECT CONSTRUCTION LIMITS.



Smooth

System ID	Link ID	Geometry				Upstream				Downstream				Fill Height		Min Field	Joint	Smooth Wall Options					
		Diameter (in)	No. of Barrels	Pipe Length (ft)	Slope (%)	Node	Node Description	Node Station	Link Invert (ft)	Node	Node Description	Node Station	Link Invert (ft)	Min (ft)	Max (ft)	SPT "N" below invert	Pressure (psi)	HDPE Type	Built ✓	RCP Highest Class	Built ✓	SRAP Thickest Gage	Built ✓
RO-OP-27	RO-NP-23	18	1	7.59	19.77	RO-OEP-23	OPEN PIPE	9173+44.31	236.67	RO-JB-22	JUNC. BOX	9173+52.10	235.17	0.00	1.25		10	S		III		16ga	
RO-OP-27	RO-NP-22	18	1	59.53	1.06	RO-JB-22	JUNC. BOX	9173+52.10	235.17	RO-JB-29	JUNC. BOX	9173+84.42	234.54	1.00	2.11		10			III		16ga	
RO-OP-27	RO-DWP-30	18	1	84.42	3.75	RO-OEP-30	OPEN PIPE	9173+00.00	237.70	RO-JB-29	JUNC. BOX	9173+84.42	234.54	1.00	1.30		10			III		16ga	
RO-OP-27	RO-NP-29	18	1	15.58	1.00	RO-JB-29	JUNC. BOX	9173+84.42	234.54	RO-OP-28	OPEN PIPE	9174+00.00	234.38	0.00	1.30		10			III		16ga	
RO-OP-27	RO-NP-27	18	1	9.64	5.95	RO-OEP-27	OPEN PIPE	9174+49.99	234.15	RO-EX-DI	EX.DROP INLET	9174+57.53	236.92	0.00	1.00		10			III		16ga	

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REV. NO.	BY	DATE	DESCRIPTION OF REVISION
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DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1241/S-40-1421 (ROCKLAND RD/ZIMALCREST DR)
DRAINAGE AND EROSION CONTROL PLAN SHEET
STA 9171+00 TO STA 9175+00

S-32-1241/S-40-1421

PLOT DRIVER: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 PEN TABLE: SCDOT PREALPHA.STB
USER: JEFF CARPER DATE: June 22, 2026 TIME: 13:32
FILE: drn_rockandrd_r4.dwg

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1241 S-40-1421	EC1

GENERAL CONSTRUCTION NOTES (EROSION CONTROL PLANS)

EROSION CONTROL NOTES

1. IF NECESSARY, SLOPES, WHICH EXCEED EIGHT (8) VERTICAL FEET SHOULD BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS, IN ADDITION TO HYDROSEEDING. IT MAY BE NECESSARY TO INSTALL TEMPORARY SLOPE DRAINS DURING CONSTRUCTION. TEMPORARY BERMS MAY BE NEEDED UNTIL THE SLOPE IS BROUGHT TO GRADE.

2. STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN FOURTEEN (14) DAYS AFTER WORK HAS CEASED, EXCEPT AS STATED BELOW.

A. WHERE STABILIZATION BY THE 14TH DAY IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS, STABILIZATION MEASURES MUST BE INITIATED AS SOON AS PRACTICABLE.

B. WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH-DISTURBING ACTIVITIES WILL BE RESUMED WITHIN 14 DAYS, TEMPORARY STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE.

3. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED ONCE EVERY CALENDAR WEEK. IF PERIODIC INSPECTION OR OTHER INFORMATION INDICATES THAT A BMP HAS BEEN INAPPROPRIATELY OR INCORRECTLY INSTALLED, THE PERMITTEE MUST ADDRESS THE NECESSARY REPLACEMENT OR MODIFICATION REQUIRED TO CORRECT THE BMP WITHIN 48 HOURS OF IDENTIFICATION.

4. PROVIDE SILT FENCE AND/OR OTHER CONTROL DEVICES, AS MAY BE REQUIRED, TO CONTROL SOIL EROSION DURING UTILITY CONSTRUCTION. ALL DISTURBED AREAS SHALL BE CLEANED, GRADED, AND STABILIZED WITH GRASSING IMMEDIATELY AFTER THE UTILITY INSTALLATION. FILL, COVER, AND TEMPORARY SEEDING AT THE END OF EACH DAY ARE RECOMMENDED. IF WATER IS ENCOUNTERED WHILE TRENCHING, THE WATER SHOULD BE FILTERED TO REMOVE ANY SEDIMENTS BEFORE BEING PUMPED BACK INTO ANY WATERS OF THE STATE.

5. ALL EROSION CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.

6. THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO PAVED ROADWAY(S) FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM PAVEMENT, AS MAY BE REQUIRED.

7. RESIDENTIAL SUBDIVISIONS REQUIRE EROSION CONTROL FEATURES FOR INFRASTRUCTURE AS WELL AS FOR INDIVIDUAL LOT CONSTRUCTION. INDIVIDUAL PROPERTY OWNERS SHALL FOLLOW THESE PLANS DURING CONSTRUCTION OR OBTAIN APPROVAL OF AN INDIVIDUAL PLAN IN ACCORDANCE WITH S.C REG. 72-300 ET SEQ. AND SCR160000.

8. TEMPORARY DIVERSION BERMS AND/OR DITCHES WILL BE PROVIDED AS NEEDED DURING CONSTRUCTION TO PROTECT WORK AREAS FROM UPSLOPE RUNOFF AND/OR TO DIVERT SEDIMENT-LADEN WATER TO APPROPRIATE TRAPS OR STABLE OUTLETS.

9. ALL WATERS OF THE STATE (WOS), INCLUDING WETLANDS, ARE TO BE FLAGGED OR OTHERWISE CLEARLY MARKED IN THE FIELD. A DOUBLE ROW OF SILT FENCE IS TO BE INSTALLED IN ALL AREAS WHERE A 50-FOOT BUFFER CAN NOT BE MAINTAINED BETWEEN THE DISTURBED AREA AND ALL WOS. A 10-FOOT BUFFER SHOULD BE MAINTAINED BETWEEN THE LAST ROW OF SILT FENCE AND ALL WOS.

10. LITTER, CONSTRUCTION DEBRIS, OILS, FUELS, AND BUILDING PRODUCTS WITH SIGNIFICANT POTENTIAL FOR IMPACT (SUCH AS STOCKPILES OF FRESHLY TREATED LUMBER) AND CONSTRUCTION CHEMICALS THAT COULD BE EXPOSED TO STORM WATER MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE IN STORM WATER DISCHARGES.

11. A COPY OF THE SWPPP, INSPECTIONS RECORDS, AND RAINFALL DATA MUST BE RETAINED AT THE CONSTRUCTION SITE OR A NEARBY LOCATION EASILY ACCESSIBLE DURING NORMAL BUSINESS HOURS, FROM THE DATE OF COMMENCEMENT OF CONSTRUCTION ACTIVITIES TO THE DATE THAT FINAL STABILIZATION IS REACHED.

12. INITIATE STABILIZATION MEASURES ON ANY EXPOSED STEEP SLOPE (3H:1V OR GREATER) WHERE LAND-DISTURBING ACTIVITIES HAVE PERMANENTLY OR TEMPORARILY CEASED, AND WILL NOT RESUME FOR A PERIOD OF 7 CALENDAR DAYS.

13. MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL.

14. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM EQUIPMENT AND VEHICLE WASHING, WHEEL WASH WATER, AND OTHER WASH WATERS. WASH WATERS MUST BE TREATED IN A SEDIMENT BASIN OR ALTERNATIVE CONTROL THAT PROVIDES EQUIVALENT OR BETTER TREATMENTS PRIOR TO DISCHARGE.

15. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM DEWATERING OF TRENCHES AND EXCAVATED AREAS. THESE DISCHARGES ARE TO BE ROUTED THROUGH APPROPRIATE BMPS (SEDIMENT BASIN, FILTER BAG, ETC.).

16. THE FOLLOWING DISCHARGES FROM SITES ARE PROHIBITED:

A. WASTEWATER FROM WASHOUT OF CONCRETE, UNLESS MANAGED BY AN APPROPRIATE CONTROL;

B. WASTEWATER FROM WASHOUT AND CLEANOUT OF STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS;

C. FUELS, OILS, OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE; AND

D. SOAPS OR SOLVENTS USED IN VEHICLE AND EQUIPMENT WASHING.

17. AFTER CONSTRUCTION ACTIVITIES BEGIN, INSPECTIONS MUST BE CONDUCTED AT A MINIMUM OF AT LEAST ONCE EVERY CALENDAR WEEK AND MUST BE CONDUCTED UNTIL FINAL STABILIZATION IS REACHED ON ALL AREAS OF THE CONSTRUCTION SITE.

18. IF EXISTING BMPS NEED TO BE MODIFIED OR IF ADDITIONAL BMPS ARE NECESSARY TO COMPLY WITH THE REQUIREMENTS OF THIS PERMIT AND/OR SC'S WATER QUALITY STANDARDS, IMPLEMENTATION MUST BE COMPLETED BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE. IF IMPLEMENTATION BEFORE THE NEXT STORM EVENT IS IMPRACTICABLE, THE SITUATION MUST BE DOCUMENTED IN THE SWPPP AND ALTERNATIVE BMPS MUST BE IMPLEMENTED AS SOON AS REASONABLY POSSIBLE.

19. A PRE-CONSTRUCTION CONFERENCE MUST BE HELD FOR EACH CONSTRUCTION SITE WITH AN APPROVED ON-SITE SWPPP PRIOR TO THE IMPLEMENTATION OF CONSTRUCTION ACTIVITIES. FOR NON-LINEAR PROJECTS THAT DISTURB 10 ACRES OR MORE THIS CONFERENCE MUST BE HELD ON-SITE UNLESS THE DEPARTMENT HAS APPROVED OTHERWISE.

SEDIMENT & EROSION CONTROL CONSTRUCTION SEQUENCE

1. ESTABLISH LIMITS OF DISTURBANCE / CONSTRUCTION.
2. INSTALL TEMPORARY CONSTRUCTION ENTRANCE(S) PER SCDOT STD. 815-505-00.
3. INSTALL SILT FENCE AS SHOWN ON THE EROSION CONTROL PLANS AND PER SCDOT STD. 815-605-00.
4. INSTALL SEDIMENT TUBES IN EXISTING DITCHES PER SCDOT STD. 815-205-00.
5. CLEAR AND GRUB SITE.
6. ROUGH GRADE PROPOSED DITCHES AND INSTALL SEDIMENT TUBES PER SCDOT STD. 815-205-00 AND AS DETAILED ON PLAN SHEET EC1.
7. INSTALL PROPOSED STORM DRAINAGE SYSTEMS AS SHOWN ON THE DRAINAGE PLANS.
8. INSTALL INLET STRUCTURE FILTERS AT ALL STORM DRAINAGE STRUCTURES PER SCDOT STD. 815-002-00 AND 815-006-00 AND AS SHOWN ON THE EROSION CONTROL PLANS.
9. PLACE RIP RAP AT PIPE OUTLETS AS SHOWN IN THE PLANS.
10. FINE GRADE TO PROPOSED GRADES SHOWN IN THE PLANS AND CROSS SECTIONS.
11. TEMPORARY SEED ALL DISTURBED AREAS AS DESCRIBED IN SCDOT STANDARD SPECIFICATION SECTION 810 FOR SEEDING.
12. FINE GRADE ALL DITCHES AND BACK SLOPES.
13. LINE PROPOSED DITCHES WITH TEMPORARY EROSION CONTROL BLANKET AS SHOWN ON SHEET EC1 AND PER SCDOT STANDARD SPECIFICATION 815-605-00.
14. PERMANENT SEED ALL DISTURBED AREAS AS DESCRIBED IN SCDOT STANDARD SPECIFICATION SECTION 810 FOR SEEDING.
15. ONCE THE SITE IS STABILIZED, REMOVE ALL TEMPORARY EROSION CONTROL DEVICES.
16. PERMANENT SEED ALL AREAS WHERE EROSION CONTROL DEVICES WERE REMOVED AS DESCRIBED IN SCDOT STANDARD SPECIFICATION SECTION 810 FOR SEEDING.

CONSTRUCTION SEQUENCE NOTES

IF NPDES COVERAGE IS BEING ISSUED AFTER LAND-DISTURBING ACTIVITIES HAVE ALREADY STARTED (E.G. IN RESPONSE TO A NOTICE TO COMPLY, NOTICE OF VIOLATION, OR ENFORCEMENT ACTION), THEN THE CONSTRUCTION SEQUENCE MUST SPECIFICALLY INDICATE THE ITEMS THAT HAVE ALREADY OCCURRED AND THE ITEMS THAT WILL BE OCCURRING AFTER NPDES COVERAGE IS ISSUED.

IF FLOWS FROM OFFSITE AREAS WILL BE DIVERTED AROUND THE SITE AND THE ON-SITE STRUCTURES ARE NOT DESIGNED TO HANDLE FLOWS FROM OFFSITE AREAS, THE DIVERSIONS/PIPING FOR THE OFFSITE FLOWS MUST BE INSTALLED BEFORE LAND-DISTURBING ACTIVITIES BEGIN ON THE SITE. SEDIMENT AND EROSION CONTROL MEASURES FOR THE DISTURBED AREAS FOR THE DIVERSION/PIPING MUST BE INSTALLED BEFORE THOSE AREAS ARE DISTURBED AND SHOULD BE SHOWN ON THE PLANS.

MAINTENANCE OF SEDIMENT AND EROSION CONTROL MEASURES MUST CONTINUE UNTIL THE SITE IS PERMANENTLY STABILIZED AND THE CONTROLS ARE REMOVED.

CONSTRUCTION NOTES

1. CLEARING AND GRUBBING
THE CONTRACTOR WILL BE REQUIRED TO CLEAR ALL AREAS NECESSARY FOR THE CONSTRUCTION OF ANY SEDIMENT CONTROL STRUCTURES AND INSTALL THE SEDIMENT CONTROL STRUCTURES AND ALL OTHER PERIMETER EROSION CONTROL MEASURES PRIOR TO CLEARING AND GRUBBING ACTIVITIES.

2. SEEDING
SEEDING SHALL BE ACCOMPLISHED ACCORDING TO S.C.D.O.T. SUPPLEMENTAL TECHNICAL SPECIFICATION "SEEDING-SC-M-810 (LATEST EDITION)."

3. EROSION CONTROL MEASURES
ALL EROSION CONTROL MEASURES ON THIS PROJECT SHALL BE IMPLEMENTED AS DETAILED ON THE PLANS. SILT FENCE AND OTHER EROSION CONTROL FEATURES SHALL BE IN PLACE PRIOR TO GROUND DISTURBING ACTIVITY BEGINS. EROSION CONTROL MEASURES SHALL BE IMPLEMENTED DURING ALL STAGES OF CONSTRUCTION.

4. PERIMETER EROSION CONTROL DEVICES
SILT FENCE MAY BE PLACED AT LOCATIONS WHERE SEDIMENT LEAVES THE PROJECT LIMITS ESPECIALLY AT THE TOE OF FILL SLOPES THAT SLOPE AWAY FROM THE PROJECT. SILT FENCE SHALL NOT BE PLACED IN A POSITION SUCH THAT IT BLOCKS DRIVEWAYS OR POINTS OF ACCESS TO PROPERTY.

5. INSPECTION AND IMPLEMENTATION
ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE NPDES GENERAL CONSTRUCTION PERMIT. STABILIZATION MEASURES SHALL BE IMPLEMENTED AS SOON AS PRACTICABLE WITHIN THE ALLOWABLE TIME FRAME STATED WITHIN THE NPDES GENERAL CONSTRUCTION PERMIT IN PORTIONS OF THE SITE WHERE ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL FINAL STABILIZATION HAS BEEN OBTAINED.

6. BARRIER FENCE
THE CONTRACTOR SHALL INSTALL AND MAINTAIN A BARRIER FENCE TO MARK ALL BOUNDARIES OF JURISDICTIONAL WATERS OF THE STATE, CULTURAL RESOURCE AREAS, AND OTHER ENVIRONMENTAL SENSITIVE AREAS WITHIN THE PROJECT CORRIDOR. THE FENCE AND FLAGGING SHALL BE PLACED PRIOR TO ANY LAND DISTURBANCE ACTIVITIES. REFER TO THE PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION. THE CONTRACTOR SHALL MAINTAIN BARRIER FENCE FOR THE DURATION OF THE PROJECT AS DETERMINED BY THE RESIDENT CONSTRUCTION ENGINEER.

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CARPER CIVIL CONSULTING, LLC No. 5672 CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26131 JOSEPH ROBINSON CARPER

REV.NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1241/S-40-1421 (ROCKLAND RD/ZIMALCREST DR)

EROSION CONTROL NOTES

S-32-1241/S-40-1421 SHT D-RO-NOTES

PLOT DRIVER: ADOBE PDF
USER: JEFF CARPER
FILE: ecn.dwg
DATE: June 22, 2026
PEN TABLE: SCDOT PREALPHA.STB
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VOLUME 4

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1241 S-40-1421	EC2

RECEIVING WATERS

ROAD / ROUTE	OUTFALL DITCH STATION	OUTFALL DITCH SIDE	NAME OF RECEIVING WATERS	NAME OF ULTIMATE RECEIVING WATERS
Rockland Rd / S-1241	9147+00	LT	STOOP CREEK	SALUDA RIVER
Rockland Rd / S-1241	9147+00	RT	STOOP CREEK	SALUDA RIVER
Rockland Rd / S-1241	9159+00	RT	STOOP CREEK	SALUDA RIVER
Rockland Rd / S-1241	9172+50	LT	UNNAMED TRIB.	SALUDA RIVER

SOIL TYPES

ROAD / ROUTE	STATION TO STATION		SOIL PARTICLE SIZE (COARSE / FINE)	ZONE
Rockland Rd / S-1241	9147+00	9172+50	COARSE	SANDHILLS

TEMPORARY EROSION CONTROL BLANKET

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF BLANKET (FT)	DITCH BOTTOM WIDTH (FT)	SLOPES x : 1 FRONT	SLOPES x : 1 BACK	MSY
S-1241	9146+54	9147+62	RT	2.25	0	2	2.0	0.121
S-1241	9158+75	9159+83	RT	1.75	0	4	4.0	0.173
S-1241	9156+58	9158+88	LT	1.5	0	4	4.0	0.316
S-1241	9173+94	9174+92	LT	1.5	0	4	2.0	0.104
							TOTAL	0.714

TURF REINFORCED MATTING (TRM)

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF MAT (FT)	SLOPES (x : 1) FRONT	SLOPES (x : 1) BACK	DITCH BOTTOM WIDTH (FT)	TYPE	TYPE 1 (MSY)	TYPE 2 (MSY)	TYPE 3 (MSY)
Rockland Rd / S-1241	9146+70	9147+80	LT	2	2	2	0	1	0.109		
Rockland Rd / S-1241	9147+80	9148+38	LT	1.75	4	4	0	1	0.093		
Rockland Rd / S-1241	9148+38	9152+35	LT	1.25	4	4	0	1	0.455		
Rockland Rd / S-1241	9147+62	9148+38	RT	2	4	2	0	1	0.107		
Rockland Rd / S-1241	9148+38	9152+78	RT	1.75	4	2	0	1	0.544		
Rockland Rd / S-1241	9152+78	9154+85	RT	2	4	2	0	1	0.293		
Rockland Rd / S-1241	9154+85	9156+55	RT	2	4	2	0	1	0.240		
Rockland Rd / S-1241	9153+40	9154+84	LT	1.25	4	4	0	1	0.165		
Rockland Rd / S-1241	9154+84	9156+49	LT	1.5	4	4	0	1	0.227		
Rockland Rd / S-1241	9159+83	9163+92	RT	1.75	4	3	0	1	0.579		
Rockland Rd / S-1241	9158+96	9159+82	LT	1.5	4	4	0	1	0.118		
Rockland Rd / S-1241	9159+82	9163+96	LT	1.75	4	4	0	1	0.664		
Rockland Rd / S-1241	9172+22	9173+44	LT	1.75	4	2	0	1	0.151		
Rockland Rd / S-1241	9170+62	9171+70	LT	1.75	4	2	0	1	0.134		
Rockland Rd / S-1242	9164+00	9166+30	RT	1.75	4	2	0	1	0.284		
Rockland Rd / S-1242	9167+00	9168+80	RT	2	4	4	0	1	0.330		
Rockland Rd / S-1242	9169+60	9169+80	RT	2	4	4	0	1	0.037		
Rockland Rd / S-1242	9170+60	9173+00	RT	2.5	4	2	0	1	0.424		
Rockland Rd / S-1242	9174+00	9174+50	Rt	2.5	4	2	0	1	0.088		
								TOTALS	5.042		

SEDIMENT TUBES IN DITCHES

ROAD / ROUTE	STATION TO STATION		SIDE	AVERAGE LENGTH	SPACING (FT)	TOTAL	COMMENTS
S-1241	9146+70	9147+80	LT	8	50	32	
S-1241	9147+80	9148+38	LT	8	75	16	
S-1241	9148+38	9152+35	LT	8	25	136	
S-1241	9146+54	9147+62	RT	8	100	24	
S-1241	9147+62	9148+38	RT	8	50	24	
S-1241	9148+38	9152+78	RT	8	25	152	
S-1241	9152+78	9154+85	RT	8	25	80	
S-1241	9154+85	9156+55	RT	8	100	24	
S-1241	9153+40	9154+84	LT	8	40	40	
S-1241	9154+84	9156+49	LT	8	100	24	
S-1241	9158+75	9159+83	RT	8	150	16	
S-1241	9159+83	9163+92	RT	8	75	56	
S-1241	9156+58	9158+88	LT	8	150	24	
S-1241	9158+96	9159+82	LT	8	75	24	
S-1241	9159+82	9163+96	LT	8	75	56	
S-1241	9173+94	9174+92	LT	8	150	16	
S-1241	9172+22	9173+44	LT	8	100	24	
S-1241	9170+62	9171+70	LT	8	75	24	
S-1241	9174+00	9174+50	RT	8	100	16	
S-1241	9170+60	9173+00	RT	8	100	32	
S-1241	9169+80	9169+60	RT	8	50	0	
S-1241	9167+00	9168+80	RT	8	100	24	
S-1241	9164+00	9166+30	RT	8	100	32	
					TOTAL	896	

SEDIMENT DAM

NO	ROAD / ROUTE	STATION	SIDE	DRAINED OR NOT DRAINED	LENGTH OF SILT BASIN	WIDTH OF SILT BASIN	DAM HEIGHT	SIDE SLOPE OF SILT BASIN	SPILLWAY BOTTOM WIDTH	DAM BOTTOM WIDTH	RIP RAP CLASS	TOTAL STORAGE VOLUME	SEDIMENT STORAGE HEIGHT	OUTFALL CHANNEL WIDTH	OUTFALL CHANNEL DEPTH	OUTFALL CHANNEL LENGTH

P:\HDR\2020008 CCR\Rockland\DRW\[ECDS_10_18_2015.xlsx]ECDS SHEET 1

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CARPER CIVIL CONSULTING, LLC No. 5672 — CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 26131

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
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TOPO. _____ DATE _____
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R/W _____ DATE _____

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SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1241/S-40-1421 (ROCKLAND RD/ZIMALCREST DR)
EROSION CONTROL DATA SHEET

S-32-1241/S-40-1421

PLOT DRIVER: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 PEN TABLE: SCDOT PREALPHA.STB
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VOLUME 4

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	LEXINGTON RICHLAND	P043328	S-32-1241 S-40-1421	ED1

S-32-1241 (ZIMALCREST DR. EXIST.)

UTILITY COORDINATION NOTES:
1. VERIFY ALL UTILITIES HAVE BEEN DISCONNECTED FROM STRUCTURES ON THE PARCEL(S).
2. COORDINATE REMOVAL OF PHYSICAL CONNECTIONS BY EACH UTILITY OWNER AS NEEDED.
3. REMOVE UNDERGROUND AND OVERHEAD UTILITY SERVICE CONNECTIONS IN ACCORDANCE WITH 2025 SCDOT STANDARD SPECIFICATIONS (OR LATEST EDITION).

NOTES:
1. THE LOCATION OF UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE EXACT LOCATION OF UTILITIES ON THE PROJECT SITE. THE CONTRACTOR SHALL CALL THE PALMETTO UTILITY PROTECTION SERVICE, PUPS, AT 811 SEVENTY-TWO HOURS PRIOR TO BEGINNING CONSTRUCTION.
2. EXISTING CONDITIONS ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED PRIOR TO BEGINNING CONSTRUCTION.
3. THE CONTRACTOR SHALL PROTECT AND MAINTAIN THE STRUCTURAL INTEGRITY OF ALL ROADWAYS AND UTILITIES LOCATED WITHIN THE SCDOT RIGHT-OF-WAY AND BE RESPONSIBLE FOR ANY AND ALL DAMAGES/REPAIRS DURING CONSTRUCTION.
4. ALL REMOVAL AND DISPOSAL ITEMS SHALL BE PERFORMED IN ACCORDANCE WITH THE SCDOT PROJECT SPECIFICATIONS. REMOVAL AND DISPOSAL ITEMS SHALL BE DISPOSED IN ACCORDANCE WITH ALL APPLICABLE STATE LAWS AND REGULATIONS. SEE HAZARDOUS MATERIAL REPORTS PREPARED BY F&ME CONSULTANTS FOR ADDITIONAL INFORMATION RELATED TO THIS TRACT.
5. IN AREAS OF PAVEMENT REMOVAL, THE CONTRACTOR SHALL CUT THE EXISTING PAVEMENT TO PROVIDE A SMOOTH EDGE BETWEEN THE EXISTING PAVEMENT AND ADJACENT TERRAIN.
6. ALL AREAS DISTURBED BY DEMOLITION ACTIVITIES SHALL BE SEEDED IN ACCORDANCE WITH SCDOT SEEDING SPECIFICATIONS FOR PERMANENT COVER (LATEST EDITION).
7. UPON COMPLETION OF DEMOLITION AND DISPOSAL OPERATIONS, THE CONTRACTOR SHALL UNIFORMLY GRADE DISTURBED AREAS TO DRAIN.
8. UNLESS NOTED OTHERWISE, EXISTING UTILITIES SHALL BE ABANDONED IN PLACE. SERVICE LINES SHALL BE CUT AND CAPPED 24" BELOW GRADE.
9. PAY ITEMS (QUANTITIES NOT INCLUDED IN SUMMARY OF ESTIMATE QUANTITIES. PAY ITEMS FOR REFERENCE AND TO BE INCLUDED IN REMOVAL AND DISPOSAL ITEM #12 COST.):

FOR CONCRETE
72023000 REMOVAL & DISPOSAL OF EXISTING PAVEMENT 967 SY

FOR CURB & GUTTER
72024100 REMOVAL & DISPOSAL OF EXISTING CURB 1,920 LF

FOR ASPHALT
72025000 REMOVAL & DISPOSAL OF EXISTING ASPHALT PAVEMENT 6,909 SY

SPECIAL PROVISION TRACT 547 DEMOLITION

REMOVE EXIST. INLETS AND STORM PIPE

REMOVE EXIST. TREES

REMOVE EXIST. INLETS AND STORM PIPE

REMOVE EXIST. TREES

REMOVE ALL PAVEMENT, CURB, AND SIDEWALKS

REMOVE APPROX. 830 LF OF VARIABLE HEIGHT RETAINING WALL. SEE SPECIAL PROVISIONS FOR REMOVAL AND DISPOSAL OF HAZARDOUS MATERIALS.

REMOVE RETAINING WALLS AND FOUNDATION. SEE SPECIAL PROVISIONS FOR REMOVAL AND DISPOSAL OF HAZARDOUS MATERIALS. GRADE AREA TO DRAIN.

REMOVE ALL PAVEMENT, CURB, AND SIDEWALKS

REMOVE EXIST. TREES

REMOVE EXIST. TREES

REMOVE EXIST. INLETS AND STORM PIPE

LEGEND

- ASPHALT PAVEMENT TO BE REMOVED
- CONC. SIDEWALK/PAD TO BE REMOVED
- CURB TO BE REMOVED

RICHLAND COUNTY
LEXINGTON COUNTY

P04100

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No. 26131 LICENSED PROFESSIONAL ENGINEER JORDAN BRINSON

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
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TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 20'
0 10 20 40

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

CAROLINA CROSSROADS
S-32-1241/S-40-1421 (ROCKLAND RD/ZIMALCREST DR)
DEMOLITION PLAN
TRACT 547

S-32-1241/S-40-1421

8.3 AutoDesk© Storm and Sanitary Analysis Report

Autodesk® Storm and Sanitary Analysis 2024 - Version 13.6.268 (Build 0)

****
Project Description
****
File Name P043321.SPF
Description ..... Rockland Rd Relocation

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. Rational
Time of Concentration..... SCS TR-55
Return Period..... 10 years
Link Routing Method ..... Kinematic Wave
Storage Node Exfiltration.. None
Starting Date JUL-03-2025 00:00:00
Ending Date JUL-04-2025 00:00:00
Report Time Step 00:00:10

****
Element Count
****
Number of subbasins 15
Number of nodes 39
Number of links 34

****
Subbasin Summary
****

Subbasin ID	Total Area acres
RO-DA-DWP-32	0.95
RO-DA-DWP-34	0.51
RO-DA-OC-03	4.76
RO-DA-OC-04	0.18
RO-DA-OC-09	1.75
RO-DA-OC-12	0.25
RO-DA-OC-15	0.94
RO-DA-OC-17	0.99
RO-DA-OC-19	1.20
RO-DA-OC-21	0.10
RO-DA-OC-24	0.13
RO-DA-OC-26	2.49
RO-DA-OC-28	0.16
RO-DA-OC-35	0.71
RO-DA-OC-37	0.49

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
RO-CB-10	JUNCTION	232.84	240.60	0.00	
RO-JB-22	JUNCTION	235.17	240.48	0.00	
RO-JB-29	JUNCTION	234.54	239.71	0.00	
RO-OCJ-02	JUNCTION	189.46	195.00	0.00	

RO-OCJ-03	JUNCTION	191.31	197.00	0.00
RO-OCJ-04	JUNCTION	224.89	234.00	0.00
RO-OCJ-05	JUNCTION	188.52	194.00	0.00
RO-OCJ-06	JUNCTION	191.80	196.83	0.00
RO-OCJ-08	JUNCTION	244.18	250.00	0.00
RO-OCJ-09	JUNCTION	247.83	253.00	0.00
RO-OCJ-11	JUNCTION	244.17	250.00	0.00
RO-OCJ-12	JUNCTION	247.84	253.00	0.00
RO-OCJ-14	JUNCTION	248.55	254.00	0.00
RO-OCJ-15	JUNCTION	261.36	266.00	0.00
RO-OCJ-17	JUNCTION	247.84	254.00	0.00
RO-OCJ-18	JUNCTION	248.52	254.00	0.00
RO-OCJ-19	JUNCTION	262.71	268.00	0.00
RO-OCJ-21	JUNCTION	235.48	240.00	0.00
RO-OCJ-26	JUNCTION	244.96	251.00	0.00
RO-OCJ-37	JUNCTION	261.35	266.00	0.00
RO-OEP-16	JUNCTION	245.75	252.50	0.00
RO-OEP-23	JUNCTION	236.67	242.00	0.00
RO-OEP-25	JUNCTION	240.96	246.00	0.00
RO-OEP-27	JUNCTION	234.15	240.00	0.00
RO-OEP-30	JUNCTION	237.70	243.00	0.00
RO-OEP-32	JUNCTION	246.48	251.00	0.00
RO-OEP-34	JUNCTION	250.73	256.00	0.00
RO-OEP-36	JUNCTION	256.15	261.00	0.00
RO-OP-07	JUNCTION	230.18	238.00	0.00
RO-OP-24	JUNCTION	239.55	245.00	0.00
RO-OP-28	JUNCTION	234.38	240.00	0.00
RO-OP-31	JUNCTION	243.63	249.00	0.00
RO-OP-33	JUNCTION	247.27	252.00	0.00
RO-OP-35	JUNCTION	254.96	260.00	0.00
RO-EXJB	OUTFALL	233.58	235.08	0.00
RO-OCJ-20	OUTFALL	234.95	239.45	0.00
RO-OCO-01	OUTFALL	183.42	189.15	0.00
RO-OCO-04	OUTFALL	186.00	190.50	0.00
RO-OP-13	OUTFALL	242.00	251.17	0.00

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Link Summary
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Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
RO-DWP-25	RO-OEP-25	RO-OP-24	CONDUIT	51.5	2.7352	0.0130
RO-DWP-30	RO-OEP-30	RO-JB-29	CONDUIT	84.4	3.7432	0.0130
RO-DWP-32	RO-OEP-32	RO-OP-31	CONDUIT	76.9	3.7061	0.0130
RO-DWP-34	RO-OEP-34	RO-OP-33	CONDUIT	76.9	4.4993	0.0130
RO-DWP-36	RO-OEP-36	RO-OP-35	CONDUIT	67.3	1.7682	0.0130
RO-NP-10	RO-CB-10	RO-OP-07	CONDUIT	79.8	3.3346	0.0130
RO-NP-16	RO-OEP-16	RO-OP-13	CONDUIT	85.0	2.0579	0.0130
RO-NP-22	RO-JB-22	RO-JB-29	CONDUIT	59.5	1.0583	0.0130
RO-NP-23	RO-OEP-23	RO-JB-22	CONDUIT	7.6	19.7628	0.0130
RO-NP-27	RO-OEP-27	RO-EXJB	CONDUIT	9.6	5.9129	0.0130
RO-NP-29	RO-JB-29	RO-OP-28	CONDUIT	15.6	1.0270	0.0130
RO-OC-02	RO-OCJ-02	RO-OCO-01	CHANNEL	113.0	4.5044	0.0350
RO-OC-03	RO-OCJ-03	RO-OCJ-02	CHANNEL	58.0	3.9310	0.0320
RO-OC-04	RO-OCJ-04	RO-OCJ-03	CHANNEL	413.0	8.7409	0.0320
RO-OC-05	RO-OCJ-05	RO-OCO-04	CHANNEL	121.0	2.0826	0.0350
RO-OC-06	RO-OCJ-06	RO-OCJ-05	CHANNEL	76.0	4.5132	0.0350
RO-OC-07	RO-OP-07	RO-OCJ-06	CHANNEL	422.0	9.0592	0.0350
RO-OC-08	RO-OCJ-08	RO-OP-07	CHANNEL	206.0	6.8447	0.0350
RO-OC-09	RO-OCJ-09	RO-OCJ-08	CHANNEL	170.0	2.1294	0.0350
RO-OC-11	RO-OCJ-11	RO-CB-10	CHANNEL	144.0	5.6944	0.0320
RO-OC-12	RO-OCJ-12	RO-OCJ-11	CHANNEL	165.0	2.1939	0.0320
RO-OC-14	RO-OCJ-14	RO-OP-13	CHANNEL	108.0	1.3056	0.0320

RO-OC-15	RO-OCJ-15	RO-OCJ-14	CHANNEL	398.0	3.2111	0.0320
RO-OC-17	RO-OCJ-17	RO-OEP-16	CHANNEL	232.0	0.9267	0.0320
RO-OC-18	RO-OCJ-18	RO-OEP-16	CHANNEL	86.0	3.2674	0.0320
RO-OC-19	RO-OCJ-19	RO-OCJ-18	CHANNEL	426.0	3.3310	0.0320
RO-OC-21	RO-OCJ-21	RO-OCJ-20	CHANNEL	100.6	0.5266	0.0350
RO-OC-24	RO-OP-24	RO-OEP-23	CHANNEL	123.0	2.3415	0.0350
RO-OC-26	RO-OCJ-26	RO-OEP-25	CHANNEL	108.7	3.6799	0.0350
RO-OC-28	RO-OP-28	RO-OEP-27	CHANNEL	49.7	0.4629	0.0350
RO-OC-31	RO-OP-31	RO-OEP-30	CHANNEL	239.0	2.4812	0.0350
RO-OC-33	RO-OP-33	RO-OEP-32	CHANNEL	19.2	4.1146	0.0320
RO-OC-35	RO-OP-35	RO-OEP-34	CHANNEL	173.0	2.4451	0.0320
RO-OC-37	RO-OCJ-37	RO-OEP-36	CHANNEL	221.0	2.3529	0.0350

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Cross Section Summary
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Link ID	Shape	Depth/ Diameter	Width	No. of Barrels	Cross Sectional Area	Full Flow Hydraulic Radius	Design Flow Capacity
		ft	ft		ft²	ft	cfs
RO-DWP-25	CIRCULAR	1.50	1.50	1	1.77	0.38	17.37
RO-DWP-30	CIRCULAR	1.50	1.50	1	1.77	0.38	20.32
RO-DWP-32	CIRCULAR	1.50	1.50	1	1.77	0.38	20.22
RO-DWP-34	CIRCULAR	1.50	1.50	1	1.77	0.38	22.28
RO-DWP-36	CIRCULAR	1.50	1.50	1	1.77	0.38	13.97
RO-NP-10	CIRCULAR	1.50	1.50	1	1.77	0.38	19.18
RO-NP-16	CIRCULAR	2.00	2.00	3	3.14	0.50	32.45
RO-NP-22	CIRCULAR	1.50	1.50	1	1.77	0.38	10.81
RO-NP-23	CIRCULAR	1.50	1.50	1	1.77	0.38	46.70
RO-NP-27	CIRCULAR	1.50	1.50	1	1.77	0.38	25.54
RO-NP-29	CIRCULAR	1.50	1.50	1	1.77	0.38	10.64
RO-OC-02	IRREGULAR	4.50	16.00	1	31.00	1.66	391.17
RO-OC-03	TRIANGULAR	4.00	16.00	1	32.00	1.79	434.17
RO-OC-04	TRIANGULAR	4.00	16.00	1	32.00	1.79	647.41
RO-OC-05	IRREGULAR	4.50	16.00	1	31.00	1.66	265.98
RO-OC-06	IRREGULAR	4.50	16.00	1	31.00	1.66	391.55
RO-OC-07	IRREGULAR	4.50	16.00	1	31.00	1.66	554.74
RO-OC-08	IRREGULAR	4.50	16.00	1	31.00	1.66	482.19
RO-OC-09	IRREGULAR	4.50	16.00	1	31.00	1.66	268.95
RO-OC-11	TRIANGULAR	4.00	16.00	1	32.00	1.79	522.55
RO-OC-12	TRIANGULAR	4.00	16.00	1	32.00	1.79	324.35
RO-OC-14	TRIANGULAR	4.00	16.00	1	32.00	1.79	250.21
RO-OC-15	TRIANGULAR	4.00	14.00	1	28.00	1.74	336.61
RO-OC-17	TRIANGULAR	4.00	16.00	1	32.00	1.79	210.80
RO-OC-18	TRIANGULAR	4.00	16.00	1	32.00	1.79	395.83
RO-OC-19	TRIANGULAR	4.00	16.00	1	32.00	1.79	399.66
RO-OC-21	IRREGULAR	4.50	16.00	1	31.00	1.66	133.75
RO-OC-24	IRREGULAR	4.50	16.00	1	31.00	1.66	282.02
RO-OC-26	IRREGULAR	4.50	16.00	1	31.00	1.66	353.56
RO-OC-28	IRREGULAR	4.50	16.00	1	31.00	1.66	125.39
RO-OC-31	IRREGULAR	4.50	16.00	1	31.00	1.66	290.32
RO-OC-33	TRIANGULAR	4.00	16.00	1	32.00	1.79	444.19
RO-OC-35	TRIANGULAR	4.00	16.00	1	32.00	1.79	342.41
RO-OC-37	IRREGULAR	4.50	16.00	1	31.00	1.66	282.71

****
Transect Summary
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Transect XS-01
Area:

0.0004	0.0016	0.0035	0.0063	0.0098
0.0141	0.0192	0.0251	0.0317	0.0392

0.0474 0.0564 0.0662 0.0768 0.0882
0.1003 0.1133 0.1270 0.1415 0.1568
0.1728 0.1897 0.2073 0.2258 0.2450
0.2649 0.2857 0.3073 0.3296 0.3527
0.3767 0.4013 0.4268 0.4531 0.4801
0.5079 0.5366 0.5660 0.5961 0.6271
0.6588 0.6914 0.7247 0.7588 0.7939
0.8309 0.8701 0.9113 0.9546 1.0000

Hrad:

0.0222 0.0445 0.0667 0.0889 0.1111
0.1334 0.1556 0.1778 0.2001 0.2223
0.2445 0.2667 0.2890 0.3112 0.3334
0.3557 0.3779 0.4001 0.4223 0.4446
0.4668 0.4890 0.5113 0.5335 0.5557
0.5779 0.6002 0.6224 0.6446 0.6669
0.6891 0.7113 0.7335 0.7558 0.7780
0.8002 0.8225 0.8447 0.8669 0.8891
0.9114 0.9336 0.9558 0.9781 0.9858
0.9842 0.9851 0.9882 0.9933 1.0000

Width:

0.0169 0.0338 0.0506 0.0675 0.0844
0.1013 0.1181 0.1350 0.1519 0.1688
0.1856 0.2025 0.2194 0.2363 0.2531
0.2700 0.2869 0.3038 0.3206 0.3375
0.3544 0.3713 0.3881 0.4050 0.4219
0.4388 0.4556 0.4725 0.4894 0.5063
0.5231 0.5400 0.5569 0.5738 0.5906
0.6075 0.6244 0.6413 0.6581 0.6750
0.6919 0.7088 0.7256 0.7425 0.7750
0.8200 0.8650 0.9100 0.9550 1.0000

Transect XS-02

Area:

0.0004 0.0016 0.0035 0.0063 0.0098
0.0142 0.0193 0.0252 0.0318 0.0393
0.0476 0.0566 0.0664 0.0771 0.0885
0.1006 0.1136 0.1274 0.1419 0.1573
0.1734 0.1903 0.2080 0.2264 0.2457
0.2658 0.2866 0.3082 0.3306 0.3538
0.3778 0.4026 0.4281 0.4545 0.4816
0.5095 0.5382 0.5677 0.5980 0.6290
0.6609 0.6935 0.7269 0.7611 0.7963
0.8332 0.8721 0.9128 0.9555 1.0000

Hrad:

0.0220 0.0440 0.0660 0.0880 0.1100
0.1320 0.1540 0.1760 0.1980 0.2200
0.2420 0.2640 0.2860 0.3081 0.3301
0.3521 0.3741 0.3961 0.4181 0.4401
0.4621 0.4841 0.5061 0.5281 0.5501
0.5721 0.5941 0.6161 0.6381 0.6601
0.6821 0.7041 0.7261 0.7481 0.7701
0.7921 0.8141 0.8361 0.8581 0.8801
0.9022 0.9242 0.9462 0.9682 0.9774
0.9783 0.9812 0.9859 0.9922 1.0000

Width:

0.0173 0.0346 0.0518 0.0691 0.0864
0.1037 0.1210 0.1383 0.1555 0.1728
0.1901 0.2074 0.2247 0.2420 0.2592
0.2765 0.2938 0.3111 0.3284 0.3457
0.3629 0.3802 0.3975 0.4148 0.4321
0.4493 0.4666 0.4839 0.5012 0.5185
0.5358 0.5530 0.5703 0.5876 0.6049
0.6222 0.6395 0.6567 0.6740 0.6913
0.7086 0.7259 0.7432 0.7604 0.7913
0.8330 0.8748 0.9165 0.9583 1.0000

**************************	Volume	Depth
Runoff Quantity Continuity	acre-ft	inches
**************************	---------	-------
Total Precipitation	1.677	1.289
Continuity Error (%)	0.584	

**************************	Volume	Volume
Flow Routing Continuity	acre-ft	Mgallons
**************************	---------	---------
External Inflow	0.000	0.000
External Outflow	0.701	0.228
Initial Stored Volume	0.015	0.005
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.001	

****
Runoff Coefficient Computations Report
****

Subbasin RO-DA-DWP-32

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.28	-	0.35
-	0.66	-	0.90
Composite Area & Weighted Runoff Coeff.	0.95		0.73

Subbasin RO-DA-DWP-34

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.15	-	0.35
-	0.36	-	0.90
Composite Area & Weighted Runoff Coeff.	0.51		0.73

Subbasin RO-DA-OC-03

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	4.66	-	0.35
-	0.10	-	0.90
Composite Area & Weighted Runoff Coeff.	4.76		0.36

Subbasin RO-DA-OC-04

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.18	-	0.35
Composite Area & Weighted Runoff Coeff.	0.18		0.35

Subbasin RO-DA-OC-09

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.31	-	0.35
-	0.44	-	0.90
Composite Area & Weighted Runoff Coeff.	1.75		0.49

Subbasin RO-DA-OC-12

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.19	-	0.35
-	0.06	-	0.90
Composite Area & Weighted Runoff Coeff.	0.25		0.49

Subbasin RO-DA-OC-15

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.55	-	0.35
-	0.39	-	0.90
Composite Area & Weighted Runoff Coeff.	0.94		0.58

Subbasin RO-DA-OC-17

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.75	-	0.35
-	0.24	-	0.90
Composite Area & Weighted Runoff Coeff.	0.99		0.48

Subbasin RO-DA-OC-19

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.91	-	0.35
-	0.29	-	0.90
Composite Area & Weighted Runoff Coeff.	1.20		0.48

Subbasin RO-DA-OC-21

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.07	-	0.35
-	0.03	-	0.90
Composite Area & Weighted Runoff Coeff.	0.10		0.52

Subbasin RO-DA-OC-24

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.09	-	0.35
-	0.04	-	0.90

Composite Area & Weighted Runoff Coeff.	0.13		0.51

Subbasin RO-DA-OC-26

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	2.44	-	0.35
-	0.05	-	0.90
Composite Area & Weighted Runoff Coeff.	2.49		0.36

Subbasin RO-DA-OC-28

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.11	-	0.35
-	0.05	-	0.90
Composite Area & Weighted Runoff Coeff.	0.16		0.51

Subbasin RO-DA-OC-35

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.21	-	0.35
-	0.50	-	0.90
Composite Area & Weighted Runoff Coeff.	0.71		0.74

Subbasin RO-DA-OC-37

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.15	-	0.35
-	0.34	-	0.90
Composite Area & Weighted Runoff Coeff.	0.49		0.74

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where:

Tc = Time of Concentration (hrs)
n = Manning's Roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)

V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin RO-DA-DWP-32

User-Defined TOC override (minutes): 5.00

Subbasin RO-DA-DWP-34

User-Defined TOC override (minutes): 5.00

Subbasin RO-DA-OC-03

User-Defined TOC override (minutes): 32.00

Subbasin RO-DA-OC-04

User-Defined TOC override (minutes): 5.00

Subbasin RO-DA-OC-09

User-Defined TOC override (minutes): 5.00

Subbasin RO-DA-OC-12

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        User-Defined TOC override (minutes):      5.00

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Subbasin RO-DA-OC-15
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        User-Defined TOC override (minutes):      5.00

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Subbasin RO-DA-OC-17
------------------------

        User-Defined TOC override (minutes):      5.00

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Subbasin RO-DA-OC-19
------------------------

        User-Defined TOC override (minutes):      5.00

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Subbasin RO-DA-OC-21
------------------------

        User-Defined TOC override (minutes):      5.00

------------------------
Subbasin RO-DA-OC-24
------------------------

        User-Defined TOC override (minutes):      5.00

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Subbasin RO-DA-OC-26
------------------------

        User-Defined TOC override (minutes):     31.00

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Subbasin RO-DA-OC-28
------------------------

        User-Defined TOC override (minutes):      5.00

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Subbasin RO-DA-OC-35
------------------------

        User-Defined TOC override (minutes):      5.00

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Subbasin RO-DA-OC-37
------------------------

        User-Defined TOC override (minutes):      5.00
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Subbasin Runoff Summary
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Subbasin ID	Accumulated Precip in	Rainfall Intensity in/hr	Total Runoff in	Peak Runoff cfs	Weighted Runoff Coeff	Time of Concentration days	Time of Concentration hh:mm:ss
RO-DA-DWP-32	0.68	8.11	0.49	5.60	0.730	0	00:05:00
RO-DA-DWP-34	0.68	8.11	0.49	3.02	0.730	0	00:05:00
RO-DA-OC-03	2.01	3.76	0.72	6.45	0.360	0	00:32:00
RO-DA-OC-04	0.68	8.11	0.24	0.51	0.350	0	00:05:00
RO-DA-OC-09	0.68	8.11	0.33	6.95	0.490	0	00:05:00
RO-DA-OC-12	0.68	8.11	0.33	0.99	0.490	0	00:05:00
RO-DA-OC-15	0.68	8.11	0.39	4.42	0.580	0	00:05:00
RO-DA-OC-17	0.68	8.11	0.32	3.85	0.480	0	00:05:00
RO-DA-OC-19	0.68	8.11	0.32	4.68	0.480	0	00:05:00
RO-DA-OC-21	0.68	8.11	0.35	0.42	0.520	0	00:05:00
RO-DA-OC-24	0.68	8.11	0.34	0.54	0.510	0	00:05:00
RO-DA-OC-26	1.98	3.83	0.71	3.43	0.360	0	00:31:00
RO-DA-OC-28	0.68	8.11	0.34	0.65	0.510	0	00:05:00
RO-DA-OC-35	0.68	8.11	0.50	4.27	0.740	0	00:05:00
RO-DA-OC-37	0.68	8.11	0.50	2.94	0.740	0	00:05:00

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Node Depth Summary
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Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
RO-CB-10	3.23	3.60	236.44	0	00:06	0	0	0:00:00
RO-JB-22	0.02	0.58	235.75	0	00:31	0	0	0:00:00
RO-JB-29	0.03	5.17	239.71	0	00:04	0.16	4	0:00:00
RO-OCJ-02	0.31	1.23	190.69	0	00:32	0	0	0:00:00
RO-OCJ-03	0.74	1.53	192.84	0	00:32	0	0	0:00:00
RO-OCJ-04	3.23	3.50	228.39	0	00:05	0	0	0:00:00
RO-OCJ-05	0.01	1.14	189.66	0	00:07	0	0	0:00:00
RO-OCJ-06	0.16	1.14	192.94	0	00:06	0	0	0:00:00
RO-OCJ-08	0.11	1.20	245.38	0	00:05	0	0	0:00:00
RO-OCJ-09	0.08	1.19	249.02	0	00:05	0	0	0:00:00
RO-OCJ-11	0.10	0.55	244.72	0	00:05	0	0	0:00:00
RO-OCJ-12	0.05	0.51	248.35	0	00:05	0	0	0:00:00
RO-OCJ-14	0.04	0.88	249.43	0	00:06	0	0	0:00:00
RO-OCJ-15	0.00	0.79	262.15	0	00:05	0	0	0:00:00
RO-OCJ-17	0.06	0.95	248.79	0	00:05	0	0	0:00:00
RO-OCJ-18	0.05	0.77	249.29	0	00:06	0	0	0:00:00
RO-OCJ-19	0.00	0.75	263.46	0	00:05	0	0	0:00:00
RO-OCJ-21	0.00	0.52	236.00	0	00:05	0	0	0:00:00
RO-OCJ-26	0.02	0.78	245.74	0	00:31	0	0	0:00:00
RO-OCJ-37	0.00	0.80	262.15	0	00:05	0	0	0:00:00
RO-OEP-16	0.01	0.86	246.61	0	00:06	0	0	0:00:00
RO-OEP-23	0.03	0.84	237.51	0	00:31	0	0	0:00:00
RO-OEP-25	0.02	0.78	241.74	0	00:31	0	0	0:00:00
RO-OEP-27	0.04	1.83	235.98	0	00:05	0	0	0:00:00
RO-OEP-30	0.01	1.41	239.11	0	00:06	0	0	0:00:00
RO-OEP-32	0.01	0.93	247.41	0	00:05	0	0	0:00:00
RO-OEP-34	0.01	0.90	251.63	0	00:06	0	0	0:00:00
RO-OEP-36	0.00	0.78	256.93	0	00:05	0	0	0:00:00

RO-OP-07	0.01	0.88	231.06	0	00:06	0	0	0:00:00
RO-OP-24	0.03	0.84	240.39	0	00:31	0	0	0:00:00
RO-OP-28	0.04	1.84	236.22	0	00:05	0	0	0:00:00
RO-OP-31	0.01	1.42	245.05	0	00:05	0	0	0:00:00
RO-OP-33	0.01	0.93	248.20	0	00:05	0	0	0:00:00
RO-OP-35	0.01	0.91	255.87	0	00:05	0	0	0:00:00
RO-EXJB	0.01	0.72	234.30	0	00:05	0	0	0:00:00
RO-OCJ-20	0.00	0.50	235.45	0	00:06	0	0	0:00:00
RO-OCO-01	1.26	2.18	185.60	0	00:32	0	0	0:00:00
RO-OCO-04	0.01	1.14	187.14	0	00:07	0	0	0:00:00
RO-OP-13	5.18	6.02	248.02	0	00:06	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
RO-CB-10	JUNCTION	0.00	0.92	0	00:06	0.00		
RO-JB-22	JUNCTION	0.00	3.41	0	00:31	0.00		
RO-JB-29	JUNCTION	0.00	14.92	0	00:06	4.28	0	00:06
RO-OCJ-02	JUNCTION	0.00	6.44	0	00:32	0.00		
RO-OCJ-03	JUNCTION	6.45	6.45	0	00:32	0.00		
RO-OCJ-04	JUNCTION	0.51	0.51	0	00:05	0.00		
RO-OCJ-05	JUNCTION	0.00	7.20	0	00:07	0.00		
RO-OCJ-06	JUNCTION	0.00	7.22	0	00:06	0.00		
RO-OCJ-08	JUNCTION	0.00	6.69	0	00:05	0.00		
RO-OCJ-09	JUNCTION	6.95	6.95	0	00:05	0.00		
RO-OCJ-11	JUNCTION	0.00	0.93	0	00:05	0.00		
RO-OCJ-12	JUNCTION	0.99	0.99	0	00:05	0.00		
RO-OCJ-14	JUNCTION	0.00	4.02	0	00:06	0.00		
RO-OCJ-15	JUNCTION	4.42	4.42	0	00:05	0.00		
RO-OCJ-17	JUNCTION	3.85	3.85	0	00:05	0.00		
RO-OCJ-18	JUNCTION	0.00	4.23	0	00:06	0.00		
RO-OCJ-19	JUNCTION	4.68	4.68	0	00:05	0.00		
RO-OCJ-21	JUNCTION	0.42	0.42	0	00:05	0.00		
RO-OCJ-26	JUNCTION	3.43	3.43	0	00:31	0.00		
RO-OCJ-37	JUNCTION	2.94	2.94	0	00:05	0.00		
RO-OEP-16	JUNCTION	0.00	7.70	0	00:06	0.00		
RO-OEP-23	JUNCTION	0.00	3.41	0	00:31	0.00		
RO-OEP-25	JUNCTION	0.00	3.42	0	00:31	0.00		
RO-OEP-27	JUNCTION	0.00	12.01	0	00:05	0.00		
RO-OEP-30	JUNCTION	0.00	13.92	0	00:06	0.00		
RO-OEP-32	JUNCTION	5.60	14.22	0	00:05	0.00		
RO-OEP-34	JUNCTION	3.02	9.08	0	00:05	0.00		
RO-OEP-36	JUNCTION	0.00	2.76	0	00:05	0.00		
RO-OP-07	JUNCTION	0.00	7.46	0	00:06	0.00		
RO-OP-24	JUNCTION	0.54	3.42	0	00:31	0.00		
RO-OP-28	JUNCTION	0.65	12.15	0	00:05	0.00		
RO-OP-31	JUNCTION	0.00	14.21	0	00:05	0.00		
RO-OP-33	JUNCTION	0.00	9.08	0	00:05	0.00		
RO-OP-35	JUNCTION	4.27	6.56	0	00:05	0.00		
RO-EXJB	OUTFALL	0.00	11.98	0	00:05	0.00		
RO-OCJ-20	OUTFALL	0.00	0.39	0	00:06	0.00		
RO-OCO-01	OUTFALL	0.00	6.42	0	00:32	0.00		
RO-OCO-04	OUTFALL	0.00	7.17	0	00:07	0.00		
RO-OP-13	OUTFALL	0.00	97.36	0	00:00	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
RO-EXJB	5.35	2.37	11.98
RO-OCJ-20	1.22	0.12	0.39
RO-OCO-01	4.78	3.04	6.42
RO-OCO-04	2.90	0.97	7.17
RO-OP-13	2.88	1.81	97.36
System	3.42	8.31	97.36

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
RO-DWP-25	CONDUIT	0 00:31	7.64	1.00	3.42	17.37	0.20	0.30	0	Calculated
RO-DWP-30	CONDUIT	0 00:06	12.39	1.00	13.91	20.32	0.68	0.61	0	Calculated
RO-DWP-32	CONDUIT	0 00:05	12.40	1.00	14.21	20.22	0.70	0.62	0	Calculated
RO-DWP-34	CONDUIT	0 00:05	11.97	1.00	9.08	22.28	0.41	0.44	0	Calculated
RO-DWP-36	CONDUIT	0 00:05	6.16	1.00	2.76	13.97	0.20	0.30	0	Calculated
RO-NP-10	CONDUIT	0 00:06	5.61	1.00	0.92	19.18	0.05	0.15	0	Calculated
RO-NP-16	CONDUIT	0 00:00	27.58	1.00	97.36	97.36	1.00	0.50	0	> CAPACITY
RO-NP-22	CONDUIT	0 00:32	5.42	1.00	3.41	10.81	0.32	0.39	0	Calculated
RO-NP-23	CONDUIT	0 00:31	15.43	1.00	3.41	46.70	0.07	0.18	0	Calculated
RO-NP-27	CONDUIT	0 00:05	14.24	1.00	11.98	25.54	0.47	0.48	0	Calculated
RO-NP-29	CONDUIT	0 00:05	7.05	1.00	11.51	10.64	1.08	1.00	3	SURCHARGED
RO-OC-02	CHANNEL	0 00:32	6.58	1.00	6.42	391.17	0.02	0.21	0	Calculated
RO-OC-03	CHANNEL	0 00:32	6.68	1.00	6.44	434.17	0.01	0.21	0	Calculated
RO-OC-04	CHANNEL	0 00:06	10.96	1.00	0.45	647.41	0.00	0.06	0	Calculated
RO-OC-05	CHANNEL	0 00:07	4.48	1.00	7.17	265.98	0.03	0.25	0	Calculated
RO-OC-06	CHANNEL	0 00:07	6.58	1.00	7.20	391.55	0.02	0.22	0	Calculated
RO-OC-07	CHANNEL	0 00:06	9.34	1.00	7.22	554.74	0.01	0.19	0	Calculated
RO-OC-08	CHANNEL	0 00:06	8.11	1.00	6.58	482.19	0.01	0.20	0	Calculated
RO-OC-09	CHANNEL	0 00:05	9.65	1.00	6.69	268.95	0.02	0.24	0	Calculated
RO-OC-11	CHANNEL	0 00:06	3.42	1.00	0.92	522.55	0.00	0.09	0	Calculated
RO-OC-12	CHANNEL	0 00:05	6.90	1.00	0.93	324.35	0.00	0.11	0	Calculated
RO-OC-14	CHANNEL	0 00:06	2.82	1.00	3.98	250.21	0.02	0.21	0	Calculated
RO-OC-15	CHANNEL	0 00:06	12.61	1.00	4.02	336.61	0.01	0.19	0	Calculated
RO-OC-17	CHANNEL	0 00:06	7.47	1.00	3.51	210.80	0.02	0.21	0	Calculated
RO-OC-18	CHANNEL	0 00:06	4.00	1.00	4.22	395.83	0.01	0.18	0	Calculated
RO-OC-19	CHANNEL	0 00:06	12.88	1.00	4.23	399.66	0.01	0.18	0	Calculated
RO-OC-21	CHANNEL	0 00:06	3.35	1.00	0.39	133.75	0.00	0.11	0	Calculated
RO-OC-24	CHANNEL	0 00:31	4.75	1.00	3.41	282.02	0.01	0.19	0	Calculated
RO-OC-26	CHANNEL	0 00:31	5.95	1.00	3.42	353.56	0.01	0.17	0	Calculated
RO-OC-28	CHANNEL	0 00:05	2.44	1.00	12.01	125.39	0.10	0.40	0	Calculated
RO-OC-31	CHANNEL	0 00:06	4.89	1.00	13.92	290.32	0.05	0.31	0	Calculated
RO-OC-33	CHANNEL	0 00:05	5.25	1.00	9.08	444.19	0.02	0.23	0	Calculated
RO-OC-35	CHANNEL	0 00:06	4.07	1.00	6.49	342.41	0.02	0.23	0	Calculated
RO-OC-37	CHANNEL	0 00:05	8.60	1.00	2.76	282.71	0.01	0.17	0	Calculated

8.4 Ditch Calculations

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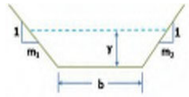
Table 8-1 Ditch Worksheet

Ditch Computation Sheet

Designed By: JKC *Checked By:* LBC

Project Name:	Rockland Rd Relocation
Route/Road Number:	*S-2905*
Project ID:	*P043321*
Date:	*4/06/2026*
County:	*Richland*



Tc (min)	*Design Storm*	*Intensity*	*Ditch Location*		*ID RO-**	*Alignment*	*SIDE*	*Drainage Area (Ac)*	*DA 'C' Value*	*Q (cfs)*	*Side Slope (m_1)*	*Side Slope (m_2)*	*Base Width (b)*	*Ditch Cover*	*Ditch 'n' Value*	*Slope (%)*	*Flow Depth (ft) (y)*	*Velocity (ft/s)*	*Comments*
			From Station Elevation	*To Station Elevation*															
33 min	*10-year*	*3.61*	*9147+80*	*9146+70*	*OC-02*	*Rockland*	*Lt*	*4.94*	*0.36*	*6.42*	*2*	*2*	*0*	*TRM Type 1*	*0.032*	*4.50%*	*0.94*	*6.58*	*Meets requirements*
			189.74	*184.65*						*Rational*									
33 min	*10-year*	*3.62*	*9148+38*	*9147+80*	*OC-03*	*Rockland*	*Lt*	*4.94*	*0.36*	*6.44*	*4*	*4*	*0*	*TRM Type 1*	*0.032*	*3.93%*	*0.82*	*6.68*	*Meets requirements*
			192.02	*189.74*						*Rational*									
7 min	*10-year*	*7.14*	*9152+35*	*9148+38*	*OC-04*	*Rockland*	*Lt*	*0.18*	*0.35*	*0.45*	*4*	*4*	*0*	*TRM Type 1*	*0.032*	*8.74%*	*0.26*	*10.96*	*Meets requirements*
			228.12	*192.02*						*Rational*									
7 min	*10-year*	*7.30*	*9147+62*	*9146+54*	*OC-05*	*Rockland*	*Rt*	*2.00*	*0.49*	*7.15*	*2*	*2*	*0*	*ECB*	*0.032*	*2.08%*	*1.14*	*4.48*	*Meets requirements*
			188.52	*186.00*						*Rational*									
7 min	*10-year*	*7.36*	*9148+38*	*9147+62*	*OC-06*	*Rockland*	*Rt*	*2.00*	*0.49*	*7.21*	*4*	*2*	*0*	*TRM Type 1*	*0.032*	*4.51%*	*0.99*	*6.58*	*Meets requirements*
			191.95	*188.52*						*Rational*									
7 min	*10-year*	*7.36*	*9152+78*	*9148+38*	*OC-07*	*Rockland*	*Rt*	*2.00*	*0.49*	*7.21*	*4*	*2*	*0*	*TRM Type 1*	*0.032*	*9.06%*	*0.61*	*9.34*	*Meets requirements*
			230.71	*191.95*						*Rational*									
6 min	*10-year*	*7.67*	*9154+85*	*9152+78*	*OC-08*	*Rockland*	*Rt*	*1.75*	*0.49*	*6.58*	*4*	*2*	*0*	*TRM TYPE 1*	*0.032*	*6.84%*	*0.62*	*8.11*	*Meets requirements*
			244.28	*230.71*						*Rational*									
5 min	*10-year*	*7.80*	*9156+55*	*9154+85*	*OC-09*	*Rockland*	*Rt*	*1.75*	*0.49*	*6.69*	*4*	*2*	*0*	*TRM Type 1*	*0.032*	*2.13%*	*1.10*	*9.65*	*Meets requirements*
			247.90	*244.28*						*Rational*									
6 min	*10-year*	*7.51*	*9154+84*	*9153+40*	*OC-11*	*Rockland*	*Lt*	*0.25*	*0.49*	*0.92*	*4*	*4*	*0*	*TRM Type 1*	*0.032*	*5.69%*	*0.37*	*3.42*	*Meets requirements*
			244.27	*236.07*						*Rational*									
6 min	*10-year*	*7.59*	*9156+49*	*9154+84*	*OC-12*	*Rockland*	*Lt*	*0.25*	*0.49*	*0.93*	*4*	*4*	*0*	*TRM Type 1*	*0.032*	*2.19%*	*0.44*	*6.90*	*Meets requirements*
			247.89	*244.27*						*Rational*									
4 min	*10-year*	*8.58*	*9159+83*	*9158+75*	*OC-14*	*Rockland*	*Rt*	*0.80*	*0.58*	*3.98*	*4*	*4*	*0*	*ECB*	*0.032*	*1.31%*	*0.85*	*2.82*	*Meets requirements*
			248.58	*247.17*						*Rational*									
3 min	*10-year*	*8.66*	*9163+92*	*9159+83*	*OC-15*	*Rockland*	*Rt*	*0.80*	*0.58*	*4.02*	*4*	*3*	*0*	*TRM Type 1*	*0.032*	*3.21%*	*0.75*	*12.61*	*Meets requirements*
			261.36	*248.58*						*Rational*									
6 min	*10-year*	*7.39*	*9156+58*	*9158+88*	*OC-17*	*Rockland*	*Lt*	*0.99*	*0.48*	*3.51*	*4*	*4*	*0*	*ECB*	*0.032*	*0.93%*	*0.85*	*7.47*	*Meets requirements*
			247.90	*245.75*						*Rational*									
5 min	*10-year*	*7.99*	*9159+82*	*9158+96*	*OC-18*	*Rockland*	*Lt*	*1.10*	*0.48*	*4.22*	*4*	*4*	*0*	*TRM Type 1*	*0.032*	*3.27%*	*0.73*	*4.00*	*Meets requirements*
			248.56	*245.75*						*Rational*									
5 min	*10-year*	*8.01*	*9163+96*	*9159+82*	*OC-19*	*Rockland*	*Lt*	*1.10*	*0.48*	*4.23*	*4*	*4*	*0*	*TRM Type 1*	*0.032*	*3.32%*	*0.72*	*12.88*	*Meets requirements*
			262.71	*248.56*						*Rational*									
6 min	*10-year*	*7.50*	*9173+94*	*9174+92*	*OC-21*	*Rockland*	*Lt*	*0.10*	*0.52*	*0.39*	*4*	*2*	*0*	*ECB*	*0.032*	*0.53%*	*0.49*	*3.35*	*Meets requirements*
			235.48	*234.95*						*Rational*									
35 min	*10-year*	*3.52*	*9172+22*	*9173+44*	*OC-24*	*Rockland*	*Lt*	*2.62*	*0.37*	*3.41*	*4*	*2*	*0*	*TRM Type 1*	*0.032*	*2.34%*	*0.84*	*4.75*	*Meets requirements*
			239.55	*236.67*						*Rational*									
30 min	*10-year*	*3.82*	*9170+62*	*9171+70*	*OC-26*	*Rockland*	*Lt*	*2.49*	*0.36*	*3.42*	*4*	*2*	*0*	*TRM Type 1*	*0.032*	*3.68%*	*0.78*	*5.95*	*Meets requirements*
			244.96	*240.96*						*Rational*									
28 min	*10-year*	*3.94*	*9174+00*	*9174+50*	*OC-28*	*Rockland*	*Rt*	*5.44*	*0.56*	*12.01*	*4*	*2*	*0*	*TRM Type 1*	*0.032*	*0.46%*	*1.29*	*2.44*	*Meets requirements*
			235.35	*234.15*						*Rational*									
7 min	*10-year*	*7.07*	*9170+60*	*9173+00*	*OC-31*	*Rockland*	*Rt*	*2.66*	*0.74*	*13.92*	*4*	*2*	*0*	*TRM Type 1*	*0.032*	*2.48%*	*1.41*	*4.89*	*Meets requirements*
			243.63	*237.70*						*Rational*									
7 min	*10-year*	*7.18*	*9169+60*	*9169+80*	*OC-33*	*Rockland*	*Rt*	*1.71*	*0.74*	*9.08*	*4*	*4*	*0*	*TRM Type 1*	*0.032*	*4.11%*	*0.93*	*5.25*	*Meets requirements*
			247.27	*246.48*						*Rational*									
7 min	*10-year*	*7.31*	*9167+00*	*9168+80*	*OC-35*	*Rockland*	*Rt*	*1.20*	*0.74*	*6.49*	*4*	*4*	*0*	*TRM Type 1*	*0.032*	*2.45%*	*0.90*	*4.07*	*Meets requirements*
			254.96	*250.73*						*Rational*									
6 min	*10-year*	*7.61*	*9164+00*	*9166+30*	*OC-37*	*Rockland*	*Rt*	*0.49*	*0.74*	*2.76*	*4*	*2*	*0*	*TRM Type 1*	*0.032*	*2.35%*	*0.78*	*8.60*	*Meets requirements*
			261.35	*256.15*						*Rational*									

8.4.1 Channel Lining Analysis

Hydraulic Analysis Report

Project Data

Project Title: Gale Dr Hydaulic Analysis
Project Date: Wednesday, March 26, 2025
Project Units: U.S. Customary Units

Channel Analysis: Channel Analysis OC-02

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 2.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0450 ft/ft
Manning's n: 0.0320
Flow 6.4200 cfs

Result Parameters

Depth 0.8031 ft
Area of Flow 1.2899 ft^2
Wetted Perimeter 3.5915 ft
Hydraulic Radius 0.3591 ft
Average Velocity 4.9773 ft/s
Top Width 3.2123 ft
Froude Number: 1.3842
Critical Depth 0.9146 ft
Critical Velocity 3.8373 ft/s
Critical Slope: 0.0225 ft/ft
Critical Top Width 3.66 ft
Calculated Max Shear Stress 2.2550 lb/ft^2
Calculated Avg Shear Stress 1.0085 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-02

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive
D75: 2.54 mm
Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.984371 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 2.20112 lb/ft^2
Effective Shear Stress: 0.0188013 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-03

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft
Longitudinal Slope: 0.0393 ft/ft
Manning's n: 0.0300
Flow 6.4400 cfs

Result Parameters

Depth 0.6082 ft
Area of Flow 1.4798 ft^2
Wetted Perimeter 5.0157 ft
Hydraulic Radius 0.2950 ft
Average Velocity 4.3519 ft/s
Top Width 4.8659 ft
Froude Number: 1.3907
Critical Depth 0.6940 ft
Critical Velocity 3.3427 ft/s
Critical Slope: 0.0194 ft/ft
Critical Top Width 5.55 ft
Calculated Max Shear Stress 1.4916 lb/ft^2
Calculated Avg Shear Stress 0.7235 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-03

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.723529 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.49159 lb/ft^2
Effective Shear Stress: 0.00224569 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-04

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft
Longitudinal Slope: 0.0874 ft/ft
Manning's n: 0.0320
Flow 0.4500 cfs

Result Parameters

Depth 0.1978 ft
Area of Flow 0.1564 ft^2
Wetted Perimeter 1.6307 ft
Hydraulic Radius 0.0959 ft
Average Velocity 2.8768 ft/s
Top Width 1.5820 ft
Froude Number: 1.6123

Critical Depth 0.2394 ft
Critical Velocity 1.9632 ft/s
Critical Slope: 0.0315 ft/ft
Critical Top Width 1.92 ft
Calculated Max Shear Stress 1.0785 lb/ft^2
Calculated Avg Shear Stress 0.5231 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-04

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.510637 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.05271 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-05

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 2.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0208 ft/ft
Manning's n: 0.0320
Flow 7.1500 cfs

Result Parameters
Depth 0.9664 ft
Area of Flow 1.8677 ft^2
Wetted Perimeter 4.3217 ft
Hydraulic Radius 0.4322 ft
Average Velocity 3.8283 ft/s
Top Width 3.8654 ft
Froude Number: 0.9706
Critical Depth 0.9549 ft
Critical Velocity 3.9209 ft/s
Critical Slope: 0.0222 ft/ft
Critical Top Width 3.82 ft
Calculated Max Shear Stress 1.2543 lb/ft^2
Calculated Avg Shear Stress 0.5609 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-05

Lining Input Parameters
Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.035
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results
Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.580089 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.29712 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-06

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0451 ft/ft
Manning's n: 0.0300
Flow 7.2100 cfs

Result Parameters

Depth 0.6936 ft
Area of Flow 1.4434 ft^2
Wetted Perimeter 4.4109 ft
Hydraulic Radius 0.3272 ft
Average Velocity 4.9952 ft/s
Top Width 4.1618 ft
Froude Number: 1.4948
Critical Depth 0.8340 ft
Critical Velocity 3.4549 ft/s
Critical Slope: 0.0169 ft/ft
Critical Top Width 5.63 ft
Calculated Max Shear Stress 1.9521 lb/ft^2
Calculated Avg Shear Stress 0.9209 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-06

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.920899 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.95205 lb/ft^2
Effective Shear Stress: 0.0129898 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-07

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0906 ft/ft
Manning's n: 0.0300
Flow 7.2100 cfs

Result Parameters

Depth 0.6086 ft
Area of Flow 1.1112 ft^2
Wetted Perimeter 3.8701 ft
Hydraulic Radius 0.2871 ft
Average Velocity 6.4887 ft/s
Top Width 3.6516 ft
Froude Number: 2.0729
Critical Depth 0.8340 ft
Critical Velocity 3.4549 ft/s
Critical Slope: 0.0169 ft/ft
Critical Top Width 5.63 ft
Calculated Max Shear Stress 3.4406 lb/ft^2
Calculated Avg Shear Stress 1.6232 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-07

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 10 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm

Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 1.62316 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 3.44064 lb/ft^2
Effective Shear Stress: 0.0156109 lb/ft^2
Permissible Shear Stress on RECP: 5.18272 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-08

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0684 ft/ft
Manning's n: 0.0250
Flow 6.5800 cfs

Result Parameters

Depth 0.5789 ft
Area of Flow 1.0055 ft^2
Wetted Perimeter 3.6816 ft
Hydraulic Radius 0.2731 ft
Average Velocity 6.5440 ft/s
Top Width 3.4736 ft
Froude Number: 2.1434
Critical Depth 0.8041 ft
Critical Velocity 3.3923 ft/s
Critical Slope: 0.0119 ft/ft
Critical Top Width 5.43 ft
Calculated Max Shear Stress 2.4710 lb/ft^2
Calculated Avg Shear Stress 1.1657 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-08

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product

Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.025
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 1.16572 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 2.471 lb/ft^2
Effective Shear Stress: 0.0250985 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-09

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0213 ft/ft
Manning's n: 0.0320
Flow 6.7000 cfs

Result Parameters

Depth 0.7958 ft
Area of Flow 1.8997 ft^2
Wetted Perimeter 5.0604 ft
Hydraulic Radius 0.3754 ft
Average Velocity 3.5269 ft/s
Top Width 4.7745 ft
Froude Number: 0.9853
Critical Depth 0.8099 ft
Critical Velocity 3.4046 ft/s
Critical Slope: 0.0194 ft/ft
Critical Top Width 5.47 ft

Calculated Max Shear Stress 1.0577 lb/ft^2
Calculated Avg Shear Stress 0.4990 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-09

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.487029 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.03237 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-11

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft
Longitudinal Slope: 0.0569 ft/ft
Manning's n: 0.0320
Flow 0.9200 cfs

Result Parameters

Depth 0.2802 ft
Area of Flow 0.3141 ft^2
Wetted Perimeter 2.3110 ft

Hydraulic Radius 0.1359 ft
Average Velocity 2.9286 ft/s
Top Width 2.2420 ft
Froude Number: 1.3787
Critical Depth 0.3187 ft
Critical Velocity 2.2650 ft/s
Critical Slope: 0.0287 ft/ft
Critical Top Width 2.55 ft
Calculated Max Shear Stress 0.9950 lb/ft^2
Calculated Avg Shear Stress 0.4827 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-11

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.471117 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 0.971233 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-12

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft

Longitudinal Slope: 0.0219 ft/ft
Manning's n: 0.0320
Flow 0.9300 cfs

Result Parameters

Depth 0.3365 ft
Area of Flow 0.4531 ft^2
Wetted Perimeter 2.7753 ft
Hydraulic Radius 0.1633 ft
Average Velocity 2.0527 ft/s
Top Width 2.6924 ft
Froude Number: 0.8818
Critical Depth 0.3200 ft
Critical Velocity 2.2699 ft/s
Critical Slope: 0.0286 ft/ft
Critical Top Width 2.56 ft
Calculated Max Shear Stress 0.4599 lb/ft^2
Calculated Avg Shear Stress 0.2231 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-12

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 1.75 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.217757 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 0.448917 lb/ft^2
Effective Shear Stress: 0.00335522 lb/ft^2
Permissible Shear Stress on RECP: 0.906977 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-14

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft
Longitudinal Slope: 0.0131 ft/ft
Manning's n: 0.0320
Flow 3.9800 cfs

Result Parameters

Depth 0.6392 ft
Area of Flow 1.6345 ft^2
Wetted Perimeter 5.2714 ft
Hydraulic Radius 0.3101 ft
Average Velocity 2.4349 ft/s
Top Width 5.1140 ft
Froude Number: 0.7590
Critical Depth 0.5725 ft
Critical Velocity 3.0360 ft/s
Critical Slope: 0.0236 ft/ft
Critical Top Width 4.58 ft
Calculated Max Shear Stress 0.5225 lb/ft^2
Calculated Avg Shear Stress 0.2535 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-14

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 1.75 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.035
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.262134 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 0.540404 lb/ft^2
Effective Shear Stress: 0.0106742 lb/ft^2
Permissible Shear Stress on RECP: 0.906977 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-15

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 3.0000 ft/ft
Longitudinal Slope: 0.0321 ft/ft
Manning's n: 0.0300
Flow 4.0200 cfs

Result Parameters

Depth 0.5580 ft
Area of Flow 1.0896 ft^2
Wetted Perimeter 4.0649 ft
Hydraulic Radius 0.2680 ft
Average Velocity 3.6894 ft/s
Top Width 3.9057 ft
Froude Number: 1.2310
Critical Depth 0.6088 ft
Critical Velocity 3.0987 ft/s
Critical Slope: 0.0202 ft/ft
Critical Top Width 4.35 ft
Calculated Max Shear Stress 1.1176 lb/ft^2
Calculated Avg Shear Stress 0.5369 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-15

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm

Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.536914 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.11761 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-17

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft
Longitudinal Slope: 0.0093 ft/ft
Manning's n: 0.0320
Flow 3.5100 cfs

Result Parameters

Depth 0.6503 ft
Area of Flow 1.6915 ft^2
Wetted Perimeter 5.3623 ft
Hydraulic Radius 0.3154 ft
Average Velocity 2.0751 ft/s
Top Width 5.2022 ft
Froude Number: 0.6413
Critical Depth 0.5444 ft
Critical Velocity 2.9606 ft/s
Critical Slope: 0.0240 ft/ft
Critical Top Width 4.36 ft
Calculated Max Shear Stress 0.3774 lb/ft^2
Calculated Avg Shear Stress 0.1831 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-17

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.035
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.189307 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 0.390267 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-18

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft
Longitudinal Slope: 0.0327 ft/ft
Manning's n: 0.0320
Flow 4.2200 cfs

Result Parameters

Depth 0.5504 ft
Area of Flow 1.2120 ft^2
Wetted Perimeter 4.5391 ft
Hydraulic Radius 0.2670 ft
Average Velocity 3.4820 ft/s
Top Width 4.4036 ft
Froude Number: 1.1696
Critical Depth 0.5861 ft
Critical Velocity 3.0717 ft/s
Critical Slope: 0.0234 ft/ft
Critical Top Width 4.69 ft
Calculated Max Shear Stress 1.1232 lb/ft^2
Calculated Avg Shear Stress 0.5448 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-18

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.531792 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.09632 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-19

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft
Longitudinal Slope: 0.0332 ft/ft
Manning's n: 0.0320
Flow 4.2300 cfs

Result Parameters

Depth 0.5494 ft
Area of Flow 1.2072 ft^2
Wetted Perimeter 4.5302 ft
Hydraulic Radius 0.2665 ft
Average Velocity 3.5039 ft/s
Top Width 4.3950 ft
Froude Number: 1.1782

Critical Depth 0.5866 ft
Critical Velocity 3.0732 ft/s
Critical Slope: 0.0234 ft/ft
Critical Top Width 4.69 ft
Calculated Max Shear Stress 1.1381 lb/ft^2
Calculated Avg Shear Stress 0.5521 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-19

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.538868 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.1109 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-21

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0053 ft/ft
Manning's n: 0.0320
Flow 0.3900 cfs

Result Parameters
Depth 0.3556 ft
Area of Flow 0.3793 ft^2
Wetted Perimeter 2.2611 ft
Hydraulic Radius 0.1677 ft
Average Velocity 1.0283 ft/s
Top Width 2.1334 ft
Froude Number: 0.4298
Critical Depth 0.2597 ft
Critical Velocity 1.9278 ft/s
Critical Slope: 0.0283 ft/ft
Critical Top Width 1.75 ft
Calculated Max Shear Stress 0.1176 lb/ft^2
Calculated Avg Shear Stress 0.0555 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-21

Lining Input Parameters
Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results
Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.0541491 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 0.114781 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-24

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0234 ft/ft
Manning's n: 0.0300
Flow 3.4100 cfs

Result Parameters

Depth 0.5924 ft
Area of Flow 1.0528 ft^2
Wetted Perimeter 3.7672 ft
Hydraulic Radius 0.2795 ft
Average Velocity 3.2389 ft/s
Top Width 3.5544 ft
Froude Number: 1.0488
Critical Depth 0.6182 ft
Critical Velocity 2.9744 ft/s
Critical Slope: 0.0186 ft/ft
Critical Top Width 4.17 ft
Calculated Max Shear Stress 0.8650 lb/ft^2
Calculated Avg Shear Stress 0.4081 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-24

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.408074 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 0.865004 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-26

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0368 ft/ft
Manning's n: 0.0300
Flow 3.4200 cfs

Result Parameters

Depth 0.5448 ft
Area of Flow 0.8904 ft^2
Wetted Perimeter 3.4644 ft
Hydraulic Radius 0.2570 ft
Average Velocity 3.8411 ft/s
Top Width 3.2687 ft
Froude Number: 1.2970
Critical Depth 0.6189 ft
Critical Velocity 2.9761 ft/s
Critical Slope: 0.0186 ft/ft
Critical Top Width 4.18 ft
Calculated Max Shear Stress 1.2510 lb/ft^2
Calculated Avg Shear Stress 0.5902 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-26

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm

Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.590173 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.251 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-28

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0046 ft/ft
Manning's n: 0.0300
Flow 12.0100 cfs

Result Parameters

Depth 1.2886 ft
Area of Flow 4.9816 ft^2
Wetted Perimeter 8.1945 ft
Hydraulic Radius 0.6079 ft
Average Velocity 2.4109 ft/s
Top Width 7.7317 ft
Froude Number: 0.5293
Critical Depth 1.0229 ft
Critical Velocity 3.8261 ft/s
Critical Slope: 0.0158 ft/ft
Critical Top Width 6.90 ft
Calculated Max Shear Stress 0.3699 lb/ft^2
Calculated Avg Shear Stress 0.1745 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-28

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2

See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.174497 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 0.369885 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-31

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0248 ft/ft
Manning's n: 0.0300
Flow 13.9200 cfs

Result Parameters

Depth 0.9930 ft
Area of Flow 2.9584 ft^2
Wetted Perimeter 6.3149 ft
Hydraulic Radius 0.4685 ft
Average Velocity 4.7052 ft/s
Top Width 5.9583 ft
Froude Number: 1.1768
Critical Depth 1.0851 ft
Critical Velocity 3.9407 ft/s
Critical Slope: 0.0155 ft/ft
Critical Top Width 7.32 ft
Calculated Max Shear Stress 1.5368 lb/ft^2

Calculated Avg Shear Stress 0.7250 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-31

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.724978 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.53675 lb/ft^2
Effective Shear Stress: 0.00329943 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-33

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft
Longitudinal Slope: 0.0411 ft/ft
Manning's n: 0.0300
Flow 9.0800 cfs

Result Parameters

Depth 0.6861 ft
Area of Flow 1.8828 ft^2
Wetted Perimeter 5.6576 ft
Hydraulic Radius 0.3328 ft

Average Velocity 4.8225 ft/s
Top Width 5.4887 ft
Froude Number: 1.4510
Critical Depth 0.7962 ft
Critical Velocity 3.5804 ft/s
Critical Slope: 0.0186 ft/ft
Critical Top Width 6.37 ft
Calculated Max Shear Stress 1.7596 lb/ft^2
Calculated Avg Shear Stress 0.8535 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-33

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.853509 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.75955 lb/ft^2
Effective Shear Stress: 0.00849814 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-35

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 4.0000 ft/ft
Longitudinal Slope: 0.0245 ft/ft

Manning's n: 0.0300
Flow 6.4900 cfs

Result Parameters

Depth 0.6665 ft
Area of Flow 1.7770 ft^2
Wetted Perimeter 5.4963 ft
Hydraulic Radius 0.3233 ft
Average Velocity 3.6522 ft/s
Top Width 5.3322 ft
Froude Number: 1.1149
Critical Depth 0.6962 ft
Critical Velocity 3.3479 ft/s
Critical Slope: 0.0194 ft/ft
Critical Top Width 5.57 ft
Calculated Max Shear Stress 1.0190 lb/ft^2
Calculated Avg Shear Stress 0.4943 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-35

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.494275 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.01897 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

Channel Analysis: Channel Analysis OC-37

Input Parameters

Channel Type: Triangular
Side Slope 1 (Z1): 4.0000 ft/ft
Side Slope 2 (Z2): 2.0000 ft/ft
Longitudinal Slope: 0.0235 ft/ft
Manning's n: 0.0300
Flow 2.7600 cfs

Result Parameters

Depth 0.5468 ft
Area of Flow 0.8970 ft^2
Wetted Perimeter 3.4772 ft
Hydraulic Radius 0.2580 ft
Average Velocity 3.0770 ft/s
Top Width 3.2808 ft
Froude Number: 1.0371
Critical Depth 0.5680 ft
Critical Velocity 2.8512 ft/s
Critical Slope: 0.0192 ft/ft
Critical Top Width 3.83 ft
Calculated Max Shear Stress 0.8018 lb/ft^2
Calculated Avg Shear Stress 0.3783 lb/ft^2

Channel Lining Analysis: Channel Lining Design Analysis OC-37

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
See https://highways.dot.gov/federal-lands/specs refer to FLH FP 14, Table 713-3 or 713-4 to get this value
Manning's n value input as user-supplied n
RECP is an open weave textile
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.37827 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 0.801827 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2

This value is compared with the maximum shear stress times the safety factor to determine lining stability
This value is compared with the maximum shear stress times the safety factor to determine lining stability
Channel bottom is stable
Channel Lining Stability Results 2
The channel is stable

8.5 Culvert Analysis

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 45 cfs

Design Flow: 97.4 cfs

Maximum Flow: 100 cfs

Table 1 - Summary of Culvert Flows at Crossing: NP-16

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
248.14	45.00	45.00	0.00	1
248.44	50.50	50.50	0.00	1
248.78	56.00	56.00	0.00	1
249.15	61.50	61.50	0.00	1
249.56	67.00	67.00	0.00	1
249.81	72.50	70.18	2.18	13
249.88	78.00	71.04	6.85	6
249.93	83.50	71.72	11.69	5
249.98	89.00	72.29	16.55	4
250.05	97.40	73.10	24.18	4
250.07	100.00	73.33	26.53	3
249.75	69.41	69.41	0.00	Overtopping

Rating Curve Plot for Crossing: NP-16

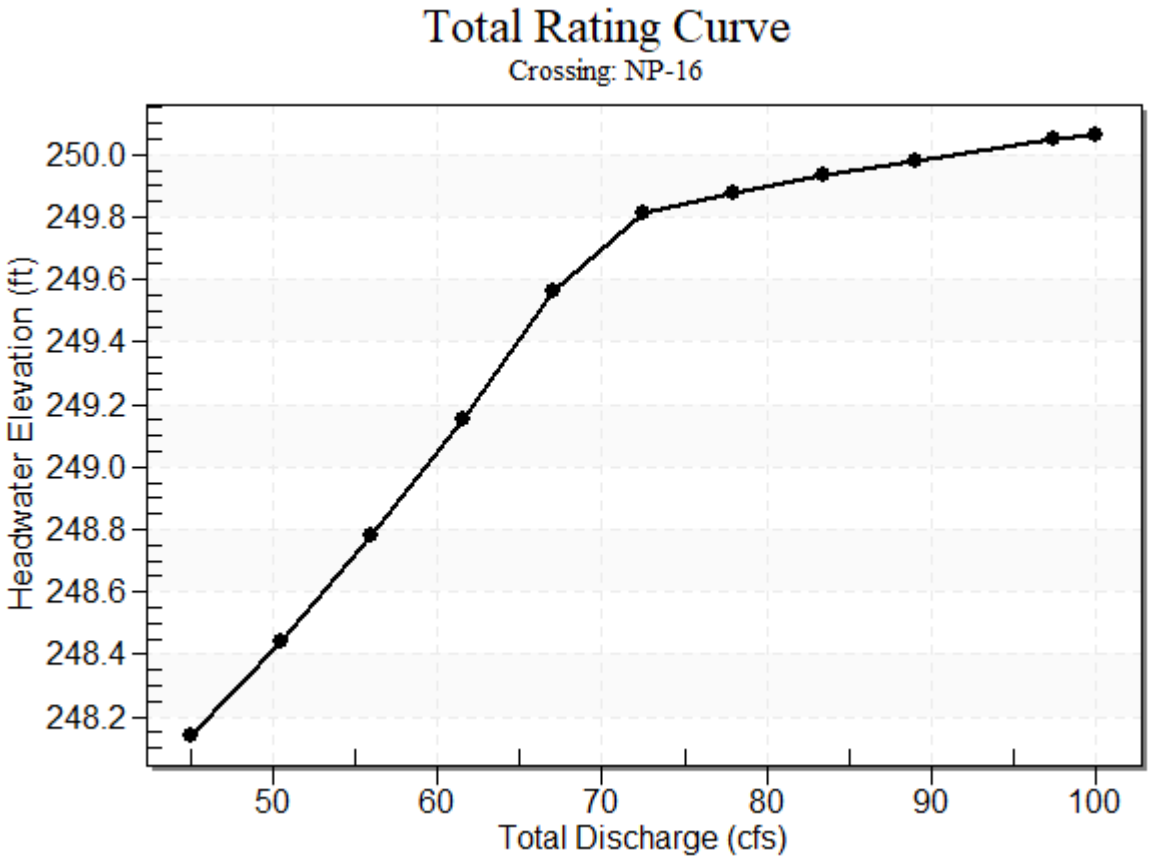


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
45.00	45.00	248.14	2.393	0.619	5-S2n	0.954	1.396	0.988	0.665	9.701	4.464
50.50	50.50	248.44	2.693	0.955	5-S2n	1.021	1.479	1.056	0.710	9.998	4.637
56.00	56.00	248.78	3.031	1.535	5-S2n	1.086	1.555	1.123	0.753	10.273	4.796
61.50	61.50	249.15	3.405	1.880	5-S2n	1.152	1.624	1.192	0.794	10.499	4.944
67.00	67.00	249.56	3.812	2.251	5-S2n	1.217	1.686	1.262	0.833	10.689	5.082
72.50	70.18	249.81	4.061	2.477	5-S2n	1.256	1.718	1.303	0.870	10.797	5.211
78.00	71.04	249.88	4.130	2.539	5-S2n	1.266	1.726	1.313	0.907	10.828	5.334
83.50	71.72	249.93	4.184	2.589	5-S2n	1.274	1.732	1.322	0.942	10.854	5.450
89.00	72.29	249.98	4.231	2.631	5-S2n	1.281	1.738	1.329	0.976	10.876	5.560
97.40	73.10	250.05	4.297	2.691	5-S2n	1.291	1.745	1.338	1.026	10.909	5.719
100.00	73.33	250.07	4.316	2.708	5-S2n	1.294	1.747	1.341	1.041	10.919	5.766

****

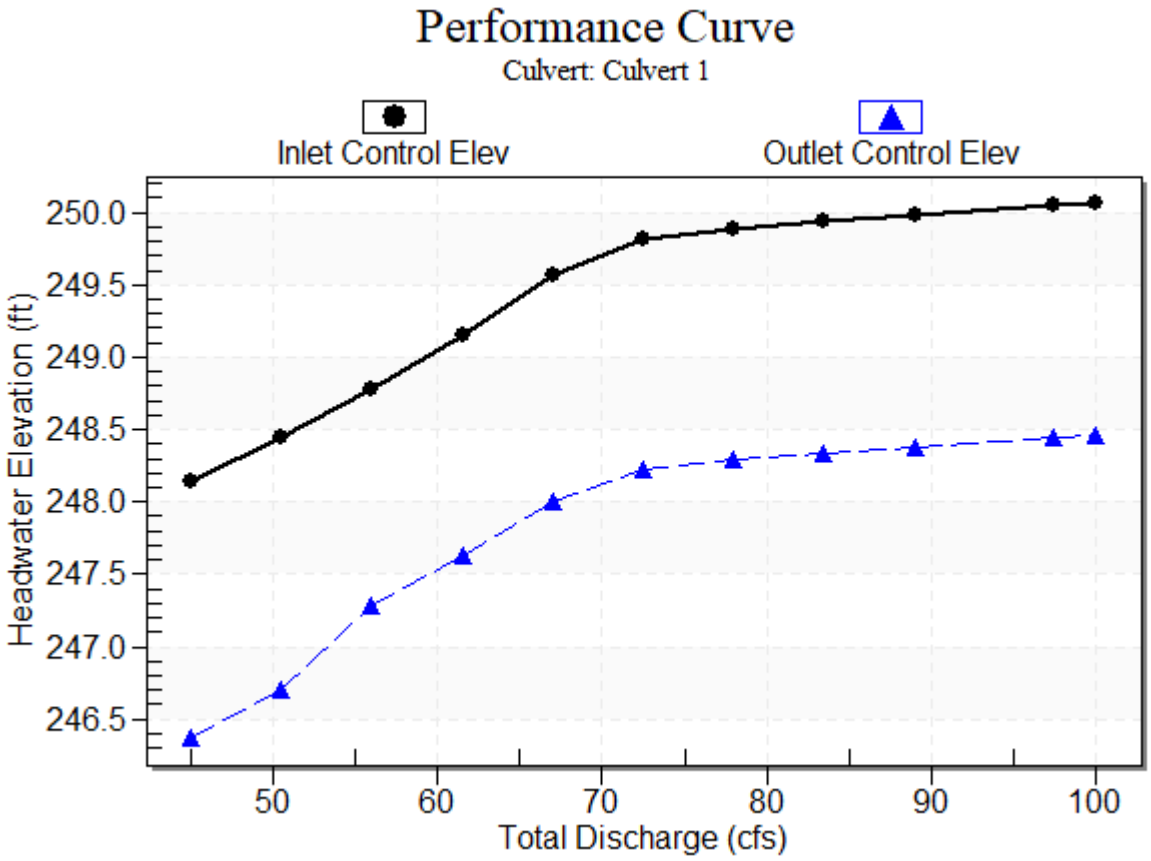
Straight Culvert

Inlet Elevation (invert): 245.75 ft, Outlet Elevation (invert): 244.00 ft

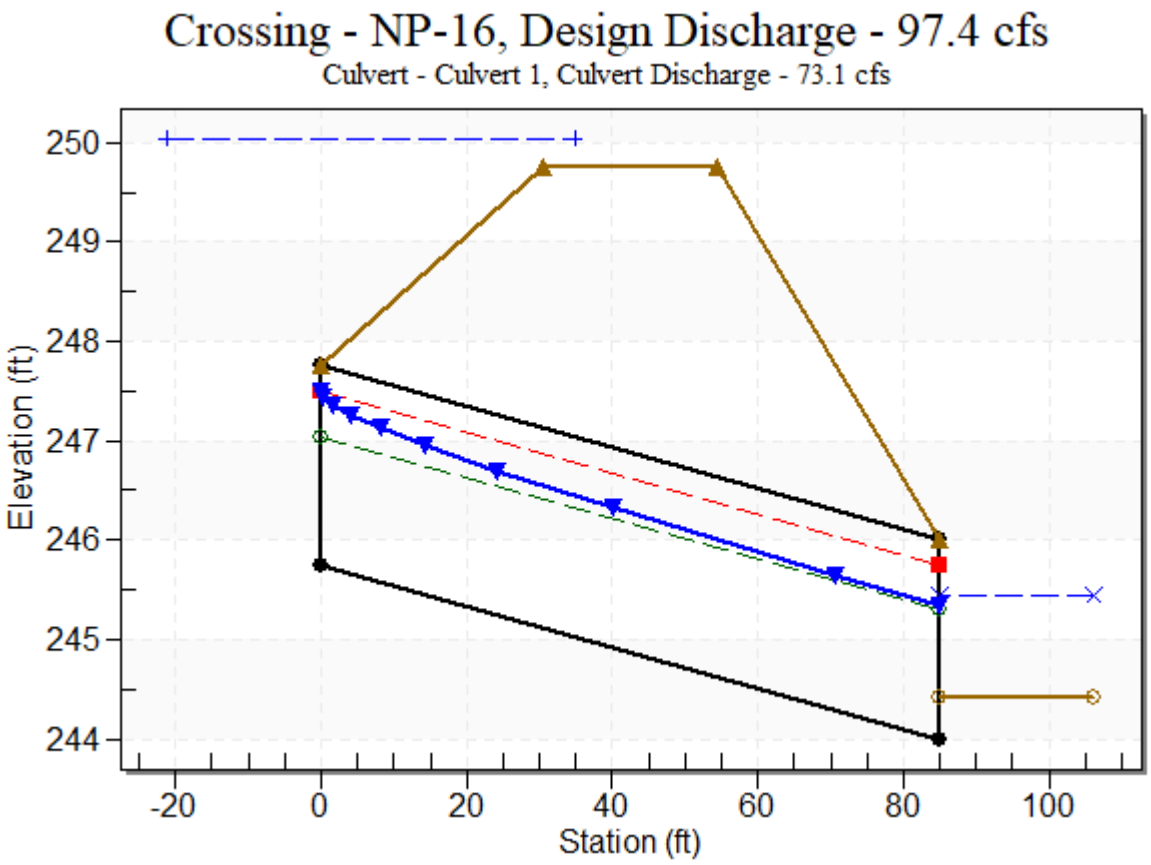
Culvert Length: 85.02 ft, Culvert Slope: 0.0206

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 245.75 ft

Outlet Station: 85.00 ft

Outlet Elevation: 244.00 ft

Number of Barrels: 3

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material:

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: None

Table 3 - Downstream Channel Rating Curve (Crossing: NP-16)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
45.00	245.08	0.66	4.46	0.83	1.05
50.50	245.13	0.71	4.64	0.89	1.06
56.00	245.17	0.75	4.80	0.94	1.06
61.50	245.21	0.79	4.94	0.99	1.07
67.00	245.25	0.83	5.08	1.04	1.08
72.50	245.29	0.87	5.21	1.09	1.09
78.00	245.33	0.91	5.33	1.13	1.09
83.50	245.36	0.94	5.45	1.18	1.10
89.00	245.40	0.98	5.56	1.22	1.10
97.40	245.45	1.03	5.72	1.28	1.11
100.00	245.46	1.04	5.77	1.30	1.11

Tailwater Channel Data - NP-16

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.50 ft

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0200

Channel Manning's n: 0.0320

Channel Invert Elevation: 244.42 ft

Roadway Data for Crossing: NP-16

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 50.00 ft

Crest Elevation: 249.75 ft

Roadway Surface: Paved

Roadway Top Width: 24.00 ft

8.6 Rip-Rap Calculations

Hydraulic Analysis Report

Project Data

Project Title: Gale Dr Hydaulic Analysis

Designer:

Project Date: Wednesday, March 26, 2025

Project Units: U.S. Customary Units

Notes:

Riprap Analysis: Riprap Analysis NP-02

Notes:

Input Parameters

Riprap Type: Revetment

The channel is a trapezoidal channel

Local Depth of Flow: 0.495548 ft

Riprap Shape is Angular

Stability Coefficient: 0.3

This value is updated by the selected Riprap Shape

Blanket Thickness Coefficient: 1

Channel Cross-sectional Average Velocity: 10.9978 ft/s

Which is the Average Velocity with Spurs

Centerline Radius of Curvature of Channel Bend: 1e+09 ft

Width of Water Surface at Upstream End of Channel Bend: 1.72688 ft

Bank Angle: 4 :1 H:V

.966 < Bank Angle < 4.011

The location of the revetment protection is on a straight channel

Specific Gravity of Riprap: 2.65

Safety Factor: 1.1

Result Parameters

Side slope Correction Factor: 0.999989

Velocity Distribution Coefficient: 1

Design Velocity: 10.9978 ft/s

Design velocity never less than average channel velocity

Computed D30: 335.575 mm

Computed D50: 402.69 mm

Riprap Class

Riprap Class Name:CLASS V

Riprap Class Order:5

The following values are an 'average' of the size fraction range for the selected riprap class.

D100: 914.40 mm

D85: 647.70 mm

D50: 469.90 mm

D15: 330.20 mm

Layout Recommendations

Minimum Riprap Thickness: 432.00 in

Name of Selected Channel: Channel Analysis OC-02

Riprap Analysis: Riprap Analysis NP-05

Notes:

Input Parameters

Riprap Type: Revetment

The channel is a trapezoidal channel

Local Depth of Flow: 0.689189 ft

Riprap Shape is Angular

Stability Coefficient: 0.3

This value is updated by the selected Riprap Shape

Blanket Thickness Coefficient: 1

Channel Cross-sectional Average Velocity: 9.07305 ft/s

Which is the Average Velocity with Spurs

Centerline Radius of Curvature of Channel Bend: 1e+09 ft

Width of Water Surface at Upstream End of Channel Bend: 1.49506 ft

Bank Angle: 4 :1 H:V

.966 < Bank Angle < 4.011

The location of the revetment protection is on a straight channel

Specific Gravity of Riprap: 2.65

Safety Factor: 1.1

Result Parameters

Side slope Correction Factor: 0.999989

Velocity Distribution Coefficient: 1

Design Velocity: 9.07305 ft/s

Design velocity never less than average channel velocity

Computed D30: 191.028 mm

Computed D50: 229.233 mm

Riprap Class

Riprap Class Name:CLASS II

Riprap Class Order:2

The following values are an 'average' of the size fraction range for the selected riprap class.

D100: 457.20 mm

D85: 330.20 mm

D50: 241.30 mm

D15: 177.80 mm

Layout Recommendations

Minimum Riprap Thickness: 216.00 in

Name of Selected Channel: Channel Analysis OC-05

Riprap Analysis: Riprap Analysis NP-10

Notes:

Input Parameters

Riprap Type: Revetment

The channel is a trapezoidal channel

Local Depth of Flow: 0.201841 ft

Riprap Shape is Angular

Stability Coefficient: 0.3

This value is updated by the selected Riprap Shape

Blanket Thickness Coefficient: 1

Channel Cross-sectional Average Velocity: 6.48108 ft/s

Which is the Average Velocity with Spurs

Centerline Radius of Curvature of Channel Bend: 1e+09 ft

Width of Water Surface at Upstream End of Channel Bend: 1.02376 ft

Bank Angle: 4 :1 H:V

.966 < Bank Angle < 4.011

The location of the revetment protection is on a straight channel

Specific Gravity of Riprap: 2.65

Safety Factor: 1.1

Result Parameters

Side slope Correction Factor: 0.999989

Velocity Distribution Coefficient: 1

Design Velocity: 6.48108 ft/s

Design velocity never less than average channel velocity

Computed D30: 111.986 mm

Computed D50: 134.384 mm

Riprap Class

Riprap Class Name:CLASS I

Riprap Class Order:1

The following values are an 'average' of the size fraction range for the selected riprap class.

D100: 304.80 mm

D85: 228.60 mm

D50: 165.10 mm

D15: 114.30 mm

Layout Recommendations

Minimum Riprap Thickness: 144.00 in

Name of Selected Channel: Channel Analysis NP-10

Riprap Analysis: Riprap Analysis NP-16

Notes:

Input Parameters

Riprap Type: Revetment

The channel is a natural channel

Local Depth of Flow: 2.46048 ft

Riprap Shape is Angular

Stability Coefficient: 0.3

This value is updated by the selected Riprap Shape

Blanket Thickness Coefficient: 1

Channel Cross-sectional Average Velocity: 15.845 ft/s

Which is the Average Velocity with Spurs

Centerline Radius of Curvature of Channel Bend: 1e+09 ft

Width of Water Surface at Upstream End of Channel Bend: 2.30432 ft

Bank Angle: 4 :1 H:V

.966 < Bank Angle < 4.011

The location of the revetment protection is on a straight channel

Specific Gravity of Riprap: 2.65

Safety Factor: 1.1

Result Parameters

Side slope Correction Factor: 0.999989

Velocity Distribution Coefficient: 1

Design Velocity: 15.845 ft/s

Design velocity never less than average channel velocity

Computed D30: 560.11 mm

Computed D50: 672.132 mm

Riprap Class

Riprap Class Name:CLASS VIII

Riprap Class Order:8

The following values are an 'average' of the size fraction range for the selected riprap class.

D100: 1524.00 mm

D85: 1079.50 mm

D50: 800.10 mm

D15: 558.80 mm

Layout Recommendations

Minimum Riprap Thickness: 720.00 in

Name of Selected Channel: Channel Analysis NP-16

8.7 Water Quality Monitoring Report

SC Department of Environmental Services

Watershed and Water Quality Information

General Information

Applicant Name: SCDOT
Address: Rockland Rd, Columbia, SC, 29210
MS4 Designation: Small MS4
Within Coastal Critical Area: No
Waterbody Name: STOOP CREEK

Permit Type: MS4
Latitude/Longitude: 34.035425 / -81.113994
Monitoring Station: S-507
Water Classification (Provisional): FW
Entered Waterbody Name:

Parameter Description

NH3N	Ammonia	CD	Cadmium	CR	Chromium
CU	Copper	HG	Mercury	NI	Nickel
PB	Lead	ZN	Zinc	DO	Dissolved Oxygen
PH	pH	TURBIDITY	Turbidity	ECOLI	Escherichia coli (Freshwaters)
FC	Fecal Coliform (Shellfish)	BIO	Macroinvertebrates (Bio)	TP	(Lakes) Phosphorus
TN	(Lakes) Nitrogen	CHLA	(Lakes) Chlorophyll a	ENTERO	Enterococcus (Coastal Waters)
HGF	Mercury (Fish Tissue)	PCB	PCB (Fish)		

Impaired Status (downstream sites)

Station	NH3N	CD	CR	CU	HG	NI	PB	ZN	DO	PH	TURBIDITY	ECOLI	FC	BIO	TP	TN	CHLA	ENTERO	HGF	PCB
S-507	X	X	X	X	X	X	X	X	X	X	X	X	X	N	X	X	X	X	X	X
CRK08	X	X	X	X	X	X	X	X	X	X	X	N	X	A	X	X	X	X	X	X

F = Standards full supported
N = Standards not supported
A = Assessed at upstream station
X = Parameter not assessed at station
WnTN = Within TMDL, parameter not supported
InTN = In TMDL, parameter not supported
WnTF = Within TMDL, parameter full supported
InTF = In TMDL, parameter full supported

Parameters to be addressed (those not supporting standards)

BIO - Macroinvertebrates (Bio)

ECOLI - Escherichia coli (Freshwaters)

Fish Consumption Advisory

Waters of Concern (WOC)

TMDL Information - TMDL Parameters to be addressed

In TMDL Watershed: No
TMDL Report No:
TMDL Document Link:

TMDL Site:
TMDL Parameter:

Report Date: July 8, 2025

Vol. 5

Gale Drive

hdrinc.com 4400 Leeds Avenue, Suite 450, North Charleston, SC 29405-7547
(843) 414-37000

STORMWATER MANAGEMENT DESIGN REPORT

Gale Drive Relocation

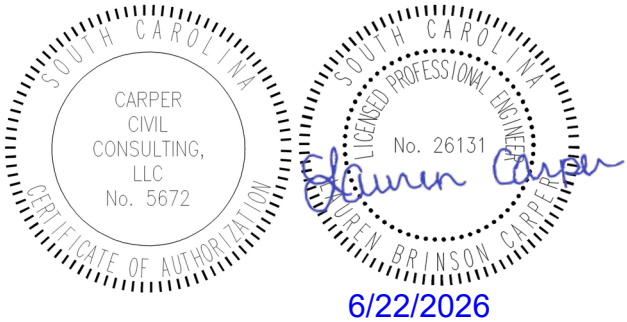
S-2905

Carolina Crossroads Phase 3A

SCDOT Project ID No. P043328

Richland County, South Carolina

June, 2026



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1. Project Summary

Gale Drive (S-2905) is being relocated in Phase 3A of the Carolina Crossroads Project in preparation for Phase 3E. Approximately 1,000 ft of Gale Dr will be relocated between Fairhaven Drive and Morninghill Drive. The project is located in Richland County, South Carolina (see Section 8.1, Figure 8.1.1 for Vicinity Map).

Gale Drive is a local residential road owned and maintained by the South Carolina Department of Transportation (SCDOT). The road currently consists of two paved 9 ft travel lanes with 3 ft valley gutters. The road parallels the I-20 EB right-of-way lying west of the Broad River Road interchange and east of the I-26 interchange. Previous right-of-way acquisitions included demolition and removal of structures within the proposed right-of-way.

The project area is located within an existing residential subdivision. Single-family homes are situated on parcels that are approximately 1/3 acre (see Section 8.1, Figure 8.1.3 for Aerial Map). Aerial and Field surveying of topography, surface structures, and utilities have been provided as part of the Carolina Crossroads Project. Based on the survey and USGS Topographic Maps, the contributory drainage area is estimated to be approximately 11 acres. The site generally drains to the northwest, where surface water is collected and discharged into an unnamed tributary to the Saluda River (see Section 8.1, Figure 8.1.4 for USGS Topographic Map). Existing drainage infrastructure consists of catch basins and stormwater pipes (< 30-in). This infrastructure will be removed or abandoned as part of the proposed work.

The Gale Drive will be relocated approximately 100 feet south of its current location into the previously obtained right-of-way. Land disturbance will include approximately 1.77 acres. Overall drainage patterns will remain the same, and based on the reduction of impervious surfaces, there will be no increase in discharge. See Section 7.4 for Pre Vs Post Analysis.

The project area is located in Zone X as shown on Panel No. 45079C0236L, effective December 21, 2017 (see Section 8.1, Figure 8.1.5 for FIRM Map).

The drainage design and stormwater management techniques comply with SCDOT Requirements for Hydraulic Design Studies, published May 26, 2009.

The information in this report is based on the Construction Plans for the Gale Drive Relocation project completed by Carper Civil Consulting as of June 2026.

2. Water Quality Considerations

The project lies within the Saluda River Watershed. Runoff from the site drains to a tributary to the Saluda River, which carries to the Congaree River. The site is not within an approved TMDL watershed. However, according to the Watershed and Water Quality Report (Section 8.8), Ecoli and Turbidity standards are not supported and need to be addressed. Best management practices will be utilized to limit the transport of sediment off-site. Construction of this project will not have adverse impacts on the downstream water quality.

3. Soils Information

Hydrologic soil groups are established by the Natural Resource Conservation Service (NRCS) and classified based on estimates of the soil's runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils have a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well-drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils have a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well-drained or well-drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils have a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils have a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

The Soil Survey of Richland County published by the Natural Resources Conservation Service (NRCS) indicates the presence of two predominant soil types within the project drainage area. These soil types

are Altavista silt loam, (hydrologic soil group A/D), and Orangeburg-Urban land complex, (hydrologic soil group B)

The Soil Survey can be seen in Figure 8.1.6 in Section 8.1.

4. Drainage Design Criteria

The hydrologic analysis was performed in accordance with SCDOT's Requirements for Hydraulic Design Studies, dated May 26, 2009. Specific design standards and analysis methods are discussed in Section 7. Table 4-1 below details the drainage design criteria for the project.

Table 4-1 Drainage Design Criteria

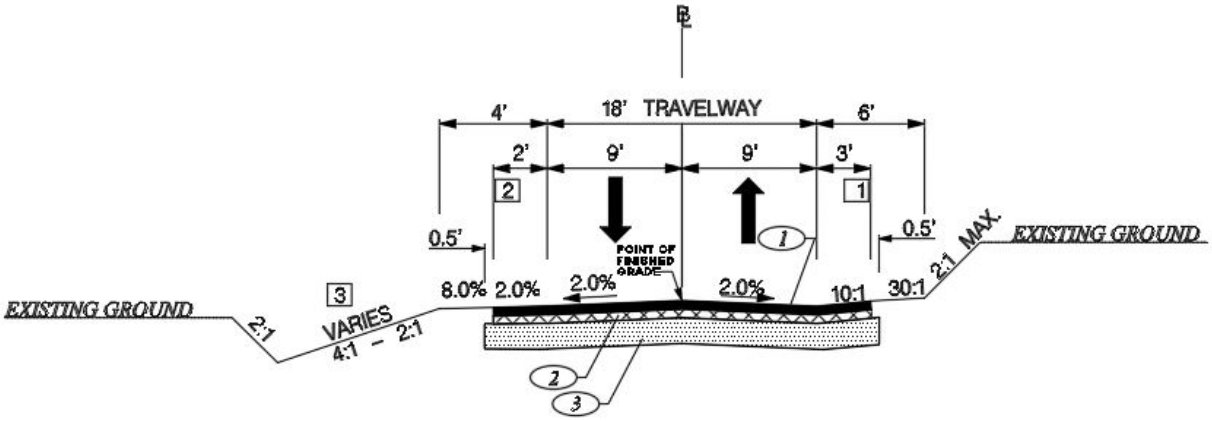
DRAINAGE DESIGN				
DESIGN ELEMENT			**DESIGN CRITERIA**	**SOURCE**
Design Discharge	Cross-Line Pipes		25-year	SCDOT Req. for Hydraulic Design Studies, May 26, 2009 **Section 2.2.2** and **2.2.3**
	Systems and Ditches	0 – 40 AC	10-year	
		40 – 500 AC	25-year	
		> 500 AC	50-year	
Allowable Spread Criteria	Roadway	Design Storm	10-year	SCDOT Req. Hydraulic Design Studies, May 26, 2009 **Section 4.2.2**
		Spread	½ travel lane	
Minimum Grades (%)	Pipe		0.30%	SCDOT Requirements for Hydraulic Design Studies, May 26, 2009 **Section 2.2.5**
	Ditch		0.30%	SCDOT Requirements for Hydraulic Design Studies, May 26, 2009 **Section 2.2.5**
Minimum Velocity			3.0 ft/sec	SCDOT Requirements for Hydraulic Design Studies, May 26, 2009 **Section 2.2.5**
Minimum Pipe Size	Storm Drainage Systems & Cross-Line Pipes		18"	SCDOT Requirements for Hydraulic Design Studies, May 26, 2009 **Section 2.2.6**
	Yard Drains & Driveway Pipes		15"	
Minimum Pipe Cover	Yard Drains		1.0'	SCDOT Standard Drawings
	Pipes Except Yard Drains		2.0' for CB-1	

5. Proposed Conditions

The proposed alignment will shift the road approximately 100 feet south of its current location and maintain connectivity with Luster Lane, Morninghill Drive, and Fairhaven Drive. The proposed typical roadway section includes two 9-foot travel lanes (one travel lane in each direction), a 4-foot shoulder and

roadside ditch on the left-hand (northern) side, and a 3-foot valley gutter on the right-hand (southern) side. See Figure 5-1 below for the proposed typical roadway section.

Figure 5-1. Proposed Typical Roadway Section



Type 9 Catch Basins will collect roadway runoff into the closed systems and convey the discharge to the roadside ditch. Inlet locations were selected based on gutter spread calculations. Smooth wall pipe was used in the analysis. The roadside ditch will connect to the existing tributary at the west end of the project.

6. Temporary Sediment and Erosion Control

Inlet structure filters Type A and Type F are to be placed at proposed drainage structures to prevent sediment from entering the closed systems.

Rip rap is to be placed on fill slopes at pipe ends per SCDOT's Instructional Bulletin No. 2009-2. Rip rap aprons are to be placed at the outfalls of the closed drainage systems. The aprons at pipe outfalls were sized per HEC-14 and SCDOT's instructional bulletins, and sizing calculations can be found in Section 8.7. Refer to the Erosion Control Plan Sheets (Section 8.2) and the calculations for rip rap dimensions and locations.

To achieve slope stabilization during construction, fill slopes that are 5 feet or higher are to be lined with a temporary erosion control blanket (Class B). All proposed ditches are also to be lined with a temporary erosion control blanket (Class B), or turf reinforcement mats (TRM) as indicated in the Ditch Worksheet (Section 8.6) and the Erosion Control Data Sheet.

Sediment tubes are to be placed in all ditches within the project limits to reduce flow velocities and to aid in sediment control. The Erosion Control Data Sheet located in the plan set provides details on the proposed locations of erosion control measures.

A single row of silt fence will be placed outside of the construction limits at fill sections. All erosion control measures were proposed according to SCDOT Standard Drawings from Sections 804 and 815 and the SCDES BMP Handbook.

7. Stormwater Analysis

7.1. Stormwater Analysis Overview

Drainage areas, flow paths and lengths, and watercourse slopes were delineated using survey data and the USGS 7.5-minute Quadrangle Map *COLUMBIA NORTH, SC* (see Section 8.1, Figure 8.1.7 for Drainage Area Exhibit). The Rational Method was used to determine peak discharges for the basins. The time of concentration for each watershed was calculated based on the methodology outlined in the Soil Conservation Service's Urban Hydrology for Small Watersheds (Technical Release 55) "TR-55" publication, dated June 1986, with a minimum time of concentration of five minutes. SCDOT-published rainfall intensity value charts for Richland County were used to determine rainfall intensities (in/hr). Manning's n values were estimated from survey data and aerial photography.

Survey data and aerial photography were used to determine pervious and impervious areas to calculate runoff coefficients. Pervious surfaces were assigned a C value of 0.35 and 0.90 was used for impervious surfaces. Weighted C values were then calculated for each basin.

The Rational Method Rainfall Intensity Coefficients for Richland County are shown below in Table 7.1.

Figure 7.1-1 Rainfall Intensity Coefficients

Frequency (Years)	a	b	c
2	63.5900	11.3200	0.8350
5	54.9500	9.9720	0.7593
10	50.0800	8.6690	0.7047
25	41.5400	6.6990	0.6264
50	37.5500	5.4330	0.5759
100	34.0700	4.2260	0.5297

These coefficients were utilized in the following equation to calculate rainfall intensities for various Times of Concentration:

$$i = \frac{a}{(b+t_c)^c}$$

7.2. Closed Drainage System Analysis

Closed drainage systems were analyzed with Autodesk Storm & Sanitary Analysis using a 10-year design storm. Drainage Area, Node and Link calculations can be found in Section 8.4. Closed drainage system profiles can be found in Section 8.3, Figure 8.3.1.

The proposed pipes were designed to have smooth walls, with a minimum grade of 0.3 percent and a maximum flow depth of 94 percent. A Manning's Roughness coefficient of 0.013 was used for all smooth-wall pipes.

The gutter spread was analyzed at each catch basin to verify that runoff would be contained within half of the travel lane, as well as to minimize bypass flows downstream. A Manning's Roughness coefficient of 0.014 was used for the gutter analysis. The locations that encounter superelevation rollover were analyzed for inlet placement. The area contributing to CB-02 generates less than 0.5 cfs so no additional inlet is deemed necessary. An additional drop inlet was added upstream of the superelevation at the end of the project, in order to reduce the rollover flow contributing to CB-14. This will improve the situation over the existing conditions.

Gutter Spread Calculations can be found in Section 8.5.

7.3. Open Channel Analysis

A "V"-shaped ditch is proposed to convey runoff from the road to the primary project outfall. The ditches were designed for stability and flow depth with the 10-year storm event. A freeboard distance of 1 foot between the design water surface elevation and the road subgrade was implemented where possible. Ditch Calculations can be found in Section 8.6.

7.4. Pre Vs Post Analysis

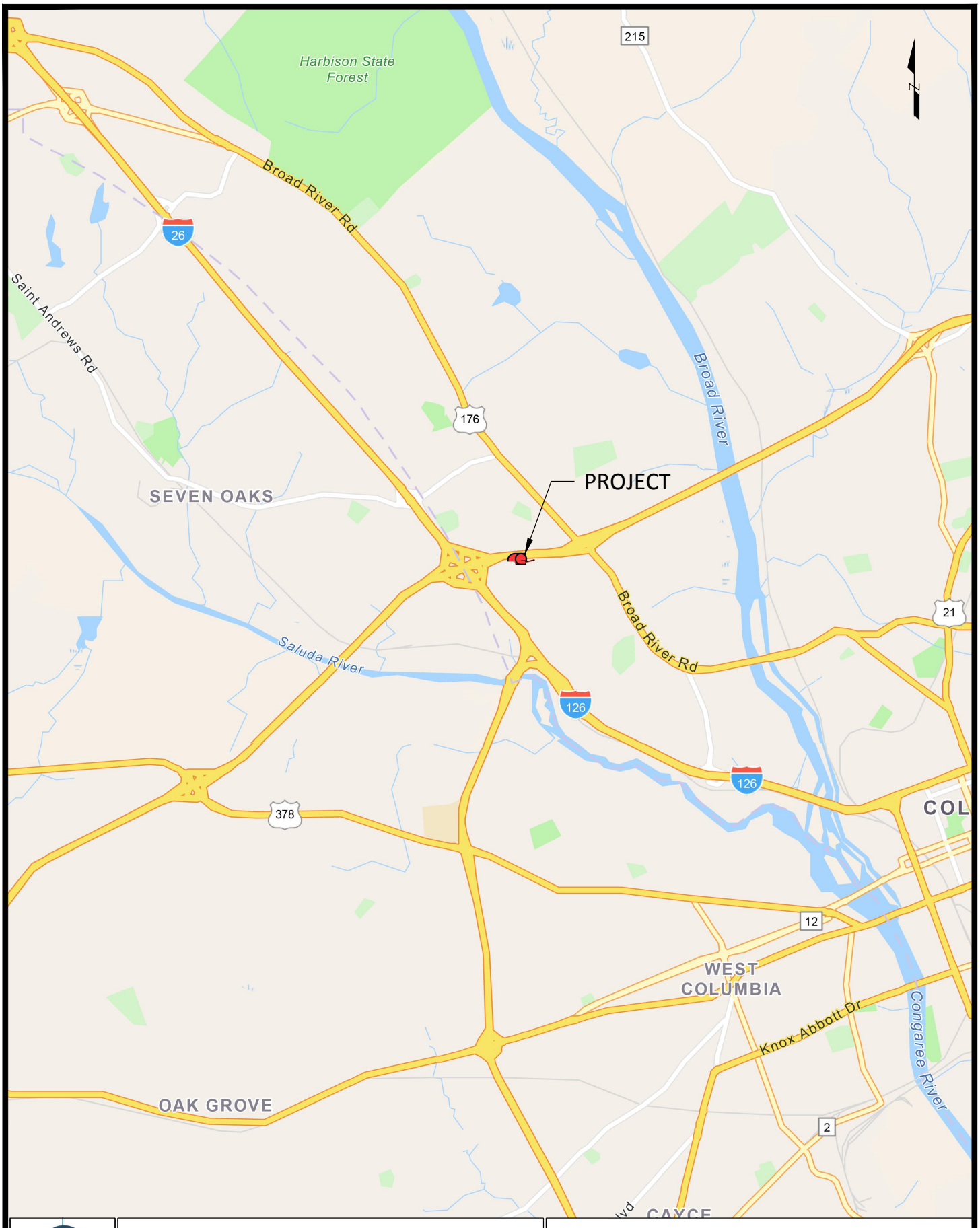
As part of the relocation effort, approximately 34,165 sq.ft. of impervious area (homes, driveways, and roadway) will be removed from the watershed. The comparison of Pre-development Vs Post-development runoff indicates a reduction in runoff of 1.22 cfs.

				2-yr*		**10-yr***		**25-yr***		**50-yr***		**100-yr***	
	Area (ac)	C	Tc (min)	i (in/hr)	Q (cfs)	i (in/hr)	Q (cfs)	i (in/hr)	Q (cfs)	i (in/hr)	Q (cfs)	i (in/hr)	Q (cfs)
Pre	10.73	0.55	30	2.84	16.76	3.81	22.48	4.35	28.23	4.81	34.05	5.24	38.65
Post	10.73	0.52	30	2.84	15.85	3.81	21.26	4.35	26.70	4.81	32.21	5.24	36.55

*Rational Cf Modification
2yr – 1.0
10yr – 1.0
25yr – 1.1
50yr – 1.2
100yr – 1.25

8. Engineering Appendix Data

8.1. Project Maps



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CARPER
CIVIL CONSULTING

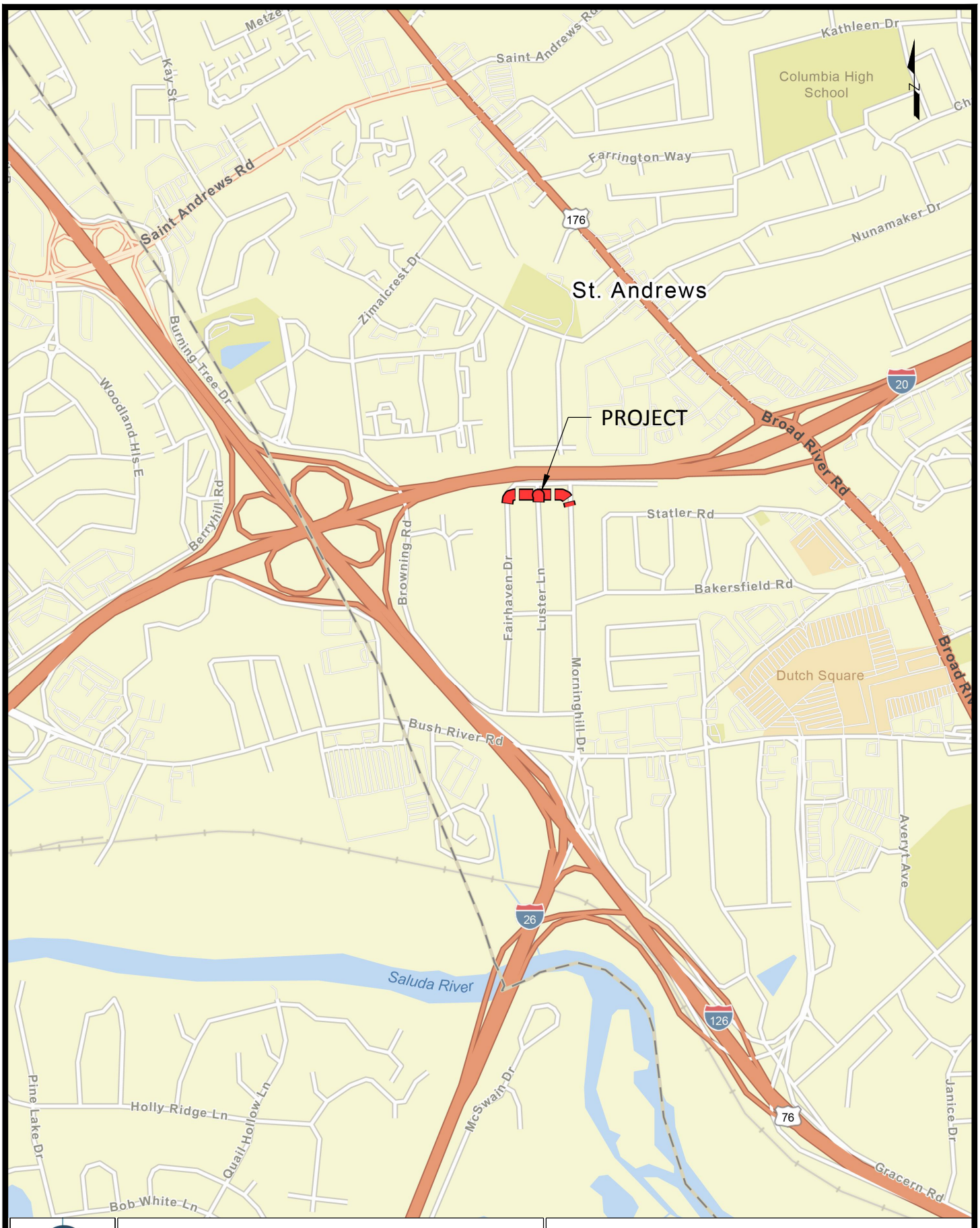
GALE DRIVE RELOCATION
COLUMBIA, SC
RICHLAND COUNTY

VICINITY MAP

0 50 100 Miles

FILE NAME:	drn exhibits
SCALE:	1 in=1 mi

FIGURE
8.1.1



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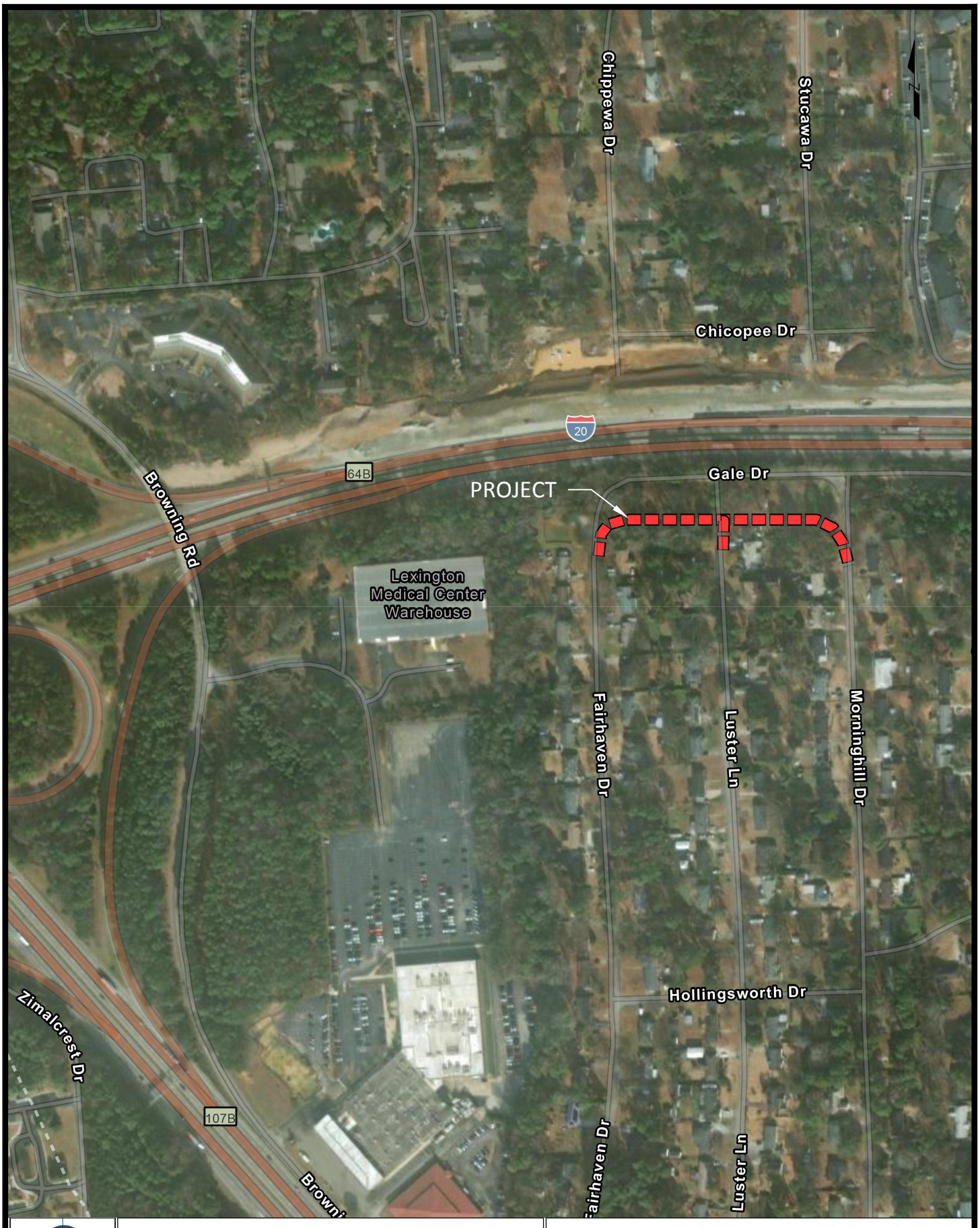
GALE DRIVE RELOCATION
COLUMBIA, SC
RICHLAND COUNTY

LOCATION MAP

0 50 100 Feet

FILE NAME:	drn exhibits
SCALE:	1" = 1334'

FIGURE 8.1.2



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GALE DRIVE RELOCATION
COLUMBIA, SC
RICHLAND COUNTY

AERIAL MAP

0 50 100 Feet

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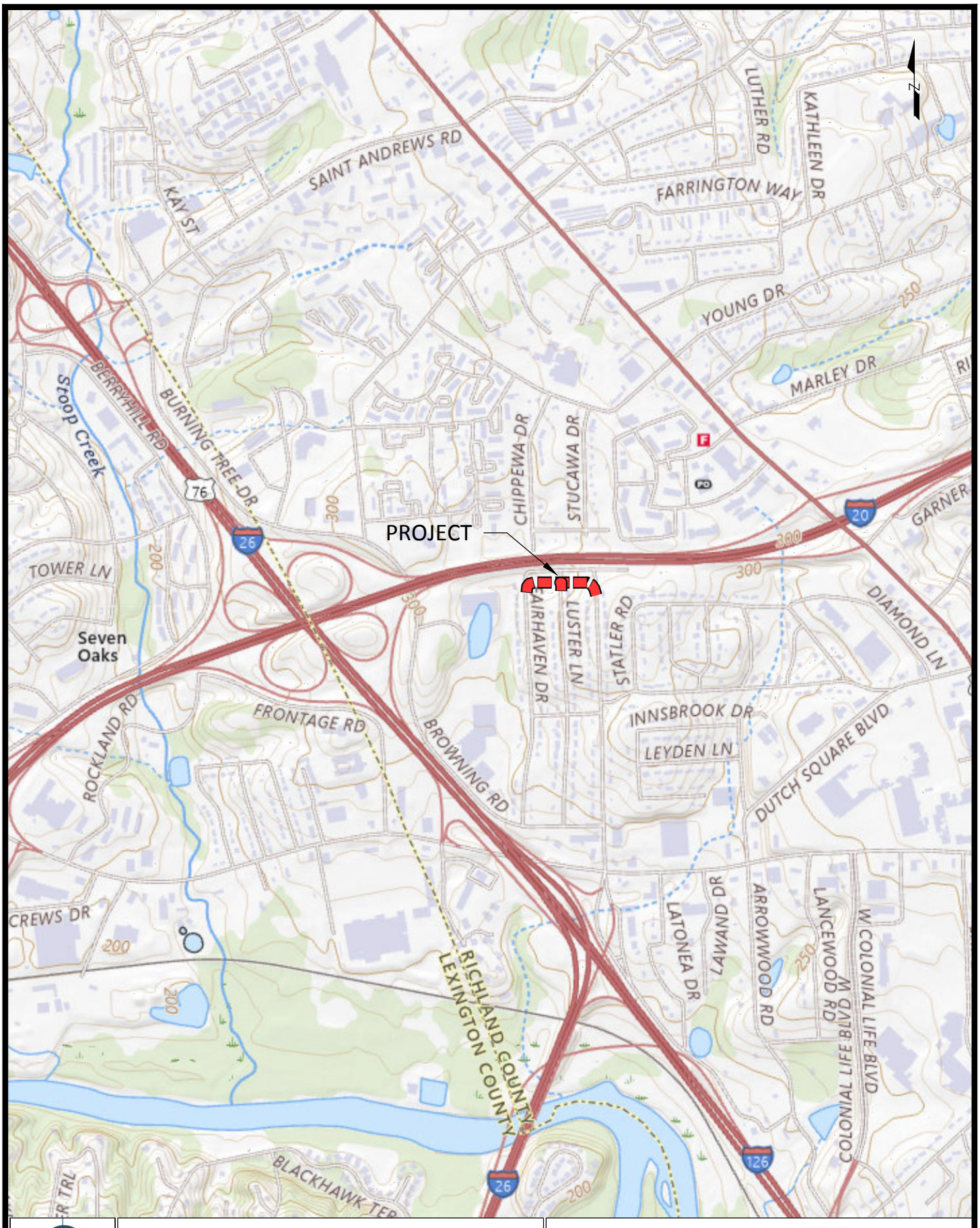

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GALE DRIVE RELOCATION
COLUMBIA, SC
RICHLAND COUNTY

USGS TOPOGRAPHIC MAP

0 50 100 Feet

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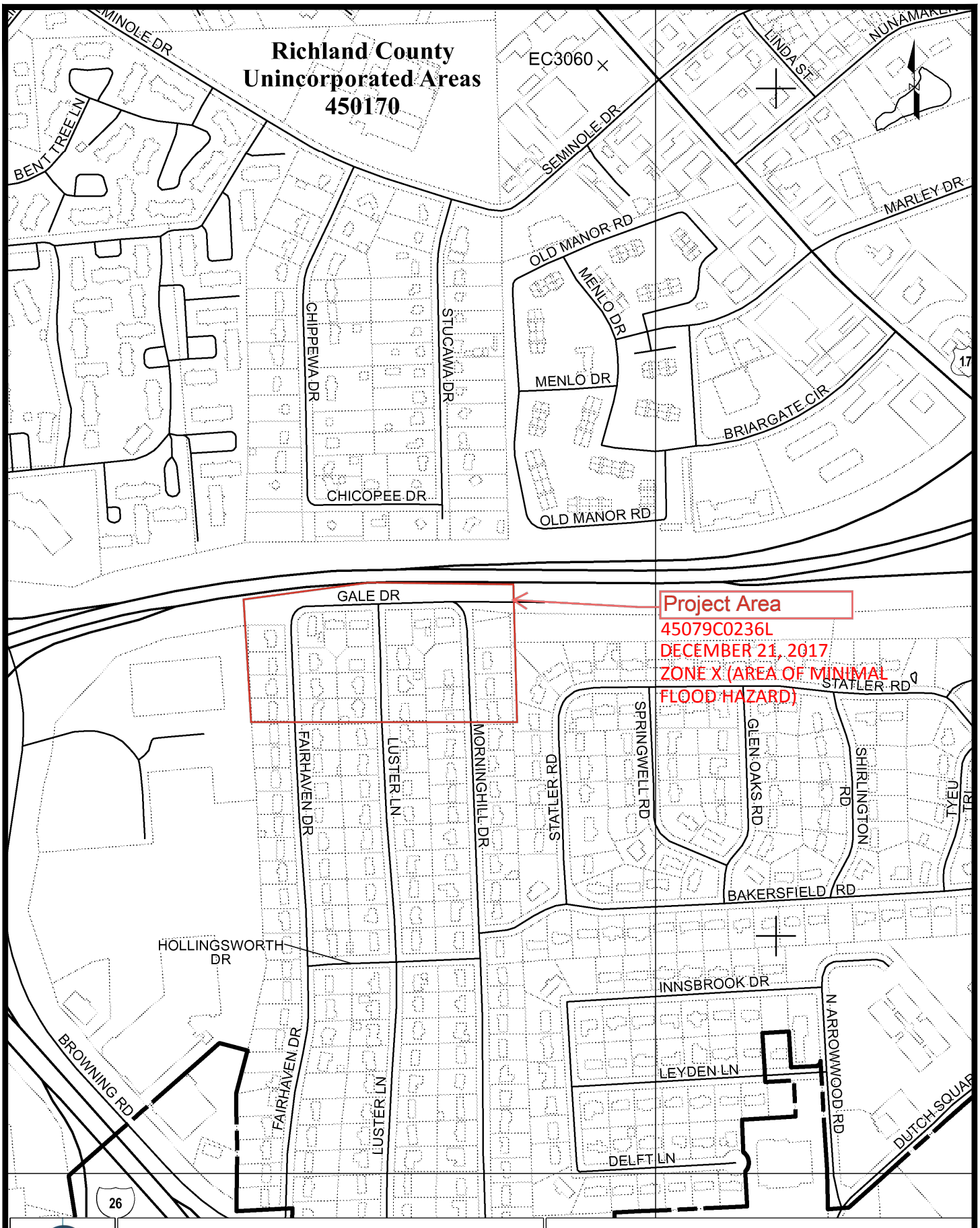

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CARPER
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GALE DRIVE RELOCATION
COLUMBIA, SC
RICHLAND COUNTY

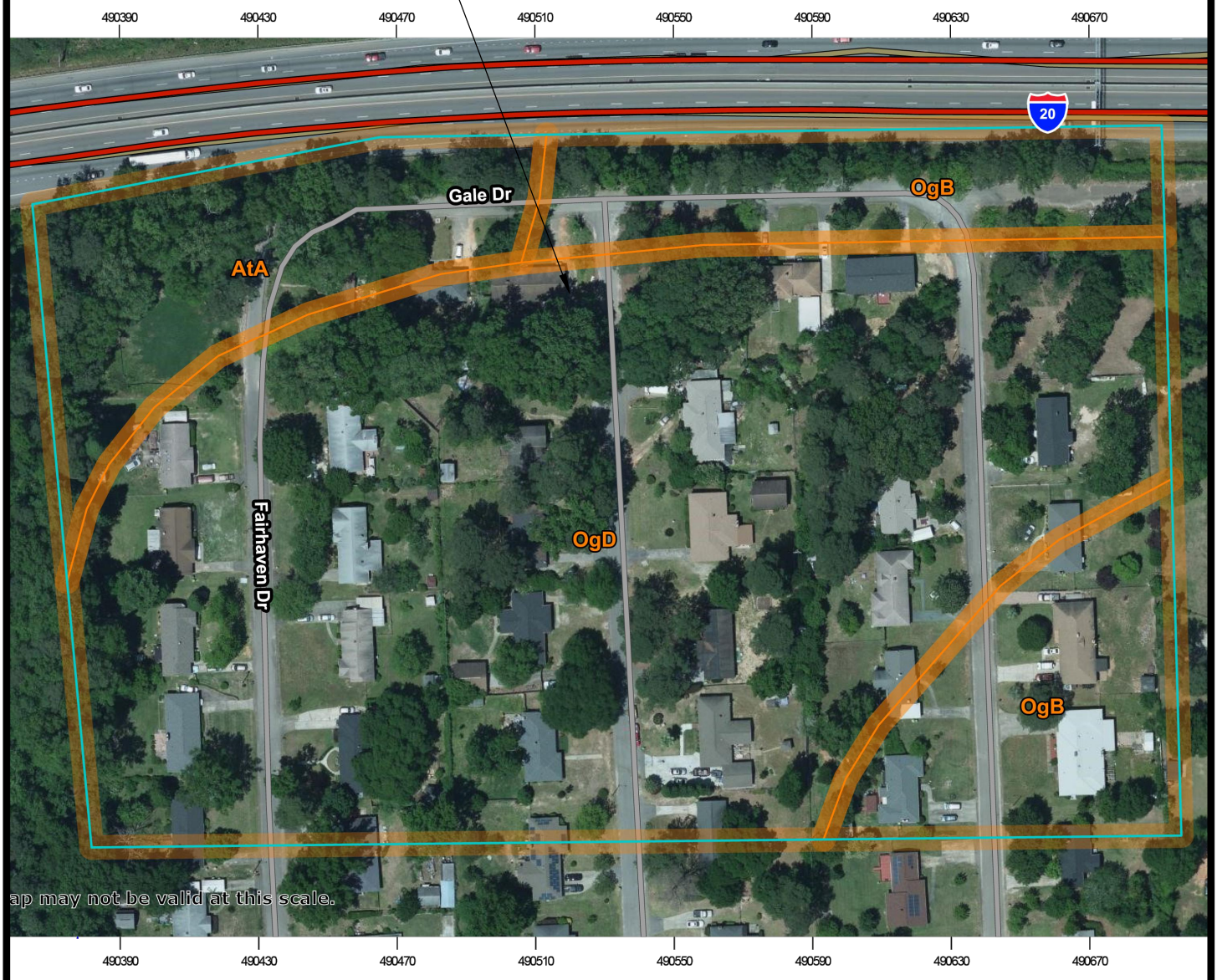
FEMA FIRMETTE

0 50 100 Feet

FILE NAME: drn exhibits
SCALE: 1" = 500'

FIGURE
8.1.5

Custom Soil Resource Report
Soil Map



N

CARPER CIVIL CONSULTING	GALE DRIVE RELOCATION COLUMBIA, SC RICHLAND COUNTY	USDA SOILS MAP	
		0 50 100 Feet	FILE NAME: drn exhibits
			SCALE: 1" = 1820'
			FIGURE 8.1.6

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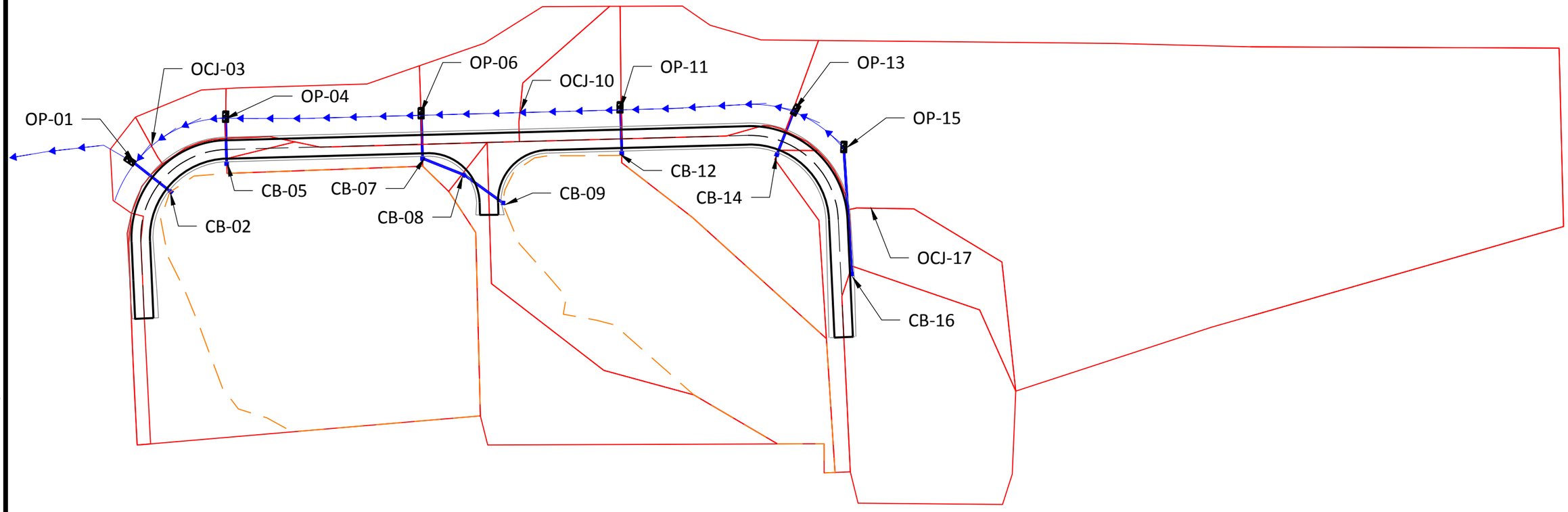
COUNTY	ROUTE
RICHLAND	GALE



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CARPER
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GALE DRIVE RELOCATION
COLUMBIA, SC
RICHLAND COUNTY

DRAINAGE AREA EXHIBIT

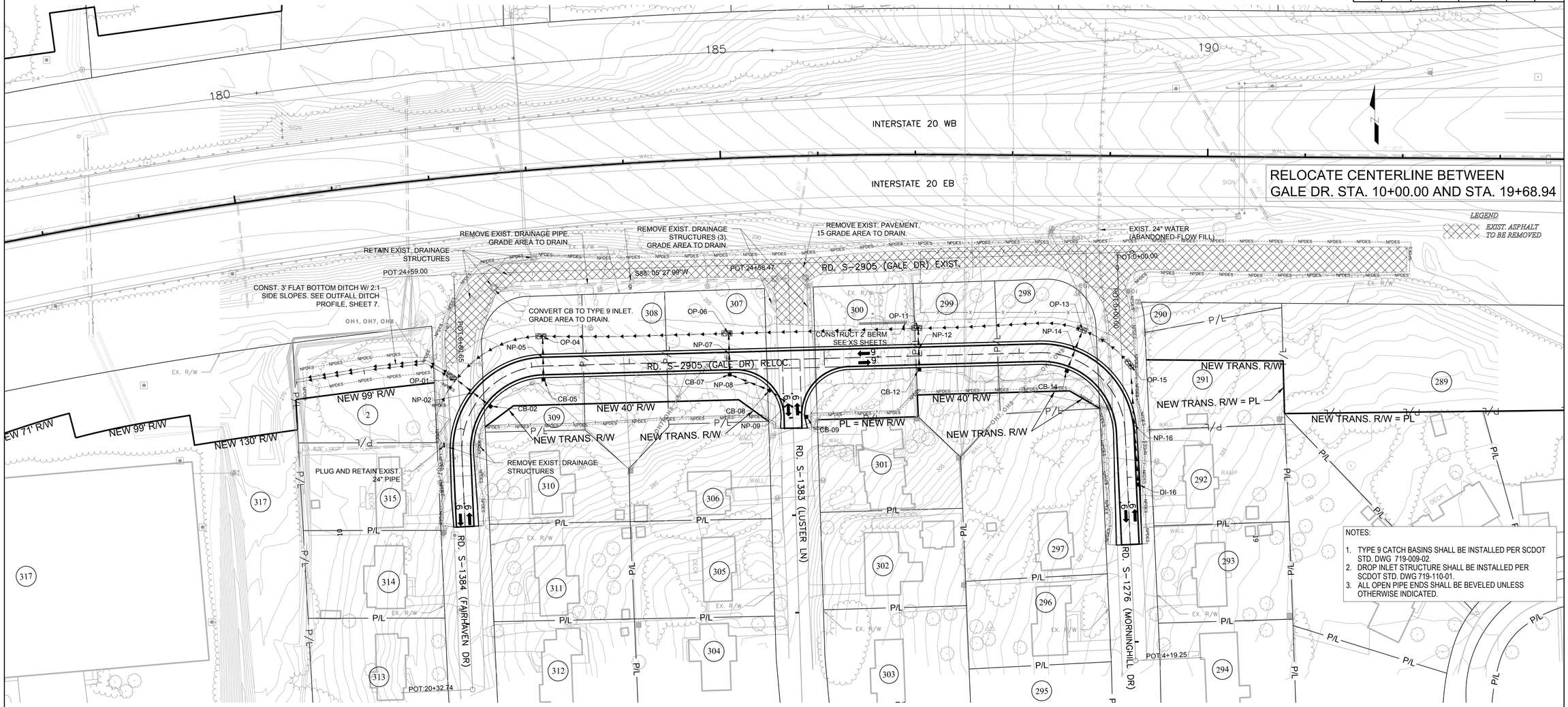
0 50 100 Feet

FILE NAME:	drn exhibits	FIGURE
SCALE:	1" = 100'	8.1.7

8.2. Drainage & Erosion Control Sheets

VOLUME 5

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-2905	D1



Smooth

System ID	Link ID	Geometry				Upstream				Downstream				Fill Height		Min Field SPT "N" below invert	Joint Pressure (psi)	Smooth Wall Options					
		Diameter (in)	No. of Barrels	Pipe Length (ft)	Slope (%)	Node	Node Description	Node Station	Link Invert (ft)	Node	Node Description	Node Station	Link Invert (ft)	Min (ft)	Max (ft)			HDPE Type	Built ✓	RCP Highest Class	Built ✓	SRAP Thickest Gage	Built ✓
OP-01	NP-02	18	1	44.72	0.42	CB-02	CB TYPE 9	11+36.39	268.30	OP-01	PIPE OUTFALL	11+37.19	268.11	0.00	2.58		10	S		IV		16ga	
OP-04	NP-05	18	1	44.07	1.00	CB-05	CB TYPE 9	12+11.43	270.08	OP-04	PIPE OUTFALL	12+11.75	269.64	0.00	2.44		10	S		IV		16ga	
OP-06	NP-07	18	1	42.05	1.00	CB-07	CB TYPE 9	14+02.66	280.58	OP-06	PIPE OUTFALL	14+02.12	280.16	0.00	2.05		10	S		IV		16ga	
OP-06	NP-08	18	1	43.68	1.00	CB-08	CB TYPE 9	23+28.88	281.02	CB-07	CB TYPE 9	14+02.66	280.58	1.30	4.83		10	S		III		16ga	
OP-06	NP-09	18	1	45.85	1.00	CB-09	CB TYPE 9	23+00.60	281.48	CB-08	CB TYPE 9	23+28.88	281.02	4.12	5.90		10	S		III		16ga	
OP-11	NP-12	18	1	42.05	1.00	CB-12	CB TYPE 9	15+97.15	294.49	OP-11	PIPE OUTFALL	15+97.14	294.07	0.00	1.94		10	S		IV		16ga	
OP-13	NP-14	18	1	44.75	0.96	CB-14	CB TYPE 9	17+54.65	308.10	OP-13	PIPE OUTFALL	17+54.26	307.67	0.00	2.36		10	S		IV		16ga	
OP-15	NP-16	18	1	122.47	2.00	DI-16	DROP INLET	19+07.80	314.04	OP-15	PIPE OUTFALL	18+00.00	311.59	0.00	5.52		10	S		III		16ga	

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1218 RIVERS REACH DR.
WANDO, SC, 29492
843-277-7261

CARPER CIVIL CONSULTING, LLC No. 5672 — CERTIFICATE OF AUTHORIZATION

CARPER — LICENSED PROFESSIONAL ENGINEER — No. 26131 — WILLIAM WINSTON

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = 50'
0 25 50 100

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

S-2905 GALE DR
ROAD RELOCATION PROJECT
DRAINAGE PLAN

S-2905

PLOT DRIVER: AUTOCAD PDF (HIGH QUALITY PRINT).PC3
USER: ----
FILE: D1-Drainage Plan.dwg
PEN TABLE: SCDOT PREALPHA.STB
DATE: 6/22/26
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VOLUME 5

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-2905	EC1

RECEIVING WATERS

ROAD / ROUTE	OUTFALL DITCH STATION	OUTFALL DITCH SIDE	NAME OF RECEIVING WATERS	NAME OF ULTIMATE RECEIVING WATERS
GALE DR / S-2905	11+36	LT	Unnamed Trib. To Saluda	SALUDA RIVER

SOIL TYPES

ROAD / ROUTE	STATION TO STATION		SOIL PARTICLE SIZE (COARSE / FINE)	ZONE
GALE DR / S-2905	10+00	19+68	COARSE	SANDHILLS

TEMPORARY EROSION CONTROL BLANKET

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF BLANKET (FT)	DITCH BOTTOM WIDTH (FT)	SLOPES x : 1 FRONT	SLOPES x : 1 BACK	MSY
GALE / S-2905	11+36	11+55	LT	2.75	0	4	2.0	0.037
							TOTAL	0.037

TURF REINFORCED MATTING (TRM)

ROAD / ROUTE	STATION TO STATION		SIDE	DEPTH OF MAT (FT)	SLOPES (x : 1) FRONT	SLOPES (x : 1) BACK	DITCH BOTTOM WIDTH (FT)	TYPE	TYPE 1 (MSY)	TYPE 2 (MSY)	TYPE 3 (MSY)
GALE / S-2905	11+36	09+66	LT	2	2	2	3	1	0.226		
GALE / S-2905	11+55	12+12	LT	2	4	2	0	1	0.081		
GALE / S-2905	12+12	14+03	LT	1.5	4	2	0	2		0.202	
GALE / S-2905	14+03	15+00	LT	1.5	4	2	0	2		0.103	
GALE / S-2905	15+00	15+97	LT	1.5	4	2	0	3			0.103
GALE / S-2905	15+97	17+55	LT	1.5	4	2	0	2		0.167	
GALE / S-2905	17+55	18+00	LT	1.5	4	2	0	1	0.048		
								TOTALS	0.354	0.473	0.103

SEDIMENT TUBES IN DITCHES

ROAD / ROUTE	STATION TO STATION		SIDE	AVERAGE LENGTH	SPACING (FT)	TOTAL	COMMENTS
GALE / S-2905	11+36	18+48	LT	18	75	198	
						TOTAL	198

SEDIMENT DAM

NO	ROAD / ROUTE	STATION	SIDE	DRAINED OR NOT DRAINED	LENGTH OF SILT BASIN	WIDTH OF SILT BASIN	DAM HEIGHT	SIDE SLOPE OF SILT BASIN	SPILLWAY BOTTOM WIDTH	DAM BOTTOM WIDTH	RIP RAP CLASS	TOTAL STORAGE VOLUME	SEDIMENT STORAGE HEIGHT	OUTFALL CHANNEL WIDTH	OUTFALL CHANNEL DEPTH	OUTFALL CHANNEL LENGTH
1	GALE / S-2905	11+36	LT	UNDRAINED	50	10	4	1:1	4.5	10	CLASS A	242 CY	0.75	2	2	10

P:\HDR\2020008 CCR\Gale\Drainage\[ECDS_10_18_2015.xlsx]ECDS SHEET 1

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CARPER CIVIL CONSULTING, LLC

1218 RIVERS REACH DR.
WANDO, SC, 29492
843-277-7261

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION CARPER CIVIL CONSULTING, LLC No. 5672

CERTIFIED PROFESSIONAL ENGINEER No. 26131 STATE OF SOUTH CAROLINA

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
4			
3			
2			
1			

TOPO. _____ DATE _____
DWG. _____ DATE _____
R/W _____ DATE _____

PLAN SCALE 1" = N/A

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

S-2905 GALE DR
ROAD RELOCATION PROJECT
EROSION CONTROL DATA SHEET

S-2905

FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-2905	EC2

SCDES STANDARD NOTES

1. IF NECESSARY, SLOPES, WHICH EXCEED EIGHT (8) VERTICAL FEET SHOULD BE STABILIZED WITH SYNTHETIC OR VEGETATIVE MATS, IN ADDITION TO HYDROSEEDING. IT MAY BE NECESSARY TO INSTALL TEMPORARY SLOPE DRAINS DURING CONSTRUCTION. TEMPORARY BERMS MAY BE NEEDED UNTIL THE SLOPE IS BROUGHT TO GRADE.
2. STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED.BUT IN NO CASE MORE THAN FOURTEEN (14I DAYS AFTER WORK HAS CEASED.EXCEPT AS STATED BELOW.
   - WHERE STABILIZATION BY THE 14th DAY IS PRECLUDED BY SNOW COVER OR FROZEN GROUND CONDITIONS STABILIZATION MEASURES MUST BE INITIATED AS SOON AS PRACTICABLE.
   - WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH-DISTURBING ACTIVITIES WILL BE RESUMED WITHIN 14 DAYS. TEMPORARY STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE.
3. ALL SEDIMENT AND EROSION CONTROL DEVICES SHALL BE INSPECTED ONCE EVERY CALENDAR WEEK. IF PERIODIC INSPECTION OR OTHER INFORMATION INDICATES THAT A BMP HAS BEEN INAPPROPRIATELY, OR INCORRECTLY CONSTRUCTED, THE PERMIT TEE MUST ADDRESS THE NECESSARY REPLACEMENT OR MODIFICATION REQUIRED TO CORRECT THE BMP WITHIN 48 HOURS OF IDENTIFICATION.
4. PROVIDE SILT FENCE AND/OR OTHER CONTROL DEVICES, AS MAY BE REQUIRED, TO CONTROL SOIL EROSION DURING UTILITY CONSTRUCTION. ALL DISTURBED AREAS SHALL BE CLEANED, GRADED, AND STABILIZED WITH GRASSING IMMEDIATELY AFTER THE UTILITY INSTALLATION. FILL, COVER, AND TEMPORARY SEEDING AT THE END OF EACH DAY ARE RECOMMENDED. IF WATER IS ENCOUNTERED WHILE TRENCHING, THE WATER SHOULD BE FILTERED TO REMOVE ANY SEDIMENTS BEFORE BEING PUMPED BACK INTO ANY WATERS OF THE STATE.
5. ALL EROSION CONTROL DEVICES SHALL BE PROPERLY MAINTAINED DURING ALL PHASES OF CONSTRUCTION UNTIL THE COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND ALL DISTURBED AREAS HAVE BEEN STABILIZED. ADDITIONAL CONTROL DEVICES MAY BE REQUIRED DURING CONSTRUCTION IN ORDER TO CONTROL EROSION AND/OR OFFSITE SEDIMENTATION. ALL TEMPORARY CONTROL DEVICES SHALL BE REMOVED ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED.
6. THE CONTRACTOR MUST TAKE NECESSARY ACTION TO MINIMIZE THE TRACKING OF MUD ONTO PAVED ROADWAY(S) FROM CONSTRUCTION AREAS AND THE GENERATION OF DUST. THE CONTRACTOR SHALL DAILY REMOVE MUD/SOIL FROM PAVEMENT AS MAY BE REQUIRED.
7. TEMPORARY DIVERSION BERMS AND/OR DITCHES WILL BE PROVIDED AS NEEDED DURING CONSTRUCTION TO PROTECT WORK AREAS FROM UPSLOPE RUNOFF AND/OR TO DIVERT SEDIMENT-LADEN WATER TO APPROPRIATE TRAPS OR STABLE OUTLETS.
8. ALL WATERS OF THE STATE (WOS), INCLUDING WETLANDS, ARE TO BE FLAGGED OR OTHERWISE CLEARLY MARKED IN THE FIELD. A DOUBLE ROW OF SILT FENCE IS TO BE INSTALLED IN ALL AREAS WHERE A 5O-FOOT BUFFER CAN'T BE MAINTAINED BETWEEN THE DISTURBED AREA AND ALL WOS. A I0-FOOT BUFFER SHOULD BE MAINTAINED BETWEEN THE LAST ROW OF SILT FENCE AND ALL WOS.
9. LITTER, CONSTRUCTION DEBRIS, OILS, FUELS, AND BUILDING PRODUCTS WITH SIGNIFICANT POTENTIAL FOR IMPACT (SUCH AS STOCKPILES OF FRESHLY TREATED LUMBER AND CONSTRUCTION CHEMICALS THAT COULD BE EXPOSED TO STORM WATER MUST BE PREVENTED FROM BECOMING A POLLUTANT SOURCE IN STORM WATER DISCHARGES.
10. A COPY OF THE SWPPP, INSPECTION RECORDS, AND RAINFALL DATA MUST BE RETAINED AT THE CONSTRUCTION SITE OR A NEARBY LOCATION EASILY ACCESSIBLE DURING NORMAL BUSINESS HOURS, FROM THE DATE OF COMMENCEMENT OF CONSTRUCTION ACTIVITIES TO THE DATE THAT FINAL STABILIZATION IS REACHED.
11. INITIATE STABILIZATION MEASURES ON ANY EXPOSED STEEP SLOPE (3H:I) OR GREATER WHERE LAND-DISTURBING ACTIVITIES HAVE PERMANENTLY OR TEMPORARILY CEASED, AND WILL NOT RESUME FOR A PERIOD OF 7 CALENDAR DAYS.
12. MINIMIZE SOIL COMPACTION AND, UNLESS INFEASIBLE, PRESERVE TOPSOIL.
13. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM EQUIPMENT AND VEHICLE WASHING, WHEEL WASH WATER, AND OTHER WASH WATERS. WASH WATERS MUST BE TREATED IN A SEDIMENT BASIN OR ALTERNATIVE CONTROL THAT PROVIDES EQUIVALENT OR BETTER TREATMENT PRIOR TO DISCHARGE.
14. MINIMIZE THE DISCHARGE OF POLLUTANTS FROM DEWATERING OF TRENCHES AND EXCAVATED AREAS. THESE DISCHARGES ARE TO BE ROUTED THROUGH APPROPRIATE BMPS (SEDIMENT BASIN, FILTER BAG, ETC.)
15. THE FOLLOWING DISCHARGES FROM SITES ARE PROHIBITED:
   - WASTEWATER FROM WASHOUT OF CONCRETE,UNLESS MANAGED BY AN APPROPRIATE CONTROL;
   - WASTEWATER FROM WASHOUT OF WASHOUT AND CLEANOUT OF STUCCO, PAINT, FORM RELEASE OILS, CURING COMPOUNDS AND OTHER CONSTRUCTION MATERIALS;
   - FUELS, OILS, OR OTHER POLLUTANTS USED IN VEHICLE AND EQUIPMENT OPERATION AND MAINTENANCE; AND
   - SOAPS OR SOL VENTS USED IN VEHICLE AND EQUIPMENT WASHING.
16. AFTER CONSTRUCTION ACTIVITIES BEGIN, INSPECTIONS MUST BE CONDUCTED AT A MINIMUM OF AT LEAST ONCE EVERY CALENDAR WEEK AND MUST BE CONDUCTED UNTIL FINAL STABILIZATION IS REACHED ON ALL AREAS OF THE CONSTRUCTION SITE.
17. IF EXISTING BMPS NEED TO BE MODIFIED OR IF ADDITIONAL BMPS ARE NECESSARY TO COMPLY WITH REQUIREMENTS OF THIS PERMIT AND/OR SC'S WATER QUALITY STANDARDS, IMPLEMENTATION MUST BE COMPLETED BEFORE THE NEXT STORM EVENT WHENEVER PRACTICABLE. IF IMPLEMENTATION BEFORE THE NEXT STORM EVENT IS IMPRACTICABLE, THE SITUATION MUST BE DOCUMENTED IN THE SWPPP AND ALTERNATIVE BMPS MUST BE IMPLEMENTED AS SOON AS REASONABLY POSSIBLE.
18. A PRE-CONSTRUCTION CONFERENCE MUST BE HELD FOR EACH CONSTRUCTION SITE WITH AN APPROVED ON-SITE SWPPP PRIOR TO THE IMPLEMENTATION OF CONSTRUCTION ACTIVITIES. FOR NON-LINEAR PROJECTS THAT DISTURB 10 ACRES OR MORE, THIS CONFERENCE MUST BE HELD ON-SITE UNLESS THE DEPARTMENT HAS APPROVED OTHERWISE.

SEDIMENT & EROSION CONTROL CONSTRUCTION SEQUENCE

1. RECEIVE NPDES COVERAGE FROM SCDES-BOW.
2. PRE-CONSTRUCTION MEETING (ON-SITE IF MORE THAN 10 ACRES DISTURBED AND NON-LINEAR).
3. NOTIFY SCDES-BOW OFFICE 48 HOURS PRIOR TO BEGINNING LAND-DISTURBING ACTIVITIES.
4. INSTALLATION OF CONSTRUCTION ENTRANCE(S).
5. CLEARING AND GRUBBING ONLY AS NECESSARY FOR INSTALLATION OF PERIMETER CONTROLS.
6. INSTALLATION OF PERIMETER CONTROLS (E.G. SILT FENCE).
7. CLEARING AND GRUBBING OF SITE OR DEMOLITION. (SEDIMENT AND EROSION CONTROL MEASURES FOR THESE AREAS MUST ALREADY BE INSTALLED).
8. ROUGH GRADING
9. INSTALL STORM DRAINAGE SYSTEMS AS ALLOWED. INSTALL INLET PROTECTION, CLEAN OUT AS NECESSARY.
10. FINE GRADING,PAVING,ETC.
11. PERMANENT/FINAL STABILIZATION.
12. REMOVAL OF TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES AFTER ENTIRE AREA DRAINING TO THE STRUCTURE IS FINALLY STABILIZED. (IT IS RECOMMENDED THAT THE PROJECT OWNER/OPERATOR HAVE THE SWPPP PREPARER OR REGISTRATION EQUIVALENT APPROVE THE REMOVAL OF TEMPORARY STRUCTURES).
13. SUBMIT NOTICE OF TERMINATION (NOT) TO SCDES AS APPROPRIATE.

CONSTRUCTION SEQUENCE NOTES

IF NPDES COVERAGE IS BEING ISSUED AFTER LAND-DISTURBING ACTIVITIES HAVE ALREADY STARTED (E.G. IN RESPONSE TO A NOTICE TO COMPLY, NOTICE OF VIOLATION, OR ENFORCEMENT ACTION!, THEN THE CONSTRUCTION SEQUENCE MUST SPECIFICALLY INDICATE THE ITEMS THAT HAVE ALREADY OCCURRED AND THE ITEMS THAT WILL BE OCCURING AFTER NPDES COVERAGE IS ISSUED.

IF FLOWS FROM OFFSITE AREAS WILL BE DIVERTED AROUND THE SITE AND THE ON-SITE STRUCTURES ARE NOT DESIGNED TO HANDLE FLOWS FROM OFFSITE AREAS, THE DIVERSIONS/PIPING FOR THE OFFSITE FLOWS MUST BE INSTALLED BEFORE LAND-DISTURBING ACTIVITIES BEGIN ON THE SITE. SEDIMENT AND EROSION CONTROL MEASURES FOR THE DISTURBED AREAS FOR THE DIVERSION/PIPING MUST BE INSTALLED BEFORE THOSE AREAS ARE DISTURBED AND SHOULD BE SHOWN ON THE PLANS.

MAINTENANCE OF SEDIMENT AND EROSION CONTROL MEASURES MUST CONTINUE UNTIL THE SITE IS PERMANENTLY STABILIZED AND THE CONTROLS ARE REMOVED.

CONSTRUCTION NOTES

I. CLEARING AND GRUBBING

THE CONTRACTOR WILL BE REQUIRED TO CLEAR ALL AREAS NECESSARY FOR THE CONSTRUCTION OF ANY SEDIMENT CONTROL STRUCTURES AND INSTALL THE SEDIMENT CONTROL STRUCTURES AND ALL OTHER PERIMETER EROSION CONTOL MEASURES PRIOR TO CLEARING AND GRUBBING ACTIVITIES.

2. SEEDING

SEEDING SHALL BE ACCOMPLISHED ACCORDING TO S.C.D.O. T. SUPPLEMENT AL TECHNICAL SPECIFICATION "SEEDING-SC-M-81O (LATEST EDITION).

3. EROSION CONTROL MEASURES

ALL EROSION CONTROL MEASURES ON THIS PROJECT SHALL BE IMPLEMENTED AS DETAILED ON THE PLANS. SILT FENCE AND OTHER EROSION CONTROL FEATURES SHALL BE IN PLACE PRIOR TO GROUND DISTURBING ACTIVITY BEGINS. EROSION CONTROL MEASURES SHALL BE IMPLEMENTED DURING ALL STAGES OF CONSTRUCTION.

4. PERIMETER EROSION CONTROL DEVICES

SILT FENCE MAY BE PLACED AT LOCATIONS WHERE SEDIMENT LEAVES THE PROJECT LIMITS ESPECIALLY AT THE TOE OF FILL SLOPES THAT SLOPE AWAY FROM THE PROJECT. SILT FENCE SHALL NOT BE PLACED IN A POSITION SUCH THAT IT BLOCKS DRIVEWAYS OR POINTS OF ACCESS TO PROPERTY.

5. INTERIOR EROSION CONTROL DEVICES

INLET PROTECTION SHOULD BE PLACED WHEN PRACTICAL, AROUND NEW CATCH BASINS SO AS TO PREVENT SEDIMENT FROM ENTERING THE STORM SEWER SYSTEM. REFER TO THE PLAN SHEETS FOR PLACEMENT OF EROSION CONTROL MEASURES.

6. INSPECTION AND IMPLEMENTATION

ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE INSPECTED ACCORDING TO THE REQUIREMENTS OF THE NPDES GENERAL CONSTRUCTION PERMIT. STABILIZATION MEASURES SHALL BE IMPLEMENTED AS SOON AS PRACTICABLE WITHIN THE ALLOWABLE TIME FRAME ST A TED WITHIN THE NPDES GENERAL CONSTRUCTION PERMIT IN PORTIONS OF THE SITE WHERE ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL FINAL STABILIZATION HAS BEEN OBTAINED.

7. BARRIER FENCE

THE CONSTRACTOR SHALL INSTALL AND MAINTAIN A BARRIER FENCE TO MARK ALL BOUNDARIES OF JURISDICTIONAL WATERS OF THE STATE, CULTURAL RESOURCE AREAS, AND OTHER ENVIRONMENTAL SENSITIVE AREAS WITHIN THE PROJECT CORRIDOR. THE FENCE AND FLAGGING SHALL BE PLACED PRIOR TO ANY LAND DISTURBANCE ACTIVITIES. REFER TO THE PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION. THE CONTRACTOR SHALL MAINTAIN BARRIER FENCE FOR THE DURATION OF THE PROJECT AS DETERMINED BY THE RESIDENT CONSTRUCTION ENGINEER.

CARPER CIVIL CONSULTING

CARPER CIVIL CONSULTING, LLC

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SOUTH CAROLINA — CARPER CIVIL CONSULTING, LLC No. 5672 — CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26131 — JEREMY BRYAN CARPER

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
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R/W _____ DATE _____

PLAN SCALE 1" = N/A

SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

S-2905 GALE DR
ROAD RELOCATION PROJECT
EROSION CONTROL NOTES

S-2905

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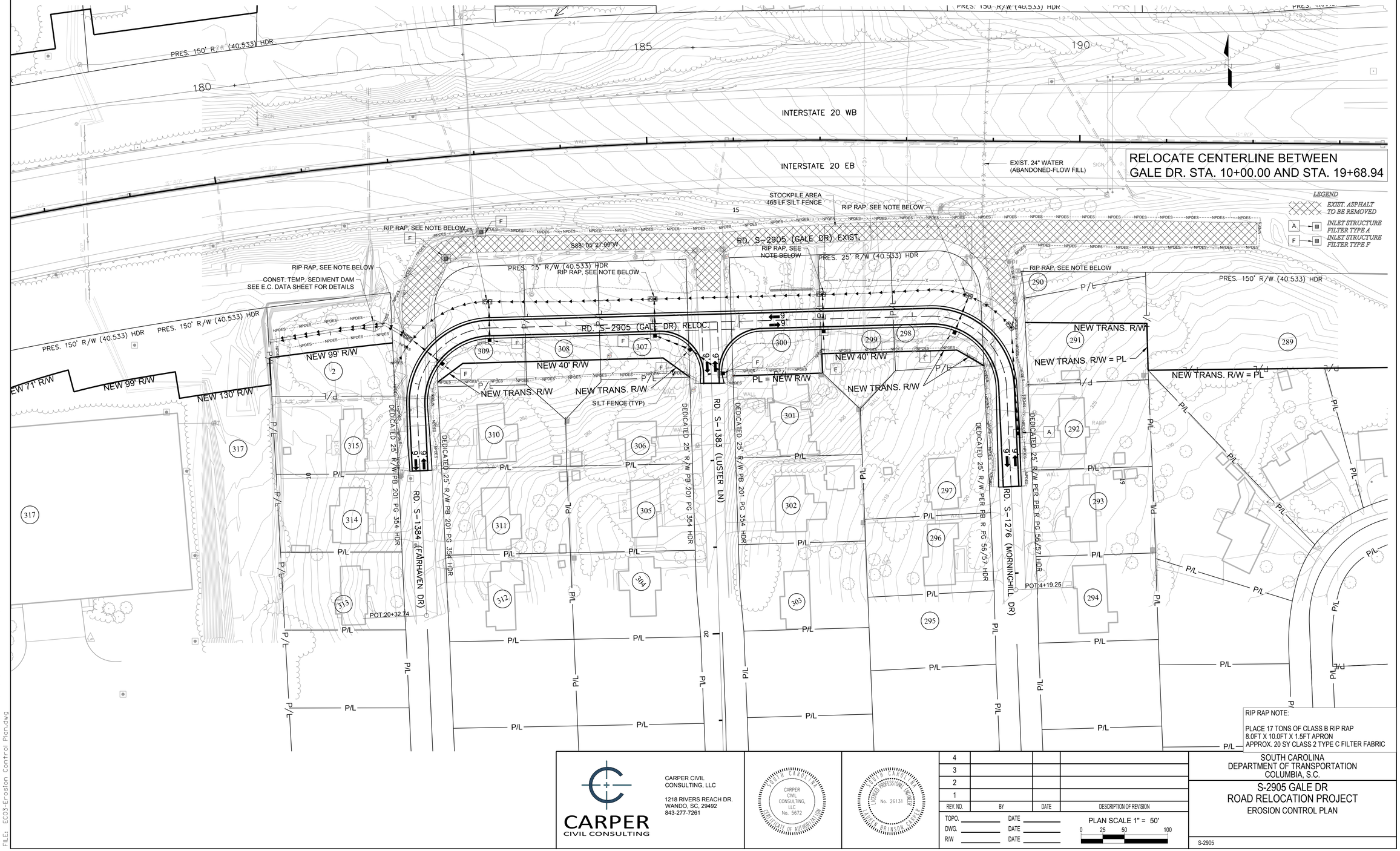
FED. RD. DIV NO.	STATE	COUNTY	PROJECT ID	ROAD/ROUTE NO.	SHEET NO.
3	S.C.	RICHLAND	P043328	S-2905	EC3



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SOUTH CAROLINA — LICENSED PROFESSIONAL ENGINEER — No. 26131 — BRANSON CARPER

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SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION
COLUMBIA, S.C.

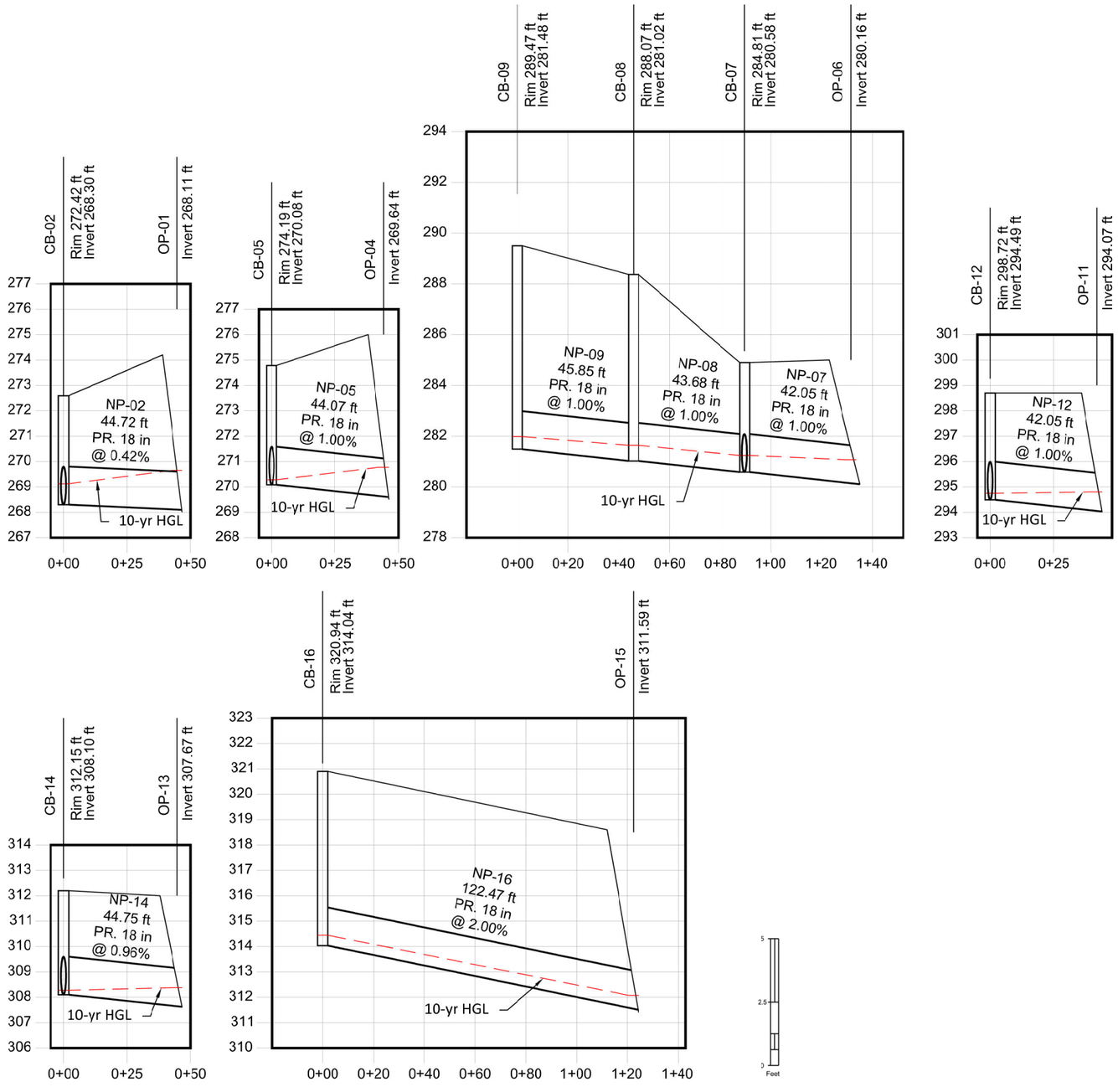
S-2905 GALE DR ROAD RELOCATION PROJECT

EROSION CONTROL PLAN

S-2905

8.3. Closed Drainage System Profiles

COUNTY	ROUTE
RICHLAND	GALE



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CARPER CIVIL CONSULTING

GALE DRIVE RELOCATION
COLUMBIA, SC
RICHLAND COUNTY

CLOSED DRAINAGE SYSTEM PROFILES

FILE NAME:	drn exhibits
SCALE:	1"=50'H/5'V

FIGURE 8.3.1

8.4. Autodesk® Storm and Sanitary Analysis Report

Autodesk® Storm and Sanitary Analysis 2024 - Version 13.6.268 (Build 0)

****
Project Description
****
File Name P043328.SPF

****
Analysis Options
****
Flow Units ..... cfs
Subbasin Hydrograph Method. Rational
Time of Concentration..... SCS TR-55
Return Period..... 10 years
Link Routing Method ..... Kinematic Wave
Storage Node Exfiltration.. None
Starting Date MAR-03-2025 00:00:00
Ending Date MAR-04-2025 00:00:00
Report Time Step 00:00:10

****
Element Count
****
Number of subbasins 18
Number of nodes 19
Number of links 23

****
Subbasin Summary
****

Subbasin ID	Total Area acres
Sub-01	0.06
Sub-02	0.30
Sub-02Y	1.54
Sub-03	0.09
Sub-04	0.26
Sub-05	0.10
Sub-06	0.28
Sub-07	0.04
Sub-08	0.56
Sub-09	0.24
Sub-09Y	1.05
Sub-10	0.22
Sub-11	0.44
Sub-12	0.46
Sub-13	3.93
Sub-14	0.18
Sub-15	0.24
Sub-16	0.74

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Elev. ft	Ponded Area ft²	External Inflow
CB-02Y	JUNCTION	268.61	272.59	10.00	
CB-09Y	JUNCTION	281.54	291.54	10.00	
OCJ-03	JUNCTION	268.20	275.00	0.00	
OCJ-10	JUNCTION	285.95	290.20	0.00	
OP-01	JUNCTION	268.11	276.00	0.00	
OP-04	JUNCTION	269.64	276.00	0.00	
OP-06	JUNCTION	280.16	285.00	0.00	
OP-11	JUNCTION	294.07	299.00	0.00	
OP-13	JUNCTION	307.67	312.00	0.00	
OP-15	JUNCTION	311.59	318.50	0.00	
OC	OUTFALL	264.60	266.60	0.00	

****
Inlet Summary
****

Inlet ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation ft	Inlet Rim Elevation ft	Ponded Area ft²	Initial Water Elevation ft	Grate Clogging Factor %
CB-02	FHWA HEC-22 GENERIC	N/A	On Sag	1	268.30	272.42	10.00	268.30	0.00
CB-05	FHWA HEC-22 GENERIC	N/A	On Grade	1	270.08	274.19	-	270.08	0.00
CB-07	FHWA HEC-22 GENERIC	N/A	On Grade	1	280.58	284.81	-	280.58	0.00
CB-08	FHWA HEC-22 GENERIC	N/A	On Sag	1	281.02	288.07	10.00	281.02	0.00
CB-09	FHWA HEC-22 GENERIC	N/A	On Sag	1	281.48	289.47	10.00	281.49	0.00
CB-12	FHWA HEC-22 GENERIC	N/A	On Grade	1	294.49	298.72	-	294.49	0.00
CB-14	FHWA HEC-22 GENERIC	N/A	On Grade	1	308.10	312.15	-	308.10	0.00
CB-16	NEENAH FOUNDRY	R 3246 A Type C	On Grade	1	314.04	321.94	-	314.04	-

****
Roadway and Gutter Summary
****

Inlet ID	Roadway Longitudinal Slope ft/ft	Roadway Cross Slope ft/ft	Roadway Manning's Roughness	Gutter Cross Slope ft/ft	Gutter Width ft	Gutter Depression in
CB-02	-	0.0200	0.0140	0.0800	3.00	0.00
CB-05	0.0560	0.0200	0.0140	0.0800	3.00	0.00
CB-07	0.0560	0.0200	0.0140	0.0800	3.00	0.00
CB-08	-	0.0200	0.0140	0.0800	3.00	0.00
CB-09	-	0.0200	0.0140	0.0800	3.00	0.00
CB-12	0.0864	0.0200	0.0140	0.0800	3.00	0.00
CB-14	0.0864	0.0200	0.0140	0.0800	3.00	0.00
CB-16	0.0260	0.0200	0.0140	0.0800	3.00	0.00

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness

DP-02Y	CB-02Y	CB-02	CONDUIT	5.0	1.0000	0.0130
DP-09Y	CB-09Y	CB-09	CONDUIT	5.0	1.2000	0.0130
Gutter-05	CB-05	CB-02	CHANNEL	62.0	3.5323	0.0320
Gutter-07	CB-07	CB-05	CHANNEL	191.0	5.5340	0.0320
Gutter-12	CB-12	CB-07	CHANNEL	110.0	12.6455	0.0320
Gutter-14	CB-14	CB-12	CHANNEL	150.0	8.9533	0.0320
Gutter-16	CB-16	CB-14	CHANNEL	129.2	6.6042	0.0320
NP-02	CB-02	OP-01	CONDUIT	44.7	0.4249	0.0130
NP-05	CB-05	OP-04	CONDUIT	44.1	0.9984	0.0130
NP-07	CB-07	OP-06	CONDUIT	42.0	0.9988	0.0130
NP-08	CB-08	CB-07	CONDUIT	43.7	1.0073	0.0130
NP-09	CB-09	CB-08	CONDUIT	45.9	1.0033	0.0130
NP-12	CB-12	OP-11	CONDUIT	42.0	0.9988	0.0130
NP-14	CB-14	OP-13	CONDUIT	44.8	0.9609	0.0130
NP-16	CB-16	OP-15	CONDUIT	122.5	2.0005	0.0130
OC-01	OP-01	OC	CHANNEL	170.0	2.0647	0.0350
OC-03	OCJ-03	OP-01	CHANNEL	25.0	0.3600	0.0350
OC-04	OP-04	OCJ-03	CHANNEL	76.3	1.8870	0.0350
OC-06	OP-06	OP-04	CHANNEL	190.2	5.5310	0.0350
OC-10	OCJ-10	OP-06	CHANNEL	96.4	6.0068	0.0350
OC-11	OP-11	OCJ-10	CHANNEL	97.0	8.3711	0.0350
OC-13	OP-13	OP-11	CHANNEL	167.0	8.1437	0.0350
OC-15	OP-15	OP-13	CHANNEL	61.0	6.4262	0.0350

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
DP-02Y	CIRCULAR	1.50	1.50	1	1.77	0.38	10.50
DP-09Y	CIRCULAR	1.50	1.50	1	1.77	0.38	11.51
Gutter-05	TRAPEZOIDAL	0.25	15.50	1	1.94	0.12	4.23
Gutter-07	TRAPEZOIDAL	0.25	15.50	1	1.94	0.12	5.29
Gutter-12	TRAPEZOIDAL	0.25	15.50	1	1.94	0.12	8.00
Gutter-14	TRAPEZOIDAL	0.25	15.50	1	1.94	0.12	6.73
Gutter-16	TRAPEZOIDAL	0.25	15.50	1	1.94	0.12	5.78
NP-02	CIRCULAR	1.50	1.50	1	1.77	0.38	6.85
NP-05	CIRCULAR	1.50	1.50	1	1.77	0.38	10.50
NP-07	CIRCULAR	1.50	1.50	1	1.77	0.38	10.50
NP-08	CIRCULAR	1.50	1.50	1	1.77	0.38	10.54
NP-09	CIRCULAR	1.50	1.50	1	1.77	0.38	10.52
NP-12	CIRCULAR	1.50	1.50	1	1.77	0.38	10.50
NP-14	CIRCULAR	1.50	1.50	1	1.77	0.38	10.30
NP-16	CIRCULAR	1.50	1.50	1	1.77	0.38	14.86
OC-01	TRAPEZOIDAL	2.00	11.00	1	14.00	1.17	94.95
OC-03	IRREGULAR	3.50	23.00	1	37.25	1.85	142.77
OC-04	IRREGULAR	3.50	23.00	1	37.25	1.85	326.88
OC-06	IRREGULAR	3.50	23.00	1	37.25	1.85	559.63
OC-10	IRREGULAR	3.50	23.00	1	37.25	1.85	583.21
OC-11	IRREGULAR	3.50	23.00	1	37.25	1.85	688.48
OC-13	IRREGULAR	3.50	23.00	1	37.25	1.85	679.06
OC-15	IRREGULAR	3.50	23.00	1	37.25	1.85	603.22

```
****************
Transect Summary
****************

Transect XS-01
Area:
          0.0004    0.0015    0.0034    0.0060    0.0094
          0.0136    0.0184    0.0241    0.0305    0.0376
          0.0456    0.0542    0.0636    0.0738    0.0847
          0.0964    0.1088    0.1220    0.1359    0.1506
          0.1660    0.1822    0.1992    0.2168    0.2353
          0.2546    0.2748    0.2960    0.3181    0.3412
          0.3652    0.3901    0.4160    0.4428    0.4706
          0.4993    0.5289    0.5595    0.5911    0.6235
          0.6569    0.6913    0.7266    0.7628    0.8000
          0.8381    0.8772    0.9172    0.9581    1.0000
Hrad:
          0.0214    0.0428    0.0643    0.0857    0.1071
          0.1285    0.1499    0.1714    0.1928    0.2142
          0.2356    0.2570    0.2784    0.2999    0.3213
          0.3427    0.3641    0.3855    0.4070    0.4284
          0.4498    0.4712    0.4926    0.5141    0.5355
          0.5566    0.5773    0.5977    0.6179    0.6378
          0.6577    0.6774    0.6971    0.7167    0.7364
          0.7560    0.7756    0.7952    0.8148    0.8345
          0.8542    0.8738    0.8936    0.9133    0.9331
          0.9529    0.9728    0.9926    1.0125    1.0000
Width:
          0.0178    0.0356    0.0533    0.0711    0.0889
          0.1067    0.1244    0.1422    0.1600    0.1778
          0.1956    0.2133    0.2311    0.2489    0.2667
          0.2844    0.3022    0.3200    0.3378    0.3556
          0.3733    0.3911    0.4089    0.4267    0.4444
          0.4667    0.4889    0.5111    0.5333    0.5556
          0.5778    0.6000    0.6222    0.6444    0.6667
          0.6889    0.7111    0.7333    0.7556    0.7778
          0.8000    0.8222    0.8444    0.8667    0.8889
          0.9111    0.9333    0.9556    0.9778    1.0000

Transect XS-02
Area:
          0.0004    0.0016    0.0036    0.0063    0.0099
          0.0142    0.0193    0.0253    0.0320    0.0395
          0.0478    0.0568    0.0667    0.0773    0.0888
          0.1010    0.1140    0.1279    0.1425    0.1579
          0.1740    0.1910    0.2088    0.2273    0.2466
          0.2668    0.2877    0.3094    0.3319    0.3552
          0.3792    0.4041    0.4298    0.4562    0.4834
          0.5114    0.5402    0.5698    0.6002    0.6314
          0.6634    0.6961    0.7297    0.7643    0.8003
          0.8376    0.8763    0.9162    0.9574    1.0000
Hrad:
          0.0178    0.0356    0.0535    0.0713    0.0891
          0.1069    0.1247    0.1426    0.1604    0.1782
          0.1960    0.2139    0.2317    0.2495    0.2673
          0.2851    0.3030    0.3208    0.3386    0.3564
          0.3742    0.3921    0.4099    0.4277    0.4455
```

0.4633	0.4812	0.4990	0.5168	0.5346
0.5525	0.5703	0.5881	0.6059	0.6237
0.6416	0.6594	0.6772	0.6950	0.7128
0.7307	0.7485	0.7688	0.8034	0.8369
0.8698	0.9023	0.9347	0.9672	1.0000

Width:

0.0183	0.0365	0.0548	0.0730	0.0913
0.1096	0.1278	0.1461	0.1643	0.1826
0.2009	0.2191	0.2374	0.2557	0.2739
0.2922	0.3104	0.3287	0.3470	0.3652
0.3835	0.4017	0.4200	0.4383	0.4565
0.4748	0.4930	0.5113	0.5296	0.5478
0.5661	0.5843	0.6026	0.6209	0.6391
0.6574	0.6757	0.6939	0.7122	0.7304
0.7487	0.7670	0.7870	0.8174	0.8478
0.8783	0.9087	0.9391	0.9696	1.0000

**************************	Volume	Depth
Runoff Quantity Continuity	acre-ft	inches
**************************	---------	-------
Total Precipitation	1.222	1.367
Continuity Error (%)	0.517	

**************************	Volume	Volume
Flow Routing Continuity	acre-ft	Mgallons
**************************	---------	---------
External Inflow	0.000	0.000
External Outflow	0.591	0.192
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.124	

****
Runoff Coefficient Computations Report
****

Subbasin Sub-01

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.06	-	0.35
Composite Area & Weighted Runoff Coeff.	0.06		0.35

Subbasin Sub-02

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.26	-	0.90
-	0.04	-	0.35
Composite Area & Weighted Runoff Coeff.	0.30		0.83

Subbasin Sub-02Y

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.54	-	0.35
Composite Area & Weighted Runoff Coeff.	1.54		0.35

Subbasin Sub-03

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.09	-	0.35
Composite Area & Weighted Runoff Coeff.	0.09		0.35

Subbasin Sub-04

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.22	-	0.35
-	0.04	-	0.90
Composite Area & Weighted Runoff Coeff.	0.26		0.44

Subbasin Sub-05

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.04	-	0.35
-	0.06	-	0.90
Composite Area & Weighted Runoff Coeff.	0.10		0.66

Subbasin Sub-06

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.12	-	0.35
-	0.16	-	0.90
Composite Area & Weighted Runoff Coeff.	0.28		0.67

Subbasin Sub-07

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.02	-	0.35
-	0.02	-	0.90
Composite Area & Weighted Runoff Coeff.	0.04		0.67

Subbasin Sub-08

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.29	-	0.35
-	0.27	-	0.90
Composite Area & Weighted Runoff Coeff.	0.56		0.61

Subbasin Sub-09

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.19	-	0.90
-	0.05	-	0.35
Composite Area & Weighted Runoff Coeff.	0.24		0.79

Subbasin Sub-09Y

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	1.05	-	0.35
Composite Area & Weighted Runoff Coeff.	1.05		0.35

Subbasin Sub-10

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.11	-	0.35
-	0.11	-	0.90
Composite Area & Weighted Runoff Coeff.	0.22		0.61

Subbasin Sub-11

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.19	-	0.35
-	0.25	-	0.90
Composite Area & Weighted Runoff Coeff.	0.44		0.66

Subbasin Sub-12

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.41	-	0.35
-	0.05	-	0.90
Composite Area & Weighted Runoff Coeff.	0.46		0.41

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	3.03	-	0.35
-	0.90	-	0.90
Composite Area & Weighted Runoff Coeff.	3.93		0.48

Subbasin Sub-14

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.01	-	0.35
-	0.17	-	0.90
Composite Area & Weighted Runoff Coeff.	0.18		0.87

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.21	-	0.35
-	0.03	-	0.90
Composite Area & Weighted Runoff Coeff.	0.24		0.42

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	Runoff Coeff.
-	0.38	-	0.35
-	0.36	-	0.90
Composite Area & Weighted Runoff Coeff.	0.74		0.61

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where:

Tc = Time of Concentration (hrs)
n = Manning's Roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin Sub-01

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	85.00	0.00	0.00
Slope (%):	3.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.09	0.00	0.00
Computed Flow Time (minutes):	15.12	0.00	0.00
Total TOC (minutes):	15.12		

Subbasin Sub-02

User-Defined TOC override (minutes): 6.00

Subbasin Sub-02Y

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	7.60	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.14	0.00	0.00
Computed Flow Time (minutes):	11.87	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	276.00	0.00	0.00
Slope (%):	7.60	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	4.45	0.00	0.00
Computed Flow Time (minutes):	1.03	0.00	0.00
Total TOC (minutes):	12.90		

Subbasin Sub-03

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	88.00	0.00	0.00
Slope (%):	7.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.13	0.00	0.00
Computed Flow Time (minutes):	11.07	0.00	0.00
Total TOC (minutes):	11.07		

Subbasin Sub-04

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00

Flow Length (ft):	100.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.21	0.00	0.00
Computed Flow Time (minutes):	8.06	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	95.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.22	0.00	0.00
Total TOC (minutes):	8.28		

Subbasin Sub-05

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	20.00	0.00	0.00
Slope (%):	5.50	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.09	0.00	0.00
Computed Flow Time (minutes):	3.73	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	150.00	0.00	0.00
Slope (%):	5.50	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	4.77	0.00	0.00
Computed Flow Time (minutes):	0.52	0.00	0.00
Total TOC (minutes):	4.25		

Subbasin Sub-06

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.18	0.00	0.00

Computed Flow Time (minutes):	9.04	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	0.27	0.00	0.00
Total TOC (minutes):	9.31		

Subbasin Sub-07

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	10.00	0.00	0.00
Slope (%):	5.50	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.08	0.00	0.00
Computed Flow Time (minutes):	2.14	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	25.00	0.00	0.00
Slope (%):	5.50	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	4.77	0.00	0.00
Computed Flow Time (minutes):	0.09	0.00	0.00
Total TOC (minutes):	2.23		

Subbasin Sub-08

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	6.10	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.13	0.00	0.00
Computed Flow Time (minutes):	12.96	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	340.00	0.00	0.00
Slope (%):	6.10	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	3.98	0.00	0.00
Computed Flow Time (minutes):	1.42	0.00	0.00
Total TOC (minutes):	14.38		

Subbasin Sub-09

User-Defined TOC override (minutes): 6.00

Subbasin Sub-09Y

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	8.90	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.15	0.00	0.00
Computed Flow Time (minutes):	11.14	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	330.00	0.00	0.00
Slope (%):	8.90	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	4.81	0.00	0.00
Computed Flow Time (minutes):	1.14	0.00	0.00
Total TOC (minutes):	12.29		

Subbasin Sub-10

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.18	0.00	0.00
Computed Flow Time (minutes):	9.04	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	55.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	0.15	0.00	0.00
Total TOC (minutes):	9.19		

Subbasin Sub-11

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	7.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.14	0.00	0.00
Computed Flow Time (minutes):	12.27	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	105.00	0.00	0.00
Slope (%):	7.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	4.27	0.00	0.00
Computed Flow Time (minutes):	0.41	0.00	0.00
Total TOC (minutes):	12.68		

Subbasin Sub-12

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	8.50	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.15	0.00	0.00
Computed Flow Time (minutes):	11.35	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	154.00	0.00	0.00

Slope (%):	8.50	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	4.70	0.00	0.00
Computed Flow Time (minutes):	0.55	0.00	0.00
Total TOC (minutes):	11.90		

Subbasin Sub-13

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	1.70	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.08	0.00	0.00
Computed Flow Time (minutes):	21.61	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	500.00	0.00	0.00
Slope (%):	3.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	2.79	0.00	0.00
Computed Flow Time (minutes):	2.99	0.00	0.00
Total TOC (minutes):	24.59		

Subbasin Sub-14

User-Defined TOC override (minutes): 5.00

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	5.90	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.13	0.00	0.00
Computed Flow Time (minutes):	13.13	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	118.00	0.00	0.00
Slope (%):	5.90	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	3.92	0.00	0.00
Computed Flow Time (minutes):	0.50	0.00	0.00
Total TOC (minutes):	13.64		

Subbasin Sub-16

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	5.40	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.60	3.60	3.60
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	13.61	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	280.00	0.00	0.00
Slope (%):	5.40	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	4.72	0.00	0.00
Computed Flow Time (minutes):	0.99	0.00	0.00
Total TOC (minutes):	14.60		

****
Subbasin Runoff Summary
****

Subbasin ID	Accumulated Precip in	Rainfall Intensity in/hr	Total Runoff in	Peak Runoff cfs	Weighted Runoff Coeff	Time of Concentration days	Time of Concentration hh:mm:ss
Sub-01	1.36	5.37	0.47	0.11	0.350	0	00:15:07
Sub-02	0.75	7.55	0.63	1.88	0.830	0	00:06:00
Sub-02Y	1.23	5.75	0.43	3.10	0.350	0	00:12:54
Sub-03	1.12	6.12	0.39	0.19	0.350	0	00:11:04
Sub-04	0.95	6.82	0.42	0.78	0.440	0	00:08:16
Sub-05	0.66	7.93	0.44	0.52	0.660	0	00:05:00
Sub-06	1.02	6.54	0.68	1.23	0.670	0	00:09:18
Sub-07	0.66	7.93	0.44	0.21	0.670	0	00:05:00
Sub-08	1.31	5.49	0.80	1.87	0.610	0	00:14:22
Sub-09	0.75	7.55	0.60	1.43	0.790	0	00:06:00
Sub-09Y	1.21	5.87	0.42	2.16	0.350	0	00:12:17

Sub-10	1.00	6.57	0.61	0.88	0.610	0	00:09:11
Sub-11	1.22	5.79	0.81	1.68	0.660	0	00:12:40
Sub-12	1.17	5.95	0.48	1.12	0.410	0	00:11:54
Sub-13	1.74	4.24	0.84	7.99	0.480	0	00:24:35
Sub-14	0.66	7.93	0.57	1.24	0.870	0	00:05:00
Sub-15	1.28	5.62	0.54	0.57	0.420	0	00:13:38
Sub-16	1.33	5.45	0.81	2.46	0.610	0	00:14:36

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
CB-02Y	0.01	0.56	269.17	0	00:13	0	0	0:00:00
CB-09Y	0.01	0.44	281.98	0	00:12	0	0	0:00:00
OCJ-03	0.04	1.54	269.74	0	00:14	0	0	0:00:00
OCJ-10	0.02	0.78	286.73	0	00:15	0	0	0:00:00
OP-01	0.04	1.54	269.65	0	00:14	0	0	0:00:00
OP-04	0.03	1.13	270.77	0	00:14	0	0	0:00:00
OP-06	0.02	0.91	281.07	0	00:14	0	0	0:00:00
OP-11	0.02	0.73	294.80	0	00:15	0	0	0:00:00
OP-13	0.02	0.71	308.38	0	00:24	0	0	0:00:00
OP-15	0.01	0.49	312.08	0	00:14	0	0	0:00:00
OC	0.02	0.86	265.46	0	00:14	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Peak Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
CB-02Y	JUNCTION	3.10	3.10	0	00:13	0.00		
CB-09Y	JUNCTION	2.16	2.16	0	00:12	0.00		
OCJ-03	JUNCTION	0.19	14.64	0	00:14	0.00		
OCJ-10	JUNCTION	0.88	9.86	0	00:15	0.00		
OP-01	JUNCTION	0.11	17.68	0	00:13	0.00		
OP-04	JUNCTION	0.78	14.50	0	00:14	0.00		
OP-06	JUNCTION	1.23	14.20	0	00:14	0.00		
OP-11	JUNCTION	1.68	9.62	0	00:15	0.00		
OP-13	JUNCTION	7.99	8.99	0	00:24	0.00		
OP-15	JUNCTION	0.57	2.97	0	00:14	0.00		
OC	OUTFALL	0.00	17.66	0	00:14	0.00		

****
Inlet Depth Summary
****

Inlet ID	Max Gutter Spread during Peak Flow ft	Max Gutter Water Elev during Peak Flow ft	Max Gutter Water Depth during Peak Flow ft	Time of Maximum Depth Occurrence days	Time of Maximum Depth Occurrence hh:mm
CB-02	7.31	272.92	0.33	0	00:13
CB-05	1.67	274.91	0.13	0	00:05
CB-07	1.97	285.51	0.16	0	00:12
CB-08	6.97	288.69	0.32	0	00:12
CB-09	5.82	291.84	0.30	0	00:06
CB-12	2.18	299.43	0.17	0	00:06
CB-14	2.09	312.86	0.17	0	00:05
CB-16	3.37	321.29	0.07	0	00:14

****
Inlet Flow Summary
****

Inlet ID	Peak Flow cfs	Peak Lateral Flow cfs	Peak Flow Intercepted by Inlet cfs	Peak Flow Bypassing Inlet cfs	Inlet Efficiency during Peak Flow %	Total Flooding acre-in	Total Time Flooded minutes
CB-02	2.01	1.88	-	-	-	0.000	0
CB-05	0.55	0.52	0.40	0.15	73.16	0.000	0
CB-07	0.86	0.21	0.55	0.31	63.61	0.000	0

CB-08	1.87	1.87	-	-	-	0.000	0
CB-09	1.43	1.43	-	-	-	0.000	0
CB-12	1.39	1.12	0.67	0.72	48.40	0.000	0
CB-14	1.24	1.24	0.34	0.90	27.16	0.000	0
CB-16	2.46	2.46	0.33	2.13	13.54	0.000	0

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Peak Inflow cfs
OC	5.73	5.19	17.66
System	5.73	5.19	17.66

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged minutes	Reported Condition
DP-02Y	CONDUIT	0	00:13	5.17	1.00	3.10	10.50	0.29	0.37	0	Calculated
DP-09Y	CONDUIT	0	00:12	4.99	1.00	2.16	11.51	0.19	0.29	0	Calculated
Gutter-05	CHANNEL	0	00:07	0.98	1.00	0.14	4.23	0.03	0.28	0	Calculated
Gutter-07	CHANNEL	0	00:08	1.45	1.00	0.28	5.29	0.05	0.33	0	Calculated
Gutter-12	CHANNEL	0	00:06	3.71	1.00	0.71	8.00	0.09	0.40	0	Calculated
Gutter-14	CHANNEL	0	00:05	5.92	1.00	0.84	6.73	0.13	0.46	0	Calculated
Gutter-16	CHANNEL	0	00:00	0.00	1.00	0.00	5.78	0.00	0.00	0	Calculated
NP-02	CONDUIT	0	00:06	3.88	1.00	3.44	6.85	0.50	0.50	0	Calculated
NP-05	CONDUIT	0	00:05	2.85	1.00	0.40	10.50	0.04	0.13	0	Calculated
NP-07	CONDUIT	0	00:12	5.60	1.00	4.17	10.50	0.40	0.44	0	Calculated
NP-08	CONDUIT	0	00:12	5.47	1.00	3.78	10.54	0.36	0.41	0	Calculated
NP-09	CONDUIT	0	00:06	4.86	1.00	2.47	10.52	0.23	0.33	0	Calculated
NP-12	CONDUIT	0	00:06	3.32	1.00	0.67	10.50	0.06	0.17	0	Calculated
NP-14	CONDUIT	0	00:05	4.01	1.00	0.33	10.30	0.03	0.12	0	Calculated
NP-16	CONDUIT	0	00:15	6.99	1.00	2.45	14.86	0.16	0.27	0	Calculated
OC-01	CHANNEL	0	00:14	4.32	1.00	17.66	94.95	0.19	0.43	0	Calculated
OC-03	CHANNEL	0	00:14	2.05	1.00	14.64	142.77	0.10	0.44	0	Calculated
OC-04	CHANNEL	0	00:14	3.82	1.00	14.50	326.88	0.04	0.32	0	Calculated
OC-06	CHANNEL	0	00:14	6.22	1.00	14.20	559.63	0.03	0.26	0	Calculated
OC-10	CHANNEL	0	00:16	6.48	1.00	9.86	583.21	0.02	0.22	0	Calculated
OC-11	CHANNEL	0	00:16	7.64	1.00	9.61	688.48	0.01	0.21	0	Calculated
OC-13	CHANNEL	0	00:24	8.07	1.00	8.99	679.06	0.01	0.20	0	Calculated
OC-15	CHANNEL	0	00:15	4.07	1.00	2.96	603.22	0.00	0.14	0	Calculated

****
Highest Flow Instability Indexes
****
All links are stable.

CARPER
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```
Analysis began on:  Thu Oct  2 09:52:58 2025
Analysis ended on:  Thu Oct  2 09:53:02 2025
Total elapsed time: 00:00:04
```

8.5. Gutter Capacity and Inlet Spread Analysis

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Apr 11 2025

Gutter_Cap_2.3pct

Triangular

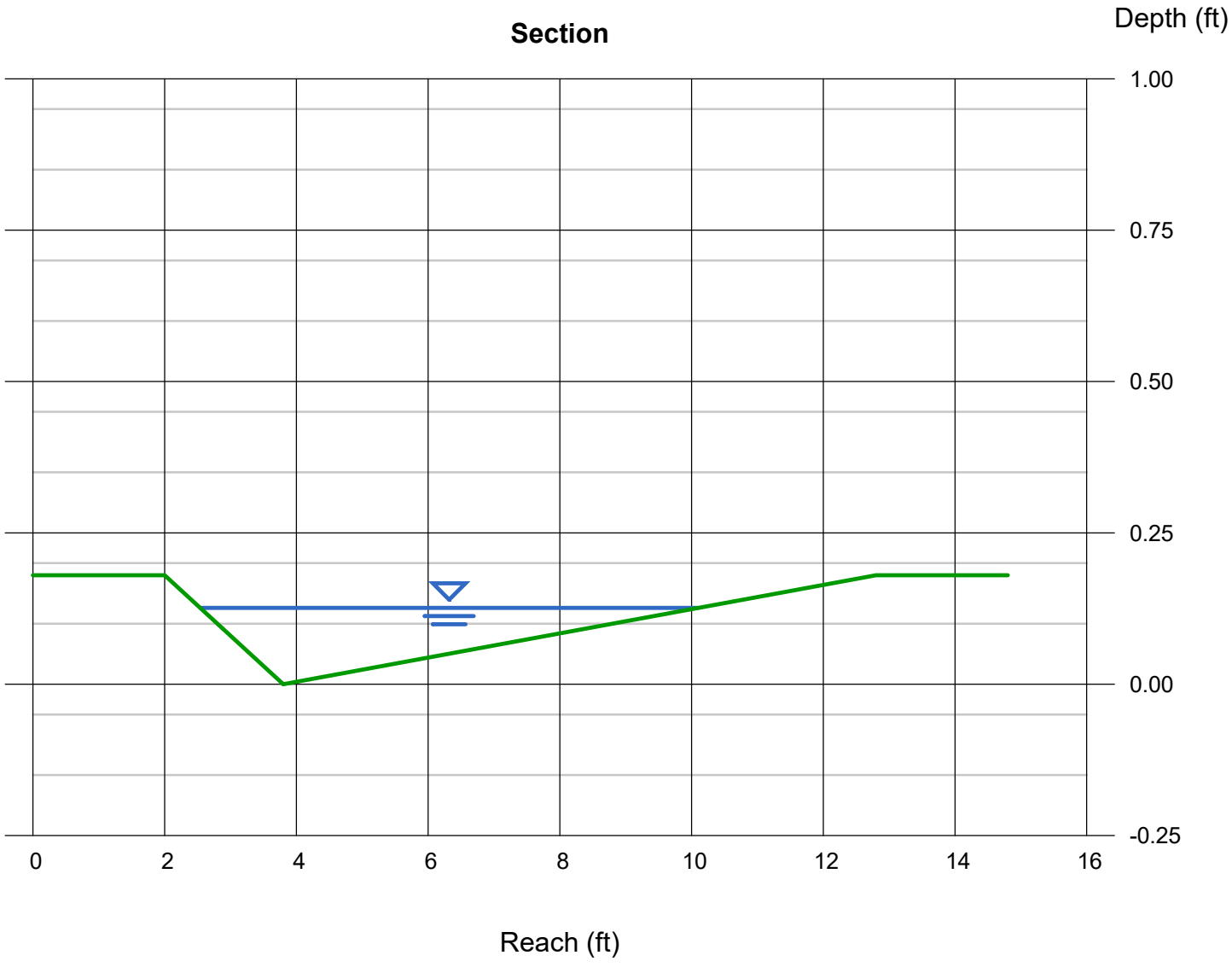
Side Slopes (z:1)	= 10.00, 50.00
Total Depth (ft)	= 0.18
Slope (%)	= 2.29
N-Value	= 0.014

Calculations

Compute by: No.	Q vs Depth
Increments	= 10

Highlighted

Depth (ft)	= 0.13
Q (cfs)	= 1.129
Area (sqft)	= 0.48
Velocity (ft/s)	= 2.37
Wetted Perim (ft)	= 7.57
Crit Depth, Yc (ft)	= 0.16
Top Width (ft)	= 7.56
EGL (ft)	= 0.21



Channel Report

Gutter_Cap_5.6pct

Triangular

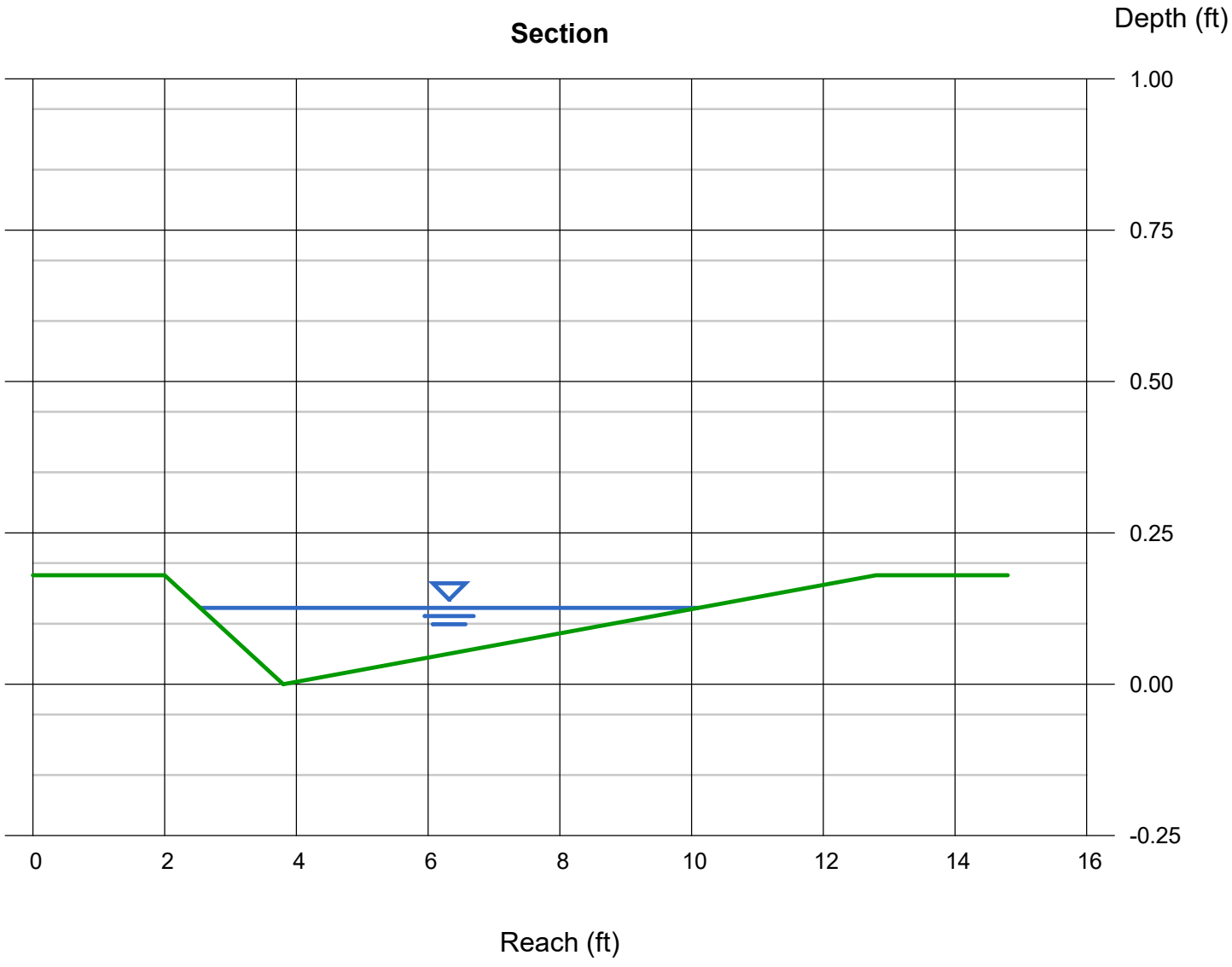
Side Slopes (z:1)	= 10.00, 50.00
Total Depth (ft)	= 0.18
Slope (%)	= 5.60
N-Value	= 0.014

Calculations

Compute by: No.	Q vs Depth
Increments	= 10

Highlighted

Depth (ft)	= 0.13
Q (cfs)	= 1.765
Area (sqft)	= 0.48
Velocity (ft/s)	= 3.71
Wetted Perim (ft)	= 7.57
Crit Depth, Yc (ft)	= 0.18
Top Width (ft)	= 7.56
EGL (ft)	= 0.34



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Apr 11 2025

Gutter_Cap_4.5pct

Triangular

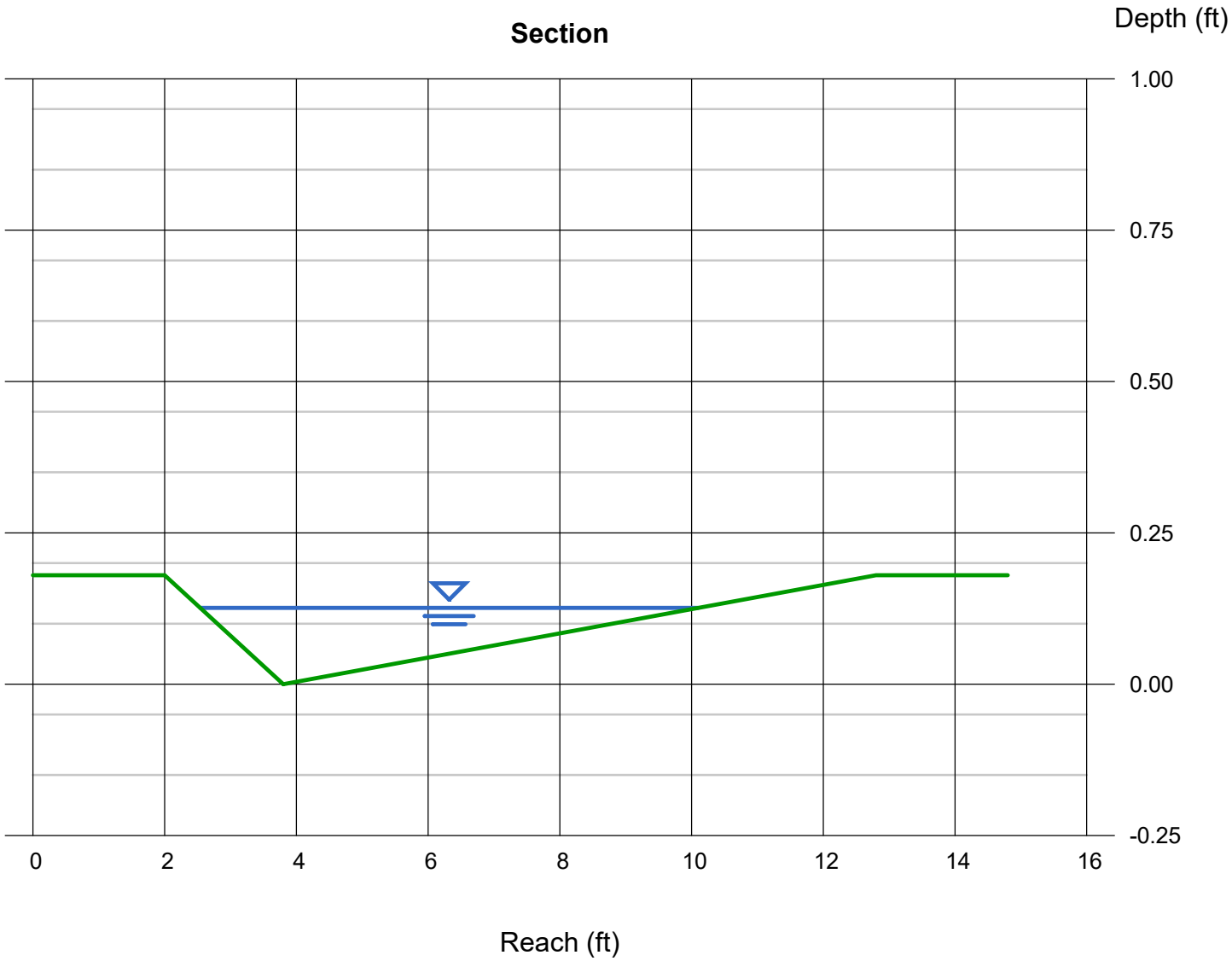
Side Slopes (z:1)	= 10.00, 50.00
Total Depth (ft)	= 0.18
Slope (%)	= 4.50
N-Value	= 0.014

Calculations

Compute by: No.	Q vs Depth
Increments	= 10

Highlighted

Depth (ft)	= 0.13
Q (cfs)	= 1.582
Area (sqft)	= 0.48
Velocity (ft/s)	= 3.32
Wetted Perim (ft)	= 7.57
Crit Depth, Yc (ft)	= 0.18
Top Width (ft)	= 7.56
EGL (ft)	= 0.30



Channel Report

Gutter_Cap_8.6pct

Triangular

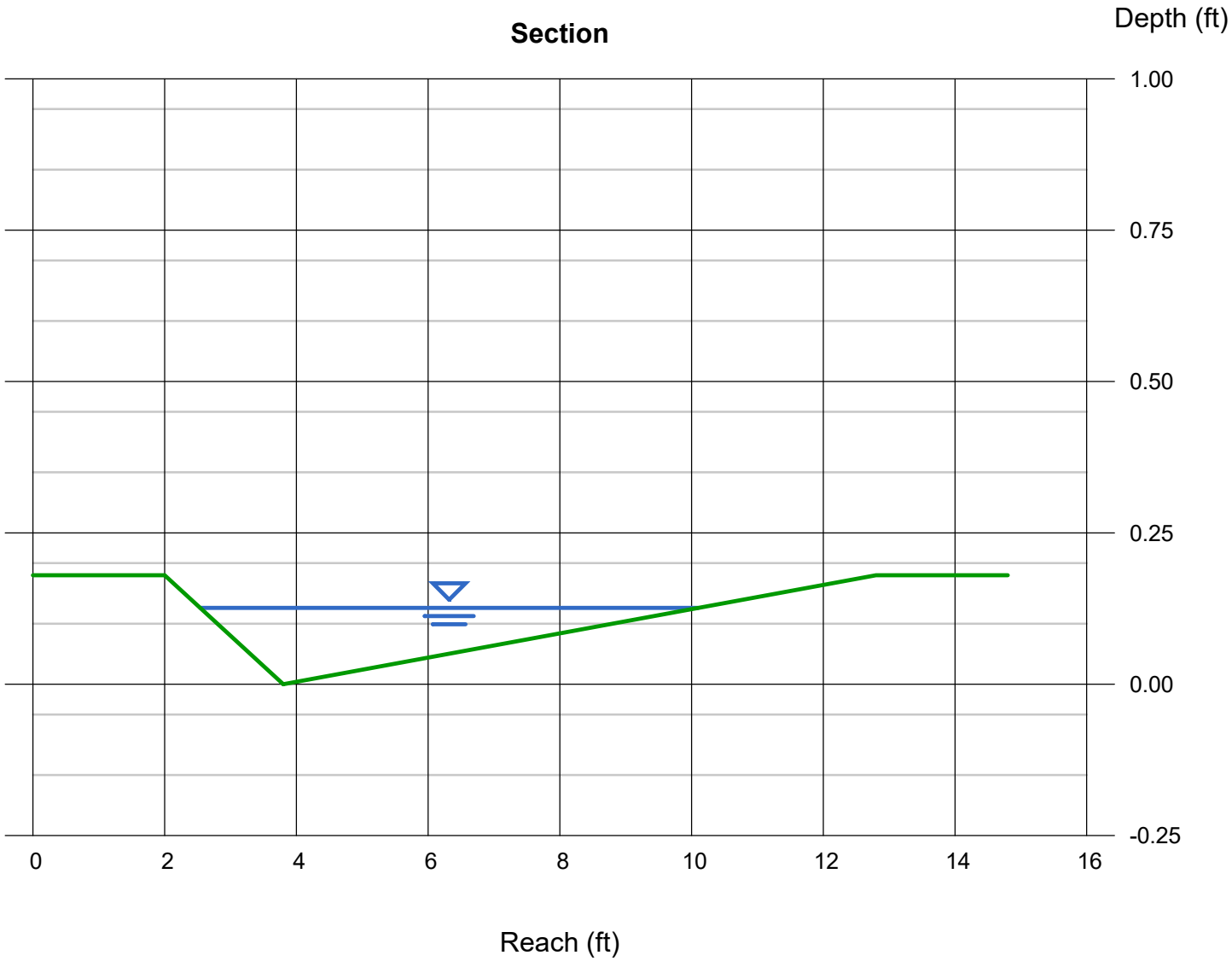
Side Slopes (z:1)	= 10.00, 50.00
Total Depth (ft)	= 0.18
Slope (%)	= 8.64
N-Value	= 0.014

Calculations

Compute by: No.	Q vs Depth
Increments	= 10

Highlighted

Depth (ft)	= 0.13
Q (cfs)	= 2.192
Area (sqft)	= 0.48
Velocity (ft/s)	= 4.60
Wetted Perim (ft)	= 7.57
Crit Depth, Yc (ft)	= 0.18
Top Width (ft)	= 7.56
EGL (ft)	= 0.46



Inlet Report

CB-02 / CB-08 / CB-09

Curb Inlet

Location	= Sag
Curb Length (ft)	= 9.00
Throat Height (in)	= 5.00
Grate Area (sqft)	= -0-
Grate Width (ft)	= -0-
Grate Length (ft)	= -0-

Gutter

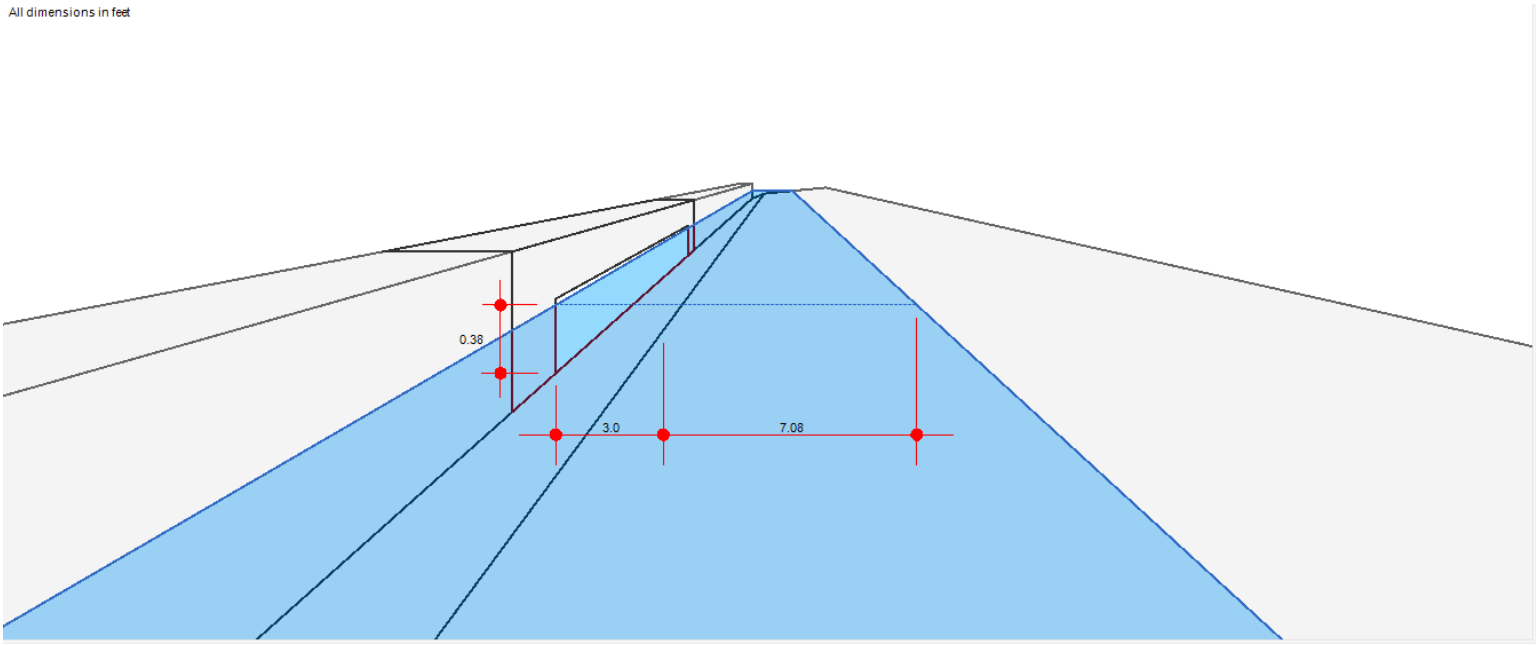
Slope, Sw (ft/ft)	= 0.080
Slope, Sx (ft/ft)	= 0.020
Local Depr (in)	= -0-
Gutter Width (ft)	= 3.00
Gutter Slope (%)	= -0-
Gutter n-value	= 0.014

Calculations

Compute by:	Q vs Depth
Max Depth (in)	= 6

Highlighted

Q Total (cfs)	= 3.00
Q Capt (cfs)	= 3.00
Q Bypass (cfs)	= -0-
Depth at Inlet (in)	= 4.58
Efficiency (%)	= 100
Gutter Spread (ft)	= 10.08
Gutter Vel (ft/s)	= 10.04
Bypass Spread (ft)	= -0-
Bypass Depth (in)	= -0-



Inlet Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Apr 11 2025

CB-05 / CB-07

Curb Inlet

Location	=	On grade
Curb Length (ft)	=	6.00
Throat Height (in)	=	5.00
Grate Area (sqft)	=	-0-
Grate Width (ft)	=	-0-
Grate Length (ft)	=	-0-

Gutter

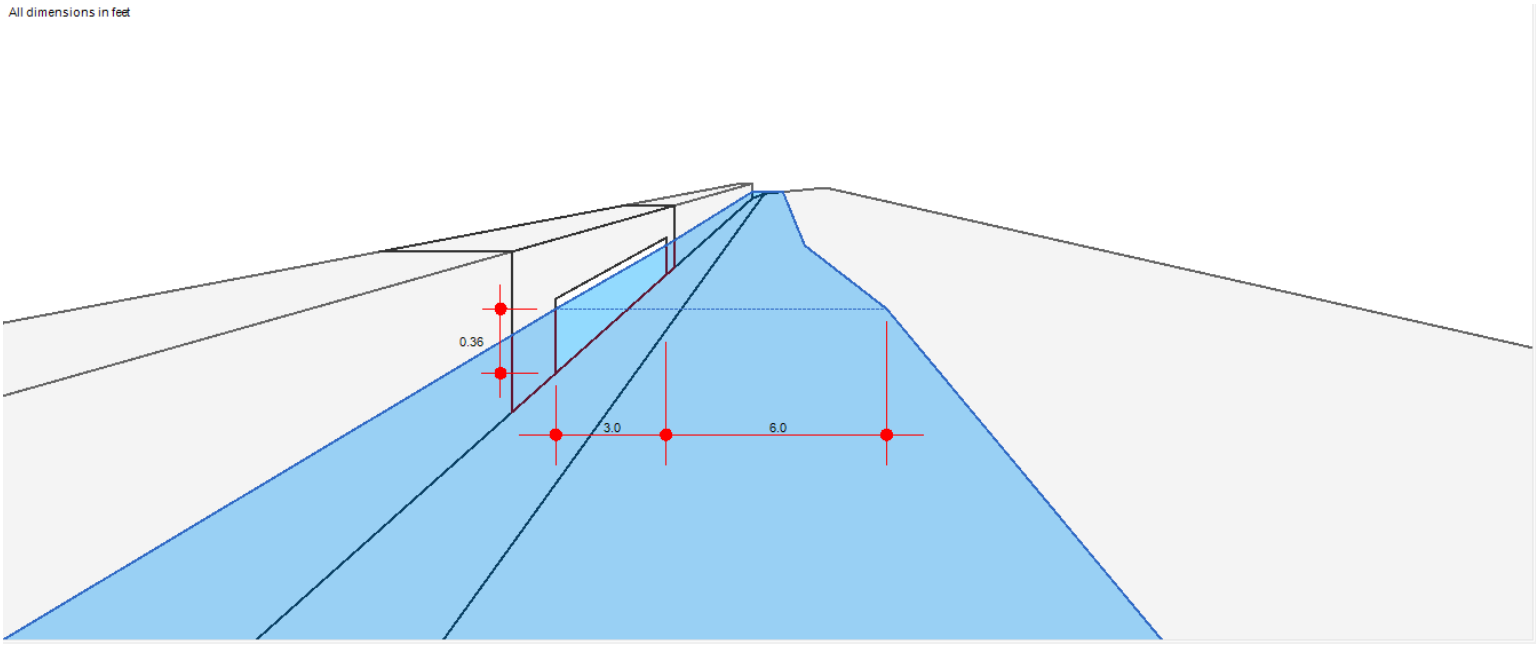
Slope, Sw (ft/ft)	=	0.080
Slope, Sx (ft/ft)	=	0.020
Local Depr (in)	=	-0-
Gutter Width (ft)	=	3.00
Gutter Slope (%)	=	5.60
Gutter n-value	=	0.014

Calculations

Compute by:		Q vs Depth
Max Depth (in)	=	6

Highlighted

Q Total (cfs)	=	9.00
Q Capt (cfs)	=	2.23
Q Bypass (cfs)	=	6.77
Depth at Inlet (in)	=	4.32
Efficiency (%)	=	25
Gutter Spread (ft)	=	9.00
Gutter Vel (ft/s)	=	8.33
Bypass Spread (ft)	=	7.53
Bypass Depth (in)	=	3.97



Inlet Report

CB-12 / CB-14

Curb Inlet

Location	=	On grade
Curb Length (ft)	=	6.00
Throat Height (in)	=	5.00
Grate Area (sqft)	=	-0-
Grate Width (ft)	=	-0-
Grate Length (ft)	=	-0-

Gutter

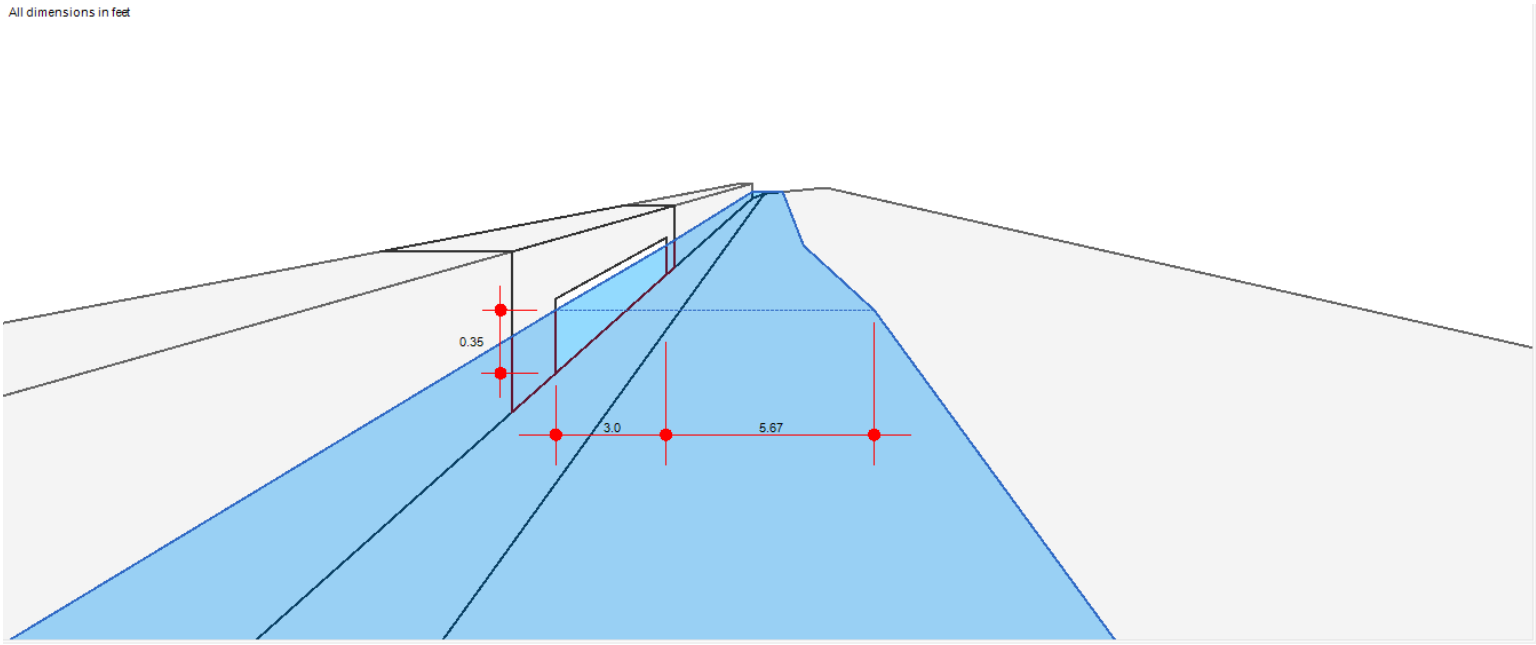
Slope, Sw (ft/ft)	=	0.080
Slope, Sx (ft/ft)	=	0.020
Local Depr (in)	=	-0-
Gutter Width (ft)	=	3.00
Gutter Slope (%)	=	8.64
Gutter n-value	=	0.014

Calculations

Compute by:		Q vs Depth
Max Depth (in)	=	6

Highlighted

Q Total (cfs)	=	10.50
Q Capt (cfs)	=	2.18
Q Bypass (cfs)	=	8.32
Depth at Inlet (in)	=	4.24
Efficiency (%)	=	21
Gutter Spread (ft)	=	8.67
Gutter Vel (ft/s)	=	10.28
Bypass Spread (ft)	=	7.48
Bypass Depth (in)	=	3.95



Inlet Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Apr 11 2025

DI-16

Drop Grate Inlet

Location	=	On grade
Curb Length (ft)	=	-0-
Throat Height (in)	=	-0-
Grate Area (sqft)	=	2.20
Grate Width (ft)	=	2.00
Grate Length (ft)	=	3.00

Gutter

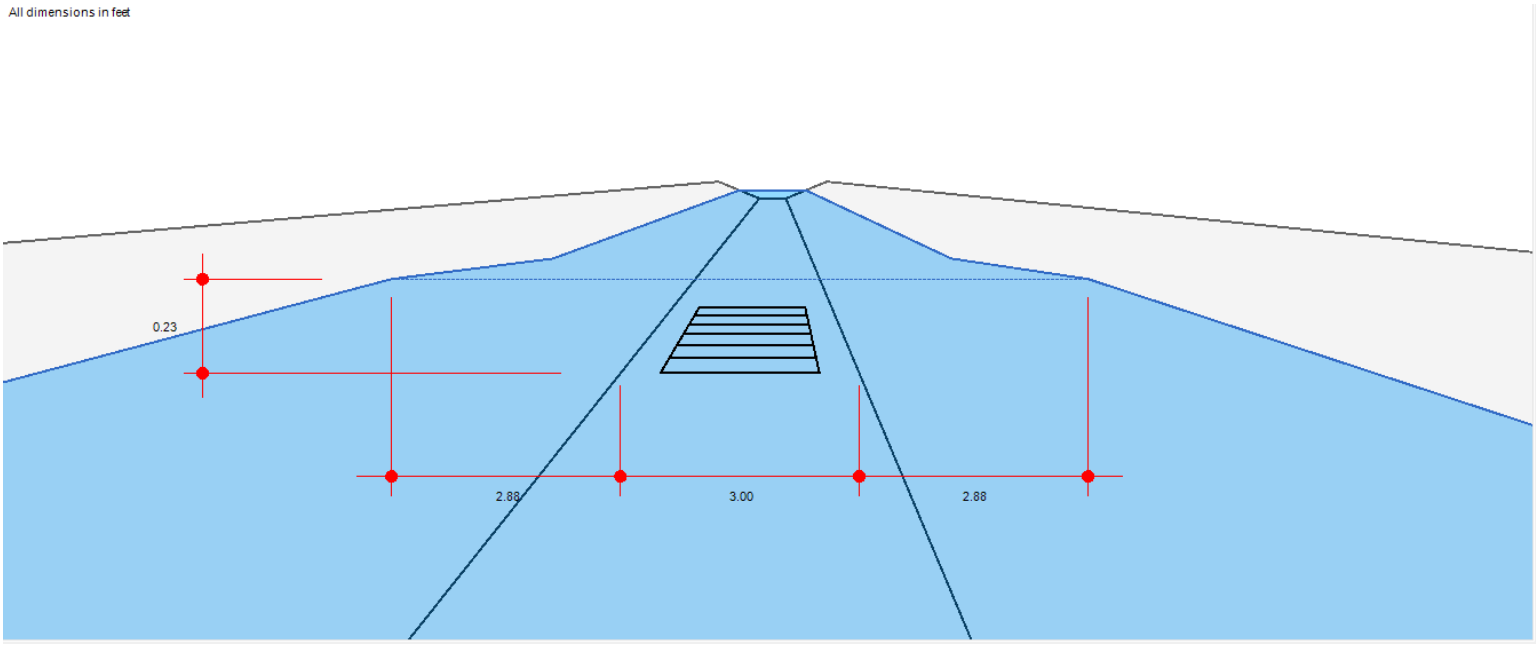
Slope, Sw (ft/ft)	=	0.080
Slope, Sx (ft/ft)	=	0.080
Local Depr (in)	=	-0-
Gutter Width (ft)	=	3.00
Gutter Slope (%)	=	2.30
Gutter n-value	=	0.014

Calculations

Compute by:		Q vs Depth
Max Depth (in)	=	3

Highlighted

Q Total (cfs)	=	5.75
Q Capt (cfs)	=	2.18
Q Bypass (cfs)	=	3.57
Depth at Inlet (in)	=	2.76
Efficiency (%)	=	38
Gutter Spread (ft)	=	8.75
Gutter Vel (ft/s)	=	4.26
Bypass Spread (ft)	=	7.50
Bypass Depth (in)	=	2.16



8.6. Ditch Calculations

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Table 8.6 – Ditch Computation Sheet

Ditch Computation Sheet

Designed By: JKC *Checked By:* LBC

Project Name:	Gale Rd Relocation
Route/Road Number:	*S-2905*
Project ID:	*P043328*
Date:	*3/12/2025*
County:	*Richland*

Tc (min)	*Design Storm*	*Intensity*	*Ditch Location*		*ID*	*Alignment*	*Drainage Area (Ac)*	*DA 'C' Value*	*Q (cfs)*	*Side Slope (m1)*	*Side Slope (m2)*	*Base Width (b)*	*Ditch Cover*	*Ditch 'n' Value*	*Slope (%)*	*Flow Depth (ft) (y)*	*Velocity (ft/s)*	*Max. Shear Stess (lbf/ft2)*	*Comments*
			From Station Elevation	*To Station Elevation*															
30 min	*10-year*	*3.83*	*11+36*	*OUTFALL*	*OC-01*	*Gale*	*10.73*	*0.52*	*21.20*	*2*	*2*	*3*	*TRM TYPE 1*	*0.035*	*2.06%*	*0.95*	*4.55*	*1.13*	*Meets requirements*
			268.11	*264.60*					*Rational*										
35 min	*10-year*	*3.51*	*11+55*	*11+36*	*OC-03*	*Gale*	*8.83*	*0.53*	*16.29*	*4*	*2*	*0*	*ECB*	*0.032*	*0.36%*	*1.61*	*2.10*	*0.36*	*Meets requirements*
			268.20	*268.11*					*Rational*										
35 min	*10-year*	*3.51*	*12+12*	*11+55*	*OC-04*	*Gale*	*8.74*	*0.53*	*16.15*	*4*	*2*	*0*	*TRM TYPE 1*	*0.032*	*1.89%*	*1.17*	*3.92*	*1.30*	*Meets requirements*
			269.66	*268.20*					*Rational*										
34 min	*10-year*	*3.58*	*14+03*	*12+12*	*OC-06*	*Gale*	*8.38*	*0.53*	*15.85*	*4*	*2*	*0*	*TRM TYPE 2*	*0.032*	*5.53%*	*0.95*	*6.22*	*3.09*	*Meets requirements*
			280.16	*269.66*					*Rational*										
44 min	*10-year*	*3.08*	*15+00*	*14+03*	*OC-10*	*Gale*	*6.61*	*0.52*	*9.87*	*4*	*2*	*0*	*TRM TYPE 2*	*0.032*	*6.01%*	*0.78*	*6.48*	*2.77*	*Meets requirements*
			285.95	*280.16*					*Rational*										
42 min	*10-year*	*3.13*	*15+97*	*15+00*	*OC-11*	*Gale*	*5.99*	*0.51*	*9.63*	*4*	*2*	*0*	*TRM TYPE 3*	*0.032*	*8.37%*	*0.73*	*7.64*	*3.60*	*Meets requirements*
			294.07	*285.95*					*Rational*										
35 min	*10-year*	*3.47*	*17+55*	*15+97*	*OC-13*	*Gale*	*5.09*	*0.51*	*9.00*	*4*	*2*	*0*	*TRM TYPE 2*	*0.032*	*8.14%*	*0.71*	*8.07*	*3.43*	*Meets requirements*
			307.67	*294.07*					*Rational*										
15 min	*10-year*	*5.38*	*18+00*	*17+55*	*OC-15*	*Gale*	*0.98*	*0.56*	*2.97*	*4*	*2*	*0*	*TRM Type 1*	*0.032*	*6.43%*	*0.49*	*4.07*	*1.87*	*Meets requirements*
			311.59	*307.67*					*Rational*										
14 min	*10-year*	*5.56*	*18+48*	*18+00*	*OC-17*	*Gale*	*0.24*	*0.42*	*0.56*	*4*	*2*	*0*	*TRM Type 1*	*0.032*	*6.51%*	*0.26*	*6.75*	*1.25*	*Meets requirements*
			315.07	*311.59*					*Rational*										

8.6.1. Channel Lining Analysis

Channel Lining Design Analysis OC-01

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
RECP is a turf reinforcement mat
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.775136 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.12896 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
Channel bottom is ***stable***
The channel is ***stable***

Channel Lining Design Analysis OC-03

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 1.75 lb/ft^2
RECP is an erosion control blankets
Manning's n: 0.035
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2

Lining Results

Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.16984 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 0.360013 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 0.906977 lb/ft^2
Channel bottom is ***stable***
The channel is ***stable***

Channel Lining Design Analysis OC-04

Lining Input Parameters

Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
RECP is a turf reinforcement mat
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2
Lining Results
Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.614692 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.30298 lb/ft^2
Effective Shear Stress: 0 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
Channel bottom is ***stable***
The channel is ***stable***

Channel Lining Design Analysis OC-06
Lining Input Parameters
Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 8 lb/ft^2
RECP is a turf reinforcement mat
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2
Lining Results
Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 1.4603 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 3.09544 lb/ft^2
Effective Shear Stress: 0.0216121 lb/ft^2
Permissible Shear Stress on RECP: 4.14618 lb/ft^2
Channel bottom is ***stable***
The channel is ***stable***

Channel Lining Design Analysis OC-10
Lining Input Parameters
Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 8 lb/ft^2
RECP is a turf reinforcement mat

Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2
Lining Results
Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 1.30819 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 2.77301 lb/ft^2
Effective Shear Stress: 0.0159696 lb/ft^2
Permissible Shear Stress on RECP: 4.14618 lb/ft^2
Channel bottom is ***stable***
The channel is ***stable***

Channel Lining Design Analysis OC-11
Lining Input Parameters
Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 10 lb/ft^2
RECP is a turf reinforcement mat
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2
Lining Results
Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 1.69645 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 3.59602 lb/ft^2
Effective Shear Stress: 0.0177861 lb/ft^2
Permissible Shear Stress on RECP: 5.18272 lb/ft^2
Channel bottom is ***stable***
The channel is ***stable***

Channel Lining Design Analysis OC-13
Lining Input Parameters
Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 8 lb/ft^2
RECP is a turf reinforcement mat
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3

soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2
Lining Results
Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 1.61693 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 3.42745 lb/ft^2
Effective Shear Stress: 0.0274222 lb/ft^2
Permissible Shear Stress on RECP: 4.14618 lb/ft^2
Channel bottom is ***stable***
The channel is ***stable***

Channel Lining Design Analysis OC-15
Lining Input Parameters
Channel Lining Type: Rolled Erosion Control Product
Shear Stress on RECP that results in 0.5 in of erosion: 6 lb/ft^2
RECP is a turf reinforcement mat
Manning's n: 0.03
Manning's n range: 0.022-0.028
Specific Weight of Water: 62.4 lb/ft^3
soil is noncohesive
D75: 2.54 mm
Safety Factor: 1.2
Lining Results
Permissible Soil Shear Stress: 0.04 lb/ft^2
Mean Boundary Shear Stress: 0.880893 lb/ft^2
Maximum Shear Stress on the Channel Bottom: 1.86725 lb/ft^2
Effective Shear Stress: 0.011011 lb/ft^2
Permissible Shear Stress on RECP: 3.10963 lb/ft^2
Channel bottom is ***stable***
The channel is ***stable***

8.7. Rip-Rap Calculations

CARPER
CIVIL CONSULTING

Rip Rap Computation Sheet

SHEET 1 OF 1

Project Name:	Gale Drive Relocation
Project ID:	P043328
Date:	4/1/2025
County:	Richland

Sheet Totals			
Payitem Class	A	B	C
Weight of RipRap	--	102 tons	--
Filter Fabric	--	120 SY	--

Rip Rap Apron in Channel										
Node ID	OP-01	OP-04	OP-06	OP-11	OP-13	OP-15				
Alignment	Gale	Gale	Gale	Gale	Gale	Gale				
Station	11+36	12+12	14+02	15+97	17+54	18+00				
Left / Right	LT	LT	LT	LT	LT	LT				
Inlet / Oulet	Outlet	Outlet	Outlet	Outlet	Outlet	Outlet				
Pipe Inside Diameter (ft)	1.5	1.5	1.5	1.5	1.5	1.5				
Tailwater Depth (ft)	0.6	0.6	0.6	0.6	0.6	0.6				
Tailwater < 0.5D?	yes	yes	yes	yes	yes	yes				
Pipe Slope (%)	1	1	1	1	1	1				
Rip Rap Depth (ft)*	1.5	1.5	1.5	1.5	1.5	1.5				
Rip Rap Apron Length (ft)*	5	5	5	5	5	5				
Outlet Ditch Foreslope (S1:1)	4	4	4	4	4	4				
Outlet Ditch Backslope (S2:1)	2	2	2	2	2	2				
Outlet Ditch Base Width (ft)	0	0	0	0	0	0				
Rip Rap Apron Width (ft)	8	8	8	8	8	8				
Rip Rap Volume (cf)	72	72	72	72	72	72				
Rip Rap Weight (ton)	5	5	5	5	5	5				
Payitem Class	B	B	B	B	B	B				
Filter Fabric (sy)	5	5	5	5	5	5				
Rip Rap Pipe End Slope Protection										
Fill Slope (_:1)	4	4	4	4	4	4				
Rip Rap Weight (ton)**	12	12	12	12	12	12				
Filter Fabric (sy)**	15	15	15	15	15	15				

* From SCDOT Standard Drawing # 804-305-03, effective date July 2017.
** From SCDOT Instructional Bulletin # 2009-2, effective date September 2009.

Designed by:	JKC
Checked by:	LBC

8.8. Water Quality Monitoring Report

Watershed and Water Quality Information

SC Department of Environmental Services

General Information

Applicant Name: SCDOT
Address: Gale Dr, Columbia, SC, 29210
MS4 Designation: Medium MS4
Within Coastal Critical Area: No
Waterbody Name: Unnamed Trib

Permit Type: MS4
Latitude/Longitude: 34.038151 / -81.102978
Monitoring Station: SRE
Water Classification (Provisional): TPGT
Entered Waterbody Name:

Parameter Description

NH3N	Ammonia	CD	Cadmium	CR	Chromium
CU	Copper	HG	Mercury	NI	Nickel
PB	Lead	ZN	Zinc	DO	Dissolved Oxygen
PH	pH	TURBIDITY	Turbidity	ECOLI	Escherichia coli (Freshwaters)
FC	Fecal Coliform (Shellfish)	BIO	Macroinvertebrates (Bio)	TP	(Lakes) Phosphorus
TN	(Lakes) Nitrogen	CHLA	(Lakes) Chlorophyll a	ENTERO	Enterococcus (Coastal Waters)
HGF	Mercury (Fish Tissue)	PCB	PCB (Fish)		

Impaired Status (downstream sites)

Station	NH3N	CD	CR	CU	HG	NI	PB	ZN	DO	PH	TURBIDITY	ECOLI	FC	BIO	TP	TN	CHLA	ENTERO	HGF	PCB
SRE	X	X	X	X	X	X	X	X	X	X	X	N	X	X	X	X	X	X	X	X
S-298	X	F	F	F	F	F	F	F	F	F	N	A	X	X	X	X	X	X	X	X
RBZ	X	A	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X
C-007F	X	A	A	A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	N	X
CSB-001R	F	A	A	A	A	A	A	A	A	A	A	A	X	F	X	X	X	X	A	X

F = Standards full supported
N = Standards not supported
A = Assessed at upstream station
X = Parameter not assessed at station
WnTN = Within TMDL, parameter not supported
InTN = In TMDL, parameter not supported
WnTF = Within TMDL, parameter full supported
InTF = In TMDL, parameter full supported

Parameters to be addressed (those not supporting standards)

ECOLI - Escherichia coli (Freshwaters)

TURBIDITY - Turbidity

Fish Consumption Advisory

HGF - Mercury (Fish Tissue)

Waters of Concern (WOC)

TMDL Information - TMDL Parameters to be addressed

In TMDL Watershed: No
TMDL Report No:
TMDL Document Link:

TMDL Site:
TMDL Parameter:

Report Date: March 28, 2025