STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

November 30, 2007

U. S. Army Corps of Engineers
Regulatory Field Office
151 Patton Avenue, Room 208
Asheville, NC 28801-5006

ATTENTION: Mr. Steve Lund
NCDOT Coordinator

Dear Sir:

SUBJECT: **Nationwide Permit 33 Application** for the replacement of Bridge No. 86 over Buffalo Shoals Creek on SR 1333 (Eufola Rd.) in Iredell County. Federal Project No. BRZ-1333(5), State Project No. 8.2822801, WBS Element 32620.1.1, Division 12, T.I.P. No. B-2146.

Please see the enclosed Pre-Construction Notification (PCN), US Fish and Wildlife (USFWS) concurrence letter (to be received), permit drawings and design plans for the above referenced project. A Categorical Exclusion was completed for this project on April 13, 2005 and distributed shortly thereafter. Additional copies are available upon request. The North Carolina Department of Transportation (NCDOT) proposes to replace the 73-foot, two-span Bridge No. 86 with a new 125-foot, single span, steel girder bridge over Buffalo Shoals Creek. The existing bridge will be replaced in place and traffic will be detoured off-site during construction. There will be 0.03 acre of temporary stream impacts to Buffalo Shoals Creek. There are no jurisdictional wetlands located within the project area.

IMPACTS TO WATERS OF THE UNITED STATES

General Description:
The single water resource impacted for project B-2146 is Buffalo Shoals Creek. Buffalo Shoals Creek is located in the Catawba River Basin (Division of Water Quality (DWQ)

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-715-1334
FAX: 919-715-5501
WEBSITE: WWW.NCDOT.ORG

LOCATION:
PARKER LINCOLN BUILDING,
2728 CAPITAL BLVD.
RALEIGH NC 27604

subbasin 03-08-32) and is approximately 30 feet wide and 2.5 feet deep within the project area. The DWQ Index number for this section of Buffalo Shoals Creek is 11-73-(3) and the Hydrological Cataloguing Unit is 03050101. The DWQ classifies Buffalo Shoals Creek as "WS-IV CA". Buffalo Shoals Creek is not listed as a 303(d) water. There are no 303(d) waters within a mile downstream of the project area. No High Quality Waters (HQW), Water Supplies (WS-I or WSII), or Outstanding Resource Waters (ORW) occur within one mile of the project study area. There are no jurisdictional wetlands within the project area.

Permanent Impacts:
There will be no permanent impacts to Buffalo Shoals Creek as a result of this project.

Temporary Impacts:
There will be 0.03 acre of temporary impacts to Buffalo Shoals Creek resulting from the installation of a temporary rock causeway. This causeway is necessary to remove the existing interior bent.

Utility Impacts:
There will be no jurisdictional impacts associated with relocation of utilities for this project.

Schedule:
The project schedule calls for a June 17, 2008 Let date and a review date of April 29, 2008. The date of availability for construction is on July 29, 2008.

Bridge Demolition:

The superstructure for Bridge No. 86 is composed of a timber deck on I-beams and double channels. The substructure is composed of reinforced concrete posts and beams. There is potential for concrete to be dropped into Buffalo Shoals Creek during demolition and removal. The maximum potential temporary fill associated with the removal of the bridge is approximately 26.7 cubic yards. All guidelines for bridge demolition and removal will be followed in addition to Best Management Practices (BMPs) for the Protection of Surface Waters and BMPs for Bridge Demolition and Removal.

FEDERALLY PROTECTED SPECIES

Plants and animals with federal classifications of Endangered (E), Threatened (T), Proposed Endangered (PE) and Proposed Threatened (PT) are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. As of November 5, 2007, the USFWS lists two federally protected species for Iredell County (Table 1). No habitat exists within the project area for the bog turtle. During a survey on April 17, 2007 dwarf-flowered heartleaf was found in the project area, previously not known to exist in Iredell County (officially added to the list with the most recent update this November). A population of 192 dwarf-flowered heartleaf plants was discovered in the southwest quadrant of the project area. Approximately 29 of these plants are located within the right of way for this project. The cut slope in the southwest quadrant was tightened to a 1.5:1 slope in order to successfully avoid all of the dwarf-flowered heartleaf

within the project area. Concurrence from USFWS is currently pending for a May Affect, Not Likely to Adversely Affect conclusion since NCDOT has modified the design plans and will avoid impacting the plants. The concurrence letter will be forwarded to USACE upon receipt.

Table 1. Federally Protected Species for Iredell County

Common Name	Scientific Name	Status	Survey Notes	Biological Conclusion
Bog turtle	*Clemmys muhlenbergii*	T(S/A)	Not Required	N/A
Dwarf-flowered heartleaf	*Hexastylis naniflora*	T	Habitat and Plants Present	Unresolved

Avoidance and Minimization:
Avoidance examines all appropriate and practicable possibilities of averting impacts to "Waters of the United States." The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize jurisdictional stages; minimization measures were incorporated as part of the project design. The use of best management practices for construction should reduce impacts to plant communities.

- The new bridge will be longer than the existing bridge, spanning Buffalo Shoals Creek.
- Traffic will be detoured off-site during construction. This eliminates the need for a temporary on-site detour.
- Water will not be directly discharged into Buffalo Shoals Creek via deck drains.

In addition, Best Management Practices will be followed as outlined in "NCDOT's Best Management Practices for Construction and Maintenance Activities".

Compensatory Mitigation:
NCDOT proposes no mitigation for this project as all impacts to Buffalo Shoals Creek will be temporary.

REGULATORY APPROVALS

Section 404 Permit:
It is anticipated that the temporary impacts to Buffalo Shoals Creek will be authorized under Section 404 Nationwide Permit 33 (Temporary Construction Access and Dewatering). We are, therefore, requesting the issuance of a Nationwide Permit 33.

Section 401 Permit:
We anticipate 401 General Certification number 3688 will apply to this project. Therefore, in accordance with 15A NCAC 2H .0501(a) we are providing two copies of this application to the North Carolina Department of Environmental and Natural Resources, Division of Water Quality, for their records. The NCDOT will adhere to all general conditions of the Water Quality Certification.

Thank you for your assistance with this project. If you have any questions or need additional information, please contact Erin Cheely at ekcheely@dot.state.nc.us or (919) 715-5529.

Sincerely,

for Gregory J. Thorpe, Ph.D., Environmental Management Director
Project Development and Environmental Analysis Branch

cc:
W/attachment

Mr. John Hennessy, NCDWQ (2 Copies)
Ms. Marella Buncick, USFWS
Ms. Marla Chambers, NCWRC

W/o attachment (see website for attachments)

Dr. David Chang, P.E., Hydraulics
Mr. Greg Perfetti, P.E., Structure Design
Mr. Victor Barbour, P.E., Project Services Unit
Mr. Mark Staley, Roadside Environmental
Mr. M.L. Holder, P.E., Division Engineer
Ms. Trish Simon, DEO
Mr. Jay Bennett, P.E., Roadway Design
Mr. Majed Alghandour, P. E., Programming and TIP
Mr. Art McMillan, P.E., Highway Design
Mr. Scott McLendon, USACE, Wilmington
Mr. Vince Rhea, P.E., Project Planning Engineer

Office Use Only: Form Version March 05

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
   - ☐ Express 401 Water Quality Certification

2. Nationwide, Regional or General Permit Number(s) Requested: NW 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 Ecosystem Enhancement Program (NCEEP) is proposed for mitigation of impacts, attach the acceptance letter from NCEEP, 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: Gregory J. Thorpe, Ph.D., Environmental Management Director
   Mailing Address: 1598 Mail Service Center
   Telephone Number: (919) 733-3141 Fax Number: (919) 733-9794
   E-mail Address: ekschubert@dot.state.nc.us

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 No. 86 over Buffalo Shoals Creek on SR 1333 (Eufola Road)

2. T.I.P. Project Number or State Project Number (NCDOT Only): B-2146

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

4. Location
   County: Iredell Nearest Town: Sharon
   Subdivision name (include phase/lot number): N/A
   Directions to site (include road numbers/names, landmarks, etc.):

5. Site coordinates (For linear projects, such as a road or utility line, attach a sheet that separately lists the coordinates for each crossing of a distinct waterbody.)
   Decimal Degrees (6 digits minimum): 35°43'31.76" °N -81°01'28.83" °W

6. Property size (acres): N/A

7. Name of nearest receiving body of water: Catawba River

8. River Basin: Catawba
   (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: The land uses surrounding and within the project area are primarily agricultural and woodland with residential homes.

10. Describe the overall project in detail, including the type of equipment to be used:
    Standard construction equipment will be used (backhoes, bulldozers, cranes and/or other heavy machinery)

11. Explain the purpose of the proposed work: The purpose of the project is to replace a structurally deficient and functionally obsolete structure (sufficiency rating 27.2 out of 100) to obtain safer and more efficient traffic operations.

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. Each impact must be listed separately in the tables below (e.g., culvert installation should be listed separately from riprap dissipater pads). Be sure to indicate if an impact is temporary. All proposed impacts, permanent and temporary, must be listed, and must be labeled and clearly identifiable on an accompanying site plan. All wetlands and waters, and all streams (intermittent and perennial) should 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: 76 linear feet (0.03 acre) of impacts due to the installation of a temporary rock causeway. Permanent: No permanent impacts.

2. Individually list wetland impacts. Types of 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.

Wetland Impact Site Number (indicate on map)	Type of Impact	Type of Wetland (e.g., forested, marsh, herbaceous, bog, etc.)	Located within 100-year Floodplain (yes/no)	Distance to Nearest Stream (linear feet)	Area of Impact (acres)
No Wetlands					
Total Wetland Impact (acres)					

3. List the total acreage (estimated) of all existing wetlands on the property: N/A

4. Individually list all intermittent and perennial stream impacts. Be sure to identify temporary impacts. Stream impacts include, but are not limited to placement of fill or culverts, dam construction, flooding, relocation, stabilization activities (e.g., cement walls, rip-rap, crib walls, 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. To calculate acreage, multiply length X width, then divide by 43,560.

Stream Impact Number (indicate on map)	Stream Name	Type of Impact	Perennial or Intermittent?	Average Stream Width Before Impact	Impact Length (linear feet)	Area of Impact (acres)
1	Buffalo Shoals Creek	Temporary	Perennial	30	76	0.03
Total Permanent Stream Impact (by length and acreage)					0	0

5. Individually list all open water impacts (including lakes, ponds, estuaries, sounds, Atlantic Ocean and any other water of the U.S.). Open water impacts include, but are not limited to fill, excavation, dredging, flooding, drainage, bulkheads, etc.

Open Water Impact Site Number (indicate on map)	Name of Waterbody (if applicable)	Type of Impact	Type of Waterbody (lake, pond, estuary, sound, bay, ocean, etc.)	Area of Impact (acres)
No open water impacts				
Total Open Water Impact (acres)				

6. List the cumulative impact to all Waters of the U.S. resulting from the project:

Stream Impact (acres):	0.03 (temporary)
Wetland Impact (acres):	0
Open Water Impact (acres):	0
Total Impact to Waters of the U.S. (acres)	0.03 (temporary)
Total Stream Impact:	76 linear feet (temporary)

7. Isolated Waters
Do any isolated waters exist on the property? ☐ Yes ☒ No
Describe all impacts to isolated waters, and include the type of water (wetland or stream) and the size of the proposed impact (acres or linear feet). Please note that this section only applies to waters that have specifically been determined to be isolated by the USACE.
N/A

8. 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.):_____
Proposed use or purpose of pond (e.g., livestock watering, irrigation, aesthetic, trout pond, local stormwater requirement, etc.):_____
Current land use in the vicinity of the pond:_____
Size of watershed draining to pond:_____ Expected pond surface area:_____

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. Traffic will be detoured off-site during construction and the new bridge will span Buffalo Shoals Creek. No deck drains will be used and NCDOT's Best Management Practices will be followed.

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 January 15, 2002, 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 NCEEP 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.
   No mitigation is proposed for this project as all the impacts to Buffalo Shoals Creek are temporary.

2. Mitigation may also be made by payment into the North Carolina Ecosystem Enhancement Program (NCEEP). Please note it is the applicant's responsibility to contact the NCEEP at (919) 715-0476 to determine availability, and written approval from the NCEEP indicating that they are will to accept payment for the mitigation must be attached to this form. For additional information regarding the application process for the NCEEP, check the NCEEP website at http://h2o.enr.state.nc.us/wrp/index.htm. If use of the NCEEP is proposed, please check the appropriate box on page five and provide the following information:

   Amount of stream mitigation requested (linear feet): 0
   Amount of buffer mitigation requested (square feet): 0
   Amount of Riparian wetland mitigation requested (acres): 0
   Amount of Non-riparian wetland mitigation requested (acres): 0
   Amount of Coastal wetland mitigation requested (acres): 0

IX. Environmental Documentation (required by DWQ)

1. Does the project involve an expenditure of public (federal/state/local) funds or the use of public (federal/state) land? Yes ☒ No ☐

2. 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 ☐

3. 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.

1. Will the project impact protected riparian buffers identified within 15A NCAC 2B .0233 (Neuse), 15A NCAC 2B .0259 (Tar-Pamlico), 15A NCAC 02B .0243 (Catawba) 15A NCAC 2B .0250 (Randleman Rules and Water Supply Buffer Requirements), or other (please identify_____)? Yes ☐ No ☒

2. If "yes", 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 for Catawba)	
2		1.5	
Total			

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

3. If buffer mitigation is required, please discuss what type of mitigation is proposed (i.e., Donation of Property, Riparian Buffer Restoration / Enhancement, or Payment into the Riparian Buffer Restoration Fund). Please attach all appropriate information as identified within 15A NCAC 2B .0242 or .0244, or .0260. N/A

XI. Stormwater (required by DWQ)

Describe impervious acreage (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. If percent impervious surface exceeds 20%, please provide calculations

demonstrating total proposed impervious level. Impervious surfaces will not significantly increase as a result of this project. There will be no deck drains installed.

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. Cumulative Impacts (required by DWQ)

Will this project (based on past and reasonably anticipated future impacts) result in additional development, which could impact nearby downstream water quality? Yes ☐ No ☒
If yes, please submit a qualitative or quantitative cumulative impact analysis in accordance with the most recent North Carolina Division of Water Quality policy posted on our website at http://h2o.enr.state.nc.us/ncwetlands. If no, please provide a short narrative description:
The new bridge will be constructed in the same location as the old bridge.

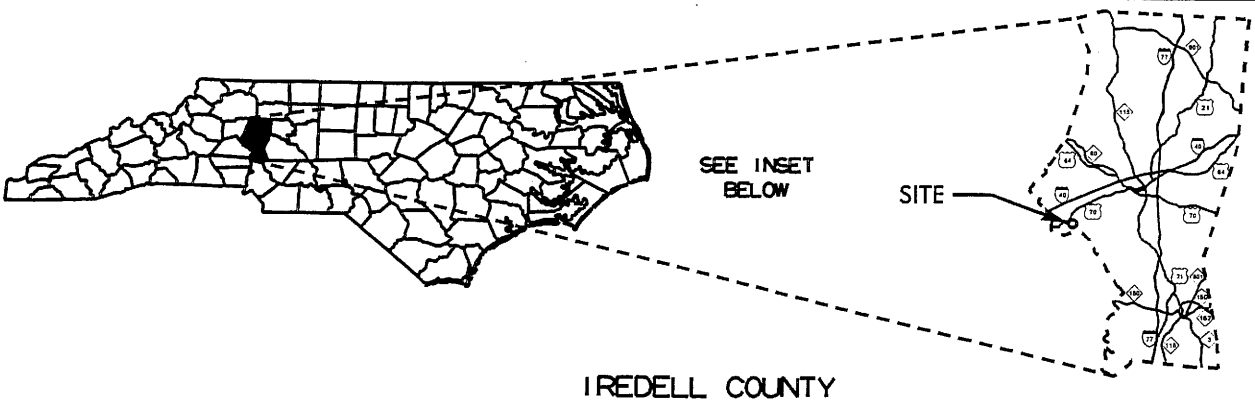
XV. Other Circumstances (Optional):

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).
N/A

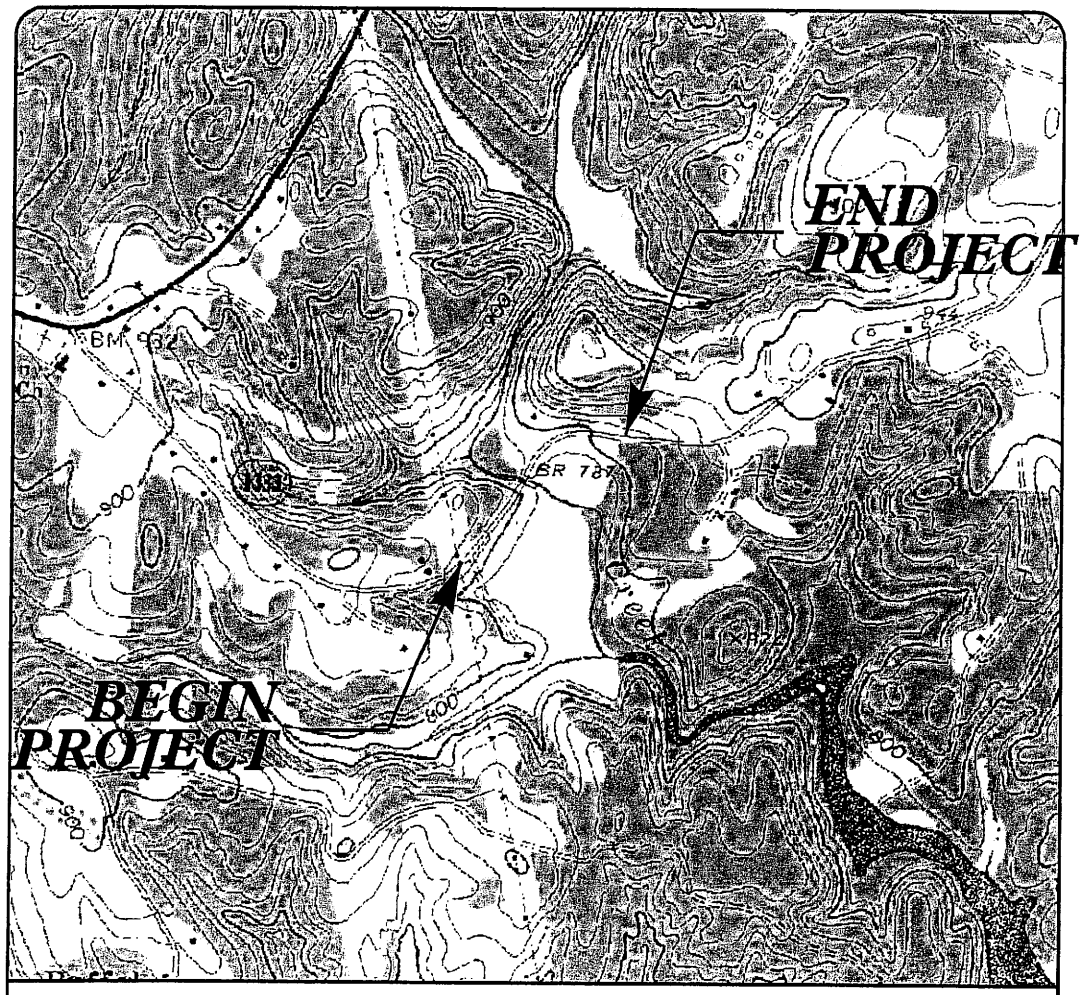
E. L. Lusk 11.30.07

Applicant/Agent's Signature **Date**

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



IREDELL COUNTY



VICINITY MAP NTS

WETLAND AND STREAM IMPACTS

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

IREDELL COUNTY
PROJECT: (B-2146)
BRIDGE NO. 86 OVER
BUFFALO SHOAL CREEK ON SR 1333

SHEET ____ OF ____ **8/23/07**

Permit Drawing
Sheet 1 of 9

PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES
1	Joseph Neid Williams, Jr	103 Robinneble Lane Stateville, NC 28625
2	Allen C. and Joyce R. Johnson	Rt. 14, Box Statesville, NC 28625
3	Jimmy Lee Shaver	P.O. Box 6424 Statesville, NC 28625
4	David Kirk Mize	Rt 3 Box 199 Statesville, NC 28677
5	James E. and Cheryle T. Valentine	Rt 4 Box 323-G Statesville, NC 28677

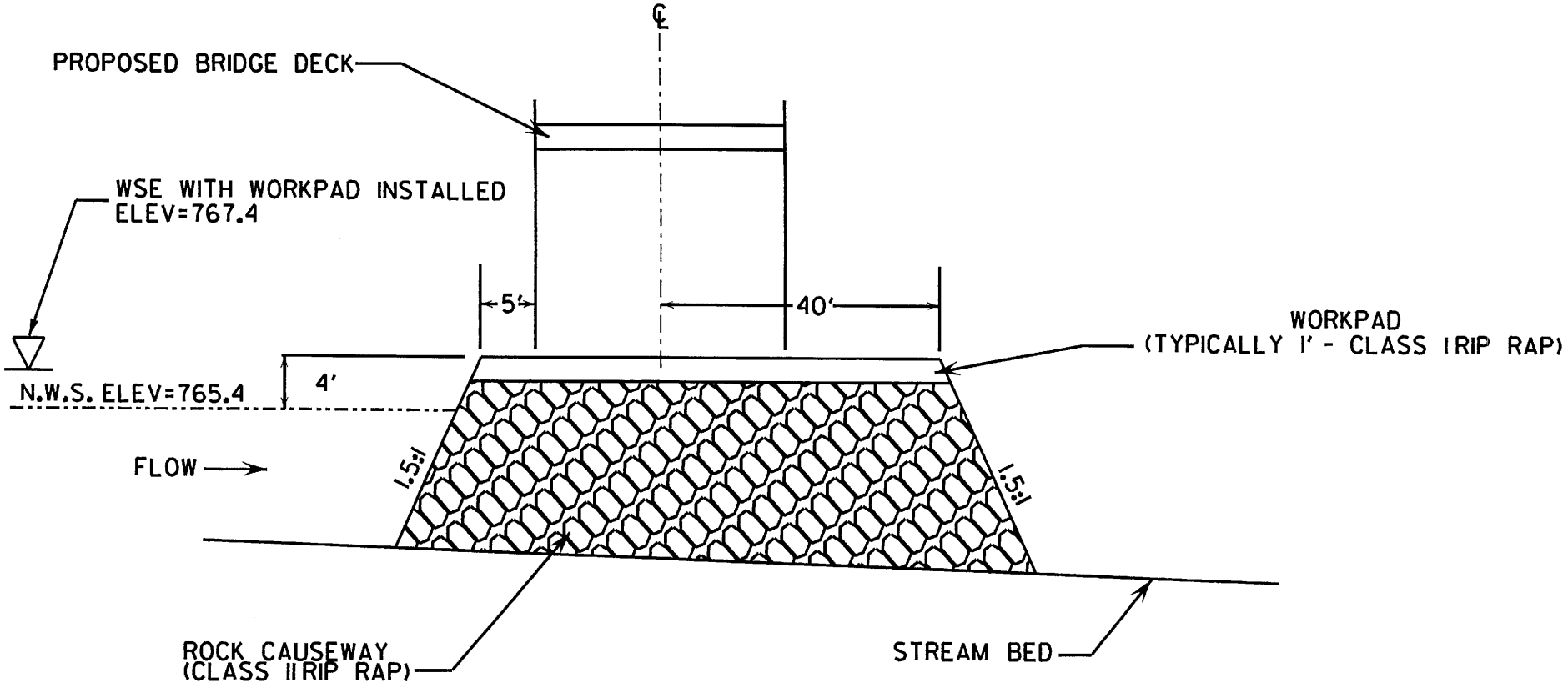
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

IREDELL COUNTY
PROJECT: (B-2146)
BRIDGE NO. 86 OVER
BUFFALO SHOAL CREEK ON SR 1333

SHEET ____ OF ____ 8/23/07

Permit Drawing
Sheet 2 of 9

WORKPAD DETAIL
(NOT TO SCALE)



QUANTITIES OF ESTIMATES

VOLUME OF CLASS II RIP RAP= 228 yds^3

AREA OF CLASS II RIP RAP= 0.031 ac

Estimate 340 Tons Class II Rip Rap

Permit Drawing
Sheet 3 of 9

NCDOT

DIVISION OF HIGHWAYS
IREDELL COUNTY

PROJECT: (B-2146)

BRIDGE NO. 86 OVER
BUFFALO SHOAL CREEK ON SR 1333

SHEET **OF** **8/23/07**

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	17+51/18+76 -L-	TEMP. CAUSEWAY							0.03		76	
TOTALS:									0.03		76	

Permit Drawing Sheet 4 of 9

ATN Revised 3/31/05

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

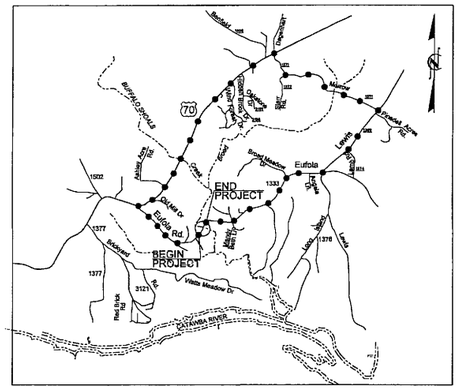
IREDELL COUNTY
PROJECT: 32620.1.1 (B-2146)

SHEET 8/23/2007

TIP PROJECT: B-2146

CONTRACT #

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



VICINITY MAP

OFF-SITE DETOUR

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

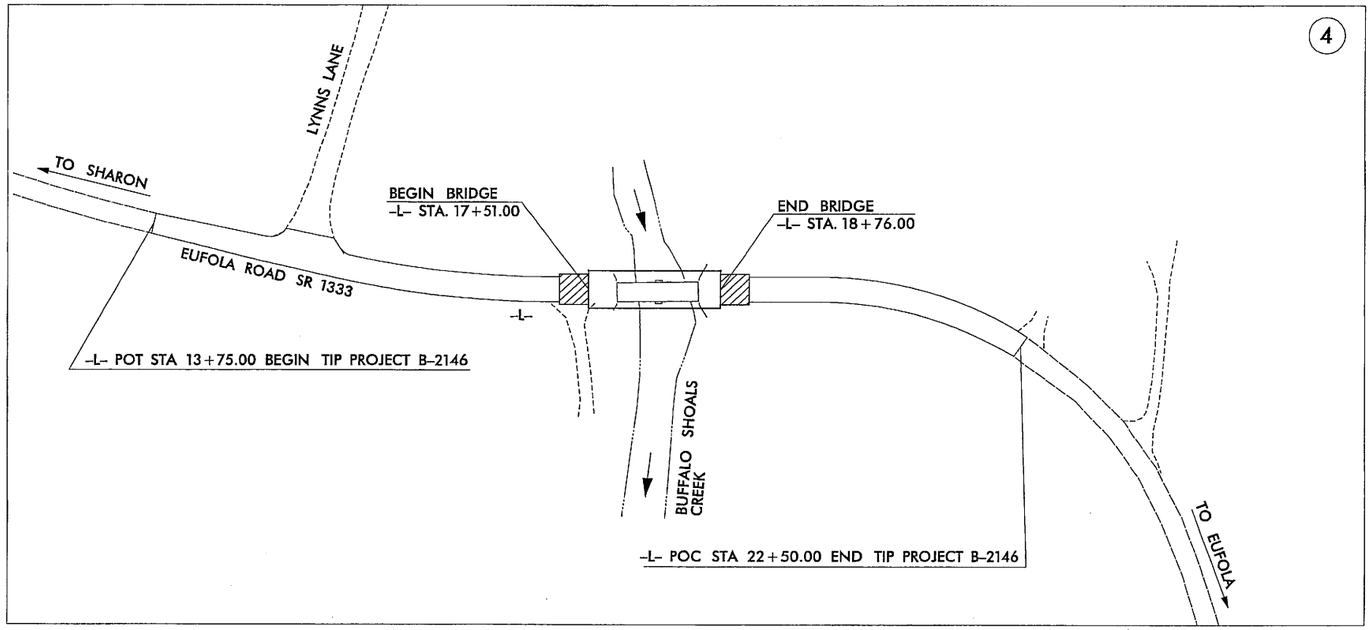
IREDELL COUNTY

LOCATION: BRIDGE NO. 86 AND APPROACHES ON SR 1333 (EUFOLA ROAD) OVER BUFFALO SHOALS CREEK

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-2146	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
32620.1.1	BRZ-1333(5)	P.E.
32620.3.1	BRZ-1333(5)	UTIL. & R/W
32620.2.3	BRZ-1333(5)	CONST.



NAD 83 /2001 NC GRID

** DESIGN EXCEPTION FOR HORIZONTAL ALIGNMENT AND SAG VERTICAL CURVE REQUIRED.

SLINGATE DESIGN GROUP, P.A.

Permit Drawing
Sheet 5 of 9

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

5 2.5 0 5 10
PROFILE (VERTICAL)

DESIGN DATA

ADT 2008 = 730
ADT 2028 = 1,048
DHV = 12 %
D = 60 %
T = 3 % *
** V = 60 MPH

* TTST 1 % DUAL 2 %

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-2146 = .142 mi
LENGTH STRUCTURE TIP PROJECT B-2146 = .024 mi

TOTAL LENGTH OF TIP PROJECT B-2146 = .166 mi

Plans prepared in the office of:
RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place
Raleigh, North Carolina 27609
919-872-5115 Tel. 919-878-8410 Fax.
www.rameykemp.com

for the North Carolina Department of Transportation

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JUNE 16, 2006

LETTING DATE:
MARCH 18, 2008

N.C.D.O.T. CONTACT:
CATHY S. HOUSER, P.E.
PROJECT ENGINEER
ROADWAY DESIGN

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 9334 ENGINEER W. HENRY WELLS, JR.
W. HENRY WELLS, JR. *P.E.*

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 24416 ENGINEER M. SCOTT CLARK
M. SCOTT CLARK, P.E. *P.E.*

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR *DATE*

PROJECT REFERENCE NO.	SHEET NO.
B-2146	4

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 24416 ENGINEER M. SCOTT CLARK

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 9334 ENGINEER W. HENRY WELLS, JR.

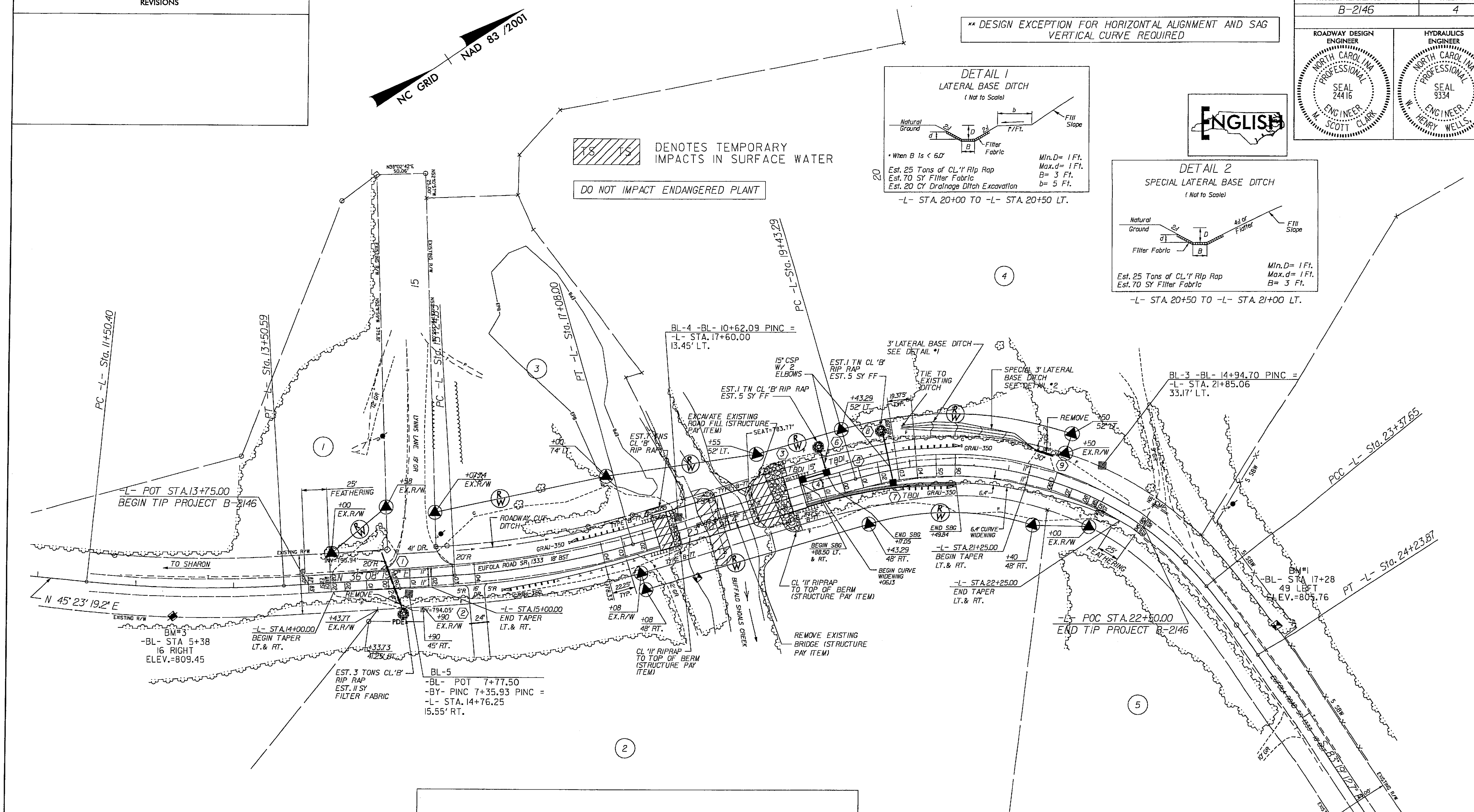
REVISIONS

ENGLISH

** DESIGN EXCEPTION FOR HORIZONTAL ALIGNMENT AND SAG VERTICAL CURVE REQUIRED

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

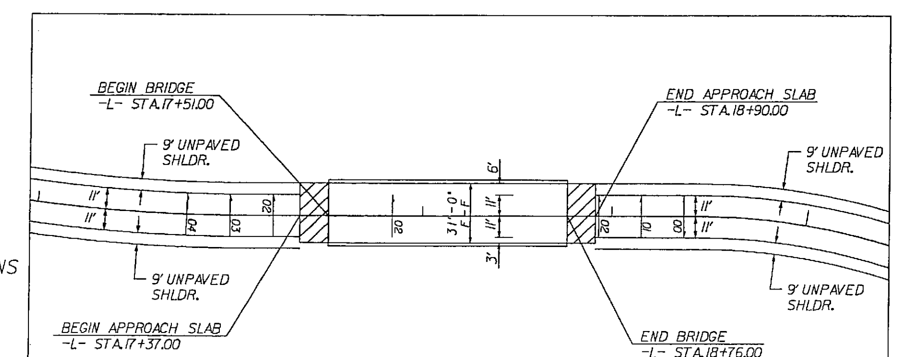
DO NOT IMPACT ENDANGERED PLANT



NC GRID NAD 83 /2001
DETAIL 1
LATERAL BASE DITCH
(Not to Scale)
Natural Ground
Filter Fabric
Fill Slope
* When B is < 6.0'
Min.D= 1 Ft.
Max.d= 1 Ft.
B= 3 Ft.
b= 5 Ft.
Est. 25 Tons of CL'I' Rip Rap
Est. 70 SY Filter Fabric
Est. 20 CY Drainage Ditch Excavation
-L- STA. 20+00 TO -L- STA. 20+50 LT.
DETAIL 2
SPECIAL LATERAL BASE DITCH
(Not to Scale)
Natural Ground
Filter Fabric
4:1 or Flatter
Fill Slope
Min.D= 1 Ft.
Max.d= 1 Ft.
B= 3 Ft.
Est. 25 Tons of CL'I' Rip Rap
Est. 70 SY Filter Fabric
-L- STA. 20+50 TO -L- STA. 21+00 LT.
PC -L- Sta. 11+50.40
PT -L- Sta. 13+50.59
PC -L- Sta. 15+16.79
PT -L- Sta. 17+08.00
PC -L- Sta. 19+43.29
PCC -L- Sta. 23+37.65
PT -L- Sta. 24+23.87
-L- POT STA. 13+75.00
BEGIN TIP PROJECT B-2146
-L- POC STA. 22+50.00
END TIP PROJECT B-2146
N 45° 23' 19.2" E
TO SHARON
TO EUFOLA
EUFOLA ROAD SR 1333
BUFFALO SHOALS CREEK
LYNNS LANE
BL-4 -BL- 10+62.09 PINC = -L- STA. 17+60.00 13.45' LT.
BL-3 -BL- 14+94.70 PINC = -L- STA. 21+85.06 33.17' LT.
BL-5 -BL- POT 7+77.50 -BY- PINC 7+35.93 PINC = -L- STA. 14+76.25 15.55' RT.
BM#3 -BL- STA 5+38 16 RIGHT ELEV.=809.45
BM#1 -BL- STA 17+28 49 LEFT ELEV.=805.76
EST. 3 TONS CL'B' RIP RAP EST. 11 SY FILTER FABRIC
-L- STA. 14+00.00 BEGIN TAPER LT.& RT.
-L- STA. 15+00.00 END TAPER LT.& RT.
-L- STA. 21+25.00 BEGIN TAPER LT.& RT.
-L- STA. 22+25.00 END TAPER LT.& RT.
25' FEATHERING
ROADWAY CUT DITCH
EXCAVATE EXISTING ROAD FILL (STRUCTURE PAY ITEM)
EST. 7 TNS CL 'B' RIP RAP
EST. 1 TN CL 'B' RIP RAP EST. 5 SY FF
15" CSP W/ 2 ELBOWS
EST. 1 TN CL 'B' RIP RAP EST. 5 SY FF
3' LATERAL BASE DITCH SEE DETAIL #1
TIE TO EXISTING DITCH
SPECIAL 3' LATERAL BASE DITCH SEE DETAIL #2
CL 'II' RIPRAP TO TOP OF BERM (STRUCTURE PAY ITEM)
REMOVE EXISTING BRIDGE (STRUCTURE PAY ITEM)
BEGIN SBG
END SBG
BEGIN CURVE WIDENING
6.4' CURVE WIDENING
REMOVE
EX.R/W
1
2
3
4
5

-L-	-L-	-L-
PI Sta 12+50.72	PI Sta 16+16.79	PI Sta 21+66.54
Δ = 9° 15' 00.0" (LT)	Δ = 12° 37' 22.8" (LT)	Δ = 67° 02' 30.5" (RT)
D = 4° 37' 14.3"	D = 6° 53' 29.6"	D = 17° 00' 00.0"
L = 200.19'	L = 183.17'	L = 394.36'
T = 100.31'	T = 91.96'	T = 223.25'
R = 1,240.00'	R = 831.39'	R = 337.03'
E = 0.06	E = 0.06	E = 0.06
RUN OFF = SEE PLANS	RUN OFF = SEE PLANS	RUN OFF = SEE PLANS

-L-
PI Sta 23+80.80
Δ = 6° 07' 20.5" (RT)
D = 7° 06' 02.7"
L = 86.22'
T = 43.15'
R = 806.90'
E = 0.06
RUN OFF = SEE PLANS



SKETCH SHOWING ROADWAY IN RELATION TO STRUCTURE

DENOTES APPROACH SLAB

FOR -L- PROFILE SEE SHEET NO.5

SEE SHEETS S-1 THRU S- FOR STRUCTURE PLANS

Permit Drawing Sheet 6 of 9

SUNGATE DESIGN GROUP, P.A.

RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
B-2146	4

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24416 M. SCOTT CLARK

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 9334 W. HENRY WELLS, JR.

ENGLISH

** DESIGN EXCEPTION FOR HORIZONTAL ALIGNMENT AND SAG VERTICAL CURVE REQUIRED

TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DO NOT IMPACT ENDANGERED PLANT

DETAIL 1
LATERAL BASE DITCH
(Not to Scale)

Natural Ground; Filter Fabric; Fill Slope

* When B is < 6.0'

Est. 25 Tons of CL.'I' Rip Rap
Est. 70 SY Filter Fabric
Est. 20 CY Drainage Ditch Excavation

Min. D= 1 Ft.
Max. d= 1 Ft.
B= 3 Ft.
b= 5 Ft.

-L- STA. 20+00 TO -L- STA. 20+50 LT.

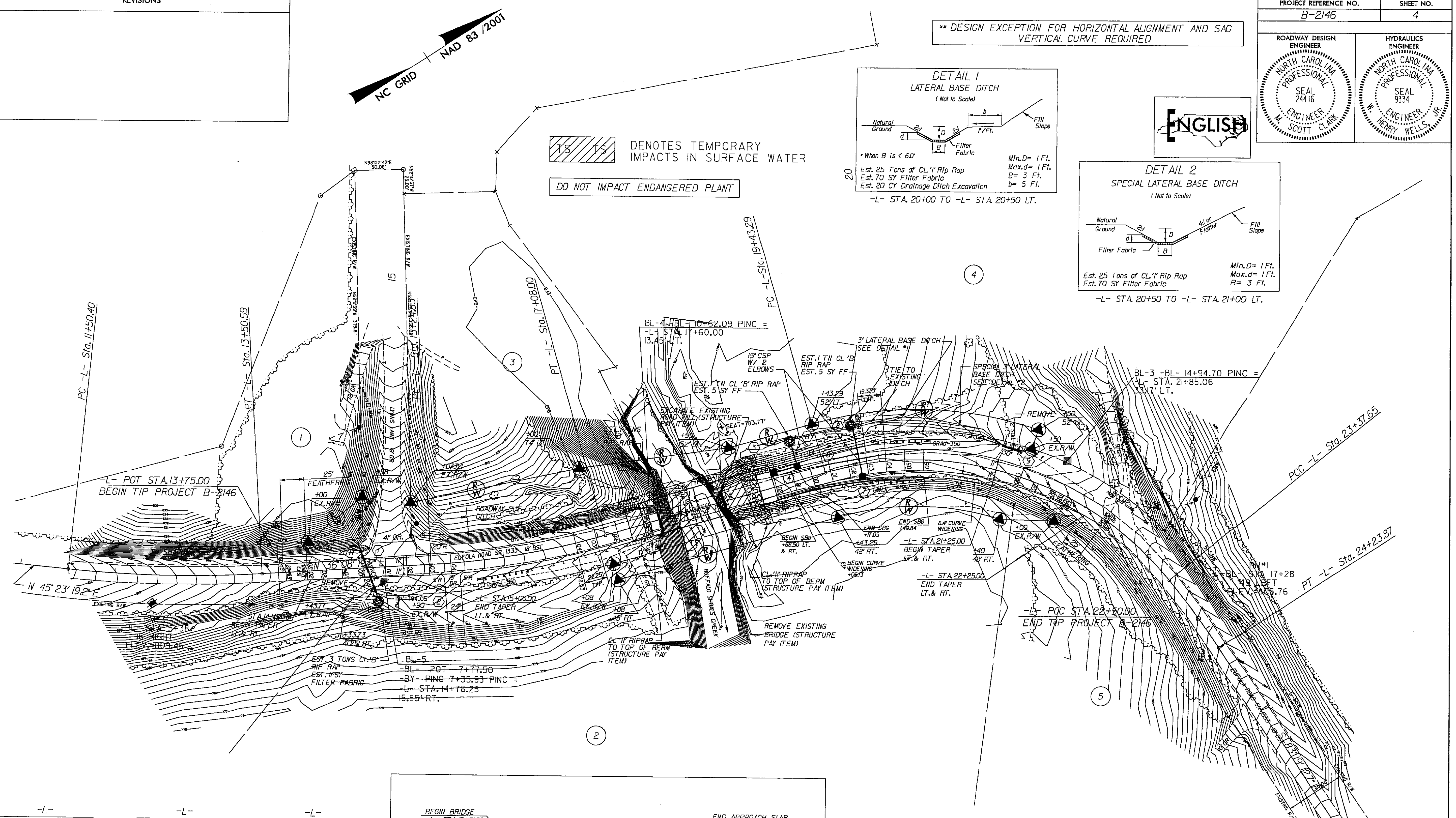
DETAIL 2
SPECIAL LATERAL BASE DITCH
(Not to Scale)

Natural Ground; Filter Fabric; 4:1 or Flatter; Fill Slope

Est. 25 Tons of CL.'I' Rip Rap
Est. 70 SY Filter Fabric

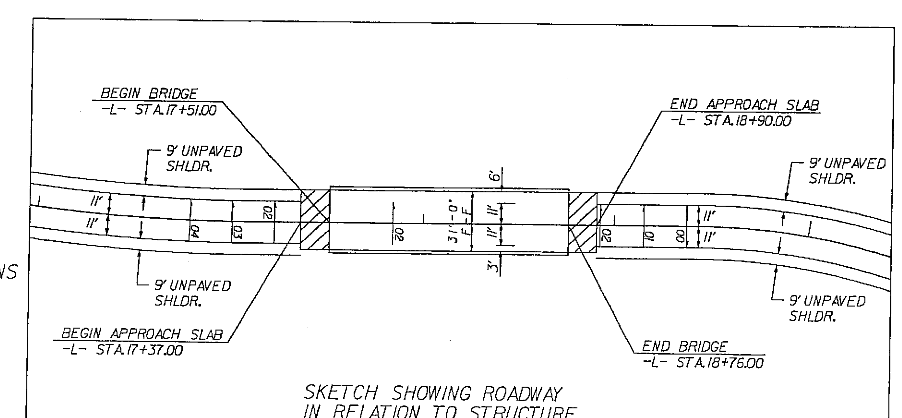
Min. D= 1 Ft.
Max. d= 1 Ft.
B= 3 Ft.

-L- STA. 20+50 TO -L- STA. 21+00 LT.



-L-	-L-	-L-
PI Sta 12+50.72	PI Sta 16+16.79	PI Sta 21+66.54
Δ = 9° 15' 00.0" (LT)	Δ = 12° 37' 22.8" (LT)	Δ = 67° 02' 30.5" (RT)
D = 4° 37' 14.3"	D = 6° 53' 29.6"	D = 17° 00' 00.0"
L = 200.19'	L = 183.17'	L = 394.36'
T = 100.31'	T = 91.96'	T = 223.25'
R = 1,240.00'	R = 831.39'	R = 337.03'
E = 0.06	E = 0.06	E = 0.06
RUN OFF = SEE PLANS	RUN OFF = SEE PLANS	RUN OFF = SEE PLANS

-L-
PI Sta 23+80.80
Δ = 6° 07' 20.5" (RT)
D = 7° 06' 02.7"
L = 86.22'
T = 43.15'
R = 806.90'
E = 0.06
RUN OFF = SEE PLANS



SKETCH SHOWING ROADWAY IN RELATION TO STRUCTURE

DENOTES APPROACH SLAB

FOR -L- PROFILE SEE SHEET NO. 5

SEE SHEETS S-1 THRU S- FOR STRUCTURE PLANS

Permit Drawing
Sheet 7 of 9

SUNGATE DESIGN GROUP, P.A.

RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers

PROJECT REFERENCE NO.	SHEET NO.
B-2146	5

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 24416 ENGINEER SCOTT CLARK

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 9334 ENGINEER HENRY WELLS, JR.

INFORMATION TO BE SHOWN ON PLANS

Design:	Discharge 3400 c.f.s.	Frequency 25 YR.	Elev. 774.9
Base Flood:	Discharge 5010 c.f.s.	Frequency 100 YR.	Elev. 777.0
Overtopping:	Discharge 7340+ c.f.s.	Frequency 500 YR±	Elev. 785.35

B.M.#2 ELEV.= 783.82
R.R SPIKE IN 24" PINE
63' RT. OF -BL- STA. 10+75
53.14' RT. OF -L- STA. 17+62.30

TS L-S — DENOTES TEMPORARY FILL IN SURFACE WATER

CL STA 18+13.5 -L-
1@125', STEEL GIRDER
90° SKEW
CRGR EL 786.12

BEGIN FEATHERING
-L- STA.13+75.00
TIE TO EXIST.

802.01

BEGIN GRADE
-L- STA.14+00.00
ELEV.= 802.01
(INCLUDES 1.25" RESURFACING)

BEGIN VERTICAL CURVE
STA. 15+75.00

(-)4.9068%

BEGIN BRIDGE -L- STA.17+51.00
ELEV.= 787.23

END VERTICAL CURVE
STA. 18+55.00

END BRIDGE -L- STA.18+76.00
ELEV.= 785.68

(-)10.5365%

PI = 17+15.00
EL = 786.54'
K = 64
VC = 280'

PI = 20+70.00
EL = 784.64'
K = 64
VC = 300'

END GRADE
-L- STA.22+25.00
ELEV.= 791.13
(INCLUDES 1.25" RESURFACING)

END VERTICAL CURVE
STA. 22+20.00

END FEATHERING
-L- STA.22+50.00
TIE TO EXIST.

BEGIN VERTICAL CURVE
STA. 19+20.00

(-)10.5365%

(+)4.1866%

+1.00'

END 3' SPEC. LATERAL BASE DITCH
STA. 21+00 LT.
ELEV.= 784.00

END 3' LATERAL BASE DITCH
BEGIN 3' SPEC. LATERAL BASE DITCH
STA. 20+50 LT.
ELEV.= 780.5

BEGIN 3' LATERAL BASE DITCH
STA. 20+00 LT.
ELEV.= 777.00

CL. II RIP RAP TO TOP OF BERM (TYP.)

1.5:1 NORMAL (TYP.)

EXCAVATE EXISTING ROAD FILL (STRUCTURE PAY ITEM)

TS
TS
TS

NWS ELEV.= 766.21

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE	= 3,400 CFS
DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 774.9 FT.
BASE DISCHARGE	= 5,010 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 777.00 FT
OVERTOPPING DISCHARGE	= 7,340+ CFS
OVERTOPPING FREQUENCY	= 500+ YR.
OVERTOPPING ELEVATION	= 785.35 FT

-L-
(FOR PLAN, SEE SHEET NO.4)

Permit Drawing
Sheet 8 of 9

** DESIGN EXCEPTION FOR HORIZONTAL ALIGNMENT AND SAG VERTICAL CURVE REQUIRED

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

SUNGATE DESIGN GROUP, P.A.
915 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL 919-859-1212 FAX 919-859-1404

RAMEY KEMP & ASSOCIATES, INC.
5808 Faringdon Place
Raleigh, North Carolina 27609
919-872-5115 tel. 919-878-3416 fax - www.rameykemp.com

02/03/98

PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
B-2146	X-6	

Permit Drawing
Sheet 9 of 9

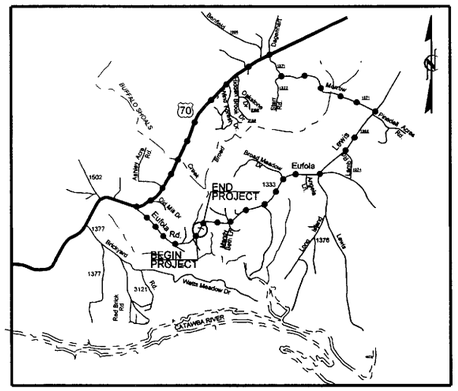
DENOTES CRYSTALLINE ROCK FOR EXACT LOCATION SEE SUBSURFACE PLANS

▨ DENOTES EXISTING FILL TO BE EXCAVATED

TIP PROJECT: B-2146

CONTRACT #

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



VICINITY MAP

OFF-SITE DETOUR

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

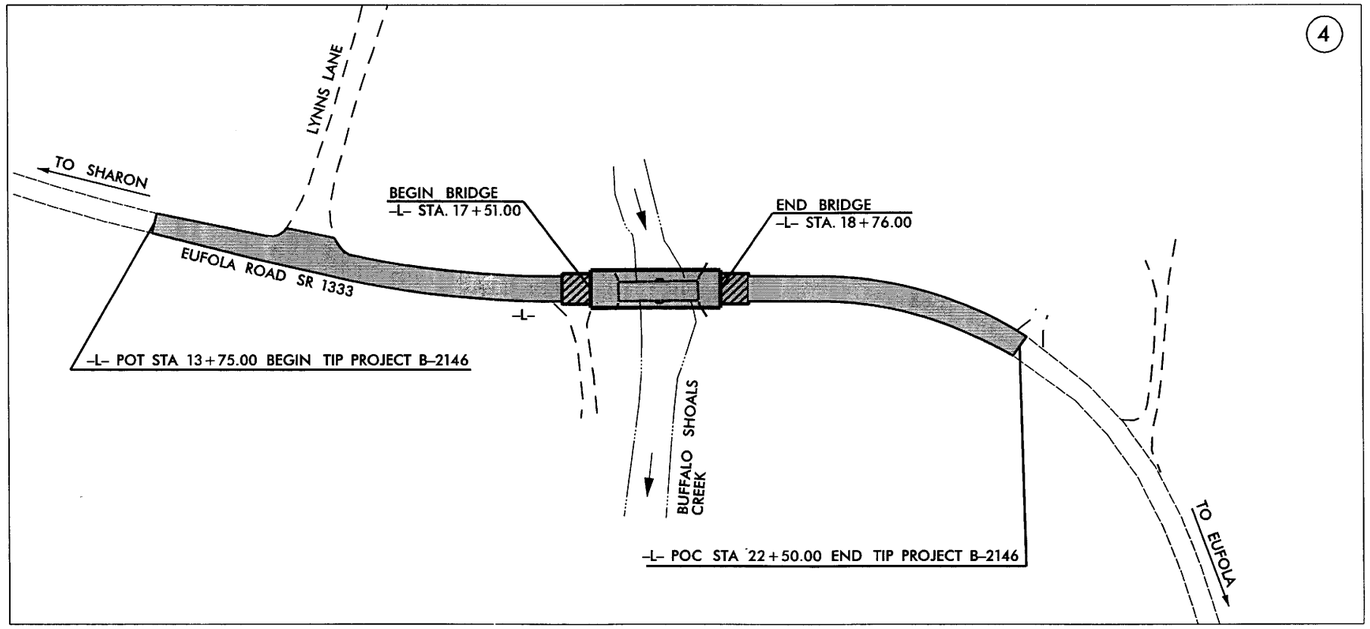
IREDELL COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-2146	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
32620.1.1	BRZ-1333(5)	P.E.
32620.3.1	BRZ-1333(5)	UTIL. & R/W
32620.2.3	BRZ-1333(5)	CONST.

LOCATION: BRIDGE NO. 86 AND APPROACHES ON SR 1333 (EUFOLA ROAD) OVER BUFFALO SHOALS CREEK

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



NC GRID
NAD 83 /2001

** DESIGN EXCEPTION FOR HORIZONTAL ALIGNMENT AND SAG VERTICAL CURVE REQUIRED.

SUNGATE DESIGN GROUP, P.A.

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

5 2.5 0 5 10
PROFILE (VERTICAL)

DESIGN DATA

ADT 2008	=	730
ADT 2028	=	1,048
DHV	=	12 %
D	=	60 %
T	=	3 % *
** V	=	60 MPH

* TTST 1 % DUAL 2 %

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-2146	=	.142 mi
LENGTH STRUCTURE TIP PROJECT B-2146	=	.024 mi
TOTAL LENGTH OF TIP PROJECT B-2146	=	.166 mi

Plans prepared in the office of:
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for the North Carolina Department of Transportation

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JUNE 16, 2006

LETTING DATE:
MARCH 18, 2008

N.C.D.O.T. CONTACT:
CATHY S. HOUSER, P.E.
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ROADWAY DESIGN

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 9334 ENGINEER W. HENRY WELLS, JR.
W. HENRY WELLS, JR. *P.E.*

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 24416 ENGINEER M. SCOTT CLARK
M. SCOTT CLARK, P.E. *P.E.*

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR *DATE*

ROADWAY ENGLISH STANDARD DRAWINGS

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated January 18, 2006 are applicable to this project and by reference hereby are considered a part of these plans:

STD.NO.	TITLE
DIVISION 2 - EARTHWORK	
200.03	Method of Clearing - Method III
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superelevation - Two Lane Pavement
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation - Method 'A'
310.10	Driveway Pipe Construction
DIVISION 4 - MAJOR STRUCTURES	
422.10	Reinforced Bridge Approach Fills
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Superelevated Curve - Method I
DIVISION 6 - ASPHALT BASES AND PAVEMENTS	
654.01	Pavement Repairs
DIVISION 8 - INCIDENTALS	
840.29	Frames and Narrow Slot Flat Grates
840.35	Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
862.01	Guardrail Placement
862.02	Guardrail Installation
862.03	Structure Anchor Units
876.02	Guide for Rip Rap at Pipe Outlets

INDEX OF SHEETS

GENERAL NOTES: 2006 SPECIFICATIONS
EFFECTIVE: 7-18-06

GRADING AND SURFACING:

THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. GRADE LINES MAY BE ADJUSTED AT THEIR BEGINNING AND ENDING AND AT STRUCTURES AS DIRECTED BY THE ENGINEER IN ORDER TO SECURE A PROPER TIE-IN.

CLEARING:

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.

SUPERELEVATION:

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 USING THE RATE OF SUPERELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPERELEVATION IS TO BE REVOLVED ABOUT THE GRADE POINTS SHOWN ON THE TYPICAL SECTIONS.

SHOULDER CONSTRUCTION:

ASPHALT, EARTH, AND CONCRETE SHOULDER CONSTRUCTION ON THE HIGH SIDE OF SUPERELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.01.

DRIVEWAYS:

DRIVEWAYS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. 848.03 AT LOCATIONS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER.

STREET TURNOUT:

STREET RETURNS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. 848.04 USING THE RADII NOTED ON PLANS.

GUARDRAIL:

THE GUARDRAIL LOCATIONS SHOWN ON THE PLANS MAY BE ADJUSTED DURING CONSTRUCTION AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHOULD CONSULT WITH THE ENGINEER PRIOR TO ORDERING GUARDRAIL MATERIAL.

TEMPORARY SHORING:

SHORING REQUIRED FOR THE MAINTENANCE OF TRAFFIC WILL BE PAID FOR AS "EXTRA WORK" IN ACCORDANCE WITH SECTION 104-7.

END BENTS:

THE ENGINEER SHALL CHECK THE STRUCTURE END BENT PLANS, DETAILS, AND CROSS-SECTION PRIOR TO SETTING OF THE SLOPE STAKES FOR THE EMBANKMENT OR EXCAVATION APPROACHING A BRIDGE.

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE: DUKE POWER.
ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

RIGHT-OF-WAY MARKERS:

ALL RIGHT-OF-WAY MARKERS ON THIS PROJECT SHALL BE PLACED BY OTHERS.

RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Farlngdon Place, Suite 100
Raleigh, North Caroline 27609
919-872-5115 Tel. 919-878-5416 Fax.
www.rameykemp.com

3/15/06

PROJECT REFERENCE NO.	SHEET NO.
B-2146	1-B

*S.U.E. = *Subsurface Utility Engineering*

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 23
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign — S
- Well
- Small Mine
- Foundation
- Area Outline
- Cemetery
- Building
- School
- Church
- Dam

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- Jurisdictional Stream — JS
- Buffer Zone 1 — BZ 1
- Buffer Zone 2 — BZ 2
- Flow Arrow
- Disappearing Stream
- Spring
- Swamp Marsh
- Proposed Lateral, Tail, Head Ditch — FLOW
- False Sump

RAILROADS:

- Standard Gauge
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH
- RR Abandoned
- RR Dismantled

RIGHT OF WAY:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line
- Proposed Right of Way Line with Iron Pin and Cap Marker
- Proposed Right of Way Line with Concrete or Granite Marker
- Existing Control of Access — CA
- Proposed Control of Access — CA
- Existing Easement Line — E
- Proposed Temporary Construction Easement — E
- Proposed Temporary Drainage Easement — TDE
- Proposed Permanent Drainage Easement — PDE
- Proposed Permanent Utility Easement — PUE

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Wheel Chair Ramp — WCR
- Proposed Wheel Chair Ramp Curb Cut — WCR
- Curb Cut for Future Wheel Chair Ramp — CCFR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR:

- Head and End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB — CB
- Paved Ditch Gutter
- Storm Sewer Manhole — S
- Storm Sewer — S

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole — HH
- H-Frame Pole
- Recorded U/G Power Line — P
- Designated U/G Power Line (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Booth
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole — HH
- Recorded U/G Telephone Cable — T
- Designated U/G Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Recorded U/G Fiber Optics Cable — T FO
- Designated U/G Fiber Optics Cable (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line — W
- Designated U/G Water Line (S.U.E.*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G
- Designated U/G Gas Line (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- Recorded SS Forced Main Line — FSS
- Designated SS Forced Main Line (S.U.E.*) — FSS

MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line — ?UTL
- U/G Tank; Water, Gas, Oil
- A/G Tank; Water, Gas, Oil
- U/G Test Hole (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

RAMEY KEMP & ASSOCIATES, INC.
Transportation Engineers
5808 Faringdon Place
Raleigh, North Carolina 27609
919-872-5115 Tel. 919-872-6410 Fax
www.rameykemp.com

PROJECT REFERENCE NO.	SHEET NO.
B-2146	4

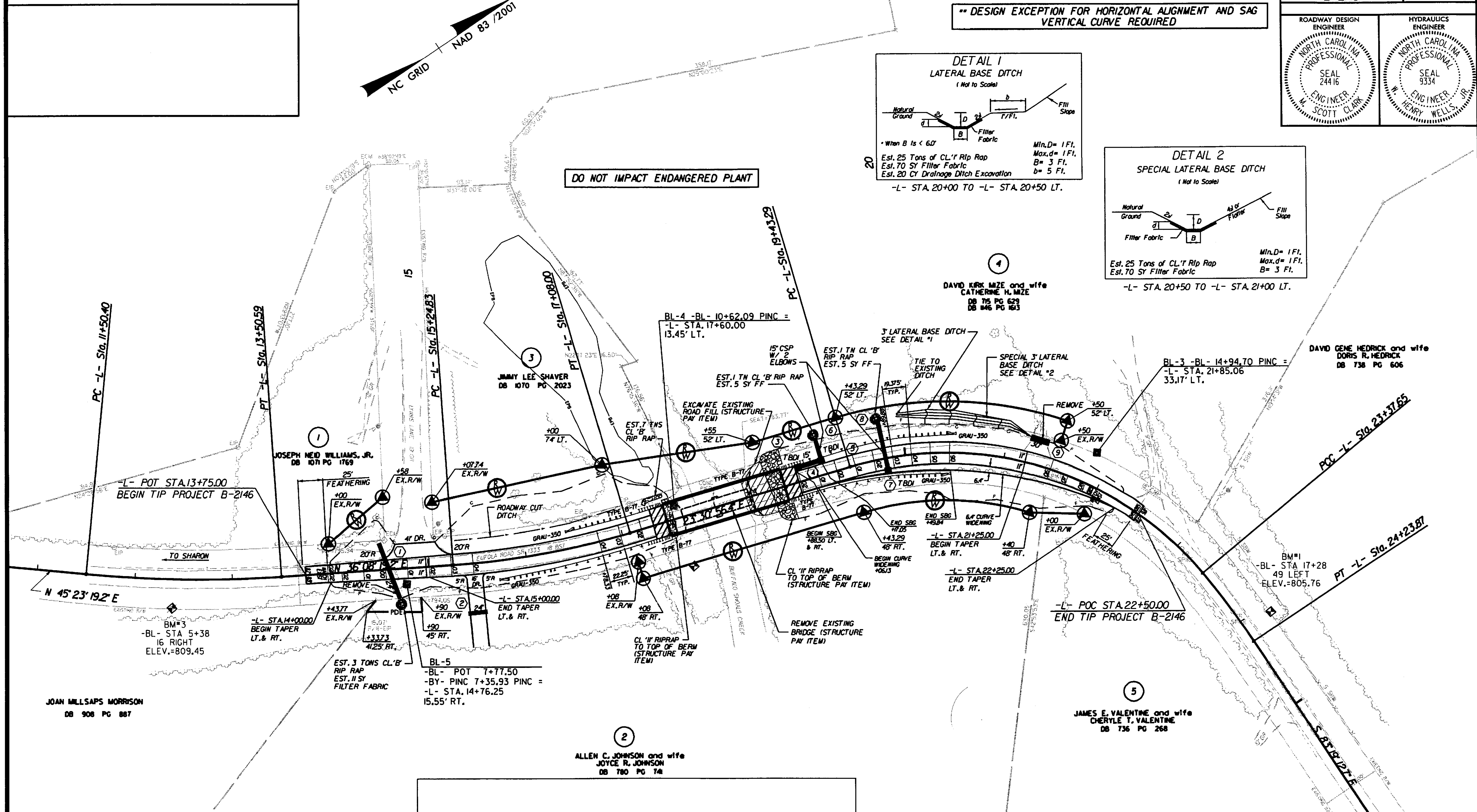
ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 24416 ENGINEER W. SCOTT CLARK

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 9334 ENGINEER W. HENRY WELLS, JR.

REVISIONS

** DESIGN EXCEPTION FOR HORIZONTAL ALIGNMENT AND SAG VERTICAL CURVE REQUIRED

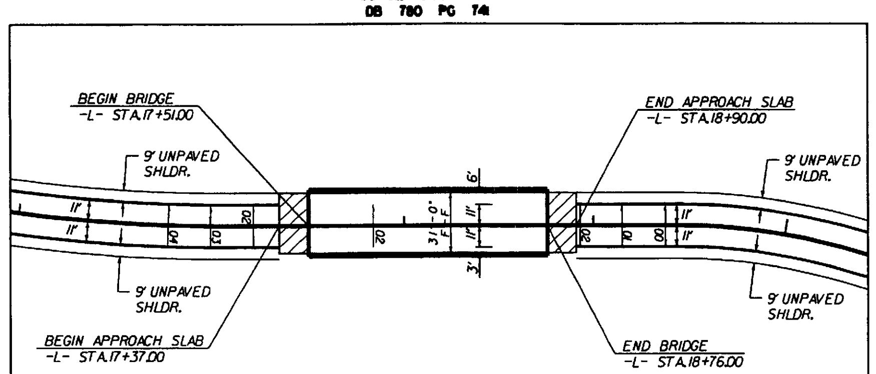
DO NOT IMPACT ENDANGERED PLANT



DETAIL 1
LATERAL BASE DITCH
(Not to Scale)
Est. 25 Tons of CL.'I' Rip Rap
Est. 70 SY Filter Fabric
Est. 20 CY Drainage Ditch Excavation
Min.D= 1 Ft.
Max.d= 1 Ft.
B= 3 Ft.
b= 5 Ft.
-L- STA. 20+00 TO -L- STA. 20+50 LT.
DETAIL 2
SPECIAL LATERAL BASE DITCH
(Not to Scale)
Est. 25 Tons of CL.'I' Rip Rap
Est. 70 SY Filter Fabric
Min.D= 1 Ft.
Max.d= 1 Ft.
B= 3 Ft.
-L- STA. 20+50 TO -L- STA. 21+00 LT.
NC GRID NAD 83 /2001
PC -L- Sta. 11+50.40
PT -L- Sta. 13+50.59
PC -L- Sta. 15+24.83
PT -L- Sta. 17+08.00
PC -L- Sta. 19+43.29
PCC -L- Sta. 23+37.65
PT -L- Sta. 24+23.87
-L- POT STA. 13+75.00
BEGIN TIP PROJECT B-2146
-L- POC STA. 22+50.00
END TIP PROJECT B-2146
N 45°23' 19.2" E
N 36°08' 19.2" E
S 83°19' 12.7" E
JOSEPH NEID WILLIAMS, JR. DB 1071 PG 1769
JIMMY LEE SHAVER DB 1070 PG 2023
DAVID KIRK MIZE and wife CATHERINE H. MIZE DB 715 PG 629 DB 846 PG 163
DAVID GENE HEDRICK and wife DORIS R. HEDRICK DB 738 PG 606
JAMES E. VALENTINE and wife CHERYLE T. VALENTINE DB 736 PG 268
ALLEN C. JOHNSON and wife JOYCE R. JOHNSON DB 780 PG 741
JOAN MILLSAPS MORRISON DB 908 PG 887
BL-4 -BL- 10+62.09 PINC = -L- STA. 17+60.00 13.45' LT.
BL-3 -BL- 14+94.70 PINC = -L- STA. 21+85.06 33.17' LT.
BL-5 -BL- POT 7+77.50 -BY- PINC 7+35.93 PINC = -L- STA. 14+76.25 15.55' RT.
BM#1 -BL- STA 17+28 49 LEFT ELEV.=805.76
BM#3 -BL- STA 5+38 16 RIGHT ELEV.=809.45
TO SHARON
TO EUFOLA
EUFOLA ROAD SR 1333
BUFFALO SHOALS CREEK
EXCAVATE EXISTING ROAD FILL (STRUCTURE PAY ITEM)
REMOVE EXISTING BRIDGE (STRUCTURE PAY ITEM)
CL 'II' RIPRAP TO TOP OF BERM (STRUCTURE PAY ITEM)
EST. 3 TONS CL.'B' RIP RAP EST. 11 SY FILTER FABRIC
EST. 1 TN CL 'B' RIP RAP EST. 5 SY FF
3' LATERAL BASE DITCH SEE DETAIL #1
SPECIAL 3' LATERAL BASE DITCH SEE DETAIL #2
TIE TO EXISTING DITCH
ROADWAY CUT DITCH
15" CSP W/ 2 ELBOWS
-L- STA.14+00.00 BEGIN TAPER LT.& RT.
-L- STA.15+00.00 END TAPER LT.& RT.
-L- STA.21+25.00 BEGIN TAPER LT.& RT.
-L- STA.22+25.00 END TAPER LT.& RT.
25' FEATHERING

-L-	-L-	-L-
PI Sta 12+50.72	PI Sta 16+16.79	PI Sta 21+66.54
Δ = 9°15' 00.0" (LT)	Δ = 12°37' 22.8" (LT)	Δ = 67°02' 30.5" (RT)
D = 4°37' 14.3"	D = 6°53' 29.6"	D = 17°00' 00.0"
L = 200.19'	L = 183.17'	L = 394.36'
T = 100.31'	T = 91.96'	T = 223.25'
R = 1,240.00'	R = 831.39'	R = 337.03'
E = 0.06	E = 0.06	E = 0.06
RUN OFF = SEE PLANS	RUN OFF = SEE PLANS	RUN OFF = SEE PLANS

-L-
PI Sta 23+80.80
Δ = 6°07' 20.5" (RT)
D = 7°06' 02.7"
L = 86.22'
T = 43.15'
R = 806.90'
E = 0.06
RUN OFF = SEE PLANS



SKETCH SHOWING ROADWAY IN RELATION TO STRUCTURE

DENOTES APPROACH SLAB

FOR -L- PROFILE SEE SHEET NO.5

SEE SHEETS S-1 THRU S- FOR STRUCTURE PLANS

SUNGATE DESIGN GROUP, P.A.

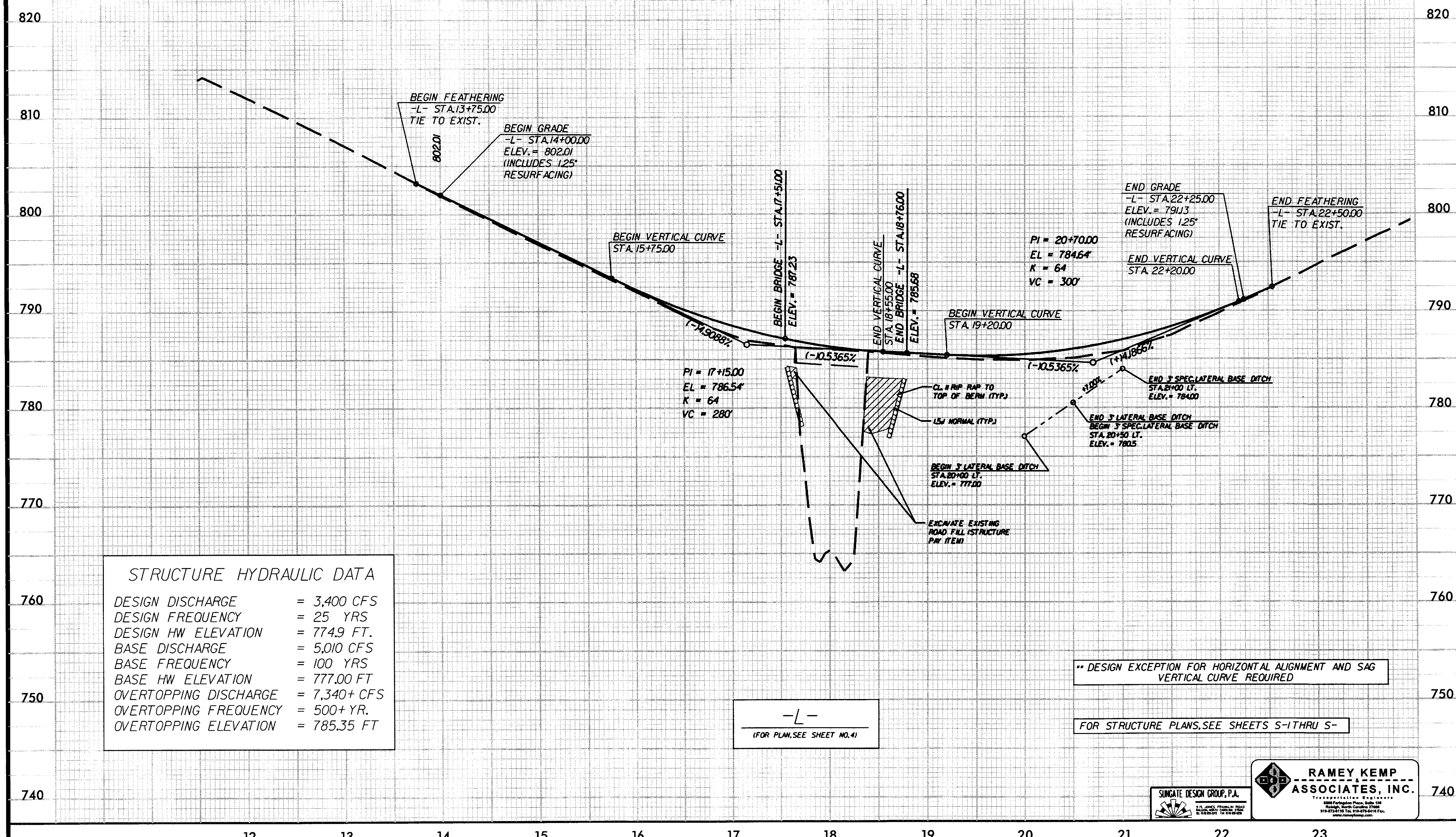
RAMEY KEMP & ASSOCIATES, INC.

PROJECT REFERENCE NO.	SHEET NO.
B-2146	5

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 24416 M. SCOTT CLARK

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 9334 W. HENRY WELLS, JR.

B.M.*2 ELEV.= 783.82
R.R SPIKE IN 24" PINE
63' RT. OF -BL- STA. 10+75
53.14' RT. OF -L- STA. 17+62.30



STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE	=	3,400 CFS
DESIGN FREQUENCY	=	25 YRS
DESIGN HW ELEVATION	=	774.9 FT.
BASE DISCHARGE	=	5,010 CFS
BASE FREQUENCY	=	100 YRS
BASE HW ELEVATION	=	777.00 FT
OVERTOPPING DISCHARGE	=	7,340+ CFS
OVERTOPPING FREQUENCY	=	500+ YR.
OVERTOPPING ELEVATION	=	785.35 FT

-L-
(FOR PLAN, SEE SHEET NO. 4)

** DESIGN EXCEPTION FOR HORIZONTAL ALIGNMENT AND SAG VERTICAL CURVE REQUIRED

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

SUNGATE DESIGN GROUP, P.A.
915 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606

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02/03/98

0 5	PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
	B-2146	X-6	

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

795
790
785

1.5:1
3:1
0.0200

STA.17+30.00
EL.786.75

800
795
790
785
780

1.5:1
3:1
0.0225

STA.17+15.00
EL.786.95

—L—

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

IREDELL COUNTY
BRIDGE NO. 86 ON SR 1333 (EUFOLA ROAD)
OVER BUFFALO SHOALS CREEK

FEDERAL-AID PROJECT NO. BRZ-1333(5)
STATE PROJECT NO. 8.2822801
TIP NO. B-2146

CATEGORICAL EXCLUSION

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
AND
N.C. DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

APPROVED:

4/11/05
DATE

for Gregory J. Thorpe, Ph.D.
Environmental Management Director
Project Development & Environmental Analysis Branch
North Carolina Department of Transportation

4/13/05
DATE

John F. Sullivan, III, P.E.
Division Administrator
Federal Highway Administration

IREDELL COUNTY
BRIDGE NO. 86 ON SR 1333 (EUFOLA ROAD)
OVER BUFFALO SHOALS CREEK

FEDERAL-AID PROJECT NO. BRZ-1333(5)
STATE PROJECT NO. 8.2822801
TIP NO. B-2146

CATEGORICAL EXCLUSION

Document Prepared by
Ramey Kemp & Associates, Inc.
4928-A Windy Hill Drive
Raleigh, North Carolina 27609

Stephen C. Greene, P.E.
Ramey Kemp & Associates, Inc.

3/18/05
Date

For the North Carolina Department of Transportation

Vince Rhea, P.E., Project Development Engineer
Project Development and Environmental Analysis Branch

PROJECT COMMITMENTS

IREDELL COUNTY
BRIDGE NO. 86 ON SR 1333 (EUFOLA ROAD)
OVER BUFFALO SHOALS CREEK

FEDERAL-AID PROJECT NO. BRZ-1333(5)
STATE PROJECT NO. 8.2822801
TIP NO. B-2146

In addition to the standard Nationwide Permit #23 Conditions, the General Nationwide Permit Conditions, Section 404 Only Conditions, Regional Conditions, State Consistency Conditions, NCDOT's Guidelines for Best Management Practices for the Protection of Surface Waters, 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:

IREDELL COUNTY
BRIDGE NO. 86 ON SR 1333 (EUFOLA ROAD)
OVER BUFFALO SHOALS CREEK

FEDERAL-AID PROJECT NO. BRZ-1333(5)
STATE PROJECT NO. 8.2822801
T.I.P. NO. B-2146

INTRODUCTION

The replacement of Bridge No. 86 located on SR 1333 (Eufola Road) over Buffalo Shoals Creek is included in the North Carolina Department of Transportation (NCDOT) 2004-2010 Transportation Improvement Program (TIP) and in the Federal-Aid Bridge Replacement Program (BRZ-1333(5)). The location is shown in Figure 1.

No substantial impacts are anticipated. The project is classified as a Federal "Categorical Exclusion".

I. PURPOSE AND NEED

The NCDOT Bridge Maintenance Unit records indicate Bridge No. 86 has a sufficiency rating of 27.2 out of a possible 100 for a new structure. The bridge is considered structurally deficient and functionally obsolete. The replacement of this inadequate structure will result in safer and more efficient traffic operations.

II. EXISTING CONDITIONS

Bridge No. 86 is located on SR 1333 (Eufola Road) in rural Iredell County. Refer to Figure 1 for the project location and Figures 2 and 3 for photos of the existing project study area.

Bridge No. 86 was constructed in 1955. The bridge is currently posted to restrict weight limits to 11 tons for single vehicles (SV) and 14 tons for truck-tractor semi-trailers (TTST).

The overall length of the 2-span structure is 73 ft. It has a clear roadway width of 19.2 ft that includes two travel lanes over the bridge. The superstructure consists of a timber deck on I-beams and double channels. The substructure consists of reinforced concrete posts and beams. The height from crown to streambed is 22 ft.

SR 1333 is classified as a rural local in the Statewide Functional Classification System. The 2003 average daily traffic volume (ADT) is estimated to be 650 vehicles per day (vpd). The percentages of truck traffic are 1 percent TTST vehicles and 2 percent dual-tired vehicles. The projected 2025 ADT is 1000 vpd.

The two-lane facility measures approximately 18 ft in width and has approximately 8 ft grassed shoulders on each side of the roadway in the vicinity of the bridge. The horizontal alignment of SR 1333 is poor adjacent to the bridge with reversing curves on each end of the bridge. The vertical alignment is generally good with slight rises in grade on each end of the bridge. There is no posted speed limit in the immediate vicinity of the bridge. Therefore, the statutory speed limit is 55 miles per hour (mph). Existing right-of-way is approximately 60 ft in width.

There are no utilities in the vicinity of the bridge.

This section of SR 1333 is not part of a designated bicycle route nor is it listed in the Transportation Improvement Program as needing incidental bicycle accommodations. There is no indication that an unusual number of bicyclists use this roadway.

Land use within the project study area is a mixture of undeveloped land, rural residential properties, and forest land.

According to Iredell County school officials; there are a total of eight bus crossings per day on this bridge.

Crash records maintained by the NCDOT indicate there have been three crashes reported in the vicinity of Bridge No. 86 during a recent three year period. These included two crashes where vehicles hit a fixed object and one where the vehicle ran off the road.

III. ALTERNATIVES

A. Project Description

Based upon the preliminary hydraulic report, the proposed replacement structure for Bridge No. 86 will consist of a 115-foot bridge. The structure will provide two 11 ft travel lanes with 3 ft of lateral clearance on each side of the bridge.

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.

The roadway approaches will provide two 11 ft travel lanes with 6 ft grassed shoulders. The grade will be approximately the same as the existing roadway. The design speed is 60 mph

B. Build Alternatives

Two (2) build alternatives for replacing Bridge No. 86 were considered and are described below:

Alternative A

Alternative A consists of replacing the bridge in-place with a new bridge. During construction, traffic will be maintained by an off-site detour. The total length of permanent roadway approach work for this alternative is approximately 900 ft. Refer to Figure 4 for illustration of this alternative.

The off-site detour will be approximately 6.5 miles long utilizing local roads. This detour has been coordinated with the local EMS and the school district. The detour route is shown in Figure 1.

Alternative B

Alternative B consists of replacing the bridge in-place with a new bridge. During construction, traffic will be maintained by an on-site detour north of SR 1333. The total length of permanent roadway approach work for this alternative is approximately 900 ft. Refer to Figures 5 and 6 for illustration of this alternative.

The on-site detour will be located approximately 10 ft east of the proposed bridge. The temporary structure will be approximately 95-foot in length and will have a clear roadway width of 26 ft including two 10 ft travel lanes and 3 ft of lateral clearance on each side of the bridge. The detour roadway approaches will provide two 10 ft travel lanes and 4 ft wide shoulders on each side. The length of the temporary detour will be approximately 1620 ft.

C. Alternatives Eliminated From Further Consideration

Two (2) alternatives for replacing Bridge No. 86 that were considered and eliminated from consideration are described below:

Alternative C

Alternative C consists of replacing the bridge with a new bridge on a new location to the north of the existing bridge. Traffic would be maintained on the existing bridge during construction. The total length of permanent roadway approach work for this alternative would be approximately 2000 ft. This alternative was eliminated from consideration due to its higher cost and greater amount of natural impacts.

The "Do-Nothing" alternative will eventually necessitate closure of the bridge due to its poor condition. This is not desirable due to the traffic service provided by SR 1333.

Investigation of the existing structure by the NCDOT Bridge Maintenance Unit indicates that rehabilitation of the existing bridge is not feasible due to its deteriorated condition.

D. Preferred Alternative (Alternative A)

Alternative A was selected as the preferred because of the lower cost and the lower quantity of impacts associated with this alternative.

The Division Engineer concurs with Alternative A as the Preferred Alternative.

E. Anticipated Design Exception(s)

The speed limit is not posted on SR 1333; therefore, a statutory speed limit of 55 mph applies. Due to the existing road conditions a design exception will be required for the horizontal alignment for Alternative A.

IV. ESTIMATED COSTS

The estimated costs for each alternative, based on current dollars, are shown in Table 1:

Table 1
Estimated Project Costs

	Alternative A	Alternative B
Structure Removal (Existing)	$14,600	$14,600
Structure Proposed	$276,000	$276,000
Detour Structure and Approaches	$0	$106,400
Roadway Approaches	$355,260	$357,456
Miscellaneous and Mobilization	$153,460	$172,168
Engineering and Contingencies	$119,900	$150,000
Right-of-Way/Easement and Utilities	Not available yet	Not available yet
Total Project Cost	**$919,220**	**$1,076,624**

The estimated cost of the project, as shown in the 2004-2010 NCDOT Transportation Improvement Program is $625,000 including $75,000 spent in prior years, $50,000 for right-of-way and $500,000 for construction.

V. NATURAL RESOURCES

Natural resources within the project study area were evaluated to provide: 1) an assessment of existing vegetation, wildlife, protected species, streams, wetlands, and water quality; 2) an evaluation of probable impacts resulting from construction; and 3) a preliminary determination of permit needs.

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 (Catawba, NC 7.5-minute quadrangle, 1970), U.S. Fish and Wildlife Service (FWS) National Wetlands Inventory (NWI) mapping (FWS NWI 1994), and recent aerial photography. Plant community descriptions are based on a classification system utilized by the N.C. Natural Heritage Program (NHP) (Schafale and Weakley 1990). When appropriate, community classifications were modified to better reflect field observations. Vascular plant names generally follow nomenclature found in Radford *et al.* (1968), with adjustments made to reflect more current nomenclature (Kartesz 1998). Jurisdictional areas were evaluated using the three-parameter approach following U.S. Army Corps of Engineers (COE) delineation guidelines (DOA 1987). Wetland jurisdictional areas were characterized according to a classification scheme established by Cowardin *et al.* (1979) and *A Field Guide To North Carolina Wetlands* (DEM 1996). Habitat used by terrestrial wildlife and aquatic organisms, as well as expected population distributions, were determined through field observations, evaluation of available habitat, and supportive documentation (Webster *et al.* 1985, Potter *et al.* 1980, Martof *et al.* 1980, Rohde *et al.* 1994, Menhinick 1991, Palmer and Braswell 1995). Water quality information for area streams and tributaries was derived from available sources (DWQ 1999, 2003). Quantitative sampling was not undertaken to support existing data.

The most current FWS listing of federally protected species with ranges which extend into Iredell County (January 30, 2003) was obtained prior to initiation of the field investigation. In addition, NHP records documenting the presence of federally or state listed species were consulted before commencing the field investigation.

Bridge No. 86 was visited on March 17, 2003. The project study area was walked and visually surveyed for significant features. For purposes of field surveys, the project study area has been delineated. Special concerns evaluated in the field include 1) potential habitat for protected species and 2) wetlands and water quality protection in Buffalo Shoals Creek.

B. Physiography and Soils

The project study area occurs within the Inner Piedmont Belt geologic formation within the Inner Piedmont physiographic province of North Carolina, and is underlain by metamorphic fine-grained biotite gneiss. Elevations in the project study area are approximately 780.0 to 840.0 ft National Geodetic Vertical Datum (NGVD) (USGS Catawba, NC 7.5-minute quadrangle, 1970).

The Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service (SCS), indicates that Chewacla soils (*Fluvaquentic Dystrudepts*), Starr loam (*Fluventic Dystrudepts*), Conagree soils (*Oxyaquic Udifluvents*), Cecil soils (*Typic Kanhapludults*), and Louisburg soils (*Ruptic-Ultic Dystrochrepts*) occur within the project study area (SCS 1964).

The Chewacla series consists of very deep, moderately permeable, somewhat poorly drained soils on floodplains. Chewacla soils in Iredell County are non-hydric but may contain inclusions of the hydric Wehadkee (*Fluvaquentic Endoaquepts*) soils at the base of slopes and in depressions (USDA 1996).

The Starr series consists of well drained, moderately permeable, gently sloping soils of upland slopes and depressions. Starr soils are considered to be non-hydric in Iredell County.

The Congaree series consists of deep, nearly level, well drained soils with moderately rapid permeability found on first bottoms. Congaree soils are considered to be non-hydric in Iredell County.

The Cecil series consists of very deep, well drained, moderately permeable soils on ridges and side slopes of the Piedmont uplands. Cecil soils are considered to be non-hydric in Iredell County.

The Louisburg series consists of very shallow, well drained, moderately permeable soils on bedrock. Louisburg soils are considered to be non-hydric in Iredell County.

C. Water Resources

C.1. Waters Impacted

The project study area is located within sub-basin 03-08-32 of the Catawba River Basin (DWQ 1999). This area is part of USGS accounting unit 03050101 of the South Atlantic-Gulf Coast Region. The section of Buffalo Shoals Creek within the project study area has been assigned Stream Index Number 11-78-(3) by the N.C. Division of Water Quality (DWQ) (DWQ 2003). Buffalo Shoals Creek is not listed on the DWQ 303d list of impaired streams in the Catawba River Basin (April 3, 2000 DWQ list).

Within the project study area, Buffalo Shoals Creek is a third-order perennial stream exhibiting moderate sinuosity, rapid velocity, and a well-developed riffle-pool sequence. The width of the stream is approximately 30.0 ft at the point of the bridge crossing. During the field survey, water depth varied from 6.0 inches in riffles to 4.0 ft in pools, and clarity was fair. The substrate is composed of gravel, cobble, and boulders in riffles and sand

and gravel in pools. The stream banks are steep and range from 8.0 to 15.0 ft in height. The right bank is steeper, with the floodplain existing on the left bank. Bank erosion is evident under the bridge due to a constrictive design.

There is an unnamed tributary (UT) to Buffalo Shoals Creek within the project study area. This UT is a first-order perennial stream exhibiting weak sinuosity, low velocity, and weak riffle-pool sequence. The width of the stream is approximately 3.0 ft within the project study area. The water depth was approximately 3.0 inches and water clarity was clear. The substrate is composed of sand covered with organic matter (leaf litter). The stream banks range from 4 to 6 inches. This stream is groundwater fed and most likely has human origins.

A best usage classification of **WS-IV CA** has been assigned to Buffalo Shoals Creek and its tributaries in the project study area. **WS-IV** waters are used as sources of potable water. These waters are also protected for Class **C** uses which include aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. Secondary recreation refers to human body contact with waters on an infrequent or incidental basis. **WS-IV** waters are generally in moderately to highly developed watersheds or Protected Areas, and involve no categorical restrictions on discharges. The secondary classification of **CA** or watershed Critical Area designates land adjacent to a water supply intake where the risk associated with pollution is greater than from remaining portions of the watershed. The Critical Area includes land within 0.5 mile upstream and draining to a river intake or within 0.5 mile and draining to the normal pool elevation of water supply reservoirs.

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 mile of the project study area (DWQ 1999, DWQ 2003).

Buffalo Shoals Creek and its tributaries does not appear on the Department of Environment and Natural Resources 303d list of waters not meeting water quality standards or which have impaired uses.

The DWQ (previously known as the Division of Environmental Management, Water Quality Section) has initiated a whole-basin approach to water quality management for the 17 river basins within the state. Buffalo Shoals Creek has a use support rating of **Fully Supporting** in the vicinity of the project study area and is not designated as an impaired water body regulated under the provisions of the federal Clean Water Act, Section 303(d). No benthic macroinvertebrate monitoring stations occur within 1.0 mile of the project study area (DWQ 1999).

The Catawba River subbasin 03-08-32 supports six major and 49 minor point source dischargers. Permitted flow is 10.53 million gallons per day for the major dischargers and 4.73 million gallons per day for the minor dischargers. Major non-point sources of pollution within the Catawba River Basin include runoff from construction activities, agriculture, timber harvesting, hydrologic modification, failing septic systems, straight pipes, roads, parking lots, and roof tops. Sedimentation and nutrient inputs are major problems associated with non-point source discharges (DWQ 1999).

The N.C. Wildlife Resources Commission (WRC) has developed a Significant Aquatic Endangered Species Habitat database to enhance planning and impact analysis in areas proposed by WRC as being critical due to the presence of Endangered or Threatened aquatic species. No Significant Aquatic Endangered Species Habitat occurs within the project study area. The nearest Significant Aquatic Endangered Species Habitat within the Catawba River Basin occurs approximately 35.0 miles northwest of the project study area.

C.2. Anticipated Impacts to Water Resources

Impacts to water resources in the project study area are likely to result from activities associated with project construction. Activities likely to result in impacts consist of clearing and grubbing along stream banks, removal of riparian canopy, instream construction, use of fertilizers and pesticides as part of revegetation operations, and installation of pavement. The following impacts to surface water resources are likely to result from the aforementioned construction activities:

- Short-term increases in sedimentation and siltation downstream of the crossing associated with increased erosion potential in the project study area during and immediately following construction.
- Short-term changes in incident light levels and turbidity due to increased sedimentation rates and vegetation removal.
- Short-term alteration of water levels and flows due to interruptions and/or additions of surface water and groundwater during construction.
- Short-term increases in nutrient loading during construction via runoff from temporarily exposed land surfaces.
- A short-term increase in the potential for the release of toxic compounds (such as petroleum products) from construction equipment and other vehicles.
- Changes in and possible destabilization of water temperature regimes due to removal of vegetation within or overhanging the watercourse.
- Increased concentrations of pollutants typically associated within roadway runoff.

To minimize potential impacts to water resources in and downstream of the project study area, NCDOT's *Best Management Practices for the Protection of Surface Waters* (NCDOT, 1997) will be strictly enforced during the construction phase of the project. Impacts will be minimized to the fullest degree practicable by limiting instream activities and by revegetating stream banks immediately following the completion of grading.

C.3. Impacts Related to Bridge Demolition and Removal

In order to protect the water quality and aquatic life in the area affected by this project, the NCDOT and all contractors will follow appropriate guidelines for bridge demolition and removal. These guidelines are presented in three NCDOT documents entitled: *Pre-Construction Guidelines for Bridge Demolition and Removal*, *Policy: Bridge Demolition* and *Removal in Water of the United States*, and *Best Management Practices for Bridge Demolition and Removal.*

The superstructure for Bridge No. 86 is composed of a timber deck on I-beams and double channels. The substructure is composed of reinforced concrete posts and beams. There is potential for concrete to be dropped into Buffalo Shoals Creek during demolition and removal. The maximum potential temporary fill associated with the removal of the bridge is approximately 26.7 cubic yards.

Because no moratoriums apply and Buffalo Shoals Creek is a Class **WS-IV CA** water, this project falls under Case 3 (no special restrictions) of the *Best Management Practices for Bridge Demolitions and Removal.*

D. Biotic Resources

Living systems described in the following sections include communities of associated plants and animals observed within the project study area. These descriptions refer to the flora and fauna in each community and the relationship of these biotic components. Biotic resources assessed as part of this investigation include

discernable terrestrial and aquatic communities. The composition and distribution of biotic communities within the project study area are a function of topography, soils, hydrology, and past and present land uses.

Terrestrial systems are discussed primarily from the perspective of dominant plant communities and are classified in accordance with the *Classification of Natural Communities of North Carolina: Third Approximation* (Schafale and Weakley, 1990) where applicable. Representative animal species likely to inhabit or utilize biotic communities of the project study area (based on published range distributions) are also discussed. Species observed during field investigation are listed.

D.1. Plant Communities

Five distinct plant communities were identified within the project study area. They are: (1) disturbed/maintained land, (2) Dry-Mesic Oak Pine Forest, (3) Piedmont Heath Bluff, (4) Piedmont Levee Forest, and (5) pine plantation. These plant communities are described below.

Disturbed/Maintained Land — Disturbed/maintained land is the dominant community with the project study area, covering 5.3 acres, and occurs as maintained right-of-ways, crop land, and residential landscape. The maintained roadside area is approximately 8.0 ft wide. No trees and very few shrubs contribute to the composition of this community. Plant species on the roadside margins include wild strawberry (*Duchesnea indica*), clover (*Trifolium* spp.), chickweed (*Stellaria media*), nightshade (*Solanum carolinense*), bittercress (*Cardamine hirsuta*), wild onion (*Allium canadense*), violets (*Viola* spp.), henbit (*Lamium amplexicaule*), plantain (*Plantago virginica*), Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), and fescue (*Festuca* spp.). The crop land (southeastern quadrant) had been recently tilled and contained no vegetation. The residential landscape consists of fescue and bare ground with scatterings of trees, such as red maple (*Acer rubrum*), Virginia pine (*Pinus virginiana*), and oaks (*Quercus* spp.). Disturbed/Maintained land is relatively low in plant and wildlife diversity. Wildlife species that utilize disturbed/maintained land include American robins (*Turdus migratorius*), white-tailed deer (*Odocoileus virginianus*), and woodchucks (*Marmota monax*). American robins forage for soil invertebrates, white-tailed deer consume many of the herbaceous species, and woodchucks consume crops and other herbaceous species. Red-tailed hawks (*Buteo jamaicensis*), eastern screech owls (*Otus asio*), and foxes hunt in large areas of disturbed/maintained habitats for rodents and insects that also utilize the habitat.

Dry-Mesic Oak Pine Forest — Dry-Mesic Oak Pine Forest occurs on upland sites near Buffalo Shoals Creek and encompasses a total of 1.9 acres. This is a modified natural plant community based upon the Dry-Mesic Oak Hickory Forest as described by Schafale and Weakly (1990). Canopy trees are approximately 20 years old and may explain the lack of hickories. Hickories produce large and heavy seeds that do not disperse well without help from small mammals (Webb 1986). The canopy is dominated by tulip poplar (*Liriodendron tulipifera*), white oak (*Quercus alba*), and Virginia pine. Less dominant canopy trees present are sourwood (*Oxydendrum arboreum*), red maple, and black cherry (*Prunus serotina*). Understory trees/shrubs observed were flowering dogwood (*Cornus florida*), American holly (*Ilex opaca*), Chinese privet, and many of the canopy species. Vines and herbaceous vegetation include common greenbriar (*Smilax rotundifolia*), muscadine grape (*Vitis rotundifolia*), Japanese honeysuckle, and Christmas fern (*Polystichum acrostichoides*). Many wildlife species use this habitat for food and cover. Eastern gray squirrels (*Sciurus carolinensis*), blue jays (*Cyanocitta cristata*), wild turkey (*Meleagris gallopavo*), and white-tailed deer consume acorns from the oaks. Virginia pine is an important forage tree for wintering birds such as golden-crowned kinglets (*Regulus satrapa*) and red-breasted nuthatches (*Sitta canadensis*). Some bird species that breed and forage in Dry-Mesic Oak Pine forests include brown-headed

nuthatches (*Sitta pusilla*), blue-gray gnatcatchers (*Polioptila caerulea*), great crested flycatchers (*Myiarchus crinitus*), and pine warblers (*Dendroica pinus*).

Piedmont Levee Forest -- Piedmont Levee Forest is most extensive on the left bank and floodplain (northwest and northeast quadrants) and covers approximately 1.9 acres. Representatives of this plant community within the project study area range from 20 to 40 years old. The canopy consists of riparian tree species including river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), tulip poplar, loblolly pine (*Pinus taeda*), and red oak (*Quercus rubra*). Subcanopy trees and shrubs include flowering dogwood, musclewood, American holly, black cherry, and eastern red cedar (*Juniperus virginiana*). A few exotic invasives have colonized this plant assemblage including Chinese privet, Japanese honeysuckle, and multiflora rose (*Rosa multiflora*). Vines present include muscadine grape, greenbriar, and cross vine. Christmas fern, spotted wintergreen (*Chimaphila maculata*), and ebony spleenwort (*Asplenium platyneuron*) make up the sparse herbaceous species. There are a few vernal pools in the northeast quadrant of the project study area in which upland chorus frogs (*Pseudacris triseriata*) were breeding. These vernal pools are non-jurisdictional and occur at least 100 ft from the centerline of SR 1333. Woodchuck burrows were observed in the right river bank (looking downstream) of the southeast quadrant Piedmont Levee forest. Northern parulas (*Parula americana*), yellow-throated warblers (*Dendroica dominica*), and Acadian flycatchers (*Empidonax virescens*) breed and forage in deciduous trees on banks or on floodplains of streams and rivers. Belted kingfishers nest in burrows on high banks and feed on fish of streams and rivers. Barred owls (*Strix varia*) have owlets by late winter and capitilize on the abundance of amphibians breeding during this time of year.

Piedmont Heath Bluff — Piedmont Heath Bluff occurs in the southwest quadrant of the project study area and covers approximately 0.2 acre. Canopy species present include white oak, northern red oak, red maple, river birch, and American beech (*Fagus grandifolia*). The subcanopy consists of sourwood, muscle wood (*Carpinus caroliniana*), and red maple. Mountian Laurel (*Kalmia latifolia*) and dog-hobble (*Leucothoe fontanesiana*) are the dominant shrubs. Cross vine (*Anisostichus capreolata*), greenbriar, and muscadine grape are common vines. The herb layer has potential to be diverse due to the diverse microclimates of the north facing slope. However, the only herbaceous species observed was liverleaf (*Hepatica americana*), resurrection fern (*Polypodium polypodioides*), and Christmas fern. Many of the faunal species found in the Piedmont Levee Forest will occupy and utilize the same resources of the Piedmont Heath Bluff.

Pine Plantation -- A loblolly pine plantation is located in the northwestern quadrant and covers an area of approximately 0.2 acre within the project study area. The plantation is a monoculture approximately 5-10 years old. Pine plantations have relatively low plant and wildlife diversity but may be used for cover by white-tailed deer and foraging by pine warblers.

D.2. Wildlife

During the field survey there were observations or signs of white-tailed deer and woodchuck (*Marmota monax*). Characteristic mammals expected to frequent wooded and brushy river corridors in the western Piedmont include Virginia opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), eastern eastern gray squirrel, cottontail (*Sylvilagus floridanus*), southeastern shrew (*Sorex longirostris*), least shrew (*Cryptotis parva*), meadow vole (*Microtus pennsylvanicus*), eastern mole (*Scalopus aquaticus*), red bat (*Lasiurus borealis*), southern flying squirrel (*Glaucomys volans*), gray fox (*Urocyon cinereoargenteus*), and mink (*Mustela vision*).

Bird species identified during the field survey are American robin, American crow (*Corvus brachyrhyncos*), Carolina chickadee (*Poecile carolinensis*), tufted titmouse (*Baeolophus bicolor*), pine warbler, yellow-rumped warbler (*Dendroica coronata*), mourning dove (*Zenaida macroura*), eastern phoebe (*Sayornis phoebe*), red-shouldered hawk (*Buteo lineatus*), dark-eyed junco (*Junco hyemalis*), eastern towhee (*Pipilo erythrophthalmus*), golden-crowned kinglet, and American goldfinch (*Carduelis tristis*). The project study area's wooded and agricultural land habitat is expected to support other species such as red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), belted kingfisher (*Ceryle alcyon*), common flicker (*Colaptes auratus*), red-bellied woodpecker (*Melanerpes carolinus*), brown thrasher (*Toxostoma rufum*), eastern bluebird (*Sialia sialis*), northern cardinal (*Cardinalis cardinalis*), and ruby-crowned kinglet (*Regulus calendula*). Breeding Neotropical migrants that may inhabit the project study area during the breeding season (April through July) include blue-gray gnatcatcher, great crested flycatcher, blue-headed vireo (*Vireo solitarius*), red-eyed vireo (*Vireo olivaceous*), northern parula, Louisiana waterthrush (*Seiurus motacilla*), Acadian flycatcher, and hooded warbler (*Wilsonia citrina*). These species capitalize on the abundant riparian insects and nesting substrates (canopy trees, subcanopy trees, undercut banks, and shrubs).

Upland chorus frogs (*Pseudacris triseriata*) were the only amphibian or reptile observed during the site visit. Reptile and amphibian species expected in habitats within the project study area are American toad (*Bufo americana*), northern cricket frog (*Acris gryllus*), gray treefrog (*Hyla versicolor*), slimy salamander (*Plethodon glutinosus*), marbled salamander (*Ambystoma opacum*), Carolina anole (*Anolis carolinensis*), eastern box turtle (*Terrapene carolina*), eastern hognose snake (*Heterodon platyrhinos*), rat snake (*Elaphe obsoleta*), and eastern garter snake (*Thamnophis sirtalis*).

D.3. Aquatic Communities

Upland chorus frogs (*Pseudacris triseriata*) were the only amphibians observed during the field visit. Typical amphibian species for these habitat types include southern two-lined salamander (*Eurycea cirrigera*), spring peeper (*Pseudacris crucifer*), eastern newt (*Notophthalmus viridescens*), and green frog (*Rana melanota*). No reptiles were observed during the field visit. Buffalo Shoals Creek provides suitable habitat for aquatic and semi-aquatic reptiles including painted turtle (*Chrysemys picta*), northern water snake (*Nerodia sipedon*), queen snake (*Regina septemvitatta*), and snapping turtle (*Chelydra serpentina*). The only benthic invertebrates observed were Asian clams (*Corbicula fluminea*).

No sampling was undertaken in Buffalo Shoals Creek to determine fishery potential. No fish were noted during the field visit. Species which may be present within Buffalo Shoals Creek include fieryblack shiner (*Notropis pyrrhomelas*), rosyside dace (*Clinostomus funduloides*), silvery minnow (*Hybognathus regius*), creek chub (*Semotilus atromaculatus*), white sucker (*Catostomus commersoni*), redbreast sunfish (*Lepomis auritus*), and margined madtom (*Noturus insignis*).

D.4. Anticipated Impacts to Biotic Communities

D.4.a. Terrestrial Communities Impacts

Potential impacts to plant communities are estimated based on the approximate area of each plant community present within both the proposed right-of-way and the temporary construction limits of any on-site detour or easement that falls outside the estimated permanent right-of-way limit. A summary of potential plant community impacts is presented in Table 2. All plant community impacts are based on aerial photograph base mapping. A

portion of the permanent plant community impact amount will consist of proposed right-of-way for the road after the bridge replacement is complete. Impervious surface and open water areas are not included in this analysis.

Table 2
Potential Impacts to Plant Communities

PLANT COMMUNITY	POTENTIAL IMPACTS acres		
	ALT A (Preferred)	ALT B	
	Impacts	Impacts	Temp. Impacts*
Disturbed/Maintained Land	0	0	.03
Dry-Mesic Oak Pine Forest	0	0	.03
Piedmont Levee Forest	0	0	.01
Piedmont Heath Bluff	0	0	0
Pine Plantation	0	0	0
Total (acre)	0	0	.07
TOTAL FOR ALT (acre)	**0**	**.07**	

* Note: Temporary construction impacts are based on the portion of the impacts that fall outside the estimated right-of-way limit or impacts of temporary on-site detours.

Permanent community impacts for Alternative A represent the least amount of the two alternatives when the potential temporary impacts are included. The highest amount of permanent plant community impacts result from Alternative B, which calls for bridge replacement in place with a temporary bridge to the east of the existing bridge utilized as a detour during construction. The plant community with the largest amount of potential permanent and temporary impacts for all proposed alternatives is the Dry-Mesic Oak Pine Forest.

D.4.b. Aquatic Communities Impacts

The replacement of Bridge No. 86 over Buffalo Shoals Creek will result in certain unavoidable impacts to the aquatic community. Probable impacts will be associated with the physical disturbance of the benthic habitat and water column disturbances resulting from changes in water quantity and quality. Significant disturbance of stream segments can have an adverse effect on aquatic community composition by reducing species diversity and the overall quality of aquatic habitats. Physical alterations to aquatic habitats can result in the following impacts to aquatic communities:

- Inhibition of plant growth.
- Resuspension of organic detritus and removal of aquatic vegetation that can lead to increased nutrient loading. Nutrient loading can, in turn, lead to algal blooms and ensuing depletion of dissolved oxygen levels.
- Increases in suspended and settleable solids that can, in turn, lead to clogging of feeding structures of filter-feeding organisms and the gills of fish.
- Loss of benthic macroinvertebrates through increased scouring and sediment loading.
- Loss of fish shelter through removal of overhanging stream banks and snags.
- Increases in seasonal water temperatures resulting from removal of riparian canopy.

- Burial of benthic organisms and associated habitat.

Unavoidable impacts to aquatic communities within and immediately downstream of the project study area will be minimized to the fullest degree practicable through strict adherence to NCDOT's *Best Management Practices for the Protection of Surface Waters* (NCDOT, 1997) and other applicable guidelines pertaining to best management practices. Means to minimize impacts will include (1) utilizing construction methods that will limit instream activities as much as practicable, (2) restoring the stream bed as needed, and (3) revegetating stream banks immediately following the completion of grading.

E. Special Topics

E.1. "Waters of the United States": Jurisdictional Issues

Surface waters within the embankments of Buffalo Shoals Creek and the UT to Buffalo Shoals Creek are subject to jurisdictional consideration under Section 404 of the Clean Water Act as "Waters of the United States" (33 CFR 328.3). Wetlands subject to review under Section 404 of the Clean Water Act (33 U.S.C. 1344) are defined by the presence of three primary criteria: hydric soils, hydrophytic vegetation, and evidence of hydrology within 12 inches of the soil surface for a portion (12.5 percent) of the growing season (DOA 1987). No wetlands have been mapped within the project study area under the National Wetlands Inventory (NWI) program.

The surface waters within Buffalo Shoals Creek exhibit characteristics of a permanently flooded, upper perennial, riverine habitat with an unconsolidated bottom (R3UB1H). The surface waters within the UT to Buffalo Shoals Creek exhibit characteristics of a seasonally flooded, upper perennial, riverine habitat with an unconsolidated bottom (R3UB3Y). Both are considered jurisdictional surface waters.

E.2. Anticipated Impacts to Waters of the United States

Temporary and permanent impacts to surface waters and wetlands are estimated based on the amount of each jurisdictional area within the project limits. Temporary impacts include those impacts that will result from temporary construction activities outside of permanent right-of-way and/or those associated with temporary on-site detours. Temporary impact areas will be restored to their original condition after the project has been completed. Permanent impacts are those areas that will be in the construction limits and/or the proposed right-of-way of the new structure and approaches. Portions of those areas that are considered temporary impact areas often end up being within the final right-of-way. Potential wetland and surface water impacts are included in Table 3.

No jurisdictional wetlands were found within the project study area. The preferred alternative, Alternative A, which replaces the bridge in-place with an off-site detour, incurs the least amount of jurisdictional impacts with regard to wetlands and stream channel. Alternative A is not anticipated to impact any Jurisdictional Areas or Perennial Streams. Alternative B may temporarily impact .02 acres of Jurisdictional Areas and 32 feet of a Perennial Stream.

Table 3
Anticipated Impacts to Jurisdictional Wetlands and Surface Waters

JURISDICTIONAL AREAS	ALT A	ALT B	
	Impacts	Impacts	Temp. Impacts*
R3UB1H	0	0	.02
R3UB3Y	0	0	0
Total Areas (acres)	0	0	.02
TOTAL FOR ALT (acres):	**0**	**.02**	
Perennial Stream Channel Impacts (ft)	0	0	32
TOTAL FOR ALT (ft)	**0**	**32**	

R3UB1H - permanently flooded, upper perennial, riverine with an unconsolidated bottom primarily of sand, cobble, and gravel
R3UB3Y - seasonal, upper perennial, riverine with an unconsolidated bottom primarily of mud
Note: Temporary construction impacts are based on the portion of the impacts not included in the permanent right-of-way.

E.2. Permits

Section 404 of the Clean Water Act - In accordance with Section 404 of the Clean Water Act (33 U.S.C. 1344), a permit is required from the USACE for projects of this type for the discharge of dredge or fill material in "Waters of the United States". The USACE issues two types of permits for these activities. A general permit may be issued on a nationwide or regional basis for a category, or categories, of activities when: those activities are substantially similar in nature and cause only minimal individual or cumulative environmental impacts, or when the general permit would result in avoiding unnecessary duplication of regulatory control exercised by another Federal, state, or local agency provided that the environmental consequences of the action are individually and cumulatively minimal. If a general permit is not appropriate for a particular activity, then an individual permit must be utilized. Individual permits are authorized on a case-by-case evaluation of a specific project involving the proposed discharges.

It is anticipated that this project will fall under Nationwide Permit 23, which is a type of general permit. Nationwide Permit 23 is relevant to approved Categorical Exclusions. This permit authorizes any activities, work, and discharges undertaken, assisted, authorized, regulated, funded, or financed, in whole or in part, by another federal agency and that the activity is "categorically excluded" from environmental documentation because it is included within a category of actions which neither individually nor cumulatively have a significant effect on the environment. Activities authorized under nationwide permits must satisfy all terms and conditions of the particular permit. However, final permit decisions are left to the discretionary authority of the USACE.

Section 401 Water Quality Certification - A 401 Water Quality Certification, administered through the DWQ, will also be required. This certification is issued for any activity which may result in a discharge into waters for which a federal permit is required. According to the DWQ, one condition of the permit is that the appropriate sediment and erosion control practices must be utilized to prevent exceedences of the appropriate turbidity water quality standard.

E.3. Mitigation

The USACE has adopted, through the Council on Environmental Quality (CEQ), a wetland mitigation policy which 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, specifically wetlands. Mitigation of wetland 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). Each of these three aspects (avoidance, minimization, and compensatory mitigation) must be considered sequentially.

Avoidance – Mitigation by avoidance examines appropriate and practicable measures for averting impact to waters of the United States. A 1990 Memorandum of Agreement between the Environmental Protection Agency (EPA) and the USACE states that in determining appropriate and practicable measures to offset unavoidable impacts; such measures should be appropriate to the scope and degree of those impacts and practicable in terms of cost, existing technology, and logistics in light of overall project purposes.

The project purpose necessitates traversing Buffalo Shoals Creek; therefore, totally avoiding surface water impacts is impossible.

Minimization – Minimization of adverse impact to waters of the United States includes examination of appropriate and practicable measures to reduce such impacts. Implementation of these steps will be required through project modifications and permit conditions. Adverse impacts are typically minimized by decreasing the proposed project footprint through reduction of median widths, right-of-way widths, and/or fill slopes.

Other practical mechanisms to minimize impacts to waters of the United States include strict enforcement of sedimentation control BMPs for protection of surface waters during the entire life of the project; reduction of clearing and grubbing activity; reduction/elimination of direct discharge into streams; reduction of runoff velocity; reestablishment of vegetation on exposed areas, with judicious pesticide and herbicide management; minimization of instream activity; and litter/debris control.

No measures are proposed for this project because there are no jurisdictional wetlands within the project study area.

Compensatory Mitigation – Compensatory mitigation, including restoration, creation and enhancement of waters of the United States, is typically not considered until anticipated impacts to waters of the United States have been avoided and minimized to the maximum extent practicable. Further, it is recognized that "no net loss of wetlands" may not be achievable in every permit action. Therefore, compensatory mitigation is required for unavoidable adverse impacts which remain after all appropriate and practicable minimization measures have been required.

Compensatory mitigation is not expected to be required for this project. A final determination regarding mitigation requirements rest with the USACE.

F. Protected Species

F.1. Federally Protected Species

Species with the federal classification of Endangered (E) or Threatened (T), Proposed Endangered (PE), and Proposed Threatened (PT) are protected under provisions of Section 7 and Section 9 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). One federal protected species is listed for Iredell County (USFWS list dated January 30, 2003) and is shown in Table 4:

Table 4
Federally Protected Species Listed for Iredell County

Common Name	Scientific Name	Status	Biological Conclusion
Bog Turtle	*Clemmys muhlenbergii*	T(S/A)	N/A

Threatened (S/A) – a species carrying the threatened status due to having a similar appearance to another listed species.

Bog Turtle - The bog turtle is a small turtle reaching an adult size of approximately 3 to 4 inches (8 to 10 centimeters) in carapace length. This otherwise dark-colored species is readily identifiable by the presence of bright orange or yellow blotches on the sides of the head and neck (Martof *et al.* 1980). The bog turtle is typically found in bogs, marshes, and wet pastures, usually in association with aquatic or semi-aquatic vegetation and small, shallow streams over soft bottoms (Palmer and Braswell 1995). In North Carolina, bog turtles have a discontinuous distribution in the mountains and western Piedmont. The bog turtle has declined drastically within the northern portion of its range due to over-collection and habitat alteration. As a result, the FWS officially proposed to list bog turtle as threatened within the northern portion of its range in the January 29, 1997 Federal Register (62 FR 4229). Within the southern portion of its range, which includes North Carolina, the bog turtle is listed as T (S/A) because of similarity in appearance to individuals of the northern population.

NHP records document the nearest occurrence of the bog turtle in Alexander County as approximately 18 miles north of the project study area. The project study area has no habitat for bog turtles. T (S/A) species are not subject to Section 7 consultation and a biological conclusion for this species is not required.

BIOLOGICAL CONCLUSION: NO SURVEY REQUIRED

F.2. Federal Species of Concern

Federal Species of Concern (FSC) are not afforded federal protection under the Endangered Species Act and are not subject to any of the provisions included in Section 7 until they are formally proposed or listed as Threatened or Endangered. In addition to the federal program, organisms that are listed as Endangered (E), Threatened (T), or Special Concern (SC) by the North Carolina Natural Heritage Program (NCNHP) on its list of Rare Plant and Animal Species are afforded state protection under the N.C. State Endangered Species Act and the N.C. Plant Protection and Conservation Act of 1979. Table 5 lists the Federal Species of Concern for Iredell County, the state status of these species, and the potential for suitable habitat in the project study area. The NCNHP database shows no occurrences of FSC within 4.0 miles of the project study area as of July 2001.

Table 5
Federal Species of Concern (FSC) for Iredell County

Common Name	Scientific Name	Potential Habitat	State Status
Allegheny Woodrat	*Neotoma magister*	Yes	SC
Heller's Trefoil	*Lotus helleri*	Yes	E-SC
Tall Larkspur	*Delphinium exaltatum*	Yes	SR-T

Endangered (E) – any native or once-native species in danger of extinction throughout all or a significant portion of its range.
Threatened (T) - any native or once-native species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Special Concern (SC) – any species which requires monitoring but which may be collected and sold under specific regulations.
Significantly Rare(SR) – species which are very rare, generally with 1-20 populations in the state, and generally reduced in numbers by habitat destruction.

F.3. Summary of Anticipated Impacts

The proposed project is not anticipated to impact any threatened or endangered species.

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, implemented by the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106, codified at 36 CFR Part 800. Section 106 requires Federal agencies to take into account the effect of their undertakings (federally funded, licensed, or permitted) on properties listed in or eligible for inclusion in the National Register of Historic Places and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. This project has been coordinated with the North Carolina State Historic Preservation Officer (SHPO) in accordance with the Advisory Council's regulations and FHWA procedures.

B. Historic Architecture

The SHPO, in a memorandum dated March 10, 2003, stated "We have determined that the project as proposed will not affect any historic structures." A copy of the SHPO memorandum is included in the Appendix.

C. Archaeology

The SHPO, in a memorandum dated November 24, 2003, stated "The letter states that one archaeological site, 31ID329** was discovered in the proposed project area. We concur site 31ID329** is not eligible for the National Register of Historic Places." A copy of the SHPO memorandum is included in the Appendix.

VII. ENVIRONMENTAL EFFECTS

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

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

Replacement of Bridge No. 86 will not have an adverse effect on the quality of the human or natural environment with the use of the current North Carolina Department of Transportation standards and specifications.

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

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

In compliance with Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations) the project would not disproportionately impact any minority or low-income populations.

The studied route does not contain any bicycle accommodations, nor is it a designated bicycle route; therefore, no bicycle accommodations have been included as part of this project.

This project has been coordinated with the United States Department of Agriculture, Natural Resources Conservation Service. The Farmland Protection Policy Act requires all federal agencies or their representatives to consider the potential impact to prime farmland for all land acquisition and construction projects. Alternative A and Alternative B will not impact Prime and Unique Farmland. Alternative A is the preferred alternative and therefore impacts to prime or locally important farmland are minimized.

No publicly owned parks or recreational facilities, wildlife and waterfowl refuges, or historic sites of national, state or local significance in the immediate vicinity of the project will be impacted.

The proposed project will not require right-of-way acquisition or easement from any land protected under Section 4(f) of the Department of Transportation Act of 1966.

No adverse effects to air quality are anticipated from this project. This project is an air quality "neutral" project, so it is not required to be included in the regional emissions analysis and a project level CO analysis is not required. Since the project is located in an attainment area, 40 CFR Part 51 is not applicable. If vegetation or wood debris is disposed of by open burning, it shall be done in accordance with applicable local laws and regulations of the North Carolina State Implementation Plan (SIP) for air quality in compliance with 15 NCAC 2D.0520 and 1990 Clean Air Act Amendments and the National Environmental Policy Act. This evaluation completes the assessment requirements for air quality, and no additional reports are required.

Ambient noise levels may increase during the construction of this project; however this increase will be only temporary and usually confined to daylight hours. There should be no notable change in traffic volumes after this project is complete. Therefore, this project will have no adverse effect on existing noise levels. Noise receptors in

the project study area will not be impacted by this project. This evaluation completes the assessment requirements for highway noise set forth in 23 CFR Part 772. No additional reports are required.

The NCDOT Geotechnical Unit determined that no underground storage tanks or areas of other contamination were present at or near the project study area.

Iredell County is a participant in the National Flood Insurance Regular Program. The replacement structure is proposed as an in-kind replacement and in the absence of historical problems, increased flood impacts associated with this bridge replacement are not anticipated. The approximate 100-year floodplain in the project study area is shown in Figure 7.

Geotechnical borings for the bridge foundation will be necessary.

Based on the above discussion, it is concluded that no substantial adverse environmental impacts will result from the replacement of Bridge No. 86.

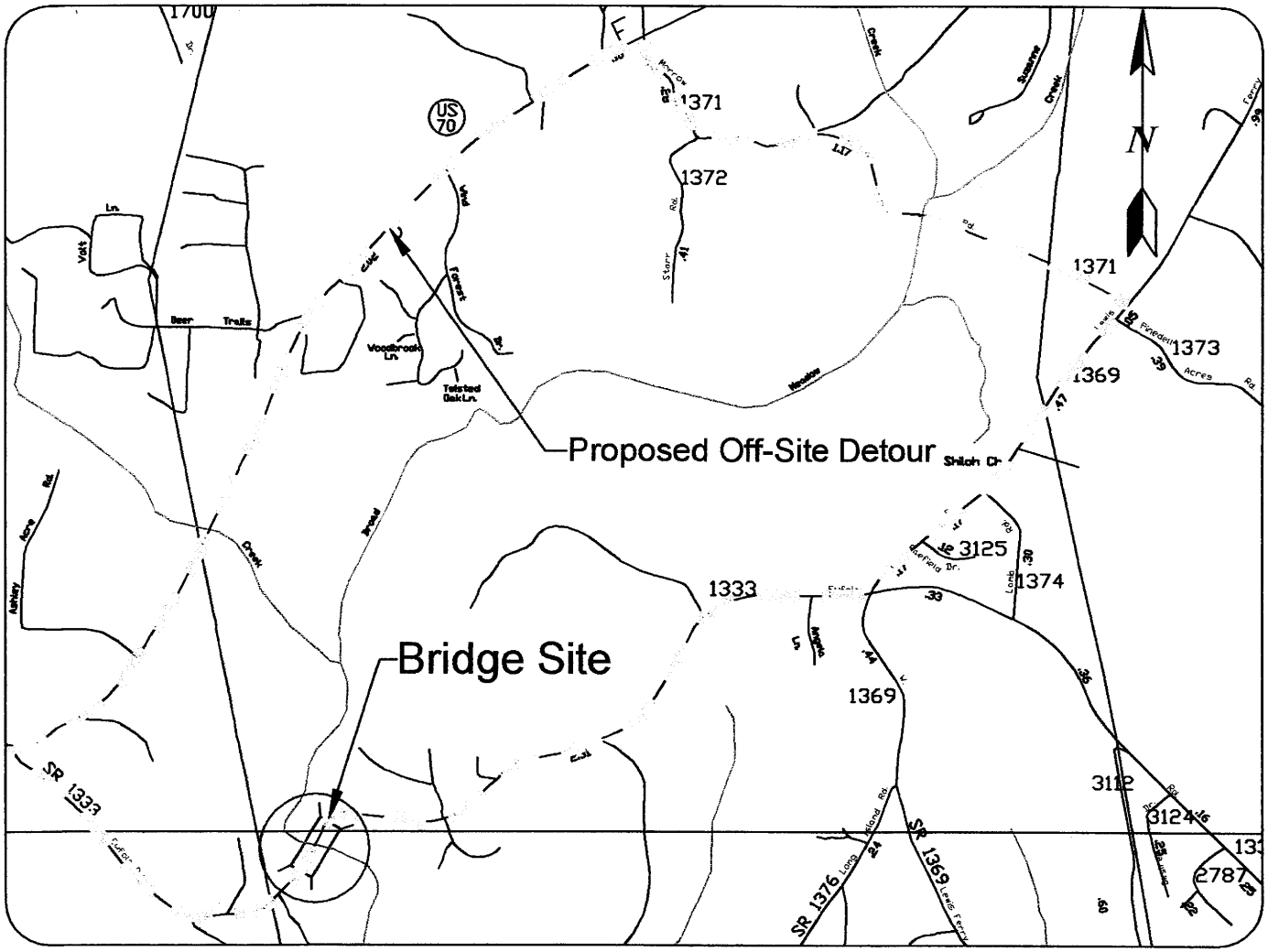
VIII. PUBLIC INVOLVEMENT

Due to the isolated nature of this bridge replacement project, no formal public involvement program was initiated. Efforts were undertaken early in the planning process to contact local officials to involve them in the project development with a scoping letter.

IX. AGENCY COMMENTS

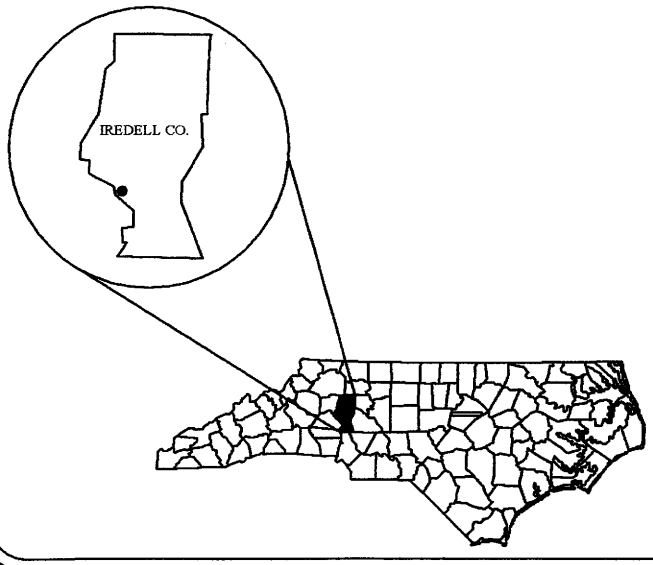
No comments other than standard.

FIGURES



Legend

Proposed Off-Site Detour



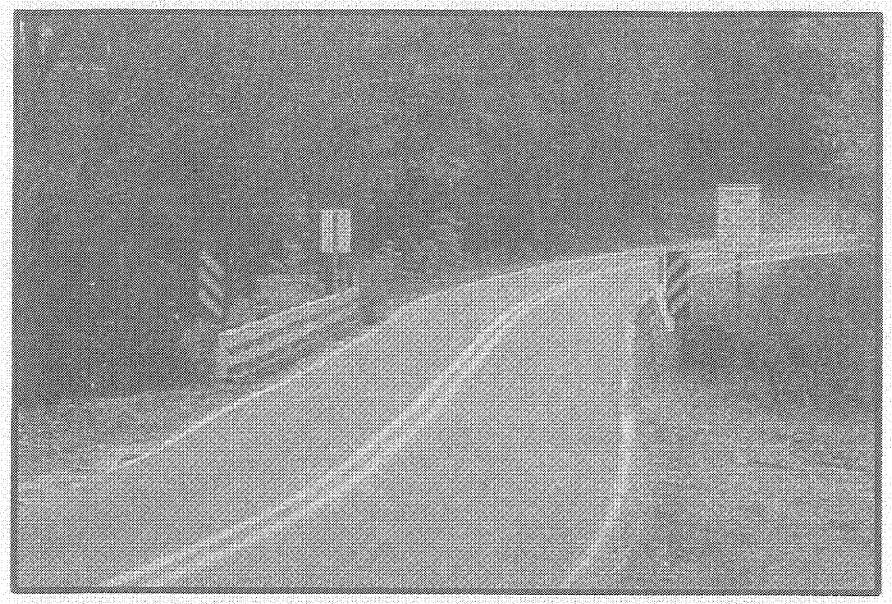
NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

SR 1333
Replace Bridge No. 86
over Buffalo Sholes Creek
Iredell County, North Carolina

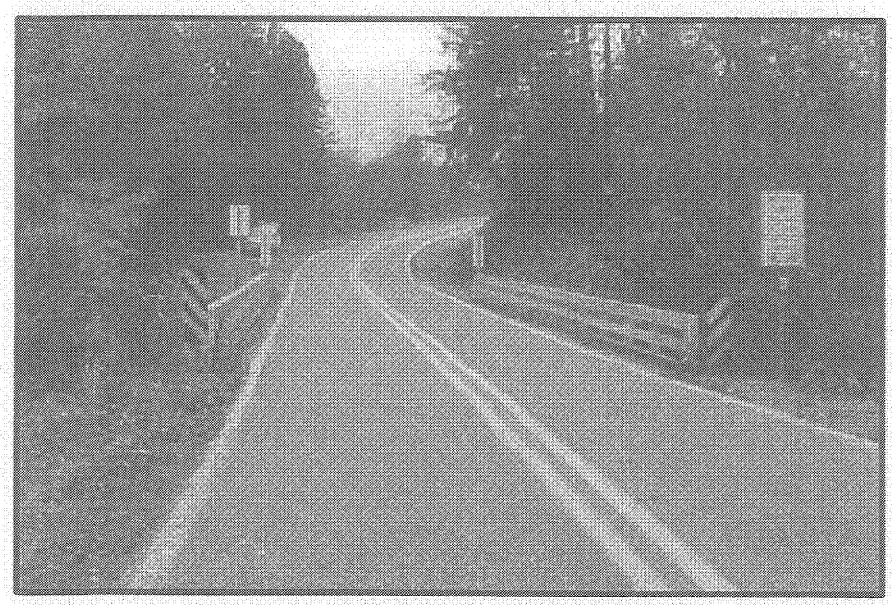
TIP NO. B-2146
PROJECT LOCATION MAP

Not to Scale

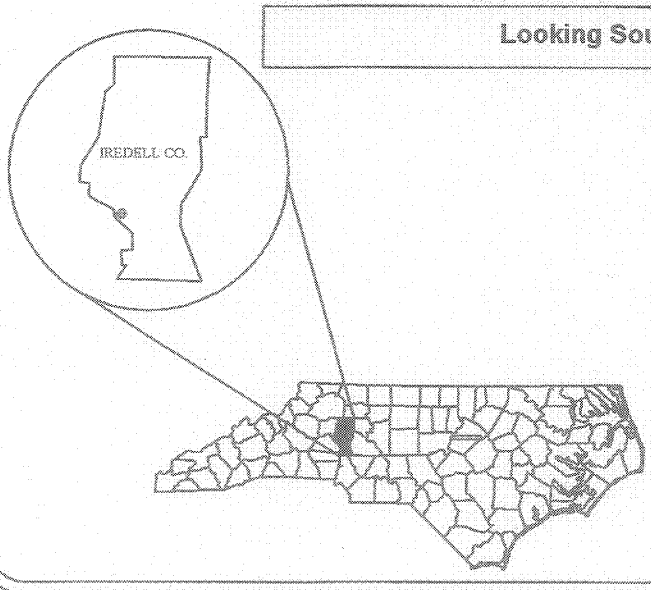
FIGURE 1



Looking North across Bridge No. 86



Looking South across Bridge No. 86



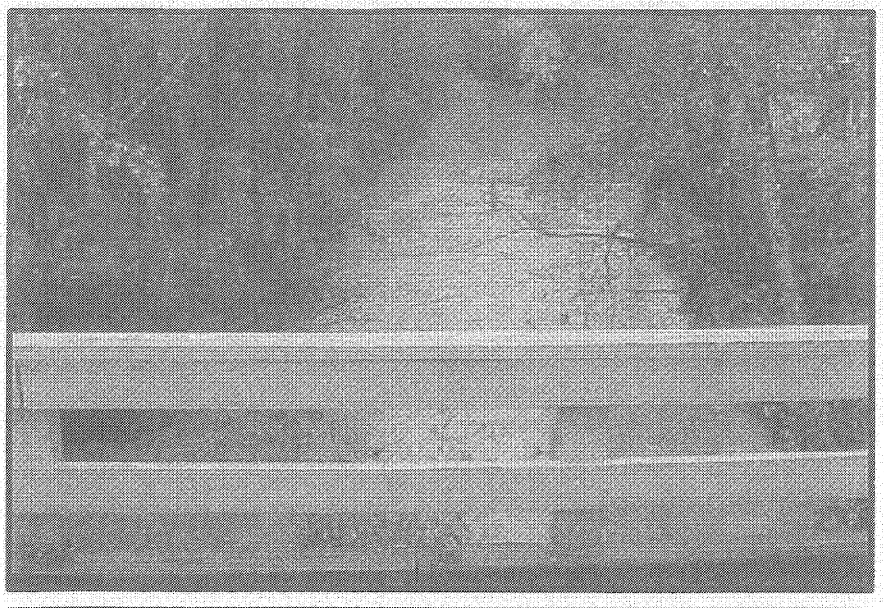
NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

SR 1333
Replace Bridge No. 86 over
Buffalo Sholes Creek
Iredell County, North Carolina

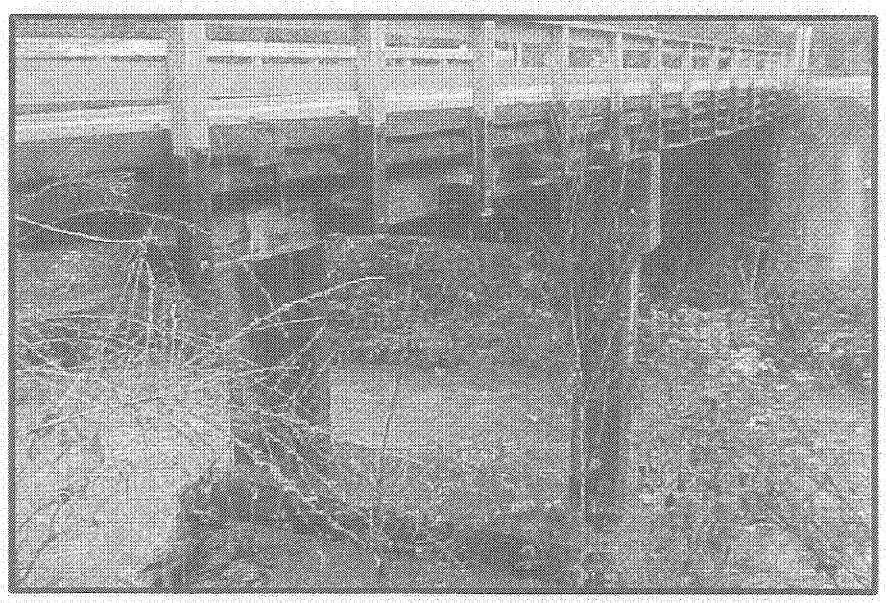
TIP NO. B-2146

Not to Scale

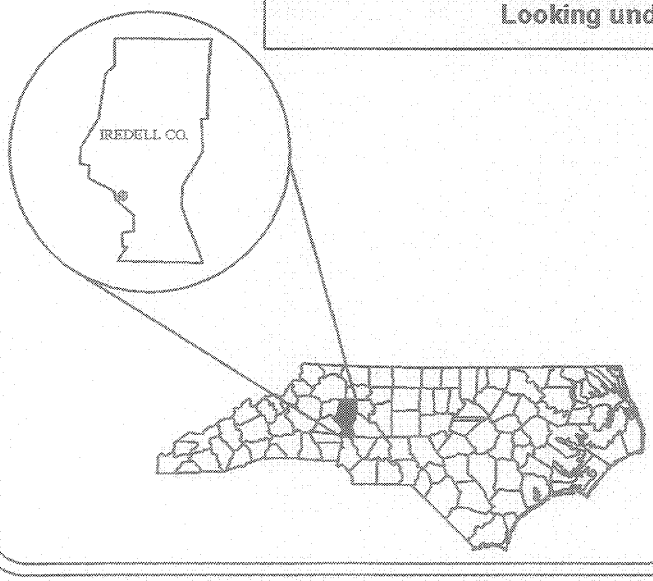
FIGURE 2



Looking West from Bridge No. 86



Looking under Bridge No. 86



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

SR 1333
Replace Bridge No. 86 over
Buffalo Sholes Creek
Iredell County, North Carolina

TIP NO. B-2146

Not to Scale

FIGURE 3

(ALTERNATIVE A)
(IN-PLACE WITH OFF-SITE DETOUR)
FIGURE 4

PROJECT REFERENCE NO.	SHEET NO.
B-2146	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

30

35

RT -L- Sta. 28+27.45

PC -L- Sta. 31+70.98

PT -L- Sta. 35+08.18

BEGIN CONSTRUCTION
-L- STA. 30+00.00

-L-
PI Sta 33+40.04
Δ = 10° 22' 16.4" (LT)
D = 3° 04' 32.5"
L = 337.20'
T = 169.06'
R = 1,862.86'
DS = 70 mph

-L-
PI Sta 39+40.20
Δ = 71° 36' 20.4" (RT)
D = 13° 01' 56.3"
L = 549.45'
T = 317.11'
R = 439.64'
DS = 35 mph

END BRIDGE
-L- STA. 35+45.00

END CONSTRUCTION
-L- STA. 39+00.00

N 37° 15' 05.0" E

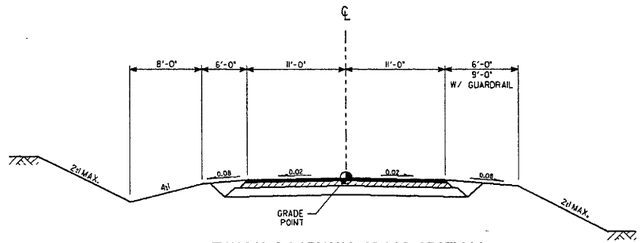
SR 1333 EUFOLA ROAD

N 26° 52' 48.6" E

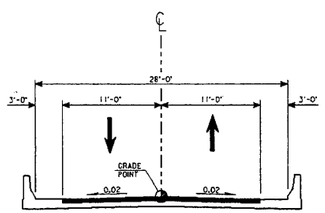
BEGIN BRIDGE
-L- STA. 34+30.00

BUFFALO SHOALS CREEK

PC -L- Sta. 36+23.08



TYPICAL ROADWAY CROSS SECTION



TYPICAL BRIDGE CROSS SECTION

NOTES:

1. ASSUMED 60' RIGHT-OF-WAY.

2. DESIGNED THRU TOPOGRAPHIC MAPS AS SURVEYS & PLANIMETRICS WERE UNAVAILABLE.

SCALE
50 0 50 100

DESIGN DATA

*DESIGN SPEED	60 mph
POSTED SPEED	55 mph
CURRENT YEAR ADT (2002)	700 vpd
DESIGN YEAR ADT (2025)	1,200 vpd
% TTST ,% DUALS	1% ,2%
FUNCTIONAL CLASSIFICATION	Rural Local
TERRAIN	Mountainous
MAX RADIUS	1,205 ft
MAXIMUM GRADE	10% Mountainous
SUPERELEVATION RATE	Se = 0.08

* DESIGN EXCEPTION REQUIRED

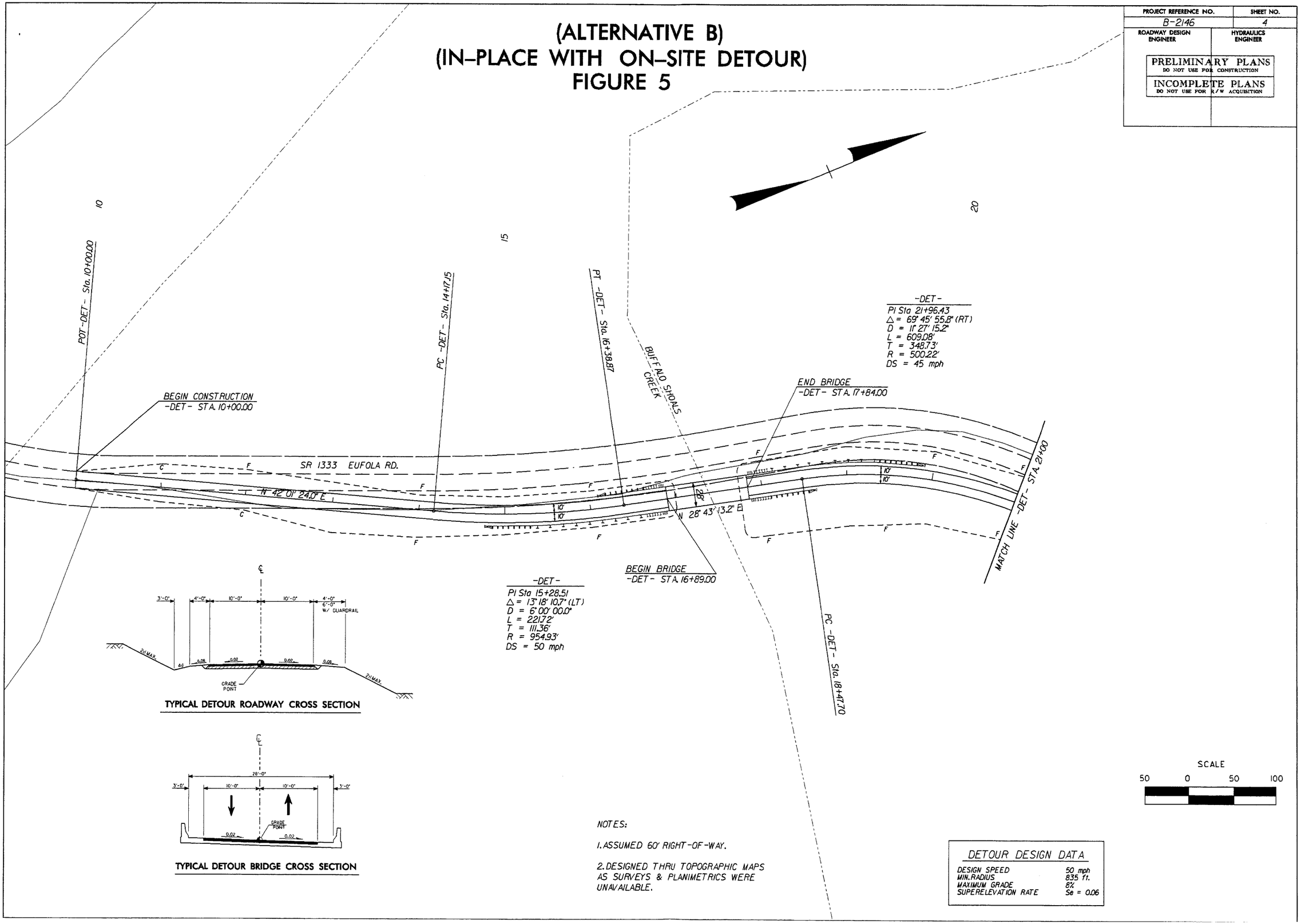
Ramey Kemp & Associates, Inc.
Transportation Consulting Engineers
4928-A Windy Hill Drive Raleigh, North Carolina 27609
(919) 872-545 fax (919) 878-5416

(ALTERNATIVE B)
(IN-PLACE WITH ON-SITE DETOUR)
FIGURE 5

PROJECT REFERENCE NO.	SHEET NO.
B-2146	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



TYPICAL DETOUR ROADWAY CROSS SECTION

TYPICAL DETOUR BRIDGE CROSS SECTION

SCALE
50 0 50 100

NOTES:

1. ASSUMED 60' RIGHT-OF-WAY.

2. DESIGNED THRU TOPOGRAPHIC MAPS AS SURVEYS & PLANIMETRICS WERE UNAVAILABLE.

DETOUR DESIGN DATA

DESIGN SPEED	50 mph
MIN. RADIUS	835 ft.
MAXIMUM GRADE	8%
SUPERELEVATION RATE	Se = 0.06

PROJECT REFERENCE NO.	SHEET NO.
B-2146	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

(ALTERNATIVE B)
(IN-PLACE WITH ON-SITE DETOUR)
FIGURE 6

25

-DET-
PI Sta 21+96.43
Δ = 69° 45' 55.8" (RT)
D = 11° 27' 15.2"
L = 609.08'
T = 348.73'
R = 500.22'
DS = 40 mph

POT -DET- Sta. 26+56.78

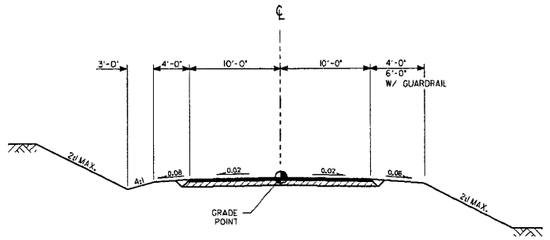
END CONSTRUCTION
-DET- STA. 26+20.00

S 81° 30' 51.0" E

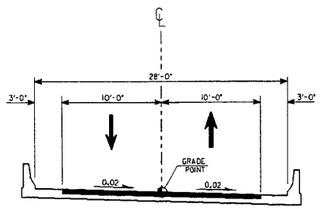
SR 1333 EUFOLA RD.

MATCH LINE -DET- STA. 21+00

PT -DET- Sta. 24+56.78



TYPICAL DETOUR ROADWAY CROSS SECTION



TYPICAL DETOUR BRIDGE CROSS SECTION

NOTES:

1. ASSUMED 60' RIGHT-OF-WAY.

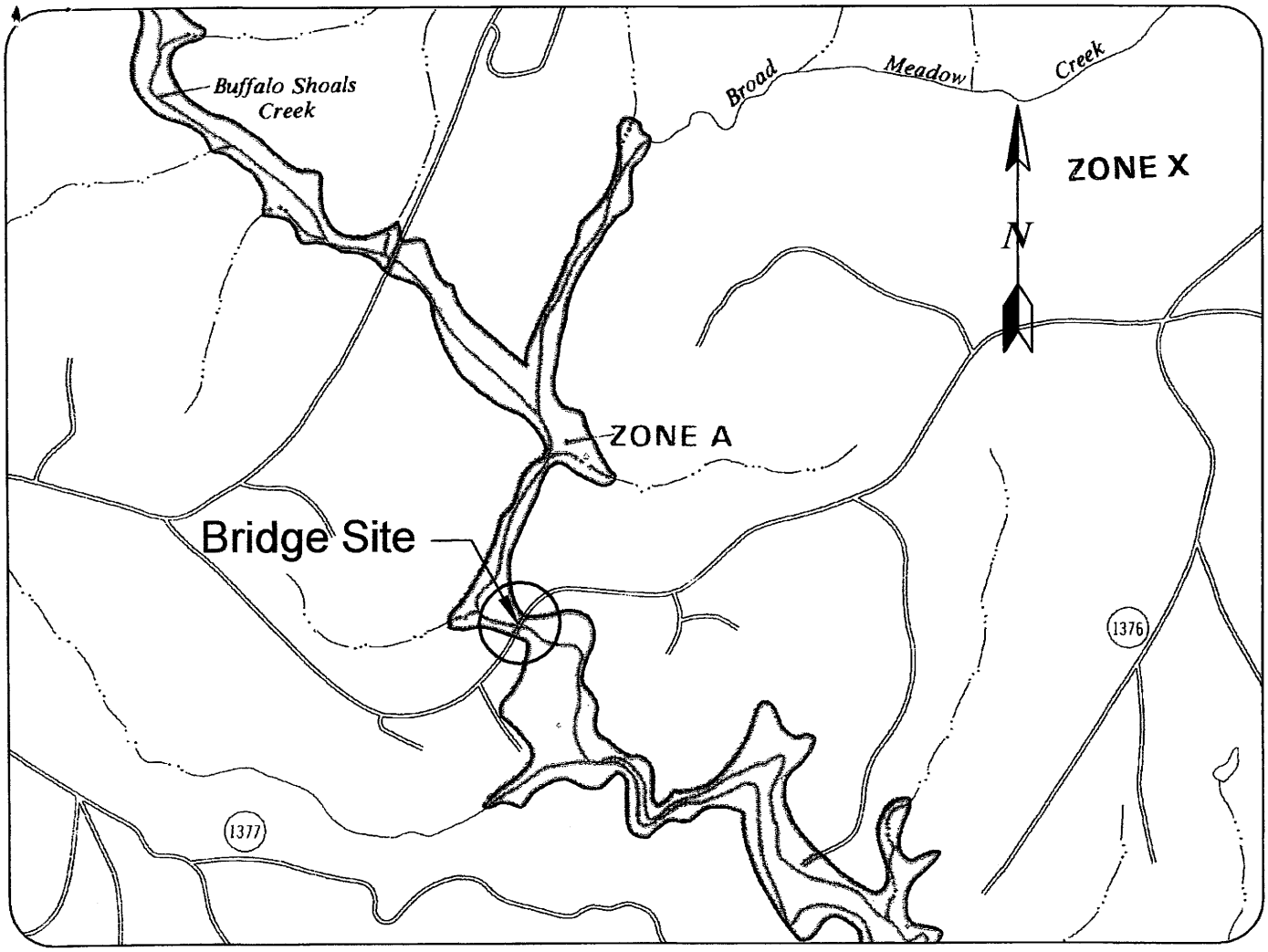
2. DESIGNED THRU TOPOGRAPHIC MAPS AS SURVEYS & PLANIMETRICS WERE UNAVAILABLE.

SCALE
50 0 50 100

UPPER TRIBUTARY BUFFALO SHOALS CREEK

DETOUR DESIGN DATA

DESIGN SPEED	50 mph
MIN. RADIUS	835 ft.
MAXIMUM GRADE	8%
SUPERELEVATION RATE	Se = 0.06



FLOOD INSURANCE RATE MAP

IREDELL COUNTY,
NORTH CAROLINA
(UNINCORPORATED AREAS)

PANEL 150 OF 220
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
370313 0150 C

MAP REVISED:
JUNE 22, 1998

Federal Emergency Management Agency

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

SR 1333
Replace Bridge No. 86 over
Buffalo Sholes Creek
Iredell County, North Carolina

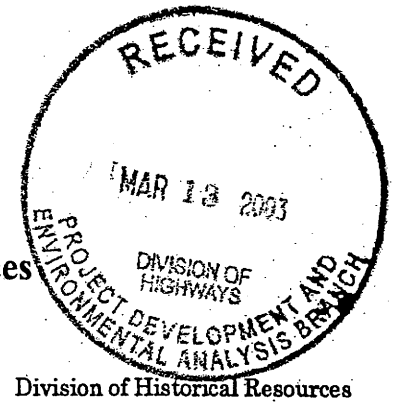
TIP NO. B-2146
FEMA 100-YEAR FLOOD PLAIN MAP

Not to Scale

FIGURE 7

APPENDIX

D. Weaver



North Carolina Department of Cultural Resources

State Historic Preservation Office

David L. S. Brook, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary
Jeffrey J. Crow, Deputy Secretary

Division of Historical Resources
David J. Olson, Director

March 10, 2003

MEMORANDUM

TO: Greg Thorpe, Manager
Project Development and Environmental Analysis Branch
NCDOT Division of Highways

FROM: David Brook DSB for David Brook

SUBJECT: Replacement of Bridge No. 86 on SR 1330 over Buffalo Shoals Creek, B-2146, Iredell County, ER 03-0249

Thank you for your memorandum of January 20, 2003, concerning the above project.

Numerous archeological sites are located in similar settings. We recommend that a comprehensive survey be conducted by an experienced archaeologist to identify and evaluate the significance of archaeological remains that may be damaged or destroyed by the proposed project. Potential effects on unknown resources must be assessed prior to the initiation of construction activities.

Two copies of the resulting archaeological survey report, as well as one copy of the appropriate site forms, should be forwarded to us for review and comment as soon as they are available and well in advance of any construction activities.

A list of archaeological consultants who have conducted or expressed an interest in contract work in North Carolina is available at www.arch.dcr.state.nc.us/consults. The archaeologists listed, or any other experienced archaeologist, may be contacted to conduct the recommended survey.

It is our opinion that any off-site detour would have less impact on archeological sites than an on site detour.

We have determined that the project as proposed will not affect any historic structures.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763. In all future communication concerning this project, please cite the above referenced tracking number.

Cc: Matt Wilkerson
Mary Pope Furr

North Carolina Department of Cultural Resources
State Historic Preservation Office
David L. S. Brook, Administrator

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary
Jeffrey J. Crow, Deputy Secretary
Office of Archives and History

Division of Historical Resources

November 24, 2003

MEMORANDUM

TO: Greg Thorpe, Ph.D., Director
Project Development and Environmental Analysis Branch
NCDOT Division of Highways

FROM: David Brook RS for David Brook

SUBJECT: Replacement of Bridge No. 86 on SR 1330 for Buffalo Shoals Creek, Federal Aid Project No. BRZ-1333 (5), State Project No. 8.2822801, TIP Number B-2146, Iredell County, ER 03-0249

Thank you for transmitting the revised archaeological survey report, in a letter of October 13, 2003.

The letter states that one archaeological site, 31ID329** was discovered in the proposed project area. The initial report Figure 5 illustrates a large "surface collection area" within the southeastern quad of the proposed project area that was changed to "surface survey area". The boundary is still the same type of boundary that the key illustrates as the site boundary. In the future, confusion could be avoided by adding a different line type to the key and using it to illustrate other areas, such as wetlands, survey limits.

We concur site 31ID329** is not eligible for the National Register of Historic Places.

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. In all future communication concerning this project, please cite the above-referenced tracking number.

cc: Matt Wilkerson, NCDOT