STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

November 30, 2005

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

ATTN: Mr. Eric Alsmeyer
NCDOT Coordinator

Subject: **Application for Nationwide Permit 23 and Neuse River Buffer Certification, and Memo for Nationwide Permit 13** for the proposed replacement of Bridge No. 5 over Mountain Creek on SR 1616 / SR 1793 (Bahama Road) in Durham County, Federal Aid Project No. BRA-1616(5); State Project No. 8.2353201; Division 5; TIP No. B-4110

Dear Sir:

Please find enclosed a copy of the Programmatic Categorical Exclusion (PCE) document and NRTR, as well as permit drawings, buffer drawings, ½ size plans (roadway plans), and a Pre-construction Notification (PCN) Form for the subject project. The North Carolina Department of Transportation (NCDOT) proposes to replace Bridge No. 5 on SR 1793 (a.k.a. SR 1616) over Mountain Creek with a new 95-foot long box girder bridge in approximately the same location and roadway elevation as the existing bridge. The cross section of the new bridge will include two 12-foot lanes with 8-foot offsets. Approach work will consist of resurfacing and tying into the existing alignment for approximately 353 feet on either side of the new bridge. The new bridge will span Mountain Creek, avoiding the need for bents in the creek, and an off-site detour will be used to route traffic during construction. There will be 0.021 acre of permanent impacts (riprap fill) due to the need for stream bank protection along both banks of Mountain Creek under the bridge. There will be no wetland impacts associated with this project. There will be 202 ft^2 of Zone 1 and 2,233 ft^2 of Zone 2 Neuse River Riparian Buffer impacts.

IMPACTS TO WATERS OF THE UNITED STATES

General Description: The project is located in the Falls Lake Watershed (sub-basin 03-04-01) of the Neuse River Basin with a Hydrologic Unit Code of 03020201. This section of

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

TELEPHONE: 919-715-1500
FAX: 919-715-1501
WEBSITE: WWW.NCDOT.ORG

LOCATION:
2728 CAPITAL BLVD
PLB SUITE 168
RALEIGH NC 27604

Mountain Creek has been assigned Stream Index Number 27-2-21-4 by the N.C. Division of Water Quality (DWQ). A best usage classification of "WS-II HQW NSW CA" has been assigned to Mountain Creek. There are no wetlands in the project area; therefore, no wetland impacts.

Permanent Impacts: There will be 60 linear feet (0.021 acre) of permanent surface water impact from the placement of riprap along the shoreline for stream bank protection. The riprap will be placed along both banks of Mountain Creek under the bridge, adjacent to the excavation areas, as shown on Permit Drawings - Sheet 5 of 8, Sheet 6 of 8, and Sheet 7 of 8.

There will be no bents placed in surface waters associated with this bridge replacement project.

Temporary Impacts: An off-site detour will be used to route traffic during construction, and staging of construction equipment will not occur in surface waters or Riparian Buffers. Therefore, there will be no temporary impacts associated with this project.

Utility Impacts: There will be no impacts to surface waters or the Riparian Buffers from sewer, water, electric or other utilities associated with this bridge replacement project. Verizon has a single buried fiber optic cable that is located on the south side of SR 1793 / SR 1616 traveling adjacent to the existing edge of pavement that has an aerial crossing of Mountain Creek. Verizon has another aerial cable on the south side of the project that travels the entire length of the project. Verizon plans to alleviate their conflicts to this project by directional boring their cables under the creek bed throughout the entire length of the project. However, Verizon may decide to bore under the creek bed and the adjacent buffer zones and attach the cables aerially to poles located outside of the buffer zones.

Bridge Demolition: Bridge No. 5 is composed of timber floor on timber joists and a substrate of timber caps on timber posts and concrete sills. The resulting potential temporary fill associated with the removal of Bridge No. 5 is 20 cubic yards, as noted in the PCE document. NCDOT's Best Management Practices for Bridge Demolition and Removal will be followed to minimize the amount of temporary fill.

NEUSE RIVER BUFFER IMPACTS

This project is located in the Neuse River Basin; therefore the regulations pertaining to the Neuse River Buffer Rules will apply. Impacts to buffers include that of construction of the new bridge and the roadway fill for the approach work associated with the bridge replacement project. The North Carolina Division of Water Quality (NCDWQ) has informed NCDOT that the allowable buffer impacts for bridges, in accordance with 15A NCAC 02B .0233(6), extend from approach slab to approach slab. Due to the orientation of Mountain Creek to the existing roadway (the creek turns and somewhat parallels the roadway), roadway fill for approach work associated with the bridge replacement project will impact 2,435 square feet of riparian buffer outside of the bridge approach slabs.

Pursuant to 15A NCAC 02B .0233(6), these impacts to the riparian buffer are allowable with mitigation. Buffer impacts are shown on Buffer Drawings - Sheets 1 & 2 of 2.

Table 2. Neuse River Buffer Impacts

	Bridge Construction	Road Impacts
Zone 1 Impact (ft^2)	7,835	202
Zone 2 Impact (ft^2)	4,115	2,233
Mitigation Requirement	Allowable	Allowable w/ Mitigation

NCDOT is providing compensatory mitigation for the buffer impacts associated with the roadway fill through the EEP. The EEP acceptance letter for buffer mitigation is enclosed with this application.

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 January 29, 2003, the United States Fish and Wildlife Service (USFWS) lists four federally protected species for Wake County. Table 1 lists the species, their status and biological conclusion.

Table 1. Federally-Protected Species for Durham County

Common Name	Scientific Name	Federal Status	Biological Conclusion
bald eagle	Haleaeetus leucephalus	T	No Effect
Michaux's sumac	*Rhus michauxii*	E	No Effect
smooth coneflower	*Echinacea laevigata*	E	No Effect

"T" denotes Threatened (a species that is likely to become an endangered species within the foreseeable future throughout all or significant portion of its range).

"E" denotes Endangered (a species that is in danger of extinction throughout all or a significant portion of its range).

The PCE noted that the project does not involve habitat where federally listed endangered or threatened species may occur. The Natural Resource Technical Report (NRTR) for this project (dated July 2001) determined that there is no habitat for bald eagle, and therefore a No Effect biological conclusion was given. The NRTR noted that there are potential areas of habitat for smooth coneflower and Michaux's sumac at the site, consisting of the roadsides and the powerline corridor. However, the NRTR also noted that grasses completely covered the roadsides, while dense, tall, woody and herbaceous growth covered the powerline corridor that restricted the amounts of sunlight to the areas. Surveys conducted on July 30, 2001 as part of the NRTR, resulted in no individuals of smooth coneflower or Michaux's sumac being identified, resulting in No Effect biological conclusions for both species. Because smooth coneflower and Michaux's sumac are species that have the potential to migrate, subsequent surveys were conducted on August 29, 2005.

No individuals of either species were identified during the subsequent surveys. The Biological Conclusions for smooth coneflower and for Michaux's sumac remain No Effect.

The dwarf wedgemussel has been reported from the Eno River in adjacent Orange County. Because Mountain River occurs within the Eno River Subbasin of the Neuse River Basin, a survey for dwarf wedgemussel was conducted by NCDOT biologists on August 1, 2003, even though dwarf wedgemussel is not listed for Durham County. A discussion of the survey findings with Gary Jordan of the U.S. Fish and Wildlife Service (USFWS) resulted in a No Effect determination for dwarf wedgemussel. As such, formal Section 7 concurrence is not warranted or required.

AVOIDANCE, MINIMIZATION, AND MITIGATION

Avoidance and Minimization: The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize wetland impacts, and to provide full compensatory mitigation of all remaining wetland impacts. Avoidance measures were taken during the planning and NEPA phases; minimization measures were incorporated as part of the project design and include:

- Design Standards for Sensitive Watersheds will be used.
- Preformed scour holes will be constructed to diffuse stormwater runoff.
- The new bridge will span Mountain Creek with no bents in the water.
- Fill slopes in and adjacent to the riparian buffers have a 2:1 slope to minimize buffer impacts (Roadway Plans – Sheet X-2).
- Fill slopes adjacent to the pond in the northwest quadrant have a 2:1 slope to avoid surface water impacts (Roadway Plans – Sheet X-4).
- An off-site detour will be utilized to avoid additional stream impacts.

Mitigation: The placement of the riprap, authorized by Nationwide Permit 13, does not require mitigation. As such, the stream mitigation confirmation portion of the attached Ecosystem Enhancement Program (EEP) letter is not applicable to this project, and NCDOT will be rescinding the stream mitigation with EEP.

REGULATORY APPROVALS

Section 404 Permit: This project is being processed by the Federal Highway Administration as a "Categorical Exclusion" in accordance with 23 CFR 771.115(b). Since the CE summarizes the temporary impacts, the NCDOT requests that the temporary fill associated with the bridge demolition activities be authorized by a Nationwide Permit 23 (FR number 10, pages 2020-2095; January 15, 2002). It is anticipated that the 60 linear feet (0.021 acre) of permanent fill (riprap along shoreline for stream bank stabilization) will be authorized under Section 404 Nationwide Permit 13.

Section 401 Permit: We anticipate 401 General Certification numbers 3403 and 3495 will apply to this project. All general conditions of the Water Quality Certifications will be met.

In accordance with 15A NCAC 2H, Section .0500(a) and 15A NCAC 2B.0200 we are providing seven (7) copies of this application to the North Carolina Department of Environmental and Natural Resources, Division of Water Quality, for their review.

Buffer Certification: The NCDOT requests that the DWQ issue an Authorization Certificate pursuant to 15A NCAC 2B .0233 for the proposed work within the Neuse River Buffer.

The project Let date has been accelerated to April 18, 2006, to have the construction activities coincide with when school will be out of session. This will eliminate the need for school buses to use the off-site detour. As such, NCDOT respectfully requests that the application review process and permit / certification issuance be expedited to allow this objective to be met. Thank you for your time and assistance with this project. Please contact Bill Barrett at (919) 715-1624 if you have any questions or need any additional information.

Sincerely,

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

w/attachment

Mr. John Hennessy, NCDWQ (7 Copies)
Mr. Travis Wilson, NCWRC
Mr. Gary Jordan USFWS
Dr. David Chang, P.E., Hydraulics
Mr. Mark Staley, Roadside Environmental
Mr. Greg Perfetti, P.E., Structure Design
Mr. Jon Nance, P.E., Division Engineer
Mr. Chris Murray, DEO Division 5

w/o attachment

Mr. Jay Bennett, P.E., Roadway Design
Mr. Majed Alghandour, P. E., Programming and TIP
Mr. Art McMillan, P.E., Highway Design
Mr. Scott McLendon, USACE, Wilmington
Mr. Bill T. Goodwin, P.E., PDEA Project Planning
Ms. Beth Harmon, EEP
Mr. Todd Jones, NCDOT External Audit Branch

Ecosystem Enhancement PROGRAM

November 7, 2005

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

Dear Dr. Thorpe:

Subject: EEP Mitigation Acceptance Letter:

B-4110, Replace Bridge Number 5 over the Mountain Creek on SR 1616 (SR 1793), Durham County

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide the compensatory stream mitigation and buffer mitigation for the subject project. Based on the information supplied by you in a letter dated September 8, 2005 and revised letter dated October 20, 2005, the impacts are located in CU 03020201 of the Neuse River Basin in the Central Piedmont (CP) Eco-Region, and are as follows:

Stream:	60 feet
Zone 1 Buffer:	202 square feet
Zone 2 Buffer:	2,233 square feet

The NCDOT estimated buffer impacts in the 7-year Impact Projection Database submitted to EEP in May 2005. The buffer mitigation required for the NCDOT's impact projections was incorporated into EEP's biennial budget that was submitted to the NCDOT for approval in June 2005. However, EEP intends to continue managing all of the NCDOT's buffer mitigation requests and approvals through the In-Lieu Fee (ILF) Program's Buffer Fund. Any buffer impact associated with projects located in the Neuse, Tar-Pamlico, and portions of the Catawba and Cape Fear River Basins are automatic acceptances by the EEP, per the agreement with the NCDWQ.

The NCDOT will be responsible to ensure that the appropriate compensation for the buffer mitigation will be provided in the agreed upon method of fund transfer. Upon receipt of the NCDWQ's Buffer Certification, the NCDOT will provide the EEP a copy of the Certification along with a letter verifying the buffer impact/mitigation amounts and

requesting a fund transfer to provide the required compensation. The EEP will transfer funds from the MOA Account (Fund 2984) into the ILF Buffer Mitigation Fund (Fund 2982).

This mitigation acceptance letter replaces the mitigation acceptance letter issued on September 20, 2005. As stated in your letter, the subject project is listed in Exhibit 2 of the Memorandum of Agreement among the North Carolina Department of Environment and Natural Resources, the North Carolina Department of Transportation, and the U. S. Army Corps of Engineers, Wilmington District dated July 22, 2003. The compensatory stream mitigation for the subject project will be provided in accordance with this agreement.

If you have any questions or need additional information, please contact Ms. Beth Harmon at 919-715-1929.

Sincerely,

James B. Stanfill Jr

William D. Gilmore, P.E.
EEP Director

cc: Mr. Eric Alsmeyer, USACE-Raleigh
Mr. John Hennessy, Division of Water Quality, Wetlands/401 Unit
File: B-4110 Revised

Office Use Only: Form Version March 05

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

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

I. Processing

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

2. Nationwide, Regional or General Permit Number(s) Requested: NW 13 and NW 33

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

4. If payment into the North Carolina Ecosystem Enhancement Program (NCEEP) is proposed for mitigation of impacts, attach the acceptance letter from NCEEP, complete section VIII, and check here: ☒

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

II. Applicant Information

1. Owner/Applicant Information
   Name: Gregory J. Thorpe, Ph.D., Environmental Management Director
   Mailing Address: 1598 Mail Service Center
   Telephone Number: (919) 733-3141 Fax Number: (919) 733-9794
   E-mail Address:

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

III. Project Information

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

1. Name of project: Replacement of Bridge No. 5 over Mountain Creek on SR 161/SR 1793

2. T.I.P. Project Number or State Project Number (NCDOT Only): B-4110

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

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

5. Site coordinates (For linear projects, such as a road or utility line, attach a sheet that separately lists the coordinates for each crossing of a distinct waterbody.)
   Decimal Degrees (6 digits minimum): 36.1525 °N 78.9033 °W

6. Property size (acres): N/A

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

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

9. Describe the existing conditions on the site and general land use in the vicinity of the project at the time of this application: Bridge No. 5 has a sufficiency rating of 55.7 out of 100 (structurally deficient) and is located in a predominately rural portion of north-central Durham County.

10. Describe the overall project in detail, including the type of equipment to be used: The project consists of replacing Bridge No. 5 over Mountain Creek with a new two-span bridge in the same location, and utilize an off-site detour to route traffic during construction. No bents will be located in the stream. Construction equipment will consist of heavy duty trucks, earth moving equipment, etc.

11. Explain the purpose of the proposed work: The existing bridge is considered to be structurally deficient (sufficiency rating of 55.7 out of a possible 100). The replacement of the bridge will result in a safer and more efficient use for traffic.

IV. Prior Project History

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

V. Future Project Plans

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

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

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to wetlands, open water, and stream channels associated with the project. Each impact must be listed separately in the tables below (e.g., culvert installation should be listed separately from riprap dissipater pads). Be sure to indicate if an impact is temporary. All proposed impacts, permanent and temporary, must be listed, and must be labeled and clearly identifiable on an accompanying site plan. All wetlands and waters, and all streams (intermittent and perennial) should be shown on a delineation map, whether or not impacts are proposed to these systems. Wetland and stream evaluation and delineation forms should be included as appropriate. Photographs may be included at the applicant's discretion. If this proposed impact is strictly for

wetland or stream mitigation, list and describe the impact in Section VIII below. If additional space is needed for listing or description, please attach a separate sheet.

1. Provide a written description of the proposed impacts: There will be up to approximately 20 cubic yards of temporary fill associated with the bridge demolition. There will be 60 linear feet (0.021 acre) of permanent fill in surface waters (riprap of shoreline for stream bank stabilization).

2. Individually list wetland impacts. Types of impacts include, but are not limited to mechanized clearing, grading, fill, excavation, flooding, ditching/drainage, etc. For dams, separately list impacts due to both structure and flooding.

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

3. List the total acreage (estimated) of all existing wetlands on the property: 0

4. Individually list all intermittent and perennial stream impacts. Be sure to identify temporary impacts. Stream impacts include, but are not limited to placement of fill or culverts, dam construction, flooding, relocation, stabilization activities (e.g., cement walls, rip-rap, crib walls, gabions, etc.), excavation, ditching/straightening, etc. If stream relocation is proposed, plans and profiles showing the linear footprint for both the original and relocated streams must be included. To calculate acreage, multiply length X width, then divide by 43,560.

Stream Impact Number (indicate on map)	Stream Name	Type of Impact	Perennial or Intermittent?	Average Stream Width Before Impact	Impact Length (linear feet)	Area of Impact (acres)
1	Mountain Creek	Perm. Fill in SW	Perennial	~ 30 ft	60	0.021
2	Mountain Creek	Temp. Fill in SW	Perennial	~ 30 ft		20 yd3
Total Stream Impact (by length and acreage)						

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

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

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

Stream Impact (acres):	20 yd3 (from temp fill - bridge demo)
Wetland Impact (acres):	0
Open Water Impact (acres):	0
Total Impact to Waters of the U.S. (acres)	0
Total Stream Impact (linear feet):	60 (perm fill - riprap)

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

_____

_____

8. Pond Creation
If construction of a pond is proposed, associated wetland and stream impacts should be included above in the wetland and stream impact sections. Also, the proposed pond should be described here and illustrated on any maps included with this application.
Pond to be created in (check all that apply): ☐ uplands ☐ stream ☐ wetlands
Describe the method of construction (e.g., dam/embankment, excavation, installation of draw-down valve or spillway, etc.):_____
Proposed use or purpose of pond (e.g., livestock watering, irrigation, aesthetic, trout pond, local stormwater requirement, etc.):_____
Current land use in the vicinity of the pond:_____
Size of watershed draining to pond:_____ Expected pond surface area:_____

VII. Impact Justification (Avoidance and Minimization)

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

VIII. Mitigation

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

USACE – In accordance with the Final Notice of Issuance and Modification of Nationwide Permits, published in the Federal Register on January 15, 2002, mitigation will be required when necessary to ensure that adverse effects to the aquatic environment are minimal. Factors including size and type of proposed impact and function and relative value of the impacted aquatic resource will be considered in determining acceptability of appropriate and practicable mitigation as proposed. Examples of mitigation that may be appropriate and practicable include, but are not limited to: reducing the size of the project; establishing and maintaining wetland and/or upland vegetated buffers to protect open waters such as streams; and replacing losses of aquatic resource functions and values by creating, restoring, enhancing, or preserving similar functions and values, preferable in the same watershed.

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

1. Provide a brief description of the proposed mitigation plan. The description should provide as much information as possible, including, but not limited to: site location (attach directions and/or map, if offsite), affected stream and river basin, type and amount (acreage/linear feet) of mitigation proposed (restoration, enhancement, creation, or preservation), a plan view, preservation mechanism (e.g., deed restrictions, conservation easement, etc.), and a description of the current site conditions and proposed method of construction. Please attach a separate sheet if more space is needed.
   No mitigation is required for the 20 cubic yards of temporary fill, pursuant to NW 33., and no mitigation is required for the 60 linear feet (0.021 acre) of permanent fill (riprap), pursuant to NW 13. Mitigation for buffer impacts to be provided by EEP.

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

Amount of stream mitigation requested (linear feet): 0
Amount of buffer mitigation requested (square feet): 606 of Zone 1, and 3,350 of Zone 2 (see table in Item X2)
Amount of Riparian wetland mitigation requested (acres): 0
Amount of Non-riparian wetland mitigation requested (acres): 0
Amount of Coastal wetland mitigation requested (acres): 0

IX. Environmental Documentation (required by DWQ)

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

2. If yes, does the project require preparation of an environmental document pursuant to the requirements of the National or North Carolina Environmental Policy Act (NEPA/SEPA)? Note: If you are not sure whether a NEPA/SEPA document is required, call the SEPA coordinator at (919) 733-5083 to review current thresholds for environmental documentation. Yes ☒ No ☐

3. If yes, has the document review been finalized by the State Clearinghouse? If so, please attach a copy of the NEPA or SEPA final approval letter. Yes ☒ No ☐

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

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

1. Will the project impact protected riparian buffers identified within 15A NCAC 2B .0233 (Neuse), 15A NCAC 2B .0259 (Tar-Pamlico), 15A NCAC 02B .0243 (Catawba) 15A NCAC

2B .0250 (Randleman Rules and Water Supply Buffer Requirements), or other (please identify Neuse)? Yes ☒ No ☐

2. If "yes", identify the square feet and acreage of impact to each zone of the riparian buffers. If buffer mitigation is required calculate the required amount of mitigation by applying the buffer multipliers.

Zone*	Impact (square feet)	Multiplier	Required Mitigation
1	202	3 (2 for Catawba)	606
2	2233	1.5	3350
Total	2435		3956

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

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

XI. Stormwater (required by DWQ)

Describe impervious acreage (existing and proposed) versus total acreage on the site. Discuss stormwater controls proposed in order to protect surface waters and wetlands downstream from the property. If percent impervious surface exceeds 20%, please provide calculations demonstrating total proposed impervious level.

XII. Sewage Disposal (required by DWQ)

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

XIII. Violations (required by DWQ)

Is this site in violation of DWQ Wetland Rules (15A NCAC 2H .0500) or any Buffer Rules?
Yes ☐ No ☒

Is this an after-the-fact permit application? Yes ☐ No ☒

XIV. Cumulative Impacts (required by DWQ)

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

XV. Other Circumstances (Optional):

It is the applicant's responsibility to submit the application sufficiently in advance of desired construction dates to allow processing time for these permits. However, an applicant may choose to list constraints associated with construction or sequencing that may impose limits on work schedules (e.g., draw-down schedules for lakes, dates associated with Endangered and Threatened Species, accessibility problems, or other issues outside of the applicant's control).
The Project Let date has been accelerated to April 18, 2005 to have construction activities coincide with when school will be out of session. This will eliminate the need for school buses to use the off-site detour. As such, NCDOT respectfully requests that the application review process and permit / certification issuance be expedited to allow this objecctive to be met.

R Upchurch 11/30/05

Applicant/Agent's Signature **Date**

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

CATEGORICAL EXCLUSION ACTION CLASSIFICATION FORM

TIP Prcject No.	**B-4110**
State Project No.	**8.2353201**
Federal Project No.	**BRZ-1616(5)**

A. Project Description:

This project proposes to replace Bridge No. 5 on SR 1793 over Mountain Creek in Durham County. The bridge will be replaced with a 95-foot (29.0-m) long bridge in approximately the same location and roadway elevation as the existing bridge. The cross section of the new bridge will include two 12-foot (3.6-m) lanes with 8-foot (2.4-m) offsets. Approach work will consist of resurfacing and tying into the existing alignment for approximately 353 feet (107.5 m) on either side of the new bridge. Guardrail will be installed where warranted. Traffic will be detoured along surrounding roads during construction.

B. Purpose and Need:

Bridge No. 5 has a sufficiency rating of 55.7 out of a possible 100. On July 2, 1998, the bridge had a sufficiency rating of 33.4 out of a possible 100 and was programmed for replacement based on that rating. The deck and substructure of this 50-year old bridge are in fair condition. Therefore, the bridge is structurally deficient and needs to be replaced.

C. Proposed Improvements:

The following Type II improvements which apply to the project are circled:

1. Modernization of a highway by resurfacing, restoration, rehabilitation, reconstruction, adding shoulders, or adding auxiliary lanes (e.g., parking, weaving, turning, climbing).

    a. Restoring, Resurfacing, Rehabilitating, and Reconstructing pavement (3R and 4R improvements)
    b. Widening roadway and shoulders without adding through lanes
    c. Modernizing gore treatments
    d. Constructing lane improvements (merge, auxiliary, and turn lanes)
    e. Adding shoulder drains
    f. Replacing and rehabilitating culverts, inlets, and drainage pipes, including safety treatments
    g. Providing driveway pipes
    h. Performing minor bridge widening (less than one through lane)
    i. Slide Stabilization
    j. Structural BMP's for water quality improvement

2. Highway safety or traffic operations improvement projects including the installation of ramp metering control devices and lighting.

    a. Installing ramp metering devices
    b. Installing lights

c. Adding or upgrading guardrail
d. Installing safety barriers including Jersey type barriers and pier protection
e. Installing or replacing impact attenuators
f. Upgrading medians including adding or upgrading median barriers
g. Improving intersections including relocation and/or realignment
h. Making minor roadway realignment
i. Channelizing traffic
j. Performing clear zone safety improvements including removing hazards and flattening slopes
k. Implementing traffic aid systems, signals, and motorist aid
l. Installing bridge safety hardware including bridge rail retrofit

3. Bridge rehabilitation, reconstruction, or replacement or the construction of grade separation to replace existing at-grade railroad crossings.

a. Rehabilitating, reconstructing, or replacing bridge approach slabs
b. Rehabilitating or replacing bridge decks
c. Rehabilitating bridges including painting (no red lead paint), scour repair, fender systems, and minor structural improvements
d. Replacing a bridge (structure and/or fill)

4. Transportation corridor fringe parking facilities.

5. Construction of new truck weigh stations or rest areas.

6. Approvals for disposal of excess right-of-way or for joint or limited use of right-of-way, where the proposed use does not have significant adverse impacts.

7. Approvals for changes in access control.

8. Construction of new bus storage and maintenance facilities in areas used predominantly for industrial or transportation purposes where such construction is not inconsistent with existing zoning and located on or near a street with adequate capacity to handle anticipated bus and support vehicle traffic.

9. Rehabilitation or reconstruction of existing rail and bus buildings and ancillary facilities where only minor amounts of additional land are required and there is not a substantial increase in the number of users.

10. Construction of bus transfer facilities (an open area consisting of passenger shelters, boarding areas, kiosks and related street improvements) when located in a commercial area or other high activity center in which there is adequate street capacity for projected bus traffic.

11. Construction of rail storage and maintenance facilities in areas used predominantly for industrial or transportation purposes where such construction is not inconsistent with existing zoning and where there is no significant noise impact on the surrounding community.

12. Acquisition of land for hardship or protective purposes, advance land acquisition loans under section 3(b) of the UMT Act. Hardship and protective buying will be permitted only for a particular parcel or a limited number of parcels. These types of land acquisition qualify for a CE only where the acquisition will not limit the evaluation of alternatives, including shifts in alignment for planned construction

projects, which may be required in the NEPA process. No project development on such land may proceed until the NEPA process has been completed.

13. Acquisition and construction of wetland, stream and endangered species mitigation sites.

14. Remedial activities involving the removal, treatment or monitoring of soil or groundwater contamination pursuant to state or federal remediation guidelines.

D. Special Project Information:

Estimated Costs:

Total Construction	$ 725,000
Right of Way	$ 24,500
Total	$ 749,500

Estimated Traffic:

Current	- 3000 vpd
Year 2025	- 6600 vpd
TTST	- 1%
Dual	- 2%

Detour Length:

1.5 miles (2.4 km)

Proposed Typical Roadway Cross Section:

The approach roadway cross section will include two 12-foot (3.6-m) lanes and 8-foot (2.4-m) grassed shoulders. The shoulder width will be increased to 11 feet (3.3 m) where guardrail is installed.

Design Speed:

60 mph (96.6 kmh)

Functional Classification:

Rural Minor Collector

Division Office Comments:

Division Five Construction Office concurs with replacing the bridge in the existing location and approximately the existing elevation while maintaining traffic using an off-site detour.

Bridge Demolition:

Bridge No. 5 is composed of timber floor on timber joists and a substructure of timber caps on timber posts and concrete sills. The resulting temporary fill associated with the removal of Bridge No. 5 is 20 yd^3.

Alternates Eliminated from Further Study

The "no build" alternate is not practical or feasible. Continued deterioration of the existing bridge would result in its closure to traffic. This is not acceptable due to the amount of traffic that Bridge No. 5 serves.

Rehabilitation of the existing bridge is not practical. The existing substructure is composed of timber abutments and bents that would not be adequate enough to handle additional loading from rehabilitation of the superstructure.

The use of an on-site detour is not environmentally or financially prudent for maintaining traffic. The project is located in the Neuse River Basin and is subject to the riparian buffer rules for this basin. An on-site detour would bring additional impacts to the riparian buffer along Mountain Creek. Since a good, 1.5-mile (2.4-km) off-site detour is available, the use of an on-site detour for this project was eliminated from further study.

E. Threshold Criteria

The following evaluation of threshold criteria must be completed for Type II actions

ECOLOGICAL		YES	NO
(1)	Will the project have a substantial impact on any unique or important natural resource?		X
(2)	Does the project involve habitat where federally listed endangered or threatened species may occur?		X
(3)	Will the project affect anadromous fish?		X
(4)	If the project involves wetlands, is the amount of permanent and/or temporary wetland taking less than one-tenth (1/10) of an acre and have all practicable measures to avoid and minimize wetland takings been evaluated?	NA	
(5)	Will the project require the use of U. S. Forest Service lands?		X
(6)	Will the quality of adjacent water resources be adversely impacted by proposed construction activities?		X
(7)	Does the project involve waters classified as Outstanding Water Resources (OWR) and/or High Quality Waters (HQW)?	X	
(8)	Will the project require fill in waters of the United States in any of the designated mountain trout counties?		X
(9)	Does the project involve any known underground storage tanks (UST's) or hazardous materials sites?		X

PERMITS AND COORDINATION		YES	NO
(10)	If the project is located within a CAMA county, will the project significantly affect the coastal zone and/or any "Area of Environmental Concern" (AEC)?		X
(11)	Does the project involve Coastal Barrier Resources Act resources?		X
(12)	Will a U. S. Coast Guard permit be required?		X

(13)	Will the project result in the modification of any existing regulatory floodway?		X
(14)	Will the project require any stream relocations or channel changes?		X

SOCIAL, ECONOMIC, AND CULTURAL RESOURCES		**YES**	**NO**
(15)	Will the project induce substantial impacts to planned growth or land use for the area?		X
(16)	Will the project require the relocation of any family or business?		X
(17)	Will the project have a disproportionately high and adverse human health and environmental effect on any minority or low-income population?		X
(18)	If the project involves the acquisition of right of way, is the amount of right of way acquisition considered minor?	X	
(19)	Will the project involve any changes in access control?		X
(20)	Will the project substantially alter the usefulness and/or land use of adjacent property?		X
(21)	Will the project have an adverse effect on permanent local traffic patterns or community cohesiveness?		X
(22)	Is the project included in an approved thoroughfare plan and/or Transportation Improvement Program (and is, therefore, in conformance with the Clean Air Act of 1990)?	X	
(23)	Is the project anticipated to cause an increase in traffic volumes?		X
(24)	Will traffic be maintained during construction using existing roads, staged construction, or on-site detours?	X	
(25)	If the project is a bridge replacement project, will the bridge be replaced at its existing location (along the existing facility) and will all construction proposed in association with the bridge replacement project be contained on the existing facility?	X	
(26)	Is there substantial controversy on social, economic, or environmental grounds concerning the project?		X

(27)	Is the project consistent with all Federal, State, and local laws relating to the environmental aspects of the project?	X	
(28)	Will the project have an "effect" on structures/properties eligible for or listed on the National Register of Historic Places?		X
(29)	Will the project affect any archaeological remains, which are important to history or pre-history?		X
(30)	Will the project require the use of Section 4(f) resources (public parks, recreation lands, wildlife and waterfowl refuges, historic sites, or historic bridges, as defined in Section 4(f) of the U. S. Department of Transportation Act of 1966)?		X
(31)	Will the project result in any conversion of assisted public recreation sites or facilities to non-recreation uses, as defined by Section 6(f) of the Land and Water Conservation Act of 1965, as amended?		X
(32)	Will the project involve construction in, across, or adjacent to a river designated as a component of or proposed for inclusion in the Natural System of Wild and Scenic Rivers?		X

F. **Additional Documentation Required for Unfavorable Responses in Part E**
(Discussion regarding all unfavorable responses in Part E should be provided below. Additional supporting documentation may be attached, as necessary.)

7. NCDOT has investigated avoiding and minimizing impacts to the High Quality Water resource associated with the proposed project. The resource cannot be totally avoided because the project is a bridge replacement. However, the project proposes to minimize impacts by replacing the bridge in approximately the existing location and using an off-site detour to maintain traffic. The proposed bridge will be lengthened to avoid and minimize impacts to the riparian buffer zone. High Quality Sedimentation and Erosion Control measures will be required on this project. The Neuse River Riparian Buffer Rules will be adhered to throughout design.

G. CE Approval

TIP Project No.	**B-4110**
State Project No.	**8.2353201**
Federal-Aid Project No.	**BRZ-1616(5)**

Project Description:

This project proposes to replace Bridge No. 5 on SR 1793 over Mountain Creek in Durham County. The bridge will be replaced with a 95-foot (29.0-m) long bridge in approximately the same location and roadway elevation as the existing bridge. The cross section of the new bridge will include two 12-foot (3.6-m) lanes with 8-foot (2.4-m) offsets. Approach work will consist of resurfacing and tying into the existing alignment for approximately 353 feet (107.5 m) on either side of the new bridge. Guardrail will be installed where warranted. Traffic will be detoured along surrounding roads during construction.

Categorical Exclusion Action Classification:

_____ TYPE II(A)
X TYPE II(B)

Approved:

6/22/03 — Date
Assistant Manager
Project Development & Environmental Analysis Branch

6/22/03 — Date
Project Planning Unit Head
Project Development & Environmental Analysis Branch

6/22/03 — Date
Project Planning Engineer
Project Development & Environmental Analysis Branch

For Type II(B) projects only:

7/23/03 — Date
John L. Sullivan, III,
Division Administrator
Federal Highway Administration

Project Commitments

Replacement of Bridge No. 5 on SR 1616 Over Mountain Creek
Durham County
F. A. Project No. BRZ-1616(5)
State Project No. 8.2353201
T.I.P. No. B-4110

Roadside Environmental Unit, Division 5

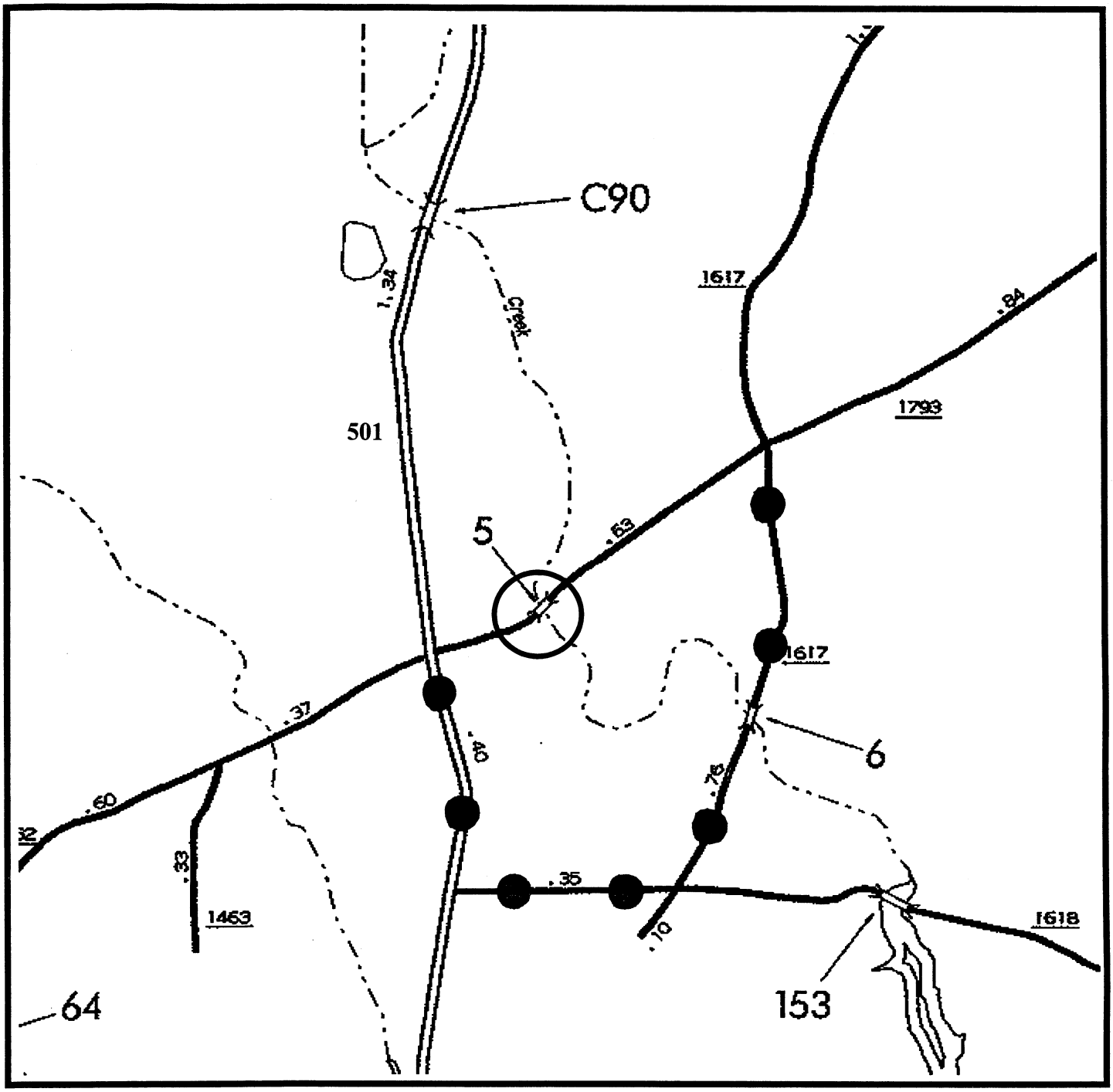
The proposed project crosses Mountain Creek, which has been labelled as a High Quality Water Resource. Therefore, High Quality Sedimentation and Erosion Control meaures will be used on this project.

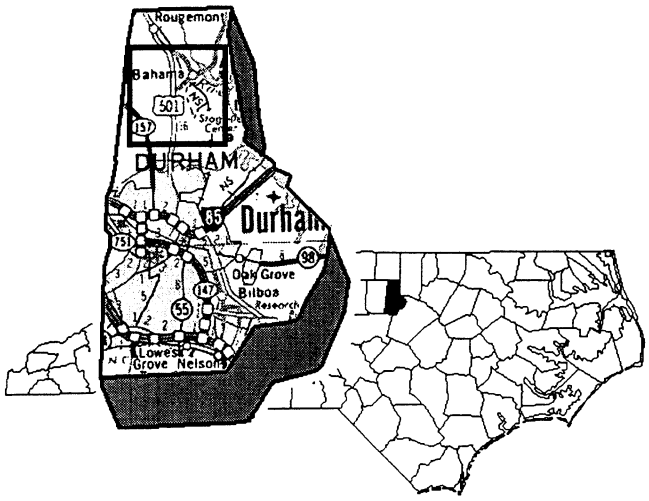
Roadway Design Unit, Structure Design Unit, Roadside Environmental, Division 5, Project Development and Environmental Analysis Branch

Mountain Creek is within the Neuse River basin. Therefore, the Neuse River Riparian Buffer Rules will be adhered during the final design phase and throughout the construction of the project.

Structure Design Unit, Division 5

Upon request of the Division of Emergency Mangement for Durham County, the period of road closure for SR 1616 will be kept to a minimum by NCDOT. The Structure Design Unit will estimate the time for construction during the final design phase and will inform the Durham County Division of Emergency Management of the anticipated length of road closure. EMS has requested adequate notice (minimium 30 days) of when the road closure will begin in order to plan alternate routes.





NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
PROJECT DEVELOPMENT &
ENVIRONMENTAL ANALYSIS BRANCH

DURHAM COUNTY
REPLACE BRIDGE NO. 5 ON SR 1793
OVER MOUNTAIN CREEK
B-4110

Figure 1

Woodwin Capps

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

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

Division of Historical Resources
David J. Olson, Director

March 22, 2002

MEMORANDUM

TO: William D. Gilmore, Manager
Project Development and Environmental Analysis Branch
Division of Highways
Department of Transportation

FROM: David Brook DLB for David Brook

SUBJECT: Replace Bridge No. 5 and SR 1616 over Mountain Creek, B-4110, Durham County, ER 02-8596

Thank you for your memorandum of September 25, 2001, concerning the above project.

There are no known archaeological sites within the project area. Based on our knowledge of the area, it is unlikely that any archaeological resources that may be eligible for conclusion in the National Register of Historic Places will be affected by the project. We, therefore, recommend that no archaeological investigation be conducted in connection with this project.

Because the Department of Transportation is in the process of surveying and evaluating the National Register eligibility of all of its concrete bridges, we are unable to comment on the National Register eligibility of the subject bridge. Please contact Mary Pope Furr, in the Architectural History Section, to determine if further study of the bridge is needed.

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 296 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 919/72929-47629. In all future communication concerning this project, please cite the above-referenced tracking number.

DB:kgc

	Location	Mailing Address	Telephone/Fax
Administration	507 N. Blount St, Raleigh, NC	4617 Mail Service Center, Raleigh 27699-4617	(919) 733-4763 •733-8653
Restoration	515 N. Blount St, Raleigh , NC	4613 Mail Service Center, Raleigh 27699-4613	(919) 733-6547 •715-4801
Survey & Planning	515 N. Blount St, Raleigh, NC	4618 Mail Service Center, Raleigh 27699-4618	(919) 733-4763 •715-4801

NATURAL SYSTEMS REPORT

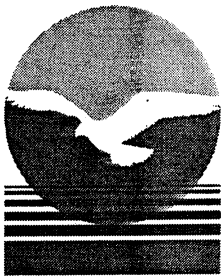
Replacement of Bridge No. 5
SR 1616 over Mountain Creek

Durham County, North Carolina
(B-4110)
(State Project 8.2353201)
(Federal Aid No. BR2-1616[5])

Prepared for:

The North Carolina Department of Transportation
Raleigh, North Carolina

Prepared by:



EcoScience

ECOSCIENCE CORPORATION
1101 Haynes Street, Suite 101
Raleigh, NC 27604
Tel (919) 828-3433 Fax (919) 828-3518

November 2001

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Replacement of Bridge No. 5
SR 1616 over Mountain Creek
Durham County, North Carolina
(B-4110)

1.0 INTRODUCTION

1.1 Project Description

The North Carolina Department of Transportation (NCDOT) proposes replacement of Bridge No. 5 on SR 1616 (Bahama Road) over Mountain Creek in Durham County, NC (Figure 1). SR 1616 is a two-lane road that runs in a southwest-northeast alignment, and is nearly 20 feet (6.1 meters) wide with a 40 foot (24.4 meter) right of way. Bridge No. 5, which is approximately 2.3 miles (3.7 kilometers) upstream (north) from its confluence with Little River, is also nearly 20 feet (6.1 meters) wide and approximately 55 feet (26.8 meters) long.

[Alternatives]

[Bridge demolition paragraph #1]

1.2 Purpose

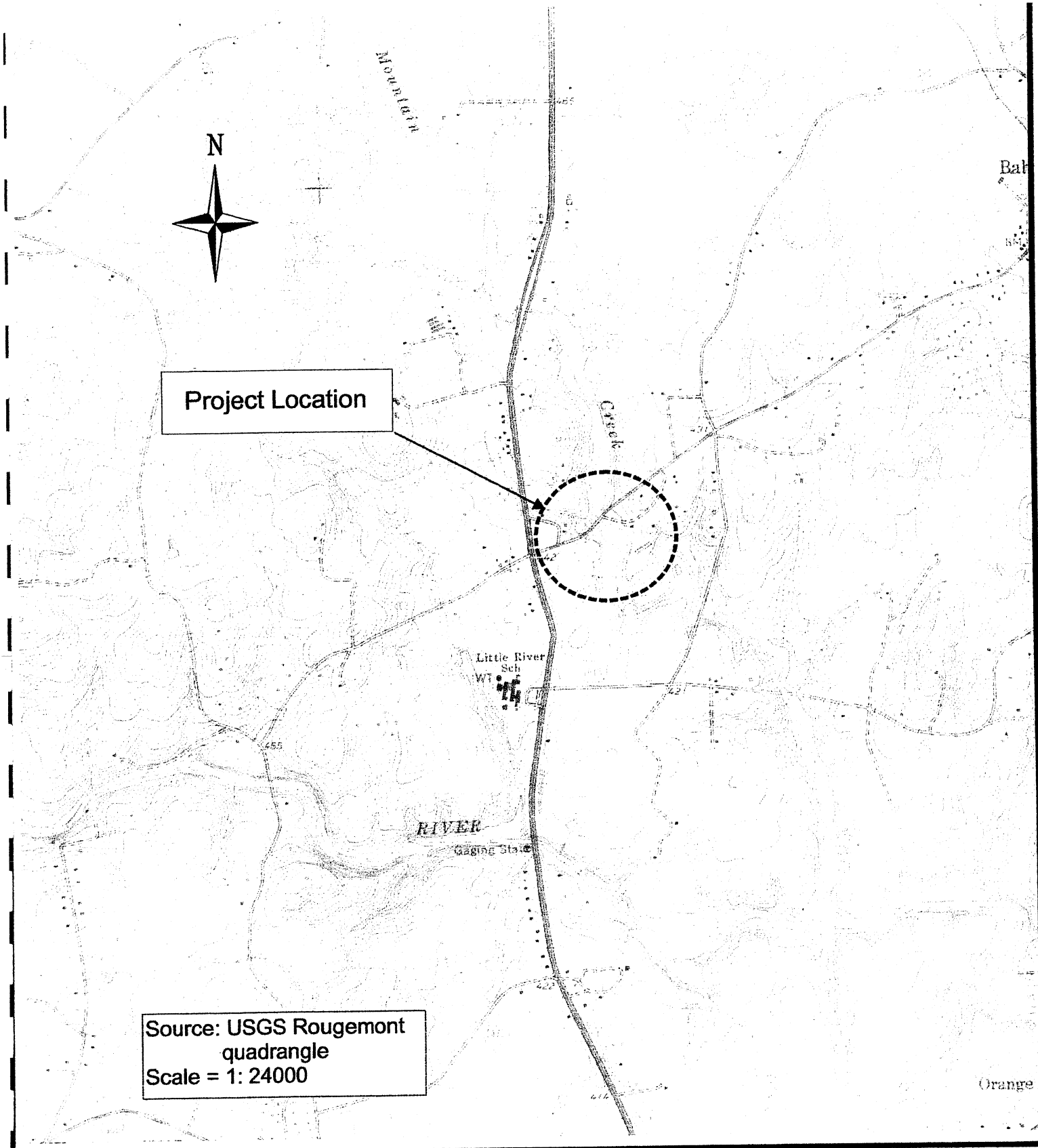
The purpose of this study is to provide an evaluation of biological resources in the project area (defined in section 1.4). Specifically, the tasks performed for this study include 1) an assessment of biological features within the project area including descriptions of vegetation, wildlife, protected species, jurisdictional wetlands, and water quality, 2) a delineation of Section 404 jurisdictional areas and subsequent survey of jurisdictional boundaries (utilizing Trimble XRS Differential Global Positioning System [DGPS] technology), 3) an evaluation of probable impacts resulting from construction, and 4) a preliminary determination of permit needs.

1.3 Methods

Materials and literature supporting this investigation have been derived from a number of sources including U.S. Geological Survey (USGS) topographic mapping (Rougemont, NC 7.5 minute quadrangle), U.S. Fish and Wildlife Service (FWS) National Wetlands Inventory mapping (NWI) (Rougemont, NC 7.5 minute quadrangle), Natural Resources Conservation Service (NRCS; formerly the Soils Conservation Service) soils mapping (SCS 1980), and recent aerial photography (scale 1:1200) furnished by the NCDOT.

The project area was visited on July 30, 2001. The project area, indicated on aerial photography, was walked and visually studied for significant features. Special concerns evaluated in the field include 1) potential protected species habitat and 2) wetlands and water quality protection in Mountain Creek.

The fieldwork for this investigation was conducted by EcoScience Corporation biologists Shay Garriock, Billy Sweet, and Kirsten Collings. Mr. Garriock is a Project Scientist with 5 years of experience in the environmental field. Mr. Garriock has a bachelor's degree in wildlife biology from Virginia Polytechnic and State University, and has conducted field research and species inventories involving small mammals, songbirds, reptiles, amphibians, fish, freshwater mussels,



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LOCATION MAP
B-4110
Replacement of Bridge No. 5
Durham County, North Carolina

Dwn. by:	TAB
Ckd by:	SS
Date:	AUG 2001
Project:	00-046.09

FIGURE 1

and aquatic and terrestrial invertebrates. Professional expertise includes jurisdictional area delineations, stream and riparian buffer determinations, plant and wildlife identification and community mapping, protected species surveys, and environmental document preparation.

Mr. Sweet is a Project Scientist with 7 years of experience in the environmental field. He has received a bachelor's degree in physics from the University of North Carolina at Chapel Hill, and a master's degree in estuarine system science from North Carolina State University. Mr. Sweet has conducted field research involving alluvial, estuarine, and oceanic water quality and circulation. His professional expertise includes environmental science instrumentation and water quality and fluid circulation monitoring/modeling.

Ms. Collings is a summer intern and a rising junior working toward a bachelor's degree in natural resources/ecosystem assessment at North Carolina State University. Her field experience extends to wetland delineation, plant identification, protected species surveys and environmental document preparation. She has also taken pertinent courses including dendrology, chemistry, biology, and ecology.

Plant community descriptions are based on a classification system utilized by North Carolina Natural Heritage Program (NHP) (Schafale and Weakley 1990). When appropriate, community classifications were modified to better reflect field observations. Vascular plant names follow nomenclature found in Radford *et al.* (1968) with adjustments made to reflect more current nomenclature. Jurisdictional areas were evaluated using the three-parameter approach following U.S. Army Corps of Engineers (COE) delineation guidelines (DOA 1987). Jurisdictional areas were characterized according to a classification scheme established by Cowardin *et al.* (1979). Aquatic and terrestrial wildlife habitat requirements and distributions were determined by supportive literature (Martof *et al.* 1980; Potter *et al.* 1980; Webster *et al.* 1985; Menhinick 1991; Hamel 1992; Palmer and Braswell 1995; Rohde *et al.* 1994). Water quality information for regional streams and tributaries was derived from available sources (DWQ 1998, 1997).

The most current FWS listing of federally protected species with ranges extending into Durham County (April 12, 2001) was reviewed prior to generation of this report. In addition, NHP records documenting presence of federally or state listed species were consulted before commencing field investigations.

1.4 Project Area

The project area is located on SR 1616 (Bahama Road) at Mountain Creek, approximately 0.2 mile (0.4 kilometer) east of US-501 and 2.0 miles (3.2 kilometers) west of Bahama, NC (Figure 1). The project area spans the channel of Mountain Creek, the associated floodplain, and adjacent uplands for a distance of approximately 1040 feet (317 meters) along a southwest-northeast orientation (Figure 2). The maximum width of the project area is 280 feet (85.4 meters). For descriptive convenience, the division of SR 1616 and Mountain Creek will be used to subdivide the project area into four quadrants.

1.5 Physiography and Soils

The project area is underlain by the Carolina Slate Belt System geologic formation within the Piedmont physiographic province of North Carolina. This system is characterized by gently

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Client:
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Project:
B-4110

Replacement of Bridge No. 5 over Mountain Creek

Durham County, North Carolina

Title:

BRIDGE NO. 5

Bahama Rd. (SR 1616),

Durham County NORTH CAROLINA

Dwn By:	Date:
BS	Aug 2001
Ckd By:	Scale:
SS	1" = 100'

ESC Project No.: 01-077

FIGURE

2

rolling hillsides with sharp topographic breaks such as knolls and saddles with relatively short valley sides. Soil systems in the Piedmont are determined by the local bedrock type and form in saprolite weathered from bedrock of various composition (Daniels *et al.* 1999). The project area is located within the floodplain of Mountain Creek, with elevations in the project area ranging from 380 to 420 feet (116 to 128 meters) National Geodetic Vertical Datum (NGVD) (USGS Rougemont, NC quadrangle).

The Natural Resource Conservation Service (formerly the Soil Conservation Service) (SCS 1980) indicates the following soils within the project area: Chewacla silt loam (*Fluvaquentic Dystrochrepts*), including the streambed and associated floodplain; and Georgeville silt loam (*Typic Hapludults*) along the western uplands.

The Chewacla series consists of frequently flooded, somewhat poorly drained, moderately permeable soils on nearly level floodplains adjacent to streams. This Chewacla soil has a silt loam surface layer about 11 inches (27.9 centimeters) thick. The subsoil extends to a depth of 60 inches (152 centimeters) where underlying material of bedrock is often encountered. The soil is commonly flooded for brief periods during late winter and early spring. The Natural Resources Conservation Service lists the Chewacla series as having hydric inclusions of Wehadkee soil occurring in depressional seeps and along the mapping unit boundaries. (NRCS 1997).

The Georgeville series consists of well-drained, moderately permeable soils on gently to steeply sloping uplands. Organic matter content of the surface layer is low, available water capacity is medium, and shrink-swell potential is low. The surface layer consists of a silt loam 6 inches (15.2 centimeters) thick. The subsoil extends to a depth of 60 inches (152 centimeters) where bedrock is generally encountered. Slope ranges from 2 to 15 percent, with moderate infiltration and high rates of run-off that create erosional hazards where ground cover is removed. The NRCS considers the Georgeville series to be non-hydric in Durham County.

2.0 WATER RESOURCES

2.1 Waters Impacted

The project area is located within sub-basin 03-04-01 (Falls Lake Watershed) of the Neuse River Basin (DWQ 1998). This area is part of USGS Hydrologic Unit 03020101 of the South-Atlantic/Gulf Region. Structures targeted for replacement span the main channel of Mountain Creek, nearly 20 feet (6.1 meters) downstream of a joining tributary that is also within the project area. This section of Mountain Creek has been assigned Stream Index Number 27-2-21-4 by the N.C. Division of Water Quality (DWQ 1997).

2.1.1 Stream Characteristics

Mountain Creek is a perennial, second-order Piedmont stream with a gravel/sand substrate. The stream channel is slightly entrenched, has low sinuosity, and is approximately 15 feet (4.6 meters) wide. The banks are steep and average 4 feet (1.2 meters) high. Directly upstream of the bridge and within the project area, a perennial tributary joins Mountain Creek. Prior to this confluence, this tributary flows over a relatively steep gradient of a cobble/gravel substrate with sections of exposed bedrock. Both Mountain Creek and the unnamed tributary are characterized by forest vegetation along the banks and adjacent floodplains providing both intra-stream shading and organic deposition.

During field investigations, water clarity within Mountain Creek was somewhat turbid due to recent rainfalls that heightened flow velocities. Within the main stem and tributary, flows were quite rapid approaching 1.5 feet/second (0.5 meters/second) with water depth approximately 2 feet (0.6 meter) and 0.5 foot (0.2 meter), respectively.

2.1.2 Best Usage Classifications and Water Quality

Classifications are assigned to waters of the State of North Carolina based on the existing or contemplated best usage of various streams or segments of streams in the basin. A best usage classification of **WS-II HQW NSW CA** has been assigned to this section of Mountain Creek. The designation **WS-II** denotes waters used as sources of water supply for drinking, culinary, or food processing. **WS-II** waters are generally in predominantly undeveloped watersheds. The watershed Critical Area (**CA**) is the land and water area within 0.5 mile (0.8 kilometer) upstream and draining to the intake. NCDOT has developed Best Management Practices for the Protection of Surface Waters to protect water supply waters. By default, **WS-II** waters are considered highest quality waters (**HQW**) that are rated as excellent based on biological and physical/chemical characteristics through division monitoring. The designation **NSW** denotes Nutrient Sensitive Waters that require limitations on nutrient inputs.

The Division of Water Quality (DWQ) (previously known as the Division of Environmental Management, Water Quality Section [DEM]) has initiated a whole-basin approach to water quality management for the 17 river basins within the state. Water quality for the proposed project area is summarized in the Neuse basinwide water quality plan (DWQ 1998). Mountain Creek was rated as **Good-Fair** during 1994 benthic classification, but received neither a chemical nor Index of Biotic Integrity (NCIBI) rating. However, a stem of the Little River, approximately 5.0 miles (8.1 kilometers) east and upstream of the confluence with Mountain Creek (~ 3.0 miles [~ 4.8 kilometers] downstream of the project area), received a chemical rating of **Supporting** and a NCIBI rating of **Good**. This same stretch also received a benthic bioclassification rating of **Excellent** in 1991; however, the rating dropped to **Good** in 1995.

The Neuse River subbasin 03-04-01 (Falls Lake Watershed) has been biologically and chemically monitored with the following use support ratings: 71 percent of its reaches **Fully Supporting**, 15 percent as **Support Threatened**, 6 percent as **Partially Supporting**, and 3 percent as **Not Supporting**, and 4 percent of its stream miles were not evaluated. The length of Mountain Creek has been rated as **Support Threatened**.

Subbasin 03-04-01, containing the entire Mountain Creek catchment from its headwaters to its confluence with Little Creek, supports three major point-source dischargers with a combined permitted discharge of 26.5 million gallons per day (MGD) (100 million liters per day [MLD]) permitted flow. None of these discharges are located along Mountain Creek or its few tributaries. The subbasin includes 20 minor point-source dischargers, with a total permitted flow of 0.53 MGD (2.1 MLD). Major non-point sources of pollution for the Neuse River Basin are agriculture, animal operations, urban runoff, construction, forestry, mining, on-site wastewater disposal, solid waste disposal, and atmospheric deposition. Sedimentation and nutrient inputs are major problems associated with non-point source discharges and often result in fecal coliform, heavy metals, oil from roads and parking lots, and increased nutrient levels in surface waters (DWQ 1998).

2.2 Anticipated Impacts to Water Resources

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

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

Due to the composition of Mountain creek's stream bed, sediment curtains should be utilized to minimize potential water quality degradation as a result of bridge replacement.

[Bridge demolition paragraph # 3]

3.0 BIOTIC RESOURCES

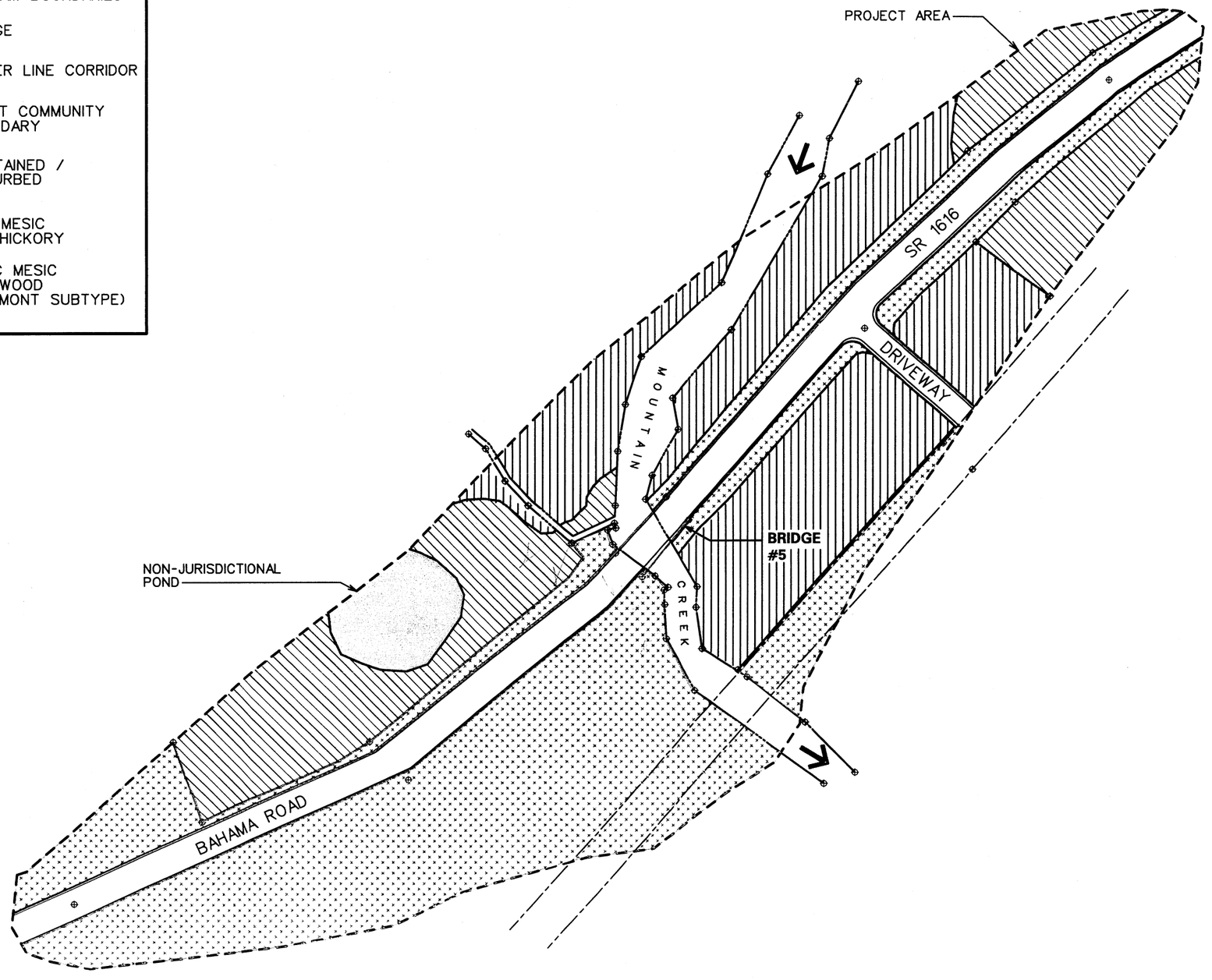
3.1 Plant Communities

Three distinct plant communities were identified within the project area (Figure 3), and classified following descriptions by Schafale and Weakley (1990): dry-mesic oak/hickory forest, basic mesic hardwood forest (Piedmont subtype), and roadside/disturbed land. These plant communities are described below.

Dry-Mesic Oak/Hickory Forest – Dry-mesic oak/hickory forest occurs along the higher elevations and slopes within the two northern quadrants and the southeastern quadrant of the project area. This community represents approximately 25 percent of the vegetated project area and consists of a developed canopy, sub-canopy, and herbaceous level. The canopy is quite thick and includes hickory (*Carya* sp.), white oak (*Quercus alba*), loblolly pine (*Pinus taeda*), southern red oak (*Quercus rubra*), and pignut hickory (*Carya glabra*). The sub-canopy/shrub layer is dotted with red maple *(Acer rubrum*), hickory (*Carya* sp.), sweetgum (*Liquidambar styraciflua*), eastern red cedar (*Juniperus virginiana*), American holly (*Ilex opaca*), flowering dogwood (*Cornus florida*), black cherry (*Prunus serotina*), American elm (*Ulmus americana*), white ash (*Fraxinus americana*), and sourwood (*Oxydendrum arboreum*). Herbaceous vegetation includes poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), wild grape (*Vitus rotundifolia*), common greenbriar (*Smilax rotundifolia*), and ebony spleenwort (*Aspenium playtneuron*).

LEGEND

- STREAM BOUNDARIES
- BRIDGE
- POWER LINE CORRIDOR
- PLANT COMMUNITY BOUNDARY
- MAINTAINED / DISTURBED
- DRY MESIC OAK/HICKORY
- BASIC MESIC HARDWOOD (PIEDMONT SUBTYPE)



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SCALE IN FEET

EcoScience Corporation
Raleigh, North Carolina

REVISIONS

Client: **NCDOT**

Project: **BRIDGE #5 (B-4110) SR 1616 (Bahama Road) over MOUNTAIN CREEK**

DURHAM COUNTY, NORTH CAROLINA

Title: **PLANT COMMUNITIES**

Dwn By:	Date:
MAF	AUG 2001
Ckd By:	Scale:
BS	1"= 80'

ESC Project No.: 00-046.09

FIGURE **3**

Basic Mesic Hardwood Forest (Piedmont subtype) – Basic mesic hardwood forest covers portions of the northeastern, northwestern, and southeastern quadrants, totaling nearly 35 percent of the vegetated project area. These regions occupy the Mountain Creek floodplain and other lower-lying topographic regions within the project area. The canopy is well established and consists of sweetgum, green ash (*Fraxinus pennsylvanica*), American elm, tulip poplar, river birch (*Betula nigra*), black walnut (*Juglans nigra*), and American sycamore (*Platanus occidentalis*). The sub-canopy is composed of blackgum (*Nyssa sylvatica*), spicebush (*Calycanthus floridus*), American elm, ironwood (*Carpinus caroliniana*), green ash, and hackberry (*Celtis laevigata*). The herbaceous layer is comprised of microstegium (*Microstegium vimineum*), bindweed (*Convolvulus arvensis*), aster (*Aster* sp.), and common greenbriar.

Roadside/Disturbed Land - Roadside/disturbed land is defined as the maintained roadside, powerline corridor, and developed/maintained margins within the project area. This plant community represents approximately 40 percent of the total vegetated project area. These communities occur adjacent to SR 1616, along the powerline easement that runs along the northern quadrants, and surrounding a barn and house within the eastern quadrants. Plant species include Bermuda grass (*Cynodon dactylon*), poison ivy, Japanese honeysuckle (*Lonicera japonica*), black walnut, slippery elm (*Ulmus rubra*), winged elm (*Ulmus alata*), eastern redbud (*Cercis canadensis*), woodland sunflower (*Halenium* sp.), and sassafras (*Sassafras albidum*). There are also small groves of secondary growth, wooded regions within these disturbed lands which stand over a cleared understory. Species found in these pockets include white oak, black walnut, princess tree (*Paulownia tomentosa*), sweetgum, and cherrybark oak (*Quercus pagodaefolia*).

3.2 Plant communities within the Project Area

Plant community areas are estimates of the total amount of plant community present within the project area (Figure 1) and are summarized in Table 1.

Table 1: Plant Community Area within the project area in acres (hectares)

Plant Community	Area
Dry-Mesic Oak/Hickory Forest	1.11 (0.45)
Basic Mesic Hardwood Forest	1.68 (0.68)
Roadside/Disturbed Land	1.64 (0.66)
Total	4.43 (1.79)

3.3 Wildlife

3.3.1 Terrestrial

Raccoon (*Procyon lotor*) tracks were observed during the site visit along the creek sides. Other characteristic mammals expected to frequent similar habitats in the Piedmont include beaver (*Castor canadensis*), white-tailed deer (*Odocoileus virginianus*), meadow vole (*Microtus pennsylvanicus*), eastern cottontail (*Sylvilagus floridanus*), Virginia opossum (*Didelphis*

virginiana), southeastern shrew *(Sorex longirostris*), least shrew (*Cryptotis parva*), eastern mole (*Scalopus aquaticus*), gray squirrel (*Sciurus carolinensis*), and cotton mouse (*Peromyscus gossypinus*).

Birds observed within or adjacent to the project area are northern cardinal (*Cardinalis cardinalis*), turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), blue jay (*Cyanocitta cristata*), yellow-billed cuckoo (*Coccyzus americanus*), mourning dove (*Zenaida macroura*), indigo bunting (*Passerina cyanea*), Carolina wren (*Thryothorus ludovicianus*), blue grosbeak (*Guiraca caerulea*), red-eyed vireo (*Vireo olivaceus*), Louisiana waterthrush (*Seiurus noveboracensis*), and eastern pewee (*Contopus virens*). Other avian species expected to occur in the project area are prothonotory warbler (*Protonotaria citrea*), red-bellied woodpecker (*Melanerpes carolinus*), downy woodpecker (*Picoides pubescens*), tufted titmouse (*Baeolophus bicolor*), blue-gray gnatcatcher (*Polioptila caerulea*), Carolina chickadee (*Poecile carolinensis*), eastern towee (*Pipilo erythrophthalmus*), American robin (*Turdus migratorius*), hermit thrush (*Catharus guttatus*), Acadian flycatcher (*Empidonax virescens*), American redstart (*Setophaga ruticilla*), pileated woodpecker (*Dryocopus pileatus*), barred owl (*Strix varia*), and red-shouldered hawk (*Buteo lineatus*).

Terrestrial amphibians and reptiles spotted during the field visit include the green frog (*Rana clamitans*) and five-lined skink (*Eumeces fasciatus*). Other terrestrial reptiles which may occur within the project area include eastern box turtle (*Terrapene carolina*), eastern slender glass lizard (*Ophisaurus attenuatus*), northern fence lizard (*Sceloporus undulatus*), broadhead skink (*Eumeces laticeps*), ground skink *(Scinella lateralis*), worm snake (*Carphophis amoenus*), rat snake (*Elaphe obsoleta*), northern black racer (*Coluber constrictor*), rough green snake (*Opheodrys aestivus*), eastern kingsnake (*Lampropeltis getula*), eastern garter snake (*Thamnophis sirtalis*), copperhead (*Agkistrodon contortrix*), red salamander (*Pseudotriton ruber*), redback salamander (*Plethodon cinereus*), American toad (*Bufo americanus*), Fowler's toad (*Bufo woodhousei*), and slimy salamander (*Plethodon cylindraceus*).

3.3.2 Aquatic

A northern water snake (*Nerodia sipedon*) was the only observed aquatic reptile or amphibian species within the project area. Aquatic or semi-aquatic reptiles and amphibians which are expected to occur within the project area include snapping turtle (*Chelydra serpentina*), eastern mud turtle (*Kinosternon subrubrum*), eastern painted turtle (*Chrysemys picta*), queen snake (*Regina septemvittata*), eastern newt (*Notophthalmus viridescens*), southern two-lined salamander (*Eurycea cirrigera*), three-lined salamander (*Eurycea guttolineata*), marbled salamander (*Ambystoma opacum*), and northern dusky salamander (*Desmognathus fuscus*).

Mountain Creek was not sampled to determine fishery potential. Visual observation of Mountain Creek did reveal the presence of small fish and molluscan fauna, including the invasive Asian clam (*Corbicula fluminea*). Fish species which may be present in Mountain Creek include redfin pickerel (*Esox americanus*), rosyside dace (*Clinostomus funduloides*), bluehead chub (*Nocomis leptocephalus*), margined madtom (*Noturus insignis*), swallowtail shiner (*Notropis procne*), white shiner (*Notropis albeolus*), rosefin shiner (*Lythrurus ardens*), creek chub (*Semotilus atromaculatus*), creek chubsucker (*Erimyson oblongus*), pumpkinseed (*Lepomis gibbosus*), bluegill (*Lepomis macrochirus*), redbreast sunfish (*Lepomis auritus*), green sunfish (*Lepomis cyanellus*), Roanoke darter (*Percina roanoka*), and glassy darter (*Etheostoma vitreum*).

3.4 Anticipated Impacts to Wildlife

Habitat fragmentation is not expected to be an issue since most improvements will be restricted to existing roadside margins. Construction noise and associated disturbances will have short-term impacts on avifauna and migratory wildlife movement patterns.

Impacts associated with turbidity and suspended sediments resulting from bridge replacement will be minimized through the use of silt curtains and the implementation of stringent erosion control measures. Also, since Mountain Creek is a perennial stream identified on recent USGS 7.5 minute quadrangle maps, in-stream activities associated with bridge replacement should not interfere with anadromous fish passage. No in-stream activities should occur during the spring migration period for anadromous fish species (February 15 to June 15).

4.0 SPECIAL TOPICS

4.1 Waters of the United States

Surface waters within the embankments of Mountain Creek and its unnamed tributary (Figure 4) are subject to jurisdictional consideration under Section 404 of the Clean Water Act as "waters of the United States" (33 CFR section 328.3). NWI mapping indicates that Mountain Creek exhibits characteristics of a palustrine, broad-leaf deciduous system which is temporarily flooded (PFO1A) (Cowardin *et al.* 1979); the unnamed tributary is not listed under NWI mapping. Field investigations indicate that Mountain Creek and its unnamed tributary are bank-to-bank perennial stream systems. Linear distances and areas of Mountain Creek and the unnamed tributary are provided in Table 2.

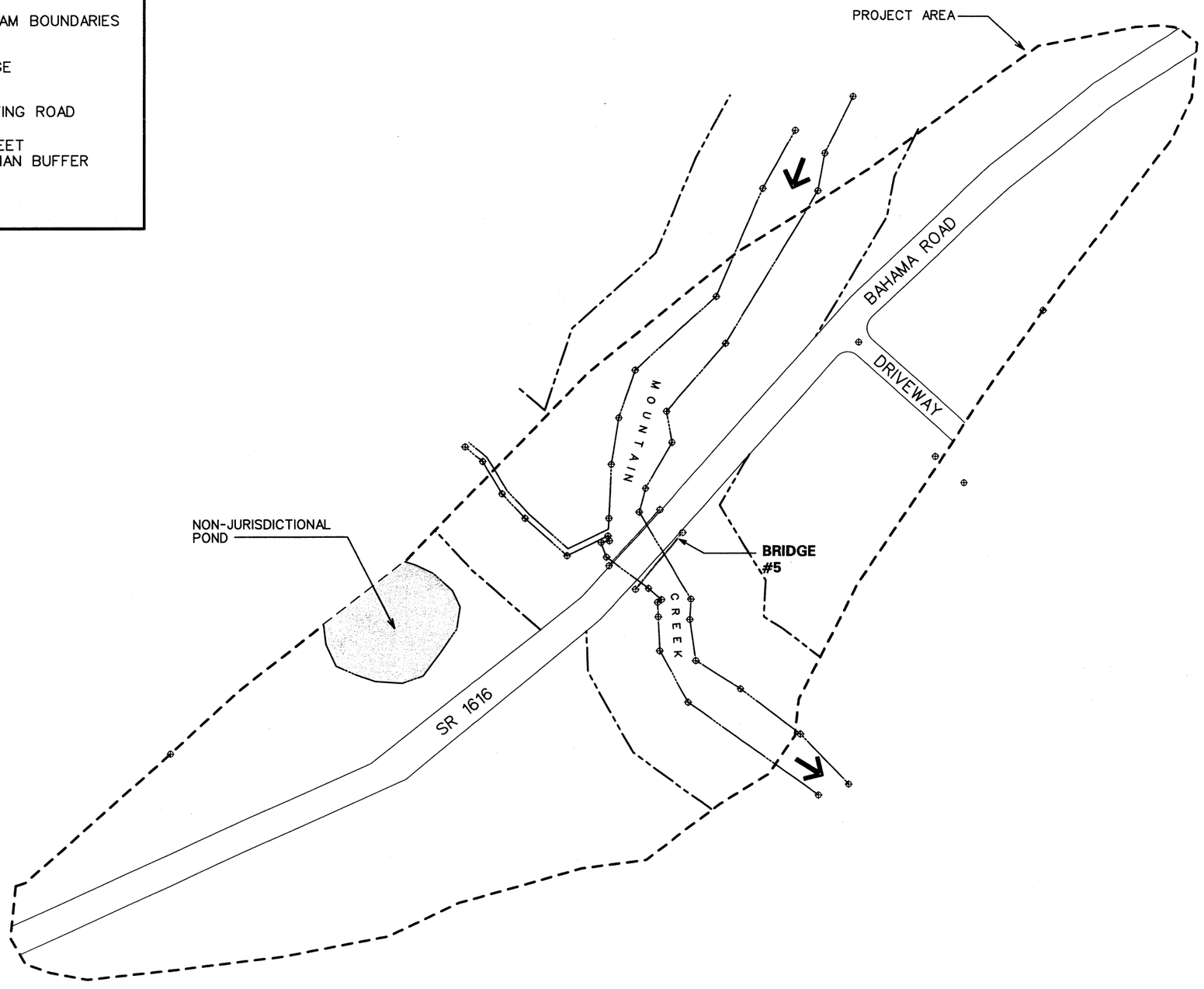
Table 2: linear distance and area of surface waters (Mountain Creek and unnamed tributary) and riparian buffer within the project area. Linear distance is expressed in feet (meters) and area is expressed in acres (hectares).

Jurisdictional Type	Linear Distance	Area
Surface Water	650 (198)	0.45 (0.18)
Riparian Buffer	630 (192)	1.45 (0.58)

Vegetated wetlands are defined by the presence of three primary criteria: hydric soils, hydrophytic vegetation, and evidence of hydrology at or near the surface for a portion (12.5 percent) of the growing season (DOA 1987). No vegetated wetlands subject to jurisdictional consideration under Section 404 of the Clean Water Act as "waters of the United States" (CFR 328.3) occur within the project area.

LEGEND

- STREAM BOUNDARIES
- BRIDGE
- EXISTING ROAD
- 50 FEET RIPARIAN BUFFER



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SCALE IN FEET

EcoScience Corporation
Raleigh, North Carolina

REVISIONS

Client: **NCDOT**

Project: **BRIDGE #5 (B-4110) SR 1616 (Bahama Road) over MOUNTAIN CREEK**

DURHAM COUNTY, NORTH CAROLINA

Title: **JURISDICTIONAL SYSTEMS**

Dwn By:	Date:
MAF	AUG 2001
Ckd By:	Scale:
BS	1"= 80'

ESC Project No.: 00-046.09

FIGURE **4**

The project area contains a small man-made pond. This pond has been constructed in an upland slope characterized by non-hydric soils. The pond is fed primarily by groundwater seepage and secondly by surface runoff. The pond is not directly connected with any Section 404 jurisdictional areas and is therefore not considered to be subject to Section 404 authority.

The Nutrient Sensitive Waters Management Strategy for the Protection and Maintenance of Existing Riparian Buffers (15A NCAC 02B.0259) provides a designation for uses that cause impacts to riparian buffers within the Neuse River Basin. The Neuse River Basin Rule applies to 50-foot (15.3-meter) wide riparian buffers directly adjacent to surface waters in the Neuse River Basin. This rule does not apply to portions of the riparian buffer where a use is existing and ongoing. Any change in land use within the riparian buffer is characterized as an impact. Land use changes within the riparian buffer are defined as being **Exempt**, **Allowable**, **Allowable with Mitigation**, or **Prohibited**. The **Allowable** designation refers to uses that may proceed within the riparian buffer provided there are no practical alternatives, and that written authorization from the DWQ is obtained prior to project development. The **Allowable with Mitigation** designation refers to uses that are allowed, given there are no practical alternatives and appropriate mitigation plans have been approved. The **Prohibited** designation refers to uses that are prohibited without a variance.

Figure 4 depicts the positions of riparian buffer within the project area. The calculated linear distance/area of riparian buffer along Mountain Creek and its unnamed tributary within the project area are shown in Table 2.

[Bridge demolition paragraph # 3]

As this reach of Mountain Creek has potential as a travel corridor for migratory fish, this project can be classified as Case 2, where in-water work will be avoided during moratorium periods associated with spring migratory, spawning, and nursery areas.

4.1.1 Permits

This project may be processed as a Categorical Exclusion (CE) under Federal Highway Administration (FHWA) guidelines. The COE has made available Nationwide Permit (NWP) #23 (61 FR 65874, 65916; December 13, 1996) for CEs due to minimal impacts to waters of the U.S. expected with bridge construction. DWQ has made available a General 401 Water Quality Certification for NWP No. 23. However, authorization for jurisdictional area impacts through use of this permit will require written notice to DWQ. In the event that NWP No. 23 will not suffice, impacts attributed to bridge replacement and associated approach improvements may qualify under General Bridge Permit (GP) 031 issued by the Wilmington COE District. DWQ has made available a General 401 Water Quality Certification for GP 031. Notification to the Wilmington COE office is required if this general permit is utilized. The COE may exert discretionary authority and require an Individual Permit if avoidance and minimization have not been adequately addressed, or if mitigation is inadequate (assuming mitigation may be required).

The Neuse River Basin Rule applies to 50-foot (15.3-meter) wide riparian buffers directly adjacent to surface waters of the Neuse River Basin. Neuse Buffer Certification will be needed in addition to a COE permit and DWQ Water Quality Certification.

4.1.2 Mitigation

Compensatory mitigation is not proposed for this project due to the limited nature of project impacts. However, utilization of BMPs is recommended in an effort to minimize impacts. Temporary impacts to floodplains associated with construction activities could be mitigated by replanting disturbed regions with native wetland species and removal of temporary fill material upon project completion. Fill or alteration of more than 150 linear feet (45.8 meters) of stream may require compensatory mitigation in accordance with 15 NCAC 2H .0506(h). A final determination regarding mitigation rests with the COE and DWQ.

The requirement for riparian buffer mitigation will depend on the amount of actual impacts resulting from proposed bridge replacement and the availability of practical alternatives. A final determination regarding practical alternatives rests with DWQ.

4.2 Protected Species

4.2.1 Federally Protected Species

Species with the federal classification of Endangered (E), Threatened (T), Threatened due to Similarity of Appearance (T [S/A]), or officially Proposed (P) for such listing are protected under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The term "Endangered Species" is defined as "any species which is in danger of extinction throughout all or a significant portion of its range", and the term "Threatened Species" is defined as "any species which is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C. 1532). The term "Threatened due to Similarity of Appearance" is defined as a species which is not "Endangered" or "Threatened", but "closely resembles an Endangered or Threatened species" (16 U.S.C. 1532). Federally protected species listed for Durham County (April 12, 2001 FWS list) are presented in Table 3.

Table 3: Federally Protected Species listed for Durham County (April 12, 2001 FWS list).

Common Name	Scientific Name	Status
Bald Eagle	*Haliaeetus leucocephalus*	T
Michaux's Sumac	*Rhus michauxii*	E
Smooth Coneflower	*Echinacea laevigata*	E

Bald Eagle - The adult bald eagle is a large, dark brown raptor with a white head and tail and a wingspan greater than 6 feet (1.8 meters). Immature eagles are brown with whitish mottling on the tail, belly, and wing linings. In the Carolinas, bald eagles typically nest in tall, living trees in a conspicuous location near open water from December to May (Potter *et al.* 1980). Bald eagles forage over large bodies of water and utilize adjacent trees for perching (Hamel 1992) and typically feed on fish and occasionally birds and small mammals. Disturbance activities within a primary zone extending 750 to 1500 feet (229 to 458 meters) from a nest tree are considered to result in unacceptable conditions for eagles (FWS 1987). The FWS recommends avoiding disturbance activities, including construction and tree-cutting within this primary zone. Within a secondary zone, extending from the primary zone boundary out to a distance of 1.0 mile (1.6 kilometers) from a nest tree, construction and land-clearing activities should be

restricted to the non-nesting period. The FWS also recommends avoiding alteration of natural shorelines where bald eagles forage, and avoiding significant land-clearing activities within 1500 feet (458 meters) of known roosting sites.

The project area contains tall hardwood trees, but none stand out as providing appropriate roosting or perching habitat for the bald eagle. Also, the project area does not contain an adequate amount of open water habitat for eagle feeding. Furthermore, NHP records do not document the occurrence of this species within 2.0 mile (3.2 kilometers) of the project area.

> **BIOLOGICAL CONCLUSION:** The bald eagle typically roosts, nests, and feeds from large trees near open water. The project area does not provide suitable habitat for the eagle. NHP records do not document the occurrence of this species within 2.0 mile (3.2 kilometers) of the study area. Based on available information, replacement of Bridge No. 5 will not result in an adverse impact to bald eagle. **NO EFFECT**

Michaux's sumac - Michaux's sumac is a densely pubescent, deciduous, rhizomatous shrub, usually less than 2 feet (0.6 meter) high. The alternate, compound leaves consist of 9 to 13 hairy, round-based, toothed leaflets borne on a hairy rachis that may be slightly winged (Radford *et al.* 1968). Small male and female flowers are produced during June on separate plants; female flowers are produced on terminal, erect clusters followed by small, hairy, red fruits (drupes) in August and September. Michaux's sumac tends to grow in disturbed regions where competition is reduced by periodic fire or other disturbances, and may grow along roadside margins or utility right-of-ways. In the Piedmont, Michaux's sumac appears to prefer clay soil derived from mafic rocks or sandy soil derived from granite; in the Sandhills, it prefers loamy swales (Weakley 1993). Michaux's sumac range from south Virginia through Georgia in the inner Coastal Plain and lower Piedmont.

The project area includes relatively large amounts of disturbed regions along both the roadsides and powerline corridor. However, these areas are covered with thick vegetation - the roadside with introduced grasses which are mowed frequently and the powerline corridor with tall woody and herbaceous growth over 6.0 feet (1.8 meter) in height. Neither region had indicators of acidic soils or granitic rock outcroppings. Systematic surveys of habitat with potential to support Michaux's sumac found no individuals of this species. NHP records do not document the occurrence of this species within 2.0 miles (3.2 kilometers) of the project area.

> **BIOLOGICAL CONCLUSION:** Grasses completely cover the roadsides within the project area, while dense, tall, woody and herbaceous growth cover the powerline corridor. Systematic surveys of the areas found no indication of this species. NHP records do not document the occurrence of this species within 2.0 miles (3.2 kilometers) of the project area. Based on available information and site surveys, replacement of Bridge No. 5 will not result in an adverse impact to Michaux's sumac. **NO EFFECT**

Smooth coneflower - This species is a stiffly erect, rarely branched perennial that grows up to 5 feet (1.5 meters) tall. Basal and stem leaves are large, glabrous, and lanceolate to narrowly ovate blades reaching 3 inches (15 centimeters) in length. This coneflower blooms from late May to July, producing solitary, heads of small purplish disk flowers with long drooping pink to purplish ray flowers (Kral 1983). This species occurs on calcareous, basic, or circumneutral soils on roadsides, clearcuts, power line right-of-ways where there is abundant light and little

herbaceous competition (Gaddy 1991). Fire-maintained woodlands also appear to provide potential habitat for the coneflower.

The roadside within the project area receives little direct sunlight, and has a dense cover of introduced grasses, while the powerline corridor has dense, tall herbaceous and woody vegetation. Systematic surveys of habitat with potential to support smooth coneflower found no individuals of this species. NHP records do not document the occurrence of this species within 2.0 miles (3.2 kilometers) of the project area.

> **BIOLOGICAL CONCLUSION:** Grasses completely cover the roadsides within the project area, while dense, tall, woody and herbaceous growth cover the powerline corridor. These areas receive restricted amounts of sunlight due to canopy shading from the surrounding forested communities. Systematic surveys of the areas found no indication of the species. NHP records do not document the occurrence of this species within 2.0 miles (3.2 kilometers) of the project area. Based on available information and site surveys, replacement of Bridge No. 5 will not result in an adverse impact to smooth coneflower. **NO EFFECT**

Federal Species of Concern - The April 12, 2001 FWS list includes a category of species designated as "Federal Species of Concern" (FSC). A species with this designation is one that may or may not be listed in the future (formerly C2 candidate species or species under consideration for listing for which there is insufficient information to support listing). The FSC designation provides no federal protection under the ESA for the species listed. FSC species listed for Durham County are presented in Table 4. NHP files list documentation for two FSC species within 2.0 miles (3.2 kilometers) of the project area: the Pinewoods shiner (*Lythrurus matutinus*) located 1.0 mile (1.6 kilometers) south of the project area in the Little River, and the Yellow lampmussel (*Lampsilis cariosa*) located 1.5 miles (2.5 kilometers) southwest of the project area also within the Little River.

Table 4: Federal Species of Concern listed for Durham County (April 12, 2001 FWS list).

Common Name	Scientific Name	***Potential Habitat***	***State Status****
Carolina darter	*Etheostoma collis lepidinion*	Y	SC
Pinewoods shiner	*Lythrurus matutinus*	Y	SR
Atlantic pigtoe	*Fusconaia masoni*	Y	T
Septima's clubtail dragonfly	*Gomphus septima*	Y	SR
Yellow lampmussel	*Lampsilis cariosa*	Y	T
Green floater	*Lasmigona subviridus*	Y	E
Panhandle pebblesmail	*Somotogyrus virginicus*	N	SR
Tall larkspur	*Delphinium exaltatum*	Y	E-SC
Butternut	*Juglans cinerea*	N	W5
Sweet pinesap	*Monotropsis odorata*	Y	C
A liverwort	*Plagiochila columbiana*	Y	W2

* E = Endangered; T = threatened; SC = Special concern; SR = Significantly Rare; C = Candidate; P = Species has been formally proposed for listing as Endangered, Threatened, or Special Concern; W1 = NC Plant Watch List: rare, but relatively secure; W3 = NC Plant Watch List: rare, but uncertain documentation (Amoroso 1999; LeGrand and Hall1999).

4.2.2 State Protected Species

Plant and animal species which are on the North Carolina state list as Endangered (E), Threatened (T), Special Concern (SC), Candidate (C), Significantly Rare (SR), or Proposed (P) (Amoroso 1999; LeGrand and Hall 1999) receive limited protection under the North Carolina Endangered Species Act (G.S. 113-331 *et seq.*) and the North Carolina Plant Protection Act of 1979 (G.S. 106-202 *et seq.*). NHP records indicate that five state protected species are documented to occur within 2.0 miles (3.2 kilometers) of the project area. Four of the five state protected species, Roanoke bass (*Ambloplites cavifrons*) (SR), Neuse River waterdog (*Necturus lewisi*) (SC), yellow lampmussel (T), and a caddisfly (*Dibusa argata*) (SR), are found 1.3 miles (2.1 kilometers) southwest and downstream of the project area within Little River. The fifth state protected specie, Pinewoods shiner (SR), is found approximately 1.3 miles (2.1 kilometers) downstream and due south of the project area, also on Little River.

NHP also documents Significant Natural Heritage Areas (SNHA) selected on the basis of the occurrence of rare plant and animal species, rare or high quality natural communities and special animal habitats. SNHA sites are rated on site significance, dependent on a global and statewide rarity of these elements and the quality of their occurrence at a site relative to other occurrences. NHP documents the Little River Aquatic Habitat (B) and Little River Gorge (C) SNHA sites located nearly 1.0 miles (1.6 kilometers) and 1.4 miles (2.3 kilometers) downstream and south-southwest of the project area, respectively. A "B" raing implies the occurrence of ecological resources that are among the highest quality in North Carolina. A "C" rating implies the occurrence of natural elements that are among the outstanding examples in their geographic region of the state.

5.0 REFERENCES

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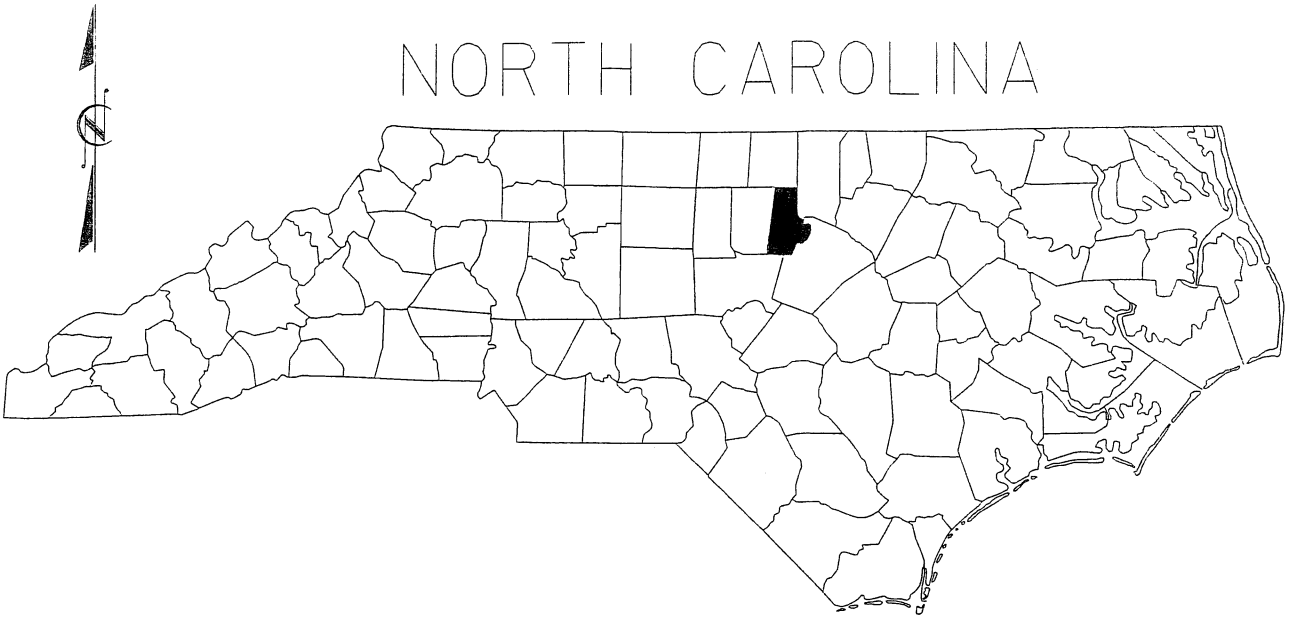
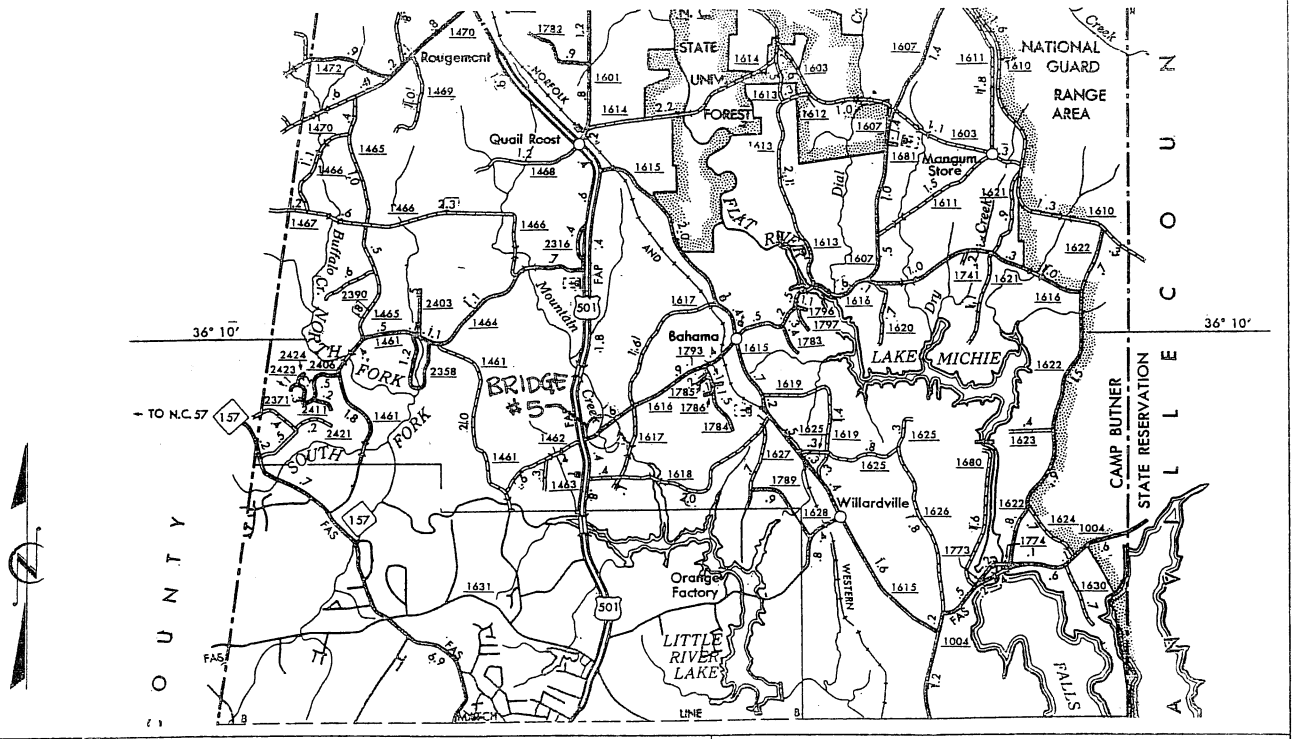




PERMIT DRAWINGS

VICINITY MAPS

NCDOT

DIVISION OF HIGHWAYS

DURHAM COUNTY

PROJECT: 33465.1.1 (B-4110)

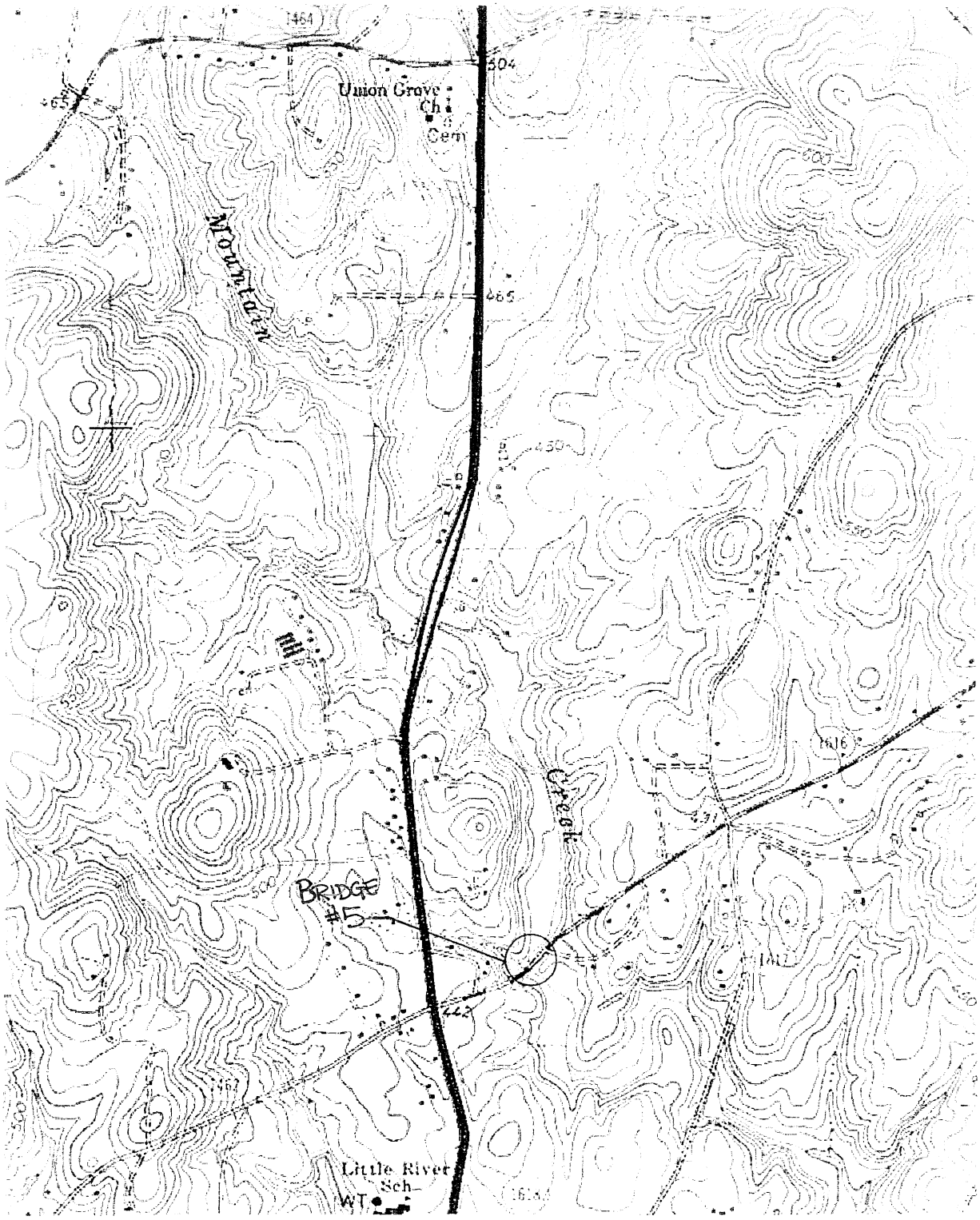
BRIDGE NO. 5

OVER MOUNTAIN CREEK

AND APPROACHES

ON SR 1616 (BAHAMA ROAD)

SHEET 1 OF 9 5/5/05



9° W

TOPO MAP

SCALE: 1" : 1500'

NCDOT

DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: 33465.1.1 (B-4110)
BRIDGE NO. 5
OVER MOUNTAIN CREEK
AND APPROACHES
ON SR 1616 (BAHAMA ROAD)

SHEET 2 OF 8 5/5/05

PROPERTY OWNERS

NAMES AND ADDRESSES

REFERENCE NO.	NAMES	ADDRESSES
1	Maxton Bolton	P.O. Box 394 Bahama, NC 27503
2	Patricia T. Byrd	114 Patrick Road Bahama, NC 27503
3	Ricky E. Herron	400 Bahama Road Bahama, NC 27503
4	Charles Hill	P.O. Box 472 Bahama, NC 27503
5	Sandra Hill	P.O. Box 12 Bahama, NC 27503
6	Walter Allen Linthicum	406 Bahama Road Durham, NC 27503
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10	Harold K. Terry	9318 Roxboro Bahama, NC 27503
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NCDOT

DIVISION OF HIGHWAYS

DURHAM COUNTY

PROJECT: 33465.1.1 (B-4110)

BRIDGE NO. 5

OVER MOUNTAIN CREEK

AND APPROACHES

ON SR 1616 (BAHAMA ROAD)

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	17+41.66 -L-	1@105'	NO WETLANDS IN PROJECT VICINITY					0.021	0.000	60	0	0
		39" CONCRETE										
		BOX GIRDER										
		1@45'										
		27" CONCRETE										
		BOX GIRDER										
		BRIDGE										
TOTALS:								0.021		60		

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
DURHAM
COUNTY
WBS - 33465.1.1 (B-4110)

6/8/2005

ATN Revised 3/31/05

PROJECT REFERENCE	SHEET NO.
B-4110	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
SHEET	5 of 8

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

Prepared in the Office of: GIBSON ENGINEERS, PC

GRAPHIC SCALE 25' 0 25' 50'

EXISTING CONCRETE FOOTINGS CAN BE PULLED OUT FROM THE BANK

REMOVAL OF ROADWAY FILL

FILL IN SURFACE WATER

NO WETLANDS IN PROJECT VICINITY

ENGLISH

NAD 83 NC GRID

EXISTING BENTS

BEGIN STATE PROJECT (B-4110)
-L- PCC Sta. 14+00.00

-L- PRC Sta. 19+05.42

END STATE PROJECT (B-4110)
-L- POC Sta. 22+00.00

N 63° 26' 06.0" E

N 51° 32' 35.8" E

SPECIAL DITCH
SEE DETAIL 1
EST RIP RAP = 20 TONS
EST FF = 25 SY

FALSE SUMP
SEE DETAIL 4

END SHBG 18+70

BEG SHBG 18+47

SEE DETAIL 7
SEE DETAIL 8

CLASS II RIP RAP
STR PAY ITEM

PSH
SEE DETAIL 6

LATERAL BASE DITCH
SEE DETAIL 2
EST DDE = 249 CY
EST RIP RAP = 95 TONS
EST FF = 142 SY

TOE PROTECTION
SEE DETAIL 5
EST RIP RAP = 77 TONS
EST FF = 113 SY

CLASS B RIP RAP
W/FILTER FABRIC
EST RIP RAP = 2 TONS
EST FF = 7 SY

LATERAL BASE DITCH
SEE DETAIL 3
EST DDE = 59 CY

WOODS

EXISTING R/W

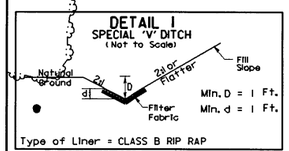
60' 40'

18' F 24" CONC

12" CONC

18" CONC

DETAIL 1
SPECIAL "V" DITCH
(Not to Scale)

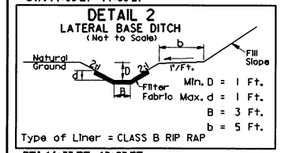


Min. D = 1 Ft.
Min. d = 1 Ft.

Type of Liner = CLASS B RIP RAP

STA 14+00 LT - 14+50 LT

DETAIL 2
LATERAL BASE DITCH
(Not to Scale)

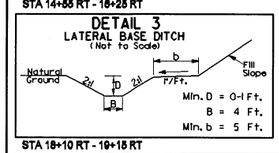


Min. D = 1 Ft.
Max. d = 1 Ft.
B = 3 Ft.
b = 5 Ft.

Type of Liner = CLASS B RIP RAP

STA 14+55 RT - 18+25 RT

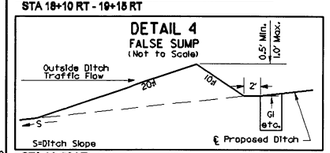
DETAIL 3
LATERAL BASE DITCH
(Not to Scale)



Min. D = 0-1 Ft.
B = 4 Ft.
Min. b = 5 Ft.

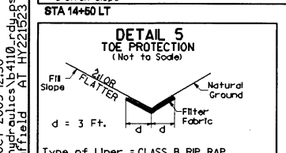
STA 18+10 RT - 19+15 RT

DETAIL 4
FALSE SUMP
(Not to Scale)



STA 14+50 LT

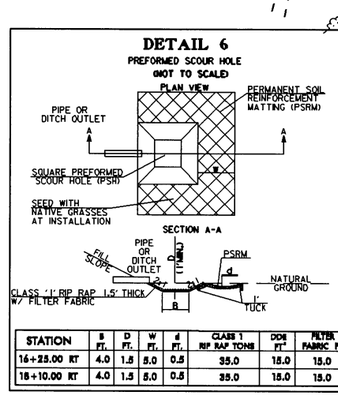
DETAIL 5
TOE PROTECTION
(Not to Scale)



Type of Liner = CLASS B RIP RAP

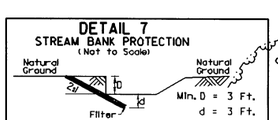
STA 20+50 RT - 22+00 RT

DETAIL 6
PREFORMED SCOUR HOLE
(NOT TO SCALE)



STATION	S FT.	D FT.	W FT.	d FT.	CLASS 1 RIP RAP TONS	DDE FT³	FILTER FABRIC FT²	PSRM FT²
16+25.00 RT	4.0	1.5	5.0	0.5	35.0	15.0	15.0	25.0
18+10.00 RT	4.0	1.5	5.0	0.5	35.0	15.0	15.0	25.0

DETAIL 7
STREAM BANK PROTECTION
(Not to Scale)

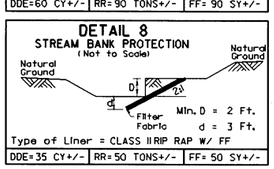


Min. D = 3 Ft.
d = 3 Ft.

Type of Liner = CLASS II RIP RAP W/ FF

DDE=60 CY+/-	RR=90 TONS+/-	FF=90 SY+/-

DETAIL 8
STREAM BANK PROTECTION
(Not to Scale)



Min. D = 2 Ft.
d = 3 Ft.

Type of Liner = CLASS II RIP RAP W/ FF

DDE=35 CY+/-	RR=50 TONS+/-	FF=50 SY+/-

FILL IN SURFACE WATER DUE TO STREAM BANK PROTECTION

NOTES: FOR STRUCTURE EXCAVATION LIMITS SEE STRUCTURE PLANS.

TAPER SHOULDERS PARALLEL TO GUARDRAIL WITH 3' OFFSET ON ALL 4 CORNERS OF BRIDGE.

SHBG IS SHOULDER BERM GUTTER.

PAVED SHOULDER (PS) WIDTH VARIES AS SHOWN IN PLAN VIEW.

* DESIGN EXCEPTIONS REQUIRED FOR HORIZONTAL SSD AND SUPERELEVATION

FOR -L- PROFILE SEE SHEET 5

PROJECT REFERENCE	SHEET NO.
B-4110	

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

SHEET 6 of 8

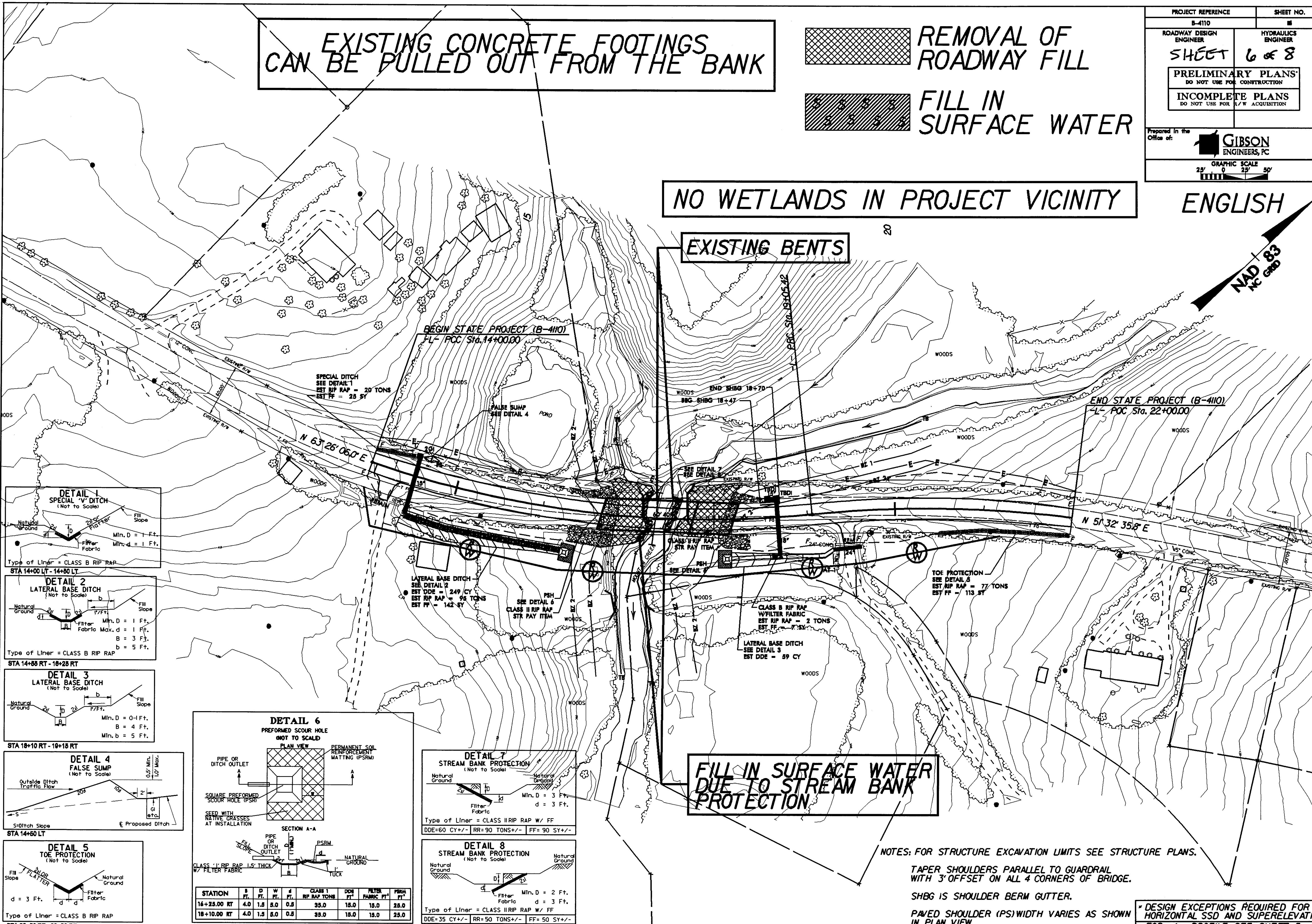
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

Prepared in the Office of: GIBSON ENGINEERS, PC

GRAPHIC SCALE 25' 0 25' 50'

ENGLISH



EXISTING CONCRETE FOOTINGS CAN BE PULLED OUT FROM THE BANK
REMOVAL OF ROADWAY FILL
FILL IN SURFACE WATER
NO WETLANDS IN PROJECT VICINITY
EXISTING BENTS
NAD 83 NC GRID
BEGIN STATE PROJECT (B-4110) -L- POC Sta. 14+00.00
END STATE PROJECT (B-4110) -L- POC Sta. 22+00.00
N 63°26'06.0" E
N 51°32'35.8" E
SPECIAL DITCH SEE DETAIL 1 EST RIP RAP = 20 TONS EST FF = 25 SY
FALSE SUMP SEE DETAIL 4
POND
WOODS
END SHBG 18+70
BEG SHBG 18+47
SEE DETAIL 7
LATERAL BASE DITCH SEE DETAIL 2 EST DDE = 249 CY EST RIP RAP = 95 TONS EST FF = 142 SY
PSH SEE DETAIL 6 CLASS II RIP RAP STR PAY ITEM
TOE PROTECTION SEE DETAIL 5 EST RIP RAP = 77 TONS EST FF = 113 SY
CLASS B RIP RAP W/FILTER FABRIC EST RIP RAP = 2 TONS
LATERAL BASE DITCH SEE DETAIL 3 EST DDE = 59 CY
FILL IN SURFACE WATER DUE TO STREAM BANK PROTECTION
DETAIL 1 SPECIAL 'V' DITCH (Not to Scale)
Min. D = 1 Ft. Min. d = 1 Ft.
Type of Liner = CLASS B RIP RAP
STA 14+00 LT - 14+50 LT
DETAIL 2 LATERAL BASE DITCH (Not to Scale)
Min. D = 1 Ft. Max. d = 1 Ft. B = 3 Ft. b = 5 Ft.
Type of Liner = CLASS B RIP RAP
STA 14+55 RT - 18+25 RT
DETAIL 3 LATERAL BASE DITCH (Not to Scale)
Min. D = 0-1 Ft. B = 4 Ft. Min. b = 5 Ft.
STA 18+10 RT - 19+15 RT
DETAIL 4 FALSE SUMP (Not to Scale)
S=Ditch Slope
STA 14+50 LT
DETAIL 5 TOE PROTECTION (Not to Scale)
d = 3 Ft.
Type of Liner = CLASS B RIP RAP
STA 20+50 RT - 22+00 RT
DETAIL 6 PREFORMED SCOUR HOLE (NOT TO SCALE)
PLAN VIEW
SECTION A-A
CLASS 'I' RIP RAP 1.5' THICK W/ FILTER FABRIC
DETAIL 7 STREAM BANK PROTECTION (Not to Scale)
Min. D = 3 Ft. d = 3 Ft.
Type of Liner = CLASS II RIP RAP W/ FF
DDE=60 CY+/- | RR=90 TONS+/- | FF=90 SY+/-
DETAIL 8 STREAM BANK PROTECTION (Not to Scale)
Min. D = 2 Ft. d = 3 Ft.
Type of Liner = CLASS II RIP RAP W/ FF
DDE=35 CY+/- | RR=50 TONS+/- | FF=50 SY+/-

STATION	B FT.	D FT.	W FT.	d FT.	CLASS 1 RIP RAP TONS	DDE FT³	FILTER FABRIC FT²	PSRM FT²
16+25.00 RT	4.0	1.5	5.0	0.5	35.0	15.0	15.0	25.0
18+10.00 RT	4.0	1.5	5.0	0.5	35.0	15.0	15.0	25.0

NOTES: FOR STRUCTURE EXCAVATION LIMITS SEE STRUCTURE PLANS.

TAPER SHOULDERS PARALLEL TO GUARDRAIL WITH 3' OFFSET ON ALL 4 CORNERS OF BRIDGE.

SHBG IS SHOULDER BERM GUTTER.

PAVED SHOULDER (PS) WIDTH VARIES AS SHOWN IN PLAN VIEW.

* DESIGN EXCEPTIONS REQUIRED FOR HORIZONTAL SSD AND SUPERELEVATION

FOR -L- PROFILE SEE SHEET 5

$$DATE$$
25-OCT-2005 13:09
r:\hydraulics\b4110_rdy_psh4_permit.dgn
dduffield AT HY221523

EXCAVATION OF ROADWAY FILL

ENGLISH

PROJECT REFERENCE	SHEET NO.
B-4110	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
SHEET 7 & 8	

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Prepared in the Office of: GIBSON ENGINEERS, PC

VERTICAL SCALE 5' 0 5' 10'

HORIZONTAL SCALE 25' 0 25' 50'

BEGIN GRADE
STA.= 14+00.00
EL = 406.19'

-L-

PI = 18+50.00
EL = 377.00'
VC = 600'
* K = 53

BEGIN BRIDGE
STA.= 16+66.61

END BRIDGE
STA.= 18+16.71

END GRADE
STA.= 22+00.00
EL = 394.15'

(-) 8.220%

(-) 8.266%

(-) 6.000%

(+) 6.486%

(+) 0.400%

(+) 4.898%

14+00 LT BEGIN SP DITCH
EL = 405.16

14+50 LT END SP DITCH
EL = 401.65

14+55 RT BEGIN 3' LAT BASE DITCH
EL = 395.00

PI = 15+00.00 RT
EL = 394.28

16+25 RT END 3' LAT BASE DITCH
EL = 383.78

18+10 RT BEGIN 4' LAT BASE DITCH
EL = 377.08

19+15 RT END 4' LAT BASE DITCH
EL = 377.50

OHW = 374.4

MWS = 373.4
(11-02-04)

15'

12'

2%

15'

DITCH ON LEFT SIDE — · — · —
DITCH ON RIGHT SIDE - - - - - - - -

BENCH MARKS

BM 764: -BL- STA 15+98 LEFT 53'
-L- STA 18+51.42 LEFT 47.85'
N 874,471 E 2,028,868
EL = 378.56'

BM 766: -BL- STA 21+17 RIGHT 24'
-L- STA 23+70.50 RIGHT 41.41'
N 874,754 E 2,029,308
EL = 409.49'

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 1700 CFS
DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 380.9 FT
BASE DISCHARGE	= 2600 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 382.9 FT
OVERTOPPING DISCHARGE	= 4260 CFS
OVERTOPPING FREQUENCY	= 500 YRS
OVERTOPPING ELEVATION	= 385.7 FT
DATE OF SURVEY	= 11/02/04
W.S. ELEVATION AT DATE OF SURVEY	= 373.4 FT

* DESIGN EXCEPTION REQUIRED FOR VERTICAL SAG K FACTOR

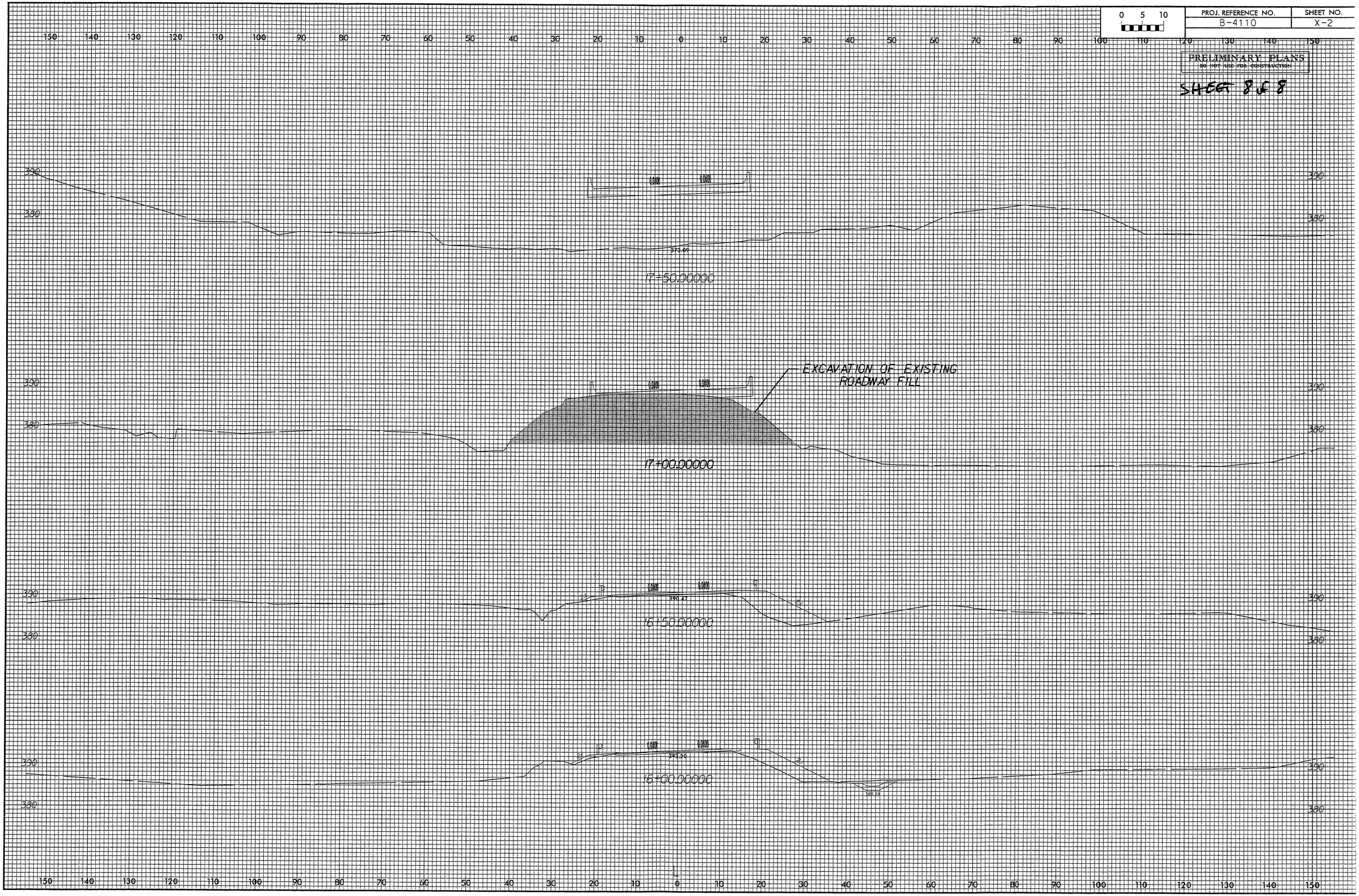
FOR -L- PLAN VIEW SEE SHEET 4

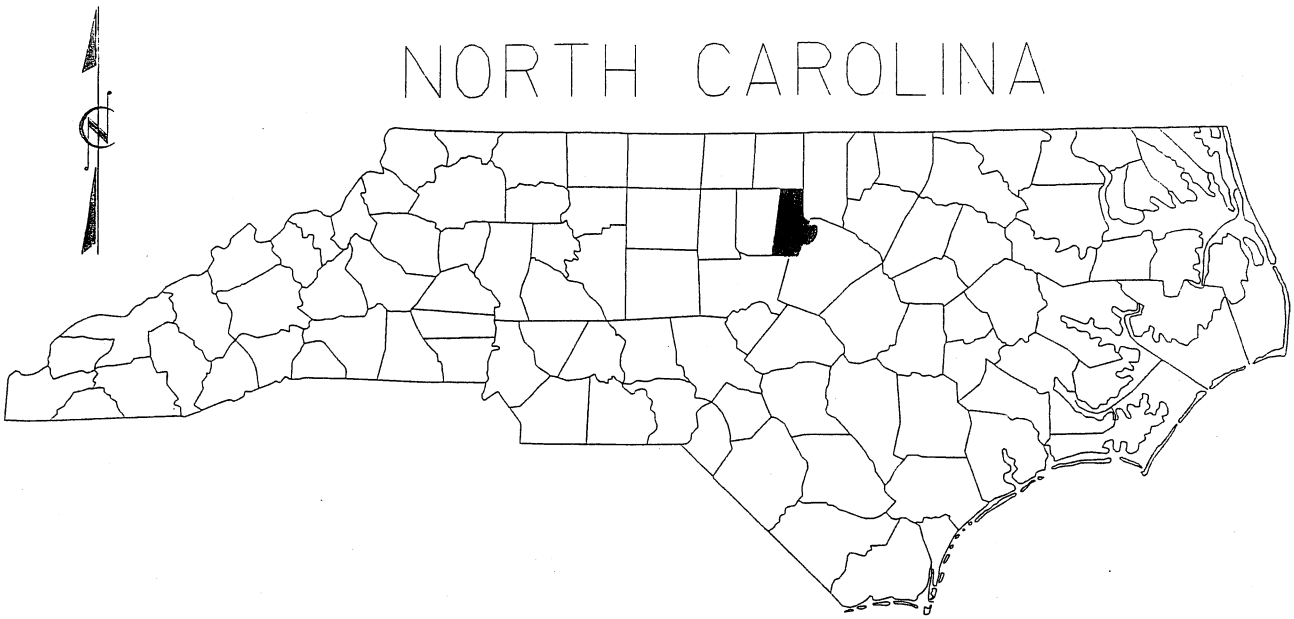
$$DATE$$
25-OCT-2005 16:07
c:\projects\b4110_pfl_permit.dgn
dduffield
AT HY221523

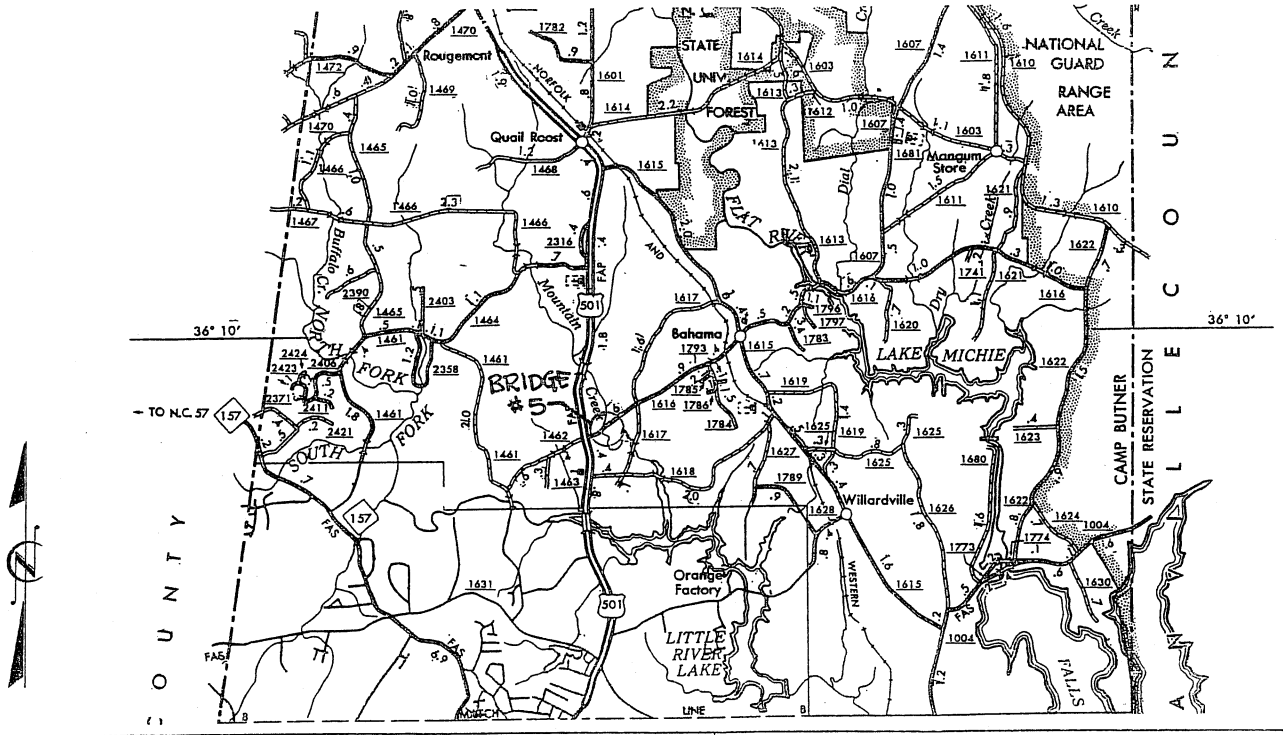
0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-4110	X-2

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

SHEET 8 OF 8







BUFFER DRAWINGS

VICINITY MAPS

NCDOT

DIVISION OF HIGHWAYS

DURHAM COUNTY

PROJECT: 33465.1.1 (B-4110)

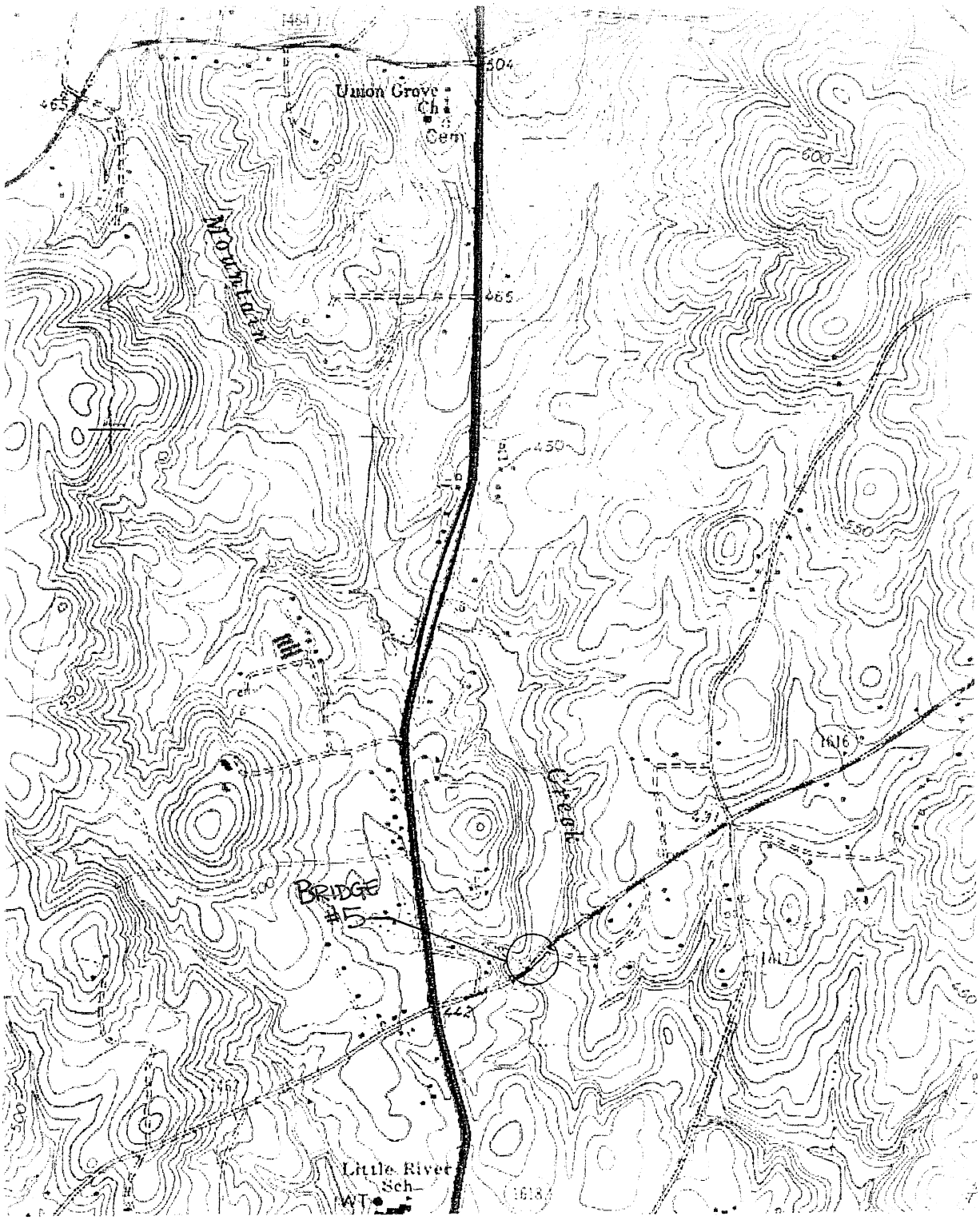
BRIDGE NO. 5

OVER MOUNTAIN CREEK

AND APPROACHES

ON SR 1616 (BAHAMA ROAD)

SHEET 1 OF 6 5/5/05



9° W

TOPO MAP

SCALE: 1" : 1500'

NCDOT

DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: 33465.1.1 (B-4110)
BRIDGE NO. 5
OVER MOUNTAIN CREEK
AND APPROACHES
ON SR 1616 (BAHAMA ROAD)

SHEET 2 OF 6 5/5/05

PROPERTY OWNERS

NAMES AND ADDRESSES

REFERENCE NO.	NAMES	ADDRESSES
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2	Patricia T. Byrd	114 Patrick Road Bahama, NC 27503
3	Ricky E. Herron	400 Bahama Road Bahama, NC 27503
4	Charles Hill	P.O. Box 472 Bahama, NC 27503
5	Sandra Hill	P.O. Box 12 Bahama, NC 27503
6	Walter Allen Linthicum	406 Bahama Road Durham, NC 27503
7	Joseph Mangum	308 Bahama Road Bahama, NC 27503
8	Juanita Pearce	210 Preston Andrews Road Bahama, NC 27503
9	Frances A. Terry	114 Patrick Road Bahama, NC 27503
10	Harold K. Terry	9318 Roxboro Bahama, NC 27503
11	Kevin A. Terry	302 Bahama Road Bahama, NC 27503
12	George P. Tilley, Jr.	310 Yellit Road Bahama, NC 27503
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NCDOT

DIVISION OF HIGHWAYS

DURHAM COUNTY

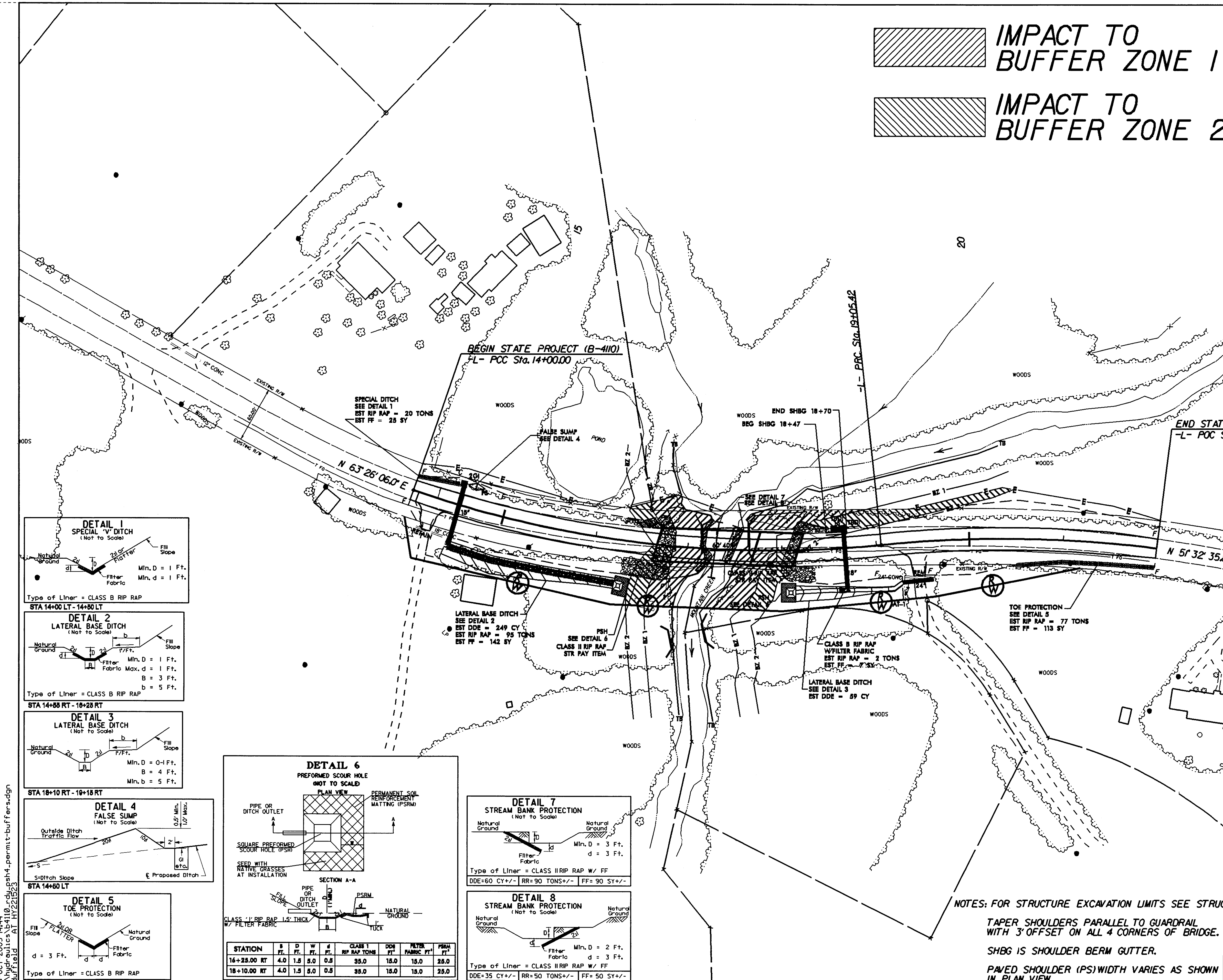
PROJECT: 33465.1.1 (B-4110)

BRIDGE NO. 5

OVER MOUNTAIN CREEK

AND APPROACHES

ON SR 1616 (BAHAMA ROAD)



IMPACT TO BUFFER ZONE 1
IMPACT TO BUFFER ZONE 2
BEGIN STATE PROJECT (B-4110)
-L- PCC Sta. 14+00.00
END STATE PROJECT (B-4110)
-L- POC Sta. 22+00.00
-L- PRC Sta. 19+05.42
N 63° 26' 06.0" E
N 51° 32' 35.8" E
SPECIAL DITCH
SEE DETAIL 1
EST RIP RAP = 20 TONS
EST FF = 25 SY
FALSE SUMP
SEE DETAIL 4
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WOODS
END SHBG 18+70
BEG SHBG 18+47
SEE DETAIL 7
SEE DETAIL 8
LATERAL BASE DITCH
SEE DETAIL 2
EST DDE = 249 CY
EST RIP RAP = 95 TONS
EST FF = 142 SY
PSH
SEE DETAIL 6
CLASS II RIP RAP
STR PAY ITEM
CLASS B RIP RAP
W/FILTER FABRIC
EST RIP RAP = 2 TONS
LATERAL BASE DITCH
SEE DETAIL 3
EST DDE = 59 CY
TOE PROTECTION
SEE DETAIL 5
EST RIP RAP = 77 TONS
EST FF = 113 SY
EXISTING R/W
12" CONC
15" CONC
18" CONC
24" CONC
DETAIL 1
SPECIAL 'V' DITCH
(Not to Scale)
Natural Ground
Fill Slope
Filter Fabric
Min. D = 1 Ft.
Min. d = 1 Ft.
Type of Liner = CLASS B RIP RAP
STA 14+00 LT - 14+50 LT
DETAIL 2
LATERAL BASE DITCH
(Not to Scale)
Min. D = 1 Ft.
Max. d = 1 Ft.
B = 3 Ft.
b = 5 Ft.
Type of Liner = CLASS B RIP RAP
STA 14+55 RT - 16+25 RT
DETAIL 3
LATERAL BASE DITCH
(Not to Scale)
Min. D = 0-1 Ft.
B = 4 Ft.
Min. b = 5 Ft.
STA 18+10 RT - 19+15 RT
DETAIL 4
FALSE SUMP
(Not to Scale)
Outside Ditch
Traffic Flow
S=Ditch Slope
℄ Proposed Ditch
STA 14+50 LT
DETAIL 5
TOE PROTECTION
(Not to Scale)
2:1 OR FLATTER
d = 3 Ft.
Type of Liner = CLASS B RIP RAP
STA 20+50 RT - 22+00 RT
DETAIL 6
PREFORMED SCOUR HOLE
(NOT TO SCALE)
PLAN VIEW
PIPE OR DITCH OUTLET
PERMANENT SOIL REINFORCEMENT MATTING (PSRM)
SQUARE PREFORMED SCOUR HOLE (PSH)
SEED WITH NATIVE GRASSES AT INSTALLATION
SECTION A-A
FILL SLOPE
CLASS 'I' RIP RAP 1.5' THICK W/ FILTER FABRIC
NATURAL GROUND
TUCK
DETAIL 7
STREAM BANK PROTECTION
(Not to Scale)
Min. D = 3 Ft.
d = 3 Ft.
Type of Liner = CLASS II RIP RAP W/ FF
DDE=60 CY+/- | RR=90 TONS+/- | FF= 90 SY+/-
DETAIL 8
STREAM BANK PROTECTION
(Not to Scale)
Min. D = 2 Ft.
d = 3 Ft.
Type of Liner = CLASS II RIP RAP W/ FF
DDE=35 CY+/- | RR=50 TONS+/- | FF= 50 SY+/-

STATION	B FT.	D FT.	W FT.	d FT.	CLASS 1 RIP RAP TONS	DDE FT³	FILTER FABRIC FT²	PSRM FT²
16+25.00 RT	4.0	1.5	5.0	0.5	35.0	15.0	15.0	25.0
18+10.00 RT	4.0	1.5	5.0	0.5	35.0	15.0	15.0	25.0

PROJECT REFERENCE	SHEET NO.
B-4110	

ROADWAY DESIGN ENGINEER — SHEET | HYDRAULICS ENGINEER — 4 of 6

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

Prepared in the Office of: GIBSON ENGINEERS, PC

GRAPHIC SCALE 25' 0 25' 50'

ENGLISH

NAD 83 NC GRID

NOTES: FOR STRUCTURE EXCAVATION LIMITS SEE STRUCTURE PLANS.

TAPER SHOULDERS PARALLEL TO GUARDRAIL WITH 3' OFFSET ON ALL 4 CORNERS OF BRIDGE.

SHBG IS SHOULDER BERM GUTTER.

PAVED SHOULDER (PS) WIDTH VARIES AS SHOWN IN PLAN VIEW.

* DESIGN EXCEPTIONS REQUIRED FOR HORIZONTAL SSD AND SUPERELEVATION FOR -L- PROFILE SEE SHEET 5

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PROJECT REFERENCE	SHEET NO.
B-4110	4

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
SHEET	5 of 6

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

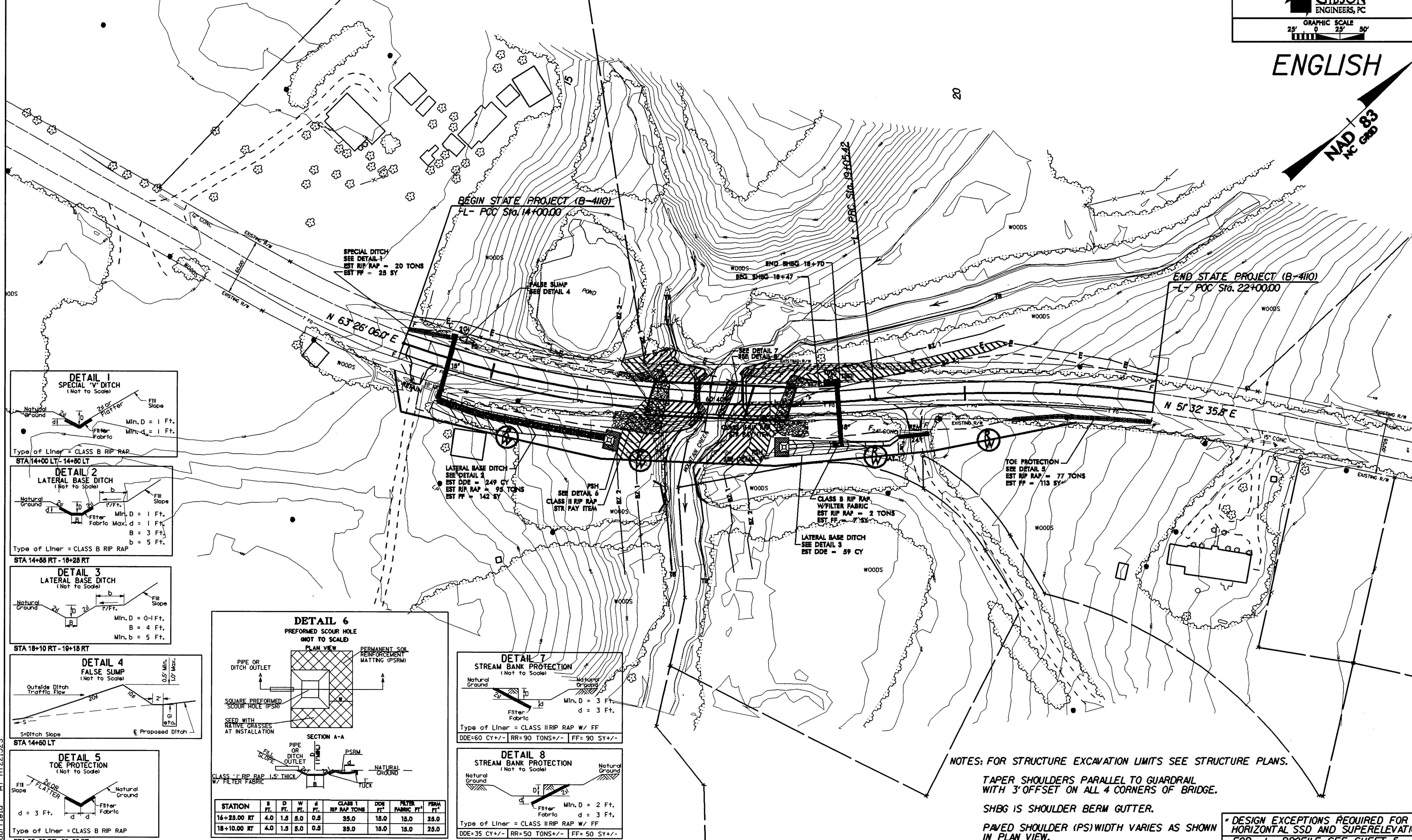
Prepared in the Office of: GIBSON ENGINEERS, PC

GRAPHIC SCALE 25' 0 25' 50'

ENGLISH

IMPACT TO BUFFER ZONE 1

IMPACT TO BUFFER ZONE 2



NAD 83 NC GRID
BEGIN STATE PROJECT (B-4110)
-L- POC Sta. 14+00.00
END STATE PROJECT (B-4110)
-L- POC Sta. 22+00.00
N 63° 25' 06.0" E
N 51° 32' 35.8" E
SPECIAL DITCH SEE DETAIL 1 EST RIP RAP = 20 TONS EST FF = 25 SY
FALSE SUMP SEE DETAIL 4
POND
END SHBG 18+70
BEG SHBG 18+47
SEE DETAIL 7
LATERAL BASE DITCH SEE DETAIL 2 EST DDE = 249 CY EST RIP RAP = 95 TONS EST FF = 142 SY
PSH SEE DETAIL 6 CLASS II RIP RAP STR PAY ITEM
CLASS B RIP RAP W/FILTER FABRIC EST RIP RAP = 2 TONS
LATERAL BASE DITCH SEE DETAIL 3 EST DDE = 59 CY
TOE PROTECTION SEE DETAIL 5 EST RIP RAP = 77 TONS EST FF = 113 SY
WOODS
DETAIL 1 SPECIAL 'V' DITCH (Not to Scale)
Type of Liner = CLASS B RIP RAP
STA 14+00 LT - 14+50 LT
DETAIL 2 LATERAL BASE DITCH (Not to Scale)
Type of Liner = CLASS B RIP RAP
STA 14+55 RT - 16+25 RT
DETAIL 3 LATERAL BASE DITCH (Not to Scale)
STA 18+10 RT - 19+15 RT
DETAIL 4 FALSE SUMP (Not to Scale)
STA 14+50 LT
DETAIL 5 TOE PROTECTION (Not to Scale)
Type of Liner = CLASS B RIP RAP
STA 20+50 RT - 22+00 RT
DETAIL 6 PREFORMED SCOUR HOLE (NOT TO SCALE)
DETAIL 7 STREAM BANK PROTECTION (Not to Scale)
Type of Liner = CLASS II RIP RAP W/ FF
DDE=60 CY+/- RR=90 TONS+/- FF=90 SY+/-
DETAIL 8 STREAM BANK PROTECTION (Not to Scale)
Type of Liner = CLASS II RIP RAP W/ FF
DDE=35 CY+/- RR=50 TONS+/- FF=50 SY+/-

STATION	B FT.	D FT.	W FT.	d FT.	CLASS 1 RIP RAP TONS	DDE FT³	FILTER FABRIC FT²	PSRM FT²
16+25.00 RT	4.0	1.5	5.0	0.5	35.0	15.0	15.0	25.0
18+10.00 RT	4.0	1.5	5.0	0.5	35.0	15.0	15.0	25.0

NOTES: FOR STRUCTURE EXCAVATION LIMITS SEE STRUCTURE PLANS.

TAPER SHOULDERS PARALLEL TO GUARDRAIL WITH 3' OFFSET ON ALL 4 CORNERS OF BRIDGE.

SHBG IS SHOULDER BERM GUTTER.

PAVED SHOULDER (PS) WIDTH VARIES AS SHOWN IN PLAN VIEW.

* DESIGN EXCEPTIONS REQUIRED FOR HORIZONTAL SSD AND SUPERELEVATION

FOR -L- PROFILE SEE SHEET 5

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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	1@105'	17+41.66 -L-	X		7835.0	4114.9	11949.9					
	39" CONCRETE											
	BOX GIRDER											
	1@45'											
	27" CONCRETE											
	BOX GIRDER											
	BRIDGE											
2	ROADWAY FILL	18+50.00 TO		X				201.7	2233.5	2435.2		
		20+50.00 -L-										
TOTAL:					7835.0	4114.9	11949.9	201.7	2233.5	2435.2	0.0	0.0

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

DURHAM
COUNTY

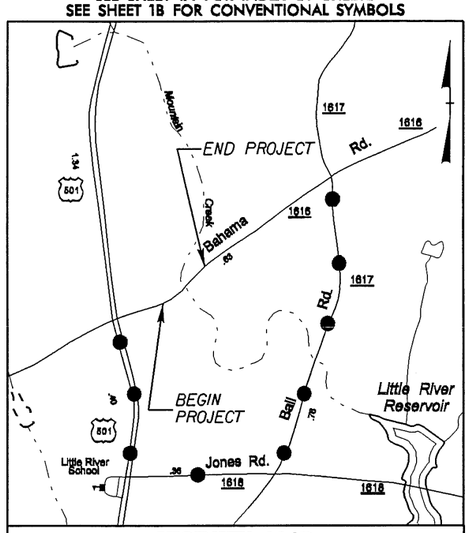
WBS - 33465.1.1 (B-4110)

SHEET 6 of 6 8/26/2005

TIP PROJECT: B-4110

CONTRACT: 201490

SEE SHEET 1A FOR INDEX OF SHEETS
SEE SHEET 1B FOR CONVENTIONAL SYMBOLS



VICINITY MAP

OFF-SITE DETOUR

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

THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DURHAM COUNTY

ROW PLAN SUBMITTAL

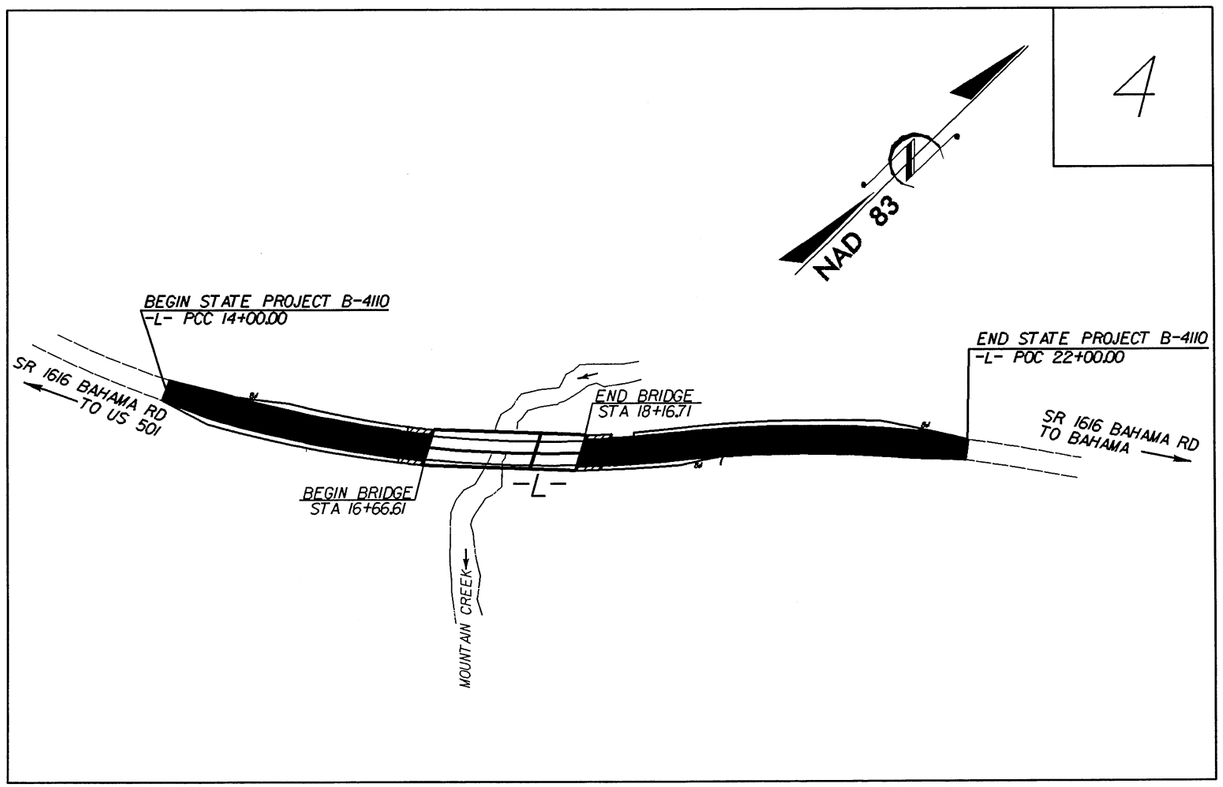
LOCATION: BRIDGE NO. 5 OVER MOUNTAIN CREEK AND APPROACHES ON SR 1616 (BAHAMA ROAD)

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4110	1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
33465.1.1	BRZ-1616(5)	P.E.	

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

4



NCDOT CONTACT: CATHY HOUSER, PE, ENGINEERING COORDINATION PROJECT ENGINEER, ROADWAY DESIGN UNIT

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 2006	=	3750
ADT 2026	=	6750
DHV	=	13 %
D	=	60 %
T	=	3 % *
V	=	60 MPH

* TTST 1% DUAL 2%

FUNC CLASS:
RURAL MINOR COLLECTOR

DESIGN EXCEPTIONS:
SAG VERTICAL CURVE K
SUPERELEVATION
HORIZONTAL SSD

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4110	=	0.124 MILES
LENGTH STRUCTURES TIP PROJECT B-4110	=	0.028 MILES
TOTAL LENGTH OF TIP PROJECT B-4110	=	0.152 MILES

Prepared In the Office of:
GIBSON ENGINEERS, PC
PO BOX 700
FUQUAY VARINA, N.C. 27526
PHONE 919-552-2253
FAX 919-552-2254

GIBSON ENGINEERS, PC

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JUNE 17, 2005

LETTING DATE: APRIL 18, 2006

GLENDA M. GIBSON, PE
PROJECT ENGINEER

MICHAEL PEKAREK, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR *DATE*

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PROJECT REFERENCE	SHEET NO.
B-4110	1-B

Note: Not to Scale

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

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing High Quality Wetland Boundary — HQ WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB

BUILDINGS AND OTHER CULTURE:

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

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- River Basin Buffer — RBB
- Flow Arrow
- Disappearing Stream
- Spring
- Swamp Marsh
- Proposed Lateral, Tail, Head Ditch — FLOW
- False Sump

RAILROADS:

- Standard Guage — CSX TRANSPORTATION
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH
- RR Abandoned
- RR Dismantled

RIGHT OF WAY:

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

ROADS AND RELATED FEATURES:

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

VEGETATION:

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

EXISTING STRUCTURES:

MAJOR:

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

MINOR:

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

UTILITIES:

POWER:

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

TELEPHONE:

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

WATER:

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

TV:

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

GAS:

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

SANITARY SEWER:

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

MISCELLANEOUS:

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

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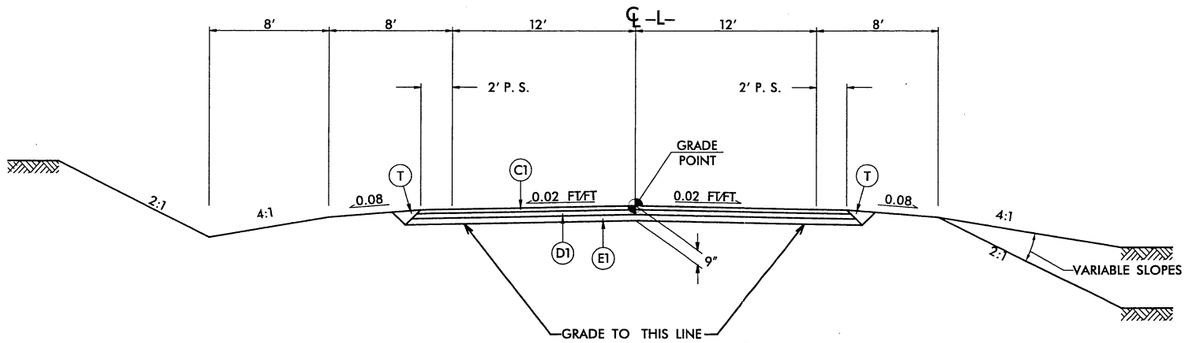
PROJECT REFERENCE	SHEET NO.
B-4110	2
ROADWAY DESIGN ENGINEER	PAVEMENT ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

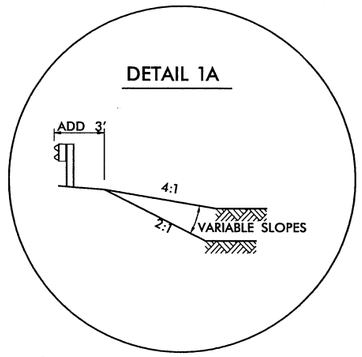
Prepared in the Office of: GIBSON ENGINEERS, PC



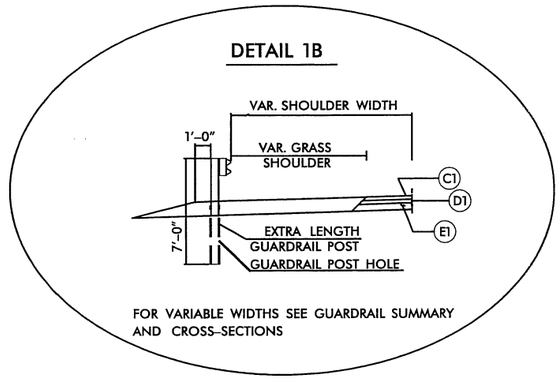
TYPICAL SECTION NO. 1

USE TYPICAL SECTION NO. 1:
–L– STA 14+00.00 TO 16+66.61
–L– STA 18+16.71 TO 22+00.00

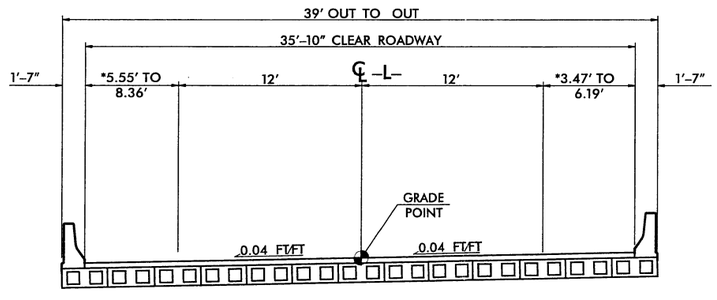
NOTE: FOR VARIABLE SLOPES SEE CROSS SECTIONS.



DETAIL 1A
USE AT GUARDRAIL LOCATIONS



USE DETAIL 1B IN CONJUNCTION WITH SECTION 1 AT:
–L– STA 15+25 LT TO 16+25 LT



TYPICAL SECTION NO. 2

USE TYPICAL SECTION NO. 2:
–L– STA 16+66.61 TO 18+16.71

* BRIDGE TO BE CONSTRUCTED ON A TANGENT. ALIGNMENT ON A CURVE RESULTS IN VARIABLE BRIDGE RAIL OFFSETS WITH A MINIMUM OF 3'.

PAVEMENT SCHEDULE	
C1	PROP. APPROX. 2" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 220LBS. PER SQ. YD.
D1	PROP. APPROX. 2½" ASPHALT CONCRETE BINDER COURSE. TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.
E1	PROP. APPROX. 4½" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 513 LBS. PER SQ. YD.
T	EARTH MATERIAL.

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

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STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PROJECT REFERENCE	SHEET NO.
B-4110	3-A

Prepared in the Office of: GIBSON ENGINEERS, PC

SUMMARY OF EARTHWORK

Station	Station	Uncl. Excav.	Undercut Excav.	Embank. +%	Borrow	Waste
14+00.00	16+66.61	98		785	687	
18+16.71	22+00.00	49		1573	1524	
PROJECT TOTALS:		147		2358	2211	0
EXCAVATION FROM STRUCTURE IN LIEU OF BORROW					-1500	
EST. 5% TO REPLACE TOPSOIL IN BORROW PITS					35.55	
GRAND TOTALS:		147		2358	747	0
SAY:		**170**		**2600**	**850**	**0**

DDE	450 CY
EST. UNDERCUT	200 CY
SELECT GRANULAR MATERIAL	100 CY
CLASS IV SUBGRADE STABILIZATION	100 CY

SUMMARY OF EXISTING ASPHALT PAVEMENT REMOVAL

LINE	Station	Station	LOC LT/RT/CL	SY^2
-L-	14+00.00	17+14.87	CL	734.7
-L-	17+66.00	22+00.00	CL	1012.67
			TOTAL:	1747.37
			SAY:	1900

"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

LINE	BEG. STA.	END STA.	LOC.	LENGTH			WARRANT POINT		"N" DIST	TOTAL	FLARE LENGTH		W		ANCHORS							IMP. ATTEN. TYPE 350			REMOVE		REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPR. END	TRAIL. END	FROM E.O.L.	SHLDR WIDTH	APPR. END	TRAIL. END	APPR. END	TRAIL. END	XI MOD	III	GRAU 350	M-350	XII	CAT-1	AT-1	EA	G	NG	EXISTING GRDRAIL		
-L-	15+20.79	16+58.29	LT	137.50			16+58.29		6.19		68.75		1.38			1	1										
-L-	14+37.37	16+63.04	RT	212.50	50		16+63.04		6.19		178.61		1.81			1					1						
-L-	18+34.78	21+34.78	LT	300.00			18+34.78		5.55		231.25		2.45			1	1										
-L-	18+22.84	19+32.07	RT	87.50	50		18+22.84		5.58		72.2		1.44			1					1						
SUBTOTAL				737.50	100											4	2				2						
ANCHOR DEDUCTIONS				187.50																							
TOTAL				**550.00**	**100**											**4**	**2**				**2**						

ANCHOR DEDUCTIONS		
GRAU-350	2 X 50 =	100
TYPE III	4 X 18.75 =	75
AT-1	2 X 6.25 =	12.5
TOTAL		187.5

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PROJECT REFERENCE	SHEET NO.
B-4110	4

ROADWAY DESIGN ENGINEER — HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Prepared in the Office of: GIBSON ENGINEERS, PC

GRAPHIC SCALE 25' 0 25' 50'

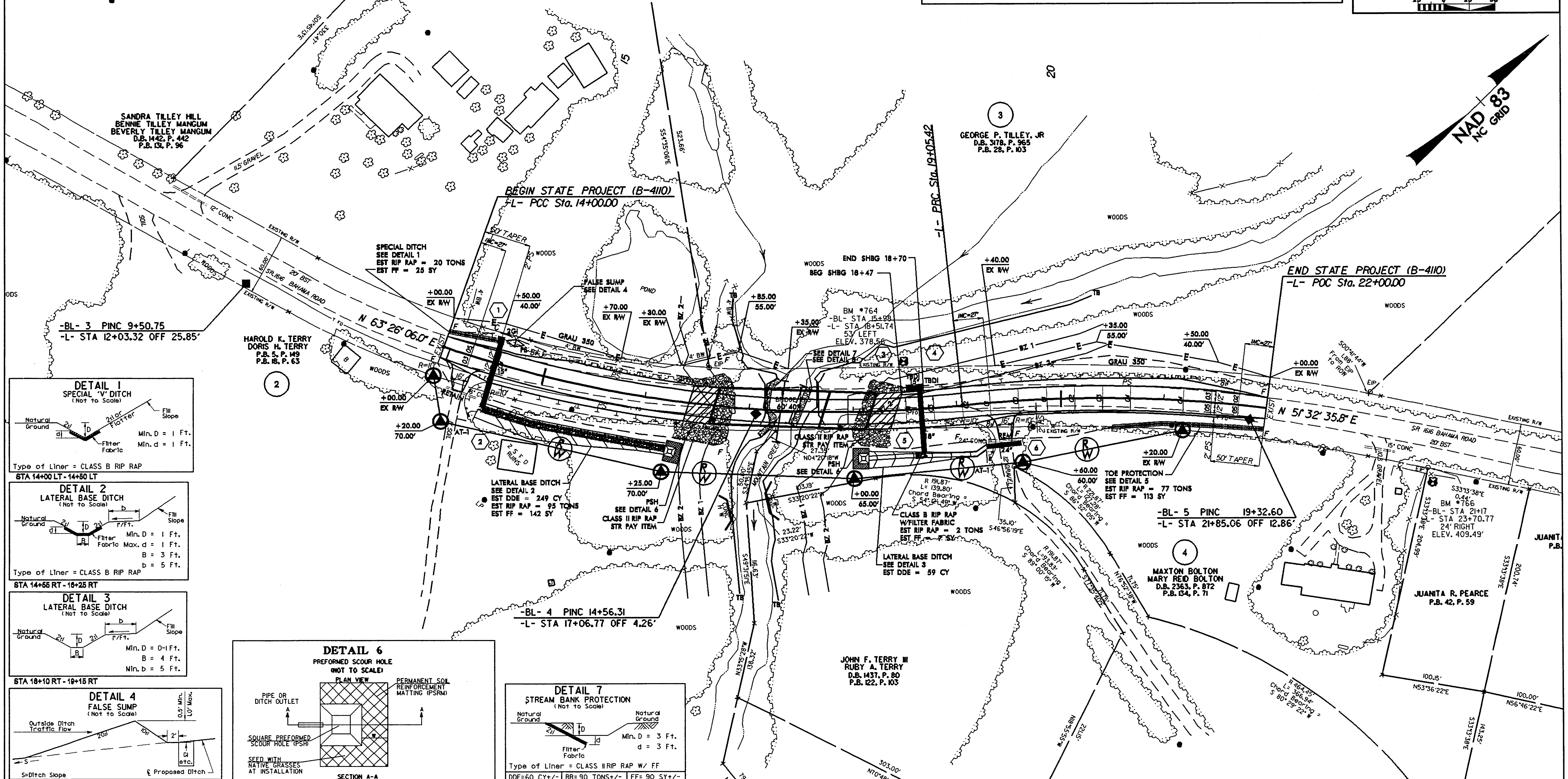
-L-

PI Sta 16+56.86	PI Sta 21+01.26
Δ = 25° 10' 53.2" (LT)	Δ = 17° 31' 55.0" (RT)
D = 4° 58' 56.1"	D = 4° 30' 41.3"
L = 505.42'	L = 388.61'
T = 256.86'	T = 195.83'
R = 1,150.00'	R = 1,270.00'
*SE= SEE PLANVIEW	*SE= SEE PLANVIEW

DETAIL SHOWING PAVEMENT - BRIDGE RELATIONSHIP

BEG APPROACH SLAB STA 16+41.61 — END APPROACH SLAB STA 18+41.72 — BEG BRIDGE STA 16+66.61 — END BRIDGE STA 18+16.72

** G/R ANCHOR UNIT REQUIRED



DETAIL 1 — SPECIAL 'V' DITCH (Not to Scale) — Min. D = 1 Ft., Min. d = 1 Ft. — Type of Liner = CLASS B RIP RAP — STA 14+00 LT - 14+50 LT

DETAIL 2 — LATERAL BASE DITCH (Not to Scale) — Min. D = 1 Ft., Max. d = 1 Ft., B = 3 Ft., b = 5 Ft. — Type of Liner = CLASS B RIP RAP — STA 14+55 RT - 16+25 RT

DETAIL 3 — LATERAL BASE DITCH (Not to Scale) — Min. D = 0-1 Ft., B = 4 Ft., Min. b = 5 Ft. — STA 18+10 RT - 19+15 RT

DETAIL 4 — FALSE SUMP (Not to Scale) — STA 14+50 LT

DETAIL 5 — TOE PROTECTION (Not to Scale) — d = 3 Ft. — Type of Liner = CLASS B RIP RAP — STA 20+50 RT - 22+00 RT

DETAIL 6 — PREFORMED SCOUR HOLE (NOT TO SCALE)

STATION	B FT.	D FT.	W FT.	d FT.	CLASS 1 RIP RAP TONS	DDE FT³	FILTER FABRIC FT²	PSRM FT²
16+25.00 RT	4.0	1.5	5.0	0.5	35.0	15.0	15.0	25.0
18+10.00 RT	4.0	1.5	5.0	0.5	35.0	15.0	15.0	25.0

DETAIL 7 — STREAM BANK PROTECTION (Not to Scale) — Min. D = 3 Ft., d = 3 Ft. — Type of Liner = CLASS II RIP RAP W/ FF — DDE=60 CY+/- | RR= 90 TONS+/- | FF= 90 SY+/-

DETAIL 8 — STREAM BANK PROTECTION (Not to Scale) — Min. D = 2 Ft., d = 3 Ft. — Type of Liner = CLASS II RIP RAP W/ FF — DDE=35 CY+/- | RR= 50 TONS+/- | FF= 50 SY+/-

NOTES: FOR STRUCTURE EXCAVATION LIMITS SEE STRUCTURE PLANS,

TAPER SHOULDERS PARALLEL TO GUARDRAIL WITH 3' OFFSET ON ALL 4 CORNERS OF BRIDGE.

SHBG IS SHOULDER BERM GUTTER.

PAVED SHOULDER (PS) WIDTH VARIES AS SHOWN IN PLAN VIEW.

* DESIGN EXCEPTIONS REQUIRED FOR HORIZONTAL SSD AND SUPERELEVATION

FOR -L- PROFILE SEE SHEET 5

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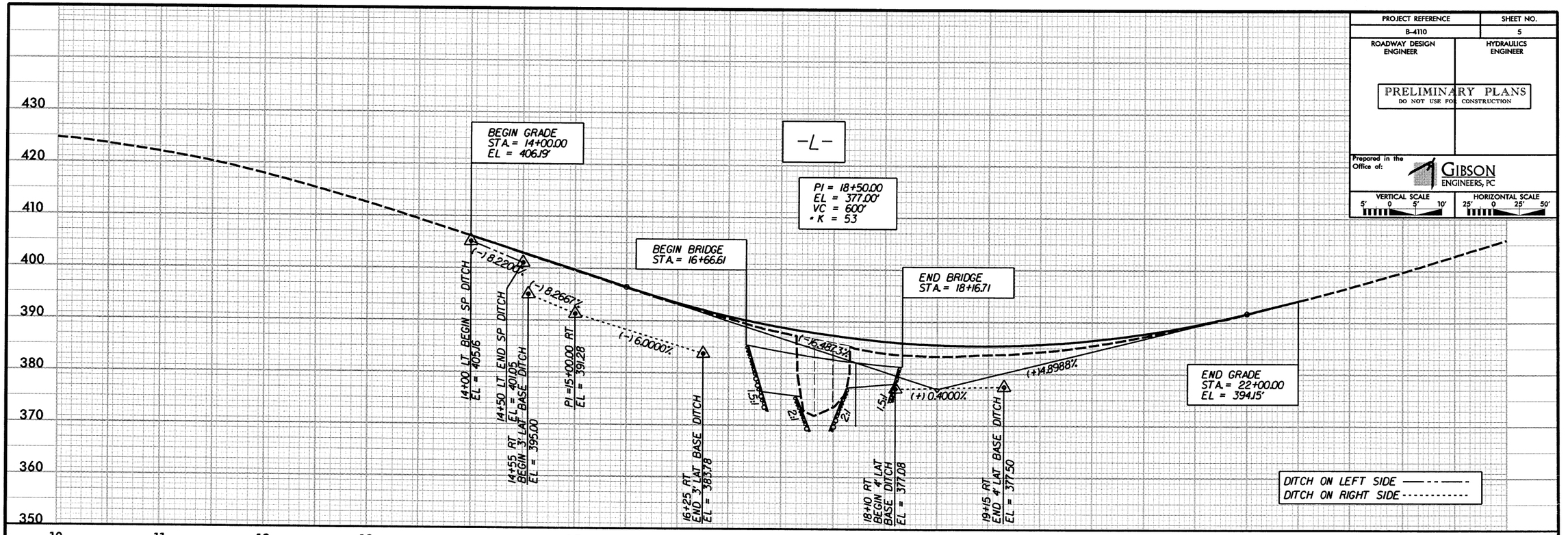
PROJECT REFERENCE	SHEET NO.
B-4110	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Prepared in the Office of: GIBSON ENGINEERS, PC

VERTICAL SCALE 0 5' 10'
HORIZONTAL SCALE 0 25' 50'



BENCH MARKS

BM 764: -BL- STA 15+98 LEFT 53'
-L- STA 18+51.42 LEFT 47.85'
N 874,471 E 2,028,868
EL = 378.56'

BM 766: -BL- STA 21+17 RIGHT 24'
-L- STA 23+70.50 RIGHT 41.41'
N 874,754 E 2,029,308
EL = 409.49'

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 1700 CFS
DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 380.9 FT
BASE DISCHARGE	= 2600 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 382.9 FT
OVERTOPPING DISCHARGE	= 4260 CFS
OVERTOPPING FREQUENCY	= 500 YRS
OVERTOPPING ELEVATION	= 385.7 FT
DATE OF SURVEY	= 11/02/04
W.S. ELEVATION AT DATE OF SURVEY	= 373.4 FT

* DESIGN EXCEPTION REQUIRED FOR VERTICAL SAG K FACTOR

FOR -L- PLAN VIEW SEE SHEET 4

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PROJ. REFERENCE NO.	SHEET NO.
B-4110	X-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CROSS-SECTION SUMMARY

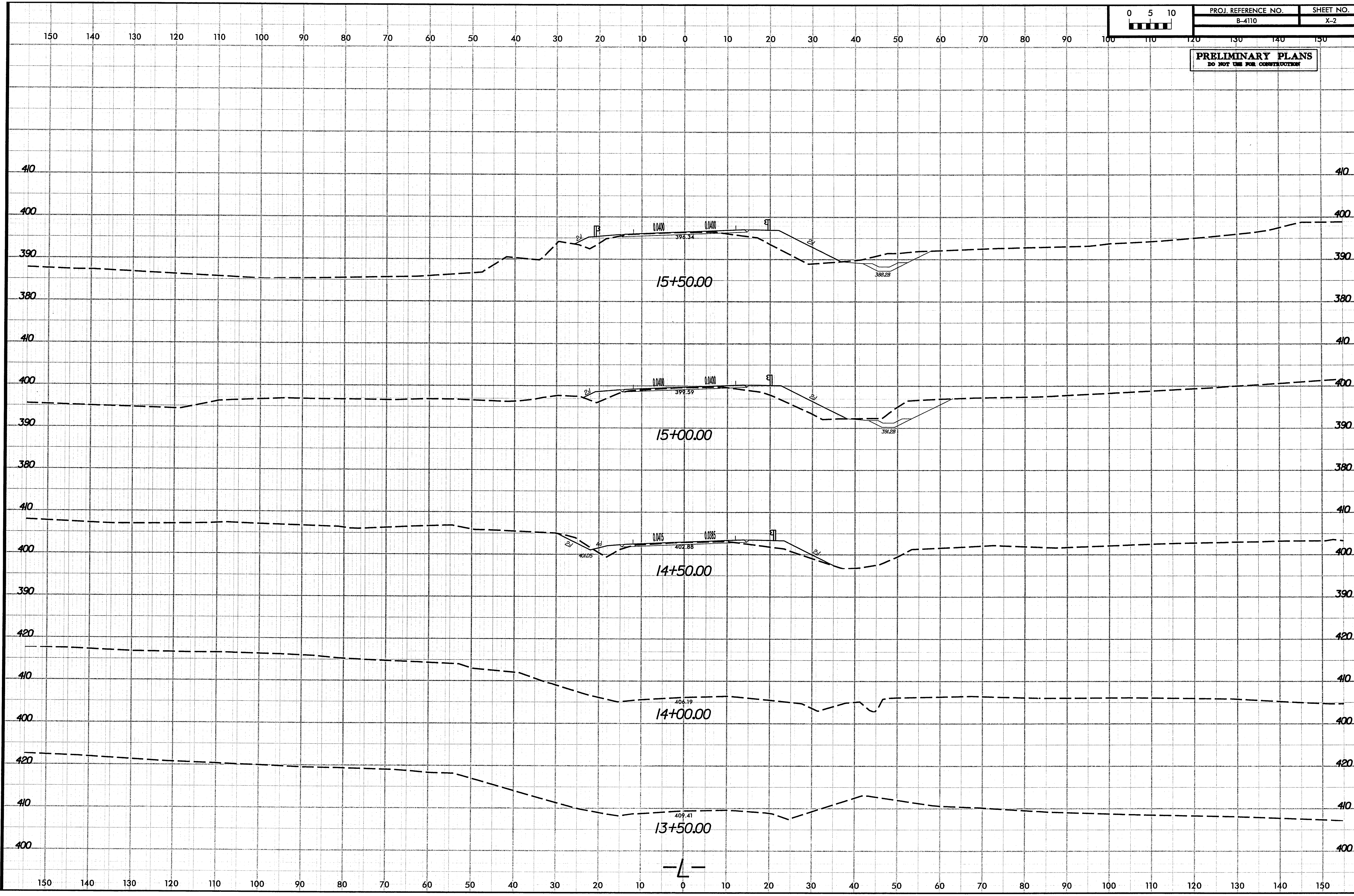
NOTE: EMBANKMENT COLUMN INCLUDES BACKFILL FOR UNDERCUT

Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
14+00.000	0	0
14+50.000	28	34
15+00.000	22	97
15+50.000	17	142
16+00.000	17	136
16+50.000	11	139
16+66.610	2	54
16+82.500	1	52

Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
18+07.500	0	0
18+16.700	0	33
18+50.000	0	239
19+00.000	0	306
19+50.000	0	179
20+00.000	0	156
20+50.000	1	185
21+00.000	7	125
21+50.000	17	63
22+00.000	24	25

PROJ. REFERENCE NO.	SHEET NO.
B-4110	X-2

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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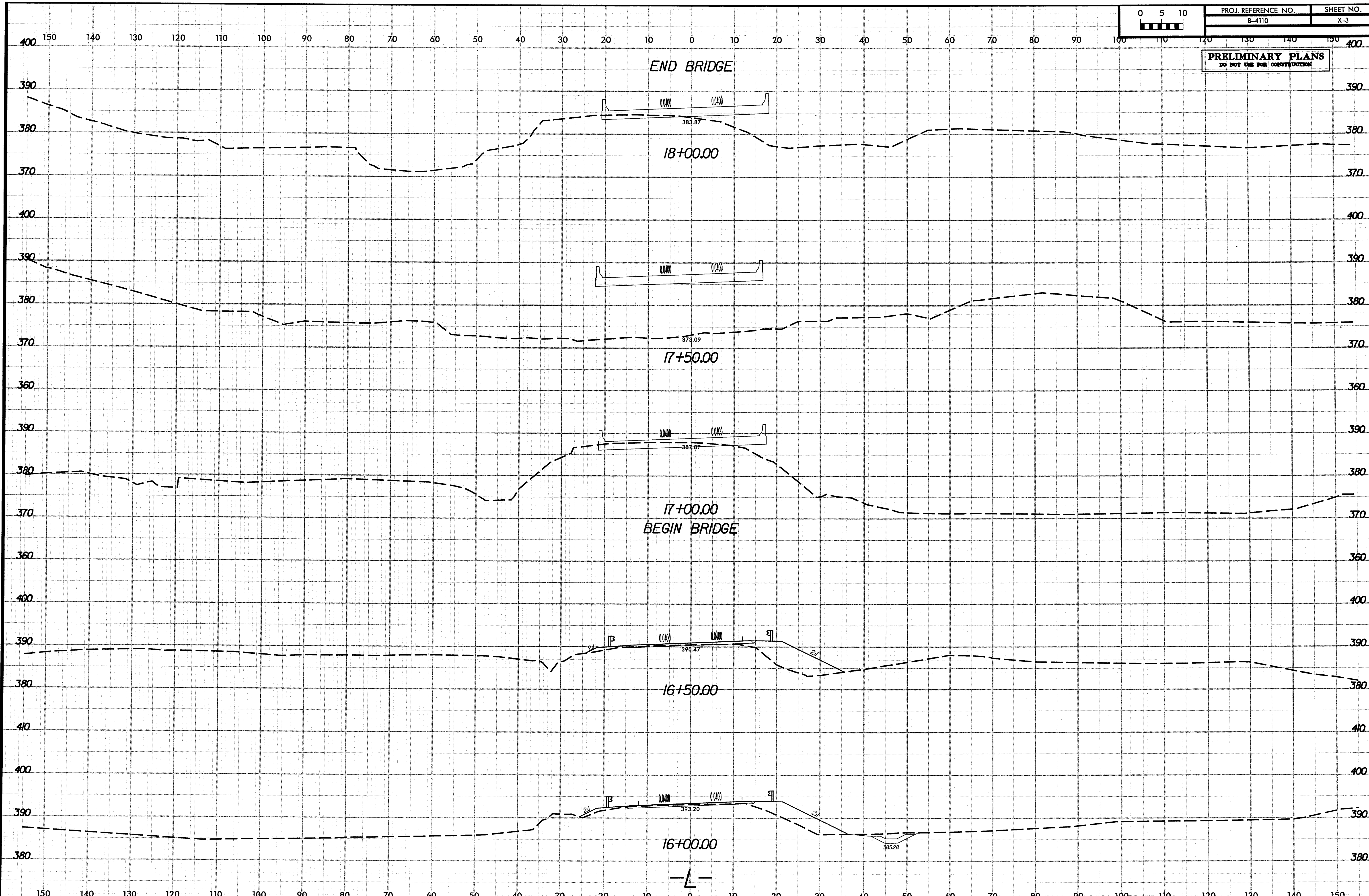

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PROJ. REFERENCE NO.	SHEET NO.
B-4110	X-4

0 5 10

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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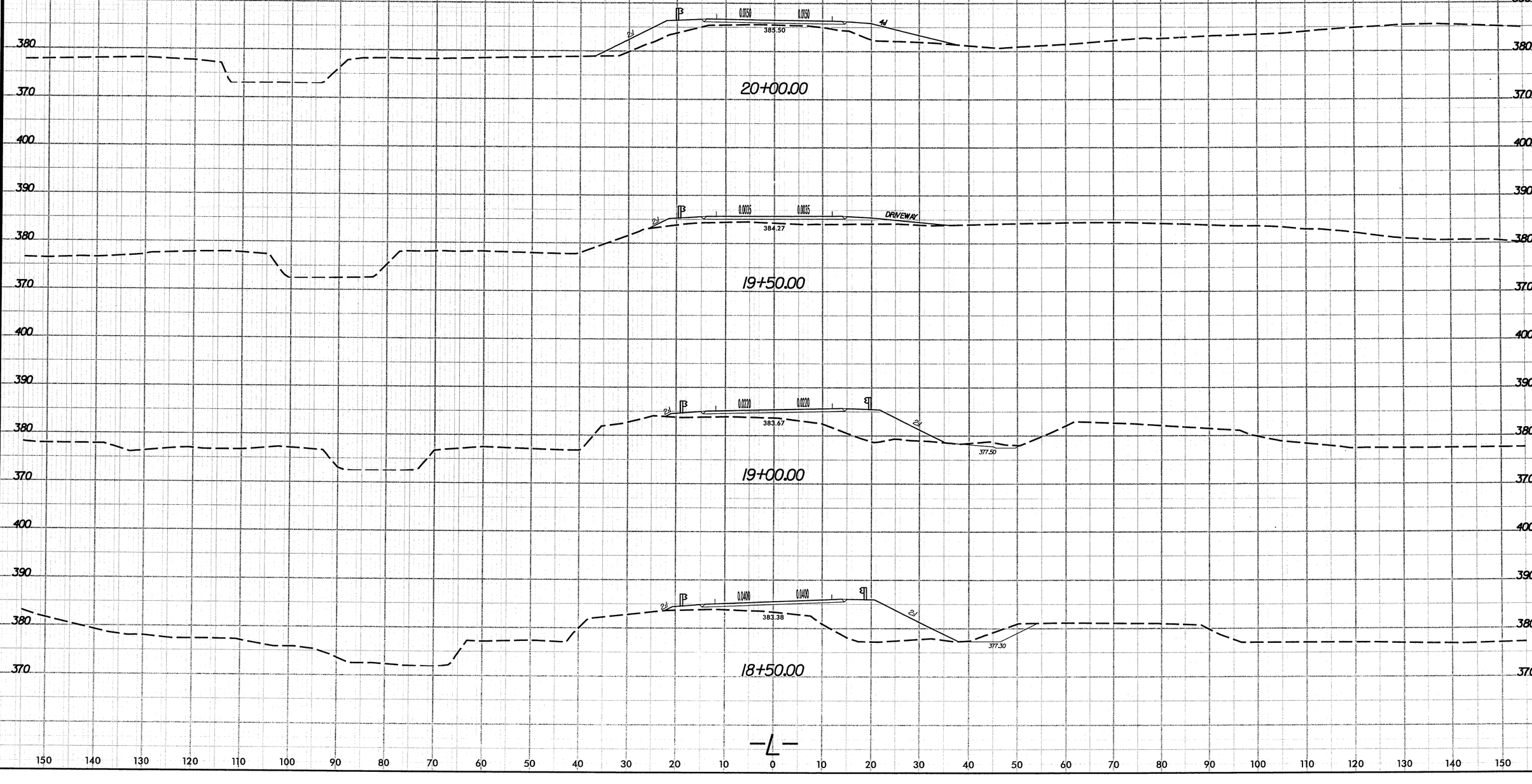
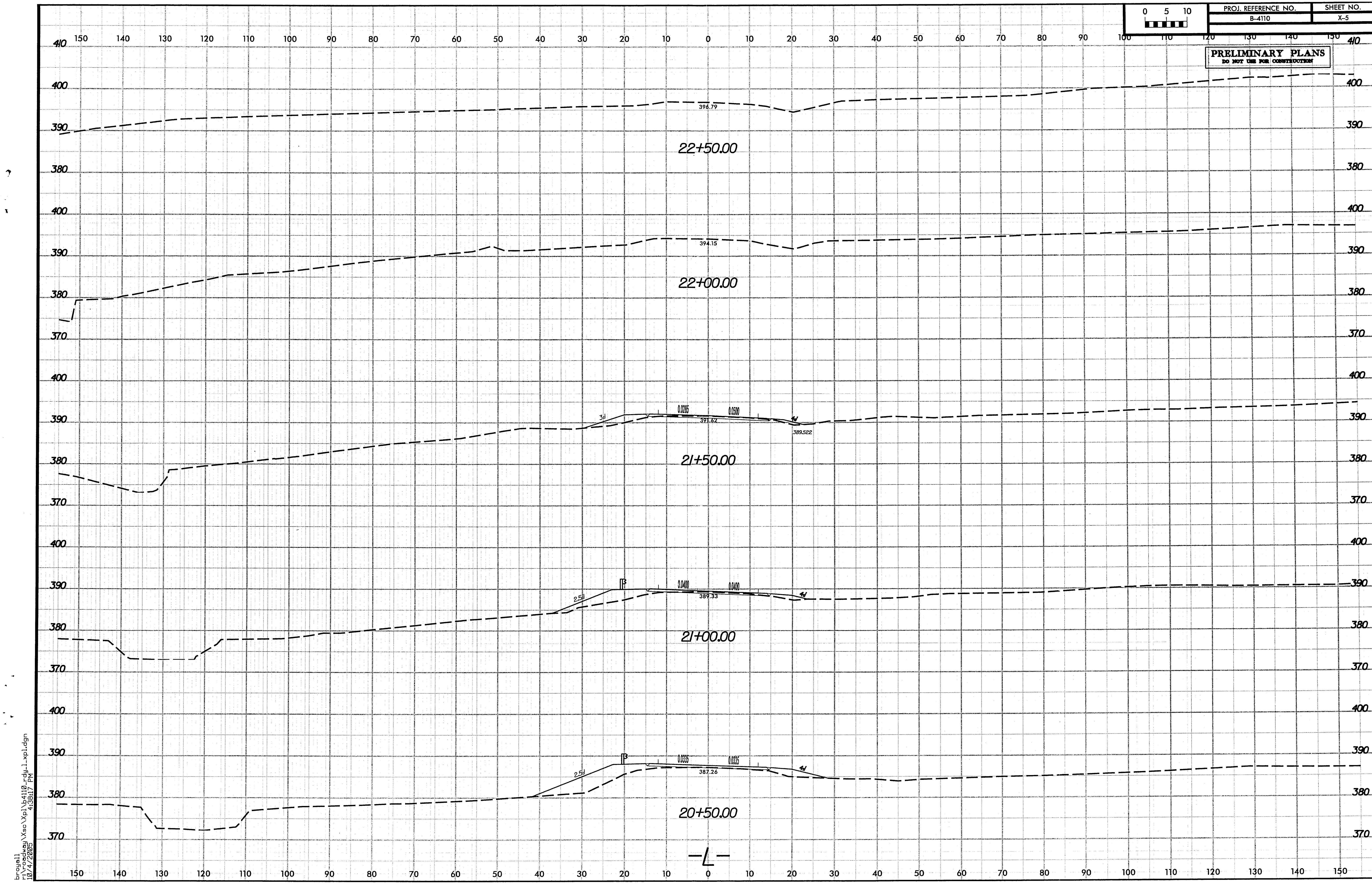
400 390 380 370




0 5 10
PROJ. REFERENCE NO.
B-4110
SHEET NO.
X-5
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
22+50.00
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22+00.00
394.15
21+50.00
0.0285
0.0500
391.62
389.522
21+00.00
0.0400
0.0400
389.33
20+50.00
0.0335
0.0335
387.26
-L-
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