STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

March 3, 2005

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

ATTENTION: Mr. John Thomas
NCDOT Coordinator

SUBJECT: **Application for Nationwide Permit 33** for the proposed replacement of Bridge No. 21 on SR 1001 (Woolen Stone Rd.) over Troublesome Creek, Rockingham County. Federal Aid Project No. BRZ-1001(23), State Project No. 8.2511201, Division 7, TIP No. B-3899.

Dear Sir:

The North Carolina Department of Transportation (NCDOT) proposes to replace Bridge No. 21 over Troublesome Creek. The current bridge is 138 feet long, and was constructed in 1952. Bridge Maintenance Unit records indicate Bridge No. 21 has a sufficiency rating of 16.3 out of a possible 100 for a new structure. The bridge is considered structurally deficient and functionally obsolete. For your review, please find enclosed three copies of the Categorical Exclusion (CE) Document, Pre-construction Notification (PCN), ½ size plans, permit drawings.

As proposed, the replacement structure will be a new bridge constructed adjacent to the existing location. The new bridge will be 135 feet long with a 30 ft clear roadway width. The roadway approaches will provide two 12 ft. travel lanes with 8 ft. grassed shoulders. The roadway approach and bridge grades will approximately match existing bridge and roadway elevations. Total length of roadway approach work will be approximately 2,370 ft. The existing bridge is to be used as a detour during construction.

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

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

LOCATION:
2728 CAPITAL BLVD.
PARKER LINCOLN BUILDING, SUITE 168
RALEIGH NC 27604

IMPACTS TO WATERS OF THE UNITED STATES

General Description: One surface water, Troublesome Creek, will be directly impacted by the proposed replacement of Bridge No. 21. Troublesome Creek has been assigned a best usage classification of WS-III NSW. Troublesome Creek is listed as an impaired water due to sediment under Section 303(d) of the Clean Water Act. The substrate consists of sand and silt. There are no impacts to jurisdictional wetlands in the project area.

Permanent Impacts: According to the proposed plan, the bridge will span the creek and no permanent impact to surface waters is expected.

Temporary Impacts: As proposed, 0.03 acres of temporary fill within the Troublesome Creek channel will be required for construction of a temporary work causeway. The temporary fill will consist of suitable materials in accordance with applicable Nationwide Permit and 401 Water Quality Certification conditions. After construction, the temporary fill will be removed and disposed of in accordance with applicable regulations.

- Schedule: The project schedule calls for a Let date of August 16, 2005. It is anticipated that the contractor will begin construction around September 21, 2005. NCDOT will request the contractor to complete construction in a timely manner in order to minimize impacts to Troublesome Creek.

- Restoration Plan: The material used for fill to control erosion within the banks of Troublesome Creek will be removed after the purpose has been served. The contractor will be required to submit a reclamation plan for removal of and disposal of all material off-site.

Utility Impacts: There is an aerial crossing of telephone cable over Troublesome Creek. An underground crossing, drilled by directional bore, will replace the aerial crossing. No other utilities will be impacted during the replacement of Bridge No. 21.

Bridge Demolition: Bridge No. 21, constructed in 1952, consists of a continuous reinforced concrete deck on timber joists. The overall length of the structure is 138 feet and is approximately 10 feet above the creek bed. It has been determined that the bridge can be removed without any concrete being dropped into Troublesome Creek. In addition, NCDOT and its contractors will adhere to Best Management Practices for "Bridge Demolition and Removal" during the removal of Bridge No. 21.

FEDERALLY-PROTECTED SPECIES

Plants and animals with federal classifications of Endangered, Threatened, Proposed Endangered, and Proposed Threatened are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. As of January 29, 2003 USFWS lists two federally protected species for Rockingham County, James spinymussel (*Pleurobema collina*) and smooth coneflower (*Echinacea laevigata*).

Troublesome Creek is in the Cape Fear River Basin. No James spinymussels have ever been found in the Cape Fear River Basin. NCDOT biologists surveyed the project study area on April 17, 2001. No James spinymussels were found during the survey. North Carolina Natural Heritage Program (NHP) records do not document any James spinymussel populations within 3.0 miles of the project study area as of April 8, 2003. Therefore, a biological conclusion of "No Effect" was issued for the James spinymussel.

The project area contained what appeared to be potential habitat for the smooth coneflower, however, no specimens were found during a species-specific survey. This project will not impact any coneflower populations. NHP records do not indicate any coneflower populations within 3.0 miles of the project area as of April 8, 2003. Therefore, a biological conclusion of "No Effect" was issued for Smooth Coneflower.

AVOIDANCE AND MINIMIZATION

NCDOT is proposing to utilize the existing structure as a detour, thereby eliminating additional temporary impacts required to install a temporary crossing structure. The proposed design spans the stream with no bents in the water.

- The proposed design spans the stream with no bents in the water
- NCDOT will make use of pre-formed scour holes (PSH) and silt fences in order to prevent erosion and sedimentation into Troublesome Creek.
- NCDOT will adhere to Design Standards for Sensitive Watersheds

Construction impacts will be minimize or avoided through implementation with applicable Best Management Practices. For instance, during demolition NCDOT will adhere to Best Management Practices for Bridge Demolition and Removal which will reduce or eliminate temporary fill materials from entering Troublesome Creek. Additionally, adherence to NCDOT's Best Management Practices for Protection of Surface Waters will minimize construction impacts since these practices require the use of appropriate sediment and erosion control measures. NCDOT will also adhere to Design Standards for Sensitive Watersheds in order to avoid further degradation of water quality.

COMPENSATION

Since the proposed project will have only a temporary impact on jurisdictional waters, no compensatory mitigation has been proposed.

REGULATORY APPROVALS

Section 404 Permit: This project is being processed by the Federal Highway Administration as a "Categorical Exclusion" in accordance with 23 CFR 77.11.115(b). Therefore, we do not anticipate requesting an individual permit. The project requires construction of a temporary work causeway. Therefore, we will propose to proceed under

a Nationwide 33 as authorized by the Nationwide Permit 33 (FR number 10, pages 2020-2095; January 15, 2002).

Section 401 Permit: We anticipate 401 General Certification number 3366 will apply to this project. All general conditions of the Water Quality Certifications will be met. Therefore, written concurrence from the NCDWQ is not required. In accordance with 15A NCAC 2H, Section .0501(a) we are providing two copies of this application to the North Carolina Department of Environment and Natural Resources, Division of Water Quality, for their records.

Thank you for your assistance with this project. If you have any questions or need additional information, please contact Eric Adrignola at (919) 715-1462 or at eadrignola@dot.state.nc.us.

Sincerely,

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

w/attachment

Mr. John Hennessy, Division of Water Quality (2 copies)
Mr. Travis Wilson, NCWRC
Mr. Gary Jordan,USFWS
Dr. David Chang, P.E., Hydraulics
Mr. Greg Perfetti, P.E., Structure Design
Mr. J. M. Mills, P.E.
Mr. Jerry Parker, DEO

w/o attachment

Mr. Jay Bennett, P.E., Roadway Design
Mr. Omar Sultan, Programming and TIP
Mr. Art McMillan, P.E., Highway Design
Mr. Mark Staley, Roadside Environmental
PDEA Project Planning Engineer
Mr. David Franklin, USACE, Wilmington
Ms. Beth Harmon, EEP
Mr. Carl Goode, PE

Office Use Only: Form Version May 2002

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

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

I. Processing

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

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

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

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

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

II. Applicant Information

1. Owner/Applicant Information
   Name: _____
   Mailing Address: NCDOT
   1548 Mail Service Center
   Raleigh, NC 27699-1548
   Telephone Number: 919-733-3141 Fax Number: 919-733-9794
   E-mail Address: gthorpe@dot.state.nc.us

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

III. Project Information

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

1. Name of project: Bridge No. 21 Replacement

2. T.I.P. Project Number or State Project Number (NCDOT Only): B-3899

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

4. Location
   County: Rockingham Nearest Town: Reidsville
   Subdivision name (include phase/lot number):
   Directions to site (include road numbers, landmarks, etc.):
   Bridge No. 21 crossing of Troublesome Creek on SR 1001
   (please refer to attached maps)

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

6. Property size (acres): Please refer to attached drawings

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

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

9. Describe the existing conditions on the site and general land use in the vicinity of the project at the time of this application: The project area lies in the Piedmont Physiographic Province and consists of agricultural land, maintained/disturbed land, and forested land.

10. Describe the overall project in detail, including the type of equipment to be used: Replace Bridge No. 21 over Troublesome Creek with a 3 span, cored slab bridge

11. Explain the purpose of the proposed work: To replace a structurally deficient and functionally obsolete bridge crossing over Troublesome Creek.

IV. Prior Project History

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

N/A

V. Future Project Plans

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

N/A

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

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

1. Provide a written description of the proposed impacts: The replacement of the bridge

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

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

5. Pond Creation

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

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

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

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

Size of watershed draining to pond: N/A Expected pond surface area: N/A

VII. Impact Justification (Avoidance and Minimization)

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

The preferred alternative was selected since it proposed using the existing structure as a detour therefore does not require additional impacts of a temporary onsite structure. During demolition, adherence toNCDOT's Best Management Practices for Bridge Demolition and Removal will reduce temporary fill materials from entering Troublesome Creek. In addition, adherence to NCDOT Best Management Practices for Protection of Surface Waters will minimize construction impacts since these BMPs require use of erosion and sediment control measures.

VIII. Mitigation

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

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

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

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

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

   Amount of stream mitigation requested (linear feet): N/A
   Amount of buffer mitigation requested (square feet): N/A
   Amount of Riparian wetland mitigation requested (acres): N/A
   Amount of Non-riparian wetland mitigation requested (acres): N/A
   Amount of Coastal wetland mitigation requested (acres): N/A

IX. Environmental Documentation (required by DWQ)

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

Yes ☒ No ☐

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

Yes ☒ No ☐

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

Yes ☒ No ☐

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

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

Will the project impact protected riparian buffers identified within 15A NCAC 2B .0233 (Neuse), 15A NCAC 2B .0259 (Tar-Pamlico), 15A NCAC 2B .0250 (Randleman Rules and Water Supply Buffer Requirements), or other (please identify activity is exempt)?

Yes ☐ No ☒ If you answered "yes", provide the following information:

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

Zone*	Impact (square feet)	Multiplier	Required Mitigation
1		3	
2		1.5	
Total			

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

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

N/A

XI. Stormwater (required by DWQ)

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

NA

XII. Sewage Disposal (required by DWQ)

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

NA

XIII. Violations (required by DWQ)

Is this site in violation of DWQ Wetland Rules (15A NCAC 2H .0500) or any Buffer Rules?

Yes ☐ No ☒

Is this an after-the-fact permit application?

Yes ☐ No ☒

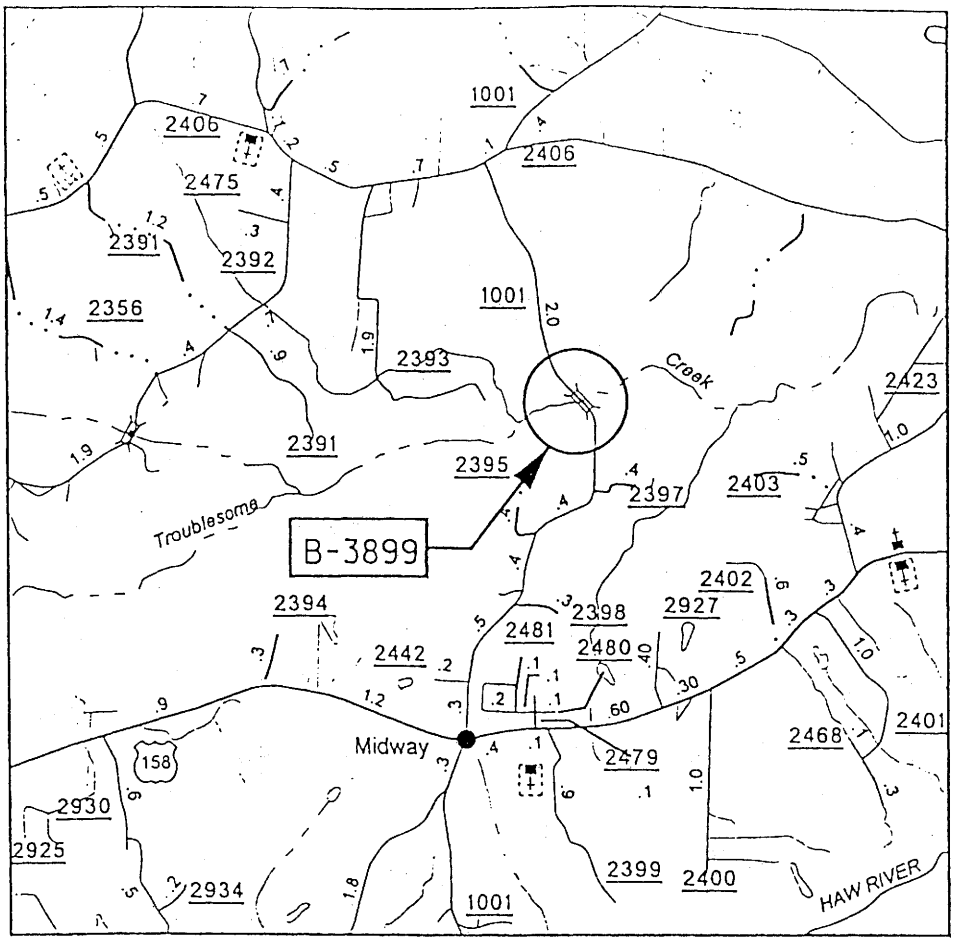
XIV. Other Circumstances (Optional):

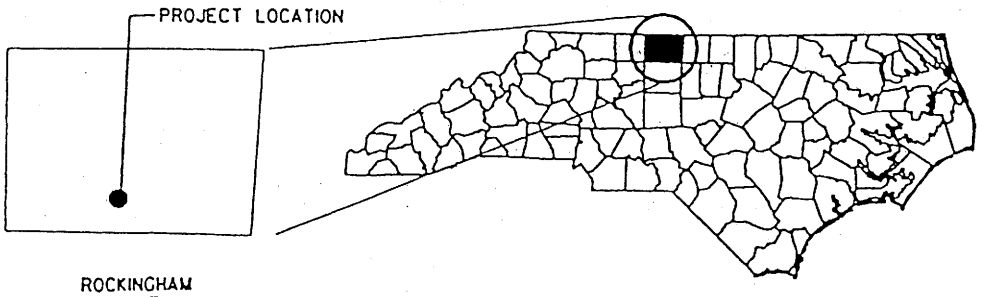
It is the applicant's responsibility to submit the application sufficiently in advance of desired construction dates to allow processing time for these permits. However, an applicant may choose to list constraints associated with construction or sequencing that may impose limits on work schedules (e.g.,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

Rebecca H. [illegible] 2/25/05

Applicant/Agent's Signature **Date**

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





SCALE IN MILES

1 0 1

North Carolina Department of Transportation
Division of Highways

AREA LOCATION MAP
BRIDGE NO. 21
ON SR 1001
OVER TROUBLESOME CREEK
ROCKINGHAM, NORTH CAROLINA
TIP PROJECT B-3899

PROPERTY OWNER

NAME AND ADDRESS

	OWNER'S NAME	ADDRESS
(1)	EUGENE MASON	1441 WOOLEN STORE ROAD REIDSVILLE, NC 27320

WETLAND & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

ROCKINGHAM COUNTY

PROJECT: 8.2511201 (B-3899)

BRZ-1001(23)

Replacemnet Bridge #21 over

Troublesome Creek on SR 1001

SHEET 2 OF 7 DATE 11/2004

WETLAND LEGEND

WLB — WETLAND BOUNDARY

WETLAND

DENOTES FILL IN WETLAND

DENOTES FILL IN SURFACE WATER

DENOTES FILL IN SURFACE WATER (POND)

DENOTES TEMPORARY FILL IN WETLAND

DENOTES EXCAVATION IN WETLAND

DENOTES TEMPORARY FILL IN SURFACE WATER

DENOTES MECHANIZED CLEARING

FLOW DIRECTION

TB — TOP OF BANK

WE — EDGE OF WATER

C — PROP. LIMIT OF CUT

F — PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG — NATURAL GROUND

PL — PROPERTY LINE

TDE — TEMP. DRAINAGE EASEMENT

PDE — PERMANENT DRAINAGE EASEMENT

EAB — EXIST. ENDANGERED ANIMAL BOUNDARY

EPB — EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

CORE FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

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

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 — ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE

LEVEL SPREADER (LS)

DITCH / GRASS SWALE

WETLAND & SURFACE WATER

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

ROCKINGHAM COUNTY

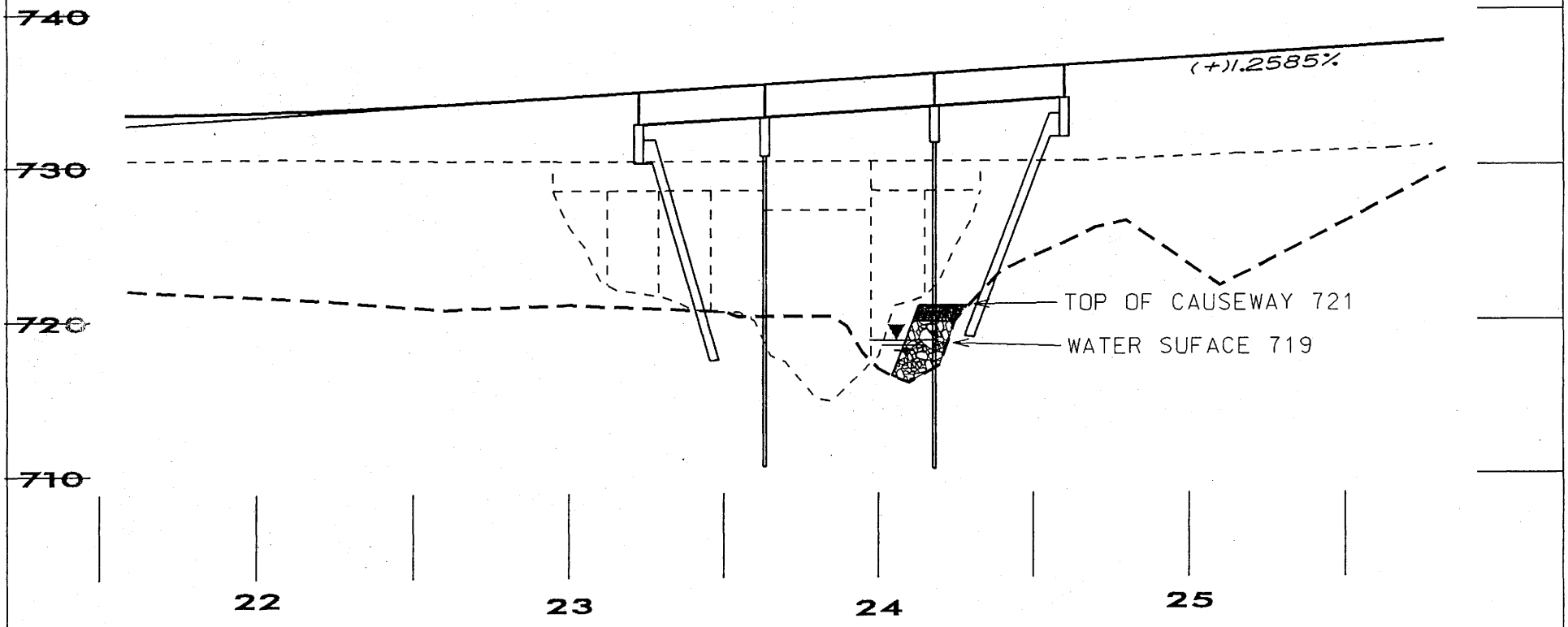
PROJECT: 8.2511201 (B-3899)

BRZ-1001(23)

Replacemnet Bridge #21 over

Troublesome Creek on SR 1001

SHEET 3 OF 7 DATE 11/2004



PROFILE

NCDOT

DIVISION OF HIGHWAYS
ROCKINGHAM COUNTY
PROJECT: 8.2511201 (B-3899)
BRZ-1001(23)
Replacement Bridge #21 over
Troublesome Creek on SR 1001

SHEET 4 **OF** 7 **11/2004**

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			Fill In Wetlands (sq. ft.)	Temp. Fill In Wetlands (acres)	Excavation In Wetlands (acres)	Mechanized Clearing (Method III) (sq. ft.)	Fill In SW (Natural) (acres)	Fill In SW (Pond) (acres)	Temp. Fill In SW (acres)	Existing Channel Impacted (ft.) *	Natural Stream Design (ft.)
1	24+10 to 24+40	Temporary Causeway							0.03	100	
TOTALS:									0.03	100	

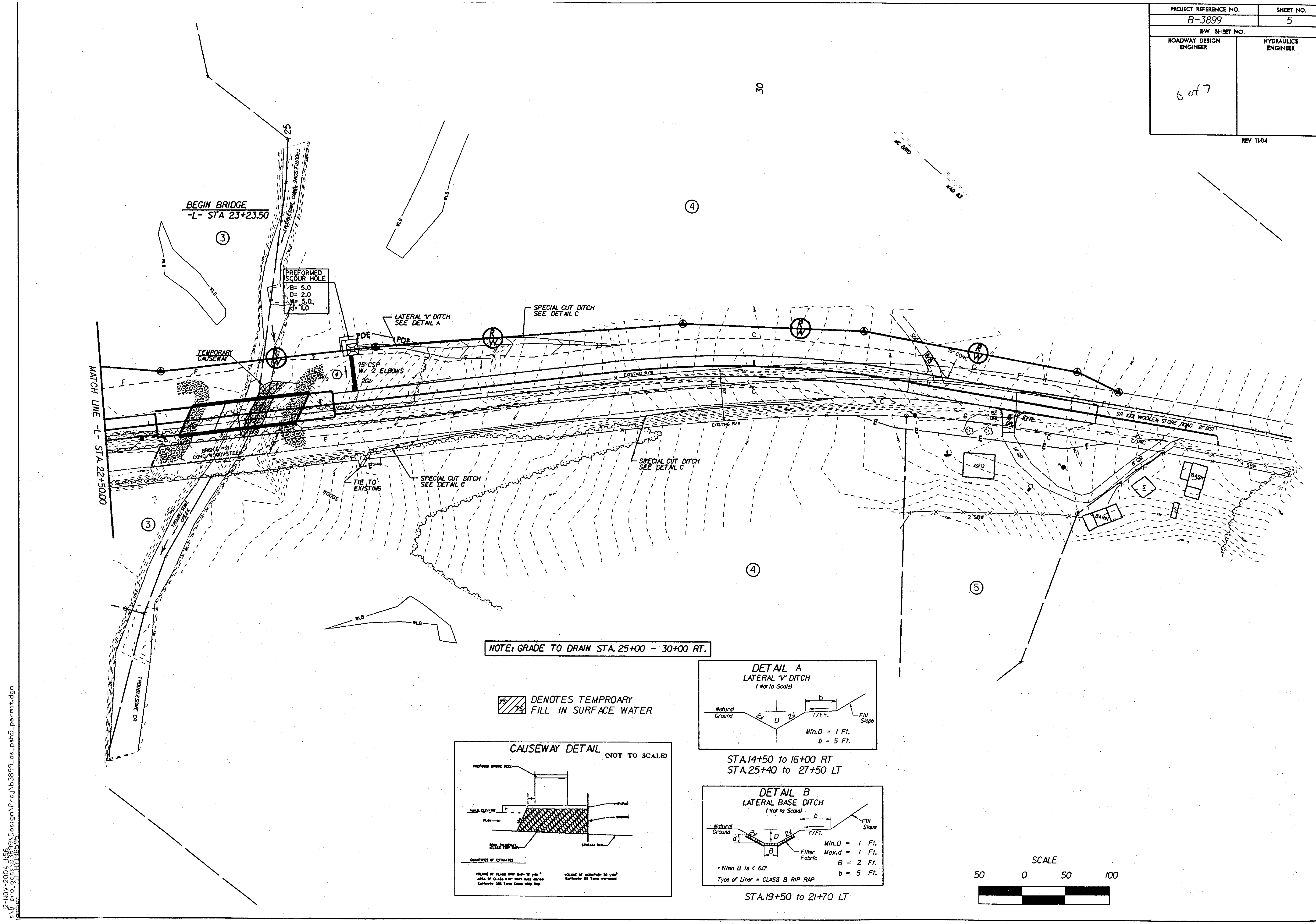
* Temporary impact due to causeway

WETLAND & SURFACE WATER

NCDOT

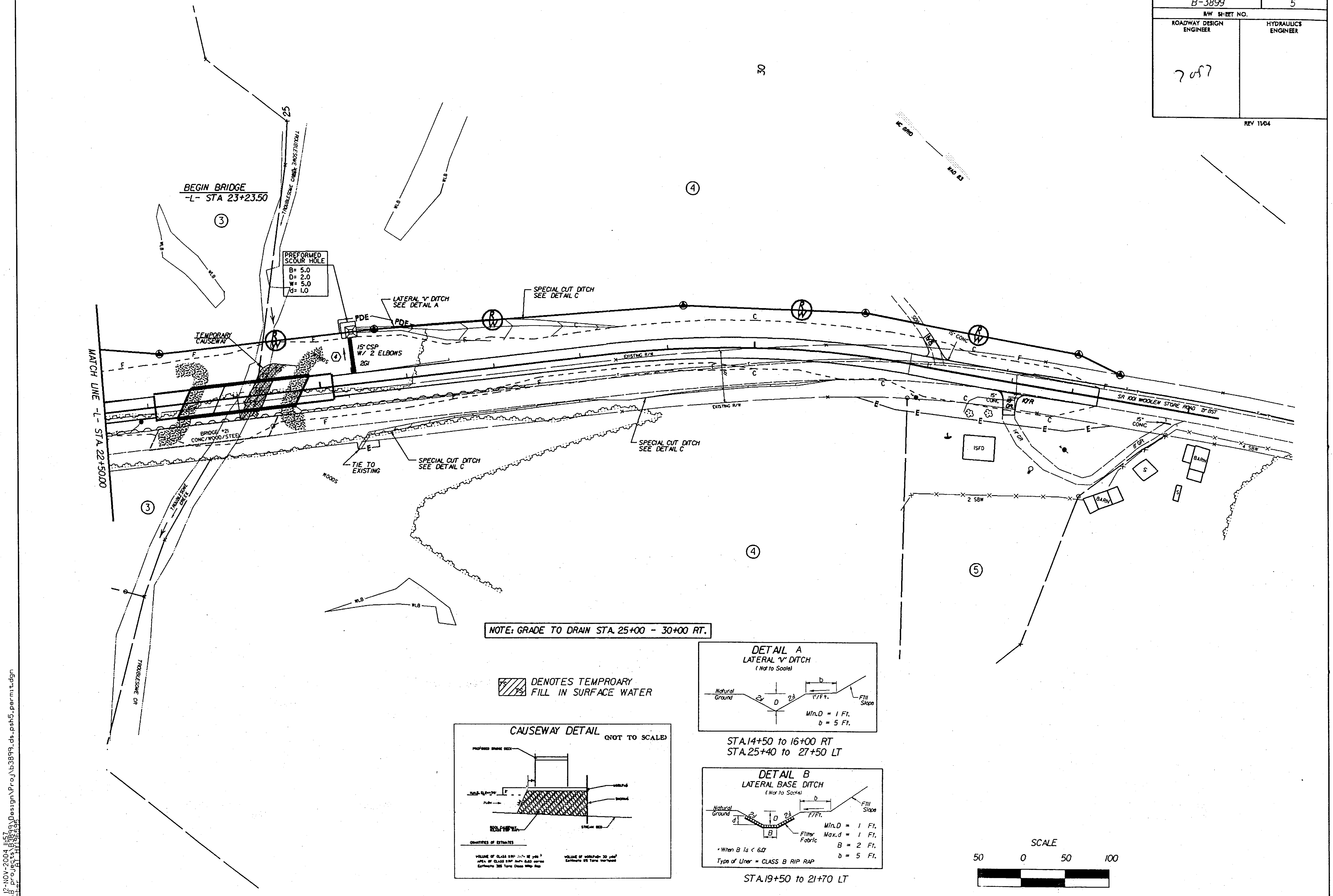
DIVISION OF HIGHWAYS
ROCKINGHAM COUNTY
PROJECT: 8.2511201 (B-3899)
BRZ-1001(23)
Replacemnet of Bridge#21 over
Troublesome Creek on SR 1001

SHEET 5 OF 7 DATE 11/2004


PROJECT REFERENCE NO.
B-3899
SHEET NO.
5
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
6 of 7
REV 11/04
30
25
BEGIN BRIDGE
-L- STA 23+23.50
PREFORMED SCOUR HOLE
B= 5.0
D= 2.0
W= 5.0
d= 1.0
LATERAL 'V' DITCH SEE DETAIL A
SPECIAL CUT DITCH SEE DETAIL C
TEMPORARY CAUSEWAY
15" CSP W/ 2 ELBOWS
MATCH LINE -L- STA. 22+50.00
BRIDGE
SPECIAL CUT DITCH SEE DETAIL C
TIE TO EXISTING
TROUBLESOME CR
SR 1001 WOOLEN STORE ROAD
NOTE: GRADE TO DRAIN STA. 25+00 - 30+00 RT.
DENOTES TEMPROARY FILL IN SURFACE WATER
CAUSEWAY DETAIL (NOT TO SCALE)
DETAIL A
LATERAL 'V' DITCH
(Not to Scale)
Natural Ground
Fill Slope
Min.D = 1 Ft.
b = 5 Ft.
STA.14+50 to 16+00 RT
STA.25+40 to 27+50 LT
DETAIL B
LATERAL BASE DITCH
(Not to Scale)
Natural Ground
Fill Slope
Filter Fabric
Min.D = 1 Ft.
Max.d = 1 Ft.
B = 2 Ft.
b = 5 Ft.
* When B is < 6.0'
Type of Liner = CLASS B RIP RAP
STA.19+50 to 21+70 LT
SCALE
50
0
50
100
12-NOV-2004 11:56
s:\B_projects\B3899\Design\Proj\b3899_ds_psh5_permit.dgn

PROJECT REFERENCE NO.	SHEET NO.
B-3899	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

REV 11/04



ROCKINGHAM COUNTY
BRIDGE NO. 21 ON SR 1001
OVER TROUBLESOME CREEK

FEDERAL-AID PROJECT NO. BRZ-1001(23)
STATE PROJECT NO. 8.2511201
TIP NO. B-3899

CATEGORICAL EXCLUSION

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
AND
N.C. DEPARTMENT OF TRANSPORTATION

APPROVED:

05-28-03
DATE

for Gregory J. Thorpe, Ph.D.
Environmental Management Director
Project Development & Environmental Analysis Branch
North Carolina Department of Transportation

5/29/03
DATE

for John F. Sullivan, III
Division Administrator
Federal Highway Administration

ROCKINGHAM COUNTY
BRIDGE NO. 21 ON SR 1001
OVER TROUBLESOME CREEK

FEDERAL-AID PROJECT NO. BRZ-1001(23)
STATE PROJECT NO. 8.2511201
TIP NO. B-3899

CATEGORICAL EXCLUSION

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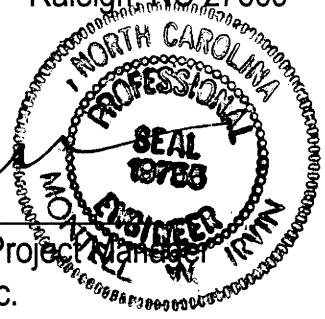

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05-23-03
Date

For the North Carolina Department of Transportation

Theresa J. Ellerby
Theresa Ellerby, Project Manager
Project Development and Environmental Analysis Branch

5-28-03
Date

PROJECT COMMITMENTS

ROCKINGHAM COUNTY
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The NCDOT agrees to follow the standard Nationwide Permit #23 Conditions, the General Nationwide Permit Conditions, Section 404 Only Conditions, Regional Conditions, State Consistency Conditions, NCDOT's Guidelines for Best Management Practices for the Protection of Surface Waters, Design Standards for Sensitive Watersheds, NCDOT's Guidelines for Best Management Practices for Bridge Demolition and Removal, General Certification Conditions, and Section 401 Conditions for Certification.

No other special commitments are required for this project.

ROCKINGHAM COUNTY
BRIDGE NO. 21 ON SR 1001
OVER TROUBLESOME CREEK

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STATE PROJECT NO. 8.2511201
TIP NO. B-3899

INTRODUCTION

The replacement of Bridge No. 21, located on SR 1001 over Troublesome Creek in Rockingham County, is included in the North Carolina Department of Transportation (NCDOT) 2002-2008 Transportation Improvement Program (TIP) as B-3899 and in the Federal-Aid Bridge Replacement Program as BRZ-1001(23). The location is shown in Figures 1 and 10.

No substantial impacts are anticipated. The project is classified as a Federal "Categorical Exclusion".

I. PURPOSE AND NEED

The NCDOT Bridge Maintenance Unit records indicate Bridge No. 21 has a sufficiency rating of 16.3 out of a possible 100 for a new structure. The bridge is considered structurally deficient and functionally obsolete. The replacement of this inadequate structure will result in safer and more efficient traffic operations.

II. EXISTING CONDITIONS

Bridge No. 21 is located approximately 2.5 miles (4.0 km) north of US 158 at Midway on SR 1001 in Rockingham County. Refer to Figure 1 and 10 for the project location and Figures 2, 3 and 4 for photos of the existing project area.

Bridge No. 21 was constructed in 1952. It is currently posted to restrict weight limits at 15 tons (13.6 metric tons) for single vehicles and 22 tons (20.0 metric tons) for truck-tractor semi-trailers.

The overall length of the seven-span structure is 138.0 ft (42.1 m). It has a clear roadway width of 22.2 ft (6.8 m) that includes two 11.1 ft (3.3 m) travel lanes over the bridge. The superstructure consists of a reinforced concrete deck with an asphalt wearing surface with timber joists on the approach spans and steel I-beams on the main span. The substructure of the bridge is a combination of timber caps and timber piles (bents 1, 2, 3 and 6) and reinforced concrete caps and timber piles (bents 4 and 5). The height from the crown to stream bed is 16 ft (4.9 m). The scour at pier 5 is within 1 ft (0.3 m) of the scour critical depth.

SR 1001 is classified as a rural minor collector in the Statewide Functional Classification System. The 2005 average daily traffic volume (ADT) on SR 1001 is estimated to be 2500 vehicles per day (vpd). The percentages of truck traffic are 1 percent TTST vehicles and 2 percent dual-tired vehicles. The projected 2030 (ADT) is 4200 vpd.

The two-lane facility measures approximately 21 ft (6.4 m) in width and has 5-ft (1.5-m) grassed shoulders on each side of the roadway. The existing bridge is in a short tangent section between opposing curves. The vertical alignment is generally flat at the bridge with both the north and south approaches rising on a

gentle grade away from the structure. The speed limit in the immediate vicinity of the bridge and toward the south is posted at a precautionary 45 miles per hour (mph) (72 km/h) due to the horizontal curvature approaching the bridge from the south. Existing right-of-way is approximately 60 ft (18.3 m) in width.

This section of SR 1001 is not part of a designated bicycle route nor is it listed in the Transportation Improvement Program as needing incidental bicycle accommodations. There is no indication that an unusual number of bicyclists use this roadway.

There are underground telephone utilities along the west side of SR 1001. The line is aerial over Troublesome Creek. On the south approach, the line is fiber optic cable. There are no other apparent utilities that would be affected by the proposed project. Utility impacts are expected to be low.

Land use within the immediate project area is primarily swampy wooded areas with large cultivated fields to the north and south of the low areas associated with Troublesome Creek. Approximately 1600 ft (490 m) south and 800 ft (250 m) north of Bridge No. 21, there are several residences and outbuildings associated with farming operations.

Three school buses cross Bridge No. 21 twice daily, for a total of six bus trips per day.

There have been five crashes reported in the vicinity of Bridge No. 21 during the period from December 1, 1999 and November 30, 2002.

III. ALTERNATIVES

A. Project Description

Based upon a preliminary hydraulics analysis, the proposed replacement structure will be approximately 140 ft (42.7 m) long with a 30 ft (9.1 m) clear roadway width. The bridge will include two 12 ft (3.6 m) travel lanes with 3 ft (1.0 m) of lateral clearance on each side of the bridge.

The length and opening size of the proposed structure may increase or decrease as necessary to accommodate peak flows as determined by a more detailed hydraulic analysis to be performed during the final design phase of the bridge.

The roadway approaches will provide two 12 ft (3.6 m) travel lanes with 8 ft (2.4 m) grassed shoulders. The roadway approach and bridge grades will approximately match existing bridge and roadway elevations. The design speed is 60 mph (100 km/h).

B. Build Alternatives

Four (4) build alternatives studied for replacing the existing bridge are described below:

Alternative A

Alternative A consists of replacing the bridge in-place with a new bridge. During construction, traffic will be maintained by using an off-site detour. The total length of roadway approach work for this alternative is approximately 750 ft (229 m). SR 1001 will be closed within the project limits for approximately 12 months during the construction of the bridge. Refer to Figure 6 for illustration of this alternative.

Two off-site detours were studied. The "west" detour is SR 1001 (Sandy Cross Road), US 158, SR 2351 (Witty Road), SR 2392 (Brown Road) and SR 2406 (Iron Works Road). The length of this detour is 12.9

miles (20.8 km). There are no posted structures on this detour. The "east" detour is SR 1001, SR 2406, SR 2422 (Monroeton Road), SR 2423 (Meadow Branch Road) and US 158. The length of this detour is 11.0 miles (17.7 km). There is one posted structure on this route, 18 tons (16.3 metric tons) for single vehicles and 23 tons (20.9 metric tons) for truck-tractor semi-trailers. Refer to Figure 5 for illustration of the temporary off-site detour routes.

Alternative A was not selected because of the long detour route and heavy commuter traffic.

Alternative B

Alternative B consists of replacing the bridge in-place with a new bridge. During construction, traffic will be maintained by an on-site detour parallel to and east (downstream) of the existing bridge. The total length of permanent roadway approach work for this alternative is approximately 750 ft (229 m). Refer to Figure 7 for illustration of this alternative.

The on-site detour structure will be approximately 130 ft (39.6 m) in length and will have a clear roadway width of 28 ft (8.6 m) including two 11 ft (3.3-m) travel lanes and 3 ft (0.9 m) of lateral clearance on each side of the bridge. The detour roadway approaches will provide two 11 ft (3.3-m) travel lanes with 3 ft (0.9-m) grassed shoulders. The detour roadway approach and bridge may be lowered to provide a minimum 1.0 ft (0.3 m) freeboard for the 5-year event. The length of the temporary detour will be approximately 1,100 ft (335 m).

Alternative B was not selected as the preferred because of the cost and environmental impacts associated with the on-site detour.

Alternative C

Alternative C consists of replacing the bridge with a new bridge on new alignment east (downstream) of the existing bridge. Traffic will be maintained on the existing bridge during construction. The total length of roadway approach work for this alternative is approximately 1,905 ft (577 m). Refer to Figures 8A and 8B for illustration of this alternative.

Alternative C was not selected as the preferred because of the higher environmental impacts at the northern end of the project.

Alternative D (Preferred)

Alternative D consists of replacing the bridge with a new bridge on new alignment west (upstream) of the existing bridge. Traffic will be maintained on the existing bridge during construction. The total length of roadway approach work for this alternative is approximately 2,370 (718 m). Refer to Figures 9A and 9B for illustration of this alternative.

C. Alternatives Eliminated From Further Consideration

A "Do-Nothing" alternative will eventually necessitate closure of the bridge due to its poor condition. This is not desirable due to the traffic service provided by SR 1001.

Investigation of the existing structure by the NCDOT Bridge Maintenance Unit indicates that rehabilitation of the old bridge is not feasible due to its age and deteriorated condition.

D. Preferred Alternative

Alternative D, replacement on new alignment to the west (upstream) of the existing bridge, was selected as the Preferred Alternative because it eliminates the need for a long off-site detour and the cost associated with maintaining traffic off-site.

The Division Engineer concurs with Alternative D as the Preferred Alternative.

IV. ESTIMATED COSTS

The estimated costs, based on current dollars, are shown below:

Table 1
Estimated Project Costs

	Alternative A	Alternative B	Alternative C	Alternative D (Preferred)
Structure Removal (existing)	$ 24,512	$ 24,512	$ 24,512	$ 31,000
Structure (proposed)	273,000	273,000	273,000	336,000
Detour Structure and Approaches	0	595,118	0	0
Roadway Approaches	246,468	246,468	701,706	583,297
Miscellaneous and Mobilization	244,020	462,682	449,782	317,534
Engineering and Contingencies	137,000	273,220	251,000	232,169
Right-of-Way/Easements and Utilities	28,300	38,400	53,500	71,000
Total Project Cost	**$ 953,300**	**$ 1,913,400**	**$ 1,753,500**	**$ 1,571,000**

The estimated cost of the project, as shown in the 2002-2008 NCDOT Transportation Improvement Program is $1,030,000, including $150,000 spent in prior years, $80,000 for right-of-way and $ 800,000 for construction.

V. NATURAL RESOURCES

Natural resources within the project study area were evaluated to provide: 1) an assessment of existing vegetation, wildlife, protected species, streams, wetlands, and water quality; 2) an evaluation of probable impacts resulting from construction; and 3) a preliminary determination of permit needs.

A. Methodology

Materials and research data in support of this investigation have been derived from a number of sources. The Bethany NC, United States Geological Survey (USGS) 7.5-minute topographic quadrangle map (USGS 1971) was consulted to determine the physiographic relief and to assess landscape characteristics. Additional resources utilized include U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory mapping, and the *Soil Survey of Rockingham County, North Carolina* (USDA 1992).

Aerial photography served as the basis for mapping plant communities and wetlands. Plant community patterns were identified from available mapping sources and then field verified in May 2001. Plant community descriptions are based on a classification system utilized by the NC Natural Heritage Program (NHP) (Schafale and Weakley 1990). When appropriate, community classifications were modified to better

reflect field observations. Vascular plant names typically follow nomenclature found in Radford *et al.* (1968).

Jurisdictional areas were identified using the three parameter approach (hydrophytic vegetation, hydric soils, wetland hydrology) following U.S. Army Corps of Engineers (USACE) delineation guidelines (DOA 1987). Jurisdictional areas were characterized according to a classification scheme established by Cowardin *et al.* (1979). Jurisdictional stream channels were identified using criteria outlined by the USACE and the NC Division of Water Quality (DWQ).

Water resource information for Troublesome Creek was derived from the most recent versions of the *Cape Fear River Basinwide Water Quality Plan* (DWQ 2000), *Basinwide Assessment Report-Cape Fear River Basin* (DWQ 1999) and several DWQ internet resources. Quantitative sampling was not undertaken to support existing data.

At the time of the field investigation, the most current USFWS list of federal protected species listed for Rockingham County was dated April 12, 2001. This list was reviewed prior to the field investigation and included only smooth coneflower, Jarnes spinymussel, and Heller trefoil. The most recent USFWS list, dated February 25, 2003, now includes the green floater as a Federal Species of Concern. In addition, NHP records documenting occurrences of federal or state-listed species listed within the project study area were consulted before commencing the field investigation. An updated NHP records search was conducted on December 20, 2001, October 21, 2002 and April 8, 2003 and no protected species are known to exist within the project study area.

Direct observations of terrestrial and aquatic wildlife were documented. Expected population distributions were determined through observations of available habitat and review of supportive documentation found in Martof *et al.* (1980), Webster *et al.* (1985), Menhinick (1991), Hamel (1992), Rohde *et al.* (1994), and Palmer and Braswell (1995).

B. Physiography and Soils

The project study area is located in the Piedmont physiographic province of North Carolina. The topography in the project study area is generally characterized as semi-level. Elevations in the project study area range from 700 to 800 feet (213 to 244 m) above mean sea level (MSL) (USGS 1971).

The project vicinity contains undisturbed forest, agricultural land, residential areas, and other maintained/disturbed areas.

The project study area crosses five soil mapping units (USDA 1992). The only hydric soil mapped within the project study area is the Wehadkee (*Typic Fluvaquents*) series. Non-hydric soils mapped within the project study area that may contain hydric soil inclusions includes the Chewacla (*Fluvaquentic Dystrochrepts*) series. Non-hydric soils are mapped as the Appling (*Typic Kanhapludults*) series, Cecil (*Typic Kanhapludults*) series, and Pacolet (*Typic Kanhapludults*) series (USDA 1992).

C. Water Resources

C.1. Waters Impacted

The project study area is located within sub-basin 030601 of the Cape Fear River Basin (DWQ 1999, DWQ 2000) and is part of USGS hydrologic unit 03030002 (USGS 1974). Troublesome Creek originates west of US 220, flows east into Lake Reidsville, and then flows into the Haw River. The drainage area at the

bridge crossing is 25.5 square miles (65.7 square kilometers). The DWQ has assigned Troublesome Creek Stream Index Number (SIN) 16-6-(0.3) (DEM 1993, DENR 2002a).

C.2. Water Resource Characteristics

Troublesome Creek is a perennial stream with moderate flow over substrate consisting of sand and silt. Water clarity was moderate to good at the time of the site investigation. The main channel width ranges between 15 feet (6 m) and 60 feet (18 m). Mean depth ranges from 0.25 feet (0.08 m) to 3.0 feet (0.9 m). A geomorphic characterization of the stream section within the project study area indicates Troublesome Creek is an "F" type channel (Rosgen 1996). The stream occurs on alluvial valleys and has moderate sinuosity. The "F" designation indicates that the stream has an entrenched meandering channel on a low gradient with high width/depth ratio (Rosgen 1996).

Troublesome Creek has been assigned a best usage classification of **WS-III NSW** (DEM 1993, DENR 2002a). The **WS-III** designation indicates waters protected as water supplies, which are generally in low to moderately developed watersheds. Point source discharges of treated wastewater are permitted in these waters; however, local programs to control non-point source and stormwater discharge of pollution are required. The **NSW** designation refers to Nutrient Sensitive Waters, which require limitations on nutrient inputs.

Troublesome Creek is listed as an impaired water under Section 303(d) of the Clean Water Act. From its source to SR 2423, Troublesome Creek is considered biologically impaired. This stretch of stream is listed as impaired due to its historical listing caused by sediment from potential agricultural sources and is listed as a high priority for improvement (DWQ 2000b).

No Outstanding Resource Waters (**ORW**), High Quality Waters (**HQW**), **WS-I**, or **WS-II** Waters occur within 1.0 miles (1.6 km) upstream or downstream of the project study area (DEM 1993, DENR 2002a). Troublesome Creek is not designated as a North Carolina Natural and Scenic River, or as a National Wild and Scenic River.

One method used by DWQ to monitor water quality is through long-term monitoring of macroinvertebrates. The closest benthic monitoring station on Troublesome Creek is located approximately 3.0 miles (4.8 km) downstream from the project study area on SR 2423. This site was sampled in 1998 and received a bio-classification rating of Good-Fair (DWQ 2000).

Another measure of water quality being used by the DWQ is the North Carolina Index of Biotic Integrity (NCIBI), which assesses biological integrity using the structure and health of the fish community. Troublesome Creek has been sampled at Bridge No. 21 on SR 1001, which is within the project study area. This site was sampled in 1998 and received a NCIBI rating of Poor (DWQ 2000).

Discharges that enter surface waters through a pipe, ditch or other well-defined point of discharge are broadly referred to as "point sources". There is one permitted discharger located on an unnamed tributary to Troublesome Creek and one permitted discharger located on Troublesome Creek (DWQ 1999, DENR 2002b). No obvious sources of non-point source discharges were observed in the project study area.

C.3. Anticipated Impacts to Water Resources

Short-term impacts to water quality, such as sedimentation and turbidity, may result from construction-related activities. Temporary construction impacts due to erosion and sedimentation will be minimized through implementation of a stringent erosion control schedule and the use of BMP's. These measures include: the use of dikes, berms, silt basins, and other containment measures to control runoff and

elimination of construction staging areas in floodplains and adjacent waterways. Disturbed sites will be revegetated with herbaceous cover after any temporary construction impacts.

Other impacts to water quality, such as changes in water temperature as a result of increased exposure to sunlight due to the removal of stream-side vegetation or increased shade due to the construction of the bridges, and changes in stormwater flows due to changes in the amount of impervious surface adjacent to the stream channels, can be anticipated as a result of this project. However, due to the limited amount of overall change in the surrounding areas, impacts are expected to be temporary in nature.

No adverse long-term impacts to water resources are expected to result from the alternatives being considered. The proposed bridge replacement project will allow for continuation of present stream flow within the existing channel, thereby protecting stream integrity.

C.4. Impacts Related to Bridge Demolition and Removal

In order to protect the water quality and aquatic life in the area affected by this project, the NCDOT and all potential contractors will follow appropriate guidelines for bridge demolition and removal. These guidelines are presented in three NCDOT documents entitled *Pre-Construction Guidelines for Bridge Demolition and Removal*, *Policy: Bridge Demolition and Removal in Waters of the United States*, and *Best Management Practices for Bridge Demolition and Removal.*

The superstructure of Bridge No. 21 consists of a reinforced concrete deck with an asphalt wearing surface with timber joists on the approach spans and steel I-beams on the main span. The bridge has seven (7) spans and totals 138 feet (42.1 m) in length. All bents consist of either timber caps and piles or reinforced concrete caps and timber piles. The maximum resulting temporary fill associated with the removal of Bridge No. 21 is approximately 29.0 cubic yards (22.2 cubic m). It has been determined that the bridge can be removed without dropping any concrete into waters of the United States. After construction activities are completed, any abandoned existing approaches associated with the existing structure should be removed and revegetated in accordance with NCDOT guidelines.

Because no moratoriums apply, this project falls under Case 3 (no special restrictions) of the Best Management Practices for Bridge Demolition and Removal.

D. Biotic Resources

D.1. Plant Communities

Terrestrial distribution and composition of plant communities throughout the project study area reflect landscape-level variations in topography, soils, hydrology, and past and present land use practices. When appropriate, the plant community names have been adopted and modified from the NHP classification system (Schafale and Weakley 1990) and the descriptions written to reflect local variations within the project study area. Four plant communities were identified within the project study area: Piedmont alluvial forest, mixed hardwood forest, agricultural land, and maintained/disturbed land.

Piedmont Alluvial Forest – The Piedmont alluvial forest community is located in river and stream floodplains in which separate fluvial landforms and associated vegetation zones are too small to distinguish (Schafale and Weakley 1990). Tree species encountered include American sycamore (*Platanus occidentalis*), river birch (*Betula nigra*), green ash (*Fraxinus americanus*), and paw-paw (*Asimina triloba*). Groundcover species include Japanese honeysuckle (*Lonicera japonica*) and poison ivy (*Toxicodendron radicans*).

Mixed Hardwood Forest – Mixed hardwood forest is located on mid-slopes, low ridges, upland flats, and other dry-mesic upland areas. This community type is dominated by a mixture of oaks and hickories including northern red oak (*Quercus rubra*), black oak (*Quercus velutina*), shagbark hickory (*Carya ovata*), mockernut hickory (*Carya tomentosa*), American beech (*Fagus grandifolia*), and flowering dogwood (*Cornus florida*). Groundcover species include Japanese honeysuckle and Virginia creeper (*Parthenocissus quinquefolia*).

Agricultural Land – These areas are currently in production of cash crops or have recently been in production of livestock and/or crops.

Maintained/Disturbed Land – Maintained/disturbed land include road rights-of-way, maintained residential yards, powerline right-of-way corridors, and areas where other human-related activities dominate. Roadsides and powerline right-of-way are maintained by mowing and/or herbicides. Species observed include various grasses such as fescue (*Festuca* sp.) and broomsedge (*Andropogon virginica*), and unidentified ornamentals.

D. 2. Wildlife

The project study area was visually surveyed for signs of terrestrial and aquatic wildlife. The project study area is surrounded by busy roadways, agricultural fields, and residential yards. Alluvial forests along streams such as Troublesome Creek provide cover and food and allow animals to travel between more optimal habitats. Wildlife species likely to be found here are those adapted to ecotones between the maintained roadsides and agricultural fields and adjacent natural forest.

One reptile was positively identified in the project study area. A black rat snake (*Elaphe obsoleta*) was found dead on the road. Other species expected to occur within the project study area include the eastern box turtle (*Terrapene carolina*), eastern garter snake (*Thamnophis sirtalis*), and eastern fence lizard (*Sceloporus undulatus*).

No terrestrial amphibians were observed in the project study area. Species expected to occur in the study area include the gray treefrog (*Hyla chrysoscelis*), spring peeper (*Pseudacris crucifer*), American toad (*Bufo americanus*), white-spotted slimy salamander (*Plethodon cylindraceus*), and marbled salamander (*Ambystoma opacum*).

Bird species documented in the project study area include green heron (*Butorides virescens*), pileated woodpecker (*Dryocopus pileatus*), red-eyed vireo (*Vireo olivaceus*), American crow (*Corvus brachyrhynchos*), tufted titmouse (*Baeolophus bicolor*), ovenbird (*Seiurus aurocapillus*), and indigo bunting (*Passerina cyanea*).

Two mammal species were documented within the project study area; white-tailed deer (*Odocoileus virginianus*) and Virginia opossum (*Didelphis virginiana*). Other mammal species expected to occur in the project study area include the gray squirrel (*Sciurus carolinensis*), gray fox (*Urocyon cinereoargenteus*), and eastern cottontail (*Sylvilagus floridanus*).

D.3. Aquatic Communities

Limited kick-netting, seining, dip-netting, electro-shocking and visual observation of stream banks and the channel within the project study area were conducted in Troublesome Creek. Benthic macroinvertebrate samples were collected pursuant to current DWQ Aquatic Insect Collection Protocols.

Benthic invertebrate organisms collected within Troublesome Creek were identified to at least Order and Family if possible and include dobsonflies (Megaloptera: Cordylidae), beetles (Coleoptera: Gyrinidae, Hydroptilidae, Haliplidae), mayflies (Ephemeroptera: Heptageniidae, Ephemeridae), dragonflies (Odonata: Gomphidae, Aeshnidae), caddisflies (Trichoptera: Hydropsychidae, Polycentropidae), stoneflies (Plecoptera: Perlidae), marsh flies (Diptera: Sciomyzidae), midges (Diptera: Chironomidae, Nematocera), mosquitoes: (Diptera: Culicidae), segmented worms (Oligochaeta), leeches (Hirudinea), scuds (Amphipoda), and crayfish (Decapoda). Identifications are based on McCafferty (1998). In addition to the above macroinvertebrates, Eastern elliptio (*Elliptio complanata*) shells were observed along the banks of Troublesome Creek.

In addition to the above microinvertebrates, eastern elliptio (*Elliptio complanata*) shells were observed along the banks of Troublesome Creek. NCDOT documented the notched rainbow (*Villosa consticta*) and Asiatic clam (*Corbicula fluminea*) during a mussel survey conducted on April 17, 2001.

Fish species documented in the segment of Troublesome Creek within the project study area include the margined madtom (*Noturus insignis*), redbreast sunfish (*Lepomis auritus*), rosefin shiner (*Lythrurus ardens*), and crescent shiner (*Luxilus cerasinus*).

The only aquatic reptile observed in the project study area was northern water snake (*Nerodia sipedon*). Other species expected to occur in the project study area include the common snapping turtle (*Chelydra serpentina*), eastern painted turtle (*Chrysemys picta*), and eastern mud turtle (*Kinosternon subrubrum*).

Unidentified salamander larvae and an unidentified frog (*Rana* sp.) were observed in the project study area. Aquatic amphibian species expected to occur in the project study area include the northern dusky salamander (*Desmognathus fuscus*), green frog (*Rana clamitans*) and bullfrog (*R. catesbeiana*).

D.4. Anticipated Impacts to Biotic Communities

D.4.a. Terrestrial Community Impacts

Potential impacts to plant communities are estimated based on the approximate area of each plant community present within both the proposed 100 ft (30.3 m) right-of-way and the temporary construction limits of the on-site detour or easement that falls outside the proposed right-of-way limit. A summary of potential plant community impacts is presented in Table 2. Impervious surface and open water areas are not included in this analysis.

Permanent community impacts for Alternative A represent the least amount of the four alternatives. The highest amount of permanent plant community impacts result from Alternative C.

D.4.b. Aquatic Communities Impacts

The proposed bridge replacement will not result in substantial loss or displacement of known aquatic wildlife populations. Potential down-stream impacts to aquatic habitat will be avoided by bridging Troublesome Creek to maintain regular flow and stream integrity. In addition, temporary impacts to downstream habitat from increased sediment during construction will be reduced by limiting in-stream work to an absolute minimum, except for the removal of the portion of the sub-structure below the water. BMP-BDR will be followed to minimize impacts due to anticipated bridge demolition.

Table 2
Potential Impacts to Plant Communities

PLANT COMMUNITY	POTENTIAL IMPACTS acres (hectares)				
	ALT A	ALT B		ALT C	ALT D
	Impacts	Impacts	Temp. Impacts	Impacts	Impacts
Piedmont Alluvial Forest Mixed Hardwood Forest Agricultural Land Maintained/Disturbed	0.60 (0.24) 0.14 (0.06) 0.0 0.0	0.40 (0.16) 0.13 (0.05) 0.0 0.0	0.82 (0.33) 0.06 (0.02) 0.10 (0.04) 0.0	0.94 (0.38) 0.31 (0.13) 0.90 (0.36) 0.23 (0.09)	0.89 (0.36) 0.07 (0.03) 0.35 (0.14) 0.06 (0.02)
Total: acres (ha):	0.74 (0.30)	0.53 (0.21)	0.98 (0.40)	2.38(0.96)	1.37 (0.55)
TOTAL FOR ALT. acres (ha)	**0.74 (0.30)**	**1.51 (0.61)**		**2.38 (0.96)**	**1.37 (0.55)**

Note: Temporary construction impacts are based on the portion of the impacts that fall outside the proposed right-of-way limits.

E. Special Topics

E.1. Waters of the United States

Surface waters within the embankments of Troublesome Creek are subject to jurisdictional consideration under Section 404 of the Clean Water Act as "Waters of the United States" (33 CFR 328.3). The surface waters within Troublesome Creek exhibit characteristics of riverine, lower perennial, unconsolidated bottom, permanently flooded, (R2UBH) waters (Cowardin *et al.* 1979).

Wetlands subject to review under Section 404 of the Clean Water Act (33 U.S.C. 1344) are defined by the presence of three primary criteria: hydric soils, hydrophytic vegetation, and evidence of hydrology within 12 inches (31 cm) the soil surface for a portion (12.5 percent) of the growing season (DOA 1987). Based on this three-parameter approach, jurisdictional wetlands do occur within the project study area in the form of bottomland hardwood forest. There are four small areas of jurisdictional hardwood forest delineated within the project study area. These jurisdictional features exhibit characteristics of palustrine, forested, broad-leaved deciduous, temporarily flooded (PFO1A) wetlands (Cowardin *et al.* 1979). These wetland areas appear to be riverine (*i.e.*, riparian) wetlands in that they receive occasional over-bank flooding from Troublesome Creek. These areas are located in the forested corridor that runs parallel with Troublesome Creek. Two of the delineated wetlands are isolated.

Dominant wetland vegetation includes tree species such as river birch, green ash, sycamore, ironwood (*Carpinus caroliniana*) and red maple. Groundcover is comprised of such species as spotted touch-me-not (*Impatiens capensis*), false nettle (*Boehmaria cylindrica*), netted chain fern (*Woodwardia areolata*), and poison ivy. Impacts to jurisdictional wetlands will be assessed by the area impacted. Soil in these wetland areas is mapped as Wehadkee silt loam. The soil was saturated at the surface and the depth to free water in a pit was approximately 6 inches (15 cm) on May 22, 2001.

E.2 Anticipated Impacts to Waters of the United States

Temporary and permanent impacts to wetlands and surface waters are estimated based on the amount of each jurisdictional area within the project limits. Permanent impacts are those areas that will be in the construction limits and/or the proposed right-of-way of the new structure and approaches. Temporary impacts include those impacts that will result from temporary construction activities outside of the proposed right-of-way and/or those associated with staging areas and/or temporary detours. Temporary impacts will

be restored to their original condition after the project has been completed. Potential wetland and surface water impacts are included in Table 3.

Table 3
Jurisdictional Wetlands and Surface Waters

JURISDICTIONAL AREAS	POTENTIAL IMPACTS WITHIN EACH ALTERNATIVE							
	ALT A Perm. Impacts	ALT A Temp. Impacts	ALT B Perm. Impacts	ALT B Temp. Impacts	ALT C Perm. Impacts	ALT C Temp. Impacts	ALT D Perm. Impacts	ALT D Temp. Impacts
PFO1 acres (ha)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R2UBH acres (ha)	0.0	0.04 (0.01)	0.0	0.08 (0.03)	0.0	0.04 (0.01)	0.0	0.04 (0.01)
Perennial Channel feet (m)	0.0	30 (9)	0.0	58 (18)	0.0	30 (9)	0.0	30 (9)

R2UBH – riverine, lower perennial, unconsolidated bottom, permanently flooded
PFO1A – palustrine, forested, broad-leaved deciduous, temporarily flooded
Note: Temporary construction impacts are based on the portion of the impacts that fall outside the proposed right-of-way limits.

Bridging Troublesome Creek will result in no permanent fill placed in jurisdictional areas. Alternative A, which replaces the bridge in-place while using an off-site detour, incurs 0.04 acre (0.01 ha) of temporary surface water impact along 30 feet (9 m) of stream channel. Alternative B, which replaces the bridge in-place with a temporary on-site detour on the northeast side, incurs 0.08 acre (0.03 ha) of temporary surface water impact along 58 feet (18 m) of stream channel. Alternative C, which replaces the bridge on new alignment east of the existing bridge, incurs 0.04 acre (0.01 ha) of temporary surface water impact along 30 feet (9 m) of stream channel. Alternative D, which replaces the bridge on new alignment west of the existing bridge, incurs 0.04 (0.01) of temporary surface water impact along 30 feet (9 m) of stream channel.

None of the four jurisdictional forested wetland areas are affected by any of the four alternatives.

E.3. Permits

Section 404 of the Clean Water Act – In accordance with Section 404 of the Clean Water Act (33 U.S.C. 1344), a permit is required from the USACE for projects of this type for the discharge of dredged or fill material into "Waters of the United States". The USACE issues two types of permits for these activities. A general permit may be issued on a nationwide or regional basis for a category or categories of activities when: those activities are substantially similar in nature and cause only a minimal individual or cumulative environmental impacts, or when the general permit would result in avoiding unnecessary duplication or regulatory control exercised by another Federal, state, or local agency provided that the environmental consequences of the action are individually and cumulatively minimal. If a general permit is not appropriate for a particular activity, then an individual permit must be utilized. Individual permits are authorized on a case-by-case evaluation of a specific project involving the proposed discharges.

It is anticipated that this project will fall under Nationwide Permit 23, which is a type of general permit. Nationwide Permit 23 is relevant to approved Categorical Exclusions. This permit authorizes any activities, work and discharges undertaken, assisted, authorized, regulated, funded or financed, in whole or in part,

by another federal agency and that the activity is "categorically excluded" from environmental documentation because it is included within a category of actions which neither individually nor cumulatively have a significant effect on the environment. Activities authorized under nationwide permits must satisfy all terms and conditions of the particular permit. However, final permit decisions are left to the discretionary authority of the USACE.

Section 401 Water Quality Certification – A 401 Water Quality Certification, administered through the DWQ, will also be required. This certification is issued for any activity which may result in a discharge into waters for which a federal permit is required. According to the DWQ, one condition of the permit is that the appropriate sediment and erosion control practices must be utilized to prevent exceedances of the appropriate turbidity water quality standard.

E.4. Mitigation Evaluation

Avoidance – Each project alternative avoids impacts to jurisdictional wetlands, but contains jurisdictional surface waters, which will be crossed. Open water areas will be bridged from high ground to high ground.

Minimization – Bridging jurisdictional surface waters from high ground to high ground will minimize impacts. Best Management Practices should be implemented during all phases of construction to further minimize detrimental environmental effects. Further efforts to minimize jurisdictional impacts will be made during the final design phase of this project.

Mitigation – Compensatory mitigation is not expected for this project due to the limited nature of project impacts. Temporary impacts associated with the construction activities could be mitigated by replanting disturbed areas with native species and removal of any temporary fill material within the floodplain upon project completion. Final compensatory wetland and stream mitigation requirements will be determined by the USACE.

F. Rare and Protected Species

F.1. Federally Protected Species

Species with the federal classification of Endangered (E) or Threatened (T), Proposed Endangered (PE), and Proposed Threatened (PT) are protected under provisions of Section 7 and Section 9 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The following federal protected species are listed for Rockingham County (USFWS list dated February 25, 2003):

Table 4
Federally Protected Species Listed for Rockingham County

Common Name	Scientific Name	Status	Biological Conclusion
James spinymussel	*Pleurobema collina*	E	No Effect
Smooth coneflower	*Echinacea laevigata*	E	No Effect

Endangered – any native or once-native species in danger of extinction throughout all or a significant portion of its range.

James spinymussel - The James spinymussel is a freshwater mussel with a 2 inch (5.1 cm) long oblong shell. Young specimens usually have three short spines on each valve. This species range currently includes the upper James River basin in Virginia and West Virginia (Terwilliger 1991). A newly found population occurs in the Dan River in Stokes County, North Carolina. Although no specimens have been

discovered in Rockingham County, this species is listed for Rockingham County because portions of the Dan River occur in Rockingham County.

BIOLOGICAL CONCLUSION – NO EFFECT

Troublesome Creek is in the Cape Fear River Basin and no James spinymussels have ever been recorded from the Cape Fear River Basin. NCDOT biologist surveyed the project study area for the James spinymussel on April 17, 2001. Survey methodology included wading using visual (view bucket) and tactile methods. No James spinymussels were found during this survey. No impacts to the James spinymussel are expected as a result of this project. NHP records do not document any James spinymussel populations within 3.0 miles (4.8 km) of the project study area as of April 8, 2003.

Smooth coneflower - Smooth coneflower is a rhizomatous perennial herb that grows up to 4.9 feet (1.5 m) tall from a vertical root stock. The stems are smooth, with few leaves. Mid-stem leaves have shorter stems or no stems and are smaller in size than the basal leaves. The rays of the flowers are light pink to purplish, usually drooping, and 2 to 3 inches (5 to 8 cm) long. Flower heads are usually solitary and flowering occurs from May through July (USFWS 1995)

The habitat of smooth coneflower is open woods, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line rights-of-way. Optimal sites are characterized by abundant sunlight and little competition in the herbaceous layer. Natural fires, as well as large herbivores, are part of the history of the vegetation in this species' range (USFWS 1995).

BIOLOGICAL CONCLUSION – NO EFFECT

The project study area contains what appeared to be potential habitat for the smooth coneflower; however, none were found during a species specific survey. Areas representing potential habitat were surveyed for smooth coneflower in May 2001 during the field investigation. No smooth coneflower plants were found within the project study area. This project will not impact any smooth coneflower populations. NHP records do not document any smooth coneflower populations within 3.0 miles (4.8 km) of the project study area as of April 8, 2003.

F.2. Federal Species of Concern

The February 25, 2003 USFWS list also includes a category of species designated as "Federal species of concern" (FSC). The FSC designation provides no federal protection under the ESA for the species listed. The presence of potential suitable habitat (Amoroso 1999, LeGrand *et al.* 2001) within the project study area has been evaluated for the FSC listed for Rockingham County and are listed in Table 5.

An updated NHP records search was performed on April 8, 2003. NHP records show no documentation of FSC species occurring within 3.0 miles (4.8 km) of the project study area.

F.3. State Protected Species

Plant and animal species which are on the North Carolina state list as Endangered (E), Threatened (T), or Special Concern (SC), receive limited protection under the North Carolina Endangered Species Act (G.S. 113-331 *et seq.*) and the North Carolina Plant Protection Act of 1979 (G.S. 106-202 *et seq.*). A freshwater mussel species, the notched rainbow (*Villosa constricta*), that is listed by the state as SC was found during the mussel survey conducted by NCDOT on April 2001.

Table 5
Federal Species of Concern (FSC) for Rockingham County

Common Name	Scientific Name	Potential Habitat	State Status*
Green Floater	*Lasmigona subviridis*	Y	E
Heller's trefoil	*Lotus helleri*	Y	SR-PT

Endangered (E) – any native or once-native species in danger of extinction throughout all or a significant portion of its range.
Threatened (T) - any native or once-native species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Proposed (P) – a species which has been formally proposed for listed as endangered, threatened, or special concern, but has not yet completed the legally mandated listing process.
Significantly Rare (SR) – species which are very rare, generally with 1-20 populations in the state, and generally reduced in numbers by habitat destruction.

VI. CULTURAL RESOURCES

A. Compliance Guidelines

This project is subject to compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, implemented by the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106, codified at 36 CFR Part 800. Section 106 requires Federal agencies to take into account the effect of their undertakings (federally funded, licensed, or permitted) on properties included in or eligible for inclusion in the National Register of Historic Places and to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. This project has been coordinated with the North Carolina State Historic Preservation Officer (SHPO) in accordance with the Advisory Council's regulations and FHWA procedures.

B. Historic Architecture

In their August 6, 2001, letter, the SHPO stated "We have conducted a search of our files and are aware of no structures of historical or architectural importance located within the planning area". Based on the SHPO's comments, no survey is required and compliance with Section 106 is complete. However, a survey had already been conducted and three properties were reviewed with the North Carolina State Historic Preservation Officer (SHPO) on August 30, 2001. All three properties were determined not eligible. A copy of the SHPO memorandum is included in the Appendix.

C. Archaeology

In their August 6, 2001, letter, the SHPO stated "There are no known archaeological sites within the proposed project area. Based on our present knowledge of the area, it is unlikely that any archaeological resources, which may be eligible for inclusion in the National Register of Historic Places, will be affected by the project construction. We, therefore recommend that no archaeological investigation be conducted in connection with this project." Based on the SHPO's comments, no survey is required and compliance with Section 106 is complete. A copy of the SHPO memorandum is included in the Appendix.

VII. ENVIRONMENTAL EFFECTS

The project is expected to have an overall positive impact. Replacement of inadequate bridges will result in safer traffic operations.

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

Replacement of Bridge No. 21 will not have an adverse effect on the quality of the human or natural environment with the use of the current North Carolina Department of Transportation standards and specifications.

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

No adverse impact on families or communities is anticipated. Right-of-way acquisition will be limited. No relocatees are expected with implementation of the proposed alternative.

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

In compliance with Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations) a review was conducted to determine whether minority or low-income populations were receiving disproportionately high and adverse human health and environmental impacts as a result of this project. The investigation determined the project would not disproportionately impact any minority or low-income populations.

The studied route does not contain any bicycle accommodations, nor is it a designated bicycle route; therefore, no bicycle accommodations have been included as part of this project.

This project has been coordinated with the United States Department of Agriculture, Natural Resources Conservation Service. The Farmland Protection Policy Act requires all federal agencies or their representatives to consider the potential impact to prime farmland for all land acquisition and construction projects. The NRCS has responded "Unfortunately, we regret to inform you that at this time we will not be able to complete the Farmland Conversion Impact rating form for the above project".

No publicly owned parks or recreational facilities, wildlife and waterfowl refuges, or historic sites of national, state or local significance in the immediate vicinity of the project will be impacted.

The proposed project will not require right-of-way acquisition or easement from any land protected under Section 4(f) of the Department of Transportation Act of 1966.

No adverse effects to air quality are expected to result from this project. This project is an air quality "neutral" project, so it is not required to be included in the regional emissions analysis (if applicable), and a project level CO analysis is not required. Since the project is located in an attainment area, 40 CFR Part 51 is not applicable. If vegetation or wood debris is disposed of by open burning, it shall be done in accordance with applicable local laws and regulations of the North Carolina State Implementation Plan (SIP) for air quality in compliance with 15 NCAC 2D.0520 and 1990 Clean Air Act Amendments and the

National Environmental Policy Act. This evaluation completes the assessment requirements for air quality, and no additional reports are required.

Ambient noise levels may increase during the construction of this project; however this increase will be only temporary and usually confined to daylight hours. There should be no notable change in traffic volumes after this project is complete. Therefore, this project will have no adverse effect on existing noise levels. Noise receptors in the project area will not be impacted by this project. This evaluation completes the assessment requirements for highway noise set forth in 23 CFR Part 772. No additional reports are required.

During the site visit, observation revealed no evidence of underground storage tanks or hazardous waste sites in the project area.

Rockingham County is a participant in the National Flood Insurance Regular Program. The project is located in a Detailed Study Area. The approximate 100-year floodplain in the project area is shown in Figure 11. There are no practical alternatives to crossing the floodplain area. The replacement structure is proposed as an in-kind replacement and in the absence of historical problems, increased flood impacts associated with this bridge replacement are not anticipated. All reasonable measures will be taken to minimize any possible harm.

Geotechnical borings for the bridge foundation will be necessary.

Based on the above discussion, it is concluded that no substantial adverse environmental impacts will result from the replacement of Bridge No. 21.

VIII. PUBLIC INVOLVEMENT

Due to the isolated nature of this bridge replacement project, no formal public involvement program was initiated. Efforts were undertaken early in the planning process (June 2001) to contact local officials to involve them in the project development with scoping letters.

IX. AGENCY COMMENTS

Agency comments were received during the scoping process and can be found in the Appendix.

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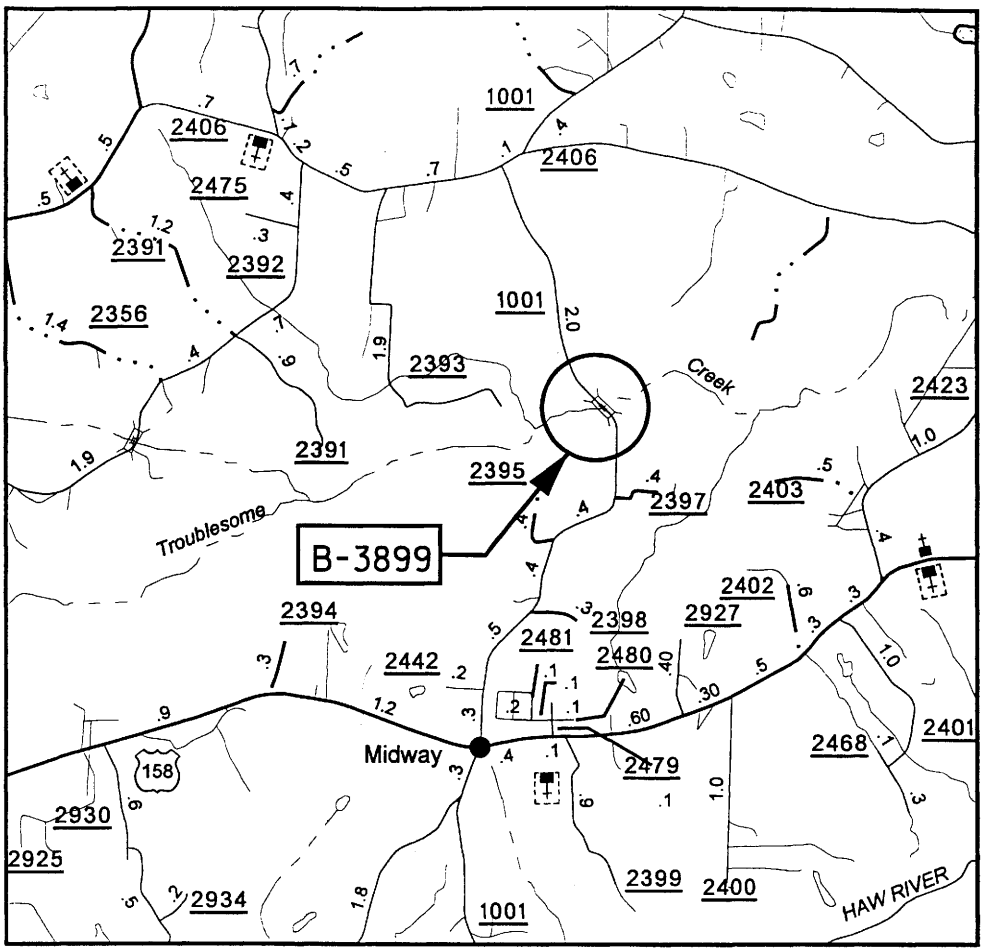
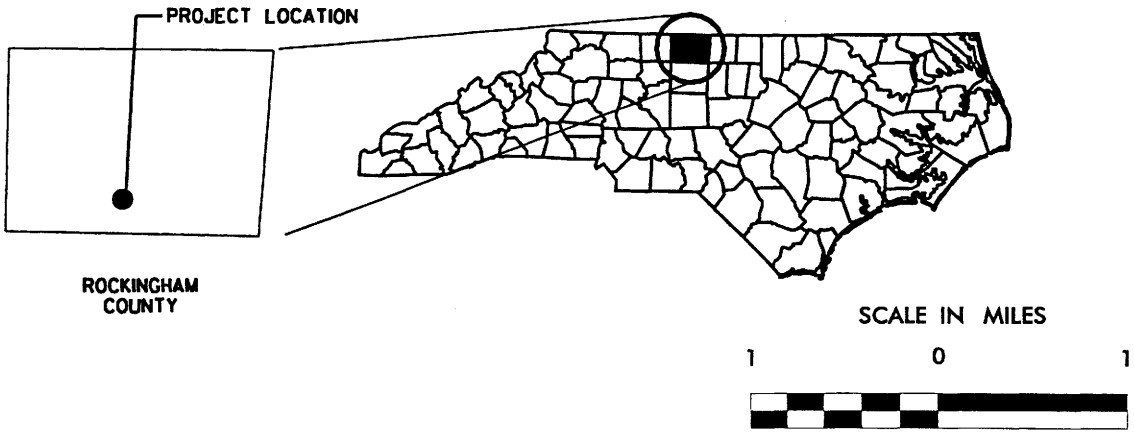
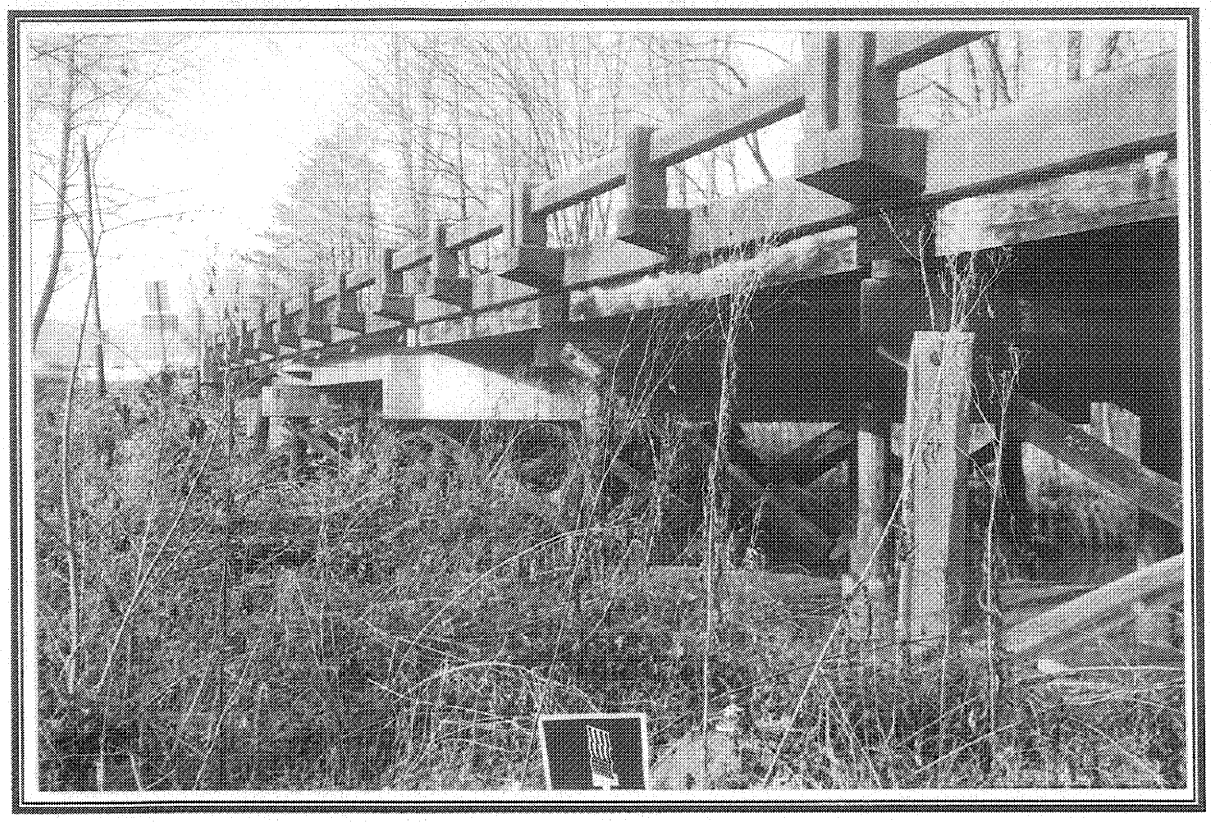
FIGURES



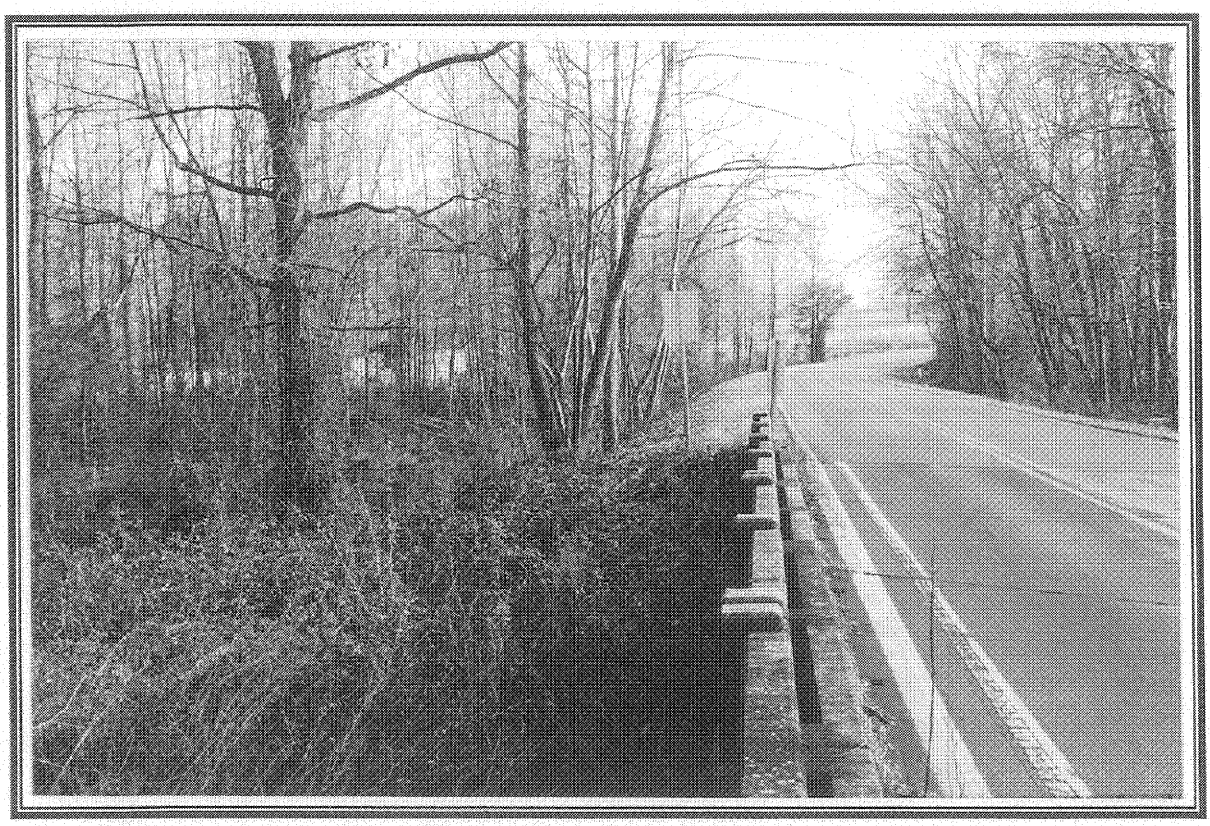


North Carolina Department of Transportation
Division of Highways
Project Development & Environmental Analysis Branch

FIGURE 1
AREA LOCATION MAP
BRIDGE NO. 21
ON SR 1001
OVER TROUBLESOME CREEK
ROCKINGHAM, NORTH CAROLINA
TIP PROJECT B-3899



LOOKING ALONG THE WEST SIDE OF BRIDGE NO. 21

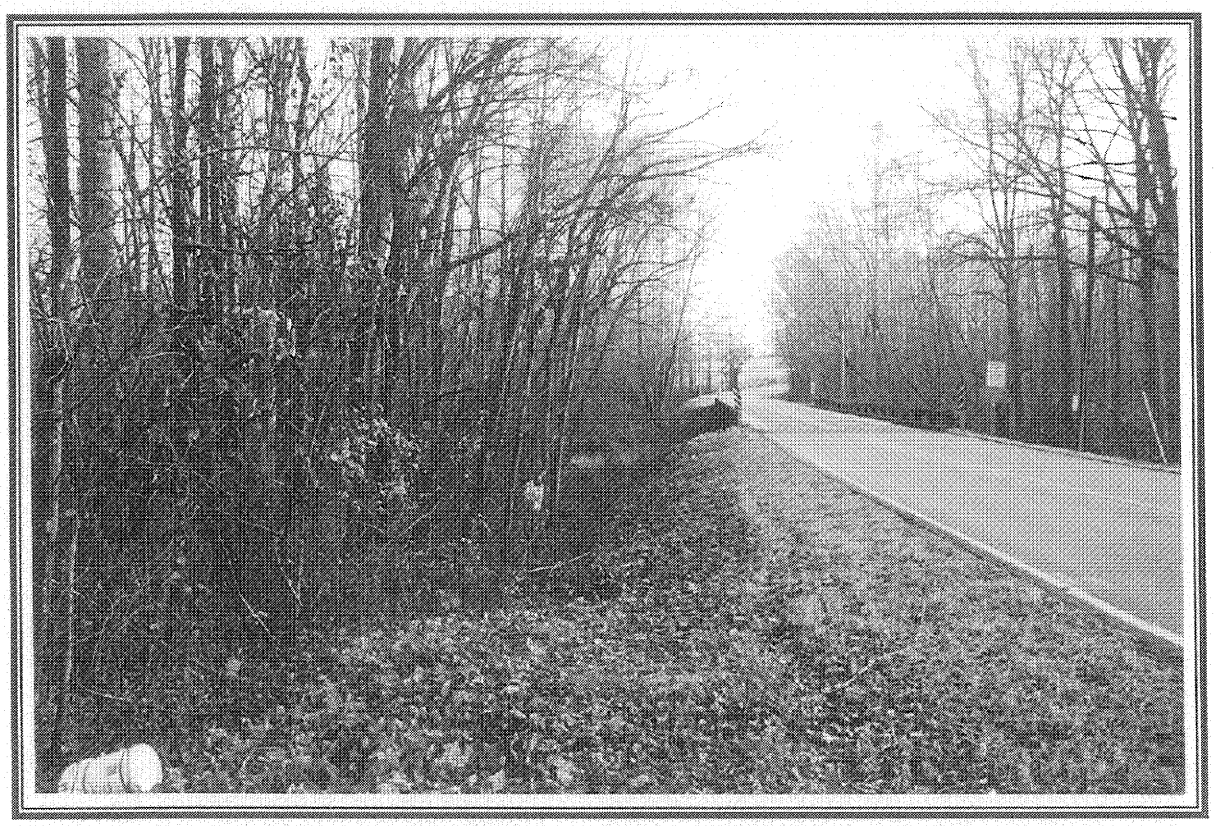


LOOKING ALONG THE EAST SIDE OF BRIDGE NO. 21

B-3899 ROCKINGHAM COUNTY
REPLACE BRIDGE NO. 21 OVER TROUBLESOME CREEK

FIGURE 2
PROJECT PHOTOGRAPHS

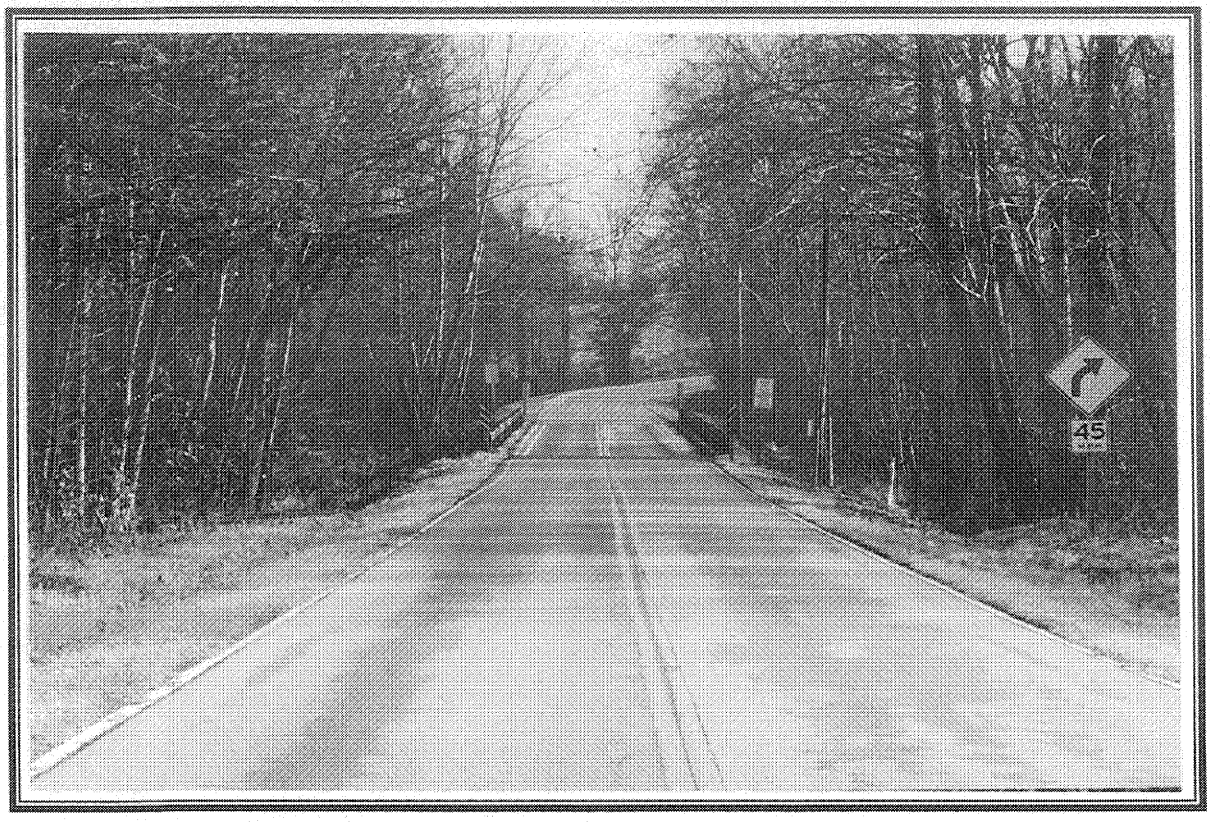
LOOKING ALONG THE WEST SIDE OF BRIDGE NO. 21



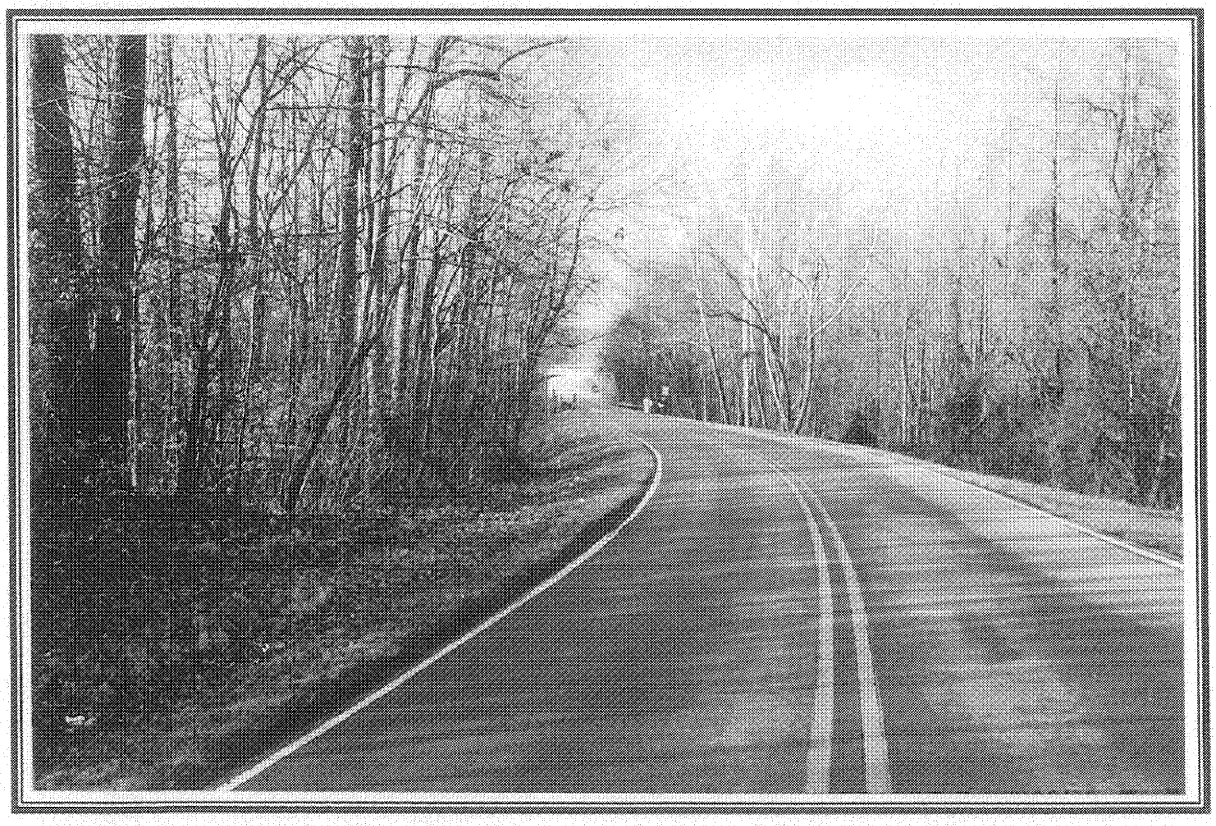
LOOKING ALONG THE EAST SIDE OF BRIDGE NO. 21

B-3899 ROCKINGHAM COUNTY
REPLACE BRIDGE NO. 21 OVER TROUBLESOME CREEK

FIGURE 3
PROJECT PHOTOGRAPHS



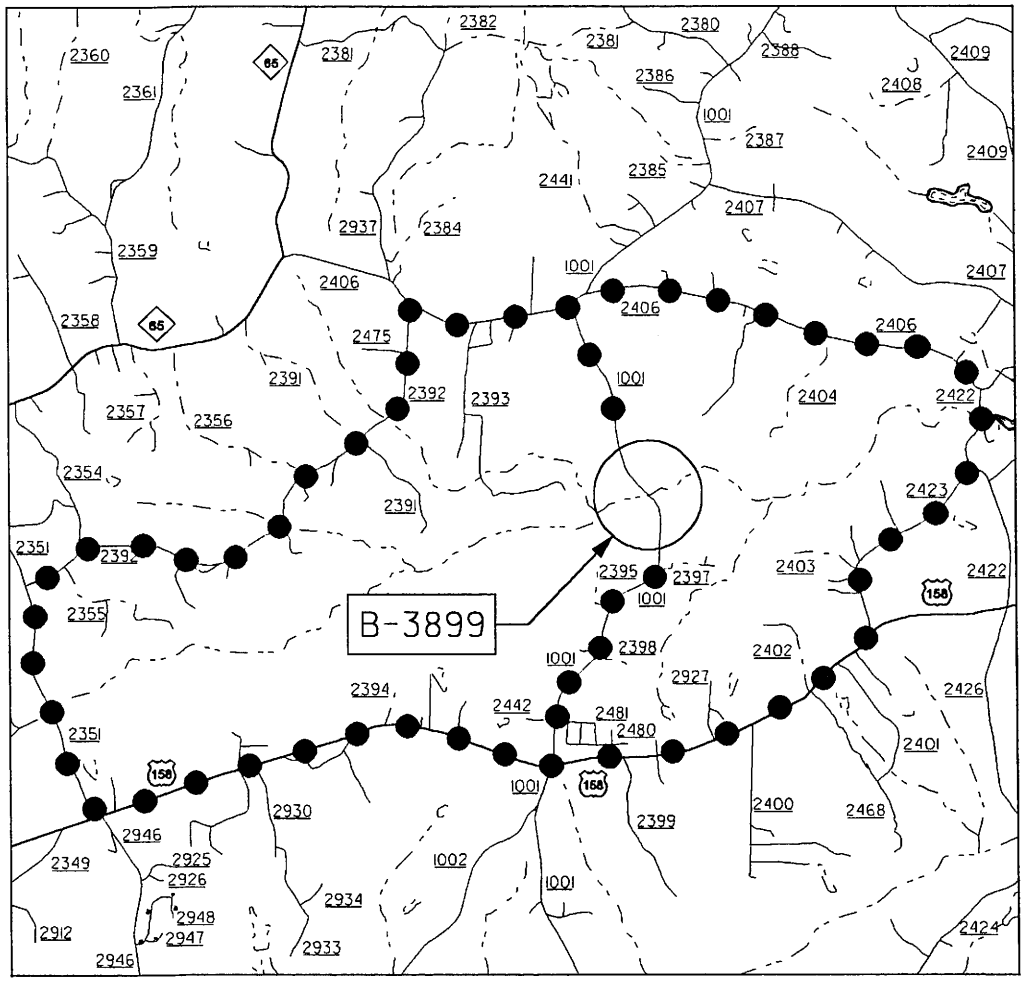
LOOKING ACROSS BRIDGE NO. 21 FROM THE SOUTH APPROACH



LOOKING ACROSS BRIDGE NO. 21 FROM THE SOUTH APPROACH

B-3899 ROCKINGHAM COUNTY
REPLACE BRIDGE NO. 21 OVER TROUBLESOME CREEK

FIGURE 4
PROJECT PHOTOGRAPHS



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

FIGURE 5
STUDIED OFF-SITE DETOURS
BRIDGE NO. 21
ON SR 1001
OVER TROUBLESOME CREEK
ROCKINGHAM COUNTY, NORTH CAROLINA
TIP PROJECT B-3899

PROJECT REFERENCE NO.	SHEET NO.
B-3899	
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

(REPLACE IN-PLACE WITH OFF-SITE DETOUR)
ALTERNATE A

NC MAP GRID 83

-ALTA- PC Sta. 8+50.00

N 14° 35' 18.3" W

EXISTING R/W

SR 1001 22' BST

GRAU 350

CURVE 1

-L- CURVE 1
PI Sta 13+60.43
Δ = 34° 04' 05.4" (LT)
D = 7° 00' 00.0"
L = 486.69'
T = 250.78'
R = 818.51'

-ALTA- CURVE 1
PI Sta 10+25.80
Δ = 24° 14' 38.2" (LT)
D = 7° 00' 00.0"
L = 346.34'
T = 175.80'
R = 818.51'

BEGIN PROJECT
-ALTA- POC STA 10+50.00 =
-L- POC STA 14+50.00

PT Sta. 11+96.34

BEGIN BRIDGE
-ALTA- STA 12+54.00

PROP. GUARDRAIL

END BRIDGE
-ALTA- STA 13+94.00

END PROJECT
-ALTA- POT STA 17+00.00 =
-L- POT STA 21+00.00

-ALTA-
N 48° 39' 23.7" W

TYPE XI

-L- CURVE 2
PI Sta 25+30.38
Δ = 20° 13' 39.7" (RT)
D = 3° 30' 00.0"
L = 577.93'
T = 292.01'
R = 1,637.02'

CURVE 2

10' (-ALTA-)

15' (-ALTA-)

TROUBLESOME CREEK

WOODS

FIELD

WLB

BW

RW

E

F

TYPICAL ROADWAY CROSS SECTION

TYPICAL BRIDGE CROSS SECTION

TYPICAL DETOUR BRIDGE CROSS SECTION

TYPICAL DETOUR ROADWAY CROSS SECTION

DESIGN CRITERIA

DESIGN SPEED	50 mph (80 km/h)
POSTED SPEED	45 mph (70 km/h)
CURRENT YEAR ADT (2000)	3300 vpd
DESIGN YEAR ADT (2025)	3900 vpd
% TTST, % DUALS	12, 2%
FUNCTIONAL CLASSIFICATION	Rural Minor Collector
TERRAIN	Rolling
MAX RADIUS	764 ft (233 m)
MAXIMUM GRADE	7% Rolling
SUPERELEVATION RATE	Se = 0.08

DETOUR DESIGN CRITERIA

DESIGN SPEED	40 mph (65 km/h)
MAX RADIUS	509 ft (155 m)
MAX GRADE	10%
SUPERELEVATION RATE	Se = 0.06

SCALE
50 0 50 100

FIGURE 6

(REPLACE IN-PLACE WITH ON-SITE DETOUR)
ALTERNATE B

PROJECT REFERENCE NO.	SHEET NO.
B-3899	
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

NC GRID NAD 83

BEGIN DETOUR
-ALTB- POC STA 10+00.00 =

-ALTA- PC Sta 8+50.00

-ALTB- PC STA 11+60.92

BEGIN PROJECT
-ALTA- POC STA 10+50.00 =
-L- POC STA 14+50.00

PT Sta. 11+96.34

BEGIN BRIDGE
-ALTA- STA 12+54.00

END BRIDGE
-ALTA- STA 13+94.00

END PROJECT
-ALTA- POT STA 17+00.00 =
-L- POT STA 21+00.00

-ALTB- PC STA 17+58.56

END DETOUR BRIDGE
-ALTB- STA 16+80.00

BEGIN DETOUR BRIDGE
-ALTB- STA 15+50.00

-ALTB- PT STA 15+01.61

-ALTB- PRC STA 19+28.93

END DETOUR
-ALTB- PT STA 20+83.81
-L- POT STA 21+69.45

10 (-ALTB-)
10 (-ALTA-)
15 (-ALTB-)
15 (-ALTA-)
20 (-ALTB-)

-ALTA-
N 48° 39' 23.7" W

-ALTB-
N 48° 39' 23.7" W

N 14° 35' 18.3" W

SR 1001 22' BST

GRAU 350

TYPE VI

TROUBLESOME CREEK

WOODS

FIELD

EXISTING R/W

-L- CURVE 1
PI Sta 13+60.43
Δ = 34° 04' 05.4" (LT)
D = 7° 00' 00.0"
L = 486.69'
T = 250.78'
R = 818.51'

-ALTA- CURVE 1
PI Sta 10+25.80
Δ = 24° 14' 38.2" (LT)
D = 7° 00' 00.0"
L = 346.34'
T = 175.80'
R = 818.51'

-ALTB- CURVE 1
PI Sta 13+36.47
Δ = 34° 04' 05.4" (LT)
D = 10° 00' 00.0"
L = 340.68'
T = 175.54'
R = 572.96'

-ALTB- CURVE 2
PI Sta 18+44.38
Δ = 17° 02' 12.0" (LT)
D = 10° 00' 00.0"
L = 170.37'
T = 85.82'
R = 572.96'

-ALTB- CURVE 3
PI Sta 20+06.94
Δ = 17° 02' 12.0" (RT)
D = 11° 00' 00.0"
L = 154.88'
T = 78.02'
R = 520.87'

-L- CURVE 2
PI Sta 25+30.38
Δ = 20° 13' 39.7" (RT)
D = 3° 30' 00.0"
L = 577.93'
T = 292.01'
R = 1,637.02'

DESIGN CRITERIA	
DESIGN SPEED	50 mph (80 km/h)
POSTED SPEED	45 mph (70 km/h)
CURRENT YEAR ADT (2000)	2200 vpd
DESIGN YEAR ADT (2025)	3300 vpd
% TTST, % DUALS	1%, 2%
FUNCTIONAL CLASSIFICATION	Rural Minor Collector
TERRAIN	Rolling
MIN. RADIUS	764 ft (233 m)
MAXIMUM GRADE	7% Rolling
SUPERELEVATION RATE	Se = 0.08

DETOUR DESIGN CRITERIA	
DESIGN SPEED	40 mph (65 km/h)
MIN. RADIUS	509 ft (155 m)
MAX. GRADE	9%
SUPERELEVATION RATE	Se = 0.06

SCALE
50 0 50 100

TYPICAL ROADWAY CROSS SECTION

TYPICAL BRIDGE CROSS SECTION

TYPICAL DETOUR BRIDGE CROSS SECTION

TYPICAL DETOUR ROADWAY CROSS SECTION

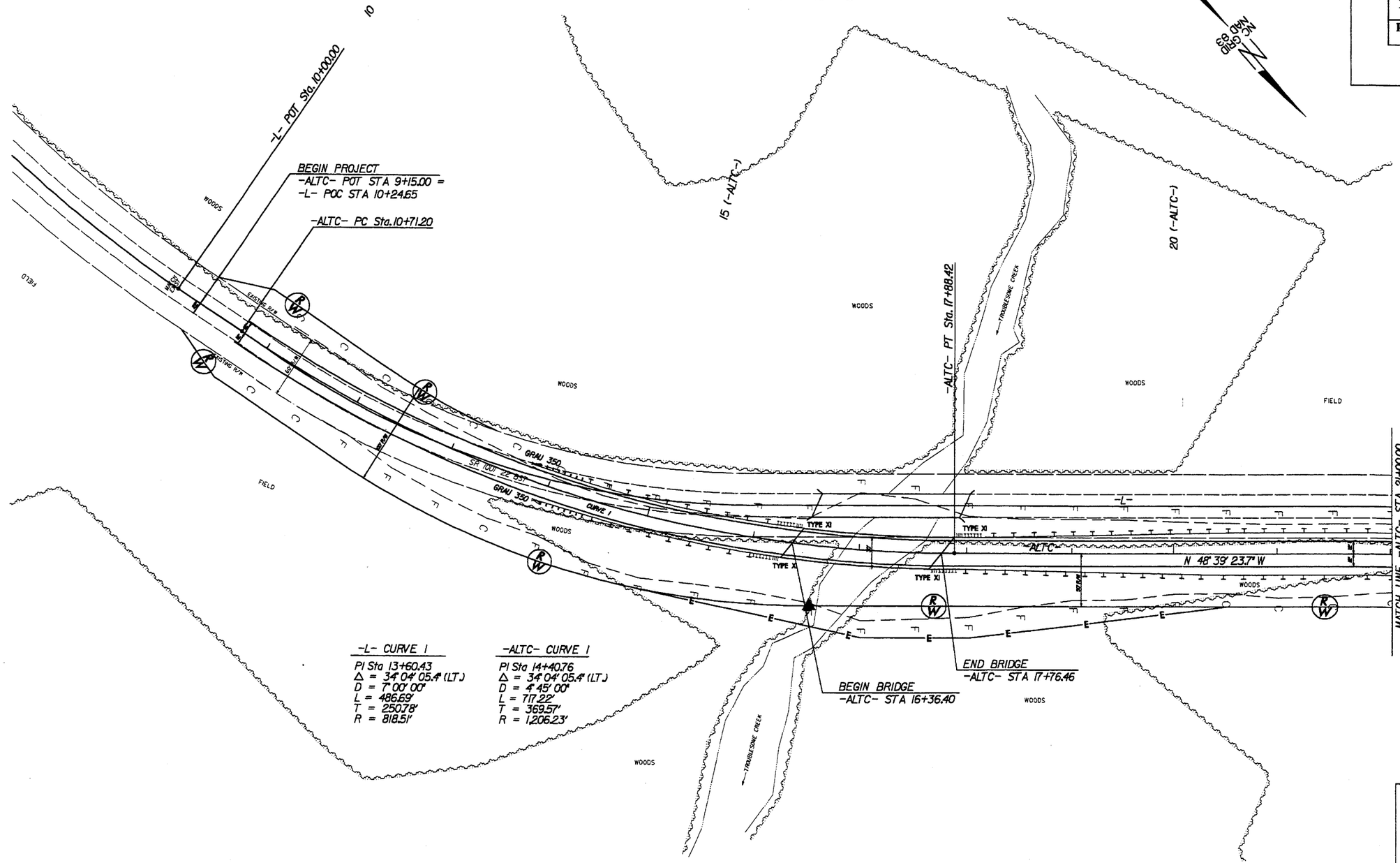
FIGURE 7

(NEW LOCATION EAST OF EXISTING BRIDGE)
ALTERNATE C

PROJECT REFERENCE NO.	SHEET NO.
B-3899	
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

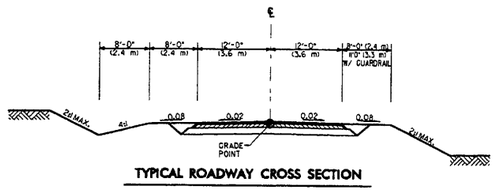


-L- CURVE 1

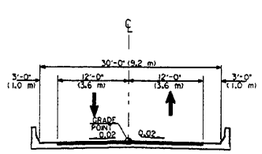
PI Sta 13+60.43
Δ = 34° 04' 05.4" (LT.)
D = 7° 00' 00"
L = 486.69'
T = 250.78'
R = 818.51'

-ALTC- CURVE 1

PI Sta 14+40.76
Δ = 34° 04' 05.4" (LT.)
D = 4° 45' 00"
L = 717.22'
T = 369.57'
R = 1,206.23'



TYPICAL ROADWAY CROSS SECTION



TYPICAL BRIDGE CROSS SECTION

DESIGN CRITERIA

DESIGN SPEED	50 mph (80 km/h)
POSTED SPEED	45 mph (70 km/h)
CURRENT YEAR ADT (2000)	2200 vpd
DESIGN YEAR ADT (2025)	3900 vpd
K TTST, % DUALS	7X, 2X
FUNCTIONAL CLASSIFICATION	Rural Minor Collector
TERRAIN	Rolling
MAX. RADIUS	764 ft (233 m)
MAXIMUM GRADE	7% Rolling
SUPERELEVATION RATE	Se = 0.08

SCALE
50 0 50 100

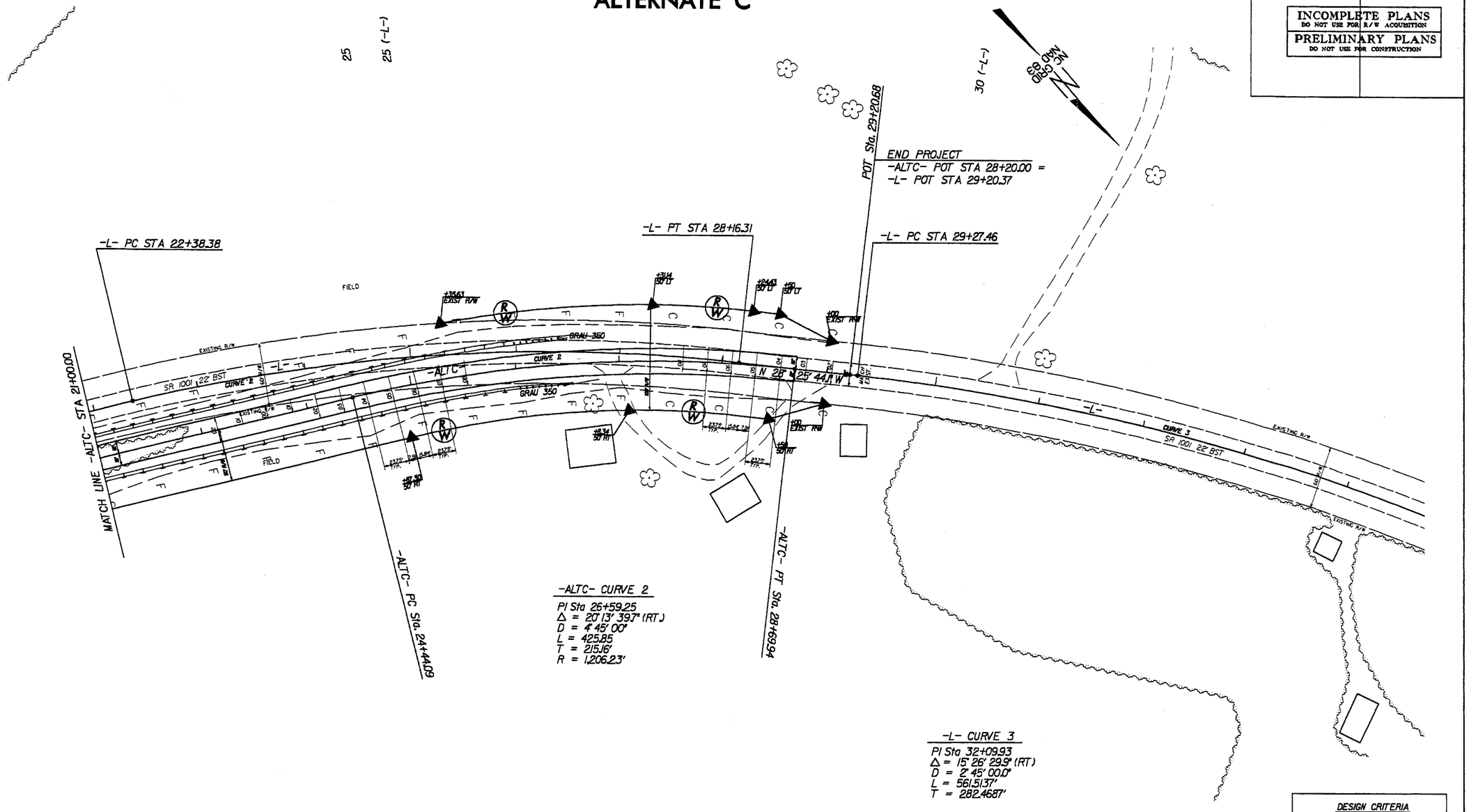
FIGURE 8A

(NEW LOCATION EAST OF EXISTING BRIDGE)
ALTERNATE C

PROJECT REFERENCE NO.	SHEET NO.
B-3899	
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

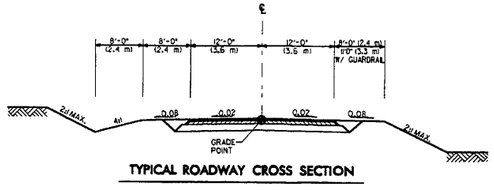


-ALTC- CURVE 2

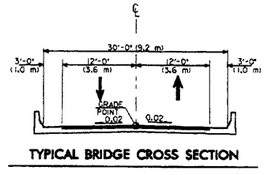
PI Sta 26+59.25
Δ = 20° 13' 39.7" (RT)
D = 4° 45' 00"
L = 425.85
T = 215.16'
R = 1,206.23'

-L- CURVE 3

PI Sta 32+09.93
Δ = 15° 26' 29.9" (RT)
D = 2° 45' 00.0"
L = 561.5137'
T = 282.4687'



TYPICAL ROADWAY CROSS SECTION



TYPICAL BRIDGE CROSS SECTION

DESIGN CRITERIA

DESIGN SPEED	50 mph (80 km/h)
POSTED SPEED	45 mph (70 km/h)
CURRENT YEAR ADT (2020)	6800 vpd
DESIGN YEAR ADT (2040)	9500 vpd
K TST X DUALS	12 - 2%
FUNCTIONAL CLASSIFICATION	Rural Minor Collector
TERRAIN	Rolling
MAX RADIUS	764 ft (233 m)
MAXIMUM GRADE	7% Desirable
SUPERELEVATION RATE	Se = 0.08

SCALE
50 0 50 100

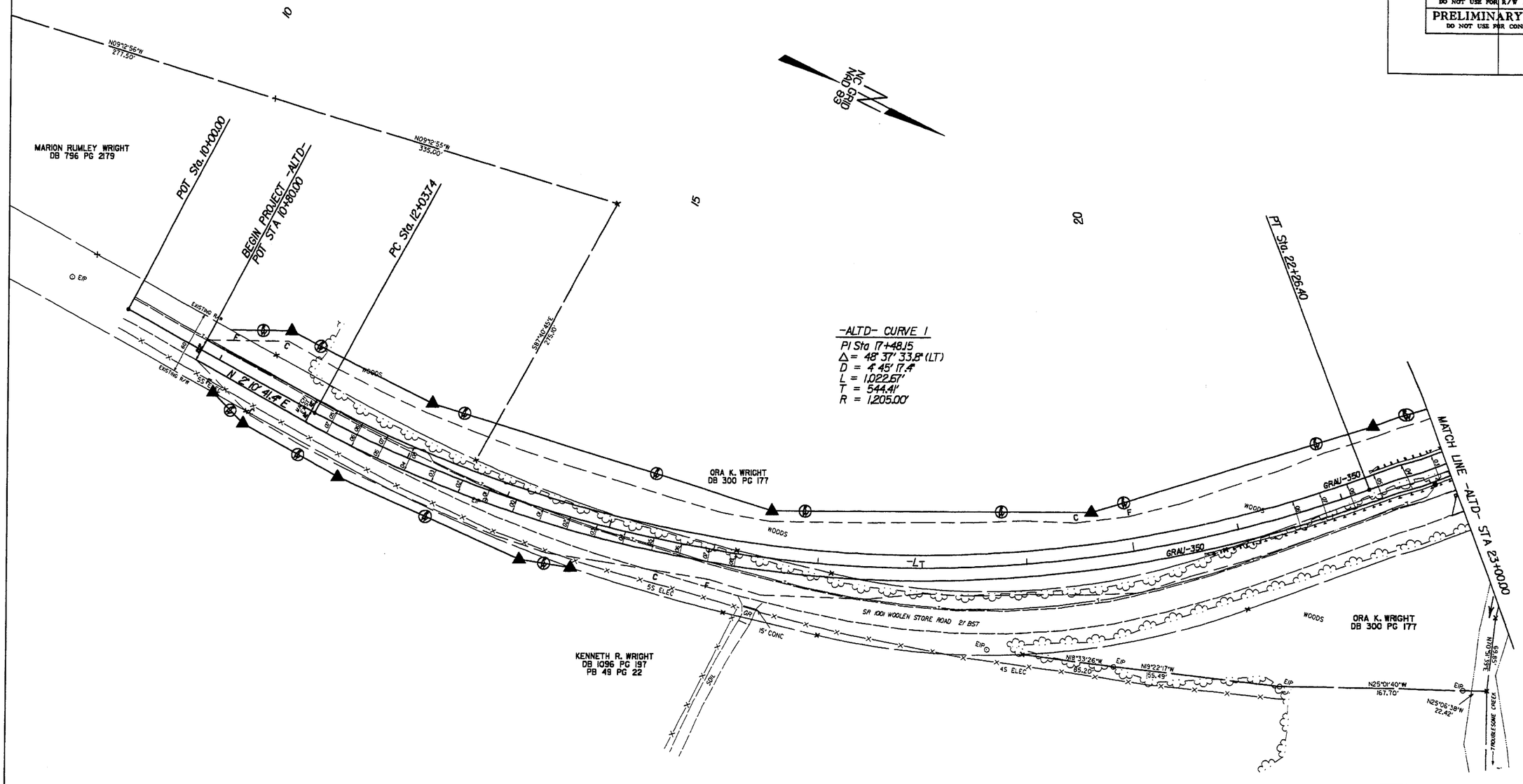
FIGURE 8B

(NEW LOCATION WEST OF EXISTING BRIDGE)
ALTERNATE D

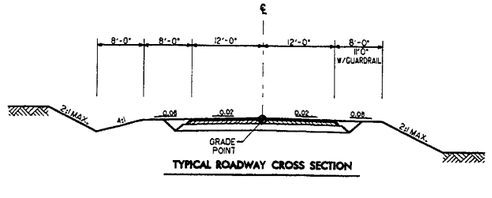
PROJECT REFERENCE NO.	SHEET NO.
B-3899	
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

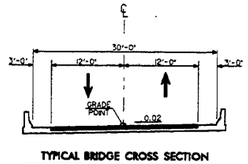
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-ALTD- CURVE 1
PI Sta 17+48.15
Δ = 48° 37' 33.8" (LT)
D = 4° 45' 17.4"
L = 1,022.67'
T = 544.41'
R = 1,205.00'



TYPICAL ROADWAY CROSS SECTION



TYPICAL BRIDGE CROSS SECTION

DESIGN CRITERIA	
DESIGN SPEED	60 mph (50 km/h)
POSTED SPEED	55 mph (85 km/h)
CURRENT YEAR ADT (2000)	2800 vpd
DESIGN YEAR ADT (2025)	3900 vpd
% TT'SV , % DUALS	12, 6%
FUNCTIONAL CLASSIFICATION	Rural Minor Collector
TERRAIN	Rolling
MAX. RADIUS	1205 ft (305 m)
MAXIMUM GRADE	6% Rolling
SUPERELEVATION RATE	Se = 0.08

FIGURE 9A

FOR -L- PROFILE SEE SHEET NO.6

SCALE
50 0 50 100

(NEW LOCATION WEST OF EXISTING BRIDGE)
ALTERNATE D

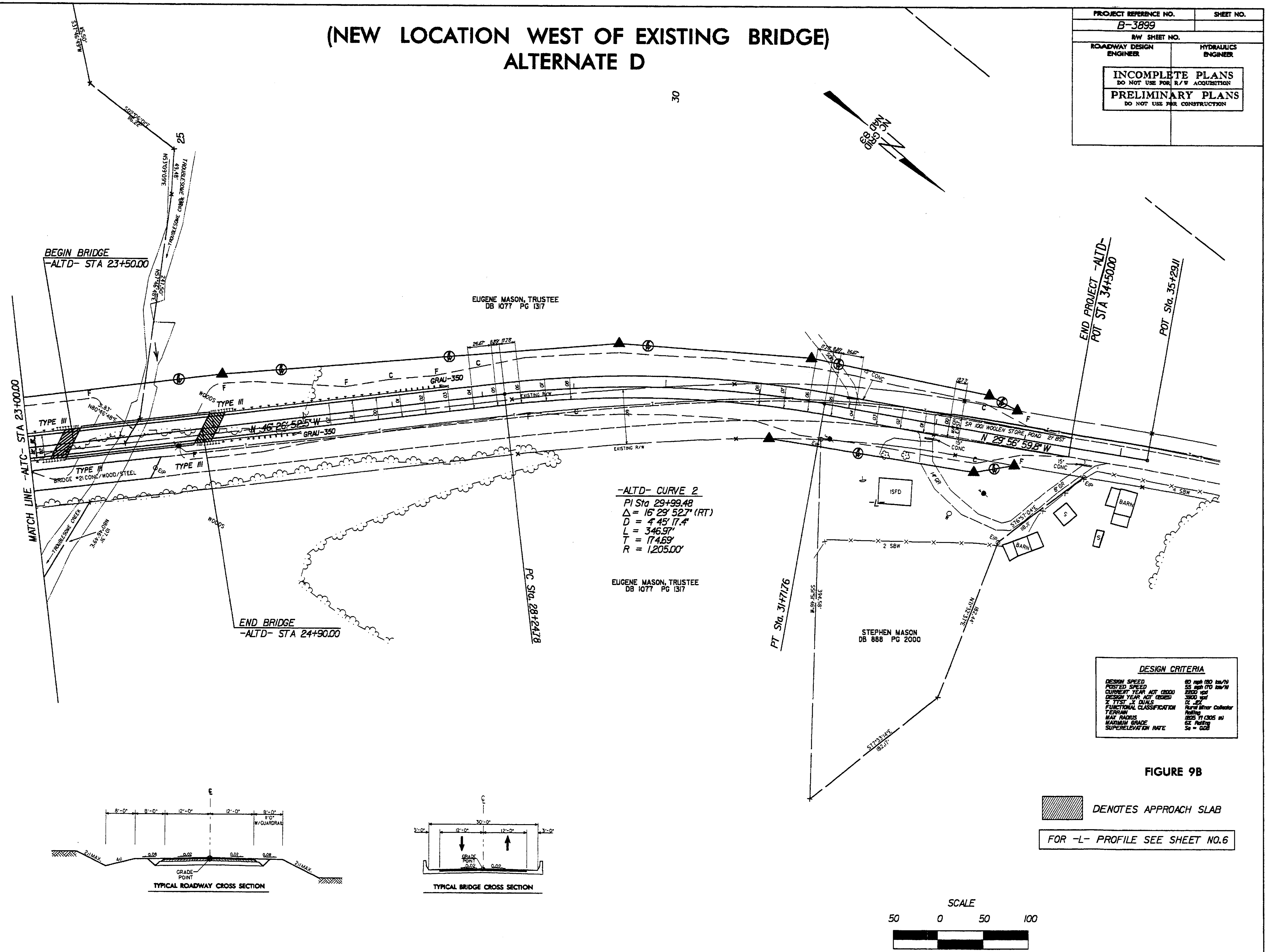
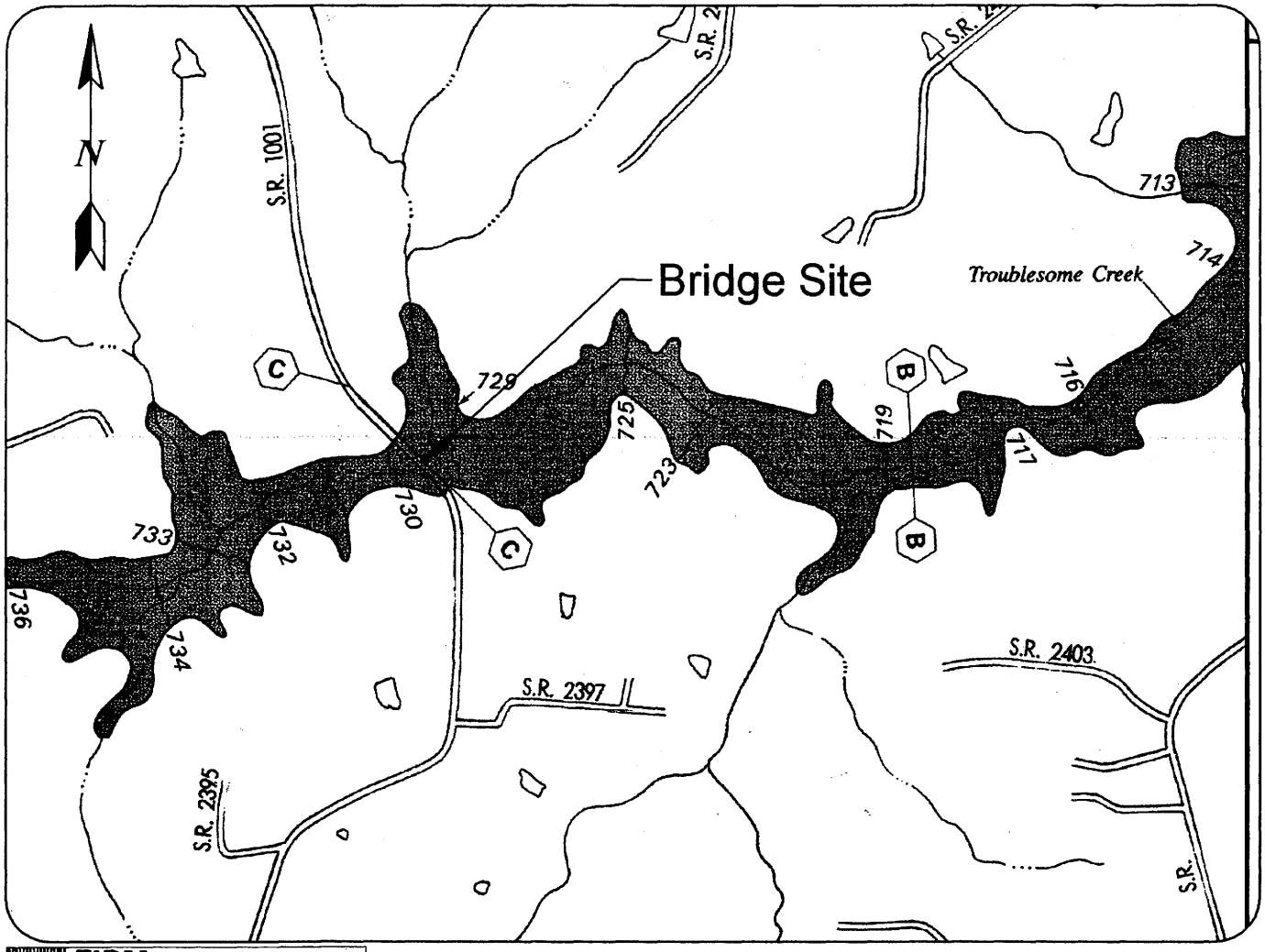


FIGURE 9B

SR 1001
Replace Bridge No. 21 over
Troublesome Creek
Rockingham County, North Carolina

Figure 10
Project Vicinity
TIP NO. B-3899



FIRM
FLOOD INSURANCE RATE MAP

ROCKINGHAM
COUNTY,
NORTH CAROLINA
(UNINCORPORATED AREAS)

PANEL 200 OF 225

COMMUNITY–PANEL NUMBER:
370350 0200 B
EFFECTIVE DATE:
MAY 15, 1991

Federal Emergency Management Agency

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

SR 1001
Replace Bridge No. 21
over Troublesome Creek
Rockingham County, North Carolina

TIP NO. B-3899
FEMA 100-YEAR FLOOD PLAIN MAP

Not to Scale

FIGURE 11

APPENDIX

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

August 9, 2001

Mr. William D. Gilmore, P.E., Manager
NCDOT
Project Development and Environmental Analysis Branch
1548 Mail Service Center
Raleigh, North Carolina 27699-1548

Dear Mr. Gilmore:

Thank you for your June 21, 2001 request for information from the U.S. Fish and Wildlife Service (Service) on the potential environmental impacts of the proposed replacement of Bridge No. 21 on SR 1001 over Troublesome Creek, Rockingham County, North Carolina (TIP No. 3899). This report provides scoping information and is provided in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661-667d) and Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543). This report also serves as initial scoping comments to federal and state resource agencies for use in their permitting and/or certification processes for this project.

The following recommendations are provided to assist you in your planning process and to facilitate a thorough and timely review of the project.

Generally, the Service recommends that wetland impacts be avoided and minimized to the maximum extent practical as outlined in Section 404 (b)(1) of the Clean Water Act Amendments of 1977. In regard to avoidance and minimization of impacts, we recommend that proposed highway projects be aligned along or adjacent to existing roadways, utility corridors, or previously developed areas in order to minimize habitat fragmentation and encroachment. Areas exhibiting high biodiversity or ecological value important to the watershed and region should be avoided. Crossings of streams and associated wetland systems should use existing crossings and/or occur on a structure wherever feasible. Where bridging is not feasible, culvert structures that maintain natural water flows and hydraulic regimes without scouring, or impeding fish and wildlife passage, should be employed. Highway shoulder and median widths should be reduced through wetland areas. Roadway embankments and fill areas should be stabilized by using appropriate erosion control devices and techniques. Wherever appropriate, construction in sensitive areas should occur outside fish spawning and migratory bird nesting seasons.

The National Wetlands Inventory (NWI) map of the Bethany 7.5 Minute Quadrangle shows wetland resources in the specific work area. However, while the NWI maps are useful for providing an overview of a given area, they should not be relied upon in lieu of a detailed wetland delineation by trained personnel using an acceptable wetland classification methodology. Therefore, in addition to the above guidance, we recommend that the environmental documentation for this project include the following in sufficient detail to facilitate a thorough review of the action.

1. The extent and acreage of waters of the U.S., including wetlands, that are to be impacted by filling, dredging, clearing, ditching, or draining. Acres of wetland impact should be differentiated by habitat type based on the wetland classification scheme of the National Wetlands Inventory. Wetland boundaries should be determined by using the 1987 Corps of Engineers Wetlands Delineation Manual and verified by the U.S. Army Corps of Engineers (Corps).

2. If unavoidable wetland impacts are proposed, we recommend that every effort be made to identify compensatory mitigation sites in advance. Project planning should include a detailed compensatory mitigation plan for offsetting unavoidable wetland impacts. Opportunities to protect mitigation areas in perpetuity, preferably via conservation easement, should be explored at the outset.

The document presents a number of scenarios for replacing each bridge, ranging from in-place to relocation, with on-site and off-site detours. The Service recommends that each bridge be replaced on the existing alignment with an off-site detour.

The enclosed list identifies the federally-listed endangered and threatened species, and Federal Species of Concern (FSC) that are known to occur in Rockingham County. The Service recommends that habitat requirements for the listed species be compared with the available habitats at the respective project sites. If suitable habitat is present within the action area of the project, biological surveys for the listed species should be performed. Environmental documentation that includes survey methodologies, results, and NCDOT's recommendations based on those results, should be provided to this office for review and comment.

FSC's are those plant and animal species for which the Service remains concerned, but further biological research and field study are needed to resolve the conservation status of these taxa. Although FSC's receive no statutory protection under the ESA, we would encourage the NCDOT to be alert to their potential presence, and to make every reasonable effort to conserve them if found. The North Carolina Natural Heritage Program should be contacted for information on species under state protection.

The Service appreciates the opportunity to comment on this project. Please continue to advise us during the progression of the planning process, including your official determination of the impacts of this project. If you have any questions regarding these comments, please contact Tom McCartney at 919-856-4520, Ext. 32.

Sincerely,

Garland B. Pardue

Dr. Garland B. Pardue
Ecological Services Supervisor

Enclosure

cc: COE, Raleigh, NC (Eric Alsmeyer)
NCDWQ, Raleigh, NC (John Hennessy)
NCDNR, Creedmoor, NC (David Cox)

FWS/R4:TMcCartney:TM:08/08/01:919/856-4520 extension 32:\brdg#21r.ock

COMMON NAME	SCIENTIFIC NAME	STATUS
Southern hognose snake	*Heterodon simus*	FSC
Red-cockaded woodpecker	*Picoides borealis*	Endangered
Carolina gopher frog	*Rana capito capito*	FSC
Vascular Plants		
Georgia indigo-bush	*Amorpha georgiana* var. *georgiana*	FSC*
Sandhills milkvetch	*Astragalus michauxii*	FSC*
Venus flytrap	*Dionaea muscipula*	FSC
Dwarf burhead	*Echinodorus parvulus*	FSC
Bog spicebush	*Lindera subcoriacea*	FSC
Carolina bogmint	*Macbridea caroliniana*	FSC
Awned meadowbeauty	*Rhexia aristosa*	FSC
Michaux's sumac	*Rhus michauxii*	Endangered
ROCKINGHAM COUNTY		
Vascular Plants		
Smooth coneflower	*Echinacea laevigata*	Endangered
Heller's trefoil	*Lotus helleri*	FSC
ROWAN COUNTY		
Vertebrates		
Bald eagle	*Haliaeetus leucocephalus*	Threatened
Vascular Plants		
Georgia aster	*Aster georgianus*	FSC
Schweinitz's sunflower	*Helianthus schweinitzii*	Endangered
Virginia quillwort	*Isoetes virginica*	FSC
Heller's trefoil	*Lotus helleri*	FSC
RUTHERFORD COUNTY		
Vertebrates		
Green salamander	*Aneides aeneus*	FSC
Cerulean warbler	*Dendroica cerulea*	FSC
Peregrine falcon	*Falco peregrinus anatum*	Endangered
Eastern small-footed myotis	*Myotis leibii*	FSC
Indiana bat	*Myotis sodalis*	Endangered
Southern Appalachian woodrat	*Neotoma floridana haematoreia*	FSC
Northern pine snake	*Pituophis melanoleucus melanoleucus*	FSC
Vascular Plants		
Dwarf-flowered heartleaf	*Hexastylis naniflora*	Threatened
Butternut	*Juglans cinerea*	FSC
Sweet pinesap	*Monotropsis odorata*	FSC
Carolina saxifrage	*Saxifraga caroliniana*	FSC
Divided-leaf ragwort	*Senecio millefolium*	FSC

North Carolina Wildlife Resources Commission

Charles R. Fullwood, Executive Director

TO: Theresa Ellerby
Project Development Engineer, NCDOT

FROM: David Cox, Highway Project Coordinator
Habitat Conservation Program

DATE: October 8, 2001

SUBJECT: NCDOT Bridge Replacements in Rockingham County of North Carolina. TIP No. B-3899.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Project specific comments:

1. B-3899 – Rockingham County – Bridge No. 21 over Troublesome Creek. Standard comments apply. We are not aware of any threatened of endangered species in the project vicinity.

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

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

Michael F. Easley
Governor

William G. Ross, Jr., Secretary
Department of Environment and Natural Resources

Kerr T. Stevens
Division of Water Quality

July 18, 2001

MEMORANDUM

TO: Ms. Theresa Ellerby, Project Development Engineer
NCDOT, Project Development & Environmental Analysis

THROUGH: John R. Dorney, NC Division of Water Quality

FROM: Cynthia F. Van Der Wiele, NCDOT Coordinator

SUBJECT: Review of Scoping Sheets for Replacement of Bridge No. 21 on SR 1001 over Troublesome Creek, Rockingham County; Federal Aid No. BRZ-1001(23), State Project No. 8.2511201, TIP No. B-3899.

In reply to your correspondence dated June 21, 2001 (with vicinity map received July 9, 2001) in which you requested comments for the referenced project, preliminary analysis of the project reveals that Troublesome Creek [16-6-(0.3)] is rated as WS-III NSW; however, it may lie within the critical area, but was not able to be determined with the vicinity map provided. The Division of Water Quality requests that NCDOT consider the following environmental issues for the proposed project:

A. DWQ prefers replacement of bridges with bridges, particularly in higher quality waters (i.e. trout streams, water supply watersheds, high quality and outstanding resource waters). However, if the new structure is to be a culvert, it should be countersunk to allow unimpeded fish and other aquatic organisms passage through the crossing. Please be aware that floodplain culverts are required.

B. The document should provide a detailed and itemized presentation of the proposed impacts to wetlands and streams with corresponding mapping.

C. There should be a discussion on mitigation plans for unavoidable impacts. If mitigation is required, it is preferable to present a conceptual (if not finalized) mitigation plan with the environmental documentation. While the NCDWQ realizes that this may not always be practical, it should be noted that for projects requiring mitigation, appropriate mitigation plans will be required prior to issuance of a 401 Water Quality Certification.

D. Since the impacted water is classified as WS-III NSW and may lie within the critical area, the DWQ requests that DOT strictly adhere to North Carolina regulations entitled, "Design Standards in Sensitive Watersheds" (15A NCAC 04B .0024) throughout design and construction of the project. This would apply for any area that drains to streams having a WS (Water Supply) classification. In addition, stormwater and buffer requirements specific to WS-III waters are applicable [15A NCAC 2B .0215]. You should be aware that local communities may have their own requirements in regards to water supply watershed buffers, stormwater and sedimentation and erosion control.

E. When practical, the DWQ requests that bridges be replaced on the existing location with road closure. If a detour proves necessary, remediation measures in accordance with the NCDWQ

requirements for General 401 Certification 2726/Nationwide Permit No. 33 (Temporary Construction, Access and Dewatering) must be followed.

F. If applicable, DOT should not install the bridge bents in the creek, to the maximum extent practicable.

G. Wetland and stream impacts should be avoided (including sediment and erosion control structures/measures) to the maximum extent practical. If this is not possible, alternatives that minimize wetland impacts should be chosen. Mitigation for unavoidable impacts will be required by DWQ for impacts to wetlands in excess of one acre and/or to streams in excess of 150 linear feet.

H. Borrow/waste areas should not be located in wetlands. It is likely that compensatory mitigation will be required if wetlands are impacted by waste or borrow.

I. If foundation test borings are necessary; it should be noted in the document. Geotechnical work is approved under General 401 Certification Number 3027/Nationwide Permit No. 6 for Survey Activities.

J. In accordance with the NCDWQ Wetlands Rules {15A NCAC 2H.0506(b)(6)}, mitigation will be required for impacts of greater than 150 linear feet to any single perennial stream. In the event that mitigation becomes required, the mitigation plan should be designed to replace appropriate lost functions and values. In accordance with the NCDWQ Wetlands Rules {15A NCAC 2H.0506 (h)(3)}, the Wetland Restoration Program may be available for use as stream mitigation.

K. Sediment and erosion control measures should not be placed in wetlands.

L. The 401 Water Quality Certification application will need to specifically address the proposed methods for stormwater management. More specifically, stormwater should not be permitted to discharge directly into the creek. Instead, stormwater should be designed to drain to a properly designed stormwater detention facility/apparatus.

M. While the use of National Wetland Inventory (NWI) maps and soil surveys is a useful office tool, their inherent inaccuracies require that qualified personnel perform onsite wetland delineations prior to permit approval.

Thank you for requesting our input at this time. The DOT is reminded that issuance of a 401 Water Quality Certification requires that appropriate measures be instituted to ensure that water quality standards are met and designated uses are not degraded or lost. If you have any questions or require additional information, please contact Cynthia Van Der Wiele at (919) 733.5715.

Pc: Eric Alsmeyer, USACE Raleigh Field Office
Marella Buncick, USFWS
Maryellen Haggard, NCWRC
Jeff Coutu, DWQ
Central Files
File Copy

Theresa Ellerby

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

Michael F. Easley, Governor
Lisbeth C. Evans, Secretary

Division of Archives and History
Jeffrey J. Crow, Director

August 6, 2001

MEMORANDUM

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

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

Re: Replace Bridge No. 21 on SR 1001 over Troublesome Creek, B-3899, Rockingham County, ER 01-10079

Thank you for your memorandum of June 21, 2001, concerning the above project.

We have conducted a search of our files and are aware of no structures of historical or architectural importance located within the planning area.

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

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

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

DB:kgc

cc: John Wadsworth, FHwA
T. Padgett, NCDOT

Federal Aid # BRZ-1001(23) *TIP* # B-3899 *County*: Rockingham

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

Project Description: Replace Bridge No. 21 on SR 1001 over Troublesome Creek

On 8/29/2001 8/30/2001, representatives of the

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

Reviewed the subject project at

- [ ] Scoping meeting
- [x] Historic architectural resources photograph review session/consultation
- [ ] Other

All parties present agreed

- [ ] There are no properties over fifty years old within the project's area of potential effects.
- [x] There are no properties less than fifty years old which are considered to meet Criteria Consideration G within the project's area of potential effects.
- [x] AM HF There are properties over fifty years old within the project's Area of Potential Effects (APE), but based on the historical information available and the photographs of each property, the properties identified as Properties 1-3 are considered not eligible for the National Register and no further evaluation of them is necessary.
- [x] There are no National Register-listed or Study Listed properties within the project's area of potential effects.
- [x] All properties greater than 50 years of age located in the APE have been considered at this consultation, and based upon the above concurrence, all compliance for historic architecture with Section 106 of the National Historic Preservation Act and GS 121-12(a) has been completed for this project.
- [x] There are no historic properties affected by this project. (*Attach any notes or documents as needed*)

Signed:

Representative, NCDOT — Date 8/30/01

FHWA, for the Division Administrator, or other Federal Agency — Date 9/7/01

Representative, HPO — Date 8/30/01

State Historic Preservation Officer — Date 8/30/01

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

B-3699

U.S. ARMY CORPS OF ENGINEERS

Wilmington District

Action ID: 200121176 County: Rockingham

Notification of Jurisdictional Determination

Property owner: North Carolina Department of Transportation
Attn: Mr. William D. Gilmore, P.E., Manager
Project Development and Environmental Analysis Branch
1548 Mail Service Center
Raleigh, North Carolina 27699-1548
Telephone Number: (919) 733-3141
Size and Location of Property (waterbody, Highway name/number, town, etc.): Bridge No. 21 on SR 1001, north of NC Highway 158, southwest of Reidsville, North Carolina. The property is located adjacent to, and below the headwaters of, Troublesome Creek.
Indicate which of the following apply:

* There are wetlands on the above described property which we strongly suggest should be surveyed. The surveyed wetland lines must be verified by our staff before the Corps will make a final jurisdictional determination on your property.
* Because of the size of your property and our present workload, our identification and delineation of your wetlands cannot be accomplished in a timely manner. You may wish to employ a consultant to obtain a more timely delineation of the wetlands. Once your consultant has flagged a wetland line on the property, Corps staff will review it, and, if it is accurate, we strongly recommend that you have the line surveyed for final approval by the Corps. The Corps will not make a final jurisdictional determination on your property without an approved survey.

XX* The wetlands on your lot have been delineated, and the limits of Corps jurisdiction have been explained to you. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

* There are no wetlands present on the above described property which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

Placement of dredged or fill material in wetlands on this property without a Department of the Army permit is in most cases a violation of Section 301 of the Clean Water Act (33 USC 1311). A permit is not required for work on the property restricted entirely to existing high ground. If you have any questions regarding the Corps of Engineers regulatory program, please contact Jean B. Manuele at (919) 876-8441, Extension 24

Project Manager Signature: Jean B. Manuele

Date: 9 October 2001 Expiration Date: 9 October 2006

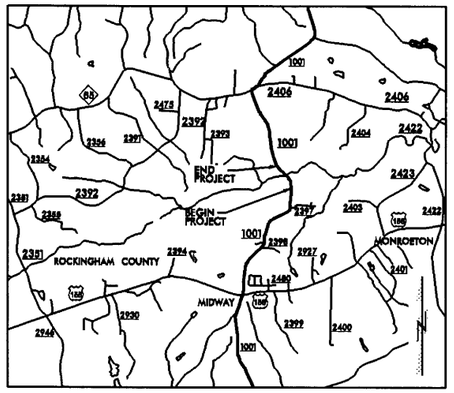
SURVEY PLAT OR FIELD SKETCH OF DESCRIBED PROPERTY AND THE WETLAND DELINEATION FORM MUST BE ATTACHED TO THE YELLOW (FILE) COPY OF THIS FORM.

09/08/99

TIP PROJECT: B-3899

CONTRACT #

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



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ROCKINGHAM COUNTY

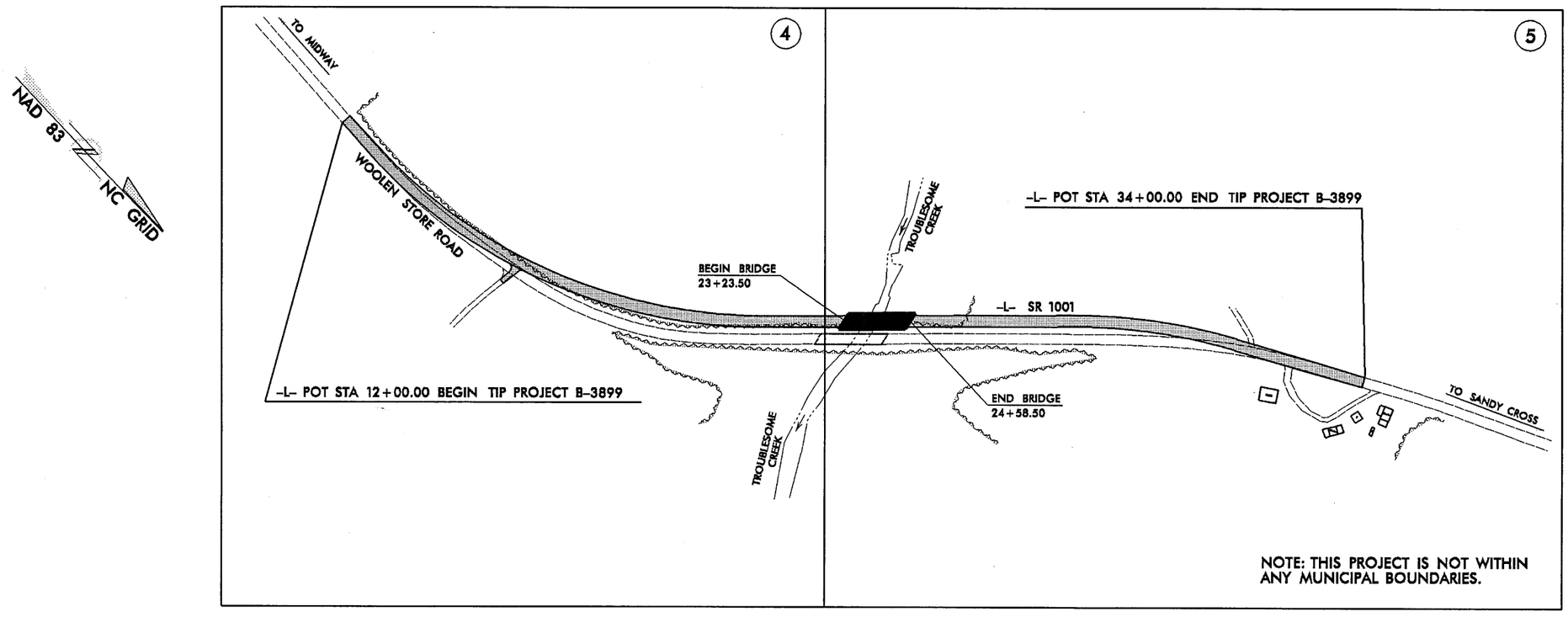
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3899	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
33335.1.1	BRZ-1001(23)	P.E.
33335.2.2	BRZ-1001(23)	R/W & UTIL.

LOCATION: REPLACE BRIDGE NO. 21 AND APPROACHES ON SR 1001 (WOOLEN STORE ROAD) OVER TROUBLESOME CREEK

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

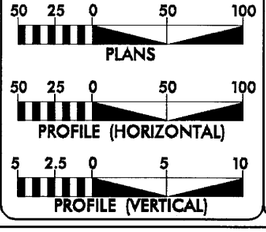
SUBMITTAL: R/W PLANS



NOTE: CLEARING OF THIS PROJECT SHALL BE PERFORMED TO LIMITS ESTABLISHED BY METHOD III.

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES



DESIGN DATA

ADT 2005 = 2,484
ADT 2025 = 3,900
DHV = 13 %
D = 60 %
T = 3 % *
V = 55 MPH

* TTST 1 % DUAL 2 %

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-3899	=	0.391 mi
LENGTH STRUCTURE TIP PROJECT B-3899	=	0.026 mi
TOTAL LENGTH OF TIP PROJECT B-3899	=	0.417 mi

Plans prepared in the office of:

Ramey Kemp & Associates, Inc.
Transportation Consulting Engineers

Ramey Kemp & Associates, Inc.
4928-A Windy Hill Drive
Raleigh, North Carolina 27609
(919) 872-585 fax (919) 878-5416

for the North Carolina Department of Transportation

1995 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MARCH 19, 2004

LETTING DATE:
MARCH 15, 2005

N.C.D.O.T. CONTACT:
VIRGINIA MABRY
PROJECT DESIGN ENGINEER
DESIGN SERVICES

HYDRAULICS ENGINEER

P.E.
JAMES A. BYRD, P.E.

ROADWAY DESIGN ENGINEER

P.E.
MICHAEL A. YOUNG, P.E.

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

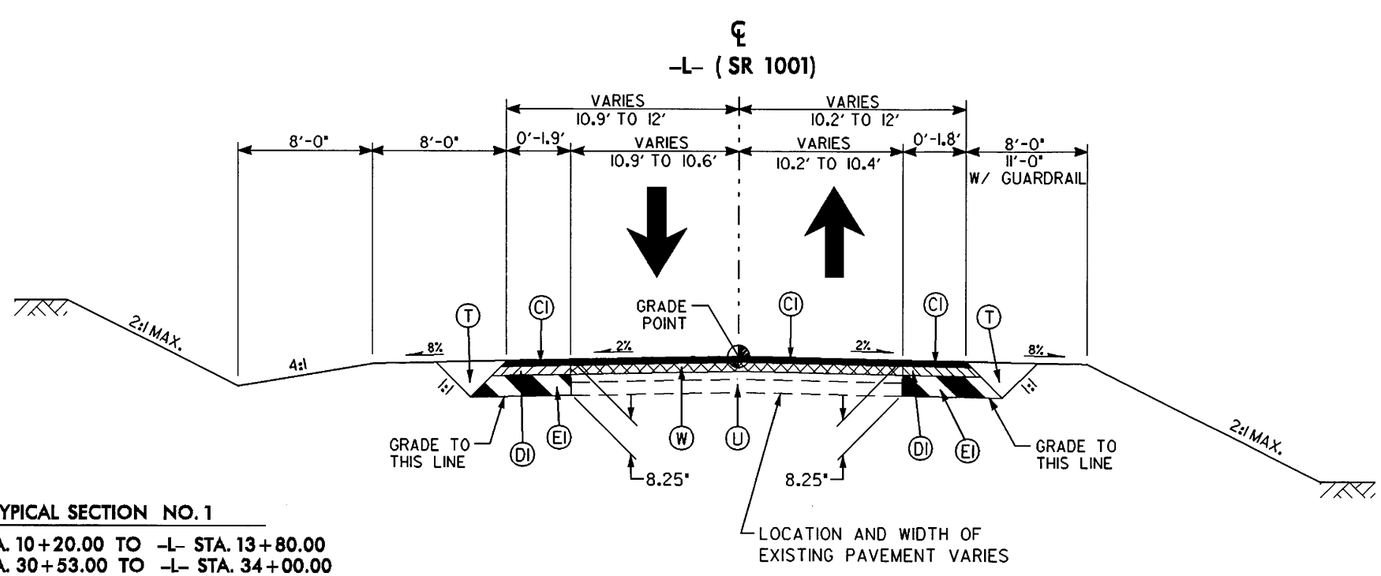
DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

09-DEC-2004 08:23
R:\Roadway\Proj\B3899_ds_tsh.dgn
Steve Hall

PROJECT REFERENCE NO.	SHEET NO.
B-3899	2
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

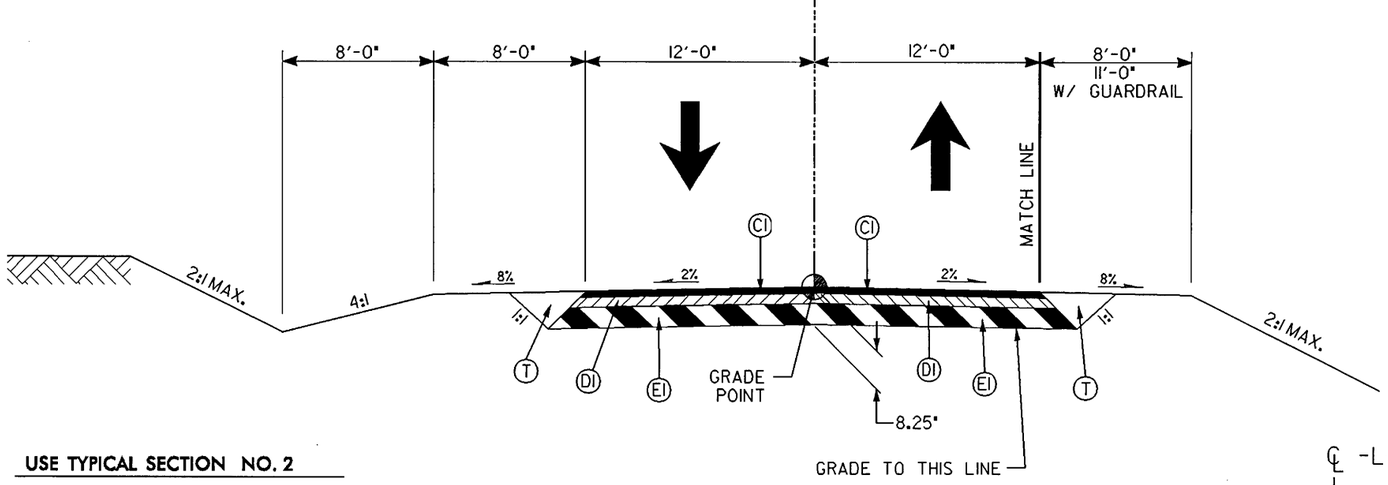
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



USE TYPICAL SECTION NO. 1

-L- STA. 10+20.00 TO -L- STA. 13+80.00
-L- STA. 30+53.00 TO -L- STA. 34+00.00

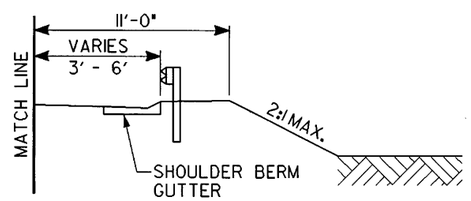
TYPICAL SECTION NO. 1



USE TYPICAL SECTION NO. 2

-L- STA. 13+80.00 TO -L- STA. 23+23.50 (BEGIN BRIDGE)
-L- STA. 24+58.50 (END BRIDGE) TO -L- STA. 30+53.00

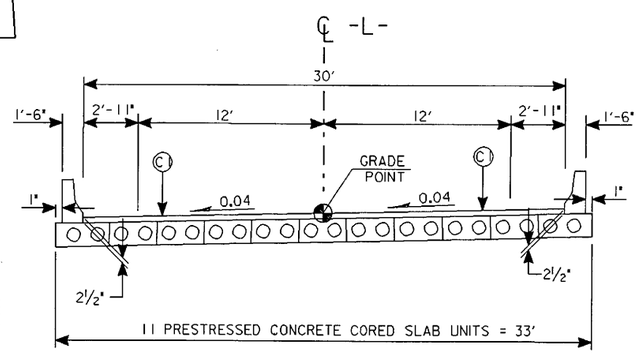
TYPICAL SECTION NO. 2



USE TYPICAL SECTION NO. 2A

-L- STA. 21+50.00 LT. TO -L- STA. 23+07.00 LT.
-L- STA. 22+70.64 RT. TO -L- STA. 22+89.39 RT.
-L- STA. 24+92.00 LT. TO -L- STA. 26+50.00 LT.
-L- STA. 24+74.17 RT. TO -L- STA. 24+92.92 RT.

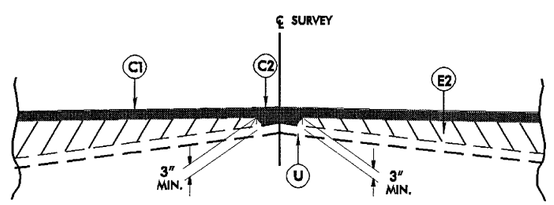
TYPICAL SECTION NO. 2A



CORED SLAB DETAIL

PAVEMENT SCHEDULE	
C1	PROP. APPROX. 2 1 / 2" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 137.5 LBS. PER SQ.YD. IN EACH OF TWO LAYERS.
C2	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1" DEPTH TO PLACED IN LAYERS NOT TO EXCEED 1 1 / 2" IN DEPTH.
D1	PROP. APPROX. 2 1 /4" ASPHALT CONCRETE BASE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 257 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO PLACED IN LAYERS NOT LESS THAN 2¼" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 3 1 /2" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 399 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5 1 / 2" IN DEPTH.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
W	WEDGING

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



Detail Showing Method of Wedging

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Transportation Consulting Engineers
4928-A Windy Hill Drive Raleigh, North Carolina 27609
(919) 872-5115 fax (919) 878-5486

09-DEC-2004 08:30
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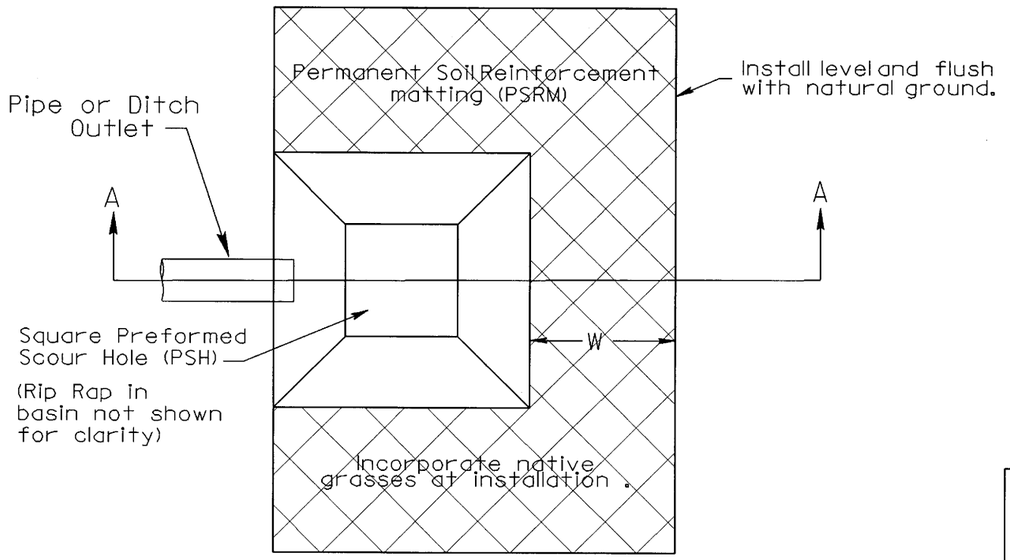
PROJECT REFERENCE NO.	SHEET NO.
B-3899	2-A
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PREFORMED SCOUR HOLE DETAIL

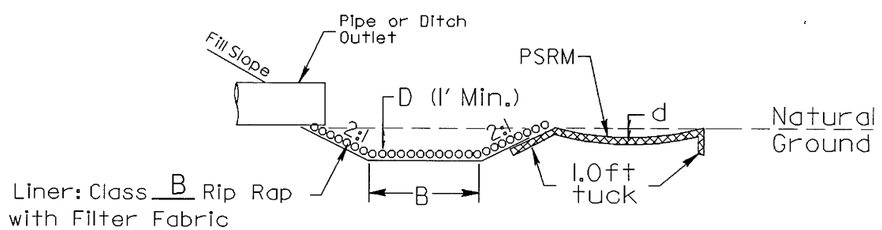
PLAN VIEW



LOCATION (AT OUTLET)
Sta 21+70 -L- (Lt.)
Sta 25+40 -L- (Lt.)

B	5	ft
D	2	ft
W	5	ft
d	1	ft

SECTION A-A



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Transportation Consulting Engineers
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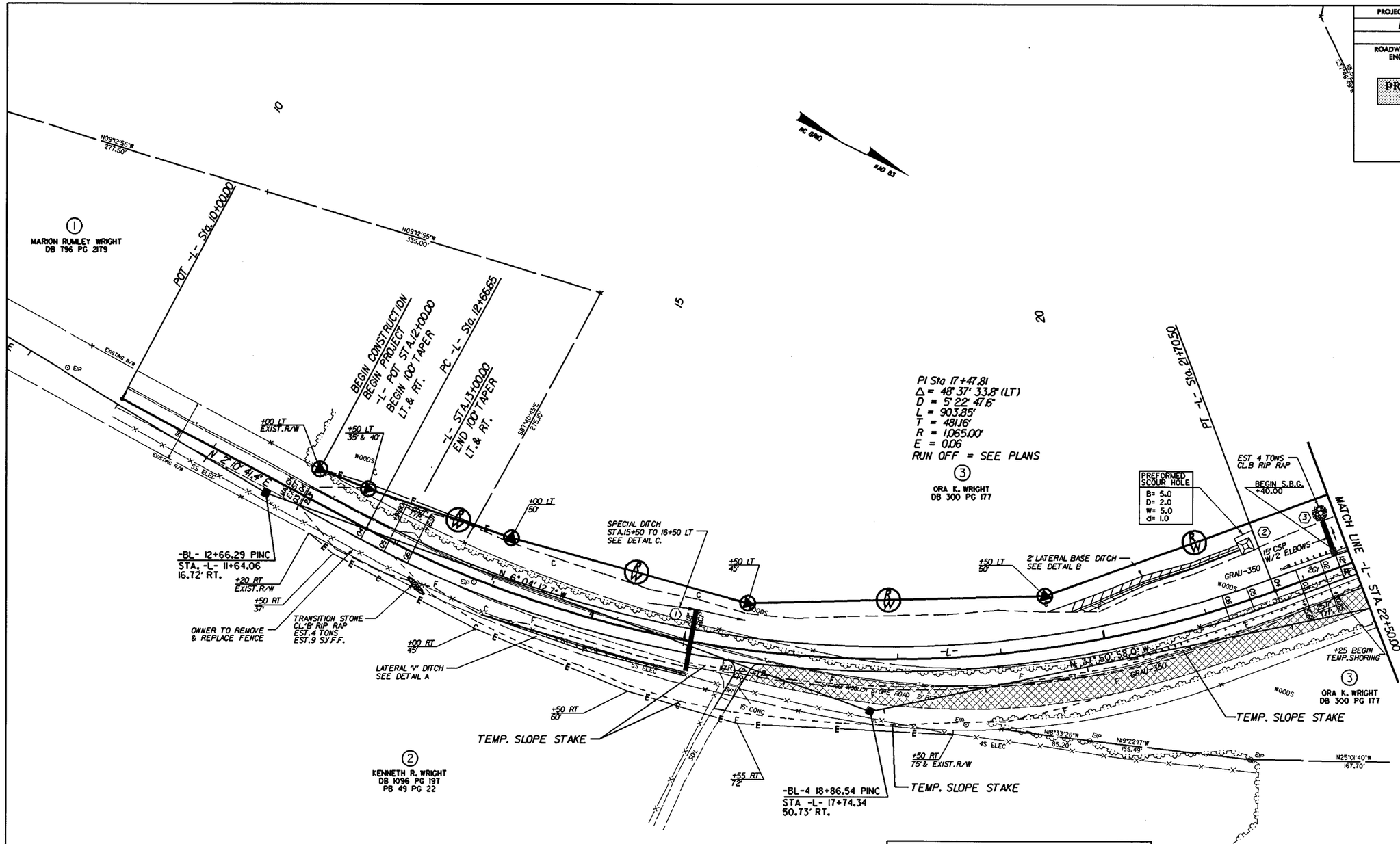
(919) 872-5115 fax (919) 878-5416

PROJECT REFERENCE NO.	SHEET NO.
B-3899	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

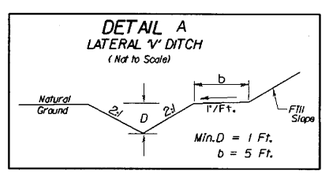
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



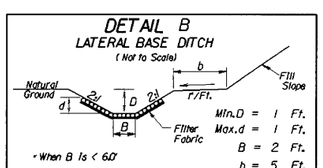
NOTE: GRADE TO DRAIN STA. 14+50 - 23+00 RT.

DATUM DESCRIPTION

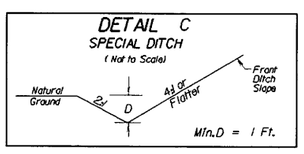
THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B3899-2" WITH NAD 1983/95 STATE PLANE GRID COORDINATES OF NORTHING: 927322.2661(ft) EASTING: 1771159.5221(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.000005310 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B3899-2" TO -L- STATION 10+00.00 IS N 4°26'43.30" E 600.99' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NAVD 88



STA.14+00 to 16+50 RT
STA.25+40 to 27+50 LT



STA.19+50 to 21+70 LT



STA.15+50 to 16+50 LT.

FOR -L- PROFILE SEE SHEET NO. 6

SEE SHEETS S-1 THRU S- FOR STRUCTURE PLANS

SCALE
50 0 50 100

Ramey Kemp & Associates, Inc.
Transportation Consulting Engineers
4928-A Windy Hill Drive Raleigh, North Carolina 27609
(919) 872-585 Fax (919) 878-546

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dfarr

PROJECT REFERENCE NO.	SHEET NO.
B-3899	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

BEGIN BRIDGE
-L- STA 23+23.50

ORA K. WRIGHT
DB 300 PG 177

PREFORMED SCOUR HOLE
B= 5.0
D= 2.0
W= 5.0
d= 1.0

BM #1
-BL- STA 26+52.3
142.9' LEFT
ELEV = 721.22'

EUGENE MASON, TRUSTEE
DB 1077 PG 1317

DAVID J. KING
DB 713 PG 328

STA. -L- 33+00.00
BEGIN 100' TAPER LT.& RT.

END CONSTRUCTION
END PROJECT
-L- POT STA.34+00.00
END 100' TAPER LT & RT.

POT -L- Sta. 35+36.72

MATCH LINE -L- STA 22+50.00

15" CSP
W/ 2 ELBOWS

2GI

TYPE III

BRIDGE #21
CONC/WOOD/STEEL

N 46° 28' 52.4" W

N 42° 15' 51.3" W

N 29° 56' 59.7" W

N 25° 38' 52.9" W

SR 1001 WOOLEN STORE ROAD 21' BST

TEMP. SLOPE STAKE

PI Sta 30+06.19
Δ = 16° 29' 52.7" (RT)
D = 4° 45' 17.4"
L = 346.97'
T = 174.69'
R = 1,205.00'
E = 0.06
RUN OFF = SEE PLANS

PC -L- Sta. 28+31.50

PT -L- Sta. 31+78.47

-BL-6 33+25.27 PINC
STA -L- 31+98.55
16.95' LT.

-BL- 5 24+06.64 PINC
STA -L- 22+79.23
52.18' RT.

END BRIDGE
-L- STA 24+58.50

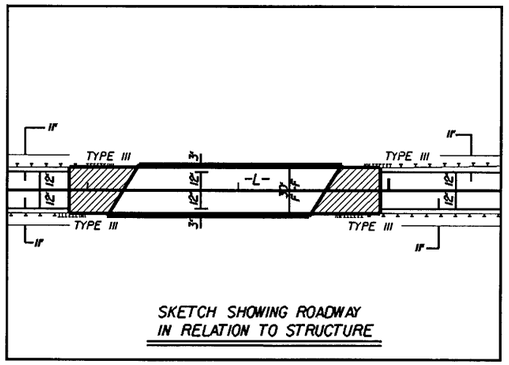
BEGIN APPROACH SLAB
-L- STA. 23+07.98

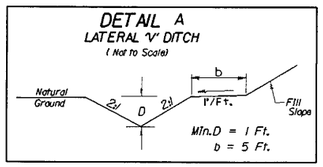
END APPROACH SLAB
-L- STA. 25+14.13

STEPHEN MASON
DB 888 PG 2000

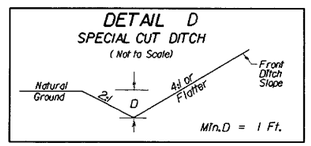
ISFD

BARN





STA. 25+40 to 27+50 LT



STA. 25+50 to 31+00 RT
STA. 27+50 to 28+50 LT

SCALE
50 0 50 100

DENOTES APPROACH SLAB

FOR -L- PROFILE SEE SHEET NO. 7

SEE SHEETS S-1 THRU S- FOR STRUCTURE PLANS

Ramey Kemp & Associates, Inc.
Transportation Consulting Engineers
4928-A Windy Hill Drive Raleigh, North Carolina 27609
(919) 872-585 fax (919) 878-546

PROJECT REFERENCE NO.	SHEET NO.
B-3899	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

BEGIN GRADE -L- STA. 12+90.00
ELEV. = 769.01 (INCLUDES 2.5" RESURFACING)

EXISTING GROUND

PROPOSED GRADE

PI STA. 16+72.00
EL = 729.19'
VC = 825'
K = 115

(-)1.60%

(+)1.25%

(-)5.90%

1.00%

BEGIN LATERAL "A" DITCH STA. 14+00 RT. ELEV. = 734.06

END LATERAL "A" DITCH STA. 14+00 RT. ELEV. = 734.00

BEGIN SPECIAL DITCH STA. 14+50 LT. ELEV. = 741.00

PI STA. 14+50 LT. ELEV. = 741.20

END SPECIAL DITCH STA. 14+50 LT. ELEV. = 741.40

60:1 S.R.S. INCL. EMBKT. SLOPE 1.33%

BEGIN E LATERAL BASE DITCH STA. 19+50 LT. ELEV. = 730.50

PI STA. 18+50 LT. ELEV. = 728.00

END E LATERAL BASE DITCH STA. 17+10 LT. ELEV. = 728.00

PIPE HYDRAULIC DATA

DESIGN DISCHARGE	= 0.91	CFS
DESIGN FREQUENCY	= 10	YRS
DESIGN HW ELEVATION	= 744.75	FT.
BASE DISCHARGE	= 1.21	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 744.75	FT
OVERTOPPING DISCHARGE	= NA	CFS
OVERTOPPING FREQUENCY	= NA	YR.
OVERTOPPING ELEVATION	= NA	FT

-L-

FOR -L- PLAN SEE SHEET 4

Ramey Kemp & Associates, Inc.
Transportation Consulting Engineers
4928-A Windy Hill Drive Raleigh, North Carolina 27609
(919) 872-565 fax (919) 878-546

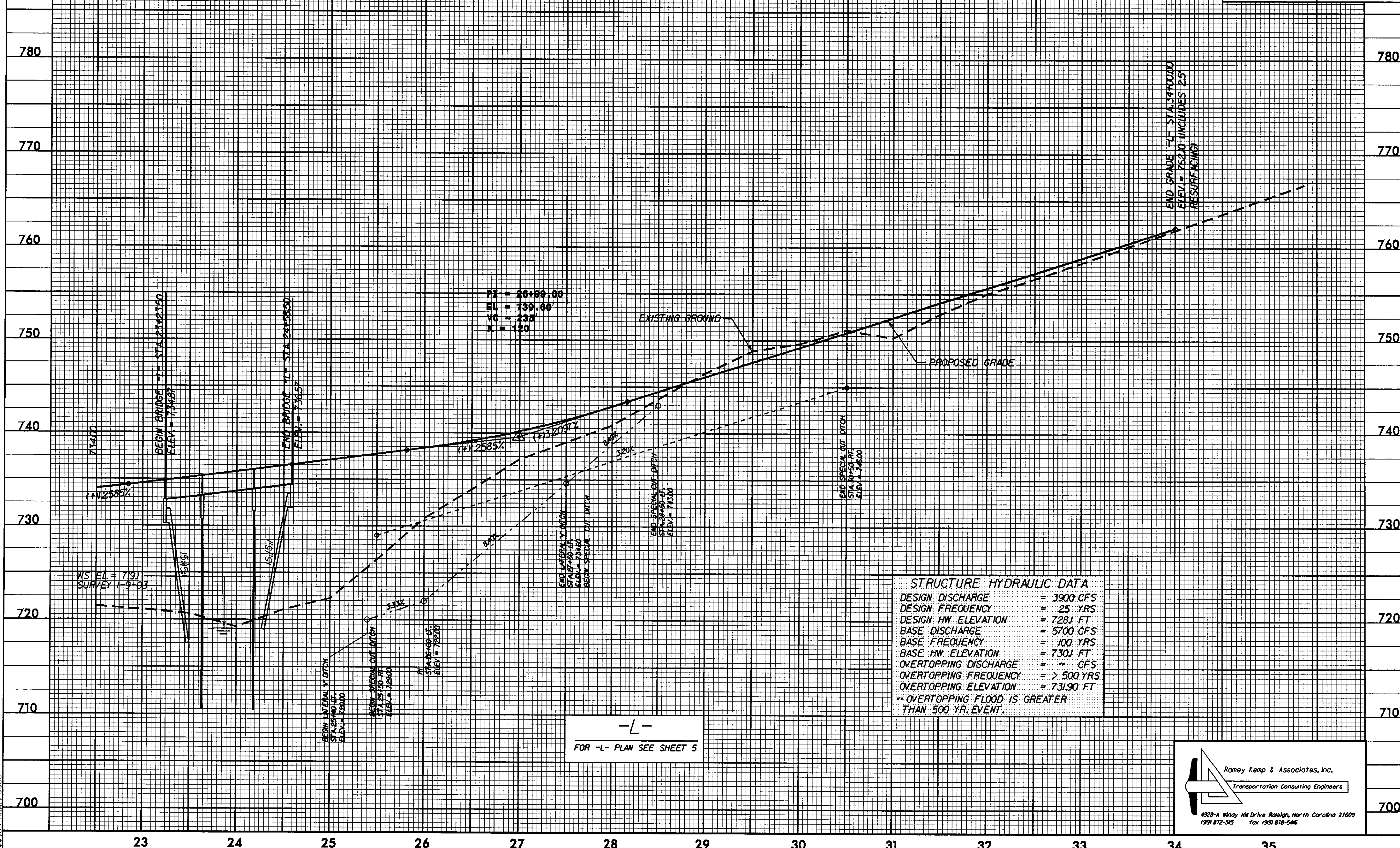
$$$$SYS_TIME$$$$
$$$$USERNAME$$$$
$$$$DGN$$$$
$$$$

PROJECT REFERENCE NO.	SHEET NO.
B-3899	7

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



STRUCTURE HYDRAULIC DATA

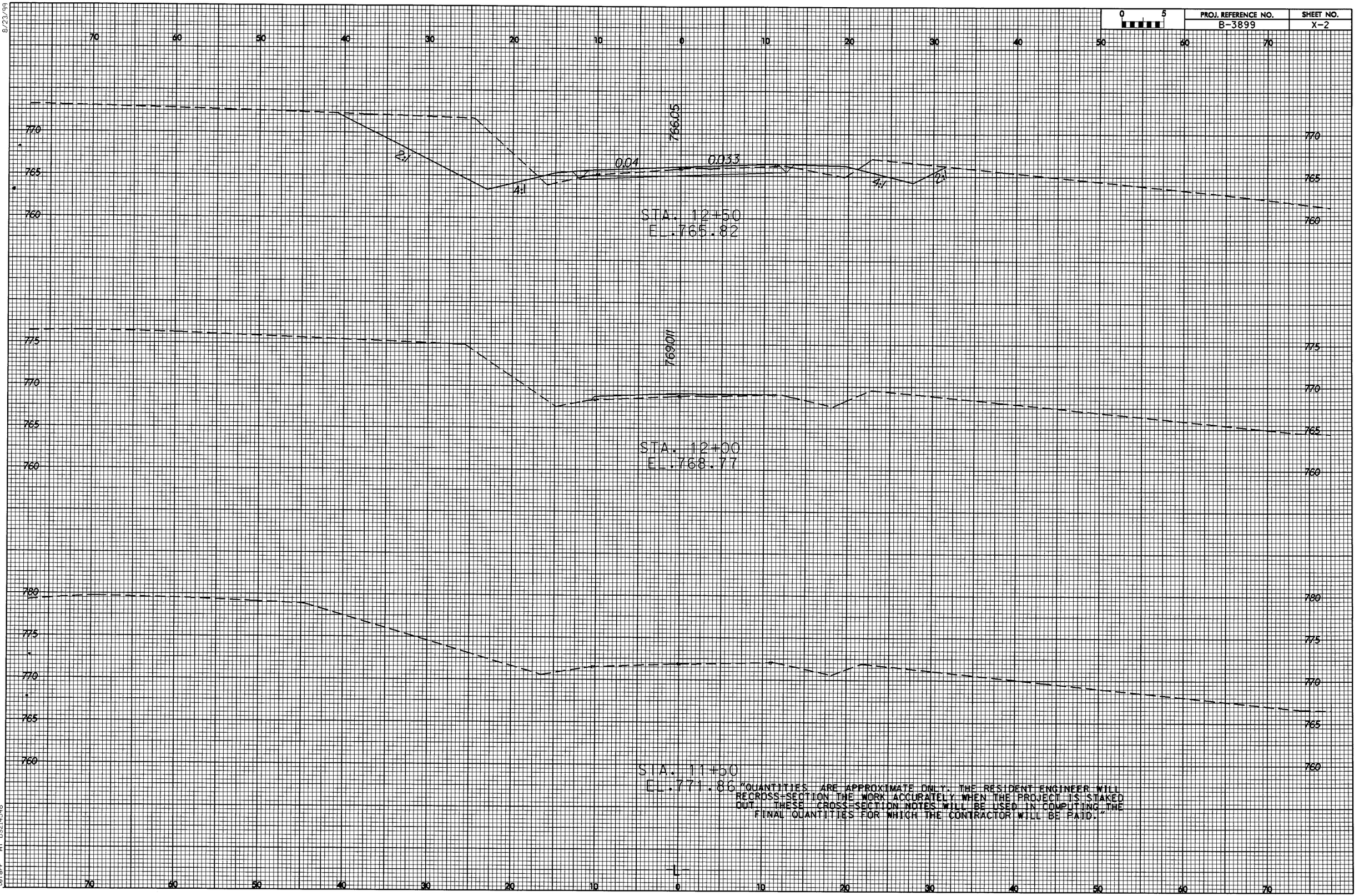
DESIGN DISCHARGE	=	3900 CFS
DESIGN FREQUENCY	=	25 YRS
DESIGN HW ELEVATION	=	728.1 FT
BASE DISCHARGE	=	5700 CFS
BASE FREQUENCY	=	100 YRS
BASE HW ELEVATION	=	730.1 FT
OVERTOPPING DISCHARGE	=	** CFS
OVERTOPPING FREQUENCY	=	> 500 YRS
OVERTOPPING ELEVATION	=	731.90 FT

** OVERTOPPING FLOOD IS GREATER THAN 500 YR. EVENT.

Ramey Kemp & Associates, Inc.
Transportation Consulting Engineers
4928-A Windy Hill Drive Raleigh, North Carolina 27609
(919) 872-5115 fax (919) 878-5416

8/23/99

0 5	PROJ. REFERENCE NO.	SHEET NO.
	B-3899	X-2



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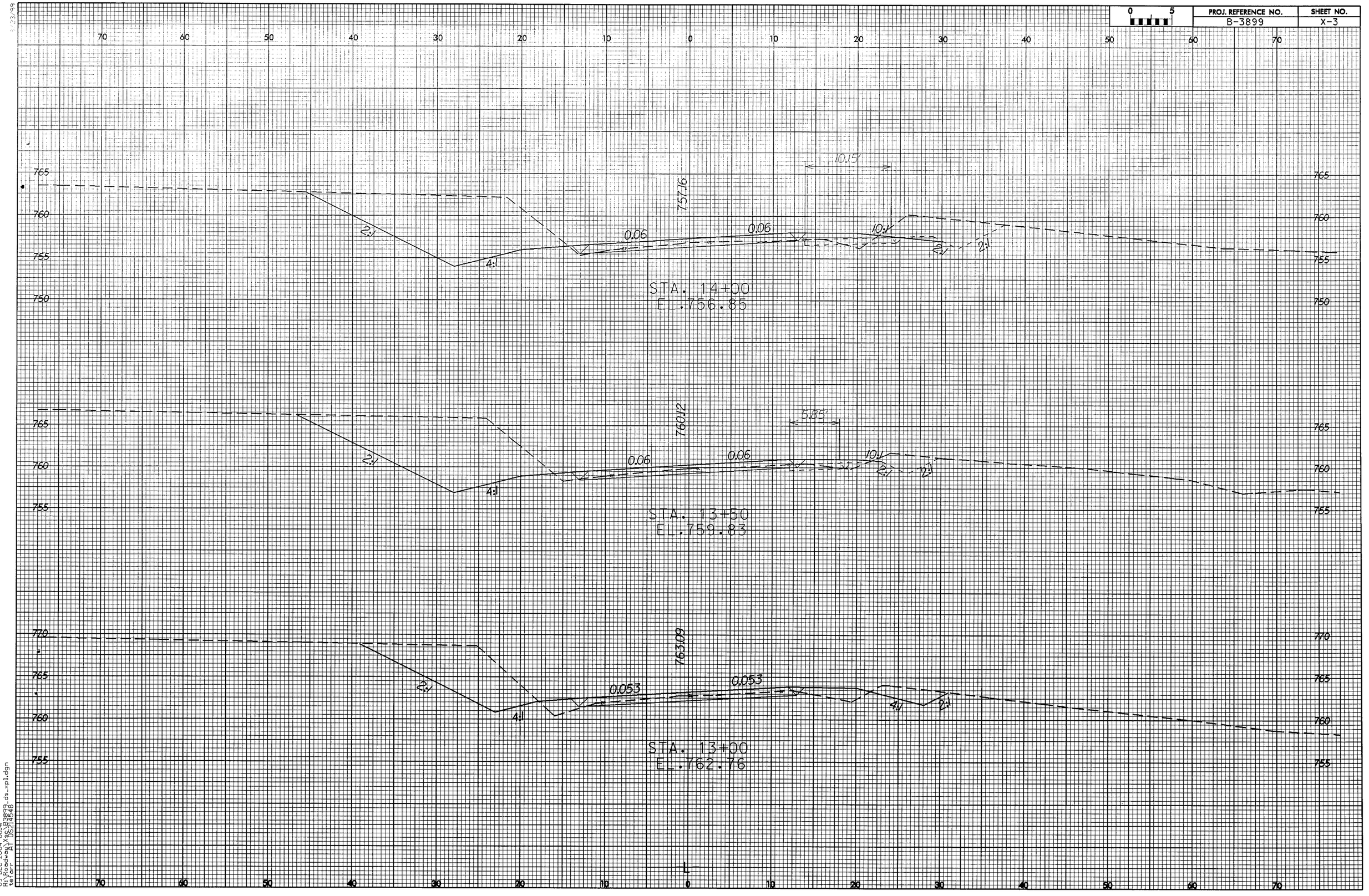
AT US214548

0 5	PROJ. REFERENCE NO.	SHEET NO.
	B-3899	X-3



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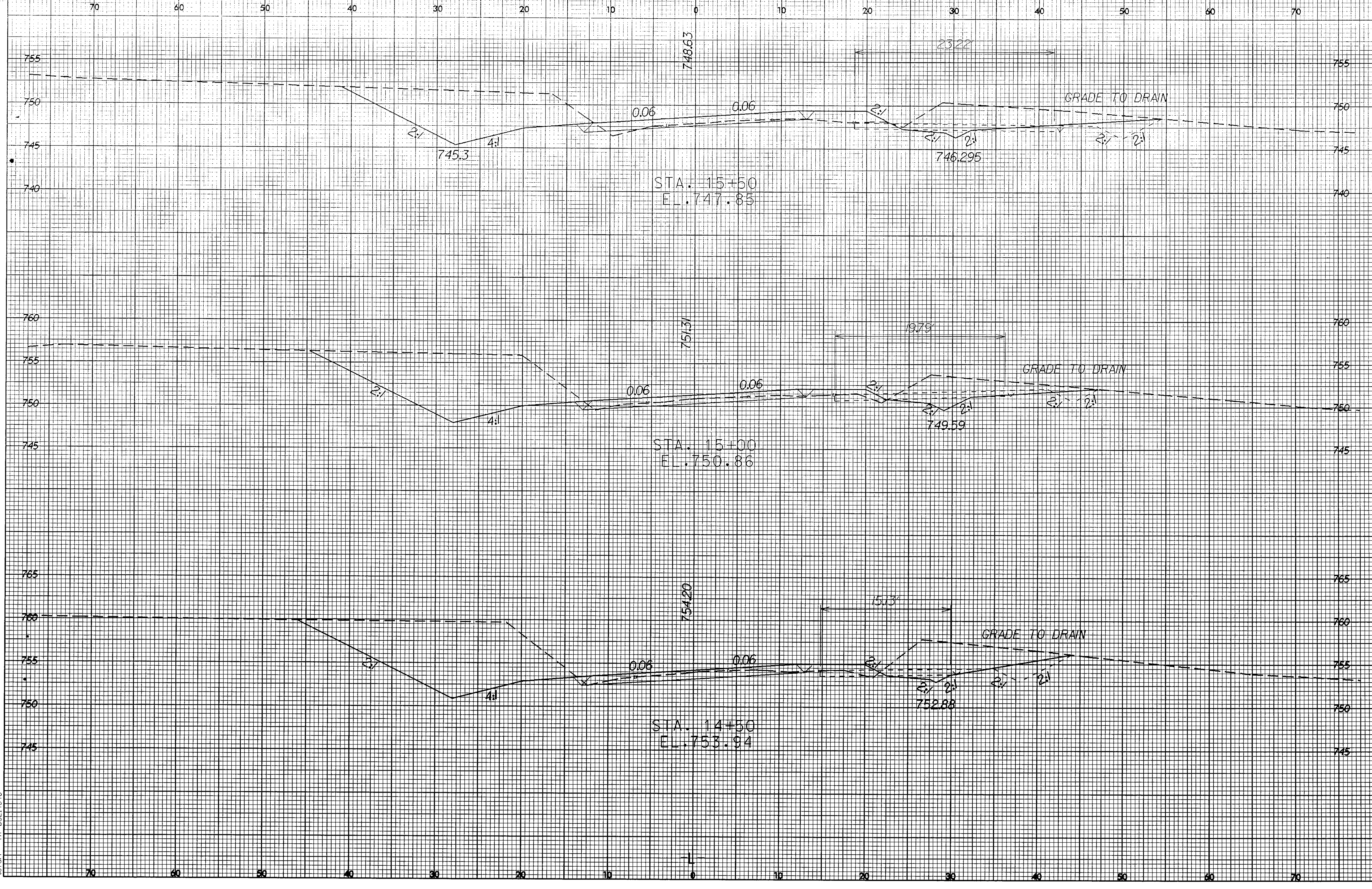
B-3899	X-4



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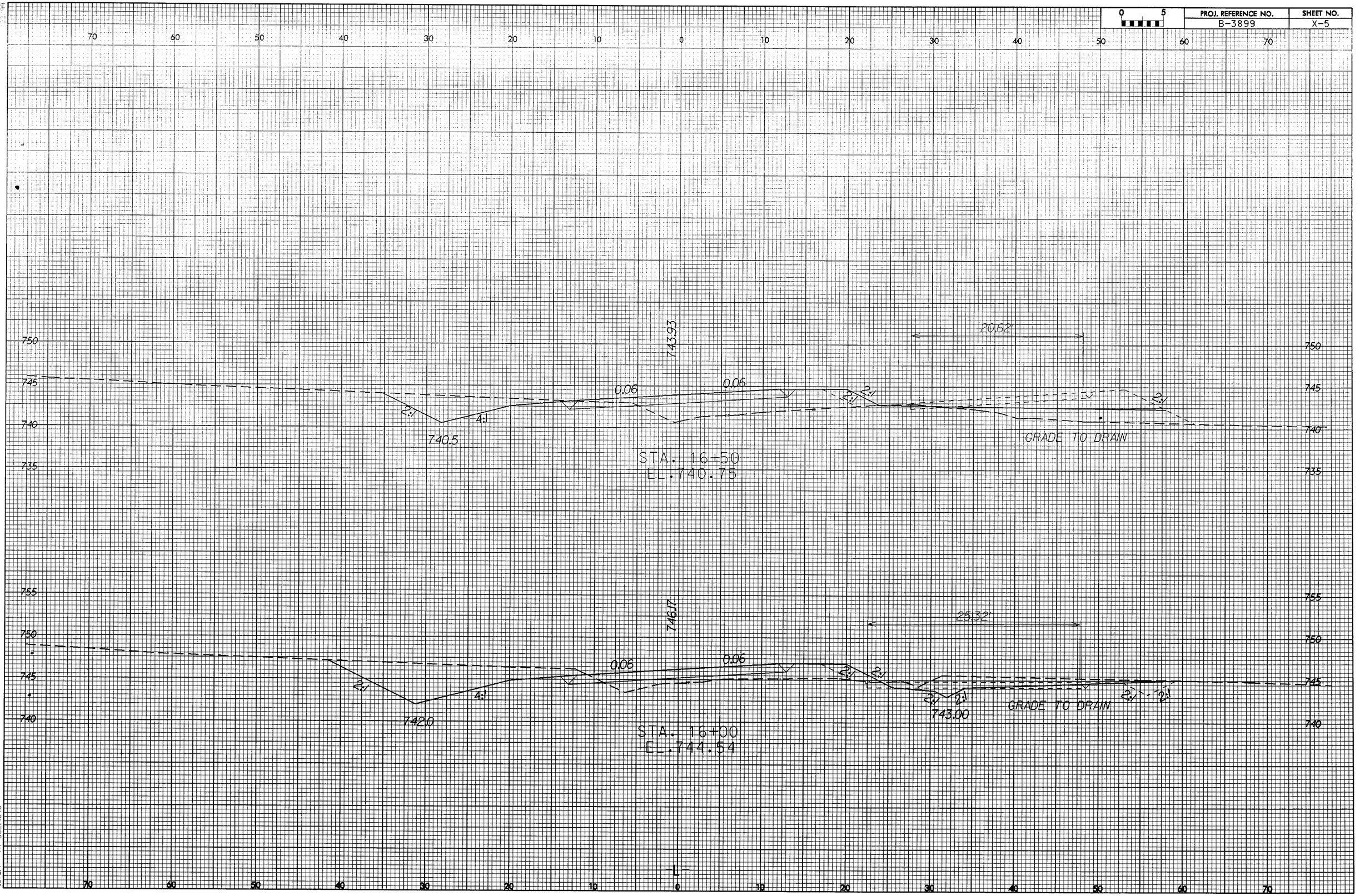
0 5	PROJ. REFERENCE NO.	SHEET NO.
	B-3899	X-5



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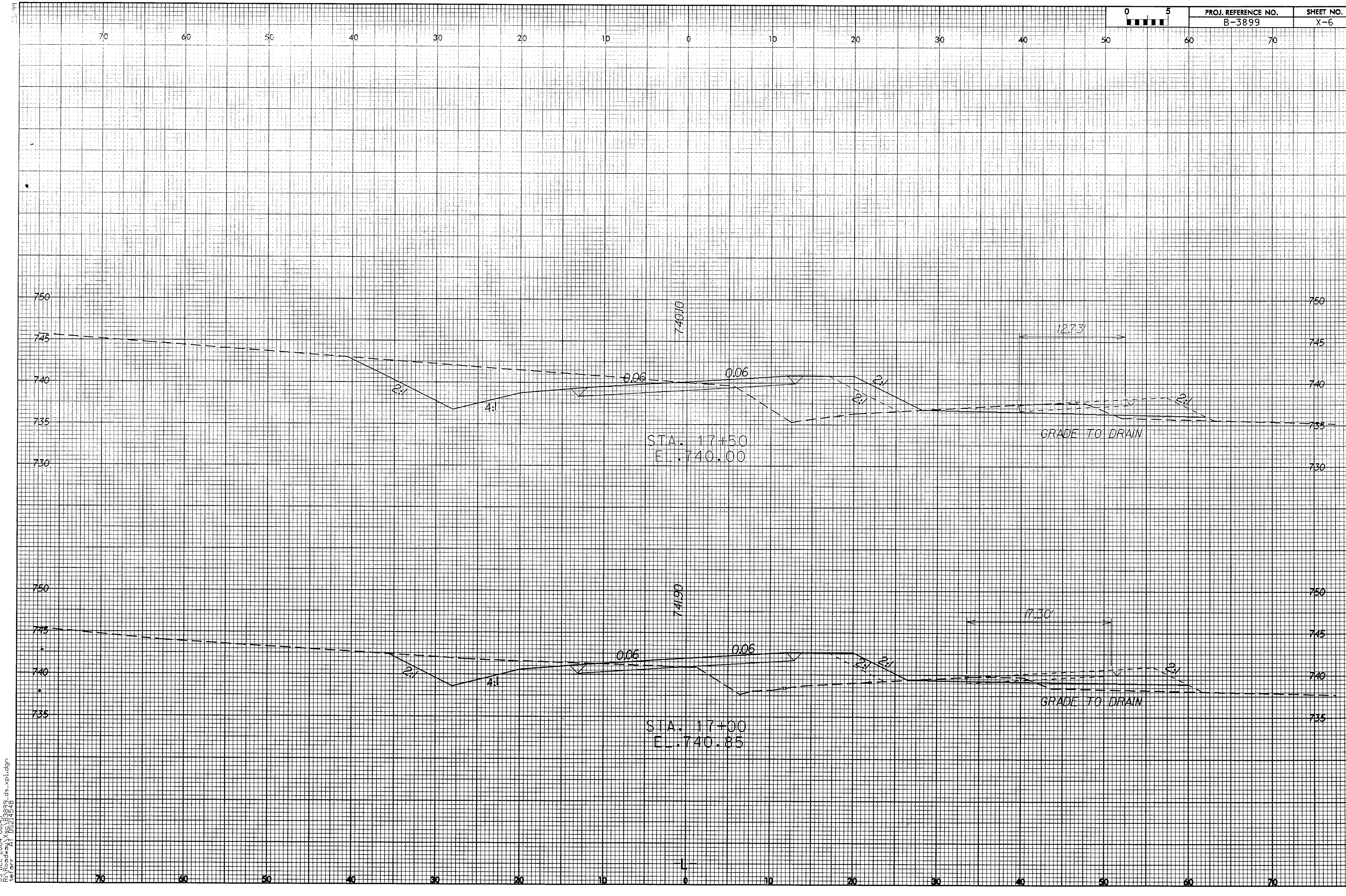
PROJ. REFERENCE NO.	SHEET NO.
B-3899	X-6



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tefarr AT DS214548

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
B-3899	X-7

0 5

STA. 19+00
E. 735.60

735.98

0.06 0.06

2:1 4:1 2:1 2:1

1.95'

GRADE TO DRAIN

STA. 18+50
E. 737.59

737.13

0.06 0.06

2:1 4:1 2:1 2:1

4.87'

GRADE TO DRAIN

STA. 18+00
E. 739.20

738.51

0.06 0.06

2:1 4:1 2:1 2:1

8.42'

GRADE TO DRAIN

745 740 735 730

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

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AT DS214548

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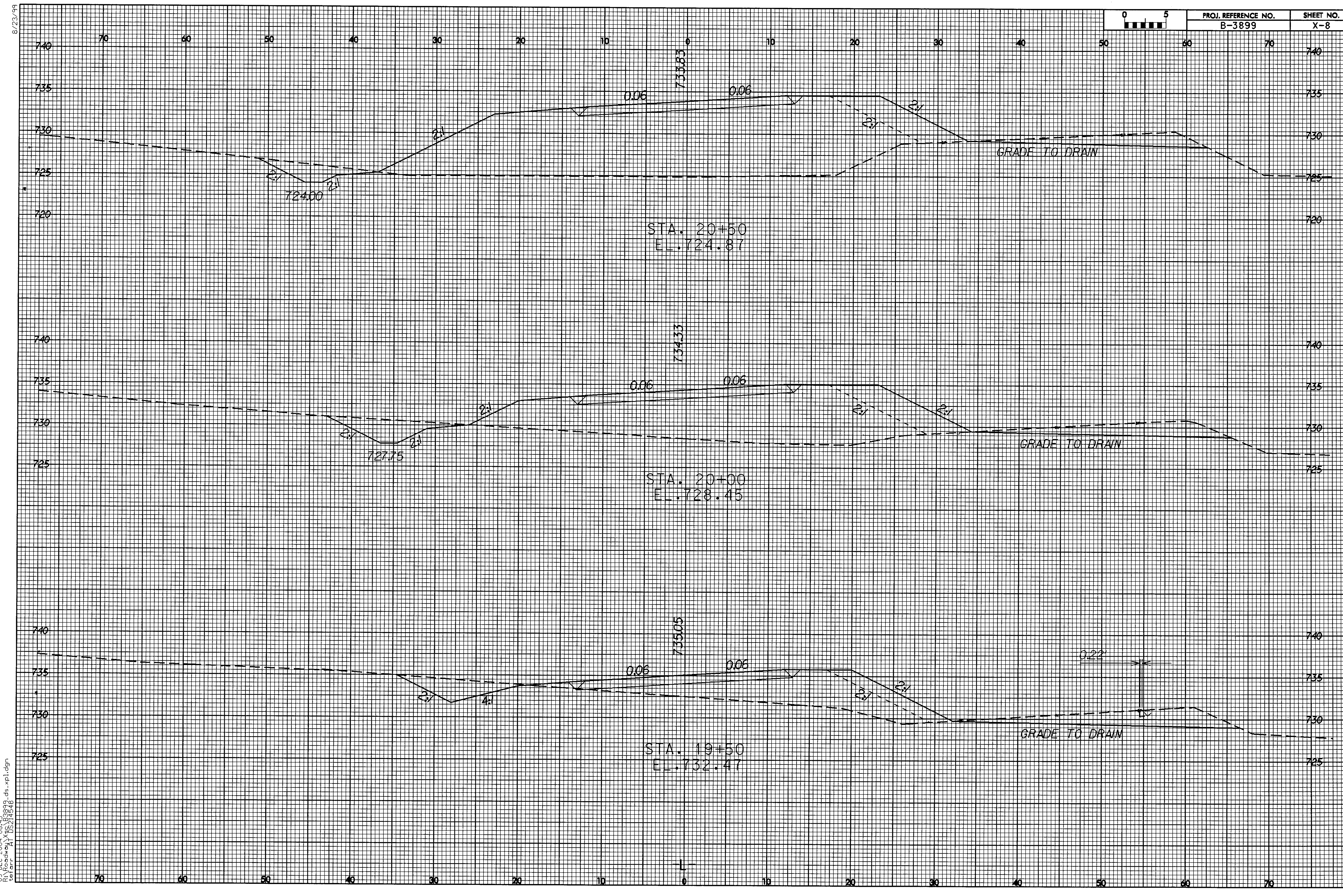
PROJ. REFERENCE NO.	SHEET NO.
B-3899	X-8



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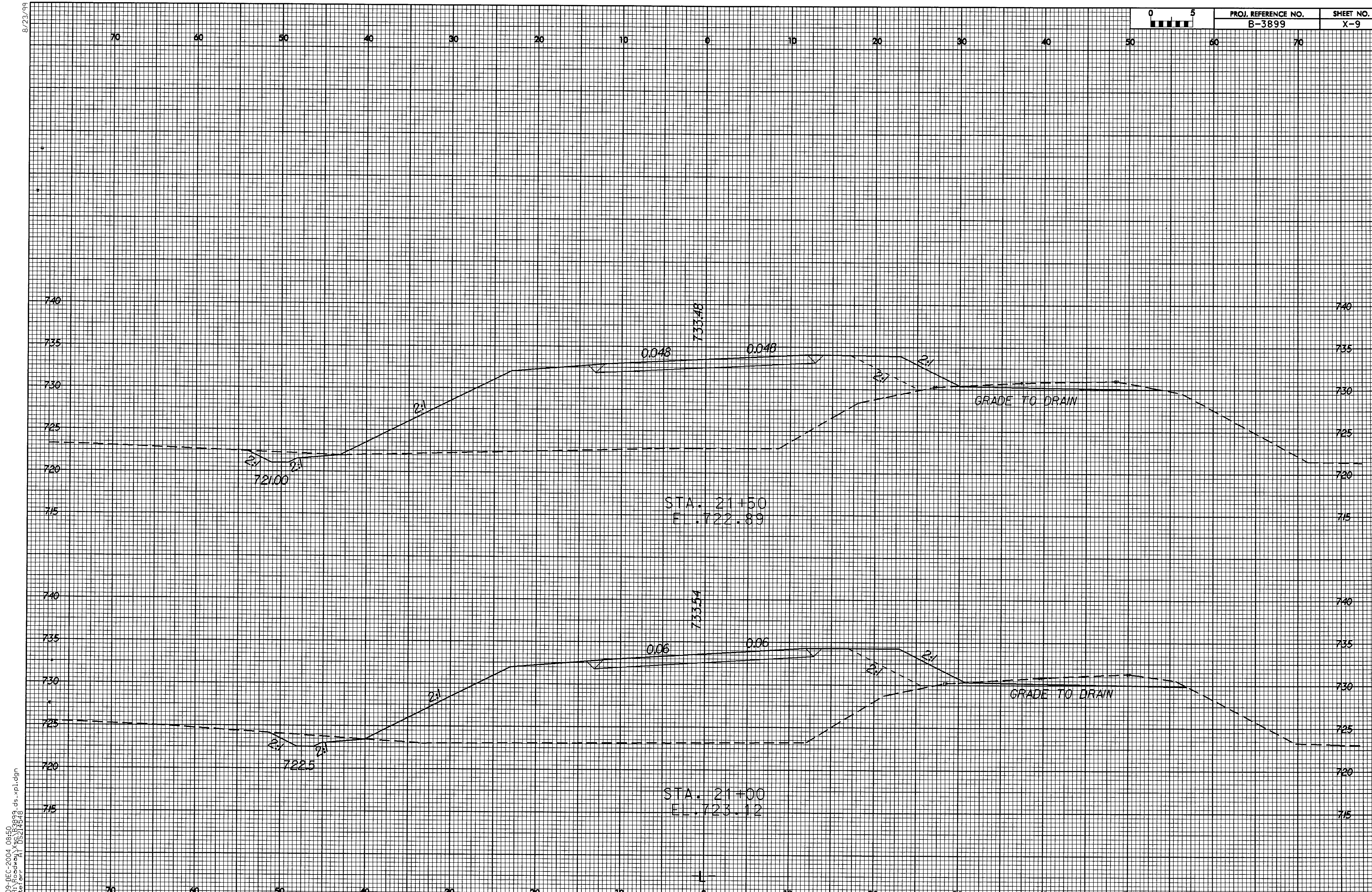
8/23/99
0 5
733.48
0.048
0.048
2:1
2:1
2:1
2:1
2:1
721.00
GRADE TO DRAIN
STA. 21+50
EL. 722.89
733.54
0.06
0.06
2:1
2:1
2:1
2:1
2:1
722.5
GRADE TO DRAIN
STA. 21+00
EL. 723.12
09-DEC-2004 08:50
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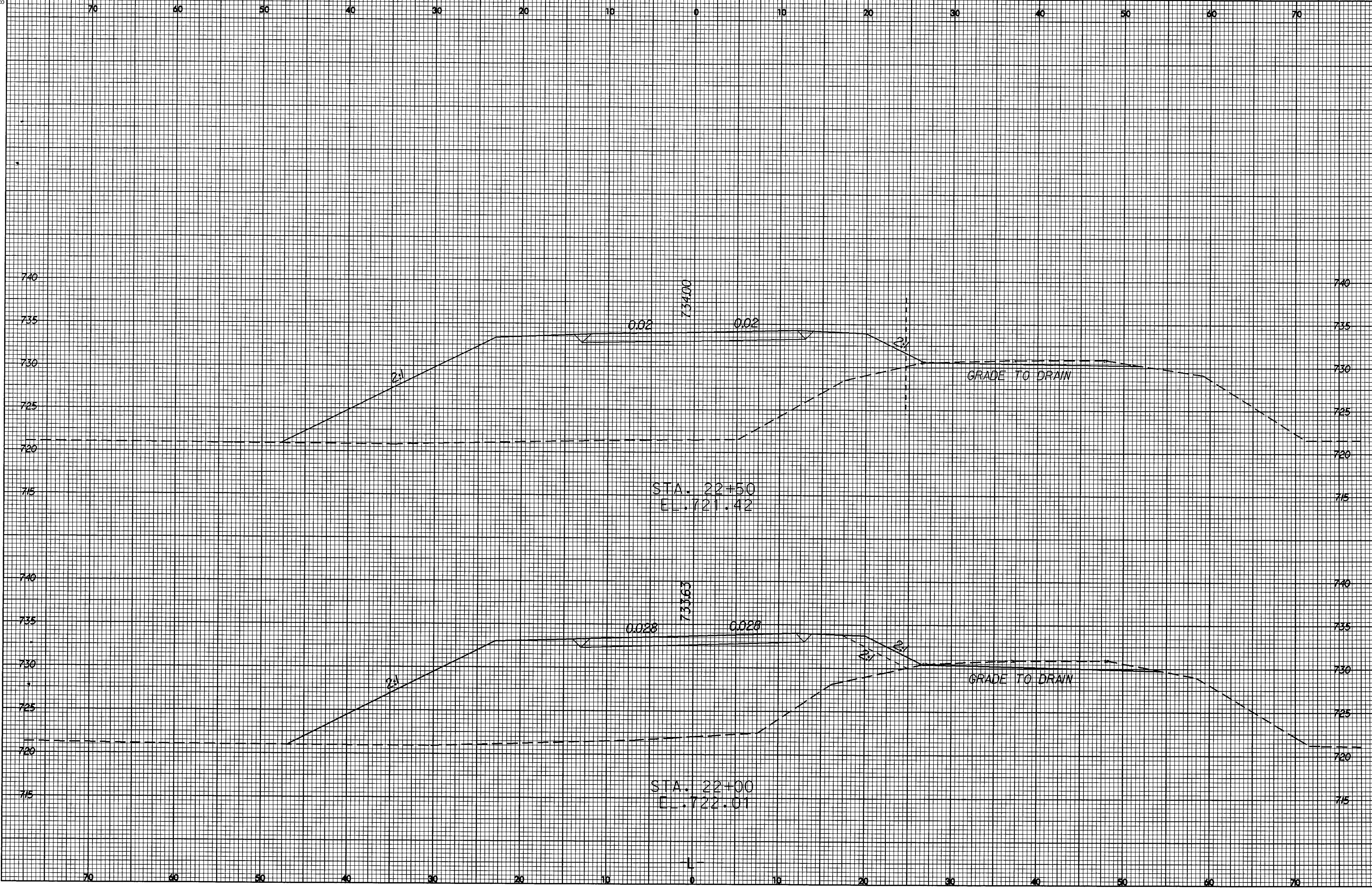
PROJ. REFERENCE NO.	SHEET NO.
B-3899	X-10



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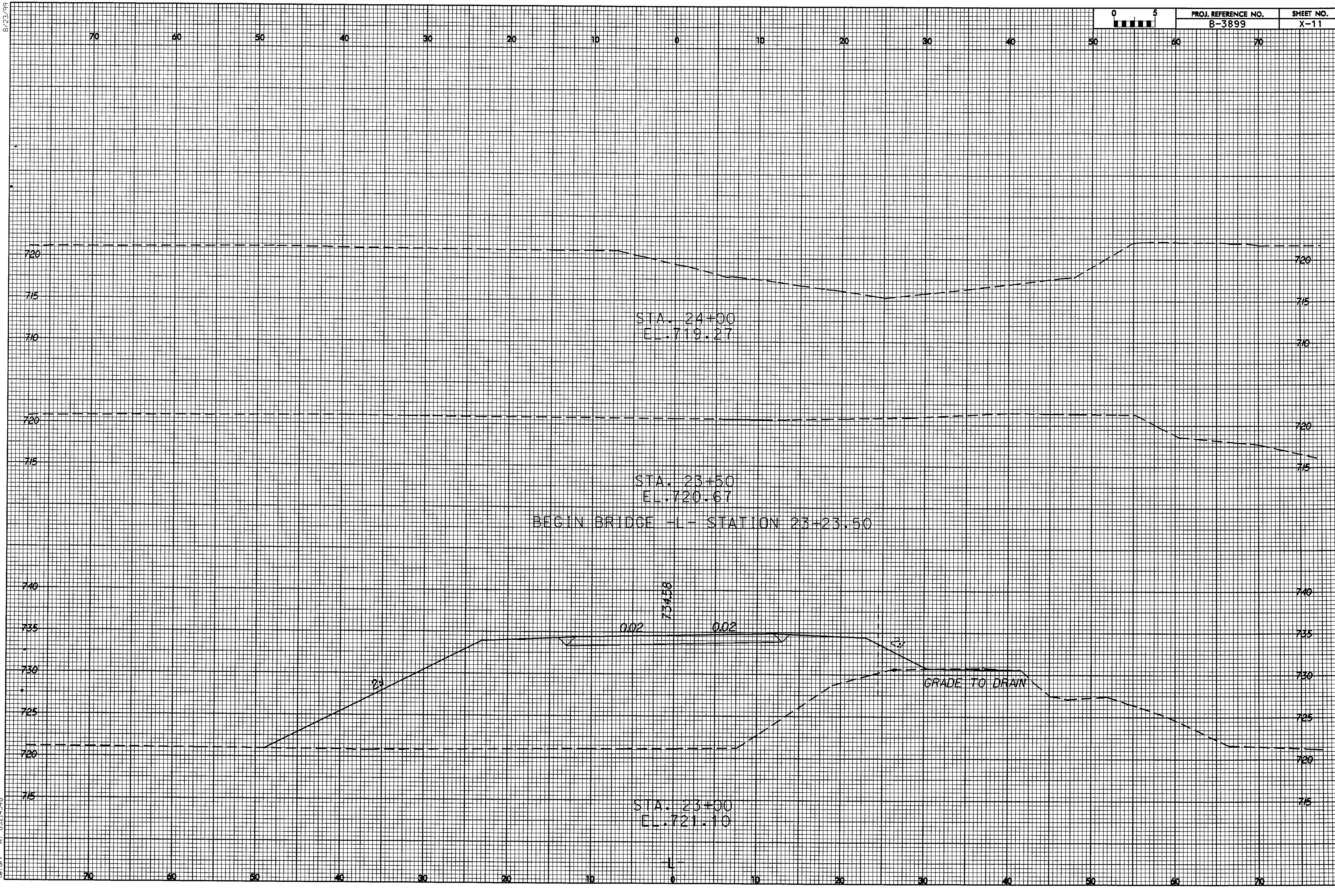
PROJ. REFERENCE NO.	SHEET NO.
B-3899	X-11



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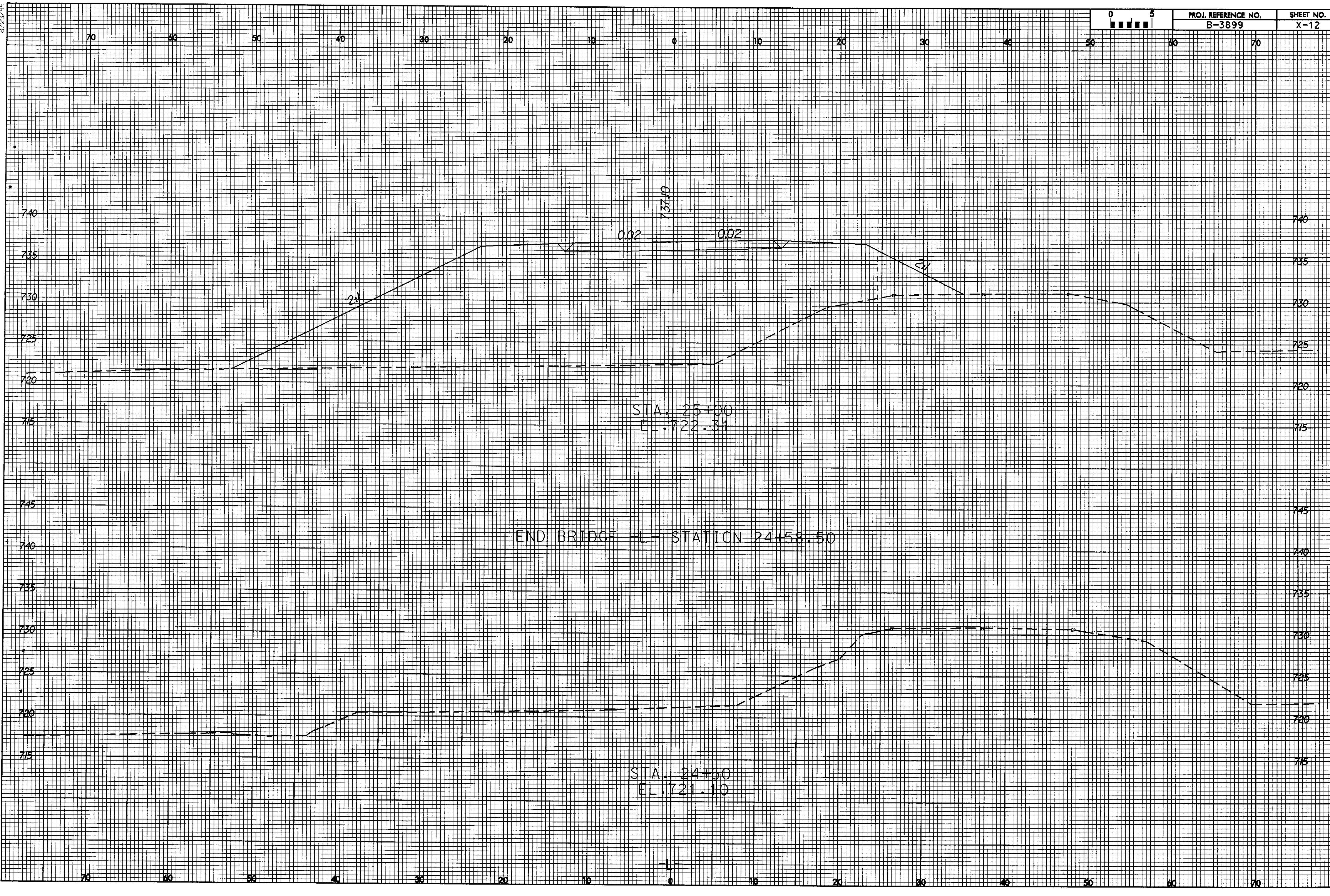

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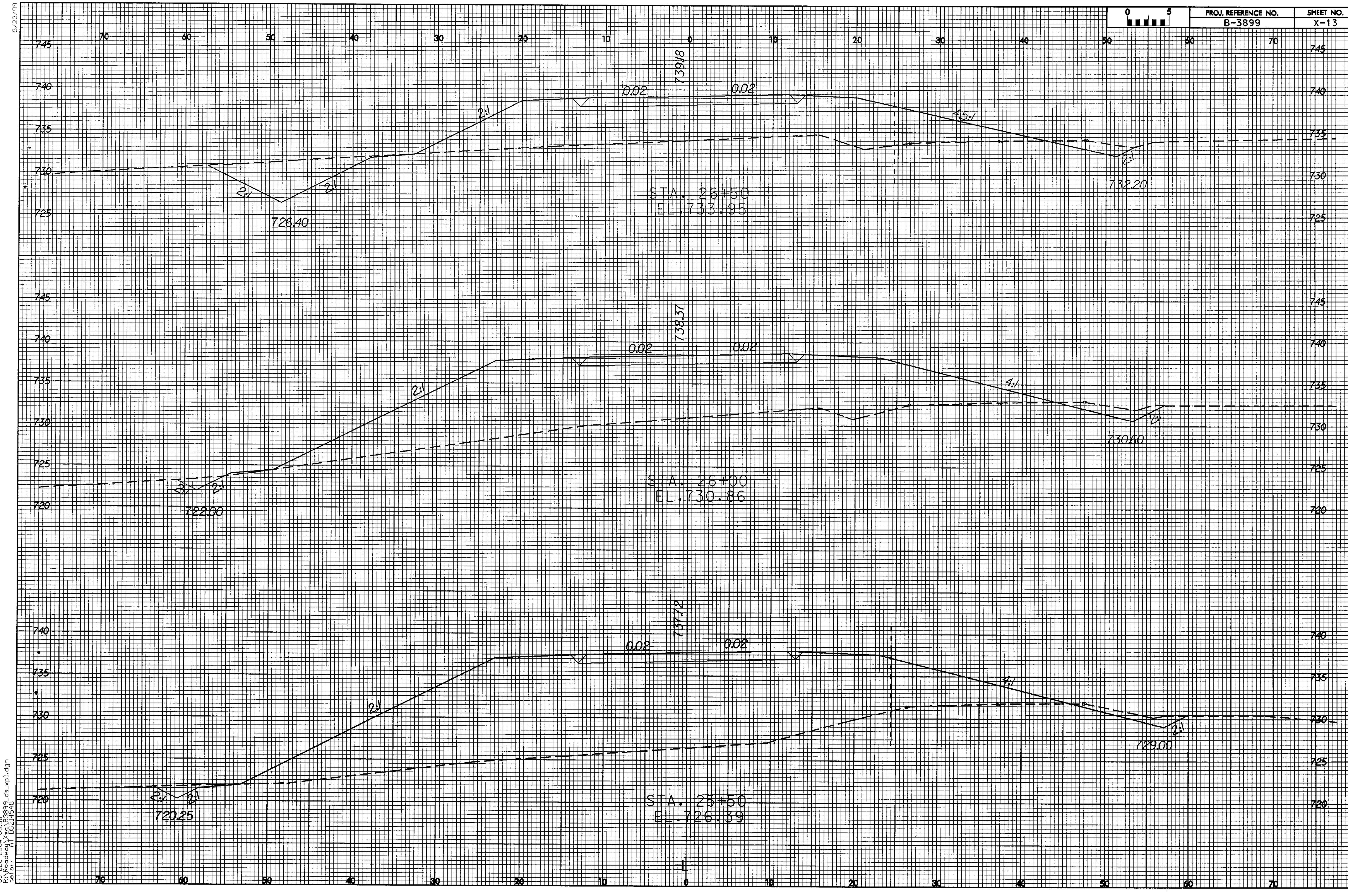

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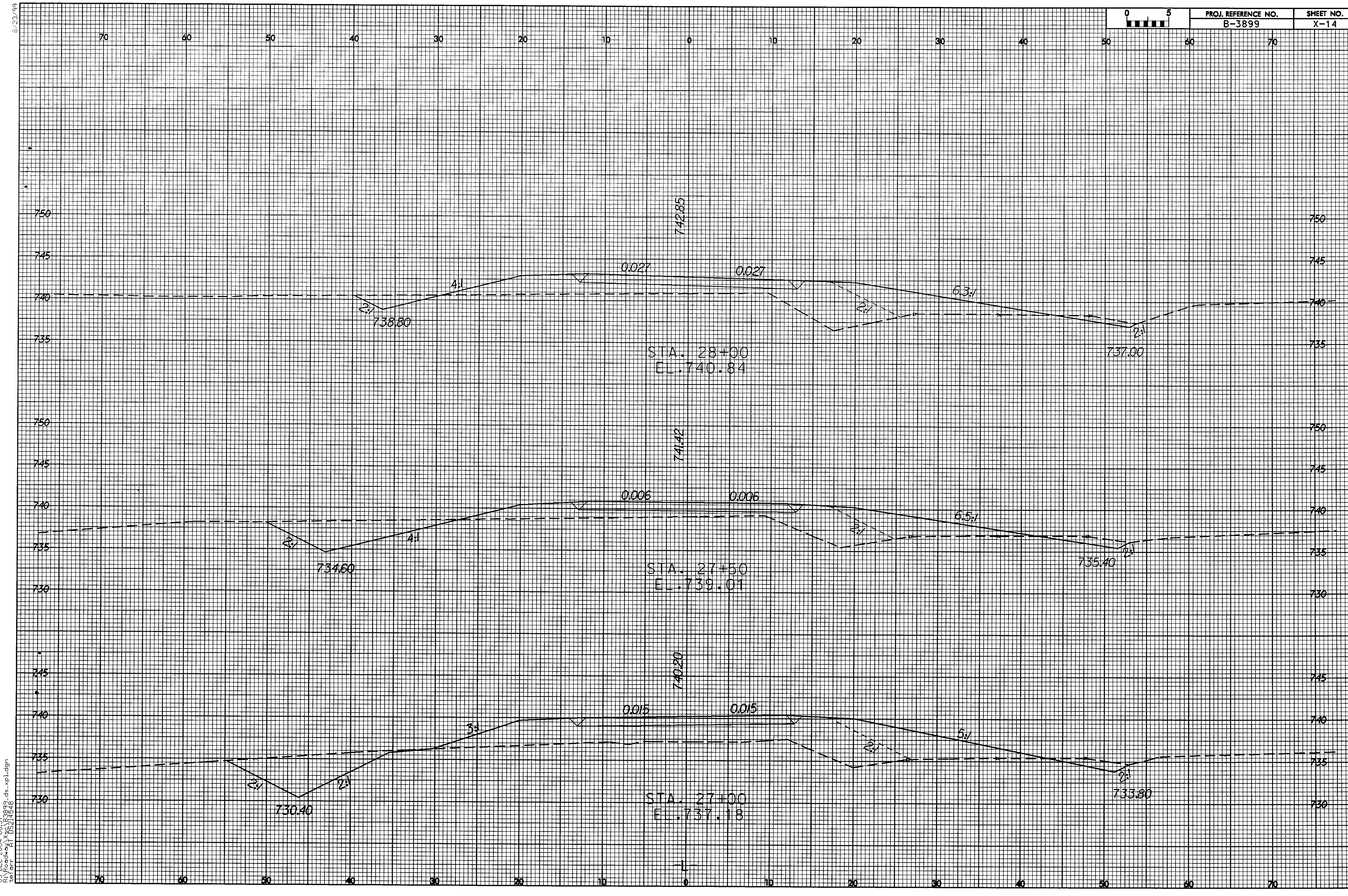
PROJ. REFERENCE NO.
B-3899
SHEET NO.
X-14
8/23/99
STA. 28+00
EL. 740.84
742.85
0.027
0.027
4:1
2:1
738.80
6.3:1
2:1
737.00
STA. 27+50
EL. 739.01
741.42
0.006
0.006
4:1
2:1
734.60
6.5:1
2:1
735.40
STA. 27+00
EL. 737.18
740.20
0.015
0.015
3:1
2:1
2:1
730.40
5:1
2:1
733.80
-L-
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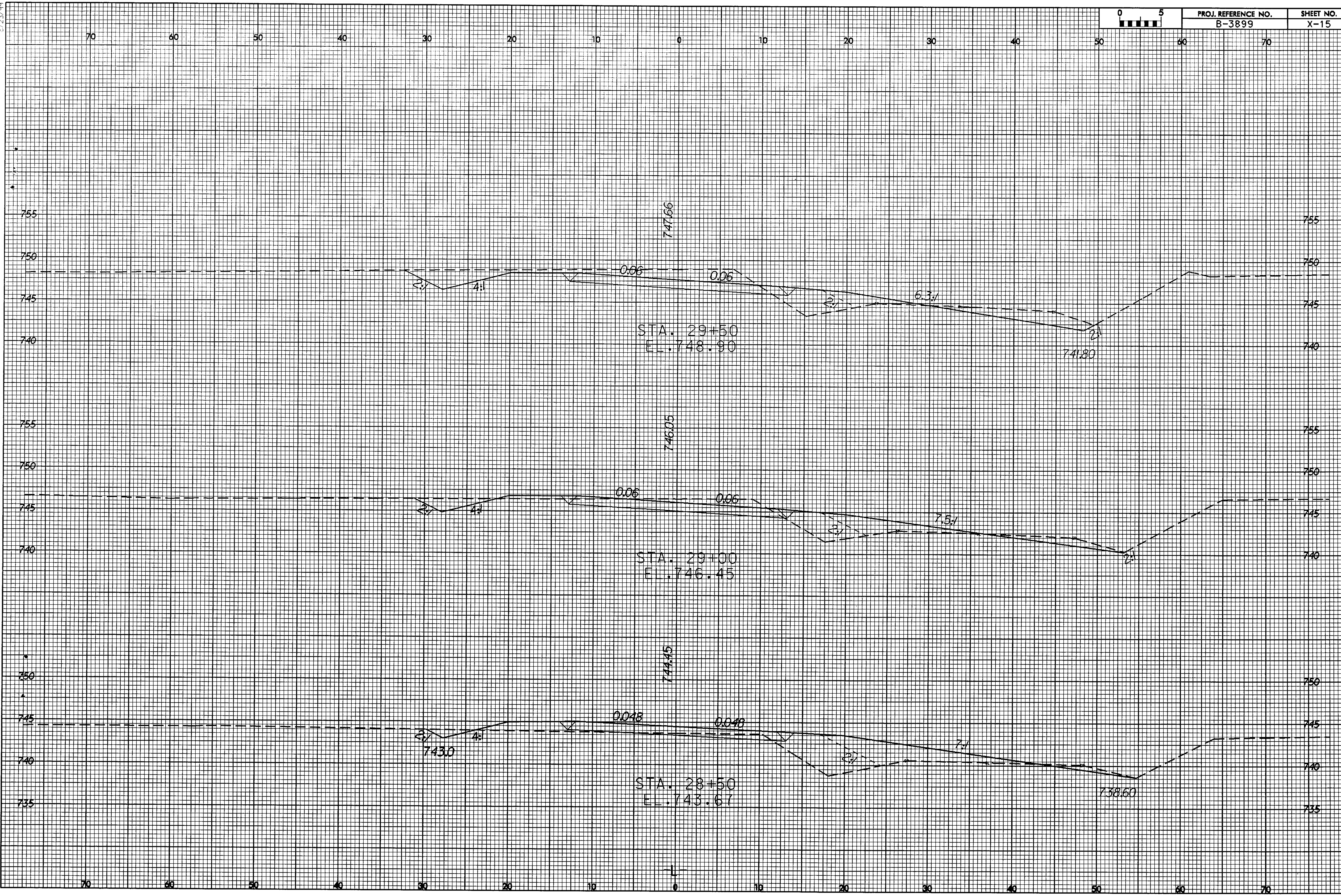
tefarr AT DS214548

PROJ. REFERENCE NO.	SHEET NO.
B-3899	X-15



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3/23/99

PROJ. REFERENCE NO.	SHEET NO.
B-3899	X-16

0 5

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

760 755 750 745 740

752.47

0.06 0.06

2:1 4:1 4:1 2:1

STA. 31+00
EL. 750.32

750.87

0.06 0.06

2:1 4:1 4:1 2:1

745.00

STA. 30+50
EL. 751.14

749.26

0.06 0.06

2:1 4:1 5.2:1 2:1

745.40

STA. 30+00
EL. 749.69

℄

09-DEC-2004 08:38
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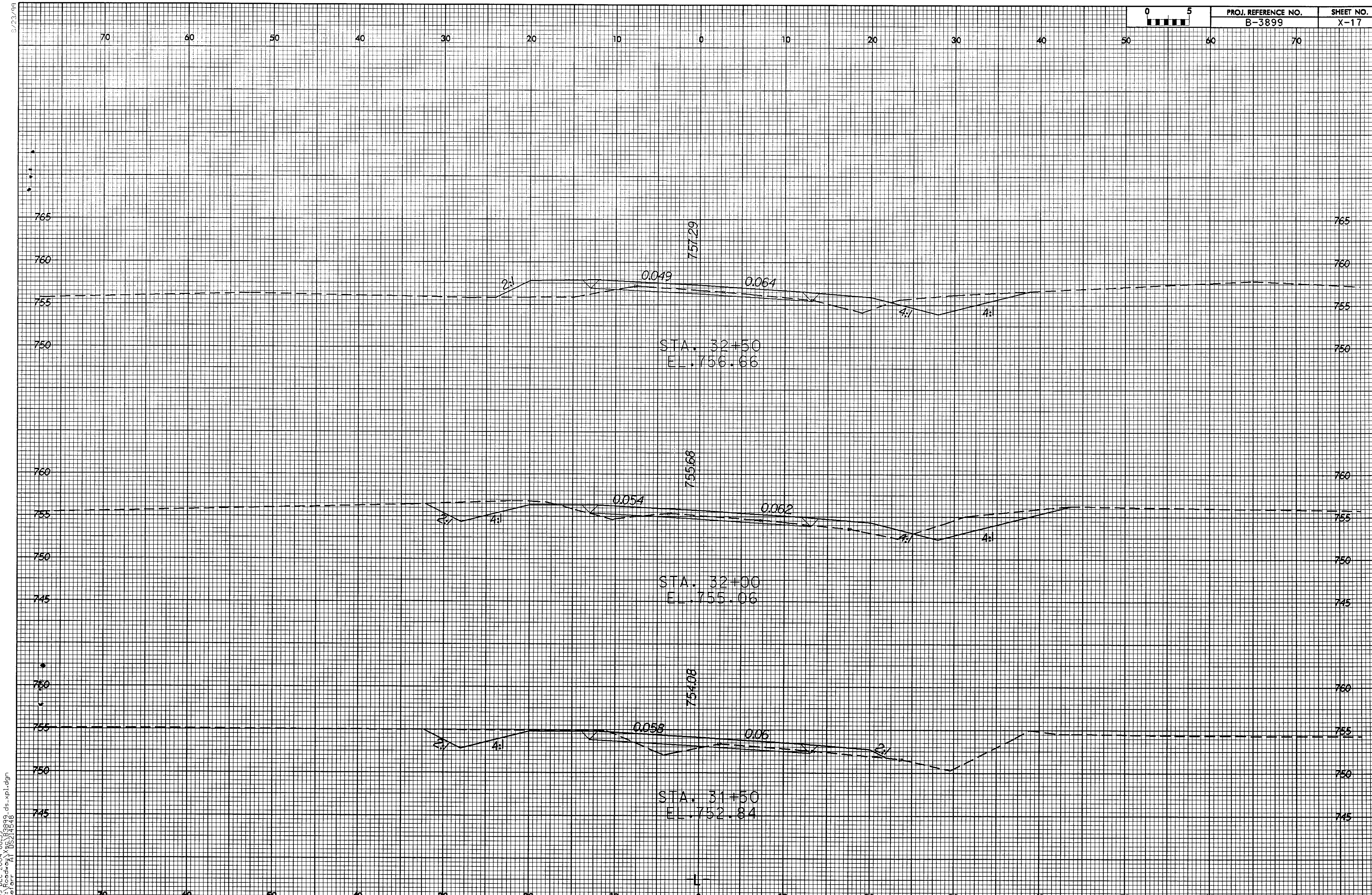
bcarr

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

PROJ. REFERENCE NO.	SHEET NO.
B-3899	X-17



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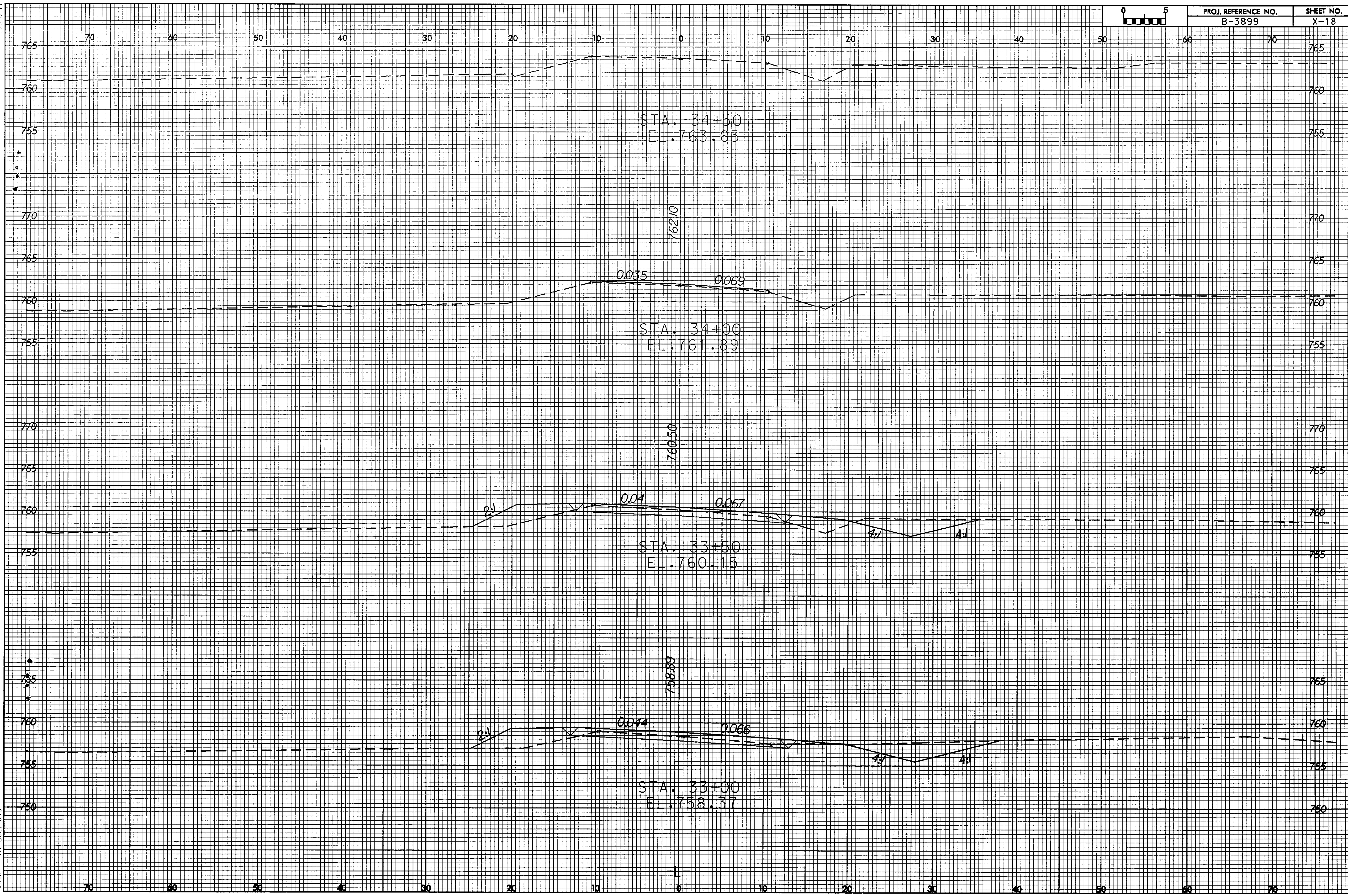
PROJ. REFERENCE NO.	SHEET NO.
B-3899	X-18



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tefarr AT DS214548