STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 13, 2007

U.S. Army Corps of Engineers
Raleigh Regulatory Field Office
6508 Falls of Neuse Road, Suite 120
Raleigh, NC 27615-6814

ATTENTION: Mr. John Thomas
NCDOT Coordinator, Division 9

Dear Sir:

SUBJECT: **Application for Section 404 Nationwide Permit 33** for the replacement of Bridge No. 30 over Muddy Creek on SR 1631 (Mizpah Church Rd), Forsyth County, Division 9. Federal Aid Project No: BRZ-1631 (2), State Project No: 8.2625901, WBS No: 33467.1.1, TIP Project No: B-4112.

Please see the enclosed copies of the Categorical Exclusion (CE), Pre-construction Notification (PCN), permit drawings, and design plans for the above-referenced project. The North Carolina Department of Transportation (NCDOT) proposes to replace Bridge No. 30 over Muddy Creek on SR 1631 (Mizpah Church Rd) in Forsyth County. The current 80-foot bridge was constructed in 1961 and has a sufficiency rating of 19.6 out of 100 (for a new structure); it is therefore considered functionally obsolete and structurally deficient. The project proposes to demolish the existing bridge and construct a one span, 39-inch pre-stressed concrete box beam bridge on the existing horizontal alignment. This new structure will span Muddy Creek. The new bridge will be approximately 100 feet long and 33 feet wide, with two 12-foot lanes and two 2-foot, 11-inch shoulders. The new bridge approaches will have two 12-foot lanes with 8-foot shoulders. During construction, SR 1631 will be closed near the existing bridge and traffic will be re-routed using an offsite detour.

IMPACTS TO WATERS OF THE UNITED STATES

General Description

The project is located in the Yadkin River Basin (sub-basin 03-07-04) in Forsyth County. This area is part of Hydrologic Cataloging Unit 03040101. Water resources within the project study area include Muddy Creek, an unnamed tributary (UT) of Muddy Creek, and two small ponds.

Muddy Creek is a third-order perennial stream that flows southward through the project study area. The portion of Muddy Creek that flows through the study area is assigned Stream Index Number 12-94-(0.5) (08/01/1998) by the N.C. Division of Water Quality (NCDWQ) and has a best usage classification of **C**. It is approximately 25 feet wide where it flows under Bridge No. 30 and has 4 foot high, steeply sloping

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

TELEPHONE: 919-715-1334
FAX: 919-715-1501
WEBSITE: WWW.NCDOT.ORG

LOCATION:
2728 CAPITAL BLVD., SUITE 240
RALEIGH NC 27604

banks. During field investigations associated with the Natural Resources Technical Report (NRTR; September 2004), water clarity was described as being good, visibility was to the substrate, and flow velocity was moderate. The substrate was primarily composed of cobble, gravel, and sand, but contained some silt.

The UT to Muddy Creek is also a perennial stream, with banks that range up to 2 feet high and water up to 1 foot in depth. The UT generally flows northeast prior to entering the study area, then turns north within the study area, and flows into a small man-made pond (Pond 2). The UT exits the pond beyond the western study area limits and flows west/northwest towards Muddy Creek. During NRTR-related field investigations, the water clarity was rated as good, flow velocity was moderate, and the substrate was composed of silt and fine sand.

Neither High Quality Waters (HQW), Water Supplies (WS I: undeveloped watersheds or WS II: predominately undeveloped watersheds), nor Outstanding Resource Waters (ORW) occur within 1.0 mile of the project study area. No portion of Muddy Creek, its tributaries, or other surface waters within 1.0 mile of the project are listed on the NCDWQ 2006 Final 303(d) List of Impaired Waters.

The first small pond (Pond 1) is located in an area adjacent to Muddy Creek, southeast of the current bridge. It occupies approximately 0.3 acres within the project study area and is classified as palustrine, with an unconsolidated shore primarily composed of silt and clay, and lying within a basin excavated by man (PUS3x Cowardin classification).

The second pond (Pond 2) is located approximately 450 feet southeast of the bridge and is adjacent to Mizpah Church Rd. This impoundment was created when a gravel driveway was constructed across the UT to Muddy Creek. Approximately 0.5 acres of the pond lies within the project study area. The pond is classified as a palustrine, permanently flooded impoundment with an unconsolidated bottom composed of mud (PUB3Hh).

The second pond was not originally described in either the NRTR or CE and was first identified during the Jurisdictional Determination (JD) field visit between U.S. Army Corps of Engineers (USACE) Regulatory Specialist John Thomas and EcoScience biologists on June 12, 2007. The pond was created some time between 2005 and 2007, submerging a significant portion of the UT to Muddy Creek originally identified within the project study area. The submerged portion formerly ran north/northwest through the area the pond now occupies. The remaining UT segment located within the study area lies south of the pond, well outside of the construction limits. The pond has also submerged a small wetland originally described in both the NRTR and CE. The former riverine wetland was located in an area just south of Mizpah Church Rd., which is now part of the northeast portion of the pond. It was classified as a palustrine, shrub-scrub, broad-leaved deciduous, seasonally flooded wetland (PSS1C) and was 0.01 acres in size.

Permanent Impacts

The new structure will span Muddy Creek. Additionally, the UT to Muddy Creek (not shown on the permit drawings) is well outside of the construction limits. Therefore, no permanent stream impacts are anticipated. No permanent impacts are anticipated for Pond 1 or Pond 2, both of which are located beyond the project construction limits.

Temporary Impacts

No temporary impacts are anticipated for the UT to Muddy Creek or the two ponds. However, a temporary causeway will be placed into Muddy Creek to allow for removal of the existing in-water bent and erection of the box beam units. The causeway will be composed of Class II riprap topped with 1 foot

of Class A riprap. The Class II riprap will be placed below the observed high water (OHW) mark and will result in 0.01 acres (31 linear feet) of temporary impacts to the stream.

Bridge Demolition

Bridge No. 30 has a timber deck on I-beams supported by timber caps, piles, and bulkheads. NCDOT shall adhere to NCDOT's Best Management Practices (BMPs) for Bridge Demolition and Removal. It is anticipated that the existing structure will be removed without dropping any components into Muddy Creek.

Utility Impacts

No impacts to jurisdictional waters will occur as a result of utility work associated with this project. However, a directional bore will be installed by Bell South under Muddy Creek, approximately 2 feet inside the right-of-way, on the south side of the project.

RESTORATION PLAN

No permanent fill will result from the subject activity. The stone materials used as temporary fill in the construction of the causeway will be removed from the streambed. The temporary fill areas will be restored back to their pre-project elevations. NCDOT will also restore the streambed to its pre-project contours.

Removal and Disposal Plan

The causeway will be removed from the stream after the existing in-water bent is removed and the box beam units are erected. All stone material placed in the stream for construction of the temporary causeway will be removed by the contractor using excavation equipment. The contractor will be required to submit a reclamation plan for the removal of and disposal of all material off-site at an upland location. The contractor will have the option of reusing any of the materials that the engineer deems suitable in the construction of project.

AVOIDANCE, MINIMIZATION, AND COMPENSATORY MITIGATION

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

According to the Clean Water Act (CWA) §404(b)(1) guidelines, NCDOT must avoid, minimize, and mitigate, in sequential order, impacts to waters of the US. The following is a list of the project's jurisdictional stream avoidance/minimization activities proposed or completed by NCDOT:

Avoidance/Minimization

- In-stream activity will be limited to the use of a temporary causeway for bent removal and erection of box beam units.
- During construction, traffic will be re-routed using an off-site detour.
- No bents are to be placed in Muddy Creek.
- Temporary construction impacts due to erosion and sedimentation will be minimized through implementation of stringent erosion control methods and use of NCDOT's BMPs for Protection of Surface Waters.

- NCDOT's BMP's for Bridge Demolition and Removal will be implemented during this project.

Compensatory Mitigation

No permanent impacts will result from the construction of the new structure. Therefore, no mitigation is proposed for this project.

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 its most recent update on May 10, 2007, the United States Fish and Wildlife Service (USFWS) website lists three federally-protected species for Forsyth County: the bog turtle (*Clemmys muhlenbergii*), red-cockaded woodpecker (*Picoides borealis*), and small-anthered bittercress (*Cardamine micranthera*).

Table 1. Federally protected species in Forsyth County

Scientific Name	Common Name	Federal Status	Biological Conclusion	Habitat Present
Clemmys muhlenbergii	bog turtle	T(S/A)	Not Required	No
Picoides borealis	red-cockaded woodpecker	E	No Effect	No
Cardamine micranthera	small-anthered bittercress	E	No Effect	Yes, but species not found in river basin

Suitable habitat for the bog turtle does not exist within the project study area and no individuals were observed during a site visit on May 19, 2004. Additionally, a search of the North Carolina Natural Heritage Program (NCNHP) database (most recently on July 12, 2007) revealed no known populations within 1.0 mile of the project. This species is listed as T(S/A) due to its similarity of appearance to another rare species listed for protection. T(S/A) species are not subject to Section 7 consultation and a **biological conclusion for this species is not required**.

The project study area does not provide suitable habitat for the red-cockaded woodpecker and no individuals were observed during a site visit on May 19, 2004. Furthermore, the NCNHP database shows no known populations within 1.0 mile of the project study area (most recently checked on July 12, 2007). Therefore, this project will not impact this species and a biological conclusion of **No Effect** has been rendered.

Although suitable habitat for small-anthered bittercress exists within the project area, no individuals were located during a plant-by-plant survey conducted by Ecoscience Corporation biologists on May 19, 2004. Additionally, since the initial survey was performed, it has been determined that surveys for this species, which is endemic to the Roanoke River basin, are not necessary outside of sub-basin 03-02-01 (the Dan River drainage basin). This project is located within the Yadkin River basin, sub-basin 03-07-04. Furthermore, the NCNHP database shows no known populations of this species within 1.0 mile of the project study area (most recently checked on July 12, 2007). Therefore, this project will not impact this species and a biological conclusion of **No Effect** has been rendered.

SCHEDULE

The project calls for a review date of November 27, 2007, a letting of January 15, 2008, and a date of availability of February 26, 2008. It is expected that the contractor will choose to start construction in February/March 2008.

REGULATORY APPROVALS

Section 404 Permit: A request is hereby submitted to the Department of the Army, Corps of Engineers for Nationwide Permit (NWP) 33, issued under Section 404 of the CWA, authorizing the above-described activities.

Section 401 Permit: We anticipate that Section 401 General Water Quality Certification (WQC) 3634 will apply to this project. The NCDOT will adhere to all general conditions of this WQC. Therefore, written concurrence from the NCDWQ is not required. In accordance with 15A NCAC 2H, Section .0500 (a) and 15A NCAC 2B, Section .0200, we are providing two copies of this application to the North Carolina Department of Environment and Natural Resources (NCDENR), NCDWQ, as notification.

A copy of this permit application will be posted on the NCDOT website at: http://www.ncdot.org/doh/preconstruct/pe/. If you have any questions or need additional information please call Mr. Jim Mason at (919) 715-5531.

Sincerely,

E. L. Lush

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

w/attachment:
- Mr. John Hennessy, NCDWQ (2 Copies)
- Ms. Marla Chambers, NCWRC
- Ms. Marella Buncick, USFWS
- Dr. David Chang, P.E., Hydraulics
- Mr. Mark Staley, Roadside Environmental
- Mr. Victor Barbour, Project Services Unit
- Mr. Greg Perfetti, P.E., Structure Design
- Mr. S. P. Ivey, P.E., Division Engineer
- Mr. Kent Boyer, DEO, Division 9

w/o attachment:
- 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. Wade Kirby, P.E., PDEA 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: Nationwide 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: North Carolina Department of Transportation
   1598 Mail Service Center
   Raleigh, NC 27699-1598

   Telephone Number: (919) 733-3141 Fax Number: (919) 733-9794
   E-mail Address: _____

2. Agent/Consultant Information (A signed and dated copy of the Agent Authorization letter must be attached if the Agent has signatory authority for the owner/applicant.)

   Name: _____
   Company Affiliation: _____
   Mailing Address: _____

   Telephone Number: _____ Fax Number: _____
   E-mail Address: _____

III. Project Information

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

1. Name of project: Replacement of Bridge No. 30 over Muddy Creek on SR 1631 (Mizpah Church Rd)

2. T.I.P. Project Number or State Project Number (NCDOT Only): B-4112

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

4. Location
   County: Forsyth Nearest Town: Winston-Salem
   Subdivision name (include phase/lot number): N/A
   Directions to site (include road numbers/names, landmarks, etc.): North on US 52, left on SR 4002, right on SR 1631, 1st bridge crossing.

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): _____ °N _____ °W

6. Property size (acres): N/A

7. Name of nearest receiving body of water: Muddy Creek

8. River Basin: Yadkin
   (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: SR 1631 is classified as a Rural Local Road in the Statewide Functional Classification System. Land use is primarily residential, agricultural, and forested

10. Describe the overall project in detail, including the type of equipment to be used: The project proposes to demolish the existing bridge and construct a one span, 39-inch pre-stressed concrete box beam bridge on the existing horizontal alignment. This new structure will be approximately 100 feet long and 33 feet wide, with two 12-foot lanes and two 2-foot, 11-inch shoulders. The new bridge approaches will have two 12-foot lanes with 8-foot shoulders. During construction, SR 1631 will be closed near the existing bridge and traffic will be re-routed using an offsite detour. Heavy duty excavation equipment will be used such as trucks, dozers, cranes and other various equipment necessary for roadway construction.

11. Explain the purpose of the proposed work: The current bridge was constructed in 1961 and has a sufficiency rating of 19.6 out of 100 (for a new structure); it is therefore considered functionally obsolete and structurally deficient.

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: No permanent impacts are anticipated for Muddy Creek, the UT to Muddy Creek, or the two small ponds. No temporary impacts are anticipated for the UT to Muddy Creek or the two ponds. However, a temporary causeway will be placed into Muddy Creek to allow for removal of the existing in-water bent and erection of the box beam units. This will result in temporary fill being placed into Muddy Creek. The causeway will be composed of Class II riprap topped with one foot of Class A riprap. The Class II riprap will be placed below the observed high water (OHW) mark and will result in 0.01 acres (31 linear feet) of temporary impacts to the stream.

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)
Total Wetland Impact (acres)					0.0

3. List the total acreage (estimated) of all existing wetlands on the property: 0.0

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	Muddy Creek	Temp. Causeway	Perennial	~ 25 ft	31	0.01
Total Stream Impact (by length and acreage)					31	0.01

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)
Total Open Water Impact (acres)				0.0

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

Stream Impact (acres):	0.01
Wetland Impact (acres):	
Open Water Impact (acres):	
Total Impact to Waters of the U.S. (acres)	0.01
Total Stream Impact (linear feet):	31

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. Best Management Practices (BMPs) for Bridge Demolition and Removal will be used during the demolition of the existing bridge. Also, BMPs will be used during the construction of the new structure. In-stream activity will be limited to the use of a temporary causeway for in-bent removal and erection of box beam units. Additionally, all stone materials associated with the temporary causeway will be removed after the existing in-water bent is removed and the box beam units are erected. Furthermore, no bents are to be placed in Muddy Creek.

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.
   N/A

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

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	0.0		

* 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.N/A

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:
N/A

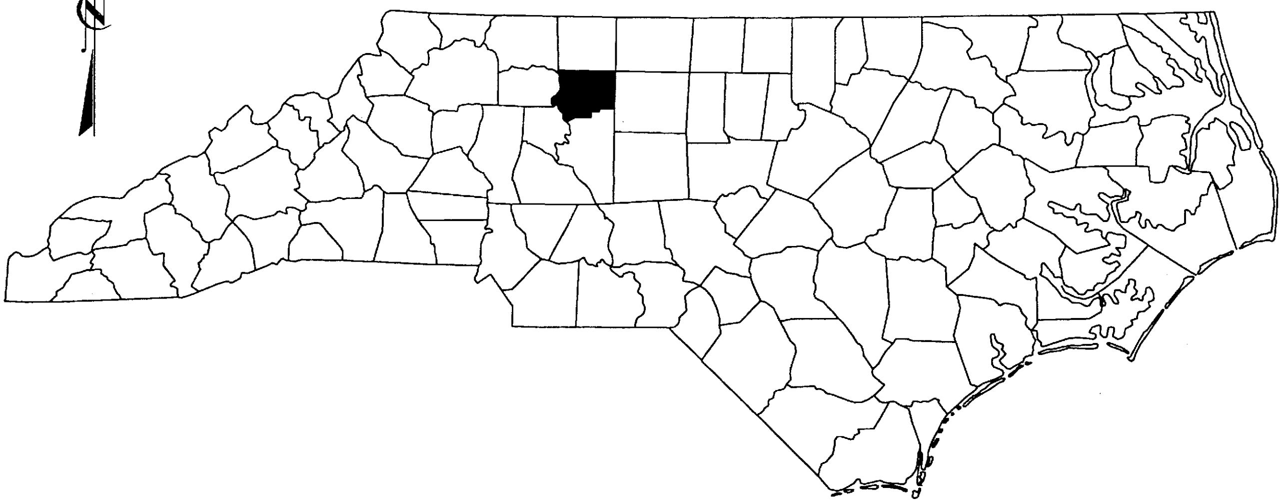
XV. Other Circumstances (Optional):

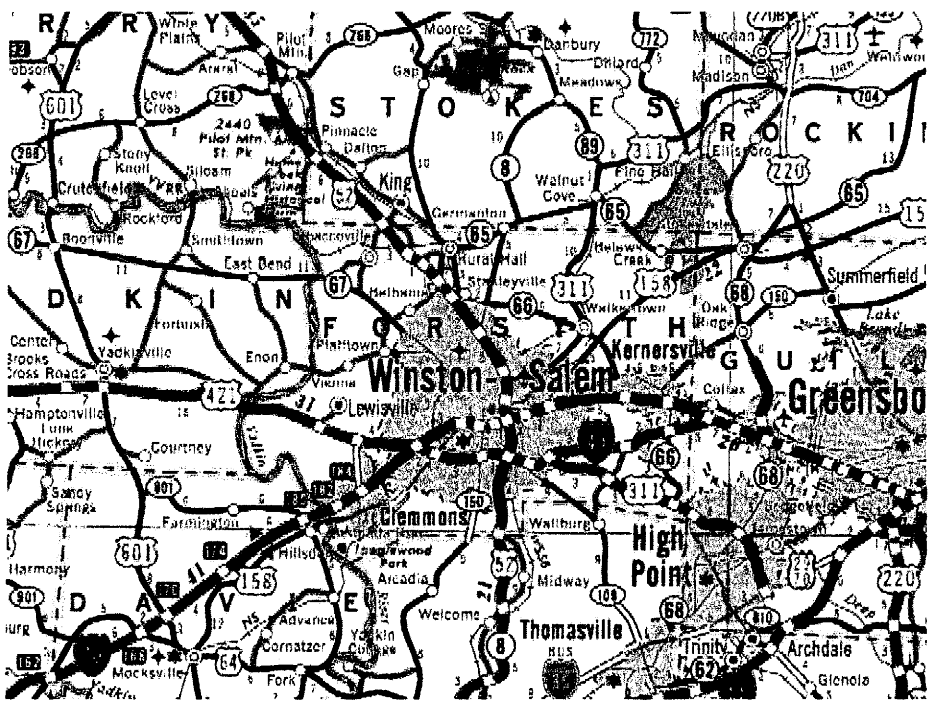
It is the applicant's responsibility to submit the application sufficiently in advance of desired construction dates to allow processing time for these permits. However, an applicant may choose to list constraints associated with construction or sequencing that may impose limits on work schedules (e.g., 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 7.13.07

Applicant/Agent's Signature **Date**
(Agent's signature is valid only if an authorization letter from the applicant is provided.)

NORTH CAROLINA





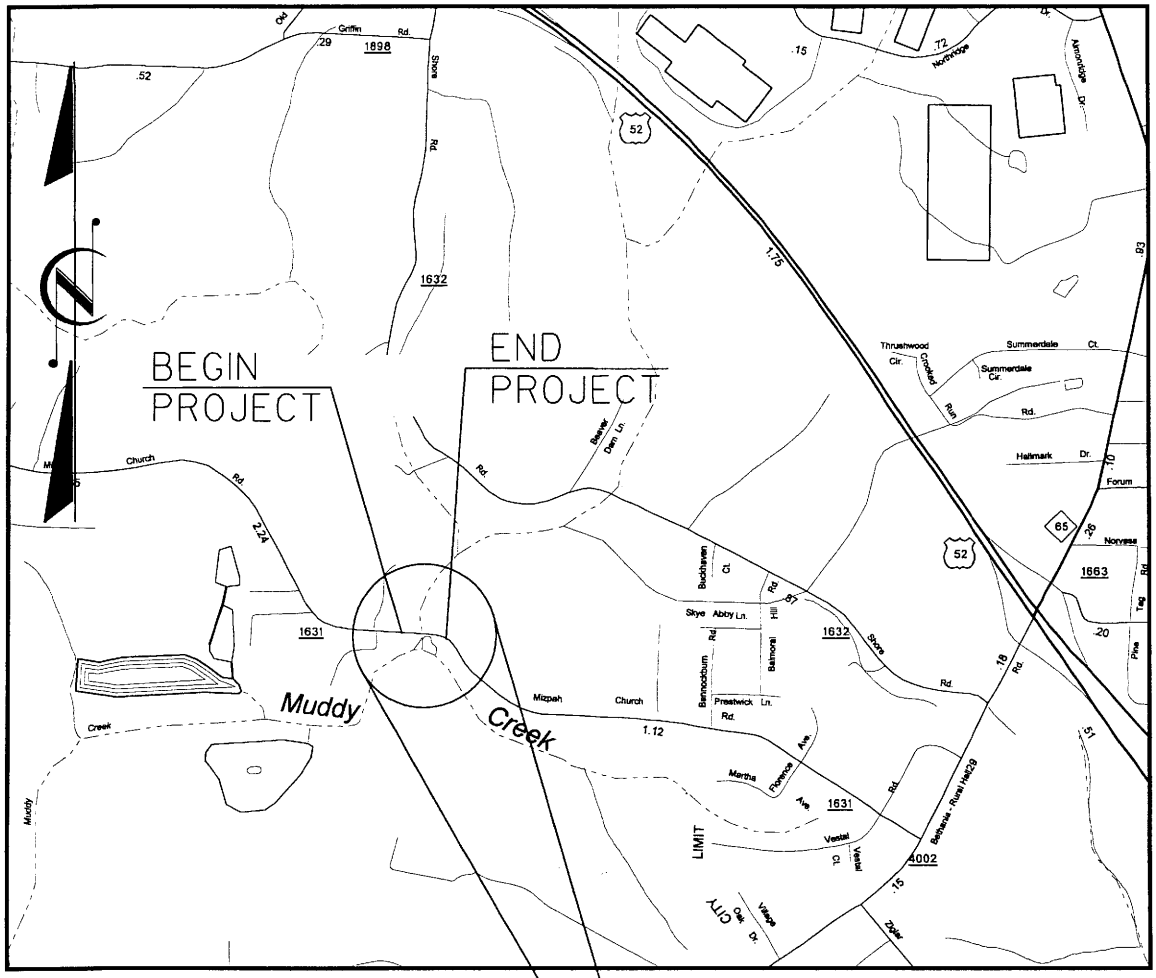
VICINITY MAP

NCDOT

DIVISION OF HIGHWAYS
FORSYTH COUNTY
PROJECT: 33467.1.1 (B-4112)
BRIDGE 30 OVER
MUDDY CREEK
ON SR 1631

SHEET 1 **OF** 8 **3/07/06**

SITE MAP



SITE

NCDOT

DIVISION OF HIGHWAYS

FORSYTH COUNTY

PROJECT: 33467.1.1 (B-4112)

BRIDGE 30 OVER

MUDDY CREEK

ON SR 1631

ENGLISH

SHEET 2 OF 8 3/07/06

WETLAND LEGEND

WLB WETLAND BOUNDARY

WETLAND

DENOTES FILL IN WETLAND

DENOTES FILL IN SURFACE WATER

DENOTES FILL IN SURFACE WATER (POND)

DENOTES TEMPORARY FILL IN WETLAND

DENOTES EXCAVATION IN WETLAND

DENOTES TEMPORARY FILL IN SURFACE WATER

DENOTES MECHANIZED CLEARING

FLOW DIRECTION

TB TOP OF BANK

WE EDGE OF WATER

C PROP. LIMIT OF CUT

F PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG NATURAL GROUND

PL PROPERTY LINE

TDE TEMP. DRAINAGE EASEMENT

PDE PERMANENT DRAINAGE EASEMENT

EAB EXIST. ENDANGERED ANIMAL BOUNDARY

EPB EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

COIR FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

PROPOSED PIPE CULVERT
12"-48" PIPES
54" PIPES & ABOVE

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE

LEVEL SPREADER (LS)

DITCH / GRASS SWALE

NCDOT

DIVISION OF HIGHWAYS
FORSYTH COUNTY
PROJECT: 33467.1.1 (B-4112)
BRIDGE 30 OVER
MUDDY CREEK
ON SR 1631

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	16+40 TO 16+60	39" BOX BEAM BRIDGE, 1@100'							0.01		31	
TOTALS:			0.00	0.00	0.00	0.00	0.00	0.00	0.01	0	31	0

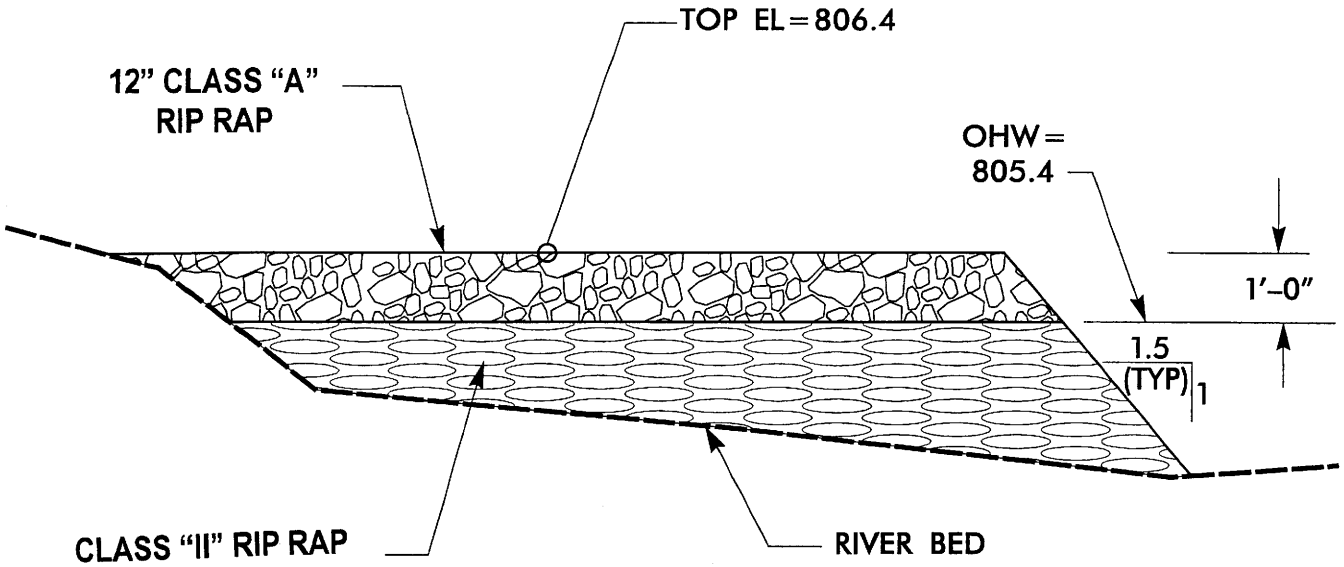
NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

FORSYTH COUNTY
WBS - 33467.1.1 (B-4112)

SHEET 4 of 8 3/09/2007

ATN Revised 3/31/05

DETAIL OF CAUSEWAY
PROPOSED BRIDGE



VOLUME AND AREA OF TEMPORARY FILL (CLASS "I" RIP RAP) BELOW OHW	
AREA =	0.01 Ac
VOLUME =	28 CY

ENGLISH

NCDOT

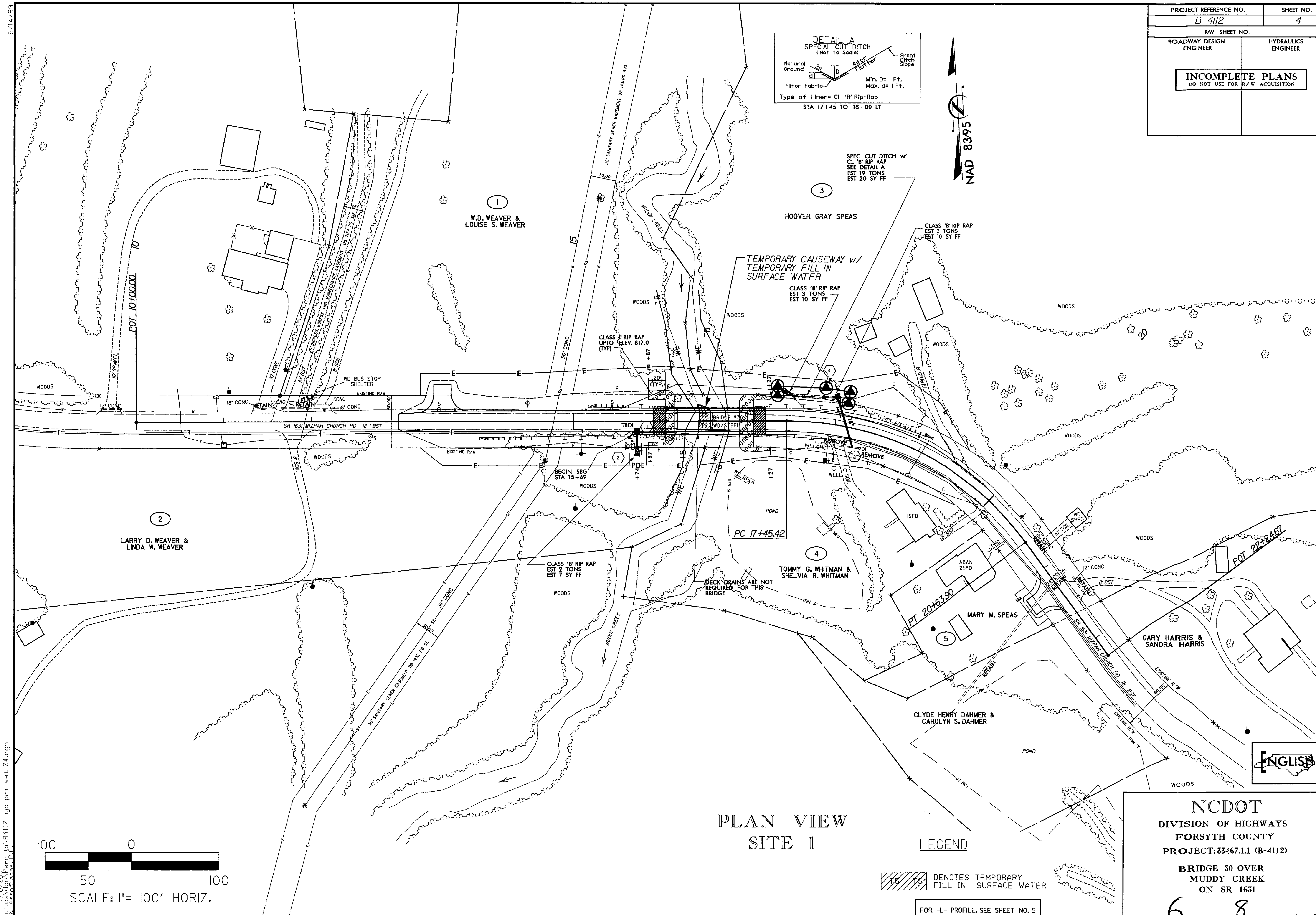
DIVISION OF HIGHWAYS
FORSYTH COUNTY
PROJECT: 33467.1.1 (B-4112)
BRIDGE 30 OVER
MUDDY CREEK
ON SR 1631

SHEET 5 OF 8 3/09/07

3/12/2007
8:44:33 AM
R:\Hydraulics\dgn\Permits\B4112_Hyd_prm_tempcw.dgn

PROJECT REFERENCE NO.	SHEET NO.
B-4112	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION



DETAIL A
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
Filter Fabric
Front Ditch Slope
4:1 or Flatter
Min. D= 1 Ft.
Max. d= 1 Ft.
Type of Liner= CL 'B' Rip-Rap
STA 17+45 TO 18+00 LT
NAD 83/95
W.D. WEAVER &
LOUISE S. WEAVER
LARRY D. WEAVER &
LINDA W. WEAVER
HOOVER GRAY SPEAS
TOMMY G. WHITMAN &
SHELVIA R. WHITMAN
MARY M. SPEAS
GARY HARRIS &
SANDRA HARRIS
CLYDE HENRY DAHMER &
CAROLYN S. DAHMER
SPEC CUT DITCH w/
CL 'B' RIP RAP
SEE DETAIL A
EST 19 TONS
EST 20 SY FF
CLASS 'B' RIP RAP
EST 3 TONS
EST 10 SY FF
TEMPORARY CAUSEWAY w/
TEMPORARY FILL IN
SURFACE WATER
CLASS 'B' RIP RAP
EST 3 TONS
EST 10 SY FF
CLASS II RIP RAP
UPTO ELEV. 817.0
(TYP)
CLASS 'B' RIP RAP
EST 2 TONS
EST 7 SY FF
DECK DRAINS ARE NOT
REQUIRED FOR THIS
BRIDGE
BEGIN SBG
STA 15+69
PC 17+45.42
PT 20+63.90
POT 10+00.00
POT 22+24.67
SR 1631 MIZPAH CHURCH RD 18' BST
MUDDY CREEK
WOODS
POND
WD BUS STOP SHELTER
ISFD
ABAN 2SFD
WD SHED
EXISTING R/W
RETAIN
REMOVE
30' SANITARY SEWER EASEMENT
100 0 50 100
SCALE: 1" = 100' HORIZ.

PLAN VIEW
SITE 1

LEGEND

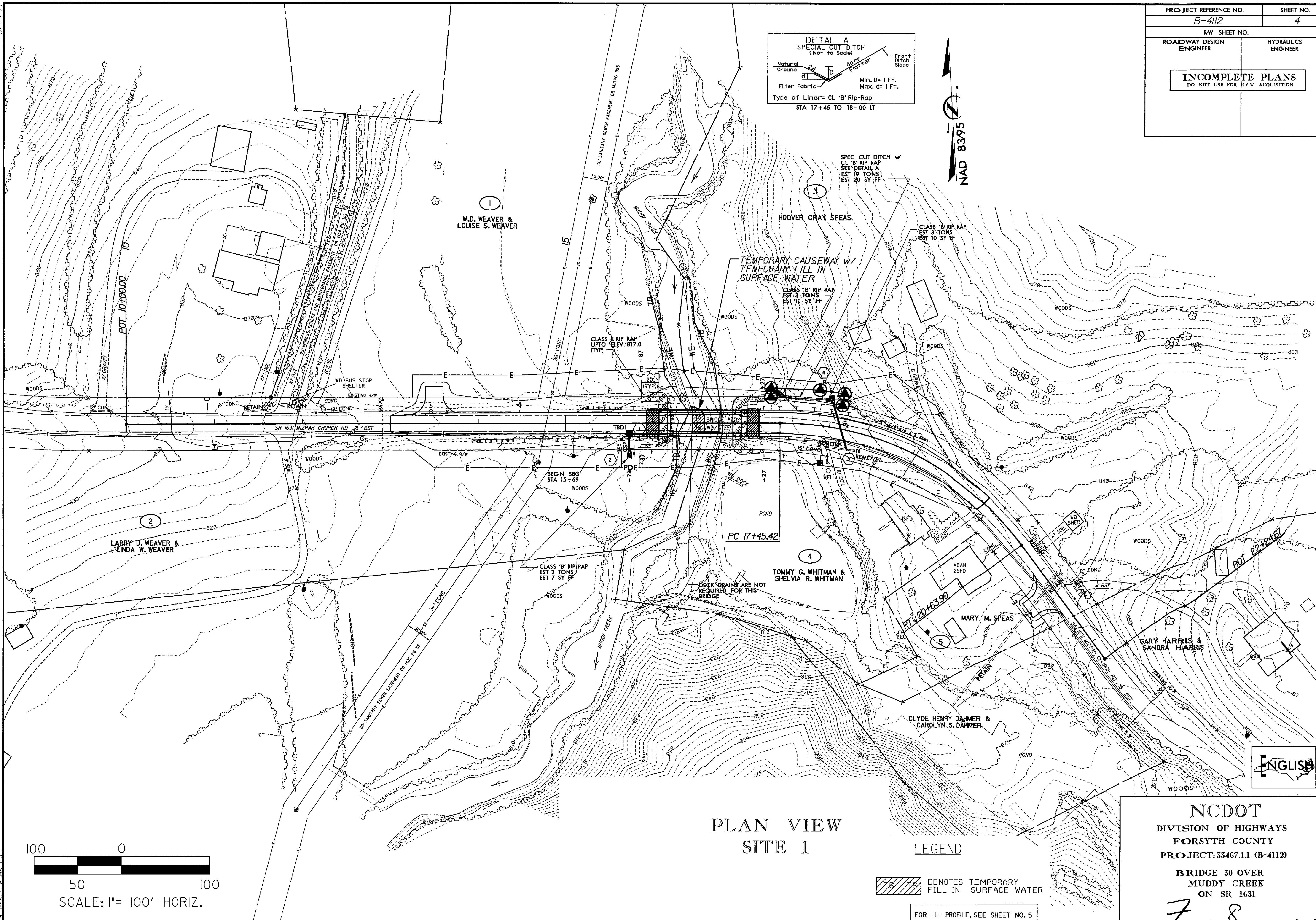
TS — DENOTES TEMPORARY FILL IN SURFACE WATER

FOR -L- PROFILE, SEE SHEET NO. 5

NCDOT
DIVISION OF HIGHWAYS
FORSYTH COUNTY
PROJECT: 33467.1.1 (B-4112)

BRIDGE 30 OVER MUDDY CREEK ON SR 1631

SHEET 6 OF 8 7/10/07



PROJECT REFERENCE NO.
SHEET NO.
B-4112
4
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DETAIL A
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
Filter Fabric
Front Ditch Slope
4:1 or Flatter
Min. D= 1 Ft.
Max. d= 1 Ft.
Type of Liner= CL 'B' Rip-Rap
STA 17+45 TO 18+00 LT
NAD 83/95
SPEC CUT DITCH w/ CL 'B' RIP RAP
SEE DETAIL A
EST 19 TONS
EST 20 SY FF
W.D. WEAVER &
LOUISE S. WEAVER
HOOVER GRAY SPEAS
CLASS 'B' RIP RAP
EST 3 TONS
EST 10 SY FF
TEMPORARY CAUSEWAY w/
TEMPORARY FILL IN
SURFACE WATER
CLASS II RIP RAP
UPTO ELEV: 817.0
(TYP)
MUDDY CREEK
WOODS
POT 10+00.00
WD BUS STOP SHELTER
SR 1631 MIZPAH CHURCH RD
BRIDGE
EXISTING R/W
BEGIN SBG
STA 15+69
REMOVE
POND
PC 17+45.42
LARRY D. WEAVER &
LINDA W. WEAVER
CLASS 'B' RIP RAP
EST 2 TONS
EST 7 SY FF
DECK DRAINS ARE NOT REQUIRED FOR THIS BRIDGE
TOMMY G. WHITMAN &
SHELVIA R. WHITMAN
ABAN 2SFD
PT 20+63.90
MARY M. SPEAS
POT 22+84.67
GARY HARRIS &
SANDRA HARRIS
RETAIN
CLYDE HENRY DAHMER &
CAROLYN S. DAHMER
ENGLISH
100 0 50 100
SCALE: 1"= 100' HORIZ.

PLAN VIEW
SITE 1

LEGEND

DENOTES TEMPORARY FILL IN SURFACE WATER

FOR -L- PROFILE, SEE SHEET NO. 5

NCDOT
DIVISION OF HIGHWAYS
FORSYTH COUNTY
PROJECT: 33467.1.1 (B-4112)

BRIDGE 30 OVER
MUDDY CREEK
ON SR 1631

SHEET 7 OF 8

7/10/07

PROJECT REFERENCE NO.	SHEET NO.
B-4112	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE 202 RALEIGH, N.C. 27606
(919) 851-6066

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

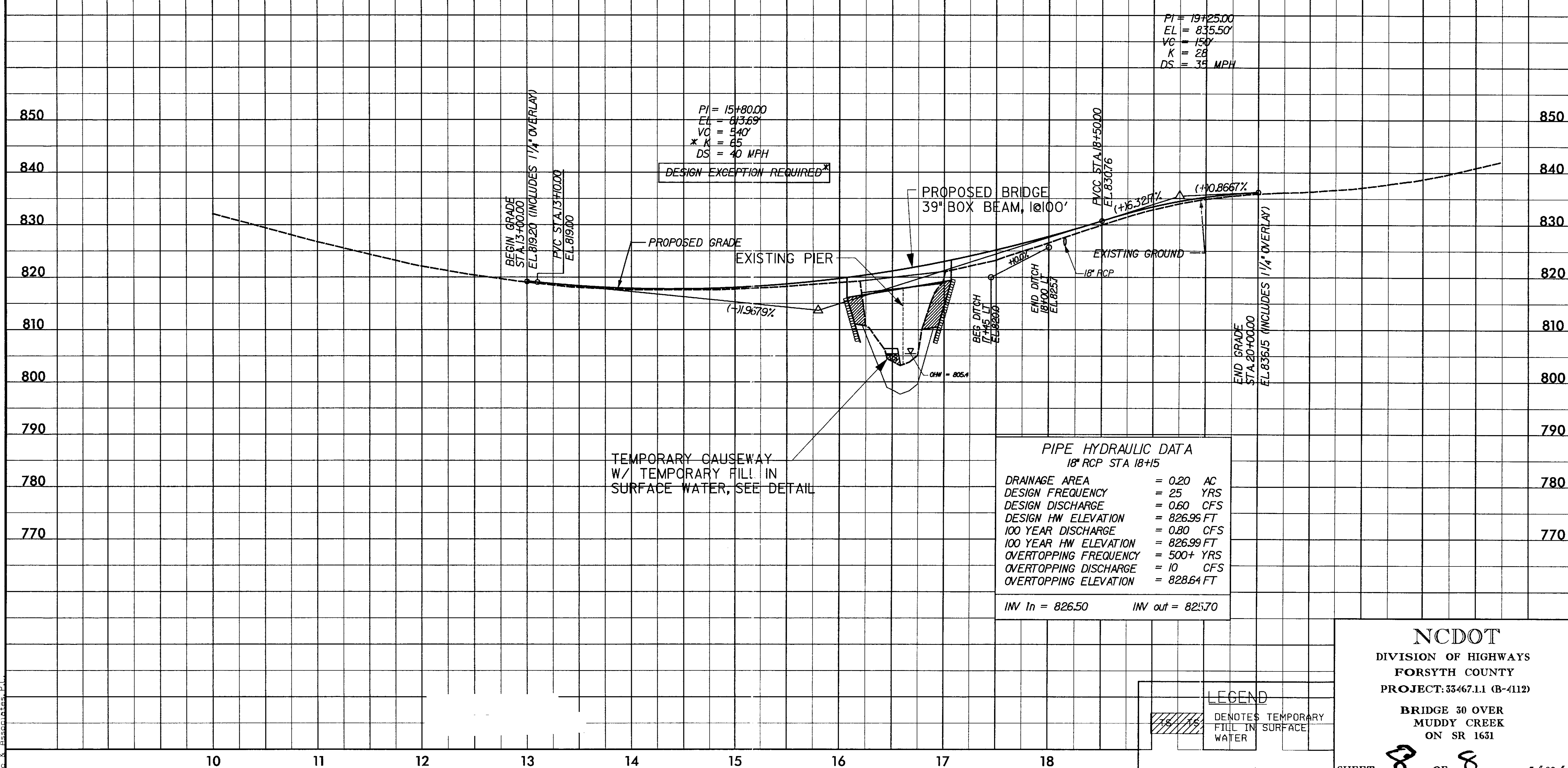
ENGLISH

B.M.#3 EL = 812.87'
RR SPIKE IN 14" ASH
226' LT OF -BL- STA 12+87
234' LT OF -L- STA 16+29

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 3170 CFS
DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 815.5 FT
BASE DISCHARGE	= 4790 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 817.3 FT
OVERTOPPING DISCHARGE	= 5850 CFS
OVERTOPPING FREQUENCY	= 200± YRS
OVERTOPPING ELEVATION	= 818.4 FT
DATE OF SURVEY	= 4-22-04
W.S. ELEVATION AT DATE OF SURVEY	= 804.4 FT

-L-
FOR PLAN, SEE SHEET NO.4



PIPE HYDRAULIC DATA
18" RCP STA 18+15

DRAINAGE AREA	= 0.20 AC
DESIGN FREQUENCY	= 25 YRS
DESIGN DISCHARGE	= 0.60 CFS
DESIGN HW ELEVATION	= 826.95 FT
100 YEAR DISCHARGE	= 0.80 CFS
100 YEAR HW ELEVATION	= 826.99 FT
OVERTOPPING FREQUENCY	= 500+ YRS
OVERTOPPING DISCHARGE	= 10 CFS
OVERTOPPING ELEVATION	= 828.64 FT

INV In = 826.50 INV out = 825.70

LEGEND
TS — DENOTES TEMPORARY FILL IN SURFACE WATER

NCDOT
DIVISION OF HIGHWAYS
FORSYTH COUNTY
PROJECT: 33467.1.1 (B-4112)
BRIDGE 30 OVER
MUDDY CREEK
ON SR 1631

SHEET 8 OF 8 3/09/07

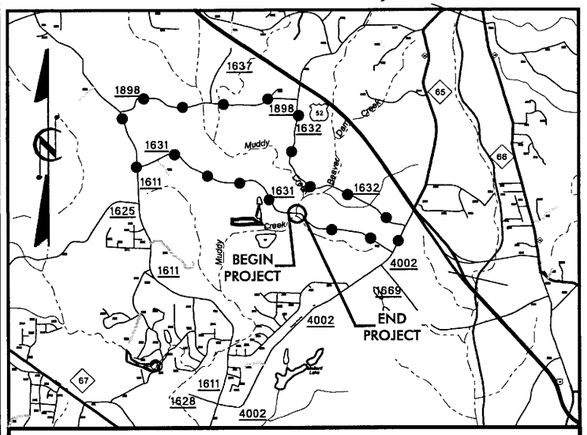
5/14/99
3/9/2007
R:\Hydraulics\dgn\Permits\B4112_hyd_wet_pfl 05.dgn
KO & Associates, P.C.

03/08/09

TIP PROJECT: B-4112

CONTRACT:

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



VICINITY MAP

PROPOSED OFFSITE DETOUR

90% PLANS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

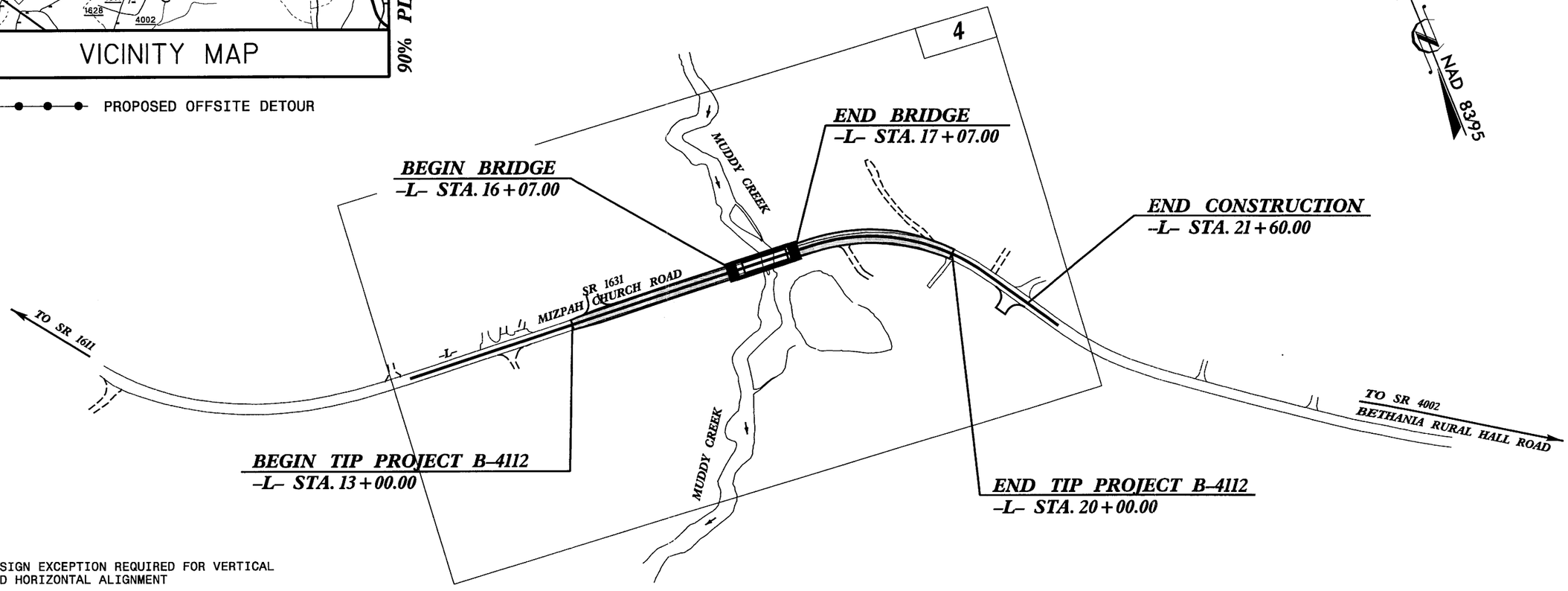
FORSYTH COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4112	1	

WBS PROJ.NO.	F. A. PROJ. NO.	DESCRIPTION
33467.1.1	BRZ-1631(2)	P.E.
33467.2.1	BRZ-1631(2)	R/W & UTIL

LOCATION: ***BRIDGE NO. 30 OVER MUDDY CREEK ON SR 1631 (MIZPAH CHURCH ROAD)***

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



** DESIGN EXCEPTION REQUIRED FOR VERTICAL AND HORIZONTAL ALIGNMENT

NCDOT CONTACT: CATHY HOUSER, P.E.
ROADWAY DESIGN - ENGINEERING COORDINATION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

(RURAL LOCAL)

ADT 2008 = 1635
ADT 2028 = 2535
DHV = 10 %
D = 65 %
T = 3 % *
** V = 50 MPH

* TTST 1% DUAL 2%

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4112	=	*0.114 MI.*
LENGTH STRUCTURE TIP PROJECT B-4112	=	*0.019 MI.*
TOTAL LENGTH OF TIP PROJECT B-4112	=	*0.133 MI.*

Prepared In the Office of:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 Sobaub Dr. Suite 202 Raleigh NC 27606
(919) 851-6066

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: AUGUST 29, 2006

LETTING DATE: JANUARY 15, 2008

STEPHEN R. WHITLEY, PE
PROJECT ENGINEER

DAVID C. WALLER, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER *P.E.*

3/13/2007
R:\Roadway\Proj\B4112_Rdy_tsh.dgn
Ko & Associates, P.C.

10/25/05

PROJECT REFERENCE NO.	SHEET NO.
B-4112	1-B

Note: Not to Scale

****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 — EPM
- Parcel/Sequence Number — 123
- 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 — W
- 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
- False Sump

RAILROADS:

- Standard Gauge — CSX TRANSPORTATION
- 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
- 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

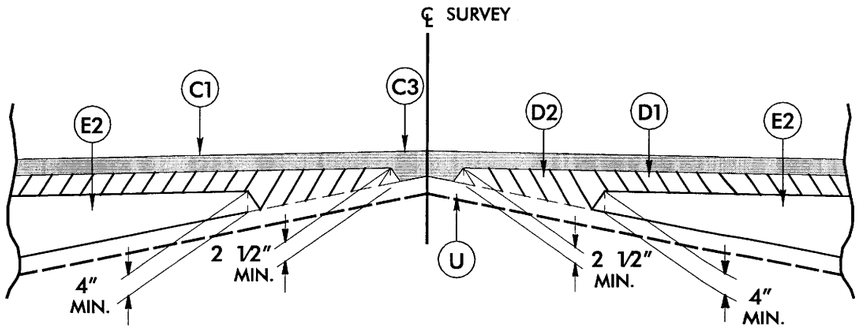
MISCELLANEOUS:

- 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.

6/2/99

PAVEMENT SCHEDULE	
C1	PROP. APPROX. 1¼" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 138 LBS. PER SQ. YD.
C2	PROP. APPROX. 2½" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 138 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 1½" IN DEPTH.
D1	PROP. APPROX. 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2½" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 4" IN DEPTH OR GREATER THAN 5½" IN DEPTH.
U	EXISTING PAVEMENT.
T	EARTH MATERIAL.
W	VARIABLE DEPTH ASPHALT PAVEMENT

NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



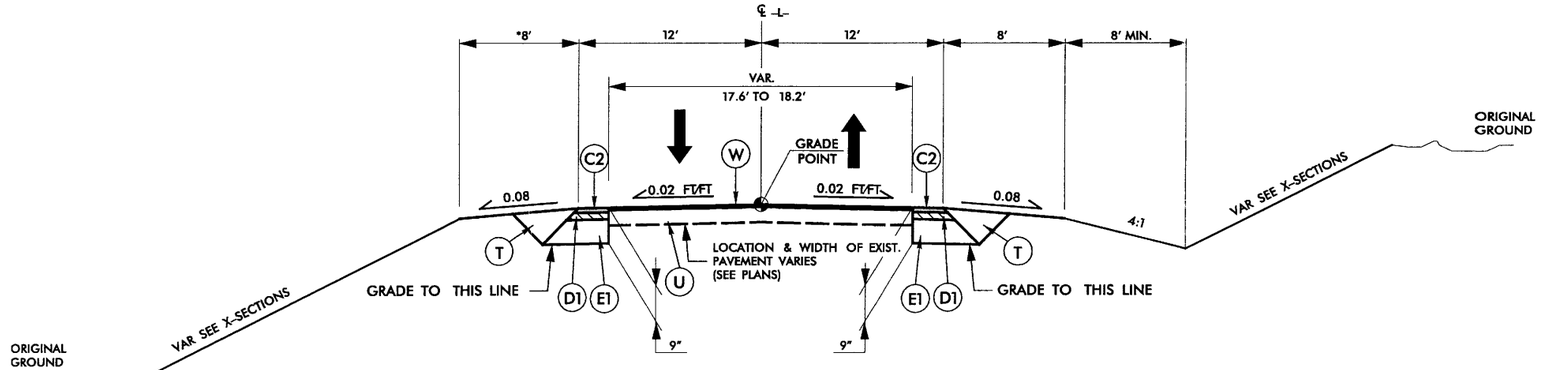
Detail Showing Method of Wedging

TRANSITION FROM EXISTING TO TYPICAL NO. 1
–L– STA. 13+00.00 TO 13+50.00

USE TYPICAL SECTION NO. 1
–L– STA. 13+50.00 TO 15+50.00
–L– STA. 18+25.00 TO 19+00.00

TRANSITION FROM EXISTING TO TYPICAL NO. 1
–L– STA. 19+00.00 TO 20+00.00

* ADD 3' WITH GUARDRAIL



TYPICAL SECTION NO. 1
–L– (SR 1631)

KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE 202 RALEIGH, N.C. 27606
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
B-4112	2

ROADWAY DESIGN ENGINEER

PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

3/13/2007
R:\Roadway\Proj\B4112_Rdy_typ.dgn
KO & Associates, P.A.

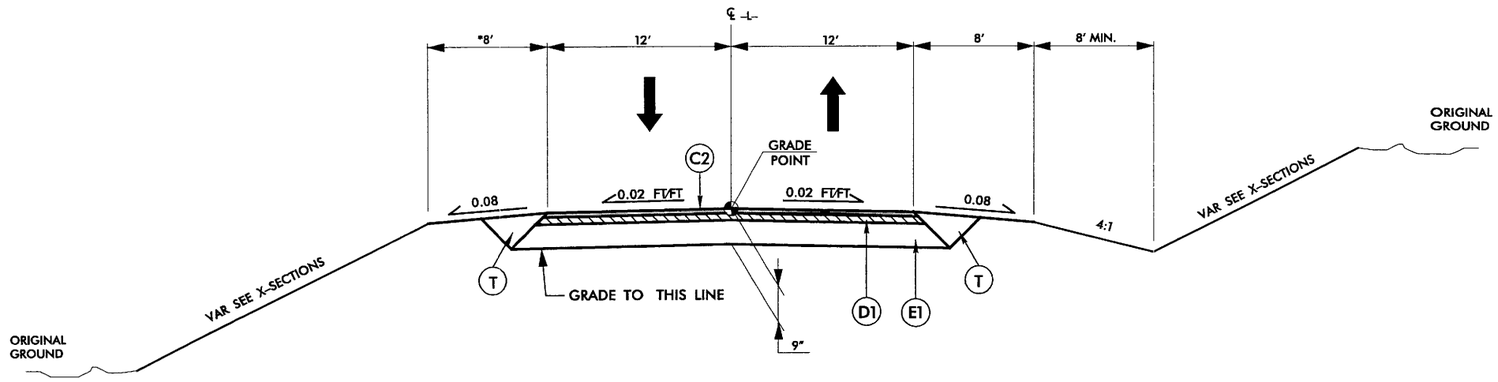
6/2/99

KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE 202 RALEIGH, N.C. 27606
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
B-4112	2-A
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

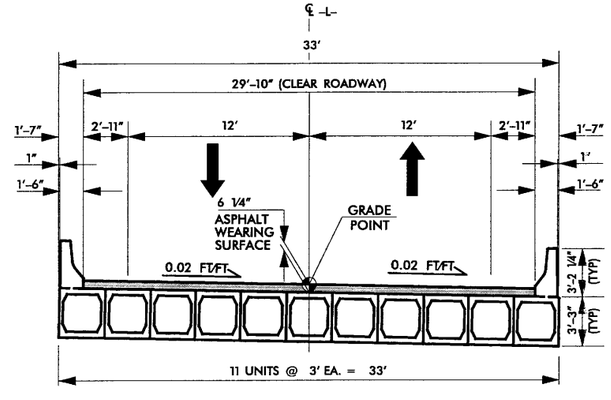
USE TYPICAL SECTION NO. 2
–L– STA. 15+50.00 TO STA. 15+93.00 (APPROACH SLAB)
–L– STA. 17+21.00 (APPROACH SLAB) TO STA. 18+25.00



TYPICAL SECTION NO. 2
–L– (SR 1631)

PAVEMENT SCHEDULE	
C1	PROP. APPROX. 1¼" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 138 LBS. PER SQ. YD.
C2	PROP. APPROX. 2½" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 138 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 1½" IN DEPTH.
D1	PROP. APPROX. 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2½" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 4" IN DEPTH OR GREATER THAN 5½" IN DEPTH.
U	EXISTING PAVEMENT.
T	EARTH MATERIAL.
W	VARIABLE DEPTH ASPHALT PAVEMENT

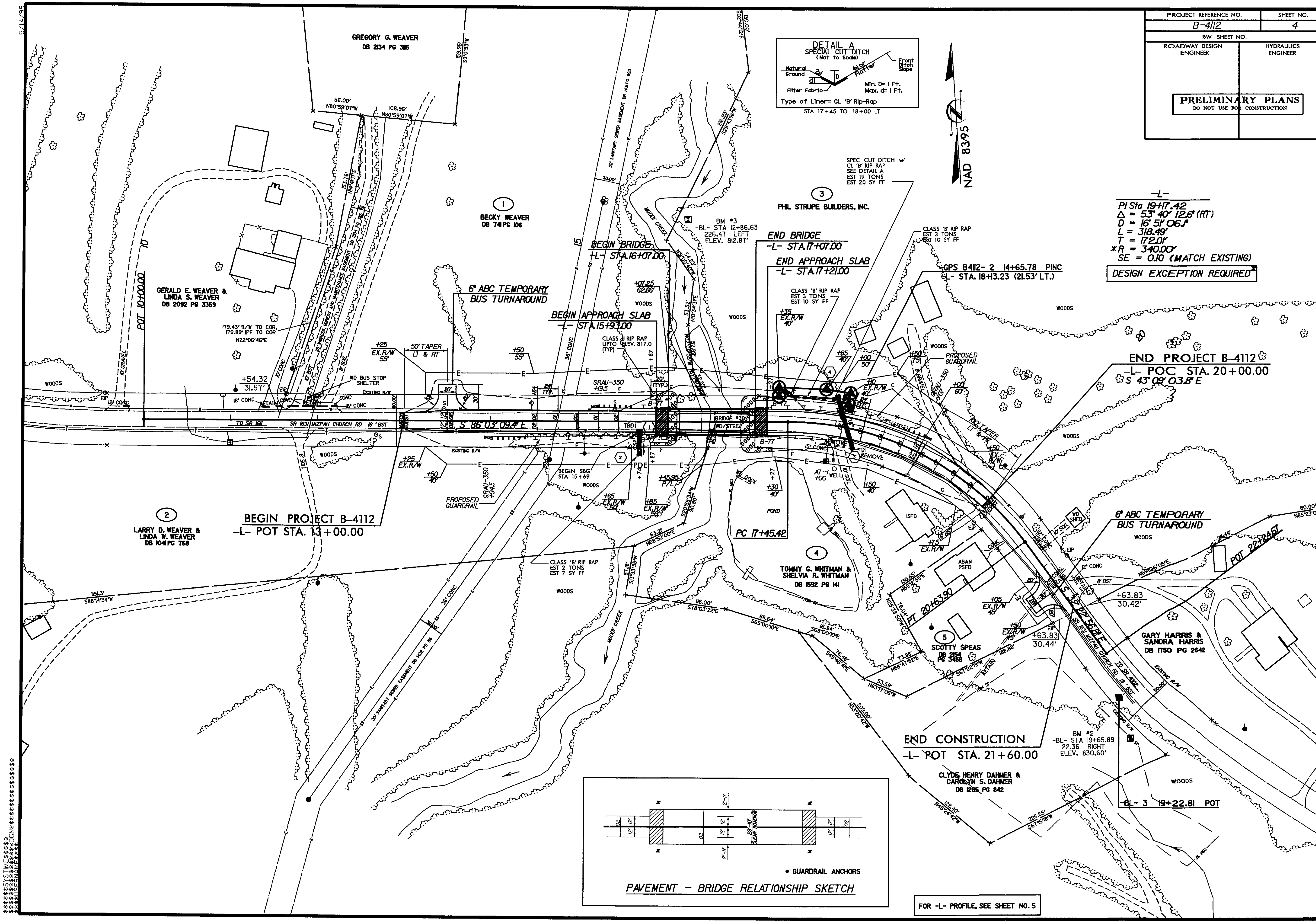
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.



TYPICAL SECTION NO. 3
STRUCTURE ON SR 1631
SITE 1

USE TYPICAL SECTION NO. 3
–L– STA. 16+07 TO 17+07

3/13/2007
H:\Roadway\Proj\B4112_Rdy_typ.dgn
Roadway Documentation Package


PROJECT REFERENCE NO.
B-4112
SHEET NO.
4
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
DETAIL A
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
Filter Fabric
Front Ditch Slope
4:1 or Flatter
Min. D= 1 Ft.
Max. d= 1 Ft.
Type of Liner= CL 'B' Rip-Rap
STA 17+45 TO 18+00 LT
NAD 83/95
GREGORY G. WEAVER
DB 2134 PG 385
BECKY WEAVER
DB 741 PG 106
GERALD E. WEAVER & LINDA S. WEAVER
DB 2092 PG 3359
PHIL STRUPE BUILDERS, INC.
LARRY D. WEAVER & LINDA W. WEAVER
DB 1041 PG 768
TOMMY G. WHITMAN & SHELVIA R. WHITMAN
DB 1592 PG 141
SCOTTY SPEAS
GARY HARRIS & SANDRA HARRIS
DB 1750 PG 2642
CLYDE HENRY DAHMER & CAROLYN S. DAHMER
DB 1285 PG 842
-L-
PI Sta 19+17.42
Δ = 53° 40' 12.6" (RT)
D = 16° 51' 06.1"
L = 318.49'
T = 172.01'
*R = 340.00'
SE = 0.10 (MATCH EXISTING)
DESIGN EXCEPTION REQUIRED*
SPEC CUT DITCH w/ CL 'B' RIP RAP
SEE DETAIL A
EST 19 TONS
EST 20 SY FF
BM #3
-BL- STA 12+86.63
226.47 LEFT
ELEV. 812.87'
BEGIN BRIDGE
-L- STA. 16+07.00
END BRIDGE
-L- STA. 17+07.00
END APPROACH SLAB
-L- STA. 17+21.00
BEGIN APPROACH SLAB
-L- STA. 15+93.00
6" ABC TEMPORARY BUS TURNAROUND
GPS B4112- 2 14+65.78 PINC
-L- STA. 18+13.23 (21.53' LT.)
END PROJECT B-4112
-L- POC STA. 20+00.00
S 43° 09' 03.8" E
BEGIN PROJECT B-4112
-L- POT STA. 13+00.00
POT 10+00.00
S 86° 03' 09.4" E
SR 1631 MIZPAH CHURCH RD 18' BST
WD BUS STOP SHELTER
50' TAPER LT & RT
PROPOSED GUARDRAIL
BEGIN SBG STA 15+69
PC 17+45.42
PT 20+63.90
POT 22+24.67
END CONSTRUCTION
-L- POT STA. 21+60.00
BM #2
-BL- STA 19+65.89
22.36 RIGHT
ELEV. 830.60'
-BL- 3 19+22.81 POT
MUDDY CREEK
WOODS
POND
CLASS 'B' RIP RAP
EST 2 TONS
EST 7 SY FF
PAVEMENT - BRIDGE RELATIONSHIP SKETCH
• GUARDRAIL ANCHORS
FOR -L- PROFILE, SEE SHEET NO. 5
5/14/99

KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202 RALEIGH, N.C. 27606
(919) 851-6066

PROJECT REFERENCE NO.	SHEET NO.
B-4112	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

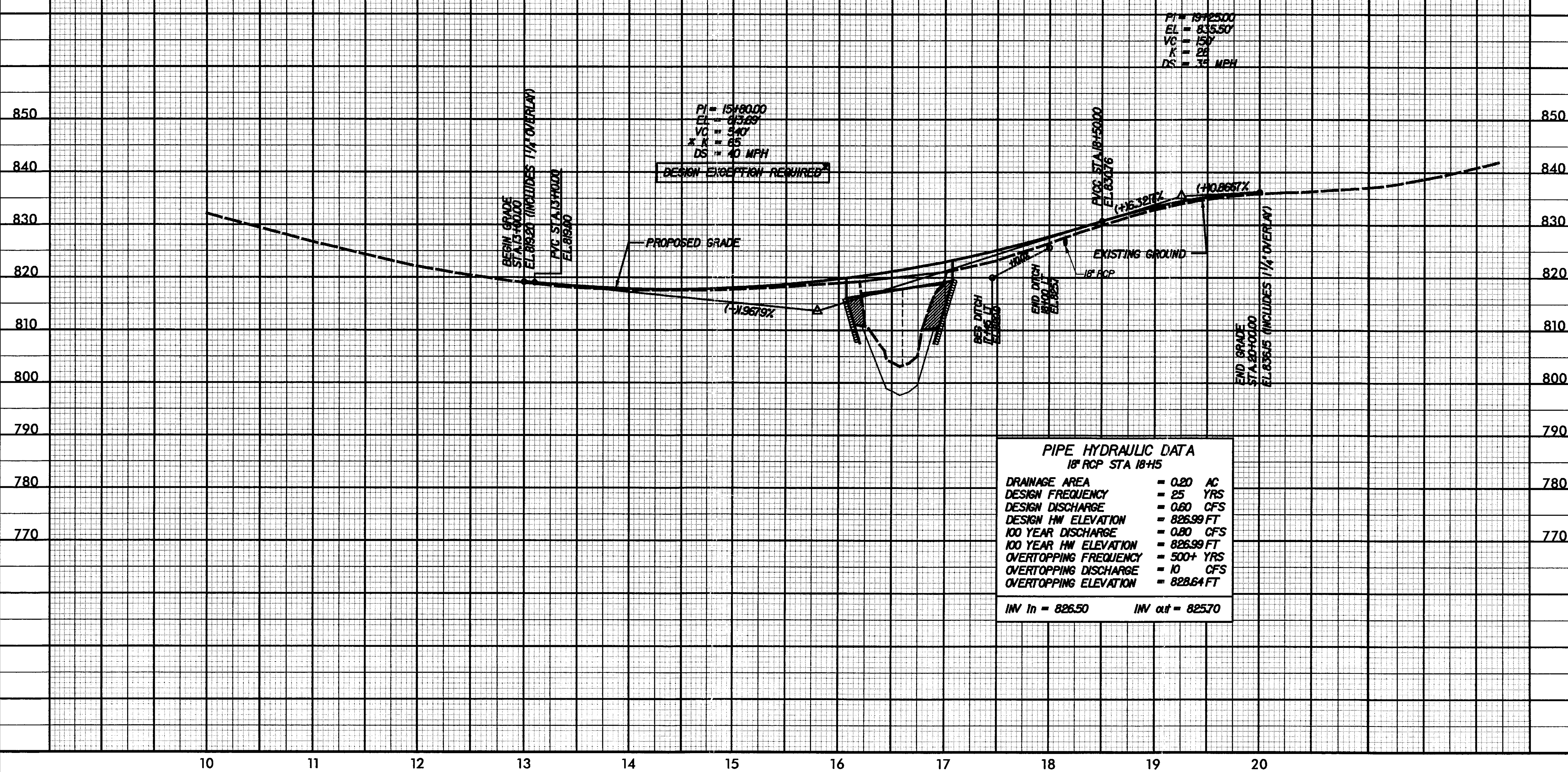
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

B.M. #3 EL = 812.87'
RR SPIKE IN 14" ASH
226' LT OF -BL- STA 12+87
234' LT OF -L- STA 16+29

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 3170 CFS
DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 815.5 FT
BASE DISCHARGE	= 4790 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 817.3 FT
OVERTOPPING DISCHARGE	= 5850 CFS
OVERTOPPING FREQUENCY	= 200± YRS
OVERTOPPING ELEVATION	= 818.4 FT
DATE OF SURVEY	= 4-22-04
W.S. ELEVATION AT DATE OF SURVEY	= 804.4 FT

-L-
FOR PLAN, SEE SHEET NO. 4



PIPE HYDRAULIC DATA
18" RCP STA 18+15

DRAINAGE AREA	= 0.20 AC
DESIGN FREQUENCY	= 25 YRS
DESIGN DISCHARGE	= 0.60 CFS
DESIGN HW ELEVATION	= 826.99 FT
100 YEAR DISCHARGE	= 0.80 CFS
100 YEAR HW ELEVATION	= 826.99 FT
OVERTOPPING FREQUENCY	= 500+ YRS
OVERTOPPING DISCHARGE	= 10 CFS
OVERTOPPING ELEVATION	= 828.64 FT

INV In = 826.50 INV out = 825.70

Forsyth County
SR 1631
Bridge No. 30 over Muddy Creek
Federal-Aid Project No. BRSTP-1631(2)
State Project No. WBS 33467.1.1
T.I.P. No. B-4112

CATEGORICAL EXCLUSION

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

AND

N.C. DEPARTMENT OF TRANSPORTATION

APPROVED:

7.11.05
DATE

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

7/11/05
DATE

for
John F. Sullivan III, P.E.
Division Administrator, FHWA

Forsyth County
SR 1631
Bridge No. 30 over Muddy Creek
Federal-Aid Project No. BRSTP-1631(2)
State Project No. WBS 33467.1.1
T.I.P. No. B-4112

CATEGORICAL EXCLUSION

May 2005

Documentation Prepared By Ko & Associates, P.C.

L. J. Ward, P.E.
Project Manager

For North Carolina Department of Transportation

for Karen B. Taylor, P.E.
Project Development Engineer

PROJECT COMMITMENTS

Forsyth County
SR 1631
Bridge No. 30 over Muddy Creek
Federal-Aid Project No. BRSTP-1631(2)
State Project No. WBS 33467.1.1
T.I.P. No. B-4112

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 Protection of Surface Waters, NCDOT's Guidelines for Best Management Practices for Construction and Maintenance Activities, General Certifications, and Section 401 Conditions of Certification, the following special commitments have been agreed to by NCDOT:

Project Development and Environmental Analysis Branch, Roadway Design Unit:

The length of the approaches in the final design should be limited as much as possible to prevent any right of way acquisition of the Speas property located southeast of Bridge No. 30. While not designated as a historic property, it does hold local historic significance. A design exception may be necessary.

Construction Office, Division 9:

The County Schools Transportation Director requests a designated turn around for school buses on both sides of the bridge during road closure. The location of the turn around areas will be determined during final design through coordination between NCDOT Roadway Design, Division 9 Construction Engineers, and the local School Officials. The turn around areas will be included in the final design plans. Forsyth County Fire Department, Emergency Medical Services, and Sheriff's Office should be notified prior to road closure.

Forsyth County
SR 1631
Bridge No. 30 over Muddy Creek
Federal-Aid Project No. BRSTP-1631(2)
State Project No. WBS 33467.1.1
T.I.P. No. B-4112

INTRODUCTION: The replacement of Bridge No. 30 is included in the North Carolina Department of Transportation 2004-2010 Transportation Improvement Program and in the Federal-Aid Bridge Replacement Program. The location is shown in Figure 1A. No substantial environmental impacts are anticipated. The project is classified as a Federal "Categorical Exclusion".

I. PURPOSE AND NEED STATEMENT

Bridge Maintenance Unit records indicated the bridge has a sufficiency rating of 26.7 out of a possible 100 for a new structure. The bridge is considered functionally obsolete and structurally deficient. The replacement of this inadequate structure will result in safer and more efficient traffic operations.

II. EXISTING CONDITIONS

SR 1631 (Mizpah Church Road) crosses over Muddy Creek about 1.1 miles west of its junction with SR 4002, north of Winston-Salem. Development in the immediate area is mainly residential. A pond is located next to the bridge in the southeast quadrant. There are two houses on the south side of SR 1631 east of Bridge No. 30. Adjacent to the two houses, on the north side of SR 1631, there are several barns. Two fields are located west of the bridge. The field on the north side of the road has several barns in the southwest corner of the field. The entrance to a private driveway is located adjacent to this field approximately 450 feet from the west end of the bridge. The field on the south side of the road has a house in the southwest corner, and the driveway for this house is approximately 400 feet from the end of the bridge (see Figures 4 and 5). SR 1631 is classified as a Rural Local Road in the Statewide Functional Classification System.

SR 1631 has a current pavement width of 17 feet with 6-foot grass shoulders in the area of the bridge. The roadway approaches are short tangents and on downgrades toward the bridge. About 200 feet from the east end of the bridge, the road curves to the south making sight distance poor in this direction. The western approach is a longer tangent than the eastern approach and it curves to the north about 750 feet from the west end of the bridge.

The estimated annual daily traffic (ADT) for 2005 on SR 1631 at Muddy Creek is 1,500 vehicles per day (vpd), and for the design year 2025, the estimated ADT is 2,400 vpd. The volumes include an estimated 1 percent truck-tractor semi-trailer (TTST) and 2 percent dual-tired (DT) vehicles. The posted speed limit is 45 mph in the vicinity of the bridge.

Bridge No. 30, as shown in Figures 2A and 2B, has an overall length of 81 feet and a clear deck width of 19.1 feet. The existing two-lane bridge has a timber deck on I-beams supported by timber caps and piles. The structure was constructed in 1961. The current posted weight limit is 14 tons for single unit vehicles and 17 tons for truck-tractor semi-trailer vehicles. The bridge has a sufficiency rating of 26.7 compared to a rating of 100 for a new structure and roadway approaches. Bridge No. 30 has a bed-to-crown distance of approximately 16 feet.

No accidents were reported in the vicinity of the bridge during the period from April 1, 1999 to March 31, 2002.

There are several utilities located throughout the project area near the bridge and include the following:

- a Duke Power aerial transmission line along the south side of SR 1631 that also crosses over SR 1631 east and west of the bridge as well as Muddy Creek; and,
- Alltel aerial and underground telephone cables along the south side of SR 1631 crossing over the road east of the bridge and continuing aerially over Muddy Creek.

In addition to these utilities, the City of Winston-Salem has both water and sanitary sewer mains along the proposed bridge replacement project. A 36-inch sanitary sewer interceptor runs parallel along the west side of Muddy Creek and through a 72-inch tunnel liner under SR 1631. An 8-inch ductile iron water main parallels SR 1631 on the north side and crosses under Muddy Creek and over the 36-inch sanitary sewer interceptor.

Eight school buses cross over the bridge totaling 16 times per day.

III. ALTERNATIVES

A. Project Description

NCDOT proposes to replace Bridge No. 30 with a new bridge approximately 110 feet long with a clear roadway width of 30 feet. The length and width of the new bridge will be determined during final design. New approaches to the bridge will provide 12-foot travel lanes in each direction with 8-foot shoulders. The proposed cross sections are shown in Figures 3A and 3B. The design speed will be 50 mph.

B. Detailed Study Alternates

Two alternatives were studied for the replacement of Bridge No. 30 over Muddy Creek. See Figures 4 and 5 for depictions of each alternative.

Alternate 1 replaces Bridge No. 30 at its existing location by closing SR 1631 and maintaining traffic with an off-site detour. The off-site detour recommended by NCDOT Division Nine

utilizes SR 1611 (Bethania Road), SR 1898 (Griffin Road), SR 1632 (Shore Road) and SR 4002 (Bethania-Rural Hall Road) (see Figure 6). The structures along the detour route have posted weight limits that are equal to or higher than those for Bridge No. 30. The detour is about 7.6 miles in length and the posted speed limit on the detour route is 55 mph.

Alternate 2 replaces the existing structure at its existing location and maintains traffic with a temporary structure and detour on the north side of SR 1631.

After further study, Alternate 2 is not considered feasible because of impacts associated with the use of an on-site detour and temporary structure. Environmentally, on-site detours and temporary structures require disturbing vegetation, stream banks, and wetlands in addition to those areas already being disturbed by the replacement of the existing bridge. The demolition of the detour/temporary structure and the required re-vegetation adds additional cost to the project. In addition, according to a planner from the Forsyth County and Winston-Salem City-County Planning Board (CCPB), there are plans for a 76-home residential development on a 40+ - acre tract of land northeast and adjacent to Bridge No. 30. The entrance to this development is proposed to be approximately 140-160 feet east of Muddy Creek. The additional right-of-way that will be required for Alternate 2 may impact the proposed site plan for this development. Furthermore, there is not much support for Alternate 2 from federal, state, and local agencies (see the Appendix for comments).

Alternates Eliminated from Further Study

The No-Build or "do-nothing" alternate was also considered but this alternate would eventually necessitate closure of the bridge. This is not a desirable alternate due to the traffic service provided by SR 1631.

Investigation of the existing structure by the NCDOT Bridge Maintenance Unit indicates that rehabilitation of Bridge No. 30 is not feasible due to its age and deteriorated condition. The existing bridge is classified as structurally deficient.

Preferred Alternate

Alternate 1, replacing Bridge No. 30 at its existing location by closing SR 1631 and maintaining traffic with an off-site detour, is the preferred alternate. Alternate 1 was selected because it is more economical, has less environmental and development impacts, and has more support from federal, state, and local agencies than Alternate 2.

The new structure will be 110 feet long with a clear roadway width of 30 feet. New approaches to the bridge will provide 12-foot travel lanes with 8-foot shoulders. During final design, the approach on the eastern end of the bridge should be limited in order to prevent any right of way acquisition of the Speas property located southeast of Bridge No. 30. While not designated as a historic property, it does hold local historic significance. A design exception for the proposed typical section will be required to eliminate impacts to this property.

The design speed for the replacement bridge will be 50 mph; however, design exceptions for both the horizontal and vertical alignments will be necessary. A design exception for the

horizontal alignment with a 35 mph design speed will be necessary because the proposed alignment will be tying into an existing horizontal curve. The design exception for the vertical curve with design speeds of 39 mph and 42 mph is required because maintaining a 50 mph design speed will necessitate a longer vertical curve and raising the grade considerably. A longer vertical curve and grade change will impact a larger amount of residential property and will increase the estimated cost of this alternate.

In accordance with the NCDOT Guidelines for Evaluation of Off-site Detours for Bridge Replacement Projects (April 2004), the average delay per motorist using the proposed detour for Alternate 1 is estimated to range from 10-15 minutes for a construction period of 12 months, which falls under the Evaluation (E) range of the Guidelines (see Figure 6 for the proposed detour route). The Evaluation (E) range suggests an on-site detour is justifiable from a traffic operations standpoint but must be weighed with other project factors to determine if it is appropriate.

Coordination with local agencies indicates that an off-site detour would not cause undue hardship to the local community and is their preferred alternative with the exception of Winston-Salem/Forsyth County School officials. School officials prefer Alternate 2, citing the number of trips its buses make over Bridge No. 30 per day (16). However, additional documentation from school officials requests designated turn around areas for school buses on both sides of the bridge during construction if Alternate 1 is chosen as the preferred alternative. The location of the turn around areas will be determined during final design through coordination between NCDOT Roadway Design, Division 9 Construction Engineers, and the local School Officials. The turn around areas will be included in the final design plans.

Through the Winston-Salem Department of Transportation (WSDOT), the offices of Forsyth County Fire Department, Forsyth County Emergency Medical Services, and Forsyth County Sheriff's Office were asked to submit comments on how this project may affect their operations. Fire and medical officials expressed concern that a closure of the bridge during construction could negatively impact response times, and no comments were received from the sheriff's office. WSDOT personnel requests these agencies be notified prior to the closing of Bridge No. 30 so that alternative emergency routes may be identified. In a subsequent letter, NCDOT informed WSDOT that Alternate 1 is the preliminary recommendation and requested WSDOT contact county fire, medical, and sheriff offices to inform them of the preliminary recommendation. Furthermore, NCDOT informed WSDOT that they will proceed with this recommendation unless WSDOT or any of the other organizations notifies NCDOT that a bridge closure will present a significant problem for their operations. No further response was received from these agencies.

The estimated cost for the recommended proposed improvement is $ 856,100. The current estimated cost of the project, as shown in the NCDOT 2004-2010 Transportation Improvement Program, is $ 55,000 for right-of-way and $550,000 for construction.

The Division Office concurs with the recommended improvements.

IV. ESTIMATED COST

The estimated costs of the alternates studied, based on 2004 prices, are shown in the following table:

	Alternate 1 Off-site Detour	Alternate 2 On-site Detour
Structure Removal	$ 12,800.00	$ 12,800.00
Structure	$ 340,560.00	$ 340,560.00
Roadway Approaches	$ 153,400.00	$ 153,400.00
Mobilization and Miscellaneous	$ 122,240.00	$ 122,240.00
Engineering and Contingencies	$ 96,000.00	$ 96,000.00
Temporary Detour	N/A	$ 525,000.00
SUBTOTAL	$ 725,000.00	$1,250,000.00
Right-of-Way/Const. Ease./Util.	$ 131,100.00	$ 153,600.00
TOTAL	$ 856,100.00	$1,403,600.00

The above estimates are based on functional design plans; therefore, 45 percent is included for miscellaneous items and contractor mobilization, and 15 percent for engineering and contingencies.

V. NATURAL RESOURCES

A. Methodology

Materials and literature supporting this investigation have been derived from a number of sources including U.S. Geological Survey (USGS) topographic mapping (Rural Hall, N.C. (1994) 7.5-minute quadrangle), U.S. Fish and Wildlife Service (FWS) National Wetlands Inventory (NWI) mapping (Rural Hall, N.C. (1994) 7.5-minute quadrangle), Natural Resources Conservation Service (NRCS; formerly the Soils Conservation Service) soils mapping (SCS 1976), WRC proposed Significant Aquatic Endangered Species Habitats (WRC 1998), 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 follow nomenclature found in Radford *et al.* (1968) with adjustments for updated nomenclature (Kartesz 1998). Jurisdictional areas were evaluated using the three-parameter approach following U.S. Army Corps of Engineers (USACE) delineation guidelines (DOA 1987). Jurisdictional areas were characterized according to a classification scheme established by Cowardin *et al.* (1979) and/or the N.C. Division of Environmental Management (DEM) *Field Guide to North Carolina Wetlands* (1996). Aquatic and terrestrial wildlife habitat requirements and distributions were determined by supportive literature (Martof *et al.* 1980, Potter *et al.* 1980, Webster *et al.* 1985,

Menhinick 1991, Palmer and Braswell 1995, and Rohde *et al.* 1994). Water quality information for area streams and tributaries was derived from available sources (DWQ 2002, DWQ 2004a-c). Quantitative sampling was not undertaken to support existing data.

The most current FWS listing of federally protected species with ranges extending into Forsyth County (February 18, 2003 FWS list) is considered in this report. NHP records documenting the presence of federally or state listed species were consulted on April 17, 2004 before commencing field investigations. In addition, Significant Aquatic Endangered Species Habitats proposed by the WRC (December 11, 1998 listing) were consulted to determine the presence of Proposed Critical Habitats for aquatic species.

The project study area (Figure 7) was walked and visually surveyed for significant features. Study Area is about 300 feet in width (centered on the existing roadway) and 1800 feet in length, encompassing 11.8 acres. Potential impacts of construction will be limited to cut-fill boundaries for each alternate. Special concerns evaluated in the field include: 1) potential protected species habitat; and 2) wetlands and water quality protection of Muddy Creek.

B. Physiography and Soils

The project study area is located within the Northern Inner Piedmont ecoregion of the Piedmont physiographic province of North Carolina. This ecoregion is characterized by dissected irregular plains, some hills, linear ridges, and isolated monadnocks; and low to moderate gradient streams with mostly boulder and cobble substrates (Griffith *et al.* 2002). The project study area is located within a moderately sloping floodplain valley. Elevations within the project study area range from a high of approximately 880 feet National Geodetic Vertical Datum (NGVD), at the eastern end of the project study area, to a low of approximately 805 feet NGVD within the stream channel (Rural Hall, N.C. (1994) 7.5-minute quadrangle). Land uses within and adjacent to the project study area consist of woodlands, agricultural and residential lots, utility line corridors, and roadside shoulders.

Based on soil mapping for Forsyth County (SCS 1976), the project study area is underlain by six soil series: Chewacla loam (*Fluvaquentic Dystrochrepts*), Congaree complex (*Typic Udifluvents*), Hiwassee loams (*Typic Rhodudults*), Madison fine sandy and clay loams (*Typic Hapludults*), Pacolet clay loam (*Typic Hapludults*) and Wehadkee soils (*Typic Fluvaquents*). Chewacla, Congaree, and Wehadkee soils occur adjacent to the stream, and the remainder are found on the upland slopes. Wehadkee soils are considered hydric in Forsyth County (NRCS 1997), and underlie approximately 2.1 acres, or 18 percent of the project study area.

The Chewacla series (0 to 2 percent slopes) consists of poorly drained soil in floodplains that was formed in alluvium. This soil tends to be flooded frequently for brief periods in winter and occasionally for brief periods during the growing season. Permeability and available water capacity are both moderate. Depth to bedrock is greater than 5 feet, and the seasonal high water table occurs at approximately 1.5 feet for two to six months annually.

The Congaree series (0 to 2 percent slopes) consists of well-drained soils in floodplains that were formed in recent alluvium. These soils tend to be flooded frequently for brief periods. Permeability and available water capacity are both moderate. Depth to bedrock is greater than 5 feet, and the seasonal high water table occurs at approximately 6 feet.

The Hiwassee series (2 to 10 percent slopes) consists of well-drained soil on upland side slopes and broad upland ridges. Permeability and available water capacity are both moderate. Due to the slope, erosion is a severe hazard when the soil surface is bare and unprotected. Depth to bedrock and the seasonal high water table occur at a depth greater than 5 feet.

The Madison series (6 to 15 percent slopes) consisting of fine sandy loam is well-drained and found on upper side slopes in uplands. Permeability and available water capacity are both moderate. Due to the slope, erosion is a severe hazard when the soil surface is bare and unprotected. Depth to bedrock ranges from 3 to greater than 5 feet and the seasonal high water table occurs at a depth of greater than five feet.

The Pacolet series (15 to 45 percent slopes) consists of well-drained clay loam on lower upland side slopes. Permeability is slow, and available water capacity is moderate. Due to the slope, erosion is a severe hazard where the surface is bare and unprotected. Depth to bedrock and the seasonal high water table occur at a depth greater than 4 feet.

The Wehadkee series (0 to 2 percent slopes) consists of deep, poorly drained, moderately permeable soils that formed in recent alluvium. These soils are found in depressions on floodplains that tend to be flooded frequently for brief periods of time. Permeability is moderate and available water capacity is high. Depth to bedrock is greater than 5 feet, and the seasonal high water table occurs at or near the surface during wet periods.

1. Water Resources

The project study area is located within sub-basin 03-07-04 of the Yadkin River Basin (DWQ 2002). This area is part of USGS Hydrologic Unit 03040101 of the South Atlantic/Gulf Region (Seaber *et al.* 1987). The structure targeted for replacement spans Muddy Creek. The portion of Muddy Creek that lies within the project study area has been assigned Stream Index Number (SIN) 12-94-(0.5) by the N.C. Division of Water Quality (DWQ) (DWQ 2004a).

2. Water Resource Characteristics

The project study area contains a small pond and two streams: Muddy Creek and an unnamed tributary (UT) to Muddy Creek. Muddy Creek generally flows southward through the western half of the project study area. The UT is located in the southeastern quadrant formed by the intersection of Mizpah Church Road and Muddy Creek. The UT flows generally northwest for approximately 400 feet before turning west and flowing out of the project study area. The pond is located in the southeastern quadrant formed by Muddy Creek and Mizpah Church Road. The pond extends to within approximately 30 feet from each, with approximately 0.3 acre lying within the project study area.

Muddy Creek flows southward through the project study area as a well-defined, third-order, perennial stream with moderate flow over a cobble, gravel, and sand substrate (containing some silt). At Bridge No. 30, Muddy Creek is approximately 25 feet wide. The banks of Muddy Creek are approximately 4 feet high and are steeply sloping. During field investigations, the water level appeared low and ranged to approximately 2 feet deep. Water clarity was good, with visibility to the substrate, and flow velocity was moderate. No persistent emergent aquatic vegetation was observed within the stream. Muddy Creek may provide good aquatic habitat for mussels and benthic macroinvertebrates due to the observation of little siltation within the stream and the channel substrate composition. Opportunities for habitat within Muddy Creek include overhanging trees, undercut banks, fallen logs, and leaf packs.

The UT enters the project study area as a well-defined, first-order, perennial stream with moderate flow over a fine sand and silt substrate. The banks of the UT range up to 2 feet high and are steeply sloping. During field investigations, the water level appeared low and ranged to approximately one foot in depth. Water clarity was good, with visibility to the substrate, and flow-velocity was moderate. No persistent emergent aquatic vegetation was observed within the stream. Opportunities for habitat within the UT include overhanging trees, undercut banks, fallen logs, and leaf packs.

The N.C. Division of Water Quality (DWQ) has assembled a list of impaired waterbodies according to the Clean Water Act Section 303(d) and 40 CFR 130.7, hereafter referred to as the N.C. 2004 Section 303(d) list. The list is a comprehensive public accounting of all impaired waterbodies. An impaired waterbody is one that does not meet water quality standards including designated uses, numeric and narrative criteria, and anti-degradation requirements defined in 40 CFR 131. The standards violation may be due to an individual pollutant, multiple pollutants, pollution, or an unknown cause of impairment. The impairment could be from point sources, nonpoint sources, and/or atmospheric deposition. Some sources of impairment exist across state lines. North Carolina's methodology is strongly based on the aquatic life use support guidelines available in the Section 305(b) guidelines (EPA-841-B-97-002A and -002B). Those streams attaining only Partially Supporting (PS) or Not Supporting (NS) status are listed on the N.C. 2004 Section 303(d) list. Streams are further categorized into one of six parts within the N.C. 2004 Section 303(d) list, according to source of impairment and degree of rehabilitation required for the stream to adequately support aquatic life. Within Parts 1, 4, 5, and 6 of the list, North Carolina has developed a priority ranking scheme (low, medium, high) that reflects the relative value and benefits those waterbodies provide to the State. The reach of Muddy Creek between Mill Creek #3 and SR 2995 (Loop Road) is on the N.C. 2004 Section 303(d) list due to impaired biological integrity (DWQ 2004c). This 15.2-mile reach of Muddy Creek lies approximately 3.0 miles downstream of the project study area. The reach of Muddy Creek within the project study area is not listed on any section of the N.C. 2004 Section 303(d) list (DWQ 2004c).

Classifications are assigned to waters of the State of North Carolina based on the existing or contemplated best usage of various streams or segments of streams in the basin. A Best Usage Classification of C has been assigned to this reach of Muddy Creek and its unnamed tributaries. Class C waters are suitable for aquatic life propagation and protection, agriculture, and secondary recreation. Secondary recreation includes wading, boating, and other uses not involving human body contact with waters on an organized or frequent basis. No designated

High Quality Waters (HQW), Outstanding Resource Waters (ORW), Water Supply I (WS-I), Water Supply II (WS-II) waters, or watershed Critical Areas (CA) occur within 1.0 mile of the project study area (DWQ 2002).

The DWQ has initiated a whole-basin approach to water quality management for the 17 river basins within the state. Water quality for the proposed project study area is summarized in the Yadkin River Basinwide Water Quality Plan (DWQ 2002). The reach of Muddy Creek within the project study area is currently listed by DWQ as Supporting its designated uses. No benthic macroinvertebrate monitoring stations occur within one mile of the project study area (DWQ 2002).

Sub-basin 03-07-04 of the Yadkin River Basin supports 36 permitted, point source discharges with a total discharge of over 77.0 million gallons per day. Five of the permitted discharges are classified as major dischargers, discharging 75.3 million gallons per day. The 31 remaining permitted dischargers are minor, with four having no limits set on discharges (DWQ 2004b). One discharger, RJ Reynolds Tobacco Company (permit number 0055093) discharges into Barker's Creek (SIN 12-94-1), which joins Parker's Creek (SIN 12-94-1-1) before coming to a confluence with Muddy Creek approximately 2.2 miles upstream from the project study area. The RJ Reynolds Tobacco Company is located approximately 3.5 miles upstream from the project study area, and is listed as a minor discharger with no limit set on discharges (DWQ 2004b). Both Barker's Creek and Parker's Creek have been assigned a Best Usage Classification of C, and neither appears on any section of the N.C. 2004 303d list (DWQ 2004c). Major non-point sources of pollution within the Yadkin Basin include runoff from construction activities, agriculture, timber harvesting, hydrologic modification, failing septic systems, roads, parking lots, and roof tops. Sedimentation and nutrient inputs are major problems associated with non-point source discharges (DWQ 2002).

The 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 Yadkin River Basin occurs approximately 24.5 miles to the northwest in an unnamed tributary to Snow Creek in sub-basin 03-07-02 (DWQ 2002) (WRC 1998).

3. Anticipated Impacts to Water Resources

Impacts to water resources in the project study area may result from activities associated with project construction. Activities that would result in impacts are clearing and grubbing on streambanks, riparian canopy removal, in-stream construction, fertilizers and pesticides used in revegetation, and pavement/culvert installation. The following impacts to surface water resources could result from the construction activities mentioned above.

- Increased sedimentation and siltation downstream of the crossing and increased erosion in the project study area.
- Alteration of stream discharge due to silt loading and changes in surface and groundwater drainage patterns.

- Changes in light incidence and water clarity due to increased sedimentation and vegetation removal.
- Changes in and destabilization of water temperature due to vegetation removal.
- Alteration of water levels and flows due to interruptions and/or additions to surface and ground water flow from construction.
- Increased nutrient loading during construction via runoff from exposed areas.
- Increased concentrations of toxic compounds in roadway runoff.
- Increased potential for release of toxic compounds such as fuel and oil from construction equipment and other vehicles.

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

Temporary construction impacts due to erosion and sedimentation will be minimized through implementation of a stringent erosion-control schedule and the use of Best Management Practices (BMPs). The contractor will follow contract specifications pertaining to erosion control measures as outlined in 23 CFR 650 Subpart B and Article 107-13 entitled Control of Erosion, Siltation, and Pollution (NCDOT, Specifications for Roads and Structures). These measures include the use of dikes, berms, silt basins, and other containment measures to control runoff; elimination of construction staging areas in floodplains and adjacent to waterways; re-seeding of herbaceous cover on disturbed sites; management of chemicals (herbicides, pesticides, de-icing compounds) with potential negative impacts on water quality; and avoidance of direct discharges into streams by catch basins and roadside vegetation.

4. Impacts Related to Bridge Demolition and Removal

The existing two-lane bridge has a timber deck on I-beams supported by timber caps, piles, and bulkheads. The structure is expected to be removed without dropping components into Muddy Creek.

C. BIOTIC RESOURCES

1. Plant Communities

Two distinct plant communities were identified within the project study area: disturbed/maintained land, and hardwood forest. Plant communities were delineated to determine the approximate area and location of each (Figure 7). These communities are described below in order of their dominance within the project study area.

a) Disturbed/maintained land

Approximately 7.9 acres (67 percent) of the project study area is encompassed by disturbed/maintained land. This community includes roadside shoulders, agricultural fields, utility line corridors, and residential lot. Along roadside shoulders and agricultural land margins,

grasses and herbs dominate the vegetation. Representative species include fescue (*Festuca* sp.), Carolina cranesbill (*Geranium carolinianum*), violets (*Viola* sp.), white clover (*Trifolium* repens), and wild onion (*Allium canadense*).

Along woodland edges and within the utility line corridors, the sapling layer is sparse and consists of scattered individuals of sweetgum (*Liquidambar styraciflua*), tulip poplar (*Liriodendron tulipifera*), and red maple (*Acer rubrum*). Vines include Japanese honeysuckle (*Lonicera japonica*), Virginia creeper (*Parthenocissus quinquefolia*), and kudzu (*Pueraria lobata*). Shrubs present include multiflora rose (*Rosa multiflora*) and bamboo (*Phyllostachys aurea*). Representative herbs consist of dandelion (*Taraxacum officinale*), vetch (*Vicia* sp.), and goldenrod (*Solidago* sp.).

A wet area dominated by vines and herbs is located within disturbed/maintained land just south of Mizpah Church Road approximately 450 feet east of Muddy Creek (Figure 7). This low, moist area supports hydrophytic species such as soft rush (*Juncus effusus*), jewelweed (*Impatiens capensis*), and bulrushes (*Scirpus* spp.).

b) Hardwood Forest

Approximately 3.2 acres (27 percent) of the project study area is encompassed by hardwood forest. This community occurs on floodplains, floodplain slopes, and uplands in the project study area. This community consists of a mature forest characterized by a closed canopy with a relatively open understory.

In the floodplain of Muddy Creek, this community supports a canopy of sycamore (*Platanus occidentalis*), white ash (*Fraxinus americana*), black walnut (*Juglans nigra*), and tulip poplar. Sapling and shrub layers include canopy species as well as box elder (*Acer negundo*), tag alder (*Alnus serrulata*), black cherry (*Prunus serotina*), ironwood (*Carpinus caroliniana*), bamboo, oriental bittersweet (*Celastrus orbiculatus*), and multiflora rose. Vines within this community are dominated by grapevine (*Vitis* sp.), Japanese honeysuckle and Virginia creeper. The herbaceous layer is vegetated by species such as smartweed (*Polygonum* sp.), jewelweed, common blue violets (*Viola sororia*), microstegium (*Microstegium vimineum*), Joe-pye weed (*Eupatorium fistulosum*), and green-headed coneflower (*Rudbeckia laciniata*).

Moving out of the floodplain onto the floodplain slopes and uplands, the canopy is made up of red maple, sweetgum, sycamore, black walnut, and tulip poplar. The subcanopy/shrub layers include saplings of canopy species, ironwood, and multiflora rosa. Vines within this community are dominated by common greenbriar (*Smilax rotundifolia*), Japanese honeysuckle, and Virginia creeper. Groundcover along uplands and floodplain slopes includes Christmas fern (*Polystichum achrostichoides*), poison ivy (*Toxicodendron radicans*), and mayapple (*Peltatum podophyllum*).

2. Wildlife

Wildlife directly observed in a plant community or determined to be present through evidence (tracks, scat, burrows, etc.) during field investigations are indicated with an asterisk (*). In addition, approximately 0.7 acre (6 percent) of the project study area is covered by the impermeable surface of Mizpah Church Road.

a) Disturbed/maintained land

Open areas within the project study area provide a specialized habitat for herbivore, seed-eater, and insectivore foraging, but little cover from predation. Wildlife which may occur within the open portion of the project study area include herbivores and seed-eaters such as mourning dove* (*Zenaida macroura*), American goldfinch (*Carduelis tristis*), hispid cotton rat (*Sigmodon hispidus*), and meadow vole (*Microtus pennsylvanicus*); insectivores such as American robin* (*Turdus migratorius*), chimney swift* (*Chaetura pelagica*), least shrew (*Cryptotis parva*), eastern mole (*Scalopus aquaticus*), six-lined racerunner (*Cnemidophorus sexlineatus*), southeastern five-lined skink (*Eumeces inexpectatus*), and northern cricket frog (*Acris crepitans*); omnivores such as eastern box turtle (*Terrapene carolina*); predators of small mammals, birds, and herptiles such as red-tailed hawk (*Buteo jamaicensis*) and black racer (*Coluber constrictor*); and scavengers such as American crow (*Corvus brachyrhynchos*).

These ecotones provide both shelter and foraging potential for a wide range of wildlife. Species typically present within adjacent open areas may utilize this area for food, cover, protection from predators, and nesting. Other wildlife species which may occur along shrubby areas and along forest/grassland ecotones include herbivores such as eastern cottontail (*Sylvilagus floridanus*), eastern chipmunk (*Tamias striatus*), and white-tailed deer (*Odocoileus virginianus*); insectivores such as red bat (*Lasiurus borealis*); omnivores such as northern mockingbird (*Mimus polyglottos*) and brown thrasher (*Toxostoma rufum*); and predators of small birds, mammals, and herptiles such as eastern garter snake (*Thamnophis sirtalis*).

b) Hardwood Forest

The stratification and abundance of food and cover within this community may result in a wide diversity of forest interior species. Wildlife which may be expected to occur within the hardwood forest include herbivores and seed-eaters such as indigo bunting* (*Passerina cyanea*), northern cardinal* (*Cardinalis cardinalis*), eastern chipmunk, golden mouse (*Ochrotomys nuttalli*), gray squirrel (*Sciurus carolinensis*), and white-tailed deer; insectivores such as red-eyed vireo* (*Vireo olivaceus*), Carolina wren* (*Thryothorus ludovicianus*), tufted titmouse* (*Baeolophus bicolor*), eastern phoebe* (*Sayornis phoebe*), blue-gray gnatcatcher* (*Polioptila caerulea*), song sparrow* (*Melospiza melodia*), wood thrush (*Hylocichla mustelina*), golden-crowned kinglet (*Regulus satrapa*), eastern fence lizard (*Sceloporus undulatus*), five-lined skink (*Eumeces fasciatus*), spring peeper (*Pseudacris crucifer*), American toad (*Bufo americanus*), and slimy salamander (*Plethodon glutinosus*), and gray treefrog (*Hyla versicolor*); omnivores such as raccoon (*Procyon lotor*) and eastern box turtle; and predators such as barred owl (*Strix varia*), southern ringneck snake (*Diadophis punctatus*), and copperhead (*Agkistrodon contortrix*).

Many of these wildlife species are adaptable and can eat a wide variety of plant and animal material when the preferred food is absent. Many of these species can be found within disturbed areas, brushy edges of the forest, within heavy underbrush, or amongst shrubby plants. Migration between communities of the project study area may be frequent based on the needs of each species for food, cover, protection from predators, and nesting.

3. Aquatic Communities

The project study area includes two perennial streams bounded by natural vegetation, and a small pond. These water resources are expected to provide diverse habitats (riffle-pool complexes, undercut banks, rock and organic debris, fallen logs, and overhanging branches) for fish, wildlife, and benthic populations. Limited investigations resulted in no observations of aquatic herptiles. Aquatic or semi-aquatic reptiles and amphibians expected to occur within the project study area vicinity include the insectivorous green frog (*Rana clamitans*) and two-lined salamander (*Eurycea bislineata*); and the omnivorous eastern musk turtle (*Sternotherus odoratus*).

No sampling was undertaken in Muddy Creek to determine fishery potential and no fish species were observed during the field survey, but the observance of belted kingfisher (*Megaceryle alcyon*), indicates the presence of fish in Muddy Creek. Fish that may be present in this reach of Muddy Creek include smaller fish species such as margined madtom (*Noturus insignis*), rosyside dace (*Clinostomus funduloides*), and spottail shiner (*Notropis hudsonius*).

4. Summary of Anticipated Impacts

Permanent and temporary impacts are anticipated as a result of this project. Permanent impacts are considered to be those impacts that occur within proposed cut-fill limits. Temporary impacts are considered to be those impacts, which occur within the cut-fill footprint associated with the temporary detour of Alternative 2, but outside the cut-fill footprint of the permanent impacts associated with Alternative 1. Plant communities within the project study area were delineated to determine the approximate area and location of each (Figure 7). A summary of plant community areas and the potential impacts to each is presented in Table 1.

Table 1. Plant Communities Within Cut/Fill Areas of Respective Alternatives

	Alternate 1	Alternate 2		
Plant Community	**Permanent**	**Permanent**	**Temporary**	**Total**
Maintained/Disturbed Land	0.97	0.97	0.3	1.27
Hardwood Forest	0.16	0.16	0.15	0.31
Total	1.13	1.13	0.45	1.58

Areas are given in acres.

Projected permanent impacts to natural plant communities resulting from bridge replacements are generally restricted to narrow strips adjacent to the existing bridge and roadway approach segments. Little area of natural plant community is expected to be permanently impacted by the proposed project. Temporary impacts present the greater amount of impact to natural communities, and although these impacts are considered to be short-term, re-growth of this community to pre-project stand age and ecological function will require several decades.

No significant habitat fragmentation is expected as a result of project activities since potential improvements will be restricted to adjoining roadside margins. Construction noise and associated disturbances are anticipated to have short-term impacts on avifauna and migratory wildlife movement patterns.

No Significant Aquatic Endangered Species Habitat exists within or near the project study area. Impacts associated with turbidity and suspended sediments resulting from bridge replacement will be minimized through stringent erosion control measures.

Potential downstream impacts to aquatic habitat are anticipated to be avoided by bridging the stream system to maintain regular flow and stream integrity. Short-term impacts associated with turbidity and suspended sediments may affect benthic populations. Temporary impacts to downstream habitat from increased sediment during construction will be minimized by the implementation of stringent erosion control measures.

D. SPECIAL TOPICS

1. Waters of the United States

Surface waters within the project study area are subject to jurisdictional consideration under Section 404 of the Clean Water Act as waters of the United States (33 CFR Section 328.3). The National Wetlands Inventory (NWI) system for classification of wetlands and deepwater habitats was used to determine the type of each jurisdictional area present (Cowardin *et al.* 1979). Section 404 jurisdictional areas are depicted by Figure 7.

Muddy Creek exhibits characteristics of a well-defined, third-order, perennial stream with moderate flow over a cobble, gravel, and sand substrate (containing some silt). This stream contains several point bars composed of sand and gravel and vegetated by species such as jewelweed. Muddy Creek can be classified as riverine, upper perennial with an unconsolidated bottom composed primarily of gravel and sand (R3UB1) (Figure 7, Muddy Creek). The UT can be classified as a well-defined, first-order, riverine, lower perennial stream with an unconsolidated bottom composed primarily of sand and silt (R2UB2) (Figure 7, UT). The small pond occupies approximately 0.3 acre within the project study area and may be classified as palustrine, with an unconsolidated shore composed primarily of silt and clay; and lying within a basin excavated by man (PUS3x) (Figure 7, Pond).

Vegetated wetlands are defined by the presence of three primary criteria: hydric soils, hydrophytic vegetation, and evidence of hydrology at or near the surface for a portion (12.5 percent) of the growing season (DOA 1987). The project study area contains one vegetated wetland area (Figure 7, Wetland) located just south of Mizpah Church Road approximately 450 feet east of Muddy Creek. This low, moist area supports hydrophytic species such as soft rush, jewelweed, and bulrush (*Scirpus* sp.). This area may be defined as a palustrine, shrub-scrub, broad leaved deciduous, seasonally flooded wetland (PSS1C). Soils exhibit hydric chromas, while hydrology indicators are inundation, surface flow, and oxidized rhizospheres. The surrounding area is in an early stage of succession following clearcut logging, and is dominated by kudzu. This system would be considered a "riverine" wetland by DWQ, based upon its location within the floodplain of the UT.

Both alternates contain an identical replacement in-place component, while Alternate 2 also contains a temporary on-site detour component. No permanent or temporary impacts are expected to affect the wetland area, the UT, or the small pond. However, bridge supports may be installed into Muddy Creek.

The existing bridge is to be removed without dropping components into Muddy Creek. Therefore, no potential fill into waters of the United States is anticipated. NCDOT will coordinate with various resource agencies during project planning to ensure that all concerns regarding bridge demolition are resolved.

2. Permits

Impacts to vegetated wetlands are not anticipated as a result of the proposed project. However, bridge supports may be installed into Muddy Creek. Therefore, construction activities may require permits and certifications from various regulatory agencies in charge of protecting water quality and public water resources.

This project has been processed as a Categorical Exclusion (CE) under Federal Highway Administration (FHWA) guidelines. The USACE has made available Nationwide Permit (NWP) 23 (67 FR 2020, 2082; January 15, 2002) for CEs due to minimal impacts to waters of the U.S. expected with bridge construction. DWQ has made available a General 401 Water Quality Certification for NWP 23 (GC 3403). If temporary structures are necessary for construction activities, access fills, or dewatering of the site, then a NWP 33 (67 FR 2020, 2087; January 15, 2002) permit and the associated General 401 Water Quality Certification (GC 3366) will be required. Impacts to vegetated wetlands may be authorized under NWP 3 (67 FR 2020, 2078) and the associated General 401 Water Quality Certification (GC 3376). In the event that NWPs 23, 33, and 3 will not suffice, impacts attributed to bridge replacement and associated approach improvements may qualify under General Bridge Permit (GP) 031 issued by the Wilmington USACE District. DWQ has made available a General 401 Water Quality Certification for GP 031 (GC 3404). Notification to the Wilmington USACE District office is required if this general permit is utilized.

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 waters of the United States, and specifically wetlands. Mitigation of wetland impacts has been defined by the CEQ to include: avoiding impacts (to wetlands), 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 examines all appropriate and practicable possibilities of averting impacts to waters of the United States. According to a 1990 Memorandum of Agreement (MOA) between the Environmental Protection Agency (EPA) and the USACE, 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.

Minimization includes the examination of appropriate and practicable steps to reduce the adverse impacts to waters of the United States. Implementation of these steps will be required through project modifications and permit conditions. Minimization typically focuses on decreasing the footprint of the proposed project through the reduction of median widths, right-of-way widths, fill slopes, and/or road shoulder widths. All efforts will be made to decrease impacts to surface waters.

Compensatory mitigation is not normally considered until anticipated impacts to waters of the United States have been avoided and minimized to the maximum extent possible. It is recognized that "no net loss of wetlands" functions and values may not be achieved in each and every permit action. In accordance with 15A NCAC 2H .0506(h), DWQ may require compensatory mitigation for projects with greater than or equal to 1.0 acre of impacts to jurisdictional wetlands or greater than or equal to 150 linear feet of total perennial stream impacts. Furthermore, in accordance with 67 FR 2020, 2092 (January 15, 2002), the USACE requires compensatory mitigation when necessary to ensure that adverse effects to the aquatic environment are minimal. The size and type of the proposed project impact and the function and value of the impacted aquatic resource are factors considered in determining acceptability of appropriate and practicable compensatory mitigation. Appropriate and practicable compensatory mitigation is required for unavoidable adverse impacts which remain after all appropriate and practicable minimization has been required. Compensatory actions often include restoration, preservation and enhancement, and creation of waters of the United States. Such actions should be undertaken first in areas adjacent to or contiguous to the discharge site.

Mitigation for Section 404 jurisdictional areas may not need to be proposed for this project due to the potentially limited nature of the project impacts. However, utilization of BMPs is recommended in an effort to minimize impacts. Temporary impacts to floodplains associated with construction activities could be mitigated by replanting disturbed areas with native riparian species and removal of temporary fill material upon project completion. A final determination regarding mitigation rests with the USACE and DWQ.

E. Rare and Protected Species

1. Federally Protected Species

Species with the federal classification of Endangered, Threatened, or officially Proposed for such listing are protected under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The term "Endangered Species" is defined as "any species which is in danger of extinction throughout all or a significant portion of its range," and the term "Threatened Species" is defined as "any species which is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C. 1532).

Three federally protected species are listed for Forsyth County (February 18, 2003 FWS list): red-cockaded woodpecker (*Picoides borealis*), small-anthered bittercress (*Cardamine micranthera*), and bog turtle (*Clemmys muhlenbergii*). The red-cockaded woodpecker and small-anthered bittercress are Endangered, while the bog turtle is Threatened due to Similarity of Appearance. NHP files list no documentation of Endangered, Threatened, or Proposed species within 2.0 miles of the project study area (NHP file review conducted April 17, 2004).

Picoides borealis (Red-cockaded woodpecker)
Endangered
Family: Picidae
Date Listed: October 13, 1970

This small woodpecker (7 to 8.5 inches long) has a black head, prominent white cheek patches, and a black-and-white barred back. Males often have red markings (cockades) behind the eye, but the cockades may be absent or difficult to see (Potter *et al.* 1980). Primary habitat consists of mature to over-mature southern pine forests dominated by loblolly (*Pinus taeda*), long-leaf (*P. palustris*), slash (*P. elliottii*), and pond (*P. serotina*) pines (Thompson and Baker 1971). Nest cavities are constructed in the heartwood of living pines, generally older than 60 years that have been infected with red-heart disease. Nest cavity trees tend to occur in clusters, which are referred to as clusters. The woodpecker drills holes into the bark around the cavity entrance, resulting in a shiny, resinous buildup around the entrance that allows for easy detection of active nest trees. Primary nest sites for red-cockaded woodpeckers include open pine stands greater than 60 years of age with little or no mid-story development. Foraging habitat is comprised of open pine or pine/mixed hardwood stands 30 years of age or older (Henry 1989). Pine flatwoods or pine-dominated savannas which have been maintained by frequent natural or prescribed fires serve as ideal nesting and foraging sites for this woodpecker. Development of a thick understory may result in abandonment of cavity trees.

BIOLOGICAL CONCLUSION: NO EFFECT

The project study area does not provide suitable habitat for red-cockaded woodpecker, and no individuals were observed during the site visit. Based on habitat requirements, NHP documentation, and professional judgment, this project will not affect red-cockaded woodpecker.

***Cardamine micranthera* (Small-anthered bittercress)**
Endangered
Family: Brassicaceae
Date Listed: September 21, 1989

Small-anthered bittercress is a low, erect, biennial or perennial herb with simple, slender stems. The plant has crenate, lobed basal leaves 0.3 to 0.7 inch in length, and unlobed, crenate stem leaves that are slightly shorter. It flowers in bracteate racemes with small flowers having white petals to 0.1 inch long. Blooming season is April through May. Typical habitat is stream banks and low, moist woods (Murdock 1991).

BIOLOGICAL CONCLUSION: NO EFFECT

Suitable habitat for small-anthered bittercress exists in the project study area. This habitat occurs along the banks of Muddy Creek and along the smaller tributary stream within the project study area. However, a systematic, plant-by-plant survey conducted on May 19, 2004 failed to identify any individuals of small-anthered bittercress. In addition, there are no known populations within one mile of the project area. Therefore, this project will not affect this species.

Clemmys muhlenbergii **(Bog turtle)**
Threatened due to similarity of appearance
Family: Emydidae
Date Listed: May 1, 1997

The bog turtle is a small turtle reaching an adult size of approximately 3 to 4 inches. This otherwise darkly colored species is readily identifiable by the presence of a bright orange or yellow blotch on the sides of the head and neck (Martof *et al.* 1980). 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 in the January 29, 1997 Federal Register (62 FR 4229) to list bog turtle as threatened within the northern portion of its range, and within the southern portion of its range, which includes North Carolina. The bog turtle was proposed for listing as threatened due to similarity of appearance (T S/A) to the northern population. The listing would allow incidental take of bog turtles in the southern population resulting from otherwise lawful activity. 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.

Suitable habitat does not exist within the project study area, no individuals were observed, and NHP files list no documentation for bog turtle within 2.0 miles of the project study area. The bog turtle is listed as T(S/A) due to its similarity of appearance to another rare species listed for protection. T (S/A) species are not subject to Section 7 consultation and **a biological conclusion for this species is not required.**

2. Federal Species of Concern

The February 18, 2003 FWS list also includes a category of species designated as "Federal Species of Concern" (FSC). A species with this designation is one that may or may not be listed in the future (formerly C2 candidate species or species under consideration for listing for which there is insufficient information to support listing). The FSC designation provides no federal protection under the ESA for the species listed. NHP files list no documentation for FSC species within 2.0 miles of the project study area.

3. State-Protected Species

One FSC species is listed for Forsyth County: the brook floater (*Alasmidonta varicosa*), which has a state status of Endangered. Brook floater habitat includes rapids or riffles on rock and gravel substrates in small streams. While the reach of Muddy Creek within the project study area does provide suitable habitat for brook floater, the UT does not.

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 that for federally funded, licensed, or permitted projects having an effect on properties listed in or eligible for the National Register of Historic Places, the Advisory Council on Historic Preservation be given the opportunity to comment.

B. Historic Architecture

In a memorandum dated: March 10, 2004, the State Historic Preservation Office (HPO) stated that they were aware of no historic resources that would be affected by the project. However, in a letter dated: March 24, 2004, the historic preservation planner from Forsyth County identified two historic properties within the vicinity of the project. NCDOT architectural historians were notified and a survey was conducted on December 10, 2004 that confirmed that neither of the two houses were eligible for the National Register, nor were they locally designated as historic sites. A concurrence form was signed on April 5, 2005. Therefore, there are no eligible properties within the Area of Potential Effect (APE). Copies of all correspondence are included in the Appendix.

C. Archaeology

A memorandum from the HPO dated March 10, 2004 states that they are aware of no historic resources that would be affected by the project. Accordingly, NCDOT archaeologist did not initiate a survey for the project. A copy of the memorandum is included in the Appendix.

VII. ENVIRONMENTAL EFFECTS

The project is expected to have an overall positive impact by replacing a potentially unsafe bridge.

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

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

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

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.

There is the potential one residential relocation will be required as a result of the proposed project. However, efforts should be made (through design exceptions) during design to eliminate the need for this residential relocation. No business relocatees are anticipated.

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

The proposed project is excluded from the Farmland Protection Policy Act (FPPA) since the project is located within the urban area of Winston-Salem (7 CFR Part 658).

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

The 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. 40 CFR Part 51 is not applicable because the proposed project is located in an attainment area. If vegetation or wood debris is disposed of by 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. The bridge replacement project will not increase or decrease traffic volumes. The noise levels will increase during the construction period, but will only be temporary. This evaluation completes the assessment requirements for highway traffic noise of Title 23, Code of Federal Regulations (CFR), Part 772 and for air quality (1990 Clean Air Act Amendments and the National Environmental Policy Act) and no additional reports are required.

The results from a pre-scoping geotechnical and geoenvironmental investigation performed by the NCDOT Geotechnical Engineering Unit showed that no underground storage tank sites or hazardous waste sites or apparent landfills were identified within the project limits. The geotechnical pre-scoping report is included in the appendix.

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

VIII. PUBLIC INVOLVEMENT

A "start of study" letter was distributed to local officials and agencies requesting information and concerns relative to the proposed study alternates. Their responses are included in the Appendix.

Due to the isolated nature of this bridge replacement project, no formal public involvement program was initiated.

IX. AGENCY COORDINATION

Letters requesting comments and environmental input were sent to the following agencies:

Federal Highway Administration
US Army Corps of Engineers- Wilmington District
US Fish and Wildlife Service*
State Clearinghouse
NC Department of Cultural Resources*
NC Wildlife Resources Commission*
NC Division of Water Quality*
County Manager, Forsyth County
Chairman, Forsyth County Commissioners
Director, Winston-Salem/Forsyth County City-County Planning Board*
Department of Transportation, City of Winston-Salem*
Transportation Planner, Winston-Salem MPO
Superintendent, Winston-Salem/Forsyth County Public Schools*
Forsyth County Emergency Management Services
Sheriff, Forsyth County

Asterisks (*) indicate agencies from which written/oral comments were received. Scoping comments and corresponding responses are given below. Copies of the comments received are in the Appendix.

United States Department of Interior – Fish and Wildlife Service

Comment: "...we recommend conducting habitat assessments and surveying any suitable habitat in the project areas for these species [listed on the *Federal List of Endangered and Threatened Wildlife and Plants* or Federal Species of Concern] prior to any further planning or on-the-ground activities to ensure that no adverse impacts occur".

Response: A survey of the project area concluded this project will not adversely affect any threatened or endangered species or any federal species of concern.

Comment: "[Fish and Wildlife Service – Asheville Field Office officials] recommend spanning structures, preferably bridges, in all cases".

Response: Bridge No. 30 will be replaced with a new bridge approximately 110 feet long with a maximum clear roadway width of 30 feet. The number of spans will be determined during final design.

Comment: "...off-site detours, which would reduce stream-bank disturbance, are preferable to temporary on-site crossings".

Response: Alternate 1, replacing Bridge No. 30 at its existing location by closing SR 1631 and maintaining traffic with an off-site detour, is the preferred alternate.

North Carolina Wildlife Resources Commission

Comment: "Impacts to aquatic and terrestrial resources should be minimized. Standard requirements and BMP's should apply".

Response: In order to minimize impacts to water resources, NCDOT BMP's for the Protection of Surface Waters will be strictly enforced during the entire life of the project.

Forsyth County and Winston-Salem City-County Planning Board

Comment: "Any work in the [project] area should be done in a manner to preserve [local historic resources]".

Response: During final design, the approach on the eastern end of the bridge should be limited in order to prevent any right of way acquisition of the locally historic property located southeast of Bridge No. 30.

Comment: "Given the environmental obstacles, the surrounding historic properties, and the small amount of traffic using the road, the 'replace at existing location maintaining traffic with a temporary structure and detour on the north side' should be eliminated from consideration as an alternative".

Response: Alternate 1, replacing Bridge No. 30 at its existing location by closing SR 1631 and maintaining traffic with an off-site detour, is the preferred alternate.

Comment: "...City-County Planning Board staff would request that the work needed to either repair or replace the bridge be completed in a timely manner and that any off-site detours that are needed be used for the absolute minimum amount possible".

Response: Construction time will be limited to a reasonable amount of time.

Winston-Salem Department of Transportation

Comment: "Input from [the county school transportation director, sheriff's department, county fire department, and emergency medical services] should be considered prior to construction".

Response: These agencies will be notified prior to closure of SR 1631.

Winston-Salem/Forsyth County Schools

Comment (dated 3/12/04): "We have several buses that use [SR 1631] daily and would appreciate it if provisions could be made during this project to allow an on-site detour rather than disrupting our traffic pattern".

Response: Alternate 1, replacing Bridge No. 30 at its existing location by closing SR 1631 and maintaining traffic with an off-site detour, is the preferred alternate. The Winston-Salem/Forsyth County Schools Transportation Director will be notified prior to construction.

Comment (dated 3/24/03): "A few buses cannot be rerouted without utilizing a complete detour to service homes on both sides of the closure. This will require a designated turn around on both sides of the bridge, large enough to accommodate a school bus".

Response: The request for designated school bus turn arounds has been included in this document.

REFERENCES

Amoroso, J.L. 2004. Natural Heritage Program List of the Rare Plant Species of North Carolina. North Carolina Natural Heritage Program, Division of Parks and Recreation, N.C. Department of Environment, Health and Natural Resources, Raleigh.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS -79/31. Fish and Wildlife Service, U.S. Department of the Interior, Washington, DC. 103 pp.

Department of the Army (DOA). 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. US Army Engineer Waterways Experiment Station, Vicksburg, MS. 100 pp.

Division of Environmental Management (DEM). 1996. A Field Guide to North Carolina Wetlands. North Carolina Department of Environment, Health, and Natural Resources, Raleigh.

Division of Water Quality (DWQ). 2002. Yadkin River Basinwide Water Quality Plan. North Carolina Department of Environment and Natural Resources, Raleigh.

Division of Water Quality (DWQ). 2004a. Basinwide Information Management System (BIMS) (http://h2o.enr.state.nc.us/bims/Reports/reportsWB.html). North Carolina Department of Environment, Health and Natural Resources, Raleigh.

Division of Water Quality (DWQ). 2004b. List of Active Permits (online). Available: http://h2o.enr.state.nc.us/NPDES/documents/BIMS_031604.xls [April 8, 2004]. North Carolina Department of Environment and Natural Resources, Raleigh.

Division of Water Quality (DWQ). 2004c. Water Quality Assessment and Impaired Waters List -Draft (online). Available: http://h2o.enr.state.nc.us/tmdl/General_303d.htm [April 28, 2004] North Carolina Department of Environment and Natural Resources, Raleigh.

Griffith, G.E., J.M. Omernik, J.A. Comstock, M.P. Schafale, W.H. McNab, D.R. Lenat, T.F. MacPherson, J.B. Glover, and V.B. Shelbourne. 2002. Ecoregions of North Carolina and South Carolina (color poster with map, descriptive text, summary table, and photographs). U.S. Geological Survey, Reston, Virginia.

Henry, V.G. 1989. Guidelines for Preparation of Biological Assessments and Evaluations for the Red-cockaded Woodpecker. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region, Atlanta, GA. 13 pp.

Kartesz, J. 1998. A Synonymized Checklist of the Vascular Flora of the United States, Puerto Rico, and the Virgin Islands. Biota of North America Program.

LeGrand, H.E. and S.P. Hall. 2001. Natural Heritage Program List of the Rare Animal Species of North Carolina. North Carolina Natural Heritage Program, Division of Parks and Recreation, N.C. Department of Environment, Health, and Natural Resources, Raleigh.

Martof, B.S., W.M. Palmer, J.R. Bailey, and J.R. Harrison III. 1980. Amphibians and Reptiles of the Carolinas and Virginia. The University of North Carolina Press, Chapel Hill, N.C. 264 pp.

Menhinick, E.F. 1991. The Freshwater Fishes of North Carolina. North Carolina Wildlife Resources Commission, Raleigh. 227 pp.

Murdock, N. and A. Weakley. 1991. Recovery Plan for Small-anthered Bittercress (*Cardamine micranthera* Rollins). U.S. Fish and Wildlife Service, Southeastern Region.

Natural Resources Conservation Service (NRCS). 1997. U.S. Department of Agriculture. Hydric Soils, Forsyth County, N.C. Technical Guide, Section II-A-2.

Palmer, W.M. and A.L. Braswell. 1995. Reptiles of North Carolina. The University of North Carolina Press, Chapel Hill, N.C. 412 pp.

Potter, E.F., J.F. Parnell, and R.P. Teulings. 1980. Birds of the Carolinas. The University of North Carolina Press, Chapel Hill, N.C. 408 pp.

Radford, A.E., H.E. Ahles, and C.R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. The University of North Carolina Press, Chapel Hill, N.C. 1183 pp.

Rohde, F.C., R.G. Arndt, D.G. Lindquist, and J.F. Parnell. 1994. Freshwater Fishes of the Carolinas, Virginia, Maryland, and Delaware. The University of North Carolina Press, Chapel Hill, N.C. 222 pp.

Schafale, M.P. and A.S. Weakley. 1990. Classification of the Natural Communities of North Carolina: Third Approximation. Natural Heritage Program, Division of Parks and Recreation, N.C. Department of Environment, Health, and Natural Resources. Raleigh. 325 pp.

Seaber, P.R., F.P. Kapinos, and G.L. Knapp. 1987. Hydrologic Unit Maps: U.S. Geological Survey Water-Supply Paper 2294, 63 pp (online). Available: http://www.water.usgs.gov/GIS/huc_name.txt [March 29, 2004]. U.S. Geological Survey.

Soil Conservation Service (SCS). 1976. Soil Survey of Forsyth County, North Carolina, USDA National Cooperative Soil Survey.

Thompson, R.L. and W.W. Baker. 1971. A survey of red-cockaded woodpeckers nesting habitat requirements. R.L. Thompson ed., The Ecology and Management of the Red-cockaded Woodpecker. Tall Timbers Research Station, Tallahassee, FL.

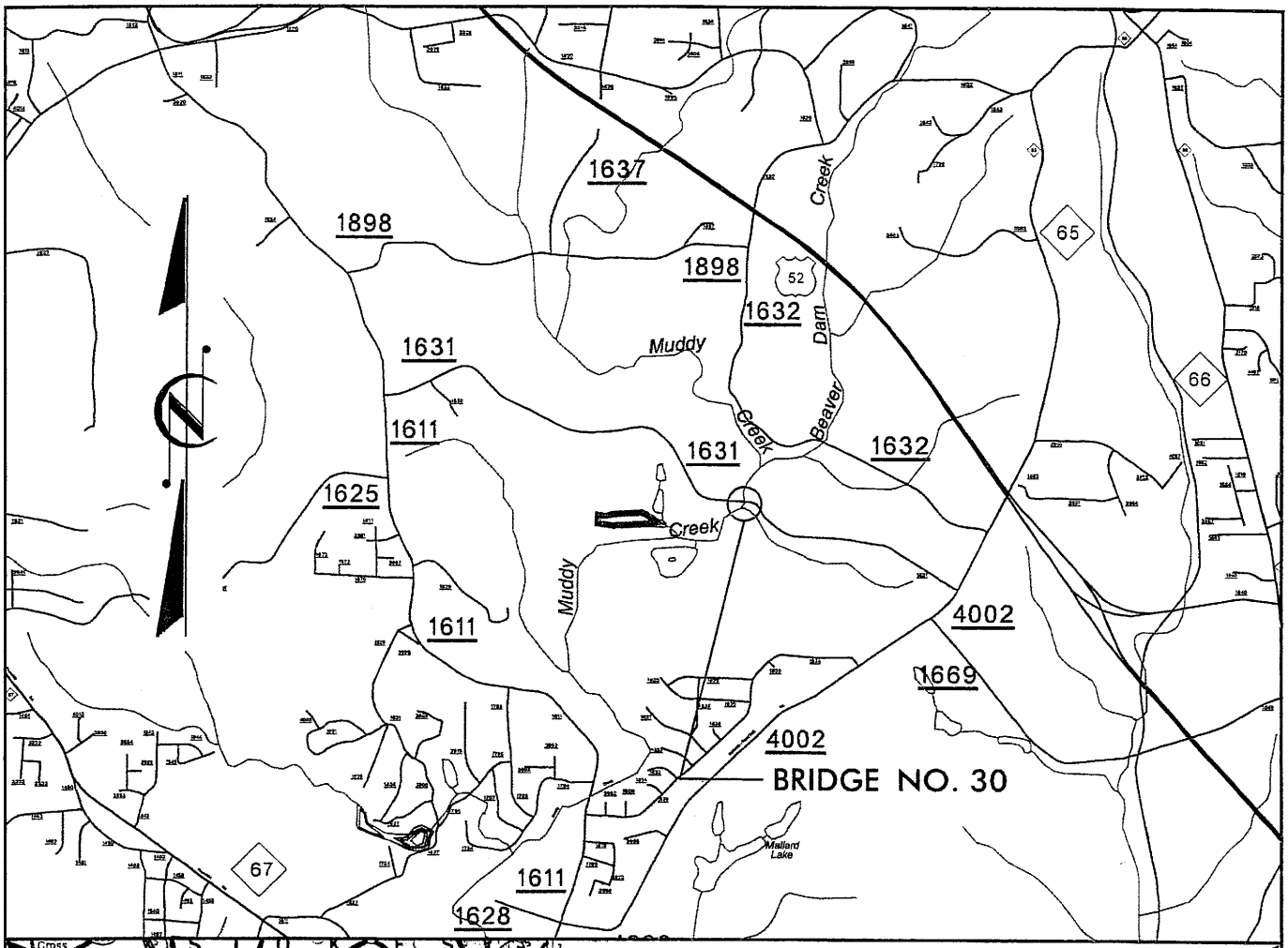
U.S. Fish and Wildlife Service. 2002. National Wetlands Inventory (NWI) (online). Available: http://www.nwi.fws.gov [March 29, 2004]. U.S. Fish and Wildlife Service.

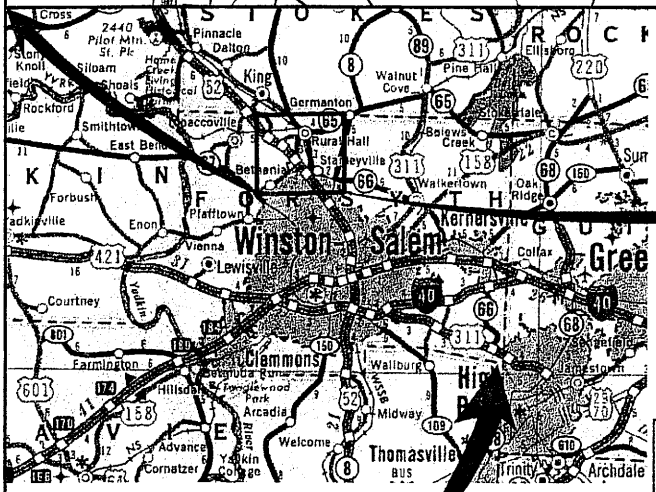
U.S. Fish and Wildlife Service. 2003. Forsyth County Endangered Species, Threatened Species, and Federal Species of Concern (online). Available: http://nc-es.fws.gov/es/cntylist/Forsyth.html [March 29, 2004]. U.S. Fish and Wildlife Service.

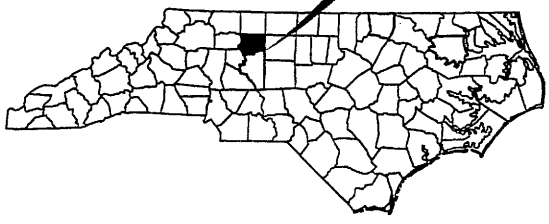
Webster, W.D., J.F. Parnell, and W.C. Biggs, Jr. 1985. Mammals of the Carolinas, Virginia, and Maryland. The University of North Carolina Press, Chapel Hill, N.C.. 255 pp.

Wildlife Resources Commission (WRC). 1998. Significant Aquatic Endangered Species Habitats. North Carolina Department of Environment and Natural Resources, Raleigh.

Figures







NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

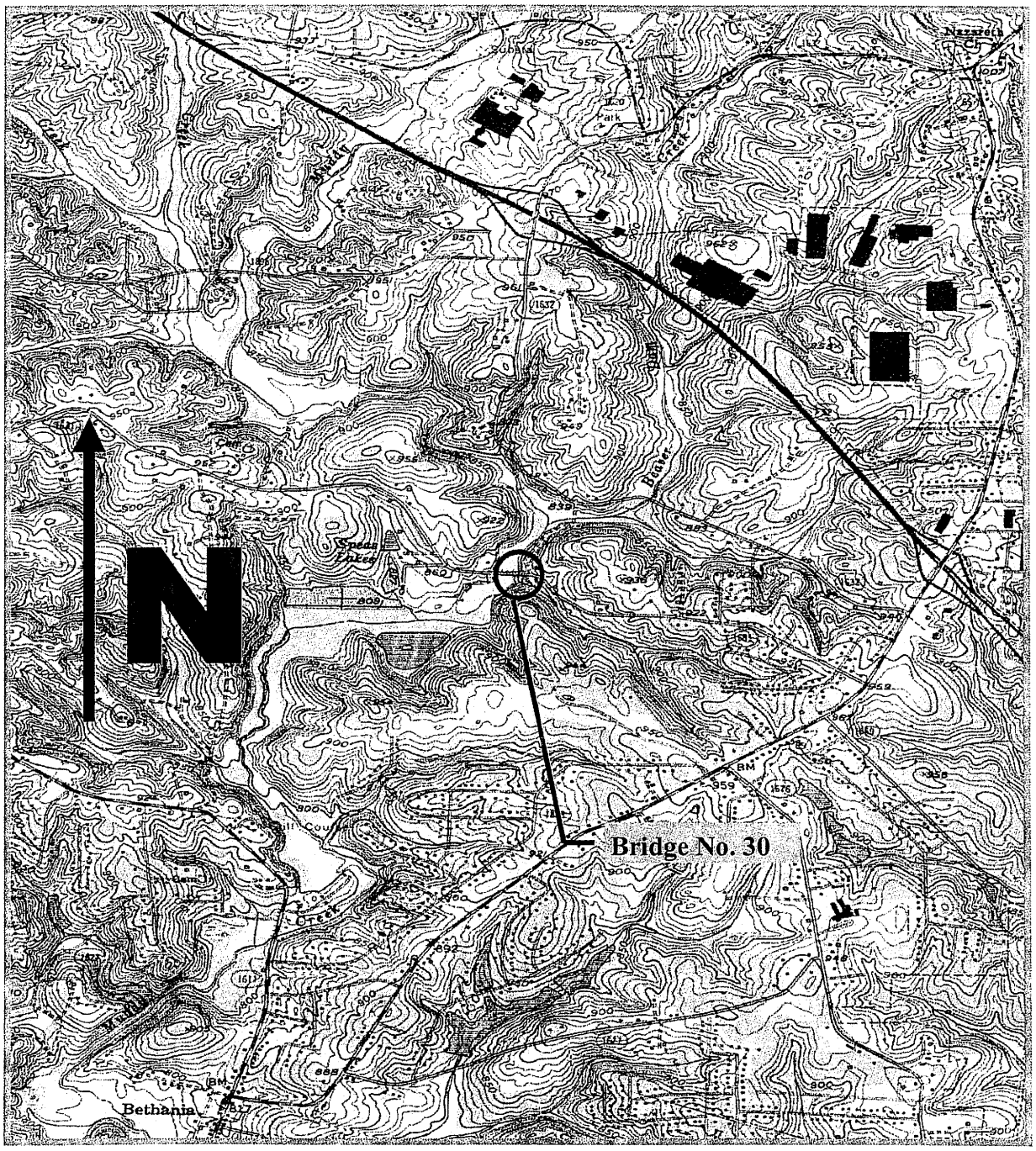
Project Development and Environmental Analysis Branch

BRIDGE NO. 30
SR 1631 OVER MUDDY CREEK
FORSYTH COUNTY
B-4112

VICINITY MAP

0 0.5
GRAPHIC SCALE (MILES)

FIGURE 1A

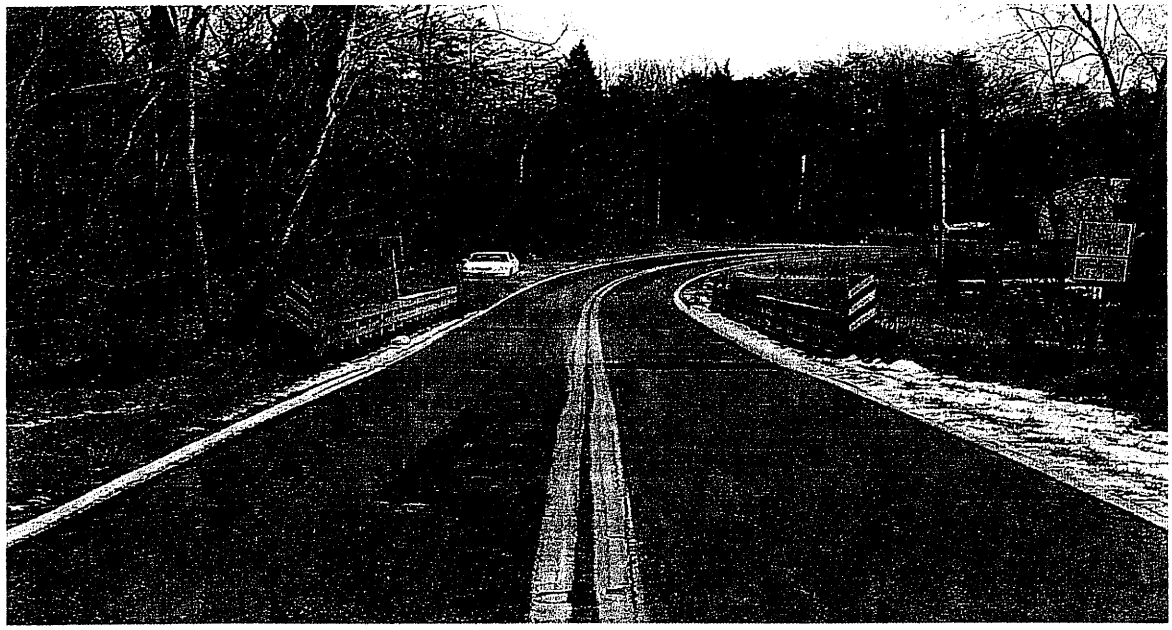


North Carolina Department of Transportation
Project Development and Environmental Analysis Branch

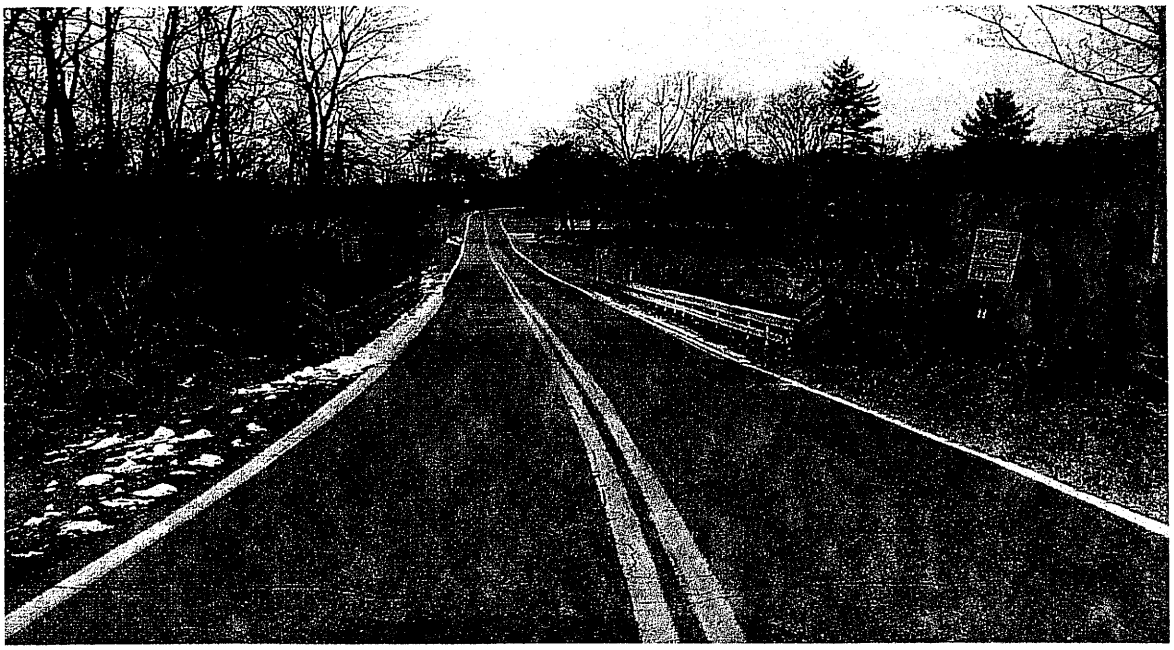
T.I.P. B-4112
Bridge No. 30 Over Muddy Creek
On SR 1631—Forsyth County, N.C.

Quad. Map: Rural Hall

FIGURE 1B



LOOKING EAST ACROSS BRIDGE



LOOKING WEST ACROSS BRIDGE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS BRANCH

BRIDGE NO. 30

ON SR 1631 OVER MUDDY CREEK
FORSYTH COUNTY
B-4112

FIGURE 2A

STRUCTURE PROFILE, LOOKING NORTH & UPSTREAM

STRUCTURE PROFILE, LOOKING SOUTH & DOWNSTREAM

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS BRANCH

BRIDGE NO. 30

ON SR 1631 OVER MUDDY CREEK
FORSYTH COUNTY
B-4112

FIGURE 2B

PROPOSED DESIGN CRITERIA

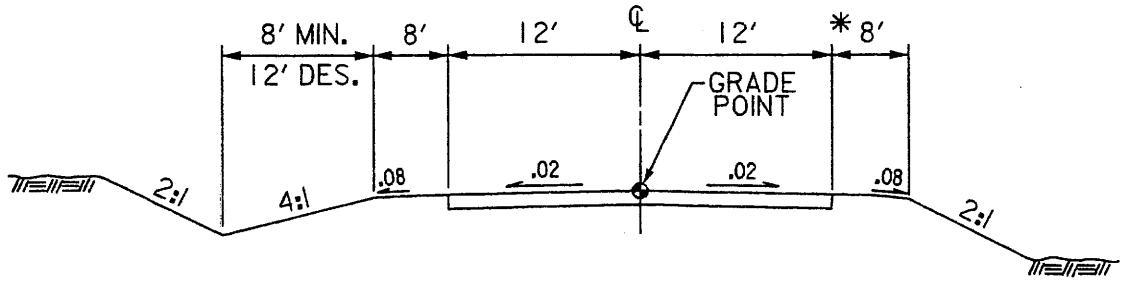
FIGURE 3 A

REPLACE BRIDGE NO. 30 ON SR 1631
OVER MUDDY CREEK
FORSYTH COUNTY
B-4112

FUNCTIONAL CLASSIFICATION: RURAL LOCAL
POSTED SPEED: 45 MPH
ESTIMATED ADT:

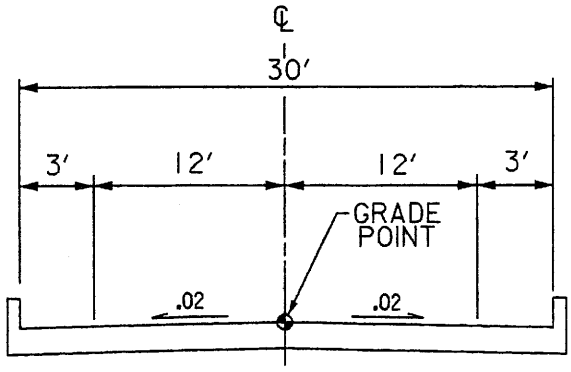
2005 ADT	=	1,500
2025 ADT	=	2,400
TTST	=	1%
DUAL	=	2%
DHV	=	10%
DIR	=	65%

DESIGN SPEED: 50 MPH
MAXIMUM RATE OF SUPERELEVATION: 0.06 ft/ft
MAXIMUM DEGREE OF CURVE: 6°50'
MAXIMUM GRADE: 8%
MINIMUM DESIRABLE K FACTORS: Ksag = 96 Kcrest = 84
SHOULDER WIDTH & TYPE : 8.0 ft TURF TOTAL (11.0ft WITH GUARDRAIL)
LANE WIDTHS: 12.0 ft
BRIDGE DECK WIDTH: 30.0ft CLEAR
BRIDGE LENGTH: 110.0 ft



*11' WITH GUARDRAIL

APPROACH ROADWAY TYPICAL SECTION



BRIDGE TYPICAL SECTION

NOTE:
HORIZONTAL & VERTICAL DESIGN EXCEPTIONS MAY BE REQUIRED.

PREPARED BY: KO & ASSOC. DATE: 02-04-04
APPROVED BY: _____ DATE: _____

FIGURE 3 B

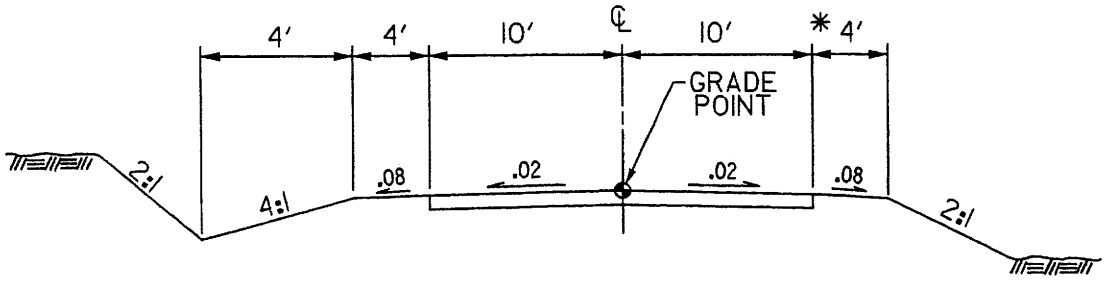
PROPOSED DETOUR CRITERIA

REPLACE BRIDGE NO. 30 ON SR 1631
OVER MUDDY CREEK
FORSYTH COUNTY
B-4112

FUNCTIONAL CLASSIFICATION: RURAL LOCAL
POSTED SPEED: 45 MPH
ESTIMATED ADT:

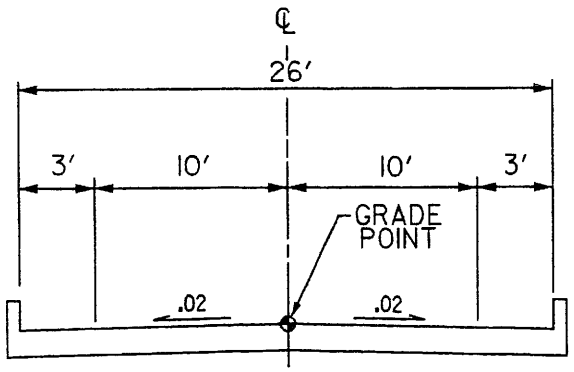
2005 ADT	=	1,500
2025 ADT	=	2,400
TTST	=	1%
DUAL	=	2%
DHV	=	10%
DIR	=	65%

DESIGN SPEED: 35 MPH
MAXIMUM RATE OF SUPERELEVATION: 0.06 ft/ft
MAXIMUM DEGREE OF CURVE: 16°20'
MAXIMUM GRADE: 12%
MINIMUM DESIRABLE K FACTORS: Ksag = 49 Kcrest = 29
SHOULDER WIDTH & TYPE : 4.0 ft TOTAL (7.0ft WITH GUARDRAIL)
LANE WIDTHS: 10.0 ft
BRIDGE DECK WIDTH: 26.0ft CLEAR
BRIDGE LENGTH: 120.0 ft



* 7' WITH GUARDRAIL

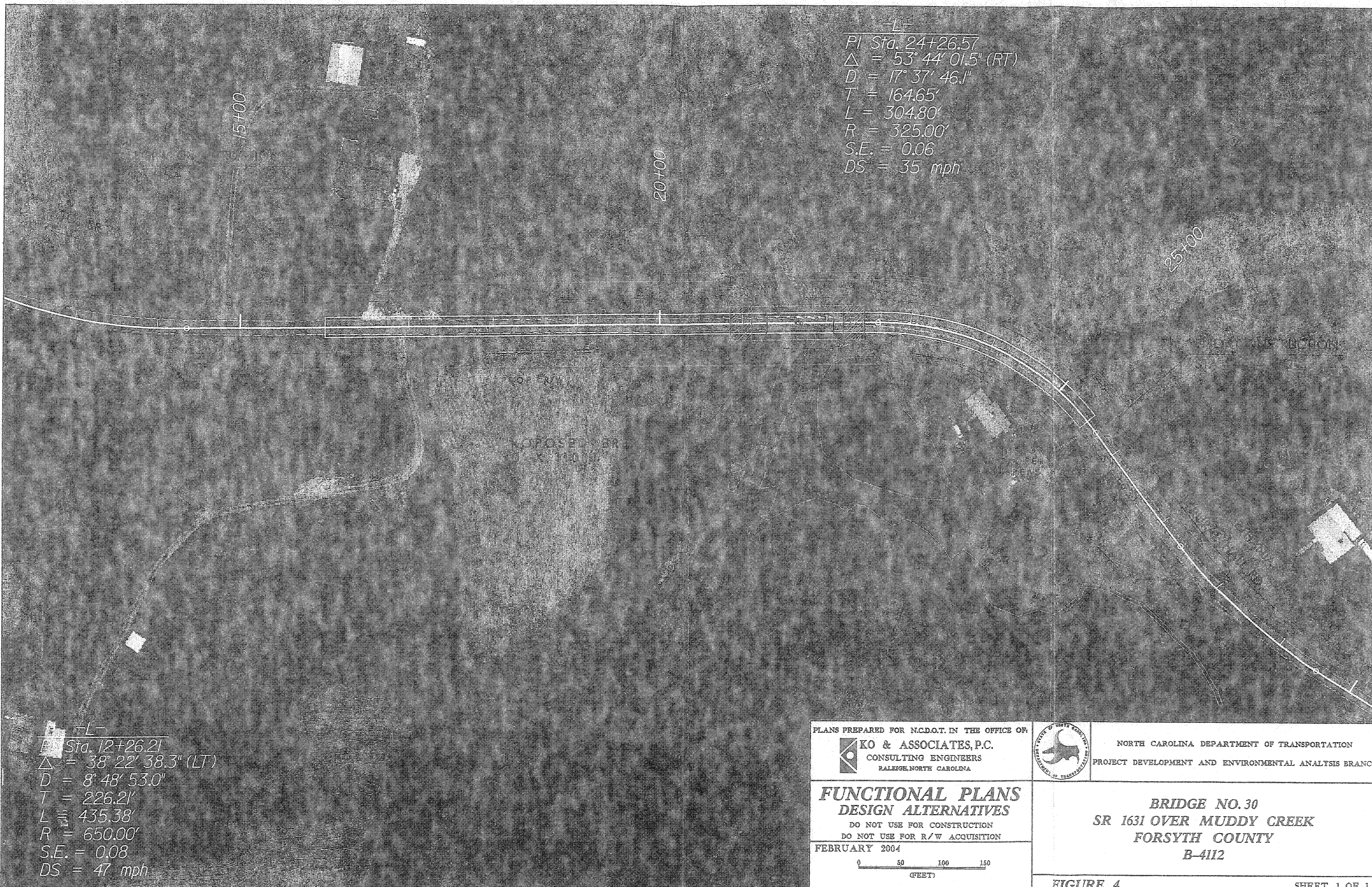
DETOUR APPROACH ROADWAY TYPICAL SECTION



DETOUR BRIDGE TYPICAL SECTION

NOTE:
A VERTICAL DESIGN EXCEPTION MAY BE REQUIRED.

PREPARED BY: KO & ASSOC. DATE: 02-04-04
APPROVED BY: _____ DATE: _____



PLANS PREPARED FOR N.C.D.O.T. IN THE OFFICE OF:

KO & ASSOCIATES, P.C.
CONSULTING ENGINEERS
RALEIGH, NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS BRANCH

FUNCTIONAL PLANS
DESIGN ALTERNATIVES
DO NOT USE FOR CONSTRUCTION
DO NOT USE FOR R/W ACQUISITION

FEBRUARY 2004

0 50 100 150
(FEET)

BRIDGE NO. 30
SR 1631 OVER MUDDY CREEK
FORSYTH COUNTY
B-4112

FIGURE 4

SHEET 1 OF 1

PLANS PREPARED FOR N.C.D.O.T. IN THE OFFICE OF:

KO & ASSOCIATES, P.C.
CONSULTING ENGINEERS
RALEIGH, NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS BRANCH

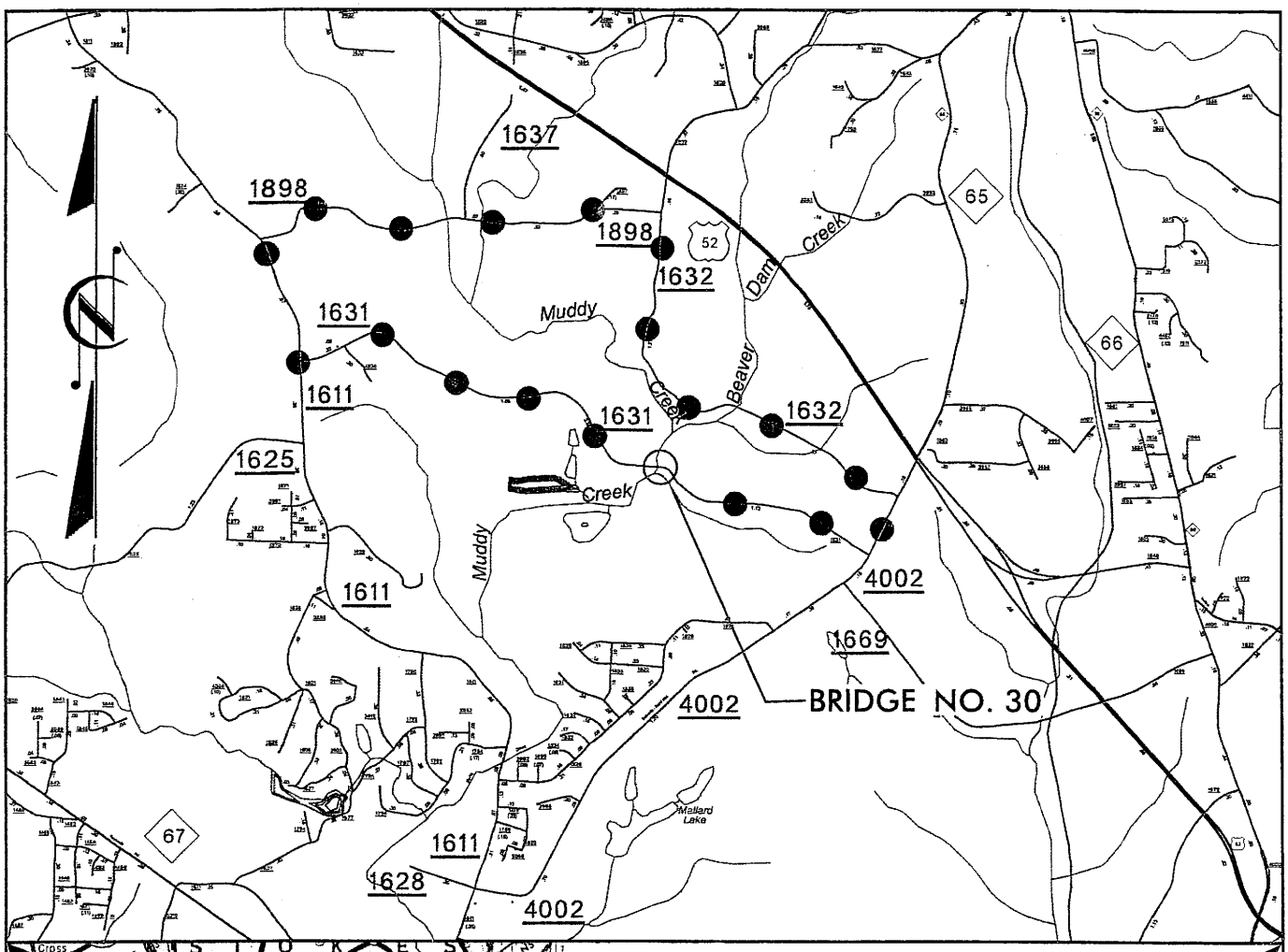
FUNCTIONAL PLANS
DESIGN ALTERNATIVES
DO NOT USE FOR CONSTRUCTION
DO NOT USE FOR R/W ACQUISITION

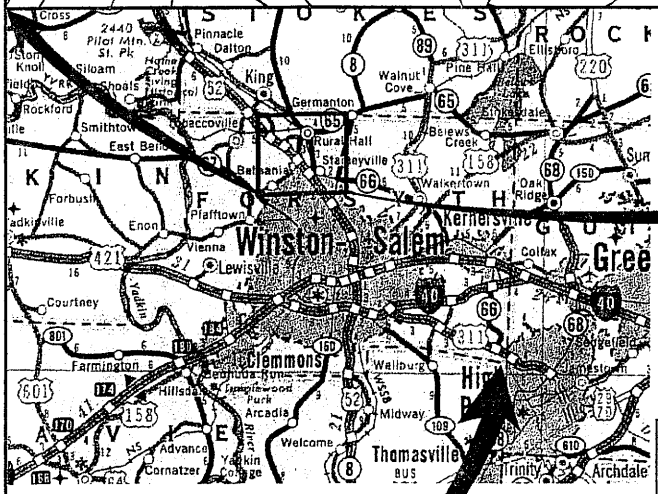
FEBRUARY 2004

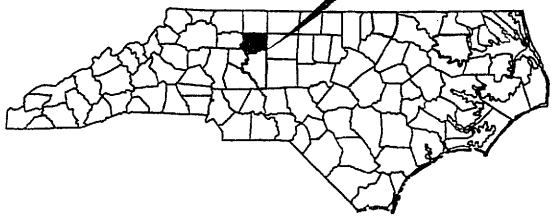
0 50 100 150
(FEET)

BRIDGE NO. 30
SR 1631 OVER MUDDY CREEK
FORSYTH COUNTY
B-4112

FIGURE 5 SHEET 1 OF 1







NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

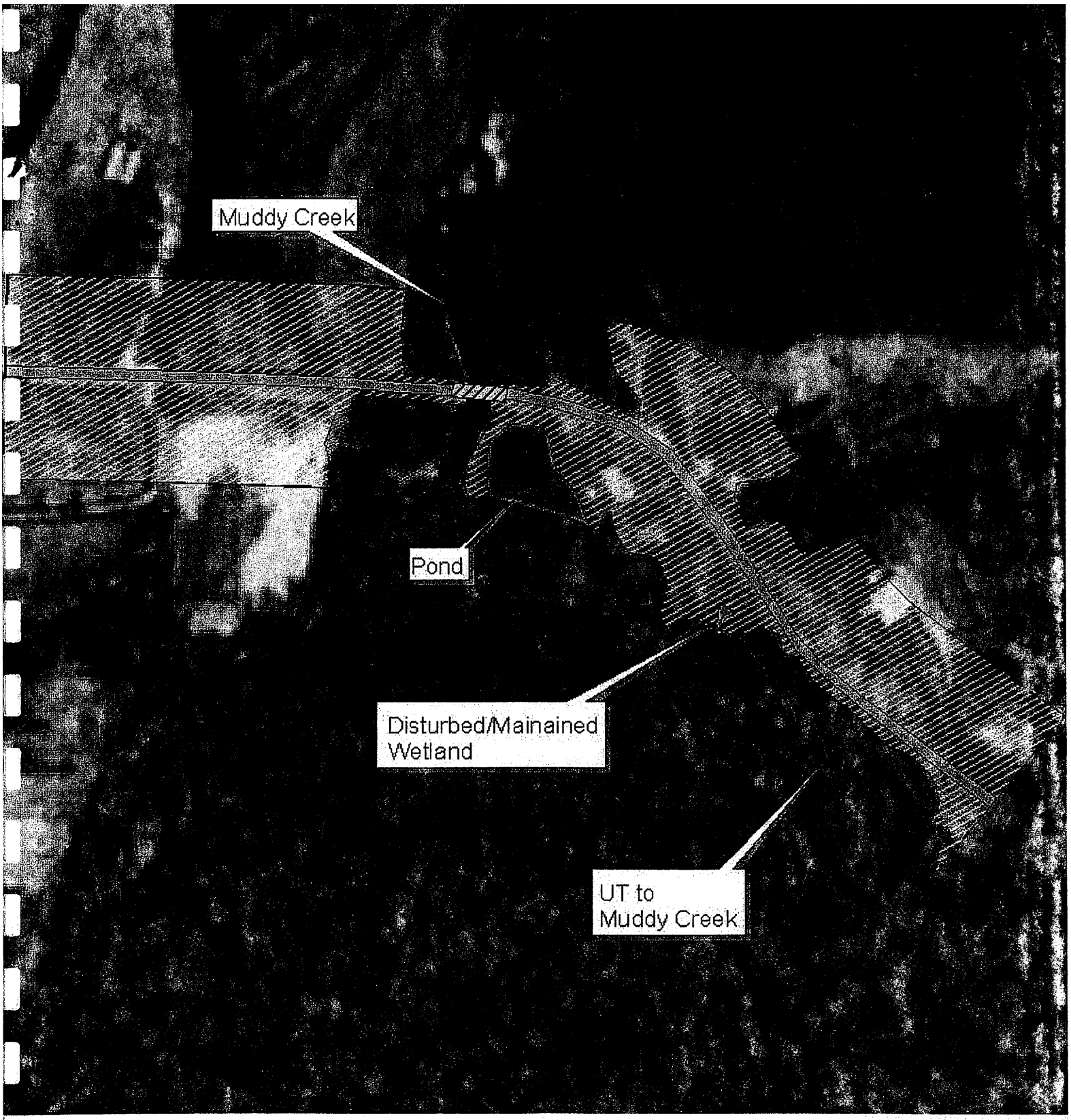
Project Development and Environmental Analysis Branch

BRIDGE NO. 30
SR 1631 OVER MUDDY CREEK
FORSYTH COUNTY
B-4112

DETOUR MAP

0 0.5
GRAPHIC SCALE (MILES)

FIGURE 6



200 0 200 400 600 800 Feet

N
W E
S

B-4112
Bridge No. 30
Mizpah Church Road Over Muddy Creek

Legend:
- Project Study Area
- Bridge No. 30
- SR1631
- Muddy Creek
- UT
- Pond
- Wetland
- Hardwood Forest
- Dist/Maint. Land

Figure 7
Project Study Area

EcoScience Corporation
1101 Haynes Street, Suite 101
Raleigh, NC 27604
Ph: 919-828-3433
Fax: 919-828-3518

Appendix

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Field Office
160 Zillicoa Street
Asheville, North Carolina 28801

March 9, 2004

Mr. Gregory J. Thorpe, Ph.D., Director
Project Development and Environmental Analysis Branch
North Carolina Department of Transportation
1548 Mail Service Center
Raleigh, North Carolina 27699-1548

Dear Mr. Thorpe:

Subject: Scoping Comments for Five Bridge Replacement Proposals, Stokes, Davidson, Forsyth, and Davie Counties, North Carolina

We have reviewed the subject bridge replacement proposals and provide the following comments in accordance with the Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661-667e), and section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543) (Act). Given the early stages of development for these projects, our comments are limited primarily to the known locations of listed species and federal species of concern. When the categorical exclusions are prepared and more information is available regarding environmental effects, we can offer more substantive comments.

Enclosed is a species list for the four counties included in this package. This list provides the names of species on the *Federal List of Endangered and Threatened Wildlife and Plants* as well as federal species of concern. Federal species of concern are not legally protected under the Act and are not subject to any of its provisions, including section 7, unless they are formally proposed or listed as endangered or threatened. We are including these species in our response to give you advance notification and to request your assistance in protecting them if any are found in the vicinity of your projects. Our records indicate the following:

Stokes County – B-4281, Bridge No. 60 on NC 8 and 89 over the Dan River (our Log No. 4-2-04-122) - Our records for Stokes County indicate known locations of the federally endangered James spinymussel (*Pleurobema collina*) in the project area. It is likely that James spinymussel individuals would be affected by this project; if that is the case, formal consultation will be required. In addition, there are occurrences of the federally endangered small-anthered bittercress *(Cardamine micrantherea*) near the project area.

Davidson County - B-4100, Bridge No. 142 on SR 1741, and B-4101, Bridge No.141 over Abbotts Creek (our Log Nos. 4-2-04-123, 4-2-04-124).

Forsyth County - B-4112, Bridge No. 30 on SR 1631 over Muddy Creek (our Log No. 4-2-04-125).

Davie County - B-4104, Bridge No. 21 on NC 801 over Carter Creek (our Log No. 4-2-04-128).

Our records for these counties and project areas indicate no known locations of listed species in the project areas. However, we recommend conducting habitat assessments and surveying any suitable habitat in the project areas for these species prior to any further planning or on-the-ground activities to ensure that no adverse impacts occur.

We are interested in the types of structures that will replace the existing bridges and would recommend spanning structures, preferably bridges, in all cases. In addition, off-site detours, which would reduce stream-bank disturbance, are preferable to temporary on-site crossings. We look forward to reviewing the completed categorical exclusion documents.

If you have questions about these comments, please contact Ms. Marella Buncick of our staff at 828/258-3939, Ext. 237. In any future correspondence concerning these projects, please reference the log numbers assigned with our comments for each project as shown above

Sincerely,

Brian P. Cole

Brian P. Cole
Field Supervisor

Enclosure

cc:
Mr. Eric Alsmeyer, U.S. Army Corps of Engineers, Raleigh Regulatory Field Office, 6508 Falls of the Neuse Road, Suite 120, Raleigh, NC 27615
Ms. Marla J. Chambers, Highway Projects Coordinator, North Carolina Wildlife Resources Commission, 12275 Swift Road, Oakboro, NC 28129
Ms. Cynthia Van Der Wiele, North Carolina Department of Environment and Natural Resources, Division of Water Quality, Wetlands Section, 1621 Mail Service Center, Raleigh, NC 27699-1621

ENDANGERED, THREATENED, AND CANDIDATE SPECIES AND FEDERAL SPECIES OF CONCERN, DAVIDSON, DAVIE, FORSYTH, AND STOKES COUNTIES, NORTH CAROLINA

This list was adapted from the North Carolina Natural Heritage Program's County Species List. It is a listing, for Davidson, Davie, Forsyth, and Stokes Counties, of North Carolina's federally listed and proposed endangered, threatened, and candidate species and Federal species of concern (for a complete list of rare species in the state, please contact the North Carolina Natural Heritage Program). The information in this list is compiled from a variety of sources, including field surveys, museums and herbaria, literature, and personal communications. The North Carolina Natural Heritage Program's database is dynamic, with new records being added and old records being revised as new information is received. Please note that this list cannot be considered a definitive record of listed species and Federal species of concern, and it should not be considered a substitute for field surveys.

Critical habitat: Critical habitat is noted, with a description, for the counties where it is designated or proposed.

Aquatic species: Fishes and aquatic invertebrates are noted for counties where they are known to occur. However, projects may have effects on downstream aquatic systems in adjacent counties.

COMMON NAME	SCIENTIFIC NAME	STATUS
DAVIDSON COUNTY		
Vertebrates		
Bog turtle	*Clemmys muhlenbergii*	T(S/A)[1]
Carolina darter	*Etheostoma collis collis*	FSC
Bald eagle	*Haliaeetus leucocephalus*	Threatened (proposed for delisting)
Vascular Plants		
Georgia aster	*Aster georgianus*	C1
Schweinitz's sunflower	*Helianthus schweinitzii*	Endangered
Heller's trefoil	*Lotus helleri*	FSC
DAVIE COUNTY		
Vertebrates		
Robust redhorse	*Moxostoma robustum*	FSC
Vascular Plants		
Creamy tick-trefoil	*Desmodium ochroleucum*	FSC*
Heller's trefoil	*Lotus helleri*	FSC*
Michaux's sumac	*Rhus michauxii*	Endangered
FORSYTH COUNTY		
Vertebrates		
Bog turtle	*Clemmys muhlenbergii*	T(S/A)[1]
Red-cockaded woodpecker	*Picoides borealis*	Endangered****

COMMON NAME	SCIENTIFIC NAME	STATUS
Invertebrates		
Brook floater	*Alasmidonta varicosa*	FSC
Vascular Plants		
Small-anthered bittercress	*Cardamine micranthera*	Endangered
STOKES COUNTY		
Vertebrates		
Orangefin madtom	*Noturus gilberti*	FSC
Rustyside sucker	*Thoburnia hamiltoni*	FSC
Invertebrates		
Green floater	*Lasmigona subviridis*	FSC
James spinymussel	*Pleurobema collina*	Endangered
Diana fritillary butterfly	*Speyeria diana*	FSC*
Vascular Plants		
Small-anthered bittercress	*Cardamine micranthera*	Endangered
Schweinitz's sunflower	*Helianthus schweinitzii*	Endangered
Butternut	*Juglans cinerea*	FSC
Sweet pinesap	*Monotropsis odorata*	FSC

KEY:

Status	Definition
Endangered	A taxon "in danger of extinction throughout all or a significant portion of its range."
Threatened	A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."
C1	A taxon under consideration for official listing for which there is sufficient information to support listing.
FSC	A Federal species of concern--a species that may or may not be listed in the future (formerly C2 candidate species or species under consideration for listing for which there is insufficient information to support listing).
T(S/A)	Threatened due to similarity of appearance (e.g., American alligator)--a species that is threatened due to similarity of appearance with other rare species and is listed for its protection. These species are not biologically endangered or threatened and are not subject to Section 7 consultation.

Species with 1, 2, 3, or 4 asterisks behind them indicate historic, obscure, or incidental records.
*Historic record - the species was last observed in the county more than 50 years ago.
**Obscure record - the date and/or location of observation is uncertain.
***Incidental/migrant record - the species was observed outside of its normal range or habitat.
****Historic record - obscure and incidental record.

[1]In the November 4, 1997, *Federal Register* (55822-55825), the northern population of the bog turtle (from New York south to Maryland) was listed as T (threatened), and the southern population (from Virginia south to Georgia) was listed as T(S/A) (threatened due to similarity of appearance). The T(S/A) designation bans the collection and interstate and international commercial trade of bog turtles from the southern population. The T(S/A) designation has no effect on land-management activities by private landowners in North Carolina, part of the southern population of the species. In addition to its official status as T(S/A), the U.S. Fish and Wildlife Service considers the southern population of the bog turtle as a Federal species of concern due to habitat loss.

North Carolina Wildlife Resources Commission

Charles R. Fullwood, Executive Director

TO: Gregory J. Thorpe, Ph.D., Director
Project Development and Environmental Analysis Branch, NCDOT

FROM: Marla Chambers, Highway Projects Coordinator
Habitat Conservation Program, NCWRC

DATE: August 10, 2004

SUBJECT: Scoping review of NCDOT's proposed replacement of Bridge No. 30 on SR 1631 over Muddy Creek, Forsyth County. TIP No. B-4112.

North Carolina Department of Transportation (NCDOT) is requesting comments from the North Carolina Wildlife Resources Commission (NCWRC) regarding impacts to fish and wildlife resources resulting from the subject project. Staff biologists have reviewed the information provided and have the following preliminary comments. These comments are provided in accordance with the provisions of the National Environmental Policy Act (42 U.S.C. 4332(2)(c)) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667d).

Our standard recommendations for bridge replacement projects of this scope are as follows:

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

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

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

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

Mailing Address: Division of Inland Fisheries • 1721 Mail Service Center • Raleigh, NC 27699-1721
Telephone: (919) 733-3633 ext. 281 • Fax: (919) 715-7643

5. If temporary access roads or detours are constructed, they should be removed back to original ground elevations immediately upon the completion of the project. Disturbed areas should be seeded or mulched to stabilize the soil and native tree species should be planted with a spacing of not more than 10'x10'. If possible, when using temporary structures the area should be cleared but not grubbed. Clearing the area with chain saws, mowers, bush-hogs, or other mechanized equipment and leaving the stumps and root mat intact, allows the area to revegetate naturally and minimizes disturbed soil.

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

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

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

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

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

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

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

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

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

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

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

17. If culvert installation is being considered, conduct subsurface investigations prior to structure design to determine design options and constraints and to ensure that wildlife passage issues are addressed.

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

1. The culvert must be designed to allow for aquatic life and fish passage. Generally, the culvert or pipe invert should be buried at least 1 foot below the natural streambed (measured from the natural thalweg depth). If multiple barrels are required, barrels other than the base flow barrel(s) should be placed on or near stream bankfull or floodplain bench elevation (similar to Lyonsfield design). These should be reconnected to floodplain benches as appropriate. This may be accomplished by utilizing sills on the upstream end to restrict or divert flow to the base flow barrel(s). Silled barrels should be filled with sediment so as not to cause noxious or mosquito breeding conditions. Sufficient water depth should be provided in the base flow barrel during low flows to accommodate fish movement. If culverts are longer than 40-50 linear feet, alternating or notched baffles should be installed in a manner that mimics existing stream pattern. This should enhance aquatic life passage: 1) by depositing sediments in the barrel, 2) by maintaining channel depth and flow regimes, and 3) by providing resting places for fish and other aquatic organisms. In essence, the base flow barrel(s) should provide a continuum of water depth and channel width without substantial modifications of velocity.

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

3. Culverts or pipes should be situated along the existing channel alignment whenever possible to avoid channel realignment. Widening the stream channel must be avoided. Stream channel widening at the inlet or outlet end of structures typically decreases water velocity causing sediment deposition that requires increased maintenance and disrupts aquatic life passage.

4. Riprap should not be placed in the active thalweg channel or placed in the streambed in a manner that precludes aquatic life passage. Bioengineering boulders or structures should be professionally designed, sized, and installed.

In most cases, we prefer the replacement of the existing structure at the same location with road closure. If road closure is not feasible, a temporary detour should be designed and located to avoid wetland impacts, minimize the need for clearing and to avoid destabilizing stream banks. If the structure will be on a new alignment, the old structure should be removed and the approach fills removed from the 100-year floodplain. Approach fills should be removed

down to the natural ground elevation. The area should be stabilized with grass and planted with native tree species. Tall fescue should not be used in riparian areas. If the area that is reclaimed was previously wetlands, NCDOT should restore the area to wetlands. If successful, the site may be used as wetland mitigation for the subject project or other projects in the watershed.

Project specific comments:

1. B-4121, Forsyth Co., Bridge No. 30 over Muddy Creek on SR 1631. Muddy Creek is Class C waters. No special concerns are indicated at this time. Impacts to aquatic and terrestrial resources should be minimized. Standard requirements and BMP's should apply.

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

If you need further assistance or information on NCWRC concerns regarding bridge replacements, please contact me at (704) 485-2384. Thank you for the opportunity to review and comment on this project.

cc: Marella Buncick, USFWS
Brian Wrenn, NCDWQ

Michael F. Easley, Governor
William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources

Alan W. Klimek, P.E., Director
Division of Water Quality
Coleen H. Sullins, Deputy Director
Division of Water Quality

March 24, 2004

MEMORANDUM

TO: Gregory J. Thorpe, PhD, Director
NCDOT Project Development and Environmental Analysis Branch

FROM: Robert Ridings, Env. Tech., DWQ 401 Unit

THROUGH: John Hennessy, Supervisor, DWQ 401 Transportation Unit

SUBJECT: Scoping Review of NCDOT's proposed bridge replacement projects: B-4281, B-4112, B-4252, B-4254, B-4100, B-4101, B-4243, B-4244, B-4246, B-4104, B-4129, B-4130, B-4131.

In reply to your correspondence dated February 10, 2004 (received February 18, 2004) to Cynthia Van der Wiele, in which you requested comments for the referenced projects, the NC Division of Water Quality has the following comments:

I. General Comments Regarding Bridge Replacement Projects

1. If corrugated metal pipe arches, reinforced concrete pipes, or concrete box culverts are used to replace the bridge, then DWQ recommends the use of Nationwide Permit No. 14 rather than Nationwide Permit 23.

2. Bridge demolition should be performed using Best Management Practices developed by NCDOT.

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

4. Bridge deck drains should not discharge directly into the stream; stormwater should be directed across the bridge and pre-treated through site-appropriate means (grassed swales, pre-formed scour holes, vegetated buffers, etc.) before entering the stream. Please refer to NCDOT Best Management Practices for the Protection of Surface Waters

5. Live concrete should not be allowed to contact the water in or entering into the stream. Concrete is mostly made up of lime (calcium carbonate) and when in a dry or wet state (not hardened) calcium carbonate is very soluble in water and has a pH of approximately 12. In an unhardened state concrete or cement will change the pH of fresh water to very basic and will cause fish and other macroinvertebrate kills.

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

7. If temporary access roads or detours are constructed, they should be removed back to original ground elevations immediately upon the completion of the project. Disturbed areas should be seeded or mulched to stabilize the soil and native tree species should be planted with a spacing of not more than 10'x10'. If possible, when using temporary structures the area should be cleared but not grubbed. Clearing the area with chain saws, mowers, bush-hogs, or other mechanized equipment and leaving the stumps and root mat intact, allows the area to re-vegetate naturally and minimizes disturbed soil.

8. A clear bank (rip rap-free) area of at least 10 feet should remain on each side of the steam underneath the bridge.

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

10. Bare soil should be stabilized through vegetation or other means as quickly as feasible to prevent sedimentation of water resources.

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

12. Heavy equipment should be operated from the bank rather than in stream channels in order to minimize sedimentation and reduce the likelihood of introducing other pollutants into streams. This equipment should be inspected daily and maintained to prevent contamination of surface waters from leaking fuels, lubricants, hydraulic fluids, or other toxic materials.

II. General Comments if Replacing the Bridge with a Culvert

1. The culvert must be designed to allow for aquatic life and fish passage. Generally, the culvert or pipe invert should be buried at least 1 foot below the natural streambed (measured from the natural thalweg depth). If multiple barrels are required, barrels other than the base flow barrel(s) should be placed on or near stream bankfull or floodplain bench elevation (similar to Lyonsfield design). These should be reconnected to floodplain benches as appropriate. This may be accomplished by utilizing sills on the upstream end to restrict or divert flow to the base flow barrel(s). Silled barrels should be filled with sediment so as not to cause noxious or mosquito breeding conditions. Sufficient water depth should be provided in the base flow barrel during low flows to accommodate fish movement. If culverts are longer than 40-50 linear feet, alternating or notched baffles should be installed in a manner that mimics existing stream pattern. This should enhance aquatic life passage: 1) by depositing sediments in the barrel, 2) by maintaining channel depth and flow regimes, and 3) by providing resting places for fish and other aquatic organisms. In essence, the base flow barrel(s) should provide a continuum of water depth and channel width without substantial modifications of velocity.

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

3. Culverts or pipes should be situated along the existing channel alignment whenever possible to avoid channel realignment. Widening the stream channel must be avoided. Stream channel widening at the inlet or outlet end of structures typically decreases water velocity causing sediment deposition that requires increased maintenance and disrupts aquatic life passage.

4. Riprap should not be placed in the active thalweg channel or placed in the streambed in a manner that precludes aquatic life passage. Bioengineering boulders or structures should be professionally designed, sized, and installed.

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

III. Project-Specific Comments

B-4281, Bridge 60, Dan River, Stokes County
Dan River is classified as C Trout and is in the Roanoke River Basin. A moratorium prohibiting in-stream w and land disturbance within the 25-foot trout buffer is recommended from October 15 to April 15 to protect th egg and fry stages of trout. DWQ would prefer this bridge to be replaced with a bridge and the use of BMPs (particularly for sediment and erosion control) to be maximized.

B-4112, Bridge 30, Muddy Creek, Forsyth County
Muddy Creek is classified as C and is in the Yadkin River Basin. DWQ has no special concerns with this proj Please refer to general recommendations listed above.

B-4252, Bridges 67 and 95, Little Beaver and Big Beaver Creeks, Rockingham County
Little Beaver and Big Beaver Creeks are both classified as C and are in the Roanoke River Basin. DWQ has n special concerns with this project.

B-4254, Bridge 89, Little Troublesome Creek, Rockingham County
Little Troublesome Creek is listed as C NSW and is in the Cape Fear River Basin. It is a 303(d) listed water. NCDOT shall maximize the use of Best Management Practices for all work crossing or draining to the Critical Area of the Water Supply Watershed and 303(d)-listed waters. In addition, NCDOT shall strictly adhere to "Design Standards in Sensitive Watersheds" (15A NCAC 04B .0124).

B-4100 and B-4101, Bridges 142 and 141, Abbotts Creek, Davidson County
Abbotts Creek is listed as WS-III water supply stream and is in the Yadkin River Basin. There are 30-foot vegetated buffer requirements in WS waters in addition to the requirements to minimize storm water runoff an maximize use of BMPs. Refer to 15A NCAC 2B .0216(3)(b)(i)(F) and (G).

B-4243, Bridge 71, Hasketts Creek, Randolph County
Hasketts Creek is listed as C and is in the Cape Fear River Basin. It is a 303(d) listed water. NCDOT shall maximize the use of Best Management Practices for all work crossing or draining to the Critical Area of the Water Supply Watershed and 303(d)-listed waters. In addition, NCDOT shall strictly adhere to "Design Standards in Sensitive Watersheds" (15A NCAC 04B .0124).

B-4244, Bridge 140, Gabriels Creek, Randolph County
Gabriels Creek is listed as C and is in the Cape Fear River Basin. DWQ has no special concerns for this projec

B-4246, Bridge 228, Richland Creek, Randolph County
Richland Creek is listed as C and is in the Cape Fear River Basin. It is a 303(d) listed water. NCDOT shall maximize the use of Best Management Practices for all work crossing or draining to the Critical Area of the Water Supply Watershed and 303(d)-listed waters. In addition, NCDOT shall strictly adhere to "Design Standards in Sensitive Watersheds" (15A NCAC 04B .0124).

B-4104, Bridge 21, Carter Creek, Davie County
Carter Creek is listed as WS-IV and is in the Yadkin River Basin. There are 30-foot vegetated buffer requirements in WS waters in addition to the requirements to minimize storm water runoff and maximize use c BMPs. Refer to 15A NCAC 2B .0216(3)(b)(i)(F) and (G).

B-4129, Bridge 226, Little Alamance Creek, Guilford County
Little Alamance Creek is listed as WS-IV NSW CA and is in the Cape Fear River Basin. There are 30-foot vegetated buffer requirements in WS waters in addition to the requirements to minimize storm water runoff a maximize use of BMPs. Refer to 15A NCAC 2B .0216(3)(b)(i)(F) and (G). Since the project is located within the Critical Area of a water supply watershed, hazardous spill catch basins may be required for this project bas on traffic count, percent truck traffic or proximity to industries transporting hazardous materials. The projec shall incorporate the requirements for WS-IV Waters within the critical area as specified in 15A NCAC 2B .02 (i.e., stormwater management, sedimentation and erosion control, and buffers).

B-4130, Bridge 228, Alamance Creek, Guilford County
Alamance Creek is listed as WS-IV NSW CA and is in the Cape Fear River Basin. There are 30-foot vegetated buffer requirements in WS waters in addition to the requirements to minimize storm water runoff and maxim use of BMPs. Refer to 15A NCAC 2B .0216(3)(b)(i)(F) and (G). Since the project is located within the Crit Area of a water supply watershed, hazardous spill catch basins may be required for this project based on traffic count, percent truck traffic or proximity to industries transporting hazardous materials. The project shall incorporate the requirements for WS-IV Waters within the critical area as specified in 15A NCAC 2B .0215 stormwater management, sedimentation and erosion control, and buffers).

B-4131, Bridge 11, Little Alamance Creek, Guilford County
Little Alamance Creek is listed as WS-IV NSW CA and is in the Cape Fear River Basin. There are 30-foot vegetated buffer requirements in WS waters in addition to the requirements to minimize storm water runoff an maximize use of BMPs. Refer to 15A NCAC 2B .0216(3)(b)(i)(F) and (G). Since the project is located with the Critical Area of a water supply watershed, hazardous spill catch basins may be required for this project bas on traffic count, percent truck traffic or proximity to industries transporting hazardous materials. The project shall incorporate the requirements for WS-IV Waters within the critical area as specified in 15A NCAC 2B . (i.e., stormwater management, sedimentation and erosion control, and buffers).

Thank you for requesting our input at this time. The DOT is reminded that issuance of a 401 Water Quality Certification requires that appropriate measures be instituted to ensure that water quality standards are met and designated uses are not degraded or lost. If you have any questions or require additional information, please contact Robert Ridings at (919) 733-9817 or Cynthia Van der Wiele at (919) 733-5715.

cc: USACE Raleigh Field Office
File Copy

North Carolina Department of Cultural Resources
State Historic Preservation Office

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

Division of Historical Resources
David L. S. Brook, Director

March 10, 2004

MEMORANDUM

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

FROM: David Brook RSH for David Brook

SUBJECT: Bridge No. 30 on SR 1631 over Muddy Creek, B-4112, Forsyth County, ER04-0498

Thank you for your letter of February 10, 2004, concerning the above project.

We have conducted a review of the proposed undertaking and are aware of no historic resources which would be affected by the project. Therefore, we have no comment on the undertaking as proposed.

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

Thank you for your cooperation and consideration. If you have questions concerning the above comment, 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: Mary Pope Furr
Matt Wilkerson

Federal Aid #: **BRZ-1631(2)** *TIP # :* **B-4112** *County*: **Forsyth**

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

Project Description:

On **April 5, 2005**, representatives of the

- ☒ North Carolina Department of Transportation (NCDOT)
- ☐ Federal Highway Administration (FHWA)
- ☒ North Carolina State Historic Preservation Office (HPO)
- ☐ Other

Reviewed the subject project at

- ☐ Scoping meeting
- ☒ Historic architectural resources photograph review session/consultation
- ☐ Other

All parties present agreed

- ☐ There are no properties over fifty years old within the project's area of potential effects.
- ☒ There are no properties less than fifty years old which are considered to meet Criteria Consideration G within the project's area of potential effects.
- ☒ There are properties over fifty years old within the project's Area of Potential Effects (APE), but based on the historical information available and the photographs of each property, the properties identified as **(List below)** are considered not eligible for the National Register and no further evaluation of them are necessary.

  Speas House and outbuildings

- ☒ There are no National Register-listed or Study Listed properties within the project's area of potential effects.
- ☐ All properties greater than 50 years of age located in the APE have been considered at this consultation, and based upon the above concurrence, all compliance for historic architecture with Section 106 of the National Historic Preservation Act and GS 121-12(a) has been completed for this project.
- ☒ There are no historic properties affected by this project. (*Attach any notes or documents as needed*)

Signed:

Jennifer Cathey — 4/5/05
Representative, NCDOT — Date

FHWA, for the Division Administrator, or other Federal Agency — Date

Representative, HPO — 4/5/05 Date

Renee Gledhill-Earley — 4/5/05
State Historic Preservation Officer — Date

City-County Planning Board
FORSYTH COUNTY & WINSTON-SALEM, NORTH CAROLINA

100 E. FIRST ST. • P.O. BOX 2511 • WINSTON-SALEM, N.C. 27102
336.727.2087 • fax 336.748.3163 • planning@cityofws.org

March 25, 2004

North Carolina Department of Transportation
Project Development and Environmental Analysis Branch
Attn: Ms. Karen Taylor, PE – Project Development Engineer
1548 Mail Service Center
Raleigh, NC 27699-1548

Re: Bridge No. 30 on SR 1631 (Mizpah Church Road) over Muddy Creek (TIP # B-4112)

Dear Ms. Taylor:

The City-County Planning Board (CCPB) of Winston-Salem and Forsyth County has received your correspondence requesting input on the potential environmental impacts of the proposed bridge replacement project for Bridge No. 30 on SR 1631 (Mizpah Church Road) (TIP # B-4112). The City-County Planning Board staff provides support to WSDOT on transportation projects in such areas as environmental impact, historic preservation, and long-range planning.

Although obviously needed to complete the overall study of alternatives, the "Do Nothing" alternative can be easily eliminated. In order to continue providing multiple routes between destinations and to facilitate the existing and future uses along Mizpah Church Road, the bridge will be needed. By "doing nothing" the bridge would eventually fail and would prohibit easy access for the property owners along Mizpah Church Road and the users of the surrounding road network.

Environmentally, there is a significant amount of floodway and floodway fringe area along Muddy Creek, as well as several wetland areas, both north and south of Mizpah Church Road in the vicinity of the existing bridge. Additionally, there are some considerable slope issues along Mizpah Church Road in the area surrounding the bridge. Given these environmental constraints, an on-site, temporary bridge would be a difficult proposition.

Beyond environmental considerations, there are historical properties that may also limit an on-site, temporary bridge. Per a memo from Ms. LeAnn Pegram, Historic Resources Coordinator for the City-County Planning Board staff (see attached), there are two (2) historic properties within one-half (1/2) mile of the existing bridge. The Daniel Speas House (Inventory #605) is located adjacent to the existing bridge, located on the southeast bank of Muddy Creek directly south of Mizpah Church Road. A late-19th century house (Inventory #675) lies on the northern side of Mizpah Church Road on the west side of Muddy Creek, approximately one-half (1/2) mile west of the existing bridge. Any work in the area should be done in a manner to preserve these historic resources.

In examining the 2001 ADT maps for the area, Mizpah Church Road does not carry a lot of traffic

(between 680 and 1400 ADT). Additionally, there has not been a significant amount of development in the surrounding area since 2001 that would cause a 'spike' in expected traffic along the road. Given the environmental obstacles, the surrounding historic properties, and the small amount of traffic using the road, the "replace at existing location maintaining traffic with a temporary structure and detour on the north side" should be eliminated from consideration as an alternative.

The preferred alternatives, given the issues raised above, would be either to "rehabilitate the existing structure" or to "replace at existing location by closing the existing roadway and maintaining traffic with an off-site detour". Under either of these alternatives, City-County Planning Board staff would request that the work needed to either repair or replace the bridge be completed in a timely manner and that any off-site detours that are needed be used for the absolute minimum amount possible.

In closing, the City-County Planning Board appreciates the opportunity to comment on this very important project. Should you have any questions, please do not hesitate to contact me at (336) 727-2087. For historic preservation questions, please contact LeAnn Pegram, Project Planner, at the same telephone number.

Sincerely,

Chris Murphy, AICP
Principal Planner

xc: Village of Tobaccoville Administrator
WSDOT

MEMORANDUM

To: Chris Murphy

From: LeAnn Pegram

Date: March 24, 2004

RE: MIZPAH CHURCH ROAD BRIDGE REPLACEMENT PROJECT POTENTIAL HISTORIC RESOURCE IMPACTS

According to Forsyth County's historic survey files, the following two properties are located in the proximity of the aforementioned project:

Daniel Speas House (Inventory #605)

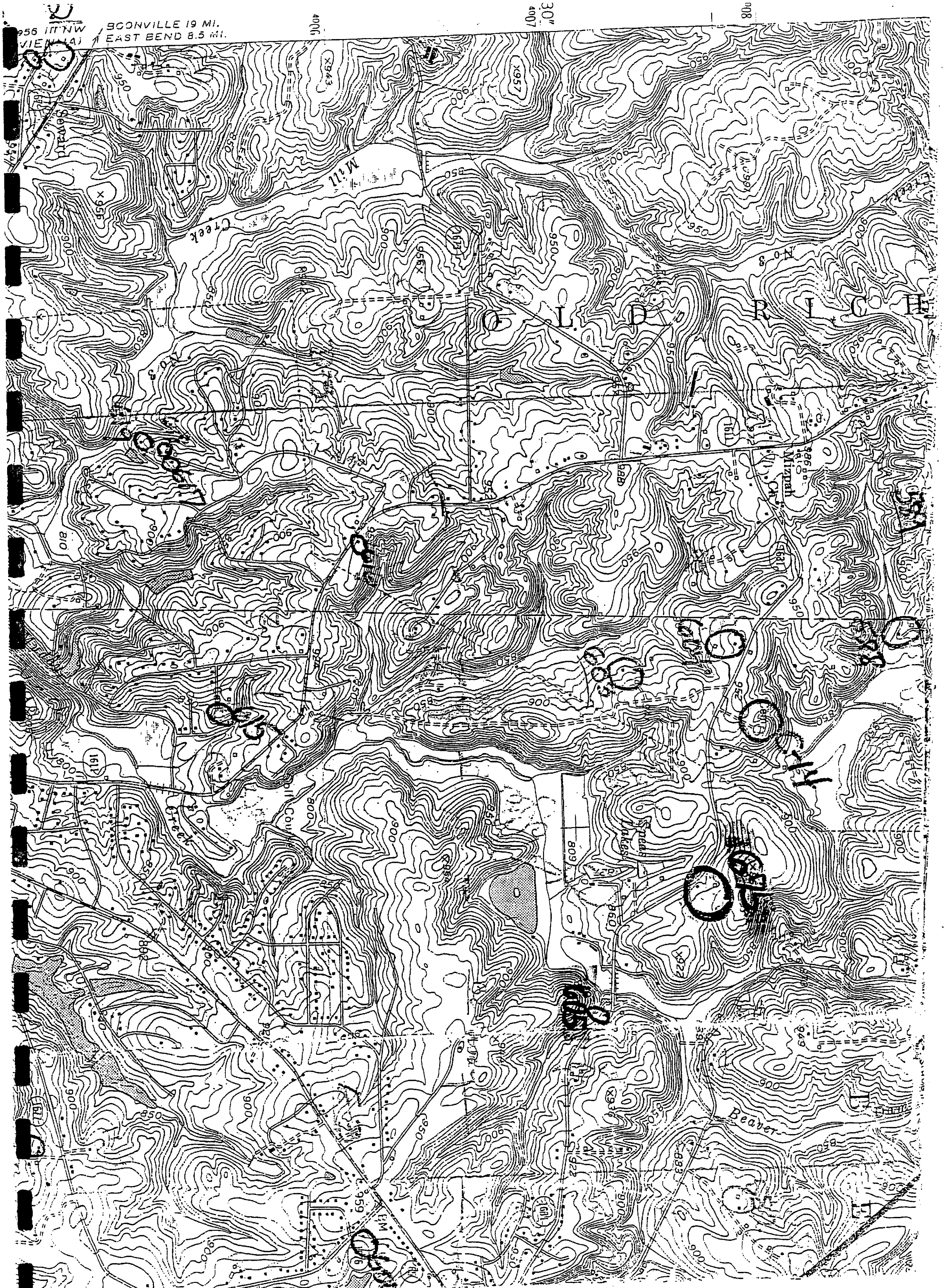
One of the finest remaining stone chimneys in Forsyth County stands on this log house said to have been built by Daniel Speas. According to family members, Speas probably built the house in the early 19th century, but it was enlarged with a frame addition that appears to date from the late 19th century. The brick stack of the stone chimney has been replaced, but from the shoulders down to the ground, the chimney is a masterpiece of tight-fitting stone masonry laid without mortar.

House (Inventory #675)

This property is identified as a late-19th century I-house. It is a 2-story, 3-bay structure that has been altered with siding. The house features a stone foundation and a brick, common-bond chimney with stepped shoulders. There is a front hipped-roof porch with turned post supports. Additionally, there is a frame barn and a log outbuilding on the property.

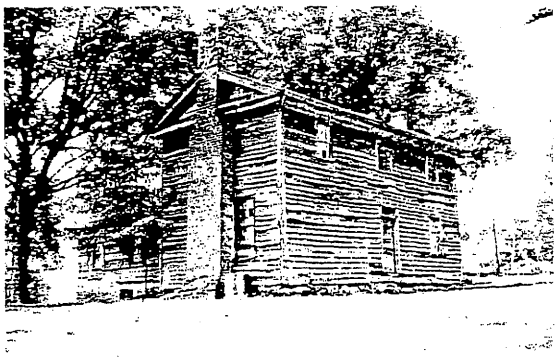
Please let me know if you have questions.

Attachments

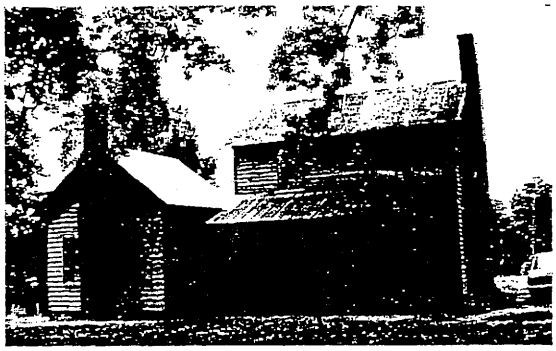


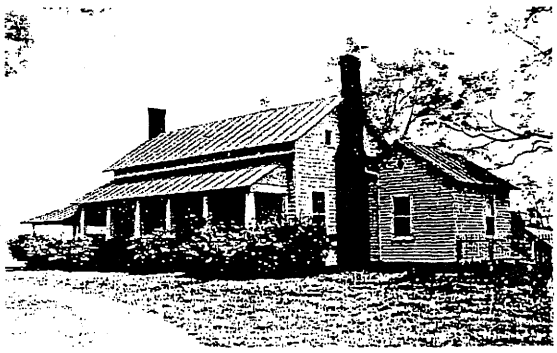
956 III NW
BOONVILLE 19 MI.
EAST BEND 8.5 MI.
O L D R I C H
Mill
Creek
Mizpah
Seward
Beaver

26



28





31

26 - Petree-Spainhour House, King Vicinity

The provenance of this important 19th century house is unclear, but according to the owner it probably was built by a member of the Petree family and was subsequently owned by the Spainhours. The house was built in two parts--one brick-nogged and one log. The one-story log house may have been built in the early 19th century; probably around the mid-19th century the house was raised to two stories and enlarged with a brick-nogged addition. A three-bay facade was created which features a Federal-style five-paneled front door and a four-light transom. A log rear ell of unknown date stands behind the brick-nogged part of the building.

27 - Nathaniel Petree House, Winston-Salem Vicinity

According to local tradition, this one-story log house was built by Nathaniel Petree (ca. 1860-1936). It has been heavily altered, but unusual mantels with paneled friezes and pulvinated shelves remain intact. Also on the property stand a log barn and other outbuildings which probably date from the late 19th century.

28 - Edwin F. Shore House, Rural Hall Vicinity

This two-story, two-bay log house is thought to have been built by the Shore family. It stood close to Muddy Creek but was moved up the hill to its present location by Edwin F. Shore in the late 19th or early 20th century. The house probably dates from the mid-19th century. Greek Revival style two-paneled doors appear on the two-story log house and its projecting front addition. A log barn and log shed survive on the property. The house and outbuildings remain in the Shore family.

29 - Slate-Dillon House, Germanton Vicinity

Local tradition maintains that this log and frame structure has served as a church, a school and a private residence. It appears that the log half of the house was constructed in the mid-19th century, and it features a partial stone chimney. The frame half of the structure probably was added in the late 19th or early 20th century. A log smokehouse stands behind the property.

30 - Daniel Speas House, Rural Hall Vicinity

One of the finest remaining stone chimneys in Forsyth County stands on this log house said to have been built by Daniel Speas. According to family members, Speas probably built the house in the early 19th century, but it was enlarged with a frame addition which appears to date from the late 19th century. The brick stack of the stone chimney has been replaced, but from the shoulders down to the ground the chimney is a masterpiece of tight-fitting stone masonry laid without mortar. The house remains in the Speas family.

31 - Jessie D. Speas House, Tobaccoville Vicinity

The Jessie D. Speas House is a typical, late 19th century farmhouse in Forsyth County. It is a one-story, three-bay house with exterior end brick chimneys and Greek Revival-style details. Successive generations of the Speas family have altered and expanded the house.

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
X EXCELLENT	DETERIORATED	UNALTERED	X ORIGINAL SITE
GOOD	RUINS	X ALTERED	MOVED DATE
FAIR	UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

8 SIGNIFICA

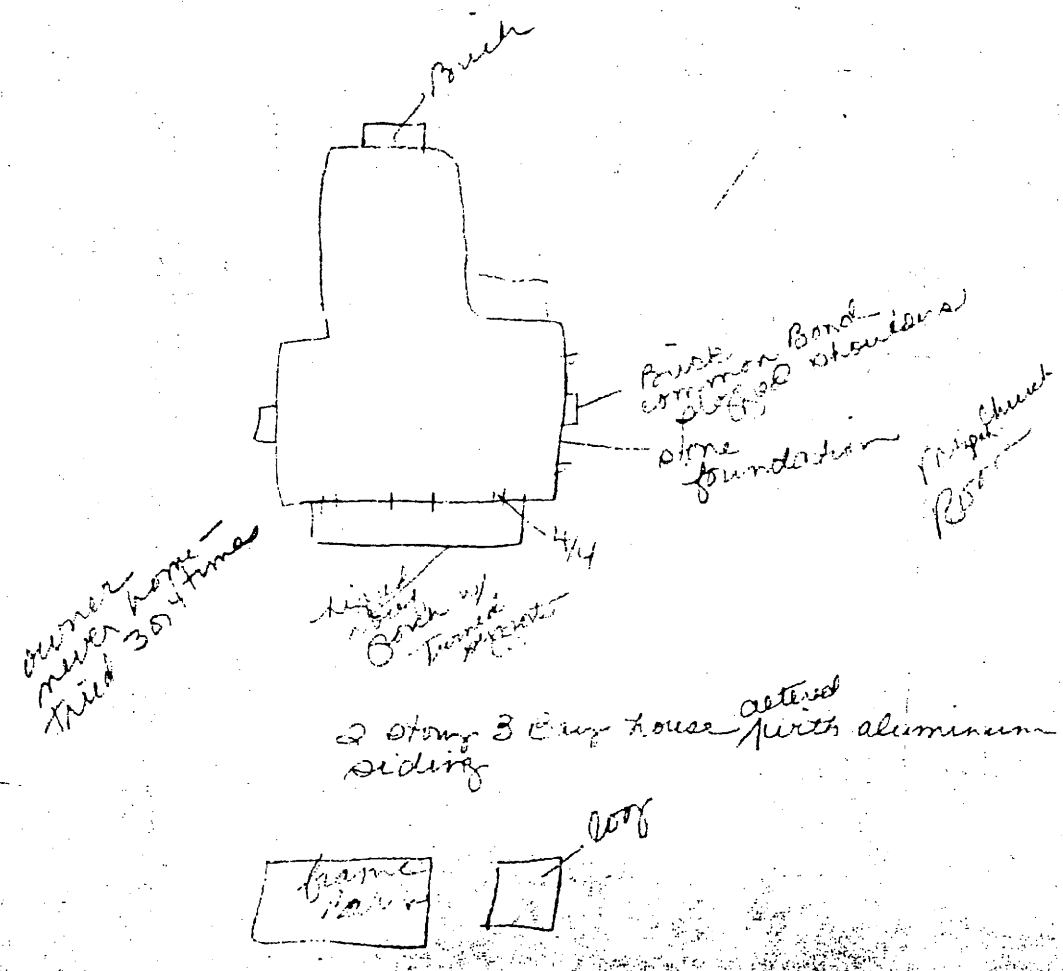
PERIOD

- PREHISTO
- 1400-1499
- 1500-1599
- 1600-1699
- 1700-1799
- 1800-1899
- 1900-

SPECIFIC DATES

STATEMENT OF SIG

informa



2 story 3 Bay house altered Vinyl aluminum siding

Winston-Salem

Department of
Transportation

City of Winston-Salem
P.O. Box 2511
Winston-Salem, NC 27102
Tel 336.727.2707
Fax 336.748.3370
www.cityofws.org/dot/

March 26, 2004

North Carolina Department of Transportation
Project Development And Environmental Analysis
Attention: Ms. Karen Taylor, P.E., Project Development Engineering
1548 Mail Service Center
Raleigh, NC 27699-1548

Re: Forsyth County B-4112, Bridge No. 30 on SR 1631 over Muddy Creek

Dear Ms. Taylor

The Winston-Salem Department of Transportation has received your letter in reference to the request for input on evaluating the potential community and environmental impacts of the rehabilitation of B-4112, Bridge No. 30 on SR 1631 (Mizpah Church Road) over Muddy Creek.

In reviewing the alternatives listed for this project we recommend that the "Do Nothing" alternative not be considered. The bridge must be rehabilitated or replaced in order to maintain the existing level of accessibility for the property owners in the vicinity. Also, according to the letter dated March 25, 2004 provided by the City-County Planning Board (CCPB) there are two historic properties within ½ mile of the existing bridge. We agree with the CCPB in order to preserve these structures, the alternative that suggests to "Replace at existing location maintaining traffic with a temporary structure and detour on north side" should not be considered as an alternative.

The two remaining alternatives, " Rehabilitate the Existing Structure" and " Replace at existing location by closing the existing roadway and maintaining traffic with an off-site detour" are both viable options. We believe that if the structure were replaced at its existing location utilizing an off-site detour route, closing the road to through traffic would assist with minimizing construction time; hence minimizing the length of time the road needs to be closed. It has been evaluated that there are options available for access onto both ends of Mizpah Church Road without excessively inconviencing the property owners.

The County Fire Department and the Emergency Medical Services have been contacted to determine if closing the road to through traffic would be a problem. It was expressed by both agencies that the closure could negatively impact response time, which is at times unavoidable regardless of road closures. The Winston-Salem Forsyth County Schools

Transportation Director and the Sheriff's Department were also contacted; however, they were not able to respond in time for us to make your deadline. Input from these agencies should be considered prior to construction. To assist with reducing any impacts, it is requested that each of these agencies be notified prior to the closing of the road so that alternative emergency routes may be identified. There are no permits or other approvals required by the City's Department of Transportation for this project.

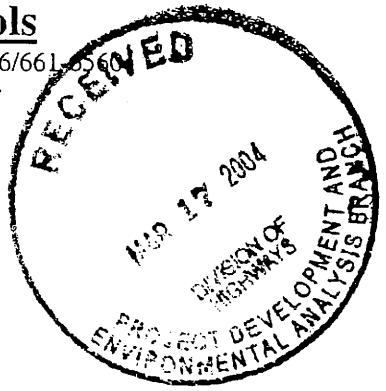
Thank you for the opportunity to comment on the alternatives for this project. Please continue to keep us informed on the preferred alternative and the progress of this project. If you have any additional questions, contact me at (336) 747-6877.

Sincerely,

Lakesha C. Dunbar

Lakesha C. Dunbar
Civil Engineer

Winston-Salem/Forsyth County Schools
4150 Carver Road, Winston-Salem, NC 27105 • 336/661-4986 • Fax 336/661-8560
Transportation Information Management System Coordinator



MEMO

To: Dr. Gregory J. Thorpe
Environmental Management Director
Project Development and Environmental Analysis Branch
N.C. Department of Transportation
1548 Mail Service Center
Raleigh, NC 27699-1548

From: Don Carter DC

Date: March 12, 2004

Re: Forsyth County Bridge Project B-4112

I am writing on behalf or the Winston-Salem Forsyth County Schools in reference to a request for information from February 10, 2004. We have several buses that use this road daily and would appreciate it if provisions could be made during this project to allow an on-site detour rather than disrupting our traffic pattern. Thank you for your consideration.

Winston-Salem/Forsyth County Schools

4150 Carver Road, Winston-Salem, NC 27105 • 336/661-4992 • Fax: 336/661-4983

Operations Manager for Transportation

B-4112

March 24, 2003

Davis Moore
NC Department of Transportation
Project Development & Environmental Analysis Branch
1548 Mail Service Center
Raleigh, NC 27699-1548

Dear Mr. Moore:

In reference to the memo dated August 21, 2002 on replacement of Bridge No. 30 on SR 1631 over Muddy Creek in Forsyth County, State Project No. 8.2625901, eight buses cross over this bridge totaling sixteen times per day. Most crossings could be rerouted, but would create significant delays and/or additional mileage. A few buses cannot be rerouted without utilizing a complete detour to service homes on both sides of the closure. This will require a designated turn around on both sides of the bridge, large enough to accommodate a school bus.

If you have any questions, please contact me at (336) 661-4994.

Thank you,

Frank Tingley
Operations Manager

FT:ah

WSFCS

EIS RELOCATION REPORT

North Carolina Department of Transportatio
RELOCATION ASSISTANCE PROGRA

☒ E.I.S. ☐ CORRIDOR ☐ DESIGN

WBS:	33467.1.1	COUNTY	Forsyth	Alternate 1 of 1 Alternat
I.D. NO.:	B-4112	F.A. PROJECT	BRZ-1631(2)	
DESCRIPTION OF PROJECT:	Bridge No. 30 (SR 1631) over Muddy Creek in Forsyth County			

ESTIMATED DISPLACEES

Type of Displacees	Owners	Tenants	Total	Minorities
Residential	1	0	1	0
Businesses	0	0	0	0
Farms	0	0	0	0
Non-Profit	0	0	0	0

INCOME LEVEL

0-15M	15-25M	25-35M	35-50M	50 UP
0	0	0	0	

VALUE OF DWELLING				DSS DWELLING AVAILABLE			
Owners		Tenants		For Sale		For Rent	
0-20M	0	$ 0-150	0	0-20M	0	$ 0-150	
20-40M	0	150-250	0	20-40M	0	150-250	
40-70M	0	250-400	0	40-70M	25	250-400	
70-100M	0	400-600	0	70-100M	73	400-600	1
100 UP	1	600 UP	0	100 UP	324	600 UP	9
TOTAL	1		0		422		11

ANSWER ALL QUESTIONS

Yes	No	Explain all "YES" answers.
	X	1. Will special relocation services be necessary?
	X	2. Will schools or churches be affected by displacement?
X		3. Will business services still be available after project?
	X	4. Will any business be displaced? If so, indicate size, type, estimated number of employees, minorities, etc.
	X	5. Will relocation cause a housing shortage?
		6. Source for available housing (list).
	X	7. Will additional housing programs be needed?
	X	8. Should Last Resort Housing be considered?
	X	9. Are there large, disabled, elderly, etc. families?
	X	10. Will public housing be needed for project?
X		11. Is public housing available?
X		12. Is it felt there will be adequate DSS housing housing available during relocation period?
	X	13. Will there be a problem of housing within financial means?
N/A	N/A	14. Are suitable business sites available (list source).
		15. Number months estimated to complete RELOCATION? 6-9

REMARKS (Respond by Number)

3. General businesses are still available in the area due to no business displacees on project.

6. Realtor.com, MLS service, Winston Salem Journal

11. Winston Salem Housing Authority

12. Due to a robust real estate market in Winston Salem and Forsyth County, there will be adequate DSS housing

Notes: Mark on arial plans indicate local historic property. Property appears to be one tract with two houses located on it. The local historic house is in need of repair and appears to be vacant.

Heather Fuller — Right of Way Agent
8-17-04 — Date

Relocation Coordinator — Date

FRM15-E Revised 09-02

Original & 1 Copy: Relocation Coordinator
2 Copy Division Relocation File

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

Michael F. Easley
GOVERNOR

Lyndo Tippett
SECRETARY

September 8, 2004

MEMORANDUM TO: Mr. Gregory J. Thorpe, Ph.D., Director
Project Development and Environmental Analysis Branch

ATTENTION: Karen B. Taylor, PE
Project Development Engineer

FROM: Njoroge W. Wainaina, PE
State Geotechnical Engineer

TIP NO. B-4112
WBS 33467.1.1
FEDERAL PROJECT: BRZ-1631 (2)
COUNTY: Forsyth
DESCRIPTION: Bridge # 30 over Muddy Creek on SR 1631

SUBJECT: Geotechnical Pre-Scoping Report

The Geotechnical Engineering Unit performed a limited pre-scoping investigation of the above reference project to provide an early identification of any Geotechnical and GeoEnvironmental issues that might impact the project's planning, design or construction. The following information summarizes our findings.

GEOENVIRONMENTAL ISSUES

Purpose

This report presents the results of a GeoEnvironmental Impact Evaluation conducted along the above referenced project. The main purpose of this investigation is to identify properties within

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL ENGINEERING UNIT
1589 MAIL SERVICE CENTER
RALEIGH NC 27699-1589

TELEPHONE: 919-250-4088
FAX: 919-250-4237

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC

the project study area that are or may be contaminated and therefore result in increased project costs and future liability if acquired by the Department. GeoEnvironmental impacts may include, but are not limited to, active and abandoned underground storage tank (UST) sites, hazardous waste sites, regulated landfills and unregulated dumpsites.

Techniques/Methodologies Used

The Geographical Information System (GIS) was consulted to identify known environmentally impacting sites in relation to the project corridor. GeoEnvironmental Section personnel conducted a field reconnaissance survey along the project corridor on April 26, 2004.

Findings

Underground Storage Tank (UST) Facilities

Based on our study, there are no UST sites identified within the project limits.

Hazardous Waste Sites

No Hazardous Waste Sites were identified within the project limits.

Land Fills

No apparent landfills were identified within the project limits.

Other GeoEnvironmental Concerns

No additional sites were encountered within the project limits.

Anticipated Impacts

We anticipate no monetary or scheduling impacts resulting from contaminated properties within the project limits.

The GeoEnvironmental Section observed no additional contaminated properties during the field reconnaissance and regulatory agencies' records search. Please note that discovery of additional sites not recorded by regulatory agencies and not reasonably discernable during the project

reconnaissance may occur. The GeoEnvironmental Section should be notified immediately after discovery of such sites so their potential impact(s) may be assessed.

If there are any questions regarding these or other GeoEnvironmental issues on the project, please contact Cyrus Parker, LG at (919)-250-4088.

GEOTECHNICAL ISSUES

Techniques and Methodologies

The geotechnical investigation consisted of a reconnaissance and one Standard Penetration Test boring. The boring was conducted in the northeastern quadrant, on the shoulder of the existing road.

Findings

The test boring found about 14 feet of clayey roadway fill , 6 feet of alluvial sand, and 10 feet of residual soil. The residual soil was very stiff to hard micaceous silt that changed abruptly to hard rock at a depth of 28 feet below the collar elevation. The collar was about 16 feet above the streambed elevation.

There is a pond in the southeast (downstream left) quadrant.

Anticipated Impacts

No significant geotechnical impacts were noted. Avoiding the pond is preferable. End bent piles and interior drilled shaft foundations are most likely.

If there are any questions regarding these Geotechnical comments, please contact Clint Little, L.G., or John Pilipchuk, L.G., P.E., at (704)-455-8902.

NWW/CFP/CBL/dbm