STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

November 7, 2003

Mr. William D. Gilmore, P.E.
EEP Transition Manager
Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652

Dear Sir:

Subject: Proposed replacement of Bridge No. 273 over Middle Creek on SR 1006, Wake County. WBS Element 33130.1.1, Federal Aid No. BRZ-1006(13), State Project No. 8.2407501; TIP Project No. B-3521.

The purpose of this letter is to request that the North Carolina Ecosystem Enhancement Program (EEP) provide confirmation that you are willing to provide compensatory mitigation for the project in accordance with the Memorandum of Agreement (MOA) signed July 22, 2003 by the USACE, the NCDENR and the NCDOT.

The North Carolina Department of Transportation (NCDOT) proposes to replace Bridge No. 273 on SR 1006 over Middle Creek at its existing location. The existing 3 span, 105.6 ft long, 24.5 ft wide bridge will be replaced by a 3 span, 157 ft long, 33 ft wide bridge. A temporary detour bridge (185 ft long) will be located just to the west (upstream) of SR 1006. The existing roadway approaches, which consist of two 12 ft lanes, will be replaced with two 12 ft lanes with 8 ft shoulders. Four feet of the shoulder area will be paved and 4 ft will be turf. At this location, Middle Creek is in the Neuse River Basin and is classified as C-NSW.

RESOURCES UNDER THE JURISDICTION OF SECTION 404 AND 401 OF THE CLEAN WATER ACT.

We have avoided and minimized the impacts to jurisdictional resources to the greatest extent possible as described in the permit application. A copy of the permit application can be found at http://www.ncdot.org/planning/pe/naturalunit/Applications.html. The remaining impacts to jurisdictional resources will be compensated for by mitigation provided by the EEP program. We estimate that permanent wetland impacts associated with the replacement bridge approach work will be 0.233 acre (which consists of 0.047 acre of fill and 0.186 acre of mechanized clearing).

The project is located in the Central Piedmont Physiographic Province in Wake County in the 03-04-03 subbasin of the Neuse River basin in Hydrological Cataloguing Unit 03020201. The wetlands impacted are non-riverine, scrub-shrub wetlands. We propose to provide compensatory mitigation for the wetland impacts by using the EEP for the 0.233 acre of impacts.

Please send the letter of confirmation to Mr. Eric Alsmeyer (USACE Coordinator) at U. S. Army Corps of Engineers Raleigh Regulatory Field Office, 6508 Falls of the Neuse Road/Suite 120, Raleigh, NC 27615. Mr. Alsmeyer's FAX number is (919)876-5823. The current let date for the project is April 20, 2004 for which the let review date is March 02, 2004.

If you have any questions or need additional information please call Ms. Elizabeth Lusk at (919)715-1444.

Sincerely,

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

GJT/hwm

cc: w/attachment
Mr. John Dorney, Division of Water Quality
Mr. Travis Wilson, NCWRC
Mr. Greg Perfetti, P.E., Structure Design
Mr. Gary Jordan, USFWS
Mr. David Franklin, USACE, Wilmington
Mr. Jay Bennett, P.E., Roadway Design
Mr. Omar Sultan, Programming and TIP
Ms. Debbie Barbour, P.E., Hwy Design
Mr. David Chang, P.E., Hydraulics
Mr. Mark Staley, REU
Mr. Jon Nance, P.E., Division Engineer
Mr. Chris Murray, Division DEO
Mr. John Conforti, PDEA

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MICHAEL F. EASLEY
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SECRETARY

November 7, 2003

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

ATTENTION: Mr. Eric Alsmeyer
NCDOT Coordinator

SUBJECT: Nationwide Permit 23 and 33 Application for the proposed replacement of Bridge No. 273 over Middle Creek on SR 1006, NCDOT Division 5, Wake County. Federal Aid No. BRZ-1006(13), State Project No. 8.2407501; TIP Project No. B-3521.

Dear Sir:

Please find the enclosed PCN form, CE document, project site map, permit drawings, and roadway design plan sheets. The North Carolina Department of Transportation (NCDOT) proposes to replace Bridge No. 273 on SR 1006 over Middle Creek at its existing location. The existing 3 span, 105.6 ft long, 24.5 ft wide bridge will be replaced by a 3 span, 157 ft long, 33 ft wide bridge. A temporary detour bridge (185 ft long) will be located just to the west (upstream) of SR 1006. The existing roadway approaches, which consist of two 12 ft lanes, will be replaced with two 12 ft lanes with 8 ft shoulders. Four feet of the shoulder area will be paved and 4 ft will be turf. At this location, Middle Creek is in the Neuse River Basin and is classified as C-NSW.

PROPOSED IMPACTS

No permanent impacts to Middle Creek [DWQ Index No. 27-43-15-(4)] will result from the proposed project. However, 0.004 ac of temporary impacts will result from the placement of the proposed rip rap work pad. Both the replacement bridge and the temporary detour bridge are spanning structures. Therefore, no bents will be placed in Middle Creek. Permanent wetland impacts associated with the replacement bridge approach work total 0.233 acre (which consists of 0.047 acre of fill and 0.186 acre of mechanized clearing). Temporary wetland impacts total 0.053 acre fill associated with the detour approach work. Additional impacts from mechanized clearing beyond the 10 ft line is required for utility installation along the right side (east side) of the project (see summary sheet for a break down of impacts). Time Warner Cable will be performing a

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

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

WEBSITE: www. NCDOT.ORG

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

directional bore under the creek beginning at approximate station 15+00 and ending at approximate station 18+50. This activity will be kept inside the proposed right of way limits. Time Warner Cable will then trench cable from approximate station 18+50 to the end of the project. This trenching process will go through the edge of the Site 1 wetland and is therefore considered as part of the permanent impacts listed above. This utility installation activity will not result in any impacts to riparian buffers.

Restoration Plan:

The material used for installation of the temporary work pad and detour approach within wetlands, buffers, and surface waters will be removed after its purpose has been served. The temporary fill areas will be restored to their original contours. Elevations and contours in the vicinity of the proposed work pad and detour bridge are available from field survey notes. The project schedule calls for an April 20, 2004 let date. It is expected that the contractor will choose to begin construction of the temporary detour and work pad shortly after that date. After the temporary fill is no longer needed, the contractor will use excavating equipment to remove all material within jurisdictional areas. All material will become the property of the contractor. The contractor will be required to submit a reclamation plan for removal of and disposal of all material off-site.

WETLAND MITIGATION OPTIONS

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

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

1) The maximum span for a cored slab bridge was used in order to keep bents out of the main channel.
2) The proposed detour structure was lengthened to 185 ft to avoid impacts to an upstream tributary to Middle Creek.
3) Embankment fill slopes of 2:1 were used to lessen the roadway fill in wetlands.
4) No deck drains will be installed in the bridge.
5) Pre-form scour holes with level spreader aprons were utilized at the NW end of the bridge.
6) Grass swales are proposed instead of typical roadway ditches.

Pipe systems are proposed to drain off-site water through the project so that the proposed grass swales can function as they were designed.

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

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

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

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

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

Since the subject project is listed in Exhibit 1, the necessary compensatory mitigation to offset unavoidable impacts to waters that are jurisdictional under the federal Clean Water Act will be provided by the EEP. The offsetting mitigation will derive from an inventory of assets already in existence within the same 8-digit cataloguing unit. The Department has avoided and minimized impacts to jurisdictional resources to the greatest extent possible as described above. The remaining, unavoidable impacts to 0.233 acre of jurisdictional wetlands will be offset by compensatory mitigation provided by the EEP program.

NEUSE RIVER BASIN BUFFER RULES

This project is located in the Neuse River Basin (subbasin 03-04-03, HUC 03020201), therefore the regulations pertaining to the buffer rules apply. Buffer impacts associated with this project total 10,323 sq ft (0.237 acre) for Zone 1 and 6,403 sq ft (0.146 acre) for Zone 2. According to the buffer rules, temporary roads for bridge construction are ALLOWABLE. Uses designated as allowable may proceed within the riparian buffer provided that there are no practical alternatives to the requested use pursuant to Item (8) of this Rule. These uses require written authorization from the Division or the delegated local authority. Therefore, NCDOT requests written authorization for a Buffer Certification from the Division of Water Quality.

FEDERALY-PROTECTED SPECIES

Plants and animals with federal classifications of Endangered, Threatened, Proposed Endangered, and Proposed Threatened are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. As of January 29, 2003, the United States Fish and Wildlife Service lists four federally protected species for Wake County: bald eagle, red-cockaded woodpecker, dwarf wedge mussel, and Michaux's sumac. As reported in the attached CE document, biological conclusions of "No Effect" were rendered for bald eagle, red-cockaded woodpecker, and Michaux's sumac based on the lack of suitable habitat. Habitat for dwarf wedge mussel does exist within the project area. During surveys, the project site was observed to be somewhat degraded due to sediment and no dwarf wedge mussels were found near the project site. However, NCNHP records indicate an occurrence within 2 miles downstream from the project site. Provided that the provisions listed in the CE's "Special Project Commitments" green sheet are adhered to, it can be concluded that project construction is Not Likely to Adversely Affect the dwarf wedgemussel.

REGULATORY APPROVALS

It is anticipated that the temporary work pad and detour bridge will be authorized under Section 404 Nationwide Permit 33. We are, therefore, requesting the issuance of a Nationwide Permit 33 for these activities. It is anticipated that the utility installation work will be authorized under Section 404 Nationwide Permit 12. We are, therefore, requesting the issuance of a Nationwide Permit 12 for these activities. All other aspects of this project are being processed by the Federal Highway Administration as a "Categorical Exclusion" in accordance with 23 CFR § 771.115(b). The NCDOT requests that these activities be authorized by a Nationwide Permit 23 (FR number 10, pages 2020-2095; January 15, 2002). We anticipate 401 General Certifications numbers 3403, 3366, and 3374 will apply to this project. In accordance with 15A NCAC 2H .0501(a) we are providing two copies of this application to the North Carolina Department of Environment and Natural Resources, Division of Water Quality, for their records. NCDOT also requests written authorization for a Buffer Certification from the Division of Water Quality.

Thank you for your assistance with this project. If you have any questions or need additional information please call Ms. Elizabeth Lusk at (919)715-1444.

Sincerely,

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

GJT/hwm

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

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Mr. Jay Bennett, P.E., Roadway Design
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Mr. David Chang, P.E., Hydraulics
Mr. Mark Staley, REU
Mr. Jon Nance, P.E., Division Engineer
Mr. Chris Murray, DEO
Mr. John Conforti, PDEA

Office Use Only: Form Version May 2002

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

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

I. Processing

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

2. Nationwide, Regional or General Permit Number(s) Requested: NWP 23 & 33 & 12

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

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

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

II. Applicant Information

1. Owner/Applicant Information
   Name: NCDOT Project Development & Environmental Analysis Branch
   Mailing Address: NCDOT/PDEA
   Attention: Gregory J. Thorpe, Ph.D.
   1548 Mail Service Center
   Raleigh, NC 27699-1548
   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: N/A
   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. 273 over Middle Creek on SR 1006

2. T.I.P. Project Number or State Project Number (NCDOT Only): B-3521

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

4. Location
   County: Wake Nearest Town: Willow Springs/Fuquay-Varina
   Subdivision name (include phase/lot number): N/A
   Directions to site (include road numbers, landmarks, etc.): Page 62 of NC Gazetteer: take I- 40 south of Raleigh to Exit# 312 at Hwy 42. Take Hwy 42 West towards Willow Springs/ Fuquay-Varina, cross from Johnston County, back into Wake County. Pass Rock Service Rd. and Barber Bridge Rd., then make a right onto Old Federal Rd./ Old Stage Road. Bridge No. 273 is the second stream crossing, just past Norman Blalock Road.

5. Site coordinates, if available (UTM or Lat/Long): 35° 36.56'N, 78° 41.19'W
   (Note – If project is linear, such as a road or utility line, attach a sheet that separately lists the coordinates for each crossing of a distinct waterbody.)

6. Property size (acres): approximately 4 acres (~1,400 project ft x ~120 ft ROW)

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

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

9. Describe the existing conditions on the site and general land use in the vicinity of the project at the time of this application: Existing land uses include forested and maintained communities. The area has a mixture of residential and undeveloped landuse. SR 1006, a Rural Minor Collector, runs through the project area with Bridge No. 273 serving residential uses.

10. Describe the overall project in detail, including the type of equipment to be used: NCDOT proposes to replace Bridge No. 273 on SR 1006 over Middle Creek at it's existing location. The existing 3 span, 105.6 ft long, 24.5 ft wide bridge will be replaced with by a 3-span, 157 ft long, 33 ft wide bridge. A temporary detour bridge (185 ft long) will be located just to the west (upstream) of SR 1006. The existing roadway approaches, which consist of two 12 ft lanes, will be replaced with two 12 ft lanes with 8 ft shoulders. Four feet of the shoulder area will be paved and 4 ft will be turf.

Heavy duty construction equipment will be used during construction.

11. Explain the purpose of the proposed work: public transportation

IV. Prior Project History

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

N/A

V. Future Project Plans

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

N/A

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

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to wetlands, open water, and stream channels associated with the project. The applicant must also provide justification for these impacts in Section VII below. All proposed impacts, permanent and temporary, must be listed herein, and must be clearly identifiable on an accompanying site plan. All wetlands and waters, and all streams (intermittent and perennial) must be shown on a delineation map, whether or not impacts are proposed to these systems. Wetland and stream evaluation and delineation forms should be included as appropriate. Photographs may be included at the applicant's discretion. If this proposed impact is strictly for wetland or stream mitigation, list and describe the impact in Section VIII below. If additional space is needed for listing or description, please attach a separate sheet.

1. Provide a written description of the proposed impacts: The replacement bridge and detour bridge approach work will result in 0.047 ac of permanent fill in wetlands and 0.186 ac of mechanized clearing in wetlands. An additional 0.053 ac of temporary fill in wetlands will result from the detour approach fill work. To facilitate construction, a work pad will be necessary. Temporary surface water impacts associated with the work pad will 0.004 ac.

2. Individually list wetland impacts below:

Wetland Impact Site Number (indicate on map)	Type of Impact*	Area of Impact (acres)	Located within 100-year Floodplain** (yes/no)	Distance to Nearest Stream (linear feet)	Type of Wetland***
1	approach fill and mechanized clearing	0.139	Yes	180	scrub-shrub
2	approach fill and mechanized clearing	0.064	Yes	450	scrub-shrub
3	Temporary detour approach fill and mechanized clearing	0.083	Yes	450	scrub-shrub

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

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

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

List the total acreage (estimated) of all existing wetlands on the property: 0.5 acre
Total area of wetland impact proposed: 0.286 ac (of which 0.053 is temporary)

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

Stream Impact Site Number (indicate on map)	Type of Impact*	Length of Impact (linear feet)	Stream Name**	Average Width of Stream Before Impact	Perennial or Intermittent? (please specify)
work pad	temporary	~35ft 0.004 ac fill	Middle Creek	40 ft	Perennial

* List each impact separately and identify temporary impacts. Impacts include, but are not limited to: culverts and associated rip-rap, dams (separately list impacts due to both structure and flooding), relocation (include linear feet before and after, and net loss/gain), stabilization activities (cement wall, rip-rap, crib wall, gabions, etc.), excavation, ditching/straightening, etc. If stream relocation is proposed, plans and profiles showing the linear footprint for both the original and relocated streams must be included.

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

Cumulative impacts (linear distance in feet) to all streams on site: ~35 ft (0.004 ac fill)

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

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

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

5. Pond Creation

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

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

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

N/A

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

N/A

Size of watershed draining to pond:_____ 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.

The maximum span for a cored slab bridge was used in order to keep bents out of the main channel. The proposed detour structure was lengthened to 185 ft to avoid impacts to an upstream tributary. Embankment fill slopes of 2:1 were used to lessen the roadway fill in wetlands. No deck drains will be installed in the bridge. Pre-form scour holes with level spreader aprons were utilized at the NW end of the bridge. Grass swales are proposed instead of typical roadway ditches. Pipe systems are proposed to drain off-site water through the project so that the proposed grass swales can function as they were designed.

VIII. Mitigation

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

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

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

1. Provide a brief description of the proposed mitigation plan. The description should provide as much information as possible, including, but not limited to: site location (attach directions and/or map, if offsite), affected stream and river basin, type and amount (acreage/linear feet) of mitigation proposed (restoration, enhancement, creation, or preservation), a plan view, preservation mechanism (e.g., deed restrictions, conservation easement, etc.), and a

description of the current site conditions and proposed method of construction. Please attach a separate sheet if more space is needed.

N/A

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

   Amount of stream mitigation requested (linear feet): N/A
   Amount of buffer mitigation requested (square feet): N/A
   Amount of Riparian wetland mitigation requested (acres): N/A
   Amount of Non-riparian wetland mitigation requested (acres): amount that will cover 0.233 ac of total wetland impacts (0.047 acre fill and 0.186 acre mechanized clearing).
   Amount of Coastal wetland mitigation requested (acres): N/A

IX. Environmental Documentation (required by DWQ)

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

Yes ☒ No ☐

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

Yes ☒ No ☐

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

Yes ☒ No ☐

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

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

Regional Office may be included as appropriate. Photographs may also be included at the applicant's discretion.

Will the project impact protected riparian buffers identified within 15A NCAC 2B .0233 (Neuse), 15A NCAC 2B .0259 (Tar-Pamlico), 15A NCAC 2B .0250 (Randleman Rules and Water Supply Buffer Requirements), or other (please identify_____)?
Yes ☒ No ☐ If you answered "yes", provide the following information:

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

Zone*	Impact (square feet)	Multiplier	Required Mitigation
1	Perm: 7,971	3	N/A
	Temporary 2,352		
2	Perm: 5,009	1.5	N/A
	Temporary 1,394		
Total	Perm: 10,323		N/A
	Temporary: 6,403		

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

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

XI. Stormwater (required by DWQ)

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

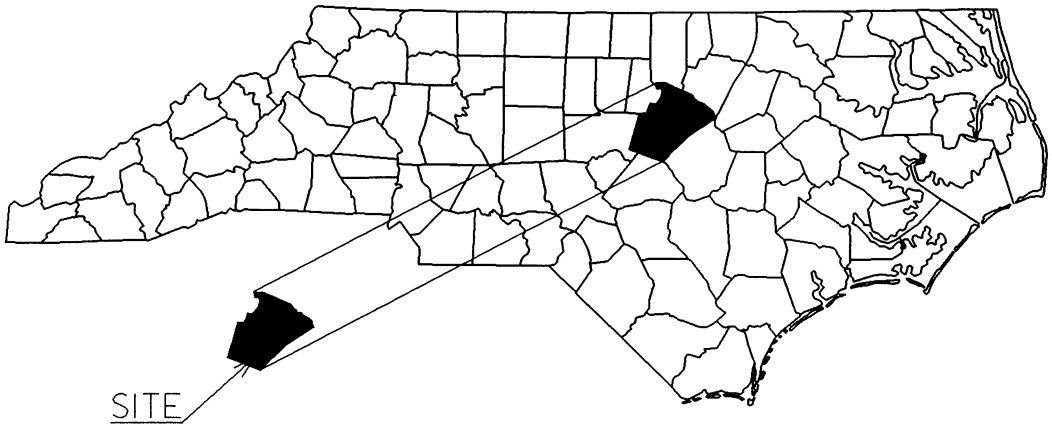
N/A

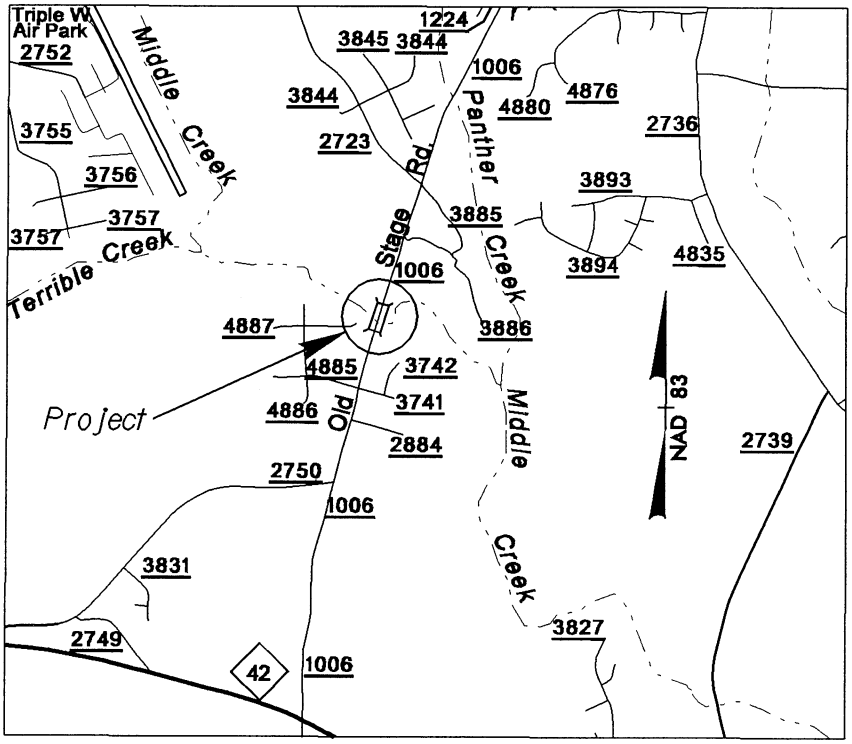
11/7/03

Applicant/Agent's Signature **Date**

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

NORTH CAROLINA





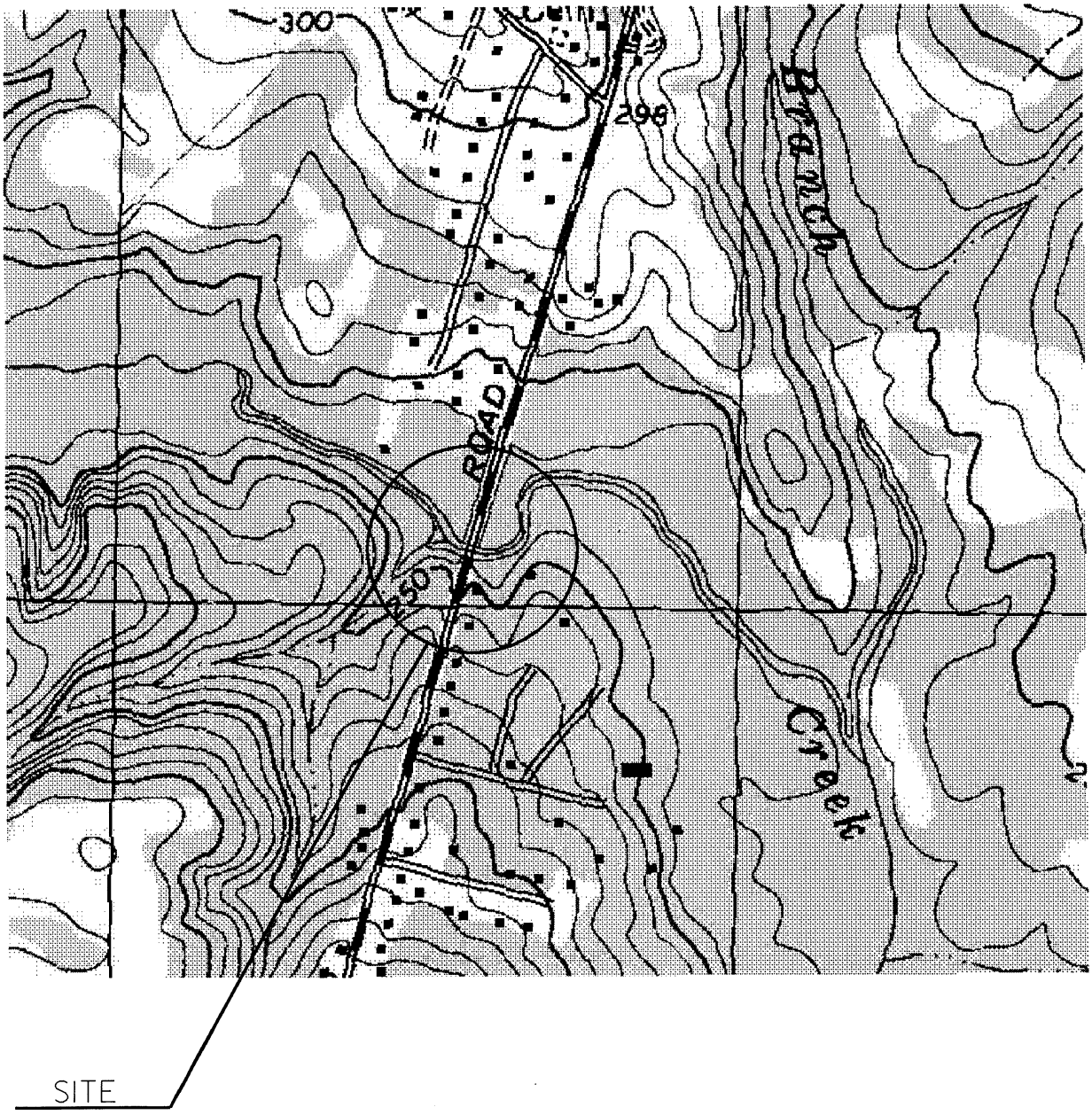
WETLAND IMPACT VICINITY MAPS

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

PROJECT: 8.2407501 (B-3521)

SR 1006 (OLD STAGE ROAD)

SHEET 1 OF 6



NOT TO SCALE

ANGIER QUAD MAP

WETLAND IMPACT VICINITY MAPS

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

PROJECT: 8.2407501 (B-3521)

SR 1006 (OLD STAGE ROAD)

WETLAND LEGEND

WLB WETLAND BOUNDARY

WETLAND

F F DENOTES FILL IN WETLAND

S S DENOTES FILL IN SURFACE WATER

P P DENOTES FILL IN SURFACE WATER (POND)

T T DENOTES TEMPORARY FILL IN WETLAND

E E DENOTES EXCAVATION IN WETLAND

TS TS DENOTES TEMPORARY FILL IN SURFACE WATER

DENOTES MECHANIZED CLEARING

FLOW DIRECTION

TB TOP OF BANK

WE EDGE OF WATER

C PROP. LIMIT OF CUT

F PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG NATURAL GROUND

PL PROPERTY LINE

TDE TEMP. DRAINAGE EASEMENT

PDE PERMANENT DRAINAGE EASEMENT

EAB EXIST. ENDANGERED ANIMAL BOUNDARY

EPB EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

CORE FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

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

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE

LEVEL SPREADER (LS)

DITCH / GRASS SWALE

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

PROJECT: 8.2407501 (B-3521)

SR 1006 (OLD STAGE ROAD)

SHEET 3 OF 6 4/7/03

PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES
1	GOOD, NORMAN L.	3004 ERIC STREET WILLOW SPRING, NC 27592
2	ASWORTH, TSUTOMU	1507 MIDDLE RIDGE DRIVE WILLOW SPRING, NC 27592
3	GOLIGHTLY III, SAMUEL I	1503 MIDDLE CREEK WILLOW SPRING, NC 27592
4	ROWLAND, LOIS T.	10948 STAGE ROAD RALEIGH, NC 27603
5	BOWLING, J. TRACY	PO BOX 1156 ATLANTIC BEACH, NC 28512
6	BROOKS, HENRY VANCE	11033 OLD STAGE ROAD WILLOW SPRING, NC 27592
7	STRICKLAND, PHILIP K.	1221 VANNSTONE DRIVE RALEIGH, NC 27603

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

PROJECT: 8.2407501 (B-3521)

SR 1006 (OLD STAGE ROAD)

GRASS SWALE DATA-14+00 TO 16+00LT-L-

DA= 1.24ac MINIMUM LENGTH OF SWALE= 124 ft	
SWALE LENGTH PROVIDED=200ft	
LONGITUDINAL SLOPE= 4% SIDE SLOPES =3:1	
Q2=2.3cfs	Q10= 3.0cfs
V2= 1.7ft/s	V10= 1.9ft/s
D2= 0.7ft	D10= 0.7ft

GRASS SWALE DATA-13+00 TO 13+59RT-L-

DA= 0.17ac MINIMUM LENGTH OF SWALE= 17 ft	
SWALE LENGTH PROVIDED=59 ft	
LONGITUDINAL SLOPE= 4% SIDE SLOPES >/=3:1	
Q2=0.4 cfs	Q10= 0.5 cfs
V2=0.5 ft/s	V10= 0.6 ft/s
D2=0.3 ft	D10= 0.3 ft

GRASS SWALE DATA-17+74 TO 20+50LT-L-

DA= .52ac MINIMUM LENGTH OF SWALE= 52ft	
SWALE LENGTH PROVIDED=236FT	
LONGITUDINAL SLOPE= .2% SIDE SLOPES =3:1	
Q2= 1.0cfs	Q10= 1.3cfs
V2= .26ft/s	V10= .30ft/s
D2= .9ft	D10= .9ft

GRASS SWALE DATA-14+65 TO 15+00RT-L-

DA=0.34 ac MINIMUM LENGTH OF SWALE= 35 ft	
SWALE LENGTH PROVIDED=35 ft	
LONGITUDINAL SLOPE= 4% SIDE SLOPES >/=3:1	
Q2=0.7 cfs	Q10= 0.9 cfs
V2=0.8 ft/s	V10= 0.9 ft/s
D2=0.3 ft	D10= 0.3 ft

GRASS SWALE DATA-13+50 TO 14+00LT-L-

DA=0.42 ac MINIMUM LENGTH OF SWALE= 42 ft	
SWALE LENGTH PROVIDED=50 ft	
LONGITUDINAL SLOPE= 4% SIDE SLOPES >/=3:1	
Q2=0.9 cfs	Q10= 1.1cfs
V2=0.8 ft/s	V10= 1.0 ft/s
D2=0.3 ft	D10= 0.3 ft

SWALE DATA

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

PROJECT: 8.2407501 (B-3521)

SR 1006 (OLD STAGE ROAD)

SHEET 5 OF 6

4/7/03

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: Fill In Wetlands (ac)	WETLAND IMPACTS: Temp. Fill In Wetlands (ac)	WETLAND IMPACTS: Excavation In Wetlands (ac)	WETLAND IMPACTS: Mechanized Clearing (Method III) (ac)	SURFACE WATER IMPACTS: Fill In SW (Natural) (ac)	SURFACE WATER IMPACTS: Fill In SW (Pond) (ac)	SURFACE WATER IMPACTS: Temp. Fill In SW (ac)	SURFACE WATER IMPACTS: Existing Channel Impacted (ft)	SURFACE WATER IMPACTS: Natural Stream Design (ft)
1	18+82 TO 22+25-L-	BRIDGE APPROACH FILL	0.009			0.060					
		UTILITY INSTALLATION				0.07 →	Additional impact beyond 10ft is requied for utility installation				
2	21+49 TO 22+60-L-	BRIDGE APPROACH FILL	0.038			0.026					
3	21+40 TO 22+84-Det-	DETOUR APPROACH FILL		*0.053		0.03	*Temp.Fill Impact area overlaps -L- mechanized clearing. Use				
							.027ac for impact area outside of -L- mechanized clearing.				
	17+23 TO 17+31-L-	WORK PAD-L-							0.004		
TOTALS:			0.047	*.053	0	0.186	0	0	0.004	0	0

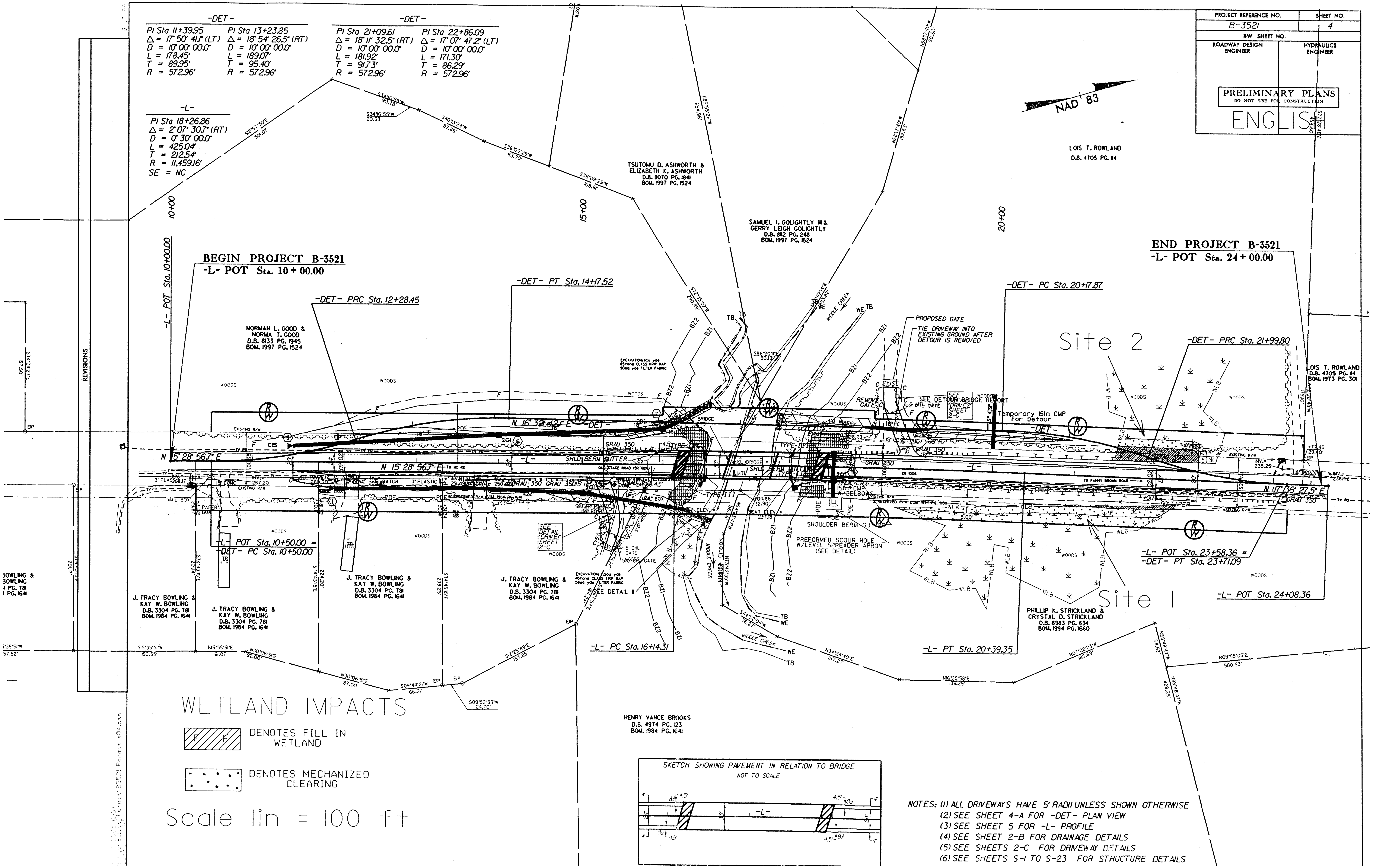
NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT 8.2407501 B-3521

SHEET 6 OF 6 4/7/03

Form Revised 3/22/01

Rev. 10-23-03



PROJECT REFERENCE NO. B-3521
SHEET NO. 4
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
ENGLISH
NAD 83
-DET-
PI Sta 11+39.95
Δ = 17° 50' 41.1" (LT)
D = 10° 00' 00.0"
L = 178.45'
T = 89.95'
R = 572.96'
PI Sta 13+23.85
Δ = 18° 54' 26.5" (RT)
D = 10° 00' 00.0"
L = 189.07'
T = 95.40'
R = 572.96'
-DET-
PI Sta 21+09.61
Δ = 18° 11' 32.5" (RT)
D = 10° 00' 00.0"
L = 181.92'
T = 91.73'
R = 572.96'
PI Sta 22+86.09
Δ = 17° 07' 47.2" (LT)
D = 10° 00' 00.0"
L = 171.30'
T = 86.29'
R = 572.96'
-L-
PI Sta 18+26.86
Δ = 2° 07' 30.7" (RT)
D = 0° 30' 00.0"
L = 425.04'
T = 212.54'
R = 11,459.16'
SE = NC
BEGIN PROJECT B-3521
-L- POT Sta. 10+00.00
END PROJECT B-3521
-L- POT Sta. 24+00.00
-DET- PRC Sta. 12+28.45
-DET- PT Sta. 14+17.52
-DET- PC Sta. 20+17.87
-DET- PRC Sta. 21+99.80
-L- POT Sta. 10+50.00 =
-DET- PC Sta. 10+50.00
-L- PC Sta. 16+14.31
-L- PT Sta. 20+39.35
-L- POT Sta. 23+58.36 =
-DET- PT Sta. 23+71.09
-L- POT Sta. 24+08.36
N 15° 28' 56.7" E
N 16° 32' 42" E
N 17° 36' 27.5" E
Site 2
Site 1
TSUTOMU D. ASHWORTH &
ELIZABETH K. ASHWORTH
D.B. 8070 PG. 1841
BOM. 1997 PG. 1524
SAMUEL I. GOLIGHTLY III &
GERRY LEIGH GOLIGHTLY
D.B. 812 PG. 248
BOM. 1997 PG. 1524
LOIS T. ROWLAND
D.B. 4705 PG. 14
NORMAN L. GOOD &
NORMA T. GOOD
D.B. 8133 PG. 1945
BOM. 1997 PG. 1524
J. TRACY BOWLING &
KAY W. BOWLING
D.B. 3304 PG. 781
BOM. 1984 PG. 1641
PHILLIP K. STRICKLAND &
CRYSTAL D. STRICKLAND
D.B. 8983 PG. 634
BOM. 1994 PG. 1660
HENRY VANCE BROOKS
D.B. 4974 PG. 123
BOM. 1984 PG. 1641
MIDDLE CREEK
PROPOSED GATE
TIE DRIVEWAY INTO EXISTING GROUND AFTER DETOUR IS REMOVED
SEE DETOUR BRIDGE REPORT
Temporary 15in CMP For Detour
PREFORMED SCOUR HOLE W/LEVEL SPREADER APRON (SEE DETAIL)
SHOULDER BERM GUTTER
REVISIONS
WETLAND IMPACTS
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
Scale 1in = 100 ft
SKETCH SHOWING PAVEMENT IN RELATION TO BRIDGE
NOT TO SCALE
NOTES: (1) ALL DRIVEWAYS HAVE 5' RADII UNLESS SHOWN OTHERWISE
(2) SEE SHEET 4-A FOR -DET- PLAN VIEW
(3) SEE SHEET 5 FOR -L- PROFILE
(4) SEE SHEET 2-B FOR DRAINAGE DETAILS
(5) SEE SHEETS 2-C FOR DRIVEWAY DETAILS
(6) SEE SHEETS S-1 TO S-23 FOR STRUCTURE DETAILS

PROJECT REFERENCE NO.	SHEET NO.
B-3521	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

REVISIONS

8/17/99

-DET-

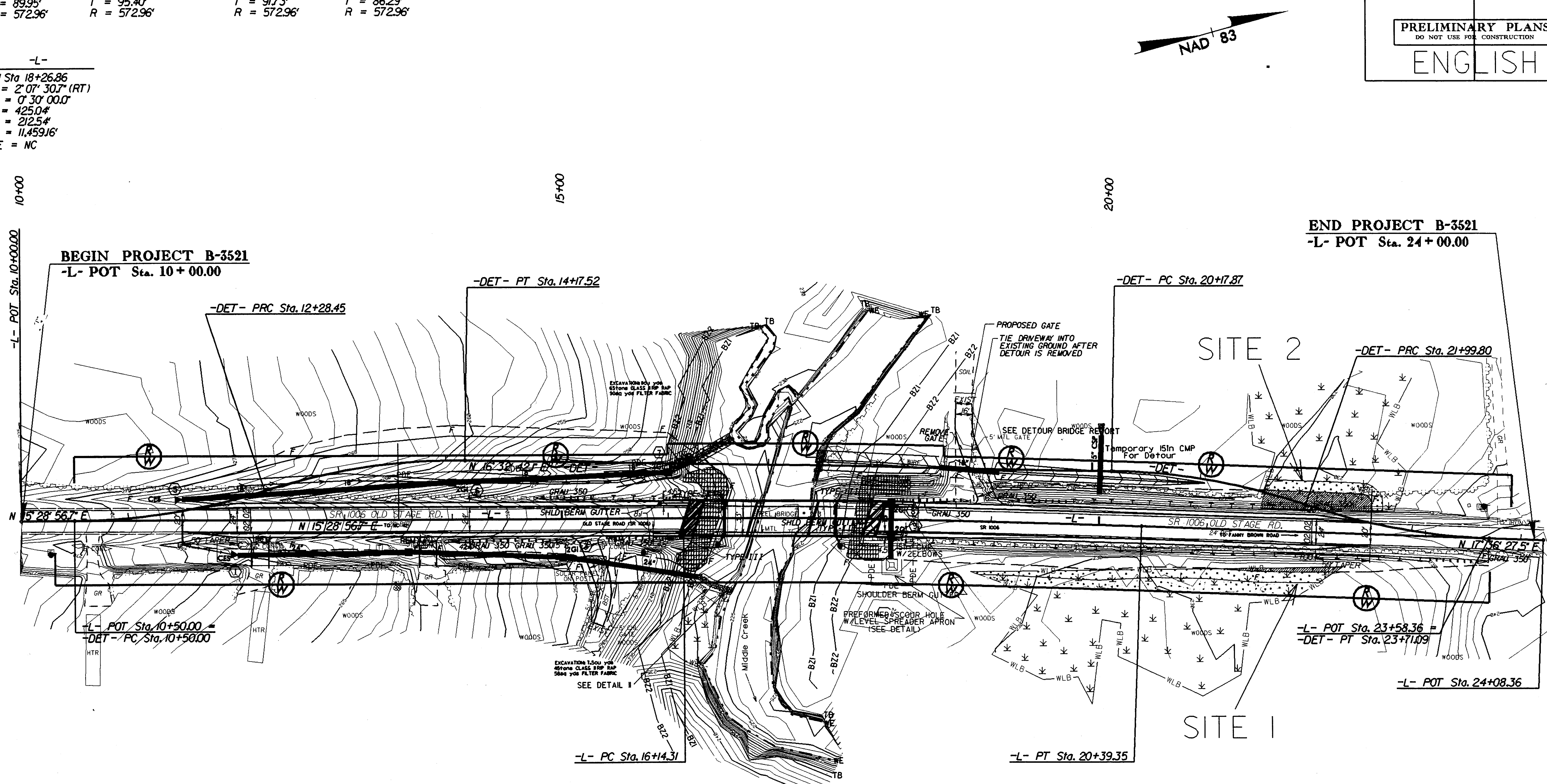
PI Sta 11+39.95	PI Sta 13+23.85
Δ = 17° 50' 41.1" (LT)	Δ = 18° 54' 26.5" (RT)
D = 10° 00' 00.0"	D = 10° 00' 00.0"
L = 178.45'	L = 189.07'
T = 89.95'	T = 95.40'
R = 572.96'	R = 572.96'

-DET-

PI Sta 21+09.61	PI Sta 22+86.09
Δ = 18° 11' 32.5" (RT)	Δ = 17° 07' 47.2" (LT)
D = 10° 00' 00.0"	D = 10° 00' 00.0"
L = 181.92'	L = 171.30'
T = 91.73'	T = 86.29'
R = 572.96'	R = 572.96'

-L-

PI Sta 18+26.86
Δ = 2° 07' 30.7" (RT)
D = 0° 30' 00.0"
L = 425.04'
T = 212.54'
R = 11,459.16'
SE = NC

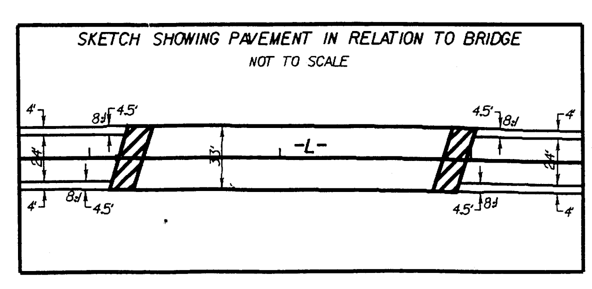


WETLAND IMPACTS

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

Scale 1in = 100 ft



NOTES: (1) ALL DRIVEWAYS HAVE 5' RADII UNLESS SHOWN OTHERWISE
(2) SEE SHEET 4-A FOR -DET- PLAN VIEW
(3) SEE SHEET 5 FOR -L- PROFILE
(4) SEE SHEET 2-A FOR DRAINAGE DETAILS
(5) SEE SHEETS S- TO S- FOR STRUCTURE DETAILS

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8/17/99

REVISIONS

-DET-

PI Sta 11+39.95
Δ = 17° 50' 41.1" (LT)
D = 10° 00' 00.0"
L = 178.45'
T = 89.95'
R = 572.96'

PI Sta 13+23.85
Δ = 18° 54' 26.5" (RT)
D = 10° 00' 00.0"
L = 189.07'
T = 95.40'
R = 572.96'

-DET-

PI Sta 21+09.61
Δ = 18° 11' 32.5" (RT)
D = 10° 00' 00.0"
L = 181.92'
T = 91.73'
R = 572.96'

PI Sta 22+86.09
Δ = 17° 07' 47.2" (LT)
D = 10° 00' 00.0"
L = 171.30'
T = 86.29'
R = 572.96'

-L-

PI Sta 18+26.86
Δ = 2° 07' 30.7" (RT)
D = 0° 30' 00.0"
L = 425.04'
T = 212.54'
R = 11,459.16'
SE = NC

PROJECT REFERENCE NO.	SHEET NO.
B-3521	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

NAD 83

10+00 15+00 20+00

-L- POT Sta. 10+00.00

BEGIN PROJECT B-3521
-L- POT Sta. 10 + 00.00

END PROJECT B-3521
-L- POT Sta. 24 + 00.00

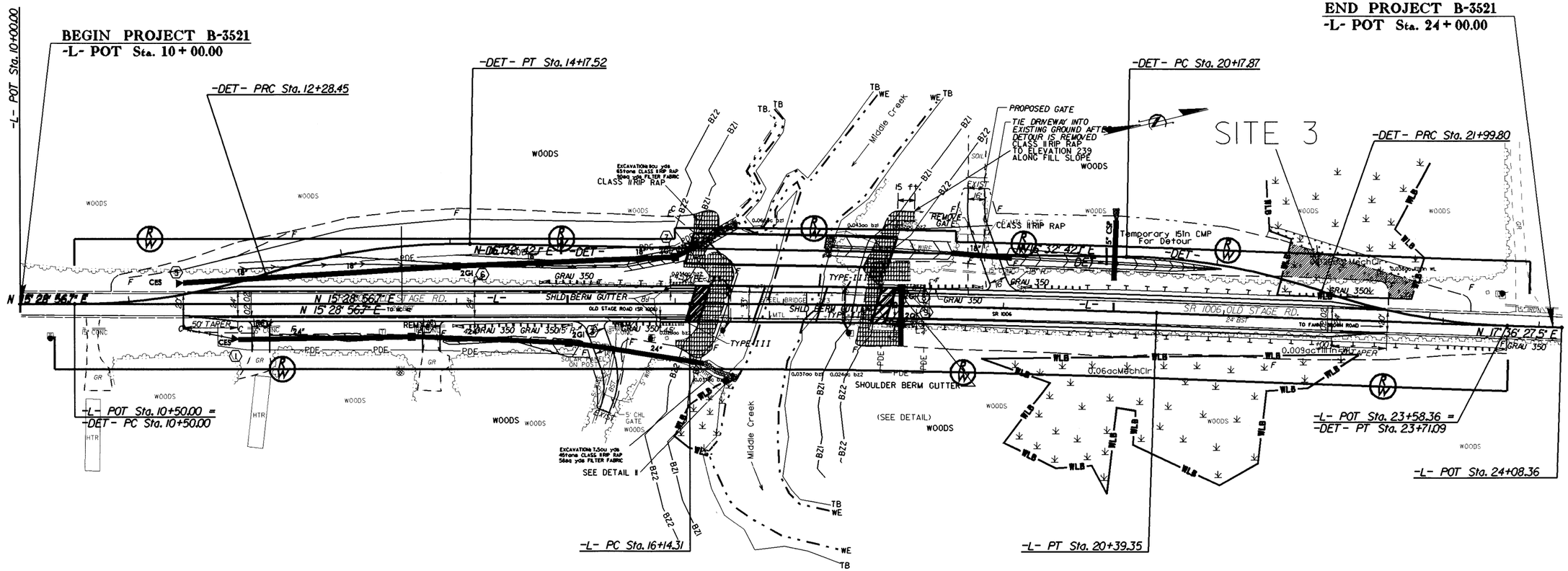
-DET- PRC Sta. 12+28.45

-DET- PT Sta. 14+17.52

-DET- PC Sta. 20+17.87

-DET- PRC Sta. 21+99.80

SITE 3



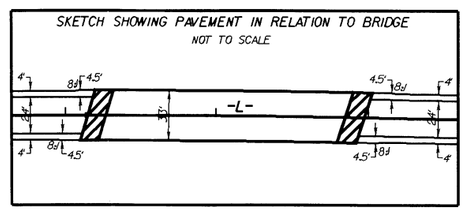
WETLAND IMPACTS-TEMPORARY BRIDGE

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

Scale 1in = 100 ft

SKETCH SHOWING PAVEMENT IN RELATION TO BRIDGE
NOT TO SCALE



NOTES: (1) ALL DRIVEWAYS HAVE 5' RADII UNLESS SHOWN OTHERWISE
(2) SEE SHEET 4-A FOR -DET- PLAN VIEW
(3) SEE SHEET 5 FOR -L- PROFILE
(4) SEE SHEET 2-A FOR DRAINAGE DETAILS
(5) SEE SHEETS S- TO S- FOR STRUCTURE DETAILS

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bzerman

PROJECT REFERENCE NO.	SHEET NO.
B-3521	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

8/17/99

REVISIONS

-DET-

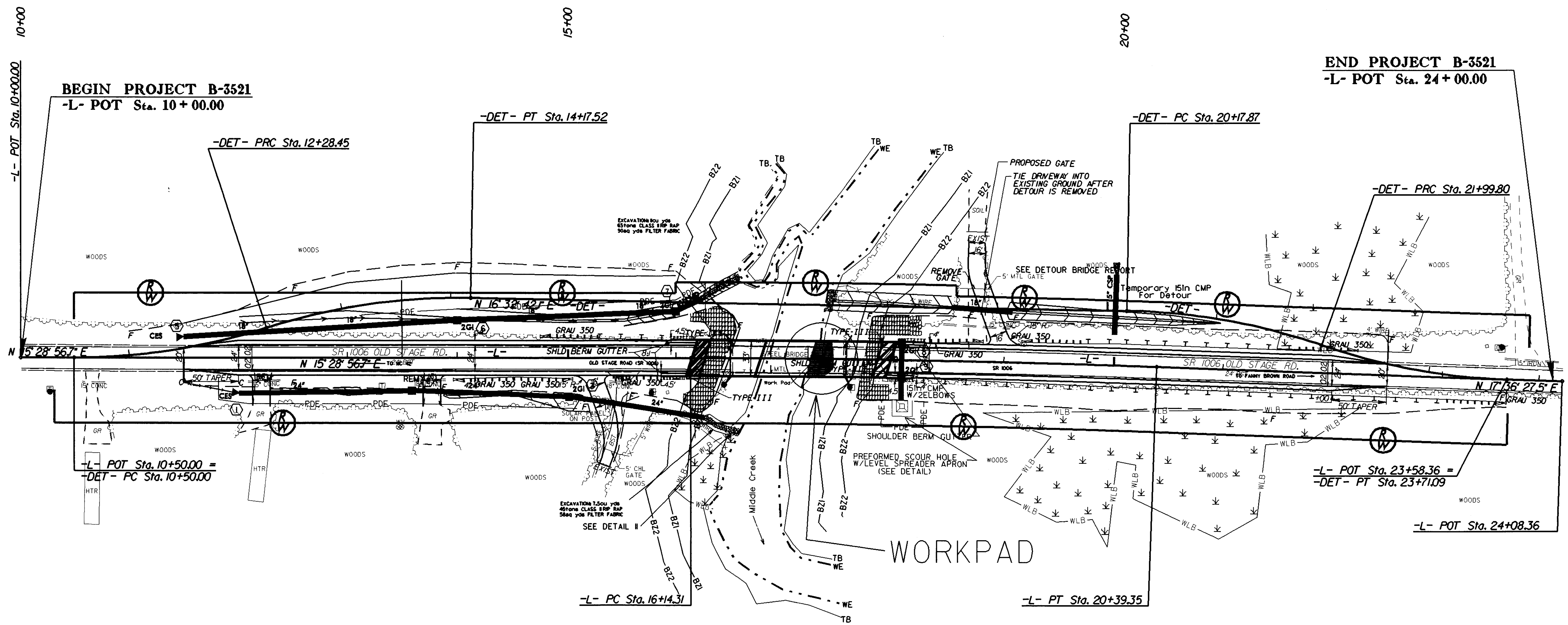
PI Sta 11+39.95	PI Sta 13+23.85
Δ = 17° 50' 41.1" (LT)	Δ = 18° 54' 26.5" (RT)
D = 10° 00' 00.0"	D = 10° 00' 00.0"
L = 178.45'	L = 189.07'
T = 89.95'	T = 95.40'
R = 572.96'	R = 572.96'

-DET-

PI Sta 21+09.61	PI Sta 22+86.09
Δ = 18° 11' 32.5" (RT)	Δ = 17° 07' 47.2" (LT)
D = 10° 00' 00.0"	D = 10° 00' 00.0"
L = 181.92'	L = 171.30'
T = 91.73'	T = 86.29'
R = 572.96'	R = 572.96'

-L-

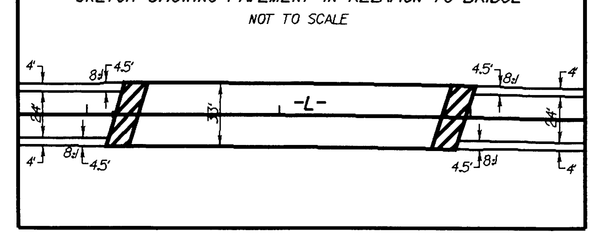
PI Sta 18+26.86
Δ = 2° 07' 30.7" (RT)
D = 0° 30' 00.0"
L = 425.04'
T = 212.54'
R = 11,459.16'
SE = NC



WORKPAD

Scale 1in = 100 ft

SKETCH SHOWING PAVEMENT IN RELATION TO BRIDGE
NOT TO SCALE



NOTES: (1) ALL DRIVEWAYS HAVE 5' RADII UNLESS SHOWN OTHERWISE
(2) SEE SHEET 4-A FOR -DET- PLAN VIEW
(3) SEE SHEET 5 FOR -L- PROFILE
(4) SEE SHEET 2-A FOR DRAINAGE DETAILS
(5) SEE SHEETS S- TO S- FOR STRUCTURE DETAILS

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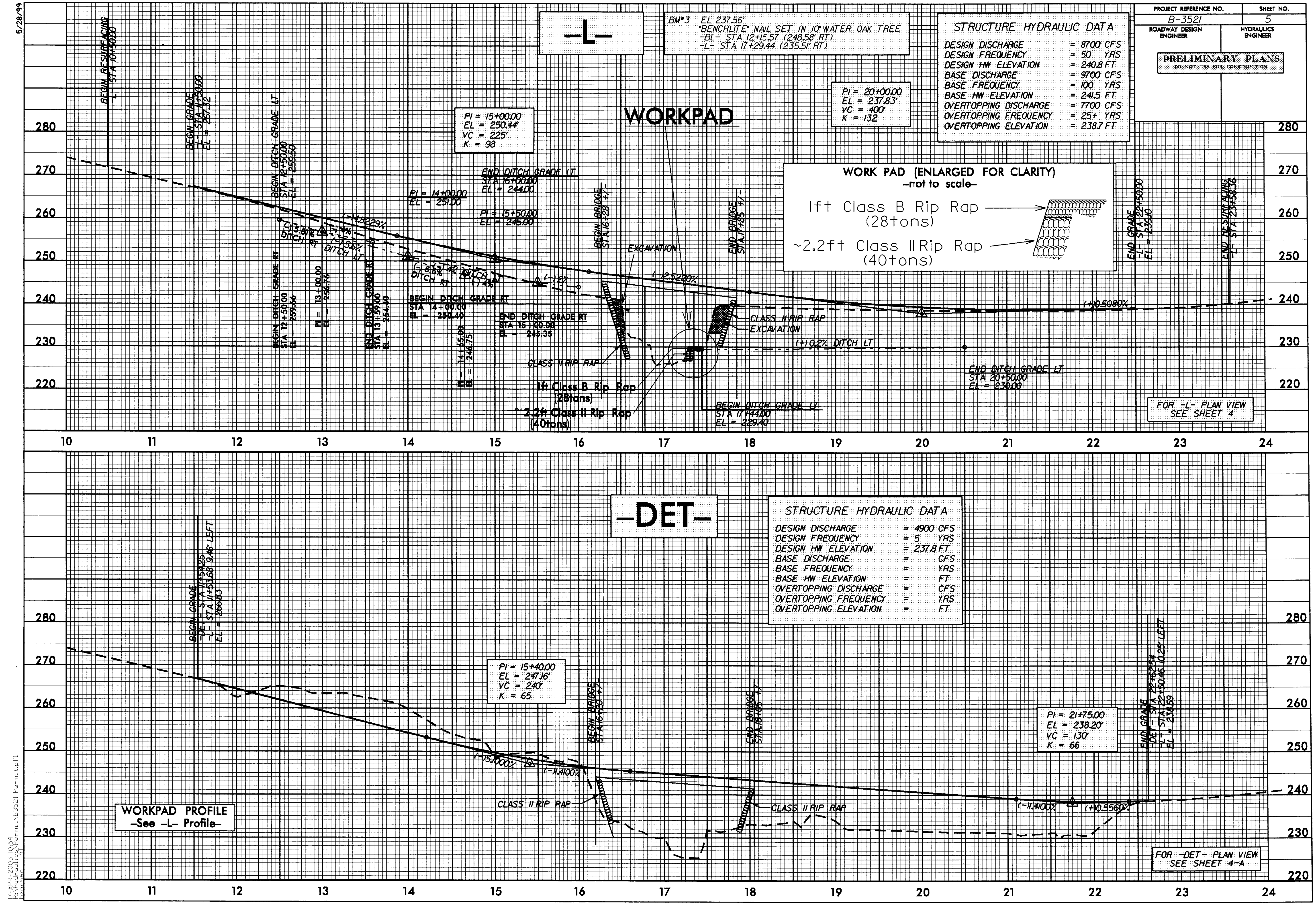

5/28/99
PROJECT REFERENCE NO.
B-3521
SHEET NO.
5
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
-L-
BM#3 EL 237.56'
"BENCHLITE" NAIL SET IN 10" WATER OAK TREE
-BL- STA 12+15.57 (248.58' RT)
-L- STA 17+29.44 (235.51' RT)
STRUCTURE HYDRAULIC DATA
DESIGN DISCHARGE = 8700 CFS
DESIGN FREQUENCY = 50 YRS
DESIGN HW ELEVATION = 240.8 FT
BASE DISCHARGE = 9700 CFS
BASE FREQUENCY = 100 YRS
BASE HW ELEVATION = 241.5 FT
OVERTOPPING DISCHARGE = 7700 CFS
OVERTOPPING FREQUENCY = 25+ YRS
OVERTOPPING ELEVATION = 238.7 FT
WORKPAD
PI = 15+00.00
EL = 250.44'
VC = 225'
K = 98
PI = 20+00.00
EL = 237.83'
VC = 400'
K = 132
BEGIN RESURFACING -L- STA 10+50.00
BEGIN GRADE -L- STA 11+50.00 EL = 267.32
BEGIN DITCH GRADE LT STA 12+50.00 EL = 259.50
END DITCH GRADE LT STA 16+00.00 EL = 244.00
PI = 14+00.00 EL = 251.00
PI = 15+50.00 EL = 245.00
(-)4.8229%
(-)3.81% DITCH RT
(-)5.6% DITCH LT
(-)2%
(-)4%
(-)12.5220%
(+)0.5080%
BEGIN BRIDGE STA 16+28 +/-
END BRIDGE STA 17+85 +/-
EXCAVATION
WORK PAD (ENLARGED FOR CLARITY)
-not to scale-
1ft Class B Rip Rap (28tons)
~2.2ft Class II Rip Rap (40tons)
END GRADE -L- STA 22+50.00 EL = 239.10
END RESURFACING -L- STA 23+58.36
BEGIN DITCH GRADE RT STA 12+50.00 EL = 259.56
PI = 13+00.00 EL = 256.76
END DITCH GRADE RT STA 13+59.00 EL = 254.30
BEGIN DITCH GRADE RT STA 14+00.00 EL = 250.40
PI = 14+55.00 EL = 244.75
END DITCH GRADE RT STA 15+00.00 EL = 245.35
CLASS II RIP RAP
EXCAVATION
(+)0.2% DITCH LT
END DITCH GRADE LT STA 20+50.00 EL = 230.00
CLASS II RIP RAP
1ft Class B Rip Rap (28tons)
~2.2ft Class II Rip Rap (40tons)
BEGIN DITCH GRADE LT STA 17+44.00 EL = 229.40
FOR -L- PLAN VIEW SEE SHEET 4
-DET-
STRUCTURE HYDRAULIC DATA
DESIGN DISCHARGE = 4900 CFS
DESIGN FREQUENCY = 5 YRS
DESIGN HW ELEVATION = 237.8 FT
BASE DISCHARGE = CFS
BASE FREQUENCY = YRS
BASE HW ELEVATION = FT
OVERTOPPING DISCHARGE = CFS
OVERTOPPING FREQUENCY = YRS
OVERTOPPING ELEVATION = FT
BEGIN GRADE -DET- STA 11+54.25 -L- STA 11+53.68 9.46' LEFT EL = 266.83
PI = 15+40.00
EL = 247.16'
VC = 240'
K = 65
BEGIN BRIDGE STA 16+20 +/-
END BRIDGE STA 18+05 +/-
(-)15.7000%
(-)1.4100%
CLASS II RIP RAP
CLASS II RIP RAP
PI = 21+75.00
EL = 238.20'
VC = 130'
K = 66
END GRADE -DET- STA 22+62.54 -L- STA 22+50.46 10.25' LEFT EL = 238.69
(-)1.4100%
(+)0.5560%
WORKPAD PROFILE -See -L- Profile-
FOR -DET- PLAN VIEW SEE SHEET 4-A
17-APR-2003 10:54
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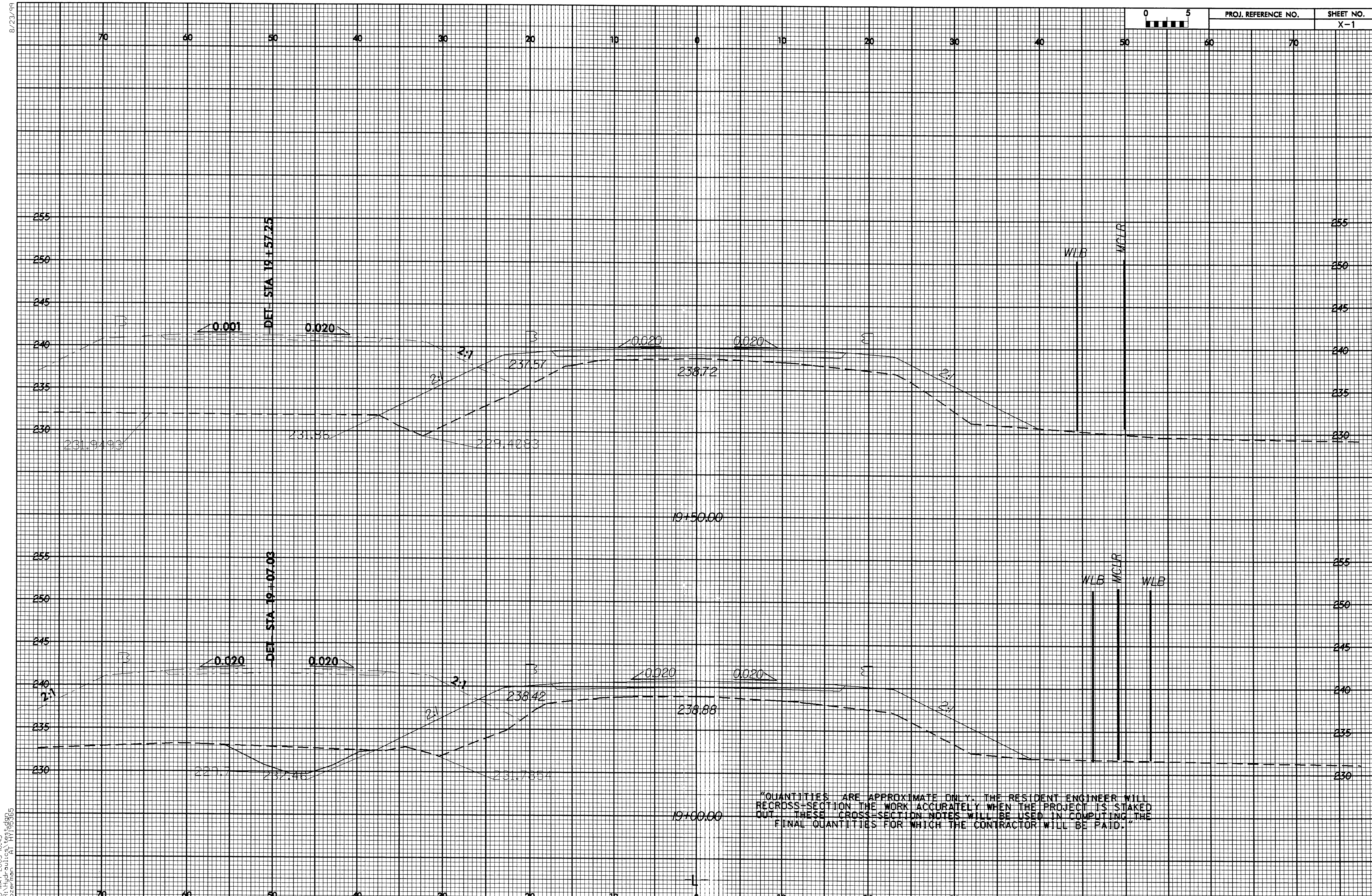
PROJ. REFERENCE NO.	SHEET NO.
	X-1



"QUANTITIES ARE APPROXIMATE ONLY. THE RESIDENT ENGINEER WILL RECROSS-SECTION THE WORK ACCURATELY WHEN THE PROJECT IS STAKED OUT. THESE CROSS-SECTION NOTES WILL BE USED IN COMPUTING THE FINAL QUANTITIES FOR WHICH THE CONTRACTOR WILL BE PAID."

8/23/99
15-MAY-2003 10:45
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bzerman AT HY195365

8/23/99

0 5	PROJ. REFERENCE NO.	SHEET NO.
		X-4

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70

255 250 245 240 235 230

MCLR-DET

MCLR

WLB

DET- STA 22+62.07

EXIST

EXIST

EXIST

0.021

238.87

231.36

2:1

2:1

2:1

22+50.00

MCLR DET

MCLR

WLB

DET- STA 22+10.64

0.020

0.020

0.020

0.020

238.62

230.0000

230.61

2:1

2:1

3:1

WLB

MCLR

WLB

22+00.00

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70

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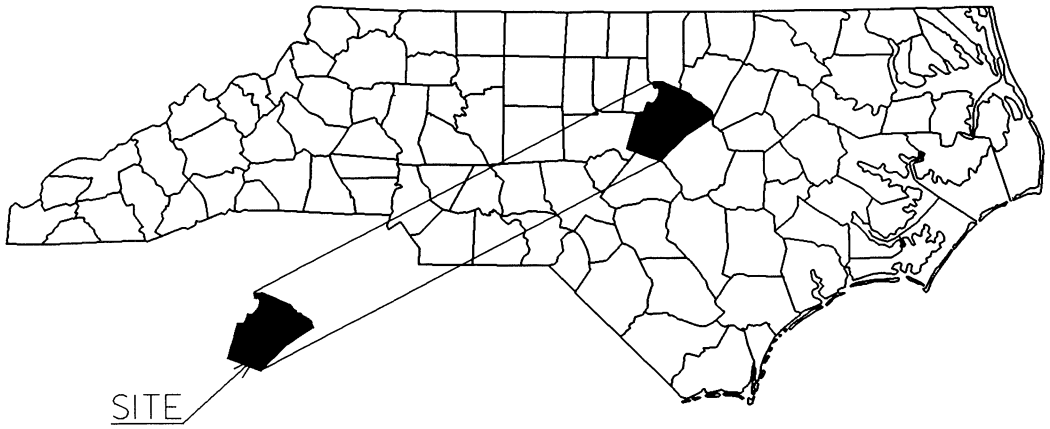
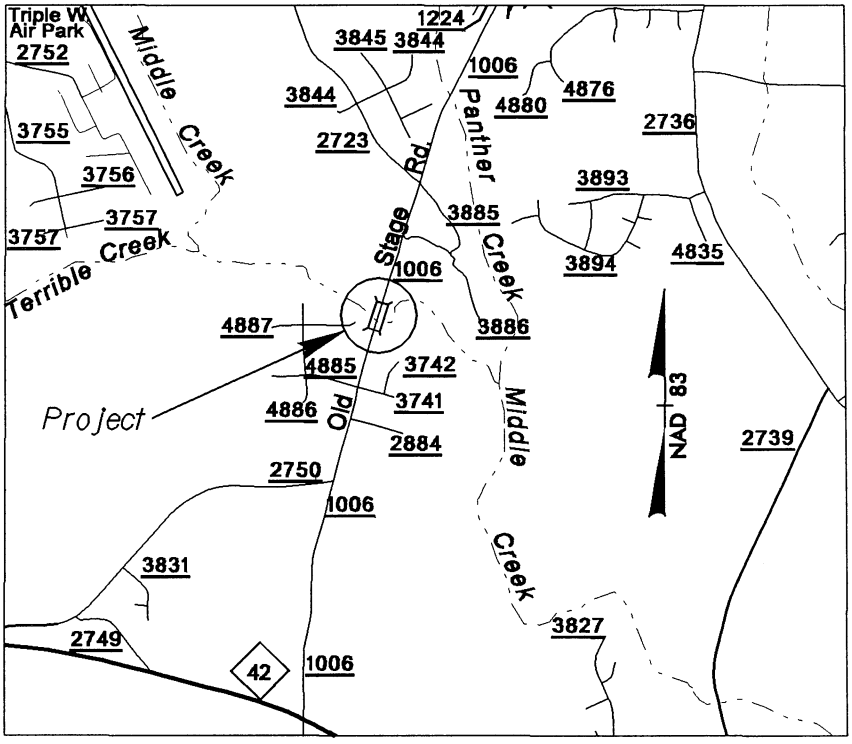
bzerman
AT HY195365

NORTH CAROLINA





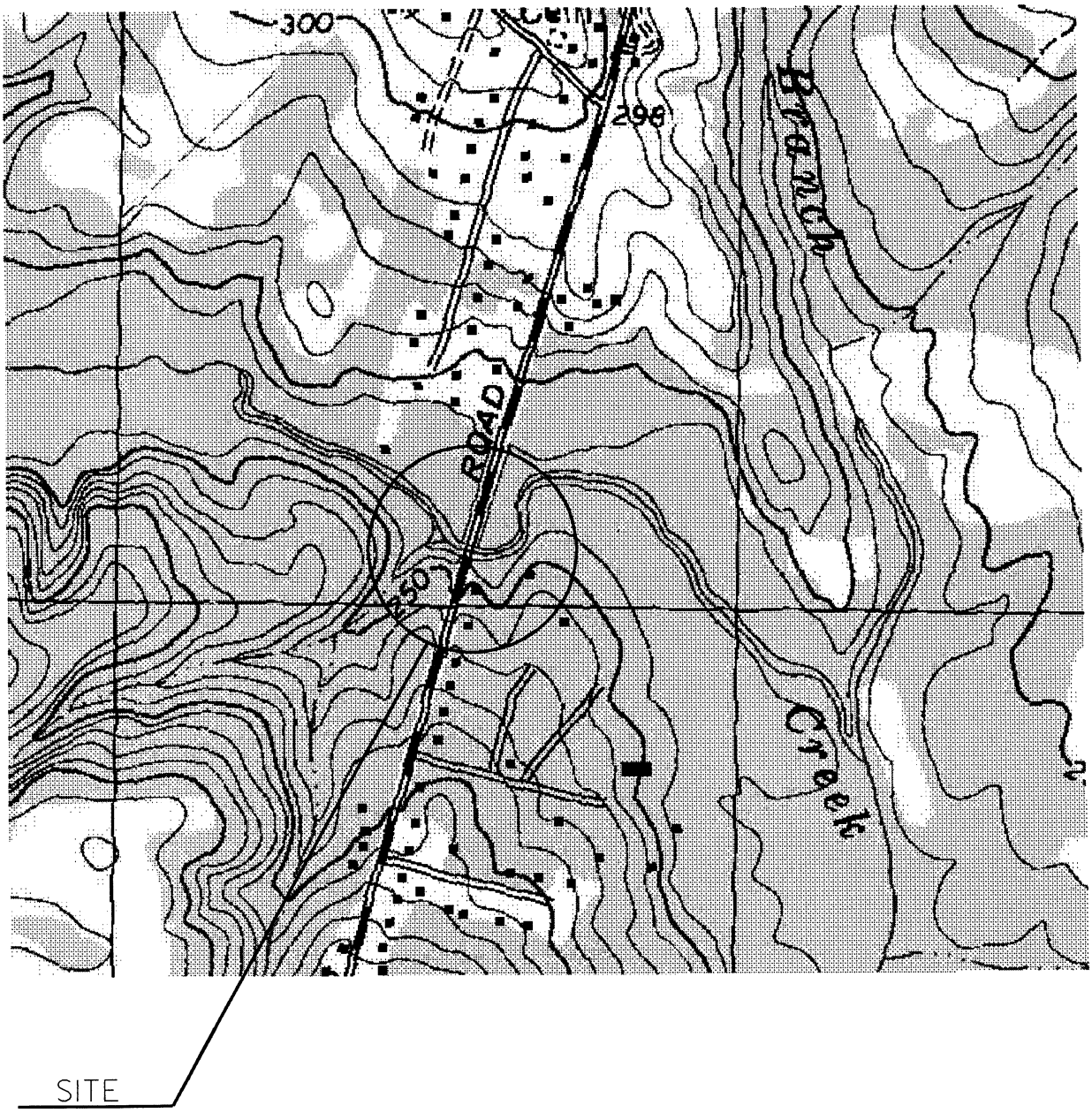
NEUSE RIVER BUFFER
VICINITY MAPS

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

PROJECT: 8.2407501 (B-3521)

SR 1006 (OLD STAGE ROAD)

SHEET 1 OF 5



NOT TO SCALE

ANGIER QUAD MAP

NEUSE RIVER BUFFER
VICINITY MAPS

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

PROJECT: 8.2407501 (B-3521)

SR 1006 (OLD STAGE ROAD)

SHEET 2 OF 5

BUFFER LEGEND

WLB WETLAND BOUNDARY

WETLAND

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

BZ RIPARIAN BUFFER ZONE

BZ1 RIPARIAN BUFFER ZONE 1
30 ft (9.2m)

BZ2 RIPARIAN BUFFER ZONE 2
20 ft (6.1m)

FLOW DIRECTION

TB TOP OF BANK

WE EDGE OF WATER

C PROP. LIMIT OF CUT

F PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG NATURAL GROUND

PL PROPERTY LINE

TDE TEMP. DRAINAGE EASEMENT

PDE PERMANENT DRAINAGE EASEMENT

EAB EXIST. ENDANGERED ANIMAL BOUNDARY

EPB EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

CORE FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

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

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE (PSH)

LEVEL SPREADER (LS)

GRASS SWALE

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

PROJECT: 8.2407501 (B-3521)

SR 1006 (OLD STAGE ROAD)

SHEET 3 OF 5 4/7/03

PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES
1	GOOD, NORMAN L.	3004 ERIC STREET WILLOW SPRING, NC 27592
2	ASWORTH, TSUTOMU	1507 MIDDLE RIDGE DRIVE WILLOW SPRING, NC 27592
3	GOLIGHTLY III, SAMUEL I	1503 MIDDLE CREEK WILLOW SPRING, NC 27592
4	ROWLAND, LOIS T.	10948 STAGE ROAD RALEIGH, NC 27603
5	BOWLING, J. TRACY	PO BOX 1156 ATLANTIC BEACH, NC 28512
6	BROOKS, HENRY VANCE	11033 OLD STAGE ROAD WILLOW SPRING, NC 27592
7	STRICKLAND, PHILIP K.	1221 VANNSTONE DRIVE RALEIGH, NC 27603

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

PROJECT: 8.2407501 (B-3521)

SR 1006 (OLD STAGE ROAD)

BUFFER IMPACTS SUMMARY

			IMPACT								BUFFER REPLACEMENT	
			TYPE		ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
1	Bridge	17+06-L-	X		7971	5009	12980					
2	Detour Bridge	17+12.5-Det-	X		2352	1394	3746					
TOTAL:					10323	6403	16726					

Note: Detour Impacts Are Shown For Areas Outside Of -L- Impacts. (An Overlap Exists)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 8.2407501 (B-3521)

4/7/03
SHEET 5 OF 5

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
B-3521	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

-DET-
PI Sta 11+39.95
Δ = 17° 50' 41.1" (LT)
D = 10° 00' 00.0"
L = 178.45'
T = 89.95'
R = 572.96'

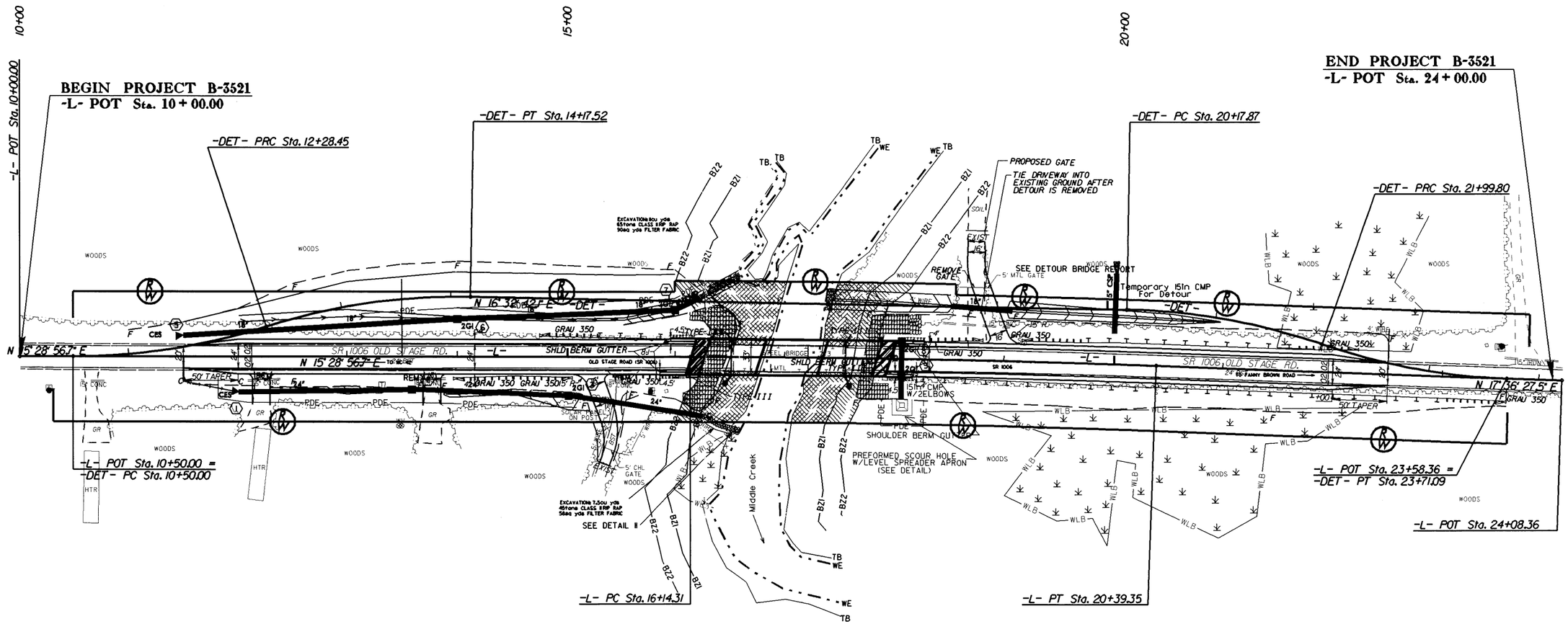
PI Sta 13+23.85
Δ = 18° 54' 26.5" (RT)
D = 10° 00' 00.0"
L = 189.07'
T = 95.40'
R = 572.96'

-DET-
PI Sta 21+09.61
Δ = 18° 11' 32.5" (RT)
D = 10° 00' 00.0"
L = 181.92'
T = 91.73'
R = 572.96'

PI Sta 22+86.09
Δ = 17° 07' 47.2" (LT)
D = 10° 00' 00.0"
L = 171.30'
T = 86.29'
R = 572.96'

-L-
PI Sta 18+26.86
Δ = 2° 07' 30.7" (RT)
D = 0° 30' 00.0"
L = 425.04'
T = 212.54'
R = 11,459.16'
SE = NC

NAD 83



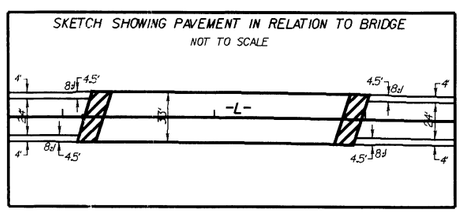
BUFFER ZONE IMPACTS

DENOTES BUFFER ZONE 1 IMPACT

DENOTES BUFFER ZONE 2 IMPACT

Scale 1in = 100 ft

SKETCH SHOWING PAVEMENT IN RELATION TO BRIDGE
NOT TO SCALE



NOTES: (1) ALL DRIVEWAYS HAVE 5' RADII UNLESS SHOWN OTHERWISE
(2) SEE SHEET 4-A FOR -DET- PLAN VIEW
(3) SEE SHEET 5 FOR -L- PROFILE
(4) SEE SHEET 2-A FOR DRAINAGE DETAILS
(5) SEE SHEETS S- TO S- FOR STRUCTURE DETAILS

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PROJECT REFERENCE NO.	SHEET NO.
B-3521	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

-DET-

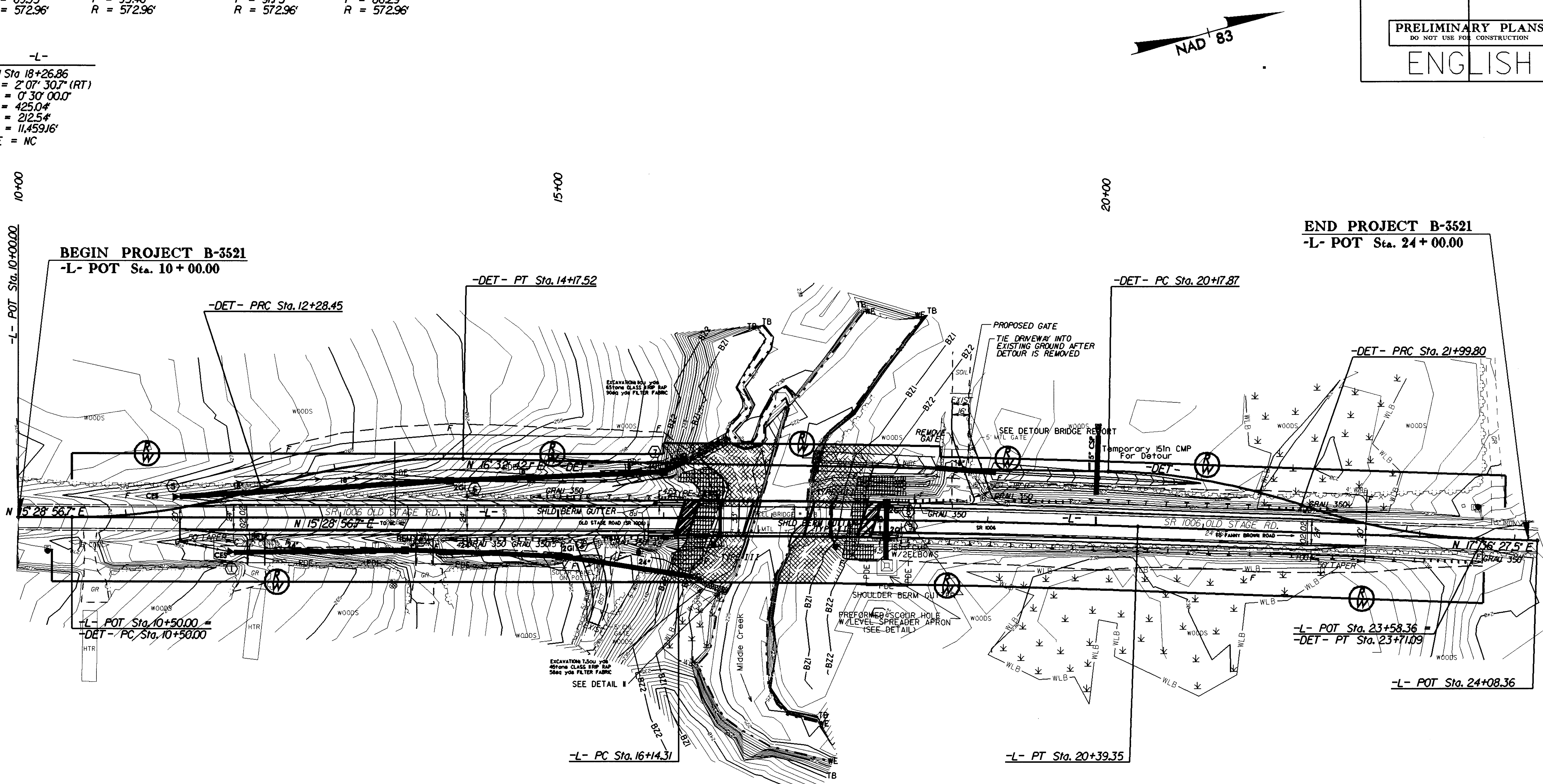
PI Sta 11+39.95	PI Sta 13+23.85
Δ = 17° 50' 41.1" (LT)	Δ = 18° 54' 26.5" (RT)
D = 10° 00' 00.0"	D = 10° 00' 00.0"
L = 178.45'	L = 189.07'
T = 89.95'	T = 95.40'
R = 572.96'	R = 572.96'

-DET-

PI Sta 21+09.61	PI Sta 22+86.09
Δ = 18° 11' 32.5" (RT)	Δ = 17° 07' 47.2" (LT)
D = 10° 00' 00.0"	D = 10° 00' 00.0"
L = 181.92'	L = 171.30'
T = 91.73'	T = 86.29'
R = 572.96'	R = 572.96'

-L-

PI Sta 18+26.86
Δ = 2° 07' 30.7" (RT)
D = 0° 30' 00.0"
L = 425.04'
T = 212.54'
R = 11,459.16'
SE = NC



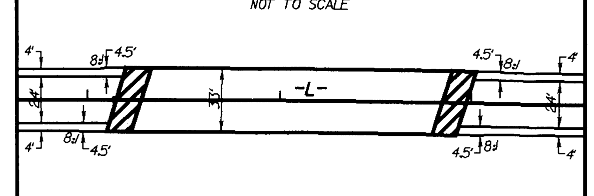
BUFFER ZONE IMPACTS

DENOTES BUFFER ZONE 1 IMPACT

DENOTES BUFFER ZONE 2 IMPACT

Scale 1in = 100 ft

SKETCH SHOWING PAVEMENT IN RELATION TO BRIDGE
NOT TO SCALE



NOTES:
(1) ALL DRIVEWAYS HAVE 5' RADII UNLESS SHOWN OTHERWISE
(2) SEE SHEET 4-A FOR -DET- PLAN VIEW
(3) SEE SHEET 5 FOR -L- PROFILE
(4) SEE SHEET 2-A FOR DRAINAGE DETAILS
(5) SEE SHEETS S- TO S- FOR STRUCTURE DETAILS

REVISIONS

8/17/99

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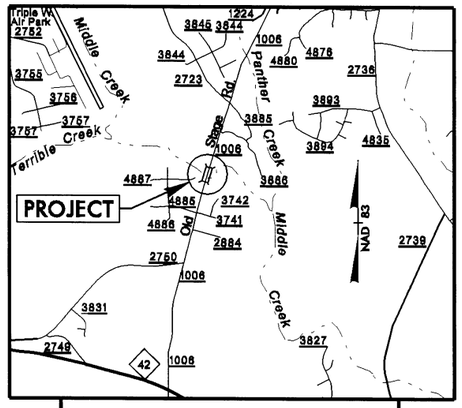
B-3521

PROJECT: 8.2407501

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



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3521	1	

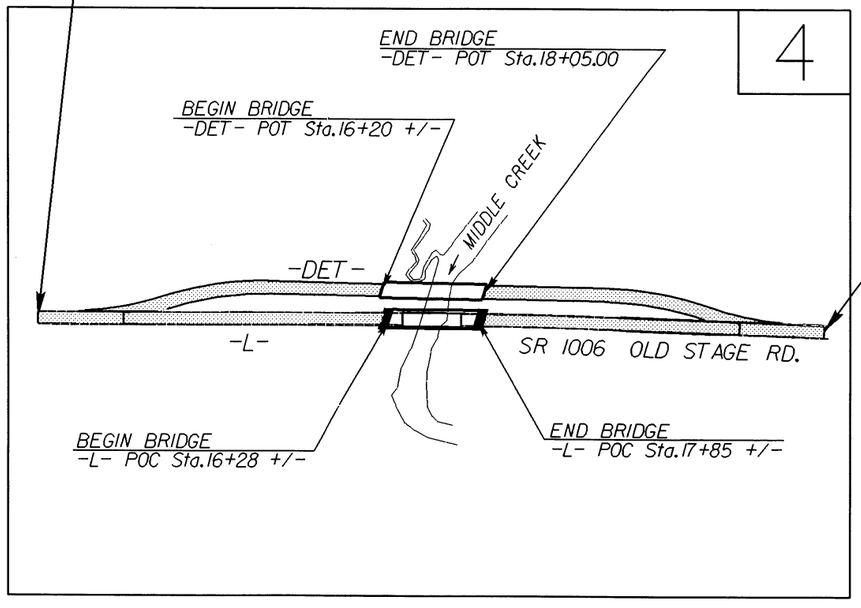
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
8.2407501	BRZ-1006(13)	PE
8.2407502	BRZ-1006(13)	R/W, UTIL.

LOCATION: BRIDGE NO. 273 ON SR 1006 OVER MIDDLE CREEK

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

NAD 83

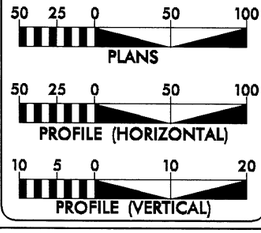
-L- STA 10+00.00 BEGIN STATE PROJECT 8.2407501
-L- STA 10+00.00 BEGIN F.A. PROJECT BRZ-1006(13)



-L- STA 24+00.00 END STATE PROJECT 8.2407501
-L- STA 24+00.00 END F.A. PROJECT BRZ-1006(13)

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II
THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.

GRAPHIC SCALES



DESIGN DATA

ADT 2003	=	3815
ADT 2025	=	8300
DHV	=	10 %
D	=	60 %
T	=	3 % *
V	=	50 MPH
V (DETOUR)	=	40 MPH

* TTST 2 % DUAL 1 %

PROJECT LENGTH

LENGTH ROADWAY PROJECT 8.2407501 = 0.235 mi
LENGTH STRUCTURE PROJECT 8.2407501 = 0.030 mi
TOTAL LENGTH STATE PROJECT 8.2407501 = 0.265 mi

Prepared in the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr.
Raleigh, NC 27610

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPTEMBER 30, 2002

LETTING DATE:
JANUARY 20, 2004

ROGER D. THOMAS, P.E.
PROJECT ENGINEER

MICHAEL W. LITTLE, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

P.E.
SIGNATURE:

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR *DATE*

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PROJECT REFERENCE NO.	SHEET NO.
B-3521	1-B

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
CONVENTIONAL SYMBOLS

*S.U.E = SUBSURFACE UTILITY ENGINEER

ROADS & RELATED ITEMS

Edge of Pavement	
Curb	
Prop. Slope Stakes Cut	C
Prop. Slope Stakes Fill	F
Prop. Woven Wire Fence	
Prop. Chain Link Fence	
Prop. Barbed Wire Fence	
Prop. Wheelchair Ramp	WCR
Curb Cut for Future Wheelchair Ramp	CCFR
Exist. Guardrail	
Prop. Guardrail	
Equality Symbol	
Pavement Removal	

RIGHT OF WAY

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

HYDROLOGY

Stream or Body of Water	
River Basin Buffer	BZ
Flow Arrow	
Disappearing Stream	
Spring	
Swamp Marsh	
Shoreline	
Falls, Rapids	
Prop Lateral, Tail, Head Ditches	FLOW

STRUCTURES

MAJOR

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

MINOR

Head & End Wall	CONC HW
Pipe Culvert	
Footbridge	
Drainage Boxes	CB
Paved Ditch Gutter	

UTILITIES

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

BOUNDARIES & PROPERTIES

State Line	
County Line	
Township Line	
City Line	
Reservation Line	
Property Line	
Property Line Symbol	PL
Exist. Iron Pin	EIP
Property Corner	
Property Monument	ECM
Property Number	123
Parcel Number	6
Fence Line	
Existing Wetland Boundaries	WLB
High Quality Wetland Boundary	HQ WLB
Medium Quality Wetland Boundaries	MQ WLB
Low Quality Wetland Boundaries	LQ WLB
Proposed Wetland Boundaries	WLB
Existing Endangered Animal Boundaries	EAB
Existing Endangered Plant Boundaries	EPB

WW & ISBW

BUILDINGS & OTHER CULTURE

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

TOPOGRAPHY

Loose Surface	
Hard Surface	
Change in Road Surface	
Curb	
Right of Way Symbol	R/W
Guard Post	GP
Paved Walk	
Bridge	
Box Culvert or Tunnel	
Ferry	
Culvert	
Footbridge	
Trail, Footpath	
Light House	

VEGETATION

Single Tree	
Single Shrub	
Hedge	
Woods Line	
Orchard	
Vineyard	VINEYARD

RAILROADS

Standard Gauge	CSX TRANSPORTATION
RR Signal Milepost	MILEPOST 35
Switch	SWITCH

revised 02/02/00

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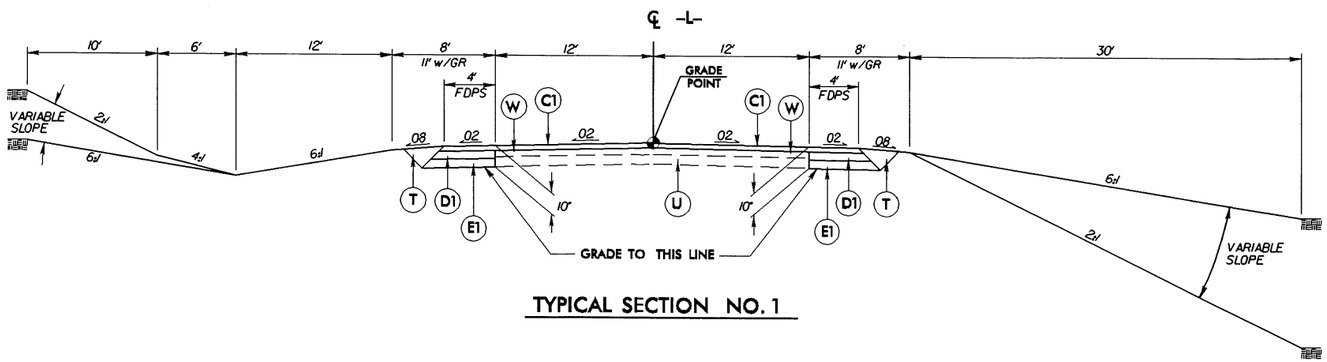
5/14/99

PROJECT REFERENCE NO.	SHEET NO.
B-3521	2
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

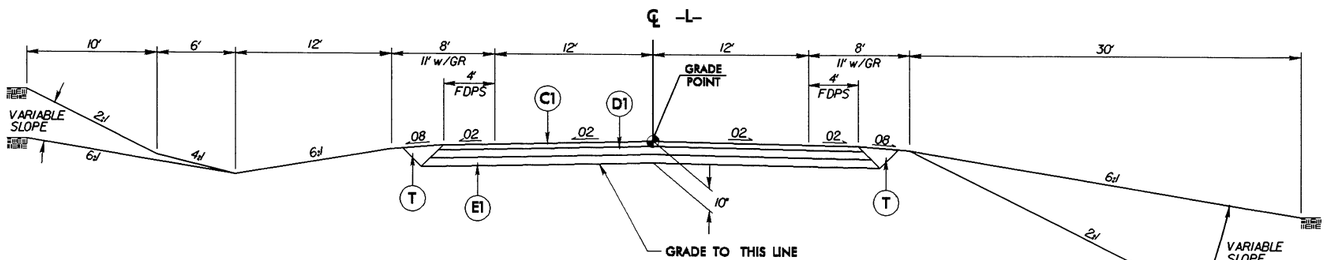
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PAVEMENT SCHEDULE

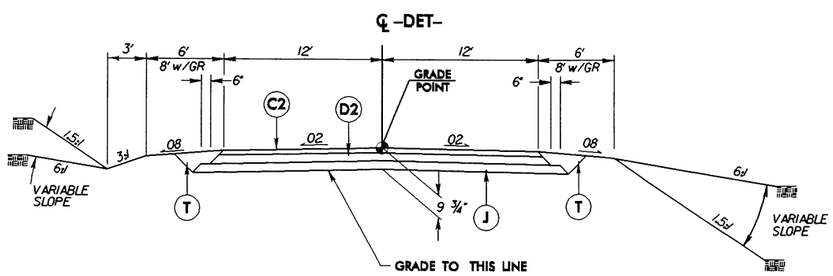
C1	PROP. APPROX. 2½" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 280 LBS. PER SQ. YD.	D2	PROP. APPROX. 2¼" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 256.5 LBS. PER SQ. YD.	J	PROP. 6" AGGREGATE BASE COURSE.
C2	PROP. APPROX. 1½" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5A, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.	D3	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2¼" IN DEPTH OR GREATER THAN 4" IN DEPTH.	T	EARTH MATERIAL.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 1½" IN DEPTH.	E1	PROP. APPROX. 4½" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 513 LBS. PER SQ. YD.	U	EXISTING PAVEMENT.
D1	PROP. APPROX. 3" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 342 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 3" IN DEPTH OR GREATER THAN 5½" IN DEPTH.	W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAIL)



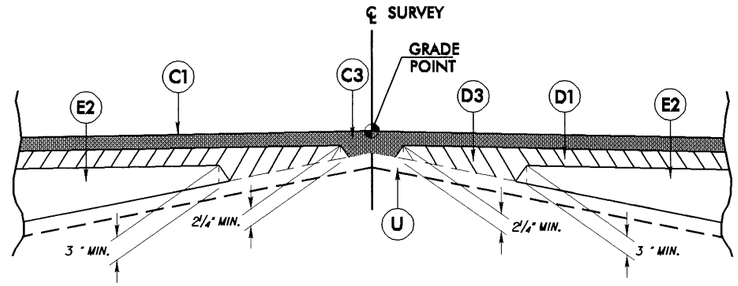
TYPICAL SECTION NO. 1



TYPICAL SECTION NO. 2



TYPICAL SECTION NO. 3



Detail Showing Method of Wedging

NOTES: TRANSITION FROM EXISTING TO TYPICAL SECTION NO.1
-L- STA 10+00.00 TO -L- STA 12+00.00
-L- STA 22+00.00 TO -L- STA 24+00.00

USE TYPICAL SECTION NO. 1

-L- STA 12+00.00 TO -L- STA 13+00.00
-L- STA 19+50.00 TO -L- STA 22+00.00

USE TYPICAL SECTION NO. 2

-L- STA 13+00.00 TO -L- STA 16+28 +/- (BEGIN BRIDGE)
-L- STA 17+85 +/- (END BRIDGE) TO -L- STA 19+50.00

USE TYPICAL SECTION NO. 3

-DET- STA 12+15.00 TO -DET- STA 16+20 +/- (BEGIN BRIDGE)
-DET- STA 18+05 +/- (END BRIDGE) TO -DET- STA 22+08.00

NOTES: TRANSITION FROM EXISTING TO TYPICAL SECTION NO.3
-DET- STA 10+50.00 - 12+15.00
-DET- STA 22+08.00 - 23+71.09

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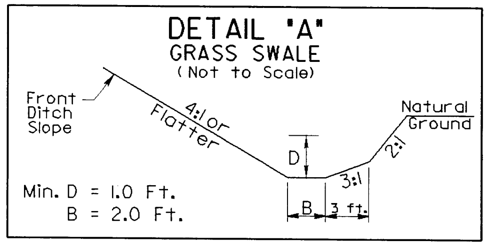
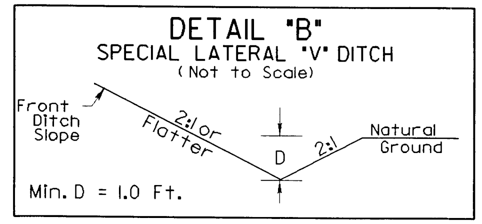
\Dunn AT B3521.typ

PROJECT REFERENCE NO.	SHEET NO.
B-3521	2-A
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

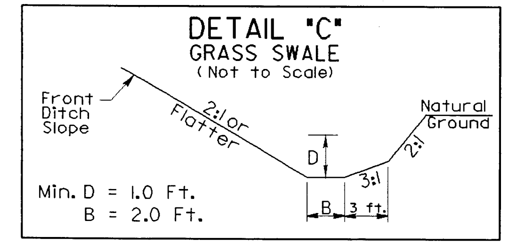
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



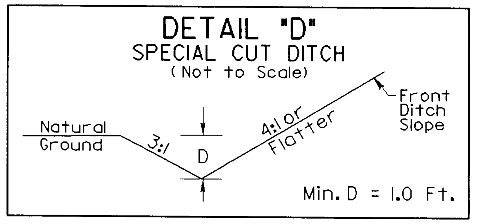
-L- STA. 12+50 TO 13+59 RT.



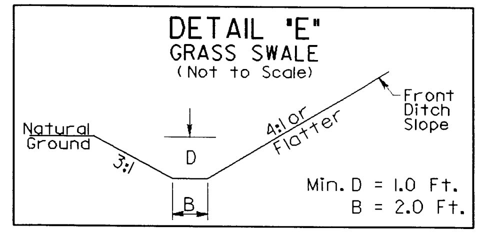
-L- STA. 14+00 TO 14+65 RT.



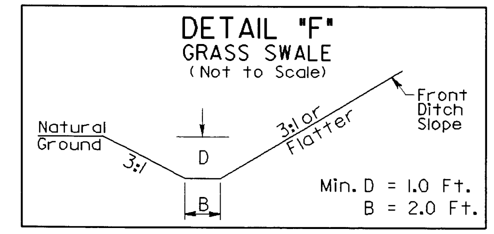
-L- STA. 14+65 TO 15+00 RT.



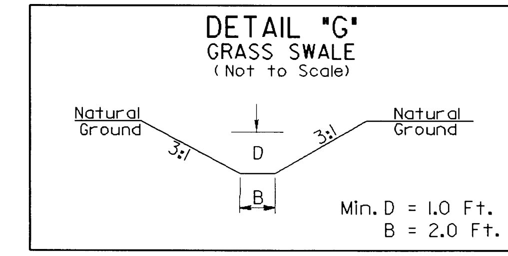
-L- STA. 12+50 TO 14+00 LT.



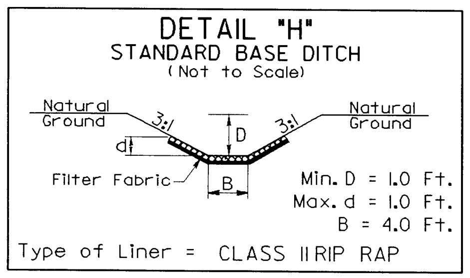
-L- STA. 14+00 TO 15+00 LT.



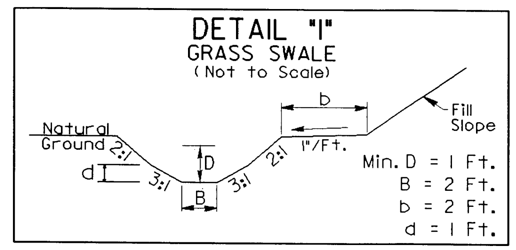
-L- STA. 15+00 TO 15+75 LT.



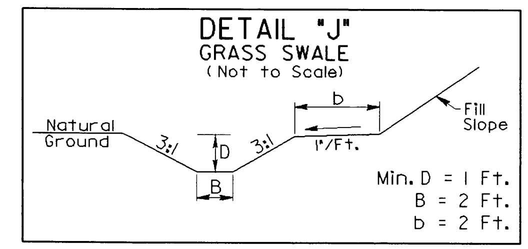
-L- STA. 15+75 TO 16+00 LT.



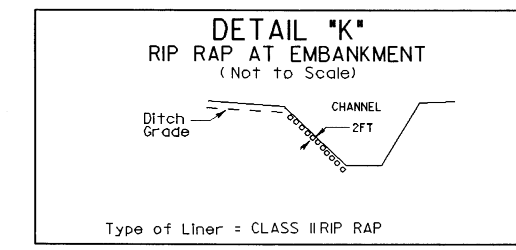
-L- STA. 16+14 TO 16+37 RT.
-L- STA. 16+22 TO 16+58 LT.



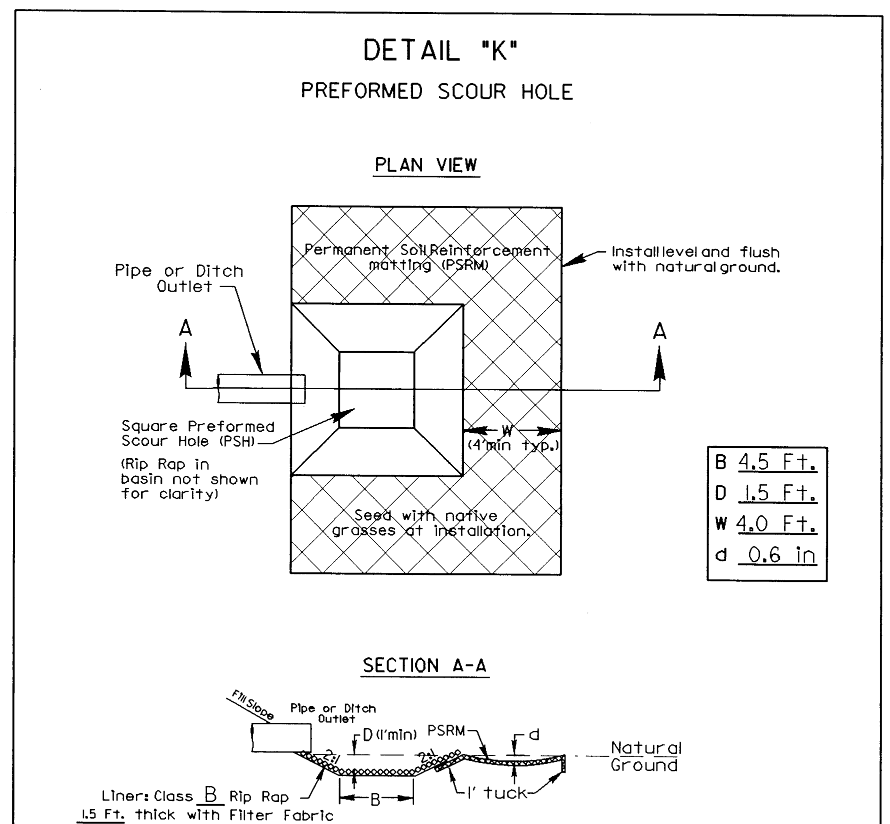
-L- STA. 17+44 TO 19+00 LT.



-L- STA. 19+00 TO 20+50 LT.



-L- STA. 16+51 RT. TO WATERS EDGE: 7 TONS RIP RAP
-L- STA. 17+44 LT. TO WATERS EDGE: 4 TONS RIP RAP



EARTHWORK					
LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT+ %	BORROW	WASTE
-DET- 10+50.00 TO 16+20 +/- (BEGIN BRIDGE)	2799		290		2,509
-DET- 18+05 +/- (END BRIDGE) TO 23+71.09	6		8312	8,306	
WASTE IN LIEU OF BORROW				-2509	-2509
SUBTOTAL	2805		8602	5797	
-L- 11+50.00 TO 16+28 +/- (BEGIN BRIDGE)	46		2876	2830	
-L- 17+85 +/- (END BRIDGE) TO 22+50.00	19		2086	2067	
SUBTOTAL	65		4962	4897	
DETOUR REMOVAL					
-DET- 10+50.00 TO 16+38.00	281		284	3	
-DET- 17+86.00 TO 23+38.00	6,354		4		6,350
WASTE IN LIEU OF BORROW				-3	-3
SUBTOTAL	6635		288		6347
TOTAL	9505		13852	10694	6347
PROJECT TOTAL	9505		13852	10694	6347
EST 5% TO REPLACE TOPSOIL IN BORROW PIT				535	
GRAND TOTAL	9505			11229	6,347
SAY	9600			11300	6,400

DDE = 648 CY

PROJECT REFERENCE NO.	SHEET NO.
B-3521	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

-DET-

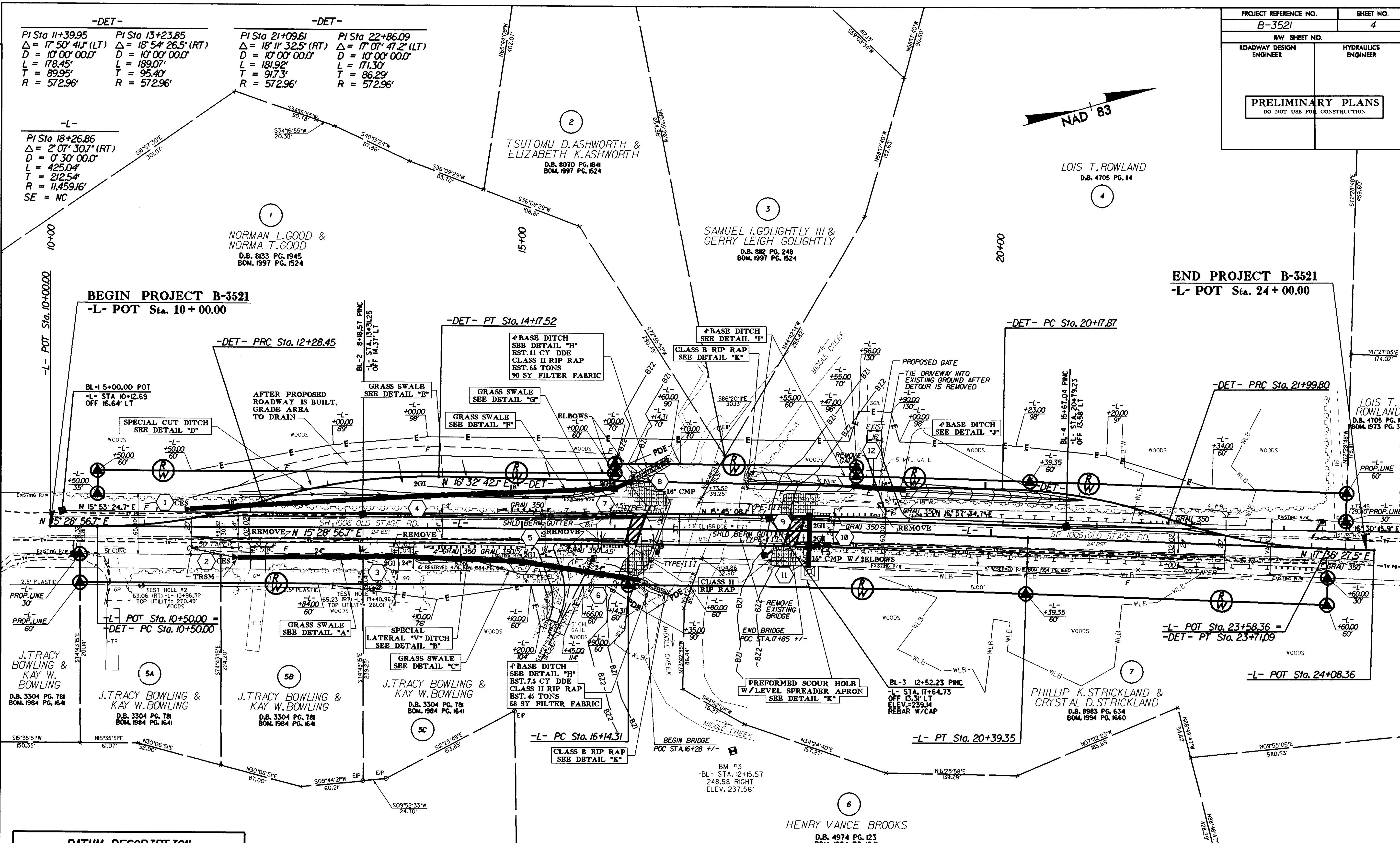
PI Sta 11+39.95	PI Sta 13+23.85
Δ = 17° 50' 41.1" (LT)	Δ = 18° 54' 26.5" (RT)
D = 10° 00' 00.0"	D = 10° 00' 00.0"
L = 178.45'	L = 189.07'
T = 89.95'	T = 95.40'
R = 572.96'	R = 572.96'

-DET-

PI Sta 21+09.61	PI Sta 22+86.09
Δ = 18° 11' 32.5" (RT)	Δ = 17° 07' 47.2" (LT)
D = 10° 00' 00.0"	D = 10° 00' 00.0"
L = 181.92'	L = 171.30'
T = 91.73'	T = 86.29'
R = 572.96'	R = 572.96'

-L-

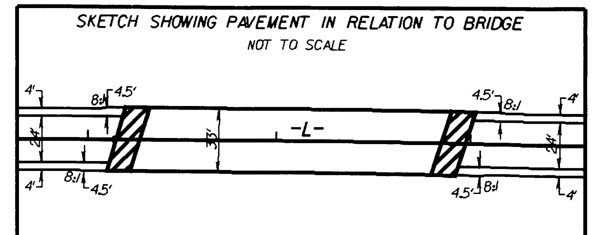
PI Sta 18+26.86
Δ = 2° 07' 30.7" (RT)
D = 0° 30' 00.0"
L = 425.04'
T = 212.54'
R = 11,459.16'
SE = NC



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B-3521-1"
WITH NAD 1983/95 STATE PLANE GRID COORDINATES OF NORTHING: 678331.359(ft) EASTING: 2093728.909(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99988390
THE N.C.LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B-3521-1" TO -L- STATION 10+00.00 IS S 17° 35' 13.91" W 2243.05 ft
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

SKETCH SHOWING PAVEMENT IN RELATION TO BRIDGE
NOT TO SCALE



NOTES: (1) ALL DRIVEWAYS HAVE 5' RADII UNLESS SHOWN OTHERWISE
(2) SEE SHEET 4-A FOR -DET- PLAN VIEW
(3) SEE SHEET 5 FOR -L- PROFILE
(4) SEE SHEET 2-A FOR DRAINAGE DETAILS
(5) SEE SHEETS S- TO S- FOR STRUCTURE DETAILS

REVISIONS

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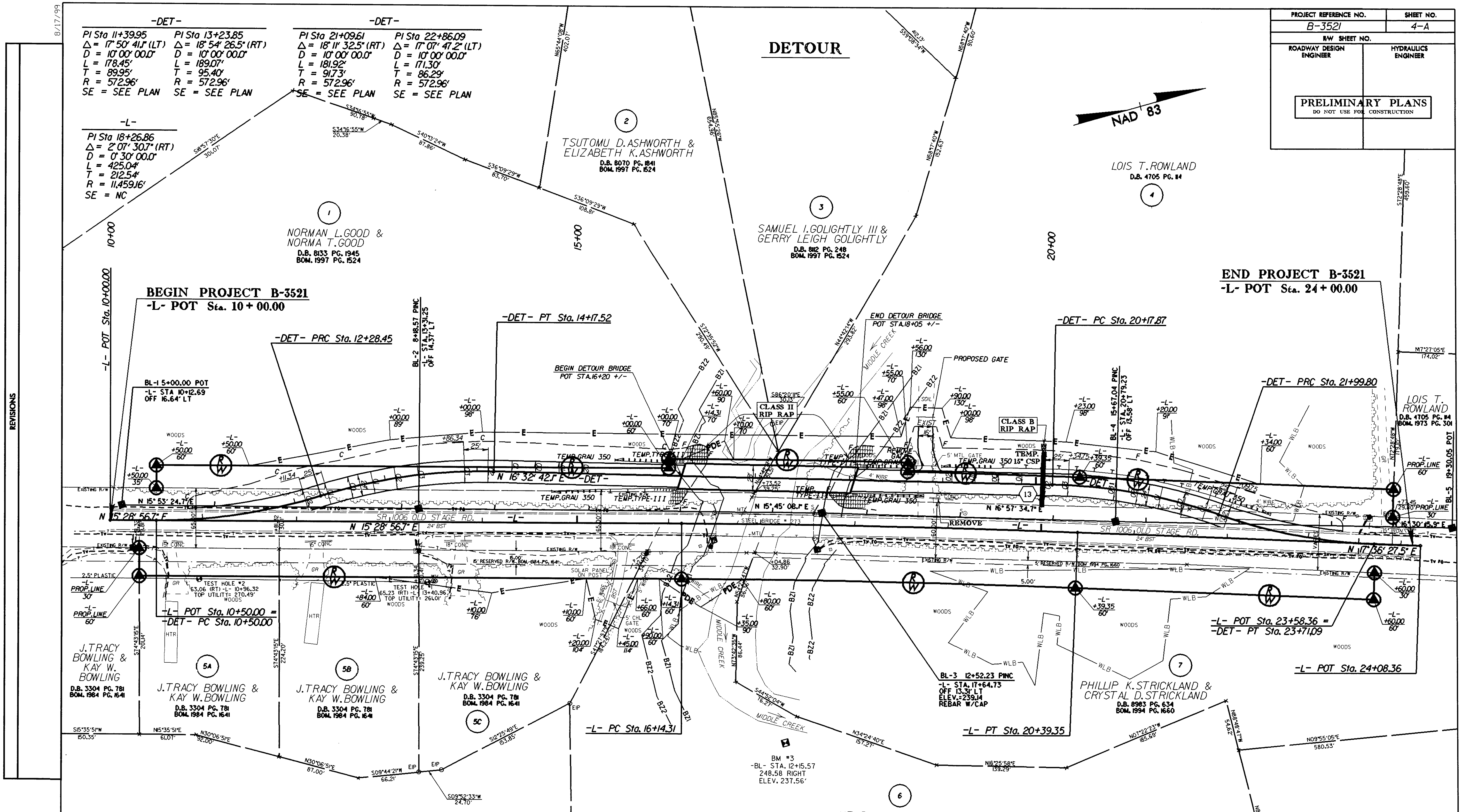

PROJECT REFERENCE NO. B-3521
SHEET NO. 4-A
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
DETOUR
NAD 83
-DET-
PI Sta 11+39.95
△ = 17° 50' 41.1" (LT)
D = 10° 00' 00.0"
L = 178.45'
T = 89.95'
R = 572.96'
SE = SEE PLAN
PI Sta 13+23.85
△ = 18° 54' 26.5" (RT)
D = 10° 00' 00.0"
L = 189.07'
T = 95.40'
R = 572.96'
SE = SEE PLAN
-DET-
PI Sta 21+09.61
△ = 18° 11' 32.5" (RT)
D = 10° 00' 00.0"
L = 181.92'
T = 91.73'
R = 572.96'
SE = SEE PLAN
PI Sta 22+86.09
△ = 17° 07' 47.2" (LT)
D = 10° 00' 00.0"
L = 171.30'
T = 86.29'
R = 572.96'
SE = SEE PLAN
-L-
PI Sta 18+26.86
△ = 2° 07' 30.7" (RT)
D = 0° 30' 00.0"
L = 425.04'
T = 212.54'
R = 11,459.16'
SE = NC
BEGIN PROJECT B-3521
-L- POT Sta. 10 + 00.00
END PROJECT B-3521
-L- POT Sta. 24 + 00.00
-DET- PRC Sta. 12+28.45
-DET- PT Sta. 14+17.52
-DET- PC Sta. 20+17.87
-DET- PRC Sta. 21+99.80
BEGIN DETOUR BRIDGE POT STA.16+20 +/-
END DETOUR BRIDGE POT STA.18+05 +/-
-L- POT Sta. 10+50.00 = -DET- PC Sta. 10+50.00
-L- POT Sta. 23+58.36 = -DET- PT Sta. 23+71.09
-L- POT Sta. 24+08.36
-L- PC Sta. 16+14.31
-L- PT Sta. 20+39.35
BL-1 5+00.00 POT -L- STA 10+12.69 OFF 16.64' LT
BL-2 8+18.57 PINC -L- STA 13+34.25 OFF 14.37' LT
BL-3 12+52.23 PINC -L- STA. 17+64.73 OFF 13.31' LT ELEV.=239.14 REBAR W/CAP
BL-4 15+67.04 PINC -L- STA. 20+79.23 OFF 13.58' LT
BL-5 19+30.05 POT
BM #3 -BL- STA. 12+15.57 248.58 RIGHT ELEV. 237.56'
N 15° 28' 56.7" E
N 16° 32' 42.1" E
N 15° 45' 08.1" E
N 16° 57' 34.7" E
N 17° 36' 27.5" E
SR 1006 OLD STAGE RD.
CLASS II RIP RAP
CLASS B RIP RAP
PROPOSED GATE
REMOVE
TEMP. GRAU 350
TEMP. TYPE-III
MIDDLE CREEK
STEEL BRIDGE
TEST HOLE #2 63.06 (RT) -L- 10+96.32 TOP UTILITY: 270.49'
TEST HOLE 65.23 (RT) -L- 13+40.96 TOP UTILITY: 264.01'
SOLAR PANEL ON POST
WOODS
1 NORMAN L.GOOD & NORMA T.GOOD D.B. 8133 PG. 1945 BOM. 1997 PG. 1524
2 TSUTOMU D.ASHWORTH & ELIZABETH K.ASHWORTH D.B. 8070 PG. 1841 BOM. 1997 PG. 1524
3 SAMUEL I.GOLIGHTLY III & GERRY LEIGH GOLIGHTLY D.B. 8112 PG. 248 BOM. 1997 PG. 1524
4 LOIS T.ROWLAND D.B. 4705 PG. 114
LOIS T. ROWLAND D.B. 4705 PG. 114 BOM. 1973 PG. 301
5A J.TRACY BOWLING & KAY W.BOWLING D.B. 3304 PG. 781 BOM. 1984 PG. 1641
5B J.TRACY BOWLING & KAY W.BOWLING D.B. 3304 PG. 781 BOM. 1984 PG. 1641
5C J.TRACY BOWLING & KAY W.BOWLING D.B. 3304 PG. 781 BOM. 1984 PG. 1641
J.TRACY BOWLING & KAY W. BOWLING D.B. 3304 PG. 781 BOM. 1984 PG. 1641
6 HENRY VANCE BROOKS D.B. 4974 PG. 123 BOM. 1984 PG. 1641
7 PHILLIP K.STRICKLAND & CRYSTAL D.STRICKLAND D.B. 8983 PG. 634 BOM. 1994 PG. 1660
10+00
15+00
20+00
REVISIONS

DATUM DESCRIPTION

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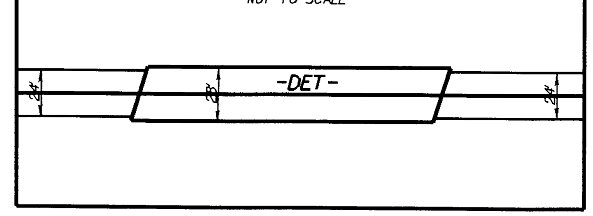
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B-3521-1" TO -L- STATION 10+00.00 IS S 17° 35' 13.9" W 2243.05 ft
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

SKETCH SHOWING PAVEMENT IN RELATION TO BRIDGE
NOT TO SCALE



NOTES: (1) ALL DRIVEWAYS HAVE 5' RADII UNLESS SHOWN OTHERWISE
(2) SEE SHEET 4 FOR -L- PLAN VIEW
(3) SEE SHEET 5 FOR -DET- PROFILE
(4) SEE SHEET 2-A FOR DRAINAGE DETAILS
(5) SEE SHEETS S- TO S- FOR STRUCTURE DETAILS

8/17/99
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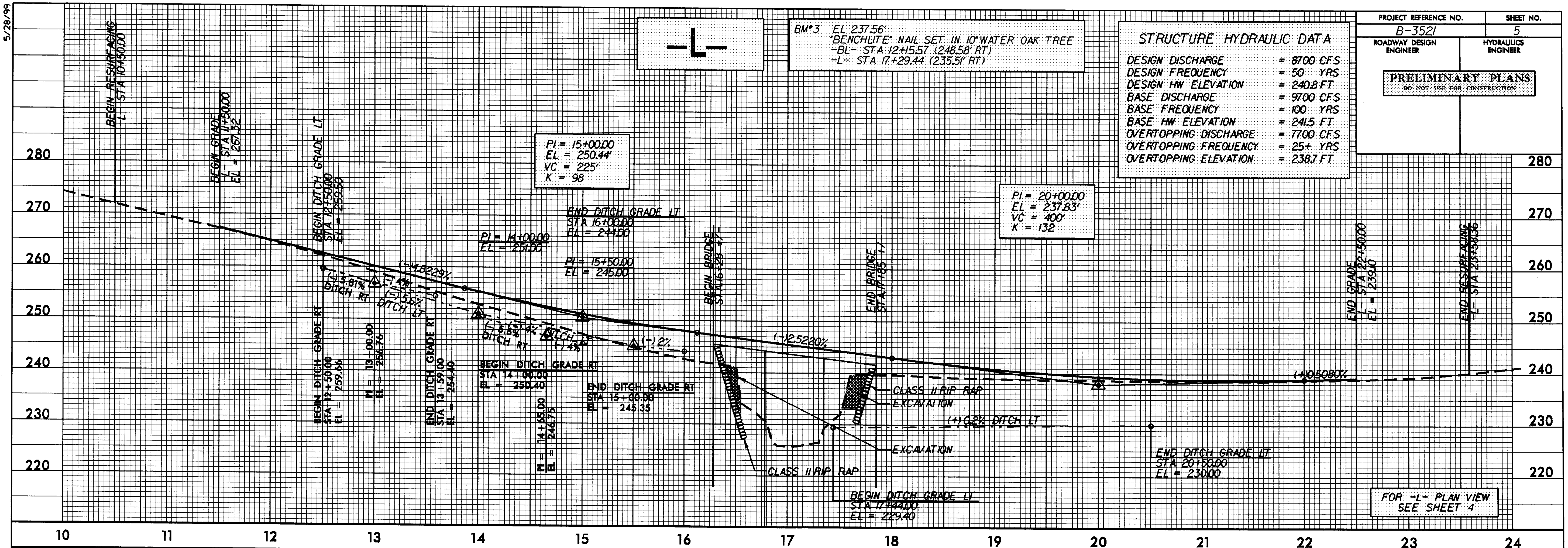
5/28/99

PROJECT REFERENCE NO.	SHEET NO.
B-3521	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

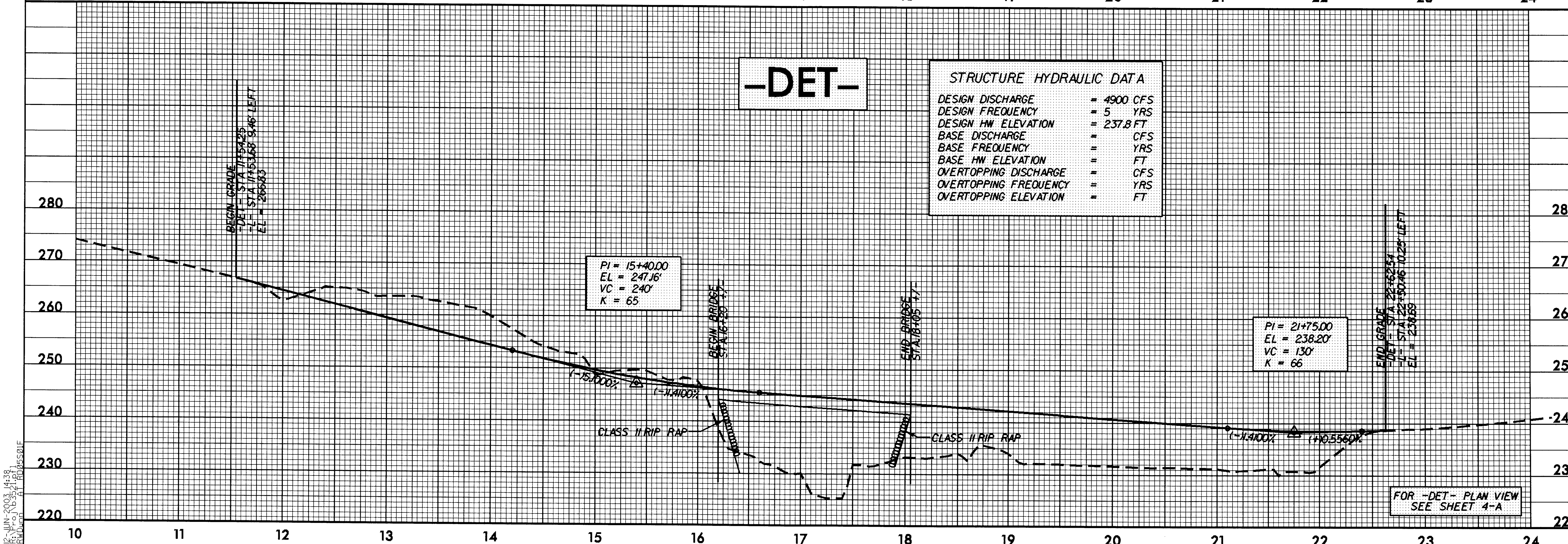
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L-
BM#3 EL 237.56'
"BENCHLITE" NAIL SET IN 10" WATER OAK TREE
-BL- STA 12+15.57 (248.58' RT)
-L- STA 17+29.44 (235.51' RT)
BEGIN RESURFACING -L- STA 10+50.00
BEGIN GRADE -L- STA 11+50.00 EL = 267.32
BEGIN DITCH GRADE LT STA 12+50.00 EL = 259.50
PI = 15+00.00
EL = 250.44'
VC = 225'
K = 98
PI = 14+00.00 EL = 251.00
END DITCH GRADE LT STA 16+00.00 EL = 244.00
PI = 15+50.00 EL = 245.00
(-)4.8229%
(-) 5.81% DITCH RT
(-) 4%
(-) 5.6% DITCH LT
(-) 5.8% (-) 4% DITCH RT
DITCH LT (-) 4%
(-) 2%
BEGIN DITCH GRADE RT STA 12+50.00 EL = 259.66
PI = 13+00.00 EL = 256.76
END DITCH GRADE RT STA 13+59.00 EL = 254.40
BEGIN DITCH GRADE RT STA 14+00.00 EL = 250.40
PI = 14+65.00 EL = 246.75
END DITCH GRADE RT STA 15+00.00 EL = 245.35
BEGIN BRIDGE STA 16+28 +/-
END BRIDGE STA 17+85 +/-
(-)2.5220%
CLASS II RIP RAP
EXCAVATION
(+) 0.2% DITCH LT
EXCAVATION
CLASS II RIP RAP
BEGIN DITCH GRADE LT STA 17+44.00 EL = 229.40
PI = 20+00.00
EL = 237.83'
VC = 400'
K = 132
END DITCH GRADE LT STA 20+50.00 EL = 230.00
(+)0.5080%
END GRADE -L- STA 22+50.00 EL = 239.10
END RESURFACING -L- STA 23+58.36
FOR -L- PLAN VIEW SEE SHEET 4
280
270
260
250
240
230
220
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

STRUCTURE HYDRAULIC DATA (-L-)

DESIGN DISCHARGE	=	8700 CFS
DESIGN FREQUENCY	=	50 YRS
DESIGN HW ELEVATION	=	240.8 FT
BASE DISCHARGE	=	9700 CFS
BASE FREQUENCY	=	100 YRS
BASE HW ELEVATION	=	241.5 FT
OVERTOPPING DISCHARGE	=	7700 CFS
OVERTOPPING FREQUENCY	=	25+ YRS
OVERTOPPING ELEVATION	=	238.7 FT



-DET-
BEGIN GRADE -DET- STA 11+54.25 -L- STA 11+53.68 9.46' LEFT EL = 266.83
PI = 15+40.00
EL = 247.16'
VC = 240'
K = 65
(-)5.1000%
(-)1.4100%
BEGIN BRIDGE STA 16+20 +/-
END BRIDGE STA 18+05 +/-
CLASS II RIP RAP
CLASS II RIP RAP
(-)1.4100%
(+)0.5560%
PI = 21+75.00
EL = 238.20'
VC = 130'
K = 66
END GRADE -DET- STA 22+62.54 -L- STA 22+50.46 10.25' LEFT EL = 238.69
FOR -DET- PLAN VIEW SEE SHEET 4-A
280
270
260
250
240
230
220
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

STRUCTURE HYDRAULIC DATA (-DET-)

DESIGN DISCHARGE	=	4900 CFS
DESIGN FREQUENCY	=	5 YRS
DESIGN HW ELEVATION	=	237.8 FT
BASE DISCHARGE	=	CFS
BASE FREQUENCY	=	YRS
BASE HW ELEVATION	=	FT
OVERTOPPING DISCHARGE	=	CFS
OVERTOPPING FREQUENCY	=	YRS
OVERTOPPING ELEVATION	=	FT

12-JUN-2003 14:38

Wake County

SR 1006

Bridge No. 273 over Middle Creek

Federal Aid Project No. BRZ-1006(13)

State Project 8.2407501

TIP Project No. B-3521

CATEGORICAL EXCLUSION

US DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

AND

NC DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

APPROVED:

4-30-02
DATE

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

4/30/02
DATE

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

Wake County

SR 1006

Bridge No. 273 over Middle Creek

Federal Aid Project No. BRZ-1006(13)

State Project 8.2407501

TIP Project No. B-3521

CATEGORICAL EXCLUSION

April 2002

Document Prepared by

EARTH TECH

A tyco INTERNATIONAL LTD. COMPANY

Edward B. McFalls 4/29/02

Edward B. McFalls, P.E., Project Manager
Earth Tech, Inc.

NORTH CAROLINA PROFESSIONAL SEAL 022546 ENGINEER EDWARD B McFALLS

for the North Carolina Department of Transportation

Brian F. Yamamoto, Unit Head
Consultant Engineering Unit
Project Development and Environmental Analysis Branch

John Conforti, REM, Project Manager
Consultant Engineering Unit
Project Development and Environmental Analysis Branch

REGISTERED ENVIRONMENTAL MANAGER JOHN G. CONFORTI REM 9766 NREP

SPECIAL PROJECT COMMITMENTS

Wake County
SR 1006
Bridge No. 273 Over Middle Creek
Federal Aid Project No. BRZ-1006(13)
State Project 8.2407501
TIP Project No. B-3521

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

Division 5:
Due to the presence of anadromous fish spawning grounds, in-water construction will be prohibited between February 15 and June 15.

Division 5, Project Development and Environmental Analysis Branch, Hydraulics Unit, and Structure Design Unit:

The following provisions must be incorporated into the design and enforced during construction to ensure the Dwarf Wedge Mussel is not effected:

1. NCDOT shall conduct an in-stream survey just prior to the construction let date.
2. The NCDOT resident engineer shall be responsible for alerting Tim Savidge of the Project Development and Environmental Analysis Branch two months prior to the project being awarded so that they may plan the required in-steam survey.
3. There will be a moratorium on clearing and grubbing between November 15 and April 1.
4. Deck drains shall be configured so that the run-off does not fall into the stream.
5. The NCDOT resident engineer is responsible for providing a written invitation to the North Carolina Wildlife Resources Commission, Nongame and Protected Species Branch, and the US Fish and Wildlife Service for a field inspection prior to construction.
6. The erosion control plans for Protected Aquatic Species must be used. These plans include the following requirements:

- Sediment and erosion controls must be in place prior to land clearing activities. No sediment from either bridge demolition or construction activities shall be allowed to enter the flowing stream.
- "Environmentally Sensitive Areas" will be defined on the plans, which consist of a 50 ft. buffer zone on both sides of the stream.
- The Contractor may perform clearing operation, but not grubbing operations in the "Environmentally Sensitive Areas", until immediately prior to beginning grading operations.
- Once grading operations begin in "Environmentally Sensitive Areas", as specified on the plans, work will progress in a continuous manner until complete.
- Seeding and mulching will be performed immediately following final grade establishment.
- Stage seeding will be performed on cut and fill slopes as grading progresses.

Hydraulics Unit:
A floodway modification will be required for the bridge replacement project.

Wake County
SR 1006
Bridge No. 273 Over Middle Creek
Federal Aid Project No. BRZ-1006(13)
State Project 8.2407501

INTRODUCTION: Bridge No. 273 is included in the 2002–2008 North Carolina Department of Transportation (NCDOT) Transportation Improvement Program (TIP) and in the Federal Aid Bridge Replacement Program. The location is shown in **Figure 1**. No substantial environmental impacts are anticipated. The project is classified as a Federal "Categorical Exclusion".

I. PURPOSE AND NEED

NCDOT Bridge Maintenance Unit records indicate the bridge has a sufficiency rating of 7 out of a possible of 100 for a new structure. The bridge is considered structurally deficient and functionally obsolete. The replacement of this inadequate structure will result in safer and more efficient traffic operations.

II. EXISTING CONDITIONS

SR 1006 (Old Stage Road) in Wake County is functionally classified as "Rural Minor Collector" in the Statewide Functional Classification System.

Through the project area, SR 1006 has two 9-foot (2.7 m) lanes. There is not a recorded right-of-way; therefore, the right-of-way is to the edge of pavement. The bridge is located on a tangent section of roadway with good vertical and horizontal alignment. The bridge crosses Middle Creek at approximately 90 degrees. The posted speed limit on SR 1006 near the bridge is 45 mph. **Figure 2** shows the existing bridge and roadway.

The existing bridge was constructed in 1965. The superstructure consists of a steel plank floor on steel girders floor beam system. The substructure consists of timber caps on timber piles. The abutments are vertical. The existing bridge consists of three spans of approximately 35 feet (10.7 m) each and the clear roadway width is 24 feet (7.3 m). The crown of the roadway is approximately 15 feet (4.6 m) over the bed of Middle Creek. Presently, the posted weight limit is 16 tons for single vehicles and 21 tons for trucks with trailers. **Figure 4** shows photographs of the existing bridge.

The average daily traffic volume on SR 1006 at Bridge No. 273 was 3,000 vehicles per day in 1999. By the design year 2025, the average daily traffic volume is expected to increase to 8,300 vehicles per day. The projected traffic volume includes two percent

dual-tired vehicles and one percent truck-tractor semi-trailers. Ten school buses each cross the bridge two times daily. SR 1006 is not a designated bicycle route.

Seven accidents were reported on SR 1006 near Bridge No. 273 in the period between January 1, 1998 and December 31, 2000:

- One accident involved a vehicle running off the road. A circumstance contributing to the accident was exceeding the posted speed limit.
- Two accidents involved animals.
- One accident was a rear-end collision where the following vehicle failed to stop when the leading vehicle stopped.
- One accident involved a vehicle exceeding the speed limit, losing control traveling down the left shoulder, then sideswiping an oncoming vehicle's right side.
- One accident involved a vehicle turning left being hit by a vehicle from behind. Alcohol was involved with the vehicle from behind.
- One accident involved a vehicle turning left being hit by a vehicle attempting to pass on the left side.

Underground fiber optic cable markers are located on the east side of SR 1006. The line appears to cross Middle Creek on utility poles. A Progress Energy overhead power line is located south of the bridge on the east side of SR 1006.

III. ALTERNATIVES

A. Project Description

The project replaces the existing bridge with a new bridge crossing at approximately the same location. The bridge will carry two lanes of traffic over Middle Creek. **Figure 3** shows the typical cross-sections of the roadway approaches and bridge.

Build Alternatives

Three alternatives were carried forward for detailed study in this categorical exclusion report.

Alternative 1 replaces the bridge on the existing alignment with a bridge approximately 130 feet (40 m) in length, while using a temporary on-site detour east of the existing bridge to maintain traffic. The temporary on-site detour would require a 120-foot (37m) temporary bridge be constructed. This alternative would require the relocation of two homes.

Alternative 2 replaces the bridge on the existing alignment with a bridge of approximately 130 feet (40 m) in length, while using a temporary on-site detour west of

the existing bridge to maintain traffic. The temporary detour would require a 150-foot (46m) temporary bridge be constructed.

Alternative 3 replaces the bridge on the existing alignment with a bridge of approximately 130 feet (40 m) in length, while using an off-site detour to maintain traffic. The off-site detour requires through-traffic to drive an additional 4.0 miles (6.4 km), and consists of SR 1006 (Old Stage Road), NC 42, and SR 2736 (Rock Service Road). The off-site detour has a total driving loop of approximately 10 miles (16 km).

C. Alternatives Eliminated from Further Study

No Action. This alternative consists of short-term minor reconstruction and maintenance activities that are part of an ongoing plan for continuing operation of the existing bridge and roadway system in the project area. Many of the structural elements are decaying. The bridges safe load-bearing capacity has already been reduced due to the decay. Although further maintenance activities will slow the decay, eventually the bridge will have to be closed.

D. Preferred Alternative

Alternative 2, replacing the existing bridge in its current location while maintaining traffic on a temporary on-site detour located to the west of the bridge, is the preferred alternative. **Alternative 2,** was selected because it will affect the fewest wetlands, will not disrupt traffic significantly, and will not displace any residences. Alternative 1 impacts more wetlands and would require the relocation of two homes. Alternative 3 was not selected because it would not maintain traffic on-site. Due to the high traffic volumes and length of the off-site detour, it is recommended to maintain traffic on-site. Comparing the two on-site detours, the detour associated with Alternative 2 incurs the least impacts to the human and natural environment.

IV. ESTIMATED COSTS

Construction and right-of-way cost estimates for the alternatives studied are presented below in **Table 1**.

Table 1: Estimated Costs

		Preferred	
	Alternative 1	**Alternative 2**	**Alternative 3**
Structure Removal	$20,775	$20,775	$20,775
Structure	$280,800	$280,800	$280,800
Roadway Approaches	$330,050	$330,050	$330,050
Detour Structure & Approaches	$474,700	$522,500	N/A
Miscellaneous and Mobilization	$508,675	$540,875	$293,375
Engineering and Contingencies	$235,000	$250,000	$125,000
Right-of-way/Utilities/Relocations	$162,000	$112,400	$91,700
Total Cost of Alternative	**$2,012,000**	**$2,057,400**	**$1,141,700**

The estimated cost of the project, as shown in the 2002-2008 Transportation Improvement Program, is $740,000, including $50,000 for right-of-way and $600,000 for construction. Right-of-way acquisition is scheduled for Federal Fiscal Year 2002, with construction to follow in Federal Fiscal Year 2003.

V. NATURAL RESOURCES

A. Methodology

Published information and resources were collected prior to the field investigation. Information sources used to prepare this report include the following:

- United States Geological Survey (USGS) quadrangle map (Angier, 1993)
- United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Map (Angier, 1993)
- NCDOT aerial photograph of project area (1:1200)
- *Soil Survey of Wake County, North Carolina* (Natural Resources Conservation Service [NRCS] 1970)
- North Carolina Department of Environment and Natural Resources (NCDENR) basin-wide assessment information (NCDENR, 1996)
- USFWS list of protected and candidate species.
- North Carolina Natural Heritage Program (NHP) files of rare species and unique habitats

Water resource information was obtained from publications posted on the World Wide Web by NCDENR Division of Water Quality. Information concerning the occurrence of federally protected species in the study area was obtained from the USFWS list of protected and candidate species (March 2001), posted on the World Wide Web by the Ecological Services branch of the USFWS office in North Carolina. Information concerning species under state protection was obtained from the NHP database of rare species and unique habitats. NHP files were reviewed for documented sightings of species on state or federal lists and locations of significant natural areas.

A general field survey was conducted along the proposed project route by Earth Tech biologists on November 11, 2000. Water resources were identified and their physical characteristics were recorded. For the purposes of this study, a brief habitat assessment was performed within the project area of Middle Creek. Plant communities and their associated wildlife were identified using a variety of observation techniques, including active searching, visual observations, and identifying characteristic signs of wildlife (sounds, tracks, scats, and burrows). Terrestrial community classifications generally follow Schafale and Weakley (1990) where appropriate and plant taxonomy follows Radford *et al.* (1968). Vertebrate taxonomy follows Potter *et al.* (1980), Martof *et al.* (1980), and Webster *et al. (*1985). Vegetative communities were mapped using aerial photography of the project site. Predictions regarding wildlife community composition involved general qualitative habitat assessment based on existing vegetative communities.

Jurisdictional wetlands, if present, were delineated and evaluated based on criteria established in the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (USACE, 1987). Wetlands were classified based on Cowardin *et al.* (1979).

B. Physiography and Soils

Soil and water resources that occur in the project area are discussed with respect to possible environmental concerns.

1. Regional Characteristics

The project area lies in the east-central portion of North Carolina within the Piedmont physiographic province. Elevations in the project area are approximately 230 feet (70 m) above mean sea level (National Geodetic Vertical Datum, 1929). The topography of the project vicinity is hilly with gentle to moderately steep slopes.

The proposed project is in a rural area in Wake County approximately 6.2 miles (10 km) south of Garner, NC. Wake County's major economic resources are business, education, and industry. The population of Wake County in 1999 was 592,218 (North Carolina Office of State Budget, Planning and Management 1999).

2. Soils

Information about soils in the project area was taken from the Soil Survey of Wake County, North Carolina (NRCS, 1970). The map units in the project area are Wehadkee and Bibb, Altavista fine sandy loam, Cecil clay loam, Cecil sandy loam, and Wake soils.

- **Wehadkee and Bibb soils, 0 to 4 percent,** (an undifferentiated mapping unit) are nearly level, poorly drained soils found in floodplains, narrow upland draws, and in depressions throughout the county. This soil unit is mapped along the banks of the project area. Surface runoff is slow to ponded and infiltration is

good to fair. These soils are wet and subject to frequent flooding of long duration. The seasonal high water table is at the surface. Both soils are listed as hydric soils by the Natural Resource Conservation Service (NRCS).

- **Altavista fine sandy loam, 0 to 4 percent slopes,** occur in the northern most area of the project site. These nearly level, moderately well-drained soils occur on low stream terraces. They have formed in alluvial deposits under forests. Infiltration of these soils is generally good, and surface runoff is slow to medium. The seasonal high water table usually remains below 2 feet (0.6 m).
- **Cecil clay loam, severely eroded soils, 6 to 10 percent slopes**, are found in the southwestern section of the project area. These soils are found on narrow side slopes, where erosion can be severe. Infiltration is poor, and surface runoff is very rapid. The seasonal high water table is greater than 10 feet (3.5 m).
- **Cecil sandy loam, severely eroded soils, 6 to 10 percent slopes and 10 to 15 percent slopes**, are located in the southeastern and northeastern parts of the project area. In these soils infiltration is good and surface runoff is rapid. Erosion is a major concern. They can be found on short to long side slopes. The seasonal high water table is greater than 10 feet (3.5 m).
- **Wake soils, 10 to 25 percent slopes,** are found in the southern section of the project area. This shallow soil is found in uplands on side slopes. Permeability is moderately rapid, and surface runoff is very rapid. The seasonal high water table is greater than 10 feet (3.5 m).

Site index is a measure of soil quality and productivity. The index is the average height, in feet, that dominant and co-dominant trees of a given species attain in a specified number of years (typically 50). The site index applies to fully-stocked, even-aged, unmanaged stands.

C. Water Resources

This section contains information concerning water resources likely to be impacted by the proposed project. Water resources assessments include the physical characteristics likely to be impacted by the proposed project (determined by field survey), best usage classifications, and water quality aspects of the water resources. Probable impacts to surface waters are also discussed, as well as means to minimize impacts.

1) Waters Impacts

The project is located in the Neuse River basin (NEU03 sub-basin). Middle Creek originates about 12.4 miles (19.9 km) northwest of the project area. From the project area, the stream meanders in a southeasterly direction about 40 miles (12.1 km) to its confluence with the Little Neuse River.

2) Water Resource Characteristics

Middle Creek is approximately 30 feet (9.2 m) wide in the study area. Upstream and to the west of Bridge No. 273, Middle creek runs perpendicular to SR 1006. The stream then passes under SR 1006 and curves in a northeasterly direction away from the

bridge. The stream then flows in an easterly direction away from the project area. The substrate of Middle Creek at this point consists of silt, and gravel with a few cobbles. The water was clear with a moderate flow on the day of the site visit. The depth ranged from about 3 to 4 feet (0.9 to 1.2 m). No rapids were observed near the project area.

The banks are nearly vertical to a height of 3 to 4 feet (0.9 to 1.2 m) above the water surface. The creek is about 75 percent shaded by trees behind the bank tops.

Just up stream of the existing bridge, a small unnamed stream enters Middle Creek from the southwest. This stream is 2 to 3 feet (0.6 to 0.9 m) wide and deeply incised with nearly vertical banks 3 to 4 feet (0.9 to 1.2 m) high. The stream's substrate is sand and there is approximately 80 percent canopy cover.

Surface waters in North Carolina are assigned a classification by the DWQ that is designed to maintain, protect, and enhance water quality within the state. Middle Creek [Index # 27-43-15-(4)] is classified as a Class C NSW water body (NCDENR, 1999). Class C water resources are waters protected for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner. There are no restrictions on watershed development activities. The supplemental NSW classification refers to nutrient sensitive waters. This supplemental is classification intended for waters needing additional nutrient management because of excessive growth of microscopic or macroscopic vegetation. In general, management strategies for point and non-point source pollution control require no increase in nutrients over background levels.

No waters classified as High Quality Water (HQW), Water Supplies (WS-I or WS-II) or Outstanding Resource Waters (ORW) occur within 1.0 mile (1.6 km) of the project study area.

The project area is in a forested, moderately developed watershed. No disturbances to the landscape were observed in the immediate vicinity, and the area is largely unsuitable for most agricultural, residential, or industrial uses. Potential threats to stream quality are residential development and increased nutrients, and silts and sediment in runoff.

Basin-wide water quality assessments are conducted by the Environmental Sciences Branch, Water Quality Section of the DWQ. The program has established monitoring stations for sampling selected benthic macroinvertebrates, which are known to have varying levels of tolerance to water pollution. An index of water quality can be derived from the number of taxa present and the ratio of tolerant to intolerant taxa. Streams can then be givan a bioclassification ranging from Poor to Excellent.

There are two monitoring stations on Middle Creek. Information for each station can be found in **Table 2**.

Table 2: DWQ Monitoring Station on Middle Creek

Monitoring Station	Distance from Project Area in Miles (km)	Date Sampled	Bioclassification
Near Tallicud Rd.	1 (1.62) upstream	05/86	Fair
SR 1375	1 (1.62) downstream	08/95 07/91 05/86	Good-Fair Good-Fair Fair

Point source discharges in North Carolina are permitted through the National Pollutant Discharge Elimination System (NPDES) program administered by the DWQ. All dischargers are required to obtain a permit to discharge. One minor non-municipal discharge permit within 3 miles (4.8 km) is issued on Middle Creek as of February 2001 (NCDENR 2001).

3. Summary of Anticipated Impacts to Water Resources

a) General Impacts

Any action that affects water quality can adversely affect aquatic organisms. Temporary impacts during the construction phases may result in long-term impacts to the aquatic community. In general, replacing an existing structure in the same location with an off-site detour is the preferred environmental approach. Bridge replacement at a new location results in more severe impacts, and permanent physical impacts are also incurred at the point of bridge replacement. No stream relocation is anticipated to be required, the temporary bridge on the detour is anticipated to bridge the unnamed tributary located southwest of the existing bridge. If, during final design, it is apparent this stream will be impacted, mitigation may be required by the Division of Water Quality's Wetland Rules.

Project construction may result in the following impacts to surface water resources:

- Increased sediment loading and siltation as a consequence of watershed vegetation removal, erosion, and/or construction.
- Decreased light penetration/water clarity from increased sedimentation.
- Changes in water temperature with vegetation removal.
- Changes in the amount of available organic matter with vegetation removal.
- Increased concentration of toxic compounds from highway runoff, construction activities and construction equipment, and spills from construction equipment.
- Alteration of water levels and flows as a result of interruptions and/or additions to surface and groundwater flow from construction.

Construction impacts may not be restricted to the communities in which the construction activity occurs, but may also affect downstream communities. Efforts will be made to ensure that no sediment leaves the construction site. NCDOT's Best Management Practices for the Protection of Surface Waters will be implemented, as applicable, during the construction phase of the project to ensure that no sediment leaves the construction site.

D. Biotic Resources

Terrestrial and aquatic communities are included in the description of biotic resources. Living systems described in the following sections include communities of associated plants and animals. These descriptions refer to the dominant flora and fauna in each community and the relationships of these biotic components. Descriptions of the terrestrial systems are presented in the context of plant community classifications. These classifications follow Schafale and Weakley (1990) where possible. They are also cross-referenced to *The Nature Conservancy International Classification of Ecological Communities: Terrestrial Vegetation of the Southeastern United States* (Weakley *et al.,* 1998), which has recently been adopted as the standard land cover classification by the Federal Geographic Data Committee. Representative animal species that are likely to occur in these habitats (based on published range distributions) are also cited. Scientific nomenclature and common names (when applicable) are used for the plant and animal species described. Subsequent references to the same species are by the common name only.

1) Terrestrial Communities

Six terrestrial communities were identified within the project area: a maintained landscape community, a bottomland hardwood forest, and upland mixed hardwood forest, a pine plantation, a scrub wetland and an old field community. Dominant faunal components associated with these terrestrial areas will be discussed in each community description. Many species are adapted to the entire range of habitats found along the project alignment, but may not be mentioned separately in each community description.

a) Maintained Roadside Community

This community covers the area along the road shoulders in the project area and adjoining residential property. Species include Bermuda grass (*Cynodon dactylon*), various grasses (*Panicum* sp.), tick-seed (*Bidens* sp.), rushes (*Juncus* sp.), sedges (*Carex* sp.), plantain (*Plantago* sp.), and dandelion (*Taraxacum officinale*),

The animal species present in these disturbed habitats are opportunistic and capable of surviving on a variety of resources, ranging from vegetation to both living and dead faunal components. Northern mockingbird (*Mimus polyglottos*), starling (*Sturnus vulgaris*), and American robin (*Turdus migratorius*) are common birds that use these

habitats. The area may also be used by the Virginia opossum (*Didelphis virginiana*), various species of mice (*Peromyscus* sp.), eastern garter snake (*Thamnophis sirtalis*), and American toad (*Bufo americanus*).

b) Scrub-Shrub Wetland Community

A scrub wetland community is present north of Middle Creek and on both sides of Old Stage Road. This community is adjacent to the foot slope and is slightly lower in the landscape. A low canopy is dominated by red maple, sweet gum, river birch, black willow (*Salix nigra*). Herbaceous vegetation includes wool grass (*Scirpus cyperinus*), soft rush (*Juncus effusus*), and marsh dewflower (*Murdannia keisak*).

This community is similar in part to the Piedmont/Mountain Levee Forest as described by Schafale and Weakley (1990). The TNC equivalent is I.B.2.N.d.5 *Betula nigra* – (*Platanus occidentalis*) Temporarily Flooded Forest Alliance (A.280).

Birds and mammals that utilize this community are essentially the same as those found in the Bottomland Hardwood Forest described in section V.D.1.c. Amphibians likely to be found here include southern two-lined salamander (*Eurycea bislineata*), bullfrog (*Rana catesbeiana*) and leopard frog (*Rana pipiens*). Reptiles include the northern water snake (*Nerodia sipedon*).

c) Bottomland Hardwood Forest

This community occurs in the floodplain of Middle Creek. Canopy species include sweet gum (*Liquidambar styraciflua*), white oak (*Quercus alba*), willow oak (*Quercus phellos*), river birch (*Betula nigra*), bitternut hickory (*Carya cordiformis*), and green ash (*Fraxinus pennsylvanica*). The understory includes American holly (*Ilex opaca*), ironwood (*Carpinus caroliniana*), arrow-wood (*Viburnum dentatum*), silky dogwood (*Cornus amomum*), Japanese honeysuckle (*Lonicera japonica*), river oats (*Chasmanthium latifolia*), and giant cane (*Arundinaria gigantea*). A small portion of this community is jurisdictional wetland but no significant differences in vegetation were observed. Although the species composition does not appear to change, soils in a small portion of this community become hydric east of the bridge. The community in this area is therefore considered jurisdictional wetland.

This community probably represents an example of a Piedmont/Low Mountain Alluvial Forest as described by Schafale and Weakley (1990), although it does contain some elements of a Piedmont/Mountain Bottomland Forest. The TNC classification is most likely I.B.2.N.d.12 Liquidambar styraciflua – (*Liriodendron tulipifera, Acer rubrum*) Temporarily Flooded Forest Alliance.

Raccoon (*Procyon lotor*) may be expected here, along with eastern towhee (*Pipilo erythrophthalmus*), Carolina wren (*Thryothorus ludovicianus*), white-tailed deer (*Odocoileus virginianus*), southeastern shrew (*Sorex longirostris*), and eastern box turtle (*Terrapene carolina*).

d) Upland Mixed Hardwood Forest

This community occurs on upland slopes adjacent to the bottomland hardwood community. Canopy species in this community include white oak (*Quercus alba*), northern red oak (*Quercus rubra*), American beech (*Fagus grandifolia*), red maple (*Acer rubrum*), and loblolly pine (*Pinus taeda*). The understory includes sourwood (*Oxydendrum arboreum*), American holly, flowering dogwood (*Cornus florida*), and Christmas fern (*Polystichum acrostichoides*).

This community is tentatively classified as a Mesic Mixed Hardwood Forest, Piedmont subtype as described by Schafale and Weakley (1990). The TNC equivalent is I.B.2.N.a.17 *Fagus grandifolia – Quercus rubra – Quercus alba* Forest Alliance.

Tufted titmouse (*Parus bicolor*), Carolina chickadee (*Parus carolinensis*), red-bellied woodpecker (*Melanerpes carolinus*), and ruby-crowned kinglet (*Regulus calendula*) are common inhabitants of this community. Other inhabitants may include common flicker (*Colaptes auratus*), gray squirrel (*Sciurus carolinensis*), and black racer (*Coluber constrictor*).

e) Pine Plantation

This community occurs on upland slopes adjacent to the mixed hardwood forest community. The canopy is a loblolly pine forest. Understory species include flowering dogwood, sourwood, red maple, American holly, yellow jessamine (*Gelsemium sempervirens*). A small portion of this community occurs on a more well drained portion of the floodplain to the northwest of the existing bridge. This community appears be younger, but no change in composition was noted.

Schafale and Weakley (1990) do not describe this community. This community has a tentatively The Nature Conservancy (TNC) classification of I.A.8.C.x.9 *Pinus taeda* Planted Forest Alliance.

Animals expected in this community include pine warbler (*Dendroica pinus*), ruby-crowned kinglet, striped skunk (*Mephitis mephitis*), eastern mole (*Scalopus aquaticus*), and corn snake (*Elaphe guttata guttata*).

f) Old Field Community

An old field community is present at the northwest end of the project area. This is an abandoned field that is succeeding to the surrounding forests. Vegetation is shrubby and contains numerous old field weeds. Species present include loblolly pine, red maple, privet, blackberry (*Rubus* sp.), buttonbush (*Cephalanthus occidentalis*), golden rod (*Solidago* sp.), Japanese honeysuckle, and giant cane.

Schafale and Weakley (1990) do not describe this community. The TNC classification is most likely I.A.8.N.b.16 *Pinus taeda* Forest Alliance (A.30).

Animal species expected here include raccoon, white-tailed deer, eastern harvest mouse (*Reithrodontomys humilis*), eastern screech owl (*Otus asia*), indigo bunting (*Passerina cyanea*), white-throated sparrow (*Zonotrichia albicolis*), and northern cardinal (*Cardinalis cardinalis*).

2. Wildlife

Wildlife in the project area is described with its respective terrestrial community above.

3. Aquatic Communities

Within the project area, Middle Creek is a mid-gradient, third-order stream. The bed material consists of silt, gravel and cobbles, with a small percentage of sand. On the day of the site visit, the water was clear with no suspended sediment. The riparian community is mostly deciduous trees and shrubs, and is described in Section V.D.1.c.

According to a communication from the District 3 Fisheries Biologist, Middle Creek contains populations of Dwarf Wedge Mussel. Also, it is important spawning grounds for certain populations of anadromous fish such as shad (*Alosa* sp.), and herring (*Clupea* sp.).

4. Anticipated Impacts to Biotic Communities

Project construction will have various impacts to the previously described terrestrial and aquatic communities. Any construction activities in or near these resources have the potential to impact biological functions. This section quantifies and qualifies potential impacts to the natural communities within the project area in terms of the area impacted and the plants and animals affected. Temporary and permanent impacts are considered here along with recommendations to minimize or eliminate impacts.

a) Terrestrial Communities

Terrestrial communities in the project area will be impacted permanently by project construction from clearing and paving. Estimated impacts are based on the length of the alternative and the entire study corridor width. The project length for the bridge replacement portion of Alternatives 1, 2 and 3 is 1080 feet (329 m) and the width is approximately 100 feet (30.5 m) wide. The length for the Alternative 1 detour is 1600 feet (4800 m) and the width is up to 90 feet (27 m) wide beyond the mainline improvements. The length of the Alternative 2 detour is 1600 feet (488 m) and the width varies up to 70 feet (21 m) beyond the width of the mainline improvements. **Table 3** describes the potential impacts to terrestrial communities by habitat type. Because impacts are based on the entire study corridor width, the actual loss of habitat will likely be less than the estimate.

Table 3: Estimated Areas of Impact to Terrestrial Communities

	Area of Impact in Acres (Hectares)					
	Alternative 1		Alternative 2		Alternative 3	
Community	**Permanent**	**Temporary**	**Permanent**	**Temporary**	**Permanent**	**Temporary**
Maintained Landscape	0.34 (0.14)	0.31 (0.13)	0.34 (0.14)	0.02 (0.05)	0.34 (0.14)	N/A
Bottomland Hardwood Forest	0.27 (0.11)	0.27 (0.11)	0.27 (0.11)	0.65 (0.26)	0.27 (0.11)	N/A
Mixed Hardwoods	0.56 (0.23)	1.05 (0.43)	0.56 (0.23)	0.64 (0.26)	0.56 (0.23)	N/A
Pine Plantation	0.12 (0.05)	0.09 (0.04)	0.12 (0.05)	0.36 (0.15)	0.12 (0.05)	N/A
Scrub Wetland	0.29 (0.12)	0.25 (0.10)	0.29 (0.12)	0.03 (0.01)	0.29 (0.12)	N/A
Old Field	0.02 (0.01)	0.001 (0.00)	0.02 (0.01)	0.00 (0.00)	0.02 (0.01)	N/A
Total Impact	**1.6 (0.66)**	**2.0 (0.8)**	**1.6 (0.66)**	**1.8 (0. 71)**	**1.6 (0.66)**	N/A

[1] Temporary impacts are from the temporary on-site detour. Areas disturbed by the temporary on-site detour would be restored to its pre-existing condition after construction of the new culvert on the existing alignment.

Destruction of terrestrial communities along the project alignment will result in the loss of foraging and breeding habitats for the various animal species that utilize the area. Animal species will be displaced into surrounding communities. Adult birds, mammals, and some reptiles are mobile enough to avoid mortality during construction. Young animals and less mobile species, such as many amphibians, may suffer direct loss during construction. The plants and animals that are found in these upland communities are generally common throughout eastern North Carolina.

Impacts to terrestrial communities, particularly in locations having steep to moderate slopes, can result in the aquatic community receiving heavy sediment loads as a consequence of erosion. Construction impacts may not be restricted to the communities in which the construction activity occurs, but may also affect downstream communities. Efforts should be made to ensure that no sediment leaves the construction site.

b) Wetland Communities

The preferred alternative, Alternative 2, will impact a total of 0.35 acres (0.14 ha) of wetlands. 0.32 acres (0.13ha) will be impacted by the mainline, and the temporary on-site detour will impact 0.03 acres (0.01 ha) of wetlands. The temporary on-site detour associated with Alternative 1, on the east side of the road, would impact 0.25 acres (0.1. ha) of wetlands. Therefore, of the two alternatives that maintain traffic using temporary detours, the one that impacts the fewest wetlands was selected.

c) Aquatic Communities

Impacts to aquatic communities include fluctuations in water temperatures as a result of the loss of riparian vegetation. Shelter and food resources, both in the aquatic and

terrestrial portions of these organisms' life cycles, will be affected by losses in the terrestrial communities. The loss of aquatic plants and animals will affect terrestrial fauna which rely on them as a food source.

Temporary and permanent impacts to aquatic organisms may result from increased sedimentation. Aquatic invertebrates may drift downstream during construction and recolonize the disturbed area once it has been stabilized. Sediments have the potential to affect fish and other aquatic life in several ways, including the clogging and abrading of gills and other respiratory surfaces, affecting the habitat by scouring and filling of pools and riffles, altering water chemistry, and smothering different life stages. Increased sedimentation may cause decreased light penetration through an increase in turbidity.

Wet concrete should not come into contact with surface water during bridge construction. Potential adverse effects can be minimized through the implementation of NCDOT *Best Management Practices for Protection of Surface Waters.* Additional provisions will be adhered to as described in Section V.E.2.a to prevent adverse affects to aquatic federally endangered species.

Due to the presence of anadromous fish in Middle Creek, a moratorium on in-water work will be enforced from February 15 to June 15. NCDOT will follow the "Stream Guidelines for Anadromous Fish Passage".

E. Special Topics

This section provides inventories and impact analyses for two federal and state regulatory issues: "Waters of the United States", and rare and protected species.

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

Wetlands and surface waters fall under the broad category of "Waters of the United States" as defined in 33 CFR § 328.3 and in accordance with provisions of Section 404 of the Clean Water Act (33 U.S.C. 1344). These wetlands and surface waters are regulated by the USACE. Any action that proposes to dredge or place fill material into surface waters or wetlands falls under these provisions.

Jurisdictional wetlands occur within the project area and will be impacted by project construction. Three different areas of wetlands are found within the project area (**Figure 2**). The largest wetland is present north of Middle Creek on the eastern side of Old Stage Road. It does not adjoin the stream channel within the project limits. Located north of Middle Creek and west of Old Stage Road is a second wetland. Both of these wetlands are scrub wetlands. The third and smallest wetland is on the eastern side of the project area and along the south side of Middle Creek. This wetland adjoins the stream channel and is part of the bottomland hardwood community. These wetland communities are described in Sections V.D.1.b and V.D.1.c. Middle Creek meets the

definition of surface waters, and is therefore classified as Waters of the United States. The channel is approximately 30 feet (9.2 m) wide within the project area.

The preferred alternative, Alternative 2, will impact a total of 0.35 acres (0.14ha) of wetlands. 0.32 acres (0.13ha) will be impacted by the mainline, and the temporary on-site detour will impact 0.03 acres (0.01 ha) of wetlands. The temporary on-site detour associated with Alternative 1, on the east side of the road, would impact 0.25 acres (0.1. ha) of wetlands. Therefore, of the two alternatives that maintain traffic using temporary detours, the one that impacts the fewest wetlands was selected.

In the project area, the stream is approximately 30 feet (9.1 m) wide. Approximately 100 linear feet (30.5 m) of the stream may be impacted by having the new bridge constructed over it. Approximately 3000 square feet (278 m^2) of surface waters will be impacted.

2. Permits

a) Section 404 of the Clean Water Act

Impacts to jurisdictional surface waters and wetlands are anticipated from the proposed project. Permits and certifications from various state and federal agencies may be required prior to construction activities.

Construction is likely to be authorized by Nationwide Permit (NWP) No. 23, as promulgated under 61 FR 65874, 65916; December 13, 1996. This permit authorizes activities undertaken, assisted, authorized, regulated, funded, or financed in whole or in part, by another Federal agency or department where that agency or department has determined that, pursuant to the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act:

- The activity, work, or discharge is categorically excluded from environmental documentation because it is included within a category of actions which neither individually nor cumulatively have a significant effect on the human environment; and
- The Office of the Chief Engineer has been furnished notice of the agency's or department's application for the categorical exclusion and concurs with that determination.

b) Section 401 Water Quality Certification

This project will also require a 401 Water Quality Certification or waiver thereof, from the Department of Environment and Natural Resources (DENR) prior to issuance of the NWP 23. Section 401 of the Clean Water Act requires that the state issue or deny water certification for any federally permitted or licensed activity that results in a discharge into Waters of the U.S. Final permit decision rests with the USACE.

c) Bridge Demolition and Removal

Demolition and removal of a highway bridge over Waters of the United States requires a permit from the U.S. Army Corps of Engineers if dropping components of the bridge into the water is the only practical means of demolition. Effective 9/20/99, this permit is included with the permit for bridge reconstruction. The permit application henceforth will require disclosure of demolition methods and potential impacts to the body of water in the planning document for the bridge reconstruction.

Section 402-2 "Removal of Existing Structures" of NCDOT's Standard Specifications for Roads and Structures stipulates that "excavated materials shall not be deposited....in rivers, streams, or impoundments," and "the dropping of parts or components of structures into any body of water will not be permitted unless there is no other practical method of removal. The removal from the water of any part or component of a structure shall be done so as to keep any resulting siltation to a minimum." To meet these specifications, NCDOT shall adhere to Best Management Practices for the Protection of Surface Waters, as supplemented with Best Management Practices for Bridge Demolition and Removal.

In addition, all in-stream work shall be classified into one of three categories as follows:

Case 1) In-water work is limited to an absolute minimum, due to the presence of special resource waters or threatened and/or endangered species, except for the removal of the portion of the sub-structure below the water. The work is carefully coordinated with the responsible agency to protect the Special Resource Water or T&E species.

Case 2) No work at all in the water during moratorium periods associated with fish migration, spawning, and larval recruitment into nursery areas.

Case 3) No special restrictions other than those outlined in Best Management Practices for Protection of Surface Waters.

Middle Creek contains populations of the Federally Endangered Dwarf Wedge Mussel and has important spawning grounds for certain anadromous fishes (shad, herring). Therefore, Case 1 applies to the proposed replacement of Bridge No. 273 over Middle Creek.

The superstructure consists of steel planks, steel girders, and timber. The substructure consists of timber caps and timber piles. This structure contains no concrete, and will not have to be demolished. It is expected that there will be no fill in the stream channel.

The streambed in the project area is silt, and sand with some gravel. Therefore, conditions in the stream raise sediment concerns and a turbidity curtain is recommended.

3. Neuse River Basin: Nutrient Sensitive Water Management Strategy

Pursuant to 15 NCAC 2B.0233, Riparian Area Rules for Nutrient Sensitive Waters apply. The rules state that roads, bridges, stormwater management facilities, ponds, and utilities may be allowed within the 50-foot riparian buffer area of subject streams where no practical alternative exists. They also state that these structures shall be located, designed, constructed, and maintained to have minimal disturbance, to provide maximum erosion protection, to have the least adverse effects on aquatic life and habitat, and to protect water quality to the maximum extent practical through the use of best management practices. Every reasonable effort will be made to avoid and minimize wetland and stream impacts.

Estimated impacts to the riparian buffers are quantified below in **Table 4**. Impacts to Zone 1 are based on a buffer width of 30 feet measured landward from the top of bank or rooted vegetation. Impacts to Zone 2 are based on a buffer width of 20 feet measured landward from the outer edge of Zone 1. The Authorization Certificate for Neuse Buffer Impacts will be requested along with the 401 Water Quality Certification.

Table 4: Estimated Impacts to Riparian Buffers for Middle Creek

	Mainline	Temporary Detour
Zone 1 - acres (ha)	0.099 (0.159)	0.073 (0.117)
Zone 2 - acres (ha)	0.080 (0.128)	0.089 (0.144)
Total - acres (ha)	0.179 (0.287)	0.162 (0.261)

The buffer impacts for Detour 1 include impacts to the Unnamed Tributary to Middle Creek.

4. Avoidance, Minimization, Mitigation

Because this project will likely be authorized under a Nationwide Permit, mitigation for impacts to surface waters may or may not be required by the USACE. In accordance with the Division of Water Quality Wetland Rules [15A NCAC 211 .0506 (h)] "Fill or alteration of more than one acre of wetlands will require compensatory mitigation; and fill or alteration of more than 150 linear feet of streams may require compensatory mitigation." Because wetland impacts will be less than an acre, wetland mitigation likely will not be required. A total of 100 linear feet (30.5 m) of Middle Creek are located within the study corridor for the proposed project. If the final length of stream impact is greater than 150 linear feet (45.6 m), compensatory mitigation may be required.

F. Rare and Protected Species

Some populations of plants and animals are declining either as a result of natural forces or their difficulty competing with humans for resources. Rare and protected species listed for Wake County, and any likely impacts to these species as a result of the proposed project construction, are discussed in the following sections.

1. Species Under Federal Protection

Plants and animals with a federal classification 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.

The USFWS lists 4 species under federal protection for Wake County as of March 2001 (USFWS 2001). These species are listed in **Table 5**.

Table 5: Species Under Federal Protection in Wake County

Common Name	Scientific Name	Federal Status
Vertebrates		
Bald eagle	*Haliaeetus leucocephalus*	Threatened (proposed for delisting)
Red-cockaded woodpecker	*Picoides borealis*	Endangered
Invertebrates		
Dwarf wedge mussel	*Alasmidonta heterodon*	Endangered
Vascular Plants		
Michaux's sumac	*Rhus michauxii*	Endangered
Notes: E	Endangered-A species that is threatened with extinction throughout all or a significant portion of its range.	
T	Threatened-A species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.	

A brief description of the characteristics and habitat requirements of each species follows, along with a conclusion regarding potential project impact.

***Haliaeetus leucocephalus* (bald eagle)** **Threatened (proposed for delisting)**

Family: *Accipitridae*
Date of first listing: 1967
Date of downlisting: 1995

A large raptor, the bald eagle has a wingspread of about 7 feet (2.12 m). Its plumage is mainly dark brown, and adults have a pure white head and tail. First year juveniles are often chocolate brown to blackish, sometimes with white mottling on the tail, belly, and underwings. The head and tail become increasingly white with age until full adult plumage is reached in the fifth or sixth year. An opportunistic predator, the bald eagle feeds primarily on fish but also takes a variety of birds, mammals, and turtles (both live and as carrion) when fish are not readily available.

The bald eagle is primarily riparian, associated with coasts, rivers, and lakes, usually nesting near bodies of water where it feeds. Selection of nesting sites varies

tremendously depending on the species of trees growing in a particular area. In the Southeast, nests are constructed in dominant or codominant pines or cypress. Nests are usually constructed in living trees, but bald eagles will occasionally use dead ones.

Biological Conclusion: **No Effect**

No suitable nesting sites exist in the project area, and Middle Creek is not large enough in the project area to provide an adequate food source for bald eagles. A review of the NHP files did not reveal any records of bald eagles in the project vicinity. It can be determined that the project will not impact this threatened species.

***Picoides borealis* (red-cockaded woodpecker)** **Endangered**

Family: *Picidae*
Federally Listed: 1970

The red-cockaded woodpecker about 8 inches (20.3 cm) long, with a wingspan of 13.8 to 15 inches (35 to 38 cm). There are black and white horizontal stripes on its back, and its cheeks and underparts are white. Its flanks are black streaked. The cap and stripe on the side of the neck and the throat are black. The male has a small red spot on each side of the black cap. After the first post-fledgling molt, fledgling males have a red crown patch. This woodpecker's diet is composed mainly of insects, which include ants, beetles, wood-boring insects, caterpillars, and corn ear worms if available. About 16 to 18 percent of the diet includes seasonal wild fruit.

Open stands of pines with a minimum age of 80 to 120 years, depending on the site, provide suitable nesting habitat. Longleaf pines (*Pinus palustris*) are most commonly used, but other species of southern pine are also acceptable. Dense stands (stands that are primarily hardwood, or that have a dense hardwood understory) are avoided. Foraging habitat is provided in pine and pine hardwood stands 30 years old or older with foraging preference for pine trees 10 inches (25.4 cm) or larger in diameter. In good, well-stocked, pine habitat, sufficient foraging substrate can be provided on 80 to 125 acres (29.2 to 45.6 hectares).

Biological Conclusion: **No Effect**

No suitable red-cockaded woodpecker habitat exists within the project area. These birds are not associated with mixed hardwood riparian areas or human-dominated maintained habitats. A search of the NHP files did not reveal any records of red-cockaded woodpeckers in the project vicinity. It can be concluded that the project will not threaten this endangered species.

***Alasmidonta heterodon* (dwarf wedge mussel)** **Endangered**

Family: *Unionidae*
Federally Listed: 1990

The dwarf wedge mussel is a small, brown to yellowish mussel that rarely exceeds 1.5 in (3.81 cm) in length. It is also the only North American freshwater mussel that has two lateral teeth on the right valve, but only one on the left. The female's shell is inflated in the back where the marsupial gills are located. Little is known about the species' life history and reproductive cycle. Gravid females have been observed from late August until June. Like other freshwater mussels, this species' eggs are fertilized in the female as sperm passes through its gills; the resulting larvae than attaches to a fish host. Although this host is still unknown, strong evidence suggests that it is an anadromous fish which migrates from the ocean into freshwater to spawn.

The dwarf wedge mussel occurs along the Atlantic Coast from Canada south to North Carolina. There are a number of documented populations in North Carolina streams, including Middle Creek. The habitat is described as creek and river areas with a slow to moderate current and a substrate that consists of sand, gravel, or muddy bottom. These areas must be silt free.

Major factors contributing to the endangered status of the species include water quality degradation and loss of habitat. The mussel needs slow to moderate currents and a silt-free environment. Construction of dams alters these conditions. Another significant factor is its anadromous fish host has been blocked from some habitat areas by impoundment and dams. Increased acidity, runoff of agricultural chemicals and fertilizers and the mussels sensitivity to potassium, zinc, copper, cadmium and other elements associated with industrial pollution also contribute.

Biological Conclusion: **Not Likely to Adversely Affect**

A search of the NHP files revealed a record of dwarf wedge mussel occurring within 2 miles (3.24 km) downstream from the project area. At the site of the project, Middle Creek is somewhat degraded due to sediment. Mussel surveys were conducted on October 11 and 18, 2000, by a Environmental Specialist, from the Project Development and Environmental Analysis Branch, NCDOT. No dwarf wedge mussels were found near the project site. Provided that the following provisions are adhered to, it can be concluded that project construction is "Not Likely to Adversely Affect" this species:

1. NCDOT shall conduct an in-stream survey just prior to the construction let date.
2. The NCDOT resident engineer shall be responsible for alerting Tim Savidge of the Project Development and Environmental Analysis Branch two months prior to the project being awarded so that they may plan the required in-steam survey.
3. There will be a moratorium on clearing and grubbing between November 15 and April 1.
4. Bridge deck drains shall be configured so that the run-off does not fall into the stream.
5. The NCDOT resident engineer is responsible for providing a written invitation for a field inspection to the North Carolina Wildlife Resources Commission,

Nongame and Protected Species Branch, and the US Fish and Wildlife Service prior to construction.

6. The erosion control plans for Protected Aquatic Species must be used. These plans include the following requirements:
   - Sediment and erosion controls must be in place prior to land clearing activities. No sediment from either bridge demolition or construction activities shall be allowed to enter the flowing stream.
   - "Environmentally Sensitive Areas" will be defined on the plans, which consist of a 50 ft. buffer zone on both sides of the stream.
   - The Contractor may perform clearing operation, but not grubbing operations in the "Environmentally Sensitive Areas", until immediately prior to beginning grading operations.
   - Once grading operations begin in "Environmentally Sensitive Areas", as specified on the plans, work will progress in a continuous manner until complete.
   - Seeding and mulching will be performed immediately following final grade establishment.
   - Stage seeding will be performed on cut and fill slopes as grading progresses.

***Rhus michauxii* (Michaux's sumac)** **Endangered**

Family: *Anacardiaceae*
Federally Listed: 1989

Michaux's sumac or false poison sumac is a densely hairy colonial shrub with erect stems, which are 1 to 3 feet (0.3 to 0.9 m) in height. The shrub's compound leaves are narrowly winged at their base, dull on their tops, and veiny and slightly hairy on their bottoms. Each leaf is finely toothed on its edges. Flowers are greenish-yellow to white and are 4 to 5 parted. Each plant is unisexual. With a male plant the flowers and fruits are solitary, with a female plant all flowers are grouped in 3 to 5 stalked clusters. The plant flowers from April to June; its fruit, a dull red drupe, is produced in October and November.

Michaux's sumac grows in sandy or rocky open woods in association with basic soils. Apparently, this plant survives best in areas where some form of disturbance has provided an open area. Most of the plant's remaining populations are on highway rights-of way, roadsides, or on the edges of artificially maintained clearings. Other populations are in areas with periodic fires, or on sites undergoing natural succession. One population is situated in a natural opening on the rim of a Carolina bay. Currently, the plant survives in the following North Carolina Counties: Richmond; Hoke, Scotland, Franklin, Davie, Robeson, and Wake.

Biological Conclusion: **No Effect**

No habitat exists in the project area for Michaux's sumac. The soils in the project area are all acidic. A search of the NHP database and a search by Earth Tech biologists found no occurrences of Michaux's sumac in the project vicinity. It can be concluded that the project will not impact this threatened species.

2. Federal Species of Concern and State Status

Federal Species of Concern (FSC) are not legally protected under the Endangered Species Act and are not subject to any of its provisions, including Section 7, until they are formally proposed or listed as Threatened or Endangered. **Table 6** includes FSC species listed for Wake County and their state classifications. Organisms which are listed as Endangered (E), Threatened (T), or Special Concern (SC) on the North Carolina Natural Heritage Program list of Rare Plant and Animal Species are afforded state protection under the State Endangered Species Act and the North Carolina Plant Protection and Conservation Act of 1979. However, the level of protection given to state-listed species does not apply to NCDOT activities.

Table 6: Federal Species of Concern in Wake County

Common Name	Scientific Name	State Status	Habitat present
Vertebrates			
Bachman's Sparrow *	*Aimophila aestivalis*	SC	NO
Carolina Darter	*Etheostoma collies lepidinion*	SC	
Pinewoods Shiner	*Lythrurus matutinus*	SR	YES
Southeastern Bat *		SC	NO
Southern Hognose Snake **	*Heterodon simus*	SR	NO
Invertebrates			
Atlantic Pigtoe	*Fusconaia masoni*	T	YES
Diana Fritillary **	*Speyeria diana*	SR	YES
Green Floater	*Lasmigona subviridis*	E	YES
Yellow Lance	*Elliptio lanceolata*	T	YES
Vascular Plants			
Bog Spicebush	*Lindera subcoriacea*	E	NO
Carolina Least Trillium *	*Trillium pusillum* var *pusillum*	E	NO
Sweet Pinesap *	*Monotropsis odorata*	C	NO

Sources: Amoroso, ed., 1999; LeGrand and Hall, eds., 1999
Key: T = Threatened, E = Endangered, SC = Special Concern, C = Candidate, SR = Significantly Rare
*=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.

No FSC species were observed during the site visit, however three federally listed species are recorded at NHP as occurring within 2 miles (3.2 km) of the project area. Current records for the yellow lance, pinewoods shiner, and Atlantic pigtoe indicate populations of these species nearby. The yellow lance is generally found in the Neuse and Tar River drainages near the fall line. Pinewoods shiners are endemic to North Carolina and are found in the Neuse and Tar River drainages. The Atlantic Pigtoe can be found in most Atlantic drainages, especially in streams of the lower Piedmont and upper Coastal Plain. The pinewoods shiner and the Atlantic pigtoe were both observed within very close proximity to Bridge 273.

3. Summary of Anticipated Impacts

The proposed project is not anticipated to impact any threatened or endangered species, provided the special conditions listed to prevent potential impacts to the dwarf wedge mussel are followed.

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 if a federally funded, licensed, or permitted project has an effect on a property listed on or eligible for the National Register of Historic Places, the Advisory Council on Historic Preservation be given an opportunity to comment.

B. Historic Architectural Resources

A field survey of the Area of Potential Effect was conducted on December 15, 1999. All structures were photographed, and later reviewed by the State Historic Preservation Office (HPO). In a concurrence form dated February 17, 2000 and a memorandum dated November 16, 2000, the State Historic Preservation officer (SHPO) concurred that there are no historic architectural resources either listed in or eligible for listing in the National Register of Historic Places within the APE. A copy of the concurrence form and memorandum are included in the Appendix.

C. Archaeological Resources

The State Historic Preservation Officer (SHPO), in a memorandum dated November 16, 2000 said they had reviewed the project and are aware of no properties of architectural, historic, or archaeological significance, which would be affected by the project. In addition, they have no comment on the project as currently proposed. A copy of the SHPO memorandum is included in the Appendix.

VII. ENVIRONMENTAL EFFECTS

Anticipated impacts to the resources in the project area are described in this section. The project is considered to be a Federal "Categorical Exclusion" because of its limited scope and insignificant environmental consequences. The project is expected to have an overall positive impact. Replacement of an inadequate bridge will result in safer traffic operations.

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

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

No adverse effect on families or communities is anticipated. Right-of-way acquisition will be limited. There are no relocations.

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 Farmland Protection Policy Act requires all federal agencies or their representatives to consider the potential impacts to prime and important farmland soils by all land acquisition and construction projects. Prime and important farmland soils are defined by the U.S. Natural Resources Conservation Service. No prime or important farmlands will be impacted by the proposed project. The land use adjacent to the project is residential or wooded.

This project is an air quality "neutral" project, so it is not required to be included in the regional emission analysis (if applicable) and a project level CO analysis is not required. This project is not anticipated to create any adverse effects on the air quality of this attainment area.

Traffic volumes will not increase or decrease because of this project; therefore there will not be substantial changes in noise and air quality due to this project.

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

An examination of available environmental records revealed neither underground storage tanks, hazardous waste sites, regulated or unregulated landfills, nor dump sites in the project area.

Wake County is a participant in the National Flood Insurance Program (NFIP). Flood Insurance Study maps for Wake County show that Bridge No. 273 is located in a FEMA 100-year floodplain. Replacement of this bridge is not expected to affect the 100-year floodplain. The hydraulic opening of the bridge crossing approximates that of the existing bridge. The grade of the proposed roadway should remain the same as existing in the vicinity of the bridge crossing.

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

VIII. PUBLIC INVOLVEMENT

A newsletter was circulated in November, 2001 to inform residents in the area of the proposed project and to announce a Citizens Informational Workshop. A Citizen's Informational Workshop was held from 4:00 P.M. to 7:00 P.M on November 28, 2001 in the Willow Springs Elementary School Media Center (6800 Dwight Rowland Road) in Wake County.

Approximately five people attended the Citizen's Informational Workshop. The handout given to the attendees contained project purpose and need, description, estimated traffic volumes, vicinity map, project schedule, cost estimates, and current status. In addition, it contained a comment sheet for all attendees to address any concerns they may of have about this project.

Since the Citizen's Informational Workshop, we have received comments from citizens. The majority of the comments state that they believe the replacement on the existing alignment while using an on-site detour is the best option. The reason given is their concern with length of the off-site detour. One citizen, owner of property located in the southwest quadrant of Old Stage Road and Middle Creek, is concerned about old growth oak trees located in the vicinity of the proposed on-site detour.

IX. AREAS OF CONTROVERSY

There are no areas of controversy on this project.

X. AGENCY COMMENTS

A. Federal

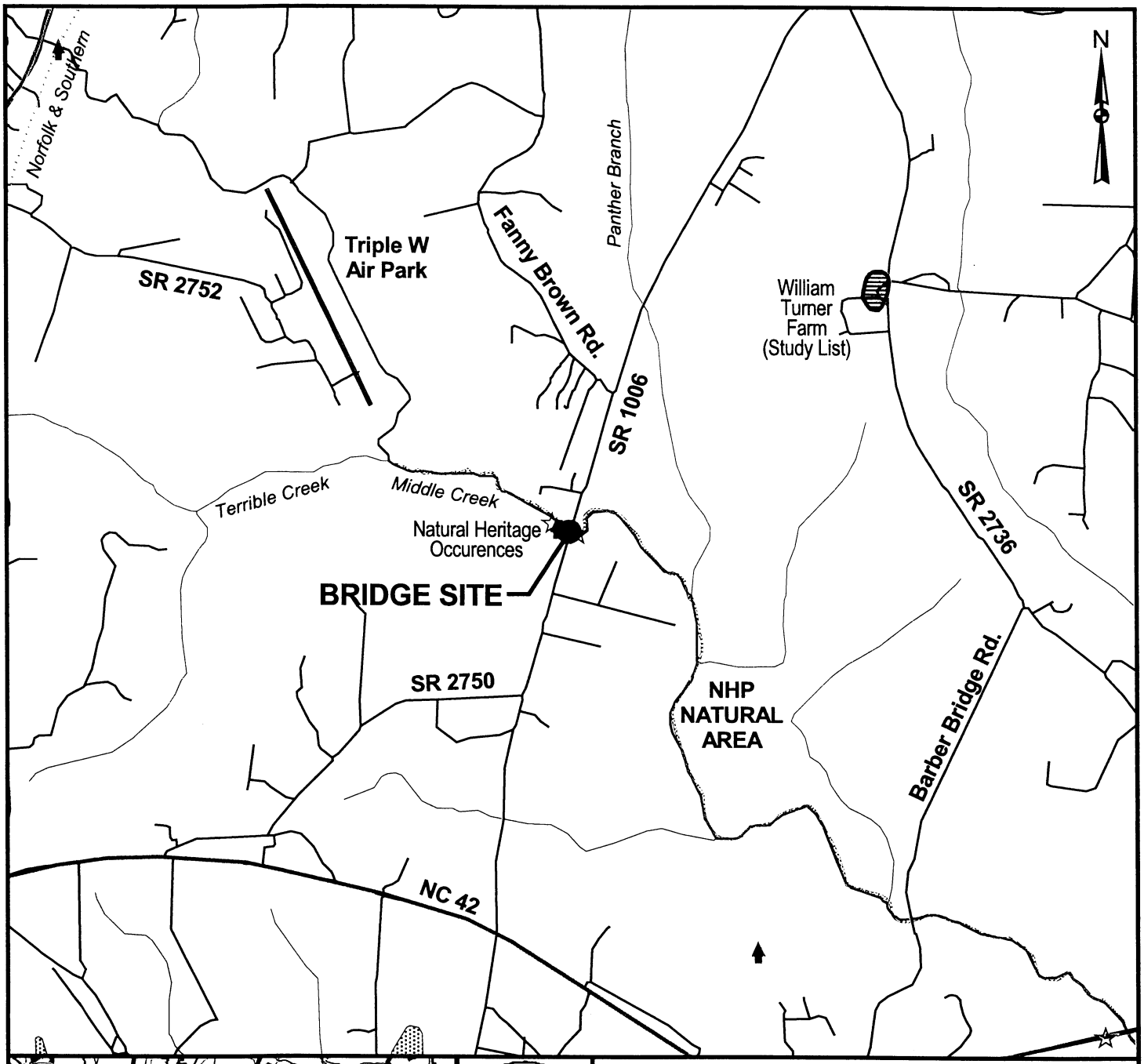
The United States Department of Agriculture's Natural Resource Conservation Service provided a letter stating they had no comments on the project. No other federal agencies provided written comments. Other agencies were contacted and some provided verbal or email input.

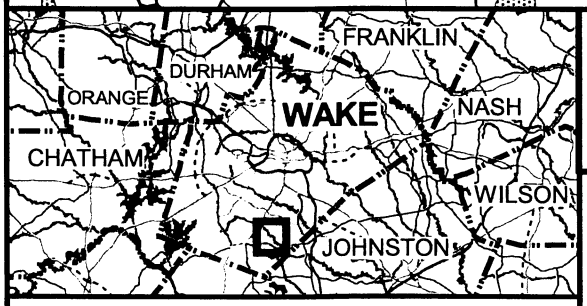
B. State

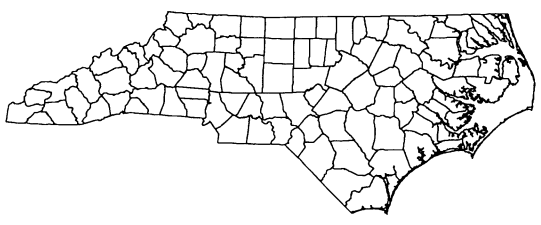
State Historic Preservation Office, November 16, 2000: They are aware of no properties of architectural, historic, or archaeological significance, which would be affected by the project.

North Carolina Wildlife Resources Commission, October 8, 2001: The North Carolina Wildlife Resources Commission cited that Middle Creek serves as an important spawning ground for anadromous fish. Therefore, they noted NCDOT should closely follow the "Stream Crossing Guidelines for Anadromous Fish Passage" and enforce a moratorium on in-water work between February 15 and June 15.

FIGURES







North Carolina - Department of Transportation
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Project Development and Environmental Analysis Branch

FIGURE 1
VICINITY MAP

REPLACEMENT OF BRIDGE NUMBER 273
ON SR 1006 OVER MIDDLE CREEK
WAKE COUNTY
TIP NO. B-3521

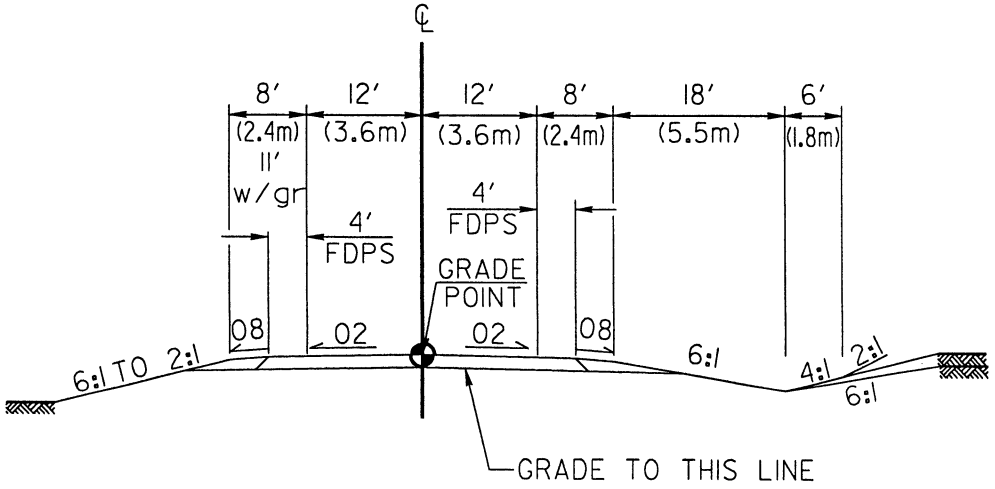
0.5 0 0.5 1 Miles

North Carolina Department of Transportation
Division of Highways
Project Development & Environmental Analysis Branch

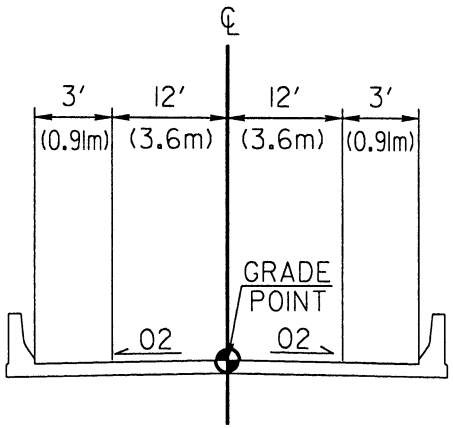
FUNCTIONAL DESIGN LEGEND

- Alt. 1, 2, &3, Centerline
- Alt. 1, 2, &3, Edge of Pavement
- Alt. 1, 2, &3, Construction Limits
- Detour for Alt. 1, Centerline
- Detour for Alt. 1, Edge of Pavement
- Detour for Alt. 1, Construction Limits
- Detour for Alt. 2, Centerline
- Detour for Alt. 2, Edge of Pavement
- Detour for Alt. 2, Construction Limits

FIGURE 2
ALTERNATIVES 1, 2 & 3
REPLACEMENT OF BRIDGE NO. 273
ON SR 1006 OVER
MIDDLE CREEK
WAKE COUNTY
TIP NO. B-3521



TYPICAL ROADWAY APPROACH SECTION



TYPICAL SECTION ON STRUCTURE

TRAFFIC DATA

ADT 1999	3000
ADT 2025	8300
DUAL	2%
TTST	1%

FUNCTIONAL CLASSIFICATION: RURAL COLLECTOR (MINOR)

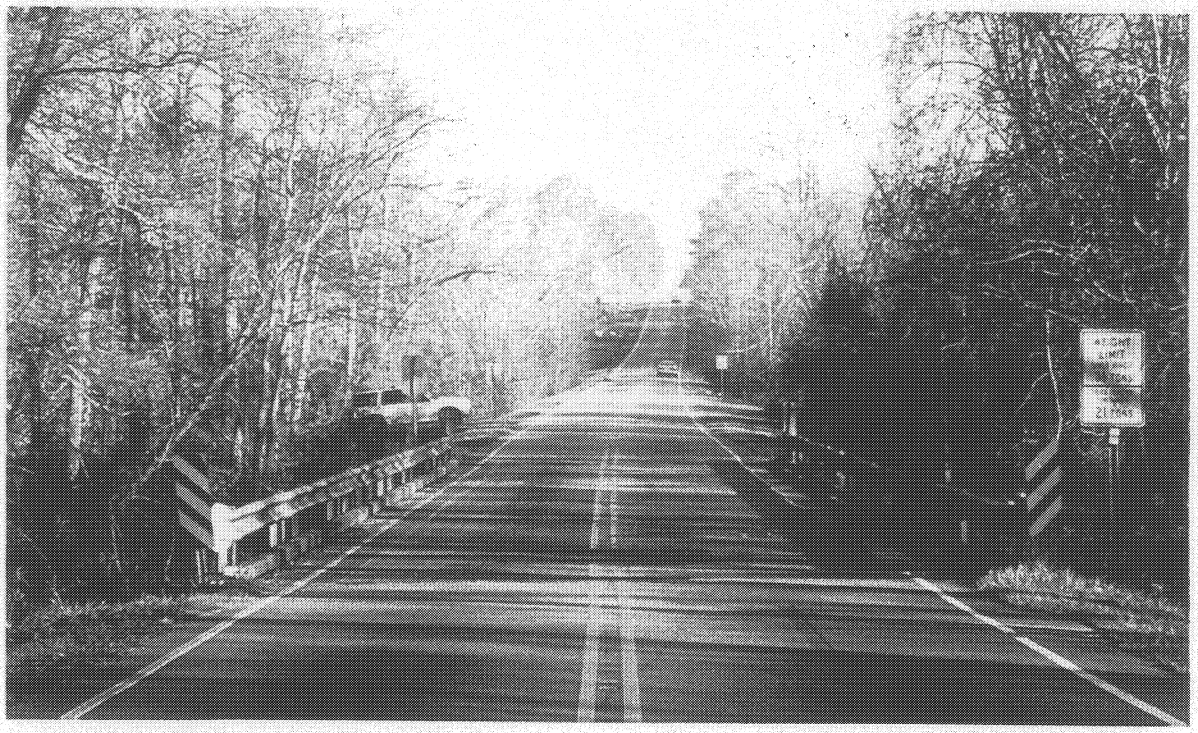
NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND
ENVIRONMENTAL ANALYSIS BRANCH

FIGURE 3
TYPICAL SECTION

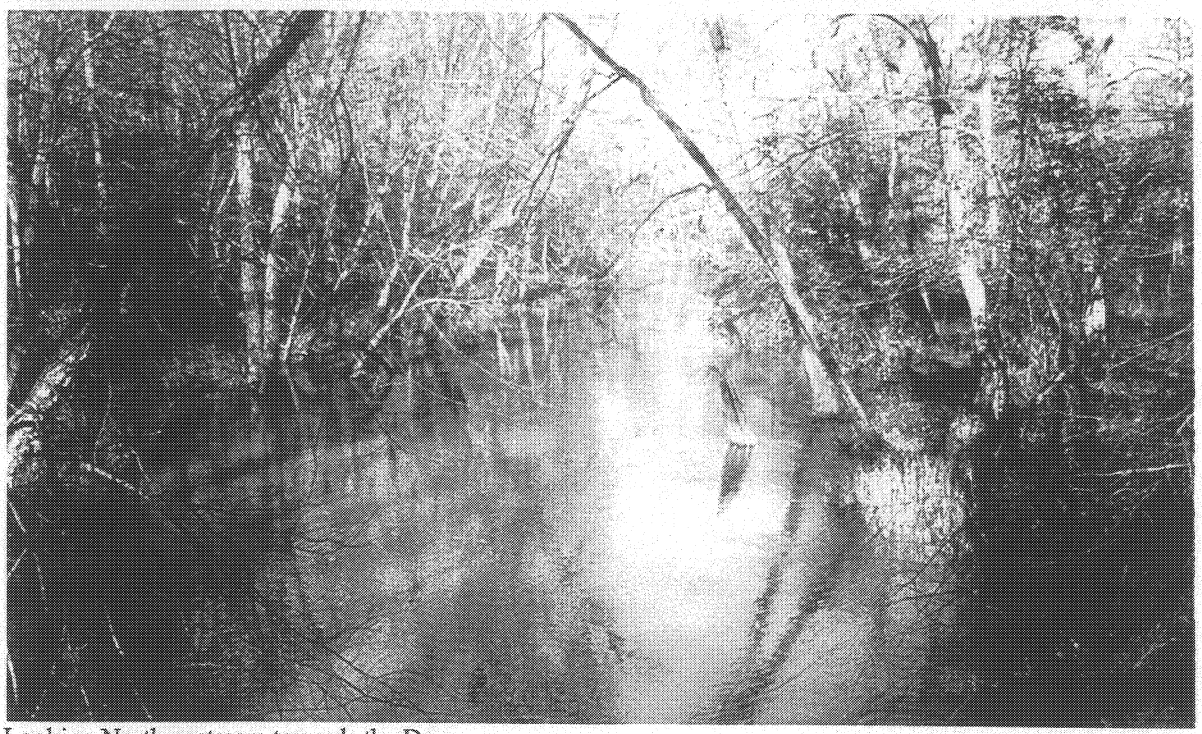
BRIDGE NO. 273 ON SR 1006
OVER MIDDLE CREEK
WAKE COUNTY

TIP NO. B-3521

NOT TO SCALE



Looking North at the Bridge Approaches.



Looking North upstream towards the Dam

North Carolina – Department of Transportation

Division of Highways

Project Development and
Environmental Analysis Branch

FIGURE 4a
NORTH VIEWS OF BRIDGE

REPLACEMENT OF BRIDGE NUMBER 273
ON SR 1006 OVER MIDDLE CREEK
WAKE COUNTY
TIP NO. B-3521

Upstream Side of Bridge

Looking Downstream off the Bridge.

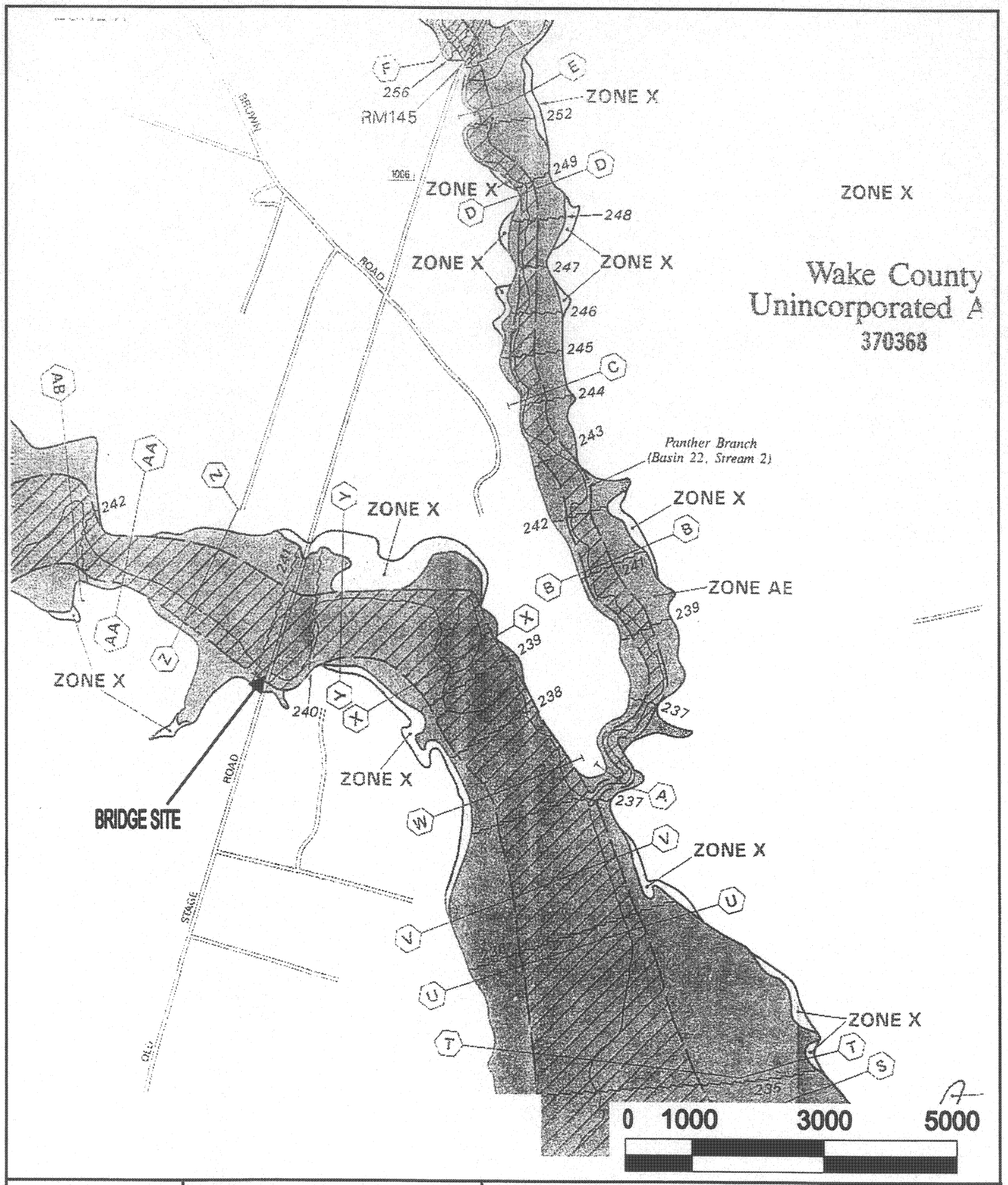
North Carolina – Department of Transportation

Division of Highways

Project Development and
Environmental Analysis Branch

FIGURE 4b
SOUTH AND EAST VIEWS OF BRIDGE

REPLACEMENT OF BRIDGE NUMBER 273
ON SR 1006 OVER MIDDLE CREEK
WAKE COUNTY
TIP NO. B-3521



North Carolina – Department of Transportation

Division of Highways

Project Development and Environmental Analysis Branch

FIGURE 5
FEMA 100 – YEAR FLOODPLAIN MAP
REPLACEMENT OF BRIDGE NUMBER 273
ON SR 1006 OVER MIDDLE CREEK
WAKE COUNTY
TIP NO. B-3521

APPENDIX

Complete

Federal Aid #BRZ-1006(13) *TIP* #B-3521 *County*: Wake

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

Project Description: Replace Bridge No. 273 on SR 1006 over Middle Creek

On February 17, 2000, representatives of the

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

Reviewed the subject project at

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

All parties present agreed

- [ ] there are no properties over fifty years old within the project's area of potential effect.
- [x] there are no properties less than fifty years old which are considered to meet Criterion Consideration G within the project's area of potential effect.
- [x] there are properties over fifty years old (list attached) within the project's area of potential effect, but based on the historical information available and the photographs of each property, properties identified as #1-8 are considered not eligible for the National Register and no further evaluation of them is necessary.
- [x] there are no National Register-listed properties located within the project's area of potential effect.

Signed:

Mary Pope Furr — 2.17.2000
Representative, NCDOT — Date

[signature] — 2/17/2000
FHWA, for the Division Administrator, or other Federal Agency — Date

[signature] — 2/17/2000
Representative, SHPO — Date

[signature] — 2/23/2000
State Historic Preservation Officer — Date

If a survey report is prepared, a final copy of this form and the attached list will be included.

B-3521

North Carolina Wildlife Resources Commission

Charles R. Fullwood, Executive Director

TO: Yvonne G. G. Howell, PE
Earth Tech

FROM: David Cox, Highway Project Coordinator
Habitat Conservation Program

DATE: October 8, 2001

SUBJECT: NCDOT Bridge Replacements in Granville, Halifax, Vance, and Wake counties of North Carolina. TIP Nos. B-3643, B-3644, B-3645, B-3653, B-3853, B-3702, B-3915, B-3521, B-3523, B-3530, B-3703, B-3704, B-3705, B-3917, and B-3918.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Project specific comments:

1. B-3643 – Granville County – Bridge No. 72 over Hatchers Run. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

2. B-3644 - Granville County – Bridge No. 226 over Knap of Reeds Creek. NCDOT should be aware that NCWRC has designated NCWRC gamelands in the vicinity of this bridge. Impacts to gameland properties should be avoided. There are also records of state listed mussels upstream of the project. Therefore, due to the potential for impacts to listed species we request that NCDOT perform a mussel survey prior to the construction of this bridge.

3. B-3645 – Granville County – Bridge No. 201 over Little Grassy Creek. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

4. B-3653 – Halifax County – Bridge No. 162 over Chockoyotte Creek. Due to the potential for anadromous fish at this location, NCDOT should closely follow the "Stream Crossing Guidelines for Anadromous Fish Passage". This includes an in-water work moratorium from February 15 to June 15. We are not aware of any threatened of endangered species in the project vicinity. Standard comments apply.

5. B-3853 – Halifax County – Bridge No. 82 over Marsh Swamp. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

6. B-3702 – Vance County – Bridge No. 19 over Flat Creek. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

7. B-3915 - Vance County – Bridge No. 21 over Flat Creek. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

8. B-3521– Wake County – Bridge No 273 over Middle Creek. Due to the potential for anadromous fish at this location, NCDOT should closely follow the "Stream Crossing Guidelines for Anadromous Fish Passage". This includes an in-water work moratorium from February 15 to June 15. There are also records of state listed mussels upstream of the project. Therefore, due to the potential for impacts to listed species we request that NCDOT perform a mussel survey prior to the construction of this bridge. Standard comments apply.

9. B-3523 – Wake County – Bridge No. 525 over Swift Creek. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

10. B-3530 - Wake County – Bridge No. 174 over Buffalo Creek. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

11. B-3703 – Wake County – Bridge No. 317 over Middle Creek. There are records of state listed mussels upstream of the project. Therefore, due to the potential for impacts to listed species we request that NCDOT perform a mussel survey prior to the construction of this bridge. Standard comments apply.

12. B-3704 – Wake County – Bridge No. 108 over Lower Bartons Creek. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

13. B-3705 – Wake County – Bridge No. 125 over Smiths Creek. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

14. B-3917 Wake County – Bridge No. 311 over Lake Wheeler (Swift Creek). Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

15. B-3918 – Wake County – Bridge No. 127 over Tom Creek. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

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

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

USDA

ıited States
ːpartment of
ɡriculture

ıtural
ːsources
ɔnservation
ːrvice

105 Bland Rd.
ɹite 205
aleigh, NC 27609

19) 873-2134

October 30, 2000

Mr. John Conforti
Project Development & Environmental Analysis Branch
1548 Mail Service Center
Raleigh, NC 27699-1548

Dear Mr. Conforti:

Thank you for the opportunity to provide comments on Bridge Group XXVIII bridge replacement projects listed below:

TIP Project No.	County	Bridge Number	Road Carried	Stream Crossed
B-3643	Granville	72	SR1004 (Providence Rd.)	Hachers Run
B-3644	Granville	226	SR1120 (Veasey Rd.)	Knap of Reeds Creek
B-3645	Granville	201	SR 1435 (Davis Chapel Rd.)	Little Grassy Creek
B-3653	Halifax	162	SR1450 (Branch Rd.)	Chockoyotte Creek
B-3853	Halifax	82	NC561	Marsh Swamp
B-3702	Vance	19	SR 1305 (Barker Rd.)	Flat Creek
B-3915	Vance	21	SR 1303 (Hicksboro Rd.)	Flat Creek
B-3521	Wake	273	SR 1006 (Old Stage Rd.)	Middle Creek
B-3523	Wake	525	SR 1300 (Kildaire Farm Rd.)	Swift Creek
B-3530	Wake	174	SR 2320 (Riley Hill Rd.)	Buffalo Creek
B-3703	Wake	317	SR 1404 (Johnson Pond Rd.)	Middle Creek
B-3704	Wake	108	SR 1834 (Norwood Rd.)	Lower Bartons Creek
B-3705	Wake	125	SR 2045 (Burlington Mills Rd.)	Smiths Creek
B-3917	Wake	311	SR 1379 (Penny Rd.)	Lake Wheeler (Swift Cr.)
B-3918	Wake	127	SR 2044 (Ligon Mill Rd.)	Tom Creek

The Natural Resources Conservation Service does not have any comments at this time.

Sincerely,

Mary K. Combs
State Conservationist

North Carolina Department of Cultural Resources

State Historic Preservation Office

David L. S. Brook, Administrator

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

Division of Archives and History
Jeffrey J. Crow, Director

November 16, 2000

MEMORANDUM

To: William D. Gilmore, P.E., Manager
Project Development & Environmental Analysis Branch

From: David Brook RBG for David Brook
Deputy State Historic Preservation Officer

Re: Bridge Group XXVII Bridge Replacement Projects, Bridge #273, SR 1006 (Old State Rd) over Middle Creek, Wake County, B-3521, ER 01-7789

Thank you for your memorandum of October 2, 2000, concerning the above project.

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

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

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, Environmental Review Coordinator, at 919/733-4763.

DB:kgc

cc: Mary Pope Furr, NC DOT
T. Padgett, NC DOT

3521

	Location	Mailing Address	Telephone/Fax
ADMINISTRATION	507 N. Blount St., Raleigh NC	4617 Mail Service Center, Raleigh NC 27699-4617	(919) 733-4763 • 733-8653
ARCHAEOLOGY	421 N. Blount St., Raleigh NC	4619 Mail Service Center, Raleigh NC 27699-4619	(919) 733-7342 • 715-2671
RESTORATION	515 N. Blount St., Raleigh NC	4613 Mail Service Center, Raleigh NC 27699-4613	(919) 733-6547 • 715-4801
SURVEY & PLANNING	515 N. Blount St., Raleigh NC	4618 Mail Service Center, Raleigh NC 27699-4618	(919) 733-6545 • 715-4801