STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

October 19, 2004

US Army Corps of Engineers
Regulatory Branch
6508 Falls of the Neuse Road/ Suite 120
Raleigh, NC 27615

ATTENTION: Mr. John T. Thomas, Jr.
NCDOT Coordinator

Dear Sir:

Subject: **Nationwide 33 Permit Application** for the replacement of Bridge No. 55 over Belews Lake Spillway on SR 1138 (Lindsey Bridge Road), Rockingham County. Federal Aid Project No. BRZ-1138 (9), State Project No. 8.2510801, Division 7, TIP No. B-3694, WBS #33234.1.1.

Please find enclosed copies of the project planning report, permit drawings, and ½ size plans for the above referenced project. The document states that Bridge No. 55 was constructed in 1961 over Belews Lake Spillway and will be replaced on a new location. The new structure will placed approximately 50 feet upstream (south) of the existing structure. The approach length is approximately 1440 feet total with approximately 970 feet east of the crossing and 470 feet west of the crossing. The new structure will be approximately 167 ft long as shown in the permit drawings. During construction, traffic will be maintained on the existing structure.

IMPACTS TO WATERS OF THE UNITED STATES

GENERAL DESCRIPTION: This project is located in the Roanoke River Basin within USGS hydrologic unit 03010103 (sub-basin 03-02-01). The proposed bridge replacement is located over Belews Lake Spillway (DWQ Index no. 22-27-(7.5), which has been assigned a Division of Water Quality best usage classification of "WS-IV".

PERMANENT IMPACTS: No streams or wetlands will be permanently impacted as a result of this project.

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

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

WEBSITE: WWW.NCDOT.ORG

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

TEMPORARY IMPACTS: Temporary surface water impacts of 0.02 acre are anticipated due to the construction of two temporary work pads. No temporary wetland impacts are anticipated as a result of this project.

BRIDGE DEMOLITION: Bridge No. 55 is a five-span two-lane structure that consists of pre-cast pre-stressed concrete channels. The end bents and interior bents consist of pre-cast pre-stressed concrete caps and timber piles. Bent #1 consists of a steel cap and pile crutch. The overall length of the structure is 151 feet. The clear roadway width is 24'-1". During removal of the existing bridge, the bridge rails will be removed without dropping them into waters of the United States. It is anticipated that the bridge railings and substructure will be removed without dropping components into Waters of the United States. All guidelines for bridge demolition and removal will be followed in addition to Best Management Practices for the Protection of Surface Waters and BMP's for Bridge Demolition and Removal.

This project falls under Case 2 of the Best Management Practices for Bridge Demolition and Removal. Case 2 "allows no work at all in the water during moratorium periods associated with fish migration, spawning, and larval recruitment into nursery areas". The moratorium period is in regards to the healthy sunfish population in Belews Lake and extends from April 1 to May 31.

UTILITIES: No impacts to utilities are anticipated as a result of demolition or construction.

MITIGATION

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

AVOIDANCE AND MINIMIZATION: The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize jurisdictional impacts, and to provide full compensatory mitigation of all remaining, unavoidable jurisdictional impacts.

- No in-water work will be performed from April 1 to May 31.
- High Quality Sedimentation and Erosion Control Measures will be used.
- No bents will be placed in the stream.
- Preformed scour holes will be constructed to diffuse stormwater runoff.

COMPENSATORY MITIGATION: The Department has avoided and minimized impacts to jurisdictional resources to the greatest extent possible as described above. There are no permanent impacts from this project to streams or wetlands that require mitigation.

FEDERALLY-PROTECTED SPECIES

Plants and animals with federal classifications of Endangered, Threatened, Proposed Endangered, and Proposed Threatened are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. As of February 25, 2003 the Fish and Wildlife Service (FWS) lists four federally protected species for Rockingham and Stokes County (Table 1).

Field surveys were conducted for each species by NCDOT staff. On August 17, 2001 a field survey was conducted for James spinymussel 400 feet downstream to 100 feet upstream from the project site with no specimens observed. On July 17, 2001 (the blooming season lasts from late May to July) a systematic field survey was conducted for smooth coneflower within the power line easement and along the road shoulders (considered suitable habitat). No individuals of any *Echinacea* species were documented within the study corridor. A field survey was conducted for Schweinitz's sunflower on September 19, 2001. The study corridor contains suitable habitat for Schweinitz's sunflower, but no individuals were observed. A systematic field survey (date unknown) was also conducted along the moist portions of the Piedmont/Mountain Levee Forest, stream banks, and sandbars within the study corridor for Small-anthered bittercress. No specimens were observed during the survey.

A biological conclusion of "No Effect" has been rendered for James spinymussel, smooth coneflower, small-anthered bittercress, and Schweinitz's sunflower.

Table 1- Federally Protected Species of Rockingham and Stokes County

Common Name	Scientific Name	Federal Status	County	Biological Conclusion
James spinymussel	*Pleurobema collina*	E	R/S	No Effect
Smooth coneflower	*Echinacea laevigata*	E	R	No Effect
Small-anthered bittercress	*Cardamine micranthera*	E	S	No Effect
Schweinitz's sunflower	*Helianthus schweinitzii*	E	S	No Effect

REGULATORY APPROVALS

It is anticipated that the construction of the temporary work pads will be authorized under Section 404 Nationwide Permit 33 (Temporary Construction Access and Dewatering). We are, therefore, requesting the issuance of a Nationwide Permit 33 authorizing construction of the causeway. We anticipate a 401 General Water Quality Certification number 3366 will apply to this project and will adhere to the general conditions of WQC 3366. In accordance with 15A NCAC 2H .0501(a) we are providing two copies of this

application to the North Carolina Department of Environment and Natural Resources, Division of Water Quality, for their records.

If you have any questions or need additional information, please contact Jon Scott at (919) 715-1340.

Sincerely,

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

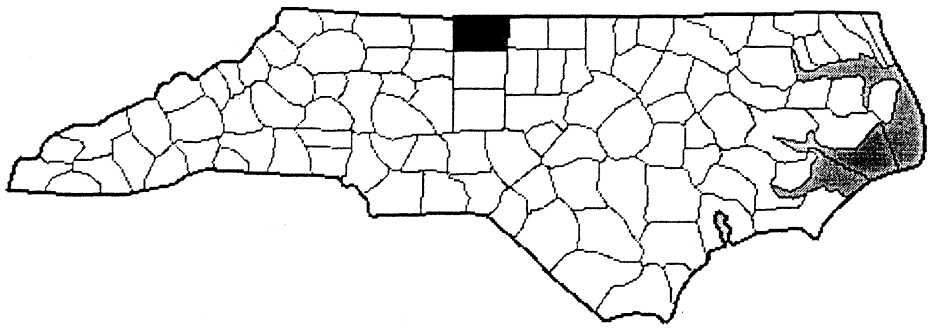
w/attachment

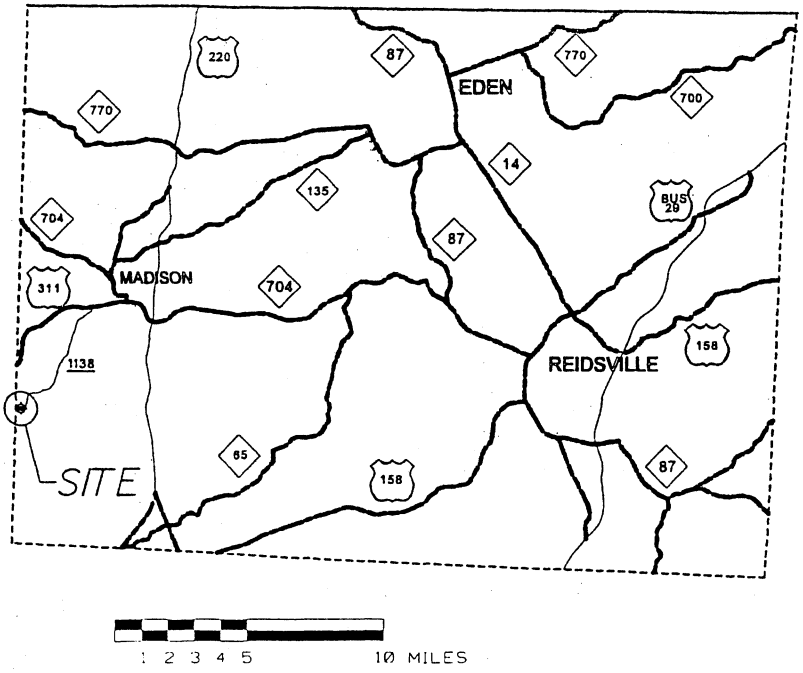
Mr. John Hennessy, Division of Water Quality (2 copies)
Mr. Travis Wilson, NCWRC
Mr. Gary Jordan, USFWS
Dr. David Chang, P.E., Hydraulics
Mr. Greg Perfetti, P.E., Structure Design
Mr. J. M. Mills, P.E.
Mr. Jerry Parker, DEO

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
Mr. Elmo Vance, PDEA Engineer
Mr. David Franklin, USACE, Wilmington
Ms. Beth Harmon, EEP

NORTH CAROLINA





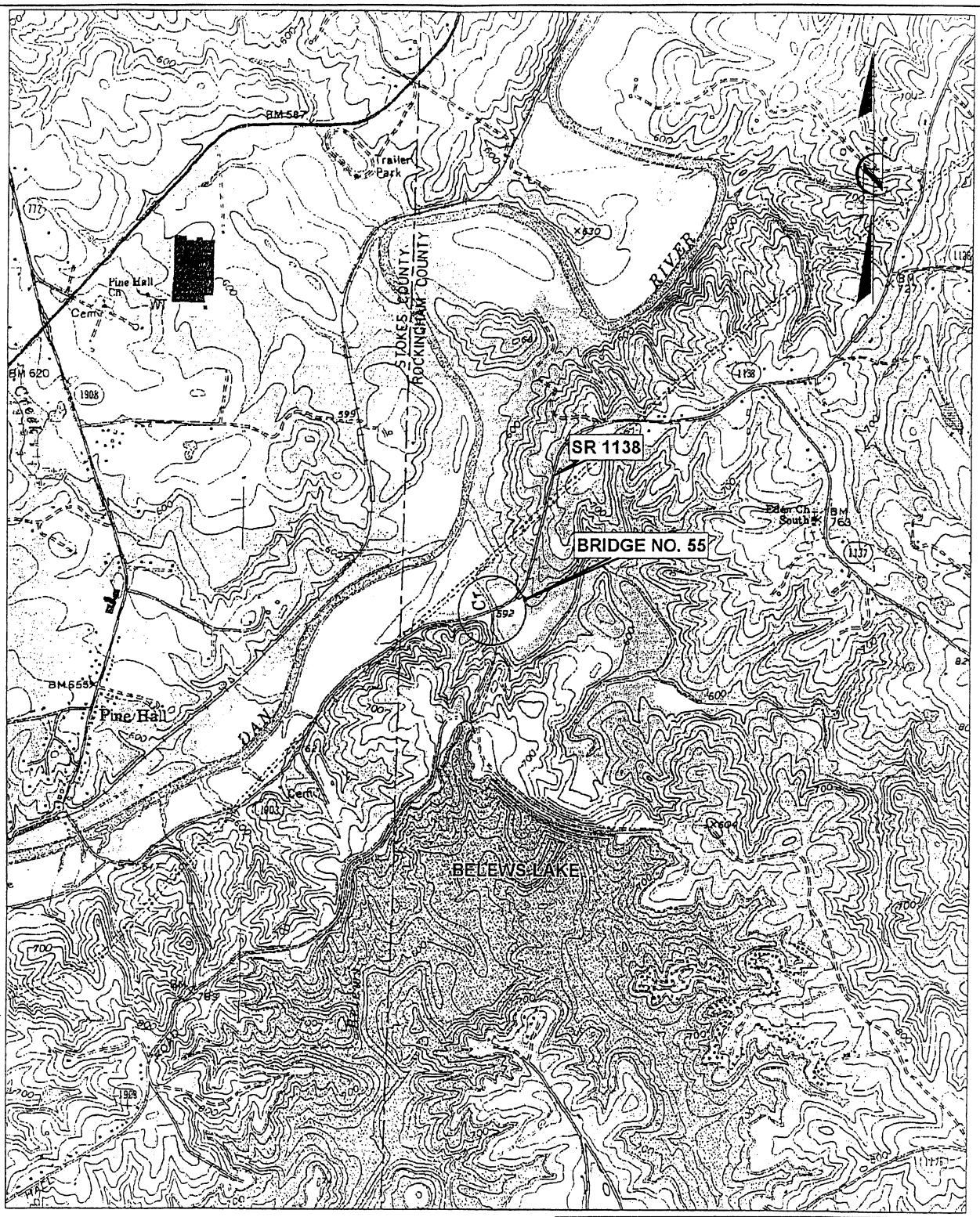
VICINITY MAP

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

PROJECT: 8.2510801 - B-3694

REPLACE BRIDGE NO. 55
OVER BELEWS LAKE SPILLWAY
ON SR 1134 (LINDSEY BRIDGE RD.)

SHEET 1 OF 7 **APRIL 2004**



SITE MAP

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

ROCKINGHAM COUNTY

PROJECT: 8.2510801 - B-3694

BRIDGE #55 OVER
BELEWS LAKE SPILLWAY
ON SR 1134 (LINDSEY BRIDGE RD.)

SHEET 2 OF 7 APRIL 2004

8/17/99

REVISIONS

English

PROJECT REFERENCE NO.	SHEET NO.
B-3694	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Sheet 3 of 7

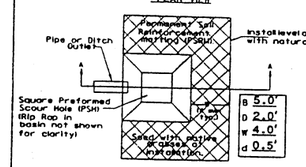
-L-
PI Sta 21+72.25
Δ = 68° 51' 04.4" (LT)
D = 6° 44' 26.4"
L = 1,021.43'
T = 582.57'
R = 850.00'*
SE = 0.06
RO = SEE PLANS
DS = 40mph **

NAD 83
NC GRID

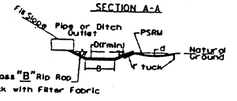
DETAIL A
PREFORMED SCOUR HOLE

USE AT THE FOLLOWING LOCATIONS:
-L- 16+06 LT
-L- 16+20 RT
-L- 18+00 RT

PLAN VIEW



SECTION A-A



EST. PSRM: 34 SY
EST. CL "B' RIP RAP: 10 TONS
EST. FILTER FABRIC: 26 SY

10/10/0

DUKE POWER
H-FRAME

FALLOW

WOODS

DEPRESSION DITCH

FALLOW

PREFORMED SCOUR HOLE (PSH)
SEE DETAIL 'A'

-L- PC 15+89.69

TOP OF BANK

TOP OF BANK

BELLEWS CREEK

MATCHLINE SEE SHEET 5 -L- Sta 20+00

N 82° 39' 13" E
Lindsay Bridge Rd. SR 1138
20' PAVED ROADWAY
18"RCP

2GI W.M.S. GRATE
1B TRAFFIC BEARING

-L- POT Sta 10+00.00

"V" DITCH BEHIND RETAINING WALL SEE DETAIL 'B'

TEMP. ACCESS RD.

2GI W.M.S. FLAT GRATE

CONC. BRIDGE DECK WITH ASPHALT OVERLAY WOOD BENTS WITH CONC. CAPS

GUARDRAIL

20' PAVED ROADWAY

TEMP. ACCESS RD.

2GI W.M.S. FLAT GRATE

-L-

PSH SEE DETAIL 'F'

WORK PAD #1

WORK PAD

15"CSP WITH ELBOWS

2GI W.M.S. FLAT GRATE

CL "B" RIP RAP EST. 5 TONS EST. 10 SY F.F.

SPECIAL DITCH SEE DETAIL "C"

TOP OF BANK

PSH SEE DETAIL 'A'

TOP OF BANK

WOODS

BASE DITCH SEE DETAIL 'D'

CL "B" RIP RAP EST. 2 TONS EST. 7 SY F.F.

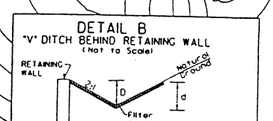
OLD CONC BENTS

70' DUKE POWER CO. EASEMENT

OLD CONC BENTS

WOODS

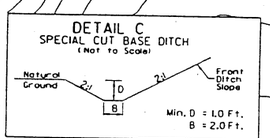
DETAIL B
"V" DITCH BEHIND RETAINING WALL
(Not to Scale)



Min. D = 1.0 Ft.
Max. d = 1.0 Ft.
Type of Liner = CL "B" RIP RAP

-L- STA. 11+20+/- TO 15+40+/- RT
EST. CL "B" RIPRAP = 154 TONS
EST. F.F. = 460 SY

DETAIL C
SPECIAL CUT BASE DITCH
(Not to Scale)

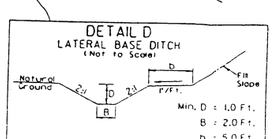


Min. D = 1.0 Ft.
B = 2.0 Ft.

-L- STA. 15+40+/- TO 16+15+/- RT

BRIDGE/ROADWAY RELATIONSHIP SKETCH

DETAIL D
LATERAL BASE DITCH
(Not to Scale)



Min. D : 1.0 Ft.
B : 2.0 Ft.
D : 5.0 Ft.

-L- STA. 18+00 TO 21+20 RT
EST. DDE: 528 CY

TS TS DENOTES TEMPORARY FILL IN SURFACE WATER

DENOTES PAVED SHOULDERS, RETAINING WALL & SHOULDER BERM GUTTER

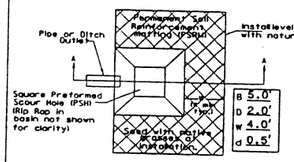
TGS ENGINEERS
SUITE 141
975 WALNUT STREET
CARY, NC 27511
PH (919) 319-8850

8/17/99

REVISIONS

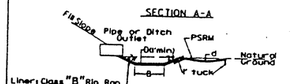
DETAIL A
PREFORMED SCOUR HOLE

PLAN VIEW



USE AT THE FOLLOWING LOCATIONS:
-L- 16+06 LT
-L- 16+20 RT
-L- 18+00 RT

SECTION A-A



EST. PSRM: 34 SY
EST. CL "B" RIP RAP: 10 TONS
EST. FILTER FABRIC: 26 SY

10/10/01

-L-
PI Sta 21+72.25
Δ = 68° 51' 04.4" (LT)
D = 6° 44' 26.4"
L = 1021.43'
T = 582.57'
R = 850.00'*
SE = 0.06
RO = SEE PLANS
DS = 40mph **

NAD 83
NC GRID

English

PROJECT REFERENCE NO.	SHEET NO.
B-3694	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Sheet 4 of 7

DUKE POWER
H-FRAME

FALLOW

WOODS

10+00

DEPRESSION DITCH

N 82° 39' 13" E
Lindsay Bridge Rd. SR 1138

20' PAVED ROADWAY

18"RCP

2GI WM.S. GRATE

JB TRAFFIC BEARING

-L- POT 10+00.00

"Y" DITCH BEHIND RETAINING WALL SEE DETAIL 'B'

18"RCP

3 2GI WM.S. FLAT GRATE

CL "B" RIP RAP EST. 3 TONS EST. 10 SY F.F.

SPECIAL DITCH SEE DETAIL "C"

15+00

FALLOW

PREFORMED SCOUR HOLE (PSH) SEE DETAIL 'A'

-L- PC 15+89.69

TEMP. ACCESS RD.

2GI WM.S. FLAT GRATE

4

5

15" RCP

PSH SEE DETAIL 'A'

WORK PAD #1

WORK PAD #2

TOP OF BANK

BELEWS CREEK

TOP OF BANK

TOP OF BANK

CONC. BRIDGE DECK WITH ASPHALT OVERLAY. WOOD BENTS WITH CONC. CAPS BRIDGE #5

TEMP. ACCESS RD.

20' PAVED ROADWAY

6 2GI WM.S. FLAT GRATE

15" CSP WITH ELBOWS

PSH SEE DETAIL 'A'

TOP OF BANK

WOODS

BASE DITCH SEE DETAIL 'D'

CL "B" RIP RAP EST. 7 SY F.F.

TO DUKE POWER CO. EASEMENT

OLD CONC BENTS

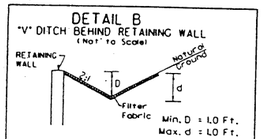
OLD CONC BENTS

WOODS

20+00

MATCHLINE SEE SHEET 5 -L- Sta. 20+00

DETAIL B
"V" DITCH BEHIND RETAINING WALL
(Not to Scale)

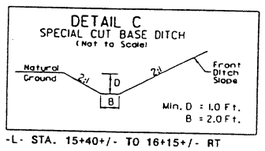


Min. D = 1.0 Ft.
Max. d = 1.0 Ft.

Type of Liner : CL "B" RIP RAP

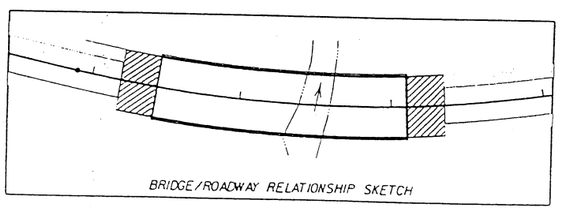
-L- STA. 11+20+/- TO 15+40+/- RT
EST. CL "B" RIPRAP = 154 TONS
EST. F.F. = 460 SY

DETAIL C
SPECIAL CUT BASE DITCH
(Not to Scale)



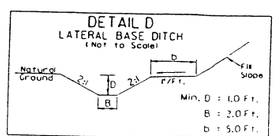
Min. D = 1.0 Ft.
B = 2.0 Ft.

-L- STA. 15+40+/- TO 16+15+/- RT



BRIDGE/ROADWAY RELATIONSHIP SKETCH

DETAIL D
LATERAL BASE DITCH
(Not to Scale)



Min. D = 1.0 Ft.
B = 2.0 Ft.
b = 5.0 Ft.

-L- STA. 18+00 TO 21+20 RT
EST. DDE: 528 CY

DENOTES TEMPORARY FILL IN SURFACE WATER

DENOTES PAVED SHOULDERS, RETAINING WALL & SHOULDER BERM GUTTER

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975 WALNUT STREET
CARY, NC 27511
PH (919) 319-8850

PROJECT REFERENCE NO.	SHEET NO.
B-3694	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

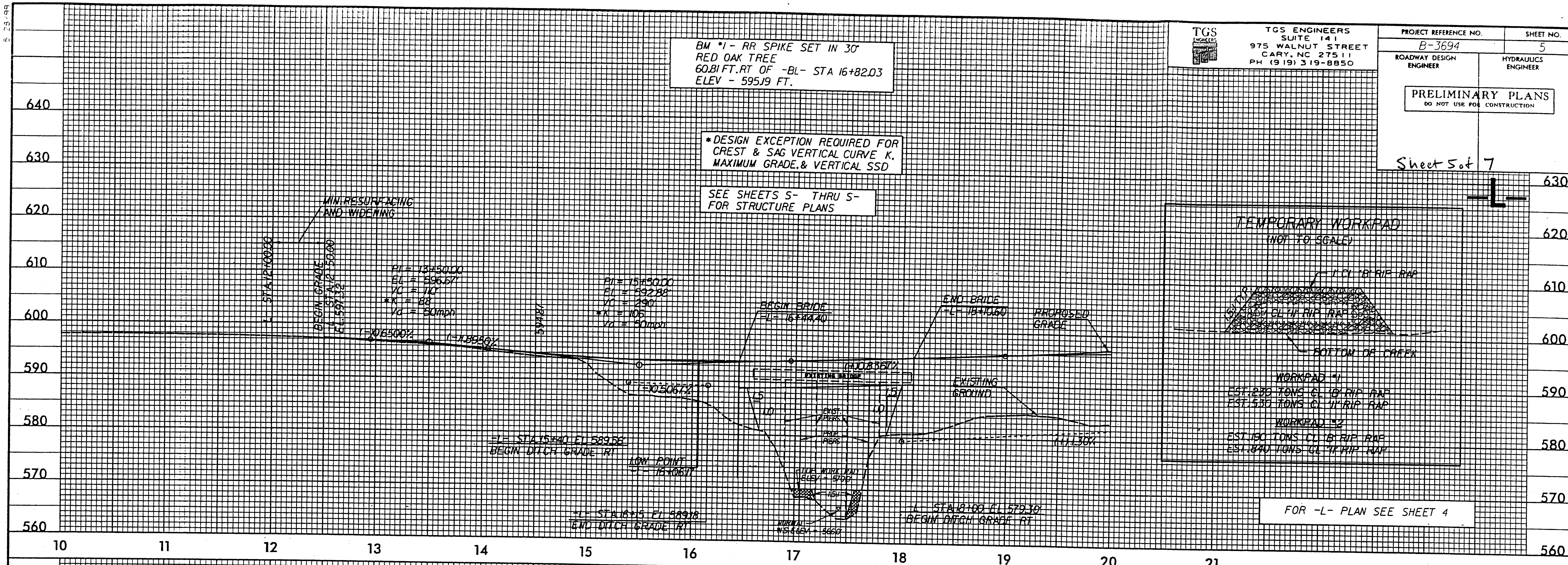
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Sheet 5 of 7

BM #1 - RR SPIKE SET IN 30" RED OAK TREE
60.81 FT. RT OF -BL- STA 16+82.03
ELEV - 595.19 FT.

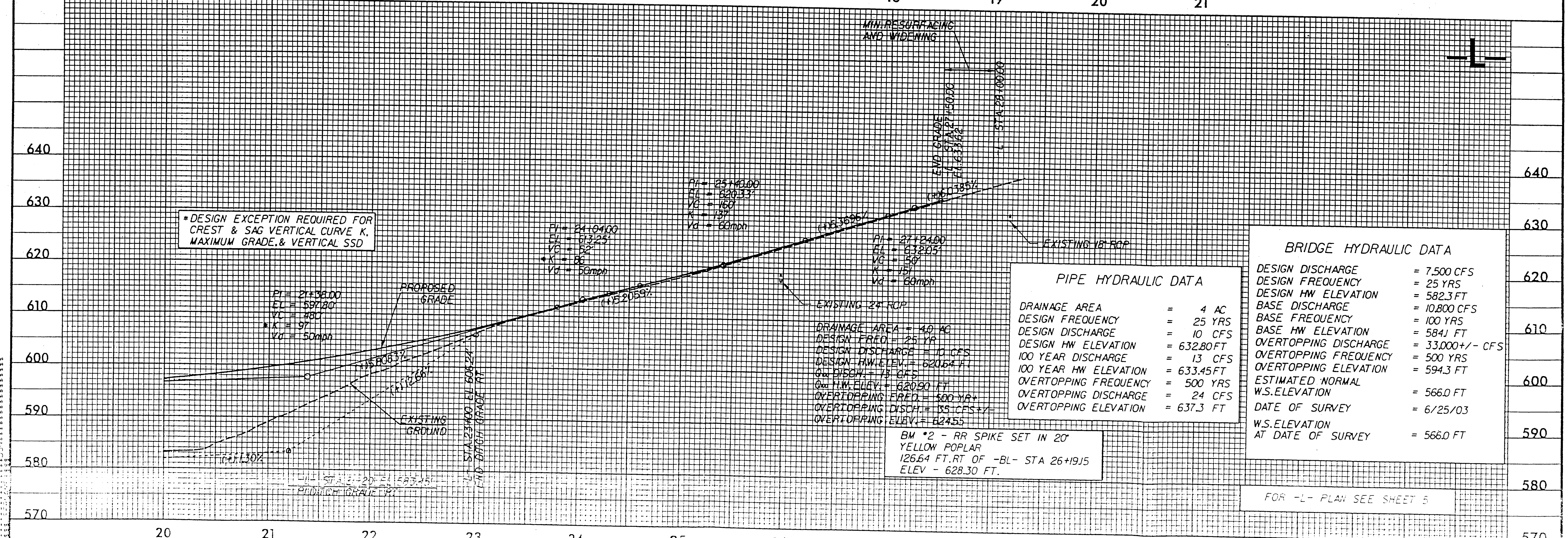
*DESIGN EXCEPTION REQUIRED FOR CREST & SAG VERTICAL CURVE K. MAXIMUM GRADE & VERTICAL SSD

SEE SHEETS S- THRU S- FOR STRUCTURE PLANS



-L-
MIN. RESURFACING AND WIDENING
-L- STA 12+00.00
BEGIN GRADE -L- STA 12+50.00 EL 597.32
PI = 13+50.00
EL = 596.57
VC = 110
*K = 86
Vd = 50mph
(-) 0.6500%
(-) 1.8950%
PI = 15+50.00
EL = 592.86
VC = 290
*K = 106
Vd = 50mph
(-) 0.5067%
BEGIN BRIDGE -L- 16+44.40
END BRIDGE -L- 18+10.60
(+) 0.8857%
EXISTING BRIDGE
PROPOSED GRADE
EXISTING GROUND
(+) 1.30%
-L- STA 15+40 EL 589.56 BEGIN DITCH GRADE RT
LOW POINT -L- 16+06.17
-L- STA 16+15 EL 589.18 END DITCH GRADE RT
NORMAL W.S. ELEV. = 566.0
-L- STA 18+00 EL 579.30 BEGIN DITCH GRADE RT
TEMPORARY WORKPAD (NOT TO SCALE)
1' CL 'B' RIP RAP
CL 'II' RIP RAP
BOTTOM OF CREEK
WORKPAD #1
EST. 230 TONS CL 'B' RIP RAP
EST. 530 TONS CL 'II' RIP RAP
WORKPAD #2
EST. 180 TONS CL 'B' RIP RAP
EST. 840 TONS CL 'II' RIP RAP
FOR -L- PLAN SEE SHEET 4

*DESIGN EXCEPTION REQUIRED FOR CREST & SAG VERTICAL CURVE K. MAXIMUM GRADE & VERTICAL SSD



-L-
MIN. RESURFACING AND WIDENING
END GRADE -L- STA 27+50.00 EL 633.62
-L- STA 28+00.00
PI = 21+38.00
EL = 597.80
VC = 480
*K = 97
Vd = 50mph
PROPOSED GRADE
(+) 5.8083%
(+) 1.2561%
EXISTING GROUND
(+) 1.30%
-L- STA 23+00 EL 606.24 END DITCH GRADE RT
PI = 24+04.00
EL = 613.25
VC = 52
*K = 86
Vd = 50mph
(+) 5.2059%
PI = 25+40.00
EL = 620.33
VC = 160
K = 137
Vd = 60mph
(+) 6.3596%
PI = 27+24.00
EL = 632.05
VC = 50
K = 151
Vd = 60mph
(+) 3.385%
EXISTING 18" RCP
EXISTING 24" RCP
DRAINAGE AREA = 4.0 AC
DESIGN FREQ. = 25 YR
DESIGN DISCHARGE = 10 CFS
DESIGN H.W. ELEV. = 620.64 FT
Q100 DISCH. = 13 CFS
Q100 H.W. ELEV. = 620.90 FT
OVERTOPPING FREQ. = 500 YR+
OVERTOPPING DISCH. = 35 CFS+/-
OVERTOPPING ELEV. = 624.55
FOR -L- PLAN SEE SHEET 5

PIPE HYDRAULIC DATA

DRAINAGE AREA	= 4 AC
DESIGN FREQUENCY	= 25 YRS
DESIGN DISCHARGE	= 10 CFS
DESIGN HW ELEVATION	= 632.80 FT
100 YEAR DISCHARGE	= 13 CFS
100 YEAR HW ELEVATION	= 633.45 FT
OVERTOPPING FREQUENCY	= 500 YRS
OVERTOPPING DISCHARGE	= 24 CFS
OVERTOPPING ELEVATION	= 637.3 FT

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 7,500 CFS
DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 582.3 FT
BASE DISCHARGE	= 10,800 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 584.1 FT
OVERTOPPING DISCHARGE	= 33,000+/- CFS
OVERTOPPING FREQUENCY	= 500 YRS
OVERTOPPING ELEVATION	= 594.3 FT
ESTIMATED NORMAL W.S. ELEVATION	= 566.0 FT
DATE OF SURVEY	= 6/25/03
W.S. ELEVATION AT DATE OF SURVEY	= 566.0 FT

BM #2 - RR SPIKE SET IN 20" YELLOW POPLAR
126.64 FT. RT OF -BL- STA 26+19.15
ELEV - 628.30 FT.

IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation In Wetlands (ac)	Mechanized Clearing (Method III) (ac)	Fill In SW (Natural) (ac)	Fill In SW (Pond) (ac)	Temp. Fill In SW (ac)	Existing Channel Impacted (ft)	Enclosed Channel (ft)
1	-L- 17+00 (Work Pad # 1)	Temp. Rock Work Pad							No impacts		
2	-L- 17+65 (Work Pad # 2)	Temp. Rock Work Pad							0.02		
	TOTALS								0.02		

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

ROCKINGHAM COUNTY

PROJECT: 8.2510801 (B-3694)

PROPERTY OWNER

NAME AND ADDRESS

OWNER'S NAME	ADDRESS
DUKE POWER COMPANY	P.O. BOX 1244, CHARLOTTE, NC 28201

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

ROCKINGHAM COUNTY

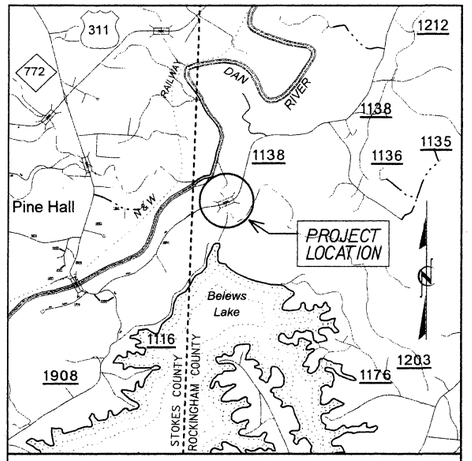
PROJECT: 8.2510801 - B-3694

04/08/99

TIP PROJECT: B-3694

CONTRACT:

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



VICINITY MAP

90% PLANS SUBMITTAL

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

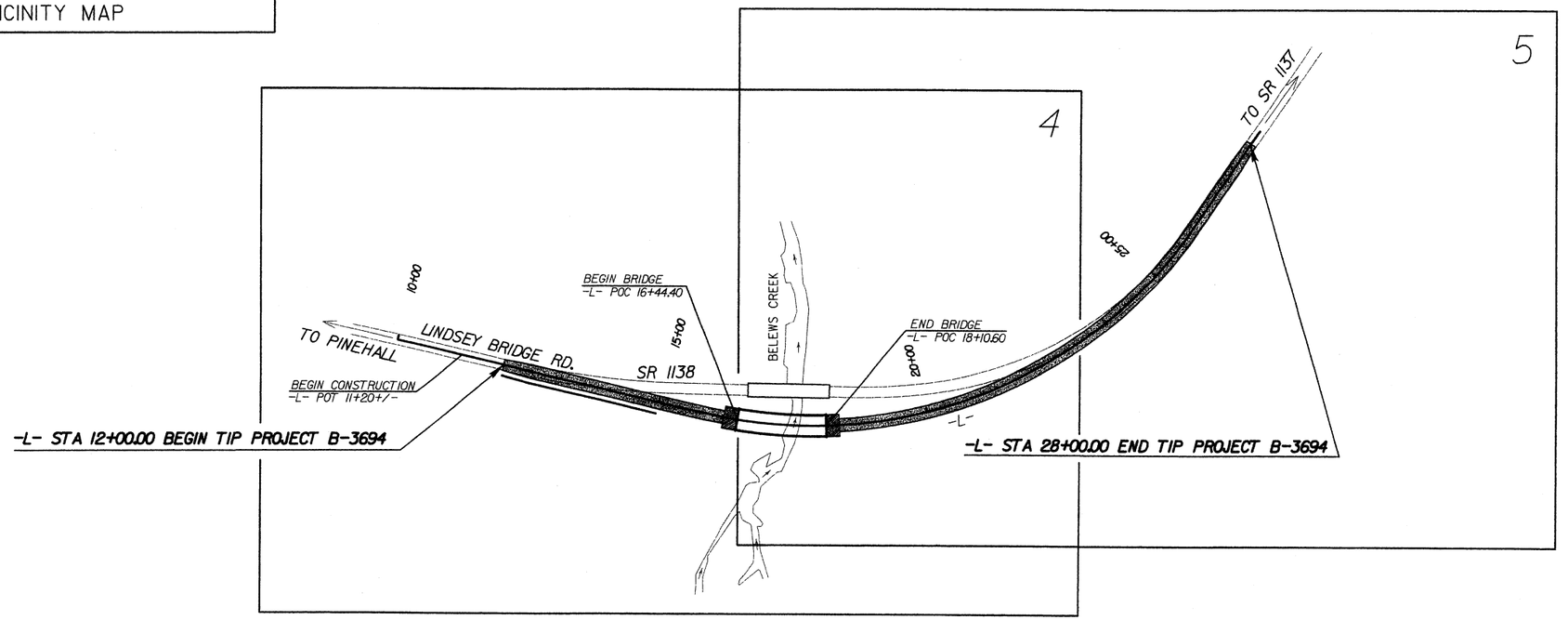
ROCKINGHAM COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-3694	1	

STATE WBS NO.	F. A. PROJ. NO.	DESCRIPTION
33234.1.1	BRZ-1138(9)	PE
33234.2.2	BRZ-1138(9)	RW, UTIL.

LOCATION: BRIDGE NO. 55 OVER BELEWS LAKE SPILLWAY ON SR 1138 (LINDSEY BRIDGE ROAD)

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



PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2005 = 1,650
ADT 2025 = 2,500
DHV = 10 %
D = 60 %
T = 3 % *
V = 60 MPH
* (TTST 1% + DUAL 2%)

DESIGN EXCEPTION REQ'D FOR: MAXIMUM GRADE, MIN. HORIZONTAL CURVE RADIUS, SAG & CREST VERTICAL CURVE K, HORIZONTAL SSD, & VERTICAL SSD

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-3694 = 0.272 MI
LENGTH STRUCTURE TIP PROJECT B-3694 = 0.031 MI
TOTAL LENGTH TIP PROJECT B-3694 = 0.303 MI

PLANS PREPARED BY:

TGS ENGINEERS
SUITE 141
975 WALNUT STREET
CARY, NC 27511
PH (919) 319-8850

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MARCH 31, 2004

LETTING DATE:
MARCH 15, 2005

NCDOT CONTACT: *TERESA BRUTON, PE*
PROJECT ENGINEER - DESIGN SERVICES

PLANS PREPARED FOR:

DIVISION OF HIGHWAYS
1000 Birch Ridge Dr.
Raleigh, NC 27610

CHARLES L. FLOWE, PE
PROJECT ENGINEER

W. CRAIG PARKER, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE DESIGN ENGINEER P.E.

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

PROJECT REFERENCE NO.	SHEET NO.
B-3694	1-A

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
B-3694	1-B

*S.U.E = SUBSURFACE UTILITY ENGINEER

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

ROADS & RELATED ITEMS

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

RIGHT OF WAY

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

HYDROLOGY

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

STRUCTURES

MAJOR

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

MINOR

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

UTILITIES

- Exist. Pole
- Exist. Power Pole
- Prop. Power Pole
- Exist. Telephone Pole
- Prop. Telephone Pole
- Exist. Joint Use Pole
- Prop. Joint Use Pole
- Telephone Pedestal — T
- U/G Telephone Cable Hand Hold — HH
- Cable TV Pedestal — C
- U/G TV Cable Hand Hold — HH
- U/G Power Cable Hand Hold — HH
- Hydrant
- Satellite Dish
- Exist. Water Valve
- Sewer Clean Out
- Power Manhole — P
- Telephone Booth
- Cellular Telephone Tower
- Water Manhole — W
- Light Pole
- H-Frame Pole
- Power Line Tower
- Pole with Base
- Gas Valve
- Gas Meter
- Telephone Manhole — T
- Power Transformer
- Sanitary Sewer Manhole — S
- Storm Sewer Manhole — S
- Tank; Water, Gas, Oil
- Water Tank With Legs
- Traffic Signal Junction Box — S
- Fiber Optic Splice Box — F
- Television or Radio Tower
- Utility Power Line Connects to Traffic Signal Lines Cut Into the Pavement — TS TS

- Recorded Water Line — W W
- Designated Water Line (S.U.E.*) — W W
- Sanitary Sewer — SS SS
- Recorded Sanitary Sewer Force Main — FSS FSS
- Designated Sanitary Sewer Force Main(S.U.E.*) — FSS FSS
- Recorded Gas Line — G G
- Designated Gas Line (S.U.E.*) — G G
- Storm Sewer — S S
- Recorded Power Line — P P
- Designated Power Line (S.U.E.*) — P P
- Recorded Telephone Cable — T T
- Designated Telephone Cable (S.U.E.*) — T T
- Recorded U/G Telephone Conduit — TC TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC TC
- Unknown Utility (S.U.E.*) — ?UTL ?UTL
- Recorded Television Cable — TV TV
- Designated Television Cable (S.U.E.*) — TV TV
- Recorded Fiber Optics Cable — FO FO
- Designated Fiber Optics Cable (S.U.E.*) — FO FO
- Exist. Water Meter — 0
- U/G Test Hole (S.U.E.*) — ATTUR
- Abandoned According to U/G Record
- End of Information — E.O.I.

BOUNDARIES & PROPERTIES

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

BUILDINGS & OTHER CULTURE

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

TOPOGRAPHY

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

VEGETATION

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

RAILROADS

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

revised 02/02/00

PROJECT REFERENCE NO.	SHEET NO.
B-3694	1-C
LOCATION AND SURVEYS	

SURVEY CONTROL SHEET B-3694

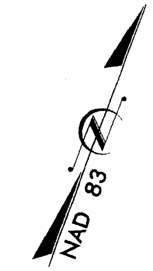
NOTES

1. THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:

   HTTP:\WWW.DOH.DOT.STATE.NC.US/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT/

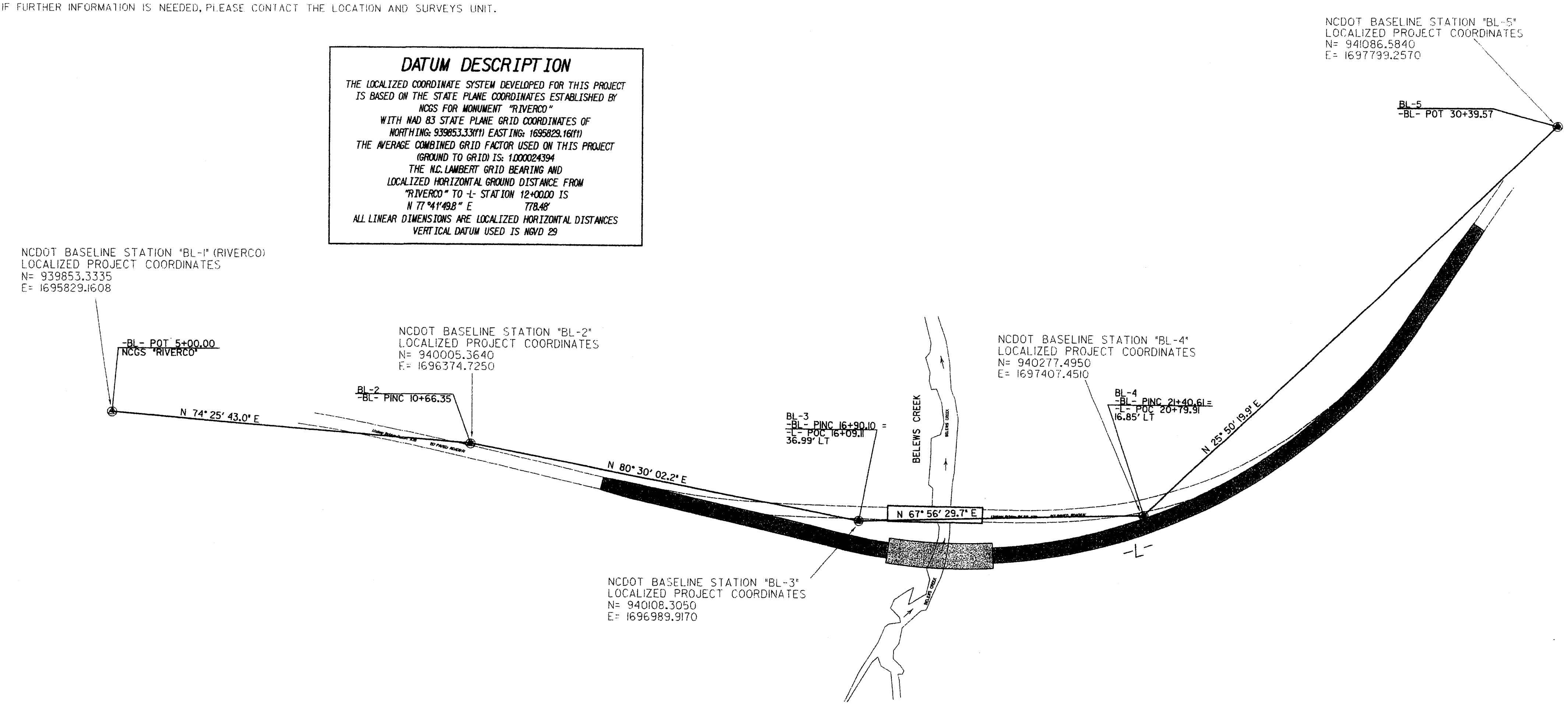
   FILE: B3694_LS_CONTROL_031215.TXT

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



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT
IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY
NCGS FOR MONUMENT "RIVERCO"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 939853.33(ft) EASTING: 1695829.16(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT
(GROUND TO GRID) IS: 1.000024394
THE N.C. LAMBERT GRID BEARING AND
LOCALIZED HORIZONTAL GROUND DISTANCE FROM
"RIVERCO" TO -L- STATION 12+00.00 IS
N 77°41'49.8" E 778.48'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29



BL

POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
1	BL-1	939853.3335	1695829.1608	592.26	OUTSIDE PROJECT LIMITS	
2	BL-2	940005.3640	1696374.7250	596.87	OUTSIDE PROJECT LIMITS	
3	BL-3	940108.3050	1696989.9170	592.41	16+09.11	36.99 LT
4	BL-4	940277.4950	1697407.4510	595.99	20+79.91	16.85 LT
5	BL-5	941086.5840	1697799.2570	646.22	OUTSIDE PROJECT LIMITS	

40 ELEVATION = 595.15
N 940047 E 1696992
L STATION 16+02 24 RIGHT
R/R SPIKE IN BASE OF RED OAK

41 ELEVATION = 628.30
N 940653 E 1697730
L STATION 25+68 51 RIGHT
R/R SPIKE IN ROOT OF YELLOW POPLAR

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT
IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY
NCGS FOR MONUMENT "RIVERCO"
WITH NAD 83 STATE PLANE GRID COORDINATES OF
NORTHING: 939853.33(ft) EASTING: 1695829.16(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT
(GROUND TO GRID) IS: 1.000024394
THE N.C. LAMBERT GRID BEARING AND
LOCALIZED HORIZONTAL GROUND DISTANCE FROM
"RIVERCO" TO -L- STATION 10+00 IS
N 75°59'19" E 579.49'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

◎ INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.

PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.

NETWORK ESTABLISHED FROM NGS ONLINE POSITIONING USER SERVICE (OPUS)

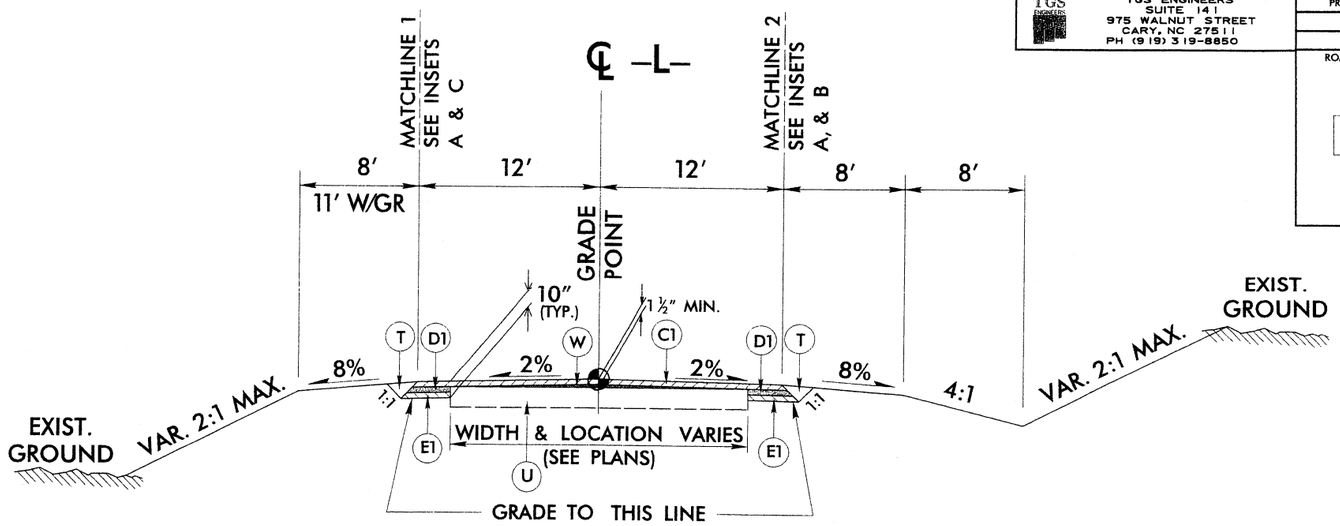
SEE GPS CALIBRATION SHEET FOR HORIZONTAL AND VERTICAL COORDINATE VALUES.

NOTE: DRAWING NOT TO SCALE

5/14/99

PAVEMENT SCHEDULE	
C1	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 168 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 112 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 1¼" IN DEPTH OR GREATER THAN 1½" IN DEPTH.
D1	PROP. APPROX. 4" ASPHALT CONCRETE INTER. COURSE. TYPE I19.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTER. COURSE. TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2¼" IN DEPTH OR GREATER THAN 4" IN DEPTH.
E1	PROP. APPROX. 3" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5½" IN DEPTH
R1	CONCRETE EXPRESSWAY GUTTER.
R2	SHOULDER BERM GUTTER.
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
W	WEDGING EXISTING PAVEMENT (SEE DETAIL ON THIS SHEET).

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

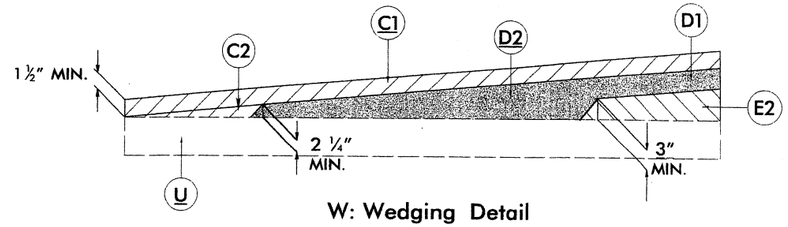


TYPICAL SECTION NO. 1

USE TYPICAL SECTION NO. 1 AS FOLLOWS:

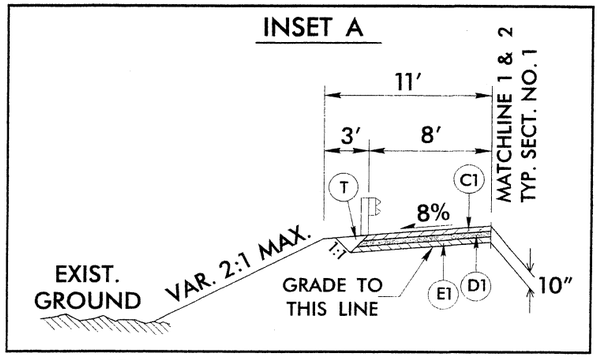
–L– Sta. 12+00.00 TO –L– Sta. 16+45+/– (BEGIN BRIDGE)
–L– Sta. 18+10+/– (END BRIDGE) TO –L– Sta. 28+00.00

NOTE: ALL NEW PAVEMENT – NO WIDENING
–L– Sta. 14+75+/– TO –L– Sta. 22+25+/–



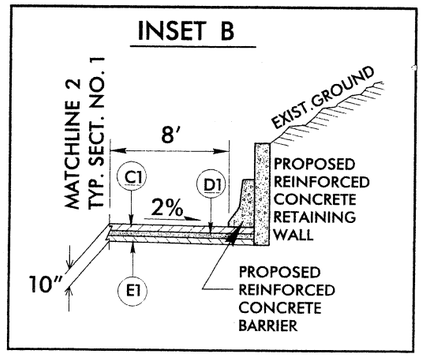
W: Wedging Detail

INSET A



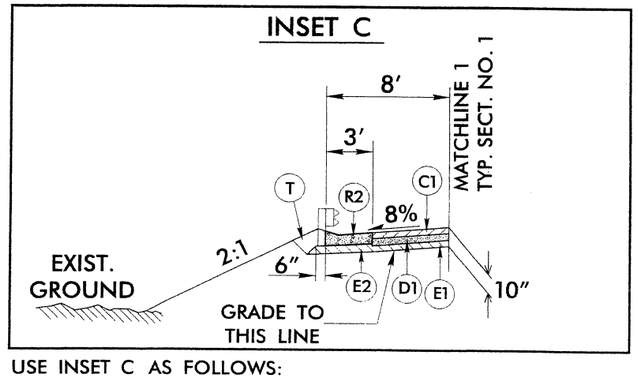
USE INSET A FOR ALL AREAS ADJACENT TO PROPOSED GUARDRAIL (SEE PLANS)

INSET B



USE INSET B AS FOLLOWS:
–L– Sta. 12+00.00 RT TO –L– Sta. 15+00.00 RT

INSET C



USE INSET C AS FOLLOWS:
–L– Sta. 16+00.00 LT TO –L– Sta. 16+45+/– (BEG. BRIDGE) LT
–L– Sta. 18+10+/– (END BRIDGE) LT TO –L– Sta. 20+00.00 LT
–L– Sta. 16+15+/– RT TO –L– Sta. 16+45+/– (BEG. BRIDGE) RT
–L– Sta. 18+10+/– (END BRIDGE) RT TO –L– Sta. 18+40+/– RT

TGS ENGINEERS
SUITE 141
975 WALNUT STREET
CARY, NC 27511
PH (919) 319-8850

PROJECT REFERENCE NO.	SHEET NO.
B-3694	2
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

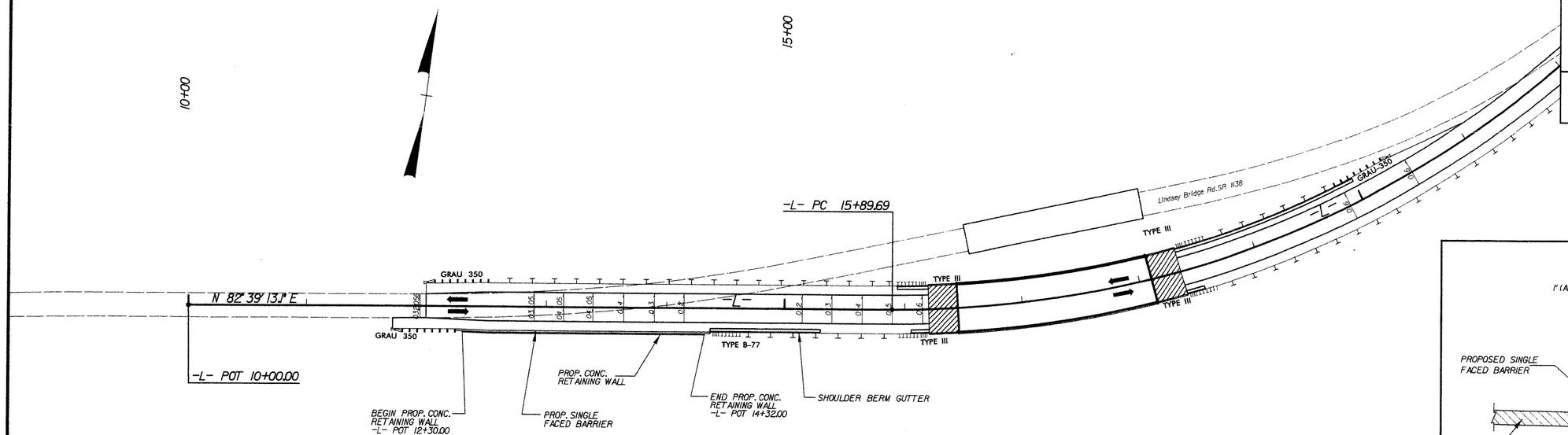
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

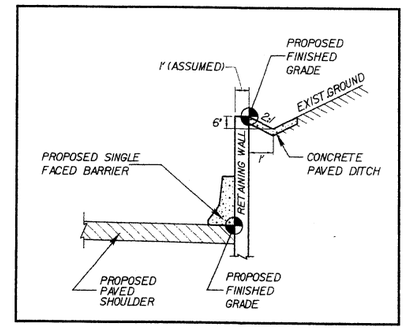
RETAINING WALL ENVELOPE DETAIL

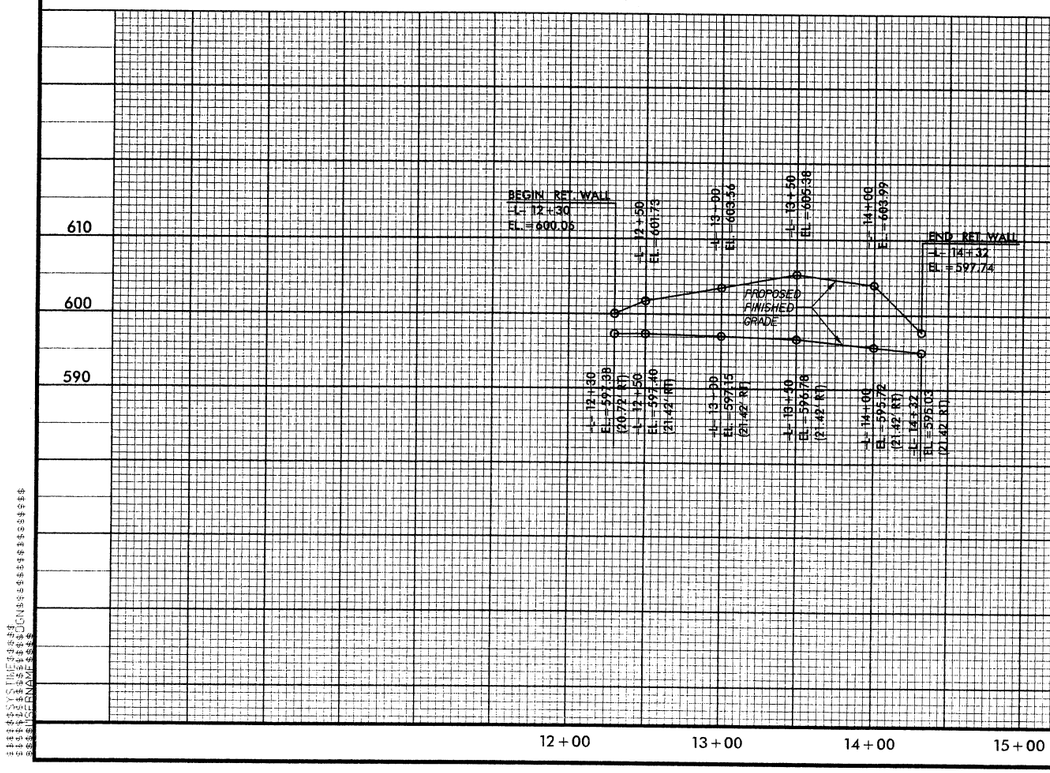
PROJECT REFERENCE NO.	SHEET NO.
B-3694	2-A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

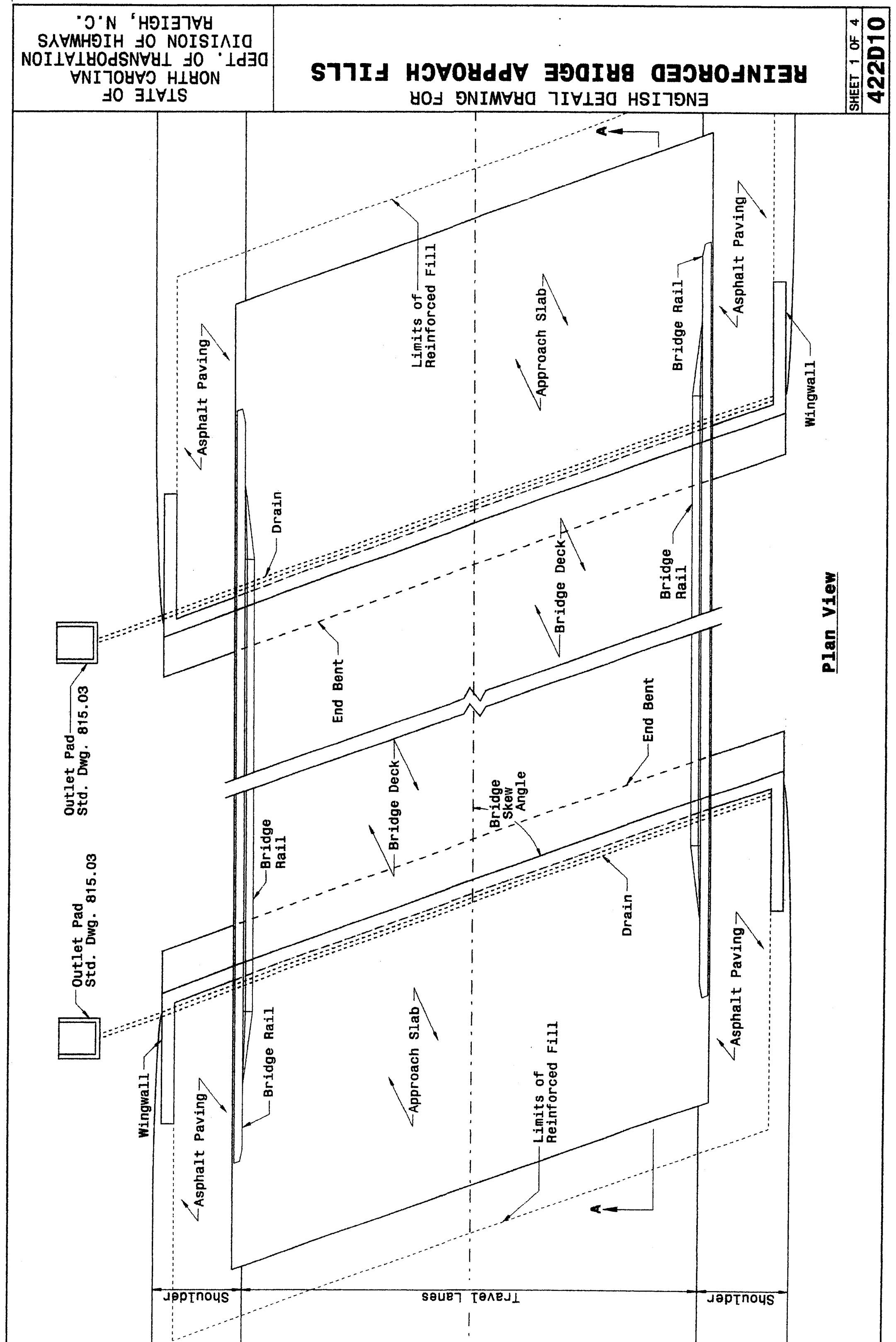
TGS ENGINEERS
SUITE 141
975 WALNUT STREET
CARY, NC 27511
PH (919) 319-8850







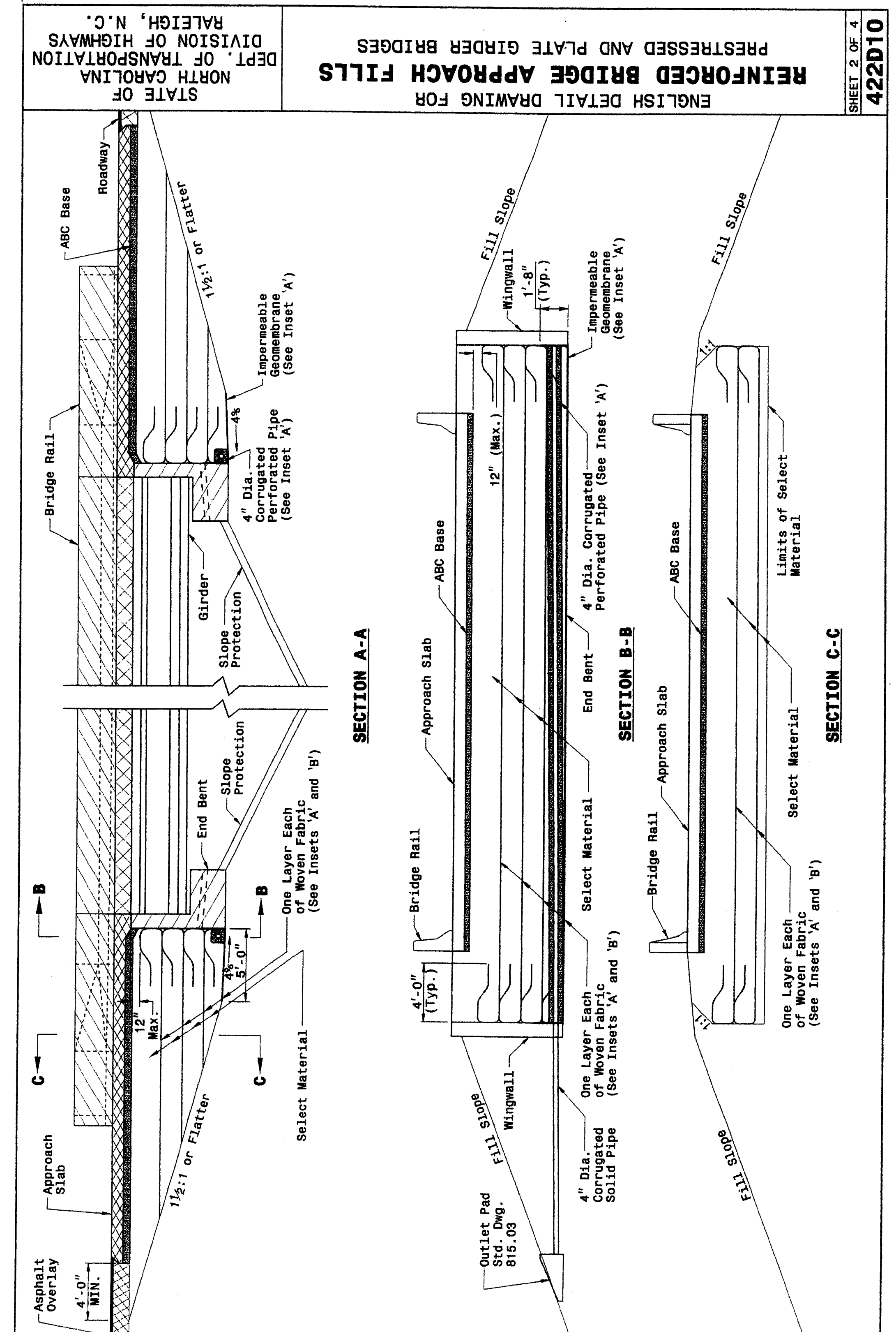
PROJECT REFERENCE NO.	SHEET NO.
B-3694	2-B



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

ENGLISH DETAIL DRAWING FOR
REINFORCED BRIDGE APPROACH FILLS

SHEET 1 OF 4
422D10



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

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

SHEET 2 OF 4
422D10

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

SEE PLATE FOR TITLE

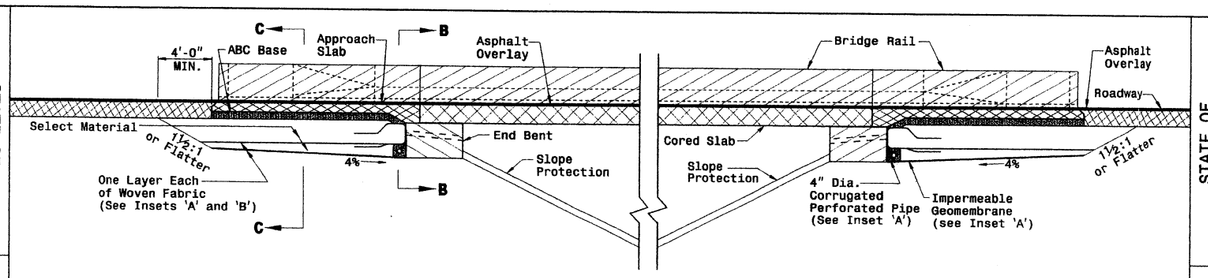
ORIGINAL BY: 2002 STANDARDS DATE: 01-15-02
MODIFIED BY: E.E. WARD DATE: 04-02-04
CHECKED BY: DATE:

5/14/99

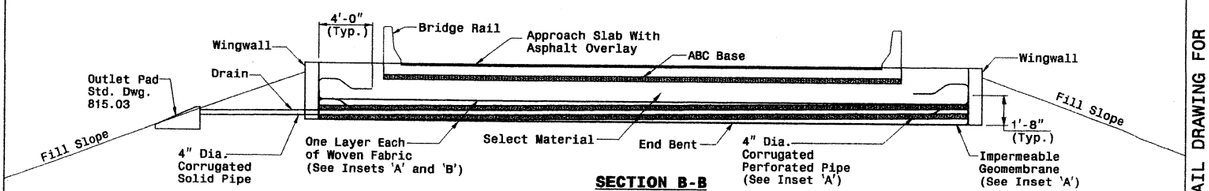
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
REINFORCED BRIDGE APPROACH FILLS
CORED SLAB BRIDGES

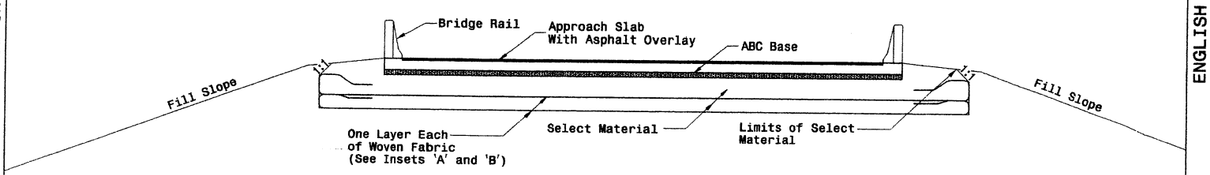
SHEET 3 OF 4
422D10



SECTION A-A



SECTION B-B



SECTION C-C

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

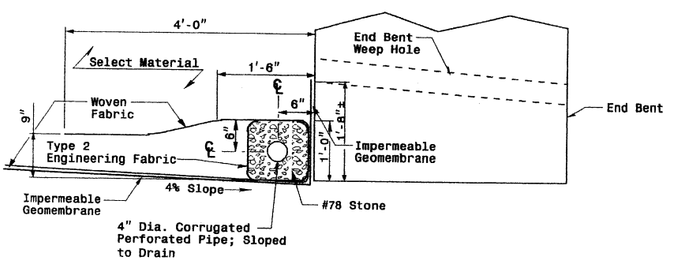
ENGLISH DETAIL DRAWING FOR
REINFORCED BRIDGE APPROACH FILLS
CORED SLAB BRIDGES

SHEET 3 OF 4
422D10

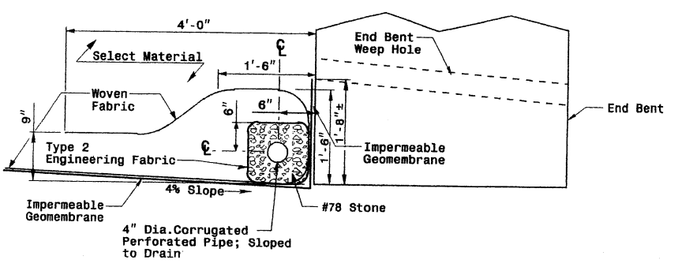
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
REINFORCED BRIDGE APPROACH FILLS
INSETS AND CHARTS

SHEET 4 OF 4
422D10

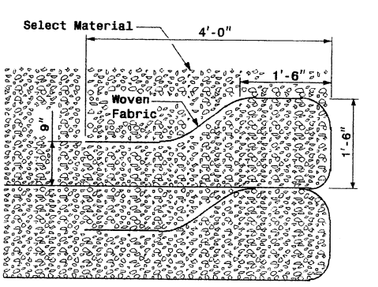


Cored Slab Bridge
Showing First Lift and Drains



Girder Bridge
Showing First Lift and Drains

Inset 'A'



Typical Fabric Lift and Wrap
Showing Second and Above Lifts

Inset 'B'

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

Note: Cored Slab Structures Require 2 Fabric Layers.

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

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

ENGLISH DETAIL DRAWING FOR
REINFORCED BRIDGE APPROACH FILLS
INSETS AND CHARTS

SHEET 4 OF 4
422D10

SEE PLATE FOR TITLE

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

ORIGINAL BY: 2002 STANDARDS DATE: 01-15-02
MODIFIED BY: E.E. WARD DATE: 03-26-03
CHECKED BY: DATE:

PROJECT REFERENCE NO. B-3694
SHEET NO. 2-C

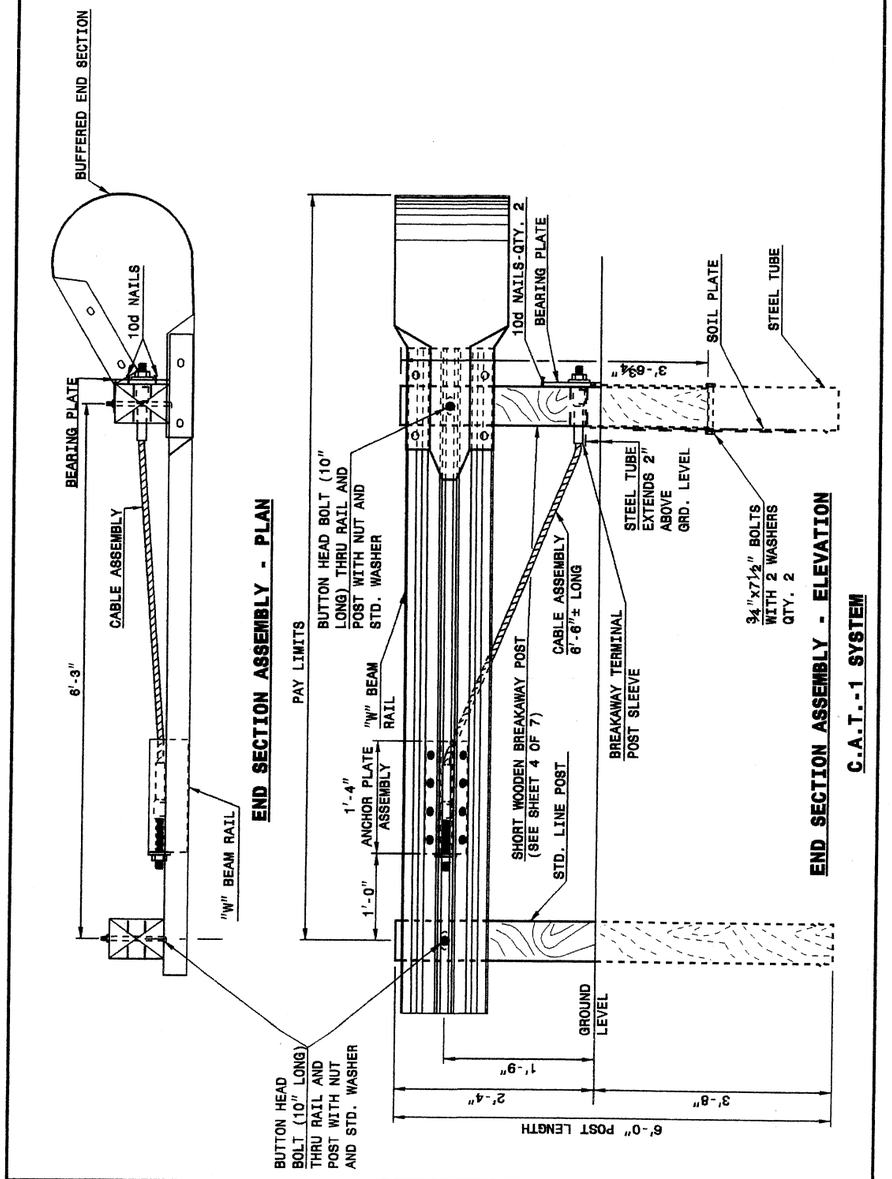
5/14/99

PROJECT REFERENCE NO.	SHEET NO.
B-3694	2-D

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

ENGLISH DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 1 OF 7 — **862D02**



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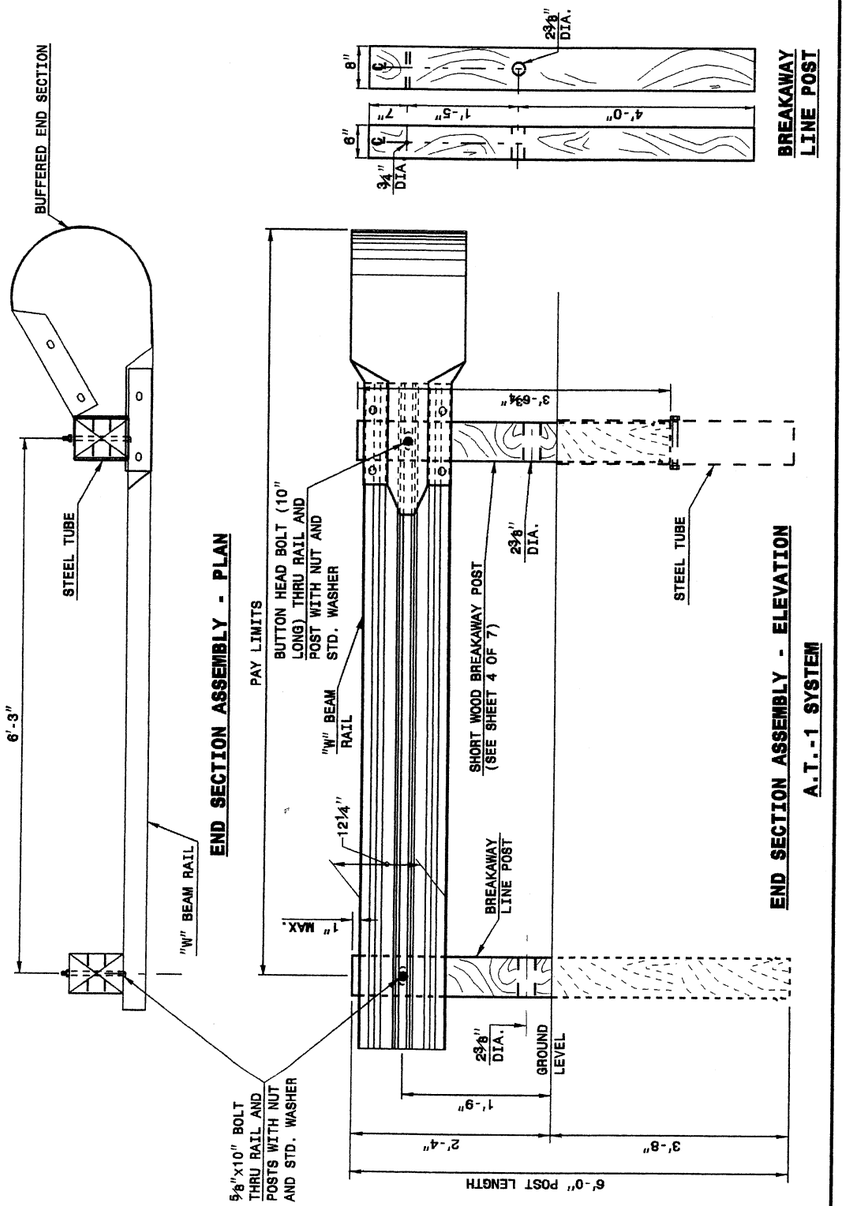
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 2 OF 7 — **862D02**



STATE OF
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RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 2 OF 7 — **862D02**

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Office 919-250-4128 FAX 919-250-4119

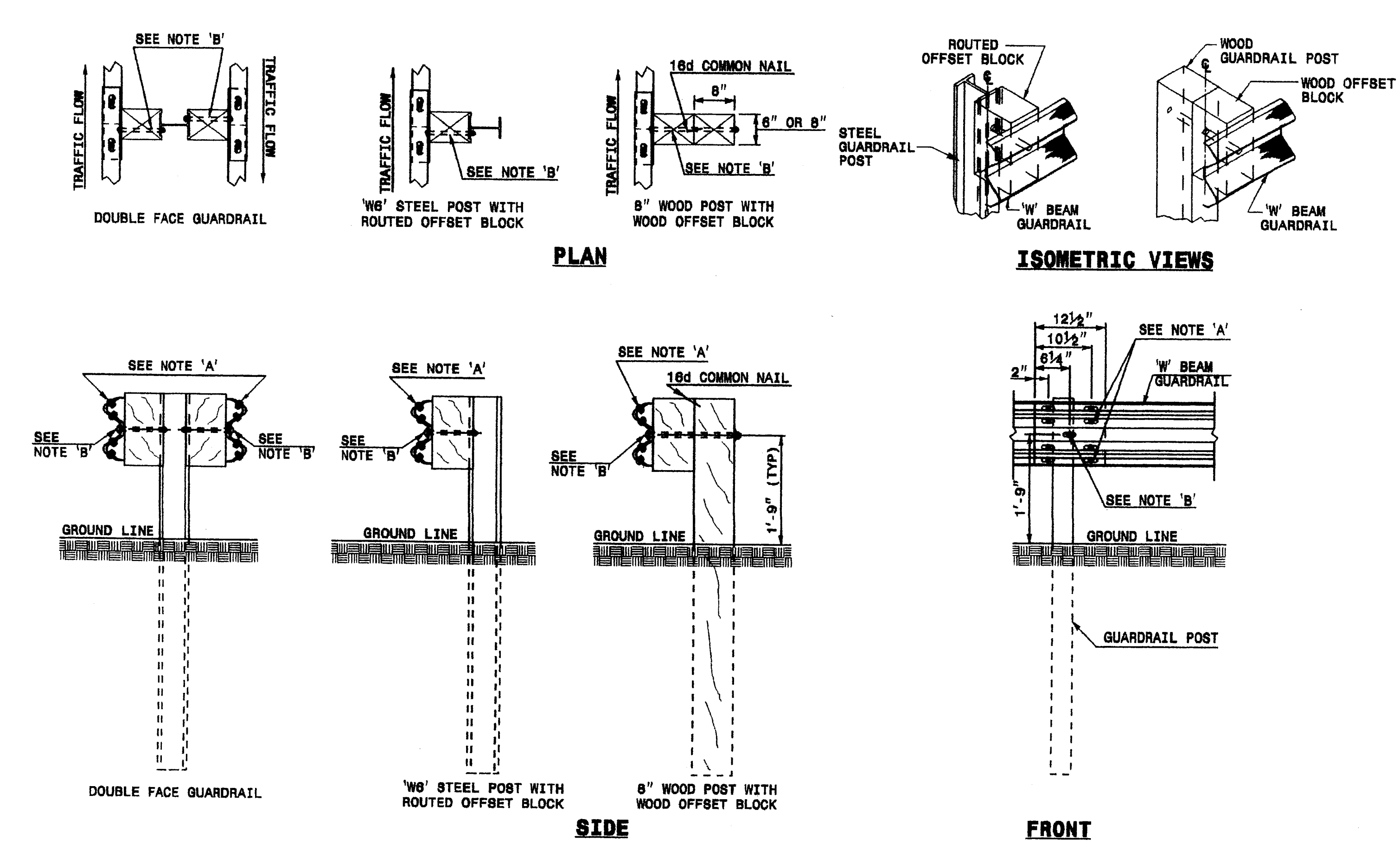
SEE PLATE FOR TITLE

ORIGINAL BY: 2002 STD.862.02 DATE:
MODIFIED BY: E.E. WARD DATE: 02-09-03
CHECKED BY: DATE:

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

ENGLISH DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 3 OF 7
862D02



NOTES:
A - ⅝" DIA. BUTTON HEAD SPLICE BOLT 1¼" LONG WITH STD. WASHER UNDER NUT (8 REQ. PER SPLICE JOINT).
B - ⅝" DIA. BUTTON HEAD BOLT 7½"/8" LONG WITH NUT FOR BOLTING 6"/8" ROUTED OFFSET BLOCK TO STEEL POSTS OR ⅝" DIA. BUTTON HEAD BOLT 18" LONG WITH STD. WASHER UNDER NUT FOR BOLTING TO WOOD POSTS (1 REQ. PER LOCATION)
C - FIELD PUNCHING OF HOLES INTO GUARDRAIL SHALL BE AS DIRECTED BY THE ENGINEER.

TYPICAL GUARDRAIL AND GUARDRAIL POST ALTERNATIVES

STATE OF NORTH CAROLINA
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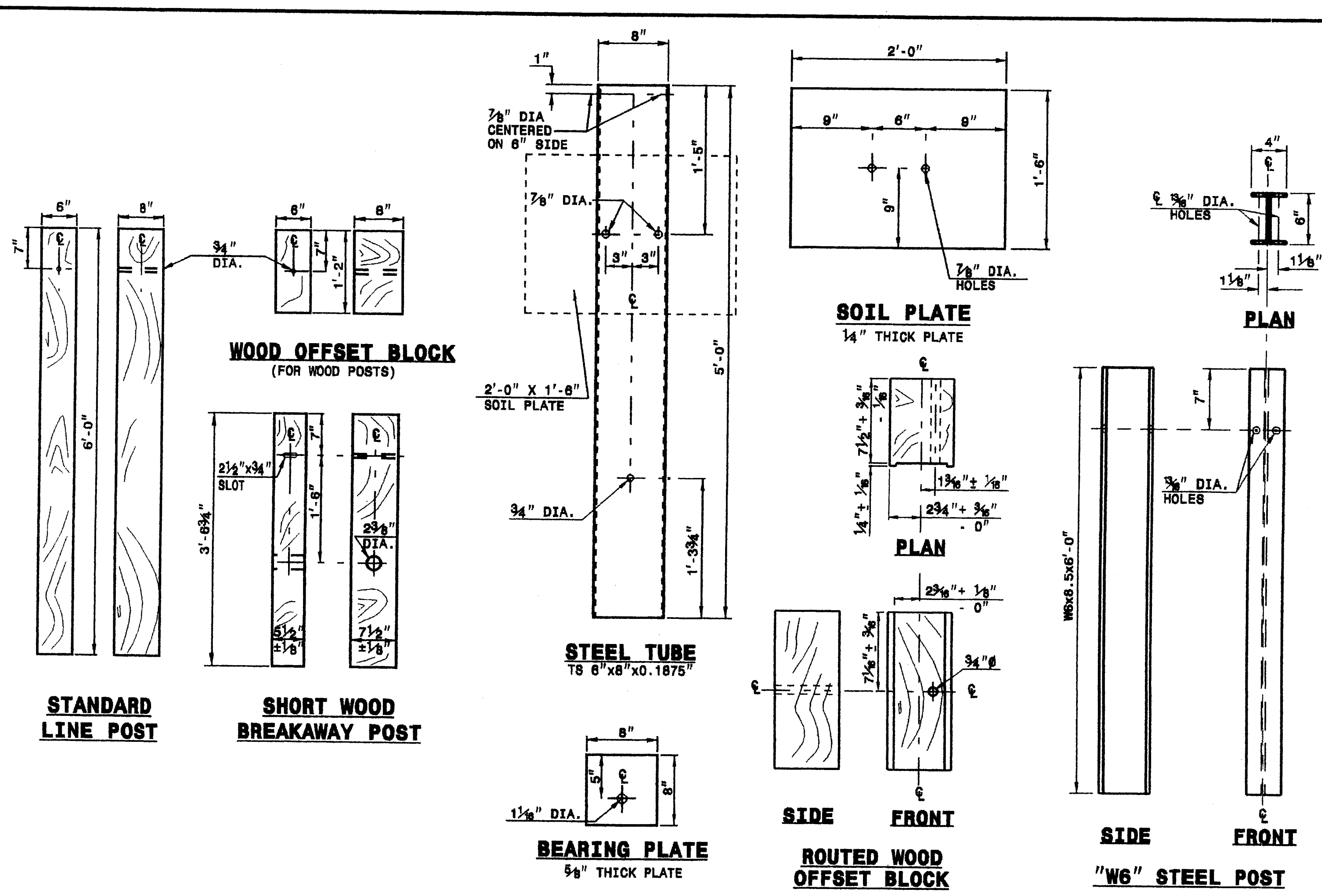
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 4 OF 7
862D02



SYSTEM PARTS

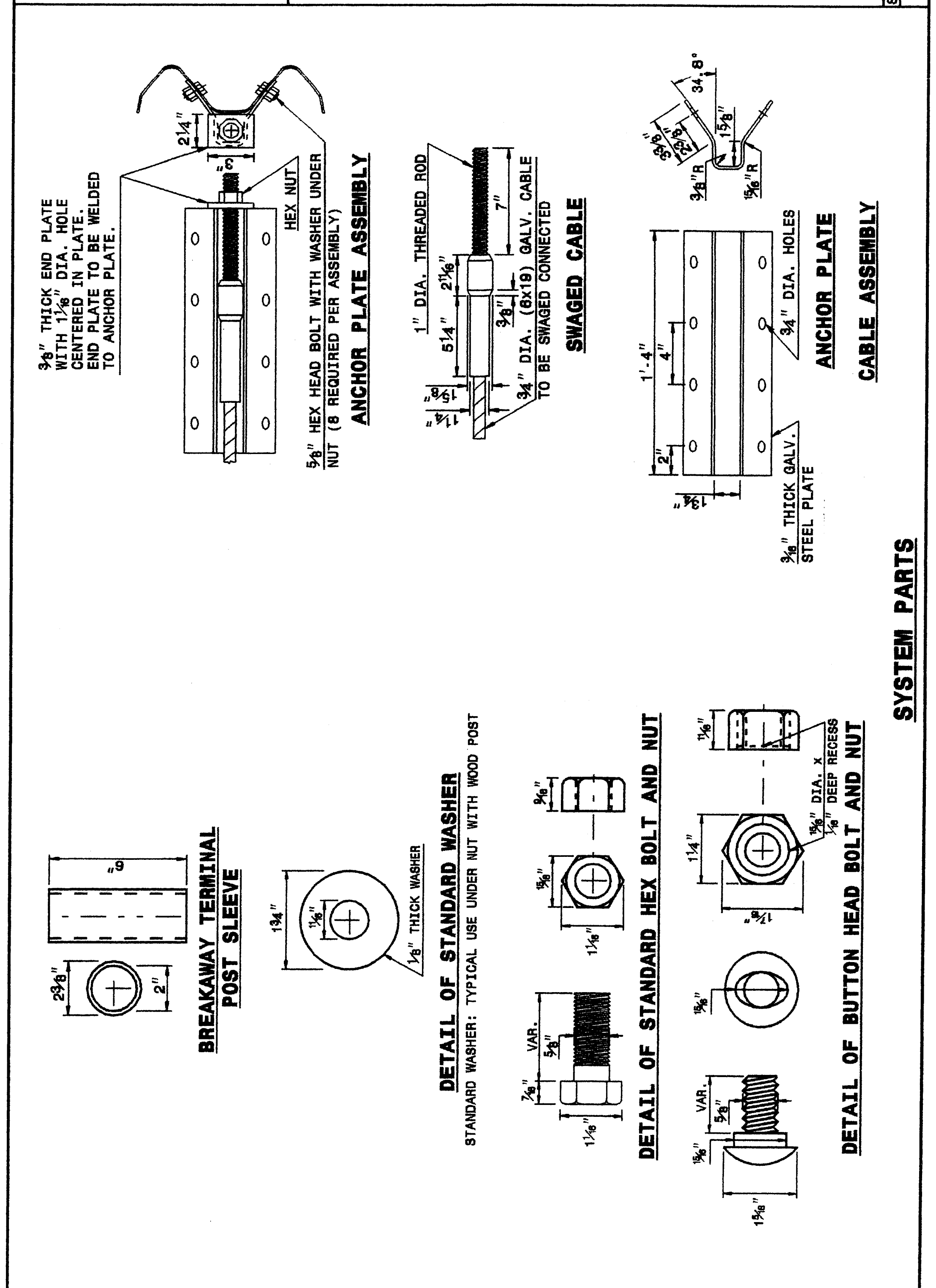
DESIGN SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
Office 919-250-4128 FAX 919-250-4119

SEE PLATE FOR TITLE

ORIGINAL BY: 2002 STD.862.02 DATE:
MODIFIED BY: E.E. WARD DATE: 02-09-03
CHECKED BY: DATE:

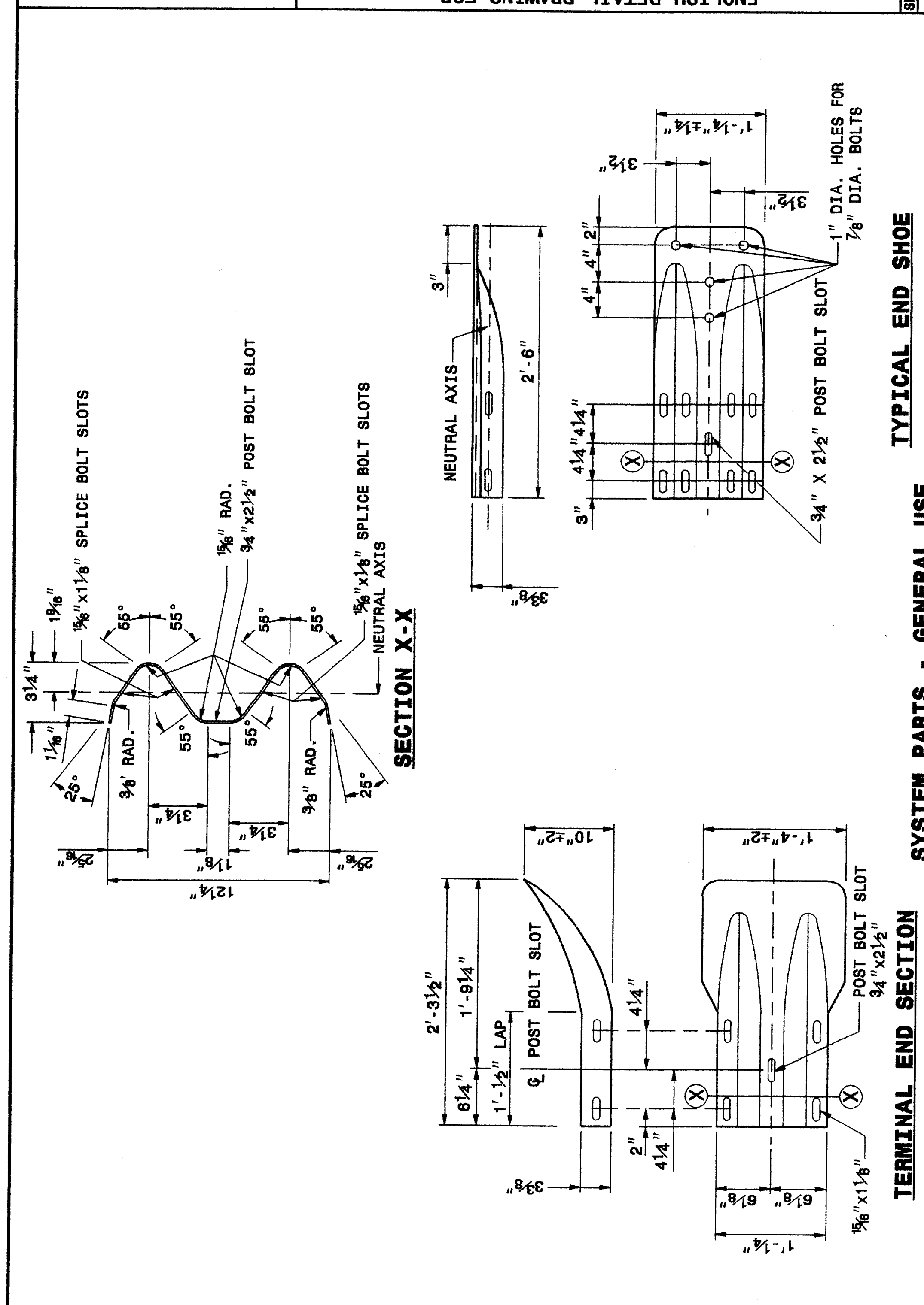
PROJECT REFERENCE NO.	SHEET NO.
B-3694	2-F

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



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

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



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

DESIGN SERVICES UNIT
STANDARDS AND SPECIAL DESIGN
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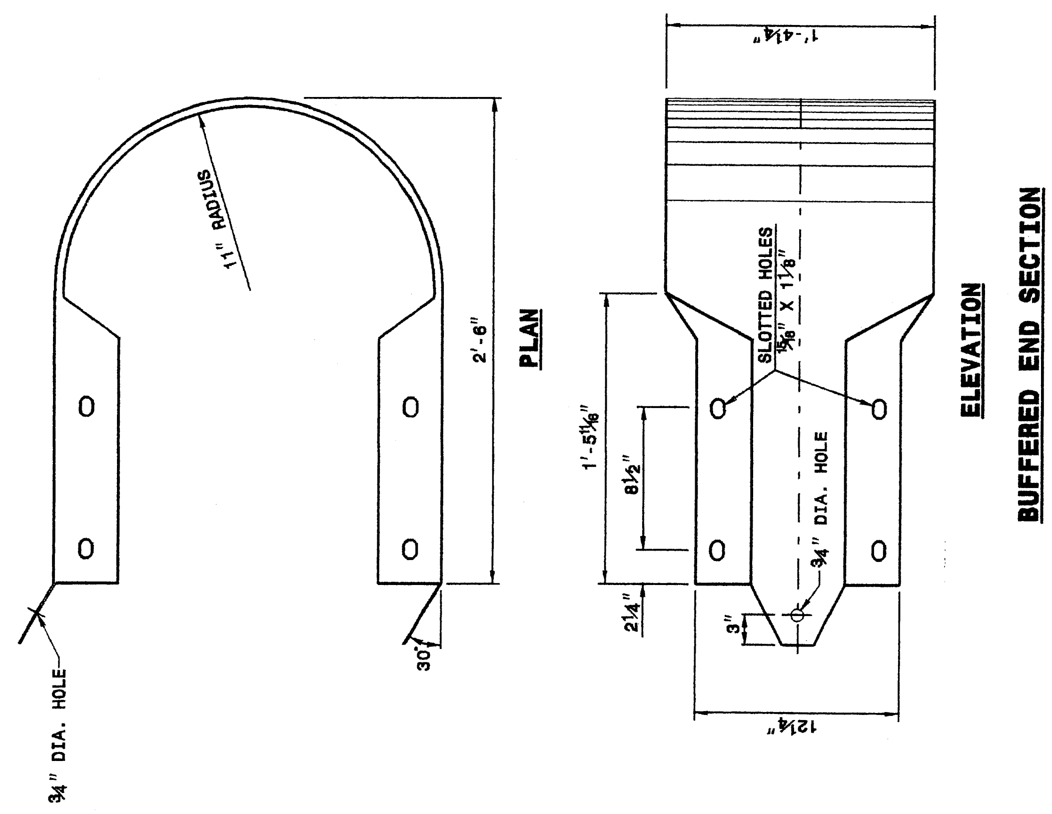
SEE PLATE FOR TITLE

ORIGINAL BY: 2002 STD.862.02 DATE:
MODIFIED BY: E.E. WARD DATE: 02-09-03
CHECKED BY: DATE:

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



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

5/14/99

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

SEE PLATE FOR TITLE

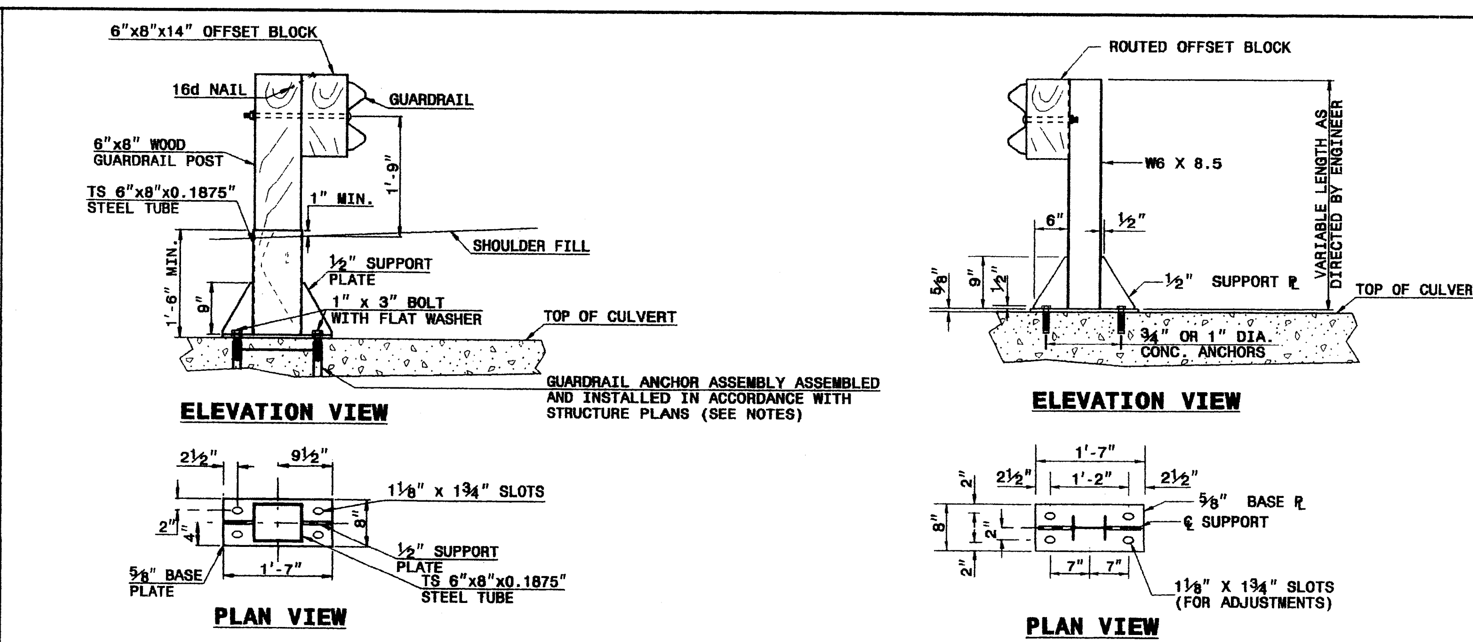
ORIGINAL BY: 2002 STD.862.02 DATE:
MODIFIED BY: E.E. WARD DATE: 02-09-03
CHECKED BY: DATE:

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
B-3694	2-H

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

ENGLISH DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
ANCHORAGE FOR GUARDRAIL POST ON BOX CULVERT



NOTES FOR:
GUARDRAIL POST ANCHORED TO STRUCTURE:
-USE FULL LENGTH ¼" BUTT WELDS AT ALL LOCATIONS OF CONTACT BETWEEN THE BASE PLATE, SUPPORT PLATES AND STEEL POST OR STEEL TUBE.
-USE POST AND POST BASE PLATES CONFORMING TO THE REQUIREMENTS OF A.S.T.M. A-36 AND GALVANIZED AFTER FABRICATION TO CONFORM TO A.S.T.M. A-123.
-USE WOOD POSTS WHICH FIT SNUGLY IN THE STEEL TUBE WITH A MAXIMUM OF ⅛" CLEARANCE BETWEEN TUBE WALL AND POST.

NEW STRUCTURES:
-ATTACH POST TO INSERT ASSEMBLY UNITS (USING ANCHOR BOLTS SUPPLIED WITH INSERTS) WHICH HAVE BEEN CAST INTO THE STRUCTURE DURING CONSTRUCTION.

EXISTING STRUCTURES:
-USE CONCRETE ANCHORS CONSISTING OF A STUD BOLT WITH NUT AND WASHER. USE STUDS THREADED ON ONE END AND HAVING AN EXPANDED WEDGE ASSEMBLY POSITIONED AROUND A TAPERED AREA AT THE OTHER END. USE ANCHORS WHICH PROVIDE A MINIMUM SAFE HOLDING POWER OF 2875 LBS. FOR A ¾" OR 1" DIAMETER BOLT. CALCULATE HOLDING POWER BASED ON ¼ THE ACTUAL HOLDING POWER OF THE ANCHOR IN 3500 PSI CONCRETE AS DETERMINED BY AN APPROVED COMMERCIAL TESTING LABORATORY.

-USE ANCHORS GALVANIZED IN ACCORDANCE WITH A.S.T.M. A-153. SIZE HOLES FOR THE CONCRETE ANCHORS IN ACCORDANCE WITH THE ANCHOR MANUFACTURER'S RECOMMENDATIONS. DRILL HOLES WITH A CARBIDE OR DIAMOND TIPPED MASONRY BIT POWERED BY A ROTARY OR ROTARY IMPACT DRILL. NO OTHER IMPACT TOOLS WILL BE PERMITTED. DRILL HOLES VERTICALLY. FURNISH DOCUMENTATION OF HOLE SIZE RECOMMENDED FOR THE SPECIFIED ANCHOR TO THE ENGINEER BEFORE DRILLING HOLES. THOROUGHLY CLEAN HOLES FOR ANCHORS OF ALL CONCRETE CHIPS, DUST, GREASE, OIL, ETC. BEFORE ANCHORS ARE INSTALLED. REPAIR ALL DAMAGE CAUSED BY THIS WORK TO THE SATISFACTION OF THE ENGINEER.

ANCHORAGE FOR GUARDRAIL POST ON BOX CULVERT

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

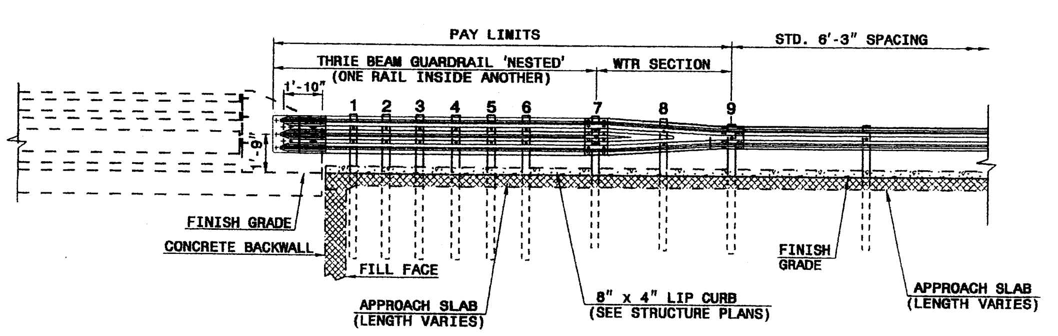
ENGLISH DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
ANCHORAGE FOR GUARDRAIL POST ON BOX CULVERT

SHEET 1 OF 4
862D03

SHEET 1 OF 4
862D03

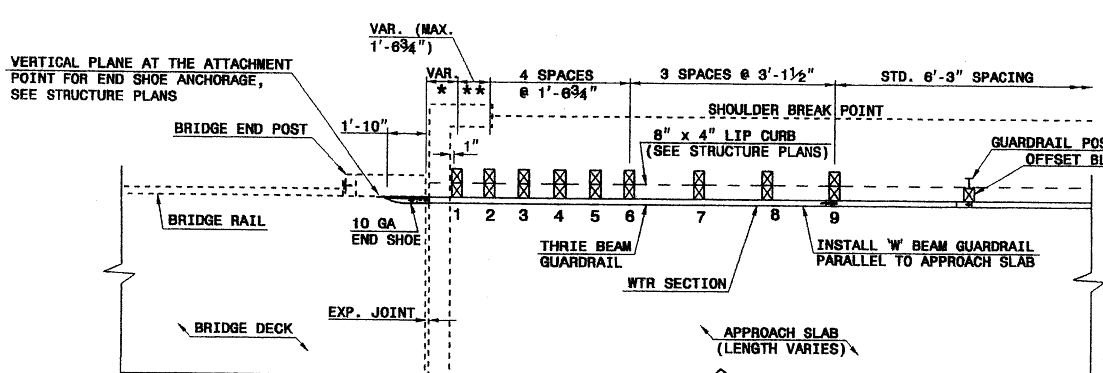
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE



ELEVATION

NOTE:
**POST NOT REQUIRED FOR SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
*THE DISTANCE FROM END OF BRIDGE RAIL TO CENTER LINE OF THE FIRST POST SHOULD BE 11½" IF CONCRETE BACKWALL IS NOT PRESENT.
-SHOULDER BERM GUTTER MUST BE INSTALLED WITHIN THE PAY LIMITS IF THE ANCHOR UNIT IS NOT ADJACENT TO AN APPROACH SLAB.
-MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER).
-USE NO STEEL POSTS WITHIN THE GUARDRAIL ANCHOR UNIT LIMITS.
-LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
-SEE SHEET 4 FOR POST SECTIONS 1 THRU 9.



PLAN VIEW

GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE

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

ENGLISH DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON BRIDGE

SHEET 2 OF 4
862D03

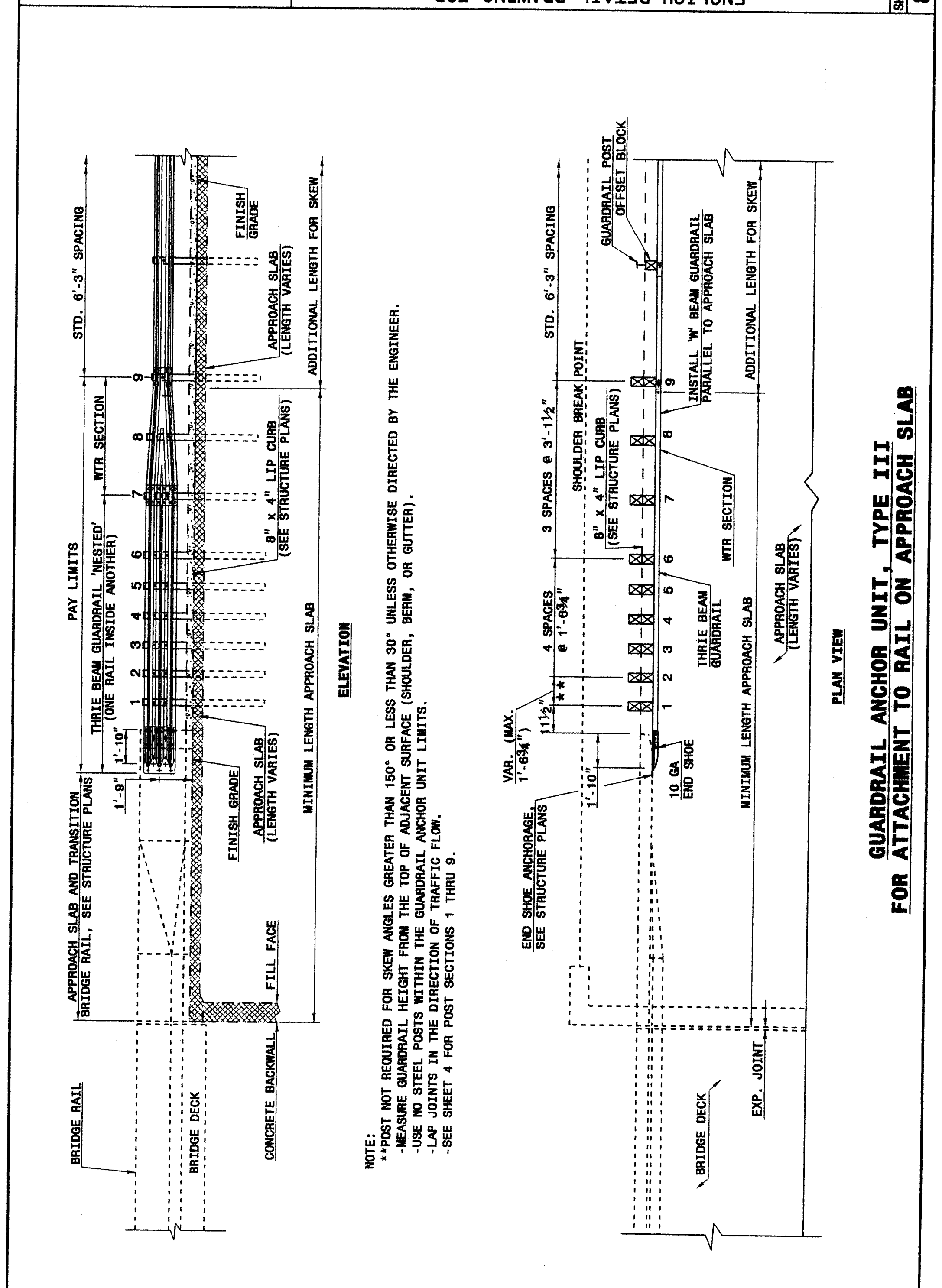
SHEET 2 OF 4
862D03

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

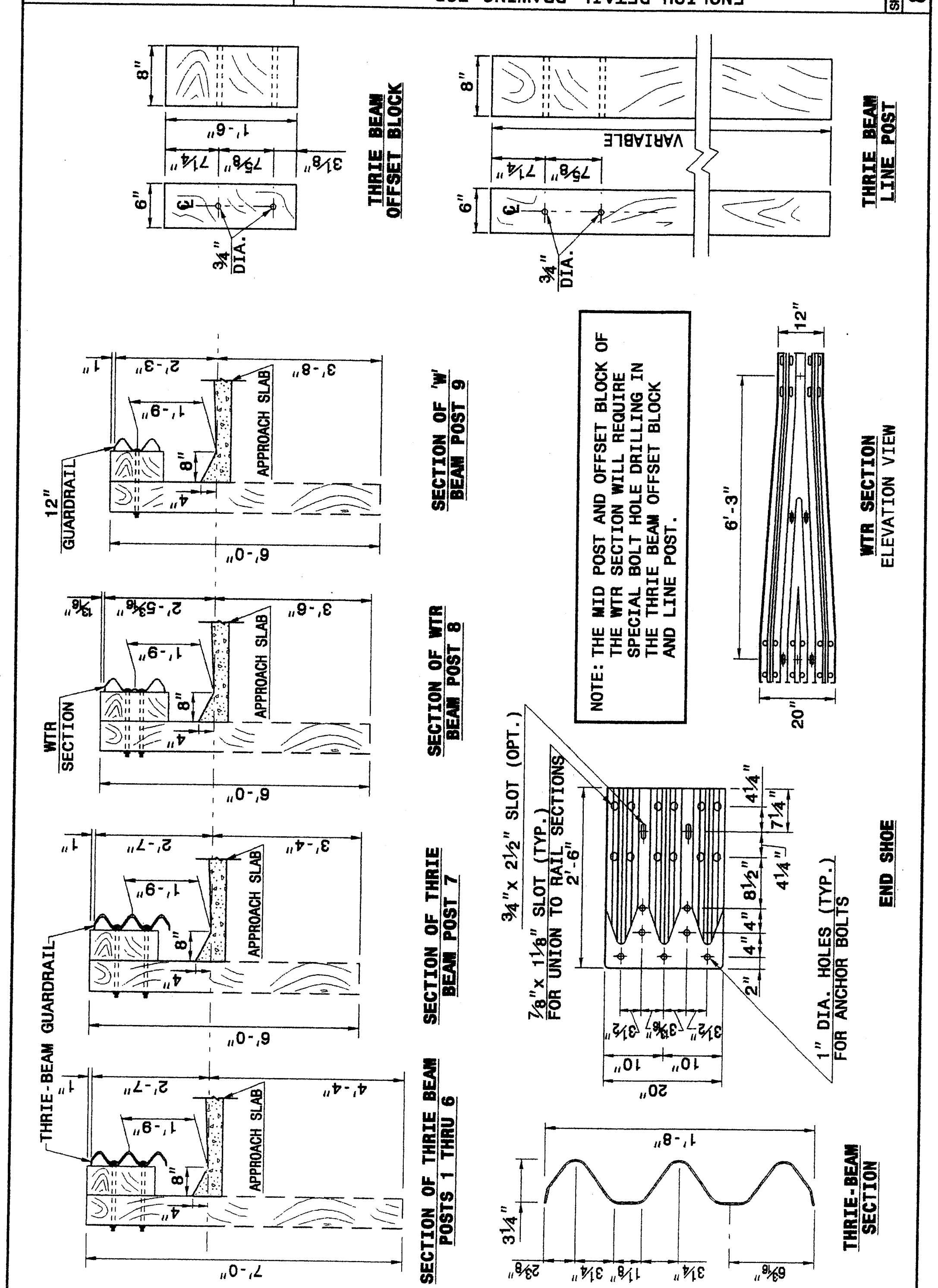
SEE PLATE FOR TITLE

ORIGINAL BY: 2002 STANDARDS DATE: 01-15-02
MODIFIED BY: E.E. WARD DATE: 04-07-04
CHECKED BY: DATE:

PROJECT REFERENCE NO.	SHEET NO.
B-3694	2-I


GUARDRAIL ANCHOR UNIT, TYPE III
FOR ATTACHMENT TO RAIL ON APPROACH SLAB
ELEVATION
PLAN VIEW
STD. 6'-3" SPACING
PAY LIMITS
THRIE BEAM GUARDRAIL 'NESTED' (ONE RAIL INSIDE ANOTHER)
WTR SECTION
APPROACH SLAB (LENGTH VARIES)
MINIMUM LENGTH APPROACH SLAB
ADDITIONAL LENGTH FOR SKEW
APPROACH SLAB AND TRANSITION BRIDGE RAIL, SEE STRUCTURE PLANS
FINISH GRADE
FILL FACE
BRIDGE RAIL
BRIDGE DECK
CONCRETE BACKWALL
8" x 4" LIP CURB (SEE STRUCTURE PLANS)
NOTE:
**POST NOT REQUIRED FOR SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
-MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER).
-USE NO STEEL POSTS WITHIN THE GUARDRAIL ANCHOR UNIT LIMITS.
-LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
-SEE SHEET 4 FOR POST SECTIONS 1 THRU 9.
END SHOE ANCHORAGE, SEE STRUCTURE PLANS
VAR. (MAX. 1'-6¾")
10 GA. END SHOE
THRIE BEAM GUARDRAIL
4 SPACES @ 1'-6¾"
3 SPACES @ 3'-1½"
SHOULDER BREAK POINT
GUARDRAIL POST OFFSET BLOCK
INSTALL 'W' BEAM GUARDRAIL PARALLEL TO APPROACH SLAB
MINIMUM LENGTH APPROACH SLAB
EXP. JOINT

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ENGLISH DETAIL DRAWING FOR **STRUCTURE ANCHOR UNITS** GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO RAIL ON APPROACH SLAB	SHEET 3 OF 4 862D03


THRIE BEAM OFFSET BLOCK
THRIE BEAM LINE POST
VARIABLE
¾" DIA.
NOTE: THE MID POST AND OFFSET BLOCK OF THE WTR SECTION WILL REQUIRE SPECIAL BOLT HOLE DRILLING IN THE THRIE BEAM OFFSET BLOCK AND LINE POST.
WTR SECTION ELEVATION VIEW
SECTION OF 'W' BEAM POST 9
SECTION OF WTR BEAM POST 8
SECTION OF THRIE BEAM POST 7
SECTION OF THRIE BEAM POSTS 1 THRU 6
APPROACH SLAB
THRIE-BEAM GUARDRAIL
END SHOE
¾"x 2½" SLOT (OPT.)
⅞"x 1⅛" SLOT (TYP.) FOR UNION TO RAIL SECTIONS
1" DIA. HOLES (TYP.) FOR ANCHOR BOLTS
THRIE-BEAM SECTION

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ENGLISH DETAIL DRAWING FOR **STRUCTURE ANCHOR UNITS** GUARDRAIL ANCHOR UNIT, TYPE III	SHEET 4 OF 4 862D03

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

SEE PLATE FOR TITLE

ORIGINAL BY:	2002 STANDARDS	DATE:	01-15-02
MODIFIED BY:	E.E. WARD	DATE:	04-07-04
CHECKED BY:		DATE:	

PROJECT REFERENCE NO.	SHEET NO.
B-3694	3

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

COMPUTED BY: WC Parker DATE: 11-25-03
CHECKED BY: _____ DATE: _____

PROJECT NO.	SHEET NO.
B-3694	3-A

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

SUMMARY OF EARTHWORK

LINE	Station	Station	Uncl. Excav.	Undercut Excav.	Embank. +%	Borrow	Waste
-L-	12+00	16+44.40	1,836		1,116		720
	BRIDGE						
-L-	18+10.60	28+00	2,244		12,758	11,678	1,164
PROJECT TOTALS:			4,080		13,874	11,678	1,884
EST. REDUCTION IN UNCL. EXC. DUE TO CLEARING & GRUBBING			-200			200	
USE WASTE IN LIEU OF BORROW						654	654
PROJECT TOTALS:			3,880		13,874	12,532	2,538
EST. 5% TO REPLACE TOPSOIL ON BORROW PITS						627	
TOKEN UNDERCUT PER DIVISION				500			
GRAND TOTALS:			3,880	500		13,158	2,538
SAY:			**4,300**	**500**		**14,500**	**2,800**

DDE = 662 cu.yd. Pavement Structure Volume = 490 cu.yd.

EXISTING ASPHALT PAVEMENT REMOVAL

LINE	STATION	STATION	LT/RT	AREA (Yd^2)
-L-	12+17	16+54	LT	603
-L-	18+17	24+74	LT	992
			TOTAL:	1,595
			SAY:	1,700

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

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

GUARDRAIL SUMMARY

LINE	BEG. STA.	END STA.	LOC.	LENGTH STRAIGHT	LENGTH SHOP CURVED	LENGTH DOUBLE FACED	WARRANT POINT APPR. END	WARRANT POINT TRAIL. END	"N" DIST. FROM E.O.L.	TOTAL BERM WIDTH	FLARE LENGTH APPR. END	FLARE LENGTH TRAIL. END	W APPR. END	W TRAIL. END	ANCHORS CAT-1	ANCHORS III	ANCHORS GRAU 350	ANCHORS M-350	ANCHORS AT-1	ANCHORS B-77	IMP. ATTEN. TYPE 350 EA	IMP. ATTEN. TYPE 350 G	IMP. ATTEN. TYPE 350 NG	REMOVE EXISTING GUARDRAIL		REMARKS
-L-	11+50	12+00	RT	50				BARRIER	9.4'		50'		1'				1									
-L-	12+00.65	16+19.40	LT	418.75				BRIDGE	8'			50'		1'		1	1							149		
-L-	15+00	16+19.40	RT	125			BRIDGE		8'							1				1				148		
-L-	18+35.60	20+41.85	LT	206.25			BRIDGE		8'		50'		1'			1	1									
-L-	18+35.60	22+41.85	RT	406.25				BRIDGE	8'			50'		1'		1	1									
			SUBTOTAL:	1,206.25												4	4			1						
			ANCHOR DEDUCTIONS:																							
			TYPE III - 4 @ 18.75' EA:	75.00																						
			GRAU-350 - 4 @ 50' EA:	200.00			ADDITIONAL GUARDRAIL POSTS = 5 EA																			
			B-77 - 1 @ 18.75' EA:	18.75																						
			GRAND TOTALS:	**912.50**												4	4			1				297		TOTAL GUARDRAIL REMOVAL
			SAY:	**950.00**																						

COMPUTED BY: JLT DATE: 3/10/2004

CHECKED BY: WCP DATE: 9/3/2004

PROJECT NO.	SHEET NO.
B-3694	3-B

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

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

STATION	LOCATION (LT, RT, OR CL)'	STRUCTURE NO. FROM	STRUCTURE NO. TO	TOP ELEVATION	INVERT ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE) SIZE							BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE) SIZE								15" SIDE DRAIN PIPE	18" SIDE DRAIN PIPE	24" SIDE DRAIN PIPE	ENDWALLS STD. 838.01 OR STD. 838.11 (UNLESS NOTED OTHERWISE) CU. YARDS	
SIZE								12"	15"	18"	24"	30"	36"	42"	48"	12"	15"	18"	24"	30"	36"	42"	48"				R.C.P.	C.S.P.
THICKNESS OR GAUGE																.064	.064	.064	.064	.079	.079	.109	.109					
11+20	RT	1		596.8																								
		1	2		593.8	592.73				28.0																		
11+48	RT	2		596.5																								
		2	3		592.73	589.75				384.0																		
15+26	RT	3		594.15																								
		3	OUT		589.75	589.56				20.0																		
16+16	LT	4		592.38																								
		4	5		589.6	589.35			20.0																			
15+98	LT	5		592.44																								
		5	OUT		589.35	581										80.0												
18+57	LT	6		594.09																								
		6	OUT		591.34	581										72.0												
22+85	LT	7		601.5																								
		7	OUT		598.75	597			40.0																			
25+97	LT	8			EXIST.	614.47					20.0																	
25+99	RT	9			618.98	EXIST.					16.0																	
TOTALS									60.0	432.0	36.0					152.0								7		

QUANTITIES FOR DRAINAGE STRUCTURES 'TOTAL L.F. FOR PAY QUANTITY SHALL BE COL. 'A' + (1.3 X COL.'B') LIN. FT.			C.B. STD. 840.01 OR STD. 840.02	FRAME, GRATES, AND HOOD STANDARD 840.03 TYPE OF GRATE			M.D.I. TYPE "B" STD. 840.18 OR 840.27	M.D.I. FRAME WITH TWO GRATES STD. 840.22	M.D.I. FRAME WITH TWO (N.S.) FLAT GRATES STD. 840.29	M.D.I. FRAME WITH TWO (N.S.) SAG GRATES STD. 840.24	TRAFFIC BEARING J.B. STD. 840.34	CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" C.Y. STD. 840.72			REMARKS
PER EACH (0' THRU 5.0')	A 5.0' THRU 10.0'	B 10.0' AND ABOVE		E	F	G										
1							1			1						
1											1					
1							1		1							
1							1		1							
1							1		1							
1							1		1							
1							1	1								
													0.5526			REMOVE HEADWALL
													0.5526			REMOVE HEADWALL
7							6	1	4	1	1	2 @ 90	1.1052			
													SAY: 1.2			

ABBREVIATIONS

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

5/14/99

TGS
ENGINEERS

TGS ENGINEERS
SUITE 141
975 WALNUT STREET
CARY, NC 27511
PH (919) 319-8850

PROJECT REFERENCE NO.	SHEET NO.
B-3694	3-C
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

STATE OF NORTH CAROLINA

DIVISION OF HIGHWAYS

PARCEL INDEX SHEET

PARCEL NO.	SHEET NO.	PROPERTY OWNER NAME
1	4/5	DUKE POWER /DUKE ENERGY COMPANY

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$
$$$USERNAME$$$$

6/17/99

REVISIONS

TGS ENGINEERS	PROJECT REFERENCE NO.	SHEET NO.
SUITE 141 975 WALNUT STREET CARY, NC 27511 PH (919) 319-8850	B-3694	4
	RW SHEET NO.	4
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCGS FOR MONUMENT "RIVERCO" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 939853.33(ft) EASTING: 1695829.16(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.000024394
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "RIVERCO" TO -L- STATION 12+00.00 IS
N 77°41'49.8" E 778.48'
ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NGVD 29

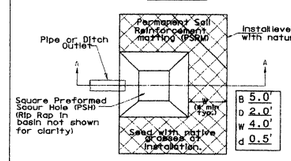
DUKE POWER
H-FRAME

DETAIL A

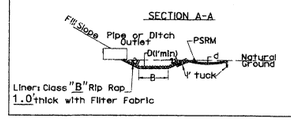
PREFORMED SCOUR HOLE

USE AT THE FOLLOWING LOCATIONS:
-L- 16+06 LT
-L- 16+20 RT
-L- 18+00 RT

PLAN VIEW



SECTION A-A

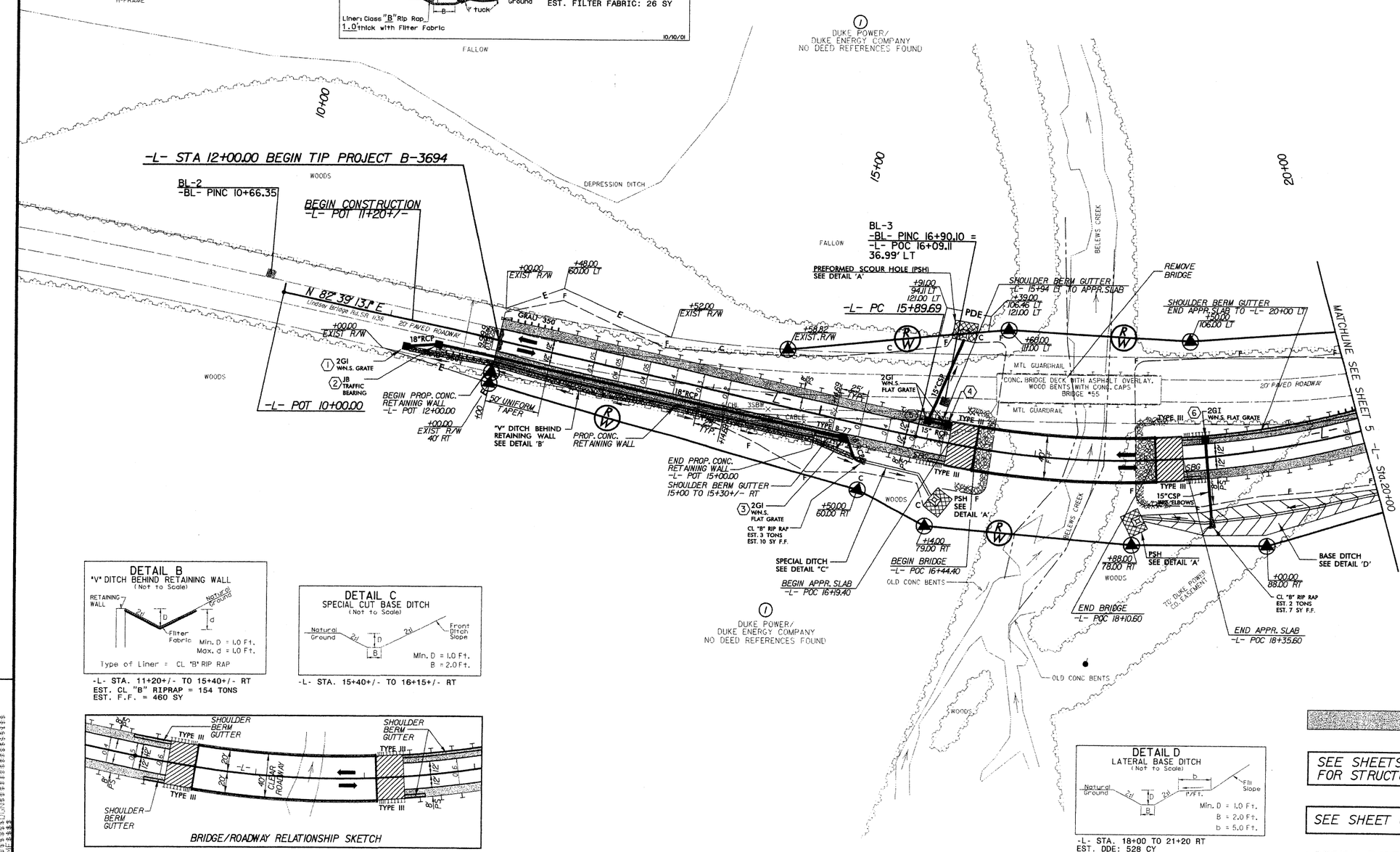


EST. PSRM: 34 SY
EST. CL "B" RIP RAP: 10 TONS
EST. FILTER FABRIC: 26 SY

10/10/01

-L-
PI Sta 21+72.25
Δ = 68°51'04.4" (LT)
D = 6°44'26.4"
L = 1,021.43'
T = 582.57'
R = 850.00'*
SE = 0.06
RO = SEE PLANS
DS = 40mph **

NAD 83 NC GRID



① DUKE POWER/ DUKE ENERGY COMPANY NO DEED REFERENCES FOUND

① DUKE POWER/ DUKE ENERGY COMPANY NO DEED REFERENCES FOUND

DETAIL B

"V" DITCH BEHIND RETAINING WALL
(Not to Scale)

Min. D = 1.0 Ft.
Max. d = 1.0 Ft.
Type of Liner = CL "B" RIP RAP

-L- STA. 11+20+/- TO 15+40+/- RT
EST. CL "B" RIPRAP = 154 TONS
EST. F.F. = 460 SY

DETAIL C

SPECIAL CUT BASE DITCH
(Not to Scale)

Min. D = 1.0 Ft.
B = 2.0 Ft.

-L- STA. 15+40+/- TO 16+15+/- RT

BRIDGE/ROADWAY RELATIONSHIP SKETCH

DETAIL D

LATERAL BASE DITCH
(Not to Scale)

Min. D = 1.0 Ft.
B = 2.0 Ft.
b = 5.0 Ft.

-L- STA. 18+00 TO 21+20 RT
EST. DDE: 528 CY

DENOTES PAVED SHOULDERS, RETAINING WALL & SHOULDER BERM GUTTER

SEE SHEETS S-1 THRU S- FOR STRUCTURE PLANS

SEE SHEET 6 FOR -L- PROFILE

*DESIGN EXCEPTION REQUIRED FOR MINIMUM HORIZONTAL CURVE RADIUS

**DESIGN EXCEPTION REQUIRED FOR HORIZONTAL SSD. HORIZONTAL SSD MEETS A 40 MPH DESIGN SPEED

8-17-99

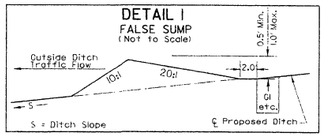
REVISIONS

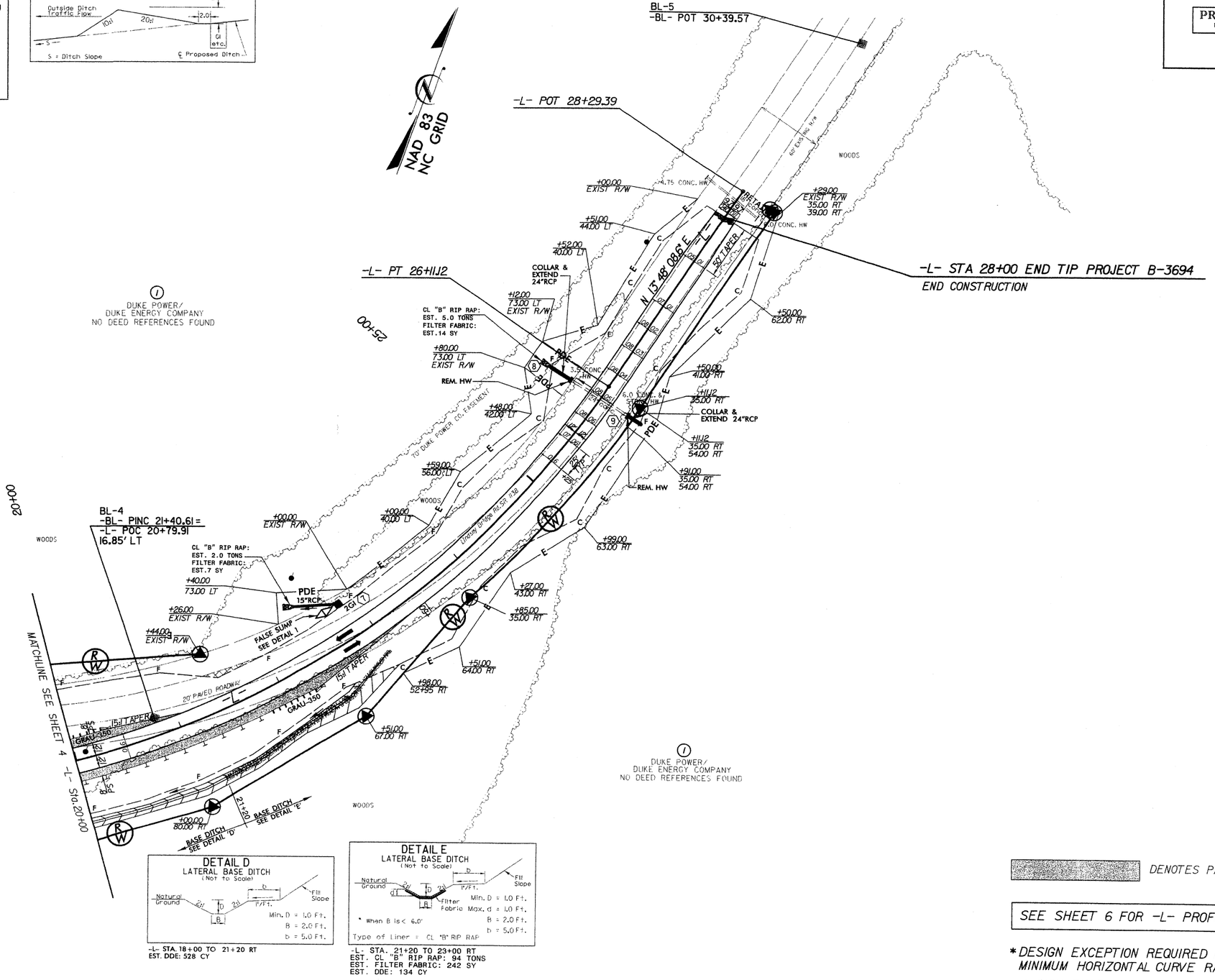
TGS ENGINEERS	PROJECT REFERENCE NO.	SHEET NO.
SUITE 141 975 WALNUT STREET CARY, NC 27511 PH (919) 319-8850	B-3694	5
	R/W SHEET NO.	5
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L-
PI Sta 21+72.25
Δ = 68° 51' 04.4" (LT)
D = 6° 44' 26.4"
L = 1,021.43'
T = 582.57'
R = 850.00'*
SE = 0.06
RO = SEE PLANS
DS = 40mph **

DETAIL I
FALSE SUMP
(Not to Scale)





DETAIL D
LATERAL BASE DITCH
(Not to Scale)

-L- STA. 18+00 TO 21+20 RT
EST. DDE: 528 CY

DETAIL E
LATERAL BASE DITCH
(Not to Scale)

-L- STA. 21+20 TO 23+00 RT
EST. CL "B" RIP RAP: 94 TONS
EST. FILTER FABRIC: 242 SY
EST. DDE: 134 CY

DENOTES PAVED SHOULDERS

SEE SHEET 6 FOR -L- PROFILE

* DESIGN EXCEPTION REQUIRED FOR MINIMUM HORIZONTAL CURVE RADIUS

** DESIGN EXCEPTION REQUIRED FOR HORIZONTAL SSD. HORIZONTAL SSD MEETS A 40 MPH DESIGN SPEED

5/28/99

TGS ENGINEERS
SUITE 141
975 WALNUT STREET
CARY, NC 27511
PH (919) 319-8850

PROJECT REFERENCE NO.	SHEET NO.
B-3694	6

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

BM #1 - RR SPIKE SET IN 30" RED OAK TREE 60.81 FT. RT OF -BL- STA 16+82.03 ELEV - 595.19 FT.

*DESIGN EXCEPTION REQUIRED FOR CREST & SAG VERTICAL CURVE K, MAXIMUM GRADE, & VERTICAL SSD

SEE SHEETS S-1 THRU S- FOR STRUCTURE PLANS

MIN. RESURFACING AND WIDENING

-L- STA. 12+00.00

BEGIN GRADE STA. 12+50.00 EL. 597.32

PI = 13+50.00
EL = 596.67'
VC = 110'
*K = 88
Vd = 50mph

(-)1.6500%

(-)1.5850%

PI = 15+50.00
EL = 592.88'
VC = 290'
*K = 106
Vd = 50mph

BEGIN BRIDGE -L- 16+44.40

END BRIDGE -L- 18+10.60

PROPOSED GRADE

(+)0.8567%

(-)1.0506%

EXISTING GROUND

(+)1.30%

-L- STA. 15+40 EL 589.56' BEGIN DITCH GRADE RT

LOW POINT -L- 16+06.17

-L- STA. 16+15 EL 589.18' END DITCH GRADE RT

NORMAL WATER ELEV. = 566.0'

-L- STA. 18+00 EL 579.30' BEGIN DITCH GRADE RT

FOR -L- PLAN SEE SHEET 4

MIN. RESURFACING AND WIDENING

END GRADE STA. 27+50.00 EL 635.62

-L- STA. 28+00.00

(+)0.7385%

PI = 25+40.00
EL = 620.33'
VC = 160'
K = 131'
Vd = 60mph

(+)0.3667%

PI = 27+24.00
EL = 632.03'
VC = 50'
K = 15'
Vd = 60mph

EXISTING 18" RCP

*DESIGN EXCEPTION REQUIRED FOR CREST & SAG VERTICAL CURVE K, MAXIMUM GRADE, & VERTICAL SSD

PI = 24+04.00
EL = 613.25'
VC = 52'
*K = 86
Vd = 50mph

(+)0.5259%

PI = 21+38.00
EL = 597.80'
VC = 48'
*K = 91'
Vd = 50mph

PROPOSED GRADE

(+)0.6083%

(+)0.2667%

EXISTING GROUND

(+)1.30%

-L- STA. 21+20 EL 583.45' FT DITCH GRADE RT

-L- STA. 23+00 EL 606.24' END DITCH GRADE RT

DRAINAGE AREA = 4.0 AC
DESIGN FREQ. = 25 YR
DESIGN DISCHARGE = 10 CFS
DESIGN HW ELEV. = 620.64 FT
Q100 DISCH. = 13 CFS
Q100 HW ELEV. = 620.90 FT
OVERTOPPING FREQ. = 500 YR+
OVERTOPPING DISCH. = 35 CFS+/-
OVERTOPPING ELEV. = 624.55

EXISTING 24" RCP

BM #2 - RR SPIKE SET IN 20" YELLOW POPLAR 126.64 FT. RT OF -BL- STA 26+19.15 ELEV - 628.30 FT.

FOR -L- PLAN SEE SHEET 5

PIPE HYDRAULIC DATA

DRAINAGE AREA	= 4 AC
DESIGN FREQUENCY	= 25 YRS
DESIGN DISCHARGE	= 10 CFS
DESIGN HW ELEVATION	= 632.80 FT
100 YEAR DISCHARGE	= 13 CFS
100 YEAR HW ELEVATION	= 633.45 FT
OVERTOPPING FREQUENCY	= 500 YRS
OVERTOPPING DISCHARGE	= 24 CFS
OVERTOPPING ELEVATION	= 637.3 FT

BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE	= 7,500 CFS
DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 582.3 FT
BASE DISCHARGE	= 10,800 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 584.1 FT
OVERTOPPING DISCHARGE	= 33,000+/- CFS
OVERTOPPING FREQUENCY	= 500 YRS
OVERTOPPING ELEVATION	= 594.3 FT
ESTIMATED NORMAL W.S. ELEVATION	= 566.0 FT
DATE OF SURVEY	= 6/25/03
W.S. ELEVATION AT DATE OF SURVEY	= 566.0 FT

R:\B-3694\Roadway\Xsc\xsc_ew_volumes.xls

R:\B-3694\Roadway\Xsc\Earthwork\ew_L.log

PROJ. REFERENCE NO.	SHEET NO.
B-3694	X-SUM

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CROSS-SECTION SUMMARY

NOTE: EMBANKMENT COLUMN INCLUDES BACKFILL FOR UNDERCUT

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

Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
12+50.000	0	0
13+00.000	21	60
13+50.000	44	25
14+00.000	70	8
14+50.000	71	27
15+00.000	109	107
15+50.000	280	178
16+00.000	458	302
16+50.000	872	207

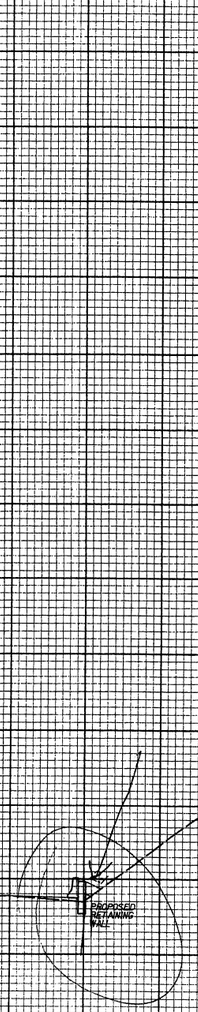
Station L	Uncl. Exc. (cu. yd.)	Embt (cu. yd.)
18+50.000	0	0
19+00.000	369	1372
19+50.000	294	1230
20+00.000	183	1292
20+50.000	107	1317
21+00.000	57	1214
21+50.000	12	1027
22+00.000	0	744
22+50.000	0	421
23+00.000	49	168
23+50.000	170	53
24+00.000	130	48
24+50.000	42	57
25+00.000	129	53
25+50.000	142	44
26+00.000	47	122
26+50.000	6	139
27+00.000	27	61
27+50.000	97	48

6/23/99

0 10	PROJ. REFERENCE NO.	SHEET NO.
	B-3694	X-1

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

670
660
650
640
630
620
610
600
590
580



12+00.000
597.44

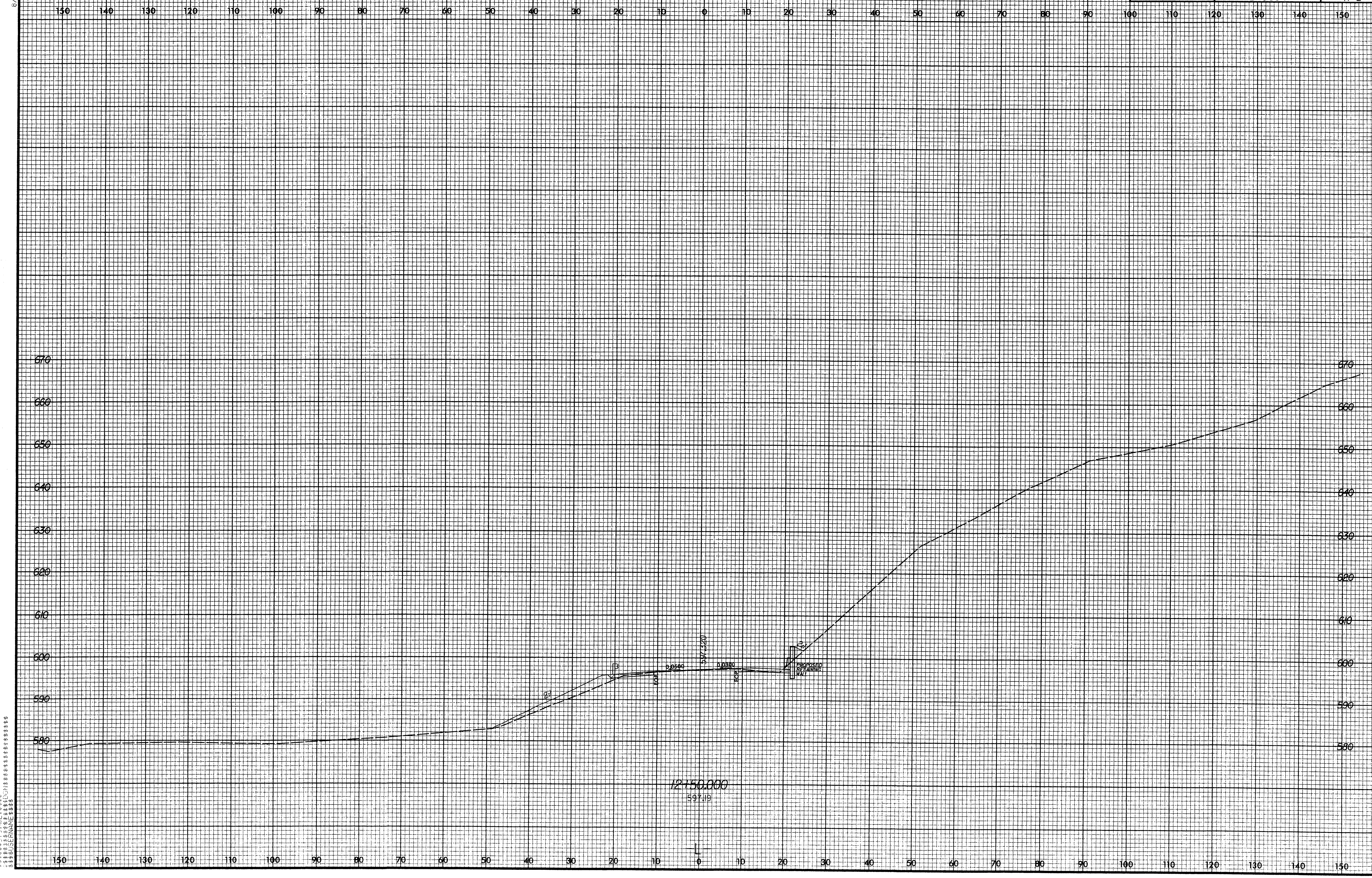
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Approximate quantities only. Unclassified Excavation, Fine Grading, Clearing and Grubbing, and Removal of Existing Asphalt Pavement will be paid for at the contract Lump Sum price for "Grading."

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

$$$$USERNAME$$$$

0 — 10	PROJ. REFERENCE NO.	SHEET NO.
	B-3694	X-2



8/23/99

8/23/99

0 10	PROJ. REFERENCE NO.	SHEET NO.
	B-3694	X-3

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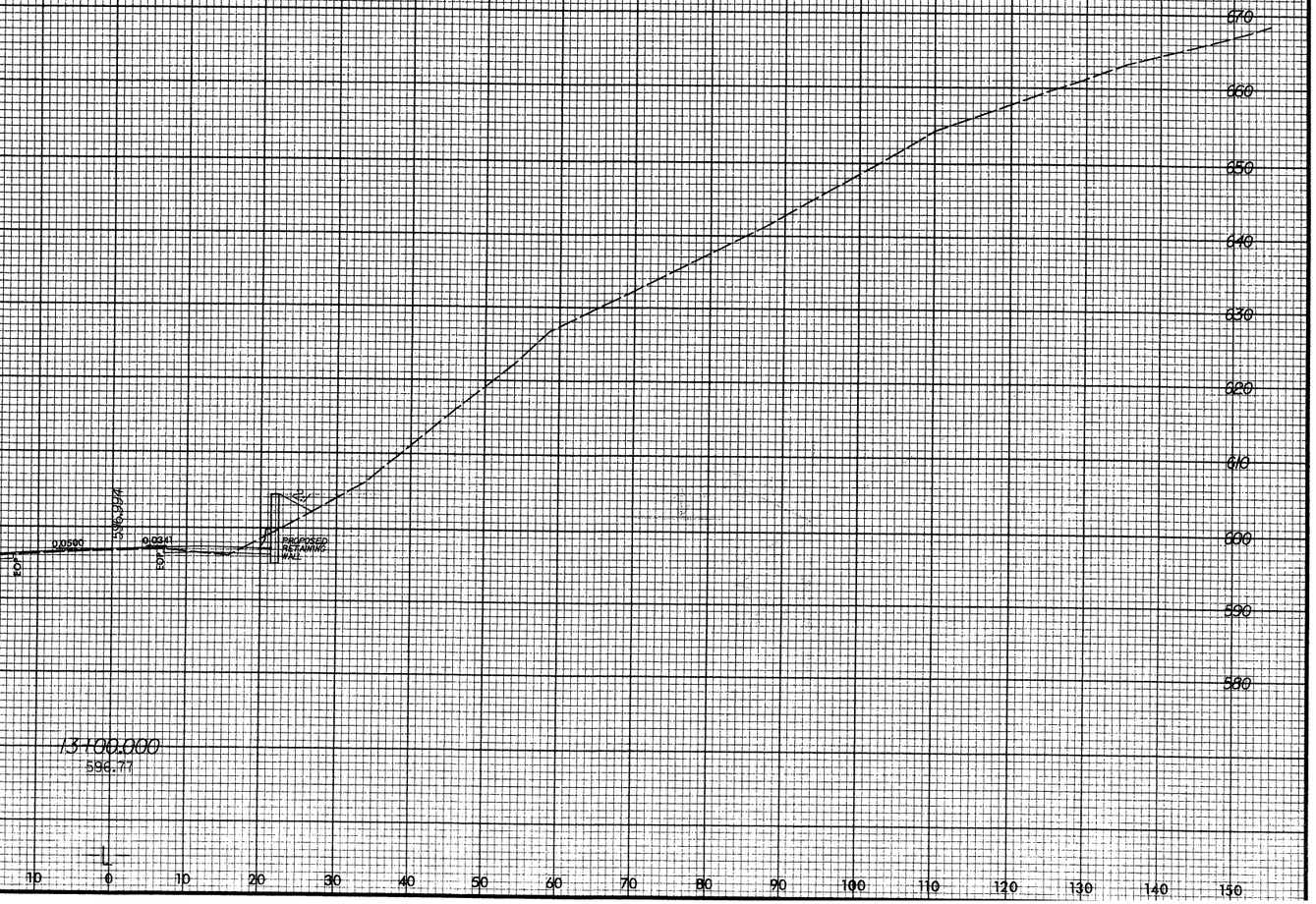
670 660 650 640 630 620 610 600 590 580



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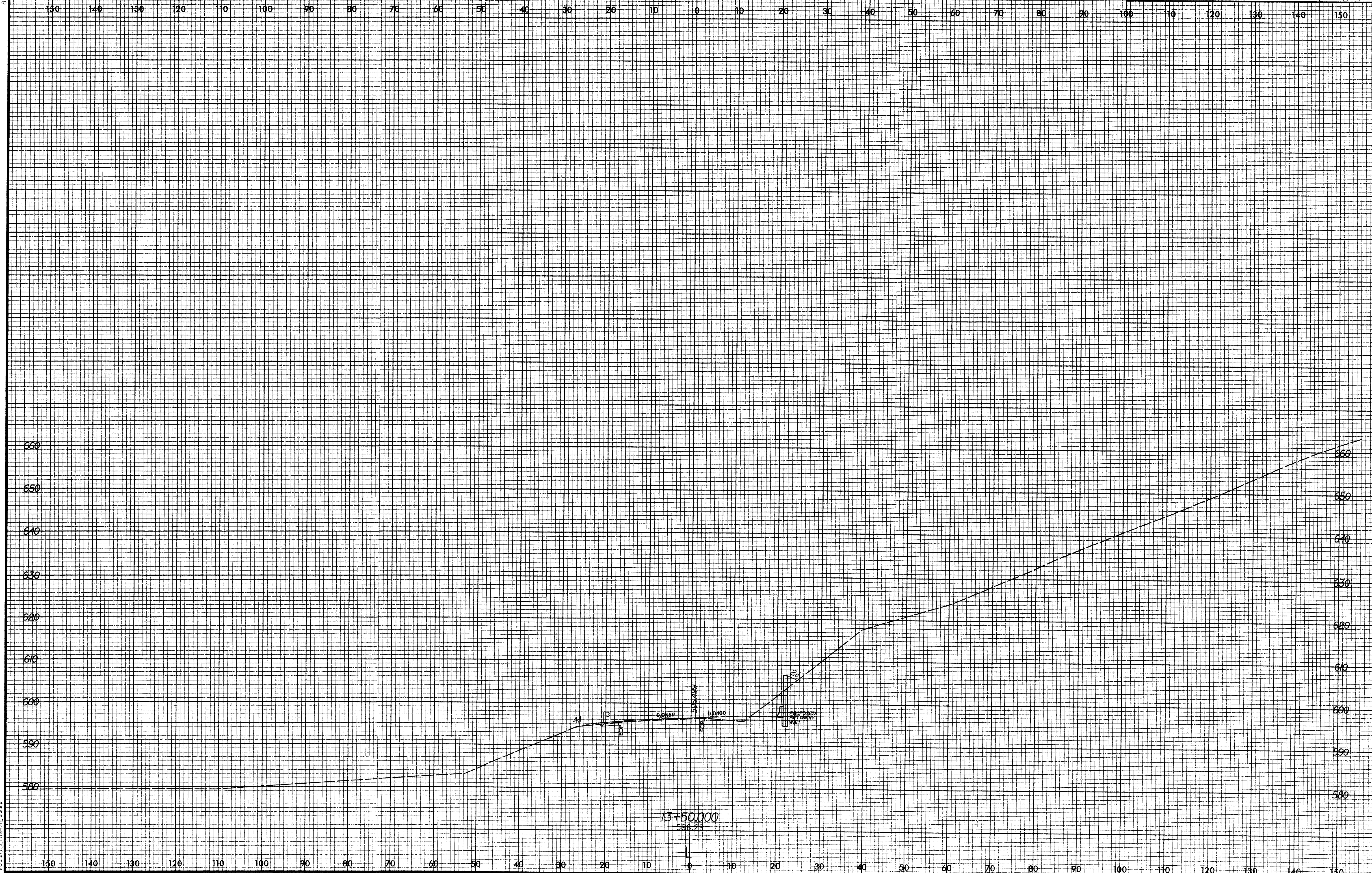
PROJ. REFERENCE NO.	SHEET NO.
B-3694	X-4



8/23/99

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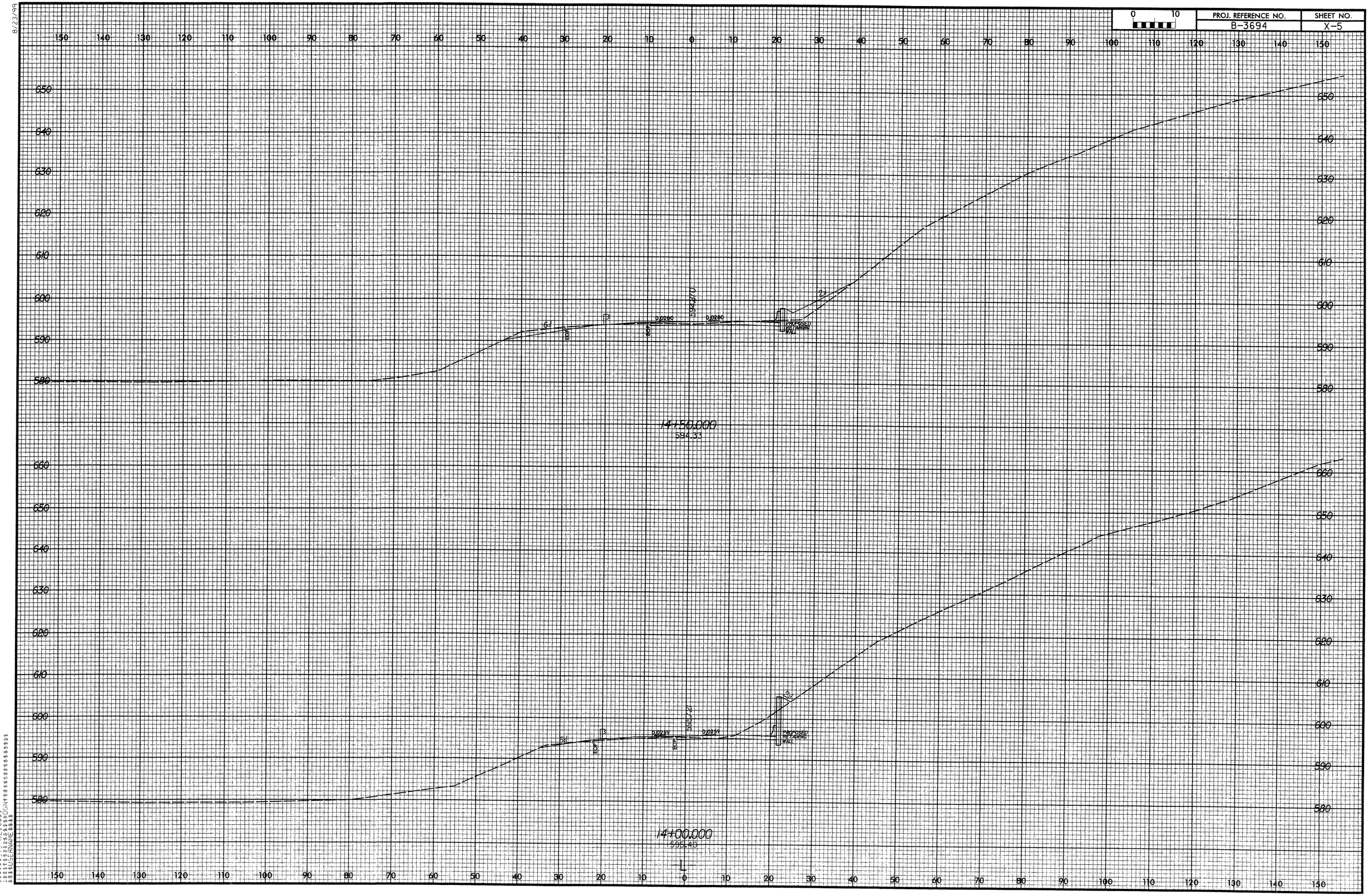
	B-3694	X-5



8/23/99

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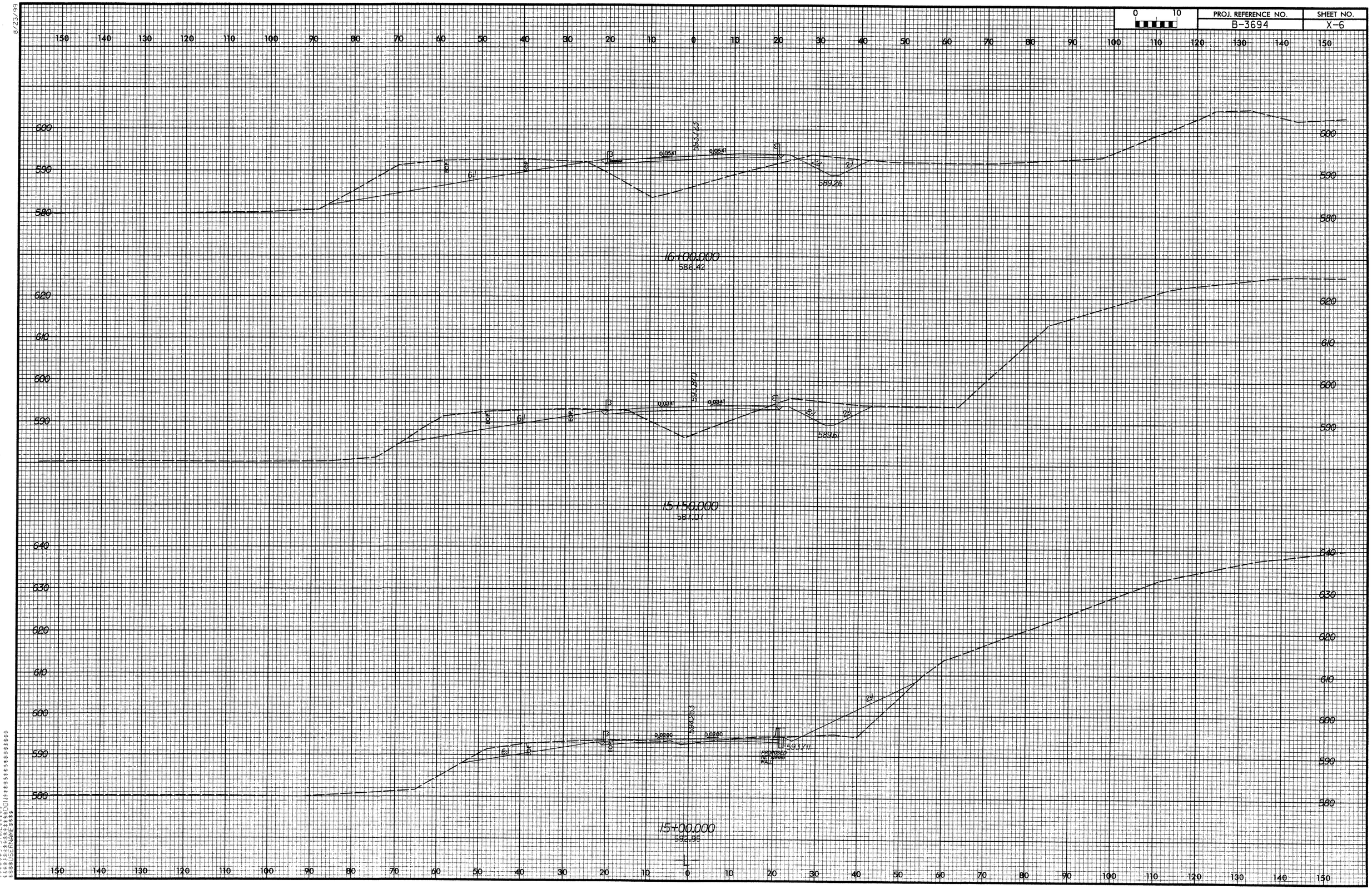
	B-3694	X-6



8/23/99

PROJ. REFERENCE NO.	SHEET NO.
B-3694	X-7

0 10

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

600 590 580 570

0.0600 0.0600 594.353

17+50.000
564.44

600 590 580 570

0.0600 0.0600 594.165

17+00.000
568.52

600 590 580 570

EOP EOP 0.0600 0.0600 593.812 0.0030

16+50.000
581.57

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

8/23/99

0 10	PROJ. REFERENCE NO.	SHEET NO.
	B-3694	X-8

19+50.000
584.26

19+00.000
584.57

18+50.000
582.52

18+00.000
580.65

8/23/99

PROJ. REFERENCE NO.	SHEET NO.
B-3694	X-9

0 10

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

600 590

601.99 0.0600 0.0600 4% EOP EOP 4% 587.25

21+50.000
594.77

596.235 0.0600 0.0600 6% EOP EOP 6% 583.19

21+00.000
590.37

594.900 0.0600 0.0600 6% EOP EOP 6% 582.54

20+50.000
585.32

591.784 0.0600 0.0600 6% EOP EOP 6% 581.89

20+00.000
580.27

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

$$$$USERNAME$$$$

6/23/99

0 10	PROJ. REFERENCE NO.	SHEET NO.
	B-3694	X-10

24+00.000
612.69

23+50.000
609.62

23+00.000
607.02

22+50.000
603.00

22+00.000
599.60

8/23/99

0 10	PROJ. REFERENCE NO.	SHEET NO.
	B-3694	X-12

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

650 640 630 620

28+000.000
636.42

650 640 630 620

633.620
0.0500
0.0000
6.8%
6.8%
4:1
4:1
6:1
6:1
630.380
650.940
27+50.000
633.43

640 630

630.532
0.0700
0.0100
6.8%
4:1
4:1
2:1
627.041
628.241
27+00.000
630.38

640 630 620

627.737
0.0800
0.0800
6.8%
6.8%
6:1
6:1
4:1
2:1
625.457
26+50.000
627.114

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

Rockingham County
Bridge No. 55 on SR 1138 (Lindsey Bridge Road)
over Belews Lake Spillway
Federal Aid Project No. BRZ-1138 (9)
State Project No. 8.2510801
T.I.P. No. B-3694

CATEGORICAL EXCLUSION

UNITED STATES DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

AND

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

APPROVED:

4/24/03
DATE

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

4/25/03
DATE

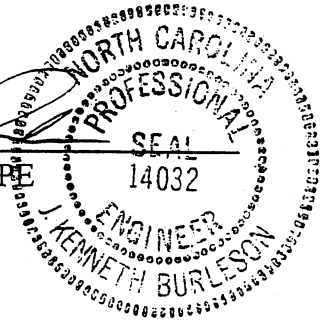
for
Donald J. Voelker
Acting Division Administrator, FHWA

Rockingham County
Bridge No. 55 on SR 1138 (Lindsey Bridge Road)
over Belews Lake Spillway
Federal Aid Project No. BRZ-1138 (9)
State Project No. 8.2510801
T.I.P. No. B-3694

CATEGORICAL EXCLUSION

April 2003

Documentation Prepared by:
TGS Engineers



J. Kenneth Burleson, PE
Project Manager

4/17/03
Date

For the North Carolina Department of Transportation
Project Development and Environmental Analysis Branch

Elmo E. Vance
Project Manager
Consultant Engineering Unit

SUMMARY OF ENVIRONMENTAL COMMITMENTS

Rockingham County
Bridge No. 55 on SR 1138 (Lindsey Bridge Road)
over Belews Lake Spillway
Federal Aid Project No. BRZ-1138 (9)
State Project No. 8.2510801
T.I.P. No. B-3694

If the implementation of this project involves a disturbance to the waters of Belews Lake Spillway, a Nationwide Section 404 permit and a Section 401 Water Quality permit will be required. If so, any foreseen secondary impacts to water resources from soil disturbance on any downstream systems can be minimized by the use of best management practices. No long term impacts are expected as a result of the proposed project.

It is concluded that no serious adverse environmental effects will result from implementation of the project.

Division 7:

A. No in-water work will be performed from April 1 to May 31. High Quality Sedimentation and Erosion Control Measures will be used.

B. A FERC permit is not required. NCDOT will coordinate with Duke Power Company to avoid impacts to their operations at the Belews Lake facility.

Rockingham County
Bridge No. 55 on SR 1138 (Lindsey Bridge Road)
over Belews Lake Spillway
Federal Aid Project No. BRZ-1138 (9)
State Project No. 8.2510801
T.I.P. No. B-3694

INTRODUCTION: Rockingham County Bridge No. 55 is included in the 2002-2008 North Carolina Department of Transportation (NCDOT) Transportation Improvement Program (TIP) and in the Federal-Aid Bridge Replacement Program. The location is shown in Figure 1. No substantial environmental impacts are anticipated. The project is classified as a Federal "Categorical Exclusion".

I. PURPOSE AND NEED STATEMENT

NCDOT Bridge Maintenance Unit records indicate the bridge has a sufficiency rating of 13.4 out of a possible 100 for a new structure. The bridge is considered functionally obsolete. The replacement of this inadequate structure will result in safer and more efficient traffic operations.

II. EXISTING CONDITIONS

The project is located in the western part of Rockingham County just 0.2 miles (322 meters) east of the Stokes County line (see Figure 1). SR 1138 (Lindsey Bridge Road) is classified as a rural minor collector in the Statewide Functional Classification System. SR 1138 becomes SR 1903 when it enters Stokes County. The primary land use along SR 1138 is agricultural mixed with light residential development (see Figure 2). SR 1138 is undeveloped in the vicinity of Bridge No. 55 and there are currently no major generators of traffic located within the project area. The property adjacent to SR 1138 is owned by Duke Power as part of the Belews Lake reservoir. According to Duke Power officials, Belews Lake is not an FERC (Federal Energy Regulatory Commission) lake (see Appendix). There are currently no plans for proposed development of the area on file with the Rockingham County Planning Department. This area is zoned RA (Residential Agricultural).

Rockingham County Bridge No. 55 is a five-span two-lane structure that consists of precast prestressed concrete channels. The end bents and interior bents consist of precast prestressed concrete caps and timber piles. Bent No.1 consists of a steel cap and pile crutch. The existing bridge (see Figure 3) was constructed in 1961 and is in poor condition. The overall length of the structure is 151 feet (46 meters). The clear roadway width is 24.1 feet (7.3 meters). There are no sidewalks on the bridge. The posted weight limit on this bridge is 21 tons for single vehicles and 24 tons for TTST's.

This section of SR 1138 is not a part of a designated bicycle route nor is it listed in the TIP as needing incidental bicycle accommodations.

In the vicinity of the bridge, SR 1138 has a 19-foot (5.8-meter) pavement width with 6-foot (1.8-meter) grass shoulders (see Figures 3 and 4). The existing bridge is on a tangent with a curve to the east. The roadway is approximately 31 feet (9.4 meters) above the stream bed.

The current traffic volume of 1400 vehicles per day (VPD) is expected to increase to 2500 by the year 2025. The projected volume includes 1 percent truck-tractor semi-trailer (TTST) and 2 percent dual-tired vehicles (DT). This route does not contain a posted speed limit. The statutory speed limit is 55 miles per hour.

There are no utilities attached to the existing structure. Utility impacts are anticipated to be low.

Five accidents were reported in the vicinity of Bridge No. 55 during the period from December 1, 1999 through November 30, 2002. These accidents involved vehicles running off the road to the right along the curve preceding the bridge.

Two school buses cross the bridge daily on their morning and afternoon routes.

III. ALTERNATIVES

A. Project Description

The proposed replacement structure will be approximately 167 feet (51 meters) long with a 40-foot (12-meter) clear width. The replacement structure will require a spill-through end bent on each end and the low steel will be no lower than the existing crossing. This structure will provide two 12-foot (3.6-meter) lanes with 8-foot (2.4-meter) shoulders on each side (see Figure 5).

The proposed bridge length is based on a preliminary hydraulic analysis. The length of the new structure may be increased or decreased as necessary to accommodate peak flows as determined by further hydrologic studies.

The roadway grade of the new structure will need to be raised approximately one-foot at this location.

The existing roadway will be widened to a 24-foot (7.2-meter) pavement width to provide two12-foot (3.6-meter) lanes with 8-foot (2.4-meter) shoulders on each side. Typical sections of the existing and proposed approaches are shown in Figure 4.

B. Build Alternatives

The following two alternatives were considered for replacing Bridge No. 55.

Alternative 1 involves replacement of the structure along the existing alignment and provides a temporary on-site detour to maintain traffic during the construction period. The new approaches would be approximately 700 feet (213 meters) long. The design speed of this alignment is 45 miles (72 kilometers) per hour. This alternative is not recommended because the estimated cost is higher and the design speed is lower than the preferred alternative.

Alternative 2 (Preferred) involves replacement of the structure on a new alignment approximately 50 feet (15.2 meters) upstream (south) of the existing structure (see Figure 2). The approach length is approximately 1440 feet (439 meters) total with approximately 970 feet (296 meters) east of the crossing and 470 feet (143 meters) west of the crossing. The two-lane shoulder section will have a design speed of 50 miles (80 kilometers) per hour. The existing structure and approaches will serve to maintain traffic during the construction period.

C. Alternatives Eliminated from Further Study

Alternative 3 involves replacement of the structure on a new alignment downstream (north) of the existing structure. This alternative was eliminated from further study when it was determined that over 1800 feet of approach length would be needed to provide a less than desirable 45 miles (72 kilometers) per hour design speed . This alternative would also involve extensive encroachment on the existing floodplain north of the existing crossing.

Alternative 4 is similar to Alternative 1 replacing the structure along the existing alignment but using an off-site detour along existing routes to maintain traffic during the construction period. The best available off-site detour route follows SR 1138 northeastward to SR 1194 which connects to US 311, then follows US 311 southwestward to SR 1908 in Stokes County. The route continues south on SR 1908 to SR 1903 which becomes SR 1138 at the Rockingham County line just west of the subject crossing. The total length of this detour route is over 12 miles and is considered inadequate for the fire and rescue services in the area as well as the 1400 vehicles currently using the crossing daily. This alternative was eliminated due to the lack of an adequate detour route for emergency services.

The "Do-Nothing" or "No-Build" alternative will eventually necessitate closure of the bridge. Closure of SR 1138 is not desirable due to the lack of an acceptable offsite detour for emergency services.

"Rehabilitation" of the existing bridge is not feasible due to its age and deteriorated condition.

D. Preferred Alternative

Rockingham County Bridge No. 55 is recommended to be replaced approximately 50 feet (15.2 meters) upstream of the existing location as shown by Alternative 2 in Figure 2. This alternative is preferred because it is the least costly and allows on-site traffic maintenance.

IV. DESIGN EXCEPTION

Since a posted speed limit is not provided along SR 1138, the statutory speed limit is 55 miles (88 kilometers) per hour. The preferred Alternative 2 will provide a better alignment than the existing route and the best alignment considered for this replacement. However, this alignment provides a design speed of 50 miles (80 kilometers) per hour which is less than the standard 60 miles (96 kilometers) per hour normally used for such a route. Therefore, a design exception is anticipated to be required for this alternative.

V. ESTIMATED COSTS

The estimated costs for the two alternatives, based on current prices, are as follows:

	Alternative 1	**Alternative 2** (Preferred)
Structure	$434,200	434,200
Roadway Approaches	455,669	425,238
Detour Structure and Approaches	140,280	N/A
Structure Removal	37,750	36,360
Misc. & Mob.	480,101	403,212
Eng. & Contingencies	252,000	200,990
Total Construction Cost	**$ 1,800,000**	**$ 1,500,000**
Right-of-Way Costs	$68,500	$60,500
Total Project Cost	**$ 1,868,500**	**$ 1,560,500**

The estimated cost of the project, shown in the 2002-2008 NCDOT Transportation Improvement Program (TIP), is $725,000, including $55,000 for right-of-way, $550,000 for construction and $120,000 prior years expense.

VI. NATURAL RESOURCES

A review of the project has been undertaken to evaluate natural resource features likely to be affected by the project. Materials and research data in support of this investigation have been derived from a number of sources including applicable U.S. Geological Survey (USGS) topographic mapping (Belews Lake, NC 7.5 minute quadrangle, 1994), and U.S. Fish and Wildlife Service (FWS) National Wetlands Inventory (NWI) mapping.

A. Methodology

A natural resources field investigation was conducted on April 11, 2001. During the site visit, a study corridor was walked and visually investigated for significant features. For purposes of the field investigation and to assure proper area coverage of both alternatives, the study corridor was assumed to be approximately 850 feet (259 meters) in length (approximately 425 feet [129.5 meters] from the bridge to each end), with a width extending approximately 200 feet (61 meters) south of the SR 1138 centerline and 100 feet (30.5 meters) north of the SR 1138 centerline. Plant community impact calculations provided in this report are based on individual corridors centered on each of the two alternatives (Figure 2). Actual impacts will be limited to within construction boundaries and are expected to be less than those shown here for alternative corridors. Special concerns evaluated in the field include 1) potential habitat for protected species and 2) wetlands and water quality protection in Belews Lake Spillway.

The study corridor is located approximately 1.25 miles (2.0 kilometers) east of the town of Pine Hall, NC and 5.5 miles (8.8 kilometers) southwest of Madison, NC (Figure 1). The bridge is located along SR 1138 (Lindsey Bridge Road) at Belews Lake Spillway in Rockingham County. The study corridor includes the channel and floodplain adjacent to Belews Lake Spillway. Belews Lake Spillway flows from the Belews Lake Dam, continues north, joins an unnamed tributary, and flows under Bridge No. 55. The stream continues north and joins the Dan River approximately 0.4 mile (0.6 kilometer) to the north.

Plant community descriptions are based on a classification system utilized by North Carolina Natural Heritage Program (NHP) (Schafale and Weakley 1990). When appropriate, community classifications were modified to better reflect field observations. Vascular plant names follow nomenclature found in Radford *et al.* (1968), with adjustments made to reflect more current nomenclature. Jurisdictional areas were evaluated using the three-parameter approach following U.S. Army Corps of Engineers (COE) delineation guidelines (DOA 1987). Jurisdictional areas were characterized according to a classification scheme established by Cowardin *et al.* (1979). Habitat used by terrestrial wildlife and aquatic organisms, as well as expected population distributions, were determined through field observations,

evaluation of available habitat, and supportive documentation (Webster *et al.* 1985, Potter *et al.* 1980, Martof *et al.* 1980, Rohde *et al.* 1994, Menhinick 1991, Palmer and Braswell 1995). Fish and wildlife nomenclature follow current standards. Water quality information for area streams and tributaries was derived from available sources (DWQ 1996a, 1996b). Quantitative sampling was not undertaken to support existing data.

The U.S. Fish and Wildlife Service (FWS) listing of federal-protected species with ranges that extend into Rockingham and Stokes Counties was obtained prior to initiation of the field investigation. In addition, NHP records documenting presence of federally or state listed species were consulted before commencing the field investigation.

B. Physiography and Soils

Land use within the study corridor includes Piedmont/Mountain Levee Forest, Dry-Mesic Oak-Hickory Forest, and roadside/disturbed land.

The study corridor is located in the Biotite Gneiss and Schist geologic formation within the Inner Piedmont physiographic province of North Carolina. This system is characterized by broad, gently sloping uplands, moderately to steeply sloping areas with narrow convex ridges, and steep valley slopes. Soil systems in the Piedmont are determined by the major bedrock type and form in saprolite weathered from bedrock of various composition (Daniels *et al.* 1999). The study corridor is located within the floodplain and adjacent side slopes of Belews Lake Spillway. Within the study corridor, the floodplain ranges in width from very narrow upstream of the bridge to broadly expansive downstream of the bridge. Elevations rise from approximately 560 feet (171 meters) National Geodetic Vertical Datum (NGVD) at stream side to 640 feet (195 meters) NGVD at the southwest extreme of the study corridor (USGS Belews Lake, NC quadrangle).

The Natural Resources Conservation Service (USDA 1992) indicates the following soils are within the study corridor: Chewacla loam (fine-loamy, mixed, thermic *Fluvaquentic Dystrochrepts*), adjacent to and including the riverbed; Rion sandy loam (15-30 percent slope) (fine-loamy, mixed, thermic *Typic Hapludults*) on the slopes descending from the dam south of the project; and Wickham sandy loam (fine-loamy, mixed, thermic *Typic Hapludults*) to the west of the river channel.

The Chewacla series consists of deep, somewhat poorly drained, moderately permeable soils that formed in alluvium. These soils are on narrow floodplains along smaller streams and in slightly depressed areas on floodplains along major streams. Slopes range from 0 to 2 percent. The Rion series consists of deep, well drained, moderately permeable soils that formed in material weathered from acid, crystalline

rocks. These soils are in hilly areas on relatively narrow, gently sloping ridge tops and moderately steep side slopes. Slopes range from 2 to 30 percent. The Wickham series consists of deep, well drained, moderately permeable soils that formed in old alluvium. These soils are on narrow, slightly elevated stream terraces. Slopes range from 1 to 4 percent.

Of the predominant soil map units in the study corridor, the Natural Resources Conservation Service lists only the Chewacla series as having hydric inclusions (USDA 1997). The Chewacla series has hydric soil inclusions of Wedhadkee soils in depressions. These hydric soil inclusions are saturated or flooded for very long to substantial periods during the growing season, and support woody vegetation under natural conditions.

C. Water Resources

1. Waters Impacted

The study corridor is located within sub-basin 03-02-01 (upper reach of the North Carolina portion of the Dan River and tributaries) of the Roanoke River Basin (DWQ 1996b). This area is part of USGS accounting unit 03010103 of the South Atlantic-Gulf Coast Region. The section of Belews Lake Spillway crossed by the project bridge has been assigned Stream Index Number 22-27-(7) by the N.C. Division of Water Quality (DWQ 1996a).

2. Stream Characteristics

Belews Lake Spillway (Belews Creek) discharges from the Belews Lake Reservoir approximately 1800 feet (549 meters) upstream of Bridge No. 55. Within the study corridor, the channel of Belews Lake Spillway is highly scoured and composed of an unconsolidated, boulder and gravel substrate. The stream is moderately broad and deep, highly entrenched, exhibiting poor sinuosity, and a poor riffle-and-pool sequence. Width of the stream is approximately 35 feet (10.7 meters) at the point of the bridge crossing. Bridge height above the stream bed is approximately 31 feet (9.4 meters).

During the field visit, water depths along the study corridor varied from 1 to 3 feet (0.3 to 0.9 meter), permitting sparsely distributed vegetation to cling to debris pile within the stream channel. Persistent emergent aquatic vegetation was not observed, however high amounts of filamentous algae was present in some of the slower-flowing reaches of the stream. The stream banks are composed of a silty loam textured soil. Evidence of burrowing mammals was observed along the streambanks 5 to 10 feet (1.5 to 3.0 meters) above the water surface.

Classifications are assigned to waters of North Carolina based on the existing or contemplated best usage of various streams or segments of streams in the basin. A best usage classification of WS-IV has been assigned to Belews Lake Spillway. The designation WS-IV denotes waters protected as water supplies which are generally in moderately to highly developed watersheds; point source discharges of treated wastewater are permitted; local programs to control non-point source and storm water discharge of pollution are required; suitable for all Class **C** uses. Class **C** waters are suitable for aquatic life propagation and protection, agriculture, and secondary recreation. Secondary recreation refers to wading, boating, and other uses not involving human body contact with waters on an organized or frequent basis (DWQ 1996a). No designated Outstanding Resource Waters (ORW), High Quality Waters (HQW), Water Supply I (WS-I), or Water Supply II (WS-II) waters occur within 1.0 mile (1.6 kilometers) of the study corridor. No watershed Critical Areas (CA) occur within 1.0 mile (1.6 kilometers) of the study corridor.

The Division of Water Quality (DWQ) (previously known as the Division of Environmental Management, Water Quality Section [DEM]) has initiated a whole-basin approach to water quality management for the 17 river basins within the state. Water quality for the proposed study corridor is summarized in the Roanoke River basin management plan. Water quality samples in the upper reaches of the North Carolina portion of the Dan River sub-basin in 1995 indicated Good water quality based on macroinvertebrate samples, and Good or Good/Excellent ecological health based on fish samples. Fish tissue samples taken in Belews Lake near the mouth of Belews Lake Spillway have resulted in a continuance of a fish consumption advisory for Belews Lake due to elevated selenium levels from Duke Power's ash basin discharge.

The Roanoke River watershed has been monitored and sampled at 101 locations and has a use support rating of Fully Supporting in 56 percent of its reaches. An additional 27 percent is rated as Support Threatened, 9 percent as Partially Supporting, and 8 percent of its stream miles were not evaluated. Belews Lake Spillway (Belews Creek) is rated as Partially Supporting. The Roanoke River sub-basin 03-02-01, containing the upper reaches of the North Carolina portion of the Dan River, supports a major point-source discharge from the Duke Power Company non-municipal effluent, with 5.0 million gallons per day (MGD) (19.0 million liters per day [MLD]) permitted flow. The discharge is into the Belews Lake reservoir and upstream of Belews Lake Spillway. There are 28 minor dischargers, eight upstream of the study corridor, with a total permitted flow of 1.15 MGD (4.37 MLD). Non-point source pollution is also a major consideration in the Roanoke River drainage,

with sedimentation and erosion the most widespread problem throughout Rockingham County (DWQ 1996b).

3. Anticipated Impacts

Both project alternatives include complete bridging of Belews Lake Spillway to maintain the current water quality, aquatic habitat, and flow regime. Alternative 1 involves replacement of the structure along the existing alignment, with a temporary on-site detour provided to maintain traffic during the construction period. The detour structure would be located approximately 45 feet (13.7 meters) to the south (upstream) of the existing structure. Alternative 2 involves replacement of the existing structure on a new alignment approximately 50 feet (15.2 meters) upstream (south). The existing structure and approaches will serve to maintain traffic during the construction period. Temporary construction impacts due to erosion and sedimentation will be minimized through implementation of a stringent erosion control schedule and the use of best management practices. The contractor will follow contract specifications pertaining to erosion control measures as outlined in 23 CFR 650 Subpart B and Article 107-13 entitled "Control of Erosion, Siltation, and Pollution" (NCDOT, Specifications for Roads and Structures). These measures include the use of dikes, berms, silt basins, and other containment measures to control runoff; elimination of construction staging areas in floodplains and adjacent to waterways; re-seeding of herbaceous cover on disturbed sites; management of chemicals (herbicides, pesticides, de-icing compounds) with potential negative impacts on water quality; and avoidance of direct discharges into streams by catch basins and roadside vegetation.

Each of the two alternatives will allow for continuation of pre-project stream flows in Belews Lake Spillway, thereby protecting the integrity of this waterway. Long-term impacts resulting from construction are expected to be negligible. In order to minimize impacts to water resources, NCDOT's Best Management Practices (BMPs) for the Protection of Surface Waters will be strictly enforced during the entire life of the project.

During removal of the existing bridge, the bridge rails will be removed without dropping them into waters of the United States. There is potential for components of the deck and interior bents to be dropped into waters of the United States, resulting in a temporary fill of approximately 100.84 cubic yards (77.1 cubic meters). NCDOT's BMPs for Bridge Demolition and Removal must be applied for the removal of this bridge.

D. Biotic Resources

1. Plant Communities

Three distinct plant communities were identified within the study corridor: Piedmont/Mountain Levee Forest, Dry-Mesic Oak-Hickory Forest, and roadside/disturbed land. These plant communities are described below.

Piedmont/Mountain Levee Forest - Piedmont/Mountain Levee Forest occurs on the floodplain east and west of Belews Lake Spillway. The levee forest is bordered by an agricultural field northwest of SR 1138, Dry-Mesic Oak-Hickory Forest to the southwest and southeast, and by a shrub assemblage to the northeast. A power line easement, characterized by a disturbed and maintained herbaceous community, bisects the southeast section of the levee forest. This community is described by Schafale and Weakley (1990) as occurring in large floodplains of Piedmont rivers and streams. The Piedmont/Mountain Levee Forest is a mature, structurally complex community, with well-developed canopy, sub-canopy, shrub, and groundcover strata. Predominant canopy species include tulip poplar (*Liriodendron tulipifera*), river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), hackberry (*Celtis laevigata*), black cherry (*Prunus serotina*), sweetgum (*Liquidambar styraciflua*), and boxelder (*Acer negundo*). The mid-story and shrub layer are well-developed and include redbud (*Cercis canadensis*), American holly (*Ilex opaca*), ironwood (*Carpinus caroliniana*), multiflora rose (*Rosa multiflora*), eastern red cedar (*Juniperus virginiana*), flowering dogwood (*Cornus florida*), and pawpaw (*Asimina triloba*). Vines and herbaceous species are sparse to common in more open patches and include muscadine (*Vitis rotundifolia*), Japanese honeysuckle (*Lonicera japonica*), cross vine (*Anisostichus capreolata*), Solomon's seal (*Polygonatum biflorum*), and greenbrier (*Smilax rotundifolia*).

Dry-Mesic Oak-Hickory Forest - Dry-Mesic Oak-Hickory Forest occurs mainly in the southwest quadrant of the study corridor and is bordered by roadside/disturbed land to the north along SR 1138 and by Piedmont/Mountain Levee Forest to the east along Belews Lake Spillway. This community is described by Schafale and Weakley (1990) as occurring on dry upland slopes and ridges of the Piedmont. The Dry-Mesic Oak-Hickory Forest is a mature forest, with a closed canopy, well-developed sub-canopy, and sparse shrub and groundcover strata. The canopy contains white oak (*Quercus alba*), scarlet oak (*Quercus coccinea*), Virginia pine (*Pinus virginiana*), northern red oak (*Quercus rubrum*), and American beech (*Fagus grandifolia*). The sub-canopy and shrub layer is composed of red maple (*Acer rubrum*), flowering dogwood, and saplings of dominant canopy

species. The herbaceous layer includes Christmas fern (*Polystichum acrostichoides*) and running cedar (*Lycopodium clavatum*).

Roadside/Disturbed Land - Roadside/disturbed land occurs along the right-of-way of SR 1138, and along a power line easement bisecting the southeast quadrant of each study corridor. The roadside margin is approximately 10 feet (3.0 meters) wide, and the power line right-of-way is approximately 50 feet (15.2 meters) wide. This community is periodically mowed and primarily supports herbaceous species. Common species on roadsides are fescue (*Festuca* sp.), chickweed (*Stellaria* sp.), clover (*Trifolium* sp.), mayapple (*Podophyllum peltatum*), Carolina cranesbill (*Ranunculus carolina*), Queen Anne's lace (*Daucus carota*), and violets (*Viola* spp.). Within the power line right-of-way, volunteer species include blackberry (*Rubus argutus*), tulip poplar, goldenrod (*Solidago* sp.), honeysuckle, and giant cane *(Arundinaria gigantea)*.

2. Plant Community Impacts

Plant community impacts are estimated based on the amount of each plant community present within alternative corridors (Figure 2). Alternate 1 involves replacement of the structure along the existing location with a temporary on-site detour. Alternate 2 involves replacement of the structure on a new alignment with the existing structure and approaches serving to maintain traffic during the construction period. A summary of plant community impacts for each alternative is presented in the following table.

Plant Community Areas. Plant community areas are given in acres, with hectares in parentheses.

	Alternative 1			Alternative 2
Plant Community	Existing Location	Temp. On-Site Detour	Total	New Alignment
Piedmont/Mtn Levee Forest	0.25 (0.10)	0.31 (0.13)	0.56 (0.23)	0.52 (0.21)
Dry-Mesic Oak-Hickory Forest	0.0 (0.0)	0.09 (0.04)	0.09 (0.04)	0.12 (0.05)
Roadside/ Disturbed Land	0.09 (0.04)	0.23 (0.09)	0.32 (0.13)	0.96 (0.39)
TOTAL:	0.34 (0.14)	0.63 (0.26)	0.97 (0.40)	1.60 (0.65)

From an ecological perspective, permanent impacts of upgrading existing road facilities are typically minimal relative to upgrades on new alignment. However, both alternatives considered here include either construction on a new alignment or construction of a temporary detour on a new alignment, so impacts are considered more than minimal for both alternatives. Alternative 2 includes approximately one-third more total impacts than Alternative 1 because of a new roadway alignment; however, most of the impact is on land that is already highly disturbed (roadside/maintained land). Both alternatives contain similar amounts of natural plant communities (Piedmont/Mountain Levee Forest and Dry-Mesic Oak-Hickory Forest). No new fragmentation of plant communities will be created for either alternative, as the project will result only in relocation of community boundaries.

Roadside-forest ecotones typically serve as vectors for invasive species into local natural communities. An example of an undesirable invasive species utilizing roadsides is kudzu (*Pueria montana*). The establishment of a hardy groundcover on road shoulders as soon as practicable will limit the availability of construction areas to invasive and undesirable plants.

3. Wildlife

No live terrestrial mammal species were identified in the study corridor during the field visit. However, a dead Virginia opossum (*Didelphis virginiana*) was found. Tracks of raccoon (*Procyon lotor*), white-tailed deer (*Odocoileus virginianus*), as well as signs of a mole (most likely eastern mole [*Scalopus aquaticus*]) were noted within the study corridor. Some characteristic mammals which are expected to frequent small streams and riparian forests in this portion of the Piedmont include red bat (*Lasiurus borealis*), beaver (*Castor canadensis*), woodchuck (*Marmota monax*), eastern cottontail (*Sylvilagus floridanus*), southern flying squirrel (*Glaucomys volans*), cotton mouse (*Peromyscus gossypinus*), and gray fox (*Urocyon cinereoargenteus*).

Bird species identified during the field visit are mourning dove (*Zenaida macroura*), eastern phoebe (*Sayornis phoebe*), belted kingfisher (*Megaceryle alcyon*), northern cardinal (*Cardinalis cardinalis*), eastern towhee (*Pipilo erythrophthalmus*), American crow (*Corvus brachyrhynchos*), Carolina chickadee (*Poecile carolinensis*), tufted titmouse (*Baeolophus bicolor*), and downy woodpecker (*Picoides pubescens*). The stream habitat might be expected to also support wood duck (*Aix sponsa*), Acadian flycatcher (*Empidonax virescens*), American woodcock (*Scolopax minor*), barred owl (*Strix varia*), white-breasted nuthatch (*Sitta carolinensis*), American robin (*Turdus migratorius*), northern parula (*Parula americana*), white-eyed vireo

(*Vireo griseus*), yellow-rumped warbler (*Dendroica coronata*), and white-throated sparrow (*Zonotrichia albicollis*).

No terrestrial reptile or amphibian species were observed within the study corridor. Species that might be expected are five-lined skink (*Eumeces fasciatus*), rough green snake (*Opheodrys aestivus*), eastern box turtle (*Terrapene carolina*), marbled salamander (*Ambystoma opacum*), slimy salamander (*Plethodon glutinosus*), American toad (*Bufo americanus*), Fowler's toad (*Bufo woodhousei*), rat snake (*Elaphe obsoleta*), and eastern ribbon snake (*Thamnophis sauritus*).

No aquatic amphibian or reptile species were observed during the field visit. Belews Lake Spillway provides suitable habitat for aquatic and semi-aquatic reptiles including snapping turtle (*Chelydra serpentina*), painted turtle (*Chrysemys picta*), eastern ribbon snake (*Thamnophis sauritus*), and northern water snake (*Nerodia sipedon*). Typical amphibian species for this region include northern dusky salamander (*Desmognathus fuscus*), three-lined salamander (*Eurycea guttolineata*), pickerel frog (*Rana palustris*), and eastern newt (*Notophthalmus viridescens*). No mollusks or arthropods were observed, with the exception of shells of the invasive Asian clam (*Corbicula fluminea*).

No sampling was undertaken in Belews Lake Spillway to determine fishery potential. Small minnows and crappie (*Pomoxis* sp.) were seen during visual investigations, but no larger fish were noted. Species which may be present in Belews Lake Spillway include, chain pickerel (*Esox niger*), gizzard shad (*Dorosoma cepedianum*), rosyside dace (*Clinostomus funduloides*), yellow perch (*Perca flavescens*), eastern mosquitofish (*Gambusia holbrooki*), pumkinseed (*Lepomis gibbosus*), redbreast sunfish (*Lepomis auritusorone*), bluegill (*Lepomis macrochirus*), silver redhorse (*Moxostoma anisurum*), largemouth bass (*Micropterus salmoides*), and fantail darter (*Etheostoma flabellare*).

4. Impacts to Wildlife

Due to the limited extent of infringement on natural communities, the proposed bridge replacement will not result in substantial loss or displacement of known terrestrial animal populations. No substantial habitat fragmentation is expected since most permanent improvements will be restricted to or adjoining existing roadside margins. Construction noise and associated disturbances will have short-term impacts on avifauna and migratory wildlife movement patterns. Long-term impacts are expected to be minimal for both alternatives. After removal of temporary bridge

structures and associated fill, the area will be replanted.

For both alternatives, potential impacts to down-stream aquatic habitats will be minimized by bridging the stream to maintain regular flow and stream integrity. Short-term impacts associated with turbidity and suspended sediments will affect benthic populations. Temporary impacts to downstream habitats from increased sediment during construction will be minimized by the implementation of stringent erosion control measures. The N.C. Wildlife Resources Commission recommends a moratorium on in-water work from April 1 to May 31 to avoid adverse effects on breeding of the local sunfish population.

E. Jurisdictional Issues

1. Waters of the United States

Surface waters within the embankments of Belews Lake Spillway are subject to jurisdictional consideration under Section 404 of the Clean Water Act as "waters of the United States" (33 CFR section 328.3). NWI mapping indicates that Belews Lake Spillway exhibits characteristics of a riverine system with an unconsolidated bottom that is permanently flooded (R2UBH; Cowardin *et al.* 1979). Field investigation indicates that Belews Lake Spillway can be characterized as a perennial stream system with an unconsolidated bottom of boulders, cobble, and gravel.

There is potential that components of the existing bridge may be dropped into "waters of the United States" during demolition. The resulting temporary fill is approximately 100.84 cubic yards (77.1 cubic meters). In consideration of surface water impacts, this project can be classified as Case 2, where no in-stream work may occur during the moratorium period of April 1 to May 31, due to the healthy sunfish population as recommended by the N.C. Wildlife Resources Commission. In addition, restrictions outlined in Best Management Practices for Protection of Surface Waters must be followed. NCDOT will coordinate with the various resource agencies during project planning to ensure that all concerns regarding bridge demolition are resolved.

2. Jurisdictional Wetlands

Vegetated wetlands are subject to jurisdictional consideration under Section 404 of the Clean Water Act as "waters of the United States" (33 CFR section 328.3). These areas are defined by the presence of three primary criteria: hydric soils, hydrophytic vegetation, and evidence of hydrology at or near the surface for a portion (12.5 percent) of the growing season (DOA 1987). No

vegetated wetlands subject to jurisdictional consideration occur within the study corridor. Jurisdictional impacts are avoided by both considered alternatives.

3. Permits Required

A Federal permit under Section 404 of the Clean Air Act is required for discharges of dredged or fill material in "Waters of the United States". This project is being processed as a Categorical Exclusion (CE) under Federal Highway Administration (FHWA) guidelines. It is anticipated that this project will fall under Nationwide Permit (NWP) #23 (61 FR 65874, 65916; December 13, 1996) for CEs due to expected minimal impact. DWQ has made available a General 401 Water Quality Certification for NWP #23. However, authorization for jurisdictional area impacts through use of this permit will require written notice to DWQ. In the event that NWP #23 will not suffice, minor impacts attributed to bridging and associated approach improvements are expected to qualify under General Bridge Permit 031 issued by the Wilmington COE District. Notification to the Wilmington COE office is required if this general permit is utilized.

According to Duke power officials, Belews Lake is not an FERC (Federal Energy Regulatory Commission) lake and a FERC permit will not be required (Appendix).

4. Mitigation

Compensatory mitigation is not proposed for this project due to the limited nature of project impacts. However, utilization of BMPs is recommended in an effort to minimize impacts. Fill or alteration of more than 150 linear feet (45.8 meters) of stream may require compensatory mitigation in accordance with 15 NCAC2H.0506(h). A final determination regarding mitigation rests with the COE.

F. Protected Species

1. Federal Species

Species with the federal classification of Endangered, Threatened, or officially Proposed for such listing, are protected under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The term "Endangered species" is defined as "any species which is in danger of extinction throughout all or a significant portion of its range", and the term "Threatened species" is defined as "any species which is likely to become an

Endangered species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C. 1532). Federally protected species for Rockingham and Stokes County (February 25, 2003 FWS list) are listed in the table below.

Federally Protected Species: Species name and status for federally protected species in Rockingham (R) and Stokes (S) County (February 25, 2003 FWS list).

Common Name	Scientific Name	Federal Status	County
James spinymussel	*Pleurobema collina*	Endangered	R/S
Smooth coneflower	*Echinacea laevigata*	Endangered	R
Schweinitz's sunflower	*Helianthus schweinitzii*	Endangered	S
Small anthered bittercress	*Cardamine micranthera*	Endangered	S

James Spinymussel - The James spinymussel is a small, sub-rhomboidal mussel, with an obliquely sub-truncated posterior, that grows to approximately 1.5 inches (40 millimeters) in length. The external shell of the juveniles usually bears one to three short spines on each valve. The adult shells usually lack spines. The shell is smooth, straw-colored to brownish-black, with widely spaced concentric striations. Preferred habitat of the spiny mussel includes relatively fast-flowing, well-oxygenated, circum-neutral water over a silt-free, non-compacted, gravel/coarse sand substrate. According to the FWS species recovery plan (FWS 1990), this spinymussel was only known from 10 streams within the James River basin in Virginia and West Virginia.

Extensive surveys for mussel fauna have been conducted by NCDOT staff in the Dan River in Stokes and Rockingham Counties. Personnel from the US Fish and Wildlife Service, North Carolina Wildlife Resources Commission and NC State University School of Veterinary Medicine assisted at various times during these survey efforts. The apparent range (@ 30 river-miles) of the spinymussel in the Dan River extends from North Carolina / Virginia border near the first bridge crossing in North Carolina (Flippin Road, SR 1416) in Northwest Stokes County down to the town of Danbury in central Stokes County. The spinymussel has not been found in the Dan River in Rockingham County. The species has been found in the Mayo River in northwest Rockingham County, near the NC / VA border. More surveys are

needed to determine the range of this species in the Mayo River.

In October 2000, an unidentified spinymussel was found in the Dan River in Stokes County, North Carolina during a survey conducted by personnel of NCDOT, the N.C. Wildlife Resources Commission, and the N.C. Division of Marine Fisheries. Subsequent surveys in the Dan River found several more individuals of spinymussel (personal communication, Tim Savidge, April 4, 2001). Spinymussels had not previously been identified within the Dan River basin. The mussels found in the Dan River have characteristics similar to the James spinymussel and the Tar spinymussel (*Elliptio steinstansanna*). Specimens of the recently found spinymussel are currently (as of April 2001) undergoing genetic analysis. The finding of this unidentified spinymussel has resulted in the FWS listing James spinymussel in North Carolina counties that include tributaries of the Dan River basin.

The subject project is located on the spillway of Belews Lake, which is formed by Belews Creek. Belews Creek then flows into the Dan River less than 1 mile downstream of the project crossing. The confluence of Belews Creek and the Dan River is approximately 16 river-miles downstream of Danbury (furthermost downstream extent of the spinymussel in the Dan River. Belews Lake Spillway is a highly disturbed, well entrenched, perennial stream, characterized by moderate flow. The stream bed is primarily composed of bedrock and cobble with scattered gravel and sand.

NCDOT Environmental Specialists Tim Savidge and Mike Wood visited the project site on August 17, 2001. Surveys for mussels were conducted from approximately 400 feet downstream to 100 feet upstream (base of the spillway) of the project crossing. Survey methodology included wading using visual (batiscope and tactile) methods. Water was not being released at the time of the survey, and water depth ranged from 6 inches to 2 feet. There is evidence of extreme high flows(water release) and streambank scour in the creek. No mussels were found in 1 man-hour of survey. The aquatic snail (*Helisoma anceps)* and the introduced Asian clam (*Corbicula fluminea)* were present in the stream but nowhere abundant. No spinymussel species were found during this survey.

BIOLOGICAL CONCLUSION: NHP records indicate that James River spinymussel has not been documented to occur within 1.0 mile (1.6 kilometers) of the study corridor. Given the survey results, it is apparent that the spinymussel does not occur in the project area. The spinymussel has not been found in the stretch of the Dan River downstream of the project area. It can be concluded that project construction will not impact this species. **NO EFFECT.**

Smooth coneflower - This species is a stiffly erect, rarely branched perennial that grows up to 5 feet (1.5 meters) tall. Basal and stem leaves are large, glabrous, lanceolate to narrowly ovate blades reaching 3 inches (7.6 centimeters) in length. This coneflower blooms from late May to July, producing solitary, heads of small purplish disk flowers with long drooping pink to purplish ray flowers (Kral 1983). This species occurs on calcareous, basic, or circumneutral soils on roadsides, clear-cuts, power line right-of-ways where there is abundant light and little herbaceous competition (Gaddy 1991). Fire-maintained woodlands also appear to provide potential habitat for the coneflower. Within the study corridor, suitable habitat occurs for smooth coneflower along road shoulders and within the power line right-of-way. NHP records have no documentation of this species within 5.0 miles (8.0 kilometers) of the study corridor.

BIOLOGICAL CONCLUSION: Within the study corridor, suitable habitat occurs for coneflower along road shoulders and within the power line easement, both of which are kept free of an established canopy. A systematic field survey was conducted within the power line easement and along the road shoulders during the blooming season (late May to July) on July 17, 2001. No individuals of any *Echinacea* species were documented within the study corridor. Based on the results of field surveys and available information, the proposed project will not affect the smooth coneflower. **NO EFFECT**.

Schweinitz's Sunflower - Schweinitz's sunflower is an erect, unbranched, rhizomatous, perennial herb that grows to approximately 6.0 feet (1.8 meters) in height. The stem may be purple, usually pubescent, but sometimes nearly smooth. Leaves are sessile, opposite on the lower stem but alternate above. Leaf shape is lanceolate and average 5 to 10 times as long as wide. The leaves are rather thick and stiff, with a few small serrations. The upper leaf surface is rough and the lower surface is usually pubescent with soft white hairs. Schweinitz's sunflower blooms from September to frost; the yellow flower heads are about 0.6 inch (1.5 centimeters) in diameter. The current range of this species is within 60 miles of Charlotte, North Carolina, occurring on upland interstream flats or gentle slopes, in soils that are thin or clayey in texture. The species needs open areas protected from shade or excessive competition, reminiscent of Piedmont prairies. Disturbances such as fire maintenance or regular mowing help sustain preferred habitat (FWS 1994). Within the study corridor, suitable habitat occurs for Schweinitz's sunflower along road shoulders and within the power line easement. NHP records have no documentation of this sunflower within 5.0 miles (8.0 kilometers) of the study corridor

BIOLOGICAL CONCLUSION: The study corridor contains suitable habitat for Schweinitz's sunflower. No existing populations are known within 5.0 miles (8.0 kilometers) of Bridge No. 52. A survey for this sunflower was conducted during the blooming season (September to frost) on September 19, 2001. This survey consisted of systematically walking all areas of suitable habitat and identifying all *Helianthus* species. Sunflowers identified included *H. microcephalus*. No individuals of Schweinitz's sunflower were identified within the study corridor. Based on available information and results of an on-site survey, the proposed project will not affect Schweinitz's sunflower. **NO EFFECT**.

Small anthered bittercress - Small-anthered bittercress is a low, erect, biennial or perennial herb with simple, slender stems. The plant has crenate, lobed basal leaves 0.3 to 0.7 inches (0.8 to 1.8 centimeters) in length, and unlobed, crenate stem leaves that are slightly shorter. The small flowers have white petals to 0.1 inch (3 millimeters) long and bloom in the late spring. This species is only known from Forsyth and Stokes Counties, and has not been observed in Forsyth County within the past 20 years. This species has never been found in Rockingham County and is included in this discussion due to the proximity of the study corridor to the Stokes County line. Typical habitat is seepages, wet rock crevices, stream banks, sandbars, and wet woods along small streams in the Dan River drainage. The study corridor contains a high, relatively dry levee forest which provides poor habitat for the small anthered bittercress, but the stream banks and sandbars within Belews Lake spillway provide suitable habitat for this species.

BIOLOGICAL CONCLUSION: NHP records indicate that this species has not been documented within one-mile (1.6 kilometers) of the study corridor. The Piedmont/Mountain Levee Forest provides poor habitat for the small anthered bittercress but the stream banks do provide suitable habitat for this species. A systematic survey of the moist portions of the Piedmont/Mountain Levee Forest, stream banks, and sandbars within the study corridor were conducted during this field investigation. No specimens of small-anthered bittercress were observed during the survey. Based on available information and best professional judgement, the proposed project will not affect small anthered bittercress. **NO EFFECT**

Federal Species of Concern - The February 25, 2003 FWS list also includes a category of species designated as "Federal species of concern" (FSC) in Rockingham and Stokes Counties. A species with this designation is one that may or may not be listed in the future (formerly C2 candidate species or species under consideration for listing for which there is insufficient information to support listing). A list of FSC species occurring in

Rockingham (R) and Stokes (S) Counties is given in the following table.

Federal Species of Concern (FSC)

(Species name, habitat potential within the study corridor, and state status for species federally designated as FSC within Rockingham (R) and Stokes (S) Counties)

Common Name	Scientific Name	Potential Habitat	State Status**	County
Green floater	*Lasmigona subviridis*	Yes	E	R/S
Heller's trefoil	*Lotus helleri*	Yes	C	R
Orangefin madtom	*Noturus gilberti*	Yes	E	S
Rustyside sucker	*thoburnia hamiltoni*	Yes	E	S
Diana fritillary butterfly	*Speyeria diana*	Yes	SR	S
Butternut	*Juglans cinerea*	No	W5	S
Sweet pinesap	*Monotropsis odorata*	No	C	S

** E = Endangered; T = threatened; SC = Special concern; SR = Significantly Rare; C = Candidate; P = Species has been formally proposed for listing as Endangered, Threatened, or Special Concern; W5 = NC Plant Watch List: rare because of severe decline (Amoroso 1999; LeGrand and Hall1999).

The FSC designation provides no federal protection under the ESA for the species listed. NHP records document the occurrence of the Green floater (*Lasmigona subviridis*) approximately 0.4 mile (0.6 kilometer) north of the study corridor within the main stem of the Dan River. This mussel has a state status of Endangered and a federal status of FSC. The green floater occurs in small to medium-sized streams, prefers quiet pools, and is intolerant of strong currents. The study corridor does provide suitable habitat for this species. Other than the Green floater noted above, NHP files do not document any occurrences of FSC species within one-mile (1.6 kilometers) of the study corridor.

2. State Species

Plant and animal species which are on the North Carolina state list as Endangered, Threatened, Special Concern, Candidate, Significantly Rare, or Proposed (Amoroso 1999, LeGrand and Hall 1999) receive limited protection under the North Carolina Endangered Species Act (G.S. 113-331 *et seq.*) and the North Carolina Plant Protection Act of 1979 (G.S. 106-202 *et seq.*). NHP records document the occurrence of riverweed darter (*Etheostoma podostemone*) approximately 1.6 miles (2.5 kilometers) southwest of the

study corridor within the Dan River. This fish has a state status of Special Concern.

NHP records document a Significant Natural Heritage Area, the Dan River Aquatic Habitat (Rockingham Section), approximately 0.4-miles (0.6-kilometers) north of the study corridor, within the main stem of the Dan River. This area has been designated a natural area significance of "A", which indicates an area that contains examples of natural communities, rare plant or animal populations, or geologic features that are among the highest quality or best of their kind in the nation, or clusters of such elements that are among the best in the nation.

IV. CULTURAL RESOURCES

A. Compliance Guidelines

This project is subject to compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, and 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 a reasonable opportunity to comment on such undertakings.

B. Historic Architecture

A field survey of the Area of Potential Effects (APE) was conducted on February 29, 2000. All structures within the APE were photographed, and later reviewed by NCDOT architectural historians and the State Historic Preservation Office (HPO). None of the properties were considered eligible, and in a concurrence form dated June 1, 2000, the State Historic Preservation Officer (SHPO) concurred that there are no historic architectural resources either listed in or eligible for listing in the National Register of Historic Places within the APE. A copy of the concurrence form is included in the Appendix.

C. Archaeology

This is a federally funded project subject to Section 106 of the National Historic Preservation Act of 1966, which requires consultation with the State Historic Preservation Office (SHPO) on possible effects of the project on historic properties. The Area of Potential Effect (APE) is defined as a 150-foot (45.7-meter) wide area,

inclusive of the 100-foot (30.5-meter) wide right-of-way for a project corridor, measuring about 850-feet (259.1-meters) long. The SHPO (ER 01-8190) made a request for an archaeological survey of the project's APE in order to identify the presence and significance of archaeological remains, in regards to Site 31Rk42**, which is located near the project.

A visual inspection was conducted within the area of the known archaeological site on September 19, 2001. Subsurface testing occurred only in areas of high potential for locating intact archaeological deposits within the APE. Located on the east side of Belews Creek and outside the APE, Site 31Rk42** could not be relocated. Two shovel test pits (STP's) were positioned at 20-meter intervals on the terrace along the east bank of the creek in order to locate possible remnants of Site 31Rk42**, which was supposed to be located upstream from this terrace. Remnants of a previous bridge (i.e. poured concrete abutments) were identified in the area, but were not considered historically significant.

Based on the survey, no archaeological deposits eligible for listing on the National Register of Historic Places were identified within the boundaries of the proposed APE. No further archaeological work is recommended prior to construction. In a letter dated December 20, 2001, the SHPO concurred with this recommendation. A copy of the SHPO's letter is included in the Appendix.

V. ENVIRONMENTAL EFFECTS

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

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

The bridge replacement 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.

According to Duke Power officials, Belews Lake is not a Federal Energy Regulatory Commission (FERC) lake and a FERC permit will not be needed for 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.

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 or environmental impacts as a result of this project. The investigation determined the project would not disproportionately impact any minority or low income populations.

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

The project does not involve any known Section 4(f) properties. There are no publicly-owned parks, recreational facilities, or wildlife and waterfowl refuges of National, State, or local significance in the vicinity of the project.

The Farmland Protection Policy Act requires all federal agencies or their representatives to consider the potential impacts to prime, unique or important farmland soils for all land acquisition and construction projects. Prime and important farmland soils are defined by the Natural Resources Conservation Service (NRCS). The proposed project has been coordinated with the US Department of Agriculture and no prime, unique or important farmland will be converted as a result of this bridge replacement project. This project is in conformance with the Farmland Protection Policy Act (FPPA).

The replacement of Rockingham County Bridge No. 55 is an air quality "neutral" project, so it is not required to be included in the regional emissions analysis and a project level CO analysis is not required. 40 CFR Part 51 is not applicable because the proposed project is located in an attainment area. If vegetation is disposed of by burning, all burning shall be done in accordance with applicable local laws and regulations of the North Carolina SIP for air quality in compliance with 15 NCAC 2D.0520. The replacement of the existing bridge will not increase or decrease traffic volumes; therefore, the project's impact on noise and air quality will not be significant. The noise levels will increase during the construction period, but will only be temporary. This evaluation completes the assessment requirements for highway traffic noise of Title 23, Code of Federal Regulations (CFR), Part 772 and for air quality (1990 Clean Air Act Amendments and the National Environmental Policy Act) and no additional reports are required.

An examination of records at the North Carolina Department of Environment and Natural Resources, Division of Waste Management revealed no leaking underground storage tanks or hazardous waste sites in the project area.

This area is not in a FEMA Flood Study, but is in a FEMA Special Flood Hazard Zone A. No base flood elevations have been determined. This section of stream is relatively short, begins at Belews Lake approximately 1800 feet (550 meters) upstream and converges with the Dan River approximately 2000 feet (610 meters) downstream. The Dan River floodplain

encroaches up the stream to the subject crossing. The approximate 100-year floodplain in the project area is shown in Figure 6. The amount of floodplain area to be affected is not substantial. The final design of the bridge will be such that the backwater elevation of the stream will not encroach beyond the current 100-year floodplain limits.

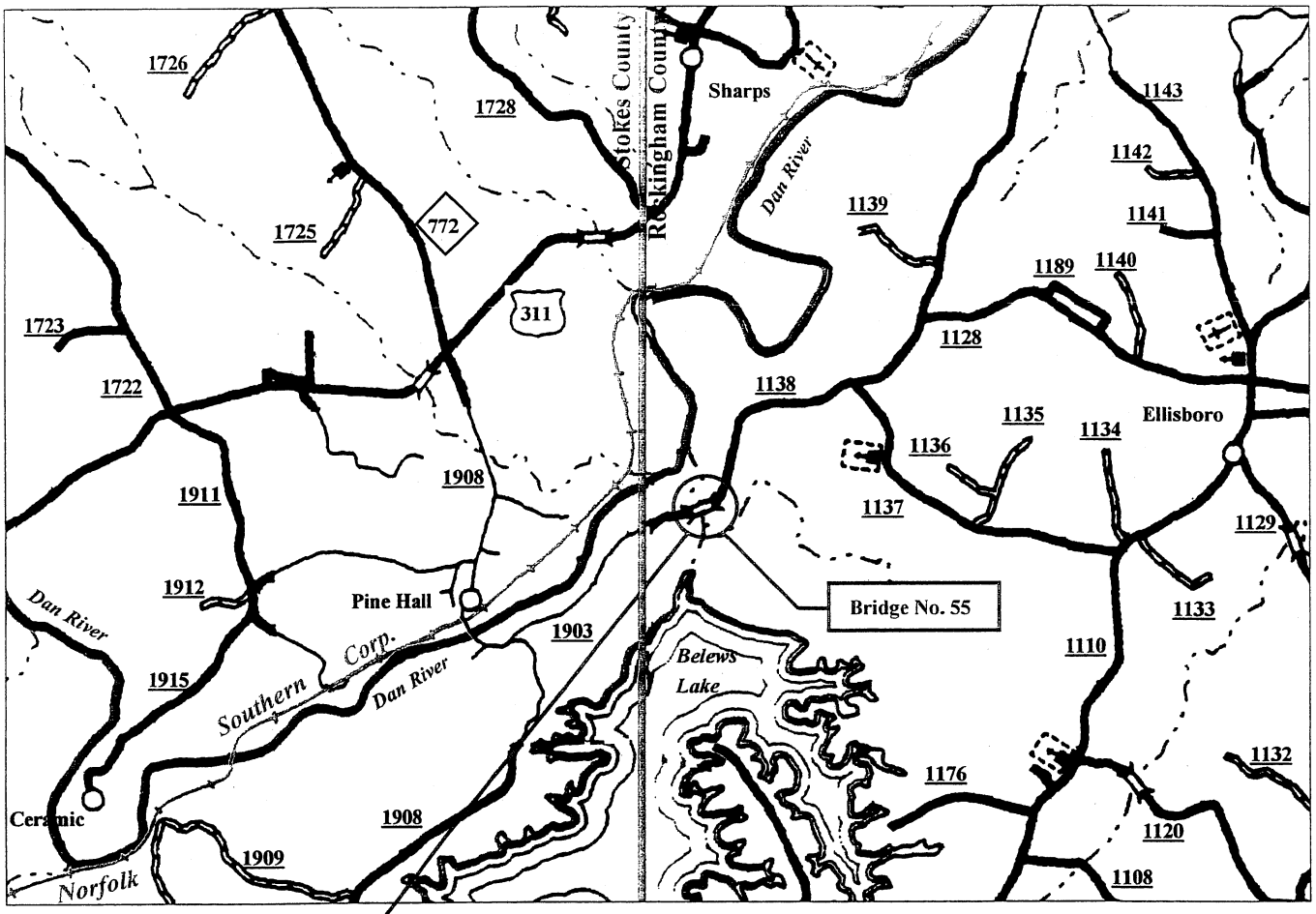
On the basis of the above discussion, it is concluded that no substantial adverse environmental impacts will result from implementation of this project.

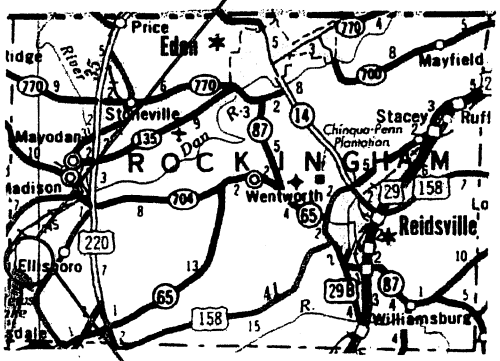
VI. AGENCY COMMENTS

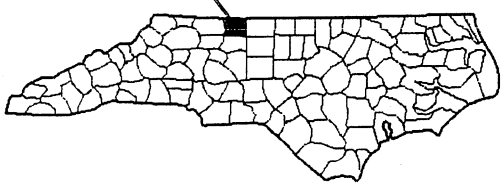
North Carolina Wildlife Resources Commission

Comment: This area supports good numbers of sunfish and may support a tailrace fishery. Therefore, we request that no in-water work be performed from April 1 to May 31. We request that High Quality Sedimentation and Erosion Control Measures be used due to the DWQ water quality classification of WS-IV.

Response: Comment noted and project commitment included on Green Sheet.







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0 Meters 1600

0 Miles 1.0

APPROXIMATE SCALE

North Carolina
Department of Transportation
Project Development
& Environmental Analysis Branch

ROCKINGHAM COUNTY
Bridge No. 55
on SR 1138 (Lindsey Bridge Road)
over Bellews Lake Spillway
TIP No. B-3694

April 2003

Figure 1

Bridge No. 55

Alternative 1

Alternative 1
(Temp. Detour)

Alternative 2
(Preferred)

Spillway

Belews Lake

SR 1138 Lindsey Bridge Road

0 Meters 30

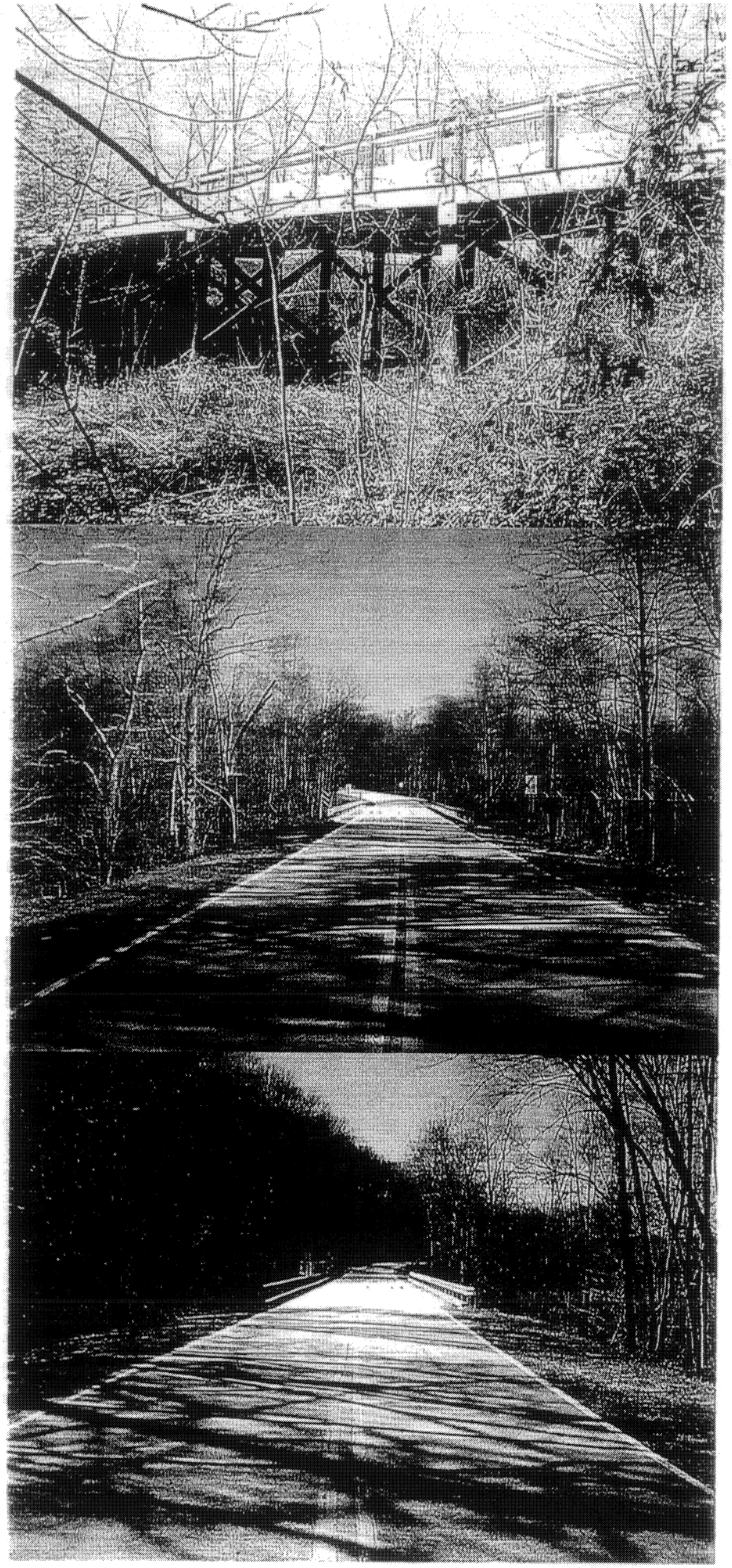
0 Feet 100

APPROXIMATE SCALE

North Carolina
Department of Transportation
Project Development
& Environmental Analysis Branch

ROCKINGHAM COUNTY
Bridge No. 55
on SR 1138 (Lindsey Bridge Road)
Over Belews Lake Spillway
TIP No. B-3694

Figure



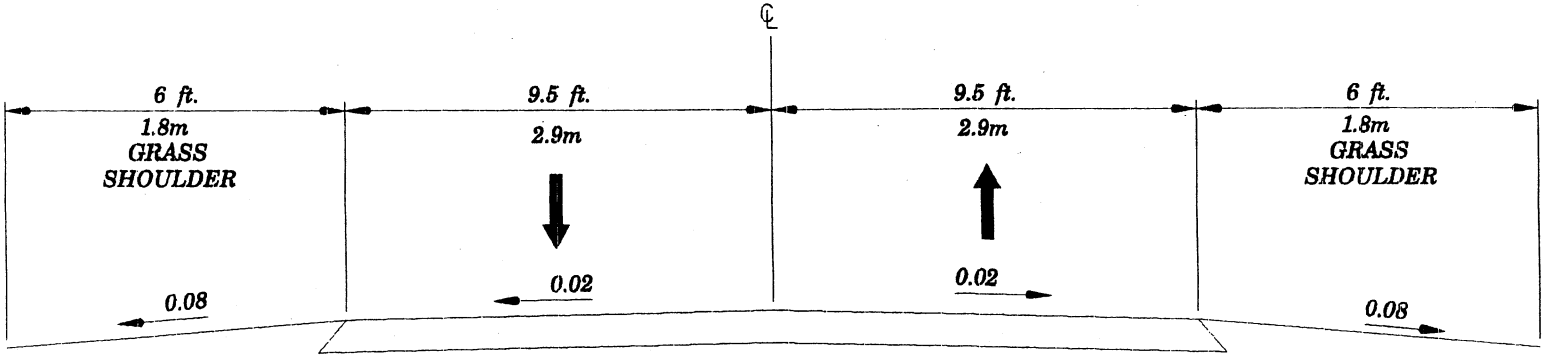
ROCKINGHAM COUNTY
BRIDGE NO. 55 ON SR 1138 OVER
BELEWS LAKE SPILLWAY
B-3694

SIDE VIEW
LOOKING NORTH

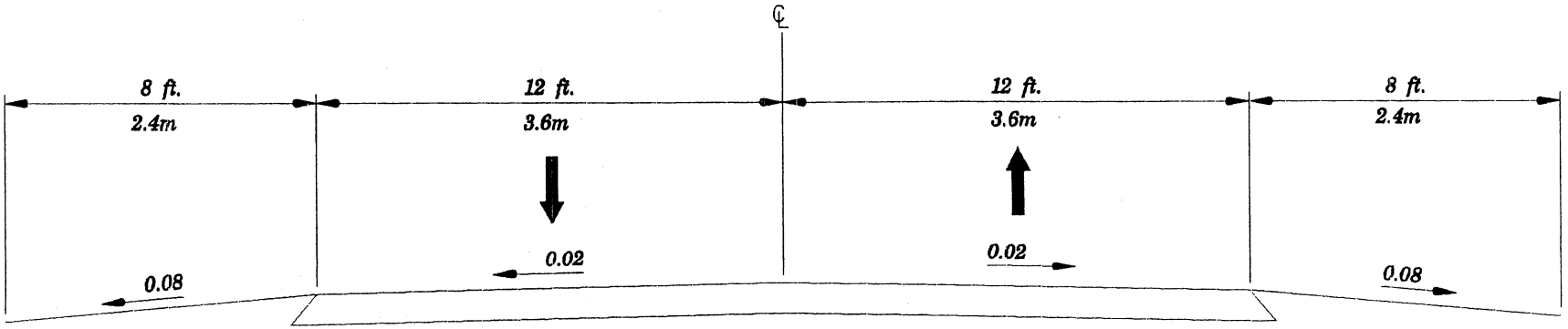
WEST APPROACH
LOOKING EAST

EAST APPROACH
LOOKING WEST

FIGURE 3



TYPICAL APPROACH SECTION
(EXISTING)



TYPICAL APPROACH SECTION
(PROPOSED)

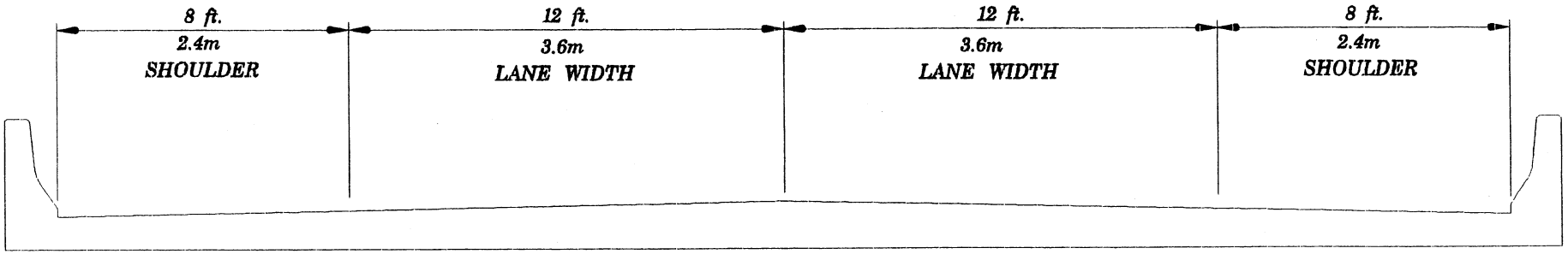
FUNCTIONAL CLASSIFICATION: RURAL MINOR COLLECTOR

AVERAGE DAILY TRAFFIC		
(EXISTING)	*1999*	*= 1400*
(DESIGN YR.)	*2025*	*= 2500*

North Carolina
Department of Transportation
Project Development
& Environmental Analysis Branch

ROCKINGHAM COUNTY
Bridge No. 55
on SR 1138
over Belews Lake Spillway
TIP No. B-3694

Figure 4



TYPICAL BRIDGE SECTION

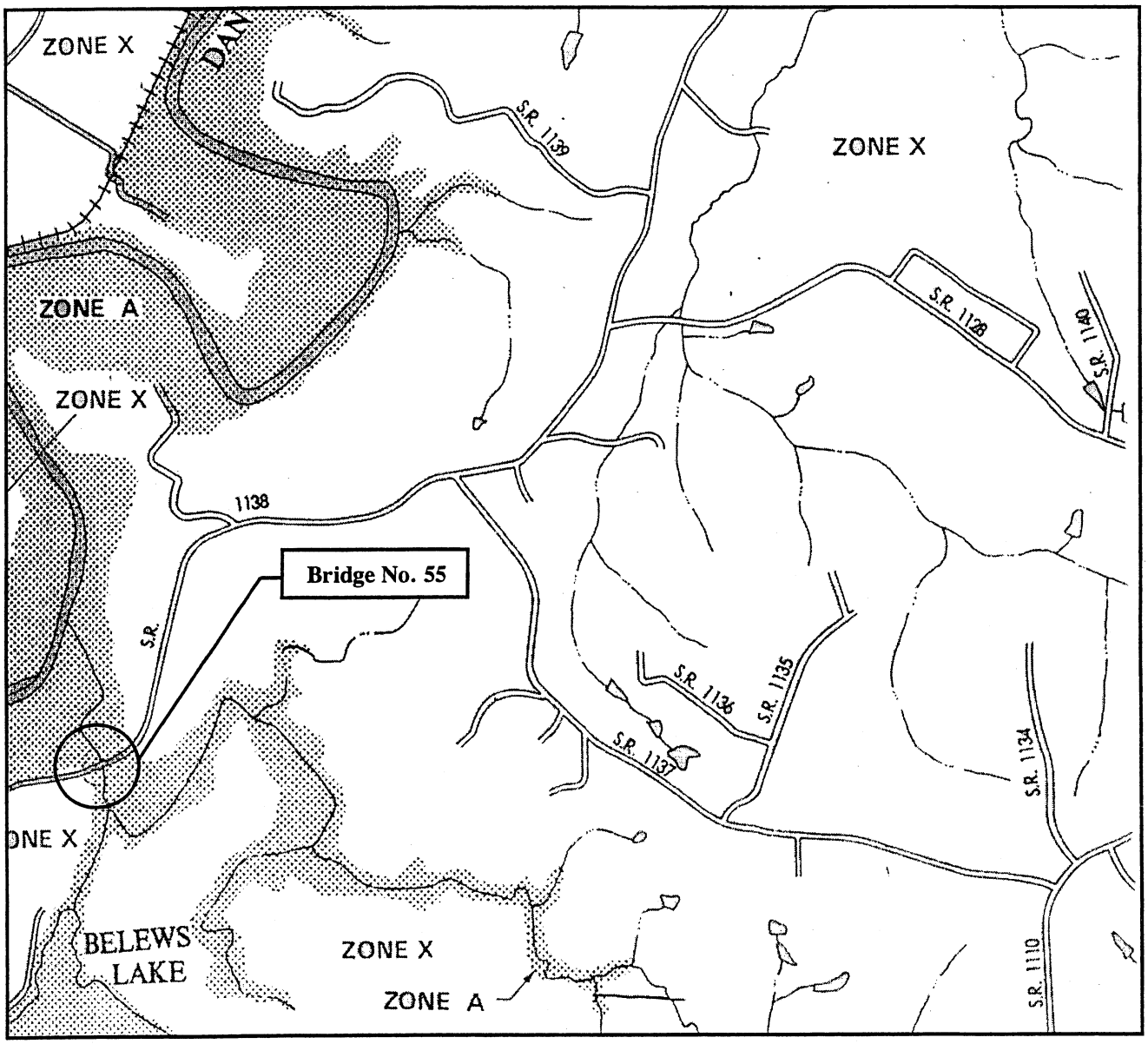
FUNCTIONAL CLASSIFICATION: RURAL MINOR COLLECTOR

AVERAGE DAILY TRAFFIC		
(EXISTING)	*1999* =	*1400*
(DESIGN YR.)	*2025* =	*2500*

North Carolina
Department of Transportation
Project Development
& Environmental Analysis Branch

ROCKINGHAM COUNTY
Bridge No. 55
on SR 1138
over Belews Lake Spillway
TIP No. B-3694

Figure 5



FEMA – Floodplain Map of Project Area

N

0 2000

FEET

APPROXIMATE SCALE

North Carolina
Department of Transportation
Project Development
& Environmental Analysis Branch

ROCKINGHAM COUNTY
Bridge No. 55
on SR 1138 (Lindsey Bridge Road)
over Belews Lake Spillway
TIP No. B-3694

Figure 6

APPENDIX

United States Department of the Interior

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

December 22, 2000

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

Dear Mr. Gilmore:

Thank you for your November 15, 2000, request for information from the U.S. Fish and Wildlife Service (Service) on the potential environmental impacts of a proposed bridge replacement in Rockingham County, North Carolina. 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 North Carolina Department of Transportation (NCDOT) proposes to replace the following bridge structure:

1. B-3694 Bridge No. 55 on SR 1138 over Belews Lake Spillway

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 Belews Lake 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 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,

Dr. Garland B. Pardue
Ecological Services Supervisor

Enclosure

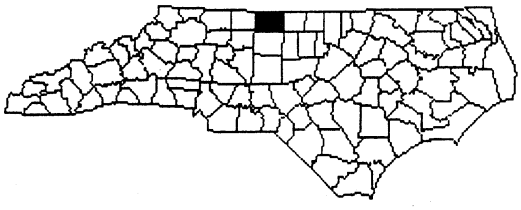
cc: COE, Raleigh, NC (Eric Alsmeyer)
NCDWQ, Raleigh, NC (John Hennessy)
NCDNR, Northside, NC (David Cox)

FWS/R4:TMcCartney:TM:12/22/00:919/856-4520 extension 32:\1brdgroc.ham

Updated: 02/25/2003

U.S. Fish & Wildlife Service

ROCKINGHAM COUNTY



Common Name	Scientific Name	Status
Invertebrates		
Green floater	*Lasmigona subviridis*	FSC
James spinymussel	*Pleurobema collina*	Endangered
Vascular Plants		
Heller's trefoil	*Lotus helleri*	FSC
Smooth coneflower	*Echinacea laevigata*	Endangered

KEY:

Status	Definition
Endangered -	A taxon "in danger of extinction throughout all or a significant portion of its range."
Threatened -	A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."
Proposed -	A taxon proposed for official listing as endangered or threatened.
C1 -	A taxon under consideration for official listing for which there is sufficient information to support listing.
FSC -	A Federal species of concern--a species that may or may not be listed in the future (formerly C2 candidate species or species under consideration for listing for which there is insufficient information to support listing).

T(S/A) - Threatened due to similarity of appearance (e.g., American alligator)--a species that is threatened due to similarity of appearance with other rare species and is listed for its protection. These species are not biologically endangered or threatened and are not subject to Section 7 consultation.

EXP - A taxon that is listed as experimental (either essential or nonessential). Experimental, nonessential endangered species (e.g., red wolf) are treated as threatened on public land, for consultation purposes, and as species proposed for listing on private land.

Species with 1, 2, 3, or 4 asterisks behind them indicate historic, obscure, or incidental records.

*Historic record - the species was last observed in the county more than 50 years ago.

**Obscure record - the date and/or location of observation is uncertain.

***Incidental/migrant record - the species was observed outside of its normal range or habitat.

****Historic record - obscure and incidental record.

For additional information regarding this Web page, contact Mark Cantrell, in Asheville, NC, at mark_a_cantrell@fws.gov
Visit the North Carolina ES Homepage
Visit the U.S. Fish and Wildlife Service Home Page

Keywords={same keywords listed above - used for search tools}

North Carolina Wildlife Resources Commission

512 N. Salisbury Street, Raleigh, North Carolina 27604-1188, 919-733-3391
Charles R. Fullwood, Executive Director

TO: John Conforti
Project Engineer, NCDOT

FROM: David Cox, Highway Project Coordinator
Habitat Conservation Program

DATE: January 2, 2001

SUBJECT: NCDOT Bridge Replacements in Anson, Cabarrus, Catawba, Cleveland, Davie, Forsythe, Gaston, Guilford, Mecklenburg, Randolph, Rockingham, and Stanly counties of North Carolina. TIP Nos. B-3404, B-3421, B-3822, B-3828, B-3637, B-3835, B-3454, B-3839, B-3840, B-3337, B-3652, B-3851, B-3677, B-3506, B-3694, and B-3700.

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

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

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

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

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

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

5. If temporary access roads or detours are constructed, they should be removed back to original ground elevations immediately upon the completion of the project. Disturbed areas should be seeded or mulched to stabilize the soil and native tree species should

be planted with a spacing of not more than 10'x10'. If possible, when using temporary structures the area should be cleared but not grubbed. Clearing the area with chain saws, mowers, bush-hogs, or other mechanized equipment and leaving the stumps and root mat intact, allows the area to revegetate naturally and minimizes disturbed soil.

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

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

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

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

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

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

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

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

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

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

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

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

1. The culvert must be designed to allow for fish passage. Generally, this means that the culvert or pipe invert is buried at least 1 foot below the natural stream bed. If

multiple cells are required the second and/or third cells should be placed so that their bottoms are at stream bankful stage (similar to Lyonsfield design). This could be accomplished by constructing a low sill on the upstream end of the other cells that will divert low flows to another cell. This will allow sufficient water depth in the culvert or pipe during normal flows to accommodate fish movements. If culverts are long, notched baffles should be placed in reinforced concrete box culverts at 15 foot intervals to allow for the collection of sediments in the culvert, to reduce flow velocities, and to provide resting places for fish and other aquatic organisms moving through the structure.

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

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

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

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

Project specific comments:

1. B-3404 – Anson County – Bridge No. 314 over South Fork Jones Creek. We have no specific comments. We are not aware of any threatened of endangered species in the project vicinity.

2. B-3421 – Cabarrus County – Bridge No. 266 over Norfolk and Southern Railway. No comment.

3. B-3822 – Catawba County – Bridge No. 8 over unnamed tributary to the Catawba River. We request that High Quality Sedimentation and Erosion Control Measures be used due to the DWQ water quality classification of WS-IV. We are not aware of any threatened of endangered species in the project vicinity.

4. B-3828 – Cleveland County – Bridge No. 233 over Buffalo Creek. We have no specific comments. We are not aware of any threatened of endangered species in the project vicinity.

5. B-3637 – Davie County – Bridge No. 37 over I-40. No comment.

6. B-3835 – Davie-Forsyth counties – Bridge No. 35 over the Yadkin River. We request that High Quality Sedimentation and Erosion Control Measures be used due to the DWQ water quality classification of WS-IV. We request that the new bridge span the adjacent wetlands

entirely. The old fill causeways should then be removed and graded to natural ground level. We are not aware of any threatened of endangered species in the project vicinity.

7. B-3454 – Forsyth County – Bridge No. 260 over Muddy Creek. We have no specific comments. We are not aware of any threatened of endangered species in the project vicinity.

8. B-3839 – Forsyth County – Bridge No.139 over Fishers Branch. We have no specific comments. We are not aware of any threatened of endangered species in the project vicinity.

9. B-3840 – Gaston County – Bridge No. 52 over South Crowders Creek. We have no specific comments. We are not aware of any threatened of endangered species in the project vicinity.

10. B-3337 – Guilford County – Bridge No. 527 over North Buffalo Creek. We have no specific comments. We are not aware of any threatened of endangered species in the project vicinity.

11. B-3652 – Guilford County – Bridge No. 20 over the Deep River. SR 4121 crosses the Deep River just below the dam of High Point City Lake. This area supports good numbers of sunfish and may support a tailrace fishery. Therefore, we request that no in-water work be preformed from April 1 to May 31. We request that High Quality Sedimentation and Erosion Control Measures be used due to the DWQ water quality classification of WS-IV. We are not aware of any threatened of endangered species in the project vicinity.

12. B-3851 – Guilford County – Bridge No. 21 over US 29/70. No comment.

13. B-3677 – Mecklenburg County – Bridge No. 36 over Greasy Creek. We have no specific comments. We are not aware of any threatened of endangered species in the project vicinity.

14. B-3506 – Randolph County – Bridge No. 226 over Richland Creek. Richland Creek is a medium sized stream that supports good populations of sunfish. Therefore, we request that no in-water work be preformed from April 1 to May 31. We are not aware of any threatened of endangered species in the project vicinity.

15. B-3694 – Rockingham County – Bridge No. 55 over the Belews Lake Spillway. This bridge appears to be just downstream of the Belews Lake dam. This area supports good numbers of sunfish and may support a tailrace fishery. Therefore, we request that no in-water work be preformed from April 1 to May 31. We request that High Quality Sedimentation and Erosion Control Measures be used due to the DWQ water quality classification of WS-IV. We are not aware of any threatened of endangered species in the project vicinity.

16. B-3700 – Stanly County – Bridge No. 187 over Long Creek. This segment of Long Creek may support the state listed Carolina darter. Therefore, we request that High Quality Sedimentation and Erosion Control Measures be used to minimize project impacts to this species.

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.

Ken Burleson

From: "John W. Harmon Sr" <jwharmon@duke-energy.com>
To: <kburleson@tgsengineers.com>
Sent: Tuesday, December 11, 2001 12:42 PM
Subject: Project B-3494 Rockingham County

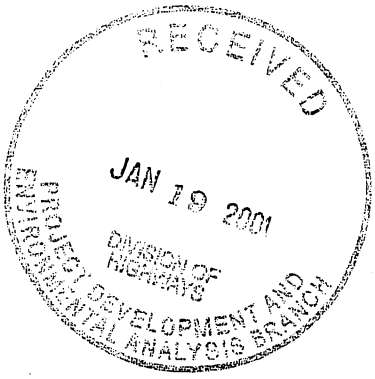
Ken, Belews Lake is not a FERC lake. There will be no FERC permit required.

Concerti

North Carolina Department of Cultural Resources

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

Division of Archives and History
William S. Price, Jr., Director



January 8, 2001

MEMORANDUM

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

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

Re: Request for Comments for Group XXX Bridge Replacement, Projects, Replace Bridge No. 55 on SR 1138 over Belews Lake Spillway, B-3694, Rockingham County; ER 01-8190

Thank you for your letter of November 15, 2000, concerning the above project.

Historic period archaeological site 31RK42** is located approximately 50 yards south of the existing bridge. We recommend that an archaeological survey be undertaken of the area of potential effect (APE) for this project. If site 31RK42** is to be affected by the bridge replacement, sufficient historical research and testing should be undertaken to determine its eligibility for inclusion in the National Register of Historic Places.

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

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.

cc: Thomas Padgett, NCDOT

Federal Aid =BRZ-1138(9) *TIP* =B-3694 *County*: Rockingham

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

Project Description: Replace Bridge No. 55 on SR 1138 over Belews Lake Spillway

On June 1, 2000, representatives of the

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

Reviewed the subject project at

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

All parties present agreed

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

Signed:

Mary Pope Furr — 6-1-00
Representative, NCDOT — Date

Richard C. Dawson — 6/1/00
FHWA, for the Division Administrator, or other Federal Agency — Date

Representative, SHPO — 6/1/00 — Date

State Historic Preservation Officer — 6/9/00 — Date

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