STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J.R. "JOEY" HOPKINS
SECRETARY

September 27, 2024

U.S. Army Corps of Engineers
Regulatory Field Office
151 Patton Avenue, Room 208
Asheville, North Carolina 28801

ATTN: Mr. Steve Brumagin
NCDOT Coordinator

N.C. Department of Environmental Quality
Raleigh Central Office
1617 Mail Service Center
Raleigh, NC 27699

Mr. Ryan Conchilla
NCDOT Coordinator

Subject: **Application for Phased Modification of Section 404 Regional General Permit No. 198200031 and Individual 401 Water Quality Certification** for the proposed Widening of NC 24/27 from NC 740 in Albemarle in Stanly County to the Troy Bypass in Montgomery County, Federal Aid Project No. STBG-0024(083), Divisions 8 & 10, TIP Nos. R-2527, R-2530B, & B-4974. Debit $767 from WBS 35572.1.1.

Reference: FONSI signed April 2017
Section 404 RGP 31, Action ID SAW-2008-02315, issued 5/02/2019, renewed 5/20/2021.
401 Water Quality Certification No. 20181416, issued 4/03/2019, renewed 6/08/2021.

Dear Sirs:

TIP project R-2527 involves widening existing NC 24-27 from a two-lane facility to a four-lane divided facility with a 46-foot depressed median from the Pee Dee River to the proposed Troy Bypass, west of Troy in Montgomery County. The length of the proposed R-2527 project is approximately 8.25 miles long. R-2527 is the eastern half of the total 14.6 miles long NC24/27 Widening extending from Albemarle to the Troy Bypass. R-2530 and B-4974 constitute the western half of the widening and were permitted in 2019 (renewed in 2021). At that time, preliminary impacts were presented for R-2527. This phased modification request is for the final design of R-2527.

Please see the enclosed Division of Mitigation Services (DMS) mitigation acceptance letter, permit drawing review minutes (4B and 4C), State Stormwater Management Plan (SMP), Final permit drawings, and utility drawings.

Purpose and Need

The purpose of this project is to improve traffic flow and level of service (LOS) on the section of NC 24-27 between the Pee Dee River to the proposed Troy Bypass, west of Troy.

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
ENVIRONMENT ANALYSIS UNIT
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1598

Telephone: (919) 707-6000
Fax: (919) 212-5785
Customer Service: 1-877-368-4968
Website: www.ncdot.gov

Location:
1000 BIRCH RIDGE DRIVE
RALEIGH NC 27610

MERGER INFORMATION

In compliance with the NEPA/404 Merger Process, the following Concurrence Meetings were held for R-2527: 4B: December 18, 2019, and 4C: January 13, 2021.

PROJECT SCHEDULE

R-2527 is currently slated to Let September 15, 2026.

RESOURCE STATUS

Waters within the project area are located in the Yadkin Pee Dee River Basin (HUC 03040104). There are no Outstanding Resource Waters (ORW) within the project area. No Water Supply Waters (WS-I or WS-II) waters occur within 1.0 mile of the project area; however, the Pee Dee River and its UTs are designated as WS-IV, B; CA (water supply watershed) and Rocky Creek (Little River Tributary) is designated as C;HQW.

Wetland and stream determinations within R-2527 were conducted using the field delineation method outlined in the 1987 Corps of Engineers Wetland Delineation Manual and the 2012 Eastern Mountains and Piedmont Supplement. The projects were initially verified between 2006 and 2008. Ronnie Smith from ACOE and David Wainwright of DWR field reverified the wetlands and surface waters in 2012 through 2014. Eric Alsmeyer from ACOE issued a Verification Letter for the project in May 2021. All jurisdictional resources were reassessed in spring 2024 and a PJD Package will be submitted with this permit modification application.

303(d) Impaired Waters:
Clark Creek is currently listed on the North Carolina 2022 Final 303(d) list of impaired waters for fecal coliform.

IMPACTS TO WATERS OF THE U.S.

Tables 1, 2, and 3 summarize the impacts to jurisdictional water resources for R-2527. Site numbers correspond with the permit (hydraulic) drawings included in this application. The stream and wetland nomenclature correspond to the 2012 JD package.

Table 1 – R-2527 Wetland Impacts (acres)

Permit Site	JD Site	NC WAM Classification	Wetland Size	Permanent Fill in Wetlands	Excavation in Wetlands	Mechanized Clearing	Hand Clearing	Impact Description
1	WF	Floodplain pool	0.10	<0.01	--	<0.01	--	Roadway fill
1A	WZZ	Floodplain pool	0.04	--	--	0.02	--	Roadway fill
2	WYA	Bottomland hardwood forest	0.08	0.07	--	0.01	--	Roadway fill/Base ditch
8	WH	Headwater forest	<0.01	<0.01	--	--	--	Roadway fill
9	WJ	Headwater forest	<0.01	<0.01	--	<0.01	--	Roadway fill
11	WR	Headwater forest	0.10	0.03	--	0.03	--	Roadway fill
13	WP	Headwater forest	0.09	0.09	--	--	--	Roadway fill
14	WM	Headwater forest	0.01	<0.01	--	<0.01	--	Roadway fill
16	WN	Headwater forest	0.01	<0.01	--	<0.01	--	Roadway fill
18	WV	Headwater forest	0.07	--	--	0.02	--	Roadway fill
19	WS	Headwater forest	0.05	<0.01	--	0.03	--	Roadway fill
21	WU	Headwater forest	0.02	0.02	--	--	--	Roadway fill
26	WT (N)	Headwater forest	0.11	0.11	--	--	--	Roadway fill
26	WT (S)	Headwater forest	0.06	0.04	--	0.01	--	Roadway fill
31	WU-2	Headwater forest	0.12	0.10	--	0.03	--	Roadway fill
35A	WYB	Headwater forest	0.06	0.04	<0.01	0.02	--	Roadway fill/Base ditch
35B	WYC	Headwater forest	0.02	<0.01	--	<0.01	--	Pipe/Outlet stabilization)
37	WZ-1	Headwater forest	<0.01	<0.01	--	<0.01	--	Roadway fill
40	WKK	Headwater forest	<0.01	<0.01	--	<0.01	--	Pipe/Outlet stabilization)
41	WMM	Headwater forest	0.04	0.01	--	0.02	--	Roadway fill/Pipe
42	WLL	Headwater forest	0.05	--	--	<0.01	--	Roadway fill/Pipe
45A	WYD	Bottomland hardwood forest	<0.01	<0.01	--	--	--	Roadway fill
46	WNN	Bottomland hardwood forest	0.07		--	<0.01	--	Roadway fill
48	WHH	Headwater forest	0.02	0.02	--	--	--	Roadway fill
49	WFF	Headwater forest	0.60	--	--	<0.01	--	Easement
49	WFF	“	“	<0.01	--	0.02	--	Roadway Fill
49	WFF	“	“	--	--	<0.01	--	Easement
49	WFF	“	“	--	<0.01	<0.01	--	Ditch
51	WGG	Headwater forest	0.25	<0.01	--	0.06	--	Ditch/Fill
51	WGG	“	“	<0.01	--	--	--	Ditch/Fill

Table 1 Continued – R-2527 Wetland Impacts (acres)

Permit Site	JD Site	NC WAM Classification	Wetland Size	Permanent Fill in Wetlands	Excavation in Wetlands	Mechanized Clearing	Hand Clearing	Impact Description
52	WPP	Headwater forest	0.06	<0.01	--	<0.01	--	Pipe/Fill
52	WPP	"	"	<0.01	--	<0.01	--	Pipe/Fill
55	WEE (N)	Headwater forest	0.31	0.01	--	0.01	--	Pipe/Fill
55	WEE (S)	"	"	0.02	--	0.01	--	Pipe/Fill
58	WCC	Bottomland hardwood forest	0.02	0.02	--	--	--	Outfall protection
60	WBB	Headwater forest	0.15	<0.01	--	0.02	--	Pipe/Fill
Total Wetland Impacts:				**0.62**	**<0.01**	**0.37**		
Total Wetland Impacts Requested from DMS:				**1.00**				

Table 2 - R-2527 Stream Impacts (linear feet)

Permit Site	Stream Name/ PJD/ID	Status/ Class	Permanent		Temp. Channel Impacts	ACOE Required Mitigation	DWR Required Mitigation	Impacts Description
			Channel Impacts	Bank Stabilization				
4	Rocky Creek / SB-1	Perennial WS-IV	267	--	31	267	--	Rocky Creek will be relocated into 2@ 10' x 10' RCBCs
4A	UT to Rocky Creek / R-1	Intermittent WS-IV	8	--	57	8	--	Stream R-1 will be impacted by channel stabilization at the outlet of a 24" RCP.
5	UT to Rocky Creek / SB-2	Intermittent WS-IV	195	--	46	195	--	Stream SB-2 will be impacted by a channel relocation into a 54" RCP and channel stabilization.
6	UT to Rocky Creek / SB-4	Intermittent WS-IV	74	--	--	74	--	Stream SB-4 will be impacted by a channel relocation and roadway fill.
7	UT to Wood Run / SJ	Intermittent WS-IV	129	--	16	129	--	Stream SJ will be impacted by channel relocation and channel stabilization at the outlet of a 36" RCP.
7A	UT to Wood Run / SA	Intermittent WS-IV	--	--	22	--	--	Stream SA will be temporarily impacted by 15" Pipe installation.
10	UT to Rocky Creek / SL-A	Perennial WS-IV	160	--	22		--	Stream SL-A will be impacted by its relocation into a 42" RCP.

Table 2 Continued - R-2527 Stream Impacts (linear feet)

Permit Site	Stream Name/ PJD/ID	Status/ Class	Permanent		Temp. Channel Impacts	ACOE Required Mitigation	DWR Required Mitigation	Impacts Description
			Channel Impacts	Bank Stabilization				
12	UT to Rocky Creek / SM-1	Intermittent WS-IV	232	--	24	232	--	Stream SM-1 will be impacted by its relocation into a 48" RCP.
15	UT to Rocky Creek / SM-2	Perennial C	--	--	17	--	--	Stream SM-2 will be temporarily impacted by channel stabilization at the outlet of a 48" RCP.
17	UT to Dumas Creek/SN	Perennial C	307	--	39	307	307	Stream SN will be impacted by its relocation into a 42" RCP.
20	UT to Dumas Creek/SO-1	Intermittent C	139	--	--	139	--	Stream SO-1 will be impacted by its relocation into a lateral base ditch.
22	UT to Dumas Creek/SO	Perennial C	211	--	23	211	--	Stream SO will be impacted by its relocation into a 42" RCP.
23	Dumas Creek/SC	Perennial C	294	--	40	294	--	Stream SC (Dumas Creek) will be impacted by its relocation into a 7' x 8' RCBC.
24	UT to Dumas Creek/SC-1	Perennial C	845	--	38	845	845	Stream SC-1 will be impacted by its relocation into a lateral base ditch.
25	UT to Dumas Creek/SC-3	Perennial C	219	--	31	219	--	Stream SC-3 will be impacted by its relocation into a 36" RCP.
28	UT to Dumas Creek/SC-2	Intermittent C	240	--	--	240	--	Stream SC-2 will be impacted by its relocation into a lateral base ditch.
29	Clarks Creek/SD	Perennial C	350	--	77	350	350	Stream SD (Clarks Creek) will be impacted by its relocation into a 2@ 14' x 9' RCBC, channel stabilization and a lateral base ditch.
30	UT to Clarks Creek/SD-1	Perennial C	--	--	9	--	--	Stream SD-1will be temporarily impacted by dewatering for the installation of channel stabilization on Stream SD. (Site 29)
32	UT to Clarks Creek/SP	Perennial C	208	--	48	208	--	Stream SP will be impacted by its relocation into a 66" RCP.
33	UT to Clarks Creek/SX-	Intermittent C	--	--	56	--	--	Stream SX will be temporarily impacted by the installation of an erosion control basin and construction access.
34	UT to Clarks Creek/SQ	Intermittent C	27	--	11	27	--	Stream SQ will be impacted by channel stabilization at the outlet of a 24" RCP.
35	UT to Lick Fork Creek/SR	Intermittent C	63	--	--	63	--	Stream SR will be impacted by its relocation into a 36" RCP.

Table 2 Continued - R-2527 Stream Impacts (linear feet)

Permit Site	Stream Name/ PJD/ID	Status/ Class	Permanent		Temp. Channel Impacts	ACOE Required Mitigation	DWR Required Mitigation	Impacts Description
			Channel Impacts	Bank Stabilization				
36	UT to Lick Fork Creek/SS-1	Intermittent C	31	--	9	31	--	Stream SS-1 will be impacted by its relocation into a 30" RCP.
38	UT to Lick Fork Creek/SU	Perennial C	232	--	25	232	--	Stream SU will be impacted by its relocation into a 60" RCP.
39	Lick Fork Creek/SE	Perennial C	301	--	54	301	301	Stream SE (Lick Fork Creek) will be impacted by its relocation into a 60" RCP and channel stabilization.
44	UT to Lick Fork Creek/SF-A	Perennial C	259	--	42	259	--	Stream SF-A will be impacted by its relocation into an 8' x 10' RCBC and channel improvements.
45	UT to Lick Fork Creek/SF-A1	Intermittent C	73	--	--	73	--	Stream SF-A1 will be impacted by roadway fill.
47	UT to Rocky Creek/SW-B	Intermittent C	213	--	93	213	--	Stream SW-B will be impacted by its relocation into a 42" RCP.
50	UT to Rocky Creek /SX	Perennial C	400	--	68	400	400	Stream SX will be impacted by its relocation into a 60" RCP and a lateral base ditch. Further upstream, Stream SX will be impacted by its relocation into a 36" RCP and channel stabilization.
53	UT to Rocky Creek /SY-A	Perennial C	439	--	45	439	439	Stream SY-A will be impacted by its relocation into an 8' x 10' RCBC and channel stabilization.
53A	UT to Rocky Creek /SY-A	Perennial C	559	--	97	559	559	Stream SY-A will be impacted by its relocation into an 8' x 10' RCBC, channel stabilization, and a standard base ditch.
54	Rocky Creek/ SF-B	Perennial C; HQW	328	--	106	328	328	Stream SF-B (Rocky Creek) will be impacted by its relocation into 3@14 x 12' RCBCs.
57	UT to Smith Branch/SZ	Intermittent C	13	--	53	13	--	Stream SZ will be impacted by its relocation into a 30" RCP and channel stabilization. Further downstream, Stream SZ will be temporarily impacted by the installation of a dissipator basin.
59	Smith Branch/SY-B	Perennial C	345	--	34	345	345	Stream SY-B (Smith Branch) will be impacted by its relocation into a 9' x 11' RCBC and channel stabilization
Total Stream Impacts:			**7161**	**--**	**1233**	**7161**	**3874**	
Total Permanent Impacts			**7161**					
Total Stream Impact Requested from DMS:						**7161**		

Table 3 – R-2527 Surface Water Impacts (acres)

Permit Site	NRTR Site	Pond Size	Impact Size: Perm/Temp	Impact Description
27	Pond F	1.50	-- /<0.01	Dewatering

Utility Impacts

Utility Site 1 (Hydro Permit Site 1) – Excavation and mechanized clearing in Wetland WF - <0.01Ac – Open cut for water line.
Utility Site 2 – Hand clearing in Wetland New1 – 0.02Ac – for overhead power line.

The following Utility impacts are encompassed within Hydraulic Permit Site impacts:
Hydro Permit Site 4 – Stream SB-1 – 0.01 Ac – open cut for water line.
Hydro Permit Site 5 – Stream SB-2 – <0.01 Ac – open cut for water line.
Hydro Permit Site 53A – Stream SY-A – temporary impacts from water and sewer lines at two locations – 0.01Ac
Hydro Permit Site 54 – Stream SF-B – temporary impacts from water and sewer lines at two locations – 0.01Ac

MITIGATION OPTIONS

The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize jurisdictional impacts, and to provide full compensatory mitigation of all remaining, unavoidable jurisdictional impacts. Avoidance measures were taken during the planning and NEPA compliance stages, and minimization measures were incorporated as part of the project design.

Avoidance and Minimization:
NCDOT has avoided impacting many wetlands and streams and reduced impacts to wetlands and streams to the greatest extent practicable. Other specific examples of avoidance and minimization measures include:

- Avoiding direct discharges where practicable.
- L-36+30 LT Hazardous spill basin for Rocky Creek (Permit Drawing Sheet 2).
- Culvert barrels with sills will be back filled with native material or class A rip rap to sill height. Native material will consist of material that is excavated from the stream bed or floodplain at the project site during culvert construction. Native material is subject to approval by the engineer and may be subject to permit conditions. Class A rip rap may be used to supplement the native material. If rip rap is used, native material should be placed on top to fill voids and provide a flat surface for animal passage.
- There are multiple jurisdictional features that are being impacted but these were minimized whenever possible by using steeper side slopes at 2:1.
- Rock Plated side slopes at 1.5:1 were utilized from -L- 167+50 to 169+50 LT to minimize pond impacts adjacent to the project.
- Existing drainage patterns were maintained to the best extent practical.
- Construction phasing and traffic control considerations were considered when laying out new culverts to reduce construction time.
- Non-symmetric widening was implemented in areas to reduce impacts to wetlands and jurisdictional streams.
- Bulb-outs were shifted where possible to avoid additional stream and wetland impacts.
- Grass swales were used where possible, and all grass swale lengths exceed the minimum length guidance.
- Directly connected impervious surfaces were minimized where possible. Runoff from road in shoulder sections was designed to drain through grassed ditches in median and outside (cut and lateral ditches) prior to outfall connection.
- Drop boxes were used in multiple locations to dissipate energy and decrease system outlet velocities draining toward wetlands and streams.

- Erosion and sediment control devices such as silt fences, wattles, rock checks, stilling basins, special stilling basins, temporary silt ditches, and impervious dikes will be utilized to minimize sediment leaving the site during and after construction. Sensitive area soil stabilization timeframes will be used to cover disturbed areas to minimize sedimentation.

- All outfalls were stabilized with an energy dissipator basin or rip rap dissipator pad to promote diffuse flow and reduce velocity.

Compensation:
The NCDOT has avoided and minimized impacts to jurisdictional resources to the greatest extent practicable as described above. Table 4 summarizes the wetland and stream impacts for each section and summarizes the mitigation requirements for the project.

Table 4 – R-2527 Mitigation Summary

HUC	Project Section/ Design Level	ACOE Required Mitigation (lf)	DWR Required Mitigation (lf)	Wetland Mitigation (ac)
03040104	R-2527 (Final Design)	**7161**	**3874**	1.00

Permanent stream and wetland impacts are proposed to be mitigated at a ratio of 2:1 with credits acquired from DMS.

REGULATORY APPROVALS

Section 404 and Section 10: Application is hereby made for a USACE RGP 198200031 as required for the above-described activities.

Section 401: We are hereby requesting a 401 Water Quality Certification from the N. C. Division of Water Resources. In compliance with Section 143 215.3D(e) of the NCAC, we will provide $767.00 to act as payment for processing the Section 401 permit application previously noted in this application (see Subject line).

Thank you for your assistance with this project. If you have any questions or need additional information, please contact Jeff Hemphill at jlhemphill@ncdot.gov or (919) 707-6126. A copy of this application and distribution list will also be posted on the NCDOT website at: https://xfer.services.ncdot.gov/pdea/PermApps/.

Sincerely,

for Michael Turchy
Environmental Coordination and Permitting [ECAP] Group Leader

cc:
NCDOT Permit Application Standard Distribution List.

Pre-Construction Notification

Pre-Construction Notification (PCN) Form

For Nationwide Permits and Regional General Permits

(along with corresponding Water Quality Certifications)

December 4, 2023 Ver 4.3

*Please note: fields marked with a red asterisk * below are required. You will not be able to submit the form until all mandatory questions are answered.*

Also, if at any point you wish to print a copy of the E-PCN, all you need to do is right-click on the document and you can print a copy of the form.

Below is a link to the online help file.

https://edocs.deq.nc.gov/WaterResources/DocView.aspx?dbid=0&id=2196924

A. Processing Information

If this is a courtesy copy, please fill in this with the submission date.

Does this project involve maintenance dredging funded by the Shallow Draft Navigation Channel Dredging and Aquatic Weed Fund, electric generation projects located at an existing or former electric generating facility, or involve the distribution or transmission of energy or fuel, including natural gas, diesel, petroleum, or electricity? *

○ Yes ◉ No

Is this project connected with ARPA funding? *

○ Yes ◉ No

County (or Counties) where the project is located: *

Montgomery

Is this a NCDMS Project *

○ Yes ◉ No

Click Yes, only if NCDMS is the applicant or co-applicant.

DO NOT CHECK YES, UNLESS YOU ARE DMS OR CO-APPLICANT.

Is this project a public transportation project? *

◉ Yes ○ No

This is any publicly funded by municipal,state or federal funds road, rail, airport transportation project.

Is this a NCDOT Project? *

◉ Yes ○ No

(NCDOT only) T.I.P. or state project number:

R-2527

WBS # *

35572.1.1

(for NCDOT use only)

1a. Type(s) of approval sought from the Corps: *

☑ Section 404 Permit (wetlands, streams and waters, Clean Water Act)

☐ Section 10 Permit (navigable waters, tidal waters, Rivers and Harbors Act)

Has this PCN previously been submitted? *

○ Yes

◉ No

1b. What type(s) of permit(s) do you wish to seek authorization? *

☐ Nationwide Permit (NWP)

☑ Regional General Permit (RGP)

☐ Standard (IP)

1c. Has the NWP or GP number been verified by the Corps? *

◉ Yes ○ No

Regional General Permit (RGP) Number: 198200031 - NCDOT Bridges, Widening Projects 2015

RGP Numbers (for multiple RGPS):

List all RGP numbers you are applying for not on the drop down list.

1d. Type(s) of approval sought from the DWR: *

check all that apply

- [ ] 401 Water Quality Certification - Regular
- [ ] 401 Water Quality Certification - Express
- [ ] Non-404 Jurisdictional General Permit
- [ ] Riparian Buffer Authorization
- [x] Individual 401 Water Quality Certification

1e. Is this notification solely for the record because written approval is not required?

*

For the record only for DWR 401 Certification: ○ Yes ◉ No

For the record only for Corps Permit: ○ Yes ◉ No

1f. Is this an after-the-fact permit application? *

○ Yes ◉ No

1g. Is payment into a mitigation bank or in-lieu fee program proposed for mitigation of impacts?

If so, attach the acceptance letter from mitigation bank or in-lieu fee program.

◉ Yes ○ No

Acceptance Letter Attachment

Click the upload button or drag and drop files here to attach document

FILE TYPE MUST BE PDF

1h. Is the project located in any of NC's twenty coastal counties? *

○ Yes ◉ No

1j. Is the project located in a designated trout watershed? *

○ Yes ◉ No

Link to trout information: http://www.saw.usace.army.mil/Missions/Regulatory-Permit-Program/Agency-Coordination/Trout.aspx

B. Applicant Information

1a. Who is the Primary Contact? *

Jeffrey Hemphill

1b. Primary Contact Email: *

jlhemphill@ncdot.gov

1c. Primary Contact Phone: *

(xxx)xxx-xxxx

(919)707-6126

1d. Who is applying for the permit? *

- [x] Owner
- [ ] Applicant (other than owner)

(Check all that apply)

1e. Is there an Agent/Consultant for this project? *

○ Yes ◉ No

2. Owner Information

2a. Name(s) on recorded deed: *

NCDOT

2b. Deed book and page no.:

2c. Contact Person:

(for Corporations)

2d. Address *

Street Address

1598 Mail Service Center

Address Line 2

City

Raleigh

State / Province / Region

NC

Postal / Zip Code

27699-1598

Country

USA

2e. Telephone Number: *

(xxx)xxx-xxxx

(919)707-6126

2f. Fax Number:

(xxx)xxx-xxxx

2g. Email Address: *

ekcheely@ncdot.gov

C. Project Information and Prior Project History

1. Project Information

1a. Name of project: *

TIP project R-2527 involves widening existing NC 24-27 from a two-lane facility to a four-lane divided facility with a 46-foot depressed median from the Pee Dee River to the proposed Troy Bypass, west of Troy in Montgomery County. The total length of the proposed project is approximately 8.25 miles long. R-2527 is the eastern half of the NC24/27 Widening extending from Albemarle to the Troy Bypass (R-2530, B-4974 constitute the western half of the widening).

1b. Subdivision name:

(if appropriate)

1c. Nearest municipality / town: *

Troy

2. Project Identification

2a. Property Identification Number:

(tax PIN or parcel ID)

2b. Property size:

(in acres)

2c. Project Address

Street Address

Address Line 2

City

State / Province / Region

Postal / Zip Code

Country

2d. Site coordinates in decimal degrees

Please collect site coordinates in decimal degrees. Use between 4-6 digits (unless you are using a survey-grade GPS device) after the decimal place as appropriate, based on how the location was determined. (For example, most mobile phones with GPS provide locational precision in decimal degrees to map coordinates to 5 or 6 digits after the decimal place.)

Latitude: *

35.3087

ex: 34.208504

Longitude: *

-80.0403

-77.796371

3. Surface Waters

3a. Name of the nearest body of water to proposed project: *

Pee Dee River/Lake Tillery

3b. Water Resources Classification of nearest receiving water: *

WS-IV,B;CA

Surface Water Lookup

3c. What river basin(s) is your project located in? *

Yadkin-PeeDee

3d. Please provide the 12-digit HUC in which the project is located. *

03040104

River Basin Lookup

4. Project Description and History

4a. Describe the existing conditions on the site and the general land use in the vicinity of the project at the time of this application: *

Rural, residential, recreation (Pee Dee River), cultivated land, USFS land.

4b. Have Corps permits or DWR certifications been obtained for this project (including all prior phases) in the past? *

(●) Yes ( ) No ( ) Unknown

If yes, please give the DWR Certification number or the Corps Action ID (exp. SAW-0000-00000).

Issued for western half of widening (R-2530B and B-4974)
USACE Action ID: SAW-2008-02315
NCDWR Project No. 20181416

4f. List the total estimated acreage of all existing wetlands on the property:

1.00

4g. List the total estimated linear feet of all existing streams on the property:

(intermittent and perennial)

7,161

4h. Explain the purpose of the proposed project: *

The purpose of these projects is to improve traffic flow and level of service (LOS) on the section of NC 24-27 between NC 740 in Albemarle to the proposed Troy Bypass, west of Troy, and to maintain a bridge across the Pee Dee River that addresses the needs of highway users.

4i. Describe the overall project in detail, including indirect impacts and the type of equipment to be used: *

The proposed projects involve widening NC 24-27 from NC 740 in Albemarle located in Stanly County to the Proposed Troy Bypass (R-623), west of Troy in Montgomery County. TIP project R-2530B involves widening existing NC 24-27 from west of NC 740 to the Pee Dee River in Stanly County from a two to three-lane facility to a four-lane divided facility. R-2530B will include a 23-foot raised median from NC 740 to SR 1731 (Sweet Home Church Road) and transition to a 46-foot depressed median from east of SR 1731 to the Pee Dee River in Stanly County. Project R-2530B also involves a superstreet design in the areas where curb and gutter is proposed and also in the open shoulder segment at STA 153+00. TIP project B-4974 involves rehabilitating existing Bridge No. 51 over the Pee Dee River on the Stanly / Montgomery County line. TIP project R-2527 involves widening existing NC 24-27 from a two-lane facility to a four-lane divided facility with a 46-foot depressed median from the Pee Dee River to the proposed Troy Bypass, west of Troy in Montgomery County. The total length of the proposed projects is approximately 14.6 miles long. Cranes, bulldozers, barges will be utilized for the construction activities.

5. Jurisdictional Determinations

5a. Have the wetlands or streams been delineated on the property or proposed impact areas? *

(●) Yes ( ) No ( ) Unknown

Comments:

5b. If the Corps made a jurisdictional determination, what type of determination was made? *

(●) Preliminary ( ) Approved ( ) Not Verified ( ) Unknown ( ) N/A

Corps AID Number:

Example: SAW-2017-99999

SAW-2008-02315

5c. If 5a is yes, who delineated the jurisdictional areas?

Name (if known): NCDOT Personnel

Agency/Consultant Company:

Other:

5d. List the dates of the Corp jurisdiction determination or State determination if a determination was made by the Corps or DWR.

Wetland and stream determinations within R-2527 were conducted using the field delineation method outlined in the 1987 Corps of Engineers Wetland Delineation Manual and the 2012 Eastern Mountains and Piedmont Supplement. The projects were initially verified between 2006 and 2008. Ronnie Smith from ACOE and David Wainwright of DWR field reverified the wetlands and surface waters in 2012 through 2014. Eric Alsmeyer from ACOE issued a Verification Letter for the project in May 2021. All jurisdictional resources were reassessed in spring 2024 and a PJD Package will be submitted with this permit modification application.

6. Future Project Plans

6a. Is this a phased project? *

(●) Yes ( ) No

6b. If yes, explain.

The proposed project involves widening NC 24-27 from NC 740 in Albemarle located in Stanly County to the Proposed Troy Bypass (R-623), west of Troy in Montgomery County. This consists of TIP projects R-2530B, B-4974, and R-2527.

R-2530B and B-4974 (first phase) were permitted in 2019. This application is for the second and final phase, R-2527.

R-2530B involves widening existing NC 24-27 from\west of NC 740 to the Pee Dee River in Stanly County from a two to three-lane facility to a four-lane divided facility.
B-4974 involves rehabilitating existing Bridge No. 51 over the Pee Dee River on the Stanly / Montgomery County line.
R-2527 involves widening existing NC 24-27 from a two-lane facility to a four-lane divided facility with a 46-foot depressed median from the Pee Dee River to the proposed Troy Bypass, west of Troy in Montgomery County.

The total length of the proposed projects is approximately 14.6 miles long.
The total length of R-2527 within that stretch is 8.25 miles long.

Are any other NWP(s), regional general permit(s), or individual permits(s) used, or intended to be used, to authorize any part of the proposed project or related activity? This includes other separate and distant crossing for linear projects that require Department of the Army authorization but don't require pre-construction notification.

D. Proposed Impacts Inventory

1. Impacts Summary

1a. Where are the impacts associated with your project? (check all that apply):

☐ Wetlands ☐ Streams-tributaries ☐ Buffers
☐ Open Waters ☐ Pond Construction

E. Impact Justification and Mitigation

1. Avoidance and Minimization

1a. Specifically describe measures taken to avoid or minimize the proposed impacts in designing the project: *

See attached Stormwater Management Plan contained in the Permit Drawings and the attached cover letter.

1b. Specifically describe measures taken to avoid or minimize the proposed impacts through construction techniques: *

See attached Stormwater Management Plan contained in the Permit Drawings and the attached cover letter.

2. Compensatory Mitigation for Impacts to Waters of the U.S. or Waters of the State

2a. Does the project require Compensatory Mitigation for impacts to Waters of the U.S. or Waters of the State?

(•) Yes ( ) No

2c. If yes, mitigation is required by (check all that apply):

[x] DWR [x] Corps

2d. If yes, which mitigation option(s) will be used for this project?

[ ] Mitigation bank [x] Payment to in-lieu fee program [ ] Permittee Responsible Mitigation

4. Complete if Making a Payment to In-lieu Fee Program

4a. Approval letter from in-lieu fee program is attached.

(•) Yes ( ) No

4b. Stream mitigation requested:

(linear feet)

7,161

4c. If using stream mitigation, what is the stream temperature:

warm

NC Stream Temperature Classification Maps can be found under the Mitigation Concepts tab on the Wilmington District's RIBITS website.

4d. Buffer mitigation requested (DWR only):

(square feet)

4e. Riparian wetland mitigation requested:

(acres)

1.0

4f. Non-riparian wetland mitigation requested:

(acres)

4g. Coastal (tidal) wetland mitigation requested:

(acres)

4h. Comments

6. Buffer mitigation (State Regulated Riparian Buffer Rules) - required by DWR

6a. Will the project result in an impact within a protected riparian buffer that requires buffer mitigation? If yes, you must fill out this entire form - please contact DWR for more information.

( ) Yes (•) No

F. Stormwater Management and Diffuse Flow Plan (required by DWR)

*** Recent changes to the stormwater rules have required updates to this section .***

1. Diffuse Flow Plan

1a. Does the project include or is it adjacent to protected riparian buffers identified within one of the NC Riparian Buffer Protection Rules?

( ) Yes (•) No

For a list of options to meet the diffuse flow requirements, click here.

If no, explain why:

2. Stormwater Management Plan

2a. Is this a NCDOT project subject to compliance with NCDOT's Individual NPDES permit NCS000250? *

(•) Yes ( ) No

Comments:

G. Supplementary Information

1. Environmental Documentation

1a. Does the project involve an expenditure of public (federal/state/local) funds or the use of public (federal/state) land? *

(•) Yes ( ) No

1b. If you answered "yes" to the above, does the project require preparation of an environmental document pursuant to the requirements of the National or State (North Carolina) Environmental Policy Act (NEPA/SEPA)? *

(•) Yes ( ) No

1c. If you answered "yes" to the above, has the document review been finalized by the State Clearing House? (If so, attach a copy of the NEPA or SEPA final approval letter.) *

(●) Yes ( ) No

2. Violations (DWR Requirement)

2a. Is the site in violation of DWR Water Quality Certification Rules (15A NCAC 2H .0500), Isolated Wetland Rules (15A NCAC 2H .1300), or DWR Surface Water or Wetland Standards or Riparian Buffer Rules (15A NCAC 2B .0200)? *

( ) Yes (●) No

3. Cumulative Impacts (DWR Requirement)

3a. Will this project (based on past and reasonably anticipated future impacts) result in additional development, which could impact nearby downstream water quality? *

(●) Yes ( ) No

4. Sewage Disposal (DWR Requirement)

4a. Is sewage disposal required by DWR for this project? *

( ) Yes ( ) No (●) N/A

5. Endangered Species and Designated Critical Habitat (Corps Requirement)

5a. Will this project occur in or near an area with federally protected species or habitat? *

(●) Yes ( ) No

5b. Have you checked with the USFWS concerning Endangered Species Act impacts? *

(●) Yes ( ) No

5c. If yes, indicate the USFWS Field Office you have contacted.

Raleigh

5d. Is another Federal agency involved? *

(●) Yes ( ) No ( ) Unknown

What Federal Agency is involved?

USFS

5e. Is this a DOT project located within Division's 1-8? *

(●) Yes ( ) No

5j. What data sources did you use to determine whether your site would impact Endangered Species or Designated Critical Habitat? *

USFWS issued informal concurrence for Schweinitz's sunflower on 4/9/2019 - updated in-season survey were conducted in 2021 and 2023 - no specimens observed - No Effect with habitat.

USFWS issued informal concurrence for Atlantic pigtoe and Green floater on 12/12/2023 - May Affect: Not Likely to Adversely Affect.

USFWS stated that the Tricolored bat was addressed under PCO issued 11/20/2023.

6. Essential Fish Habitat (Corps Requirement)

6a. Will this project occur in or near an area designated as an Essential Fish Habitat? *

( ) Yes (●) No

6b. What data sources did you use to determine whether your site would impact an Essential Fish Habitat? *

NMF

7. Historic or Prehistoric Cultural Resources (Corps Requirement)

Link to the State Historic Preservation Office Historic Properties Map (does not include archaeological data: http://gis.ncdcr.gov/hpoweb/

7a. Will this project occur in or near an area that the state, federal or tribal governments have designated as having historic or cultural preservation status (e.g., National Historic Trust designation or properties significant in North Carolina history and archaeology)? *

(●) Yes ( ) No

7b. What data sources did you use to determine whether your site would impact historic or archeological resources? *

See attached: Archaeology MOA, Archaeology Addendum Letter, Catawba Concurrence Letter, Historical Architecture Memo, USFS Letter of Consent Package, R-2530B, B-4974, R-2527 FONSI, and R-2530B, B-4974, R-2527 ICE Summary.

8. Flood Zone Designation (Corps Requirement)

Link to the FEMA Floodplain Maps: https://msc.fema.gov/portal/search

8a. Will this project occur in a FEMA-designated 100-year floodplain? *

(•) Yes ( ) No

8b. If yes, explain how project meets FEMA requirements:

See attached permit drawings

8c. What source(s) did you use to make the floodplain determination? *

FEMA Floodplain Maps

Miscellaneous

Comments

Please see attached Permit Application Cover Letter for permanent and temporary impacts for this project (See Table 1 for Wetland Impacts, Table 2 for Stream Impacts, and Table 3 for Surface Water Impacts).

Please use the space below to attach all required documentation or any additional information you feel is helpful for application review. Documents should be combined into one file when possible, with a Cover Letter, Table of Contents, and a Cover Sheet for each Section preferred.

Click the upload button or drag and drop files here to attach document

R-2530B B-4974 R-2527 September 27 2024.pdf 86.17MB

File must be PDF or KMZ

Signature

*

[x] By checking the box and signing below, I certify that:

- The project proponent hereby certifies that all information contained herein is true, accurate, and complete to the best of my knowledge and belief'; and
- The project proponent hereby requests that the certifying authority review and take action on this CWA 401 certification request within the applicable reasonable period of time.
- I have given true, accurate, and complete information on this form;
- I agree that submission of this PCN form is a "transaction" subject to Chapter 66, Article 40 of the NC General Statutes (the "Uniform Electronic Transactions Act");
- I agree to conduct this transaction by electronic means pursuant to Chapter 66, Article 40 of the NC General Statutes (the "Uniform Electronic Transactions Act");
- I understand that an electronic signature has the same legal effect and can be enforced in the same way as a written signature; AND
- I intend to electronically sign and submit the PCN form.

Full Name: *

Erin K. Cheely

Signature *

Erin K. Cheely

Date

9/27/2024

Mitigation

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
MARC RECKTENWALD
Director

NORTH CAROLINA
Environmental Quality

September 12, 2024

Mr. Jamie Lancaster, P.E.
Environmental Analysis Unit
North Carolina Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Lancaster:

Subject: Mitigation Acceptance Letter:

R-2527, NC 24 / 27 Improvements from NC 73 to the Troy Bypass (Planning Document for R-2527 also includes R-2530B and B-4974, both let separately), Montgomery County

The purpose of this letter is to notify you that the Division of Mitigation Services (DMS) will provide the compensatory mitigation for the subject project. Based on the updated information supplied by you on September 12, 2024, the impacts are located in CU 03040104 of the Yadkin River basin in the Southern Piedmont (SP) Eco-Region, and are as follows:

Yadkin 03040104 SP	Stream (Feet)			Wetlands (Acres)			Buffer (Sq. Ft.)	
	Cold	Cool	Warm	Riparian	Non-Riparian	Coastal Marsh	Zone 1	Zone 2
Impacts	0	0	7,161.000	1.000	0	0	0	0

*Some of the stream and/or wetland impacts may be proposed to be mitigated at a 1:1 mitigation ratio. See permit application for details.

This mitigation acceptance letter replaces the mitigation acceptance letter issued on October 16, 2018. DMS will commit to implement sufficient compensatory mitigation credits to offset the impacts associated with this project as determined by the regulatory agencies in accordance with the In-Lieu Fee Instrument dated July 28, 2010. If the above referenced impact amounts are revised, then this mitigation acceptance letter will no longer be valid and a new mitigation acceptance letter will be required from DMS.

If you have any questions or need additional information, please contact Beth Harmon at 919-707-8420.

Sincerely,

Elizabeth Harmon

Elizabeth Harmon
DMS NCDOT ILF Coordinator

cc: Mr. Scott Jones, USACE
Ms. Kristi Carpenter, NCDWR
File: R-2527 Revised

4B/4C Minutes

R-2527 MONTGOMERY COUNTY
4B FINAL MEETING MINUTES
December 18th, 2019 1:00 – 4:00 PM

Location: NCDOT Century Center – Structure Design Conference Room

Attendees:

NAME	AGENCY	PHONE	E-MAIL
Felix Davila	FHWA	919-747-7021	felix.davila@dot.gov
Andrew Williams	USACE	919-554-4884	andrew.e.williams2@usace.army.mil
April Norton	NCDWR	919-707-9111	april.norton@ncdenr.gov
Robert Patterson	NCDWR	919-707-3880	robert.patterson@ncdenr.gov
Amy Mathis	US Forest Service	828-259-0548	amy.mathis@usda.gov
Brady Dodd*	US Forest Service		brady.dodd@usda.gov
Michael Turchy	NCDOT EAU-ECAP	919-707-6157	maturchy@ncdot.gov
Shane Petersen	NCDOT EAU-CULT	919-707-6083	spetersen@ncdot.gov
Reuben Blakley	NCDOT Div 8	910-773-8027	rblakley@ncdot.gov
Rex Badgett	NCDOT Div 8	910-773-8016	jsbadgett@ncdot.gov
Craig Lee	NCDOT Hydraulics	919-707-6708	cjlee@ncdot.gov
Susan Locklear	NCDOT Hydraulics	919-707-6777	splocklear@ncdot.gov
Pam Williams	NCDOT PMU	919-707-6608	prwilliams@ncdot.gov
Allison White	NCDOT PMU	919-707-6341	akwhite@ncdot.gov
Melanie Nguyen	NCDOT PMU	919-707-6607	mqnguyen@ncdot.gov
Sarah Kirkpatrick	NCDOT PMU		sgkirkpatrick@ncdot.gov
Reid Robol	VHB	919-754-5005	rrobol@vhb.com
Eric Berger	VHB	919-741-5780	eberger@vhb.com
Frank Fleming	VHB	919-741-5785	ffleming@vhb.com
Andy Young	Stewart	919-866-4803	ayoung@stewartinc.com
Michael Burns	Stewart	919-866-4771	mburns@stewartinc.com

*Attended via Microsoft Teams Call-In

4B Meeting Minutes

Craig Lee welcomed the attendees, a sign-up sheet was circulated (Appendix A), and attendees introduced themselves.

Reid Robol began the meeting with a brief overview of the project's limits including the project ties to the East and West and then proceeded through the plans sheet by sheet.

General comments discussed at various times during the meeting included:

- Mr. Robol presented VHB's pipe burial and pipe outlet protection guidelines and ask for concurrence from the agencies. Generally, the guidance was deemed acceptable, but each site was discussed in turn. This guidance is attached (Appendix B) to the minutes for reference.

- Mr. Williams with the USACE discussed that rip rap embedded in the channel bed will be a permanent impact and would like these areas identified in a table for compensatory mitigation discussions at the 4C meeting.

- Mr. Williams asked if the final design had reduced the impacts from the preliminary numbers. VHB has confirmed the total preliminary permanent impacts as:

    - 1.04 AC of Permanent Wetland Impact
    - 8,068 LF of Permanent Stream Impact
    - 0.45 AC of Permanent Pond Impact

    Final Impact totals will be presented at the 4C meeting.

- Mr. Peterson ask that all archeology sites be shown on all plans and hatched as Environmentally Sensitive Areas.

- Add a Buried or Not buried label to each of the pipes on jurisdictional features.

- USFS generally requested that bottomless culverts and natural channel designed be considered throughout the project where natural channel design would be beneficial and where bottomless culverts would be feasible. USFS also expressed concern on the cumulative impacts of proposed structures and the need to mitigate those impacts on USFS lands.

Sheet 4 - No impacted Resources/No Comments

Sheet 5 - No impacted Resources/No Comments

Sheet 6

- Mr. Robol stated that there is a Jurisdictional designation (JS line) on a UT to Rocky Creek right of +/- 29+00 L that is not labeled. There may be impacts to this stream by

the bore pit required for the 42" WS pipe. Mr. Williams commented that it may be SB-3. Mr. Turchy will confirm.

- Mr. Williams pointed out that SB-4 is not labeled at outfall of 24" RCP (STA. 34+25 L LT). Label will be added.
- There was discussion about the extension of the box culvert with no comments.
- Mr. Fleming expressed concerns about the proposed Hazardous Spill Basin that is in the floodplain of Rocky Creek. The 10-year storm and above will inundate the basin. His concern is that there is a possibility that the basin will be compromised by sediment from receding flood events and therefore will be a maintenance burden on the department. Mr. Fleming asked that the basin be eliminated. Ms. Norton of NCDWR acknowledged the request and asked for more information concerning the biological assessment of Rocky Creek. Mr. Turchy will provide this information. Ms. Norton will respond to the request once she had a chance to review the requested information.
- SB-2 was discussed and rip rap embedment was recommended at the outfall.
- Mr. Robol stated that there is a Jurisdictional designation (JS line) right of 15+00 Y1A that is not labeled. This is Stream-R1. Mr. Robol expects that there will be some temporary impacts associated with construction of the dissipator pad.

Sheet 7 - No impacted Resources/No Comments

Sheet 8- No impacted Resources/No Comments

Sheet 9 - No impacted Resources/No Comments

Sheet 10

- Stream SJ was discussed. USFS Brady Dodd commented that the USFS has concerns about increase in runoff. Mr. Robol answered that the cross drainage and therefore drainage area is not changing and any increase in runoff will be a result of the increase in impervious. The increase in impervious is unavoidable due to the nature of widening the project. Mr. Dodd asked for a Pre/Post analysis. NCDOT agreed to provide an analysis. Mr. Robol stated that the topography would not be agreeable to any detention. This is an area that additional embedment of rip rap in the bed will be considered for stream stability.

Sheet 11

- Mr. Robol discussed Stream SL-A. The pipe extension will not be buried. Embedment is recommended at the outlet. Mr. Williams commented to be sure not to impede aquatic movement at the site
- Division will verify retained pipe conditions prior to 4C.

Sheet 12 - No impacted Resources/No Comments

Sheet 13

- Mr. Turchy will check the Jurisdictional call at the outlet of the existing 18" right of 127+05 L. If the resource is jurisdictional the stream will be labeled. If not, the JS line will be removed.
- There are two wetlands right of 124+00 and 126+00 that are out of the project limits but requires labels. They are wetlands WK and WL respectively.
- The inlet of the proposed 48" was discussed. The pipe will not be buried since located in a wetland. The outlet channel bed was recommended to be embedded with rip rap.

Sheet 14

- Stream SN and the inlet of the proposed 42" was discussed. The inlet will not be buried as proposed.

Sheet 15

- Stream SN was discussed. After further evaluation, a junction box will be added to this crossing on the right fill slope to reduce energy and to decrease the outfall pipe slope.
- Stream SO was discussed without comment.

Sheet 16

- Mr. Williams asked for a detail for "plugging" the existing inlet channel that is being relocated. Detail will be added to the plans.
- US Forest Service requested the department to consider an "open bottom" culvert crossing at this and other major structures. NCDOT will investigate and provide a response by the 4C Meeting.
- Stream SC-1 was discussed and Mr. Dodd asked if any natural channel design was considered in this location. Mr. Robol responded there was a pond located upstream and there was long term stability concerns along with the steepness of the terrain in this area that limited the practicality of natural channel design in this area.

Sheet 17

- Mr. Turchy will review the WEX file versus the FS file and determine the correct upstream limit of jurisdiction for SC-1. Label and/or FS file may need to be adjusted.
- Mr. Robol stated Stream-SC-3 at Sta. 169+00 RT was not labeled on the plans but will be added. No further comments on SC-3.
- The pond left of -L- was discussed. The design is utilizing a rock platted 1.5:1 fill slope to minimize the impact to the earthen dam and emergency spillway to minimize overall impact to the private pond.

Sheet 18 - All resources are outside the construction limits and proposed R/W – No Comments

Sheet 19

- The box culvert extension was discussed. The proposed design was accepted. Mr. Williams added to ensure that aquatic passage is being maintained.
- US Forest Service requested a bottomless structure. VHB stated in this location the existing box culvert is being retained and extended. The existing structure has a floor and will be extended also.

Sheet 20 - No impacted Resources/No Comments

Sheet 21 -

- Stream SP was discussed with no comment. The pipe will not be buried as it is an extension. Add a 'not buried' label to the plans. This outlet streambed will be embedded with rip rap.
- Mr. Robol noted that Wetland WU-2 at 222+50 LT needs a label.

Sheet 22

- Stream SQ was discussed with no comments. After further evaluation, a junction box will be added to this crossing on the right fill slope to reduce energy and to decrease the outfall pipe slope.

Sheet 23

- Stream SR was discussed with no comments. Rip Rap embedment is recommended at the outlet.
- Wetland WZ-1 was discussed and considered a total take. After further evaluation a junction box will be added to the system at 254+00 RT to reduce energy and decrease the outfall pipe slope. Rip Rap on banks only will be maintained.

Sheet 24

- The box culvert extension on stream SE was discussed with no comments. A "Stream Plug" detail will be added.
- Mr. Lee requested that VHB add a profile detail of the culvert extension on the plan sheet and extend the embedded rip rap on outlet of the culvert extension to the limit of where the standard base ditch ties in with Lick Fork Trib 1 (Stream SE)

Sheet 25

- Mr. Williams asked if the impacts to the small pocket wetlands right of L could be eliminated. VHB will investigate with the understanding that the pipes will remain at the bottom of the slope as designed and not perched.

Sheet 26 -No anticipated permanent impacts to Jurisdictional resources – No Comments

Sheet 27

- A "Stream Plug" detail will be added to the plan sheet.

Sheet 28

- Stream SW-B was discussed and agreed to bury the crosspipe and to embed the rip rap in the outlet channel.

Sheet 29 - No anticipated permanent impacts to Jurisdictional resources – No Comments

Sheet 30

- Mr. Turchy will investigate the Jurisdictional call at the outlet of the existing 24" pipe right of ~342+50. The pipe will be not be buried. The outfall will be embedded with rip rap. After further evaluation, a junction box will be added to this crossing on the right fill slope to reduce energy and to decrease the outfall pipe slope.
- US Forest Service requested the use of Natural Stream Design at the inlet of Stream SX. Mr. Williams stated that NCDOT does not like to use NSD techniques in short reaches. Future maintenance of stream is a concern. NCDOT will investigate and provide a response by the 4C Meeting.

Sheet 31

- The box culvert replacement on stream SY-A was discussed with no comments. A "Stream Plug" detail will be added.

Sheet 32 - All resources are outside the construction limits and proposed R/W – No Comments

Sheet 33

- The box culvert replacement of SY-A was discussed with no comment. A "Stream Plug" detail will be added.
- DEQ asked to consider a water quality treatment device adjacent to stream SF-B. NCDOT expressed concern about additional permanent easement on USFS land, inundation from stream SF-B, which leads to maintenance concerns, and access problems. The department will not be providing additional water quality devices in this area.

Sheet 34

- The crosspipe at wetland WEE was discussed and agreed that the 36" pipe will not be buried 0.6'.

Sheet 35

- Stream SZ was discussed. The outlet channel will be embedded with rip rap.

Sheet 36

- The box culvert replacement was discussed on Stream SY-B. Mr. Williams stated the stream length between the existing culvert and existing pipe under the drive that is being bypassed likely will need to be compensated at a 1:1 ratio due to loss of functionality. This can be further discussed at 4C.

Sheet 37 - No impacted Resources/No Comment

Sheet 38

- VHB has requested the permit drawings and permitted impacts to ensure these areas on Sheet 38 have been accounted for from the adjoining R-0623 project. NCDOT will provide.

Sheet 39- No impacted Resources/No Comment

TW 4-6

- Mr. Young of Stewart provided an update on the trackwork design. There will be changes to the access road. Also, it should be noted that the design was altered to eliminate impacts to Stream SF-B by the realignment of the track. No resources will be permanently impacted by the track realignment.

R-2527 MONTGOMERY COUNTY

4C MEETING MINUTES

January 13th, 2021 10:00 AM – 12:00 PM

Location: Online - GoToMeeting

Attendees:

NAME	AGENCY	PHONE	E-MAIL
Felix Davila	FHWA	919-747-7021	felix.davila@dot.gov
Mike Sanderson	NCDOT EPU	919-707-6154	jmsanderson@ncdot.gov
Jeremy Goodwin	NCDOT REU	919-707-2942	jagoodwin@ncdot.gov
Robert Patterson	NCDWR	919-707-3880	robert.patterson@ncdenr.gov
James Lastinger	USACE PM	919-554-4884, ext. 32	James.C.Lastinger@usace.army.mil
Michelle Berry	NCDOT Hydraulics	919-707-6719	mgberry@ncdot.gov
Michael Turchy	NCDOT EAU-ECAP	919-707-6157	maturchy@ncdot.gov
Shane Petersen	NCDOT Archeologist	919-707-6083	spetersen@ncdot.gov
Reuben Blakley	NCDOT Div 8	910-773-8027	rblakley@ncdot.gov
Rob Ridings	NCDENR	919-707-8786	rob.ridings@ncdenr.gov
Christina Bruinsma	PM Geotech	919-707-6878	cmbruinsma@ncdot.gov
Jennifer Hernandez	NCDOT PMU	919-707-7135	jdhernandez@ncdot.gov
Kristy Alford	NCDOT SMU	919-707-6531	kalford@ncodt.gov
Allison White	NCDOT PMU	919-707-6341	akwhite@ncdot.gov
Ali Koucheki	NCDOT Utilities	919-707-6699	akoucheki@ncdot.gov
David Webb	NCDOT Hydraulics	919-707-6731	dswebb1@ncdot.gov
Travis Wilson	NCWRC	919-707-0370	travis.wilson@ncwildlife.org
Michelle Aldridge	USFS	828-257-4259	michelle.aldridge@usda.gov
Jeff Hemphill	NCDOT ECAP	919-707-6126	jhemphill@ncdot.gov
Collin Mellor	NCDOT EPU	919-707-6139	cmellor@ncdot.gov
Benjamin Williamson	NCDOT PMU		Bpwilliamson1@ncdot.gov
Tucker Martin	NCDOT Utilities	919-707-6984	Trmartin1@ncdot.gov
Pam Williams	NCDOT PMU	919-707-6608	prwilliams@ncdot.gov
Reid Robol	VHB	919-754-5005	rrobol@vhb.com
Eric Berger	VHB	919-741-5780	eberger@vhb.com
Frank Fleming	VHB	919-741-5785	ffleming@vhb.com

4C Meeting Minutes

The Interagency Concurrence Point 4C Meeting was held on January 13, 2021 at 10:00 AM via GoToMeeting's webinar. Reid Robol began the meeting by facilitating introductions and gave a brief overview of the project and project limits. He then proceeded to lead in a site by site review of the proposed permit impacts. The following items were addressed:

1. General questions that were asked throughout the project:

- Shane Peterson brought up the archeological sites labeled as Historical Site Boundary on the 4C plans. Further discussion was held regarding how these areas should be labeled. The consensus was for these areas to be labeled 'Environmental Sensitivity Area'. James Lastinger will check on how these should be labeled. Michael Turchy stated to not to use the initials ESA on permit drawings and to spell it out.

- Michelle Aldridge referenced previous USFS coordination with NCDOT concerning eight specific sites where natural channel design was desired. Ms. Aldridge confirmed that the letter received from Pam Williams regarding these specified sites was acceptable to the USFS. Ms. Aldridge asked for USFS to be more involved early in the process for future projects with the Department.

- On Sheet 4 of 91 – Mr. Lastinger asked about why the Hazardous Spill Basin (HSB) that was near Rocky Creek was removed since the 4B meeting. Mr. Robol explained that it was originally added because it is in a critical area due to the Lake Tillary watershed. However, it was removed because it would not function correctly due to the Rocky Creek overflow. There is another HSB on the northeast quadrant of the sheet that is to be left as is.

- On Sheet Permit drawing Sheet 72 of 91 – Mr. Lastinger asked if Andy Williams provided the JD for this site. There is concern that the stream called out as "Not Jurisdictional" in the northwest quad of the triple barrel culvert may be JS. Jeff Hemphill stated that the feature was re-verified in 2012 and it remained non-jurisdictional. Mr. Hemphill will investigate this and follow up. There was also discussion on the bar downstream of the triple barrel. Mr. Robol stated this was considered during the outlet channel design.

- Mr. Lastinger asked if this project was in the merger process and if it will require an individual permit. Pam Williams answered the it will be in the merger process and going to be a permit modification. Mr. Turchy responded that R0623, R2527, and R2530B were previously permitted together and that preliminary permits were submitted for R2527. This project will be handled with a permit modification.

- Mr. Lastinger asked when the permit mod application is expected to be submitted. Pam Williams responded that NCDOT will be aiming for a spring 2021 submittal. Division 8 is requesting to have permits in place before Utility relocation starts. Allison White stated Let date is July 19, 2022

2. Review of Stormwater Management Plan (SMP) and Permit Drawings
   - Mr. Robol asked if there were any questions regarding the SMP and the Pipe burial sheet. There were no comments on the SMP or Pipe burial sheet.
   - Permit Sheet 4 of 91
     - Site 1 (Wetland WF)
       - Mr. Robol asked if the middle portion of Wetland WF should be considered an impact. Mr. Lastinger stated no total take is needed. Permit site is to be left as is.
     - Site 2 (Stream SB-3) and Site 4 (Stream SB-1) – Replacing 2 @ 9' x 7' RCBC with 2 @ 10' x 10' RCBC (Buried 1.0'). At 4B, this culvert was to be retained and extended but it has been revised due to existing culvert conditions at the request of the division.
       - No Comment
     - Site 3 (Wetland WE)
       - Mr. Robol stated a revision was needed to change the mechanized clearing to fill in wetland to create a total take at this site.
     - Site 5 (Stream SB-2) and Site 6 (Stream SB-4) – Replacing 2, 24" RCPs with a 54" Trenchless Installation Pipe
       - No Comment
   - Permit Sheet 9 of 91

- Site 7 (Stream SJ) – Replacing 2, 24” CMPs with 36” Trenchless Installation Pipe
    - No Comment

- Permit Sheet 11 of 91
    - Site 8 (Wetland WH)
        - No Comment
    - Site 9 (Wetland WF)
        - No Comment
    - Site 10 (Stream SL-A) – 42” RCP to be retained and extended
        - Mr. Robol asked about extending the TS line to the Easement lines and there were no comments. To be left as is.
- Permit Sheet 14 of 91
    - Site 11 (Wetland WR)
        - No Comment
    - Site 12 (Stream SM-1) and Site 15 (Stream SM-2) – Replacing 30” RCP with 48” Trenchless Installation Pipe
        - No Comment
    - Site 13 (Wetland WP)
        - Shane Peterson pointed out there was an archeological site of concern (environmentally sensitive area) on plansheet 13 but it is outside of the controlled access. There were no comments on permit Site 13.
    - Site 14 (Wetland WM)
        - No Comment
    - Site 16 (Wetland WN)
        - No Comment
- Permit Sheet 19 of 91
    - Site 17 (Stream SN) – Replacing 30” RCP with 42” Trenchless Installation Pipe
        - No Comment
    - Site 18 (Wetland WV)
        - No Comment

- Permit Sheet 22 of 91
    - Site 19 (Wetland WS)
        - No Comment
    - Site 20 (Stream SO-1) and Site 22 (Stream SO) – Replacing 30" RCP with 42" Trenchless Installation Pipe
        - No Comment
    - Site 21 (Wetland WU)
        - No Comment
- Permit Sheet 26 of 91
    - Site 23 (Stream SC) and Site 24 (Stream SC-1) – Replacing 60" RCP with 1 @ 7' x 8' RCBC with Beveled HW (Buried 1.0')
        - No comment
- Permit Sheet 29 of 91
    - Site 25 (Stream SC-3) – Replacing 24" RCP with 36" Trenchless Installation Pipe
        - No Comment
    - Site 26 (Wetland WT)
        - No Comment
    - Site 27 (Pond)
        - No Comment
    - Site 28 (Stream SC-2) – Stream is impacted due to the proposed roadway embankment and will be replaced with a lateral base ditch
        - Mr. Robol stated the 4C package previously distributed depicted this as site 60 but has been corrected site 28. No other comments.
- Permit Sheet 33 of 91
    - Site 29 (Stream SD) and Site 30 (Stream SD-1) – Replacing 2 @ 10' x 7' RCBC with 2 @ 14' x 9' RCBC (Buried 1.0' in West Barrel and Buried 2.0' in East Barrel). At 4B, this culvert was to be retained and extended but it has been revised due to existing culvert conditions at the request of the division.

        - Rob Ridings noted that the lateral ditch on the northwest side of the culvert needs to be connected to the stream. There were no comments on the permit impacts shown.

- Permit Sheet 36 of 91
    - Site 31 (Wetland WU-2)
        - Mr. Lastinger commented to revise the inlet channel (Left of L) to Fill in Wetlands and Mechanized Clearing outside of the proposed channel.
    - Site 32 (Stream SP) – Replacing 60" RCP with 66" Trenchless Installation Pipe. At 4B, this pipe was to be retained and extended but it has been revised due to existing pipe conditions at the request of the division.
        - No Comment
    - Site 33 (Wetland WX)
        - No Comment
- Permit Sheet 39 of 91
    - Site 34 (Stream SQ) – Replacing 18" RCP System with 24" RCP-III System
        - No Comment
- Permit Sheet 42 of 91
    - Site 35 (Stream SR) – Replacing 24" RCP with 36" RCP-III System
        - No Comment
    - Site 36 (Wetland WZ-1)
        - No Comment
    - Site 37 (Stream SS-1) – Replacing 30" RCP with 30" RCP System
        - No Comment
- Permit Sheet 44 of 91
    - Site 38 (Stream SU) – Rerouted though a 60" Trenchless Installation Pipe
        - No Comment
    - Site 39 (Stream SE) – Replacing 2 @ 7' x 7' RCBC with 2 @ 7' x 9' RCBC (Buried 1.0'). At 4B, this culvert was to be retained and extended but it has been revised due to existing culvert conditions at the request of the division.

        - No Comment
- Permit Sheet 47 of 91
    - Site 40 (Wetland WKK)
        - Mr. Robol asked if considering this wetland fully impacted was appropriate. Mr. Lastinger responded that he agreed the impacts as shown. There were no further comments.
    - Site 41 (Wetland WMM)
        - No Comment
    - Site 42 (Wetland WLL)
        - No Comment
- Permit Sheet 52 of 91
    - Site 43
        - Mr. Robol explained that this site has been removed from the plans. It will also be noted on the Impact Summary Sheet.
    - Site 44 (Stream SF-A) and Site 45 (Stream SF-A1)– Replacing 60" RCP with 1 @ 8' x 10' RCBC (Buried 1.0')
        - No Comment
    - Site 46 (Wetland WNN)
        - No Comment
- Permit Sheet 56 of 91
    - Site 47 (Stream SW-B) – Replacing 24" RCP with 42" Trenchless Installation Pipe
        - No Comment
    - Site 48 (Wetland WHH)
        - No Comment
- Permit Sheet 59 of 91
    - Site 49 (Wetland WFF)
        - No Comment
- Permit Sheet 63 of 91

- Site 50 (Stream SX) – Replacing a 24” RCP with a 36” RCP-III. This then flows into an existing 36” RCP this is being replaced with a 60” Trenchless Installation Pipe
    - No Comment
- Site 51 (Wetland WGG)
    - No Comment
- Site 52 (Wetland WPP)
    - No Comment

- Permit Sheet 69 of 91
    - Site 53 (Stream SY-A) – Replacing 1 @ 7’ x 5’ RCBC with 1 @ 8’ x 10’ RCBC (Buried 1.0’)
        - No Comment
- Permit Sheet 72 of 91
    - Site 53 (Stream SY-A) – Replacing 1 @ 7’ x 5’ RCBC with 1 @ 8’ x 10’ RCBC (Buried 1.0’) that flows into a proposed standard base ditch
        - No Comment
    - Site 54 (Stream SF-B) – Replacing 3 @ 9’ x 11’ RCBC with 3 @ 14’ x 12’ RCBC (Buried 1.0’ in East and Middle Barrel and Buried 2.0’ in West Barrel). At 4B, this culvert was to be retained and extended but it has been revised due to existing culvert conditions at the request of the division.
        - Mr. Ridings asked about the bar downstream Mr. Robol explained that VHB has investigated that already and no further action is needed.
- Permit Sheet 76 of 91
    - Site 55 (Wetland WEE)
        - No Comment
- Permit Sheet 79 of 91
    - Site 56 (Wetland NEW1)
        - This site has been removed as it is anticipated there will be no impact to the wetland created by the overhead utility. This will be noted on the Impact Summary Sheet.

- Site 57 (Wetland WXX)
    - No Comment

- Permit Sheet 82 of 91
    - Site 58 (Wetland WCC)
        - Mr. Robol stated site 58 will be revised from mechanized clearing to permanent fill in wetlands.
    - Site 59 (Stream SY-B) – Replacing 1 @ 8’ x 8’ RCBC with 1 @ 9’ x 11’ (Buried 1.0’)
        - No comment
- Permit Sheet XX of 91 (PSH 38) – This sheet was not included in the original 4C set. This will be added to the set as 84A.
    - Site 60 (Wetland WBB)
        - This site was previously permitted under the project R-0623 and these impacts are shown in green. The previously constructed drainage for R-0623 is shown in dashed lines and additional impacts were shown for the placement of the Junction Box with Manhole and 18" RCP extension at +/- Sta. 450+00 -L- LT. It was agreed that the impacts shown on the R-2527 4C set were acceptable and no additional impacts were necessary for the proposed R-2527 work to tie in with the previously permitted R-0623 project. Ali Koucheki asked if any proposed drainage work would impact the water line shown on the left side of the project and Mr. Robol explained that at this time there are no proposed impacts to the waterline.

3. Action Items

- Please see previous sections for action items.

Meeting adjourned at 12:00 PM

Permit Drawings

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.08; Released April 2018)

General Project Information

WBS Element:	35572.1.1	**TIP Number:**	R-2527	**Project Type:** Roadway Widening	**Date:** 7/12/2024
NCDOT Contact:	Brook Anderson, PE	**Contractor / Designer:**	Reid B. Robol, PE		
Address:	1000 Birch Ridge Drive Raleigh, NC 27610	**Address:**	940 Main Campus Drive Suite 500 Raleigh, NC 26060		
Phone:	919-707-6706	**Phone:**	919-754-5005		
Email:	beanderson1@ncdot.gov	**Email:**	rrobol@vhb.com		
City/Town:	PEE DEE	**County(ies):**	Montgomery		
River Basin(s):	Yadkin-Pee Dee	**CAMA County?**	No		
Wetlands within Project Limits?	Yes				

Project Description

Project Length (lin. miles or feet):	8.253 Miles	**Surrounding Land Use:**	Forest, agricultural, rural residentail
	Proposed Project		**Existing Site**
Project Built-Upon Area (ac.)	232.0 ac.		160.0 ac.
Typical Cross Section Description:	4 @ 12 ft lanes with 4' paved shoulder and 6-9' grass shoulder. 42' grass median seperating the east and west bound lanes.		2 @ 11' lanes with 2' paves shoulders.
Annual Avg Daily Traffic (veh/hr/day):	Design/Future: 14535 Year: 2041		Existing: 11839 Year: 2021
General Project Narrative: (Description of Minimization of Water Quality Impacts)	Project R-2527 invloves the widening of NC 24-27, east of NC 73 to the Troy Bypass, from 2 lanes to 4 lanes with a grass median in-between. This project is located in the Uwharrie National Forest in Montgomery County, North Carolina. There are multiple jurisdictional feature that are being impacted but these were minimized whenever possible by using steeper side slopes at 2:1. Rock Plated side slopes at 1.5:1 were utilized from -L- 167+50 to 169+50 LT to minimize pond impacts adjacent to the project. Existing drainage patterns were maintained to best extent practical. Construction phasing and traffic control considerations were considered when laying out new culverts to reduce construction time. Non-symmetric widening was implemented in areas to reduce impacts to wetlands and jurisdictional streams. Bulb-outs were shifted where possible to avoid additional stream and wetland impacts. Grass swales were used where possible. All grass swale lengths exceed the minimum length guidance. Directly connected impervious surfaces were minimized where possible. Runoff from road in shoulder section were designed to drain through grassed ditches in median and outside (cut and lateral ditches) prior to outfall connection. Drop boxes were used in multiple locations to dissipate energy and decrease system outlet velocities draining toward wetlands and streams. Erosion and sediment control devices such as silt fence, wattles, rock checks, stilling basins, special stilling basins, temporary silt ditches, and impervious dikes will be utilized to minimize sediment leaving the site during and after construction. Sensitive area soil stabilization timeframes will be used to cover disturbed areas to minimize sedimentation. All outfalls were stabilized with an energy dissipator basin or rip rap dissipator pad to promote diffuse flow and reduce velocity.		

Waterbody Information

Surface Water Body (1):	Rocky Creek (West)	**NCDWR Stream Index No.:**	13-8-(0.5)		
NCDWR Surface Water Classification for Water Body	**Primary Classification:**	Water Supply IV (WS-IV)			
	Supplemental Classification:	None			
Other Stream Classification:	None				
Impairments:	None				
Aquatic T&E Species?	No Comments:				
NRTR Stream ID:	SB-1			**Buffer Rules in Effect:**	N/A
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)	
(If yes, provide justification in the General Project Narrative)					

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.08; Released April 2018)

WBS Element: 35572.1.1 **TIP No.:** R-2527 **County(ies):** Montgomery

Additional Waterbody Information

Surface Water Body (2):	Dumas Creek		**NCDWR Stream Index No.:**	13-16-1		
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C			
		Supplemental Classification:				
Other Stream Classification:	None					
Impairments:	None					
Aquatic T&E Species?	No	Comments:				
NRTR Stream ID:	SC			**Buffer Rules in Effect:**	N/A	
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A	
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)		
(If yes, provide justification in the General Project Narrative)						

Surface Water Body (3):	Clarks Creek		**NCDWR Stream Index No.:**	13-16		
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C			
		Supplemental Classification:				
Other Stream Classification:	None					
Impairments:	None					
Aquatic T&E Species?	No	Comments:				
NRTR Stream ID:	SD			**Buffer Rules in Effect:**	N/A	
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A	
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)		
(If yes, provide justification in the General Project Narrative)						

Surface Water Body (4):	Lick Fork		**NCDWR Stream Index No.:**	13-16-4		
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C			
		Supplemental Classification:				
Other Stream Classification:	None					
Impairments:	None					
Aquatic T&E Species?	No	Comments:				
NRTR Stream ID:	SF-A			**Buffer Rules in Effect:**	N/A	
Project Includes Bridge Spanning Water Body?		**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A	
Deck Drains Discharge Over Water Body?		(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)		
(If yes, provide justification in the General Project Narrative)						

Surface Water Body (5):	Rocky Creek (East)		**NCDWR Stream Index No.:**	13-25-30-(0.3)		
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C			
		Supplemental Classification:				
Other Stream Classification:	None					
Impairments:	None					
Aquatic T&E Species?	No	Comments:				
NRTR Stream ID:	SF-B			**Buffer Rules in Effect:**	N/A	
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A	
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)		
(If yes, provide justification in the General Project Narrative)						

North Carolina Department of Transportation

Highway Stormwater Program
STORMWATER MANAGEMENT PLAN
FOR NCDOT PROJECTS

(Version 2.08; Released April 2018)

WBS Element:	35572.1.1	TIP No.:	R-2527	County(ies):	Montgomery	Page	3	of	4

Additional Waterbody Information

Surface Water Body (6):	Rocky Creek (East)		**NCDWR Stream Index No.:**	13-25-30-(0.5)			
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C				
		Supplemental Classification:	High Quality Waters (HQW)				
Other Stream Classification:	None						
Impairments:	None						
Aquatic T&E Species?	No	Comments:					
NRTR Stream ID:	SF-B			**Buffer Rules in Effect:**	N/A		
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A		
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)			
(If yes, provide justification in the General Project Narrative)							

Surface Water Body (7):	Smith Branch		**NCDWR Stream Index No.:**	13-25-30-1			
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C				
		Supplemental Classification:					
Other Stream Classification:	None						
Impairments:	None						
Aquatic T&E Species?	No	Comments:					
NRTR Stream ID:	SY-B			**Buffer Rules in Effect:**	N/A		
Project Includes Bridge Spanning Water Body?	No	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A		
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)			
(If yes, provide justification in the General Project Narrative)							

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.08; Released April 2018)

WBS Element: 35572.1.1 **TIP No.:** R-2527 **County(ies):** Montgomery

Level Spreaders, Hazardous Spill Basins, and Forebays

Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Level Spreader, Hazardous Spill Basin, or Forebay?	Drainage Area (ac)	New Built-Upon Area (ac)	Required / Minimum Treatment			Treatment Achieved		BMP Associated w/ Buffer Rules?
6	-L- 36+30 LT 35.30860, -80.05895	(1)Rocky Creek (West)	Hazardous Spill Basin	3.40	0.16	2yr, tc=10 min, td= 5 min storm runoff + 1,550 cf (cf)	6992.0	cf	9728.0	cf	N/A

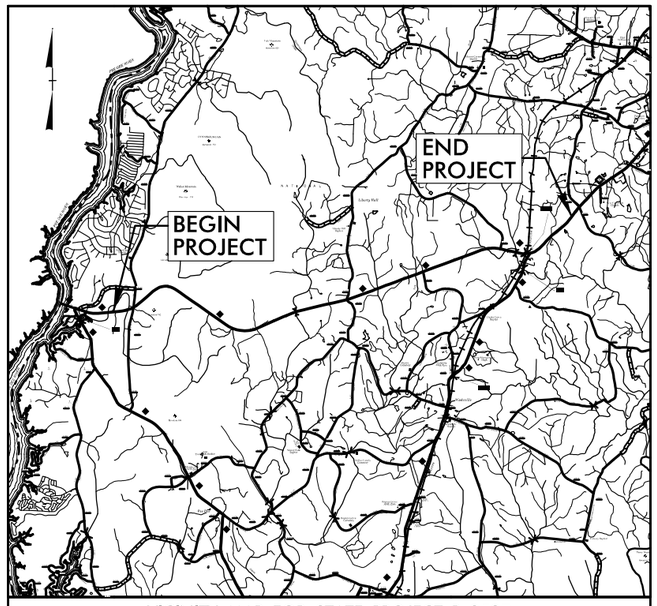
*Hazardous spill basins are pollution prevention measures designed for spill containment rather than stormwater treatment. Under Required / Minimum Treatment and Treatment Achieved, provide the minimum required volume and the actual HSB volume, respectively. Refer to the NCDOT Stormwater Best Management Practices Toolbox (2014) for design guidance.

Additional Comments

09/08/99

TIP PROJECT: R-2527

CONTRACT:



VICINITY MAP FOR STATE PROJECT R-2527

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MONTGOMERY COUNTY

LOCATION: NC 24-27 FROM NC 73 TO THE TROY BYPASS

TYPE OF WORK: GRADING, PAVING, DRAINAGE, STRUCTURE, CULVERTS, AND RAILROAD TRACKWORK

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2527	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
35572.1.1	N/A	P.E.
35572.2.1	N/A	RIGHT OF WAY
35572.2.3	N/A	UTILITIES

90% PLANS

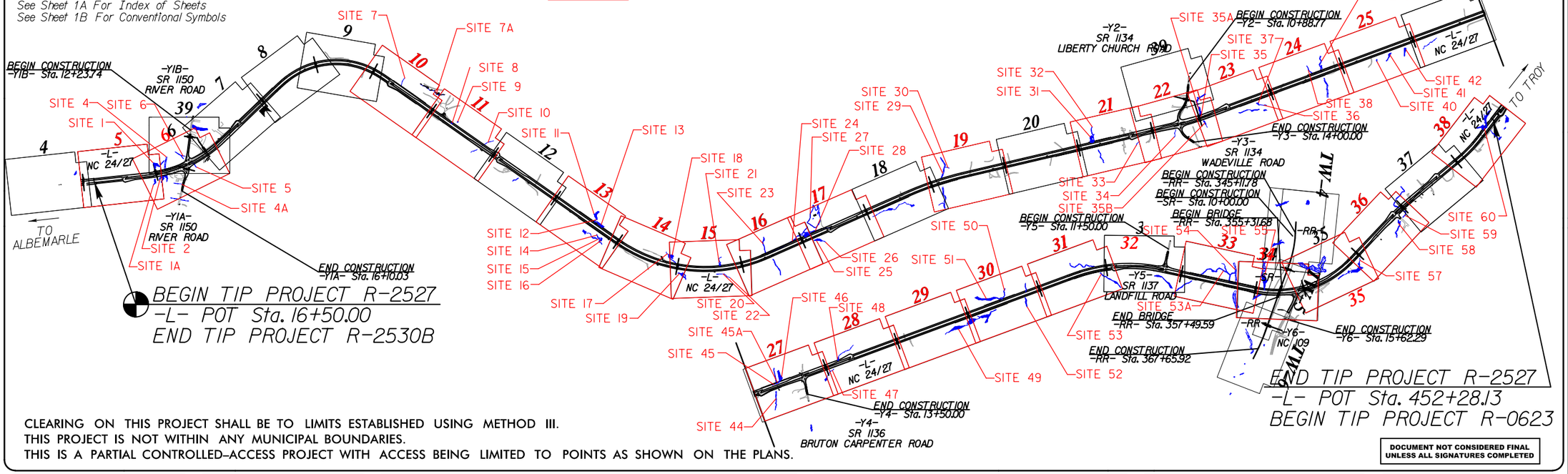
PERMIT DRAWING
SHEET 1 OF 91

WETLAND AND SURFACE WATER IMPACTS PERMIT

= SHEETS WITH IMPACTS

NAD 83/NA 2011

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols



CLEARING ON THIS PROJECT SHALL BE TO LIMITS ESTABLISHED USING METHOD III.
THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.
THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON THE PLANS.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

PLANS: 50' 25' 0 50' 100'

PROFILE (HORIZONTAL): 50' 25' 0 50' 100'

PROFILE (VERTICAL): 10' 5' 0 10' 20'

DESIGN DATA

ADT 2021 = 11,839
ADT 2041 = 14,535
K = 9%
D = 55%
T = 14 % *
V = 60 MPH
* TTST = 8% DUAL 6%
FUNC CLASS = RURAL MINOR ARTERIAL

REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2527	=	8.253 mi.
LENGTH STRUCTURES TIP PROJECT R-2527	=	0.000 mi.
TOTAL LENGTH TIP PROJECT R-2527	=	8.253 mi.

Prepared in the Offices of:

STEWART
333 S. WEST ST, STE 1100
RALEIGH, NC 27603
T 919.380.8750
NC# License # C-0355
www.stewartinc.com
PROJECT # 8135.00.03

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
FEBRUARY 27, 2019

LETTING DATE:
SEPTEMBER 15, 2026

ANDY YOUNG, PE
PROJECT ENGINEER

MICHAEL BURNS, PE
PROJECT DESIGN ENGINEER

PAMELA R. WILLIAMS
NCDOT CONTACT

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

4:40:40 PM
R:\Hydraulics\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_TSH.dgn
jhunt

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
R-2527	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART — firm License No. C-1851, 223 S. West St., Suite 1100, Raleigh, NC 27603, T: 919.380.8750, www.wbstewartPA.com

vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 1A OF 91

NAD 83/NA 2011

DETAIL 3
BERM "V" DITCH
(Not to Scale)
Natural Ground, 2:1, D, b, RDWY, 2:1, Geotextile
Min. D=1.0 Ft.
b=5.0 Ft.
Type of Liner= CLASS B RIP RAP
FROM STA. 10+88 TO STA. 13+50 -L REV- RT

DETAIL 53
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 2:1, D, 4:1 or Flatter, Front Ditch Slope
Min. D=1.0 Ft.
FROM STA. 11+47 TO STA. 13+00 -L REV- RT

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

SITE 1

SITE 1A

WETLAND WZZ

MATCH TO SHEET 4 -L- STA. 14+50.00

MATCH TO SHEET 6 -L REV- STA. 16+00.00

R-2530B TO BE CONSTRUCTED BY OTHERS

UWHARRIE MARINE SALES & SERVICE LLC
DB 539 PG 035

UWHARRIE MARINE SALES & SERVICE LLC

(190) ALD L PARTRIDGE DB 568 PG 515

(191)

(001A) KENNETH R FURR BY WILL (193)

(2) SAMUEL HORACE MCcALL III DB 244 PG 695 (195)

(192) TOMMY A BLAKE
TOMMY A BLAKE DB 246 PG 036

(1) CHARLES R MANESS DB 285 PG 104 (194)

CHARLES R. MANESS AND WIFE BETTY L. MANESS

ARCHAEOLOGICAL SITE (TYP)

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

CLEAN OUT PIPE

COLLAR AND EXTEND EXIST 18" TO PROP 2GI

TIE TO TIP PROJECT R-2530B

TIE 2GI INTO EXIST 18"

SPECIAL CUT DITCH SEE DETAIL 53

BERM V DITCH W/CLASS B RIP RAP SEE DETAIL 3 EST 100 TONS EST 285 SY GEOTEXTILE

BEGIN SBG +46 LT

50′ 0′ 100′ GRAPHIC SCALE

16.7′ 0′ 33.3′ INSET GRAPHIC SCALE

FOR INTERSECTION DETAIL,SEE SHEET 2B-1

FOR -L- PROFILE,SEE SHEET 42

FOR -L_REV- PROFILE,SEE SHEET 65

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

4:41:46 PM
R:\Projects\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_PSH05.dgn
gpowdrill

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
R-2527	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART — firm License No. C-1851, 223 S. West St., Suite 1100, Raleigh, NC 27603, T. 919.380.8750, www.wbstewartPG.com

VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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PERMIT DRAWING SHEET 1B OF 91

NAD 83/NA 2011

DETAIL 3
BERM "V" DITCH
(Not to Scale)
Natural Ground, 2:1, D, b, 2:1, RDWY, Geotextile
Min. D=1.0 Ft.
b=5.0 Ft.
Type of Liner= CLASS B RIP RAP
FROM STA. 10+88 TO STA. 13+50 -L REV- RT

DETAIL 53
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 2:1, D, 4:1 or Flatter, Front Ditch Slope
Min. D=1.0 Ft.
FROM STA. 11+47 TO STA. 13+00 -L REV- RT

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

SITE 1

SITE 1A

WETLAND WZZ

MATCH TO SHEET 4 -L- STA 14+50.00

MATCH TO SHEET 6 -L REV- STA 16+00.00

R-2530B TO BE CONSTRUCTED BY OTHERS

TIE TO TIP PROJECT R-2530B

CONVERT DI TO JB w/MH

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

CLEAN OUT PIPE

COLLAR AND EXTEND EXIST 18" TO PROP 2GI

TIE 2GI INTO EXIST 18"

SPECIAL CUT DITCH SEE DETAIL 53

BERM V DITCH W/CLASS B RIP RAP SEE DETAIL 3 EST 100 TONS EST 285 SY GEOTEXTILE

N 83° 47' 33.4" E -L-

UWHARRIE MARINE SALES & SERVICE LLC
DB 539 PG 035

UWHARRIE MARINE SALES & SERVICE LLC

KENNETH R FURR BY WILL

SAMUEL HORACE MCCALL III
DB 244 PG 695

TOMMY A BLAKE
DB 246 PG 036

CHARLES R. MANESS AND WIFE BETTY L. MANESS
CHARLES R MANESS
DB 285 PG 104

50' 0' 100'
GRAPHIC SCALE

16.7' 0' 33.3'
INSET GRAPHIC SCALE

FOR INTERSECTION DETAIL,SEE SHEET 2B-1

FOR -L- PROFILE,SEE SHEET 42

FOR -L_REV- PROFILE,SEE SHEET 65

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

4:45:01 PM
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gpvarela

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
R-2527	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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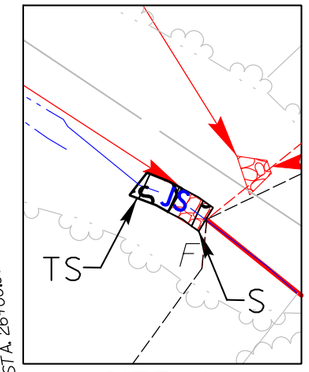
PERMIT DRAWING SHEET 2 OF 91



SITE 4A

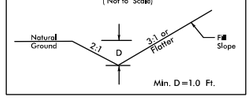
16.7′ 0′ 33.3′

INSET GRAPHIC SCALE

50′ 0′ 100′

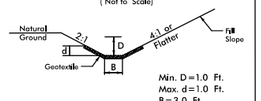
GRAPHIC SCALE

DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



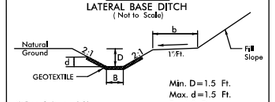
FROM STA. 11+50 TO STA. 13+92 –Y1A REV– LT
FROM STA. 12+15 TO STA. 13+75 –Y1A REV– RT

DETAIL 2
SPECIAL LATERAL BASE DITCH
(Not to Scale)



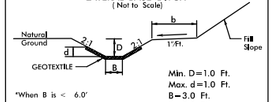
Type of Liner= CLASS I RIP RAP
FROM STA. 23+50 TO STA. 27+50 –L REV– RT

DETAIL 19
LATERAL BASE DITCH
(Not to Scale)



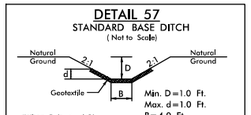
Type of Liner= Class I Rip-Rap
FROM STA. 16+32 TO STA. 17+33 –L REV– RT

DETAIL 45
LATERAL BASE DITCH
(Not to Scale)



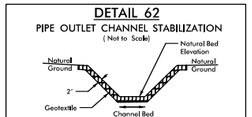
Type of Liner= CLASS I RIP RAP
FROM STA. 23+09 TO STA. 23+50 –L REV– RT

DETAIL 57
STANDARD BASE DITCH
(Not to Scale)



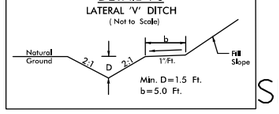
Type of Liner= CLASS I RIP RAP
FROM STA. 17+17 TO STA. 17+58 –Y1B REV– RT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)



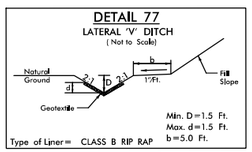
STA. 13+91 –Y1A REV– RT

DETAIL 76
LATERAL 'V' DITCH
(Not to Scale)



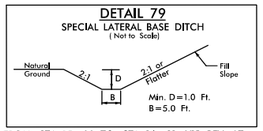
FROM STA. 10+73 TO STA. 11+50 –Y1A REV– LT

DETAIL 77
LATERAL 'V' DITCH
(Not to Scale)



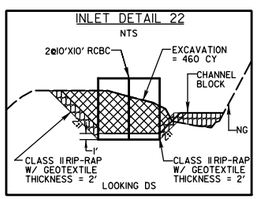
Type of Liner= CLASS B RIP RAP
FROM STA. 22+50 TO STA. 23+10 –L REV– RT

DETAIL 79
SPECIAL LATERAL BASE DITCH
(Not to Scale)

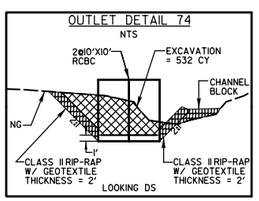


FROM STA. 15+00 TO STA. 16+91 –Y1B REV– LT
FROM STA. 23+18 TO STA. 25+00 –L REV– LT

INLET DETAIL 22
NTS



OUTLET DETAIL 74
NTS



NAD 83/NA 2011

MATCH TO SHEET 39 –Y1B– STA 13+50.00

MATCH TO SHEET 5 –L REV– STA 16+00.00

MATCH TO SHEET 7 –L REV– STA 26+00.00

SITE 1 · SITE 2 · SITE 4 · SITE 4A · SITE 5 · SITE 6

(2) SAMUEL HORACE MCCALL, III AND WIFE LYNN CORDES MCCALL — WETLAND WF

(3) MCRAE INDUSTRIES, INC.

(4) BLAKE TOMMY AND KENNETH FURR

(5) OHM2005, INC., A NORTH CAROLINA CORPORATION

(6) OWNER UNKNOWN

(7) FREDA M. LEE HARRIS

(8) JOHN FARLEY HALL, JR. AND WIFE, PHYLISS DOREEN HALL

(49) TONY L. BURRIS AND WIFE, CHARLENE BURRIS — STREAM SB–1

(50) ROBIN P. LEMONS

CHARLES R. MANESS AND WIFE BETTY L. MANESS — WETLAND WYA

STREAM SB–1 · STREAM SB–2 · STREAM SB–4 · STREAM R–1

CLASS II RIP RAP ON BANKS ONLY EST 390 TONS EST 515 SY GEOTEXTILE SEE DETAIL 74

STANDARD BASE DITCH W/CLASS I RIP RAP SEE DETAIL 57 SLOPE=1.5% EST 95 TONS EST DDE=170 CY

CLASS B RIP RAP EST 5 TONS EST 14 SY GEOTEXTILE

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

SLUICE GATE

SPECIAL LATERAL BASE DITCH TO BE UTILIZED AS A HAZARDOUS SPILL BASIN SEE DETAIL 79

2@10'x10' RCBC

BURIED 1 RCP

15" W/ELBOWS

2GI

15" RCP IN 10' FDPS

END SBG +50 LT

REMOVE 2' FDPS

REMOVE 4' FDPS

REMOVE 2' FDPS

REMOVE 2' FDPS

REMOVE

REMOVE

REMOVE

5/14/99

PERMIT DRAWING SHEET 3 OF 91

DENOTES MECHANIZED CLEARING

DENOTES IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

25' 0' 50'
GRAPHIC SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2527	6

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

STEWART
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Suite 1100
Raleigh, NC 27603
P: 919.380.8750
www.stewartinc.com

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VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
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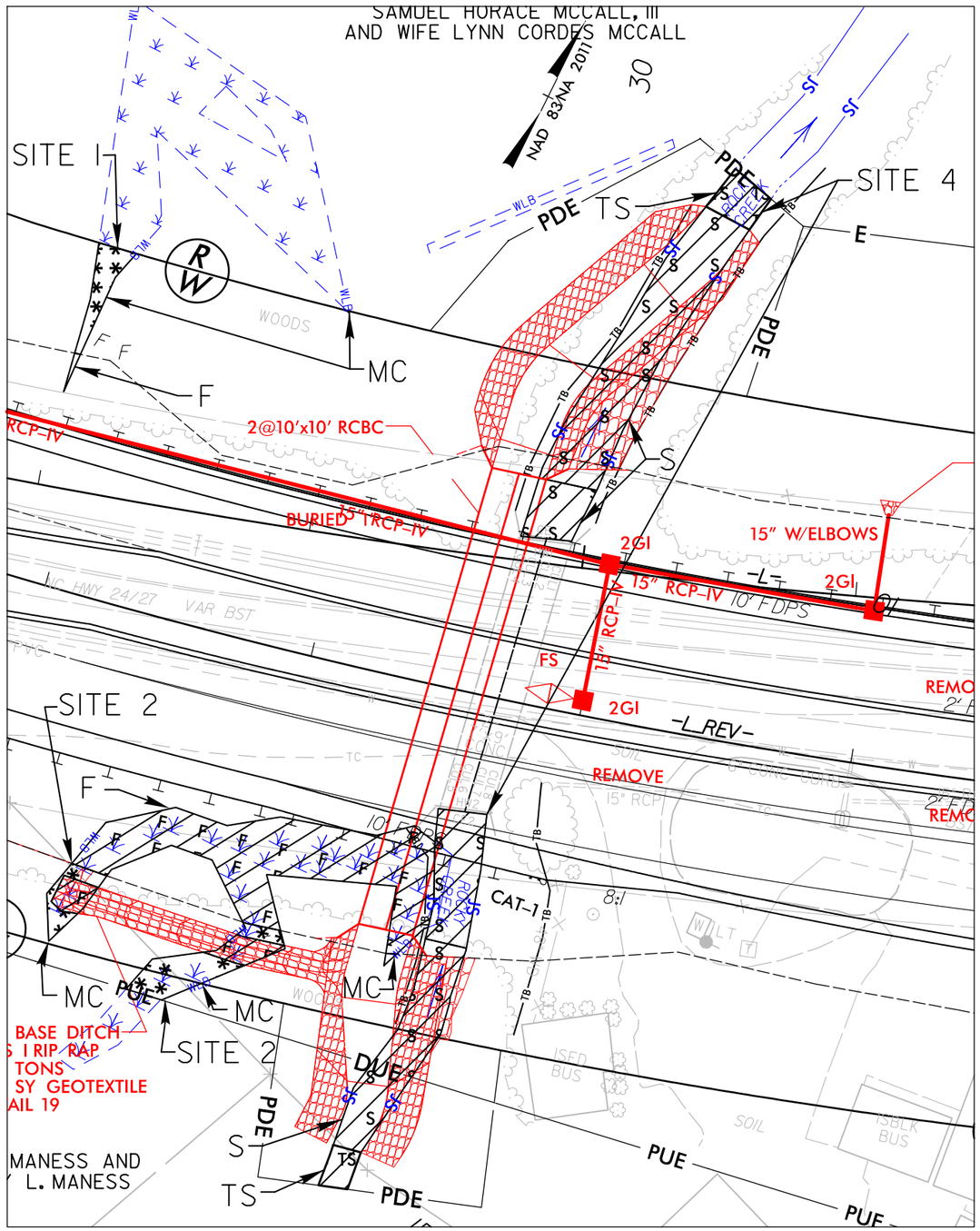
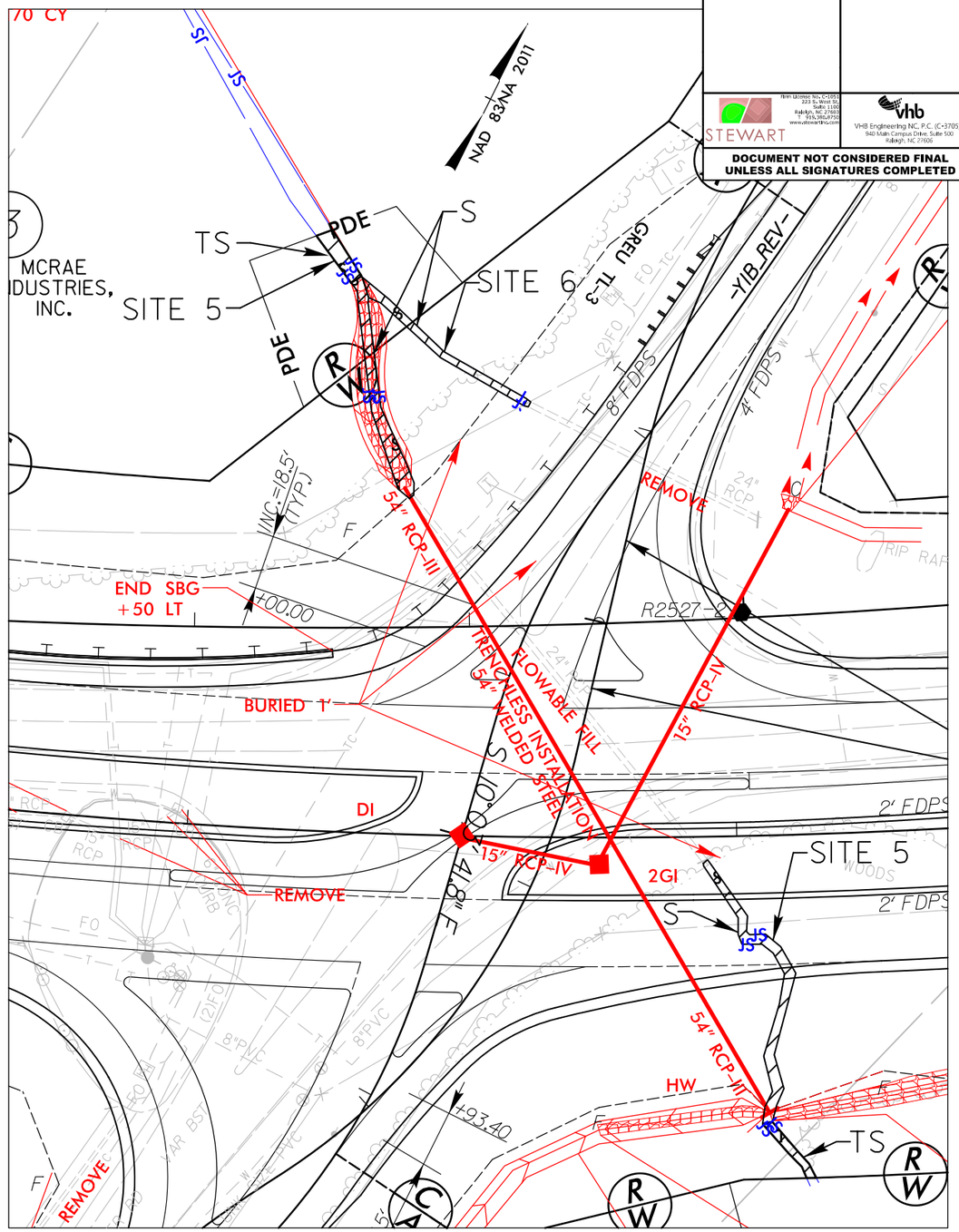


SITES 1-4



SITES 5-6

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jhuckaby

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
R-2527	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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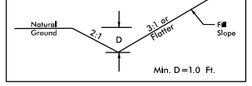
PERMIT DRAWING SHEET 4 OF 91

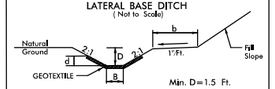
NAD 83/NA 2011

DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



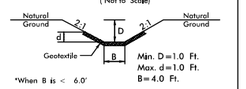
FROM STA. 11+50 TO STA. 13+92 –Y1A REV– LT
FROM STA. 12+15 TO STA. 13+75 –Y1A REV– RT

DETAIL 19
LATERAL BASE DITCH
(Not to Scale)



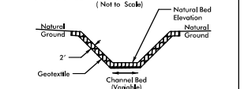
FROM STA. 16+32 TO STA. 17+33 –L REV– RT

DETAIL 57
STANDARD BASE DITCH
(Not to Scale)



FROM STA. 17+17 TO STA. 17+58 –Y1B REV– RT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)

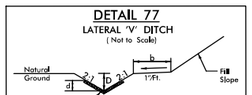


STA. 13+91 –Y1A REV– RT

DETAIL 76
LATERAL 'V' DITCH
(Not to Scale)

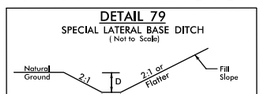
FROM STA. 10+73 TO STA. 11+50 –Y1A REV– LT

DETAIL 77
LATERAL 'V' DITCH
(Not to Scale)



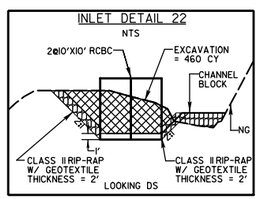
FROM STA. 22+50 TO STA. 23+10 –L REV– RT

DETAIL 79
SPECIAL LATERAL BASE DITCH
(Not to Scale)

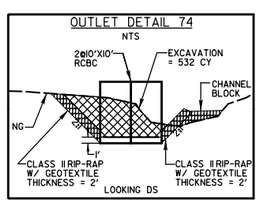


FROM STA. 15+00 TO STA. 16+91 –Y1B REV– LT
FROM STA. 23+18 TO STA. 25+00 –L REV– LT

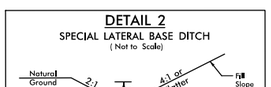
INLET DETAIL 22
NTS



OUTLET DETAIL 74
NTS

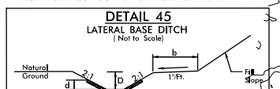


DETAIL 2
SPECIAL LATERAL BASE DITCH
(Not to Scale)

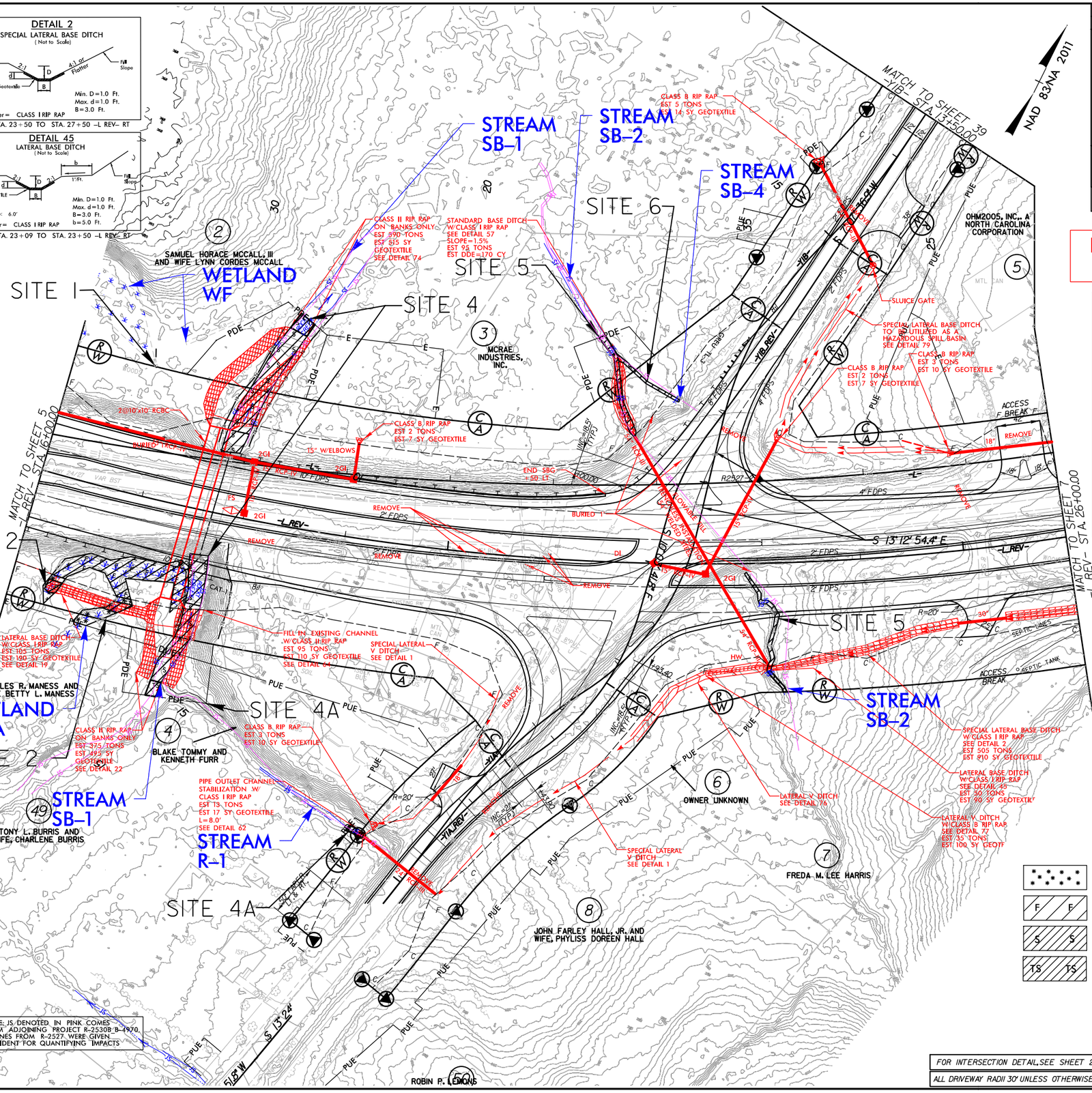


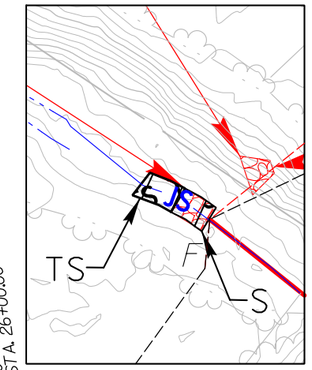
FROM STA. 23+50 TO STA. 27+50 –L REV– RT

DETAIL 45
LATERAL BASE DITCH
(Not to Scale)



FROM STA. 23+09 TO STA. 23+50 –L REV– RT





SITE 4A

16.7' 0' 33.3'
INSET GRAPHIC SCALE

50' 0' 100'
GRAPHIC SCALE

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

FOR INTERSECTION DETAIL, SEE SHEET 2B-2
FOR -L- PROFILE, SEE SHEET 42
FOR -Y1A_REV- PROFILE, SEE SHEET 58
FOR -Y1B_REV- PROFILE, SEE SHEET 58
FOR -L_REV- PROFILE, SEE SHEET 65
FOR INTERSECTION DETAIL, SEE SHEET 2B-2
ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

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5/14/99

PERMIT DRAWING
SHEET 5 OF 91

DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES TEMPORARY IMPACTS IN SURFACE WATER

25′ 0′ 50′
GRAPHIC SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2527	6

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

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Raleigh, NC 27606

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SAMUEL HORACE MCCALL, III
AND WIFE LYNN CORDES MCCALL

SITE 1
SITE 2
SITE 4
SITE 5
SITE 6

NAD 83/NA 2011

2@10′x10′ RCBC
RCP-IV
BURIED 15" TRCP-IV
15" W/ELBOWS
2GI
15" RCP-IV 10' FDPS
15" RCP-IV
FS
-L_REV-
REMOVE
CAT-1
8:1
BASE DITCH
IRIP RAP
TONS
SY GEOTEXTILE
AIL 19
MANESS AND
L. MANESS
MCRAE INDUSTRIES, INC.
70 CY
END SBG
+50 LT
+00.00
IWC=18.5' (TYP.)
54" RCP-III
-Y1B_REV-
8" FDPS
4" FDPS
GREEN TL-3
R2527-2
TRENCHLESS INSTALLATION
54" WELDED STEEL
FLOWABLE FILL
15" RCP-IV
2" FDPS
DI
-15" RCP-IV 418' @ -0.01%-
2GI
54" RCP-III
HW
+93.40

SITES 1-4

SITES 5-6

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PERMIT DRAWING
SHEET 6 OF 91

PROJECT REFERENCE NO.	SHEET NO.
_____	___
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART
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T 919.380.8750
www.stewartinc.com

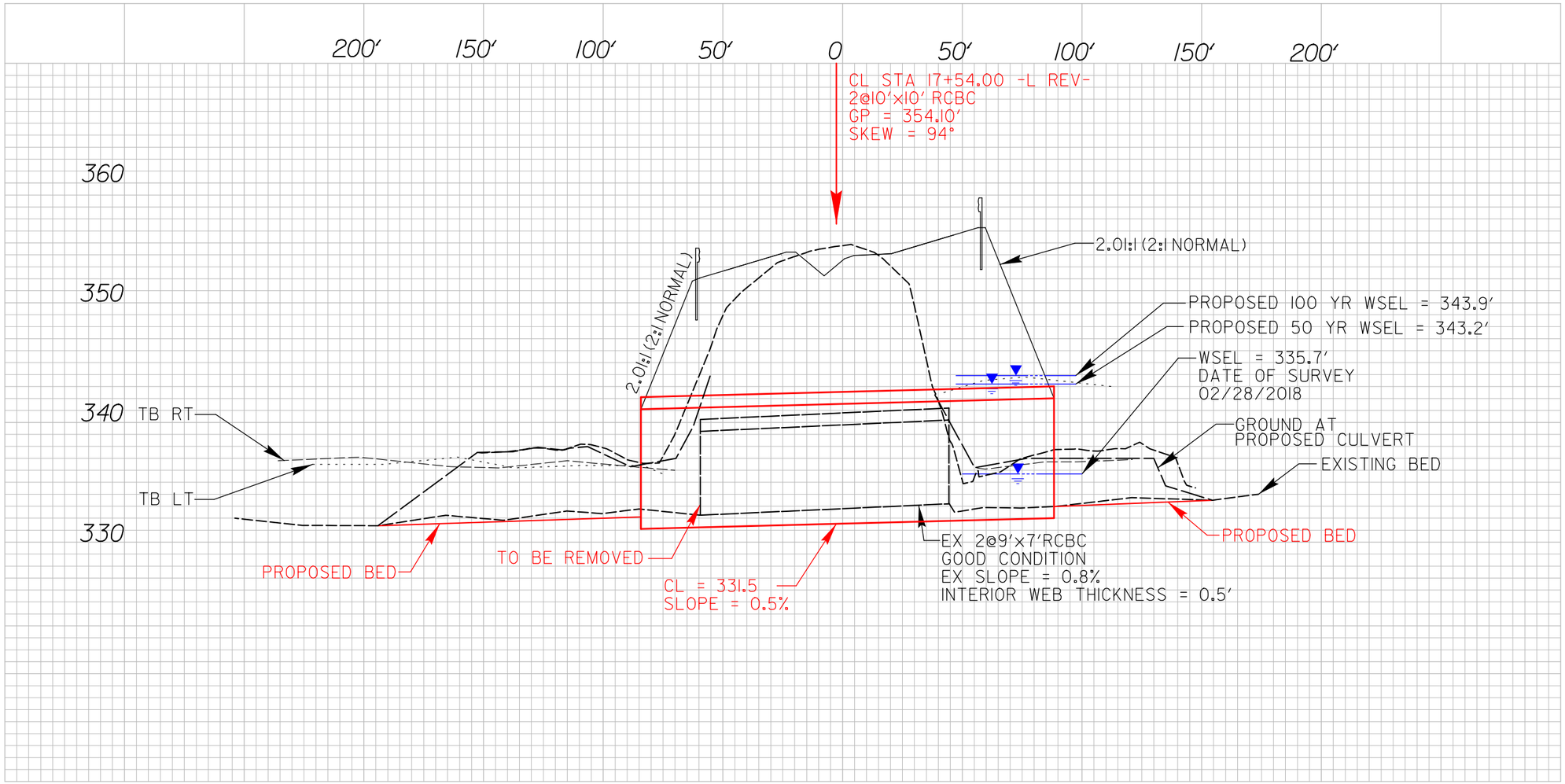
vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS

8/17/99

SITE 4



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aaverette

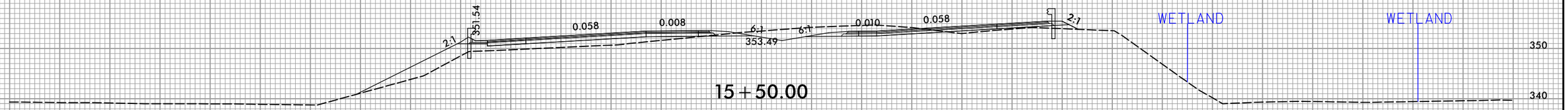
8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-8

PERMIT DRAWING
SHEET 7 OF 91

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SITE 1A



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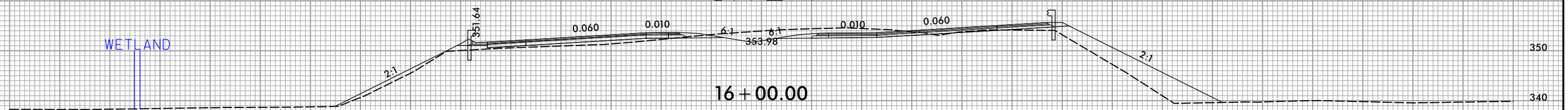
SITE 1



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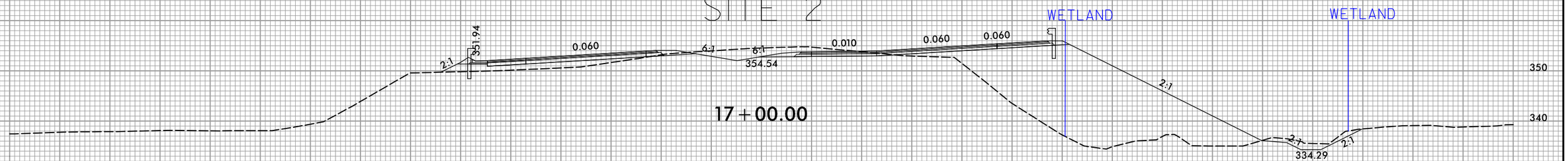
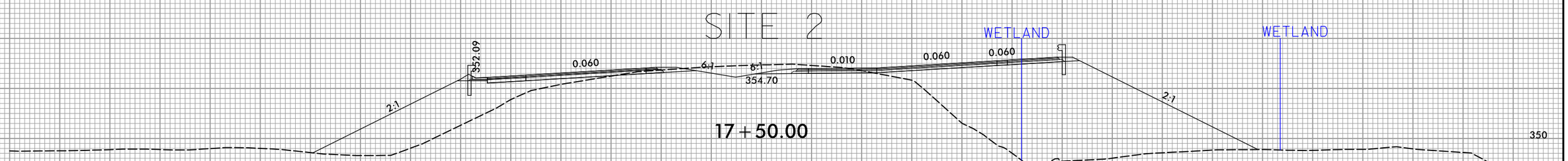
SITE 2



17+00.00

SITE 2



17+50.00

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jhunt

5/14/99

PERMIT DRAWING
SHEET 8 OF 91

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50′ 0′ 100′
GRAPHIC SCALE

25′ 0′ 50′
INSET GRAPHIC SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2527	10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

NAD 83/NA 2011

STEWART — Firm License No. C-1851, 223 S. West St., Suite 1100, Raleigh, NC 27603, P: 919.380.8750, www.stewartENG.com

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DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)
STA. 80+41 –L– LT

DETAIL 7
TOE PROTECTION
(Not to Scale)
Type of Liner= CLASS B RIP RAP
FROM STA. 78+50 TO STA. 80+28 –L– RT
FROM STA. 79+50 TO STA. 80+35 –L– LT
FROM STA. 85+00 TO STA. 87+81 –L– LT

DETAIL 9
LATERAL BASE DITCH
(Not to Scale)
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.
*When B is < 6.0'
Type of Liner= CLASS B RIP RAP
FROM STA. 80+25 TO STA. 82+40 –L– RT

DETAIL 10
LATERAL BASE DITCH
(Not to Scale)
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.
*When B is < 6.0'
Type of Liner= CLASS II RIP RAP
FROM STA. 83+75 TO STA. 85+00 –L– LT

DETAIL 1
SPECIAL LATERAL "V" DITCH
(Not to Scale)
Min. D=1.0 Ft.
FROM STA. 10+50 TO STA. 12+00 –PL– RT

DETAIL 17
STANDARD BASE DITCH
(Not to Scale)
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
*When B is < 6.0'
Type of Liner= CLASS B RIP RAP
FROM STA. 86+10 TO STA. 86+70 –L– RT

DETAIL 81
TOE PROTECTION
(Not to Scale)
d=1.0 Ft.
Type of Liner= CLASS A RIP RAP
FROM STA. 10+25 TO STA. 13+32 –Y8– LT

STREAM SJ

SITE 7

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP
EST 12 TONS
EST 21 SY GEOTEXTILE
L= 12 FT
SEE DETAIL 62

CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP
SEE DETAIL 7
EST 24 TONS
EST 73 SY GEOTEXTILE

BEGIN SBG +95 LT

INC.=40' (TYP.)

36" RCP-III

15" W/ELBOWS

15" RCP-IV

COLLAR

ADD CURB CUT

NOT BURIED

TRENCHLESS INSTALLATION STEEL CASING

FLOWABLE FILL

BEGIN SBG +25 RT

END SBG +94 RT

GREU TL-3

CAT-1

4' FDPS

2' FDPS

10' FDPS

2GI

FS

HW

TOE PROTECTION W/CLASS B RIP RAP
SEE DETAIL 7
EST 49 TONS
EST 153 SY GEOTEXTILE

LATERAL BASE DITCH W/CLASS B RIP RAP
SEE DETAIL 9
EST 97 TONS
EST 273 SY GEOTEXTILE

STANDARD BASE DITCH W/CLASS B RIP RAP
SLOPE= 1.6%
EST 35 TONS
EST 95 SY GEOTEXTILE
EST DDE = 20 CY
SEE DETAIL 17

(14) UNITED STATES FOREST SERVICE

(12) SCARBOROUGH PROPERTIES, LLC

ENVIRONMENTAL SENSITIVITY AREA

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

MATCH TO SHEET 9 –L– STA 75+00.00

MATCH TO SHEET 11 –L– STA 88+00.00

S 54°55'09.7" E –L–

SITE 7A

STREAM SA

TOE PROTECTION W/CLASS A RIP RAP
SEE DETAIL 81

CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE

LATERAL BASE DITCH W/CLASS II RIP RAP
SEE DETAIL 10
EST 150 TONS
EST 228 SY GEOTEXTILE

SOIL AND GRAVEL ROAD

WOODS

SOIL WALKING TRAIL

UNHARRIE RECREATION TRAILHEAD

RANDOLPH ELECTRIC 40'R/W

EARTH MATERIAL BERM
SEE SPECIAL DETAIL XX

SPECIAL LATERAL V DITCH
SEE DETAIL 1

END SBG +10 LT

END SBG +25 LT

CLASS B RIP RAP
EST 3 TONS
EST 10 SY GEOTEXTILE

TOE PROTECTION SEE DETAIL 7

CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE

SITE 7

DUE PUE TS

15" W/ELBOWS

36" RCP-III

S

2GI

" RCP-IV

15" RC

FOR PARKING LOT DESIGN, SEE SHEET 2B-13

ENVIRONMENTALLY SENSITIVE AREA

FOR -L- PROFILE, SEE SHEET 44

7:50:12 AM
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dwgrate

5/14/99

PERMIT DRAWING SHEET 9 OF 91

S S — DENOTES IMPACTS IN SURFACE WATER

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50′ 0′ 100′
GRAPHIC SCALE

25′ 0′ 50′
INSET GRAPHIC SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2527	10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART — firm license No. C-1851, 223 S. West St., Suite 1100, Raleigh, NC 27603, P: 919.380.8704, www.stewartENG.com

VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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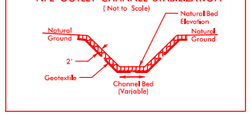
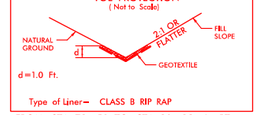
NAD 83/NA 2011

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION (Not to Scale)



STA. 80+41 –L– LT

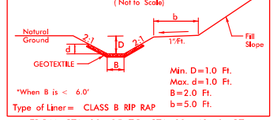
DETAIL 7
TOE PROTECTION (Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 78+50 TO STA. 80+28 –L– RT
FROM STA. 79+50 TO STA. 80+35 –L– LT
FROM STA. 85+00 TO STA. 87+81 –L– LT

DETAIL 9
LATERAL BASE DITCH (Not to Scale)



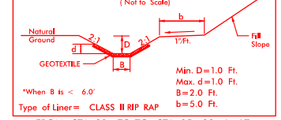
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.

*When B is < 6.0'

Type of Liner= CLASS B RIP RAP

FROM STA. 80+25 TO STA. 82+40 –L– RT

DETAIL 10
LATERAL BASE DITCH (Not to Scale)



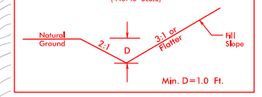
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.

*When B is < 6.0'

Type of Liner= CLASS II RIP RAP

FROM STA. 83+75 TO STA. 85+00 –L– LT

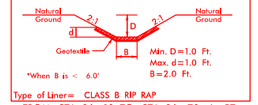
DETAIL 1
SPECIAL LATERAL "V" DITCH (Not to Scale)



Min. D=1.0 Ft.

FROM STA. 10+50 TO STA. 12+00 –PL– RT

DETAIL 17
STANDARD BASE DITCH (Not to Scale)



Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.

*When B is < 6.0'

Type of Liner= CLASS B RIP RAP

FROM STA. 86+10 TO STA. 86+70 –L– RT

DETAIL 81
TOE PROTECTION (Not to Scale)

Type of Liner= CLASS A RIP RAP

FROM STA. 10+25 TO STA. 13+32 –Y8– LT

SITE 7A

TOE PROTECTION W/CLASS A RIP RAP SEE DETAIL 81

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

LATERAL BASE DITCH W/CLASS II RIP RAP SEE DETAIL 10 EST 150 TONS EST 228 SY GEOTEXTILE

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

STREAM SJ

SITE 7

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP EST 12 TONS EST 21 SY GEOTEXTILE L= 12 FT SEE DETAIL 62

14 UNITED STATES FOREST SERVICE

STREAM SA

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 24 TONS EST 73 SY GEOTEXTILE

TOE PROTECTION SEE DETAIL 7

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

SPECIAL LATERAL V DITCH SEE DETAIL 1

EARTH MATERIAL BERM SEE SPECIAL DETAIL XX

BEGIN SBG +95 LT

BEGIN SBG +10 LT

END SBG +25 LT

END SBG +30 LT

BEGIN SBG +25 RT

END SBG +94 RT

GREU TL-3

ADD CURB CUT

FLOWABLE FILL

NOT BURIED

TRENCHLESS PLASTIC STEEL

COLLAR

36" RCP-III

15" W/ELBOWS

15" RCP-IV

HW

STANDARD BASE DITCH W/CLASS B RIP RAP SLOPE= 1.6% EST 35 TONS EST 95 SY GEOTEXTILE EST DDE = 20 CY SEE DETAIL 17

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 49 TONS EST 153 SY GEOTEXTILE

LATERAL BASE DITCH W/CLASS B RIP RAP SEE DETAIL 9 EST 97 TONS EST 279 SY GEOTEXTILE

14 UNITED STATES FOREST SERVICE

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

ENVIRONMENTAL SENSITIVITY AREA

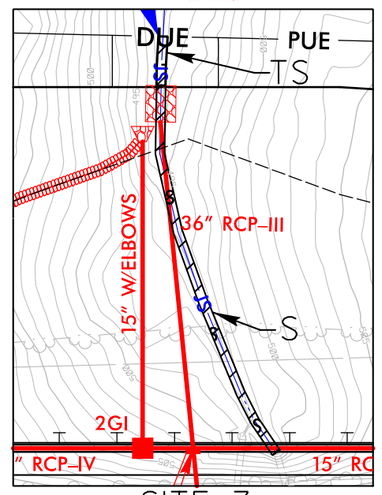
12 SCARBOROUGH PROPERTIES, LLC

MATCH TO SHEET 9 –L– STA. 75+00.00

MATCH TO SHEET 11 –L– STA. 88+00.00

S 54°55'09.7" E –L–

NC HWY 24/27 – 26 BST



SITE 7

FOR PARKING LOT DESIGN, SEE SHEET 2B-13

ENVIRONMENTALLY SENSITIVE AREA

FOR –L– PROFILE, SEE SHEET 44

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5/14/99

PERMIT DRAWING SHEET 10 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	11
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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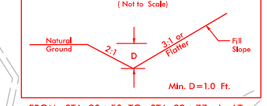
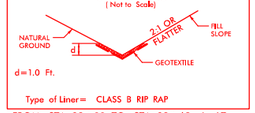
DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 90+50 TO STA. 92+77 –L– LT
FROM STA. 93+50 TO STA. 94+00 –L– LT
FROM STA. 100+00 TO STA. 100+50 –L– RT

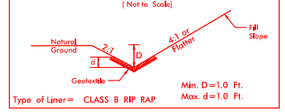
DETAIL 7
TOE PROTECTION
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 99+00 TO STA. 99+68 –L– LT
FROM STA. 99+50 TO STA. 99+82 –L– RT

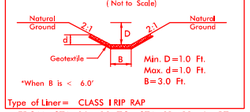
DETAIL 8
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 101+85 TO STA. 103.+00 –L– LT

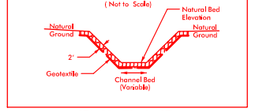
DETAIL 16
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS I RIP RAP

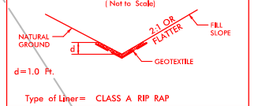
FROM STA. 90+89 TO STA. 91+13 –L– RT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)



STA. 98+78 –L– RT

DETAIL 81
TOE PROTECTION
(Not to Scale)



Type of Liner= CLASS A RIP RAP

FROM STA. 10+25 TO STA. 13+32 –Y8– LT

WETLAND WH

WETLAND WJ

STREAM SL–A

STREAM SL–A

SITE 8

SITE 9

SITE 10

(14) UNITED STATES FOREST SERVICE

(15) UNITED STATES OF AMERICA

(16) DAVID WAYNE JOYCE AND WIFE, DONNA JOYCE

(14) UNITED STATES FOREST SERVICE

MATCH TO SHEET 10 –L– STA. 88+00.00

MATCH TO SHEET 12 –L– STA. 102+00.00

CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE

SPECIAL LATERAL V DITCH
SEE DETAIL 1

SPECIAL LATERAL V DITCH
SEE DETAIL 1

TOE PROTECTION
W/CLASS B RIP RAP
SEE DETAIL 7
EST 19 TONS
EST 59 SY
GEOTEXTILE

SPECIAL LATERAL V DITCH
W/CLASS B RIP RAP
SEE DETAIL 8
EST 56 TONS
EST 168 SY GEOTEXTILE

15" W/ELBOWS

24" RCP-III

42" RCP-III

REMOVE +/– 17' OF 24" RCP

REMOVE +/– 7' OF 42" RCP

TIE 2GI INTO EXISTING 24" RCP

TIE JB W/MH INTO EXISTING 24" RCP

REMOVE +/– 6' OF 42" RCP

NOT BURIED

S 54° 55' 09.7" E
–L–

STANDARD BASE DITCH
W/CLASS I RIP RAP
SLOPE= 0.3%
EST 20 TONS
EST 40 SY GEOTEXTILE
EST DDE = 1 CY
SEE DETAIL 16

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP
EST 27 TONS
EST 38 SY GEOTEXTILE
L= 14 FT
SEE DETAIL 62

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 100'
GRAPHIC SCALE

25 0' 50
INSET GRAPHIC SCALE

SITES 8 & 9

SITE 10 (DOWNSTREAM)

SITE 10 (UPSTREAM)

FOR INTERSECTION DETAIL, SEE SHEET 2B-3

FOR PARKING LOT DESIGN, SEE SHEET 2B-13

FOR –L– PROFILE, SEE SHEETS 44 & 45

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

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Drawing: C:\Projects\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_PSH11.dgn

5/14/99

PERMIT DRAWING
SHEET 11 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	11
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART
firm License No. C-1851
223 S. West St.
Suite 1100
Raleigh, NC 27603
T: 919.380.8750
www.stewartinc.com

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

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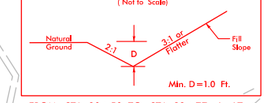
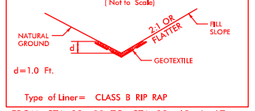
NAD 83/NA 2011

DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 90+50 TO STA. 92+77 –L– LT
FROM STA. 93+50 TO STA. 94+00 –L– LT
FROM STA. 100+00 TO STA. 100+50 –L– RT

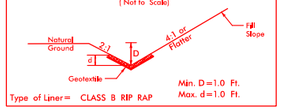
DETAIL 7
TOE PROTECTION
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 99+00 TO STA. 99+68 –L– LT
FROM STA. 99+50 TO STA. 99+82 –L– RT

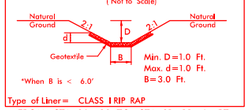
DETAIL 8
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 101+85 TO STA. 103.+00 –L– LT

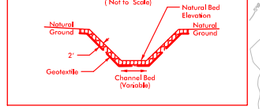
DETAIL 16
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS I RIP RAP

FROM STA. 90+89 TO STA. 91+13 –L– RT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)



STA. 98+78 –L– RT

DETAIL 81
TOE PROTECTION
(Not to Scale)

Type of Liner= CLASS A RIP RAP

FROM STA. 10+25 TO STA. 13+32 –Y8– LT

WETLAND WH

WETLAND WJ

STREAM SL–A

SITE 8

SITE 9

SITE 10

14 UNITED STATES FOREST SERVICE

15 UNITED STATES OF AMERICA

16 DAVID WAYNE JOYCE AND WIFE, DONNA JOYCE

SPECIAL LATERAL V DITCH SEE DETAIL 1

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 19 TONS EST 59 SY GEOTEXTILE

SPECIAL LATERAL V DITCH W/CLASS B RIP RAP SEE DETAIL 8 EST 56 TONS EST 168 SY GEOTEXTILE

MATCH TO SHEET 10 –L– STA. 88+00.00

MATCH TO SHEET 12 –L– STA. 102+00.00

S 54°55'09" E –L–

24" RCP–III

42" RCP–III

15" W/ELBOWS

REMOVE +/– 17' OF 24" RCP

REMOVE +/– 7' OF 42" RCP

TIE 2GI INTO EXISTING 24" RCP

TIE JB W/MH INTO EXISTING 24" RCP

NOT BURIED

RETAIN

STANDARD BASE DITCH W/CLASS I RIP RAP SLOPE= 0.3% EST 20 TONS EST 40 SY GEOTEXTILE EST DDE = .1 CY SEE DETAIL 16

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP EST 27 TONS EST 38 SY GEOTEXTILE L= 14 FT SEE DETAIL 62

4' FDPS

2' FDPS

PUE

PDE

ACCESS BREAK

WOODS

NC HWY 24/27 26' BST

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 100'
GRAPHIC SCALE

25' 0' 50'
INSET GRAPHIC SCALE

SITES 8 & 9

SITE 10 (DOWNSTREAM)

SITE 10 (UPSTREAM)

FOR INTERSECTION DETAIL, SEE SHEET 2B-3

FOR PARKING LOT DESIGN, SEE SHEET 2B-13

FOR –L– PROFILE, SEE SHEETS 44 & 45

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

4:52:05 PM
R:\Projects\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_PSH11_con.dgn

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-56

PERMIT DRAWING
SHEET 12 OF 91

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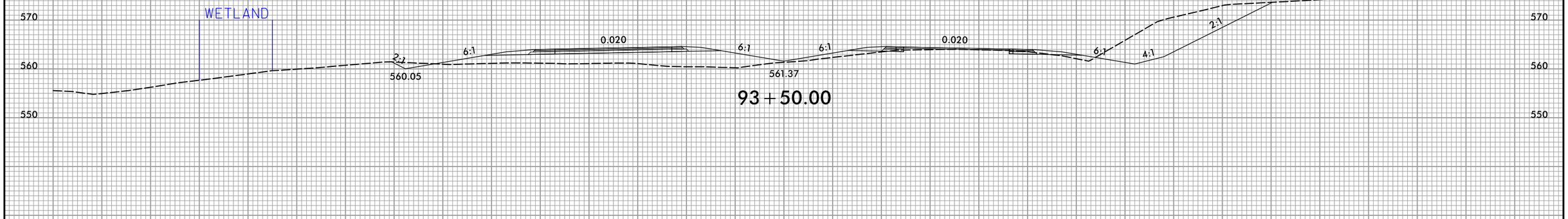
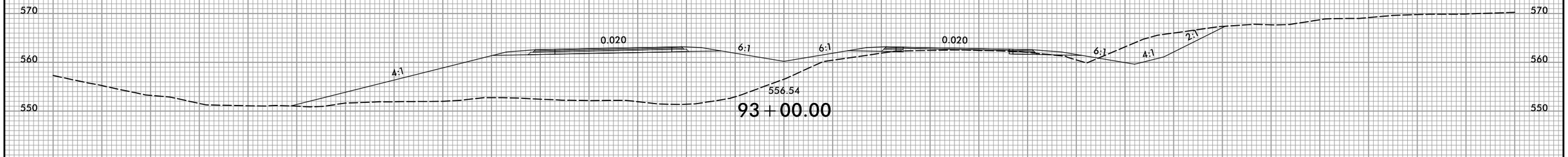
SITE 9



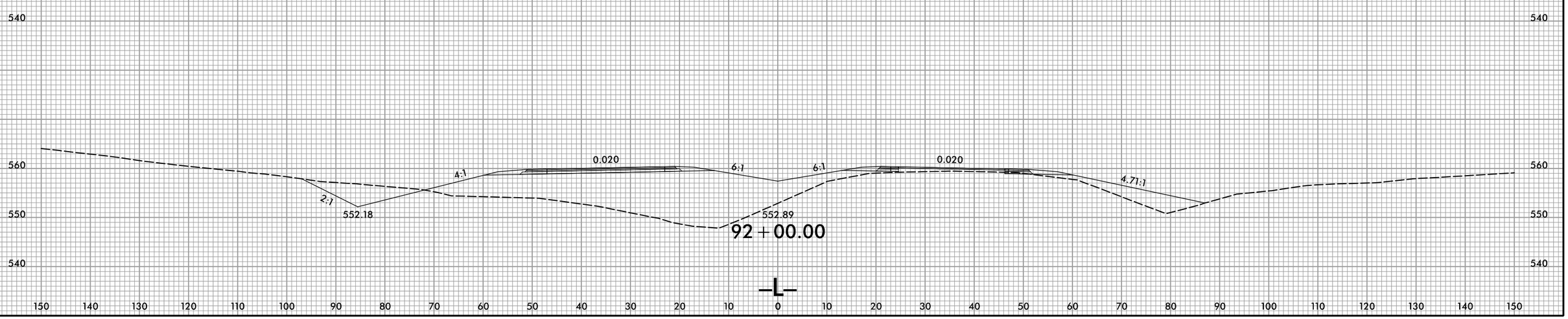
93 + 50.00



93 + 00.00

SITE 8

92 + 50.00



92 + 00.00

–L–

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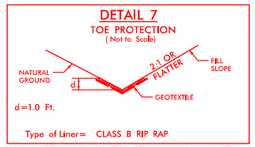
8:01:41 AM
R:\Projects\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_XPL.dgn
gaverette

5/14/99

PERMIT DRAWING SHEET 13 OF 91

- DENOTES MECHANIZED CLEARING
- F F — DENOTES FILL IN WETLAND
- S S — DENOTES IMPACTS IN SURFACE WATER
- TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DETAIL 7
TOE PROTECTION
(Not to Scale)

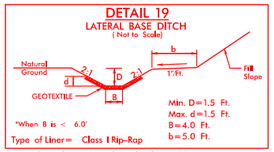


d=1.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 123+86 TO STA. 124+58 -L- LT

DETAIL 19
LATERAL BASE DITCH
(Not to Scale)



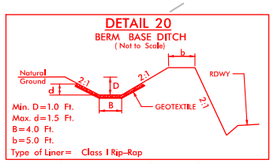
*When B is < 6.0'

Min. D=1.5 Ft.
Max. d=1.5 Ft.
B=4.0 Ft.
b=5.0 Ft.

Type of Liner= Class I Rip-Rap

FROM STA. 124+65 TO STA. 128+75 -L- LT

DETAIL 20
BERM BASE DITCH
(Not to Scale)

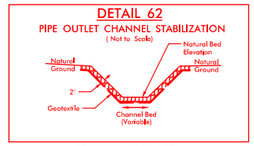


Min. D=1.0 Ft.
Max. d=1.5 Ft.
B=4.0 Ft.
b=5.0 Ft.

Type of Liner= Class I Rip-Rap

FROM STA. 128+75 TO STA. 131+63 -L- LT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)



STA. 126+85 -L- RT

NAD 83/NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	13
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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223 S. West St.
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120

125

(15) UNITED STATES OF AMERICA

SITE 11

WETLAND WR

STREAM SM-1

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 20 TONS EST 62 SY GEOTEXTILE

LATERAL BASE DITCH W/CLASS I RIP RAP SEE DETAIL 19 EST 466 TONS EST 826 SY GEOTEXTILE

SITE 13

(12) SCARBOROUGH PROPERTIES, LLC

WETLAND WP

BERM BASE DITCH W/CLASS I RIP RAP SEE DETAIL 20 EST 327 TONS EST 580 SY GEOTEXTILE

BEGIN SBG +00

CAT-1

JB w/MH

24" W/ELBOWS

48" RCP-V

15" W/ ELBOWS

END SBG +30 LT

GREU TL-3

15" RCP-IV

24" RCP-IV

NOT BURIED

FILL W/ FLOWABLE FILL

TRENCHLESS INSTALLATION W/WELDED STEEL

COLLAR

MATCH TO SHEET 12 -L- STA. 116+00.00

MATCH TO SHEET 14 -L- STA. 130+00.00

S 54°55'09"E -L-

R2527-4

BEGIN SBG +50

ACCESS BREAK

SITE 12

SITE 16

WETLAND WK

(12) SCARBOROUGH PROPERTIES, LLC

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP EST 20 TONS EST 30 SY GEOTEXTILE L= 16 FT SEE DETAIL 62

WETLAND WN

STREAM SM-1

STREAM SM-2

SITE 15

WETLAND WL

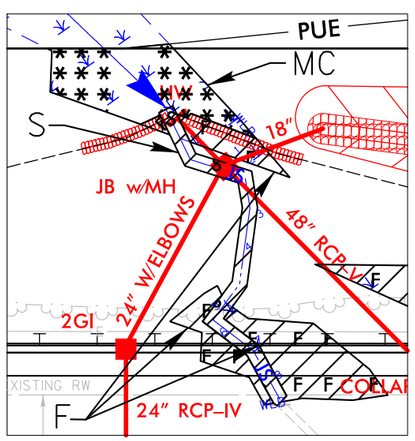
WETLAND WM

SITE 14

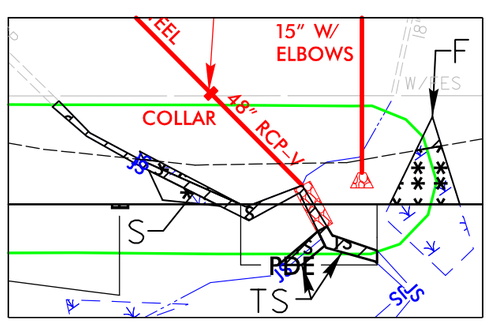
ENVIRONMENTAL SENSITIVITY AREA

50' 0' 100'
GRAPHIC SCALE

25' 0' 50'
INSET GRAPHIC SCALE



SITES 11 & 12



SITES 14, 15 & 16

ENVIRONMENTALLY SENSITIVE AREA

FOR -L- PROFILE, SEE SHEETS 45 & 46

4:42:11 PM
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hwang

5/14/99

PERMIT DRAWING SHEET 14 OF 91

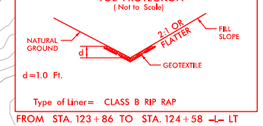
DENOTES MECHANIZED CLEARING

F F — DENOTES FILL IN WETLAND

S S — DENOTES IMPACTS IN SURFACE WATER

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DETAIL 7
TOE PROTECTION
(Not to Scale)

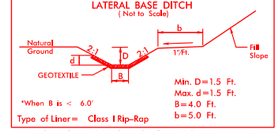


d=1.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 123+86 TO STA. 124+58 -L- LT

DETAIL 19
LATERAL BASE DITCH
(Not to Scale)



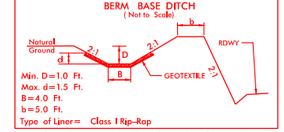
*When B is < 6.0'

Min. D=1.5 Ft.
Max. d=1.5 Ft.
B=4.0 Ft.
b=5.0 Ft.

Type of Liner= Class I Rip-Rap

FROM STA. 124+65 TO STA. 128+75 -L- LT

DETAIL 20
BERM BASE DITCH
(Not to Scale)

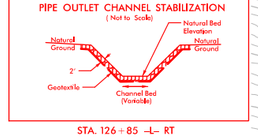


Min. D=1.0 Ft.
Max. d=1.5 Ft.
B=4.0 Ft.
b=5.0 Ft.

Type of Liner= Class I Rip-Rap

FROM STA. 128+75 TO STA. 131+63 -L- LT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)



STA. 126+85 -L- RT

NAD 83/NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	13
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART
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223 S. West St.
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www.stewartinc.com

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

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WETLAND WR

STREAM SM-1

SITE 11

(15) UNITED STATES OF AMERICA

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 20 TONS EST 62 SY GEOTEXTILE

LATERAL BASE DITCH W/CLASS I RIP RAP SEE DETAIL 19 EST 466 TONS EST 826 SY GEOTEXTILE

SITE 13

(12) SCARBOROUGH PROPERTIES, LLC

WETLAND WP

BERM BASE DITCH W/CLASS I RIP RAP SEE DETAIL 20 EST 327 TONS EST 580 SY GEOTEXTILE

MATCH TO SHEET 12 -L- STA. 116+00.00

MATCH TO SHEET 14 -L- STA. 130+00.00

BEGIN SBG +00

CAT-1

END SBG +30 LT

GREU TL-3

BEGIN SBG +50

END SBG +30 LT

ACCESS BREAK

S 54° 55' 09.7" E -L-

R2527-4

NC HWY 24/27 24" BST

WETLAND WK

SITE 12

WETLAND WN

STREAM SM-1

SITE 16

SCARBOROUGH PROPERTIES, LLC

STREAM SM-2

WETLAND WL

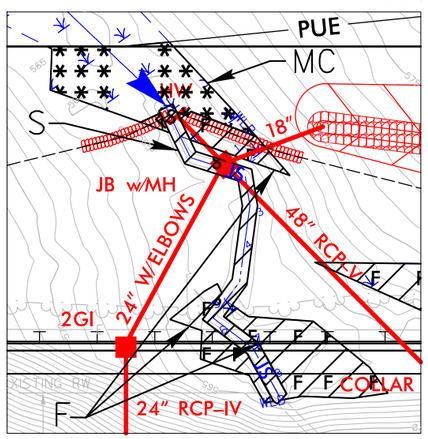
SITE 15

WETLAND WM

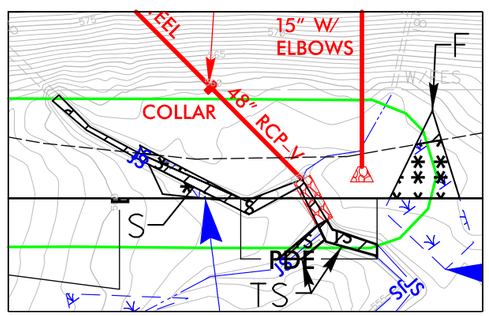
SITE 14

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP EST 20 TONS EST 30 SY GEOTEXTILE L= 16 FT SEE DETAIL 62



SITES 11 & 12



SITES 14, 15 & 16

ENVIRONMENTAL SENSITIVITY AREA

50' 0' 100'
GRAPHIC SCALE

25' 0' 50'
INSET GRAPHIC SCALE

ENVIRONMENTALLY SENSITIVE AREA

FOR -L- PROFILE, SEE SHEETS 45 & 46

4/4/24 4:34 PM
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bunt

8/23/99

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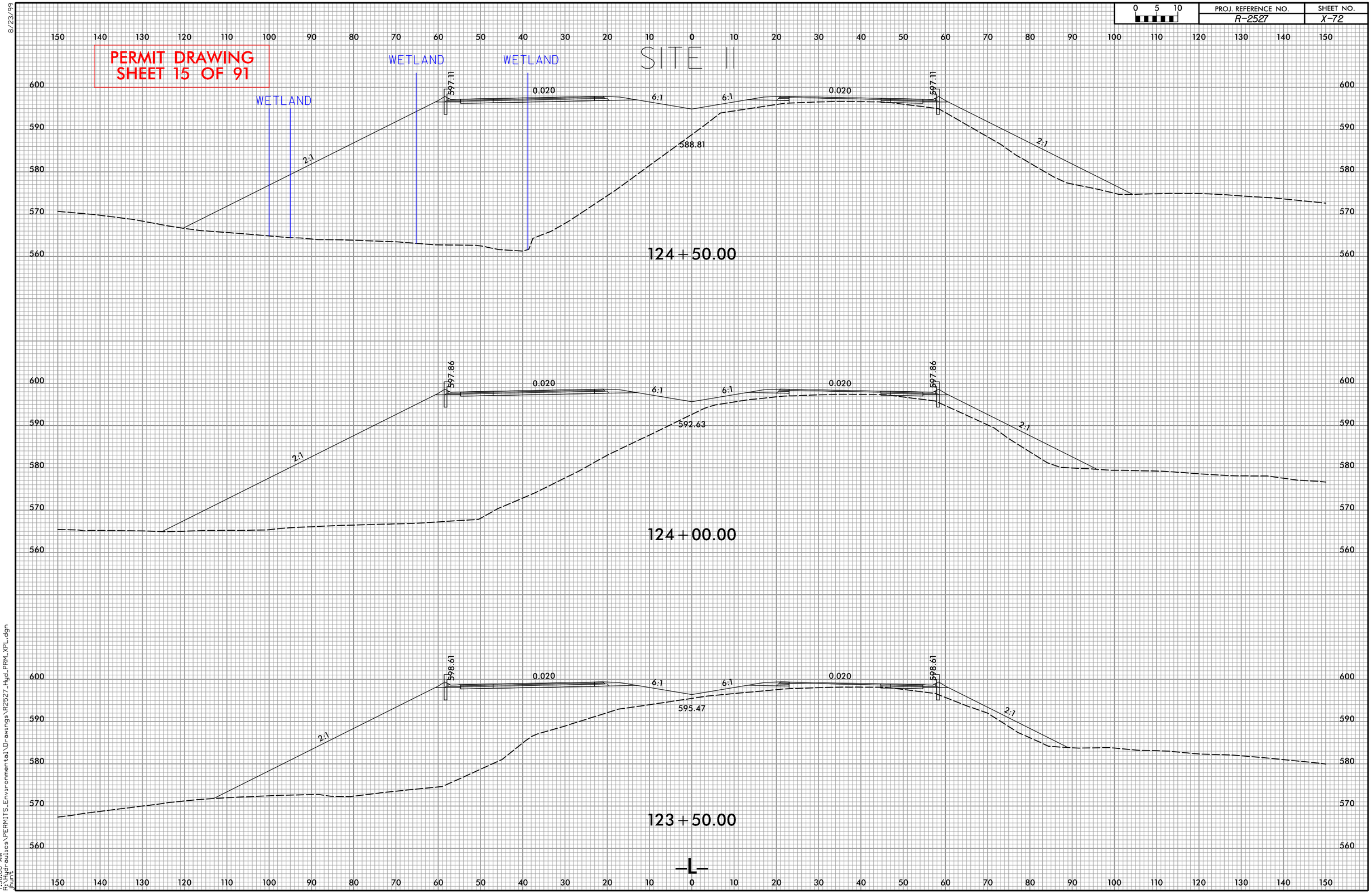
	R-2527	X-72

PERMIT DRAWING
SHEET 15 OF 91

SITE II

WETLAND WETLAND WETLAND



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8/23/99

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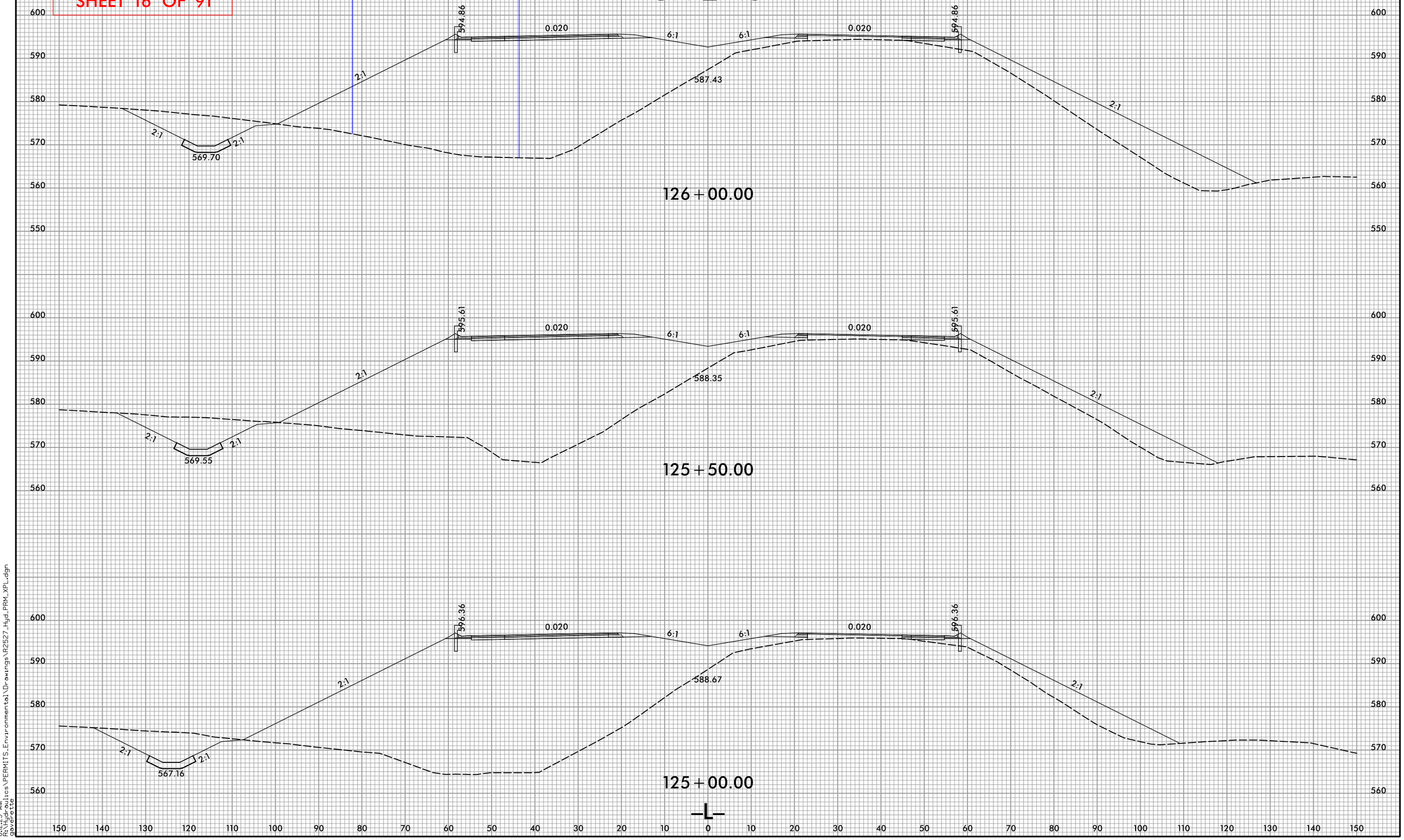
	R-2527	X-73

PERMIT DRAWING
SHEET 16 OF 91

WETLAND WETLAND

SITE 13



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gaverette

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
R-2527	X-74

0 5 10

PERMIT DRAWING
SHEET 17 OF 91

SITE 16

WETLAND CONTINUES OFF SHEET

WELAND

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

590 580 570 560 550

592.61 0.020 6:1 6:1 0.020 592.61

2:1 2:1 2:1 2:1 2:1

584.03

574.10

127+50.00

600 590 580 570 560 550

593.36 0.020 6:1 6:1 0.020 593.36

2:1 2:1 2:1 2:1 2:1

586.43

571.97

127+00.00

600 590 580 570 560 550

594.11 0.020 6:1 6:1 0.020 594.11

2:1 2:1 2:1 2:1 2:1

586.64

569.85

126+50.00

–L–

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8/25/25 AM
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Hydraulics
gaverette

5/14/99

PERMIT DRAWING
SHEET 18 OF 91

50' 0' 100'

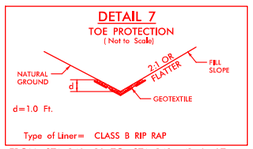
GRAPHIC SCALE

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DETAIL 7
TOE PROTECTION
(Not to Scale)

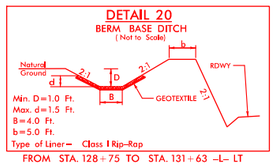


d=1.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 140+10 TO STA. 142+41 -L- LT

DETAIL 20
BERM BASE DITCH
(Not to Scale)



Min. D=1.0 Ft.
Max. d=1.5 Ft.
B=4.0 Ft.
b=5.0 Ft.
Type of Liner= Class I Rip-Rap

FROM STA. 128+75 TO STA. 131+63 -L- LT

PROJECT REFERENCE NO.	SHEET NO.
R-2527	14
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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223 S. West St.
Suite 1100
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www.stewartinc.com

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VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

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2011 ANN38 DAN

SITE 17

STREAM SN

WETLAND WV

SITE 18

140

135

(12) SCARBOROUGH PROPERTIES, LLC

(17) UNITED STATE FOREST SERVICE

MATCH TO SHEET 13 -L- STA. 130+00.00

MATCH TO SHEET 15 -L- STA. 142+00.00

BERM BASE DITCH W/CLASS I RIP RAP SEE DETAIL 20 EST 327 TONS EST 580 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 68 TONS EST 213 SY GEOTEXTILE

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

CHORD

ACCESS BREAK

INC=4% (TYP.)

REMOVE

NOT BURIED TRENCHLESS INSTALLATION 42" WELDED STEEL

COLLAR

GREU TL-3

FOR -L- PROFILE, SEE SHEET 46

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

8:32:22 AM
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dwerstle

5/14/99

PERMIT DRAWING
SHEET 19 OF 91

50' 0' 100'

GRAPHIC SCALE

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DETAIL 7
TOE PROTECTION
(Not to Scale)

d=1.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 140+10 TO STA. 142+41 -L- LT

DETAIL 20
BERM BASE DITCH
(Not to Scale)

Min. D=1.0 Ft.
Max. d=1.5 Ft.
B=4.0 Ft.
b=5.0 Ft.
Type of Liner= Class I Rip-Rap

FROM STA. 128+75 TO STA. 131+63 -L- LT

PROJECT REFERENCE NO.	SHEET NO.
R-2527	14
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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firm License No. C-1851
223 S. West St.
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www.stewartinc.com

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VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

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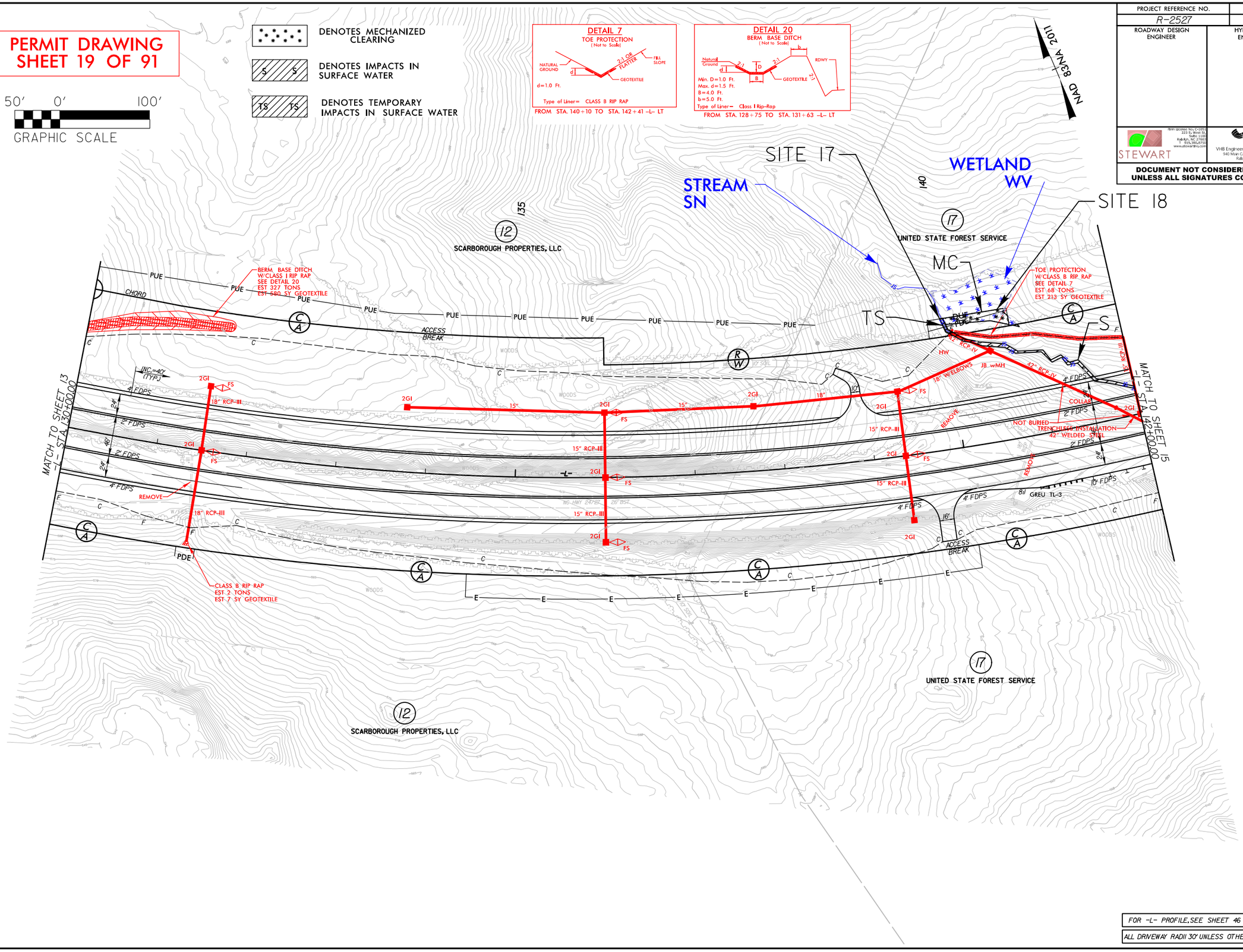

FOR -L- PROFILE, SEE SHEET 46

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

8:17:16 AM
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8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-83

PERMIT DRAWING
SHEET 20 OF 91

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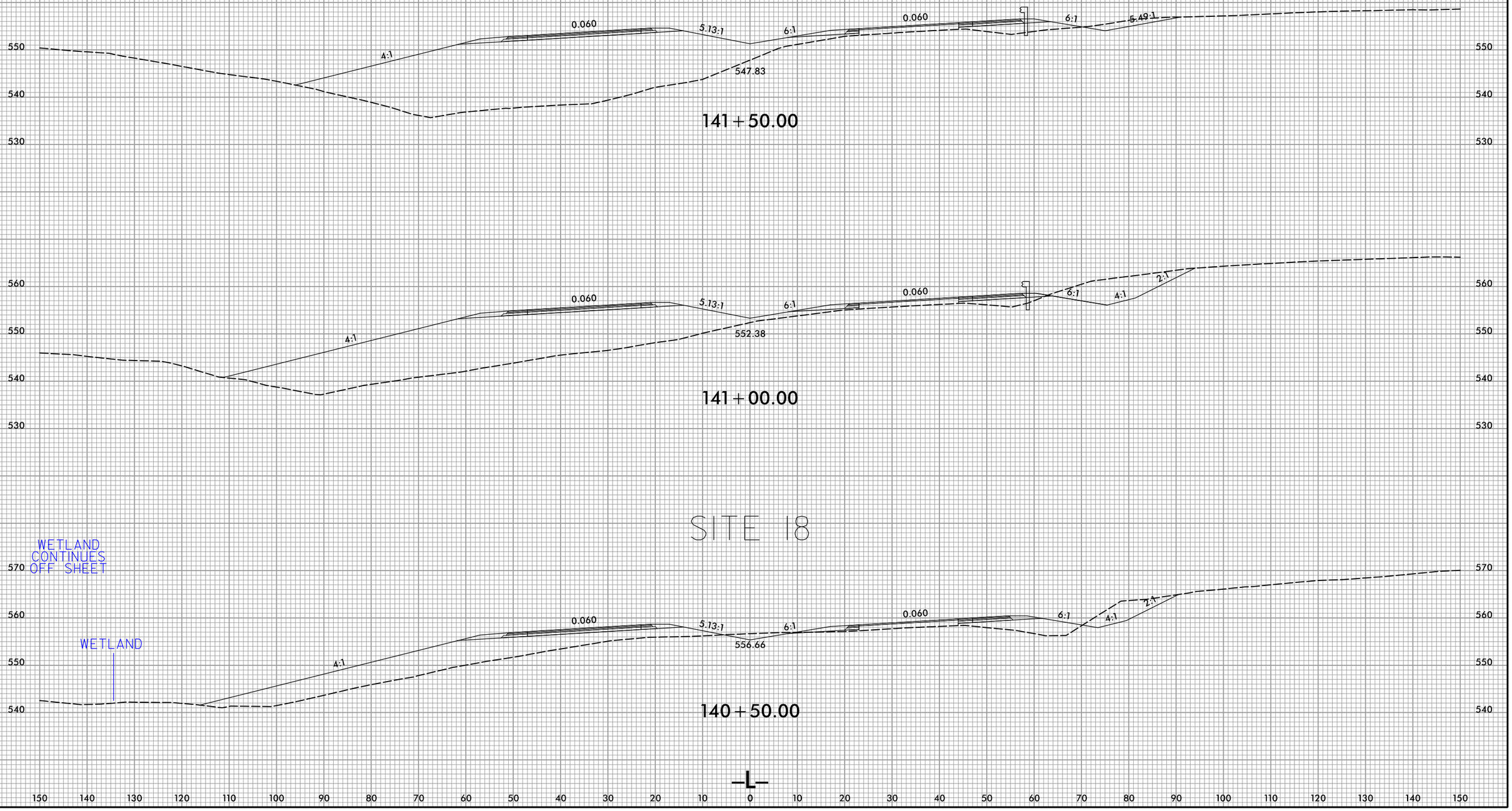

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gaverette

5/14/99

PERMIT DRAWING SHEET 21 OF 91

50′ 0′ 100′

GRAPHIC SCALE

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DETAIL 57
STANDARD BASE DITCH
(Not to Scale)

Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=4.0 Ft.
*When B is < 6.0'

Type of Liner= CLASS I RIP RAP
AT STA. 150+80 –L– RT

DETAIL 7
TOE PROTECTION
(Not to Scale)

Type of Liner= Class B Rip-Rap
FROM STA. 140+10 TO STA. 142+41 –L– LT
FROM STA. 148+00 TO STA. 151+50 –L– LT

DETAIL 63
BANKS ONLY PIPE OUTLET CHANNEL
(Not to Scale)

STA. 143+33 –L– RT

DETAIL 12
BERM BASE DITCH
(Not to Scale)

Min. D=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.
FROM STA. 143+50 TO STA. 147+75 –L– LT

DETAIL 21
LATERAL BASE DITCH
(Not to Scale)

Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.
*When B is < 6.0'
Type of Liner= CLASS I RIP RAP
FROM STA. 145+00 TO STA. 150+84 –L– RT

NAD 83/NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	15
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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940 Main Campus Drive, Suite 500
Raleigh, NC 27606

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STREAM SN

SITE 17

WETLAND WU

SITE 21

STREAM SO

SITE 22 (18) ROBERT ANTHONY MORRIS AND WIFE, JACKIE MORRIS

145

150

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 68 TONS EST 213 SY GEOTEXTILE

ACCESS BREAK

BERM BASE DITCH SEE DETAIL 12

(17) UNITED STATE FOREST SERVICE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 96 TONS EST 300 SY GEOTEXTILE

TOE PROTECTION SEE DETAIL 7

HW/D10=0.3

18" W/ELBOWS

BDO

2GI FS

18" RCP-III

42" RCP-IV

COLLAR

FILL W/ FLOWABLE FILL

NOT BURIED

BURIED 0.7'

15" RCP-III

15" W/ ELBOWS

JB w/MH

4' FDPS

2' FDPS

10' FDPS

CAT-1

MATCH TO SHEET 14 L STA 142+00.00

MATCH TO SHEET 16 L STA 154+00.00

SPRING

MC

SITE 17

SITE 19

BANKS ONLY PIPE OUTLET CHANNEL W/ CLASS I RIP RAP EST 19 TONS EST 31 SY GEOTEXTILE L= 14 FT SEE DETAIL 63

STREAM SN

WETLAND WS

LATERAL BASE DITCH W/CLASS I RIP RAP SEE DETAIL 21 EST 469 TONS EST 902 SY GEOTEXTILE

(17) UNITED STATE FOREST SERVICE

STREAM SO-1

SITE 20

STANDARD BASE DITCH W/CLASS I RIP RAP SLOPE= 0.3% EST 25 TONS EST 50 SY GEOTEXTILE EST DDE =9 CY SEE DETAIL 57

(18) ROBERT ANTHONY MORRIS AND WIFE, JACKIE MORRIS

STREAM SO

FOR –L– PROFILE, SEE SHEETS 46 & 47

4/4/24 4:41 PM
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bunt

5/14/99

PERMIT DRAWING SHEET 22 OF 91

50' 0' 100'
GRAPHIC SCALE

DENOTES MECHANIZED CLEARING

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DETAIL 57
STANDARD BASE DITCH
(Not to Scale)

Natural Ground, 2:1, d, D, 2:1, Natural Ground, Geotextile, B
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=4.0 Ft.
*When B is < 6.0'
Type of Liner= CLASS I RIP RAP
AT STA. 150+80 -L- RT

DETAIL 7
TOE PROTECTION
(Not to Scale)

NATURAL GROUND, d, 2:1 OR FLATTER, FILL SLOPE, GEOTEXTILE
d=1.0 Ft.
Type of Liner= Class B Rip-Rap
FROM STA. 140+10 TO STA. 142+41 -L- LT
FROM STA. 148+00 TO STA. 151+50 -L- LT

DETAIL 63
BANKS ONLY PIPE OUTLET CHANNEL
(Not to Scale)

Natural Ground, Natural Bed Elevation, Min. 2' Below Natural Bed, Min. 2' Below Natural Bed, Natural Ground, 2', CHANNEL BED (Variable), Geotextile
STA. 143+33 -L- RT

DETAIL 12
BERM BASE DITCH
(Not to Scale)

Natural Ground, 2:1, D, 2:1, RDWY, B, 2:1
Min. D=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.
FROM STA. 143+50 TO STA. 147+75 -L- LT

DETAIL 21
LATERAL BASE DITCH
(Not to Scale)

Natural Ground, 2:1, b, D, 2:1, 1'Ft., Fill Slope, GEOTEXTILE, d, B
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.
*When B is < 6.0'
Type of Liner= CLASS I RIP RAP
FROM STA. 145+00 TO STA. 150+84 -L- RT

NAD 83/NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	15
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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STREAM SN
SITE 17
TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 68 TONS EST 213 SY GEOTEXTILE
ACCESS BREAK
BERM BASE DITCH SEE DETAIL 12
MATCH TO SHEET 14 -L- STA. 142+00.00
4" FDPS
2" FDPS
2GI
FS
FILL W/ FLOWABLE FILL
NOT BURIED
10' FDPS
42" RCP-III WELDED STEEL
JB w/MH
SPRING
MC
BANKS ONLY PIPE OUTLET CHANNEL W/ CLASS I RIP RAP EST 19 TONS EST 31 SY GEOTEXTILE L= 14 FT SEE DETAIL 63
SITE 19
STREAM SN
WETLAND WS

WETLAND WU
SITE 21
TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 96 TONS EST 300 SY GEOTEXTILE
17 UNITED STATE FOREST SERVICE
HWD10=0.3
18" W/ELBOWS
BDO
18" RCP-III
BURIED 0.7'
JB w/MH
SITE 17
LATERAL BASE DITCH W/CLASS I RIP RAP SEE DETAIL 21 EST 469 TONS EST 902 SY GEOTEXTILE
17 UNITED STATE FOREST SERVICE
STREAM SO-1
SITE 20

STREAM SO
SITE 22
18 ROBERT ANTHONY MORRIS AND WIFE, JACKIE MORRIS
TOE PROTECTION SEE DETAIL 7
PUE
MATCH TO SHEET 16 -L- STA. 154+00.00
4" FDPS
2" FDPS
COLLAR
42" RCP-IV
15" RCP-III
15" W/ELBOWS
FILL W/ FLOWABLE FILL
JB w/MH
CAT-I
STANDARD BASE DITCH W/CLASS I RIP RAP SLOPE= 0.3% EST 25 TONS EST 50 SY GEOTEXTILE EST DDE =9 CY SEE DETAIL 57
18 ROBERT ANTHONY MORRIS AND WIFE, JACKIE MORRIS
STREAM SO

FOR -L- PROFILE, SEE SHEETS 46 & 47

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bunt

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-84

PERMIT DRAWING
SHEET 23 OF 91

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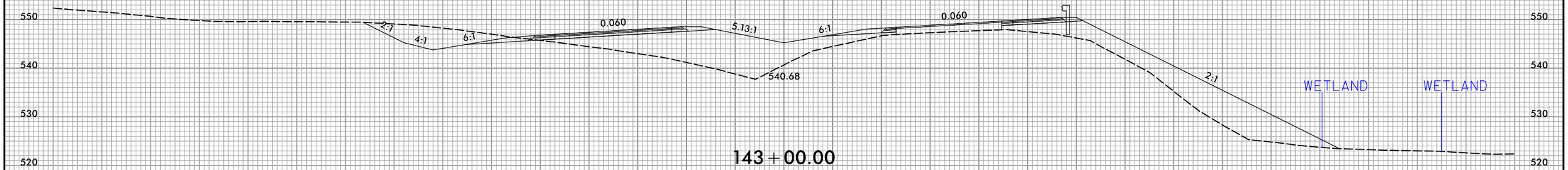
SITE 19



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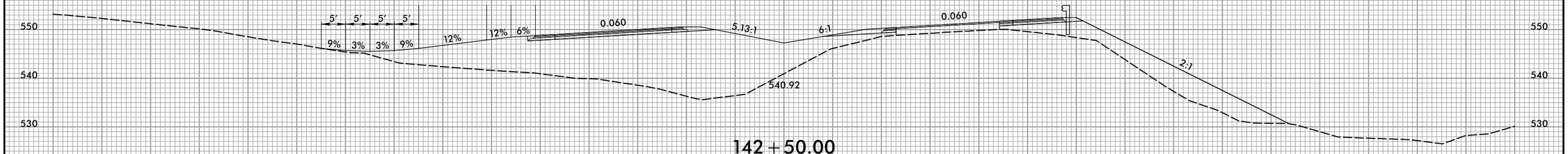
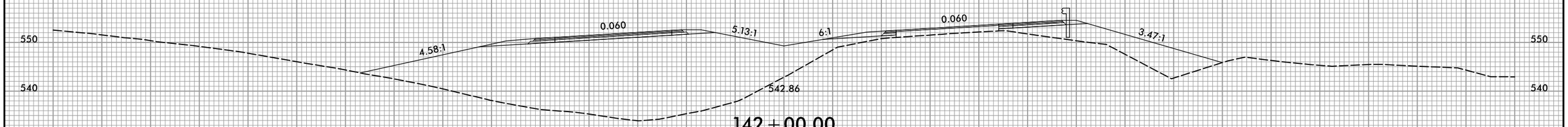


142 + 50.00



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jhunt

8/23/99

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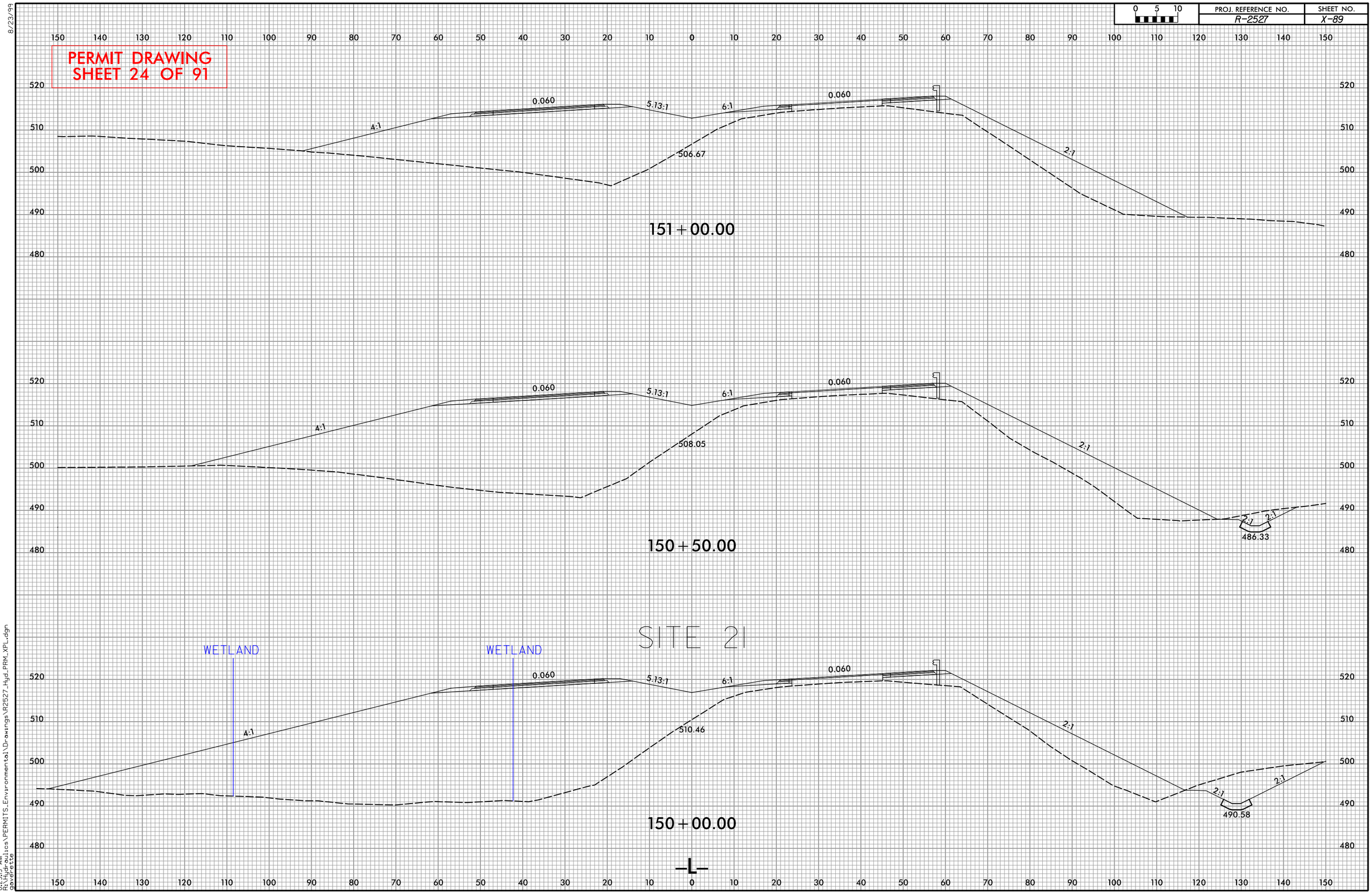
	R-2527	X-89

PERMIT DRAWING
SHEET 24 OF 91



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gaverette

5/14/99

PERMIT DRAWING SHEET 25 OF 91

50′ 0′ 100′
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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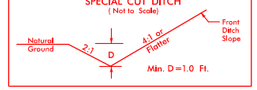
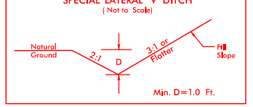
NAD 83/NA 2011

DETAIL 53
SPECIAL CUT DITCH
(Not to Scale)



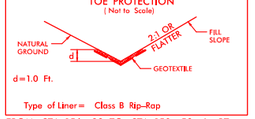
FROM STA. 154+00 TO STA. 156+50 -L- RT

DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 165+00 TO STA. 166+50 -L- RT

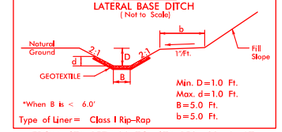
DETAIL 7
TOE PROTECTION
(Not to Scale)



Type of Liner= Class B Rip-Rap

FROM STA. 156+90 TO STA. 158+50 -L- RT

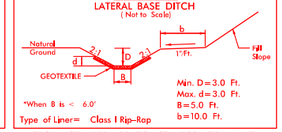
DETAIL 13
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= Class I Rip-Rap

FROM STA. 157+00 TO STA. 159+32 -L- LT
FROM STA. 160+00 TO STA. 165+00 -L- RT

DETAIL 14
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= Class I Rip-Rap

FROM STA. 159+39 TO STA. 166+75 -L- LT

155

160

165

STREAM SC

TS

FILL IN EXISTING CHANNEL W/CLASS I RIP RAP
EST 70 TONS
EST 105 SY GEOTEXTILE
SEE DETAIL 64

CLASS II RIP RAP
SEE DETAIL 23
EST 200 TONS
EST 320 SY
GEOTEXTILE
SEE DETAIL 23

7.0′ BASE CHANNEL

SIDMS CREEK

SITE 23

LATERAL BASE DITCH
W/CLASS I RIP RAP
SEE DETAIL 13
EST 241 TONS
EST 436 SY GEOTEXTILE

(18)
ROBERT ANTHONY MORRIS
AND WIFE, JACKIE MORRIS

STREAM SC-1

SITE 24

LATERAL BASE DITCH
W/CLASS I RIP RAP
SEE DETAIL 14
EST 1283 TONS
EST 2113 SY GEOTEXTILE

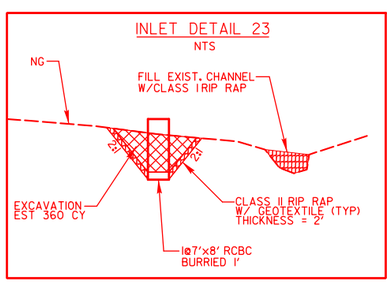
MATCH TO SHEET 15
-L- STA. 154+00.00

MATCH TO SHEET 17
-L- STA. 166+00.00

ACCESS BREAK
WOODS
4′ FDPS
2′ FDPS
10′ FDPS
24′
46′
8d
CAT-1
GREU TL-3
RANDOLPH ELECTRIC 40'RW
R=2940.00′
PUE
PDE
DUE
CHORD
E
F
C
2GI
FS
18″ W/ ELBOWS
15″ W/ELBOWS
18″ RCP-IV
15″ RCP-III
BEGIN SBG +00
(NC=40′ (TYP.)
+/-100
1@7′x8′ RCBC (BURIED 1.0′) W/BEVELED HW
N 66°14′17.2″ E
-L-
NC HWY 24/27
24′ BST
FILL W/ FLOWABLE FILL
SPECIAL CUT DITCH
SEE DETAIL 53
TOE PROTECTION
W/CLASS B RIP RAP
SEE DETAIL 7
EST 44 TONS
EST 138 SY GEOTEXTILE
FILL IN EXISTING CHANNEL
W/CLASS I RIP RAP
EST 165 TONS
EST 190 SY GEOTEXTILE
SEE DETAIL 64
LATERAL BASE DITCH
W/CLASS I RIP RAP
SEE DETAIL 13
EST 519 TONS
EST 939 SY GEOTEXTILE
SPECIAL LATERAL 'V' DITCH
SEE DETAIL 1
CLASS II RIP RAP
SEE DETAIL 24
EST 255 TONS
EST 395 SY
GEOTEXTILE
SEE DETAIL 24
7.0′ BASE
OUTLET CHANNEL
CLASS I RIP RAP
EMBEDDED INTO
STREAM BED
EST 40 TONS
EST 75 SY
GEOTEXTILE

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

INLET DETAIL 23
NTS



OUTLET DETAIL 24
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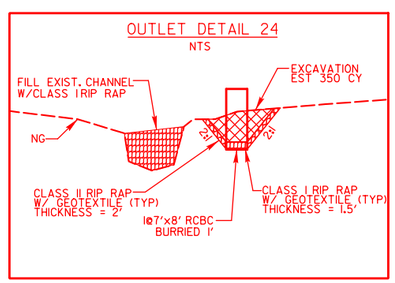

FOR -L- PROFILE, SEE SHEET 47

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dgnlib.dgn
Default

5/14/99

PERMIT DRAWING SHEET 26 OF 91

50′ 0′ 100′
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83/NA 2011

DETAIL 53
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground, 2:1, D, 4:1 or Flatter, Front Ditch Slope
Min. D=1.0 Ft.
FROM STA. 154+00 TO STA. 156+50 -L- RT

DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Natural Ground, 2:1, D, 3:1 or Flatter, Fill Slope
Min. D=1.0 Ft.
FROM STA. 165+00 TO STA. 166+50 -L- RT

DETAIL 7
TOE PROTECTION
(Not to Scale)
NATURAL GROUND, d, 2:1 OR FLATTER, FILL SLOPE, GEOTEXTILE
d=1.0 Ft.
Type of Liner= Class B Rip-Rap
FROM STA. 156+90 TO STA. 158+50 -L- RT

DETAIL 13
LATERAL BASE DITCH
(Not to Scale)
Natural Ground, 2:1, d, D, 2:1, 1'Ft., b, B, GEOTEXTILE, Fill Slope
*When B is < 6.0'
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=5.0 Ft.
b=5.0 Ft.
Type of Liner= Class I Rip-Rap
FROM STA. 157+00 TO STA. 159+32 -L- LT
FROM STA. 160+00 TO STA. 165+00 -L- RT

DETAIL 14
LATERAL BASE DITCH
(Not to Scale)
Natural Ground, 2:1, d, D, 2:1, 1'Ft., b, B, GEOTEXTILE, Fill Slope
*When B is < 6.0'
Min. D=3.0 Ft.
Max. d=3.0 Ft.
B=5.0 Ft.
b=10.0 Ft.
Type of Liner= Class I Rip-Rap
FROM STA. 159+39 TO STA. 166+75 -L- LT

STREAM SC
CLASS II RIP RAP
SEE DETAIL 23
EST 200 TONS
EST 320 SY
GEOTEXTILE
SEE DETAIL 23

FILL IN EXISTING CHANNEL W/CLASS I RIP RAP
EST 70 TONS
EST 105 SY GEOTEXTILE
SEE DETAIL 64

TS
51' DUNS CREEK 51'
7.0' BASE CHANNEL

SITE 23

LATERAL BASE DITCH W/CLASS I RIP RAP
SEE DETAIL 13
EST 241 TONS
EST 436 SY GEOTEXTILE

18 ROBERT ANTHONY MORRIS AND WIFE, JACKIE MORRIS

STREAM SC-1

SITE 24

LATERAL BASE DITCH W/CLASS I RIP RAP
SEE DETAIL 14
EST 1283 TONS
EST 2113 SY GEOTEXTILE

MATCH TO SHEET 15 -L- STA. 154+00.00

ACCESS BREAK
WOODS
4' FDPS
2' FDPS
24"
46"
15" RCP-III
2GI
FS
18" W/ ELBOWS
CAT-1
10' FDPS
BEGIN SBG +00
18" RCP-IV
[NC=40' (TYP.)
H=100
15" W/ELBOWS
N 66°14'17.2" E -L-
1@7'x8' RCBC (BURIED 1.0') W/BEVELED HW
GREU TL-3
FILL W/ FLOWABLE FILL
NC HWY/24/27
24" BST
MATCH TO SHEET 17 -L- STA. 166+00.00

SPECIAL CUT DITCH SEE DETAIL 53

TOE PROTECTION W/CLASS B RIP RAP
SEE DETAIL 7
EST 44 TONS
EST 138 SY GEOTEXTILE

PUE
DUE
PDE
RANDOLPH ELECTRIC 400kW

FILL IN EXISTING CHANNEL W/CLASS I RIP RAP
EST 165 TONS
EST 190 SY GEOTEXTILE
SEE DETAIL 64

CLASS II RIP RAP
SEE DETAIL 24
EST 255 TONS
EST 395 SY
GEOTEXTILE
SEE DETAIL 24

7.0' BASE OUTLET CHANNEL

CLASS I RIP RAP EMBEDDED INTO STREAM BED
EST 40 TONS
EST 75 SY
GEOTEXTILE

LATERAL BASE DITCH W/CLASS I RIP RAP
SEE DETAIL 13
EST 519 TONS
EST 939 SY GEOTEXTILE

SPECIAL LATERAL 'V' DITCH
SEE DETAIL 1

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

INLET DETAIL 23
NTS
NG, FILL EXIST. CHANNEL W/CLASS I RIP RAP, 1:1, 2:1, EXCAVATION EST 360 CY, CLASS II RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2', I@7'x8' RCBC BURRIED 1'

OUTLET DETAIL 24
NTS
FILL EXIST. CHANNEL W/CLASS I RIP RAP, NG, EXCAVATION EST 350 CY, 2:1, 2', CLASS II RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2', I@7'x8' RCBC BURRIED 1', CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'

FOR -L- PROFILE, SEE SHEET 47

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overdale

PERMIT DRAWING
SHEET 27 OF 91

PROJECT REFERENCE NO.	
R-2527	
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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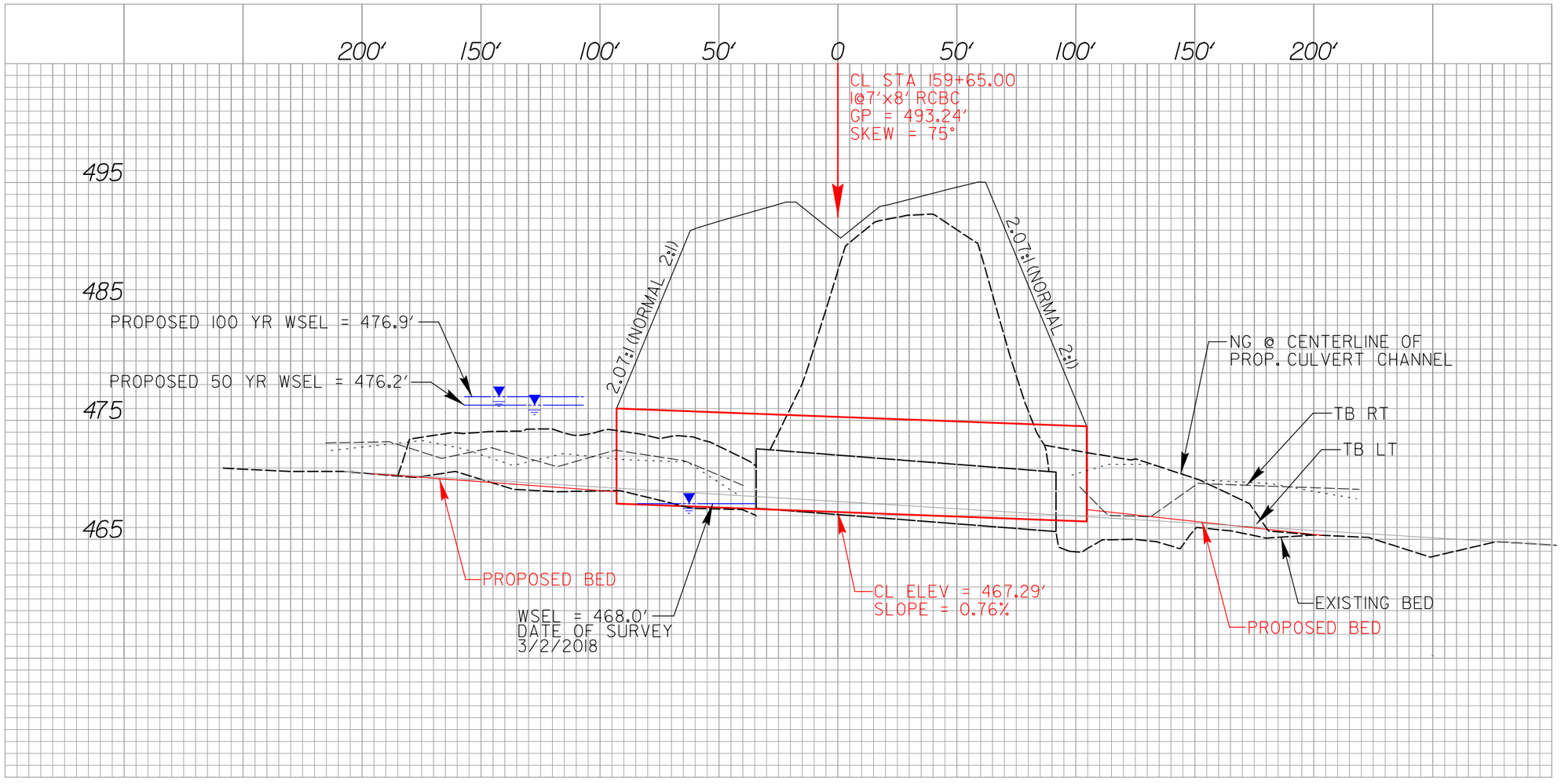
SITES 23 & 24



REVISIONS
8/17/99

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5/14/99

PERMIT DRAWING SHEET 28 OF 91

50′ 0′ 100′

GRAPHIC SCALE

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	17
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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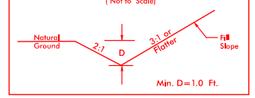
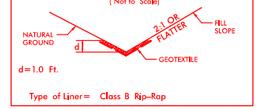
NAD 83/NA 2011

DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 165+00 TO STA. 170+50 -L- RT

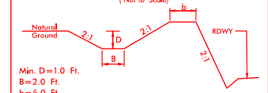
DETAIL 7
TOE PROTECTION
(Not to Scale)



Type of Liner= Class B Rip-Rap

FROM STA. 167+50 TO STA. 171+00 -L- RT

DETAIL 12
BERM BASE DITCH
(Not to Scale)



FROM STA. 178+00 TO STA. 185+96 -L- LT

DETAIL 14
LATERAL BASE DITCH
(Not to Scale)

Type of Liner= Class I Rip-Rap

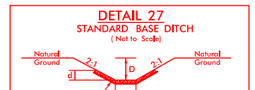
FROM STA. 159+39 TO STA. 166+75 -L- LT

DETAIL 15
LATERAL BASE DITCH
(Not to Scale)

Type of Liner= Class I Rip-Rap

FROM STA. 166+75 TO STA. 169+25 -L- LT

DETAIL 27
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= Class I Rip-Rap

FROM STA. 166+55 TO STA. 167+04 -L- LT

DETAIL 82
STANDARD 'V' DITCH
(Not to Scale)

FROM STA. 178+92 TO STA. 179+12 -L- RT

(19) UNITED STATES FOREST SERVICE

(18) T ANTHONY MORRIS IFE, JACKIE MORRIS

SITE 24

SITE 25

SITE 26

SITE 27

SITE 28

WETLAND WT

POND

STREAM SC-1

STREAM SC-2

STREAM SC-3

LATERAL BASE DITCH W/CLASS I RIP RAP SEE DETAIL 14 EST 1283 TONS EST 2113 SY GEOTEXTILE

STANDARD BASE DITCH W/CLASS I RIP RAP SLOPE= 4.3% EST 105 TONS EST 175 SY GEOTEXTILE EST DDE = 30 CY SEE DETAIL 27

CONSTRUCT BERM W/CLASS I RIP RAP IN EXISTING CHANNEL VOID FROM STA. 165+20 TO 167+50 L LT EST 150 TONS EST 210 SY GEOTEXTILE

CLASS I RIP RAP EMBEDDED IN EMERGENCY SPILLWAY EST 25 TONS EST 12 SY GEOTEXTILE

USE 1.5:1 ROCK PLATED FILL SLOPE STA 167+50 -L- LT TO STA 169+50 -L- LT

LATERAL BASE DITCH W/CLASS I RIP RAP SEE DETAIL 15 EST 260 TONS EST 470 SY GEOTEXTILE

BERM BASE DITCH SEE DETAIL 12

SPECIAL LATERAL 'V' DITCH SEE DETAIL 1

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 39 TONS EST 121 SY GEOTEXTILE

STANDARD V DITCH DDE= 2 CY SEE DETAIL 82

24" RCP-III

18" RCP-III

15" RCP-III

4' FDPS

2' FDPS

2GI

FS

COLLAR

NOT BURIED

TRENCHLESS INSTALLATION 5/8" WELDED STEEL FLOWABLE FILL

REMOVE

DESTROYED/ ABANDONED

END SBG +17

N 66°14'17.2" E

MATCH TO SHEET 16 -L- STA. 166+00.00

MATCH TO SHEET 18 -L- STA. 179+00.00

WOODS

ACCESS BREAK

PUE

SITES 25 & 26 (UPSTREAM)

25′ 0′ 50′

INSET GRAPHIC SCALE

FOR -L- PROFILE, SEE SHEET 47

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

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PERMIT DRAWING SHEET 29 OF 91

50′ 0′ 100′

GRAPHIC SCALE

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	17
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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NAD 83/NA 2011

DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

FROM STA. 165+00 TO STA. 170+50 -L- RT

DETAIL 7
TOE PROTECTION
(Not to Scale)

d=1.0 Ft.

Type of Liner= Class B Rip-Rap

FROM STA. 167+50 TO STA. 171+00 -L- RT

DETAIL 12
BERM BASE DITCH
(Not to Scale)

Min. D=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.

FROM STA. 178+00 TO STA. 185+96 -L- LT

DETAIL 14
LATERAL BASE DITCH
(Not to Scale)

*When B is < 6.0'

Min. D=3.0 Ft.
Max. d=3.0 Ft.
B=5.0 Ft.
b=10.0 Ft.

Type of Liner= Class I Rip-Rap

FROM STA. 159+39 TO STA. 166+75 -L- LT

DETAIL 15
LATERAL BASE DITCH
(Not to Scale)

*When B is < 6.0'

Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=5.0 Ft.
b=5.0 Ft.

Type of Liner= Class I Rip-Rap

FROM STA. 166+75 TO STA. 169+25 -L- LT

DETAIL 27
STANDARD BASE DITCH
(Not to Scale)

*When B is < 6.0'

Min. D=1.0 Ft.
Max. d=3.0 Ft.
B=4.0 Ft.

Type of Liner= Class I Rip-Rap

FROM STA. 166+55 TO STA. 167+04 -L- LT

DETAIL 82
STANDARD 'V' DITCH
(Not to Scale)

Min. D=1.0 Ft.

FROM STA. 178+92 TO STA. 179+12 -L- RT

SITE 24

SITE 25

SITE 26

SITE 27

SITE 28

WETLAND WT

STREAM SC-1

STREAM SC-2

STREAM SC-3

SITE 25 WETLAND WT

LATERAL BASE DITCH W/CLASS I RIP RAP SEE DETAIL 14 EST 1283 TONS EST 2113 SY GEOTEXTILE

STANDARD BASE DITCH W/CLASS I RIP RAP SLOPE= 4.3% EST 105 TONS EST 175 SY GEOTEXTILE EST DDE = 30 CY SEE DETAIL 27

CONSTRUCT BERM W/CLASS I RIP RAP IN EXISTING CHANNEL VOID FROM STA. 165+20 TO 167+50 L LT EST 150 TONS EST 210 SY GEOTEXTILE

CLASS I RIP RAP EMBEDDED IN EMERGENCY SPILLWAY EST 25 TONS EST 12 SY GEOTEXTILE

USE 1.5:1 ROCK PLATED FILL SLOPE STA 167+50 -L- LT TO STA 169+50 -L- LT

LATERAL BASE DITCH W/CLASS I RIP RAP SEE DETAIL 15 EST 260 TONS EST 470 SY GEOTEXTILE

BERM BASE DITCH SEE DETAIL 12

SPECIAL LATERAL 'V' DITCH SEE DETAIL 1

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 39 TONS EST 121 SY GEOTEXTILE

STANDARD 'V' DITCH DDE= 2 CY SEE DETAIL 82

MATCH TO SHEET 16 -L- STA. 166+00.00

MATCH TO SHEET 18 -L- STA. 179+00.00

24" RCP-III

18" RCP-III

15" RCP-III

2' FDPS

4' FDPS

NOT BURIED

COLLAR

TRENCH CLASS INSTALLATION 3' WELDED STEEL FLOWABLE FILL

END SBG +17

REMOVE

DESTROYED/ ABANDONED

N 66°14'17.22" E

ACCESS BREAK

PUE

WOODS

INSET GRAPHIC SCALE

SITES 25 & 26 (UPSTREAM)

FOR -L- PROFILE, SEE SHEET 47

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

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lburg

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-99

PERMIT DRAWING
SHEET 30 OF 91

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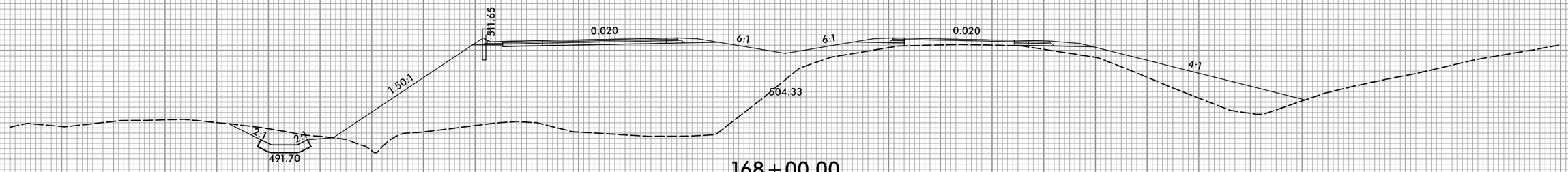
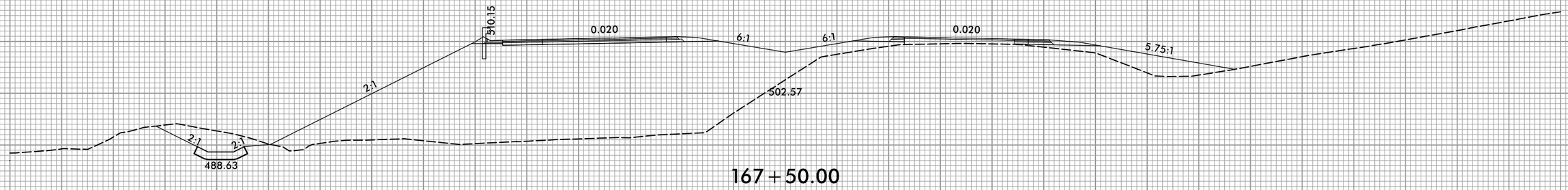
510
500
490
480



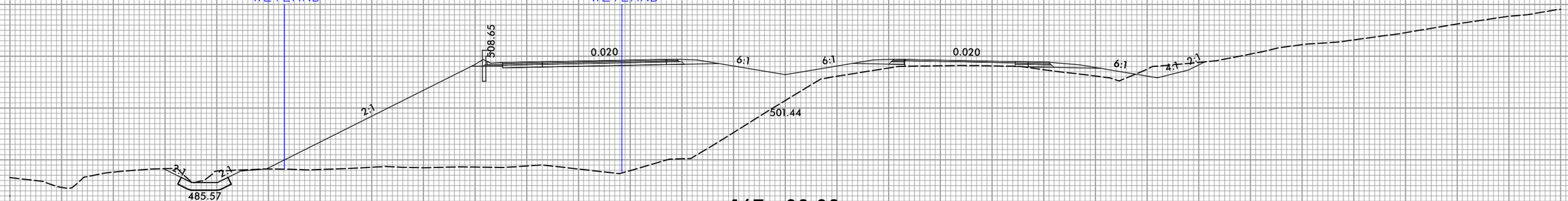
168+00.00



167+50.00

SITE 26

WETLAND
WETLAND



167+00.00

—L—

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gaverette

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-100

PERMIT DRAWING
SHEET 31 OF 91

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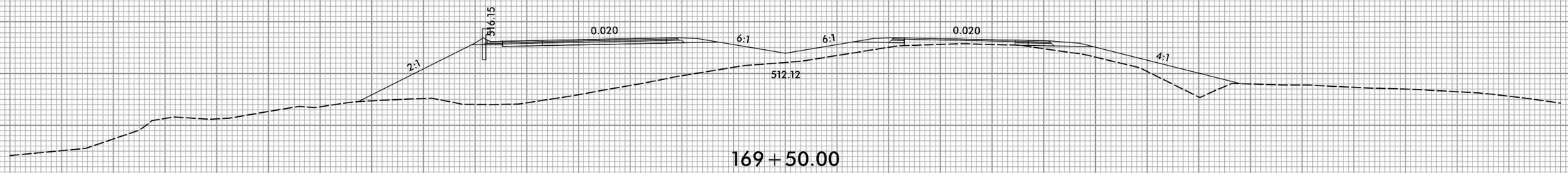
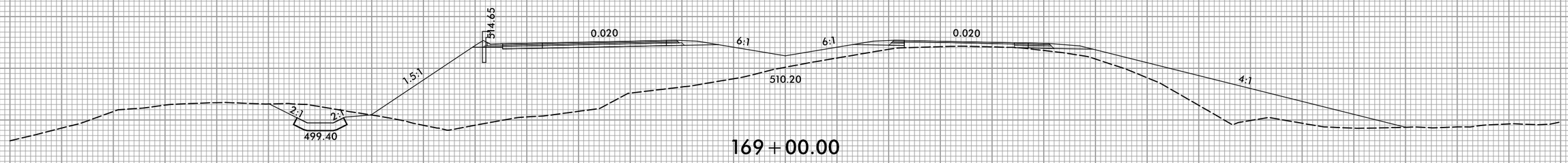
520 510 500 490

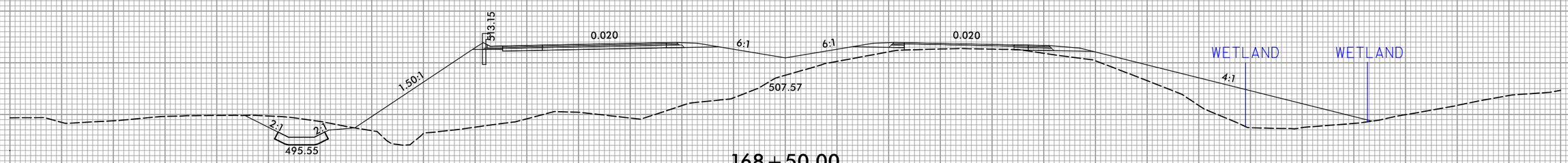


169+50.00



169+00.00

SITE 26



168+50.00

–L–

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Hydraulics
gaverette

5/14/99

PERMIT DRAWING SHEET 32 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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NAD 83/NA 2011

DETAIL 1
SPECIAL LATERAL "V" DITCH
(Not to Scale)

FROM STA. 198+50 TO STA. 199+00 -L- RT

DETAIL 9
LATERAL BASE DITCH
(Not to Scale)

FROM STA. 191+00 TO STA. 194+88 -L- LT

DETAIL 70
SPECIAL LATERAL BASE DITCH
(Not to Scale)

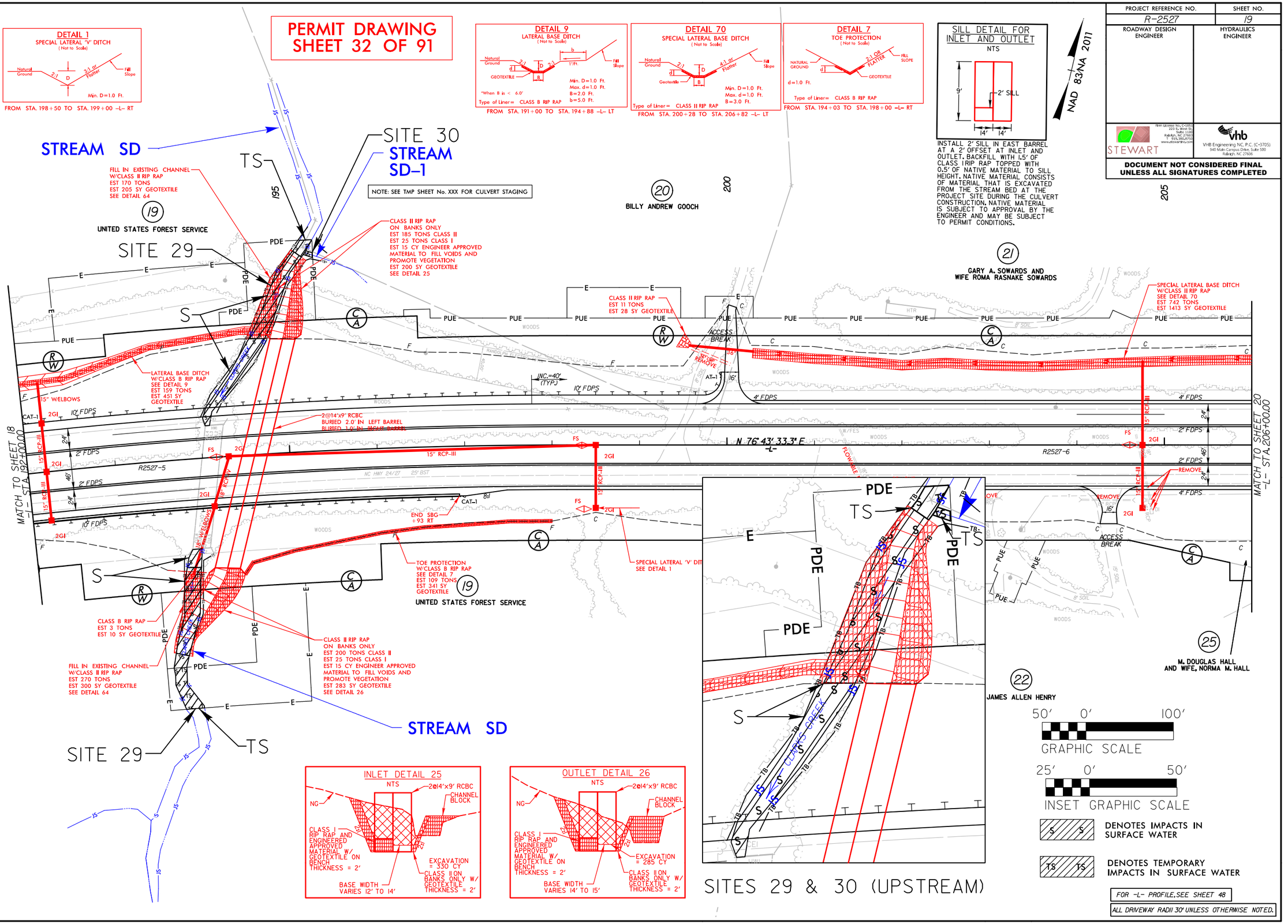
FROM STA. 200+28 TO STA. 206+82 -L- LT

DETAIL 7
TOE PROTECTION
(Not to Scale)

FROM STA. 194+03 TO STA. 198+00 -L- RT

SILL DETAIL FOR INLET AND OUTLET
NTS

INSTALL 2' SILL IN EAST BARREL AT A 2' OFFSET AT INLET AND OUTLET. BACKFILL WITH 15' OF CLASS I RIP RAP TOPPED WITH 0.5' OF NATIVE MATERIAL TO SILL HEIGHT. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING THE CULVERT CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.



INLET DETAIL 25
NTS

OUTLET DETAIL 26
NTS

SITES 29 & 30 (UPSTREAM)

50' 0' 100'
GRAPHIC SCALE

25' 0' 50'
INSET GRAPHIC SCALE

S S — DENOTES IMPACTS IN SURFACE WATER

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

FOR -L- PROFILE, SEE SHEET 48

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

$$$$USERNAME$$$$ $$$$SYSTIME$$$$ $$$$DGN$$$$

5/14/99

PERMIT DRAWING
SHEET 33 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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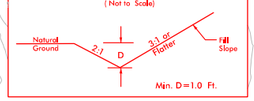
NAD 83/NA 2011

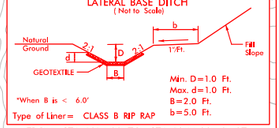
DETAIL 1
SPECIAL LATERAL "V" DITCH
(Not to Scale)



Min. D=1.0 Ft.

FROM STA. 198+50 TO STA. 199+00 -L- RT

DETAIL 9
LATERAL BASE DITCH
(Not to Scale)



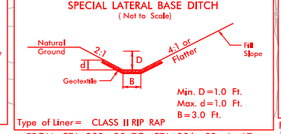
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.

*When B is < 6.0'

Type of Liner= CLASS B RIP RAP

FROM STA. 191+00 TO STA. 194+88 -L- LT

DETAIL 70
SPECIAL LATERAL BASE DITCH
(Not to Scale)

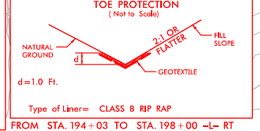


Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=3.0 Ft.

Type of Liner= CLASS II RIP RAP

FROM STA. 200+28 TO STA. 206+82 -L- LT

DETAIL 7
TOE PROTECTION
(Not to Scale)

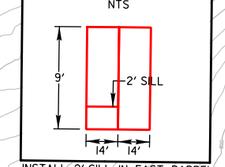


d=1.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 194+03 TO STA. 198+00 -L- RT

SILL DETAIL FOR INLET AND OUTLET
NTS



INSTALL 2' SILL IN EAST BARREL AT A 2' OFFSET AT INLET AND OUTLET. BACKFILL WITH 15' OF CLASS I RIP RAP TOPPED WITH 0.5' OF NATIVE MATERIAL TO SILL HEIGHT. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING THE CULVERT CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

STREAM SD

SITE 30

STREAM SD-1

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

FILL IN EXISTING CHANNEL W/CLASS II RIP RAP EST 170 TONS EST 205 SY GEOTEXTILE SEE DETAIL 64

(19) UNITED STATES FOREST SERVICE

SITE 29

CLASS II RIP RAP ON BANKS ONLY EST 185 TONS CLASS II EST 25 TONS CLASS I EST 35 CY ENGINEER APPROVED MATERIAL TO FILL VOIDS AND PROMOTE VEGETATION EST 200 SY GEOTEXTILE SEE DETAIL 25

(20) BILLY ANDREW GOOCH

(21) GARY A. SOWARDS AND WIFE ROMA RASNAKE SOWARDS

CLASS II RIP RAP EST 11 TONS EST 28 SY GEOTEXTILE

SPECIAL LATERAL BASE DITCH W/CLASS II RIP RAP SEE DETAIL 70 EST 742 TONS EST 1413 SY GEOTEXTILE

LATERAL BASE DITCH W/CLASS B RIP RAP SEE DETAIL 9 EST 159 TONS EST 451 SY GEOTEXTILE

2@14'x9' RCBC BURIED 2.0' IN LEFT BARREL BURIED 1.0' IN RIGHT BARREL

15" RCP-III

18" RCP-III

N 76° 43' 33.3" E -L-

R2527-5

R2527-6

END SBG +93 RT

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 109 TONS EST 341 SY GEOTEXTILE

(19) UNITED STATES FOREST SERVICE

SPECIAL LATERAL 'V' DITCH SEE DETAIL 1

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

FILL IN EXISTING CHANNEL W/CLASS II RIP RAP EST 270 TONS EST 300 SY GEOTEXTILE SEE DETAIL 64

CLASS II RIP RAP ON BANKS ONLY EST 200 TONS CLASS II EST 25 TONS CLASS I EST 15 CY ENGINEER APPROVED MATERIAL TO FILL VOIDS AND PROMOTE VEGETATION EST 283 SY GEOTEXTILE SEE DETAIL 26

STREAM SD

SITE 29

TS

CLARKS CREEK

(25) M. DOUGLAS HALL AND WIFE, NORMA M. HALL

(22) JAMES ALLEN HENRY

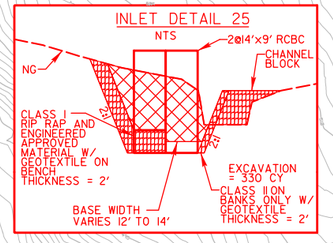
ACCESS BREAK

REMOVE

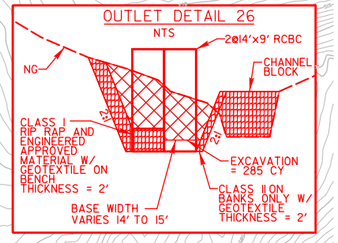
MATCH TO SHEET 18 -L- STA.192+00.00

MATCH TO SHEET 20 -L- STA.206+00.00

INLET DETAIL 25
NTS



OUTLET DETAIL 26
NTS



SITES 29 & 30 (UPSTREAM)

50' 0' 100'
GRAPHIC SCALE

25' 0' 50'
INSET GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

FOR -L- PROFILE, SEE SHEET 48

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

$$$$SYSTEMFILE$$$$
$$$$CONS$$$$
$$$$USERNAME$$$$

8/17/99

REVISIONS

PERMIT DRAWING
SHEET 34 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART
Firm License No. C-0101
223 South West St.
Suite 1150
Raleigh, NC 27603
T: 919.380.8750
www.stewartinc.com

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

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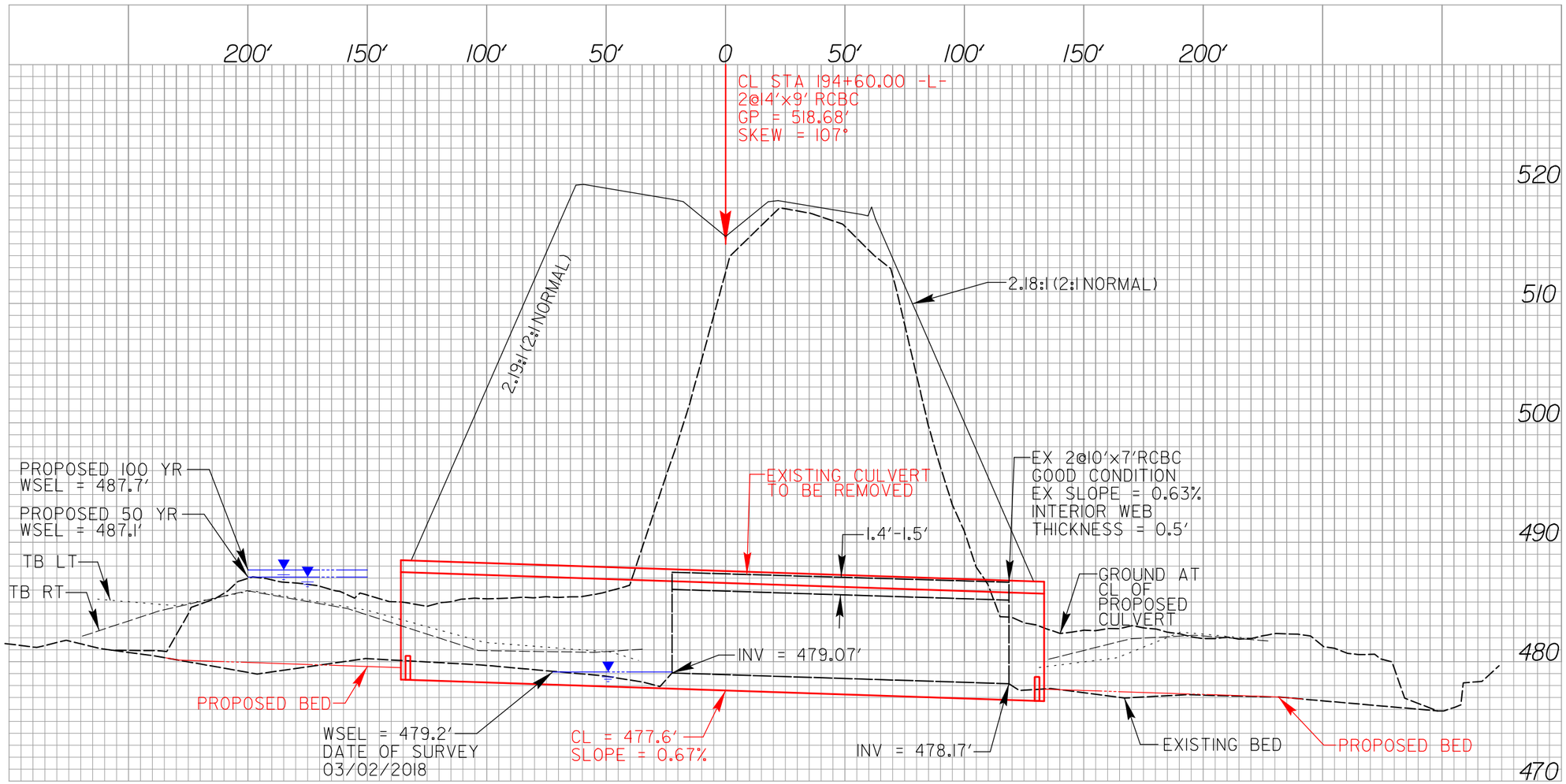
SITES 29 & 30



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PERMIT DRAWING SHEET 35 OF 91

50' 0' 100'
GRAPHIC SCALE

F F DENOTES FILL IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NAD 83/NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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DETAIL 7
TOE PROTECTION
(Not to Scale)
NATURAL GROUND, 2:1 OR FLATTER, FILL SLOPE, GEOTEXTILE, d=1.0 Ft.
Type of Liner = Class B Rip-Rap
FROM STA. 222+50 TO STA. 223+10 -L- RT
FROM STA. 223+56 TO STA. 228+00 -L- RT

DETAIL 5
BERM BASE DITCH
(Not to Scale)
Natural Ground, 2:1, d, D, B, 2:1, RDWY, GEOTEXTILE
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.
Type of Liner = CLASS B RIP RAP
FROM STA. 233+50 TO STA. 238+00 -L- LT

DETAIL 7I
STANDARD BASE DITCH
(Not to Scale)
Natural Ground, 2:1, d, D, 2:1, Natural Ground, Geotextile, B
Min. D=3.0 Ft.
Max. d=3.0 Ft.
B=4.0 Ft.
*When B is < 6.0'
Type of Liner = CLASS I RIP RAP
AT STA. 222+84 -L- LT
AT STA. 223+34 -L- RT

STREAM SP

STANDARD BASE DITCH
W/CLASS I RIP RAP
SLOPE= 0.9%
EST 180 TONS
EST 280 SY GEOTEXTILE
EST DDE = 86 CY
SEE DETAIL 71

26Z

26 WILLIAM C. BLUE AND WIFE, JO ANN BLUE

WETLAND WU-2

FILL IN EXISTING CHANNEL
W/CLASS I RIP RAP
EST 105 TONS
EST 175 SY GEOTEXTILE
SEE DETAIL 64

225

230

27 RICHARD E. GREENE AND WIFE, LORI G. GREENE

28 JOHN W. DAVIS AND WIFE, DIANA R. DAVIS

24 ANGES LINDSEY HEIRS

SITE 31

TOE PROTECTION
W/CLASS B RIP RAP
SEE DETAIL 7
EST 17 TONS
EST 52 SY GEOTEXTILE

SITE 32

BERM BASE DITCH
W/CLASS B RIP RAP
SEE DETAIL 5
EST 202 TONS
EST 571 SY GEOTEXTILE

BEGIN SBG +06 LT
END SBG +25 LT
END SBG +44 RT

MATCH TO SHEET 20 -L- STA. 220+00.00

MATCH TO SHEET 22 -L- STA. 234+00.00

N 76° 43' 33.3" E -L-

TRENCHLESS INSTALLATION 66" WELDED STEEL

COLLAR

NOT BURIED

REMOVE

SLOPE TO BE GRADED TO 3:1 OR FLATTER

CLASS B RIP RAP
EST 5 TONS
EST 14 SY GEOTEXTILE

STANDARD BASE DITCH
W/CLASS I RIP RAP
SLOPE= 0.3%
EST 108 TONS
EST 170 SY GEOTEXTILE
EST DDE = .52 CY
SEE DETAIL 71

FILL IN EXISTING CHANNEL
W/CLASS I RIP RAP
EST 40 TONS
EST 55 SY GEOTEXTILE
SEE DETAIL 64

TOE PROTECTION
W/CLASS B RIP RAP
SEE DETAIL 7
EST 122 TONS
EST 381 SY GEOTEXTILE

CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE

CLASS B RIP RAP
EST 3 TONS
EST 10 SY GEOTEXTILE

TOE PROTECTION
W/CLASS B RIP RAP
SEE DETAIL 7
EST 30 TONS
EST 381 SY GEOTEXTILE

25 M. DOUGLAS HALL AND WIFE, NORMA M. HALL

29Z

29 CHAD L. WINFREE AND WIFE, NATALIE C. WINFREE

27A RICHARD E. GREENE AND WIFE, LORI G. GREENE

30 JOHN W. DAVIS AND WIFE, DIANA R. DAVIS

SITE 33

STREAM WX

STREAM SP

WILLIAM D. BRALEY AND WIFE, LIDIE M. BRALEY

FOR INTERSECTION DETAIL, SEE SHEET 2B-4

FOR -L- PROFILE, SEE SHEET 49

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

9:00:30 AM
R:\Projects\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_PSH21.dgn
dwvette

5/14/99

PERMIT DRAWING SHEET 36 OF 91

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

DENOTES MECHANIZED CLEARING

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 100'

GRAPHIC SCALE

NAD 83/NA 2011

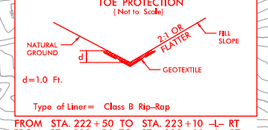
PROJECT REFERENCE NO.	SHEET NO.
R-2527	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART — firm License No. C-1851, 223 S. West St., Suite 1100, Raleigh, NC 27603, P: 919.380.8750, www.wbstewartNC.com

vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DETAIL 7
TOE PROTECTION
(Not to Scale)

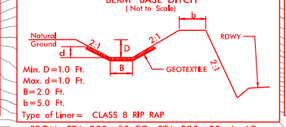


d=1.0 Ft.

Type of Liner= Class B Rip-Rap

FROM STA. 222+50 TO STA. 223+10 -L- RT
FROM STA. 223+56 TO STA. 228+00 -L- LT

DETAIL 5
BERM BASE DITCH
(Not to Scale)



Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.
Type of Liner= CLASS B RIP RAP

FROM STA. 233+50 TO STA. 238+00 -L- LT

DETAIL 7I
STANDARD BASE DITCH
(Not to Scale)

Min. D=3.0 Ft.
Max. d=3.0 Ft.
B=4.0 Ft.
*When B is < 6.0'
Type of Liner= CLASS 1 RIP RAP

AT STA. 222+84 -L- LT
AT STA. 223+34 -L- RT

STREAM SP

WETLAND WU-2

STANDARD BASE DITCH W/CLASS I RIP RAP
SLOPE= 0.5%
EST 180 TONS
EST 280 SY GEOTEXTILE
EST DDE = 86 CY
SEE DETAIL 7I

26 WILLIAM C. BLUE AND WIFE, JO ANN BLUE

26Z

FILL IN EXISTING CHANNEL W/CLASS I RIP RAP
EST 105 TONS
EST 175 SY GEOTEXTILE
SEE DETAIL 64

27 RICHARD E. GREENE AND WIFE, LORI G. GREENE

28 JOHN W. DAVIS AND WIFE, DIANA R. DAVIS

24 ANGES LINDSEY HEIRS

SITE 31

SITE 32

TOE PROTECTION W/CLASS B RIP RAP
SEE DETAIL 7
EST 17 TONS
EST 52 SY GEOTEXTILE

BEGIN SBG +06 LT

END SBG +25 LT

BERM BASE DITCH W/CLASS B RIP RAP
SEE DETAIL 5
EST 202 TONS
EST 571 SY GEOTEXTILE

ACCESS BREAK

PUE

PDE

MATCH TO SHEET 20 -L- STA. 220+00.00

MATCH TO SHEET 22 -L- STA. 234+00.00

CAT-1

GREU TL-3

4' FDPS

2' FDPS

10' FDPS

15" RCP-IV

18" RCP-IV

24" RCP-IV

2GI

COLLAR

NOT BURIED

TRENCHLESS INSTALLATION 66" WELDED STEEL

N 76° 43' 33.3" E

FLOWABLE FILL

21" W/ELBOWS

REMOVE

DI

25 M. DOUGLAS HALL AND WIFE, NORMA M. HALL

CLASS B RIP RAP
EST 5 TONS
EST 14 SY GEOTEXTILE

STANDARD BASE DITCH W/CLASS I RIP RAP
SLOPE= 0.3%
EST 108 TONS
EST 170 SY GEOTEXTILE
EST DDE = 52 CY
SEE DETAIL 7I

29Z

29 CHAD L. WINFREE AND WIFE, NATALIE C. WINFREE

FILL IN EXISTING CHANNEL W/CLASS I RIP RAP
EST 40 TONS
EST 59 SY GEOTEXTILE
SEE DETAIL 64

TOE PROTECTION W/CLASS B RIP RAP
SEE DETAIL 7
EST 122 TONS
EST 381 SY GEOTEXTILE

STREAM SP

SITE 33

STREAM WX

27A RICHARD E. GREENE AND WIFE, LORI G. GREENE

30 JOHN W. DAVIS AND WIFE, DIANA R. DAVIS

CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE

CLASS B RIP RAP
EST 3 TONS
EST 10 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP
SEE DETAIL 7
EST 30 TONS
EST 381 SY GEOTEXTILE

WILLIAM D. BRALEY AND WIFE, LIDIE M. BRALEY

FOR INTERSECTION DETAIL, SEE SHEET 2B-4

FOR -L- PROFILE, SEE SHEET 49

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

8:04:44 AM
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8/23/99

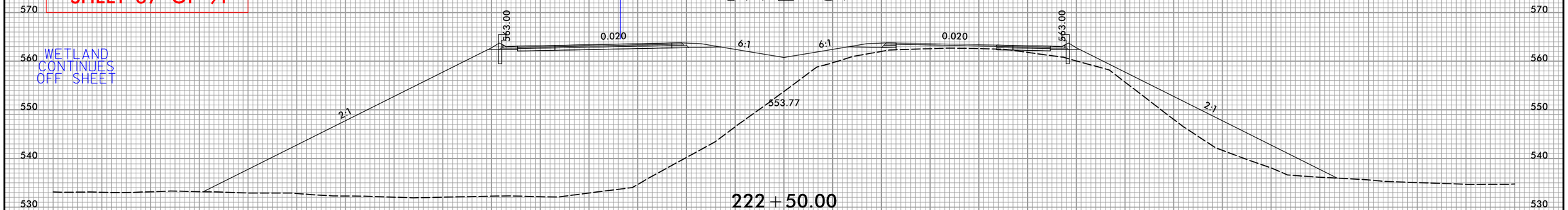
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-132

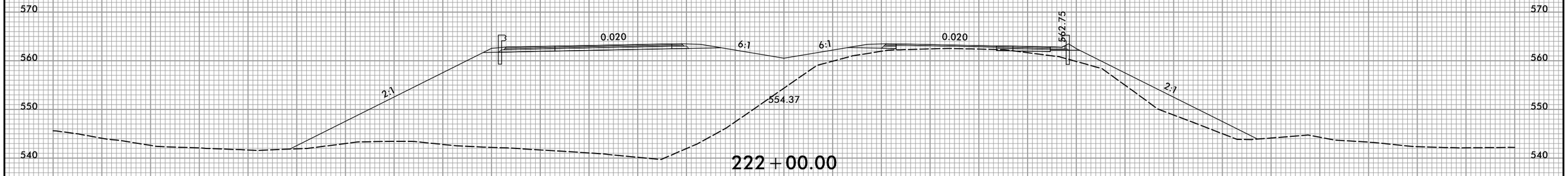
PERMIT DRAWING
SHEET 37 OF 91

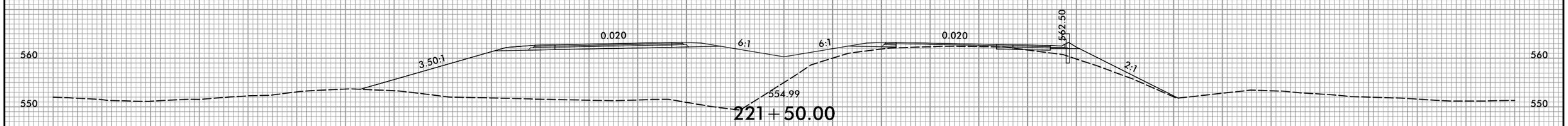
WETLAND

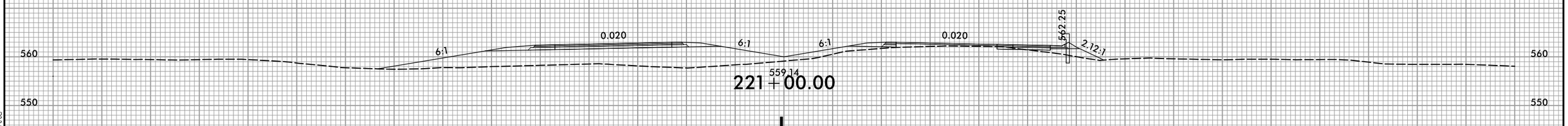
SITE 31

WETLAND CONTINUES OFF SHEET









–L–

9:06:26 AM
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gaverette

5/14/99

PERMIT DRAWING
SHEET 38 OF 91

50′ 0′ 100′
GRAPHIC SCALE

10′ 0′ 20′
INSET GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

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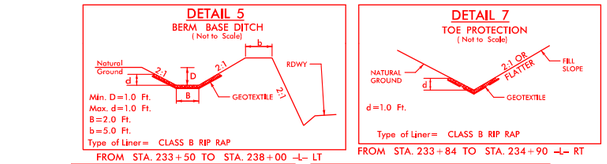
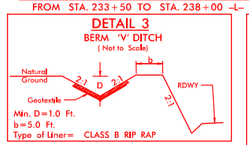
NAD 83/NA 2011

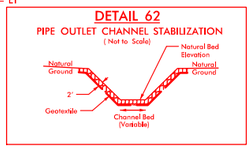


FROM STA. 233+50 TO STA. 238+00 -L- LT

FROM STA. 233+84 TO STA. 234+90 -L- RT



FROM STA. 13+66 TO STA. 16+25 -Y2- RT
FROM STA. 16+75 TO STA. 18+07 -Y2- RT
FROM STA. 10+50 TO STA. 10+00 -DR2- LT



STA. 238+18 -L- RT

235

28
JOHN W. DAVIS AND WIFE, DIANA R. DAVIS

30
JORDAN THREE, LLC

BERM BASE DITCH W/CLASS B RIP RAP SEE DETAIL 6 EST 202 TONS EST 571 SY GEOTEXTILE

BERM V DITCH W/CLASS B RIP RAP SEE DETAIL 3 EST 20 TONS EST 60 SY GEOTEXTILE

BERM V DITCH W/CLASS B RIP RAP SEE DETAIL 3 EST 80 TONS EST 240 SY GEOTEXTILE

BERM V DITCH W/CLASS B RIP RAP SEE DETAIL 3 EST 65 TONS EST 200 SY GEOTEXTILE

MATCH TO SHEET 39 -Y2- STA. 14+25.00

MATCH TO SHEET 21 -L- STA. 234+00.00

MATCH TO SHEET 23 -L- STA. 243+00.00

N 76° 43' 33.3" E

S 14° 24' 31.3" E

S 56° 09' 54.1" E

S 44° 47' 16.0" E

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 30 TONS EST 381 SY GEOTEXTILE

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS B RIP RAP EST 8 TONS EST 12 SY GEOTEXTILE L= 8 FT SEE DETAIL 62

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

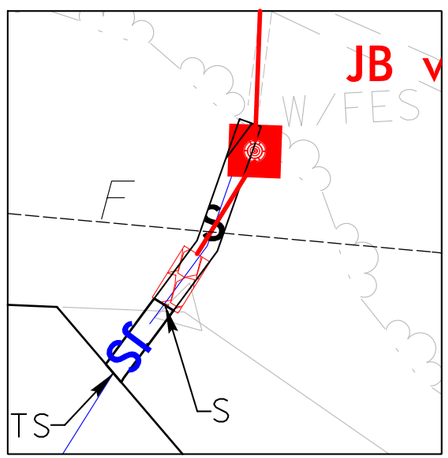
SPECIAL LATERAL V DITCH SEE DETAIL 1

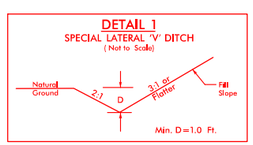
SITE 34

STREAM SQ

WILLIAM D. BRALEY AND WIFE, LIDIE M. BRALEY

ORK, LLC





FROM STA. 11+24 TO STA. 14+50 -Y3- LT

FOR INTERSECTION DETAIL, SEE SHEETS 2B-5
FOR -L- PROFILE, SEE SHEETS 49 & 50
FOR -Y2- PROFILE, SEE SHEET 59
FOR -Y3- PROFILE, SEE SHEET 59

15

5/14/99

PERMIT DRAWING
SHEET 39 OF 91

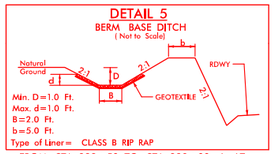
50′ 0′ 100′
GRAPHIC SCALE

10′ 0′ 20′
INSET GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

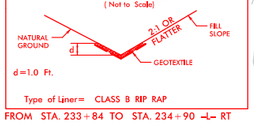
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DETAIL 5
BERM BASE DITCH
(Not to Scale)



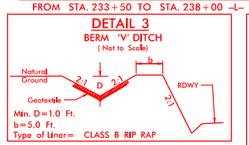
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.
Type of Liner= CLASS B RIP RAP
FROM STA. 233+50 TO STA. 238+00 -L- LT

DETAIL 7
TOE PROTECTION
(Not to Scale)



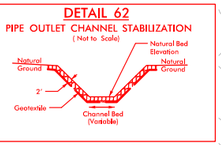
d=1.0 Ft.
Type of Liner= CLASS B RIP RAP
FROM STA. 233+84 TO STA. 234+90 -L- RT

DETAIL 3
BERM 'V' DITCH
(Not to Scale)



Min. D=1.0 Ft.
b=5.0 Ft.
Type of Liner= CLASS B RIP RAP
FROM STA. 13+66 TO STA. 16+25 -Y2- RT
FROM STA. 16+75 TO STA. 18+07 -Y2- RT
FROM STA. 10+50 TO STA. 10+00 -DR2- LT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)



STA. 238+18 -L- RT

PROJECT REFERENCE NO.	SHEET NO.
R-2527	22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

NAD 83/NA 2011

STEWART
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vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MATCH TO SHEET 39
-Y2- STA. 14+25.00

MATCH TO SHEET 21
-L- STA. 234+00.00

MATCH TO SHEET 23
-L- STA. 243+00.00

28
JOHN W. DAVIS AND WIFE, DIANA R. DAVIS

30
JORDAN THREE, LLC

30
JORDAN THREE, LLC

30
JORDAN THREE, LLC

WILLIAM D. BRALEY AND WIFE, LIDIE M. BRALEY

ORK, LLC

BERM V DITCH W/CLASS B RIP RAP SEE DETAIL 3 EST 20 TONS EST 60 SY GEOTEXTILE

BERM V DITCH W/CLASS B RIP RAP SEE DETAIL 3 EST 80 TONS EST 240 SY GEOTEXTILE

BERM V DITCH W/CLASS B RIP RAP SEE DETAIL 3 EST 65 TONS EST 200 SY GEOTEXTILE

BERM BASE DITCH W/CLASS B RIP RAP SEE DETAIL 5 EST 202 TONS EST 571 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 30 TONS EST 381 SY GEOTEXTILE

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS B RIP RAP EST 8 TONS EST 12 SY GEOTEXTILE L= 8 FT SEE DETAIL 62

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

SPECIAL LATERAL V DITCH SEE DETAIL 1

STREAM SQ

SITE 34

SITE 34

JB w/MH

24" RCP-III

18" RCP-III

15" RCP-III

REMOVE

BDO

GTD

FS

2GI

PUE

N 76° 43' 33.3" E

S 14° 24' 31.3" E

S 56° 09' 54.1" E

S 44° 47' 16.0" E

+93.86

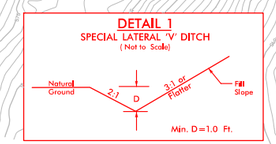
+01.57

+30.00

+46.00

+02.00

DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D=1.0 Ft.
FROM STA. 11+24 TO STA. 14+50 -Y3- LT

FOR INTERSECTION DETAIL, SEE SHEETS 2B-5

FOR -L- PROFILE, SEE SHEETS 49 & 50

FOR -Y2- PROFILE, SEE SHEET 59

FOR -Y3- PROFILE, SEE SHEET 59

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-154

PERMIT DRAWING
SHEET 40 OF 91

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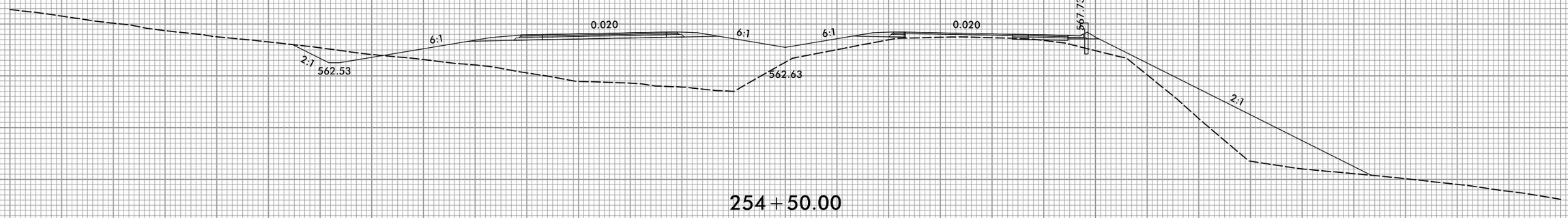
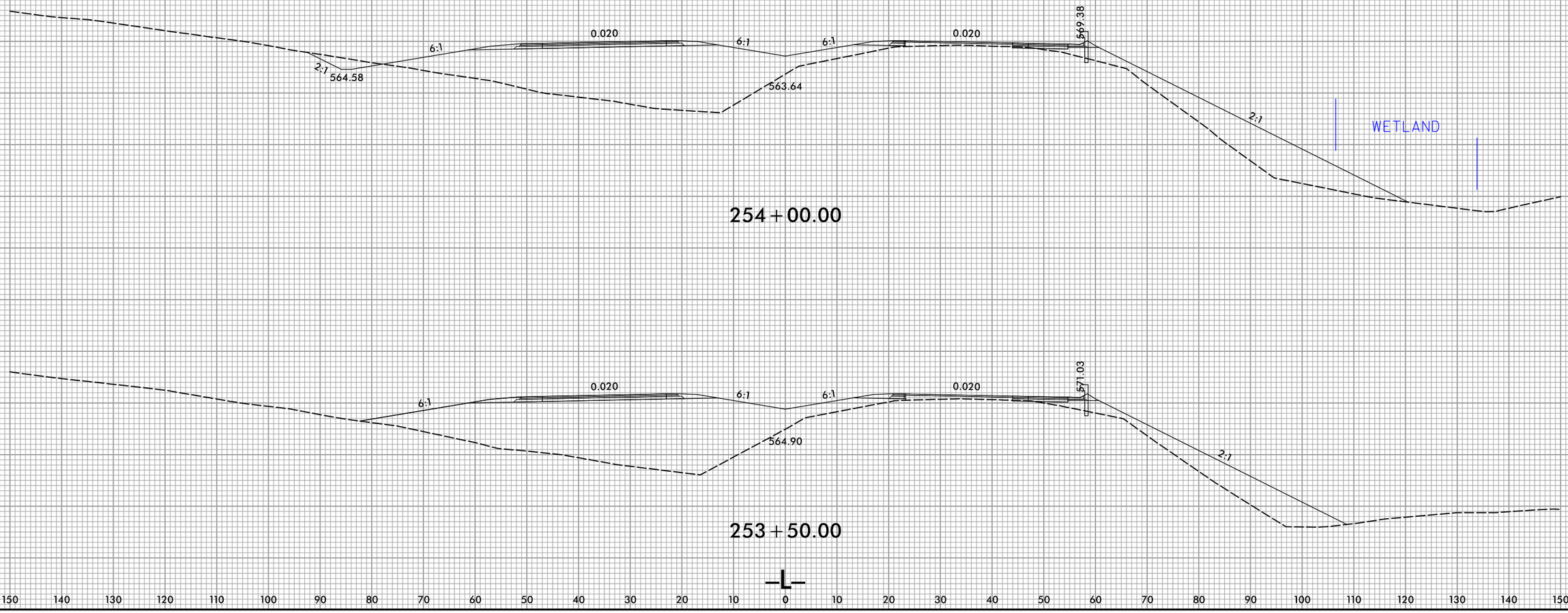
570 560 550 540 530



254+50.00

SITE 36



254+00.00

253+50.00

–L–

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

570 560 550 540

9/2/55 AM
R:\Roadfiles\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_XPL.dgn
gaverette

5/14/99

PERMIT DRAWING
SHEET 41 OF 91

F F DENOTES FILL IN WETLAND

E E WETLAND EXCAVATION

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	23
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART — firm License No. C-1851, 223 S. West St., Suite 1100, Raleigh, NC 27603, T: 919.380.8750, www.stewartinc.com

vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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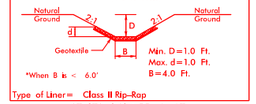
NAD 83/NA 2011

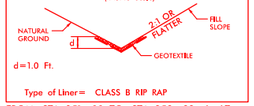
DETAIL 27
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= Class II Rip-Rap

AT STA. 243+55 –L– LT

DETAIL 7
TOE PROTECTION
(Not to Scale)

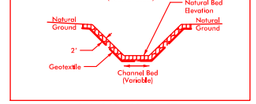


d=1.0 Ft.

Type of Liner= CLASS B RIP RAP

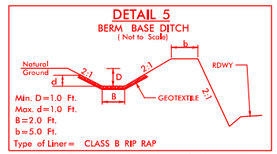
FROM STA. 251+00 TO STA. 253+32 –L– LT
FROM STA. 253+48 TO STA. 253+78 –L– LT
FROM STA. 252+20 TO STA. 253+93 –R– RT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)



STA. 243+68 –L– RT

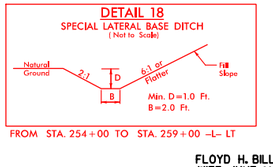
DETAIL 5
BERM BASE DITCH
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 243+25 TO STA. 243+81 –L– LT

DETAIL 18
SPECIAL LATERAL BASE DITCH
(Not to Scale)



FROM STA. 254+00 TO STA. 259+00 –L– LT

DETAIL 63
BANKS ONLY PIPE OUTLET CHANNEL
(Not to Scale)

STA. 243+97 –L– RT

245

250

255

MC

E

F

SITE 35A

SITE 35

WETLAND WYB

STREAM SR

STANDARD BASE DITCH W/CLASS II RIP RAP SLOPE= 8.5% EST 103 TONS EST 135 SY GEOTEXTILE EST DDE= 43 CY SEE DETAIL 27

30 JORDAN THREE, LLC

TIE TO EXISTING CHANNEL

BERM BASE DITCH W/CLASS B RIP RAP SEE DETAIL 5 EST 26 TONS EST 72 SY GEOTEXTILE

CLASS B RIP RAP TO BE PLACED IN DRIVEWAY DITCH EST 55 TONS EST 165 SY GEOTEXTILE

31 ORK, LLC

32 FLOYD H. BILLINGS AND WIFE, JUNE M. BILLINGS

33 JORDAN TIMBERLANDS, INC. A NORTH CAROLINA CORPORATION

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 83 TONS EST 257 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST XX TONS EST XX SY GEOTEXTILE

SPECIAL LATERAL BASE DITCH SEE DETAIL 18

ACCESS BREAK

JB w/MH

24" RCP-III

15" RCP-III

30" RCP-IV

15" RCP-IV

36" RCP-III

NOT BURIED

INC.=40' (TYP.)

2GI

FS

4' FDPS

2' FDPS

FILL W/ FLOWABLE FILL

REMOVE

6"PVC

GREU TL-3 BEGIN SBG +75

N 69° 43' 18.2" E -L-

MATCH TO SHEET 22 -L- STA.243+00.00

MATCH TO SHEET 24 -L- STA.257+00.00

WETLAND WZ-1

30" W/ ELBOWS

15" W/ ELBOWS

SITE 36

SITE 37

SITE 35B

CHORD

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP EST 16 TONS EST 23 SY GEOTEXTILE L= 12 FT SEE DETAIL 62

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

WETLAND WYC

STREAM SR

WETLAND WZ

WETLAND WZ

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 48 TONS EST 149 SY GEOTEXTILE

BANKS ONLY PIPE OUTLET CHANNEL W/ CLASS I RIP RAP EST 20 TONS EST 28 SY GEOTEXTILE L= 10 FT SEE DETAIL 63

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

STREAM SS-1

JB w/MH ELBOWS 30" S F F F F F MC TS MC

SITE 36 & 37

50' 0' 100'
GRAPHIC SCALE

16.7' 0' 33.3'
INSET GRAPHIC SCALE

FOR INTERSECTION DETAIL,SEE SHEET 2B-4

FOR -L- PROFILE,SEE SHEET 50

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PERMIT DRAWING
SHEET 42 OF 91

F F — DENOTES FILL IN WETLAND

E E — WETLAND EXCAVATION

MECHANIZED CLEARING — DENOTES MECHANIZED CLEARING

S S — DENOTES IMPACTS IN SURFACE WATER

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	23
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART — firm License No. C-1851, 223 S. West St., Suite 1100, Raleigh, NC 27603, T: 919.380.8750, www.wbstewartfirm.com

vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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NAD 83/NA 2011

DETAIL 27
STANDARD BASE DITCH
(Not to Scale)

Natural Ground, 2:1, d, D, 2:1, Natural Ground, Geotextile, B

Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=4.0 Ft.
*When B is < 6.0'

Type of Liner= Class II Rip-Rap

AT STA. 243+55 -L- LT

DETAIL 7
TOE PROTECTION
(Not to Scale)

NATURAL GROUND, d, 2:1 OR FLATTER, FILL SLOPE, GEOTEXTILE

d=1.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 251+00 TO STA. 253+32 -L- LT
FROM STA. 253+48 TO STA. 253+78 -L- LT
FROM STA. 252+20 TO STA. 253+93 -L- RT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)

Natural Ground, Natural Bed Elevation, Natural Ground, 2', Geotextile, Channel Bed (Variable)

STA. 243+68 -L- RT

DETAIL 5
BERM BASE DITCH
(Not to Scale)

Natural Ground, 2:1, d, D, 2:1, b, RDWY, B, GEOTEXTILE, 2:1

Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 243+25 TO STA. 243+81 -L- LT

DETAIL 18
SPECIAL LATERAL BASE DITCH
(Not to Scale)

Natural Ground, 2:1, D, 6:1 or Flatter, Fill Slope, B

Min. D=1.0 Ft.
B=2.0 Ft.

FROM STA. 254+00 TO STA. 259+00 -L- LT

DETAIL 63
BANKS ONLY PIPE OUTLET CHANNEL
(Not to Scale)

Natural Ground, Natural Bed Elevation, Natural Ground, 2', CHANNEL BED (Variable), Geotextile

STA. 243+97 -L- RT

245 — 250 — 255

(30) JORDAN THREE, LLC

(31) ORK, LLC

(32) FLOYD H. BILLINGS AND WIFE, JUNE M. BILLINGS

(33) JORDAN TIMBERLANDS, INC. A NORTH CAROLINA CORPORATION

SITE 35A

SITE 35

SITE 35B

SITE 36

SITE 37

WETLAND WYB

STREAM SR

WETLAND WYC

STREAM SR

WETLAND WZ

WETLAND WZ

WETLAND WZ-1

STREAM SS-1

STANDARD BASE DITCH W/CLASS II RIP RAP
SLOPE= 8.5%
EST 103 TONS
EST 135 SY GEOTEXTILE
EST DDE= 43 CY
SEE DETAIL 27

TIE TO EXISTING CHANNEL

BERM BASE DITCH W/CLASS B RIP RAP
SEE DETAIL 5
EST 24 TONS
EST 72 SY GEOTEXTILE

CLASS B RIP RAP TO BE PLACED IN DRIVEWAY DITCH
EST 55 TONS
EST 165 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP
SEE DETAIL 7
EST 83 TONS
EST 257 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP
SEE DETAIL 7
EST XX TONS
EST XX SY GEOTEXTILE

SPECIAL LATERAL BASE DITCH
SEE DETAIL 18

36" RCP-III
15" RCP-III
15" RCP-IV
30" RCP-IV
24" RCP-III
4' FDPS
2' FDPS
2GI
2GI-A
FS
JB w/MH
30" W/ ELBOWS
NOT BURIED
FILL W/ FLOWABLE FILL
REMOVE
ACCESS BREAK
GREU TL-3 BEGIN SBG +75
N 69° 43' 18.2" E -L-

MATCH TO SHEET 22 -L- STA.243+00.00

MATCH TO SHEET 24 -L- STA.257+00.00

CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP
EST 16 TONS
EST 23 SY GEOTEXTILE
L= 12 FT
SEE DETAIL 62

CLASS B RIP RAP
EST 3 TONS
EST 10 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP
SEE DETAIL 7
EST 48 TONS
EST 149 SY GEOTEXTILE

BANKS ONLY PIPE OUTLET CHANNEL W/ CLASS I RIP RAP
EST 20 TONS
EST 28 SY GEOTEXTILE
L= 10 FT
SEE DETAIL 63

CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE

JB w/MH ELBOWS 30" S F F F F F MC TS MC

SITE 36 & 37

50' 0' 100'
GRAPHIC SCALE

16.7' 0' 33.3'
INSET GRAPHIC SCALE

FOR INTERSECTION DETAIL, SEE SHEET 2B-4

FOR -L- PROFILE, SEE SHEET 50

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8/27/2014 AM
Plotted By: bunt

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-143

PERMIT DRAWING
SHEET 42A OF 91

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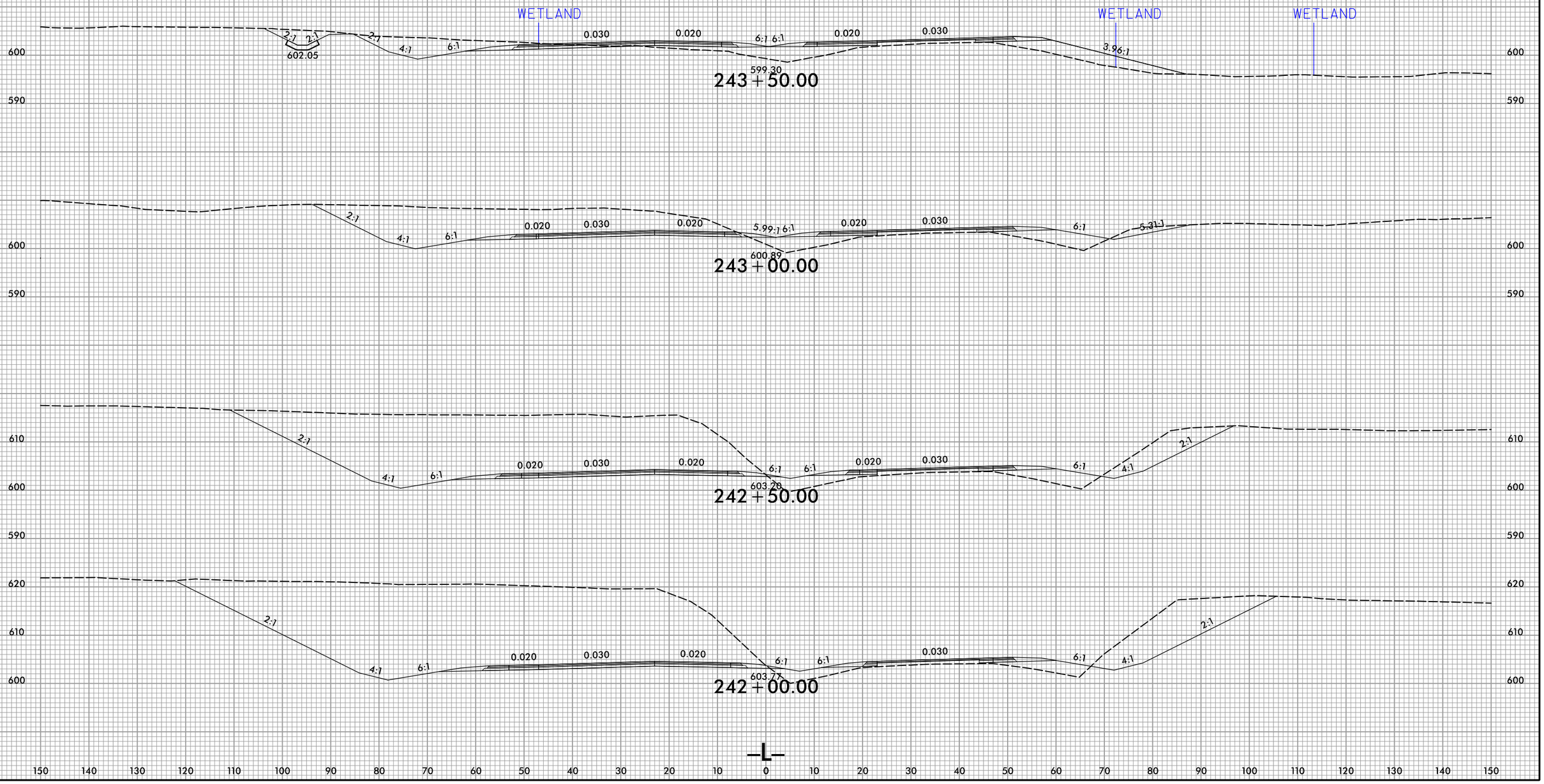
SITE 35A & 35B



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jhunt

5/14/99

PERMIT DRAWING
SHEET 43 OF 91

50′ 0′ 100′

GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART — firm licensed No. C-1851, 223 S. West St., Suite 1100, Raleigh, NC 27603, P: 919.380.8750, www.stewartinc.com

vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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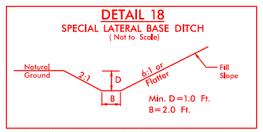
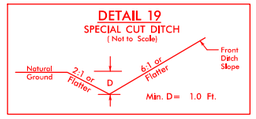
NAD 83/NA 2011

DETAIL 18
SPECIAL LATERAL BASE DITCH
(Not to Scale)



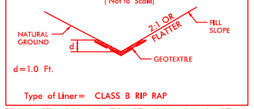
FROM STA. 254+00 TO STA. 259+00 -L- LT

DETAIL 19
SPECIAL CUT DITCH
(Not to Scale)



FROM STA. 263+00 TO STA. 263+50 -L- LT

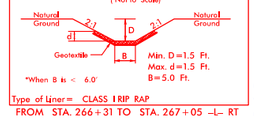
DETAIL 7
TOE PROTECTION
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 263+50 TO STA. 265+25 -L- RT
FROM STA. 265+08 TO STA. 266+98 -L- LT

DETAIL 38
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS I RIP RAP

FROM STA. 266+31 TO STA. 267+05 -L- RT

260 265 270

STREAM SE

STREAM SU

SITE 38

33

JORDAN TIMBERLANDS, INC.
A NORTH CAROLINA CORPORATION

SITE 39

TS
S

SPECIAL LATERAL BASE DITCH SEE DETAIL 18

SPECIAL CUT DITCH SEE DETAIL 19

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 52 TONS EST 163 SY GEOTEXTILE

CLASS II RIP RAP EST 245 TONS EST 320 SY GEOTEXTILE SEE DETAIL 28

FILL IN EXISTING CHANNEL W/CLASS I RIP RAP EST 65 TONS EST 80 SY GEOTEXTILE SEE DETAIL 64

CLASS I RIP RAP EST 7 TONS EST 15 SY GEOTEXTILE

MATCH TO SHEET 23 -L- STA. 257+00.00

MATCH TO SHEET 25 -L- STA. 271+00.00

24" RCP-III
15" RCP-IV
18" RCP-IV
60" RCP-IV
18" RCP-III
15" RCP-III
2GI
FS
CAT-1
GREU TL-3
BEGIN SBG +50
END SBG +05
END SBG +50
24" W/ ELBOWS
18" W/ ELBOWS
FILL W/ FLOWABLE FILL
2@7'x9' RCBC BURIED 1.0'
COLLAR
FRANGIBLE INSTALLATION 60" WELDED STEEL
N 69° 43' 18.2" E
-L-
HW
PDE
LOW BANK
LICK FORK TRIBUTARY 1
NC HWY 24/27 26' BST
WOODS
6"PVC
ACCESS BREAK
BM #16
RANDOLPH ELECTRIC 40'R/W

CLASS B RIP RAP EST 5 TONS EST 14 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 48 TONS EST 150 SY GEOTEXTILE

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

CLASS I RIP RAP EST 40 TONS EST 75 SY GEOTEXTILE

STANDARD BASE DITCH W/CLASS I RIP RAP SLOPE= 2.6% EST 110 TONS EST 190 SY GEOTEXTILE EST DDE= 25 CY SEE DETAIL 38

CLASS I RIP RAP IN STREAM BED EST 145 TONS EST 220 SY GEOTEXTILE

CLASS II RIP RAP EST 180 TONS EST 240 SY GEOTEXTILE SEE DETAIL 29

FILL IN EXISTING CHANNEL W/CLASS I RIP RAP EST 130 TONS EST 150 SY GEOTEXTILE SEE DETAIL 64

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

33
JORDAN TIMBERLANDS, INC.
A NORTH CAROLINA CORPORATION

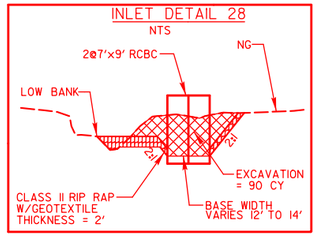
SITE 39

S

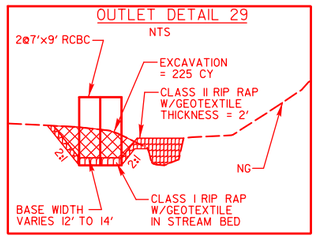
TS

STREAM SE

INLET DETAIL 28
NTS



OUTLET DETAIL 29
NTS



FOR -L- PROFILE, SEE SHEETS 50 & 51

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

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Revised

5/14/99

PERMIT DRAWING SHEET 44 OF 91

50' 0' 100'

GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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223 S. West St.
Suite 1100
Raleigh, NC 27603
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STEWART

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606
vhb

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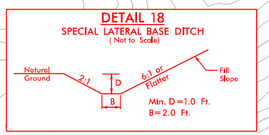
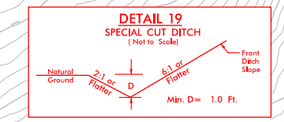
NAD 83/NA 2011

DETAIL 18
SPECIAL LATERAL BASE DITCH
(Not to Scale)



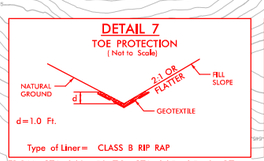
FROM STA. 254+00 TO STA. 259+00 -L- LT

DETAIL 19
SPECIAL CUT DITCH
(Not to Scale)



FROM STA. 263+00 TO STA. 263+50 -L- LT

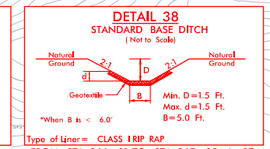
DETAIL 7
TOE PROTECTION
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 263+50 TO STA. 265+25 -L- RT
FROM STA. 265+08 TO STA. 266+98 -L- LT

DETAIL 38
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS I RIP RAP

FROM STA. 266+31 TO STA. 267+05 -L- RT

260 265 270

STREAM SE

STREAM SU

SITE 38

SITE 39

33 JORDAN TIMBERLANDS, INC. A NORTH CAROLINA CORPORATION

TS S

SPECIAL LATERAL BASE DITCH SEE DETAIL 18

SPECIAL CUT DITCH SEE DETAIL 19

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 52 TONS EST 163 SY GEOTEXTILE

CLASS B RIP RAP EST 245 TONS EST 320 SY GEOTEXTILE SEE DETAIL 28

FILL IN EXISTING CHANNEL W/CLASS I RIP RAP EST 65 TONS EST 80 SY GEOTEXTILE SEE DETAIL 64

CLASS I RIP RAP EST 7 TONS EST 15 SY GEOTEXTILE

24" W/ ELBOWS

END SBG +25

BEGIN SBG +50

60" RCP-IV

15" RCP-IV

2@7'x9' RCBC BURIED 1.0'

COLLAR

18" RCP-III

15" RCP-III

24" RCP-III

N 69° 43' 18.2" E -L-

FILL W/ FLOWABLE FILL

END SBG +05

24" W/ ELBOWS

MATCH TO SHEET 23 -L- STA. 257+00.00

MATCH TO SHEET 25 -L- STA. 271+00.00

ACCESS BREAK

BM #16

CLASS B RIP RAP EST 5 TONS EST 14 SY GEOTEXTILE

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 48 TONS EST 150 SY GEOTEXTILE

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

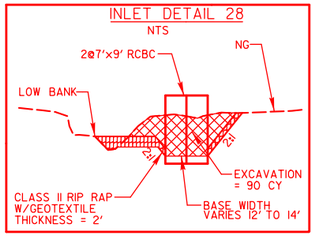
CLASS I RIP RAP EST 40 TONS EST 75 SY GEOTEXTILE

STANDARD BASE DITCH W/CLASS I RIP RAP SLOPE= 2.6% EST 110 TONS EST 190 SY GEOTEXTILE EST DDE= 25 CY SEE DETAIL 38

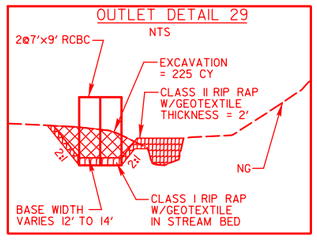
CLASS II RIP RAP EST 180 TONS EST 240 SY GEOTEXTILE SEE DETAIL 29

CLASS I RIP RAP IN STREAM BED EST 145 TONS EST 220 SY GEOTEXTILE

INLET DETAIL 28
NTS



OUTLET DETAIL 29
NTS



FOR -L- PROFILE, SEE SHEETS 50 & 51

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

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PERMIT DRAWING
SHEET 45 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART
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vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

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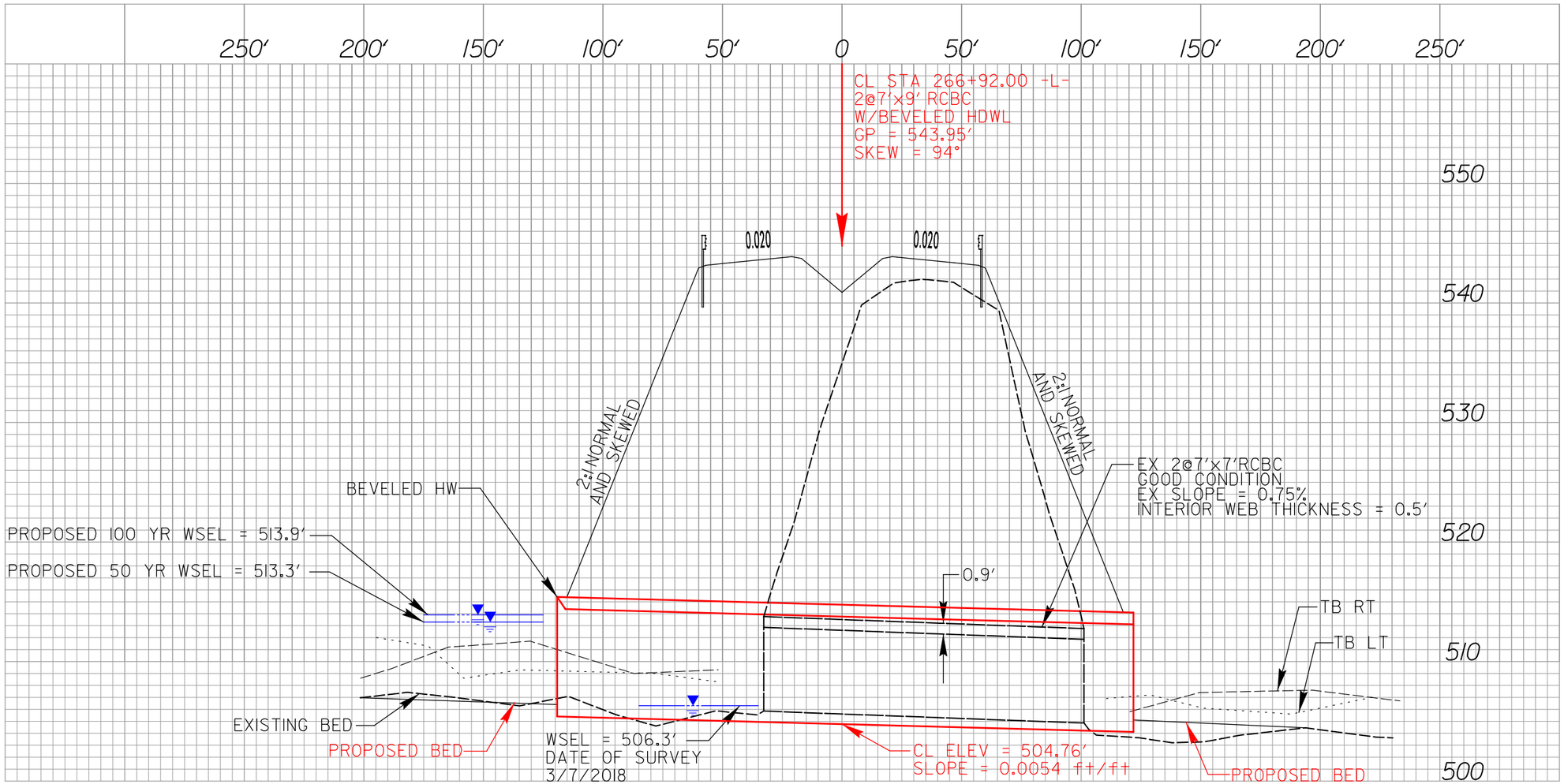
SITE 39



REVISIONS
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5/14/99

PERMIT DRAWING
SHEET 46 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	25
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

NAD 83/NA 2011

STEWART
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223 S. West St.
Suite 1100
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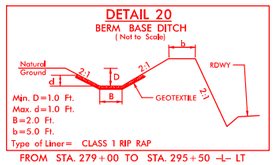
vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

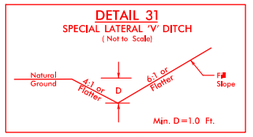
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DETAIL 20
BERM BASE DITCH
(Not to Scale)



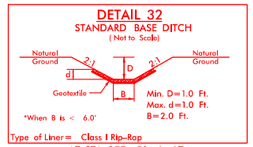
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.
Type of Liner= CLASS 1 RIP RAP
FROM STA. 279+00 TO STA. 295+50 -L- LT

DETAIL 31
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D=1.0 Ft.
FROM STA. 283+50 TO STA. 284+00 -L- RT

DETAIL 32
STANDARD BASE DITCH
(Not to Scale)

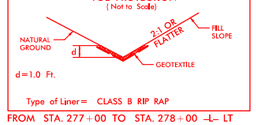


Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
*When B is < 6.0'
Type of Liner= Class I Rip-Rap
AT STA. 277+50 -L- LT

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

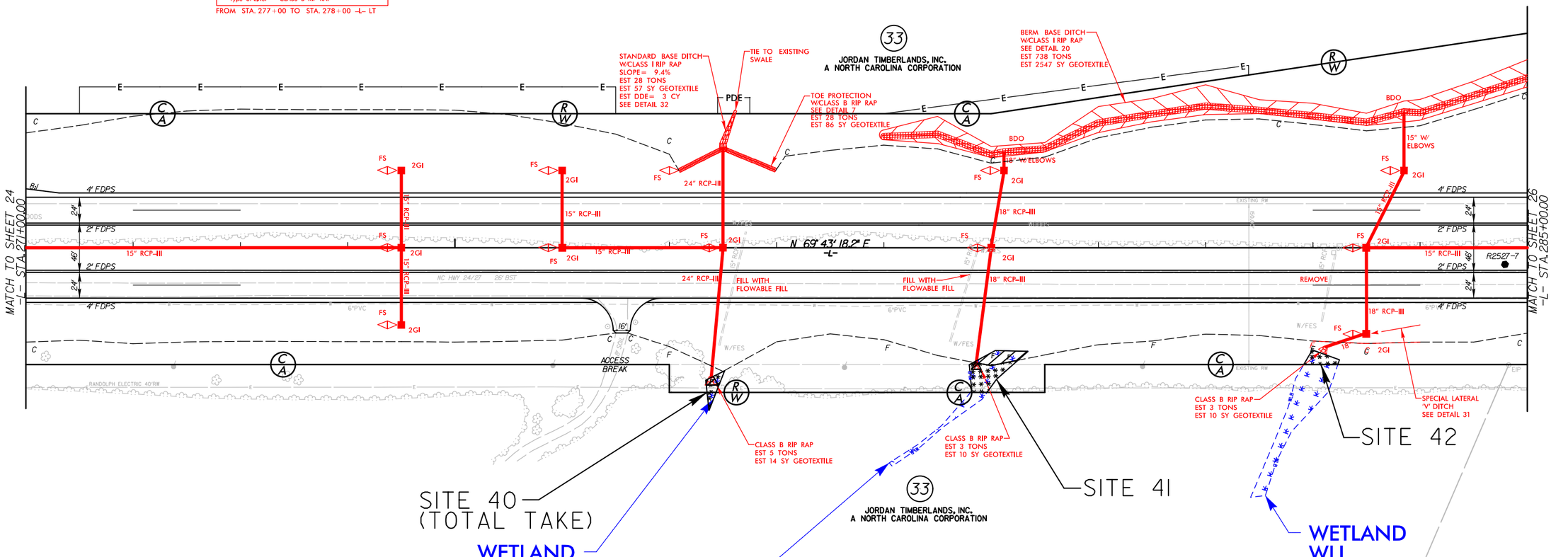
DETAIL 7
TOE PROTECTION
(Not to Scale)

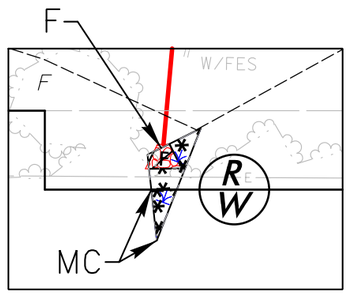


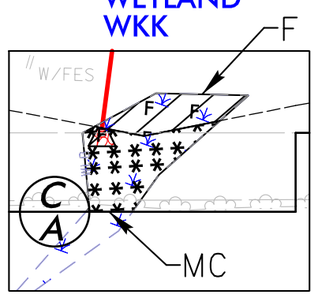
d=1.0 Ft.
Type of Liner= CLASS B RIP RAP
FROM STA. 277+00 TO STA. 278+00 -L- LT

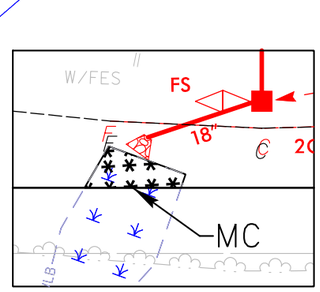
275

280









50' 0' 100'
GRAPHIC SCALE

25' 0' 50'
INSET GRAPHIC SCALE

34
WILLIAM JAMES SKIDMORE

FOR -L- PROFILE, SEE SHEET 51

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

5:02:43 PM
R:\Projects\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_PSH25.dgn
Revised Plans
overlay

5/14/99

PERMIT DRAWING
SHEET 47 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	25
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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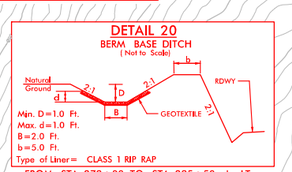
vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

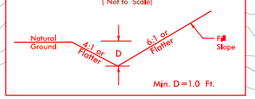
NAD 83/NA 2011

DETAIL 20
BERM BASE DITCH
(Not to Scale)



Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.
Type of Liner= CLASS 1 RIP RAP
FROM STA. 279+00 TO STA. 295+50 -L- LT

DETAIL 31
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D=1.0 Ft.
FROM STA. 283+50 TO STA. 284+00 -L- RT

DETAIL 32
STANDARD BASE DITCH
(Not to Scale)

Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
*When B is < 6.0'
Type of Liner= Class I Rip-Rap
AT STA. 277+50 -L- LT

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

DETAIL 7
TOE PROTECTION
(Not to Scale)

d=1.0 Ft.
Type of Liner= CLASS B RIP RAP
FROM STA. 277+00 TO STA. 278+00 -L- LT

275

280

33
JORDAN TIMBERLANDS, INC.
A NORTH CAROLINA CORPORATION

STANDARD BASE DITCH W/CLASS I RIP RAP
SLOPE= 9.4%
EST 28 TONS
EST 57 SY GEOTEXTILE
EST DDF= 3 CY
SEE DETAIL 32

TIE TO EXISTING SWALE

TOE PROTECTION W/CLASS B RIP RAP
SEE DETAIL 7
EST 28 TONS
EST 86 SY GEOTEXTILE

BERM BASE DITCH W/CLASS I RIP RAP
SEE DETAIL 20
EST 738 TONS
EST 2547 SY GEOTEXTILE

MATCH TO SHEET 24 -L- STA.271+00.00

MATCH TO SHEET 26 -L- STA.285+00.00

4' FDPS
2' FDPS
24"
46"
15" RCP-III
18" RCP-III
24" RCP-III
2GI
FS
PDE
BDO
15" W ELBOWS
N 69°43'18.2" E -L-
FILL WITH FLOWABLE FILL
REMOVE
R2527-7
6"PVC
W/FES
16'
ACCESS BREAK
RANDOLPH ELECTRIC 40'R/W
EXISTING RR

CLASS B RIP RAP
EST 5 TONS
EST 14 SY GEOTEXTILE

CLASS B RIP RAP
EST 3 TONS
EST 10 SY GEOTEXTILE

CLASS B RIP RAP
EST 3 TONS
EST 10 SY GEOTEXTILE

SPECIAL LATERAL 'V' DITCH
SEE DETAIL 31

SITE 40
(TOTAL TAKE)

SITE 41

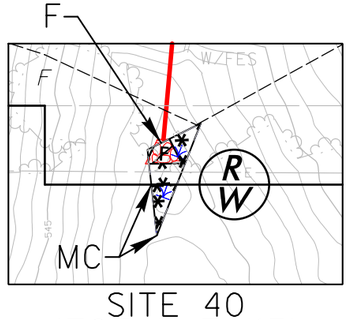
SITE 42

33
JORDAN TIMBERLANDS, INC.
A NORTH CAROLINA CORPORATION

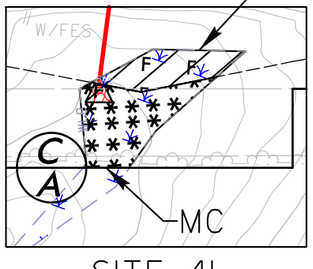
WETLAND WKK

WETLAND WMM

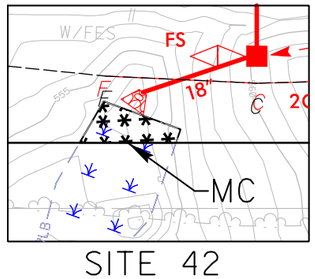
WETLAND WLL



SITE 40
(TOTAL TAKE)



SITE 41



SITE 42

50' 0' 100'
GRAPHIC SCALE

25' 0' 50'
INSET GRAPHIC SCALE

34
WILLIAM JAMES SKIDMORE

FOR -L- PROFILE, SEE SHEET 5I

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

5/20/56 PM
R:\Projects\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_PSH25_con.dgn
RPVerdate

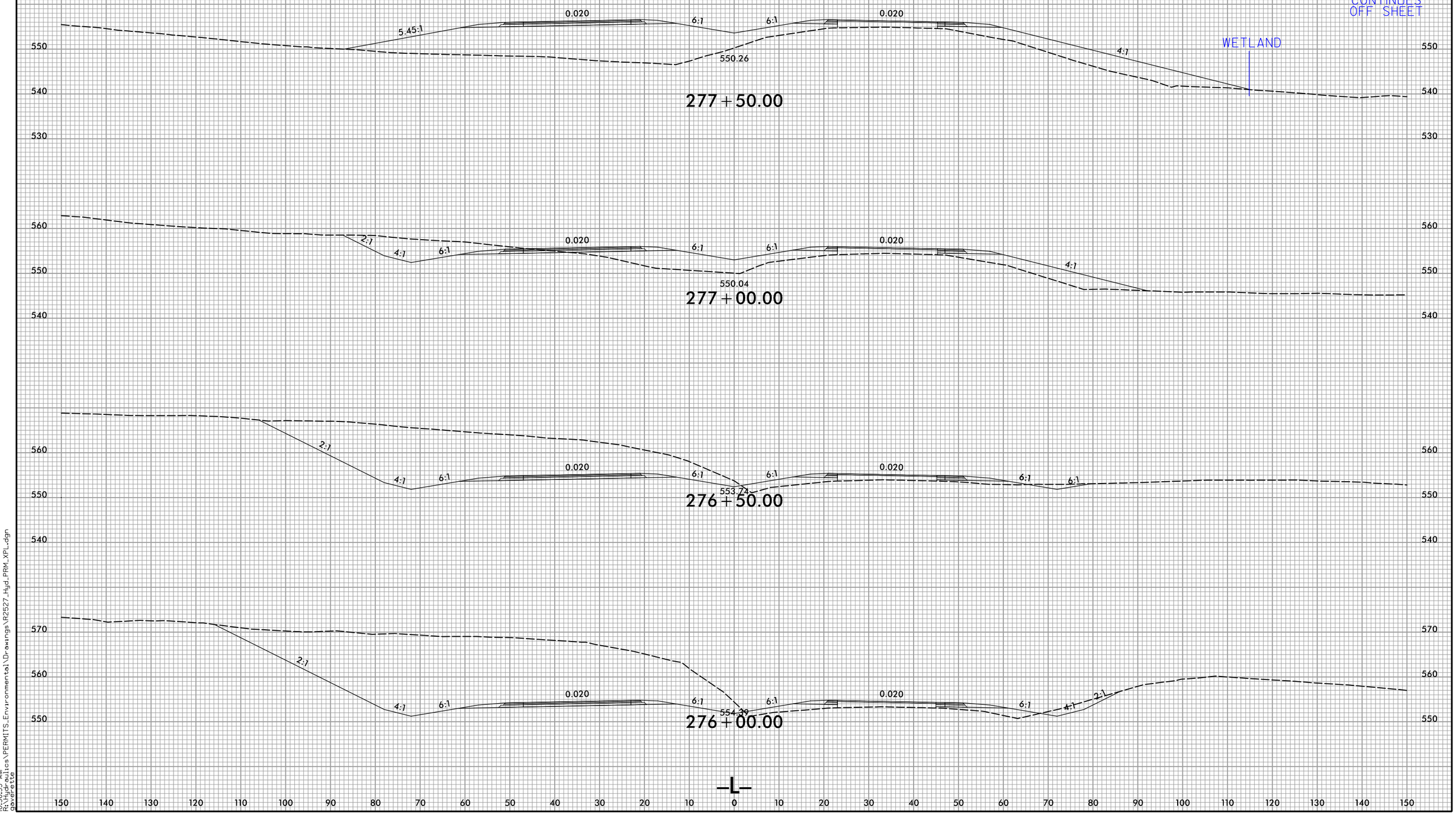
8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-167

PERMIT DRAWING
SHEET 48 OF 91

SITE 40

WETLAND CONTINUES OFF SHEET



10:36:55 AM
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gaverette

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-169

PERMIT DRAWING
SHEET 49 OF 91

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

570 560 550 540

2:1 2:1 560.20 2:1 4:1 6:1 0.020 6:1 556.08 6:1 0.020 4:1

280+50.00

SITE 41

570 560 550 540

WETLAND CONTINUES OFF SHEET

2:1 2:1 556.13 6:1 6:1 0.020 6:1 553.56 6:1 0.020 4:1

WETLAND

280+00.00

570 560 550 540

2:1 2:1 560.12 2:1 4:1 6:1 0.020 6:1 553.64 6:1 0.020 4:1

279+50.00

–L–

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

10:36:57 AM
R:\Projects\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_XPL.dgn
Arthur Collins
gaverette

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-171

PERMIT DRAWING
SHEET 50 OF 91

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

580
570
560
550

2:1 2:1 576.15 2:1 4:1 6:1 0.020 6:1 564.25 6:1 0.020 6:1 6:1

283+50.00

SITE 42

2:1 2:1 578.33 2:1 4:1 6:1 0.020 6:1 561.83 6:1 0.020 4.02:1

WETLAND WETLAND

283+00.00

2:1 2:1 580.52 2:1 4:1 6:1 0.020 6:1 560.54 6:1 0.020 6:1

282+50.00

–L–

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

10:36:59 AM
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gaverette

5/14/99

PERMIT DRAWING
SHEET 51 OF 91

50' 0' 100'
GRAPHIC SCALE

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NAD 83/NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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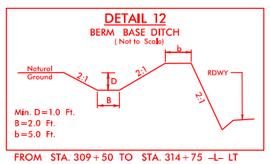
vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

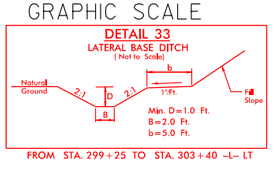
DETAIL 12
BERM BASE DITCH (Not to Scale)



Min. D=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.

FROM STA. 309+50 TO STA. 314+75 –L– LT

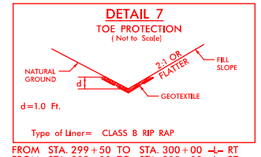
DETAIL 33
LATERAL BASE DITCH (Not to Scale)



Min. D=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.

FROM STA. 299+25 TO STA. 303+40 –L– LT

DETAIL 7
TOE PROTECTION (Not to Scale)

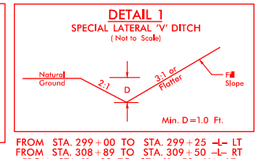


d=1.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 299+50 TO STA. 300+00 –L– RT
FROM STA. 303+00 TO STA. 305+00 –L– RT

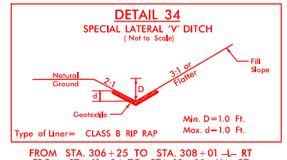
DETAIL 1
SPECIAL LATERAL 'V' DITCH (Not to Scale)



Min. D=1.0 Ft.

FROM STA. 299+00 TO STA. 299+25 –L– LT
FROM STA. 308+89 TO STA. 309+50 –L– RT
FROM STA. 11+00 TO STA. 11+50 –Y4– LT

DETAIL 34
SPECIAL LATERAL 'V' DITCH (Not to Scale)

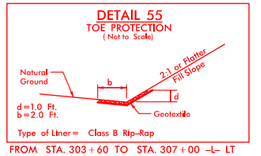


Type of Liner= CLASS B RIP RAP

Min. D=1.0 Ft.
Max. d=1.0 Ft.

FROM STA. 306+25 TO STA. 308+01 –L– RT
FROM STA. 11+34 TO STA. 12+00 –Y4– RT

DETAIL 55
TOE PROTECTION (Not to Scale)

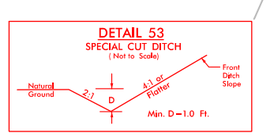


d=1.0 Ft.
b=2.0 Ft.

Type of Liner= Class B Rip-Rap

FROM STA. 303+60 TO STA. 307+00 –L– LT

DETAIL 53
SPECIAL CUT DITCH (Not to Scale)



Min. D=1.0 Ft.

FROM STA. 305+50 TO STA. 306+25 –L– RT

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

300

310

STREAM SF–A1

STREAM SF–A

WETLAND WNN

WETLAND WYD

WETLAND WOO

STREAM SW–B

SITE 45

SITE 45A

SITE 46

SITE 47

SITE 44

TS

S

MC

PI

PDE

PUE

CLASS B RIP RAP
EST 2 TONS
EST 7 SY
GEOTEXTILE

LATERAL BASE DITCH
SEE DETAIL 33

CLASS II RIP RAP
EST 385 TONS
EST 500 SY GEOTEXTILE
SEE DETAIL 53

TOE PROTECTION
W/CLASS B RIP RAP
SEE DETAIL 55
EST 128 TONS
EST 36 SY GEOTEXTILE

BERM BASE DITCH
SEE DETAIL 12

ACCESS BREAK

BEGIN SBG +46

END SBG +12

BEGIN SBG +50

END SBG +00

15" W/ ELBOWS

24" W/ ELBOWS

CAT-1

GREU TL-3

10' FDPS

4' FDPS

15" RCP-IV

18" RCP-IV

24" RCP-IV

15" RCP-III

1@8'x10' RCBC

2GI

2GI-A

FS

DI

REMOVE

FILL WITH FLOWABLE FILL

N 69°43'18.2" E

S 11°05'43.6" E

R=10'

50' TAPER LT & RT

NC HWY 24/27

26' BST

WOODS

TOE PROTECTION
W/CLASS B RIP RAP
SEE DETAIL 7
EST 14 TONS
EST 43 SY GEOTEXTILE

CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE

CLASS B RIP RAP
EST 5 TONS
EST 14 SY GEOTEXTILE

TOE PROTECTION
W/CLASS B RIP RAP
SEE DETAIL 7
EST 55 TONS
EST 72 SY GEOTEXTILE

CLASS II RIP RAP
EST 300 TONS
EST 420 SY GEOTEXTILE
SEE DETAIL 36

FILL IN EXISTING CHANNEL
W/CLASS II RIP RAP
EST 180 TONS
EST 195 SY GEOTEXTILE
SEE DETAIL 64

SPECIAL CUT 'V' DITCH
SEE DETAIL 53

SPECIAL LATERAL 'V' DITCH
W/CLASS B RIP RAP
SEE DETAIL 34
EST 102 TONS
EST 276 SY GEOTEXTILE

SPECIAL LATERAL 'V' DITCH
SEE DETAIL 1

(36) EDWARDS TIMBER COMPANY, INC.

(37) CONNIE A. GRAHAM AND HUSBAND, WILLIAM E. GRAHAM

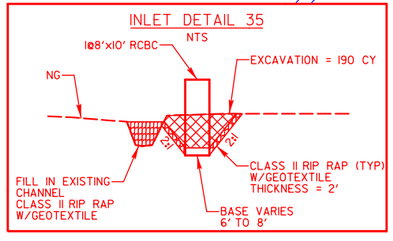
(38) STATE OF NORTH CAROLINA

(39) UNITED STATES FOREST SERVICE

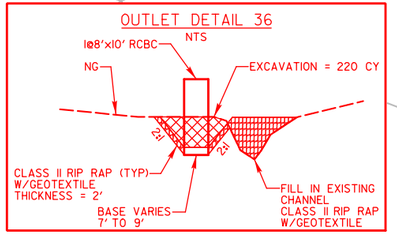
(39) UNITED STATES FOREST SERVICE

JACK C. STARNES, UNMARRIED

INLET DETAIL 35



OUTLET DETAIL 36



MATCH TO SHEET 26 –L– STA.299+00.00

MATCH TO SHEET 28 –L– STA.313+00.00

FOR –L– PROFILE, SEE SHEET 52

FOR –Y4– PROFILE, SEE SHEET 60

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

2B-6 & 2B-7

7:59:25 AM
R:\Hydraulics\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_PSH27.dgn
dunn

5/14/99

PERMIT DRAWING
SHEET 52 OF 91

50' 0' 100'
GRAPHIC SCALE

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NAD 83/NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DETAIL 12
BERM BASE DITCH (Not to Scale)

Min. D=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.

FROM STA. 309+50 TO STA. 314+75 –L– LT

DETAIL 33
LATERAL BASE DITCH (Not to Scale)

Min. D=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.

FROM STA. 299+25 TO STA. 303+40 –L– LT

DETAIL 7
TOE PROTECTION (Not to Scale)

d=1.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 299+50 TO STA. 300+00 –L– RT
FROM STA. 303+00 TO STA. 305+00 –L– RT

DETAIL 1
SPECIAL LATERAL 'V' DITCH (Not to Scale)

Min. D=1.0 Ft.

FROM STA. 299+00 TO STA. 299+25 –L– LT
FROM STA. 308+89 TO STA. 309+50 –L– RT
FROM STA. 11+00 TO STA. 11+50 –Y4– LT

DETAIL 34
SPECIAL LATERAL 'V' DITCH (Not to Scale)

Type of Liner= CLASS B RIP RAP

Min. D=1.0 Ft.
Max. d=1.0 Ft.

FROM STA. 306+25 TO STA. 308+01 –L– RT
FROM STA. 11+34 TO STA. 12+00 –Y4– RT

DETAIL 55
TOE PROTECTION (Not to Scale)

d=1.0 Ft.
b=2.0 Ft.

Type of Liner= Class B Rip-Rap

FROM STA. 303+60 TO STA. 307+00 –L– LT

DETAIL 53
SPECIAL CUT DITCH (Not to Scale)

Min. D=1.0 Ft.

FROM STA. 305+50 TO STA. 306+25 –L– RT

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

STREAM SF–A1

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

STREAM SF–A

36 EDWARDS TIMBER COMPANY, INC.

CLASS II RIP RAP EST 385 TONS EST 500 SY GEOTEXTILE SEE DETAIL 64

WETLAND WNN

SITE 45

SITE 46

SITE 46

LATERAL BASE DITCH SEE DETAIL 33

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 55 EST 128 TONS EST 36 SY GEOTEXTILE

WETLAND WYD

39 UNITED STATES FOREST SERVICE

BERM BASE DITCH SEE DETAIL 12

ACCESS BREAK

BEGIN SBG +46

CAT-1 10' FDPS 4' FDPS

15" W/ ELBOWS

15" RCP–IV

END SBG +12

GREU TL-3

15" RCP–III

MATCH TO SHEET 26 –L– STA 299+00.00

MATCH TO SHEET 28 –L– STA 313+00.00

N 69° 43' 18.2" E

1@8'x10' RCBC

24" RCP–IV

18" RCP–IV

FILL WITH FLOWABLE FILL

BURIED 1.0'

24" W/ ELBOWS

END SBG +00

BEGIN SBG +50

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 14 TONS EST 43 SY GEOTEXTILE

37 CONNIE A. GRAHAM AND HUSBAND, WILLIAM E. GRAHAM

SITE 44

CLASS B RIP RAP EST 5 TONS EST 14 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 155 TONS EST 72 SY GEOTEXTILE

FILL IN EXISTING CHANNEL W/CLASS II RIP RAP EST 180 TONS EST 195 SY GEOTEXTILE SEE DETAIL 64

CLASS II RIP RAP EST 300 TONS EST 420 SY GEOTEXTILE SEE DETAIL 36

SPECIAL CUT 'V' DITCH SEE DETAIL 53

SPECIAL LATERAL 'V' DITCH W/CLASS B RIP RAP SEE DETAIL 34 EST 102 TONS EST 276 SY GEOTEXTILE

SPECIAL LATERAL 'V' DITCH SEE DETAIL 1

38 STATE OF NORTH CAROLINA

JACK C. STARNES, UNMARRIED

STREAM SF–A

SITE 47

39 UNITED STATES FOREST SERVICE

WETLAND WOO

STREAM SW–B

S 11° 05' 43.6" E

50' TAPER LT & RT

R=10'

REMOVE

INLET DETAIL 35
NTS

@8'x10' RCBC
NG
EXCAVATION = 190 CY
FILL IN EXISTING CHANNEL CLASS II RIP RAP W/GEOTEXTILE
CLASS II RIP RAP (TYP) W/GEOTEXTILE THICKNESS = 2'
BASE VARIES 6' TO 8'

OUTLET DETAIL 36
NTS

@8'x10' RCBC
NG
EXCAVATION = 220 CY
CLASS II RIP RAP (TYP) W/GEOTEXTILE THICKNESS = 2'
BASE VARIES 7' TO 9'
FILL IN EXISTING CHANNEL CLASS II RIP RAP W/GEOTEXTILE

2B-6 & 2B-7

FOR –L– PROFILE, SEE SHEET 52

FOR –Y4– PROFILE, SEE SHEET 60

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

7:59:42 AM
R:\Hydraulics\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_PSH27_con.dgn
bunt

8/17/99

REVISIONS

PERMIT DRAWING
SHEET 53 OF 91

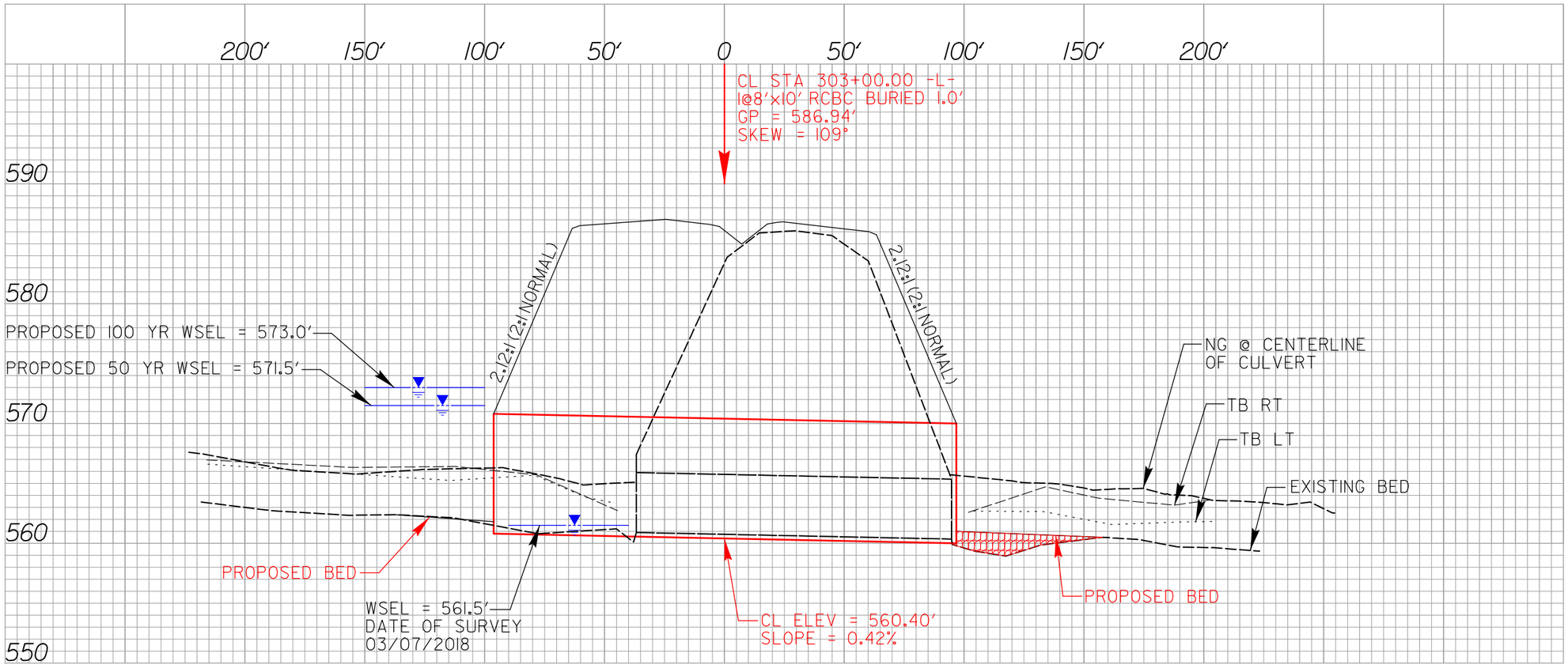
PROJECT REFERENCE NO.	SHEET NO.
R-2527	
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

Firm License No. C-0501
223 South West St.
Suite 1100
Raleigh, NC 27603
T: 919.380.8750
www.stewartinc.com
STEWART

VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SITES 44, 45, & 46



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8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-185

PERMIT DRAWING
SHEET 54 OF 91

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589.76
0.020 0.020 6:1 6:1 0.020 0.020
2:1
3.88:1
582.89
590 580 570

305+00.00

SITE 46

WETLAND

WETLAND
CONTINUES
OFF SHEET

588.70
0.020 0.020 6:1 6:1 0.020
2:1
3.04:1
582.13
590 580 570 560

304+50.00

587.75
0.020 0.020 6:1 6:1 0.020 587.75
2:1
2:1
581.30
590 580 570 560

304+00.00

–L–

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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jhunt

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-184

PERMIT DRAWING
SHEET 54A OF 91

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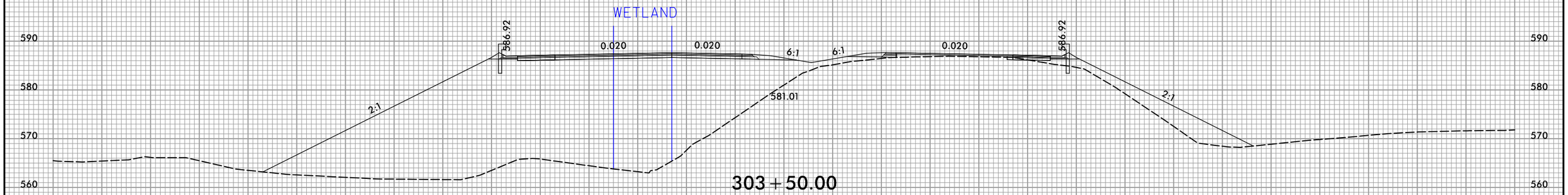
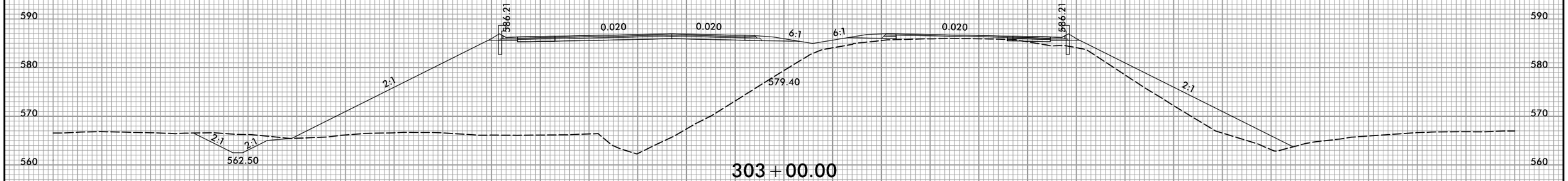
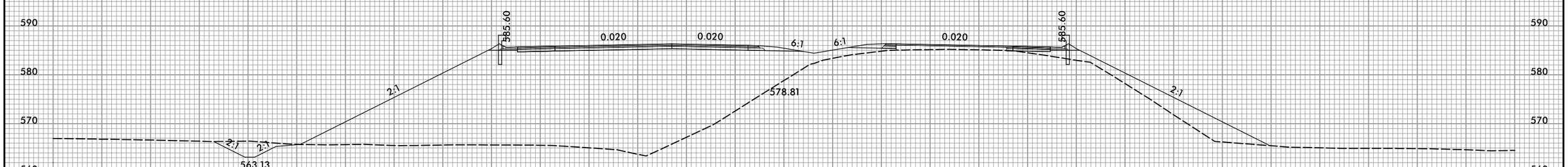
SITE 45A



303 + 50.00



303 + 00.00



302 + 50.00

–L–

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

7:59:51 AM
R:\Hydraulics\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_XPL.dgn
jhunt

5/14/99

PERMIT DRAWING
SHEET 55 OF 91

50′ 0′ 100′
GRAPHIC SCALE

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NAD 83/NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	28
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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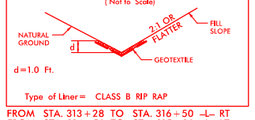
vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

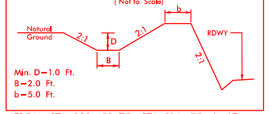
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DETAIL 7
TOE PROTECTION
(Not to Scale)



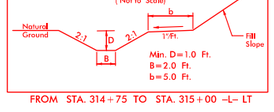
Type of Liner= CLASS B RIP RAP
FROM STA. 313+28 TO STA. 316+50 –L– RT
FROM STA. 314+50 TO STA. 315+80 –L– LT

DETAIL 12
BERM BASE DITCH
(Not to Scale)



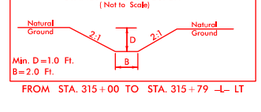
FROM STA. 309+50 TO STA. 314+75 –L– LT

DETAIL 33
LATERAL BASE DITCH
(Not to Scale)



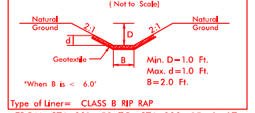
FROM STA. 314+75 TO STA. 315+00 –L– LT

DETAIL 30
STANDARD BASE DITCH
(Not to Scale)



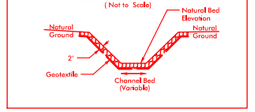
FROM STA. 315+00 TO STA. 315+79 –L– LT

DETAIL 17
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS B RIP RAP
FROM STA. 321+58 TO STA. 322+15 –L– LT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)



STA. 313+26 –L– RT

315 320 325

WETLAND WHH

SITE 48

STREAM SW–B

DAYLIGHT TO NATURAL GROUND

BERM BASE DITCH SEE DETAIL 12

LATERAL BASE DITCH SEE DETAIL 33

STANDARD BASE DITCH SLOPE= 4.9% EST DDE= 20 CY SEE DETAIL 30

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 36 TONS EST 112 SY GEOTEXTILE

STANDARD BASE DITCH W/CLASS B RIP RAP SLOPE= 5.3% EST 30 TONS EST 80 SY GEOTEXTILE EST DDE=15 CY SEE DETAIL 17

39 UNITED STATES FOREST SERVICE

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

MATCH TO SHEET 27 –L– STA. 313+00.00

MATCH TO SHEET 29 –L– STA. 327+00.00

HW

BURIED 0.7′

42" RCP-III

COLLAR

15" RCP-IV

18" RCP-IV

TB JB w/MH

15" W. ELBOWS

TRENCHLESS INSTALLATION 30" WELDED STEEL

FILL WITH FLOWABLE FILL

REMOVE

N 69°43′18.2" E –L–

4' FDPS

2' FDPS

WOODS

EXISTING RW

NC HWY 24/27 24' BST

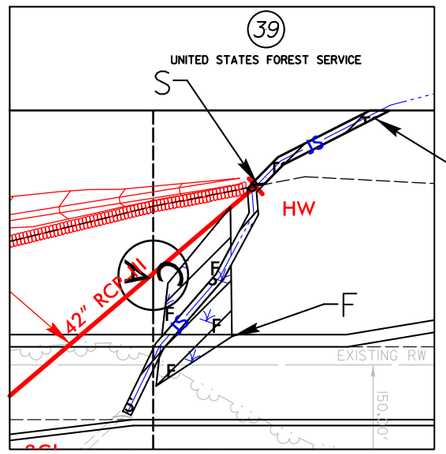
TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 89 TONS EST 276 SY GEOTEXTILE

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP EST 17 TONS EST 25 SY GEOTEXTILE L= 14 FT SEE DETAIL 62

SITE 47

25′ 0′ 50′
INSET GRAPHIC SCALE



SITE 47 & 48

ENVIRONMENTAL SENSITIVITY AREA

ENVIRONMENTALLY SENSITIVE AREA

FOR INTERSECTION DETAIL, SEE SHEET 2B-6

FOR –L– PROFILE, SEE SHEETS 52 & 53

10:46:47 AM
R:\Projects\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_PSH28.dgn
gavarrette

5/14/99

PERMIT DRAWING
SHEET 56 OF 91

50′ 0′ 100′
GRAPHIC SCALE

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	28
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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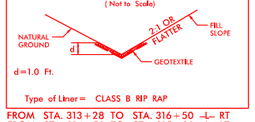
NAD 83/NA 2011

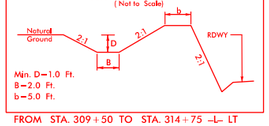
DETAIL 7
TOE PROTECTION (Not to Scale)



Type of Liner= CLASS B RIP RAP

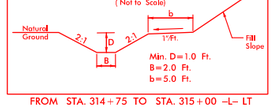
FROM STA. 313+28 TO STA. 316+50 –L– RT
FROM STA. 314+50 TO STA. 315+80 –L– LT

DETAIL 12
BERM BASE DITCH (Not to Scale)



FROM STA. 309+50 TO STA. 314+75 –L– LT

DETAIL 33
LATERAL BASE DITCH (Not to Scale)

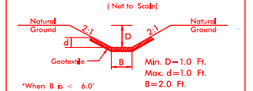


FROM STA. 314+75 TO STA. 315+00 –L– LT

DETAIL 30
STANDARD BASE DITCH (Not to Scale)

FROM STA. 315+00 TO STA. 315+79 –L– LT

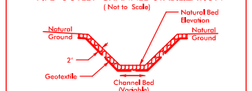
DETAIL 17
STANDARD BASE DITCH (Not to Scale)



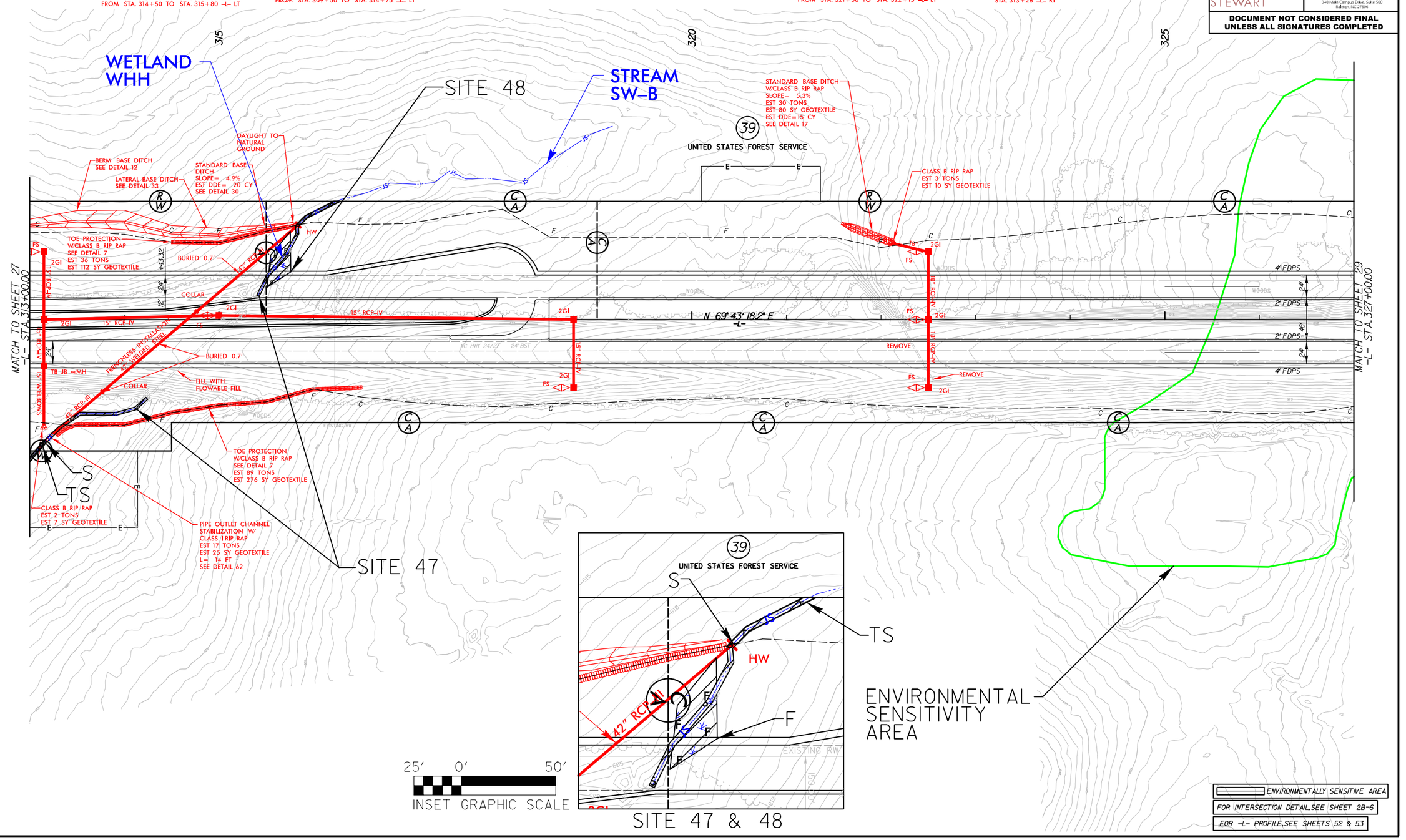
Type of Liner= CLASS B RIP RAP

FROM STA. 321+58 TO STA. 322+15 –L– LT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION (Not to Scale)



STA. 313+26 –L– RT



25′ 0′ 50′
INSET GRAPHIC SCALE

SITE 47 & 48

ENVIRONMENTAL SENSITIVITY AREA

ENVIRONMENTALLY SENSITIVE AREA

FOR INTERSECTION DETAIL, SEE SHEET 2B-6

FOR -L- PROFILE, SEE SHEETS 52 & 53

I:\2504\4 AW Planning\Graphics\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_PSH28_con.dgn
gavarrete

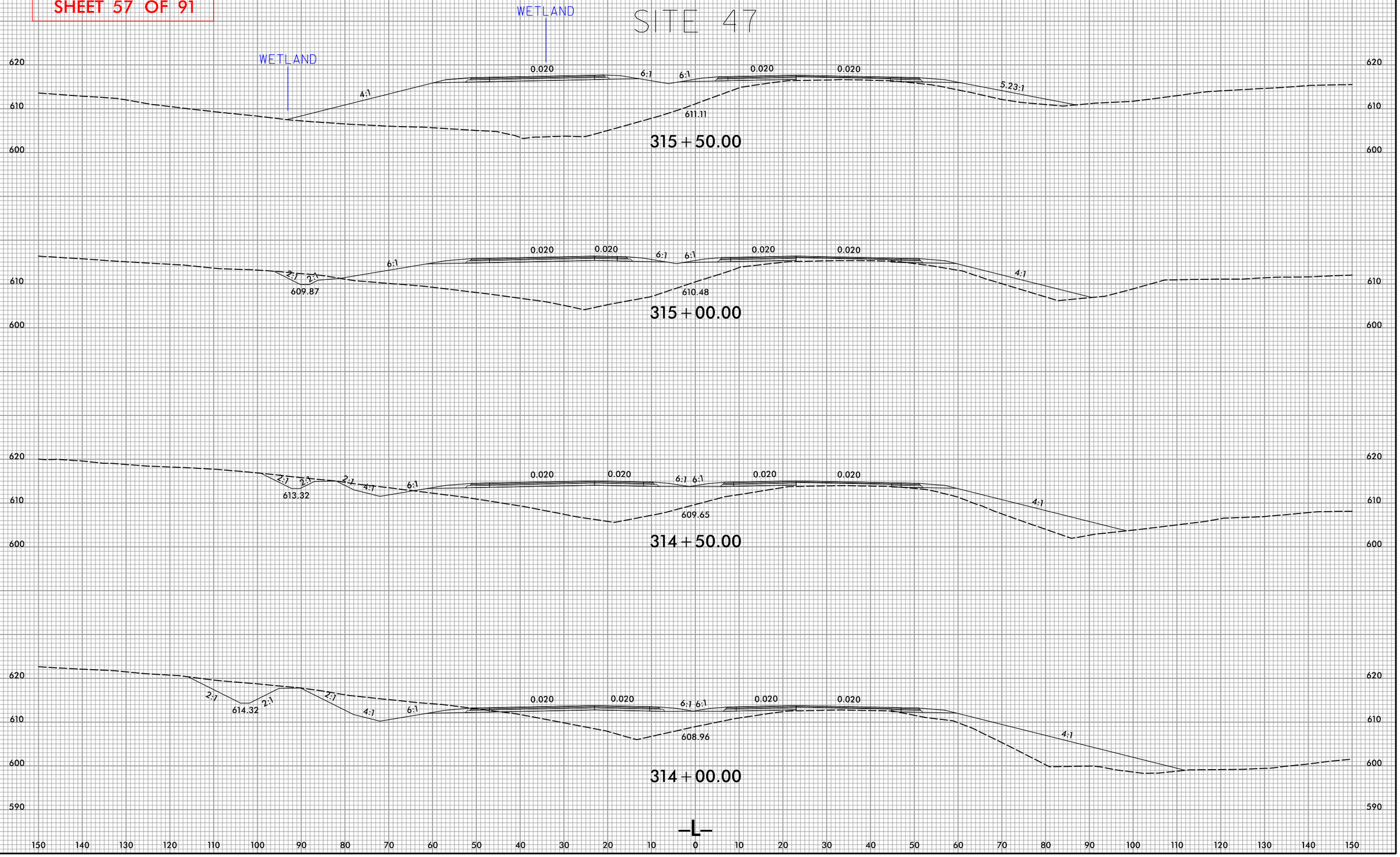
8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-190

PERMIT DRAWING
SHEET 57 OF 91

SITE 47

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



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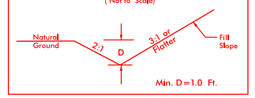
gaverette

5/14/99

PERMIT DRAWING
SHEET 58 OF 91

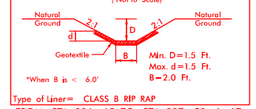
DENOTES MECHANIZED CLEARING

DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



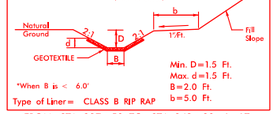
FROM STA. 328+00 TO STA. 328+50 -L- RT
FROM STA. 334+50 TO STA. 335+00 -L- LT

DETAIL 40
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS B RIP RAP
FROM STA. 336+65 TO STA. 337+50 -L- LT

DETAIL 37
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS B RIP RAP
FROM STA. 337+50 TO STA. 342+00 -L- LT

50' 0' 100'
GRAPHIC SCALE

16.7' 0' 33.3'
INSET GRAPHIC SCALE

NAD 83/NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART
firm License No. C-1851
223 S. West St.
Suite 1100
Raleigh, NC 27603
T: 919.380.8750
www.stewartENG.com

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

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330 335 340

39 UNITED STATES FOREST SERVICE

STANDARD BASE DITCH
W/CLASS B RIP RAP
SLOPE= 5.6%
EST 55 TONS
EST 140 SY GEOTEXTILE
EST DDE = 25 CY
SEE DETAIL 40

LATERAL BASE DITCH
W/CLASS B RIP RAP
SEE DETAIL 37
EST 252 TONS
EST 683 SY GEOTEXTILE

PDE

ACCESS BREAK

SPECIAL LATERAL V DITCH
SEE DETAIL 1

MATCH TO SHEET 28
-L- STA. 327+00.00

MATCH TO SHEET 30
-L- STA. 341+00.00

4' FDPS
2' FDPS
24"
46"
WOODS
2GI
FS
15" RCP-III
N 69° 43' 18.2" E
-L-
NC HWY 24/27
24' BS
REMOVE 15" RCP
GRADE TO DRAIN REMOVE
16'
ACCESS BREAK
8sl
GREU TL-3
BEGIN SBG +25 RT
10' FDPS
15" W/ELBOWS
18" RCP-III
CLASS B RIP RAP
EST 3 TONS
EST 10 SY GEOTEXTILE
SPECIAL LATERAL V DITCH
SEE DETAIL 1

SITE 49

CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE

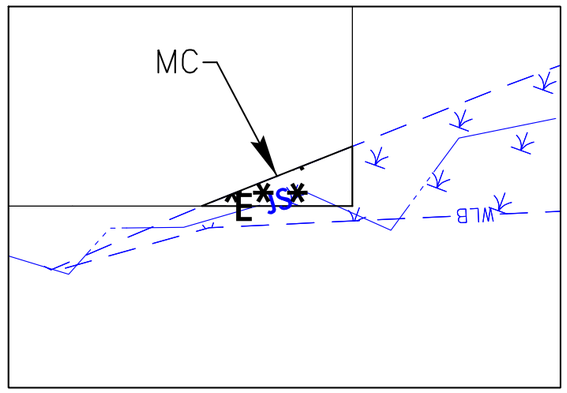
39 UNITED STATES FOREST SERVICE

WETLAND
WFF

STREAM
SX

SITE 49

WETLAND
WFF



SITE 49

ENVIRONMENTAL SENSITIVITY AREA

ENVIRONMENTALLY SENSITIVE AREA

FOR -L- PROFILE, SEE SHEET 53

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

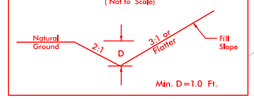
5/6/2019 2:09:11 PM
R:\Projects\Roadway\Design Units\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_PSH29.dgn
dgnsetup

5/14/99

PERMIT DRAWING
SHEET 59 OF 91

DENOTES MECHANIZED CLEARING

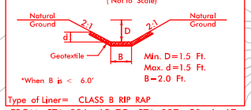
DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D=1.0 Ft.

FROM STA. 328+00 TO STA. 328+50 -L- RT
FROM STA. 334+50 TO STA. 335+00 -L- LT

DETAIL 40
STANDARD BASE DITCH
(Not to Scale)



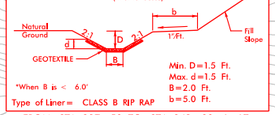
Min. D=1.5 Ft.
Max. d=1.5 Ft.
B=2.0 Ft.

*When B is < 6.0'

Type of Liner= CLASS B RIP RAP

FROM STA. 336+65 TO STA. 337+50 -L- LT

DETAIL 37
LATERAL BASE DITCH
(Not to Scale)



Min. D=1.5 Ft.
Max. d=1.5 Ft.
B=2.0 Ft.
b=5.0 Ft.

*When B is < 6.0'

Type of Liner= CLASS B RIP RAP

FROM STA. 337+50 TO STA. 342+00 -L- LT

50' 0' 100'
GRAPHIC SCALE

16.7' 0' 33.3'
INSET GRAPHIC SCALE

NAD 83/NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART
firm License No. C-1851
223 S. West St.
Suite 1100
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VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

330

335

340

39
UNITED STATES FOREST SERVICE

STANDARD BASE DITCH
W/CLASS B RIP RAP
SLOPE= 5.6%
EST 55 TONS
EST 140 SY GEOTEXTILE
EST DDE = 25 CY
SEE DETAIL 40

LATERAL BASE DITCH
W/CLASS B RIP RAP
SEE DETAIL 37
EST 252 TONS
EST 683 SY GEOTEXTILE

PDE

ACCESS BREAK

SPECIAL LATERAL V DITCH
SEE DETAIL 1

MATCH TO SHEET 28
-L- STA. 327+00.00

MATCH TO SHEET 30
-L- STA. 341+00.00

4' FDPS
2' FDPS
24"
46"

15" RCP-III
18" RCP-III
2GI
FS
REMOVE
GRADE TO DRAIN REMOVE
16'
WOODS

N 69° 43' 18.2" E -L-

NC HWY 24/27 24' BS

8d

GREU TL-3

10' FDPS

15" W/ELBOWS

BEGIN SBG +25 RT

CLASS B RIP RAP
EST 3 TONS
EST 10 SY GEOTEXTILE

CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE

SITE 49

MC

E*JS*

WLB

605

609

SITE 49

39
UNITED STATES FOREST SERVICE

WETLAND
WFF

STREAM
SX

SITE 49

WETLAND
WFF

ENVIRONMENTAL SENSITIVITY AREA

ENVIRONMENTALLY SENSITIVE AREA

FOR -L- PROFILE, SEE SHEET 53

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

5:09:23 PM
R:\Roadway Projects\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_PSH29_con.dgn

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-203

PERMIT DRAWING
SHEET 60 OF 91

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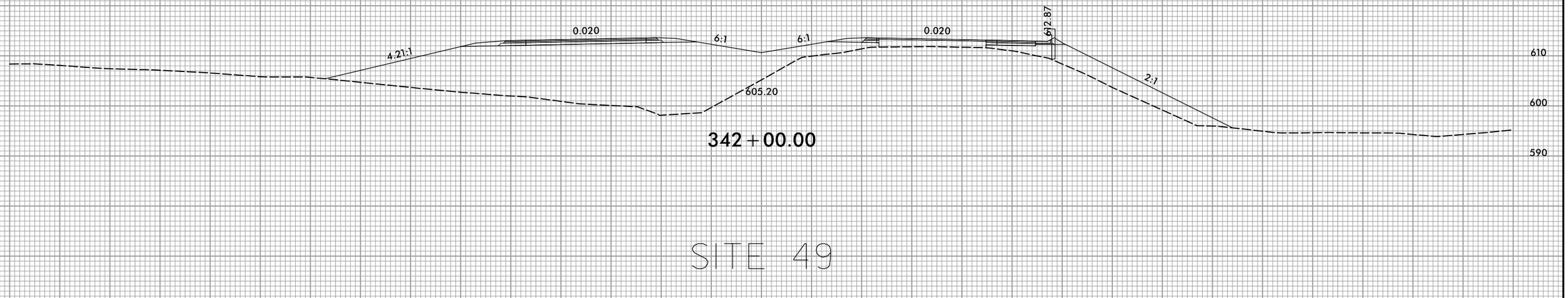
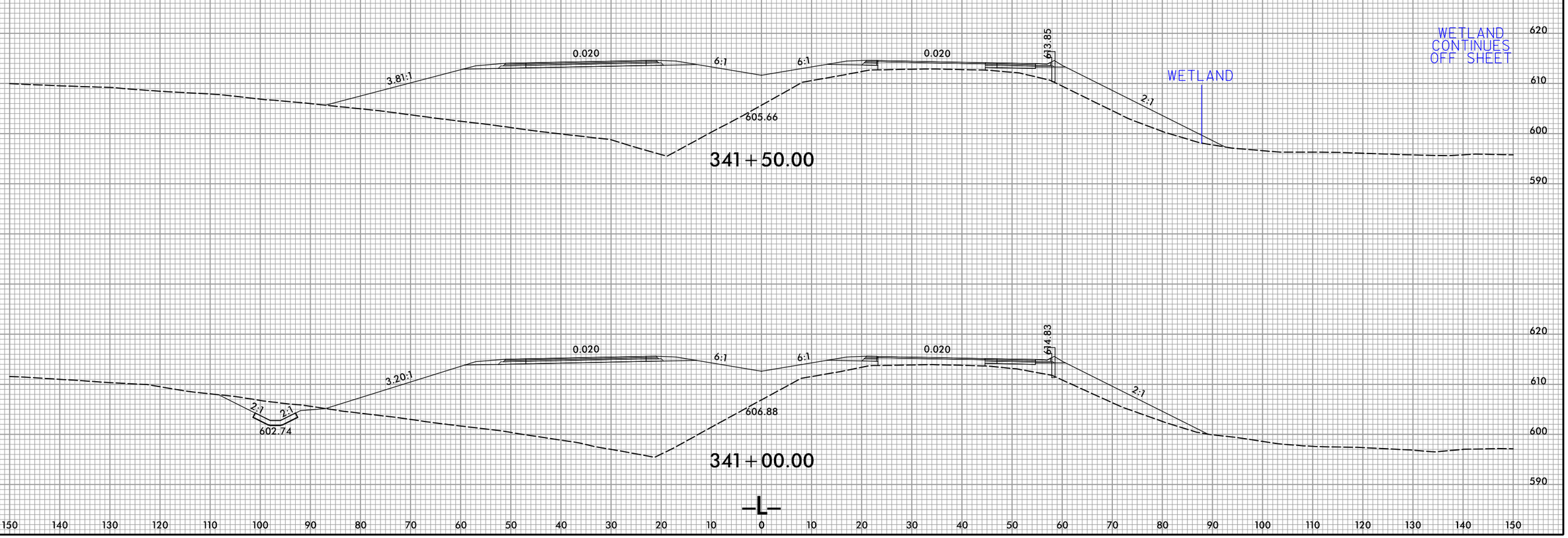


342+00.00

SITE 49



341+50.00

341+00.00

–L–

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gaverette

5/14/99

PERMIT DRAWING SHEET 61 OF 91

50′ 0′ 100′

GRAPHIC SCALE

E E DENOTES EXCAVATION IN WETLAND

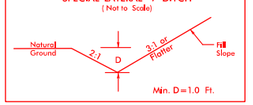
F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

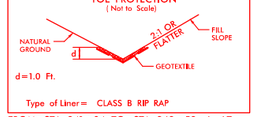
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DETAIL 1
SPECIAL LATERAL "V" DITCH
(Not to Scale)



FROM STA. 353+28 TO STA. 354+00 -L- LT

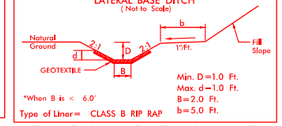
DETAIL 7
TOE PROTECTION
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 341+04 TO STA. 343+53 -L- LT
FROM STA. 347+00 TO STA. 348+38 -L- LT
FROM STA. 351+50 TO STA. 353+00 -L- RT

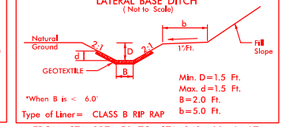
DETAIL 9
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 346+00 TO STA. 348+40 -L- RT

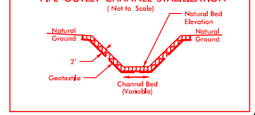
DETAIL 37
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 337+50 TO STA. 342+00 -L- LT

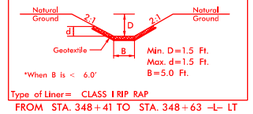
DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)



STA. 342+69 -L- RT

NAD 83/NA 2011

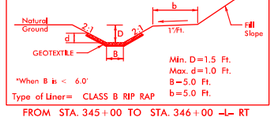
DETAIL 38
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= CLASS I RIP RAP

FROM STA. 348+41 TO STA. 348+63 -L- LT

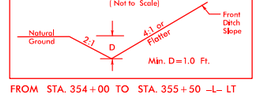
DETAIL 39
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 345+00 TO STA. 346+00 -L- RT

DETAIL 53
SPECIAL CUT DITCH
(Not to Scale)



FROM STA. 354+00 TO STA. 355+50 -L- LT

PROJECT REFERENCE NO.	SHEET NO.
R-2527	30
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART — firm License No. C-1851, 223 S. West St., Suite 1100, Raleigh, NC 27603, T: 919.380.8750, www.stewartPE.com

VHB — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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WETLAND WGG

WETLAND WGG SITE 51

345

STREAM SX

350

STREAM SX

SITE 50

WETLAND WPP

LATERAL BASE DITCH W/CLASS B RIP RAP SEE DETAIL 37 EST 252 TONS EST 683 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 69 TONS EST 214 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 38 TONS EST 119 SY GEOTEXTILE

STANDARD BASE DITCH W/CLASS I RIP RAP SLOPE= 0.9% EST 40 TONS EST 70 SY GEOTEXTILE EST DDE = 15 CY SEE DETAIL 38

39 UNITED STATES FOREST SERVICE

FILL IN CHANNEL CLASS I RIP RAP EST 25 TONS EST 40 SY GEOTEXTILE

CLASS I RIP RAP EST 11 TONS EST 22 SY GEOTEXTILE

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

SPECIAL CUT DITCH SEE DETAIL 53

SPECIAL LATERAL V DITCH SEE DETAIL 1

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

BEGIN SBG +56 LT

GRADE TO MAIN

END SBG +29 LT

CAT-1

GREU TL-3

18" W/ELBOWS

15" RCP-IV

20" RCP-IV

30" RCP-III

36" RCP-III

COLLAR

BURIED 1.0'

N 69° 43' 18.2" E

-L-

FLOWABLE FILL

TRENCHLESS INSTALLATION 10' WELDED STEEL

REMOVE

JB w/MH

NOT BURIED

15" W/ELBOWS

FILL IN CHANNEL CLASS I RIP RAP EST 8 TONS EST 11 SY GEOTEXTILE

END SBG +52 RT

ACCESS BREAK

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP EST 13 TONS EST 20 SY GEOTEXTILE L= 12 FT SEE DETAIL 62

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

LATERAL BASE DITCH W/CLASS B RIP RAP SEE DETAIL 39 EST 60 TONS EST 161 SY GEOTEXTILE

LATERAL BASE DITCH W/CLASS B RIP RAP SEE DETAIL 9 EST 108 TONS EST 305 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 42 TONS EST 129 SY GEOTEXTILE

STREAM SX

WETLAND WFF

39 UNITED STATES FOREST SERVICE

WETLAND WPP

SITE 49

SITE 50

SITE 52

MATCH TO SHEET 29 -L- STA 341+00.00

MATCH TO SHEET 31 -L- STA 355+00.00

FOR -L- PROFILE, SEE SHEETS 53 & 54

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PERMIT DRAWING
SHEET 62 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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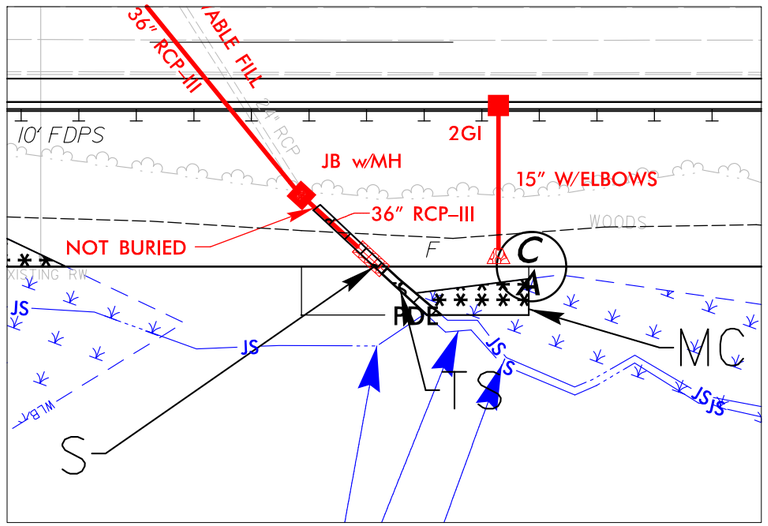
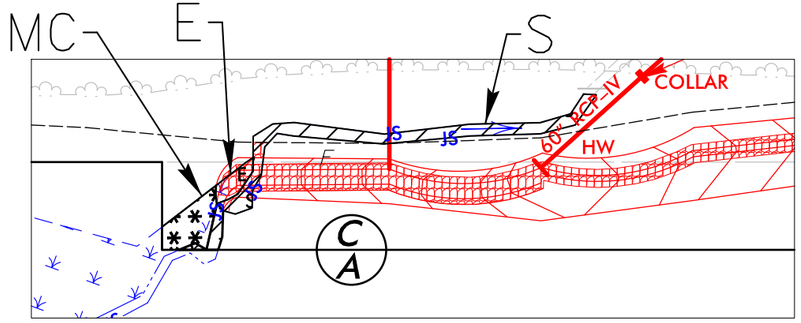
25′ 0′ 50′
INSET GRAPHIC SCALE



SITES 49 & 50



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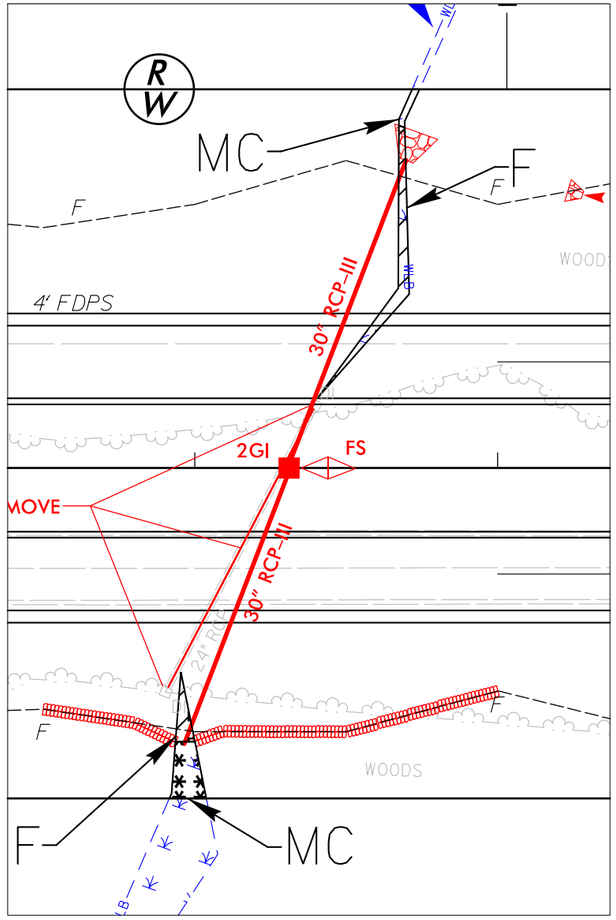

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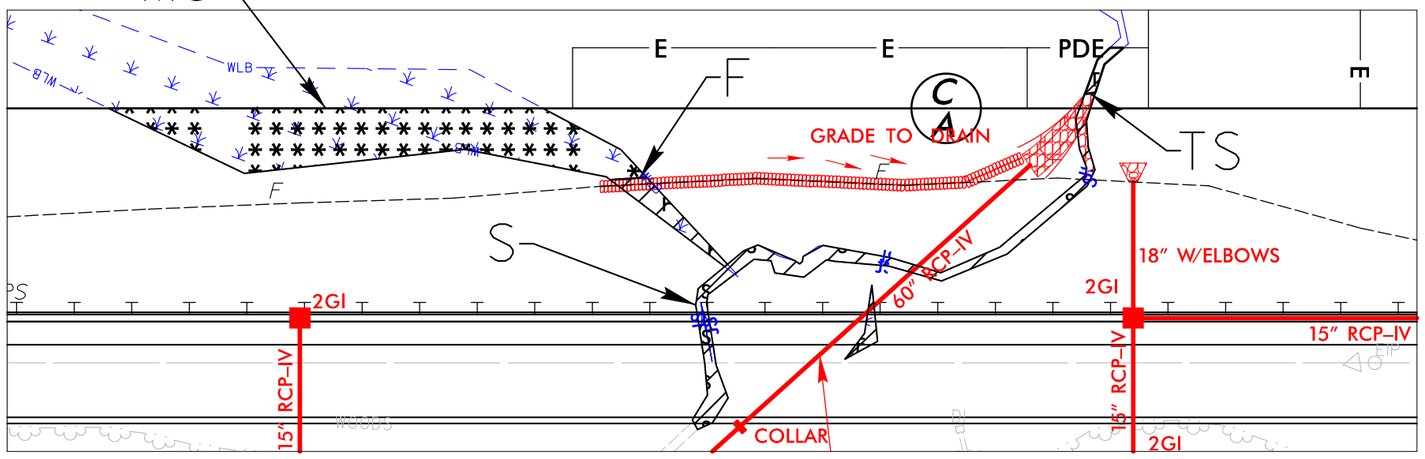

SITES 50 & 51

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bunt

5/14/99

PERMIT DRAWING SHEET 63 OF 91

50′ 0′ 100′

GRAPHIC SCALE

E E DENOTES EXCAVATION IN WETLAND

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	30
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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NAD 83/NA 2011

DETAIL 1
SPECIAL LATERAL "V" DITCH (Not to Scale)

Natural Ground, 2:1, D, 3:1 or Flatter, Fill Slope, Min. D=1.0 Ft.

FROM STA. 353+28 TO STA. 354+00 –L– LT

DETAIL 7
TOE PROTECTION (Not to Scale)

NATURAL GROUND, d, 2:1 OR FLATTER, FILL SLOPE, GEOTEXTILE, d=1.0 Ft.

Type of Liner = CLASS B RIP RAP

FROM STA. 341+04 TO STA. 343+53 –L– LT
FROM STA. 347+00 TO STA. 348+38 –L– LT
FROM STA. 351+50 TO STA. 353+00 –L– RT

DETAIL 9
LATERAL BASE DITCH (Not to Scale)

Natural Ground, 2:1, d, D, B, b, 1':Ft., Fill Slope, GEOTEXTILE, Min. D=1.0 Ft., Max. d=1.0 Ft., B=2.0 Ft., b=5.0 Ft.

*When B is < 6.0'

Type of Liner = CLASS B RIP RAP

FROM STA. 346+00 TO STA. 348+40 –L– RT

DETAIL 37
LATERAL BASE DITCH (Not to Scale)

Natural Ground, 2:1, d, D, B, b, 1':Ft., Fill Slope, GEOTEXTILE, Min. D=1.5 Ft., Max. d=1.5 Ft., B=2.0 Ft., b=5.0 Ft.

*When B is < 6.0'

Type of Liner = CLASS B RIP RAP

FROM STA. 337+50 TO STA. 342+00 –L– LT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION (Not to Scale)

Natural Ground, Natural Bed Elevation, 2', Geotextile, Channel Bed (Varies)

STA. 342+69 –L– RT

DETAIL 38
STANDARD DITCH (Not to Scale)

Natural Ground, 2:1, d, D, B, Geotextile, Min. D=1.5 Ft., Max. d=1.5 Ft., B=5.0 Ft.

*When B is < 6.0'

Type of Liner = CLASS I RIP RAP

FROM STA. 348+41 TO STA. 348+63 –L– LT

DETAIL 39
LATERAL BASE DITCH (Not to Scale)

Natural Ground, 2:1, d, D, B, b, 1':Ft., Fill Slope, GEOTEXTILE, Min. D=1.5 Ft., Max. d=1.0 Ft., B=5.0 Ft., b=5.0 Ft.

*When B is < 6.0'

Type of Liner = CLASS B RIP RAP

FROM STA. 345+00 TO STA. 346+00 –L– RT

DETAIL 53
SPECIAL CUT DITCH (Not to Scale)

Natural Ground, 2:1, D, 4:1 or Flatter, Front Ditch Slope, Min. D=1.0 Ft.

FROM STA. 354+00 TO STA. 355+50 –L– LT

WETLAND WGG

WETLAND WGG SITE 51

345

STANDARD BASE DITCH W/CLASS I RIP RAP SLOPE= 0.9% EST 40 TONS EST 70 SY GEOTEXTILE EST DDE = 15 CY SEE DETAIL 38

FILL IN CHANNEL CLASS I RIP RAP EST 25 TONS EST 40 SY GEOTEXTILE

39 UNITED STATES FOREST SERVICE

STREAM SX

SITE 50

350

WETLAND WPP

LATERAL BASE DITCH W/CLASS B RIP RAP SEE DETAIL 37 EST 252 TONS EST 683 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 69 TONS EST 214 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 38 TONS EST 119 SY GEOTEXTILE

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

CLASS I RIP RAP EST 11 TONS EST 22 SY GEOTEXTILE

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

SPECIAL CUT DITCH SEE DETAIL 53

SPECIAL LATERAL V DITCH SEE DETAIL 1

BEGIN SBG +56 LT

END SBG +29 LT

GRADE TO MAIN

MATCH TO SHEET 29 –L– STA 341+00.00

MATCH TO SHEET 31 –L– STA 355+00.00

36" RCP-III, 15" RCP-IV, 18" RCP-IV, 30" RCP-III, 18" W/ELBOWS, 15" W/ELBOWS, 10' FDPS, 4' FDPS, 2' FDPS, CAT-1, GREU TL-3, 2GI, FS, HW, COLLAR, BURIED 1.0', FLOWABLE FILL, N 69° 43' 18.2" E –L–, NC HWY 24/27 24' BST, REMOVE, ACCESS BREAK, WOODS

JB w/MH, NOT BURIED

FILL IN CHANNEL CLASS I RIP RAP EST 8 TONS EST 11 SY GEOTEXTILE

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP EST 13 TONS EST 20 SY GEOTEXTILE L= 12 FT SEE DETAIL 62

LATERAL BASE DITCH W/CLASS B RIP RAP SEE DETAIL 39 EST 60 TONS EST 161 SY GEOTEXTILE

LATERAL BASE DITCH W/CLASS B RIP RAP SEE DETAIL 9 EST 108 TONS EST 305 SY GEOTEXTILE

END SBG +52 RT

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 42 TONS EST 129 SY GEOTEXTILE

STREAM SX

STREAM SX

39 UNITED STATES FOREST SERVICE

WETLAND WFF

WETLAND WPP

SITE 49

SITE 50

SITE 52

FOR –L– PROFILE, SEE SHEETS 53 & 54

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Richard Chandler
Hydraulics

PERMIT DRAWING
SHEET 64 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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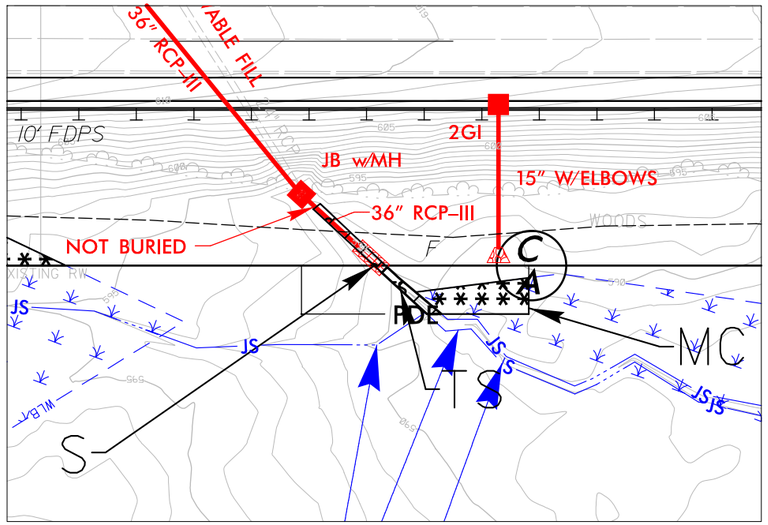
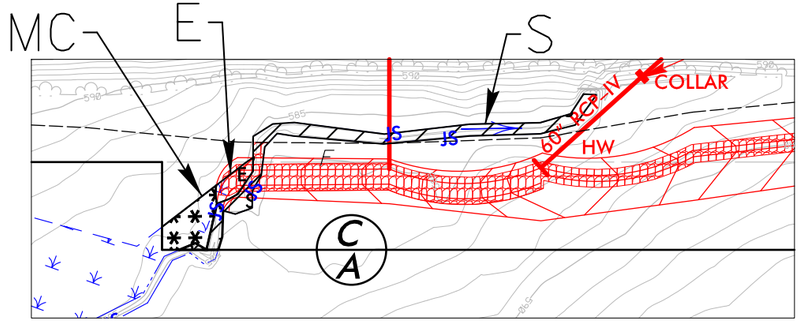
INSET GRAPHIC SCALE



SITES 49 & 50



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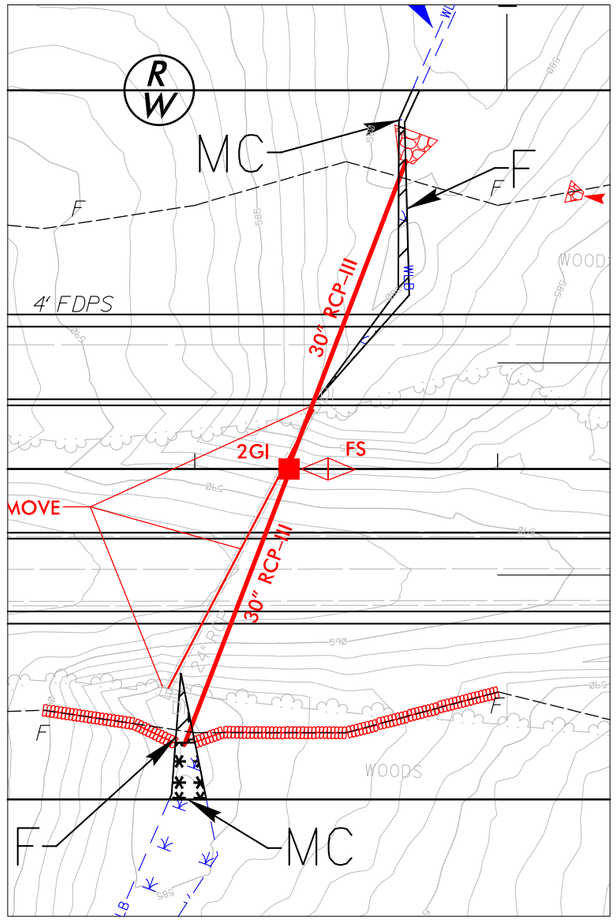

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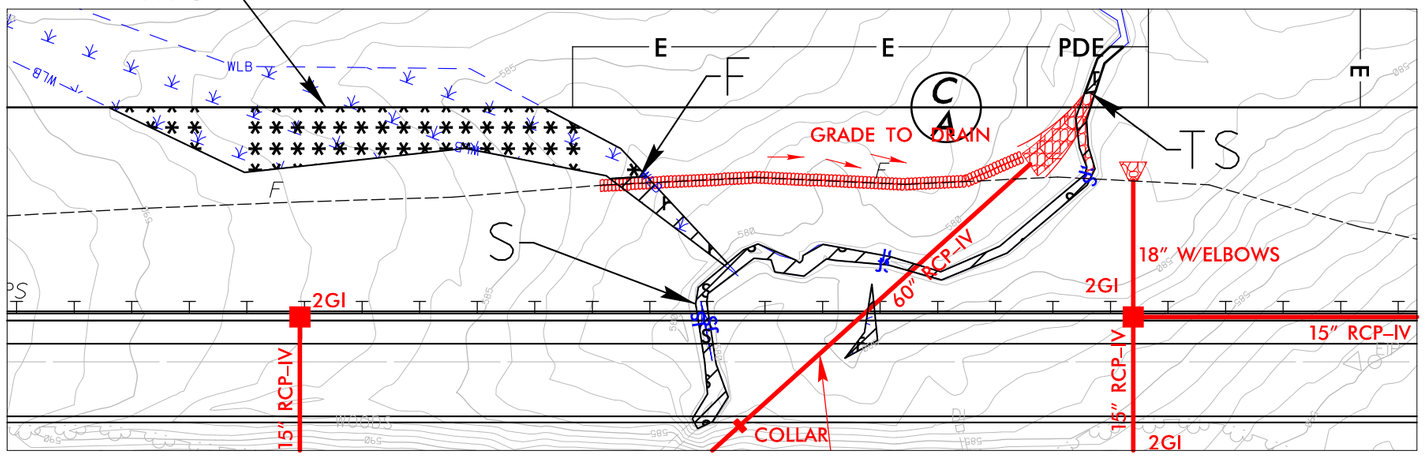

SITES 50 & 51

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8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-204

PERMIT DRAWING
SHEET 65 OF 91

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610
600
590
580

0.020 6:1 6:1 0.020

3.33:1

609.93

601.88

2:1

343+50.00

SITE 49

3.63:1

610.91

602.85

WETLAND

343+00.00

3.89:1

611.89

604.48

342+50.00

–L–

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gaverette

8/23/99

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	R-2527	X-207

PERMIT DRAWING
SHEET 66 OF 91

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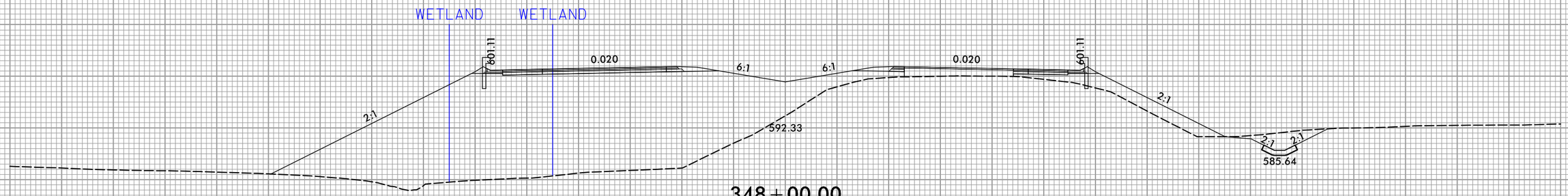
SITE 51

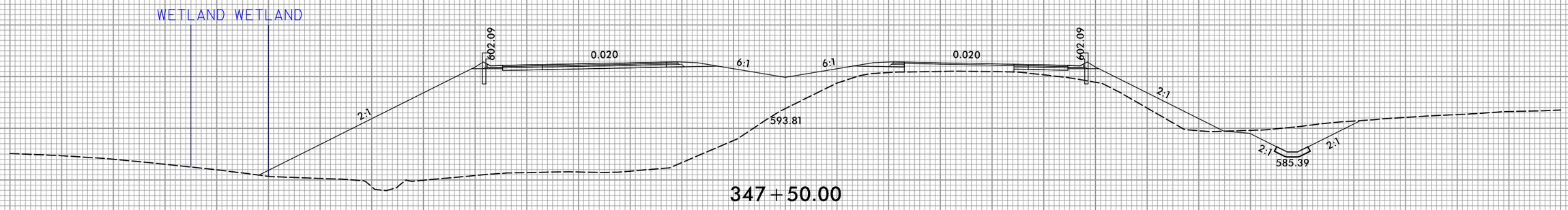
WETLAND WETLAND



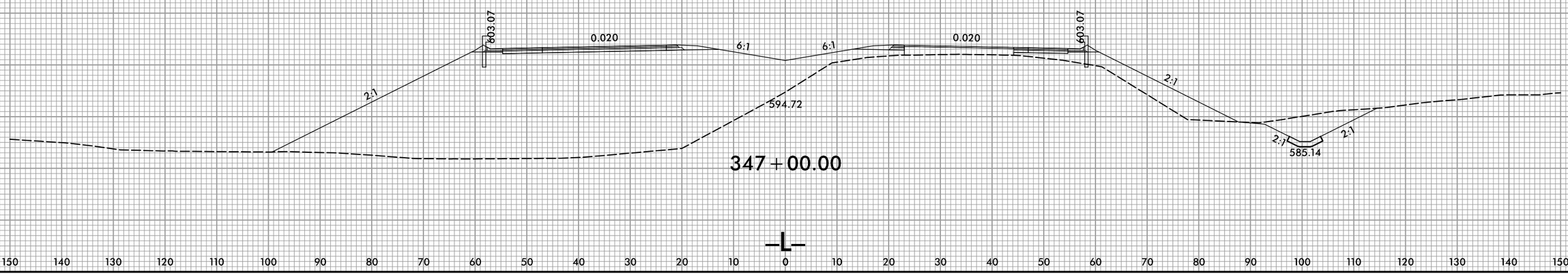
348+00.00

SITE 51

WETLAND WETLAND



347+50.00



347+00.00

–L–

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gaverette

8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-209

PERMIT DRAWING
SHEET 67 OF 91

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

WETLAND WETLAND

SITE 52

0.020 6:1 6:1 0.020

4:1 5.17:1

587.40

352+50.00

590 580

SITE 52

WETLAND WETLAND

0.020 6:1 6:1 0.020

5.49:1 3.29:1

589.31

352+00.00

590 580

0.020 6:1 6:1 0.020

6:1 6:1

590.44

351+50.00

590 580

0.020 6:1 6:1 0.020

6:1 6:1 6:1 6:1

591.59

351+00.00

590 580

600 590 580

0.020 6:1 6:1 0.020

4.88:1 6:1 5.39:1

592.54

350+50.00

–L–

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

IM409 AM
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gaverette

5/14/99

PERMIT DRAWING SHEET 68 OF 91

50′ 0′ 100′

GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	31
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART — firm License No. C-1851, 223 S. West St., Suite 1100, Raleigh, NC 27603, T: 919.380.8750, www.stewartinc.com

vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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NAD 83/NA 2011

DETAIL 3
BERM 'V' DITCH (Not to Scale)

Min. D=1.0 Ft.
b=5.0 Ft.
Type of Liner= CLASS B RIP RAP

FROM STA. 356+00 TO STA. 359+25 –L– RT

DETAIL 4
SPECIAL LATERAL BASE DITCH (Not to Scale)

Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 361+50 TO STA. 362+50 –L– RT

DETAIL 7
TOE PROTECTION (Not to Scale)

d=1.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 363+50 TO STA. 364+66 –L– LT
FROM STA. 365+00 TO STA. 367+00 –L– LT

DETAIL 9
LATERAL BASE DITCH (Not to Scale)

*When B is < 6.0'

Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 362+50 TO STA. 363+50 –L– RT

DETAIL 41
LATERAL BASE DITCH (Not to Scale)

*When B is < 6.0'

Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=5.0 Ft.
b=5.0 Ft.

Type of Liner= CLASS I RIP RAP

FROM STA. 363+50 TO STA. 366+73 –L– RT

STREAM SY–A

360

365

39 UNITED STATES FOREST SERVICE

SITE 53

CLASS B RIP RAP
EST 3 TONS
EST 10 SY GEOTEXTILE

SPECIAL CUT DITCH
SEE DETAIL 53

18" RCP–III

INC.=40' (TYP.)

15" RCP–III

N 69°43'18.2" E
–L–

REMOVE

BEGIN SBG
+75 RT

FS GREU TL–3

15" W/ELBOWS

BDO

4' FDPS

2' FDPS

10' FDPS

MATCH TO SHEET 30
–L– STA. 355+00.00

MATCH TO SHEET 32
–L– STA. 368+00.00

NC HWY 24/27 24' BST

WOODS

EXISTING RW

FLOWABLE FILL

CAT–1

TS

S

PDE

FILL IN EXISTING CHANNEL
W/CLASS II RIP RAP
EST 80 TONS
EST 95 SY GEOTEXTILE
SEE DETAIL 64

CLASS II RIP RAP
EST 250 TONS
EST 400 SY GEOTEXTILE
SEE DETAIL 42

TOE PROTECTION
W/CLASS B RIP RAP
SEE DETAIL 7
EST 32 TONS
EST 100 SY GEOTEXTILE

TOE PROTECTION
W/CLASS B RIP RAP
SEE DETAIL 7
EST 55 TONS
EST 170 SY GEOTEXTILE

REMOVE EXISTING STRUCTURE

1@8'x10' RCBC W/SILLS

BURIED 1.0

15" RCP–IV

FILL IN EXISTING CHANNEL
W/CLASS I RIP RAP
EST 75 TONS
EST 90 SY GEOTEXTILE
SEE DETAIL 64

BERM V DITCH
W/CLASS B RIP RAP
SEE DETAIL 3
EST 113 TONS
EST 341 SY GEOTEXTILE

SPECIAL LATERAL BASE DITCH
W/CLASS B RIP RAP
SEE DETAIL 4
EST 59 TONS
EST 168 SY GEOTEXTILE

LATERAL BASE DITCH
W/CLASS B RIP RAP
SEE DETAIL 9
EST 45 TONS
EST 127 SY GEOTEXTILE

LATERAL BASE DITCH
W/CLASS I RIP RAP
SEE DETAIL 41
EST 193 TONS
EST 518 SY GEOTEXTILE

CLASS I RIP RAP
EMBEDDED INTO
STREAM BED
EST 28 TONS
EST 40 SY GEOTEXTILE

CLASS II RIP RAP
EST 300 TONS
EST 420 SY GEOTEXTILE
SEE DETAIL 43

39 UNITED STATES FOREST SERVICE

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

INLET DETAIL 42
NTS

1@8'x10' RCBC
EXCAVATION=21CY
NG
2:1
2:1
CLASS II RIP RAP W/GEOTEXTILE THICKNESS = 2'
BASE WIDTH VARIES 5' TO 7'

OUTLET DETAIL 43
NTS

1@8'x10' RCBC
2:1
2:1
CLASS II RIP RAP W/GEOTEXTILE THICKNESS = 2'
NG
EXCAVATION=230 CY
BASE WIDTH VARIES 7' TO 9'

STREAM SY–A

FOR –L– PROFILE, SEE SHEET 54

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overlette

5/14/99

PERMIT DRAWING SHEET 69 OF 91

50' 0' 100'

GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	31
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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NAD 83/NA 2011

DETAIL 3
BERM 'V' DITCH
(Not to Scale)

Natural Ground, 2:1, D, 2:1, b, RDWY, Geotextile

Min. D=1.0 Ft.
b=5.0 Ft.
Type of Liner= CLASS B RIP RAP

FROM STA. 356+00 TO STA. 359+25 -L- RT

DETAIL 4
SPECIAL LATERAL BASE DITCH
(Not to Scale)

Natural Ground, 2:1, d, D, 4:1 or Flatter, Fill Slope, Geotextile, B

Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
Type of Liner= CLASS B RIP RAP

FROM STA. 361+50 TO STA. 362+50 -L- RT

DETAIL 7
TOE PROTECTION
(Not to Scale)

NATURAL GROUND, d, 2:1 OR FLATTER, FILL SLOPE, GEOTEXTILE

d=1.0 Ft.
Type of Liner= CLASS B RIP RAP

FROM STA. 363+50 TO STA. 364+66 -L- LT
FROM STA. 365+00 TO STA. 367+00 -L- LT

DETAIL 9
LATERAL BASE DITCH
(Not to Scale)

Natural Ground, 2:1, d, D, 2:1, b, 1':Ft., Fill Slope, GEOTEXTILE, B

*When B is < 6.0'
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=2.0 Ft.
b=5.0 Ft.
Type of Liner= CLASS B RIP RAP

FROM STA. 362+50 TO STA. 363+50 -L- RT

DETAIL 41
LATERAL BASE DITCH
(Not to Scale)

Natural Ground, 2:1, d, D, 2:1, b, 1':Ft., Fill Slope, GEOTEXTILE, B

*When B is < 6.0'
Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=5.0 Ft.
b=5.0 Ft.
Type of Liner= CLASS I RIP RAP

FROM STA. 363+50 TO STA. 366+73 -L- RT

STREAM SY-A

360

365

TS

S

SITE 53

UNITED STATES FOREST SERVICE

39

CLASS B RIP RAP
EST 5 TONS
EST 10 SY GEOTEXTILE

SPECIAL CUT DITCH
SEE DETAIL 53

FS

4' FDPS

2' FDPS

2GI

15" RCP-III

18" RCP-III

N 69°43'18.2" E

-L-

REMOVE

15" W/ELBOWS

BDO

INC.=40' (TYP.)

WOODS

CAT-1

8H

NC HWY 24/27 24' BST

BEGIN SBG +75 RT

FS GREU TL-3

FILL IN EXISTING CHANNEL W/CLASS II RIP RAP
EST 80 TONS
EST 95 SY GEOTEXTILE
SEE DETAIL 64

CLASS II RIP RAP
EST 250 TONS
EST 400 SY GEOTEXTILE
SEE DETAIL 42

TOE PROTECTION W/CLASS B RIP RAP
SEE DETAIL 7
EST 32 TONS
EST 100 SY GEOTEXTILE

PDE

10' FDPS

1@8'x10' RCBC W/SILLS

BURIED 1.0

TOE PROTECTION W/CLASS B RIP RAP
SEE DETAIL 7
EST 55 TONS
EST 170 SY GEOTEXTILE

REMOVE EXISTING STRUCTURE

GREU TL-3

EXISTING RW

FLOWABLE FILL

CONC. RW

FILL IN EXISTING CHANNEL W/CLASS I RIP RAP
EST 75 TONS
EST 90 SY GEOTEXTILE
SEE DETAIL 64

CLASS I RIP RAP EMBEDDED INTO STREAM BED
EST 28 TONS
EST 40 SY GEOTEXTILE

CLASS II RIP RAP
EST 300 TONS
EST 420 SY GEOTEXTILE
SEE DETAIL 43

BERM V DITCH W/CLASS B RIP RAP
SEE DETAIL 3
EST 113 TONS
EST 241 SY GEOTEXTILE

SPECIAL LATERAL BASE DITCH W/CLASS B RIP RAP
SEE DETAIL 4
EST 59 TONS
EST 168 SY GEOTEXTILE

LATERAL BASE DITCH W/CLASS B RIP RAP
SEE DETAIL 9
EST 45 TONS
EST 127 SY GEOTEXTILE

LATERAL BASE DITCH W/CLASS I RIP RAP
SEE DETAIL 41
EST 193 TONS
EST 518 SY GEOTEXTILE

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

STREAM SY-A

MATCH TO SHEET 30 -L- STA. 355+00.00

MATCH TO SHEET 32 -L- STA. 368+00.00

INLET DETAIL 42
NTS

I@8'x10' RCBC
EXCAVATION=21CY
NG
2:1
CLASS II RIP RAP W/GEOTEXTILE THICKNESS = 2'
BASE WIDTH VARIES 5' TO 7'

OUTLET DETAIL 43
NTS

I@8'x10' RCBC
2:1
CLASS II RIP RAP W/GEOTEXTILE THICKNESS = 2'
NG
EXCAVATION=230 CY
BASE WIDTH VARIES 7' TO 9'

FOR -L- PROFILE, SEE SHEET 54

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pavelotte

PERMIT DRAWING
SHEET 70 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STEWART
Firm License No. C-0193
223 S. West St.
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www.stewartinc.com

vhb
VHB Engineering NC, P.C. (C-3705)
940 Main Campus Drive, Suite 500
Raleigh, NC 27606

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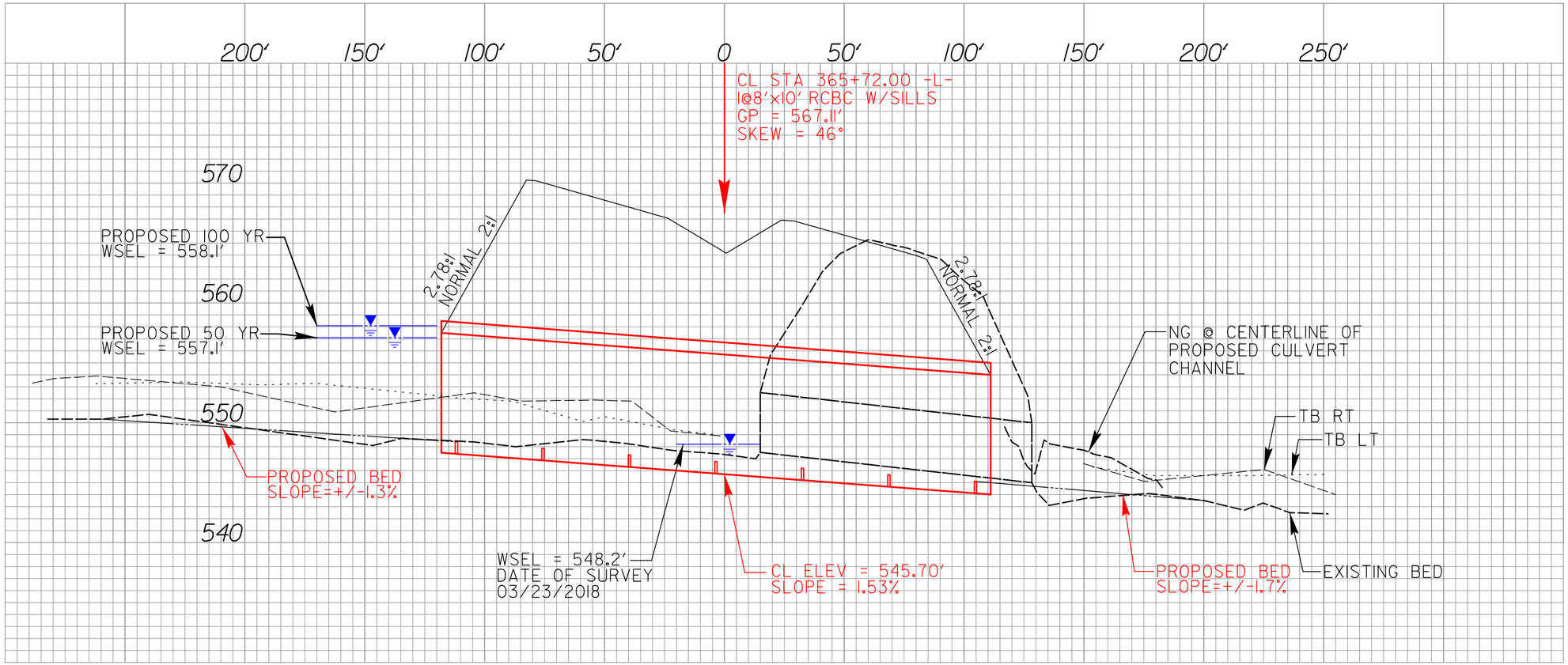
SITE 53



REVISIONS
8/17/99

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5/14/99

PERMIT DRAWING SHEET 71 OF 91

50′ 0′ 100′

GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	33
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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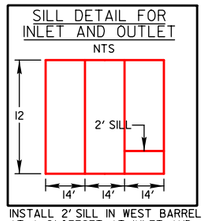
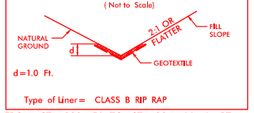
SILL DETAIL FOR INLET AND OUTLET

NTS



INSTALL 2′ SILL IN WEST BARREL AT A 2′ OFFSET AT INLET AND OUTLET. BACKFILL WITH 15′ OF CLASS I RIP RAP TOPPED WITH 0.5′ OF NATIVE MATERIAL TO SILL HEIGHT. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING THE CULVERT CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

DETAIL 7
TOE PROTECTION
(Not to Scale)

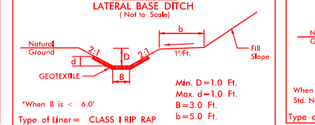


d=1.0 Ft.

Type of Liner= CLASS B RIP RAP

FROM STA. 383+50 TO STA. 384+00 -L- RT
FROM STA. 384+45 TO STA. 386+00 -L- RT
FROM STA. 389+90 TO STA. 390+50 -L- RT
FROM STA. 390+00 TO STA. 391+71 -L- LT
FROM STA. 392+25 TO STA. 394+50 -L- LT

DETAIL 45
LATERAL BASE DITCH
(Not to Scale)



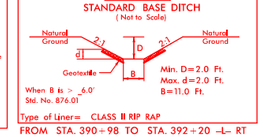
*When B is < 6.0′

Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=3.0 Ft.
b=5.0 Ft.

Type of Liner= CLASS I RIP RAP

FROM STA. 383+79 TO STA. 385+92 -L- RT

DETAIL 46
STANDARD BASE DITCH
(Not to Scale)



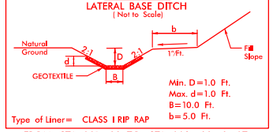
When B is > 6.0′
Std. No. 876.01

Min. D=2.0 Ft.
Max. d=2.0 Ft.
B=11.0 Ft.

Type of Liner= CLASS II RIP RAP

FROM STA. 390+98 TO STA. 392+20 -L- RT

DETAIL 56
LATERAL BASE DITCH
(Not to Scale)

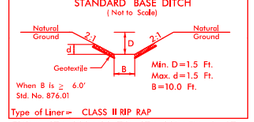


Min. D=1.0 Ft.
Max. d=1.0 Ft.
B=10.0 Ft.
b=5.0 Ft.

Type of Liner= CLASS I RIP RAP

FROM STA. 391+00 TO STA. 392+00 -L- LT

DETAIL 73
STANDARD BASE DITCH
(Not to Scale)



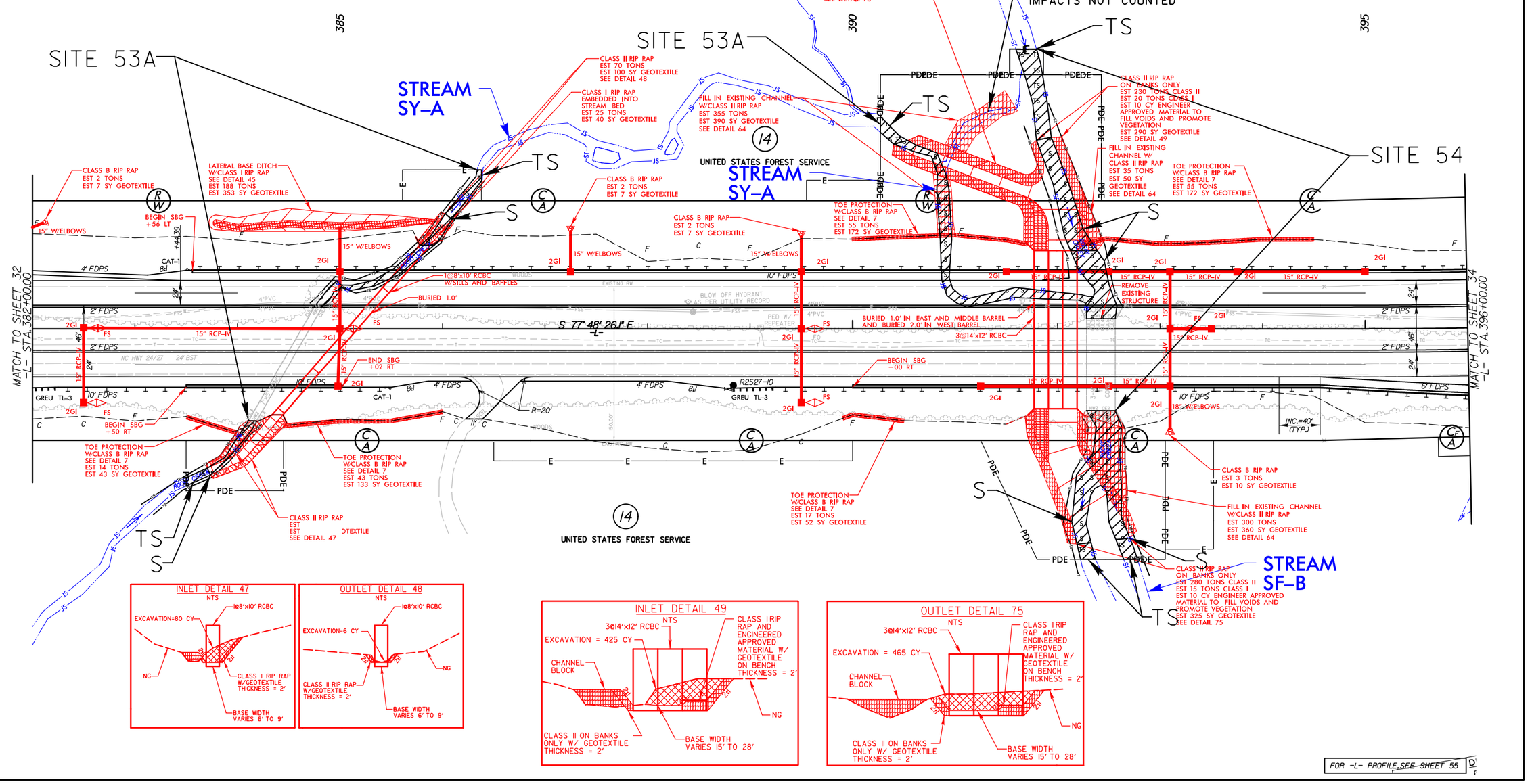
When B is ≥ 6.0′
Std. No. 876.01

Min. D=1.5 Ft.
Max. d=1.5 Ft.
B=10.0 Ft.

Type of Liner= CLASS II RIP RAP

FROM STA. 390+39 TO STA. 391+74 -L- LT

NAD 83/NA 2011



INLET DETAIL 47
NTS

OUTLET DETAIL 48
NTS

INLET DETAIL 49
NTS

OUTLET DETAIL 75
NTS

FOR -L- PROFILE SEE SHEET 55

D

4:50:45 PM
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Plotted

5/14/99

PERMIT DRAWING SHEET 72 OF 91

50′ 0′ 100′

GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	33
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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vhb — VHB Engineering NC, P.C. (C-3705), 940 Main Campus Drive, Suite 500, Raleigh, NC 27606

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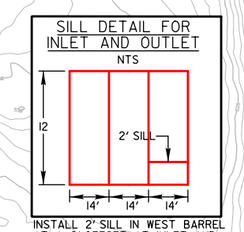
NAD 83/NA 2011

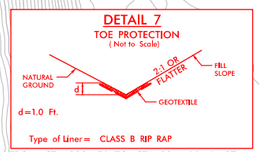
SILL DETAIL FOR INLET AND OUTLET

NTS



INSTALL 2′ SILL IN WEST BARREL AT A 2′ OFFSET AT INLET AND OUTLET. BACKFILL WITH 1.5′ OF CLASS I RIP RAP TOPPED WITH 0.5′ OF NATIVE MATERIAL TO SILL HEIGHT. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING THE CULVERT CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.

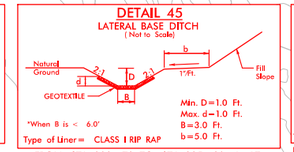
DETAIL 7
TOE PROTECTION
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 383+50 TO STA. 384+00 -L- RT
FROM STA. 384+45 TO STA. 386+00 -L- RT
FROM STA. 389+90 TO STA. 390+50 -L- RT
FROM STA. 390+00 TO STA. 391+71 -L- LT
FROM STA. 392+25 TO STA. 394+50 -L- LT

DETAIL 45
LATERAL BASE DITCH
(Not to Scale)

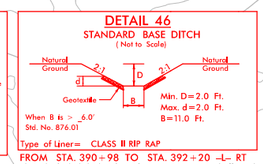


*When B is < 6.0′

Type of Liner= CLASS I RIP RAP

FROM STA. 383+79 TO STA. 385+92 -L- LT

DETAIL 46
STANDARD BASE DITCH
(Not to Scale)

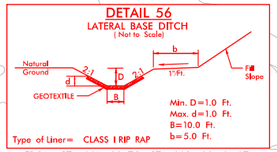


When B is ≥ 6.0′
Std. No. 876.01

Type of Liner= CLASS II RIP RAP

FROM STA. 390+98 TO STA. 392+20 -L- RT

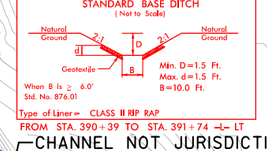
DETAIL 56
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= CLASS I RIP RAP

FROM STA. 391+00 TO STA. 392+00 -L- LT

DETAIL 73
STANDARD BASE DITCH
(Not to Scale)



When B is ≥ 6.0′
Std. No. 876.01

Type of Liner= CLASS II RIP RAP

FROM STA. 390+39 TO STA. 391+74 -L- LT

CHANNEL NOT JURISDICTIONAL PER WET FILE
IMPACTS NOT COUNTED

STANDARD BASE DITCH W/CLASS II RIP RAP ON BANKS ONLY SLOPE=1.6% EST 320 TONS EST 430 SY GEOTEXTILE EST DDE=215 CY SEE DETAIL 73

SITE 53A

SITE 54

STREAM SY-A

STREAM SF-B

CLASS II RIP RAP EST 70 TONS EST 100 SY GEOTEXTILE SEE DETAIL 48

CLASS I RIP RAP EMBEDDED INTO STREAM BED EST 25 TONS EST 40 SY GEOTEXTILE

FILL IN EXISTING CHANNEL W/CLASS II RIP RAP SEE DETAIL 45 EST 188 TONS EST 353 SY GEOTEXTILE

FILL IN EXISTING CHANNEL W/CLASS II RIP RAP EST 355 TONS EST 390 SY GEOTEXTILE SEE DETAIL 64

CLASS II RIP RAP ON BANKS ONLY EST 230 TONS CLASS II EST 20 TONS CLASS I EST 10 CY ENGINEER APPROVED MATERIAL TO FILL VOIDS AND PROMOTE VEGETATION EST 290 SY GEOTEXTILE SEE DETAIL 49

FILL IN EXISTING CHANNEL W/ CLASS II RIP RAP EST 35 TONS EST 50 SY GEOTEXTILE SEE DETAIL 64

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 55 TONS EST 172 SY GEOTEXTILE

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 14 TONS EST 43 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 42 TONS EST 133 SY GEOTEXTILE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 17 TONS EST 52 SY GEOTEXTILE

CLASS II RIP RAP EST EST SEE DETAIL 47

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

FILL IN EXISTING CHANNEL W/CLASS II RIP RAP EST 300 TONS EST 360 SY GEOTEXTILE SEE DETAIL 64

CLASS II RIP RAP ON BANKS ONLY EST 280 TONS CLASS II EST 15 TONS CLASS I EST 10 CY ENGINEER APPROVED MATERIAL TO FILL VOIDS AND PROMOTE VEGETATION EST 325 SY GEOTEXTILE SEE DETAIL 75

LATERAL BASE DITCH W/CLASS I RIP RAP SEE DETAIL 45 EST 188 TONS EST 353 SY GEOTEXTILE

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

BEGIN SBG +56 LT

END SBG +02 RT

BEGIN SBG +50 RT

BEGIN SBG +00 RT

15" W/ELBOWS

10'-8"x10' RCBC W/SILLS AND BAFFLES

BURIED 1.0'

BURIED 1.0' IN EAST AND MIDDLE BARREL AND BURIED 2.0' IN WEST BARREL

3@14'x12' RCBC

REMOVE EXISTING STRUCTURE

15" RCP-IV

4' FDPS

2' FDPS

10' FDPS

6' FDPS

18" W/ELBOWS

S 77° 48' 26.1" E

R=20'

R2527-10

GREU TL-3

CAT-1 8d

2GI

FS

PDE

TS

S

E

MATCH TO SHEET 32 -L- STA. 382+00.00

MATCH TO SHEET 34 -L- STA. 396+00.00

385

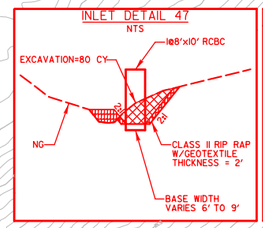
390

395

14

UNITED STATES FOREST SERVICE

INLET DETAIL 47
NTS



OUTLET DETAIL 48
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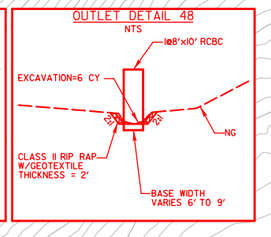

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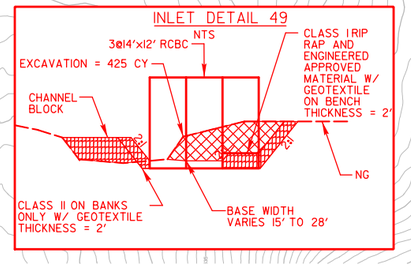

OUTLET DETAIL 75
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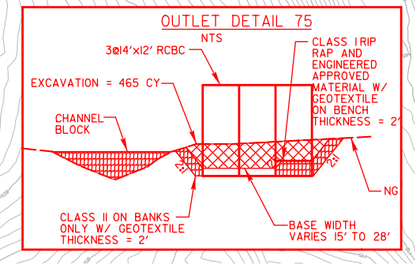

FOR -L- PROFILE SEE SHEET 55

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Plotted By:

PERMIT DRAWING
SHEET 73 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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Raleigh, NC 27606

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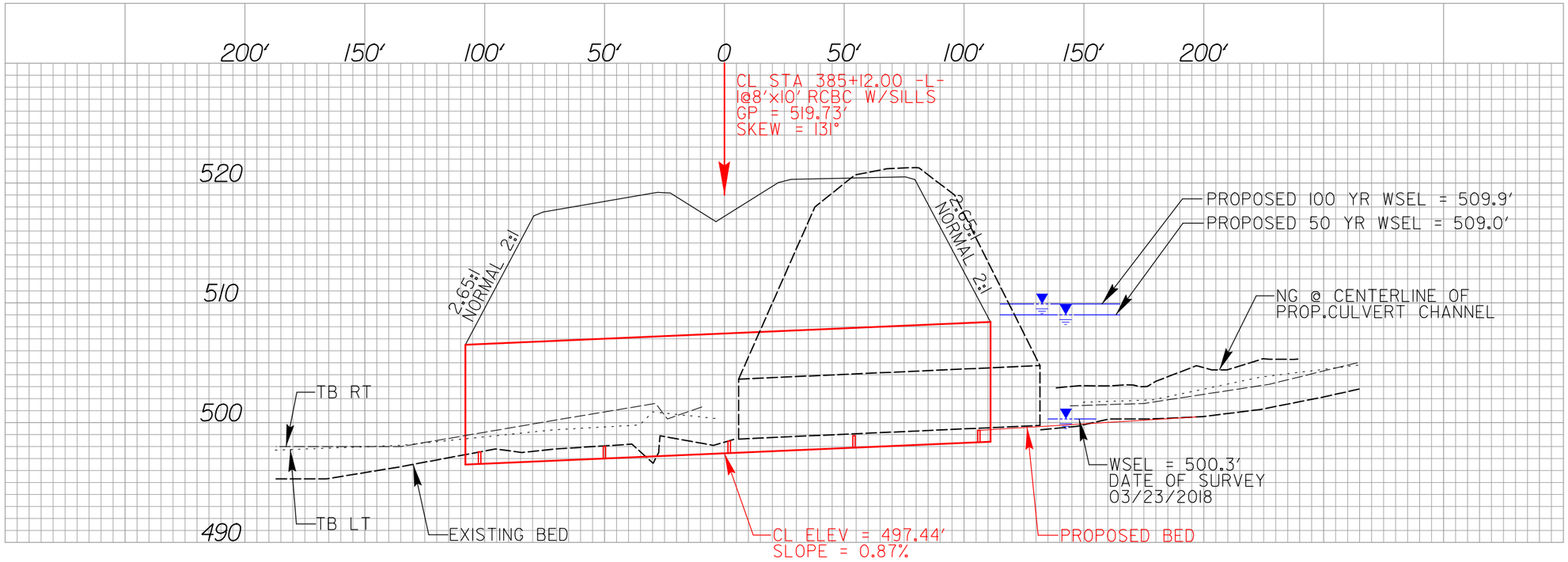
SITE 53A



8/17/99

REVISIONS

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8/17/99

PERMIT DRAWING
SHEET 74 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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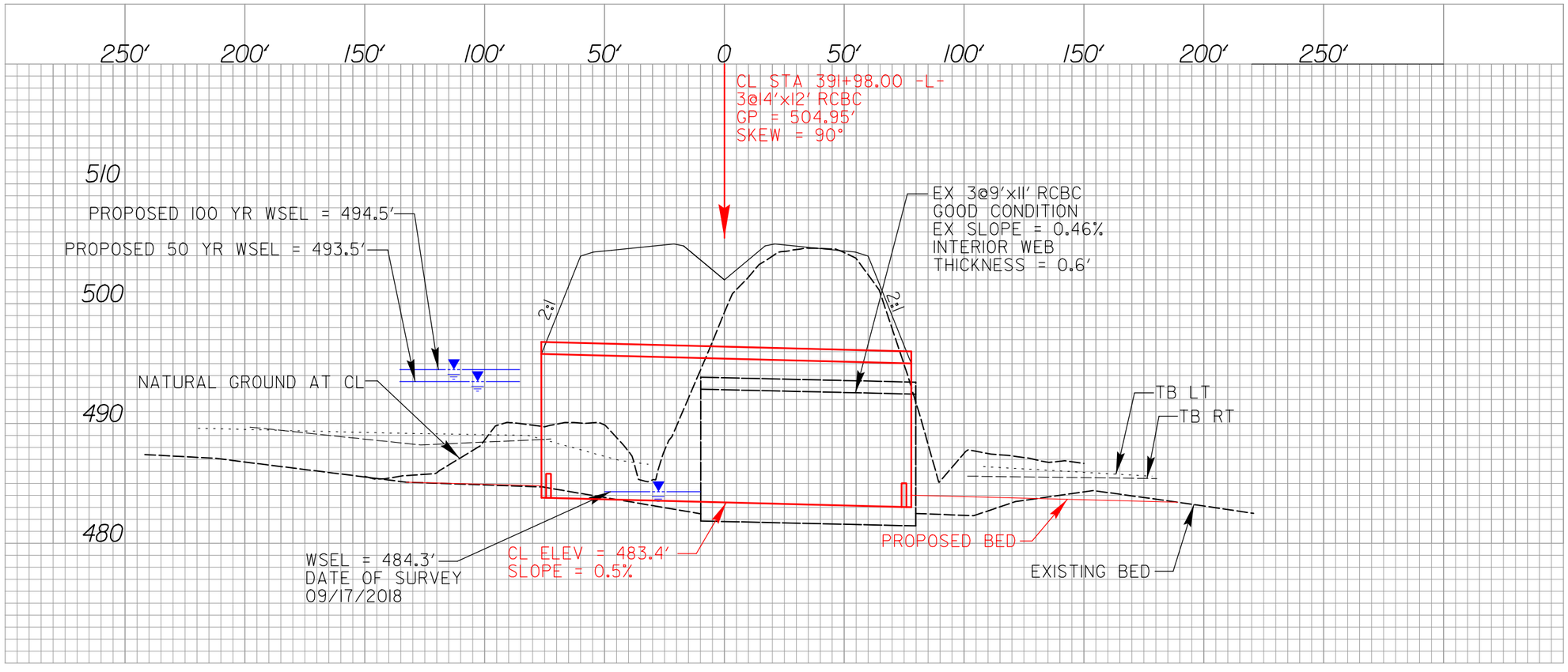
SITE 54



REVISIONS
8/17/99

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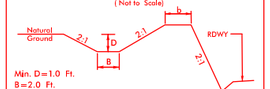
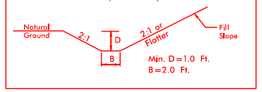
5/14/99

DETAIL 12
BERM BASE DITCH
(Not to Scale)



FROM STA. 401+51 TO STA. 408+94 –L– LT

DETAIL 66
SPECIAL LATERAL BASE DITCH
(Not to Scale)



FROM STA. 352+50 TO STA. 354+50 –RR– LT

DETAIL 68
SPECIAL CUT DITCH
(Not to Scale)

FROM STA. 19+50 TO STA. 20+16 –SR– LT

DETAIL 69
SPECIAL CUT BASE DITCH
(Not to Scale)

FROM STA. 352+50 TO STA. 353+00 –RR– RT
FROM STA. 361+00 TO STA. 362+75 –RR– LT

PERMIT DRAWING SHEET 75 OF 91

NAD 83NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	34
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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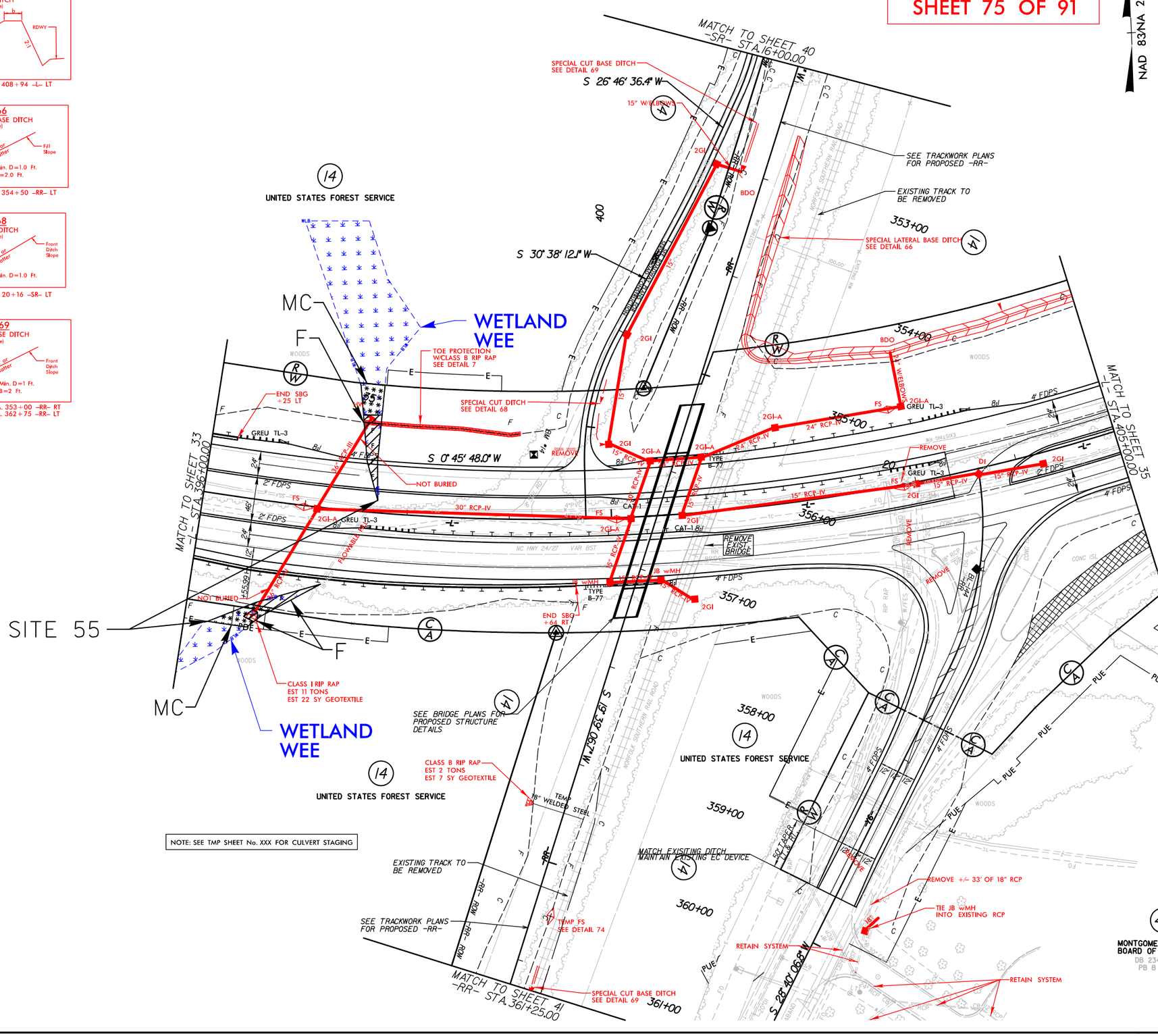
50′ 0′ 100′
GRAPHIC SCALE

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING



FOR INTERSECTION DETAIL, SEE SHEET 2B-10
FOR –L– PROFILE, SEE SHEETS 55 & 56
FOR –Y6– PROFILE, SEE SHEET 61
FOR –SR– PROFILE, SEE SHEET 62

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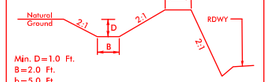
hucks

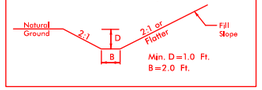
5/14/99

DETAIL 12
BERM BASE DITCH
(Not to Scale)



FROM STA. 401+51 TO STA. 408+94 –L– LT

DETAIL 66
SPECIAL LATERAL BASE DITCH
(Not to Scale)

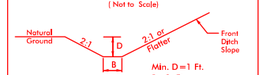


FROM STA. 352+50 TO STA. 354+50 –RR– LT

DETAIL 68
SPECIAL CUT DITCH
(Not to Scale)

FROM STA. 19+50 TO STA. 20+16 –SR– LT

DETAIL 69
SPECIAL CUT BASE DITCH
(Not to Scale)



FROM STA. 352+50 TO STA. 353+00 –RR– RT
FROM STA. 361+00 TO STA. 362+75 –RR– LT

PERMIT DRAWING
SHEET 76 OF 91

NAD 83/NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	34
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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50' 0' 100'
GRAPHIC SCALE

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

MATCH TO SHEET 40 –SR– STA. 16+00.00

SPECIAL CUT BASE DITCH SEE DETAIL 69

S 26° 46' 36.4" W

15" W/ BURLAP

2GI

SEE TRACKWORK PLANS FOR PROPOSED –RR–

EXISTING TRACK TO BE REMOVED

353+00

SPECIAL LATERAL BASE DITCH SEE DETAIL 66

14

UNITED STATES FOREST SERVICE

S 30° 38' 12.1" W

400

BDO

354+00

MC

F

WETLAND WEE

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7

END SBO +25 LT

SPECIAL CUT DITCH SEE DETAIL 68

S 0° 45' 48.0" W

GREU TL-3

2GI-A

24" RCP-IV

4" FDPS

REMOVE

TYPE B-77

NOT BURIED

30" RCP-IV

15" RCP-IV

CAT-1

395+00

MATCH TO SHEET 35 –L– STA. 405+00.00

MATCH TO SHEET 33 –L– STA. 396+00.00

SITE 55

CLASS I RIP RAP EST 11 TONS EST 22 SY GEOTEXTILE

WETLAND WEE

SEE BRIDGE PLANS FOR PROPOSED STRUCTURE DETAILS

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

18" TEMP WELDED STEEL

N 39° 90' 16" W

356+00

357+00

358+00

359+00

360+00

361+00

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

EXISTING TRACK TO BE REMOVED

SEE TRACKWORK PLANS FOR PROPOSED –RR–

TEMP FS SEE DETAIL 74

MATCH EXISTING DITCH MAINTAIN EXISTING EC DEVICE

REMOVE +/- 33' OF 18" RCP

TIE JB W/MH INTO EXISTING RCP

RETAIN SYSTEM

SPECIAL CUT BASE DITCH SEE DETAIL 69

MATCH TO SHEET 41 –RR– STA. 361+25.00

S 28° 40' 06.3" W

40

MONTGOMERY COUNTY BOARD OF EDUCATION
DB 234 PG 555
PB B PG 366

FOR INTERSECTION DETAIL, SEE SHEET 2B-10
FOR –L– PROFILE, SEE SHEETS 55 & 56
FOR –Y6– PROFILE, SEE SHEET 61
FOR –SR– PROFILE, SEE SHEET 62

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8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-234

PERMIT DRAWING
SHEET 77 OF 91

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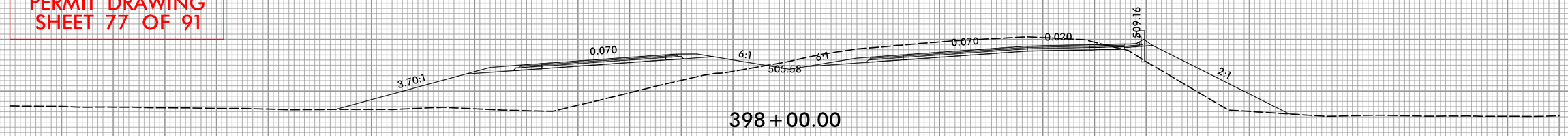
510
500
490

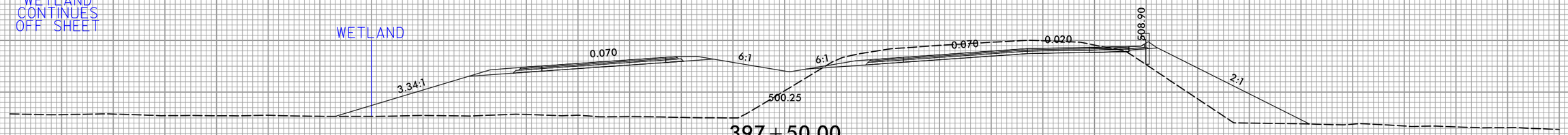


398 + 00.00

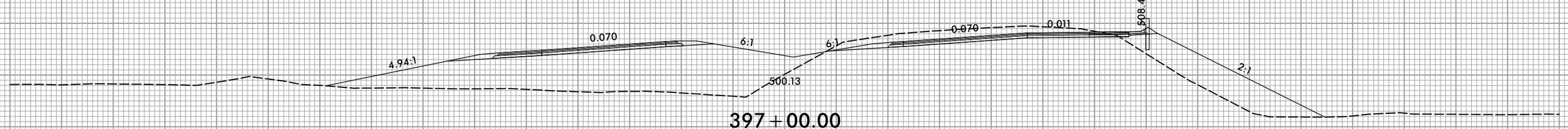
SITE 55

WETLAND CONTINUES OFF SHEET

WETLAND

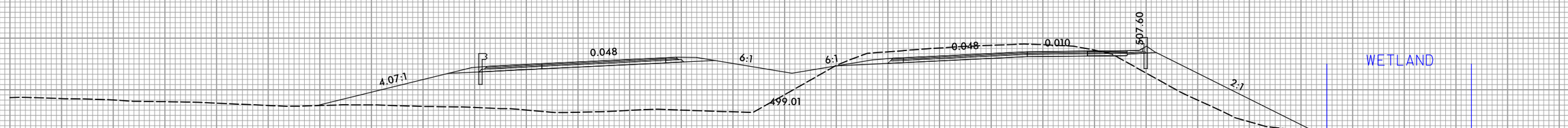


397 + 50.00



397 + 00.00

SITE 55



396 + 50.00

–L–

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gaverette

5/14/99

PERMIT DRAWING
SHEET 78 OF 91

50′ 0′ 100′
GRAPHIC SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2527	35
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

NAD 83/NA 2011

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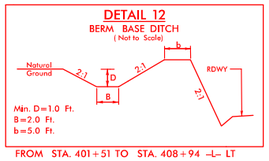
S S — DENOTES IMPACTS IN SURFACE WATER

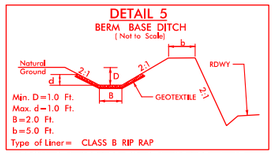
TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DETAIL 12
BERM BASE DITCH
(Not to Scale)



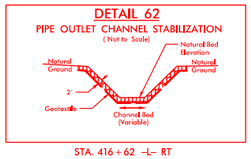
FROM STA. 401+51 TO STA. 408+94 -L- LT

DETAIL 5
BERM BASE DITCH
(Not to Scale)



FROM STA. 409+50 TO STA. 415+50 -L- LT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)



STA. 416+62 -L- RT

WETLAND NEW1

STREAM SZ

CLASS B RIP RAP
EST 3 TONS
EST 10 SY GEOTEXTILE

UNITED STATES FOREST SERVICE (14)

BERM BASE DITCH
SEE DETAIL 12

BERM BASE DITCH
SEE DETAIL 12

CLASS B RIP RAP
EST 2 TONS
EST 7 SY GEOTEXTILE

BERM BASE DITCH
W/CLASS B RIP RAP
SEE DETAIL 5
EST 269 TONS
EST 762 SY GEOTEXTILE

MATCH TO SHEET 34
-L- STA. 405+00.00

MATCH TO SHEET 36
-L- STA. 417+00.00

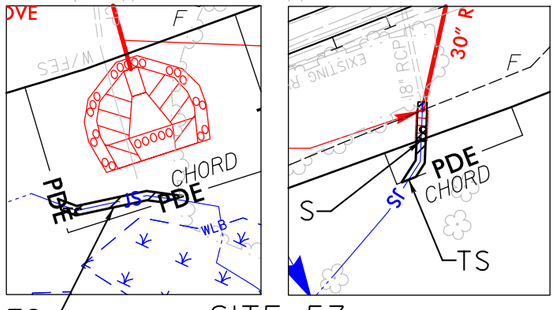
4' FDPS
2' FDPS
24"
46"
2GI
FS
15" RCP-III
30" RCP-III
36" RCP-III
GREU TL-3
8d
16'
ACCESS BREAK
CHORD
PUE
WOODS
BDO
30" W/ ELBOWS
15" W/ ELBOWS
REMOVE
NOT BURIED
2GI-A
JB w/MH
FILL WITH FLOWABLE FILL
36" W/ ELBOWS
PDE
CHORD
10' FDPS
CHORD INC.=40' (TYP.)
PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP
EST 11 TONS
EST 20 SY GEOTEXTILE
L= 10 FT
SEE DETAIL 62
ENERGY DISSIPATOR BASIN
SEE DETAIL 52 ON
SHEET 2D-1
SITE 57

WETLAND WYY

WETLAND WXX

STREAM SZ

(41) BECKY W WALLACE



25′ 0′ 50′
INSET GRAPHIC SCALE

FOR -L- PROFILE, SEE SHEET 56

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

11:58:44 AM
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DGN File

5/14/99

PERMIT DRAWING
SHEET 79 OF 91

50′ 0′ 100′
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
R-2527	35
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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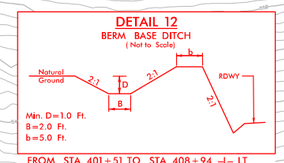
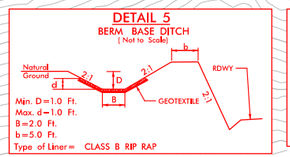
DETAIL 12
BERM BASE DITCH
(Not to Scale)



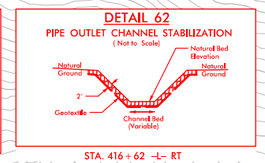
FROM STA. 401+51 TO STA. 408+94 -L- LT

DETAIL 5
BERM BASE DITCH
(Not to Scale)



FROM STA. 409+50 TO STA. 415+50 -L- LT

DETAIL 62
PIPE OUTLET CHANNEL STABILIZATION
(Not to Scale)



STA. 416+62 -L- RT

WETLAND NEW1

STREAM SZ

CLASS B RIP RAP
EST 3 TONS
EST 10 SY GEOTEXTILE

UNITED STATES FOREST SERVICE

BERM BASE DITCH
SEE DETAIL 12

BERM BASE DITCH
SEE DETAIL 12

CLASS B RIP RAP
EST 2 TONS
EST 2 SY GEOTEXTILE

BERM BASE DITCH
W/CLASS B RIP RAP
SEE DETAIL 5
EST 269 TONS
EST 762 SY GEOTEXTILE

MATCH TO SHEET 34 -L- STA 405+00

MATCH TO SHEET 36 -L- STA 417+00

SITE 57

WETLAND WYY

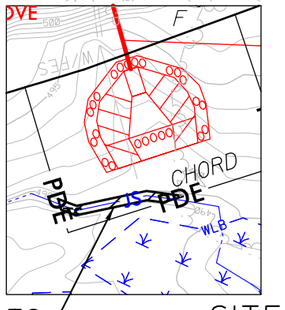
WETLAND WXX

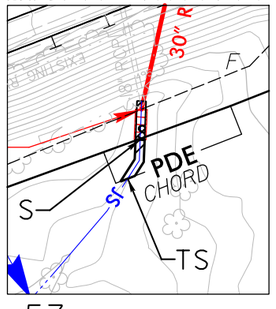
STREAM SZ

41 BECKY W WALLACE

ENERGY DISSIPATOR BASIN SEE DETAIL 52 ON SHEET 2D

PIPE OUTLET CHANNEL STABILIZATION W/ CLASS I RIP RAP EST 11 TONS EST 20 SY GEOTEXTILE L= 10 FT SEE DETAIL 62





SITE 57

25′ 0′ 50′
INSET GRAPHIC SCALE

FOR -L- PROFILE, SEE SHEET 56

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

I:\2042.PW
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8/23/99

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2527	X-241

PERMIT DRAWING
SHEET 80 OF 91

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520
510
500

2:1 2:1 513.44 6:1 6:1 0.070 0.020 6:1 6:1 0.070 2.78:1 511.90

410+50.00

WETLAND CONTINUES OFF SHEET

SITE 56 (REMOVED)

WETLAND

2:1 2:1 513.83 6:1 6:1 0.070 0.020 6:1 6:1 0.070 6:1 5.98:1 512.39

410+00.00

2:1 2:1 2:1 4:1 6:1 0.070 0.020 6:1 6:1 0.070 6:1 6:1 515.88 515.89

409+50.00

2:1 4:1 6:1 0.070 0.020 6:1 6:1 0.070 6:1 6:1 516.88

409+00.00

–L–

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

12:04:26 PM
R:\Highways\Projects\PERMITS_Environmental\Drawings\R2527_Hyd_PRM_XPL.dgn
gaverette

5/14/99

PERMIT DRAWING SHEET 81 OF 91

50′ 0′ 100′
GRAPHIC SCALE

25′ 0′ 50′
INSET GRAPHIC SCALE

DENOTES MECHANIZED CLEARING

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

(14) UNITED STATES FOREST SERVICE

PROJECT REFERENCE NO.	SHEET NO.
R-2527	36
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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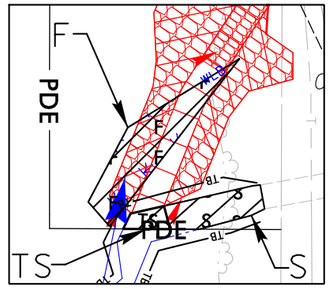
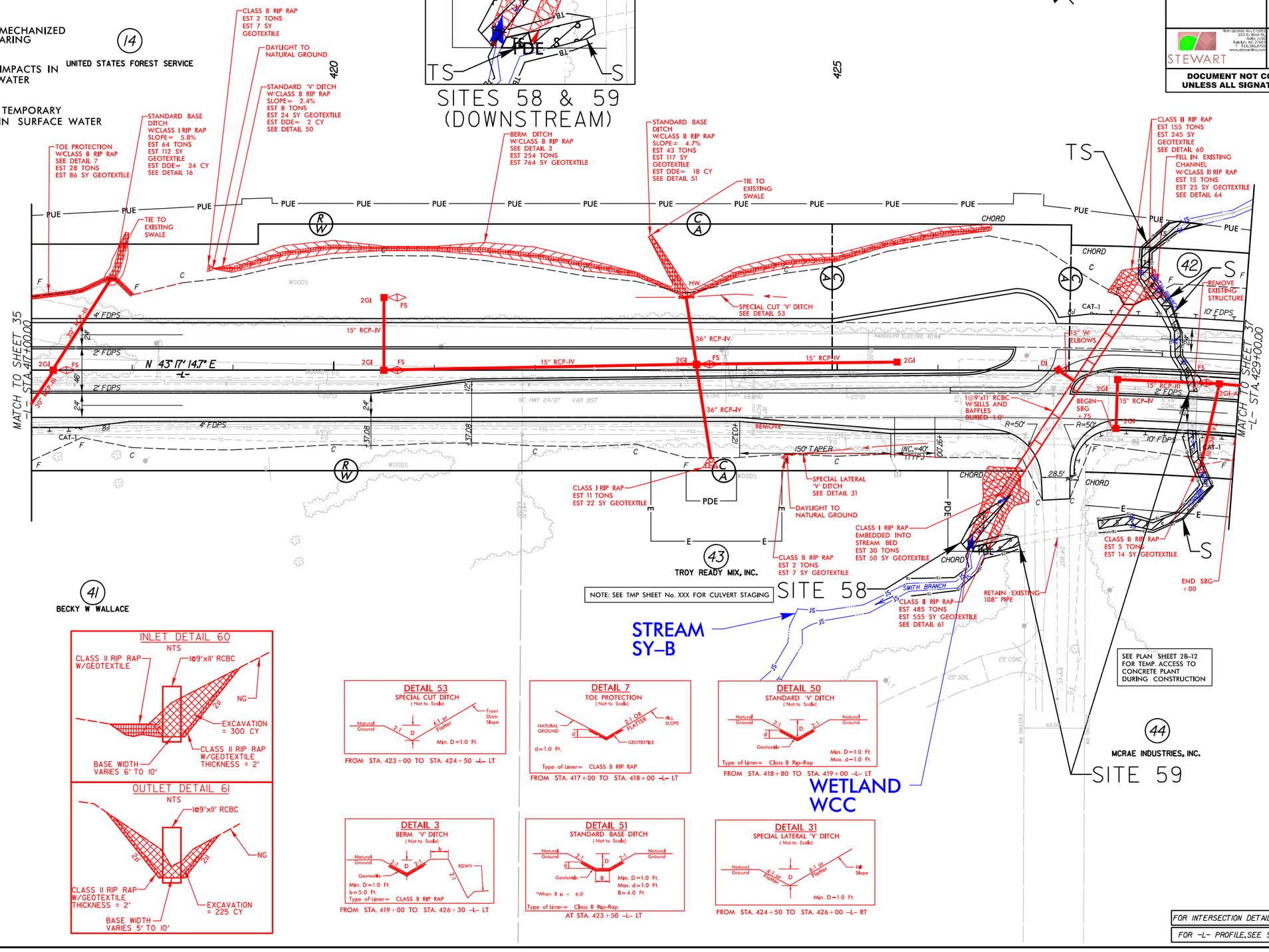
NAD 83/NA 2011



SITES 58 & 59 (DOWNSTREAM)



(41) BECKY W WALLACE

INLET DETAIL 60
NTS

OUTLET DETAIL 61
NTS

DETAIL 53
SPECIAL CUT DITCH
(Not to Scale)

FROM STA. 423+00 TO STA. 424+50 -L- LT

DETAIL 7
TOE PROTECTION
(Not to Scale)

Type of Liner= CLASS B RIP RAP
FROM STA. 417+00 TO STA. 418+00 -L- LT

DETAIL 50
STANDARD 'V' DITCH
(Not to Scale)

Type of Liner= Class B Rip-Rap
FROM STA. 418+80 TO STA. 419+00 -L- LT

DETAIL 3
BERM 'V' DITCH
(Not to Scale)

FROM STA. 419+00 TO STA. 426+30 -L- LT

DETAIL 51
STANDARD BASE DITCH
(Not to Scale)

Type of Liner= Class B Rip-Rap
AT STA. 423+50 -L- LT

DETAIL 31
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

FROM STA. 424+50 TO STA. 426+00 -L- RT

FOR INTERSECTION DETAIL, SEE SHEET 2B-11

FOR -L- PROFILE, SEE SHEET 56

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PERMIT DRAWING SHEET 82 OF 91

50′ 0′ 100′

GRAPHIC SCALE

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

25′ 0′ 50′

INSET GRAPHIC SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2527	36
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83/NA 2011

SITES 58 & 59 (DOWNSTREAM)

14 UNITED STATES FOREST SERVICE

41 BECKY W WALLACE

43 TROY READY MIX, INC.

42 S

44 MCRAE INDUSTRIES, INC.

SITE 58

SITE 59

MATCH TO SHEET 35 -L- STA 417+00.00

MATCH TO SHEET 37 -L- STA 429+00.00

N 43° 17′ 14.7″ E

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

DAYLIGHT TO NATURAL GROUND

STANDARD 'V' DITCH W/CLASS B RIP RAP SLOPE= 2.4% EST 8 TONS EST 24 SY GEOTEXTILE EST DDE= 2 CY SEE DETAIL 50

TOE PROTECTION W/CLASS B RIP RAP SEE DETAIL 7 EST 28 TONS EST 86 SY GEOTEXTILE

STANDARD BASE DITCH W/CLASS I RIP RAP SLOPE= 5.8% EST 64 TONS EST 112 SY GEOTEXTILE EST DDE= 34 CY SEE DETAIL 16

TIE TO EXISTING SWALE

BERM DITCH W/CLASS B RIP RAP SEE DETAIL 3 EST 254 TONS EST 764 SY GEOTEXTILE

STANDARD BASE DITCH W/CLASS B RIP RAP SLOPE= 4.7% EST 43 TONS EST 117 SY GEOTEXTILE EST DDE= 18 CY SEE DETAIL 51

TIE TO EXISTING SWALE

SPECIAL CUT 'V' DITCH SEE DETAIL 53

CLASS II RIP RAP EST 155 TONS EST 245 SY GEOTEXTILE SEE DETAIL 60

FILL IN EXISTING CHANNEL W/CLASS II RIP RAP EST 15 TONS EST 25 SY GEOTEXTILE SEE DETAIL 64

REMOVE EXISTING STRUCTURE

15" RCP-IV

36" RCP-IV

15" W/ ELBOWS

1@9'x11' RCBC W/SILLS AND BAFFLES BURIED 1.0'

BEGIN SBG +75

END SBG +00

CLASS I RIP RAP EST 11 TONS EST 22 SY GEOTEXTILE

SPECIAL LATERAL 'V' DITCH SEE DETAIL 31

DAYLIGHT TO NATURAL GROUND

CLASS I RIP RAP EMBEDDED INTO STREAM BED EST 30 TONS EST 50 SY GEOTEXTILE

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

CLASS B RIP RAP EST 5 TONS EST 14 SY GEOTEXTILE

CLASS II RIP RAP EST 485 TONS EST 535 SY GEOTEXTILE SEE DETAIL 61

RETAIN EXISTING 108" PIPE

NOTE: SEE TMP SHEET No. XXX FOR CULVERT STAGING

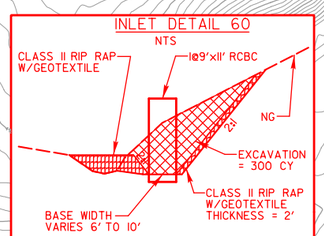
SEE PLAN SHEET 2B-12 FOR TEMP. ACCESS TO CONCRETE PLANT DURING CONSTRUCTION

STREAM SY-B

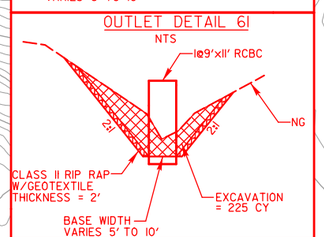
WETLAND WCC

SMITH BRANCH

INLET DETAIL 60
NTS



OUTLET DETAIL 61
NTS



DETAIL 53
SPECIAL CUT DITCH
(Not to Scale)

FROM STA. 423+00 TO STA. 424+50 -L- LT

DETAIL 7
TOE PROTECTION
(Not to Scale)

Type of Liner= CLASS B RIP RAP

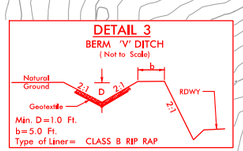
FROM STA. 417+00 TO STA. 418+00 -L- LT

DETAIL 50
STANDARD 'V' DITCH
(Not to Scale)

Type of Liner= Class B Rip-Rap

FROM STA. 418+80 TO STA. 419+00 -L- LT

DETAIL 3
BERM 'V' DITCH
(Not to Scale)



Type of Liner= CLASS B RIP RAP

FROM STA. 419+00 TO STA. 426+30 -L- LT

DETAIL 51
STANDARD BASE DITCH
(Not to Scale)

Type of Liner= Class B Rip-Rap

AT STA. 423+50 -L- LT

DETAIL 31
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

FROM STA. 424+50 TO STA. 426+00 -L- RT

FOR INTERSECTION DETAIL, SEE SHEET 2B-11

FOR -L- PROFILE, SEE SHEET 56

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gwyatte

PERMIT DRAWING
SHEET 83 OF 91

PROJECT REFERENCE NO.	SHEET NO.
R-2527	
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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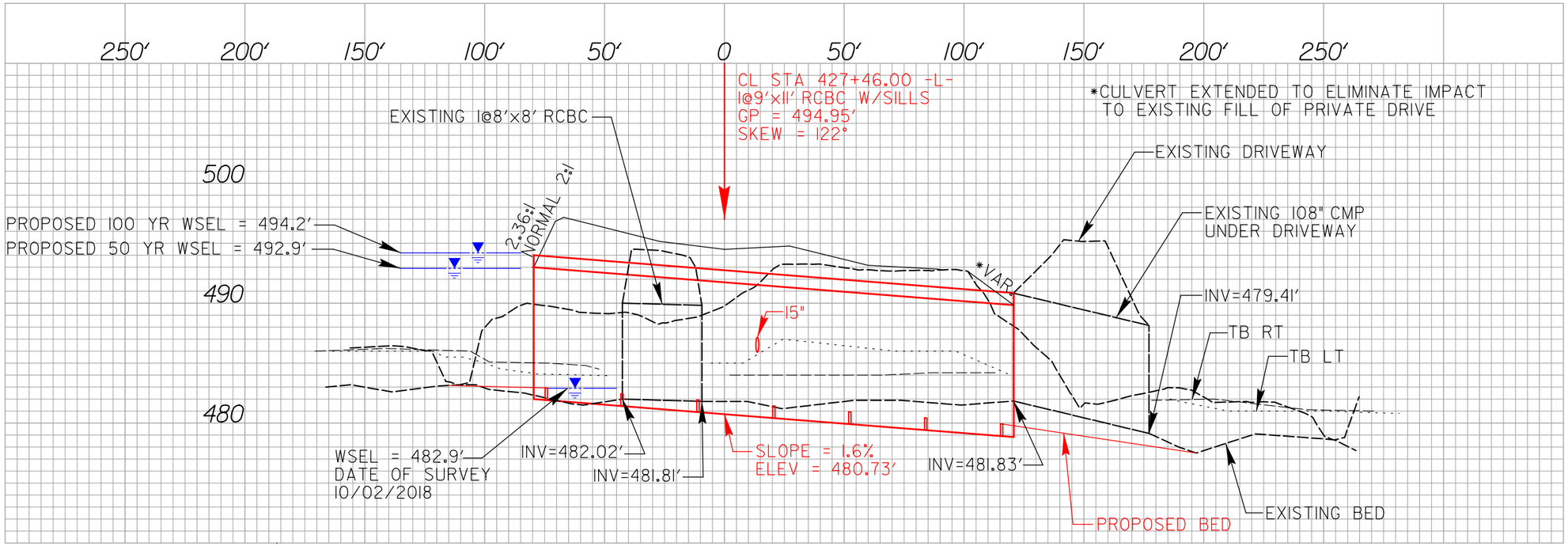
SITES 58 & 59



REVISIONS
8/17/99

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	R-2527	X-250

PERMIT DRAWING
SHEET 84 OF 91

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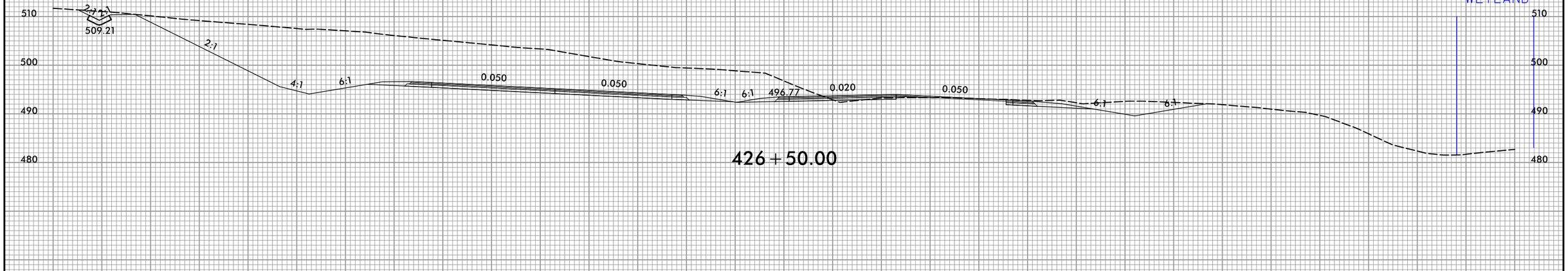
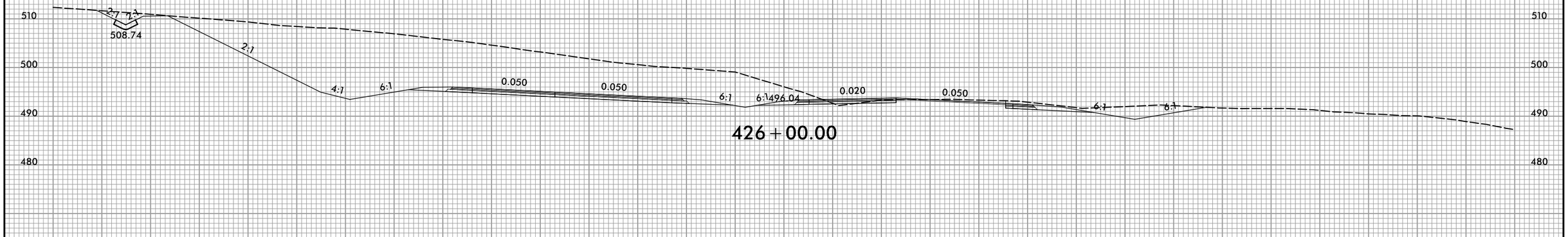
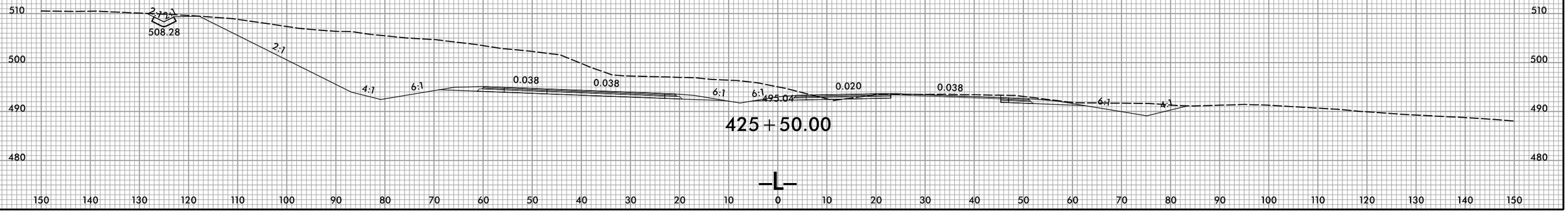
SITE 58



426+50.00



426+00.00



425+50.00

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150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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5/14/99

PERMIT DRAWING SHEET 84A OF 91

50′ 0′ 100′

GRAPHIC SCALE

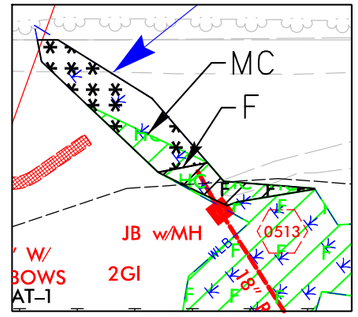
DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

PERMITTED IN PROJECT R-0623

25′ 0′ 50′

INSET GRAPHIC SCALE



NAD 83/NA 2011

PROJECT REFERENCE NO.	SHEET NO.
R-2527	38
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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445

450

KATIE K. DEATON

WETLAND WBB

STREAM SW-C

SITE 60

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

MATCH TO SHEET 37 -L- STA 442+00.000

WOODS

EXISTING R/W

20'DI

4" FDPS

2' FDPS

24"

46'

REMOVE (0407)

FS

2GI

15" RCP-IV

(INC.=40' (TYP.)

RETAIN 15" RCP-III (0409)

18" RCP-IV

HW (0514)

JB w/MH (0513)

15" W/ ELBOWS CAT-1

END SBG +50

TIE TO EXISTING

RETAIN SYSTEM (R-0623)

10' FDPS

BEGIN SBG +00

REMOVE (0405)

DI

REMOVE (0404)

REMOVE (0403)

BEGIN SBG +23

JB w/Slab Lid (0515)

N 37° 41' 59.5" E -L-

UNDER CONSTRUCTION

FS (0502)

2GI-A

24" RCP-III

SPECIAL DI (0510)

R-0623 TO BE CONSTRUCTED BY OTHERS

TIE TO EXISTING SBG (0502)

REMOVE (0402)

15" RCP-IV

15" RCP-III

JB w/MH (0408)

JB w/Slab Lid (0516)

RETAIN SYSTEM (R-0623)

TIE TO EXISTING

R2527-11

SPRING BOX (0518)

(0511)

(0509)

(0517)

CLASS B RIP RAP EST 3 TONS EST 10 SY GEOTEXTILE

MAINTAIN DITCH FROM R-0623

BANK STABILIZATION

STREAM SW-C

WETLAND WAA

WETLAND WWW

JAMIE L. KURTZ, DIVORCED

GUS SCHAD

JOE HURLY AND WIFE, HELEN HURLEY

FOR -L- PROFILE, SEE SHEET 57

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

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PERMIT DRAWING SHEET 84B OF 91

50′ 0′ 100′

GRAPHIC SCALE

DENOTES MECHANIZED CLEARING

DENOTES FILL IN WETLAND

PERMITTED IN PROJECT R-0623

25′ 0′ 50′

INSET GRAPHIC SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2527	38
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83/NA 2011

SITE 60

MC

F

JB w/MH

(0513)

2GI

445

450

KATIE K. DEATON

WETLAND WBB

STREAM SW-C

SITE 60

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

MATCH TO SHEET 37 -L- STA 442+00.00

4" FDPS

2" FDPS

24"

16'

REMOVE (0407)

FS

2GI

15" RCP-IV

(INC.=40' (TYP.))

RETAIN (0409)

15" RCP-III

18" RCP-IV

HW (0514)

JB w/MH

15" W' BELOWS CAT-1

BEGIN SBG +00

END SBG +50

TIE TO EXISTING

10' FDPS

RETAIN SYSTEM (R-0623)

R-0623 TO BE CONSTRUCTED BY OTHERS

N 37° 41' 59.5" E -L-

JB w/Slab Lid (0515)

SPECIAL DI (0510)

24" RCP-III

2GI-A

TIE TO EXISTING SBG (0502)

24" RCP-II

R2527-II

SPRING BOX (0518)

DI (0509)

HC

CSAP

(0511)

(0501)

(0516)

(0517)

BANK STABILIZATION

JAMIE L. KURTZ, DIVORCED

GUS SCHAD

WETLAND WWW

STREAM SW-C

WETLAND WAA

JOE HURLY AND WIFE, HELEN HURLEY

FOR -L- PROFILE, SEE SHEET 57

ALL DRIVEWAY RADII 30' UNLESS OTHERWISE NOTED.

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	R-2527	X-261

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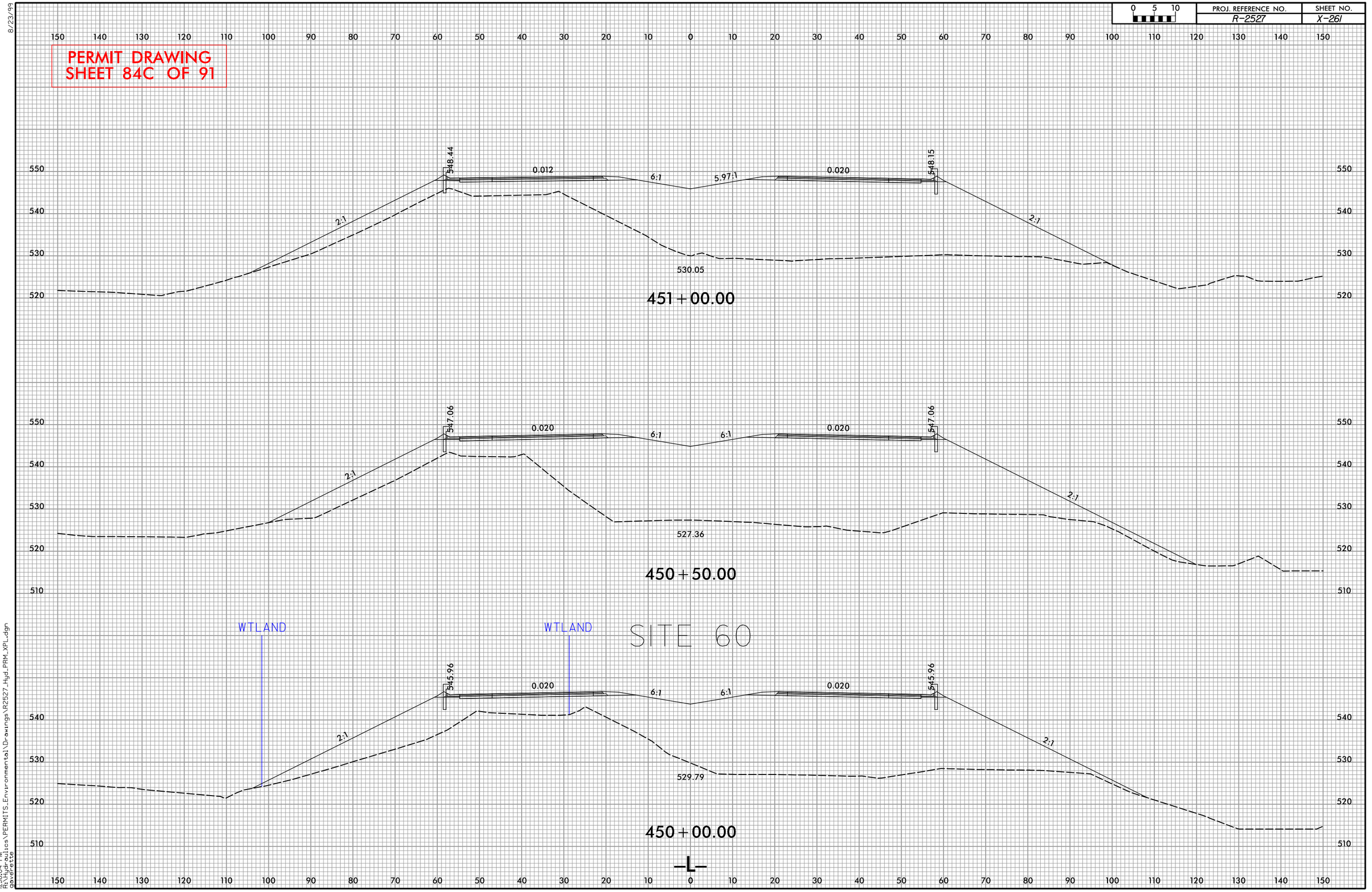
SHEET 84C OF 91



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gaverette

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	28+03/29+02 -L- LT	Fill; Mechanized Clearing	< 0.01			< 0.01						
1A	27+38/27+57 -L- RT	Mechanized Clearing				0.02						
2	28+24/29+60 -L- RT	Fill; Mechanized Clearing	0.07			0.01						
2A	28+68/29+08 -L- RT	Channel Improvements										
4	29+37/29+76 -L- RT	Channel Improvements						0.03	< 0.01	84	15	
4	29+60 -L- RT/30+02 -L- LT	2 @ 10' x 10' RCBC						0.03		70		
4	29+80/30+55 -L- LT	Channel Improvements						0.05	< 0.01	113	16	
4A	31+25/31+42 -L- RT	Channel Improvements						< 0.01	< 0.01	8	9	
4A	29+49/29+92 -L- RT	Channel Improvements							< 0.01		48	
5	33+44/33+80 -L- LT	54" WS & Channel Improvements						< 0.01	< 0.01	83	20	
5	34+81/35+15 -L- RT	54" Welded Steel						< 0.01	< 0.01	112	26	
6	33+64/34+24 -L- LT	Channel Improvements						< 0.01		74		
7	80+40/80+80 -L- LT	36" RCP-III						< 0.01	< 0.01	129	16	
7A	86+75/86+98	15" Alt Pipe EC							< 0.01		22	
8	92+24/92+50 -L- LT	24" RCP-III; Fill	< 0.01									
9	93+05/93+19 -L- LT	15" w/ Elbows	< 0.01			< 0.01						
10	98+50/98+99 -L- RT	42" RCP-III						< 0.01	< 0.01	54	10	
10	99+26/100+01 -L- LT	42" RCP-III						< 0.01	< 0.01	106	12	
TOTALS*:			0.08	0.00	0.00	0.04	0.00	0.15	0.03	833	194	0

*Rounded totals are sum of actual impacts

NOTES:
Site 2A & 3 has been removed

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/12/2024
MONTGOMERY
R-2527
355721.1.1

Revised 2018 Feb

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
11	123+75/124+86 -L- LT	Fill	0.03			0.03						
12	124+11/124+53 -L- LT	48" RCP-IV						< 0.01		123		
12	126+03/127+17 -L- RT	48" RCP-IV						0.01	< 0.01	109	24	
13	124+63/126+35 -L- LT	Fill	0.09									
14	126+32/126+65 -L- RT	Fill; Mechanized Clearing	< 0.01			< 0.01						
15	126+78/126+93 -L- RT	48" RCP-IV							< 0.01		17	
16	127+14/127+37 -L- RT	Fill; Mechanized Clearing	< 0.01			< 0.01						
17	139+95/142+31 -L- LT	42" RCP-IV						0.02	< 0.01	264	20	
17	143+12/143+62 -L- RT	42" RCP-IV						< 0.01	< 0.01	43	19	
18	139+99/140+86 -L- LT	Mechanized Clearing				0.02						
19	142+51/143+25 -L- RT	Fill; Mechanized Clearing	< 0.01			0.03						
20	149+20/150+54 -L- RT	Fill						< 0.01		139		
21	149+49/150+06 -L- LT	Fill	0.02									
TOTALS*:			0.14			0.08		0.05	< 0.01	678	80	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/12/2024
MONTGOMERY
R-2527
355721.1.1

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
22	149+81/150+15 -L- LT	42" RCP-IV						0.01	< 0.01	152	17	
22	150+53/150+93 -L- RT	42" RCP-IV						< 0.01	< 0.01	59	6	
23	158+89/159+19 -L- LT	Channel Improvements						0.01	< 0.01	105	20	
23	158+85 -L- LT/159+67 -L- RT	1 @ 7' x 8' RCBC						0.01		78		
23	159+59/159+79 -L- RT	Channel Improvements						0.02	<0.01	111	20	
24	159+11/167+33 -L- LT	Ditch Excavation; Fill						0.07	< 0.01	845	38	
25	166+00/167+31 -L- LT	Fill						0.01		180		
25	168+61/169+06 -L- RT	36" RCP-III						< 0.01	< 0.01	39	31	
26	166+70/167+85 -L- LT	Fill	0.11									
26	168+05/169+29 -L- RT	Fill; Mechanized Clearing	0.04			0.01						
27	169+07/169+53 -L- LT	Pond Spillway Stabilization							< 0.01		34	
28	166+73/171+82 -L- LT	Ditch Excavation; Fill						0.02		240		
29	193+48/193+92 -L- RT	Channel Improvements						0.04	0.02	100	54	
29	193+81 -L- RT/194+26 -L- LT	2 @ 14' x 9' RCBC						0.04		137		
29	194+03/195+36 -L- LT	Channel Improvements						0.04	< 0.01	113	23	
30	195+27/195+36 -L- LT	Channel Improvements							< 0.01		9	
TOTALS*:			0.15			0.01		0.28	0.04	2159	252	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/12/2024
MONTGOMERY
R-2527
355721.1.1

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
31	222+35/223+13 -L- LT	Fill; Mechanized Clearing	0.10			0.03						
32	223+04/223+38 -L- LT	66" RCP-IV						0.01	< 0.01	155	32	
32	223+44/223+68 -L- RT	66" RCP-IV						< 0.01	< 0.01	53	16	
33	230+75/231+26 -L- RT	EC Basin/ Const. Access							< 0.01		56	
34	238+07/238+26 -L- RT	24" RCP-III						< 0.01	< 0.01	27	11	
35	243+34/243+58 -L- LT	30" w/ Elbows; 36" RCP-III						< 0.01		63		
35A	243+27/243+68	30" w/ Elbows; 36" RCP-III	0.04		< 0.01	0.02						
35B	243+52/243+77 -L- RT	36" RCP-III	< 0.01			< 0.01						
36	253+83/254+10 -L- RT	30" w/ Elbows						< 0.01	< 0.01	31	9	
37	253+84/254+22 -L- RT	Fill	< 0.01			< 0.01						
38	264+93/267+04 -L- LT	60" RCP-IV; Fill						0.02	< 0.01	232	25	
39	267+03/267+32 -L- RT	Channel Improvements						0.03	< 0.01	91	11	
39	67+05 -L- RT/267+35 -L- LT	2 @ 7' x 9' RCBC						0.03		122		
39	267+12/267+85 -L- LT	Channel Improvements						0.02	0.01	88	43	
40	277+34/277+52 -L- RT	24" RCP-III	< 0.01			< 0.01						
TOTALS*:			0.15		< 0.01	0.06		0.12	0.03	862	203	0

*Rounded totals are sum of actual impacts

NOTES:
Site 40 represents a total take of Wetland WKK.

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/12/2024
MONTGOMERY
R-2527
355721.1.1

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
41	279+80/280+34 -L- RT	18" RCP-III; Fill	0.01			0.02						
42	282+92/283+225 -L- RT	18" Pipe				< 0.01						
44	302+39/302+89 -L- RT	Channel Improvements						0.02	< 0.01	104	33	
44	303+29/303+56 -L- LT	1 @ 8' x 10' RCBC						0.01		69		
44	302+36/302+89 -L- LT	Channel Improvements						0.01	< 0.01	86	9	
45	302+58/303+31 -L- LT	Fill						< 0.01		73		
45A	303+42/303+74 -L- LT	Fill	< 0.01									
46	304+36/304+56 -L- LT	Mechanized Clearing				< 0.01						
47	312+83/314+25 -L- RT	42" Welded Steel						< 0.01	< 0.01	124	45	
47	315+40/316+28 -L- LT	42" Welded Steel						< 0.01	< 0.01	89	48	
48	315+51/315+76 -L- LT	Fill	0.02									
49	336+84/337+17 -L RT	Easement				< 0.01						
49	340+90/341+72 -L- RT	Fill	< 0.01			0.02						
49	342+88/343+25 -L- RT	Easement				< 0.01						
49	344+75/345+05 -L- RT	Ditch Excavation			< 0.01	< 0.01						
TOTALS*:			0.03		< 0.01	0.06		0.07	0.01	545	135	0

*Rounded totals are sum of actual impacts

NOTES:
Site 43 has been removed.

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/12/2024
MONTGOMERY
R-2527
355721.1.1
SHEET 89 OF 91

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
50	342+54/342+96 -L- RT	36" RCP-III						< 0.01	< 0.01	30	24	
50	344+81/346+18 -L- RT	60" RCP-IV						0.01	< 0.01	143	26	
50	347+30/348+72 -L- LT	60" RCP-IV						0.02	< 0.01	227	18	
51	345+37/347+40 -L- LT	60" RCP-IV	< 0.01			0.06						
51	347+80/347+91 -L- LT	60" RCP-IV	< 0.01									
52	351+92/352+04 -L- RT	30" RCP-III	< 0.01			< 0.01						
52	352+41/352+74 -L- LT	30" RCP-III	< 0.01			< 0.01						
53	363+49/364+98 -L- LT	Channel Improvements						0.03	< 0.01	193	16	
53	364+88/366+19 -L- LT	1 @ 8' x 10' RCBC						0.02		152		
53	366+70/367+50 -L- RT	Channel Improvements						0.02	< 0.01	94	29	
53A	383+50/384+19 -L- RT	Channel Improvements						< 0.01	< 0.01	70	26	
53A	384+11 -L- RT/385+92 -L- LT	1 @ 8' x 10' RCBC						0.02		129		
53A	385+78/386+38 -L- LT	Channel Improvements						< 0.01	< 0.01	39	54	
53A	390+27/392+35 -L- LT	Channel Improvements						0.06	< 0.01	321	17	
TOTALS*:			0.01			0.06		0.21	0.03	1398	210	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/12/2024
MONTGOMERY
R-2527
355721.1.1

WETLAND AND SURACE WATER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
54	391+60/392+58 -L- LT	Channel Improvements						0.04	0.03	113	91	
54	92+28 -L- LT/392+56 -L- RT	3 @ 14' x 12' RCBC						0.04		76		
54	392+14/392+62 -L- RT	Channel Improvements						0.09	0.01	139	15	
55	396+23/397+23 -L- RT	36 RCP-III; Fill	0.01			0.01						
55	397+42/397+71 -L- LT	36 RCP-III; Fill	0.02			0.01						
57	413+90/414+27 -L- RT	Dissipator Basin							< 0.01		39	
57	416+67/416+64 -L- RT	30" RCP-III						< 0.01	< 0.01	13	14	
58	426+23/426+74 -L- RT	1 @ 9' x 11' RCBC	0.02									
59	426+35/426+82 -L- RT	Channel Improvements						< 0.01	< 0.01	33	17	
59	427+63/428+79 -L- RT	1 @ 9' x 11' RCBC						0.04		279		
59	427+98/428+54 -L- LT	Channel Improvements						0.02	0.01	33	17	
60	449+21/450+12 -L- LT	18 RCP-IV; Fill	< 0.01			0.02						
SHEET 85 TOTALS*			0.08			0.04		0.15	0.03	833	194	
SHEET 86 TOTALS*			0.14			0.08		0.05	< 0.01	678	80	
SHEET 87 TOTALS*			0.15			0.01		0.28	0.04	2159	252	
SHEET 88 TOTALS*			0.15		< 0.01	0.06		0.12	0.03	862	203	
SHEET 89 TOTALS*			0.03		< 0.01	0.06		0.07	0.01	545	135	
SHEET 90 TOTALS*			0.01			0.06		0.21	0.03	1398	210	
SHEET 91 TOTALS*			0.05			0.05		0.24	0.06	686	193	
PROJECT TOTALS*:			**0.62**		**< 0.01**	**0.37**		**1.11**	**0.21**	**7161**	**1267**	

*Rounded totals are sum of actual impacts

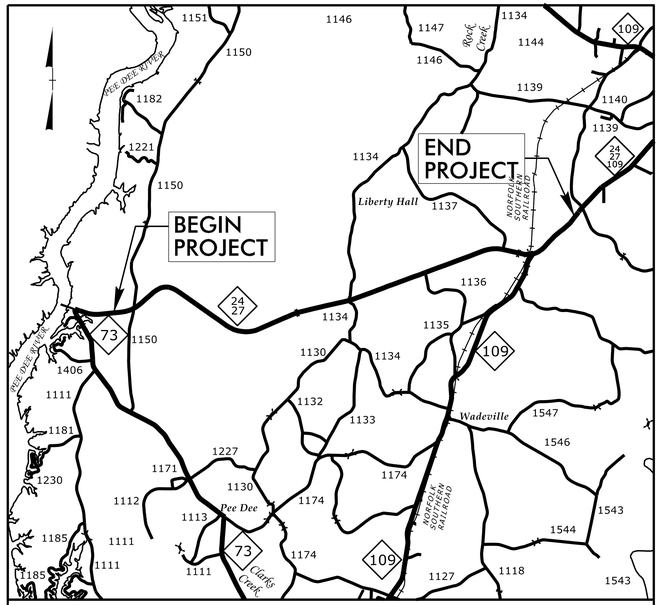
NOTES:
Additional impacts on Sheet 38 covered under R-0623 permits.
Site 56 has been removed.

Utility Impacts are addressed on attached Utility Permit Drawings

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/12/2024
MONTGOMERY
R-2527
355721.1.1
SHEET 91 OF 91

05/09/24

TIP PROJECT: R-2527



VICINITY MAP FOR STATE PROJECT R-2527

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

T.I.P. NO.	SHEET NO.
R-2527	UE-1

UTILITIES ENVIRONMENTAL PERMIT PLANS
MONTGOMERY COUNTY

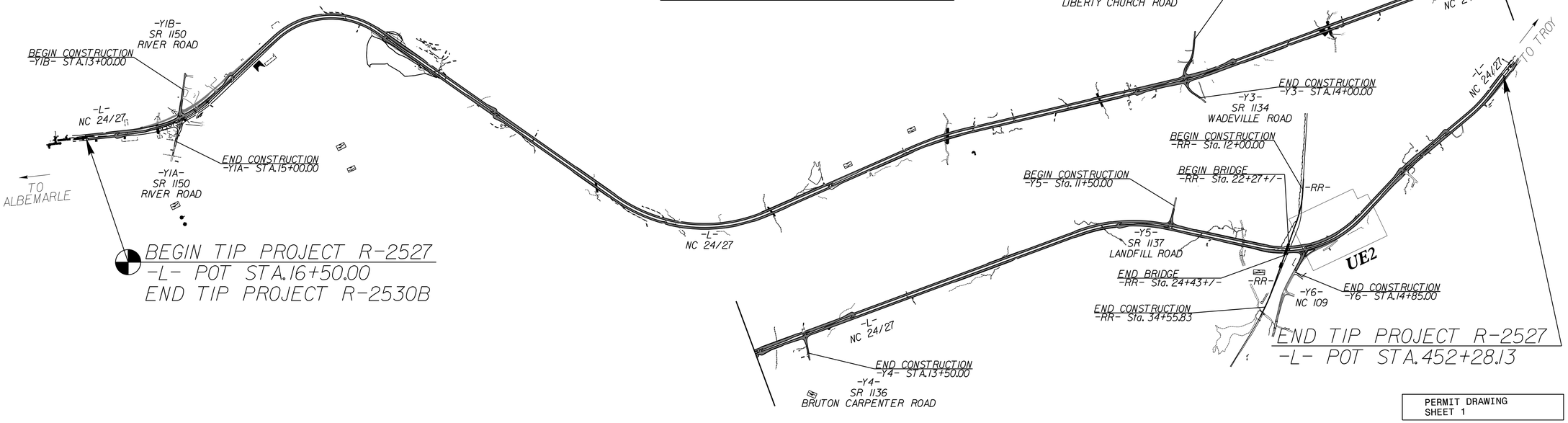
WETLAND AND SURFACE WATER IMPACTS

LOCATION: NC 24-27 FROM NC 73 TO THE TROY BYPASS

TYPE OF WORK: UTILITIES BY OTHERS

NAD 83/NA 2011

PERMIT DRAWING
SHEET 1 OF 5



PERMIT DRAWING
SHEET 1

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

INDEX OF SHEETS

SHEET NO.:	*DESCRIPTION:*
UO-1	*TITLE SHEET*
UO-2 THRU UO-30	*UBO PLAN SHEETS*

UTILITY OWNERS WITH CONFLICTS

(A) POWER - RANDOLPH EMC
(B) TELEPHONE - CENTURYLINK
(C) COMMUNICATIONS - SPECTRUM

PREPARED IN THE OFFICE OF:

Pennoni

PENNONI ASSOCIATES INC.
5430 WADE PARK BLVD., SUITE 106,
RALEIGH, NC 27607 PHONE: 919.929.1173
FAX: 919.493.6548 NC LICENSE #F-1267

ERIC TWEED, PE *PROJECT UTILITY COORDINATOR*

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UTILITIES UNIT
1555 MAIL SERVICES CENTER
RALEIGH NC 27699-1555
PHONE (919) 707-6690
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ALI KOUCHEKI, PE	*REGIONAL UTILITIES ENGINEER*
TRAVIS MORGAN, PE	*DIV. 8 UTILITIES ENGINEER*
TRENT CAVINESS	*DIV. 8 UTILITIES COORDINATOR*
DAYTON MARTIN	*REG. UTILITIES COORDINATOR*

5/9/2024
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USERNAME

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
R-2527	UE2
THIS SHEET CORRESPONDS TO RDY-5	

UTILITIES BY OTHERS

Pennoni

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PERMIT DRAWING
SHEET 2 OF 5

SITE 1

NAD 83\NA 2011

PROPOSED WATER LINE
MECHANIZED CLEARING

Open Cut
30 sq ft

UWHARRIE MARINE SALES & SERVICE LLC

ALD L PARTRIDGE

001A
KENNETH R FURR

2
SAMUEL HORACE MCcALL III

/
CHARLES R MANESS

TOMMY A BLAKE

TOMMY A BLAKE

-L- TS Sta. 22+13.04=
L_REV POT Sta. 10+00.00

-L- SC Sta. 24+13.04

MATCH TO SHEET OU-2
-L- STA. 14+50.00

MATCH TO SHEET UO-4
-L_REV- STA. 16+00.00

L_REV TS Sta. 13+16.56

L_REV SC Sta. 15+56.56

P PROJECT R-2527
PROJECT R-2530B
Sta. 16+50.00

CENTURYLINK TO SPLICE TO EXISTING

NEW GUY ANCHOR BY REMC (TYP)

NEW OHP BY REMC (TYP)

NEW POLE BY REMC (TYP)

CENTURYLINK TO BORE LINE TO AVOID WETLAND

PERMANENT OHP BY REMC

ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS. NO PAYMENT WILL BE MADE TO THE CONTRACTOR FOR PROPOSED UTILITY WORK SHOWN ON THIS SHEET.

8/28/2024
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PROJECT REFERENCE NO.	SHEET NO.
R-2527	UE3
THIS SHEET CORRESPONDS TO RDY-6	

UTILITIES BY OTHERS

ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS. NO PAYMENT WILL BE MADE TO THE CONTRACTOR FOR PROPOSED UTILITY WORK SHOWN ON THIS SHEET.

Pennoni

PENNONI ASSOCIATES INC.
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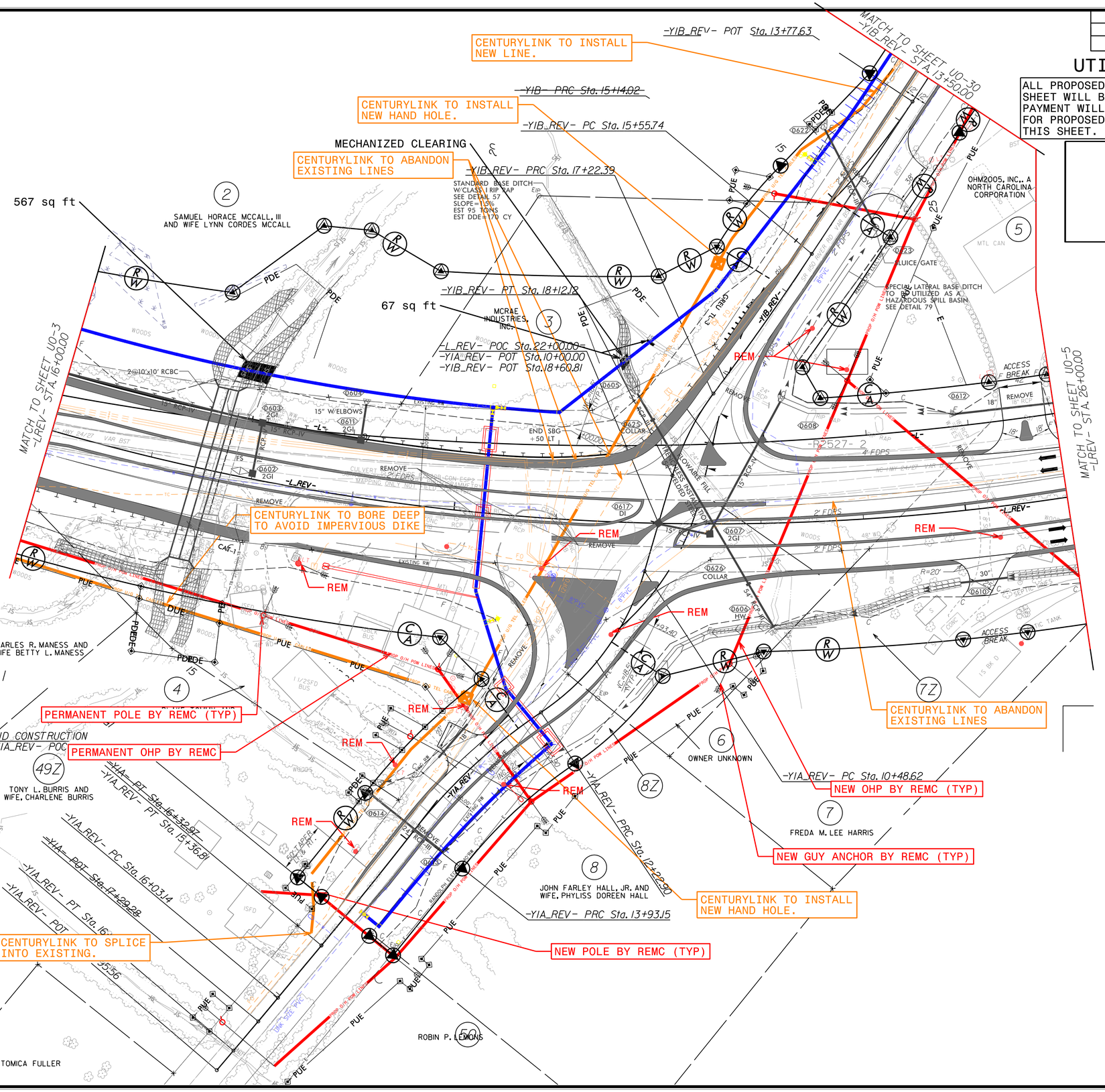
FAX: 919.493.6548 NC LICENSE #F-1267

NAD 83/NA 2011

PERMIT DRAWING
SHEET 3 OF 5



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PROJECT REFERENCE NO.	SHEET NO.
R-2527	UE4
THIS SHEET CORRESPONDS TO RDY-33	

UTILITIES BY OTHERS

ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS. NO PAYMENT WILL BE MADE TO THE CONTRACTOR FOR PROPOSED UTILITY WORK SHOWN ON THIS SHEET.

NAD 83/NA 2011

PERMIT DRAWING
SHEET 4 OF 5

Pennoni

PENNONI ASSOCIATES INC.
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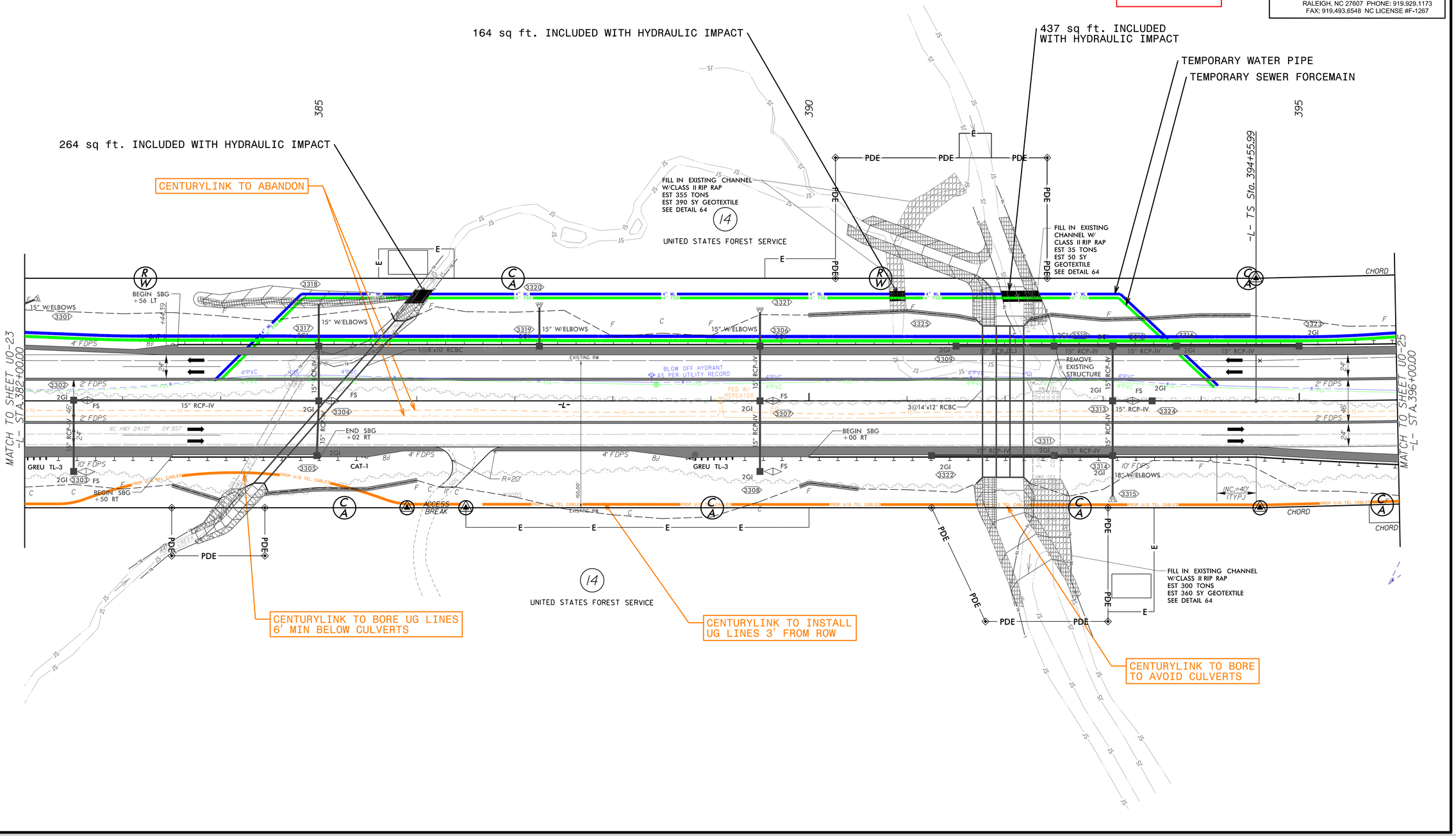
RALEIGH, NC 27607 PHONE: 919.929.1173
FAX: 919.493.6548 NC LICENSE #F-1267



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USER:cmoore

PROJECT REFERENCE NO.	SHEET NO.
R-2527	UE5
THIS SHEET CORRESPONDS TO RDY-35	

UTILITIES BY OTHERS

ALL PROPOSED UTILITY WORK SHOWN ON THIS SHEET WILL BE DONE BY OTHERS. NO PAYMENT WILL BE MADE TO THE CONTRACTOR FOR PROPOSED UTILITY WORK SHOWN ON THIS SHEET.

NAD 83/NA 2011

Pennoni

5430 WADE PARK BLVD., SUITE 106,
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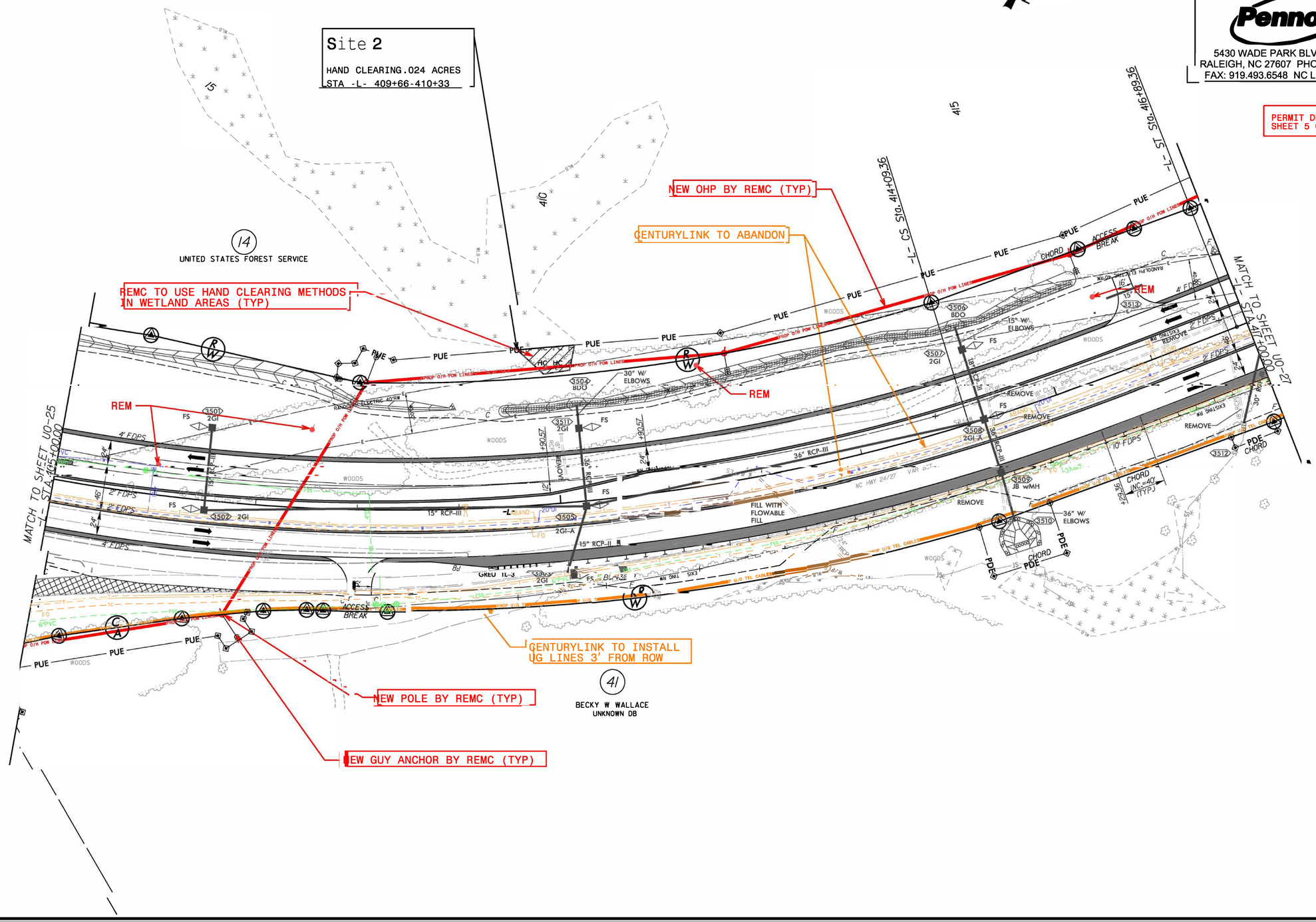
FAX: 919.493.6548 NC LICENSE #P-0189

PERMIT DRAWING
SHEET 5 OF 5



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WETLAND AND SURFACE WATER IMPACTS SUMMARY

	Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: Permanent Fill In Wetlands (ac)	WETLAND IMPACTS: Temp. Fill In Wetlands (ac)	WETLAND IMPACTS: Excavation in Wetlands (ac)	WETLAND IMPACTS: Mechanized Clearing in Wetlands (ac)	WETLAND IMPACTS: Hand Clearing in Wetlands (ac)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	SURFACE WATER IMPACTS: Temp. SW impacts (ac)	SURFACE WATER IMPACTS: Existing Channel Impacts Permanent (ft)	SURFACE WATER IMPACTS: Existing Channel Impacts Temp. (ft)	SURFACE WATER IMPACTS: Natural Stream Design (ft)
	Site 1	LREV 15+95	Open Cut Water Line			0.001	0.001						
#	Stream SB-1	LREV 17+75	Open Cut Water Line						0.013				
#	Stream SB-2	Y1B REV 17+45	Open Cut Water Line						0.001				
#	Stream SYA	L 386+00	Temporary Water & Sewer							0.006			
#	Stream SYA	L 391+00	Temporary Water & Sewer							0.004			
#	Stream SFB	L 392+00	Temporary Water & Sewer							0.010			
	Site 2	L 409+66/410+30	OH Power Line					0.024					
TOTALS*:				**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.01**	**0.02**	**0**	**0**	**0**

*Rounded totals are sum of actual impacts

NOTES:

Utility impacts contained within Hydro Permit Site impacts.

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
5/9/2024
MONTGOMERY
R2527

Protected Species/ Section 7

BIOLOGICAL EVALUATION REPORT

FOR THE

NATIONAL FOREST SERVICE

NC 24/27 WIDENING – UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY, NC

TIP NO. R-2527
WBS ELEMENT 35572.1.1

MARCH 2019

Contact Person:

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Environmental Program Specialist
North Carolina Department of Transportation
Natural Environment Section
Biological Surveys Group
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Raleigh, NC 27699
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Figure 6.0: Natural Heritage Program Community Impacts

ATTACHMENTS

Biological Resources Reports for the Uwharrie National Forest 24/27 Widening

APPENDICES

A - Prescribed Burning Analysis for TIP# R-2527
B - Natural Communities of North Carolina occurring on Uwharrie National Forest
C - NCNHP Significant Natural Heritage Areas occurring on Uwharrie National Forest
D - Biological Evaluation for the Proposed Widening of NC 24/27, January 2014
E - Aquatic Resources Report for the Proposed Widening of NC 24/27, January 2014
F - Botanical Resources Report for the proposed Widening of NC 24/27, January 2014
G - Terrestrial Animal Resources Report for the Proposed Widening of NC 24/27, January 2013

I. INTRODUCTION

This Biological Evaluation (BE) identifies the potential effects and impacts on plant and animal resources from the N.C. Department of Transportation (NCDOT) Division 8 Project, WBS Element Number 35572.1.1, TIP R-2527, NC 24/27 Widening, including portions through the Uwharrie National Forest (UNF) (Project) in Montgomery County, NC (Figure 1). The Project occurs along NC 24/27 within sub-basin 03040103 of the Yadkin Pee-Dee River Basin. The Project would involve construction within the Uwharrie National Forest (Study Area) (see Section V.B. for description).

As described in Sections V.A. and V.B., the geographic scope of this effort comprised two areas, the Study Area and Biological Analysis Area (BAA). Project design was preliminary at the initiation of field surveys, so a conservative 500-foot corridor centered on NC24/27 was used as the Study Area. Within this 245-acre Study Area, detailed investigations were conducted on the dates and times discussed in Section IV. C. The BAA encompasses all land within two kilometers of the Study Area (see Section IV. A. for description). Each area is depicted on Figure 2. Within the 14,517 acres comprising the BAA, known occurrences and Significant Natural Heritage Areas (SNHA)s are considered. The anticipated disturbance area for the Project has been developed since the field surveys were completed and is used within this document for impact analysis. This "Project Area" was created using conservative (wide) estimates of roadway cut/fill (slope stakes + 25 ft) and proposed Right-of-Way (ROW) plus 20 ft, and then incorporated permanent and temporary easements for utility relocation and erosion control within the UNF. The Project Area comprises 130 acres and is intended to encompass all areas to be directly disturbed by the Project.

In summary, the evaluation of the biological effects of the Project include a step-down approach of the BAA (2-kilometer radius), the Study Area (500 ft preliminary corridor used for field surveys), and Project Area (construction area used for direct impact analysis).

II. POTENTIAL IMPACTS CONSIDERED

Construction of the project would require disturbances within the UNF, some of which may be locally significant. Clearing and grubbing would be required to accommodate the project footprint and easements. Grading, including cut and fill sections, would be required throughout the Project Area. Blasting is possible as part of these efforts, depending on the results of geotechnical investigations that would follow approval of this BE. In addition to direct effects of clearing, grading, and blasting, concerns may include ground and air vibrations, flyrock, noise, fumes and dust. Construction would require the use of dozers, pans, dump trucks, excavators, and sheepsfoot rollers. The US Forest Service (USFS) also expressed concern for acid bearing rock in the Project Area, and conflicts between the new road and its ongoing prescription burning.

Hydrologic and soil impacts are also considered as part of this evaluation. The USFS expressed concerns for treatment and volume of stormwater, soil erosion, stream channel stability, stormwater contaminants (de-icing salts, road-derived contaminants), soil productivity, and impacts to hydric soils.

III. SPECIES CONSIDERED AND METHODS

Rare species considered in this report include federally Threatened and Endangered (T&E), Federal Species of Concern (FSC), and North Carolina Listed (NC Listed) species. Two amphibians, Mole Salamander (*Ambystoma talpoideum)* and Four-toed Salamander (*Hemidactylium scutatum*), in the BAA but with upland habitat overlapping the Study Area are also addressed. NC Listed species were derived from the North Carolina Natural Heritage Program (NCNHP) and expert consultations. Potential direct and indirect effects to T&E, FSC, and NC Listed species in the Study Area are analyzed.

A comprehensive list of these species, known to occur on UNF property, including the protection status for each, was provided by USFS botanists and fisheries and wildlife biologists in July 2018. These lists were provided to the team of resource specialists and served as the foundation for this investigation. A total of 101 species were identified, including 60 plants and 41 animals. The final list is provided as Appendix 1 of the attached Biological Resources Reports, and includes preferred habitat, protection status, and potential to occur in the Study Area.

Optimal survey windows for each species were determined and used to schedule detailed on-site investigations by the appropriate taxa experts. Survey windows were adjusted based on flowering status of local reference populations to capture seasonal variations of target species. The field surveys were conducted by a meander search pattern to survey all habitats in the Study Area. Attention was focused during the surveys on T&E, FSC, and NC Listed species as well as their potential habitats. The investigation documented all species encountered.

IV. EXISTING BIOLOGICAL CONDITION

A. BIOLOGICAL ANALYSIS AREA

The BAA comprises a two-kilometer buffer around the Study Area of approximately 14,517 acres (Figure 2). The BAA is located in the Piedmont Level III ecoregion, and the Carolina Slate Belt Level IV ecoregion. The BAA includes a portion of the Uwharrie Mountains, which is characterized by rolling hills with rougher terrain than much of the Piedmont region of North Carolina. Elevations vary across the BAA, but range between 400 feet above mean sea level (msl) along the floodplain of Rocky Creek in the east, Rocky Creek in the west, and Dumas and Clarks creeks in the south, up to over 780 feet above msl on Horse Trough Mountain in the west.

The Yadkin River is west of the Study Area and BAA, though numerous tributary streams flow across these areas. These streams include tributaries of Cattail Creek ((13-8-1)WS-IV), Dumas Creek (13-16-1) and its tributaries (Class C), Clarks Creek ((13-16) Class C)), (Lick Fork (13-16-4) Class C)), Rocky Creek (13-25-30-(0.5) Class C; HQW), and Smith Branch ((13-25-30-1) Class C)).

WS-IV waters are designated for drinking and food processing uses. WS-IV waters are assigned when more restrictive WS-I, WS-II, or WS-III designations are not feasible, typically due to urbanization. Class C waters are protected for fishing, wildlife, fish consumption, aquatic life including propagation, survival, and maintenance of biological integrity, agriculture, boating, and uses involving unorganized and infrequent human body contact. High Quality Waters (HQW) are

supplemental designations intended to protect waters rated as excellent based on physical, biological, or chemical characteristics.

The USFS provided data on rare species and natural communities within the BAA. Their records include: approximately 15 *Stewartia ovata* (Mountain Camellia) resprouting after a 2017 fire, about 25 *Iris prismatica* (Slender Blue Iris), about 12 *Sarracenia flava* (Yellow Pitcher Plant) in a hillside seep community, three populations of *Fothergilla major* (Large Witch Alder), nine locations for a newly described species of quillwort *Isoetes uwharrie* (Tiny Quillwort), and six to eight *Lindera subcoriacea* (Bog Spicebush). One *Isoetes uwharrie* occurrence is within the Project Area (Figure 4.8). No published description of this species is currently available, refer to Section V. C. of this document for a discussion. The remainder of USFS records listed above occur outside the Study Area.

Significant Natural Heritage Areas

Seven Significant Natural Heritage Natural Areas (SNHAs) are mapped within the BAA (Figure 2). Appendix C includes detailed descriptions of each, taken from the Montgomery County Natural Heritage Inventory (NCNHP 2001). Lower Rocky Creek Longleaf Pine Forest (Regionally Significant) and Roberdo Bog and Longleaf Pine Forest (Nationally Significant) are mapped within the Study Area. Clarks Grove Longleaf Pine Forest (Nationally Significant), Lawrenceville Ephemeral Pools (County Significant), Railroad Mixed Pine Forest (Nationally Significant), Walker Mountain/Wood Run Natural Area, and YAD/Upper Little River Aquatic Habitat are mapped within the BAA but not in the Study Area.

Lower Rocky Creek Longleaf Pine Forest is mapped within both the Study Area and BAA and is considered Regionally Significant because of its high-quality longleaf pine forests and rare plant species. These include: *Cirsium carolinianum* (Soft Thistle), *Helianthus laevigatus* (Smooth Sunflower), and *Smilax biltmoreana* (Biltmore's Carrionflower). This SNHA occupies 352 acres in the BAA, 12 of which are within the Study Area. The Project Area includes 8.4 acres of this SNHA. The USFS is working to restore the mature longleaf pine forest that once dominated this area. The Mixed-Pine Hardwood community present in this portion of the Project Area today is a transitional condition, not reflected in either NCNHP or USFS mapping. The USFS has been managing these areas via burning for over 30 years; Initial burns occurred in the 1980s, and prescription burns began 10 to 12 years ago (USFS, email communication).

Roberdo Bog and Longleaf Pine Forest is mapped within both the Study Area and BAA. Roberdo Bog and Longleaf Pine Forest is considered Nationally Significant and includes two distinct areas: the Bog and the Longleaf Pine Forest. Similar to the Lower Rocky Creek Longleaf Pine Forest discussed above, the USFS has conducted burns in this area for over thirty years. It is transitioning back to its natural *Pinus palustrus* dominated community.

Roberdo Bog has been the focus of a number of specific concerns relating to the Project. Its boundaries are misrepresented in two existing datasets. The NCNHP Element Occurrence dataset shows the feature entirely outside of the project Study Area. The NCNHP Managed Areas dataset shows the feature extending 200-feet into the Study Area. As part of this evaluation, North Carolina's Emergency Management QL2 LiDAR data were obtained through its Spatial Data Download portal. Based on these data, believed to most accurately reflect surface conditions, the

pool occurs approximately 80 feet outside the Study Area (Figure 5.1), and approximately 150 feet from the Project Area.

Regardless of direct impact to the pool of Roberdo Bog, impacts to uplands adjacent to this feature would occur. One rare species, *Ambystoma talpoideum*, has been documented in the pool. Another, *Hemidactylium scutatum*, is know from the BAA and may also utilize the pool for breeding.

The Roberdo Bog and Longleaf Pine Forest SNHA occupies 1,007 acres inside the BAA, including 93 acres within the Study Area. The Project Area includes 51 acres of this SNHA. The impact of the Project on Roberdo Bog and Longleaf Pine Forest would be the expansion of an existing road corridor, widened between 75 and 125 feet. This SNHA is significant due to the upland pool (Roberdo Bog discussed above), and extensive *Pinus palustrus* forests managed by USFS with controlled burns. The area is also home to several rare species, including: *Ambystoma talpoideum*, *Helianthus schweinitzii* (Schweinitz's Sunflower), *Helianthus laevigatus*, and *Pseudognaphalium helleri* var. *helleri* (Heller's Rabbit Tobacco).

Clarks Grove Longleaf Pine Forest, is considered a SNHA of National Significance. It gained this ranking due to its high quality Piedmont Longleaf Pine Forest, and by being the site of several populations of the Federally Endangered *Helianthus schweinitzii*. The location of this SNHA is along NC 109, south of the Project. It occupies 263 acres of the BAA and is 5,700 feet south of the Study Area. Due to the distance from the project, no impact to this SNHA is expected to result.

Lawrenceville Ephemeral Pools is considered a SNHA of County significance. This area was designated due to the presence of two ephemeral upland pools, including one which supports *Hemidactylium scutatum*. This SNHA occurs north of NC 24/27, about a quarter mile east of Horse Trough Mountain, and occupies 116 acres of the BAA. At its closest point, Lawrenceville Ephemeral Pools SNHP is approximately 750 feet north of the Study Area. Due to the distance from the project, no impact to this SNHA or the species it supports is expected to result.

Railroad Mixed Pine Forest is considered a SNHA of National significance. This designation is due to high quality Longleaf Pine forests and numerous rare species, including: *Helianthus schweinitzii, H. laevigatus, Nestronia umbellula* (Indian Olive), and *Amorpha schwerinii* (Schwerin's False Indigo). A Uwharrie Boggy Streamhead within this SNHA provides breeding habitat for amphibians, and its 347 acres in the BAA provide contiguous forest interior bird species habitat. The Railroad Mixed Pine Forest is situated along the railroad corridor near the Project's eastern extent, 2,100 feet north of the Study Area. Due to the distance from the Project, no impact to this SNHA or the species it supports is expected to result.

Neither the **Walker Mountain/Wood Run Natural Area**, nor the **YAD/Upper Little River Aquatic Habitat** are described in the Montgomery County Natural Area Inventory. Both areas are located more than a mile from the Study Area (5,500 and 6,400 feet respectively) and due to their distances from the Project, neither is expected to be impacted.

Natural Communities

During the 2007 botanical surveys conducted by NCDOT biologists, the Study Area was grouped

into four community types[1]: 1) Dry Oak-Hickory Forest, 2) Maintained/Disturbed, 3) Timbered Shrub-Scrub, and 4) Loblolly Pine Plantation. During the 2017/2018 botanical surveys conducted by the resource experts listed at the end of this document, the Study Area was also grouped into three community types: 1) Maintained/Disturbed, 2) Mixed Pine-Hardwood Forest, and 3) Seeps of First Order Tributaries.

Twelve NC NHP Natural Communities occur within the BAA (Figure 2). Resource experts performing the 2017/2018 surveys included botanists with experience in this area of the UNF. Not all Natural Communities were encountered in the Study Area, but are known to occur in the BAA. Piedmont Boggy Streamhead, Wet Piedmont Longleaf Pine Forest, and Dry Piedmont Longleaf Pine Forest are mapped within the Study Area. Dry-Mesic Oak-Hickory Forest (Piedmont Subtype), Dry Oak-Hickory Forest (Piedmont Subtype), Hillside Seepage Bog, Low Elevation Seep (Typic Subtype), Piedmont/Coastal Plain Heath Bluff, Piedmont Headwater Stream Forest (Typic Subtype), Piedmont Monadnock Forest (Typic Subtype), Upland Depression Swamp Forest, and Upland Pool (Roberdo Subtype) are mapped within the BAA but not in the Study Area. Note the Roberdo Bog discussion above regarding the location of this resource. Each of these Natural Communities are described in the Natural Communities of North Carolina, 4th Approximation (NCNHP, 2012). Excerpts from this document are provided as Appendix B.

Piedmont Boggy Streamhead (G2G3) communities include seepage areas across the landscape, though primarily occurring along smaller headwater streams. Evidence of flowing water may or may not be present. This community is not yet well defined but is considered distinct from other communities. These communities are considered rare. Piedmont Boggy Streamheads mapped by the NCNHP, including 10.15 acres in the Project Area, are illustrated on Figure 6.0.

Dry Piedmont Longleaf Pine Forest (G2G3) communities are dominated by *Pinus palustrus*, but also includes areas where past logging and other land uses have precluded it as a dominant landscape species. Many areas mapped as Dry Piedmont Longleaf Pine Forest within the Study Area today are dominated by Loblolly Pine (*Pinus taeda*). Localized exceptions in the Study Area do occur as the result of extensive USFS restoration activities over more than 30 years, but were too small to map independently. Within the BAA, larger contiguous areas of *P. palustrus* were observed within Longleaf Pine Forest mapping provided by USFS, depicted on the attached Figures 5.0 through 5.2. Dry Piedmont Longleaf Pine Forest areas mapped by NCNHP, including 33.76 acres in the Project Area, are depicted on Figure 6.0.

Wet Piedmont Longleaf Pine Forest (G1) include areas fed by seepage and perched woodland wetlands in which *Pinus palustris* is either dominant or codominant, which distinguishes these areas from other Piedmont wetland communities. *Pinus palustris* may be scarce in examples where past logging and fire suppression have removed it and allowed other pines and hardwoods to expand. It is distinguished from Dry Piedmont Longleaf Pine Forest by its abundant hydrophytic vegetation. Wet Longleaf Pine Forests mapped by the NCNHP, including 11.74 acres in the Project Area, are depicted on Figure 6.0.

1 Maintained/Disturbed areas include developed areas, roads and roadsides, and maintained rights-of-way. Timbered Shrub-Scrub areas, reported in 2007, are focused primarily in western portions of the Study Area and include early successional communities post-logging, within and immediately adjacent to the Study Area.

Dry-Mesic Oak-Hickory Forest (Piedmont Subtype) (G4G5), and **Dry Oak-Hickory Forest (Piedmont Subtype)** (G4G5) are mature hardwood forests occurring over a dry to mesic moisture range along acidic slopes and ridges, with Dry Oak-Hickory Forest communities dominating the highest and driest landscape positions within the BAA. Both are fairly common upland hardwood communities in North Carolina.

Hillside Seepage Bog (G2) communities occur on gradual slopes adjacent, and contributing, to similar areas such as Piedmont Boggy Streamhead areas. These areas are known from the BAA, but were not observed in the Study Area. Unlike streamhead areas, seepage bog sites lack the geomorphologic evidence of flowing water. They typically contain flora tolerant of acidic soils, primarily in the Piedmont and Mountain regions of North Carolina. The Uwharrie Mountains contain examples of this community that may eventually be recognized as their own variant of this subtype. Hillside seepage bogs are historically known to contain pitcher plants and rare plant species, but as a group have been adversely impacted in recent decades. The Uwharrie variant of this community includes sites that remain vegetatively diverse, presumably due to prescribed burning. Fire may play a critical role in this community's management.

Low Elevation Seep (Typic Subtype) (G3?) communities are relatively common lower slope, seep-fed wetland areas found across North Carolina. They are acidic sites with few unique vegetative characteristics, aside from the contrast with adjacent drier communities within which they occur. These areas are known from the BAA but were not observed in the Study Area.

Piedmont/Coastal Plain Heath Bluff (G2G3) occur in cool and moist sites in the Piedmont and Coastal Plain, adjacent to steep slopes and on sites with a northern aspect. These areas are known from the BAA but were not observed in the Study Area. They are dominated in the UNF by *Kalmia latifolia* (Mountain Laurel). In this region, mountain laurel is common but Heath Bluff communities remain recognizable by landscape position.

Piedmont Headwater Stream Forest (Typic Subtype) (G3G4) communities occur in lower slope positions associated with first and second order intermittent streams. These communities are fairly common in the landscape and dominated by wetland vegetation more characteristic of lower slopes and floodplains. Upland species are not uncommon in this community. These communities are common in topographic draws above floodplains in the BAA. Several of these communities were identified within the Study Area and are depicted on Figure 3.0 through 3.9.

Piedmont Monadnock Forest (Typic Subtype) (G3G4) communities occur on rocky, acidic, bluffs and erosional uplands. However, not all these landscape positions support Piedmont Monadnock Forest. NCNHP 2012 states that Uwharrie Mountain Piedmont Monadnock Forest communities occur "on higher knobs of felsic volcanic rocks, grades into Dry or Dry-Mesic Oak-Hickory Forest downslope, but is abruptly replaced by Basic Oak-Hickory Forest on mafic volcanic rock". Tolerance to aluminum toxicity and extreme soil acidity are assumed important factors in vegetative communities on these sites. These communities occur in the BAA, but none were found within the Study Area.

Upland Depression Swamp Forest (G2G3) communities occur on concave portions of terraces and flat ridges where poor drainage enables seasonal ponding. These areas are not saturated for

long enough periods to preclude tree establishment. This attribute also means a sparse layer of shade-tolerant understory is typical. Upland Depression Swamp Forests do occur in the BAA, but none were observed in the Study Area.

Upland Pool (Roberdo Subtype) (G1?) community is a unique community of Upland Pool located in the UNF. Upland Pools are depression wetlands not directly associated with other surface waters. Common examples occur across the piedmont (Piedmont Subtype), though there are also Mountain and Coastal Plain subtypes. Roberto Subtype, located in the BAA, is unique in that it is dominated by coastal evergreen and smilax vegetation. Please see the discussion above regarding conflicting mapping of this resource in relation to the Study Area.

B. STUDY AREA

The Study Area is the area within USFS property and includes all land within a 500-foot wide corridor centered on NC24/27. This area was established to capture all land that would be directly or indirectly disturbed by the Project based on preliminary designs. The Study Area includes two general areas of National Forest overlap (Figure 1). The first area occurs between a point 0.76 mile east of River Road and 0.74 mile west of S.R. 1134. Three portions of Study Area occur within this area. The second area occurs between Bruton Carpenter Road and 0.47 mile east of NC 109. Elevations in the Study Area range from 500 feet to 650 feet above mean msl. The Study Area encompasses approximately 245 acres.

The general community types reported from within the Study Area included: 1) Mixed Pine/Hardwood Forest, 2) Maintained Disturbed Areas, and 3) Seeps of First-Order Tributaries.

The Study Area also includes portions of two SNHAs and four Natural Communities (Figures 2 and 3). SNHAs described above that occur in the Study Area include Lower Rocky Creek Longleaf Pine Forest, and Roberdo Bog and Longleaf Pine Forest. Natural Communities located in the Study Area included Piedmont Boggy Streamhead, Piedmont Headwater Stream Forest, Dry Piedmont Longleaf Pine Forest, and Wet Piedmont Longleaf Pine Forest, all of which are described above.

Surveys conducted within the Study Area located *Fothergilla major*, *Pseudognaphalium helleri* and 17 populations of *Helianthus laevigatus*. The locations of each of these occurrences are provided on Figure 4.0 through 4.9.

C. TIMING OF FIELD SURVEYS

Field surveys were conducted in 2004, 2007, 2008, 2011, 2017, and 2018. Biologists with expertise in various fields participated in the surveys. Survey windows were adjusted based on flowering status of local reference populations to capture seasonal variations of target species. Qualifications of principle investigators from 2017 and 2018 are included in Section V of this report. The qualifications of NCDOT biologists who performed surveys in 2004, 2007, 2008, and 2011 are documented in an earlier Biological Evaluation and Biological Resource Reports for TIP# R-2527, dated January 2014 and 2013, and provided as Appendix D through Appendix G.

Benthic Macroinvertebrates
May 21, 2007 (NCDOT Biologists)
June 27, 2007 (NCDOT Biologists)
August 16, 2007 (NCDOT Biologists)
March 7 and 8, 2018 (Dave Penrose and Jason York)

Bats
June 25-26, 2007 (NCDOT Biologists)

Birds
May 22, 2007 (NCDOT Biologists)
Surveys were conducted for presence/absence using visual and auditory surveys. Special care was given to conduct the surveys in the early morning during the breeding season (April 21-June 23).
April 26 - 28, 2018 (Logan Williams and Mike Sanderson)

Bird: Bald Eagle
September 2004, (NCDOT Biologists)
April 10, 2006 (NCDOT Biologists)
March 27, 2007 (NCDOT Biologists)
December 15, 2017 (Greg Price)

Bird: Red-cockaded Woodpecker (Greg Price, Chris Hopper)
March 8, 2006 – March 27, 2007 (NCDOT Biologists)
May 21-22, 2007 (NCDOT Biologists)
November 14, 17, and 29, 2017 (Greg Price, Chris Hopper)
December 12 and 22, 2017 (Matt Haney, Greg Price, Chris Hopper, Mike Sanderson)
January 22 – 23, 2018 (Matt Haney, Greg Price, Chris Hopper, Mike Sanderson, Rex Badgett)
March 7, 2018 (Greg Price, Chris Hopper)

Plants
May 21, 2007 (NCDOT Biologists)
June 26, 2007 (NCDOT Biologists)
October 24 - 25, 2007 (NCDOT Biologists)
November 1-2, and 7, 2007 (NCDOT Biologists)
November 16, 19, and 21, 2007 (NCDOT Biologists)
October 18 – 20, 2011 (NCDOT Biologists)
October 18 and 20, 2017 (Moni Bates and Logan Williams)
November 3 and 26, 2017 (Moni Bates and Logan Williams)
April 26 – 27, 2018 (Moni Bates and Logan Williams)
May 15, 16, and 22, 2018 (Moni Bates and Logan Williams)
October 18 – 20, 2011 (NCDOT Biologists)

Plant: Schweinitz's Sunflower
April – May, 2004 (NCDOT Biologists)
September 9 – October 18, 2006 (NCDOT Biologists)
October 24, 2007 (NCDOT Biologists)

November 1, 2, 7, 16, 19, and 21 (NCDOT Biologists)
October 18 – 20, 2011 (NCDOT Biologists)
September 26, 2017 (Chris Hopper, Greg Price)
October 18, 2017 (Chris Hopper, Greg Price)

Freshwater Fish
June 27, 2007 (NCDOT Biologists)
May 22 and 28, 2018 (John Alderman and Joe Alderman)
September 11, 2018 (John Alderman and Joe Alderman)

Freshwater Mussels
August 16, 2007 (NCDOT Biologists)
May 1, 2018 (John Alderman and Joe Alderman)

Salamanders
June 26-27, 2007 (NCDOT Biologists)
March 20, 2008 (NCDOT Biologists)
October 17, 2017(Dennis Herman and Joe Alderman)

Terrestrial Animals (Birds, Salamanders, Bats, Mammals)
May 21-22, 2007 (NCDOT Biologists)
June 25-27, 2007 (NCDOT Biologists)
August 16, 2007 (NCDOT Biologists)
March 20, 2008 (NCDOT Biologists)

Terrestrial Insects
August 16, 2007 (NCDOT Biologists)

D. THREATENED, ENDANGERED, FEDERAL SPECIES OF CONCERN, AND NORTH CAROLINA LISTED SPECIES

The team of resource specialists were tasked with surveying for 101 plant and animal species. Of these, 56 T&E, FSC, and NC Listed species are addressed in this evaluation. These include two amphibians, four birds, one crustacean, four freshwater fish, 11 freshwater bivalves, two insects, one mammal, three reptiles, and 28 vascular plants. USFS Species of Interest (SI) encountered or reported by USFS are also included below and in Section V. C., and include three birds, one macroinvertebrate, and two plants. The complete list of target species, including 45 species listed as either State Significantly Rare or identified by the USFS, is provided as Appendix 1 of the attached Biological Resources Report.

Discussed below are T&E and FSC species initially considered potentially present, followed by State Listed species observed in the Study Area. Each of these are grouped below by protection status and listed alphabetically by taxonomic group.

Threatened and Endangered Species

Bird

Picoides borealis (Red-cockaded Woodpecker) – Federally Endangered, State Endangered. *Picoides borealis* occurs in mature open pine forests, mainly in longleaf pine. Suitable habitat for *P. borealis* does occur in scattered locations within the Study Area and BAA. During their 2006/2007 surveys of the area, NCDOT Biologists did locate one inactive cavity tree approximately one mile west of the railroad and 0.4 mile north of NC 24/27. These areas were surveyed via transects in 2017 and 2018; no new activity was noted and no *P. borealis* was found. The biological conclusion for this project is 'No Effect'.

Insect

Bombus affinus (Rusty-patched Bumble Bee)—Federal Endangered. This insect is an underground nester known from temperate climates. None is known in the Study Area or BAA, and none was reported during surveys. The biological conclusion for this project is 'No Effect'.

Mussel

Lasmigona decorata (Carolina Heelsplitter) – Federally Endangered, State Endangered. *Lasmigona decorata* is known from the Catawba and Yadkin-Pee Dee drainages, and is endemic to these areas in North Carolina and South Carolina. Recent mussel surveys were performed on August 16, 2007 and May 1, 2018 and none was found. Though not found during surveys, potentially suitable habitat for this species downstream of the Project Area may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset effects from the Project on this species' potentially suitable habitat. The biological conclusion for this project is 'No Effect'.

Vascular Plants

Echinacea laevigata (Smooth Coneflower) – Federally Endangered, State Endangered. *Echinacea laevigata* occurs in glades, woodlands, and open areas over mafic rock. Plant surveys occurred on October 24, November 1-2, 7, 16, 19, and 21, 2007, October 18 and 20, November 3 and 26, 2017; April 26 and 27, May 15, 16, and 22, 2018. None is known in the Study Area or BAA, and none was reported during surveys. The biological conclusion for this project is 'No Effect'.

Helianthus schweinitzii (Schweinitz's Sunflower) - Federal Endangered, State Endangered. *H. schweinitzii* populations are recorded throughout the BAA. This species favors non-forested open areas, especially roadsides and other rights-of-way. This open habitat does occur within the Study Area and was repeatedly surveyed during the course of the season. During the 2007 surveys, NCDOT biologists located *H. schweinitzii* along the railroad corridor paralleling NC 109, south of NC 24/27. During their October 2011 surveys, NCDOT Biologists documented 35 individuals within this population. In 2013, four clumps were removed by NCDOT and USFS and transplanted to another population. During a fall 2016 survey, Andy Walker, USFS Botanist, and Moni Bates conducted negative searches for remaining stems in this location. The area was visited again during the 2017 surveys and none was found. All existing populations in the BAA are distant enough from the project that they are not anticipated to be affected by the Project. Any currently unoccupied habitat to be impacted within the Project Area would be offset by the creation of additional potentially suitable habitat. The biological conclusion for this project is 'May Affect, Not Likely to Adversely Affect'.

Rhus michauxii (Michaux's Sumac) – Federal Endangered, State Endangered. *Rhus michauxii* prefers open habitats on clayey soils derived from mafic rock. Surveys were performed during the US Fish and Wildlife Service (USFWS) recommended optimal survey window on October 24, 2007, and October 18, 2017. None is known in the Study Area or BAA, and none was reported during surveys. Any currently unoccupied habitat to be impacted within the Project Area would be offset by the creation of additional potentially suitable habitat. The biological conclusion for this project is 'No Effect'.

Federal Species of Concern

Bird

Peucaea aestivalis (Bachman's Sparrow) - Federal Species of Concern, State Special Concern. *Peucaea aestivalis* prefers open longleaf pine forests and old fields. These areas were surveyed on May 21-22, 2007, March 20, 2008, April 26, 27, and 28, 2018, and none was found. Ongoing restoration of longleaf pine forests in the BAA and Study Area will continue to improve habitat for this species. While this species was not observed during surveys for this project, its longleaf pine habitat would be impacted. NCNHP mapped Wet Piedmont Longleaf Pine Forest and Dry Piedmont Longleaf Pine Forest currently undergoing restoration within the Project Area total 45.5 acres (Figure 6.0). The negative findings during several surveys for this species are assumed to be evidence that any local populations are small. Vast areas of potentially suitable habitat remaining on UNF lands would be sufficient to offset any negative impact from this project. The Project is not anticipated to adversely impact this species.

Freshwater Fish

Ambloplites cavifrons (Roanoke Bass) - Federal Species of Concern, State Significantly Rare. *Ambloplites cavifrons* occurs in the Neuse and Roanoke River Basins. This species is not known to occur in the Yadkin-Pee Dee River Basin. The Project is not anticipated to adversely impact this species.

Etheostoma collis (Carolina Darter) - Federal Species of Concern, State Special Concern. Known from the Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee, and Catawba drainages. Surveys were performed on May 22 and 28, 2018 and found none. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Moxostoma sp. 3 (Carolina Redhorse) - Federal Species of Concern, State Threatened. *Moxostoma sp. 3* is known from the Cape Fear and Yadkin-Pee Dee drainages. Surveys were performed on May 22 and 28, 2018 and found none. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Insect

Gomphus septimal (Septima's Clubtail) - Federal Species of Concern, State Significantly Rare. *Gomphus septimal* prefers rocky rivers. None is known from the Study Area or BAA. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Mussels

Alasmidonta undulata (Triangle Floater) - Federal Species of Concern, State Threatened. *Alasmidonta undulata* occurs in the Roanoke, Chowan, Tar, Neuse, and Cape Fear Drainages. This species is not known to occur in the Yadkin-Pee Dee River Basin. None is known from the Study Area or BAA. The Project is not anticipated to adversely impact this species.

Elliptio roanokensis (Roanoke Slabshell) - Federal Species of Concern, State Threatened. *Elliptio roanokensis* is known from the Roanoke, Tar, Neuse, White Oak, Cape Fear, Lumber, and Yadkin-Pee-Dee drainages. None is known from the Study Area or BAA. Surveys were performed on May 1, 2018 and none was found. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset the effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Fusconaia masoni (Atlantic Pigtoe) - Federal Species of Concern, State Endangered. *Fusconaia masoni* is known from the Roanoke, Tar Neuse, Cape Fear, and Yadkin-Pee Dee drainages. Surveys were performed on May 1, 2018 and none was found. None is known from the Study Area or BAA. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset the effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Lasmigona subviridis (Green Floater) - Federal Species of Concern, State Endangered. *Lasmigona subviridis* is known from the Roanoke, Tar, Neuse, Yadkin-Pee Dee, New, and Watauga drainages. Surveys were performed on May 1, 2018 and none was found. None is known from the Study Area or BAA. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset the effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Lampsilis cariosa (Yellow Lampmussel) - Federal Species of Concern, State Endangered. *Lampsilis cariosa* is known from the Chowan, Roanoke, Neuse, Tar, Cape Fear, Lumber, and Yadkin-Pee Dee drainages. Surveys were performed on May 1, 2018 and none was found. None is known from the Study Area or BAA. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation

controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset the effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Toxolasma pullus (Savannah Lilliput) - Federal Species of Concern, State Endangered. *Toxolasma pullus* is known from the Cape Fear, Lumber, and Yadkin-Pee Dee drainages. Surveys were performed on May 1, 2018 and none was found. None is known from the Study Area or BAA. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset the effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Villosa vaughaniana (Carolina Creekshell) - Federal Species of Concern, State Endangered. *Villosa vaughaniana* is known from the Cape Fear, Yadkin-Pee Dee, and Catawba drainages (endemic to North Carolina and South Carolina). Surveys were performed on May 1, 2018 and none was found. None is known from the Study Area or BAA. Though not found during surveys, potentially suitable habitat for this species may be adversely impacted by this project. The erosion and sedimentation controls and hydrologic preservation mitigation measures explained in Section V.D. are expected to offset the effects of the Project on this species' potentially suitable habitat. The Project is not anticipated to adversely impact this species.

Reptile

Pituophis melanoleucus (Northern Pinesnake) - Federal Species of Concern, State Special Concern. *Pituophis melanoleucus* prefers dry and sandy woods, mainly in pine/oak sandhills. None is known from the Study Area or BAA. During their 2007/2008 terrestrial animal surveys, NCDOT Biologists noted that suitable habitat was not observed. Direct impacts to this species during construction are unlikely due to the negative survey results and mobility of this species. Construction equipment vibration will be localized. Blasting, if required, could be an adverse indirect impact on these animals. Snakes rely on vibration sensitivity for feeding and danger avoidance. Development of the blasting plan discussed in Section V.D. would minimize the frequency and impact extent of any unavoidable blasting. Any adverse impacts that may result are expected to be short-lived. Potentially suitable habitat for this animal would be impacted. However, the abundance of suitable habitat on adjacent UNF lands would offset any losses associated with this project. The Project is not anticipated to adversely impact this species.

Vascular Plant

Acmispon helleri (Carolina Birdfoot-trefoil) – Federal Species of Concern, State Special Concern – Vulnerable. This plant is found on clayey soils in open forests, woodlands, and along roadsides. Plant surveys occurred on October 18 and 20, November 3 and 26, 2017; April 26 and 27, May 15, 16, and 22, 2018. None is known in the Study Area or BAA, and none was reported during surveys. The Project is not anticipated to adversely impact this species.

Carex impressinervia (Ravine Sedge) – Federal Species of Concern, State Significantly Rare – Throughout. *Carex impressinervia* is found in southern piedmont rich alluvial forests. Plant surveys occurred on October 18 and 20, November 3 and 26, 2017; April 26 and 27, May 15, 16,

and 22, 2018. None is known in the Study Area or BAA, and none was reported during surveys. The Project is not anticipated to adversely impact this species.

Lindera subcoriacea (Bog Spicebush) – Federal Species of Concern, State Significantly Rare – Throughout. *Lindera subcoriacea* is found on hillside seepage bogs, streamhead pocosins, and white cedar swamps. Plant surveys occurred on October 18 and 20, November 3 and 26, 2017; April 26 and 27, May 15, 16, and 22, 2018. None is known in the Study Area. The USFS provided a record of *L. subcoriacea* approximately 2,400 feet north of the Study Area. Because of the distance between this occurrence and the Study Area, the Project is not anticipated to adversely impact this species.

Danthonia epilis (Bog Oat-grass) – Federal Species of Concern, State Significantly Rare – Throughout. *Danthonia epilis* is found on hillside seepage bogs and in wet, seepy powerlines. Plant surveys of suitable habitat occurred on October 18 and 20, November 3 and 26, 2017; April 26 and 27, May 15, 16, and 22, 2018. None is known in the Study Area. The USFS reported that this species is known from the BAA, but records were not available for use in this evaluation. The Project is not anticipated to adversely impact this species.

Eurybia mirabilis (Piedmont Aster) – Federal Species of Concern, State Significantly Rare – Throughout. *Eurybia mirabilis* is found on rich slopes and bottomlands, mesic mixed hardwood forest, and piedmont basic mesic forests. Plant surveys occurred on October 18 and 20, November 3 and 26, 2017; April 26 and 27, May 15, 16, and 22, 2018. None is known in the Study Area or BAA, and none was reported during surveys. The Project is not anticipated to adversely impact this species.

State Listed Species Observed

Amphibians

Ambystoma talpoideum (Mole Salamander) – State Special Concern – An *A. talpoideum* larva was located by NCDOT biologists during their June 26, 2007 terrestrial animal surveys in Roberdo Bog. This species was located in the BAA, but not the Study Area. Because uplands adjacent to Roberdo Bog do extend into the Study Area, resources utilized by this species outside its breeding season may be impacted by the Project. Section V. C. of this report includes a discussion of analyses conducted to determine the potential indirect impact to this species.

Hemidactylium scutatum (Four-toed Salamander) – State Special Concern – No *H. scutatum* were observed during either 2007/2008 or 2017/2018 surveys. However, these animals are known to occur within the BAA. Because uplands adjacent to Roberdo Bog do extend into the Study Area 2017, this species has been included for discussion. Resources utilized by this species outside its breeding season may be impacted by the Project. Section V. C. of this report includes a discussion of analyses conducted to determine the potential indirect impact to this species.

Reptile

Crotalus horridus (Timber Rattlesnake) - State Special Concern - One *C. horridus* was observed denning in a hole on the side of the NC 24/27 embankment within the BAA, but not in the Study Area (Figure 4.3). Potentially suitable habitat for *C. horridus* occurs throughout the Study Area and BAA, but no other observation was noted. Direct impacts to this species during construction

are unlikely due to the negative survey results in the Project Area and mobility of this species. Indirect impacts associated with project construction may adversely affect this species. Section V. C. of this report includes a discussion of analyses conducted to determine the potential indirect impact to this species.

Vascular Plants

Amorpha schwerinii (Piedmont Indigo Bush) – USFS SI – An occurrence of A. schwerinii was reported by NCDOT within the BAA, approximately 600 feet from NC 24/27. Suitable habitat does occur within the Study Area. However, all project related surveys have failed to locate this species. Due to its distance of the known occurrence from the Study Area, this population is not anticipated to be affected by the Project.

Cirsium carolinianum (Soft Thistle) – State Endangered - A population of *C. carolinianum,* is known within the BAA along Rocky Creek, north of NC 24/27. Due to its distance from the Study Area, this population is not anticipated to be affected by the Project. Possible habitat for *C. carolinianum* is in forests and disturbed areas, mostly on basic soils. This habitat was repeatedly surveyed during the course of the season. *C. carolinianum* was not found in the Study Area. This Project is not anticipated to adversely impact this species.

Fothergilla major (Large Witch Alder) – NC Significantly Rare - A population of *F. major* was located during the October – November 2007 surveys, two populations during the October 2011 surveys (approximately 100 individuals), and eleven individuals were located during the October 2017 surveys (Element Occurrence 20808, Figure 4.1 and 4.6). Seven stems were noted near the outflow of a culvert and in an area of approximately two square meters. Four additional short stems were noted on top of the concrete culvert structure. No plants were found north of NC 24/27. These eleven plants occur within the Project Area and would be impacted by project construction.

During an October 12, 2004 survey, Alan Weakley reported a dense clonal patch of 700 stems over an area of 70 meters. It was not clear why this population had declined so significantly. During the October/November 2007 survey performed by NCDOT Biologists, two populations of *F. major* were located. No map was provided, but the botanical conclusion was that this species may be avoided by construction because it was 100-feet from the road. Extensive searches during 2017 found none other than the eleven reported above, 65 feet from the road.

The USFS provided three additional records in the BAA, each about 1,300 feet north of the Study Area. Due to the distance between the Project and these plants, no adverse impact to these plants is expected.

Parthenium auriculatum (Glade Wild Quinine), prefers glades and openings over mafic rocks. Current records for Montgomery Co. exist. This species (less than 20 individuals) was found during NCDOT 2007/2008 surveys. Suitable habitat does occur, and was searched, within the Study Area. However, none were located during the 2017/2018 surveys. Because *P. auriculatum* wasn't located during the most recent surveys of the Study Area, no adverse impact to this species is expected.

Pseudognaphalium helleri (Heller's Rabbit Tobacco) was located along the railroad corridor about 900 feet north of NC 24/27 (Figure 4.8, 4.9). Six stems were counted within a *Helianthus laevigatus* population (Subpopulation IV, described below). This population is located outside the Project Area and is not expected to be impacted by the project.

Helianthus laevigatus (Smooth Sunflower) – State Special Concern-Vulnerable - Possible habitats for *H. laevigatus* are open woods and roadsides. During their October 2011 surveys, NCDOT Biologists located approximately 300 individuals. Seventeen populations comprising 354 stems of *H. laevigatus* were located during the 2017/2018 surveys within the Study Area. These populations are along the NC 24/27 and railroad corridors in the Study Area and Project Area (Figure 4.1, 4.6, 4.8, 4.9). *H. laevigatus* may be affected by the project. Section V. C. of this evaluation describes each subpopulation located, including numbers of individuals reported. Section V.D. discusses mitigation measures for unavoidable impacts.

Symphyotrichum georgianum (Georgia Aster) – Federal Candidate, State Threatened - The *S. georgianum* population record is within the far western extent of the BAA along Rocky Creek. A second occurrence was documented by NCDOT Biologists along NC 24/27 in Stanly County, five to six miles from USFS lands. This species favors open woods, roadsides, and other rights-of-way. This open habitat does occur within the Study Area and was surveyed as recently as November 26, 2017. *S. georgianum* was not found in the Study Area; therefore, *S. georgianum* is not anticipated to be affected.

V. POTENTIAL DIRECT AND INDIRECT EFFECTS TO THREATENED, ENDANGERED, FEDERAL SPECIES OF CONCERN, AND STATE LISTED SPECIES

A. DIRECT EFFECTS OF PROJECT

Construction activities in the Project Area could include land clearing and grubbing, grading of the ground surface, possible blasting of subsurface rock, and temporary disturbances to vegetation and/or ground surfaces by construction equipment and temporary fill. Effects on natural resources from the proposed project would include vegetation removal and loss of forest habitat, soil disturbance, and altered hydrology of receiving streams. However, with implementation of mitigative measures, these effects are expected to be offset and confined to the Project Area (Figure 2). Impacts will occur primarily to those species and communities occurring adjacent to NC 24/27.

B. INDIRECT EFFECTS OF THE PROJECT

The USFS expressed concern for new/increased runoff including potential contaminants, the formation of new ephemeral channels, integrity of both receiving streams and adjacent lands, and loss of hydric soils. Maintaining access to UNF lands is also a concern raised by USFS.

Sediment and Erosion Control plans for road improvements will be designed to implement NCDOT Best Management Practices (BMPs) in accordance with Design Standards in HQW Watersheds to reduce the risk of sediment and nutrient runoff on downhill slopes and to the Yadkin River. Stormwater Management Plans will be designed to treat stormwater runoff through BMPs as detailed in the most current version of NCDOT's Stormwater BMP Manual.

Recently completed and/or approved construction projects in the vicinity of this project include: 1) The construction of one mile of mountain bike trail in the Wood Run area, an extension to connect this area with the NC 24/27 trail head, 2) The maintenance of the NC 24/27 trail head and maintenance of the Uwharrie National Recreation Trail (to be done in 2019), and 3) Watershed Improvement Projects outlined by Brady Dodd for the South Roberdo Project and a future stewardship program.

C. DETERMINATION OF IMPACTS TO THREATENED, ENDANGERED, FEDERAL SPECIES OF CONCERN, AND STATE LISTED SPECIES

The Biological Conclusion for all Federally Threatened and Endangered species is 'No Effect', except for *Helianthus schweinitzii*, which is 'May Affect, Not Likely to Adversely Affect'. Informal Consultation with the USFWS will be required. A complete list of observed plant and animal species is included as Appendix 2 of the attached botanical and animal resources reports.

Plants

Within the Study Area, seventeen populations of *Helianthus laevigatus*, one *Pseudognaphalium helleri*, one *Isoetes uwharrie*, and *Fothergilla major* population are recorded. The Project Area includes eight populations of *Helianthus laevigatus*, one *Isoetes uwharrie*, and one cluster (eleven plants) of *Fothergilla major*. *Helianthus laevigatus* subpopulation IV, and a portion of subpopulation VIII are addressed below due to proximity to the Project Area but are not expected to be adversely affected. Each of these species is addressed below.

Fothergilla major (Large Witch-alder) (Significantly Rare - Throughout) - A known population of *F. major* was found within the Project Area, on the south side of NC 24/27 (Figure 4.1) on October 18, 2017. Seven stems were noted near the outflow of a culvert and in an area of approximately two square meters, and four additional stems were located on top of a concrete culvert structure. Eleven *F. major* will be affected by the project.

Helianthus laevigatus (Smooth Sunflower) – State Special Concern – Vulnerable – Eight populations of *H. Laevigatus* were located within the Project Area.

> *H. laevigatus* Subpopulation I (Figure 4.1) was located on the north side of NC 24/27. Nineteen stems were counted along a five to six-meter length between the mowed ROW and adjacent treeline.
>
> *H. laevigatus* Subpopulation II occurs across the road from Subpopulation I (Figure 4.1) and comprised 44 stems from three clumps within a three-meter length between the mowed ROW and adjacent forest.
>
> *H. laevigatus* Subpopulation III occurs along the western edge of the railroad corridor about 400 feet north of NC 24/27 (Figure 4.8). Sixteen stems were counted in a four by six-meter area, and signs of herbivory were evident.
>
> *H. laevigatus* Subpopulation IV occurs in two areas along the railroad about 900 feet north

of NC 24/27 (Figure 4.8). The first area is on the west side of the railroad corridor and included 138 stems growing amongst discarded railroad ties. The second area is east of the railroad and included 177 stems. This is an estimate because herbivory and dense undergrowth made counting difficult. This population is located outside the Project Area and is not expected to be directly impacted by the project but is included here due to its close proximity.

H. laevigatus Subpopulation V occurs in two areas along the railroad corridor between 130 and 180 feet north of NC 24/27 (Figure 4.8). The first included 63 stems under dense woody sprouts of loblolly pine. The second included ten stems in one clump.

H. laevigatus Subpopulation VI occurs north of NC 24/27, west of the railroad bridge. About 100 stems were noted on a steep embankment dominated by woody resprouts.

H. laevigatus Subpopulation VII occurs near the railroad bridge north of NC 24/27 (Figure 4.8). At least 100 stems were found within dense vegetation.

H. laevigatus Subpopulation VIII includes multiple clumps in small patches (Figure 4.6 and 4.8). An area of 26 stems and seven individual clumps were recorded in this area, and includes a number of individuals beyond the Project Area. This area was reported in 2011 to contain "244 stems in the woods and thousands probably present". Because the stem count for this species is dependent on the time since the previous prescribed burn, the negative observation is not assumed to be evidence the plants no long persist in this area. This subpopulation also includes 76 stems counted near the intersection of Landfill Road and NC 24/27.

H. laevigatus Subpopulation IX occurs along the northern edge of NC 24/27 west of the Landfill Road intersection (Figure 4.6). Four clumps were located in this area. Due to the proximity of the records presented in this evaluation as subpopulation VIII, it's possible these records were included in the 2011 study referenced above. Much of the forest between these subpopulations is beyond the Study Area.

In summary, a total of approximately 354 *H. laevigatus* stems counted in 2017 within eight subpopulations occur within the Project Area and are likely to be directly impacted by the Project. The number of plants these stems originate from is not known but estimated between 40 and 50.

Isoetes uwharrie (new Quillwort species) – No Status Assigned – This species was recently identified in the UNF and is in the process of being described (Figure 4.5,4.8, and 4.9). One small cluster, shown on Figure 4.8, occurs within the Project Area. Additional occurrences of this species are also depicted on Figure 4.5 and 4.9. The USFS is in communication with the researcher and will provide information when available. NCDOT will work with the USFS to relocate individuals within this cluster prior to construction to avoid impacts to this new species.

Pseudognaphalium helleri (Heller's Rabbit Tobacco) was located along the railroad corridor about 900 feet north of NC 24/27 (Figure 4.8). Six stems were counted within a *Helianthus laevigatus*

population (Subpopulation IV, described above). This population is located outside the Project Area and is not expected to be impacted by the project but is included here due to its close proximity.

Birds

During the May 22, 2007 surveys conducted by NCDOT Biologists, Eastern Wood-pewee (*Contopus virens*) USFS SI, Prairie Warbler (*Dendroica discolor*) USFS SI, and Brown-headed Nuthatch (*Sitta pusill*a) USFS SI, were observed. Eastern Wood-pewee was not noted during the 2018 surveys. However, Prairie Warbler and Brown-headed Nuthatch were recorded during the 2018 surveys. Impacts to habitats utilized by these species, as well as other observed species listed in Appendix 2 of the attached botanical and animal resources reports would occur. However, these impacts are expected to be temporary and minor relative to abundant habitats on adjacent UNF lands and mobility of these species.

Amphibians

Ambystoma talpoideum (Mole Salamander) – State Special Concern – An *A. talpoideum* larva was located by NCDOT biologists during their 2007/2008 terrestrial animal surveys in Roberdo Bog. This species was located in the BAA, but not the Study Area during the 2017/2018 surveys (see discussion of the Roberdo Bog location above). Because uplands adjacent to Roberdo Bog do extend into the Study Area, this species has been included for discussion. Little is known about the distance into uplands utilized by these salamanders, but Behr reported that adults travel farther distances to breeding pools (170 m) than juveniles (50 m).

For this evaluation, the approximate extent of the Roberdo Bog pool was digitized and buffered by 50 and 170 m to reflect potential habitat use by adult and juvenile salamanders. Based on this analysis, the total existing forest buffer around Roberdo Bog comprises nine acres of potential juvenile habitat and 35 acres of potential adult habitat. The Project Area includes 0.4 acre (four percent) of the juvenile habitat, and three acres (nine percent) of adult habitat. Uplands adjacent to Roberdo Bog that are used by these animals would be impacted by the project. However, based on the results of the two surveys (one larval individual found) used in this evaluation, the density of this salamander population is assumed to be relatively small and sufficient upland habitat to accommodate this species would remain after construction. Therefore, Mole Salamander non-breeding habitat may be affected by this project, but the impact is anticipated to be minor.

Additional areas of potential habitat occur within wetlands and Piedmont Boggy Streamhead natural areas (Figure 3). These areas were investigated for evidence of amphibian breeding and none was found. These areas are protected under the Clean Water Act and impacts have been minimized to the maximum extent practicable. Numerous similar areas occur in the UNF within close proximity to the project. Impacts to these habitats is expected to be minor.

Hemidactylium scutatum (Four-toed Salamander) – State Special Concern – No *H. scutatum* were observed during either 2007/2008 or 2017/2018 surveys. However, these animals are known to occur within the BAA. Because uplands adjacent to Roberdo Bog do extend into the Study Area, this species has been included for discussion. The distance these salamanders travel into uplands is unknown. However, Meyer provided records from Massachusetts and Quebec, listing 72 m, 152 m, 198 m, and 201 m distances from nesting habitat.

For this evaluation, the Roberdo Bog was buffered by 201 m. resulting in 43 acres of existing forested buffer. The Project Area encompasses four acres (nine percent) of uplands adjacent to Roberdo Bog that are potentially used by these animals. However, based on the results of the two surveys (no individual found) used in this evaluation, the density of this salamander population is assumed to be small enough that sufficient upland habitat to accommodate this species would remain after construction. Therefore, Four-toed Salamander non-breeding habitat may be affected by this Project, but the impact is anticipated to be minor.

Additional areas of potential habitat occur within wetlands and Piedmont Boggy Streamhead natural areas (Figure 3). These areas were investigated for evidence of amphibian breeding, and none was found. These areas are protected under the Clean Water Act and impacts have been minimized to the maximum extent practicable. Numerous similar areas occur in the UNF within close proximity to the project. Impacts to these habitats is expected to be minor.

Reptile

Crotalus horridus (Timber Rattlesnake) - State Special Concern - One *C. horridus* was observed denning in a hole on the side of the NC 24/27 embankment (35.30331087 -80.02296081), within the BAA but outside the Study Area (Figure 4.3). Potentially suitable habitat for *C. horridus* occurs throughout the Study Area and BAA, but no other observation was noted during field surveys. Direct impacts to this species during construction are unlikely due to the negative survey results in the Project Area and the mobility of this species. Blasting, if required, could be an adverse impact on these animals. Snakes rely on vibration sensitivity for feeding and danger avoidance. Development of the blasting plan discussed in Section V.D. would minimize the frequency and impact extent of any unavoidable blasting. Any adverse impacts that may result are expected to be short-lived. Potentially suitable habitat for this animal would be impacted. However, the abundance of suitable habitat on adjacent UNF lands would offset any losses associated with this project.

D. DETERMINATION OF IMPACTS TO NATURAL COMMUNITIES

The USFS expressed concern over three globally significant natural communities occurring in the Study area that would be impacted by the project. These include the Upland Pool (Roberdo Subtype) (G1), Dry Piedmont Longleaf Pine Forest (G2G3), and Wet Piedmont Longleaf Pine Forest (G1) communities.

An Upland Pool (Roberdo Subtype) occurs within an area mapped by NCNHP as Dry Piedmont Longleaf Pine Forest. The pool would not be directly impacted by the project. This area is also a SNHA and was analyzed earlier for potential impacts to salamanders and their habitat. As described in Section IV. A., the pool occurs approximately 150 feet north of the Project Area (80 feet outside Study Area). This natural community is recognized as a G1 community because of its unique Coastal Plain vegetation. Edge effects of the project on adjacent vegetation were considered but are expected to be relatively minor 150 feet into the forest. The USFS's ongoing prescription burning program is anticipated to mitigate significant changes in the area's understory.

Dry Piedmont Longleaf Pine Forest mapped by NC NHP in this area of the UNF totals 1,940 acres. The project would require direct impacts to 54 acres of this natural community, or approximately three percent. However, NCNHP mapping of this community includes the existing road, its shoulders, and utility clearings, so the actual direct impact to this natural community would be a much lower percentage of the overall resource. Edge effects on this community would occur as increased wind and sunlight penetrate the new tree line. However, the current forest along NC 24/27 experiences similar edge effects today within the 54-acre impact area, and the edge effect will shift in position but be similar in magnitude. The USFS's ongoing prescription burn program, occurring on two- to three-year intervals (USFS, telephone communication) is expected to mitigate excessive understory establishment.

Wet Piedmont Longleaf Pine Forests mapped by NCNHP in this area of the UNF totals 1,562 acres. The project would require impacts to 12 acres in this natural community, or less than one percent of the resource. Similar to Dry Longleaf Pine Forests though, NCNHP mapping includes all existing disturbance in their mapping (roadway, utility line, and cleared areas), and the actual impact would be much less. One of the Wet Longleaf Pine Forest's unique features is the abundance of hydrophytic vegetation, including wet areas dominated by *Pinus palustris*. No hydric soils are mapped in this community within the Study Area or Project Area, and only 315 square feet of jurisdictional wetland were identified in this natural community (on the south side of NC 24/27, across from Landfill Road). The project would expand an existing corridor through the area mapped by NCNHP as Wet Piedmont Longleaf Pine Forest, but the actual impact to this community type is expected to be negligible due to the lack of mapped hydric soils and minimal area of wetlands in the project area.

E. PROJECT COMMITMENTS AND MITIGATION MEASURES

Through consultation with USFS, NCDOT has agreed to the following commitments and mitigation measures to offset the direct and indirect impacts associated with TIP R-2527. Proposed commitments and mitigation measures include measures to facilitate prescribed burns in adjacent forest service lands, prohibit the use of herbicides or pesticides on USFS lands, investigate the likelihood of acid-bearing rock disturbance, ensure USFS access to forest lands is not impeded, minimize hydrologic and soil impacts, develop a plan to reduce impacts associated with the potential blasting needs, and manage non-native invasive plant species. For selected USFS rare species of concern that may be directly impacted by the project, relocation has been determined to be appropriate mitigation for two plant species: Large Witch Alder and Quillwort. NCDOT will coordinate these efforts with the USFS and relocate these plants to a suitable location, to be identified in consultation with USFS. Mitigation for loss of longleaf pine forests will be addressed as part of ongoing negotiations between NCDOT and USFS.

1. Commitments and Mitigation Measures to Minimize Direct Impacts

The removal of vegetation and grading for the initial project would follow installation of erosion and sedimentation control measures. Sediment and Tree Protection Fencing would be installed along the limits of the Project Area. These visual barriers would ensure construction equipment and contractors remain within approved disturbance limits. The NCDOT also commits to continue negotiations with the USFS to arrive at suitable mitigation for the loss of

longleaf pine forest.

NCDOT does anticipate high rock lines along the project length that will require blasting. However, no reliable quantification of potential rock blasting within USFS property will be available until they are able to investigate those areas. Borings have been laid out, but SF-299 permit approval is required to continue these subsurface investigations. Approval of this document is required before that permit can be issued. If required, a blasting impact reduction plan is being developed for this project and would evolve through consultation with the USFS as information becomes available.

Potential impacts to hydric soils were investigated as part of this evaluation. All soils occurring within the Project Area are considered non-hydric according to the NRCS Web Soil Survey. However, wetland delineations have been conducted and 1.95 acres of wetland were delineated in the Study Area. The Project Area includes 0.49 acre of wetlands that may be directly affected by construction. As part of permitting unavoidable impacts to these areas, the US Army Corps of Engineers requires demonstration of avoidance and minimization of impacts. No construction would begin until USACE and NCDWR approvals are issued.

The USFS expressed concern for acid bearing rock in the Project Area. NCDOT Geotechnical engineers investigated this concern. Most acid rocks of concern are located in the western counties of North Carolina. The rock types along the NC 24/27 corridor are meta-tuffs, with minor meta-mudstone and meta-volcanic flow rocks (andesite). Iron sulfide mineral content was not indicated in weathered rock encountered in borings on nearby properties along the corridor. There are instances of volcanogenic massive sulfide deposits (source) within the Cid and Gold Hill district in Cabarrus County, and northeastern Montgomery County, but the NC 24/27 corridor does not cross through these areas.

2. Commitments and Mitigation Measures to Minimize Indirect Impacts

Erosion control measures will be designed for sensitive watershed standards in HQW Watersheds. This includes capturing runoff from larger storms and reducing the amount of exposed land and schedule for re-vegetation. Erosion Control measures (e.g., silt fence, matting, special sediment control fence, silt checks, skimmer basins, etc.) will be put in place during the clearing and grubbing, and final stages of construction to help limit erosion while temporary and permanent seeding become established. Grassed swales, dissipator pads, and rip rap lined channels were designed to promote stability in these areas. An erosion and sedimentation control plan will be developed to reduce erosion and turbidity.

The typical road section includes grassed swales and grassed shoulders to reduce flow velocity, promote sedimentation, infiltration, and runoff attenuation. The impervious percentage will increase; however, existing drainage patterns and outfalls were maintained as much as possible to minimize increases in flow and alteration of drainage patterns. Existing concerns are mainly due to undersized pipes that create increased velocities and scour holes at existing pipe outfalls. Receiving streams were visited to identify existing geometry and condition. This information was used to choose adequate and stable system outfalls. A 10 percent impervious assumption was used to accommodate any future projects upstream of these crossings. All outfalls were

supplemented with rip-rap dissipator pads to help dissipate energy at the outlet.

A Burn Management Plan was prepared by NCDOT and provided to USFS. The plan is being reviewed currently to better understand what measures can be taken to maintain USFS ability to continue their prescribed burns on both sides of the improved road. The Burn Management Plan is included with this BE as Appendix A. To mitigate potential blasting impacts, NCDOT is developing a plan to address direct and indirect impacts.

Access to the forest for maintenance, burning, and forest management is being considered during design. The road would be partial controlled access for much of its length, but NCDOT has committed to use no fencing; only concrete markers would be utilized along the entire R-2527 project (Pam Williams (NCDOT) personal communication; NCDOT Draft Right-of-Way Consultation, February 2019).

Implementation of commitments and mitigation measures agreed to between NCDOT and USFS would minimize viability concerns that could result from direct impacts. These commitments and mitigation measures would include:

- Include no fencing (except guardrails at localized areas with motorist safety concerns) and maintain access to the forest,
- Prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction,
- Avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable,
- Prohibit the use of herbicides and pesticides, and
- NCDOT Division 8 forces will work with USFS staff on a periodic basis to control the presence of priority species of non-native plants along the NC 24/27 easement on UNF.
- NCDOT will also work on adjacent NCDOT ROW to prevent the encroachment of priority non-natives on to UNF. In turn, USFS will work cooperatively with NCDOT to identify and effectively control prioritized non-native invasive plant species.

In coordination with USFS, NCDOT has developed commitments and mitigation measures to minimize the spread of non-native invasive species (NNIS) plant species on NFS lands within the UNF associated with the construction and maintenance of improvements to NC 24/27.

- To prevent the spread of non-native invasive plant species on UNF lands, NCDOT will require contractors to pressure wash all off-road equipment, including cranes, graders, pans, excavators, and loaders, prior to being brought in the UNF construction areas.
- To control the spread of NNIS plant species on UNF lands, NCDOT, in coordination with the USFS, will locate and flag areas of NNIS plant species within the Study Area. If any of these areas are within areas of proposed fill, those areas will be cleared and grubbed, and the material disposed of outside the limits of UNF. If NNIS plant species are located in areas of proposed cuts, then the material and actual thickness of root mat or other defined amount will be disposed of outside the limits of UNF.
- In consultation with the USFS, seed mixes of native grasses and forbs or non-

aggressive, non-natives will be used on UNF lands for erosion control and revegetation.

- NCDOT will utilize rolled matting or weed-free mulch for erosion control and revegetation on UNF lands.
- NCDOT will coordinate with the USFS on a landscaping plan for UNF lands. The plan will detail appropriate native seeding mixes for erosion control and site-specific control methods for invasive species. The plan will also outline a plan for ongoing coordination between NCDOT and USFS personnel to maintain vegetation diversity and ensure no long-term impacts to rare species along the project corridor.

With the implementation of these commitments and mitigation measures developed by NCDOT, in coordination with the USFS, the threat of spread of NNIS plants on UNF lands associated with the construction and maintenance of improvements to NC 24/27 is expected to be minimal.

Summary

Potential direct impacts to 77.6 acres of USFS forests, including Longleaf Pine forest, up to 3.0 acres of potentially occupied upland habitat around Roberdo Bog, habitat utilized by *Crotalus horridus* and several forest interior bird species, one macrobenthic species of interest, up to 50 *Helianthus laevigatus* plants (354 stems), and one newly described Quillwort were identified. Potential indirect impacts may result to adjacent terrestrial habitats and the fauna that occupy them, as well as receiving waters and their fauna. The above mitigation measures will be implemented in coordination with USFS throughout this project to offset and minimize adverse impacts.

VI. QUALIFICATIONS OF PRINCIPAL INVESTIGATORS

Investigator: Matthew M. Haney
Education: B.S. Natural Resources-Ecosystem Assessment, North Carolina State University, Raleigh, North Carolina
Experience: N.C. Dept. of Transportation Oct. 1999-present
N.C. Forest Service May 1998-August 1998
U.S. Forest Service, Center for Forested Wetlands Research May 1997-August 1997
Expertise: Section 7 field investigations, NEPA documentation, wetland and aquatic investigations, protected species (terrestrial/aquatic) surveys

Investigator: Michael Sanderson
Education: B.S. Fisheries and Wildlife Science, North Carolina State University
Experience: Environmental Senior Specialist, NCDOT, 2015-present.
Environmental Program Consultant, NCDOT, 2013 – 2015.
Environmental Specialist, NCDOT, April 2004 – 2013.
Wildlife Research Biologist, Down to Earth Environmental, February – June, 2003.
Wildlife Research Technician, NC Cooperative Fish and Wildlife Research Unit, 1991 – 1999.

Biological Science Technician (Wildlife), US Fish and Wildfire Service, 1995 – 1997.
Expertise: Bird surveys, behavioral analysis, habitat use/evaluation, Section 7 field investigations, protected species (terrestrial/aquatic) surveys, wetland delineation, scuba certified.

Biologist: Dennis W. Herman
Education: B.S. Biology, Western Carolina University
Experience: Retired - NCDOT, Natural Environment Section, Biological Surveys Group, June 2014; environmental Program Consultant, NCDOT, August 2004 - June 2014 coordinator of Living Collections, NC Museum of Natural Sciences, June 1996 – August 2004; assistant Curator of Herpetology, Zoo Atlanta, 1981-1996; senior Zoo Keeper of Herpetology & Mammals, Atlanta Zoological Park, 1972-1981
Expertise: Section 7 investigations, protected species (terrestrial/aquatic) surveys, bog turtle & mountain bog specialist, ecological studies, rare plant identification, and reptile and amphibian surveys; permitted to survey for the State and Federally Threatened Bog Turtle

Biologist: John M. Alderman
Education: B.A. Interdisciplinary Studies Program, Emphasis in Ecology and Taxonomy, The University of North Carolina, Chapel Hill, N.C., 1977
Experience: Retired – N.C. Wildlife Resources Commission Nongame & Endangered Wildlife Program biologist, 1984-2001; N.C. Department of Transportation Environmental Scientist, 2002-2003; President of Alderman Environmental Services, Inc. since 2003; over 30 years of experience conducting endangered and threatened species conservation activities including consultations pursuant to Section 7 of the Endangered Species Act (ESA); have lead and conducted hundreds of endangered species surveys throughout a multi-state area of the United States since 1988 (thousands of miles of creeks and rivers surveyed)
Expertise: Survey and taxonomic expert for numerous federally listed, candidate, or species of concern aquatic taxa; since 1988, member of 3 NC Wildlife Resources Commission Scientific Councils charged with state listings of Crustacea (1991-2005), fish (1989-2005), and mollusks (1988-present); federal permit to survey for 50 federally listed species throughout the Southeast United States; state permits acquired since 1990 for surveying state and federally listed species in Illinois, Indiana, West Virginia, Virginia, South Carolina, Georgia, and Texas

Biologist: J. Logan Williams
Education: PhD, Forestry, Department of Forestry and Natural Resources, NC State University, 2008
M.S., Entomology, Department of Entomology, NC State University, 1994
B.A., Philosophy, Department of Philosophy and Religion, NC State University, 1981

Experience: Retired – N.C. Department of Transportation, environmental supervisor/biological surveys group leader, 2002-September 2012; managed all activities of Biological Surveys Group; conducted complex project studies/surveys and provided information with respect to natural resources, flora and fauna, plant communities, threatened and endangered species, benthic sampling, and aquatic surveys as required by NEPA and/or Endangered Species act; conducted surveys for freshwater mussels throughout the state; oversaw the management of T&E roadside plant populations and mitigation sites; conducted ongoing shorebird habitat/food availability assessments associated with sandbag placement and Bonner Bridge replacement on Pea Island National Wildlife Refuge; conducted and/ or supervise Submerged Aquatic Vegetation (SAV) surveys in coastal waters; conducted and coordinated surveys for US Forest Service Sensitive and Species of Concern; provided information on aquatic and terrestrial ecology and botany; assessed indirect (secondary) and cumulative impacts to protected species and their habitats

Expertise: Survey and taxonomic expert for numerous federally listed, candidate, or species of concern taxa; since 1995, member of NC Wildlife Resources Commission Scientific Council charged with state listings of mollusks; invertebrate taxonomic expert

Biologist: Joseph D. Alderman

Education: B.S., Fisheries and Wildlife Science, NC State University, 2009

Experience: Alderman Environmental Services, Inc., V.P. Field Operations/Biologist; has completed hundreds of surveys for federally listed species and species of concern throughout a multi-state area

Expertise: Survey and taxonomic expert for numerous federally listed, candidate, or species of concern taxa; federally permitted to survey for 7 listed fish and mussel species throughout a multi-state area of the Southeast; NC Wildlife Resources Commission permit to survey for all bat species, including federally listed species, throughout North Carolina; assisted bat species expert, Chris McGrath, during 2013 with the I-26 corridor bat survey (included Blue Ridge Parkway project area)

Biologist: David L. Penrose

Education: Bachelor of Science, Northern Michigan University, 1972
Master of Public Health, University of Michigan, 1975

Experience: Environmental Biologist II. North Carolina Division of Water Quality, Water Quality Section from 1976-1999. Environmental Biologist III. North Carolina Division of Water Quality. Wetlands/401 Certification Unit from 1999-2004. Faculty NSCU Water Quality Group from 2004-2008.

Expertise: Use of stream/river benthic macroinvertebrates to determine water quality. Much of this work dealt with the establishment of standardized collection methods, effective metrics for assessment and biological classification protocols. Projects

include investigations of both point source problems (organics, toxics) and non-point runoff (agriculture, urban, mining, construction, silviculture). Served on Natural Area Protection Planning Committee and Outstanding Resource Water Nomination Group. Involved with the technical review of stream restoration projects in North Carolina. Assessing the successful implementation of ecological functions within restored streams. Responsibilities also included determination of intermittent versus perennial streams and administration of an EPA grant to determine the ecological function of intermittent streams. Technical review of 401 certification projects in NC.

Biologist: Jason York
Education: Bachelor of Science in Social Sciences, Unity College, Maine, 2004
Master of Science in Environmental Studies, Green Mountain College, Poultney, Vermont, 2010
Experience: Field Technician, Benthic Taxonomist Southeastern United States, (March 2013-present). Appalachian Land Stewards, Project Manager Pisgah National Forest, Western North Carolina (June 2010- present)
Expertise: Field collection of benthic samples as water quality indicators
Laboratory analysis and taxonomy. Non-native Invasive/Exotic plant management for US Forest Service on National Forest land. Timber Stand Improvement. Crown Touch Release. Habitat restoration. Hemlock treatment for Hemlock Woolly Adelgid. Private land and forest management planning.

Botanist: Moni Bates
Education: M.S. University of North Carolina at Greensboro (1996) Biology, Focus on Botanical Conservation M.A.T. University of North Carolina at Chapel Hill (1982) Science Education B.S. Iowa State University (1978) Biology
Experience: Alderman Environmental Services, Inc. - 2013 - present
North Carolina Zoological Park - 2005 to present, Guilford College - 2008 to present, North Carolina State Property Office and Local Land Trusts - 2004 to present, United States Forest Service - 1997 to present, North Carolina Natural Heritage Program - 1994 to present
Expertise: Conduct biological site surveys on private lands, write natural area management plans to guide habitat restoration, update North Carolina Natural Heritage Program element occurrence records for rare plant populations, monitor rare plants on protected lands and search for new populations of rare species, implement habitat restoration for rare plants and natural communities.

Investigator: Chris Hopper
Education: B.S. Natural Resource Mgmt. & Engineering, 1997
Experience: Senior Scientist, Carolina Ecosystems, Inc. 2015-Present
Senior Scientist/Project Professional, Kleinfelder Southeast 2012-2015
Environmental Officer, Chatham County 2011-2012

Robert J. Goldstein & Assoc. 1998-2011
Expertise: Wetland delineation, natural communities assessment, NEPA documentation, Section 7 field investigations and consultation documentation, protected species surveys

Investigator: Greg Price, PWS
Education: M.S. Biology, 1989
Experience: NCDOT Division 6 Environmental Specialist, 2018-present
Senior Scientist, Carolina Ecosystems, Inc., 2016-2018
Natural Resources Specialist, Froehling & Robertson, 2015-2016
Environmental Specialist, NCDOT-NES, 2006-2015
Senior Biologist, Buck Engineering, 2000-2006
Water Quality Specialist, City of Durham, 1997-2000
Environmental Biologist, NCDWQ, 1991-1997
Expertise: Wetland delineation, natural communities assessment, NEPA documentation, Section 7 field investigations and consultation documentation, protected species surveys

VII. LITERATURE CITED

Behr, Ashlee. Ambystoma talpoideum Mole Salamander. Radford University. Available: https://animaldiversity.org/accounts/Ambystoma_talpoideum/. Accessed February 26, 2019.

Meyer, Rachelle. 2008. Hemidactylium scutatum. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: www.fs.fed.us/database/feis/animals/amphibian/hesc/all.html, [2019, February 26].

Nature Serve Explorer (http://explorer.natureserve.org)

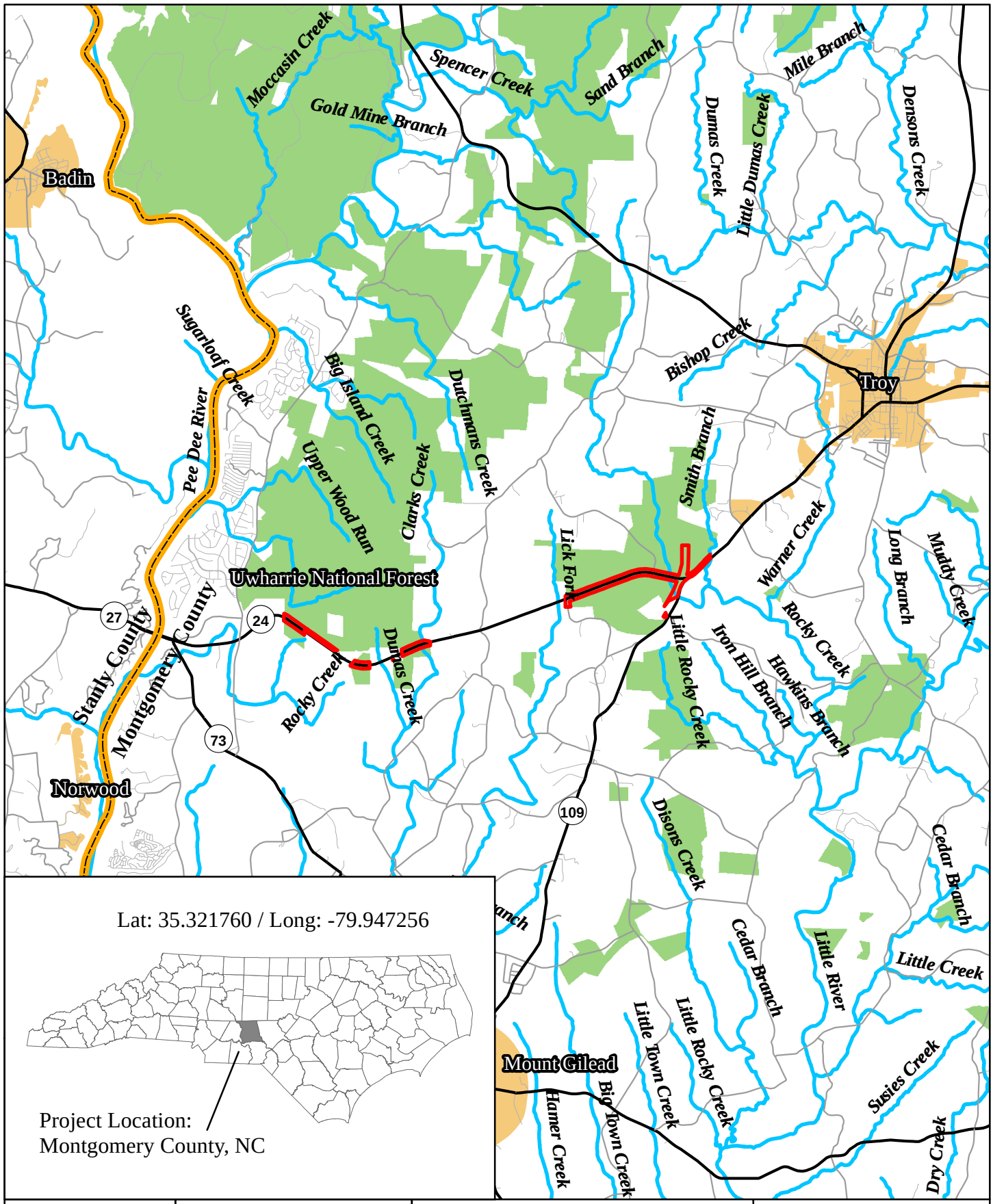
NCDOT, 2019. Draft Right-of-Way Consultation. February, 2019.

NCNHP, 2001. Moni C. Bates. Montgomery County Natural Heritage Inventory. The North Carolina Natural Heritage Program (Division of Parks and Recreation – Department of Environment and natural Resources) Raleigh, North Carolina.

NCNHP, 2012. Michael P. Schafale. Guide to the Natural Communities of North Carolina, Fourth Approximation. March 2012. North Carolina Natural Heritage Program Department of Environment and Natural Resources

Radford, A.E., H.E. Ahles, and C.R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. The University of North Carolina Press. Chapel Hill.

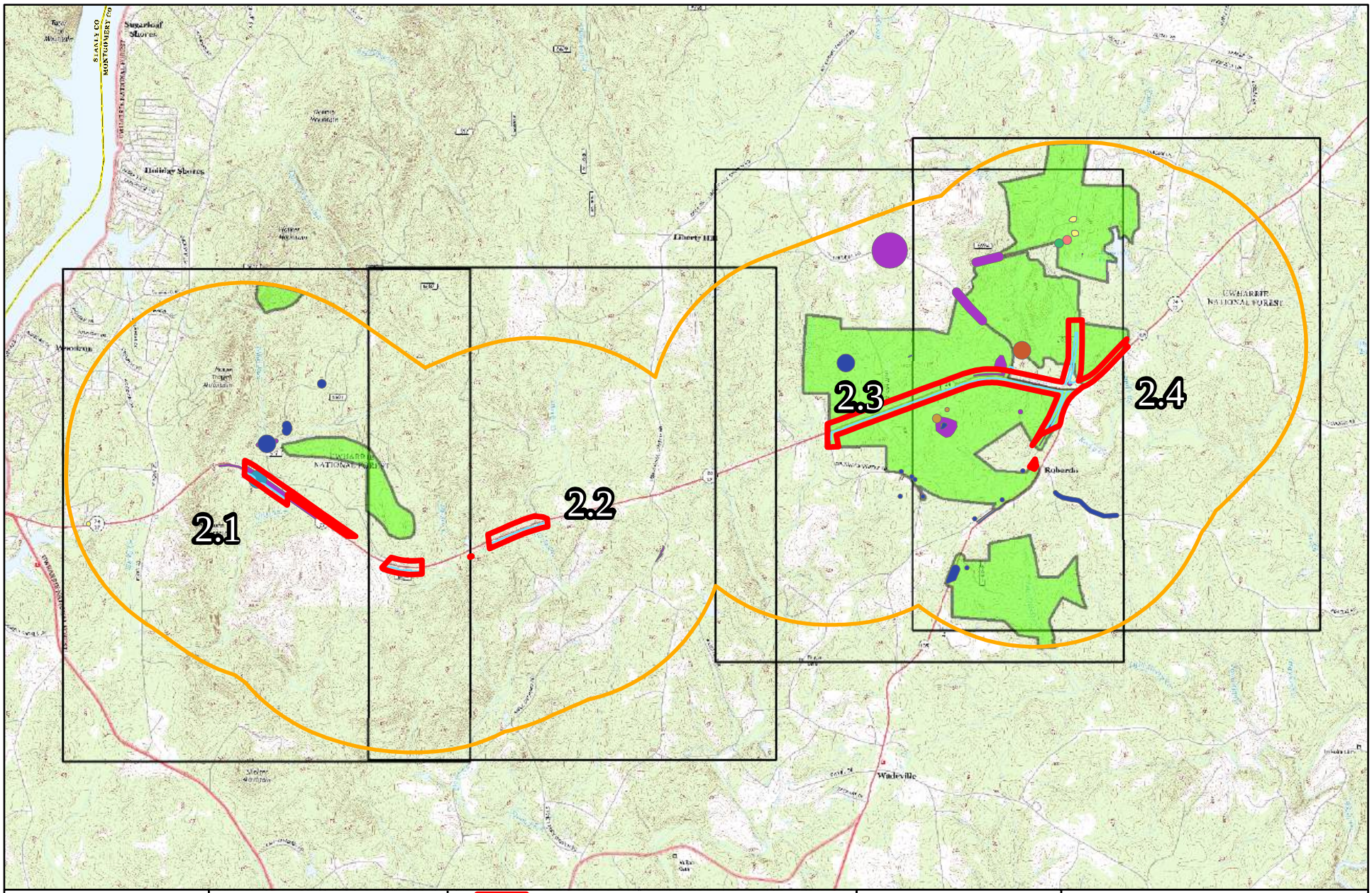
Weakley, A.S. Draft January 2012. Flora of the Carolinas, Virginia, Georgia, and surrounding areas. University of North Carolina Herbarium (NCU). North Carolina Botanical Garden University of North Carolina at Chapel Hill. Chapel Hill, NC.



February 2019

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 1: Vicinity Map



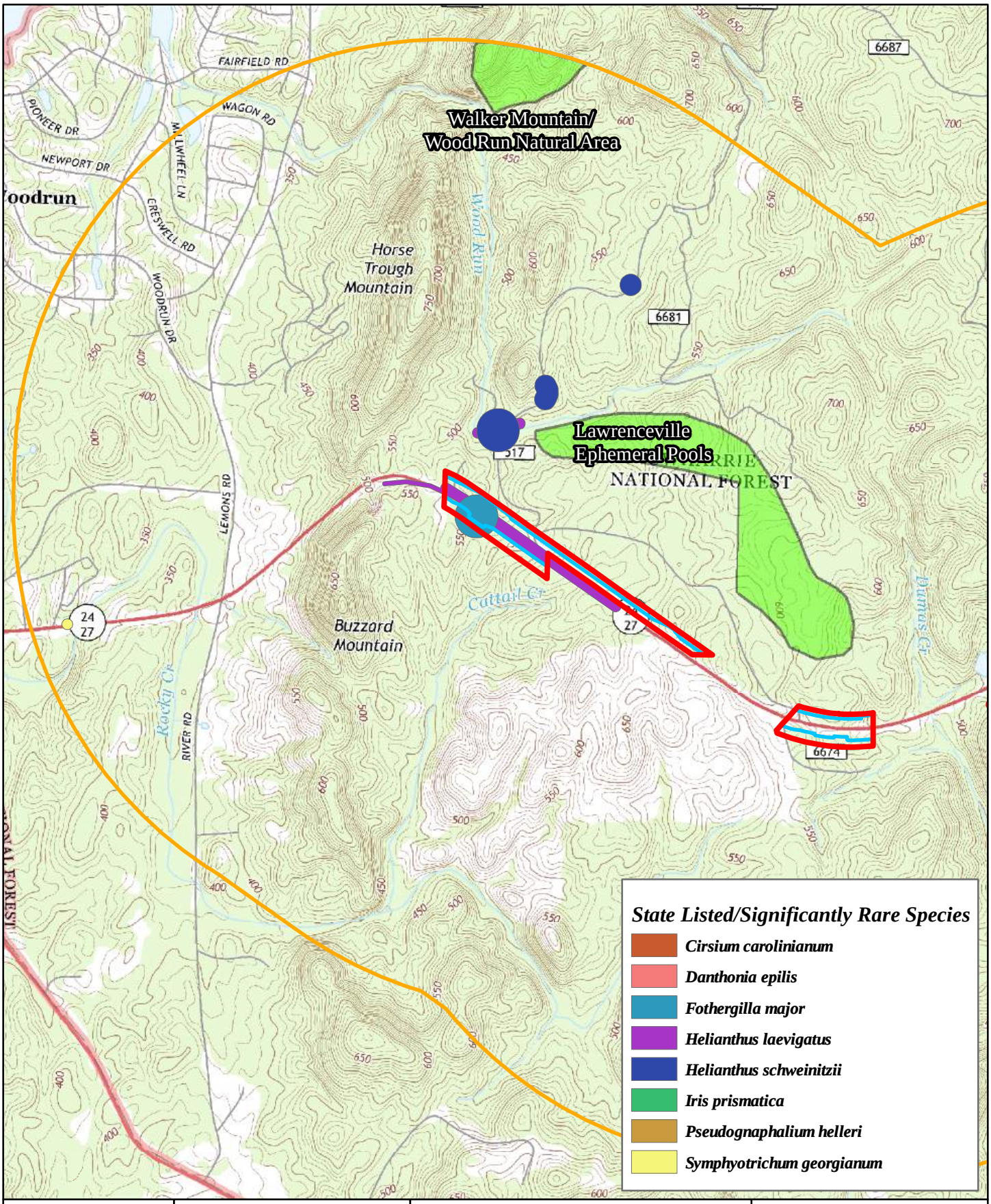
N

0 0.4 0.8 Miles

Study Area
BAA
Project Area
Sheet Limits
SNHA

Morrow Mountain (2013) and Troy (2013)
US Geological Survey 1:24,000 Quadrangle Map

Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 2.0: Biological Analysis Area, EO, & SNHA**
Revised:	



N

0 0.15 0.3 Miles

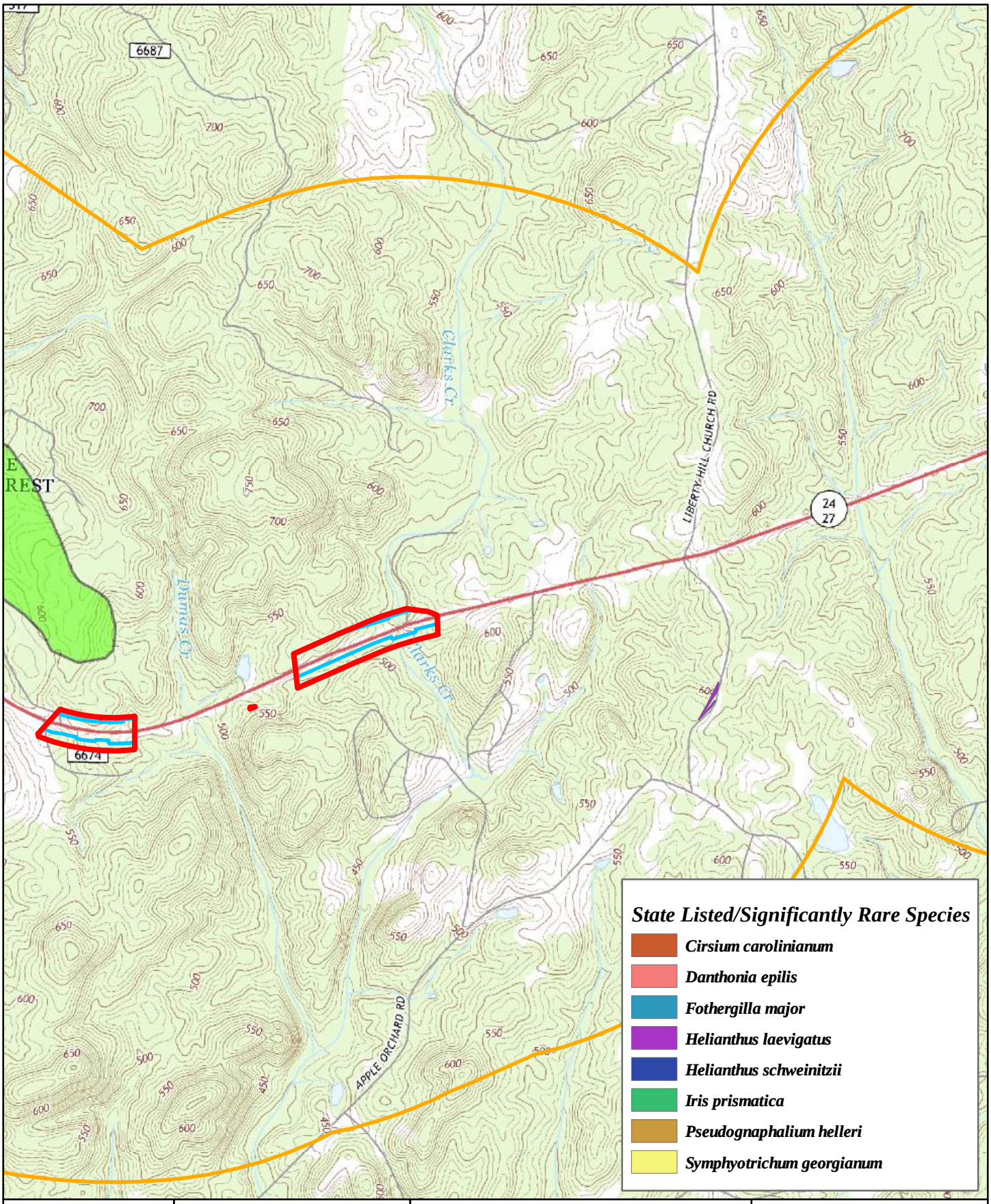
Study Area
BAA
Project Area
Significant Natural Heritage Area

Morrow Mountain (2013) and Troy (2013)
US Geological Survey 1:24,000 Quadrangle Map

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

February 2019

Figure 2.1: Biological Analysis Area, EO, & SNHA



February 2019

N

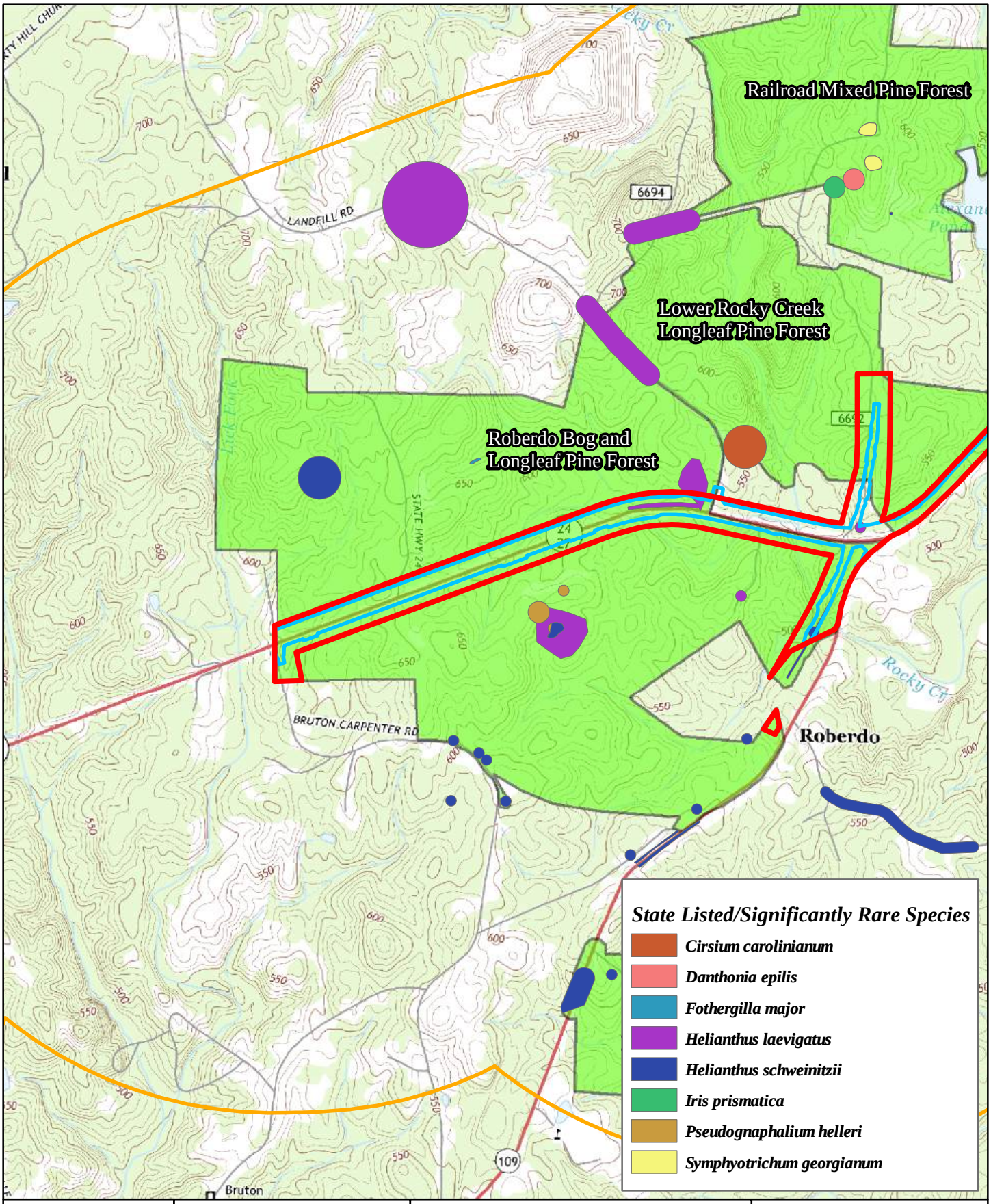
0 0.15 0.3 Miles

Study Area
BAA
Project Area
Significant Natural Heritage Area

Morrow Mountain (2013) and Troy (2013)
US Geological Survey 1:24,000 Quadrangle Map

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 2.2: Biological Analysis Area, EO, & SNHA



February 2019

N

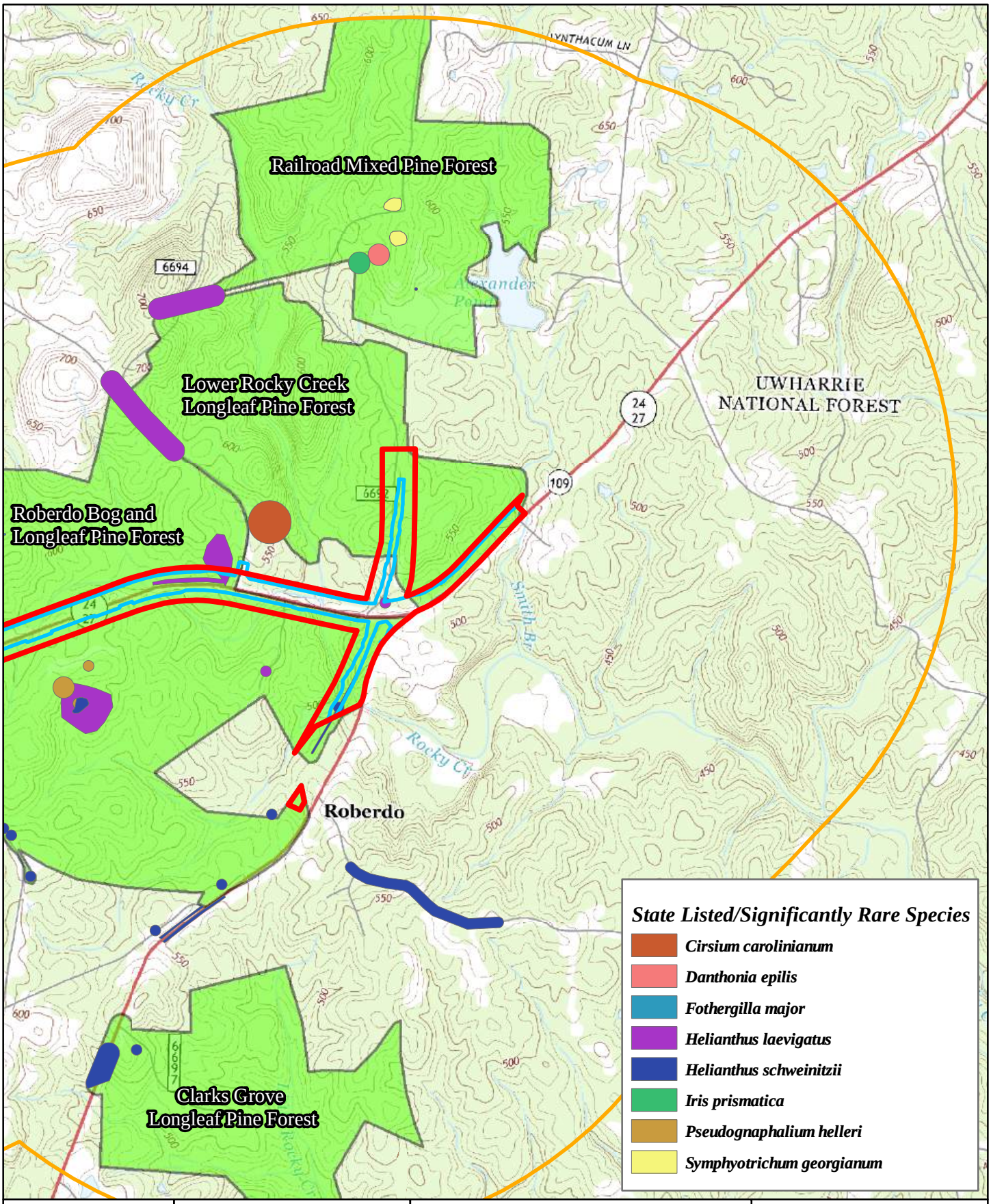
0 0.15 0.3 Miles

Study Area
BAA
Project Area
Significant Natural Heritage Area

Morrow Mountain (2013) and Troy (2013)
US Geological Survey 1:24,000 Quadrangle Map

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 2.3: Biological Analysis Area, EO, & SNHA



February 2019

N

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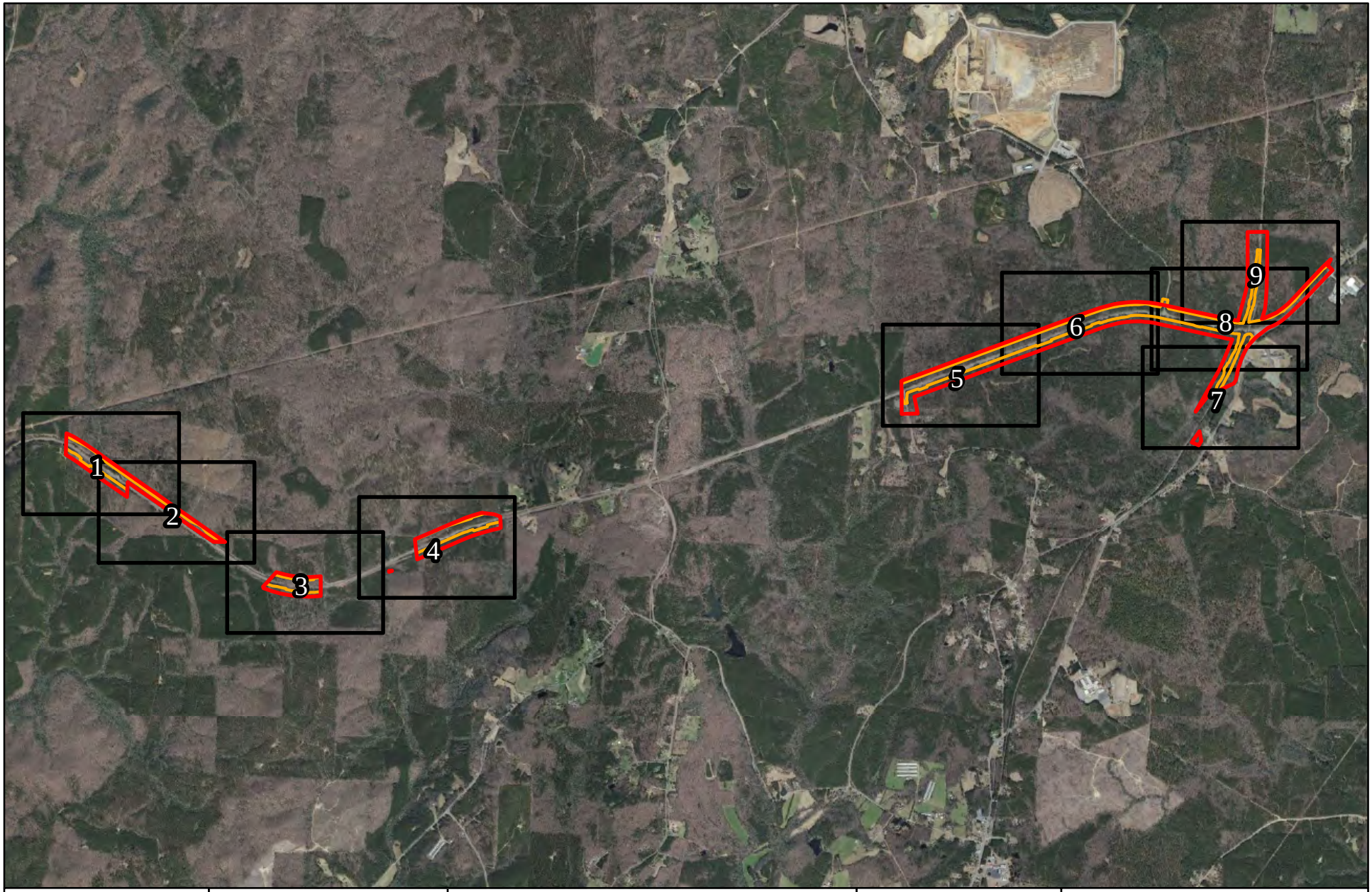
Study Area
BAA
Project Area
Significant Natural Heritage Area

Morrow Mountain (2013) and Troy (2013)
US Geological Survey 1:24,000 Quadrangle Map

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 2.4: Biological Analysis Area, EO, & SNHA



N

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Study Area 2017

Project Area 2019

Sheet Limits

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

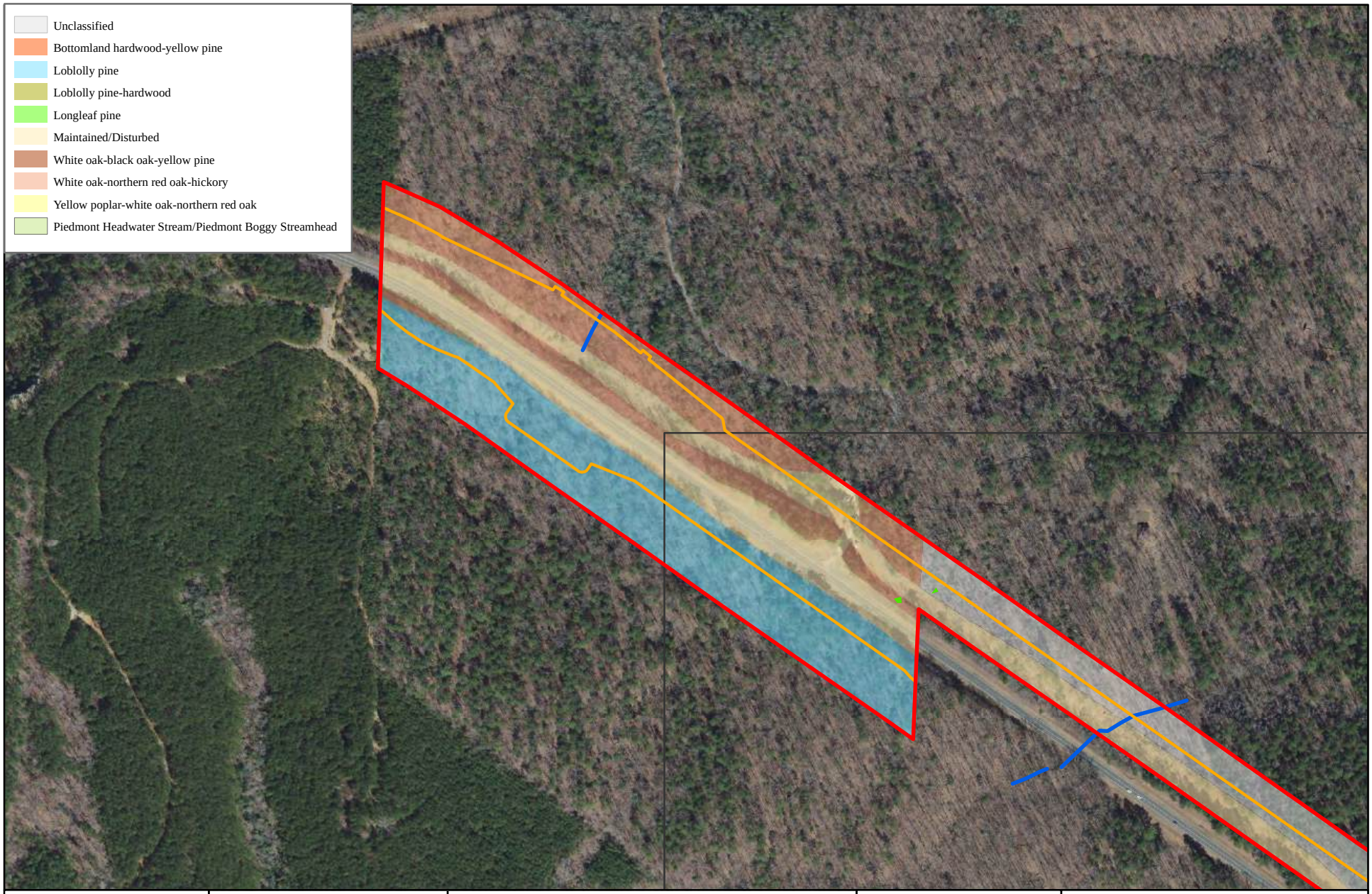
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.0:
Index Map



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017

Project Area 2019

Stream

Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.1:
Natural Communities

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

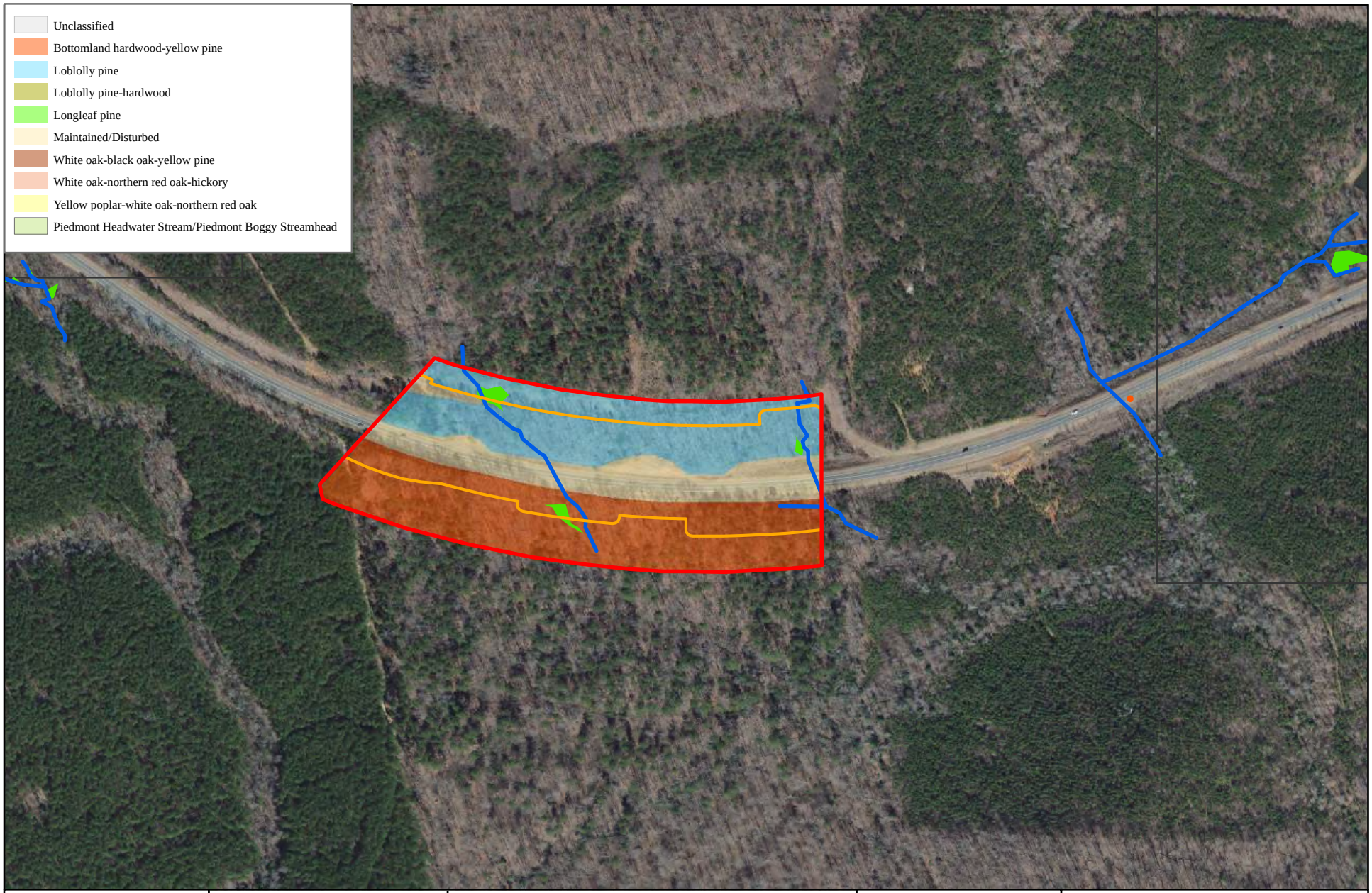
Study Area 2017
Project Area 2019
Stream
Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**
Revised:
Revised:
Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.2:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017

Project Area 2019

Stream

Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

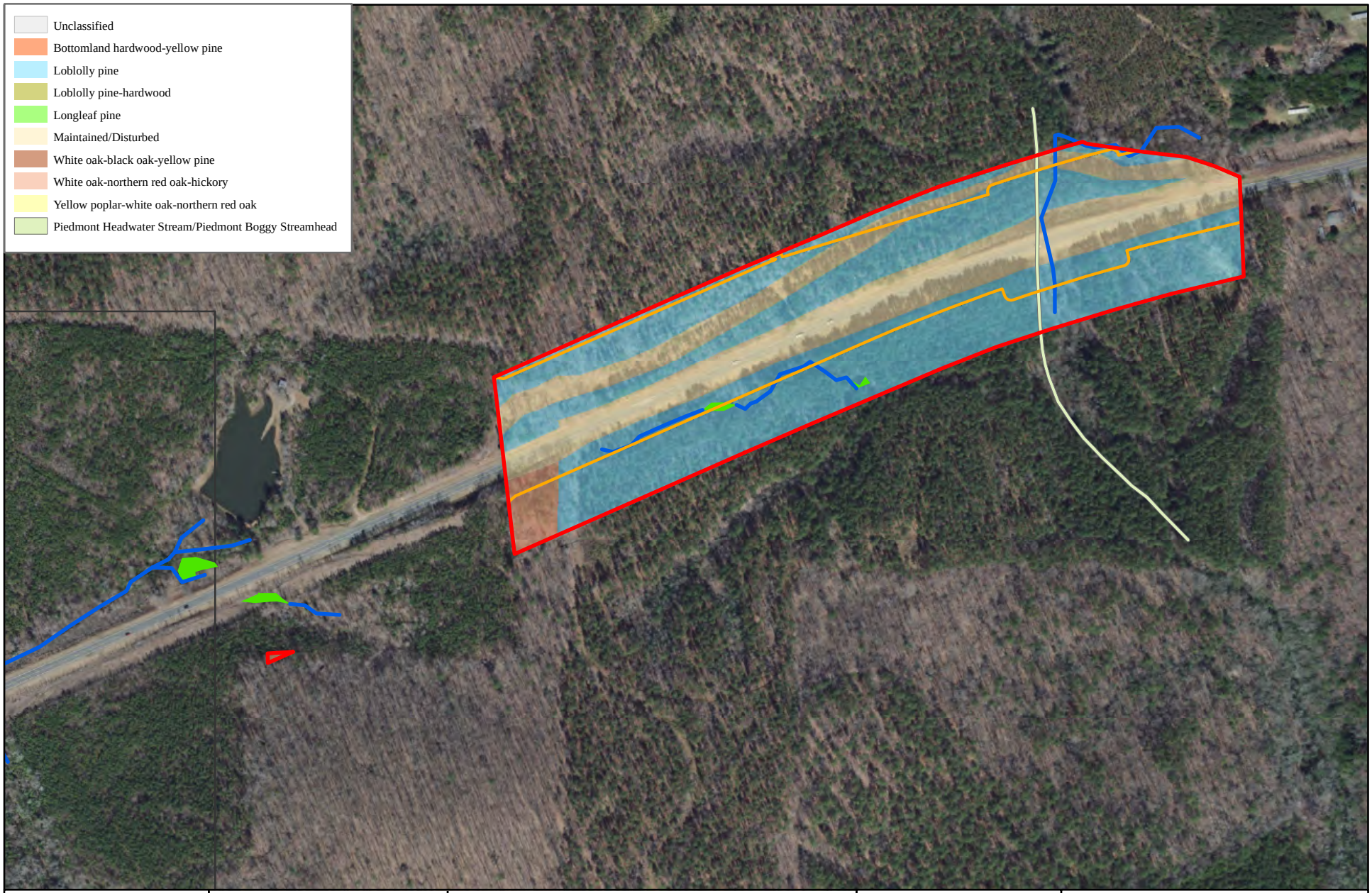
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.3:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

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Study Area 2017

Project Area 2019

Stream

Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

Revised:

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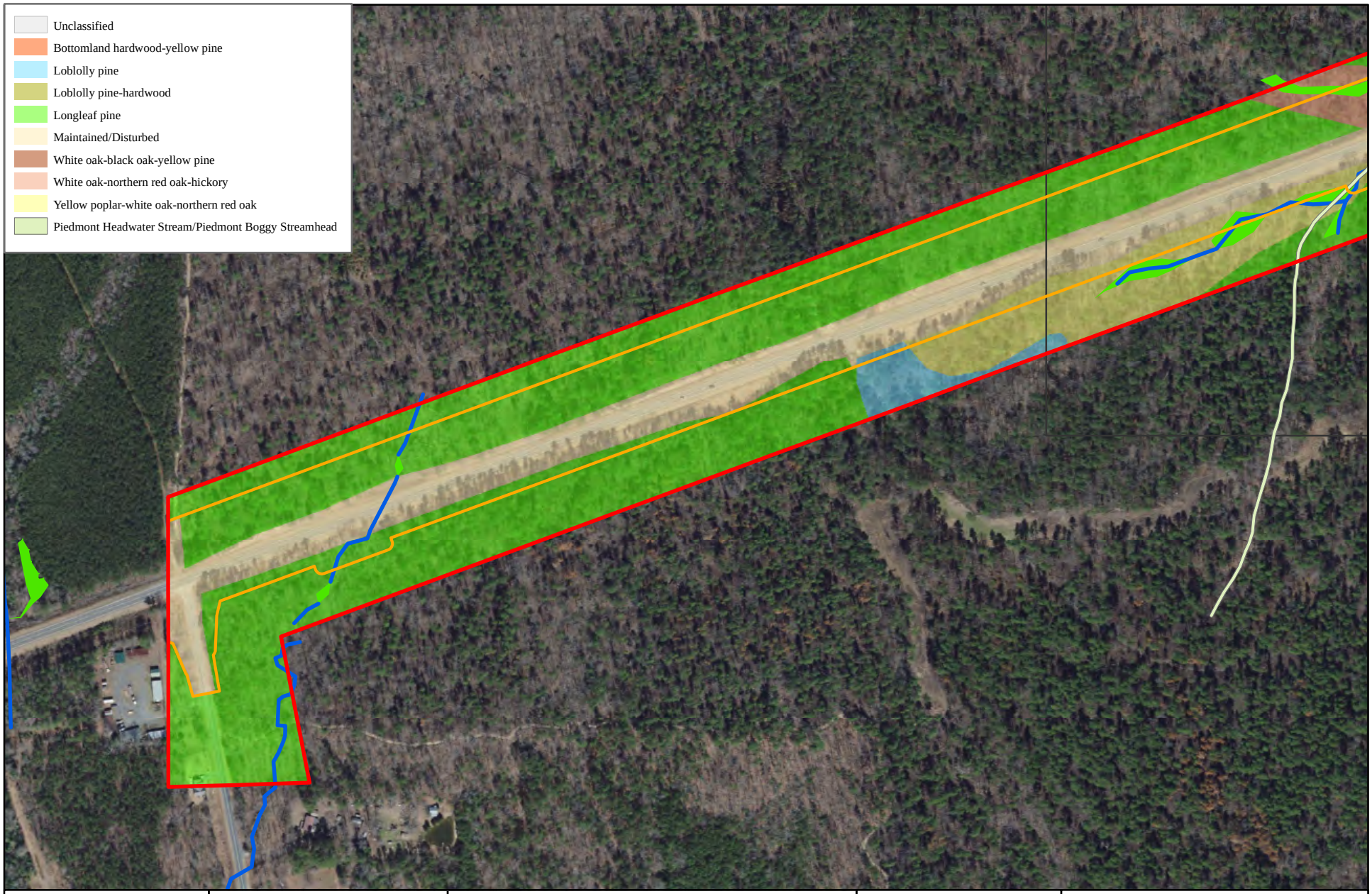
Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.4:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017
Project Area 2019
Stream
Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

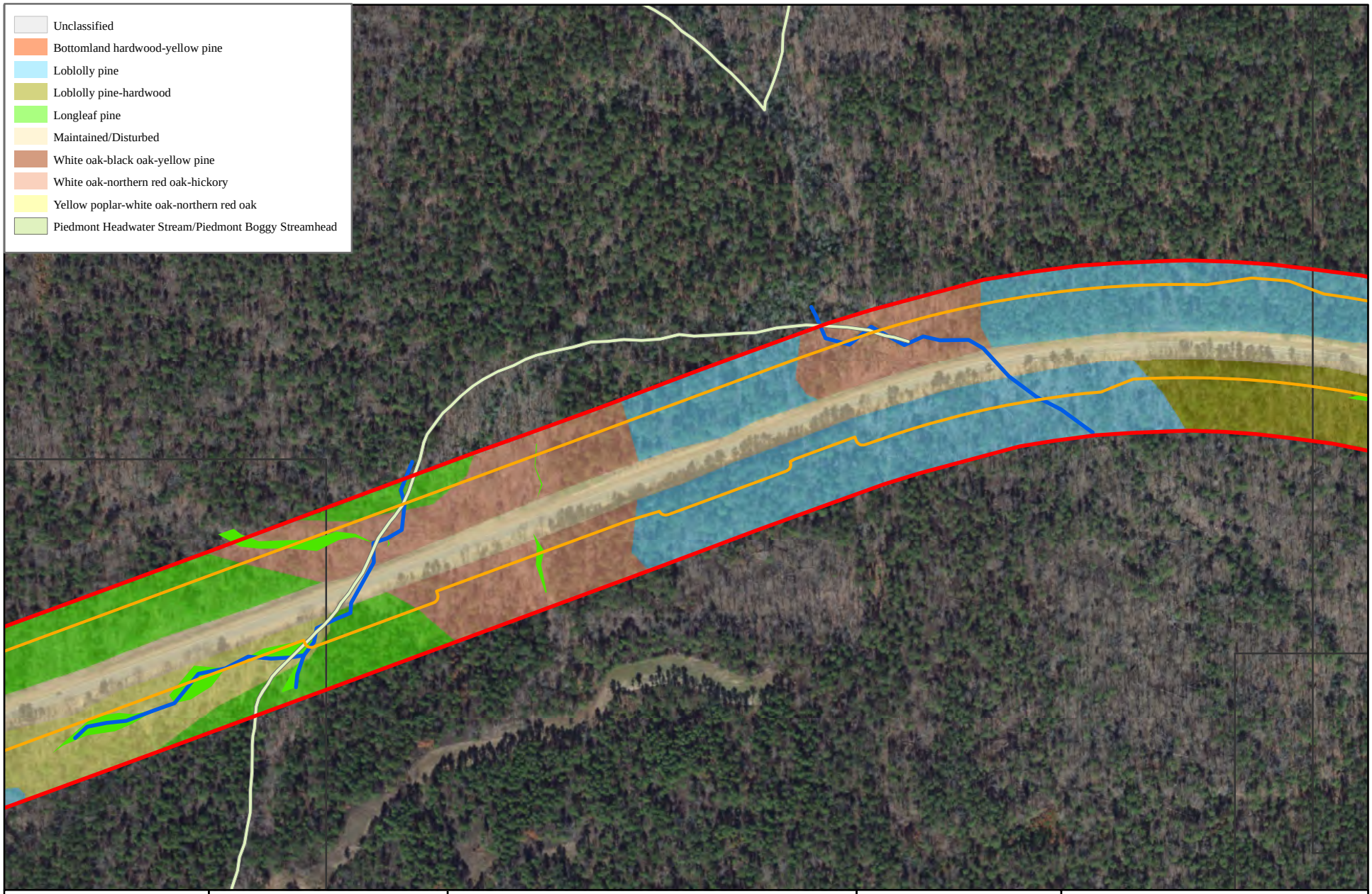
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.5:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017

Project Area 2019

Stream

Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

Revised:

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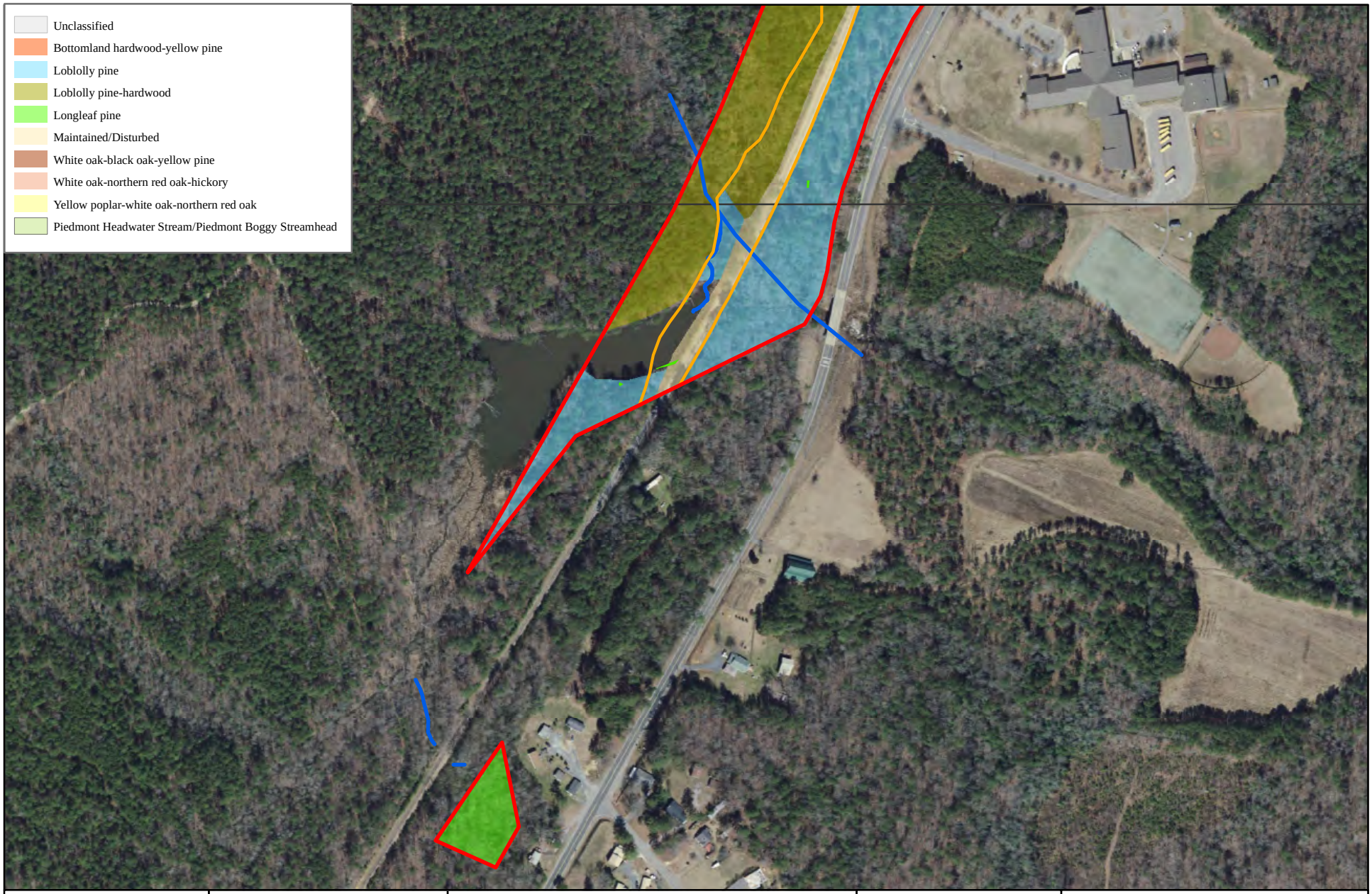
R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.6:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017
Project Area 2019
Stream
Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

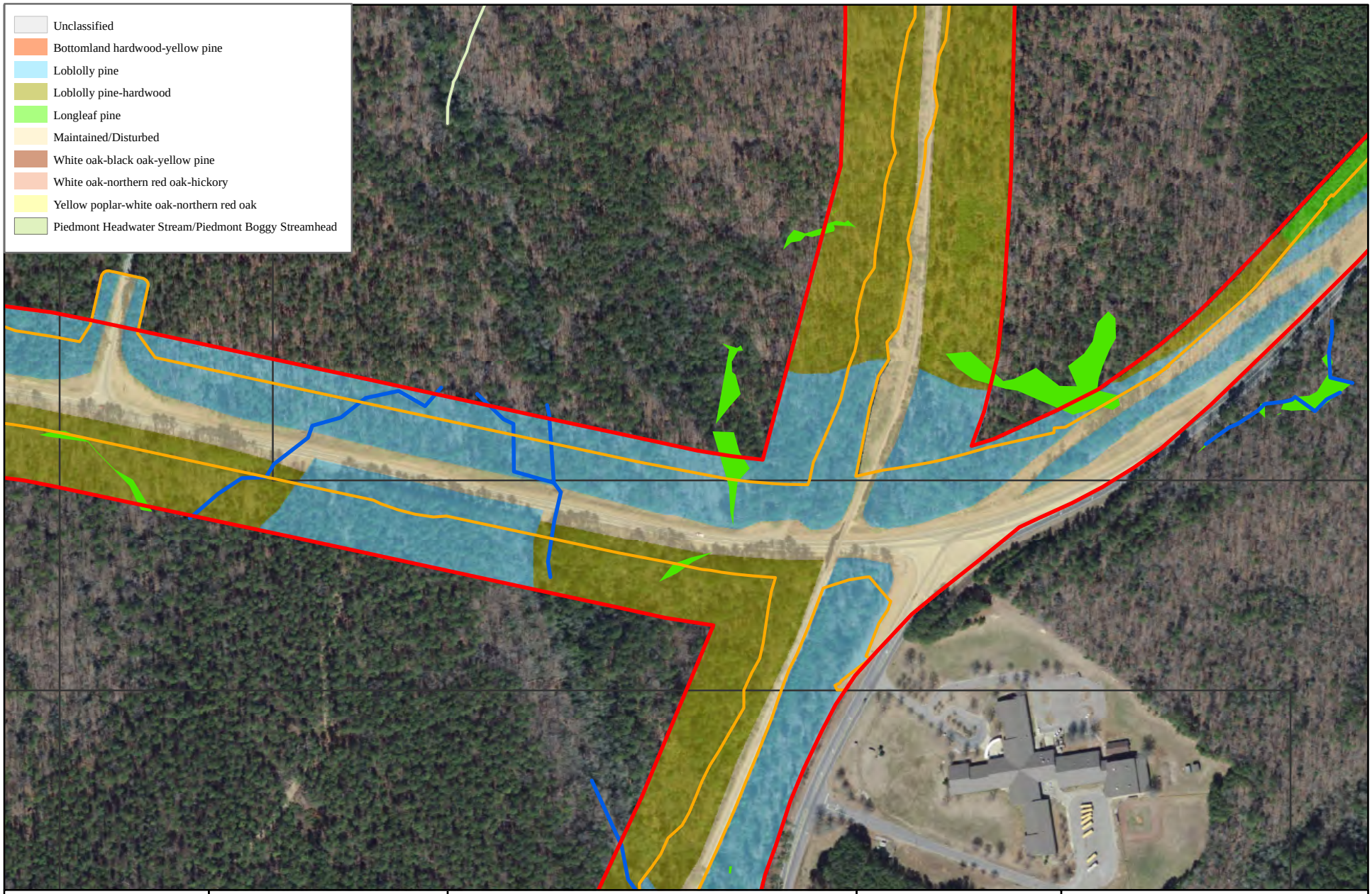
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.7:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017
Project Area 2019
Stream
Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

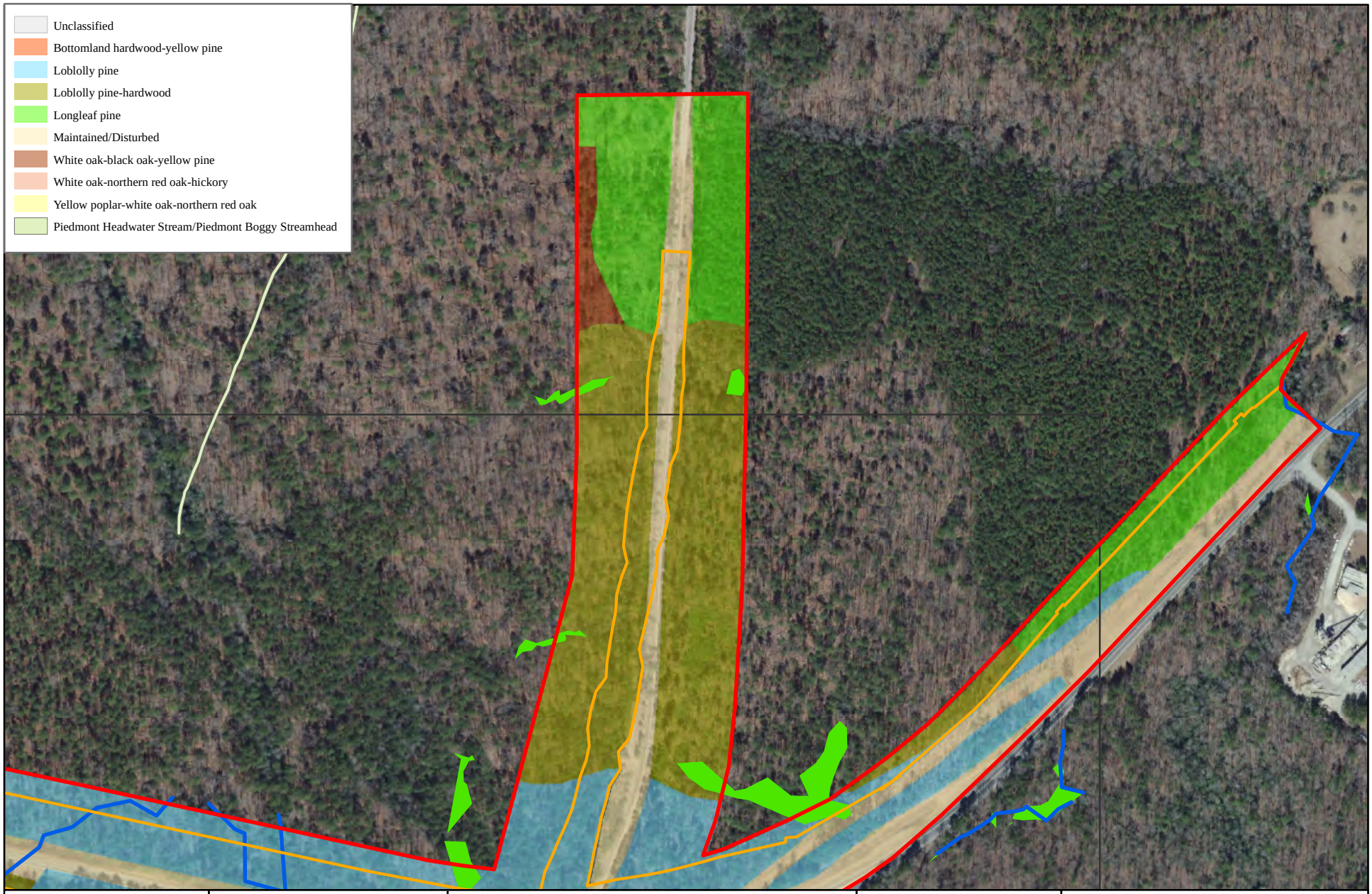
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.8:
Natural Communities



STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

N

0 200 400 Feet

Study Area 2017
Project Area 2019
Stream
Wetland

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

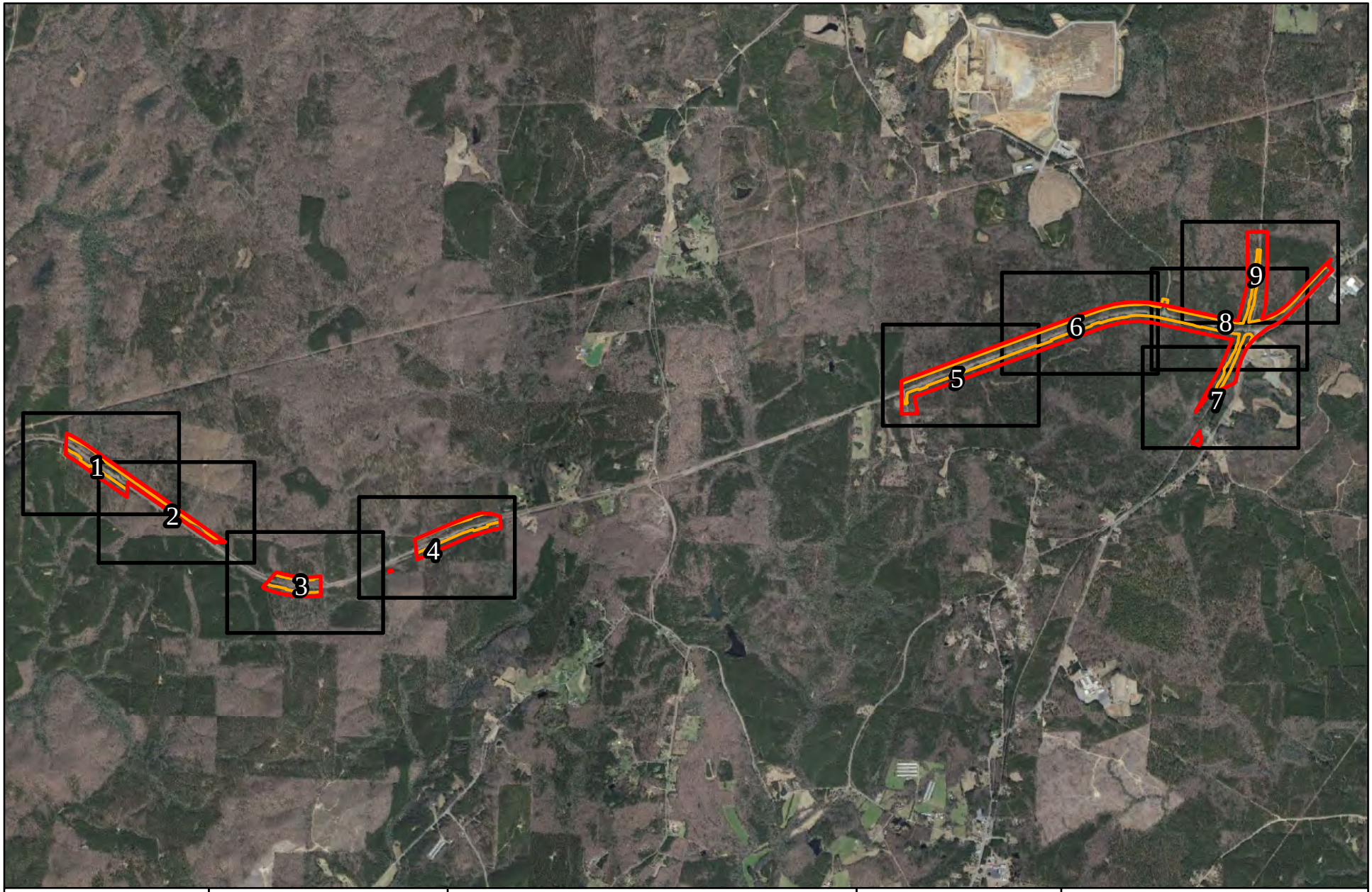
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 3.9:
Natural Communities



N

0 0.25 0.5 Miles

Study Area 2017

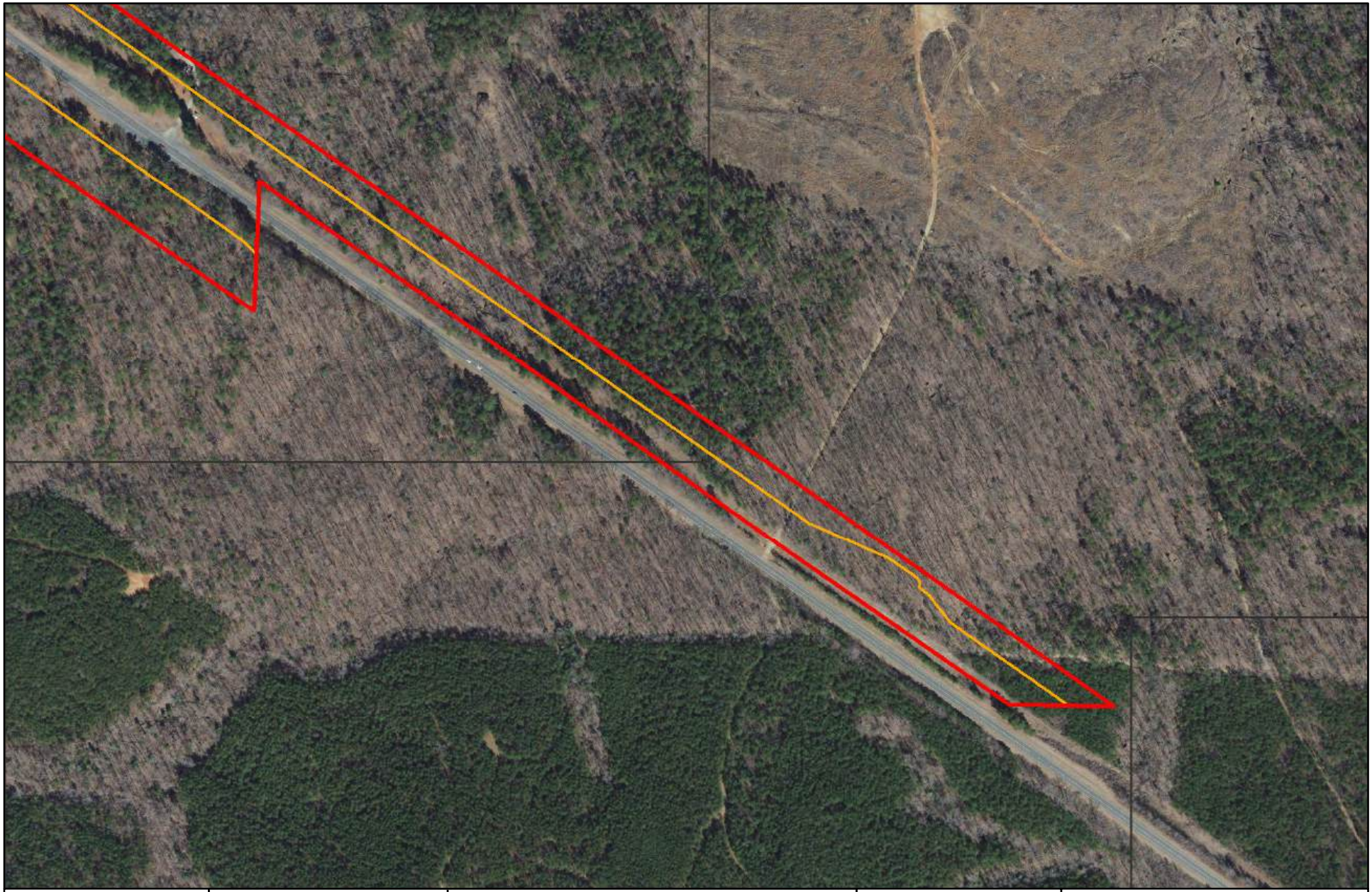
Project Area 2019

Sheet Limits

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 4.0:** **Index Map**
Revised:	

Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 4.1: Observed USFS Plant and Animal Resources**
Revised:	



N

0 200 400 Feet

Study Area 2017
Project Area 2019
Smooth Sunflower
Hellers Rabbit Tobacco
Hillside Seep
Isoetes uwharrie
Large Witch Alder
Mountain Camellia
Yellow Pitcher Plant
Timber Rattlesnake

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

Revised:

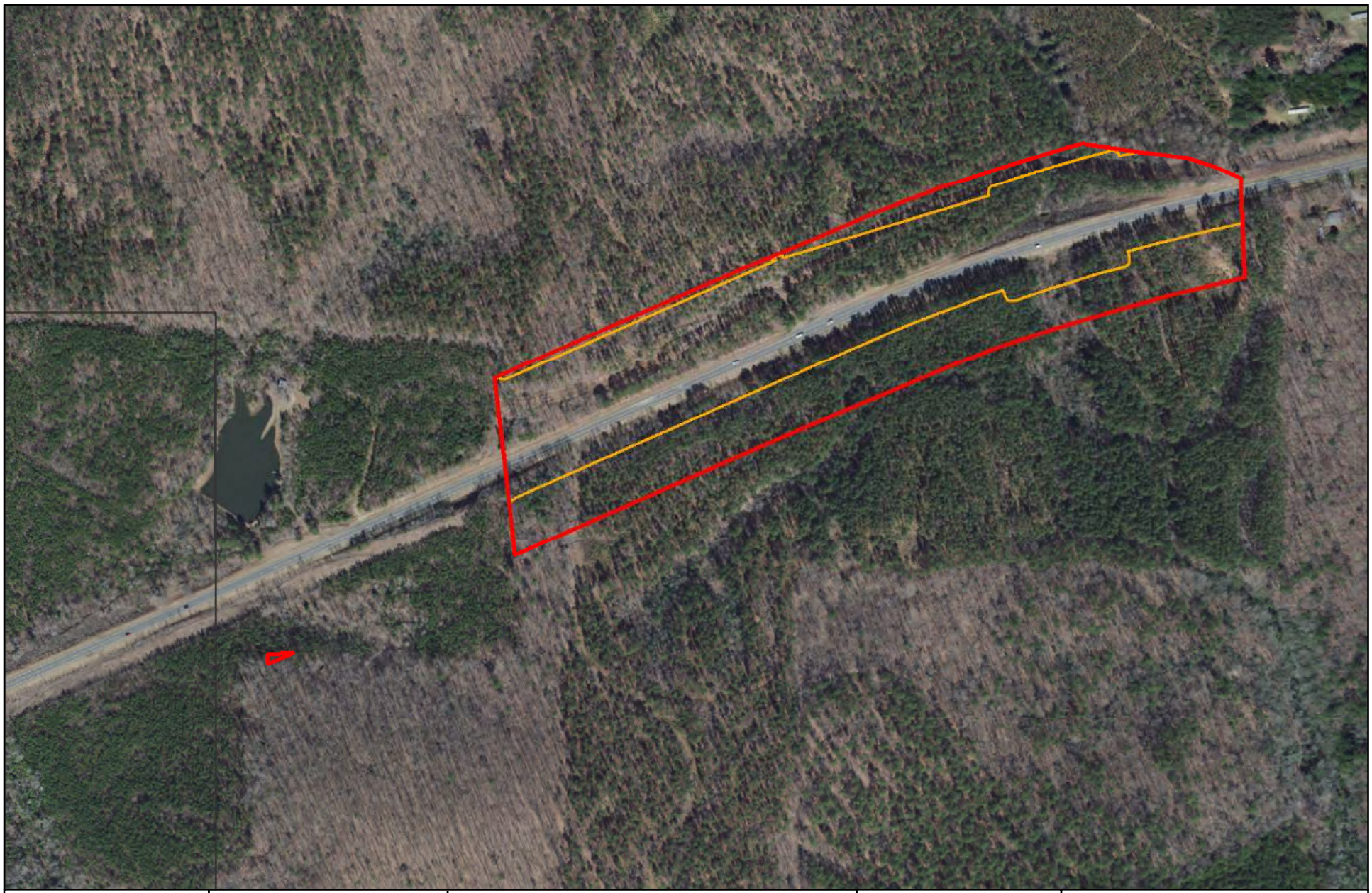
Revised:

Revised:

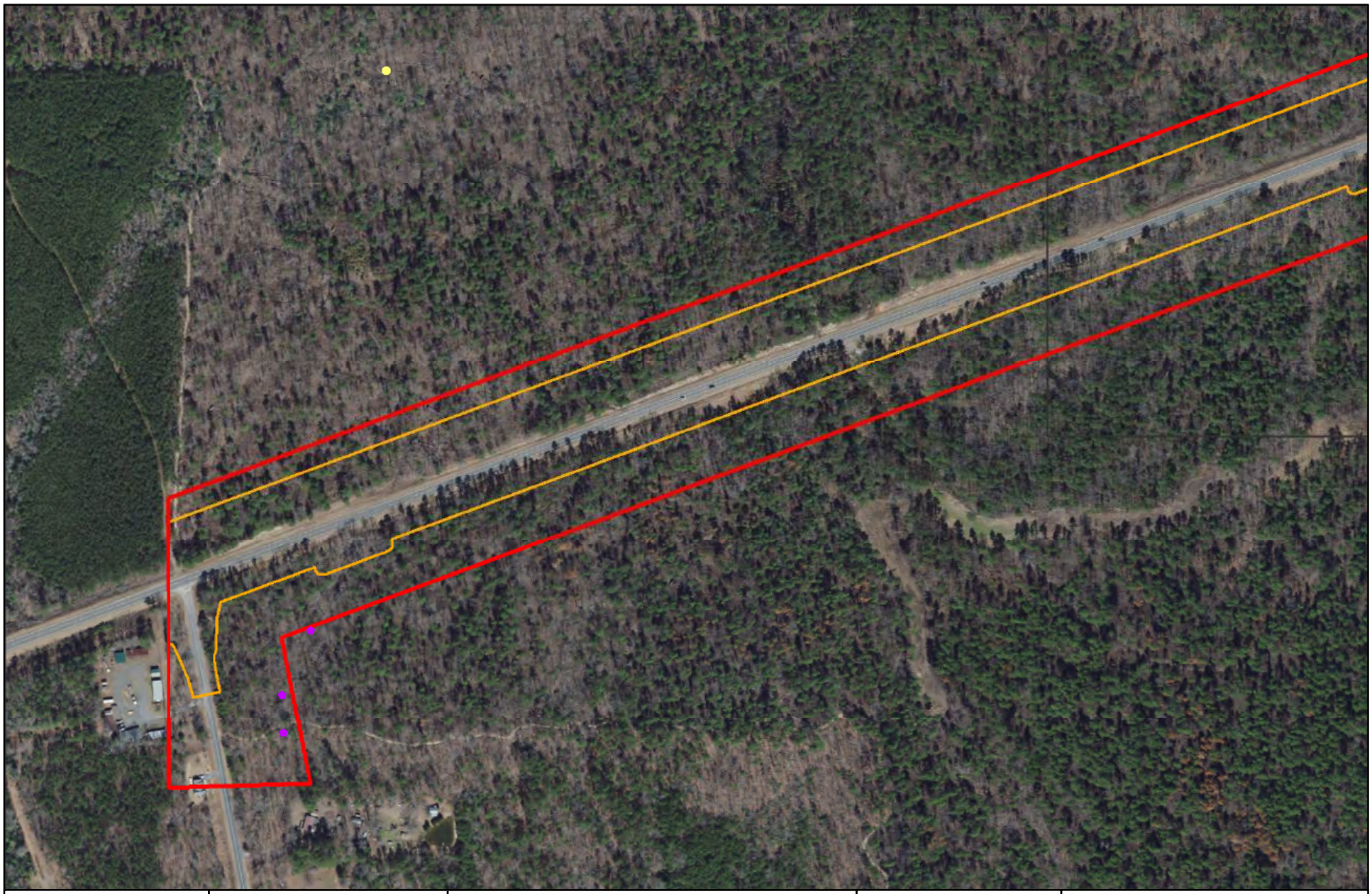
R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 4.2: Observed USFS Plant and Animal Resources

Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 4.3: Observed** **USFS Plant and Animal Resources**
Revised:	



Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 4.4: Observed USFS Plant and Animal Resources**
Revised:	



N

0 200 400 Feet

Study Area 2017
Project Area 2019
Smooth Sunflower
Hellers Rabbit Tobacco
Hillside Seep
Isoetes uwharrie
Large Witch Alder
Mountain Camellia
Yellow Pitcher Plant
Timber Rattlesnake

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

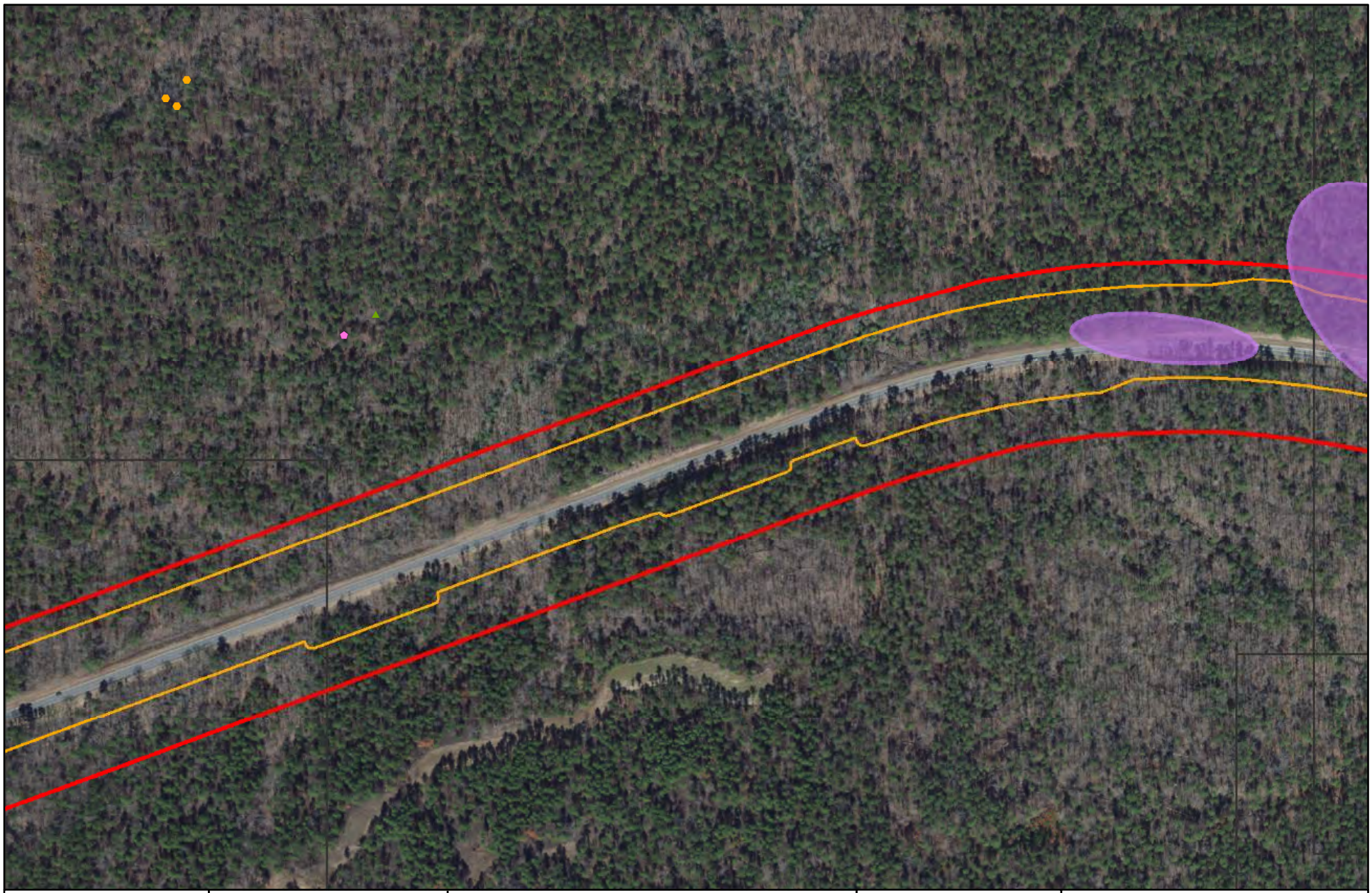
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 4.5: Observed USFS Plant and Animal Resources



N

0 200 400 Feet

Study Area 2017
Project Area 2019
Smooth Sunflower
Hellers Rabbit Tobacco
Hillside Seep
Isoetes uwharrie
Large Witch Alder
Mountain Camellia
Yellow Pitcher Plant
Timber Rattlesnake

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

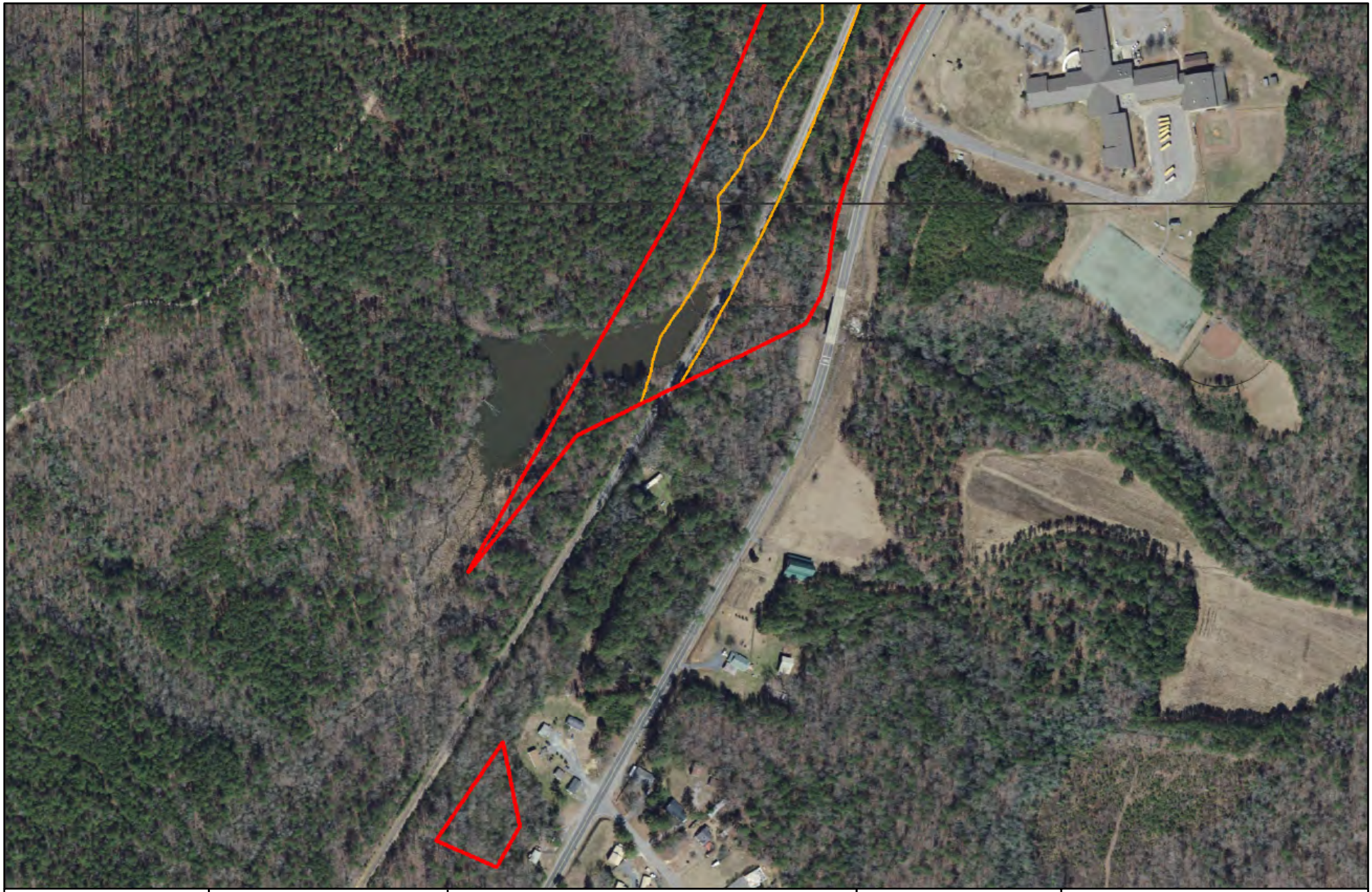
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 4.6: Observed USFS Plant and Animal Resources



N

0 200 400 Feet

Study Area 2017
Project Area 2019
Smooth Sunflower
Hellers Rabbit Tobacco
Hillside Seep
Isoetes uwharrie
Large Witch Alder
Mountain Camellia
Yellow Pitcher Plant
Timber Rattlesnake

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

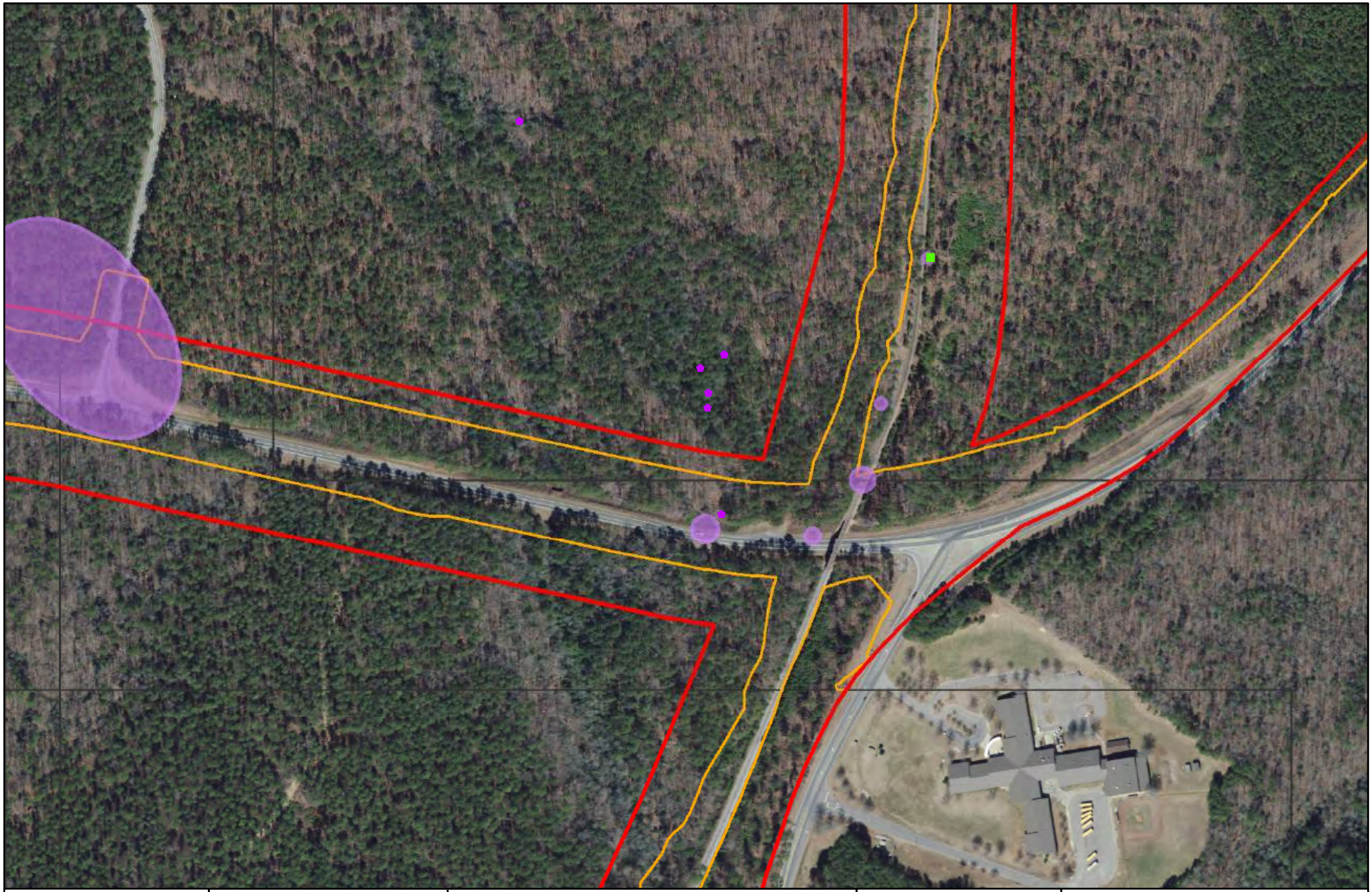
Revised:

Revised:

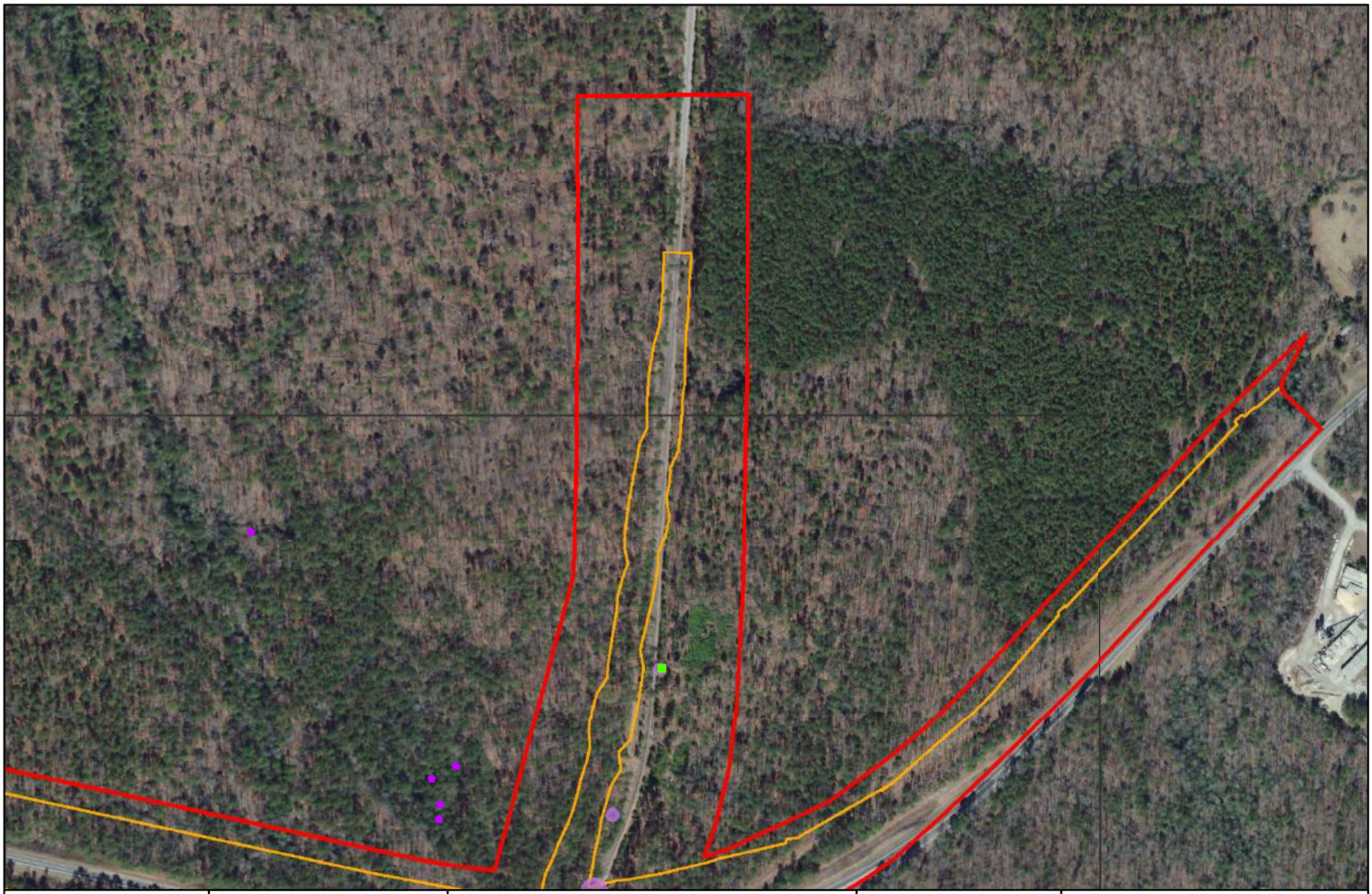
Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

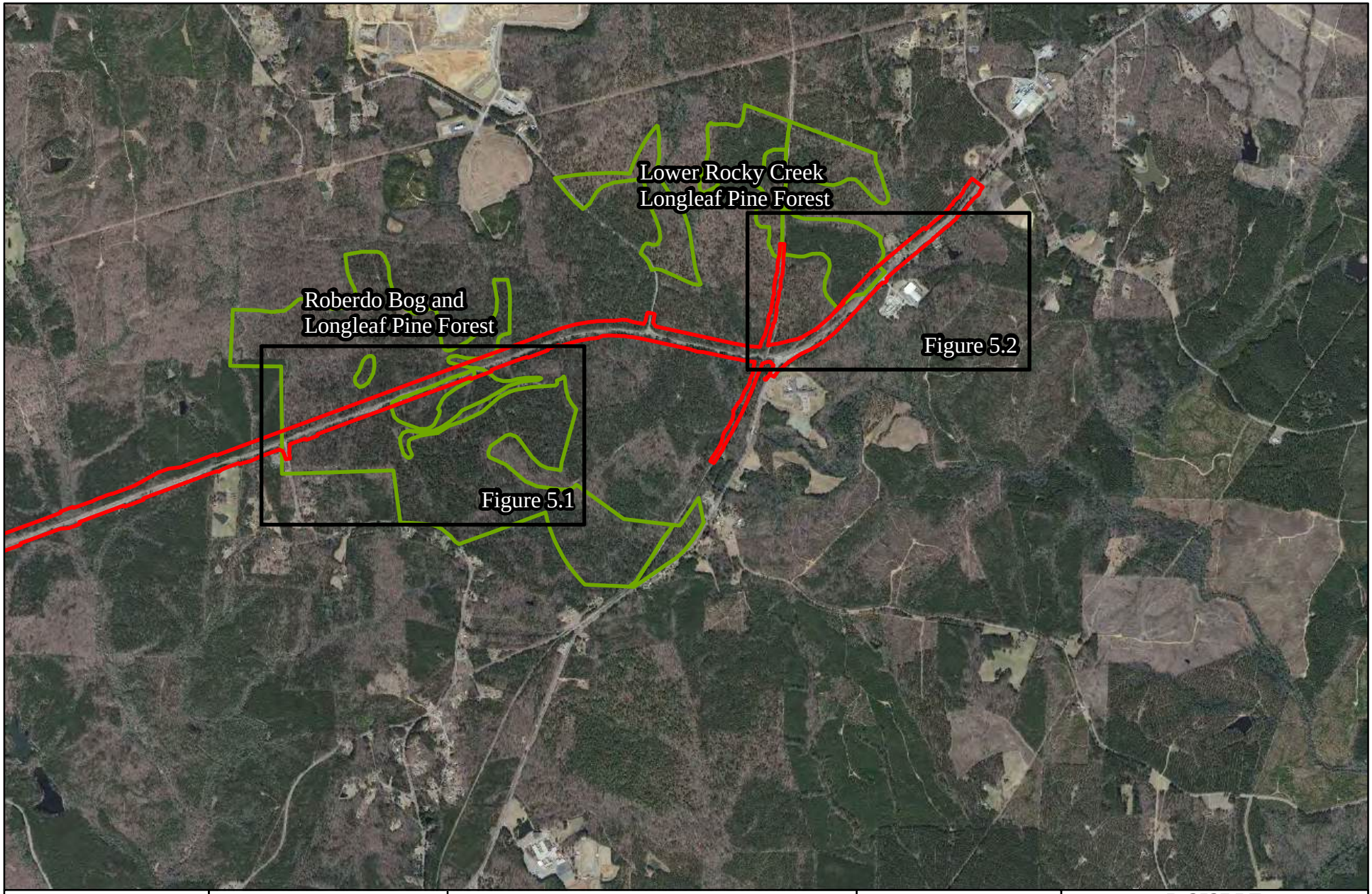
Figure 4.7: Observed USFS Plant and Animal Resources



Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 4.8: Observed USFS Plant and Animal Resources**
Revised:	



Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 4.9: Observed USFS Plant and Animal Resources**
Revised:	



N

0 0.25 0.5 Miles

Project Area

Longleaf Pine Forest

2015 NC Statewide Aerial Photographs

Map Date: **February 2019**

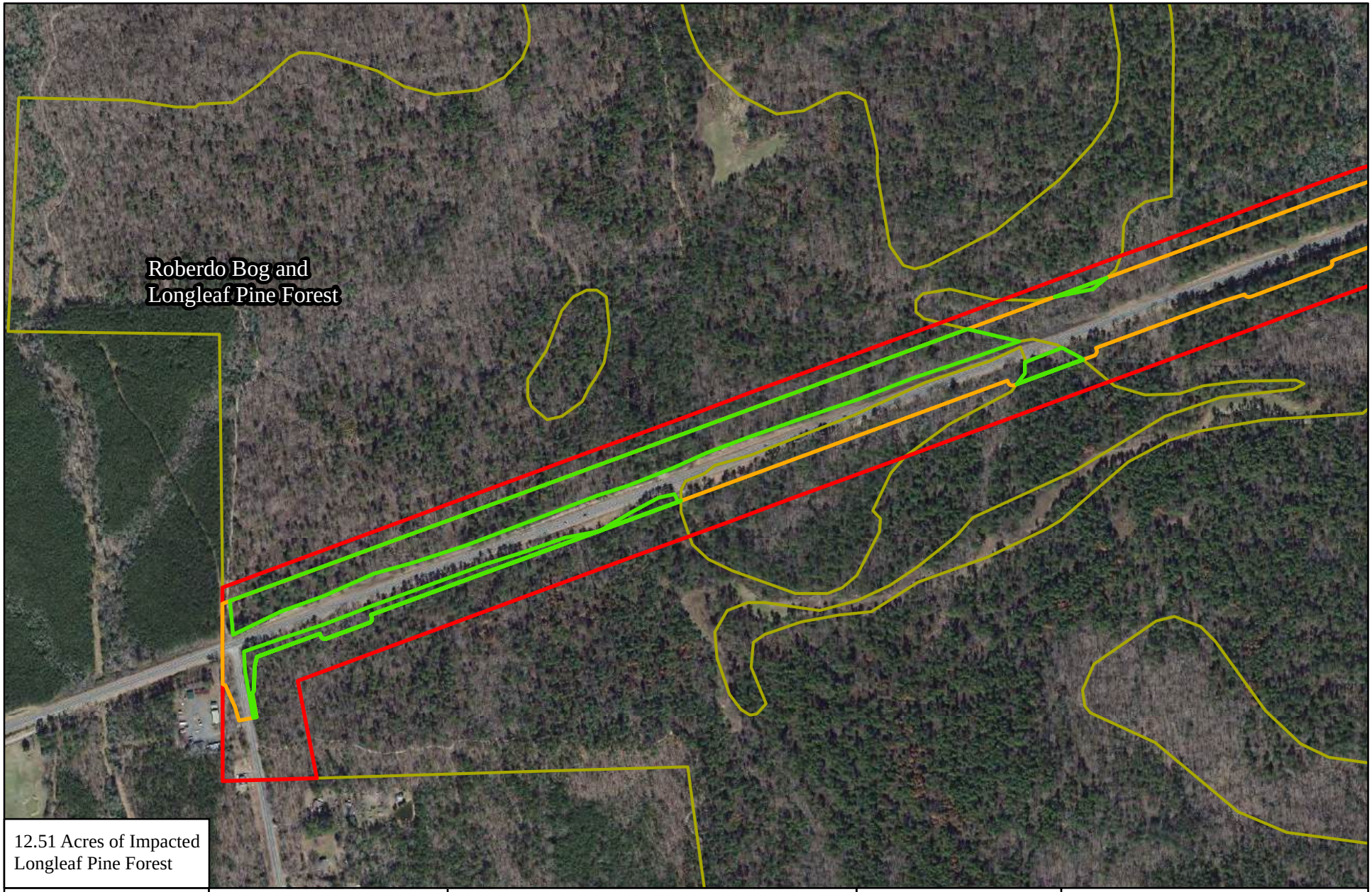
Revised:

Revised:

Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 5.0: U.S. Forest Service Longleaf Pine Stand Impacts



12.51 Acres of Impacted Longleaf Pine Forest

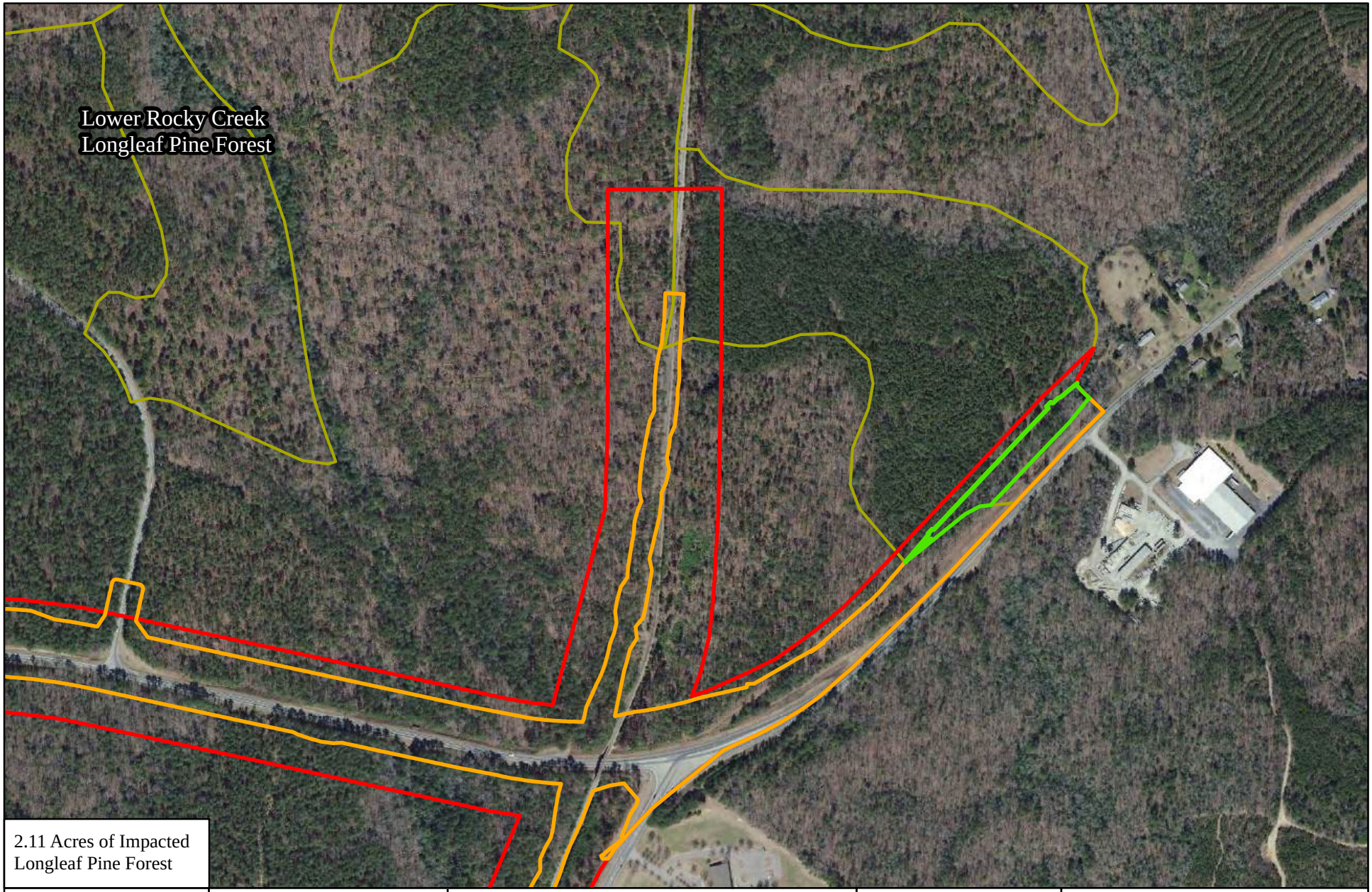
N

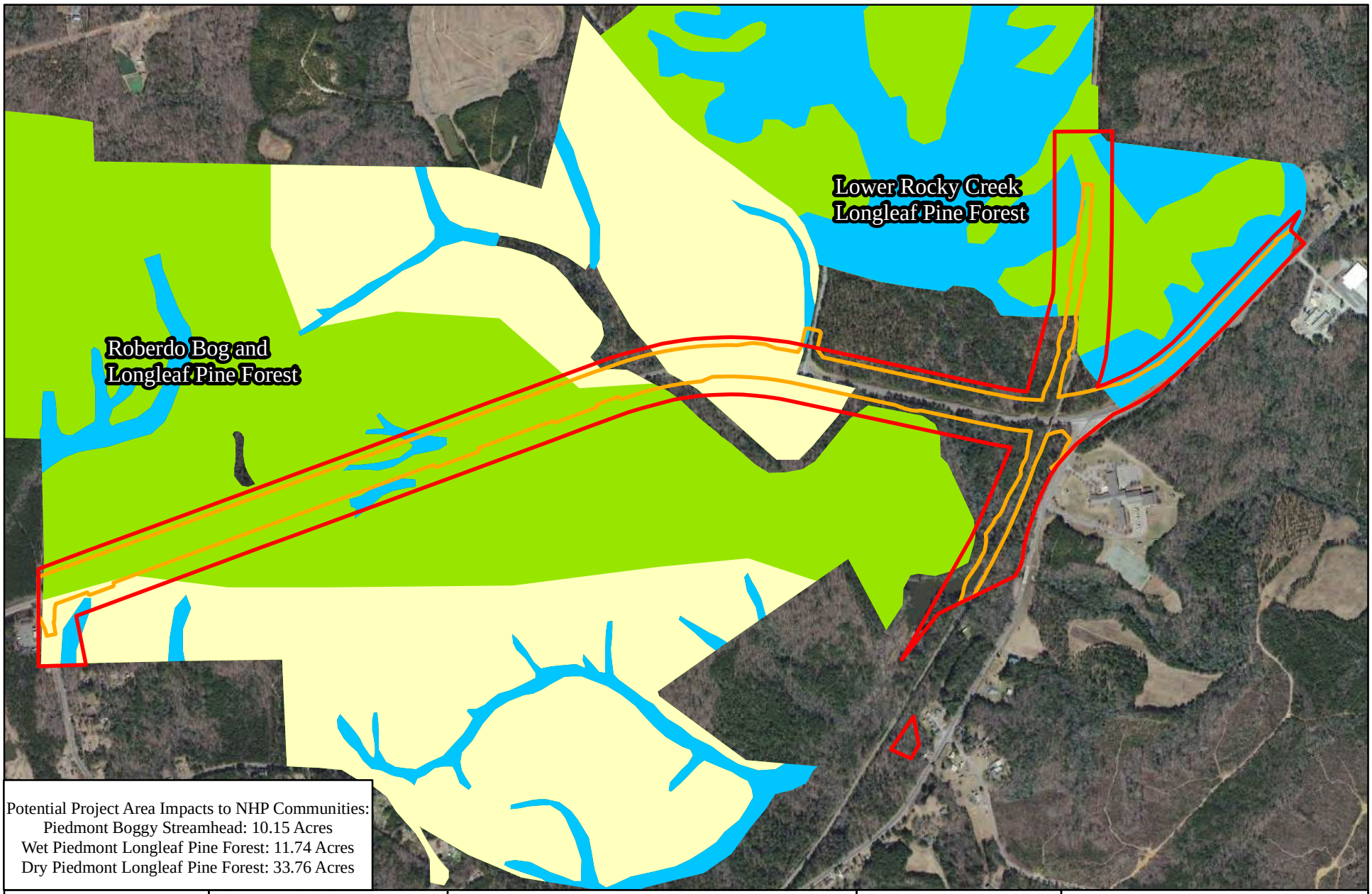
0 300 600 Feet

Study Area
Project Area
Longleaf Pine Impact Area
Longleaf Pine Forest

2015 NC Statewide Aerial Photography

Map Date: **February 2019**	**R-2527 BE** **Uwharrie National Forest** **Montgomery County, NC**
Revised:	
Revised:	**Figure 5.1: U.S. Forest Service Longleaf Pine Stand Impacts**
Revised:	


Lower Rocky Creek
Longleaf Pine Forest
2.11 Acres of Impacted
Longleaf Pine Forest
N
0
300
600
Feet
Study Area
Project Area
Longleaf Pine Impact Area
Longleaf Pine Forest
2015 NC Statewide Aerial Photography
Map Date: February 2019
Revised:
Revised:
Revised:
R-2527 BE
Uwharrie National Forest
Montgomery County, NC
Figure 5.2: U.S. Forest Service
Longleaf Pine Stand Impacts



Potential Project Area Impacts to NHP Communities:
Piedmont Boggy Streamhead: 10.15 Acres
Wet Piedmont Longleaf Pine Forest: 11.74 Acres
Dry Piedmont Longleaf Pine Forest: 33.76 Acres

N

0 600 1,200 Feet

Study Area
Project Area
Piedmont Boggy Streamhead
Wet Piedmont Longleaf Pine Forest
Dry Piedmont Longleaf Pine Forest

2015 NC Statewide Aerial Photography

Map Date: **March 2019**
Revised:
Revised:
Revised:

R-2527 BE
Uwharrie National Forest
Montgomery County, NC

Figure 6.0: National Heritage Program Community Impacts

BIOLOGICAL RESOURCES (BOTANICAL & ANIMAL) REPORTS

FOR THE

UWHARRIE NATIONAL FOREST

NC 24/27 WIDENING

MONTGOMERY COUNTY, NC

TIP NO. R-2527
WBS ELEMENT 35572.1.1

MARCH 2019

Contact Person:

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BIOLOGICAL RESOURCES (BOTANICAL & ANIMAL) REPORTS
NCDOT TIP #R-2527 NC 24/27 PROJECT UWHARRIE NATIONAL FOREST

I. INTRODUCTION

This report documents Federal Threatened and Endangered (T&E), Federal Species of Concern (FSC), and State Listed (NC Listed) biological resources species (Plant and Animal) observed within US Forest Service (USFS) lands that may be impacted by construction of TIP R-2527 (Project) in western Montgomery County, North Carolina (Figure 1). The area surveyed in detail is the Study Area, a 500-foot wide corridor centered on NC 24/27. The area that may be directly impacted by road widening construction is the Project Area, but was not known at the time of surveys (See the Biological Evaluation [BE] for the project description and activities). The Biological Analysis Area (BAA) is two kilometers (2 km) beyond the Study Area (Figure 2). This two km distance best defines the limits of any potential effects to a species' population and was adopted from The Nature Conservancy (TNC) and N.C. Natural Heritage Program (NCNHP). This analysis focuses on the Study area and BAA. The potential direct and indirect effects on T&E, FSC, and NC Listed species are evaluated. Federal Candidate (C), North Carolina Significantly Rare (SR), and other species listed by the USFS are identified and minimally discussed.

II. BIOLOGICAL RESOURCES SPECIES SURVEY AND ANALYSIS METHODS

T&E, FSC, and NC Listed biological resources species were identified by:

1. Reviewing the lists of T&E, FSC, and NC Listed species and their habitat preferences provided by USFS,
2. Consulting North Carolina Natural Heritage Program element occurrence records of T&E, FSC, and NC Listed biological resources species,
3. Consulting with individuals both in the public and private sectors who are knowledgeable of the area and its flora and fauna, and
4. Conducting field surveys in areas designated for ground disturbing activities.

Survey intensity varied depending upon the extent of any likely T&E, FSC, and NC Listed biological resources species' habitat, complexity of vegetation, and/or presence of indicator species. Some areas were virtually devoid of habitat and required little intensive survey; while, other areas, such as disturbed roadside, required considerably more time to adequately survey. Although the search was focused on the possibility of occurrences of the T&E, FSC, and NC Listed biological resources species listed on Table 1 (plants) and Table 2 (animals), all T&E, FSC, and NC Listed biological resources species were searched for during the surveys.

Field surveys were conducted in 2017 and 2018. Biologists with expertise in various fields participated in the surveys. Qualifications of principle investigators are provided in the Biological Evaluation (BE) report. Survey windows were adjusted based on flowering status of local reference populations to capture seasonal variations of target species.

Benthic Macroinvertebrates
March 7 and 8, 2018 (Dave Penrose and Jason York)

Birds
April 26 - 28, 2018 (Logan Williams and Mike Sanderson)

Bird: Bald Eagle
December 15, 2017 (Greg Price)

Bird: Red-cockaded Woodpecker (Greg Price, Chris Hopper)
November 14, 17, and 29, 2017 (Greg Price, Chris Hopper)
December 12 and 22, 2017 (Matt Haney, Greg Price, Chris Hopper, Mike Sanderson)
January 22 – 23, 2018 (Matt Haney, Greg Price, Chris Hopper, Mike Sanderson, Rex Badgett)
March 7, 2018 (Greg Price, Chris Hopper)

Plants
October 18 and 20, 2017 (Moni Bates and Logan Williams)
November 3 and 26, 2017 (Moni Bates and Logan Williams)
April 26 – 27, 2018 (Moni Bates and Logan Williams)
May 15, 16, and 22, 2018 (Moni Bates and Logan Williams)

Plant: Schweinitz's Sunflower
September 26, 2017 (Chris Hopper, Greg Price)
October 18, 2017 (Chris Hopper, Greg Price)

Freshwater Fish
May 22 and 28, 2018 (John Alderman and Joe Alderman)
September 11, 2018 (John Alderman and Joe Alderman)

Freshwater Mussels
May 1, 2018 (John Alderman and Joe Alderman)

Salamanders
October 17, 2017(Dennis Herman and Joe Alderman)

The field surveys were conducted by a meander search pattern to survey all habitats in the Study Area. Attention focused on habitats that may be associated with T&E, FSC, and NC Listed biological resources species. NCDOT biologist, Mike Sanderson, conducted bird surveys alongside Logan Williams on April 26 and April 28, 2018. Surveys were conducted for presence/absence using visual and auditory surveys. Special care was given to conduct the surveys in the early morning during the breeding season (April 21-June 23). Surveys for freshwater mussels and fish species were conducted within 400 meters downstream to 100 meters upstream within Study Area streams using visual, tactile, and electroshocking (for fish taxa) techniques. Surveys were conducted so that a T&E, FSC, and NC Listed biological resources species would not be overlooked due to phenology or time of the year that the species could reasonably be detected. A list of species observed during the surveys can be found in Appendix 2.

III. CONDITION OF EXISTING PLANT AND ANIMAL SPECIES

Plant Communities and Habitats Found in the Study Area

The BAA was characterized by three different plant communities. These include mixed pine/hardwood forest, maintained/disturbed areas, and the seeps of first-order tributaries (Figures 3.1 to 3.6). These plant communities are characterized below.

Mixed Pine/Hardwood Forest: The canopy trees include *Acer rubrum* var. *rubrum* (Eastern Red Maple), *Carya glabra* (Pignut Hickory), *Pinus echinata* (Shortleaf Pine), *Quercus alba* (White Oak), *Quercus coccinea* (Scarlet Oak), *Quercus montana* (Chestnut Oak), and *Quercus velutina* (Black Oak). The shrub, vine, and herb layers varied within this community. Common subcanopy trees include *Cornus florida* (Flowering Dogwood), and *Oxydendrum arboreum* (Sourwood). Typically, the shrub and herb layers are sparse and support *Muscadina rotundifolia* var. *rotundifolia* (Muscadine), and *Vaccinium* spp. (Blueberry species). In other areas of mixed pine/hardwood communities, the shrub layer supports common species such as *Gaylussacia frondosa* (Dangleberry), *Lyonia mariana* (Staggerbush), *Rhus copallinum* var. *copallinum* (Winged Sumac), and *Vaccinium tenellum* (Southern Blueberry). The shrub layer is also dominated with dense woody resprouts of Eastern Red Maple, *Liquidambar styraciflua* (Sweet Gum), *Sassafras albidum* (Sassafras), Sourwood, and other tree species. Common grasses include *Andropogon ternarius* var. *ternarius* (Splitbeard Bluestem), *Chasmanthium laxum* (Slender Spike Grass), *Coleataenia anceps* ssp. (Beaked Panic Grass), *Saccharum alopecuroides* (Silver Plume Grass), *Schizachyrium scoparium* var. *scoparium* (Common Little Bluestem), *Sorghastrum nutans* (Yellow Indiangrass), and *Tridens flavus* (Purpletop Tridens). The herb layer is diverse in patches where woody resprouts are not dominant. Some of the common herb species noted include *Eupatorium capillifolium* (Common Dog-fennel), *Eupatorium pilosum* (Ragged Eupatorium), *Eupatorium rotundifolium* (Common Roundleaf Eupatorium), *Eupatorium hyssopifolium* (Hyssopleaf Eupatorium), *Helianthus atrorubens* (Appalachian Sunflower), *Helianthus divaricatus* (Spreading Sunflower), *Helianthus microcephalus* (Small-headed Sunflower), *Liatris pilosa* (A Blazing-star), *Parthenium integrifolium* var. *integrifolium* (Common Wild Quinine), *Solidago odora* (Licorice Goldenrod), *Symphyotrichum grandiflorum* (Big-headed Aster), and *Tephrosia virginiana* (Virginia Goat's-rue).

Maintained/Disturbed Habitats: The south /southeast side of NC Highway 24/27 was recently burned from Bruton-Carpenter Road to about 2,000 feet east. Common species noted in the highway and power line rights-of-way (ROW)s include Appalachian Sunflower, Small-headed Sunflower, Spreading Sunflower, and *Symphyotrichum patens* var. *patens* (Common Clasping Aster). The Northwest Southern Railroad uses herbicide to control vegetation along their ROW. At the transition between the herbicide treated ROW and the canopy trees on the USFS is an edge of dense woody resprouts of Eastern Red Maple, Sweet Gum, Sourwood. The adjacent canopy trees include *Liriodendron tulipifera* var. *tulipifera* (Tulip-tree), *Pinus taeda* (Loblolly Pine), *Quercus falcata* (Southern Red Oak), and other species. A few *Pinus palustris* (Longleaf Pine) are mixed in the canopy to the east of the railroad ROW. The vine layer is dominated with Muscadine. Common herbs along the edge habitat include *Agalinis setacea* (An Agalinis or Purple-foxglove), Appalachian Sunflower, Licorice Goldenrod, *Pseudognaphalium obtusifolium* (Fragrant Rabbit Tobacco), *Silphium compositum* var. *compositum* (A Rosinweed), Silver Plume Grass, Small-headed Sunflower, and Spreading Sunflower. Herbs noted in this habitat include

Chrysopsis mariana (Maryland Golden-aster), Common Wild Quinine, *Coreopsis major* var. *major* (Woodland Coreopsis), and *Schizachyrium scoparium* var. *scoparium* (Common Little Bluestem). In addition, also along NC Highway 24/27, there are areas that support dense stands of hardwood resprouts.

Seeps of First-Order Tributaries: The lower slopes and seeps support common species including *Arundinaria gigantea* (Giant or River Cane), *Osmundastrum cinnamomeum* (Cinnamon Fern), *Osmunda spectabilis* (American Royal Fern), *Sphagnum* moss, *Viburnum nudum* (Southern Wild Raisin), and *Woodwardia areolata* (Netted Chain Fern). A common upland fern is *Pteridium aquilinum* ssp. *latiusculum* (Eastern Bracken).

Significant Natural Heritage Areas and Natural Communities

Seven Significant Natural Heritage Areas (SNHA) are known within the BAA (Figure 2). These include Clarks Grove Longleaf Pine Forest, Lawrenceville Ephemeral Pools, Railroad Mixed Pine Forest, Walker Mountain/Wood Run Natural Area, and YAD/Upper Little River Aquatic Habitat are known within the BAA. Lower Rocky Creek Longleaf Pine Forest and Roberdo Bog and Longleaf Pine Forest are known within the BAA and Study Area.

Eleven Natural Communities occur within the BAA. These include Dry-Mesic Oak-Hickory Forest (Piedmont Subtype), Dry Oak-Hickory Forest (Piedmont Subtype), Dry Piedmont Longleaf Pine Forest, Hillside Seepage Bog, Low Elevation Seep (Typic Subtype), Piedmont Boggy Streamhead, Piedmont/Coastal Plain Heath Bluff, Piedmont Headwater Stream Forest (Typic Subtype), Piedmont Monadnock Forest (Typic Subtype), Upland Depression Swamp Forest, and Upland Pool (Roberdo Subtype).

T&E, FSC, and NC Listed Plant Species

A list of T&E, FSC, and NC Listed plant species that occur in the Uwharrie National Forest, provided by USFS, is provided in Appendix 1. Table 1 and summarizes the T&E, FSC, NC Listed, and NCNHP Significantly Rare plant species that are likely to occur, known to occur, or potentially could occur[1] in the BAA.

Site characteristics and species were observed and recorded to confirm or refute the presence of listed plant species. The Uwharrie National Forest Rare Plant List (2016 and 2018) was used to target the species search. A list of populations of rare plant species known to exist in the project area was provided by NCDOT as compiled from the NCNHP biological database. Table 1 in Appendix I provides a list of 60 plant species, sorted alphabetically per listing status, and includes occurrence status for each as: 1) Found in Study Area, 2) Found within Biological Analysis Area, but not Study Area, or 3) Possibly occurs within the Biological Analysis Area (based on broad habitat concepts)[1].

There are three known populations of rare plants in the NC NHP biological database that occur on the USFS property section of NC Highway 24/27 on the Morrow Mountain topographic map.

[1] In this document, the use of "possibly," "could occur," or "may occur," means "possible species occurrence" in the very broadest of senses. Only very general habitat preferences and species' distributions are used to determine if a species may or could occur. This does not imply their existence in an area.

These populations include *Fothergilla major* (Large Witch-alder), *Helianthus laevigatus* (Smooth Sunflower), and *Pseudognaphalium helleri* (Heller's Rabbit Tobacco). All three populations were noted during the survey (Figure 4). Large witch-alder has a State Rank of S3, Global Rank of G3, and is state listed as Significantly Rare-Throughout (SR-T). Smooth sunflower is ranked as State Rank of S2, Global Rank as G4, and is listed as Special Concern-Vulnerable (SC-V) by the NCNHP. Heller's Rabbit Tobacco is ranked as State Rank of S3, Global Rank as G4G5T3T4, and is listed as Significantly Rare-Peripheral (SR-P) by the NCNHP.

Botanical Survey Information

Habitats, community types, and ranges of T&E, FSC, and NC Listed plant species are derived from information in *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas* (Weakley 2012), *Classification of the Natural Plant Communities of North Carolina*: *Third Approximation* (Schafale and Weakley 1990), *Guide to the Natural Communities of North Carolina*: *Fourth Approximation* (Schafale 2012), *Manual of the Vascular Flora of the Carolinas* (Radford 1968), *The Natural Heritage Program's List of Rare Plants of North Carolina* (2018), *Uwharrie National Forest Rare Plant List* (2016), Uwharrie National Forest Rare Plant List (2018), or information obtained through other botanists.

All habitats were visited at least once during each visit. Common plant species noted during field surveys are listed in Appendix 2.

Table 1 – Potential & Known T&E, FSC, and NC Listed Plant Species in the BAA

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
Federally Threatened or Endangered Plant Species (T&E)			
Echinacea laevigata (Smooth Coneflower)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	Not known to occur in BAA or Study Area. No Effect.
Helianthus schweinitzii (Schweinitz's Sunflower)	Vascular Plant	Open xeric forests, woodlands and roadsides	Occurs in BAA, not known to occur in Study Area. May Affect Not Likely to Adversely Affect.
Rhus michauxi (Michaux's Sumac)	Vascular Plant	Open habitats on clayey soils derived from mafic rock	Not known to occur in BAA or Study Area. No Effect.
Federal Candidate Species (C)			
Solidago plumosa (Yadkin River Goldenrod)	Vascular Plant	Open forests, woodlands and roadsides	Not known to occur in BAA or Study Area. No Effect.
Symphyotrichum georgianum (Georgia Aster)	Vascular Plant	Glades, woodlands, savannas and open areas	Occurs in BAA, not known to occur in Study Area. No Effect.
Federal Species of Concern (FSC)			
Acmispon helleri (Carolina Birdfoot-trefoil)	Vascular Plant	Open forests, woodlands and roadsides	Not known to occur in BAA or Study Area. No Effect.
Carex impressinervia (Ravine Sedge)	Vascular Plant	Southern Piedmont Alluvial Forest	Not known to occur in BAA or Study Area. No Effect.
Danthonia epilis (Bog Oat-grass)	Vascular Plant	Hillside Seepage Bog	Occurs in BAA, not known to occur in Study Area. No Effect.
Eurybia mirabilis	Vascular	Mesic Mixed Hardwood	Not known to occur in BAA or

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
(Piedmont Aster)	Plant	Forest, Piedmont Basic Mesic Forest	Study Area. No Effect.
Lindera subcoriacea (Bog Spicebush)	Vascular Plant	Hillside Seepage Bog	Occurs in BAA, not known to occur in Study Area. No Effect.
State Listed Species (NC Listed)			
Anemone berlandieri (Southern Anemone)	Vascular Plant	Thin circumneutral soil adjacent to rock outcrops	Not known to occur in BAA or Study Area. No Effect.
Baptisia alba var. alba (Thick-pod White Wild Indigo)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Not known to occur in BAA or Study Area. No Effect.
Baptisia australis var. aberans (Eastern Prairie Blue Wild Indigo)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Not known to occur in BAA or Study Area. No Effect.
Berberis canadensis (American Barberry)	Vascular Plant	Woodlands and glades, typically associated with mafic soils	Not known to occur in BAA or Study Area. No Effect.
Celastrus scandens (American Bittersweet)	Vascular Plant	Rich Mesic Forests	Not known to occur in BAA or Study Area. No Effect.
Cirsium carolinianum (Carolina Thistle)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	Occurs in BAA, not known to occur in Study Area. No Effect.
Euphorbia mercurialina (Cumberland Spurge)	Vascular Plant	Rich slopes over gabbro	Not known to occur in BAA or Study Area. No Effect.
Gillenia stpulata (Indian Physic)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, typically associated with mafic rock	Not known to occur in BAA or Study Area. No Effect.
Helenium brevifolium (Littleleaf Sneezeweed)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Not known to occur in BAA or Study Area. No Effect.
Helianthus laevigatus (Smooth Sunflower)	Vascular Plant	Open forests, woodlands and roadsides	Extant populations in BAA and Study Area. Likely to affect.
Liatris aspera (Rough Blazing-star)	Vascular Plant	Glades, barrens, open woods	Not known to occur in BAA or Study Area. No Effect.
Lilium canadense ssp. Editorum (Red Canada Lily)	Vascular Plant	Hillside Seepage Bog, openings in Basic Oak-Hickory Forest	Not known to occur in BAA or Study Area. No Effect.
Pellaea wrightiana (Wright's Cliff-brake)	Vascular Plant	mafic or nutrient-rich rock outcrop, bluffs with slate	Not known to occur in BAA or Study Area. No Effect.
Plantago cordata (Heart-leaf Plantain)	Vascular Plant	Slate-bottomed perennial stream beds	Not known to occur in BAA or Study Area. No Effect.
Primula meadia (Eastern Shooting Star)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Not known to occur in BAA or Study Area. No Effect.
Solidago radula (Western Rough Goldenrod)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	Not known to occur in BAA or Study Area. No Effect.

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
Tradescantia virginiana (Virginia Spiderwort)	Vascular Plant	Basic Mesic Hardwood Forest, woodlands	Not known to occur in BAA or Study Area. No Effect.
Tridens chapmanii (Chapman's Redtop)	Vascular Plant	Xeric Pine and Oak Forests, Basic Oak-Hickory, sandy roadsides	Not known to occur in BAA or Study Area. No Effect.
Trifolium reflexum (Buffalo Clover)	Vascular Plant	Open forests, woodlands and roadsides	Not known to occur in BAA or Study Area. No Effect.
USFS Listed and Significantly Rare (NCNHP)			
Xanthoparmelia monticola (A Rock-shield Lichen)	Lichen	Glade with mafic rock	No records in the BAA or Study Area. Not Surveyed For.
Scopelophila cataractae (Agoyan Cataract Moss)	Moss	Copper rich soils	No records in the BAA or Study Area. Not Surveyed For.
Wessia sharpie (A Moss)	Moss	Calcareous rock, cedar-oak bluffs, cedar barrens.	No records in the BAA or Study Area. Not Surveyed For.
Asclepias purpurascens (Purple Milkweed)	Vascular Plant	Swamps, Bottomlands, moist wood edge	Not known to occur in BAA or Study Area. No Effect.
Boechera missouriensis (Missouri Rockcress)	Vascular Plant	Thin circumneutral soil adjacent to rock outcrops, often with *Juniperus virginiana*	Not known to occur in BAA or Study Area. No Effect.
Callitriche terrestris (Terrestrial Water-starwort)	Vascular Plant	areas wet from perennial or ephmeral streams, ditches, low fields, wet paths	Not known to occur in BAA or Study Area. No Effect.
Cardamine dissecta (Dissected Toothwort)	Vascular Plant	Southern Piedmont Alluvial Forest	Not known to occur in BAA or Study Area. No Effect.
Carex bushii (Bush's Sedge)	Vascular Plant	open meadows, grassy roadside ditch	Not known to occur in BAA or Study Area. No Effect.
Collinsonia tuberosa (Piedmont Horsebalm)	Vascular Plant	Thin circumneutral soil adjacent to rock outcrops	Not known to occur in BAA or Study Area. No Effect.
Desmodium fernaldii (Fernald's Tick-trefoil)	Vascular Plant	Dry to mesic Hardwood-Pine Woodland	Not known to occur in BAA or Study Area. No Effect.
Dichanthelium annulum (Ringed Witch Grass)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Not known to occur in BAA or Study Area. No Effect.
Dichanthelium bicknellii (Northern Witch Grass)	Vascular Plant	Open woods, grassy slopes	Not known to occur in BAA or Study Area. No Effect.
Echinacea purpurea (Purple Coneflower)	Vascular Plant	Open woodlands, powerlines, roads	Not known to occur in BAA or Study Area. No Effect.
Fothergilla major (Large Witch-alder)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest	Known to occur in BAA and Study Area. May Affect.
Hexalectris spicata (Crested Coralroot)	Vascular Plant	Xeric to mesic forests associated with mafic rock	Not known to occur in BAA or Study Area. No Effect.
Iris prismatica (Slender Blue Iris)	Vascular Plant	Bogs, marshes, and wet powerline clearings	Occurs in BAA, not known to occur in Study Area. No Effect.
Matelea decipiens	Vascular	Glades and woodlands, over	Not known to occur in BAA or

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
(Glade Milkvine)	Plant	mafic rock	Study Area. No Effect.
Parthenium auriculatum (Glade Wild Quinine)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	Not known to occur in BAA or Study Area. No Effect.
Polygala senega (Seneca Snakeroot)	Vascular Plant	Open woods, openings, typically over calcareous or mafic rock	Not known to occur in BAA or Study Area. No Effect.
Pseudognaphalium helleri (Heller's Rabbit Tobacco)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	Population known to occur in BAA and Study Area. May affect.
Quercus austrina (Bluff Oak)	Vascular Plant	River bluff	Not known to occur in BAA or Study Area. No Effect.
Ruellia purshiana (Pursh's Wild Petunia)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest	Not known to occur in BAA or Study Area. No Effect.
Salvia azurea (Azure Sage)	Vascular Plant	Longleaf Pine-Oak Woodland	Not known to occur in BAA or Study Area. No Effect.
Sedum glaucophyllum (Cliff Stonecrop)	Vascular Plant	rock outcrops, glades, typically over calcareous or mafic substrate	Not known to occur in BAA or Study Area. No Effect.
Silphium terebinthinaceum (Prairie Dock)	Vascular Plant	Glades, woodlands, and prairies over mafic rock	Not known to occur in BAA or Study Area. No Effect.
Smilax hugeri (Huger's Carrion-flower)	Vascular Plant	Mesic Mixed Hardwood Forest, Piedmont Basic Mesic Forest	Not known to occur in BAA or Study Area. No Effect.
Solidago rigida var. glabrata (Southeastern Bold Goldenrod)	Vascular Plant	Glades, prairies, barrens, over mafic or calcareous rock	Not known to occur in BAA or Study Area. No Effect.
Stachys matthewsii (Undescribed Hedge Nettle)	Vascular Plant	Sandy alluvium of Southern Piedmont Alluvial Forest	Not known to occur in BAA or Study Area. No Effect.
Stewartia ovata (Mountain Camellia)	Vascular Plant	Bluffs and Forests,usually with Rhododendron	Not known to occur in BAA or Study Area. No Effect.
Symphyotrichum laeve var. concinnum (Narrow-leaved Aster)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	Not known to occur in BAA or Study Area. No Effect.
Viola walteri (Prostrate Blue Violet)	Vascular Plant	Mesic Hardwoods	Not known to occur in BAA or Study Area. No Effect.

T&E, FSC, and NC Listed Animal Species

Habitats, community types, and ranges of T&E, FSC, and NC Listed animal species are derived from information in *Flora of the Carolinas, Virginia, Georgia, and Surrounding Areas* (Weakley 2012), *Classification of the Natural Plant Communities of North Carolina*: *Third Approximation* (Schafale and Weakley 1990), *Guide to the Natural Communities of North Carolina*: *Fourth Approximation* (Schafale 2012), *Manual of the Vascular Flora of the Carolinas* (Radford 1968), *The Natural Heritage Program's List of Rare Animals of North Carolina* (2018), Uwharrie National Forest Rare Terrestrial and Aquatic Animal List (2018), or information obtained through other biologists.

Bird surveys were conducted for presence/absence using visual and auditory surveys. Special care was given to conduct the surveys in the early morning during the breeding season (April 21-June 23). Table 2 in Appendix I provides a list of 41 animal species, sorted alphabetically per listing status, and includes occurrence status for each as: 1) Found in Study Area, 2) Found within Biological Analysis Area, but not Study Area, or 3) Possibly occurs within the Biological Analysis Area (based on broad habitat concepts)[1]. Common animal species noted during field surveys are listed in Appendix 2.

Table 2 – Potential & Known T&E, FSC, and NC Listed Animal Species in the BAA

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
Federal Threatened or Endangered Animal Species (T&E)			
Picoides borealis (Red-cockaded Woodpecker)	Bird	mature open pine forests, mainly in longleaf pine	Not known to occur in BAA or Study Area. No Effect.
Bombus affinus (Rusty-patched Bumble Bee)	Insect	Ground nesting, temperate climates	Not known to occur in BAA or Study Area. No Effect.
Lasmigona decorata (Carolina Heelsplitter)	Mussel	Catawba and Pee Dee drainages (endemic to this area in North Carolina and adjacent South Carolina)	Not known to occur in BAA or Study Area. No Effect.
Federal Species of Concern Species (FSC)			
Peucaea aestivalis (Bachman's Sparrow)	Bird	open longleaf pine forests, old fields	Not known to occur in BAA or Study Area. No Effect.
Alasmidonta undulata (Triangle Floater)	Mussel	Roanoke, Chowan, Tar, Neuse, Cape Fear and Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Elliptio roanokensis (Roanoke Slabshell)	Mussel	Roanoke, Tar, Neuse, White Oak, Cape Fear, Lumber, and Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Fusconaia masoni (Atlantic Pigtoe)	Mussel	Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Lasmigona subviridis (Green Floater)	Mussel	Roanoke, Tar, Neuse and Yadkin-Pee Dee drainages; New and Watauga drainages	Not known to occur in BAA or Study Area. No Effect.
Toxolasma pullus (Savannah Lilliput)	Mussel	Cape Fear, Lumber, and Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Villosa vaughaniana (Carolina Creekshell)	Mussel	Cape Fear, Yadkin-Pee Dee, and Catawba drainages (endemic to North Carolina and adjacent South Carolina)	Not known to occur in BAA or Study Area. No Effect.
Ambloplites cavifrons (Roanoke Bass)	Fish	streams in Neuse and Tar systems; introduced to	Not known to occur in BAA or Study Area. No Effect.

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
		Yadkin-Pee Dee	
Etheostoma collis (Carolina Darter)	Fish	Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee, and Catawba drainages	Not known to occur in BAA or Study Area. No Effect.
Moxostoma sp. 3 (Carolina Redhorse)	Fish	Cape Fear and Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Gomphus septima (Septima's Clubtail)	Insect	rocky rivers	Not known to occur in BAA or Study Area. No Effect.
Lampsilis cariosa (Yellow Lampmussel)	Mussel	Chowan, Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Villosa constricta (Notched Rainbow)	Mussel	Roanoke, Tar, Neuse, Yadkin-Pee Dee, and Catawba drainages	Not known to occur in BAA or Study Area. No Effect.
Pituophis melanoleucus melanoleucus (Northern Pine Snake)	Reptile	dry and sandy woods, mainly in pine/oak sandhills	Not known to occur in BAA or Study Area. No Effect.
State Listed Species (NCWRC Listed), NCNHP Significantly Rare Species, and USFS Reported			
Danaus plexipus (Monarch butterfly)	Insect	Open fields and meadows with milkweed.	No records in the BAA or Study Area. Not Surveyed For.
Erynnis martialis (Mottled Duskywing)	Insect	upland woods and wooded edges; host plant -- New Jersey Tea (*Ceanothus americanus*)	Not known to occur in BAA or Study Area. No Effect.
Ambystoma talpoideum (Mole Salamander)	Amphibian	Breeds in fish-free semi-permanent woodland ponds; forages in adjacent woodlands	Known to occur in BAA. Not known to occur in Study Area. May affect.
Hemidactylium scutatum (Four-toed Salamander)	Amphibian	pools, bogs, and other wetlands in hardwood forests	Known to occur in BAA. Not known to occur in Study Area. May affect.
Falco sparverius (American Kestrel)	Bird	open country, such as extensive farmland; nests in cavities	Not known to occur in BAA or Study Area. No Effect.
Haliaeetus leucocephalus (Bald Eagle)	Bird	mature forests near large bodies of water (nesting); rivers, lakes, and sounds (foraging)	Not known to occur in BAA or Study Area. No Effect.
Lanius ludovicia (Loggerhead Shrike)	Bird	fields and pastures	Not known to occur in BAA or Study Area. No Effect.
Cambarus catagius (Greensboro Burrowing Crayfish)	Crayfish	Cape Fear and Yadkin--Pee Dee drainages; Greensboro area to the Uwharries	No records in the BAA or Study Area. Not Surveyed For.
Lampetra aepyptera (Least Brook Lamprey)	Fish	Tar and Neuse drainages	Not known to occur in BAA or Study Area. No Effect.
Notropis volucellus (Mimic Shiner)	Fish	New, French Broad, Little Tennessee, Tar, and Neuse drainages	Not known to occur in BAA or Study Area. No Effect.

Species	Type	Natural Community or Habitat	Local Occurrence & Effect Determination
Megathymus cofaqui (Cofaqui Giant Skipper)	Insect	monadnocks with yucca; host plant	Not known to occur in BAA or Study Area. No Effect.
Satyrium favonius ontario (Northern Oak Hairstreak)	Insect	oak-dominated woods, usually in dry sites; host plants -- oaks (*Quercus*)	Not known to occur in BAA or Study Area. No Effect.
Ceraclea joannae (A Caddisfly)	Insect	Little River (Montgomery) (endemic to this area)	Not known to occur in BAA or Study Area. No Effect.
Asioplax dolani (A Mayfly)	Insect	Neuse River	Not known to occur in BAA or Study Area. No Effect.
Baetopus trishae (A Mayfly)	Insect	Panthertown Creek	Not known to occur in BAA or Study Area. No Effect.
Bleptina sangamonia (A Litter Moth)	Insect	habitats not known	Not known to occur in BAA or Study Area. No Effect.
Condylura cristata pop. 1 (Star-nosed Mole (coastal plain population))	Mammal	moist meadows, bogs, swamps, bottomlands [mountain population not of concern]	Not known to occur in BAA or Study Area. No Effect.
Alasmidonta sp. 2 (Freshwater mussel (Uwharries region))	Mussel	Pee Dee drainage streams in Uwharries region (endemic to North Carolina)	Not known to occur in BAA or Study Area. No Effect.
Lampsilis radiata (Eastern Lampmussel)	Mussel	Chowan, Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee drainages	Not known to occur in BAA or Study Area. No Effect.
Strophitus undulatus (Creeper)	Mussel	Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee, Catawba, Broad, and French Broad drainages	Not known to occur in BAA or Study Area. No Effect.
Villosa delumbis (Eastern Creekshell)	Mussel	Cape Fear, Lumber, Yadkin-Pee Dee, and Catawba drainages	Not known to occur in BAA or Study Area. No Effect.
Crotalus horridus (Timber Rattlesnake)	Reptile	Rocky Upland Forests	Occurs in the BAA, but not known in the Study Area. Study Area presence is assumed, May Affect.
Ophiosaurus attenuates (Slender Glass Lizard)	Reptile	Varied Habitats, Grasslands, Wooded Areas	No records in the BAA or Study Area. Not Surveyed For.
Sistrurus miliarius miliarius (Carolina Pigmy Rattlesnake)	Reptile	Pine Flatwoods, Pine/Oak Sandhills, Other Pine/Oak Forests	No records in the BAA or Study Area. Not Surveyed For.

IV. Possible Effects and Analysis of Botanical Resources (T&E, FSC, or NC Listed Plant Species)

Study Area

One NC Listed plant species, *Helianthus laevigatus* (SC-V), and two NCNHP Significantly Rare plant species, *Fothergilla major* (State SR-T) and *Pseudognaphalium helleri* (SR-P) were found

within the Study Area (Figures 4.0 to 4.4). There were no other T&E, FSC, or NC Listed plant species close enough to the Study Area (within the BAA) to be affected by the Project. The road widening will have an effect on one NC Listed plant species because:

1) There were several known occurrences of rare plant species in the Study Area according to the North Carolina Natural Heritage Program database. These include *Fothergilla major* (State SR-T)*, Pseudognaphalium helleri* (SR-T), and *Helianthus laevigatus* (SC-V).
2) Thorough botanical field surveys within the Study Area were negative for all T&E, FSC, or NC Listed plant species except for *H. laevigatus.*
3) There was no, or very limited, marginal habitat for most other T&E, FSC, or NC Listed plant species within the Study Area (Figure 3).
4) Eleven specimens of *F. major* (SR-T) were observed in the Study Area October 18, 2017 (Figure 4.1).

Biological Analysis Area
Cirsium carolinianum (NC- E), Danthonia epilis (SR-T), *Helianthus schweinitzii* (FE), *Iris prismatica* (SR-T), and *Symphyotrichum georgianum* (C; NC-T) occur within the BAA but not within the Study Area. Known to occur in the BAA, *Fothergilla major (SR-T), Helianthus laevigatus* (SC-V), and *Pseudognaphalium helleri* (SR-T) were also found in the Study Area. Each species is discussed below:

***Cirsium carolinianum*, Soft thistle (State E)**
A population of *C. carolinianum,* is known along Rocky Creek, north of NC 24/27. This population will be unaffected by the road widening due to its distance from the Project. Possible habitat for *C. carolinianum* is in forests and disturbed areas, mostly on basic soils. This habitat was repeatedly surveyed. *C. carolinianum* was not found in the Study Area; therefore, *C. carolinianum* will not be affected.

***Danthonia epilis*, Bog oatgrass (SR-T)**
The *D. epilis* population is found north of the far western extent of the project, off an unnamed tributary to Wood Run at the end of the BAA. This population will not be affected by the road widening due to its distance from the project. There is no habitat (seepage bogs, wet seepy powerlines) for *D. epilis* within the Study Area. Therefore, *D. epilis* will not be affected.

***Helianthus schweinitzii*, Schweinitz's sunflower (Federal E)**
The *H. schweinitzii* populations are recorded throughout the BAA. These populations will not be affected by the road widening due to its distance from the project. This species favors non-forested open areas, especially roadsides and other rights-of-way. This open habitat does occur within the Study Area and was repeatedly surveyed. *H. schweinitzii* was not found in the Study Area and will not be affected**.**

***Symphyotrichum georgianum*, Georgia aster (C; NC-T)**
The *S. georgianum* population record is within the far western extent of the BAA along Rocky Creek. This species favors open woods, roadsides, and other rights-of-way. This open habitat does occur within the Study Area. This habitat was repeatedly surveyed. *S. georgianum* was not

found in the Study Area. Therefore, *S. georgianum* will not be affected.

***Iris prismatica*, Slender Blue iris (SR-T)**
The *I. prismatica* population record is within the BAA, on the Northeastern extent of the BAA on a Piedmont Boggy Streamhead. This species favors bogs, marshes, and wet powerline clearings. This bog habitat does not occur within the Study Area. This habitat was repeatedly surveyed. *I. prismatica* was not found in the Study Area. Therefore, *I. prismatica* will not be affected**.**

***Pseudognaphalium helleri*, Heller's rabbit-tobacco (SR-P)**
A population of *P. helleri* was discovered along the railroad corridor within the Study Area (Figure 4.8). This population may be affected by the road widening project. Suitable habitats for *P. helleri* are dry woodlands, openings, and glades, especially over mafic rocks. This habitat was repeatedly surveyed. One population of *P. helleri* (six stems) was found in the BAA, which may be affected.

***Fothergilla major*, Large witch-alder (SR-T)**
A known population of *F. major* was found within the Study Area, on the south side of NC 24/27 (Figure 4.1) on October 18, 2017. Seven stems were noted near the outflow of a culvert and in an area of approximately two square meters, and four additional stems were located on top of a concrete culvert structure. During an October 12, 2004 survey, Alan Weakley reported a dense clonal patch of 700 stems over an area of 70 meters. It was not clear why this population had declined so significantly. No plants were found north of NC 24/27. Possible habitats for *F. major* are typically dry ridgetop or bluff forests, seepage wetlands, and Piedmont longleaf pine forests. These habitats were repeatedly surveyed, but no additional occurrence was found in the Study Area. *F. major* will be affected.

***Helianthus laevigatus*, Smooth sunflower (SC-V)**
Numerous populations of *H. laevigatus* exist within the study area. These populations are along the northern NC 24/27 road right-of-way and the eastern extent of the Project. These populations were verified extant during a 2017 survey. These populations will be affected by the road widening project. Possible habitats for *H. laevigatus* are open woods and roadsides. This habitat was repeatedly surveyed during the course of the season.

V. Possible Effects and Analysis of Animal Resources (T&E, FSC, or NC Listed Animal Species)

Study Area
No T&E or FSC animal species was observed during the surveys. None would be affected by the project. One State Listed species, Timber Rattlesnake, was located in the BAA close enough to the Study Area to be presumed present and may be affected.

Biological Analysis Area
Based upon habitat information, 38 of the 41 T&E, FSC, or NC Listed animal species could potentially occur in the BAA (Table 2) but are not known to occur. The three species known to occur within the BAA but not within the Study Area or Project Area are Mole Salamander (*Ambystoma talpoideum*) (NC Listed Special Concern), Four-toed Salamander (*Hemidactylium scutatum*) (NC Listed Special Concern), and Timber Rattlesnake (*Crotalus horridus*) (NC Listed

Special Concern). The NCNHP provides EOs for the two amphibian species within the BAA.

VI. EFFECTS ON NORTH CAROINA STATE NATURAL AREAS

Two NCNHP Significant Natural Heritage Areas, the Roberdo Bog and Longleaf Pine Forest and the Lower Rocky Creek Longleaf Pine forest, would be impacted by the project. A discussion of these areas and likely impacts are included in the BE document.

VII. REQUIRED RECOMMENDATIONS

There are no recommendations or mitigation measures required to comply with NEPA for biological resources.

VIII. SUMMARY OF EFFECT

This proposal would not affect (directly or indirectly) any proposed or listed Federal threatened or endangered species. Consultation with the US Fish and Wildlife Service is not required. This proposal may affect two State Listed (Special Concern) species, Smooth Sunflower (*Helianthus laevigatus*), and Timber Rattlesnake (*Crotalus horridus*), and two NCNHP Significantly Rare Species: Large Witch-alder (*Fothergilla major*); and Heller's Rabbit Tobacco (*Pseudognaphalium helleri*).

IX. REFERENCES

Botanical References

Kartesz, J. 1994. A Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland. Timberland Press, Portland, OR.

Radford, A.E., et al. 1968. *Manual of the Vascular Flora of the Carolinas*. Univ. North Carolina Press. Chapel Hill, NC

Robinson, L. 2016. Natural Heritage Program List of the Rare Plants of North Carolina and North Carolina Watch List. N.C. Natural Heritage Program, Raleigh, NC.

Ruggiero, L.F., G.D. Haywood, and J.R. Squires. 1994. Viability Analysis in Biological Evaluations: Concepts of Population Viability Analysis, Biological Population, and Ecological Scale. Conservation Biology (8)2.

Schafale, M. P. and A. Weakley. 1990. *Classification of the Natural Communities of North Carolina: Third Approximation*. North Carolina Natural Heritage Program, Raleigh, NC.

Schafale, M.P. 2012. *Guide to the Natural Communities of North Carolina: Fourth Approximation.* North Carolina Natural Heritage Program, Raleigh, NC.

Strausbaugh P. D. and E. L. Core. 1977. *Flora of West Virginia*. Seneca Books Inc., Morgantown, West Virginia.

United States Forest Service. 1994. National Forests of North Carolina Proposed, Endangered, Threatened, and Sensitive (PETS) Plants List. USFS, Asheville, NC. Unpublished.

Uwharrie National Forest Rare Plant List (2018). Excel Spreadsheet, Provided via email on July 19, 2018.

Weakley, A. S. 2014. Guide to the Flora of the Carolinas and Virginia, a working draft. Unpublished, The Nature Conservancy, Southern Resource Office, Durham, NC.

Weakley, A.S., J.C. Ludwig, and J.F. Townsend. 2012. *Flora of Virginia*. Brit Press, Ft. Worth, TX.

Animal References

AmphibiaWeb: Information on amphibian biology and conservation. [web application]. 2018.

Beane, J.C., A.L. Braswell, J.C. Mitchell, W.M. Palmer, and J.R. Harrison, III. 2010. *Amphibians and Reptiles of the Carolinas and Virginia*: *Second Edition, Revised and Updated*. The University of North Carolina Press, Chapel Hill. 274 pp.

Berkeley, California: AmphibiaWeb. Available: http://amphibiaweb.org/. (Accessed:November 2018).

Birds of North Carolina: their Distribution and Abundance website: www.carolinabirdclub.org/ncbirds.

Brock, J. P. and K. Kaufman. 2003. Butterflies of North America. Houghton Mifflin Harcourt. 392 pp.

Butterflies of North Carolina website: www.dpr.ncparks.gov/nbnc.

Dragonflies and Damselflies of North Carolina website: www.dpr.ncparks.gov/odes.

Dunkle, S. W. 2000. Dragonflies through Binoculars: a field guide to Dragonflies of North America. Oxford University Press, USA. 266 pp.

Dunn, J.L., and J. Alderfer. 2011. National Geographic Field Guide to the Birds of North America; Sixth edition. National Geographic Society, Washington, DC. 574 pp.

NatureServe Explorer: An Online Encyclopedia of Life available online at http://www.natureserve.org/explorer/ (Accessed: November 2018).

N.C. Natural Heritage Program (NCNHP) map viewer and data base search available online at http://portal.ncdenr.org/web/nhp/home (Accessed: November 2018).

NCNHP. 2016. Natural Heritage Program List of Rare Animal Species of North Carolina, 2016. NC Natural Heritage Program, NC Dept. Environment & Natural Resources, Raleigh, NC. 178 pp.

Paulson. D. 2011. Dragonflies and Damselflies of the East. Princeton University Press. 538 pp.

Potter, E. F., J. F. Parnell, R. P. Teulings, R. Davis. 2006. Birds of the Carolinas. 2nd ed. Univ. North Carolina Press, Chapel Hill. 399 pp.

Schafale, M. P. and Weakley A, 1990. Classification of the Natural Communities of North Carolina: Third Approximation. North Carolina Natural Heritage Program, Raleigh, North Carolina. 325 pp.

Schafale, M.P. 2012. *Guide to the Natural Communities of North Carolina: Fourth Approximation.* North Carolina Natural Heritage Program, Raleigh, NC**.**

Uwharrie National Forest Rare Terrestrial and Aquatic Animal List (2018). Excel Spreadsheet, Provided via email on July 23, 2018.

APPENDIX 1

Federally Threatened or Endangered (T&E), Federal Species of Concern (FSC), and North Carolina State Listed (NC Listed) Plant and Animal Species of the Uwharrie National Forest

1 = Found in Study Area
2 = Found within Biological Analysis Area, but not Study Area
3 = Possibly occurs within the Biological Analysis Area (based on broad habitat concepts)

Uwharrie National Forest - Plants

Scientific Name	Form	Natural Communities, Habitat	Status	Occurrence
Echinacea laevigata (Smooth Coneflower)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	FE	3
Helianthus schweinitzii (Schweinitz's Sunflower)	Vascular Plant	Open xeric forests, woodlands and roadsides	FE	2
Rhus michauxi (Michaux's Sumac)	Vascular Plant	Open habitats on clayey soils derived from mafic rock	FE	3
Solidago plumosa	Vascular Plant	Riverside mafic rock outcrops	C	3
Symphyotrichum georgianum (Georgia Aster)	Vascular Plant	Glades, woodlands, savannas and open areas	C	2
Acmispon helleri (Carolina Birdfoot-trefoil)	Vascular Plant	Open forests, woodlands and roadsides	FSC	3
Carex impressinervia (Ravine Sedge)	Vascular Plant	Southern Piedmont Alluvial Forest	FSC	3
Danthonia epilis (Bog Oat-grass)	Vascular Plant	Hillside Seepage Bog	FSC	2
Eurybia mirabilis (Piedmont Aster)	Vascular Plant	Mesic Mixed Hardwood Forest, Piedmont Basic Mesic Forest	FSC	3
Lindera subcoriacea (Bog Spicebush)	Vascular Plant	Hillside Seepage Bog	FSC	3
Anemone berlandieri (Southern Anemone)	Vascular Plant	Thin circumneutral soil adjacent to rock outcrops	NC LISTED	3
Baptisia alba var. alba (Thick-pod White Wild Indigo)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	NC LISTED	3
Baptisia australis var. aberans (Eastern Prairie Blue Wild indigo)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	NC LISTED	3
Berberis canadensis (American Barberry)	Vascular Plant	Woodlands and glades, typically associated with mafic soils	NC LISTED	3
Celastrus scandens (American Bittersweet)	Vascular Plant	Rich Mesic Forests	NC LISTED	3
Cirsium carolinianum (Carolina Thistle)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	NC LISTED	2

Uwharrie National Forest - Plants

Scientific Name	Form	Natural Communities, Habitat	Status	Occurrence
Euphorbia mercurialina (Cumberland Spurge)	Vascular Plant	Rich slopes over gabbro	NC LISTED	3
Gillenia stpulata (Indian Physic)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, typically associated with mafic rock	NC LISTED	3
Helenium brevifolium (Littleleaf Sneezeweed)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	NC LISTED	3
Liatris aspera (Rough Blazing-star)	Vascular Plant	Glades, barrens, open woods	NC LISTED	3
Lilium canadense ssp. Editorum (Red Canada Lily)	Vascular Plant	Hillside Seepage Bog, openings in Basic Oak-Hickory Forest	NC LISTED	3
Pellaea wrightiana (Wright's Cliff-brake)	Vascular Plant	mafic or nutrient-rich rock outcrop, bluffs with slate	NC LISTED	3
Plantago cordata (Heart-leaf Plantain)	Vascular Plant	Slate-bottomed perennial stream beds	NC LISTED	3
Primula meadia (Eastern Shooting Star)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	NC LISTED	3
Solidago radula (Western Rough Goldenrod)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	NC LISTED	3
Tradescantia virginiana (Virginia Spiderwort)	Vascular Plant	Basic Mesic Hardwood Forest, woodlands	NC LISTED	3
Tridens chapmanii (Chapman's Redtop)	Vascular Plant	Xeric Pine and Oak Forests, Basic Oak-Hickory, sandy roadsides	NC LISTED	3
Xanthoparmelia monticola (A Rock-shield Lichen)	Lichen	Glade with mafic rock	NCNHP SR	3
Scopelophila cataractae (Agoyan Cataract Moss)	Moss	Copper rich soils	NCNHP SR	3
Wessia sharpie (A moss)	Moss	Calcareous rock, cedar-oak bluffs, cedar barrens	NCNHP SR	3
Asclepias purpurascens (Purple Milkweed)	Vascular Plant	Swamps, bottomlands, moist wood edge	NCNHP SR	3
Boechera missouriensis (Missouri Rockcress)	Vascular Plant	Thin circumneutral soil adjacent to rock outcrops, often with *Juniperus virginiana*	NCNHP SR	3
Callitriche terrestris (Terrestrial Water-starwort)	Vascular Plant	areas wet from perennial or ephmeral streams, ditches, low fields, wet paths	NCNHP SR	3
Cardamine dissecta (Dissected Toothwort)	Vascular Plant	Southern Piedmont Alluvial Forest	NCNHP SR	3
Carex bushii (Bush's Sedge)	Vascular Plant	open meadows, grassy roadside ditch	NCNHP SR	3
Collinsonia tuberosa (Piedmont Horsebalm)	Vascular Plant	Thin circumneutral soil adjacent to rock outcrops	NCNHP SR	3
Desmodium fernaldii (Fernald's Tick-trefoil)	Vascular Plant	Dry to mesic Hardwood-Pine Woodland	NCNHP SR	3

Uwharrie National Forest - Plants

Scientific Name	Form	Natural Communities, Habitat	Status	Occurrence
Dichanthelium annulum (Ringed Witch Grass)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	NCNHP SR	3
Dichanthelium bicknellii (Northern Witch Grass)	Vascular Plant	Open woods, grassy slopes	NCNHP SR	3
Echinacea purpurea (Purple Coneflower)	Vascular Plant	Open woodlands, powerlines, roads	NCNHP SR	3
Fothergilla major (Large Witch Alder)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest	NCNHP SR	1
Helianthus laevigatus (Smooth Sunflower)	Vascular Plant	Open forests, woodlands and roadsides	NCNHP SR	1
Hexalectris spicata (Crested Coralroot)	Vascular Plant	Xeric to mesic forests associated with mafic rock	NCNHP SR	3
Iris prismatica (Slender Blue Iris)	Vascular Plant	Bogs, marshes, and wet powerline clearings	NCNHP SR	2
Matelea decipiens (Glade Milkvine)	Vascular Plant	Glades and woodlands, over mafic rock	NCNHP SR	3
Parthenium auriculatum (Glade Wild Quinine)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	NCNHP SR	3
Polygala senega (Seneca Snakeroot)	Vascular Plant	Open woods, openings, typically over calcareous or mafic rock	NCNHP SR	3
Pseudognaphalium helleri (Heller's Rabbit Tobacco)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	NCNHP SR	1
Quercus austrina (Bluff Oak)	Vascular Plant	River bluff	NCNHP SR	3
Ruellia purshiana (Pursh's Wild Petunia)	Vascular Plant	Southern Piedmont Dry Oak or Oak-Pine Forest	NCNHP SR	3
Salvia azurea (Azure Sage)	Vascular Plant	Longleaf Pine-Oak Woodland	NCNHP SR	3
Sedum glaucophyllum (Cliff Stonecrop)	Vascular Plant	rock outcrops, glades, typically over calcareous or mafic substrate	NCNHP SR	3
Silphium terebinthinaceum (Prairie Dock)	Vascular Plant	Glades, woodlands, and prairies over mafic rock	NCNHP SR	3
Smilax hugeri (Huger's Carrion-flower)	Vascular Plant	Mesic Mixed Hardwood Forest, Piedmont Basic Mesic Forest	NCNHP SR	3
Solidago rigida var. glabrata (Southeastern Bold Goldenrod)	Vascular Plant	Glades, prairies, barrens, over mafic or calcareous rock	NCNHP SR	3
Stachys matthewsii (Undescribed Hedge Nettle)	Vascular Plant	Sandy alluvium of Southern Piedmont Alluvial Forest	NCNHP SR	3
Stewartia ovata (Mountain Camellia)	Vascular Plant	Bluffs and Forests,usually with Rhododendron	NCNHP SR	3
Symphyotrichum laeve var. concinnum (Narrow-leaved Aster)	Vascular Plant	Glades, woodlands, and open areas over mafic rock	NCNHP SR	3
Viola walteri (Prostrate Blue Violet)	Vascular Plant	Mesic Hardwoods	NCNHP SR	3

Montgomery County – Animals

Scientific Name	Group	Natural Communities, Habitat	Status	Occurrence
Picoides borealis (Red-cockaded Woodpecker)	Bird	mature open pine forests, mainly in longleaf pine	FE	3
Bombus affinus (Rusty Patched Bumble Bee)	Insect	Underground nesters in temperate climate	FE	3
Lasmigona decorata (Carolina Heelsplitter)	Mussel	Catawba and Yadkin-Pee Dee drainages (endemic to this area in North Carolina and adjacent South Carolina)	FE	3
Peucaea aestivalis (Bachman's Sparrow)	Bird	open longleaf pine forests, old fields	FSC	3
Ambloplites cavifrons (Roanoke Bass)	Fish	streams in Neuse and Tar systems	FSC	3
Etheostoma collis (Carolina Darter)	Fish	Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee, and Catawba drainages	FSC	3
Moxostoma sp. 3 (Carolina Redhorse)	Fish	Cape Fear and Pee Dee drainages	FSC	3
Gomphus septima (Septima's Clubtail)	Insect	rocky rivers	FSC	3
Alasmidonta undulata (Triangle Floater)	Mussel	Roanoke, Chowan, Tar, Neuse, Cape Fear drainages	FSC	3
Elliptio roanokensis (Roanoke Slabshell)	Mussel	Roanoke, Tar, Neuse, White Oak, Cape Fear, Lumber, and Yadkin-Pee Dee drainages	FSC	3
Fusconaia masoni (Atlantic Pigtoe)	Mussel	Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee drainages	FSC	3
Lasmigona subviridis (Green Floater)	Mussel	Roanoke, Tar, Neuse and Yadkin-Pee Dee drainages; New and Watauga drainages	FSC	3
Lampsilis cariosa (Yellow Lampmussel)	Mussel	Chowan, Roanoke, Neuse, Tar, Cape Fear, Lumber, Yadkin-Pee Dee drainages	FSC	3
Toxolasma pullus (Savannah Lilliput)	Mussel	Cape Fear, Lumber, and Yadkin-Pee Dee drainages	FSC	3
Villosa vaughaniana (Carolina Creekshell)	Mussel	Cape Fear, Yadkin-Pee Dee, and Catawba drainages (endemic to North Carolina and adjacent South Carolina)	FSC	3
Pituophis melanoleucus melanoleucus (Northern Pinesnake)	Reptile	dry and sandy woods, mainly in pine/oak sandhills	FSC	3
Ambystoma talpoideum (Mole Salamander)	Amphibian	Breeds in fish-free semipermanent woodland ponds; forages in adjacent woodlands	NC LISTED	2
Hemidactylium scutatum (Four-toed Salamander)	Amphibian	pools, bogs, and other wetlands in hardwood forests	NC LISTED	2
Haliaeetus leucocephalus (Bald Eagle)	Bird	mature forests near large bodies of water (nesting); rivers, lakes, and sounds (foraging)	NC LISTED	3

Montgomery County – Animals

Scientific Name	Group	Natural Communities, Habitat	Status	Occurrence
Lanius ludovicia (Loggerhead Shrike)	Bird	fields and pastures	NC LISTED	3
Cambarus catagius (Greensboro Burrowing crayfish)	Crayfish	Cape Fear and Yadkin-Pee Dee drainages; Greensboro area to the Uwharries	NC LISTED	3
Lampetra aepyptera (Least Brook Lamprey)	Fish	Tar and Neuse drainages	NC LISTED	3
Condylura cristata pop. 1 (Star-nosed Mole - Coastal Plain population)	Mammal	moist meadows, bogs, swamps, bottomlands [mountain population not of concern]	NC LISTED	3
Lampsilis radiata (Eastern Lampmussel)	Mussel	Chowan, Roanoke, Tar, Neuse, Cape Fear, Yadkin--Pee Dee drainages	NC LISTED	3
Strophitus undulatus (Creeper)	Mussel	Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee, Catawba, Broad, and French Broad drainages	NC LISTED	3
Villosa constricta (Notched Rainbow)	Mussel	Roanoke, Tar, Neuse, Yadkin-Pee Dee, and Catawba drainages	NC LISTED	3
Crotalus horridus (Timber Rattlesnake)	Reptile	wetland forests in the Coastal Plain; rocky, upland forests elsewhere	NC LISTED	2
Sistrurus miliarius miliarius (Carolina Pigmy Rattlesnake)_	Reptile	pine flatwoods, pine/oak sandhills, other pine/oak forests	NC LISTED	3
Falco sparverius (American Kestrel)	Bird	open country, such as extensive farmland; nests in cavities	NCNHP SR	3
Asioplax dolani (A Mayfly)	Insect	Neuse River	NCNHP SR	3
Baetopus trishae (A Mayfly)	Insect	Panthertown Creek	NCNHP SR	3
Bleptina sangamonia (A Litter Moth)	Insect	habitats not known	NCNHP SR	3
Ceraclea joannae (Lenat's Ceraclea)	Insect	Little River (Montgomery) (endemic to this area)	NCNHP SR	3
Erynnis martialis (Mottled Duskywing)	Insect	upland woods and wooded edges; host plant -- New Jersey tea (*Ceanothus americanus*)	NCNHP SR	3
Megathymus cofaqui (Cofaqui Giant-skipper)	Insect	monadnocks with yucca; host plant	NCNHP SR	3
Satyrium favonius Ontario (Northern Oak Hairstreak)	Insect	oak-dominated woods, usually in dry sites; host plants - oaks (*Quercus*)	NCNHP SR	3
Alasmidonta sp. 2	Mussel	Yadkin-Pee Dee drainage streams in Uwharries region (endemic to North Carolina)	NCNHP SR	3
Villosa delumbis (Eastern Creekshell)	Mussel	Cape Fear, Lumber, Yadkin-Pee Dee, and Catawba drainages	NCNHP SR	3
Ophiosaurus attenuates (Slender Glass Lizard)	Reptile	Reported by USFS	NCNHP SR	3

APPENDIX 2

Vascular Plant Species Noted during 2018 Botanical Surveys or Specimens from Other Botanical Surveys of the NC 24/27 Study Area.
(This may not be a complete list of the species within the BAA or Study Area.)

Acer rubrum var. rubrum	Eastern Red Maple
Agalinis setacea	An Agalinis or Purple-foxglove
Andropogon ternarius var. ternarius	Splitbeard Bluestem
Arundinaria gigantea	Giant or River Cane
Carya glabra	Pignut Hickory
Chasmanthium laxum	Slender Spike Grass
Coleataenia anceps ssp. anceps	Beaked Panic Grass
Cornus florida	Flowering Dogwood
Coreopsis major var. major	Woodland Coreopsis
Coreopsis mariana	Maryland Golden-aster
Eupatorium capillifolium	Common Dog-fennel
Eupatorium hyssopifolium	Hyssopleaf Eupatorium
Eupatorium pilosum	Ragged Eupatorium
Eupatorium rotundifolium	Common Roundleaf Eupatorium
Fothergilla major	Large Witch Alder
Gaylussacia frondosa	Dangleberry
Helianthus atrorubens	Appalachian Sunflower
Helianthus divaricatus	Spreading Sunflower
Helianthus laevigatus	Smooth Sunflower
Helianthus microcephalus	Small-Headed Sunflower
Liatris Pilosa	A Blazing-star
Liquidambar styraciflua	Sweetgum
Liriodendron tulipifera var. tulipifera	Tulip-tree
Lyonia mariana	Staggerbush
Muscadina rotundifolia var. rotundifolia	Muscadine
Osmunda spectabilis	American Royal Fern
Osmundastrum cinnamomeum	Cinnamon Fern
Oxydendrum arboreum	Sourwood
Parthenium integrifolium var. integrifolium	Common Wild Quinine
Pinus echinata	Shortleaf Pine
Pinus palustris	Longleaf Pine
Pinus taeda	Loblolly Pine

Pseudognaphalium helleri	Heller's Rabbit Tobacco
Pseudognaphalium obtusifolium	Fragrant Rabbit Tobacco
Pteridium aquilinum ssp. latiusculum	Eastern Bracken
Quercus alba	White Oak
Quercus coccinea	Scarlet Oak
Quercus falcata	Southern Red Oak
Quercus montana	Chestnut Oak
Quercus velutina	Black Oak
Rhus copallinum var. copallinum	Winged Sumac
Saccharum alopecuroides	Silver Plume Grass
Sassafras albidium	Sassafras
Schizachyrinum scoparium var. scoparium	Common Little Bluestem
Silphium compositum var. compositum	A Rosinweed
Solidago odorata	Licorice Goldenrod
Sorghastrum nutans	Yellow Indiangrass
Symphotrichum grandiflorum	Big-headed Aster
Symphotrichum patens var. patens	Common Clasping Aster
Tephrosia virginiana	Virginia Goat's-rue
Tridens flavus	Purpletop Tridens
Vaccinium spp.	Blueberry Species
Vaccinium tenellum	Southern Blueberry
Viburnum nudum	Southern Wild Rasin
Woodwardia areolata	Netted Chain Fern

Animal Species Observed, Heard, or Identified during Field Surveys in the Study Area, NC 24/27 Project, Montgomery Co., North Carolina
(This may not be a complete list of the species within the BAA or Study Area.)

Birds

Agelaius phoeniceus	Red-winged Blackbird
Archilochus colubris	Ruby-throated Hummingbird
Ardea herodias	Great Blue Heron
Baeolophus bicolor	Tufted Titmouse
Branta canadensis	Canada Goose
Carduelis tristis	American Goldfinch
Cathartes aura	Turkey Vulture
Carpodacus mexicanus	House Finch
Ceryle alcyon	Belted Kingfisher

Charadrius vociferus	Killdeer
Corvus brachyrhynchos	American Crow
Corvus ossifragus	Fish Crow
Cyanocitta cristata	Blue Jay
Dendroica coronata	Yellow Rumped Warbler
Dendroica discolor	Prairie Warbler
Dendroica dominica	Yellow-throated Warbler
Dendroica petechia	Yellow Warbler
Dendroica pinus	Pine Warbler
Dendroica vire	Black-throated Green Warbler
Dryocopus pileatus	Pileated Woodpecker
Dumetella carolinensis	Gray Catbird
Empidonax virescens	Acadian Flycatcher
Geothlypis trichas	Common Yellowthroat
Helmitheros vermivora	Worm Eating Warbler
Hirundo rustica	Barn Swallow
Hylocichla mustelina	Wood Thrush
Icteria virens	Yellow-breasted Chat
Meleagris gallopavo	Wild Turkey
Melanerpes carolinus	Red-bellied Woodpecker
Mimus polyglottos	Northern Mockingbird
Mniotilta varia	Black and White Warbler
Myiarchus crinitus	Great Crested Flycatcher
Molothrus ater	Brown-headed Cowbird
Pandion haliaetus	Osprey
Parula americana	Northern Parula
Passerina cyanea	Indigo Bunting
Petrochelidon pyrrhonota	Cliff Swallow
Pheucticus ludovicianus	Rose-breasted Grosbeak
Picoides pubescens	Downy Woodpecker
Picoides villosus	Hairy Woodpecker
Pipilo erythrophthalmus	Eastern Towhee
Piranga olivacea	Scarlet Tanager
Poecile carolinensis	Carolina Chickadee
Polioptila caerulea	Blue-grey Gnatcatcher
Prothonotaria citrea	Prothonotary Warbler
Quiscalus quiscula	Common Grackle
Regulus calendula	Ruby-crowned Kinglet
Seiurus aurocapillus	Ovenbird
Setophaga ruticilla	American Redstart
Sialis sialis	Eastern Bluebird
Sitta carolinensis	White-breasted Nuthatch
Sitta pusilla	Brown-headed Nuthatch
Sphyrapicus varius	Yellow-bellied Sapsucker
Spizella passerine	Chipping Sparrow
Stelgidopteryx serripennis	Northern Rough-winged Swallow

Strix varia	Barred Owl
Sturnus vulgaris	European Starling
Thryothorus ludovicianus	Carolina Wren
Troglodytes aedon	House Wren
Toxostoma rufum	Brown Thrasher
Turdus migratorius	American Robin
Tyrannus tyrannus	Eastern Kingbird
Vireo flavifrons	Blue-headed Vireo
Vireo griseus	White-eyed Vireo
Vireo olivaceus	Red-eyed Vireo
Wilsonia citrina	Hooded Warbler
Zenaida macroura	Mourning Dove
Zonotrichia albicollis	White-throated Sparrow

Freshwater Fish

Ameiurus nebulosus	Brown Bullhead
Aphredoderus sayanus	Pirate Perch
Clinostomus funduloides	Rosyside Dace
Erimyzon oblongus	Creek Chubsucker
Esox niger	Chain Pickerel
Etheostoma olmstedi	Tessellated Darter
Lepomis aurutus	Redbreast
Lepomis macrochirus	Bluegill
Micropterus salmoides	Largemouth Bass
Nocomis leptocephalus	Bluehead Chub
Notropis altipinnis	Highfin Shiner
Semotilus atromaculatus	Creek Chub

Reptile

Crotalus horridus	Timber Rattlesnake

Mollusks - Freshwater Mussels

Elliptio complanata	Eastern Elliptio

Insects – Butterflies

Celastrina ladon neglecta	Summer Azure
Epargyreus clarus	Silver-spotted Skipper
Everes comyntas	Eastern Tailed-blue
Hermeuptychia sosybius	Carolina Satyr
Papilio glaucus	Eastern Tiger Swallowtail
Papilio troilus	Spicebush Swallowtail
Phyciodes tharos	Pearl Crescent
Polygonia interrogationis	Question Mark

Vanessa atalanta	Red Admiral
Vanessa virginiensis	American Lady

Insects – Benthic Macroinvertebrates

Ablabesmyia spp	Midge#
Acentrella spp	Small Minnow Mayfly#
Acroneuria spp	Stonefly#
Allocapnia spp	Stonefly#
Amphinemura spp	Stonefly#
Anopheles spp	Mosquito#
Baetis alachua	Blue Winged Olive Mayfly#
Caecidotea spp	Aquatic Sowbug#
Caenis spp.	Mayfly#
Crangonyx spp	Amphipod#
Cricotopus vieriensis	Midge#
Clioperla clio	Clio Stripetail
Cordulegaster spp	Dragonfly#
Cyrnellus fraternus	Caddisfly#
Helichus spp	Aquatic Beetle#
Heterotrissocladius spp	Nematoceran Fly#
Hexatoma spp	Cranefly#
Hydatophylax argus	Giant Cream Pattern-wing Sedge
Isoperla kirchneri	Stripetail#
Larsia spp	Midge#
Lepidostoma spp	Caddisfly#
Leuctra spp	Stonefly#
Maccaffertium modestum	White Eyed Mayfly
Maccaffertium vicarium	Flatheaded Mayfly
Neophylax consimilis	Autumn Mottled Sedge#
Neoporus spp	Aquatic Beetle#
Nigronia fasciatus	Hellgrammite#
Parachaetocladius spp	Midge#
Parametriocnemus lunbecki	Midge#
Prosimulium spp	Blackfly#
Prostoia spp	Stonefly#
Psectrocladius spp	Midge#
Psephenus herricki	Water Penny Beetle#
Psilotreta spp	Caddisfly#

Vanessa atalanta	Red Admiral
Vanessa virginiensis	American Lady

Insects – Benthic Macroinvertebrates

Ablabesmyia spp	Midge#
Acentrella spp	Small Minnow Mayfly#
Acroneuria spp	Stonefly#
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Cordulegaster spp	Dragonfly#
Cyrnellus fraternus	Caddisfly#
Helichus spp	Aquatic Beetle#
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Isoperla kirchneri	Stripetail#
Larsia spp	Midge#
Lepidostoma spp	Caddisfly#
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Maccaffertium modestum	White Eyed Mayfly
Maccaffertium vicarium	Flatheaded Mayfly
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Neoporus spp	Aquatic Beetle#
Nigronia fasciatus	Hellgrammite#
Parachaetocladius spp	Midge#
Parametriocnemus lunbecki	Midge#
Prosimulium spp	Blackfly#
Prostoia spp	Stonefly#
Psectrocladius spp	Midge#
Psephenus herricki	Water Penny Beetle#
Psilotreta spp	Caddisfly#

Pycnopsyche lepida	Great Autumn Brown Sedge
Rhyacophilia torva	Green Sedge
Similum spp	Blackfly#
Somatochlora spp	Dragonfly#
Stenelmis spp	Aquatic Beetle#
Stenonema femoratum	Cream Cahill
Strophopteryx spp	Caddisfly#
Suwallia marginata	York Sallfly
Taeniopteryx spp	Willowfly#
Tipula spp	Cranefly#
Tvetenia bavarica group	Midge#
Wormaldia spp	Caddisfly#

Insects – Dragonflies

Calopteryx maculata
Cordulegaster spp
Gomphus (*Gomphus*) *lividus*
Plethemis lydia
Somatochlora spp

Salamanders

Ambystoma talpoideum	Mole Salamander
Desmognathus fuscus	Northern Dusky Salamander

APPENDICES

A - Prescribed Burning Analysis for TIP# R-2527
B - Natural Communities of North Carolina occurring on Uwharrie National Forest
C - NCNHP Significant Natural Heritage Areas occurring on Uwharrie National Forest
D - Biological Evaluation for the Proposed Widening of NC 24/27, January 2014
E - Aquatic Resources Report for the Proposed Widening of NC 24/27, January 2014
F - Botanical Resources Report for the Proposed Widening of NC 24/27, January 2014
G - Terrestrial Animal Resources Report for the Proposed Widening of NC 24/27, January 2013

Appendix A

Prescribed Burning Analysis for TIP# R-2527

Prescribed Burning Analysis for TIP# R-2527, NC 24/27 Improvements, Uwharrie National Forest, Montgomery Co., N.C.

March 31, 2014

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Prescribed Burning Analysis for TIP# R-2527 Project, Uwharrie Ranger District, Uwharrie National Forest, Montgomery Co., North Carolina

Introduction

This prescribed burning analysis identifies the potential effects on the current and future U.S. Forest Service's prescribed burning program by the proposed road widening of NC 24/27 (TIP # R-2527) from east of the Yadkin-Pee Dee River to west of SR 1134 (Wadeville Road). This proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way.

Four portions of the proposed NC 24/27 highway project falls within the Uwharrie Ranger District, Uwharrie National Forest, Montgomery Co., N.C. Approximately 50 acres of USFS land falls within the 500 foot project study corridor (project area) for a distance of 3.28 miles.

Since Longleaf Pine ecosystem restoration is a major driver of the new forest plan for the Uwharrie National Forest (Uwharrie NF), the Uwharrie Ranger District (Uwharrie RD) foresees continuing and expanding its growing season burn program. In addition to the Longleaf Pine (*Pinus palustris*), the federally protected Schweinitz's Sunflower (*Helianthus schweinitzii*) and other Forest Service sensitive and locally rare species occur in several areas along NC Highway 24/27 (TIP# R-2527).

Restoring the Uwharrie NF to a more natural ecological condition encompasses the biological and physical natural resources of vegetation, wildlife, soil, water and fisheries (USDA Forest Service 2012). Although all of these are important to the overall restoration of the forest, this prescribed burning analysis will focus only on the Longleaf Pine and Schweinitz's Sunflower restoration management areas along and adjacent to NC 24/27. These management areas currently undergo a prescribed burning regime and may be affected by the proposed highway project that will increase the width of the transportation corridor.

The Uwharrie NF Management Plan (USDA 2012) lists vegetation-related goals and conditions, three of which pertain to this prescribed burning analysis:

- Longleaf Pine and oak-hickory woodlands that provide habitat for federally listed, sensitive, and locally rare species in canopy openings.

- Plant communities such as longleaf pine woodlands, shortleaf pine woodlands, and oak hickory forests.

- Schweinitz's Sunflowers (federally listed as endangered since 1991), that historically occurred across the Piedmont of North Carolina, and are being restored on appropriate sites across the forest.

Ecological systems are defined by groups of plant associations occurring in regions of similar physical conditions and biological potential. The desired composition, structure and process for each system listed in the vegetation-related goals above, including fire return intervals for each (USDA 2012) include Southern Interior Longleaf Pine Woodland, Dry Oak-Hickory Forest, Southern Piedmont Mafic Hardpan Woodland, and Xeric Oak Forest.

The desired fire return intervals for the above ecological systems of the Uwharrie NF are:

Southern Interior Longleaf Pine Woodland	3 - 5 years
Dry Oak-Hickory Forest	7 - 20 years
Southern Piedmont Mafic Hardpan Woodland	3 - 5 years
Xeric Oak Forest	7 - 20 years

The objectives of prescribed burns are to improve wildlife habitat, to reduce dangerous fuel buildup, and to improve overall ecosystem health. Prescribed fire can do this by stimulating lush and abundant re-growth after the fire that is more desirable for wildlife forage. Prescribed fires can also reduce wildfire threat by consuming fuels that naturally accumulate in the absence of fire, and prescribed fire can improve overall ecosystem health in terms of the forest structure, reduced tree density, better species diversity, as well as maintain or restore fire dependent species.

Creating more open conditions by reestablishing or maintaining a more appropriate fire return interval will help with the restoration and maintenance of certain rare plant communities as well as support habitat for Schweinitz's sunflower, and habitat for sensitive species. It will be important to emphasize opportunities for Longleaf Pine restoration and Schweinitz's Sunflower restoration when prioritizing work, such as when deciding what part of the national forest to prescribed burn from year to year. Most fuels treatments will occur in the wildland – urban interface. Burns in the pine forest types would also improve the fire regime condition class (USDA 2012).

The Uwharrie NF has a set of fire management standards and guidelines that are followed (USDA 2012). These standards and guidelines will pertain to the NC 24/27 proposed highway project:

- Existing barriers, e.g., streams, lakes, wetlands, roads, and trails, shall be used whenever possible to reduce the need for fire line construction and to minimize resource impacts.

- All prescribed burning shall comply with the state's smoke management plan (http://www.ncforestservice.gov/fire_control/fc_smoke_management_guidelines.htm).

- When prescribe burning, at least every third burn on a site should be a growing season burn. It is permissible to burn the same acreage in two sequential years and to apply only growing season fire to the same acreage for three or more sequential burning cycles.

- When prescribe burning, the fire should be allowed to burn in a mosaic pattern resulting from differential influence of topography, fuel loading and moisture, and vegetation type.

When prescribed burning, state management guidelines as detailed in FSM 5140, the North Carolina Prescribed Burning Act 113-60.43, and the North Carolina open burning Rule 15A-NCAC 02D-1900 should be followed.

Management Areas (MAs) are areas in the Uwharrie NF that are similar in some respect. They have similar features or uses, or contain special attributes that must be taken into account when considering management activities. The two management areas in Uwharrie NF that pertain directly to TIP # R-2527, NC 24/27 widening project are:

Longleaf Pine Restoration MA (15,094 acres) [**Maps 1 & 2**]: This MA occurs in sections of the Uwharrie NF where Longleaf Pine restoration would be focused. It contains most of the existing longleaf as well as areas having the characteristics of potential longleaf communities. It encompasses most of the southeastern part of the Forest in the vicinity of the NC 24/27 project area. Within this MA, management actions would retain, restore, or enhance the longleaf pine community when the following conditions are encountered:

- Presence of existing remnant longleaf,
- Presence of Piedmont longleaf associated forbs and grasses such as Little Bluestem (*Schizachyrium scoparium*) and Indiangrass (*Sorghastrum nutans*).
- Dry ridges or south facing slopes.

Schweinitz's Sunflower Habitat MA (2,307 acres) [**Maps 1 & 2**]: These are areas of the Uwharrie NF that have ecological attributes that are conducive to restoring Schweinitz's Sunflower. The desired condition within Schweinitz's Sunflower's management areas is for open conditions within drier portions of the landscape, specifically in Xeric Oak Forest, Dry Oak-Hickory Forest, Dry-Mesic Oak-Hickory Forest, and Piedmont Longleaf Woodlands. The desirable fire frequency once these habitats are restored would be on a 3-5 year cycle.

Uwharrie NF Prescribed Burning History

The Uwharrie NF currently has approximately 4,000 acres of longleaf (or longleaf/mix) forest, with at least 10,000 more acres suitable for establishing longleaf. Most of these acres have historically been managed with dormant season fire.

Each year an average of 3,000 to 6,000 acres in the Uwharrie NF undergo prescribed burns to create open canopy conditions, reduce midcanopy, and move toward ecological conditions described in the ecological systems above. Public and firefighter safety will be the first priority in fire management activities (USDA 2012).

Historically, dormant season burns have encouraged regrowth of unwanted hardwoods. However, growing season burns are reported to significantly reduce hardwood stem numbers and the amount of regrowth. In 2007 the Uwharrie Ranger District conducted a growing season

burn. Little to no damage to existing longleaf saplings and grass formation in the understory, resulting in a more "classic" longleaf stand appearance was observed after this burn (USDOI/USDA 2007).

Several areas of Uwharrie NF property occur on either one or both sides of NC 24/27 in the proposed highway project area. Roberdo, the largest area, occurs from Smith Creek westward to SR 1136 (Bruton Carpenter Rd.) and spans approximately 12,050 ft (2.26 mi) along the proposed highway project area. The easternmost section of the Roberdo area is located on the north side of the highway from Smith Creek to the intersection of NC 24/27 and NC 109 for a distance of approximately 2,416 ft (0.46 mi). The remainder, and largest section, of the Roberdo area (NC 24/27 - NC 109 intersection to SR 1136) on the west side of NC 109 spans a distance of approximately 9,634 ft (1.8 mi) along NC 24/27. (**See Map 3**)

Three smaller sections (western, central, and eastern) of Uwharrie NF are located along NC 24/27, starting approximately 0.75 mi east of River Rd. (SR 1150) on both sides of NC 24/27 [**Map 4**]. The western section is associated with the national forest's Wood Run/Lawrenceville area and spans approximately 1,860 ft (0.35 mi) highway frontage along NC 24/27. This section is the only one of the three that is currently in the forest burn rotation. The central section spans 1,317 ft (0.25 mi) highway frontage and the eastern section spans 2,241 ft (0.42 mi) along the highway. Neither of these sections is currently in the forest burn rotation. There are no immediate plans to burn either of the two remaining tracts because they are currently a low priority for burns.

Prescribed burns during the dormant season have been conducted on the Roberdo and Wood Run/Lawrenceville areas adjacent to NC 24/27 for many years. One of the first growing season burns took place in 2007, and these areas have become part of the burn rotation since. These areas are burned at least every 3 years, but if the opportunity (and funding) arises, Uwharrie NF will burn portions of these areas every other year. National Forest botanists suggest that the ecosystem is improved more by burning more frequently for a few burn cycles. There is no set schedule for if the burn will be dormant season or growing season, but a rule of thumb is that at least every other burn will be a growing season burn. The various areas or specific tracts in the forest compartments below are not generally burned on the same day or the same year. *The different tract or area names presented below are names used by Uwharrie NF personnel for internal identification purposes and record keeping* (Kelly Cagle, pers. comm.).

1. The Roberdo area has the most Longleaf Pine and Schweinitz's Sunflowers in the highway project vicinity. The entire area is a Longleaf Pine Restoration MA that includes three Schweinitz's Sunflower Habitat MAs (**Map 1**). Prescribed burns in the Roberdo area occur as described in the two compartments below (**See Map 3**):

   Compartment 37 (north of NC 24/27)
   - Railroad Tracks East/N Boon Chesson, east of the RR tracks.
   - Roberdo West (or Landfill Road burn unit), west of the RR tracks. The current burn regime for the southern portion of this area will produce some effects from smoke along NC 24/27.

Compartment 36 (south of NC 24/27)

- Roberdo South. The current burn regime for the northern part of this area will produce some effects from smoke along NC 24/27 and, possibily, NC 109 east of the RR tracks.

2. The Wood Run/Lawrenceville area (**Map 4**) makes up parts of *Compartments 34* and *35*, and is located north of NC 24/27. This area is almost entirely within a Longleaf Pine Restoration MA, and includes the Wood Run Schweinitz's Sunflower Habitat MA (**Map 2**). Only the small westernmost section currently being burned is located adjacent to the highway project area, but the current burn regime for the southern portion of the Wood Run/Lawrenceville area will produce some effects from smoke along NC 24/27.

Prescribed Burn Analysis for the NC 24/27 Improvement Project

The proposed NC 24/27 highway project will have negligible effects on the ability of Uwharrie NF to conduct prescribed burns. The 2010 Annual Average Daily Traffic (AADT) along NC 24/27 within the Uwharrie NF is estimated between 7,200 - 10,100 AADT and the 2035 estimate is 10,500 – 14,800 AADT (NCDOT 2010a; 2010b). The predicted increase in traffic volume on NC 24/27 after the project will not be enough to affect frequency, duration, or timing of prescribed burns.

The following information was provided by Kelly Cagle, prescribed burn supervisor, Uwharrie National Forest:

Each management area is currently burned at least every three years, but may be burned every other year (no more frequently than that) on some type of alternating schedule between growing and dormant season fires. These prescribed burns may be executed at any time of the year, with some occurring during the dormant season as well as the growing season. For instance the Roberdo and Wood Run/Lawrenceville areas could be burned during the same season but will not be burned at the same time or on the same day.

The USFS does not typically close NC 24/27 or NC 109, but when they are burning, they may flag traffic and stop it for brief periods (5 minutes or until heavy smoke clears). Most of the time the USFS place signs along the highway in numerous locations and then have some sort of law enforcement presence to slow traffic down to a safe speed. This may happen 2 to 4 times per year, and in some years it does not occur at all. Burns have been postponed when the weather was likely to carry smoke onto the roadways and the FS could not mitigate that with signs or flagmen; the USFS usually waits until favorable conditions occur to initiate a burn.

The NCDOT Division 8 district office has not played a major role with the prescribed burns along NC 24/27 in the past. The USFS usually relies on Forest law enforcement staff or the Montgomery County sheriff's office to provide help in maintaining slow traffic during the burns.

Notice can be given to NCDOT, Montgomery sheriff's department, and local residents **no** earlier than the afternoon or evening prior to the prescribed burn because FS cannot get a

reasonably accurate weather forecast any sooner than that. USFS can make plans a few days earlier than that, but the actual 'go or no go' could not occur until the day prior. Sometimes this changes even as late as the morning of a scheduled burn, if winds or humidities change at the last minute.

All of the tracts along NC 24/27 are considered Urban Interface because every management area has private land adjacent to them and most have private structures somewhere in the vicinity. The residents are usually notified the afternoon prior to the prescribed burn.

Traffic is fairly consistent and steady on NC 24/27 and NC 109 on weekdays. It seems to be less on weekends. Weekdays are when the majority of burns occur, but FS occasionally schedules a burn on weekends (2 or 3 times a year). Holidays are rarely scheduled for prescribed burn, but it has occurred a few times in past years. Burns are usually started by mid-morning (10:00 a.m. or so) and last most of the day, usually ending between 3:00 – 6:00 p.m. depending on acreage and amount of help on a burn day.

Currently, NC 24/27 acts as a fire break or fire line, and will continue to do so post construction. USFS has had good success in limiting smoke on the highways, but most of the time a roadway will have at least some smoke. Traffic flowing along a highway actually makes a "vortex" type of effect along the edge of the road, and that tends to suck smoke out into the roadway as traffic passes by. There are times when winds have blown smoke directly into the highway, and during these times FS ramps up the law enforcement presence and signage. Smoke impacts will usually be worse immediately at the onset of ignition operations, and then decrease as FS work their way away from the road edge and the smoke has time to rise a bit before it crosses the road.

Only sections adjacent to the actual burn area will be affected and the need to detour traffic rarely occurs. Minor traffic control to reduce speed is the best way to manage in the event that smoke crosses the highway.

The NCDOT, Division 8, proposes to take the following actions to assist the Uwharrie NF during prescribed burns along the NC 24/27 portion within the forest. In the event of smoke on the roadway, road closures, or detours, NCDOT can:

- Provide personnel and assistance to the Uwharrie NF and the Montgomery Co. sheriff's department.
- Provide signs or cones.
- Provide guide vehicles and/or flagmen.

References

Cagle, Kelly (Uwharrie National Forest). 2013. Personal Communication.

Fire Weather Reports- Raleigh Zone
http://www.ncforestservice.gov/fire_control/fire_weather_reports.htm

N. C. Division of Forest Resources Smoke Management Guidelines
http://www.ncforestservice.gov/fire_control/fc_smoke_management_guidelines.htm

NCDOT. 2010a. 2010 Annual Average Daily Traffic – No Build. Sheet 1-1. NC 24-27 Improvements, TIP:R-2527, B-4974, WBS: 35572.1. November 9, 2010.

NCDOT. 2010b. 2035 Annual Average Daily Traffic – Build / No Build. Sheet 1-1. NC 24-27 Improvements, TIP:R-2527, B-4974, WBS: 35572.1. November 9, 2010.

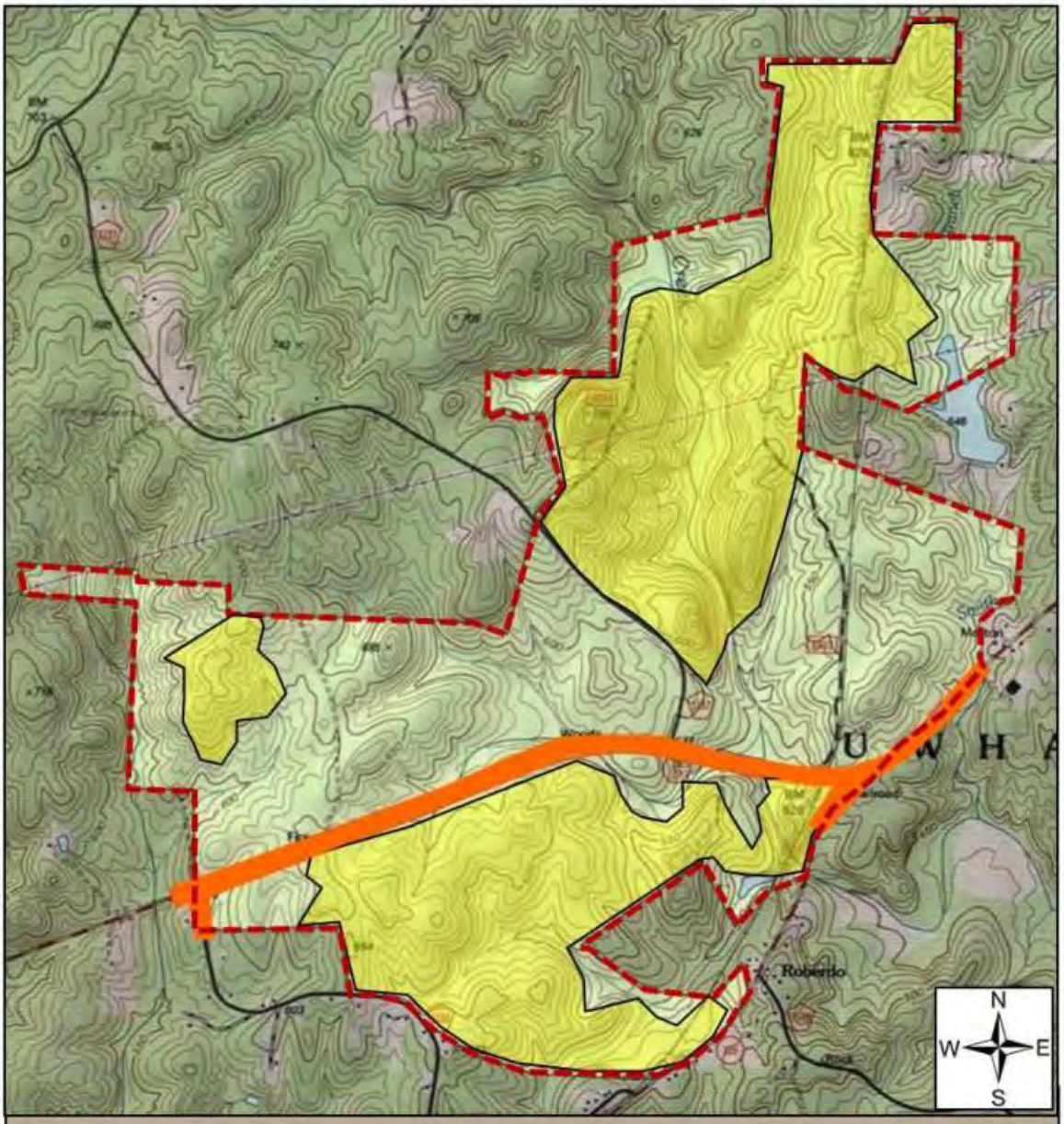
N.C. Prescribed Burning Act,
http://www.cals.ncsu.edu/wq/lpn/statutes/nc/prescribedburning.htm

USDA/FS. 2012. Uwharrie National Forest Land and Resource Management Plan. R8-MB 140A. U.S.D.A. Forest Service, Southern Region. 129 pp.

USDA/FS. 2011. Letter to Friends of the Uwharrie National Forest regarding prescribed fire. Troy, NC. November 8, 2011.

USDOI/USDA. 2007. National Fire Plan Success Story; Growing Season Prescribed Burning. Uwharrie National Forest, 2007. National Fire Plan. USDOI/USDA Forests and Rangelands Cooperative.
http://www.forestsandrangelands.gov/success/stories/2007/nfp_2007_nc_fs_uwnf_growseasonburn_fuelsreduction.shtml

Map 1: Management Areas, TIP # R-2527, Uwharrie National Forest, Montgomery Co., N.C.

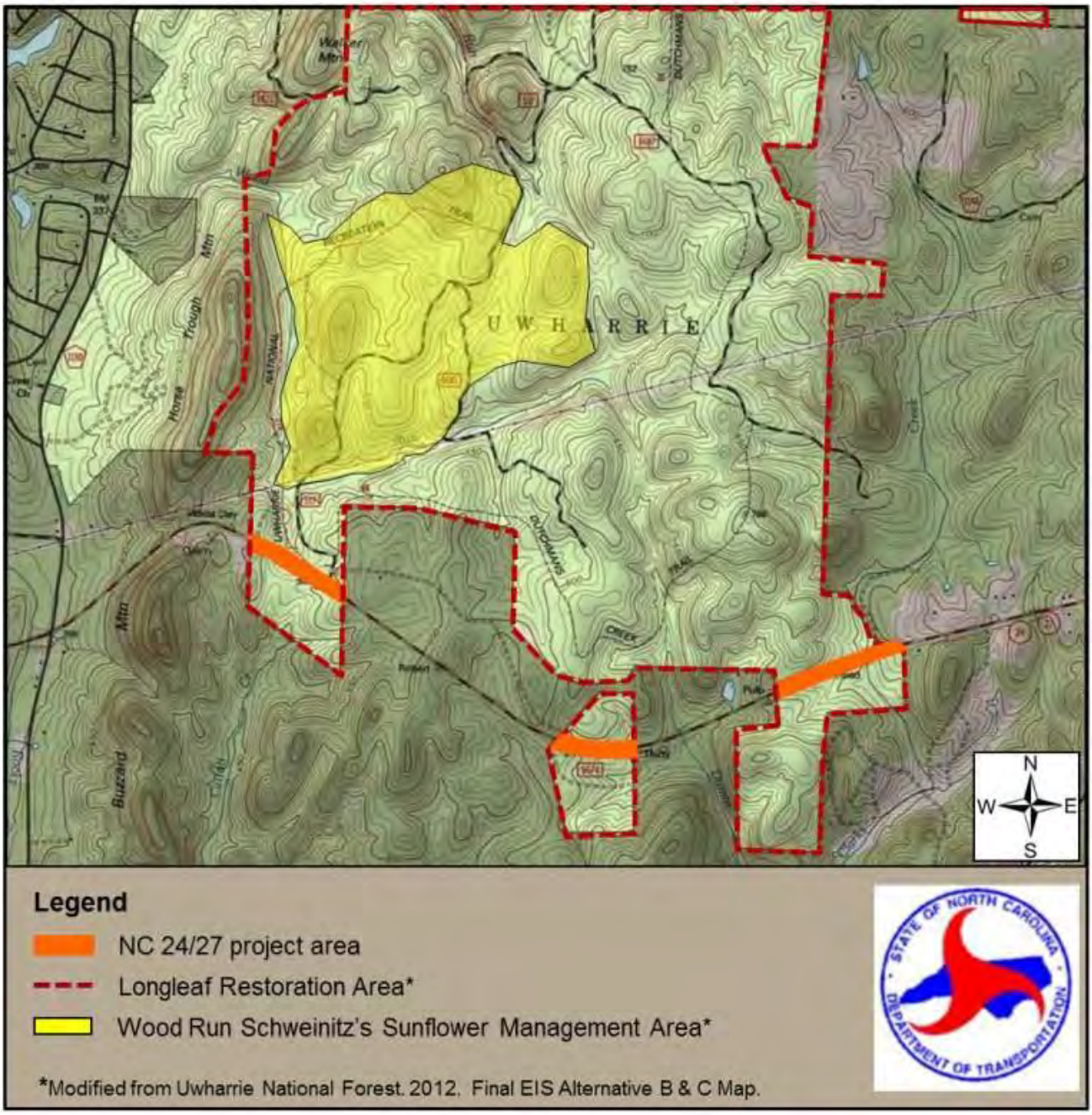


Legend

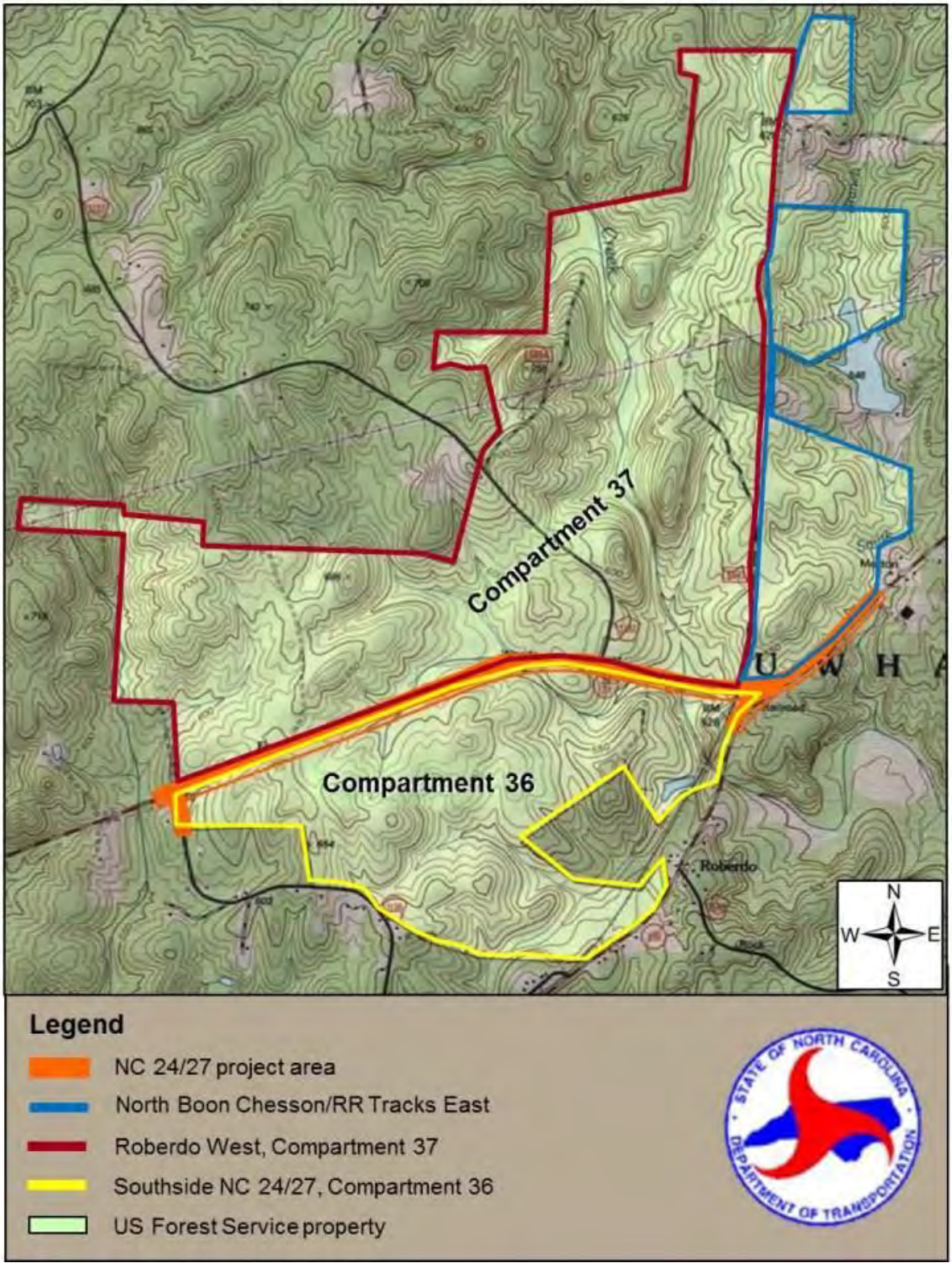
- NC 24/27 project area
- Longleaf Restoration Area*
- Roberdo Schweinitz's Sunflower Management Area*

*Modified from Uwharrie National Forest. 2012. Final EIS Alternative B & C Map.

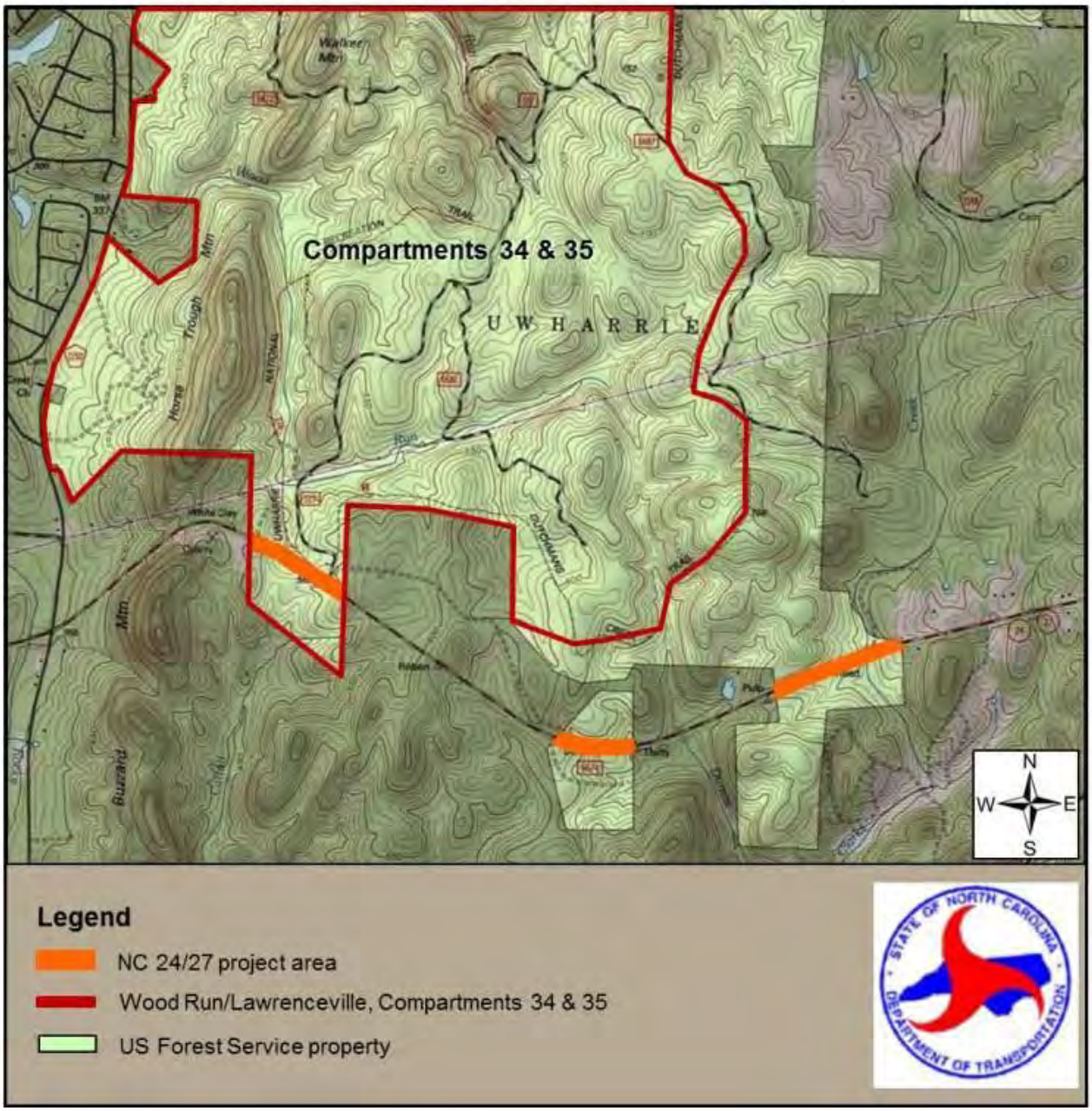
Map 2: Management Areas, Tip# R-2527, Uwharrie National Forest Montgomery Co., N.C.



Map 3: Prescribed Burn Areas in the Roberdo Area, TIP # R-2527, Uwharrie National Forest, Montgomery Co., N.C.



Map 4: Prescribed Burn Areas in the Lawrenceville Area, Uwharrie National Forest, Tip# R-2527, Montgomery Co., N.C.



Appendix B

Natural Communities of North Carolina occurring on Uwharrie National Forest

Natural Communities of North Carolina - March 2012
Michael P. Schafale
North Carolina Natural Heritage Program
Department of Environment and Natural Resources

NC 24/27 WIDENING – UWHARRIE NATIONAL FOREST

Piedmont Boggy Streamhead (G2G3) is described in Schafale (2012).

Synonyms: *Acer rubrum var. trilobum - Liriodendron tulipifera / Ilex opaca var. opaca / Osmunda cinnamomea* Forest (CEGL004551). Streamhead Seep (Seymour 2011). Ecological Systems: Piedmont Seepage Wetland (CES202.298).

Concept: Type covers seepage areas along small headwater streams (generally intermittent or 1st to 2nd order), and occasional other seepage wetlands far from lower slopes or larger streams, which lack the characteristics of Hillside Seepage Bogs. Known examples are all in the eastern and central Piedmont, geographically separated from the Upper Piedmont Springhead Subtype. Vegetation is a mix of widely tolerant acidic seepage species and of species shared with Piedmont Headwater Stream Forests and uplands, often with some characteristic Coastal Plain species.

Distinguishing Features: This type is distinguished from other seepage wetland communities by occurring in upland or headwater settings while lacking the characteristic species of Hillside Seepage Bogs, such as *Sarracenia flava* and *Sarracenia purpurea*. Wetlands that have been known once to have had more distinctive open bog herbs typical of the Hillside Seepage Bog type, such as *Sarracenia flava, Sarracenia purpurea*, and *Helenium brevifolium*, should be treated as degraded Hillside Seepage Bogs rather than as this type.

Piedmont Boggy Streamhead is distinguished from Low Elevation Seep by a more upland setting and by floristic differences. Species characteristic of this type but scarce or absent in Low Elevation Seeps include *Osmunda regalis, Eubotrys racemosa, Vaccinium fuscatum, Vaccinium formosum, Cyrilla racemiflora*, and *Smilax laurifolia*. More species are shared with the Piedmont/Mountain Springhead Subtype of Low Elevation Seep than with the other subtypes (e.g., *Vaccinium* spp., *Viburnum nudum, Ilex opaca, Smilax laurifolia, Woodwardia areolata*). However, Piedmont/Mountain Springheads tend to lack other characteristic species such as *Liquidambar styraciflua, Eubotrys racemosa, Osmunda regalis, Morella caroliniensis (= Myrica heterophylla), Cyrilla racemiflora, Gaylussacia frondosa, Pinus taeda*, and *Chasmanthium laxum*. They tend to have species such as *Alnus serrulata, Ilex verticillata, Decumaria barbara*, and *Carex allegheniensis* that are absent in Piedmont Boggy Streamheads. There is also a geographic separation. No Piedmont Boggy Streamheads (as defined here) are known from the western Piedmont or Mountains. (Some communities in the western Piedmont were previously called Piedmont Boggy Streamheads). Other subtypes of Low Elevation Seep have greater floristic differences, including a number of additional species such as *Saururus cernuus, Boehmeria cylindrica, Arisaema triphyllum, Leersia* spp., *Glyceria striata, Acer negundo, Fraxinus pennsylvanica, Celtis laevigata, Peltandra virginica, Sagittaria* spp., and *Cephalanthus occidentalis*).

Piedmont Boggy Streamheads occur along headwater streams, and can show some evidence of flowing water. They are distinguished from Piedmont Headwater Stream Forest by a greater proportion of seepage wetland species and a scarcity of upland species. Many of the species are shared, including *Osmundastrum (Osmunda) cinnamomeum* and *Viburnum nudum*, but are minor components in Piedmont Headwater Stream Forest.

Comments: The Piedmont Boggy Streamhead was not recognized in the 3rd Approximation, but was recognized and tracked shortly thereafter. Definition of the conceptual boundary with Hillside Seepage Bog has always been difficult because of the loss of herbaceous flora in many Hillside Seepage Bogs. Some examples may remain ambiguous. However, analysis by Seymour (2011) found this to be a distinct group of communities, and its retention as a type seems appropriate. These communities are rare.

Dry Piedmont Longleaf Pine Forest (G2G3) is described in Schafale (2012)
Synonyms: *Pinus palustris - Pinus echinata - (Pinus virginiana) / Quercus marilandica - (Quercus prinus) / Vaccinium pallidum* Woodland (CEGL008437).
Ecological Systems: Southeastern Interior Longleaf Pine Woodland (CES202.319).

Concept: Type covers woodlands or forests of the eastern Piedmont (primarily the Uwharries and areas adjacent to the Sandhills) in which *Pinus palustris* naturally dominates or codominates. *Pinus palustris* may be scarce in examples where past logging and fire suppression have removed it and allowed other pines or hardwoods to dominate.

Distinguishing Features: Dry Piedmont Longleaf Pine Forest is distinguished from all other Piedmont dry communities by having *Pinus palustris* dominant or codominant, or by having evidence that it once dominated. In degraded examples the canopy may resemble Dry Oak–Hickory Forest or Piedmont Monadnock Forest, or may be dominated by *Pinus taeda* and *Pinus echinata*, with only scattered *Pinus palustris*. It is distinguished from Wet Piedmont Longleaf Pine Forest by its overall dry to dry-mesic vegetation, lacking any appreciable amount of wetland species or even mesic species such as *Panicum virgatum* or *Chasmanthium laxum*. It is distinguished from most longleaf pine communities of the adjacent Coastal Plain by lacking *Aristida stricta, Quercus laevis, Quercus incana*, and *Quercus margarettiae*, as well as by its Piedmont location. The Northern Subtype of Pine/Scrub Oak Sandhill also lacks *Aristida stricta*, but contains the Coastal Plain scrub oaks.

Comments: This type covers a broader range of moisture and topographic positions than Piedmont hardwood forests. It may be that additional subtypes should be recognized, but their distinction is hidden by the universal alteration by past fire suppression in all remaining examples. *Pinus palustris – Quercus marilandica - Quercus prinus / Symplocos tinctoria* Woodland (CEGL004554), formerly considered distinct in the NVC, was merged with this type. It represents a single example in the Uwharrie Mountains, on a steep south slope.

Wet Piedmont Longleaf Pint Forest (G1)
Synonyms: *Pinus palustris - Pinus taeda - Pinus serotina / Chasmanthium laxum - Panicum virgatum* Piedmont Woodland (CEGL003663).

Ecological Systems: Southeastern Interior Longleaf Pine Woodland (CES202.319).

Concept: Type covers seepage fed or perched wetland woodlands or forests of the eastern Piedmont (primarily the Uwharries and areas adjacent to the Sandhills) in which *Pinus palustris* naturally dominates or codominates. *Pinus palustris* may be scarce in examples where past logging and fire suppression have removed it and allowed other pines and hardwoods to expand.

Distinguishing Features: Wet Piedmont Longleaf Pine Forest is distinguished from all other Piedmont wetland communities by having a component of *Pinus palustris* or evidence that it once dominated. In degraded examples the canopy may be dominated by *Pinus taeda* and *Pinus serotina* with only scattered *Pinus palustris*. It is distinguished from Dry Piedmont Longleaf Pine Forest by its overall mesic to wet flora, with appreciable amounts of facultative wetland species such as *Panicum virgatum* or *Chasmanthium laxum*, and often some more exclusively wetland species such as *Osmunda (Osmundastrum) cinnamomeum*. It is distinguished from most longleaf pine communities of the adjacent Coastal Plain by lacking *Aristida stricta*, as well as by its Piedmont location. Northern Wet Pine Savanna also lacks *Aristida stricta*, but has a more depauperate and northern flora that still contains a number of Coastal Plain species absent in the Piedmont.

Comments: Hillside Seepage Bogs are often associated with Dry Piedmont Longleaf Pine Forest. It is possible that *Pinus palustris* once occurred in them, potentially blurring the distinction between them and Wet Piedmont Longleaf Pine Forest. However, Hillside Seepage Bogs contain a more specialized wetland flora.

Dry-Mesic Oak-Hickory Forest (Piedmont Subtype) (G4G5) is described in Schafale (2012).
Synonyms: *Quercus alba - Quercus rubra - Carya alba / Cornus florida / Vaccinium stamineum / Desmodium nudiflorum* Piedmont Forest (CEGL008475).
Ecological Systems: Southern Piedmont Dry Oak-(Pine) Forest (CES202.339).

Concept: Type covers dry-mesic forests of acidic upland slopes and somewhat sheltered ridges in the Piedmont and Coastal Plain, dominated by combinations of *Quercus alba, Quercus rubra, Quercus velutina, Carya tomentosa, Carya glabra*, along with varying amounts of pine, maple, and poplar. Basic soil plants are absent or scarce, and acid tolerant species such as *Oxydendrum arboreum* and *Vaccinium* spp. are common. These forests cover the moisture range between that where *Fagus* becomes a significant component and that where *Quercus falcata, Quercus stellata, Quercus marilandica*, or *Quercus montana* become significant components. Subtype covers Piedmont examples, which lack characteristic Coastal Plain species.

Distinguishing Features: Dry-Mesic Oak–Hickory Forest is distinguished from Dry Oak–Hickory Forest by a flora of more mesic composition, most clearly in the canopy. *Quercus stellata, Quercus falcata, Quercus marilandica*, and *Quercus montana* are scarce or absent. It is distinguished from Mesic Mixed Hardwood Forest by the absence of more mesic species, particularly *Fagus grandifolia*. It is distinguished from Montane Oak–Hickory Forest by the absence of characteristically montane flora, such as *Castanea dentata, Magnolia fraseri, Acer pensylvanicum, Rhododendron calendulaceum*, and *Rhododendron maximum*. Additionally, some species are widespread in Montane Oak–Hickory Forests but are restricted to more mesic

communities than this in the Piedmont and Coastal Plain. These include *Kalmia latifolia, Hamamelis virginiana*, and *Polygonatum biflorum*.

The Dry-Mesic Oak–Hickory Forest type is distinguished from Dry-Mesic Basic Oak–Hickory Forest by the absence or scarcity of a suite of basic indicators, such as *Symphoricarpos orbiculatus, Frangula caroliniana*, *Celtis* spp., *Fraxinus americana, Cercis canadensis, Brachyelytrum erectum*, and *Dichanthelium boscii*. Basic indicators also include a set of species that are characteristic of more mesic or floodplain communities but that occur in dry sites that are less acidic. These include *Acer floridanum, Carya ovata, Elymus hystrix, Elymus virginicus, Phryma leptostachya*, and *Phegopteris hexagonoptera*. Characteristic species of acidic soils, such as *Oxydendrum arboreum, Vaccinium stamineum, Vaccinium pallidum, Vaccinium tenellum, Gaylussacia frondosa*, and *Chimaphila maculata* may be present in basic communities, but don't predominate as they do in Dry Mesic Oak–Hickory Forest.
The Piedmont Subtype is distinguished from the Coastal Plain Subtype by floristic differences. *Quercus rubra* is largely restricted to the Piedmont Subtype. *Quercus nigra, Gaylussacia frondosa, Morella cerifera*, and *Arundinaria tecta* are largely restricted to the Coastal Plain Subtype. The Coastal Plain Subtype also tends to have at some least some plants more typical of wetter habitats, such as *Ilex glabra, Osmunda cinnamomea*, and *Woodwardia areolata*, presumably associated with very small seepage patches.

Comments: This association is perhaps the most common one in the Piedmont. It is also common in Virginia, where *Quercus coccinea* becomes more common than *Quercus rubra* as a component. It extends across the Coastal Plain in northern Virginia.

Dry Oak-Hickory Forest (Piedmont Subtype) (G4G5) is described in Schafale (2012).
Synonyms: *Quercus falcata - Quercus alba - Carya alba / Oxydendrum arboreum / Vaccinium stamineum* Forest (CEGL007244).
Ecological Systems: Southern Piedmont Dry Oak-(Pine) Forest (CES202.339).

Concept: Type covers upland hardwood forests of acidic soils in the driest typical topographic positions, on south slopes and ridge tops; where *Quercus alba, Q. stellata*, and *Q. falcata* predominate in the canopy. They are less xeric in composition than the *Quercus stellata - Q. marilandica* forests that occur in specialized edaphic conditions such clay hardpans, shallow rock, or very sandy soils. They contain acid-tolerant flora such as *Oxydendrum arboreum, Nyssa sylvatica, Vaccinium stamineum, Vaccinium pallidum*, and *Vaccinium arboreum*, and lack more base-loving plants. Subtype covers typical examples of the Piedmont, which lack significant Coastal Plain flora.

Distinguishing Features: Dry Oak–Hickory Forests are distinguished from Dry-Mesic Oak–Hickory Forests by canopy composition, which has *Quercus stellata, Q. falcata*, and other trees more drought tolerant than *Quercus alba* predominating over *Quercus rubra* and other trees less drought-tolerant than *Quercus alba*. They are distinguished from Xeric Hardpan Forests by a canopy which contains significant Quercus alba and other trees that are less xerophytic than *Quercus stellata*.

Dry Oak–Hickory Forests are distinguished from Dry Basic Oak–Hickory Forests by having acid tolerant plants predominating and by lacking more base-loving plants. This is most apparent in the lower strata, but the number of distinguishing species is less than in more mesic communities because of the limited number of species present. *Oxydendrum arboreum, Vaccinium pallidum, Vaccinium tenellum*, and *Chimaphila maculata* are generally abundant in Dry Oak–Hickory Forest but absent or scarce in Dry Basic Oak–Hickory Forest. *Cercis canadensis, Fraxinus americana, Acer leucoderme*, and *Viburnum* spp. are generally abundant in Dry Basic Oak–Hickory Forest and scarce in Dry Oak–Hickory Forest, and stronger basic indicators such as *Frangula caroliniana, Symphoricarpos orbiculatus*, or *Rhus aromatica* are often present. As in Dry-Mesic Basic Oak–Hickory Forest, species otherwise typical of floodplains or of more mesic communities may be present, though less commonly.

The Piedmont Subtype is distinguished from the Coastal Plain Subtype by floristic differences. The Coastal Plain Subtype generally has a number of species that are absent in the Piedmont, though they may not be the dominant species in the community. Species shared with drier communities, such as *Quercus margarettiae, Quercus incana, Cnidoscolus stimulosus*, or *Gaylussacia dumosa* are often present in the Coastal Plain Subtype, as are species of wetter communities, such as *Quercus nigra, Gaylussacia frondosa, Morella cerifera*, and *Arundinaria tecta*.

Comments: As currently defined in the NVC, this association is very broad and not precisely defined, extending to Mississippi and Kentucky. It apparently excludes the Atlantic Coastal Plain. It apparently does not occur in Virginia, where drier sites are occupied by an oak/heath forest of more northerly affinities. This concept is almost certainly inappropriately broad.

Pinus echinata - Quercus alba / Vaccinium pallidum / Hexastylis arifolia - Chimaphila maculata Forest (CEGL008427) and *Pinus taeda - Quercus (alba, falcata, stellata)* Successional Coastal Plain Forest (CEGL004766) are widespread associations that appear to overlap this. While pines of several species may be present in natural examples in North Carolina, codominant or dominant pines suggests a successional version of this community type. *Pinus taeda - Quercus falcata / Vaccinium pallidum / Hexastylis arifolia* Forest (CEGL006033) has been defined in Virginia and not attributed to North Carolina. It is unclear how it relates to this.

A Slate Slope Variant of Dry Oak–Hickory Forest may be recognized for steep slopes on slate or other rocks that break into small fragments. The accumulation of rock fragments makes these slopes better drained and somewhat unstable, and it has been suggested the vegetation is distinctive. They tend to have more *Pinus virginiana* or *Pinus echinata* in them, perhaps reflecting more frequent natural disturbance. They may have some unusual species, such as *Rhus aromatica*, along with more typical acid-tolerant species. These do not appear to be distinct enough to recognize as a subtype.

Hillside Seepage Bog (G2) is described in Schafale (2012).
Synonyms: *Acer rubrum var. trilobum / Morella caroliniensis - Gaylussacia frondosa / Andropogon glomeratus - (Sarracenia flava)* Woodland (CEGL004781). Headwater Boggy Seep (Seymour 2011).
Ecological Systems: Piedmont Seepage Wetland (CES202.298).

Concept: Covers gently sloping wetlands of the Piedmont that have a distinctive acid-loving flora that generally includes *Sarracenia flava* or *Sarracenia purpurea*, along with other herbaceous species of Coastal Plain affinities.

Distinguishing Features: Hillside Seepage Bogs share many plants with Piedmont Boggy Streamheads, including *Sphagnum, Smilax laurifolia, Osmundastrum (= Osmunda) cinnamomeum*, or *Osmunda regalis*. They are distinguished from Piedmont Boggy Streamheads as well as from Low Elevation Seep by occurring in more isolated upland locations, having more seepage but less influence by flowing water, and by having a more boggy, acid-tolerant, herbaceous flora. *Sarracenia flava* or *Sarracenia purpurea* are good indicators of this type, but are not always present. When examples are burned, a variety of other distinctive herbaceous species are present, including *Symphyotrichum dumosum (=Aster dumosus), Rhexia mariana, Danthonia sericea, Eupatorium leucolepis*, and *Drosera brevifolia*. Piedmont Boggy Streamheads lack most of these species, though they share many woody wetland species, including many of Coastal Plain affinities. They also contain a few more widespread floodplain species such as *Lindera benzoin* and *Xanthorhiza simplicissima*, as well as upland species such as *Quercus alba* and *Liriodendron tulipifera*.

Low Elevation Seep (Piedmont/Mountain Springhead Subtype) shares many woody species of Coastal Plain affinities with this type, such as *Viburnum nudum* and *Smilax laurifolia*, but lacks the distinctive herbaceous species. It is known only from the upper Piedmont and Mountains, while Hillside Seepage Bogs are known only from the middle and lower Piedmont. When Hillside Seepage Bogs have been degraded by woody encroachment related to lack of fire and to hydrologic alteration, they may come to resemble the Piedmont/Mountain Springhead Subtype or Piedmont Boggy Streamhead. However, sites that are known to have once harbored the more distinctive herbaceous species should be regarded as degraded Hillside Seepage Bogs rather than as one of the other kinds of communities.

Other subtypes of Low Elevation Seep share some wetland species with Hillside Seepage Bogs, but are less similar. Species such as *Arisaema triphyllum ssp. triphyllum, Glyceria striata, Boehmeria cylindrica*, and *Saururus cernuus* are Low Elevation Seep species not characteristic of this type. Low Mountain Seepage Bogs share a similar topographic and hydrologic setting with Hillside Seepage Bogs, along with sharing some species, but their location in the western Mountains leads to a substantially different flora.

Comments: Hillside Seepage Bogs occur in two clusters, one in Iredell County and the other in the Uwharrie Mountains area (Montgomery and Randolph County). These are recognized as variants, and may warrant eventual recognition as subtypes.

Seymour (2011), in her study of Piedmont seep vegetation, recognized a Headwater Boggy Seep type that corresponded to Hillside Seepage Bogs. It was more narrowly defined, encompassing only two of the sites that have been recognized as Hillside Seepage Bogs grouped in it. This appears to be because these bogs had been burned, promoting a more diverse herbaceous flora that stood out, while the loss of distinctive flora in the degraded examples made them indistinguishable in analysis from Low Elevation Seeps. Nevertheless, for Natural Heritage

purposes, sites that are known to have once had pitcher plants or other distinctive bog plants should be regarded as degraded Hillside Seepage Bogs. Seymour (2011) found this to be the most acidic and infertile of her five groups of Piedmont seep communities, but with soils high in clay.

These communities have suffered tremendous degradation and loss over recent decades. A number of sites that were known as bogs with pitcher plants and rare plant species have become densely forested and have lost their distinctive herbaceous flora. In many bogs of the Iredell County variant, this appears to have accompanied entrenchment or headward erosion of adjacent streams, which has altered hydrology. But in the Uwharrie variant, increase of woody vegetation appears to have occurred without hydrologic alteration. The few bogs that remain diverse communities with abundant herbaceous vegetation in the Uwharries are those that have had prescribed burning. It appears that fire is needed to maintain Hillside Seepage Bogs, at least in the Uwharrie variant.

Low Elevation Seep (Typic Subtype) (G3?) is described in Schafale (2012).
Synonyms: *Acer rubrum var. trilobum / Viburnum nudum var. nudum / Osmunda cinnamomea - Saururus cernuus - Impatiens capensis* Forest (CEGL004426). Rich Foot-slope Seeps (Seymour 2011).
Ecological Systems: Piedmont Seepage Wetland (CES202.298).

Concept: Type covers seepage-fed wetlands that lack the distinctive species composition and other characteristics of Hillside Seepage Bog, High Elevation Seep, Rich Montane Seep, or Sandhill Seep. They may occur in any region of the state. Sites include small hollows on slopes, slope breaks, toe slopes, or edges of floodplains. They can be quite small, but have wetland vegetation which contrasts sharply with adjacent communities. Subtype covers examples of the Piedmont and Coastal Plain which occur on lower slopes or edges of bottomlands but not on well-developed floodplains. These are the most typical examples, lacking the distinctive physical and floristic features of the other subtypes. They are fairly common, though they are small and many examples are overlooked.

Distinguishing Features: Low Elevation Seeps are distinguished by abundant wetland vegetation, without the characteristic composition and setting of other seepage wetlands. *Sphagnum* is not generally abundant but may be present in limited amounts. Many species may be shared with Southern Appalachian Bogs and other mountain bog communities, including *Viburnum nudum, Viburnum cassinoides, Impatiens capensis, Osmundastrum (Osmunda) cinnamomeum, Osmunda regalis, Woodwardia areolata*, and *Carex* spp. However, other species indicative of less nutrient-poor conditions, such as *Saururus cernuus, Lycopus virginicus*, and *Lindera benzoin*, are also present. Rich Montane Seeps share some species but have a number of species not found in this type, such as *Laportea canadensis, Diphylleia cymosa, Rudbeckia laciniata, Micranthes micranthidifolia (=Saxifraga micranthidifolia), Lilium superbum*, and *Lilium grayi*.

The Typic Subtype may be distinguished from the Floodplain Subtype by occurring in uplands or at the heads of small streams, rather than on the edge of larger floodplains. It consequently lacks the admixture of floodplain and alluvial species found in the Floodplain Subtype, such as *Acer*

negundo, Fraxinus pennsylvanica, and *Celtis laevigata*, as well as species of wetter areas such as *Peltandra virginica, Sagittaria* spp., and *Cephalanthus occidentalis*.

Comments: This subtype corresponds to the group Seymour (2011) called Rich Foot-slope Seeps, but also includes examples in the Coastal Plain which may be a bit different. Soil analysis and flora indicate that it is more fertile than any other except the Floodplain Subtype, but it too is an acidic wetland that has few or no species characteristic of rich sites.

The NVC association linked to this subtype does not describe the range of vegetation of this type well. In addition, it can be difficult to characterize the vegetation structure of these communities. Examples usually have a tree canopy above them, but often are small enough that most canopy cover comes from upland trees rooted outside of the community. Hence wetland canopy trees are absent. Some other communities with similar vegetation structure are treated as herbaceous vegetation associations rather than forests.

Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum var. nudum / Osmunda cinnamomea - Woodwardia areolata Forest (CEGL006238) is a seepage swamp of states to the north, primarily in the Coastal Plain. It may be related.

Piedmont/Coastal Plain Heath Bluff (G2G3) is described in Schafale (2012).
Synonyms: *Fagus grandifolia - Quercus alba / Kalmia latifolia - (Symplocos tinctoria, Rhododendron catawbiense) / Galax urceolata* Forest (CEGL004539).
Ecological Systems: Southern Piedmont Mesic Forest (CES202.342).

Concept: Type covers communities of cool microsites in the Piedmont and Coastal Plain, generally north-facing bluffs, with dense shrub layers dominated by *Kalmia latifolia, Rhododendron catawbiense*, or occasionally *Symplocos tinctoria*, under a variable, usually open, canopy.

Distinguishing Features: Piedmont/Coastal Plain Heath Bluff is distinguished from Mesic Mixed Hardwood Forest by having a dense shrub layer dominated by *Kalmia latifolia, Rhododendron* sp., or *Symplocos tinctoria*. The species diversity is generally very low. These communities may grade conceptually into Acidic Cove Forests in the upper Piedmont, with *Rhododendron maximum* becoming a more prominent component and more montane flora being present. Substantial presence of *Tsuga canadensis, Betula lenta, Halesia tetraptera*, or *Liriodendron tulipifera*, predominating over *Quercus montana, Quercus alba*, or *Fagus grandifolia*, indicates Acidic Cove Forest. This type grades into the Heath Subtype of Piedmont Monadnock Forest on higher, more exposed rocky slopes, at least in the Uwharrie Mountains.

Comments: At least three variants can be recognized. A Catawba Rhododendron Variant, dominated by *Rhododendron catawbiense*, is confined to Orange and Durham counties. The Mountain Laurel Variant, dominated by *Kalmia latifolia* is the most widespread. The Horse Sugar Variant has *Symplocos tinctorial* dominant or codominant, with or without abundant *Kalmia latifolia*, and encompasses some of the Coastal Plain examples.

Fagus grandifolia - (Liquidambar styraciflua) / Oxydendrum arboreum / Kalmia latifolia Forest

(CEGL004636) is a nonstandard entity in the NVC, based on Rice and Peet's (1997) Roanoke River study. It is not clear that Roanoke River examples or most Coastal Plain examples are distinct from those in the Piedmont. However, some Coastal Plain examples contain a larger component of characteristic Coastal Plain species, usually including some wetland that apparently are associated with seepage from the steep bluffs.

Pinus echinata - Pinus virginiana / Rhododendron minus - Kalmia latifolia Woodland (CEGL003563) was named as a slate slope community, based on a single site for which there is no community documentation. There is not enough evidence to support recognition of slate slopes as a distinctive type or subtype. This association, or the site on which it was based, may be best classified as a Heath Bluff.

This community type barely ranges into Virginia. In much of the Virginia Piedmont, *Kalmia latifolia* is widespread in the oak-heath forests, and is not confined to cool microsites. The Heath Bluff communities therefore grade into more widespread oak-heath forests, recognized in the NVC as *Quercus prinus - (Quercus coccinea, Quercus rubra) / Kalmia latifolia / Vaccinium pallidum* Forest (CEGL006299) and *Quercus alba - Quercus (coccinea, velutina, prinus) / Gaylussacia baccata* Forest (CEGL008521). A similar but less drastic blurring occurs in the Uwharrie Mountains, where *Kalmia* is more widespread in the landscape and occurs in other community types, but distinct occurrences of Piedmont/Coastal Plain Heath Bluff are still recognizable there. In the rest of the North Carolina Piedmont and Coastal Plain, *Kalmia latifolia* is scarce and is largely confined to this community type.

Piedmont Headwater Stream Forest (Typic Subtype) (G3G4) is described in Schafale (2012).
Synonyms: *Liriodendron tulipifera - Quercus alba - (Liquidambar styraciflua) / Ilex opaca / Polystichum acrostichoides* Piedmont Small Stream Forest (CEGL004900). Piedmont/Low Mountain Alluvial Forest (3rd Approximation).
Ecological Systems: Southern Piedmont Small Floodplain and Riparian Forest (CES202.323).

Concept: Type covers forests of floodplains of the smallest Piedmont streams, generally intermittent to 1st or 2nd order, where flooding and alluvial processes have some, but limited, influence on vegetation and most characteristic alluvial species are absent or scarce. They have vegetation that consists largely of species of broad ecological tolerance and of upland species, but occur on distinct floodplains, have vegetation in combinations not usually found in upland community types, and have a few floodplain species. The Typic Subtype covers most examples of typical small streams, excluding only those with the specialized characteristics of the Hardpan Subtype.

Distinguishing Features: Piedmont Headwater Stream Forests are distinguished from other floodplain communities by the absence of alluvial species such as *Platanus occidentalis, Betula nigra*, and *Celtis laevigata*, though other riparian species such as *Xanthorhiza simplicissima* or wetland species such as *Osmundastrum(Osmunda) cinnamomeum, Osmunda regalis*, or *Viburnum nudum* may be present. Widely tolerant species such as *Liriodendron tulipifera* and *Liquidambar styraciflua*, and upland species such as *Quercus alba, Quercus rubra*, and *Fagus grandifolia* are generally present in both this type and in Piedmont Alluvial Forest. However, upland species are more abundant and diverse in this type. Piedmont Headwater Stream Forests

are distinguished from Mesic Mixed Hardwood Forest, with which they may share many species, by the presence of riparian and/or wetland species as well as by evidence of flooding.

The Typic Subtype is distinguished from the Hardpan Subtype by not occurring in broad, gently sloped bottoms with dense clay hardpan substrates. Generally, the soil in the Typic Subtype is coarse-textured. *Quercus phellos* and *Carya carolinae-septentrionalis* are both largely absent from the Typic Subtype.

Comments: *Fagus grandifolia* - *Quercus* spp. / *Kalmia latifolia* - *Hamamelis virginiana* / *Galax urceolata* Forest [Provisional] (CEGL004549) was initially described as a mesic forest of the Uwharrie area, but further examination of the plot attributed to it shows it to be a floodplain forest closely related enough to this type to be questionably distinct.

Piedmont Monadnock Forest (Typic Subtype) (G3G4) is described in Schafale (2012).
Synonyms: *Quercus prinus* - *Quercus alba* / *Oxydendrum arboreum* / *Vitis rotundifolia* Forest (CEGL006281).
Ecological Systems: Southern Piedmont Dry Oak-(Pine) Forest (CES202.339).

Concept: Type covers forests of rocky, acidic, central and eastern Piedmont sites dominated by *Quercus montana*, occasionally codominated by *Quercus coccinea*, but lacking characteristic montane species typical of Chestnut Oak Forests. These typically occur on isolated erosional remnant hills (monadnocks or inselbergs), but occasionally occur on bluffs.

Subtype covers most examples, those not having the distinctive characteristics of the other subtypes.

Distinguishing Features: Piedmont Monadnock Forests may be distinguished from Chestnut Oak Forests by a more limited flora that lacks many characteristic montane species, such as *Castanea dentata, Rhododendron calendulaceum, Pyrularia pubera, Gaylussacia ursina, Magnolia fraseri, Carex pensylvanica*, and *Maianthemum racemosum*. Piedmont species such as *Quercus falcata* and *Quercus stellata* are often present. It is distinguished from all other community types by the dominance of *Quercus montana*. Some Dry Oak–Hickory Forests that are transitional to this type may have abundant *Quercus montana*.

The Typic Subtype is distinguished by the absence of a significant admixture of pines, more xerophytic oaks, or *Kalmia latifolia*.

Comments: This community was tentatively treated as a subtype of Chestnut Oak Forest in earlier versions of the 4th Approximation guide. The recognition of several subtypes within it suggests it would be better treated as a distinct type. While floristically depauperate, it appears to be as distinct from montane Chestnut Oak Forest as Montane Oak–Hickory Forest is from Piedmont oak-hickory forests. Some examples have well-developed shrub layers of *Vaccinium pallidum*, or on Occoneechee Mountain, *Gaylussacia baccata*, but some have *Vitis rotundifolia* dominating the ground cover with little shrub or herb component. With a more natural fire regime, they might be more grassy.

Not all isolated hills support this community type. The abundance of rock may be an important factor in determining its occurrence, as may soil chemistry. Extreme soil acidity, accompanied by aluminum toxicity, has been suggested as important. Most examples are on hard rhyolite flows or quartzite. In the Uwharrie Mountains, the Piedmont Monadnock Forest type occurs on higher knobs of felsic volcanic rocks, grades to Dry or Dry-Mesic Oak–Hickory Forest downslope, but is abruptly replaced by Basic Oak–Hickory Forest on mafic volcanic rocks. In the largest monadnock expanses in the Uwharrie Mountains, there is a distinct landscape pattern of the Typic Subtype occurring on knobs and ridge tops, the Pine Subtype on east and west side slopes, the Xeric Subtype on south slopes, and the Heath Subtype on north slopes. On most smaller monadnocks elsewhere in the Piedmont, only the Typic Subtype is present. A few examples elsewhere occur on mafic or intermediate igneous rocks. These may represent a distinct variant.

Upland Depression Swamp Forest (G2G3) is described in Schafale (2012).
Synonyms: *Quercus phellos / Carex (albolutescens, intumescens, joorii) / Climacium americanum* Forest (CEGL007403).
Ecological Systems: Piedmont Upland Depression Swamp (CES202.336).

Concept: Type covers forested isolated wetlands in depressions on upland ridges and flats with impeded soil drainage, where water stands for part of the year but wetness is not great enough to prevent a closed tree canopy from developing. They occur on unusually flat areas with hardpan soils derived from mafic rocks or slates, or in small topographic basins on ridgetops of volcanic rock. The forests are usually dominated by *Quercus phellos*, sometimes codominant with or replaced by *Quercus lyrata, Quercus bicolor, Quercus michauxii*, or *Liquidambar styraciflua*. Successional examples may be dominated by *Acer rubrum* or *Liquidambar styraciflua*.

Distinguishing Features: The Upland Depression Swamp Forest type is distinguished from Upland Pool by having (or potentially having, if recently disturbed) a closed canopy across the basin, and therefore lacking shade-intolerant shrubs and herbs. Upland Pools may have trees on the edge but lack them in the center and have a much less diverse flora because of the long hydroperiod.

Upland Depression Swamp Forests are distinguished from floodplain forests of various kinds by their isolated upland location and lack of channel flow or overbank flooding, which is indicated by the lack of most characteristic bottomland trees, the usual predominance of *Quercus phellos*, and the usual presence of *Sphagnum lescurii* and *Climacium americanum*. Ambiguous and transitional examples are possible where small streams originate in upland flats. Piedmont Headwater Stream Forest (Hardpan Subtype) occurrences may be dominated by *Quercus phellos*, and have sometimes been called Upland Depression Swamp Forests in the past, but have a visible channel and have a more diverse flora that includes floodplain species.

Comments: *Liquidambar styraciflua - Acer rubrum / Carex* spp. - *Sphagnum* spp. Forest (CEGL007388) was a problematic association that was attributed to a single Upland Depression Swamp in North Carolina as well as depressional wetlands elsewhere. Further examination of the North Carolina example found it not to be a natural Upland Depression Swamp, and the association was removed from North Carolina. *Liquidambar styraciflua* is often present in

Upland Depression Swamp Forests, and sometimes comes to dominate or codominate after major disturbances such as logging. These are better viewed as degraded examples of this association than as a different community type.

Seymour (2011) identified four different groups of Upland Depression Swamp communities, divided by wetness and by rock substrate: wet felsic, dry felsic, wet mafic, and dry mafic. The strongest vegetational differences were between drier and wetter swamp communities. However, these differences consisted largely of the presence of a few upland species, such as *Danthonia spicata* and *Quercus alba*, that may be ecotonal, confined to drier microsites, or short-lived. Differences between felsic and mafic substrates were slightly less but may be more worthy of recognition for our purposes. Mafic depressions had some species that are associated with other mafic-substrate communities, such as *Fraxinus* sp., *Ulmus americana, Ulmus alata*, and *Trachelospermum difforme*. Felsic depressions had a few species that are recognizable as acid-tolerant, such as *Sphagnum* sp. and *Vaccinium* spp., but differences in other distinguishing species such as *Liquidambar styraciflua* and *Acer rubrum* are probably coincidental. Plot samples and soil analysis in comparable communities in Virginia found that even mafic depressions are strongly acidic. Seymour (2011) also found this, but found differences in soil texture, cation exchange capacity, calcium, magnesium, and other cations. These four types may be recognized as variants, but at present do not appear marked enough to warrant defining as subtypes.

Additional variation occurs in canopy dominance. Examples dominated by *Quercus lyrata* or by *Quercus bicolor* may be recognized as additional variants divided from the wet mafic variant, and the one example dominated by *Quercus michauxii* may be recognized as a variant divided from the dry mafic variant. It appears that all examples with different canopy dominants occur on mafic substrate. While *Quercus phellos* is usually present in them, it generally is distinctly subordinate.

Upland Pool (Roberdo Subtype) (G1?) is described in Schafale (2012). NOTE: Upland Pool (Typic Piedmont Subtype) added below for complete summary.
Synonyms: *Leucothoe racemosa - Vaccinium fuscatum - Smilax walteri* Shrubland (CEGL004533).
Ecological Systems: Piedmont Upland Depression Swamp (CES202.336).

Concept: Subtype covers the distinctive example with a more “pocosin-like” character, with a substantial component of evergreen Coastal Plain shrubs and greenbriers.

Distinguishing Features: The Roberdo Subtype is distinguished by the substantial presence of evergreen shrubs such as *Cyrilla racemiflora*, and of *Smilax*.

Upland Pool (Typic Piedmont Subtype) (G1) is described in Schafale (2012).
Synonyms: *Cephalanthus occidentalis - (Leucothoe racemosa) / Carex joorii* Shrubland (CEGL004075). *Carex joorii* Pools (Seymour 2011).
Ecological Systems: Piedmont Upland Depression Swamp (CES202.336).

Concept: Type covers depression wetlands not associated with rivers or streams, holding water long enough through the growing season to present development of a substantial tree canopy. Trees are limited to the edge of the basin. Subtype covers the most typical and widespread Piedmont examples, which lack the distinctive Coastal Plain flora of the Pleasant Grove and Roberdo subtypes.

Distinguishing Features: Upland Pools are distinguished from Upland Depression Swamp Forests by the lack of a well-developed tree canopy. Some trees may be present, scattered in the pool or forming an edge zone within the wetland. The pool may also be partly shaded by trees from adjacent forests, but should have sufficient light to allow shade-intolerant plants to survive.

The Typic Piedmont Subtype is distinguished from the Pleasant Grove and Roberdo subtypes by the absence of the characteristic Coastal Plain species that distinguish them - *Nyssa biflora, Cyrilla racemiflora*, and *Smilax walteri*. It is distinguished from the Mountain Subtype by the absence of the characteristic Blue Ridge components of the flora, as well as occurrence in the eastern or central Piedmont.

Comments: Seymour (2011) noted that, while *Carex joorii* usually strongly dominated the herb layer, the absence of other species was more characteristic than the presence of *Carex joorii*. She found this to be the most distinctive of the five Piedmont depression wetland types she identified; however the single plots for the Pleasant Grove and Roberdo subtypes were removed as outliers.

Appendix C

NCNHP Significant Natural Heritage Areas occurring on Uwharrie National Forest

Montgomery County Natural Heritage Inventory Site Report

Clarks Grove Longleaf Pine Forest

Site Significance: National
Size: 536 acres
Quadrangle: Troy
Ownership: U.S.F.S. - Uwharrie National Forest
Protection Status: No special designation

Significant Factors:

1. Clarks Grove Longleaf Pine Forest supports a high quality Piedmont Longleaf Pine Forest and numerous rare plant populations.

2. Several occurrences of a rare sunflower, Helianthus schweinitzii, which has a North Carolina and Federal Status of Endangered, occur within road and powerline right-of-ways and longleaf pine forests in the Clarks Grove area.

3. The upland habitat on this site supports numerous large populations of a rare shrub, Nestronia umbellula, which is on the North Carolina Watch List.

Landscape Relationships:

Clarks Grove Longleaf Pine Forest is a large block of U.S.F.S. - Uwharrie National Forest property that is southwest of Troy. Other large blocks of forest in this vicinity include Railroad Mixed Pine Forest, Lower Rocky Creek Longleaf Pine Forest, and Roberdo Bog and Longleaf Pine Forest. The Rocky Creek and its tributaries flow through all of these sites.

Description of Natural Communities and Rare Plant Populations:

The quality of the forests in the Clarks Grove area varies. The canopy of the Piedmont Longleaf Pine Forest is dominated with Pinus palustris (Long-leaf pine) and a mix of Pinus echinata (Short-leaf pine), Pinus taeda (Loblolly pine), Quercus falcata (Spanish oak), Quercus marilandica (Blackjack oak), and Carya tomentosa (Mockernut). The subcanopy supports saplings of hardwood trees such as Liriodendron tulipifera (Tuliptree), Acer rubrum (Red maple), Carya glabra (Pignut hickory), Quercus alba (White oak), Liquidambar styracifula (Sweet gum), and Quercus phellos (Willow oak). The shrub layer includes Gaylussacia frondosa var. frondosa (Dangleberry), Lyonia mariana (Stagger-bush), and Rhus copallina (Winged sumac). The herb layer is sparse in areas where shrubs dominate, but herb diversity increases near seeps and south facing slopes. The herb layer includes species such as Stylosanthes biflora (Pencil flower), Aster paternus, Pteridium aquilinum (Bracken fern), Chasmathium laxum, Solidago odora (A goldenrod), Euphorbia corollata (Flowering spurge), Eupatorium rotundifolia var. ovatum (A Thoroughwort), Erianthus contortus

(Beard grass), Elephantopus tomentosus (Elephant's-foot), Erygnium yuccifolium (Rattlesnake master), Polystichum acrostichoides (Christmas fern), Vernonia acaulis (An ironweed), Coreopsis major var. stellata (Greater coreopsis), Parthenium integrifolium var. integrifolium (Wild quinine), Rhexia mariana (A meadow-beauty), Panicum anceps, and Helianthus microcephalus (A sunflower). Three new populations of the federally endangered sunflower, Helianthus schweinitzii (Schweinitz's sunflower), were found during the botanical survey: one site occurs along a roadside, one within the Piedmont Longleaf Pine Forest, and one under a powerline right-of-way.

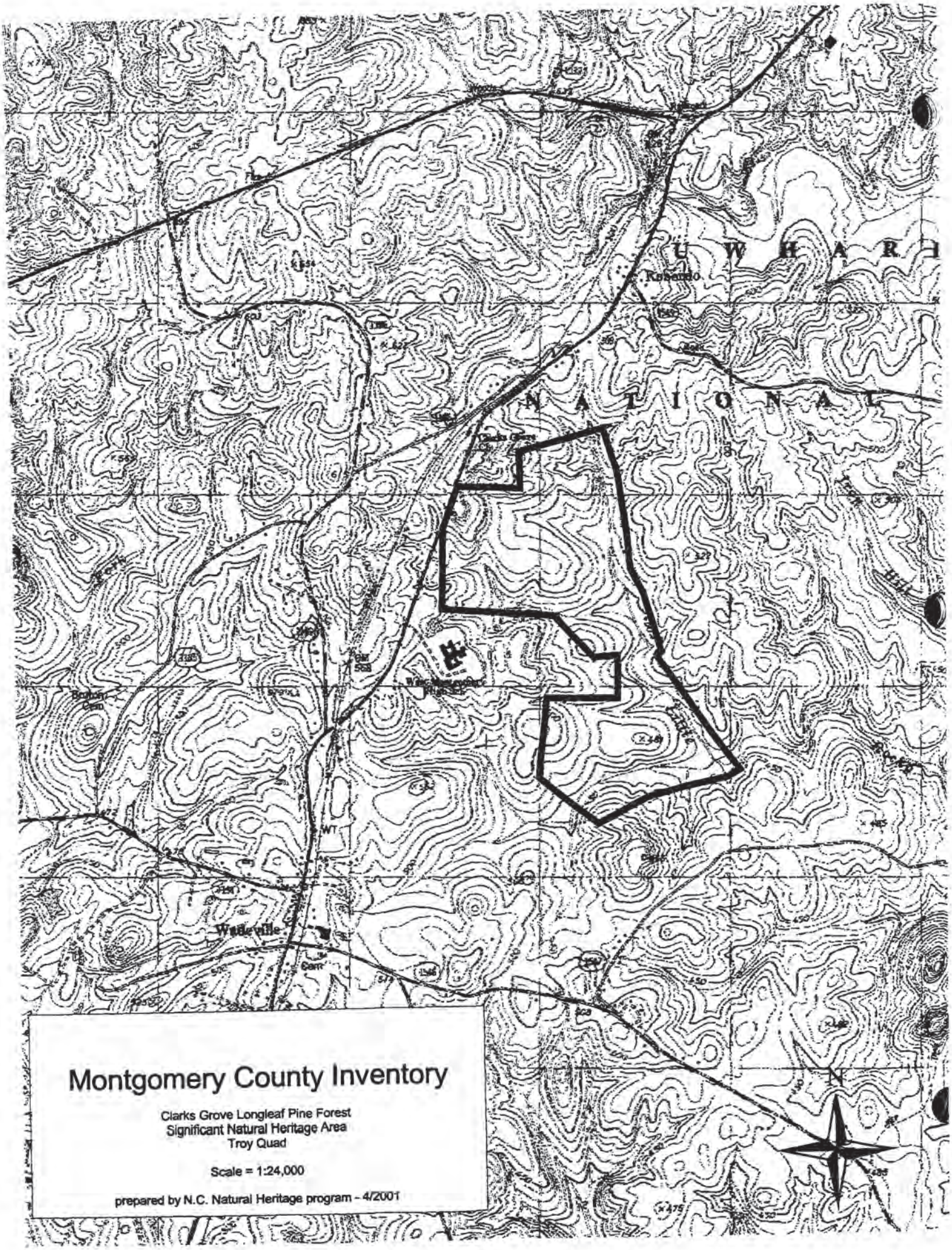
The area east of Little Rocky Creek consists of a dense canopy and subcanopy. Large Pinus taeda (Loblolly pine) individuals are common in the canopy and immature hardwoods form a dense stand in the understory. Liquidambar styracifula (Sweet gum) is the dominant understory trees. In another area, the canopy consists of a hardwood and pine mix. A few mature Pinus palustris (Long-leaf pine) individuals occur in the canopy and fire-suppressed saplings in the understory. The herb and shrub diversity is low due to the shade created by the thick understory. Gaylussacia frondosa var. frondosa (Dangleberry) is the dominant shrub. There are numerous windfall canopy gaps in this stand.

Description of Faunal Communities and Rare Animal Populations:

No animal survey was conducted on this site. Two forest interior animals were noted during the botanical survey: Dryocopus pileatus (Pileated woodpecker) and Terrapene carolina (Eastern box turtle).

Management/Protection Recommendations:

Clarks Grove Longleaf Pine Forest has a national rank because of the high integrity of the Piedmont Longleaf Pine Forest and occurrence of several Helianthus schweinitzii (Schweinitz's sunflower) populations. Restoration and protection measures are currently under consideration by the U.S.F.S. - Uwharrie National Forest, U.S. Fish and Wildlife, and the North Carolina Plant Conservation Program.



Montgomery County Inventory

Clarks Grove Longleaf Pine Forest
Significant Natural Heritage Area
Troy Quad

Scale = 1:24,000

prepared by N.C. Natural Heritage program - 4/2001

Montgomery County Natural Heritage Inventory Site Report

Lawrenceville Ephemeral Pools

Site Significance: County
Size: 116 acres
Quadrangle: Morrow Mountain
Ownership: U.S.F.S. - Uwharrie National Forest
Protection Status: no special designation

Significant Factors:

1. Lawrenceville Ephemeral Pools supports two pools in upland habitat.

2. One of the ephemeral pools on this site supports Hemidactylium scutatum (Four-toed salamander), which has a North Carolina status of Special Concern.

Landscape Relationships:

The Lawrenceville Ephemeral Pools tract occurs is the southern most portion of a large block of U.S.F.S. - Uwharrie National Forest property. The site is one quarter to one half mile north of US Highway 24/27, no secondary roads occur near the site. The Dutchmans Creek Trail which is a hiking trail runs through the site. To the south is the Historic Lawrenceville/Cochran Estate tract that is protected through the LandTrust for Central North Carolina.

Description of Natural Communities and Rare Plant Populations:

The Lawrenceville Ephemeral Pools site supports two ephemeral pools surrounded by Upland Depression Swamp Forests. A canopy covers a large portion of the ephemeral pools and the dominant canopy trees are Quercus phellos (Willow oak) and Acer rubrum (Red maple). Other canopy trees include Liquidambar styracifula (Sweet gum) and Liriodendron tulipifera (Tuliptree). The surrounding upland habitat includes a mix of pine and hardwoods. The dominant pine species is Pinus taeda (Loblolly pine). The hardwood trees include Quercus alba (White oak), Quercus stellata (Post oak), Quercus montana (Chestnut oak), Quercus nigra (Water oak), Quercus falcata (Spanish oak), Quercus marilandica (Blackjack oak), and Carya spp.(Hickories). The understory supports Cornus florida (Flowering dogwood), Ilex opaca (American holly), Juniperus virginiana (Virginia red-cedar), and Oxydendrum arboreum (Sourwood). The shrub layer is dominated with Vaccinium spp. (Blueberry) and the herb layer is sparse. The site varies in quality of natural communities. The upland habitat probably once supported a Dry-Mesic Oak-Hickory Forest. However, the occurrence of scattered loblolly pines diminishes the integrity of the natural community.

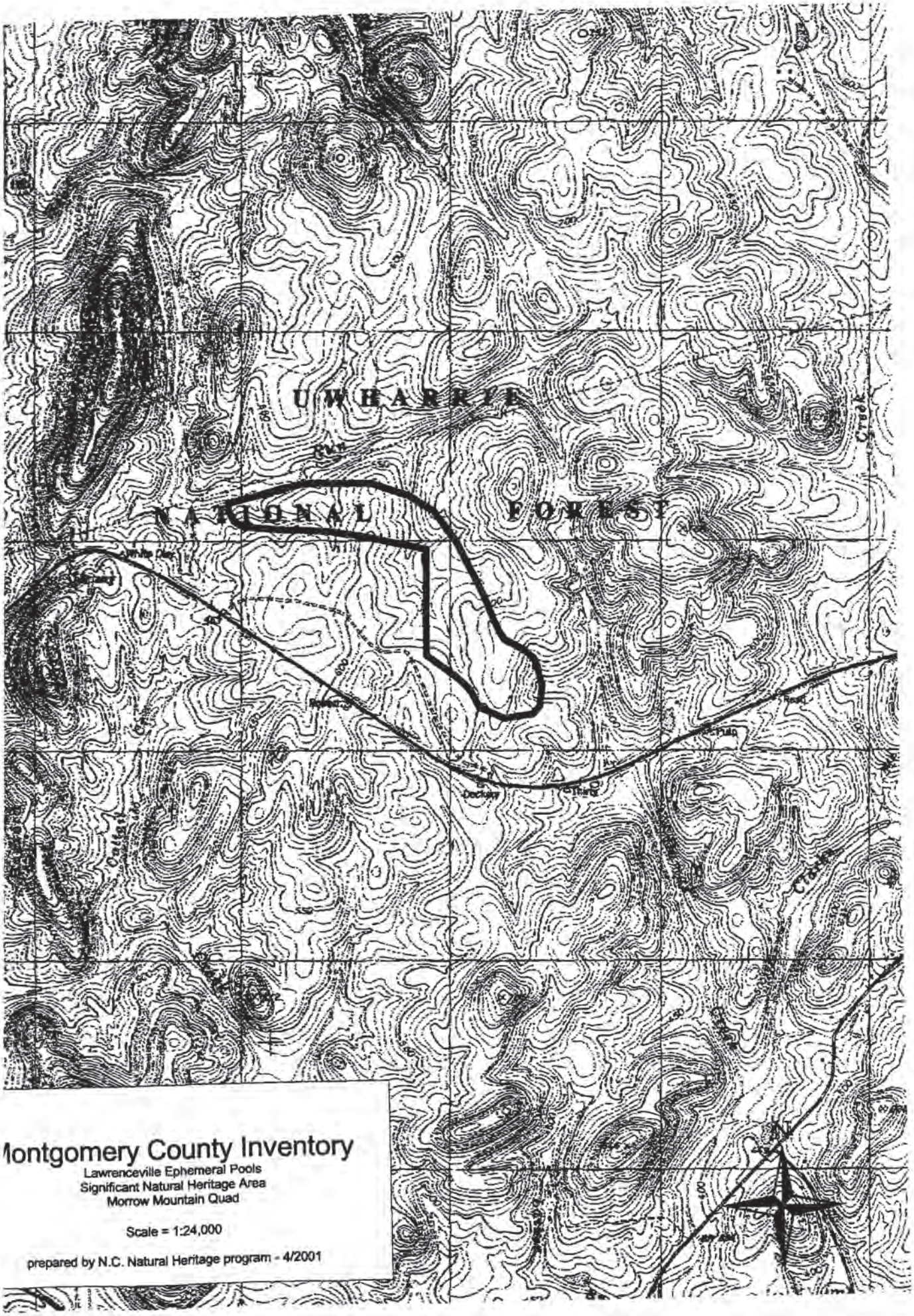
Description of Faunal Communities and Rare Animal Populations:

This site supports three ephemeral pools in unfragmented, upland habitat. The northern most ephemeral pools are about 1/4 to 1/3 acre in size. These pools support Ambystoma maculatum (Spotted salamander) and Ambystoma opacum (Marbled salamander), but lacks the habitat necessary for the rare species, Hemidactylium scutatum (Four-toed salamander).

The third ephemeral pool occurs to the southeast of the other pools and on the border of U.S.F.S. - Uwharrie National Forest and private property. This pool is 1/4 to 1/3 acre in size. In addition to the common spotted and marbled salamanders, this pool supports Hemidactylium scutatum (Four-toed salamander). The extensive moss mats provide habitat for the four-toed salamander's eggs. The four-toed salamander has a North Carolina Status of Special Concern. The ephemeral pool is surrounded by a mature hardwood/pine forest on U.S.F.S. - Uwharrie National Forest property. U.S. Highway 24/27 occurs about 1/4 to 1/2 mile to the south. However, no secondary roads occur near the ephemeral pool.

Management/Protection Recommendations:

Upland buffers around the ephemeral pools provide non-breeding habitat for salamanders. Protecting the private property to the south would enhance the buffer. On U.S.F.S. - Uwharrie National Forest property, timber practices that reduce impact to the buffer would help protect the rare salamander habitat.



Montgomery County Inventory

Lawrenceville Ephemeral Pools
Significant Natural Heritage Area
Morrow Mountain Quad

Scale = 1:24,000

prepared by N.C. Natural Heritage program - 4/2001

Montgomery County Natural Heritage Inventory Site Report

Lower Rocky Creek Longleaf Pine Forest

Site Significance: Regional
Size: 246 acres
Quadrangle: Troy
Ownership: U.S.F.S. - Uwharrie National Forest
Protection Status: none

Significant Factors:

1. A high quality Piedmont Longleaf Pine Forest occurs on this site and supports numerous rare plant species.

2. There are occurrence of three rare plant species, as follows:
   Cirsium carolinianum (Carolina thistle), North Carolina Status of Candidate
   Helianthus laevigatus (Smooth sunflower), North Carolina Status of Significantly Rare
   Smilax biltmoreana (Biltmore carrion-flower), North Carolina Status of Candidate

3. Large example of a Uwharrie Boggy Streamhead with potential habitat for breeding amphibians.

Landscape Relationships:

The Lower Rocky Creek Longleaf Pine Forest is a large block of U.S.F.S. - Uwharrie National Forest property that is southwest of Troy. Other large blocks of forest in this vicinity include Railroad Mixed Pine Forest, Roberdo Bog and Longleaf Pine Forest, and Clarks Grove Longleaf Pine Forest. Rocky Creek and its tributaries flow through all of these sites.

Description of Natural Communities and Rare Plant Populations:

The Lower Rocky Creek Longleaf Pine Forest site supports three important natural areas. A Piedmont Longleaf Pine Forest occurs on the west side and supports numerous rare plants. The dominant canopy tree is Pinus palustris (Long-leaf pine). Recent controlled burns by the U.S.F.S. - Uwharrie National Forest opened the understory and a high diversity herb layer is replacing the woody, hardwood saplings. The herb layer includes three rare plants: Cirsium carolinianum (Carolina thistle), Smilax biltmoreana (Biltmore carrion-flower), and Helianthus laevigatus (Smooth sunflower). The dominant herb is Erygnium yuccifolium (Rattlesnake master). Due to fire suppression, this species is uncommon. Large numbers of Rattlesnake master were in full bloom during the botanical survey. The shrub layer supports Gaylussacia frondosa var. frondosa

(Dangleberry) and Vaccinium tenellum (A blueberry). This exemplary Piedmont Longleaf Pine Forest will continue to improve in quality through controlled burns conducted by the U.S.F.S.

A hardwood buffer occurs along Rocky Creek. On the west side of Rocky Creek is a Piedmont Longleaf Pine Forest on the uplands and the buffer supports a mature hardwood forest. The canopy includes xeric species such as Quercus montana (Chestnut oak), Quercus alba (White oak), Quercus stellata (Post oak), and Quercus velutina (Black oak). The steep slopes support a Piedmont Health Bluff that is dominated with Kalmia latifolia (Mountain laurel) in the shrub layer and Galax aphylla in the herb layer. Orontium aquaticum (Golden club) occurs in the stream channel of Rocky Creek.

A small ephemeral pool occurs to the east of the Forest Service Road and railroad track. This area is less than a quarter of an acre and lacks an herb layer and sphagnum moss. Liquidambar styracifula (Sweet gum) and Acer rubrum (Red maple) are rooted along the edges and a couple individuals in the center of the pool. Ilex verticillata (Common winterberry) is found in the shrub layer. The surrounding forest is of low quality and supports mature pines and immature hardwoods. Mature Pinus taeda (Loblolly pine) is common in the canopy and a few scattered Pinus palustris (Long-leaf pine) are mixed with the loblolly pine. The understory is dense with immature hardwoods.

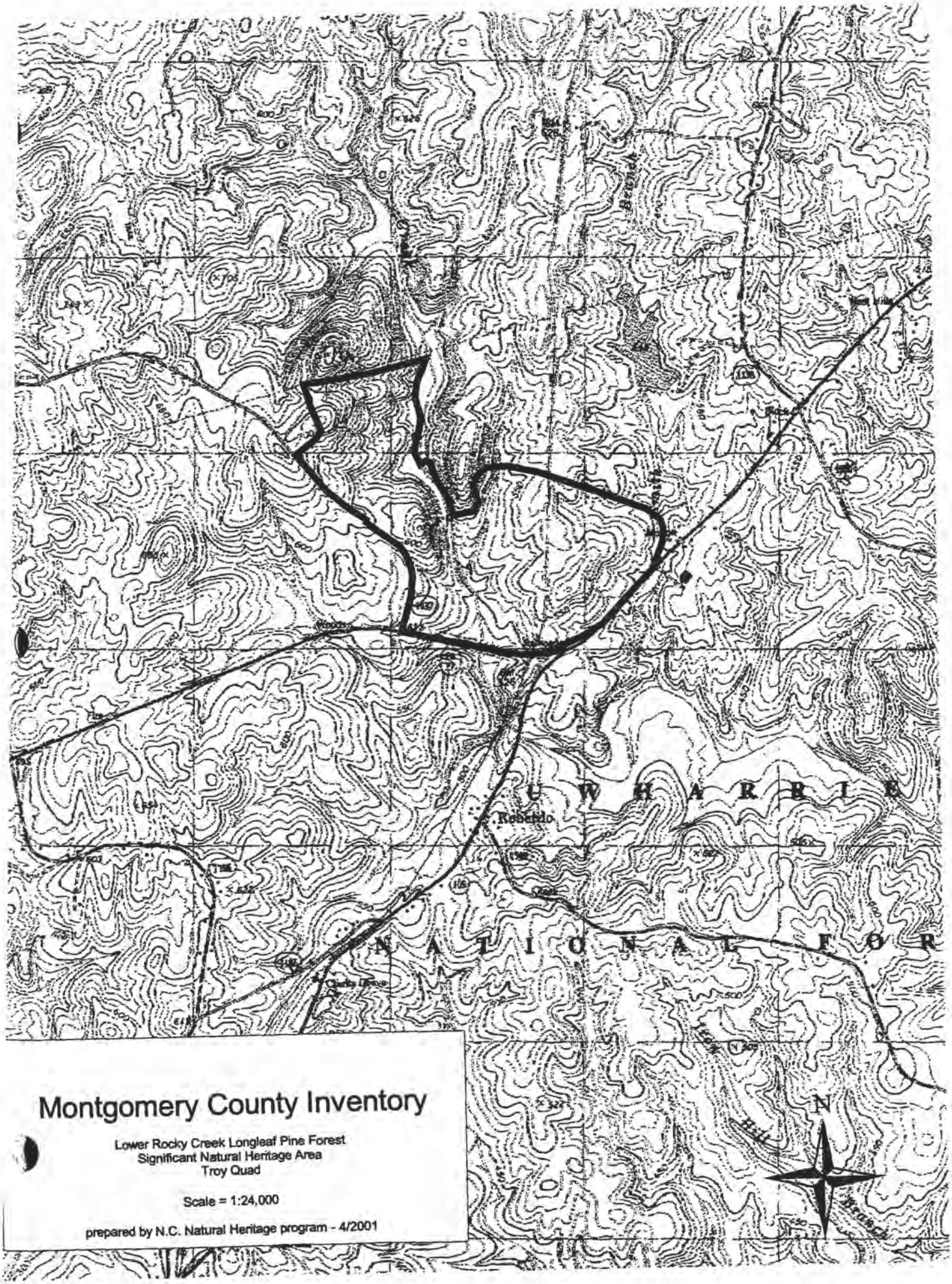
Uwharrie Boggy Streamheads are scattered throughout this site. This natural community supports herbs and shrubs that are characteristic of moist soil conditions. The herb layer is dominated by Osmunda cinnamomea (Cinnamon fern) and Osmunda regalis var. spectabilis (Royal fern). Athyrium asplenioides (Lady fern) is dominant along the dry edges. Viburnun nudum (Southern wild raisin) is the dominant shrub. Other important shrubs includes coastal plain species such as Myrica heterophylla (Bayberry), Lyonia ligustrina (Maleberry), Ilex verticillata (Common winterberry), and Magnolia virginiana. Sphagnum sp. is dominant in the herb layer and forms large mats.

Description of Faunal Communities and Rare Animal Populations:

Several forest interior and neotropical migratory birds were noted during the botanical survey. These species include Polioptila caerulea (Blue-gray gnatcatcher), Wilsonia citrina (Hooded warbler), Vireo olivaceus (Red-eyed vireo), and Coccyzus americanus (Yellow-billed cuckoo). The Uwharrie Boggy Streamhead and ephemeral pool provides potential breeding habitat for amphibians and reptiles.

Management/Protection Recommendations:

The Lower Rocky Creek Longleaf Pine Forest is managed by the U.S.F.S. - Uwharrie National Forest. The Forest Service conducts regular burns in the Piedmont Longleaf Pine Forest, which enhances the habitat for rare plant species.



Montgomery County Inventory

Lower Rocky Creek Longleaf Pine Forest
Significant Natural Heritage Area
Troy Quad

Scale = 1:24,000

prepared by N.C. Natural Heritage program - 4/2001

Montgomery County Natural Heritage Inventory Site Report

Railroad Mixed Pine Forest

Site Significance: National
Size: 329 acres
Quadrangle: Troy
Ownership: Private and U.S.F.S. - Uwharrie National Forest
Protection Status: none

Significant Factors:

1. A high quality Piedmont Longleaf Pine Forest that supports numerous rare plant species occurs in the Railroad Mixed Pine Forest.

2. There is an occurrence of a rare sunflower, Helianthus schweinitzii, which has a North Carolina and Federal Status of Endangered.

3. There is an occurrence of a rare plant species, Helianthus laevigatus (Smooth sunflower), which has a North Carolina Status of Significantly Rare.

4. The upland habitat for the Piedmont Longleaf Pine Forest supports numerous large populations of a rare shrub, Nestronia umbellula, which is on the North Carolina Watch List.

5. The Piedmont Longleaf Pine Forest that occurs on the Uwharrie National Forest property supports a large population of a rare shrub called Amorpha schwerinii (Piedmont indigo-bush). This shrub has a restricted distribution and a North Carolina Status of Significantly Rare.

6. The site also supports a Uwharrie Boggy Streamhead with habitat for breeding amphibians.

7. Railroad Mixed Pine Forest provides unfragmented habitat for forest interior bird species.

Landscape Relationships:

Railroad Mixed Pine Forest is a large block of U.S.F.S. - Uwharrie National Forest and private property that is southwest of Troy. Other large blocks of forest in this vicinity include Lower Rocky Creek Longleaf Pine Forest, Roberdo Bog and Longleaf Pine Forest, and Clarks Grove Longleaf Pine Forest. Rocky Creek and its tributaries flow through all of these sites.

Description of Natural Communities and Rare Plant Populations:

The vegetation varies across this site due to past silviculture practices. The area east of the railroad tracks and north of an abandoned pond is dominated with Pinus taeda (Loblolly pine) and Pinus echinata (Short-leaf pine). The subcanopy is sparse and supports Cornus florida (Flowering dogwood) and Oxydendrum arboreum (Sourwood). Acer rubrum (Red maple) is also dominant in the subcanopy and canopy. The herb layer is sparse and the dominant herb is Vitis rotundifolia (Muscadine). This area is of low biological integrity.

The area to the west of the railroad track and north of the powerline supports a mix of Pinus taeda (Loblolly pine), Pinus palustris (Long-leaf pine), and hardwoods. Pinus taeda (Loblolly pine) is the dominant canopy tree throughout most of the area. The subcanopy and shrub layer is quite dense in some areas and includes Gaylussacia frondosa var. frondosa (Dangleberry), Gaylussacia dumosa (Dwarf huckleberry), Diospyros virginiana (Persimmon), Sassafras albidum (Sassafras), Oxydendrum arboreum (Sourwood), Castanea pumila var. pumila (Chinquapin), Symplocos tinctoria (Horse sugar), Asimina parviflora (Dwarf pawpaw), and other trees and shrubs. Two rare shrub species occur in this area, Nestronia umbellula and Amorpha schwerinii (Piedmont indigo-bush). The herb layer in the uplands includes species such as Amianthium muscaetoxicum (Fly-poison), Pitysopsis graminifolia, Helianthus microcephalus (A sunflower), Euphorbia corollata (Flowering spurge), and Crotalaria purshii. A steep slope near a stream supports Kalmia latifolia (Mountain laurel) as the dominant shrub.

The areas with intermittent streams and draws support Uwharrie Boggy Streamheads, which have a higher diversity of herbs than the upland habitat. Mesic subcanopy trees and shrubs such Magnolia virginica, Xanthorhiza simplicissima (Yellowroot), Cephalanthus occidentalis (Buttonbush), Cornus amomum (Silky dogwood), Myrica heterophylla (Bayberry), Viburnun nudum (Southern wild raisin), and Ilex verticillata (Common winterberry) occur along the streams. The herb layer is diverse in the Uwharrie Boggy Streamhead and includes species such as Carex crinita (Fringed sedge), Carex intumescens (sedge), Amsonia tabernaemontana (Blue star), Osmunda regalis var. spectabilis (Royal fern), Osmunda cinnamomea (Cinnamon fern), Selaginella apoda (Meadow spikemoss), Lycopus virginicus (A water-horehound), and Medeola virginiana (Indian cucumber-root). Sphagnum sp. is common in some of the seepage areas. Orontium aquaticum (Golden club) occurs in the stream channel.

The northern portion of the Railroad Mixed Pine Forest site is dominated by Pinus palustris (Long-leaf pine). This area supports a federally endangered sunflower, Helianthus schweinitzii. Currently the sunflower grows mainly on Uwharrie National Forest property that parallels the railroad tracks. Helianthus laevigatus (Smooth sunflower), another rare sunflower, occurs to the west and along a powerline on U.S.F.S. - Uwharrie National Forest property. Both of these sunflower species require an open canopy for their survival. For this reason, they have survived along the railroad track and powerline. However, maintenance of these utilities is not always conducive to the survival of the rare plants (refer to Management and Protection Recommendations).

The area under the powerline where Helianthus laevigatus (Smooth sunflower) occurs supports numerous plants that require an open canopy. These species include Liatris squarrosa (A blazing star), Liatris graminifolia (A blazing star), Silphium compositum var. compositum, Marshallia obovatum, Andropogon gerardii (Big blue stem), Erygnium yuccifolium (Rattlesnake master), and Helianthus angustifolius (A sunflower).

Description of Faunal Communities and Rare Animal Populations:

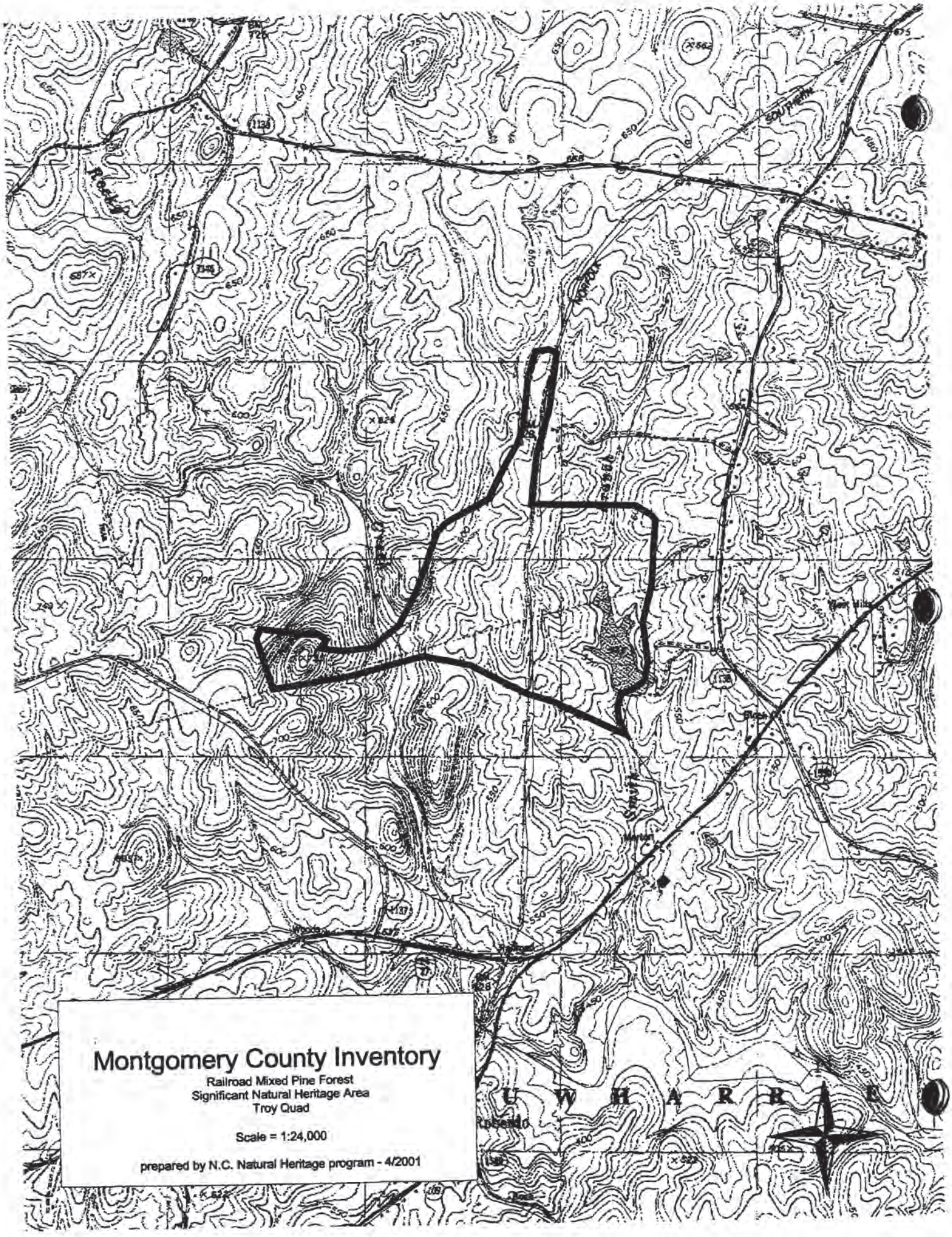
The private property portion of the Railroad Mixed Pine Forest supports numerous species of Lespedeza which attracts Colinus virginianus (Bobwhite quail) to the property. Meleagris gallopavo (Wild turkey) are also present on the site. Several forest interior and neotropical migratory bird species were noted during the botanical survey, these species include Polioptila caerulea (Blue-gray gnatcatcher), Wilsonia citrina (Hooded warbler), Vireo olivaceus (Red-eyed vireo), and Coccyzus americanus (Yellow-billed cuckoo). The Uwharrie Boggy Streamhead provides breeding habitat for amphibians.

Management/Protection Recommendations:

The Railroad Mixed Pine Forest includes U.S.F.S. - Uwharrie National Forest property and private property. Both the Forest Service and private landowner conduct regular burns in the Piedmont Longleaf Pine Forest. With regular burning the Railroad Pine Forest will mature into a high quality natural community and improve habitat for rare plants. The surrounding landscape on U.S.F.S. - Uwharrie National Forest property is also in conversion from hardwoods to longleaf pine forests.

In the past, the Helianthus schweinitzii populations along the railroad tracks have been sprayed with herbicide and some populations are now extirpated. The land management practices conducted on the private and Uwharrie National Forest property is appropriate for sustaining Helianthus schweinitzii populations, however, railroad right-of-way maintenance threatens this federally endangered sunflower. The Railroad Mixed Pine Forest site provides an opportunity for establishing viable populations of Helianthus schweinitzii in natural habitat where it is not vulnerable to right-of-way maintenance.

The current landowner of the private property is conservation minded and uses a Forestry Stewardship plan for timber management. A conservation easement with a local land trust in conjunction with the Forestry Stewardship plan would help protect this portion of the site.


Montgomery County Inventory
Railroad Mixed Pine Forest
Significant Natural Heritage Area
Troy Quad
Scale = 1:24,000
prepared by N.C. Natural Heritage program - 4/2001
U W H A R R I E
Rockfish
Norfolk Southern
Uwharrie

Montgomery County Natural Heritage Inventory Site Report

Roberdo Bog and Longleaf Pine Forest

Site Significance: National
Size: 997 acres
Quadrangle: Troy
Ownership: U.S.F.S. - Uwharrie National Forest
Protection Status: Portions of the site are Registered Natural Heritage Areas

Significant Factors:

1. Roberdo Bog and Longleaf Pine Forest supports two high quality natural communities that include a Piedmont Longleaf Pine Forest and an Upland Pool. The extensive Piedmont Longleaf Pine Forest is managed by the U.S.F.S. - Uwharrie National Forest with controlled burns.

2. There is an occurrence of Ambystoma talpoideum (Mole salamander), with a North Carolina Status of Special Concern.

3. Several populations of Helianthus schweinitzii (Schweinitz's sunflower), a Federally Endangered sunflower, occur on this site. One population is highly significant because it is one of fewer than ten known populations that occur in natural communities. Most known populations occur along road, powerline, or railroad right-of-ways and are vulnerable to maintenance procedures such as herbicide spraying and mowing conducted during the growing season.

4. Roberdo Bog and Longleaf Pine Forest supports a rare plant species, Helianthus laevigatus (Smooth sunflower), which has a North Carolina Status of Significantly Rare.

5. Records show that two subpopulations of Gnaphalium helleri var. helleri (Heller's rabbit tobacco), with a North Carolina Status of Significantly Rare, occur along old logging road clearings on this site. However, these records were not confirmed during the botanical survey for this report.

Landscape Relationships:

Roberdo Bog and Longleaf Pine Forest is a large block of U.S.F.S. - Uwharrie National Forest property that is southwest of Troy. Other large blocks of forest in this vicinity include Railroad Mixed Pine Forest, Lower Rocky Creek Longleaf Pine Forest, and Clarks Grove Longleaf Pine Forest. Rocky Creek and its tributaries flow through all of these sites.

Description of Natural Communities and Rare Plant Populations:

Two significant natural communities occur on this site, Upland Pool and Piedmont Longleaf Pine Forest. Upland pools are depressions that occur in upland habitat or ridges. Upland Pools are rare and quite variable. The water level may range from three feet deep to completely dry, depending on rainfall. The Roberdo Bog Upland Pool is surrounded by a dense shrub zone of Leucothoe racemosa (Fetter-bush), Viburnun nudum (Southern wild raisin), Cyrilla racemiflora (Titi), and a thick mat of Smilax rotundifolia (Horsebrier) and Smilax laurifolia. Canopy trees that occur on the outer zone include Acer rubrum (Red maple), Quercus phellos (Willow oak), Nyssa sylvatica (Black gum), and Pinus taeda (Loblolly pine). Common wetland herbs grow in areas of low shrub density, Oxypolis rigidior, Carex crinita (Fringed sedge), Eleocharis tuberculosa, Scirpus atrovirens, Dulichium arundinaceum, and Osmunda cinnamomea (Cinnamon fern).

The Piedmont Longleaf Pine Forest is significant because few examples of high quality longleaf pine forest still occur in the piedmont. This site supports a Piedmont Longleaf Pine Forest due to management efforts by the U.S.F.S. - Uwharrie National Forest. The quality of the longleaf pine forest varies across the site. In some areas, 90%of the canopy is Pinus palustris (Long-leaf pine). In other areas, the canopy is dominated by hardwoods. The dominant canopy trees in the Piedmont Longleaf Pine Forest are Pinus palustris (Long-leaf pine), Pinus taeda (Loblolly pine), and Pinus echinata (Short-leaf pine). Canopy hardwood trees found on the site include Quercus falcata (Spanish oak), Quercus velutina (Black oak), Quercus coccinea (Scarlet oak), Quercus montana (Chestnut oak), Liriodendron tulipifera (Tuliptree), Quercus alba (White oak), and Carya glabra (Pignut hickory). The understory supports hardwood trees such as Cornus florida (Flowering dogwood), Oxydendrum arboreum (Sourwood), Acer rubrum (Red maple), Carya tomentosa (Mockernut), Sassafras albidum (Sassafras), Quercus alba (White oak), and other oaks and hickories. The shrub and herb layer is dominated with Gaylussacia frondosa var. frondosa (Dangleberry) and Pteridium aquilinum (Bracken fern). The herb layer varies in composition depending on the soil moisture. Seepage areas support species such as Osmunda cinnamomea (Cinnamon fern), Osmunda regalis var. spectabilis (Royal fern), Woodwardia areolata (Netted chainfern), and Carex spp. (Sedges).

Three rare plant species occur on the Roberdo Bog and Longleaf Pine Forest site. All three species occur within or adjacent to abandoned logging roads or fire breaks where sunlight penetrates to the forest floor. These species include Helianthus schweinitzii (Schweinitz's sunflower), Helianthus laevigatus (Smooth sunflower), and Gnaphalium helleri var. helleri (Heller's rabbit tobacco). This site is especially significant because most known occurrences of the Helianthus species are found along road, powerlines, and railroad right-of-ways where they are threatened by mowing and herbicide spraying. Helianthus schweinitzii (Schweinitz's sunflower) is a Federally Endangered sunflower. Helianthus laevigatus (Smooth sunflower) has a North Carolina Status of Significantly Rare. Future forestry management by the U.S.F.S. - Uwharrie National Forest may improve the habitat for these species. Gnaphalium helleri var. helleri (Heller's rabbit tobacco) has a North Carolina Status of Significantly Rare and occurs along old logging road clearings.

Description of Faunal Communities and Rare Animal Populations:

Roberdo Bog and Longleaf Pine Forest is a large, square site that is bisected by N.C. Highway 24-27. Roberdo Bog occurs on the west side of the highway and is surrounded by a Piedmont Longleaf Pine Forest. There is a known occurrence of the rare salamander, Ambystoma talpoideum (Mole salamander) from Roberdo Bog. This is one of only three known breeding sites for mole salamanders in Montgomery County. Mole salamanders occur in the mountains and piedmont of North Carolina. They breed in fish-free semipermanent woodland ponds and forage in adjacent woodlands. Roberdo Bog is also the only known breeding pool for Acris gryllus (Southern cricket frog), a species abundant in the Coastal Plain but very rare in the Piedmont. Another rare salamander that occurs on this site is Hemidatylium scutatum (Four-toed salamander) which has a North Carolina Status of Special Concern. Roberdo Bog is the only site in the county that harbors two state-listed amphibians. The common Ambystoma maculatum (Spotted salamander) are also known to breed in Roberdo Bog.

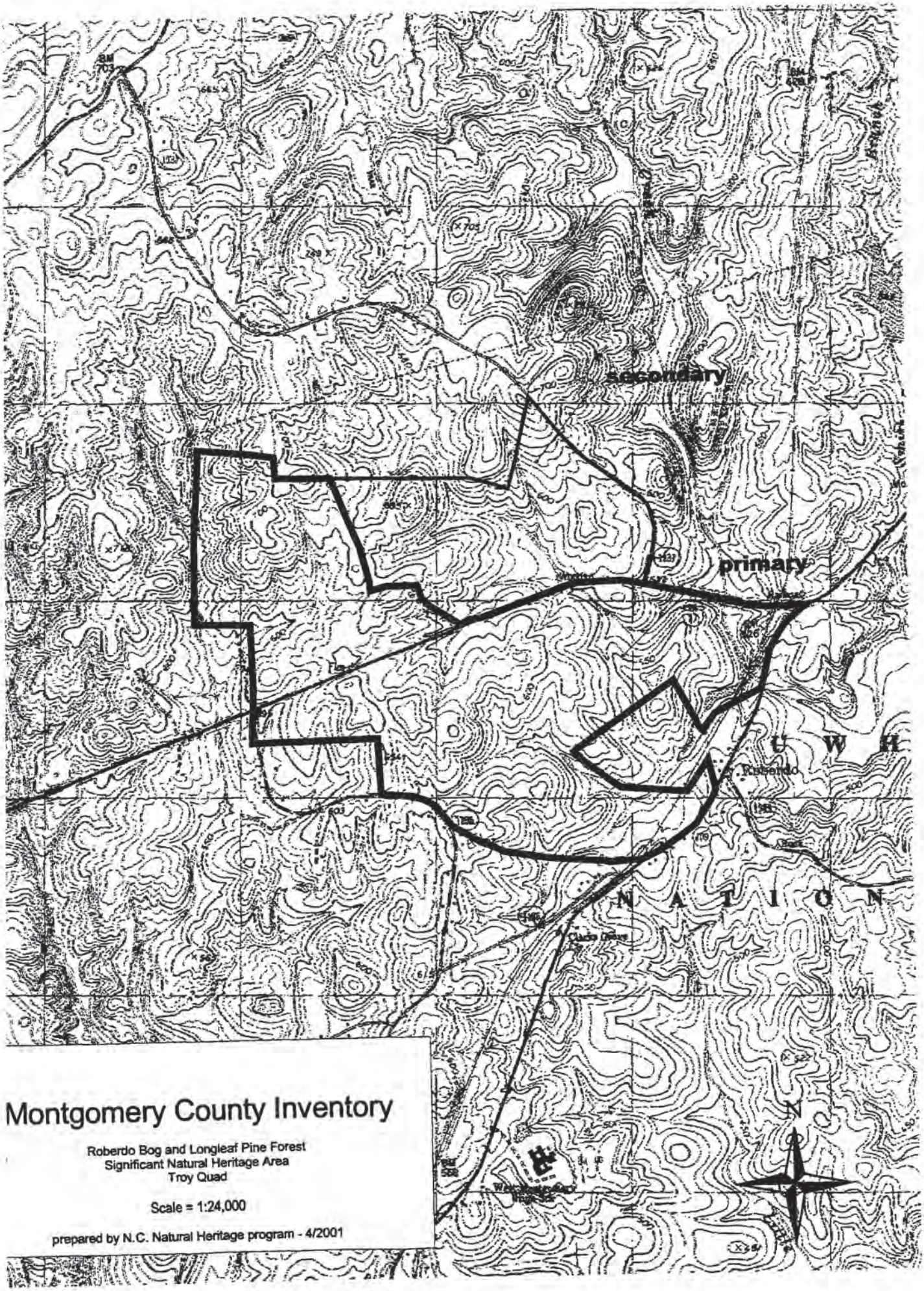
Sciurus niger (Eastern fox squirrel) has been noted in the longleaf pine forest on this site. This squirrel is disjunct from the coastal plain and sandhills. It is known to occur on only one other site in Montgomery County on the Pleasant Grove Bog and Pine Savanna site.

A few forest interior and migratory neotropical birds were noted during the botanical survey. These species include Piranga olivacea (Scarlet tanager), Coccyzus americanus (Yellow-billed cuckoo), Picoides villosus (Hairy woodpecker), and Dryocopus pileatus (Pileated woodpecker).

In addition to birds, this site provides potential habitat for Crotalus horridus (Timber rattlesnake), Lampropeltis triangulum elapsoides (Scarlet kingsnake), and possibly Sistrurus m. miliarius (Pygmy rattlesnake).

Management/Protection Recommendations:

The U.S. Forest Service manages the Roberdo Bog and Longleaf Pine Forest. Thinning is used to convert the forest from a hardwood to longleaf pine canopy. Controlled burns are used to reduce the woody sapling understory, reduce fuel buildup, and regenerate the longleaf pines. Amphibians and reptile use the upland buffer to burrow up to six inches into the ground during their nonbreeding life cycle. Therefore, it is necessary to protect the buffer from soil compaction. Portions of the site are included as a Registered Natural Area through the North Carolina Natural Heritage Program.



Montgomery County Inventory

Roberdo Bog and Longleaf Pine Forest
Significant Natural Heritage Area
Troy Quad

Scale = 1:24,000

prepared by N.C. Natural Heritage program - 4/2001

Appendix D

Biological Evaluation for the Proposed Widening of NC 24/27, January 2014

BIOLOGICAL EVALUATION

FOR THE

PROPOSED WIDENING OF NC 24/27 FROM

EAST OF THE PEE DEE RIVER TO WEST OF

SR 1134 (WADEVILLE ROAD)

UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY

NORTH CAROLINA

TIP # R-2527

WBS ELEMENT 35572.1.1

January 14, 2014

Contact Person:
Matt Haney
Environmental Specialist
North Carolina Department of Transportation
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I. INTRODUCTION

The North Carolina Department of Transportation proposes to widen NC 24/27 to a four-lane divided facility in Montgomery County, North Carolina. The proposed project, TIP No. R-2527, will widen NC 24/27 from east of the Pee Dee River to west of SR 1134 (Wadeville Road) (approximately 9 miles). Portions of this project are in the Uwharrie National Forest. The proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way.

Approximately 50 acres of USFS land falls within the 500 ft project study corridor. As design is finalized, the acreage will decrease.

II. SPECIES CONSIDERED AND METHODS

The potential effects on Sensitive (S) species are evaluated. The S species list is maintained by the Uwharrie National Forest Service, Asheville, N.C. Potential direct and indirect effects to S species were analyzed in areas where road widening is proposed. This area is referred to as the activity area.

Potentially affected rare species were identified by:

(1) Reviewing the list of S species of the Uwharrie National Forest in Montgomery Co. and streamlining this list to include only species that exist within the natural communities found at the project site.

(2) Consulting the element occurrence records of rare species as maintained by the North Carolina Natural Heritage Program (NCNHP 2012).

(3) Consulting with NCNHP, USFS, and NC Wildlife Resource Commission (NCWRC) personnel who are knowledgeable of the area and its fauna.

(4) Conducting field surveys in the activity area.

Surveys were conducted within the Forest Service property that may be impacted by the proposed road improvements. While the inventory assessed all plants and animals encountered, particular focus was directed for species listed with Threatened (T), Endangered (E) or S status.

III. EXISTING BIOLOGICAL CONDITION

A. T&E and FOREST SENSITIVE SPECIES

The Forest Service's rare species resource lists for Montgomery Co. includes three T&E species (2 Terrestrial and 1 Botanical) and 22 S species (7 Aquatic, 4 Terrestrial, and 11 Botanical).

Many of these species were ruled out due to a lack of suitable habitat in the activity area or the species has a well-known distribution that does not include the activity area. Below is a list of the T&E and S species with the reason for its elimination from the list or whether it could potentially occur in the vicinity of the activity area (bold font). Most botanical, terrestrial, and aquatic species that could potentially occur were ruled out either during the surveys or because they were "historic or extirpated" or "obscure records." The number of species on this list was substantially reduced and summarized for the following reasons:

1. Lack of suitable habitat for the species in the activity area.

2. The species has a well-known distribution that does not include the activity area.

3. Conclusions were also based on personal communication with experts in the field of study.

Threatened and Endangered Species

Birds

1. *Picoides borealis* (red-cockaded woodpecker), federally endangered, prefers mature open pine forests, mainly in longleaf pine (breeding evidence only). NCNHP has a 1994 record for a cavity tree approximately 2.4 mi south of the study corridor. Survey were conducted for this species from March 8, 2006-March 27, 2007. The surveyed areas within 0.5 mile of the project did contain pine-dominated forests. The pines within the surveyed areas were composed of young pines (between 20 to 30 years old) that would not provide suitable nesting habitat. Two areas contained older long-leaf pines (between 30 to 60 years old). The first area, located approximately 1.0 mile west of the railroad and 0.4 mile north NC 24-27, is small with scattered mature pines. An inactive cavity tree was observed within this stand. The second area is located approximately 0.3 mile north of the Additional Study Area associated with the railroad. This area provides the best potential nesting habitat, however, the older trees are scattered throughout the stand which are dominated by younger pines between 20 to 30 years old. The area within 0.5 mile of these stands is fragmented due to clear cutting. No RCWs were observed during surveys. This species is not further analyzed.

Mammals

1. *Puma concolor cougar* (eastern cougar), federally endangered, prefers extensive forests in remote areas. This species is believed to be extirpated in North Carolina. This species is not further analyzed.

Vascular Plants

1. ***Helianthus schweinitzii* (Schweinitz's sunflower), federally endangered, prefers open woods and roadsides. This species was found during surveys.**

Sensitive Species

Mollusks

1. *Elliptio roanokensis* (Roanoke slabshell), occurs in most Atlantic drainages. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. *Fusconaia masoni* (Atlantic pigtoe), occurs in most Atlantic drainages in the lower Piedmont. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
3. *Lasmigona subviridis* (green floater), occurs in the Yadkin/Pee Dee River basin. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
4. *Toxolasma pullus* (Savannah lilliput), occurs in a number of Atlantic drainages. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
5. *Villosa vaughaniana* (Carolina creekshell), occurs in the Pee Dee River basin. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Fish

1. *Etheostoma collis* (Carolina darter), occurs in streams in the Piedmont. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. *Etheostoma mariae* (pinewoods darter), possibly occurs in the Pee Dee River basin. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Terrestrial Insects

1. *Cicindela patruela* (Northern barrens tiger beetle), occurs in sandy soil in open pine or pine-oak woods. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

Amphibians

1. ***Ambystoma talpoideum* (mole salamander), breeds in fish-free semipermanent woodland ponds and forages in adjacent woodlands. Suitable habitat was observed in the activity area. This species was observed outside of the 500 ft wide project study corridor (approximately 300 ft from NC 24/27), but on Forest Service property. No impacts to this species are anticipated since it was found outside of the project corridor. This species is not further analyzed.**

Birds

1. *Haliaeetus leucocephalus* (bald eagle), prefers mature forests near large bodies of water for nesting, and lakes and sounds for nesting sites and regular non-breeding sites. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. ***Lanius ludovicia* (loggerhead shrike), prefers fields and pastures during the breeding season only. Suitable habitat was observed in the activity area. This species was not observed during surveys. No impacts to this species are anticipated. This species is not further analyzed.**

Nonvascular Plants

1. *Scopelophila cataractae* (Agoyan cataract moss), prefers copper-rich soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. *Xanthoparmelia monticola* (a rock-shield lichen), prefers high elevation rocky summits and mafic glades. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

Vascular Plants

1. ***Amorpha schwerinii* (Piedmont indigo bush), prefers dry forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. There is an occurrence of this species outside of the 500 ft wide project study corridor (approximately 600 ft from NC 24/27). This species is not further analyzed.**
2. *Berberis canadensis* (American barberry), prefers open forests and glades on basic soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
3. *Carex impressinervia* (ravine sedge), prefers rich alluvial forests. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
4. *Danthonia epilis* (bog oatgrass), occurs in seepage bogs and wet seepy power lines. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
5. *Eurybia mirabilis* (Piedmont aster), prefers rich slopes and bottomlands. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
6. ***Fothergilla major* (large witch-alder), occurs on dry ridge tops, in bluff forests, seepage wetlands, and Piedmont longleaf pine forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was found during surveys.**
7. *Lindera subcoriacea* (bog spicebush), prefers streamhead pocosins, white cedar swamps, and seepage slopes. Current records for Montgomery Co. exist. Suitable habitat was not

observed in the activity area, therefore there are no impacts. This species is not further analyzed.

8. *Solidago plumosa* (Yadkin River goldenrod), prefers riverside rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
9. ***Symphyotrichum georgianum* (Georgia aster), prefers open woods and roadsides. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys within National Forest land. This species has been found along NC 24/27 on private land in Stanly County approximately 5-6 miles away from USFS property. This species is not further analyzed.**

B. RARE SPECIES SURVEYS

Multiple surveys were conducted in the activity area to ensure that seasonal variability in species numbers and optimal survey windows for flowering plants were taken into account. Because the S and LR lists contain a broad spectrum of plants and animals, it was necessary to bring in expertise from a wide spectrum of biologists. Qualifications of principle investigators are included at the end of this document.

Survey Dates: 4/04-5/04 (Schweinitz's sunflower), 9/04 (bald eagle), 3/8/06-3/27/07 (Red-cockaded woodpeckers), 4/10/06 (bald eagle), 9/9/06-10/18/06 (Schweinitz's sunflower, smooth coneflower), 3/27/07 (bald eagle), 5/21/07 (plants), 5/22/07 (birds), 6/25/07 (bats), 6/26/07 (salamander, plants, bats), 6/27/07 (salamanders), 8/16/07 (mussels, terrestrial insects), 10/24/07 (plants), 10/25/07, 11/1/07 (plants), 11/2/07 (plants), 11/7/07 (plants), 11/16/07 (plants), 11/19/07 (plants), 11/21/07 (plants)

C. COMMUNITIES

Four common community types were found in the proposed activity areas: Dry Oak-Hickory Forest, Maintained/Disturbed, Timbered Scrub/Shrub and Loblolly Pine Plantation. The Dry Oak-Hickory Forest is described in detail by Schafale and Weakley (1990). The Maintained/Disturbed Community included a power line right-of-way dominated by grasses and forbes, and ruderal roadside edge. Most of the herbaceous diversity was associated with the Dry Oak-Hickory Forest Community. There were no significant rock outcrops or seeps.

These communities and their associated plant species are described in detail in the Natural Resources Technical Report (NRTR). The Mixed Pine/Hardwood Forest and Mixed Hardwood Forest communities described in the NRTR are similar to the Dry Oak-Hickory Forest described by Schafale and Weakley (1990).

IV. RESULTS AND POTENTIAL EFFECTS TO T, E and FOREST SERVICE S SPECIES

The proposed road widening project may affect or impact botanical and aquatic resources of the Uwharrie National Forest due to occurrence of E and Forest Service S plants or aquatic animals in the vicinity of the project area.

A larva of the S terrestrial animal species mole salamander (*Ambystoma talpoideum*) was found in an upland pool in the activity area. Mole salamanders occupy underground burrows in pine savannas, hardwood forests, and swamps and breed in fish-free semi-permanent woodland ponds and forage in adjacent woodlands. This species is found in Alleghany, Buncombe, Cherokee, Guilford, Henderson, Macon, Montgomery, Person, Polk, Richmond, Rockingham, Rowan, Surry, and Union Counties. The mole salamander is considered a species of special concern by the North Carolina Natural Heritage Program (NCNHP). This species can be avoided, as it is located approximately 300 feet from the existing alignment.

Approximately 100 individuals of the S plant species large witch alder (*Fothergilla major*) were found in forested areas in the activity area. Large witch alder is found on dry ridgetops or bluff forests, seepage wetlands, and Piedmont longleaf pine forests. This species is found in Burke, Chatham, Harnett, McDowell, Montgomery, Orange, Person, Rutherford, Stanly, Stokes, Transylvania, and Wake Counties. Large witch alder is considered a significantly rare species throughout its range by NCNHP. This species can be avoided, as it is located approximately 100 feet from the existing alignment.

Approximately 35 individuals of the federally endangered plant species Schweinitz's sunflower (*Helianthus schweinitzii*) were found adjacent to the railroad in the activity area. Schweinitz's sunflower is found in open woods and roadsides. This species is found in Anson, Cabarrus, Davidson, Gaston, Mecklenberg, Montgomery, Randolph, Rowan, Stanly, Stokes, Surry, and Union Counties. Schweinitz's sunflower is considered an endangered species by the United States Fish and Wildlife Service (USFWS). This population of Schweinitz's sunflower could be affected by the proposed project. If it is determined that this population will be affected, the plants will be transplanted to adjacent USFS land and formal consultation with the USFWS will be initiated.

REFERENCES:

Griffith, G.E.,, J.M. Omernik, J.A. Comstock, M.P. Schafale, W.H. McNab, D.R. Lenat, T.F. MacPherson, J.B. Glover, and V.B. Shelburne. 2002. Ecoregions of North Carolina and South Carolina (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

NCDOT. 2007. Mist net surveys for bats at North Carolina Department of Transportation's proposed NC 24/27 road widening (TIP NO. R-2527) in Montgomery County, North Carolina. Unpublished.

Natural Systems report for R-2527. 2004 and 2007. HDR Engineering, Inc. of the Carolinas and the North Carolina Department of Transportation.

N.C. Division of Water Quality Benthic Macroinvertebrate Assessment Data available online at http://portal.ncdenr.org/web/wq/benthosdata (Accessed: November 2012).

N.C. Division of Water Quality (NCDWQ). 2008. Yadkin-Pee Dee River Basinwide Water Quality Plan. Available online at http://portal.ncdenr.org/web/wq/ps/bpu/basin/yadkinpeedee/2008

N.C. Division of Water Quality (NCDWQ). 1998. Yadkin-Pee Dee River Basinwide Water Quality Management Plan. Available online at http://portal.ncdenr.org/c/document_library/get_file?uuid=e05c0bbc-1f76-4ed8-9f61-b5c73ade39c3&groupId=38364

N.C. Natural Heritage Program (NCNHP) map viewer and data base search available online at http://portal.ncdenr.org/web/nhp/home (Accessed: November 2012).

N.C. Natural Heritage Program (NCHNP). 2001. Montgomery County Natural Heritage Inventory. Natural Heritage Program, Office of Natural Resource Planning and Conservation, Department of Environment and Natural Resources. Inventory Biologist: Moni C. Bates. 249 pp.

Potter, E., Parnell, J., Teulings, P., and Davis, R., 2006, *Birds of the Carolinas, second edition.* University of North Carolina Press.

Radford, Albert E., et. al., (1968). *Manual of the Vascular Flora of the Carolinas*. Chapel Hill, North Carolina: University of North Carolina Press.

Schafale, M. P. and Weakley A., 1990. *Classification of the Natural Communities of North Carolina*: Third Approximation. North Carolina Natural Heritage Program, Raleigh,

North Carolina.

United States Forest Service, National Forests of North Carolina. (2007)." List of Species of Concern and Species of Interest Plants". National Forests of North Carolina: unpublished.

U.S. Geological Survey (USGS). 1974. Hydrologic Unit Map – 1974, State of North Carolina. Department of the Interior, prepared in cooperation with the U.S. Water Resources Council.

QUALIFICATIONS OF PRINCIPLE INVESTIGATORS:

Investigator: Kathy Herring, Environmental Supervisor, NCDOT
Education: B.S. Biology, University of South Carolina.
Experience: Environmental Specialist/Supervisor, NCDOT, August 2004 – present.
Environmental Biologist, NC Division of Water Quality, Biological Assessment Unit, December 1992 – July 2004.
Environmental Biologist Supervisor, Normandeau Associates, Aiken, SC. April 1988 to November 1992 and February 1982 to August 1985.
Aquatic Biologist Chadwick and Associates, Inc. Denver, CO, November 1986 to March 1988.
Project Manager - The Potential Effects of Flow Fluctuations on Establishing a Balanced Biological Community in Discharge Streams at the Savannah River Plant, Aiken, SC.
Academy of Natural Sciences of Philadelphia, September 1985 to September 1986
Expertise: Freshwater fish and benthic macroinvertebrate collection and identification; aquatic habitat evaluations and function; biocriteria and biotic indices evaluations; Endangered species (terrestrial/aquatic) surveys; data analysis/report writing. SCUBA diving certified.

Investigator: Karen M. Lynch, Environmental Supervisor, NCDOT
Education: B.S. Wildlife Biology and Fisheries, North Carolina State University.
Experience: Environmental Supervisor, NCDOT July 2003- present.
Environmental Specialist, NCDOT, November 1998 – July 2003.
Environmental Biologist, NC Division of Water Quality, November 1984-October 1998.
Expertise: Section 7 field investigations; NEPA documentation, protected species (terrestrial/aquatic) surveys, benthic macroinvertebrate collection, water quality analyses, aquatic plant surveys. Permitted to survey for State and Federal Threatened and Endangered mussels. SCUBA certified.

Investigator: Jason Mays, Environmental Specialist
Education: B.S. Biological Sciences, UNC Chapel Hill.
Experience: NCWRC Field Biologist May 2002-October 2003.
Environmental Specialist, NCDOT, March 2003- Present.
Expertise: Section 7 field investigations, protected species (terrestrial/aquatic) surveys, 404/401 permitting, wetland delineation/ determination, GIS studies.

Investigator: Michael Sanderson
Education: B.S. Fisheries and Wildlife Science, North Carolina State University.
Experience: Environmental Specialist, NCDOT April 2004- present.
Wildlife Research Biologist, Down to Earth Environmental, February – June,

2003.
Wildlife Research Technician, NC Cooperative Fish and Wildlife Research unit, 1991- 1999.
Biological Science Technician (Wildlife), US Fish and Wildlife Service, 1995-1997.

Expertise: Bird surveys, behavioral analysis, habitat use/evaluation, Section 7 field investigations, protected species (terrestrial/aquatic) surveys, wetland delineation, SCUBA certified.

Investigator: Logan Williams
Education: B.A. Philosophy, North Carolina State University, December 1981.
M.S. Entomology, North Carolina State University, May 1994.
Experience: Environmental Supervisor, NCDOT, 2002-present.
Entomologist, NC Dept. of Agriculture, 2001-2002.
Natural Systems Specialist, NCDOT, 1995-2000.
Supervisor of Apiary Inspection, NC Dept of Agriculture, 1988-1995.
Expertise: Coordinate and conduct Section 7 investigations (aquatic and terrestrial). Identification of aquatic benthic macroinvertebrates. Wetland Mitigation. Ecological studies, NEPA documentation. SCUBA certified.

Investigator: Dennis W. Herman
Education: B.S. Biology, Western Carolina University.
Experience: Environmental Program Consultant, NCDOT, August 2004-present.
Coordinator of Living Collections, NC Museum of Natural Sciences, June 1996-August 2004.
Assistant Curator of Herpetology, Zoo Atlanta, 1981-1996.
Senior Zoo Keeper of Herpetology & Mammals, Atlanta Zoological Park, 1972-1981.
Expertise: Section 7 investigations, protected species (terrestrial/aquatic) surveys, bog turtle & mountain bog specialist, ecological studies, rare plant identification, benthic macroinvertebrate collection, reptile and amphibian surveys.

Investigator: Matthew M. Haney
Education: B.S. Natural Resources-Ecosystem Assessment, North Carolina State University, Raleigh, North Carolina.
Experience: N.C. Dept. of Transportation Oct. 1999-present.
N.C. Forest Service May 1998-August 1998.
U.S. Forest Service, Center for Forested Wetlands Research May 1997-August 1997.
Expertise: Section 7 field investigations, NEPA documentation, wetland and aquatic investigations, protected species (terrestrial/aquatic) surveys.

Investigator:	Neil Medlin
Education:	M.A. Biology, Appalachian State University. B.S. Biology, Appalachian State University.
Experience:	Environmental Specialist/Supervisor, NCDOT, January 2002-present. Environmental Biologist, NC Division of Water Quality, June 1990-January 2002. Environmental Biologist, FL Department of Environmental Protection (formerly Department of Environmental Regulation), August 1986-June 1990.
Expertise:	Freshwater fish and benthic macroinvertebrate collection and identification; aquatic habitat evaluations and function; biocriteria and biotic indices evaluations; Endangered species (terrestrial/aquatic) surveys and assessments; permitted to survey for State and Federal Threatened and Endangered mussels and fish.

Investigator:	Mary E. Frazer
Education:	B.S. Zoology, University of Wisconsin. M.E.M. (Master of Environmental Management), Resource Ecology, Duke University.
Experience:	Natural Systems Specialist, NCDOT, August 2000-present. Water Regulation Specialist, Wisconsin Department of Natural Resources, 1998-2000. Wisconsin Coastal Management Program, 1994-1998. Biologist, Soil and Environmental Consultants, 1992-1994.
Expertise:	Section 7 field investigations; NEPA documentation, wetland and aquatic investigations.

Investigator:	Melissa Miller
Education:	B.S. Fisheries and Wildlife Sciences, North Carolina State University.
Experience:	Environmental Biologist, NCDOT, February 2005-present. Assistant Wildlife Biologist, Howell Woods Environmental Learning Center, Four Oaks, NC, January1999-February 2005.
Expertise:	Section 7 field investigations, protected species (terrestrial/aquatic) surveys.

Investigator:	Anne Burroughs
Education:	B.S. Biological Sciences, Minor in Environmental Science, North Carolina State University 1992.
Experience:	Biological Control Technician – NC Dept of Agriculture May 2001-April 2003. Environmental Specialist – NC Dept. of Transportation, May 2003-August 2003, January 2004-present.
Expertise:	Endangered species (terrestrial/aquatic) surveys; benthic macroinvertebrate collection.

Investigator:	Lance P. Fontaine, Ph.D.
Education:	Ph.D., Wildlife and Fisheries Sciences, Texas A&M University, 2008. M.S. Wildlife and Fisheries Sciences, Texas A&M University, 2002. B.S. Ecological & Evolutionary Biology, Tulane University, 1999.
Experience:	Environmental Specialist, NCDOT, Raleigh, NC, October 2006 – Present. Lecturer, University of California at Irvine, January 2006 – September 2006. Research Assistant, Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX, August 2000 – December 2005. Pond Technician/Technical Consultant, Integrated Lakes Management, Gurnee, IL September 1999 – August 2000.
Expertise:	Endangered species (terrestrial/aquatic) surveys; section 7 field investigation; biological assessment preparation; water quality analysis; aquatic and wetland ecology studies; freshwater and marine fish ecology and ecophysiology studies; invasive and exotic species (terrestrial/aquatic) issues; statistical analysis; benthic macroinvertebrate collection; GIS studies; prescribed burns.

Investigator:	Cheryl Gregory
Education:	B.S. Natural Resource Management & Ecology, Colorado State University.
Experience:	Environmental Specialist, NCDOT, Raleigh, NC, December 2003 to present. Field Tech, GeoSonics, Inc., Raleigh, NC September to December 2003.
Expertise:	Biotic community mapping and assessment, Section 404/401 permitting, Section 7 field surveys, wetland delineation, GIS mapping, and technical report writing.

Investigator:	Heather Renninger
Education:	B.S. Ecology/Environmental Biology, Appalachian State University.
Experience:	Environmental Specialist, NCDOT, February 2007- present. Environmental Biologist, H.W. Lochner, Inc., 2003-2007. Biologist, Earth Tech, Inc., 2000-2003.
Expertise:	Section 7 field investigations and documentation, benthic macroinvertebrate collection, 401/404 permitting, protected species (terrestrial/aquatic) surveys, NEPA documentation, wetland delineation, stream restoration, invasive species, avian ecology and behavior.

Appendix E

Aquatic Resources Report for the Proposed Widening of NC 24/27, January 2014

AQUATIC RESOURCES REPORT

FOR THE

PROPOSED WIDENING OF NC 24/27

FROM EAST OF THE PEE DEE RIVER

TO WEST OF SR 1134 (WADEVILLE ROAD)

UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY

NORTH CAROLINA

TIP # R-2527

WBS ELEMENT 35572.1.1

January 14, 2014

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I. INTRODUCTION

This report identifies the potential effects and impacts on aquatic resources of the proposed widening of NC 24/27 from east of the Pee Dee River to west of SR 1134 (Wadeville Road). The proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way. The project area is in the Uwharrie Ranger District, Uwharrie National Forest, Montgomery County, North Carolina.

Approximately 50 acres of USFS land falls within the 500 ft project study corridor. As design is finalized, the acreage will decrease.

This project affects Clarks Creek, Rocky Creek, unnamed tributaries to Rocky Creek, and Smith Branch along NC 24/27. These streams are located in the Piedmont III ecoregion, and the Carolina Slate Belt level IV ecoregion (Griffith et al. 2002). The Carolina Slate Belt has some of the lowest water-yielding geology in the state resulting in the tendency of streams to dry up in summer. Mount Gilead Town Wastewater Treatment Plant discharges into Clarks Creek. Clarks Creek was rated Fair in 2011 for benthic bioclassification by North Carolina Department of Environment and Natural Resources' Division of Water Quality (NCDWQ). Rocky Creek was rated Good-Fair in 1996 for benthic bioclassification by NCDWQ. Clarks Creek was rated Excellent 2004 for fish bioclassification by NCDWQ. Rocky Creek was rated Good in 2010 for fish bioclassification by NCDWQ.

Water quality ratings for fish and benthic macroinvertebrates are not always in agreement due to habitat differences. Furthermore, benthic macroinvertebrates are more sensitive to slight changes in water quality.

During the twentieth century these streams suffered numerous detrimental effects on the aquatic fauna. Logging in the Uwharrie National Forest, construction of the railroad and NC 24/27 through the National Forest, and residential development and agriculture have all contributed to periods of habitat degradation.

II. SPECIES CONSIDERED AND METHODS

The potential effects on Sensitive (S) and Locally Rare (LR) aquatic species are evaluated. The S and LR species lists are maintained by the Uwharrie National Forest Service, Asheville, N.C. Potential direct and indirect effects to S and LR aquatic species were analyzed in the Clarks Creek, Rocky Creek, and Smith Branch areas where road widening is proposed. This area is referred to as the activity area, and is shown in the attached project map (See Figure 1).

Potentially affected aquatic species were identified by:

(1) Reviewing the list of S and LR aquatic species of the Uwharrie National Forest in Montgomery Co. (Appendix 1) and streamlining this list to include only aquatic species that exist

within the natural communities found at the project site.

(2) Consulting the element occurrence records of aquatic species as maintained by the North Carolina Natural Heritage Program (NCNHP 2012).

(3) Consulting with NCNHP, USFS, and NC Wildlife Resource Commission (NCWRC) personnel who are knowledgeable of the area and its fauna.

(4) Conducting field surveys in areas designated for stream disturbing activities.

Surveys were conducted within the Forest Service property that may be impacted by the proposed road improvements. While the aquatic inventory assessed all animals encountered, particular focus was directed for species listed with Threatened (T), Endangered (E), S or LR status.

III. AQUATIC RESOURCES

A. T&E, SENSITIVE, AND LOCALLY RARE SPECIES

The 2011 revised rare aquatic species list for Montgomery County (Appendix 1) includes twenty-two T&E, S, and LR species: eighteen invertebrates (5 S and 13 LR), one amphibian (1 S), and five fish (2 S and 3 LR). The number of species on this list was substantially reduced and summarized for the following reasons:

1. Lack of suitable habitat for the species in the activity area.

2. The species has a well-known distribution that does not include the activity area.

3. Conclusions were also based on personal communication with experts in the field of study.

4. Any aquatic species that had marginal to suitable habitat in the vicinity of the area and could potentially occur were ruled out either during the surveys or because they were "historic or extirpated" or listed as "obscure records."

Endangered and Threatened Species

A detailed discussion of the T&E aquatic species was included in the accompanying Biological Evaluation along with the botanical and terrestrial species and will not be included in this report. The S and LR aquatic species are discussed below.

Sensitive Species

Eight Forest Service S aquatic species are listed for the Uwharrie National Forest in Montgomery Co. All eight species were ruled out due to not being found during surveys or outside of the project study corridor.

Mollusks

1. *Elliptio roanokensis* (Roanoke slabshell), occurs in most Atlantic drainages. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. *Fusconaia masoni* (Atlantic pigtoe), occurs in most Atlantic drainages in the lower Piedmont. The preferred habitat for the Atlantic pigtoe is a yielding substrate composed of coarse sands and gravel at the downstream edge of riffle areas. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
3. *Lasmigona subviridis* (green floater), occurs in the Yadkin/Pee Dee River basin. This species prefers pools or eddies with gravelly and sandy bottoms. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
4. *Toxolasma pullus* (Savannah lilliput), occurs in a number of Atlantic drainages. This species lives in still shallow water near the banks of streams and ponds in mud or sand. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
5. *Villosa vaughaniana* (Carolina creekshell), occurs in the Pee Dee River basin. This species is found near the bank in shaded pools of small streams. This species prefers muddy or silty gravel in shallow water. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Fish

1. *Etheostoma collis* (Carolina darter), occurs in streams in the Piedmont. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. *Etheostoma mariae* (pinewoods darter), possibly occurs in the Pee Dee River basin. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Locally Rare Species

Sixteen Forest Service LR aquatic species are listed for the Uwharrie National Forest in Montgomery Co. All sixteen species were ruled out due to not being found during surveys.

Mollusks

1. *Alasmidonta* sp. 2 (a bivalve), occurs in streams in the Uwharrie Mountains region. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. *Alasmidonta undulata* (triangle floater), occurs in most river systems in the Piedmont. This species is common in smaller rivers and streams, going well into the headwaters, found mainly in quiet waters with some current, avoiding riffles, living in coarser gravel and sand. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

3. *Anodonta implicata* (alewife floater), occurs in the Pee Dee River. This species is found living in ponds, overbank pools, streams and rivers in a variety of substrates including silt, sand and gravel. This species is listed as obscure in Montgomery Co. This species was not found during surveys. This species is not further analyzed.
4. *Lampsilis cariosa* (yellow lampmussel), occurs in a number of river systems. This species is found in medium to larger rivers often in sand in bedrock cracks, but also is found in silt, sand, gravel, and cobble substrates. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
5. *Lampsilis radiata* (eastern lampmussel), occurs in a number of river systems. This species has been found in creeks, lakes and rivers with fast current in gravel substrate and in a sandy substrate in lake like portions of rivers. This species has also been found in sand substrate with good current. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
6. *Strophitus undulatus* (creeper), occurs in most river basins in the Piedmont. This species appears adaptable to a variety of aquatic habitats, from high-gradient small streams to main channels of rivers in finer sediments to large gravel, usually deeply buried. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Crustaceans

1. *Cambarus catagius* (Greensboro burrowing crayfish), occurs in the Uwharrie Mountains. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. *Cambarus hystriocosus* (Sandhills spiny crayfish), occurs in streams in the Sandhills. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.

Aquatic Insects

1. *Beraea gorteba* (a caddisfly), has no locality data. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.
2. *Ceraclea joannae* (a caddisfly), occurs in the Little River. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
3. *Baetpous trishae* (a mayfly), has no locality data. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.
4. *Plauditus cestus* (a mayfly), has no locality data. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.
5. *Pteronarcy comstocki* (spiny salmonfly), has no locality data. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.

Fish

1. *Carpiodes sp. cf. cyprinus* (a carpsucker), occurs in the Yadkin/Pee Dee drainage. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.
2. *Moxostoma sp. 3* (Carolina redhorse), occurs in the Pee Dee drainage. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
3. *Notropis volucellus* (mimic shiner), occurs in scattered drainages near the Fall Line. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.

B. AQUATIC SPECIES SURVEYS

Benthic Macroinvertebrates

NCDOT biologists conducted multiple surveys in Rocky Creek, Clarks Creek, and Smith Branch within the Uwharrie National Forest for benthic macroinvertebrates, and samples were collected during each survey. For details on collection methods, please refer to the NCDENR DWQ Biological Assessment website: (http://www.esb.enr.state.nc.us/BAU.html). Appendix 2 lists macroinvertebrate species actually collected by NCDOT biologists on 5/21/2007, 6/27/2007, and 8/16/2007. A vicinity map can be found in this report, before the appendices. **None of the invertebrate species on the Forest Service S or LR lists were found during any of the surveys.**

Freshwater Mussels

Mussel surveys were conducted on 8/16/2007 by NCDOT biologists in Clarks Creek and Rocky Creek for the presence of live mussels and mussel shells. The only mussel species that was observed during surveys was *Elliptio complanata*. Clarks Creek and Rocky Creek had very little water during mussel surveys. **None of the freshwater mussel species on the Forest Service S or LR lists were found during any of the surveys.**

Fish

Fish surveys were conducted on 6/27/2007 by NCDOT biologists in Rocky Creek and Clarks Creek. Appendix 3 lists the fish species that were collected during the survey. **None of the fish species on the Forest Service S or LR lists were found during any of the surveys.**

Qualifications of principle investigators are included in the Biological Evaluation report.

C. COMMUNITIES

Stream characteristics were recorded during the fish surveys on 6/27/2007.

Clarks Creek had a water depth of approximately 3 inches. The stream channel was approximately 9 feet wide. The substrate was primarily cobble and gravel, but also consisted of sand and boulder. The bank height was approximately 3 feet.

Rocky Creek had a water depth of 3-6 inches. The stream channel was approximately 12 feet wide. The substrate was primarily cobble and boulder, but also consisted of bedrock and gravel. The bank height was approximately 3 feet.

IV. POTENTIAL EFFECTS TO SENSITIVE AND LOCALLY RARE AQUATIC SPECIES

There will be no effects or impacts (direct, indirect or cumulative) to any listed aquatic species if this proposal were implemented. This conclusion is supported by the following:

1) S or LR aquatic species are not known to occur in or near the activity area.

2) Site specific aquatic surveys did reveal the absence of S or LR species.

V. MITIGATION AND RATIONALE

Since there are no effects or impacts to any T & E, S and LR aquatic species, there is no recommended mitigation.

VI. SUMMARY OF EFFECT

The proposed improvements to R-2527 will not impact any S or LR aquatic species on the USDA Forest Service S and LR list for Montgomery County due to nonoccurrence in the vicinity of the activity area. No mitigation is recommended. **The proposed project will not affect any Federally listed or proposed listed aquatic species. Formal consultation with the U.S. Fish and Wildlife Service is not required.**

VII. REFERENCES

Griffith, G.E.,, J.M. Omernik, J.A. Comstock, M.P. Schafale, W.H. McNab, D.R. Lenat, T.F. MacPherson, J.B. Glover, and V.B. Shelburne. 2002. Ecoregions of North Carolina and South Carolina (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

N.C. Division of Water Quality Benthic Macroinvertebrate Assessment Data available online at http://portal.ncdenr.org/web/wq/benthosdata (Accessed: November 2012).

N.C. Division of Water Quality (NCDWQ). 2008. Yadkin-Pee Dee River Basinwide Water Quality Plan. Available online at http://portal.ncdenr.org/web/wq/ps/bpu/basin/yadkinpeedee/2008

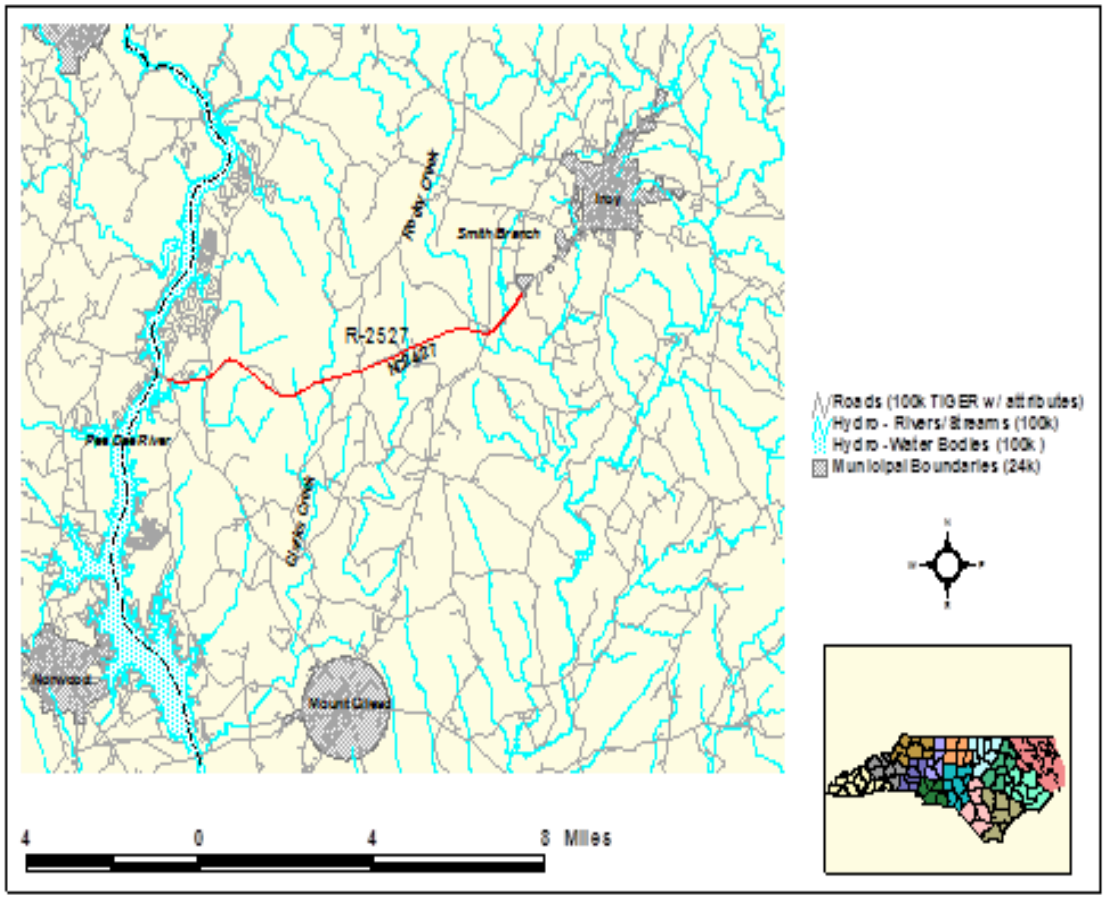
N.C. Division of Water Quality (NCDWQ). 1998. Yadkin-Pee Dee River Basinwide Water Quality Management Plan. Available online at http://portal.ncdenr.org/c/document_library/get_file?uuid=e05c0bbc-1f76-4ed8-9f61-b5c73ade39c3&groupId=38364

N.C. Natural Heritage Program (NCNHP) map viewer and data base search available online at http://portal.ncdenr.org/web/nhp/home (Accessed: November 2012).

N.C. Natural Heritage Program (NCHNP). 2001. Montgomery County Natural Heritage Inventory. Natural Heritage Program, Office of Natural Resource Planning and Conservation, Department of Environment and Natural Resources. Inventory Biologist: Moni C. Bates. 249 pp.

U.S. Geological Survey (USGS). 1974. Hydrologic Unit Map – 1974, State of North Carolina. Department of the Interior, prepared in cooperation with the U.S. Water Resources Council.

Figure 1. R-2527 Vicinity Map



Appendix 1. List of Forest Service Sensitive and Locally Rare Aquatic Species for Montgomery County (October 2012).

SCIENTIFIC NAME	COMMON NAME	STATUS	NHP-LISTED COMMUNITY OR HABITAT AND RECORDS	LIKELIHOOD OF OCCURRENCE AND CONCLUSION
Fish				
Carpiodes sp. cf. cyprinus	A carpsucker	LR	Occurs in the Yadkin/Pee Dee drainage	Species was not collected during surveys.
Etheostoma collis	Carolina darter	S	Occurs in streams in the Piedmont	Current records are known in Montgomery Co. This species was not collected during surveys.
Etheostoma mariae	Pinewoods darter	S	Possibly occurs in the Pee Dee drainage	Current records are known in Montgomery Co. This species was not collected during surveys.
Moxostoma sp. 3	Carolina redhorse	LR	Occurs in the Pee Dee drainage	Current records are known in Montgomery Co. This species was not collected during surveys.
Notropis volucellus	Mimic shiner	LR	Occurs in scattered drainages near Fall Line	Species was not collected during surveys.
Mussels				
Alasmidonta sp. 2	A bivalve	LR	Occurs in streams in the Uwharrie Mountains region	Current records are known in Montgomery Co. This species was not collected during surveys.
Alasmidonta undulata	Triangle floater	LR	Occurs in most river systems in Piedmont	Current records are known in Montgomery Co. This species was not collected during surveys.
Anodonta implicata	Alewife floater	LR	Occurs in the Pee Dee River	Listed as obscure in Montgomery Co. This species was not collected during surveys.

Elliptio roanokensis	Roanoke slabshell	S	Occurs in most Atlantic drainages	Current records are known in Montgomery Co. This species was not collected during surveys.
Fusconaia masoni	Atlantic pigtoe	S	Occurs in most Atlantic drainages, in the lower Piedmont	Current records are known in Montgomery Co. This species was not collected during surveys.
Lampsilis cariosa	Yellow lampmussel	LR	Occurs in a number of river systems; mainly near the Fall Line	Current records are known in Montgomery Co. This species was not collected during surveys.
Lampsilis radiata	Eastern lampmussel	LR	Occurs in a number of river systems	Current records are known in Montgomery Co. This species was not collected during surveys.
Lasmigona subviridis	green floater	S	Occurs in the Yadkin/Pee Dee system downstate	Current records are known in Montgomery Co. This species was not collected during surveys.
Strophitus undulatus	creeper	LR	Occurs in most river basins in the Piedmont	Current records are known in Montgomery Co. This species was not collected during surveys.
Toxolasma pullus	Savannah lilliput	S	Occurs in a number of Atlantic drainages	Current records are known in Montgomery Co. This species was not collected during surveys.
Villosa vaughaniana	Carolina creekshell	S	Occurs in the Pee Dee system	Current records are known in Montgomery Co. This species was not collected during surveys.
Crayfish				
Cambarus catagius	Greensboro burrowing crayfish	LR	Occurs in the Greensboro area, south to the Uwharrie Mountains	Current records are known in Montgomery Co. This species was not collected during surveys.
Cambarus hystriocosus	Sandhills spiny crayfish	LR	Occurs in streams in the Sandhills	This species was not collected during surveys.
Insects				
Beraea gorteba	A caddisfly	LR	No locality data	This species was not

				collected during surveys.
Ceraclea joannae	A caddisfly	LR	Occurs in the Little River	Current records are known in Montgomery Co. Endemic to this area. This species was not collected during surveys.
Baetpous trishae	A mayfly	LR	No locality data	This species was not collected during surveys.
Plauditus cestus	A mayfly	LR	No locality data	This species was not collected during surveys.
Pteronarcy comstocki	Spiny salmonfly	LR	No locality data	This species was not collected during surveys.

Forest Service Status (FS) is designated by the U.S. Forest Service. Sensitive and locally rare species are protected under provisions of the National Forest Management Act and directions set forth in FS manual 2670.

STATUS CODE	STATUS	DESCRIPTION
E	Endangered	A taxon which is in danger of extinction throughout all or a significant portion of its range
T	Threatened	A taxon which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range
S	Sensitive	Species at risk of extinction in a portion of their range as evidenced by downward trends in population numbers or density, or downward trends in habitat capability.
FC	Forest Concern	Species not at risk of extinction, even in a portion of their range, and not showing a downward population trend over their range as a whole within North Carolina.

Appendix 2. Taxa list with indication of relative abundance. A = Abundant (≥10), C=Common (3-9), and R = Rare (1-2). Uwharrie National Forest, Montgomery County, May 21, 2007. (Macroinvertebrate species found during NCDOT field surveys on May 21, 2007)

Stream	**Rocky Cr**	**Rocky Cr**	**Clark Cr**	**Clark Cr**	**Smith Br**	**Smith Br**
Site (relative to NC 24/27)	**Upstream**	**Downstream**	**Upstream**	**Downstream**	**Upstream**	**Downstream**
Date	**5/21/07**	**5/21/07**	**5/21/07**	**5/21/07**	**5/21/07**	**5/21/07**
	Abundance	**Abundance**	**Abundance**	**Abundance**	**Abundance**	**Abundance**
Ephemeroptera						
Acerpenna pygmaea	R		R	R	R	R
Baetis flavistriga	R	R	R	C		
Baetis pluto	R	C	R	C		
Baetis propinquis			R		C	R
Caenis			A	C		
Centroptilum					C	C
Habrophlediodes sp.	A	A	A	A	A	A
Heptagenia	R		R		C	
Isonychia sp.	A	A	A	C	A	A
Eurylophella	C	A	A	A		
Ephemerella dorothea	R	C				
Leucrocuta	A	A	C	C	C	A
Plauditus dubius grp.		R	R	R	C	A
Pseudocloeon frondalis			C		R	
Stenacron interpunctatum	C	C	A	C	R	R
Stenonema modestum		R	C	C	C	C
Odonata						
Argia sp.			C			
Boyeria vinosa	R	R	R	R	R	R
Calopteryx sp.		R	R	R		R
Cordulegaster						R
Lanthus	C			R	R	
Somatochlora		R				R
Plecoptera						
Alloperla	R					
Acroneuria abnormis	A	A				
Amphinemura sp.					R	
Ecoptura xanthenes				R		
Neoperla	C	C				
Isoperla holochlora	R		C	R	R	
Perlesta placida	A	A	A	A	A	A
Leuctra	C					
Megaloptera						
Corydalus cornutus		C	R	R		
Nigronia serricornis			R	R		
Sialis			R			R
Trichoptera						
Chimarra	A	A	A	C		
Hydropsychye betteni		R				
Cheumatopsyche sp.	A	A	A	A	C	
Ceraclea ancylus	C		C			
Diplectrona modesta				R	C	
Neophylax oligius		R				C
Polycentropus	R	R				
Pteronarcys		R				

Pycnopshyche				R		
Ryacophila carolina				C		
Coleoptera						
Ancyronyx variegatus			R	C		
Dineutus			R			
Dytiscidae			A	A		
Gyrinus			R			
Helichus		C	A	C	R	
Macronychus glabratus			R	R		
Neoporus sp.						C
Stenelmis sp.			R			R
Psephenus herricki	R	C	R	C		
Diptera						
Antocha			R		C	R
Dicranota			C	R		
Simulium	C	A	A	A	R	
Hexatoma		C	C	C	R	
Tipula		C		R	R	
Palpomyia			R	R		
Other						
Erpobdella/Moreeobdella		C				

Appendix 3. Fish species collected during surveys for R-2527

Chain pickerel	*Esox niger*
Rosyside dace	*Clinostomus funduloides*
Highback chub	*Hybopsis hypsinotus*
Bluehead chub	*Nocomis leptocephalus*
Redlip shiner	*Notropis chiliticus*
Highfin shiner	*Notropis altipinnis*
Creek chub	*Semotilus atromaculatus*
Creek chubsucker	*Erimyzon oblongus*
Flat bullhead	*Ameiurus platycephalus*
Yellow bullhead	*Ameiurus natalis*
Margined madtom	*Notorus insignis*
Pirate perch	*Aphredoderus sayanus*
Green sunfish	*Lepomis cyanellus*
Redbreast	*Lepomis auritus*
Pumpkinseed	*Lepomis gibbosus*
Warmouth	*Lepomis gulosus*
Tessellated darter	*Etheostoma olmstedi*
Fantail darter	*Etheostoma flabellare*

Appendix F

Botanical Resources Report for the Proposed Widening of NC 24/27, January 2014

BOTANICAL RESOURCES REPORT

FOR THE

PROPOSED WIDENING OF NC 24/27

FROM EAST OF THE YADKIN-PEE DEE RIVER TO

WEST OF SR 1134 (WADEVILLE ROAD)

UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY

NORTH CAROLINA

TIP # R-2527

WBS ELEMENT 35572.1.1

January 14, 2014

Contact Person:
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I. INTRODUCTION

This report identifies the potential effects on botanical resources of a proposed road widening of NC 24/27 from east of the Yadkin-Pee Dee River to west of SR 1134 (Wadeville Road). The proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way. The project area is in the Uwharrie Ranger District, Uwharrie National Forest, Montgomery Co., North Carolina.

Approximately 50 acres of USFS land falls within the 500 ft wide project study corridor. As design is finalized, the acreage will decrease.

II. SPECIES CONSIDERED AND METHODS

The potential effects on USFS Sensitive (S) and Locally Rare (LR) plant species are evaluated. Threatened (T) and Endangered (E) plant species are discussed in the Biological Evaluation report. Potential direct and indirect effects to S and LR plant species were analyzed in the areas where road widening is proposed. This area is referred to as the activity area, and is shown in the attached project map (Figure 1 of Biological Evaluation).

Potentially affected plant species were identified by:

1) Reviewing the list of S and LR plant species of the Uwharrie National Forest in Montgomery Co. (Appendix 1) and streamlining this list to include only plants that could potentially exist within the natural communities found at the project site. The streamlined list is shown below in Table 1.

2) Consulting element occurrence records of plants as maintained by the North Carolina Natural Heritage Program (NCNHP 2012).

3) Consulting with NCNHP and US Forest Service personnel who are knowledgeable of the area and its flora.

4) Conducting field surveys in areas designated for ground disturbing activities.

Surveys were conducted within the Forest Service property that will be impacted by the proposed road widening. While the floral survey assessed all plants encountered, particular focus was directed for plants listed as Threatened (T), Endangered (E), S or LR Status.

III. BOTANICAL RESOURCES

A. T&E, SENSITIVE AND LOCALLY RARE SPECIES:

The 2011 revised rare botanical species list for Montgomery Co. (Appendix 1) includes thirty-nine T&E, S, and LR species: two nonvascular species (2 S) and thirty-seven vascular species (1 E, 9 S and 27 LR).

All but fourteen species were dropped from the list for further consideration and discussion for one of the two following reasons: 1) lack of suitable habitat for the species in the project area, 2) the species has a well-known distribution that does not include the project area.

Habitats, community types and ranges of plant Threatened (T) and Endangered (E), S and LR species are derived from information in "Classification of the Natural Plant Communities of North Carolina (1990)," the Natural Heritage Program's "List of Rare Plant Species of North Carolina" (http://portal.ncdenr.org/c/document_library/get_file?uuid=b0c4aa96-6cdf-4c19-8885-88c4c0dc18c7&groupId=61587) or personal communication with other botanists.

Endangered and Threatened Species
A detailed discussion of the T&E botanical species was included in the accompanying Biological Evaluation along with the botanical and terrestrial species and will not be included in this report. The S and LR botanical species are discussed below.

Sensitive Species
Eleven Forest Service S botanical species are listed for the Uwharrie National Forest in Montgomery Co. All but three species were ruled out due to lack of suitable habitat.

Nonvascular

1. *Scopelophila cataractae* (Agoyan cataract moss), prefers copper-rich soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. *Xanthoparmelia monticola* (a rock-shield lichen), prefers high elevation rocky summits and mafic glades. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

Vascular

1. *Amorpha schwerinii* (Piedmont indigo bush), prefers dry forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. There is an occurrence of this species outside of the 500 ft wide project study corridor (approximately 600 ft from NC 24/27). This species is not further analyzed.
2. *Berberis canadensis* (American barberry), prefers open forests and glades on basic soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
3. *Carex impressinervia* (ravine sedge), prefers rich alluvial forests. Current records for

Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

4. *Danthonia epilis* (bog oatgrass), occurs in seepage bogs and wet seepy power lines. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
5. *Eurybia mirabilis* (Piedmont aster), prefers rich slopes and bottomlands. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
6. *Fothergilla major* (large witch-alder), occurs on dry ridge tops, in bluff forests, seepage wetlands, and Piedmont longleaf pine forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was found during surveys.
7. *Lindera subcoriacea* (bog spicebush), prefers streamhead pocosins, white cedar swamps, and seepage slopes. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
8. *Solidago plumosa* (Yadkin River goldenrod), prefers riverside rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
9. *Symphyotrichum georgianum* (Georgia aster), prefers open woods and roadsides. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys within National Forest land. This species has been found along NC 24/27 on private land in Stanly County approximately 5-6 miles away from USFS property. This species is not further analyzed.

Locally Rare Species

Twenty-seven Forest Service LR botanical species are listed for the Uwharrie National Forest in Montgomery Co. All but eleven species were ruled out due to lack of suitable habitat.

Vascular

1. *Anemone berlandieri* (southern anemone), prefers thin circumneutral soil adjacent to rock outcrops. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. *Baptisia alba var. alba* (thick-pod white wild indigo), prefers open woodlands and clearings. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
3. *Baptisia australis var. aberrans* (eastern prairie blue wild indigo), prefers glades and open forests on basic soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
4. *Cardamine dissecta* (dissected toothwort), prefers rich woods, cove forests, and

bottomlands. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

5. *Cirsium carolinianum* (Carolina thistle), occurs in forests and disturbed areas, mostly on basic soils. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
6. *Collinsonia tuberosa* (Piedmont horsebalm), prefers thin circumneutral soil adjacent to rock outcrops. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
7. *Desmodium fernaldii* (Fernald's tick-trefoil), prefers dry to mesic hardwood-pine woodlands. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
8. *Dichanthelium boreale* (northern witch grass), prefers open woods. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was added to the USFS list since the last surveys were done. Surveys will be done for this species closer to the let date for this project.
9. *Gillenia stipulata* (Indian physic), prefers forests and open woods, mainly over mafic rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
10. *Helenium brevifolium* (littleleaf sneezeweed), prefers bogs, seeps, riverbanks, and other wet sites. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
11. *Helianthus laevigatus* (smooth sunflower), prefers shaly open woods and roadsides. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was found during surveys.
12. *Matelea decipiens* (glade milkvine), prefers thin woodlands over mafic or calcareous rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
13. *Parthenium auriculatum* (glade wild quinine), prefers glades and openings over mafic rocks. Current records for Montgomery Co. exist. This species was found during surveys.
14. *Primula meadia* (eastern shooting star), prefers mafic cliffs, dry coniferous woodlands, and associated nutrient-rich alluvial forests. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area. This species is not further analyzed.
15. *Pseudognaphalium helleri* (Heller's rabbit tobacco), prefers dry woodlands, openings, and glades, especially over mafic rocks. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during

surveys. This species is not further analyzed. There is a population of this species south of NC 24/27 within the National Forest, approximately 800 feet from the road.

16. *Quercus austrina* (bluff oak), prefers bluff and bottomland forests over circumneutral soil. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
17. *Ruellia purshiana* (Pursh's wild petunia), prefers glades and woodlands, mostly over mafic or calcareous rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
18. *Salvia azurea* (azure sage), occurs in sandhills. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
19. *Sedum glaucophyllum* (cliff stonecrop), prefers rock outcrops, mainly calcareous or mafic. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
20. *Smilax hugeri* (Huger's carrion-flower), prefers deciduous forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
21. *Solidago radula* (western rough goldenrod), prefers dry woodlands over mafic rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
22. *Stachys* sp. 1 (undescribed hedge nettle), prefers sandy edges of forested floodplains. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
23. *Stewartia ovata* (mountain camellia), occurs on bluffs and in forests, usually with rhododendrons. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
24. *Tradescantia virginiana* (Virginia spiderwort), prefers rich woods on circumneutral soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
25. *Tridens chapmanii* (Chapman's redtop), prefers dry pine and oak woods, and sandy roadsides. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
26. *Trifolium reflexum* (buffalo clover), prefers open woods and clearings. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
27. *Viola walteri* (prostrate blue violet), prefers rich cove forests and other rich forests. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

B. BOTANICAL SURVEYS:

The activity area was surveyed by multiple NCDOT biologists on May 21, 2007, June 26, 2007, October 24, 2007, November 1, 2007, November 2, 2007, November 7, 2007, November 16, 2007, November 19, 2007, and November 21, 2007. Surveys for Schweinitz's sunflower were conducted on October 18-20, 2011. **One population of Endangered (Schweinitz's sunflower, *Helianthus schweinitzii*), two populations of S (large witch alder, *Fothergilla major*) one population of LR (glade wild quinine, *Parthenium auriculatum*) and several populations of LR (smooth sunflower, *Helianthus laevigatus*) species were detected during the site visits**. An additional population of Schweinitz's sunflower, as well as a population of Georgia aster, were found during the October 2011 survey dates, but these populations are not on USFS property.

C. COMMUNITIES

Four common community types were found in the proposed activity areas: Dry Oak-Hickory Forest, Maintained/Disturbed, Timbered Scrub/Shrub and Loblolly Pine Plantation. The Dry Oak-Hickory Forest is described in detail by Schafale and Weakley (1990). The Maintained/Disturbed Community included a power line right-of-way dominated by grasses and forbes, and ruderal roadside edge. Most of the herbaceous diversity was associated with the Dry Oak-Hickory Forest Community. There were no significant rock outcrops or seeps.

These communities and their associated plant species are described in detail in the Natural Resources Technical Report (NRTR). The Mixed Pine/Hardwood Forest and Mixed Hardwood Forest communities described in the NRTR are similar to the Dry Oak-Hickory Forest described by Schafale and Weakley (1990).

IV. POTENTIAL BOTANICAL EFFECTS TO T and E, S and LR plants.

There are approximately 450 individuals of T and E, S or LR plant species within the 500 ft wide project study corridor. Approximately 100 individuals of the S plant species large witch alder (*Fothergilla* major), 300 individuals of the LR plant species smooth sunflower (*Helianthus* laevigatus), 35 individuals of the E plant species Schweinitz's sunflower (*Helianthus* schweinitzii) and several (less than 20) individuals of the LR plant species glade wild quinine (*Parthenium auriculatum*) were found in the activity area. It is not anticipated that all of these individuals will be affected or impacted (direct, indirect or cumulative) since construction will not occur throughout the entire 500 ft wide project study corridor. As design is finalized, NCDOT will have a more accurate estimation of how many individuals will be affected. This conclusion is supported by the following:

1) Site specific botanical surveys did reveal the presence of T and E, S or LR species, or habitat that is specific to T and E, S and LR species.

2) Dry Oak-Hickory Forest, Maintained/Disturbed, Timbered Scrub/Shrub, and Loblolly Pine Plantation communities are common community types within the Uwharrie National Forest. The habitats and natural communities found within the activity area have potential for T and E, S and LR plant species occurrence.

Direct effects to the aforementioned species include any effect related to the actual construction of the project. These effects would include: clearing vegetation, placing fill material on top of plants, cut slopes (digging up plants). These direct effects would result in the death of all the individuals of the species in the construction corridor.

Indirect effects include effects that occur after project construction. These effects would include: additional stormwater flowing to where these species occur, additional drainage and the possibility of invasive species increasing in areas that are cleared. Indirect effects may result in the eventual death of individuals of the four species.

V. MITIGATION AND RATIONALE

Since there are known effects to T and E, S and LR plant species, some form of mitigation is recommended. Mitigation options include: transplanting, avoidance (flagging or fencing), using native plantings for erosion control, and habitat enhancement. NCDOT will discuss these options with USFS.

The large witch alder plants can possibly be avoided since they are located approximately 100 ft from the existing road. Smooth sunflower seeds were harvested from the impact area for potential mitigation needs in 2007 and were subsequently transferred to USFS. Seeds from the Schweinitz's sunflower population that may be affected (EO 028) were collected in 2011 and 2012 and stored for potential mitigation.

VI. SUMMARY OF EFFECT

The proposed project will potentially impact E, S and LR plant species. The Biological Conclusion for Schweinitz's sunflower is May Affect, Likely to Adversely Affect. Therefore, formal consultation with the U.S. Fish and Wildlife Service is required.

This project may impact individuals of the three S and LR species (smooth sunflower, large witch alder and glade wild quinine), but will not affect the viability of any of the three species across the forest. Discussions will occur with the USFS to determine avoidance and minimization options.

REFERENCES:

Natural Systems report for R-2527. 2004 and 2007. HDR Engineering, Inc. of the Carolinas and the North Carolina Department of Transportation.

Radford, Albert E., et. al., (1968). *Manual of the Vascular Flora of the Carolinas*. Chapel Hill, North Carolina: University of North Carolina Press.

Schafale, M. P. and Weakley Alan. (1990). *Classification of the Natural Communities of North Carolina*: Third Approximation. North Carolina Natural Heritage Program, Raleigh, North Carolina.

United States Forest Service, National Forests of North Carolina. (2007)." List of Species of Concern and Species of Interest Plants". National Forests of North Carolina: unpublished.

Appendix 1. Forest Service Endangered (E), Sensitive (S) and Locally Rare (LR) list of plant species on the Uwharrie National Forest, North Carolina (October 2012).

SCIENTIFIC NAME	FOREST SERVICE STATUS (E, S, LR)	COMMON NAME	NATURAL HABITAT IN WHICH SPECIES OCCUR	LIKELIHOOD OF OCCURRENCE AND CONCLUSION
NONVASCULAR				
Scopelophila cataractae	S	Agoyan cataract moss	Prefers copper-rich soils	Habitat not present
Xanthoparmelia monticola	S	A rock-shield lichen	Prefers high elevation rocky summits and mafic glades	Habitat not present
VASCULAR				
Helianthus schweinitzii	**E**	**Schweinitz's sunflower**	**Open forests, woodlands and roadsides**	**Found during surveys**
Amorpha schwerinii	S	Piedmont indigo bush	Southern Piedmont Dry Oak or Oak-Pine Forest	Habitat present, but not found during surveys
Berberis canadensis	S	American barberry	Woodlands & Glades, typically associated with mafic soils	Habitat not present
Carex impressinervia	S	Ravine sedge	Southern Piedmont Alluvial Forest	Habitat not present
Danthonia epilis	S	Bog oat-grass	Seeps around rock outcrops, granitic domes	Habitat not present
Eurybia mirabilis	S	Piedmont aster	Mesic Mixed Hardwood Forest, Piedmont Basic Mesic Forest	Habitat not present
Fothergilla major	**S**	**Large witch alder**	**Southern Piedmont Dry Oak or Oak-Pine Forest**	**Found during surveys**
Lindera subcoriacea	S	Bog spicebush	Hillside Seepage Bog	Habitat not present
Solidago plumosa	S	Yadkin River goldenrod	Riverside mafic rock outcrops	Habitat not present
Symphyotrichum georgianum	S	Georgia aster	Glades, woodlands, savannas and open areas	Habitat present, but not found during surveys
Anemone berlandieri	LR	Southern anemone	Thin circumneutral soil adjacent to rock outcrops	Habitat not present
Baptisia alba var. alba	LR	Thick-pod white wild indigo	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Habitat present, but not found during surveys
Baptisia australis var. *aberrans*	LR	Eastern prairie blue wild indigo	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides. This species has been found over limestone of mafic rock	Habitat not present

			influenced plant communities.	
Cardamine dissecta	LR	Dissected toothwort	Southern Piedmont Alluvial Forest	Habitat not present
Cirsium carolinianum	LR	Carolina thistle	Glades, woodlands, and open areas over mafic rock	Habitat present, but not found during surveys
Collinsonia tuberosa	LR	Piedmont horsebalm	Thin circumneutral soil adjacent to rock outcrops	Habitat not present
Desmodium fernaldii	LR	Fernald's tick-trefoil	Dry to mesic hardwood-pine woodland	Habitat present, but not found during surveys
Dichanthelium boreale	LR	Northern witch grass	Open woods	Habitat present. Surveys for this species will be done in 2013.
Gillenia stipulata	LR	Indian physic	Southern Piedmont Dry Oak or Oak-Pine Forest, typically associated with mafic rock	Habitat not present
Helenium brevifolium	LR	Littleleaf sneezeweed	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Habitat present, but not found during surveys
Helianthus laevigatus	**LR**	**Smooth sunflower**	**Open forests, woodlands and roadsides**	**Found during surveys**
Matelea decipiens	LR	Glade milkvine	Glades and woodlands, over mafic rock	Habitat not present
Parthenium auriculatum	**LR**	**Glade wild quinine**	**Glades, woodlands, and open areas over mafic rock**	**Found during surveys**
Primula meadia	LR	Eastern shooting star	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides over mafic substrates	Habitat not present
Pseudognaphalium helleri	LR	Heller's rabbit tobacco	Glades, woodlands, and open areas over mafic rock	Habitat present, but not found during surveys
Quercus austrina	LR	Bluff oak	River bluff	Habitat not present
Ruellia purshiana	LR	Pursh's wild petunia	Southern Piedmont Dry Oak or Oak-Pine Forest over mafic rock substrates	Habitat not present
Salvia azurea	LR	Azure sage	Longleaf pine-oak woodland	Habitat present, but not found during surveys
Sedum glaucophyllum	LR	Cliff stonecrop	Rock outcrops, glades, typically over calcareous or mafic substrate	Habitat not present
Smilax hugeri	LR	Huger's carrion-flower	Mesic mixed hardwood forest, piedmont basic mesic forest	Habitat present, but not found during surveys
Solidago radula	LR	Western Rough Goldenrod	Glades, woodlands, and open areas over	Habitat not present

			mafic rock	
Stachys sp. 1	LR	Undescribed hedge nettle	Sandy alluvium of Southern Piedmont Alluvial Forest	Habitat not present
Stewartia ovata	LR	Mountain Camellia	Bluffs and Forests,usually with Rhododendron	Habitat not present
Tradescantia virginiana	LR	Virginia spiderwort	Basic Mesic Hardwood Forest, woodlands	Habitat present, but not found during surveys
Tridens chapmanii	LR	Chapman's Redtop	Xeric Pine and Oak Forests, sandy roadsides	Habitat present, but not found during surveys
Trifolium reflexum	LR	Buffalo clover	Open forests, woodlands and roadsides	Habitat present, but not found during surveys
Viola walteri	LR	Prostrate Blue Violet	Mesic Hardwoods	Habitat not present

Appendix G

Terrestrial Animal Resources Report for the Proposed Widening of NC 24/27, January 2013

TERRESTRIAL ANIMAL RESOURCES REPORT

FOR THE

PROPOSED WIDENING OF NC 24/27 FROM EAST

OF THE YADKIN-PEE DEE RIVER TO WEST OF SR 1134 (WADEVILLE ROAD)

UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY

NORTH CAROLINA

TIP # R-2527

WBS ELEMENT 35572.1.1

January 7, 2013

Contact Person:
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I. INTRODUCTION

This report identifies the potential effects on terrestrial animal resources of a proposed road widening of NC 24/27 from east of the Yadkin-Pee Dee River to west of SR 1134 (Wadeville Road). The proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way. The project area is in the Uwharrie Ranger District, Uwharrie National Forest, Montgomery Co., North Carolina. This project is located in the Piedmont III ecoregion, and the Carolina Slate Belt level IV ecoregion (Griffith et al. 2002). Habitat types found in the proposed activity areas include Mixed Pine-Hardwood Forest, Maintained/Disturbed, Timbered Scrub Shrub, and Pine Plantation. The natural communities are described in detail by Schafale and Weakley (1990). The elevation of the study area is approximately 300 to 600 feet above mean sea level.

Approximately 50 acres of USFS land falls within the 500 ft project study corridor. As design is finalized, this acreage will decrease.

II. SPECIES CONSIDERED AND METHODS

The potential effects on USFS Sensitive (S) and Locally Rare (LR) terrestrial animal species are evaluated. Threatened (T) and Endangered (E) terrestrial animal species are evaluated in the Biological Evaluation report. LR species are usually peripheral or disjunct. Potential direct and indirect effects to S and LR animal species were analyzed in the areas where road widening is proposed. This area is referred to as the activity area and is shown in the attached project map (Figure 1 of Biological Evaluation).

Potentially affected terrestrial animal species were identified by:

1) Reviewing the list of S and LR animal species of the Uwharrie National Forest in Montgomery Co. (Appendix 1) and streamlining this list to include only the species that exist within the habitats found at the project site.

2) Consulting element occurrence records of animals as maintained by the North Carolina Natural Heritage Program (NCNHP) using the most up-to-date information in their database (http://nhpweb.enr.state.nc.us/nhis/public/gmap75_main.phtml)(August 10, 2012).

3) Consulting with NCNHP, NC Wildlife Resources Commission, US Fish and Wildlife Service and USFS personnel who are knowledgeable of the area and its flora.

4) Conducting field surveys in areas designated for ground disturbing activities. Surveys were conducted within the Forest Service property that will be impacted by the proposed road widening.

III. TERRESTRIAL ANIMAL RESOURCES:

A. T&E, SENSITIVE, AND LOCALLY RARE SPECIES

The 2011 revised rare terrestrial species list for Montgomery Co. (Appendix 1) includes nine T&E, S, and LR species: two invertebrates (1 S and 1 LR), one amphibian (1 S), one reptile (2 LR), three birds (2 S and 1 E), and one mammal (1 E). This list of animals that could potentially be impacted by the project was substantially reduced and summarized for the following reasons:

1) Lack of suitable habitat for the species in the project area. This may include elevation and/or forest type.
2) The species has a well-known distribution that does not include the project area or has never been recorded in Montgomery Co.
3) Based on field surveys of potential habitat, no habitat was observed in the activity area.
4) Conclusions were also based on personal communication with experts in the field.

Endangered and Threatened Species

A detailed discussion of the T&E terrestrial species is included in the accompanying Biological Evaluation along with the botanical and aquatic species and will not be included in this report. The S and LR terrestrial species are discussed below.

Sensitive Species

Four Forest Service S terrestrial species are listed for the Uwharrie National Forest in Montgomery Co. All four species were ruled out due to lack of suitable habitat, not being observed during surveys, or occurring outside of the project study corridor.

Insects

1. *Cicindela patruela* (Northern barrens tiger beetle), occurs in sandy soil in open pine or pine-oak woods. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

Amphibians

1. *Ambystoma talpoideum* (mole salamander), breeds in fish-free semipermanent woodland ponds and forages in adjacent woodlands. Suitable habitat was observed in the activity area. This species was observed outside of the 500 ft wide project study corridor (approximately 300 ft from NC 24/27). No impacts to this species are anticipated. This species is not further analyzed.

Birds

1. *Haliaeetus leucocephalus* (bald eagle), prefers mature forests near large bodies of water for nesting, and lakes and sounds for nesting sites and regular non-breeding sites. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. *Lanius ludovicia* (loggerhead shrike), prefers fields and pastures during the breeding season only. Suitable habitat was observed in the activity area. This species was not observed during surveys. No impacts to this species are anticipated. This species is not further analyzed.

Locally Rare Species
Three Forest Service LR terrestrial species are listed for the Uwharrie National Forest in Montgomery Co. All three species were ruled out due to lack of suitable habitat or not being observed during surveys.

Insects

1. *Erynnis martialis* (mottled duskywing), occurs in upland woods and wooded edges. The host plant for this species is New Jersey tea (*Ceanothus americanus*). Suitable habitat was observed in the activity area. This species was not observed during surveys. No impacts to this species are anticipated. This species is not further analyzed.

Reptiles

1. *Ophiosaurus attenuatus* (slender glass lizard), prefers old fields, wooded edges, and open woods. Suitable habitat was observed in the activity area. This species was not observed during surveys. No impacts to this species are anticipated. This species is not further analyzed.
2. *Pituophis melanoleucus melanoleucus* (Northern pine snake), prefers dry and sandy woods, mainly in pine/oak sandhills. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

B. TERRESTRIAL SPECIES SURVEYS
Multiple surveys were conducted for Forest Service S and LR species in the activity area in suitable habitat by NCDOT biologists with varying expertise with invertebrates, amphibians, reptiles, birds, and mammals. Qualifications of principle investigators are included in Biological Evaluation report.

Surveys Dates: 5/21/2007-5/22/2007, 6/25/2007-6/27/2007, 8/16/2007, and 3/20/2008.

A list of all terrestrial species detected can be found in Appendix 2. One S species (mole salamander) was found during the site visits. However, this occurrence is outside of the 500 ft wide project study corridor (approximately 300 ft from NC 24/27).

C. COMMUNITIES
Four common community types were found in the proposed activity areas: Dry Oak-Hickory Forest, Maintained/Disturbed, Timbered Scrub/Shrub and Loblolly Pine Plantation. The Dry Oak-Hickory Forest is described in detail by Schafale and Weakley (1990). Of these communities, the Dry Oak-Hickory Forest Community dominates. This community encompasses the Mixed Pine/Hardwood Forest and Mixed Hardwood Forest communities that are described in the Natural Resources Technical Report (NRTR). Plant species found in this community can be found in the NRTR.

IV. POTENTIAL EFFECTS TO ANIMAL SPECIES OF CONCERN AND SPECIES OF INTEREST

There are no known effects or impacts (direct, indirect or cumulative) to any S or LR animal species. This conclusion is supported by the following:

1) Literature review, North Carolina Natural Heritage Program files, site specific surveys and consultation with experts in the field did not reveal the presence of any S or LR species or habitat that is specific to S and LR species.

2) The community types found at the project site are common community types within the Uwharrie National Forest and the habitats found within this proposal have a low potential for S and LR animal species to occur.

V. MITIGATION AND RATIONALE

Since there are no effects to any T & E, S and LR aquatic species, there is no recommended mitigation.

VI. SUMMARY OF EFFECT

The proposed improvements to R-2527 are not likely to adversely affect any S or FC terrestrial species on the USDA Forest Service S and LR list for Montgomery County due to nonoccurrence in the vicinity of the activity area. No mitigation is recommended. The proposed project will not affect any Federally listed or proposed listed aquatic species. Formal consultation with the U.S. Fish and Wildlife Service is not required.

REFERENCES:

Griffith, G.E.,, J.M. Omernik, J.A. Comstock, M.P. Schafale, W.H. McNab, D.R. Lenat, T.F. MacPherson, J.B. Glover, and V.B. Shelburne. 2002. Ecoregions of North Carolina and South Carolina (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

NCDOT. 2007. Mist net surveys for bats at North Carolina Department of Transportation's proposed NC 24/27 road widening (TIP NO. R-2527) in Montgomery County, North Carolina. Unpublished.

Natural Systems report for R-2527. 2004 and 2007. HDR Engineering, Inc. of the Carolinas and the North Carolina Department of Transportation.

Schafale, M. P. and Weakley A., 1990. *Classification of the Natural Communities of North Carolina*: Third Approximation. North Carolina Natural Heritage Program, Raleigh, North Carolina.

Potter, E., Parnell, J., Teulings, P., and Davis, R., 2006, *Birds of the Carolinas, second edition.* University of North Carolina Press.

WORLD WIDE WEB REFERENCES:

North Carolina Natural Heritage Program: http://www.ncnhp.org/

US Fish and Wildlife Service in NC: http://www.fws.gov/nc-es/es/countyfr.html

OTHER SOURCES:

Bat Blitz data from Southeastern Bat Diversity Network (SBDN), 2004

Appendix 1. List of Forest Service Endangered, S, and LR Terrestrial Animal Species for the Uwharrie National Forest (October 2012). *Species that were detected are listed in bold.

SCIENTIFIC NAME	COMMON NAME	STATUS	NHP-LISTED COMMUNITY OR HABITAT AND RECORDS	LIKELIHOOD OF OCCURRENCE AND CONCLUSION
Mammals				
Puma concolor cougar	Eastern cougar	E	Extensive forests and remote areas	This species is extirpated in N.C. and across most of its range.
Birds				
Picoides borealis	Red-cockaded Woodpecker (RCW)	E	Open Pine woods	NHP has a 1994 record for a cavity tree approximately 2.4 mi south of the study corridor. An inactive cavity tree was observed during surveys from March 8, 2006-March 27, 2007. No RCWs were observed during surveys.
Haliaeetus leucocephalus	Bald Eagle	S	Mature forests near large bodies of water	A known bald eagle nest is located approximately 7000 ft southwest of the

			for nesting	project's west terminus. This nest is located outside the boundaries of the Uwharrie National Forest.
Lanius ludovicianus	Loggerhead Shrike	S	fields and pastures	This species has been observed recently in Montgomery County, but was not detected during surveys on May 22, 2007.
Insects				
Cicindela patruela	Northern barrens tiger beetle	S	Occurs in sandy soil in open pine or pine-oak woods	Suitable habitat was not observed for this species.
Erynnis martialis	Mottled duskywing	LR	Occurs in upland woods and wooded edges; host plant-New Jersey tea (Ceanothus americanus)	This species has been observed recently in Montgomery County, but was not detected during surveys.
Amphibians				
Ambystoma talpoideum	**Mole salamander**	**S**	**Breeds in fish-free semipermanent woodland ponds and forages in adjacent woodlands**	**This species was observed during surveys, but this occurrence is outside of the 500 ft project study corridor.**
Reptiles				
Ophiosaurus attentuatus	Slender glass lizard	LR	Prefers old fields, wooded edges, and open woods	This species was not observed during surveys.
Pituophis melanoleucus melanoleucus	Northern pine snake	LR	Prefers dry and sandy woods, mainly in pine/oak sandhills	This species has been observed recently in Montgomery County, but suitable habitat was not observed for this species.

Forest Service Status (FS) is designated by the U.S. Forest Service. Sensitive and locally rare species are protected under provisions of the National Forest Management Act and directions set forth in FS manual 2670.

STATUS CODE	STATUS	DESCRIPTION
E	Endangered	A taxon which is in danger of extinction throughout all or a significant portion of its range
T	Threatened	A taxon which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range
S	Sensitive	Species at risk of extinction in a portion of their range as evidenced by downward trends in population numbers or density, or downward trends in habitat capability.
FC	Forest Concern	Species not at risk of extinction, even in a portion of their range, and not showing a downward population trend over their range as a whole within North Carolina.

Appendix 2: Terrestrial Animal Detections for R-2527
This list represents animal detections during surveys in the activity area and areas immediately adjacent. It is not exhaustive. Other species may exist in the project area.

Insects:

Fawn darner	*Boyeria vinosa*
Ebony jewelwing	*Calopteryx maculata*
Painted lady	*Vanessa cardui*
Summer azure	*Celastrina neglecta*
Eastern tiger swallowtail	*Papillio glaucus*

Birds:

Black vulture	*Coragyps atratus*
Turkey vulture	*Cathartes aura*
Red-shouldered hawk	*Buteo lineatus*
Red-tailed hawk	*Buteo jamaicensis*
Rock pigeon	*Columba livia*
Mourning dove	*Zenaida macroura*
Yellow-billed cuckoo	*Coccyzus americanus*
Great horned owl	*Bubo virginianus*
Whip-poor-will	*Caprimulgus vociferus*
Chimney swift	*Chaetura pelagica*
Ruby-throated hummingbird	*Archilochus colubris*
Red-bellied woodpecker	*Melanerpes carolinus*
Downy woodpecker	*Picoides pubescens*
Pileated woodpecker	*Dryocopus pileatus*
Eastern wood-pewee	*Contopus virens*
Acadian flycatcher	*Empidonax virescens*
Eastern phoebe	*Sayornis phoebe*
Great crested flycatcher	*Myiarchus crinitus*
White-eyed vireo	*Vireo griseus*
Yellow-throated vireo	*Vireo flavifrons*
Red-eyed vireo	*Vireo olivaceus*
Blue jay	*Cyanocitta cristata*
American crow	*Corvus brachyrhynchos*
Fish crow	*Corvus ossifragus*
Carolina chickadee	*Poecile carolinensis*
Tufted titmouse	*Baeolophus bicolor*
White-breasted nuthatch	*Sitta carolinensis*
Brown-headed nuthatch	*Sitta pusilla*
Carolina wren	*Thryothorus ludovicianus*
Blue-gray gnatcatcher	*Polioptila caerulea*

Eastern bluebird	*Sialia sialis*
Wood thrush	*Hylocichla mustelina*
American robin	*Turdus migratorius*
Brown thrasher	*Toxostoma rufum*
European starling	*Sturnus vulgaris*
Northern parula	*Parula americana*
Yellow-throated warbler	*Dendroica dominica*
Pine warbler	*Dendroica pinus*
Prairie warbler	*Dendroica discolor*
Black-and-white warbler	*Mniotilta varia*
Ovenbird	*Seiurus aurocapilla*
Northern waterthrush	*Seiurus noveboracensis*
Common yellowthroat	*Geothlypis trichas*
Hooded warbler	*Wilsonia citrina*
Yellow-breasted chat	*Icteria virens*
Summer tanager	*Piranga rubra*
Scarlet tanager	*Piranga olivacea*
Eastern towhee	*Pipilo erythrophthalmus*
Field sparrow	*Spizella pusilla*
Song sparrow	*Melospiza melodia*
Northern cardinal	*Cardinalis cardinalis*
Indigo bunting	*Passerina cyanea*
Common grackle	*Quiscalus quiscula*
Brown-headed cowbird	*Molothrus ater*
American goldfinch	*Carduelis tristis*

Mammals:

Big brown bat	*Eptesicus fuscus*
Red bat	*Lasiurus borealis*
Evening bat	*Nycticeius humeralis*
Eastern pipistrelle	*Pipistrellus subflavus*
White-tailed deer	*Odocoileus virginianus*

Amphibians and Reptiles:

Upland chorus frog	*Pseudacris feriarum*
Gray treefrog	*Hyla chrysoscelis*
Eastern narrowmouth toad	*Gastrophryne carolinensis*
Three-lined salamander	*Eurycea guttolineata*
Mole salamander	*Ambystoma talpoideum*
Northern dusky salamander	*Desmognathus fuscus*
Eastern box turtle	*Terrapene carolina*

Black rat snake	*Elaphe obsoleta*
Black racer	*Coluber constrictor*

Appendix 2: Terrestrial Animal Detections for R-2527
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Brown-headed nuthatch	*Sitta pusilla*
Carolina wren	*Thryothorus ludovicianus*
Blue-gray gnatcatcher	*Polioptila caerulea*
Eastern bluebird	*Sialia sialis*
Wood thrush	*Hylocichla mustelina*
American robin	*Turdus migratorius*
Brown thrasher	*Toxostoma rufum*
European starling	*Sturnus vulgaris*
Northern parula	*Parula americana*
Yellow-throated warbler	*Dendroica dominica*

Pine warbler	*Dendroica pinus*
Prairie warbler	*Dendroica discolor*
Black-and-white warbler	*Mniotilta varia*
Ovenbird	*Seiurus aurocapilla*
Northern waterthrush	*Seiurus noveboracensis*
Common yellowthroat	*Geothlypis trichas*
Hooded warbler	*Wilsonia citrina*
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Summer tanager	*Piranga rubra*
Scarlet tanager	*Piranga olivacea*
Eastern towhee	*Pipilo erythrophthalmus*
Field sparrow	*Spizella pusilla*
Song sparrow	*Melospiza melodia*
Northern cardinal	*Cardinalis cardinalis*
Indigo bunting	*Passerina cyanea*
Common grackle	*Quiscalus quiscula*
Brown-headed cowbird	*Molothrus ater*
American goldfinch	*Carduelis tristis*

Mammals:

Big brown bat	*Eptesicus fuscus*
Red bat	*Lasiurus borealis*
Evening bat	*Nycticeius humeralis*
Eastern pipistrelle	*Pipistrellus subflavus*
White-tailed deer	*Odocoileus virginianus*

Amphibians and Reptiles:

Upland chorus frog	*Pseudacris feriarum*
Gray treefrog	*Hyla chrysoscelis*
Eastern narrowmouth toad	*Gastrophryne carolinensis*
Three-lined salamander	*Eurycea guttolineata*
Mole salamander	*Ambystoma talpoideum*
Northern dusky salamander	*Desmognathus fuscus*
Eastern box turtle	*Terrapene carolina*
Black rat snake	*Elaphe obsoleta*
Black racer	*Coluber constrictor*

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh ES Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

April 19, 2019

Jeff Hemphill
North Carolina Department of Transportation
Environmental Analysis Unit
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Hemphill:

This letter is in response to your email of April 11, 2019 which provided the U.S. Fish and Wildlife Service (Service) with the biological conclusion of the North Carolina Department of Transportation that the proposed widening of NC 24/27 from NC 73 to the Troy Bypass in Montgomery County (STIP No. R-2527) may affect, but is not likely to adversely affect the federally endangered Schweinitz's sunflower (*Helianthus schweinitzii*). The following response is provided in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543).

According to information provided, the project area has been surveyed multiple times for Schweinitz's sunflower, with the most recent survey being October 18, 2017. No Schweinitz's sunflowers were observed. Based on the survey results and other available information, the Service concurs with your conclusion that the proposed action may affect, but is not likely to adversely affect Schweinitz's sunflower. We believe that the requirements of Section 7(a)(2) of the ESA have been satisfied. We remind you that obligations under Section 7 consultation must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered in this review; (2) this action is subsequently modified in a manner that was not considered in this review; or (3) a new species is listed or critical habitat determined that may be affected by this identified action.

The Service appreciates the opportunity to review this project. If you have any questions regarding our response, please contact Mr. Gary Jordan at (919) 856-4520 (Ext. 32).

Sincerely,

Gary Jordan

for Pete Benjamin
Field Supervisor

Electronic copy:

Andy Williams, USACE, Wake Forest, NC

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh ES Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726
December 12, 2023

Jeffrey Hemphill
NC Department of Transportation
Environmental Analysis Unit
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Hemphill:

This letter is in response to your letter of December 11, 2023, which provided the U.S. Fish and Wildlife Service (Service) with the biological conclusion of the North Carolina Department of Transportation that the proposed widening of NC 24/27 from NC 73 to the Troy Bypass in Montgomery County (STIP No. R-2527) may affect, but is not likely to adversely affect the federally threatened Atlantic Pigtoe (*Fusconaia masoni*) and proposed threatened Green Floater (*Lasmigona subvirdis*). The proposed endangered Tricolored Bat (*Perimyotis subflavus*) has previously been addressed through a Programmatic Conference Opinion issued on November 20, 2023. The following response is provided in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543).

According to information provided, mussel surveys were conducted at 15 stream crossings along NC 24/27 during April and May 2023. Surveys extended 100 meters upstream and 400 meters downstream of NC 24/27. No live mussels of any species were observed. Based on survey results and other available information, the Service concurs with your conclusion that the proposed action may affect, but is not likely to adversely affect the Atlantic Pigtoe and Green Floater. We believe that the requirements of Section 7(a)(2) of the ESA have been satisfied. We remind you that obligations under Section 7 consultation must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered in this review; (2) this action is subsequently modified in a manner that was not considered in this review; or (3) a new species is listed or critical habitat determined that may be affected by this identified action. If you have any questions regarding our response, please contact Mr. Gary Jordan at gary_jordan@fws.gov .

Sincerely,

for Pete Benjamin
Field Supervisor

Electronic copy:

Monte Matthews, USACE, Wake Forest, NC
Travis Wilson, NCWRC, Creedmoor, NC
Art King, NCDOT, Carthage, NC

Archaeology

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

December 20, 2018

MEMORANDUM

TO: Matt Wilkerson
Office of Human Environment
NCDOT Division of Highways

FROM: Ramona M. Bartos RMB for Ramona M. Bartos

SUBJECT: Memorandum of Agreement for R-2530, B-4974, and R-2527,
Stanly and Montgomery Counties, ER 04-0086, CH07-0295 & ER 02-7546

Thank you for your December 13, 2018, letter transmitting the Memorandum of Agreement for the above-referenced undertaking(s) that will adversely affect six archaeological sites that have been determined eligible for listing in the National Register of Historic Places. Dr. Kevin Cherry, State Historic Preservation Officer, has signed the agreement, which we return for execution and filing with the Advisory Council on Historic Preservation. We look forward to receipt of a fully executed copy for our records and to implementation of the mitigation measured outline in the agreement.

The above comments are made pursuant to Section 106 and 110 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Attached: MOA

cc: Felix Davila, FHWA, Felix.Davila@dot.gov

MEMORANDUM OF AGREEMENT
AMONG THE
FEDERAL HIGHWAY ADMINISTRATION,
THE UNITED STATES FOREST SERVICE,
THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION,
THE CATAWBA INDIAN NATION,
AND
NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICER
FOR THE
IMPROVEMENTS TO NC 24/NC 27 FROM NC 740 IN ALBEMARLE TO THE PROPOSED TROY BYPASS,
STANLY & MONTGOMERY COUNTIES, NORTH CAROLINA,
TIP NOS. R-2530B, B-4974, & R-2527,
FEDERAL AID NO. STBG-0024(083) R-2530B

WHEREAS, the Federal Highway Administration (FHWA) has determined that the proposed improvements to NC 24/27 from NC 740 in Albemarle to the proposed Troy Bypass (the Undertaking) will have an adverse effect upon archaeological sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204** which have been determined eligible for the National Register of Historic Places (NRHP) under Criterion D; and

WHEREAS, the FHWA has consulted with the North Carolina State Historic Preservation Officer (SHPO), pursuant to 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f); and

WHEREAS, the FHWA has notified the Advisory Council on Historic Preservation (Council) of the adverse effect to archaeological sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204** and it has declined to comment or participate in the consultation; and

WHEREAS, the North Carolina Department of Transportation (NCDOT)has participated in the consultation and has been invited by the FHWA to be a signatory to this Memorandum of Agreement (MOA); and

Whereas the Catawba Indian Nation and the United States Forest Service (USFS) have been notified of the adverse effects and invited to participate in the consultation and concur in this MOA; and

WHEREAS, the consulting parties agree that the recovery of significant information from archaeological sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204** may be done in accordance with the published guidance; and

WHEREAS, the consulting parties agree that it is in the public interest to expend funds for the recovery of significant information from archaeological sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204** to mitigate the adverse effects of the project; and

WHEREAS, to the best of our knowledge and belief, no human remains, associated or unassociated funerary objects or sacred objects, or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001), are expected to be encountered in the archaeological work;

NOW, THEREFORE, the FHWA, NCDOT, and the SHPO agree that the Undertaking shall be implemented in accordance with the following stipulations in compliance with the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470).

I. Stipulations

1. The NCDOT, in consultation with the SHPO, USFS, and the Catawba Indian Nation, will develop Data Recovery Plans (DRPs) for archaeological sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204** which will be affected by the subject project.
2. The NCDOT will ensure that the DRPs will be implemented after Right-of-Way is acquired and prior to construction activities within the site location as shown in the DRPs.
3. Upon completion of the Data Recovery efforts, the NCDOT will prepare and forward a Management Summary to the SHPO, USFS, and the Catawba Indian Nation detailing the results of the Data Recovery field investigations. The Management Summary will contain sufficient information to demonstrate that the field investigation portion of the DRP has been implemented.
4. Upon receipt of the Management Summary, the SHPO, USFS, and the Catawba Indian Nation will respond within ten (10) days to the recommendations contained within the document.
5. Upon acceptance of the recommendations contained in the Management Summary, the SHPO, USFS, and the Catawba Indian Nation will issue the NCDOT documentation that the Data Recovery field investigations have been completed.
6. The analysis and report preparation, detailing archaeological work conducted at sites 31MG1806, 31MG1629, 31MG321, and the archaeological district composed of sites 31ST195, 31ST196, and 31ST204/204**, will be completed by the NCDOT, or their consultants, within eighteen (18) months after completion of the fieldwork.

II. Unanticipated Discovery

In accordance with 36 CFR 800.11(a), if NCDOT identifies additional cultural resource(s) during construction and determine them to be eligible for the NRHP, all work will be halted within the limits of the NRHP-eligible resource(s) and the FHWA and SHPO contacted. If after consultation with the Signatory and Concurring Party additional mitigation is determined necessary, the NCDOT, in consultation with the Signatory and Concurring Party, will develop and implement appropriate protection/mitigation measures for the resource(s). Inadvertent or accidental discovery of human remains will be handled in accordance with North Carolina General Statutes 65 and 70.

III. Dispute Resolution

Should any Signatory object within (30) days to any plans or documentation provided for review pursuant to this Agreement, the FHWA shall consult with the objecting party(ies) to resolve the objection. If the FHWA or objecting party(ies) determines that the objection cannot be resolved,

the FHWA will forward all documentation relevant to the dispute to the Advisory Council on Historic Preservation (Council). Within thirty (30) days after receipt of all pertinent documentation, the Council will either:

A. Provide the FHWA with recommendations, which the FHWA will take into account in reaching a final decision regarding the dispute, or
B. Notify the FHWA that it will comment pursuant to 36 CFR Section 800.7(c) and proceed to comment. Any Council comment provided in response to such a request will be taken into account by the FHWA, in accordance with 36 CFR Section 800.7 (c) (4) with reference to the subject of the dispute.

Any recommendation or comment provided by the Council will be understood to pertain only to the subject of the dispute; the FHWA's responsibility to carry out all of the actions under this agreement that are not the subject of the dispute will remain unchanged.

IV. Amendments

If any Signatory to this MOA believes that its terms cannot be carried out, or that an amendment to the terms must be made, that party(ies) shall immediately consult with the other party(ies) to develop amendments in accordance with 36 CFR 800.6(c)(7). If an amendment cannot be agreed upon, the dispute resolution process set forth in Section III will be followed.

V. Termination

Any Signatory to this MOA may terminate the agreement by providing notice to the other party(ies), provided that the party(ies) will consult during the period prior to termination to seek agreement on amendments or other actions that would avoid termination. Termination of this MOA will require compliance with 36 CFR 800. This MOA may be terminated by the execution of a subsequent MOA that explicitly terminates or supersedes its terms.

VI. Duration

Unless terminated as detailed above, this MOA will be in effect until FHWA, in consultation with the other Signatories, determines that all terms have satisfactorily been fulfilled or if NCDOT is unable or decides not to construct the Undertaking.

Execution of this Memorandum of Agreement by the FHWA and the North Carolina SHPO, its subsequent filing with the Council and implementation of its terms evidence that FHWA, has afforded the Council an opportunity to comment on the Undertaking, and that the FHWA, has taken into account the effects of the Undertaking on the aforementioned archaeological sites.

MEMORANDUM OF AGREEMENT
AMONG THE
FEDERAL HIGHWAY ADMINISTRATION,
THE UNITED STATES FOREST SERVICE,
THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION,
THE CATAWBA INDIAN NATION,
AND
NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICER
FOR THE
IMPROVEMENTS TO NC 24/NC 27 FROM NC 740 IN ALBEMARLE TO THE PROPOSED TROY BYPASS,
STANLY & MONTGOMERY COUNTIES, NORTH CAROLINA,
TIP NOS. R-2530B, B-4974, & R-2527,
FEDERAL AID NO. STBG-0024(083) R-2530B

Execution of this Memorandum of Agreement by the FHWA and the North Carolina SHPO, its subsequent filing with the Council and implementation of its terms evidence that FHWA, has afforded the Council an opportunity to comment on the Undertaking, and that the FHWA, has taken into account the effects of the Undertaking upon archaeological site 31WA1997/1997.

FILED:

By: _____ Date: _____
Advisory Council on Historic Preservation

AGREE:

By: _____ Date: 12/13/18
Federal Highway Administration

By: _____ Date: 12/19/18
North Carolina State Historic Preservation Officer

By: _____ Date: 12/13/2018
North Carolina Department of Transportation

CONCUR:

By: _____ Date: _____
United States Forest Service

By: _____ Date: _____
Catawba Indian Nation

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

April 19, 2023

Joel Hardison
Forest Archaeologist/Tribal Liaison
Forest Service
National Forests in North Carolina
160 Zillicoa Street, Suite A
Asheville, North Carolina 28801

Dear Mr. Hardison,

Subject: R-2527 Addendum, Proposed Expansion of the Wood Run Trail Parking Lot, Montgomery County, North Carolina.

This letter is intended to serve as an addendum to the 2008 *Intensive Archaeological Survey and Evaluation (Phase I and II) for Widening of NC 24/27/73 from West of the Pee Dee River Bridge to West of Troy* archaeological report (R-2527). The referenced report covers the intensive archaeological investigations and site evaluations associated with the North Carolina Department of Transportation's (NCDOT) proposal to improve NC 24/27, including widening the facility from a three-lane highway with shoulder facilities to a four-lane divided facility with a 46-foot depressed grass median and 10-foot outside shoulders. To accommodate the range of alternative designs under consideration early in the process, the main corridor for the project included a 500-foot (152-meter) wide corridor along the length of the 5.5-mile (8.8-kilometer) length of the project in addition to smaller segments centered on intersections along this stretch of road. This 500-foot wide study area was considered to be the archaeological area of potential effects (APE) for the survey and evaluation efforts. The referenced report outlined the results of the archaeological survey and evaluation and was accepted in the letter from your office dated March 4, 2010 (file code 2360/2730-2).

As a part of the proposed widening and improvements to NC 24/27 west of Troy, NCDOT intends to expand and improve the parking lot at the Wood Run Trail Head, north of the highway in the Uwharrie National Forest (Figure 1). Although impacts to the walking trail are anticipated to be minimal, construction of the parking lot will require a portion of the Uwharrie Recreational Walking Trail to be realigned (Figures 2 and 3). It is also anticipated that additional easements for construction will be required that extend

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ENVIRONMENTAL ANALYSIS UNIT
1598 MAIL SERVICE CENTER
RALEIGH, NC 27699-1598

Telephone 919-707-6000
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Customer Service: 1-877-368-4968

Website: www.ncdot.gov

Location:
1000 BIRCH RIDGE DRIVE
RALEIGH, NC 27610

northwards, beyond the 250-foot buffer that had been examined as part of the original R-2527 survey (Figure 4). Thus, for the purposes of archaeological considerations, an additional area of potential effects, hereafter referred to as the Wood Run Parking Lot APE, was established for the portions of the project that extended outside the 2008 R-2527 APE. This addendum APE encompasses approximately .6 acre (slightly over .24 hectare).

The Jorgenson et al. (2008) report on the R-2527 archaeological investigations included investigations at 55 archaeological sites within the roughly 719-acre (291-hectare) study area associated within the APE as defined at the time. This included 44 newly identified archaeological sites and 11 previously recorded archaeological resources. Additionally, the report authors conducted a reasonably extensive background report for the project vicinity. Among the noteworthy resources recognized within the 2008 APE, and for our purposes, in the vicinity of the Wood Run Trail Head parking lot, is the location of the former community and county seat of Lawrenceville as well as the associated features (such as the reported adjacent plank road remnants). Cultural remains associated with Lawrenceville, plank road remnant elements, historic structural remains that post-date Lawrenceville, and a few archaeological sites have been identified within a .5-mile radius of the Wood Run Parking Lot APE.

While a much more complete cultural history (prehistory and history) of the Piedmont region of North Carolina and Montgomery County, in particular, are recounted in the full R-2527 report (Jorgenson et al. 2007, pp. 7-26), it is worth summarizing and briefly updating in the Lawrenceville vicinity here. Portions of this updated material are derived from the 2007 report by Ken Robinson entitled, *The Lost Town of Lawrenceville, Montgomery County, North Carolina: A Short History and Archaeological Observations*, which was excerpted as an appendix to a vegetative management plan produced for the Land Trust for Central North Carolina (Mascia 2009, Appendix B).

The early history of Montgomery County involved the frequent relocation of the county seat, until it was established at Lawrenceville by 1817, at the behest of the state legislature, near the then geographic center of the county (cf. Corbitt 1950: 152). The town was laid out in a grid that covered roughly 50 acres surrounding the courthouse location. Several prominent families in the county purchased lots in the town, although undoubtedly some lots remained unimproved. Over the decades Lawrenceville served as the county seat, the town could boast of 400-500 residents, the courthouse, a post office, the Lawrenceville Academy, and the county poorhouse.

But, shortly after the portion of the county west of the Pee Dee River became Stanly County in 1841 (Corbitt 1950: 195), the county seat was relocated farther east to its current location at Troy. Shortly after the county seat was officially relocated the courthouse in Lawrenceville, along with many of the county records, was destroyed through arson. Following the relocation of the county seat, the community at Lawrenceville began to diminish. By 1930, soil mapping for the county only depicts one structure in the area and doesn't bother to label the "town".

By 1998, the property encompassing the former location of Lawrenceville and all the extant traces of the community had been acquired by the Three Rivers Land Trust, a non-

profit organization dedicated to conserving natural and cultural resources in rural areas of the Carolina Piedmont and Sandhills. In 2013, the Three Rivers Land Trust transferred the 112-acre property encompassing the Lawrenceville location to the United States Forest Service (Three Rivers Land Trust 2013).

Only one structure in the Lawrenceville vicinity survived into the 21st Century. The 2007 and 2009 archaeological surveys both noted the presence of the Thompson Farmstead (MG0151), a circa 1910, one- and a half-story pyramidal roof, frame Craftsman bungalow with board and batten siding. The North Carolina State Historic Preservation Office (SHPO) considered the National Register of Historic Places (NRHP) eligibility to be questionable and by 2017 the structure had been burned (presumably by the United States Forest Service as noted in SHPO GIS records).

As noted above, a number of cultural resources, in addition to the Thompson Farmstead, have been recorded in the vicinity of Lawrenceville (Figure 5). Several of the archaeological sites that have been recorded in this area have been identified as exhibiting prehistoric assemblages (i.e., 31MG121, 31MG370-374, 31MG1805, etc.). A few sites recorded or revisited in 2007 may have been associated with the historic occupation of the Lawrenceville community. Closest to the Wood Run Parking Lot APE, but outside it, is site 31MG382. This site was originally recorded in 1978 as a scatter of non-diagnostic lithic artifacts. But in 2007 (Jorgenson et al. 2008, pp 80-82), in addition to a collection of more metavolcanic debitage, a single whiteware plate fragment was recovered. While the ceramic artifact added a historic component to the site, nothing in the assemblage suggested to the report authors archaeological significance.

Site 31MG1800, identified farther to the southeast and closer to the presumed core of the Lawrenceville community, did produce a small assemblage of metavolcanic lithics, but also a handful of historic ceramics that align more closely with the dates of historic Lawrenceville (Jorgenson et al 2008: pp 82-84). This small historic assemblage consisted of "one undecorated creamware sherd (A.D. 1762-1810), six pearlware sherds (four painted and two undecorated, A.D. 1775-1830), and one painted whiteware sherd (A.D. 1830-1890)". The report authors considered the site to be potentially associated with the Lawrenceville community but determined that the small assembled was recovered from an archaeological context that lacked integrity and clarity that would allow for additional information to be gleaned about the historic occupation of the site. The proximity of this site to the transportation feature noted on USFS signage as the remnant of a plank road was noted in the report as well (Figures 6 and 7).

Farther to the south and southeast, on the opposite side of NC 24/27, site 31MG1801 was identified within the 2007 study corridor (Jorgenson et al. 2008: pp 84-86). Much like similar sites to the northwest, this site exhibited a combination of prehistoric lithic and historic assemblages. Where 31MG1801 differs from its neighbors is in the number and character of the historic assemblage. Examples of ceramic wares in the assemblage included: painted and undecorated creamware (1762-1820); embossed edge, shell edged, painted, and undecorated pearlware (1775-1840); lead-glazed redware; undecorated white granite (1842-1930); and print decorated whiteware (1820-1900). In addition to these wares an unidentified iron nail and glass fragments (mold blown and window) were recovered. Despite the increased variety of artifacts represented in the historic

assemblage, Jorgenson et al. felt the site still lacked the integrity and clarity required for NRHP eligibility.

As noted above, none of the archaeological resources identified in the vicinity of Lawrenceville, or the Wood Run Parking Lot APE, were considered to be eligible for the NRHP under their own individual merits. Artifact assemblages were interpreted as mixed (possibly from historic-period plowing activities) and relatively dense. No cultural features, above or below ground were observed in association with the recorded artifact assemblages.

But surface features in the vicinity of the presumed Lawrenceville location have been observed. Ken Robinson's archaeological assessment of the Lawrenceville vicinity resulted in his reporting of "at least ten chimneys and fireplaces (chimney piles)" (Mascia 2009: Appendix B). Following the intensive archaeological survey of the Wood Run Parking Lot APE as outlined below, a reconnaissance examination of the Lawrenceville vicinity and the former location of the Thompson Farmstead revealed numerous chimney piles as observed by Robinson. All of these resources are located well outside the area expected to be impacted by the Parking Lot expansion (Figure 8).

An examination of the United States Department of Agriculture, Natural Resources Conservation Service (NRCS) Web Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm) reveals the following soil types within the proposed APE for the Wood Run Parking Lot: Badin-Tarrus complex, 2 to 8 percent slopes (BdB); and Georgeville silt loam, 8 to 15 percent slopes, very stony (GgC). Based on this soil mapping, QL2 LiDAR-derived topographic mapping, and the 2007 archaeological reporting on the vicinity (Jorgenson et al.: pp 80-84). The A-E-B soil sequence typical of Piedmont woodlands was anticipated with soils derived from metavolcanic bedrock geology. In general, and despite the USDA soil type descriptions, topographic mapping suggested slopes that might not be too steep in areas for moderate potential for archaeological resources.

This information was conveyed to both the NCDOT project engineers and to the Office of State Archaeology reviewer for Montgomery County. The NCDOT Project Management Unit submitted a request for comment from SHPO and OSA on December 15, 2022 (ER 02-7546). In a letter dated to January 18, 2023, NCDOT received a response from the Deputy State Historic Preservation Officer that stated that those entities were "aware of no historic resources which would be affected by the project in the extended study area" and that they "have no comment on the extended project study area as proposed". This response was transmitted via email to Nichole Wagner and Joel Hardison at USFS on January 18, 2023. On January 25, 2023 a response from Allyson Conner, the USFS liaison to NCDOT, was received via email stating that archaeological surveys would still be necessary for the Wood Run Parking Lot expansion "due to the proximity of the Lawrenceville tract, and the boundaries of the Lawrenceville tract not being fully known".

On February 23, 2023, NCDOT archaeologists, Brian Overton and Shane Petersen, initiated archaeological investigations of the Wood Run Parking Lot APE (Figures 9-13). A single transect of four shovel test pits on a 30-meter interval was proposed roughly

through the center of the APE. Of these four proposed subsurface tests, only two were excavated due to the slopes, past logging disturbances, and erosional gullies observed within the Wood Run Parking Lot APE.

Table: Subsurface Testing Results.

Shovel Test Pit	Level	Depth (top)	Depth (base)	Munsell	Color	Soil Texture	Artifacts	Notes
1	1	0	7	10YR5/4	yellowish brown	silt loam	no	Topped by 7cm humic layer
	2	7	15	7.5YR6/8	reddish yellow	clay loam	no	
	3	15	27	5YR5/8	yellowish red	clay	no	
2	1	0	10	10YR5/4	yellowish brown	silt loam	no	STP offset to the NE to avoid tree tip-up disturbances.
	2	10	41	10YR6/6	brownish yellow	silt clay loam	no	
	3	41	55	10YR7/8	yellow	clay loam	no	
3	na	na	na	na	na	na	na	no dig
4	na	na	na	na	na	na	na	no dig

As expected, below varying amounts of decaying organic material, a general A-E-B soil profile was observed on a ridge slope that pitched towards the north, where an intermittent drainage is located. The two excavated subsurface tests were located on small "benches" in an otherwise more sloped landform (including a shift of STP No. 2 to the north several meters) that was expected based on the LiDAR terrain map. An attempt to shift STP No. 4 farther to the west and north to avoid erosional gullies and disturbances was to no avail.

Despite the relatively high density of archaeological and cultural features in the vicinity of the Wood Run Parking Lot APE, no evidence was observed through surface and subsurface investigation of the potentially impacted areas that had not been previously investigated in 2007. Based on observations made in the field and previous archaeological and historic research conducted in the vicinity, the current project is not anticipated to impact any NRHP-eligible archaeological resources through the expansion of the Wood Run Trail Parking Lot. No further archaeological investigations are recommended in association with this project as currently defined. Should the project expand beyond the areas that have been subjected to intensive archaeological investigation, further consultation regarding the possibility of additional work is suggested.

We look forward to your response to our conclusions regarding this project. Copies of this documentation are also being provided to the Catawba Indian Nation and the North Carolina Office of State Archaeology. If you have specific questions regarding the proposed project, please contact Mr. Shane Petersen at 919-707-6083 or by email at

scpetersen@ncdot.gov or Mr. Matt Wilkerson at 919-707-6089 or by email at mtwilkerson@ncdot.gov.

Sincerely,

Shane C. Petersen
Archaeologist II
Environmental Analysis Unit

SCP/MTW

Enclosures (cover letter; USDA soil mapping)

cc Matt Wilkerson, NCDOT (mtwilkerson@ncdot.gov)
Allyson Conner, USFS (allyson.conner@usda.gov)
Nichole Wagner, USFS (nichole.wagner@usda.gov)
Wenonah Haire, Catawba Indian Nation
Rosie Blewitt, NC OSA (rosemarie.blewitt@ncdcr.gov)
Allison White, NCDOT (akwhite@ncdot.gov)

References Cited:

Corbitt, D. L.
1950 *The Formation of the North Carolina Counties 1663-1943.*Division of Archives and History, North Carolina Department of Cultural Resources, Raleigh.

Jorgenson, M., M. Brown, and D. F. Cassedy
2008 *Intensive Archaeological Survey and Evaluation (Phase I and II) for Widening of NC 24/27/73 from West of the Pee Dee River Bridge to West of Troy, Montgomery County, North Carolina.* Ms. on file, Environmental Analysis Unit, North Carolina Department of Transportation, Raleigh.

Mascia, T. J.
2009 *Restoring Historic Vegetation at Historic Lawrenceville, North Carolina: Comprehensive Management Plan Prepared for the Land Trust for Central N.C.* Master's project, Duke University. Retrieved from https://hdl.handle.net/10161/1044 on February 8, 2023.

Three Rivers Land Trust
2013 Historic Lawrenceville Property. Electronic document, https://threeriverslandtrust.org/2013/historic-lawrenceville-property/, accessed March 28, 2023.

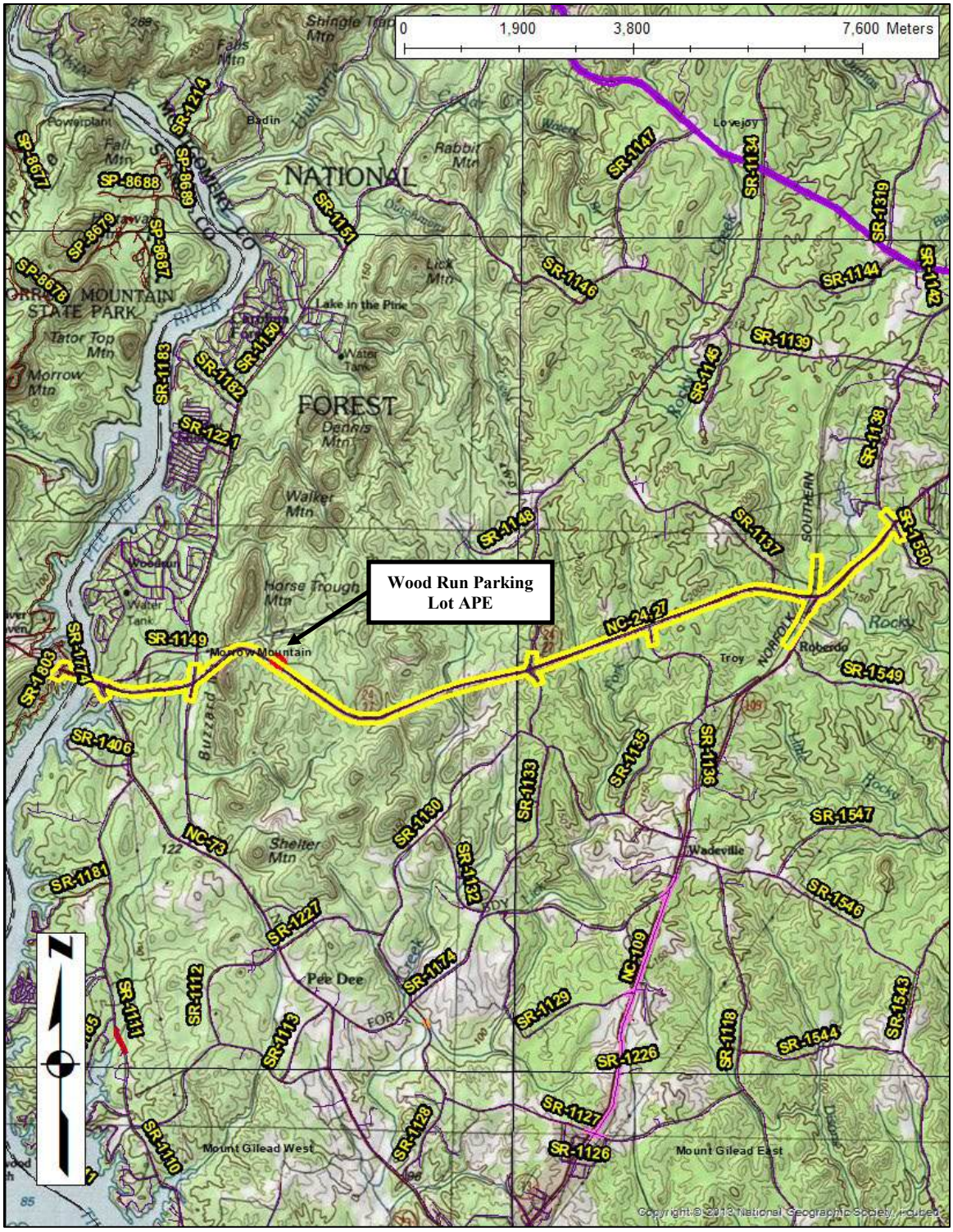


Figure 1: Detail of the USGS Badin, Lovejoy, Morrow Mountain, Roberdo, Mount Gilead West, and Mount Gilead East quadrangles illustrating the location of the R-2527 project area (yellow lines) and the Wood Run Parking Lot APE (red lines).

Figure 2: NCDOT Visualization Team conception of the improved parking area at the Wood Run Trail Head and a portion of the improved NC 24/27 corridor.

Figure 3: Photograph of the existing parking area at the Wood Run Trail Head, from the entrance facing west.

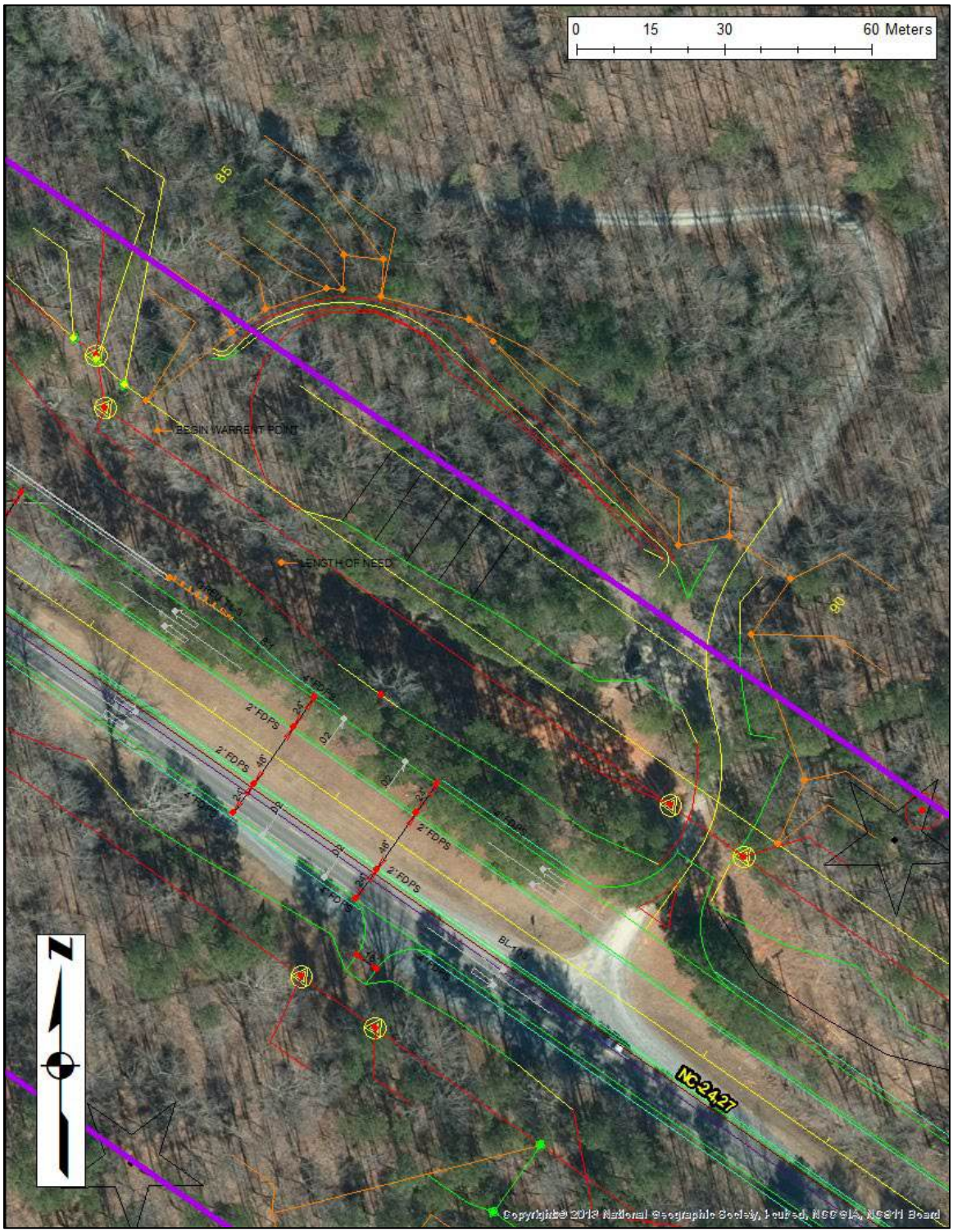


Figure 4: Aerial photograph of the Wood Run Trail Head area illustrating a portion of the proposed design drawings associated with the parking lot improvements; note the limits of the original survey area (archaeological APE) denoted by purple lines.

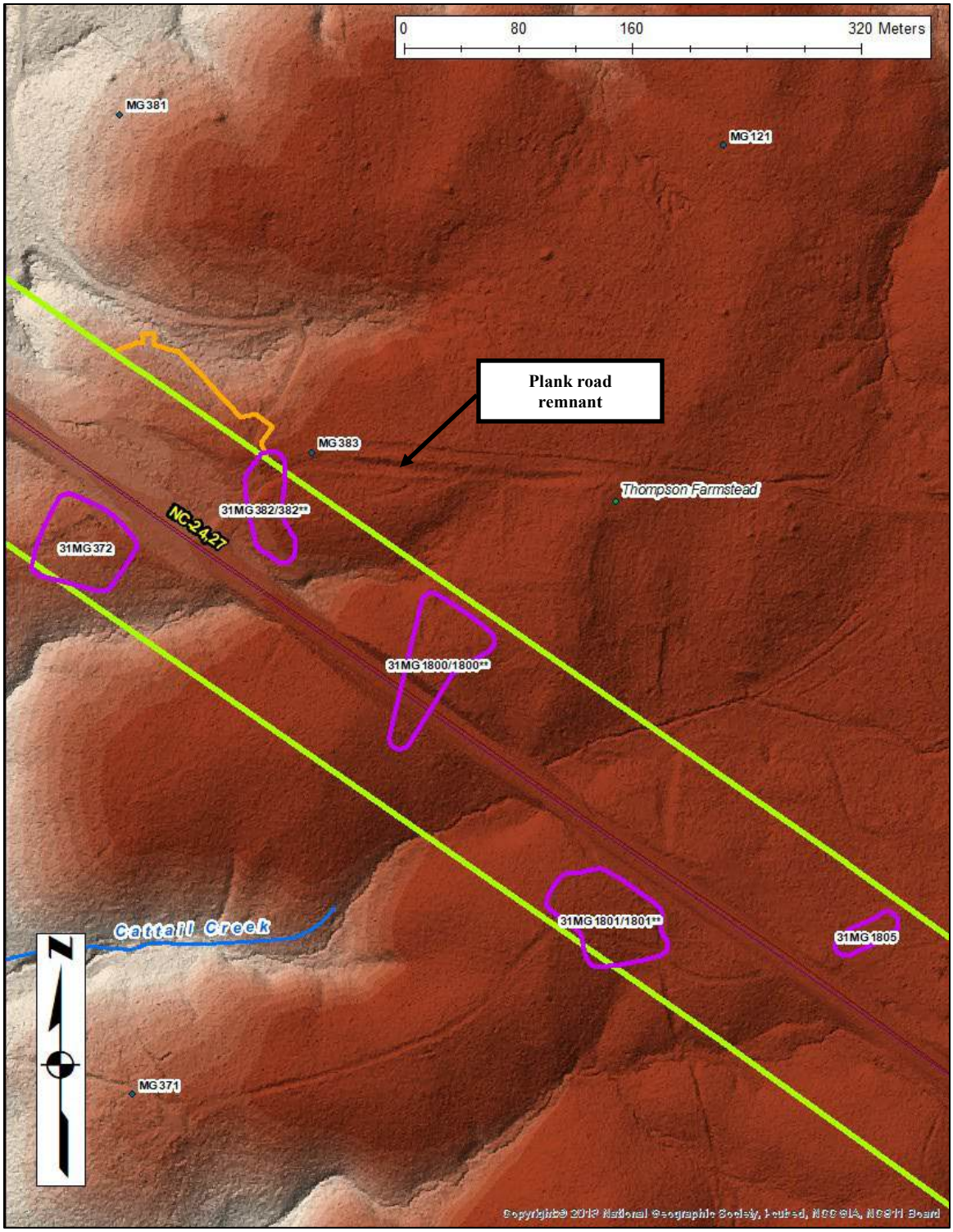


Figure 5: QL2 Lidar bare-earth terrain map illustrating the locations of the Wood Run Parking Lot APE (orange lines), the R-2527 study area (light green lines), archaeological sites identified by the 2007 R-2527 archaeological survey (purple lines), and other sites on file at the Office of State Archaeology (green dots).

Figure 6: Photograph of the general location of 31MG1800 near the proposed ROW limits (facing east).

Figure 7: Photograph of the trail leading into the Lawrenceville location near the plank road remnant (facing east).

Figure 8: Photograph of the general vicinity of Lawrenceville near the former location of the Thompson Farmstead (facing northeast).

Figure 9: Photograph of trail leading westwards from the western end of the extant parking lot near the edge of the proposed NC 24/27 widening APE.

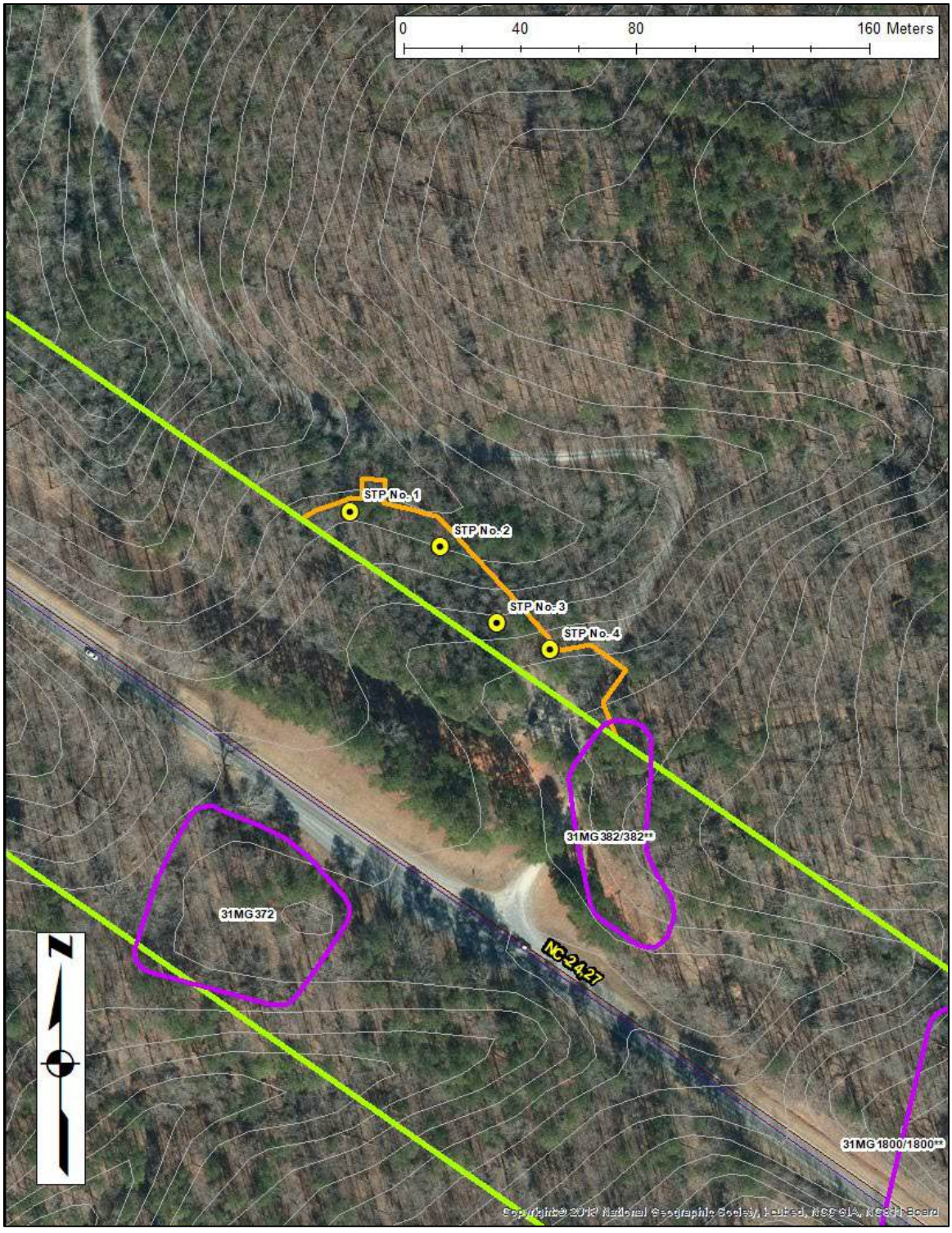


Figure 10: Aerial photograph with 2-foot contours depicting GPS-recorded shovel test pit locations (yellow dots) within the Wood Run Parking Lot APE (orange lines) and roughly parallel to the R-2527 APE (green lines); note the recorded site limits of 31MG372, 31MG382, and 31MG1800.

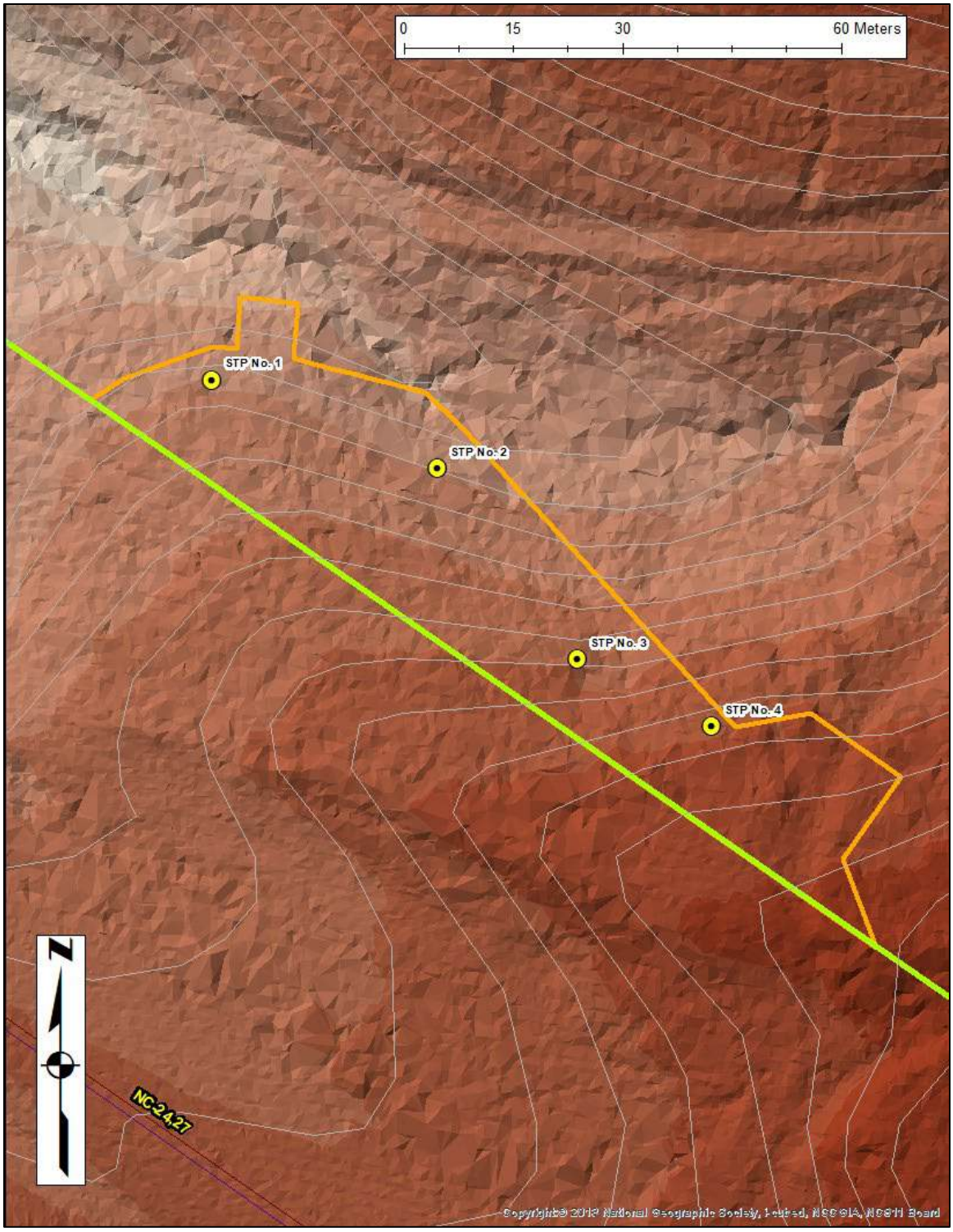


Figure 11: QL2 Lidar bare-earth terrain map with 2-foot contour lines illustrating the topography in the vicinity of the Wood Run Parking Lot APE (orange lines) and the R-2527 archaeological study area (light green lines); note the location of shovel test pits recorded via GPS.

Figure 12: Photograph of the Wood Run Parking Lot APE near STP No. 4 facing west.

Figure 13: Photograph of the extant Wood Run Parking Lot near the southeast corner of the proposed APE for the parking lot expansion outside the R-2527 APE (facing northwest).

Soil Map—Montgomery County, North Carolina
(R-2527 Addendum APE)

Map Scale: 1:748 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 10 20 40 60

Feet
0 35 70 140 210

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Montgomery County, North Carolina
Survey Area Data: Version 23, Sep 12, 2022

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

Date(s) aerial images were photographed: Mar 13, 2022—May 9, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BdB	Badin-Tarrus complex, 2 to 8 percent slopes	0.2	28.0%
GgC	Georgeville silt loam, 8 to 15 percent slopes, very stony	0.4	72.0%
Totals for Area of Interest		**0.6**	**100.0%**

Historic Architecture and Landscapes

North Carolina Department of Natural and Cultural Resources
State Historic Preservation Office
Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary D. Reid Wilson

Office of Archives and History
Deputy Secretary, Darin J. Waters, Ph.D.

August 16, 2023

MEMORANDUM

TO: Allison K. White akwhite@ncdot.gov
Project Management Unit
NC Department of Transportation

FROM: Ramona M. Bartos, Deputy
State Historic Preservation Officer RSL for Ramona M. Bartos

SUBJECT: NC 24-27, PeeDee River Bridge to Troy Bypass, R-2527, Montgomery, Stanly, ER 02-7546

Thank you for your July 25, 2023, email concerning the above-referenced undertaking. We understand that the US Forest Service has raised the question as to the National Register eligibility of the subject bridge that will be removed as part of the project. Based on the information provided, we do not find the bridge to be historic in that it is a standard/common type and has no other outstanding characteristics beyond its being built in 1958 and now 65 years old.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.reivew@dncr.nc.gov. In all future communication concerning this project, please cite the above referenced tracking number.

cc: Katrina Feltes, NCDOT kmfeltes@ncdot.gov
Clarence Colemen, FHWA clarence.coleman@dot.gov
Allyson Conner, USFS/Asheville allyson.conner@usda.gov
John Jamison, NCDOT johnjamison@ncdot.gov

Tribal Coordination

Catawba Indian Nation
Tribal Historic Preservation Office
1536 Tom Steven Road
Rock Hill, South Carolina 29730

Office 803-328-2427
Fax 803-328-5791

May 30, 2023

Attention: Shane Peterson
NC Department of Transportation
1598 Mail Service Center
Raleigh, NC 27699

Re. THPO #	TCNS #	Project Description
2023-193-157		R-2527 Addendum, Proposed Expansion of the Wood Run Trail Parking Lot, Montgomery Co., NC

Dear Mr. Peterson,

The Catawba have no immediate concerns with regard to traditional cultural properties, sacred sites or Native American archaeological sites within the boundaries of the proposed project areas. **However, the Catawba are to be notified if Native American artifacts and / or human remains are located during the ground disturbance phase of this project.**

If you have questions please contact Caitlin Rogers at 803-328-2427 ext. 226, or e-mail Caitlin.Rogers@catawba.com.

Sincerely,

Caitlin Rogers for

Wenonah G. Haire
Tribal Historic Preservation Officer

Letter of Consent

USDA United States Department of Agriculture | Forest Service | National Forests in North Carolina | 160A Zillicoa Street
Asheville, NC 28801
828-257-4200
Fax: 828-257-4263

File Code: 5400
Date: April 19, 2024

Yolanda K. Jordan
North Carolina Division Administrator
310 New Bern Avenue, Suite 410
Raleigh, NC 27601

Dear Ms. Jordan,

Application has been made for the appropriation and transfer of lands of the United States within the Uwharrie National Forest for right-of-way for the construction of North Carolina Department of Transportation (NCDOT) Project R-2527 on NC 24-27 from NC 73 to the Troy Bypass, Montgomery County, NC. The areas applied for include the following parcels:

- Parcel 014, plan sheets 9-11, 32-36, 40-41; USFS Tract U-291, U-374, U-1505
- Parcel 015, plan sheets 11-13; USFS Tract U-1709
- Parcel 017, plan sheets 14-15; USFS Tract U-675
- Parcel 019, plan sheets 17-19; USFS Tract U-97, U-1673
- Parcel 039, plan sheets 27-32; USFS Tract U-374, U-1640, U-1505

We agree to the appropriation and transfer of these lands under the provision of Sections 107(d) and 317 of the Act of August 27, 1958, 72 Stat. 893 and 916; 23 U.S.C. 107(d) and 317, under the following conditions to be included in the grant of Highway Easement Deed:

1. Outstanding valid claims, if any, existing on the date of this grant, and the Grantee shall obtain such permission as may be necessary on account of any such claims.

2. The Grantee and the Forest Service authorized officer shall make a determination as to the necessity for archeological and paleontological reconnaissance and salvage within the right-of-way, and such reconnaissance and salvage, to the extent determined necessary because of construction of the highway facility, is to be undertaken by the Grantee in compliance with the acts entitled "An Act for the Preservation of American Antiquities", approved June 8, 1906 (34 Stat. 225, 16 U.S.C. 432-433), and the "Archaeological Resources Protection Act of 1979" (93 Stat. 721, 16 U.S.C. 470aa-47011), and State laws where applicable.

3. Unless the Grantee and the Forest Service authorized officer stipulate as to a shorter time, the easements herein granted shall terminate ten (10) years from the date of the execution of this deed by the United States of America, in the event that construction of a highway on the right-of-way is not started during such ten-year period.

4. The easements herein granted are limited to uses described, and the space above and below the established grade line of the highway pavement, for the purpose of

construction, operation, and maintenance of highway and other easements in accordance with the approved plans described in the following condition number 5, and does not include the grant of any rights for non-highway purposes or facilities; provided that the right of the Forest Service to use or authorize the use of any portion of the right-of-way for non-highway purposes shall not be exercised when such use would be inconsistent with the provisions of Title 23 of the United States Code and of the Federal Highway Administration regulations issued pursuant thereto, or would interfere with the free flow of traffic, or impair the full use and safety of the highway; and in any case, the Grantee and the FHWA shall be consulted prior to the exercise of such rights, provided further, that nothing herein shall preclude the Forest Service from locating National Forest and other Department of Agriculture information signs on the portions of the right-of-way outside of the construction clearing limits.

5. The design and construction of the highway project situated on the right-of-way will be in accordance with the provisions of Title 23, U.S.C. – Highways, 23 CFR, and amendments; the Regulations for the Administration of Federal Aid for Highways, effective May 11, 1960, and amendments and established procedures for Federal-aid projects, including the requirements of Title 23, Code of Federal Regulations, Part 771, and the construction specifications of the NCDOT as approved by the FHWA for use on Federal-aid projects.

   The Forest Service authorized officer will be provided an opportunity to review plans relative to the effects, if any, that the project works as planned will have upon adequate protection and utilization of the land traversed by the right-of-way and adjoining land under the administration of the Forest Service for the purposes for which such land is being administered. Those features of design, construction, and maintenance of the highway facility and the use of the right-of-way that would have an effect on the protection and utilization of the land under the administration of the Forest Service are to be mutually agreed upon by the Forest Service authorized officer and the Grantee by conference or other communication during the preparation of the plans and specifications of each construction project; and the plans shall be revised, modified, or supplemented to meet the approval of the Forest Service authorized officer, or when deemed appropriate, supplemented by written stipulation between the Forest Service authorized officer and the Grantee, prior to the start of construction.

   The final design and the construction specifications for any highway construction project on the right-of-way will be presented to the Forest Service authorized officer for approval; and construction shall not begin until such approval is given; provided, that if it is subsequently deemed necessary that the approved plans, specifications, or stipulations be amended or supplemented, any amendment or supplement which affects alignment, subgrade, or natural resources shall be approved by the Forest Service authorized officer and the NCDOT before being placed in effect.

6. Consistent with highway safety standards, the Grantee shall:

a. Protect and preserve soil and vegetative cover, and scenic and aesthetic values, on the right-of-way outside of construction limits.
b. Provide for the prevention and control of soil erosion within the right-of-way and adjacent lands that might be affected by the construction, operation or maintenance of the highway, and shall vegetate and keep vegetated with suitable species all earth cut or fill slopes feasible for re-vegetation, or other areas on which ground cover is destroyed, where it is deemed necessary during a joint review between the Forest Service authorized officer and the Grantee prior to completion of the highway; and the Grantee shall maintain all terracing, water bars, lead-off ditches, or other preventive works that may be required to accomplish this objective. This provision shall also apply to slopes that are repaired following slides which occur during or after construction.

7. The Grantee shall establish no borrow, sand, or gravel pits, stone quarries, permanent storage areas, sites for highway operation and maintenance facilities, camps, supply depots, or disposal areas within the right-of-way, unless shown on approved construction plans, without first obtaining approval of the Forest Service authorized officer.

8. The Grantee shall maintain the clearing of the right-of-way by means of chemicals only after specific written approval has been given by the Forest Service authorized officer. Application for such approval must be in writing and specify the time, methods, chemicals, and exact portion of the right-of-way to be chemically treated.

9. The Grantee in consideration of the conveyance of said land, does hereby covenant and agree, as a covenant running with the land for itself, its successors and assigns, that (a) no person shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination with regard to any facility located wholly or impart on, over, or under such lands hereby conveyed; (b) that the Grantee shall use said land so conveyed in compliance with all requirements imposed by or in pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary of Transportation, Part 21, "Nondiscrimination in Federally assisted programs of the Department of Transportation", implementing Title VI of the Civil Rights Act of 1964, and as said regulations may be amended.

   In the event of breach of any of the above-mentioned nondiscrimination conditions, the FHWA shall have the right to re-enter said land, and facilities on said land, and the above-described land and facilities shall thereon revert to and vest in and become the absolute property of the Department of Agriculture-Forest Service, and it assigns, as such interest existed prior to this instrument.

10. When need for the easement herein granted shall no longer exist and the area has been reasonably rehabilitated to protect the public and environment, the Grantee shall give notice of that fact to the Secretary of Transportation and the rights herein granted

shall terminate and the land shall immediately revert to the full control of the Secretary of the Department of Agriculture or their assigns.

Conditions from USFS staff for continued coordination include the following items:

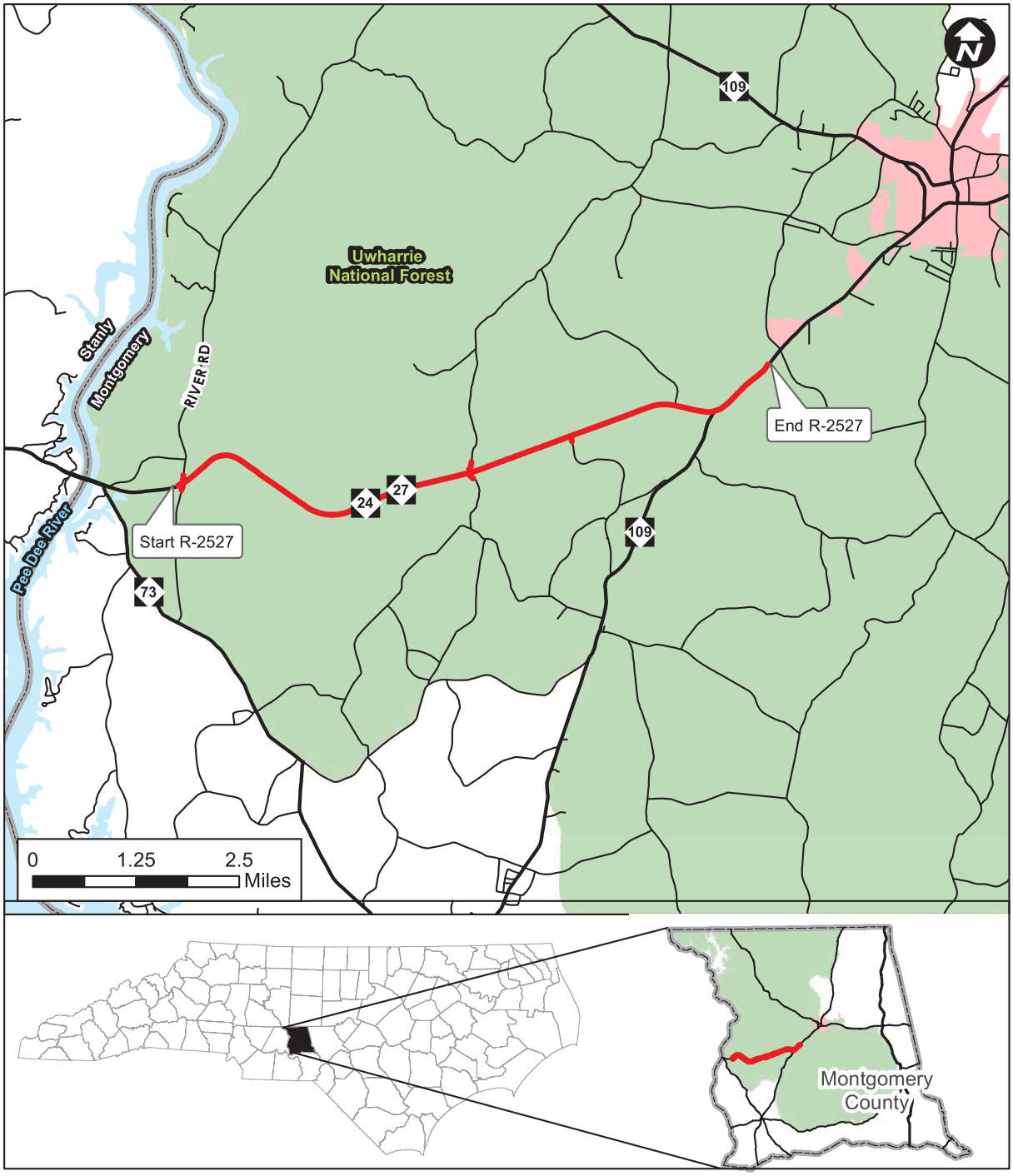
1. Consultation with USFS botanists on locations and pre-treatment methods of non-native invasive species prior to the start of construction and treatment methods after NCDOT concludes project construction.
2. Protection of the Lawrenceville Tract stone monument at the 24/27 Trailhead during construction. If the monument is damaged, NCDOT will repair or replace the monument.
3. Access to USFS tracts from NC 24/27 shall remain available during construction activities of the highway widening project.
4. Implement wildlife crossing measures recommended by NCWRC at Clarks Creek and Rocky Creek for improved passage.
5. Relocate and reestablish witness trees and monuments along the newly acquired ROW.
6. Provide new USFS signage that was removed or damaged during construction of the highway project.

You may authorize immediate entry under the above terms.

Sincerely,

JAMES E. MELONAS
Forest Supervisor

R-2527 Project Map
Deed of Easement
Survey Plats
Construction Stipulations
USFS Survey Report for R-2527



R-2527 | Uwharrie National Forest | Troy | County Boundary

Figure 1
Vicinity Map
STIP Project R-2527
NC 24-27 Widening
Montgomery County

Excise Tax: Exempt (GS§105-228.28)

Prepared by: Martin T. McCracken, Special Deputy Attorney General, North Carolina Department of Transportation, Attorney General's Office, 1505 Mail Service Center, Raleigh, NC 27699-1505
Return to: NCDOT, Attn: Denise Amato, Real Property Agent, 1546 Mail Service Center, Raleigh, NC 27699-1546
The hereinafter described property does not include the primary residence of the GRANTOR.
STATE OF NORTH CAROLINA
COUNTY OF **Montgomery**
TAX PARCEL NUMBER:

DEED OF EASEMENT

THIS DEED, made this _____ day of _____, 20___, by and between the UNITED STATES OF AMERICA, acting by and through the DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, EASTERN FEDERAL LANDS HIGHWAY DIVISION (FHWA), and the STATE OF NORTH CAROLINA, acting by and through the DEPARTMENT OF TRANSPORTATION, an agency of the State of North Carolina (NCDOT), hereinafter referred to as the Grantee:

WITNESSETH:

WHEREAS, the Grantee has filed application under the provisions of the act of Congress of August 27, 1958, as amended (23 U.S.C. Section 317), for the right-of-way of a highway over certain Federal land under the jurisdiction of the United States Department of Agriculture, Forest Service in the State of North Carolina;

WHEREAS, this transfer is further authorized under the provisions of the Act of congress approved October 15, 1966 (80 Stat. 931, 937 Section 6(a)(1)(A);

WHEREAS, the Federal Lands Highway Division Engineer, pursuant to delegations of authority from the Secretary of Transportation, has determined that an easement over the land covered by the application is reasonably necessary for a right-of-way for the construction of NC 24-27 in and through the Uwharrie National Forest, Montgomery County, Federal Aid Project No. 0024093;

WHEREAS, the Department of Agriculture, acting by and through the United States Forest Service, in its consent to the appropriation of the federal land, has agreed to the transfer by the FHWA of an easement over the land to the Grantee;

WHEREAS, the easement rights transferred will affect a portion of the Uwharrie National Forest, Montgomery County, as shown on project plans NCDOT R-2527 described as: NC 24-27 from NC 73 to the Troy Bypass, Federal Aid Project No. 0024093, dated February 27, 2019, parcel 014, plan sheets 9, 10, 11, 32 & 33, parcel 015, plan sheets 11, 12 & 13, parcel 017, plan sheets 14 & 15, parcel 019, plan sheets 17, 18 & 19, parcel 039, plan sheets 27, 28, 29, 30, 31 & 32;

WHEREAS, the project plans are on file at the Department of Transportation, 1 South Wilmington St., Raleigh, NC, 7601, and will be recorded, pursuant to NC Gen. Stat. §136-19.4, in the Office of the Montgomery County Register of Deeds.

NOW, THEREFORE, the FHWA, as authorized by law, and in compliance with all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary of Transportation, Part 21, "Nondiscrimination in Federally-assisted programs of the Department of Transportation (49 CFR 21.2 – 21.23)", pertaining to and effectuating the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252; 42 U.S.C. Sections 2000d to2000d-4), does hereby grant to the Grantee an easement described in Exhibit "A" attached hereto and made a part hereof, over, across, and upon certain lands in the Uwharrie National Forest, Montgomery County, for the construction, operation and maintenance of a highway and use of the space above and below the established grade line of the highway pavement for highway purposes, which lands and easements are more particularly shown on project plans for the construction of NCDOT project R-2527, Federal Aid Project No. 0024093, dated February 27, 2019, incorporated herein by reference, and made part hereof; subject, however, to the following terms, conditions, and covenants:

1. Outstanding valid claims, if any, existing on the date of this grant, and the Grantee shall obtain such permission as may be necessary on account of any such claims.

2. The Grantee and the Forest Service authorized officer shall make a determination as to the necessity for archeological and paleontological reconnaissance and salvage within the right-of-way, and such reconnaissance and salvage, to the extent determined necessary because of construction of the highway facility, is to be undertaken by the Grantee in compliance with the acts entitled "An Act for the Preservation of American Antiquities", approved June 8, 1906 (34 Stat. 225, 16 U.S.C. 432-433), and the "Archaeological Resources Protection Act of 1979" (93 Stat. 721, 16 U.S.C. 470aa-47011), and State laws where applicable.

3. Unless the Grantee and the Forest Service authorized officer stipulate as to a shorter time, the easements herein granted shall terminate ten (10) years from the date of the execution of this deed by the United States of America, in the event that construction of a highway on the right-of-way is not started during such ten-year period.

4. The easements herein granted are limited to uses described, and the space above and below the established grade line of the highway pavement, for the purpose of construction, operation, and maintenance of highway and other easements in accordance with the approved plans described in the following condition number 5, and does not include the grant of any rights for non-highway purposes or facilities; provided that the

right of the Forest Service to use or authorize the use of any portion of the right-of-way for non-highway purposes shall not be exercised when such use would be inconsistent with the provisions of Title 23 of the United States Code and of the Federal Highway Administration regulations issued pursuant thereto, or would interfere with the free flow of traffic, or impair the full use and safety of the highway; and in any case, the Grantee and the FHWA shall be consulted prior to the exercise of such rights, provided further, that nothing herein shall preclude the Forest Service from locating National Forest and other Department of Agriculture information signs on the portions of the right-of-way outside of the construction clearing limits.

5. The design and construction of the highway project situated on the right-of-way will be in accordance with the provisions of Title 23, U.S.C. – Highways, 23 CFR, and amendments; the Regulations for the Administration of Federal Aid for Highways, effective May 11, 1960, and amendments and established procedures for Federal-aid projects, including the requirements of Title 23, Code of Federal Regulations, Part 771, and the construction specifications of the NCDOT as approved by the FHWA for use on Federal-aid projects.

   The Forest Service authorized officer will be provided an opportunity to review plans relative to the effects, if any, that the project works as planned will have upon adequate protection and utilization of the land traversed by the right-of-way and adjoining land under the administration of the Forest Service for the purposes for which such land is being administered. Those features of design, construction, and maintenance of the highway facility and the use of the right-of-way that would have an effect on the protection and utilization of the land under the administration of the Forest Service are to be mutually agreed upon by the Forest Service authorized officer and the Grantee by conference or other communication during the preparation of the plans and specifications of each construction project; and the plans shall be revised, modified, or supplemented to meet the approval of the Forest Service authorized officer, or when deemed appropriate, supplemented by written stipulation between the Forest Service authorized officer and the Grantee, prior to the start of construction.

   The final design and the construction specifications for any highway construction project on the right-of-way will be presented to the Forest Service authorized officer for approval; and construction shall not begin until such approval is given; provided, that if it is subsequently deemed necessary that the approved plans, specifications, or stipulations be amended or supplemented, any amendment or supplement which affects alignment, subgrade, or natural resources shall be approved by the Forest Service authorized officer and the NCDOT before being placed in effect.

6. Consistent with highway safety standards, the Grantee shall:
   a. Protect and preserve soil and vegetative cover, and scenic and aesthetic values, on the right-of-way outside of construction limits.
   b. Provide for the prevention and control of soil erosion within the right-of-way and adjacent lands that might be affected by the construction, operation or maintenance of the highway, and shall vegetate and keep vegetated with suitable species all earth cut or fill slopes feasible for re-vegetation, or other areas on which ground cover is destroyed, where it is deemed necessary during a joint review between the Forest Service authorized officer and the Grantee prior to completion of the highway; and the Grantee shall maintain all terracing, water

bars, lead-off ditches, or other preventive works that may be required to accomplish this objective. This provision shall also apply to slopes that are repaired following slides which occur during or after construction.

7. The Grantee shall establish no borrow, sand, or gravel pits, stone quarries, permanent storage areas, sites for highway operation and maintenance facilities, camps, supply depots, or disposal areas within the right-of-way, unless shown on approved construction plans, without first obtaining approval of the Forest Service authorized officer.

8. The Grantee shall maintain the clearing of the right-of-way by means of chemicals only after specific written approval has been given by the Forest Service authorized officer. Application for such approval must be in writing and specify the time, methods, chemicals, and exact portion of the right-of-way to be chemically treated.

9. The Grantee in consideration of the conveyance of said land, does hereby covenant and agree, as a covenant running with the land for itself, its successors and assigns, that (a) no person shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination with regard to any facility located wholly or impart on, over, or under such lands hereby conveyed; (b) that the Grantee shall use said land so conveyed in compliance with all requirements imposed by or in pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary of Transportation, Part 21, "Nondiscrimination in Federally assisted programs of the Department of Transportation", implementing Title VI of the Civil Rights Act of 1964, and as said regulations may be amended.

   In the event of breach of any of the above-mentioned nondiscrimination conditions, the FHWA shall have the right to re-enter said land, and facilities on said land, and the above-described land and facilities shall thereon revert to and vest in and become the absolute property of the Department of Agriculture-Forest Service, and it assigns, as such interest existed prior to this instrument.

10. When need for the easement herein granted shall no longer exist and the area has been reasonably rehabilitated to protect the public and environment, the Grantee shall give notice of that fact to the Secretary of Transportation and the rights herein granted shall terminate and the land shall immediately revert to the full control of the Secretary of the Department of Agriculture or their assigns.

IN WITNESS WHEREOF, I _____, Division Administrator, pursuant to delegations authority from the Secretary of Transportation the Federal Highway Administrator, and the Chief Counsel, Federal Highway Administration, by virtue of authority vested in me by law, hereunto subscribe my name as to the day and year first above written.

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

BY: _____
Yolonda Jordan
Division Administrator
North Carolina Division
Federal Highway Administration

State of North Carolina
County of Montgomery

I, _____, a Notary Public in and for the county of _____, do hereby certify that on this _____ day of_____, 20___, before me personally appeared **Yolanda Jordan, Division Administrator, North Carolina Division, Federal Highway Administration**, and acknowledge that the foregoing instrument was executed by her in her official capacity and by authority vested in her by law, for the purposes and intents in said instruments described and set forth, and acknowledge the same to be her free act and deed as Division Administrator, Federal Highway Administration.

Witness my hand and seal the _____ day of _____, 20 ___.

_____
Notary Public
My commission expires: _____

ACCEPTED:

In compliance with the conditions set forth in the foregoing deed, the Department of Transportation, an agency of the State certifies, and by acceptance of this deed, accepts the land herein described and agrees for itself, its successors and assigns forever to abide by the conditions set forth in said deed.

DEPARTMENT OF TRANSPORTATION

BY: _____
Heather L. Fulghum
Manager of Right-of-Way Unit

State of North Carolina
County of Montgomery

I, _____, a Notary Public in and for the county of _____ do hereby certify that on this _____ day of _____, 20 _____, before me personally appeared **Heather L. Fulghum, Manager of Right of Way Unit, of the Department of Transportation** and acknowledged that the foregoing instrument, was executed by her in her official capacity and by authority vested in her by law, for the purposes and intents in said instruments described and set forth, and acknowledged the same to be her free act and deed as Manager of Right of Way Unit, the Department of Transportation.

Witness my hand and seal this _____ day of _____, 20 _____.

_____
Notary Public

My commission expires: _____

ATTORNEY CERTIFICATON:

Martin T. McCracken, an attorney licensed to practice law in the State of North Carolina, hereby certifies that this deed is legally sufficient for its stated purpose.

Date: _____

_____
Martin T. McCracken
Special Deputy Attorney General
North Carolina State Bar No. 21362

EXHIBIT A

Reference is made to the project plans for Department of Transportation Project R-2527 NC 24-27 from NC 73 to the Troy Bypass, Montgomery County, for survey stations and greater certainty of descriptions. The project plans are on file at the Department of Transportation, 1 South Wilmington St., Raleigh, NC 27601 and will be recorded, pursuant to NC Gen. Stat. §136-19.4, in the Office of the Montgomery County Register of Deeds.

NCDOT Project R-2527

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E:
1705433.255 Z: 547.02

NEW AREA #1: USFS# U-97 Area #1: Beginning at POB, N.C. "Localized" Grid Coordinates = N:567,670.3691 E:1,696,337.4852, thence N 06A27'51" W 179.62 ft. to point; thence N 7A11'57" E 34.66 ft. to point; thence N 66A14'17" E 209.23 ft. to point; thence S 02A31'59" W 177.46 ft. to point; thence S 66A14'17" W 216.39 ft.; returning to the place of beginning; containing 0.849 acre more or less.

NEW AREA #2: USFS# U-97 Area #2: Beginning at POB, N.C. "Localized" Grid Coordinates = N:567,514.2625 E:1,696,355.1725, thence N 66A14'17" E 29.85 ft. to point; thence S 21A30'51" E 16.08 ft. to point; thence S 53A09'15" W 15.51 ft. to point; thence S 07A17'28" E 12.62 ft. to point; thence S 74A09'08" W 19.74 ft. to point; thence N 06A27'51" W 30.33 ft. returning to the place of beginning; containing 0.019 acre more or less.

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E: 1705433.255 Z: 547.02

NEW AREA #1: USFS# U-291 Area #1: Beginning at POB, N.C. "Localized" Grid Coordinates = N:570,364.2570 E:1,687,422.9468, thence N 01"39'09" E 112.98 ft. to point; thence S 64"24'05" E 203.29 ft. to point; thence S 64"24'05" E 290.28 ft. to point; thence N 32"14'12" E 11.62 ft. to point; thence S 57"45'48" E 30.00 ft. to point; thence S 32"14'12" W 11.05 ft. to point; thence S 53"36'57" E 111.02 ft. to point; thence S 53"36'57" E 35.01 ft. to point; thence S 53"36'57" E 140.82 ft. to point; thence N 38"53'12" E 10.65 ft. to point; thence S 51"06'48" E 30.00 ft. to point; thence S 38"53'12" W 11.02 ft. to point; thence S 47"03'47" E 252.83 ft. to point; thence S 51"20'35" E 18.89 ft. to point; thence S 09"55'08" E 2.34 ft. to point; thence S 47"03'47" E 24.94 ft. to point; thence S 54"55'10" E 736.52 ft. to point; thence S 02"20'42" W 125.28 ft. to point; thence N 54"51'49" W 1477.79 ft. to point; thence along a curve turning to the left, having a radius of 3375.0000 ft. and having a chord with a bearing of N 57"28'04" W and a chord distance of 306.71 ft., an arc distance of 306.82 ft. along said curve to point, thence along a curve turning to the left, having a radius of 1505.0000 ft. and having a chord with a bearing of N 61"44'21" W and

a chord distance of 87.55 ft., an arc distance of 87.57 ft. along said curve returning to the place of beginning; containing 5.191 acres more or less.

NEW AREA #2: USFS# U-291 Area #2: Beginning at POB, N.C. "Localized" Grid Coordinates = N:570,035.1922 E:1,687,672.3224, thence S 54"51'49" E 547.31 ft. to point; thence N 68"13'21" W 154.14 ft. to point; thence S 35"04'52" W 35.00 ft. to point; thence N 54"55'10" W 250.00 ft. to point; thence N 35"04'50" E 35.01 ft. to point; thence N 46"23'46" W 101.12 ft. to point; thence N 30"59'09" W 51.77 ft. returning to the place of beginning; containing 0.544 acre more or less.

NEW AREA #3: USFS# U-291 Area #3: Beginning at POB, N.C. "Localized" Grid Coordinates = N:569,348.9846 E:1,688,647.3783, thence S 54"51'49" E 115.00 ft. to point; thence S 84"59'05" W 84.97 ft. to point; thence N 54"55'10" W 50.00 ft. to point; thence N 35"04'50" E 54.84 ft. returning to the place of beginning; containing 0.104 acre more or less.

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E: 1705433.255 Z: 547.02

NEW AREA #1: USFS# U-374 Area #1: Beginning at POB, N.C. "Localized" Grid Coordinates = N:571,752.6398 E:1,708,813.6853, thence N 00A22'33" E 89.77 ft. to point; thence N 69A43'18" E 2771.99 ft. to point; thence N 20A16'42" W 20.00 ft. to point; thence N 69A43'18" E 30.00 ft. to point; thence S 88A28'37" E 53.85 ft. to point; thence N 69A43'18" E 1110.00 ft. to point; thence N 20A16'42" W 20.00 ft. to point; thence N 69A43'18" E 40.00 ft. to point; thence S 20A16'42" E 20.00 ft. to point; thence N 69A43'18" E 109.20 ft. to point; thence S 02A02'29" W 90.77 ft. to point; thence S 02A02'29" W 0.03 ft. to point; thence S 69A43'18" W 4108.37 ft. returning to the place of beginning; containing 7.969 acres more or less.

NEW AREA #2: USFS# U-374 Area #2: Beginning at POB, N.C. "Localized" Grid Coordinates = N:573,640.5344 E:1,713,929.6839, thence N 01A58'59" E 0.32 ft. to point; thence N 01A58'59" E 88.36 ft. to point; thence along a curve turning to the right, having a radius of 3000.0000 ft. and having a chord with a bearing of N 72A32'35" E and a chord distance of 13.22 ft., an arc distance of 13.22 ft. along said curve to point, thence N 17A19'51" W 35.00 ft. to point; thence along a curve turning to the right, having a radius of 3035.0000 ft. and having a chord with a bearing of N 74A00'52" E and a chord distance of 142.50 ft., an arc distance of 142.51 ft. along said curve to point, thence S 14A38'25" E 35.00 ft. to point; thence along a curve turning to the right, having a radius of 3000.0000 ft. and having a chord with a bearing of N 81A56'11" E and a chord distance of 687.18 ft., an arc distance of 688.70 ft. along said curve to point, thence N 01A29'14" W 25.00 ft. to point; thence along a curve turning to the right, having a radius of 3025.0000 ft. and having a chord with a bearing of N 88A45'43" E and a chord distance of 26.30 ft., an arc distance of 26.30 ft. along said curve to point, thence S 00A59'20" E 25.00 ft. to point; thence along a curve turning to the right, having a radius of 3000.0000 ft. and having a chord with a bearing of S 89A50'35" E and a chord distance of 119.99 ft., an arc distance of 120.00 ft. along said curve to point, thence N 81A44'38" E 133.33 ft. to point; thence along a curve turning to the right, having a radius of 3025.0000 ft. and having a chord with a bearing of S 85A58'42" E and a chord distance of 24.02 ft.,

an arc distance of 24.02 ft. along said curve to point, thence S 16A20'17" E 116.56 ft. to point; thence along a curve turning to the left, having a radius of 2940.0000 ft. and having a chord with a bearing of S 83A27'51" W and a chord distance of 1173.88 ft., an arc distance of 1181.82 ft. along said curve, returning to the place of beginning; containing 2.431 acres more or less.

NEW AREA #3: USFS# U-374 Area #3: Beginning at POB, N.C. "Localized" Grid Coordinates = N:571,592.4334 E:1,708,812.8863, thence N 69A43'18" E 25.88 ft. to point; thence S 11A31'34" E 184.86 ft. to point; thence N 23A33'59" W 102.42 ft. to point; thence N 65A48'07" W 23.64 ft. to point; thence N 01A05'22" E 68.61 ft. returning to the place of beginning; containing 0.086 acre more or less.

NEW AREA #4: USFS# U-374 Area #4: Beginning at POB, N.C. "Localized" Grid Coordinates = N:571,622.4411 E:1,708,894.1023, thence N 69A43'18" E 48.35 ft. to point; thence S 13A00'47" W 57.25 ft. to point; thence S 01A59'51" W 102.67 ft. to point; thence N 11A31'34" W 144.54 ft. returning to the place of beginning; containing 0.066 acre more or less.

NEW AREA #5: USFS# U-374 Area #5: Beginning at POB, N.C. "Localized" Grid Coordinates = N:571,751.8364 E:1,709,244.3114, thence N 69A43'18" E 200.00 ft. to point; thence S 20A16'42" E 30.00 ft. to point; thence S 69A43'18" W 200.00 ft. to point; thence N 20A16'42" W 30.00 ft. returning to the place of beginning; containing 0.138 acre more or less.

NEW AREA #6: USFS# U-374 Area #6: Beginning at POB, N.C. "Localized" Grid Coordinates = N:572,791.5766 E:1,712,058.3726, thence N 69A43'18" E 75.00 ft. to point; thence S 20A16'42" E 16.00 ft. to point; thence S 69A43'18" W 75.00 ft. to point; thence N 20A16'42" W 16.00 ft. returning to the place of beginning; containing 0.028 acre more or less.

NEW AREA #7: USFS# U-374 Area #7: Beginning at POB, N.C. "Localized" Grid Coordinates = N:572,869.5570 E:1,712,269.4269, thence N 69A43'18" E 375.00 ft. to point; thence S 20A16'42" E 29.00 ft. to point; thence S 69A43'18" W 375.00 ft. to point; thence N 20A16'42" W 29.00 ft. returning to the place of beginning; containing 0.250 acre more or less.

NEW AREA #8: USFS# U-374 Area #8: Beginning at POB, N.C. "Localized" Grid Coordinates = N:573,480.3934 E:1,713,924.1390, thence along a curve turning to the right, having a radius of 2790.0000 ft. and having a chord with a bearing of N 78A48'58" E and a chord distance of 776.14 ft., an arc distance of 778.66 ft. along said curve to point, thence S 67A56'15" W 100.52 ft. to point; thence along a curve turning to the left, having a radius of 2735.0000 ft. and having a chord with a bearing of S 82A49'59" W and a chord distance of 190.22 ft., an arc distance of 190.26 ft. along said curve to point, thence S 09A09'35" E 35.00 ft. to point; thence along a curve turning to the left, having a radius of 2700.0000 ft. and having a chord with a bearing of S 80A07'47" W and a chord distance of 66.96 ft., an arc distance of 66.96 ft. along said curve to point, thence N 72A56'36" W 73.77 ft. to point; thence along a curve turning to the left, having a radius of 2735.0000 ft. and having a chord with a bearing of S 75A04'54" W and a chord distance of 283.27 ft., an arc distance of 283.40 ft. along said curve to point, thence S 71A10'00" W 80.35 ft. to point; thence N 01A58'59" E 34.23 ft. returning to the place of beginning; containing 0.606 acre more or less.

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E: 1705433.255 Z: 547.02

NEW AREA #1: USFS# U-675 Area #1: Beginning at POB= N.C. "Localized" Grid Coordinates = N:566,944.2996 E:1,692,736.7408, thence N 47A31'18" E 6.83 ft. to point; thence S 65A06'44" E 13.64 ft. to point; thence N 82A01'14" W 3.37 ft. to point; thence N 87A19'32" W 14.08 ft. returning to the place of beginning; containing 0.001 acre more or less.

NEW AREA #2: USFS# U-675 Area #2: Beginning at POB= N.C. "Localized" Grid Coordinates = N:566,858.7290 E:1,692,643.2859, thence N 47A31'18" E 96.19 ft. to point; thence along a curve turning to the left, having a radius of 2700.0000 ft. and having a chord with a bearing of S 73A29'20" E and a chord distance of 157.35 ft., an arc distance of 157.37 ft. along said curve to point, thence N 14A50'29" E 20.00 ft. to point; thence S 76A06'42" E 89.17 ft. to point; thence S 12A56'06" W 20.00 ft. to point; thence along a curve turning to the left, having a radius of 2700.0000 ft. and having a chord with a bearing of S 85A26'29" E and a chord distance of 786.64 ft., an arc distance of 789.45 ft. along said curve to point, thence N 03A49'04" W 40.00 ft. to point; thence N 84A39'40" E 141.22 ft. to point; thence S 57A13'38" E 62.05 ft. to point; thence along a curve turning to the left, having a radius of 2700.0000 ft. and having a chord with a bearing of N 81A41'15" E and a chord distance of 41.33 ft., an arc distance of 41.33 ft. along said curve to point, thence N 13A35'40" W 105.67 ft. to point; thence S 82A58'10" E 11.50 ft. to point; thence S 09A02'24" E 21.05 ft. to point"; thence S 46A16'30" E 44.37 ft. to point; thence S 02A57'51" E 130.83 ft. to point; thence along a curve turning to the right, having a radius of 2790.0000 ft. and having a chord with a bearing of N 84A57'52" W and a chord distance of 1358.14 ft., an arc distance of 1371.92 ft. along said curve returning to the place of beginning; containing 2.824 acres more or less.

NEW AREA #3: USFS# U-675 Area #3: Beginning at POB= N.C. "Localized" Grid Coordinates = N:566,919.7799 E:1,693,900.6128, thence N 52A08'33" E 24.82 ft. to point; thence S 61A53'04" E 25.42 ft. to point; thence S 85A34'39" W 42.14 ft. returning to the place of beginning; containing 0.007 acre more or less.

NEW AREA #1: USFS# U-1505 Area #1: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,774.1530 E:1,715,095.9350, thence N 16A20'17" W 116.56 ft. to point; thence along a curve turning to the right, having a radius of 3025.0000 ft. and having a chord with a bearing of S 84A58'56" E and a chord distance of 81.19 ft., an arc distance of 81.19 ft. along said curve to point, thence S 69A47'55" E 107.72 ft. to point; thence along a curve turning to the right, having a radius of 3000.0000 ft. and having a chord with a bearing of S 81A12'34" E and a chord distance of 105.84 ft., an arc distance of 105.84 ft. along said curve to point, thence S 79A22'15" E 99.48 ft. to point; thence N 32A35'08" E 75.94 ft. to point; thence N 12A35'31" E 150.00 ft. to point; thence S 77A24'29" E 20.84 ft. to point; thence S 12A35'31" W 243.12 ft. to point; thence S 60A46'59" W 93.29 ft. to point; thence along a curve turning to the left, having a radius of 2940.0000 ft. and having a chord with a bearing of N 81A57'27" W and a chord distance of 314.15 ft., an arc distance of 314.30 ft. along said curve returning to the place of beginning; containing 0.929 acre more or less.

NEW AREA #2: USFS# U-1505 Area #2: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,762.5643 E:1,715,546.9554, thence N 12A35'31" E 243.22 ft. to point; thence S 77A24'29" E 19.16 ft. to point; thence S 12A35'31" W 65.00 ft. to point; thence S 77A24'29" E 15.00 ft. to point; thence S 12A35'31" W 20.00 ft. to point; thence N 77A24'29" W 15.00 ft. to point; thence S 12A35'31" W 65.00 ft. to point; thence S 35A56'47" E 104.52 ft. to point; thence S 77A48'26" E 1027.00 ft. to point; thence N 12A11'34" E 123.00 ft. to point; thence S 77A48'26" E 216.00 ft. to point; thence S 12A11'34" W 123.00 ft. to point; thence S 77A48'26" E 212.99 ft. to point; thence S 79A11'26" E 270.72 ft. to point; thence along a curve turning to the left, having a radius of 1775.0000 ft. and having a chord with a bearing of S 86A35'39" E and a chord distance of 282.56 ft., an arc distance of 282.86 ft. along said curve to point, thence N 24A43'51" E 169.44 ft. to point; thence N 19A39'07" E 215.24 ft. to point; thence N 09A55'13" E 93.12 ft. to point; thence along a curve turning to the left, having a radius of 1859.8593 ft. and having a chord with a bearing of N 13A07'49" E and a chord distance of 332.37 ft., an arc distance of 332.82 ft. along said curve to point, thence S 81A59'46" E 6.21 ft. to point; thence S 03A23'56" W 128.33 ft. to point; thence S 03A26'07" W 24.91 ft. to point; thence S 03A39'15" W 24.71 ft. to point; thence S 04A05'32" W 24.52 ft. to point; thence S 04A44'57" W 24.33 ft. to point; thence S 05A37'30" W 24.14 ft. to point; thence S 06A43'12" W 23.95 ft. to point; thence along a curve turning to the right, having a radius of 1040.0000 ft. and having a chord with a bearing of S 12A54'55" W and a chord distance of 202.03 ft., an arc distance of 202.35 ft. along said curve to point, thence S 19A06'38" W 23.95 ft. to point; thence S 20A12'20" W 24.14 ft. to point"; thence S 21A04'54" W 24.33 ft. to point; thence S 21A44'18" W 24.52 ft. to point; thence S 22A10'34" W 24.71 ft. to point; thence S 22A23'42" W 24.89 ft. to point; thence S 22A25'53" W 269.72 ft. to point; thence along a curve turning to the right, having a radius of 1833.8600 ft. and having a chord with a bearing of N 86A54'15" W and a chord distance of 293.65 ft., an arc distance of 293.97 ft. along said curve to point, thence N 79A17'37" W 294.10 ft. to point; thence N 77A48'26" W 1485.94 ft. to point; thence N 37A35'44" W 93.96 ft. returning to the place of beginning; containing 5.637 acres more or less.

NEW AREA #3: USFS# U-1505 Area #3: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,310.0370 E:1,717,749.6785, thence N 22A25'53" E 133.01 ft. to point; thence along a curve turning to the left, having a radius of 1745.0000 ft. and having a chord with a bearing of N 77A44'54" E and a chord distance of 308.94 ft., an arc distance of 309.34 ft. along said curve to point, thence N 77A27'28" E 186.92 ft. to point; thence N 18A02'14" W 13.62 ft. to point; thence N 63A09'36" E 16.22 ft. to point; thence N 04A32'01" E 16.44 ft. to point; thence N 85A17'33" E 31.64 ft. to point; thence N 59A57'29" E 322.35 ft. to point; thence N 48A44'26" E 349.52 ft. to point; thence N 40A13'46" E 346.71 ft. to point; thence N 48A23'49" W 5.36 ft. to point; thence N 41A36'11" E 30.00 ft. to point; thence S 48A23'49" E 5.45 ft. to point; thence N 43A18'55" E 735.98 ft. to point; thence N 45A07'35" W 10.41 ft. to point; thence N 44A52'25" E 30.00 ft. to point; thence S 45A07'35" E 11.29 ft. to point; thence N 50A03'09" E 146.53 ft. to point; thence S 26A54'15" W 18.49 ft. to point; thence S 04A49'43" W 34.70 ft. to point; thence S 47A10'10" E 25.97 ft. to point; thence S 81A39'47" E 38.55 ft. to point; thence S 70A31'53" E 26.26 ft. to point; thence S 45A33'43" E 24.01 ft. to point; thence S 79A48'39" E 18.66 ft. to point; thence S 50A45'17" E 7.37 ft. to point; thence along a curve turning to the left, having a radius of 3230.0000 ft. and having a chord with a bearing of S 43A55'12" W and a chord distance of 299.79 ft., an arc distance of 299.90 ft. along said curve to point, thence S 44A29'25" W

873.86 ft. to point; thence S 45A58'36" W 294.09 ft. to point; thence along a curve turning to the right, having a radius of 1833.8600 ft. and having a chord with a bearing of S 67A37'02" W and a chord distance of 1171.21 ft., an arc distance of 1192.09 ft. along said curve returning to the place of beginning; containing 8.388 acres more or less.

NEW AREA #4: USFS# U-1505 Area #4: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,572.3169 E:1,715,429.9730, thence S 77A48'22" E 37.27 ft. to point "290"; thence S 11A57'01" W 16.11 ft. to point; thence N 78A11'22" W 37.18 ft. to point; thence N 11A37'48" E 16.36 ft. returning to the place of beginning; containing 0.014 acre more or less.

NEW AREA #5: USFS# U-1505 Area #5: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,462.1087 E:1,715,940.0156, thence S 77A48'26" E 95.00 ft. to point; thence S 12A11'34" W 49.00 ft. to point; thence N 77A48'26" W 95.00 ft. to point; thence N 12A11'34" E 49.00 ft. returning to the place of beginning; containing 0.107 acre more or less.

NEW AREA #6: USFS# U-1505 Area #6: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,298.4280 E:1,716,697.5337, thence S 77A48'26" E 180.00 ft. to point; thence S 12A11'34" W 116.00 ft. to point; thence N 77A48'26" W 125.00 ft. to point; thence N 13A10'29" W 128.38 ft. returning to the place of beginning; containing 0.406 acre more or less.

NEW AREA #7: USFS# U-1505 Area #7: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,192.7285 E:1,717,210.3205, thence S 79A19'21" E 31.23 ft. to point; thence S 09A36'35" W 18.41 ft. to point; thence N 80A03'11" W 31.44 ft. to point; thence N 10A16'08" E 18.81 ft. returning to the place of beginning; containing 0.013 acre more or less.

NEW AREA #8: USFS# U-1505 Area #8: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,154.3008 E:1,717,523.7766, thence along a curve turning to the left, having a radius of 1983.8600 ft. and having a chord with a bearing of S 88A49'22" E and a chord distance of 52.99 ft., an arc distance of 52.99 ft. along said curve to point, thence S 22A25'53" W 661.85 ft. to point; thence along a curve turning to the right, having a radius of 5815.4675 ft. and having a chord with a bearing of S 23A55'08" W and a chord distance of 301.91 ft., an arc distance of 301.95 ft. along said curve to point, thence N 64A36'04" W 19.97 ft. to point; thence S 89A19'33" W 28.97 ft. to point; thence N 01A59'17" W 32.66 ft. to point; thence N 89A12'33" E 22.21 ft. to point"; thence N 25A18'02" E 56.18 ft. to point; thence N 26A44'36" E 48.55 ft. to point; thence N 35A17'11" E 52.88 ft. to point; thence N 37A17'37" E 53.82 ft. to point; thence N 19A57'37" E 92.03 ft. to point; thence N 19A39'07" E 616.99 ft. returning to the place of beginning; containing 0.735 acre more or less.

NEW AREA #9: USFS# U-1505 Area #9: Beginning at POB= N.C. "Localized" Grid Coordinates = N:572,805.9666 E:1,717,659.4976, thence N 26A34'32" W 14.83 ft. to point; thence N 63A25'28" E 16.77 ft. to point; thence N 23A11'42" E 5.62 ft. to point; thence N 52A17'23" E 1.95 ft. to point; thence S 27A36'30" W 5.85 ft. to point; thence S 23A11'51" W 23.86 ft. returning to the place of beginning; containing 0.003 acre more or less.

NEW AREA #10: USFS# U-1505 Area #10: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,083.9503 E:1,717,826.8174, thence S 40A31'34" E 32.09 ft. to point; thence S

28A40'07" W 278.94 ft. to point; thence S 52A17'23" W 13.32 ft. to point; thence N 23A11'39" E 4.42 ft. to point; thence N 27A36'30" E 91.35 ft. to point; thence N 52A17'23" E 15.05 ft. to point; thence N 61A19'53" W 28.58 ft. to point; thence N 28A40'07" E 193.02 ft. returning to the place of beginning; containing 0.144 acre more or less.

NEW AREA #4: USFS# U-675 Area #4: Beginning at POB= N.C. "Localized" Grid Coordinates = N:566,602.7983 E:1,693,028.0514, thence along a curve turning to the left, having a radius of 2940.0000 ft. and having a chord with a bearing of S 82A09'36" E and a chord distance of 259.57 ft., an arc distance of 259.65 ft. along said curve to point, thence S 05A18'33" W 25.91 ft. to point; thence along a curve turning to the right, having a radius of 2960.0000 ft. and having a chord with a bearing of N 82A09'18" W and a chord distance of 261.86 ft., an arc distance of 261.95 ft. along said curve to point, thence N 10A22'47" E 25.89 ft. returning to the place of beginning; containing 0.155 acre more or less.

NEW AREA #5: USFS# U-675 Area #5: Beginning at POB= N.C. "Localized" Grid Coordinates = N:566,555.0313 E:1,693,518.4951, thence along a curve turning to the left, having a radius of 2940.0000 ft. and having a chord with a bearing of N 86A00'29" E and a chord distance of 486.67 ft., an arc distance of 487.22 ft. along said curve to point, thence S 02A57'51" E 17.67 ft. to point; thence S 71A17'31" W 45.09 ft. to point; thence S 07A52'25" E 25.00 ft. to point; thence along a curve turning to the right, having a radius of 2985.0000 ft. and having a chord with a bearing of S 86A26'09" W and a chord distance of 448.65 ft., an arc distance of 449.07 ft. along said curve to point, thence N 00A44'45" E 50.89 ft. returning to the place of beginning; containing 0.542 acre more or less.

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E: 1705433.255 Z: 547.02

NEW AREA #1: USFS# U-1640 Area #1: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,176.5199 E:1,712,667.4228, thence N 02A02'29" E 0.03 ft. to point, thence N 02A02'29" E 90.77 ft. to point; thence N 69A43'18" E 1082.90 ft. to point; thence N 70A31'38" E 245.20 ft. to point; thence along a curve turning to the right, having a radius of 3000.0000 ft. and having a chord with a bearing of N 72A15'54" E and a chord distance of 15.90 ft., an arc distance of 15.90 ft. along said curve to point, thence S 01A58'59" W 88.36 ft. to point; thence S 01A58'59" W 0.32 ft. to point; thence along a curve turning to the left, having a radius of 2940.0000 ft. and having a chord with a bearing of S 70A50'06" W and a chord distance of 114.24 ft., an arc distance of 114.25 ft. along said curve to point, thence S 69A43'18" W 1230.63 ft. returning to the place of beginning; containing 2.586 acres more or less.

NEW AREA #2: USFS# U-1640 Area #2: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,254.2609 E:1,713,310.6295, thence N 69A43'18" E 370.00 ft. to point; thence S 20A16'42" E 24.00 ft. to point; thence S 69A43'18" W 370.00 ft. to point; thence N 20A16'42" W 24.00 ft. returning to the place of beginning; containing 0.204 acre more or less.

NEW AREA #3: USFS# U-1640 Area #3: Beginning at POB= N.C. "Localized" Grid

Coordinates = N:573,466.9311 E:1,713,886.3146, thence N 70A24'31" E 40.15 ft. to point; thence S 01A58'59" W 34.23 ft. to point; thence S 71A10'02" W 27.56 ft. to point; thence N 19A35'57" W 31.47 ft. returning to the place of beginning; containing 0.025 acre more or less.

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E: 1705433.255 Z: 547.02

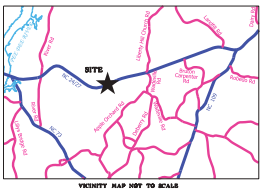
NEW AREA #1: USFS# U-1673 Area #1: Beginning at POB= N.C. "Localized" Grid Coordinates = N:567,757.5625 E:1,696,535.5360, thence N 02A31'59" E 177.46 ft. to point; thence N 66A14'17" E 645.30 ft. to point; thence N 20A17'17" W 10.88 ft. to point; thence N 69A42'43" E 30.00 ft. to point; thence S 20A17'17" E 10.86 ft. to point; thence N 73A05'22" E 180.58 ft. to point; thence S 58A14'15" W 197.15 ft. to point; thence S 23A45'43" E 24.32 ft. to point; thence N 66A14'17" E 114.35 ft. to point; thence N 58A14'15" E 149.52 ft. to point; thence N 66A11'02" E 188.92 ft. to point; thence N 73A05'22" E 213.00 ft. to point; thence N 18A25'33" W 3.87 ft. to point; thence along a curve turning to the right, having a radius of 5900.0000 ft. and having a chord with a bearing of N 72A13'19" E and a chord distance of 133.39 ft., an arc distance of 133.39 ft. along said curve to point, thence N 17A07'49" W 15.00 ft. to point; thence along a curve turning to the right, having a radius of 5915.0000 ft. and having a chord with a bearing of N 73A01'45" E and a chord distance of 32.92 ft., an arc distance of 32.92 ft. along said curve to point, thence N 16A48'41" W 77.00 ft. to point; thence along a curve turning to the right, having a radius of 5992.0000 ft. and having a chord with a bearing of N 73A31'51" E and a chord distance of 71.59 ft., an arc distance of 71.59 ft. along said curve to point, thence S 12A37'48" W 9.46 ft. to point; thence S 79A18'22" E 12.44 ft. to point; thence S 16A03'51" E 78.10 ft. to point; thence along a curve turning to the right, having a radius of 5900.0000 ft. and having a chord with a bearing of N 74A25'31" E and a chord distance of 100.79 ft., an arc distance of 100.79 ft. along said curve to point, thence N 14A46'33" W 7.62 ft. to point; thence N 75A13'27" E 30.00 ft. to point; thence S 14A46'33" E 10.40 ft. to point; thence N 76A43'33" E 36.27 ft. to point; thence S 79A18'22" E 251.23 ft. to point; thence S 82A36'18" E 5.68 ft. to point; thence S 76A43'33" W 113.48 ft. to point; thence along a curve turning to the left, having a radius of 5804.5780 ft. and having a chord with a bearing of S 71A28'55" W and a chord distance of 1061.02 ft., an arc distance of 1062.51 ft. along said curve to point, thence S 66A14'17" W 851.15 ft. returning to the place of beginning; containing 5.686 acres more or less.

NEW AREA #2: USFS# U-1673 Area #2: Beginning at POB= N.C. "Localized" Grid Coordinates = N:568,136.9902 E:1,697,819.6512, thence along a curve turning to the right, having a radius of 5654.5780 ft. and having a chord with a bearing of N 72A49'00" E and a chord distance of 343.31 ft., an arc distance of 343.36 ft. along said curve to point, thence S 15A26'11" E 40.96 ft. to point; thence along a curve turning to the left, having a radius of

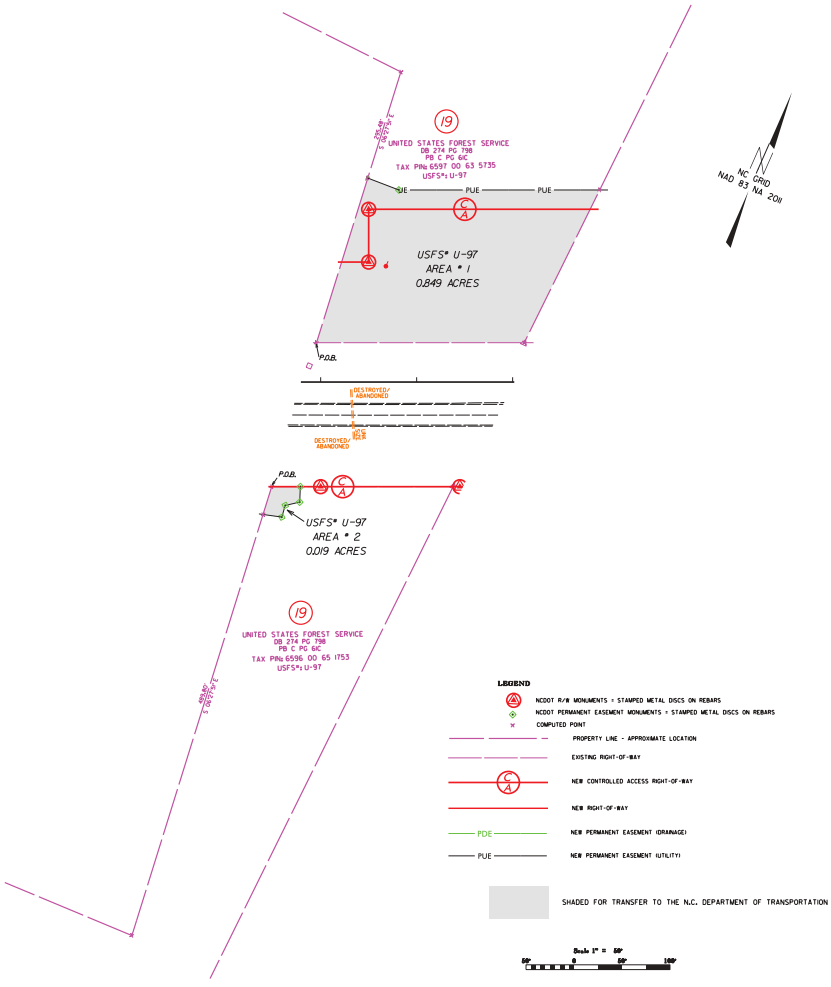
5600.0000 ft. and having a chord with a bearing of S 73A48'05" W and a chord distance of 149.00 ft., an arc distance of 149.01 ft. along said curve to point, thence S 16A57'39" E 87.00 ft. to point; thence along a curve turning to the left, having a radius of 7373.5906 ft. and having a chord with a bearing of S 72A30'21" W and a chord distance of 102.59 ft., an arc distance of 102.59 ft. along said curve to point, thence N 18A01'38" W 87.00 ft. to point; thence along a curve turning to the left, having a radius of 5600.0000 ft. and having a chord with a bearing of S 71A31'28" W and a chord distance of 87.65 ft., an arc distance of 87.65 ft. along said curve to point, thence N 18A55'26" W 40.94 ft. returning to the place of beginning; containing 0.582 acre more or less.

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E: 1705433.255 Z: 547.02

NEW AREA #1: USFS# U-1709 Area #1: Beginning at POB= N.C. "Localized" Grid Coordinates = N:569,307.3517 E:1,688,967.1673, thence N 02A20'42" E 125.28 ft. to point; thence S 54A55'10" E 2036.82 ft. to point; thence S 66A13'45" E 153.28 ft. to point; thence S 54A55'10" E 100.00 ft. to point; thence S 35A04'50" W 30.06 ft. to point; thence S 54A55'10" E 384.44 ft. to point; thence N 87A08'33" W 196.12 ft. to point; thence N 54A56'58" W 2118.15 ft. to point; thence along a curve turning to the right, having a radius of 5654.5780 ft. and having a chord with a bearing of N 54A54'23" W and a chord distance of 8.47 ft., an arc distance of 8.47 ft. along said curve to point, thence N 54A51'49" W 311.29 ft. returning to the place of beginning; containing 6.288 acres more or less.



VICINITY MAP NOT TO SCALE



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
NEW RIGHT-OF-WAY & PERMANENT EASEMENT EXHIBIT FOR THE

UNITED STATES OF AMERICA -- U.S. FOREST SERVICE

THE NORTH CAROLINA DEPARTMEN OF TRANSPORTATION

N.C.D.O.T. -- TIP: R-2527 -- WBS: 35572.1.1 -- PARCEL: 019

U.S. FOREST SERVICE No.: U-97

UWHARRIE TOWNSHIP -- MONTGOMERY COUNTY -- N.C.

MAP COMPILED BY THE
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION, DIVISION No. 8
LOCATION AND SURVEYS UNIT
225 DOT DRIVE
ASHEBORO, N.C. 27205
PHONE: 919-414-4705
CLINTON B. OSBORNE, PLS
N.C. PROFESSIONAL LAND SURVEYOR No. 3834

SEPTEMBER 30, 2025

LEGEND

- NCDOT R/W MONUMENTS = STAMPED METAL DISCS ON REBARS
- NCDOT PERMANENT EASEMENT MONUMENTS = STAMPED METAL DISCS ON REBARS
- COMPUTED POINT
- PROPERTY LINE - APPROXIMATE LOCATION
- EXISTING RIGHT-OF-WAY
- NEW CONTROLLED ACCESS RIGHT-OF-WAY
- NEW RIGHT-OF-WAY
- PDE — NEW PERMANENT EASEMENT (DRAINAGE)
- PUE — NEW PERMANENT EASEMENT (UTILITY)

SHADED FOR TRANSFER TO THE N.C. DEPARTMENT OF TRANSPORTATION

Scale 1" = 50'
50' 0 50' 100'

I, Clinton B. Osborne, a Professional Land Surveyor in the state of North Carolina, hereby certify that this map has been prepared for the NC Department of Transportation, in accordance with G.S. 47-30 as amended. I further certify that all ground evidence and highway design plans as provided by NCDOT. I further attest that all computations and map completions to compose this map were performed under my supervision and meet the requirements of the NCDOT Location & Surveys Unit Property Mapping Manual and the requirements of G.S. 47-30 as amended. This is not a boundary survey. All property information shown on this map was compiled from best available evidence surveys by others, recorded deeds, and/or GIS/tax map information. This map has been prepared as an exhibit for the United States Forest Service only, and is not intended to comply with GS 47-30 and is not for recordation. Reference is hereby made to the original survey plats and descriptions recorded or filed or to be filed in the appropriate County Register of Deeds or with the NCDOT Right of Way Branch, Raleigh, N.C. for for additional information.

Witness my hand and seal on this day .../.../.....

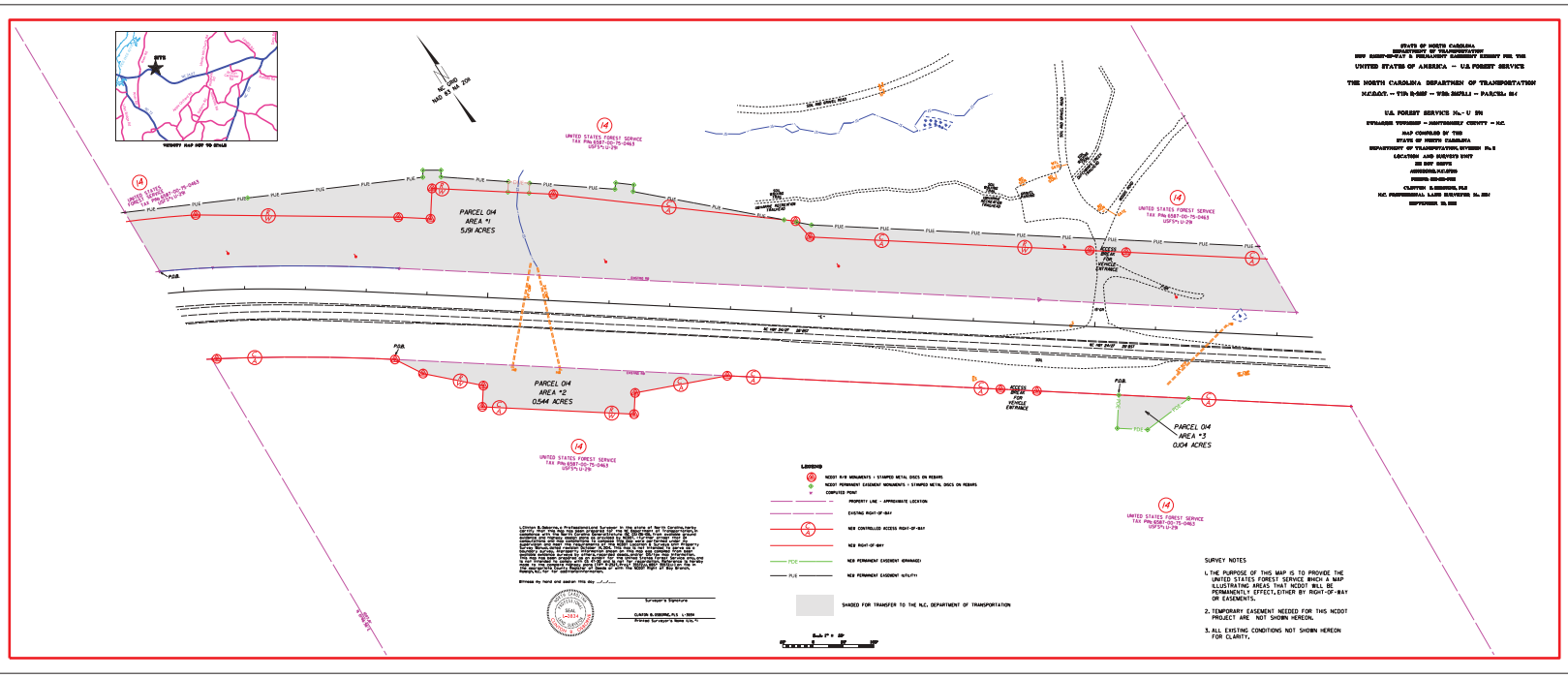
NORTH CAROLINA PROFESSIONAL SEAL L-3834 LAND SURVEYOR CLINTON B. OSBORNE

Surveyor's Signature

CLINTON B. OSBORNE, PLS L-3834
Printed Surveyor's Name & NC PLS

SURVEY NOTES

1. THE PURPOSE OF THIS MAP IS TO PROVIDE THE UNITED STATES FOREST SERVICE WHICH A MAP ILLUSTRATING AREAS THAT NCDOT WILL BE PERMANENTLY EFFECT, EITHER BY RIGHT-OF-WAY OR EASEMENTS.
2. TEMPORARY EASEMENT NEEDED FOR THIS NCDOT PROJECT ARE NOT SHOWN HEREON.
3. ALL EXISTING CONDITIONS NOT SHOWN HEREON FOR CLARITY.


SITE
VICINITY MAP NOT TO SCALE
N/F
UNITED STATES FOREST SERVICE
TAX PIN:8587-00-75-0463
USFS#1-U-219
PARCEL 014
AREA #1
5.91 ACRES
PARCEL 014
AREA #2
0.544 ACRES
PARCEL 014
AREA #3
0.104 ACRES
PROPOSED ACCESS BREAK FOR VEHICLE ENTRANCE
EXISTING ACCESS BREAK FOR VEHICLE ENTRANCE
EXISTING ACCESS BREAK FOR VEHICLE ENTRANCE
POB
POE
PUE
FCE
EXISTING RW
EXISTING RW
EXISTING RW

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
NEW RIGHT-OF-WAY & PERMANENT EASEMENT EXHIBIT FOR THE

UNITED STATES OF AMERICA -- U.S FOREST SERVICE

THE NORTH CAROLINA DEPARTMEN OF TRANSPORTATION

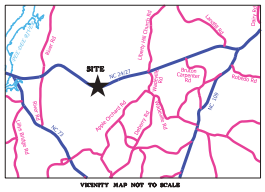
N.C.D.O.T. -- TIP: R-2527 -- WBS: 35572.1.1 -- PARCEL: 017

U.S. FOREST SERVICE No.- U-675

UWHARRIE TOWNSHIP -- MONTGOMERY COUNTY -- N.C.

MAP COMPILED BY THE
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION, DIVISION No. 8
LOCATION AND SURVEYS UNIT
225 DOT DRIVE
ASHEBORO, N.C. 27205
PHONE: 888-184-4968
CLINTON B. OSBORNE, PLS
N.C. PROFESSIONAL LAND SURVEYOR No. 3834

SEPTEMBER 30, 2025



VICINITY MAP NOT TO SCALE

NC GRID
NAD 83 NA 2011

USFS* U-675
AREA * 1
0.001 ACRES

P.O.B.

17
UNITED STATE FOREST SERVICE
DB 92 PG 226
TAX PIN: 6596 00 36 2081
USFS*: U-675

USFS* U-675
AREA * 2
2.824 ACRES

ACCESS BREAK FOR VEHICLE ENTRANCE

USFS* U-675
AREA * 3
0.007 ACRES

USFS* U-675
AREA * 4
0.055 ACRES

USFS* U-675
AREA * 5
0.542 ACRES

RANDOLPH ELECTRIC 42'R/W

NC HWY 24/27 - 28' BST

W/FES

SPRING

I, Clinton B. Osborne, a Professional Land Surveyor in the state of North Carolina, hereby certify that this map has been prepared for the NC Department of Transportation, in compliance with the North Carolina General Statute 47, (G.S.) 136-102, from available ground evidence and highway design plans as provided by NCDOT. I further attest that to the best of my knowledge, information and belief, this map was made under my supervision and meet the requirements of the NCDOT Location & Surveys Unit Property Survey Manual, dated revision October 14, 2014. This map is not intended to serve as a boundary survey. Surveyor by information shown hereon, does not certify to any boundary evidence, surveyor by information shown hereon, does not certify to any information. This map has been prepared as an exhibit for the United States Forest Service only, and is not intended to comply with GS 47-30 and is not for recordation. Reference is hereby made to the complete highway plans (TIP# R-2527, Proj.# 35572.1.1, WBS# 35572.1.1) on file in the Geometrics Unit of the Division of Highways or with the NCDOT Right of Way Branch, Raleigh, N.C. for additional information.

Witness my hand and seal on this day .../.../.....

SEAL
L-3834

Surveyor's Signature

CLINTON B. OSBORNE, PLS L-3834
Printed Surveyor's Name (Lic. #)

LEGEND

- NCDOT R/W MONUMENTS = STAMPED METAL DISCS ON REBARS
- NCDOT PERMANENT EASEMENT MONUMENTS = STAMPED METAL DISCS ON REBARS
- COMPUTED POINT
- PROPERTY LINE - APPROXIMATE LOCATION
- EXISTING RIGHT-OF-WAY
- NEW CONTROLLED ACCESS RIGHT-OF-WAY
- NEW RIGHT-OF-WAY
- PDE — NEW PERMANENT EASEMENT (DRAINAGE)
- PUE — NEW PERMANENT EASEMENT (UTILITY)

SHADED FOR TRANSFER TO THE N.C. DEPARTMENT OF TRANSPORTATION

Scale 1" = 50'
50' 0 50' 100'

SURVEY NOTES

1. THE PURPOSE OF THIS MAP IS TO PROVIDE THE UNITED STATES FOREST SERVICE WHICH A MAP ILLUSTRATING AREAS THAT NCDOT WILL BE PERMANENTLY EFFECT, EITHER BY RIGHT-OF-WAY OR EASEMENTS.
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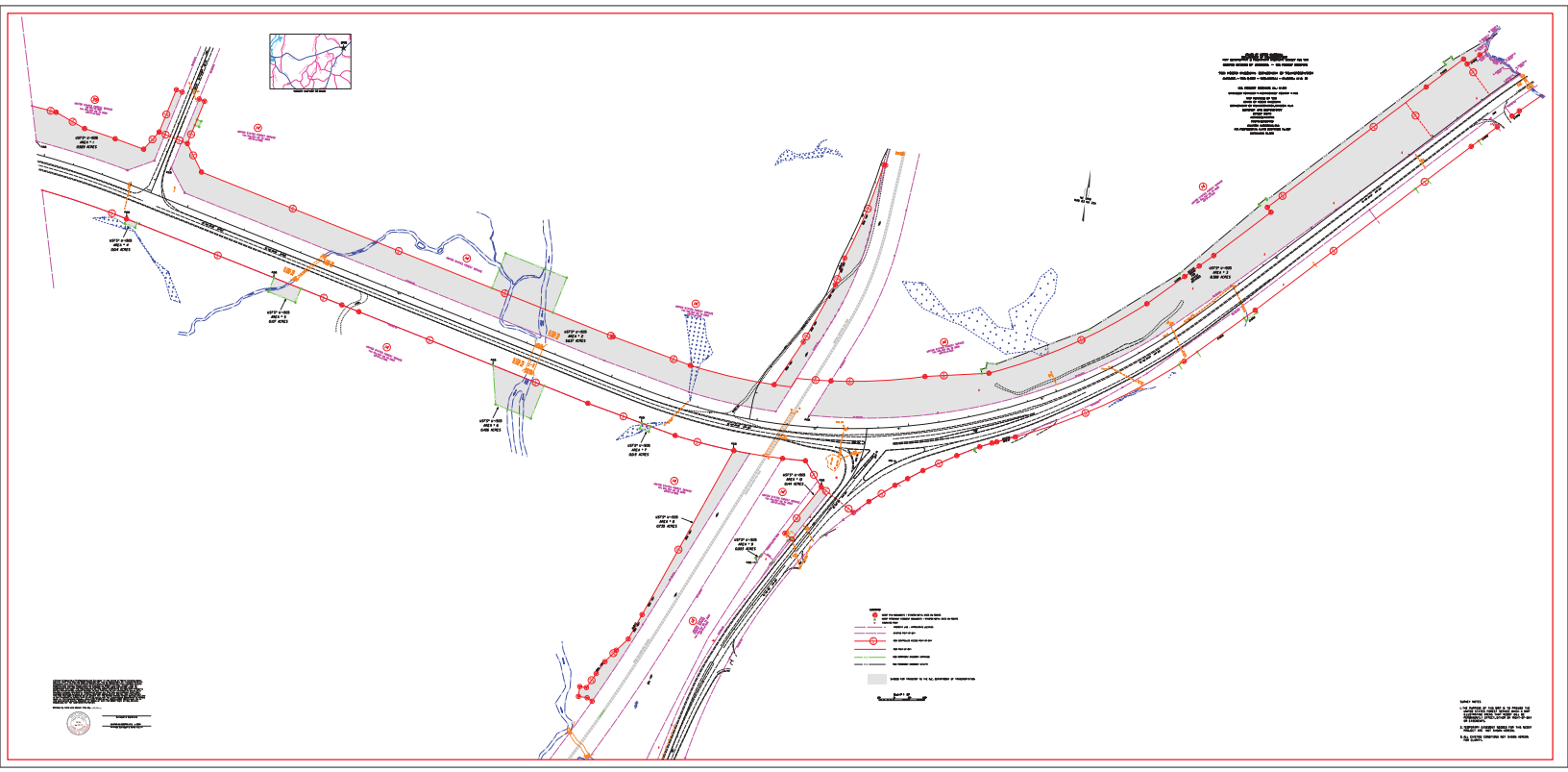

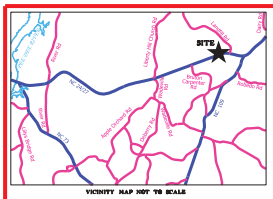

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
NEW RIGHT-OF-WAY & PERMANENT EASEMENT EXHIBIT FOR THE
UNITED STATES OF AMERICA -- U.S. FOREST SERVICE

THE NORTH CAROLINA DEPARTMEN OF TRANSPORTATION
N.C.D.O.T. -- TIP: R-2827 -- WBS: 35573.1.1 -- PARCEL: 039

U.S. FOREST SERVICE No.- U-1640
UWHARRIE TOWNSHIP -- MONTGOMERY COUNTY -- N.C.

MAP COMPILED BY THE
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPOTATION, DIVISION No. 8
LOCATION AND SURVEYS UNIT
188 DOT DRIVE
ASHEBORO, N.C. 27205
PHONE: 828-301-9925
CLINTON B.OSBORNE, PLS
N.C. PROFESSIONAL LAND SURVEYOR, No. 3834
SEPTEMBER 30, 2025

NC GRID NAD 83 NA 2011

39
UNITED STATES FOREST SERVICE
DB 185 PG 665
TAX PIN: 7517 00 34 2071
USFS*: U-1640

USFS* U-1640
AREA * 1
2.586 ACRES

P.O.B.

NC HWY 24/27 24 BST

ACCESS GATE AT FOR VEHICLE ENTRANCE

P.O.B.

USFS* U-1640
AREA * 2
0.204 ACRES

P.O.B.

USFS* U-1640
AREA * 3
0.025 ACRES

39
UNITED STATES FOREST SERVICE
DB 185 PG 665
TAX PIN: 7517 00 33 4005
USFS*: U-1640

LEGEND

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- NEW CONTROLLED ACCESS RIGHT-OF-WAY
- NEW RIGHT-OF-WAY
- PDE — NEW PERMANENT EASEMENT (DRAINAGE)
- PUE — NEW PERMANENT EASEMENT (UTILITY)
- SHADED FOR TRANSFER TO THE N.C. DEPARTMENT OF TRANSPORTATION

Scale 1" = 60'
60' 0 60' 120'

I, Clinton B. Osborne, a Professional Land Surveyor in the state of North Carolina, hereby certify that this map has been prepared for the NC Department of Transportation, in conformance with the Standards of Practice for Land Surveying in North Carolina (21 NCAC 56.1600) and that the information shown hereon was compiled from existing deeds, plats and other documents of record and from ground surveys made by me or under my supervision on 09/30/2025. All distances and coordinates shown hereon are horizontal ground distances and NAD83 grid coordinates unless otherwise noted. All traverse closures and computations and map compilations to compose this map were performed under my supervision and meet the requirements of the NCDOT Location & Surveys Unit Property Mapping Manual. Unless otherwise noted, this survey is a Category 1 Condition 2 boundary survey. Boundary information shown on this map was compiled from best available evidence surveys by others, recorded deeds, and/or GIS/tax map information. This map has been prepared as an exhibit for the United States Forest Service only, and is not intended to comply with GS 47-30 and is not for recordation. Reference is hereby made to the Montgomery County Register of Deeds or with the NCDOT Right of Way Branch, Raleigh, N.C. for for additional information.

Witness my hand and seal on this day .../.../....

NORTH CAROLINA PROFESSIONAL SEAL L-3834 LAND SURVEYOR

Surveyor's Signature

CLINTON B. OSBORNE, PLS L-3834
Printed Surveyor's Name (Lic. #)

SURVEY NOTES

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3. ALL EXISTING CONDITIONS NOT SHOWN HEREON FOR CLARITY.

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
NEW RIGHT-OF-WAY & PERMANENT EASEMENT DEEDED FOR THE
UNITED STATES OF AMERICA -- U.S. FOREST SERVICE

THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
N.C.D.O.T. - TIP R-2417 - WBS 35211.1 - PARCEL 619

U.S. FOREST SERVICE No.: U-1673
CYPRESS TOWNSHIP - MONTGOMERY COUNTY - NC.

MAP COMPILED BY THE
STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION, DIVISION No. 8
LOCATION AND SURVEYS UNIT
20 DAY DRIVE
ASHEBORO, NC. 27203
PHONE: 336-626-0325

CLINTON E. GRIGGS, PLS
N.C. PROFESSIONAL LAND SURVEYOR No. 2514
SEPTEMBER, 15, 2015

VICINITY MAP NOT TO SCALE

SITE

NC HWY 24/27
MAG 8.5 NE 2CR

(19) UNITED STATES FOREST SERVICE
DB 214 PG 291
PAC C PG 60
TAX PIN 6098 00 77 3950
USFS*s U-1673

USFS* U-1673
AREA * 1
5.686 ACRES

USFS* U-1673
AREA * 2
0.582 ACRES

ACCESS BREAK FOR VEHICLE ENTRANCE

PUE — PERMANENT UTILITY EASEMENT
POE — PERMANENT OPEN EASEMENT
POB — POINT OF BEGINNING
EXISTING RW — EXISTING RIGHT-OF-WAY
NEW RW — NEW RIGHT-OF-WAY
GATES
FENCE LINE
CREEK
POND
TREE LINE
EXISTING RW
NEW RW
NEW CONTROLLED ACCESS RW
NEW PUE
NEW POE

LEGEND

NCDOT R/W MONUMENTS - STAMPED METAL DISCS ON REBARS
NCDOT PERMANENT EASEMENT MONUMENTS - STAMPED METAL DISCS ON REBARS
COMPUTED POINT
PROPERTY LINE - APPROXIMATE LOCATION
EXISTING RIGHT-OF-WAY
NEW CONTROLLED ACCESS RIGHT-OF-WAY
NEW RIGHT-OF-WAY
NEW PERMANENT EASEMENT (DRAINAGE)
NEW PERMANENT EASEMENT (UTILITY)

SHADED FOR TRANSFER TO THE N.C. DEPARTMENT OF TRANSPORTATION

Scale 1" = 50'
0 50' 100'

SURVEY NOTES

1. THE PURPOSE OF THIS MAP IS TO PROVIDE THE UNITED STATES FOREST SERVICE WITH A MAP ILLUSTRATING AREAS THAT NCDOT WILL BE PERMANENTLY EFFECT, EITHER BY RIGHT-OF-WAY OR EASEMENTS.
2. TEMPORARY EASEMENT NEEDED FOR THIS NCDOT PROJECT ARE NOT SHOWN HEREON.
3. ALL EXISTING CONDITIONS NOT SHOWN HEREON FOR CLARITY.

I, Clinton E. Griggs, a Professional Surveyor in the state of North Carolina, certify that this map was drawn by me or under my supervision; that the boundaries not surveyed are shown as broken lines plotted from information found in Deed Book 214 Page 291 and Deed Book 60 Page 77 of the Pacific Coast Lumber Company property; that the ratio of precision as calculated is 1:10,000; that this map was prepared in accordance with G.S. 47-30 as amended. Witness my hand and seal this the 15th day of September, A.D. 2015.

Witness my hand and seal this day ___/___/___

Surveyor's Signature

CLINTON E. GRIGGS, PLS L-2514
Printed Surveyor's Name L.S. #

SEAL L-2514 NORTH CAROLINA SURVEYOR

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
NEW RIGHT-OF-WAY & PERMANENT EASEMENT DEEDED FOR USE
UNITED STATES OF AMERICA -- U.S. FOREST SERVICE

THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
NCDOT – TIP: R-5021 – WBS: 50911.1 – PARCEL: 102

U.S. FOREST SERVICE No.: U-1709
CHARLES TOWNSEND – MONTGOMERY COUNTY – NC
MAP CONTAINS 87 TIES
TIES TO NC GRID NAD 83/2011
BEARINGS ARE BASED ON GRID NORTH PER GPS
LENGTHS ARE REDUCED GRID
US SURVEY FEET
ADMINISTRATIVE
FIELD: 03/26/2025
CLASSIC SURVEYING, PLLC
N.C. PROFESSIONAL LAND SURVEYOR, No. L-3321
SEPTEMBER 15, 2025

VICINITY MAP NOT TO SCALE

USFS# U-1709
AREA 71
6.288 ACRES

UNITED STATES OF AMERICA
DB 1171, PG 28
TAX PIN/REID: 00 09 2379
USFS#'s U-1709

LEGEND

- NCDOT R/W MONUMENTS = STAMPED METAL DISCS ON PEDESTAL
- NCDOT PERMANENT EASEMENT MONUMENTS = STAMPED METAL DISCS ON PEDESTAL
- COMPUTED POINT
- PROPERTY LINE – APPROXIMATE LOCATION
- EXISTING RIGHT-OF-WAY
- NCDOT CONTROLLED ACCESS RIGHT-OF-WAY
- NCDOT RIGHT-OF-WAY
- NCDOT PERMANENT EASEMENT OBTAINED
- NCDOT PERMANENT EASEMENT UTILITY
- SHADED FOR TRANSFER TO THE N.C. DEPARTMENT OF TRANSPORTATION

Scale: 0" = 50'

SURVEY NOTES

1. THE PURPOSE OF THIS MAP IS TO PROVIDE THE UNITED STATES FOREST SERVICE WHICH A MAP ILLUSTRATING AREAS THAT NCDOT WILL BE ACQUIRING IN FEE, EITHER BY RIGHT-OF-WAY OR EASEMENT.
2. TEMPORARY EASEMENT NEEDED FOR THIS NCDOT PROJECT ARE NOT SHOWN HEREON.
3. ALL EXISTING CONDITIONS NOT SHOWN HEREON FOR CLARITY.

I, [illegible], certify that the survey created by me or under my supervision (deed description recorded in Book [illegible], Page [illegible], etc.) (map recorded in Plat Book [illegible], Page [illegible], etc.); that the boundaries not surveyed are clearly indicated as drawn from information found in Book [illegible], Page [illegible], etc.; that the ratio of precision as calculated is 1:[illegible]; that this plat was prepared in accordance with G.S. 47-30 as amended. Witness my hand and seal this [illegible] day of [illegible], [illegible].

Surveyor's Signature

CLARK S. GRIFFIN, P.L.S. L-3321
Printed Surveyor's Name, P.L.S.

Construction Stipulations
North Carolina Department of Transportation
TIP No. R-2527
Widening of North Carolina Route NC 24/27
Montgomery County, North Carolina

This Stipulation, made this 17th day of April 2024, by and between the North Carolina Department of Transportation, hereinafter referred to as the State, and the Forest Service, United States Department of Agriculture, acting herein by and through the Forest Supervisor, hereinafter referred to as the Forest Supervisor.

WHEREAS, the State is engaged in widening 8.25 miles of NC 24/27 from a two-lane to a four-lane divided highway with a 46-foot depressed median from the Pee Dee River to the proposed Troy Bypass on the Uwharrie Ranger District of the Uwharrie National Forest, which traverses lands of the United States in the State of North Carolina, County of Montgomery administered by the Forest Service, and

WHEREAS, the State and the Forest Supervisor desire to cooperate in the improvement of NC 24/27 that will adequately protect and afford adequate utilization of the lands of the United States traversed by the highway for the purposes for which the lands are being administered.

NOW, THEREFORE, supplementary to the terms and conditions of the highway easement deed between the United States, and the State, the parties hereto agree to carry out the following provisions during the construction stage: (Construction stage is to begin when construction activities commence on lands administered by the Forest Service and end when the Forest Supervisor and the State mutually agree that any work done thereafter will be considered as maintenance, EXCEPT, that the Forest Supervisor reserves the right to reinstate the provisions of this stipulation if the State subsequently submits plans for reconstruction or alteration of the highway).
The State shall:

1. Before any clearing of the right-of-way or construction of the road begins:

a. **All plans and specifications must comply with the mitigation measures contained in this document and the Biological Evaluation dated April 2019 which is made part of these stipulations. The 90% construction plans dated July 28, 2020 and October 20, 2023 are made part of these stipulations. The 100% plans are expected in January 2025 and once finalized, are made part of these stipulations.**

b. Follow the fire protection plan that sets forth in detail the fire prevention, pre-suppression, and suppression measures that will be taken by the State, its employees, contractors, and subcontractors, and their employees in all operations during the construction stage. The fire plan shall be made available to all bidders prior to letting contract and the State shall cause its contractors to comply with all provisions of the fire plan and of all burning permits issued for disposal of flammable materials.

c. Follow the clearing plan that sets forth in detail the procedures and standards that will apply to all clearing and disposal of merchantable timber and young growth in the right-of-way and debris disposals, including debris removal from all streams. Such plan shall include provision for payment by the State or its contractors for the merchantable timber on lands of the United States to be cut, used, or destroyed in the construction of the highway or in clearing of said right-of-way. Payment for merchantable timber shall be at appraised value as determined by the Forest Supervisor: Provided, that the Forest Supervisor may dispose of the merchantable timber to other than the State or its contractors at no stumpage cost to the State or its contractors.

d. Follow the landscape and erosion control plan with the objective of protecting, restoring, or enhancing the roadside landscape, protecting soil, and protecting or reestablishing vegetative cover. Such plan shall, when appropriate, provide for vegetating cuts, fills, and other areas damaged as a result of highway construction; maintenance or operation; and for terraces, drainage, waste disposal areas, soil replacement, and other related requirements necessary to achieve the objective. Contract specifications pertaining to erosion control shall be made available to the Forest Service prior to contract advertisement.

2. Dispose of waste material resulting from slides during and after construction and surplus material at locations approved by the Forest Supervisor. A plan showing the proposed method of disposal shall be submitted by the State at the time approval is requested.

3. Permanently monument the right-of-way in accordance with State requirements for such right-of-way before completing construction, but in any event, the minimum requirements shall be to place permanent monuments at the intersection of right-of-way with all property lines, section lines, and at intervals of not more than 1,000 feet along the right-of-way limits.

4. Land monuments and property corners or witness markers shall not be damaged, destroyed, or obliterated without the prior permission of the Forest Supervisor and shall be relocated or reestablished in accordance with standards satisfactory to the Forest Supervisor.

IN WITNESS WHEREOF, the parties hereto have caused this Stipulation to be executed on the day and year first above written.

North Carolina Department of Transportation:

DocuSigned by:
Heather L. Fulghum
76686ECD712B469...

Heather Fulghum
Manager of Right-of-Way
North Carolina Department of Transportation

Date: 04/18/2024

United States Forest Service:

JAMES MELONAS
Digitally signed by JAMES MELONAS
Date: 2024.04.19 13:54:43 -04'00'

James E. Melonas
Forest Supervisor
National Forests in North Carolina

Date:_____

REQUIRED MITIGATION MEASURES
NCDOT Green Sheet Commitments July 2023

- In regard to the Wood Run Trailhead in the Uwharrie Recreation Trailhead, NCDOT will continue coordination with USFS to ensure that road access control does not hinder trailhead access. NCDOT will move, restore and/or replace all USFS signage. NCDOT will continue coordination with USFS to re-establish parking within the area of the trailhead parking area from NC 24/27 on USFS property.
- NCDOT will provide a 24' wide driveway for vehicles to have safe ingress/egress from the trailhead parking from NC 24/27, with two-way traffic. A 24' wide driveway with two-way access has been incorporated into the design.
- NCDOT will continue coordination with USFS that all USFS roads, shown in the maps in the ROW Consultation appendix, that are currently accessible by NC 24/27 will remain accessible to fire and logging equipment.
- Access to all USFS roads were coordinated with USFS and have been incorporated into the project design.
- NCDOT will use non-combustible material within the USFS property for guardrail.
- For selected USFS rare species of concern that may be directly impacted by the project, relocation has been determined to be appropriate mitigation for two plant species: Large Witch Alder and Quillwort. Pre-construction surveys for Quillwort will be conducted with USFS to identify all individuals within the construction footprint. NCDOT will coordinate relocation efforts with the USFS and relocate these plants to a suitable location, to be identified consultation with USFS.
- The NCDOT will not hinder USFS' prescribed burning as recommended by the Forest's Fire Management Officer.
- The removal of vegetation and grading for the initial project would follow installation of erosion and sedimentation control measures. Sediment and Tree Protection Fencing would be installed along the limits of the Project Area. These visual barriers would ensure construction equipment and contractors remain within approved disturbance limits. The NCDOT also commits to continue negotiations with the USFS to arrive at suitable mitigation for the loss of longleaf pine forest.
- NCDOT does anticipate high rock lines along the project length that will require blasting. However, no reliable quantification of potential rock blasting within USFS property will be available until they are able to investigate those areas. Borings have been laid out, but SF-299 permit was approved to continue these subsurface investigations. Approval of this document is required before that permit can be issued. If required, a blasting impact reduction plan is being developed for this project and would evolve through consultation with the USFS as information becomes available.
- Potential impacts to hydric soils were investigated as part of this evaluation. All soils occurring within the Project Area are considered non-hydric according to the NSCS Web Soil Survey. However, wetland delineations have been conducted and 1.95 acres of wetland were delineated in the Study Area. The Project Area includes 0.49 acre of wetlands that may be directly affected by construction. As part of permitting unavoidable impacts to these areas, the US Army Corps of Engineers requires demonstration of avoidance and minimization of impacts. No construction would begin until USACE and NCDWR approvals are issued.
- Erosion control measures will be designed for sensitive watershed standards in HQW Watersheds. This includes capturing runoff from larger storms and reducing the amount of exposed land and schedule for re-vegetation. Erosion Control measures (e.g., silt fence, matting, special sediment control fence, silt

checks, skimmer basins, etc.) will be put in place during the clearing and grubbing, and final stages of construction to help limit erosion while temporary and permanent seeding become established. Grasses swales, dissipator pads, and rip rap lined channels were designed to promote stability in these areas. An erosion and sedimentation control plan will be developed to reduce erosion and turbidity.

- The typical road section includes grassed swales and grassed shoulders to reduce flow velocity, promote sedimentation, infiltration, and runoff attenuation. The impervious percentage will increase; however, existing drainage patterns and outfalls were maintained as much as possible to minimize increases in flow and alteration of drainage patterns. Existing concerns are mainly due to undersized pipes that create increased velocities and scour holes at existing pipe outfalls. Receiving streams were visited to identify existing geometry and condition. This information was used to choose adequate and stable system outfalls. A 10 percent impervious assumption was used to accommodate any future projects upstream of these crossings. All outfalls were supplemented with rip-rap dissipator pads to help dissipate energy at the outlet.
- A Burn Management Plan was prepared by NCDOT and provided to USFS. The plan was reviewed by Uwharrie National Forest Fire Management Officer, Kelly Cagle, and requested no revisions or changes on 2/20/2019. The Burn Management Plan is included in the BE as Appendix A. To mitigate potential blasting impacts, NCDOT is developing a plan to address direct and indirect impacts.
- Access to the forest for maintenance, burning, and forest management is being considered during design. The road would be partial controlled access for much of its length, but NCDOT has committed to use no fencing; only concrete markers would be utilized along the entire R-2527 project (Pam Williams (NCDOT) personal communication; NCDOT Draft Right-of-Way Consultation, February 2019).
- Implementation of commitments and mitigation measures agreed to between NCDOT and USFS would minimize viability concerns that could result from direct impacts. These commitments and mitigation measures would include:

  - Include no fencing (except guardrails at localized areas with motorist safety concerns) and maintain access to the forest,
  - Prior to construction, NCDOT will coordinate with the USFS to identify occurrences of USFS rare plant species near the project construction limits and put up protective orange fencing to be removed after completion of construction,
  - Avoid placing staging areas within 250 feet of USFS rare plant species occurrences, where practicable,
  - Prohibit the use of herbicides and pesticides, and
  - NCDOT Division 8 forces will work with USFS staff on the periodic basis to control the presence of priority species of non-native plants along the NC 24/27 easement on UNF.
  - NCDOT will also work on adjacent NCDOT ROW to prevent the encroachment of priority non-natives on to UNF. In turn, USFS will work cooperatively with NCDOT to identify and effectively control prioritized non-native invasive plant species.

- In coordination with USFS, NCDOT has developed commitments and mitigation measures to minimize the spread of non-native invasive species (NNIS) plant species on NFS lands within the UNF associated with the construction and maintenance of improvements to NC 24/27.

  - To prevent the spread of non-native invasive plant species on UNF lands, NCDOT will require contractors to pressure wash all off-road equipment, including cranes, graders, pans, excavators, and loaders, prior to being brought in the UNF construction areas.
  - To control the spread of NNIS plant species on UNF lands, NCDOT, in coordination with the USFS, will locate and flag areas of NNIS plant species within the Study Area. If any of these areas are within areas of proposed fill, those areas will be cleared and grubbed, and the material disposed of outside the

limits of UNF. If NNIS plant species are located in areas of proposed cuts, then the material and actual thickness of root mat or others defined amount will be disposed of outside the limits of UNF.

- In consultation with the USFS, seed mixes of native grasses and forbs or non-aggressive, non-natives will be used on UNF lands for erosion control and revegetation.
- NCDOT will utilize seed mixes for erosion control and revegetation on the UNF will be developed in consultation with USFS.
- NCDOT will coordinate with the USFS on a landscaping plan UNF lands. The plan will detail appropriate native seeding mixed for erosion control and site-specific control methods for invasive species. The plan will also outline a plan for ongoing coordination between NCDOT and USFS personnel to maintain vegetation diversity and ensure no long-term impacts to rare species along the project corridor.

FIRE PROTECTION PLAN

During the period of construction, the State shall both independently and in cooperation with the Forest Service, do everything that is reasonable and practical to prevent and suppress forest fires on the easement area and in its immediate vicinity. All contracts and subcontracts for the construction of the road shall include provisions requiring contractors, subcontractors, and their respective employees to do likewise. The State, the contractors, and subcontractors will conform to, but not be limited to, the following Fire Plan:

1. Take immediate independent or cooperative action to control and extinguish any fire, regardless of cause, within the easement area and its vicinity.

2. Be responsible for all damage and fire suppression costs incurred by any Government agency resulting from this use of National Forest lands. The contractor will require his personnel and equipment to be available for fire suppression, under the direction of the Forest Service, for all fires resulting from his operation.

3. The contractor will be required to contact the N.C. Forest Service and the U.S. Forest Service to obtain a permit for burning on the granted area. The N.C. State Forest Service will coordinate their burning permit with the U.S. Forest Service. The Forest Service will be contacted by the contractor if burning on private land is near Forest Service land.

4. At all times, when burning, the contractor shall have on the project a sufficient number of personnel and equipment to keep fire(s) under control.

5. Conduct burning operations on National Forest land in a manner prescribed by, and satisfactory to, the National Forest Officer in charge.

6. Provide adequate spark arrestors acceptable to the Forest Officer on all steam and internal combustion engines, including tractors, trucks power rollers, power shovels, and chain saws. The use of welding equipment, cutting torches, and similar flammable equipment must be done in an area cleared of all vegetation, leaves and debris. Power saws shall not be refueled while hot and shall be refueled in a roadway or other cleared area.

7. When the Forest Service advises the State that local fire weather conditions are becoming critical, the State shall keep with gasoline chain saws at all times, a shovel, and take precautionary measures requested by the Forest Service.

CLEARING PLAN

The State, or his contractors and subcontractors will conform to the following Clearing Plan:

1. The State, or his contractors, will pay for all merchantable timber on National Forest land to be cut, used, or destroyed in the construction of the highway or in clearing of said right-of-way. Lump sum payment for merchantable timber will be appraised value as determined by the Forest Supervisor using the R-8 timber appraisal schedule; provided, that the Forest Supervisor may dispose of the merchantable timber to other than the State or its contractors at no stumpage cost to the Grantee or its contractors.

2. Unmerchantable materials, including tops and branches, shall be disposed of by being used as brush barriers as directed by the Forest Service. Alternative methods of disposal, including any of the following methods or combinations of methods (lop and scatter, chip, remove, pile only), must be approved in advance by the Forest Service.

3. The maximum clearing and grubbing limits are to be set at 5 feet outside actual construction lines except that cutting of hazard trees outside these limits may be done with approval. Construction machinery is to be contained within the clearing limits.

4. The State does hereby agree that prior to clearing operations within the easement limits, that in consultation with the Forest Supervisor, the mitigation measures contained in the Biological Evaluation (BE) will be incorporated into the construction plan. If during the clearing phase of construction endangered, threatened, and sensitive species are encountered, the Forest Supervisor will be notified before clearing proceeds and a specific BE will be performed. If the BE concludes that adverse effects to endangered, threatened, and sensitive species is likely to occur, then it will be necessary to consult with the Forest Supervisor regarding the findings and diverse mitigation measures to ensure protection of the species.

LANDSCAPE AND EROSION CONTROL PLAN

The State or its contractor shall take necessary measures to prevent and control soil erosion within the right-of-way and on adjacent lands that might be affected by construction, operation, or maintenance of the highway; and shall revegetate, and keep revegetated, all areas of soil made bare by these activities, and shall constrain eroded material within the construction limits. To meet this objective the State or Contractor will accomplish the following provisions during construction:

1. Slope cut banks in earth or mixed earth and rock to a 1:1 or flatter slope, so that the banks will remain stable and support vegetation. Round top of bank.

2. Leave cut banks in a rough condition to provide good seed bed. Use serrated banks where needed to provide adequate seed bed.

3. Construction intercepting ditches above cut banks 30 feet or more in height. Ditches will have a 2 percent gradient to carry runoff into an adjacent stable channel.

4. Maintain uniform cut and fill slopes. Do not permit steep pitches, particularly at the toe of the slope.

5. Leave raised berm along fill sections until fill is stabilized. Provide stable drainage channels through berm and down fills at adequate intervals to prevent water concentration and gullying.

6. Protect fills with a suitable riprap where rills or gullies develop.

7. Slope earth fills to 1-1/2:1 or flatter to reduce sloughing.

8. Do not remove and replace culverts outside the normal seeding season, April 1 to September 30, or when precipitation is expected.

9. Install culverts on natural slope or so that they will drain on stable material. Use water spreading devices where needed to prevent gullying below culvert.

10. Construct toe walls or retaining walls at the toe of fills on steep slopes where sediment from the fill would reach the high water level or a live stream.

11. Establish and maintain a vegetative cover on all earth cut and fill banks on all mixed earth and rock banks which have enough soil due to construction. General guidelines for stabilization include:

(a) Seeding as construction progresses. A temporary cover crop will be established if there is a conflict in planting season. A permanent cover crop will be established at the first approved time of planting utilizing a seed mix approved by the USFS Botanist. Seed mixes may vary based on available soil moisture, slope, and distance from road; certain seed mixes may dictate a change in mowing frequency.

(b) Completing all seeding, fertilizing, and mulching within 14 days of construction during the seeding season, unless drought conditions prevail.

(c) Using a seed mixture adapted to soil, climate, and season. Mulching with straw tied down with cellulose or guar gum applications.

12. Seed bare soils within 100 feet of the streambank the same day as completion of soil disturbance. Use coir matting on slopes over 10% and within 100 feet of streambanks.

13. Use stream spanning structures in place of culverts at stream crossings and provide aquatic organism passage, where possible.

14. Comply with the Mitigation Measures contained within the Biological Evaluation (BE) prepared for the project. If any of the above stipulations conflict with the mitigation contained in the BE, those contained in the BE shall take precedence.

CULTURAL RESOURCE PLAN

If archaeological sites are discovered during construction, each will be evaluated by a professional archaeologist using the National Register of Historic Places, criteria of significance, using known data.

(a) In the event that archaeological site testing is required to evaluate significance, and the construction project cannot be moved so that no adverse effect will occur to the cultural resource, the public road agency will notify the Forest Supervisor for consultation before construction resumes.

(b) All activities requiring modifications to National Register listed or eligible sites will be coordinated by the Forest Service and the Advisory Council on Historic Places and the State Historic Preservation Officer, whether under easement or not.

(c) Testing or mitigating National Register sites will require a 1906 Antiquities Act permit, authorized by the Regional Forester and the Smithsonian Institution. The permit shall be sought prior to any investigations of this order.

(d) A report describing the sites found, their significance, and the judgments used to arrive at significant determinations, will be prepared by the public road agency's professional archaeologist and submitted to the Forest Supervisor for review.

(e) A "site" is defined as more than two artifacts in close proximity and older than 50 years.

R-2527 Federal Land Transfer

Survey Report

Uwharrie National Forest

Uwharrie Ranger District

Montgomery County, North Carolina

Overview: The NFNC Survey Department has reviewed the NCDOT Legal Descriptions and Parcel Drawings/dgns for the R-2527 Federal Land Transfer at the request of the NCDOT Liaison. The Survey Department has verified acreages and error of closures only.

Key Points:

- The computer-generated Legal Descriptions provided by the NCDOT do not meet standards for verification. Many parcel descriptions do not have the proper curve data to calculate acreage. (Exhibit A, attached)

- In lieu of the unsatisfactory written descriptions, dgn files for each parcel were provided by the NCDOT. • Dgns were reviewed to ensure closed polygons were created. Acreages were checked to ensure correlation with the Legal Description acreages. (Exhibit B, attached)

Conclusions: The dgn parcels meet Standards of Practice for error precision and appear to meet an acceptable standard of acreage accuracy when compared to the Legal Descriptions.

Prepared by: CALE MOODY Digitally signed by CALE MOODY Date: 2024.04.19 09:27:30 -04'00' _____

Cale Moody, P.L.S. N.C. (L-4877)
Civil Engineer Technician (Facilities)-Pisgah Zone
National Forests in North Carolina

Reviewed by: _____

Jason Holifield
Lands Program Assistant &Minerals Program Manager
National Forests in North Carolina

Prepared by: _____

Jeffrey Fillion
Forest Land Surveyor
National Forests in North Carolina

Excise Tax: Exempt (GS§105-228.28)

Prepared by: Martin T. McCracken, Special Deputy Attorney General, North Carolina Department of Transportation, Attorney General's Office, 1505 Mail Service Center, Raleigh, NC 27699-1505
Return to: NCDOT, Attn: Denise Amato, Real Property Agent, 1546 Mail Service Center, Raleigh, NC 27699-1546
The hereinafter described property does not include the primary residence of the GRANTOR.
STATE OF NORTH CAROLINA
COUNTY OF **Montgomery**
TAX PARCEL NUMBER:

DEED OF EASEMENT

THIS DEED, made this _____ day of _____, 20___, by and between the UNITED STATES OF AMERICA, acting by and through the DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, EASTERN FEDERAL LANDS HIGHWAY DIVISION (FHWA), and the STATE OF NORTH CAROLINA, acting by and through the DEPARTMENT OF TRANSPORTATION, an agency of the State of North Carolina (NCDOT), hereinafter referred to as the Grantee:

WITNESSETH:

WHEREAS, the Grantee has filed application under the provisions of the act of Congress of August 27, 1958, as amended (23 U.S.C. Section 317), for the right-of-way of a highway over certain Federal land under the jurisdiction of the United States Department of Agriculture, Forest Service in the State of North Carolina;

WHEREAS, this transfer is further authorized under the provisions of the Act of congress approved October 15, 1966 (80 Stat. 931, 937 Section 6(a)(1)(A);

WHEREAS, the Federal Lands Highway Division Engineer, pursuant to delegations of authority from the Secretary of Transportation, has determined that an easement over the land covered by the application is reasonably necessary for a right-of-way for the construction of NC 24-27 in and through the Uwharrie National Forest, Montgomery County, Federal Aid Project No. 0024093;

WHEREAS, the Department of Agriculture, acting by and through the United States Forest Service, in its consent to the appropriation of the federal land, has agreed to the transfer by the FHWA of an easement over the land to the Grantee;

WHEREAS, the easement rights transferred will affect a portion of the Uwharrie National Forest, Montgomery County, as shown on project plans NCDOT R-2527 described as: NC 24-27 from NC 73 to the Troy Bypass, Federal Aid Project No. 0024093, dated February 27, 2019, parcel 014, plan sheets 9, 10, 11, 32 & 33, parcel 015, plan sheets 11, 12 & 13, parcel 017, plan sheets 14 & 15, parcel 019, plan sheets 17, 18 & 19, parcel 039, plan sheets 27, 28, 29, 30, 31 & 32;

WHEREAS, the project plans are on file at the Department of Transportation, 1 South Wilmington St., Raleigh, NC, 7601, and will be recorded, pursuant to NC Gen. Stat. §136-19.4, in the Office of the Montgomery County Register of Deeds.

NOW, THEREFORE, the FHWA, as authorized by law, and in compliance with all requirements imposed by or pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary of Transportation, Part 21, "Nondiscrimination in Federally-assisted programs of the Department of Transportation (49 CFR 21.2 – 21.23)", pertaining to and effectuating the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252; 42 U.S.C. Sections 2000d to2000d-4), does hereby grant to the Grantee an easement described in Exhibit "A" attached hereto and made a part hereof, over, across, and upon certain lands in the Uwharrie National Forest, Montgomery County, for the construction, operation and maintenance of a highway and use of the space above and below the established grade line of the highway pavement for highway purposes, which lands and easements are more particularly shown on project plans for the construction of NCDOT project R-2527, Federal Aid Project No. 0024093, dated February 27, 2019, incorporated herein by reference, and made part hereof; subject, however, to the following terms, conditions, and covenants:

1. Outstanding valid claims, if any, existing on the date of this grant, and the Grantee shall obtain such permission as may be necessary on account of any such claims.

2. The Grantee and the Forest Service authorized officer shall make a determination as to the necessity for archeological and paleontological reconnaissance and salvage within the right-of-way, and such reconnaissance and salvage, to the extent determined necessary because of construction of the highway facility, is to be undertaken by the Grantee in compliance with the acts entitled "An Act for the Preservation of American Antiquities", approved June 8, 1906 (34 Stat. 225, 16 U.S.C. 432-433), and the "Archaeological Resources Protection Act of 1979" (93 Stat. 721, 16 U.S.C. 470aa-47011), and State laws where applicable.

3. Unless the Grantee and the Forest Service authorized officer stipulate as to a shorter time, the easements herein granted shall terminate ten (10) years from the date of the execution of this deed by the United States of America, in the event that construction of a highway on the right-of-way is not started during such ten-year period.

4. The easements herein granted are limited to uses described, and the space above and below the established grade line of the highway pavement, for the purpose of construction, operation, and maintenance of highway and other easements in accordance with the approved plans described in the following condition number 5, and does not include the grant of any rights for non-highway purposes or facilities; provided that the right of the Forest Service to use or authorize the use of any portion of the right-of-way for non-highway purposes shall not be exercised when such use would be inconsistent with the provisions of Title 23 of the United States Code and of the Federal Highway Administration regulations issued pursuant thereto, or would interfere with the free flow of traffic, or impair the full use and safety of the highway; and in any case, the Grantee and the FHWA shall be consulted prior to the exercise of such rights, provided further, that nothing herein shall preclude the Forest Service from locating National Forest and other Department of Agriculture information signs on the portions of the right-of-way outside of the construction clearing limits.

5. The design and construction of the highway project situated on the right-of-way will be in accordance with the provisions of Title 23, U.S.C. – Highways, 23 CFR, and amendments; the Regulations for the Administration of Federal Aid for Highways, effective May 11, 1960, and amendments and established procedures for Federal-aid

projects, including the requirements of Title 23, Code of Federal Regulations, Part 771, and the construction specifications of the NCDOT as approved by the FHWA for use on Federal-aid projects.

The Forest Service authorized officer will be provided an opportunity to review plans relative to the effects, if any, that the project works as planned will have upon adequate protection and utilization of the land traversed by the right-of-way and adjoining land under the administration of the Forest Service for the purposes for which such land is being administered. Those features of design, construction, and maintenance of the highway facility and the use of the right-of-way that would have an effect on the protection and utilization of the land under the administration of the Forest Service are to be mutually agreed upon by the Forest Service authorized officer and the Grantee by conference or other communication during the preparation of the plans and specifications of each construction project; and the plans shall be revised, modified, or supplemented to meet the approval of the Forest Service authorized officer, or when deemed appropriate, supplemented by written stipulation between the Forest Service authorized officer and the Grantee, prior to the start of construction.

The final design and the construction specifications for any highway construction project on the right-of-way will be presented to the Forest Service authorized officer for approval; and construction shall not begin until such approval is given; provided, that if it is subsequently deemed necessary that the approved plans, specifications, or stipulations be amended or supplemented, any amendment or supplement which affects alignment, subgrade, or natural resources shall be approved by the Forest Service authorized officer and the NCDOT before being placed in effect.

6. Consistent with highway safety standards, the Grantee shall:
    a. Protect and preserve soil and vegetative cover, and scenic and aesthetic values, on the right-of-way outside of construction limits.
    b. Provide for the prevention and control of soil erosion within the right-of-way and adjacent lands that might be affected by the construction, operation or maintenance of the highway, and shall vegetate and keep vegetated with suitable species all earth cut or fill slopes feasible for re-vegetation, or other areas on which ground cover is destroyed, where it is deemed necessary during a joint review between the Forest Service authorized officer and the Grantee prior to completion of the highway; and the Grantee shall maintain all terracing, water bars, lead-off ditches, or other preventive works that may be required to accomplish this objective. This provision shall also apply to slopes that are repaired following slides which occur during or after construction.

7. The Grantee shall establish no borrow, sand, or gravel pits, stone quarries, permanent storage areas, sites for highway operation and maintenance facilities, camps, supply depots, or disposal areas within the right-of-way, unless shown on approved construction plans, without first obtaining approval of the Forest Service authorized officer.

8. The Grantee shall maintain the clearing of the right-of-way by means of chemicals only after specific written approval has been given by the Forest Service authorized officer. Application for such approval must be in writing and specify the time, methods, chemicals, and exact portion of the right-of-way to be chemically treated.

9. The Grantee in consideration of the conveyance of said land, does hereby covenant and agree, as a covenant running with the land for itself, its successors and assigns, that (a)

no person shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination with regard to any facility located wholly or impart on, over, or under such lands hereby conveyed; (b) that the Grantee shall use said land so conveyed in compliance with all requirements imposed by or in pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary of Transportation, Part 21, "Nondiscrimination in Federally assisted programs of the Department of Transportation", implementing Title VI of the Civil Rights Act of 1964, and as said regulations may be amended.

In the event of breach of any of the above-mentioned nondiscrimination conditions, the FHWA shall have the right to re-enter said land, and facilities on said land, and the above-described land and facilities shall thereon revert to and vest in and become the absolute property of the Department of Agriculture-Forest Service, and it assigns, as such interest existed prior to this instrument.

10. When need for the easement herein granted shall no longer exist and the area has been reasonably rehabilitated to protect the public and environment, the Grantee shall give notice of that fact to the Secretary of Transportation and the rights herein granted shall terminate and the land shall immediately revert to the full control of the Secretary of the Department of Agriculture or their assigns.

IN WITNESS WHEREOF, I _____, Division Administrator, pursuant to delegations authority from the Secretary of Transportation the Federal Highway Administrator, and the Chief Counsel, Federal Highway Administration, by virtue of authority vested in me by law, hereunto subscribe my name as to the day and year first above written.

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

BY: _____
Yolonda Jordan
Division Administrator
North Carolina Division
Federal Highway Administration

State of North Carolina
County of Montgomery

I, _____, a Notary Public in and for the county of _____, do hereby certify that on this _____ day of_____, 20___, before me personally appeared **Yolanda Jordan, Division Administrator, North Carolina Division, Federal Highway Administration**, and acknowledge that the foregoing instrument was executed by her in her official capacity and by authority vested in her by law, for the purposes and intents in said instruments described and set forth, and acknowledge the same to be her free act and deed as Division Administrator, Federal Highway Administration.

Witness my hand and seal the _____ day of _____, 20 ___.

_____
Notary Public
My commission expires: _____

ACCEPTED:

In compliance with the conditions set forth in the foregoing deed, the Department of Transportation, an agency of the State certifies, and by acceptance of this deed, accepts the land herein described and agrees for itself, its successors and assigns forever to abide by the conditions set forth in said deed.

DEPARTMENT OF TRANSPORTATION

BY: _____
Heather L. Fulghum
Manager of Right-of-Way Unit

State of North Carolina
County of Montgomery

I, _____, a Notary Public in and for the county of _____ do hereby certify that on this _____ day of _____, 20 _____, before me personally appeared **Heather L. Fulghum, Manager of Right of Way Unit, of the Department of Transportation** and acknowledged that the foregoing instrument, was executed by her in her official capacity and by authority vested in her by law, for the purposes and intents in said instruments described and set forth, and acknowledged the same to be her free act and deed as Manager of Right of Way Unit, the Department of Transportation.

Witness my hand and seal this _____ day of _____, 20 _____.

_____
Notary Public

My commission expires: _____

ATTORNEY CERTIFICATON:

Martin T. McCracken, an attorney licensed to practice law in the State of North Carolina, hereby certifies that this deed is legally sufficient for its stated purpose.

Date: _____

_____
Martin T. McCracken
Special Deputy Attorney General
North Carolina State Bar No. 21362

EXHIBIT A

Reference is made to the project plans for Department of Transportation Project R-2527 NC 24-27 from NC 73 to the Troy Bypass, Montgomery County, for survey stations and greater certainty of descriptions. The project plans are on file at the Department of Transportation, 1 South Wilmington St., Raleigh, NC 27601 and will be recorded, pursuant to NC Gen. Stat. §136-19.4, in the Office of the Montgomery County Register of Deeds.

NCDOT Project R-2527

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E:
1705433.255 Z: 547.02

NEW AREA #1: USFS# U-97 Area #1: Beginning at POB, N.C. "Localized" Grid Coordinates = N:567,670.3691 E:1,696,337.4852, thence N 06A27'51" W 179.62 ft. to point; thence N 7A11'57" E 34.66 ft. to point; thence N 66A14'17" E 209.23 ft. to point; thence S 02A31'59" W 177.46 ft. to point; thence S 66A14'17" W 216.39 ft.; returning to the place of beginning; containing 0.849 acre more or less.

NEW AREA #2: USFS# U-97 Area #2: Beginning at POB, N.C. "Localized" Grid Coordinates = N:567,514.2625 E:1,696,355.1725, thence N 66A14'17" E 29.85 ft. to point; thence S 21A30'51" E 16.08 ft. to point; thence S 53A09'15" W 15.51 ft. to point; thence S 07A17'28" E 12.62 ft. to point; thence S 74A09'08" W 19.74 ft. to point; thence N 06A27'51" W 30.33 ft. returning to the place of beginning; containing 0.019 acre more or less.

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E: 1705433.255 Z: 547.02

NEW AREA #1: USFS# U-291 Area #1: Beginning at POB, N.C. "Localized" Grid Coordinates = N:570,364.2570 E:1,687,422.9468, thence N 01"39'09" E 112.98 ft. to point; thence S 64"24'05" E 203.29 ft. to point; thence S 64"24'05" E 290.28 ft. to point; thence N 32"14'12" E 11.62 ft. to point; thence S 57"45'48" E 30.00 ft. to point; thence S 32"14'12" W 11.05 ft. to point; thence S 53"36'57" E 111.02 ft. to point; thence S 53"36'57" E 35.01 ft. to point; thence S 53"36'57" E 140.82 ft. to point; thence N 38"53'12" E 10.65 ft. to point; thence S 51"06'48" E 30.00 ft. to point; thence S 38"53'12" W 11.02 ft. to point; thence S 47"03'47" E 252.83 ft. to point; thence S 51"20'35" E 18.89 ft. to point; thence S 09"55'08" E 2.34 ft. to point; thence S 47"03'47" E 24.94 ft. to point; thence S 54"55'10" E 736.52 ft. to point; thence S 02"20'42" W 125.28 ft. to point; thence N 54"51'49" W 1477.79 ft. to point; thence along a curve turning to the left, having a radius of 3375.0000 ft. and having a chord with a bearing of N 57"28'04" W and a chord distance of 306.71 ft., an arc distance of 306.82 ft. along said curve to point, thence along a curve turning to the left, having a radius of 1505.0000 ft. and having a chord with a bearing of N 61"44'21" W and

a chord distance of 87.55 ft., an arc distance of 87.57 ft. along said curve returning to the place of beginning; containing 5.191 acres more or less.

NEW AREA #2: USFS# U-291 Area #2: Beginning at POB, N.C. "Localized" Grid Coordinates = N:570,035.1922 E:1,687,672.3224, thence S 54"51'49" E 547.31 ft. to point; thence N 68"13'21" W 154.14 ft. to point; thence S 35"04'52" W 35.00 ft. to point; thence N 54"55'10" W 250.00 ft. to point; thence N 35"04'50" E 35.01 ft. to point; thence N 46"23'46" W 101.12 ft. to point; thence N 30"59'09" W 51.77 ft. returning to the place of beginning; containing 0.544 acre more or less.

NEW AREA #3: USFS# U-291 Area #3: Beginning at POB, N.C. "Localized" Grid Coordinates = N:569,348.9846 E:1,688,647.3783, thence S 54"51'49" E 115.00 ft. to point; thence S 84"59'05" W 84.97 ft. to point; thence N 54"55'10" W 50.00 ft. to point; thence N 35"04'50" E 54.84 ft. returning to the place of beginning; containing 0.104 acre more or less.

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E: 1705433.255 Z: 547.02

NEW AREA #1: USFS# U-374 Area #1: Beginning at POB, N.C. "Localized" Grid Coordinates = N:571,752.6398 E:1,708,813.6853, thence N 00A22'33" E 89.77 ft. to point; thence N 69A43'18" E 2771.99 ft. to point; thence N 20A16'42" W 20.00 ft. to point; thence N 69A43'18" E 30.00 ft. to point; thence S 88A28'37" E 53.85 ft. to point; thence N 69A43'18" E 1110.00 ft. to point; thence N 20A16'42" W 20.00 ft. to point; thence N 69A43'18" E 40.00 ft. to point; thence S 20A16'42" E 20.00 ft. to point; thence N 69A43'18" E 109.20 ft. to point; thence S 02A02'29" W 90.77 ft. to point; thence S 02A02'29" W 0.03 ft. to point; thence S 69A43'18" W 4108.37 ft. returning to the place of beginning; containing 7.969 acres more or less.

NEW AREA #2: USFS# U-374 Area #2: Beginning at POB, N.C. "Localized" Grid Coordinates = N:573,640.5344 E:1,713,929.6839, thence N 01A58'59" E 0.32 ft. to point; thence N 01A58'59" E 88.36 ft. to point; thence along a curve turning to the right, having a radius of 3000.0000 ft. and having a chord with a bearing of N 72A32'35" E and a chord distance of 13.22 ft., an arc distance of 13.22 ft. along said curve to point, thence N 17A19'51" W 35.00 ft. to point; thence along a curve turning to the right, having a radius of 3035.0000 ft. and having a chord with a bearing of N 74A00'52" E and a chord distance of 142.50 ft., an arc distance of 142.51 ft. along said curve to point, thence S 14A38'25" E 35.00 ft. to point; thence along a curve turning to the right, having a radius of 3000.0000 ft. and having a chord with a bearing of N 81A56'11" E and a chord distance of 687.18 ft., an arc distance of 688.70 ft. along said curve to point, thence N 01A29'14" W 25.00 ft. to point; thence along a curve turning to the right, having a radius of 3025.0000 ft. and having a chord with a bearing of N 88A45'43" E and a chord distance of 26.30 ft., an arc distance of 26.30 ft. along said curve to point, thence S 00A59'20" E 25.00 ft. to point; thence along a curve turning to the right, having a radius of 3000.0000 ft. and having a chord with a bearing of S 89A50'35" E and a chord distance of 119.99 ft., an arc distance of 120.00 ft. along said curve to point, thence N 81A44'38" E 133.33 ft. to point; thence along a curve turning to the right, having a radius of 3025.0000 ft. and having a chord with a bearing of S 85A58'42" E and a chord distance of 24.02 ft.,

an arc distance of 24.02 ft. along said curve to point, thence S 16A20'17" E 116.56 ft. to point; thence along a curve turning to the left, having a radius of 2940.0000 ft. and having a chord with a bearing of S 83A27'51" W and a chord distance of 1173.88 ft., an arc distance of 1181.82 ft. along said curve, returning to the place of beginning; containing 2.431 acres more or less.

NEW AREA #3: USFS# U-374 Area #3: Beginning at POB, N.C. "Localized" Grid Coordinates = N:571,592.4334 E:1,708,812.8863, thence N 69A43'18" E 25.88 ft. to point; thence S 11A31'34" E 184.86 ft. to point; thence N 23A33'59" W 102.42 ft. to point; thence N 65A48'07" W 23.64 ft. to point; thence N 01A05'22" E 68.61 ft. returning to the place of beginning; containing 0.086 acre more or less.

NEW AREA #4: USFS# U-374 Area #4: Beginning at POB, N.C. "Localized" Grid Coordinates = N:571,622.4411 E:1,708,894.1023, thence N 69A43'18" E 48.35 ft. to point; thence S 13A00'47" W 57.25 ft. to point; thence S 01A59'51" W 102.67 ft. to point; thence N 11A31'34" W 144.54 ft. returning to the place of beginning; containing 0.066 acre more or less.

NEW AREA #5: USFS# U-374 Area #5: Beginning at POB, N.C. "Localized" Grid Coordinates = N:571,751.8364 E:1,709,244.3114, thence N 69A43'18" E 200.00 ft. to point; thence S 20A16'42" E 30.00 ft. to point; thence S 69A43'18" W 200.00 ft. to point; thence N 20A16'42" W 30.00 ft. returning to the place of beginning; containing 0.138 acre more or less.

NEW AREA #6: USFS# U-374 Area #6: Beginning at POB, N.C. "Localized" Grid Coordinates = N:572,791.5766 E:1,712,058.3726, thence N 69A43'18" E 75.00 ft. to point; thence S 20A16'42" E 16.00 ft. to point; thence S 69A43'18" W 75.00 ft. to point; thence N 20A16'42" W 16.00 ft. returning to the place of beginning; containing 0.028 acre more or less.

NEW AREA #7: USFS# U-374 Area #7: Beginning at POB, N.C. "Localized" Grid Coordinates = N:572,869.5570 E:1,712,269.4269, thence N 69A43'18" E 375.00 ft. to point; thence S 20A16'42" E 29.00 ft. to point; thence S 69A43'18" W 375.00 ft. to point; thence N 20A16'42" W 29.00 ft. returning to the place of beginning; containing 0.250 acre more or less.

NEW AREA #8: USFS# U-374 Area #8: Beginning at POB, N.C. "Localized" Grid Coordinates = N:573,480.3934 E:1,713,924.1390, thence along a curve turning to the right, having a radius of 2790.0000 ft. and having a chord with a bearing of N 78A48'58" E and a chord distance of 776.14 ft., an arc distance of 778.66 ft. along said curve to point, thence S 67A56'15" W 100.52 ft. to point; thence along a curve turning to the left, having a radius of 2735.0000 ft. and having a chord with a bearing of S 82A49'59" W and a chord distance of 190.22 ft., an arc distance of 190.26 ft. along said curve to point, thence S 09A09'35" E 35.00 ft. to point; thence along a curve turning to the left, having a radius of 2700.0000 ft. and having a chord with a bearing of S 80A07'47" W and a chord distance of 66.96 ft., an arc distance of 66.96 ft. along said curve to point, thence N 72A56'36" W 73.77 ft. to point; thence along a curve turning to the left, having a radius of 2735.0000 ft. and having a chord with a bearing of S 75A04'54" W and a chord distance of 283.27 ft., an arc distance of 283.40 ft. along said curve to point, thence S 71A10'00" W 80.35 ft. to point; thence N 01A58'59" E 34.23 ft. returning to the place of beginning; containing 0.606 acre more or less.

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E: 1705433.255 Z: 547.02

NEW AREA #1: USFS# U-675 Area #1: Beginning at POB= N.C. "Localized" Grid Coordinates = N:566,944.2996 E:1,692,736.7408, thence N 47A31'18" E 6.83 ft. to point; thence S 65A06'44" E 13.64 ft. to point; thence N 82A01'14" W 3.37 ft. to point; thence N 87A19'32" W 14.08 ft. returning to the place of beginning; containing 0.001 acre more or less.

NEW AREA #2: USFS# U-675 Area #2: Beginning at POB= N.C. "Localized" Grid Coordinates = N:566,858.7290 E:1,692,643.2859, thence N 47A31'18" E 96.19 ft. to point; thence along a curve turning to the left, having a radius of 2700.0000 ft. and having a chord with a bearing of S 73A29'20" E and a chord distance of 157.35 ft., an arc distance of 157.37 ft. along said curve to point, thence N 14A50'29" E 20.00 ft. to point; thence S 76A06'42" E 89.17 ft. to point; thence S 12A56'06" W 20.00 ft. to point; thence along a curve turning to the left, having a radius of 2700.0000 ft. and having a chord with a bearing of S 85A26'29" E and a chord distance of 786.64 ft., an arc distance of 789.45 ft. along said curve to point, thence N 03A49'04" W 40.00 ft. to point; thence N 84A39'40" E 141.22 ft. to point; thence S 57A13'38" E 62.05 ft. to point; thence along a curve turning to the left, having a radius of 2700.0000 ft. and having a chord with a bearing of N 81A41'15" E and a chord distance of 41.33 ft., an arc distance of 41.33 ft. along said curve to point, thence N 13A35'40" W 105.67 ft. to point; thence S 82A58'10" E 11.50 ft. to point; thence S 09A02'24" E 21.05 ft. to point"; thence S 46A16'30" E 44.37 ft. to point; thence S 02A57'51" E 130.83 ft. to point; thence along a curve turning to the right, having a radius of 2790.0000 ft. and having a chord with a bearing of N 84A57'52" W and a chord distance of 1358.14 ft., an arc distance of 1371.92 ft. along said curve returning to the place of beginning; containing 2.824 acres more or less.

NEW AREA #3: USFS# U-675 Area #3: Beginning at POB= N.C. "Localized" Grid Coordinates = N:566,919.7799 E:1,693,900.6128, thence N 52A08'33" E 24.82 ft. to point; thence S 61A53'04" E 25.42 ft. to point; thence S 85A34'39" W 42.14 ft. returning to the place of beginning; containing 0.007 acre more or less.

NEW AREA #4: USFS# U-675 Area #4: Beginning at POB= N.C. "Localized" Grid Coordinates = N:566,602.7983 E:1,693,028.0514, thence along a curve turning to the left, having a radius of 2940.0000 ft. and having a chord with a bearing of S 82A09'36" E and a chord distance of 259.57 ft., an arc distance of 259.65 ft. along said curve to point, thence S 05A18'33" W 25.91 ft. to point; thence along a curve turning to the right, having a radius of 2960.0000 ft. and having a chord with a bearing of N 82A09'18" W and a chord distance of 261.86 ft., an arc distance of 261.95 ft. along said curve to point, thence N 10A22'47" E 25.89 ft. returning to the place of beginning; containing 0.155 acre more or less.

NEW AREA #5: USFS# U-675 Area #5: Beginning at POB= N.C. "Localized" Grid Coordinates = N:566,555.0313 E:1,693,518.4951, thence along a curve turning to the left, having a radius of 2940.0000 ft. and having a chord with a bearing of N 86A00'29" E and a chord distance of 486.67 ft., an arc distance of 487.22 ft. along said curve to point, thence S 02A57'51" E 17.67 ft. to point;

thence S 71A17'31" W 45.09 ft. to point; thence S 07A52'25" E 25.00 ft. to point; thence along a curve turning to the right, having a radius of 2985.0000 ft. and having a chord with a bearing of S 86A26'09" W and a chord distance of 448.65 ft., an arc distance of 449.07 ft. along said curve to point, thence N 00A44'45" E 50.89 ft. returning to the place of beginning; containing 0.542 acre more or less.

NEW AREA #1: USFS# U-1505 Area #1: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,774.1530 E:1,715,095.9350, thence N 16A20'17" W 116.56 ft. to point; thence along a curve turning to the right, having a radius of 3025.0000 ft. and having a chord with a bearing of S 84A58'56" E and a chord distance of 81.19 ft., an arc distance of 81.19 ft. along said curve to point, thence S 69A47'55" E 107.72 ft. to point; thence along a curve turning to the right, having a radius of 3000.0000 ft. and having a chord with a bearing of S 81A12'34" E and a chord distance of 105.84 ft., an arc distance of 105.84 ft. along said curve to point, thence S 79A22'15" E 99.48 ft. to point; thence N 32A35'08" E 75.94 ft. to point; thence N 12A35'31" E 150.00 ft. to point; thence S 77A24'29" E 20.84 ft. to point; thence S 12A35'31" W 243.12 ft. to point; thence S 60A46'59" W 93.29 ft. to point; thence along a curve turning to the left, having a radius of 2940.0000 ft. and having a chord with a bearing of N 81A57'27" W and a chord distance of 314.15 ft., an arc distance of 314.30 ft. along said curve returning to the place of beginning; containing 0.929 acre more or less.

NEW AREA #2: USFS# U-1505 Area #2: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,762.5643 E:1,715,546.9554, thence N 12A35'31" E 243.22 ft. to point; thence S 77A24'29" E 19.16 ft. to point; thence S 12A35'31" W 65.00 ft. to point; thence S 77A24'29" E 15.00 ft. to point; thence S 12A35'31" W 20.00 ft. to point; thence N 77A24'29" W 15.00 ft. to point; thence S 12A35'31" W 65.00 ft. to point; thence S 35A56'47" E 104.52 ft. to point; thence S 77A48'26" E 1027.00 ft. to point; thence N 12A11'34" E 123.00 ft. to point; thence S 77A48'26" E 216.00 ft. to point; thence S 12A11'34" W 123.00 ft. to point; thence S 77A48'26" E 212.99 ft. to point; thence S 79A11'26" E 270.72 ft. to point; thence along a curve turning to the left, having a radius of 1775.0000 ft. and having a chord with a bearing of S 86A35'39" E and a chord distance of 282.56 ft., an arc distance of 282.86 ft. along said curve to point, thence N 24A43'51" E 169.44 ft. to point; thence N 19A39'07" E 215.24 ft. to point; thence N 09A55'13" E 93.12 ft. to point; thence along a curve turning to the left, having a radius of 1859.8593 ft. and having a chord with a bearing of N 13A07'49" E and a chord distance of 332.37 ft., an arc distance of 332.82 ft. along said curve to point, thence S 81A59'46" E 6.21 ft. to point; thence S 03A23'56" W 128.33 ft. to point; thence S 03A26'07" W 24.91 ft. to point; thence S 03A39'15" W 24.71 ft. to point; thence S 04A05'32" W 24.52 ft. to point; thence S 04A44'57" W 24.33 ft. to point; thence S 05A37'30" W 24.14 ft. to point; thence S 06A43'12" W 23.95 ft. to point; thence along a curve turning to the right, having a radius of 1040.0000 ft. and having a chord with a bearing of S 12A54'55" W and a chord distance of 202.03 ft., an arc distance of 202.35 ft. along said curve to point, thence S 19A06'38" W 23.95 ft. to point; thence S 20A12'20" W 24.14 ft. to point"; thence S 21A04'54" W 24.33 ft. to point; thence S 21A44'18" W 24.52 ft. to point; thence S 22A10'34" W 24.71 ft. to point; thence S 22A23'42" W 24.89 ft. to point; thence S 22A25'53" W 269.72 ft. to point; thence along a curve turning to the right, having a radius of 1833.8600 ft. and having a chord with a bearing of N 86A54'15" W and a chord distance of 293.65 ft., an arc distance of 293.97 ft. along said curve to point, thence N 79A17'37" W 294.10 ft. to point; thence N 77A48'26" W 1485.94 ft.

to point; thence N 37A35'44" W 93.96 ft. returning to the place of beginning; containing 5.637 acres more or less.

NEW AREA #3: USFS# U-1505 Area #3: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,310.0370 E:1,717,749.6785, thence N 22A25'53" E 133.01 ft. to point; thence along a curve turning to the left, having a radius of 1745.0000 ft. and having a chord with a bearing of N 77A44'54" E and a chord distance of 308.94 ft., an arc distance of 309.34 ft. along said curve to point, thence N 77A27'28" E 186.92 ft. to point; thence N 18A02'14" W 13.62 ft. to point; thence N 63A09'36" E 16.22 ft. to point; thence N 04A32'01" E 16.44 ft. to point; thence N 85A17'33" E 31.64 ft. to point; thence N 59A57'29" E 322.35 ft. to point; thence N 48A44'26" E 349.52 ft. to point; thence N 40A13'46" E 346.71 ft. to point; thence N 48A23'49" W 5.36 ft. to point; thence N 41A36'11" E 30.00 ft. to point; thence S 48A23'49" E 5.45 ft. to point; thence N 43A18'55" E 735.98 ft. to point; thence N 45A07'35" W 10.41 ft. to point; thence N 44A52'25" E 30.00 ft. to point; thence S 45A07'35" E 11.29 ft. to point; thence N 50A03'09" E 146.53 ft. to point; thence S 26A54'15" W 18.49 ft. to point; thence S 04A49'43" W 34.70 ft. to point; thence S 47A10'10" E 25.97 ft. to point; thence S 81A39'47" E 38.55 ft. to point; thence S 70A31'53" E 26.26 ft. to point; thence S 45A33'43" E 24.01 ft. to point; thence S 79A48'39" E 18.66 ft. to point; thence S 50A45'17" E 7.37 ft. to point; thence along a curve turning to the left, having a radius of 3230.0000 ft. and having a chord with a bearing of S 43A55'12" W and a chord distance of 299.79 ft., an arc distance of 299.90 ft. along said curve to point, thence S 44A29'25" W 873.86 ft. to point; thence S 45A58'36" W 294.09 ft. to point; thence along a curve turning to the right, having a radius of 1833.8600 ft. and having a chord with a bearing of S 67A37'02" W and a chord distance of 1171.21 ft., an arc distance of 1192.09 ft. along said curve returning to the place of beginning; containing 8.388 acres more or less.

NEW AREA #4: USFS# U-1505 Area #4: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,572.3169 E:1,715,429.9730, thence S 77A48'22" E 37.27 ft. to point "290"; thence S 11A57'01" W 16.11 ft. to point; thence N 78A11'22" W 37.18 ft. to point; thence N 11A37'48" E 16.36 ft. returning to the place of beginning; containing 0.014 acre more or less.

NEW AREA #5: USFS# U-1505 Area #5: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,462.1087 E:1,715,940.0156, thence S 77A48'26" E 95.00 ft. to point; thence S 12A11'34" W 49.00 ft. to point; thence N 77A48'26" W 95.00 ft. to point; thence N 12A11'34" E 49.00 ft. returning to the place of beginning; containing 0.107 acre more or less.

NEW AREA #6: USFS# U-1505 Area #6: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,298.4280 E:1,716,697.5337, thence S 77A48'26" E 180.00 ft. to point; thence S 12A11'34" W 116.00 ft. to point; thence N 77A48'26" W 125.00 ft. to point; thence N 13A10'29" W 128.38 ft. returning to the place of beginning; containing 0.406 acre more or less.

NEW AREA #7: USFS# U-1505 Area #7: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,192.7285 E:1,717,210.3205, thence S 79A19'21" E 31.23 ft. to point; thence S 09A36'35" W 18.41 ft. to point; thence N 80A03'11" W 31.44 ft. to point; thence N 10A16'08" E 18.81 ft. returning to the place of beginning; containing 0.013 acre more or less.

NEW AREA #8: USFS# U-1505 Area #8: Beginning at POB= N.C. "Localized" Grid

Coordinates = N:573,154.3008 E:1,717,523.7766, thence along a curve turning to the left, having a radius of 1983.8600 ft. and having a chord with a bearing of S 88A49'22" E and a chord distance of 52.99 ft., an arc distance of 52.99 ft. along said curve to point, thence S 22A25'53" W 661.85 ft. to point; thence along a curve turning to the right, having a radius of 5815.4675 ft. and having a chord with a bearing of S 23A55'08" W and a chord distance of 301.91 ft., an arc distance of 301.95 ft. along said curve to point, thence N 64A36'04" W 19.97 ft. to point; thence S 89A19'33" W 28.97 ft. to point; thence N 01A59'17" W 32.66 ft. to point; thence N 89A12'33" E 22.21 ft. to point"; thence N 25A18'02" E 56.18 ft. to point; thence N 26A44'36" E 48.55 ft. to point; thence N 35A17'11" E 52.88 ft. to point; thence N 37A17'37" E 53.82 ft. to point; thence N 19A57'37" E 92.03 ft. to point; thence N 19A39'07" E 616.99 ft. returning to the place of beginning; containing 0.735 acre more or less.

NEW AREA #9: USFS# U-1505 Area #9: Beginning at POB= N.C. "Localized" Grid Coordinates = N:572,805.9666 E:1,717,659.4976, thence N26034'32"W, a distance of 14.83 feet; thence N63025'28"E, a distance of 16.77 feet; thence N23011'42"E, a distance of 5.62 feet; thence N52017'23"E, a distance of 1.95 feet; thence S27036'30"W, a distance of 5.85 feet; thence S23011'5l"W, a distance of 23.86 returning to the place of beginning; containing 0.0031 acres, more or less.

NEW AREA #10: USFS# U-1505 Area #10: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,083.9503 E:1,717,826.8174, thence S 40A31'34" E 32.09 ft. to point; thence S 28A40'07" W 278.94 ft. to point; thence S 52A17'23" W 13.32 ft. to point; thence N 23A11'39" E 4.42 ft. to point; thence N 27A36'30" E 91.35 ft. to point; thence N 52A17'23" E 15.05 ft. to point; thence N 61A19'53" W 28.58 ft. to point; thence N 28A40'07" E 193.02 ft. returning to the place of beginning; containing 0.144 acre more or less.

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E: 1705433.255 Z: 547.02

NEW AREA #1: USFS# U-1640 Area #1: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,176.5199 E:1,712,667.4228, thence N 02A02'29" E 0.03 ft. to point, thence N 02A02'29" E 90.77 ft. to point; thence N 69A43'18" E 1082.90 ft. to point; thence N 70A31'38" E 245.20 ft. to point; thence along a curve turning to the right, having a radius of 3000.0000 ft. and having a chord with a bearing of N 72A15'54" E and a chord distance of 15.90 ft., an arc distance of 15.90 ft. along said curve to point, thence S 01A58'59" W 88.36 ft. to point; thence S 01A58'59" W 0.32 ft. to point; thence along a curve turning to the left, having a radius of 2940.0000 ft. and having a chord with a bearing of S 70A50'06" W and a chord distance of 114.24 ft., an arc distance of 114.25 ft. along said curve to point, thence S 69A43'18" W 1230.63 ft. returning to the place of beginning; containing 2.586 acres more or less.

NEW AREA #2: USFS# U-1640 Area #2: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,254.2609 E:1,713,310.6295, thence N 69A43'18" E 370.00 ft. to point; thence S 20A16'42" E 24.00 ft. to point; thence S 69A43'18" W 370.00 ft. to point; thence N 20A16'42" W 24.00 ft. returning to the place of beginning; containing 0.204 acre more or less.

NEW AREA #3: USFS# U-1640 Area #3: Beginning at POB= N.C. "Localized" Grid Coordinates = N:573,466.9311 E:1,713,886.3146, thence N 70A24'31" E 40.15 ft. to point; thence S 01A58'59" W 34.23 ft. to point; thence S 71A10'02" W 27.56 ft. to point; thence N 19A35'57" W 31.47 ft. returning to the place of beginning; containing 0.025 acre more or less.

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E: 1705433.255 Z: 547.02

NEW AREA #1: USFS# U-1673 Area #1: Beginning at POB= N.C. "Localized" Grid Coordinates = N:567,757.5625 E:1,696,535.5360, thence N 02A31'59" E 177.46 ft. to point; thence N 66A14'17" E 645.30 ft. to point; thence N 20A17'17" W 10.88 ft. to point; thence N 69A42'43" E 30.00 ft. to point; thence S 20A17'17" E 10.86 ft. to point; thence N 73A05'22" E 180.58 ft. to point; thence S 58A14'15" W 197.15 ft. to point; thence S 23A45'43" E 24.32 ft. to point; thence N 66A14'17" E 114.35 ft. to point; thence N 58A14'15" E 149.52 ft. to point; thence N 66A11'02" E 188.92 ft. to point; thence N 73A05'22" E 213.00 ft. to point; thence N 18A25'33" W 3.87 ft. to point; thence along a curve turning to the right, having a radius of 5900.0000 ft. and having a chord with a bearing of N 72A13'19" E and a chord distance of 133.39 ft., an arc distance of 133.39 ft. along said curve to point, thence N 17A07'49" W 15.00 ft. to point; thence along a curve turning to the right, having a radius of 5915.0000 ft. and having a chord with a bearing of N 73A01'45" E and a chord distance of 32.92 ft., an arc distance of 32.92 ft. along said curve to point, thence N 16A48'41" W 77.00 ft. to point; thence along a curve turning to the right, having a radius of 5992.0000 ft. and having a chord with a bearing of N 73A31'51" E and a chord distance of 71.59 ft., an arc distance of 71.59 ft. along said curve to point, thence S 12A37'48" W 9.46 ft. to point; thence S 79A18'22" E 12.44 ft. to point; thence S 16A03'51" E 78.10 ft. to point; thence along a curve turning to the right, having a radius of 5900.0000 ft. and having a chord with a bearing of N 74A25'31" E and a chord distance of 100.79 ft., an arc distance of 100.79 ft. along said curve to point, thence N 14A46'33" W 7.62 ft. to point; thence N 75A13'27" E 30.00 ft. to point; thence S 14A46'33" E 10.40 ft. to point; thence N 76A43'33" E 36.27 ft. to point; thence S 79A18'22" E 251.23 ft. to point; thence S 82A36'18" E 5.68 ft. to point; thence S 76A43'33" W 113.48 ft. to point; thence along a curve turning to the left, having a radius of 5804.5780 ft. and having a chord with a bearing of S 71A28'55" W and a chord distance of 1061.02 ft., an arc distance of 1062.51 ft. along said curve to point, thence S 66A14'17" W 851.15 ft. returning to the place of beginning; containing 5.686 acres more or less.

NEW AREA #2: USFS# U-1673 Area #2: Beginning at POB= N.C. "Localized" Grid Coordinates = N:568,136.9902 E:1,697,819.6512, thence along a curve turning to the right, having a radius of 5654.5780 ft. and having a chord with a bearing of N 72A49'00" E and a chord distance of 343.31 ft., an arc distance of 343.36 ft. along said curve to point, thence S 15A26'11" E 40.96 ft. to point; thence along a curve turning to the left, having a radius of 5600.0000 ft. and having a chord with a bearing of S 73A48'05" W and a chord distance of 149.00 ft., an arc distance of 149.01 ft. along said curve to point, thence S 16A57'39" E 87.00 ft. to point; thence along a curve turning to the left, having a radius of 7373.5906 ft. and having a chord with a bearing of S 72A30'21" W and a chord distance of 102.59 ft., an arc distance of 102.59 ft. along

said curve to point, thence N 18A01'38" W 87.00 ft. to point; thence along a curve turning to the left, having a radius of 5600.0000 ft. and having a chord with a bearing of S 71A31'28" W and a chord distance of 87.65 ft., an arc distance of 87.65 ft. along said curve to point, thence N 18A55'26" W 40.94 ft. returning to the place of beginning; containing 0.582 acre more or less.

NCDOT DATUM DESCRIPTION: 1) TIP: R-2527, 2) WBS: 35572.1.1, 3) HORIZONTAL DATUM: NAD83(NA2011), 4) VERTICAL DATUM: NAVD88, 5) GEOID MODEL: GEOID 12B, 6) COMBINED FACTOR: 0.9998523380, 7) GPS LOCALIZATION MONUMENT: "99", 8) NC GRID COORDINATES = N: 570400.050 E: 1705433.255 Z: 547.02

NEW AREA #1: USFS# U-1709 Area #1: Beginning at POB= N.C. "Localized" Grid Coordinates = N:569,307.3517 E:1,688,967.1673, thence N 02A20'42" E 125.28 ft. to point; thence S 54A55'10" E 2036.82 ft. to point; thence S 66A13'45" E 153.28 ft. to point; thence S 54A55'10" E 100.00 ft. to point; thence S 35A04'50" W 30.06 ft. to point; thence S 54A55'10" E 384.44 ft. to point; thence N 87A08'33" W 196.12 ft. to point; thence N 54A56'58" W 2118.15 ft. to point; thence along a curve turning to the right, having a radius of 5654.5780 ft. and having a chord with a bearing of N 54A54'23" W and a chord distance of 8.47 ft., an arc distance of 8.47 ft. along said curve to point, thence N 54A51'49" W 311.29 ft. returning to the place of beginning; containing 6.288 acres more or less.

EXHIBIT B

PARCEL	TRACT	LEGAL DESCRIPTION	CALCULATED AREA	WITHIN TOLERANCE
U-97				
	TRACT 1	0.849 AC.	0.849 AC.	YES
	TRACT 2	0.019 AC.	0.019 AC.	YES
U-291				
	TRACT 1	5.191 AC.	5.191 AC.	YES
	TRACT 2	0.544 AC.	0.544 AC.	YES
	TRACT 3	0.104 AC.	0.104 AC.	YES
U-374				
	TRACT 1	7.969 AC.	7.95045566 AC.	YES
	TRACT 2	2.431 AC.	2.43401263 AC.	YES
	TRACT 3	0.086 AC.	0.0863541736 AC.	YES
	TRACT 4	0.066 AC.	0.0663919927 AC.	YES
	TRACT 5	0.138 AC.	0.137741047 AC.	YES
	TRACT 6	0.028 AC.	0.0275482094 AC.	YES
	TRACT 7	0.250 AC.	0.249655647 AC.	YES
	TRACT 8	0.606 AC.	0.605997709 AC.	YES
U-675				
	TRACT 1	0.0001 AC.	0.000936554178 AC.	YES
	TRACT 2	2.824 AC.	2.82178476 AC.	YES
	TRACT 3	0.007 AC.	0.00661414601 AC.	YES
	TRACT 4	0.155 AC.	0.155097684 AC.	YES
	TRACT 5	0.542 AC.	0.541847397 AC.	YES
U-1505				
	TRACT 1	0.929 AC.	0.928991745 AC.	YES
	TRACT 2	5.637 AC.	5.637241103 AC.	YES
	TRACT 3	8.388 AC.	8.38785732 AC.	YES
	TRACT 4	0.014 AC.	0.014 AC.	YES
	TRACT 5	0.107 AC.	0.10735781 AC.	YES
	TRACT 6	0.406 AC.	0.40610652 AC.	YES
	TRACT 7	0.013 AC.	0.0133862879 AC.	YES
	TRACT 8	0.735 AC.	0.735100324 AC.	YES
	TRACT 9	0.155 AC.	0.155 AC.	YES
	TRACT 10	0.144 AC.	0.149223382 AC.	YES
U-1640				
	TRACT 1	2.586 AC.	2.58539461 AC.	YES
	TRACT 2	0.204 AC.	0.203856749 AC.	YES
	TRACT 3	0.025 AC.	0.0246667057 AC.	YES
U-1673				
	TRACT 1	5.686 AC.	5.686 AC.	YES
	TRACT 2	0.582 AC.	0.582 AC.	YES
U-1709				

	TRACT 1	6.288 AC.	6.28867132 AC.	YES

ICE
Summary

R-2530B/B-4974/R-2527
ICE Summary for Permit Application
September 25, 2018

Community Impact Assessments (CIAs) were prepared in June 2008 and August 2007 for R-2530B and R-2527, respectively. Consistent with NCDOT procedures at that time, each CIA included an analysis of indirect and cumulative effects (ICE). A single Environmental Assessment (EA) covering R-2527, R-2530B, and B-4974 (replacing Bridge 51 over the Pee Dee River) was approved in December 2011. A single Finding of No Significant Impact (FONSI) covering these three projects was approved in April 2017. In September 2018, NCDOT prepared a short-form ICE report which combined and updated the ICE analyses in the R-2527 and R-2530B CIAs to provide a unified assessment and conclusion for the permit application.

The revised Indirect and Cumulative Effects analyses indicated that the combined projects are not expected to have notable indirect effects on land use or development patterns in the Future Land Use Study Area (FLUSA) because of slower forecasted population growth, limited water/sewer availability, and a slower market for development. Also, despite the amount of available land in the FLUSA, there are several constraints to development, namely the presence of Uwharrie National Forest and development regulations in the Lake Tillery Class IV Water Supply Watershed.

Because few indirect effects are anticipated, the cumulative effect of this project when considered in the context of other past, present, and future actions, and the resulting impact on the notable human and natural features, is expected to be minimal. Direct natural environmental impacts by NCDOT projects will be addressed by avoidance, minimization, or mitigation consistent with programmatic agreements with the natural resource agencies during the Permitting process. All future development will be required to follow local, state, and federal guidelines and permitting regulations.

NEPA/SEPA Document

NC 24-27
From NC 740 in Albermarle
To the Proposed Troy Bypass (R-623), west of Troy
Stanly and Montgomery Counties
Federal Aid Project STBG-0024(083) – R-2530B
W.B.S. Elements 34446.1.7, 39922.1.1, & 35572.1.1
T.I.P. Projects R-2530B, B-4974, and R-2527

Administrative Action

FINDING OF NO SIGNIFICANT IMPACT

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
AND
N.C. DEPARTMENT OF TRANSPORTATION

Submitted pursuant to the National Environmental Policy Act
42 U.S.C. 4332(2) (c)
And 49 U.S.C.303

APPROVED:

4/6/17
DATE

Beverly G. Robinson
Beverly G. Robinson, CPM
Western Region Group Supervisor,
Project Development & Environmental Analysis Unit

4/10/17
DATE

Clarence W. Coleman, Jr.
for John F. Sullivan, III, Division Administrator
Federal Highway Administration

NC 24-27
From NC 740 in Albermarle
To the Proposed Troy Bypass (R-623), west of Troy
Stanly and Montgomery Counties
Federal Aid Project STBG-0024(083) – R-2530B
W.B.S. Elements 34446.1.7, 39922.1.1, & 35572.1.1
T.I.P. Projects R-2530B, B-4974, and R-2527

FINDING OF NO SIGNIFICANT IMPACTS

April 2017

Documentation Prepared in
Project Development and Environmental Analysis Unit By:

4/6/17
DATE

Dionne C. Brown, P.E.
Project Manager
DAVENPORT

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PROJECT COMMITMENTS

NC 24-27
From NC 740 in Albemarle
To the Proposed Troy Bypass (R-623), west of Troy
Stanly and Montgomery Counties
Federal Aid Project STBG-0024(083) – R-2530B
WBS Elements 34446.1.7, 39922.1.1, & 35572.1.1

TIP Projects R-2530B, B-4974, and R-2527

Current status, changes, or additions to the project commitments as shown in the environmental document for the project are printed in *italics*.

Project Development & Environmental Analysis Unit/ Natural Environmental Unit

NCDOT will coordinate with ~~Progress~~ Duke Energy regarding any requirements of the Federal Energy Regulatory Commission (FERC) ~~regarding~~ approvals. Requirements from the FERC regarding approvals will be met prior to right of way acquisition.

FERC coordination is currently underway and will be completed prior to construction.

Project Development & Environmental Analysis Unit, Roadway Design Unit, Rail Division

In the R-2527 project limits, the Norfolk Southern Railroad bridge crosses NC 24-27 within the Uwharrie National Forest which is under the US Forest Service's jurisdiction. NCDOT will ensure that the US Forest Service is part of the project's railroad design coordination process.

Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. NCDOT will coordinate with the US Forest Service regarding the railroad design and will begin to develop right of way plans for Project R-2527. Results of this coordination will be captured in a consultation document.

Geotechnical Unit

Preliminary site assessments will be conducted for twenty-three potentially contaminated sites within the proposed right of way prior to right of way acquisition.

Site assessments will be determined and completed once final ROW plans become available and prior to ROW acquisition.

Divisions 8 and 10 Construction Units

This project involves construction activities on or adjacent to the Federal Emergency Management Agency (FEMA) regulated stream. Therefore, the Division shall submit sealed as-built construction plans to the Hydraulics Unit upon completion of project construction, certifying that the drainage structures and roadway embankment that are located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically.

This is a standard project commitment.

Division 8 and 10 Construction and Wildlife Resources Commission

NCDOT commits to resurface and pave the Swift Island Boat access facility parking lot with the conditions that a de minimus determination will be rendered for the impacts to the property. WRC commits to allow NCDOT access to the property to complete these construction activities.

Hydraulics Unit

The Hydraulics Unit will coordinate with the Floodplain Mapping Program (FMP), the delegated state agency for administering FEMA's National Flood Insurance Program, to determine the status of the project with regard to applicability of NCDOT'S Memorandum of Agreement with FMP, or approval of a Conditional Letter of Map Revision (CLOMR) and subsequent final Letter of Map Revision (LOMR).

This commitment will be addressed during final design.

Division of Bicycle and Pedestrian Transportation, Project Development & Environmental Analysis Unit, Roadway Design Unit

Fourteen foot outside travel lanes will be utilized for bicycle accommodations from NC 740 in Albemarle to SR 1731, Sweet Home Church Road. Four foot paved shoulders will be utilized for bicycle accommodations from SR 1731, Sweet Home Church Road to the proposed Troy Bypass, west of Troy.

The current design illustrates this commitment.

Bicycle and pedestrian accommodations will be further coordinated with the City of Albemarle prior to final project design. In accordance with the NCDOT Pedestrian Policy, NCDOT will bear the full cost to replace any existing sidewalks to be relocated by the project along existing streets. The City of Albemarle will participate in the cost of new sidewalks in areas where sidewalks do not currently exist. A municipal agreement will be prepared prior to project construction.

The City of Albemarle has committed to participate in sidewalk accommodations. The municipal agreement will be prepared prior to construction. Five-foot sidewalks are proposed on both the north and south sides of NC 24-27-73, within the Albemarle city limits and the southwest quadrant of NC 24-27-73 (Spaulding Street) and SR 1625 (Raleigh Highway) for approximately 325 feet.

Project Development & Environmental Analysis Unit – Natural Environment Section

Due to the presence of Schweinitz's sunflower within the project area as well as within 1-mile of the project area, a biological conclusion of "May affect, likely to adversely affect" has been given. Additional surveys will be required prior to project construction, and this biological conclusion will necessitate further coordination and consultation with the US Fish and Wildlife Service. A Biological Assessment and a Biological Opinion will be completed prior to the completion of the final environmental document.

A Biological Assessment will be completed once surveys are updated for the proposed project. A Biological Opinion will be completed prior to construction.

Schweinitz's sunflower surveys for Project R-2530B will occur Fall 2017. Schweinitz's sunflower surveys for Project R-2527 will not occur until 2020.

The proposed projects will have no effect on the smooth coneflower. However, due to the presence of potential habitat within the project area, additional surveys will be required prior to construction.

Surveys for smooth coneflower will be conducted this Fall. An update to this species will be available prior to construction.

Additional bald eagle surveys may be required within Montgomery County and Stanly County prior to project construction as specified by the Bald and Golden Eagle Protection Act. However, these surveys will be restricted to 660 feet from the edge of the project boundaries.

This commitment will be addressed prior to construction.

This project may impact individuals of the three S and LR species (smooth coneflower, large witch alder and glade wild quinine), but will not affect the viability of any of the three species across the forest. Discussions will occur with the USFS to determine avoidance and minimization options.

Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. Updated Forest Services survey will occur in 2017 and 2018 for TIP Project

R-2527. NCDOT will coordinate with the Forest Service and will begin to develop right of way plans for Project R-2527. Results of this coordination and the new surveys will be captured in a consultation document prior to R/W acquisition for project R-2527.

The Northern Long-Eared Bat has been added to the species list since the completion of the EA. NCDOT has determined that the proposed action does not require separate consultation on the grounds that the proposed action is consistent with the final Section 4(d) rule, codified at 50 C.F.R. § 17.40(o) and effective February 16, 2016. NCDOT may presume its determination is informed by best available information and consider Section 7 responsibilities fulfilled for Northern Long-Eared Bat.

Project Development & Environmental Analysis Unit, Roadway Design Unit

~~The proposed project will have "no adverse effect" on Bridge No. 51 if a responsible party agrees to take ownership of Bridge No. 51 and preserves it in place. A Section 4(f) evaluation and a Memorandum of Agreement (MOA) will be required for B-4974, Alternative 1 if a responsible party does not agree to take ownership of Bridge No. 51 and for B-4974, Alternative 4 since Bridge No. 51 will be removed.~~

Bridge No. 51 is proposed to be rehabilitated. Coordination with the SHPO and NCDOT Historic Architecture Section, rendered a no adverse effect determination for this improvement.

Project Development & Environmental Analysis Unit–Human Environment Section

Multilingual public outreach measures will be taken on an "as needed" basis.

This commitment was satisfied during out public involvement process.

Divisions 8 and 10 Construction Units, Utilities Unit – Relocation of Utilities

All relocation of utilities including but not limited to power lines, water and sewer lines, and communication lines located on NFS lands must be coordinated with the USFS. Utility companies cannot use the easement granted to the North Carolina Department of Transportation for construction and operation of the highway for their uses. All utility companies must work directly with the USFS to modify their existing special use permits on relocations within the project area.

Divisions 8 and 10 Construction Units, Roadside Environmental – Landscaping and Erosion Control

Landscaping and erosion control plants and seed mixes to be used on NFS lands must be discussed with the FS and disclosed in this document.

Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. Coordination is needed with the US Forest Service and NCDOT Roadside Environmental Unit regarding erosion control plants and seed mixes to be used on NFS lands.

Roadside Environmental Unit, Division Resident Engineer – High Quality Waters

Given the potential for impacts to the resources during the project implementation, NCDWQ requests that NCDOT strictly adhere to North Carolina regulations entitles Design Standards in Sensitive Watersheds (15A NCAC 04B .0124) throughout design and construction of the project. This would apply for any area that drains to streams having WS CA (Water Supply Critical Area) classifications.

Standard Procedure. This commitment will be implemented during construction.

Project Development & Environmental Analysis Unit – Archaeological Section

*Six National Register of Historic Places (NRHP) eligible archaeological sites (31Mg1806, 31Mg1629, 31Mg321, 31St195, 31St196 and 31St204/204**) will be adversely effected by the undertaking per the 2014 Notification of Adverse Effect Finding. A Memorandum of Agreement (MOA) will be prepared by NCDOT in consultation with the Historic Preservation Office, the United States Forest Service (USFS) and other consulting parties that may be identified and invited by FHWA to participate. The MOA will detail the measures NCDOT plans to carry out to mitigate adverse effects to these sites. USFS is requiring actual Right-of-Way (ROW) widths to identify the actual impacts to archaeological resources present in the project area(s) and to prescribe mitigation for projection of historic resources. All required data recovery mitigation efforts will be initiated after ROW acquisition is completed relative to each site. No construction related activities are permitted within an individual site's limits until the field investigation/ mitigation requirements relative to that site have been completed. Each site will require six months after their respective ROW acquisition is complete in order to complete their respective field investigation/ mitigation requirements*

Project Development & Environmental Analysis Unit – Human Environment Section – Traffic Noise & Air Quality Group

A Design Noise Report (DNR) will be completed during final design.

NC 24-27
From NC 740 in Albemarle
To the Proposed Troy Bypass (R-623), west of Troy
Stanly and Montgomery Counties
Federal Aid Project STBG-0024(083) – R-2530B
WBS Elements 34446.1.7, 39922.1.1, & 35572.1.1
TIP Projects R-2530B, B-4974, and R-2527

I. Type of Action

This is a Federal Highway Administration (FHWA) administrative action, Finding of No Significant Impact (FONSI).

The North Carolina Department of Transportation (NCDOT) and FHWA have determined this project will not have any significant impact on the human or natural environment. This FONSI is based on the December 23, 2011 Environmental Assessment (EA) which has been independently evaluated by the FHWA and determined to adequately and accurately disclose the environmental issues and impacts of the proposed project. The EA, together with the information contained in this FONSI (including responses to comments on the EA), provides sufficient evidence and analysis for determining that an Environmental Impact Statement (EIS) is not required.

II. Description of Proposed Action

A. General Project Description

The proposed projects involve widening NC 24-27 from NC 740 in Albemarle located in Stanly County to the Proposed Troy Bypass (R-623), west of Troy in Montgomery County. TIP project R-2530B involves widening existing NC 24-27 from west of NC 740 to the Pee Dee River in Stanly County from a two to three-lane facility to a four-lane divided facility. R-2530B will include a 23-foot raised median from NC 740 to SR 1731 (Sweet Home Church Road) and transition to a 46-foot depressed median from east of SR 1731 to the Pee Dee River in Stanly County. Project R-2530B will also involve a superstreet design in the areas where curb and gutter is proposed and also in the open shoulder segment at STA 153+00. TIP project B-4974 involves rehabilitating existing Bridge No. 51 over the Pee Dee River on the Stanly / Montgomery County line. TIP project R-2527 involves widening existing NC 24-27 from a two-lane facility to a four-lane divided facility with a 46-foot depressed median from the Pee Dee River to the proposed Troy Bypass, west of Troy in Montgomery County. The total length of the proposed projects is approximately 14.6 miles long. See Figure 1 for the project vicinity.

It is anticipated approximately 150 to 250 feet of right of way plus easements will be required to accommodate these facilities. Partial control of access is proposed for the

projects. All intersecting roadways will cross the highway at grade; no grade separations or interchanges are proposed.

B. Project Cost

The latest cost estimates for the projects are listed in Table 1 below.

TABLE 1: LATEST PROJECT COST ESTIMATES*

Project Number	Right of Way/ Utility Cost	Construction Cost	Mitigation Cost	Project Cost
R-2530B:	$15,900,000	$29,200,000	$1,174,118	$46,274,118
B-4974 Rehab Alternative:	$2,025,000	$28,000,000	$403,538	$30,428,538
R-2527	$9,437,000	$46,200,000	$1,722,622	$57,359,622
Total Cost	**$27,362,000**	**$103,400,000**	**$3,300,278**	**$134,062,278**

*Based off of NCDOT STIP January 2017 and March 2017

C. Project Schedule

Right of way acquisition and construction for R-2530B and B-4974 are scheduled for SFY 2017 and SFY 2019, respectively. The Right of way acquisition and construction schedule for R-2527 in the Draft 2018-2027 STIP is 2020 and 2022, respectively.

III. Preferred Alternative

The "Best Fit" alignment alternative was analyzed in the Environmental Assessment (EA) for projects R-2530B and R-2527. This alternative widens NC 24-27 at locations that "best fit" the current road location and surrounding land uses. "Best fit" locations were evaluated and selected to improve the existing road alignment, minimize impacts, and permit maintenance of traffic during construction. Two alternatives were analyzed in the EA for project B-4974, see Figure 2. Alternative 1 consists of replacing Bridge No. 51 with a new bridge south of the existing bridges, and Alternative 4 consists of removing the National Register-Eligible Bridge No. 51 and replacing it with a new bridge along the existing roadway alignment.

On November 21, 2013, the Land Trust for Central North Carolina offered to take ownership of Bridge No. 51 once NC 24-27 was widened and a replacement bridge was constructed. On August 18, 2014, the Land Trust for Central North Carolina withdrew their offer due to the additional financial burden specified by state legislation.

A Bridge No. 51 Rehabilitation Alternative was developed for consideration since both B-4974, Alternatives 1 and 4 required removal of Bridge No. 51. This alternative proposed to keep part of the existing National Register-Eligible Bridge No. 51 intact, replace and widen the bridge deck, and rehabilitate the arch ribs and arch piers while

preserving the historic and architectural character of the original structure. The rehabilitation alternative is preferred for improving Bridge No. 51.

IV. Summary of Environmental Effects

The environmental impacts associated with the proposed project are listed in Section V of the Environmental Assessment (EA). A summary of impacts for the proposed project is shown in Table 2 below.

TABLE 2: SUMMARY OF ENVIRONMENTAL EFFECTS

IMPACT CATEGORY	PROJECT STUDY ALTERNATIVE				TOTAL IMPACTS
		A	Rehab	C	
	No Build	R-2530B	B-4974,	R-2527	A+Rehab+C
			Rehab Alt.		
Natural Resources Impacts					
Federal Listed Species Habitat	No	Yes	Yes	Yes	Yes
100-Year Flood Plain and Floodway Impacts	No	No	Yes	Yes	Yes
Wetlands (number of crossings/acres)	0	3 / 0.82	1 / 0.02	26 / 0.89	30 /1.73
Stream Crossings (number / linear feet)	0	15 / 3,842	9 / 1,356	25 / 5,695	49 / 10.893
Water Supply Critical Areas	No	Yes	Yes	Yes	Yes
Rare Plants *	No	Yes	No	Yes	Yes
USFS Forest Land (acres) **	0	0	0	50	50
Human Environment Impacts					
Residential Relocations (number)	0	19	5	8	32
Business Relocations (number)	0	18	3	2	23
Low Income/Minority Population	No	No	No	No	No
Cemeteries/Graves (number of graves impacted)	0	Yes / 0	No	No	Yes / 0
Historic Structures ***	0	0	1	0	1
Archaeological Sites	0	3	0	3	6
Section 4(f) Impacts	0	No	Yes	Yes	Yes
Traffic Noise Impacts (receptors) ****	0	15	0	11	26
Air Quality	Within an Attainment area				
Physical Environment Impacts					
Railroad Crossings (number)	0	0	0	1	1
Farmland	No	No	No	No	No
Potentially Hazardous Materials Sites (number)	0	17	2	4	23

NOTES:
All impacts, but the USFS Forest Land acreage, are based on preliminary design slope stake limits plus 25 feet. The USFS Forest Land acreage is based on preliminary proposed right of way limits.

* Rare plants include Schweinitz's Sunflower, Georgia Aster, Large Witch Alder and Smooth Sunflower.
** USFS Forest Land acreage was recalculated based on updated forest boundaries.
*** The Swift Island Ferry / James B. Garrison Bridge (Existing Bridge 51) is eligible for the National Register of Historic Places.
**** The values are based on results of the Traffic Noise Analysis (December 5, 2011) and screened against the Traffic Noise Policy (October 6, 2016). A Design Noise Report (DNR) will be completed during final design.

V. Coordination and Comments

A. Circulation of the Environmental Assessment

The Environmental Assessment was approved by the N.C. Division of Highways and the FHWA on December 23, 2011. The approved Environmental Assessment was circulated to the following federal, state, and local agencies for review and comments. An asterisk (*) indicates a written response was received from the agency. Copies of the correspondence received are included in Appendix D of this Document.

*U.S. Department of the Army- Corps of Engineers
* U.S. Department of Agriculture- Forest Service
*U.S. Department of the Interior- Fish and Wildlife Services
*U.S. Environmental Protection Agency
*N.C. Department of Administration
*N.C. Department of Agriculture and Consumer Services
* N.C. Department of Environmental and Natural Resources
*N.C. Department of Environmental and Natural Resources- Division of Water Quality
*N.C. Department of Environmental and Natural Resources- Division of Environmental Health
* N.C. Department of Environmental and Natural Resources- Office of Conservation, Planning, and Community Affairs
*N.C. Wildlife Resources Commission
* N.C. Department of Environmental and Natural Resources- Division of Water Resources
* N.C. Department of Environmental and Natural Resources- Division of Soil and Water Conservation
*N.C. Department of Environmental and Natural Resources- Forest Service
N.C. Department of Cultural Resources- State Historic Preservation Office
*N.C. Department of Crime Control and Public Safety- Division of Emergency Management
*Stanly County
*Stanly County Board of Commissioners
*City of Albemarle
Rocky River RPO
Piedmont Triad RPO
*FRA – Office of Policy & Communication
*Montgomery County Board of Commissioners

B. **Comments Received on the Environmental Assessment**

Comments received on the Environmental Assessment are noted in this section. Additionally, any comments that resulted in a revision to the Environmental Assessment are addressed in **Section VI** of this document.

1. Agency Comments received on the Environmental Assessment

U.S. Army Corps of Engineers

Comment: Stream St-W should be removed from the impact table and the EA. During the February 2, 2011 CP 2a field meeting, Stream St-W was determined to an ephemeral feature that is not subject to the permit requirement of the section 404 of Clean Water Act.

Response: Stream St-W has been removed from the impact table and the EA. See Table 3 below for updated impacts for streams for B-4974.

TABLE 3: STREAM IMPACTS IN THE B-4974 PROJECT STUDY AREA

STREAM ID	STREAM NAME	NCDENR STATUS CLASSIFICATION	DWQ SCORE	STREAM LENGTH IN STUDY AREA (FEET)	PRELIMINARY DESIGN STREAM IMPACTS (FEET) REHABILITATION ALTERNATIVE: 4
St-T	UT, Pee Dee River	Perennial	29	821	213
St-U	UT, Pee Dee River	Perennial	33	1445	303
St-V	UT, Pee Dee River	Perennial	34.5	1255	328
SG	UT, Pee Dee River	Intermittent	26	242	65
SH	UT, Pee Dee River	Perennial	32.5	386	72
SA-1	UT, Rocky Creek	Intermittent	--	832	201
SA	Rocky Creek	Perennial	42.5	1,123	174
TOTAL STREAM IMPACTS FOR B-4974					**1,356**

NOTES: Impacts are based on preliminary design slope stake limits plus 25 feet

Comment: The EA should explain why a 46' median is being proposed along portions of the project and a 23' median is being proposed along other portions of the project. Median widths can be further discussed at the CP 4A meeting.

Response: Using the North Carolina functional classification system, NC 24-27 within the Albemarle city limits (R-2530B) is classified as an urban principal arterial. Through the remainder of the project area (R-2530B, B-4974 and R-2527), NC 24-27 is classified as a rural minor arterial. The strategic highway corridor vision for NC 24-27 in the project area is that NC 24-27 be improved to an expressway. The proposed typical section from NC 740 to SR 1731 (Sweet Home Church Road) within the Albemarle city limits is a four-lane divided facility with a 23-foot raised median which transitions to the proposed typical section for the remainder of the project area which is a four-lane divided facility with a 46-foot depressed median from SR 1731 to the proposed Troy Bypass, west of Troy. Median widths were discussed at the merger meeting and was agreed upon.

U.S. Department of Agriculture, Forest Service

Comment: The Environmental Assessment (EA) is lacking in the analysis of effects to most environmental resources present in the study area. It is very difficult to review analysis that is not present in the document. Direct, indirect, and cumulative effects to all biological resources must be disclosed in the EA.

Response: The proposed improvements to R-2527 will not impact any S or LR aquatic species on the USDA Forest Service S and LR list for Montgomery County due to nonoccurrence in the vicinity of the activity area. No mitigation is recommended. The proposed project will not affect any Federally listed or proposed listed aquatic species. Formal consultation with the U.S. Fish and Wildlife Service is not required.

The proposed project will potentially impact E, S and LR plant species. The Biological Conclusion for Schweinitz's sunflower is May Affect, Likely to Adversely Affect. Therefore, formal consultation with the U.S. Fish and Wildlife Service is required.

This project may impact individuals of the three S and LR species (smooth sunflower, large witch alder and glade wild quinine), but will not affect the viability of any of the three species across the forest. Discussions will occur with the USFS to determine avoidance and minimization options. NCDOT will coordinate with the Forest Service regarding avoidance and minimization options and will begin to develop right of way plans for Project R-2527. Updated USFS surveys ill occur in 2017 and 2018. Results of this coordination and the new surveys will be captured in a consultation document prior to right of way acquisition for Project R-2527.

The proposed improvements to R-2527 are not likely to adversely affect any S or LR terrestrial species on the USDA Forest Service S and LR list for Montgomery County due to nonoccurrence in the vicinity of the activity area. No mitigation is recommended. The proposed project will not affect any Federally listed or proposed listed aquatic species. Formal consultation with the U.S. Fish and Wildlife Service is not required.

Formal consultation will be finalized prior to construction.

Comment: All references in the document to "National Forest Service lands" need to be referred to as to "National Forest System lands" and thereafter, NFS lands.

Response: Comment noted.

Comment: All maps contained in the EA should note the location of NFS lands on the Uwharrie National Forest (UNF) in relation to the project. It appears that the UNF boundaries depicted on the maps included in the document are the proclamation boundary and not the actual property boundaries. The proclamation boundary includes all land both public and private within which the UNF can legally acquire property.

Response: Figures 3A to 3K were updated for the FONSI to include the actual UNF boundary.

Comment: Evaluation of impacts on NFS lands need to be addressed specifically in the document i.e. not imbedded in the discussion of impacts to the entire project area in accordance with our Forest Plan.

Response: The following tables lists streams and wetlands within the UNF boundary. Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. Coordination is needed with the US Forest Service. Table 4 list stream impacts and Table 5 list the wetland impacts within the NFS land boundary.

TABLE 4: STREAM IMPACTS IN THE UNF BOUNDARY FOR R-2527 PROJECT STUDY AREA

STREAM ID	STREAM NAME	NCDENR STATUS CLASSIFICATION	DWQ SCORE	STREAM LENGTH IN STUDY AREA (FEET)	PRELIMINARY DESIGN STREAM IMPACTS (FEET) ALTERNATIVE: BEST FIT
SD	Clarks Creek	Perennial	41.5	531	145
SL-A	UT, Cattail Creek	Perennial	33.5	627	114
SW-A	UT, Cattail Creek	Intermittent	25	782	20
SJ	UT, Wood Run	Intermittent	20	210	109
SX	UT, Lick Fork Creek	Perennial	37.5	1,567	339
SY-A	UT, Rocky Creek	Perennial	40.5	2,335	729
SF-B	Rocky Creek	Perennial	48.5	517	155
SW-B	UT, Lick Fork Creek	Intermittent	29	672	147
TOTAL STREAM IMPACTS FOR R-2527					**1,738**

NOTES: Impacts are based on preliminary design slope stake limits plus 25 feet.

TABLE 5: WETLAND IMPACTS IN THE UNF BOUNDARY FOR R-2527 PROJECT STUDY AREA

WETLAND ID	WETLAND TYPE	WETLAND RATING	WETLAND AREA IN STUDY AREA (Acres)	PRELIMINARY DESIGN WETLAND IMPACTS (ACRES) ALTERNATIVE: BEST FIT
WH	Riverine	18	0.007	0.01
WJ	Riverine	18	0.003	<0.01
WSS	Riverine	37	0.061	<0.01
WHH	Riverine	31	0.019	0.02
WFF	Riverine	31	0.601	0.04
WGG	Non-Riverine	22	0.251	0.05
WPP	Non-Riverine	18	0.057	<0.01
WEE	Non-Riverine	18	0.308	0.04
WOO	Riverine	31	0.028	0
WQQ	Riverine	18	0.114	0
WXX	Riverine	28	0.233	0
WYY	Riverine	16	0.008	0
TOTAL WETLAND IMPACTS FOR R-2527				**0.19**

NOTES: Impacts are based on preliminary design slope stake limits plus 25 feet.

Comment: The EA does not discuss any mitigation options for loss of NFS lands or stream or wetlands impacts on NFS lands as a result of the proposed actions. The US Forest Service (USFS) would like to discuss possible mitigation for lost resources and unavoidable impacts to resources.

Response: Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. Coordination is needed with the US Forest Service to discuss possible mitigations for lost resources and unavoidable impacts to resources. NCDOT will coordinate with the Forest Service and will begin to develop right of way plans for Project R-2527. Mitigation costs are captured in this document.

Comment: The determination of effect for Schweinitz's sunflower is still being consulted on with the United States Fish and Wildlife Service (USFWS). USFWS has not yet agreed with the determination of effect for this species.

Response: Approximately 35 individuals of the federally endangered plant species Schweinitz's sunflower (*Helianthus schweinitzii*) were found adjacent to the railroad in the activity area. This population of Schweinitz's sunflower could be affected by the proposed project.

There are approximately 450 individuals of T and E, S or LR plant species within the 500 ft wide project study corridor. Approximately 100 individuals of the S plant species large

witch alder (*Fothergilla* major), 300 individuals of the LR plant species smooth sunflower (*Helianthus* laevigatus), 35 individuals of the E plant species Schweinitz's sunflower (*Helianthus* schweinitzii) and several (less than 20) individuals of the LR plant species glade wild quinine (*Parthenium auriculatum*) were found in the activity area. It is not anticipated that all of these individuals will be affected or impacted (direct, indirect or cumulative) since construction will not occur throughout the entire 500 ft wide project study corridor. Updated surveys for Schweinitz's sunflower will be conducted this Fall. Once surveys are completed a Biological Assessment will be completed and a Biological Opinion will be rendered prior to construction. Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. NCDOT will coordinate with the USFWS and will begin to develop right of way plans for Project R-2527. Results of this coordination will be captured in a consultation document. Forest Service surveys will occur in 2017 and 2018. See appendix for activity regarding Schweinitz's sunflower through WRC coordination with NCDOT.

Comment: Disclose the impacts to wetlands (acres), streams (linear feet), federally listed species habitat, flood plain impacts, rare plants, archeological sites, traffic noise impacts, railroad crossings, and potentially hazardous material sites located on NFS lands. Table S1: There will be "0" acres of NFS lands impacted by project B-4974 and the acres of impact on NFS for project R-2527 is overestimated. As noted in general comments, make sure that NFS acres are evaluated using the actual property boundaries not the proclamation boundary.

Response: Updated tables are included in this document with impacts to Forest Service lands. Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. NCDOT will coordinate with the Forest Service and updated proposed impacts within the UNF as right of way plans for Project R-2527 are being developed.

Comment: Only project R-2527 will require a special use permit from the USFS for the proposed projects. The USFS does not own any property that will be affected by project B-4974; therefore, a permit is not required. The wording "permit from the USFS will be required to provide land for the proposed project" needs to clearly reflect that the USFS will only be permitting use of the land and not actually transferring ownership of the land to the North Carolina Department of Transportation.

Response: Comment noted.

Comment: Include the length of the road corridor that bisects NFS lands within the UNF.

Response: The length of road corridor that bisects NFS lands within the UNF is 3.91 miles.

Comment: The EA needs to state which power lines, water and sewer lines, and communication lines are located on the UNF. This can be done in the narrative or on maps that show both the line locations and the UNF boundaries.

Response: Power lines, water and sewer lines, communication lines within the UNF boundary are shown on Figures 3A to 3K.

Comment: The document states "In the year 2010, average daily traffic along NC 24-27 will likely range between 7,200 vehicles per day and 14,100 vehicles per day". If this is actual data, the document need to say "ranges" instead of "will likely range". If these are truly estimates it would be better to include actual data if known since the date shown is in the past.

Response: The traffic volume information presented in the Environmental Assessment are estimated numbers based on growth factors and other constraints for the project area. The information is presented in a standard format for traffic volumes.

Comment: Traffic Service levels should be disclosed for the various projects not lumped together. The narrative makes it appear that the entire 14.6 mile project area is currently operating at LOS E. It is clear from Tables 7 and 8 in Section IV.F that only short sections of the road are operating at LOS E. The document states "In 2010, the existing intersection operates at Level of Service (LOS) E…". What intersection is being discussed, there appears to be text missing from the document.

Response: The tables within the EA illustrated the intersection analysis along the mainline of NC 24-27. Some intersections listed in the table showed LOS better than E. However, the overall capacity analysis results for the mainline indicates that the existing two-lane facility is expected to operate at LOS E or better in 2010 and LOS E or better in 2035. A table of this information was not included in the Environmental Assessment.

Comment: The Land and Resource Management Plan for the Uwharrie National Forest (here after, Forest Plan) (May 2012) should be listed. This land use plan explains how the USDA Forest Service proposes to manage the Uwharrie National Forest over the next 15 years. Information is provided that describes what activities will be implemented, what public benefits are anticipated, and what will be the long-term conditions of the national forest as a result of implementing the plan.

Response: Comment noted. The May 2012 Land and Resource Management Plan Forest Plan UNF can be found at:
http://www.fs.usda.gov/detail/nfsnc/landmanagement/planning/?cid=stelprdb5194766 for information regarding management of the Uhwarrie National Forest over the next 15 years, activities to be implemented, public benefits and long-term conditions of the National Forest as a result of implementing the plan.

Comment: If the largest number of accidents is occurring due to animal/vehicle collisions, how is upgrading the road to a 4-lane highway and mostly likely increasing speeds going to result in fewer collisions and a safer road condition?

Response: Upgrading the roadway to four lanes will provide safer conditions for the traveling public. Four lanes have been proven to be safer than two (2) lanes for vehicular travel. This supports the purpose for the project.

Comment: While it is true that the "No Build" alternative would not meet the purpose and need; that is true of any well designed project where a good case for purpose and need have been established. However, that is not really a good reason not to carry the "No Build" alternative throughout the document. In the true spirit of NEPA an environmental document compares the environmental impacts of various alternatives. In the case of projects R-2530B and R-2527 there is really only one alternative fully analyzed in the EA. When the USFS concurred with Concurrence Point 2 (Detailed Study Alternatives Carried Forward); it was not our intention to support dropping the "No Build" alternative from full analysis in the EA.

Response: NC 24-27 is a two-lane to three-lane facility within the Albemarle city limits (R-2530B). NC 24-27 is a two-lane facility throughout the remainder of the project area except at the Pee Dee River crossing where there are two travel lanes in the eastbound direction and one travel lane in the westbound direction (R-2530B, B-4974 and R-2527). The no build alternative does not meet the purpose and need of the project. Carrying the no build alternative discussion through to the FONSI only validates the preferred alternative. A comparison of the No-Build alternative is discussed in the Revisions To The EA section of this document.

Comment: There is no NFS lands located in project B-4974. Acres of NFS lands impacted in R-2527 needs to reflect actual USFS property boundaries.

Response: Comment noted. Impacts to the NFS lands is approximately 50 acres. Impacts to wetlands and streams within the Forest Service boundary is included in Tables 4 and 5. Additional impacts within the Forest Service boundary will be coordinated with the Forest Service and captured in a consultation document to be completed prior to right of way acquisition.

Comment: See comments on Summary of Environmental Effects p. vi. The information (Yes/No) provided for federally listed species habitat and rare plants gives no indication of the actual impact. For instance, for all the action alternatives that have rare plants, will the effects extend to the entire percent of all population or just a small portion? If rare plants are present, how many species and what percentage of the population would be affected?

Response: There are approximately 450 individuals of T and E, S or LR plant species within the 500 ft wide project study corridor. Approximately 100 individuals of the S plant species large witch alder (*Fothergilla* major), 300 individuals of the LR plant

species smooth sunflower (*Helianthus* laevigatus), 35 individuals of the E plant species Schweinitz's sunflower (*Helianthus* schweinitzii) and several (less than 20) individuals of the LR plant species glade wild quinine (*Parthenium auriculatum*) were found in the activity area. It is not anticipated that all of these individuals will be affected or impacted (direct, indirect or cumulative) since construction will not occur throughout the entire 500 ft wide project study corridor. As design is finalized, NCDOT will have a more accurate estimation of how many individuals will be affected. Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. Coordination is needed with the US Forest Service. NCDOT will coordinate with the Forest Service and will begin to develop right of way plans for Project R-2527. Forest Service surveys will occur in 2017 and 2018.

Comment: The document states "A control of access fence is placed along the entire length of the facility, except at intersections and driveway". What type of fencing and what are the dimensions? This information needs to be disclosed and the impacts of the fencing on wildlife crossing needs to be disclosed in the Environmental Effects section of the document.

Response: NCDOT's standard control of access fencing includes a woven wire fence with a standard height of 4 feet 10 inches. Fencing is not proposed for this project. No impacts to wildlife crossing is anticipated.

Comment: The document needs to give design details on the replacement of the railroad bridge crossing and any realignment of the railroad track that would be required. Norfolk Southern Railway has a right of way across NFS lands to operate their railroad. The bridge and this section of railroad are located on NFS lands and movement of them will need to be coordinated with the USFS.

Response: Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. Coordination with the Forest Service will occur regarding the railroad bridge and any proposed realignment of the railroad track.

Comment: The document states "Utilities along the project will be relocated prior to construction." The EA is not clear which, if any, of these utilities are located on the UNF. The types and locations of any utilities on the UNF that will need to be relocated or upgraded as a result of the proposed project must be identified along with a description of the proposed changes.

Response: Project R-2527 is the only portion of the project that is within the UNF boundary. Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. NCDOT will coordinate with the Forest Service and will begin to develop right of way plans for Project R-2527. Results of this coordination will be captured in a consultation document. The development of right of way plans will result in identifying utilities for that portion of the project.

Comment: All relocation of utilities including but not limited to power lines, water and sewer lines, and communication lines located on NFS lands must be coordinated with the USFS. Utility companies cannot use the easement granted to the North Carolina Department of Transportation for construction and operation of the highway for their uses. All utility companies must work directly with the USFS to modify their existing special use permits on relocations within the project area.

Response: Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. NCDOT will begin to develop right of way plans for R-2527. The development of right of way plans will result in identifying utilities for that portion of the project. Utility coordination will occur prior to construction. Results of this coordination will be captured in a consultation document.

Comment: The document states "The project will also include standard landscaping as needed for erosion control purposes. No special landscaping is proposed as part of the projects". Landscaping and erosion control plants and seed mixes to be used on NFS lands must be discussed with the FS and disclosed in this document.

Response: The final landscaping and erosion control will be coordinated during or at the completion of the construction; NCDOT Roadside Environmental Unit will coordinate with NFS prior to any plantings within the NFS.

Comment: For project R-2527 there is little mention of Piedmont longleaf pine woodland, which occurs within the project area on NFS lands on the north and south side of the existing road from SR 1136 to the intersection with NC 109. This is a rare forest community within North Carolina and through its limited range. Restoration of the piedmont longleaf pine community is one of the primary goals of the newly signed Uwharrie Forest Plan. Management of this forest type requires prescribed burning.

Response: Comment noted.

Comment: The information provided on pages 21-26 only describes the existing environment and does not actually disclose the direct, indirect, and cumulative impacts to the natural resources as a result of the project. The section titled "Summary of Anticipated Effects" on page 26 is not really a summary, it is the entire analysis. This analysis is very general, vague and completely inadequate to evaluate the impacts of the project on terrestrial communities, terrestrial wildlife, and aquatic communities. No mention is made of either indirect or cumulative effects as a result of the proposed projects. A more detailed and quantified effects analysis is needed to adequately evaluate the impacts of the proposed project.

Response: The proposed improvements to R-2527 will not impact any S or LR aquatic species on the USDA Forest Service S and LR list for Montgomery County due to nonoccurrence in the vicinity of the activity area. No mitigation is recommended. The

proposed project will not affect any Federally listed or proposed listed aquatic species. Formal consultation with the U.S. Fish and Wildlife Service is not required.

The proposed project will potentially impact E, S and LR plant species. The Biological Conclusion for Schweinitz's sunflower is May Affect, Likely to Adversely Affect. Therefore, formal consultation with the U.S. Fish and Wildlife Service is required.

This project may impact individuals of the three S and LR species (smooth sunflower, large witch alder and glade wild quinine), but will not affect the viability of any of the three species across the forest. Discussions will occur with the USFS to determine avoidance and minimization options. NCDOT will coordinate with the Forest Service regarding avoidance and minimization options and will begin to develop right of way plans for Project R-2527. Updated USFS surveys ill occur in 2017 and 2018. Results of this coordination and the new surveys will be captured in a consultation document prior to right of way acquisition for Project R-2527.

The proposed improvements to R-2527 are not likely to adversely affect any S or LR terrestrial species on the USDA Forest Service S and LR list for Montgomery County due to nonoccurrence in the vicinity of the activity area. No mitigation is recommended. The proposed project will not affect any Federally listed or proposed listed aquatic species. Formal consultation with the U.S. Fish and Wildlife Service is not required.

Formal consultation will be finalized prior to construction.

Comment: We disagree with the general statement "Permanent impacts to wildlife will be minimal due to the project being a widening of the existing roadway, with no new alignment". Widening, as well as the fencing mentioned on page 15, may impact wildlife crossing ability and/or behavior. The widening of the road may have fragmentation impacts on wildlife populations.

Response: Comment noted. Fencing is not proposed for this project. Impacts to wildlife crossing ability is not anticipated.

Comment: The impacts to the Piedmont longleaf pine community located on the UNF and mentioned in a previous comment needs to be discussed. The analysis should determine how much of this existing habitat is present in the analysis area and how much will be impacted by the proposed project. It should also discuss the importance of prescribed burning in management of this community type and the impact the proposed four-lane roadway will have on the ability to prescribe burn.

Response: Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. NCDOT will begin to develop right of way plans for the Project R-2527. Updated Forest Service surveys will occur in 2017 and 2018. Results of this coordination and the new survey information will be captured in a consultation document prior to right of way acquisition for Project R-2527.

Prescribed burning is an integral part of the longleaf pine ecosystem. Burning longleaf pine stands control disease, reduces competition, provides for the establishment of native vegetation, and results in wildlife benefits. Prescribed fire controls brown spot disease in the young pine trees. The regular application of prescribed fire assists the longleaf to be more competitive by reducing the hardwood brush. The native plant community is restored and diversified with the proper use of prescribed fire.

Prescribed burning currently occurs along the NC 24-27 corridor. A widened roadway should not prohibit the activity in the future.

Comment: There is no mention or discussion of the potential for indirect effects such as the greater likelihood of non-native invasive plant species dominating the road corridor and possibly spreading to adjacent plant communities. A discussion needs to be presented on how this will be mitigated and what seeding mixtures will be utilized to stabilize the road corridor. In the UNF, and other adjacent areas, sericea lespedeza and other non-native legumes, including planted species, are currently invading fire-maintained thinned forests.

Response: A project commitment has been added for coordination with USFS and NCDOT Roadside Environmental to determine the mitigation and seed mixtures to be utilized to stabilize the road corridor within the UNF. NCDOT Roadside Environmental Unit will coordinate with USFS prior to any planting within the NFS.

Comment: In the discussion and in Tables 13 and 16, disclose the impacts to wetlands (acres) and streams (linear feet) located on NFS lands. All streams and wetlands located on the UNF need to be identified as occurring on NFS lands.

Response: Tables have been updated to reflect wetlands and streams within the UNF boundary. See tables on pages 7 and 8.

Comment: The document needs to identify which populations of Schweinitz's sunflower are located on NFS lands. The railroad population south of NC 24-27 is mentioned but there is no reference that the species would be impacted (occurrence actually over 0.25 miles south of the existing road) by straightening the railroad as part of the proposed project.

Response: This population of Schweinitz's sunflower could be affected by the proposed project, the population is in the NFS lands, see map. Surveys for Schweinitz's sunflower will be conducted this Fall. Once surveys are completed a Biological Assessment will be completed and a Biological Opinion will be rendered prior to construction. See Appendix E for coordination and mitigation regarding the Schweinitz's sunflower. Additional coordination will happen once final planes are developed for Project R-2527.

Comment: There is no discussion of how much of the located Schweinitz's sunflower population will be affected by the proposed project. While it appears that there will be a

negative effect to the entire population west of the bridge, one cannot assume that from the discussion presented. The presence of the Schweinitz's sunflower in the activity area should be the reason for the determination "may affect likely to adversely affect". The presence of habitat within 1 mile of the project area is not a reason for that determination if a negative survey, with the exception of the railroad population, was conducted for project R-2527.

Response: Comment Noted. Surveys for Schweinitz's sunflower will be conducted this Fall. Once surveys are completed a Biological Assessment will be completed and a Biological Opinion will be rendered prior to construction. Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. NCDOT will begin to develop right of way plans for project R-2527.

Comment: The document states "An inactive cavity tree was observed in this stand". It appears from the location description that this tree may be located on NFS lands; if so, the USFS would like to know the exact location of the tree and if the cavity was enlarged. The potential foraging habitat located on the UNF needs to be better described in the document. The description should include the acres and quality of the habitat located within the survey boundaries. Impacts to that habitat as a result of the proposed project should also be discussed. Additional surveys will be required by the USFS of this habitat once five years have passed since the most recent surveys.

Response: Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. Information regarding impacts to this cavity tree and habitat will be available as designs are developed and surveys are updated. Forest Service surveys will be occur in 2017 and 2018 as design plans are developed.

Comment: What in the past has been referred to as Forest Service PETS species are now referred to as TES (Threatened, Endangered, and Sensitive) species and LR (locally rare) species. There is no list provided of the TES&LR species that may occur in the project area and which species were surveyed for and why. There is no effects analysis on TES&LR species contained in this document.

Response: An Aquatic, Biological, Botanical and Terrestrial Resources Report was prepared for this project. These reports are included in Appendix E of this document. Additional coordination will occur regarding the Threatened, Endangered and Sensitive Species and Locally Rare Species in the UNF as designs are developed and surveys are updated. Forest Service surveys will occur in 2017 and 2018.

Comment: The EA should disclose which TES&LR species have habitat in the project area and the expected impacts of the proposed project on that habitat. The EA should disclose the effects to the other located non-federally listed species (smooth sunflower and large witch alder) and have a determination of effects for them on NFS lands. Once direct, indirect, and cumulative effects have been disclosed any potential mitigation or

avoidance measures should be presented. The final EA should have an attached biological evaluation which discloses effects to these species on NFS lands. The FS will be unable to participate in the selection of the preferred alternative until effects on these species and their habitats are adequately disclosed.

Response: An Aquatic, Biological, Botanical and Terrestrial Resources Report was prepared for this project. These reports are included in Appendix E of this document. Additional coordination will occur regarding the Threatened, Endangered and Sensitive Species and Locally Rare Species in the UNF as designs are developed and surveys are updated.

Comment: Disclose which soil types are found within the project area on the UNF. Again the document does not disclose the effects to the resource. This section is a description of the existing environment not an effects analysis. The document must disclose the impacts to soils located on the UNF.

Response: Information regarding impacts to soil types within the UNF will be determined as right of way plans are developed for Project R-2527. Updated Forest Service surveys will occur in 2017 and 2018.

Comment: The EA compromises the location of site 31MG1629 by describing its location in relation to the Roberdo Bog. In a document available to the general population this is a breach of site confidentiality regulations. It is preferable and acceptable to state "site 31MG1629 is located in a rare environment / eco-niche found in the Piedmont, which is likely to contain information not found in other areas. Rare and previously undocumented ecological and cultural adaption data can be retrieved from such a site in this type of location."

Response: Comment noted.

Comment: The statement "information can be retained through data recovery efforts or through creative mitigation strategies such as more intensive laboratory analysis of recovered materials" is not clear and may be misleading. It needs to be made clear and agreed that the entire area of potential effects at all National Register of Historic Places (NRHP) eligible sites will be completely excavated and the data collected and analyzed using the most up-to-date methods and procedures.

Response: It is standard practice to use the most up-to-date methods and practices for data collection and/or excavation of NRHP sites. Data Recovery efforts will be limited to the maximum area of ground disturbing construction activities including all easements within each site's limits.

Comment: No discussion or disclosure is made of the possible time and financial commitments needed to accomplish data recovery as described above. Nor are various mitigation strategies compared by alternatives. In addition, right of way widths of 250 feet and 150 feet may have different impacts on a historic property (Section 106 NHPA).

Actual right of way widths will need to be known to identify the actual impacts to archeological resources present in the project area(s) and to prescribe mitigation for protection of those resources.

Response: ROW acquisition is scheduled for May 2017 for R-2530B/ B-4974. Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. USFS is requiring actual ROW widths to identify the actual impacts to archaeological resources present in the project area(s) and to prescribe mitigation for projection of historic resources. A Memorandum of Agreement (MOA) will be prepared by NCDOT in consultation with the Historic Preservation Office (HPO), the USFS, and other consulting parties that may be identified and invited by FHWA to participate. The MOA will detail the measures NCDOT plans to carry out to mitigate adverse effects to National Register of Historic Places Eligible archaeological sites. Once ROW acquisition is complete for areas identified to involve archaeological resources, an assessment of data recovery will be completed. If needed, a Data Recovery plan for the impacted archaeological resources and coordination with the Office of State Archaeology will be completed. If USFS property is involved, NCDOT will consult with the USFS. Results of this coordination will be captured in a consultation document.

Comment: The document states "Hikers can access the 20-mile Uwharrie National Recreation Trail and the 8-mile Dutchman's Creek Trail from the unpaved, trailhead parking lot adjacent to project R-2527". Again the document does not disclose the effects to the resource. This section is a description of the existing environment not an effects analysis. The document must disclose the impacts to recreation facilities located on the UNF. If there are no impacts expected then make that statement.

Response: There are no anticipated impacts to recreational facilities within the UNF.

U.S. Department of Agriculture, EPA

Comment: EPA acknowledges the 'Green sheet' project commitments on pages i to iii in the EA. EPA has substantial environmental concerns for the potential impacts to jurisdictional resources, including High Quality Waters (HQW) and water supply critical areas. EPA is requesting that the transportation agencies consider adequate avoidance and minimization measures to meet the requirements under Clean Water Act Section 404(b)(1) guidelines. EPA is requesting that a complete wetland quality assessment be provided prior to the next Merger team meeting. EPA is requesting a copy of the MSAT qualitative analysis report prior to the issuance of the FONSI.

Response: Comment noted. Merger coordination is still underway for the proposed project. The requested information was sent to Dr. Van Der Wiele on November 10, 2016. MSAT information was recently revised and that report was sent to EPA on March 30, 2017, it can also be found in Appendix E.

Comment: Table S1 and Table 5 (by project sections) of the Federal Environmental Assessment (EA) include the jurisdictional impacts to wetlands and streams based upon the Detailed Study alternatives (DSAs). There are 7 sections identified in Table 5. Stream and wetland impacts are also further detailed in Tables 11, 12, and 13 (Streams involving R-2530B, B-4974 & R-2527) and Tables 14, 15 and 16 (Wetlands involving R-2530B, B-4974 & R-2527).

Response: Comment noted.

Comment: DSA A/B1/C impacts approximately 2.4 acres and 15,230 linear feet of wetlands and streams, respectively. DSA A/B4/C C impacts approximately 2.3 acres and 15,520 linear feet of wetlands and streams, respectively. Considering the comparatively small differences in the overall total impacts to jurisdictional resources, neither DSA represents a clear environmentally-preferred alternative for EPA. Based upon the Table 5 impacts per project section, Alternative 1 in Section 5 (1.8 miles) represents the least environmentally damaging choice between the four alternatives presented in the EA.

Response: Comment noted.

Comment: The jurisdictional impacts outlined in the EA include NCDOT's preliminary design slope stake limits plus 25 feet. In addition, the preliminary designs also include two different median widths. For the R-2527 portion of the proposed project, a 46-foot depressed median is being designed for a very rural area between the Pee Dee River and the future Troy Bypass. Traffic capacity issues beyond 2035 have not been documented for the rural segment between NC 73 and NC 109 (Figure 3B). A 23-foot median along NC 24-27 is being judged acceptable by transportation agencies west of the Pee Dee River to Albemarle (R-2530B).

Response: Comment noted. However there will be a 46-foot median from Sweet Home Church Road to end of the project.

Comment: The EA identifies potential impacts to High Quality Waters (HQW), including Rocky River (Little River tributary). The EA also identifies numerous water supply waters and critical area designations for waters within the project study area in Table 10 that will be potentially impacted. The DSAs (Alternatives A/B1/C and A/B4/C) include potential impacts to water supply critical areas (i.e., Mountain Creek, Jacobs Creek, Pee Dee River, and Rocky Creek/Lake Tillery tributary). In addition, the proposed project impacts High Quality Waters (HQW) with the Rocky Creek/Lake Tillery tributary system. EPA notes the comment on Page 27 of the EA that there are two stream systems named Rocky Creek within the R-2527 project study area. The extent of the impact to the water supply critical areas is not quantified in the EA. This information should be provided to EPA prior to the next Merger concurrence meeting. Efforts to minimize impacts to HQW and Water Supply Critical Areas need to be identified by the transportation agencies. Quantification of impacts to floodplains also need to be quantified prior to the next Merger concurrence meeting.

Response: Updated tables were provided to the Merger Team prior to the CP3/ CP4A meeting. Any fill in the floodplain will comply with all FEMA regulations (CP4A meeting, January 22, 2014 and August 17, 2016).

The critical area (CA) water source in the project area is the Pee Dee River/ Lake Tillery. Critical are is defined as extending 0.5 mile from the normal pool elevation of a reservoir; or 0.5 mile upstream of , and draining to an intake. The effective area for hazardous spill basin placement is within 1.0 miles of the normal pool or upstream of an intake. See the following tables below for impacts within and outside of 0.5 mile from the CA source.

TABLE 6: WATER SUPPLY CRITICAL AREA IMPACTS FOR R-2530B & R-2527

STREAM ID	STREAM NAME	STREAM LENGTH IN STUDY AREA (FEET)	R-2530B & R-2527 PRELIMINARY DESIGN STREAM IMPACTS (FEET) ALTERNATIVE: BEST FIT	WITHIN 0.5 MILE FROM CA WATER SOURCE (PEE DEE RIVER/ LAKE TILLERY)
DITCH	UT, Mountain Creek	290	31	No
St-AN 02	UT, Mountain Creek	788	250	No
St-B	UT, Mountain Creek	475	149	No
St-CC	UT, Mountain Creek	515	70	No
St-D	UT, Mountain Creek	454	21	No
St-E	UT, Mountain Creek	396	35	No
St-EE	UT, Mountain Creek	527	30	No
St-F	UT, Mountain Creek	799	137	No
St-FF	UT, Mountain Creek	392	123	No
St-GG	UT, Mountain Creek	310	178	No
St-HH	UT, Mountain Creek	619	154	No
St-I	UT, Mountain Creek	1867	1433	No
St-M	UT, Jacobs Creek	3730	656	No
St-N	UT, Jacobs Creek	676	240	No
SB-1	Rocky Creek	903	117	No
SB-2	UT, Rocky Creek	643	151	No
SF-B	Rocky Creek	517	155	No
SH-1	UT, Pee Dee River	81	81	No
TOTAL STREAM IMPACTS			**5,037**	

TABLE 7: WATER SUPPLY CRITICAL AREA IMPACTS FOR B-4974

STREAM ID	STREAM NAME	STREAM LENGTH IN STUDY AREA (FEET)	B-4974 PRELIMINARY DESIGN STREAM IMPACTS (FEET) REHABILITATION ALTERNATIVE: 4	WITHIN 0.5 MILE FROM CA WATER SOURCE (PEE DEE RIVER/ LAKE TILLERY)?
St-Q	UT, Jacobs Creek	662	98	No
St-R	UT, Pee Dee River	884	237	No
St-T	UT, Pee Dee River	821	213	Yes
St-U	UT, Pee Dee River	1445	303	Yes
St-V	UT, Pee Dee River	1255	328	Yes
SG	UT, Pee Dee River	242	65	Yes
SH	UT, Pee Dee River	386	72	Yes
SA-1	UT, Rocky Creek	832	201	Yes
SA	Rocky Creek	1,123	174	Yes
TOTAL STREAM IMPACTS			**1,691**	

Comment: It is noted that the proposed project impacts several Federally-listed species of threatened and endangered plants, including Schweinitz's Sunflower, Georgia Aster, Large Witch Alder and Smooth Sunflower. EPA requests that the transportation agencies provide stringent avoidance and minimization measures for these species in consideration of a reasonable highway design and continue to work with the U.S. Fish and Wildlife Service, U.S. Forest Service and the N.C. Wildlife Resources Commission on applicable conservation measures. A context sensitive design for the proposed multi-lane, median divided facility can potentially reduce impacts to these threatened and endangered plants and also reduce impacts to other natural resources.

Response: A CP3/ CP4A meeting was held January 22, 2014 with an update to that meeting on August 17, 2016. Avoidance and Minimization was discussed at the CP4A meeting. Context sensitive designs are being implemented with this project. The only federally-listed species on the list is the Schweinitz's sunflower. The concurrence forms are included in Appendix B.

Comment: Both widening Sections 6 and 7 under R-2527 using a 'best-fit' design impact Uhwarrie National Forest. The impacts of 54 and 57 acres to these Federally-managed lands from these two sections (4.3 and 4.2 miles) represent a potentially significant impact without full consideration of avoidance and minimization. In total, DSA A1/B1/C and A1/B4/C impact 120 acres to the only National Forest wholly located in the N.C. Piedmont ecosystem. EPA believes that the 120 acres of impact to Federally-managed lands represents a potentially significant impact and that the transportation agencies consider all context sensitive design solutions and relevant avoidance and minimization measures. EPA does not believe that a 46-foot median is a reasonable design requirement for the 8.5 mile sections through a very rural area of the project study area. The purpose and need for the proposed project does not identify future capacity needs beyond the 2035 design year requiring a 46-foot median. Safety is not a specific

element of the signed purpose and need statement and a greater median width and resulting higher speeds will potentially increase the severity of animal collisions. Animal/vehicle collisions within the Uhwarrie National Forest area of the proposed widening project are a potentially significant environmental issue. A reduced raised median width of 23 feet is being proposed for other more suburban areas of the project[1] (e.g., From NC 740 to SR 1731).

Response: Additional coordination has occurred since the completion of the EA to include discussions regarding the median width at the CP3 meeting. (Refer to CP3 meeting resolution and forms dated January 22, 2014). Context sensitive designs are being implemented with this project. In addition, impacts within the UNF has been revised based on the actual boundaries.

Comment: DSA A/B4/C includes an adverse effect to a historic structure. Additional human and natural environment resource impacts for DSA A/B1/C and A/B4/C are respectively identified below:

100-year Floodplain impacts: Yes and Yes (no quantification)
Water Supply Critical Areas: Yes and Yes (no quantification)
Residential relocations: 25 and 23
Business relocations: 27 and 22
Cemeteries: Yes and Yes
Archeological sites: 6 and 6
Section 4(f) impacts: Yes and Yes
Traffic noise receptors: 30 and 30
Hazardous Materials sites: 23 and 23

Response: Since the completion of the EA, several changes have occurred regarding the historic Swift Island Bridge. Bridge No. 51 is proposed to be rehabilitated. The proposed rehabilitation will resulted in a no adverse effects with conditions. Impacts in the project area are shown in Table 2 on page 3.

Comment: The comments regarding Mobile Source Air Toxics (MSATs) on pages 57-59 are noted. EPA requests a review copy of the 12/5/11, qualitative analysis report identified on page 58 of the EA prior to the issuance of the FONSI. EPA does not concur with the generalized summary or following claim from page 59 of the EA: "*Significant progress has been made in reducing criteria pollutant emissions from motor vehicles and improving air quality, even as vehicle travel has increased rapidly*". Vehicle miles travelled in the U.S. has shown a decline in the last few years according to FHWA sources. Approximately 40 counties in N.C. are currently in maintenance or non-attainment areas for criteria air pollutants. The physical relationship between criteria pollutants (inorganic molecules: Lead, Carbon monoxide, Ozone, Sulfur dioxide, Nitrogen oxides) and MSATs (organic molecules) is not identified or explained in the EA.

Response: An updated Air Quality Report (NCDOT, March 21, 2017) has been prepared. This statement is from the FHWA publication titled Transportation Air Quality: Selected

Facts and Figures (February 2016) found at https://www.fhwa.dot.gov/environment/air_quality/publications/fact_book/factbook2016.pdf
With a decline in vehicle miles travelled, one could presume even further reductions in criteria pollutant emissions. We disagree with the statement of 40 counties in NC are currently in maintenance or non-attainment areas for criteria air pollutants. According to the EPA Green Book at https://www3.epa.gov/airquality/greenbook/anayo_nc.html, there are seven (7) NC counties in maintenance due to the 2008 8-hour Ozone standard. There are no counties in nonattainment. NCDOT is not including counties where criteria pollutant standards have been revoked (1997 8-hour Ozone standard) or where 20-year maintenance plans (for CO) have ended. We are unclear of the relevance of the question of physical relationship between criteria pollutants and MSATs to the proposed transportation improvements. The proposed project is located in Stanly and Montgomery counties, which are in attainment with EPA's National Ambient Air Quality Standards. Therefore, transportation conformity does not apply. The project is also anticipated to have no meaningful potential MSAT effects. This project will not result in changes in traffic volumes, vehicle mix, basic project location, or any other factor that would cause a meaningful increase in MSAT impacts of the project from that of the no-build alternative. Whatever the relationship is between inorganic and organic molecules does not change these findings. The updated MSAT information has been forwarded to the EPA.

Comment: The impacts between the DSAs are very similar and EPA has not identified an environmentally preferred alternative at this time.

Response: The preferred alternative was selected during CP3 meeting, refer to forms dated August 17, 2016.

N.C. Department of Agriculture and Consumer Service

Comment: Thank you for the opportunity to comment on the proposed project to widen NC 24-27 from west of NC 740 in Stanly County to the proposed Troy Bypass in Montgomery County. The North Carolina Department of Agriculture and Consumer Services (NCDA&CS) is concerned about the conversion of North Carolina's farm and forest lands to other uses. Due to the importance of agricultural activities in the area, as well as the economy of the entire state, NCDA&CS strongly encourages the project planners to avoid conversion of agricultural land to other uses whenever possible. When avoidance is not possible, all reasonable efforts to minimize impacts to farming operations and agricultural land should be implemented.

Response: Based on the EA, farmlands will not be impacted as a part of this project.

N.C. Department of Environment and Natural Resources, Division of Water Quality

Comment: This project is being planned as part of the 404/NEPA Merger Process. As a participating team member, NCDWQ will continue to work with the team.

Response: Comment noted.

Comment: It is stated that there are no waters within the study area that are included on the Final 2010 303(d) list. It should be clarified that the Final 2010 and Draft 2012 303(d) lists include all 13,178 surface waters in North Carolina for limited fish consumption advisories due to elevated concentrations of mercury in fish tissue of several species.

Response: No streams in project area are included on the 303d list. Clarification noted.

Comment: Review of the project reveals the presence of surface waters classified as Water Supply Critical Area in the project study area. Given the potential for impacts to these resources during the project implementation, NCDWQ requests that NCDOT strictly adhere to North Carolina regulations entitled Design Standards in Sensitive Watersheds (15A NCAC 04B .0124) throughout design and construction of the project. This would apply for any area that drains to streams having WS CA (Water Supply Critical Area) classifications.

Response: This standard operating procedure will be followed for this project.

Comment: Should the bridge project be located within the Critical Area of a Water Supply. NCDOT may be required to design, construct, and maintain hazardous spill catch basins in the project area. The number of spill basins installed should be determined by the design of the bridge, so that runoff would enter said basin (s) rather than flowing directly into the stream, and in consultation with NCDWQ.

Response: Both bridges crossing the Pee Dee River currently have direct stormwater discharge through the deck. It is anticipated that the replacement/ new location alternative would reconfigure the new bridge geometry in such a way to provide for a stormwater collection system that could route stormwater through a hazardous spill basin before discharging back to the Pee Dee River. Because the preferred alternative retains both bridges and rehabilitates the historical bridge in-kind, the existing bridge geometry is such that retrofitting a collection system to the existing bridge is not feasible. Additionally, the State Historic Preservation Office determined that a drainage collection system on the rehabilitated bridge would have an adverse effect to the historic nature of the bridge. NCDOT will continue to coordinate with NCDWQ regarding hazardous spill basins and the replacement of the basins as it relates to Swift Island Bridge and other areas within the Critical Area.

Comment: Review of the project reveals the presence of surface waters classified as C; High Quality Waters of the State in the project study area. This is one of the highest classifications for water quality. Pursuant to 15A NCAC 2H, 1006 and 15A NCAC 2B .0224, NCDOT will be required to obtain a State Stormwater Permit prior to construction. As such, the NCDOT is strongly encouraged to contact the NCDWQ to discuss appropriate permitting requirements and strategies.

Response: Comment Noted. The proposed project is following the NEPA/404 Merger Process. Coordination regarding permitting is occurring through the merger process and is standard for projects with similar impacts.

Comment: Table 1 shows the cost estimates for the project. It is noted that the amount allowed for mitigation for projects R-2530B and B-4974 is zero. It is not clear to NCDWQ why no funds are/were allocated to mitigation for these two projects when Table 5 and Tables 11-16 clearly indicate that there will be enough impacts to streams and wetlands associated with these projects to warrant mitigation.

Response: Stream mitigation cost for the three projects are $3,235,221. Wetland mitigation cost for the three projects are $65,057. That mitigation cost is $3,300,278.

Comment: In Table 6 (Summary of Environmental Effects), the residential and business relocations for R-2530B state to "See B-4974." It is unclear what this means; there is no footnote explanation and it is not discussed in the text. Additionally, it is not clear whether it is referring Alternative 1 or Alternative 4 under B-4974.

Response: The Summary of Environmental Effects for the preferred alternative table is shown on page 3 of this document and lists the impacts for each section of the project.

Comment: The NCDWQ prefers onsite mitigation as opposed to offsite or in-lieu fee mitigation. The NCDWQ strongly encourages the NCDOT to thoroughly investigate any potential onsite mitigation opportunities, as is stated on page 34.

Response: NCDOT will investigate any potential onsite mitigation opportunities as the project progresses.

Comment: With respect to the "Bridge Demolition" section on page 35, if demolition of Bridge 51 is to occur, the NCDOT should follow the "Removal of Existing Structures" guidance referenced and select a demolition method and procedure(s) that prevents pieces of the bridge from falling in the river during the demolition/removal process. Also, there is a reference to project B-2527; it is believed it should actually reference project B-4974.

Response: The references to B-2527 is shown in the revision to EA section of the FONSI. Additionally, the "Removal of Existing Structures" guidelines is a standard operation procedure that will be followed for this project with the rehabilitation of Bridge No. 51.

Comment: There is a brief discussion of the anticipated indirect and cumulative effects (ICE) discussed on page 53. The conclusion by the NCDOT is that ICE will be minimal, primarily due to federal land ownership, land planning regulations, and water supply watershed regulations. While this conclusion may be true based on these factors, the NCDWQ would like to know that other factors have been considered as well. The NCDWQ would like to see the NCDOT's screening criteria table included. This would show that other factors other than land ownership and current policy, which can change rather quickly, have been evaluated on a quantitative level.

Response: NCDOT's screening criteria tables are below.

TABLE 8. POTENTIAL FOR LAND USE CHANGE, 2000-2020 FOR R-2530B

Rating	Change in Accessibility	Change in Property Values	Forecasted Growth	Land Supply vs. Land Demand	Water/Sewer Availability	Market For Development	Public Policy
Strong	Travel Time Savings > 10 min.	> 50% Increase	> 3% Annual Pop. Growth	< 10-Year Supply of Land	Current Services Exist	Extremely High Potential	Pro-Growth
^ " " "	X	X	X	X	X	X	X
Weak	Travel Time Savings < 2 min.	No Change	< 1% Annual Pop. Growth	> 20-Year Supply of Land	No Plans For Future Service	Extremely Low Potential	Anti-Growth

TABLE 9: POTENTIAL FOR NEW GROWTH OR LAND USE CHANGE, 2000-2030 FOR R-2527

Rating	**Change in Accessibility**	**Change in Property Values**	**Forecasted Growth**	**Land Supply v. Land Demand**	**Water/Sewer Availability**	**Market for Development**	**Public Policy**
STRONG	> 10 minute travel time savings	> 50% increase in property values	> 3% annual population growth	< 10-year supply of land	Existing service available	Development activity abundant	Less stringent; no growth management
↑							
↗		X		X		X	XX
→		X	X	X	X	X	
↘	XX	X	X	X	X	X	
↓	X		X				
weak	< 2 minute travel time savings	No property value increase	0-1% annual population growth	> 30-year supply of land	No service available now or in future	Development activity lacking	More stringent; growth management

X no-Build Scenario X Build Scenario X Growth Impact Study Areas

Comment: General Comments #11-28 (See Appendix)

Response: Standard practices will be followed.

North Carolina Wildlife Resources Commission

Comment: NCDOT currently shows an estimated impact of 120 acres to the Uwharrie National Forest. This acreage appears excessive for the amount of widening occurring within US Forest Service lands. Also the figures illustrating Uwharrie National Forest depicts an area much larger than the existing lands that comprise the forest. NCDOT should coordinate with the USFS to confirm the accuracy of mapping and impacts to this area. None-the-less, as a public resource including being managed as a Game Land impacts to this area should be minimized, and NCDOT should coordinate with the USFS to identify potential mitigation options for unavoidable impacts.

Response: Impacts to USFS lands were recalculated based on updated boundary limits. The total of USFS land impacted is 50 acres. Avoidance and minimization efforts were discussed and an agreement was reached as of December 18, 2016. Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. NCDOT will coordinate with the Forest Service to further avoid and minimize impacts and identify potential mitigation options will begin to develop right of way plans for Project R-2527.

Comment: There are two WRC facilities with the project study area, the Swift Island public boating access area and the Troy Depot. Impacts to these facilities should be minimized to the greatest extent practicable. Minimization efforts during design and further coordination with WRC personnel prior to construction will be necessary to allow continued access to these sites through project completion.

Response: NCDOT is currently coordinating with WRC and Duke Energy regarding the boat access at Swift Island Bridge. Coordination will continue to ensure schedules are coordinated and impacts are minimized. Concurrence on current impacts are included in the Appendix D. The Troy Depot is not a protected resource. It is not available for public use. This building is used to house WRC offices.

Department of Environment and Natural Resources – Division of Water Resources Public Water Supply Section

Comment: All construction projects with water systems must submit plans and specifications to Public Water Supply Section (PWSS) for review and obtain approval before construction work can begin. Once the project is completed before the water system can be placed into service the applicant again must obtain a final approval from PWSS.

Response: Standard procedure.

Public Hearing Comments

R-2530B (NC 24/27 from NC 740 to Lake Tillery)

Several citizens submitted concerns of placement of left-overs and U-turn bulbs along the project limits. U-turn bulbs and leftovers along this portion of the project is currently being addressed. Other citizens had a concern with the 5-lane design; however, NCDOT has decided that a 4-lane facility will be constructed along NC 24/27.

B-4974 (Swift Island Bridge over Lake Tillery)

Citizens and county officials wanted the bridge to be replaced. NCDOT at that time were to determine which alternative to be chosen during the Least Environmentally Damaging Practicable Alternative (LEDPA) meeting. The Swift Island Bridge will be rehabilitated in its current location.

R-2527 (NC 24/27 from Lake Tillery to the proposed Troy Bypass)

There were a couple concerns with U-turn bulb placements and NCDOT will be investigating options during the right of way plan preparation. A couple citizens were concerned about proximity of a house and cemetery within the project area. NCDOT will try to minimize the impacts to the property during right of way plans preparations and look into the location of the cemetery.

Following the circulation of the EA, a Combined Public Hearing was held on June 21, 2012. The Albemarle City Council voted unanimously to request that NCDOT consider using a 5-lane section on the portion of the project that begins at NC 740 and extends to Sweet Home Church Road. However, Department staff decided to move forward with the current 4-lane median divided design. This was based on the facilities designation as a Strategic Highway Corridor, the design year traffic projections, the design speed, and the noted safety benefits of median divided facility. Other design decisions determined were the Indian Mound Road Extension will not be extended to connect to NC 24/27 on a temporary or permanent basis and a directional left-over will be provided at Charter Street.

Additional Project Coordination

Merger Process

A CP3 LEDPA/ CP4 Meeting was on August 17, 2016. The purpose of this meeting was to confirm the LEPA for R-2530B, R-2527 (best fit alignments) and decide on LEPA and avoidance and minimization for B-4974. The majority of the team concurred on August 17, 2016. The RPO concurred on December 18, 2016 (See Appendix).

Coordination with Local Officials

There was coordination with the Town of Albemarle for sidewalks within the project limits. Additionally, coordination is underway with Albemarle regarding the proposed superstreet designs only in the curb and gutter section of R-2530B and other design features of the project.

Coordination with other Federal and State Agencies

Agency coordination occurred through the Merger Process. In addition coordination is underway for FERC, Swift Island Bridge boat access with WRC and Duke Energy respectively. Coordination with USFS will also be on-going.

Coordination for Controversial Issues

There was coordination with the NCDOT and the County on the bridge retention or replacement of the bridge.

VI. Revisions to the EA

The following are revisions to the Environmental Assessment (EA):

A. SUMMARY

Summary, 2. Project Purposed Description of Proposed Action, page iv, General Description, page 1 states:

The EA states TIP project B-4974 involves replacing existing Bridge No. 51 over the Pee Dee River on the Stanly/ Montgomery County line.

Revision: TIP project B-4974 involves rehabilitating existing Bridge No. 51 over Pee Dee River on the Stanly/ Montgomery County line.

Summary, 4. Alternatives Considered, page v, paragraph 1 states:

"and widening NC 24-27 from NC 740 in Albemarle to the proposed Troy Bypass (TIP project R-623), west of Troy to include constructing a new bridge over the Pee Dee River."

Revision: This portion of the paragraph should be revised to replace "constructing a new bridge" to "rehabilitate the old bridge over the Pee Dee River."

Summary, 4. Alternatives Considered, page v, paragraph 1 states:

Preliminary alternatives examined for the proposed projects included the "No Build" alternative, alternate modes of transportation, Transportation Systems Management (TSM) alternative, and widening NC 24-27 from NC 740 in Albemarle to the proposed Troy Bypass (TIP project R-623), west of Troy to include constructing a new bridge over the Pee Dee River. Of these preliminary alternatives, only widening NC 24-27 would serve the project purpose of improving traffic flow and level of service on the section of NC 24-27 between NC 740 in Albemarle to the proposed Troy Bypass and to maintain a bridge across the Pee Dee River that addresses the needs of highway users.

Revision: The No Build alternative was omitted as an alternative to carry forward for detailed study on the CP2 form dated 12/11/2008. To capture the "No Build" impacts associated with this project, information was added to the impact table below comparing the alternatives that were studied. Based upon the purpose and need, the No Build alternative does not meet the purpose and need for the project.

IMPACT CATEGORY	PROJECT STUDY ALTERNATIVE				TOTAL IMPACTS
		A	Rehab	C	
	No Build	R-2530B	B-4974,	R-2527	A+Rehab+C
			Rehab Alt.		
Natural Resources Impacts					
Federal Listed Species Habitat	No	Yes	Yes	Yes	Yes
100-Year Flood Plain and Floodway Impacts	No	No	Yes	Yes	Yes
Wetlands (number of crossings/acres)	0	3 / 0.82	1 / 0.02	26 / 0.89	30 /1.73
Stream Crossings (number / linear feet)	0	15 / 3,842	9 / 1,356	25 / 5,695	49 / 10.893
Water Supply Critical Areas	No	Yes	Yes	Yes	Yes
Rare Plants *	No	Yes	No	Yes	Yes
USFS Forest Land (acres) **	0	0	0	50	50
Human Environment Impacts					
Residential Relocations (number)	0	19	5	8	32
Business Relocations (number)	0	18	3	2	23
Low Income/Minority Population	No	No	No	No	No
Cemeteries/Graves (number of graves impacted)	0	Yes / 0	No	No	Yes / 0
Historic Structures ***	0	0	1	0	1
Archaeological Sites	0	3	0	3	6
Section 4(f) Impacts	0	No	Yes	Yes	Yes
Traffic Noise Impacts (receptors) ****	0	15	0	11	26
Air Quality	Within an Attainment area				
Physical Environment Impacts					
Railroad Crossings (number)	0	0	0	1	1
Farmland	No	No	No	No	No
Potentially Hazardous Materials Sites (number)	0	17	2	4	23

NOTES:

All impacts, but the USFS Forest Land acreage, are based on preliminary design slope stake limits plus 25 feet. The USFS Forest Land acreage is based on preliminary proposed right of way limits.

* Rare plants include Schweinitz's Sunflower, Georgia Aster, Large Witch Alder and Smooth Sunflower.

** USFS Forest Land acreage was recalculated based on updated forest boundaries.

*** The Swift Island Ferry / James B. Garrison Bridge (Existing Bridge 51) is eligible for the National Register of Historic Places.

**** The values are based on results of the Traffic Noise Analysis (December 5, 2011) and screened against the Traffic Noise Policy (October 6, 2016). A Design Noise Report (DNR) will be completed during final design.

Summary, 4. Alternatives Considered, page v, paragraph 2 states:

Four bridge replacement alternatives were considered for TIP project B-4974. Alternate 1 included south side widening and replacing Bridge No. 51, Alternate 2 included south side widening and replacing Bridge No. 51 and No. 50, Alternate 3 included north side widening and replacing Bridge No. 51 and No. 50, and Alternate 4 included replacing Bridge No. 51 in place.

Revision: Five alternatives were considered for TIP Project B-4974. Alternate 5 include rehabilitating the existing Bridge No. 51.

Summary, 8. Additional Information, page viii states:

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Revision: Beverly G. Robinson, CPM
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B. DESCRIPTION OF PROPOSED ACTION

Section I, B. Historical Resume and Project Status, page 1

The proposed projects are included in the North Carolina Department of Transportation (NCDOT) 2012-2020 State Transportation Improvement Program (2012-2020 STIP). Right of way acquisition and construction for R-2530B and B-4974 are scheduled for state and federal fiscal years 2014 and 2016, respectively. Right of way acquisition and construction for R-2527 is scheduled for state fiscal years 2016 and 2018, respectively.

Revision: The proposed projects are included in the NCDOT 2016-2025 STIP. Right of way acquisition and construction for R-2530B and B-4974 are scheduled for state and federal fiscal years 2017 and 2019, respectively. Project R-2527 was recently funded in the Draft STIP. However, while this FONSI was being developed, TIP Project R-2527 was unfunded and final design plans were postponed. Costs estimates for R-2527 is based on STIP costs.

.

Section I, C. Cost Estimates, page 2

The cost estimates included in the 2012-2020 STIP and the latest cost estimates are listed in Tables 1 and 2, respectively, and on page 2 of the EA. These cost were updated.

Revision: The updated cost estimates included in the 2016-2025 STIP are listed in the table below.

PROJECT COST ESTIMATE FROM THE 2016-2025 STIP*

Project Number	Right of Way/ Utility Cost	Construction Cost	Mitigation Cost	Project Cost
R-2530B:	$15,900,000	$29,200,000	$1,174,118	$46,274,118
B-4974 Rehab Alternative:	$2,025,000	$28,000,000	$403,538	$30,428,538
R-2527	$9,437,000	$46,200,000	$1,722,622	$57,359,622
Total Cost	**$27,362,000**	**$103,400,000**	**$3,300,278**	**$134,062,278**

*Based off of NCDOT STIP January 2017 and March 2017

C. PURPOSE AND NEED FOR THE PROJECTS

Section II, B. Needs for the Projects, 8. Bridges and Drainage Structures

Table 3: Existing Bridges, on page 5,

PROJECT/ BRIDGE NO.	CARRIES/ CROSSES	CLEAR ROADWAY WIDTH OR MIN. HORIZONTAL CLEARANCE UNDER	VERTICAL CLEARANCE	LENGTH	YEAR BUILT	SUFFICIENCY RATING*
B-4974 / 50	NC 24-27 / Pee Dee River	40’ (Clear Roadway Width)	N/A	1140’	1979	87.6
B-4974 / 51	NC 24-27 / Pee Dee River	20’ (Clear Roadway Width)	N/A	1060’	1927	47
R-2527 / 14	NS Railroad/ NC 24-27	43.4’ (Horizontal Clearance Under)	15’3”	145’	1957	N/A

*Sufficiency Rating (out of a possible 100 rating points).

Revision: Based on 2016 Bridge Inspection Reports

PROJECT/ BRIDGE NO.	CARRIES/ CROSSES	CLEAR ROADWAY WIDTH OR MIN. HORIZONTAL CLEARANCE UNDER	VERTICAL CLEARANCE	LENGTH	YEAR BUILT	SUFFICIENCY RATING*
B-4974 / 50	NC 24-27 / Pee Dee River	40’ (Clear Roadway Width)	N/A	1140’	1979	86.6
B-4974 / 51	NC 24-27 / Pee Dee River	20’ (Clear Roadway Width)	N/A	1060’	1927	46.82
R-2527 / 14	NS Railroad/ NC 24-27	43.4’ (Horizontal Clearance Under)	15’3”	145’	1957	N/A

*Sufficiency Rating (out of a possible 100 rating points).

Table 4: Existing Drainage Structures (Major Stream Crossings), page 6 has been updated.

Revision:

STREAM NAME	LOCATION	DRAINAGE STRUCTURE	DRAINAGE AREA (SQ. MILES)	STREAM CLASSIFICATION	DWQ SCORE
R-2530B:					
UT Mountain Creek	0.3 miles SE of the NC 740 junction	Replace 1 @ 87.5” X 68” (87”X63”) CMPA w/ 2 @ 9’x5’ RCBC	0.20 (131 Ac.)	-	-
UT Mountain Creek	0.3 miles NW of the SR 1537 junction	Replace 1 @ 6’ X 6’ RCBC w/ 1 @ 8’x7’ RCBC	0.38 (243 Ac.)	Perennial	30.5
UT Mountain Creek	0.05 miles SE of the SR 1731 junction	Replace 1 @ 6’ X 6’ RCBC w/ 1 @ 7’x7’ RCBC	0.27 (171 Ac.)	Perennial	32
B-4974:					

UT Pee Dee River	0.2 miles SE of the SR 1778 junction	Replace 1 @ 7' X 7' Bottomless RCBC w/ 1 @ 9'x7' RCBC	0.43 (275 Ac.)	Perennial	29
Rocky Creek	0.4 miles W of the SR 1150 junction	Replace 2 @ 10 X 7 RCBC w/ 2 @ 11'x9' RCBC	3.5	Perennial	42.5
R-2527:					
Rocky Creek	0.08 miles W of the SR 1150 junction	Retain and Extend 2 @ 9 X 7 RCBC	2.9	Perennial	40
Clarks Creek	0.8 miles SW of the SR 1134 junction	Retain and Extend 2 @ 10 X 7 RCBC	2.6	Perennial	41.5
UT Lick Fork Creek	0.5 miles NE of the SR 1134 junction	Retain and Extend 2 @ 7 X 7 RCBC	1.2	Perennial	44.5
UT Rocky Creek	0.2 miles W of the SR 1137 junction	Retain and Extend 1 @ 7 X 5 RCBC	0.83 (530 Ac.)	Perennial	40.5
UT Rocky Creek	0.1 miles E of the SR 1137 junction	Retain and Extend 1 @ 7 X 5 RCBC	1.0 (664 Ac.)	Perennial	40.5
Rocky Creek	0.3 miles E of the SR 1137 junction	Retain and Extend 3 @ 9 X 9 RCBC	9.0	Perennial	48.5
Smith Branch Creek	0.4 miles NE of the NC 109 junction	Retain and Extend 1 @ 8 X 8 RCBC	1.3	Perennial	43

Section II, B. Needs for the Projects, d. Traffic Carrying Capacity, 1. Existing and Future Traffic Volumes, page 7 states:

In the year 2010, average daily traffic along NC 24-27 will likely range between 7,200 and 14,100 vehicles per day. By year 2035, traffic in the project areas is predicted to range between 10,500 and 20,500 vehicles per day, respectively.

Revision: In 2010, the average daily traffic will likely range between 9,000 and 14,100 vehicles per day. By the year 2035, the traffic in the project areas is predicted to range between 13,100 and 20,500 vehicles per day, respectively.

Section II, B. Needs for the Projects, e. Accident Data, page 8 states:

An accident study was conducted along NC 24-27 in the project study areas for the time period from August 1, 2008 through July 31, 2011. During this study period, 203 crashes were reported along the subject sections of NC 24-27. Three fatal crashes occurred, and 76 crashes resulted in injuries. The total crash rate for this section of NC 24-27 is 131.36 accidents per 100 million vehicle miles (acc/100mvm). Compared to the statewide rate of 177.26 acc/100mvm for rural two-lane, undivided NC routes, NC 24-27 total crash rates are below the statewide rate. The fatal crash rate of 1.94 acc/100mvm is also below the statewide rate of 2.12 acc/100mvm for rural two-lane, undivided NC routes.

Revision: An accident study was conducted along NC 24-27 in the project study areas for the time period from December 1, 2011 through November 30, 2016. During this study period, 371 crashes were reported along the subject sections of NC 24-27. Three fatal crashes occurred, and 105 crashes resulted in injuries. The total crash rate for this section of NC 24-27 is 160.77 accidents per 100 million vehicle miles (acc/100mvm). Compared to the statewide rate of 174.39 acc/100mvm for rural two-lane, undivided NC routes, NC 24-27 total crash rates are below the statewide rate. The fatal crash rate of 1.30 acc/100mvm is also below the statewide rate of 1.94 acc/100mvm for rural two-lane, undivided NC routes.

D. ALTERNATIVES TO THE PROPOSED ACTION

Section III, D. Alignment Alternatives, page 14

Table 6: Summary of Environmental Effects, page 14 has been updated.

Revision:

IMPACT CATEGORY	PROJECT STUDY ALTERNATIVE				TOTAL IMPACTS
		A	Rehab	C	
	No Build	R-2530B	B-4974,	R-2527	A+Rehab+C
			Rehab Alt.		
Natural Resources Impacts					
Federal Listed Species Habitat	No	Yes	Yes	Yes	Yes
100-Year Flood Plain and Floodway Impacts	No	No	Yes	Yes	Yes
Wetlands (number of crossings/acres)	0	3 / 0.82	1 / 0.02	26 / 0.89	30 /1.73
Stream Crossings (number / linear feet)	0	15 / 3,842	9 / 1,356	25 / 5,695	49 / 10.893
Water Supply Critical Areas	No	Yes	Yes	Yes	Yes
Rare Plants *	No	Yes	No	Yes	Yes
USFS Forest Land (acres) **	0	0	0	50	50
Human Environment Impacts					
Residential Relocations (number)	0	19	5	8	32
Business Relocations (number)	0	18	3	2	23
Low Income/Minority Population	No	No	No	No	No
Cemeteries/Graves (number of graves impacted)	0	Yes / 0	No	No	Yes / 0
Historic Structures ***	0	0	1	0	1
Archaeological Sites	0	3	0	3	6
Section 4(f) Impacts	0	No	Yes	Yes	Yes
Traffic Noise Impacts (receptors) ****	0	15	0	11	26
Air Quality	Within an Attainment area				
Physical Environment Impacts					
Railroad Crossings (number)	0	0	0	1	1
Farmland	No	No	No	No	No
Potentially Hazardous Materials Sites (number)	0	17	2	4	23

NOTES:
All impacts, but the USFS Forest Land acreage, are based on preliminary design slope stake limits plus 25 feet. The USFS Forest Land acreage is based on preliminary proposed right of way limits.
* Rare plants include Schweinitz's Sunflower, Georgia Aster, Large Witch Alder and Smooth Sunflower.
** USFS Forest Land acreage was recalculated based on updated forest boundaries.
*** The Swift Island Ferry / James B. Garrison Bridge (Existing Bridge 51) is eligible for the National Register of Historic Places.

**** The values are based on results of the Traffic Noise Analysis (December 5, 2011) and screened against the Traffic Noise Policy (October 6, 2016). A Design Noise Report (DNR) will be completed during final design.

E. PROPOSED IMPROVEMENTS

Section IV, E. Intersections, F. Traffic Operations, page 16 states:

Due to concerns voiced by the public, the plans currently show full movement intersections at the NC 24-27 / Barnard Street / Anderson Road intersection and the NC 24-27 / Anderson Grove Church Road / Anderson Road intersection within the Albemarle city limits. The final decision concerning whether these full movement intersections will be revised will be made after the public hearing.

Revision: Coordination regarding full movement intersections occurred following the Environmental Assessment. Based on the coordination full movement intersections are proposed at the following locations:

NC 24/27 at Barnard Street/ Anderson Road
NC 24/27 at Anderson Grove Church Road/ Anderson Road

Section IV, J. Bridges and Drainage Structures, page 19

Table 9: Proposed Bridges and Drainage Structures (Major Stream Crossings) on page 20 has been updated.

Revision:

SITE NO.	STREAM UNDER OR RAILROAD OVER NC 24-27	*LOCATION ON NC 24-27*	*RECOMMENDED STRUCTURE*	*FLOOD ZONE STATUS*
R-2530B:				
1	UT Mountain Creek	0.3 miles SE of the NC 740 junction	Replace 1 @ 87.5" X 68" (87"X63") CMPA w/ 2 @ 9'x5' RCBC	N/A
2	UT Mountain Creek	0.3 miles NW of the SR 1537 junction	Replace 1 @ 6' X 6' RCBC w/ 1 @ 8'x7' RCBC	N/A
3	UT Mountain Creek	0.05 miles SE of the SR 1731 junction	Replace 1 @ 6' X 6' RCBC w/ 1 @ 7'x7' RCBC	N/A
B-4974:				
4	UT Pee Dee River	0.2 miles SE of the SR 1778 junction	Replace 1 @ 7' X 7' Bottomless RCBC w/ 1 @ 9'x7' RCBC	N/A
5	UT to Pee Dee River	0.1miles SE of the SR 1149 junction	Replace 1 @ 60" RCP w/ 1 @ 6'x8' RCBC	N/A

6	Pee Dee River Alternative 4	0.1 miles W of the NC 73 Junction	Rehab Bridge No. 51 bridge. Existing Bridge No. 50 will remain in place.	Designated Flood Hazard Zone
7	Rocky Creek	0.4 miles W of the SR 1150 junction	Replace 2 @ 10 X 7 RCBC w/ 2 @ 11'x9' RCBC	Designated Flood Hazard Zone
R-2527:				
8	Rocky Creek	0.4 miles W of the SR 1150 junction	Replace 2 @ 10 X 7 RCBC w/ 2 @ 11'x9' RCBC	Designated Flood Hazard Zone
9	Rocky Creek	0.08 miles W of the SR 1150 junction	Retain and Extend 2 @ 9 X 7 RCBC	Designated Flood Hazard Zone
10	Clarks Creek	0.8 miles SW of the SR 1134 junction	Retain and Extend 2 @ 10 X 7 RCBC	Designated Flood Hazard Zone
11	UT Lick Fork Creek	0.5 miles NE of the SR 1134 junction	Retain and Extend 2 @ 7 X 7 RCBC	Designated Flood Hazard Zone
12	UT Rocky Creek	0.2 miles W of the SR 1137 junction	Retain and Extend 1 @ 7 X 5 RCBC	N/A
13	UT Rocky Creek	0.1 miles E of the SR 1137 junction	Retain and Extend 1 @ 7 X 5 RCBC	N/A
14	Rocky Creek	0.3 miles E of the SR 1137 junction	Retain and Extend 3 @ 9 X 9 RCBC	Designated Flood Hazard Zone
Near 14	Norfolk Southern/ Aberdeen Carolina & Western Railway	0.1 miles W of the NC 109 junction	Build a new 210' bridge and railroad track west of the existing bridge. Remove Bridge No. 14	N/A
15	Smith Branch Creek	0.4 miles NE of the NC 109 junction	Retain and Extend 1 @ 8 X 8 RCBC	N/A

F. ENVIRONMENTAL EFFECTS OF PROPOSED ACTION

Section V, A. Natural Resources, 2. Water Resources, a. Clean Water Act/ Waters of the U.S., 2nd and 3rd paragraph page 29

Revision: Fifteen (15) jurisdictional streams are impacted in the R-2530B project area. Seven (7) jurisdictional streams are impacted in the B-4974 project area. Twenty-five (25) jurisdictional streams are impacted in the R-2527 project study area. Three (3) wetlands are impacted in the R-2530B project area. One (1) wetland is impacted in the B-4974 project study area. Twenty-six (26) wetlands are impacted in the R-2527 project

study area. Stream classifications, wetland types and other data are included in Tables below. See **Figures 3A to 3K** in Appendix A.

Tables 11- 16 on pages 31 – 33 under Summary of Anticipated Effects have been updated.

Revision:

STREAM IMPACTS IN THE R-2530B PROJECT STUDY AREA

STREAM ID	STREAM NAME	NCDENR STATUS CLASSIFICATION	DWQ SCORE	STREAM LENGTH IN STUDY AREA (FEET)	PRELIMINARY DESIGN STREAM IMPACTS (FEET) ALTERNATIVE: BEST FIT
DITCH	UT, Mountain Creek	-	-	290	31
St-AN 02	UT, Mountain Creek	Perennial	30.5	788	250
St-B	UT, Mountain Creek	Perennial	32	475	149
St-CC	UT, Mountain Creek	Perennial	33	515	70
St-D	UT, Mountain	Perennial	32	454	21
St-E	UT, Mountain Creek	Perennial	32	396	35
St-EE	UT, Mountain Creek	Perennial	30.5	527	30
St-F	UT, Mountain Creek	Perennial	--	799	137
St-FF	UT, Mountain Creek	Intermittent	24.5	392	123
St-GG	UT, Mountain Creek	Perennial	35.5	310	178
St-HH	UT, Mountain Creek	Perennial	30.5	619	154
St-I	UT, Mountain Creek	Intermittent	28	1867	1433
St-M	UT, Jacobs Creek	Perennial	36.5	3730	656
St-N	UT, Jacobs Creek	Perennial	40	676	240
St-Q	UT, Jacobs Creek	Perennial	34.5	662	98
St-R	UT, Pee Dee River	Perennial	31.5	884	237
TOTAL STREAM IMPACTS FOR R-2530B					**3,842**

NOTES: Impacts are based on preliminary design slope stake limits plus 25 feet.

STREAM IMPACTS IN THE B-4974 PROJECT STUDY AREA

STREAM ID	STREAM NAME	NCDENR STATUS CLASSIFICATION	DWQ SCORE	STREAM LENGTH IN STUDY AREA (FEET)	PRELIMINARY DESIGN STREAM IMPACTS (FEET) REHABILIATION ALTERNATIVE: 4
St-T	UT, Pee Dee River	Perennial	29	821	213
St-U	UT, Pee Dee River	Perennial	33	1445	303
St-V	UT, Pee Dee River	Perennial	34.5	1255	328
SG	UT, Pee Dee River	Intermittent	26	242	65
SH	UT, Pee Dee River	Perennial	32.5	386	72
SA-1	UT, Rocky Creek	Intermittent	--	832	201
SA	Rocky Creek	Perennial	42.5	1,123	174
TOTAL STREAM IMPACTS FOR B-4974					**1,356**

NOTES: Impacts are based on preliminary design slope stake limits plus 25 feet

STREAM IMPACTS IN THE R-2527 PROJECT STUDY AREA

STREAM ID	STREAM NAME	NCDENR STATUS CLASSIFICATION	DWQ SCORE	STREAM LENGTH IN STUDY AREA (FEET)	PRELIMINARY DESIGN STREAM IMPACTS (FEET) ALTERNATIVE: BEST FIT
SB-1	Rocky Creek	Perennial	40	903	117
SB-2	UT, Rocky Creek	Perennial	32.5	643	151
SC	Dumas Creek	Perennial	43	521	109
SC-1	UT, Dumas Creek	Intermittent / Perennial	26	1,807	1372
SD	Clarks Creek	Perennial	41.5	531	145
SE	UT, Lick Fork Creek	Perennial	44.5	530	127
SF-A	Lick Fork Creek	Perennial	40.5	524	135
SF-A1	UT, Lick Fork Creek	Intermittent	30	60	60
SF-B	Rocky Creek	Perennial	48.5	517	155
SH-1	UT, Pee Dee River	Intermittent	>19	81	81
SJ	UT, Wood Run	Intermittent	20	210	109
SL-A	UT, Cattail Creek	Perennial	33.5	627	114
SM-1	UT, Rocky Creek	Intermittent	24	553	188
SM-2	UT, Rocky Creek	Perennial	35	554	172
SN	UT, Dumas Creek	Perennial	39.5	753	281
SO	UT, Dumas Creek	Perennial	37	747	122
SP	UT, Clarks Creek	Perennial	40	521	108
SR	UT, Lick Fork Creek	Intermittent	24.5	507	171
SU	UT, Lick Fork Creek	Perennial	39	343	267
SW-B	UT, Lick Fork Creek	Intermittent	29	672	147
SW-C1	UT, Rocky Creek	Intermittent	27.5	664	193
SX	UT, Lick Fork Creek	Perennial	37.5	1,567	339
SY-A	UT, Rocky Creek	Perennial	40.5	2,335	729
SY-B	Smith Branch Creek	Perennial	43	902	196
SZ	UT, Smith Branch Creek	Intermittent	27.75	749	107
TOTAL STREAM IMPACTS FOR R-2527					**5,695**

NOTES: Impacts are based on preliminary design slope stake limits plus 25 feet.

WETLAND IMPACTS IN THE R-2530B PROJECT STUDY AREA

WETLAND ID	WETLAND TYPE	WETLAND RATING	WETLAND AREA IN STUDY AREA (Acres)	PRELIMINARY DESIGN WETLAND IMPACTS (ACRES) ALTERNATIVES: BEST FIT
8	Riverine	No Form	1.20	0.61
10	Riverine	No Form	0.36	0.18
WA	Riverine	No Form	0.03	0.03
TOTAL WETLAND IMPACTS FOR R-2530B				**0.82**

NOTES: Impacts are based on preliminary design slope stake limits plus 25 feet.
Information is unavailable for items marked with "No Form".

WETLAND IMPACTS IN THE B-4974 PROJECT STUDY AREA

WETLAND ID	WETLAND TYPE	WETLAND RATING	WETLAND AREA IN STUDY AREA (Acres)	PRELIMINARY DESIGN WETLAND IMPACTS (ACRES) REHABILITATION ALTERNATIVE: 4
WB	Riverine	32	0.020	0.02
TOTAL WETLAND IMPACTS FOR B-4974				**0.02**

NOTES: Impacts are based on preliminary design slope stake limits plus 25 feet.
Information is unavailable for items marked with "No Form".

WETLAND IMPACTS IN THE R-2527 PROJECT STUDY AREA

WETLAND ID	WETLAND TYPE	WETLAND RATING	WETLAND AREA IN STUDY AREA (Acres)	PRELIMINARY DESIGN WETLAND IMPACTS (ACRES) ALTERNATIVE: BEST FIT
WBB	Riverine	20	0.152	0.14
WE	Riverine	19	0.011	0.01
WEE	Non-Riverine	18	0.308	0.04
WF	Riverine	25	0.101	0.03
WFF	Riverine	31	0.601	0.04
WGG	Non-Riverine	22	0.251	0.05
WH	Riverine	18	0.007	0.01
WHH	Riverine	31	0.019	0.02
WJ	Riverine	18	0.003	<0.01
WM	Riverine	30	0.012	0.01
WN	Riverine	30	0.017	0.01
WNN	Riverine	16	0.306	0.09
WOO	Riverine	31	0.028	0
WP	Non-Riverine	30	0.092	0.092
WPP	Non-Riverine	18	0.057	<0.01
WQQ	Riverine	18	0.114	0
WR	Non-Riverine	30	0.099	0.03
WS	Riverine	19	0.054	0.02
WSS	Riverine	37	0.061	<0.01
WT	Non-Riverine	16	0.166	0.11
WU-1	Riverine	19	0.018	0.02
WU-2	Riverine	39	0.123	0.11
WXX	Riverine	28	0.233	0
WYY	Riverine	16	0.008	0
WZ	Riverine	18	0.076	0.02
WZZ	Non-Riverine	19	0.037	<0.01
TOTAL WETLAND IMPACTS FOR R-2527				**0.89**

NOTES: Impacts are based on preliminary design slope stake limits plus 25 feet.

Section V, A. Natural Resources, 2. Water Resources, e. Summary of Anticipated Effects page 30

This information has been updated

Revision: For project R-2530B, there are 3,507 linear feet of stream impacts and 0.82 acres of wetland impacts. For project B-4974, Rehabilitation Alternative, there are

1,691 linear feet of stream impacts and 0.02 acres of wetland impacts. For project R-2725, there are 5,695 linear feet of stream impacts and 0.88 acres of wetland impacts.

Section V, A. Natural Resources, 3. Rare and Protected Species, a. Endangered Species Act Protected Species pages 36

Table 17 – Federally Protected Species Listed For Stanly and Montgomery Counties has been updated.

Revision:

PROJECT & COUNTY	COMMON NAME	FEDERAL STATUS	HABITAT PRESENT?	BIOLOGICAL CONCLUSION
R-2530B & R-2527 – Stanly/ Montgomery	Schweinitz's Sunflower	E	Yes	May Affect, Likely to Adversely Affect
R-2527 – Montgomery	Smooth Coneflower	E	Yes	No Effect
R-2527 – Montgomery	Red-cockaded Woodpecker	E	No	No Effect
R-2530B – Stanly	Northern Long-Eared Bat	T	Yes	Unresolved

NCDOT has determined that the proposed action does not require separate consultation on the grounds that the proposed action is consistent with the final Section 4(d) rule, codified at 50 C.F.R. § 17.40(o) and effective February 16, 2016. NCDOT may presume its determination is informed by best available information and consider Section 7 responsibilities fulfilled for Northern Long-Eared Bat.

Section V, B. Cultural Resources, 1. Historic Architectural Resources, b. Potential Project Effects page 42

Table 18 has been updated to include rehabilitation of the bridge

Revision:

ALTERNATIVE/ SCENARIO	EFFECT FINDING
Alt. 1, 2 & 3 – new owner agrees to take ownership of Bridge No. 51	No Adverse Effect
Alt. 1, 2 & 3 – no new owner agrees to take ownership of Bridge No. 51	Adverse Effect
Alternative 4	Adverse Effect
Alternative – rehabilitation of bridge, no new ownership of Bridge No. 51	No Adverse Effect with conditions

Rehabilitation alternative received a "no adverse effect with conditions" determination based on the agreement that the bridge be rehabilitated with similar structural

components as the existing structure. The Concurrence Form for Assessment of Effects can be found in the Appendix.

Section V, C. Section 4(f)/ 6(f) Resources paragraph 2 page 45

Additional information has developed since the completion of the EA. A Rehabilitation Alternative was developed for the improvements to Bridge No. 51. This rehabilitation alternative removes the superstructure of the bridge. The Environmental Assessment detailed the terms and conditions if bridge was replaced and a responsible party took the bridge over. A responsible party agreed to take the bridge over however due to state legislation, withdrew their offer because of the additional financial burden specified by this legislation.

Revision: Boat access coordination is currently underway with NCDOT, WRC and Duke Energy regarding impacts to the Swift Island Boat access area, schedule and construction. The design for facilities within the boat access area has been coordinated with Duke Energy and WRC.

Section V, E. Social Effects, 5. Bicycle and Pedestrian Facilities and Scenic Byways 2nd paragraph page 49-50

According to local officials, no trails or greenways exist within the R-2530B, B-4974 or R-2527 project study area or are planned in these areas. They have suggested that existing Bridge No. 51 over the Pee Dee River could be utilized as a pedestrian bridge for any potential future greenway or trail system.

Revision: Bridge No. 51 will be rehabilitated and will not be taken over to be utilized as a pedestrian bridge for any potential future greenway or trail system.

Section V, J. Highway Traffic Noise page 54

Revision: An updated design noise report will be completed during final design.

Section IV, Sidewalk Location, Addition to EA

Sidewalk location was not included in the EA. Since the signing of the document, it has been coordinated to include sidewalks in the project. The sidewalks will be included in the project at the following locations:

Five-foot sidewalks are proposed on both the north and south sides of NC 24-27-73, within the Albemarle city limits and the southwest quadrant of NC 24-27-73 (Spaulding Street) and SR 1625 (Raleigh Highway) for approximately 325 feet. Information regarding costs and location of the sidewalks were shared with the City of Albemarle. Estimated costs for sidewalks and cost sharing participation is as follows:

The total cost for constructing five-foot sidewalks on both sides of NC 24-27-73, East Main Street, within the Albemarle city limits is estimated to be approximately $271,639. The City of Albemarle's share is estimated to be $81,492, and NCDOT's share is estimated to be $190,147.

The total cost for constructing five-foot sidewalks on the north side of NC 24-27-73, East Main Street, within the Albemarle city limits is estimated to be approximately $140,070. The City of Albemarle's share is estimated to be $42,021, and NCDOT's share is estimated to be $98,049.

The total cost for constructing five-foot sidewalks on the south side of NC 24-27-73, East Main Street, within the Albemarle city limits is estimated to be approximately $131,956. The City of Albemarle's share is estimated to be $39,587, and NCDOT's share is estimated to be $92,369.

The total cost for constructing five-foot sidewalks along the east side of Spaulding Street within the Albemarle city limits is estimated to be approximately $193. The City of Albemarle's share is estimated to be $58, and NCDOT's share is estimated to be $135.

G. COMMENTS AND COORDINATION

Section VI, E. FERC Coordination page 63

Coordination with Progress Energy for potential requirements of the Federal Energy Regulatory Commission (FERC) regarding approvals has been initiated. Preliminary design plans will be forwarded to the appropriate contact. This coordination will continue through the permitting phase of the projects.

Revision: FERC coordination with Duke Energy is currently underway and will be finalized prior to construction.

VII. Bases for Finding of No Significant Impact

The EA documents a study of the impacts of the proposed project. Based upon this study and on comments received from federal, state, local agencies and the general public, it is the finding of the FHWA that this project will not have a significant adverse impact upon the human or natural environment. No significant impacts to natural, social, ecological, cultural, economic, or scenic resources are expected. The proposed project is consistent with local plans. The project has been extensively coordinated with federal, state, and local agencies. In view of this evaluation, it has been determined that a Finding of No Significant Impact (FONSI) is applicable for this project. Therefore, neither an Environmental Impact Statement nor further environmental analysis is required. The Summary of Findings for the project are listed in Table 10 below.

TABLE 10. SUMMARY OF FINDINGS

SECTION OF THE EA	SIGNIFICANT IMPACT?
Impacts to Aquatic Communities	No. Prior to construction, an Erosion and Sedimentation Control Plan/Stormwater Pollution Prevention Plan will be developed for the preferred alternative in accordance with the NCDENR publication Erosion and Sediment Control Planning and Design and the NCDOT's Best Management Practices for Protection of Surface Waters, to minimize any adverse impacts to aquatic communities. These Plans will be implemented and maintained throughout the construction period.
Water Resources	No. The construction activities associated with the project will follow NCDOT's Best Management Practices for Construction and Maintenance Activities. The standard sedimentation and erosion control measures adopted by NCDOT for the installation of bridges and culverts will be followed.
Jurisdictional Areas	No. It is anticipated impacts to jurisdictional surface waters will total approximately 10,893 linear feet. 1.73 acres of wetlands will be impacted as a result of this project. The NCDOT will coordinate the project with the Ecological Enhancement Program (EEP) to mitigate the stream impacts identified above.
Federally Protected Species	No. Endangered species addressed in the study area include Schweinitz's Sunflower, Smooth Coneflower, and red-cockaded woodpecker. The Northern Long-Eared Bat has been added to the species list since the completion of the EA. NCDOT has determined that the proposed action does not require separate consultation on the grounds that the proposed action is consistent with the final Section 4(d) rule, codified at 50 C.F.R. § 17.40(o) and effective February 16, 2016. NCDOT may presume its determination is informed by best available information and consider Section 7 responsibilities fulfilled for Northern Long-Eared Bat. A Biological Assessment and a Biological Opinion will be rendered for the species where habitat and species are observed.
Historic Architecture	No. One historic property, James B. Garrison Bridge (Swift Island Ferry Bridge), is located within the project study area. During a meeting with HPO, FHWA and NCDOT staff it was agreed rehabilitating the bridge will have no adverse effects with the conditions.
Flood Hazard Evaluation	No. The proposed project will impact areas designated as 100-year floodplain /floodway zones for Pee Dee River. The proposed new structures and replacement structures will provide equivalent or greater conveyance than that of the existing structures.
Archaeology	No. It was determined that significant archaeological resources are unlikely to be affected by the project. USFS is requiring actual ROW widths to identify the actual impacts to archaeological resources

	present in the project area(s) and to prescribe mitigation for projection of historic resources. Once ROW acquisition is complete for areas identified to involve archaeological resources, an assessment of data recovery will be completed. If needed, a Data Recovery plan for the impacted archaeological resources and coordination with the Office of State Archaeology will be completed
Section 4(f)	No. Two (2) 4(f) resources will be impacted – James B Garrison Bridge (Swift Island Ferry Bridge), Wildlife Resources Commission's Swift Island public boat access. Uwharrie National Recreational Trail will not have any impacts.
Social Effects	No. 32 homes and 23 businesses will be impacted by this project; however, no cohesion or other community effects are anticipated and no low income, minority or any other communities will be impacted.
Community Facilities & Services	No. Recreational facility (Swift Island boat access) will be impacted by the project but will not have an adverse effect on the ability to access and use this facility. Because no indirect impacts are anticipated, the cumulative effects of this project, when considered in the context of other past, present, and future actions, and the resulting impact on notable human and natural features should be minimal. Therefore, any contribution of the project to cumulative impacts resulting from current and planned development patterns are expected to be minimal.
Economic Impact	No. The widening project is expected to have an overall neutral economic impact on the Town of Albemarle and Town of Troy areas.
Noise	No. Although there would be traffic noise impacts as a result of the Preferred Alternative, very few of these impacts would be due to a substantial increase over existing noise levels.
Air Quality	No. The proposed project is located in Stanly and Montgomery Counties, which have been determined to comply with the NAAQS. The proposed project is located in an attainment area; therefore, 40 CFR Parts 51 and 93 are not applicable. The proposed project is not anticipated to create any adverse effects on the air quality of this attainment area. The project will have no meaningful potential for Mobile Source Air Toxic (MSAT) Effects.
Farmlands	No. The study area is located in a rural area of Stanly and Montgomery counties; however, the project would have no impacts to farmlands. An NRCS screening was completed for this project which found it to be below minimum criteria.
Hazardous Materials	No. Twenty-one possible UST facilities, one (1) junk yard and one (1) tire dump were identified within the limits. Preliminary site assessments will be determined and completed once final ROW plans become available and prior to ROW acquisition. A project special provision

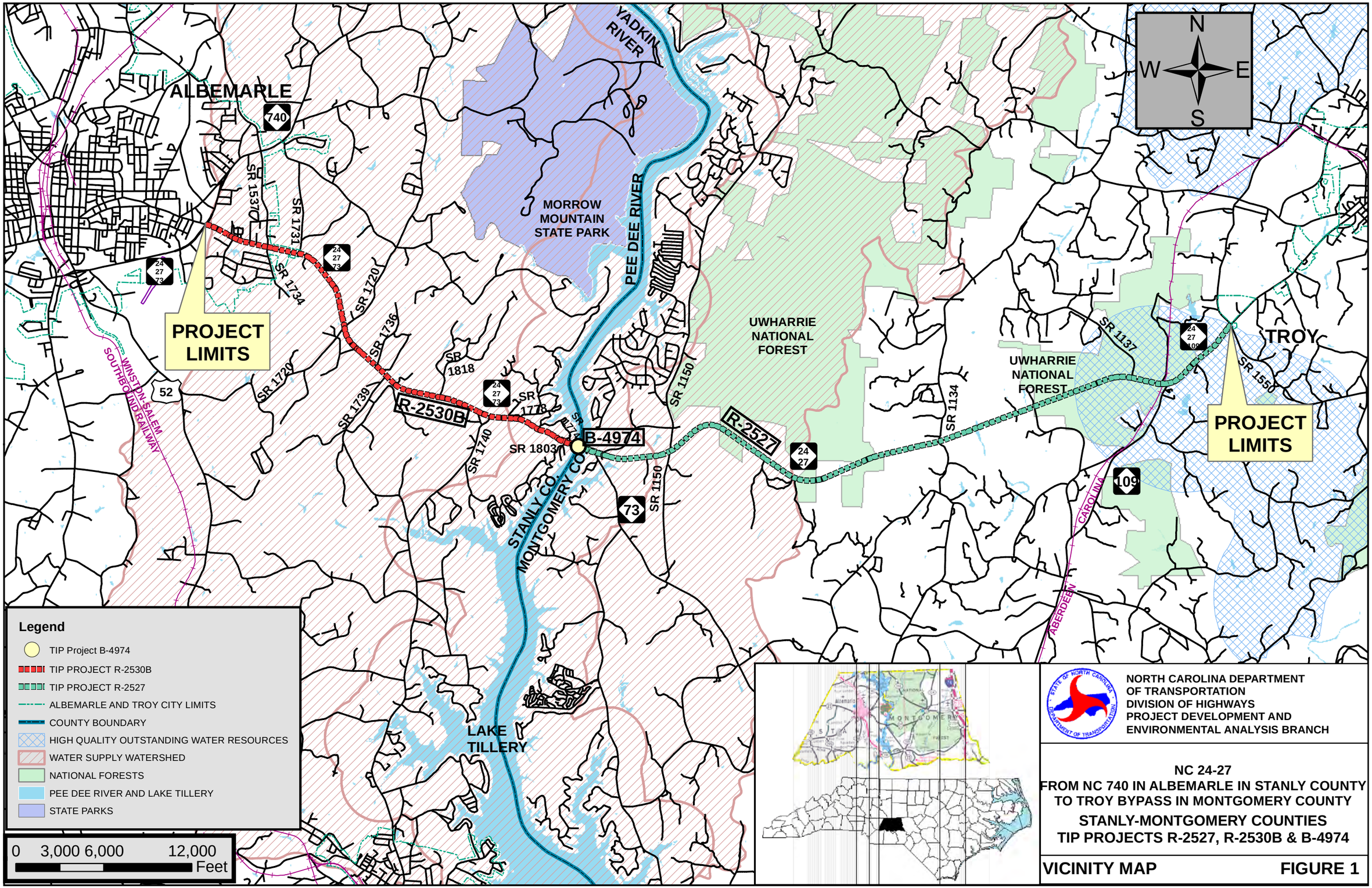
	will be included in the let package to instruct the contractor in the event contaminated soil or ground water is encountered. In the event that additional right of way is needed on any of these properties, it is requested that the Right of Way office contact the GeoEnvironmental Section before making an offer to purchase.
SECTION OF THE EA	FINDINGS
Permits	An individual permit may be required if impacts to Waters of the US exceed half and acre or impacts to an individual stream exceed 300 feet. If not, then a nationwide may be required. If a Section 404 permit is required, then a Section 401 Water Quality Certification from the NCDWR will be needed. The USACE holds the final discretion as to what permit will be required to authorize project construction.
Mitigation	Decisions regarding final mitigation plans for the project will be made in cooperation with the Ecological Enhancement Program, the USACE, and the NCDWQ.

The following people may be contacted for additional information concerning this proposal and statement:

John F. Sullivan, III, PE, Division Administrator
Federal Highway Administration
310 New Bern Avenue, Suite 410
Raleigh, North Carolina 27601
Telephone: (919) 856-4346

Beverly G. Robinson, CPM, Western Group Supervisor
Project Development and Environmental Analysis Unit
NC Department of Transportation
1548 Mail Service Center
Raleigh, North Carolina 27699-1548
Telephone: (919) 707-6041

APPENDIX A
FIGURES



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS BRANCH

NC 24-27
FROM NC 740 IN ALBEMARLE IN STANLY COUNTY TO TROY BYPASS IN MONTGOMERY COUNTY
STANLY-MONTGOMERY COUNTIES
TIP PROJECTS R-2527, R-2530B & B-4974

VICINITY MAP **FIGURE 1**

FIGURE 2: PUBLIC HEARING MAP FOR B-4974

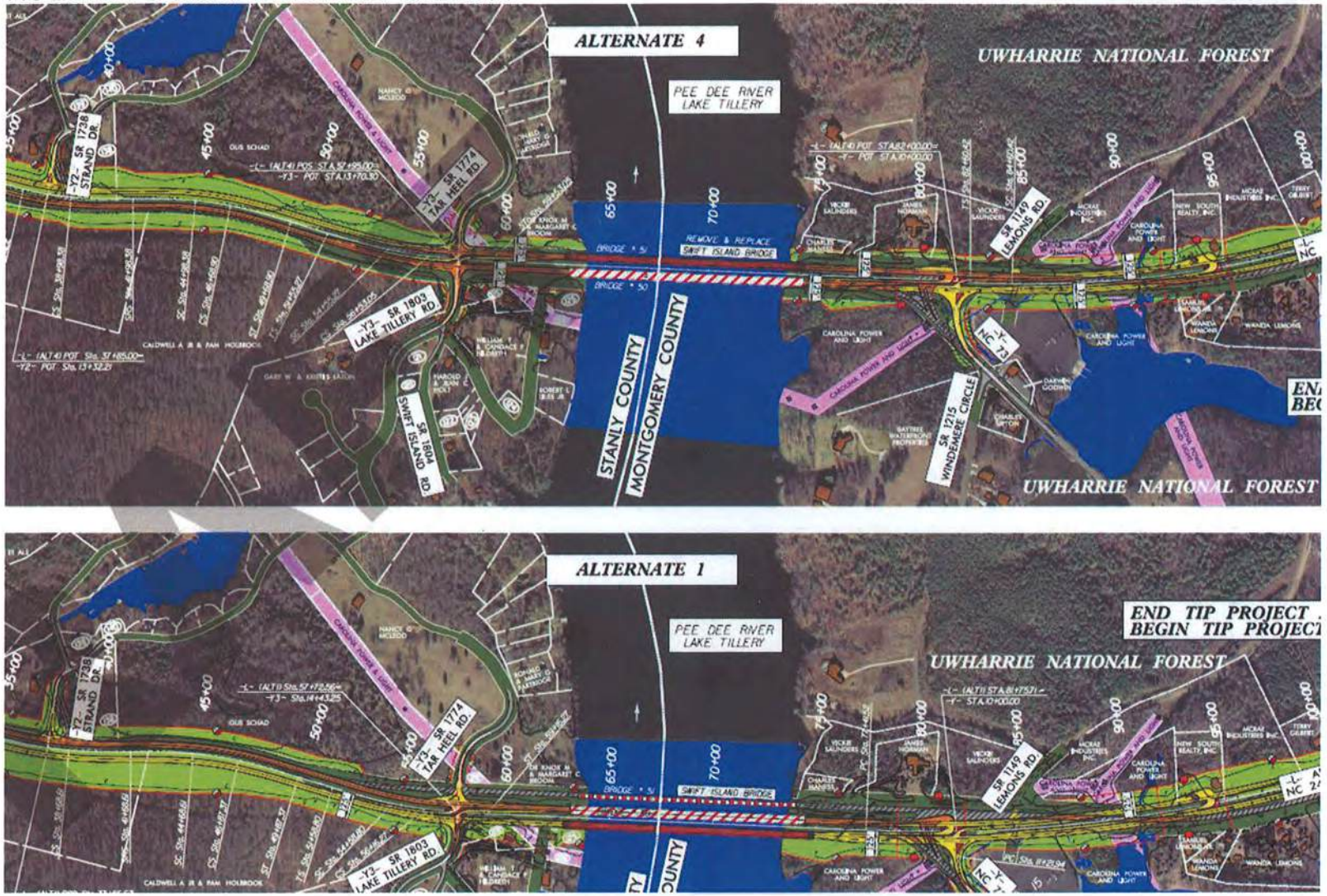


FIGURE 2

FEET
0 500 1000 1500
0 100 200 300 400
METERS

NC 24-27-740

SR 1537 (ANDERSON GROVE CHURCH ROAD)

SR 1731 (SWEET HOME CHURCH ROAD)

BROOKWOOD EXECUTIVE PARK

BARNARD ROAD

CHARTER STREET

STALEY STREET

ANDERSON GROVE CHURCH

CEMETERY

TILLERY HOUSING CENTER

CUSTOM ACCESSORIES

NC 24-27-73

RHINO LINING

STANLY GARDEN OF MEMORY

BEGIN PROJECT TIP R-2530B

MAIN STREET

PAPER SUPPLY

SECURITY COMMISSION

YAMAHA

CITY ELECTRIC SUPPLY

STANLY PAINT

VEPON MARKET & TIENDA MEXICANA LA GUERRERO

VIET STORE

BAR

CLINIC

BLUE BAY

RITE AID

1ST BANK

ALTA

ABC STORE

GENERAL & NORTH STATE AUTO GLASS

UWHARRIE MONUMENTS

McDONALD'S

FOOD LION

EASTGATE SHOPPING CENTER

WALGREEN'S

DELL

NC 24-27-73 (E. MAIN ST.)

ALBEMARLE

ANDERSON ROAD

SR 1734 (ANDERSON ROAD)

MATCHLINE SEE FIGURE 3B

W1 W2 W3 W4 W5 W6 W7 W8

ST-AN 01 ST-AN 02 ST-AN 03 ST-AN 04 ST-AN 05 ST-AN 06

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS UNIT

NC 24-27
FROM NC 740 IN ALBEMARLE IN STANLY COUNTY TO TROY BYPASS IN MONTGOMERY COUNTY
STANLY-MONTGOMERY COUNTIES
TIP PROJECTS R-2530B, B-4974 & R-2527

FONSI **FIGURE 3A**

SR 1731
(SWEET HOME
CHURCH ROAD)

FEET
0 500 1000 1500
0 100 200 300 400
METERS

WET SEEP

St-HH

St-B

St-B

W6

W9

St-D

Pond 1

St-E

St-F

W10

St-I

POND B

NC 24-27-73

SCHWEINITZ'S
SUNFLOWER

St-I

TROY BYPASS

St-G

W12

St-H

St-EE

SR 1720
(VALLEY DRIVE)

MATCHLINE
SEE FIGURE 3C

MATCHLINE
SEE FIGURE 3A

GEORGIA
ASTER

SR 1720
(STONEY
GAP ROAD)

LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED ALIGNMENT
- PROPOSED PAVEMENT
- PROPOSED STRUCTURES & ISLANDS
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- UWHARRIE NATIONAL FOREST
- WETLANDS
- STREAMS
- RARE PLANTS

NORTH CAROLINA DEPARTMENT
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PROJECT DEVELOPMENT AND
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NC 24-27
FROM NC 740 IN ALBEMARLE IN STANLY COUNTY
TO TROY BYPASS IN MONTGOMERY COUNTY
STANLY-MONTGOMERY COUNTIES
TIP PROJECTS R-2530B, B-4974, & R-2527

FONSI FIGURE 3B

FEET
0 500 1000 1500
0 100 200 300 400
METERS

MATCHLINE SEE FIGURE 3B

SR 1736 (DUNLOP ROAD)

MATCHLINE SEE FIGURES 3D

SR 1818 (STONY MOUNTAIN LOOP)

GEORGIA ASTER

NC 24-27-73

EAST SIDE VOLUNTEER FIRE STATION No. 2

LAKESIDE REAL ESTATE

GIRLS CONSIGNMENT

GS DEVELOPMENT CORP

SR 1739 (McNEIL ROAD)

POND C

POND D

St-EE

W22A

St-N

W15

St-O

St-M

St-CC

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS UNIT

NC 24-27
FROM NC 740 IN ALBEMARLE IN STANLY COUNTY TO TROY BYPASS IN MONTGOMERY COUNTY
STANLY-MONTGOMERY COUNTIES
TIP PROJECTS R-2530B, B-4974, & R-2527

FONSI **FIGURE 3C**

LEGEND

- *EXISTING RIGHT OF WAY*
- *PROPOSED ALIGNMENT*
- *PROPOSED PAVEMENT*
- *PROPOSED STRUCTURES & ISLANDS*
- *PROPOSED RIGHT OF WAY*
- *PROPOSED EASEMENT*
- *UWHARRIE NATIONAL FOREST*
- *WETLANDS*
- *STREAMS*
- *RARE PLANTS*

FEET
0 500 1000 1500
0 100 200 300 400
METERS

B-4974, ALTERNATIVE 1

MATCHLINE SEE FIGURE 4C

BEGIN PROJECT R-2530B/
B-4974, ALTERNATIVE 1 TIE

BEGIN PROJECT B-4974

END PROJECT R-2530B/
B-4974, ALTERNATIVE 1
TIE

PROJECT R-2530B

PROJECT B-4974

SR 1778 (RIVER HAVEN ROAD)

SR 1738 STRAND ROAD)

NC 24-27-73

POND

GRAYSTONE FARMS

POND

POND

POND

W20

W21

W17

W16

HAMMER RACING

BP

TILLERY REALTY

RUSSELL AUTOMOTIVE

SR 1831 (INDIAN MOUND ROAD)

SR 1740 (INDIAN MOUND ROAD)

MATCHLINE SEE FIGURE 4E

LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED ALIGNMENT
- PROPOSED PAVEMENT
- PROPOSED STRUCTURES & ISLANDS
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- UWHARRIE NATIONAL FOREST
- WETLANDS
- STREAMS
- RARE PLANTS

NORTH CAROLINA DEPARTMENT
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NC 24-27
FROM NC 740 IN ALBEMARLE IN STANLY COUNTY
TO TROY BYPASS IN MONTGOMERY COUNTY
STANLY-MONTGOMERY COUNTIES
TIP PROJECTS R-2530B, B-4974, & R-2527

FONSI **FIGURE 3D**

B-4974, ALTERNATIVE 1

FEET
0 500 1000 1500
0 100 200 300 400
METERS

PEE DEE RIVER

MATCHLINE SEE FIGURE 4H

CENTURY 21 REALTY

END PROJECT B-4974
BEGIN PROJECT R-2527

UWHARRIE MARINE

NEW SOUTH REALTY

SR 1774 (TARHEEL ROAD)

PROJECT B-4974

PROJECT R-2527

DUSTY ROCK ROAD (PRIVATE)

NC 24-27-73

SWIFT ISLAND BOATING ACCESS

MATCHLINE SEE FIGURE 4D

SR 1803 LAKE TILLERY ROAD)

PEE DEE RIVER/ LAKE TILLERY

NC 73

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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FONSI **FIGURE 3E**

FEET
0 500 1000 1500
0 100 200 300 400
METERS

NAD 83

UWHARRIE NATIONAL FOREST

FOREST REC AREA

MATCHLINE
SEE FIGURES 3E

SR 1150 (RIVER ROAD)

W2

W1

SWIFT
ISLAND BP

NC 24-27

SUMMIT
CONST. CO.

SB-1

SB-2

WF-1

WF-2

SB-3

W22

SJ

WJ

WH

SJ-A

MATCHLINE
SEE FIGURE 3G

R1

SEEP

UWHARRIE MOUNTAIN
WILDERNESS ADVENTURES

R2

R2

BLAKE
REAL
ESTATE

GAS STATION
& GRILL

SR 1150 (RIVER ROAD)

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FONSI **FIGURE 3F**

FEET
0 500 1000 1500
0 100 200 300 400
METERS

MATCHLINE SEE FIGURE 3F

MATCHLINE SEE FIGURE 3H

SMOOTH SUNFLOWER

NC 24-27

WJ WK WL WM WN WP WR SM WU WV WS SC SC-1 SC-2 SC-3 SC-4 SC-5 SC-6 SC-7 SC-8 SC-9 SC-10 SC-11 SC-12 SC-13 SC-14 SC-15 SC-16 SC-17 SC-18 SC-19 SC-20 SC-21 SC-22 SC-23 SC-24 SC-25 SC-26 SC-27 SC-28 SC-29 SC-30 SC-31 SC-32 SC-33 SC-34 SC-35 SC-36 SC-37 SC-38 SC-39 SC-40 SC-41 SC-42 SC-43 SC-44 SC-45 SC-46 SC-47 SC-48 SC-49 SC-50 SC-51 SC-52 SC-53 SC-54 SC-55 SC-56 SC-57 SC-58 SC-59 SC-60 SC-61 SC-62 SC-63 SC-64 SC-65 SC-66 SC-67 SC-68 SC-69 SC-70 SC-71 SC-72 SC-73 SC-74 SC-75 SC-76 SC-77 SC-78 SC-79 SC-80 SC-81 SC-82 SC-83 SC-84 SC-85 SC-86 SC-87 SC-88 SC-89 SC-90 SC-91 SC-92 SC-93 SC-94 SC-95 SC-96 SC-97 SC-98 SC-99 SC-100 SC-101 SC-102 SC-103 SC-104 SC-105 SC-106 SC-107 SC-108 SC-109 SC-110 SC-111 SC-112 SC-113 SC-114 SC-115 SC-116 SC-117 SC-118 SC-119 SC-120 SC-121 SC-122 SC-123 SC-124 SC-125 SC-126 SC-127 SC-128 SC-129 SC-130 SC-131 SC-132 SC-133 SC-134 SC-135 SC-136 SC-137 SC-138 SC-139 SC-140 SC-141 SC-142 SC-143 SC-144 SC-145 SC-146 SC-147 SC-148 SC-149 SC-150 SC-151 SC-152 SC-153 SC-154 SC-155 SC-156 SC-157 SC-158 SC-159 SC-160 SC-161 SC-162 SC-163 SC-164 SC-165 SC-166 SC-167 SC-168 SC-169 SC-170 SC-171 SC-172 SC-173 SC-174 SC-175 SC-176 SC-177 SC-178 SC-179 SC-180 SC-181 SC-182 SC-183 SC-184 SC-185 SC-186 SC-187 SC-188 SC-189 SC-190 SC-191 SC-192 SC-193 SC-194 SC-195 SC-196 SC-197 SC-198 SC-199 SC-200 SC-201 SC-202 SC-203 SC-204 SC-205 SC-206 SC-207 SC-208 SC-209 SC-210 SC-211 SC-212 SC-213 SC-214 SC-215 SC-216 SC-217 SC-218 SC-219 SC-220 SC-221 SC-222 SC-223 SC-224 SC-225 SC-226 SC-227 SC-228 SC-229 SC-230 SC-231 SC-232 SC-233 SC-234 SC-235 SC-236 SC-237 SC-238 SC-239 SC-240 SC-241 SC-242 SC-243 SC-244 SC-245 SC-246 SC-247 SC-248 SC-249 SC-250 SC-251 SC-252 SC-253 SC-254 SC-255 SC-256 SC-257 SC-258 SC-259 SC-260 SC-261 SC-262 SC-263 SC-264 SC-265 SC-266 SC-267 SC-268 SC-269 SC-270 SC-271 SC-272 SC-273 SC-274 SC-275 SC-276 SC-277 SC-278 SC-279 SC-280 SC-281 SC-282 SC-283 SC-284 SC-285 SC-286 SC-287 SC-288 SC-289 SC-290 SC-291 SC-292 SC-293 SC-294 SC-295 SC-296 SC-297 SC-298 SC-299 SC-300 SC-301 SC-302 SC-303 SC-304 SC-305 SC-306 SC-307 SC-308 SC-309 SC-310 SC-311 SC-312 SC-313 SC-314 SC-315 SC-316 SC-317 SC-318 SC-319 SC-320 SC-321 SC-322 SC-323 SC-324 SC-325 SC-326 SC-327 SC-328 SC-329 SC-330 SC-331 SC-332 SC-333 SC-334 SC-335 SC-336 SC-337 SC-338 SC-339 SC-340 SC-341 SC-342 SC-343 SC-344 SC-345 SC-346 SC-347 SC-348 SC-349 SC-350 SC-351 SC-352 SC-353 SC-354 SC-355 SC-356 SC-357 SC-358 SC-359 SC-360 SC-361 SC-362 SC-363 SC-364 SC-365 SC-366 SC-367 SC-368 SC-369 SC-370 SC-371 SC-372 SC-373 SC-374 SC-375 SC-376 SC-377 SC-378 SC-379 SC-380 SC-381 SC-382 SC-383 SC-384 SC-385 SC-386 SC-387 SC-388 SC-389 SC-390 SC-391 SC-392 SC-393 SC-394 SC-395 SC-396 SC-397 SC-398 SC-399 SC-400 SC-401 SC-402 SC-403 SC-404 SC-405 SC-406 SC-407 SC-408 SC-409 SC-410 SC-411 SC-412 SC-413 SC-414 SC-415 SC-416 SC-417 SC-418 SC-419 SC-420 SC-421 SC-422 SC-423 SC-424 SC-425 SC-426 SC-427 SC-428 SC-429 SC-430 SC-431 SC-432 SC-433 SC-434 SC-435 SC-436 SC-437 SC-438 SC-439 SC-440 SC-441 SC-442 SC-443 SC-444 SC-445 SC-446 SC-447 SC-448 SC-449 SC-450 SC-451 SC-452 SC-453 SC-454 SC-455 SC-456 SC-457 SC-458 SC-459 SC-460 SC-461 SC-462 SC-463 SC-464 SC-465 SC-466 SC-467 SC-468 SC-469 SC-470 SC-471 SC-472 SC-473 SC-474 SC-475 SC-476 SC-477 SC-478 SC-479 SC-480 SC-481 SC-482 SC-483 SC-484 SC-485 SC-486 SC-487 SC-488 SC-489 SC-490 SC-491 SC-492 SC-493 SC-494 SC-495 SC-496 SC-497 SC-498 SC-499 SC-500 SC-501 SC-502 SC-503 SC-504 SC-505 SC-506 SC-507 SC-508 SC-509 SC-510 SC-511 SC-512 SC-513 SC-514 SC-515 SC-516 SC-517 SC-518 SC-519 SC-520 SC-521 SC-522 SC-523 SC-524 SC-525 SC-526 SC-527 SC-528 SC-529 SC-530 SC-531 SC-532 SC-533 SC-534 SC-535 SC-536 SC-537 SC-538 SC-539 SC-540 SC-541 SC-542 SC-543 SC-544 SC-545 SC-546 SC-547 SC-548 SC-549 SC-550 SC-551 SC-552 SC-553 SC-554 SC-555 SC-556 SC-557 SC-558 SC-559 SC-560 SC-561 SC-562 SC-563 SC-564 SC-565 SC-566 SC-567 SC-568 SC-569 SC-570 SC-571 SC-572 SC-573 SC-574 SC-575 SC-576 SC-577 SC-578 SC-579 SC-580 SC-581 SC-582 SC-583 SC-584 SC-585 SC-586 SC-587 SC-588 SC-589 SC-590 SC-591 SC-592 SC-593 SC-594 SC-595 SC-596 SC-597 SC-598 SC-599 SC-600 SC-601 SC-602 SC-603 SC-604 SC-605 SC-606 SC-607 SC-608 SC-609 SC-610 SC-611 SC-612 SC-613 SC-614 SC-615 SC-616 SC-617 SC-618 SC-619 SC-620 SC-621 SC-622 SC-623 SC-624 SC-625 SC-626 SC-627 SC-628 SC-629 SC-630 SC-631 SC-632 SC-633 SC-634 SC-635 SC-636 SC-637 SC-638 SC-639 SC-640 SC-641 SC-642 SC-643 SC-644 SC-645 SC-646 SC-647 SC-648 SC-649 SC-650 SC-651 SC-652 SC-653 SC-654 SC-655 SC-656 SC-657 SC-658 SC-659 SC-660 SC-661 SC-662 SC-663 SC-664 SC-665 SC-666 SC-667 SC-668 SC-669 SC-670 SC-671 SC-672 SC-673 SC-674 SC-675 SC-676 SC-677 SC-678 SC-679 SC-680 SC-681 SC-682 SC-683 SC-684 SC-685 SC-686 SC-687 SC-688 SC-689 SC-690 SC-691 SC-692 SC-693 SC-694 SC-695 SC-696 SC-697 SC-698 SC-699 SC-700 SC-701 SC-702 SC-703 SC-704 SC-705 SC-706 SC-707 SC-708 SC-709 SC-710 SC-711 SC-712 SC-713 SC-714 SC-715 SC-716 SC-717 SC-718 SC-719 SC-720 SC-721 SC-722 SC-723 SC-724 SC-725 SC-726 SC-727 SC-728 SC-729 SC-730 SC-731 SC-732 SC-733 SC-734 SC-735 SC-736 SC-737 SC-738 SC-739 SC-740 SC-741 SC-742 SC-743 SC-744 SC-745 SC-746 SC-747 SC-748 SC-749 SC-750 SC-751 SC-752 SC-753 SC-754 SC-755 SC-756 SC-757 SC-758 SC-759 SC-760 SC-761 SC-762 SC-763 SC-764 SC-765 SC-766 SC-767 SC-768 SC-769 SC-770 SC-771 SC-772 SC-773 SC-774 SC-775 SC-776 SC-777 SC-778 SC-779 SC-780 SC-781 SC-782 SC-783 SC-784 SC-785 SC-786 SC-787 SC-788 SC-789 SC-790 SC-791 SC-792 SC-793 SC-794 SC-795 SC-796 SC-797 SC-798 SC-799 SC-800 SC-801 SC-802 SC-803 SC-804 SC-805 SC-806 SC-807 SC-808 SC-809 SC-810 SC-811 SC-812 SC-813 SC-814 SC-815 SC-816 SC-817 SC-818 SC-819 SC-820 SC-821 SC-822 SC-823 SC-824 SC-825 SC-826 SC-827 SC-828 SC-829 SC-830 SC-831 SC-832 SC-833 SC-834 SC-835 SC-836 SC-837 SC-838 SC-839 SC-840 SC-841 SC-842 SC-843 SC-844 SC-845 SC-846 SC-847 SC-848 SC-849 SC-850 SC-851 SC-852 SC-853 SC-854 SC-855 SC-856 SC-857 SC-858 SC-859 SC-860 SC-861 SC-862 SC-863 SC-864 SC-865 SC-866 SC-867 SC-868 SC-869 SC-870 SC-871 SC-872 SC-873 SC-874 SC-875 SC-876 SC-877 SC-878 SC-879 SC-880 SC-881 SC-882 SC-883 SC-884 SC-885 SC-886 SC-887 SC-888 SC-889 SC-890 SC-891 SC-892 SC-893 SC-894 SC-895 SC-896 SC-897 SC-898 SC-899 SC-900 SC-901 SC-902 SC-903 SC-904 SC-905 SC-906 SC-907 SC-908 SC-909 SC-910 SC-911 SC-912 SC-913 SC-914 SC-915 SC-916 SC-917 SC-918 SC-919 SC-920 SC-921 SC-922 SC-923 SC-924 SC-925 SC-926 SC-927 SC-928 SC-929 SC-930 SC-931 SC-932 SC-933 SC-934 SC-935 SC-936 SC-937 SC-938 SC-939 SC-940 SC-941 SC-942 SC-943 SC-944 SC-945 SC-946 SC-947 SC-948 SC-949 SC-950 SC-951 SC-952 SC-953 SC-954 SC-955 SC-956 SC-957 SC-958 SC-959 SC-960 SC-961 SC-962 SC-963 SC-964 SC-965 SC-966 SC-967 SC-968 SC-969 SC-970 SC-971 SC-972 SC-973 SC-974 SC-975 SC-976 SC-977 SC-978 SC-979 SC-980 SC-981 SC-982 SC-983 SC-984 SC-985 SC-986 SC-987 SC-988 SC-989 SC-990 SC-991 SC-992 SC-993 SC-994 SC-995 SC-996 SC-997 SC-998 SC-999 SC-1000

LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED ALIGNMENT
- PROPOSED PAVEMENT
- PROPOSED STRUCTURES & ISLANDS
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- UWHARRIE NATIONAL FOREST
- WETLANDS
- STREAMS
- RARE PLANTS

NORTH CAROLINA DEPARTMENT
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NC 24-27
FROM NC 740 IN ALBEMARLE IN STANLY COUNTY
TO TROY BYPASS IN MONTGOMERY COUNTY
STANLY-MONTGOMERY COUNTIES
TIP PROJECTS R-2530B, B-4974, & R-2527

FONSI **FIGURE 3G**

FEET
0 500 1000 1500
0 100 200 300 400
METERS

N

MATCHLINE
SEE FIGURE 3G

SR 1134 (LIBERTY
HILL CHURCH ROAD)

GREENE'S
AMMO & GUNS

SD
SD
SD
NC 24-27

SW-A
WSS
SW-A
WSS
SMOOTH
SUNFLOWER

WU
SP
WX
SQ
WA-1
LW
LH
SR

MATCHLINE
SEE FIGURE 3I

SR 1134 (WADESVILLE ROAD)

NORTH CAROLINA DEPARTMENT
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FONSI **FIGURE 3H**

FEET
0 500 1000 1500
0 100 200 300 400
METERS

N

NC 24-27

SR 1136 (BRUTON CARPENTER ROAD)

WILDLIFE RESOURCES COMMISSION

TROY DEPOT

WZ
GMA
BE
SU
SE
WKK
WMM
WLL
SV
WNN
SF-A
WHH
WOO
SW-B
SS
BCW
BC1
BC2

MATCHLINE SEE FIGURE 3H

MATCHLINE SEE FIGURE 3J

LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED ALIGNMENT
- PROPOSED PAVEMENT
- PROPOSED STRUCTURES & ISLANDS
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- UWHARRIE NATIONAL FOREST
- WETLANDS
- STREAMS
- RARE PLANTS

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STANLY-MONTGOMERY COUNTIES
TIP PROJECTS R-2530B, B-4974, & R-2527

FONSI **FIGURE 3I**

FEET
0 500 1000 1500
0 100 200 300 400
METERS

SMOOTH SUNFLOWER
SMOOTH SUNFLOWER
LARGE WITCH ALDER
LARGE WITCH ALDER
SH1
WOO
SY-A
SY-A
SY-B
WEE
WEE
NWW
NE
SMOOTH SUNFLOWER
SMOOTH SUNFLOWER
SEW2
SWW1
SWW2
SWW3
SWS3
WGG
WBR
WPP
SX
SX
WFF
Rocky Creek
Pond outfall stream
UWHARRIE ENVIRONMENTAL RECYCLING COMPLEX
SR 1137 (LANDFILL ROAD)
MATCHLINE SEE FIGURE 3K
MATCHLINE SEE FIGURE 3K
MATCHLINE SEE FIGURE 3I
NC 24-27
NC 109
NORFOLK SOUTHERN RAILROAD
SCHWEINITZ'S SUNFLOWER
SCHWEINITZ'S SUNFLOWER

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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NC 24-27
FROM NC 740 IN ALBEMARLE IN STANLY COUNTY TO TROY BYPASS IN MONTGOMERY COUNTY
STANLY-MONTGOMERY COUNTIES
TIP PROJECTS R-2530B, B-4974, & R-2527

FONSI **FIGURE 3J**

UWHARRIE ENVIRONMENTAL RECYCLING COMPLEX

NORFOLK SOUTHERN RAILROAD

FEET
0 500 1000 1500
0 100 200 300 400
METERS

MATCHLINE SEE FIGURE 3J

NWW2

NWW1

NEW2

NEW1

WEE

SMOOTH SUNFLOWER

SY-A

WYY

WXX

WCC

SY-B

NC 24-27

WBB

SW-C

WAA

SI

WWW

WATER TOWER

SR 1138 (DAIRY ROAD)

BUSINESS CENTER DRIVE (PRIVATE)

UWHARRIE BUILDERS

TOWN OF UWHARRIE BUSINESS CENTER

TROY BYPASS TIP PROJECT R-623

WOLF CREEK PAINTBALL

WEST MIDDLE SCHOOL

McRAE INDUSTRIES FOOTWEAR DIVISION

SR 1550 (SAUNDERS ROAD)

MATCHLINE SEE FIGURE 3J

LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED ALIGNMENT
- PROPOSED PAVEMENT
- PROPOSED STRUCTURES & ISLANDS
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- UWHARRIE NATIONAL FOREST
- WETLANDS
- STREAMS
- RARE PLANTS

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FONSI FIGURE 3K

APPENDIX B

MERGER / 4(F) INFORMATION

Merger Project Team Meeting Agreement

Concurrence Point No. 3: Least Environmentally Damaging Practicable Alternative (LEDPA) Revisit for B-4974

Project Name/Description: NC 24-27, Widen to multi-lanes from NC 740 in Albemarle in Stanly County to the Troy Bypass, west of Troy, in Montgomery County

TIP Projects: R-2530B, B-4974, and R-2527

WBS Nos.: 34446.1.6, 39922.1.1, and 35572.1.1

Least Environmentally Damaging Practicable Alternative (LEDPA): Based upon the current project development information, the Project Team has concurred that the following checked alternatives are the Least Environmentally Damaging Practicable Alternative (LEDPA):

R-2530B, Section 1 – NC 740 to SR 1731 – "Best Fit"

☑ Asymmetrical Widening to the South – 23' Raised Median

Comments: Concurrence reached on 1/22/14, revisit not required.

R-2530B, Section 2 – SR 1731 to SR 1720 – "Best Fit"

☑ Asymmetrical Widening to the North – 46' Median

Comments: Concurrence reached on 1/22/14, revisit not required.

R-2530B, Section 3 – SR 1720 to SR 1818 – "Best Fit"

☑ Asymmetrical Widening to the South – 46' Median

Comments: Concurrence reached on 1/22/14, revisit not required.

R-2530B, Section 4 – SR 1818 to west of SR 1778 – "Best Fit"

☐ Asymmetrical Widening to the South(Tie to B-4974, Alternative 1)–46' Median

☐ Asymmetrical Widening to the North(Tie to B-4974, Alternative 4)–46' Median

☑ Asymmetrical Widening to the North (Tie to B-4974, Bridge No. 51 Rehabilitation Alternative) – 46' Median

Comments: _____

B-4974, Section 5 – west of SR 1778 to east of NC 73

☐ Alternative 1 - South side widening, replace Bridge No. 51

☐ Alternative 4 - Replace in place, replace Bridge No. 51

☑ Bridge No. 51 Rehabilitation Alternative, rehabilitate Bridge No. 51

Comments: _____

R-2527, Section 6 – east of NC 73 to SR 1134 – "Best Fit"

☑ Asymmetrical Widening to the North – 46' Median

Comments: Concurrence reached on 1/22/14, revisit not required.

R-2527, Section 7 – SR 1134 to SR 1550 – "Best Fit"

☑ Asymmetrical Widening to the North – 46' Median

Comments: Concurrence reached on 1/22/14, revisit not required.

The Project Team has concurred on this date of August 17, 2016, on the above mentioned alternatives as the Least Environmentally Damaging Practicable Alternative (LEDPA) for TIP Project B-4974.

USACE Andrea Williams 8/17/2016 Date

NCDOT Lee M. Teller 8/17/16 Date

USEPA Cynthia J. VanDerWiele 8.17.2016 Date

USFWS Gary Jordan 8/17/2016 Date

FHWA Philip Dixon 8/17/16 Date

NCDWR B. J. Cox 8/17/16 Date

NC WRC S. R. W. 8-31-16 Date

NCDCR Renee Gledhill-Earley 8-17-16 Date

PTRPO Kelly E. Tarkins 8/17/16 Date

RRRPO Dan Dorgyle 12/13/16 Date

USFS _____ Date

Merger Project Team Meeting Agreement

Concurrence Point No. 4A: Avoidance and Minimization Revisit for B-4974

Project Name/Description: NC 24-27, Widen to multi-lanes from NC 740 in Albemarle in Stanly County to the Troy Bypass, west of Troy, in Montgomery County

TIP Projects: R-2530B, B-4974, and R-2527

WBS Nos.: 34446.1.6, 39922.1.1, and 35572.1.1

Avoidance and Minimization: Based upon the current project development and design information, the jurisdictional impacts have been avoided and minimized to the maximum extent practicable. The following avoidance and minimization measures have been utilized:

- 2:1 slopes were used at culvert crossings and wetland areas, where feasible.

Comments:

The Project Team has concurred with the avoidance and minimization measures for TIP Project B-4974 on this date of August 17, 2016.

USACE Andrew Williams 8/17/2016 Date

NCDOT Lisa M. Fowler 8/17/16 Date

USEPA Cynthia J. VanderWiele 8.17.2016 Date

SFWS Gary Jordan 8/17/2016 Date

FHWA [illegible] 8/17/16 Date

NCDWR [signature] 8/17/16 Date

NC WRC [signature] 8-31-16 Date

NCDCR Renee Gledhill-Earley 8.17.16 Date

PTRPO Kelly Eskridge 8/17/16 Date

RRRPO Dana Joseph 12/13/16 Date

USFS _____ Date

Federal Aid #: *TIP#:* B-4974 *County*: Stanley

Property and Status	Alternative	Effect Finding	Reasons
Stanley County Bridge 51 (Determined Eligible)	rehab bridge	no adverse effect with conditions	Replace deck & spandrel bents (3 arch piers) in order to widen roadway to 2 lanes w/ 6' shoulders on each side - rail will be 42" in height with formed panels - no sidewalks - superstructure stylistic elements (plinths, capitals, cross members, recessed panels) will be replaced "in kind" - HPO will be provided the 65% plans to review and comment

Initialed: NCDOT MPT FHWA MCJ HPO Rose

FHWA Intends to use the HPO's concurrence as a basis for a "de minimis" finding for the following properties, pursuant to Section 4(f):

Stanley County Bridge 51

Federal Aid #: *TIP#:* B-4974 *County*: Stanley

CONCURRENCE FORM FOR ASSESSMENT OF EFFECTS

Project Description: Replace Stanley County Bridge 51 (open spandrel concrete arch) on NC 24-73-27 over the Pee Dee River, associated with TIP # R-2527 and R-2530B

On *August 2, 2016*, representatives of the

- [x] North Carolina Department of Transportation (NCDOT)
- [x] Federal Highway Administration (FHWA)
- [x] North Carolina State Historic Preservation Office (HPO)
- [ ] Other

Reviewed the subject project and agreed on the effects findings listed within the table on the reverse of this signature page.

Signed:

Mary Pope Furr — 8/2/2016
Representative, NCDOT — Date

Michael A. Dawson — 8/2/2016
FHWA, for the Division Administrator, or other Federal Agency — Date

Renee Gledhill-Earley — 8/2/16
Representative, HPO — Date

APPENDIX C
AGENCY COMMENTS

USDA United States Department of Agriculture | Forest Service | National Forests in North Carolina Supervisor's Office | 160 ZILLICOA ST STE A ASHEVILLE NC 28801-1082 828-257-4200

File Code: 2730 2012
Date: May 11, 2011

Mr. Gregory J. Thorpe, Ph.D., Manager
Project Development and Analysis Branch
N.C. Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548

Dear Mr. Thorpe:

Enclosed are the Forest Service comments on the Federal Environmental Assessment for TIP Projects R-2530B, B-4974, and R-2527 in Stanly and Montgomery Counties, North Carolina. We have limited our comments to portions of the document addressing project R-2527 which is the only project impacting National Forest System lands. We appreciate having the opportunity to review and comment on this document. We also appreciate you allowing us to submit our comments past the requested date due to a death in the family of Karen Compton our NCDOT Liaison.

Our major concerns with this document are the lack of true analysis of the effects for many of the environmental resources present in the project area and lack of discussion of proposed mitigation and avoidance measures for the expected impacts. The Forest Service will be unable to concur with any Least Environmentally Damaging Practicable Alternative (LEDPA) selection until effects to all resources have been adequately disclosed.

If you have any questions concerning these comments, please contact Karen Compton at (828) 257-4230.

Sincerely,

Steven M. Whitehead for

KEITH LAWRENCE
Acting Forest Supervisor

Enclosure

cc: Deborah Walker, Uwharrie District Ranger
Gary Jordon, USFWL
Travis Wilson, NCWRC
Chris Militscher, USEPA
Ronnie Smith, USACE
Felix Davila, FHWA

USFS COMMENTS ON THE EA
NC 24/27
T.I.P NO. R-2527

Review completed May 9, 2012

General Comments

A. The Environmental Assessment (EA) is lacking in the analysis of effects to most environmental resources present in the study area. It is very difficult to review analysis that is not present in the document. Direct, indirect, and cumulative effects to all biological resources must be disclosed in the EA.

B. All references in the document to "National Forest Service lands" need to be referred to as to "National Forest System lands" and thereafter, NFS lands.

C. All maps contained in the EA should note the location of NFS lands on the Uwharrie National Forest (UNF) in relation to the project. It appears that the UNF boundaries depicted on the maps included in the document are the proclamation boundary and not the actual property boundaries. The proclamation boundary includes all land both public and private within which the UNF can legally acquire property.

D. Evaluation of impacts on NFS lands need to be addressed specifically in the document i.e. not imbedded in the discussion of impacts to the entire project area in accordance with our Forest Plan.

E. The EA does not discuss any mitigation options for loss of NFS lands or stream or wetlands impacts on NFS lands as a result of the proposed actions. The US Forest Service (USFS) would like to discuss possible mitigation for lost resources and unavoidable impacts to resources.

Green Sheets p. ii

The determination of effect for Schweinitz's sunflower is still being consulted on with the United States Fish and Wildlife Service (USFWL). USFWL has not yet agreed with the determination of effect for this species.

Summary of Environmental Effects p. vi

Disclose the impacts to wetlands (acres), streams (linear feet), federally listed species habitat, flood plain impacts, rare plants, archeological sites, traffic noise impacts, railroad crossings, and potentially hazardous material sites located on NFS lands. Table S1: There will be "0" acres of NFS lands impacted by project B-4974 and the acres of impact on NFS for project R-2527 is overestimated. As noted in general comments, make sure that NFS acres are evaluated using the actual property boundaries not the proclamation boundary.

Permits Required p. vii and p. 35
Only project R-2527 will require a special use permit from the USFS for the proposed projects. The USFS does not own any property that will be affected by project B-4974; therefore, a permit is not required. The wording "permit from the USFS will be required to provide land for the proposed project" needs to clearly reflect that the USFS will only be permitting use of the land and not actually transferring ownership of the land to the North Carolina Department of Transportation.

I. Description of Proposed Action, General Description p. 1
Include the length of the road corridor that bisects NFS lands within the UNF.

II. Purpose and Need for the Projects, Utilities p. 4
The EA needs to state which power lines, water and sewer lines, and communication lines are located on the UNF. This can be done in the narrative or on maps that show both the line locations and the UNF boundaries.

II. Purpose and Need for the Projects, Traffic Carrying Capacity p. 7
Existing and Future Traffic Volumes: The document states "In the year 2010, average daily traffic along NC 24-27 will likely range between 7,200 vehicles per day and 14,100 vehicles per day". If this is actual data, the document need to say "ranges" instead of "will likely range". If these are truly estimates it would be better to include actually data if known since the date shown is in the past.

Existing and Future Levels of Service: Traffic Service levels should be disclosed for the various projects not lumped together. The narrative makes it appear that the entire 14.6 mile project area is currently operating at LOS E. It is clear from Tables 7 and 8 in Section IV.F that only short sections of the road are operating at LOS E. The document states "In 2010, the existing intersection operates at Level of Service (LOS) E...". What intersection is being discussed, there appears to be text missing from the document.

II. Purpose and Need for the Projects, Land Use Plans p. 9
The Land and Resource Management Plan for the Uwharrie National Forest (here after, Forest Plan) (May 2012) should be listed. This land use plan explains how the USDA Forest Service proposes to manage the Uwharrie National Forest over the next 15 years. Information is provided that describes what activities will be implemented, what public benefits are anticipated, and what will be the long-term conditions of the national forest as a result of implementing the plan.

II. Purpose and Need for the Projects, Benefits of the Project p. 10
Safety: If the largest number of accidents is occurring due to animal/vehicle collisions, how is upgrading the road to a 4-lane highway and mostly likely increasing speeds going to result in fewer collisions and a safer road condition?

III. Alternatives to the Proposed Action, "No Build" Alternative p. 11
While it is true that the "No Build" alternative would not meet the purpose and need; that is true of any well designed project where a good case for purpose and need have been established. However, that is not really a good reason not to carry the "No Build" alternative throughout the document. In the true spirit of NEPA an environmental document compares the environmental

impacts of various alternatives. In the case of projects R-2530B and R-2527 there is really only one alternative fully analyzed in the EA. When the USFS concurred with Concurrence Point 2 (Detailed Study Alternatives Carried Forward); it was not our intention to support dropping the "No Build" alternative from full analysis in the EA.

III. Alternatives to the Proposed Action, Summary of Environmental Effects p. 13
Table 5: There is no NFS lands located in project B-4974. Acres of NFS lands impacted in R-2527 needs to reflect actual USFS property boundaries.

III. Alternatives to the Proposed Action, Summary of Environmental Effects p. 14
Table 6: See comments on Summary of Environmental Effects p. vi. The information (Yes/No) provided for federally listed species habitat and rare plants gives no indication of the actual impact. For instance, for all the action alternatives that have rare plants, will the effects extend to the entire percent of all population or just a small portion? If rare plants are present, how many species and what percentage of the population would be affected?

IV. Proposed Improvements, Right of Way and Access Control p. 15
The document states "A control of access fence is placed along the entire length of the facility, except at intersections and driveway". What type of fencing and what are the dimensions? This information needs to be disclosed and the impacts of the fencing on wildlife crossing needs to be disclosed in the Environmental Effects section of the document.

IV. Proposed Improvements, Railroad Crossings p. 19
The document needs to give design details on the replacement of the railroad bridge crossing and any realignment of the railroad track that would be required. Norfolk Southern Railway has a right of way across NFS lands to operate their railroad. The bridge and this section of railroad are located on NFS lands and movement of them will need to be coordinated with the USFS.

IV. Proposed Improvements, Utilities p. 19
The document states "Utilities along the project will be relocated prior to construction." The EA is not clear which, if any, of these utilities are located on the UNF. The types and locations of any utilities on the UNF that will need to be relocated or upgraded as a result of the proposed project must be identified along with a description of the proposed changes.

All relocation of utilities including but not limited to powerlines, water and sewer lines, and communication lines located on NFS lands must be coordinated with the USFS. Utility companies cannot use the easement granted to the North Carolina Department of Transportation for construction and operation of the highway for their uses. All utility companies must work directly with the USFS to modify their existing special use permits on relocations within the project area.

IV. Proposed Improvements, Landscaping p. 21
The document states "The project will also include standard landscaping as needed for erosion control purposes. No special landscaping is proposed as part of the projects". Landscaping and erosion control plants and seed mixes to be used on NFS lands must be discussed with the FS and disclosed in this document.

V. Environmental Effects of Proposed Action, Terrestrial Communities p. 21

For project R-2527 there is little mention of Piedmont longleaf pine woodland, which occurs within the project area on NFS lands on the north and south side of the existing road from SR 1136 to the intersection with NC 109. This is a rare forest community within North Carolina and through its limited range. Restoration of the piedmont longleaf pine community is one of the primary goals of the newly signed Uwharrie Forest Plan. Management of this forest type requires prescribed burning.

V. Environmental Effects of Proposed Action, p. 21-26

The information provided on pages 21-26 only describes the existing environment and does not actually disclose the direct, indirect, and cumulative impacts to the natural resources as a result of the project. The section titled "Summary of Anticipated Effects" on page 26 is not really a summary, it is the entire analysis. This analysis is very general, vague and completely inadequate to evaluate the impacts of the project on terrestrial communities, terrestrial wildlife, and aquatic communities. No mention is made of either indirect or cumulative effects as a result of the proposed projects. A more detailed and quantified effects analysis is needed to adequately evaluate the impacts of the proposed project.

We disagree with the general statement "Permanent impacts to wildlife will be minimal due to the project being a widening of the existing roadway, with no new alignment". Widening, as well as the fencing mentioned on page 15, may impact wildlife crossing ability and/or behavior. The widening of the road may have fragmentation impacts on wildlife populations.

The impacts to the Piedmont longleaf pine community located on the UNF and mentioned in a previous comment needs to be discussed. The analysis should determine how much of this existing habitat is present in the analysis area and how much will be impacted by the proposed project. It should also discuss the importance of prescribed burning in management of this community type and the impact the proposed four-lane roadway will have on the ability to prescribe burn.

There is no mention or discussion of the potential for indirect effects such as the greater likelihood of non-native invasive plant species dominating the road corridor and possibly spreading to adjacent plant communities. A discussion needs to be presented on how this will be mitigated and what seeding mixtures will be utilized to stabilize the road corridor. In the UNF, and other adjacent areas, sericea lespedeza and other non-native legumes, including planted species, are currently invading fire-maintained thinned forests.

V. Environmental Effects of Proposed Action, Summary of Anticipated Effects p. 30

In the discussion and in Tables 13 and 16, disclose the impacts to wetlands (acres) and streams (linear feet) located on NFS lands. All streams and wetlands located on the UNF need to be identified as occurring on NFS lands.

V. Environmental Effects of Proposed Action, Schweinitz's Sunflower p. 36

The document needs to identify which populations of Schweinitz's sunflower are located on NFS lands. The railroad population south of NC 24-27 is mentioned but there is no reference that the species would be impacted (occurrence actually over 0.25 miles south of the existing road) by straightening the railroad as part of the proposed project.

There is no discussion of how much of the located Schweinitz's sunflower population will be affected by the proposed project. While it appears that there will be a negative effect to the entire population west of the bridge, one cannot assume that from the discussion presented. The presence of the Schweinitz's sunflower in the activity area should be the reason for the determination "may affect likely to adversely affect". The presence of habitat within 1 mile of the project area is not a reason for that determination if a negative survey, with the exception of the railroad population, was conducted for project R-2527.

V. Environmental Effects of Proposed Action, Red-cockaded Woodpecker p. 38

The document states "An inactive cavity tree was observed in this stand". It appears from the location description that this tree may be located on NFS lands; if so, the USFS would like to know the exact location of the tree and if the cavity was enlarged. The potential foraging habitat located on the UNF needs to be better described in the document. The description should including the acres and quality of the habitat located within the survey boundaries. Impacts to that habitat as a result of the proposed project should also be discussed. Additional surveys will be required by the USFS of this habitat once five years have passed since the most recent surveys.

V. Environmental Effects of Proposed Action, (PETS) species p. 39

What in the past has been referred to as Forest Service PETS species are now referred to as TES (Threatened, Endangered, and Sensitive) species and LR (locally rare) species. There is no list provided of the TES&LR species that may occur in the project area and which species were surveyed for and why. There is no effects analysis on TES&LR species contained in this document.

The EA should disclose which TES&LR species have habitat in the project area and the expected impacts of the proposed project on that habitat. The EA should disclose the effects to the other located non-federally listed species (smooth sunflower and large witch alder) and have a determination of effects for them on NFS lands. Once direct, indirect, and cumulative effects have been disclosed any potential mitigation or avoidance measures should be presented. The final EA should have an attached biological evaluation which discloses effects to these species on NFS lands. The FS will be unable to participate in the selection of the preferred alternative until effects on these species and their habitats are adequately disclosed.

V. Environmental Effects of Proposed Action, Soils p. 40

Disclose which soil types are found within the project area on the UNF. Again the document does not disclose the effects to the resource. This section is a description of the existing environment not an effects analysis. The document must disclose the impacts to soils located on the UNF.

V. Environmental Effects of Proposed Action, Archeological Resources p. 44

The EA compromises the location of site 31MG1629 by describing its location in relation to the Roberdo Bog. In a document available to the general population this is a breach of site confidentiality regulations. It is preferable and acceptable to state "site 31MG1629 is located in a rare environment / eco-niche found in the Piedmont, which is likely to contain information not found in other areas. Rare and previously undocumented ecological and cultural adaption data can be retrieved from such a site in this type of location."

The statement "information can be retained through data recovery efforts or through creative mitigation strategies such as more intensive laboratory analysis of recovered materials" is not clear and may be misleading. It needs to be made clear and agreed that the entire area of potential effects at all National Register of Historic Places (NRHP) eligible sites will be completely excavated and the data collected and analyzed using the most up-to-date methods and procedures.

No discussion or disclosure is made of the possible time and financial commitments needed to accomplish data recovery as described above. Nor are various mitigation strategies compared by alternatives. In addition, right of way widths of 250 feet and 150 feet may have different impacts on a historic property (Section 106 NHPA). Actual right of way widths will need to be known to identify the actual impacts to archeological resources present in the project area(s) and to prescribe mitigation for protection of those resources.

V. Environmental Effects of Proposed Action, Recreational Facilities p. 50

The document states "Hikers can access the 20-mile Uwharrie National Recreation Trail and the 8-mile Dutchman's Creek Trail from the unpaved, trailhead parking lot adjacent to project R-2527". Again the document does not disclose the effects to the resource. This section is a description of the existing environment not an effects analysis. The document must disclose the impacts to recreation facilities located on the UNF. If there are no impacts expected then make that statement.

APPENDIX D
CORRESPONDENCE

P | 704.984.9410
F | 704.984.9406

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NORTH CAROLINA
Water. Air. Land. Opportunity.

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PO Box 190
Albemarle, NC 28001

Office of the City Manager

November 8, 2016

Beverly Robinson
Western Region Group Leader
Project Development and Environmental Analysis
1548 Mail Service Center
Raleigh, NC 27699-1548

SUBJECT: Pedestrian Facilities for STIP Project R-2530B

Dear Ms. Robinson:

I am writing as a response to your letter dated October 27 regarding the above described project. The City of Albemarle continues its desire to see the accommodation of bicycles as well as the installation of sidewalk within the City limits in conjunction with the construction of this project. At their November 7 regular meeting, the Albemarle City Council voted unanimously to reaffirm their support and commitment to the bicycle and pedestrian accommodations / facilities as described in your letter.

If you have any further questions regarding this matter or if I can be of any assistance, please let me know.

Sincerely,

Michael J. Ferris
City Manager
City of Albemarle
mferris@albemarlenc.gov

cc: Mayor and City Council

CITY OF ALBEMARLE
P.O. BOX 190
ALBEMARLE, N.C. 28002-0190

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RECEIVED
Division of Highways
NOV 14 2016
Preconstruction
Project Development and
Environmental Analysis Branch

Beverly Robinson
Western Region Group Leader
Project Development and Environmental
Analysis
1548 Mail Service Center
Raleigh, NC 27699-1548

27699-154899

Brown, Dionne C

From: Davila, Felix (FHWA) <Felix.Davila@dot.gov>
Sent: Monday, April 10, 2017 11:08 AM
To: Brown, Dionne C
Subject: FW: R-2530B/B-4974/R-2527 4(f) evaluation

From: Wilson, Travis W. [mailto:travis.wilson@ncwildlife.org]
Sent: Monday, April 10, 2017 9:42 AM
To: Robinson, Beverly G
Cc: Coleman, Clarence (FHWA); Davila, Felix (FHWA); Travis.Sinclair@duke-energy.com; Gardner, Gary; Cabe, Daniel E.
Subject: R-2530B/B-4974/R-2527 4(f) evaluation

Beverly,

WRC has reviewed the proposed layout to the Swift Island BAA. There does appear to be room for improvement in the design that could add some additional spaces. With that said, for the purposes of the FHWA finding of de minimus impacts to the Section 4(f) property WRC can agree to that finding. However, NCDOT should continue to review and coordinate the layout of this facility to avoid or minimize any loss of use.

Also, please note this is a recreational area ultimately regulated under a FERC license. In no way by agreeing to a de minimus call on a 4(f) resource should NCDOT view that as the final agreement on impacts to this BAA.

WRC has noted NCDOT's commitment to paving and restriping the BAA

As far as access to this facility. Duke Energy is the owner of this facility, WRC has a long term maintenance agreement for the BAA. All future coordination by NCDOT for access and improvements to Swift Island BAA should include both Duke Energy and WRC.

Troy Depot is a WRC operations and maintenance type facility. WRC does not object to FHWA's determination of this property not meeting 4(f) requirements.

Travis W. Wilson
Eastern Region Highway Project Coordinator
Habitat Conservation Program

NC Wildlife Resources Commission
1718 Hwy 56 West
Creedmoor, NC 27522
Phone: 919-707-0370
Fax: 919-528-2524
Travis.Wilson@ncwildlife.org

ncwildlife.org

From: Robinson, Beverly G
Sent: Thursday, April 06, 2017 10:49 AM
To: Wilson, Travis W. <travis.wilson@ncwildlife.org>
Cc: Coleman, Clarence <clarence.coleman@fhwa.dot.gov>; Davila, Felix (FHWA) <Felix.Davila@dot.gov>
Subject:

Hello Travis,

I had a call will Travis Sinclair on today regarding the Swift Island Boat access facility. Attached is the layout of the parking spaces based on placement of the proposed Duke amenities. I am finalizing a Finding of No Significant Impact (FONSI) for the proposed improvements to NC 24-27. I am requesting that you review the attached plan and the parking space matrix associated with the plan and respond to the information listed below. Please let me know if you need to discuss this. I look forward to hearing from you. This information is needed by COB today. Thanks.

1. Please indicate by responding to this email that you agree that the project as proposed near the Swift Island Boat access facility does not adversely affect the activities, features, or attributes that make the property eligible for 4(f) protection. Please concur that you are party with signature authority, landowner and official with jurisdiction over the Swift Island Bridge Boat access facility. Please be informed that, based on your concurrence, the FHWA intends to make a de minimus finding regarding impacts to the Swift Island Boat access facility, thus satisfying the requirements of Section 4(f).
2. NCDOT commit to restripe and pave the Boat access facility.
3. NCDOT requests that any requirement for accessing this property be granted to NCDOT to allow the restriping and paving to occur. We will include this language in the Project Commitments and will continue to coordinate as the project progresses.

4. Please confirm that the Troy Depot is not protected under Section 4(f). This facility is used only by WRC staff.

	Existing	Duke Site Plan	KH Plan
Boat (Std)	100	98	93
Boat (ADA)	4	4	4
Total	**104**	**102**	**97**
Car (Std)	15	16	17
Car (ADA)	0	2	2
Car (Non-Std)	1	1	
Total	**16**	**19**	**19**

Grand Total	120	121	116

Delta from KH	4	5	-

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Brown, Dionne C

From: Davila, Felix (FHWA) <Felix.Davila@dot.gov>
Sent: Friday, April 07, 2017 3:37 PM
To: Brown, Dionne C
Cc: Coleman, Clarence (FHWA); Robinson, Beverly G
Subject: FW: Swift Island Boat access area
Attachments: 2017-04-06_Boat Parking Lot Exhibit (002).pdf

Dionne, please be aware of this e-mail from Travis Sinclair from Duke-energy.

Have you heard anything from Travis Wilson from NC WRC?

Thanks,

Felix Davila P.E.
Preconstruction and Environment Engineer
Federal Highway Administration
310 New Bern Avenue, Suite 410
Raleigh, North Carolina 27601
Phone (919)747-7021
Fax (919)747-7030

Please consider the environment before printing this email

From: Sinclair, Travis Lee [mailto:Travis.Sinclair@duke-energy.com]
Sent: Friday, April 07, 2017 11:14 AM
To: Robinson, Beverly G
Cc: Coleman, Clarence (FHWA); Davila, Felix (FHWA); Mellor, Colin
Subject: RE: Swift Island Boat access area

Ms. Robinson,

Thank you for the note and opportunity to respond to the draft plans for the NCDOT proposed improvement to NC 24-27, specifically how it impacts the federal recreation site known as Swift Island Access Area.

Below are Duke Energy's comments regarding this request and impacts on Swift Island Access Area:

- Duke Energy Progress, LLC. Is the owner of the property know as Swift Island Access Area. Duke Energy is also the owner of the Federal Energy Regulatory Commission (FERC) operating license for the Yadkin-Pee Dee project, which includes Lake Tillery.
- The Swift Island Access Area is located within the FERC project boundary and is required under the FERC Operating License for the Yadkin-Pee Dee Project, Issued April 1, 2015 and required under FERC Order 313 to be held for public recreation.
- Based the current design provided and the park lot matrix enclosed below the Swift Island Access Area would be losing five (5) parking spaces. Duke Energy agrees this design does not pose a significant impact on the public recreation space with the following conditions:

- Because Swift Island Access Area is within the FERC's federal boundary, the FERC must approval any and all change to the recreation site prior to any work being conducted on this site. FERC reserves the right to approve, reject, and/or require modification to the plan. Therefore, this finding of no significant impact is subject to change contingent upon FERC approval.
- With the proposed widening of the NCDOT Right of Way, FERC must approve the associated land being removed out of the FERC boundary and the loss of recreation lands. This is a separate approval than the modification to facilities and amenities to the recreation site as outlined in the above bulleted point. FERC reserves the right to approve, reject, and/or require modifications to the plan. Additionally, FERC reserves the right to require lands of equal recreational opportunity be added to the FERC project boundary as a replacement. If required by FERC to replace the land loss for recreation it will be the responsibility of the NCDOT to acquire the land and transfer it to Duke Energy for the sole purpose of public recreation and/or a separate agreement between NCDOT and Duke Energy to resolve this requirement. Because this would be a federal order, in the event this cannot be resolved then the plan would not be approved.
- The lose of five (5) parking spaces is minor. However NCDOT should continue to revise the plan in order to replace all parking spaces at a rate of one-to-one for vehicle only and vehicle with trailer spaces, both existing and FERC approved planned for the 2018 upgrades, which are lost due to the NCDOT proposed improvement of NC 24-27.
- All final plans must be approved by Duke Energy and FERC prior to any work being performed at the Swift Island Access Area. If the NCDOT design plans are modified or deviate from the plans attached then Duke Energy and FERC most approve the modification prior to performing any work.

If you have questions please let me know. Duke Energy understand and supports this project. With continued communication and coordination I feel confident we can achieve the proposed improvements to NC 24-27 while meeting all the federal regulatory requirement for this property. I look forward to meeting with you on April 21, 2017.

Sincerely,

==========

Travis L. Sinclair
Water Strategy, Hydro Licensing and Lake Services
Duke Energy Carolinas, LLC. | 526 S. Church Street | Mailcode: EC12Q | Charlotte, NC 28202
o: 704.382.6920 | c: 704.681.2703

From: Robinson, Beverly G [mailto:brobinson@ncdot.gov]
Sent: Thursday, April 06, 2017 11:20 AM
To: Sinclair, Travis Lee
Cc: Coleman, Clarence; Davila, Felix (FHWA); Mellor, Colin
Subject: Swift Island Boat access area

*** Exercise caution. This is an EXTERNAL email. DO NOT open attachments or click links from unknown senders or unexpected email. ***

Hello Travis,

Good Morning Travis. Thank you for taking my call on today regarding the Swift Island Boat access facility. Attached is the layout of the parking spaces based on placement of the proposed Duke amenities. I am finalizing a Finding of No Significant Impact (FONSI) for the proposed improvements to NC 24-27. I am requesting that you review the attached plan and the parking space matrix associated with the plan and respond to the information listed below. Please let me know if you need to discuss this. I look forward to hearing from you. This information is needed by COB today. Thanks.

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	Existing	Duke Site Plan	KH Plan
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Grand Total	120	121	116

Delta from KH	4	5	-

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Kimley»Horn
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421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NC 27601

PROJECT REFERENCE NO.	SHEET NO.
R-2530B/B-4974	EXHIBIT

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

RIGHT-OF-WAY REV.

CONST. REV.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS 5/14/99

4/6/2017

MATCHLINE -L- STA 347+50 (SEE SHEET 27)

MATCHLINE -L- STA 361+50 (SEE SHEET 29)

JAMES ANTHONY NORMAN JR, DB 320 PG 456

VICKIE LYNN SAUNDERS DB 210 PG 563 DB 241 PG 841

VICKIE LYNN SAUNDERS DB 241PG 841

CHARLES R MANESS DB 236 PG 496

PROGRESS ENERGY CAROLINAS, INC DB 471 PG 222

BAYTREE WATERFRONT PROPERTIES INC. DB 225 PG 878 PLAT SLIDE B-339

LINDA GODWIN DB 190 PG 245

CHARLES UPTON DB 354 PG 759 PLAT SLIDE B-337

CAROLINA POWER AND LIGHT

R2527-2

BL-45

S 82° 39' 41.4" W

S 34° 38' 18.3" W

S 59° 26' 39.9" W

S 19° 15' 21.6" W

S 28° 08' 23.5" E

355+00

350+00

360+00

15+00

+25.43 187.67' LT 125.00' LT

+44.48 165.21' LT

+41.34 165.41' LT

+00.00 -Y17- EX. R/W

EX. R/W

25' driveway width

PROPERTY LINE IS HIGH WATER MARK SCALED FROM PHOTOGRAMETRY

BM#52
ELEV = 293.97'
N 567843 E 1679271
-Y16- STATION 16+20.00
S 45°32'16" E 129.65'
RR SPIKE IN BASE OF PP

BM#51
ELEV = 292.23'
N 568[illegible] E 167953
-Y16- STATION 35[illegible]
24.17' RIGHT
RR SPIKE IN BASE 2' PINE POPLAR

-L-

PIs Sta 357+24.34
Θs = 1° 15' 33.3"
Ls = 200.00'
LT = 133.34'
ST = 66.67'

PI Sta 367+14.43
Δ = 22° 56' 41.5" (LT)
D = 1° 15' 33.3"
L = 1,822.11'
T = 923.43'
R = 4,550.00'
SE = 0.04

-Y16-

PI Sta 12+42.80
Δ = 48° 23' 45.1" (LT)
D = 18° 14' 49.4"
L = 265.23'
T = 141.10'
R = 314.00'
SE = 0.04
RO = 108°
DS = 35 MPH

-Y17-

PI Sta 10+59.36
Δ = 24° 48' 21.6" (LT)
D = 22° 55' 05.9"
L = 108.24'
T = 54.98'
R = 250.00'

-DRW16-

PI Sta 10+71.13
Δ = 63° 24' 19.9" (LT)
D = 114° 35' 29.6"
L = 55.33'
T = 30.88'
R = 50.00'

SEE SHEET 2B-4 FOR INTERSECTION DETAILS
SEE SHEET 48 FOR -L- PROFILE
SEE SHEET 54 FOR -Y16- PROFILE
SEE SHEET 55 FOR -Y17- PROFILE
SEE SHEET 59 FOR -DRW16- PROFILE

APPENDIX E
SUPPORTING DOCUMENTATION

AQUATIC RESOURCES REPORT

FOR THE

PROPOSED WIDENING OF NC 24/27

FROM EAST OF THE PEE DEE RIVER

TO WEST OF SR 1134 (WADEVILLE ROAD)

UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY

NORTH CAROLINA

TIP # R-2527

WBS ELEMENT 35572.1.1

January 14, 2014

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I. INTRODUCTION

This report identifies the potential effects and impacts on aquatic resources of the proposed widening of NC 24/27 from east of the Pee Dee River to west of SR 1134 (Wadeville Road). The proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way. The project area is in the Uwharrie Ranger District, Uwharrie National Forest, Montgomery County, North Carolina.

Approximately 50 acres of USFS land falls within the 500 ft project study corridor. As design is finalized, the acreage will decrease.

This project affects Clarks Creek, Rocky Creek, unnamed tributaries to Rocky Creek, and Smith Branch along NC 24/27. These streams are located in the Piedmont III ecoregion, and the Carolina Slate Belt level IV ecoregion (Griffith et al. 2002). The Carolina Slate Belt has some of the lowest water-yielding geology in the state resulting in the tendency of streams to dry up in summer. Mount Gilead Town Wastewater Treatment Plant discharges into Clarks Creek. Clarks Creek was rated Fair in 2011 for benthic bioclassification by North Carolina Department of Environment and Natural Resources' Division of Water Quality (NCDWQ). Rocky Creek was rated Good-Fair in 1996 for benthic bioclassification by NCDWQ. Clarks Creek was rated Excellent 2004 for fish bioclassification by NCDWQ. Rocky Creek was rated Good in 2010 for fish bioclassification by NCDWQ.

Water quality ratings for fish and benthic macroinvertebrates are not always in agreement due to habitat differences. Furthermore, benthic macroinvertebrates are more sensitive to slight changes in water quality.

During the twentieth century these streams suffered numerous detrimental effects on the aquatic fauna. Logging in the Uwharrie National Forest, construction of the railroad and NC 24/27 through the National Forest, and residential development and agriculture have all contributed to periods of habitat degradation.

II. SPECIES CONSIDERED AND METHODS

The potential effects on Sensitive (S) and Locally Rare (LR) aquatic species are evaluated. The S and LR species lists are maintained by the Uwharrie National Forest Service, Asheville, N.C. Potential direct and indirect effects to S and LR aquatic species were analyzed in the Clarks Creek, Rocky Creek, and Smith Branch areas where road widening is proposed. This area is referred to as the activity area, and is shown in the attached project map (See Figure 1).

Potentially affected aquatic species were identified by:

(1) Reviewing the list of S and LR aquatic species of the Uwharrie National Forest in Montgomery Co. (Appendix 1) and streamlining this list to include only aquatic species that exist

within the natural communities found at the project site.

(2) Consulting the element occurrence records of aquatic species as maintained by the North Carolina Natural Heritage Program (NCNHP 2012).

(3) Consulting with NCNHP, USFS, and NC Wildlife Resource Commission (NCWRC) personnel who are knowledgeable of the area and its fauna.

(4) Conducting field surveys in areas designated for stream disturbing activities.

Surveys were conducted within the Forest Service property that may be impacted by the proposed road improvements. While the aquatic inventory assessed all animals encountered, particular focus was directed for species listed with Threatened (T), Endangered (E), S or LR status.

III. AQUATIC RESOURCES

A. T&E, SENSITIVE, AND LOCALLY RARE SPECIES

The 2011 revised rare aquatic species list for Montgomery County (Appendix 1) includes twenty-two T&E, S, and LR species: eighteen invertebrates (5 S and 13 LR), one amphibian (1 S), and five fish (2 S and 3 LR). The number of species on this list was substantially reduced and summarized for the following reasons:

1. Lack of suitable habitat for the species in the activity area.
2. The species has a well-known distribution that does not include the activity area.
3. Conclusions were also based on personal communication with experts in the field of study.
4. Any aquatic species that had marginal to suitable habitat in the vicinity of the area and could potentially occur were ruled out either during the surveys or because they were "historic or extirpated" or listed as "obscure records."

Endangered and Threatened Species

A detailed discussion of the T&E aquatic species was included in the accompanying Biological Evaluation along with the botanical and terrestrial species and will not be included in this report. The S and LR aquatic species are discussed below.

Sensitive Species

Eight Forest Service S aquatic species are listed for the Uwharrie National Forest in Montgomery Co. All eight species were ruled out due to not being found during surveys or outside of the project study corridor.

Mollusks

1. *Elliptio roanokensis* (Roanoke slabshell), occurs in most Atlantic drainages. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. *Fusconaia masoni* (Atlantic pigtoe), occurs in most Atlantic drainages in the lower Piedmont. The preferred habitat for the Atlantic pigtoe is a yielding substrate composed of coarse sands and gravel at the downstream edge of riffle areas. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
3. *Lasmigona subviridis* (green floater), occurs in the Yadkin/Pee Dee River basin. This species prefers pools or eddies with gravelly and sandy bottoms. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
4. *Toxolasma pullus* (Savannah lilliput), occurs in a number of Atlantic drainages. This species lives in still shallow water near the banks of streams and ponds in mud or sand. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
5. *Villosa vaughaniana* (Carolina creekshell), occurs in the Pee Dee River basin. This species is found near the bank in shaded pools of small streams. This species prefers muddy or silty gravel in shallow water. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Fish

1. *Etheostoma collis* (Carolina darter), occurs in streams in the Piedmont. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. *Etheostoma mariae* (pinewoods darter), possibly occurs in the Pee Dee River basin. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Locally Rare Species

Sixteen Forest Service LR aquatic species are listed for the Uwharrie National Forest in Montgomery Co. All sixteen species were ruled out due to not being found during surveys.

Mollusks

1. *Alasmidonta* sp. 2 (a bivalve), occurs in streams in the Uwharrie Mountains region. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. *Alasmidonta undulata* (triangle floater), occurs in most river systems in the Piedmont. This species is common in smaller rivers and streams, going well into the headwaters, found mainly in quiet waters with some current, avoiding riffles, living in coarser gravel and sand. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

3. *Anodonta implicata* (alewife floater), occurs in the Pee Dee River. This species is found living in ponds, overbank pools, streams and rivers in a variety of substrates including silt, sand and gravel. This species is listed as obscure in Montgomery Co. This species was not found during surveys. This species is not further analyzed.
4. *Lampsilis cariosa* (yellow lampmussel), occurs in a number of river systems. This species is found in medium to larger rivers often in sand in bedrock cracks, but also is found in silt, sand, gravel, and cobble substrates. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
5. *Lampsilis radiata* (eastern lampmussel), occurs in a number of river systems. This species has been found in creeks, lakes and rivers with fast current in gravel substrate and in a sandy substrate in lake like portions of rivers. This species has also been found in sand substrate with good current. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
6. *Strophitus undulatus* (creeper), occurs in most river basins in the Piedmont. This species appears adaptable to a variety of aquatic habitats, from high-gradient small streams to main channels of rivers in finer sediments to large gravel, usually deeply buried. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Crustaceans

1. *Cambarus catagius* (Greensboro burrowing crayfish), occurs in the Uwharrie Mountains. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. *Cambarus hystriocosus* (Sandhills spiny crayfish), occurs in streams in the Sandhills. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.

Aquatic Insects

1. *Beraea gorteba* (a caddisfly), has no locality data. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.
2. *Ceraclea joannae* (a caddisfly), occurs in the Little River. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
3. *Baetpous trishae* (a mayfly), has no locality data. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.
4. *Plauditus cestus* (a mayfly), has no locality data. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.
5. *Pteronarcy comstocki* (spiny salmonfly), has no locality data. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.

Fish

1. *Carpiodes sp. cf. cyprinus* (a carpsucker), occurs in the Yadkin/Pee Dee drainage. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.
2. *Moxostoma sp. 3* (Carolina redhorse), occurs in the Pee Dee drainage. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
3. *Notropis volucellus* (mimic shiner), occurs in scattered drainages near the Fall Line. Current records for Montgomery Co. possibly exist. This species was not found during surveys. This species is not further analyzed.

B. AQUATIC SPECIES SURVEYS

Benthic Macroinvertebrates

NCDOT biologists conducted multiple surveys in Rocky Creek, Clarks Creek, and Smith Branch within the Uwharrie National Forest for benthic macroinvertebrates, and samples were collected during each survey. For details on collection methods, please refer to the NCDENR DWQ Biological Assessment website: (http://www.esb.enr.state.nc.us/BAU.html). Appendix 2 lists macroinvertebrate species actually collected by NCDOT biologists on 5/21/2007, 6/27/2007, and 8/16/2007. A vicinity map can be found in this report, before the appendices. **None of the invertebrate species on the Forest Service S or LR lists were found during any of the surveys.**

Freshwater Mussels

Mussel surveys were conducted on 8/16/2007 by NCDOT biologists in Clarks Creek and Rocky Creek for the presence of live mussels and mussel shells. The only mussel species that was observed during surveys was *Elliptio complanata*. Clarks Creek and Rocky Creek had very little water during mussel surveys. **None of the freshwater mussel species on the Forest Service S or LR lists were found during any of the surveys.**

Fish

Fish surveys were conducted on 6/27/2007 by NCDOT biologists in Rocky Creek and Clarks Creek. Appendix 3 lists the fish species that were collected during the survey. **None of the fish species on the Forest Service S or LR lists were found during any of the surveys.**

Qualifications of principle investigators are included in the Biological Evaluation report.

C. COMMUNITIES

Stream characteristics were recorded during the fish surveys on 6/27/2007.

Clarks Creek had a water depth of approximately 3 inches. The stream channel was approximately 9 feet wide. The substrate was primarily cobble and gravel, but also consisted of sand and boulder. The bank height was approximately 3 feet.

Rocky Creek had a water depth of 3-6 inches. The stream channel was approximately 12 feet wide. The substrate was primarily cobble and boulder, but also consisted of bedrock and gravel. The bank height was approximately 3 feet.

IV. POTENTIAL EFFECTS TO SENSITIVE AND LOCALLY RARE AQUATIC SPECIES

There will be no effects or impacts (direct, indirect or cumulative) to any listed aquatic species if this proposal were implemented. This conclusion is supported by the following:

1) S or LR aquatic species are not known to occur in or near the activity area.

2) Site specific aquatic surveys did reveal the absence of S or LR species.

V. MITIGATION AND RATIONALE

Since there are no effects or impacts to any T & E, S and LR aquatic species, there is no recommended mitigation.

VI. SUMMARY OF EFFECT

The proposed improvements to R-2527 will not impact any S or LR aquatic species on the USDA Forest Service S and LR list for Montgomery County due to nonoccurrence in the vicinity of the activity area. No mitigation is recommended. **The proposed project will not affect any Federally listed or proposed listed aquatic species. Formal consultation with the U.S. Fish and Wildlife Service is not required.**

VII. REFERENCES

Griffith, G.E.,, J.M. Omernik, J.A. Comstock, M.P. Schafale, W.H. McNab, D.R. Lenat, T.F. MacPherson, J.B. Glover, and V.B. Shelburne. 2002. Ecoregions of North Carolina and South Carolina (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

N.C. Division of Water Quality Benthic Macroinvertebrate Assessment Data available online at http://portal.ncdenr.org/web/wq/benthosdata (Accessed: November 2012).

N.C. Division of Water Quality (NCDWQ). 2008. Yadkin-Pee Dee River Basinwide Water Quality Plan. Available online at http://portal.ncdenr.org/web/wq/ps/bpu/basin/yadkinpeedee/2008

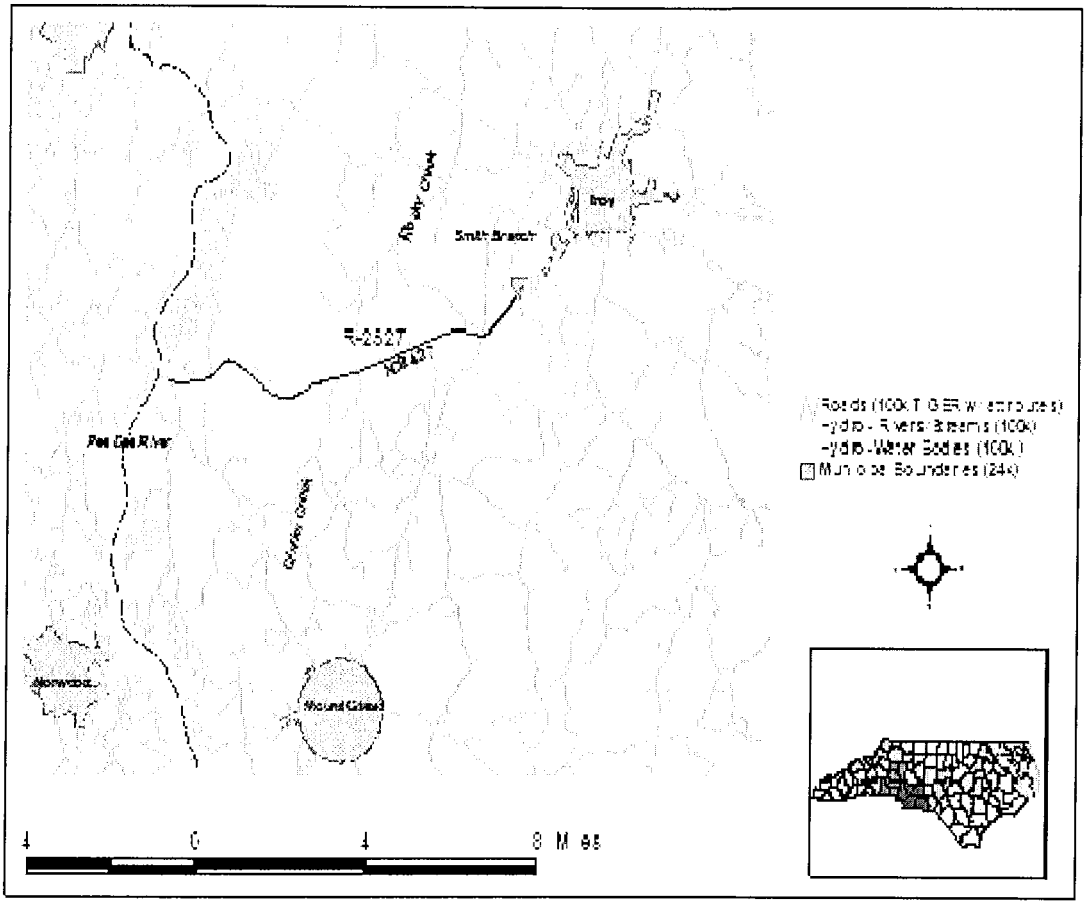
N.C. Division of Water Quality (NCDWQ). 1998. Yadkin-Pee Dee River Basinwide Water Quality Management Plan. Available online at http://portal.ncdenr.org/c/document_library/get_file?uuid=e05c0bbc-1f76-4ed8-9f61-b5c73ade39c3&groupId=38364

N.C. Natural Heritage Program (NCNHP) map viewer and data base search available online at http://portal.ncdenr.org/web/nhp/home (Accessed: November 2012).

N.C. Natural Heritage Program (NCHNP). 2001. Montgomery County Natural Heritage Inventory. Natural Heritage Program, Office of Natural Resource Planning and Conservation, Department of Environment and Natural Resources. Inventory Biologist: Moni C. Bates. 249 pp.

U.S. Geological Survey (USGS). 1974. Hydrologic Unit Map – 1974, State of North Carolina. Department of the Interior, prepared in cooperation with the U.S. Water Resources Council.

Figure 1. R-2527 Vicinity Map



Appendix 1. List of Forest Service Sensitive and Locally Rare Aquatic Species for Montgomery County (October 2012).

SCIENTIFIC NAME	COMMON NAME	STATUS	NHP-LISTED COMMUNITY OR HABITAT AND RECORDS	LIKELIHOOD OF OCCURRENCE AND CONCLUSION
Fish				
Carpiodes sp. cf. cyprinus	A carpsucker	LR	Occurs in the Yadkin/Pee Dee drainage	Species was not collected during surveys.
Etheostoma collis	Carolina darter	S	Occurs in streams in the Piedmont	Current records are known in Montgomery Co. This species was not collected during surveys.
Etheostoma mariae	Pinewoods darter	S	Possibly occurs in the Pee Dee drainage	Current records are known in Montgomery Co. This species was not collected during surveys.
Moxostoma sp. 3	Carolina redhorse	LR	Occurs in the Pee Dee drainage	Current records are known in Montgomery Co. This species was not collected during surveys.
Notropis volucellus	Mimic shiner	LR	Occurs in scattered drainages near Fall Line	Species was not collected during surveys.
Mussels				
Alasmidonta sp. 2	A bivalve	LR	Occurs in streams in the Uwharrie Mountains region	Current records are known in Montgomery Co. This species was not collected during surveys.
Alasmidonta undulata	Triangle floater	LR	Occurs in most river systems in Piedmont	Current records are known in Montgomery Co. This species was not collected during surveys.
Anodonta implicata	Alewife floater	LR	Occurs in the Pee Dee River	Listed as obscure in Montgomery Co. This species was not collected during surveys.

Elliptio roanokensis	Roanoke slabshell	S	Occurs in most Atlantic drainages	Current records are known in Montgomery Co. This species was not collected during surveys.
Fusconaia masoni	Atlantic pigtoe	S	Occurs in most Atlantic drainages, in the lower Piedmont	Current records are known in Montgomery Co. This species was not collected during surveys.
Lampsilis cariosa	Yellow lampmussel	LR	Occurs in a number of river systems; mainly near the Fall Line	Current records are known in Montgomery Co. This species was not collected during surveys.
Lampsilis radiata	Eastern lampmussel	LR	Occurs in a number of river systems	Current records are known in Montgomery Co. This species was not collected during surveys.
Lasmigona subviridis	green floater	S	Occurs in the Yadkin/Pee Dee system downstate	Current records are known in Montgomery Co. This species was not collected during surveys.
Strophitus undulatus	creeper	LR	Occurs in most river basins in the Piedmont	Current records are known in Montgomery Co. This species was not collected during surveys.
Toxolasma pullus	Savannah lilliput	S	Occurs in a number of Atlantic drainages	Current records are known in Montgomery Co. This species was not collected during surveys.
Villosa vaughaniana	Carolina creekshell	S	Occurs in the Pee Dee system	Current records are known in Montgomery Co. This species was not collected during surveys.
Crayfish				
Cambarus catagius	Greensboro burrowing crayfish	LR	Occurs in the Greensboro area, south to the Uwharrie Mountains	Current records are known in Montgomery Co. This species was not collected during surveys.
Cambarus hystriocosus	Sandhills spiny crayfish	LR	Occurs in streams in the Sandhills	This species was not collected during surveys.
Insects				
Beraea gorteba	A caddisfly	LR	No locality data	This species was not

				collected during surveys.
Ceraclea joannae	A caddisfly	LR	Occurs in the Little River	Current records are known in Montgomery Co. Endemic to this area. This species was not collected during surveys.
Baetpous trishae	A mayfly	LR	No locality data	This species was not collected during surveys.
Plauditus cestus	A mayfly	LR	No locality data	This species was not collected during surveys.
Pteronarcy comstocki	Spiny salmonfly	LR	No locality data	This species was not collected during surveys.

Forest Service Status (FS) is designated by the U.S. Forest Service. Sensitive and locally rare species are protected under provisions of the National Forest Management Act and directions set forth in FS manual 2670.

STATUS CODE	STATUS	DESCRIPTION
E	Endangered	A taxon which is in danger of extinction throughout all or a significant portion of its range
T	Threatened	A taxon which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range
S	Sensitive	Species at risk of extinction in a portion of their range as evidenced by downward trends in population numbers or density, or downward trends in habitat capability.
FC	Forest Concern	Species not at risk of extinction, even in a portion of their range, and not showing a downward population trend over their range as a whole within North Carolina.

Appendix 2. Taxa list with indication of relative abundance. A = Abundant (≥10), C=Common (3-9), and R = Rare (1-2). Uwharrie National Forest, Montgomery County, May 21, 2007. (Macroinvertebrate species found during NCDOT field surveys on May 21, 2007)

Stream	**Rocky Cr**	**Rocky Cr**	**Clark Cr**	**Clark Cr**	**Smith Br**	**Smith Br**
Site (relative to NC 24/27)	**Upstream**	**Downstream**	**Upstream**	**Downstream**	**Upstream**	**Downstream**
Date	**5/21/07**	**5/21/07**	**5/21/07**	**5/21/07**	**5/21/07**	**5/21/07**
	Abundance	**Abundance**	**Abundance**	**Abundance**	**Abundance**	**Abundance**
Ephemeroptera						
Acerpenna pygmaea	R		R	R	R	R
Baetis flavistriga	R	R	R	C		
Baetis pluto	R	C	R	C		
Baetis propinquis			R		C	R
Caenis			A	C		
Centroptilum					C	C
Habrophlediodes sp.	A	A	A	A	A	A
Heptagenia	R		R		C	
Isonychia sp.	A	A	A	C	A	A
Eurylophella	C	A	A	A		
Ephemerella dorothea	R	C				
Leucrocuta	A	A	C	C	C	A
Plauditus dubius grp.		R	R	R	C	A
Pseudocloeon frondalis			C		R	
Stenacron interpunctatum	C	C	A	C	R	R
Stenonema modestum		R	C	C	C	C
Odonata						
Argia sp.			C			
Boyeria vinosa	R	R	R	R	R	R
Calopteryx sp.		R	R	R		R
Cordulegaster						R
Lanthus	C			R	R	
Somatochlora		R				R
Plecoptera						
Alloperla	R					
Acroneuria abnormis	A	A				
Amphinemura sp.					R	
Ecoptura xanthenes				R		
Neoperla	C	C				
Isoperla holochlora	R		C	R	R	
Perlesta placida	A	A	A	A	A	A
Leuctra	C					
Megaloptera						
Corydalus cornutus		C	R	R		
Nigronia serricornis			R	R		
Sialis			R			R
Trichoptera						
Chimarra	A	A	A	C		
Hydropsychye betteni		R				
Cheumatopsyche sp.	A	A	A	A	C	
Ceraclea ancylus	C		C			
Diplectrona modesta				R	C	
Neophylax oligius		R				C
Polycentropus	R	R				
Pteronarcys		R				

Pycnopshyche				R		
Ryacophila carolina				C		
Coleoptera						
Ancyronyx variegatus			R	C		
Dineutus			R			
Dytiscidae			A	A		
Gyrinus			R			
Helichus		C	A	C	R	
Macronychus glabratus			R	R		
Neoporus sp.						C
Stenelmis sp.			R			R
Psephenus herricki	R	C	R	C		
Diptera						
Antocha			R		C	R
Dicranota			C	R		
Simulium	C	A	A	A	R	
Hexatoma		C	C	C	R	
Tipula		C		R	R	
Palpomyia			R	R		
Other						
Erpobdella/Moreeobdella		C				

Appendix 3. Fish species collected during surveys for R-2527

Chain pickerel	*Esox niger*
Rosyside dace	*Clinostomus funduloides*
Highback chub	*Hybopsis hypsinotus*
Bluehead chub	*Nocomis leptocephalus*
Redlip shiner	*Notropis chiliticus*
Highfin shiner	*Notropis altipinnis*
Creek chub	*Semotilus atromaculatus*
Creek chubsucker	*Erimyzon oblongus*
Flat bullhead	*Ameiurus platycephalus*
Yellow bullhead	*Ameiurus natalis*
Margined madtom	*Notorus insignis*
Pirate perch	*Aphredoderus sayanus*
Green sunfish	*Lepomis cyanellus*
Redbreast	*Lepomis auritus*
Pumpkinseed	*Lepomis gibbosus*
Warmouth	*Lepomis gulosus*
Tessellated darter	*Etheostoma olmstedi*
Fantail darter	*Etheostoma flabellare*

BOTANICAL RESOURCES REPORT

FOR THE

PROPOSED WIDENING OF NC 24/27

FROM EAST OF THE YADKIN-PEE DEE RIVER TO

WEST OF SR 1134 (WADEVILLE ROAD)

UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY

NORTH CAROLINA

TIP # R-2527

WBS ELEMENT 35572.1.1

January 14, 2014

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I. INTRODUCTION

This report identifies the potential effects on botanical resources of a proposed road widening of NC 24/27 from east of the Yadkin-Pee Dee River to west of SR 1134 (Wadeville Road). The proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way. The project area is in the Uwharrie Ranger District, Uwharrie National Forest, Montgomery Co., North Carolina.

Approximately 50 acres of USFS land falls within the 500 ft wide project study corridor. As design is finalized, the acreage will decrease.

II. SPECIES CONSIDERED AND METHODS

The potential effects on USFS Sensitive (S) and Locally Rare (LR) plant species are evaluated. Threatened (T) and Endangered (E) plant species are discussed in the Biological Evaluation report. Potential direct and indirect effects to S and LR plant species were analyzed in the areas where road widening is proposed. This area is referred to as the activity area, and is shown in the attached project map (Figure 1 of Biological Evaluation).

Potentially affected plant species were identified by:

1) Reviewing the list of S and LR plant species of the Uwharrie National Forest in Montgomery Co. (Appendix 1) and streamlining this list to include only plants that could potentially exist within the natural communities found at the project site. The streamlined list is shown below in Table 1.

2) Consulting element occurrence records of plants as maintained by the North Carolina Natural Heritage Program (NCNHP 2012).

3) Consulting with NCNHP and US Forest Service personnel who are knowledgeable of the area and its flora.

4) Conducting field surveys in areas designated for ground disturbing activities.

Surveys were conducted within the Forest Service property that will be impacted by the proposed road widening. While the floral survey assessed all plants encountered, particular focus was directed for plants listed as Threatened (T), Endangered (E), S or LR Status.

III. BOTANICAL RESOURCES

A. T&E, SENSITIVE AND LOCALLY RARE SPECIES:

The 2011 revised rare botanical species list for Montgomery Co. (Appendix 1) includes thirty-nine T&E, S, and LR species: two nonvascular species (2 S) and thirty-seven vascular species (1 E, 9 S and 27 LR).

All but fourteen species were dropped from the list for further consideration and discussion for one of the two following reasons: 1) lack of suitable habitat for the species in the project area, 2) the species has a well-known distribution that does not include the project area.

Habitats, community types and ranges of plant Threatened (T) and Endangered (E), S and LR species are derived from information in "Classification of the Natural Plant Communities of North Carolina (1990)," the Natural Heritage Program's "List of Rare Plant Species of North Carolina" (http://portal.ncdenr.org/c/document_library/get_file?uuid=b0c4aa96-6cdf-4c19-8885-88c4c0dc18c7&groupId=61587) or personal communication with other botanists.

Endangered and Threatened Species

A detailed discussion of the T&E botanical species was included in the accompanying Biological Evaluation along with the botanical and terrestrial species and will not be included in this report. The S and LR botanical species are discussed below.

Sensitive Species

Eleven Forest Service S botanical species are listed for the Uwharrie National Forest in Montgomery Co. All but three species were ruled out due to lack of suitable habitat.

Nonvascular

1. *Scopelophila cataractae* (Agoyan cataract moss), prefers copper-rich soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. *Xanthoparmelia monticola* (a rock-shield lichen), prefers high elevation rocky summits and mafic glades. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

Vascular

1. *Amorpha schwerinii* (Piedmont indigo bush), prefers dry forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. There is an occurrence of this species outside of the 500 ft wide project study corridor (approximately 600 ft from NC 24/27). This species is not further analyzed.
2. *Berberis canadensis* (American barberry), prefers open forests and glades on basic soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
3. *Carex impressinervia* (ravine sedge), prefers rich alluvial forests. Current records for

Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

4. *Danthonia epilis* (bog oatgrass), occurs in seepage bogs and wet seepy power lines. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
5. *Eurybia mirabilis* (Piedmont aster), prefers rich slopes and bottomlands. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
6. *Fothergilla major* (large witch-alder), occurs on dry ridge tops, in bluff forests, seepage wetlands, and Piedmont longleaf pine forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was found during surveys.
7. *Lindera subcoriacea* (bog spicebush), prefers streamhead pocosins, white cedar swamps, and seepage slopes. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
8. *Solidago plumosa* (Yadkin River goldenrod), prefers riverside rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
9. *Symphyotrichum georgianum* (Georgia aster), prefers open woods and roadsides. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys within National Forest land. This species has been found along NC 24/27 on private land in Stanly County approximately 5-6 miles away from USFS property. This species is not further analyzed.

Locally Rare Species

Twenty-seven Forest Service LR botanical species are listed for the Uwharrie National Forest in Montgomery Co. All but eleven species were ruled out due to lack of suitable habitat.

Vascular

1. *Anemone berlandieri* (southern anemone), prefers thin circumneutral soil adjacent to rock outcrops. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. *Baptisia alba var. alba* (thick-pod white wild indigo), prefers open woodlands and clearings. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
3. *Baptisia australis var. aberrans* (eastern prairie blue wild indigo), prefers glades and open forests on basic soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
4. *Cardamine dissecta* (dissected toothwort), prefers rich woods, cove forests, and

bottomlands. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

5. *Cirsium carolinianum* (Carolina thistle), occurs in forests and disturbed areas, mostly on basic soils. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
6. *Collinsonia tuberosa* (Piedmont horsebalm), prefers thin circumneutral soil adjacent to rock outcrops. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
7. *Desmodium fernaldii* (Fernald's tick-trefoil), prefers dry to mesic hardwood-pine woodlands. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
8. *Dichanthelium boreale* (northern witch grass), prefers open woods. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was added to the USFS list since the last surveys were done. Surveys will be done for this species closer to the let date for this project.
9. *Gillenia stipulata* (Indian physic), prefers forests and open woods, mainly over mafic rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
10. *Helenium brevifolium* (littleleaf sneezeweed), prefers bogs, seeps, riverbanks, and other wet sites. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
11. *Helianthus laevigatus* (smooth sunflower), prefers shaly open woods and roadsides. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was found during surveys.
12. *Matelea decipiens* (glade milkvine), prefers thin woodlands over mafic or calcareous rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
13. *Parthenium auriculatum* (glade wild quinine), prefers glades and openings over mafic rocks. Current records for Montgomery Co. exist. This species was found during surveys.
14. *Primula meadia* (eastern shooting star), prefers mafic cliffs, dry coniferous woodlands, and associated nutrient-rich alluvial forests. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area. This species is not further analyzed.
15. *Pseudognaphalium helleri* (Heller's rabbit tobacco), prefers dry woodlands, openings, and glades, especially over mafic rocks. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during

surveys. This species is not further analyzed. There is a population of this species south of NC 24/27 within the National Forest, approximately 800 feet from the road.

16. *Quercus austrina* (bluff oak), prefers bluff and bottomland forests over circumneutral soil. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
17. *Ruellia purshiana* (Pursh's wild petunia), prefers glades and woodlands, mostly over mafic or calcareous rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
18. *Salvia azurea* (azure sage), occurs in sandhills. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
19. *Sedum glaucophyllum* (cliff stonecrop), prefers rock outcrops, mainly calcareous or mafic. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
20. *Smilax hugeri* (Huger's carrion-flower), prefers deciduous forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
21. *Solidago radula* (western rough goldenrod), prefers dry woodlands over mafic rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
22. *Stachys* sp. 1 (undescribed hedge nettle), prefers sandy edges of forested floodplains. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
23. *Stewartia ovata* (mountain camellia), occurs on bluffs and in forests, usually with rhododendrons. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
24. *Tradescantia virginiana* (Virginia spiderwort), prefers rich woods on circumneutral soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
25. *Tridens chapmanii* (Chapman's redtop), prefers dry pine and oak woods, and sandy roadsides. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
26. *Trifolium reflexum* (buffalo clover), prefers open woods and clearings. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. This species is not further analyzed.
27. *Viola walteri* (prostrate blue violet), prefers rich cove forests and other rich forests. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

B. BOTANICAL SURVEYS:

The activity area was surveyed by multiple NCDOT biologists on May 21, 2007, June 26, 2007, October 24, 2007, November 1, 2007, November 2, 2007, November 7, 2007, November 16, 2007, November 19, 2007, and November 21, 2007. Surveys for Schweinitz's sunflower were conducted on October 18-20, 2011. **One population of Endangered (Schweinitz's sunflower, *Helianthus schweinitzii*), two populations of S (large witch alder, *Fothergilla major*) one population of LR (glade wild quinine, *Parthenium auriculatum*) and several populations of LR (smooth sunflower, *Helianthus laevigatus*) species were detected during the site visits.** An additional population of Schweinitz's sunflower, as well as a population of Georgia aster, were found during the October 2011 survey dates, but these populations are not on USFS property.

C. COMMUNITIES

Four common community types were found in the proposed activity areas: Dry Oak-Hickory Forest, Maintained/Disturbed, Timbered Scrub/Shrub and Loblolly Pine Plantation. The Dry Oak-Hickory Forest is described in detail by Schafale and Weakley (1990). The Maintained/Disturbed Community included a power line right-of-way dominated by grasses and forbes, and ruderal roadside edge. Most of the herbaceous diversity was associated with the Dry Oak-Hickory Forest Community. There were no significant rock outcrops or seeps.

These communities and their associated plant species are described in detail in the Natural Resources Technical Report (NRTR). The Mixed Pine/Hardwood Forest and Mixed Hardwood Forest communities described in the NRTR are similar to the Dry Oak-Hickory Forest described by Schafale and Weakley (1990).

IV. POTENTIAL BOTANICAL EFFECTS TO T and E, S and LR plants.

There are approximately 450 individuals of T and E, S or LR plant species within the 500 ft wide project study corridor. Approximately 100 individuals of the S plant species large witch alder (*Fothergilla* major), 300 individuals of the LR plant species smooth sunflower (*Helianthus* laevigatus), 35 individuals of the E plant species Schweinitz's sunflower (*Helianthus* schweinitzii) and several (less than 20) individuals of the LR plant species glade wild quinine (*Parthenium auriculatum*) were found in the activity area. It is not anticipated that all of these individuals will be affected or impacted (direct, indirect or cumulative) since construction will not occur throughout the entire 500 ft wide project study corridor. As design is finalized, NCDOT will have a more accurate estimation of how many individuals will be affected. This conclusion is supported by the following:

1) Site specific botanical surveys did reveal the presence of T and E, S or LR species, or habitat that is specific to T and E, S and LR species.

2) Dry Oak-Hickory Forest, Maintained/Disturbed, Timbered Scrub/Shrub, and Loblolly Pine Plantation communities are common community types within the Uwharrie National Forest. The habitats and natural communities found within the activity area have potential for T and E, S and LR plant species occurrence.

Direct effects to the aforementioned species include any effect related to the actual construction of the project. These effects would include: clearing vegetation, placing fill material on top of plants, cut slopes (digging up plants). These direct effects would result in the death of all the individuals of the species in the construction corridor.

Indirect effects include effects that occur after project construction. These effects would include: additional stormwater flowing to where these species occur, additional drainage and the possibility of invasive species increasing in areas that are cleared. Indirect effects may result in the eventual death of individuals of the four species.

V. MITIGATION AND RATIONALE

Since there are known effects to T and E, S and LR plant species, some form of mitigation is recommended. Mitigation options include: transplanting, avoidance (flagging or fencing), using native plantings for erosion control, and habitat enhancement. NCDOT will discuss these options with USFS.

The large witch alder plants can possibly be avoided since they are located approximately 100 ft from the existing road. Smooth sunflower seeds were harvested from the impact area for potential mitigation needs in 2007 and were subsequently transferred to USFS. Seeds from the Schweinitz's sunflower population that may be affected (EO 028) were collected in 2011 and 2012 and stored for potential mitigation.

VI. SUMMARY OF EFFECT

The proposed project will potentially impact E, S and LR plant species. The Biological Conclusion for Schweinitz's sunflower is May Affect, Likely to Adversely Affect. Therefore, formal consultation with the U.S. Fish and Wildlife Service is required.

This project may impact individuals of the three S and LR species (smooth sunflower, large witch alder and glade wild quinine), but will not affect the viability of any of the three species across the forest. Discussions will occur with the USFS to determine avoidance and minimization options.

REFERENCES:

Natural Systems report for R-2527. 2004 and 2007. HDR Engineering, Inc. of the Carolinas and the North Carolina Department of Transportation.

Radford, Albert E., et. al., (1968). *Manual of the Vascular Flora of the Carolinas*. Chapel Hill, North Carolina: University of North Carolina Press.

Schafale, M. P. and Weakley Alan. (1990). *Classification of the Natural Communities of North Carolina*: Third Approximation. North Carolina Natural Heritage Program, Raleigh, North Carolina.

United States Forest Service, National Forests of North Carolina. (2007)." List of Species of Concern and Species of Interest Plants". National Forests of North Carolina: unpublished.

Appendix 1. Forest Service Endangered (E), Sensitive (S) and Locally Rare (LR) list of plant species on the Uwharrie National Forest, North Carolina (October 2012).

SCIENTIFIC NAME	FOREST SERVICE STATUS (E, S, LR)	COMMON NAME	NATURAL HABITAT IN WHICH SPECIES OCCUR	LIKELIHOOD OF OCCURRENCE AND CONCLUSION
NONVASCULAR				
Scopelophila cataractae	S	Agoyan cataract moss	Prefers copper-rich soils	Habitat not present
Xanthoparmelia monticola	S	A rock-shield lichen	Prefers high elevation rocky summits and mafic glades	Habitat not present
VASCULAR				
Helianthus schweinitzii	**E**	**Schweinitz's sunflower**	**Open forests, woodlands and roadsides**	**Found during surveys**
Amorpha schwerinii	S	Piedmont indigo bush	Southern Piedmont Dry Oak or Oak-Pine Forest	Habitat present, but not found during surveys
Berberis canadensis	S	American barberry	Woodlands & Glades, typically associated with mafic soils	Habitat not present
Carex impressinervia	S	Ravine sedge	Southern Piedmont Alluvial Forest	Habitat not present
Danthonia epilis	S	Bog oat-grass	Seeps around rock outcrops, granitic domes	Habitat not present
Eurybia mirabilis	S	Piedmont aster	Mesic Mixed Hardwood Forest, Piedmont Basic Mesic Forest	Habitat not present
Fothergilla major	**S**	**Large witch alder**	**Southern Piedmont Dry Oak or Oak-Pine Forest**	**Found during surveys**
Lindera subcoriacea	S	Bog spicebush	Hillside Seepage Bog	Habitat not present
Solidago plumosa	S	Yadkin River goldenrod	Riverside mafic rock outcrops	Habitat not present
Symphyotrichum georgianum	S	Georgia aster	Glades, woodlands, savannas and open areas	Habitat present, but not found during surveys
Anemone berlandieri	LR	Southern anemone	Thin circumneutral soil adjacent to rock outcrops	Habitat not present
Baptisia alba var. alba	LR	Thick-pod white wild indigo	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Habitat present, but not found during surveys
Baptisia australis var. *aberrans*	LR	Eastern prairie blue wild indigo	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides. This species has been found over limestone of mafic rock	Habitat not present

			influenced plant communities.	
Cardamine dissecta	LR	Dissected toothwort	Southern Piedmont Alluvial Forest	Habitat not present
Cirsium carolinianum	LR	Carolina thistle	Glades, woodlands, and open areas over mafic rock	Habitat present, but not found during surveys
Collinsonia tuberosa	LR	Piedmont horsebalm	Thin circumneutral soil adjacent to rock outcrops	Habitat not present
Desmodium fernaldii	LR	Fernald's tick-trefoil	Dry to mesic hardwood-pine woodland	Habitat present, but not found during surveys
Dichanthelium boreale	LR	Northern witch grass	Open woods	Habitat present. Surveys for this species will be done in 2013.
Gillenia stipulata	LR	Indian physic	Southern Piedmont Dry Oak or Oak-Pine Forest, typically associated with mafic rock	Habitat not present
Helenium brevifolium	LR	Littleleaf sneezeweed	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides	Habitat present, but not found during surveys
Helianthus laevigatus	**LR**	**Smooth sunflower**	**Open forests, woodlands and roadsides**	**Found during surveys**
Matelea decipiens	LR	Glade milkvine	Glades and woodlands, over mafic rock	Habitat not present
Parthenium auriculatum	**LR**	**Glade wild quinine**	**Glades, woodlands, and open areas over mafic rock**	**Found during surveys**
Primula meadia	LR	Eastern shooting star	Southern Piedmont Dry Oak or Oak-Pine Forest, Roadsides over mafic substrates	Habitat not present
Pseudognaphalium helleri	LR	Heller's rabbit tobacco	Glades, woodlands, and open areas over mafic rock	Habitat present, but not found during surveys
Quercus austrina	LR	Bluff oak	River bluff	Habitat not present
Ruellia purshiana	LR	Pursh's wild petunia	Southern Piedmont Dry Oak or Oak-Pine Forest over mafic rock substrates	Habitat not present
Salvia azurea	LR	Azure sage	Longleaf pine-oak woodland	Habitat present, but not found during surveys
Sedum glaucophyllum	LR	Cliff stonecrop	Rock outcrops, glades, typically over calcareous or mafic substrate	Habitat not present
Smilax hugeri	LR	Huger's carrion-flower	Mesic mixed hardwood forest, piedmont basic mesic forest	Habitat present, but not found during surveys
Solidago radula	LR	Western Rough Goldenrod	Glades, woodlands, and open areas over	Habitat not present

			mafic rock	
Stachys sp. 1	LR	Undescribed hedge nettle	Sandy alluvium of Southern Piedmont Alluvial Forest	Habitat not present
Stewartia ovata	LR	Mountain Camellia	Bluffs and Forests,usually with Rhododendron	Habitat not present
Tradescantia virginiana	LR	Virginia spiderwort	Basic Mesic Hardwood Forest, woodlands	Habitat present, but not found during surveys
Tridens chapmanii	LR	Chapman's Redtop	Xeric Pine and Oak Forests, sandy roadsides	Habitat present, but not found during surveys
Trifolium reflexum	LR	Buffalo clover	Open forests, woodlands and roadsides	Habitat present, but not found during surveys
Viola walteri	LR	Prostrate Blue Violet	Mesic Hardwoods	Habitat not present

BIOLOGICAL EVALUATION

FOR THE

PROPOSED WIDENING OF NC 24/27 FROM

EAST OF THE PEE DEE RIVER TO WEST OF

SR 1134 (WADEVILLE ROAD)

UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY

NORTH CAROLINA

TIP # R-2527

WBS ELEMENT 35572.1.1

January 14, 2014

Contact Person:
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I. INTRODUCTION

The North Carolina Department of Transportation proposes to widen NC 24/27 to a four-lane divided facility in Montgomery County, North Carolina. The proposed project, TIP No. R-2527, will widen NC 24/27 from east of the Pee Dee River to west of SR 1134 (Wadeville Road) (approximately 9 miles). Portions of this project are in the Uwharrie National Forest. The proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way.

Approximately 50 acres of USFS land falls within the 500 ft project study corridor. As design is finalized, the acreage will decrease.

II. SPECIES CONSIDERED AND METHODS

The potential effects on Sensitive (S) species are evaluated. The S species list is maintained by the Uwharrie National Forest Service, Asheville, N.C. Potential direct and indirect effects to S species were analyzed in areas where road widening is proposed. This area is referred to as the activity area.

Potentially affected rare species were identified by:

(1) Reviewing the list of S species of the Uwharrie National Forest in Montgomery Co. and streamlining this list to include only species that exist within the natural communities found at the project site.

(2) Consulting the element occurrence records of rare species as maintained by the North Carolina Natural Heritage Program (NCNHP 2012).

(3) Consulting with NCNHP, USFS, and NC Wildlife Resource Commission (NCWRC) personnel who are knowledgeable of the area and its fauna.

(4) Conducting field surveys in the activity area.

Surveys were conducted within the Forest Service property that may be impacted by the proposed road improvements. While the inventory assessed all plants and animals encountered, particular focus was directed for species listed with Threatened (T), Endangered (E) or S status.

III. EXISTING BIOLOGICAL CONDITION

A. T&E and FOREST SENSITIVE SPECIES

The Forest Service's rare species resource lists for Montgomery Co. includes three T&E species (2 Terrestrial and 1 Botanical) and 22 S species (7 Aquatic, 4 Terrestrial, and 11 Botanical).

Many of these species were ruled out due to a lack of suitable habitat in the activity area or the species has a well-known distribution that does not include the activity area. Below is a list of the T&E and S species with the reason for its elimination from the list or whether it could potentially occur in the vicinity of the activity area (bold font). Most botanical, terrestrial, and aquatic species that could potentially occur were ruled out either during the surveys or because they were "historic or extirpated" or "obscure records." The number of species on this list was substantially reduced and summarized for the following reasons:

1. Lack of suitable habitat for the species in the activity area.

2. The species has a well-known distribution that does not include the activity area.

3. Conclusions were also based on personal communication with experts in the field of study.

Threatened and Endangered Species

Birds

1. *Picoides borealis* (red-cockaded woodpecker), federally endangered, prefers mature open pine forests, mainly in longleaf pine (breeding evidence only). NCNHP has a 1994 record for a cavity tree approximately 2.4 mi south of the study corridor. Survey were conducted for this species from March 8, 2006-March 27, 2007. The surveyed areas within 0.5 mile of the project did contain pine-dominated forests. The pines within the surveyed areas were composed of young pines (between 20 to 30 years old) that would not provide suitable nesting habitat. Two areas contained older long-leaf pines (between 30 to 60 years old). The first area, located approximately 1.0 mile west of the railroad and 0.4 mile north NC 24-27, is small with scattered mature pines. An inactive cavity tree was observed within this stand. The second area is located approximately 0.3 mile north of the Additional Study Area associated with the railroad. This area provides the best potential nesting habitat, however, the older trees are scattered throughout the stand which are dominated by younger pines between 20 to 30 years old. The area within 0.5 mile of these stands is fragmented due to clear cutting. No RCWs were observed during surveys. This species is not further analyzed.

Mammals

1. *Puma concolor cougar* (eastern cougar), federally endangered, prefers extensive forests in remote areas. This species is believed to be extirpated in North Carolina. This species is not further analyzed.

Vascular Plants

1. ***Helianthus schweinitzii* (Schweinitz's sunflower), federally endangered, prefers open woods and roadsides. This species was found during surveys.**

Sensitive Species

Mollusks

1. *Elliptio roanokensis* (Roanoke slabshell), occurs in most Atlantic drainages. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. *Fusconaia masoni* (Atlantic pigtoe), occurs in most Atlantic drainages in the lower Piedmont. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
3. *Lasmigona subviridis* (green floater), occurs in the Yadkin/Pee Dee River basin. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
4. *Toxolasma pullus* (Savannah lilliput), occurs in a number of Atlantic drainages. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
5. *Villosa vaughaniana* (Carolina creekshell), occurs in the Pee Dee River basin. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Fish

1. *Etheostoma collis* (Carolina darter), occurs in streams in the Piedmont. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.
2. *Etheostoma mariae* (pinewoods darter), possibly occurs in the Pee Dee River basin. Current records for Montgomery Co. exist. This species was not found during surveys. This species is not further analyzed.

Terrestrial Insects

1. *Cicindela patruela* (Northern barrens tiger beetle), occurs in sandy soil in open pine or pine-oak woods. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

Amphibians

1. ***Ambystoma talpoideum* (mole salamander), breeds in fish-free semipermanent woodland ponds and forages in adjacent woodlands. Suitable habitat was observed in the activity area. This species was observed outside of the 500 ft wide project study corridor (approximately 300 ft from NC 24/27), but on Forest Service property. No impacts to this species are anticipated since it was found outside of the project corridor. This species is not further analyzed.**

Birds

1. *Haliaeetus leucocephalus* (bald eagle), prefers mature forests near large bodies of water for nesting, and lakes and sounds for nesting sites and regular non-breeding sites. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. ***Lanius ludovicia* (loggerhead shrike), prefers fields and pastures during the breeding season only. Suitable habitat was observed in the activity area. This species was not observed during surveys. No impacts to this species are anticipated. This species is not further analyzed.**

Nonvascular Plants

1. *Scopelophila cataractae* (Agoyan cataract moss), prefers copper-rich soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. *Xanthoparmelia monticola* (a rock-shield lichen), prefers high elevation rocky summits and mafic glades. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

Vascular Plants

1. ***Amorpha schwerinii* (Piedmont indigo bush), prefers dry forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys. There is an occurrence of this species outside of the 500 ft wide project study corridor (approximately 600 ft from NC 24/27). This species is not further analyzed.**
2. *Berberis canadensis* (American barberry), prefers open forests and glades on basic soils. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
3. *Carex impressinervia* (ravine sedge), prefers rich alluvial forests. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
4. *Danthonia epilis* (bog oatgrass), occurs in seepage bogs and wet seepy power lines. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
5. *Eurybia mirabilis* (Piedmont aster), prefers rich slopes and bottomlands. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
6. ***Fothergilla major* (large witch-alder), occurs on dry ridge tops, in bluff forests, seepage wetlands, and Piedmont longleaf pine forests. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was found during surveys.**
7. *Lindera subcoriacea* (bog spicebush), prefers streamhead pocosins, white cedar swamps, and seepage slopes. Current records for Montgomery Co. exist. Suitable habitat was not

observed in the activity area, therefore there are no impacts. This species is not further analyzed.

8. *Solidago plumosa* (Yadkin River goldenrod), prefers riverside rocks. Current records for Montgomery Co. exist. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
9. ***Symphyotrichum georgianum* (Georgia aster), prefers open woods and roadsides. Current records for Montgomery Co. exist. Suitable habitat was observed in the activity area. This species was not found during surveys within National Forest land. This species has been found along NC 24/27 on private land in Stanly County approximately 5-6 miles away from USFS property. This species is not further analyzed.**

B. RARE SPECIES SURVEYS

Multiple surveys were conducted in the activity area to ensure that seasonal variability in species numbers and optimal survey windows for flowering plants were taken into account. Because the S and LR lists contain a broad spectrum of plants and animals, it was necessary to bring in expertise from a wide spectrum of biologists. Qualifications of principle investigators are included at the end of this document.

Survey Dates: 4/04-5/04 (Schweinitz's sunflower), 9/04 (bald eagle), 3/8/06-3/27/07 (Red-cockaded woodpeckers), 4/10/06 (bald eagle), 9/9/06-10/18/06 (Schweinitz's sunflower, smooth coneflower), 3/27/07 (bald eagle), 5/21/07 (plants), 5/22/07 (birds), 6/25/07 (bats), 6/26/07 (salamander, plants, bats), 6/27/07 (salamanders), 8/16/07 (mussels, terrestrial insects), 10/24/07 (plants), 10/25/07, 11/1/07 (plants), 11/2/07 (plants), 11/7/07 (plants), 11/16/07 (plants), 11/19/07 (plants), 11/21/07 (plants)

C. COMMUNITIES

Four common community types were found in the proposed activity areas: Dry Oak-Hickory Forest, Maintained/Disturbed, Timbered Scrub/Shrub and Loblolly Pine Plantation. The Dry Oak-Hickory Forest is described in detail by Schafale and Weakley (1990). The Maintained/Disturbed Community included a power line right-of-way dominated by grasses and forbes, and ruderal roadside edge. Most of the herbaceous diversity was associated with the Dry Oak-Hickory Forest Community. There were no significant rock outcrops or seeps.

These communities and their associated plant species are described in detail in the Natural Resources Technical Report (NRTR). The Mixed Pine/Hardwood Forest and Mixed Hardwood Forest communities described in the NRTR are similar to the Dry Oak-Hickory Forest described by Schafale and Weakley (1990).

IV. RESULTS AND POTENTIAL EFFECTS TO T, E and FOREST SERVICE S SPECIES

The proposed road widening project may affect or impact botanical and aquatic resources of the Uwharrie National Forest due to occurrence of E and Forest Service S plants or aquatic animals in the vicinity of the project area.

A larva of the S terrestrial animal species mole salamander (*Ambystoma talpoideum*) was found in an upland pool in the activity area. Mole salamanders occupy underground burrows in pine savannas, hardwood forests, and swamps and breed in fish-free semi-permanent woodland ponds and forage in adjacent woodlands. This species is found in Alleghany, Buncombe, Cherokee, Guilford, Henderson, Macon, Montgomery, Person, Polk, Richmond, Rockingham, Rowan, Surry, and Union Counties. The mole salamander is considered a species of special concern by the North Carolina Natural Heritage Program (NCNHP). This species can be avoided, as it is located approximately 300 feet from the existing alignment.

Approximately 100 individuals of the S plant species large witch alder (*Fothergilla major*) were found in forested areas in the activity area. Large witch alder is found on dry ridgetops or bluff forests, seepage wetlands, and Piedmont longleaf pine forests. This species is found in Burke, Chatham, Harnett, McDowell, Montgomery, Orange, Person, Rutherford, Stanly, Stokes, Transylvania, and Wake Counties. Large witch alder is considered a significantly rare species throughout its range by NCNHP. This species can be avoided, as it is located approximately 100 feet from the existing alignment.

Approximately 35 individuals of the federally endangered plant species Schweinitz's sunflower (*Helianthus schweinitzii*) were found adjacent to the railroad in the activity area. Schweinitz's sunflower is found in open woods and roadsides. This species is found in Anson, Cabarrus, Davidson, Gaston, Mecklenberg, Montgomery, Randolph, Rowan, Stanly, Stokes, Surry, and Union Counties. Schweinitz's sunflower is considered an endangered species by the United States Fish and Wildlife Service (USFWS). This population of Schweinitz's sunflower could be affected by the proposed project. If it is determined that this population will be affected, the plants will be transplanted to adjacent USFS land and formal consultation with the USFWS will be initiated.

REFERENCES:

Griffith, G.E.,, J.M. Omernik, J.A. Comstock, M.P. Schafale, W.H. McNab, D.R. Lenat, T.F. MacPherson, J.B. Glover, and V.B. Shelburne. 2002. Ecoregions of North Carolina and South Carolina (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

NCDOT. 2007. Mist net surveys for bats at North Carolina Department of Transportation's proposed NC 24/27 road widening (TIP NO. R-2527) in Montgomery County, North Carolina. Unpublished.

Natural Systems report for R-2527. 2004 and 2007. HDR Engineering, Inc. of the Carolinas and the North Carolina Department of Transportation.

N.C. Division of Water Quality Benthic Macroinvertebrate Assessment Data available online at http://portal.ncdenr.org/web/wq/benthosdata (Accessed: November 2012).

N.C. Division of Water Quality (NCDWQ). 2008. Yadkin-Pee Dee River Basinwide Water Quality Plan. Available online at http://portal.ncdenr.org/web/wq/ps/bpu/basin/yadkinpeedee/2008

N.C. Division of Water Quality (NCDWQ). 1998. Yadkin-Pee Dee River Basinwide Water Quality Management Plan. Available online at http://portal.ncdenr.org/c/document_library/get_file?uuid=e05c0bbc-1f76-4ed8-9f61-b5c73ade39c3&groupId=38364

N.C. Natural Heritage Program (NCNHP) map viewer and data base search available online at http://portal.ncdenr.org/web/nhp/home (Accessed: November 2012).

N.C. Natural Heritage Program (NCHNP). 2001. Montgomery County Natural Heritage Inventory. Natural Heritage Program, Office of Natural Resource Planning and Conservation, Department of Environment and Natural Resources. Inventory Biologist: Moni C. Bates. 249 pp.

Potter, E., Parnell, J., Teulings, P., and Davis, R., 2006, *Birds of the Carolinas, second edition.* University of North Carolina Press.

Radford, Albert E., et. al., (1968). *Manual of the Vascular Flora of the Carolinas*. Chapel Hill, North Carolina: University of North Carolina Press.

Schafale, M. P. and Weakley A., 1990. *Classification of the Natural Communities of North Carolina*: Third Approximation. North Carolina Natural Heritage Program, Raleigh,

North Carolina.

United States Forest Service, National Forests of North Carolina. (2007)." List of Species of Concern and Species of Interest Plants". National Forests of North Carolina: unpublished.

U.S. Geological Survey (USGS). 1974. Hydrologic Unit Map – 1974, State of North Carolina. Department of the Interior, prepared in cooperation with the U.S. Water Resources Council.

QUALIFICATIONS OF PRINCIPLE INVESTIGATORS:

Investigator: Kathy Herring, Environmental Supervisor, NCDOT
Education: B.S. Biology, University of South Carolina.
Experience: Environmental Specialist/Supervisor, NCDOT, August 2004 – present.
Environmental Biologist, NC Division of Water Quality, Biological Assessment Unit, December 1992 – July 2004.
Environmental Biologist Supervisor, Normandeau Associates, Aiken, SC. April 1988 to November 1992 and February 1982 to August 1985.
Aquatic Biologist Chadwick and Associates, Inc. Denver, CO, November 1986 to March 1988.
Project Manager - The Potential Effects of Flow Fluctuations on Establishing a Balanced Biological Community in Discharge Streams at the Savannah River Plant, Aiken, SC.
Academy of Natural Sciences of Philadelphia, September 1985 to September 1986
Expertise: Freshwater fish and benthic macroinvertebrate collection and identification; aquatic habitat evaluations and function; biocriteria and biotic indices evaluations; Endangered species (terrestrial/aquatic) surveys; data analysis/report writing. SCUBA diving certified.

Investigator: Karen M. Lynch, Environmental Supervisor, NCDOT
Education: B.S. Wildlife Biology and Fisheries, North Carolina State University.
Experience: Environmental Supervisor, NCDOT July 2003- present.
Environmental Specialist, NCDOT, November 1998 – July 2003.
Environmental Biologist, NC Division of Water Quality, November 1984-October 1998.
Expertise: Section 7 field investigations; NEPA documentation, protected species (terrestrial/aquatic) surveys, benthic macroinvertebrate collection, water quality analyses, aquatic plant surveys. Permitted to survey for State and Federal Threatened and Endangered mussels. SCUBA certified.

Investigator: Jason Mays, Environmental Specialist
Education: B.S. Biological Sciences, UNC Chapel Hill.
Experience: NCWRC Field Biologist May 2002-October 2003.
Environmental Specialist, NCDOT, March 2003- Present.
Expertise: Section 7 field investigations, protected species (terrestrial/aquatic) surveys, 404/401 permitting, wetland delineation/ determination, GIS studies.

Investigator: Michael Sanderson
Education: B.S. Fisheries and Wildlife Science, North Carolina State University.
Experience: Environmental Specialist, NCDOT April 2004- present.
Wildlife Research Biologist, Down to Earth Environmental, February – June,

2003.
Wildlife Research Technician, NC Cooperative Fish and Wildlife Research unit, 1991- 1999.
Biological Science Technician (Wildlife), US Fish and Wildlife Service, 1995-1997.

Expertise: Bird surveys, behavioral analysis, habitat use/evaluation, Section 7 field investigations, protected species (terrestrial/aquatic) surveys, wetland delineation, SCUBA certified.

Investigator: Logan Williams
Education: B.A. Philosophy, North Carolina State University, December 1981.
M.S. Entomology, North Carolina State University, May 1994.
Experience: Environmental Supervisor, NCDOT, 2002-present.
Entomologist, NC Dept. of Agriculture, 2001-2002.
Natural Systems Specialist, NCDOT, 1995-2000.
Supervisor of Apiary Inspection, NC Dept of Agriculture, 1988-1995.
Expertise: Coordinate and conduct Section 7 investigations (aquatic and terrestrial). Identification of aquatic benthic macroinvertebrates. Wetland Mitigation. Ecological studies, NEPA documentation. SCUBA certified.

Investigator: Dennis W. Herman
Education: B.S. Biology, Western Carolina University.
Experience: Environmental Program Consultant, NCDOT, August 2004-present.
Coordinator of Living Collections, NC Museum of Natural Sciences, June 1996-August 2004.
Assistant Curator of Herpetology, Zoo Atlanta, 1981-1996.
Senior Zoo Keeper of Herpetology & Mammals, Atlanta Zoological Park, 1972-1981.
Expertise: Section 7 investigations, protected species (terrestrial/aquatic) surveys, bog turtle & mountain bog specialist, ecological studies, rare plant identification, benthic macroinvertebrate collection, reptile and amphibian surveys.

Investigator: Matthew M. Haney
Education: B.S. Natural Resources-Ecosystem Assessment, North Carolina State University, Raleigh, North Carolina.
Experience: N.C. Dept. of Transportation Oct. 1999-present.
N.C. Forest Service May 1998-August 1998.
U.S. Forest Service, Center for Forested Wetlands Research May 1997-August 1997.
Expertise: Section 7 field investigations, NEPA documentation, wetland and aquatic investigations, protected species (terrestrial/aquatic) surveys.

Investigator:	Neil Medlin
Education:	M.A. Biology, Appalachian State University. B.S. Biology, Appalachian State University.
Experience:	Environmental Specialist/Supervisor, NCDOT, January 2002-present. Environmental Biologist, NC Division of Water Quality, June 1990-January 2002. Environmental Biologist, FL Department of Environmental Protection (formerly Department of Environmental Regulation), August 1986-June 1990.
Expertise:	Freshwater fish and benthic macroinvertebrate collection and identification; aquatic habitat evaluations and function; biocriteria and biotic indices evaluations; Endangered species (terrestrial/aquatic) surveys and assessments; permitted to survey for State and Federal Threatened and Endangered mussels and fish.

Investigator:	Mary E. Frazer
Education:	B.S. Zoology, University of Wisconsin. M.E.M. (Master of Environmental Management), Resource Ecology, Duke University.
Experience:	Natural Systems Specialist, NCDOT, August 2000-present. Water Regulation Specialist, Wisconsin Department of Natural Resources, 1998-2000. Wisconsin Coastal Management Program, 1994-1998. Biologist, Soil and Environmental Consultants, 1992-1994.
Expertise:	Section 7 field investigations; NEPA documentation, wetland and aquatic investigations.

Investigator:	Melissa Miller
Education:	B.S. Fisheries and Wildlife Sciences, North Carolina State University.
Experience:	Environmental Biologist, NCDOT, February 2005-present. Assistant Wildlife Biologist, Howell Woods Environmental Learning Center, Four Oaks, NC, January1999-February 2005.
Expertise:	Section 7 field investigations, protected species (terrestrial/aquatic) surveys.

Investigator:	Anne Burroughs
Education:	B.S. Biological Sciences, Minor in Environmental Science, North Carolina State University 1992.
Experience:	Biological Control Technician – NC Dept of Agriculture May 2001-April 2003. Environmental Specialist – NC Dept. of Transportation, May 2003-August 2003, January 2004-present.
Expertise:	Endangered species (terrestrial/aquatic) surveys; benthic macroinvertebrate collection.

Investigator:	Lance P. Fontaine, Ph.D.
Education:	Ph.D., Wildlife and Fisheries Sciences, Texas A&M University, 2008. M.S. Wildlife and Fisheries Sciences, Texas A&M University, 2002. B.S. Ecological & Evolutionary Biology, Tulane University, 1999.
Experience:	Environmental Specialist, NCDOT, Raleigh, NC, October 2006 – Present. Lecturer, University of California at Irvine, January 2006 – September 2006. Research Assistant, Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX, August 2000 – December 2005. Pond Technician/Technical Consultant, Integrated Lakes Management, Gurnee, IL September 1999 – August 2000.
Expertise:	Endangered species (terrestrial/aquatic) surveys; section 7 field investigation; biological assessment preparation; water quality analysis; aquatic and wetland ecology studies; freshwater and marine fish ecology and ecophysiology studies; invasive and exotic species (terrestrial/aquatic) issues; statistical analysis; benthic macroinvertebrate collection; GIS studies; prescribed burns.

Investigator:	Cheryl Gregory
Education:	B.S. Natural Resource Management & Ecology, Colorado State University.
Experience:	Environmental Specialist, NCDOT, Raleigh, NC, December 2003 to present. Field Tech, GeoSonics, Inc., Raleigh, NC September to December 2003.
Expertise:	Biotic community mapping and assessment, Section 404/401 permitting, Section 7 field surveys, wetland delineation, GIS mapping, and technical report writing.

Investigator:	Heather Renninger
Education:	B.S. Ecology/Environmental Biology, Appalachian State University.
Experience:	Environmental Specialist, NCDOT, February 2007- present. Environmental Biologist, H.W. Lochner, Inc., 2003-2007. Biologist, Earth Tech, Inc., 2000-2003.
Expertise:	Section 7 field investigations and documentation, benthic macroinvertebrate collection, 401/404 permitting, protected species (terrestrial/aquatic) surveys, NEPA documentation, wetland delineation, stream restoration, invasive species, avian ecology and behavior.

TERRESTRIAL ANIMAL RESOURCES REPORT

FOR THE

PROPOSED WIDENING OF NC 24/27 FROM EAST

OF THE YADKIN-PEE DEE RIVER TO WEST OF SR 1134 (WADEVILLE ROAD)

UWHARRIE NATIONAL FOREST

MONTGOMERY COUNTY

NORTH CAROLINA

TIP # R-2527

WBS ELEMENT 35572.1.1

January 7, 2013

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I. INTRODUCTION

This report identifies the potential effects on terrestrial animal resources of a proposed road widening of NC 24/27 from east of the Yadkin-Pee Dee River to west of SR 1134 (Wadeville Road). The proposed project would affect U.S. Forest Service (USFS) property along the existing and proposed right-of-way. The project area is in the Uwharrie Ranger District, Uwharrie National Forest, Montgomery Co., North Carolina. This project is located in the Piedmont III ecoregion, and the Carolina Slate Belt level IV ecoregion (Griffith et al. 2002). Habitat types found in the proposed activity areas include Mixed Pine-Hardwood Forest, Maintained/Disturbed, Timbered Scrub Shrub, and Pine Plantation. The natural communities are described in detail by Schafale and Weakley (1990). The elevation of the study area is approximately 300 to 600 feet above mean sea level.

Approximately 50 acres of USFS land falls within the 500 ft project study corridor. As design is finalized, this acreage will decrease.

II. SPECIES CONSIDERED AND METHODS

The potential effects on USFS Sensitive (S) and Locally Rare (LR) terrestrial animal species are evaluated. Threatened (T) and Endangered (E) terrestrial animal species are evaluated in the Biological Evaluation report. LR species are usually peripheral or disjunct. Potential direct and indirect effects to S and LR animal species were analyzed in the areas where road widening is proposed. This area is referred to as the activity area and is shown in the attached project map (Figure 1 of Biological Evaluation).

Potentially affected terrestrial animal species were identified by:

1) Reviewing the list of S and LR animal species of the Uwharrie National Forest in Montgomery Co. (Appendix 1) and streamlining this list to include only the species that exist within the habitats found at the project site.

2) Consulting element occurrence records of animals as maintained by the North Carolina Natural Heritage Program (NCNHP) using the most up-to-date information in their database (http://nhpweb.enr.state.nc.us/nhis/public/gmap75_main.phtml)(August 10, 2012).

3) Consulting with NCNHP, NC Wildlife Resources Commission, US Fish and Wildlife Service and USFS personnel who are knowledgeable of the area and its flora.

4) Conducting field surveys in areas designated for ground disturbing activities. Surveys were conducted within the Forest Service property that will be impacted by the proposed road widening.

III. TERRESTRIAL ANIMAL RESOURCES:

A. T&E, SENSITIVE, AND LOCALLY RARE SPECIES

The 2011 revised rare terrestrial species list for Montgomery Co. (Appendix 1) includes nine T&E, S, and LR species: two invertebrates (1 S and 1 LR), one amphibian (1 S), one reptile (2 LR), three birds (2 S and 1 E), and one mammal (1 E). This list of animals that could potentially be impacted by the project was substantially reduced and summarized for the following reasons:

1) Lack of suitable habitat for the species in the project area. This may include elevation and/or forest type.
2) The species has a well-known distribution that does not include the project area or has never been recorded in Montgomery Co.
3) Based on field surveys of potential habitat, no habitat was observed in the activity area.
4) Conclusions were also based on personal communication with experts in the field.

Endangered and Threatened Species

A detailed discussion of the T&E terrestrial species is included in the accompanying Biological Evaluation along with the botanical and aquatic species and will not be included in this report. The S and LR terrestrial species are discussed below.

Sensitive Species

Four Forest Service S terrestrial species are listed for the Uwharrie National Forest in Montgomery Co. All four species were ruled out due to lack of suitable habitat, not being observed during surveys, or occurring outside of the project study corridor.

Insects

1. *Cicindela patruela* (Northern barrens tiger beetle), occurs in sandy soil in open pine or pine-oak woods. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

Amphibians

1. *Ambystoma talpoideum* (mole salamander), breeds in fish-free semipermanent woodland ponds and forages in adjacent woodlands. Suitable habitat was observed in the activity area. This species was observed outside of the 500 ft wide project study corridor (approximately 300 ft from NC 24/27). No impacts to this species are anticipated. This species is not further analyzed.

Birds

1. *Haliaeetus leucocephalus* (bald eagle), prefers mature forests near large bodies of water for nesting, and lakes and sounds for nesting sites and regular non-breeding sites. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.
2. *Lanius ludovicia* (loggerhead shrike), prefers fields and pastures during the breeding season only. Suitable habitat was observed in the activity area. This species was not observed during surveys. No impacts to this species are anticipated. This species is not further analyzed.

Locally Rare Species

Three Forest Service LR terrestrial species are listed for the Uwharrie National Forest in Montgomery Co. All three species were ruled out due to lack of suitable habitat or not being observed during surveys.

Insects

1. *Erynnis martialis* (mottled duskywing), occurs in upland woods and wooded edges. The host plant for this species is New Jersey tea (*Ceanothus americanus*). Suitable habitat was observed in the activity area. This species was not observed during surveys. No impacts to this species are anticipated. This species is not further analyzed.

Reptiles

1. *Ophiosaurus attenuatus* (slender glass lizard), prefers old fields, wooded edges, and open woods. Suitable habitat was observed in the activity area. This species was not observed during surveys. No impacts to this species are anticipated. This species is not further analyzed.
2. *Pituophis melanoleucus melanoleucus* (Northern pine snake), prefers dry and sandy woods, mainly in pine/oak sandhills. Suitable habitat was not observed in the activity area, therefore there are no impacts. This species is not further analyzed.

B. TERRESTRIAL SPECIES SURVEYS

Multiple surveys were conducted for Forest Service S and LR species in the activity area in suitable habitat by NCDOT biologists with varying expertise with invertebrates, amphibians, reptiles, birds, and mammals. Qualifications of principle investigators are included in Biological Evaluation report.

Surveys Dates: 5/21/2007-5/22/2007, 6/25/2007-6/27/2007, 8/16/2007, and 3/20/2008.

A list of all terrestrial species detected can be found in Appendix 2. One S species (mole salamander) was found during the site visits. However, this occurrence is outside of the 500 ft wide project study corridor (approximately 300 ft from NC 24/27).

C. COMMUNITIES

Four common community types were found in the proposed activity areas: Dry Oak-Hickory Forest, Maintained/Disturbed, Timbered Scrub/Shrub and Loblolly Pine Plantation. The Dry Oak-Hickory Forest is described in detail by Schafale and Weakley (1990). Of these communities, the Dry Oak-Hickory Forest Community dominates. This community encompasses the Mixed Pine/Hardwood Forest and Mixed Hardwood Forest communities that are described in the Natural Resources Technical Report (NRTR). Plant species found in this community can be found in the NRTR.

IV. POTENTIAL EFFECTS TO ANIMAL SPECIES OF CONCERN AND SPECIES OF INTEREST

There are no known effects or impacts (direct, indirect or cumulative) to any S or LR animal species. This conclusion is supported by the following:

1) Literature review, North Carolina Natural Heritage Program files, site specific surveys and consultation with experts in the field did not reveal the presence of any S or LR species or habitat that is specific to S and LR species.

2) The community types found at the project site are common community types within the Uwharrie National Forest and the habitats found within this proposal have a low potential for S and LR animal species to occur.

V. MITIGATION AND RATIONALE

Since there are no effects to any T & E, S and LR aquatic species, there is no recommended mitigation.

VI. SUMMARY OF EFFECT

The proposed improvements to R-2527 are not likely to adversely affect any S or FC terrestrial species on the USDA Forest Service S and LR list for Montgomery County due to nonoccurrence in the vicinity of the activity area. No mitigation is recommended. The proposed project will not affect any Federally listed or proposed listed aquatic species. Formal consultation with the U.S. Fish and Wildlife Service is not required.

REFERENCES:

Griffith, G.E.,, J.M. Omernik, J.A. Comstock, M.P. Schafale, W.H. McNab, D.R. Lenat, T.F. MacPherson, J.B. Glover, and V.B. Shelburne. 2002. Ecoregions of North Carolina and South Carolina (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

NCDOT. 2007. Mist net surveys for bats at North Carolina Department of Transportation's proposed NC 24/27 road widening (TIP NO. R-2527) in Montgomery County, North Carolina. Unpublished.

Natural Systems report for R-2527. 2004 and 2007. HDR Engineering, Inc. of the Carolinas and the North Carolina Department of Transportation.

Schafale, M. P. and Weakley A., 1990. *Classification of the Natural Communities of North Carolina*: Third Approximation. North Carolina Natural Heritage Program, Raleigh, North Carolina.

Potter, E., Parnell, J., Teulings, P., and Davis, R., 2006, *Birds of the Carolinas, second edition.* University of North Carolina Press.

WORLD WIDE WEB REFERENCES:

North Carolina Natural Heritage Program: http://www.ncnhp.org/

US Fish and Wildlife Service in NC: http://www.fws.gov/nc-es/es/countyfr.html

OTHER SOURCES:

Bat Blitz data from Southeastern Bat Diversity Network (SBDN), 2004

Appendix 1. List of Forest Service Endangered, S, and LR Terrestrial Animal Species for the Uwharrie National Forest (October 2012). *Species that were detected are listed in bold.

SCIENTIFIC NAME	COMMON NAME	STATUS	NHP-LISTED COMMUNITY OR HABITAT AND RECORDS	LIKELIHOOD OF OCCURRENCE AND CONCLUSION
Mammals				
Puma concolor cougar	Eastern cougar	E	Extensive forests and remote areas	This species is extirpated in N.C. and across most of its range.
Birds				
Picoides borealis	Red-cockaded Woodpecker (RCW)	E	Open Pine woods	NHP has a 1994 record for a cavity tree approximately 2.4 mi south of the study corridor. An inactive cavity tree was observed during surveys from March 8, 2006-March 27, 2007. No RCWs were observed during surveys.
Haliaeetus leucocephalus	Bald Eagle	S	Mature forests near large bodies of water	A known bald eagle nest is located approximately 7000 ft southwest of the

			for nesting	project's west terminus. This nest is located outside the boundaries of the Uwharrie National Forest.
Lanius ludovicianus	Loggerhead Shrike	S	fields and pastures	This species has been observed recently in Montgomery County, but was not detected during surveys on May 22, 2007.
Insects				
Cicindela patruela	Northern barrens tiger beetle	S	Occurs in sandy soil in open pine or pine-oak woods	Suitable habitat was not observed for this species.
Erynnis martialis	Mottled duskywing	LR	Occurs in upland woods and wooded edges; host plant-New Jersey tea (Ceanothus americanus)	This species has been observed recently in Montgomery County, but was not detected during surveys.
Amphibians				
Ambystoma talpoideum	**Mole salamander**	**S**	**Breeds in fish-free semipermanent woodland ponds and forages in adjacent woodlands**	**This species was observed during surveys, but this occurrence is outside of the 500 ft project study corridor.**
Reptiles				
Ophiosaurus attentuatus	Slender glass lizard	LR	Prefers old fields, wooded edges, and open woods	This species was not observed during surveys.
Pituophis melanoleucus melanoleucus	Northern pine snake	LR	Prefers dry and sandy woods, mainly in pine/oak sandhills	This species has been observed recently in Montgomery County, but suitable habitat was not observed for this species.

Forest Service Status (FS) is designated by the U.S. Forest Service. Sensitive and locally rare species are protected under provisions of the National Forest Management Act and directions set forth in FS manual 2670.

STATUS CODE	STATUS	DESCRIPTION
E	Endangered	A taxon which is in danger of extinction throughout all or a significant portion of its range
T	Threatened	A taxon which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range
S	Sensitive	Species at risk of extinction in a portion of their range as evidenced by downward trends in population numbers or density, or downward trends in habitat capability.
FC	Forest Concern	Species not at risk of extinction, even in a portion of their range, and not showing a downward population trend over their range as a whole within North Carolina.

Appendix 2: Terrestrial Animal Detections for R-2527

This list represents animal detections during surveys in the activity area and areas immediately adjacent. It is not exhaustive. Other species may exist in the project area.

Insects:

Fawn darner	*Boyeria vinosa*
Ebony jewelwing	*Calopteryx maculata*
Painted lady	*Vanessa cardui*
Summer azure	*Celastrina neglecta*
Eastern tiger swallowtail	*Papillio glaucus*

Birds:

Black vulture	*Coragyps atratus*
Turkey vulture	*Cathartes aura*
Red-shouldered hawk	*Buteo lineatus*
Red-tailed hawk	*Buteo jamaicensis*
Rock pigeon	*Columba livia*
Mourning dove	*Zenaida macroura*
Yellow-billed cuckoo	*Coccyzus americanus*
Great horned owl	*Bubo virginianus*
Whip-poor-will	*Caprimulgus vociferus*
Chimney swift	*Chaetura pelagica*
Ruby-throated hummingbird	*Archilochus colubris*
Red-bellied woodpecker	*Melanerpes carolinus*
Downy woodpecker	*Picoides pubescens*
Pileated woodpecker	*Dryocopus pileatus*
Eastern wood-pewee	*Contopus virens*
Acadian flycatcher	*Empidonax virescens*
Eastern phoebe	*Sayornis phoebe*
Great crested flycatcher	*Myiarchus crinitus*
White-eyed vireo	*Vireo griseus*
Yellow-throated vireo	*Vireo flavifrons*
Red-eyed vireo	*Vireo olivaceus*
Blue jay	*Cyanocitta cristata*
American crow	*Corvus brachyrhynchos*
Fish crow	*Corvus ossifragus*
Carolina chickadee	*Poecile carolinensis*
Tufted titmouse	*Baeolophus bicolor*
White-breasted nuthatch	*Sitta carolinensis*
Brown-headed nuthatch	*Sitta pusilla*
Carolina wren	*Thryothorus ludovicianus*
Blue-gray gnatcatcher	*Polioptila caerulea*

Eastern bluebird	*Sialia sialis*
Wood thrush	*Hylocichla mustelina*
American robin	*Turdus migratorius*
Brown thrasher	*Toxostoma rufum*
European starling	*Sturnus vulgaris*
Northern parula	*Parula americana*
Yellow-throated warbler	*Dendroica dominica*
Pine warbler	*Dendroica pinus*
Prairie warbler	*Dendroica discolor*
Black-and-white warbler	*Mniotilta varia*
Ovenbird	*Seiurus aurocapilla*
Northern waterthrush	*Seiurus noveboracensis*
Common yellowthroat	*Geothlypis trichas*
Hooded warbler	*Wilsonia citrina*
Yellow-breasted chat	*Icteria virens*
Summer tanager	*Piranga rubra*
Scarlet tanager	*Piranga olivacea*
Eastern towhee	*Pipilo erythrophthalmus*
Field sparrow	*Spizella pusilla*
Song sparrow	*Melospiza melodia*
Northern cardinal	*Cardinalis cardinalis*
Indigo bunting	*Passerina cyanea*
Common grackle	*Quiscalus quiscula*
Brown-headed cowbird	*Molothrus ater*
American goldfinch	*Carduelis tristis*

Mammals:

Big brown bat	*Eptesicus fuscus*
Red bat	*Lasiurus borealis*
Evening bat	*Nycticeius humeralis*
Eastern pipistrelle	*Pipistrellus subflavus*
White-tailed deer	*Odocoileus virginianus*

Amphibians and Reptiles:

Upland chorus frog	*Pseudacris feriarum*
Gray treefrog	*Hyla chrysoscelis*
Eastern narrowmouth toad	*Gastrophryne carolinensis*
Three-lined salamander	*Eurycea guttolineata*
Mole salamander	*Ambystoma talpoideum*
Northern dusky salamander	*Desmognathus fuscus*
Eastern box turtle	*Terrapene carolina*

Black rat snake	*Elaphe obsoleta*
Black racer	*Coluber constrictor*

Appendix 2: Terrestrial Animal Detections for R-2527
This list represents animal detections during surveys in the activity area and areas immediately adjacent. It is not exhaustive. Other species may exist in the project area.

Insects:
Fawn darner *Boyeria vinosa*

Ebony jewelwing	*Calopteryx maculata*
Painted lady	*Vanessa cardui*
Summer azure	*Celastrina neglecta*
Eastern tiger swallowtail	*Papillio glaucus*

Birds:

Black vulture	*Coragyps atratus*
Turkey vulture	*Cathartes aura*
Red-shouldered hawk	*Buteo lineatus*
Red-tailed hawk	*Buteo jamaicensis*
Rock pigeon	*Columba livia*
Mourning dove	*Zenaida macroura*
Yellow-billed cuckoo	*Coccyzus americanus*
Great horned owl	*Bubo virginianus*
Whip-poor-will	*Caprimulgus vociferus*
Chimney swift	*Chaetura pelagica*
Ruby-throated hummingbird	*Archilochus colubris*
Red-bellied woodpecker	*Melanerpes carolinus*
Downy woodpecker	*Picoides pubescens*
Pileated woodpecker	*Dryocopus pileatus*
Eastern wood-pewee	*Contopus virens*
Acadian flycatcher	*Empidonax virescens*
Eastern phoebe	*Sayornis phoebe*
Great crested flycatcher	*Myiarchus crinitus*
White-eyed vireo	*Vireo griseus*
Yellow-throated vireo	*Vireo flavifrons*
Red-eyed vireo	*Vireo olivaceus*
Blue jay	*Cyanocitta cristata*
American crow	*Corvus brachyrhynchos*
Fish crow	*Corvus ossifragus*
Carolina chickadee	*Poecile carolinensis*
Tufted titmouse	*Baeolophus bicolor*
White-breasted nuthatch	*Sitta carolinensis*
Brown-headed nuthatch	*Sitta pusilla*
Carolina wren	*Thryothorus ludovicianus*
Blue-gray gnatcatcher	*Polioptila caerulea*
Eastern bluebird	*Sialia sialis*
Wood thrush	*Hylocichla mustelina*
American robin	*Turdus migratorius*
Brown thrasher	*Toxostoma rufum*
European starling	*Sturnus vulgaris*
Northern parula	*Parula americana*
Yellow-throated warbler	*Dendroica dominica*

Pine warbler	*Dendroica pinus*
Prairie warbler	*Dendroica discolor*
Black-and-white warbler	*Mniotilta varia*
Ovenbird	*Seiurus aurocapilla*
Northern waterthrush	*Seiurus noveboracensis*
Common yellowthroat	*Geothlypis trichas*
Hooded warbler	*Wilsonia citrina*
Yellow-breasted chat	*Icteria virens*
Summer tanager	*Piranga rubra*
Scarlet tanager	*Piranga olivacea*
Eastern towhee	*Pipilo erythrophthalmus*
Field sparrow	*Spizella pusilla*
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Black racer	*Coluber constrictor*

R-2527 notes from data warehouse

10/20/11 Two clumps of sunflowers located on RR tracks south of 24-27. On east side of tracks across from the beaver pond, we will collect seeds and work with USFS to provide a site for them and the plants themselves.

3/28/13 Roberdo section of UWharrie NF was planted with six Helianthus schweinitzii individuals from the railroad site south of NC 24/27 (EO #28) as well as some previously collected seed from that subpopulation. The plants were moved under a BA written by USFS for sunflower management on Uwharrie. Seeds collected from the Stanly County NC 24/27 site were also sown EO (243).

4/15/13 Contract signed between USFS and NCDOT. DOT pays USFS and in return, USFS takes sunflowers from R-2527 and R-0623. **Transplants from Stanly County sunflower population will be taken by USFS closer to let date, after BA is completed.**

8/28/13 NCDOT paid USFS for sunflower mitigation contract.

2/20/14 Cheryl: changed status to "in progress" vs "complete" since Mary still coordinating with USFS on plant mitigation.

3/5/14 Remaining seeds from RR tracks planted USFS Roberdo site (Uwharrie NF) with Gary Kauffman.

6/17/14 Email from Gary Jordan: "Although it's ultimately up to the lead federal action agency to decide when to do formal consultation, I highly recommend not doing it until closer to the let date in this particular situation. If the first let date is 2019, then ideally, updated Schweinitz sunflower surveys would be conducted during the 2017 flowering season (late August - October). The BA could be written after that and the BO wrapped up sometime in early 2018....Putting formal consultation off until later would avoid replication of work and reduce costs."

R-2530B notes from warehouse

10/20/11 We will collect seeds for now and will attempt to work with Morrow Mtn State Park to provide a site for the seeds and the sunflower plants themselves.

Also to be impacted by the highway: a population of Georgia aster (EO 4?) on the south side of the highway. This species may be more rare than Schweinitz's sunflower and there is a multiple-agency effort underway to keep it off the endangered species list. NCDOT should do what it can to protect/preserve this population in a safe location.

AIR QUALITY REPORT

NC 24-27
from NC 740 in Albemarle to
the Proposed Troy Bypass (R-623), West of Troy

TIP Projects R-2530B, B-4974 and R-2527
WBS Elements 34446.1.6, 39922.1.1 and 35572.1.1

Stanly and Montgomery Counties

Prepared for:

North Carolina Department of Transportation
Project Development and Environmental Analysis Unit

Submitted by:

Human Environment Section
Traffic Noise & Air Quality Group

March 21, 2017

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Accepted By:

NCDOT Human Environment Section
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3-23-17
Date

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1. Introduction

The North Carolina Department of Transportation (NCDOT) proposes widening NC 24-27 from NC 740 in Albemarle located in Stanly County to the Proposed Troy Bypass (R-623), west of Troy in Montgomery County. TIP project R-2530B involves widening existing NC 24-27 from west of NC 740 to the Pee Dee River in Stanly County from a two to three-lane facility to a four-lane divided facility. R-2530B will include a 23-foot raised median from NC 740 to SR 1731 (Sweet Home Church Road) and transition to a 46-foot depressed median from east of SR 1731 to the Pee Dee River in Stanly County. Project R-2530B will also involve a superstreet design in the areas where curb and gutter is proposed. TIP project B-4974 involves rehabilitating existing Bridge No. 51 over the Pee Dee River on the Stanly / Montgomery County line. TIP project R-2527 involves widening existing NC 24-27 from a two-lane facility to a four-lane divided facility with a 46-foot depressed median from the Pee Dee River to the proposed Troy Bypass, west of Troy in Montgomery County. The total length of the proposed project is approximately 14.6 miles long (see Vicinity Map).

The needs to be addressed by the proposed project include improving transportation deficiencies along NC 24-27 in the project study area, replacing the bridge over the Pee Dee River which is structurally deficient and maintaining and improving the mobility and connectivity functions of the NC 24-27 corridor as part of the Strategic Highway Corridor Vision and the North Carolina Intrastate System. A federal Environmental Assessment (EA) is being prepared for this project.

The "Best Fit" alignment alternative was analyzed in the Environmental Assessment (EA) for projects R-2530B and R-2527. This alternative widens NC 24-27 at locations that "best fit" the current road location and surrounding land uses. "Best fit" locations were evaluated and selected to improve the existing road alignment, minimize impacts, and permit maintenance of traffic during construction. Two alternatives were analyzed in the EA for project B-4974. Alternative 1 consists of replacing Bridge No. 51 with a new bridge south of the existing bridges, and Alternative 4 consists of removing the National Register-Eligible Bridge No. 51 and replacing it with a new bridge along the existing roadway alignment.

On November 21, 2013, the Land Trust for Central North Carolina offered to take ownership of Bridge No. 51 once NC 24-27 was widened and a replacement bridge was constructed. On August 18, 2014, the Land Trust for Central North Carolina withdrew their offer due to the additional financial burden specified by state legislation.

A Bridge No. 51 Rehabilitation Alternative was developed for consideration since both B-4974, Alternatives 1 and 4 required removal of Bridge No. 51. This alternative proposed to keep part of the existing National Register-Eligible Bridge No. 51 intact, replace and widen the bridge deck, and rehabilitate the arch ribs and arch piers while preserving the historic and architectural character of the original structure. The rehabilitation alternative is preferred for improving Bridge No. 51.

2. Air Quality Analysis

Air pollution originates from various sources. Emissions from industry and internal combustion engines are the most prevalent sources. The impact resulting from highway

construction ranges from intensifying existing air pollution problems to improving the ambient air quality. Changing traffic patterns are a primary concern when determining the impact of a new highway facility or the improvement of an existing highway facility. Motor vehicles emit carbon monoxide (CO), nitrogen oxide (NO), hydrocarbons (HC), particulate matter, sulfur dioxide (SO_2), and lead (Pb) (listed in order of decreasing emission rate).

The Federal Clean Air Act of 1970 established the National Ambient Air Quality Standards (NAAQS). These were established in order to protect public health, safety, and welfare from known or anticipated effects of air pollutants. The NAAQS contain criteria for SO_2, particulate matter (PM_{10}, 10-micron and smaller, $PM_{2.5}$, 2.5 micron and smaller), CO, nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb). The National and North Carolina Ambient Air Quality Standards are presented in Table 1.

The primary pollutants from motor vehicles are unburned hydrocarbons (HC), Nitrogen oxides (NOx), CO, and particulates. HC and NOx can combine in a complex series of reactions catalyzed by sunlight to produce photochemical oxidants such as O3 and NO2. Because these reactions take place over a period of several hours, maximum concentrations of photochemical oxidants are often found far downwind of the precursor sources. These pollutants are regional problems.

Table 1. National and North Carolina Ambient Air Quality Standards (NAAQS)					
Pollutant		**Primary/ Secondary**	**Averaging Time**	**Level**	**Form**
Carbon Monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 μg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2)	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 μg/m^3	annual mean, averaged over 3 years
		secondary	1 year	15.0 μg/m^3	annual mean, averaged over 3 years
		primary and secondary	24 hours	35 μg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

(1) In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 μg/m3 as a calendar quarter average) also remain in effect.

(2) The level of the annual NO2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

(3) Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

(4) The previous SO2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2)any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous SO2 standards or is not meeting the requirements of a SIP call under the previous SO2 standards (40 CFR 50.4(3)), A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the require NAAQS.

Source: US EPA, https://www.epa.gov/criteria-air-pollutants/naaqs-table, accessed November 15, 2016.

3. Attainment Status

The proposed project is located in Stanly and Montgomery Counties, which have been determined to comply with the NAAQS. The proposed project is located in an attainment area; therefore, 40 CFR Parts 51 and 93 are not applicable. The proposed project is not anticipated to create any adverse effects on the air quality of this attainment area.

4. Carbon Monoxide

Automobiles are considered the major source of CO in the project area. In order to determine the ambient CO concentration at a receptor near a highway, two concentration components must be used: local and background. The local concentration is defined as the CO emissions from cars operating on highways in the near vicinity (i.e., distances within 400 feet) of the receptor location. The background concentration is defined by the North Carolina Department of Environmental Quality as "the concentration of a pollutant at a point that is the result of missions outside the local vicinity; that is, the concentration at the upwind edge of the local sources."

5. Ozone & Oxides

Automobiles are regarded as sources of HC and NOx. HC and NOx emitted from cars are carried into the atmosphere where they react with sunlight to form O_3 and NO_2. Automotive emissions of HC and NOx are expected to decrease in the future due to the continued installation and maintenance of pollution control devices on new cars. However, regarding area-wide emissions, these technological improvements may be offset by the increasing number of cars on the transportation facilities of the area.

The photochemical reactions that form O_3 and NO_2 require several hours to occur. For this reason, the peak levels of ozone generally occur ten to twenty kilometers downwind of the source of HC emissions. Urban areas as a whole are regarded as sources of HC, not individual streets and highways. The emissions of all sources in an urban area mix in the atmosphere, and, in the presence of sunlight, this mixture reacts to form O_3, NO_2, and other photochemical oxidants. The best example of this type of air pollution is the smog that forms in Los Angeles, California.

6. Particulate Matter & Sulfur

Automobiles are not regarded as significant sources of particulate matter (PM) and SO_2. Nationwide, highway sources account for less than seven percent of PM emissions and less than two percent of SO_2 emissions. PM and SO_2 emissions are predominantly the result of non-highway sources (e.g., industrial, commercial, and agricultural). Because emissions of PM and SO_2 from automobiles are very low, there is no reason to suspect that traffic on the proposed project will cause air quality standards for PM and SO_2 to exceed the NAAQS.

This project is within an attainment area for $PM_{2.5}$ and PM_{10} and does not include significant increases in diesel traffic. Therefore, no quantitative $PM_{2.5}$ or PM_{10} analysis is required.

7. Lead

Automobiles without catalytic converters can burn regular gasoline. The burning of regular gasoline emits lead as a result of regular gasoline containing tetraethyl lead, which is added by refineries to increase the octane rating of the fuel. Newer cars with catalytic converters burn unleaded gasoline, thereby eliminating lead emissions. Also, the United States Environmental Protection Agency (EPA) has required the reduction in the lead content of leaded gasoline. The overall average lead content of gasoline in 1974 was approximately 0.53 gram per liter. By 1989, this composite average had dropped to 0.003 gram per liter. The Clean Air Act Amendments of 1990 (CAAA) made the sale, supply, or transport of leaded gasoline or lead

additives unlawful after December 31, 1995. Because of these reasons, it is not expected that traffic on the proposed project will cause the NAAQS for lead to be exceeded.

8. Mobile Source Air Toxics (MSAT)

8.1. Background

Controlling air toxic emissions became a national priority with the passage of the CAAA, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants. The EPA assessed this expansive list in its rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007), and identified a group of 93 compounds emitted from mobile sources that are part of EPA's Integrated Risk Information System (IRIS).[1] In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the 2011 National Air Toxics Assessment (NATA).[2] These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority MSAT, the list is subject to change and may be adjusted in consideration of future EPA rules.

8.2. Motor Vehicle Emissions Simulator (MOVES)

According to EPA, MOVES2014 is a major revision to MOVES2010 and improves upon it in many respects. MOVES2014 includes new data, new emissions standards, and new functional improvements and features. It incorporates substantial new data for emissions, fleet, and activity developed since the release of MOVES2010. These new emissions data are for light- and heavy- duty vehicles, exhaust and evaporative emissions, and fuel effects. MOVES2014 also adds updated vehicle sales, population, age distribution, and vehicle miles travelled (VMT) data.

MOVES2014 incorporates the effects of three new Federal emissions standard rules not included in MOVES2010. These new standards are all expected to impact MSAT emissions and include Tier 3 emissions and fuel standards starting in 2017 (79 FR 60344), heavy-duty greenhouse gas regulations that phase in during model years 2014-2018 (79 FR 60344), and the second phase of light duty greenhouse gas regulations that phase in during model years 2017-2025 (79 FR 60344). Since the release of MOVES2014, EPA has released MOVES2014a. In the November 2015 MOVES2014a Questions and Answers Guide,[3] EPA states that for on-road emissions, MOVES2014a adds new options requested by users for the input of local VMT, includes minor updates to the default fuel tables, and corrects an error in MOVES2014 brake wear emissions. The change in brake wear emissions results in small decreases in PM emissions, while emissions for other criteria pollutants remain essentially the same as MOVES2014.

Using EPA's MOVES2014a model, as shown in Figure 1, FHWA estimates that even if VMT increases by 45 percent from 2010 to 2050 as forecast, a combined reduction of 91 percent in the total annual emissions for the priority MSAT is projected for the same time period.

[1] https://www.epa.gov/iris

[2] https://www.epa.gov/national-air-toxics-assessment

[3] https://www.epa.gov/moves/moves2014a-latest-version-motor-vehicle-emission-simulator-moves

Diesel PM is the dominant component of MSAT emissions, making up 50 to 70 percent of all priority MSAT pollutants by mass, depending on calendar year. Users of MOVES2014a will notice some differences in emissions compared with MOVES2010b. MOVES2014a is based on updated data on some emissions and pollutant processes compared to MOVES2010b, and also reflects the latest Federal emissions standards in place at the time of its release. In addition, MOVES2014a emissions forecasts are based on lower VMT projections than MOVES2010b, consistent with recent trends suggesting reduced nationwide VMT growth compared to historical trends.

8.3. MSAT Research

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA.

Nonetheless, air toxics concerns continue to arise on highway projects during the National Environmental Policy Act (NEPA) process. Even as the science emerges, the public and other agencies expect FHWA to address MSAT impacts in its environmental documents. The FHWA, EPA, the Health Effects Institute, and others have funded and conducted research studies to try to more clearly define potential risks from MSAT emissions associated with highway projects. The FHWA will continue to monitor the developing research in this field.

8.4. NEPA Context

The NEPA requires, to the fullest extent possible, that the policies, regulations, and laws of the Federal Government be interpreted and administered in accordance with its environmental protection goals, and that Federal agencies use an interdisciplinary approach in planning and decision-making for any action that adversely impacts the environment (42 U.S.C. 4332). In addition to evaluating the potential environmental effects, FHWA must also take into account the need for safe and efficient transportation in reaching a decision that is in the best overall public interest (23 U.S.C. 109(h)). The FHWA policies and procedures for implementing NEPA are contained in regulation at 23 CFR Part 771.

8.5. Consideration of MSAT in NEPA Documents

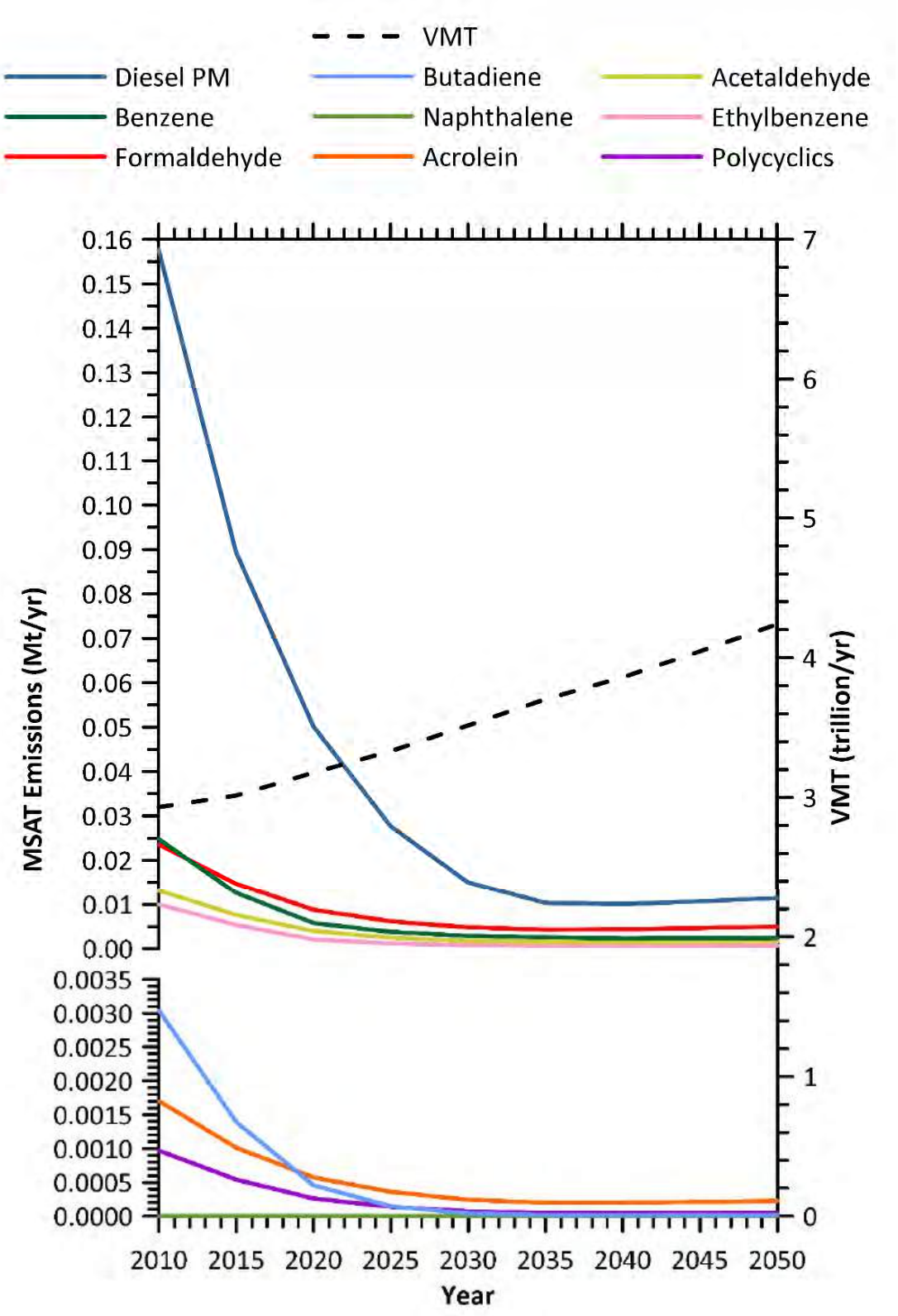
The FHWA developed a tiered approach with three categories for analyzing MSAT in NEPA documents, depending on specific project circumstances:

(1) No analysis for projects with no potential for meaningful MSAT effects;

(2) Qualitative analysis for projects with low potential MSAT effects; or

(3) Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

For projects warranting MSAT analysis, all nine priority MSAT should be considered.



Source: EPA MOVES2014a.

Figure 1. National MSAT Emission Trends 2010 - 2050 for Vehicles Operating on Roadways Using EPA's MOVES2014a Model

(1) Projects with No Meaningful Potential MSAT Effects, or Exempt Projects.

The types of projects included in this category are:

- Projects qualifying as a categorical exclusion under 23 CFR 771.117;
- Projects exempt under the Clean Air Act conformity rule under 40 CFR 93.126; and
- Other projects with no meaningful impacts on traffic volumes or vehicle mix.

For projects that are categorically excluded under 23 CFR 771.117, or are exempt from conformity requirements under the Clean Air Act pursuant to 40 CFR 93.126, no analysis or discussion of MSAT is necessary. Documentation sufficient to demonstrate that the project qualifies as a categorical exclusion and/or exempt project will suffice. For other projects with no or negligible traffic impacts, regardless of the class of NEPA environmental document, no MSAT analysis is recommended. However, the project record should document the basis for the determination of no meaningful potential impacts with a brief description of the factors considered.

(2) Projects with Low Potential MSAT Effects

The types of projects included in this category are those that serve to improve operations of highway, transit, or freight without adding substantial new capacity or without creating a facility that is likely to meaningfully increase MSAT emissions. This category covers a broad range of projects.

FHWA anticipates that most highway projects that need an MSAT assessment will fall into this category. Examples of these types of projects are minor widening projects; new interchanges; replacing a signalized intersection on a surface street; and projects where design year traffic is projected to be less than 140,000 to 150,000 annual average daily traffic (AADT).

For these projects, a qualitative assessment of emissions projections should be conducted. This qualitative assessment should compare, in narrative form, the expected effect of the project on traffic volumes, vehicle mix, or routing of traffic and the associated changes in MSAT for the project alternatives, including no-build, based on VMT, vehicle mix, and speed. It should also discuss national trend data projecting substantial overall reductions in emissions due to stricter engine and fuel regulations issued by EPA. Because the emission effects of these projects typically are low, we expect there would be no appreciable difference in overall MSAT emissions among the various alternatives.

In addition to the qualitative assessment, a NEPA document for this category of projects must include a discussion of information that is incomplete or unavailable for a project specific assessment of MSAT impacts, in compliance with the Council on Environmental Quality (CEQ) regulations (40 CFR 1502.22(b)). This discussion should explain how current scientific techniques, tools, and data are not sufficient to accurately estimate human health impacts that could result from a transportation project in a way that would be useful to decision-makers. Also in compliance with 40 CFR 150.22(b), this discussion should contain information regarding the health impacts of MSAT.

(3) Projects with Higher Potential MSAT Effects

This category includes projects that have the potential for meaningful differences in MSAT emissions among project alternatives. FHWA expects a limited number of projects to meet this two-pronged test. To fall into this category, a project should:

- Create or significantly alter a major intermodal freight facility that has the potential to concentrate high levels of diesel PM in a single location, involving a significant number of diesel vehicles for new projects or accommodating with a significant increase in the number of diesel vehicles for expansion projects; or
- Create new capacity or add significant capacity to urban highways such as Interstates, urban arterials, or urban collector-distributor routes with traffic volumes where the AADT is projected to be in the range of 140,000 to 150,000[4] or greater by the design year;

And also

- Be proposed to be located in proximity to populated areas.

Projects falling within this category should be more rigorously assessed for impacts. If a project falls within this category, the project sponsor should contact the Office of Natural Environment (HEPN) and the Office of Project Development and Environmental Review (HEPE) in FHWA Headquarters for assistance in developing a specific approach for assessing impacts. This approach would include a quantitative analysis to forecast local-specific emission trends of the priority MSAT for each alternative, to use as a basis of comparison. This analysis also may address the potential for cumulative impacts, where appropriate, based on local conditions. How and when cumulative impacts should be considered would be addressed as part of the assistance outlined above.

If the analysis for a project in this category indicates meaningful differences in levels of MSAT emissions among alternatives, mitigation options should be identified and considered.

The project sponsor should also consult with HEPN and HEPE if a project does not fall within any of the types of projects listed in Category (3) above, but may have the potential to substantially increase future MSAT emissions.

Projects R-2530B, B-4974 and R-2527 fall under Category (1) because the projects have no meaningful impact on traffic volumes or vehicle mix. The project's Design Year traffic ranges from 10,500 to 20,500 vehicles per day (VPD) along NC 24-27 under both the No-Build and Build conditions.

The purpose of this project is to improve transportation deficiencies along NC 24-27 in the project study area, rehabilitate the bridge over the Pee Dee River which is structurally deficient and maintaining and improving the mobility and connectivity functions of the NC 24-27 corridor as part of the Strategic Highway Corridor Vision and the North Carolina Intrastate System by widening NC 24-27 to a four lane divided facility and rehabilitating Bridge No. 51 over the Pee Dee River. This project has been determined to generate minimal

[4] Using EPA's MOVES2014a emissions model, FHWA determined that this range of AADT would result in emissions significantly lower than the Clean Air Act definition of a major hazardous air pollutant (HAP) source, i.e., 25 tons/yr. for all HAPs or 10 tons/yr. for any single HAP. Variations in conditions such as congestion or vehicle mix could warrant a different range for AADT.

air quality impacts for Clean Air Act criteria pollutants and has not been linked with any special mobile source air toxic (MSAT) concerns. As such, this project will not result in changes in traffic volumes, vehicle mix, basic project location, or any other factor that would cause a meaningful increase in MSAT impacts of the project from that of the no-build alternative.

Moreover, Environmental Protection Agency (EPA) regulations for vehicle engines and fuels will cause overall MSAT emissions to decline significantly over the next several decades. Based on regulations now in effect, an analysis of national trends with EPA's MOVES2014 model forecasts a combined reduction of over 90 percent in the total annual emissions rate for the priority MSAT from 2010 to 2050 while vehicle-miles of travel are projected to increase by over 45 percent (Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents, Federal Highway Administration, October 12, 2016). This will both reduce the background level of MSAT as well as the possibility of even minor MSAT emissions from this project.

9. Construction Air Quality

Air Quality impacts resulting from roadway construction activities are typically not a concern when contractors utilize appropriate control measures. During construction of the proposed project, all materials resulting from clearing and grubbing, demolition or other operations will be removed from the project, burned or otherwise disposed of by the Contractor. Any burning done will be done in accordance with applicable local laws and ordinances and regulations of the North Carolina State Implementation Plan (SIP) for air quality in compliance with 15A NCAC 2D.1903. Care will be taken to ensure burning will be done at the greatest distance practical from dwellings and not when atmospheric conditions are such as to create a hazard to the public. Operational agreements that reduce or redirect work or shift times to avoid community exposures can have positive benefits. Burning will be performed under constant surveillance.

During construction, measures will be taken to reduce the dust generated by construction, by wet suppression or equivalent, when the control of dust is necessary for the protection and comfort of motorists or area residents.

10. Summary

Vehicles are a major contributor to decreased air quality because they emit a variety of pollutants into the air. Changing traffic patterns are a primary concern when determining the impact of a new highway facility or the improvement of an existing highway facility. New highways or the widening of existing highways increase localized levels of vehicle emissions, but these increases could be offset due to increases in speeds from reductions in congestion and because vehicle emissions will decrease in areas where traffic shifts to the new roadway. Significant progress has been made in reducing criteria pollutant emissions from motor vehicles and improving air quality, even as vehicle travel has increased rapidly.

The proposed project is located in Stanly and Montgomery Counties, which comply with the NAAQS. Therefore, the project is not anticipated to create any adverse effects on the air quality of this attainment area. This evaluation completes the assessment requirements for air quality of the 1990 Clean Air Act Amendments and the NEPA process. No additional reports are necessary.

ALBEMARLE

YADKIN RIVER

MORROW MOUNTAIN STATE PARK

PEE DEE RIVER

UWHARRIE NATIONAL FOREST

TROY

PROJECT LIMITS

PROJECT LIMITS

R-2530B

R-2527

B-4974

SR 1803

SR 740

SR 1531

SR 1731

SR 1734

SR 1720

SR 1736

SR 1739

SR 1818

SR 1778

SR 1740

SR 1150

SR 1134

SR 1137

SR 1138

SR 1550

WINSTON-SALEM SOUTHBOUND RAILWAY

STANLY CO.

MONTGOMERY CO.

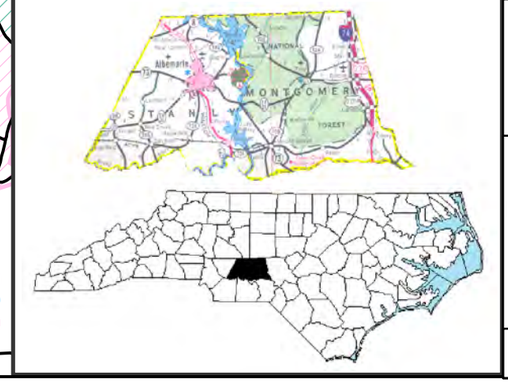
LAKE TILLERY

ABERDEEN CAROLINA

Legend

- TIP Project B-4974
- TIP PROJECT R-2530B
- TIP PROJECT R-2527
- ALBEMARLE AND TROY CITY LIMITS
- COUNTY BOUNDARY
- WATER SUPPLY WATERSHED
- HIGH QUALITY OUTSTANDING WATER RESOURCES
- PEE DEE RIVER AND LAKE TILLERY
- STATE PARKS
- UWHARRIE NATIONAL FOREST

0 3,000 6,000 12,000 Feet



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS BRANCH

NC 24-27
FROM NC 740 IN ALBEMARLE IN STANLY COUNTY TO TROY BYPASS IN MONTGOMERY COUNTY
STANLY-MONTGOMERY COUNTIES
TIP PROJECTS R-2527, R-2530B & B-4974

VICINITY MAP