STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT L. MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

April 27, 2015

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

ATTN: Ms. Loretta Beckwith
NCDOT Coordinator

Subject: **Application for Section 404 Nationwide Permit 33** for the proposed replacement of Bridge No.172 over Little Tennessee River on SR 1456 in Macon County, Federal Aid Project No. BRZ-1456(6), WBS 33313.FD2, Division 14, TIP No. B-3868.

Dear Madam:

The North Carolina Department of Transportation (NCDOT) proposes to replace Bridge No. 172 over the Little Tennessee River on SR 1456 with a 305-foot three-span steel girder bridge approximately 30' north of the existing bridge. Traffic will be maintained during construction on the existing bridge. Upon completion, the existing bridge will remain in place and ownership of it will be transferred to Macon County.

There will be 102 linear feet (0.17 ac) of temporary stream impacts due to temporary causeways needed for the construction of the new interior bents.

Please see enclosed copies of the Pre-Construction Notification (PCN), Biological Opinion (BO), stormwater management plan, permit drawings and design plans for the above-referenced project. The Categorical Exclusion (CE) was completed in May 2013 and distributed shortly thereafter. Additional copies are available upon request.

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

TELEPHONE: 919-707-6000
FAX: 919-212-5785
WEBSITE:NCDOT.GOV

LOCATION:
CENTURY CENTER, BUILDING B
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

This project calls for a letting date of November 17, 2015 and a review date of September 29, 2015; however, the let date may advance as additional funding becomes available.

A copy of this permit application and its distribution list will be posted on the NCDOT Website at: http://connect.ncdot.gov/resources/Environmental. If you have any questions or need additional information, please call Erin Cheely at (919) 707-6108.

Sincerely,

for Richard W. Hancock, P.E., Manager
Project Development and Environmental Analysis Unit

cc:
NCDOT Permit Application Standard Distribution List

Office Use Only:
Corps action ID no. _____
DWQ project no. _____
Form Version 1.3 Dec 10 2008

Pre-Construction Notification (PCN) Form

A. Applicant Information

1. Processing

1a. Type(s) of approval sought from the Corps:	☒ Section 404 Permit	☐ Section 10 Permit
1b. Specify Nationwide Permit (NWP) number:	33	or General Permit (GP) number:
1c. Has the NWP or GP number been verified by the Corps?	☐ Yes	☒ No

1d. Type(s) of approval sought from the DWQ (check all that apply):

☒ 401 Water Quality Certification – Regular ☐ Non-404 Jurisdictional General Permit

☐ 401 Water Quality Certification – Express ☐ Riparian Buffer Authorization

1e. Is this notification solely for the record because written approval is not required?	For the record only for DWQ 401 Certification: ☒ Yes ☐ No	For the record only for Corps Permit: ☐ Yes ☒ No
1f. Is payment into a mitigation bank or in-lieu fee program proposed for mitigation of impacts? If so, attach the acceptance letter from mitigation bank or in-lieu fee program.		☐ Yes ☒ No
1g. Is the project located in any of NC's twenty coastal counties. If yes, answer 1h below.		☐ Yes ☒ No
1h. Is the project located within a NC DCM Area of Environmental Concern (AEC)?		☐ Yes ☒ No

2. Project Information

2a. Name of project:	Replacement of Bridge 172 over Little Tennessee River on SR 1456
2b. County:	Macon
2c. Nearest municipality / town:	Cowee
2d. Subdivision name:	*not applicable*
2e. NCDOT only, T.I.P. or state project no:	B-3868

3. Owner Information

3a. Name(s) on Recorded Deed:	North Carolina Department of Transportation
3b. Deed Book and Page No.	*not applicable*
3c. Responsible Party (for LLC if applicable):	*not applicable*
3d. Street address:	1598 Mail Service Center
3e. City, state, zip:	Raleigh, NC 27699-1598
3f. Telephone no.:	(919) 707-6108
3g. Fax no.:	(919) 212-5785
3h. Email address:	ekcheely@ncdot.gov

4. Applicant Information (if different from owner)	
4a. Applicant is:	☐ Agent ☐ Other, specify:
4b. Name:	*not applicable*
4c. Business name (if applicable):	
4d. Street address:	
4e. City, state, zip:	
4f. Telephone no.:	
4g. Fax no.:	
4h. Email address:	
5. Agent/Consultant Information (if applicable)	
5a. Name:	*not applicable*
5b. Business name (if applicable):	
5c. Street address:	
5d. City, state, zip:	
5e. Telephone no.:	
5f. Fax no.:	
5g. Email address:	

B. Project Information and Prior Project History		
1. Property Identification		
1a. Property identification no. (tax PIN or parcel ID):	*not applicable*	
1b. Site coordinates (in decimal degrees):	Latitude: 35.272119 (DD.DDDDDD)	Longitude: - 83.440562 (-DD.DDDDDD)
1c. Property size:	1.97 acre	
2. Surface Waters		
2a. Name of nearest body of water (stream, river, etc.) to proposed project:	Little Tennessee River	
2b. Water Quality Classification of nearest receiving water:	B	
2c. River basin:	Little Tennessee	
3. Project Description		
3a. Describe the existing conditions on the site and the general land use in the vicinity of the project at the time of this application: The land use within the vicinity of the project consists of about 87% forest land, 5% developed or disturbed lands (roadsides and residential areas), 5% cultivated land (agricultural fields and pastures), 2% open water and 1% scrub.		
3b. List the total estimated acreage of all existing wetlands on the property: 0		
3c. List the total estimated linear feet of all existing streams (intermittent and perennial) on the property: 400		
3d. Explain the purpose of the proposed project: The purpose of this project is to replace a structurally deficient (sufficiency rating of 20 of 100 and structural evaluation appraisal of 2 of 9) and fracture critical bridge.		
3e. Describe the overall project in detail, including the type of equipment to be used: The project involves replacing a 280-foot five-span bridge with a 305-foot three-span steel girder bridge on a new alignment approximately 30' north of the existing bridge. Traffic will remain on the existing bridge during construction. Upon completion, the old bridge will remain in place and ownership of it will be transferred to Macon County. Standard road building equipment, such as trucks, dozers, and cranes will be used.		
4. Jurisdictional Determinations		
4a. Have jurisdictional wetland or stream determinations by the Corps or State been requested or obtained for this property / project (including all prior phases) in the past? Comments: Only perennial streams, no prior JD needed	☐ Yes	☒ No ☐ Unknown
4b. If the Corps made the jurisdictional determination, what type of determination was made?	☐ Preliminary	☐ Final
4c. If yes, who delineated the jurisdictional areas? Name (if known):	Agency/Consultant Company: NCDOT Other:	
4d. If yes, list the dates of the Corps jurisdictional determinations or State determinations and attach documentation.		
5. Project History		
5a. Have permits or certifications been requested or obtained for this project (including all prior phases) in the past?	☐ Yes	☒ No ☐ Unknown
5b. If yes, explain in detail according to “help file” instructions.		
6. Future Project Plans		
6a. Is this a phased project?	☐ Yes	☒ No
6b. If yes, explain.		

C. Proposed Impacts Inventory

1. Impacts Summary

1a. Which sections were completed below for your project (check all that apply):

☐ Wetlands ☒ Streams - tributaries ☐ Buffers

☐ Open Waters ☐ Pond Construction

2. Wetland Impacts

If there are wetland impacts proposed on the site, then complete this question for each wetland area impacted.

2a. Wetland impact number – Permanent (P) or Temporary (T)	2b. Type of impact	2c. Type of wetland (if known)	2d. Forested	2e. Type of jurisdiction (Corps - 404, 10 DWQ – non-404, other)	2f. Area of impact (acres)
Site 1 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
Site 2 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
Site 3 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
Site 4 ☐ P ☐ T			☐ Yes ☐ No	☐ Corps ☐ DWQ	
				2g. **Total wetland impacts**	0 Permanent 0 Temporary

2h. Comments: No wetlands within construction limits

3. Stream Impacts

If there are perennial or intermittent stream impacts (including temporary impacts) proposed on the site, then complete this question for all stream sites impacted.

3a. Stream impact number - Permanent (P) or Temporary (T)	3b. Type of impact	3c. Stream name	3d. Perennial (PER) or intermittent (INT)?	3e. Type of jurisdiction (Corps - 404, 10 DWQ – non-404, other)	3f. Average stream width (feet)	3g. Impact length (linear feet)
Site 1 ☐ P ☒ T	Temporary Causeway	Little Tennessee River	☒ PER ☐ INT	☒ Corps ☐ DWQ	30	102 (0.09ac)
Site 1 ☐ P ☒ T	Temporary Causeway	Little Tennessee River	☒ PER ☐ INT	☒ Corps ☐ DWQ	30	100 (0.08 ac)
Site 1 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
Site 2 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
Site 3 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
Site 4 ☐ P ☐ T			☐ PER ☐ INT	☐ Corps ☐ DWQ		
					3h. **Total stream and tributary impacts**	0 Perm 102 Temp* (0.17 ac Temp)

3i. Comments: *Total impact length is 102’ due to causeways occupying the same reach of the Little Tennessee River Permanent impacts due to interior bents/piers in the water – 870 sq ft (0.02ac).

4. Open Water Impacts

If there are proposed impacts to lakes, ponds, estuaries, tributaries, sounds, the Atlantic Ocean, or any other open water of the U.S. then individually list all open water impacts below.

4a. Open water impact number – Permanent (P) or Temporary (T)	4b. Name of waterbody (if applicable)	4c. Type of impact	4d. Waterbody type	4e. Area of impact (acres)
O1 ☐ P ☐ T				
O2 ☐ P ☐ T				
O3 ☐ P ☐ T				
O4 ☐ P ☐ T				
			4f. Total open water impacts	0 Permanent 0 Temporary

4g. Comments: No open water within construction limits.

5. Pond or Lake Construction

If pond or lake construction proposed, then complete the chart below.

5a. Pond ID number	5b. Proposed use or purpose of pond	5c. Wetland Impacts (acres)			5d. Stream Impacts (feet)			5e. Upland (acres)
		Flooded	Filled	Excavated	Flooded	Filled	Excavated	Flooded
P1								
P2								
	5f. Total							

5g. Comments:

5h. Is a dam high hazard permit required?	☐ Yes ☐ No If yes, permit ID no:
5i. Expected pond surface area (acres):	
5j. Size of pond watershed (acres):	
5k. Method of construction:	

6. Buffer Impacts (for DWQ)

If project will impact a protected riparian buffer, then complete the chart below. If yes, then individually list all buffer impacts below. If any impacts require mitigation, then you **MUST** fill out Section D of this form.

6a. Project is in which protected basin?			☐ Neuse ☐ Catawba ☐ Tar-Pamlico ☐ Randleman ☐ Other:		
6b. Buffer impact number – Permanent (P) or Temporary (T)	6c. Reason for impact	6d. Stream name	6e. Buffer mitigation required?	6f. Zone 1 impact (square feet)	6g. Zone 2 impact (square feet)
B1 ☐ P ☐ T			☐ Yes ☐ No		
B2 ☐ P ☐ T			☐ Yes ☐ No		
B3 ☐ P ☐ T			☐ Yes ☐ No		
		6h. **Total buffer impacts**			
6i. Comments: This project is not located within a protected buffer area.					

D. Impact Justification and Mitigation

1. Avoidance and Minimization

1a. Specifically describe measures taken to avoid or minimize the proposed impacts in designing project.

The proposed replacement bridge will have interior rents that line up with those of the old bridge to minimize channel disturbance. Rainfall that accumulates on the bridge will concentrate along the curbs and flow off the bridge into one of four inlets located past each corner of the bridge and pass through one of two drainage systems before entering the Little Tennessee River. See the attached Stormwater Management Plan for more details.

1b. Specifically describe measures taken to avoid or minimize the proposed impacts through construction techniques.

Traffic will be maintained on the existing bridge during construction. Design Standards in Sensitive Watershed as well as Best Management Practices (BMPs) will be utilized during construction to attempt to reduce the stormwater impacts to the receiving stream due to erosion and runoff. A moratorium on in-water work will be in place from April 1 to July 15 to protect the reproduction of spotfin chub and Appalachian elktoe. In addition, NCDOT has committed to clearing the few trees within the area of disturbance during the recommended period of October 15-April 15 in order to avoid potential take of the northern long-eared bat.

2. Compensatory Mitigation for Impacts to Waters of the U.S. or Waters of the State

2a. Does the project require Compensatory Mitigation for impacts to Waters of the U.S. or Waters of the State?	☐ Yes ☒ No If no, explain: No loss of waters of U.S.
2b. If yes, mitigation is required by (check all that apply):	☐ DWQ ☐ Corps
2c. If yes, which mitigation option will be used for this project?	☐ Mitigation bank ☐ Payment to in-lieu fee program ☐ Permittee Responsible Mitigation

3. Complete if Using a Mitigation Bank

3a. Name of Mitigation Bank: not applicable

3b. Credits Purchased (attach receipt and letter)	Type	Quantity

3c. Comments:

4. Complete if Making a Payment to In-lieu Fee Program

4a. Approval letter from in-lieu fee program is attached.	☐ Yes
4b. Stream mitigation requested:	0 linear feet
4c. If using stream mitigation, stream temperature:	☐ warm ☐ cool ☐ cold
4d. Buffer mitigation requested (DWQ only):	0 square feet
4e. Riparian wetland mitigation requested:	0 acres
4f. Non-riparian wetland mitigation requested:	0 acres
4g. Coastal (tidal) wetland mitigation requested:	0 acres

4h. Comments: The NCDOT does not propose mitigation for the102 linear feet (0.17 acre) of temporary stream impacts. None of these impacts require permanent fill in the stream bed and, therefore, under Section 404 of the Clean Water Act, do not constitute Loss of Waters of the U.S. and are not subject to compensatory mitigation.

5. Complete if Using a Permittee Responsible Mitigation Plan

5a. If using a permittee responsible mitigation plan, provide a description of the proposed mitigation plan.

6. Buffer Mitigation (State Regulated Riparian Buffer Rules) – required by DWQ				
6a. Will the project result in an impact within a protected riparian buffer that requires buffer mitigation?			☐ Yes	☒ No
6b. If yes, then identify the square feet of impact to each zone of the riparian buffer that requires mitigation. Calculate the amount of mitigation required.				
Zone	6c. Reason for impact	6d. Total impact (square feet)	Multiplier	6e. Required mitigation (square feet)
Zone 1			3 (2 for Catawba)	
Zone 2			1.5	
	6f. **Total buffer mitigation required:**			
6g. If buffer mitigation is required, discuss what type of mitigation is proposed (e.g., payment to private mitigation bank, permittee responsible riparian buffer restoration, payment into an approved in-lieu fee fund).				
6h. Comments:				

E. Stormwater Management and Diffuse Flow Plan (required by DWQ)	
1. Diffuse Flow Plan	
1a. Does the project include or is it adjacent to protected riparian buffers identified within one of the NC Riparian Buffer Protection Rules?	☐ Yes ☒ No
1b. If yes, then is a diffuse flow plan included? If not, explain why. Comments: If required from 1a, see attached buffer permit drawings.	☐ Yes ☐ No
2. Stormwater Management Plan	
2a. What is the overall percent imperviousness of this project?	N/A
2b. Does this project require a Stormwater Management Plan?	☒ Yes ☐ No
2c. If this project DOES NOT require a Stormwater Management Plan, explain why:	
2d. If this project DOES require a Stormwater Management Plan, then provide a brief, narrative description of the plan: See attached permit drawings.	
2e. Who will be responsible for the review of the Stormwater Management Plan?	☐ Certified Local Government ☐ DWQ Stormwater Program ☒ DWQ 401 Unit
3. Certified Local Government Stormwater Review	
3a. In which local government's jurisdiction is this project?	not applicable
3b. Which of the following locally-implemented stormwater management programs apply (check all that apply):	☐ Phase II ☐ NSW ☐ USMP ☐ Water Supply Watershed ☐ Other:
3c. Has the approved Stormwater Management Plan with proof of approval been attached?	☐ Yes ☐ No
4. DWQ Stormwater Program Review	
4a. Which of the following state-implemented stormwater management programs apply (check all that apply):	☐ Coastal counties ☐ HQW ☐ ORW ☐ Session Law 2006-246 ☐ Other:
4b. Has the approved Stormwater Management Plan with proof of approval been attached?	☐ Yes ☐ No N/A
5. DWQ 401 Unit Stormwater Review	
5a. Does the Stormwater Management Plan meet the appropriate requirements?	☐ Yes ☐ No N/A
5b. Have all of the 401 Unit submittal requirements been met?	☐ Yes ☐ No N/A

F. Supplementary Information		
1. Environmental Documentation (DWQ Requirement)		
1a. Does the project involve an expenditure of public (federal/state/local) funds or the use of public (federal/state) land?	☒ Yes	☐ No
1b. If you answered "yes" to the above, does the project require preparation of an environmental document pursuant to the requirements of the National or State (North Carolina) Environmental Policy Act (NEPA/SEPA)?	☒ Yes	☐ No
1c. If you answered "yes" to the above, has the document review been finalized by the State Clearing House? (If so, attach a copy of the NEPA or SEPA final approval letter.) Comments: Categorical Exclusion (CE) approved 5/29/13	☒ Yes	☐ No
2. Violations (DWQ Requirement)		
2a. Is the site in violation of DWQ Wetland Rules (15A NCAC 2H .0500), Isolated Wetland Rules (15A NCAC 2H .1300), DWQ Surface Water or Wetland Standards, or Riparian Buffer Rules (15A NCAC 2B .0200)?	☐ Yes	☒ No
2b. Is this an after-the-fact permit application?	☐ Yes	☒ No
2c. If you answered "yes" to one or both of the above questions, provide an explanation of the violation(s):		
3. Cumulative Impacts (DWQ Requirement)		
3a. Will this project (based on past and reasonably anticipated future impacts) result in additional development, which could impact nearby downstream water quality?	☐ Yes ☒ No	
3b. If you answered "yes" to the above, submit a qualitative or quantitative cumulative impact analysis in accordance with the most recent DWQ policy. If you answered "no," provide a short narrative description. Due to the minimal transportation impact resulting from this bridge replacement, this project will neither influence nearby land uses nor stimulate growth. Therefore, a detailed indirect or cumulative effects study will not be necessary.		
4. Sewage Disposal (DWQ Requirement)		
4a. 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. not applicable		

5. Endangered Species and Designated Critical Habitat (Corps Requirement)		
5a. Will this project occur in or near an area with federally protected species or habitat?	☒ Yes	☐ No
5b. Have you checked with the USFWS concerning Endangered Species Act impacts?	☒ Yes	☐ No
5c. If yes, indicate the USFWS Field Office you have contacted.	☐ Raleigh ☒ Asheville	
5d. What data sources did you use to determine whether your site would impact Endangered Species or Designated Critical Habitat? As of April 2, 2015 there are ten federally listed species for Macon County. In addition, this project is located within critical habitat for both Appalachian elktoe and spotfin chub. Formal Section 7 consultation was conducted with USFWS regarding the listed species for this project. A Biological Assessment (BA) was prepared and submitted to the USFWS on November 24, 2014. A Biological Opinion (BO) was rendered by the USFWS on March 9, 2015 (see attached BO for more information).		
6. Essential Fish Habitat (Corps Requirement)		
6a. Will this project occur in or near an area designated as essential fish habitat?	☐ Yes	☒ No
6b. What data sources did you use to determine whether your site would impact Essential Fish Habitat? NMFS County Index		
7. Historic or Prehistoric Cultural Resources (Corps Requirement)		
7a. Will this project occur in or near an area that the state, federal or tribal governments have designated as having historic or cultural preservation status (e.g., National Historic Trust designation or properties significant in North Carolina history and archaeology)?	☐ Yes	☒ No
7b. What data sources did you use to determine whether your site would impact historic or archeological resources? NEPA Documentation		
8. Flood Zone Designation (Corps Requirement)		
8a. Will this project occur in a FEMA-designated 100-year floodplain?	☐ Yes	☒ No
8b. If yes, explain how project meets FEMA requirements: NCDOT Hydraulics Unit coordination with FEMA		
8c. What source(s) did you use to make the floodplain determination? FEMA Maps		

for Richard W. Hancock, P.E. Applicant/Agent's Printed Name	Applicant/Agent's Signature (Agent's signature is valid only if an authorization letter from the applicant is provided.)	4-27-2015 Date

United States Department of the Interior

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

March 9, 2015

Mr. John F. Sullivan, III, P.E.
Division Administrator
Federal Highway Administration
310 New Bern Avenue, Suite 410
Raleigh, North Carolina 27601

Attention: Mr. Mitch Batuzich, Western North Carolina Engineer, Federal Highway Administration

Dear Mr. Sullivan:

Subject: Biological Opinion, Proposed Replacement of Bridge No. 172 (TIP No. B-3868) over the Little Tennessee River in Macon County, North Carolina, and Its Effects on Federally Endangered Species

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) based on our review of the Biological Assessment (BA) on the effects of the subject bridge replacement on the Appalachian elktoe (*Alasmidonta raveneliana*), littlewing pearlymussel (*Pegias fabula*), and spotfin chub (*Erimonax monachus*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act).

This Opinion is based on information provided in the BA dated November 24, 2014, and received in our office December 5, 2014; other available literature; personal communications with experts on the affected species; and other sources of information. This document repeats much of the information provided in the BA, altered as needed to match style and preserve consistency, so that the Opinion can serve as a standalone document. A complete administrative record of this consultation is on file at this office.

In the BA, you determined that the following federally listed species would not be affected by the proposed bridge replacement: the bog turtle (*Clemmys muhlenbergii*), Carolina northern flying squirrel (*Glaucomys sabrinus coloratus*), Indiana bat (*Myotis sodalis*), small whorled pogonia (*Isotria medeoloides*), and rock gnome lichen (*Gymnoderma lineare*). On January 8, 2015, we received an addendum to the BA that requested a change in the biological conclusion for the Indiana bat to "not likely to adversely affect." In view of the information in the BA, we concur with your determination that the bridge replacement project will have no effect on the

remaining species. The January 8, 2015, addendum to the BA addressed effects to the Indiana bat and a proposed species—the northern long-eared bat (*Myotis septentrionalis*) (NLEB). In the addendum, the North Carolina Department of Transportation (NCDOT) committed to clearing the few trees within the area of disturbance during the period recommended (October 15 - April 15) in order to avoid direct take of Indiana bats and NLEBs. Because of the small number of trees to be cleared, the timing of the clearing, and the active agricultural setting of the surrounding habitat, we do not believe this action is likely to jeopardize (as described in section 7(a)(4) of the Act) the NLEB and is not likely to adversely affect the Indiana bat. Publication of the final listing rule for the NLEB is expected on or about April 2, 2015. If tree-clearing for this project takes place after publication of the final listing rule and during the recommended time frame, this document will serve as concurrence with a biological conclusion of "not likely to adversely affect" for the NLEB. The BA addressed effects to a candidate species—the sicklefin redhorse (*Moxostoma* sp.). This species is presently being evaluated for elevation to proposed status but does not yet have legal protection under the Act. The BA acknowledges that the project has the potential to adversely affect this species, but we believe that avoidance and minimization measures intended to benefit the other aquatic listed species in this habitat are similarly effective for protection of the sicklefin redhorse. We believe the requirements under section 7 of the Act are fulfilled for these species. However, obligations under section 7 of the Act must be reconsidered if: (1) new information reveals effects of this identified action that may affect listed species or critical habitat in a manner not previously considered, (2) this action is subsequently modified in a manner that was not considered in this review, or (3) a new species is listed or critical habitat is determined that may be affected by the identified action.

CONSULTATION HISTORY

August 26, 2008 - Received letter requesting attendance at project alternatives meeting on September 3, 2008.

September 2, 2008 - Service staff (Mr. John Fridell and Mr. Troy Wilson) conducted a site visit to assess habitat suitability. Habitat in the project area was appropriate for the Appalachian elktoe, littlewing pearlymussel, and spotfin chub.

September 3, 2008 - Service staff (Mr. Troy Wilson and Ms. Marella Buncick) attended a project alternatives meeting at Southwestern College in Bryson City, North Carolina.

September 26, 2012 - Telephone conversation between NCDOT Project Engineer Mr. John Williams and Service biologist Mr. Jason Mays, discussing information that will be needed to complete section 7 consultation. During this discussion it was noted that Macon County Commissioners had requested to keep the existing bridge structure in place and that they would assume maintenance responsibilities for the bridge. Mr. Mays requested that a formal agreement be completed between the Macon County and the NCDOT outlining maintenance responsibilities for the existing bridge.

December 18, 2012 - Telephone conversation between NCDOT Project Engineer Mr. John Williams and Service biologist Mr. Jason Mays, discussing the results of the NCDOT's negotiation with the Macon County Commissioners to leave the existing bridge in place for

Macon County to maintain as a pedestrian bridge. Mr. Williams indicated that the NCDOT would provide inspection for 8 years and in the event that Macon County fails to maintain the old bridge, the NCDOT would remove it.

January 10, 2013 - Telephone conference call involving Mr. Jason Mays and multiple NCDOT engineers, specialists, and consultants. Discussion points included reasons for alternative selection, project schedule, and conservation measures. The conservation measures discussed in this meeting involved investigating options for off-site bank stabilization to improve habitat quality and/or participation in propagation efforts.

June 26, 2013 - Site meeting with NCDOT Mitigation Specialist Mr. Colin Mellor and Mr. Jason Mays to search for sites where streambank stabilization may be possible. Property downstream of Emory Dam is chosen as the best alternative.

January 9, 2014 - Telephone conversation with NCDOT Division 14 Environmental Supervisor Mr. Mark Davis concerning the need to have machinery in the river for geotechnical drilling.

January 15, 2014 - Received concurrence request from Mr. Mark Davis indicating that geotechnical drilling conducted from a barge was not likely to adversely affect listed species in the action area.

January 22, 2014 - Service granted concurrence for geotechnical drilling.

March 28, 2014 - Telephone exchange with NCDOT Environmental Specialist Mr. Mike Sanderson discussing placement of riprap and a request from the Service to investigate the potential for vegetating riprap to minimize sun exposure.

October 15, 2014 - Telephone exchange with Mr. Mike Sanderson discussing conservation measures. Investigation of on-site bank stabilization revealed that conflicts with utilities were going to make the costs too high to consider. Discussion included a proposal for partnering with the North Carolina Wildlife Resources Commission (NCWRC) to propagate the Appalachian elktoe as a reasonable alternative.

October 23, 2014 - Telephone conference with Service, U.S. Federal Highway Administration (FHWA), and NCDOT staff to discuss vegetating riprap and funding for mussel propagation. For this project, the riprap is too high on the fill slope for there to be adequate water to support vegetation. This measure is more appropriate on the streambank, where soils remain moist. The NCDOT and FHWA have proposed contributing $35,000 to propagation efforts for the Appalachian elktoe as a conservation measure.

December 15, 2014 - The Service receives the BA and a request to initiate formal consultation.

December 15, 2014 - Telephone exchange with Mr. Mike Sanderson to discuss including the NLEB in the BA.

January 8, 2015 - The Service received an addendum to the BA, stating that the NCDOT has committed to cutting trees outside of the bat moratorium (April 15 - October 15).

January 22, 2015 - The Service received an email from Mr. Brian Burch, NCDOT Division 14 Construction Engineer, clarifying that causeways were expected to require less than 1 month for installation, 6 weeks for shaft installation, and then 9 months in place to serve as a crane platform throughout the rest of construction. This communication stated that the NCDOT will commit to allow only the smallest extent of causeway necessary to complete each phase of construction and will remove the causeway as soon as possible after the completion of construction activities in order to minimize effects to the river's flow and the habitat surrounding the project area.

BIOLOGICAL OPINION

I. DESCRIPTION OF THE PROPOSED ACTION

As defined in the Service's section 7 regulations (50 CFR 402.02), "action" means "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas." The action area is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present federal, state, or private activities, as well as the cumulative effects of reasonably certain future state or private activities within the action area. This Opinion addresses only those actions from which the Service believes adverse effects may result. In their BA, the NCDOT outlined those activities involved in the construction of Bridge No. 172 on SR 1456 (Appendix A) over the Little Tennessee River (B-3868) that would affect the Appalachian elktoe, littlewing pearlymussel, and spotfin chub. This Opinion addresses whether replacing the existing bridge is likely to jeopardize the continued existence of the Appalachian elktoe, littlewing pearlymussel, and spotfin chub.

The NCDOT has determined that the subject bridge is deficient because of deteriorating structural integrity. The NCDOT's Bridge Management Unit records indicate Bridge No. 172 has a sufficiency rating of 16.99 out of a possible 100. In addition, it received a structural evaluation of 3 out of 9 according to FHWA standards and is functionally obsolete. The aging bridge is fracture critical with substandard horizontal clearance and is posted at 3 tons for single vehicles; tractor-trailers are not permitted to cross. Continued maintenance of the structure for vehicular use is no longer prudent. Replacement of the bridge will result in safer traffic operation.

The proposed action, as defined in the BA, is to build a new bridge that will be constructed 30 feet (ft) downstream of the existing structure. Traffic will continue using the current bridge during construction. The permanent replacement structure will be approximately 305 ft long, providing a minimum 28-foot (ft) clear deck width. The bridge will include two 10-ft lanes and 4-ft offsets. The approach roadway will extend

approximately 265 ft to the east end of the bridge at its intersection with NC 28. Also, some improvements will be made to NC 28 in order to increase the sight distance near the intersection with Rose Creek Road.

This project involves realignment of the intersection of Rose Creek Road and HP McCoy Road so that it tees into Rose Creek Road. The approaches will be widened to include a 20-ft pavement width, providing two 10-ft lanes. Grass shoulders, 6 ft wide, will be provided on each side. In total, construction will require the disturbance of approximately 6.25 acres of land, most of which is agricultural or open field with some trees along the river's edge. Of the 6.25 acres of land disturbance, 0.25 acre of that land will be temporarily disturbed and returned to a natural state once construction is complete.

The existing bridge will be left in place. For aesthetic reasons, the local community did not want the existing bridge to be removed; they requested that it remain in place and serve pedestrian and bike traffic. The NCDOT and Macon County have an agreement to transfer ownership of the existing bridge to Macon County once the new bridge is constructed. Once construction is complete, the NCDOT will continue to perform inspections on the existing bridge (one inspection every 2 years for a total of four inspections over 8 years). Once Macon County assumes maintenance inspection responsibility, inspection reports shall be submitted to the NCDOT. If the bridge becomes irreparable, the NCDOT has the right to remove the bridge (Appendix B).

A. Action Area

The project action area is defined as all areas to be affected, directly or indirectly, by the federal action and not merely the immediate area involved in the action [50 CFR §402.02]. For this type of bridge replacement, the limits of effects are generally considered to include the limits of construction of the approach and any area receiving runoff from the construction activity, including the receiving river, extending 400 meters (m) (1,314 ft) downstream and 100 m (328 ft) upstream of the structure. However, this bridge is located in critical habitat for the Appalachian elktoe and spotfin chub and has the potential for indirect and cumulative effects that may affect a greater area than the area of construction. Therefore, the area normally considered the action area is here being referred to as the direct impact area. The action area includes the direct impact area plus the critical habitat for the spotfin chub and Appalachian elktoe. Critical habitat extends from the North Carolina/Georgia state line down the Little Tennessee River to the backwaters of Fontana Lake. This expansion of the action area to include all of the critical habitat is intended to ensure that all potential effects are considered.

B. Conservation Measures

Conservation measures represent actions, pledged in the project description, that the action agency will implement in order to minimize the effects of the proposed action and further the recovery of the species under review. Such measures should be

closely related to the action and should be achievable within the authority of the action agency. The beneficial effects of conservation measures are taken into consideration in the Service's conclusion of a jeopardy versus a nonjeopardy opinion and in the analysis of incidental take.

The following "Design Standards in Sensitive Watersheds" are incorporated into NCDOT projects that occur within or upstream of water bodies that contain federally protected aquatic species:

- Erosion- and sedimentation-control measures, structures, and devices within a sensitive watershed shall be so planned, designed, and constructed to provide protection from the runoff of the 25-year storm which produces the maximum peak rate of runoff as calculated according to procedures in the "Erosion and Sediment Control Planning and Design Manual" or according to procedures adopted by the NCDOT.

- Sediment basins within sensitive watersheds shall be designed and constructed such that the basin will have a settling efficiency of at least 70 percent for the 40-micron-size (0.04-mm) soil particles transported into the basin by the runoff of the 2-year storm, which produces the maximum peak rate of runoff as calculated according to procedures in the "Erosion and Sediment Control Planning and Design Manual" or according to procedures adopted by the NCDOT.

- Erosion- and sedimentation-control measures will include the use of flocculants in appropriate areas to improve the settling of sediment particles and reduce turbidity levels in construction runoff. The use of flocculants will conform to the North Carolina Division of Water Resources' (NCDWR) approved product list. No flocculants will be used at the perimeter of the site, and erosion-control measures will be designed to prevent the release of treated soil into the stream.

- Newly constructed open channels in sensitive watersheds shall be designed and constructed with side slopes no steeper than two horizontal to one vertical if a vegetative cover is used for stabilization unless soil conditions permit a steeper slope or where the slopes are stabilized by using mechanical devices, structural devices, or other acceptable ditch liners. In any event, the angle for side slopes shall be sufficient to restrain accelerated erosion.

- Ground cover sufficient to restrain erosion must be provided for any portion of a land-disturbing activity in a sensitive watershed within 14 calendar days following completion of construction or development.

As the project is located in an Environmentally Sensitive Area, special procedures will also be used for clearing and grubbing, temporary stream crossings, and grading operations. This also requires special procedures to be used for seeding and mulching and staged seeding within the project.

The Environmentally Sensitive Area shall be defined as a 50-ft buffer zone on both sides of the stream or depression measured from the top of the streambank or the center of the depression.

- Clearing and Grubbing

  In areas identified as Environmentally Sensitive Areas, the contractor may perform clearing operations, but not grubbing operations, until immediately prior to beginning grading operations as described in Article 200-1 of the *Standard Specifications*. Only clearing operations (not grubbing) shall be allowed in this buffer zone until immediately prior to beginning grading operations. Erosion-control devices shall be installed immediately following the clearing operation.

- Grading

  Once grading operations begin in identified Environmentally Sensitive Areas, work shall progress in a continuous manner until complete. All construction within these areas shall progress in a continuous manner such that each phase is complete and areas are permanently stabilized prior to beginning the next phase. Failure on the part of the contractor to complete any phase of construction in a continuous manner in Environmentally Sensitive Areas will be just cause for the NCDOT Engineer to direct the suspension of work in accordance with Article 108-7 of the *Standard Specifications*. Work shall progress with state construction personnel during such a suspension until the area is permanently stabilized.

- Temporary Stream Crossings

  Any crossing of streams within the limits of this project shall be accomplished in accordance with the requirements of Subarticle 107-12(B) of the *Standard Specifications*.

- Seeding and Mulching

  Seeding and mulching shall be performed in accordance with section 1660 of the *Standard Specifications*, and vegetative cover sufficient to restrain erosion shall be installed immediately following grade establishment. Seeding and mulching shall be performed on the areas disturbed by construction immediately following final grade establishment. No appreciable time shall lapse into the contract time without the stabilization of slopes, ditches, and other areas within the Environmentally Sensitive Areas. Penalties to the contractor may apply if this condition is not met.

- Stage Seeding

  The work covered by this section shall consist of the establishment of a vegetative cover on cut-and-fill slopes as grading progresses. Seeding and mulching shall be accomplished in stages on cut-and-fill slopes that are greater than 20 ft in height measured along the slope or greater than 2 acres in area. No stage shall exceed the limits stated above.

The following are additional measures intended to further reduce deleterious construction-related effects to the waterway:

- No direct discharge of deck drains over water will be allowed. Discharge from the bridge will flow to inlets placed just off the end of the bridge into preformed scour holes in the floodplain, where discharge will be treated by floodplain vegetation before flowing into the river.

- Machines will be refueled outside of the Environmentally Sensitive Area and inside a specific containment area designed to contain any spills and facilitate easy cleanup.

- Machines will be inspected daily to catch and repair leaks of hydraulic fluid.

- A stormwater management plan will be submitted with the permit package.

- No in-stream work will be performed during the mussel moratorium (April 1 - July 15).

- Special provisions will be made in order to reduce the risk of "hot rock" posing a threat to protected species.

- As part of the NCDOT and FHWA's section 7.a.1 regulatory requirement under the Act, and to offset the long-term effects to the Appalachian elktoe's habitat in the location of this bridge (B-3868), the NCDOT and FHWA (in consultation with the Service) have agreed to provide $35,000 to the North Carolina Wildlife Resources Commission's Appalachian elktoe propagation program. This dollar amount was determined by a qualitative analysis of the area of temporary and permanent effects likely to occur as a result of this project. If land in this area were to be purchased as a conservation easement to offset these effects, the anticipated cost would be $35,000 to $40,000 (Macon County Schedule of Values 2015). This amount is approximately 1 percent of the overall project cost and is therefore deemed a reasonable amount. The Appalachian elktoe specimens propagated as a result of this effort will be used to boost the population numbers in the Little Tennessee River. The intent of this population boost is to have a positive effect on the baseline, which is greater than the perceived negative impact of the loss of habitat due to this bridge project.

- Tree removal will be conducted during the recommended time frame (October 15 - April 15) in order to avoid adverse effects to bats.

- Extent and duration of causeways in the river will be kept to a minimum so as to avoid adverse effects to migrating fish.

II. STATUS OF THE SPECIES

A. Appalachian elktoe (*Alasmidonta raveneliana*)

Status: Endangered
Family: Unionidae
Listed: September 3, 1993

1. Characteristics

Isaac Lea (1834) described the Appalachian elktoe from the French Broad River system in North Carolina. Its shell is thin, but not fragile, oblong and somewhat kidney-shaped, with a sharply rounded anterior margin and a broadly rounded posterior margin. Parmalee and Bogan (1998) site a maximum length of 3.1 inches (80 millimeters [mm]). However, recently observed individuals from the Little River (French Broad River basin) in Transylvania County and West Fork Pigeon River (French Broad River basin) in Haywood County measured in excess of 3.9 inches (100 mm) in length (Service 2009). The periostricum (outer shell) of the adult Appalachian elktoe varies in color from dark brown to yellowish-brown. Rays may be prominent in some individuals, usually on the posterior slope, and nearly obscure in other specimens. The nacre (inside shell surface) is a shiny bluish white, changing to salmon color in the beak cavity portion of the shell. A detailed description of the shell characteristics is contained in Clarke (1981). Ortmann (1921) provides descriptions of the soft anatomy.

The reproductive cycle of the Appalachian elktoe is similar to that of other native freshwater mussels. Males release sperm into the water column, and the sperm are then taken in by the female through their siphons during feeding and respiration. The females retain the fertilized eggs in their gills until the larvae (glochidia) fully develop. The mussel glochidia are released into the water, and within a few days they must attach to the appropriate species of fish, which they parasitize for a short time while they develop into juvenile mussels. They then detach from their fish host and sink to the stream bottom where they continue to develop, provided they land in a suitable substrate with the correct water conditions (Service 2002). The Appalachian elktoe is a bradytictic (long-term) breeder, with the females retaining glochidia in their gills from late August to mid-June (Service 2009). Glochidia are released in mid-June, attaching to either the gills or fins of a suitable fish host species. Transformation time for the Appalachian elktoe occurs within 18 to 22 days at a mean temperature of 18° C.

The Appalachian elktoe can use a variety of common fish hosts, but it appears to specialize on infesting darters and sculpins, which are common in the action area.

2. Distribution and Habitat Requirements

The Appalachian elktoe is known only from the mountain streams of western North Carolina and eastern Tennessee. Historically, the species has also been recorded from Tulula Creek (Tennessee River drainage), the main stem of the French Broad River, and the Swannanoa River (French Broad River system) (Clarke 1981), but it was reported to have been eliminated from these streams (Service 1994, 1996). Currently, it is known to occur in low numbers in a reach of the main stem of the French Broad River in Transylvania County (see discussion below). It is unclear whether this represents a recolonization, or an erroneous conclusion of extirpation. There is also a historical record of the Appalachian elktoe from the North Fork Holston River in Tennessee (S.S. Haldeman collection); however, this record is believed to represent a mislabeled locality (Gordon 1991). If the historical record for the species in the North Fork Holston River was a valid record, the species has apparently been eliminated from this river as well.

Although the complete historic range of the Appalachian elktoe is unknown, available information suggests that the species once lived in the majority of the rivers and larger creeks of the upper Tennessee River system in North Carolina, with the possible exception of the Hiwassee and Watauga River systems (the species has not been recorded from either of these river systems). In Tennessee, the species is known only from its present range in the main stem of the Nolichucky River. At the time of listing, two known populations of the Appalachian elktoe existed--the Nolichucky River, including its tributaries (the Cane River and the North Toe River) and one in the Little Tennessee River and its tributaries. The record in the Cane River was represented by one specimen found just above the confluence with the North Toe River (Service 1996). Since listing, the Appalachian elktoe has been found in additional areas. These occurrences include extensions of the known ranges in the Nolichucky River (North Toe River, South Toe River, and Cane River) and Little Tennessee River (Tuckasegee River and Cheoah River) as well as a rediscovery in the French Broad River basin (Pigeon River, Little River, Mills River, and the main stem of the French Broad River). Many of these newly discovered populations are relatively small in size and range.

In the Little Tennessee River system in North Carolina, subpopulations survive in three rivers--The Little Tennessee, Tuckasegee, and Cheoah Rivers. These subpopulations are likely functionally isolated from each other by Fontana Reservoir. The main stem of the Little Tennessee River subpopulation occurs from the City of Franklin downstream to the backwaters of Fontana Reservoir in Swain and Macon counties, covering an area of about 600 acres and including Bridge No. 172. Much of the area occupied by the Appalachian elktoe in the

Little Tennessee River flows through part of the Nantahala National Forest. The Appalachian elktoe has been reported from relatively shallow, medium-sized creeks and rivers with cool, clean, well-oxygenated, moderate- to fast-flowing water. The species is most often found in riffles, runs, and shallow flowing pools with stable, relatively silt-free, coarse sand and gravel substrate associated with cobble, boulders, and/or bedrock (Gordon 1991; Service 1994, 1996, 2009). Stability of the substrate appears to be critical to the Appalachian elktoe, and the species is seldom found in stream reaches dominated by silt or shifting sand.

With the exception of the Nolichucky River basin and the Tuckasegee populations, all of the other populations were generally considered to be small in numbers and/or restricted to short reaches of isolated streams. The Little Tennessee River population was once considered the stronghold for the species; however, densities have declined by over 90 percent in the river since 2004, and the species is now very rare throughout most of the occupied reach. The cause of this decline remains uncertain (NCWRC, unpublished data, 2014). The other populations of the Appalachian elktoe currently appear to be comprised of scattered individuals that are restricted to very short stream reaches, and their viability is questionable (Service 2009). The Cheoah River, Pigeon River, Little River, Mills River and French Broad River populations are restricted to scattered areas of suitable habitat in stream reaches of approximately 5.8 kilometers (km) (3.60 river miles [RM]), 22.6 km (14.04 RM), 17.8 km (11.1 RM), 3.2 km (2.0 RM), and 28 km (17.4 RM), respectively, making them vulnerable to extirpation from a single catastrophic event such as a major chemical spill (Service 2009).

3. Threats to the Species

The decline of the Appalachian elktoe throughout its historic range has been attributed to a variety of factors, including sedimentation, point- and nonpoint-source pollution, and habitat modification (impoundments, channelization, etc.). The low numbers of individuals and the restricted range of most of the surviving populations make them extremely vulnerable to extirpation from a single catastrophic event or activity. Catastrophic events may consist of natural events, such as flooding or drought, as well as human-influenced events, such as toxic spills associated with highways or railroads.

The Little Tennessee River basin, and most of western North Carolina, experienced catastrophic flooding in late summer 2004 as a result of Tropical Storms Francis, Ivan, and Jeanne. Numerous dead mussels, including the Appalachian elktoe, were observed in overwash areas along the Little Tennessee River after the flood events. Additionally, surveys conducted in the Little Tennessee River after the flooding yielded noticeably lower catch per unit effort of live mussels, including the Appalachian elktoe, compared to past survey efforts in this section of the river (Service 2009). As discussed above, since 2004 the population in the Little Tennessee River has declined dramatically.

Siltation resulting from improper erosion control of various types of land usage, including agricultural, forestry, and development, has been recognized as a major contributing factor to the degradation of mussel populations (Service 1996). Siltation has been documented to be extremely detrimental to mussel populations; it degrades substrate and water quality, increases the potential for exposure to other pollutants, and results in the direct smothering of mussels (Ellis 1936, Marking and Bills 1979). Sediment accumulations of less than 1 inch have been shown to cause high mortality in most mussel species (Ellis 1936). In Massachusetts, a bridge construction project decimated a population of the endangered dwarf wedgemussel (*Alasmidonta heterodon*) because of accelerated sedimentation and erosion (Smith 1981). The abrasive action of sediment on mussel shells has been shown to cause erosion of the outer shell, which allows acids to reach and corrode underlying layers (Harman 1974).

The soils in the Little Tennessee River basin are considered to be some of the most erodible soils in the state. The North Carolina Division of Emergency Management (1986) identified the Little Tennessee River basin as having the highest potential (in North Carolina) for greater than average annual erosion from pastureland. The generally steep topography in the watershed increases the potential for erosion. Agriculture and continuing development in the watershed (i.e., Franklin area) has led to significant sedimentation problems within the Little Tennessee, particularly in the stretch from the North Carolina/Georgia line to Lake Emory. Lake Emory is rapidly filling with sediment and has sometimes been drained to flush alluvium (Jenkins and Burkhead 1984). Large sediment accumulations below the lake are becoming increasingly more common (Service 1996).

Sewage treatment effluent has been documented to significantly affect the diversity and abundance of mussel fauna (Goudreau et al. 1988). Goudreau et al. (1988) found that the recovery of mussel populations might not occur for up to 2 miles (mi) (3.2 km) below points of chlorinated sewage effluent. Most of the water bodies where the Appalachian elktoe still exists have relatively few point-source discharges within the watershed and are rated as having "good" to "excellent" water quality (North Carolina Division of Water Quality [NCDWQ] 2012a, Service 1996).

The introduction of exotic species, such as the Asian clam (*Corbicula fluminea*) and zebra mussel (*Dreissena polymorpha*), has also been shown to pose significant threats to native freshwater mussels. The Asian clam is now established in most of the major river systems in the United States (Fuller and Powell 1973). At the time of listing, the Asian clam was not known from the stretch of the Little Tennessee River that is occupied by the Appalachian elktoe; however, it has been observed in the Little Tennessee River in recent years and, as mentioned earlier, may be a contributing factor to the decline of the Appalachian elktoe population. Concern has been raised over competitive interactions for

space, food, and oxygen between this species and native mussels, possibly at the juvenile stages (Neves and Widlak 1987; Alderman 1997). When the Appalachian elktoe was listed, it was speculated that due to its restricted distribution, it "may not be able to withstand vigorous competition" (Service 1996).

Another exotic species that has the potential to adversely impact aquatic species, including the Appalachian elktoe, is the Japanese knotweed (*Fallopia japonica*). The plant is considered to be an invasive species that can reproduce from its seed or from its long, stout rhizomes. It can tolerate a variety of conditions, such as full shade, high temperatures, high salinity, and drought. It can be spread by wind, water, and soil movement to an area where it quickly forms dense thickets that exclude native vegetation and greatly alter the natural ecosystem. This species has become established in riparian habitats throughout western North Carolina. The species has a very shallow root system; because of this shallow root system and its preclusion of other vegetation, areas where this species has been established may be susceptible to erosion during flood events.

Any activities that result in acidification of the water would also pose a serious threat to this species. Much of the geology within the Little Tennessee River basin contains "hot rock," usually of the Wehutty or Great Smokies formations, which contain sulfur compounds and may release sulfuric acid when weathered (McLarney 1990). Construction activities that disturb this type of geologic formation could potentially result in serious adverse effects to this species.

4. Designated Critical Habitat

In accordance with section 4 of the Act, critical habitat for listed species consists of:

a. The specific areas within the geographical area occupied by the species at the time it is listed in which are found those physical or biological features (constituent elements) that (1) are essential to the conservation of the species and (2) may require special management considerations or protection.

b. Specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the Act, upon a determination by the Secretary that such areas are "essential for the conservation of the species."

Critical habitat for the Appalachian elktoe has been designated in 144.3 total RM (232.2 km) in six distinct units. Those units are as follows:

a. Encompasses approximately 24 mi (38.5 km) of the main stem of the Little Tennessee River from the Lake Emory Dam in Franklin, Macon County,

North Carolina, downstream to the backwaters of Fontana Reservoir in Swain County, North Carolina.

b. Encompasses approximately 26 mi (41.6 km) of the main stem of the Tuckasegee River, from the NC State Route 1002 Bridge in Cullowhee, Jackson County, North Carolina, downstream to the NC 19 Bridge north of Bryson City, Swain County, North Carolina.

c. Encompasses approximately 9.1 mi (14.6 km) of the main stem of the Cheoah River from the Santeelah Dam, downstream to its confluence with the Little Tennessee River in Graham County, North Carolina.

d. Encompasses approximately 4.7 mi (7.5 km) of the main stem of the Little River (French Broad River basin) from the Cascade Lake Power Plant, downstream to its confluence with the French Broad River in Transylvania County, North Carolina.

e. Encompasses approximately 11.1 mi (17.8 km) of the main stem of the West Fork Pigeon River (French Broad River basin) from the confluence with the Little East Fork Pigeon River, downstream to the confluence with the East Fork Pigeon River; and the main stem of the Pigeon River from the confluence of the East Fork Pigeon River and West Fork Pigeon River, downstream to the NC 215 crossing, south of Canton, Haywood County, North Carolina.

f. Encompasses approximately 3.7 mi (5.9 km) of the main stem of the North Toe River, Yancey and Mitchell counties, North Carolina, from the confluence with Big Crabtree Creek, downstream to the confluence of the South Toe River; approximately 14.1 mi (22.6 km) of the main stem of the South Toe River, Yancey County, North Carolina, from the NC State Route 1152 crossing, downstream to its confluence with the North Toe River; approximately 21.6 mi (34.6 km) of the main stem of the Toe River, Yancey and Mitchell counties, North Carolina, from the confluence of the North Toe River and South Toe River, downstream to the confluence of the Cane River; approximately 16.5 mi (26.4 km) of the main stem of the Cane River, Yancey County, North Carolina, from the NC State Route 1381 crossing, downstream to its confluence with the Toe river; and approximately 13.5 mi (21.6 km) of the main stem of the Nolichucky River from the confluence of the Toe River and the Cane River in Yancey and Mitchell counties, North Carolina, downstream to the US 23/19W crossing, southwest of Erwin, Unicoi County, Tennessee.

When designating critical habitat, the Service identifies physical and biological features (primary constituent elements) that are essential to the conservation of the species and that may require special management considerations or protection.

The primary constituent elements essential for the conservation of the Appalachian elktoe are:

a. Permanent, flowing, cool, clean water;

b. Geomorphically stable stream channels and banks;

c. Pool, riffle, and run sequences within the channel;

d. Stable sand, gravel, cobble, and boulder or bedrock substrates with no more than low amounts of fine sediment;

e. Moderate to high stream gradient;

f. Periodic natural flooding; and

g. Fish hosts, with adequate living, foraging, and spawning areas for them.

Although there are specific sites within the six units that do not contain all of the primary constituent elements, these elements are found consistently throughout the designated river reaches and are present at the sites containing the "healthiest" of the occurrences (Service 2002).

B. Littlewing pearlymussel (*Pegias fabula*)

Status: Endangered
Family: Unionidae
Listed: September 3, 1993

1. Characteristics

The littlewing pearlymussel was described as *Margaritana fabula* by Lea (1838), and was later placed in a new genus--*Pegias*--by Simpson (1900). The littlewing pearlymussel is a small mussel, having the anterior portion of its shell evenly rounded and semicircular. The periostricum is usually eroded, giving the shell a chalky or ashy-white appearance. If the periostricum is present, it is light green or yellowish-brown with dark rays on the anterior surface that vary in width. It has well-developed, but incomplete, hinge teeth; the lateral teeth are either vestigial or completely lacking (Service 1989).

Little is known about the reproductive biology of the littlewing pearlymussel; however, nearly all freshwater mussel species have similar reproductive strategies, which involves a larval stage (glochidium) that becomes a temporary obligatory parasite on a fish. Many mussel species have specific fish hosts that must be present to complete their life cycle. Based upon laboratory infestation experiments, Layzer and Anderson (1992) identified the greenside darter

(*Etheostoma blennioides*) and the emerald darter (*E. baileyi*) as the potential fish hosts for the littlewing pearlymussel. Neves (1991) suggests the banded sculpin (*Cottus carolinae*) and redline darter (*Etheostoma rufilineatum*) as potential hosts based on field observations of habitat preferences of these species. Pennak (1989) should be consulted for a general overview of freshwater mussel reproductive biology.

2. Distribution and Habitat Requirements

The littlewing pearlymussel was historically widespread but uncommon in tributaries of the Tennessee and Cumberland River basins in Alabama, Kentucky, North Carolina, Tennessee, and Virginia. At the time of listing, the littlewing pearlymussel was believed to have been extirpated from all but 6 of the 24 historically known stream reaches. Prior to its discovery in the Little Tennessee River in 1990, the littlewing pearlymussel was known from only one site in North Carolina--the Valley River in Cherokee County--which is believed to have been extirpated (Service 1989). The littlewing pearlymussel inhabits small- to medium-sized streams with low turbidity, cool water, and a high to moderate gradient (Parmalee and Bogan 1998, Service 1989). The littlewing pearlymussel can be found buried in gravel, beneath boulders and slabrock, lying on top of the substratum in riffles, and partly buried or on the surface of the substratum in the transition zone between long pools and riffles. It has been suggested that the best times to find this mussel are in late spring and in the late fall, when they are on top or partly buried in the substratum during spawning (Ahlstedt 1986).

When the recovery plan was completed in 1989, the only viable populations known to exist occurred in the Big South Fork Cumberland River in Kentucky and Tennessee and in Horselick Creek in Kentucky. Currently, only the Big South Fork Cumberland River population remains (Service 2013). Except for the Big South Fork Cumberland River population, other populations are thought to be extremely small in size and, in some instances, likely represented by a small number of individuals. Extant populations persist in the Big South Fork Cumberland River, Rockcastle River, Cane Creek, Clinch River, North Fork Holston River, and Little Tennessee River watersheds (Service 2013).

In the Little Tennessee River in North Carolina, two littlewing pearlymussel males were found in Swain County, North Carolina, in 2005; however, this is not considered a viable population (Service 2013). Reasons for the decline of this species and other species of the genus Anodontoides in this stream remain unknown. Other mussel species are not impacted to the level of Anodontoides species and the littlewing pearlymussel. Survey efforts since 2005 have failed to reveal causes of this decline; however, there have been increases in development (e.g., subdivisions), gem mining, and the presence of the Asian clam in recent years (Service 2013).

The littlewing pearlymussel is found in the Upper Little Tennessee River from Dean Island to the confluence with Painter Branch, an area of about 250 acres. It occurs approximately 2.5 mi downstream of Bridge 172.

3. Threats to the Species

Due to similar habitat requirements and life history, threats to this species are identical to those mentioned previously for the Appalachian elktoe.

4. Designated Critical Habitat

There is no critical habitat for the littlewing pearlymussel.

C. Spotfin chub (*Erimonax monachus*)

Status: Threatened
Family: Unionidae
Listed: October 11, 1977

1. Characteristics

The spotfin chub was first described by Cope (1868) from the North Fork Holston River in Smyth County, Virginia. This small (maximum size 92 mm) cyprinid (minnow) is described as having a slightly compressed, elongate body with a color pattern of olive green above the lateral line and silver on the lower sides, bordered mid-dorsally and dorso-latereally by gold and green stripes (Jenkins and Burkhead 1984). The spotfin chub's common name is derived from the distinctive, prominent black spot on the lower part of the caudal fin. This species has also been referred to as the turquoise shiner due to the brilliant metallic blue color above the lateral line in nuptial (breeding) males (Service 1983).

Jenkins and Burkhead (1984) suggested that the spotfin chub might exhibit fractional spawning behavior. McLarney (1990) observed periods of breeding activity in early June (4-9) and early August (6-15), with intense feeding periods between spawns, thus supporting the fractional spawning hypothesis. Spawning takes place over bare bedrock substrate with crevices, with the eggs being deposited in the crevices (crevice spawner). Immature aquatic insects (mostly chironomids and simulids) are the major food items for this species. It is considered to be a "sight feeder" that selects its prey off of clean substrates.

2. Distribution and Habitat Requirements

The spotfin chub is endemic to the Tennessee River drainage in Alabama, Georgia, North Carolina, Tennessee, and Virginia. The historic range of this species encompassed twelve tributary systems in four physiographic provinces: Blue Ridge (French Broad River and Little Tennessee River systems); Ridge and

Valley (Clinch River, Powell River, Holston River [North and South Forks] and Chickamauga Creek systems); Cumberland Plateau (Emory River and Whites Creek systems); and Interior Low Plateau (Shoal Creek, Little Bear Creek, and Duck River systems). Presently it is known to survive in only four isolated tributary systems (Duck River, Little Tennessee River, Emory River, and North Fork Holston River) (Service 1983).

Habitat for the spotfin chub has been described as moderate to large streams, 15-70 m (49-230 ft) in width. These streams should have clear water, cool to warm temperatures, and pools alternating with riffles. Specimens of this species have been taken from a variety of substrates but rarely from significantly silted substrates. McLarney (1990) categorized their habitat utilization throughout the year. During the spawning season they occur over clean bedrock. They overwinter in pockets and/or deep pools, emerging in May, when they move to spawning sites, with possible "staging areas" over clean gravel and rubble. The pH of the water has been suggested as a limiting factor in the distribution of this species as the presence of alkaline bedrock may be necessary for the development of fertilized eggs (Alderman 1987, McLarney 1990).

The spotfin chub is found in the Upper Little Tennessee River, from Lake Emory to above US 19, covering an area of about 600 acres, including Bridge No. 172. Much of the area occupied by the spotfin chub in the Little Tennessee River flows through part of the Nantahala National Forest.

3. Threats to the Species

Many of the same factors that have been attributed to the decline of freshwater mussels have contributed to the decline of the spotfin chub as well. Jenkins and Burkhead (1984) and Service (1983) cite impoundments, channelization, pollution, turbidity, and/or siltation as likely factors that resulted in a decline of the species. Over-collection has also been suggested to be a factor, as massive application of ichthyocide wiped out the entire Abrams Creek population, and seining efforts in the North Fork Holston River sharply depleted populations (Service 1983). The recovery plan for this species lists all of the factors that have contributed to declines in each of the historically known populations (Service 1983).

Due to its behavioral characteristics, such as being a "sight feeder" and "crevice spawner," this species is intrinsically vulnerable to turbidity and siltation. Burkhead and Jelks (1998) studied the effects of suspended sediment on the reproductive success of another crevice-spawning minnow, the tri-colored shiner (*Cyprinella trichroistia*). They concluded that persistent levels or pulses of suspended sediment during the reproduction season are major factors that contribute to the imperilment of some crevice-spawning species.

As described earlier, this species spawns over bare bedrock and was not observed in habitats where the substrate was encrusted by riverweed (*Podostemon* spp.). The presence of a riparian canopy may be necessary for the maintenance of spawning habitat, as the clearing of streamside vegetation would permit riverweed to grow in previously shaded areas (McLarney 1990).

4. Designated Critical Habitat

Critical habitat for the spotfin chub has been designated in four distinct units:

a. In North Carolina, Macon and Swain counties. The Little Tennessee River, main channel from the backwaters of Fontana Lake, upstream to the North Carolina/Georgia state line.

b. In Tennessee, Cumberland, Fentress, and Morgan counties. The Emory and Obed Rivers and Clear and Daddy's Creek in Morgan County. Clear Creek in Fentress County. The Obed River, upstream to US Interstate Highway 40; Clear Creek, upstream to US Interstate Highway 40; and Daddy's Creek, upstream to US Highway 127, all in Cumberland County.

c. In Tennessee, Hawkins and Sullivan counties. North Fork Holston River, main channel, upstream from junction with the South Fork Holston River to the Tennessee/Virginia state line.

d. In Virginia, Scott and Washington counties. The North Fork Holston River, main channel from the Virginia/Tennessee state line, upstream through Scott and Washington Counties.

Constituent elements of the critical habitat were not identified; however, the Service considers clear water over gravel, boulders, and bedrock in large creeks and medium-sized rivers having moderate current as appropriate habitat (*http://www.fws.gov/asheville/htmls/listedspecies/spotfin_chub.html*).

III. ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the Act, when considering the "effects of the action" on federally listed species, we are required to take into consideration the environmental baseline. The environmental baseline includes past and ongoing natural factors and the past and present effects of all federal, state, or private actions and other activities in the action area (50 CFR 402.02), including federal actions in the area that have already undergone section 7 consultation, and the effects of state or private actions that are contemporaneous with the consultation in process. The environmental baseline for this Opinion considers all projects approved prior to the initiation of formal consultation.

A. Little Tennessee River Watershed

The Little Tennessee River is one of seventeen river basins located in North Carolina. It drains six counties in southwestern North Carolina: Swain, Macon, Clay, Graham, Cherokee, and Jackson. The headwaters of the Little Tennessee River are in Rabun County, Georgia, flowing for 7 mi before entering North Carolina. The river is within the Blue Ridge physiographic province of the Appalachian Mountains and is part of the Tennessee/Ohio/Mississippi River system. In North Carolina, the river basin covers 1,800 square mi (mi^2), with more than 2,500 stream mi and 18,000 acres of lakes and reservoirs.

B. Survey Information

While the presence of the Appalachian elktoe, littlewing pearlymussel, and spotfin chub in the Little Tennessee River and the project's direct impact area were fairly well-documented, additional survey efforts were performed as part of the section 7 consultation process.

On September 10 and 11, 2012, Catena personnel (Tim Savidge, Tom Dickinson, and Nancy Scott) visited the project site. Surveys performed included quantitative cross-river transect mussel surveys and timed, semi-quantitative mussel surveys within the proposed causeway locations. Weather conditions were relatively sunny and the river was running clear.

For the cross-river transect surveys, two 1-m-wide (3.28 ft) cross-river transects were spaced evenly apart within the 30-ft-wide area where the new bridge will be located. Each transect was divided into three sections of equal length (right descending bank, center, and left descending bank). Mussel surveys were conducted using mask/snorkel and/or glass bottom view buckets (bathyscopes) along the transect lines. Mussels within each transect were collected, identified, and returned to the location where they were found. The number of mussels within each transect was recorded as the surveyors progressed along the transect lines. Within the areas surveyed, the wavy-rayed lampmussel (*Lampsilis fasciola*) was fairly common, with 63 individuals recorded. Less common mussels encountered were the rainbow mussel (*Villosa iris*, two found), spike mussel (*Elliptio dilatata*, one found), and Tennessee clubshell (*Pleurobema oviforme*, one found). During the survey, two relict shells of the Appalachian elktoe were recorded within the survey area. Although neither the Appalachian elktoe nor the littlewing pearlymussel were found during the survey, they could be present in the project footprint in low numbers.

C. Status of the Species Within the Direct Impact Area and the Action Area

For the analysis of this proposed action, we have broken the action area into a smaller area where construction activities are likely to have direct effects and more immediate indirect effects, defined as the direct impact area. A larger action area is defined by

the critical habitat units for the Appalachian elktoe and spotfin chub, where longer duration indirect effects and cumulative effects may materialize.

The habitat quality within the direct impact area is of high quality for all three listed species. The Appalachian elktoe was abundant at this site in the recent past; however, as previously mentioned, an unknown stressor has caused a large decline in the Appalachian elktoe within this population and is now below detectable numbers at this site. This species has been found sporadically at other sites that showed a similar decline; thus, we cannot discount the possibility that the Appalachian elktoe is still present within the direct impact area. Within the greater action area, which includes most of the main stem of the Little Tennessee River, the species is greatly reduced from historical population densities but can still be reliably found at certain sites in the river. Of particular note is a short stretch of river immediately downstream of Emory Dam, where the Appalachian elktoe is relatively abundant though still fewer than were found at this site before the population decline. The drastically reduced population in this basin makes the Appalachian elktoe vulnerable to extirpation from single events and would indicate that the status of this species is moderately to greatly imperiled.

Habitat quality is likewise suitable for the littlewing pearlymussel; however, this species has not been observed in the Little Tennessee River since 2005, and it is unknown what population of this species might still be present in this system. The dramatic decline of this species over its entire range may indicate that it is particularly sensitive to a yet unknown stressor. The available data suggests that this species is either critically imperiled or extirpated from the Little Tennessee River. Due to the extremely low numbers of this species, it is unlikely that there are any littlewing pearlymussels within the direct impact area.

The spotfin chub is a mobile species that utilizes several different habitats during different parts of its life cycle. Within the direct impact area, the habitat is suitable for foraging spotfin chubs and may have some areas that are suitable for spawning. The population of the spotfin chub in the Little Tennessee River has natural fluctuation from year to year based primarily on weather patterns, but the long-term trend for this species is that the population is large and stable and does not appear to be limited by available habitat. The spotfin chub is likely to be present within the direct impact area at various times during construction.

D. Physical Characteristics and Land Use

The proposed direct impact area is within the Upper Little Tennessee River Subbasin (Hydrologic Unit Code 06010202), an area of about 790 mi^2, containing the municipalities of Franklin and Highlands. Within the subbasin, the land use as of 2011 was 86 percent forested, 6 percent developed, 4 percent agriculture, 2 percent open water, and 2 percent scrub (National Land Cover Dataset 2011). Much of the watershed is located in either the Nantahala National Forest or the Great Smoky Mountains National Park, which accounts for the large amount of forested land cover.

The area's population in 2000 was 33,168 and in 2010 had grown to 37,924 (a more than 14-percent increase) (NCDWQ 2012a).

E. Water Quality

The State of North Carolina assigns a best usage classification to all waters of North Carolina. These classifications provide a level of water quality protection to ensure that the designated usage of that water body is maintained. The minimum designation of Class C waters is defined as waters that are suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. Class C imposes a minimum standard of protection for all waters of North Carolina. Class B waters protect all Class C uses and, in addition, protect primary recreation activities: swimming, skin diving, water skiing, and similar uses involving human body contact with water (NCDWQ 2011).

The Little Tennessee River is classified as Class C waters from the North Carolina/Georgia state line to a point just upstream of the mouth of Iotla Creek, 6.5 mi upstream from Bridge 172. From the mouth of Iotla Creek to the Nantahala arm of Fontana Lake, the Little Tennessee River is classified as Class B waters. Therefore, the proposed direct impact area contains streams classified as both Class B and Class C waters (NCDWQ 2012a). The two tributaries feeding into the Little Tennessee River closest to Bridge 172--Bradley Creek and Lakey Creek--are classified as Trout Waters, a classification intended to protect fresh water for natural trout propagation and survival of stocked trout on a year-round basis. There are no High Quality Waters (HQWs), Outstanding Resource Waters, or Water Supply supplemental classifications within the Local Watershed Planning area (Ecosystem Enhancement Program [EEP] 2009).

There are benthic- and fish-monitoring locations close to the proposed direct impact area on tributaries of the Little Tennessee River. These stations (GB31, GB232, and GB208) have received ratings of "Excellent" in terms of macroinvertebrate sampling. It should be noted, however, that stations upstream of the proposed direct impact area on the main stem of the Little Tennessee River (GB35) and on tributaries of the Little Tennessee River (GF15, GB33) received ratings of "Good" for fish communities and macroinvertebrate sampling (NCDWQ 2012a). This difference of ratings from tributaries to the main stem can be expected in a rural setting that is downstream of a municipality (i.e., Town of Franklin).

A station (G2000000) exists in the NCDWR's Ambient Monitoring System, upstream of the proposed direct impact area near NC 28 and the convergence of Iotla Creek with the Little Tennessee River. The monitoring of ambient water conditions has been conducted there since 1968 and includes parameters such as pH, dissolved oxygen, fecal coliform bacteria, and turbidity. The 2012 NCDWQ Little Tennessee River Basin Plan summarizes the water-quality data at this site from the year 2000 to 2010. During this 11-year period, pH fell below 6 standard units four times, two of which occurred in 2007, a year when only six samples were collected. Dissolved

oxygen levels over that same time period did not fall below the 4 milligrams per liter (mg/L) instantaneous standard for Class C waters or below the 6 mg/L standard for trout waters. Fecal coliform counts exceeded the standard in greater than 10 percent of the samples during the 11-year period, indicating occasional contamination of the stream by animal or human waste. Turbidity measurements exceeded the standard (50 Nephelometric Turbidity Units) in less than 10 percent of the samples over the 11-year period (NCDWQ 2012a). Overall, these monitoring efforts suggest relatively high water quality with occasional elevated pollutant levels. The limited level of elevated pollutants can be expected given the location of the site downstream of an urban area (i.e., Town of Franklin).

Downstream of Lake Emory, water quality and habitat improves significantly. This section of river is noted as one of the healthiest major rivers in the Blue Ridge region and supports a nearly complete biological community, including sensitive species such as the spotfin chub, sicklefin redhorse, olive darter (*Percina squamata*), slippershell mussel (*Alasmidonta viridis*), and Appalachian elktoe. The limited capacity of Lake Emory to trap sediment, combined with possible organic and metal contaminants attached to sediments both trapped within the lake's sediment and those sediments moving through the impoundment, is a concern to protecting downstream conditions. Investigations by the U.S. Geological Survey (USGS) and Western Carolina University (as reported in the EEP's Watershed Plan) indicate metals (cadmium, copper, nickel, zinc, and lead) and organic pollutants are present in legacy sediments in Lake Emory and the Little Tennessee River. These contaminants may negatively impact aquatic biota, especially those associated with bottom substrates, such as mussels.

The heavy sediment in Lake Emory and increasing loads in the downstream reach demonstrate the need for strong sediment- and erosion-control measures, wetland restoration, and streambank stabilization throughout the entire watershed. Macon County has adopted a Soil Erosion and Sedimentation Control Ordinance that should help reduce erosion problems originating from certain new land-disturbing activities. Additional research indicates that there has been a >90-percent decline in the abundance of the Appalachian elktoe and slippershell mussels in the Little Tennessee River between Franklin Dam and the backwaters of Fontana Reservoir since 2005. This reach of the Little Tennessee River formerly supported the strongest populations of both species; however, the slippershell has now dropped below detection at multiple monitoring sites, and the Appalachian elktoe has become rare. Research into causes of this decline is ongoing by North Carolina State University and USGS. No single definitive causal factor has been identified to date, but increased sedimentation, elevated levels of manganese, and an explosion of a recently established population of the exotic Asian clam have been observed and may be contributing factors (Service 2009, NCDWQ 2012a).

F. Impaired 303(d) Listing

As mandated in section 303(d) of the Clean Water Act of 1977 (CWA), states, territories, and authorized tribes are required to develop lists of impaired waters, which are defined as water bodies that do not meet water-quality standards that states, territories, and authorized tribes have set, even after the minimum required levels of pollution-control technology have been installed on point sources of pollution. These water-quality standards include designated uses, numeric and narrative criteria, and anti-degradation requirements as defined in 40 CFR 131. Failure to meet these standards may be due to an individual pollutant, multiple pollutants, or unknown causes of impairment originating from point and nonpoint sources and/or atmospheric deposition. The law requires that these jurisdictions establish priority rankings of waters on the list and develop Total Maximum Daily Load (TMDL) limits of identified pollutants for impaired waters.

Under current conditions, several streams upstream of Bridge No. 172 are listed as impaired, including Iotla Creek, Rocky Branch, Caler Fork, and Bradley Creek. These streams are on North Carolina's section 303(d) Category 5 list of impaired streams. Category 5 waters are those impaired for one or more designated uses by a pollutant(s) and require a TMDL for the pollutant(s). So, while the main stem of the Little Tennessee River is not impaired, several streams that flow into the Little Tennessee River are impaired (see Table 1 below). These impairments are due to the ecological/biological integrity of the fish community and fecal coliform (NCDWQ 2012b). These streams are also listed on the 2014 draft 303(d) list (NCDWR 2014).

Table 1 – Little Tennessee River Impaired Streams 2012.

Stream	AU* Number	Length/Area	Reason for Rating	Parameter (Year)	Use
Caler Fork Creek (060102020402)	2-29-4	4.6 FW** Miles	Poor Bioclassification	Ecological/Biological Integrity, Fish Community (2012)	Aquatic Life
Rocky Branch (060102020401)	2-26	2.3 FW Miles	Standard Violation	Fecal Coliform (2012)	Recreation
Iotla Creek (060102020401)	2-27	5.5 FW Miles	Standard Violation	Fecal Coliform (2012)	Recreation
Iotla Branch (060102020401)	2-27-1	2.4 FW Miles	Standard Violation	Fecal Coliform (2012)	Recreation
Bradley Creek (060102020404)	2-33	3.7 FW Miles	Standard Violation	Fecal Coliform (2012)	Aquatic Life

*AU – Assessment Unit
**FW Miles – Freshwater Miles

G. Point-source Pollution

Point-source discharge is defined as discharge that enters surface waters through a pipe, ditch, or other well-defined point of discharge. These include municipal (city

and county) and industrial wastewater treatment facilities, small domestic discharging treatment systems (schools, commercial offices, subdivisions, and individual residents), and stormwater systems from large urban areas and industrial sites. The primary substances and compounds associated with point-source discharge include nutrients, oxygen-demanding wastes, and toxic substances such as chlorine, ammonia, and metals.

Under section 301 of the CWA, the discharge of pollutants into surface waters is prohibited without a permit from the Environmental Protection Agency (EPA). Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) permitting program, which delegates permitting authority to qualifying states. In North Carolina, the NCDWR of the North Carolina Department of Environment and Natural Resources (NCDENR) is responsible for the permitting and enforcement of the NPDES program. The facilities listed in Table 2 below have been issued discharge permits for the Little Tennessee River watershed in North Carolina (NCDWQ 2012b), the closest of which, the Town of Franklin's wastewater treatment plant (WWTP), is more than 5 mi upstream of the direct impact area.

The Town of Franklin's WWTP is the only major facility that discharges directly into the Upper Little Tennessee River and is the only facility with limit violations since 2007, exceeding biochemical oxygen demand and total suspended solids limits. As of the 2012 River Basin Plan (NCDWQ 2012a), the facility was in the process of upgrading portions of its treatment works. In February 2013, the facility received a new aerobic digester.

Table 2 – NPDES Permitted Discharges in Little Tennessee River Basin

Permit #	Facility	Type	Flow (GD)	Waterbody
NC0021547	Town of Franklin WWTP	Major	1,650,000	Little Tennessee River
NC0067326	Cullasaja School WWTP	Minor	3,000	Cullasaja River
NC0060844	Laurel Hills WWTP	Minor	9,000	Unnamed tributary, Little Tennessee River
NC0070394	Willowbrook Park WWTP	Minor	24,600	Coweeta Creek
NC0032778	4th Street WWTP	Minor	Not limited	Big Creek
NC0021407	HighlandsWWTP	Major	1,500,000	Cullasaja River
NC0036692	Skyline Lodge & Village WWTP	Minor	10,000	Big Creek
NC0059552	Highlands Falls WWTP	Minor	3,000	Unnamed tributary, Cullasaja River
NC0075612	Wildcat Cliffs Country Club WWTP	Minor	50,000	Unnamed tributary, Cullasaja River
NC0051381	Highlands Falls Country Club WWTP	Minor	135,000	Saltrock Branch

GD – gallons per day. Major discharge = >1 million gallons per day (MGD). Minor discharge <1 MGD.

H. Nonpoint-source Pollution

Nonpoint-source pollution refers to runoff that enters surface waters through stormwater or snowmelt. There are many types of land-use activities that are sources of nonpoint-source pollution, including land development, construction activity, animal waste disposal, mining, agriculture, and forestry operations as well as impervious surfaces, such as roadways and parking lots. Various nonpoint-source-pollution management programs have been developed by a number of agencies to control specific types of nonpoint-source pollution (e.g., forestry, pesticide, urban, construction-related, etc.). The NCDOT has been granted authority to administer its own sedimentation and erosion-control program by the Sedimentation Control Commission and NCDENR. Prior to construction, the Sedimentation Pollution Control Act of 1973 requires the submission and approval of erosion-control plans on all projects that disturb 1 acre or more. On-site inspections by the North Carolina Division of Land Quality are conducted to determine compliance with the plan and to evaluate the effectiveness of the best management practices (BMPs). The NCDOT, in cooperation with the NCDWR, has developed a sedimentation-control program for highway projects that adopts formal BMPs for the protection of surface waters. Additional erosion-control measures, as outlined in Design Standards in Sensitive Watersheds (NCAC T15A:04B .0024), are implemented by the NCDOT for projects within WS-I or WS-II water supply watersheds, critical areas, waters designated for shellfish harvest, or any waters designated by the NCDWR as HQWs. When crossing an aquatic resource containing a federally listed species, the NCDOT has committed to implementing erosion-control guidelines that go beyond both the standard BMPs and the Design Standards in Sensitive Watersheds, regardless of the NCDWR classification. These areas are designated as "Environmentally Sensitive Areas" on the erosion-control plan.

IV. EFFECTS OF THE ACTION

Under section 7(a)(2) of the Act, "effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action. The federal agency is responsible for analyzing these effects. The effects of the proposed action are added to the environmental baseline to determine the future baseline, which serves as the basis for the determination in this Opinion. Should the effects of the federal action result in a situation that would jeopardize the continued existence of the species, we may propose reasonable and prudent alternatives that the federal agency can take to avoid a violation of section 7(a)(2). The discussion that follows is our evaluation of the anticipated direct, indirect and cumulative effects of implementing the proposed action. Direct effects are actions that may result in immediate effects to the species or its critical habitat, including the construction of temporary causeways, land-clearing, potential toxic spills, and erosion. All of these activities have the potential to kill or injure the species under consideration, either by injuring them, poisoning them, or causing their habitat to be altered. Indirect effects are those caused by the proposed action that occur later in time

but that are still reasonably certain to occur. Cumulative effects are those effects of future state or private activities, not involving federal activities, which are reasonably certain to occur within the action area of the proposed federal action (50 CFR 402.02).

A. Factors to be Considered

Proximity of the Action - Based on recent surveys within the action area conducted by the Catena Group, NCWRC, and Service, it appears that the Appalachian elktoe and littlewing pearlymussel are below a detectable threshold within the direct impact area. The Appalachian elktoe has been demonstrated to still be present at sites near the direct impact area at low density; as such, the probability that the Appalachian elktoe occurs within the direct impact area is relatively higher than that of the littlewing pearlymussel due to its much lower density. The spotfin chub is present throughout this section of the Little Tennessee River and is likely to be present within the direct impact area. The proposed action is within the Appalachian elktoe and spotfin chub's critical habitat and will be directly disturbed by the proposed action.

Nature of the Effect - In-stream habitat will be affected permanently by the construction of two additional piers within the river channel. Suitable in-stream habitat at the project site will also be affected for the duration of the construction and likely for some period after project completion. Portions of the habitat may be impacted permanently by the construction and use of the temporary causeways and by hydraulic alteration caused by the additional piers. A small portion of the riparian area at both sites may be cleared for equipment access and could result in temporary increases in water temperature at each location until reforestation can occur. An increase in access for large construction vehicles to cross the river may have cumulative effects that include increased development of the watershed in an area that was previously not accessible for some types of construction.

Disturbance Duration, Frequency, and Intensity - Disturbance to the riverbed will occur over an approximately 1-year period during the installation of causeways, construction of bridge foundations, and extended use of causeways as a crane platform. Effects to the riverbed from causeway construction, use, and removal may have a long duration effect on the habitat suitability. It is largely unknown how much compaction and disturbance due to mechanical removal will alter the substrate under the causeway. Due to the gravelly nature of the substrate at the site, we estimate that it may take a few years for the habitat to recover from this disturbance but believe the effect may compare to a moderate flood event in intensity. However, disturbance to the river's flow pattern due to the additional piers will exist throughout the life of the bridge and may cause the conversion of suitable habitat to unsuitable scoured habitat, which may be considered a permanent effect. Riparian vegetation removal will be conducted and stabilized through erosion-control measures and a combination of hardened slope protection or immediate seeding and mulching. Stabilization with rock may lead to permanent alteration of the local temperature due to a combination of the loss of riparian shade and the heating of impervious surfaces.

B. Analyses of Effects of the Action

1. Appalachian elktoe.

a. Potential Beneficial Effects

The NCDOT and FHWA have committed to participating in a partnership with the Service and NCWRC to propagate and restore the Appalachian elktoe in the Little Tennessee River. As discussed previously, this species has experienced declines within the Little Tennessee River, and the present population may be below a critical level for long-term survival. Population augmentation in this river may have large population-level benefits.

b. Direct Effects

Potential direct effects to mussel species associated with transportation projects include: substrate disturbance/loss, siltation, alteration of flows, and introduction of toxic compounds. Under normal conditions, the replacement of a bridge over a stream is a relatively minor disturbance to the stream habitat; however, construction activities do invariably have some adverse effects on the aquatic habitat by increasing the amount of erosion, siltation, and chemical pollution to the impacted waters. The above-mentioned conservation measures will be incorporated by the NCDOT in order to avoid/minimize effects to the Little Tennessee River. Strict implementation of these measures will reduce the chance that the effects will be detrimental to the Appalachian elktoe.

During the most recent surveys, no Appalachian elktoe individuals were observed in the direct impact area of the proposed bridge replacement; however, prior to 2004, the species was common in the Little Tennessee River from Lake Emory downstream to Fontana Lake. The current known presence of individuals upstream of the project area may increase the chances of individuals' inhabiting the project area during construction. Therefore, it should be assumed that the Appalachian elktoe is continually present at the site. As individual Appalachian elktoe mussels may occur within the construction footprint of the replacement structure as well as the causeways required for construction, these losses could occur within the construction footprint and extend downstream 80 m and upstream 20 m. The 100-m area of anticipated loss around the construction footprint is consistent with salvage efforts to relocate mussels at construction sites in North Carolina as well as other states. Potential effects to individual mussels that occur beyond 80 m downstream and 20 m upstream are not anticipated to be significant enough to warrant moving mussels beyond these points.

The potential loss of individual Appalachian elktoe mussels at this site would normally not be expected to adversely impact the overall population within

the Little Tennessee River; however, given the severe decline of this population within the last decade, each individual mussel has increased importance. The construction of the new bridge will result in the placement of permanent and temporary fill into the Little Tennessee River. The following direct effects to the river are anticipated as a result of construction, though these numbers may change slightly in the final design:

- Permanent fill (piers) – 45 square ft (ft^2) (4.2 m^2).
- Temporary fill (rock causeways to construct piers) - 8,276.4 ft^2 (768.9 m^2).

Although effects to the streambed from the causeways are temporary, they have the potential to have long-term effects on mussel recruitment in the area of compaction. Substrate compaction from this type of temporary fill may occur, possibly creating unsuitable habitat for mussels.

The detrimental effects of siltation on aquatic species have been discussed earlier. Suspended solids, sedimentation, and turbidity result in reduced biodiversity as well as a decline in productivity at all trophic levels (Gilbert 1989). Because of the topography and the erodible nature of the soils in the project area, project construction has the potential to result in sedimentation in the Little Tennessee River. To eliminate/minimize the potential for sedimentation, the NCDOT has developed specific erosion-control measures for this project designed to protect environmentally sensitive areas. Although there are no practical erosion-control measures that can totally eliminate the chance for sedimentation from a project site, if the erosion-control plans are properly incorporated into project construction and strictly adhered to, adverse effects to the aquatic habitat of the Little Tennessee River from erosion and sedimentation should be negligible.

Geomorphically stable stream channels and banks are a primary constituent element essential for the survival and conservation of the Appalachian elktoe. Stream-channel instability can directly result from bridge construction. Natural stream stability is achieved when the stream exhibits a stable dimension, pattern, and profile such that, over time, the channel features are maintained and the channel neither aggrades nor degrades. Channel instability occurs when scour results in degradation or when sediment deposition leads to aggradation (Rosgen 1996). The placement of fill into streams, such as with bridge piers and causeways, can alter the normal flow pattern of a water body by reducing flow velocities upstream thus increasing sedimentation and flow velocities downstream, resulting in scour and erosion.

The temporary construction causeway used for this project was designed to result in the least amount of fill into the river as practical. The placement of causeways in the river will also constrict flows, thus creating higher velocities

downstream. Causeway construction will be phased to limit the amount of causeway in the river at any one time, and at no time will the causeway extend the entire width of the river. At the narrowest point, 50 percent of the river channel width will remain open. As depicted in the permit drawings (Appendix C), there will be 0.19 acre of temporary effects due to two causeways, each approximately the same size on either side of the river. The presence of bedrock in the Little Tennessee River limits the potential for significant scour of the riverbed to occur. The effects of increased velocities on channel stability are expected to be minimal and temporary, reverting to near normal conditions after the causeways are removed.

Numerous pollutants have been identified in highway runoff, including various metals (lead, zinc, iron, etc.), sediment, pesticides, deicing salts, nutrients (nitrogen, phosphorus), and petroleum hydrocarbons (Yousef et al. 1985; Gupta, et al. 1981). The sources of these runoff constituents range from construction and maintenance activities to daily vehicular use. Hoffman et al. (1984) concluded that highway runoff can contribute up to 80 percent of the total pollutant loadings to receiving water bodies. Petroleum hydrocarbons, polycyclic aromatic hydrocarbons, lead, and zinc were some of the pollutants identified in this study. The new structure is not expected to increase traffic load, so road-derived pollution is not expected to increase compared to the existing condition. The stormwater coming off the new structure will not directly enter the river; rather it will be directed into inlets placed just off the end of the bridge into preformed scour holes in the floodplain, where it will be treated via a vegetated buffer before flowing into the river. This conservation measure should allow for some road-derived pollutants to be sequestered within the preformed scour holes thereby reducing the pollutant load in the river.

There will be some adverse effects as a result of leaving the existing bridge in place for the foreseeable future as opposed to removal. The footprint of the existing bridge will be prevented from reverting back into available habitat for freshwater mussel species. The area is small in comparison to the size of the river and available habitat, with the current footprint being approximately 140 ft^2 (less than 0.01 acre). However, based on the proposed alignment of the new bridge and lack of scour and bank instability at the existing bridge, there is not expected to be an increase in scour or bank instability as a result of the existing bridge remaining in place. The proposed bridge will be set back from the banks as far as the existing bridge. The proposed piers will be aligned with the flow line of the existing bridge, and the existing banks and bed do not show signs of scour or instability (Stephen Morgan, NCDOT Hydraulics Unit, personal communication). Additionally, removal of the existing bridge would not be without its own adverse effects, as it would involve temporary disturbances to the riverbed.

Lastly, "hot rock" is a concern in the mountain regions of North Carolina. "Hot rock" is sulphidic rock with geologic mineralization that produces acidic runoff when exposed to air and water. Though "hot rock" occurs naturally, it becomes a problem during construction when rock is blasted, excavated, and transported. When disturbed and exposed to the atmosphere and weathering processes, this "hot rock" can produce damaging acid levels in leachate that can acidify the receiving body of water. The construction of a new bridge will require impacting rock in the channel of the Little Tennessee River. Thus, rock that has the potential to be hot should be kept from causing acidic runoff into the river.

According to the North Carolina Geological Survey (NCGS) map, two rock formations underlie or are in close proximity to the project area--biotite gneiss (Coweeta Group) and Great Smoky Group (Ocoee Supergroup) (NCGS 2007). In order to determine the potential for acid-producing rock within the project corridor, the NCDOT's Geotechnical Engineering Unit has conducted investigations of the hard rock underlying the project by taking cores at intervals along the project corridor. These cores were analyzed by a private laboratory (Galbraith Laboratories, Inc.) in order to determine the acid potential of the rock, which is measured as Net Neutralization Potential (NNP). NNP values less than negative 10 are considered as having a potential for producing acid drainage. The results indicate an average NNP value of -8.33. Three of the samples tested between -7.00 and -8.00 NNP, with one sample testing at -11.26 NNP. Due to that fact that the Little Tennessee River contains potential spawning habitat for the spotfin chub and sicklefin redhorse and is some of the best mussel habitat in the river basin, there is the potential for some detrimental effects to these and other aquatic species in the Little Tennessee River as a result of disturbing these acid-producing rocks.

Construction will involve drilling four 42-in shafts. This will generate 22 tons of pulverized material, which may be neutralized in a contained coffer area, depending on the method of drilling, with 350 pounds of 90-percent lime mixture (based on sample results). The shaft cores will be wasted in an area away from streams.

If the NCDOT strictly follows special provisions of testing and monitoring areas of known and potential "hot rock" within the project area and, in accordance, develops an approved mitigation plan to properly counteract these potentially damaging effects, then the potential for "hot rock" effects to the aquatic species of the Little Tennessee River should be minimized.

The NCDOT will develop a plan for mitigating potential "hot rock" issues in the area to ensure potential effects associated with disturbance of "hot rock" are minimized to the fullest extent practical. This plan will be provided to the Service for their review and approved prior to any disturbance by "hot rock" formations.

c. Indirect Effects

Indirect effects are those effects that are caused by or will result from the proposed action and are later in time but are still reasonably certain to occur (50 CFR 402.02). These types of effects can include natural responses to the proposed action's direct effects or can include human-induced effects associated with the proposed action. The indirect effects of bridge replacement are not well known. The initial construction of a bridge is known to cause changes in the flow of the stream and corresponding erosive processes that can alter the adjacent habitat. Adding, removing, or altering bents and abutments will likely cause minor local scour around the interior bents until a state of equilibrium is reached. Scour is expected to be minor, and equilibrium should be reached quickly due to the relatively minor obstruction of the interior bents in the very wide (230 ft) and relatively shallow (2 ft) river.

The existing bents have resulted in the temporary mid-river trapping of logs and woody debris on the upstream side of the crossing, a condition that will be exacerbated by the addition of a new bridge with an additional two bents. In addition to the direct effects of causeway construction that were discussed above, another concern with causeway construction is the potential for the causeway to act as a barrier to fish migration. The disruption of fish migrations can indirectly affect freshwater mussels if the fish that are disturbed serve as fish hosts for the mussel species and are infested with glochidia (juvenile mussels) at the time when their migration patterns are disrupted. The temporary duration of the causeways and the partial width causeway design, which ensures that at least 50 percent of the river channel will remain open during the life of the causeways, is not expected to permanently interfere with the normal migration of any fish species in the Little Tennessee River. Temporary disruptions to the normal migration of individuals of some fish species may occur while the causeway is constructed and in place. Individual fish may be restricted or deterred from swimming upstream of the causeways; however, these temporary disruptions to the fish behavior are not expected to significantly affect the survival of transforming Appalachian elktoes as there is ample habitat downstream of the causeways for transformed mussels. Additionally, the temporary restriction of individual fish from habitat upstream of the causeways will not impact the distribution of the Appalachian elktoe upstream of the causeway impact area as the identified potential fish host species that occur in the Little Tennessee River are widely distributed throughout the river.

Project-induced changes in land use are also considered indirect effects. These types of land-use changes are not direct consequences of the road construction but occur as a result of modifications in access to parcels of land and from modifications in travel time between various areas (Mulligan and

Horowitz 1986). This project involves the replacement of an existing structure in essentially the same location; however, the new structure will permit much larger and heavier vehicles to cross, which could result in the bridge being used to more effectively bring large construction equipment and prefabricated construction elements across the river. There are other routes available to transport these types of cargo. Presently, development pressure in the area across the river is low to moderate, so it is unknown if the increase in access will indirectly affect development.

One other indirect effect that roadway crossings of water bodies can have on the aquatic environment is the potential for toxic spills once the facility is in operation. The elimination of drop inlets with the new structure will lessen the potential for toxic spills to enter the river at this location. Hazardous spill catch basins are not proposed for the bridge replacement; a closed-drain system will be used on the replacement structure.

Lastly, the existing bridge will eventually become unsafe and require removal. The NCDOT will be responsible for removing the existing bridge and will therefore be responsible for compliance with the Clean Water and Endangered Species Acts for that project. This action will again require coordination with the EPA and Service in order to further avoid negatively impacting the Little Tennessee River and its aquatic community.

d. Interrelated and Interdependent Actions

An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. There are no known interrelated or interdependent actions that should be considered in this Opinion.

e. Cumulative Effects

Cumulative effects are those effects of future state or private activities, not involving federal activities, which are reasonably certain to occur within the action area of the proposed federal action. As discussed earlier, the Appalachian elktoe population in the Little Tennessee River, for reasons not understood, has experienced drastic declines in the past decade. The Little Tennessee River basin has experienced water-quality degradation from past mining, development, and agricultural practices. This degradation undoubtedly adversely impacted the aquatic fauna of the watershed, including the Appalachian elktoe. Given the dynamic nature of riverine habitats and the large amount of land area encompassed in a watershed, it is virtually impossible to eliminate all potential effects to the aquatic species in these habitats.

Past public and private actions within the study area include: traditional rural residential developments; agricultural operations; the existing state-maintained road network and bridge; and more recent residential subdivision developments, including Cross Creek and the Summit at Cross Creek. Infrastructure projects, such as water and sewer service, would have the potential to stimulate land development and directly or indirectly result in adverse effects to the Appalachian elktoe and its designated critical habitat; however, in the future land-use study area defined for this project, there is no existing or planned water or sewer service (HNTB 2005, HNTB 2010). The region has experienced a recent economic downturn, and no significant development has occurred in this region in recent years. However, Macon County is still one of the fastest-growing counties in North Carolina; and based on site-visit input from the NCDOT's Natural Environment Unit staff and a review of aerial photography, there has been recent large-lot residential development immediately west of the proposed project. Also, there is currently land for sale in the vicinity of the bridge to the southwest, and approximately four houses have been constructed (HNTB 2005, HNTB 2010). The construction of residential developments of this nature has the potential to adversely affect water quality in a variety of ways. Houses, driveways, and access roads increase the amount of impervious surface area within a watershed. Applications of pesticide and fertilizer to lawns can ultimately reach waters.

Although recent local planning input indicated that additional residential development in the project area was not imminent due to the economic downturn, future development potential, based upon the attractiveness of the area, will remain moderate. The lack of planned water and sewer service within the project area will limit the density of future development (HNTB 2005, HNTB 2010).

In addition to the effects associated with the bridge construction addressed in the BA, other effects to the Appalachian elktoe population in the Little Tennessee River have occurred and will continue to occur. These types of effects are difficult to identify or quantify but may include sedimentation and/or erosion effects from agricultural and residential land use, water-quality effects (fertilizers, pesticides, etc.) from agricultural and residential sources, small-scale littering into the river, effects from recreational uses of the river (fisherman stepping on individual mussels, using mussels as bait, etc.), and others, all of which could adversely impact individual mussels, or habitat. These potential effects are expected to be localized and small in size, and their cumulative effect is not likely to be large enough to cause serious declines to the overall population.

The NCDOT's analysis of future land use did not identify any other major projects planned in the action area that would threaten the viability of the Appalachian elktoe population in the Little Tennessee River. However,

localized land-use effects, such as agricultural practices or illegal pollution (dumping into the river, etc.), may occur in the watershed and could result in small-scale adverse effects to the species.

f. Conclusion

After reviewing the current status of the Appalachian elktoe, environmental baseline for the action area, effects of implementation of the proposed action, measures identified in the BA to help minimize the potential effects of the proposed project and the proposal to assist in the management and recovery of the species, and any potential cumulative effects, it is the Service's biological opinion that implementing this project is not likely to jeopardize the continued existence of the Appalachian elktoe.

2. Appalachian Elktoe Critical Habitat

The Little Tennessee River is designated as Critical Habitat Unit 1 for the Appalachian elktoe. Unavoidable effects of bridge construction are expected to adversely affect existing critical habitat in the Little Tennessee River immediately downstream of the project area, but these effects are anticipated to be temporary. Habitat loss will result from the addition of bents in the river, which will lead to long-term alteration of the substrate. The effects caused by this bridge replacement are not likely to prevent the continued and long-term use of the Little Tennessee River in the direct impact area.

a. Direct Effects

The permanent and temporary loss of habitat discussed above occurs within habitat occupied by the Appalachian elktoe and also occurs in its critical habitat. This combined loss of habitat (permanent and temporary) is relatively small compared to the amount of available habitat occurring in the 24 RM (38.5 km) comprising Unit 1. This loss of habitat is not expected to impact the Appalachian elktoe's critical habitat to the point where it will eliminate the primary constituent elements from the affected river reaches.

b. Indirect Effects

Indirect effects to Unit 1 resulting from the proposed action include possible water-quality degradation from induced changes in land use in the form of residential; commercial; and, to a lesser extent, industrial development projects. These water-quality effects may compromise the primary constituent element of "clean" water in localized areas within Unit 1. The other primary constituent elements of the designated critical habitat within the action area, including stable streams and the presence of fish host species, are not expected to be significantly compromised by any indirect effects associated with the proposed project. The construction of the new bridge is not expected

to result in significant channel instability (and thus habitat degradation) over time. Fish host species for the Appalachian elktoe will not be eliminated from the action area as a result of project-related indirect effects.

c. Cumulative Effects

Cumulative effects to the Appalachian elktoe's critical habitat in the Little Tennessee River will be similar to the cumulative effects to the species discussed in the previous section.

d. Conclusion of Effects – Appalachian Elktoe Critical Habitat Unit 1

The cumulative effects of project-related disturbance added with other potential small-scale localized effects in the action area are not expected to adversely modify the Appalachian elktoe's critical habitat in Unit 1 to the point where conservation values are compromised nor will they eliminate the primary constituent elements from the affected river reaches.

3. Littlewing pearlymussel (*Pegias fabula*)

a. Direct Effects

Potential direct effects to the littlewing pearlymussel are similar to those described for the Appalachian elktoe. No littlewing pearlymussel individuals have been observed in the direct impact area of the proposed bridge replacement. However, past survey efforts indicate that the littlewing pearlymussel still occupies a stretch of the Upper Little Tennessee River near the project site. There is a 9.3-mi-long (15-km) section approximately 2.5 mi (4.0 km) downstream of Bridge 172 in which the littlewing pearlymussel has been found; this section covers six survey sites and nine sampling events between 1990 and 2005 (North Carolina Natural Heritage Program [NCNHP] 2014). The unavoidable effects of bridge construction are expected to be minimal on the downstream areas (> 2 mi) where littlewing pearlymussel specimens have been found. While no littlewing pearlymussels have been found in the construction footprint, suitable habitat is present; the species may be present in very low numbers. Bridge construction could adversely affect existing habitat in the Little Tennessee River immediately downstream of the project area, but these effects are anticipated to be temporary. Potential adverse effects from disturbance by "hot rock" formations will be minimized to the fullest extent practical by proposed neutralization. The effects caused by this bridge replacement are not likely to prevent the continued and long-term use of the Little Tennessee River in the direct impact area.

b. Indirect Effects

Potential indirect effects to the littlewing pearlymussel are similar to those described for the Appalachian elktoe. As noted previously, indirect effects of the bridge replacement are likely to be minor and temporary. Flow patterns will likely be altered during construction and could cause a change in erosion and sedimentation levels in the river. Given the distance downstream to known littlewing pearlymussel occurrences, there will likely be minor indirect effects as a result of the proposed project.

c. Cumulative Effects

Potential cumulative effects to the littlewing pearlymussel are similar to those described for the Appalachian elktoe. The NCDOT is not aware of any other major projects planned in the action area that would threaten the viability of the littlewing pearlymussel population in the Little Tennessee River. However, localized land-use effects, such as agricultural practices and illegal pollution, may occur in the watershed and could result in small-scale adverse effects to the species.

d. Conclusion of Effects – Littlewing Pearlymussel

The littlewing pearlymussel is presumed to be present in the project area. As such, the NCDOT has committed to take extra precautions during construction in order to prevent degradation of the downstream habitat. Effects to the Little Tennessee River will be minimized to the greatest extent practicable; however, unavoidable adverse effects to this species are expected to occur. These adverse effects are expected to be minor in scope and duration and are not expected to affect the long-term viability of this population and therefore will not jeopardize the continued existence of the littlewing pearlymussel.

4. Spotfin Chub (*Erimonax monachus*)

a. Direct Effects

Potential direct effects to the spotfin chub are similar to those described for the Appalachian elktoe. The spotfin chub occurs in an area approximately 40 mi (64 km) in length, encompassing Bridge 172. It has been collected from the Franklin (Emory) Dam downstream to a point approximately 0.9 mi (1.5 km) upstream of US 19 (NCNHP 2014). The species will be directly impacted by increased sedimentation and erosion during and after construction. The spotfin chub is a species that spawns in crevices, and spawning habitat could be affected by sedimentation; however, measures taken to avoid and minimize effects to mussel species will also decrease direct effects to the spotfin chub. Potential adverse effects from disturbance by "hot rock" formations will be minimized to the fullest extent practical.

b. Indirect Effects

Potential indirect effects to the spotfin chub are similar to those described for the Appalachian elktoe. As discussed previously, indirect effects of the bridge replacement are likely to be minor and temporary. Flow patterns will likely be altered during construction and could cause a change in erosion and sedimentation levels in the river. There will likely be minor indirect effects as a result of the proposed project.

c. Cumulative Effects

Potential cumulative effects to the spotfin chub are similar to those described for the Appalachian elktoe. The NCDOT's analysis did not indicate any other major projects planned in the action area that would threaten the viability of the spotfin chub population in the Little Tennessee River; however, localized land-use effects, such as agricultural practices and illegal pollution, may occur in the watershed and could result in small-scale adverse effects to the species.

d. Conclusion of Effects – Spotfin Chub

The spotfin chub is presumed to be present in the project area. As such, the NCDOT has committed to take extra precautions during construction in order to prevent degradation of the downstream habitat. Effects to the Little Tennessee River will be minimized to the greatest extent practicable; however, unavoidable adverse effects to this species are expected to occur. These adverse effects are expected to be minor in scope and duration and are not expected to affect the long-term viability of this population.

5. Spotfin Chub - Critical Habitat

The Little Tennessee River is designated as Critical Habitat Unit 1 for the spotfin chub.

a. Direct Effects

The permanent and temporary loss of habitat discussed above occurs within habitat occupied by the spotfin chub and occurs in its critical habitat. This combined loss of habitat (permanent and temporary) is relatively small compared to the amount of available habitat occurring in the 48.6 RM (78.2 km) comprising Unit 1. This loss of habitat is not expected to impact the spotfin chub's critical habitat to the point where conservation values are compromised nor will they eliminate the suitable habitat conditions from the affected river reach.

b. **Indirect Effects**

Indirect effects to critical habitat for the spotfin chub resulting from the proposed action include possible water-quality degradation from induced changes in land use in the form of residential; commercial; and, to a lesser extent, industrial development projects. These water-quality effects may compromise the primary constituent element of "clean" water in localized areas within the critical habitat. The other primary constituent elements of the critical habitat within the action area, including stable streams and the presence of fish host species, are not expected to be significantly compromised by any indirect effects associated with the proposed project. The construction of the new bridge is not expected to result in significant habitat degradation in the long term.

c. Cumulative Effects

The proposed actions will directly result in adverse effects to the spotfin chub. Other small-scale effects to the species may also occur within the project action area. These effects are difficult to predict or quantify but may include sedimentation and/or erosion effects from agricultural practices, small-scale littering of the river, effects from recreational uses of the river (fisherman stepping on individual mussels, using mussels as bait, etc.), and others, all of which could adversely affect the constituent elements. These potential effects are expected to be localized and small in magnitude.

d. Conclusion of Effects – Spotfin Chub Critical Habitat Unit 1 Effects

The cumulative effects of project-related disturbance added with other potential small-scale localized effects in the action area are not expected to permanently alter the spotfin chub's critical habitat to the point where conservation values are compromised nor will they eliminate the suitable habitat conditions; therefore the proposed action will not adversely modify the critical habitat.

V. INCIDENTAL TAKE STATEMENT

Section 9 of the Act and federal regulations pursuant to section 4(d) of the Act prohibit the taking of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, such as breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or

sheltering. Incidental take is defined as take that is incidental to, and not for the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the Act, provided that such taking is in compliance with the terms and conditions of this incidental take statement.

A. Amount of Take Anticipated

The Service anticipates that incidental take of the Appalachian elktoe, littlewing pearlymussel, and spotfin chub may occur as a result of construction of the subject bridge. During construction, individual mussels or fish may be crushed, harmed by siltation or other water-quality degradation, or dislocated because of physical changes in their habitat.

The project will involve the disturbance of 6.25 acres of land adjacent to the river; 8,276.4 ft^2 of the streambed will be temporarily affected by the construction of the causeways; 45 ft^2 of streambed will be permanently affected by the placement of bridge piers; and critical habitat may be affected over large areas due to an unknown effect of additional development in the watershed as a result in a change in access. The NCDOT and the Service will coordinate a preconstruction survey to ensure that any individual mussels that are within the area to be covered by causeways are moved to a safe location in an effort to minimize mortality We anticipate that any remaining mussels within the area of the causeways will be killed by causeway placement. An area of nonlethal disturbance is expected to extend up to 400 m downstream from the causeways, where mussels or fish will be harmed by disturbance. We anticipate this take to be a short-term disruption of their normal life history. Cumulative effects may have harmful effects throughout the watershed, but we expect these effects to be below a measureable threshold. These assumptions are made based on construction of the project as planned, with careful adherence to conservation measures, other environmental regulations, and BMPs and without unforeseen circumstances or accidents that may have a greater effect than that which is considered in this document. If project effects extend beyond the expected disturbance distances considered or if incidental take is exceeded, all work should stop, and the Service should be contacted immediately.

B. Effect of the Take

In this Opinion the Service has determined that the level of anticipated take is not likely to result in jeopardy to the Appalachian elktoe, littlewing pearlymussel, or spotfin chub or to adversely modify critical habitat for the Appalachian elktoe or spotfin chub. This Opinion considers the small area of disturbance and the inclusion of conservation measures intended to minimize take to a level that we expect will not be measureable.

C. Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the Appalachian elktoe, littlewing pearlymussel, spotfin chub and adverse effects to the Appalachian elktoe and spotfin chub's critical habitat. These nondiscretionary measures include, but are not limited to, the terms and conditions outlined in this Opinion.

1. The NCDOT will ensure that the contractor understands and follows the measures listed in the "Conservation Measures," "Reasonable and Prudent Measures," and "Terms and Conditions" sections of this Opinion.

2. Construction activities shall be implemented consistent with measures developed to protect the Appalachian elktoe, littlewing pearlymussel, and spotfin chub, including those measures intended to maintain, improve, or enhance their habitat.

3. All appropriate NCDOT BMPs for bridge maintenance and construction will be followed or exceeded for this project, and any additional BMPs listed in the "Terms and Conditions" section of this Opinion will be followed.

D. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the NCDOT must comply with the following terms and conditions, which implement the reasonable and prudent measures described previously and outline required reporting and/or monitoring requirements. These terms and conditions are nondiscretionary.

1. A Service biologist will be present at the preconstruction meeting to cover permit conditions and discuss any questions the contractor has regarding implementation of this project. After the contractor submits plans for various stages of the project, a Service biologist will review and provide comments on the plans and will attend any meetings to discuss implementation of the plans.

2. Construction will be accomplished so that wet concrete does not contact water entering or flowing in the river.

3. Activities in the floodplain will be limited to those absolutely necessary to construct the proposed bridge. Areas used for borrow or construction by-products will not be located in wetlands or the 100-year floodplain.

4. The drill rig and crane can be refueled while inside the 100-year floodplain provided that spill response materials (such as spill blankets and fueling diapers) are used during the refueling. When weather forecasts indicate the potential for flooding, the NCDOT will immediately remove equipment, hazardous materials, fuel, lubricating oils, or other chemicals outside the 100-year floodplain or at least

200 ft from all water bodies (whichever distance is greater), preferably at an upland site.

5. Unconsolidated material (such as sand and dirt) will not be placed directly on the causeways since the material could be washed off or settle into the causeways and enter the river. If unconsolidated material must be placed on the causeways, a solid barrier will be placed on the causeways prior to the placement of the material. The barrier and unconsolidated material will be removed at any time throughout a work day when the water level rises to a point, or is expected to rise overnight to a point, where material could wash off the causeways or during periods of inactivity (2 or more consecutive days). Also, any equipment that is placed on the causeways will be removed at any time throughout a work day when the water level rises to a point, or is expected to rise overnight to a point, where material could wash off the causeways or during periods of inactivity (2 or more consecutive days). The only exception to this measure is that the drill rig may be left in place for periods of inactivity; however, it must also be removed if the water rises to a point, or is expected to rise to a point, where the drill rig could be flooded.

6. Riparian vegetation will be maintained to the maximum extent possible, especially large trees.

7. If riparian areas are disturbed, they will be revegetated with native species as soon as possible.

8. Where possible, the NCDOT will plant trees that provide shade to impervious surfaces in order to reduce heat pollution in the river.

9. The NCDOT will develop a plan for mitigating potential "hot rock" issues in the area so as to ensure that potential effects associated with disturbance of "hot rock" are minimized to the fullest extent practical. This plan will be provided to the Service for its review and approval prior to any disturbance by "hot rock" formations.

10. As described in the "Conservation Measures" section, the NCDOT will cooperate with the NCWRC and the Service to develop conservation actions in the Little Tennessee River that are funded by the conservation funding included as part of the project description. This funding should be available as early as possible so that conservation actions may take place during and after project construction.

VI. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The following conservation recommendations are discretionary

agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information:

1. Pursue funding and partnership opportunities to complete any additional research, inventory, and monitoring work in order to better understand the distribution and autecology of the rare species in the Little Tennessee watershed.

2. Where opportunities exist, work with landowners, the general public, and other agencies to promote education and the dissemination of information about endangered species and their conservation.

3. Pursue additional buffers and conservation opportunities along the main stem of the Little Tennessee River and its tributaries, either individually or in concert with other conservation organizations.

4. Explore opportunities to work with local and state water-quality officials in order to minimize or eliminate sources of pollution, including wastewater and stormwater discharges into the upper Little Tennessee watershed.

5. Consult with the Service on projects that affect aquatic habitat in the Little Tennessee drainage, regardless of the funding source, to ensure compliance with all provisions of the Act.

In order for the Service to be kept informed about actions that minimize or avoid adverse effects or that benefit listed species or their habitats, we request notification of the implementation of any conservation recommendations.

VII. REINITIATION/CLOSING STATEMENT

This concludes formal consultation on the actions outlined in your BA dated December 15, 2014, in which you requested formal consultation. As provided in 50 CFR 402.16, the reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion, or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease, pending reinitiation.

Consultation should also be reinitiated if new biological information comes to light that invalidates the assumptions made regarding the biology or distribution of the

Appalachian elktoe, littlewing pearlymussel, or spotfin chub in the Little Tennessee River in North Carolina.

If there are any questions, please contact Mr. Jason Mays of our staff at 828/258-3939, Ext. 226, or me, Ext. 223. We have assigned our log number 4-2-08-284 to this consultation; please refer to this number in any future correspondence concerning this matter.

Sincerely,

Janet A. Mizzi
Field Supervisor

Enclosures

Electronic copy to:
Ms. Marla J. Chambers, Western NCDOT Permit Coordinator, North Carolina Wildlife Resources Commission, 12275 Swift Road, Oakboro, NC 28129
Mr. Mark Davis, Environmental Supervisor, North Carolina Department of Transportation, 253 Webster Road, Sylva, NC 28779
Mr. Colin Mellor, Natural Environment Unit Project Management Group Supervisor, North Carolina Department of Transportation, 1598 Mail Service Center, Raleigh, NC 27699-1598
Mr. J. Michael Sanderson, Natural Environment Unit Biological Surveys Group, North Carolina Department of Transportation, 1598 Mail Service Center, Raleigh, NC 27699-1598
Ms. Lori Beckwith, U.S. Army Corps of Engineers, 151 Patton Avenue, Asheville, NC 28801

Literature Cited

Ahlstedt, S.A. 1986. A status survey of the Little-wing Pearlymussel *Pegias fabula* (Lea 1838). Endangered Species Field Office, U.S. Fish and Wildlife Service, Asheville, NC. 38 pp.

Alderman, J.M. 1987. North Carolina Endangered Species Research and Survey (Section 1), North Carolina Fish (Subsection B), Population status and distribution of the spotfin chub, *Hybopsis monacha* (Cope) in the Little Tennessee River, North Carolina. Final Report to the U.S. Fish and Wildlife Service. 15 pp.

Alderman, J.M. 1997. Monitoring the Swift Creek freshwater mussel community. Pages 98-107 in K.S. Cummings, A.C. Buchanan, C.A. Mayer, and T.J. Naimo, eds. 1997. Conservation and Management of Freshwater Mussels II: Initiatives for the future. Proceedings of a UMRCC symposium, 16-18 October 1995, St. Louis, Missouri. Upper Mississippi River Conservation Committee, Rock Island, IL. 293 pp.

Burkhead, N.M., and H.L. Jelks. 1998 The effects of suspended sediment on the reproductive success of a crevice-spawning minnow, the tricolor shiner (Teleostei: Cyprinidae) an experimental surrogate for the Threatened Blue Shiner. Final Report, U.S. Fish and Wildlife Service, Jacksonville, FL. 37 pp.

Clarke, A.H. 1981. The tribe Alasmidontini (Unionidae: Anodontinae), Part I: Pegias, Alasmidonta, and Arcidens. Smithsonian Contributions to Zoology (326), 101 pp.

Ecosystem Enhancement Program. 2009. Franklin to Fontana Local Watershed Plan, Phase III. Upper Little Tennessee River Basin, Swain and Macon Counties, North Carolina. Watershed Management Plan, July 2011. *http://www.nceep.net/services/lwps/Little_Tennessee/New/F2F_WMP_Final_21 July2011.pdf.*

Ellis, M.M. 1936. Erosion silt as a factor in aquatic environments. Ecology. 17:29-42.

Fuller, S.L.H., and C.E. Powell. 1973. Range extensions of *Corbicula manilensis* (Philippi) in the Atlantic drainage of the United States. Natilus. 87(2):59.

Gilbert, O.L. 1989. The ecology of urban habitats. Chapman and Hall, London, 369.

Gordon, M.E. 1991. Species account for the Appalachian elktoe (*Alasmidonta raveneliana*). Unpublished report to The Nature Conservancy. 5 pp.

Goudreau, S.E., R.J. Neves, and R.J. Sheehan. 1988. Effects of sewage treatment effluents on mollusks and fish of the Clinch River in Tazewell County, Virginia. Final Rep., U.S. Fish and Wildl. Serv. 128 pp.

Gupta, M.K., R.W. Agnew, and T.L. Meinholz. 1981. Constituents of highway runoff Volume II, Procedural manual for monitoring of highway runoff. Report FHWA/81/043. FHWA U.S. Dept. of Transportation, 121 pp.

HNTB. 2005. Community Impact Assessment: Bridge No. 172 Replacement on SR 1456/Rose Creek Road over Little Tennessee River. TIP B-3868. Macon County, NC.

HNTB. 2010. Indirect and Cumulative Effects Technical Memorandum.

Harman, W.N. 1974. The effects of reservoir construction and channelization on the mollusks of the upper Delaware watershed. Bull. Am. Malac. Union 197312-14.

Hoffman, E.J., J.S. Latimer, C.D. Hunt, G.L. Mills, and J.G. Quinn. 1984. Stormwater runoff from highways. Water, Air and Soil Pollution 25:349-364.

Jenkins, R.E., and N.M. Burkhead. 1984. Description, biology, and the distribution of the Spotfin Chub, *Hybopsis monacha*, a threatened cyprinid fish of the Tennessee River drainage. Bulletin Alabama Museum of Natural History No. 8:1-30.

Layzer, J.B., and R.M. Anderson. 1992. Impacts of the coal industry on rare and endangered aquatic organisms of the Upper Cumberland River Basin. Final Report. Tennessee Cooperative Fishery Research Unit, Tennessee Technological University, Cookeville, TN. 118 pp.

Macon County Schedule of Values. 2015. Retrieved from: *http://www.maconnctax.com/_fileUploads/files/APPROVED%202015%20Macon%20Schedule%20of%20Values.pdf.*

Marking, L.L., and T.D. Bills. 1979. Acute effects of silt and sand sedimentation on freshwater mussels. Pp. 204-211 in J.L. Rasmussen, ed., Proc. of the UMRCC symposium on the Upper Mississippi River bivalve mollusks. UMRCC. Rock Island, IL. 270 pp.

McLarney, W.O. 1990. Further studies of the Spotfin Chub (*Hybopsis monacha*) in the Little Tennessee River. Final Report to Nongame Wildlife Program, North Carolina Wildlife Resources Commission.

Mulligan, P.M., and A.J. Horowitz. 1986. Expert panel method of forecasting land use impacts of highway projects. Pp. 9-15 in Transportation Research Record 1079 land development simulation and traffic mitigation, TRB National Research Board, Washington, DC. 36 pp.

National Land Cover Dataset. 2011. Retrieved from: *http://www.mrlc.gov/nlcd2011.php.*

Neves, R.J. 1991. Mollusks. Pp. 251-320, In K. Terwillger, ed., Virginia's Endangered Species. Proc. Of a Symposium. Dept. of Game and Inland Fisheries, Commonwealth of Virginia. 672 pp.

Neves, R.J., and J.C. Widlak. 1987. Habitat ecology of juvenile freshwater mussels (Bivalvia: Unionidae) in a headwater stream in Virginia. Amer. Malacol. Bull. 1(5):1-7.

North Carolina Division of Emergency Management. 1986. Water quality progress in North Carolina 1984-1985:305b report. North Carolina Department of Environment, Health and Natural Resources, Div. of Environmental Management, Water Quality Section, Raleigh, NC. 206 pp.

North Carolina Division of Water Quality. 2011. A Guide to Surface Freshwater Classifications in North Carolina.

North Carolina Division of Water Quality. 2012a. Little Tennessee River Basinwide Water Quality Plan. North Carolina Department of Environment and Natural Resources, Division of Water Quality, Raleigh, NC.

North Carolina Division of Water Quality. 2012b. North Carolina 303(d) List 2012 – Category 5.

North Carolina Division of Water Resources. 2014. North Carolina Draft 303(d) List 2014 – Category 5.

North Carolina Geological Survey. 2007. Retrieved from: *http://data.nconemap.com/geoportal/catalog/search/resource/details.page?uuid=%7B9D6D2200-F612-4538-B040-035C431F28B1%7D.*

North Carolina Natural Heritage Program. 2014. Department of Environment and Natural Resources, Office of Conservation, Planning, and Community Affairs, Raleigh, NC. Available at: *www.ncnhp.org*. Accessed: July 23, 2014.

Ortmann, A.E. 1921. The anatomy of certain mussels from the Upper Tennessee. The Nautilus 34(3):81-91.

Parmalee, P.W., and A.E. Bogan. 1998. Freshwater Mussels of Tennessee. University of Tennessee Press, Knoxville, TN.

Pennak. 1989. Retrieved from: *http://books.google.com/books/about/Fresh_Water_Invertebrates_of_the_United.html?id=QtQUAQAAIAAJ.*

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology Books, Pagosa Springs, CO. 85 pp.

Smith, D. 1981. Selected freshwater invertebrates proposed for special concern status in Massachusetts (Mollusca, Annelida, Arthropoda). Massachusetts Dept. of Env. Qual. Engineering, Div. of Water Pollution Control. 26 pp.

U.S. Fish and Wildlife Service. 1983. Spotfin Chub Recovery Plan. Atlanta, GA. 46 pp.

U.S. Fish and Wildlife Service. 1989. Little-wing Pearly Mussel Recovery Plan. Atlanta, GA. 29 pp.

U.S. Fish and Wildlife Service. 1994. Endangered and Threatened Wildlife and Plants; Appalachian Elktoe Determined to be an Endangered Species. CFR, Vol. 59, No. 225.

U.S. Fish and Wildlife Service. 1996. Appalachian Elktoe (*Alasmidonta raveneliana*) Recovery Plan. Atlanta, GA. 30 pp.

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants: Designation of Critical Habitat for the Appalachian Elktoe. CFR, Vol. 67, No. 188.

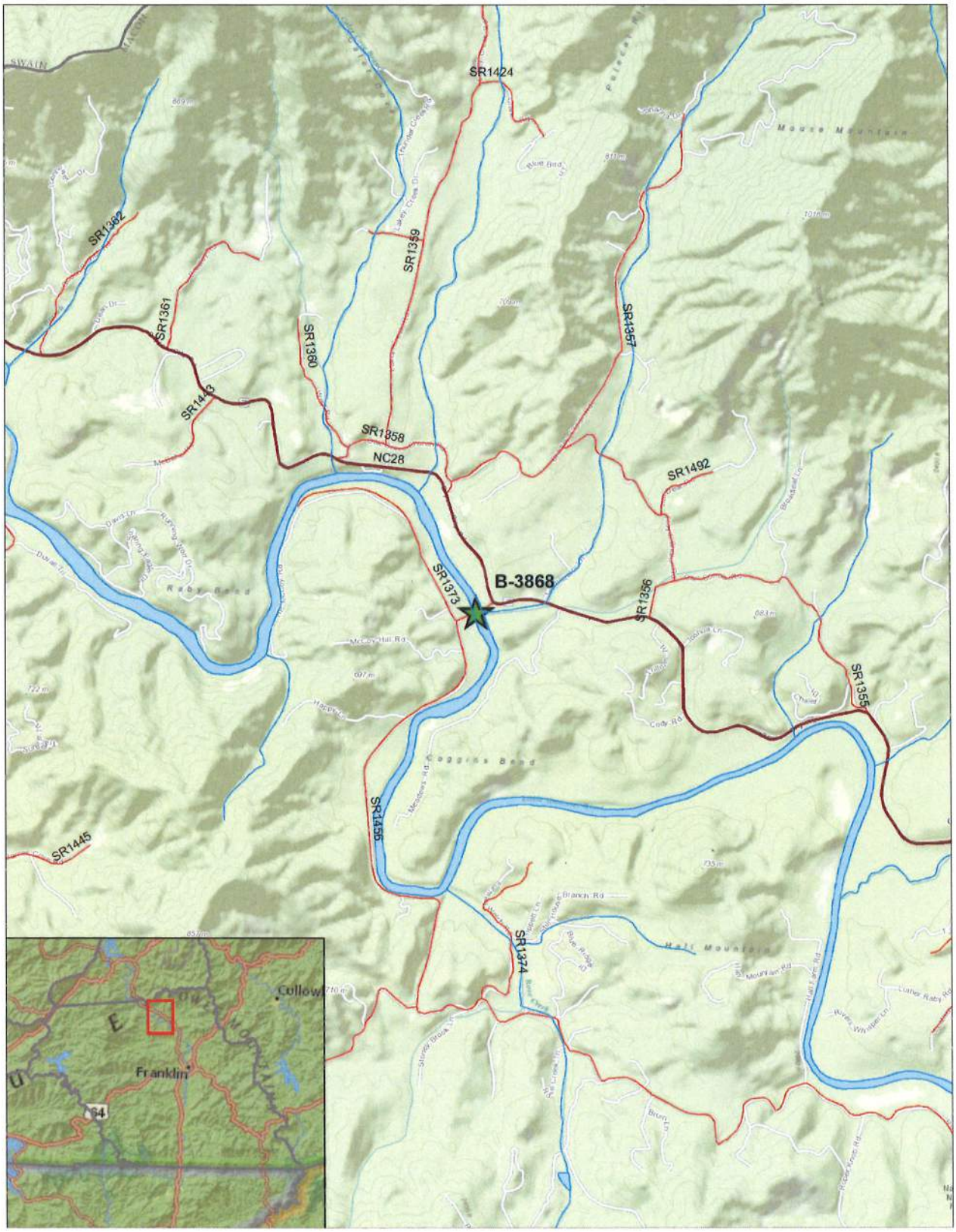
U.S. Fish and Wildlife Service. 2009. Appalachian Elktoe (*Alasmidonta raveneliana*) 5-Year Review: Summary and Evaluation. Asheville, NC.

U.S. Fish and Wildlife Service. 2013. Littlewing Pearlymussel (*Pegias fabula*) 5-year Review: Summary and Evaluation. Frankfort, KY.

Yousef, Y.A., H.H. Harper, L.P. Wiseman, and J.M. Bateman. 1985. Consequential species of heavy metals in highway runoff: Florida Department of Transportation Final Report FL-ER-29-85. 153 pp.

Appendix A

B-3868 Site Map



Appendix B

NORTH CAROLINA

MACON COUNTY

AGREEMENT AS TO TRANSFER OF OWNERSHIP AND MAINTENANCE FOR BRIDGE # 172

DATE: 11/9/2012

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

TIP #: B-3868

AND

WBS Elements: 33313.3.1

COUNTY OF MACON

THIS MUNICIPAL AGREEMENT is made and entered into on the last date executed below, by and between the North Carolina Department of Transportation, an agency of the State of North Carolina, hereinafter referred to as the "Department" and the County of Macon, hereinafter referred to as the "County".

W I T N E S S E T H:

WHEREAS, the Department has plans to make certain street and highway constructions and improvements within the County under TIP B-3868, in Macon County; and,

WHEREAS, the Department and the County have agreed that the limits, as of the date of the awarding of the contract for the construction of the above-mentioned project, are to be used in determining the duties, responsibilities, rights and legal obligations of the parties hereto for the purposes of this Agreement; and,

WHEREAS, this Agreement is made under the authority granted to the Department by the North Carolina General Assembly, including but not limited to, the following legislation: General Statutes of North Carolina, Section 136-66.1, Section 160A-296 and 297, Section 136-18, and Section 20-169, to participate in the planning and construction of a Project approved by the Board of Transportation for the safe and efficient utilization of transportation systems for the public good; and,

WHEREAS, the Department has agreed to transfer and the County has agreed to accept ownership and maintenance of the existing Bridge No. 172 in Macon County upon the terms and conditions provided hereinafter; and,

WHEREAS, transfer of ownership of Bridge No. 172 to the County will not be executed until construction of the new bridge is complete and the bridge is open to and carrying traffic; and,

WHEREAS, the parties to this Agreement have approved the construction of said Project with cost participation and responsibilities for the Project as hereinafter set out.

NOW, THEREFORE, the parties hereto, each in consideration of the promises and undertakings of the other as herein provided, do hereby covenant and agree, each with the other, as follows:

SCOPE OF THE PROJECT

1. The Project consists of replacement of Bridge No. 172 on SR 1456 in Macon County. Upon completion of the new bridge, Macon County will assume ownership and maintenance responsibilities on the existing structure. The Department shall have installed a 4'-6" bike rail and bollards on the existing structure. The Department shall have sealed the asphalt deck if warranted.

2. The Department shall exercise any rights it may have to transfer easement and/or right-or-way associated with the Bridge.

PHASES OF WORK

3. The Department shall be responsible for phases of the project which include preparing the project plans and specifications, construction and contract administration. All work shall be done in accordance with Departmental standards, specifications, policies and procedures.

MAINTENANCE

4. The Department shall perform four (4) inspection cycles on the existing Bridge No. 172 upon completion of B-3868 project. Each inspection cycle shall be up to two (2) years.

5. At the end of the four (4) inspection cycles the Department shall notify in writing, to the County, to assume maintenance inspection responsibilities for Bridge No. 172.

6. Once the County assumes the maintenance inspection responsibilities a copy of its inspection reports shall be submitted to NCDOT's Division 14 Bridge Manager.

7. The County is strongly encouraged to have the bridge inspected in accordance with the National Bridge Inspection Standards.

8. The County shall cooperate with all appropriate authorities regarding use, operation and routine inspection of the bridge for the purpose of protecting the public and furthering public safety.

9. If the County does not continue the maintenance on the bridge or the bridge becomes irreparable, the Department has the right to remove said bridge.

10. If the Department removes said bridge the County shall reimburse the Department the estimated cost of $126,000 in one final payment within 30 days of invoicing by the Department.

11. Upon completion of the Transfer the County shall comply with all federal, state and local Bicycle and Pedestrian policies and procedures regarding the operation of the pedestrian bridge. Some federal and state laws and policies may be accessed at http://www.fhwa.dot.gove/environment/bikeped/index.htm and http:///www.ncdot.org/transit/bicycle/laws/laws_intro.html. In the event the County contracts with an independent company to operate the bridge and provide maintenance, repairs and upkeep for the bridge, it will be the County's responsibility to ensure that the contractor adheres to all local, state and federal guidelines for maintaining the safety and integrity of the bridge structure.

ADDITIONAL PROVISIONS

12. The County shall be responsible for ensuring compliance with all Local, State, and Federal environmental laws, regulations and ordinances and shall indemnify the Department against any fines, assessments or other penalties resulting from noncompliance by any entity performing work under contract with the County or by any employees of the County.

14. Upon completion of the transfer of ownership, the County, at no expense to the Department, shall provide and install all route signs, warning signs and informational signs related to bicycle and pedestrian use of the bridge. Such controls shall be in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways published by the Federal Highway Administration.

15. It is the policy of the Department not to enter into any agreement with another party that has been debarred by any government agency (Federal or State). The County certifies, by signature of this agreement, that neither it nor its agents or contractors are presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction by any Federal or State Department or Agency.

16. To the extent authorized by state and federal law and as set forth above, each party shall be responsible for its respective actions under the terms of this agreement and save harmless the other party from any claims arising as a result of such actions.

17. All terms of this Agreement are subject to available departmental funding and fiscal constraints.

18. By Executive Order 24, issued by Governor Perdue, and N.C. G.S.§ 133-32, it is unlawful for any vendor or contractor (i.e. architect, bidder, contractor, construction manager, design professional,

engineer, landlord, offeror, seller, subcontractor, supplier, or vendor), to make gifts or to give favors to any State employee of the Governor's Cabinet Agencies (i.e., Administration, Commerce, Correction, Crime Control and Public Safety, Cultural Resources, Environment and Natural Resources, Health and Human Services, Juvenile Justice and Delinquency Prevention, Revenue, Transportation, and the Office of the Governor).

IT IS UNDERSTOOD AND AGREED upon that the approval of the Project by the Department is subject to the conditions of this Agreement.

IN WITNESS WHEREOF, this Agreement has been executed, in duplicate, the day and year heretofore set out, on the part of the Department and the County by authority duly given.

L.S. ATTEST:

BY: mike Decker

TITLE: Deputy Clerk to the Board

DATE: 12/11/12

COUNTY OF MACON

BY: [signature]

TITLE: County Manager

DATE: 12/11/2012

N.C.G.S. § 133-32 and Executive Order 24 prohibit the offer to, or acceptance by, any State Employee of any gift from anyone with a contract with the State, or from any person seeking to do business with the State. By execution of any response in this procurement, you attest, for your entire organization and its employees or agents, that you are not aware that any such gift has been offered, accepted, or promised by any employees of your organization.

MACON COUNTY NORTH CAROLINA 1828

This Agreement has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

BY: [signature]
(FINANCE OFFICER)

Federal Tax Identification Number
56-6000930

Remittance Address:
County of Macon
5 N Main St
Franklin, NC 28734

DEPARTMENT OF TRANSPORTATION

BY: [signature]
(CHIEF ENGINEER)

DATE: 1/11/13

APPROVED BY BOARD OF TRANSPORTATION ITEM O: 1-10-13 (Date)

Appendix C

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

July 16, 2014

WBS No.: 33313.1.1 (B-3868)
F. A. Project: BRZ-1456(6)
County: Macon
Description: Replacement of Bridge No. 172 over Little Tennessee River on SR 1456.

Memo To: Mr. Phil S. Harris, III, PE
Natural Environment Unit
Project Development and Environmental Analysis

From: Stephen R. Morgan, PE
Project Manager
Hydraulics Unit

Subject: DRAFT PERMIT DRAWINGS and IMPACT SHEETS

We have completed the draft permit drawings and impact sheets for your review. Enclosed are draft permit drawings and impact sheets for your use on the permit application for the above project.

If you have any questions, please contact Brian Radakovic, PE at 707-6747.

enclosure

cc: Mr. Kevin E. Moore, PE (Roadway Design) w/o att.
Project file

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
HYDRAULICS UNIT
1590 MAIL SERVICE CENTER
RALEIGH NC 27699-1590

TELEPHONE: 919-707-6700
FAX: 919-250-4108

WEBSITE: WWW.NCDOT.ORG/DOH/

LOCATION:
CENTURY CENTER COMPLEX
BUILDING B
1020 BIRCH RIDGE DRIVE
RALEIGH NC

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released September 2011)

Project/TIP No.: B-3868 **County(ies):** Macon

General Project Information

Project No.:	B-3868		**Project Type:**	Bridge Replacement		**Date:**	2/19/2014
NCDOT Contact:	Stephen R. Morgan, PE		**Contractor / Designer:**				
	Address:	NCDOT Hydraulics Unit 1590 Mail Service Center Raleigh, NC 27699		**Address:**			
	Phone:	919-707-6739		**Phone:**			
	Email:	smorgan@ncdot.gov		**Email:**			
City/Town:	Franklin		**County(ies):**	Macon			
River Basin(s):	Little Tennessee		**CAMA County?**	No			
Primary Receiving Water:	Little Tennessee River		**NCDWQ Stream Index No.:**	2-(26.5)			
NCDWQ Surface Water Classification for Primary Receiving Water	**Primary:**		Class B				
	Supplemental:						
Other Stream Classification:							
303(d) Impairments:	None						
Buffer Rules in Effect	N/A						

Project Description

Project Length (lin. Miles or feet):	0.22	**Surrounding Land Use:**	Rural, Mountainous

	Proposed Project	**Existing Site**
Project Built-Upon Area (ac.)	1.97 ac.	1.34 ac.
Typical Cross Section Description:	Two 10-foot lanes with 6-foot paved shoulders transitioning to variable side slopes.	
Average Daily Traffic (veh/hr/day):	Design/Future: 2035/500	Existing: 2013/330

General Project Narrative:

Abandon the function of the existing structure #172 and replace with new structure on SR 1465 over Little Tennessee River, including drainage, grading and paving. The new bridge will be located just downstream of the existing bridge. The existing bridge will remain in place and function as a bike/walk path. Temporary causeways will be required to construct new bents.

Drainage Narrative

Rainfall that accumulates on the bridge will concentrate along the curbs and flow off the bridge into one of four inlets located past each corner of the bridge. Runoff will pass through one of two drainage systems, exiting on to a Class B rip rap pad before entering on to one of two grass lined ditches. The runoff will along the grass lines ditches passing a Class II rip rap embankment before entering the Little Tennessee River. One of the grass lined ditches will also transport some of NC 28 rainfall runoff.

Rainfall runoff from NC 28 will concentrate along the concrete expressway gutters and flow into various inlets. Runoff will travel through the drainage systems, exiting on to Class B rip rap pads. The runoff will then flow via one of the grass lined ditches used for the bridge deck drainage or sheet flowing a distance of 130 feet to Bradley creek which then feeds into the Little Tennessee River.

Salt brining on the bridge

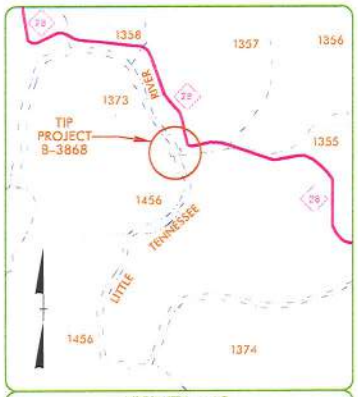
The amount of salt applied to the bridge per an extended event would create a chloride concentration of 80 mg/L flowing from the bridge which is less than the NC and EPA chloride threshold of 230 mg/L for freshwater aquatic life. As per Brian Burch: This route is third on the list of priorities for snow and ice removal and NCDOT's Snow and Ice Policy do not require deicing measures to be applied on this route. During an extended event (3 days), he expects that the bridge would be treated with a salt/chat mixture. For the routine 24 hour event, this bridge will not likely be treated at all. If we assume that Macon County will experience two extended events per year, you can estimate 28 lbs of salt to be applied to this bridge per year. On a yearly basis, the 3 day duration event will cause a precipitation amount of 3.7 inches on the bridge. Assuming 14 pounds of salt are used to treat the bridge deck and the total volume of precipitation on the bridge is 80,440 L then the Chloride concentration would be 80 mg/L.

References

CONTRACT:

TIP PROJECT: B-3868

See Sheet 1-A For Index of Sheets



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MACON COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3868	1	

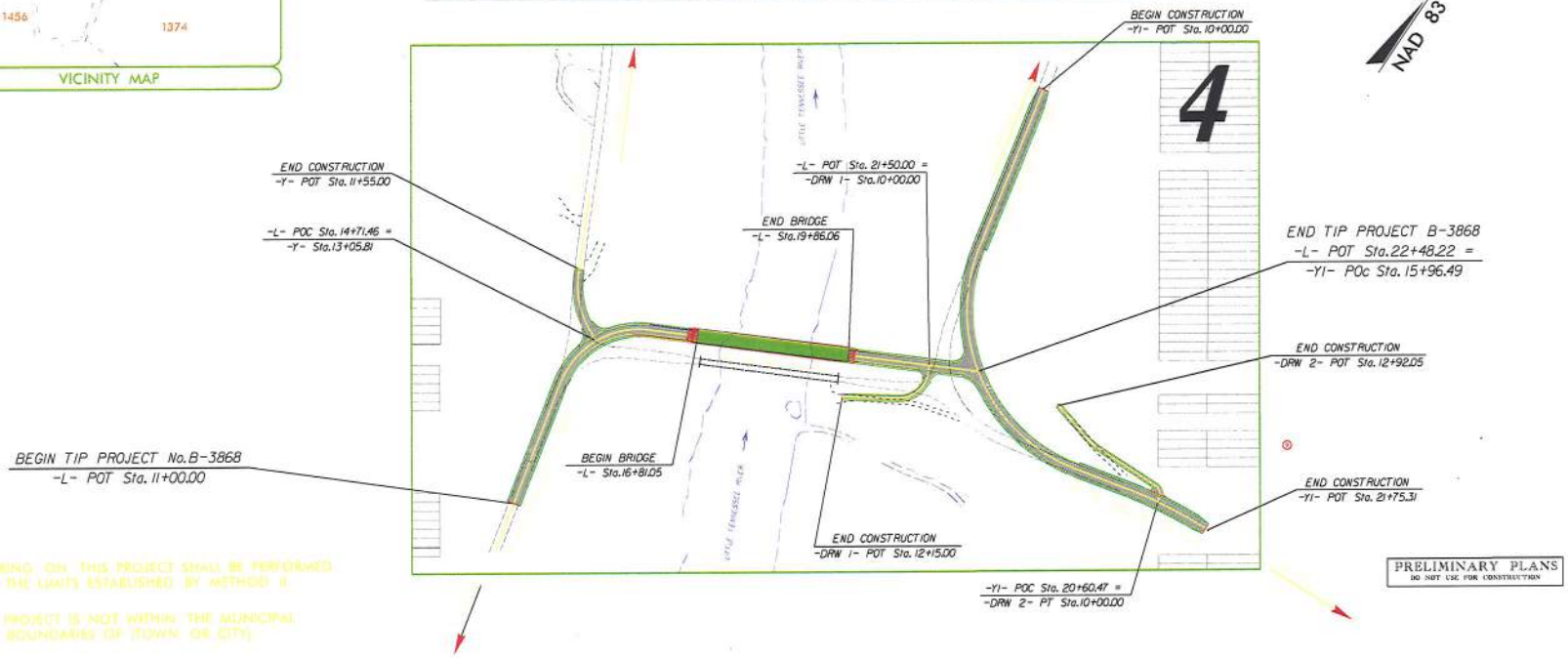
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33313.1.1	BRZ-1456(6)	P.E.
33313.2.FD2	BRZ-1456(6)	R/W, UTILITY
		CONSTRUCTION

PERMIT DRAWING
SHEET 1 OF 6

LOCATION: REPLACEMENT OF BRIDGE No. 172 OVER LITTLE TENNESSEE RIVER ON SR 1456.

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

WETLAND AND SURFACE WATER IMPACTS PERMIT



PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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

THIS PROJECT IS NOT WITHIN THE MUNICIPAL BOUNDARIES OF TOWN OR CITY.

GRAPHIC SCALES

PLANS: 50 25 0 50 100

PROFILE (HORIZONTAL): 50 25 0 50 100

PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2013 = 330
ADT 2035 = 500
DHV = 10 %
D = 65 %
T = 7 % *
V = 25 MPH
* TTST = 1% DUAL 6%
FUNC CLASS = LOCAL

SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT No. B-3868 = 0.317 Miles
LENGTH STRUCTURE TIP PROJECT No. B-3868 = 0.058 Miles
TOTAL LENGTH TIP PROJECT No. B-3868 = 0.159 Miles

THIS PROJECT DESIGNED USING SUB TIER GUIDELINES

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

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: NOVEMBER 26, 2013

LETTING DATE: NOVEMBER 2015

KEVIN MOORE, PE
PROJECT ENGINEER

STEVE KENDALL, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

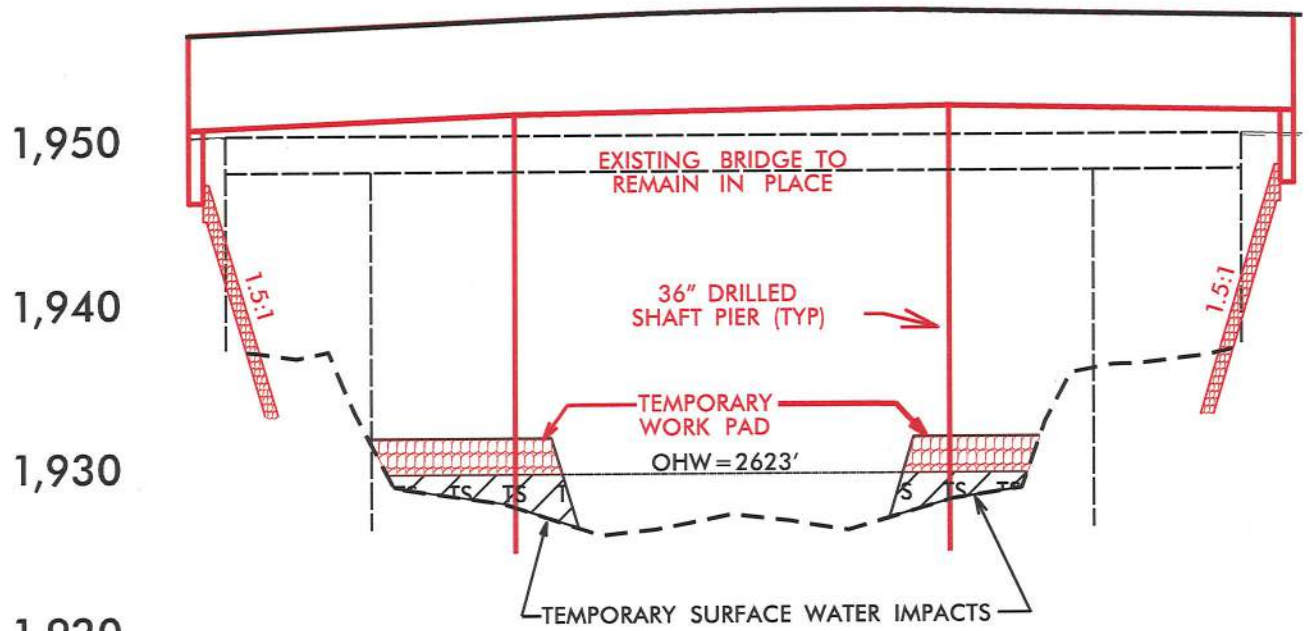
PERMIT DRAWING
SHEET 2 OF 6

PROJECT REFERENCE NO. | SHEET NO.
R/W SHEET NO.
ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS 6/17/99

PROFILE

17 + 00 18 + 00 19 + 00 20 + 00

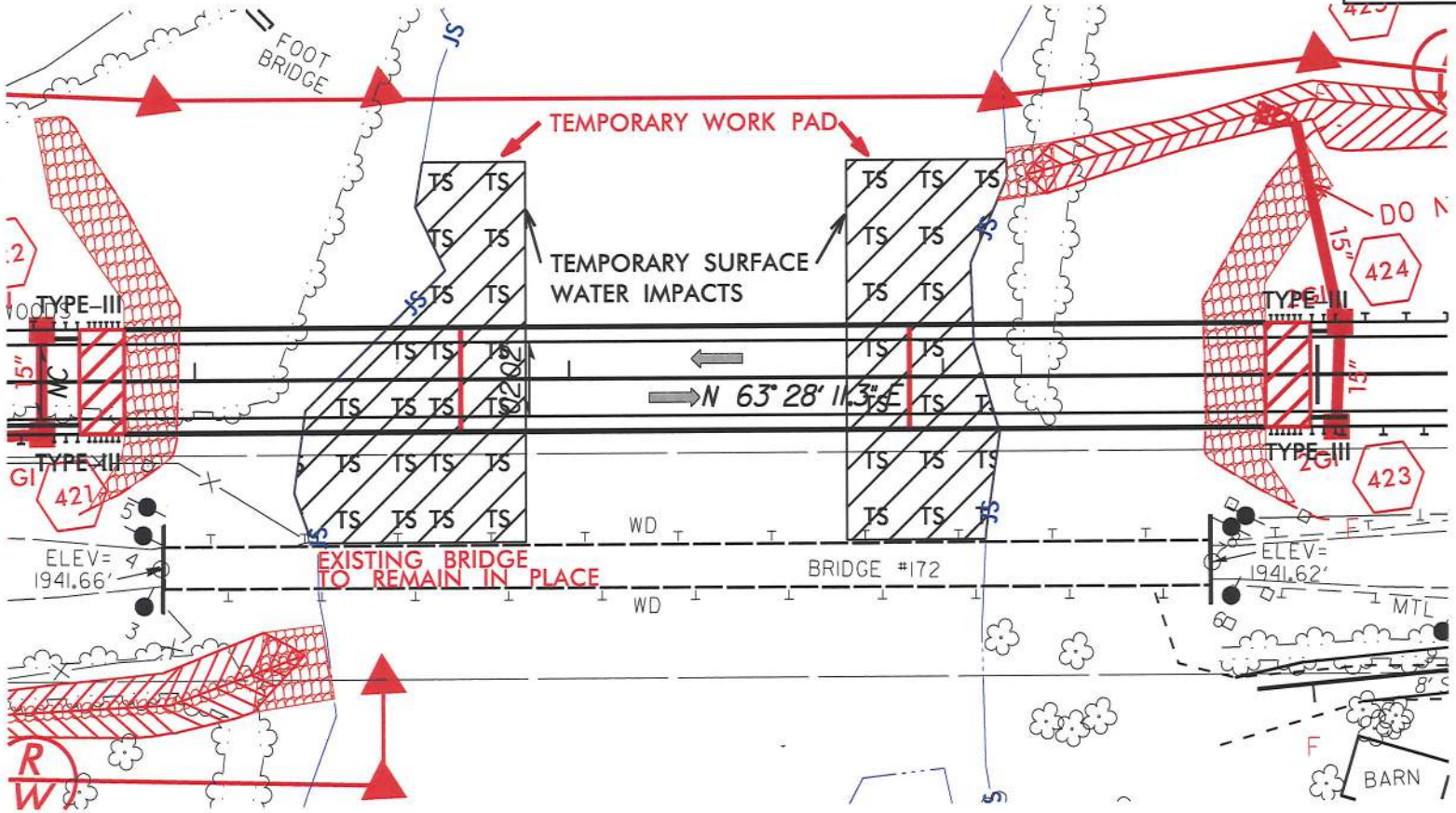


PLAN

PERMIT DRAWING
SHEET 3 OF 6

PROJECT REFERENCE NO.	SHEET NO.
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

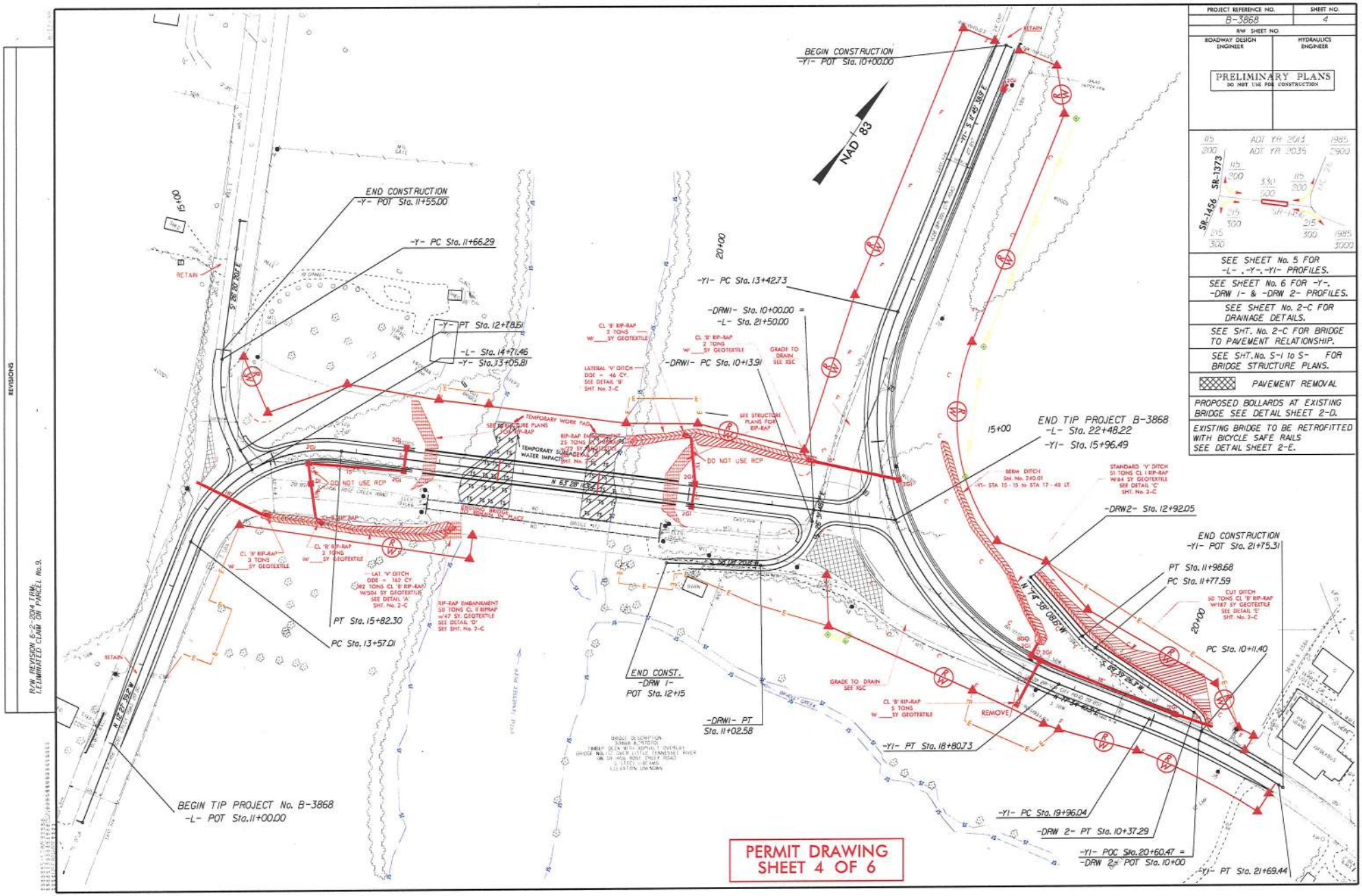
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

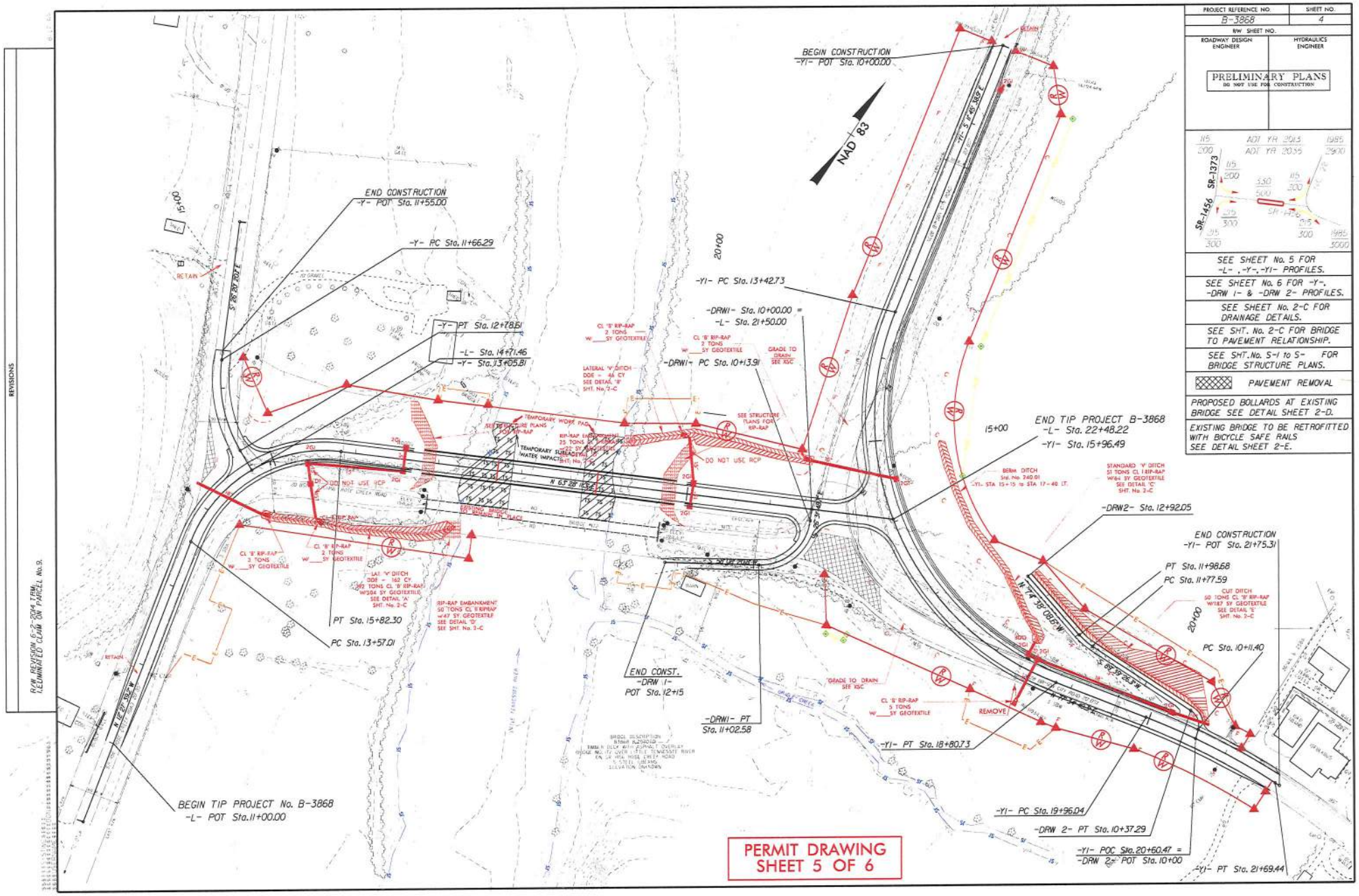


50′ 0′ 50′ 100′ 150′

GRAPHIC SCALE

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER


BEGIN CONSTRUCTION
-Y1- POT Sta. 10+00.00
NAD 83
END CONSTRUCTION
-Y- POT Sta. 11+55.00
-Y- PC Sta. 11+66.29
-Y- PT Sta. 12+78.51
-L- Sta. 14+71.46
-Y- Sta. 13+05.81
-Y1- PC Sta. 13+42.73
-DRW1- Sta. 10+00.00 =
-L- Sta. 21+50.00
-DRW1- PC Sta. 10+13.91
END TIP PROJECT B-3868
-L- Sta. 22+48.22
-Y1- Sta. 15+96.49
-DRW2- Sta. 12+92.05
END CONSTRUCTION
-Y1- POT Sta. 21+75.31
PT Sta. 11+98.68
PC Sta. 11+77.59
PC Sta. 10+11.40
PT Sta. 15+82.30
PC Sta. 13+57.01
END CONST.
-DRW 1-
POT Sta. 12+15
-DRW1- PT
Sta. 11+02.58
-Y1- PT Sta. 18+80.73
-Y1- PC Sta. 19+96.04
-DRW 2- PT Sta. 10+37.29
-Y1- POC Sta. 20+60.47 =
-DRW 2- POT Sta. 10+00
-Y1- PT Sta. 21+69.44
BEGIN TIP PROJECT No. B-3868
-L- POT Sta. 11+00.00
PERMIT DRAWING
SHEET 4 OF 6
PROJECT REFERENCE NO.
B-3868
SHEET NO.
4
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
ADT YR 2013
ADT YR 2035
SR-1373
SR-1456
SEE SHEET No. 5 FOR -L- , -Y-, -Y1- PROFILES.
SEE SHEET No. 6 FOR -Y-, -DRW 1- & -DRW 2- PROFILES.
SEE SHEET No. 2-C FOR DRAINAGE DETAILS.
SEE SHT. No. 2-C FOR BRIDGE TO PAVEMENT RELATIONSHIP.
SEE SHT. No. S-1 to S- FOR BRIDGE STRUCTURE PLANS.
PAVEMENT REMOVAL
PROPOSED BOLLARDS AT EXISTING BRIDGE SEE DETAIL SHEET 2-D.
EXISTING BRIDGE TO BE RETROFITTED WITH BICYCLE SAFE RAILS SEE DETAIL SHEET 2-E.
REVISIONS
R/W REVISION 6-2-2014 TBM:
LEMINATED CLAIM ON PARCEL No.9.


BEGIN CONSTRUCTION
-Y1- POT Sta. 10+00.00
NAD 83
END CONSTRUCTION
-Y- POT Sta. 11+55.00
-Y- PC Sta. 11+66.29
-Y- PT Sta. 12+78.51
-L- Sta. 14+71.46
-Y- Sta. 13+05.81
-Y1- PC Sta. 13+42.73
-DRW1- Sta. 10+00.00 =
-L- Sta. 21+50.00
-DRW1- PC Sta. 10+13.91
END TIP PROJECT B-3868
-L- Sta. 22+48.22
-Y1- Sta. 15+96.49
-DRW2- Sta. 12+92.05
END CONSTRUCTION
-Y1- POT Sta. 21+75.31
PT Sta. 11+98.68
PC Sta. 11+77.59
PC Sta. 10+11.40
PT Sta. 15+82.30
PC Sta. 13+57.01
END CONST.
-DRW 1-
POT Sta. 12+15
-DRW1- PT
Sta. 11+02.58
-Y1- PT Sta. 18+80.73
-Y1- PC Sta. 19+96.04
-DRW 2- PT Sta. 10+37.29
-Y1- POC Sta. 20+60.47 =
-DRW 2- POT Sta. 10+00
-Y1- PT Sta. 21+69.44
BEGIN TIP PROJECT No. B-3868
-L- POT Sta. 11+00.00
PROJECT REFERENCE NO.
B-3868
SHEET NO.
4
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
ADT YR 2013
ADT YR 2035
SR-1373
SR-1456
SEE SHEET No. 5 FOR -L- , -Y-, -Y1- PROFILES.
SEE SHEET No. 6 FOR -Y-, -DRW 1- & -DRW 2- PROFILES.
SEE SHEET No. 2-C FOR DRAINAGE DETAILS.
SEE SHT. No. 2-C FOR BRIDGE TO PAVEMENT RELATIONSHIP.
SEE SHT. No. S-1 to S- FOR BRIDGE STRUCTURE PLANS.
PAVEMENT REMOVAL
PROPOSED BOLLARDS AT EXISTING BRIDGE SEE DETAIL SHEET 2-D.
EXISTING BRIDGE TO BE RETROFITTED WITH BICYCLE SAFE RAILS SEE DETAIL SHEET 2-E.
REVISIONS
R/W REVISION 6-2-2014 TIME ELIMINATED CLAIM ON PARCEL No.9.
PERMIT DRAWING
SHEET 5 OF 6

PERMIT DRAWING
SHEET 6 OF 6

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	19+00 -L-	Bridge							0.19			
TOTALS:									0.19			

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

MACON COUNTY
WBS - 33313.1.1 (B-3868)

SHEET 7/16/2014

ATN Revised 3/31/05

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released September 2011)

Project/TIP No.: B-3868 **County(ies):** Macon

General Project Information

Project No.:	B-3868		**Project Type:**	Bridge Replacement		**Date:**	12/3/2014
NCDOT Contact:	William S. Zerman, PE		**Contractor / Designer:**				
	Address:	NCDOT Hydraulics Unit 1590 Mail Service Center Raleigh, NC 27699		**Address:**			
	Phone:	919-707-6755		**Phone:**			
	Email:	bzerman@ncdot.gov		**Email:**			
City/Town:	Franklin		**County(ies):**	Macon			
River Basin(s):	Little Tennessee		**CAMA County?**	No			
Primary Receiving Water:	Little Tennessee River		**NCDWQ Stream Index No.:**	2-(26.5)			
NCDWQ Surface Water Classification for Primary Receiving Water		**Primary:**	Class B				
		Supplemental:					
Other Stream Classification:							
303(d) Impairments:	None						
Buffer Rules in Effect	N/A						

Project Description

Project Length (lin. Miles or feet):	0.22	**Surrounding Land Use:**	Rural, Mountainous	
	Proposed Project		**Existing Site**	
Project Built-Upon Area (ac.)	1.97	ac.	1.34	ac.
Typical Cross Section Description:	Two 10-foot lanes with 6-foot paved shoulders transitioning to variable side slopes.			
Average Daily Traffic (veh/hr/day):	Design/Future: 2035/500		Existing: 2013/330	

General Project Narrative:

Abandon the function of the existing structure #172 and replace with new structure on SR 1465 over Little Tennessee River, including drainage, grading and paving. The new bridge will be located just downstream of the existing bridge. The existing bridge will remain in place and function as a bike/walk path. Temporary causeways will be required to construct new interior bents.

Drainage Narrative

Rainfall that accumulates on the bridge will concentrate along the curbs and flow off the bridge into one of four inlets located past each corner of the bridge. Runoff will pass through one of two drainage systems, exiting on to a Class B rip rap pad before entering on to one of two ditches. The runoff will flow along the grass or rip rap lined ditches passing some bank protection of Class II rip rap embankment before entering the Little Tennessee River. The grass lined ditch along the NE side of SR 1456 will also transport some of NC 28 rainfall runoff.
Rainfall runoff from NC 28 will concentrate along the concrete expressway gutters and flow into various inlets. Runoff will travel through the drainage systems, exiting on to Class B rip rap pads. The runoff will then sheet flow a distance of 130 feet just south of NC 28 to Bradley Creek which then feeds into the Little Tennessee River.

Salt brining on the bridge

The amount of salt applied to the bridge per an extended event would create a chloride concentration of 80 mg/L flowing from the bridge which is less than the NC and EPA chloride threshold of 230 mg/L for freshwater aquatic life. As per Brian Burch: This route is third on the list of priorities for snow and ice removal and NCDOT's Snow and Ice Policy does not require deicing measures to be applied on this route. During an extended event (3 days), he expects that the bridge would be treated with a salt/chat mixture. For the routine 24 hour event, this bridge will not likely be treated at all. If we assume that Macon County will experience two extended events per year, you can estimate 28 lbs of salt to be applied to this bridge per year. On a yearly basis, the 3 day duration event will cause a precipitation amount of 3.7 inches on the bridge. Assuming 14 pounds of salt are used to treat the bridge deck and the total volume of precipitation on the bridge is 80,440 L then the Chloride concentration would be 80 mg/L

References

North Carolina Department of Transportation

Highway Stormwater Program
STORMWATER MANAGEMENT PLAN
FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released September 2011)

Project/TIP No.: B-3868 **County(ies):** Macon

Project Environmental Summary

Surface Water Impacts

Sheet No.	Station (From / To)	Feature Impacted	Water / Wetland / Buffer Type	Receiving Surface Water Name	NRTR Map ID	NCDWQ Stream Index	NCDWQ Surface Water Classification	303(d) Impairments	Type of Impact	Existing SCM	Proposed SCM
4	18+35	Stream	Perennial	Little Tennessee River		2-(26.5)	B	None	Fill	N/A	Rip Rap
											at Embankment

* List all stream and surface water impact locations regardless of jurisdiction or size.
Equalizer Pipes to be noted as a minimization of impacts.
All proposed SCMs listed must also be listed under Swales, Preformed Sour Holes and other Energy Dissipators, or Other Stormwater Control Measures.

Description of Minimization of Impacts or Mitigation

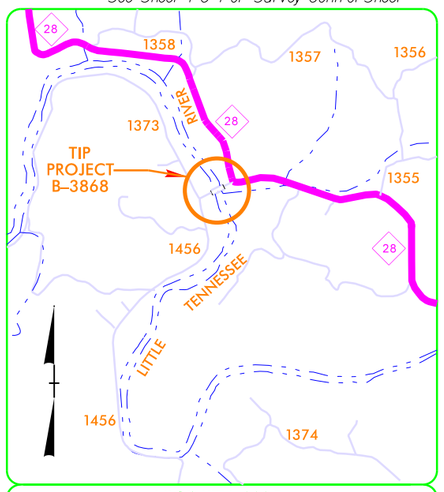
References

09/08/99

TIP PROJECT: B-3868

CONTRACT:

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



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MACON COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3868	1	

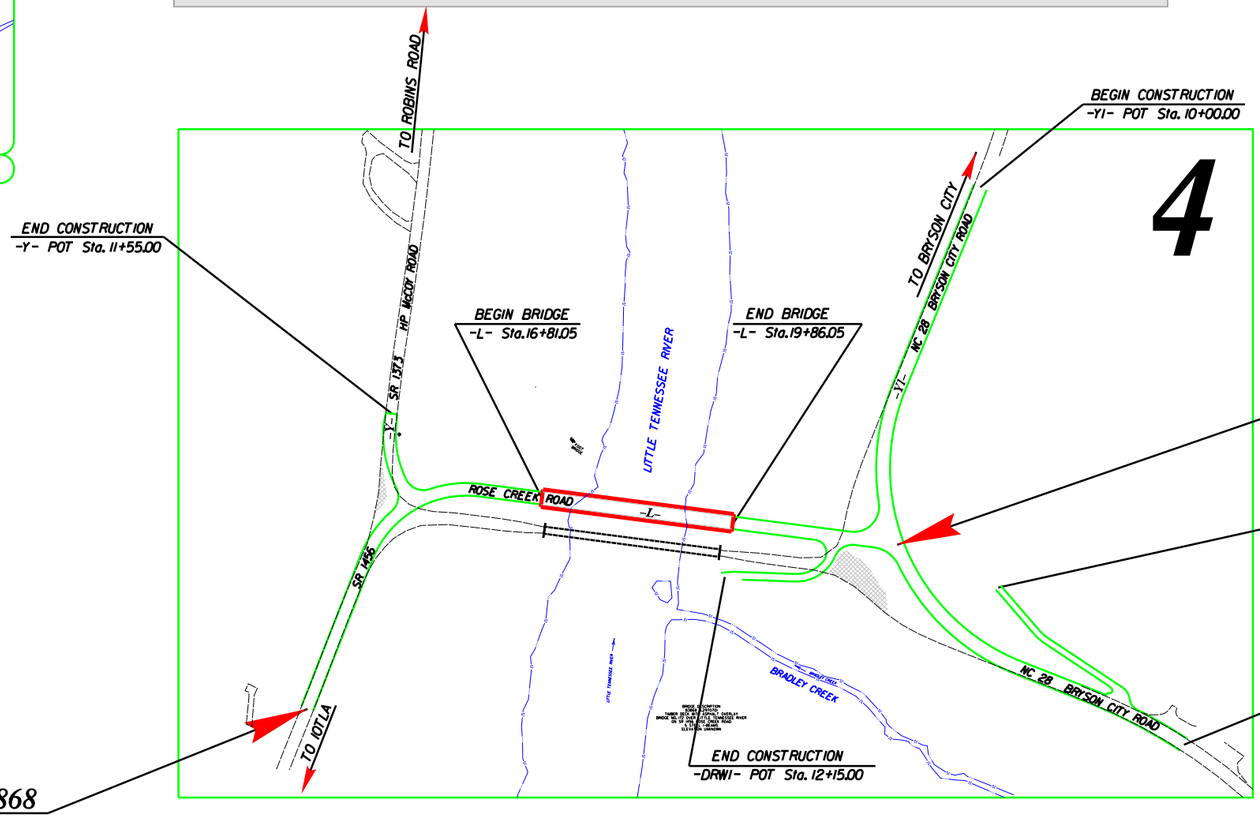
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33313.1.1	BRZ-1456(6)	P.E.
33313.2.FD2	BRZ-1456(6)	R/W, UTILITY
		CONSTRUCTION

PERMIT DRAWING
SHEET 1 OF 7

LOCATION: REPLACEMENT OF BRIDGE No. 172 OVER LITTLE TENNESSEE RIVER ON SR 1456.

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

SURFACE WATER IMPACTS PERMIT



BEGIN TIP PROJECT B-3868
-L- POT Sta. 11+00.00

END TIP PROJECT B-3868
-L- POT Sta. 22+48.22 =
-Y1- POC Sta. 15+96.49

NAD 83

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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

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 2013 = 330
ADT 2035 = 500
DHV = 10 %
D = 65 %
T = 7 % *
V = 25 MPH
* TTST =1% DUAL 6%
FUNC CLASS = LOCAL

SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY T.I.P. PROJECT B-3868 = 0.159 MI

LENGTH STRUCTURE T.I.P. PROJECT B-3868 = 0.058 MI

TOTAL LENGTH OF T.I.P. PROJECT B-3868 = 0.217 MI

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

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
NOVEMBER 26, 2013

LETTING DATE:
NOVEMBER 17, 2015

KEVIN E. MOORE, PE
PROJECT ENGINEER

STEVEN D. KENDALL, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

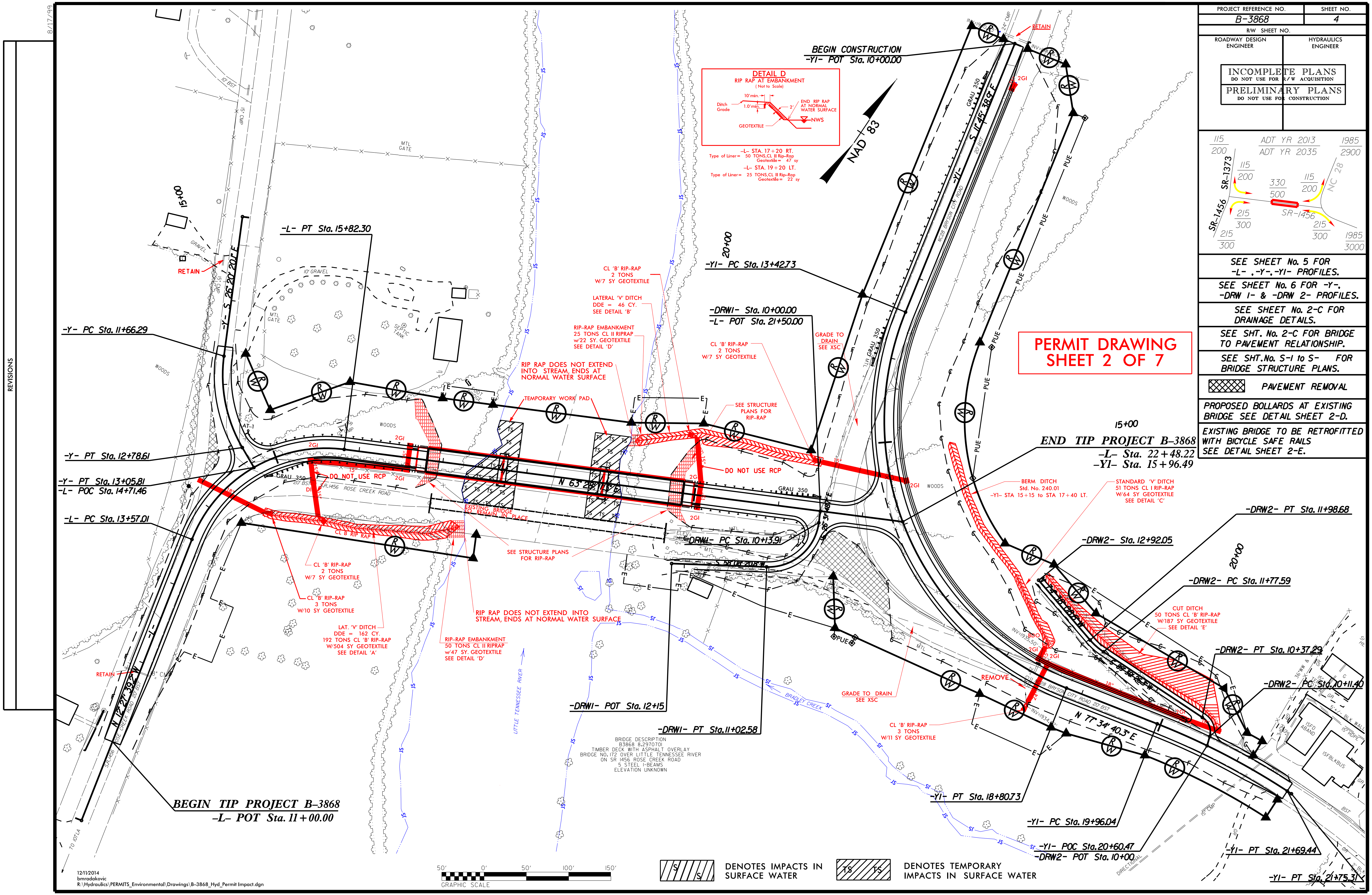
SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

12/02/2014
bmradakovic
R:\Hydraulics\PERMITS_Environmental\Drawings\B-3868_Hyd_tsh.dgn


PROJECT REFERENCE NO.
SHEET NO.
B-3868
4
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
ADT YR 2013
ADT YR 2035
SR-1373
SR-1456
NC 28
SEE SHEET No. 5 FOR -L-, -Y-, -Y1- PROFILES.
SEE SHEET No. 6 FOR -Y-, -DRW 1- & -DRW 2- PROFILES.
SEE SHEET No. 2-C FOR DRAINAGE DETAILS.
SEE SHT. No. 2-C FOR BRIDGE TO PAVEMENT RELATIONSHIP.
SEE SHT. No. S-1 to S- FOR BRIDGE STRUCTURE PLANS.
PAVEMENT REMOVAL
PROPOSED BOLLARDS AT EXISTING BRIDGE SEE DETAIL SHEET 2-D.
EXISTING BRIDGE TO BE RETROFITTED WITH BICYCLE SAFE RAILS SEE DETAIL SHEET 2-E.
PERMIT DRAWING SHEET 2 OF 7
DETAIL D
RIP RAP AT EMBANKMENT
(Not to Scale)
GEOTEXTILE
-L- STA. 17+20 RT.
-L- STA. 19+20 LT.
NAD 83
BEGIN CONSTRUCTION -Y1- POT Sta. 10+00.00
END TIP PROJECT B-3868 -L- Sta. 22+48.22 -Y1- Sta. 15+96.49
BEGIN TIP PROJECT B-3868 -L- POT Sta. 11+00.00
-L- PT Sta. 15+82.30
-Y- PC Sta. 11+66.29
-Y- PT Sta. 12+78.61
-Y- PT Sta. 13+05.81
-L- POC Sta. 14+71.46
-L- PC Sta. 13+57.01
-Y1- PC Sta. 13+42.73
-DRW1- Sta. 10+00.00
-L- POT Sta. 21+50.00
-DRW1- PC Sta. 10+13.91
-DRW1- POT Sta. 12+15
-DRW1- PT Sta. 11+02.58
-Y1- PT Sta. 18+80.73
-Y1- PC Sta. 19+96.04
-Y1- POC Sta. 20+60.47
-DRW2- POT Sta. 10+00
-Y1- PT Sta. 21+69.44
-Y1- PT Sta. 21+75.31
-DRW2- PT Sta. 11+98.68
-DRW2- Sta. 12+92.05
-DRW2- PC Sta. 11+77.59
-DRW2- PT Sta. 10+37.29
-DRW2- PC Sta. 10+11.40
DO NOT USE RCP
RIP RAP DOES NOT EXTEND INTO STREAM, ENDS AT NORMAL WATER SURFACE
TEMPORARY WORK PAD
SEE STRUCTURE PLANS FOR RIP-RAP
EXISTING BRIDGE TO REMAIN IN PLACE
LITTLE TENNESSEE RIVER
BRADLEY CREEK
CUT DITCH 50 TONS CL 'B' RIP-RAP W/187 SY GEOTEXTILE SEE DETAIL 'E'
STANDARD 'V' DITCH 51 TONS CL I RIP-RAP W/64 SY GEOTEXTILE SEE DETAIL 'C'
BERM DITCH Std. No. 240.01 -Y1- STA 15+15 to STA 17+40 LT.
LAT. 'V' DITCH DDE = 162 CY. 192 TONS CL 'B' RIP-RAP W/504 SY GEOTEXTILE SEE DETAIL 'A'
RIP-RAP EMBANKMENT 50 TONS CL II RIPRAP w/47 SY. GEOTEXTILE SEE DETAIL 'D'
RIP-RAP EMBANKMENT 25 TONS CL II RIPRAP w/22 SY. GEOTEXTILE SEE DETAIL 'D'
LATERAL 'V' DITCH DDE = 46 CY. SEE DETAIL 'B'
GRADE TO DRAIN SEE XSC
RETAIN
REMOVE
WOODS
BRIDGE DESCRIPTION
B3868 8.2970701
TIMBER DECK WITH ASPHALT OVERLAY
BRIDGE NO. 172 OVER LITTLE TENNESSEE RIVER
ON SR 1456 ROSE CREEK ROAD
5 STEEL I-BEAMS
ELEVATION UNKNOWN
GRAPHIC SCALE
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
REVISIONS
12/11/2014
bmradakovic
R:\Hydraulics\PERMITS_Environmental\Drawings\B-3868_Hyd_Permit Impact.dgn

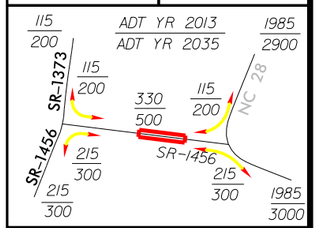
8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
B-3868	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SEE SHEET No. 5 FOR -L- , -Y-, -Y1- PROFILES.

SEE SHEET No. 6 FOR -Y-, -DRW 1- & -DRW 2- PROFILES.

SEE SHEET No. 2-C FOR DRAINAGE DETAILS.

SEE SHT. No. 2-C FOR BRIDGE TO PAVEMENT RELATIONSHIP.

SEE SHT. No. S-1 to S- FOR BRIDGE STRUCTURE PLANS.

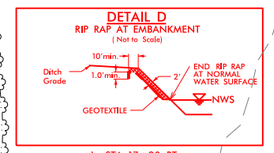
PAVEMENT REMOVAL

PROPOSED BOLLARDS AT EXISTING BRIDGE SEE DETAIL SHEET 2-D.

EXISTING BRIDGE TO BE RETROFITTED WITH BICYCLE SAFE RAILS SEE DETAIL SHEET 2-E.

PERMIT DRAWING SHEET 3 OF 7

DETAIL D
RIP RAP AT EMBANKMENT
(Not to Scale)



-L- STA. 17+20 RT.
Type of Liner= 50 TONS,CL II Rip-Rap
Geotextile= 47 sy

-L- STA. 19+20 LT.
Type of Liner= 25 TONS,CL II Rip-Rap
Geotextile= 22 sy

BEGIN CONSTRUCTION
-Y1- POT Sta. 10+00.00

NAD 83

-Y1- PC Sta. 13+42.73

-DRW1- Sta. 10+00.00
-L- POT Sta. 21+50.00

15+00
END TIP PROJECT B-3868
-L- Sta. 22+48.22
-Y1- Sta. 15+96.49

-L- PT Sta. 15+82.30

-Y- PC Sta. 11+66.29

-Y- PT Sta. 12+78.61

-Y- PT Sta. 13+05.81
-L- POC Sta. 14+71.46

-L- PC Sta. 13+57.01

-DRW1- PC Sta. 10+13.91

-DRW1- POT Sta. 12+15

-DRW1- PT Sta. 11+02.58

-Y1- PT Sta. 18+80.73

-Y1- PC Sta. 19+96.04

-Y1- POC Sta. 20+60.47

-DRW2- POT Sta. 10+00

-DRW2- PT Sta. 11+98.68

-DRW2- Sta. 12+92.05

-DRW2- PC Sta. 11+77.59

-DRW2- PT Sta. 10+37.29

-DRW2- PC Sta. 10+11.40

-Y1- PT Sta. 21+69.44

-Y1- PT Sta. 21+75.31

BEGIN TIP PROJECT B-3868
-L- POT Sta. 11+00.00

CL 'B' RIP-RAP
2 TONS
W/7 SY GEOTEXTILE

LATERAL 'V' DITCH
DDE = 46 CY.
SEE DETAIL 'B'

RIP-RAP EMBANKMENT
25 TONS CL II RIPRAP
w/22 SY. GEOTEXTILE
SEE DETAIL 'D'

RIP RAP DOES NOT EXTEND INTO STREAM, ENDS AT NORMAL WATER SURFACE

TEMPORARY WORK PAD

SEE STRUCTURE PLANS FOR RIP-RAP

DO NOT USE RCP

EXISTING BRIDGE TO REMAIN IN PLACE

CL 'B' RIP-RAP
2 TONS
W/7 SY GEOTEXTILE

CL 'B' RIP-RAP
3 TONS
W/10 SY GEOTEXTILE

LAT. 'V' DITCH
DDE = 162 CY.
192 TONS CL 'B' RIP-RAP
W/504 SY GEOTEXTILE
SEE DETAIL 'A'

RIP-RAP EMBANKMENT
50 TONS CL II RIPRAP
w/47 SY. GEOTEXTILE
SEE DETAIL 'D'

RIP RAP DOES NOT EXTEND INTO STREAM, ENDS AT NORMAL WATER SURFACE

BRIDGE DESCRIPTION
B3868 8.2370701—
TIMBER DECK WITH ASPHALT OVERLAY
BRIDGE NO. 172 OVER LITTLE TENNESSEE RIVER
ON SR 1456 ROSE CREEK ROAD
5 STEEL I-BEAMS
ELEVATION UNKNOWN

GRADE TO DRAIN
SEE XSC

CL 'B' RIP-RAP
3 TONS
W/11 SY GEOTEXTILE

BERM DITCH
Std. No. 240.01
-Y1- STA 15+15 to STA 17+40 LT.

STANDARD 'V' DITCH
51 TONS CL I RIP-RAP
W/64 SY GEOTEXTILE
SEE DETAIL 'C'

CUT DITCH
50 TONS CL 'B' RIP-RAP
W/187 SY GEOTEXTILE
SEE DETAIL 'E'

REMOVE

RETAIN

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

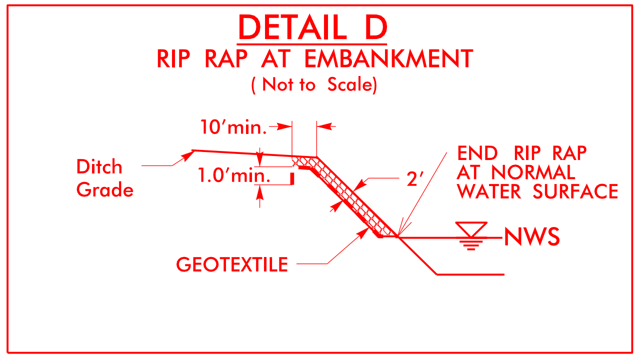
50' 0' 50' 100' 150'
GRAPHIC SCALE

12/11/2014
bmradakovic
R:\Hydraulics\PERMITS_Environmental\Drawings\B-3868_Hyd_Permit Impact.dgn

PROJECT REFERENCE NO.	SHEET NO.
B-3868	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

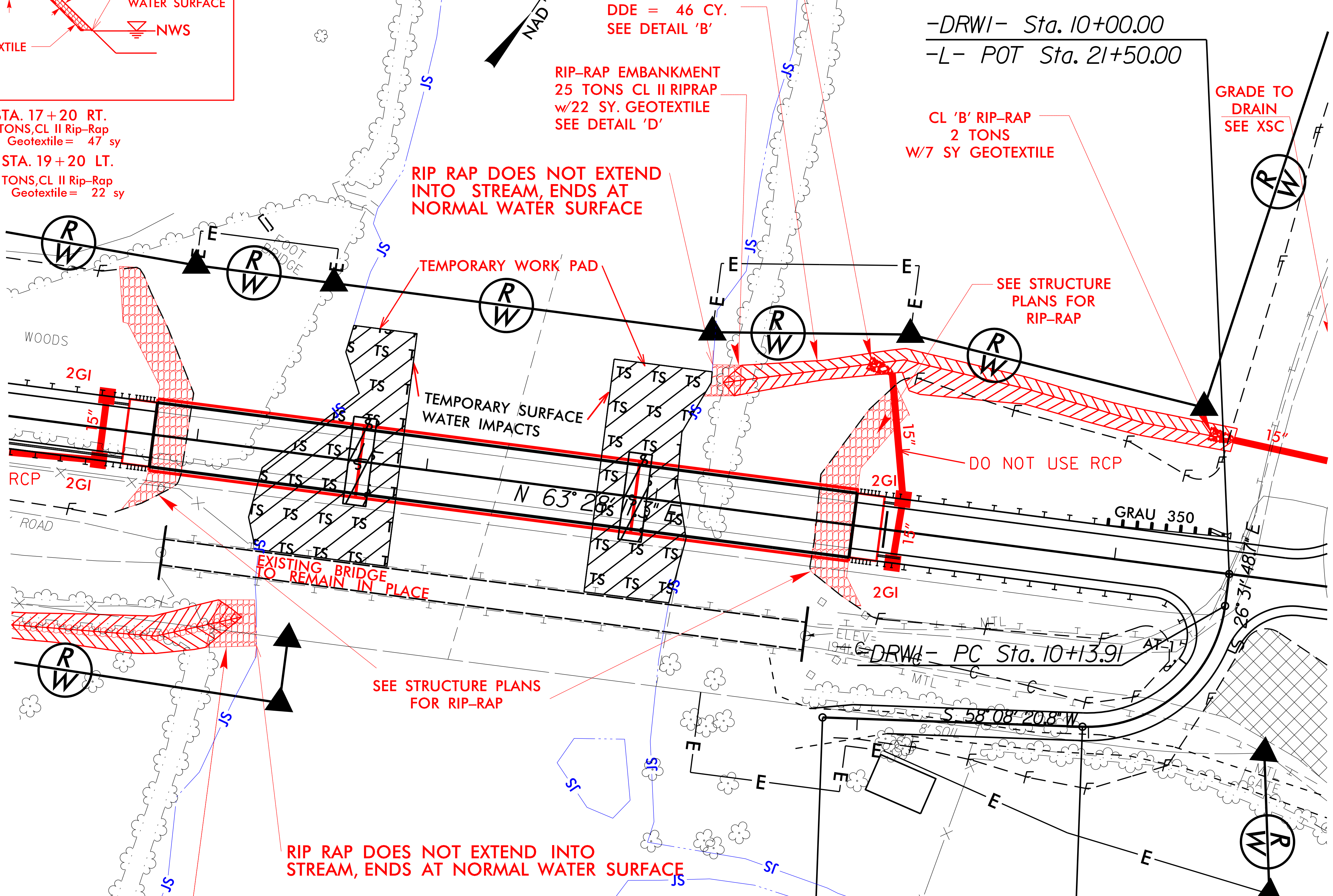
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

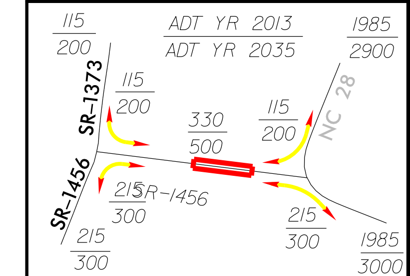
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L- STA. 17+20 RT.
Type of Liner = 50 TONS,CL II Rip-Rap
Geotextile = 47 sy

-L- STA. 19+20 LT.
Type of Liner = 25 TONS,CL II Rip-Rap
Geotextile = 22 sy





SEE SHEET No. 5 FOR -L- ,-Y-,-YI- PROFILES.

SEE SHEET No. 6 FOR -Y-, -DRW I- & -DRW 2- PROFILES.

SEE SHEET No. 2-C FOR DRAINAGE DETAILS.

SEE SHT. No. 2-C FOR BRIDGE TO PAVEMENT RELATIONSHIP.

SEE SHT. No. S-1 to S- FOR BRIDGE STRUCTURE PLANS.

PAVEMENT REMOVAL

PROPOSED BOLLARDS AT EXISTING BRIDGE SEE DETAIL SHEET 2-D.

EXISTING BRIDGE TO BE RETROFITTED WITH BICYCLE SAFE RAILS SEE DETAIL SHEET 2-E.

PERMIT DRAWING
SHEET 4 OF 7

50' 0' 50' 100' 150'
GRAPHIC SCALE

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

12/11/2014
bmradakovic
R:\Hydraulics\PERMITS_Environmental\Drawings\B-3868_Hyd_Permit Impact_enlarge.dgn

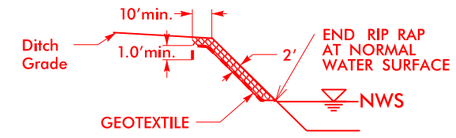
REVISIONS

8/17/99

8/17/99

REVISIONS

DETAIL D
RIP RAP AT EMBANKMENT
(Not to Scale)



–L– STA. 17+20 RT.
Type of Liner= 50 TONS,CL II Rip–Rap
Geotextile= 47 sy

–L– STA. 19+20 LT.
Type of Liner= 25 TONS,CL II Rip–Rap
Geotextile= 22 sy

CL 'B' RIP–RAP
2 TONS
W/7 SY GEOTEXTILE

LATERAL 'V' DITCH
DDE = 46 CY.
SEE DETAIL 'B'

RIP–RAP EMBANKMENT
25 TONS CL II RIPRAP
w/22 SY. GEOTEXTILE
SEE DETAIL 'D'

RIP RAP DOES NOT EXTEND INTO STREAM, ENDS AT NORMAL WATER SURFACE

TEMPORARY WORK PAD

TEMPORARY SURFACE WATER IMPACTS

EXISTING BRIDGE TO REMAIN IN PLACE

SEE STRUCTURE PLANS FOR RIP–RAP

RIP RAP DOES NOT EXTEND INTO STREAM, ENDS AT NORMAL WATER SURFACE

RIP–RAP EMBANKMENT
50 TONS CL II RIPRAP
w/47 SY. GEOTEXTILE
SEE DETAIL 'D'

–Y1– PC Sta. 13+42.73

–DRW1– Sta. 10+00.00

–L– POT Sta. 21+50.00

GRADE TO DRAIN SEE XSC

CL 'B' RIP–RAP
2 TONS
W/7 SY GEOTEXTILE

SEE STRUCTURE PLANS FOR RIP–RAP

DO NOT USE RCP

–DRW1– PC Sta. 10+13.91

S 58° 08' 20.8" W

N 63° 28' 17.3" E

GRAU 350

26° 31' 48" LT

FOOT BRIDGE

WOODS

ROAD

NAD 83

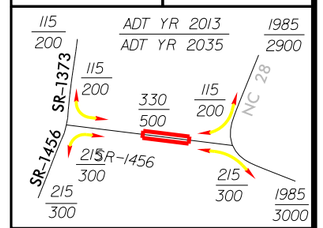
50' 0' 50' 100' 150'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PROJECT REFERENCE NO.	SHEET NO.
B-3868	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SEE SHEET No. 5 FOR -L- , -Y-, -Y1- PROFILES.

SEE SHEET No. 6 FOR -Y-, -DRW 1- & -DRW 2- PROFILES.

SEE SHEET No. 2-C FOR DRAINAGE DETAILS.

SEE SHT. No. 2-C FOR BRIDGE TO PAVEMENT RELATIONSHIP.

SEE SHT. No. S-1 to S- FOR BRIDGE STRUCTURE PLANS.

PAVEMENT REMOVAL

PROPOSED BOLLARDS AT EXISTING BRIDGE SEE DETAIL SHEET 2-D.

EXISTING BRIDGE TO BE RETROFITTED WITH BICYCLE SAFE RAILS SEE DETAIL SHEET 2-E.

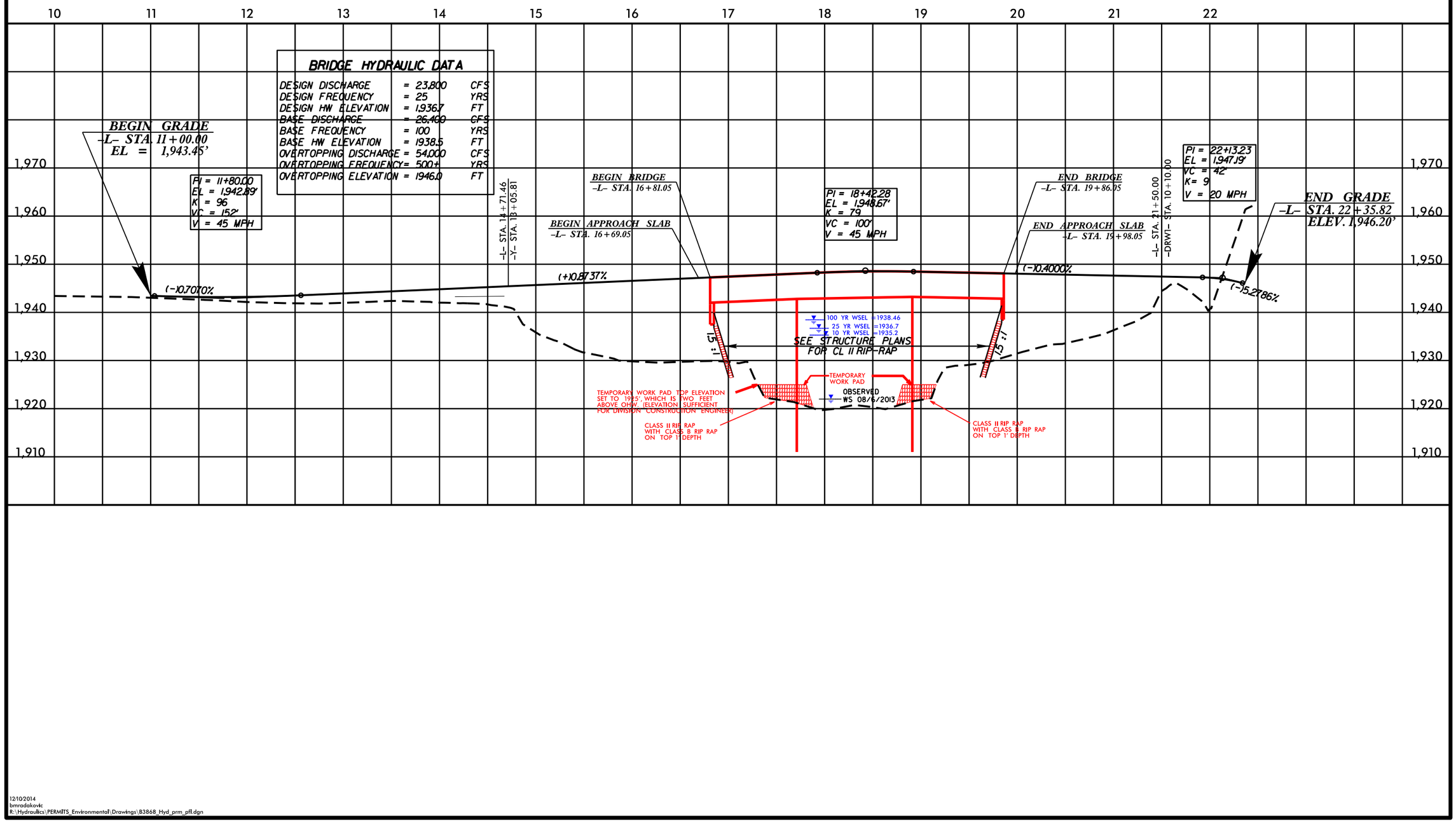
PERMIT DRAWING SHEET 5 OF 7

12/11/2014
bmradakovic
R:\Hydraulics\PERMITS_Environmental\Drawings\B-3868_Hyd_Permit Impact_enlarge.dgn

PROJECT REFERENCE NO.	SHEET NO.
B-3868	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 6 OF 7



12/10/2014
bmradakovic
R:\Hydraulics\PERMITS_Environmental\Drawings\B3868_Hyd_prm_pfl.dgn

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
	17+26 TO 17+88 -L-	CAUSEWAY							0.09		102	
	18+74 TO 19+15 -L-	CAUSEWAY							0.08			
TOTALS:									0.17		102	

PERMANENT SURFACE WATER IMPACT DUE TO PIERS= 870 SQ. FT. (0.02 AC)

EXISTING CHANNEL IMPACTS TEMP. USED THE LONGEST LENGTH BETWEEN BOTH CAUSEWAYS.
17+26 TO 17+88 LENGTH= 102.48 FT VS. 18+74 TO 19+15 LENGTH= 100 FT

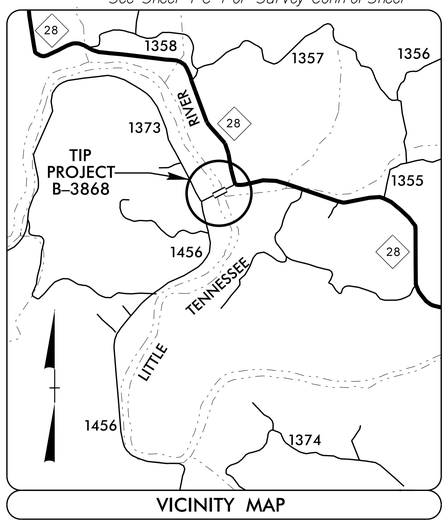
NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
12/3/2014
MACON COUNTY
B-3868
WBS 33313.1.1

09/08/99

TIP PROJECT: B-3868

CONTRACT: C203656

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



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

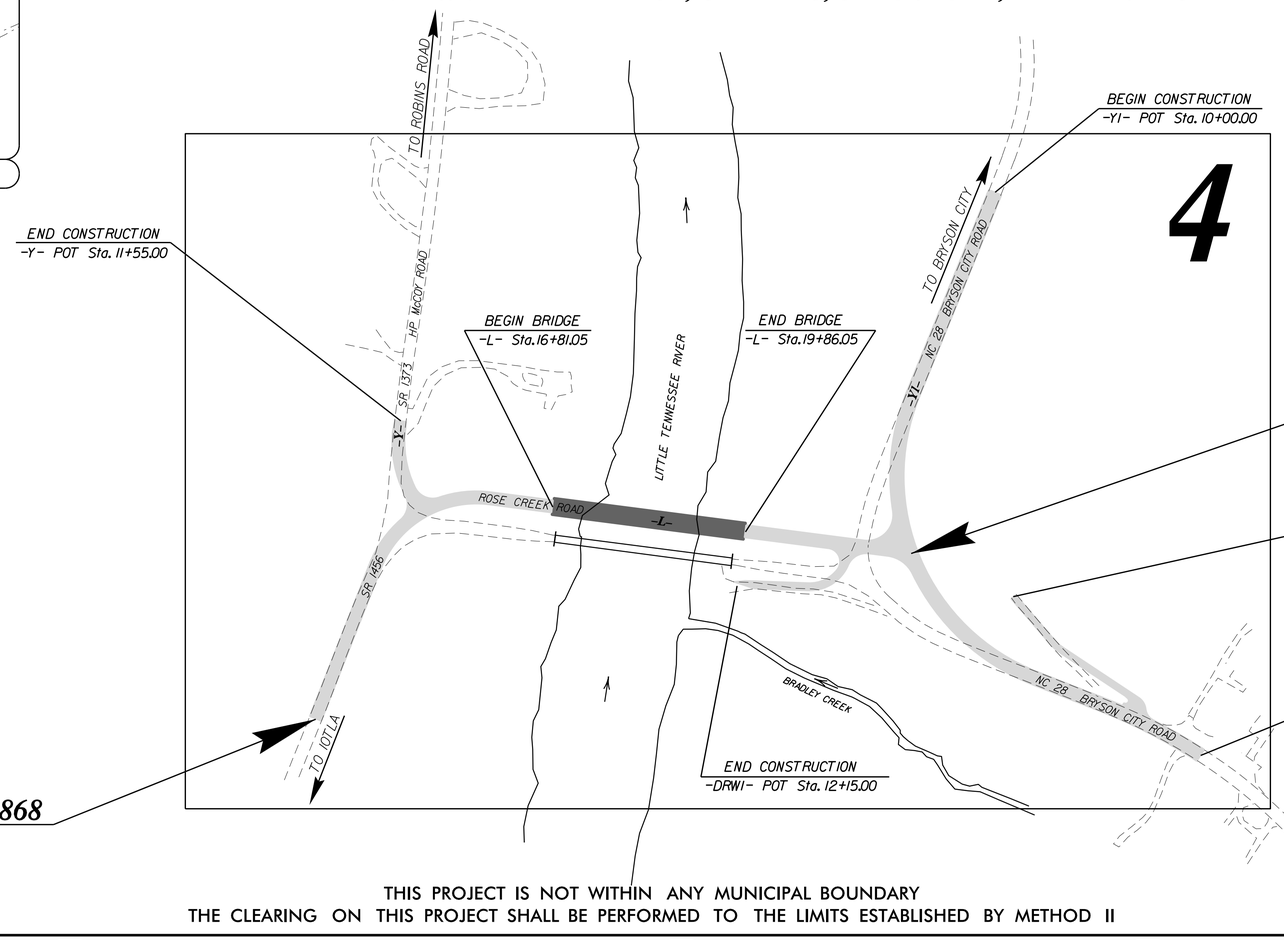
MACON COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3868	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
33313.1.1	BRZ-1456(6)	P.E.
33313.2.FD2	BRZ-1456(6)	R/W, UTILITY
		CONSTRUCTION

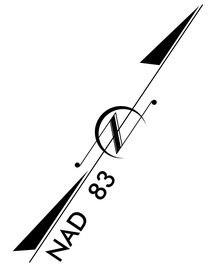
LOCATION: BRIDGE No. 172 OVER LITTLE TENNESSEE RIVER ON SR 1456

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



BEGIN TIP PROJECT B-3868
-L- POT Sta. 11+00.00

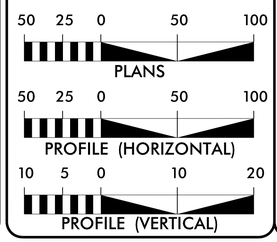
END TIP PROJECT B-3868
-L- POT Sta. 22+48.22 =
-Y1- POC Sta. 15+96.49



PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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

GRAPHIC SCALES



DESIGN DATA

ADT 2013 = 330
ADT 2035 = 500
DHV = 10 %
D = 65 %
T = 7 % *
V = 25 MPH
* TTST =1% DUAL 6%
FUNC CLASS = LOCAL

SUBREGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY T.I.P. PROJECT B-3868 = 0.159 MI

LENGTH STRUCTURE T.I.P. PROJECT B-3868 = 0.058 MI

TOTAL LENGTH OF T.I.P. PROJECT B-3868 = 0.217 MI

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

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
NOVEMBER 26, 2013

LETTING DATE:
NOVEMBER 17, 2015

KEVIN E. MOORE, PE
PROJECT ENGINEER

STEVEN D. KENDALL, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

27-FEB-2015 10:46
R:\Roadway Proj\B-3868_Rdy_tsh.dgn
$$$$USERNAME$$$$

04/16/11

PROJECT REFERENCE NO.	SHEET NO.
B-3868	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 Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB
- Known Soil Contamination: Area or Site
- Potential Soil Contamination: Area or Site

BUILDINGS AND OTHER CULTURE:

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

HYDROLOGY:

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

RAILROADS:

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

RIGHT OF WAY:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line — RW
- Proposed Right of Way Line with Iron Pin and Cap Marker — RW
- Proposed Right of Way Line with Concrete or Granite R/W Marker — RW
- Proposed Control of Access Line with Concrete C/A Marker — CA
- 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 Drainage / Utility Easement — DUE
- Proposed Permanent Utility Easement — PUE
- Proposed Temporary Utility Easement — TUE
- Proposed Aerial Utility Easement — AUE
- Proposed Permanent Easement with Iron Pin and Cap Marker

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Curb Ramp — CR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

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

EXISTING STRUCTURES:

MAJOR:

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

MINOR:

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

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole
- 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
- Underground Storage Tank, Approx. Loc. — UST
- A/G Tank; Water, Gas, Oil
- Geoenvironmental Boring
- U/G Test Hole (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

PROJECT REFERENCE NO.	SHEET NO.
B-3868	I-C
Location and Surveys	

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SURVEY CONTROL SHEET B-3868

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

BM1 ELEVATION = 1939.86
N 583335 E 674776
BL STATION 8+16.00 4 RIGHT
RAILROAD SPIKE SET IN 12" SYCAMORE TREE

BM2 ELEVATION = 1930.33
N 583614 E 675193
BL STATION 13+57.00 29 RIGHT
RAILROAD SPIKE IN 8" BIRCH TREE

BM3 ELEVATION = 1940.22
N 583715 E 675410
BL STATION 16+04.00 15 RIGHT
RAILROAD SPIKE SET IN 8" WALNUT TREE

BM4 ELEVATION = 1943.65
N 584129 E 674325
BY STATION 5+00.00
N 63°48'16.70" W DIST 64.39
RAILROAD SPIKE SET IN 8" WALNUT TREE

BM5 ELEVATION = 1949.87
N 582867 E 674819
BL STATION 5+00.00
S 01°53'26.03" W DIST 156.29'
RAILROAD SPIKE SET IN 6" LOCUST TREE

BM6 ELEVATION = 1942.54
N 584563 E 675175
BY1 STATION 5+00.00
N 07°53'34.13" W DIST 136.90
TACK IN HOLE IN HEADWALL

BM7 ELEVATION = 1942.78
N 583794 E 675904
BY1 STATION 16+35.00
N 85°27'39.39" E DIST 94.43
RAILROAD SPIKE SET IN 24" WALNUT TREE

BL

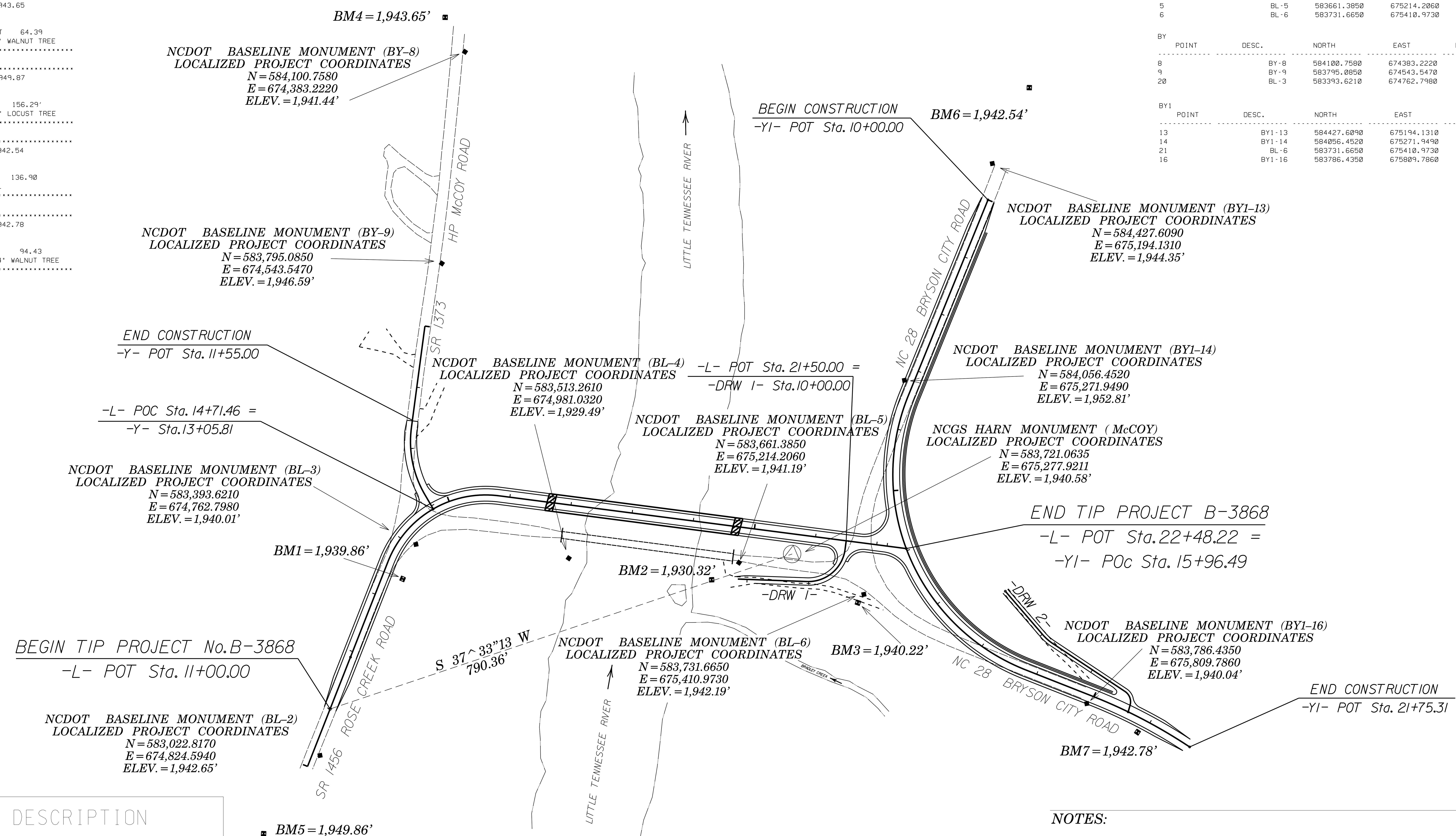
POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
11	BL-2	583022.8170	674824.5940	1942.65	10+23.90	12.27 RT
3	BL-3	583393.6210	674762.7980	1940.01	14+07.54	25.61 RT
4	BL-4	583513.2610	674981.0320	1929.48	17+07.36	85.85 RT
5	BL-5	583661.3850	675214.2060	1941.19	19+82.14	57.48 RT
6	BL-6	583731.6650	675410.9730	1942.19	21+89.58	82.49 RT

BY

POINT	DESC.	NORTH	EAST	ELEVATION	Y STATION	OFFSET
8	BY-8	584100.7580	674383.2220	1941.44	OUTSIDE PROJECT LIMITS	
9	BY-9	583795.0850	674543.5470	1946.59	OUTSIDE PROJECT LIMITS	
20	BL-3	583393.6210	674762.7980	1940.01	OUTSIDE PROJECT LIMITS	

BY1

POINT	DESC.	NORTH	EAST	ELEVATION	Y1 STATION	OFFSET
13	BY1-13	584427.6090	675194.1310	1944.35	OUTSIDE PROJECT LIMITS	
14	BY1-14	584056.4520	675271.9490	1952.81	13+21.99	15.20 RT
21	BL-6	583731.6650	675410.9730	1942.19	16+32.14	92.88 RT
16	BY1-16	583786.4350	675809.7860	1940.04	19+92.95	14.55 RT



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "McCoy"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 583721.0635(ft) EASTING: 675277.9211(ft)
ELEVATION: 1940.58(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999779853
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "McCoy" TO -L- STATION 11+00.00 IS
S 37°33'13" W 790.36
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

NOTE: DRAWING NOT TO SCALE

NOTES:

1. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:
HTTPS://CONNECT.NCDOT.GOV/RESOURCES/LOCATION/

THE FILES TO BE FOUND ARE AS FOLLOWS:
B-3868_LS_CONTROL.TXT

SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.

△ INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.
PROJECT CONTROL ESTABLISHED USING EXISTING HARN MONUMENTS.

5/28/99
27-FEB-2015 10:46

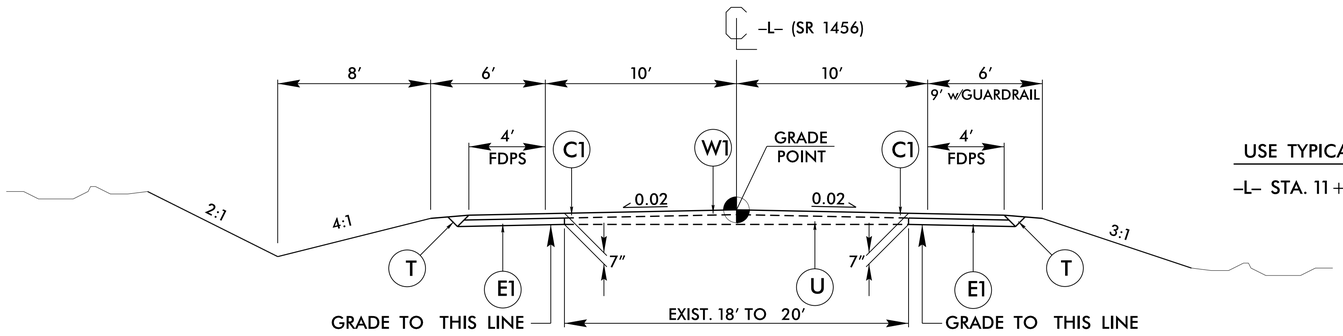
6/2/99

PAVEMENT SCHEDULE

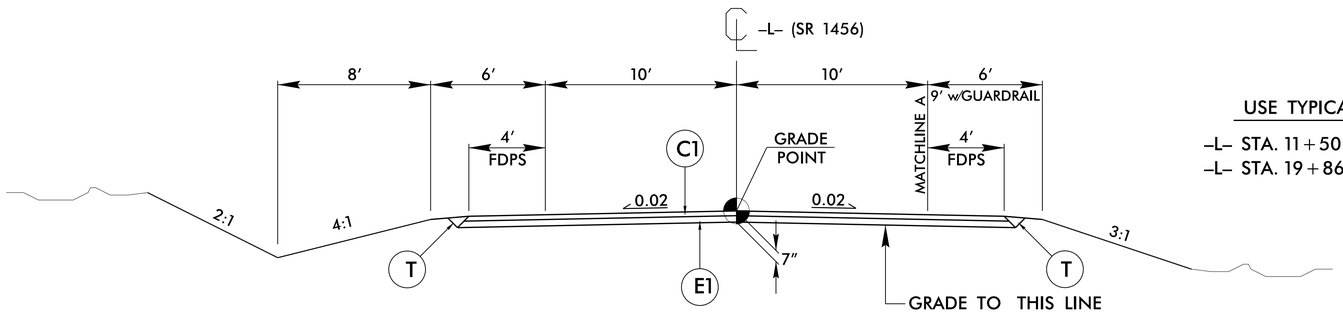
FINAL PAVEMENT DESIGN

C1	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	P	PRIME COAT AT THE RATE OF 0.35 GALLONS PER SQUARE YARD.
C2	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT TO EXCEED 2" IN DEPTH.	R1	SHOULDER BERM GUTTER.
D1	PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	R2	CONCRETE EXPRESSWAY GUTTER.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2½" IN DEPTH OR GREATER THAN 4" IN DEPTH.	T	EARTH MATERIAL.
E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	U	EXISTING PAVEMENT.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5½" IN DEPTH.	W1	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL)
J1	8" AGGREGATE BASE COURSE.	W2	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL)

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



TYPICAL SECTION NO. 1



TYPICAL SECTION NO. 2

USE TYPICAL SECTION NO. 1

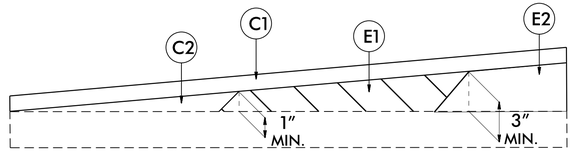
–L– STA. 11+00.00 TO 11+50.00

USE TYPICAL SECTION NO. 2

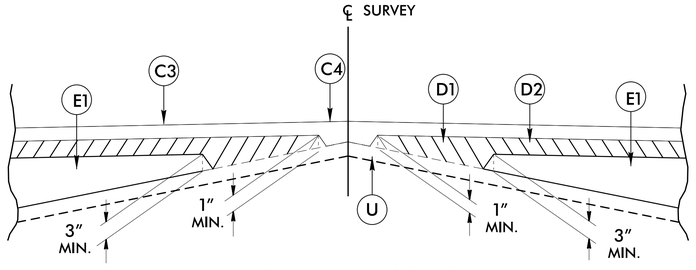
–L– STA. 11+50.00 TO 16+81.05 (BRIDGE)
–L– STA. 19+86.05 (BRIDGE) TO 22+35.82

PROJECT REFERENCE NO.	SHEET NO.
B-3868	2
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

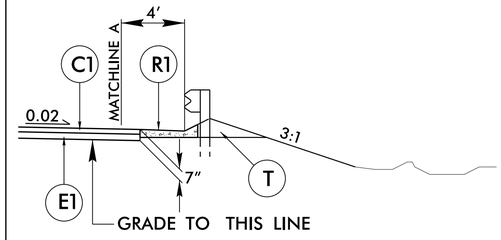


Wedging Detail (W1)



Wedging Detail (W2)

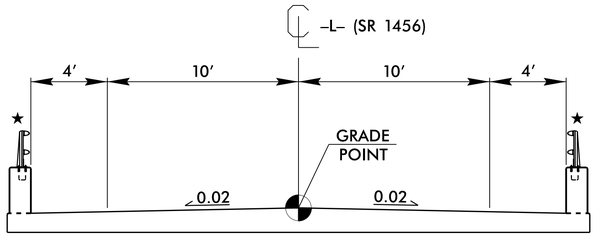
INSET A



USE INSET A IN CONJUNCTION WITH TYPICAL SECTION No. 2

SEE PLANS FOR LOCATIONS

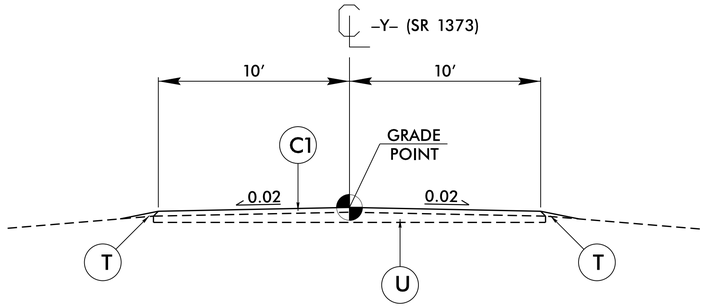
6/2/99



TYPICAL SECTION ON STRUCTURE

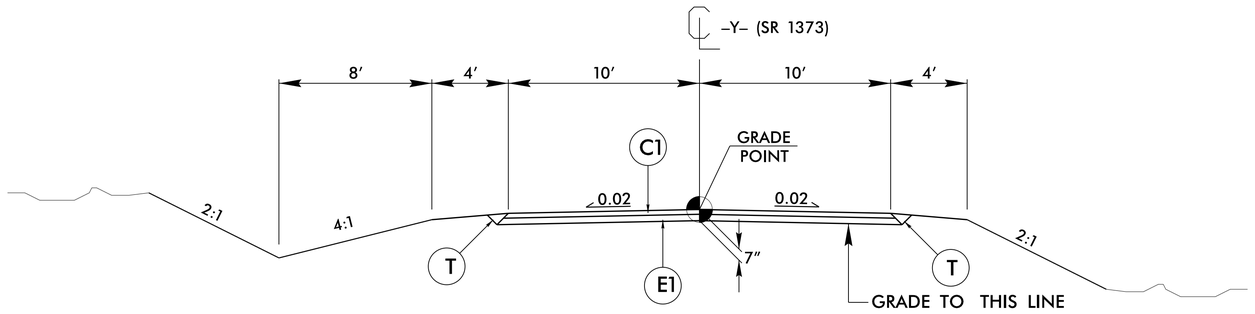
★ 2–BAR BRIDGE RAIL SEE STRUCTURE PLANS.

USE TYPICAL SECTION ON STRUCTURE
–L– STA. 16+81.05 TO 19+86.05



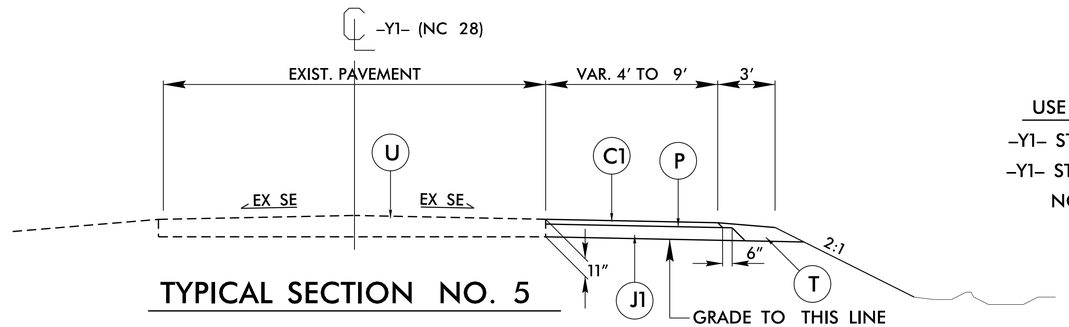
TYPICAL SECTION NO. 3

USE TYPICAL SECTION NO. 3
–Y– STA. 11+55.00 TO 12+00.00



TYPICAL SECTION NO. 4

USE TYPICAL SECTION NO. 4
–Y– STA. 12+00.00 TO 12+95.81



TYPICAL SECTION NO. 5

USE TYPICAL SECTION NO. 5
–Y1– STA. 10+00.00 TO 14+50.00 (9′)
–Y1– STA. 18+00.00 TO 20+00.00 (4′)
NOTE: TEMPORARY PAVEMENT

PROJECT REFERENCE NO.	SHEET NO.
B-3868	2-A

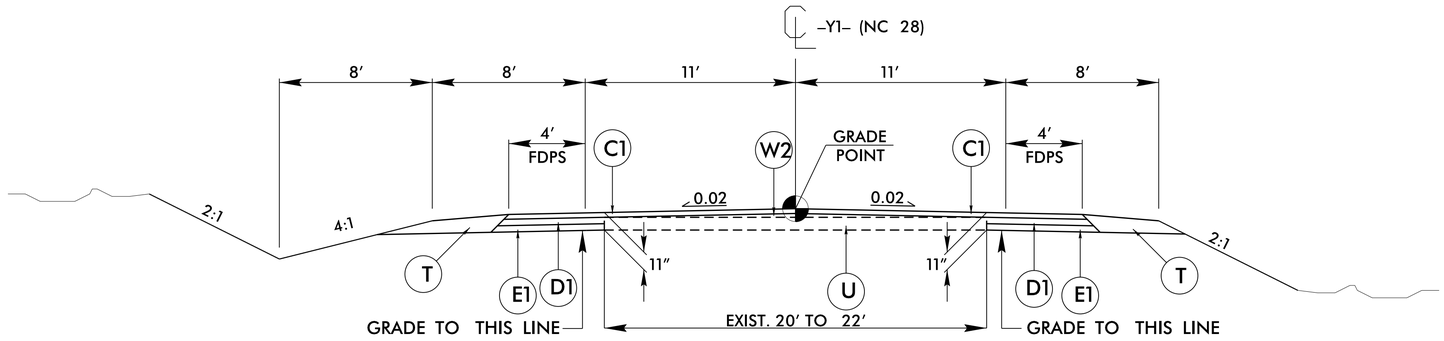
ROADWAY DESIGN ENGINEER

PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PAVEMENT SCHEDULE	
C1	3″ S9.5B
C2	VAR. S9.5B
D1	4″ I19.5B
D2	VAR. I19.0B
E1	4″ B25.0B
E2	VAR. B25.0B
J1	8″ ABC
P	.35 PRIME COAT
R1	SBG
R2	EXPWY GUTTER
T	EARTH MATERIAL
U	EXIST. PAVEMENT
W1	WEDGING
W2	WEDGING

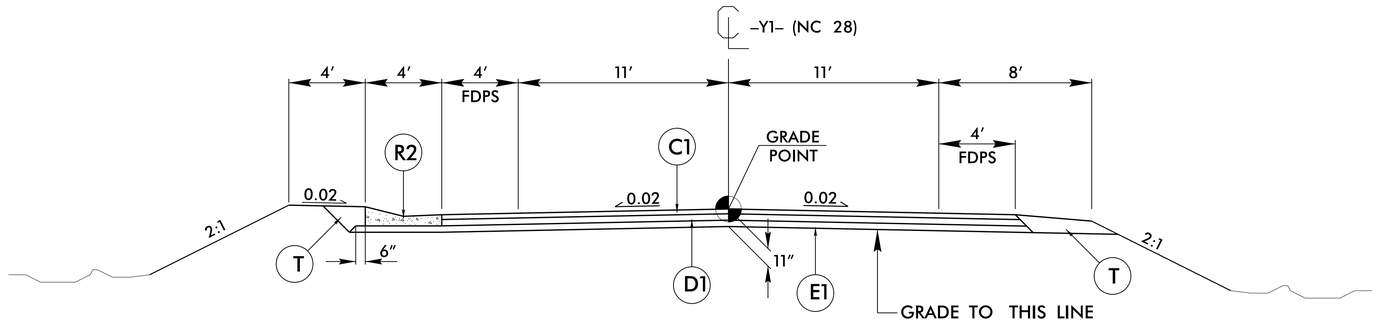
27-FEB-2015 10:46
R:\Roadway Projects\B-3868_Rdy_typ.dgn
Preliminary Plans



TYPICAL SECTION NO. 6

USE TYPICAL SECTION NO. 6

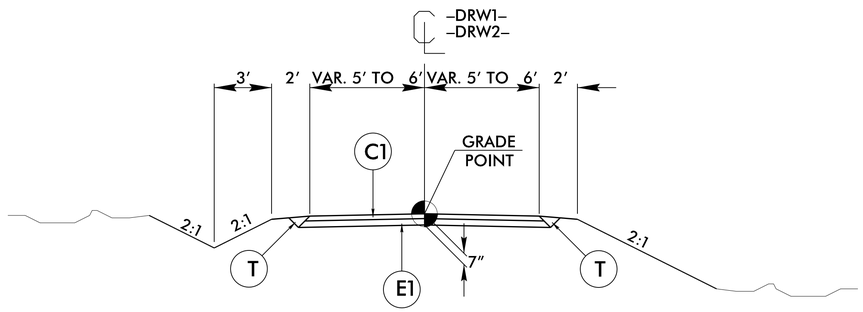
–Y1– STA. 10+00.00 TO 10+50.00
–Y1– STA. 18+25.00 TO 21+75.31



TYPICAL SECTION NO. 7

USE TYPICAL SECTION NO. 7

–Y1– STA. 10+50.00 TO 18+25.00



TYPICAL SECTION NO. 8

USE TYPICAL SECTION NO. 8

–DRW1– STA. 10+10.00 TO 12+15.00
–DRW2– STA 10+11.17 TO 12+92.05

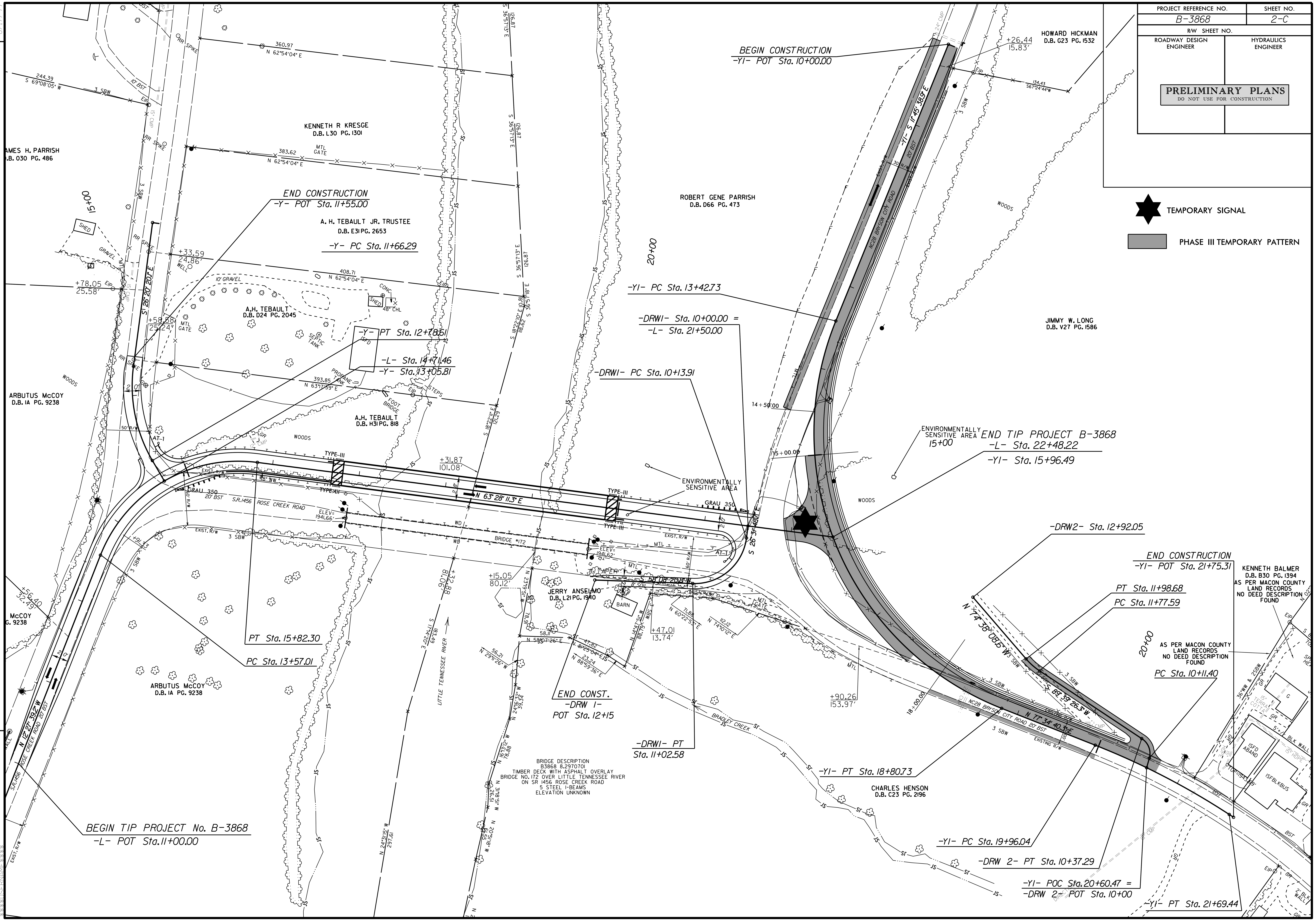
PROJECT REFERENCE NO.	SHEET NO.
B-3868	2-B

ROADWAY DESIGN ENGINEER

PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PAVEMENT SCHEDULE	
C1	3″ S9.5B
C2	VAR. S9.5B
D1	4″ I19.5B
D2	VAR. I19.0B
E1	4″ B25.0B
E2	VAR. B25.0B
J1	8″ ABC
P	.35 PRIME COAT
R1	SBG
R2	EXPWY GUTTER
T	EARTH MATERIAL
U	EXIST. PAVEMENT
W1	WEDGING
W2	WEDGING


PROJECT REFERENCE NO.
B-3868
SHEET NO.
2-C
RW SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
TEMPORARY SIGNAL
PHASE III TEMPORARY PATTERN
REVISIONS
BEGIN CONSTRUCTION
-Y1- POT Sta. 10+00.00
HOWARD HICKMAN
D.B. G23 PG. 1532
KENNETH R KRESGE
D.B. L30 PG. 1301
JAMES H. PARRISH
D.B. 030 PG. 486
END CONSTRUCTION
-Y- POT Sta. 11+55.00
A. H. TEBAULT JR. TRUSTEE
D.B. E31 PG. 2653
-Y- PC Sta. 11+66.29
ROBERT GENE PARRISH
D.B. D66 PG. 473
A.H. TEBAULT
D.B. D24 PG. 2045
-Y- PT Sta. 12+78.61
-L- Sta. 14+71.46
-Y- Sta. 13+05.81
-Y1- PC Sta. 13+42.73
-DRW1- Sta. 10+00.00 =
-L- Sta. 21+50.00
-DRW1- PC Sta. 10+13.91
JIMMY W. LONG
D.B. V27 PG. 1586
ARBUTUS McCOY
D.B. 1A PG. 9238
A.H. TEBAULT
D.B. H31 PG. 818
ENVIRONMENTALLY SENSITIVE AREA
END TIP PROJECT B-3868
-L- Sta. 22+48.22
-Y1- Sta. 15+96.49
N 63°28'11.3" E
S.R.1456 ROSE CREEK ROAD
BRIDGE #172
-DRW2- Sta. 12+92.05
END CONSTRUCTION
-Y1- POT Sta. 21+75.31
KENNETH BALMER
D.B. B30 PG. 1394
AS PER MACON COUNTY LAND RECORDS NO DEED DESCRIPTION FOUND
PT Sta. 11+98.68
PC Sta. 11+77.59
JERRY ANSELMO
D.B. L21 PG. 1940
BARN
PT Sta. 15+82.30
PC Sta. 13+57.01
ARBUTUS McCOY
D.B. 1A PG. 9238
LITTLE TENNESSEE RIVER
END CONST.
-DRW 1-
POT Sta. 12+15
-DRW1- PT
Sta. 11+02.58
BRADLEY CREEK
NC28 BRYSON CITY ROAD
N 77°34'40.3" E
PC Sta. 10+11.40
-Y1- PT Sta. 18+80.73
CHARLES HENSON
D.B. C23 PG. 2196
BRIDGE DESCRIPTION
B3868 8.2970701
TIMBER DECK WITH ASPHALT OVERLAY
BRIDGE NO. 172 OVER LITTLE TENNESSEE RIVER
ON SR 1456 ROSE CREEK ROAD
5 STEEL I-BEAMS
ELEVATION UNKNOWN
BEGIN TIP PROJECT No. B-3868
-L- POT Sta. 11+00.00
-Y1- PC Sta. 19+96.04
-DRW 2- PT Sta. 10+37.29
-Y1- POC Sta. 20+60.47 =
-DRW 2- POT Sta. 10+00
-Y1- PT Sta. 21+69.44

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

EXPRESSWAY GUTTER SUMMARY

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	LENGTH FT
-Y1-	10+50.00	20+25.00	LT	948
			TOTAL	948
			SAY	950

SHOULDER BERM GUTTER SUMMARY

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	LENGTH FT
-L-	16+62.50	16+69.05	LT	6.55
-L-	15+44.90	16+69.05	RT	121.07
-L-	19+98.05	20+02.50	LT	4.46
-L-	19+98.05	20+08.00	RT	9.96
			TOTAL	142.04
			SAY	145

REMOVAL OF EXISTING ASPHALT PAVEMENT SUMMARY

SURVEY LINE	STATION	STATION	LOCATION LT/RT/CL	SQUARE YARD
-L-	11+50.00	16+81.05	CL	1,602.77
-Y1-	10+50.00	18+25.00	CL	2,465.23
			TOTAL	4,068.00
			SAY	4,070

SUMMARY OF EARTHWORK

SURVEY LINE	STATION	STATION	UNCL. EXCAV.	EMBANK. +%	BORROW	WASTE
-L-	10+50.00	17+00.00	0	8,670	8,670	
-Y-	11+00.00	13+00.00	2	432	430	
		SUBTOTAL NO. 1	2	9,102	9,100	
-L-	19+50.00	22+00.00	0	6,341	6,341	
-DRW1-	10+00.00	12+00.00	117	501	384	
		SUBTOTAL NO. 2	117	6,842	6,725	
-Y1- (TEMP. PAVT)	10+00.00	14+50.00	95	897	802	
-Y1- PHASE I	10+00.00	21+50.00	14,734	138		14,596
-DRW2-	10+00.00	12+75.00	1,240	76		1,164
-DRW2- on -Y1-	20+00.00	20+00.00	273	0		273
		SUBTOTAL NO. 3	16,342	1,110	802	16,033
-Y1- PHASE II	10+00.00	21+50.00	2,046	1,505		541
		SUBTOTAL NO. 4	2,046	1,505		541
		PROJECT SUBTOTALS	18,507	18,559	16,627	16,573
MATERIAL FOR SHOULDER CONSTR.						
LOSS DUE TO CLEARING & GRUBBING					100	
ADDITIONAL UNDERCUT						
WASTE IN LIEU OF BORROW					-6,725	-6,725
REPLACE TOPSOIL IN BORROW PIT					500	
		GRAND TOTALS	18,507	18,559	10,502	9,848
		SAY	18,600		10,600	

DRAINAGE DITCH EXCAVATION = 300 CU YD
UNDERCUT EXCAVATION = 220 CU YD
SELECT GRANULAR MATERIAL = 200 CU YD

Earthwork quantities are calculated by the Roadway Design Unit. These earthwork quantities are based in part on subsurface data provided by the Geotechnical Engineering Unit.

NOTE: Approximate quantities only. Unclassified Excavation, Borrow Excavation, Shoulder Borrow, Fine Grading, Clearing & Grubbing, Removal of Existing Pavement will be paid for at the lump sum price for "Grading".

GUARDRAIL SUMMARY

W = TOTAL WIDTH OF FLARE FROM BEGINNING OF TAPER TO END OF GUARDRAIL.
"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.

SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH		W		ANCHORS									IMPACT ATTENUATOR TYPE 350			SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	XI MOD	XI	M-350	AT-1	CAT-1	GRAU 350	TL-2	TYPE III	B-77	EA	G	NG				
-L-	14+77.18	16+81.05	RT	190.51			16+81.05		4'	9'	50'									1		1								
-L- /-DRW1-	19+86.05	10+51.80	RT	136.87	35.9				4'	9'								1				1								
-Y- /-L-	12+65.21	16+81.05	LT	186.42	35.3				4'	9'								1				1						571.52		
-L-	19+86.05	21+48.56	LT	158.77			16+81.05		4'	9'	50'									1		1						226.08		
-Y1-	10+42.64	14+12.95	RT	373.82																2										
				———											———	———	———	———	———	———	———	———	———					———		
			PROJECT SUBTOTALS	1,037.41	71.2													2		4		4						797.60		
		DEDUCTIONS FOR	GUARDRAIL ANCHORS	-287.50																										
				———													GUARDRAIL ANCHOR DEDUCTIONS													
			PROJECT TOTALS	749.91	71.2												GRAU 350	4	EA @	50.00	FT =	200.00								
			SAY	762.50	75												AT-1	2	EA @	6.25	FT =	12.50								
																	TYPE III	4	EA @	18.75	FT =	75.00								
		ADDITIONAL	GUARDRAIL POSTS =	5													DEDUCTIONS FOR GUARDRAIL ANCHORS =					287.50								

PROJECT REFERENCE NO.	SHEET NO.
B-3868	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

REVISIONS

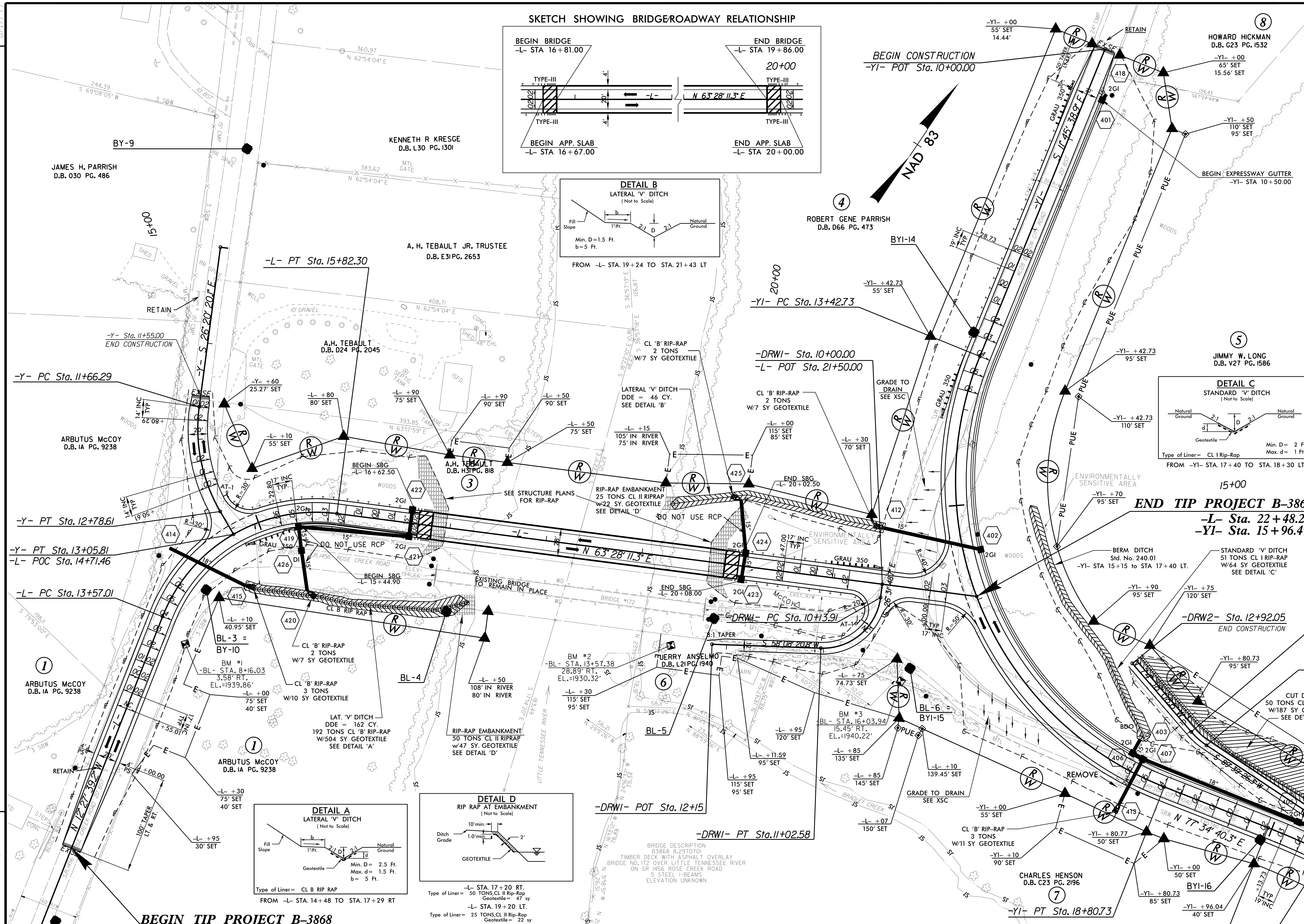
DESIGN REVISION TRM 1/27/15: ADDING ENVIRONMENTALLY SENSITIVE AREAS AND REVISING THE GRADE ON -DRW2-.

SEE SHEET No. 5 FOR -L- & -Y1- PROFILES.

SEE SHEET No. 6 FOR -Y-, -DRW 1- & -DRW 2- PROFILES.

SEE SHT. No. S-1 to S- FOR BRIDGE STRUCTURE PLANS.

PAVEMENT REMOVAL



SKETCH SHOWING BRIDGE/ROADWAY RELATIONSHIP
BEGIN BRIDGE -L- STA 16+81.00
END BRIDGE -L- STA 19+86.00
BEGIN APP. SLAB -L- STA 16+67.00
END APP. SLAB -L- STA 20+00.00
N 63° 28' 11.3" E
DETAIL A LATERAL 'V' DITCH (Not to Scale)
Min. D= 2.5 Ft. Max. d= 1.5 Ft. b= 5 Ft.
Type of Liner= CL B RIP RAP
FROM -L- STA. 14+48 TO STA. 17+29 RT
DETAIL B LATERAL 'V' DITCH (Not to Scale)
Min. D=1.5 Ft. b=5 Ft.
FROM -L- STA. 19+24 TO STA. 21+43 LT
DETAIL C STANDARD 'V' DITCH (Not to Scale)
Min. D= 2 Ft. Max. d= 1 Ft.
Type of Liner= CL I Rip-Rap
FROM -Y1- STA. 17+40 TO STA. 18+30 LT
DETAIL D RIP RAP AT EMBANKMENT (Not to Scale)
DETAIL E CUT DITCH (Not to Scale)
Min. D= VARIES Max. d= 1.0 Ft.
Type of Liner= CL B Rip-Rap
FROM -DRW 2- STA. 10+11 TO STA. 12+92
BEGIN TIP PROJECT B-3868 -L- POT Sta. 11+00.00
END TIP PROJECT B-3868 -L- Sta. 22+48.22 -Y1- Sta. 15+96.49
BEGIN CONSTRUCTION -Y1- POT Sta. 10+00.00
-L- PT Sta. 15+82.30
-Y- PC Sta. 11+66.29
-Y- PT Sta. 12+78.61
-Y- PT Sta. 13+05.81
-L- POC Sta. 14+71.46
-L- PC Sta. 13+57.01
-Y1- PC Sta. 13+42.73
-DRW1- Sta. 10+00.00
-L- POT Sta. 21+50.00
-DRW1- PC Sta. 10+13.91
-DRW1- POT Sta. 12+15
-DRW1- PT Sta. 11+02.58
-Y1- PT Sta. 18+80.73
-Y1- PC Sta. 19+96.04
-Y1- POC Sta. 20+60.47
-DRW2- POT Sta. 10+00
-Y1- PT Sta. 21+69.44
-Y1- PT Sta. 21+75.31
-DRW2- PT Sta. 11+98.68
-DRW2- Sta. 12+92.05 END CONSTRUCTION
-DRW2- PC Sta. 11+77.59
-DRW2- PT Sta. 10+37.29
-DRW2- PC Sta. 10+11.40
JAMES H. PARRISH D.B. 030 PG. 486
KENNETH R KRESGE D.B. L30 PG. 1301
A. H. TEBAULT JR. TRUSTEE D.B. E31 PG. 2653
ROBERT GENE PARRISH D.B. D66 PG. 473
HOWARD HICKMAN D.B. G23 PG. 1532
JIMMY W. LONG D.B. V27 PG. 1586
ARBUTUS McCOY D.B. 1A PG. 9238
JERRY ANSELMO D.B. L21 PG. 1940
CHARLES HENSON D.B. C23 PG. 2196
KENNETH BALMER D.B. B30 PG. 1394
NAD 83
LITTLE TENNESSEE RIVER

-L-	-Y-	-Y1-	-Y1-	-DRW1-	-DRW2-	-DRW2-
PI Sta 14+89.66	PI Sta 12+24.59	PI Sta 16+86.68	PI Sta 20+83.04	PI Sta 10+68.57	PI Sta 11+88.21	PI Sta 10+26.52
Δ = 75° 55' 50.5" (RT)	Δ = 37° 51' 16.5" (LT)	Δ = 90° 39' 40.8" (LT)	Δ = 11° 41' 16.6" (RT)	Δ = 84° 40' 09.5" (RT)	Δ = 15° 54' 01.5" (RT)	Δ = 74° 09' 43.4" (LT)
D = 33° 42' 12.2"	D = 33° 42' 12.2"	D = 16° 51' 06.1"	D = 6° 44' 26.4"	D = 95° 29' 34.7"	D = 75° 23' 21.1"	D = 286° 28' 44.0"
L = 225.29'	L = 112.32'	L = 538.00'	L = 173.39'	L = 88.67'	L = 21.09'	L = 25.89'
T = 132.65'	T = 58.29'	T = 343.95'	T = 87.00'	T = 54.66'	T = 10.61'	T = 15.12'
R = 170.00'	R = 170.00'	R = 340.00'	R = 850.00'	R = 60.00'	R = 76.00'	R = 20.00'
SE = 6 %		SE = 6 %	SE = 6 %			
DSN SPD = 25 MPH		DSN SPD = 35 MPH				

PROJECT REFERENCE NO.	SHEET NO.
B-3868	5

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

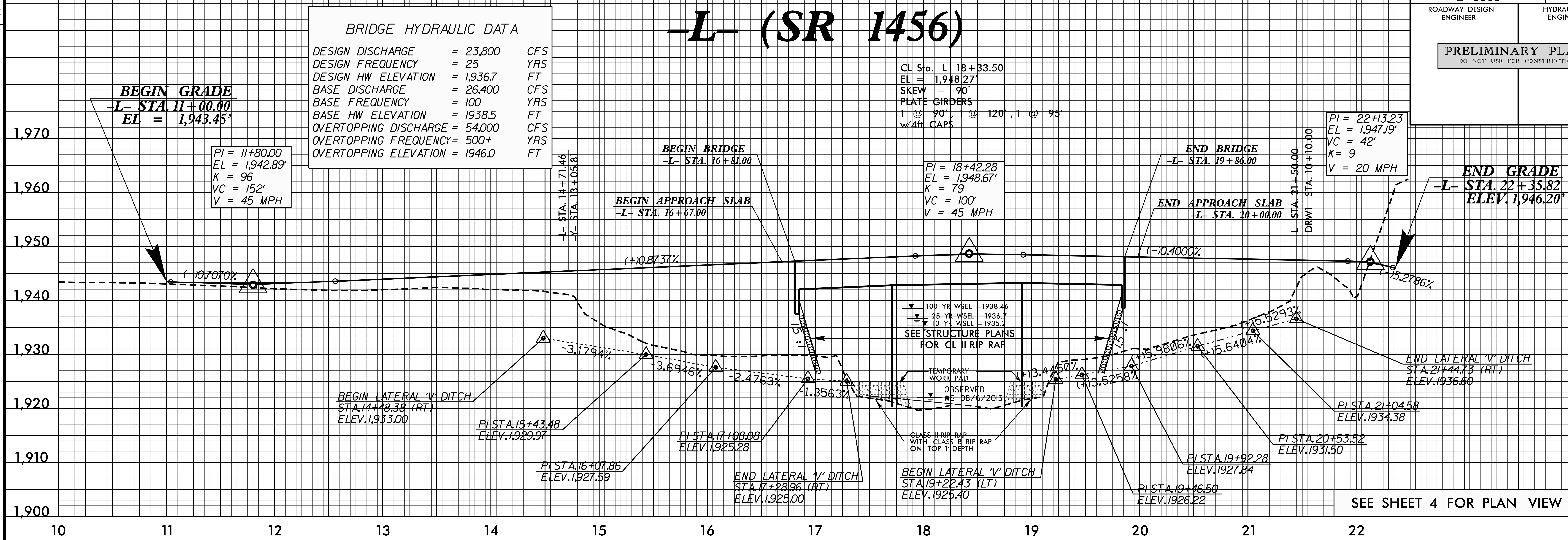
REVISIONS

DESIGN REVISION TRM 1/27/15: INCORPORATED NEW GROUND PROFILES FOR -L- AND -Y1-.

-L- (SR 1456)

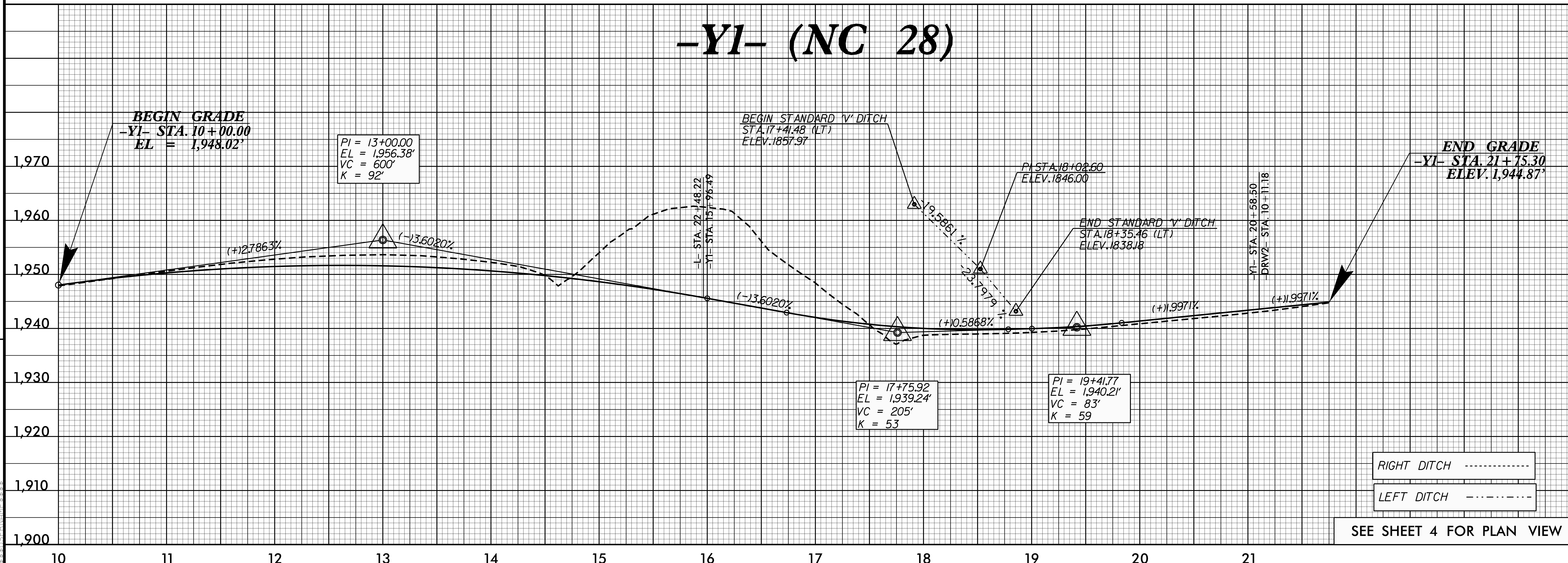
BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 23,800	CFS
DESIGN FREQUENCY	= 25	YRS
DESIGN HW ELEVATION	= 1,936.7	FT
BASE DISCHARGE	= 26,400	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 1938.5	FT
OVERTOPPING DISCHARGE	= 54,000	CFS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 1946.0	FT



SEE SHEET 4 FOR PLAN VIEW

-Y1- (NC 28)



SEE SHEET 4 FOR PLAN VIEW

PROJECT REFERENCE NO.	SHEET NO.
B-3868	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

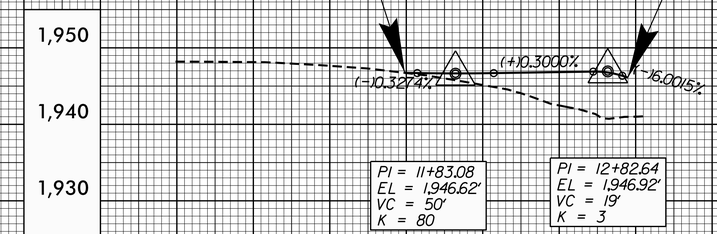
REVISIONS

5/28/99 DESIGN REVISION TRM 1/27/15: REVISED THE GRADE ON -DRW2- AND CORRECTED THE -Y- PROFILE.

-Y-

BEGIN GRADE
-Y- STA. 11+50.00
EL = 1,946.73'

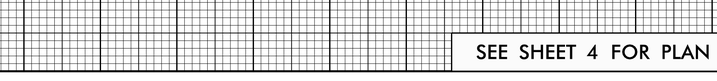
END GRADE
-Y- STA. 12+95.81
ELEV. 1,946.13'



PI = 11+83.08
EL = 1,946.62'
VC = 50'
K = 80

PI = 12+82.64
EL = 1,946.92'
VC = 19'
K = 3

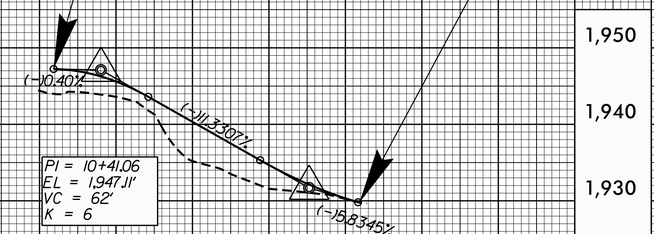
SEE SHEET 4 FOR PLAN VIEW



-DRW1-

BEGIN GRADE
-DRW1- STA. 10+10.00
EL = 1,947.23'

END GRADE
-DRW1- STA. 12+10.06
ELEV. 1,929.76'



PI = 10+41.06
EL = 1,947.11'
VC = 62'
K = 6

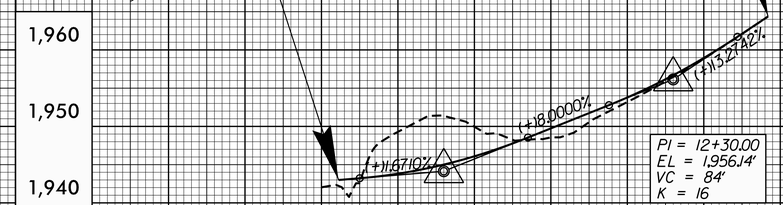
PI = 11+77.16
EL = 1,931.68'
VC = 64'
K = 12

SEE SHEET 4 FOR PLAN VIEW

-DRW2-

END GRADE
-DRW2- STA. 12+92.00
ELEV. 1,964.37'

BEGIN GRADE
-DRW2- STA. 10+11.18
EL = 1,942.99'



PI = 12+30.00
EL = 1,956.14'
VC = 84'
K = 16

PI = 10+80.00
EL = 1,944.14'
VC = 110'
K = 17

SEE SHEET 4 FOR PLAN VIEW