STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

March 19, 2004

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

ATTENTION: Mr. Eric Alsmeyer
NCDOT Coordinator

Dear Mr. Alsmeyer:

Subject: **Nationwide 23 and 33 applications, Buffer Certification Application** for the replacement of Bridge No. 226 over Knap of Reeds Creek on SR 1120, Granville County. Federal Aid Project No. BRZ-1120(5), State Project No. 8.2371001 TIP Project No. B-3644.

Please find enclosed three copies of the project planning report for the above referenced project. The document states that Bridge No. 226 will be replaced with a new 165-foot long single span bridge on the existing alignment. Traffic will use an offsite detour during construction. There are temporary impacts to Waters of the U.S. associated with this project. Impacts to Knap of Reeds Creek will be temporary consisting of 120 linear feet. There are no wetland impacts associated with this project. Knap of Reeds Creek is located in the Neuse River Basin and subject to the Neuse River Riparian Buffer Rules. Allowable impacts the riparian buffer 12,332.4 square feet. This project is located within the Falls Lake flood storage area. No permanent fill will result within the flood storage area below 264.8 feet as a result of this project.

Demolition: The superstructure of Bridge No. 226 consists of a timber deck on I-beams. The superstructure consists of end bents and internal bents with timber caps on timber posts and concrete sills. There are three spans. The maximum potential fill is 1.3 cubic yards. All guidelines for bridge demolition and removal will be followed in addition to Best Management Practices for the Protection of Surface Waters and BMP's for Bridge Demolition and Removal.

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

Temporary Causeways

There will be 0.1 acres temporary impacts from the construction two rock causeways in Knap of Reeds Creek for the construction of bridge 226 (see permit drawing Sheets 4, 5, 6, 7 and 8 of 8). The temporary rock causeway will be used to construct the new bridge. The causeway will be done in two phases so that only one causeway will be in the water at a time.

Restoration Plan: No permanent fill will result in the stream from the subject activity. The materials used as temporary fill in the construction of the causeways will be removed. The temporary fill areas will be graded back to the original contours. Elevations and contours in the vicinity of the proposed causeways are available from the field survey notes.

Schedule for Restoration of Temporary Fill Area: It is assumed that the Contractor will begin construction of the proposed causeways shortly after the date of availability for the project. The Let date is July 20, 2004 with a date of availability of August 31, 2004.

Removal and Disposal: The causeways will be removed shortly after it is no longer need for the construction of the bridge. The temporary rock causeways will be removed by the Contractor using excavating equipment. All materials placed in the stream by the Contractor will be removed and disposed of in an upland area.

Neuse River Basin Buffer Rules

As previously noted, this project is located in the Neuse River Basin (subbasin 03-04-01, HUC 03020201); therefore, the regulations pertaining to the buffer rules apply. Buffer impacts associated with this project total 8,921 sq ft for Zone 1 and 3,412 sq ft for Zone 2. All practicable measures to minimize impacts within buffer zones were followed. Measures used to minimize impacts to the buffer zone include using the current alignment. According to the buffer rules, bridges 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.

Federally 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 February 18, 2003 the Fish and Wildlife Service (FWS) lists four federally protected species for Granville County (Table 1).

Biological conclusions of "No Effect" were reached for all listed species as reflected in the attached CE dated April 2002. The CE states that habitat for smooth coneflower is present. A re-survey for the smooth coneflower was conducted on May 28, 2003 and no

individuals were found. Habitat is not present in the project study area for the other three federally protected species.

Regulatory Approvals

Section 404 Permit: It is anticipated that the construction of the causeways will be authorized under Section 404 Nationwide Permit 33 (Temporary Construction Access and Dewatering). We are, therefore, requesting the issuance of a Nationwide Permit 33 authorizing construction of the causeway. 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). Therefore, we do not anticipate requesting an individual permit, but propose to proceed under a Nationwide 23 as authorized by a Nationwide Permit 23 (FR number 10, pages 2020-2095; January 15, 2002).

Section 401 Permit: We anticipate 401 General Certifications numbers 3403 and 3366 will apply to this project. In accordance with 15A NCAC 2H .0500(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.

Neuse River Riparian Buffer Rules: NCDOT requests that the NC Division of Water Quality review the this application and issue a written authorization for a Neuse River Riparian Buffer Certification.

A copy of this permit application will be posted on the NCDOT website at: http://www.ncdot.org/planning/pe/naturalunit/permit.html

If you have any questions or need additional information, please contact Brett Feulner at (919) 715-1488.

Sincerely,

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

w/ attachment
Mr. John Hennessy, NC Division of Water Quality (2 copies)
Mr. Travis Wilson, NCWRC
Mr. Gary Jordan, USFWS
Mr. Francis Ferrel, Falls Lake Operations Branch (5 Copies)
w/o attachment
Mr. Greg Perfetti, P.E., Structure Design
Mr. David Franklin, USACE, Wilmington
Mr. Jay Bennett, P.E., Roadway Design
Mr. Omar Sultan, Programming and TIP
Mr. Art McMillan, PE, Highway Design
Mr. Mark Staley, Roadside Environmental
Mr. David Chang, P.E., Hydraulics
Mr. John Nance, PE, Div. 5 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: NW 23 and 33

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

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

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

II. Applicant Information

1. Owner/Applicant Information
   Name: NCDOT
   Mailing Address: Project Development and Environmental Analysis
   1548 Mail Service Center
   Raleigh, NC 27966-1548
   Telephone Number: (919) 733-3141 Fax Number: (919) 733-9794
   E-mail Address: gthorpe@dot.state.nc.us

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

III. Project Information

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

1. Name of project: Replacement of Bridge 2226 over Knap of Reeds Creek

2. T.I.P. Project Number or State Project Number (NCDOT Only): B-3644

3. Property Identification Number (Tax PIN): _____

4. Location
   County: Granville Nearest Town: Butner
   Subdivision name (include phase/lot number): _____
   Directions to site (include road numbers, landmarks, etc.): Follow SR 1120 out of Butner for approx. 1/2 mile

Site coordinates, if available (UTM or Lat/Long): UTM 17 698959E 4002139N

(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.)

5. Property size (acres): _____

6. Nearest body of water (stream/river/sound/ocean/lake): Knap of Reeds Creek

7. River Basin: Neuse River
   (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/.)

8. Describe the existing conditions on the site and general land use in the vicinity of the project at the time of this application: The area surronding the bridge is forestland,.

9. Describe the overall project in detail, including the type of equipment to be used: Plans for replacing the bridge include replacing the current bridge in the same location. Equipment used will include regular equipment utilized on bridge replacement projects.

10. Explain the purpose of the proposed work: The purpose is to replace the old bridge that is functionally obsolete and structurally deficient.

IV. Prior Project History

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

N/A

V. Future Project Plans

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

N/A

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

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to wetlands, open water, and stream channels associated with the project. 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 proposed project will temporary fill .1 acres of Knap of Reeds Creek.

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***

* 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:_____
Total area of wetland impact proposed:_____

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)
1	Temporary fill in surface waters	120ft	Knap of Reeds Creek	85 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: 120 (temporary)

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.)

* 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.):_____

_____

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

_____

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 No-Build or "do nothing" alternative was considered but would eventually necessitate closure of the bridge. All guidelines for bridge demolition and removal will be followed in addition to Best Management Practices for the Protection of Surface Waters and BMP's for Bridge Demolition and Removal

_____

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.
   NA

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

IX. Environmental Documentation (required by DWQ)

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	8,920	3	NA
2	3,411	1.5	NA
Total	12,332		

* 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.

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.

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.

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):

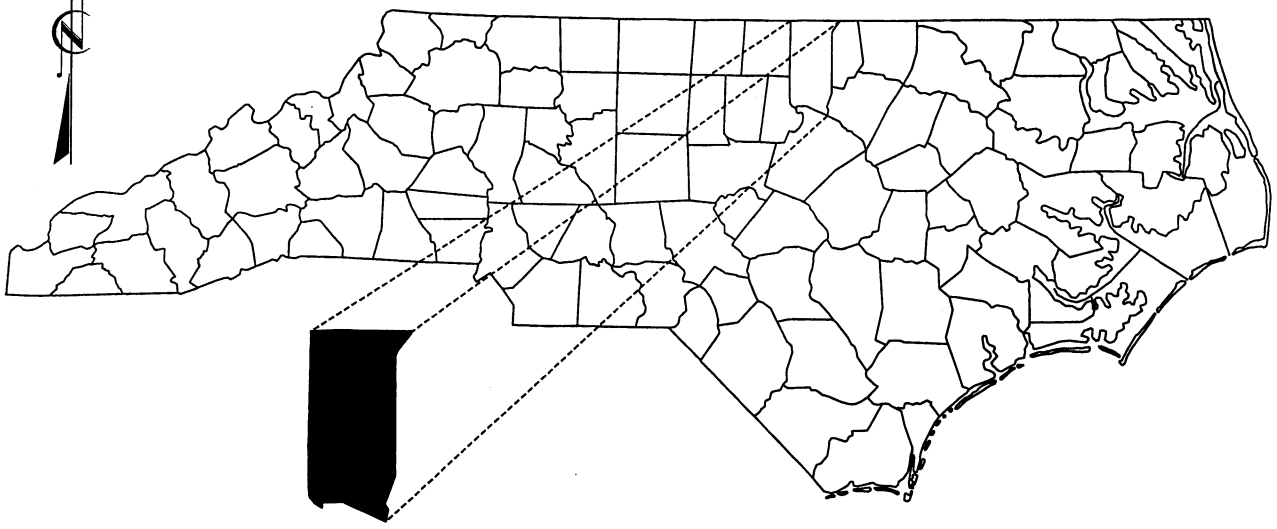
It is the applicant's responsibility to submit the application sufficiently in advance of desired construction dates to allow processing time for these permits. However, an applicant may choose to list constraints associated with construction or sequencing that may impose limits on work schedules (e.g.,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

3/16/04

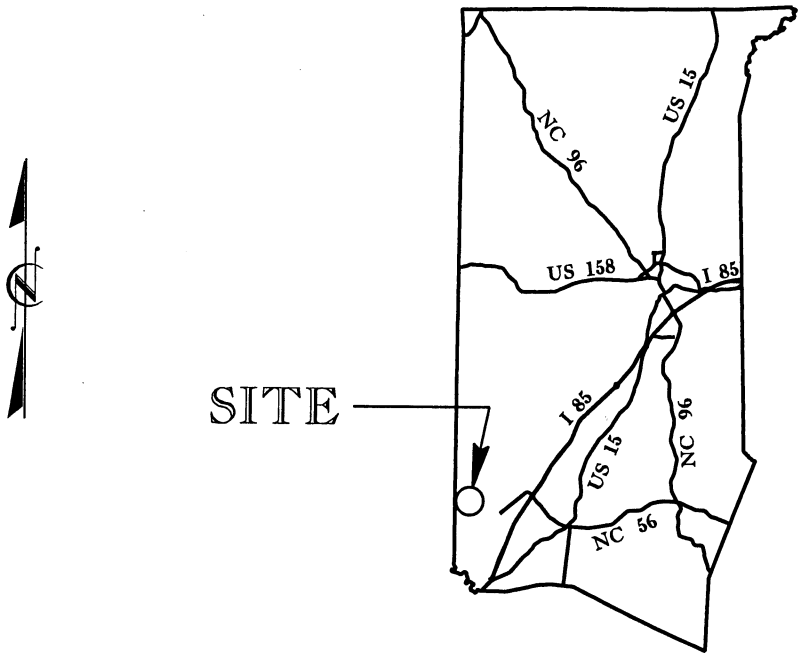
Applicant/Agent's Signature **Date**

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

NORTH CAROLINA



GRANVILLE COUNTY



VICINITY MAP

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

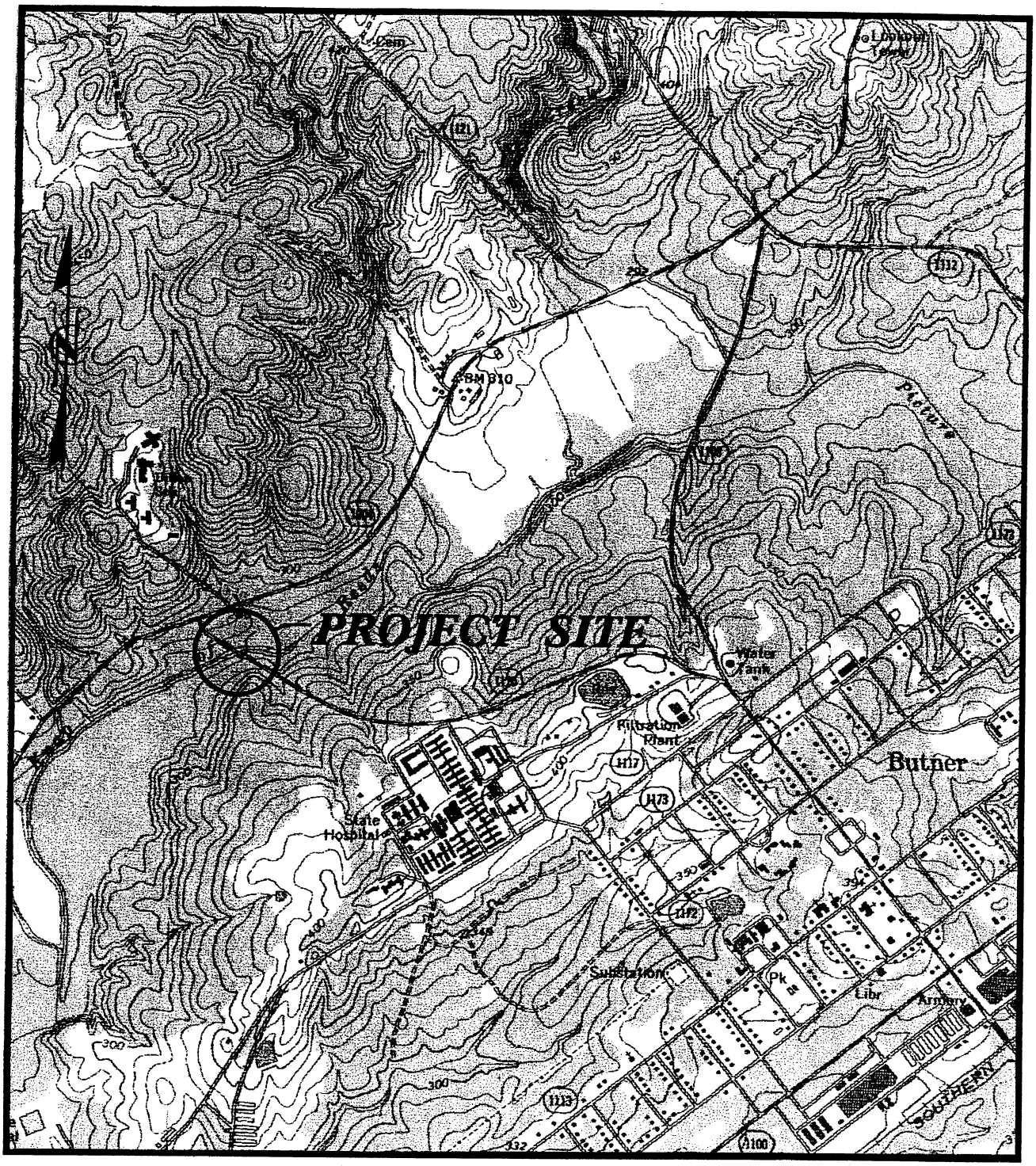
GRANVILLE COUNTY

PROJECT: 8.2371001 (B-3644)

SR 1120

BETWEEN SR 1004 AND SR 1103

SHEET 1 OF 8 DATE _____



SITE MAP

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

GRANVILLE COUNTY

PROJECT: 8.2371001 (B-3644)

SR 1120

BETWEEN SR 1004 AND SR 1103

SHEET 2 OF 8 DATE _____

WETLAND LEGEND

WLB —— WETLAND BOUNDARY

WLB / WLB — 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

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

GRANVILLE COUNTY

PROJECT: 8.2371001 (B-3644)

SR 1120

BETWEEN SR 1004 AND SR 1103

SHEET 3 OF 8 DATE _____

PROJECT REFERENCE NO.	SHEET NO.
B-3644	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125

ENGLISH

0 100'

REVISIONS

8/17/99

BEGIN STATE PROJECT B-3644
-L- STA. 10+25

END STATE PROJECT B-3644
END CONSTRUCTION
-L- STA. 21+62.46

NC GRID NAD 83

STATE OF NORTH CAROLINA

UNITED STATES OF AMERICA
ARMY CORPS OF ENGINEERS

WOODS

EXISTING R/W

SR 1004
OLD US 15

TO OXFORD

SR 1120 VEASEY ROAD

15

20

4' PREFORMED SCOUR HOLE

15" CS W/ 2 ELBOWS

10' ANIMAL PATH
BARE EARTH
BOTH SIDES

PDE

15" RCP

TS

TB

WE

KNAP OF REEDS CREEK

GRAVEL

60' EXISTING R/W

15'

10' DIRT PATH

PERMANENT SOIL REINFORCING MAT

30' CONC

CAUSEWAY TOP ELEVATION = 266.50

PLAN VIEW

NOTES

1. CAUSEWAY REQUIRED TO PLACE DRILLED SHAFTS.
2. PROPOSED BRIDGE IS A 3 SPAN BRIDGE.

TS TS DENOTES TEMPORARY FILL IN SURFACE WATER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B3644-1" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 871539.7530(ft) EASTING: 2061973.0280(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: .99998461
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B3644-1" TO -L- STATION 10+25 IS
S 23° 16' 23.2" E 21.39'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

07/1/2003
10:47:05 AM
m:\b03\01200\Road\B3644 prmt plp w&sw.dgn

PROJECT REFERENCE NO.	SHEET NO.
B-3644	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

ENGLISH

0 100'

REVISIONS

8/17/99

BEGIN STATE PROJECT B-3644
-L- STA. 10+25

END STATE PROJECT B-3644
END CONSTRUCTION
-L- STA. 21+62.46

NC GRID NAD 83

STATE OF NORTH CAROLINA

UNITED STATES OF AMERICA
ARMY CORPS OF ENGINEERS

TO OXFORD

SR 1004
OLD US 15

SR 1400 YEASEY ROAD

EXISTING R/W

WOODS

15" CS W/ 2 ELBOWS

4' PREFORMED SCOUR HOLE

10' ANIMAL PATH
BARE EARTH
BOTH SIDES

PDE

15" RCP

KNAP OF REEDS CREEK

GRADE

15

20

4' PREFORMED SCOUR HOLE

PERMANENT SOIL REINFORCING MAT

30' CONC

CAUSEWAY TOP ELEVATION = 266.50

PLAN VIEW

NOTES

1. CAUSEWAY REQUIRED TO PLACE DRILLED SHAFTS.
2. PROPOSED BRIDGE IS A 3 SPAN BRIDGE.

TS TS DENOTES TEMPORARY FILL IN SURFACE WATER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B3644-1" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 87 1539753.0(ft) EASTING: 2061973.028(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: .99998461
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B3644-1" TO -L- STATION 10+25 IS
S 23° 16' 23.2" E 21.39'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

07/7/2003
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PROJECT REFERENCE NO.	SHEET NO.
B-3644	6

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

ENGLISH

HORIZONTAL 1"=50'
0 100'

VERTICAL 1"=10'
0 20'

℄ STATION 17+10.00 -L-
3 SPAN BRIDGE @ 57': TOTAL LENGTH = 171'
21" PPCS
134° SKEW

CAUSEWAY TOP ELEVATION = 266.50

BEGIN RESURFACING STA. 10+25

BEGIN GRADE STA. 13+00 EL. 281.30

LOW POINT STA. 15+64.22 EL. 279.08

BEGIN BRIDGE STA. 16+25

END BRIDGE STA. 17+96

NORMAL WSEL= 261.3

PVT STA. 21+00.00 EL. 283.35 END GRADE

END RESURFACING STA. 21+50

295 290 285 280 275 270 265 260 255 250

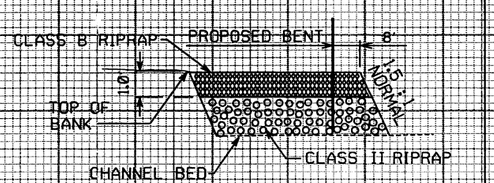
10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00

PROFILE VIEW

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 6600 CFS
DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 274.3 FT
BASE DISCHARGE	= 9300 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 277.0 FT
OVERTOPPING DISCHARGE	= 7200 CFS
OVERTOPPING FREQUENCY	= >25 YRS
OVERTOPPING ELEVATION	= 275.2 FT
DATE OF SURVEY	= 09/20/02
W.S. ELEVATION AT DATE OF SURVEY	= 261.26 FT

CAUSEWAY TYPICAL
NOT TO SCALE



QUANTITY OF RIPRAP

	WEST CAUSEWAY	EAST CAUSEWAY
CLASS B	86.9 TONS	103.1 TONS
CLASS II	1000.5 TONS	1156.1 TONS

07/17/2003
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WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			Fill In Wetlands (sq. ft.)	Temp. Fill In Wetlands (acres)	Excavation In Wetlands (acres)	Mechanized Clearing (Method III) (sq. ft.)	Fill In SW (Natural) (acres)	Fill In SW (Pond) (acres)	Temp. Fill In SW (acres)	Existing Channel Impacted (ft.)	Natural Stream Design (ft.)
1	16+25 to 17+96	3 Span Bridge							0.1	120	
TOTALS:									0.1	120	

WETLAND & SURFACE WATER

NCDOT

DIVISION OF HIGHWAYS
WAKE COUNTY
PROJECT: 8.2371001 (B-3644)
SR 1120
BETWEEN SR 1004 AND SR 1103

 DATE

PROPERTY OWNER

NAME AND ADDRESS

	OWNER'S NAME	ADDRESS
(2)	UNITED STATES OF AMERICA	X
	ARMY CORPS OF ENGINEERS	X

WETLANDS & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

GRANVILLE COUNTY

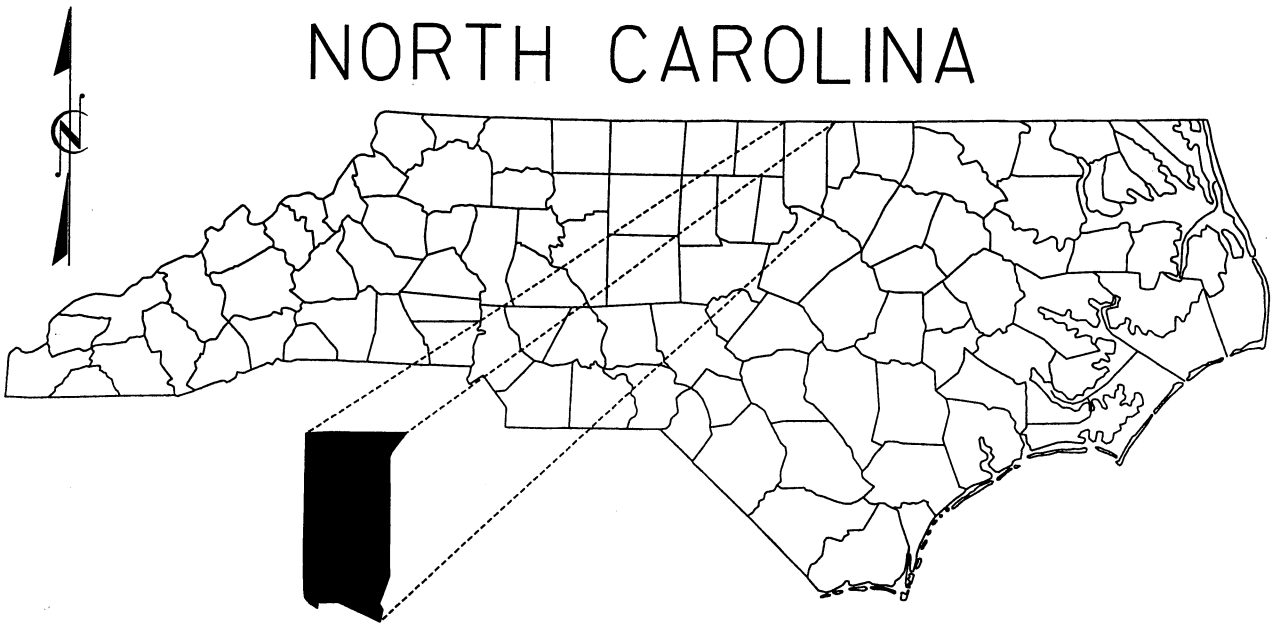
PROJECT: 8.2371001 (B-3644)

SR 1120

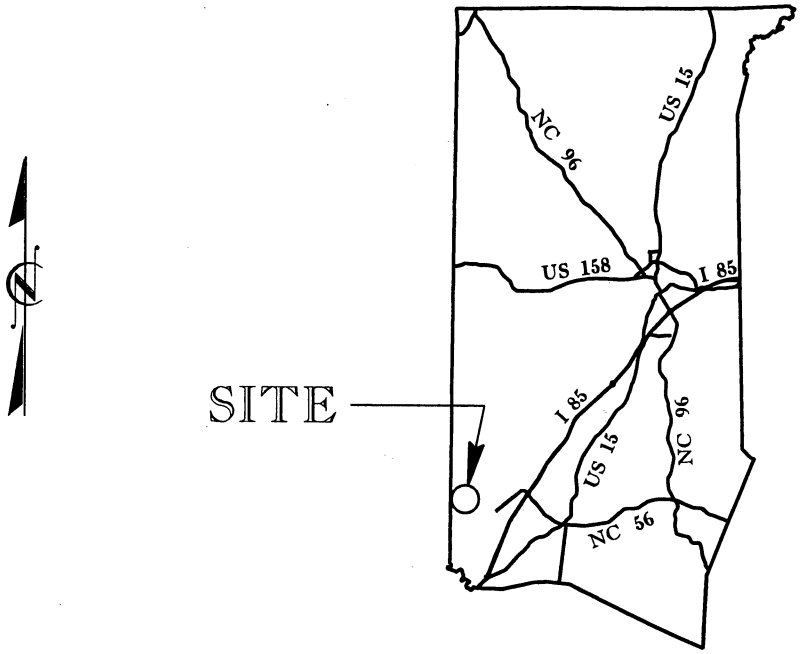
BETWEEN SR 1004 AND SR 1103

SHEET 8 OF 8 DATE _____

NORTH CAROLINA



GRANVILLE COUNTY



VICINITY MAP

BUFFER

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

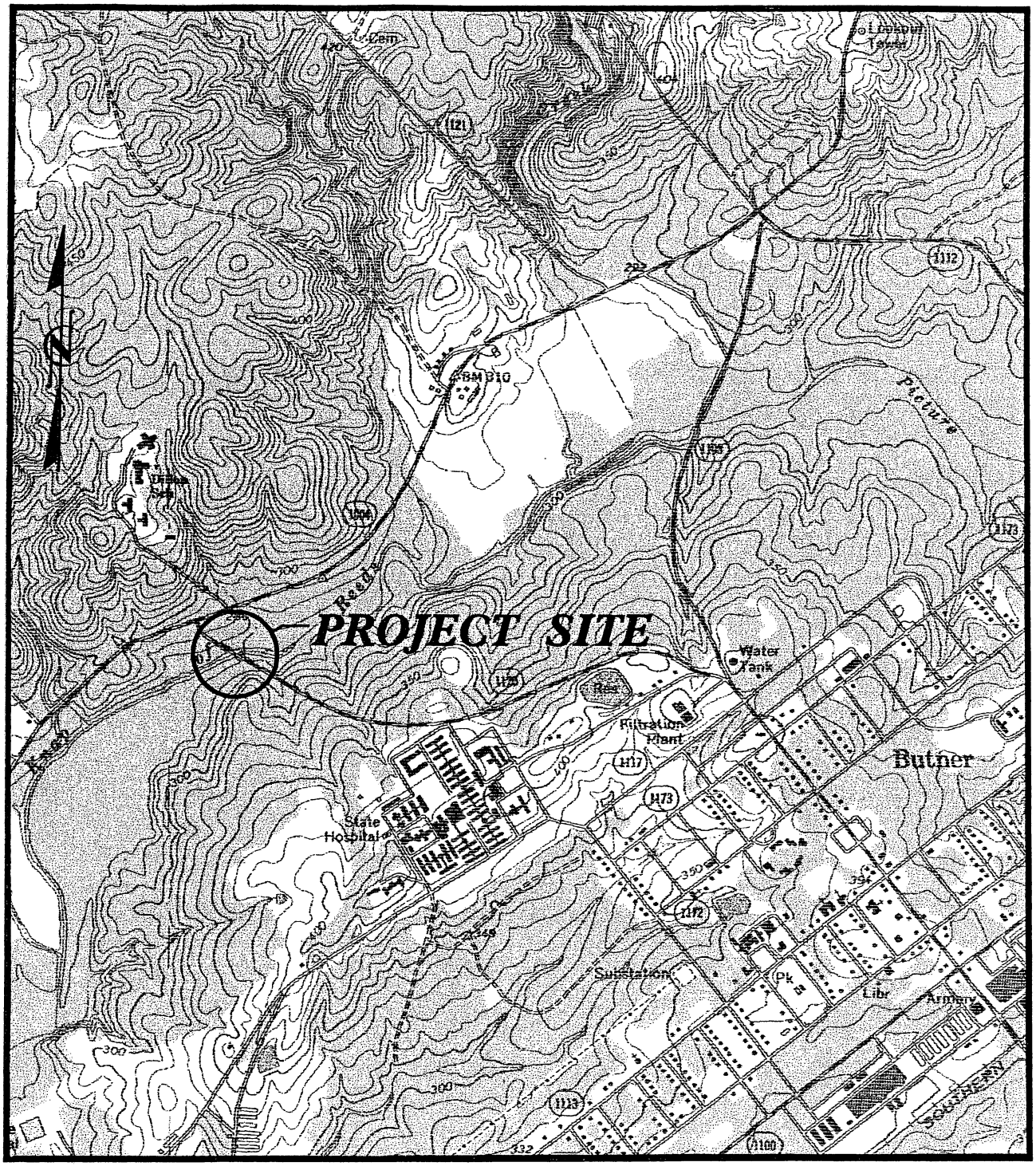
GRANVILLE COUNTY

PROJECT: 8.2371001 (B-3644)

SR 1120

BETWEEN SR 1004 AND SR 1103

SHEET 1 OF 8 DATE _____



SITE MAP

BUFFER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

GRANVILLE COUNTY

PROJECT: 8.2371001 (B-3644)

SR 1120

BETWEEN SR 1004 AND SR 1103

SHEET 2 OF 8 DATE _____

BUFFER LEGEND

WLB — WETLAND BOUNDARY

WLB / WLB — 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

—BZ2— RIPARIAN BUFFER ZONE 2
20 ft

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

BUFFER

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

GRANVILLE COUNTY

PROJECT: 8.2371001 (B-3644)

SR 1120

BETWEEN SR 1004 AND SR 1103

SHEET 3 OF 8 DATE _____

8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
B-3644	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

ENGLISH

0 100'

NC GRID NAD 83

BEGIN STATE PROJECT B-3644
-L- STA. 10+25

END STATE PROJECT B-3644
END CONSTRUCTION
-L- STA. 21+62.46

STATE OF NORTH CAROLINA (1)

UNITED STATES OF AMERICA ARMY CORPS OF ENGINEERS (2)

SR 1004 OLD US 70

TO OXFORD

EXISTING R/W

WOODS

SR 1120 VEASEY ROAD

15" CS W/ 2 ELBOWS

PDE

15" RCP

4' PREFORMED SCOUR HOLE

ALLOWABLE BZ2

ALLOWABLE BZ1

KNAP OF REEDS CREEK

GRADE

60' EXISTING R/W

PERMANENT SOIL REINFORCING MAT

15:30 CONC.

PLAN VIEW

NOTES

DENOTES ALLOWABLE BUFFER IMPACT ZONE 1

DENOTES ALLOWABLE BUFFER IMPACT ZONE 2

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B3644-1" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 871539.7530(ft) EASTING: 2061973.0280(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: .99998461
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B3644-1" TO -L- STATION 10+25 IS
S 23° 16' 23.2" E 21.39'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

07/18/2003
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8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
B-3644	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

ENGLISH

0 100'

BEGIN STATE PROJECT B-3644
-L- STA. 10+25

END STATE PROJECT B-3644
END CONSTRUCTION
-L- STA. 21+62.46

NC GRID NAD 83

STATE OF NORTH CAROLINA

UNITED STATES OF AMERICA
ARMY CORPS OF ENGINEERS

TO OXFORD

SR 1400 (OLD US 15)

SR 1400 (VEASEY ROAD)

EXISTING R/W

WOODS

15" CS W/ 2 ELBOWS

PDE

15" RCP

4' PREFORMED SCOUR HOLE

PERMANENT SOIL REINFORCING MAT

ALLOWABLE BZ2

ALLOWABLE BZ1

BZ 1

BZ 2

PLAN VIEW

NOTES

DENOTES ALLOWABLE BUFFER IMPACT ZONE 1

DENOTES ALLOWABLE BUFFER IMPACT ZONE 2

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B3644-1" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 871539753.0(11) EASTING: 2061973.028.0(11)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: .9999846
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B3644-1" TO -L- STATION 10+25 IS
S 23° 16' 23.2" E 21.39'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

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5/16/99

PROJECT REFERENCE NO.	SHEET NO.
B-3644	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

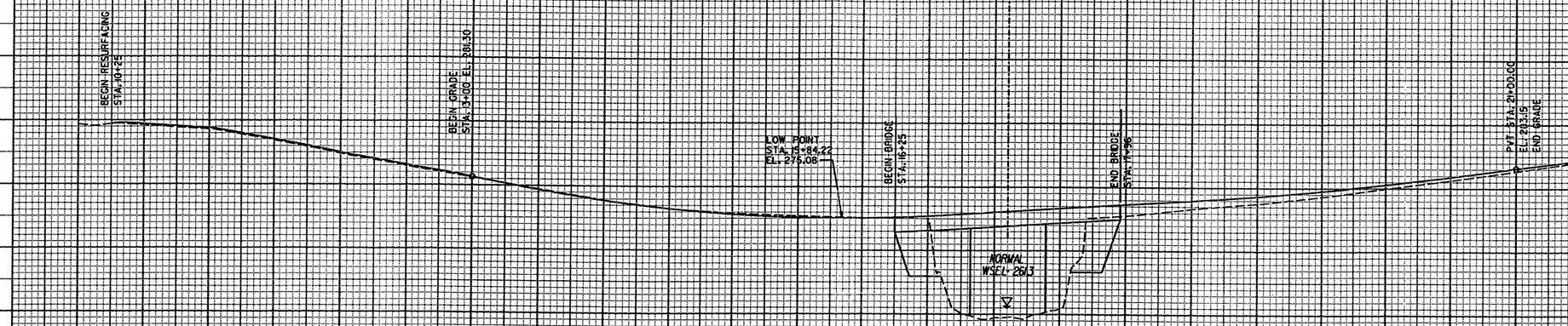
TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

ENGLISH

0 100'
HORIZONTAL 1"=50'

0 20'
VERTICAL 1"=10'

℄ STATION 17+10.00 -L-
3 SPAN BRIDGE @ 57': TOTAL LENGTH = 171'
21" PPCS
13° SKEW



PROFILE VIEW

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 6600 CFS
DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 274.3 FT
BASE DISCHARGE	= 9900 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 277.0 FT
OVERTOPPING DISCHARGE	= 7200 CFS
OVERTOPPING FREQUENCY	= >25 YRS
OVERTOPPING ELEVATION	= 275.2 FT
DATE OF SURVEY	= 09/20/02
W.S. ELEVATION AT DATE OF SURVEY	= 261.26 FT

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00

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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	3 Span Bridge	16+25 to 17+96	X		8920.5	3411.9	12332.4					
				X								
TOTAL:					8920.5	3411.9	12332.4					

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: 8.2371001 (B-3644)

PROPERTY OWNER

NAME AND ADDRESS

	OWNER'S NAME	ADDRESS
(2)	UNITED STATES OF AMERICA ARMY CORPS OF ENGINEERS	X X

BUFFER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

GRANVILLE COUNTY

PROJECT: 8.2371001 (B-3644)

SR 1120

BETWEEN SR 1004 AND SR 1103

SHEET 8 OF 8 DATE _____

CONTRACT: 33190.1.1 TIP PROJECT: B-3644

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

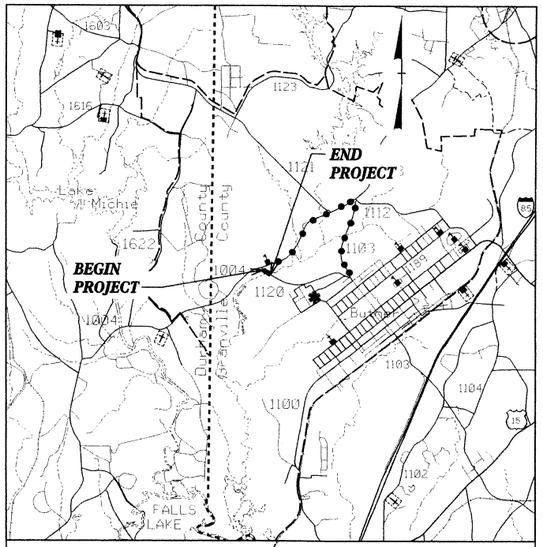
GRANVILLE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3644	1	

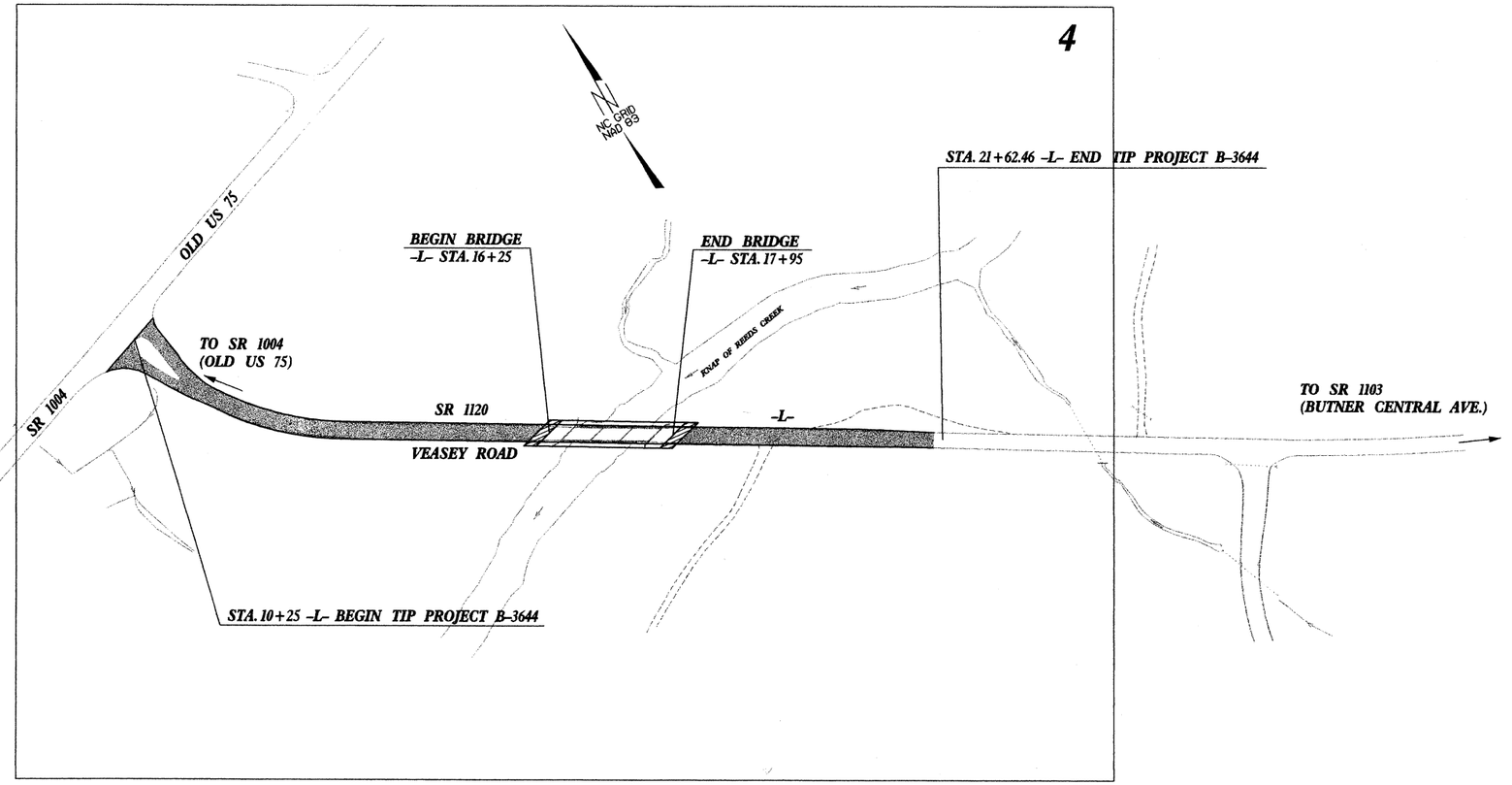
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33190.1.1	BRZ-1120(5)	P.E.
33190.2.2	BRZ-1120(6)	R/W/UTILITIES
33190.3.1	BRZ-1120(7)	CONST.

LOCATION: *Bridge 226 over Knap of Reeds Creek on SR 1120 and Approaches*

TYPE OF WORK: *Grading, Drainage, Paving and Structure*



VICINITY MAP
OFFSITE DETOUR ROUTE



* DESIGN EXCEPTION FOR VERTICAL ALIGNMENT AND STOPPING SIGHT DISTANCE REQUIRED.

NCDOT CONTACT: *CATHY S. HOUSER, P.E., PROJECT ENGINEER, DESIGN SERVICES*

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2004 = 4,000
ADT 2024 = 6,100
DHV = 10 %
D = 60 %
T = 4 %
TTST 1% DUAL 3%
V = 60 MPH*

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT B-3644	=	*0.183 mi.*
LENGTH OF STRUCTURE TIP PROJECT B-3644	=	*0.032 mi*
TOTAL LENGTH OF TIP PROJECT B-3644	=	*0.215 mi.*

Prepared for N. C. Department of Transportation by:
TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: July 18, 2003

LETTING DATE: July 20, 2004

Brian A. Wiles, P.E.
PROJECT ENGINEER

Audrey B. Burnette, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 10746 ENGINEER DENNIS K. HOYLE
SIGNATURE: 12-10-03 *P.E.*

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 16689 ENGINEER BRIAN ALLEN WILES
SIGNATURE: 12/10/03

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR *DATE*

6/21/02

COMPUTED BY: _____ DATE: _____
CHECKED BY: _____ DATE: _____

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
B-3644	1-A

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
B-3644	1-B

*S.U.E = SUBSURFACE UTILITY ENGINEER

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

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 — CA
Prop. Control of Access Line — CA
Exist. Easement Line — E
Prop. Temp. Construction Easement Line — E
Prop. Temp. Drainage Easement Line — TDE
Prop. Perm. Drainage Easement Line — PDE

HYDROLOGY

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

STRUCTURES

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

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

UTILITIES

Exist. Pole
Exist. Power Pole
Prop. Power Pole
Exist. Telephone Pole
Prop. Telephone Pole
Exist. Joint Use Pole
Prop. Joint Use Pole
Telephone Pedestal — T
U/G Telephone Cable Hand Hold — HH
Cable TV Pedestal — C
U/G TV Cable Hand Hold — HH
U/G Power Cable Hand Hold — HH
Hydrant
Satellite Dish
Exist. Water Valve
Sewer Clean Out
Power Manhole — 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 — 0
U/G Test Hole (S.U.E.*)
Abandoned According to U/G Record — ATTUR
End of Information — E.O.I.

BOUNDARIES & PROPERTIES

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

BUILDINGS & OTHER CULTURE

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

TOPOGRAPHY

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

VEGETATION

Single Tree
Single Shrub
Hedge
Woods Line
Orchard
Vineyard — VINEYARD

RAILROADS

Standard Gauge — CSX TRANSPORTATION
RR Signal Milepost — MILEPOST 35
Switch — SWITCH

revised 02/02/00

PROJECT REFERENCE NO.	SHEET NO.
B-3644	2

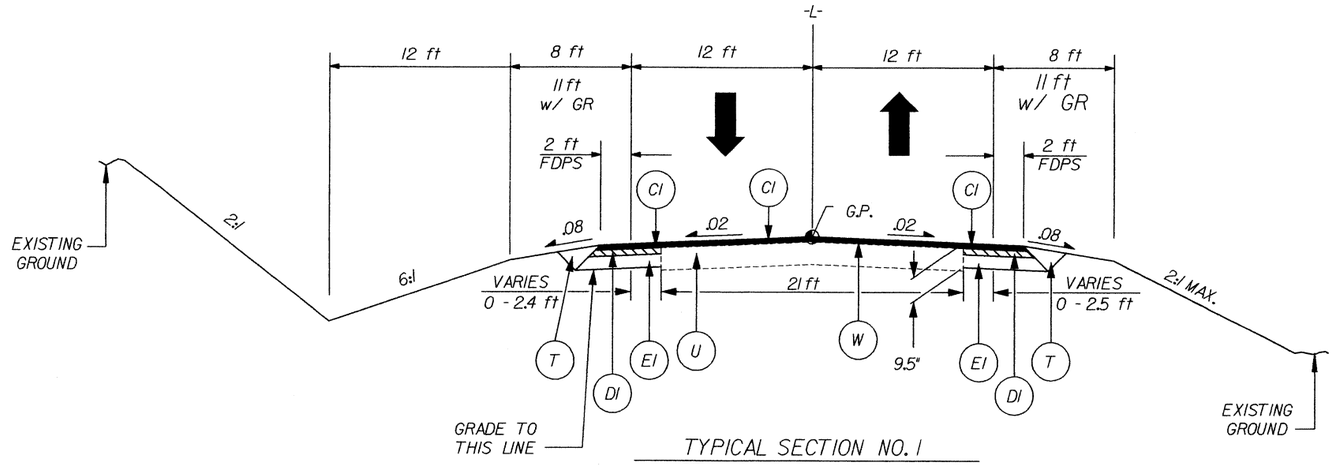
ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 16689 ENGINEER BRIAN ALLEN WILES

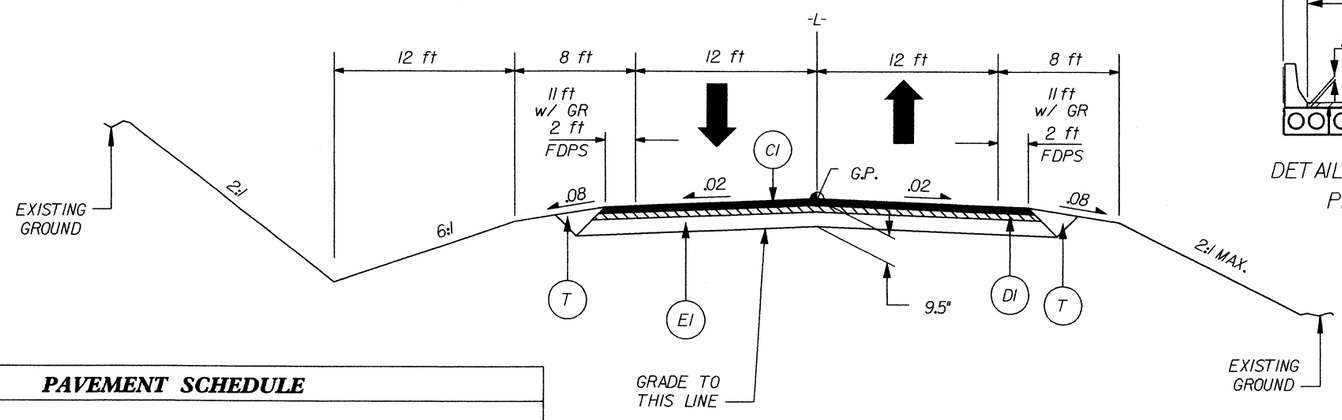
12/17/03

PAVEMENT DESIGN ENGINEER

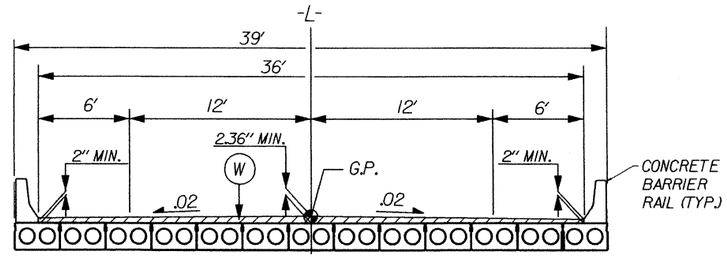
TRANSYSTEMS CORPORATION 4917 Waters Edge Drive, Suite 235 Raleigh, NC 27606 (919) 233-8125



TYPICAL SECTION NO. 1
-L- STA. 10+25 TO -L- STA. 11+45
(RESURFACING ONLY)
-L- STA. 11+45 TO -L- STA. 13+00
-L- STA. 18+50 TO -L- STA. 21+50



TYPICAL SECTION NO. 2
-L- STA. 13+00 TO -L- STA. 16+25 (BEGIN BRIDGE)
-L- STA. 17+95 (END BRIDGE) TO -L- STA. 18+50

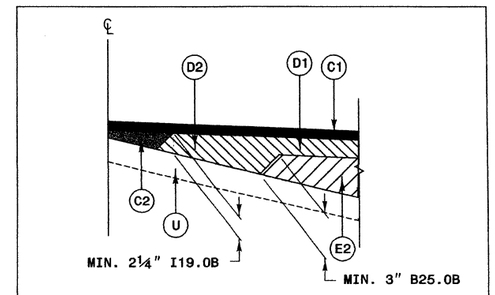


DETAIL FOR WEARING SURFACE ON CORED SLAB BRIDGE
PRESTRESSED CONCRETE CORED SLAB UNITS

PAVEMENT SCHEDULE

CODE	DESCRIPTION
C1	PROP. APPROX. 2½" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 140 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C2	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.
D1	PROP. APPROX. 2½" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AVERAGE RATE OF 285 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 2¼" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 4½" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 513 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.
T	EARTH MATERIAL
U	EXISTING ASPHALT PAVEMENT
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAIL)

NOTE: ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS NOTED OTHERWISE.



WEDGING DETAIL

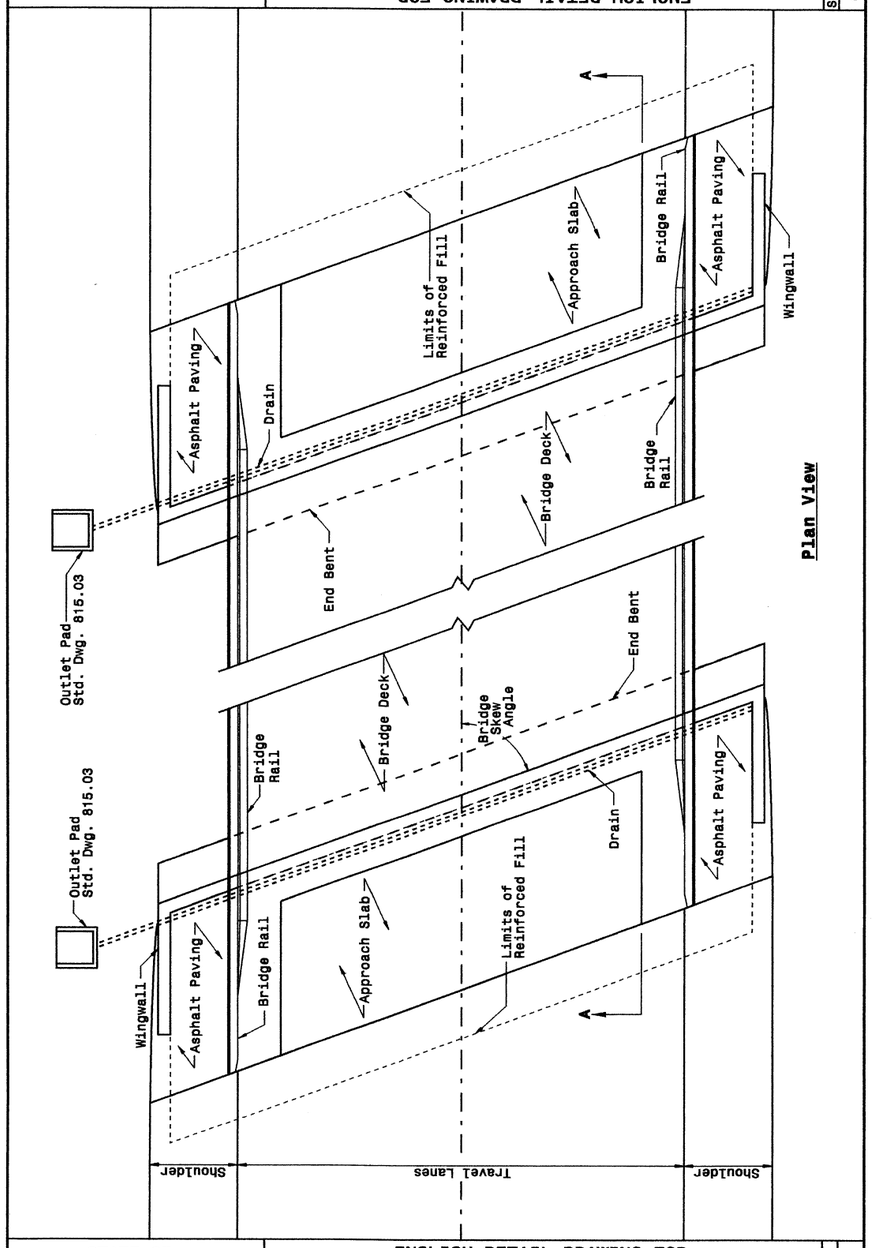
PROJECT REFERENCE NO.	SHEET NO.
B-3644	2-A

5/14/99

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

REINFORCED BRIDGE APPROACH FILLS
ENGLISH DETAIL DRAWING FOR

SHEET 1 OF 4
422D10

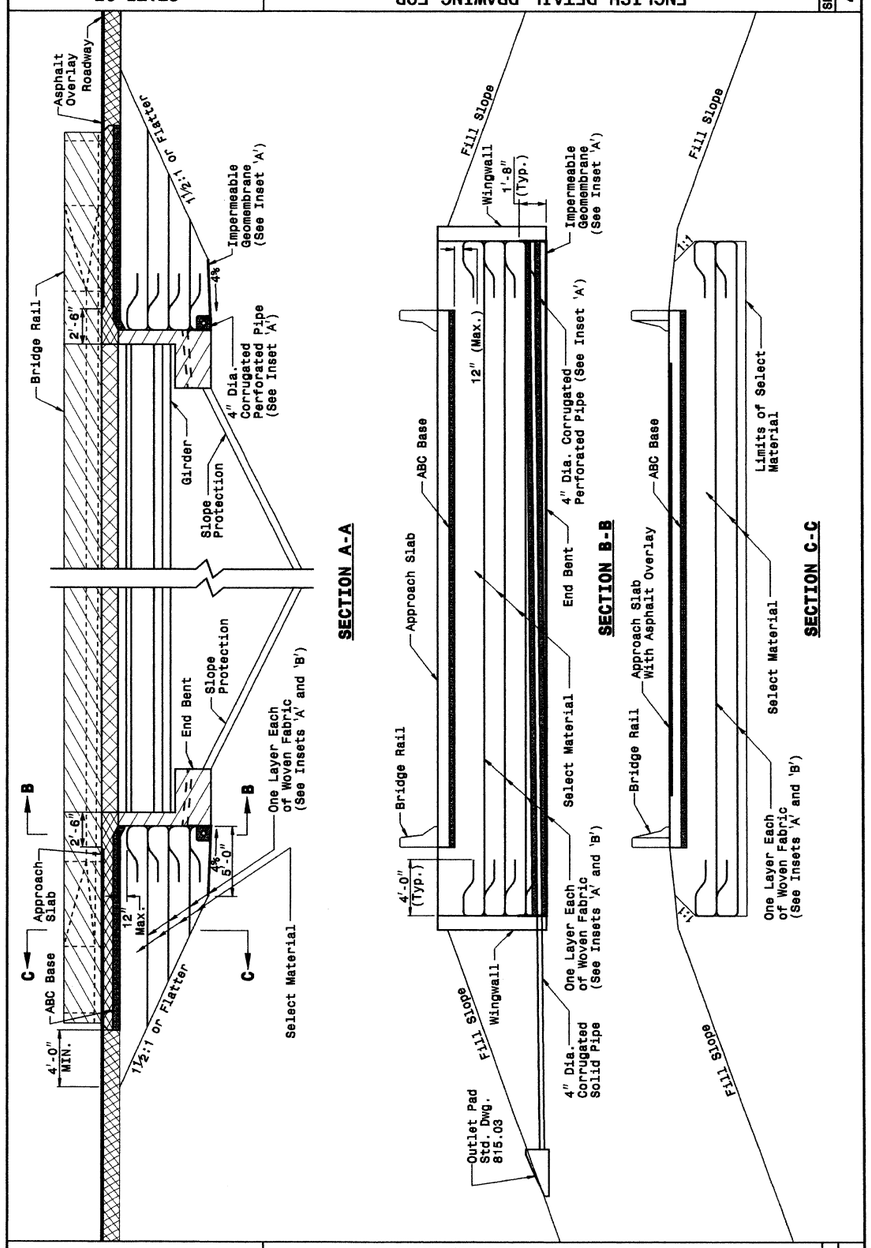


Plan View

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

REINFORCED BRIDGE APPROACH FILLS
PRESTRESSED AND PLATE GIRDER BRIDGES

SHEET 2 OF 4
422D10



SECTION A-A

SECTION B-B

SECTION C-C

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
REINFORCED BRIDGE APPROACH FILLS

SHEET 1 OF 4
422D10

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
REINFORCED BRIDGE APPROACH FILLS
PRESTRESSED AND PLATE GIRDER BRIDGES

SHEET 2 OF 4
422D10

DESIGN SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

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ORIGINAL BY: 2002 STANDARDS DATE: 01-15-02
MODIFIED BY: E.E. WARD DATE: 03-26-03
CHECKED BY: DATE:
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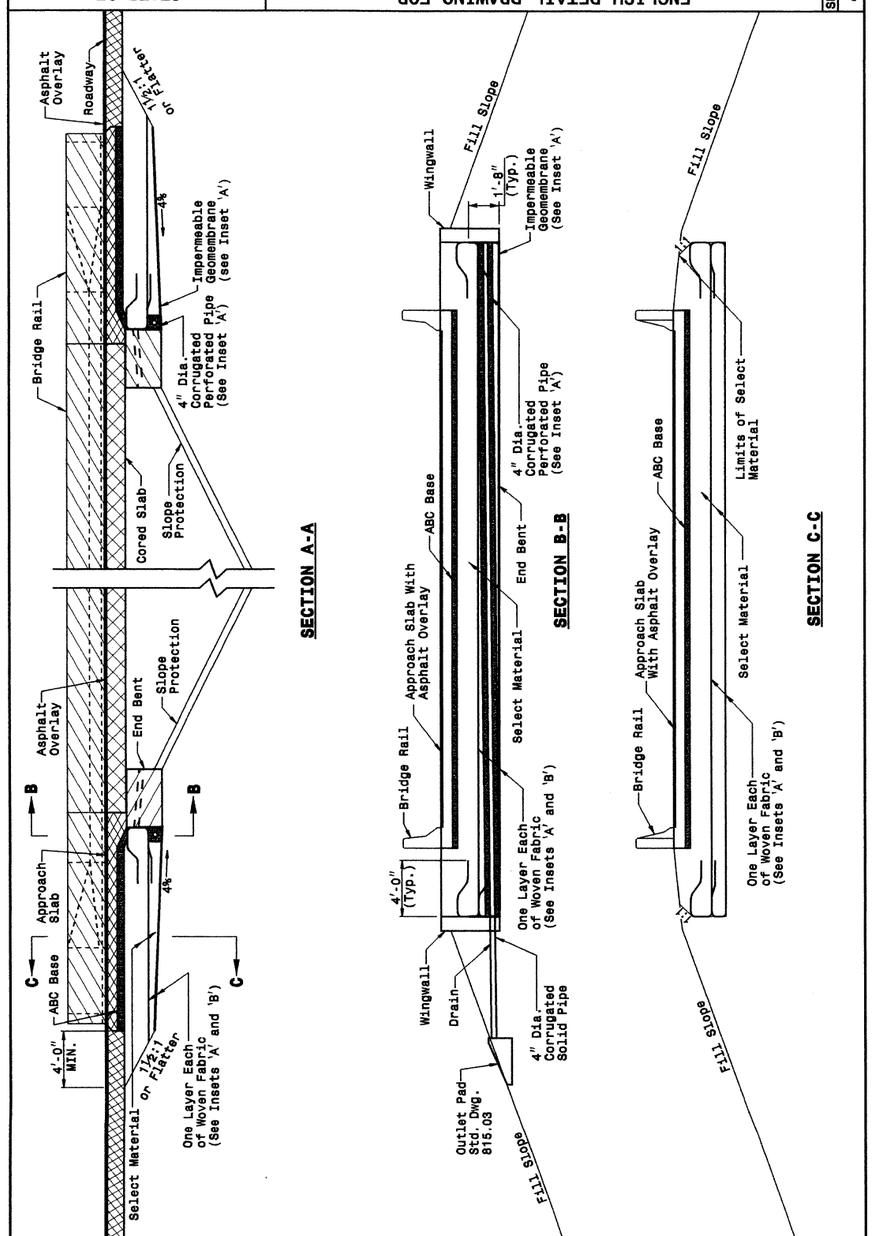
PROJECT REFERENCE NO.	SHEET NO.
B-3644	2-B

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
REINFORCED BRIDGE APPROACH FILLS
CORED SLAB BRIDGES

SHEET 3 OF 4 **422D10**

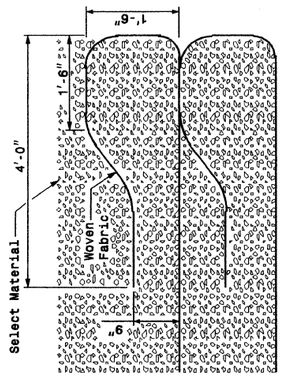


STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ENGLISH DETAIL DRAWING FOR **REINFORCED BRIDGE APPROACH FILLS** CORED SLAB BRIDGES	SHEET 3 OF 4 **422D10**

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
REINFORCED BRIDGE APPROACH FILLS
INSETS AND CHARTS

SHEET 4 OF 4 **422D10**



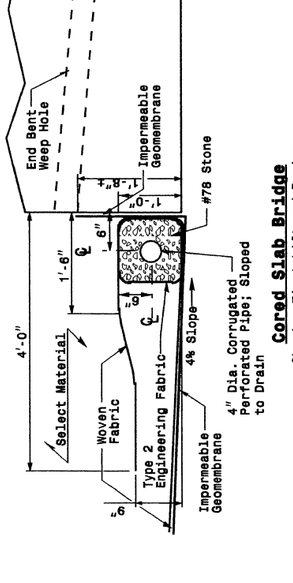
Typical Fabric Lift and Wrap
Showing Second and Above Lifts

Inset 'B'

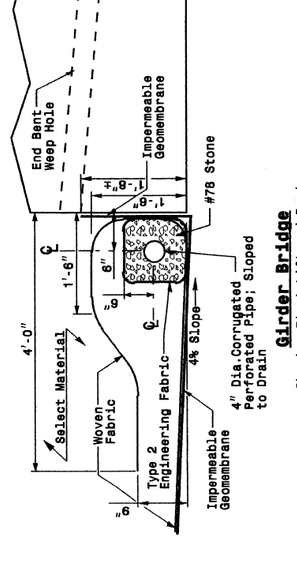
Height of Backwall	Number of Fabric Layers
4'-6" - 5'-9"	3
5'-10" - 7'-2"	4
7'-3" - 8'-8"	5
8'-9" - 10'-1"	6
10'-2" - 11'-8"	7

Note: Cored Slab Structures Require 2 Fabric Layers.

Length of Bridge End Bent Inside Wingwalls
If Bridge Skew is Less Than or Equal to 90°: (Roadway Width + 7'-0") / Sin (Bridge Skew Angle) = Dis. Between Wingwalls
If Bridge Skew is Greater Than 90°: (Roadway Width + 7'-0") / Cos (Bridge Skew Angle - 90°) = Dis. Between Wingwalls



Cored Slab Bridge
Showing First Lift and Drains



Girder Bridge
Showing First Lift and Drains

Inset 'A'

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ENGLISH DETAIL DRAWING FOR **REINFORCED BRIDGE APPROACH FILLS** INSETS AND CHARTS	SHEET 4 OF 4 **422D10**

DESIGN SERVICES UNIT
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MODIFIED BY: E.E. WARD DATE: 03-26-03
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FILE SPEC.: stds/02stdstodetails/english/422d10.dgn

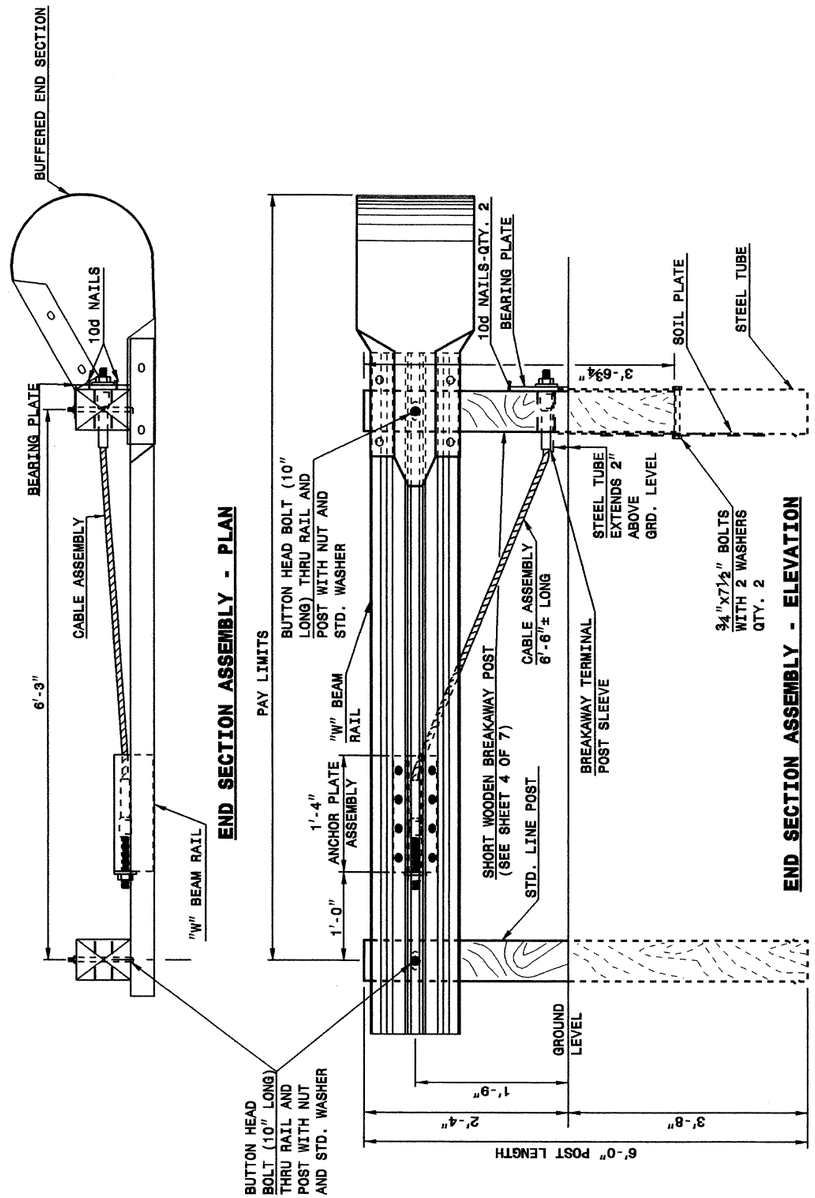
PROJECT REFERENCE NO.	SHEET NO.
B-3644	2-C

5/14/99

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 1 OF 7
862D02

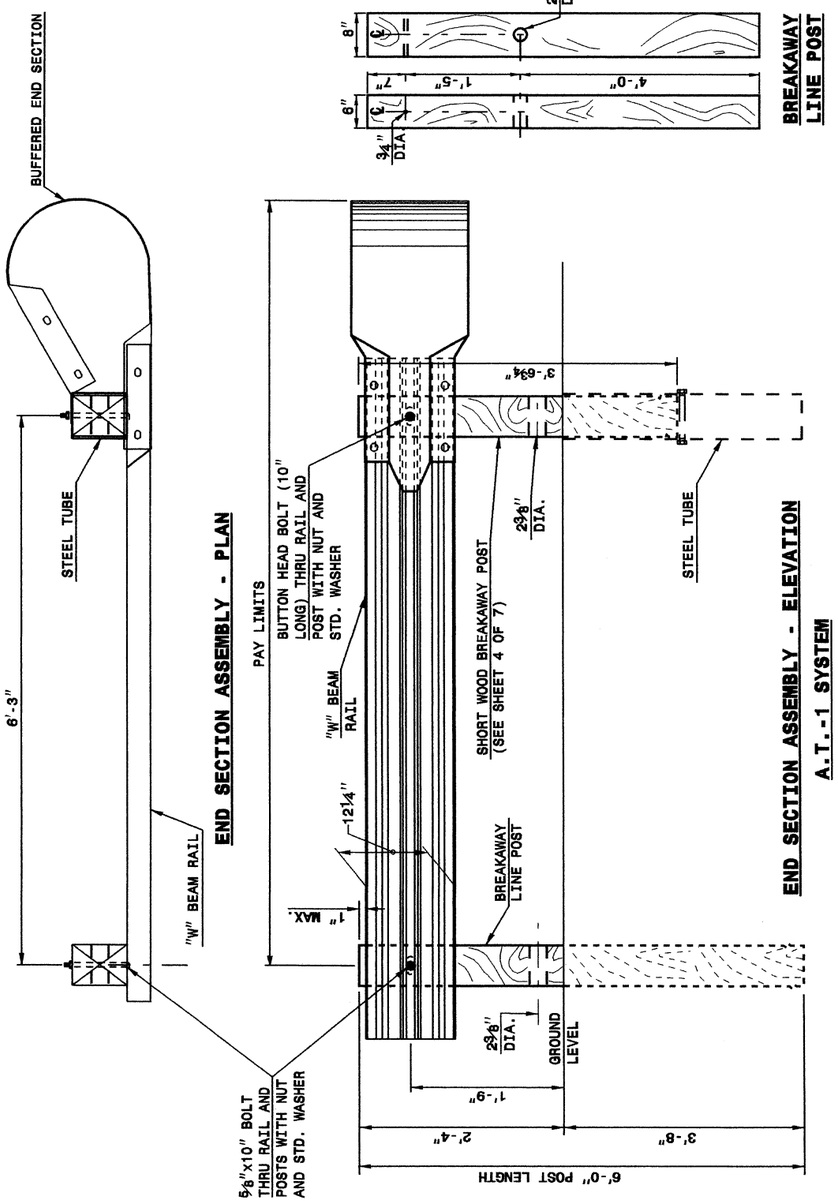


STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ENGLISH DETAIL DRAWING FOR **GUARDRAIL INSTALLATION**	SHEET 1 OF 7 **862D02**

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 2 OF 7
862D02



STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ENGLISH DETAIL DRAWING FOR **GUARDRAIL INSTALLATION**	SHEET 2 OF 7 **862D02**

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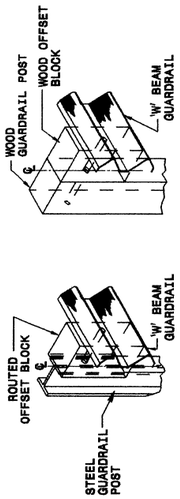
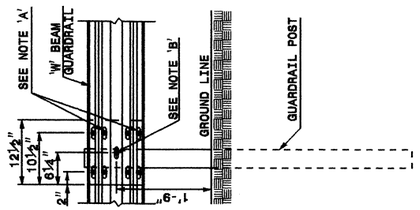
PROJECT REFERENCE NO.	SHEET NO.
B-3644	2-D

5/14/99

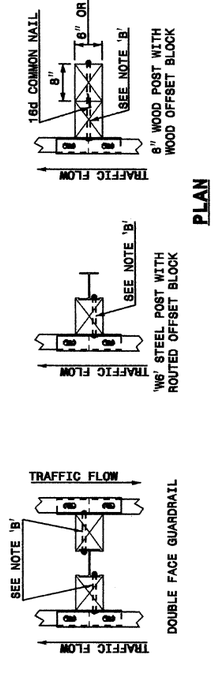
ISOMETRIC VIEWS



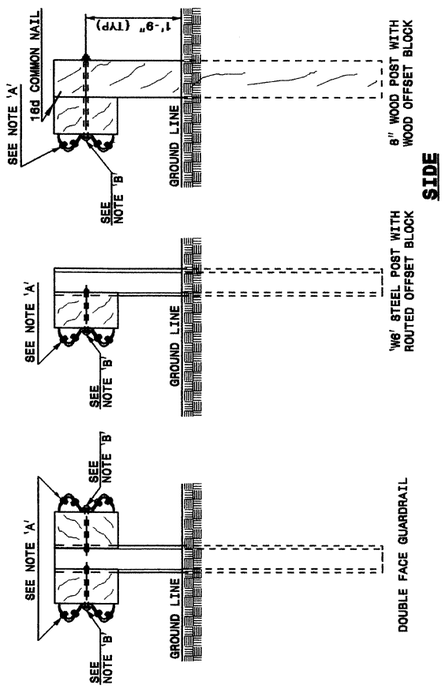
FRONT



PLAN



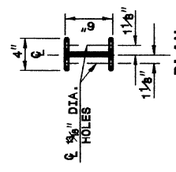
SIDE



NOTES:
A - ⅝" DIA. BUTTON HEAD SPLICE BOLT 11¼" LONG WITH STD. WASHER UNDER NUT (8 REQ. PER SPLICE JOINT).
B - ⅝" DIA. BUTTON HEAD BOLT 7½"/8" LONG WITH NUT FOR BOLTING 8"/8" ROUTED OFFSET BLOCK TO STEEL POSTS OR
⅝" DIA. BUTTON HEAD BOLT 18" LONG WITH STD. WASHER UNDER NUT FOR BOLTING TO WOOD POSTS (1 REQ. PER LOCATION)
C - FIELD PUNCHING OF HOLES INTO GUARDRAIL SHALL BE AS DIRECTED BY THE ENGINEER.

TYPICAL GUARDRAIL AND GUARDRAIL POST ALTERNATIVES

PLAN



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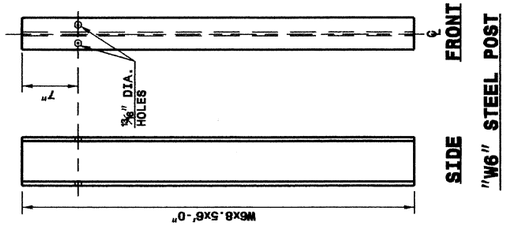
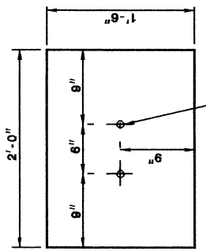


SIDE

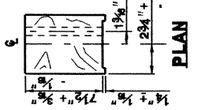
"W6" STEEL POST

SOIL PLATE

¼" THICK PLATE



PLAN



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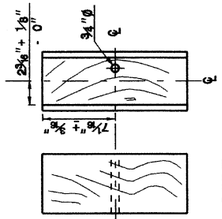
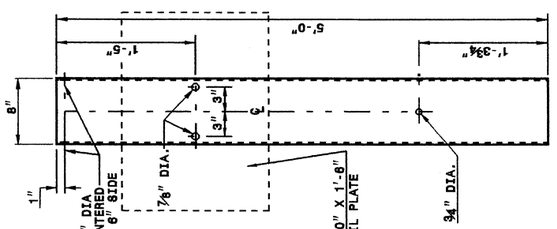


SIDE

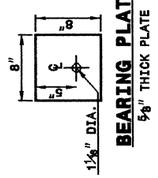
ROUTED WOOD OFFSET BLOCK

SYSTEM PARTS



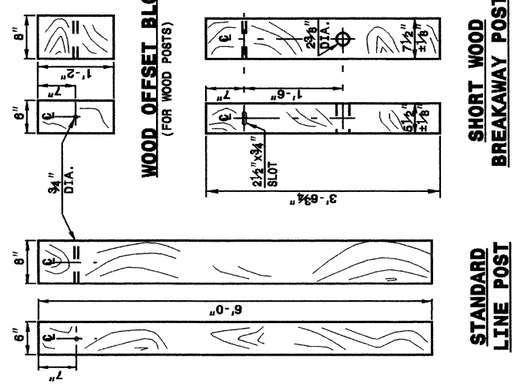
STEEL TUBE

TS 8"x8"x0.1875"



BEARING PLATE

⅝" THICK PLATE



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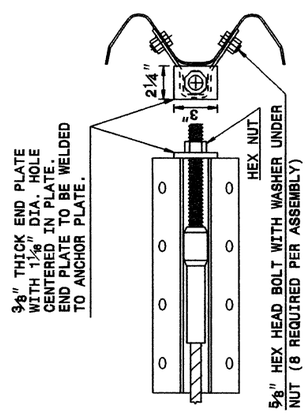
5/14/99

PROJECT REFERENCE NO.	SHEET NO.
B-3644	2-E

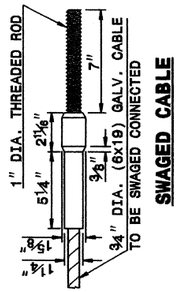
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 5 OF 7 — 862D02



ANCHOR PLATE ASSEMBLY



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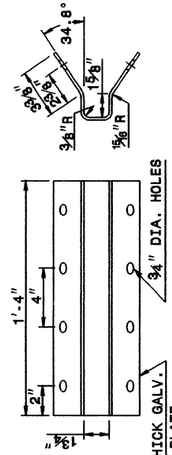
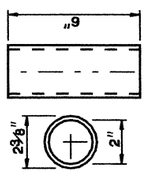


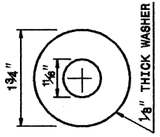
ANCHOR PLATE

CABLE ASSEMBLY

SYSTEM PARTS

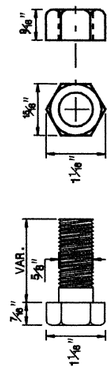


BREAKAWAY TERMINAL POST SLEEVE

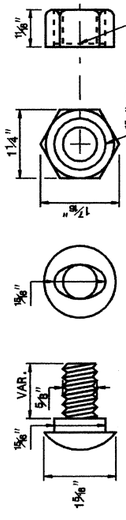


DETAIL OF STANDARD WASHER

STANDARD WASHER: TYPICAL USE UNDER NUT WITH WOOD POST



DETAIL OF STANDARD HEX BOLT AND NUT



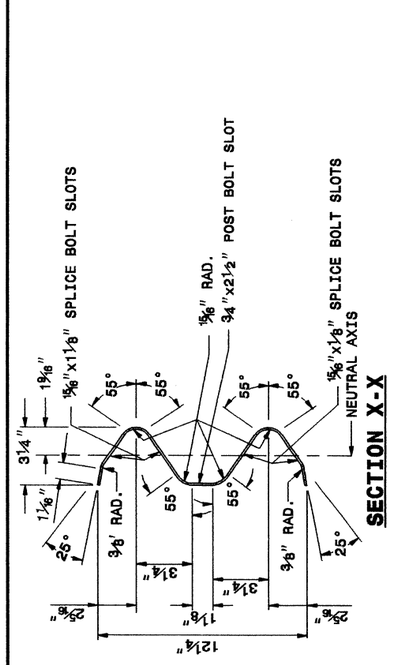
DETAIL OF BUTTON HEAD BOLT AND NUT

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ENGLISH DETAIL DRAWING FOR **GUARDRAIL INSTALLATION**	SHEET 5 OF 7 — 862D02

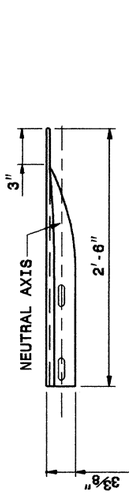
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

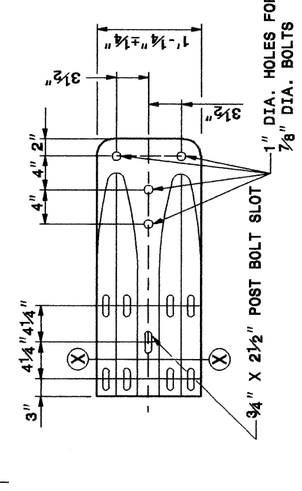
ENGLISH DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 7 — 862D02



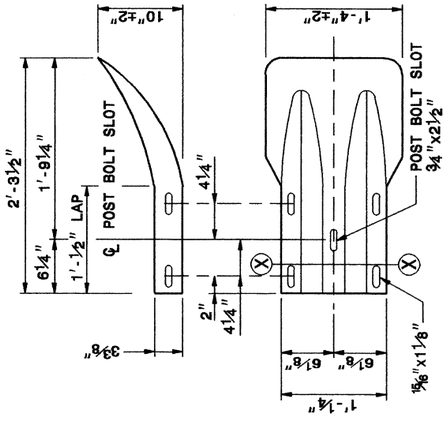
SECTION X-X





TYPICAL END SHOE

SYSTEM PARTS - GENERAL USE



TERMINAL END SECTION

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ENGLISH DETAIL DRAWING FOR **GUARDRAIL INSTALLATION**	SHEET 6 OF 7 — 862D02

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ORIGINAL BY: 2002 STD.862.02 DATE: ____ MODIFIED BY: E.E. WARD DATE: 02-09-03 CHECKED BY: ____ DATE: ____ FILE SPEC.: /usr/stds/02todetail/english/86202/862d02.dgn

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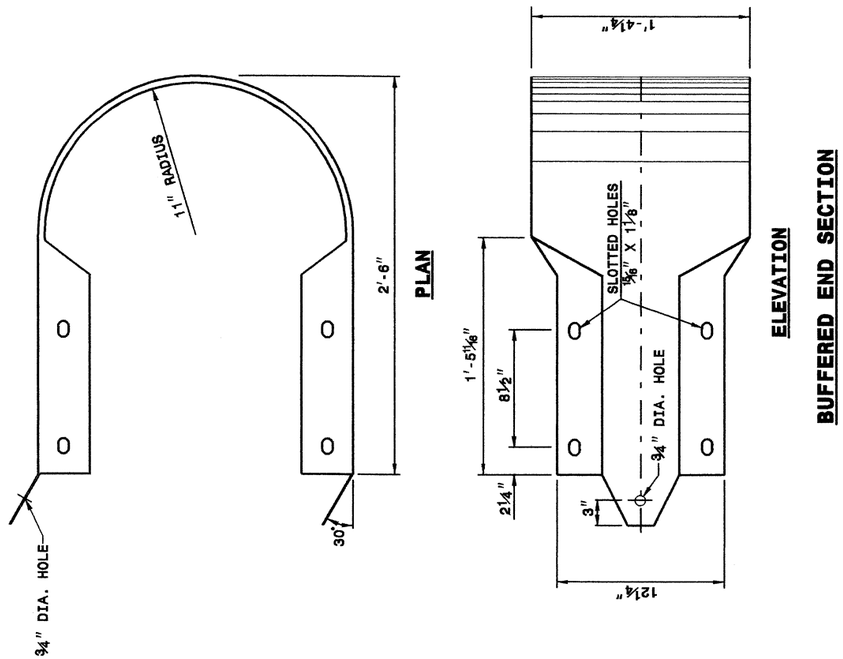
5/14/99

PROJECT REFERENCE NO.	SHEET NO.
B-3644	2-F

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 7 OF 7 — 862D02



STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 7 OF 7 — 862D02

DESIGN SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: 2002 STD.862.02 DATE:
MODIFIED BY: E.E. WARD DATE: 02-09-03
CHECKED BY: DATE:
FILE SPEC.: /usr/stds/02todetail/english/86202/862d02.dgn

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driscoll
NT DS18660

5/21/00

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CHECKED BY: _____	DATE: _____

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
B-3644	3

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6/21/00

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STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
B-3644	3-A

RIGHT OF WAY AREA DATA

PARCEL NO.	PROPERTY OWNERS NAMES	TOTAL ACREAGE	AREA TAKEN	AREA REMAINING RT.	AREA REMAINING LT.	CONST. EASE.	PERM. DRAIN. EASE.	TEMP. DRAIN. EASE.
1	STATE OF NORTH CAROLINA – DEPARTMENT		0.07 AC	AC	AC	0.02 AC		
	OF AGRICULTURE							
2	UNITED STATES OF AMERICA ARMY CORPS	2,214.93 AC	0.36 AC	AC	AC	0.63 AC	1,575 S.F.	
	OF ENGINEERS							
3	STATE OF NORTH CAROLINA – DEPARTMENT		0.05 AC	AC	AC	0.07 AC		
	OF CORRECTION							
	NOTE: THE TOTAL ACREAGE OF PARCELS 1 AND 3							
	COMBINED IS 9,407.67.							

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

STATION / SIZE / THICKNESS OR GAUGE	LOCATION (LT,RT, OR CL)	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) 12"	15"	18"	24"	30"	36"	42"	48"	BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHRWISE) 12" .064	15" .064	18" .064	24" .064	24"	30" .079	30"	36" .079	36"	42" .109	42"	48" .109	48"
15+84	RT	1		274.76																								
		1	2		272.01	271.85			32																			
15+84	LT	2		274.76																								
		2			271.85	269.35											20											
19+15	RT	3																										
TOTAL									32								20											

STATION	STRUCTURE NO. FROM	15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	24" SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. YDS. R.C.P.	C.S.P.	QUANTITIES FOR DRAINAGE STRUCTURES * TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') PER EACH (0' THRU 5.0')	LIN. *FT. A 5.0' THRU 10.0'	B 10.0' AND ABOVE	C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES AND HOOD STANDARD 840.03 TYPE OF GRATE E	F	G	
15+84	1						1							
	1													
15+84	2						1							
	2													
19+15	3	28												
TOTAL		28					2							

STATION	STRUCTURE NO. FROM	D.I. STD. 840.14 OR STD. 840.15	D.I. FRAME & GRATE STD. 840.16	M.D.I. TYPE "A" STD. 840.17 OR 840.26	M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. TYPE "D" STD. 840.19 OR 840.28	M.D.I. FRAME WITH GRATE STD. 840.22	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. (N.S.) FRAME WITH GRATE STD. 840.24	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.24	J.B. STD. 840.31 OR 840.32	M.D.I. (N.S.) FRAME WITH TWO GRATES STD. 840.29	T.B.D.I. STD. 840.35							BIT. COATED CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" C.Y. STD 840.72	CONC. & BRICK PIPE PLUG, C.Y. STD. 840.71	PIPE REMOVAL LIN.FT.	REMARKS
15+84	1											1	1											
	1																							
15+84	2											1	1											
	2																			2–15"				
19+15	3																							
TOTAL												2	2							2–15"				

ABBREVIATIONS

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

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

GUARDRAIL SUMMARY

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH STRAIGHT	LENGTH SHOP CURVED	LENGTH DOUBLE FACED	WARRANT POINT APPROACH END	WARRANT POINT TRAILING END	"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH APPROACH END	FLARE LENGTH TRAILING END	W APPROACH END	W TRAILING END	ANCHORS XI MOD	III	GRAU 350	M-350		CAT-1	VI MOD	BIC	AT-1	IMPACT ATTENUATOR TYPE 350 EA	G	NG	SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS
-L-	14+87.88	16+25.38	LEFT	137.50'			16+25.38		8'	11'	50'		1'			1	1													
-L-	12+90.62	15+90.62	RIGHT	300.00'			15+90.62		8'	11'	50'		1'			1	1													
-L-	18+29.38	21+29.38	LEFT	300.00'			18+29.38		8'	11'	50'		1'			1	1													
-L-	17+94.62	18+94.62	RIGHT	100.00'			17+94.62		8'	11'	50'		1'			1	1													
			SUBTOTAL	837.50'												4	4													
		4 GRAU-350 @ 50' =		-200.00'																										
		4 TYPE III @ 18.75' =		-75.00'																										
			TOTAL	562.50'			(5 ADDITIONAL GUARDRAIL POSTS)									4	4													

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6/21/00

COMPUTED BY: _____ DATE: _____
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STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.	SHEET NO.
B-3644	3-B

SUMMARY OF EARTHWORK

IN CUBIC YARDS

LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT+%	BORROW	WASTE
-L- STA. 11+45 TO STA. 16+25	749		337	0	412
SUBTOTAL SUMMARY NO. 1	749		337	0	412
-L- STA. 17+95 TO STA. 21+62.46	325		725	400	0
SUBTOTAL SUMMARY NO. 2	325		725	400	0
SUBTOTAL SUMMARIES NO. 1 & 2	1,074		1,062	400	412
EST. LOSS DUE TO CLEARING AND GRUBBING	-200				
WASTE TO REPLACE BORROW				-400	-400
PROJECT TOTAL	874		1,062	0	12
GRAND TOTALS	874			0	
SAY	900				

ESTIMATE UNDERCUT EXCAVATION = 200 C.Y.

SUMMARY OF PAVEMENT REMOVAL

IN SQUARE YARDS

LOCATION	ASPHALT REMOVAL	ASPHALT BREAK-UP	CONCRETE REMOVAL	CONCRETE BREAK-UP
-L- 13+00 TO 16+50	816.7			
-L- 17+70 TO 18+50	186.7			
TOTAL	1003.4			
SAY	1005			

Note: Approximate quantites only. Unclassified Excavation, Fine Grading, Clearing and Grubbing, Breaking of Existing Pavement, and Removal of Existing Pavement will be paid for at the contract lump sum price for "Grading."

PROJECT REFERENCE NO.	SHEET NO.
B-3644	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

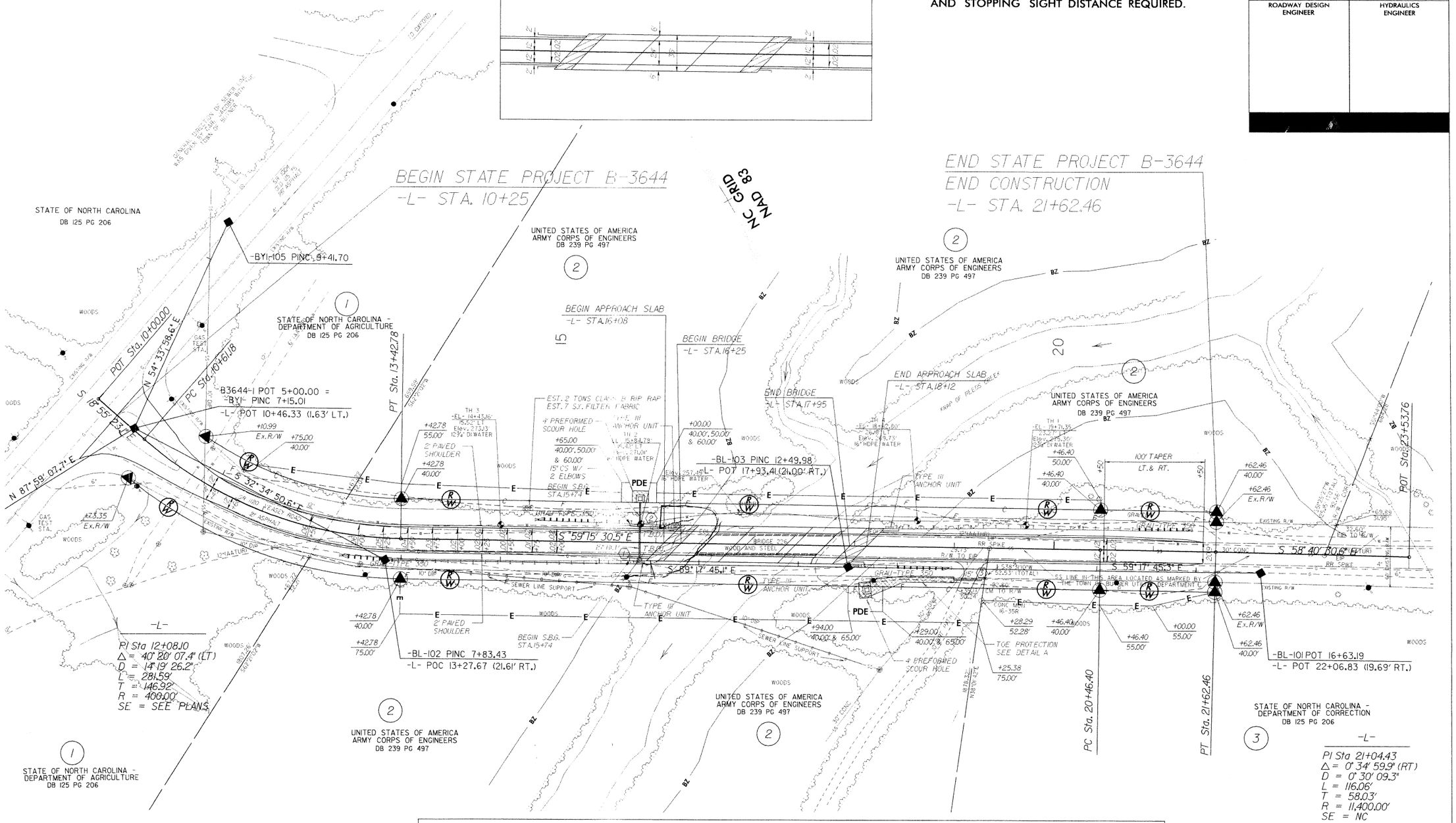
* DESIGN EXCEPTION FOR VERTICAL ALIGNMENT AND STOPPING SIGHT DISTANCE REQUIRED.

REVISIONS

1/22/04 - R/W REVISION, CONSIST OF CHANGES IN PARCEL LINES AND CHANGES ON SHEET NO. 3-A, IN THE AREA DATA TABLE.

9/17/99

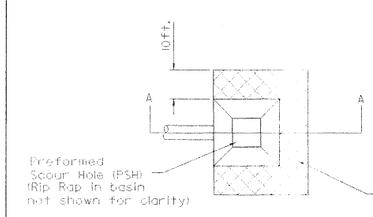
BRIDGE/ROADWAY RELATIONSHIP SKETCH

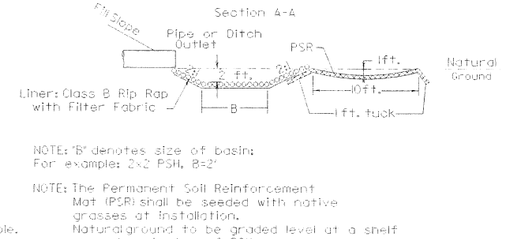


DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B3644-1" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 871539.7530(ft) EASTING: 2061973.0280(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: .9999846 THE NC LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B3644-1" TO -L- STATION 10+25 IS S 23° 16' 23.2" E 21.39' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NGVD 29

PREFORMED SCOUR HOLE WITH LEVEL SPREADER APRON (Not to scale)

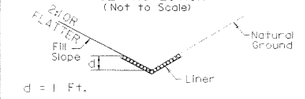




NOTE: "B" denotes size of basin: For example: 2x2 PSH, B=2'

NOTE: The Permanent Soil Reinforcement Mat (PSR) shall be seeded with native grasses at installation. Natural ground to be graded level at a shelf around perimeter of PSH.

DETAIL A
TOE PROTECTION
(Not to Scale)



Type of Liner = Permanent Soil Reinforcement Mat

FROM -L- STA. 18+00 TO 19+00 RT.

PROJECT REFERENCE NO.	SHEET NO.
B-3644	5

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 16689 ENGINEER BRIAN ALLEN WILES
12/17/03

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 10746 ENGINEER DENNIS K. HOYLE
12-18-03

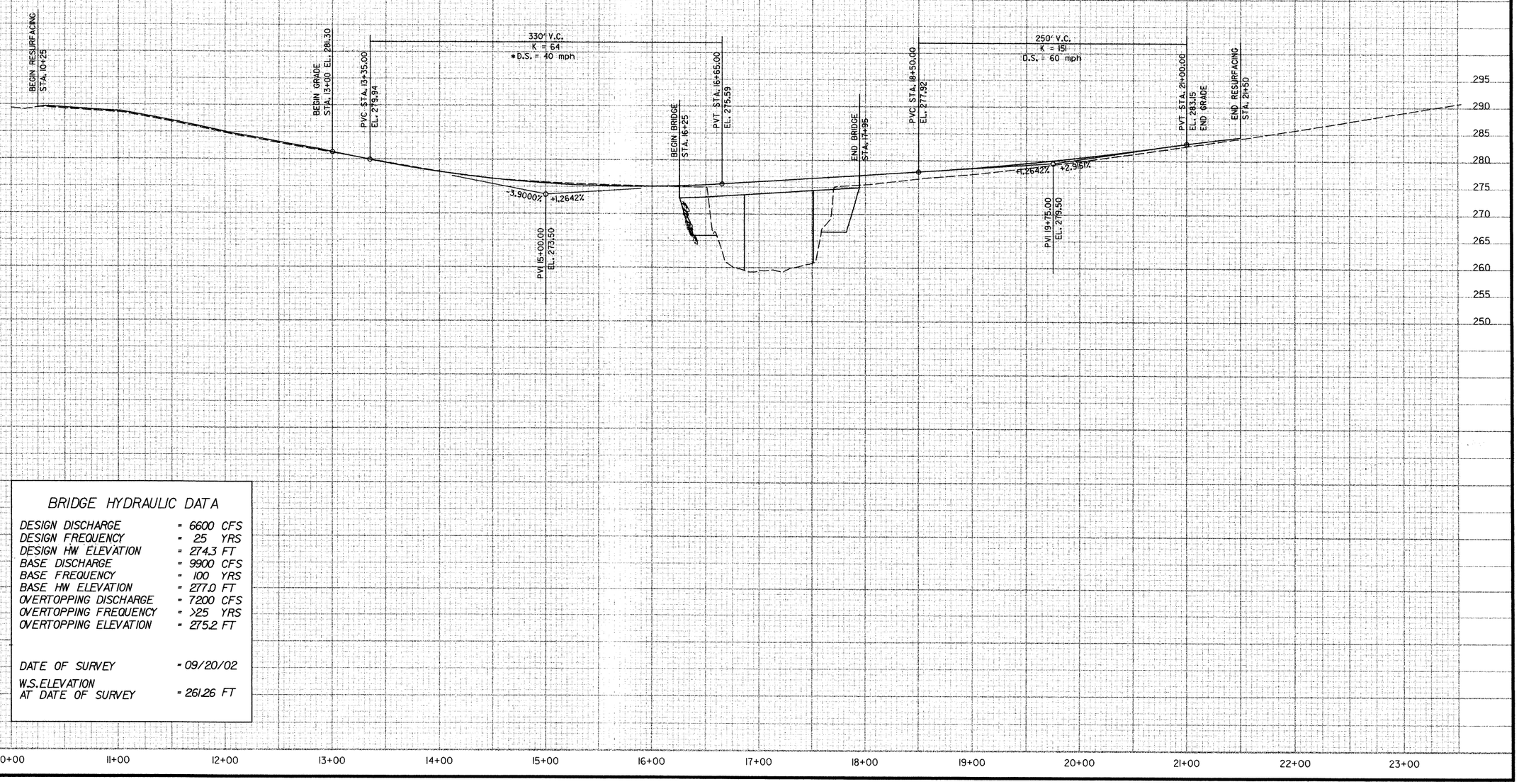
TRANSYSTEMS CORPORATION
4917 Waters Edge Drive, Suite 235
Raleigh, NC 27606 (919) 233-8125

* DESIGN EXCEPTION FOR VERTICAL ALIGNMENT AND STOPPING SIGHT DISTANCE REQUIRED.

BM #1 9" NAIL IN POWER POLE
123' LT. OF -L- STA. 10+29.52,
EL. 289.08

BM #2 SECOND JOINT OF SS LINE BEFORE FIRST SUPPORT ON NORTH SIDE OF BRIDGE
31' RT. OF -L- STA. 13+84.88,
EL. 277.26

BM #3 CORPS OF ENGINEERS-US ARMY MONUMENT 16-35-R-REF
53' RT. OF -L- STA. 19+28.25,
EL. 280.62



BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 6600 CFS
DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 274.3 FT
BASE DISCHARGE	= 9900 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 277.0 FT
OVERTOPPING DISCHARGE	= 7200 CFS
OVERTOPPING FREQUENCY	= >25 YRS
OVERTOPPING ELEVATION	= 275.2 FT
DATE OF SURVEY	= 09/20/02
W.S. ELEVATION AT DATE OF SURVEY	= 261.26 FT

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PROJ. REFERENCE NO.	SHEET NO.
B-3644	XSUM-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

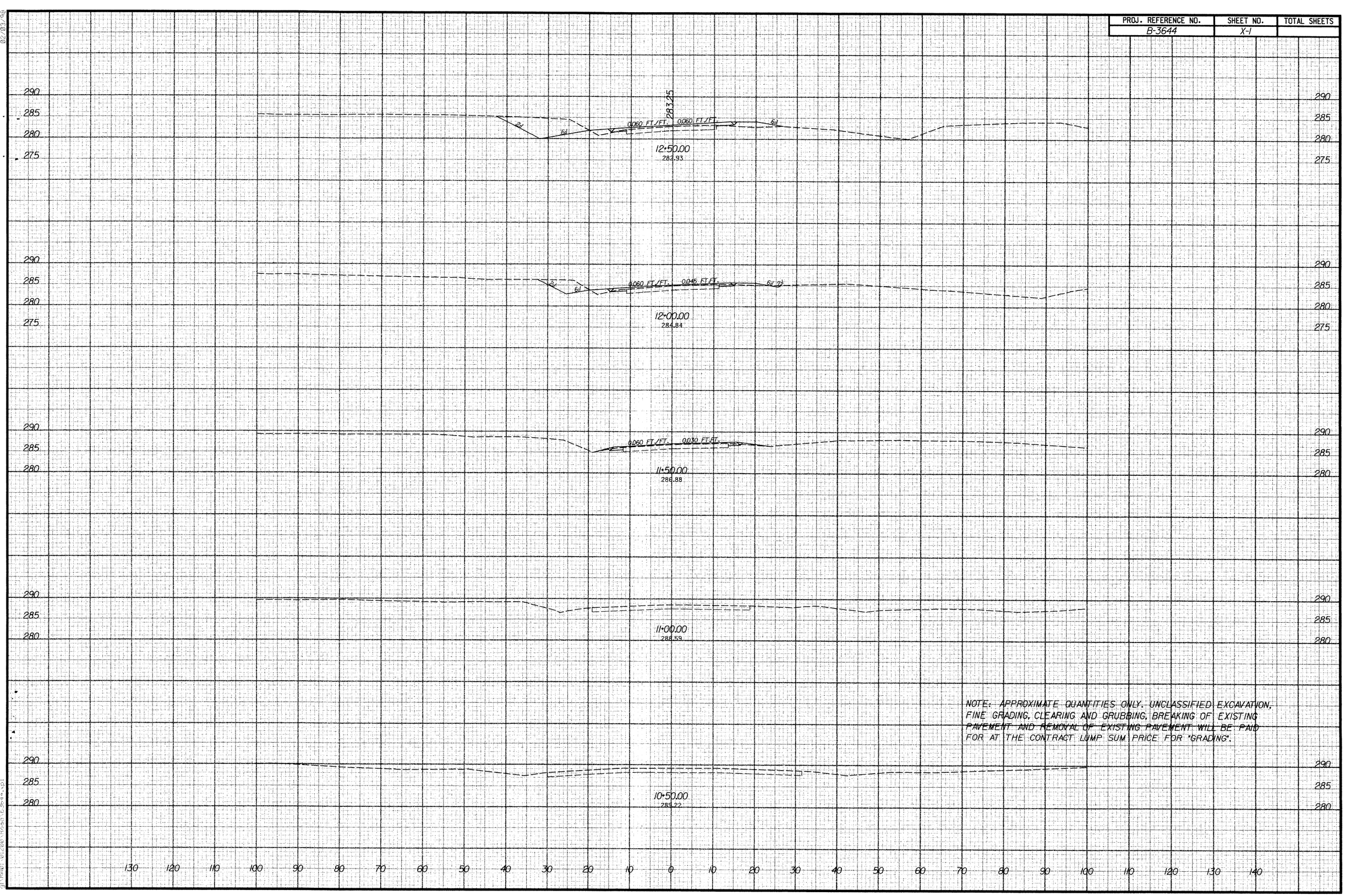
NOTE: EMBANKMENT COLUMN INCLUDES BACKFILL FOR UNDERCUT

CROSS-SECTION SUMMARY

Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
10+50.00	0	0
11+00.00	0	0
11+50.00	3	2
12+00.00	28	8
12+50.00	85	21
13+00.00	148	33
13+50.00	154	35
14+00.00	98	35
14+50.00	57	38
15+00.00	49	39
16+00.00	47	24
16+25.00	21	8
16+50.00	11	4
17+00.00	0	0
17+50.00	0	0
17+95.00	0	0
18+00.00	0	35
18+50.00	0	266
19+00.00	2	130
19+50.00	21	60
20+00.00	47	28
20+50.00	64	22
21+00.00	85	28
21+50.00	77	26
22+00.00	28	8
22+50.00	0	0
23+00.00	0	0
23+50.00	0	0

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

PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
B-3644	X-1	



NOTE: APPROXIMATE QUANTITIES ONLY. UNCLASSIFIED EXCAVATION, FINE GRADING, CLEARING AND GRUBBING, BREAKING OF EXISTING PAVEMENT AND REMOVAL OF EXISTING PAVEMENT WILL BE PAID FOR AT THE CONTRACT LUMP SUM PRICE FOR "GRADING".

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PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
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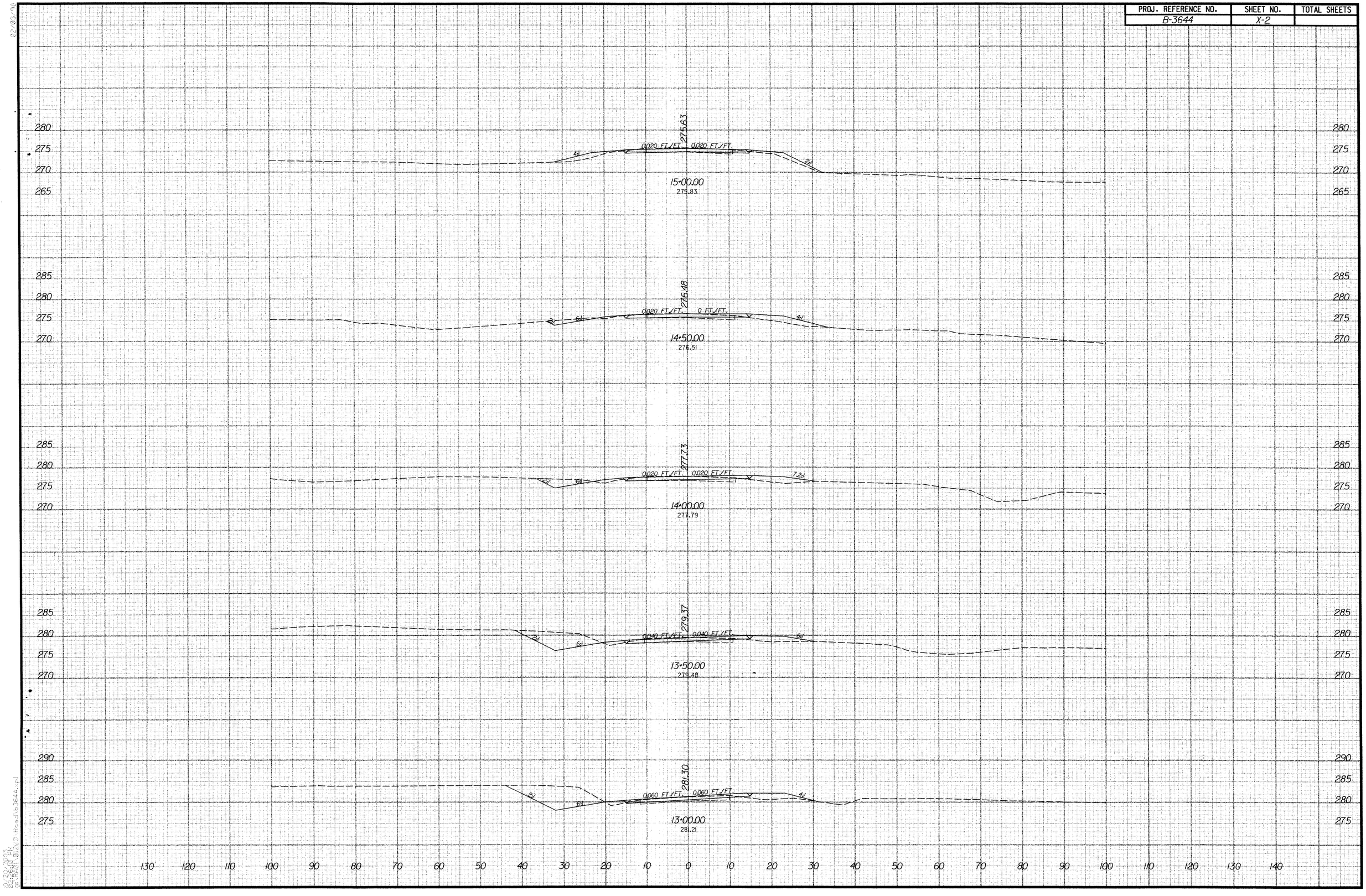

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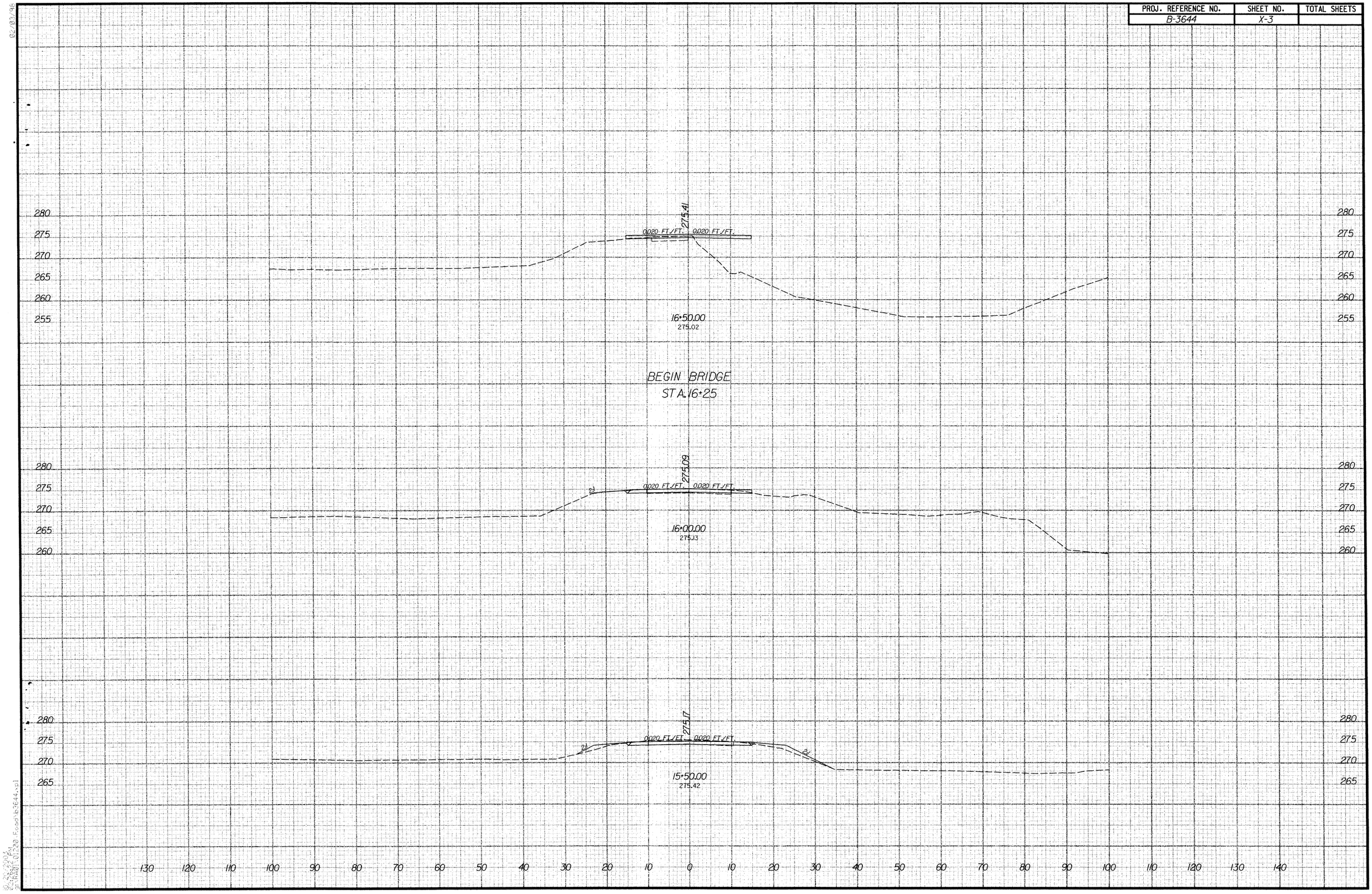

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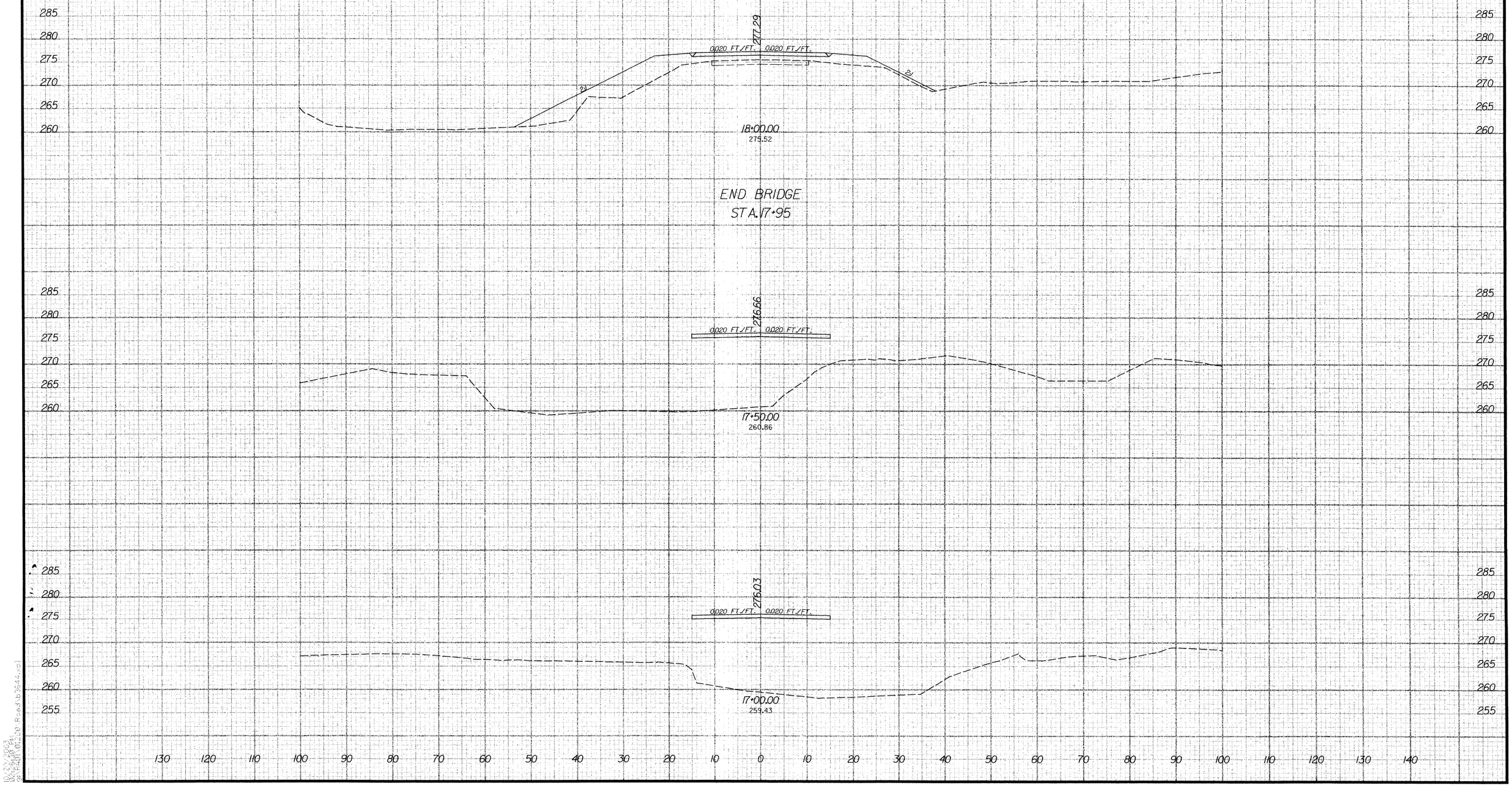

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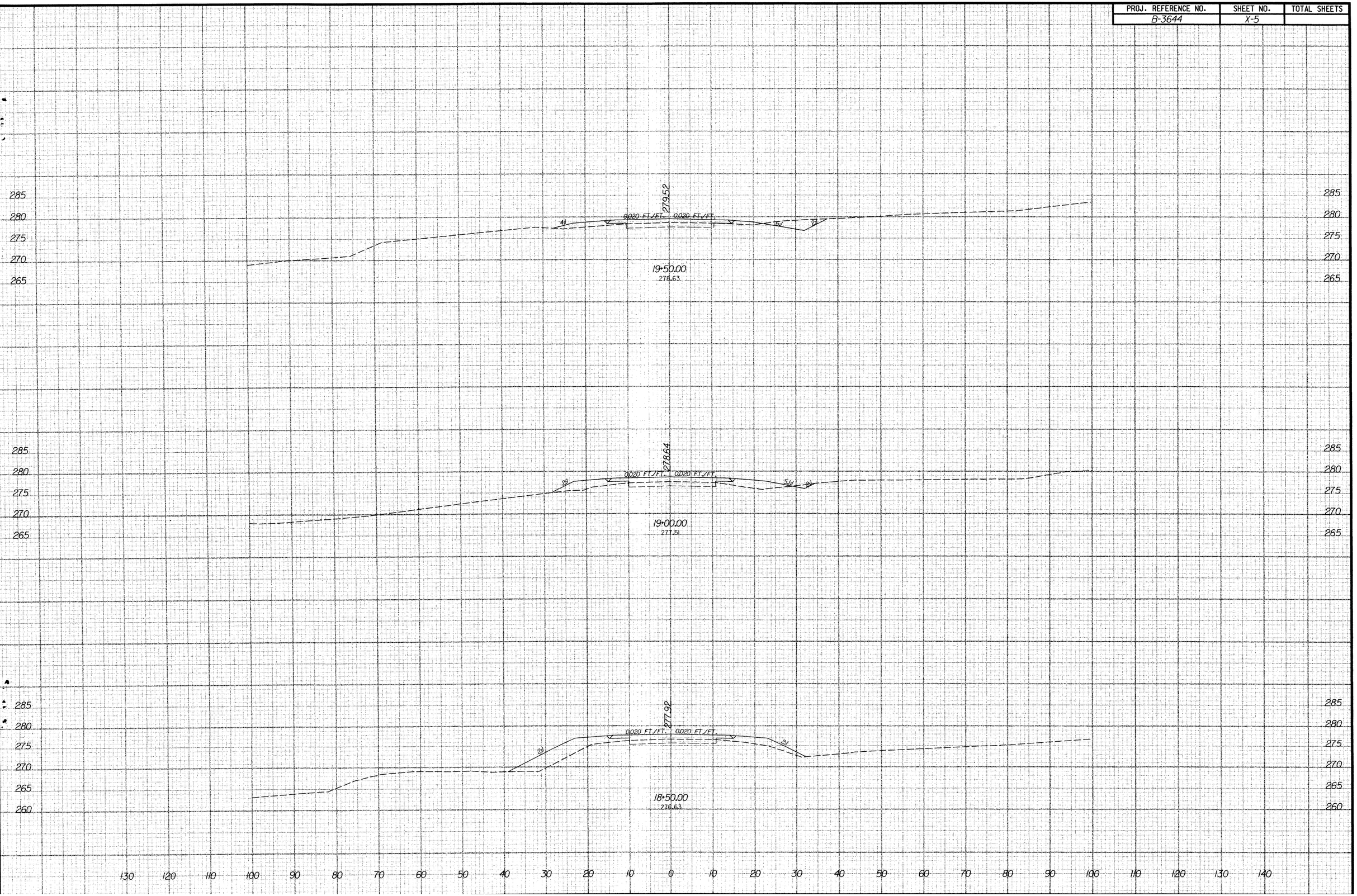

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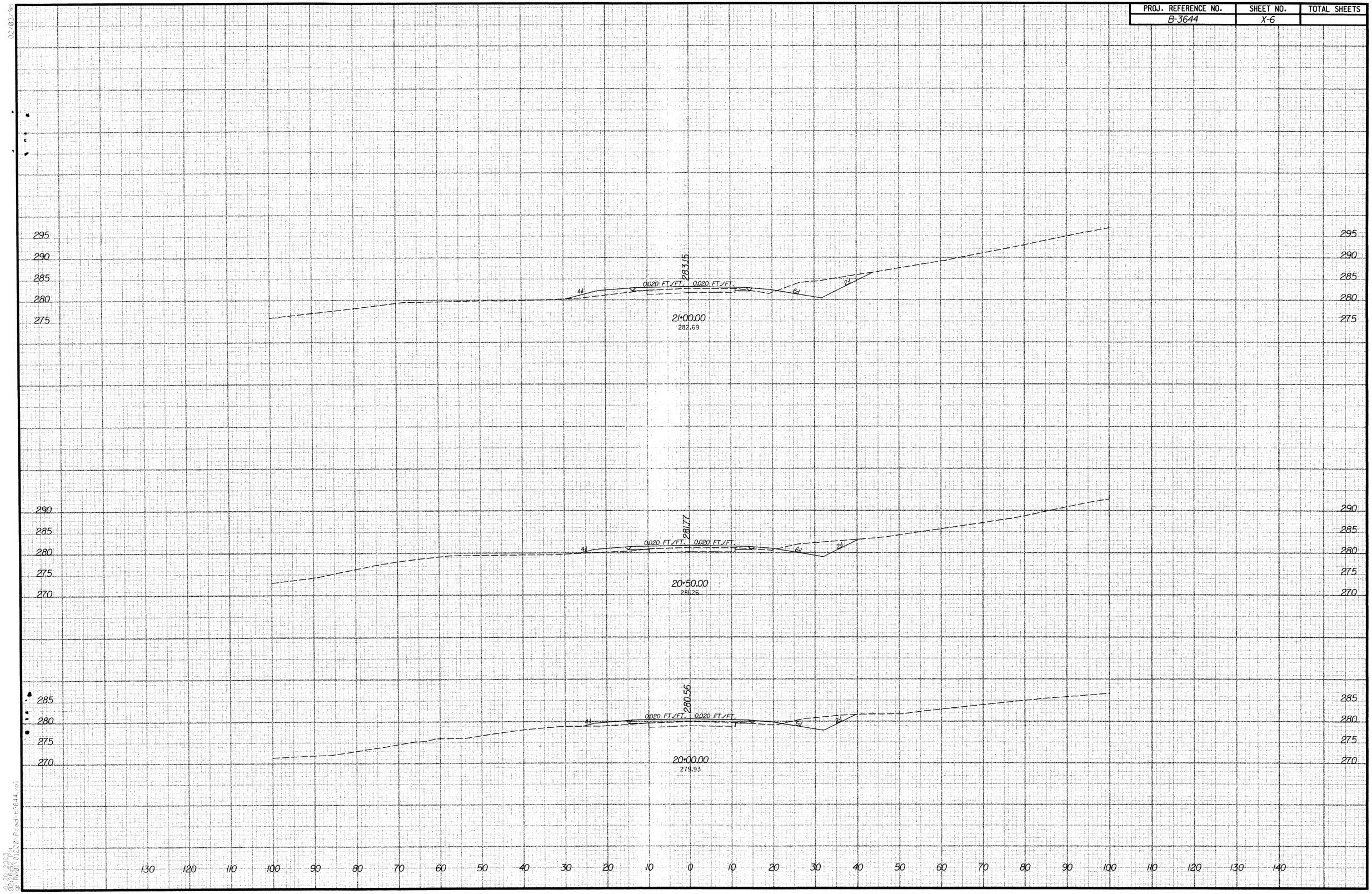

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PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
B-3644	X-7	

02/03/93

295
290
285
280
275
270

22+50.00
287.41

295
290
285
280
275

22+00.00
285.73

295
290
285
280
275

64 .0020 FT./FT. 28440 .0020 FT./FT. 64 64

21+50.00
284.16

295
290
285
280
275

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

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Granville County
SR 1120
Bridge No. 226 Over Knap of Reeds Creek
Federal Aid Project No. BRZ-1120(5)
State Project 8.2371001
TIP Project No. B-3644

CATEGORICAL EXCLUSION

US DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

AND

NC DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

APPROVED:

7-29-02
DATE

for L. Gail Grimes, P.E., Assistant Manager
Project Development and Environmental Analysis Branch
NCDOT

7/30/02
DATE

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

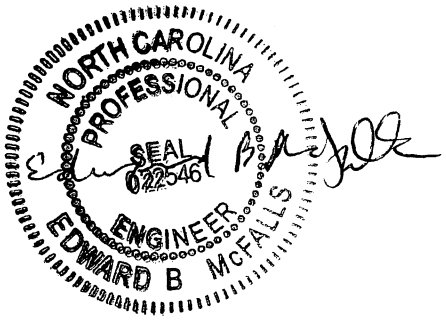
Granville County
SR 1120
Bridge No. 226 Over Knap of Reeds Creek
Federal Aid Project No. BRZ-1120(5)
State Project 8.2371001
TIP Project No. B-3644

CATEGORICAL EXCLUSION

July 2002

Document Prepared by

EARTH TECH
A tyco INTERNATIONAL LTD. COMPANY

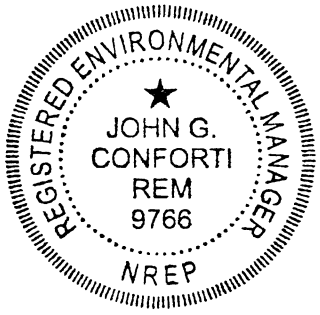


Edward B. McFalls, P.E.
Project Manager
Earth Tech

for the North Carolina Department of Transportation

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

John Conforti, R.E.M., Project Manager
Consultant Engineering Unit
Project Development and Environmental Analysis Branch



SPECIAL PROJECT COMMITMENTS

Granville County
SR 1120
Bridge No. 226 Over Knap of Reeds Creek
Federal Aid Project No. BRZ-1120(5)
State Project 8.2371001
TIP Project No. B-3644

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:

Project Development and Environmental Analysis Branch:

The stream impacts associated with the project will likely be lower than the 150 linear-foot (45.7 m) threshold. If it becomes apparent during final design that more than 150 linear feet (45.7 m) of stream will be impacted, mitigation measures will be considered.

Highway Design Branch:

Bridge deck drains in the bridge structure should not discharge directly into the stream.

Bare bank passage under the bridge structure should be provided to allow wildlife passage.

The Corps of Engineers will be provided the following for review when available:

- Impacts to temporary easements.
- Potential impacts due to relocation of utility lines within the right of way.
- Impacts to the Falls Lake flood storage capacity. Identify the number of cubic yards of fill material to be placed below elevation 264.8 feet mean sea level. Excavation of material below elevation

264.8 may be subtracted from the fill total. Show the location of all cuts and fills on full design plans. If no fill will be located below 264.8 ft mean sea level, include a statement indicating upon submission of full design plans.

- Provide five copies of the full design plan package, including roadway cross-sections and the bridge survey hydraulic design report. Plan packages should include final exact totals for wetland impacts, cubic yards of fill and excavation below 264.8 feet mean sea level, acreage of any new permanent right of way and temporary easement for roadway and/or utility work, and acres of forested land to be cleared. Requests for utility easements should be submitted by the entity operating the utility line in question. Also to facilitate onsite assessment of impacts all proposed permanent right of way and temporary easements should be staked in the field.

Granville County
SR 1120
Bridge No. 226 Over Knap of Reeds Creek
Federal Aid Project No. BRZ-1120(5)
State Project 8.2371001
TIP Project No. B-3644

INTRODUCTION: The replacement of Bridge No. 226 is included in the 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 38.9 out of a possible 100 for a new structure. The bridge is considered functionally obsolete and structurally deficient. The replacement of this inadequate structure will result in safer and more efficient traffic operations.

II. EXISTING CONDITIONS

SR 1120 (Veasey Road) in Granville County is classified as a "Local" route in the Statewide Functional Classification System.

Through the project area, SR 1120 has a 20-foot (6.1 m) wide pavement and 5-foot (1.5 m) unstabilized shoulders. The horizontal and vertical alignments in the vicinity of the bridge are good. There is no speed limit posted on SR 1120 near the bridge; therefore, the statutory speed limit of 55 miles per hour (89 kilometers per hour) applies. Existing right-of-way is 60 feet (18.3 m).

The existing bridge was constructed in 1954. The superstructure consists of a timber floor on I-beams. The substructure consists of timber caps on timber posts and concrete sills. The abutments are vertical. The existing bridge consists of three 40-foot (12.2 m) spans and has a clear roadway width 19.2 feet (5.9 m). The crown of the roadway is situated 18 feet (5.5 m) over the bed of Knap of Reeds Creek. The posted weight limit is 13 tons (12 metric tons) for single vehicles and 16 tons (15 metric tons) for trucks with trailers. The bridge is located in a tangent section of SR 1120 and crosses Knap of Reeds Creek at approximately 90 degrees. Photographs of the approaches to the existing bridge are shown in **Figure 4**.

The average daily traffic volume on SR 1120 at Bridge No. 226 was 3,800 vehicles per day in 2002. By the design year 2025, the average daily traffic volume is expected to increase to 6,200 vehicles per day. The projected traffic volume includes three percent dual-tired vehicles and one percent truck-tractor semi-trailers. Two school buses each cross the bridge four times daily. SR 1120 is not a designated bicycle route.

Two accidents were reported approximately 400 to 500 feet (122 to 152 m) from Bridge No. 226 in the period between June 1, 1998 and May 31, 2001. Both of these accidents occurred within 100 feet (30 m) of each other according to NCDOT Traffic Engineering Accident Analysis System Report.

- The first accident involved one vehicle and a movable object. The vehicle was backing up at approximately 5 miles per hour (8 kilometers per hour) when it struck the movable object.

- The second accident involved one vehicle and an animal. The estimate speed of the vehicle was 45 miles per hour (72 kilometers per hour).

There is a 12-inch (300 mm) water main adjacent to the north of the existing bridge. There is a sewer line, aerial utility lines, and Public Service of North Carolina gas line on the south side of the bridge.

The land adjacent to Bridge Number 226 is owned by the United States Army Corps of Engineers, which leases it to the North Carolina Wildlife Resource Commission (WRC). WRC operates the land as recreational gamelands.

III. ALTERNATIVES

A. Project Description

The project replaces the existing bridge with a new bridge approximately on the existing horizontal alignment and at the existing grade. The bridge will carry two lanes of traffic over Knap of Reeds Creek. It will have two 12-foot (3.6 m) lanes with 3-foot (0.9 m) shoulders. The bridge approaches will have two 12-foot (3.6 m) lanes with 8-foot (2.4 m) shoulders, 2 feet (1.2 m) of the shoulders being paved. The bridge is anticipated to be approximately 165 feet (50 m) long. **Figure 3** shows the typical cross-sections of the roadway approaches and bridge. The proposed design speed is 60 miles per hour (97 kilometers per hour).

B. Detailed Study Alternatives

Three alternatives were carried forward for detailed study in this Categorical Exclusion. They are shown on **Figure 2** and described below.

Alternative 1. This alternative replaces the bridge on its existing horizontal alignment while using an off-site detour to maintain traffic during construction. The off-site detour consists of SR 1120 (Veasey Road), SR 1103 (Central Avenue), SR 1004 (Butner Road). The total off-site detour length is 4.6 miles (7.4 km).

Alternative 2. This alternative replaces the bridge on its existing horizontal alignment while maintaining traffic on-site during construction on a temporary detour to the north.

Alternative 3. This alternative replaces the bridge on its existing horizontal alignment while maintaining traffic on-site during construction on a temporary detour to the south.

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 or corroding. Decay and corrosion has already reduced the bridge's safe load-bearing capacity. Although further maintenance activities will slow the decay, closing the bridge will eventually be necessary.

D. Preferred Alternative

Alternative 1, replacing the bridge on its existing horizontal alignment while using an off-site detour to maintain traffic during construction, is the preferred alternative. **Alternative 1** was selected because the off-site detour was adequate, it is the least costly alternative, it is the least environmentally damaging alternative, it has the least impacts to the adjacent Section 4(f) properties, and has the least impacts to surrounding utilities. No design exceptions are anticipated.

IV. ESTIMATED COSTS

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

Table 1: Estimated Costs

	Alternative 1	Alternative 2	Alternative 3
Structure Removal	$19,200	$19,200	$19,200
Structure	$390,000	$390,000	$390,000
Roadway Approaches	$228,100	$228,100	$228,100
Detour Structure & Approaches	n/a	$712,020	$659,700
Miscellaneous and Mobilization	$286,700	$607,680	$583,000
Engineering and Contingencies	$126,000	$293,000	$270,000
Right-of-way/Utilities/Relocations	$34,950	$34,950[1]	$34,950[1]
Total Cost of Alternative	**$1,084,950**	**$2,284,950**	**$2,184,950**

[1] Does not include on-site temporary detours.

The estimated cost of the project, as shown in the 2002-2008 Transportation Improvement Program, is $675,000 including $50,000 for right-of-way and $500,000 for construction. Right-of-way acquisition is scheduled for Federal Fiscal Year 2002, with construction to follow in Federal Fiscal Year 2003.

There are no residential or business relocations for all alternatives.

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 (Lake Michie, 1977)
- United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Map (Lake Michie, 1995)
- NCDOT aerial photograph of project area (1:1200)
- Soil Survey of Granville County (Natural Resources Conservation Service [NRCS] 1997)
- 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 2002), 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 July 26, 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 Knap of Reeds 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.

The project area lies in the north-central portion of North Carolina within the Piedmont physiographic province. Elevations in the project area are approximately 260 feet (79.2 m) (National Geodetic Vertical Datum, 1929). The topography of the project vicinity is flat to gently rolling hills.

The proposed project is in a semi-rural area in Granville County approximately one mile (1.6 km) west of Butner, NC. Granville County's major economic resources are agriculture, livestock production, and forest-based industry. The population of Granville County in 1999 was 45,450 (North Carolina Office of State Budget, Planning and Management 1999).

Information about soils in the project area was taken from the *Soil Survey of Granville County, North Carolina* (USDA 1997). The map units in the project area are described below.

- **Chewacla and Wehadkee soils (ChA), 0 to 2 percent slopes, frequently flooded.** This unit is mapped along both banks of Knap of

Reeds Creek. The soils are somewhat poorly to poorly drained soils formed from alluvial sediments and typically occur in drainageways in the Piedmont. They are frequently flooded for brief to long periods. The Chewacla portion occurs on floodplain ridges and the Wehadkee portion occurs in the lower swales. The seasonal high water table for Chewacla soils is 0.5 to 1.5 feet (0.2 to 0.3 m). For Wehadkee soils, the seasonal high water table is 0 to 1 foot (0.0 to 0.3 m). Permeability is moderate and shrink-swell potential is low for both soils. Chewacla and Wehadkee are both on the list of hydric soils in North Carolina.

- **Enon loam (EnC), 6 to 10 percent slopes.** This unit occurs on both sides of SR 1120. Enon soils typically occur on hill slopes in Piedmont uplands. They are very deep, well drained soils formed in residuum weathered from mafic intrusive rocks. The permeability is slow and the shrink-swell potential is high. The seasonal high water table is greater than 6 feet (1.8 m) below the surface.
- **Iredell loam (IrB), 2 to 6% slopes.** This unit also occurs on both sides of SR 1120. Iredell soils typically occur on broad interstream divides and at the head of drainageways in Piedmont uplands. They are deep, moderately well-drained soils formed in residuum weathered from mafic intrusive rocks. The permeability is slow and the shrink-swell potential is very high. The seasonal high water table is 1 to 2 feet (0.3 to 0.6 m) below the surface.
- **Mayodan sandy loam (MaB), 2 to 6% slopes.** This unit is a prime farmland soil. It occurs on both sides of SR 1120 to the west of Bridge No. 226. Mayodan soils typically occur on ridges and convex knolls in Piedmont uplands. They are very deep, well-drained soils formed in residuum weathered from interbedded sedimentary rocks. The permeability is moderate and the shrink-swell potential is moderate. The seasonal high water table is more than 6 feet (1.8 m) below the surface.

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. The site indices for soils in the project area are presented in **Table 2.**

Table 2: Site Indices

	Yellow poplar	Loblolly pine	Sweetgum	Shortleaf pine
Chewacla	96	95	100	
Wehadkee	100	93	97	
Enon loam		78	69	57
Iredell loam		72		52
Mayodan sandy loam		88		63

C. Water Resources

This section contains information about the water resources that may 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 Impacted

The project is located in the Neuse River basin (NEU01 sub-basin). Knap of Reeds Creek originates about 8.4 miles (13.5 km) north of the project area. About 2 miles (3.2 km) upstream of the project, Knap of Reeds Creek has been dammed to form Lake Butner. From the project area, the creek flows south into Falls Lake.

Knap of Reeds Creek is approximately 85 feet (25.9 m) wide in the study area. The stream flows slowly west in the project area. The substrate at this point consists of silt and cobbles. The water was an opaque red-brown color the day of the site visit.

The banks are moderately sloping and covered with kudzu (*Pueraria lobata*). The creek is about 25-percent shaded adjacent to the bridge. Other vegetation on the banks in the vicinity of the bridge includes box elder (*Acer negundo*), Japanese grass (*Microstegium vimineum*), Japanese honeysuckle (*Lonicera japonica*), giant cane (*Arundinaria gigantea*), poison ivy (*Toxicodendron radicans*), and shining sumac (*Rhus copallina*).

A sewer line crosses the creek on both sides of the bridge, so the woody vegetation has been cleared to 100 feet (30.5 m) downstream of the bridge and to 50 feet (15.2 m) upstream of the bridge. The banks in these areas are sloughing off into the stream.

A small tributary to Knap of Reeds Creek passes through a culvert under SR 1120 just west of the entrance to the Polk Youth Correctional Institute. The tributary is 2 feet (0.6 m) wide with banks 1 foot (0.3 m) high. Near the culvert, the stream is about 10% shaded. The tributary originates on the grounds of the Polk facility and is rip-rapped for a short length. Within the project area, the tributary has 10% canopy cover and the banks are covered with kudzu, giant cane, poison ivy, Japanese honeysuckle, self-heal (*Prunella vulgaris*), and Japanese grass. The substrate is 90% cobbles, with 10% sand and silt. The day of the site visit, the water was cloudy with a moderate rate of flow and the cobbles were covered with algae.

2. Water Resource Characteristics

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. Knap of Reeds Creek [Index # 27-4-(6)] is classified as a *WS-IV NSW* water body (NCDENR, 2000). *WS-IV* waters are those used as sources of water supply for drinking, culinary, or food processing purposes for those users where a WS-I, II or III classification is not feasible. *WS-IV* waters are generally in moderately to highly developed watersheds or Protected Areas. *NSW* (Nutrient Sensitive Waters) is a supplemental 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 Protected Water Supply Watershed occupied largely by forested gamelands and one small municipality. No recent disturbances to the landscape were observed in the immediate vicinity. Potential threats to stream quality in this area are highway runoff, municipal wastewater discharges, or any potential land-disturbing activities at the Polk Youth Correctional Institute on Veasey Road.

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 given a bioclassification ranging from Poor to Excellent.

There are three monitoring stations on Knap of Reeds Creek within 3 miles (4.8 km) of the project area. The locations and ratings are summarized in **Table 3** below (NCDENR 1998).

Table 3: Benthic Macroinvertebrate Monitoring Stations and Classifications

	Approximate Distance From Project	Date Sampled	Bioclassification
SR 1004 Above wastewater treatment plant	1 mile upstream	06/85	Fair
	1.5 miles downstream	09/94	Fair
		08/91	Fair
		02/87	Fair
		06/85	Fair
		05/82	Fair
100 meters below wastewater treatment plant	1.6 miles downstream	09/94	Fair
		08/91	Fair
		02/87	Poor
		06/85	Poor
		05/82	Poor

Point source discharges in North Carolina are permitted through the National Pollutant Discharge Elimination System (NPDES) program administered by the DWQ. Municipal, industrial, and other facilities that discharge directly into surface waters must obtain a permit. Homes that use a municipal wastewater system or a septic system, and do not discharge to surface waters do not require a permit under the program. There is one permit issued to discharge in Knap of Reeds Creek. The John Umstead Wastewater Treatment Plant of Butner holds Permit NC0026824 to discharge wastewater into the creek about 1.5 miles (2.4 km) downstream of the project area. This is a Major Municipal permit classified as "Domestic-Hospitals" and "Domestic-Municipal".

3. 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 with a temporary on-site detour at a new location results in more severe impacts, and physical impacts are incurred at the point of bridge replacement.

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.

Within the project area, Knap of Reeds Creek is 85 feet (25.9 m) wide. The tributary's channel is 2 feet (0.6 m) wide. Assuming a study corridor of 80 feet (24.4 m) for each alternate, the construction of the new bridge will impact up to 80 linear feet (24.4 m) of Knap of Reeds Creek. The tributary passes through a culvert under SR 1120, which will not be disturbed by the proposed project. The only segments of this tributary that may be affected are those from the edge of pavement to the construction limits on either side of SR 1120. These segments total 40 linear feet (12.2 m). A total area of 6880 sq feet (639.2 sq m) of surface waters may be impacted by the proposed project.

4. Impacts Related to Bridge Demolition and Removal

Knap of Reeds Creek in the vicinity of the proposed project is a WS-IV NSW water. It is not known to provide habitat for aquatic species on the federal list of threatened and endangered species. Therefore, Case 3 of NCDOT's Best Management Practices for Bridge Demolition and Removal applies to the proposed replacement of Bridge No. 226 over Knap of Reeds Creek.

The superstructure consists of a timber deck on I-beams. The substructure consists of end bents and internal bents with timber caps on timber posts and concrete sills. There are three spans. The maximum potential fill is 1.3 cubic yards (1 cubic meter).

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. Plant Communities

Two terrestrial communities were identified within the project area: a maintained roadside community and a mixed pine-hardwood forest. (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. Species include wild carrot (*Daucus carota*), Japanese honeysuckle, dandelion (*Taraxacum officinale*), a sunflower (*Helianthus* sp.), paspalum (*Paspalum* sp.), self-heal, poison ivy, kudzu, ironweed (*Vernonia noveboracensis*), shining sumac, trumpet creeper (*Campsis radicans*), and fescue (*Festuca* sp.).

b. Mixed Pine-Hardwood Forest

This community occurs along the entire length of the project adjacent to the maintained roadside community. Canopy species include Virginia pine (*Pinus virginiana*), sweetgum (*Liquidambar styraciflua*), tuliptree (*Liriodendron tulipifera*), sycamore (*Platanus occidentalis*), red maple (*Acer rubrum*), mockernut hickory (*Carya tomentosa*), black walnut (*Juglans nigra*), white oak (*Quercus alba*), and southern red oak (*Quercus falcata*). Sub-canopy species include eastern red cedar (*Juniperus virginiana*), eastern hophornbeam (*Ostrya virginiana*), redbud (*Cercis canadensis*), and buckeye (*Aesculus sylvatica*). The understory species include Virginia creeper (*Parthenocissus quinquefolia*), Japanese grass, Japanese honeysuckle, Jack-in-the-pulpit (*Arisaema triphyllum*), false Solomon's seal (*Smilacina racemosa*), Christmas fern (*Polystichum acrostichoides*), and rattlesnake fern (*Botrychium virginianum*).

2. Wildlife Communities

a. Maintained Roadside Community

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. Mixed Pine-Hardwood Forest

Tufted titmouse (*Parus bicolor*), Carolina chickadee (*Parus carolinensis*), red-bellied woodpecker (*Melanerpes carolinus*), ruby-crowned kinglet (*Regulus calendula*), chuck-will's-widow (*Caprimulgus carolinensis*), downy woodpecker (*Picoides pubescens*), great horned owl (*Bubo virginianus*), and blue jay (*Cyanocitta cristata*) are characteristic birds of this community type. Other vertebrates may include gray squirrel (*Sciurus carolinensis*), white-tailed deer (*Odocoileus virginianus*), southern flying squirrel (*Glaucomys volans*), southern short-tailed shrew (*Blarina carolinensis*), eastern box turtle (*Terrapene carolina*), American toad, and five-lined skink (*Eumeces fasciatus*).

3. Aquatic Communities

Within the project area, Knap of Reeds Creek is a low-gradient, fourth-order stream. The bed material consists of cobbles and silt. On the day of the site visit, the water was red-brown and clouded with suspended sediment. The riparian community adjacent to the bridge is mostly weeds, vines, and grasses.

According to WRC District 5 Fisheries Biologist Shari Bryant, Knap of Reeds Creek was sampled in 1986 upstream of Bridge No. 226 at SR 1121. Species identified were bluehead chub (*Nocomis leptocephalus*), swallowtail shiner (*Notropis procne*), creek chubsucker (*Erimyzon oblongus*), speckled killifish (*Fundulus rathbuni*), eastern mosquitofish (*Gambusia holbrooki*), redbreast sunfish (*Lepomis auritus*), bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), and green sunfish (*Lepomis cyanellus*).

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 alternate and the entire study corridor width. Alternative 1 is 80 feet (24.4 m) wide and 1500 feet (457.2 m) long. Alternative 2 is 80 feet (24.4 m) wide and 2000 feet (609.6m) long. Alternative 3 is 80 feet (24.4 m) wide and 1800 feet (548.6 m) long. **Table 4** 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 4: Estimated Area of Impact to Terrestrial Communities

Community	Area of Impact in Acres (Hectares)					
	Alternative 1		Alternative 2		Alternative 3	
	Temp[1]	Perm	Temp[1]	Perm	Temp[1]	Perm
Maintained Roadside	0 (0)	0.8 (0.3)	0.4 (0.2)	0.8 (0.3)	0.9 (0.4)	0.8 (0.3)
Mixed Pine-Hardwood Forest	0 (0)	0.4 (0.2)	1.8 (0.7)	0.4 (0.2)	1.2 (0.5)	0.4 (0.2)
Total Impact	0 (0)	**1.2 (0.5)**	**2.2 (0.9)**	**1.2 (0.5)**	**2.1 (0.9)**	**1.2 (0.5)**

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

Destruction of natural 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 the upland communities are generally common throughout the Piedmont of 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

No wetlands will be impacted.

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*. Because the stream in the proposed project area is designated as a WS-IV water, the standard rules for erosion and sedimentation controls will be implemented as included in *NCDOT's Best Management Practices for Protection of Surface Waters* and *Erosion and Sediment Control Guidelines*.

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 waters are regulated by the U.S. Army Corps of Engineers (USACOE). Any action that proposes to dredge or place fill material into surface waters or wetlands falls under these provisions.

The Lake Michie, NC NWI map shows no wetlands in the project vicinity. No jurisdictional wetlands were observed within the project area. Knap of Reeds Creek and the tributary meet the definition of surface waters, and are therefore classified as Waters of the United States. The channel of Knap of Reeds Creek is 85 feet (25.9 m) wide in the vicinity of Bridge No. 226. The tributary's channel is 2 feet (0.6 m) wide.

Project construction cannot be accomplished without infringing on the surface waters. Anticipated surface water impacts fall under the jurisdiction of the USACE and the DWQ. Within the project area, Knap of Reeds Creek is 85 feet (25.9 m) wide. The tributary's channel is 2 feet (0.6 m) wide. Assuming a study corridor of 80 feet (24.4 m) for each alternate, the construction of the new bridge

will impact up to 80 linear feet (24.4 m) of Knap of Reeds Creek. The tributary passes through a culvert under SR 1120, which will not be disturbed by the proposed project. The only segments of this tributary that may be affected are those from the edge of pavement to the construction limits on either side of SR 1120. These segments total 40 linear feet (12.2 m). A total area of 6880 sq feet (639.2 sq m) of surface waters may be impacted by the proposed project.

2. Permits

a. Section 404 of the Clean Water Act

Impacts to jurisdictional surface waters 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 67 FR 2020; January 15, 2002. 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.

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.

Knap of Reeds Creek in the vicinity of the proposed project is a WS-IV NSW water. It is not known to provide habitat for aquatic species on the federal list of threatened and endangered species. Therefore, Case 3 applies to the proposed replacement of Bridge No. 226 over Knap of Reeds Creek.

The stream bed in the project area is cobbles and silt. Therefore, conditions in the stream may raise sediment concerns and a turbidity curtain is recommended.

3. Buffer Rules

Pursuant to 15 NCAC 2B .0233, Riparian Area Rules for Nutrient Sensitive Waters in the Neuse River Basin apply to this project. 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 in **Table 5** below. Impacts to Zone 1 are based on a buffer width of 30 feet (9.1 m) measured landward from the top of bank or rooted vegetation. Impacts to Zone 2 are based on a buffer width of 20 feet (6.1 m) measured from the outer edge of Zone 1. It is possible that one or more of the water resources listed below may be exempted when an on-site determination by the Division of Water Quality is conducted. Therefore impacts may be considerably less.

Table 5: Estimated Impacts to Riparian Buffers

Water Resource	Zone 1	Zone 2	Total
	acres (ha)	acres (ha)	acres (ha)
Knap of Reeds Creek			
Alternative 1	0.07 (0.03)	0.05 (0.02)	0.12 (0.05)
Alternative 2	0.19 (0.08)	0.15 (0.06)	0.34 (0.14)
Alternative 3	0.14 (0.06)	0.29 (0.12)	0.43 (0.19)
Ut Knap of Reeds Creek			
Alternative 1	0.04 (0.02)	0.03 (0.01)	0.07 (0.03)
Alternative 2	0.14 (0.06)	0.09 (0.04)	0.23 (0.10)
Alternative 3	0.14 (0.06)	0.09 (0.04)	0.23 (0.10)

4. 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 there will be no impacted wetlands, wetland mitigation will not be required. A total of 80 linear feet (24.4 m) of Knap of Reeds 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 Granville County, and any likely impacts to these species as a result of the proposed project construction, are discussed in the following sections.

1. Federally Protected Species

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 four species under federal protection for Granville County as of March 2002. These species are listed in **Table 6**.

Table 6: Species Under Federal Protection for Granville County

Common Name	Scientific Name	Federal Status
Vertebrates		
Bald eagle	*Haliaeetus leucocephalus*	Threatened
Invertebrates		
Dwarf wedge mussel	*Alasmidonta heterodon*	Endangered
Vascular Plants		
Harperella	*Ptilimnium nodosum*	Endangered
Smooth coneflower	*Echinacea laevigata*	Endangered
Notes:	Endangered-A species that is threatened with extinction throughout all or a significant portion of its range.	
	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 First Listed: March 11, 1967
Date Downlisted: July 12, 1995

The bald eagle is a large raptor with a wingspan reaching 7 feet (2.1 m). Adults have a dark brown body with a pure white head and tail, whereas the juvenile plumage is chocolate brown to blackish with white mottling on the tail, belly and underwings. Adult plumage is fully acquired by the fifth or sixth year.

The bald eagle is primarily associated with coasts, rivers, and lakes, usually nesting near large bodies of water where it feeds. It preys primarily on fish, but will feed on birds, mammals, turtles, and carrion when fish are unavailable.

In the southeast, the nesting and breeding season runs from September to December. Large nests up to 6 feet (2 m) across and weighing hundreds of pounds are constructed from large sticks, weeds, cornstalks, grasses, and sod.

Preferred nesting sites are usually within one-half mile of water, have an open view of the surrounding area, and are in the largest living tree, usually a pine or cypress. Excessive human activity may exclude an otherwise suitable site from use. Wintering areas generally have the same characteristics as nesting sites, but may be farther from shores.

The bald eagle ranges throughout all of North America. Breeding sites in the southeast are concentrated in Florida, coastal South Carolina, and coastal Louisiana, and sporadically located elsewhere.

Biological Conclusion: **No Effect**

There are no large bodies of water in the project area that would support bald eagles. No occurrences of the bald eagle within the project vicinity were found in the NHP files. Therefore, it can be concluded that the project will not impact this threatened species.

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

Family: Unionidae
Federally Listed: 1990

The dwarf wedge mussel rarely exceeds 1.5 inches (3.8 cm) in length. It is the only American freshwater mussel that has two lateral teeth on the right valve, but only one on the left. The shell's outer surface is usually brown or yellowish brown in color, with faint green rays that are most noticeable in young specimens. The male and female shells differ slightly, with the female being wider to allow greater space for egg development.

In North Carolina, the dwarf wedge mussel is found in the Neuse and Tar River basins. The other sites are in Maryland, New Hampshire, New York, Vermont, and Virginia. The habitat is described as creek and river areas with a slow to moderate current. The preferred substrate is a 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, conditions that often are modified by dam construction. Another significant factor is the exclusion of its anadromous fish host from some habitat areas by impoundment and dams. Increased acidity, runoff of agricultural chemicals and fertilizers, and the mussel's sensitivity to potassium, zinc, copper, cadmium and other elements associated with industrial pollution also contribute to its decline.

Biological Conclusion: **No Effect**

A search of the NHP files found no occurrences of the dwarf wedge mussel in the project vicinity. Although the current is slow to moderate the stream appeared to have a heavy silt load. Also, the substrate is cobble, rather than the preferred sand, gravel, or mud substrate. Knap of Reeds Creek does not fit the necessary habitat requirements. NCDOT biologists conducted a survey on October 19, 2000 and found no mussels. Therefore, it can be concluded that the project will not have an impact on the dwarf wedge mussel.

***Echinacea laevigata* (Smooth coneflower)** **Endangered**

Family: Asteraceae
Date First Listed: October 1992
Proposed Listing: December 1991

The smooth coneflower is a rhizomatous perennial herb that grows up to 4.9 feet (1.5 m) tall. The largest leaves are the basal leaves, which reach 7.8 inches (20 cm) in length and 3 inches (7.5 cm) in width. The basal leaves have long stems, are elliptical to broadly lanceolate, tapering to the base, and smooth to slightly rough. The plant has smooth stems with few cauline leaves. The rays of the flowers (petal-like structures) are light pink to purplish, usually drooping, and 1.9 to 3.1 inches (5 to 8 cm) long. Flower heads are usually solitary. Flowering occurs from May through July.

The known range of Echinacea laevigata consists of 22 populations found now only in Virginia, North Carolina, South Carolina, and Georgia. Six of the populations are in North Carolina and are found in Durham and Granville counties. Most of the populations are small, containing less than 100 plants each. Four of the populations contain less than 10 plants each.

In North Carolina the habitat of smooth coneflower is open woods, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line rights-of-way, usually on magnesium- and calcium-rich soils associated with gabbro and diabase. Optimal sites are characterized by full sunlight and little competition in the herbaceous layer (Gaddy 1991). Natural fires, as well as large herbivores, are part of the history of the vegetation in this species' range and many of the associated herbs are also sun-loving species, which depend on periodic disturbances to reduce the shade and competition of woody plants (Kral 1983 and Gaddy 1991).

The major factors contributing to endangered status of this species are collecting, residential and industrial development, shade from woody vegetation, highway construction and improvement, and certain types of roadside and power line right-of-way maintenance. Like most coneflowers, this species is intolerant of dense shade.

Biological Conclusion: **No Effect**

A search of the NHP files found no occurrence of smooth coneflower in the project vicinity. Although there is roadside habitat in the project area, soils in the project area do not have the characteristics typically associated with this species. A survey of the project area was conducted during the flowering season (July 26, 2000), and no smooth coneflowers were found. Therefore, it can be concluded that the project will not have an impact on the smooth coneflower.

***Ptilimnium nodosum* (Harperella)** **Endangered**

Family: Apiaceae
Federally Listed: 1988

Harperella is an annual herb that grows to a height of 6 to 36 inches (0.2 to 1.0 m). The leaves are hollow, quill-like structures. The small, white flowers occur in heads, or umbels, not unlike those of Queen Anne's lace (Daucus carota). It is found in pond and riverine habitats. Flowering begins in May in the pond habitats, late June or July in the riverine habitats, and continues until frost. Seed set is apparently profuse and populations in localized areas can achieve a high density and number of individuals each year.

Harperella appears to prefer periodically disturbed sites. It typically occurs in two habitat types: (1) rocky or gravel shoals and margins of clear, swift-flowing stream sections; and (2) edges of intermittent pineland ponds in the coastal plain. It does not compete well with other species without periodic disturbance.

Major factors contributing to the endangered status of this plant are its tolerance and possible requirement of a very specific and unusual water regime. This includes moderately intensive spring floods, which may reduce or eliminate competing vegetation. Harperella is readily eliminated from its habitat by alterations of the water regime resulting from impoundments, water withdrawal, and drainage or deepening of ponds. Other factors such as siltation, pollution, and shoreline development also threaten harperella populations.

Biological Conclusion: **No Effect**

No habitat exists in the project area for the Harperella. The stream is not fast flowing and does not have rocky or gravelly shoals in the project area. A search of the NHP database found no occurrence of this plant within the project vicinity. It can be concluded that the project will not impact this endangered species.

2. Federal Species of Concern

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 7** includes FSC species listed for Granville 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 7: Federal Species of Concern in Granville County

Common Name	Scientific Name	State Status	Habitat present
Vertebrates			
Carolina darter	*Etheostoma collis lepidinion*	SC	Yes
Pinewoods shiner	*Lythrurus matutinus*	SR	Yes
Invertebrates			
Atlantic pigtoe*	*Fusconaia masoni*	T	Yes
Brook floater	*Alasmidonta varicosa*	T	Yes
Green floater	*Lasmigona subviridus*	E	Yes
Yellow lampmussel	*Lampsilis cariosa*	T	Yes
Yellow lance	*Elliptio lanceolata*	T	Yes
Vascular Plants			
Heller's trefoil	*Lotus helleri*	C	Yes
Tall larkspur	*Delphinium exaltatum*	E-SC	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.

No FSC species were observed during the site visit. One FSC species, the tall larkspur (*Delphinium exaltatum*), is recorded at NHP as occurring within 2 miles (3.2 km) of the project area. There are three Significant Natural Heritage Areas within 2 miles (3.2 km) of the project area: the Knap of Reeds Creek Diabase Levee and Slope, the Knap of Reeds Diabase Forest and Glade, and the Neuse Headwaters Triassic Basin Bottomlands Macrosite. Another Diabase Levee and Slope occurs within 2 miles (3.2 km) of the project area and is a Registered Natural Heritage Area.

3. Summary of Anticipated Impacts

No impacts to federally protected species are anticipated.

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 in 36 CFR Part 800. Section 106 requires that for federally funded, licensed, or

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

B. Historic Architecture

A field survey of the Area of Potential Effect (APE) was conducted on February 17, 2000. All structures within the APE were photographed, and later reviewed by the State Historic Preservation Office (SHPO). In a concurrence form dated February 17, 2000 and memorandum dated November 16, 2000. The 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 Appendix A.

C. Archaeology

The SHPO, in a memorandum dated November 16, 2000 did not comment on the proposed project and did not recommend that an archaeological investigation be conducted. A copy of the memorandum is included in Appendix A.

VII. SECTION 4(f) RESOURCES

Section 4(f) of the Department of Transportation Act of 1966, as amended, states in part "The Secretary may approve a transportation project or program requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge, or land of a historic site of national, state, or local significance only if:

1. There is no prudent and feasible alternative to using that land; and

2. The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from such use."

Since it is anticipated that the proposed project will require the use of property from the gamelands managed by the North Carolina Wildlife Resource Commission and owned by the United States Corps of Engineers, a recreational area, a Section 4(f) evaluation is required. See Appendix B for the Programmatic Section 4(f) evaluation.

The project may impact the adjacent public recreation and wildlife lands through possible right-of-way acquisition.
There is no feasible and prudent alternative to the use of land from the adjacent Corp property.

- The No Action Alternative is not prudent because social and economic impacts and community disruption resulting from this alternative reach extraordinary magnitudes.

- An avoidance alternative is not feasible because all of the nearby surrounding lands are Corp property and NC-WRC gamelands.

Therefore, the next step is to minimize impacts with the proposed build alternatives.

Alternative 1 has the least impacts. Functionals were initially created using conservative design guidelines and standards. In addition, the functional design was developed using USGS topographic mapping; therefore, the impacts are only an approximation—actual impacts will not be known until full design is complete. The initial slope lines of the approaches extend out approximately 100 feet (30 m) wide—beyond the existing right-of-way lines. Steeper slopes were then incorporated to minimize the footprint of the approaches, which are approximately 60 to 70 feet (18 to 21 m) wide. The approximate amount of land to be acquired is 1,070 square feet (0.025 acres) [99.4 m^2 (0.011 hectors)]. The proximity impacts of the project (e.g., noise, air and water pollution, wildlife and habitat effects, aesthetic values) on the remaining Section 4(f) land will not impair the use of the lands for its intended purposes.

The Corps of Engineers requested the following avoidance and minimization measures be incorporated into the full design plan. To avoid impacts due to direct discharge of runoff into Knapp of Reeds Creek, bridge deck drains in the bridge structure should not be located directly over the stream. In order to minimize impacts to wildlife passage the amount of bare bank passage under the bridge structure should be maximized.

In addition, the Corps of Engineers requested to review the following when available:

- Impacts to temporary easements.

- Potential impacts due to relocation of utility lines within the right of way. There are two sewer lines (one on either side of the road) and an overhead utility line located in the area potentially affected by the bridge replacement.

- Impacts to the Falls Lake flood storage capacity. Identify the number of cubic yards of fill material to be placed below elevation 264.8 feet mean sea level. Excavation of material below elevation 264.8 may be subtracted from the fill total. Show the location of all cuts and fills on full design plans. If no fill will be located below 264.8 ft mean sea level, include a statement indicating upon submission of full design plans.

- Provide five copies of the full design plan package, including roadway cross-sections and the bridge survey hydraulic design report. Plan packages should include final exact totals for wetland impacts, cubic yards of fill and excavation below 264.8 feet mean sea level, acreage of any new permanent right of way and temporary easement for roadway and/or utility work, and acres of forested land to be cleared. Requests for utility easements should be submitted by the entity operating the utility line in question. Also to facilitate onsite assessment of impacts all proposed permanent right of way and temporary easements should be staked in the field.

VIII. 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 the 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. No residences or businesses will be relocated.

There are publicly owned recreational and wildlife facilities (gamelands) in the vicinity of the project. The proximity impacts of the project (e.g., noise, air and water pollution, wildlife and habitat effects, aesthetic values) on the remaining land will not impair the use of the lands for its intended purposes.

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. In addition, the proposed project is anticipated to be limited to the existing right of way, and the land use adjacent to the project is residential.

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. There are no receptors located in the immediate project area. The project's impact on noise and air quality will not be significant.

Noise levels could increase during construction but will be temporary. If vegetation is disposed of by burning, all burning shall be done in accordance with applicable local laws and regulations of the North Carolina SIP for air quality in compliance with 15 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 records at the North Carolina Department of Environment and Natural Resources, Division of Water Quality, Groundwater Section and the Division of Waste Management revealed neither underground storage tanks, hazardous waste sites, regulated or unregulated landfills, nor dump sites in the project area.

Granville County is a participant in the National Flood Insurance Program (NFIP). Flood Insurance Study maps for Granville County show that Bridge No. 226 is located in a FEMA 100-year floodplain. Replacement of this bridge is not expected to affect the 100-year floodplain.

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

IX. PUBLIC INVOLVEMENT

There was no public involvement on this project.

X. AREAS OF CONTROVERSY

There are no areas of controversy on this project.

XI. 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

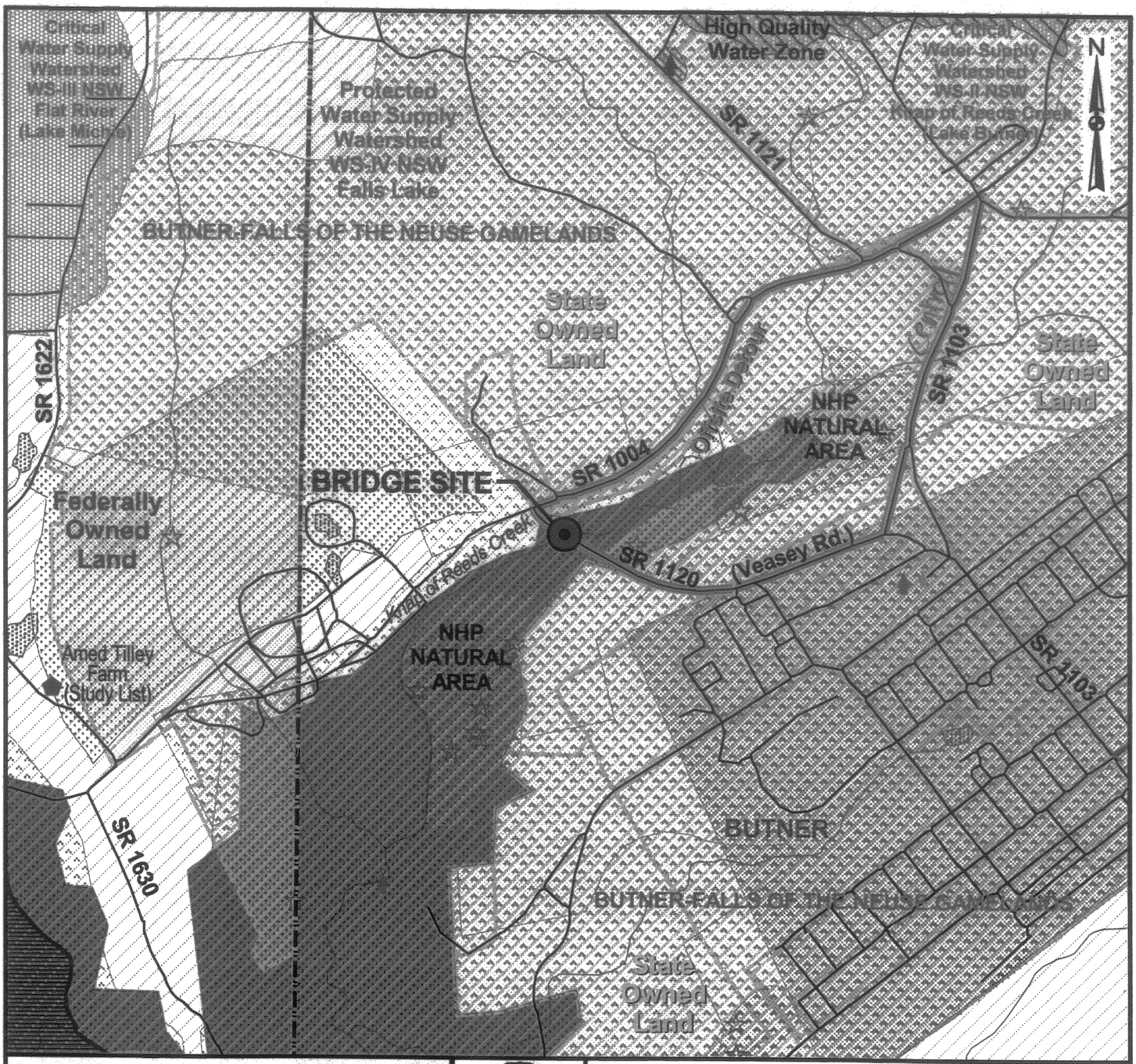
federal agencies provided written comments. Other agencies were contacted and some provided verbal or email input.

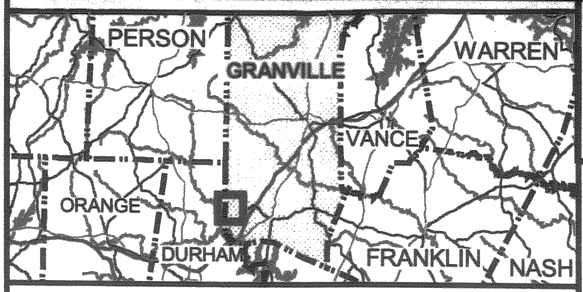
The United States Army Corps of Engineers provided a letter about impacts to their property. They concur with the determination that there is no feasible and prudent alternative to the use of the property and that Alternative 1 has the least impacts of the proposed build alternatives. In addition, the Corps provided avoidance and minimization measure suggestions, and requested to review the full design plans when they are available.

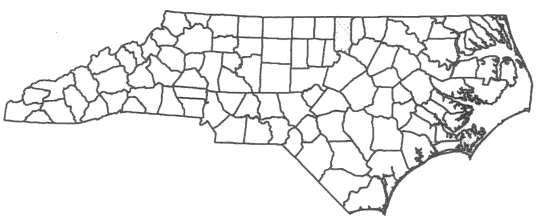
B. State

The North Carolina Wildlife Resource Commission provided a letter stating that there are NCWRC gamelands in the vicinity of the bridge and that impacts to the gamelands should be avoided. There are also records of state listed mussels upstream of the project and; therefore, recommended a mussel survey be performed prior to construction.

Figures





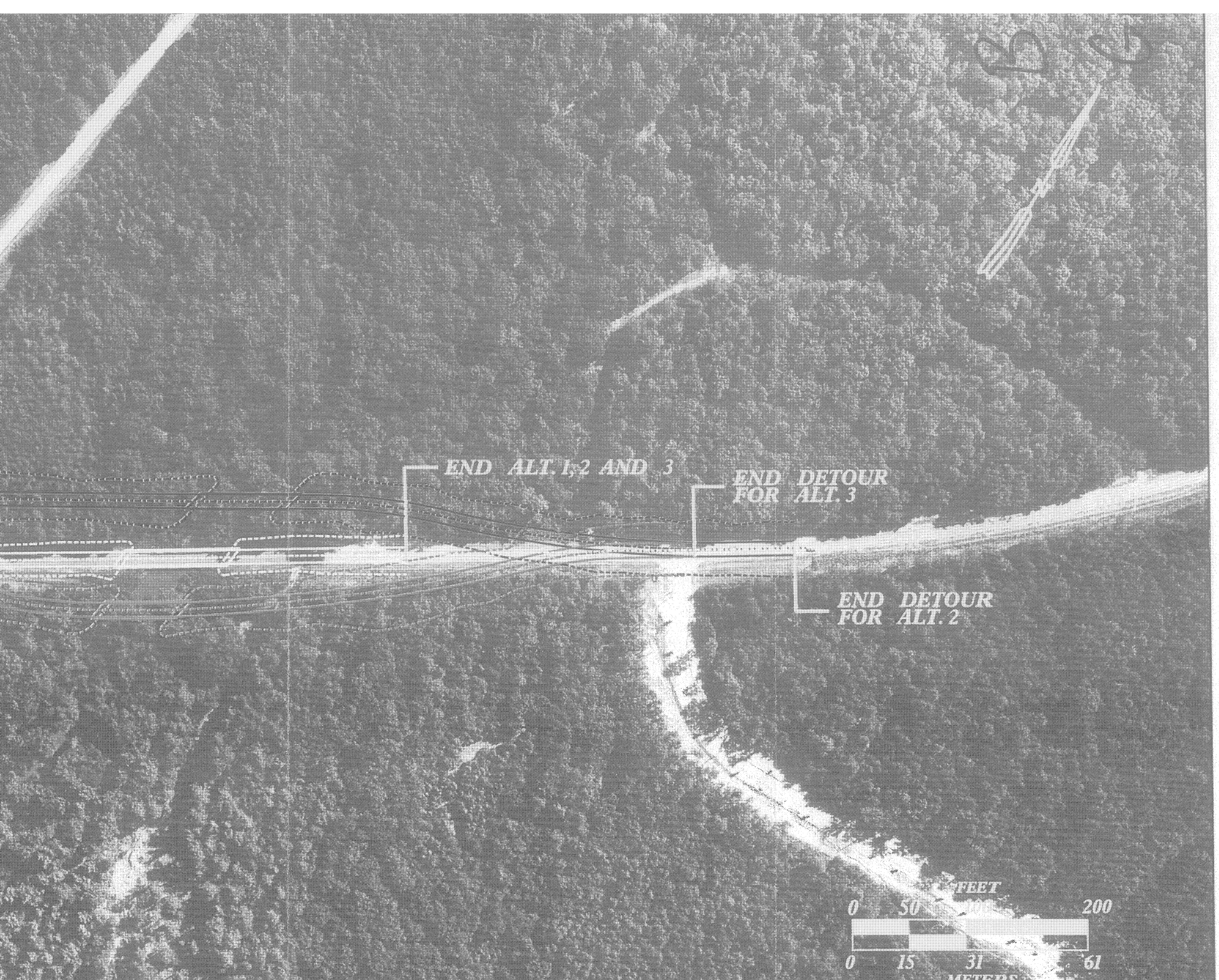


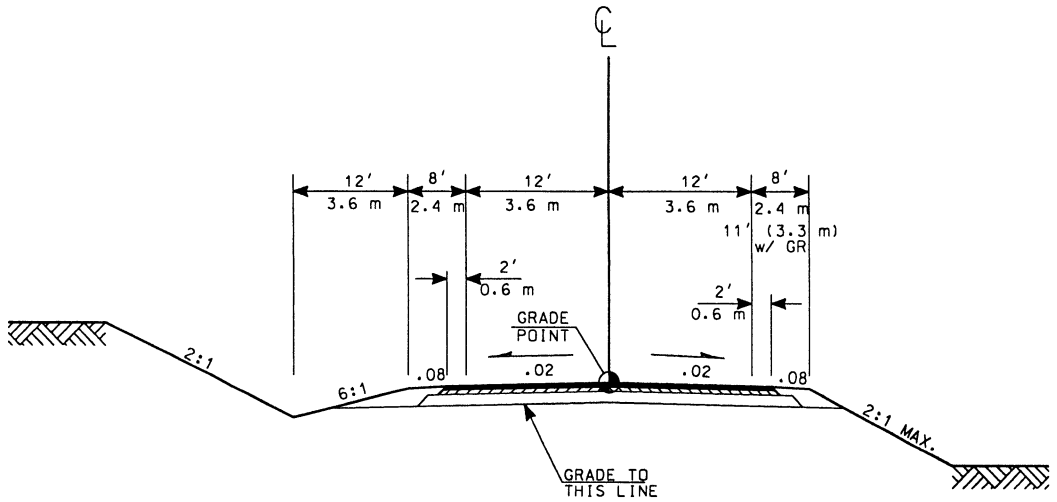
North Carolina - Department of Transportation
Division of Highways
Project Development and Environmental Analysis Branch

FIGURE 1
VICINITY MAP

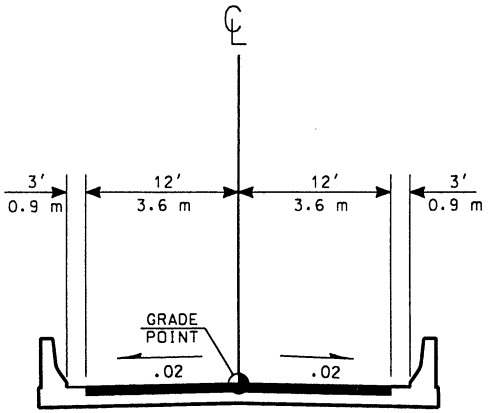
REPLACEMENT OF BRIDGE NUMBER 226
ON SR 1120 OVER KNAP OF REEDS CREEK
GRANVILLE COUNTY
TIP NO. B-3644

0.5 0 0.5 1 Miles


END ALT. 1, 2 AND 3
END DETOUR FOR ALT. 3
END DETOUR FOR ALT. 2
0
50
200
FEET
0
15
31
61
METERS



TYPICAL ROADWAY APPROACH SECTION



TYPICAL SECTION ON STRUCTURE

TRAFFIC DATA

ADT 2002	3800
ADT 2025	6200
DUAL	3%
TTST	1%

FUNCTIONAL CLASSIFICATION: RURAL LOCAL

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND
ENVIRONMENTAL ANALYSIS BRANCH

TYPICAL SECTION

BRIDGE NO. 226 ON SR 1120
OVER KNAP OF REEDS CREEK
GRANVILLE COUNTY

TIP NO. B-3644

FIGURE 3

NOT TO SCALE

Downstream side of bridge.

Bridge looking east.

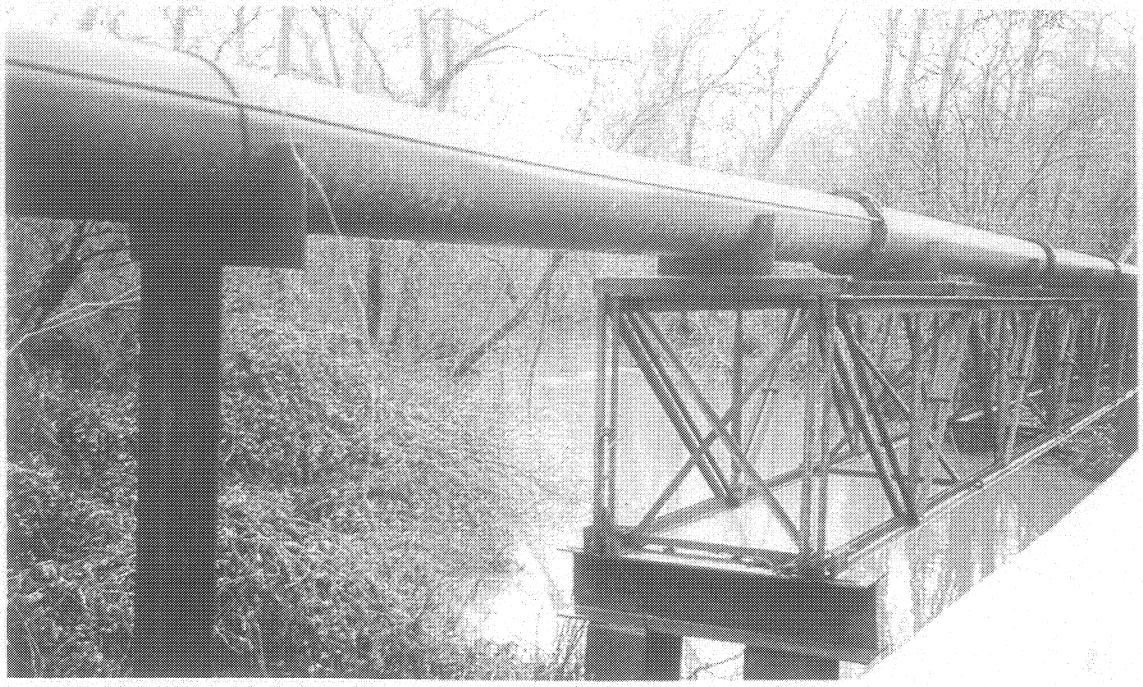
North Carolina – Department of Transportation

Division of Highways

Project Development and
Environmental Analysis Branch

FIGURE 4a

REPLACEMENT OF BRIDGE NUMBER 226
ON SR 1120 OVER
KNAP OF REEDS CREEK
GRANVILLE COUNTY
TIP NO. B-3644



Looking upstream from the bridge.

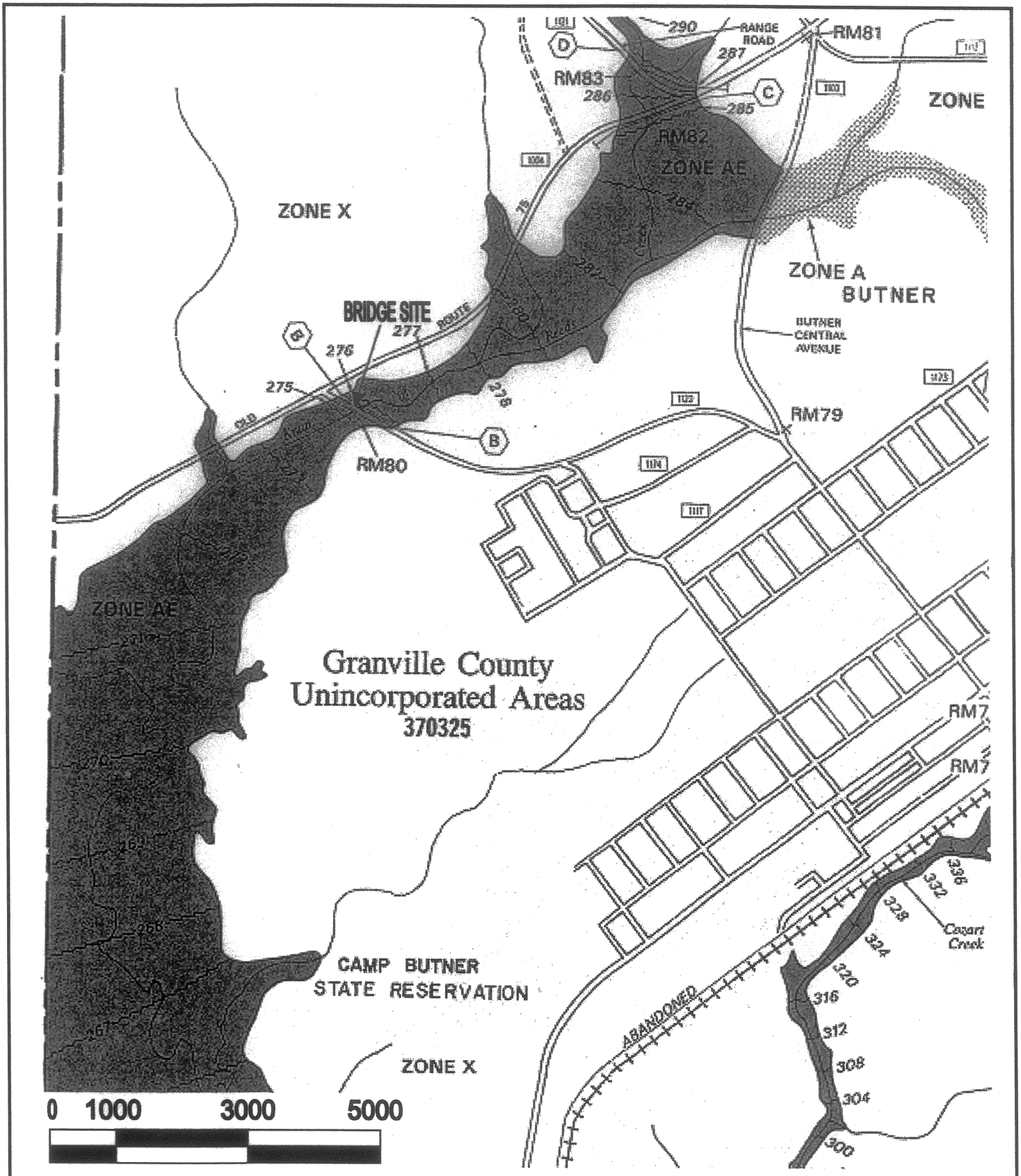
North Carolina – Department of Transportation

Division of Highways

Project Development and
Environmental Analysis Branch

FIGURE 4b

REPLACEMENT OF BRIDGE NUMBER 226
ON SR 1120 OVER
KNAP OF REEDS CREEK
GRANVILLE COUNTY
TIP NO. B-3644



North Carolina – Department of Transportation

Division of Highways

Project Development and Environmental Analysis Branch

FIGURE 5

REPLACEMENT OF BRIDGE NUMBER 226
ON SR 1120 OVER KNAP OF REEDS CREEK
GRANVILLE COUNTY
TIP NO. B-3644

Appendix A

USDA

ted States
partment of
riculture

:ural
sources
nservation
rvice

05 Bland Rd.
ite 205
leigh, 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 PSfor David Brook
Deputy State Historic Preservation Officer

Re: Bridge Group XXVII Bridge Replacement Projects, Bridge #226, SR 1120 (Veasey Rd.) over Knap of Reeds Creek, Granville County, B-3644, ER 01-7783

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

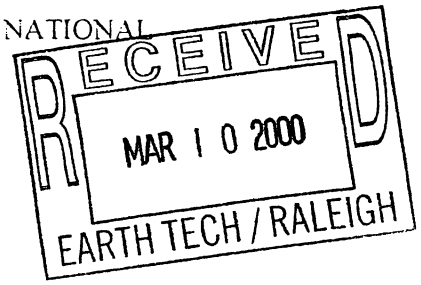
cc: Mary Pope Furr, NC DOT
T. Padgett, NC DOT

3644

	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

Federal Aid #BRZ-1120(5) *TIP* #B-3644 *County*: Granville

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



Project Description: Replace Bridge No. 226 on SR 1120 over Knap of Reeds Creek

On February 17, 2000, representatives of the

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

Reviewed the subject project at

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

All parties present agreed

- [x] 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.
- [ ] 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 _____ 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

Richard D. Dunn — 2/17/00
FHWA, for the Division Administrator, or other Federal Agency — Date

David Brook — 2/17/2000
Representative, SHPO — Date

David Brook for Jeffrey Crow — 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-3644

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

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.

Appendix B

NORTH CAROLINA DIVISION
FINAL NATIONWIDE SECTION 4(f) EVALUATION AND APPROVAL
FOR FEDERALLY-AIDED HIGHWAY PROJECTS WITH MINOR INVOLVEMENT
WITH PUBLIC PARKS, RECREATION LANDS, AND WILDLIFE AND
WATERFOWL REFUGES

F. A. Project **BRZ-1120(5)**

State Project **8.2371001**

T. I. P. No. **B-3644**

Description: **Replace Bridge Number 226 over Knap of Reeds Creek on SR 1120 in Granville County with a bridge on the existing horizontal alignment. To meet 60 mph design speed sag vertical curve criteria, the deck elevation will be approximately 5 feet higher than the existing elevation. An off-site detour will be used to maintain traffic during construction. It is anticipated that the proposed project will require the use of property from the gamelands managed by the North Carolina Wildlife Resource Commission and owned by the United States Corps of Engineers.**

		Yes	No
1.	Is the proposed project designed to improve the operational characteristics, safety, and/or physical condition of existing highway facilities on essentially the same location?	✓	
2.	Is the project on new location?		✓
3.	Is the Section 4(f) land a publicly owned public park, recreation land, or wildlife and waterfowl refuge located adjacent to the existing highway?	✓	
4.	Does the amount and location of the land to be used impair the use of the remaining Section 4(f) land, in whole or in part, for its intended purpose? (See chart below)		✓

Total size of section 4(f) site	Maximum to be acquired
less than 10 acres	10 percent of site
10 acres-100 acres	1 acre
greater than 100 acres	1 percent of site

		Yes	No
5.	Do the proximity impacts of the project (e.g., noise, air and water pollution, wildlife and habitat effects, aesthetic values) on the remaining Section 4(f) land impair the use of such land for its intended purpose?	☐	✓
6.	Do the officials having jurisdiction over the Section 4(f) land agree, in writing, with the assessment of the impacts of the proposed project on, and the proposed mitigation for, the Section 4(f) lands?	✓	☐
7.	Does the project use land from a site purchased or improved with funds under the Land and Water Conservation Act (Section 6(f)), the Federal Aid in Fish Restoration Act (Dingell-Johnson Act), the Federal Aid in Wildlife Act (Pittman-Robertson Act), or similar laws, or are the lands otherwise encumbered with a Federal interest (e.g., former Federal surplus property)?	☐	✓
8.	If the project involves lands described in Item 7 above, does the appropriate Federal Agency object to the land conversion or transfer?	☐	N/A
9.	Does the project require preparation of an EIS?	☐	✓

ALTERNATIVES CONSIDERED AND FOUND NOT TO BE FEASIBLE AND PRUDENT

	Yes	No
The following alternatives were evaluated and found not to be feasible and prudent:	✓	☐

1. Do-nothing.

Does the "do nothing" alternative:

		Yes	No
	(a) correct capacity deficiencies?	☐	✓
or	(b) correct existing safety hazards?	☐	✓
or	(c) correct deteriorated conditions?	☐	✓
and	(d) create costs, unusual problems, or impacts of extraordinary measure?	✓	☐

2. Improvement of the highway without using the adjacent public park, recreational land, or wildlife waterfowl refuge. — Yes ✓ / No ☐

(a) Have minor alignment shifts, changes in standards, use of retaining walls, etc., or traffic management measures been evaluated? — Yes ✓ / No ☐

(b) The items in 2(a) would result in (circle, as appropriate)

(i) substantial adverse community impact

or (ii) substantial increased costs

or (iii) unique engineering, transportation, maintenance, or safety problems

or (iv) substantial social, environmental, or economic impacts

or (v) a project which does not meet the need

and (vi) impacts, costs, or problems which are extraordinary magnitude

	Yes	No
3. Build an improved facility on new location without using the public park, recreational land, or wildlife and waterfowl refuge. (This would be a localized "run around.")	✓	

(a) An alternate on new location would result in: (circle, as appropriate)

(i) a project which does not solve the existing problems

or (ii) substantial social, environmental, or economic impacts

or (iii) a substantial increase in project cost or engineering difficulties

and (iv) such impacts, costs, or difficulties of truly unusual or unique or extraordinary magnitude

MINIMIZATION_OF_HARM

	Yes	No
1. The project includes all possible planning to minimize harm.	✓	☐

2. Measures to minimize harm include the following:

(circle those which are appropriate)

a. Replacement of lands used with lands of reasonably equivalent usefulness and location and of at least comparable value.

b. Replacement of facilities impacted by the project including sidewalks, paths, benches, lights, trees, and other facilities.

c. Restoration and landscaping of disturbed areas.

(d.) Incorporation of design features and habitat features, where necessary, to reduce or minimize impacts to the Section 4(f) property.

e. Payment of the fair market value of the land and improvements taken or improvements to the remaining Section 4(f) site equal to the fair market value of the land and improvements taken.

f. Additional or alternative mitigation measures as determined necessary based on consultation with the officials having jurisdiction over the parkland, recreation area, or wildlife or waterfowl refuge.

3. A discussion of specific mitigation measures is provided as follows:

Functionals were initially created using conservative design guidelines and standards. In addition, the functional design was developed using USGS topographic mapping; therefore, the impacts are only an approximation—actual impacts will not be known until full design is complete. The initial slope lines of the approaches extend out approximately 100 feet (30 m) wide—beyond the existing right-of-way lines. Steeper slopes were then incorporated to minimize the footprint of the approaches, which are approximately 60 to 70 feet (18 to 21 m) wide. The approximate amount of land to be acquired is 1,070 square feet (0.025 acres) [99.4 m2 (0.011 hectors)]. The proximity impacts of the project (e.g.,

noise, air and water pollution, wildlife and habitat effects, aesthetic values) on the remaining Section 4(f) land will not impair the use of the lands for its intended purposes.

Note: Any response in a box requires additional information prior to approval. Consult Nationwide 4(f) evaluation.

COORDINATION

The proposed project has been coordinated with the following (attach correspondence):

(a.) Officials having jurisdiction over the Section 4(f) Land
b. Local/State/Federal Agencies
c. US Coast Guard (for bridges requiring bridge permits)
d. DOI, if Section 6(f) lands are involved

SUMMARY AND APPROVAL

The project meets all criteria included in the programmatic 4(f) evaluation approved on December 23, 1986.

All required alternatives have been evaluated and the findings made are clearly applicable to this project. There are no feasible or prudent alternatives which avoid use of the Section 4(f) land.

The project includes all possible planning to minimize harm, and there are assurances that the measures to minimize harm will be incorporated in the project.

All appropriate coordination has been successfully completed.

Approved:

7.29.02 _____
Date for Manager, Planning & Environmental Branch
NCDOT

6/25/02 _____
Date for Division Administrator, FHWA

June 21, 2002

North Carolina Department of Transportation
Project Development and Environmental Analysis
Mr. William Gilmore, PE, Manager
1548 Mail Service Center
Raleigh, North Carolina 27669-1548

Dear Mr. Gilmore:

Reference your March 25, 2002 correspondence concerning the replacement of Bridge No. 226 over Knapp of Reads Creek, on SR 1120 (Veasey Road) in Granville County, North Carolina. Based on information provided it is my understanding that the NC Department of Transportation (NCDOT) and Federal Highways Administration (FHWA) are conducting a planning study for the proposed project and intend to prepare a categorical exclusion document for the project in accordance with requirements of the National Environmental Policy Act (NEPA).

We have reviewed the information provided, including the Natural Resources Technical Report. It is our understanding that the need for this project is based on your determination that Bridge No. 226 is "structurally deficient and functionally obsolete" and that "The replacement if this structure will result in safer traffic operations." We concur with your determination that there is no feasible and prudent alternative to use of Federal property and that Build Alternative 1 has the least impacts of the proposed build alternatives.

The impacts identified in the documents provided are limited and do not address some aspects of your proposed construction that may generate additional impacts on our public lands. While we understand that the impacts you address are limited to those specifically required by your NEPA review, and understand that totals given for impacts are preliminary pending the creation of a full final design, we think it appropriate to point out other impacts and concerns that will eventually need to be addressed. Accordingly, we have the following comments regarding impacts, avoidance, minimization, and mitigation.

The need for temporary easements for the bridge construction is not addressed. If temporary easements are required, impacts within these areas must also be addressed during our review. We understand that impacts due to temporary easements are not addressed at this stage of your process.

Potential impacts due to relocation of utility lines within the right of way have not been addressed. There are two sewer lines (one on either side of the road) and

an overhead utility line located in the area potentially affected by the bridge replacement. Any temporary or permanent impacts associated with relocation of these lines will be considered during our review this project.

Impacts to the Falls Lake flood storage capacity have not been addressed. The number of cubic yards of fill material to be placed below elevation 264.8 feet mean sea level must be identified. Excavation of material below elevation 264.8 may be subtracted from the fill total. Location of all cuts and fills should be indicated on full design plans. If no fill will be located below 264.8 ft msl, a statement indicating this should be included upon submission of full design plans.

We suggest the following avoidance and minimization measures be incorporated into the full design plan. To avoid impacts due to direct discharge of runoff into Knapp of Reeds Creek, weep holes in the bridge structure should not be located directly over the stream. In order to minimize impacts to wildlife passage the amount of bare bank passage under the bridge structure should be maximized.

When the full design plan package is available, including roadway cross-sections and the bridge survey hydraulic design report, please provide five copies for our review. Plan packages should include final exact totals for wetland impacts, cubic yards of fill and excavation below 264.8 feet mean sea level, acreage of any new permanent right of way and temporary easement for roadway and/or utility work, and acres of forested land to be cleared. Requests for utility easements should be submitted by the entity operating the utility line in question. Also to facilitate onsite assessment of impacts all proposed permanent right of way and temporary easements should be staked in the field.

We appreciate the opportunity to participate in your planning process. If we can provide any clarification or additional information, please call me at the Falls Lake Visitor Assistance Center (919) 846-9332 extension 222.

Sincerely,

Steve Brown
Operations Manager
Falls / Jordan

CC:

David Cox, NCWRC
Isaac Harrold, NCWRC
Sherry Oenbrink, USACE

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

March 25, 2002

Mr. Steve Brown (attn. Michael Hosey)
Operations Manager
United States Army Corp of Engineers
11405 Falls of the Neuse Road
Wake Forest, North Carolina 27587

Subject: Federal-aid Bridge Replacement Project over Knap of Reeds Creek on SR-1120 (Veasey Road) in Granville County, Bridge No. 226, TIP Project B-3644, State Project 8.2371001, Federal-aid Project BRZ-1120(5)

Dear Mr. Brown:

The North Carolina Department of Transportation (NCDOT) and Federal Highway Administration (FHWA) are conducting planning studies for the federal-aid bridge replacement project on SR-1120 (Veasey Road) over Knap of Reeds Creek in Granville County. In accordance with the National Environmental Policy Act (NEPA), NCDOT is writing a categorical exclusion. These planning studies develop alternatives based on the purpose and need, develop functional designs for each detailed study alternative using design standards and guidelines, analyze the effects on the human and non-human environments, and select a preferred alternative. The final product is a NEPA document (categorical exclusion), which includes design and construction criteria the designers and construction planners use for creating full designs for right-of-way acquisition and construction plans and specifications.

Because this federal-aid project may impact the adjacent public recreation and wildlife lands through possible right-of-way acquisition, Section 4(f) of the United States Department of Transportation Act of 1966 requires the FHWA not approve the use of land from a significant publicly owned recreation area or wildlife refuge unless a determination is made by the FHWA that there is no feasible and prudent alternative to the use of land from the property; and the action includes all possible planning to minimize harm to the property resulting from such use. Supporting information must demonstrate that there are unique problems or unusual factors involved in the use of alternatives that avoid these properties or that the cost, social, economic, and environmental impacts, or community disruption resulting from such alternatives reach extraordinary magnitudes. Please note that Section 4(f) does not apply to temporary construction easements when they are less than the time needed for construction of the

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.DOH.DOT.STATE.NC.US

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

project, do not change the ownership or result in the retention of long-term or indefinite interests in the land for transportation purposes, do not result in any temporary or permanent adverse change to the activities, features, or attributes which are important to the purposes or functions that qualify the resource for protection under Section 4(f), and include only a minor amount of land.

NCDOT needs to do a Section 4(f) evaluation before we can complete the categorical exclusion. The attached vicinity map shows the project's location. The United States Army Corp of Engineers owns the properties adjacent to the bridge's existing right-of-way and leases these properties to the North Carolina Wildlife Resource Commission (NC-WRC). NC-WRC operates these lands as gamelands. The purpose of this letter is to consult with the Corp in assessing recreational and wildlife impacts that the project and proposed mitigation may have on the adjacent Corp property.

The purpose of the project is to provide a safer crossing of Knaps of Reeds Creek. Bridge No. 226 is considered structurally deficient and functionally obsolete. The replacement of this inadequate structure will result in safer traffic operations. Several alternatives were developed and evaluated:

- ***No Action Alternative.*** 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. Decay has already reduced the bridge's safe load-bearing capacity. Although further maintenance activities will slow the decay, closing the bridge will eventually be necessary.

- ***Build Alternative 1.*** This alternative replaces the bridge on its existing horizontal alignment while using an off-site detour to maintain traffic during construction.

- ***Build Alternative 2.*** This alternative replaces the bridge on its existing horizontal alignment while maintaining traffic during construction on a temporary detour to the north.

- ***Build Alternative 3.*** This alternative replaces the bridge on its existing horizontal alignment while maintaining traffic during construction on a temporary detour to the south.

The existing NCDOT right-of-way is 60 feet. Attached is a copy of the project's natural resources report, aerial, and proposed functional designs.

There is no feasible and prudent alternative to the use of land from the adjacent Corp property. The No Action Alternative is not prudent because social and economic impacts and community disruption resulting from this alternative reach extraordinary magnitudes. An avoidance alternative is not feasible because all of the nearby surrounding lands are Corp property and NC-WRC gamelands. Therefore, the next step is to minimize impacts with the proposed build alternatives.

Build Alternative 1 has the least impacts. Functionals were initially created using conservative design guidelines and standards. As shown on the attached plan sheet for Build Alternative 1, the initial slope lines of the approaches extend out approximately 100 feet wide—beyond the existing right-of-way lines. Steeper slopes were then incorporated to minimize the footprint of the approaches, which are approximately 60 to 70 feet wide. The reasons why additional fill is needed are to be able to build a bridge that does not have vertical curvature and for the approaches to meet vertical sag curve design criteria.

The approximate amount of land to be acquired is 1,068 square feet (0.0245 acres). The proximity impacts of the project (e.g., noise, air and water pollution, wildlife and habitat effects, aesthetic values) on the remaining Section 4(f) land will not impair the use of the lands for its intended purposes.

NCDOT and FHWA are seeking agreement from the Corp, in writing, with the assessment of the impacts of the proposed project on, and the proposed mitigation for, the Section 4(f) lands. We will be contacting Mr. Michael Hosey of your office to set up a meeting to discuss this project.

Please contact John Conforti of this office (919-733-7844 x208, jgconforti@dot.state.nc.uc) or John Schrohenloher of Earth Tech (919-854-6217, john_schrohenloher@earthtech.com) if you have any questions or concerns.

Sincerely yours,

William D. Gilmore, P.E., Manager
Planning and Environmental Branch

Attachments

cc: Jake Riggsbee, FHWA
David Cox, NC-WRC
Eddie McFalls, Earth Tech, Inc.