STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

April 23, 2004

Raleigh Regulatory Field Office
US Army Corps of Engineers
6508 Falls of the Neuse Road/Suite 120
Raleigh, North Carolina 27615-6814

ATTENTION: Mr. Eric Alsmeyer
Regulatory Specialist

Dear Sir:

SUBJECT: **Nationwide Permit Application 23 and 33** for the proposed replacement of Bridge No. 119 over Prong of Mud Creek in Durham County, Division 5. Federal Project No. BRSTP-1306(4), State Project No. 8.2352901, T.I.P. No. B-3451.

Please find enclosed three copies of the Categorical Exclusion document for the above referenced project, along with a PCN form, project site map, permit drawings, and roadway design plan sheets. Bridge No. 119 will be replaced on existing location with a longer bridge. The replacement structure will be approximately 110 feet in length and will have a deck width of 42 feet. This will provide for two 12-foot travel lanes with 9-foot shoulders. During construction traffic will be detoured along existing area roads.

PROPOSED IMPACTS

Since the replacement bridge is a spanning structure, no permanent impacts are proposed to Mud Creek (DWQ Index No. 16-41-1-10) Class C NSW. However, the construction of the bridge will require the use of temporary rock causeways consisting of Class II Rip Rap with 1.5:1 slopes (see permit drawing sheets 6 – 8 of 10). The resulting temporary surface water fill will be 0.003 acre. Reference elevations are available for the area of proposed placement of the rock causeways. Impacts to jurisdictional wetlands are anticipated. Proposed impacts include 0.161 acre of permanent fill in wetlands, 0.014 acre of temporary fill in wetlands, and 0.024 acre of mechanized clearing (Method II) in wetlands. Note: this project is located within the Cape Fear River Basin HUC 03030002, therefore riparian buffer rules are not applicable.

MAILING ADDRESS:
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1548 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-733-3141
FAX: 919-733-9794
WEBSITE: WWW.NCDOT.ORG

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH, NC

BRIDGE DEMOLITION

The superstructure of Bridge No. 119 consists of fifteen lines of steel I-beams with a timber deck, and an asphalt wearing surface. The substructure consists of timber caps and piles. Best Management Practices for Bridge Demolition and Removal will be followed to avoid any temporary fill from entering Waters of the United States.

RESTORATION PLAN

The project schedule calls for a let date of September 21, 2004 with an estimated date of availability of approximately 41 days later. It is expected that the contractor will choose to start construction of the rock causeways shortly after that date. The temporary surface water fill resulting from the construction of the causeways will probably be in place for less than twelve (12) months. After the temporary causeways are no longer needed, the contractor will use excavating equipment to remove all material within jurisdictional areas. All material will become the property of the contractor. The contractor will be required to submit a reclamation plan for removal of and disposal of all material off-site.

FEDERALLY-PROTECTED SPECIES

As of January 29, 2003 the U.S. Fish and Wildlife Service (USFWS) lists three federally protected species for Durham County: bald eagle, smooth coneflower, and Michaux's sumac. No species have been added to or deleted from this list since the completion of the Categorical exclusion document where descriptions and biological conclusions of "No Effect" were given for each species. A re-survey of the project site was conducted by NCDOT biologists on July 31, 2002 and no listed specimens were observed (see attached August 2002 re-survey memo). The biological conclusions for these species remain valid.

MITIGATION OPTIONS

The Corps of Engineers has adopted, through the Council on Environmental Quality (CEQ), a wetland mitigation policy that embraces the concept of "no net loss of wetlands" and sequencing. The purpose of this policy is to restore and maintain the chemical, biological, and physical integrity of the Waters of the United States. Mitigation of wetland and surface water impacts has been defined by the CEQ to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time and compensating for impacts (40 CFR 1508.20). Executive Order 11990 (Protection of Wetlands) and Department of Transportation Order 5660.1A (Preservation of the Nations Wetlands), emphasize protection of the functions and values provided by wetlands. These directives require that new construction in wetlands be avoided as much as possible and that all practicable measures are taken to minimize or mitigate impacts to wetlands.

AVOIDANCE AND MINIMIZATION: 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; minimization measures were incorporated as part of the project design.

> **Jurisdictional impacts were minimized and avoided by proposing to replace Bridge No. 119 with a bridge. Also this bridge will be replaced on existing alignment. During construction the road will be closed and an off-site detour will be used instead using an onsite detour.**

COMPENSATION: The primary emphasis of the compensatory mitigation is to reestablish a condition that would have existed if the project were not built. As previously stated, mitigation is limited to reasonable expenditures and practicable considerations related to highway operation. Mitigation is generally accomplished through a combination of methods designed to replace wetland functions and values lost as a result of construction of the project. These methods consist of creation of new wetlands from uplands, borrow pits, and other non-wetland areas; restoration of wetlands; and enhancement of existing wetlands. Where such options may not be available, or when existing wetlands and wetland-surface water complexes are considered to be important resources worthy of preservation, consideration is given to preservation as at least one component of a compensatory mitigation proposal.

FHWA STEP DOWN COMPLIANCE: All compensatory mitigation must be in compliance with 23 CFR Part 777.9, "Mitigation of Impacts" that describes the actions that should be followed to qualify for Federal-aid highway funding. This process is known as the FHWA "Step Down" procedures:

1. Consideration must be given to mitigation within the right-of-way and should include the enhancement of existing wetlands and the creation of new wetlands in the highway median, borrow pit areas, interchange areas and along the roadside.

2. Where mitigation within the right-of-way does not fully offset wetland losses, compensatory mitigation may be conducted outside the right-of-way including enhancement, creation, and preservation.

Based upon the agreements stipulated in the "Memorandum of Agreement Among the North Carolina Department of Environment and Natural Resources, the North Carolina Department of Transportation, and the U.S. Army Corps of Engineers, Wilmington District" (MOA), it is understood that the North Carolina Department of Environment and Natural Resources Ecosystem Enhancement Program (EEP), will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for NCDOT projects that are listed in Exhibit 1 of the subject MOA during the EEP transition period which ends on June 30, 2005.

Since the subject project is listed in Exhibit 1, the necessary compensatory mitigation to offset unavoidable impacts to waters that are jurisdictional under the federal Clean Water Act will be provided by the EEP. The offsetting mitigation will derive from an inventory of assets already in existence within the same 8-digit cataloguing unit. The Department has avoided and minimized impacts to jurisdictional resources to the greatest extent possible as described above.

The remaining, unavoidable impacts to 0.199 acre of jurisdictional wetlands will be offset by compensatory mitigation provided by the EEP program.

REGULATORY APPROVALS

It is anticipated that the construction of causeway will be authorized under Section 404 Nationwide Permit 33. We are, therefore, requesting the issuance of a Nationwide Permit 33 for these activities. All other aspects of this project are being processed by the Federal Highway Administration as a "Categorical Exclusion" in accordance with 23 CFR § 771.115(b). The NCDOT requests that these activities be authorized by a Nationwide Permit 23 (FR number 10, pages 2020-2095; January 15, 2002). We anticipate 401 General Certifications numbers 3403 and 3366 will apply to this project. In accordance with 15A NCAC 2H .0501(a) we are providing two copies of this application to the North Carolina Department of Environment and Natural Resources, Division of Water Quality, for their records.

Thank you for your assistance with this project. If you have any questions or need additional information please call Ms. ~~Heather Montague~~ Carla Dagnino at (919) 715-1456.

Sincerely,

Gregory J. Thorpe, Ph.D.
Environmental Management Director, PDEA

w/attachment
- Mr. John Dorney, Division of Water Quality
- Mr. Travis Wilson, NCWRC
- Mr. Gary Jordan, USFWS
- Mr. Greg Perfetti, P.E., Structure Design

w/o attachment
- Mr. David Franklin, USACE, Wilmington
- Mr. Jay Bennett, P.E., Roadway Design
- Mr. Omar Sultan, Programming and TIP
- Ms. Debbie Barbour, P.E., Highway Design
- Mr. David Chang, P.E., Hydraulics
- Mr. Mark Staley, Roadside Environmental
- Mr. Jon Nance, P.E., Division 5 Engineer
- Mr. Chris Murray, Division 5 DEO
- Ms. Stacy Harris, P.E., PD&EA Engineer

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
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LYNDO TIPPETT
SECRETARY

August 6, 2002

MEMORANDUM TO: Stacy B. Harris, P.E., Unit Head
Consultant Engineer Unit

FROM: Heather W. Montague, Natural Systems Specialist HWM
Office of the Natural Environment

SUBJECT: Protected Species Re-Survey for the proposed replacement of Bridge No. 119 on SR 1306 over a prong of Mud Creek, Durham County. Federal-Aid Project No. BRSTP-1306(4), State Project No. 8.2352901; TIP No. B-3451.

This memo serves to document a protected species survey for TIP project No. B-3451. On July 31, 2002; NCDOT biologist Heather Montague and Alexis Baker surveyed the project area for the presence of smooth coneflower (*Echinacea laevigata*) and Michaux's sumac (*Rhus michauxii*). A plant by plant survey was conducted in all areas along the project alignment containing potential habitat for these species and no specimens were found. Additionally, a review of the Natural Heritage Program database (last updated on May 5, 2002) revealed no known occurrences of smooth coneflower or Michaux's sumac within 1.0 mile (1.6 km) of the project study area. Therefore, the biological conclusions of 'No Effect' remain valid for these species.

cc: File: B-3451

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1548 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-733-3141
FAX: 919-733-9794

WEBSITE: WWW.NCDOT.ORG

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

Office Use Only: Form Version May 2002

USACE Action ID No. _____ **DWQ No.** _____

(If any particular item is not applicable to this project, please enter "Not Applicable" or "N/A".)

I. Processing

1. Check all of the approval(s) requested for this project:
   - ☒ Section 404 Permit
   - ☐ Section 10 Permit
   - ☐ 401 Water Quality Certification
   - ☐ Riparian or Watershed Buffer Rules
   - ☐ Isolated Wetland Permit from DWQ

2. Nationwide, Regional or General Permit Number(s) Requested: NW 23 and 33

3. If this notification is solely a courtesy copy because written approval for the 401 Certification is not required, check here: ☒

4. If payment into the North Carolina Wetlands Restoration Program (NCWRP) is proposed for mitigation of impacts (verify availability with NCWRP prior to submittal of PCN), complete section VIII and check here: ☐

5. If your project is located in any of North Carolina's twenty coastal counties (listed on page 4), and the project is within a North Carolina Division of Coastal Management Area of Environmental Concern (see the top of page 2 for further details), check here: ☐

II. Applicant Information

1. Owner/Applicant Information
   Name: NCDOT Project Development & Environmental Analysis Branch
   Mailing Address: North Carolina Department of Transportation
   Project Dev & Environmental Analysis Branch
   Attention: Gregory J. Thorpe, Ph.D.
   1548 Mail Service Center
   Raleigh, NC 27699-1548
   Telephone Number: (919) 733-3141 Fax Number: (919) 733-9747
   E-mail Address: _____

2. Agent/Consultant Information (A signed and dated copy of the Agent Authorization letter must be attached if the Agent has signatory authority for the owner/applicant.)
   Name: _____
   Company Affiliation: _____
   Mailing Address: _____
   _____
   _____
   _____
   Telephone Number: _____ Fax Number: _____
   E-mail Address: _____

III. Project Information

Attach a **vicinity map** clearly showing the location of the property with respect to local landmarks such as towns, rivers, and roads. Also provide a detailed **site plan** showing property boundaries and development plans in relation to surrounding properties. Both the vicinity map and site plan must include a scale and north arrow. The specific footprints of all buildings, impervious surfaces, or other facilities must be included. If possible, the maps and plans should include the appropriate USGS Topographic Quad Map and NRCS Soil Survey with the property boundaries outlined. Plan drawings, or other maps may be included at the applicant's discretion, so long as the property is clearly defined. For administrative and distribution purposes, the USACE requires information to be submitted on sheets no larger than 11 by 17-inch format; however, DWQ may accept paperwork of any size. DWQ prefers full-size construction drawings rather than a sequential sheet version of the full-size plans. If full-size plans are reduced to a small scale such that the final version is illegible, the applicant will be informed that the project has been placed on hold until decipherable maps are provided.

1. Name of project: Bridge 119 over Mud Creek on SR 1306

2. T.I.P. Project Number or State Project Number (NCDOT Only): B-3541

3. Property Identification Number (Tax PIN): N/A

4. Location
   County: Durham Nearest Town: Durham
   Subdivision name (include phase/lot number):
   Directions to site (include road numbers, landmarks, etc.): from I-40 WB take exit 270 (15-501) north towards Durham. Stay with 15 BYP-501 BUS. Take the Cornwallis Road Exit, head West- away from town, then make a right onto Erwin Road (SR 1306).

5. Site coordinates, if available (UTM or Lat/Long): 35° 59' 48"N, 78° 58' 16"W
   (Note – If project is linear, such as a road or utility line, attach a sheet that separately lists the coordinates for each crossing of a distinct waterbody.)

6. Property size (acres): approximately 1.6 acres within fill limits

7. Nearest body of water (stream/river/sound/ocean/lake): Mud Creek

8. River Basin: Cape Fear
   (Note – this must be one of North Carolina's seventeen designated major river basins. The River Basin map is available at http://h2o.enr.state.nc.us/admin/maps/.)

9. Describe the existing conditions on the site and general land use in the vicinity of the project at the time of this application: Existing land uses include maintained and forested communities. The area has a mixture of residential and woodland landuse. SR 1306 (Erwin Road) runs through the project with Bridge No. 119 serving residential uses

10. Describe the overall project in detail, including the type of equipment to be used: Bridge No. 119 will be replaced on existing location with a new bridge using heavy duty construction equipment.

11. Explain the purpose of the proposed work: To replace inadequate bridge.

IV. Prior Project History

If jurisdictional determinations and/or permits have been requested and/or obtained for this project (including all prior phases of the same subdivision) in the past, please explain. Include the USACE Action ID Number, DWQ Project Number, application date, and date permits and certifications were issued or withdrawn. Provide photocopies of previously issued permits, certifications or other useful information. Describe previously approved wetland, stream and buffer impacts, along with associated mitigation (where applicable). If this is a NCDOT project, list and describe permits issued for prior segments of the same T.I.P. project, along with construction schedules.

N/A

V. Future Project Plans

Are any future permit requests anticipated for this project? If so, describe the anticipated work, and provide justification for the exclusion of this work from the current application.

N/A

VI. Proposed Impacts to Waters of the United States/Waters of the State

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to wetlands, open water, and stream channels associated with the project. The applicant must also provide justification for these impacts in Section VII below. All proposed impacts, permanent and temporary, must be listed herein, and must be clearly identifiable on an accompanying site

plan. All wetlands and waters, and all streams (intermittent and perennial) must be shown on a delineation map, whether or not impacts are proposed to these systems. Wetland and stream evaluation and delineation forms should be included as appropriate. Photographs may be included at the applicant's discretion. If this proposed impact is strictly for wetland or stream mitigation, list and describe the impact in Section VIII below. If additional space is needed for listing or description, please attach a separate sheet.

1. Provide a written description of the proposed impacts: temporary surface water fill will result from the use of rock causeways.

2. Individually list wetland impacts below:

Wetland Impact Site Number (indicate on map)	Type of Impact*	Area of Impact (acres)	Located within 100-year Floodplain** (yes/no)	Distance to Nearest Stream (linear feet)	Type of Wetland***
Site 1	Perm fill	0.161	yes	Adj. to Mud Creek	Bald Cypress Swamp
Site 1	Temp fill	0.014	yes	Adj. to Mud Creek	Bald Cypress Swamp
Site 1	Mech clearing	0.024	yes	Adj. to Mud Creek	Bald Cypress Swamp

* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: mechanized clearing, grading, fill, excavation, flooding, ditching/drainage, etc. For dams, separately list impacts due to both structure and flooding.

** 100-Year floodplains are identified through the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRM), or FEMA-approved local floodplain maps. Maps are available through the FEMA Map Service Center at 1-800-358-9616, or online at http://www.fema.gov.

*** List a wetland type that best describes wetland to be impacted (e.g., freshwater/saltwater marsh, forested wetland, beaver pond, Carolina Bay, bog, etc.) Indicate if wetland is isolated (determination of isolation to be made by USACE only).

List the total acreage (estimated) of all existing wetlands on the property: 0.4 ac
Total area of wetland impact proposed: 0.199 ac

3. Individually list all intermittent and perennial stream impacts below:

Stream Impact Site Number (indicate on map)	Type of Impact*	Length of Impact (linear feet)	Stream Name**	Average Width of Stream Before Impact	Perennial or Intermittent? (please specify)
temp causeways	rip-rap	0.003	Mud Creek	20 ft	perennial

* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: culverts and associated rip-rap, dams (separately list impacts due to both structure and flooding), relocation (include linear feet before and after, and net loss/gain),

stabilization activities (cement wall, rip-rap, crib wall, gabions, etc.), excavation, ditching/straightening, etc. If stream relocation is proposed, plans and profiles showing the linear footprint for both the original and relocated streams must be included.

** Stream names can be found on USGS topographic maps. If a stream has no name, list as UT (unnamed tributary) to the nearest downstream named stream into which it flows. USGS maps are available through the USGS at 1-800-358-9616, or online at www.usgs.gov. Several internet sites also allow direct download and printing of USGS maps (e.g., www.topozone.com, www.mapquest.com, etc.).

Cumulative impacts (linear distance in feet) to all streams on site: 0.003 acre

4. Individually list all open water impacts (including lakes, ponds, estuaries, sounds, Atlantic Ocean and any other water of the U.S.) below:

Open Water Impact Site Number (indicate on map)	Type of Impact*	Area of Impact (acres)	Name of Waterbody (if applicable)	Type of Waterbody (lake, pond, estuary, sound, bay, ocean, etc.)
N/A	N/A	N/A	N/A	N/A

* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: fill, excavation, dredging, flooding, drainage, bulkheads, etc.

5. Pond Creation

If construction of a pond is proposed, associated wetland and stream impacts should be included above in the wetland and stream impact sections. Also, the proposed pond should be described here and illustrated on any maps included with this application.

Pond to be created in (check all that apply): ☐ uplands ☐ stream ☐ wetlands

Describe the method of construction (e.g., dam/embankment, excavation, installation of draw-down valve or spillway, etc.): N/A

Proposed use or purpose of pond (e.g., livestock watering, irrigation, aesthetic, trout pond, local stormwater requirement, etc.): N/A

Size of watershed draining to pond: N/A Expected pond surface area: N/A

VII. Impact Justification (Avoidance and Minimization)

Specifically describe measures taken to avoid the proposed impacts. It may be useful to provide information related to site constraints such as topography, building ordinances, accessibility, and financial viability of the project. The applicant may attach drawings of alternative, lower-impact site layouts, and explain why these design options were not feasible. Also discuss how impacts were minimized once the desired site plan was developed. If applicable, discuss construction techniques to be followed during construction to reduce impacts.

Jurisdictional impacts were minimized and avoided by proposing to replace Bridge No. 119 with a bridge. Also this bridge will be replaced on existing alignment. During construction the road will be closed and an off-site detour will be used instead using an onsite detour.

VIII. Mitigation

DWQ - In accordance with 15A NCAC 2H .0500, mitigation may be required by the NC Division of Water Quality for projects involving greater than or equal to one acre of impacts to freshwater wetlands or greater than or equal to 150 linear feet of total impacts to perennial streams.

USACE – In accordance with the Final Notice of Issuance and Modification of Nationwide Permits, published in the Federal Register on March 9, 2000, mitigation will be required when necessary to ensure that adverse effects to the aquatic environment are minimal. Factors including size and type of proposed impact and function and relative value of the impacted aquatic resource will be considered in determining acceptability of appropriate and practicable mitigation as proposed. Examples of mitigation that may be appropriate and practicable include, but are not limited to: reducing the size of the project; establishing and maintaining wetland and/or upland vegetated buffers to protect open waters such as streams; and replacing losses of aquatic resource functions and values by creating, restoring, enhancing, or preserving similar functions and values, preferable in the same watershed.

If mitigation is required for this project, a copy of the mitigation plan must be attached in order for USACE or DWQ to consider the application complete for processing. Any application lacking a required mitigation plan or NCWRP concurrence shall be placed on hold as incomplete. An applicant may also choose to review the current guidelines for stream restoration in DWQ's Draft Technical Guide for Stream Work in North Carolina, available at http://h2o.enr.state.nc.us/ncwetlands/strmgide.html.

1. Provide a brief description of the proposed mitigation plan. The description should provide as much information as possible, including, but not limited to: site location (attach directions and/or map, if offsite), affected stream and river basin, type and amount (acreage/linear feet) of mitigation proposed (restoration, enhancement, creation, or preservation), a plan view, preservation mechanism (e.g., deed restrictions, conservation easement, etc.), and a description of the current site conditions and proposed method of construction. Please attach a separate sheet if more space is needed.
   Ecosystem Enhancement Program (EEP)

2. Mitigation may also be made by payment into the North Carolina Wetlands Restoration Program (NCWRP). Please note it is the applicant's responsibility to contact the NCWRP at (919) 733-5208 to determine availability and to request written approval of mitigation prior to submittal of a PCN. For additional information regarding the application process for the NCWRP, check the NCWRP website at http://h2o.enr.state.nc.us/wrp/index.htm. If use of the NCWRP is proposed, please check the appropriate box on page three and provide the following information:
   Amount of stream mitigation requested (linear feet): N/A
   Amount of buffer mitigation requested (square feet): N/A
   Amount of Riparian wetland mitigation requested (acres): N/A
   Amount of Non-riparian wetland mitigation requested (acres): N/A
   Amount of Coastal wetland mitigation requested (acres): N/A

IX. Environmental Documentation (required by DWQ)

Does the project involve an expenditure of public (federal/state) funds or the use of public (federal/state) land?

Yes ☒ No ☐

If yes, does the project require preparation of an environmental document pursuant to the requirements of the National or North Carolina Environmental Policy Act (NEPA/SEPA)? Note: If you are not sure whether a NEPA/SEPA document is required, call the SEPA coordinator at (919) 733-5083 to review current thresholds for environmental documentation.

Yes ☒ No ☐

If yes, has the document review been finalized by the State Clearinghouse? If so, please attach a copy of the NEPA or SEPA final approval letter.

Yes ☒ No ☐

X. Proposed Impacts on Riparian and Watershed Buffers (required by DWQ)

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to required state and local buffers associated with the project. The applicant must also provide justification for these impacts in Section VII above. All proposed impacts must be listed herein, and must be clearly identifiable on the accompanying site plan. All buffers must be shown on a map, whether or not impacts are proposed to the buffers. Correspondence from the DWQ Regional Office may be included as appropriate. Photographs may also be included at the applicant's discretion.

Will the project impact protected riparian buffers identified within 15A NCAC 2B .0233 (Neuse), 15A NCAC 2B .0259 (Tar-Pamlico), 15A NCAC 2B .0250 (Randleman Rules and Water Supply Buffer Requirements), or other (please identify_____)?

Yes ☐ No ☒ If you answered "yes", provide the following information:

Identify the square feet and acreage of impact to each zone of the riparian buffers. If buffer mitigation is required calculate the required amount of mitigation by applying the buffer multipliers.

Zone*	Impact (square feet)	Multiplier	Required Mitigation
1		3	
2		1.5	
Total			

* Zone 1 extends out 30 feet perpendicular from near bank of channel; Zone 2 extends an additional 20 feet from the edge of Zone 1.

If buffer mitigation is required, please discuss what type of mitigation is proposed (i.e., Donation of Property, Conservation Easement, Riparian Buffer Restoration / Enhancement, Preservation or Payment into the Riparian Buffer Restoration Fund). Please attach all appropriate information as identified within 15A NCAC 2B .0242 or .0260.

N/A

XI. Stormwater (required by DWQ)

Describe impervious acreage (both existing and proposed) versus total acreage on the site. Discuss stormwater controls proposed in order to protect surface waters and wetlands downstream from the property.

The guidelines for the NCDOT's "Best Management Practices for the Protection of Sensitive Watersheds" will be followed. These include minimizing the project footprint and diverting stormwater away from surface water supply waters as much as possible. Provisions to preclude contamination by toxic substances during the construction interval will also be strictly enforced

XII. Sewage Disposal (required by DWQ)

Clearly detail the ultimate treatment methods and disposition (non-discharge or discharge) of wastewater generated from the proposed project, or available capacity of the subject facility.

N/A

XIII. Violations (required by DWQ)

Is this site in violation of DWQ Wetland Rules (15A NCAC 2H .0500) or any Buffer Rules?

Yes ☐ No ☒

Is this an after-the-fact permit application?

Yes ☐ No ☒

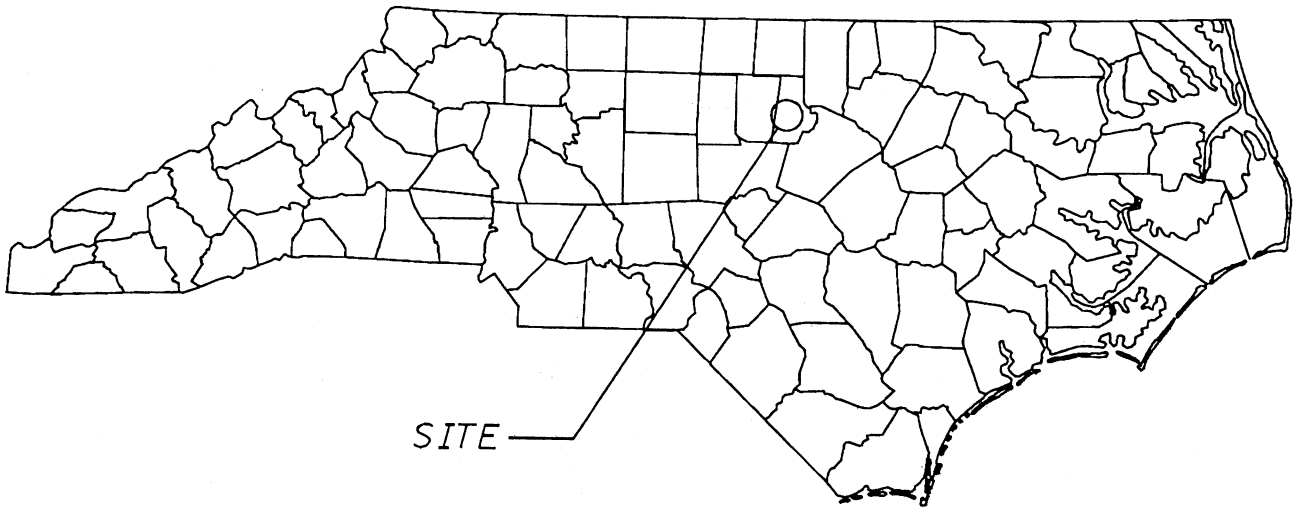
XIV. Other Circumstances (Optional):

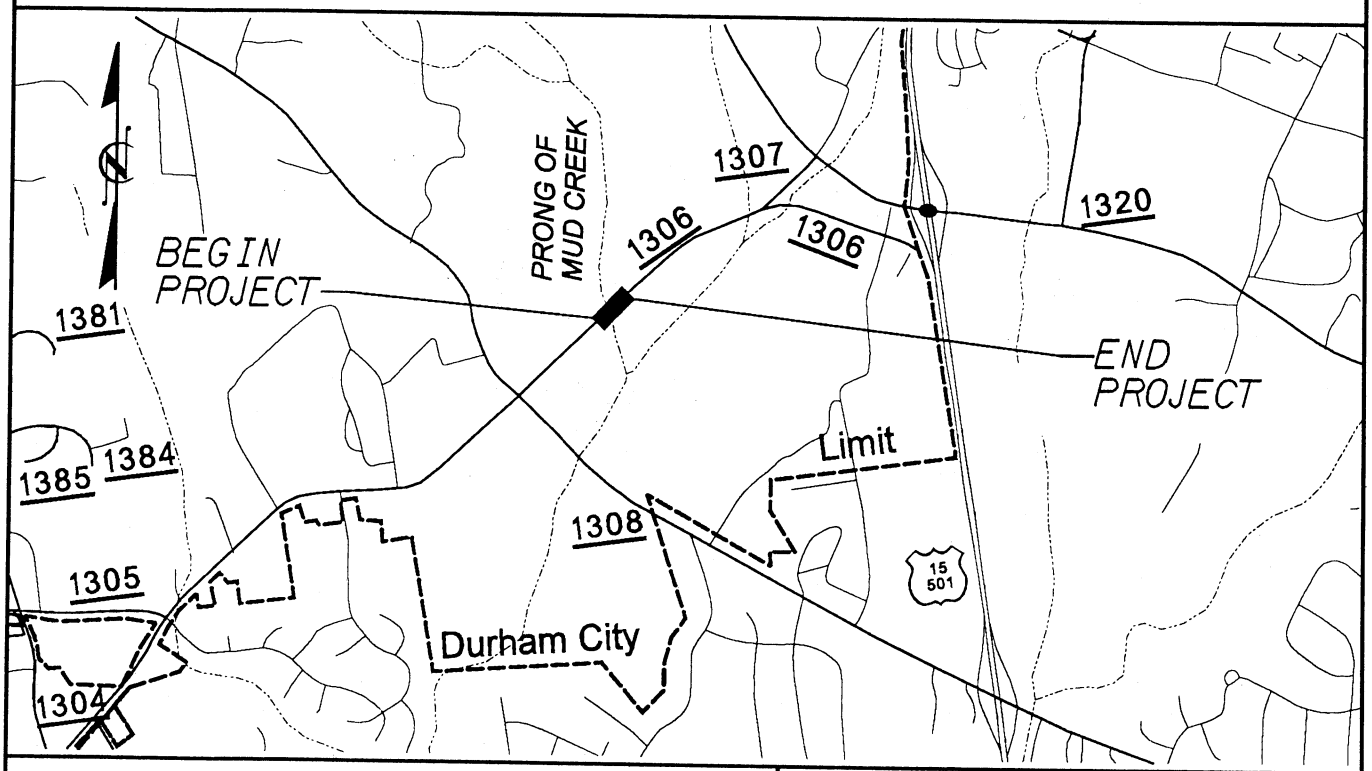
It is the applicant's responsibility to submit the application sufficiently in advance of desired construction dates to allow processing time for these permits. However, an applicant may choose to list constraints associated with construction or sequencing that may impose limits on work schedules (e.g., draw-down schedules for lakes, dates associated with Endangered and Threatened Species, accessibility problems, or other issues outside of the applicant's control).

4/14/04

Applicant/Agent's Signature **Date**

(Agent's signature is valid only if an authorization letter from the applicant is provided.)





VICINITY MAPS

NCDOT

DIVISION OF HIGHWAYS

DURHAM COUNTY

PROJECT: 8.2352901 (B-3451)

BRIDGE NO. 119

OVER MUD CREEK

ON SR 1306

WETLAND LEGEND

WLB — WETLAND BOUNDARY

WETLAND

DENOTES FILL IN WETLAND

DENOTES FILL IN SURFACE WATER

DENOTES FILL IN SURFACE WATER (POND)

DENOTES TEMPORARY FILL IN WETLAND

DENOTES EXCAVATION IN WETLAND

DENOTES TEMPORARY FILL IN SURFACE WATER

DENOTES MECHANIZED CLEARING

FLOW DIRECTION

TB — TOP OF BANK

WE — EDGE OF WATER

C — PROP. LIMIT OF CUT

F — PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG — NATURAL GROUND

PL — PROPERTY LINE

TDE — TEMP. DRAINAGE EASEMENT

PDE — PERMANENT DRAINAGE EASEMENT

EAB — EXIST. ENDANGERED ANIMAL BOUNDARY

EPB — EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

CORE FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

PROPOSED PIPE CULVERT

12"-48" PIPES

54" PIPES & ABOVE

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 — ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE WITH LEVEL SPREADER (PSH)

LEVEL SPREADER (LS)

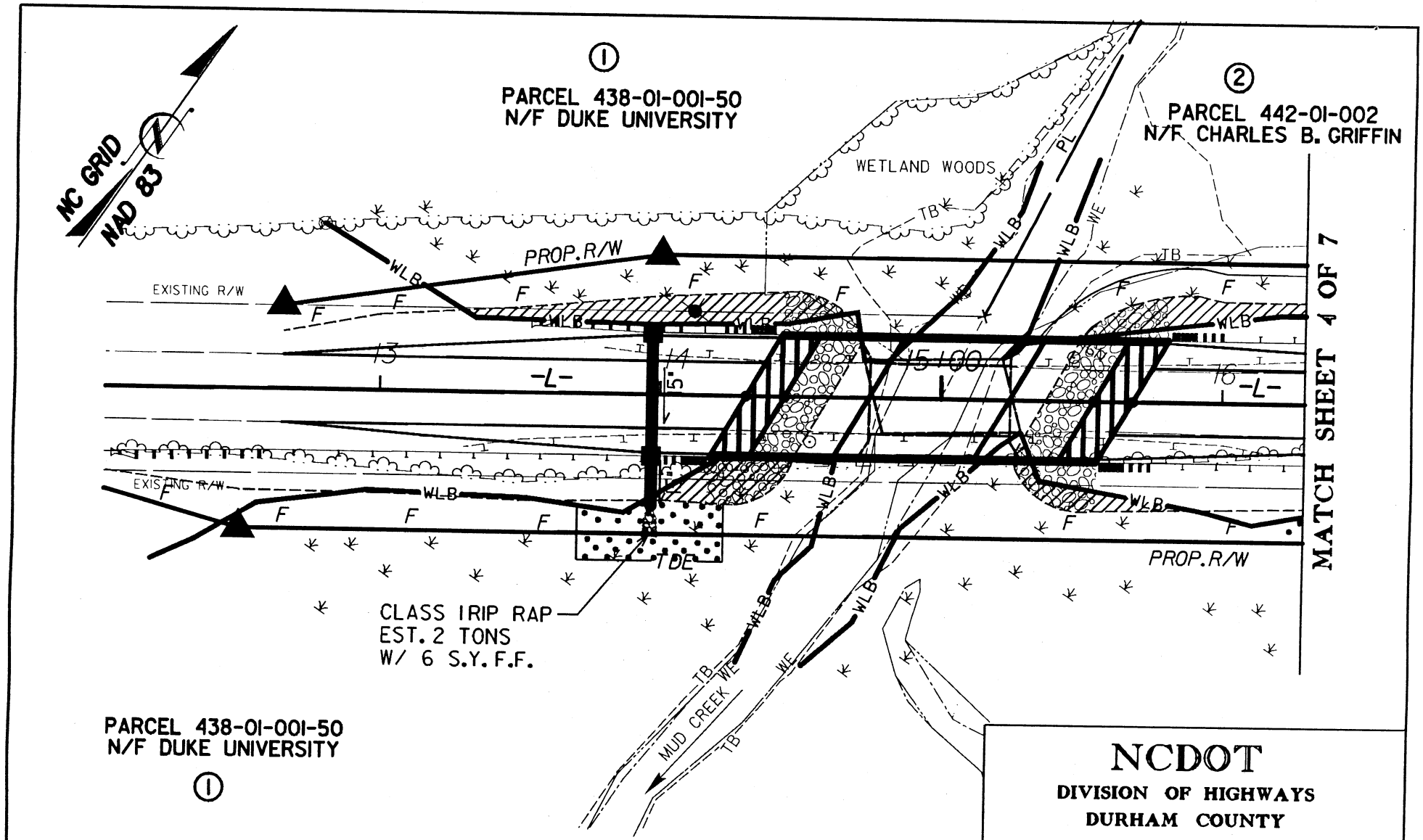
GRASS SWALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
DURHAM COUNTY

PROJECT: 8.2352901 (B-3451)

BRIDGE NO. 119
OVER MUD CREEK
ON SR 1306

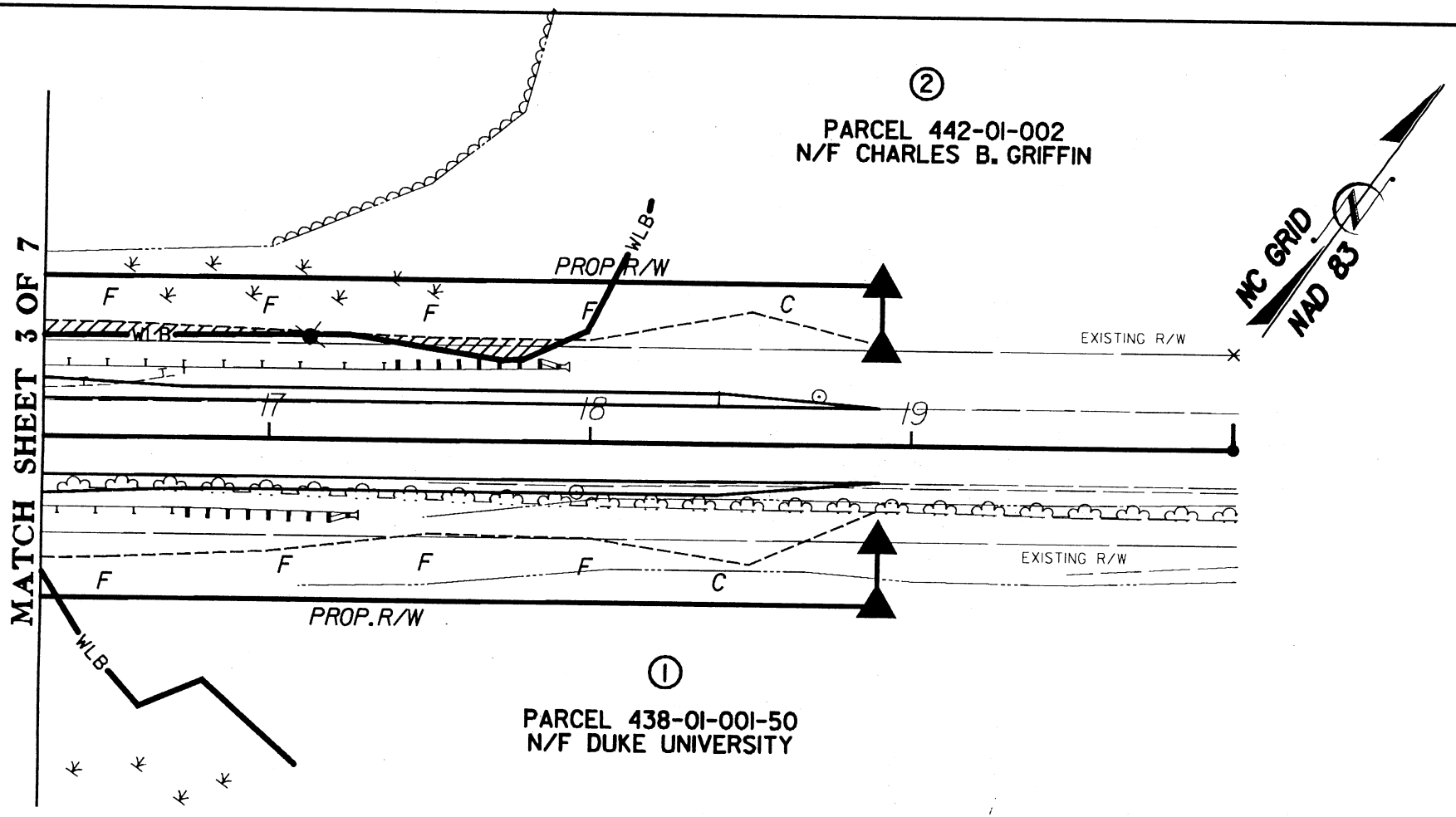
SHEET 2 OF 10 5/23/03



NCDOT

DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: 8.2352901 (B-3451)
BRIDGE NO. 119
OVER MUD CREEK
ON SR 1306

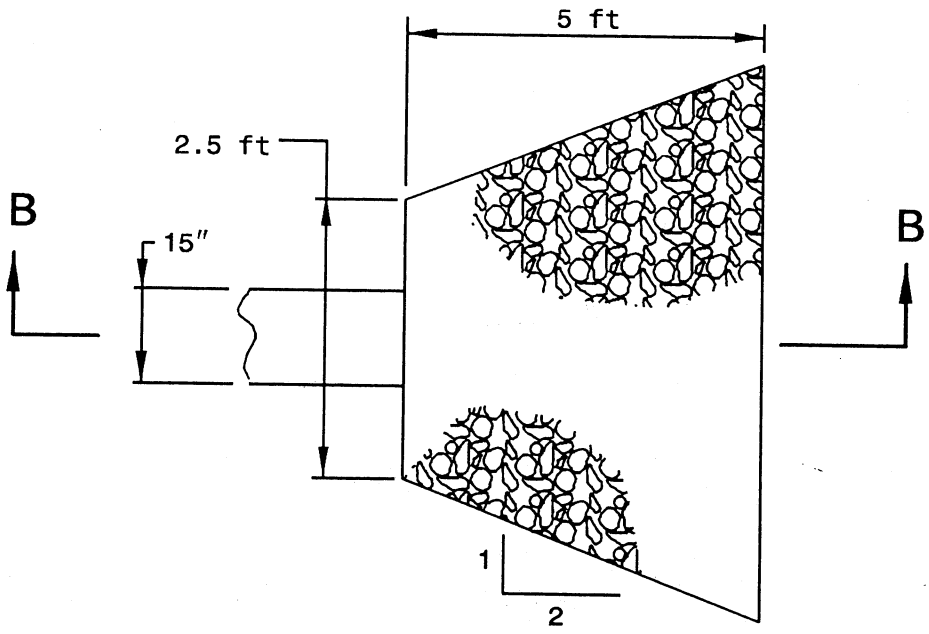
SHEET 3 OF 10 **5/23/03**



PLAN VIEW
SITE 1

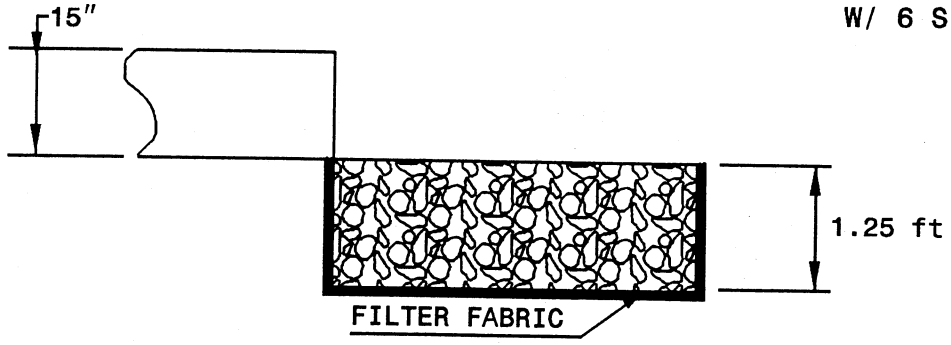
F F DENOTES FILL IN WETLAND

NCDOT
DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: 8.2352901 (B-3451)
BRIDGE NO. 119
OVER MUD CREEK
ON SR 1306



PLAN

CLASS I RIP RAP
EST 2 TONS
W/ 6 S.Y. F.F.



SECTION B-B

PIPE OUTLET WITHOUT DITCH

NCDOT
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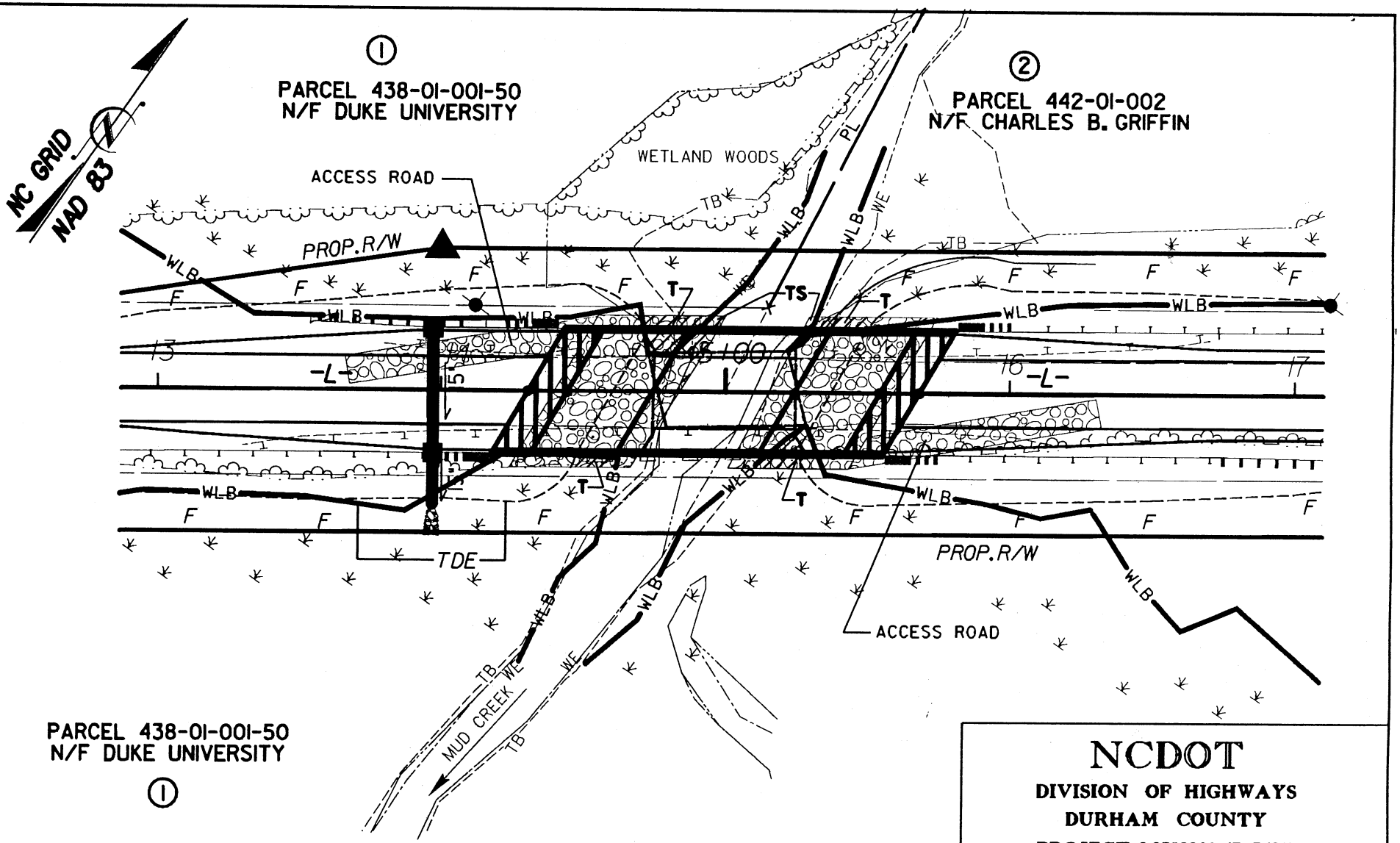
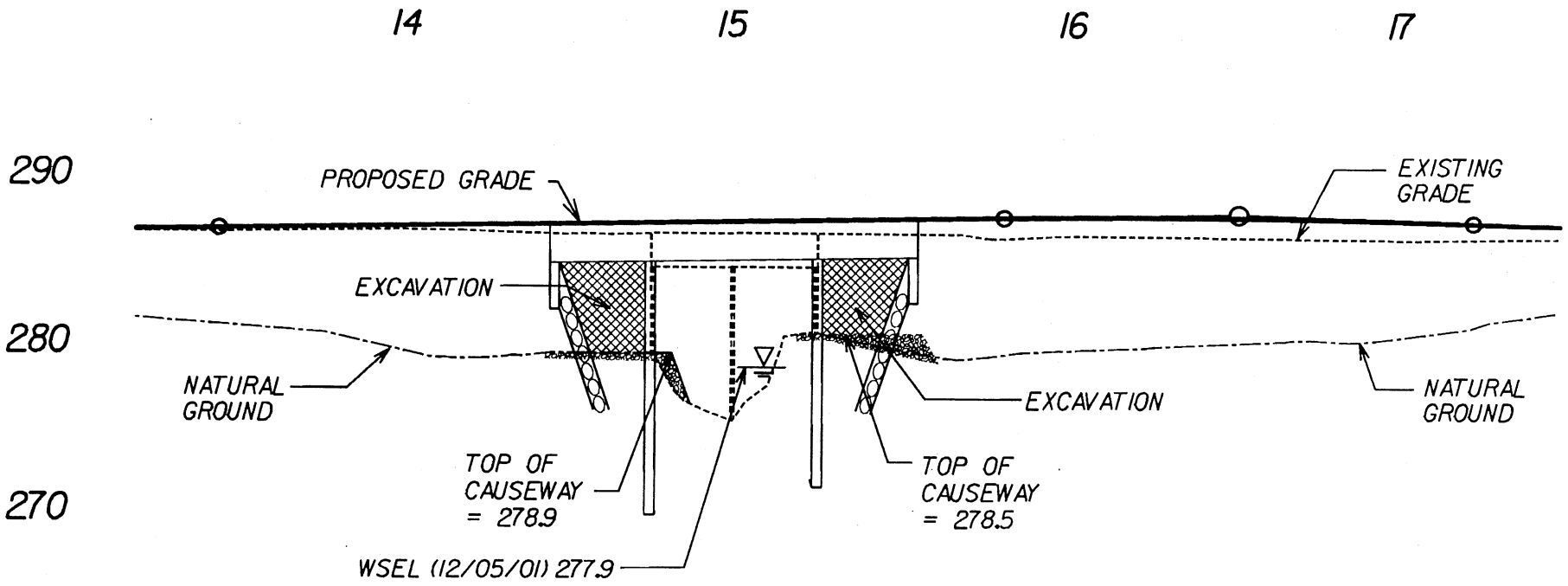
DURHAM COUNTY
PROJECT: 8.2352901 (B-3451)
BRIDGE NO. 119
OVER MUD CREEK
ON SR 1306



CAUSEWAY
SITE 1

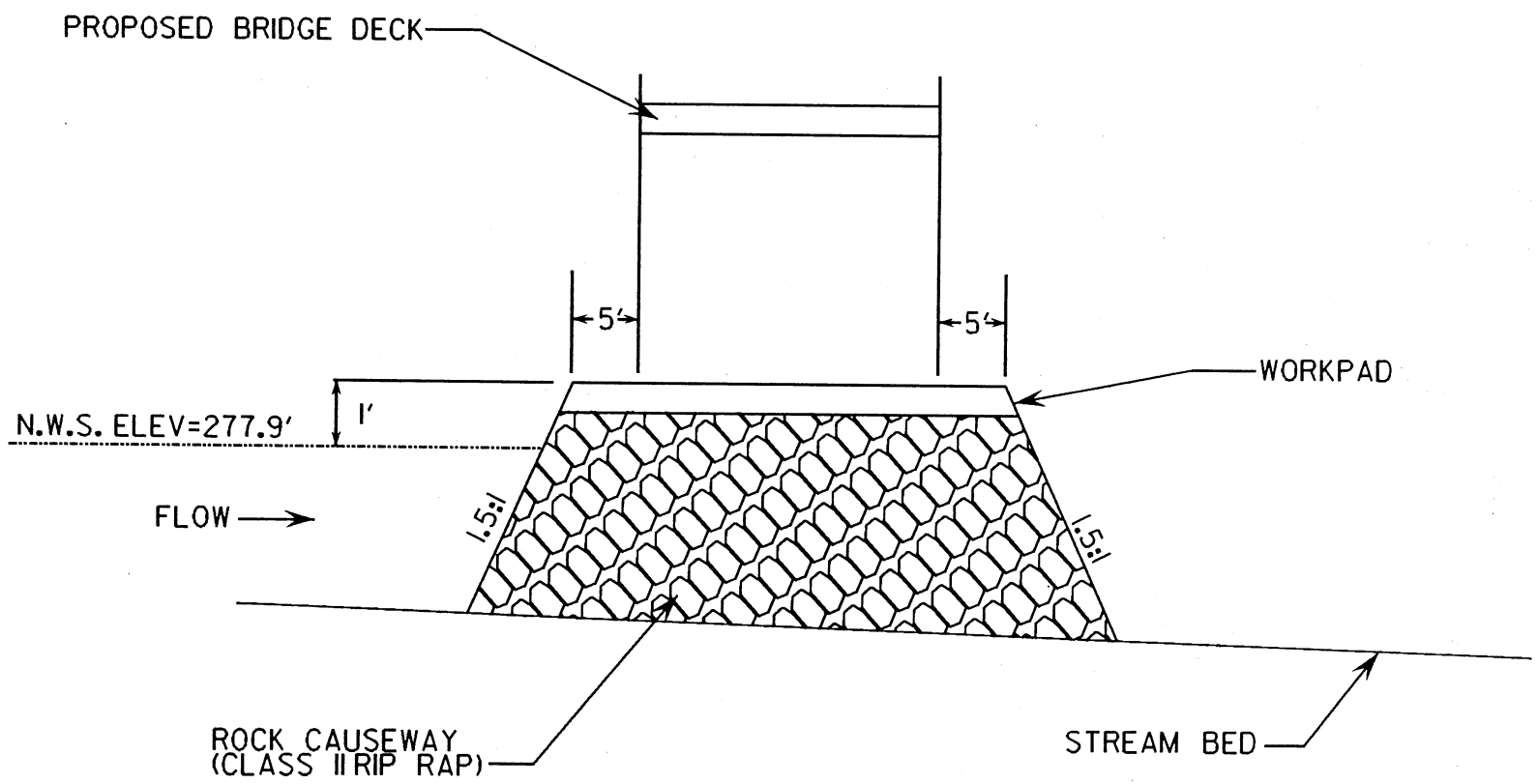
NCDOT
DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: 8.2352901 (B-3451)
BRIDGE NO. 119
OVER MUD CREEK
ON SR 1306



PROFILE VIEW
SITE 1

NCDOT
DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: 8.2352901 (B-3451)
BRIDGE NO. 119
OVER MUD CREEK
ON SR 1306

CAUSEWAY DETAIL
(NOT TO SCALE)



QUANTITIES OF ESTIMATES

VOLUME OF CLASS II RIP RAP= 480 yds^3

AREA OF CLASS II RIP RAP= 0.15 acres

Estimate 650 Tons Class II Rip Rap

NCDOT

DIVISION OF HIGHWAYS

DURHAM COUNTY

PROJECT: 8.2352901 (B-3451)

BRIDGE NO. 119

OVER MUD CREEK

ON SR 1306

PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES
438-01-001-50	DUKE UNIVERSITY	ATTN: JUDD EDERBERN 402 OREGON STREET DURHAM, NC 27705
442-01-002	CHARLES B. GRIFFIN	3912 ERWIN ROAD DURHAM, CN 27705

NCDOT

DIVISION OF HIGHWAYS

DURHAM COUNTY

PROJECT: 8.2352901 (B-3451)

BRIDGE NO. 73

OVER MUD CREEK

ON SR 1306

IMPACT SUMMARY

			WETLAND IMPACTS				SURFACE WATER IMPACTS					BUFFER IMPACTS		
Site No.	Station (From/To)	Structure Size	Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation In Wetlands (ac)	Mechanized Clearing (Method II) (ac)	Fill In SW (Natural) (ac)	Fill In SW (Pond) (ac)	Temp. Fill In SW (ac)	Existing Channel Impacted (ft)	Relocated Channel (ft)	Zone 1 (ac)	Zone 2 (ac)	Mech Clear (ac)
1	12+55 TO	N/A	0.022	0.006		0.024								
	16+30 -L- RT													
1	13+15 TO	N/A	0.039	0.008					0.003					
	16+30 -L- LT													
1	16+30 TO	N/A	0.100											
	17+75 -L- LT													
TOTALS:			0.161	0.014	0	0.024	0	0	0.003	0	0	0	0	0

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

DURHAM COUNTY
PROJECT: 8.2352901 (B-3451)

BRIDGE NO. 119 OVER MUD CREEK ON SR 1306

05/23/03

DURHAM COUNTY

SR 1306 (LEMUR LANE)

BRIDGE NO. 119 OVER PRONG OF MUD CREEK

FEDERAL-AID PROJECT NO. BRSTP-1306(4)

STATE PROJECT NO. 8.2352901

T.I.P. NO. B-3451

CATEGORICAL EXCLUSION

UNITED STATES DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

AND

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

APPROVED:

8/27/01
DATE

for William D. Gilmore, P.E., Manager
Project Development and Environmental Analysis Branch,
NCDOT

8/27/2001
DATE

for Nicholas L. Graf, P.E.
Division Administrator, FHWA

DURHAM COUNTY

SR 1306 (LEMUR LANE)

BRIDGE NO. 119 OVER PRONG OF MUD CREEK

FEDERAL-AID PROJECT NO. BRSTP-1306(4)

STATE PROJECT NO. 8.2352901

T.I.P. NO. B-3451

CATEGORICAL EXCLUSION

August 2001

Documentation Prepared by:
Barbara H. Mulkey Engineering, Inc.

Tommy Register, EI
Project Manager

8/22/01
Date

W. S. Hood, PE
Principle-In-Charge

8/22/01
Date

NORTH CAROLINA PROFESSIONAL SEAL 14509 ENGINEER WILLIS S. HOOD

For the North Carolina Department of Transportation

Stacy B. Harris, PE
Project Manager
Consultant Engineering Unit

PROJECT COMMITMENTS

Durham County
SR 1306 (Lemur Lane)
Bridge No. 119 Over Prong Of Mud Creek
Federal-Aid Project No. BRSTP-1306(4)
State Project No. 8.2352901
T.I.P. No. B-3451

In addition to the standard Nationwide Permit No.23 Conditions, the General Nationwide Permit Conditions, Section 404 Only Conditions, Regional Conditions, State Consistency Conditions, NCDOT's Guidelines for Best Management Practices for Bridge Demolition and Removal, General Certification Conditions, and Section 401 Conditions of Certification, the following special commitments have been agreed to by NCDOT:

Project Development and Environmental Analysis Branch, Roadway Design, Structure Design, Roadside Environmental, and Division Engineer

A 15-foot (4.6-meter) dry land passage on each side of Prong of Mud Creek, with sufficient headroom for wildlife movement will be provided.

Durham County
SR 1306 (Lemur Lane)
Bridge No. 119 Over Prong Of Mud Creek
Federal-Aid Project No. BRSTP-1306(4)
State Project No. 8.2352901
T.I.P. No. B-3451

INTRODUCTION: Bridge No. 119 is included in the 2002-2008 North Carolina Department of Transportation (NCDOT) Transportation Improvement Program (T.I.P.) and in the Federal-Aid Bridge Replacement Program. The location is shown in Figure 1. No substantial environmental impacts are anticipated. The project is classified as a Federal "Categorical Exclusion".

I. PURPOSE AND NEED

The NCDOT Bridge Maintenance Unit records indicate the bridge has a sufficiency rating of 12.2 out of a possible 100 for a new structure. The bridge is considered functionally obsolete and structurally deficient. The replacement of this inadequate structure will result in safer and more efficient traffic operations.

II. EXISTING CONDITIONS

Bridge No. 119 is located on SR 1306 (Lemur Lane) in Durham County, approximately 0.3 miles (0.48 kilometers) east of SR 1308, near the western city limits of Durham. Lemur Lane is classified as an Urban Minor Arterial. Land use in the project area is primarily suburban residential. Much of the land surrounding Bridge No. 119 is part of Duke University Forest. Lemur Lane is a two-lane facility that currently serves local traffic and commuters between Durham and Chapel Hill.

The existing bridge was constructed in 1951. It consists of two 25-foot (7.6-meter) spans, for a total structure length of 50 feet (15.2 meters). The bridge has a clear roadway width of 24.5 feet (7.5 meters). The superstructure consists fifteen lines of steel I-beams with a timber deck, and an asphalt wearing surface. The substructure consists of timber caps and piles. The steel I-beams are painted with aluminum over red lead paint. The bridge has a posted weight limit of 24 tons (24.3 metric tons) for single vehicle (SV) and 30 tons (30.5 metric tons) for truck-tractor semi trailer (TTST).

The approach roadway has two 10-foot (3-meter) travel lanes with a clear roadway width of 20 feet (6 meters). The posted speed limit is 45 miles per hour (mph) {70 kilometers per hour (kmh)}.

The surrounding area consists of woodlands and swamp. However, there is a middle school approximately 600 feet (0.18 km) east of Bridge No. 119. Overhead power and telephone lines are located upstream of the bridge. There are no utilities attached to the bridge. It is anticipated that the utility impacts will be minimal.

The 2001 estimated average daily traffic (ADT) volume is 13,400 vehicles per day (vpd). The projected ADT is 23,500 vpd by the design year 2025. The design hourly volume (DHV) and directional distribution (DIR) of traffic for the design year is 65% DHV and 12% DIR. The percentages of truck traffic are 3% DUALS and 1% TTST

SR 1306 is not part of a designated bicycle route nor is it listed in the TIP as needing incidental bicycle accommodations.

No accidents were reported in the vicinity of Bridge No. 119 during the period from January 1, 1995 to December 31, 1997.

Four school buses cross Bridge No. 119 twice per day, for a total of eight trips.

III. ALTERNATIVES

A. Project Description

Based on the preliminary hydraulics report the proposed replacement structure for Bridge No. 119 will be a bridge approximately 85 feet (25.9 meters) in length. The new bridge will have a deck width of 40 feet (12.0 meters). This will provide for two 12-foot (3.6-meter) travel lanes with 8-foot (2.4-meter) shoulders. The length and opening size of the proposed structure may increase or decrease as necessary to accommodate peak flows as determined, by a more detailed hydraulic analysis to be performed during the final design phase of the project. Mud Creek is considered to be a vital wildlife movement corridor. A 15-foot (4.6-meter) wide bare earth passage will be provided along the banks of the Prong of Mud Creek.

The proposed approach roadway will consist of two 12-foot (3.6 meter) travel lanes and 8-foot (2.4-meter) shoulders, including 4-foot (1.2 meter) paved shoulders (See Figure 4). The proposed grade will be approximately the same as the existing roadway.

The 8-foot paved shoulder on the new structure and the 4-foot (1.2-meter) paved shoulders on the approach roadway will adequately provided for any future designated bicycle route.

B. Reasonable and Feasible Alternatives

Three alternatives were considered reasonable and feasible for this bridge replacement. A description is provided below.

Alternative A (Preferred) consists of replacing the bridge in-place with a new bridge (See Figure 2). The roadway approach from the west is approximately 160 feet (48.8 meters) and the roadway approach from the east is approximately 155 feet (47.2 meters). Traffic will be detoured off-site during construction along the following route, SR 1308 (Cornwallis Road), US 15/501, and NC 751 (Academy Road) (See Figure 1).

Alternative B replaces the bridge in-place with a new bridge (See Figure 2A). The roadway approaches from the east and west are approximately 280 feet (85.3 meters) in length. An on-site detour will be utilized to route traffic flow during construction. The on-site detour will be a temporary bridge approximately 60 feet (18.3 meters) in length located south of the existing bridge. Alternative B was not selected as the preferred alternative due to the impacts to the wetlands and the plantation of bald cypress.

Alternative C replaces the bridge in-place as well (See Figure 2B). The roadway approaches from the east and west are approximately 300 feet (91.4 meters) in length. During construction, an on-site detour will be utilized to route traffic flow. The on-site detour will be a temporary bridge approximately 60 feet (18.3 meters) in length located north of the existing bridge. Alternative C was not selected as the preferred alternative due to the impacts to the wetlands and the plantation of bald cypress.

C. Alternatives Eliminated From Further Study

Alternatives eliminated from further consideration and specific reasons for elimination are discussed below.

Replacing the bridge on new alignment was not considered a reasonable and feasible alternative due to the following:

- The existing roadway currently has a straight horizontal alignment. Any attempt to realign SR 1306 would introduce back-to-back curves,
- The surrounding land at the NW, SW, and SE quadrants of the bridge crossing are part of the Durham Division of the Duke Forest,
- Duke Forest is owned and operated by Duke University as an outdoor laboratory for teaching and research projects,
- There is a plantation of bald cypress upstream and downstream of the bridge dating back to 1933,
- There are wetlands upstream and downstream of the bridge.

The "do-nothing' alternative was not considered reasonable and feasible because it will eventually necessitated the closure of the existing bridge and road.

Investigation of the existing structure by the Bridge Maintenance Unit indicated that rehabilitation of the existing structure was not feasible due to its age and deteriorated condition.

D. Preferred Alternative

Alternative A was selected as the preferred alternative because it maintains the existing horizontal alignment and reduces the environmental impacts by providing an off-site detour along SR 1308 Cornwallis Road), US 15-501, and NC 751 (See Figure 1).

The Division Engineer also concurs with Alternative A as the preferred alternative.

IV. ESTIMATED COST

The estimated costs of the alternatives, based on current prices are as follows:

	ALTERNATIVES		
	A (Preferred)	**B**	**C**
Structure Removal (Existing)	$ 11,000	$ 11,000	$ 11,000
Structure Proposed	221,000	195,000	195,000
Temp. Structure	0	76,800	76,800
Temp. Approaches	0	70,500	100,200
Roadway Approaches	84,800	85,900	75,500
Miscellaneous and Mobilization	141,000	213,000	216,000
Engineering Contingencies	67,200	97,800	100,500
Right-of-Way	49,000	75,000	77,000
Total	**$574,000.00**	**$825,000.00**	**$852,000.00**

The estimated cost of the project as shown in the NCDOT's 2002-2008 Transportation Improvement Program is $600,000, including $40,000 for right-of-way and $480,000 for construction.

V. NATURAL RESOURCES

A. Methodology

Materials and research data in support of this investigation have been derived from a number of sources including applicable U.S. Geological Survey (USGS) topographic mapping (Southwest Durham, NC 7.5 minute quadrangle), U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping (Southwest Durham, NC 7.5 minute quadrangle), USFWS Endangered, Threatened, and Candidate Species and Federal Species of Concern in North Carolina (February 26, 2001), United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS) soils mapping (USDA 1971), and recent aerial photography.

Bridge No. 119 was visited on September 7, 2000. The study corridor was walked and visually surveyed for substantial features. For purposes of field surveys, the study corridor was assumed to be approximately 400 feet (121.9 meters) in length for Alternative A and 600 feet (182.9 meters) in length for Alternative B. The corridor width was 150 feet (45.7 meters) to each side of centerline on both alternatives to ensure proper coverage. Impact calculations are based on 60-foot (18.3-meter) right-of-way widths. Actual impacts will be limited to construction limits and are expected to be less than those shown for right-of-way. Special concerns evaluated in the field include 1) potential habitats for protected species and 2) wetlands and water quality protection in Prong of Mud Creek.

Plant community descriptions are based on a classification system utilized by the North Carolina Natural Heritage Program (NHP) (Schafale and Weakley 1990). NHP records documenting presence of federal- or state-listed species were consulted before commencing the field investigation. When appropriate, community classifications were modified to better reflect field observations. Vascular plant names follow nomenclature found in Radford *et al.* (1968). Jurisdictional areas were

evaluated using the three-parameter approach following U.S. Army Corps of Engineers (COE) delineation guidelines (DOA 1987). Jurisdictional areas were characterized according to a classification scheme established by Cowardin *et al.* (1979). Aquatic and terrestrial wildlife habitat requirements and distributions were determined by supportive literature (Martof *et al.* 1980; Webster *et al.* 1985; Menhinick 1991; Hamel 1992; Palmer and Braswell 1995; Potter *et al.* 1980; Rohde *et al.* 1994). Water quality information for area streams and tributaries was derived from available sources (DWQ 1997, 2000). Quantitative sampling was not undertaken to support existing data.

B. Physiography and Soils

The study corridor is underlain by rocks of the Triassic Basin within the Piedmont physiographic province of North Carolina (Division of Land Resources 1985). Topography of the area is characterized as rolling with some steep areas along major streams. The study corridor is located in, and adjacent to, the floodplain of Prong of Mud Creek. Elevations in the study corridor are relatively level and average approximately 270 to 280 feet (82.3 to 85.3 meters) National Geodetic Vertical Datum (USGS Southwest Durham quadrangle).

Soil mapping units within the study corridor are Chewacla and Wehadkee, Creedmoor, and White Store series (SCS 1971). The Chewacla (*Fluvaquentic Dystrocrepts*) and Wehadkee (*Fluvaquentic Dystrocrepts*) soils mapping unit is approximately 60 percent Chewacla soil and 35 percent Wehadkee soil. This mapping unit includes somewhat poorly drained soils on flood plains and occurs as long, level areas parallel to major streams and rivers and is mapped adjacent to Prong of Mud Creek. Chewacla soils are considered to be non-hydric in Durham County, but often contain inclusions of Wehadkee soils which are considered to be hydric (NRCS 1996).

The Creedmoor series (*Aquic Hapludults*) consists of gently sloping to moderately steep, moderately well-drained soils with slow permeability. This series typically occurs on rounded divides where the difference in elevation is about 50 feet between the highest and the lowest points. Creedmoor soils are mapped on the western side of the creek floodplain. The White Store (*Vertic Hapludults*) series is moderately well-drained soils with very slow permeability. This soil typically occurs on narrow side slopes on uplands.

The White Store (*Vertic Hapludults*) series is moderately well-drained soils with very slow permeability. This soil typically occurs on narrow side slopes on uplands. The White Store series is mapped on the eastern edge of the creek floodplain. Creedmoor and White Store series are considered non-hydric (NRCS 1996).

C. Water Resources

1. Waters Impacted

The study corridor is located within sub-basin 03-06-05 of the Cape Fear River Basin (DWQ 2000). This area is part of USGS Hydrologic Unit 03030002 of the Mid Atlantic/Gulf Region. The bridge targeted for replacement spans Prong of Mud Creek with no direct involvement of additional streams or tributaries. Prong of Mud Creek joins Mud Creek approximately 1000 feet (304.8 meters) downstream of the study corridor. Mud Creek has been assigned Stream Index Number 16-41-1-10

by the N.C. Division of Water Quality (DWQ 1997). The area of the drainage basin at Bridge No. 119 is 2.5 square miles (6.47 square kilometers).

2. Stream Characteristics

Prong of Mud Creek is a well-defined Piedmont stream with low flow. During recent field investigations, water flow was slow and turbid, and water depth (beneath the bridge) was approximately 2 feet (0.6 meters). Upstream of the bridge, Prong of Mud Creek has been impounded by a beaver dam that releases water through many seeps into the main channel just north of, and adjacent to, the bridge corridor. The shallow ponded water contains scattered dead tree snags and cypress swamp borders it to the west. Downstream of the bridge, the channel is approximately 20 feet (6.1 meters) wide and 2 feet (0.2 meters) deep over a muddy substrate. The associated floodplain extends throughout most of the study corridor and supports wetland conditions such as hydrophytic vegetation, hydric soils, and signs of occasional flooding. The downstream floodplain is forested and supports mostly bald cypress swamp and some bottomland forest.

3. Best Usage Classifications and Water Quality

Classifications are assigned to waters of the State of North Carolina based on the existing or contemplated best usage of various streams or segments of streams in the basin. A best usage classification of **C** and Nutrient Sensitive Waters (**NSW**) has been assigned to Prong of Mud Creek (DWQ 1997). The designation **C** denotes that appropriate uses include aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. Secondary recreation includes wading, boating, and other uses not involving human body contact with waters on an organized or frequent basis. The supplemental classification **NSW** refers to waters needing additional nutrient management because they are subject to excessive growth of microscopic and macroscopic vegetation (DWQ 1997). No designated High Quality Waters (**HQW**), Outstanding Resource Waters (**ORW**), Water Supply I (**WS-I**), or Water Supply II (**WS-II**) waters occur within 1.0 mi (1.6 km) of the study corridor.

The Division of Water Quality (DWQ) has initiated a whole basin approach to water quality management for the 17 river basins within the state. Water quality for the proposed study corridor is summarized in the Cape Fear River water quality plan (DWQ 2000). Prong of Mud Creek has not been sampled and not rated for its support status. The Cape Fear sub-basin supports two major point-source dischargers and seven minor dischargers. Total permitted flow for the major dischargers is 26 million gallons per day (MGD) while total permitted flow for the minor dischargers is 0.3 MGD(1.1 million liters) (DWQ 2000). No discharges are in Prong of Mud Creek.

4. Anticipated Impacts to Water Resources

Proposed project alternatives include bridging Prong of Mud Creek to maintain the current water quality, aquatic habitat, and flow regime. Temporary construction impacts due to erosion and sedimentation will be minimized through implementation of a stringent erosion control schedule and the use of best management practices. The contractor will follow contract specifications pertaining to erosion control measures as outlined in 23 CFR 650 Subpart B and Article 107-13 entitled "Control of Erosion, Siltation, and Pollution" (NC DOT, Specifications for Roads and Structures). These

measures include: the use of dikes, berms, silt basins, and other containment measures to control runoff; elimination of construction staging areas in floodplains and adjacent to waterways; re-seeding of herbaceous cover on disturbed sites; management of chemicals (herbicides, pesticides, de-icing compounds) with potential negative impacts on water quality; avoidance of direct discharges into streams by catch basins and roadside vegetation.

The proposed bridge replacement will allow for continuation of pre-project stream flows in Prong of Mud Creek, thereby protecting the integrity of this waterway. Long-term impacts resulting from construction are expected to be negligible. In order to minimize impacts to water resources, NCDOT's Best Management Practices (BMPs) for the Protection of Surface Waters will be strictly enforced during the entire project.

There is little potential for components of the bridge to be dropped into "waters of the United States." Therefore, no temporary fill is expected to result from removal of the existing bridge. NCDOT's Best Management Practices for Bridge Demolition and Removal (BMP-BDR) will be applied for the removal of this bridge in addition to NCDOT's Best Management Practices (BMPs) for the Protection of Surface Waters.

D. BIOTIC RESOURCES

1. Plant Communities

Four distinct plant communities were identified within the study corridor: 1) Piedmont bottomland forest, (2) cypress swamp, (3) scrub-shrub assemblage, and 4) roadside/disturbed land. These plant communities are described below.

Piedmont Bottomland Forest: Piedmont bottomland forest occurs on the floodplain on the southeast side of SR 1306 (Lemur Lane), east of Prong of Mud Creek. Canopy species include loblolly pine (*Pinus taeda*) and green ash (*Fraxinus pennsylvanica*). Subcanopy and shrub species include slippery elm (*Ulmus rubra*), winged elm (*Ulmus alata*), arrowwood (*Viburnum dentatum*), privet (*Ligustrum sinense*), tag alder (*Alnus serrulata*), and willow oak (*Quercus phellos*). Herbs include false nettle (*Boehmeria cylindrica*), Japanese grass (*Microstegium vimineum*), and lizard's tail (*Saururus cernuus*).

Cypress Swamp: Cypress swamp occurs to the west of Prong of Mud Creek on both the north and south side of SR 1306 (Lemur Lane). The canopy is nearly pure bald cypress (*Taxodium distichum*) (with possible pond cypress [*T. ascendens*]). Green ash is occasional in the subcanopy, and tag alder is found in the shrub layer. Large poison ivy vines (*Toxicodendron radicans*) are found on many of the cypress trunks. Herbs include false nettle, spotted touch-me-not (*Impatiens capensis*), cardinal flower (*Lobelia cardinalis*), and climbing hempweed (*Mikania scandens*).

Scrub-shrub Assemblage: This wet plant community lies on the north side of the highway, partially under the power line and extending beyond it. Shrubs include tag alder, black willow (*Salix nigra*), and elderberry (*Sambucus canadensis*). Herbs include soft rush (*Juncus effusus*), lizard's tail, spotted touch-me-not, Japanese grass, climbing hempweed, and dodder (*Cuscuta* sp.).

Roadside/Disturbed Land: Roadside/disturbed land occurs along the present roadside margins and under the utility right-of-way. Young tree species include tree-of-heaven (*Ailanthus altissima*), princess tree (*Paulownia tomentosa*), green ash, and persimmon (*Diospyros virginiana*). Blackberry (*Rubus* sp.), multiflora rose (*Rosa multiflora*), ragweeds (*Ambrosia trifida, A. artemesiifolia*), goldenrods (*Solidago* spp.), and grasses (*Setaria* spp, *Paspalum* spp) are also present.

2. Plant Communities within the Study Corridor

Plant community impacts are estimated based on the amount of each plant community present within the projected 60-foot (18.3-meter) right-of-way of each alternative (actual impacts within construction limits will be less). A summary of potential plant community impacts, both permanent and temporary, is presented below:

PLANT COMMUNITY	ESTIMATED AREA (acres/hectares)				
	Alternative A	Alternative B		Alternative C	
	Permanent	Temporary	Permanent	Temporary	Permanent
Piedmont Bottomland Forest	0.03/0.01	0.13/0.05	0.05/0.02	0.13/0.05	0.05/0.02
Cypress Swamp	0.04/0.01	0.28/0.11	0.06/0.02	0.28/0.11	0.06/0.02
Scrub-shrub Assemblage	0.07/0.03		0.11/0.04		0.11/0.04
Roadside/Disturbed Land	0.18/0.07	0.09/0.04	0.28/0.11	0.09/0.04	0.28/0.11
TOTAL:	0.32/0.12	0.50/0.20	0.50/0.20	0.50/0.20	0.50/0.20

Permanent impacts to the plant communities resulting from bridge replacement in Alternative A are generally restricted to narrow strips adjacent to the existing bridge and roadway approach segments. Very little area of the other plant communities are anticipated to be impacted by this alternative. Roadside/disturbed land constitutes approximately 56 percent of the total impacts and the other natural communities approximately 44 percent.

Alternatives B and C call for onsite detours with a temporary bridge located downstream of the present structure and upstream of the present structure. These alternatives will require encroachment into cypress swamp and Piedmont bottomland forest producing temporary impacts to these two communities constituting approximately 82 percent of the total plant communities. These impacts are substantially larger than those for Alternative A.

From an ecological perspective, impacts of upgrading existing road facilities are minimal. No new fragmentation of plant communities will be created, as the project will result only in alteration of community boundaries. Much of the alignment is currently bounded by a maintained right-of-way and utility line. Alternatives B and C have higher temporary and permanent impacts partially due to the longer alignments. However, upon completion of roadway improvements, the temporary detours will be removed and natural communities will be restored.

Roadside-forest edges typically serve as vectors for invasive species encroachment into adjacent natural communities. An example of an undesirable invasive species utilizing roadsides is kudzu

(*Pueraria lobata*). The establishment of a hardy groundcover on road shoulders as soon as practicable will limit the availability of construction areas to invasive and undesirable plants.

3. Wildlife

a. Terrestrial

Signs of three mammals; racoon (*Procyon lotor*), white-tailed deer (*Odocoileus virginianus*), and beaver (*Castor canadensis*) were observed within the study corridor. Other mammal species documented as occurring in the cypress swamp area include muskrat (*Ondatra zibethicus*) and river otter (*Lutra canadensis*) (NHP 1995). Other likely common mammals may include meadow vole (*Microtus pennsylvanicus*), white-footed mouse (*Peromyscus leucopus*), short-tailed shrew (*Blarina brevicauda*), and little brown bat (*Myotis lucifugus*).

Few birds were observed in the corridor during the field investigation. However, many species would be expected to use this wetland habitat, especially during the breeding season. Some documented species (NHP 1995) include Canada goose (*Branta canadensis*), belted kingfisher (*Ceryle alcyon*), downy woodpecker (*Picoides pubescens*), blue jay (*Cyanocitta cristata*), indigo bunting (*Passerina cyanea*), prothonotary warbler (*Protonotaria citrea*), and northern parula (*Parula americana*). Avian species expected to occur within bottomland forest habitat of the study corridor are red-eyed vireo (*Vireo olivaceus*), barred owl (*Strix varia*), and Acadian flycatcher (*Empidonax virescens).*

No terrestrial reptiles were observed in the study corridor, but black racer (*Coluber constrictor*) has been documented (NHP 1995). Other herptile species expected to occur in terrestrial areas of the study corridor are eastern box turtle (*Terrapene carolina*), eastern garter snake (*Thamnophis sirtalis*), rough green snake (*Opheodrys aestivus*), and American toad (*Bufo americanus*).

b. Aquatic

Limited surveys resulted in documentation of two amphibian species, green frog (*Rana clamitans*) and cricket frog (*Acris crepitans*), and one reptile species, eastern mud turtle (*Kinosternon subrubrum*). Several other species of frog are known from the area (NHP 1995)

Prong of Mud Creek provides suitable habitat for snapping turtle (*Chelydra serpentina*), northern water snake (*Nerodia sipedon*), eastern newt (*Notophthalmus viridescens*), northern dusky salamander (*Desmognathus fuscus*), and several frog species.

No sampling was undertaken in Prong of Mud Creek to determine fishery potential. Visual surveys of Prong of Mud Creek revealed presence of small fish and crayfish. Fish species which may be present in the Prong of Mud Creek are bluehead chub (*Nocomis leptocephalus*), tessellated darter (*Etheostoma olmstedi*), golden shiner (*Notemigonus crysoleucas*) and margined madtom (*Noturus insignis*).

c. Anticipated Impacts to Wildlife

Due to the limited extent of infringement on natural communities, the proposed bridge replacement will not result in substantial loss or displacement of animal populations. No substantial habitat fragmentation is expected since most improvements will be restricted to existing roadside margins. Construction noise and associated disturbances will have short-term impacts on avifauna and migratory wildlife movement patterns, although long-term impacts are expected to be negligible. Potential down-stream impacts to aquatic habitat will be avoided by bridging the systems to maintain regular flow and stream integrity. Short-term impacts associated with turbidity and suspended sediments will affect benthic populations. Temporary impacts to downstream habitat from increased sediment during construction will be minimized by the implementation of stringent erosion control measures.

E. SPECIAL TOPICS

1. Waters of the United States

Surface waters within the embankments of Prong of Mud Creek are subject to jurisdictional consideration under Section 404 of the Clean Water Act as "waters of the United States" (33 CFR section 328.3). Field investigations indicate that Prong of Mud Creek is a perennial stream system characterized as lower perennial with an unconsolidated bottom of mud.

Wetlands adjacent to Prong of Mud Creek are subject to jurisdictional consideration under Section 404 of the Clean Water Act as "waters of the United States" (33 CFR section 328.3). These areas are defined by the presence of three primary criteria: hydric soils, hydrophytic vegetation, and evidence of hydrology at or near the surface for a portion (12.5 percent) of the growing season (DOA 1987). Field investigations indicate wetlands occur within the 300-foot (91.4-meter) study corridor in Prong of Mud Creek floodplain north and south of the bridge. NWI mapping indicates that areas adjacent to Prong of Mud Creek exhibit characteristics of a palustrine, broad-leaved, deciduous forest system that is seasonally flooded (PFO1C) (Cowardin *et al.* 1979). The site visit verified this description for the area south of the roadway and east of the creek, whereas the area south of the roadway and west of the creek is vegetated by cypress, a needle-leaved deciduous species. The area on the north side of the road beyond the maintained area is a wet scrub-shrub assemblage. A conspicuous beaver impoundment lies to the north of the roadway and east of the creek, but it is just beyond the corridor right-of-way.

The potentially affected area (acres/hectares) and length (feet/meters) of jurisdictional stream and wetland areas located within the Alternative 60-foot (18.3 meter) right-of-ways are shown as follows:

Bridge No. 119	JURISDICTIONAL AREA WITHIN RIGHT-OF-WAY		
	Alternative A	Alternative B	Alternative C
Jurisdictional Type	Permanent	Permanent	Permanent
Stream Linear Distance (ft/m)	60/18.3	106/32.3	102/31.1
Stream Area (ac/ha)	0.03/0.01	0.06/0.02	0.05/0.02
Wetland Area (ac/ha)	0.14/0.06	0.37/0.15	0.41/0.17

Potential creek impacts associated with construction activities include bridging of Prong of Mud Creek. No impacts other than shading are expected as a result of construction activities.

Jurisdictional wetlands within the study corridor occur in the floodplain of Prong of Mud Creek at the base of moderate slopes, and are present on both sides of Prong of Mud Creek on both the north and south side of the bridge. These wetlands satisfy the three-parameter approach outlined by the COE (DOA 1987). Vegetated wetlands south of the roadway are dominated by a canopy of bald cypress and green ash and support herbs such as lizard's tail and false nettle. These plants are growing in Chewacla and Wehadkee soils which exhibit values, chromas, and mottles characteristic of hydric soils. Evidence of wetland hydrology includes surface drainage patterns, oxidized root channels, and water-stained leaves. Vegetated wetlands north of the roadway are dominated by willow, tag alder, soft rush, climbing hempweed, and spotted touch-me-not. These plants are growing in Chewacla and Wehadkee soils which exhibit values, chromas, and mottles characteristic of hydric soils. Evidence of wetland hydrology includes surface drainage patterns, oxidized root channels, and water-stained leaves.

Jurisdictional wetlands (0.14 ac / 0.06 ha) occur within the proposed right-of-way of Alternative A. More extensive wetlands are present within Alternatives B and C right-of-way due to the onsite detours and incursion into the cypress swamp and bottomland hardwoods. Any impacts associated with the temporary detours will be considered permanent impacts. Temporary detours will be replanted with native vegetation.

There is little potential that components of the existing bridge may be dropped into "Waters of the United States" during construction. Therefore, no temporary fill is expected to result from bridge removal. This project can be classified as Case 3, where there are no special restrictions other than those outlined in Best Management Practices for Protection of Surface Waters.

2. Permits

This project is being processed as a Categorical Exclusion (CE) under Federal Highway Administration (FHWA) guidelines. Nationwide Permit (NWP) No.23 (61 FR 65874, 65916;

December 13, 1996) has been issued by the US Army Corps of Engineers (COE) for CEs due to expected minimal impact. DWQ has issued a General 401 Water Quality Certification for NWP No.23. However, use of this permit will require written notice to DWQ. In the event that NWP No.23 will not suffice, minor impacts attributed to bridging and associated approach improvements are expected to qualify under General Bridge Permit 031 issued by the Wilmington COE District. Notification to the Wilmington COE office is required if this general permit is utilized.

3. Mitigation

Compensatory mitigation is not proposed for this project due to the limited nature of project impacts. However, utilization of NCDOT's BMPs is recommended in an effort to minimize impacts. Temporary impacts to floodplains associated with the construction activities could be mitigated by replanting disturbed areas with native wetland species and removal of temporary fill material upon project completion. Fill or alteration of area streams may require compensatory mitigation in accordance with 15 NCAC 2H .0506(h). A final determination regarding mitigation rests with the COE.

F. Protected Species

1. Federal Protected Species

Species with the federal classification of Endangered or Threatened, officially proposed for such listing, or Threatened due to Similarity of Appearance are protected under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The term "Endangered species" is defined as "any species which is in danger of extinction throughout all or a substantial portion of its range", and the term "Threatened species" is defined as "any species which is likely to become an Endangered species within the foreseeable future throughout all or a substantial portion of its range" (16 U.S.C. 1532). The term "Threatened due to Similarity of Appearance" is defined as a species, which is not "Endangered", or "Threatened", but "closely resembles an Endangered or Threatened species" (16 U.S.C. 1532).

The following federal-protected species are listed for Durham County (March 22, 2001 FWS list):

Common Name	Scientific Name	Status
Bald Eagle	*Haliaeetus leucocephalus*	Threatened
Smooth coneflower	*Echinacea laevigata*	Endangered
Michaux's sumac	*Rhus michauxii*	Endangered

Bald Eagle - The bald eagle is a large raptor with a wingspan greater than 6.0 feet (1.8 meters). Adult bald eagles are dark brown with a white head and tail. Immature eagles are brown with whitish mottling on the tail, belly, and wing linings. Bald eagles typically feed on fish but may also take birds and small mammals. In the Carolinas, nesting season extends from December through May (Potter *et al.* 1980). Bald eagles typically nest in tall, living trees in a conspicuous location near open water. Eagles forage over large bodies of water and utilize adjacent trees for perching

(Hamel 1992). Disturbance activities within a primary zone extending 750 to 1500 feet (228.6 to 457.2 meters) from a nest tree are considered to result in unacceptable conditions for eagles (FWS 1987). The FWS recommends avoiding disturbance activities, including construction and tree-cutting within this primary zone. Within a secondary zone, extending from the primary zone boundary out to a distance of 1.0 mi (1.6 km) from a nest tree, construction and land-clearing activities should be restricted to the non-nesting period. The FWS also recommends avoiding alteration of natural shorelines where bald eagles forage, and avoiding substantial land-clearing activities within 1500 feet (457.2 meters) of known roosting sites.

Site plant communities are 1) Piedmont bottomland forest, 2) cypress swamp, 3)scrub-shrub assemblage, and 4) roadside/disturbed land. A beaver impoundment exists within the study corridor, but outside of the right-of-way. Larger trees in the cypress swamp may potentially provide suitable nesting habitat for this species. However, NHP records do not document the occurrence of bald eagles within 1.0 mi (1.6 km) of the study corridor, and no nests or eagles were observed in the study corridor during the site visit.

BIOLOGICAL CONCLUSION: The study corridor contains potential suitable feeding, nesting, and roosting habitat for bald eagle, and the entire cypress swamp potential roosting and nesting habitat. NHP records have no documentation of bald eagle within 1.0 mi (1.6 km) of the project corridor, or in the cypress swamp. Based on NHP records, observations conducted during field investigations, and best professional judgement, this project will not affect bald eagle. **NO EFFECT**

Smooth coneflower - This species is a stiffly erect, rarely branched perennial that grows up to 5.0 feet (1.5 meters) tall. Basal and stem leaves are large, glabrous, lanceolate to narrowly ovate blades reaching 3 inches (in) (7.6 centimeters [cm]) in length. This coneflower blooms from late May to July, producing solitary heads of small purplish disk flowers with long drooping pink to purplish ray flowers (Kral 1983). This species occurs on calcareous, basic, or circumneutral soils on roadsides, clearcuts, or power line right-of-ways where there is abundant light and little herbaceous competition (Gaddy 1991). Fire-maintained woodlands also appear to provide potential habitat for the coneflower.

The study corridor supports narrow areas of early successional roadside/disturbed land suitable for smooth coneflower. The maintained shoulder on the north side of the road drops abruptly into wet scrub-shrub assemblage. On the south side of the road, the maintained area drops abruptly into cypress swamp or Piedmont bottomland forest. Habitat for this species in the project corridor is practically nonexistent. Observations during the site visit on September 7, 2000, during the coneflower's fruiting period, revealed no smooth coneflower.

BIOLOGICAL CONCLUSION: Smooth coneflower occurs in cleared areas with abundant light and little competition from herbaceous vegetation. Very small portions of this project occur in areas, which contain regularly maintained roadside/disturbed land. NHP files have no documentation of this species within 1.0 mi (1.6 km) of the project corridor, and the species was not observed during an on-site investigation conducted on September 7, 2000. **NO EFFECT**

Michaux's Sumac - Michaux's sumac is a densely pubescent, deciduous, rhizomatous shrub, usually less than 2.0 feet (0.6 meters) high. The alternative, compound leaves consist of 9 to 13 hairy, round-based, toothed leaflets borne on a hairy rachis that may be slightly winged (Radford *et al* 1968). Small male and female flowers are produced during June on separate plants; female flowers are produced on terminal, erect clusters followed by small, hairy, red fruits (drupes) in August and September. Michaux's sumac tends to grow in disturbed areas where competition is reduced by periodic fire or other disturbances, and may grow along roadside margins or utility right-of ways. In the Piedmont, Michaux's sumac appears to prefer clay soil derived from mafic rocks or sandy soil derived from granite; in the Sandhills, it prefers loamy swales (Weakley 1993). Michaux's sumac ranges from south Virginia through Georgia in the inner Coastal Plain and lower Piedmont.

The study corridor supports narrow areas of early successional, roadside/disturbed land suitable for Michaux's sumac. Beyond the maintained edge on the north side of the road, the roadside drops abruptly into wet scrub-shrub assemblage. On the south side, the roadside drops abruptly into cypress swamp or bottomland forest. Habitat for Michaux's sumac is practically nonexistent in the Bridge No. 119 corridor. Observations during the site visit on September 7, 2000, during the sumac's fruiting period, revealed no Michaux's sumac.

BIOLOGICAL CONCLUSION: Michaux's sumac occurs in disturbed areas where competition is reduced by periodic fire or other disturbances. Very small portions of this project occur in areas which contain roadside/disturbed and early-successional vegetation. NHP files have no documentation of this species within 1.0 mi (1.6 km) of the project corridor, and the species was not observed during the site visit on September 7, 2000. **NO EFFECT**

Federal Species of Concern - The March 22, 2001 FWS list also includes a category of species designated as "Federal species of concern" (FSC) for Durham County:

Common Name	Scientific Name	Potential Habitat	State Status**
Carolina darter	*Etheostoma collis lepidinion*	Yes	SC
Pinewoods shiner	*Lythrurus matutinus*	No	SR
Atlantic pigtoe	*Fusconaia masoni*	No	T (PE)
Septima's clubtail	*Gomphus septima**	No	SR
Yellow lampmussel	*Lampsilis cariosa*	No	T (PE)
Green floater	*Lasmigona subviridus*	No	E
Panhandle pebblesnail	*Somotogyrus virginicus*	No	SR
Tall larkspur	*Delphinium exaltatum*	No	E-SC
Butternut	*Juglans cinerea**	No	W5
Sweet pinesap	*Monotropsis odorata*	No	C
A liverwort	*Plagiochila columbiana**	No	W2

*Historic populations not seen since 1979
**Based on listings by Amoroso(1999) and LeGrand and Hall (1999): E = Endangered; T = Threatened; SC = Special concern; SR = Significantly rare; C = Candidate; PE = Proposed Endangered; W2 =NC Watch List rare, but taxonomically questionable; W5 = NC Plant Watch List rare because of severe decline.

The FSC designation provides no federal protection under the ESA for the species listed. NHP files have no documentation of FSC species within the study corridor or within 1.0 mi. (1.6 km) of the study corridor.

2. State Protected Species

Plant and animal species which are on the North Carolina state list as Endangered (E), Threatened (T), Special Concern (SC), Candidate (C), Significantly Rare (SR), or Proposed (P) (Amoroso 1999, LeGrand and Hall 1999) receive limited protection under the North Carolina Endangered Species Act (G.S. 113-331 *et seq.*) and the North Carolina Plant Protection Act of 1979 (G.S. 106-202 *et seq.*). NHP records indicate several C or SC plants in oak/hickory forest approximately 0.6 mi (1.0 km) north of Bridge No. 119. None of these will be affected by this project.

G. Identified Priority Area (IPA)

SR 1306 (Lemur Lane) and Bridge No. 119 pass through a bald cypress swamp, which is designated an IPA of local significance by the NHP. This is not a naturally occurring stand of cypress but was planted in the 1930's as part of a project to determine how well species of trees from other parts of North Carolina would grow in the Piedmont. Part of the "swampy" nature of this site is also due to the creation of one of more dikes that run through this site (it was probably flooded only seasonally before creation of these structures) (NHP 1995). Hydrology within the site has been augmented by beaver colonization, and the site now provides habitat for several species of marsh and swamp animals. Among the most important are prothonotary warbler (*Protonotaria citrea*), dion skipper (*Euphyes dion*) - a regionally rare butterfly species, and river otter (*Lutra canadensis*). Most of the cypress is owned by the Durham Division of the Duke Forest. The cypress swamp functions as a refuge and wildlife corridor connecting wildlife habitats located further downstream in the New Hope floodplain (NHP 1995). The North Carolina Natural Heritage Program has identified Mud Creek as a vital wildlife movement corridor. Therefore the North Carolina Department of Environment and Natural Resources recommends that a bridge be used instead of a culvert and that a 15-foot wide bare earth passage be left on both sides of the stream banks for wildlife movement.

VI. Cultural Resources

A. Compliance Guidelines

This project is subject to compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, and with the Advisory Council on Historic Preservation's Regulations for Compliance Section 106, codified at 36 CFR Part 800. Section 106 requires that for federally funded, licensed, or permitted projects having an effect on properties listed in or eligible for the National Register of Historic Places, the Advisory Council on Historic Preservation be given the opportunity to comment.

B. Historic Architecture

A field survey of the Area of Potential Effects (APE) was conducted on March 1, 2000. All structures within the APE were photographed, and later reviewed by the North Carolina State Historic Preservation Office (HPO). In a concurrence form dated March 27, 2000 the HPO concurred that there are no historic architectural resources either listed or eligible for listing in the National Register of Historic Places within the APE. A copy of the concurrence form is included in the Appendix.

C. Archaeology

The State Historic Preservation Officer (SHPO), in a letter dated June 28, 2000 stated, "We have conducted a review of the project and are aware of no properties of architectural, historic, or archaeological significance which would be affected by the project. Therefore, we have no comment on the project as currently proposed." A copy of the SHPO letter is included in the Appendix.

VII. ENVIRONMENTAL EFFECTS

The project is expected to have an overall positive impact. Replacement of an inadequate bridge will result in safer traffic operations.

The project is a Federal "Categorical Exclusion" due to its limited scope and lack of significant environmental consequences.

The bridge replacement will not have an adverse effect on the quality of the human or natural environment with the use of current NCDOT standards and specifications.

The project is not in conflict with any plan, existing land use, or zoning regulation. No significant change in land use is expected to result from construction of the project.

No adverse impact on families or communities is anticipated. Right of way acquisition will be limited. No relocatees are expected with implementation of the proposed alternative.

In compliance with Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations) a review was conducted to determine whether

minority or low-income populations were receiving disproportionately high and adverse human health or environmental impacts as a result of this project. The investigation determined the project would not disproportionately impact any minority or low-income populations.

No adverse effect on public facilities or services is anticipated. The project is not expected to adversely affect social, economic, or religious opportunities in the area.

There are no publicly owned recreational facilities, or wildlife and waterfowl refuges of national, state, or local significance in the vicinity of the project.

The Farmland Protection Policy Act requires all federal agencies or their representatives to consider the potential impacts to prime and important farmland soils by all land acquisition and construction projects. Prime and important farmland soils are defined by the Natural Resources Conservation Service (NRCS). Since there are no prime or important farmlands in the immediate vicinity of the proposed bridge the Farmland Protection Policy does not apply.

This project is located in Durham County, which is within the Raleigh-Durham nonattainment area for ozone (O_3) and carbon monoxide (CO) as defined by the EPA. The 1990 Clean Air Act Amendments (CAAA) designated these areas as "moderate" nonattainment areas for O_3 and CO. However due to improved monitoring data, these areas were redesignated as "maintenance " for O_3 on June 17, 1994, and "maintenance for CO on September 18, 1995. Section 176(c) of the CAAA requires that transportation plans, programs, and projects conform to the intent of the state air quality implementation plan (SIP). The current SIP does not contain any transportation control measures for Durham County. The Durham-Chapel Hill-Carrboro 2025 Long Range Transportation Plan (LRTP) and the 2000-2006 Metropolitan Transportation Improvement Program (MTIP) has been determined to conform to the intent of the SIP. The USDOT air quality conformity of the LRTP was February 29, 2000 and the USDOT air quality conformity on the MTIP was February 29, 2000. The current conformity determination is consistent with the final conformity rule found in 40 CFR Parts 51 and 93. There have been no significant changes in the project's design concept or scope, as used in the conformity analyses.

The traffic volumes will not increase or decrease because of this project. There are no receptors located in the immediate project area. The project's impact on noise and air quality will not be significant.

Noise levels could increase during construction but will be temporary. If vegetation is disposed of by burning, all burning shall be done in accordance with applicable local laws and regulations of the North Carolina SIP for air quality in compliance with 15 NCAC 2D.0520. This evaluation completes the assessment requirements for highway traffic noise (23 CFR Part 772) and for air quality (1990 CAAA and NEPA) and no additional reports are required.

An examination of records at the North Carolina Department of Environment and Natural Resources, Division of Water Quality, Groundwater Section and the North Carolina Department of Human Resources, Solid Waste Management Section revealed no hazardous waste sites, no regulated or unregulated landfills, or dump sites in the project area.

Durham County is a participant in the National Flood Insurance Regular Program. The project site on Prong of Mud Creek is included in a detailed Federal Emergency Management Agency (F.E.M.A.) flood study. Attached is a copy of the Flood Insurance Rate Map, Figure 5, on which are shown the approximate limits of the 100-year flood plain in the vicinity of the project.

On the basis of the above discussion, it is concluded that no significant adverse environmental effects will result from implementation of the project.

VIII. PUBLIC INVOLVEMENT

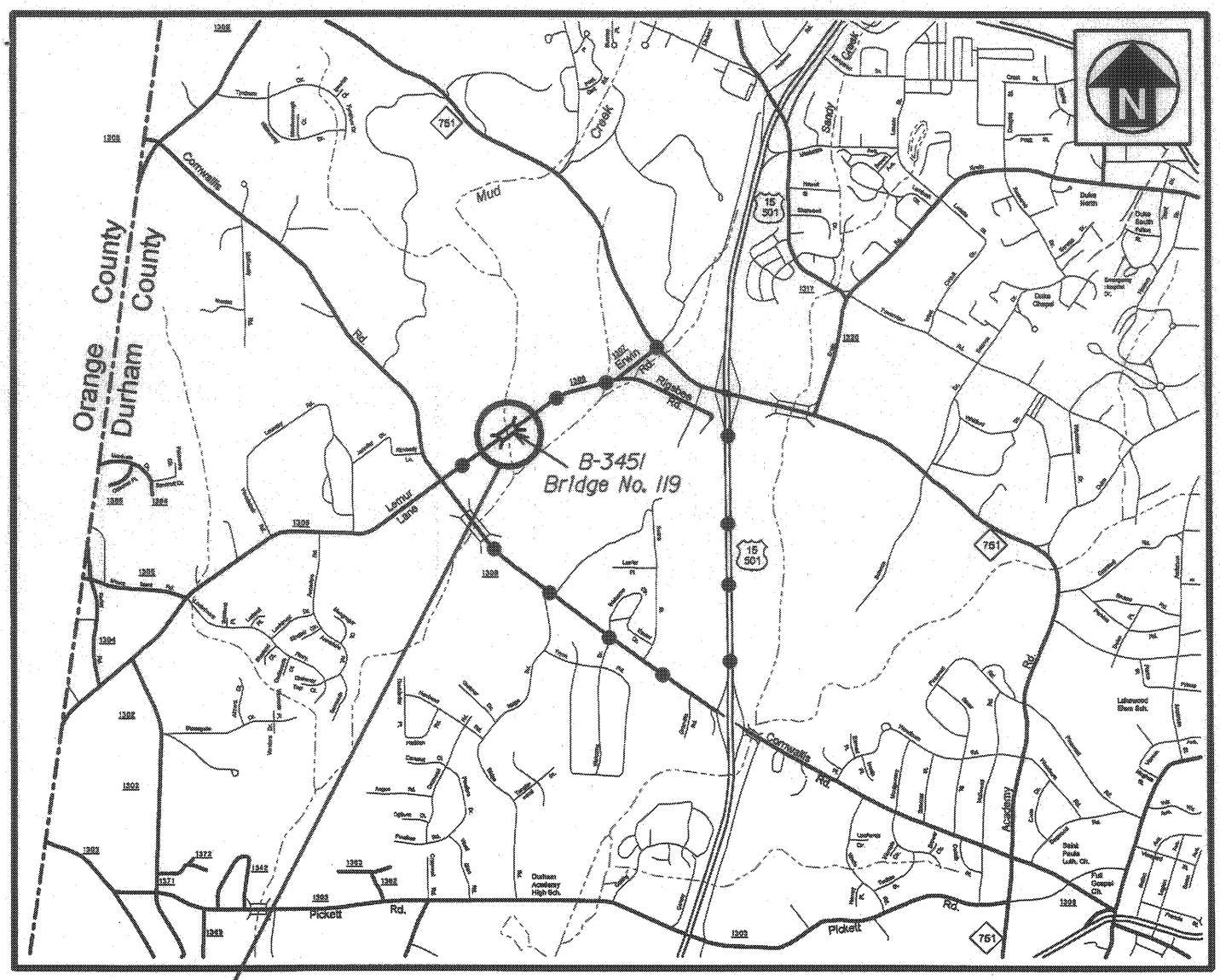
Efforts were undertaken early in the planning process to contact local officials to involve them in the project development with scoping letters. A newsletter was also mailed to local residents explaining the planning process and the selected Alternative.

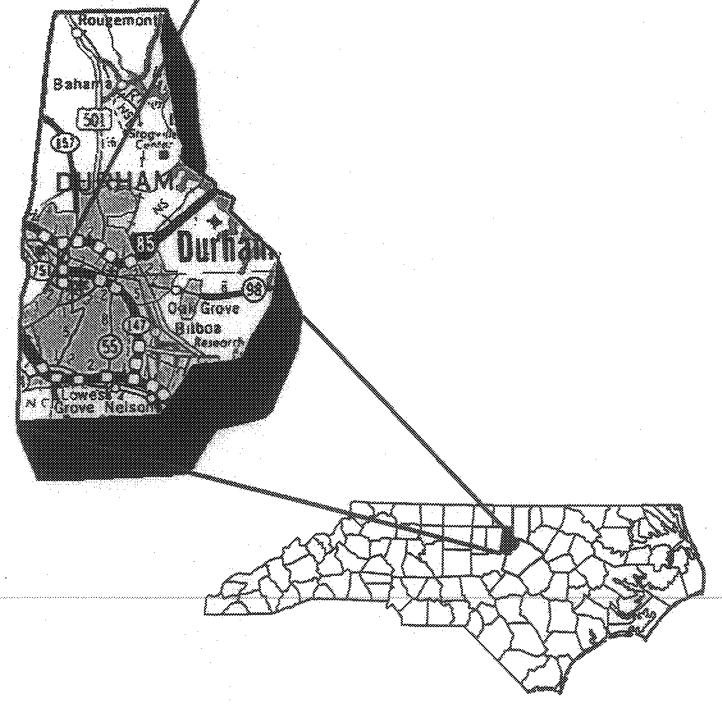
IX. AGENCY

The North Carolina Natural Heritage Program has identified New Hope Creek and its tributaries, including Mud Creek, to be vital wildlife movement corridors. In an effort to maintain these corridors a 15-foot bare earth passage will be provide along both stream banks.

The City of Durham Transportation Division requested that bike lanes be provided for this project. SR 1306 is not a designated bicycle route, however the 8-foot paved shoulders on the new structure and the 4-foot paved shoulders on the approach roadway will provide adequate accommodation for bicycle traffic.

Duke University asked that there be discussion of the fate of the beaver dam on the upstream side of the existing bridge. The bridge will be replaced at the existing location using an off-site detour. All efforts will be made to avoid any impact to the beaver dam.





LEGEND

Studied Detour Route

North Carolina Department Of Transportation
Project Development & Environmental Analysis

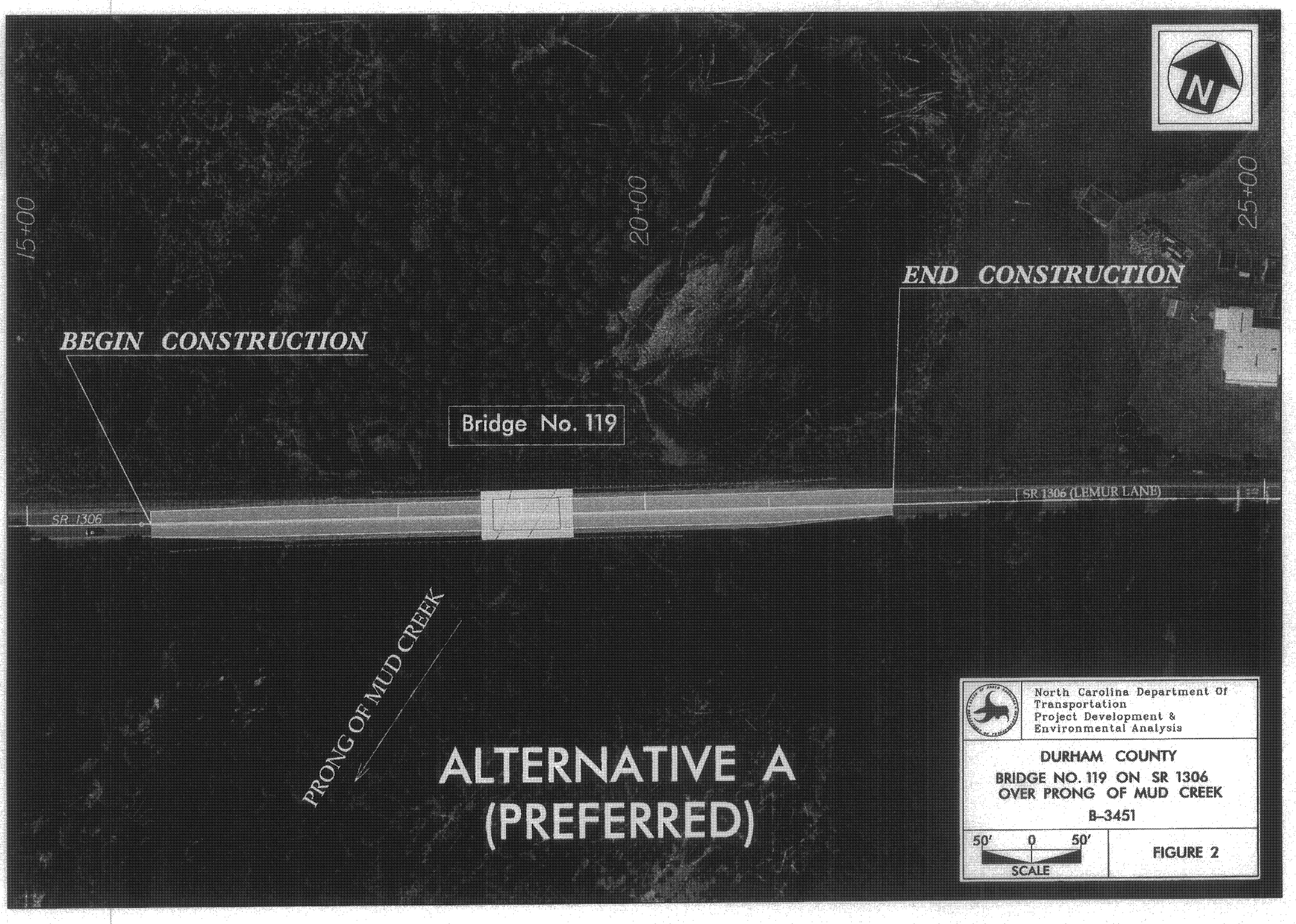
DURHAM COUNTY

BRIDGE NO. 119 ON SR 1306 OVER PRONG OF MUD CREEK

B-3451

0 kilometers 0.8 kilometers 1.6
0 miles 0.5 miles 1.0

FIGURE 1



North Carolina Department Of Transportation
Project Development & Environmental Analysis

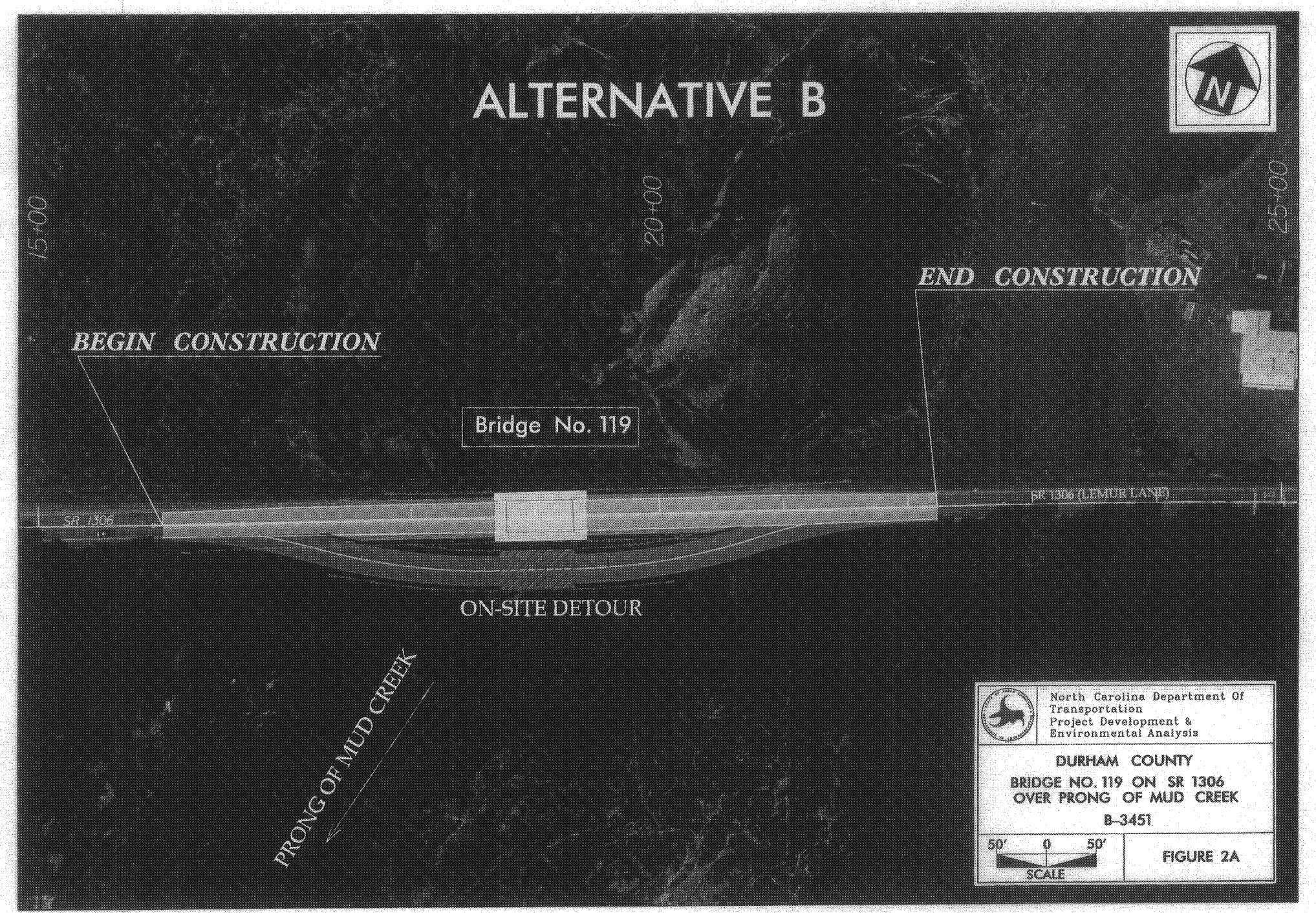
DURHAM COUNTY

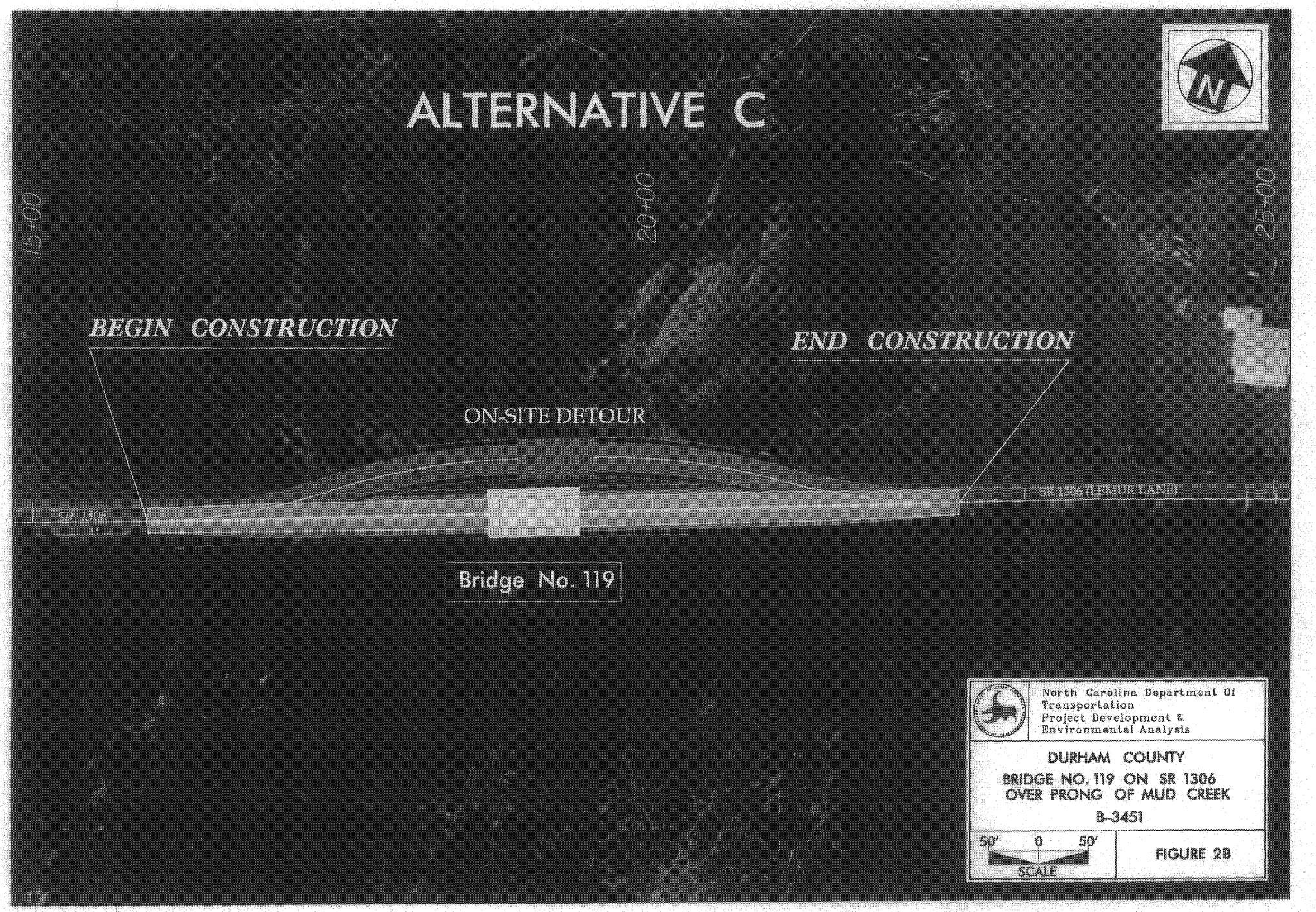
BRIDGE NO. 119 ON SR 1306 OVER PRONG OF MUD CREEK

B-3451

50′ 0 50′
SCALE

FIGURE 2


ALTERNATIVE B
N
15+00
20+00
25+00
END CONSTRUCTION
BEGIN CONSTRUCTION
Bridge No. 119
SR 1306
SR 1306 (LEMUR LANE)
ON-SITE DETOUR
PRONG OF MUD CREEK
North Carolina Department Of Transportation
Project Development & Environmental Analysis
DURHAM COUNTY
BRIDGE NO. 119 ON SR 1306
OVER PRONG OF MUD CREEK
B-3451
50' 0 50'
SCALE
FIGURE 2A



North Carolina Department Of Transportation
Project Development & Environmental Analysis

DURHAM COUNTY

BRIDGE NO. 119 ON SR 1306 OVER PRONG OF MUD CREEK

B-3451

50' 0 50'
SCALE

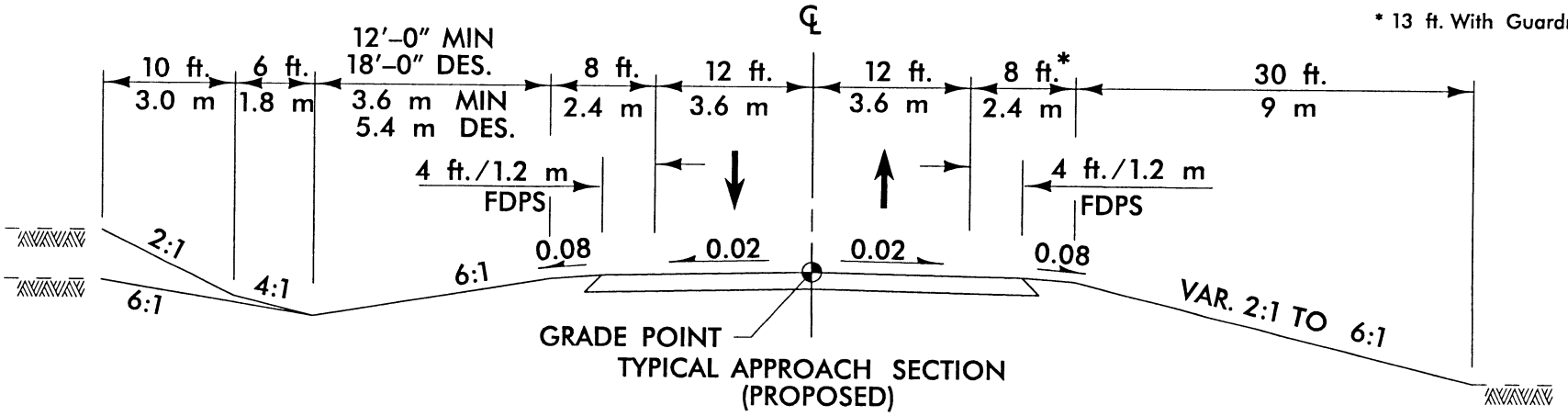
FIGURE 2B

View of bridge and approaches.

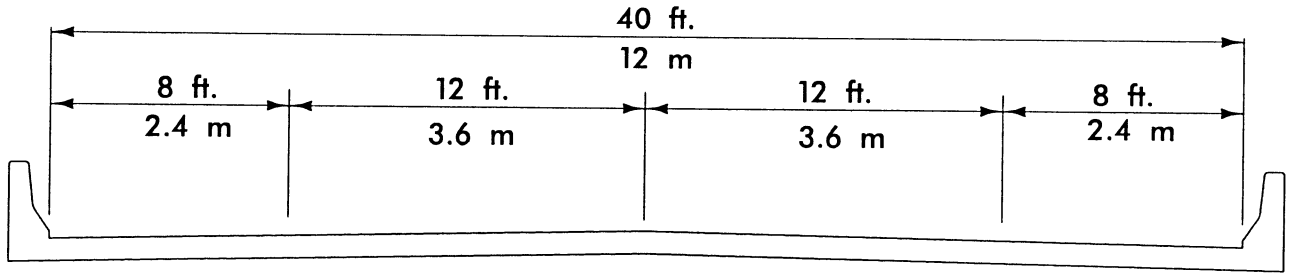
View of bridge from downstream.

View of bald cypress plantation downstream from bridge.

FIGURE 3



TYPICAL APPROACH SECTION
(PROPOSED)



TYPICAL BRIDGE SECTION

EXISTING BRIDGE NO.119 LENGTH IS 50' (15 m)
PROPOSED BRIDGE LENGTH 85' (26m)

DESIGN DATA

(EXISTING) 2001 ADT = 13,400 LOS E
(CONST. YR.) 2002 ADT = 13,600 LOS E
(DESIGN YR.) 2025 ADT = 23,500 LOS F
DUAL 3%
TTST 1%

DESIGN SPEED 50 MPH (80 KPH)
POSTED SPEED LIMIT 45 MPH (70 KPH)
MAX. DEGREE OF CURVE 6 Degrees (Min Radius 250 m)
MAX. GRADE 7%
MIN. DES. K FAC.: Ksag = 90–110 Kcrest = 110–160
METRIC: Ksag = 25–32 Kcrest = 32–49

FUNCTIONAL CLASSIFICATION : URBAN MINOR ARTERIAL

ON SITE DETOUR DESIGN DATA: DESIGN SPEED 40 MPH (60 KPH) MAX. DEGREE 11 (MIN. RADIUS 135 m)

North Carolina Department
Of Transportation
Project Development &
Environmental Analysis

DURHAM COUNTY
BRIDGE NO. 119 ON SR 1306
LEMUR LANE
OVER PRONG OF MUD CREEK
TIP NO: B-3451

FIGURE 4

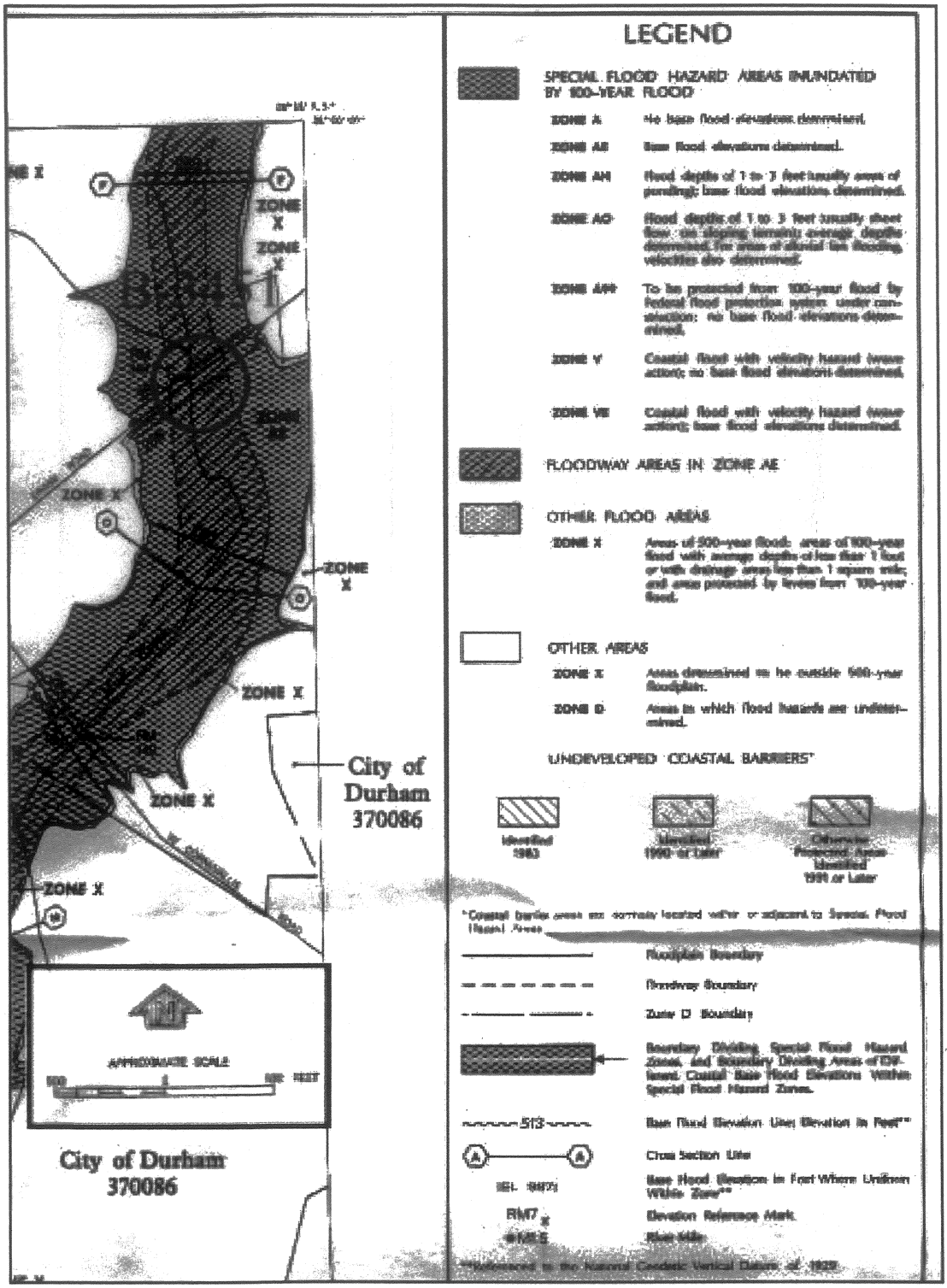

LEGEND
SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD
ZONE A
ZONE AE
ZONE AH
ZONE AO
ZONE A99
ZONE V
ZONE VE
FLOODWAY AREAS IN ZONE AE
OTHER FLOOD AREAS
ZONE X
OTHER AREAS
ZONE X
ZONE D
UNDEVELOPED COASTAL BARRIERS*
Identified 1983
Identified 1990 or Later
Otherwise Protected Areas Identified 1991 or Later
Floodplain Boundary
Floodway Boundary
Zone D Boundary
Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
513
Base Flood Elevation Line; Elevation in Feet**
Cross Section Line
Base Flood Elevation in Feet Where Uniform Within Zone**
RM7
Elevation Reference Mark
River Mile
*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas
**Referenced to the National Geodetic Vertical Datum of 1929
ZONE X
City of Durham 370086
APPROXIMATE SCALE
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
DURHAM COUNTY, NORTH CAROLINA AND INCORPORATED AREAS
PANEL 151 OF 200
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY
NUMBER
PANEL
SUFFIX
MAP NUMBER
37063C0151 G
EFFECTIVE DATE:
FEBRUARY 2, 1996
Federal Emergency Management Agency

FIGURE 5

APPENDIX

7/6/00

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

June 30, 2000

Mr. William D. Gilmore, P.E., Manager
NCDOT
Project Development and Environmental Analysis Branch
1548 Mail Service Center
Raleigh, NC 27699-1548

Dear Mr. Gilmore:

Thank you for your June 2, 2000 request for information from the U.S. Fish and Wildlife Service (Service) on the potential environmental impacts of proposed bridge replacements in Wake and Durham Counties, North Carolina. This report provides scoping information and is provided in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661-667d) and Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543). This report also serves as initial scoping comments to federal and state resource agencies for use in their permitting and/or certification processes for this project.

The North Carolina Department of Transportation (NCDOT) proposes to replace the following bridge structures:

1. B-3375 Bridge No. 301 over Swift Creek and Bridge No 471 over Lake Wheeler Spillway on SR 1375 (Lake Wheeler Road), Wake County;

2. B-3450 Bridge No. 217 over New Hope Creek and Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road), Durham County;

3. B-3451 Bridge No. 119 over Prong of Mud Creek on SR 1306 (Lemur Lane), Durham County;

4. B-3522 Bridge No. 215 over Buffalo Creek on SR 1007 (Poole Road), Wake County; and,

5. B-3528 Bridge No. 429 over Sycamore Creek on SR 1839 (Leesville Road), Wake and Durham Counties.

The following recommendations are provided to assist you in your planning process and to facilitate a thorough and timely review of the project.

Generally, the Service recommends that wetland impacts be avoided and minimized to the maximum extent practical as outlined in Section 404 (b)(1) of the Clean Water Act Amendments of 1977. In regard to avoidance and minimization of impacts, we recommend that proposed highway projects be aligned along or adjacent to existing roadways, utility corridors, or previously developed areas in order to minimize habitat fragmentation and encroachment. Areas exhibiting high biodiversity or ecological value important to the watershed and region should be avoided. Crossings of streams and associated wetland systems should use existing crossings and/or occur on a structure wherever feasible. Where bridging is not feasible, culvert structures that maintain natural water flows and hydraulic regimes without scouring, or impeding fish and wildlife passage, should be employed. Highway shoulder and median widths should be reduced through wetland areas. Roadway embankments and fill areas should be stabilized by using appropriate erosion control devices and techniques. Wherever appropriate, construction in sensitive areas should occur outside fish spawning and migratory bird nesting seasons.

The National Wetlands Inventory (NWI) maps of the Lake Wheeler, Knightdale, Southeast Durham, and Southwest Durham 7.5 Minute Quadrangles show wetland resources in the specific work areas. However, while the NWI maps are useful for providing an overview of a given area, they should not be relied upon in lieu of a detailed wetland delineation by trained personnel using an acceptable wetland classification methodology. Therefore, in addition to the above guidance, we recommend that the environmental documentation for this project include the following in sufficient detail to facilitate a thorough review of the action.

1. The extent and acreage of waters of the U.S., including wetlands, that are to be impacted by filling, dredging, clearing, ditching, or draining. Acres of wetland impact should be differentiated by habitat type based on the wetland classification scheme of the National Wetlands Inventory. Wetland boundaries should be determined by using the 1987 Corps of Engineers Wetlands Delineation Manual and verified by the U.S. Army Corps of Engineers.

2. If unavoidable wetland impacts are proposed, we recommend that every effort be made to identify compensatory mitigation sites in advance. Project planning should include a detailed compensatory mitigation plan for offsetting unavoidable wetland impacts. Opportunities to protect mitigation areas in perpetuity, preferably via conservation easement, should be explored at the outset.

The enclosed lists identify the federally-listed endangered and threatened species, and Federal Species of Concern (FSC) that are known to occur in Durham and Wake Counties. The Service recommends that habitat requirements for the listed species be compared with the available habitats at the respective project sites. If suitable habitat is present within the action area of the project, biological surveys for the listed species should be performed. Environmental documentation that includes survey methodologies, results, and NCDOT's recommendations based on those results, should be provided to this office for review and comment.

FSC's are those plant and animal species for which the Service remains concerned, but further biological research and field study are needed to resolve the conservation status of these taxa. Although FSC's receive no statutory protection under the ESA, we encourage the NCDOT to be

alert to their potential presence, and to make every reasonable effort to conserve them if found. The North Carolina Natural Heritage Program should be contacted for information on species under state protection.

The Service appreciates the opportunity to comment on these projects. Please continue to advise us during the progression of the planning process, including your official determination of the impacts of these projects. If you have any questions regarding these comments, please contact Tom McCartney at 919-856-4520, ext. 32.

Sincerely,

For Tom Augspurger

Dr. Garland B. Pardue
Ecological Services Supervisor

Enclosures

cc:
COE, Raleigh, NC (Eric Alsmeyer)
NCDWQ, Raleigh, NC (John Hennessey)
NCDNR, Northside, NC (David Cox)
FHWA, Raleigh, NC (Nicholas Graf)
EPA, Atlanta, GA (Ted Bisterfield)

FWS/R4:TMcCartney:TM:06/28/00:919/856-4520 extension 32:\bdgswake.dur

COMMON NAME	SCIENTIFIC NAME	STATUS
DAVIE COUNTY		
Vascular Plants		
Heller's trefoil	*Lotus helleri*	FSC*
Michaux's sumac	*Rhus michauxii*	Endangered
DUPLIN COUNTY		
Vertebrates		
American alligator	*Alligator mississippiensis*	T(S/A)*
Southern hognose snake	*Heterodon simus*	FSC*
Red-cockaded woodpecker	*Picoides borealis*	Endangered
Invertebrates		
Croatan crayfish	*Procambarus plumimanus*	FSC
Vascular Plants		
Venus flytrap	*Dionaea muscipula*	FSC
Savanna cowbane	*Oxypolis ternata*	FSC
DURHAM COUNTY		
Vertebrates		
Bald eagle	*Haliaeetus leucocephalus*	Threatened
Invertebrates		
Atlantic pigtoe	*Fusconaia masoni*	FSC
Septima's clubtail dragonfly	*Gomphus septima*	FSC
Yellow lampmussel	*Lampsilis cariosa*	FSC
Green floater	*Lasmigona subviridus*	FSC
Panhandle pebblesnail	*Somotogyrus virginicus*	FSC
Vascular Plants		
Tall larkspur	*Delphinium exaltatum*	FSC
Smooth coneflower	*Echinacea laevigata*	Endangered
Butternut	*Juglans cinerea*	FSC
Sweet pinesap	*Monotropsis odorata*	FSC
Michaux's sumac	*Rhus michauxii*	Endangered
Nonvascular Plants		
A liverwort	*Plagiochila columbiana*	FSC

COMMON NAME	SCIENTIFIC NAME	STATUS
WAKE COUNTY		
Vertebrates		
Bachman's sparrow	*Aimophila aestivalis*	FSC
Bald eagle	*Haliaeetus leucocephalus*	Threatened
Southern hognose snake	*Heterodon simus*	FSC*
Southeastern myotis	*Myotis austroriparius*	FSC
Red-cockaded woodpecker	*Picoides borealis*	Endangered
Invertebrates		
Dwarf wedge mussel	*Alasmidonta heterodon*	Endangered
Yellow lance	*Elliptio lanceolata*	FSC
Atlantic pigtoe	*Fusconaia masoni*	FSC
Green floater	*Lasmigona subviridus*	FSC
Diana fritillary butterfly	*Speyeria diana*	FSC*
Vascular Plants		
Sweet pinesap	*Monotropsis odorata*	FSC
Michaux's sumac	*Rhus michauxii*	Endangered
Carolina least trillium	*Trillium pusillum* var. *pusillum*	FSC
WARREN COUNTY		
Vertebrates		
Bachman's sparrow	*Aimophila aestivalis*	FSC
Invertebrates		
Dwarf wedge mussel	*Alasmidonta heterodon*	Endangered
Yellow lance	*Elliptio lanceolata*	FSC
Tar spinymussel	*Elliptio steinstansana*	Endangered
Atlantic pigtoe	*Fusconaia masoni*	FSC
Vascular Plants		
Heller's trefoil	*Lotus helleri*	FSC
WASHINGTON COUNTY		
Vertebrates		
Red wolf	*Canis rufus*	EXP
Rafinesque's big-eared bat	*Corynorhinus (=Plecotus) rafinesquii*	FSC
Waccamaw killifish	*Fundulus waccamawensis*	FSC
Bald eagle	*Haliaeetus leucocephalus*	Threatened

North Carolina Wildlife Resources Commission

Charles R. Fullwood, Executive Director

TO: Stacy Harris, PE
Project Engineer, NCDOT

FROM: David Cox, Highway Project Coordinator
Habitat Conservation Program

DATE: January 8, 2001

SUBJECT: NCDOT Bridge Replacements in Wake and Durham counties of North Carolina. TIP Nos. B-3375, B-3450, B-3451, B-3522, and B-3528.

Biologists with the N. C. Wildlife Resources Commission (NCWRC) have reviewed the information provided and have the following preliminary comments on the subject project. Our comments are provided in accordance with provisions of the National Environmental Policy Act (42 U.S.C. 4332(2)(c)) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d).

On bridge replacement projects of this scope our standard recommendations are as follows:

1. We generally prefer spanning structures. Spanning structures usually do not require work within the stream and do not require stream channel realignment. The horizontal and vertical clearances provided by bridges allows for human and wildlife passage beneath the structure, does not block fish passage, and does not block navigation by canoeists and boaters.

2. Bridge deck drains should not discharge directly into the stream.

3. Live concrete should not be allowed to contact the water in or entering into the stream.

4. If possible, bridge supports (bents) should not be placed in the stream.

5. If temporary access roads or detours are constructed, they should be removed back to original ground elevations immediately upon the completion of the project. Disturbed areas should be seeded or mulched to stabilize the soil and native tree species should be planted with a spacing of not more than 10'x10'. If possible, when using temporary structures the area should be cleared but not grubbed. Clearing the area with chain

saws, mowers, bush-hogs, or other mechanized equipment and leaving the stumps and root mat intact, allows the area to revegetate naturally and minimizes disturbed soil.

6. A clear bank (riprap free) area of at least 10 feet should remain on each side of the steam underneath the bridge.

7. In trout waters, the N.C. Wildlife Resources Commission reviews all U.S. Army Corps of Engineers nationwide and general '404' permits. We have the option of requesting additional measures to protect trout and trout habitat and we can recommend that the project require an individual '404' permit.

8. In streams that contain threatened or endangered species, NCDOT biologist Mr. Tim Savidge should be notified. Special measures to protect these sensitive species may be required. NCDOT should also contact the U.S. Fish and Wildlife Service for information on requirements of the Endangered Species Act as it relates to the project.

9. In streams that are used by anadromous fish, the NCDOT official policy entitled "Stream Crossing Guidelines for Anadromous Fish Passage (May 12, 1997)" should be followed.

10. In areas with significant fisheries for sunfish, seasonal exclusions may also be recommended.

11. Sedimentation and erosion control measures sufficient to protect aquatic resources must be implemented prior to any ground disturbing activities. Structures should be maintained regularly, especially following rainfall events.

12. Temporary or permanent herbaceous vegetation should be planted on all bare soil within 15 days of ground disturbing activities to provide long-term erosion control.

13. All work in or adjacent to stream waters should be conducted in a dry work area. Sandbags, rock berms, cofferdams, or other diversion structures should be used where possible to prevent excavation in flowing water.

14. Heavy equipment should be operated from the bank rather than in stream channels in order to minimize sedimentation and reduce the likelihood of introducing other pollutants into streams.

15. Only clean, sediment-free rock should be used as temporary fill (causeways), and should be removed without excessive disturbance of the natural stream bottom when construction is completed.

16. During subsurface investigations, equipment should be inspected daily and maintained to prevent contamination of surface waters from leaking fuels, lubricants, hydraulic fluids, or other toxic materials.

If corrugated metal pipe arches, reinforced concrete pipes, or concrete box culverts are used:

1. The culvert must be designed to allow for fish passage. Generally, this means that the culvert or pipe invert is buried at least 1 foot below the natural stream bed. If multiple cells are required the second and/or third cells should be placed so that their bottoms are at stream bankful stage (similar to Lyonsfield design). This could be

accomplished by constructing a low sill on the upstream end of the other cells that will divert low flows to another cell. This will allow sufficient water depth in the culvert or pipe during normal flows to accommodate fish movements. If culverts are long, notched baffles should be placed in reinforced concrete box culverts at 15 foot intervals to allow for the collection of sediments in the culvert, to reduce flow velocities, and to provide resting places for fish and other aquatic organisms moving through the structure.

2. If multiple pipes or cells are used, at least one pipe or box should be designed to remain dry during normal flows to allow for wildlife passage.

3. Culverts or pipes should be situated so that no channel realignment or widening is required. Widening of the stream channel at the inlet or outlet of structures usually causes a decrease in water velocity causing sediment deposition that will require future maintenance.

4. Riprap should not be placed on the stream bed.

In most cases, we prefer the replacement of the existing structure at the same location with road closure. If road closure is not feasible, a temporary detour should be designed and located to avoid wetland impacts, minimize the need for clearing and to avoid destabilizing stream banks. If the structure will be on a new alignment, the old structure should be removed and the approach fills removed from the 100-year floodplain. Approach fills should be removed down to the natural ground elevation. The area should be stabilized with grass and planted with native tree species. If the area that is reclaimed was previously wetlands, NCDOT should restore the area to wetlands. If successful, the site may be used as wetland mitigation for the subject project or other projects in the watershed.

Project specific comments:

1. B-3375 – Wake County – Bridge No. 301 over Swift Creek and Bridge No. 471 over Lake Wheeler Spillway. We request that High Quality Sedimentation and Erosion Control Measures be used due to the stream classification of WS-III. We are not aware of any threatened of endangered species in the project vicinity.

2. B-3450 – Durham County – Bridge No. 122 over Sandy Creek and Bridge No. 217 over an unnamed tributary to Sandy Creek. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity. NCDOT should pay particular attention to wildlife passage issues on these bridges due to the interest in the New Hope Creek Corridor as a greenway and wildlife travel corridor.

3. B-3451 – Durham County – Bridge No. 119 over Mud Creek. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

4. B-3522 – Wake County – Bridge No. 215 over Buffalo Creek. Buffalo Creek has a DWQ classification of B, therefore we request that NCDOT use High Quality Sedimentation and Erosion Control Measures. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

5. B-3528 – Wake/Durham counties – Bridge No. 429 over Sycamore Creek. Sycamore Creek has a DWQ classification of B, therefore we request that NCDOT use High Quality

Sedimentation and Erosion Control Measures. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

We request that NCDOT routinely minimize adverse impacts to fish and wildlife resources in the vicinity of bridge replacements. The NCDOT should install and maintain sedimentation control measures throughout the life of the project and prevent wet concrete from contacting water in or entering into these streams. Replacement of bridges with spanning structures of some type, as opposed to pipe or box culverts, is recommended in most cases. Spanning structures allow wildlife passage along streambanks, reducing habitat fragmentation and vehicle related mortality at highway crossings.

If you need further assistance or information on NCWRC concerns regarding bridge replacements, please contact me at (919) 528-9886. Thank you for the opportunity to review and comment on these projects.

7/13/00

NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF SOIL AND WATER CONSERVATION

SOIL & WATER CONSERVATION

NCDENR

JAMES B. HUNT JR.
GOVERNOR

BILL HOLMAN
SECRETARY

DAVID S. VOGEL
DIRECTOR

MEMORANDUM: July 6, 2000

TO: Melba McGee

FROM: David Harrison DSH

SUBJECT: NCDOT Bridge Replacement Projects B-3375, B-3450, B-3451, B-3522 and B-3528.

The detour routes included in the bridge replacement plans should eliminate any farmland impacts.

If additional land is needed beyond the existing right-of-way the environmental assessment should include information on adverse impacts to Prime or Statewide Important Farmland. The definition of Prime or Statewide Important Farmland is based on the soil series and not on its current land use. Areas that are developed or are within municipal boundaries are exempt from consideration as Prime or Important Farmland.

For additional information, contact the soils specialists with the Natural Resources Conservation Service, USDA, Raleigh, NC at (919) 873-2141.

Cc: Stacy Harris

6/7/00
7/6/00

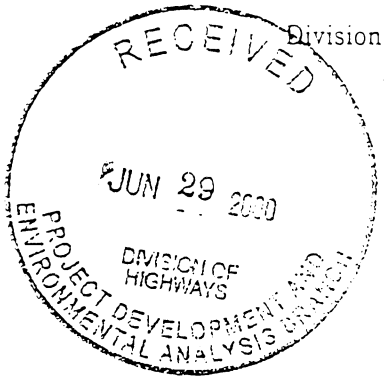
North Carolina Department of Cultural Resources

State Historic Preservation Office

David L. S. Brook, Administrator

James B. Hunt Jr., Governor
Betty Ray McCain, Secretary

Division of Archives and History
Jeffrey J. Crow, Director



June 28, 2000

William D. Gilmore, PE, Manager
NCDOT
1548 Mail Service Center
Raleigh, North Carolina 27699-1548

Re: Replacement of Bridge No. 119 over Prong of Mud Creek on NC 1306 (Lemur Lane), B-3451, Durham County, ER 00-10112

Dear Mr. Gilmore:

Thank you for your letter of June 2, 2000, concerning the above project.

We have conducted a review of the project and are aware of no properties of architectural, historic, or archaeological significance which would be affected by the project. Therefore, we have no comment on the project as currently proposed.

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, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763.

Sincerely,

Renee Gledhill-Earley

cc: David Brook
Deputy State Historic Preservation Officer

Federal Aid #BRSTP-1306(4) *TIP* #B-3451 *County*: Durham

CONCURRENCE FORM FOR PROPERTIES NOT ELIGIBLE FOR THE NATIONAL REGISTER OF HISTORIC PLACES

Project Description: Replace Bridge No. 119 on SR 1306 over prong of Mud Creek

On March 27, 2000, representatives of the

- [x] North Carolina Department of Transportation (NCDOT)
- [ ] Federal Highway Administration (FHWA)
- [x] North Carolina State Historic Preservation Office (SHPO)

Reviewed the subject project at

- [ ] a scoping meeting
- [x] photograph review session/consultation
- [ ] other

All parties present agreed

- [ ] there are no properties over fifty years old within the project's area of potential effect.
- [x] there are no properties less than fifty years old which are considered to meet Criterion Consideration G within the project's area of potential effect.
- [x] there are properties over fifty years old (list attached) within the project's area of potential effect, but based on the historical information available and the photographs of each property, properties identified as #1 are considered not eligible for the National Register and no further evaluation of them is necessary.
- [x] there are no National Register-listed properties located within the project's area of potential effect.

Signed:

Mary Pope Furr — 3-27-00
Representative, NCDOT — Date

Michael C. Dawson — 4/13/00
FHWA, for the Division Administrator, or other Federal Agency — Date

[signature] — 3/27/00
Representative, SHPO — Date

[signature] Deputy — 4-12-00
State Historic Preservation Officer — Date

6/7/00

NCDENR

NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES

DIVISION OF PARKS AND RECREATION

June 28, 2000

JAMES B. HUNT JR.
GOVERNOR

BILL HOLMAN
SECRETARY

DR. PHILIP K. MCKNELLY
DIRECTOR

MEMORANDUM

TO: Stacy Harris, DOT

FROM: Stephen Hall SH

SUBJECT: Bridge Replacement Projects, New Hope and Mud Creeks, Durham County

REFERENCE: B-3450, B-3451

The North Carolina Natural Heritage Program has identified New Hope Creek and its tributaries, including Mud Creek, to be vital wildlife movement corridors linking units of Duke Forest at the upstream end with the New Hope Game Land downstream.

Depending on the way the bridges are replaced, there is potential for significant impacts to this corridor system. We strongly recommend that bridges be used instead of culverts and that a 15' wide bare earth passage should be left along both streambanks; rip-rap should not occlude the passage of animals either beneath the bridge or along its approaches.

We further recommend that consultation be made with the Wildlife Resources Commission to determine appropriate bridge design. Other agencies or organizations that should be consulted include the Triangle Land Conservancy, Friends of the New Hope, and the Durham County Planning Department.

/sph

DURHAM
1 8 6 9
CITY OF MEDICINE

City of Durham
Transportation Division
Department of Public Works
101 City Hall Plaza
Durham, North Carolina 27701

Phone: (919) 560-4366
Fax: (919) 560-4540
www.ci.durham.nc.us

July 11, 2000

Ms. Stacy Harris, P.E.
Project Development & Environmental Analysis Branch
N. C. Department of Transportation
1548 Mail Service Center
Raleigh, N.C. 27699-1548

SUBJECT: Comments for Bridge Replacement Projects B-3450, B-3451, and B-3528 in Durham, North Carolina

Dear Ms. Harris:

In response to Mr. William Gilmore's letters of June 2, 2000 to Mayor Tennyson and P. Lamont Ewell, City Manager, the City of Durham offers the following comments concerning the subject bridge replacement projects. Please note that the Erwin Road (B-3451) and the Leesville Road (B-3528) projects are located outside the City limits. However, the proposed Erwin Road bridge detour route partially occurs within the City limits.

Project	Comments
B-3459 B-3450 (~~Bridge~~ No. 217 over New Hope Creek and Bridge No. 122 over Sandy Creek on Garrett Road)	1. The project design, scope, and schedule must be coordinated with projects U-4009 (US 15-501 Service Road relocation) and U-4012 (US 15-501 widening project). Avoid coinciding the respective project detour routes and schedules. 2. The proposed bridge should provide a five-lane curb and gutter cross section, with wide outside lanes for bicycles, consistent with U-4009. 3. Provide sidewalks for the extent of the curb and gutter section of the project limits, and/or extend to match proposed sidewalk construction requested as by the City as part of U-4009. 4. Due to existing traffic volumes on Garrett Road and severe congestion on the proposed detour route, a detour bridge or staged construction of a multi-lane structure should be incorporated into the project scope. The proposed detour route will adversely affect emergency vehicle response times, City bus service, and area traffic congestion. A detour route is not acceptable to the City. If NCDOT does not concur with this recommendation, please advise the City Manager and plan to hold a public workshop and/or hearing to advise the City Council and the public of the department's decision.

Project	Comments
B-3459 3450	5. Consider alternative bridge design concepts for aesthetic enhancement.
B-3451 (Bridge No. 119 over Prong of Mud Creek on NC 751)	1. Provide bike lanes in the proposed cross section. 2. The proposed detour schedule must not coincide with the detours of other area NCDOT projects, including U-4009, U-4012, and B-3459. 3. The proposed detour route will increase congestion at Cornwallis Road and US 15-501 ramp intersections. Appropriate traffic control measures should be studied and constructed as part of the project (such as traffic signals and turn lanes at Cornwallis Road and US 15-501 ramps). 4. Consider alternative bridge design concepts for aesthetic enhancement.
B-3528 Bridge No. 429 over Sycamore Creek on Leesville Road	1. Include bike lanes in the proposed cross section.

The City of Durham requests that these comments be included in the project record and addressed in the respective project environmental documents and project designs. Please keep the City advised of each projects' progress. If you need any additional information, please feel free to contact me at 560-4366. The N. C. Department of Transportation's coordination with the City of Durham is greatly appreciated.

Sincerely,

H. Wesley Parham, P.E.
Senior Transportation Engineer

cc: Mayor Nicholas J. Tennyson
P. Lamont Ewell, City Manager
Mark D. Ahrendsen, Transportation Manager
Stuart Carson, P.E., Civil Engineer III

DURHAM OPEN SPACE AND TRAILS COMMISSION

July 3, 2000

TO: Mr. William D. Gilmore, Manager
Project Development and Environmental Analysis
State of North Carolina Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699

FROM: Annette G. Montgomery, Chair/Development Review Committee
Durham Open Space and Trails Commission

SUBJECT: Bridge Replacement Project B-3451

It has come to our attention, through the New Hope Corridor Advisory Committee, that you are currently preparing the planning as well as environmental study for replacement of this bridge that will cross Mud Creek. The New Hope corridor including Mud Creek is a part of our DUTAG Master Plan. And while the bridge in question may also have impacts on the adjacent Duke Forest, in our advisory capacity to both the Durham City Council and the Board of County Commissioners, we would be remiss should we fail to provide input to you.

Preservation of the water quality, wildlife habitat and other natural resources are of prime importance to us. All precautions should be established to provide maximum protection against harmful impacts during this construction.

We understand that you have been notified regarding the plantations of bald cypress and the wetlands. Other preliminary recommendations we wish to provide include:

- In order to provide dry land passage for wildlife, sufficient horizontal and head room is essential and planning should include columns rather than the standard bridge piers.

- We recommend that the bridge be of sufficient width to provide the required five-foot bicycle lane on each side, outside of motorized vehicular traffic.

101 City Hall Plaza ■ Durham, North Carolina 27701 ■ (919) 560-4137 ■ Fax (919) 560-4641

- We do not favor construction of a bypass during the bridge construction process as it would obviously increase the opportunities for sedimentation into the creek as well as threats to the wildlife habitat.

Thank you for your consideration of our comments. We hope that you will inform us regarding continued planning decisions about this bridge construction process.

Respectfully submitted for DOST.

CC: New Hope Advisory Committee

DURHAM
1 8 6 9
CITY OF MEDICINE

Department of Public Works

101 City Hall Plaza
Durham, North Carolina 27701
Phone: (919) 560-4326
Fax: (919) 560-4316

June 23, 2000

NC Department of Transportation
Project Development and Environmental Analysis
1548 Mail Service Center
Raleigh, NC 27699-1548
Attention: Stacy Harris, P.E.

Re: Request for comments on NCDOT Bridge Replacement Projects B-3450, B-3451 and B-3528

Dear Ms. Harris:

This response is from the City of Durham Public Works Department, Engineering Division. Our primary interests in these projects are potential conflicts with City of Durham potable water and sanitary sewer infrastructure. We have reviewed the locations of the projects and have not identified any City potable water or sanitary sewer facilities in the vicinity of Projects B-3451 and B-3528.

Project B-3450 (replacement of Bridge No. 217 over New Hope Creek and Bridge No. 122 over Sandy Creek on SR 1116 (Garrett Road) is in the vicinity of an existing 16" diameter ductile iron potable water main (see attachments). According to City plans, the main is located outside of the pavement on the east side of Garrett Road and deflects away from both bridges and crosses beneath the channel beds upstream of the bridges. You will need to field locate the water main to confirm its actual location. Additionally, there is a 6" diameter sanitary sewer force main to the north of the project and a 42" diameter sanitary sewer gravity outfall to the south of the project (see attachments). Both the force main and outfall appear to be outside of the limits of impact by the project, but you will also need to field confirm their locations.

Please contact Don Greeley or me at (919) 560-4326 if you have any questions.

Very truly yours,

F. Stuart Carson, P.E.
Civil Engineer III

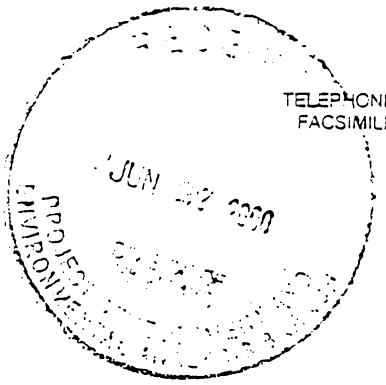
Attachments
Cc: file

Duke University
DURHAM
NORTH CAROLINA
27708-0332

NICHOLAS SCHOOL OF THE ENVIRONMENT
OFFICE OF THE DUKE FOREST
BOX 90332

TELEPHONE (919) 613-8013
FACSIMILE (919) 684-8741

June 20, 2000



Mr. William D. Gilmore, Manager
Project Development and Environmental Analysis
1548 Mail Service Center
Raleigh, NC 27699

Dear Mr. Gilmore:

I have received your letter requesting our input on the future replacement (Project B-3451) of Bridge No.119, located on Erwin Road (SR 1306) at Mud Creek. The land at the NW, SW, and SE quadrants at the bridge crossing are part of the Durham Division of the Duke Forest. As you may be aware, the Duke Forest is owned and managed by Duke University as a natural outdoor laboratory for teaching and research projects. Our observations and preliminary recommendations regarding replacement of this bridge and the potential impacts on the Forest include the following:

- Plantations of bald cypress (*Taxodium distichum*) dating back to 1933 are located both to the north and south of Erwin Road. We recommend that there be a minimum of disturbance to these plantations, as well as the wetland areas both upstream and downstream from the bridge.
- We would not favor construction of a bypass for the bridge during the construction period.
- There should be some discussion of the fate of the beaver dam on the upstream side of the bridge.
- We recommend that the bridge should be wide enough to accommodate a minimum of a five foot bicycle lane on both sides of the bridge, outside the lanes of vehicular traffic.
- We recommend that there be dry land passage for wildlife provided under the bridge.

I would welcome the opportunity to discuss the project in more detail with members of your staff at any time. Thank you for soliciting our comments on the project.

Sincerely,

Judson Edeburn

Judson Edeburn
Duke Forest Resource Manager

Cc: New Hope Creek Open Space Advisory Committee
Dean, Norman L. Christensen Jr.

B-3451
Flag # SA-06
upland

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Upland SA 06

Project/Site: B-3451 Mud Creek	Date: 9-7-00
Applicant/Owner:	County: Durham
Investigator: Sandy Smith	State: NC
Do Normal Circumstances exist on the site? (Yes) No	Community ID: Hardwood Flat
Is the site significantly disturbed (Atypical Situation)? Yes (No)	Transect ID: SA-06
Is the area a potential Problem Area? Yes (No)	Plot ID: upland
(If needed, explain on reverse)	

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Liriodendron tulip	Can	FAC	9.		
2. Liquidambar sty.	Can	FACW	10.		
3. Pinus taeda	Can	FAC	11.		
4. Fraxinus penn.	Can	FACW	12.		
5. Ligustrum sinense	shrub	FAC	13.		
6. Ulmus alata	shrub	FACU+	14.		
7. Eupatorium viminium	herb	FAC+	15.		
8. Juncus effusus	herb	FACW+	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 88

Remarks:

HYDROLOGY

__Recorded Data (Describe in Remarks):
- __Stream, Lake or Tide Gauge
- __Aerial Photographs
- __Other

X No Recorded Data Available

Field Observations:

Depth of Surface Water: _____(in.)
Depth to Free Water in Pit: _____(in.)
Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- __Inundated
- __Saturated in Upper 12 Inches
- __Water Marks
- __Drift Lines
- __Sediment Deposits
- __Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- __Oxidized Root Channels in Upper 12 Inches
- __Water-Stained Leaves
- __Local Soil Survey Data
- __FAC-Neutral Test
- __Other (Explain in Remarks)

Remarks:
No indicators

SOILS

Map Unit Name (Series and Phase): Chewacla and Wehadkee soils Drainage Class: SPD

Taxonomy (Subgroup): Fluvaquentic Dystrudepts Field Observations Confirm Mapped Type: Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-18		10YR 6/3	10YR 6/5		clay loam

Hydric Soil Indicators:

- ___Histosol
- ___Histic Epipedon
- ___Sulfidic Odor
- ___Aquic Moisture Regime
- ___Reducing Conditions
- ___Gleyed or Low-Chroma Colors
- ___Concretions
- ___High Organic Content in Surface layer in Sandy Soils
- ___Organic Streaking in Sandy Soils
- ___Listed on Local Hydric Soils List
- ___Listed on National Hydric Soils List
- ___Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

(Circle)
Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

Approved by HQUSACE 2/92

HJL
8/93

Flag # SA-Ø6
wetland

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Wetland SA Ø6

Project/Site: B-3451 Mud Creek	Date: 9-7-00
Applicant/Owner: NCDOT	County: Durham
Investigator: Sandra Smith	State: NC
Do Normal Circumstances exist on the site? (Yes) No	Community ID: Hardwood forest
Is the site significantly disturbed (Atypical Situation)? Yes (No)	Transect ID: SA-Ø6
Is the area a potential Problem Area? Yes (No)	Plot ID: wetland
(If needed, explain on reverse)	

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Fraxinus penn.	Can	FACW	9.		
2. Ulmus rubra	Shrub	FAC	10.		
3. Ulmus alata	Shrub	FACU+	11.		
4. Eulalia viminea	Herb	FAC+	12.		
5. Boehmeria cylindrica	Herb	FACW+	13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-) 80

Remarks:

HYDROLOGY

___Recorded Data (Describe in Remarks):
- ___Stream, Lake or Tide Gauge
- ___Aerial Photographs
- ___Other

X No Recorded Data Available

Field Observations:

Depth of Surface Water: _____(in.)
Depth to Free Water in Pit: _____(in.)
Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:
Primary Indicators:
- ✓ Inundated
- ___Saturated in Upper 12 Inches
- ___Water Marks
- ✓ Drift Lines
- ___Sediment Deposits
- ___Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ✓ Oxidized Root Channels in Upper 12 Inches
- ___Water-Stained Leaves
- ___Local Soil Survey Data
- ___FAC-Neutral Test
- ___Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name (Series and Phase): Chewaula and Wehadkee soils Drainage Class: SPD

Taxonomy (Subgroup): Fluvaquentic Dystrochrepts Field Observations Confirm Mapped Type: Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-18		10YR 6/2	10YR 6/6		clay loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- X Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- X Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)
Is this Sampling Point Within a Wetland? (Yes) No

Remarks:

Approved by HQUSACE 2/92

HJL
8/93

Wetland Rating Worksheet

Project name B-3451 Mud Creek Nearest road SR 1306
County Durham County Name of Evaluator Sandy Smith Date 9/7/00

Wetland location
- _ on pond or lake
- X on perennial stream
- _ on intermittent stream
- _ within interstream divide
- _ other

Adjacent land use (within 1/2 mile upstream)
forested/natural vegetation _____ %
agriculture, urban/suburban _____ %
impervious surface _____ %

Soil Series Chewacla + Wehadkee soils
- _ predominantly organic-humus, muck, or peat
- X predominantly mineral- non-sandy
- _ predominantly sandy

Dominant Vegetation
(1) Fraxinus pennsylvanica
(2) Ulmus rubra
(3) Eulalia viminea

Flooding and Wetness
- _ semipermanently to permanently flooded or inundated
- X seasonally flooded or inundated
- _ intermittently flooded or temporary surface water
- _ no evidence of flooding or surface water

Hydraulic Factors
- _ steep topography
- _ ditched or channelized
- X wetland width >/= 50 feet

Wetland Type (select one)

- X Bottomland hardwood forest
- _ Headwater forest
- _ Swamp forest
- _ Wet flat
- _ Pocosin
- _ Pine savanna
- _ Freshwater marsh
- _ Bog/fen
- _ Ephemeral wetland
- _ Other

*The rating system cannot be applied to salt or brackish marshes

Water storage	4	*	4	=	16
Bank/Shoreline stabilization	5	*	4	=	20
Pollutant removal	5	*	5	=	25
Wildlife habitat	4	*	2	=	8
Aquatic life value	4	*	4	=	16
Recreation/Education	2	*	1	=	2

Total score 87

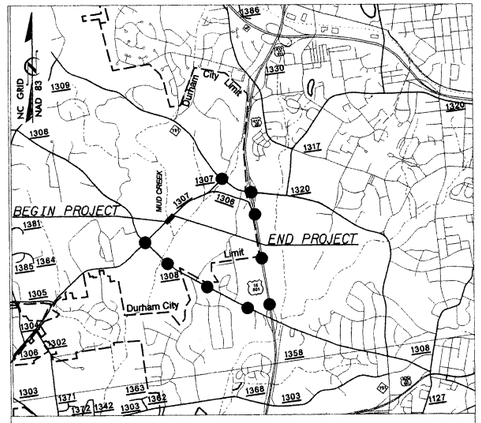
Add 1 point if in sensitive watershed and >10% nonpoint disturbance within 1/2 mile upstream

03/08/99

B-3451

PROJECT: 8.2352903

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



VICINITY MAP

DETOUR

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DURHAM COUNTY

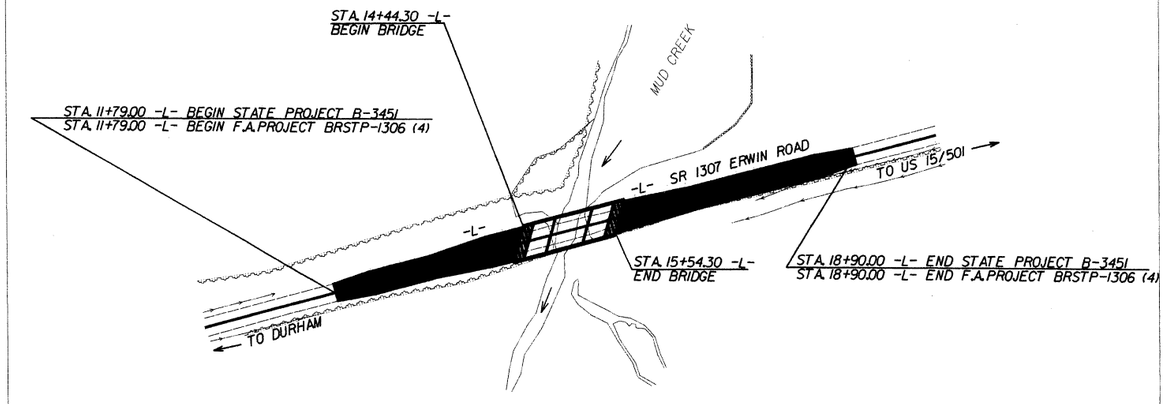
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3451	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
8.2352901	BRSTP-1306 (4)	PE
8.2352902	BRSTP-1306 (4)	R / W, UTILITIES
8.2352903	BRSTP-1306 (4)	CONSTRUCTION

LOCATION: ***BRIDGE NO. 119 OVER MUD CREEK AND APPROACHES ON SR 1307***

TYPE OF WORK: ***GRADING, DRAINAGE, PAVING, AND STRUCTURE***

4



NCDOT CONTACT: MS. CATHY S. HOUSER, PE, PROJECT ENGINEER

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2003 = 14,300 VPD
ADT 2023 = 22,700 VPD
DHV = 12%
D = 65%
T = 4% *
V = 50 MPH
* TTST 1% + DUAL 3%

PROJECT LENGTH

LENGTH ROADWAY F.A. PROJECT BRSTP-1306(4) = 0.114 MILE
LENGTH STRUCTURE F.A. PROJECT BRSTP-1306(4) = 0.021 MILE
TOTAL LENGTH STATE PROJECT 8.2352903 = 0.135 MILE

Prepared for NCDOT In the Office of:

KCI Associates of North Carolina, P.A.
RALEIGH OFFICE
ENGINEERS • PLANNERS • ECOLOGISTS
SUITE 200, LANDMARK CENTER I
4601 SIX FORKS RD.
RALEIGH, N.C. 27609-5210
(919) 783-9214

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPTEMBER 30, 2002

LETTING DATE:
OCTOBER 21, 2003

MICHELLE R. BRAME, P.E
PROJECT ENGINEER

JENNIFER M. SPOHN
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN

SIGNATURE: _____ P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER _____ P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR _____ DATE

5/28/91

PROJECT REFERENCE NO.	SHEET NO.
B-3451	1-A

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

INDEX OF SHEETS

PROJECT REFERENCE NO.	SHEET NO.
B-3451	1-B

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
CONVENTIONAL SYMBOLS

*S.U.E = SUBSURFACE UTILITY ENGINEER

ROADS & RELATED ITEMS

Edge of Pavement	— — — — —
Curb	— — — — —
Prop. Slope Stakes Cut	— — — C — — —
Prop. Slope Stakes Fill	— — — F — — —
Prop. Woven Wire Fence	—○——○—
Prop. Chain Link Fence	—□——□—
Prop. Barbed Wire Fence	—◇——◇—
Prop. Wheelchair Ramp	(WCR)
Curb Cut for Future Wheelchair Ramp	(CCFR)
Exist. Guardrail	⊤ ⊤ ⊤
Prop. Guardrail	⊤ ⊤ ⊤
Equality Symbol	⊕
Pavement Removal	⊠⊠⊠⊠⊠

RIGHT OF WAY

Baseline Control Point	◆
Existing Right of Way Marker	△
Exist. Right of Way Line w/Marker	— — △ — —
Prop. Right of Way Line with Proposed R/W Marker (Iron Pin & Cap)	——▲——
Prop. Right of Way Line with Proposed (Concrete or Granite) R/W Marker	——▲——
Exist. Control of Access Line	——(C/A)——
Prop. Control of Access Line	——(C/A)——
Exist. Easement Line	- - - - E - - - -
Prop. Temp. Construction Easement Line	——E——
Prop. Temp. Drainage Easement Line	——TDE——
Prop. Perm. Drainage Easement Line	——PDE——

HYDROLOGY

Stream or Body of Water	——— —
River Basin Buffer	——BZ——
Flow Arrow	——→
Disappearing Stream	>——
Spring	○~
Swamp Marsh	⩛
Shoreline	————
Falls, Rapids	——+——
Prop Lateral, Tail, Head Ditches	>>> ← FLOW

STRUCTURES

MAJOR

Bridge, Tunnel, or Box Culvert	[CONC]
Bridge Wing Wall, Head Wall and End Wall	) CONC WW (

MINOR

Head & End Wall	CONC HW
Pipe Culvert	═ ═ ═ ═
Footbridge	>- - - - - -<
Drainage Boxes	□ CB
Paved Ditch Gutter	— — — —

UTILITIES

Exist. Pole	●
Exist. Power Pole	●
Prop. Power Pole	○
Exist. Telephone Pole	-●-
Prop. Telephone Pole	-○-
Exist. Joint Use Pole	-●-
Prop. Joint Use Pole	-○-
Telephone Pedestal	T
U/G Telephone Cable Hand Hold	HH
Cable TV Pedestal	C
U/G TV Cable Hand Hold	HH
U/G Power Cable Hand Hold	HH
Hydrant	◈
Satellite Dish	◗
Exist. Water Valve	⊗
Sewer Clean Out	⊕
Power Manhole	Ⓟ
Telephone Booth	☎
Cellular Telephone Tower	●
Water Manhole	Ⓦ
Light Pole	¤
H-Frame Pole	●——●
Power Line Tower	⊠
Pole with Base	□
Gas Valve	◇
Gas Meter	◈
Telephone Manhole	Ⓣ
Power Transformer	◩
Sanitary Sewer Manhole	⊕
Storm Sewer Manhole	Ⓢ
Tank; Water, Gas, Oil	○
Water Tank With Legs	⊗
Traffic Signal Junction Box	S
Fiber Optic Splice Box	F
Television or Radio Tower	⊗
Utility Power Line Connects to Traffic Signal Lines Cut Into the Pavement	——TS——TS——
Recorded Water Line	——W——W——
Designated Water Line (S.U.E.*)	— —W— —W— —
Sanitary Sewer	——SS——SS——
Recorded Sanitary Sewer Force Main	——FSS——FSS——
Designated Sanitary Sewer Force Main(S.U.E.*)	— —FSS— —FSS— —
Recorded Gas Line	——G——G——
Designated Gas Line (S.U.E.*)	— —G— —G— —
Storm Sewer	——S——S——
Recorded Power Line	——P——P——
Designated Power Line (S.U.E.*)	— —P— —P— —
Recorded Telephone Cable	——T——T——
Designated Telephone Cable (S.U.E.*)	— —T— —T— —
Recorded U/G Telephone Conduit	——TC——TC——
Designated U/G Telephone Conduit (S.U.E.*)	— —TC— —TC— —
Unknown Utility (S.U.E.*)	——?UTL——?UTL——
Recorded Television Cable	——TV——TV——
Designated Television Cable (S.U.E.*)	— —TV— —TV— —
Recorded Fiber Optics Cable	——FO——FO——
Designated Fiber Optics Cable (S.U.E.*)	— —FO— —FO— —
Exist. Water Meter	0
U/G Test Hole (S.U.E.*)	⊗
Abandoned According to U/G Record	ATTUR
End of Information	E.O.I.

BOUNDARIES & PROPERTIES

State Line	—— — — — ——
County Line	—— — — ——
Township Line	—— — — ——
City Line	—— — —— —
Reservation Line	- —— - —— -
Property Line	——— ———
Property Line Symbol	PL
Exist. Iron Pin	⊙ EIP
Property Corner	—— ——+
Property Monument	□ ECM
Property Number	(123)
Parcel Number	(6)
Fence Line	—×——×——×— WW & ISBW
Existing Wetland Boundaries	— — —WLB— — —
High Quality Wetland Boundary	——HQ WLB——
Medium Quality Wetland Boundaries	——MQ WLB——
Low Quality Wetland Boundaries	——LQ WLB——
Proposed Wetland Boundaries	——WLB——
Existing Endangered Animal Boundaries	— — —EAB— — —
Existing Endangered Plant Boundaries	— — —EPB— — —

BUILDINGS & OTHER CULTURE

Buildings	
Foundations	
Area Outline	
Gate	
Gas Pump Vent or U/G Tank Cap	○
Church	
School	
Park	
Cemetery	†
Dam	———
Sign	⊙ S
Well	○ W
Small Mine	⚒
Swimming Pool	▨

TOPOGRAPHY

Loose Surface	— — ———
Hard Surface	———
Change in Road Surface	········
Curb	———
Right of Way Symbol	R/W
Guard Post	○ GP
Paved Walk	- - - - - -
Bridge	)═══(
Box Culvert or Tunnel	)= = =(
Ferry	— — ———
Culvert	>·······<
Footbridge	········
Trail, Footpath	~ - - ~ - -
Light House	✡

VEGETATION

Single Tree	✿
Single Shrub	✿
Hedge	⌒⌒⌒⌒
Woods Line	⌒⌒—⌒⌒
Orchard	✿✿✿✿✿✿
Vineyard	[VINEYARD]

RAILROADS

Standard Gauge	┼┼┼┼┼ CSX TRANSPORTATION
RR Signal Milepost	⊙ MILEPOST 35
Switch	□ SWITCH

revised 02/02/00

5/28/99

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

KCI Associates of North Carolina, P.A.
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ENGINEERS ● PLANNERS ● ECOLOGISTS
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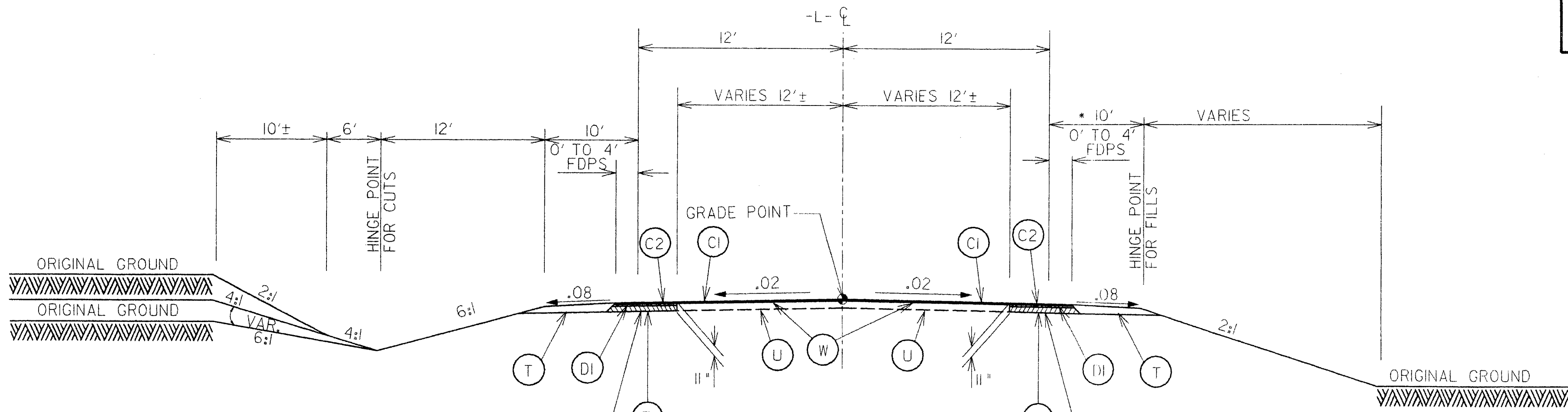
4601 SIX FORKS RD.
RALEIGH, N.C. 27609-5210
(919) 783-9214

PROJECT REFERENCE NO.	SHEET NO.
B-3451	2
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

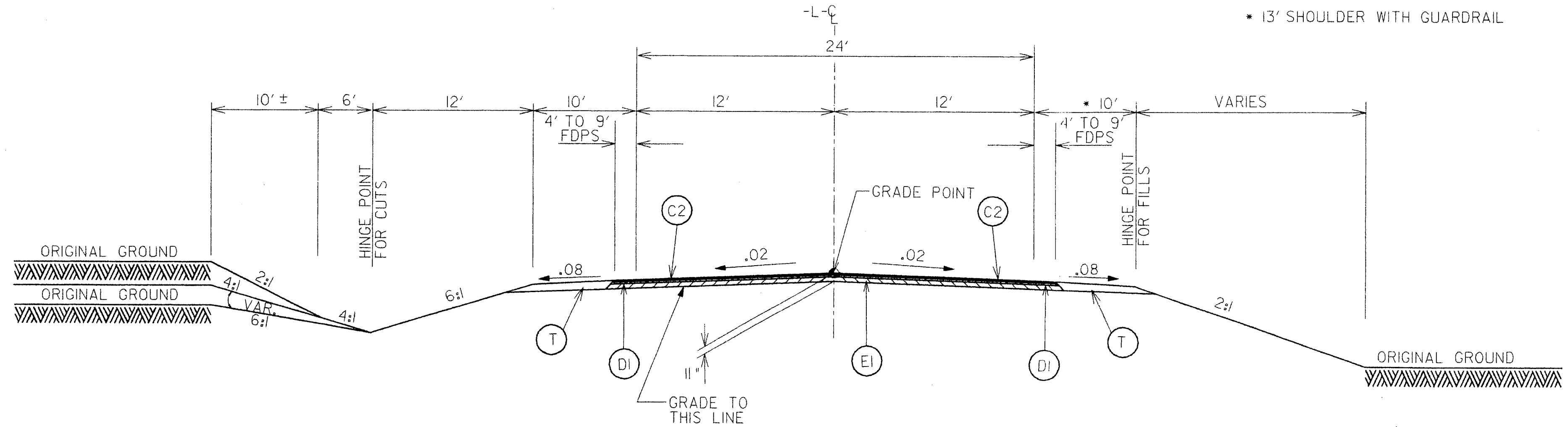
REVISIONS



TYPICAL SECTION NO.1

-L- STA. 17+25.00 TO STA. 18+73.00

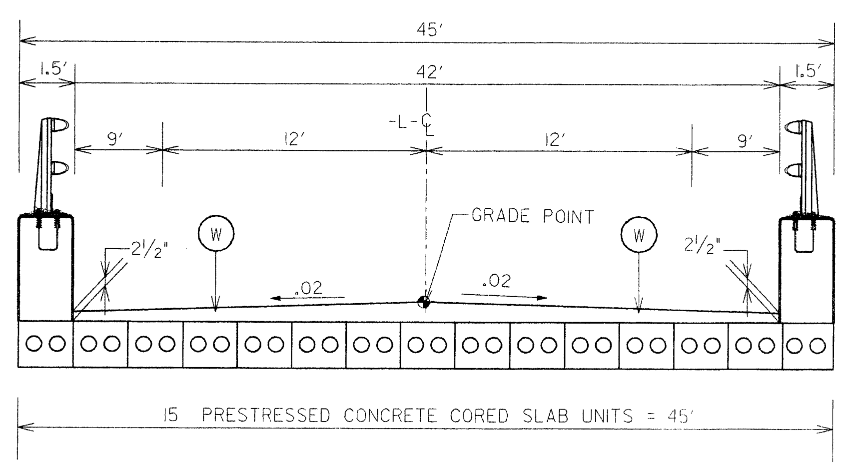
• 13' SHOULDER WITH GUARDRAIL



TYPICAL SECTION NO.2

-L- STA. 12+65.00 TO STA. 14+44.30 (BEGIN BRIDGE)
-L- STA. 15+54.30 (END BRIDGE) TO STA. 17+25.00

• 13' SHOULDER WITH GUARDRAIL



TYPICAL SECTION NO.3

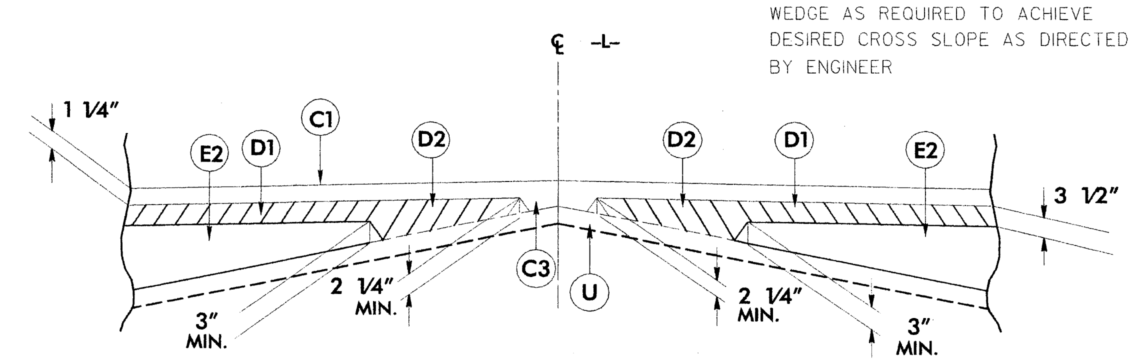
-L- STA. 14+44.30 TO STA. 15+54.30

PAVEMENT SCHEDULE

CODE	DESCRIPTION
C1	PROP. APPROX. 1¼" ASPHALT CONC. SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 140 LBS PER SQ. YARD
C2	PROP. APPROX. 2½" ASPHALT CONC. SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 140 LBS PER SQ. YARD IN EACH OF TWO LAYERS.
C3	PROP. VAR. DEPTH ASPHALT CONC. SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS PER SQ. YARD PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 1½" IN DEPTH.
D1	PROP. APPROX. 3½" ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 399 LBS PER SQ. YARD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2¼" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 5" ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 570 LBS PER SQ. YARD.
E2	PROP. VAR. DEPTH ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS PER SQ. YARD PER 1" DEPTH. TO BE PLACED IN LAYERS NOT GREATER THAN 5½" IN DEPTH OR LESS THAN 3" IN DEPTH.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT MATERIAL.
W	VAR. DEPTH ASPHALT PAVEMENT. (SEE WEDGING DETAIL)

USE 1:1 PAVEMENT EDGE SLOPES UNLESS OTHERWISE NOTED

WEDGE AS REQUIRED TO ACHIEVE DESIRED CROSS SLOPE AS DIRECTED BY ENGINEER



WEDGING DETAIL

PROJECT REFERENCE NO.	SHEET NO.
B-3451	2-A
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

KCI Associates of North Carolina, P.A.
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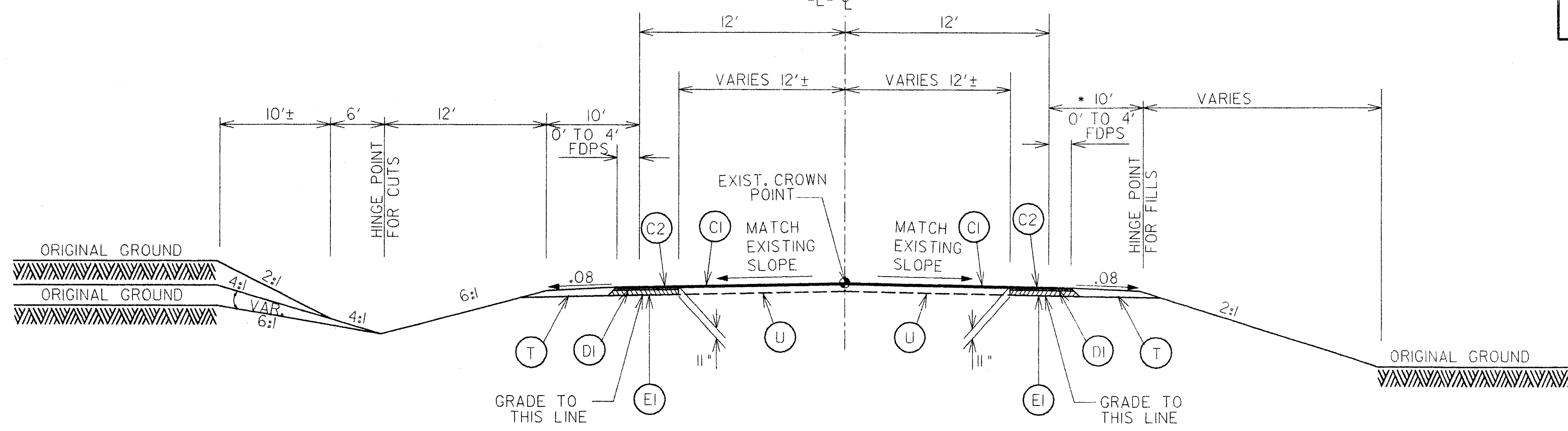

TYPICAL SECTION NO.4

-L- STA. 11+79.00 TO STA. 12+65.00

• 13' SHOULDER WITH GUARDRAIL

PAVEMENT SCHEDULE

CODE	DESCRIPTION
C1	PROP. APPROX. 1¼" ASPHALT CONC. SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 140 LBS PER SQ. YARD
C2	PROP. APPROX. 2½" ASPHALT CONC. SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 140 LBS PER SQ. YARD IN EACH OF TWO LAYERS.
C3	PROP. VAR. DEPTH ASPHALT CONC. SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS PER SQ. YARD PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 1½" IN DEPTH.
D1	PROP. APPROX. 3½" ASPHALT CONC. INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 399 LBS PER SQ. YARD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2¼" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 5" ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 570 LBS PER SQ. YARD.
E2	PROP. VAR. DEPTH ASPHALT CONC. BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS PER SQ. YARD PER 1" DEPTH. TO BE PLACED IN LAYERS NOT GREATER THAN 5½" IN DEPTH OR LESS THAN 3" IN DEPTH.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT MATERIAL.
W	VAR. DEPTH ASPHALT PAVEMENT. (SEE WEDGING DETAIL)

USE 1:1 PAVEMENT EDGE SLOPES UNLESS OTHERWISE NOTED

REVISIONS

8/17/99

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

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
B-3451	3

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SUMMARY OF QUANTITIES

COMPUTED BY:	MRB	DATE:	5-31-02
CHECKED BY:	J.RECK	DATE:	5-31-02

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

KCI Associates
of North Carolina, P.A.
RALEIGH OFFICE
ENGINEERS ● PLANNERS ● ECOLOGISTS
SUITE 200, LANDMARK CENTER I
4601 SIX FORKS RD.
RALEIGH, N.C. 27609-5210
(919) 783-9214

PROJECT REFERENCE NO.	SHEET NO.
B-3451	3-A

RIGHT OF WAY AREA DATA

PARCEL NO.	PROPERTY OWNERS NAMES	TOTAL ACREAGE	AREA TAKEN	AREA REMAINING RT.	AREA REMAINING LT.	CONST. EASE.	PERM. DRAIN. EASE.	TEMP. DRAIN. EASE.
1	DUKE UNIVERSITY	916.61 AC	0.40 AC	887.83 AC	28.38 AC			520 SF
2	CHARLES B. GRIFFIN	7.30 AC	0.17 AC		7.13 AC			

LIST OF PIPES, ENDWALLS, ETC. (FOR PIPES 48" & UNDER)

STATION	LOCATION (LT,RT, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) 12"	15"	18"	24"	30"	36"	42"	48"	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHRWISE) 12" .064	15" .064	18" .064	24" .064	24"	30" .079	30"	36" .079	36"	42" .109	42"	48" .109	48"
-L- 13+97.00	LT	1	2	285.98	283.23	283.09	YES		44'																			
-L- 13+97.00	RT	2	OUT	285.98	283.09	278.50	NO										20'											
TOTAL									44'								20'											

STATION	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	24" SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. YDS. R.C.P.	C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES PER EACH (0' THRU 5.0')	* TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') LIN. *FT. A 5.0' THRU 10.0'	B 10.0' AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G		D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME & GRATE STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32			M.D.I. FRAME WITH TWO FLAT GRATES STD. 840.29						15" CORR. STEEL ELBOWS	CONC. COLLARS CL "B" C.Y. STD 840.72	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	PIPE REMOVAL LIN.FT.	REMARKS
-L- 13+97.00						1											1									1										
-L- 13+97.00						1											1									1						2				
TOTAL						2											2									2						2				

ABBREVIATIONS

C.B.	CATCH BASIN
N.D.I.	NARROW DROP INLET
D.I.	DROP INLET
M.D.I.	MEDIAN DROP INLET
M.D.I. (N.S.)	MEDIAN DROP INLET (NARROW SLOT)
J.B.	JUNCTION BOX
M.H.	MANHOLE
T.B.D.I.	TRAFFIC BEARING DROP INLET
T.B.J.B.	TRAFFIC BEARING JUCTION BOX

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL.
TOTAL SHOULDER WIDTH = DISTANCE FROM EDGE OF TRAVEL LANE TO SHOULDER BREAK POINT.
FLARE LENGTH = DISTANCE FROM LAST SECTION OF PARALLEL GUARDRAIL TO END OF GUARDRAIL.
W = TOTAL WIDTH OF FLARE FROM BEGINNING OF TAPER TO END OF GUARDRAIL.
G = GATING IMPACT ATTENUATOR TYPE 350
NG = NON-GATING IMPACT ATTENUATOR TYPE 350

GUARDRAIL SUMMARY

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH STRAIGHT	LENGTH SHOP CURVED	LENGTH DOUBLE FACED	WARRANT POINT APPROACH END	WARRANT POINT TRAILING END	"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH APPROACH END	FLARE LENGTH TRAILING END	W APPROACH END	W TRAILING END	ANCHORS XI MOD	III	GRAU 350	M-350	XIII	CAT-1	VI MOD	BIC	AT-1	IMPACT ATTENUATOR TYPE 350 EA	G	NG	SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS
-L-	13+69.77	14+57.27	LT	87.5				14+00.00	10'	13'		50'		1'		1	1											95'		
-L-	12+18.81	14+31.31	RT	212.5			12+50.00		10'	13'	50'		1'			1	1											144'		
-L-	15+67.26	17+79.76	LT	212.5			16+50.00		10'	13'	50'		1'			1	1											146'		
-L-	15+41.29	17+28.79	RT	187.5				17+25.00	10'	13'		50'		1'		1	1											96'		
SUBTOTAL				700																										
LESS ANCHOR DEDUCTIONS																														
GRAU-350 (4 @ 50')				-200																										
TYPE III (4 @ 18.75')				-75																										
TOTAL				425												4	4											481'		
ADDITIONAL GUARDRAIL POSTS....5 EACH																														

8/17/99

REVISIONS

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PROJECT REFERENCE NO.	SHEET NO.
B-3451	3-B
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

SUMMARY OF EARTHWORK

IN CUBIC YARDS

LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT+%	BORROW	WASTE
-L- LINE					
STA. 11+79.00 TO STA. 14+44.30 (BRIDGE)	121		347	226	0
-L LINE					
STA. 15+54.30 (BRIDGE) TO STA. 18+90.00	61		840	779	0
SUBTOTAL	182		1,187	1,005	0
ESTIMATE FOR SHOULDER CONSTRUCTION			362	362	
PROJECT SUBTOTAL	182		1,549	1,367	0
EST. FOR REPL. TOPSOIL ON BORROW PITS				68	
GRAND TOTAL	182.....SAY 185		1,549	1,435....SAY 1,440	0

ESTIMATED UNDERCUT EXCAVATION = 300 CY

SUMMARY OF PAVEMENT REMOVAL

LOCATION	SY
-L- LINE	
STA. 12+65.00 TO STA. 14+75.00 LT. & RT.	578
-L LINE	
STA. 15+25.00 TO STA. 17+25.00 LT. &RT.	952
TOTAL	1530
SAY	1550

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

PROJECT REFERENCE NO.	SHEET NO.
B-3451	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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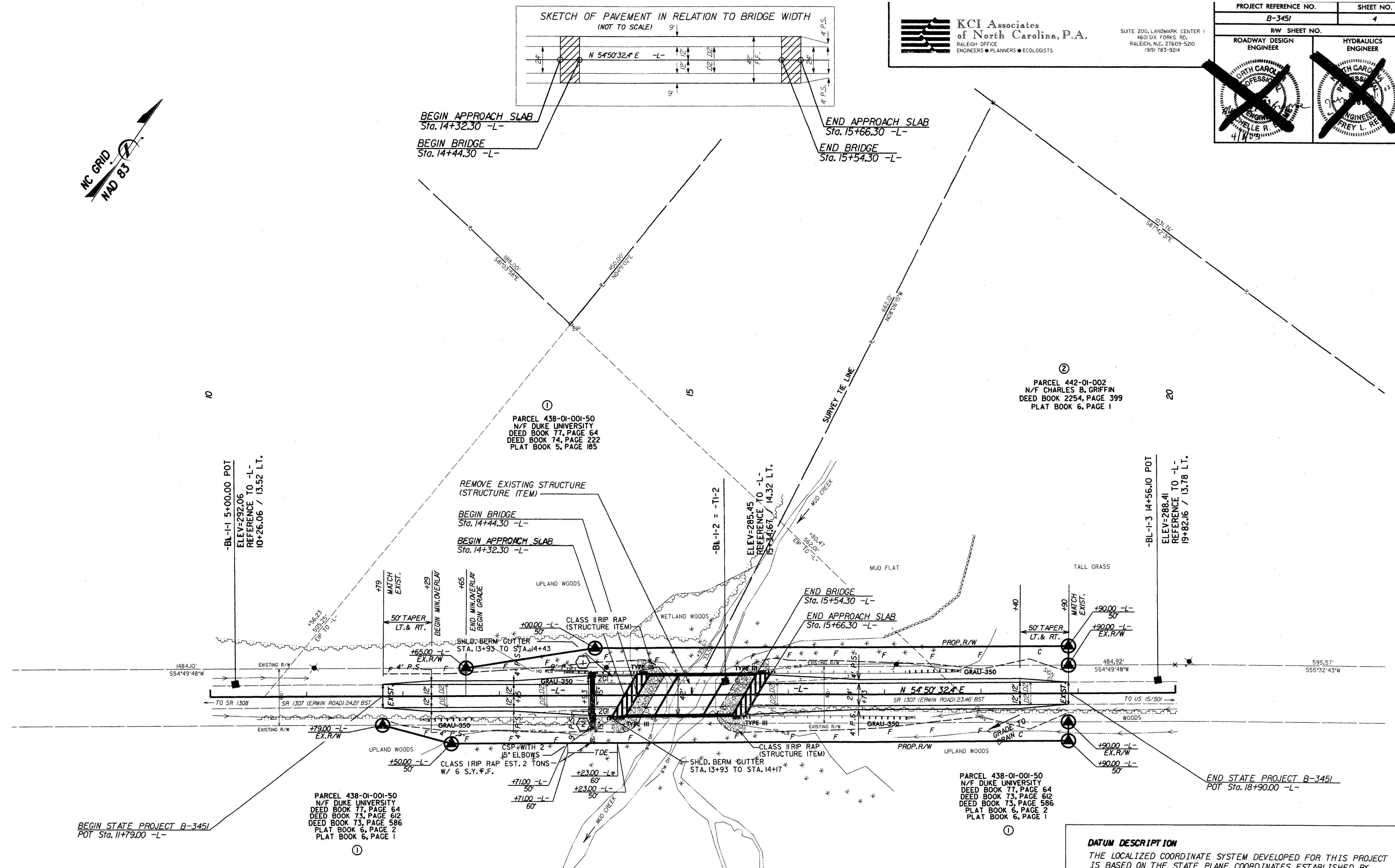

SKETCH OF PAVEMENT IN RELATION TO BRIDGE WIDTH
(NOT TO SCALE)
N 54°50'32.4" E -L-
BEGIN APPROACH SLAB
Sta. 14+32.30 -L-
BEGIN BRIDGE
Sta. 14+44.30 -L-
END APPROACH SLAB
Sta. 15+66.30 -L-
END BRIDGE
Sta. 15+54.30 -L-
NC GRID
NAD 83
SURVEY TIE LINE
PARCEL 438-01-001-50
N/F DUKE UNIVERSITY
DEED BOOK 77, PAGE 64
DEED BOOK 74, PAGE 222
PLAT BOOK 5, PAGE 185
PARCEL 442-01-002
N/F CHARLES B. GRIFFIN
DEED BOOK 2254, PAGE 399
PLAT BOOK 6, PAGE 1
-BL-1-1 5+00.00 POT
ELEV=292.06
REFERENCE TO -L-
10+26.06 / 13.52 LT.
-BL-1-2 = -T1-2
ELEV=285.45
REFERENCE TO -L-
15+34.67 / 14.32 LT.
-BL-1-3 14+56.10 POT
ELEV=288.41
REFERENCE TO -L-
19+82.16 / 13.78 LT.
REMOVE EXISTING STRUCTURE
(STRUCTURE ITEM)
UPLAND WOODS
WETLAND WOODS
MUD FLAT
TALL GRASS
MUD CREEK
CLASS II RIP RAP
(STRUCTURE ITEM)
SHLD. BERM GUTTER
STA. 13+93 TO STA. 14+43
50' TAPER
LT. & RT.
MATCH EXIST.
BEGIN MIN. OVERLAY
END MIN. OVERLAY
BEGIN GRADE
SR 1307 (ERWIN ROAD) 24.2' BST
TO SR 1308
SR 1307 (ERWIN ROAD) 23.46' BST
TO US 15/501
N 54°50'32.4" E
PROP. R/W
EXISTING R/W
GRAU-350
TYPE III
CSP WITH 2
15' ELBOWS
CLASS I RIP RAP EST. 2 TONS
W/ 6 S.Y.F.F.
SHLD. BERM GUTTER
STA. 13+93 TO STA. 14+17
CLASS II RIP RAP
(STRUCTURE ITEM)
GRADE TO DRAIN
PARCEL 438-01-001-50
N/F DUKE UNIVERSITY
DEED BOOK 77, PAGE 64
DEED BOOK 73, PAGE 612
DEED BOOK 73, PAGE 586
PLAT BOOK 6, PAGE 2
PLAT BOOK 6, PAGE 1
BEGIN STATE PROJECT B-3451
POT Sta. 11+79.00 -L-
END STATE PROJECT B-3451
POT Sta. 18+90.00 -L-
1484.10'
S54°49'48"W
484.92'
S54°49'48"W
595.57'
S55°32'43"W

DENOTES APPROACH SLAB

NOTES:
1. SEE SHEETS S-1 THRU S-? FOR STRUCTURE PLANS.
2. SEE SHEET 5 FOR GRADE AND PROFILE.

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B3451-1"
WITH NAD 1983/95 STATE PLANE GRID COORDINATES OF NORTHING: 818,126.5626(ft) EASTING: 2,009,213.3044(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99994774
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B3451-1" TO -L- STATION 11+79.00 IS S 52°39'18" W, 859.88'

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

BM#1 = RR SPIKE SET IN 36" CYPRESS 33.6' RT OF $\mathbb{P}_L$
STA 12+45.8, ELEV.=252.49', N 817615.9 E 2008603.7

BM#2 = RR SPIKE SET IN 24" PINE 38.2' RT OF $\mathbb{P}_L$
STA 16+92.0, ELEV.=282.35', N 817869.1 E 2008971.1

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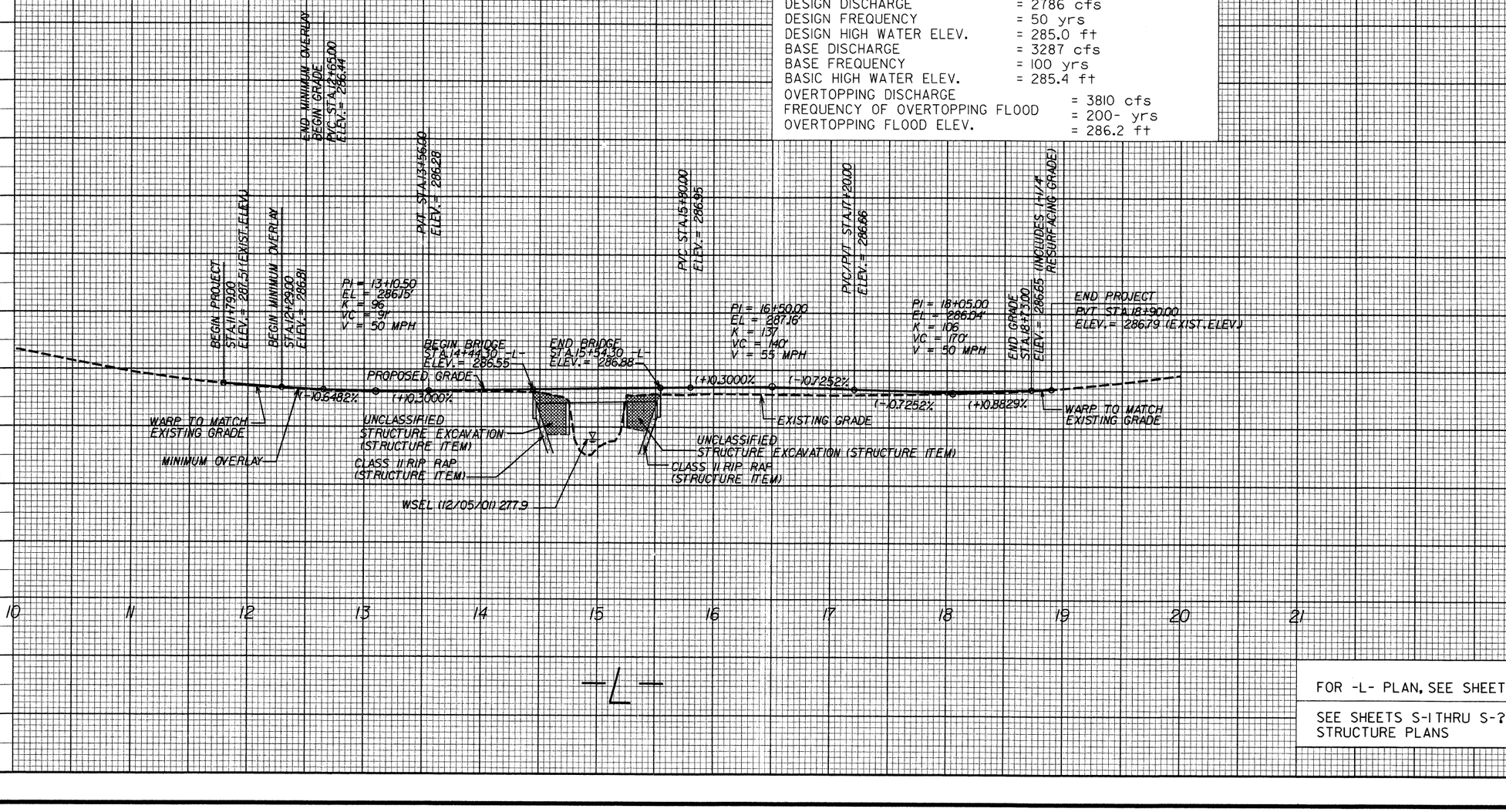
PROJECT REFERENCE NO.	SHEET NO.
B-3451	5
RW SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

HYDRAULIC & OVERTOPPING DATA

DESIGN DISCHARGE	= 2786 cfs
DESIGN FREQUENCY	= 50 yrs
DESIGN HIGH WATER ELEV.	= 285.0 ft
BASE DISCHARGE	= 3287 cfs
BASE FREQUENCY	= 100 yrs
BASIC HIGH WATER ELEV.	= 285.4 ft
OVERTOPPING DISCHARGE	= 3810 cfs
FREQUENCY OF OVERTOPPING FLOOD	= 200- yrs
OVERTOPPING FLOOD ELEV.	= 286.2 ft



FOR -L- PLAN, SEE SHEET 4

SEE SHEETS S-1 THRU S-? FOR STRUCTURE PLANS

S:\Roadway\bridges\B3451\gpk\ew.LOG

PROJ. REFERENCE NO.	SHEET NO.
B-3451	X-1

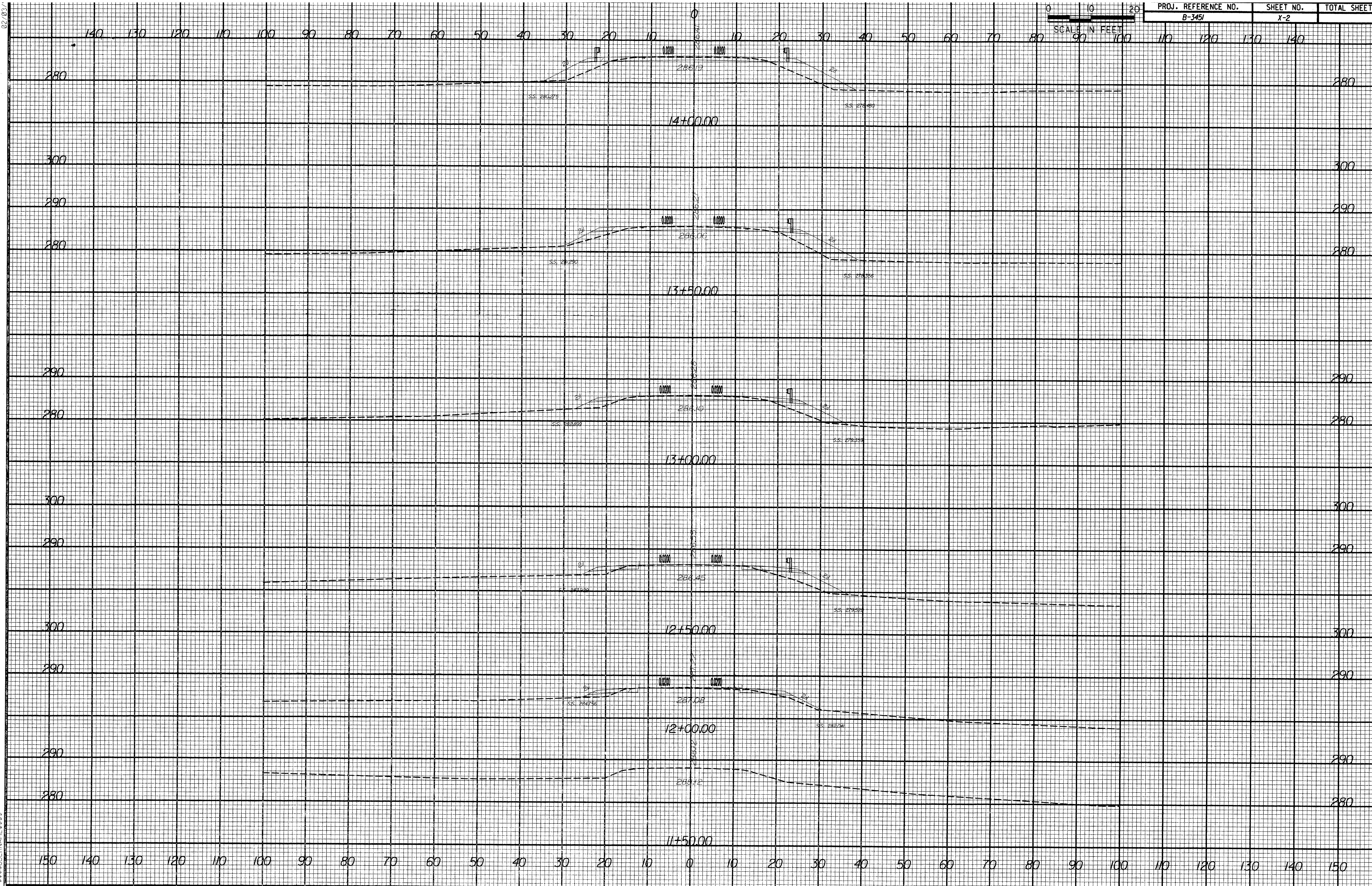
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

NOTE: EMBANKMENT COLUMN INCLUDES BACKFILL FOR UNDERCUT

CROSS-SECTION SUMMARY

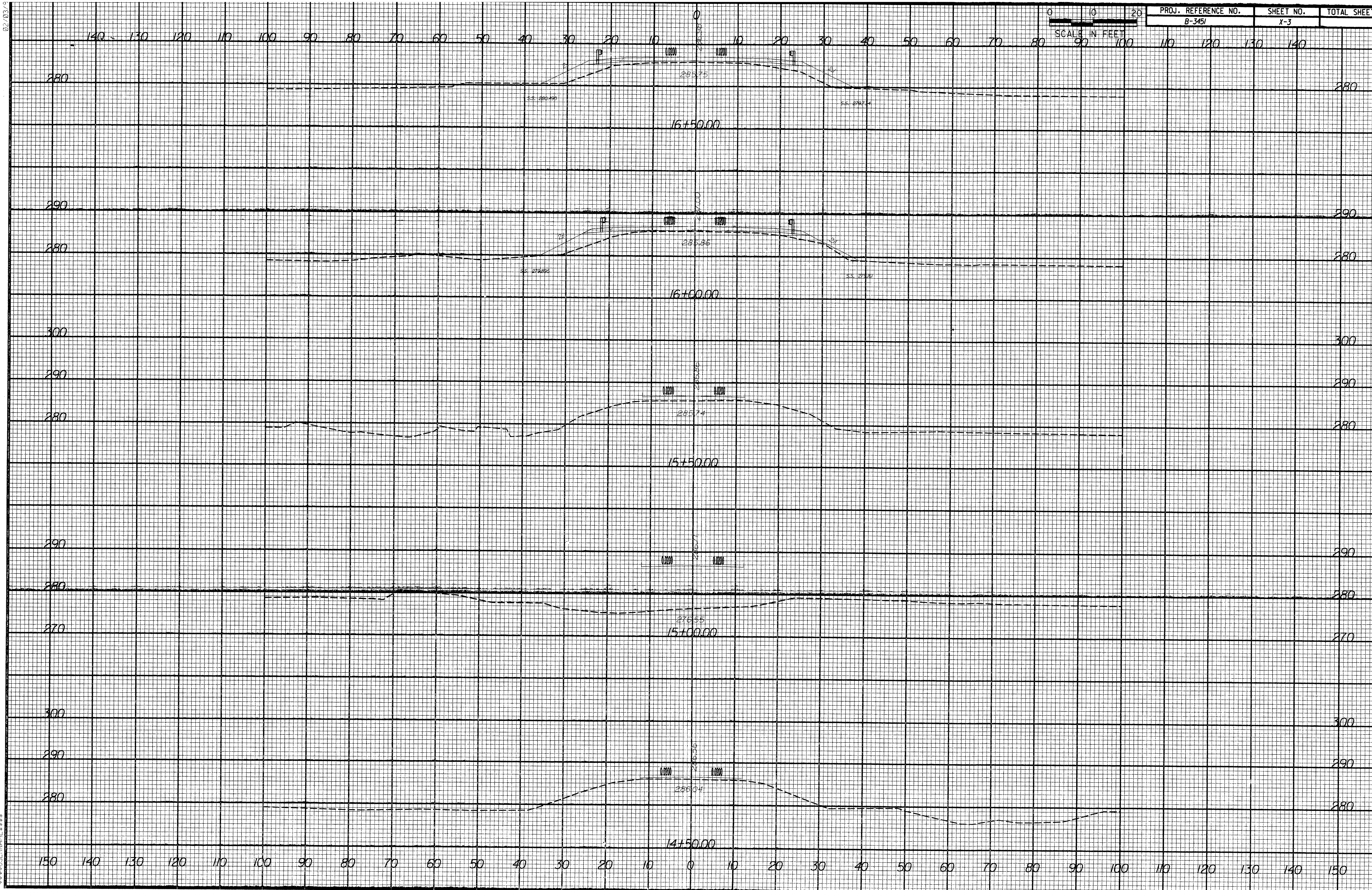
Station B3451L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
11+79.00	0	0
12+50.00	10	43
13+00.00	26	68
13+50.00	42	78
14+44.30	43	100
15+54.30	41	199
16+50.00	0	127
17+00.00	0	150
17+50.00	0	124
18+00.00	1	69
18+50.00	19	31
19+00.00	0	0

Approximate quantities only. Unclassified excavation, borrow excavation, shoulder borrow, fine grading, clearing and grubbing, breaking of existing pavement and removal of existing pavement will be paid for at the lump sum price for "Grading".



PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
B-3451	X-2	

PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
B-3451	X-3	



PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
B-3451	X-4