



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

January 4, 2008

N.C. Division of Water Quality
585 Waughtown Street
Winston-Salem, NC 27107

Attention: Ms. Sue Homewood
Ms. Amy Euliss

Subject: **Stormwater Permit Request for the Replacement of Bridge No. 85 of SR 1106.**
Replacement of Bridge No. 85. Ashe County. State Project No. 8.2712101. Federal Aid
Project BRZ-1106 (4). TIP No. B-4011. \$505.00 Debit WBS 33379.1.1.

The North Carolina Department of Transportation (NCDOT) proposes to replace bridge No. 85 over Mill Creek in Ashe County, North Carolina. The project is located on SR 1106 also known as Railroad Grade Road, a two-lane highway. The existing bridge was built in 1964 and is structurally deficient. The bridge will be replaced at its existing location with no permanent or temporary impacts to Mill Creek.

A Stormwater Application Form, the Project Scope Narrative, the project plans, Culvert Survey Reports, and the authority to debit \$505.00 for the permit application fee are included with this request. Please review this project for authorization by your division.

Thank you for your time and consideration. Please contact Galen Cail at (919) 250-4100 if you have any questions or concerns with the stormwater design. If you have any questions concerning this project, please feel free to contact Jennifer Harrod at (919) 715-7241.

Sincerely,

A handwritten signature in black ink, appearing to read "G. J. Thorpe".

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

CC:
Dr. David Chang, P.E., Hydraulics
Mr. Monte Matthews, USACE
Mr. Brian Wrenn, NCDWQ
File

OFFICE USE ONLY		
Date Received	Fee Paid	Permit Number

State of North Carolina
Department of Environment and Natural Resources
Division of Water Quality

STORMWATER MANAGEMENT PERMIT APPLICATION FORM

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
LINEAR ROADWAY PROJECT

This form may be photocopied for use as an original.

DWO Stormwater Management Plan Review:

A complete stormwater management plan submittal includes this application form, a supplement form for each BMP proposed (see Section V), design calculations, and plans and specifications showing all road and BMP details.

I. PROJECT INFORMATION

NCDOT Project Number: 33379.1.1 County: ASHE

Project Name: B-4011

Project Location: BRIDGE NO. 85 OVER MILL CREEK ON SR 1106

Contact Person: MASHALL CLAWSON Phone: 919-250-4100 Fax: _____

Receiving Stream Name: S. FORK NEW R. River Basin: NEW RIVER Class: C, TR, ORW

Proposed linear feet of project: _____

Proposed Structural BMP and Road Station (attach a list of station and BMP type if more room is needed):

Type of proposed project: (check all that apply):

- New
 Widening
 2 lane*
 4 lane*
 Curb and Gutter
 Bridge Replacement
 Other (Describe) _____

*2 lane and 4 lane imply that roadside ditches are used unless Curb and Gutter is also checked.

II. REQUIRED ITEMS CHECKLIST

Initial in the space provided below to indicate the following design requirements have been met and supporting documentation is attached. Supporting documentation shall, at a minimum, consist of a brief narrative description including (1) the scope of the project, (2) how the items below are met, (3) how the proposed best management practices minimize water quality impacts, and (4) any significant constraints and/or justification for not meeting a, b, c and d to the maximum extent practicable.

Designer's Initials

- AW a. The amount of impervious surface has been minimized as much as possible.
AW b. The runoff from the impervious areas has been diverted away from surface waters as much as possible.
AW c. Best Management Practices are employed which minimize water quality impacts.
AW d. Vegetated roadside ditches are 3:1 slope or flatter.

III. OPERATION AND MAINTENANCE AGREEMENT

I acknowledge and agree by my initials below that the North Carolina Department of Transportation is responsible for the implementation of the four maintenance items listed. I agree to notify DWQ of any operational problems with the BMP's that would impact water quality or prior to making any changes to the system or responsible party.

Maintenance Engineer's Initials

- CK* a. BMP's shall be inspected and maintained in good working order.
- CK* b. Eroded areas shall be repaired and reseeded as needed.
- CK* c. Stormwater collection systems, including piping, inlets, and outlets, shall be maintained to insure proper functioning.

Maintenance Engineer's Name: CHARLES C. REINHARDT *Charles C. Reinhardt* 11/26/07
 Title: DIVISION MAINTENANCE ENGINEER (DIV. 11)

IV. APPLICATION CERTIFICATION

I, (print or type name) W. HENRY WELLS JR of SUNGATE DESIGN GROUP Branch, certify that the information included on this permit application form is, to the best of my knowledge, correct and that the project will be constructed in conformance with the approved plans and that the proposed project complies with the requirements of 15A NCAC 2H .1000.

Title: VICE PRESIDENT
 Address: 915 JAMES FRANKLIN RD RALEIGH N.C. 27606
 Signature: *[Signature]* Date: 11/30/07

V. SUPPLEMENT FORMS

The applicable state stormwater management permit supplement form(s) listed below must be submitted for each BMP specified for this project. Contact the Stormwater and General Permits Unit at (919) 733-5083 for the status and availability of these forms.

- | | |
|---|---|
| Form SW401-Low Density | Low Density Supplement |
| Form SW401-Curb Outlet System | Curb Outlet System Supplement |
| Form SW401-Off-Site System | Off-Site System Supplement |
| Form SW401-Wet Detention Basin | Wet Detention Basin Supplement |
| Form SW401-Infiltration Basin | Infiltration Basin Supplement |
| Form SW401-Infiltration Trench | Underground Infiltration Trench Supplement |
| Form SW401-Bioretenation Cell | Bioretenation Cell Supplement |
| Form SW401-Level Spreader | Level Spreader/Filter Strip/Restored Riparian Buffer Supplement |
| Form SW401-Wetland Constructed Wetland Supplement | |
| Form SW401-Grassed Swale | Grassed Swale Supplement |
| Form SW401-Sand Filter | Sand Filter Supplement |

INFORMATION TO BE SHOWN ON PLANS

Design:	Discharge	1000	c.f.s.	Frequency	25 YR	Elev.	2897.7
Base Flood:	Discharge	1550	c.f.s.	Frequency	100 YR	Elev.	2899.0
Overtopping:	Discharge	2350+	c.f.s.	Frequency	500+YR	Elev.	2910.4

ADDITIONAL INFORMATION AND COMPUTATIONS

D.A. (SQ. MI) = 3.17		BLUE RIDGE PIEDMONT	
SAY		ASHE COUNTY FIS	
$Q = 135 DA^{0.702} = 303$	305 CFS	SOUTH FORK NEW RIVER	
$Q = 242 DA^{0.677} = 528$	530 CFS	10 YR	WS EL = 2900.5
$Q = 334 DA^{0.662} = 717$	720 CFS	50 YR	WS EL = 2904.6
$Q = 476 DA^{0.645} = 1002$	1000 CFS	100 YR	WS EL = 2906.5
$Q = 602 DA^{0.635} = 1252$	1250 CFS	500 YR	WS EL = 2911.3
$Q = 745 DA^{0.625} = 1532$	1550 CFS		
$Q = 908 DA^{0.616} = 1848$	1850 CFS		
$Q = 1160 DA^{0.605} = 2331$	2350 CFS		

SCOUR ANALYSIS: PRELIMINARY

100YR (NO OVERTOPPING)	500YR (NO OVERTOPPING)
CONTRACTION	CONTRACTION
$Y = \text{AREA APPROACH} / \text{TOP WIDTH} = 198.2 / 33.9 = 5.8'$	$Y = \text{AREA APPROACH} / \text{TOP WIDTH} = 250.6 / 34 = 7.4'$
$Q_{BC} = 1550 \text{ CFS}$ $Q_{NC} = 1549 \text{ CFS}$	$Q_{BC} = 2350 \text{ CFS}$ $Q_{NC} = 2338 \text{ CFS}$
$Y_s = Y \left[\left(\frac{Q_{BC}}{Q_{NC}} \right)^{67} - 1 \right]$	$Y_s = Y \left[\left(\frac{Q_{BC}}{Q_{NC}} \right)^{67} - 1 \right]$
$= 5.8 \left[\left(\frac{1550}{1549} \right)^{67} - 1 \right] = 0.0'$	$= 7.4 \left[\left(\frac{2350}{2338} \right)^{67} - 1 \right] = 0.0'$

SITE DATA

Drainage Area 3.17 SQ. MI. Source NC SELECTED SITES Character MOUNTAINOUS, RURAL
 Stream Classification (Such as Trout, High Quality Water, etc.) TROUT, HIGH QUALITY WATER
 Data on Existing Structure 1@17.9' TIMBER BEAMS, 1@49.9' STEEL I-BEAMS, 1@18.4' TIMBER BEAMS,
TIMBER DECK, TIMBER ABUTMENTS, INTERIOR BENTS RCP&B Waterway Opening 748 SF
 Data on Structures Up and Down Stream NA
 Gage Station No. NA Period of Records NA
 Max. Discharge NA c.f.s. Date NA Frequency NA
 Historical Flood Information: NO HIGHWATER PROBLEMS LARRY SCRUGGS - NCDOT ASHE COUNTY MAINTENANCE SUPERVISOR Period of Knowledge 8 YRS
 Date NA Elev. NA Est. Freq. NA Source ASHE COUNTY MAINTENANCE SUPERVISOR Period of Knowledge 8 YRS
 Date NA Elev. NA Est. Freq. NA Source ASHE COUNTY MAINTENANCE SUPERVISOR Period of Knowledge 8 YRS
 Historical Scour Info.: General NA Contraction NA Local NA
 Channel Slope 0.0217 FVFT Source USGS QUAD Normal Water Surface Elev. 2891.6
 Manning's n: Left O.B. 0.12 Channel 0.06 Right O.B. 0.12 Source FIELD
 Flood Study / Status APPROXIMATE STUDY AREA Floodway Established? NO
 Flood Study 100 yr. Discharge NA c.f.s.; W.S. Elev. With Floodway NA Without Floodway NA

DESIGN DATA

Hydrological Method USGS RURAL REGRESSION EQUATIONS - BLUE RIDGE PIEDMONT
 Hydraulic Design Method HEC-RAS
 Floods Evaluation: Freq. Q Elev. PROP & EXIST vs NAT Backwater Bridge Opening Velocity

10	720	2896.9	0.1	7.3
25	1000	2897.7	0.2	8.1
50	1250	2898.3	0.2	8.7
100	1550	2899.0	0.2	9.4
500	2350	2900.5	0.3	10.9

 Waterway Opening Provided 480 SF
 Average Channel Velocity (Design) 6.5 FVS Average Overbank Velocity (Design) NA
 Computed Scour: General NA Contraction 0.0' 100 YR Local NA
 Is a Floodway Revision Required? NA

NEW RIVER BASIN
 APPROXIMATE STUDY AREA

REPORT 1 OF 1

BRIDGE SURVEY & HYDRAULIC DESIGN REPORT

N. C. DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAY
 HYDRAULICS UNIT
 RALEIGH, N. C.

Project No. 33379.1.1 Proj. Station 17+52.5 -L-
 I.D. No. B-4011 Project No. 8.2712101
 County ASHE Bridge Over MILL CREEK Bridge Inv. No. 85
 On Highway SR 1106 Between SR 1109 and SR 1104
 Recommended Structure 1 @100' 42" STEEL BRIDGE
 Recommended Width of Roadway 24' SH. PT. TO SH. PT. Skew 90°
 Location is (Up, At, Down Stream from Existing Crossing) AT EXISTING CROSSING
 Nearest Shipping Point NORTH WILKESBORO on SOUTHERN R.R., 30 Miles From Bridge
 Bench Mark is BM 2-RR SPIKE IN POWER POLE -BL- STA 23+22.14 9.78' RT
 Elev. 2906.47 ft Datum: NAVD 88
 Temporary Crossing OFFSITE DETOUR

Stream MILL CREEK Bridge Inv. No. 85 Project No. B-4011



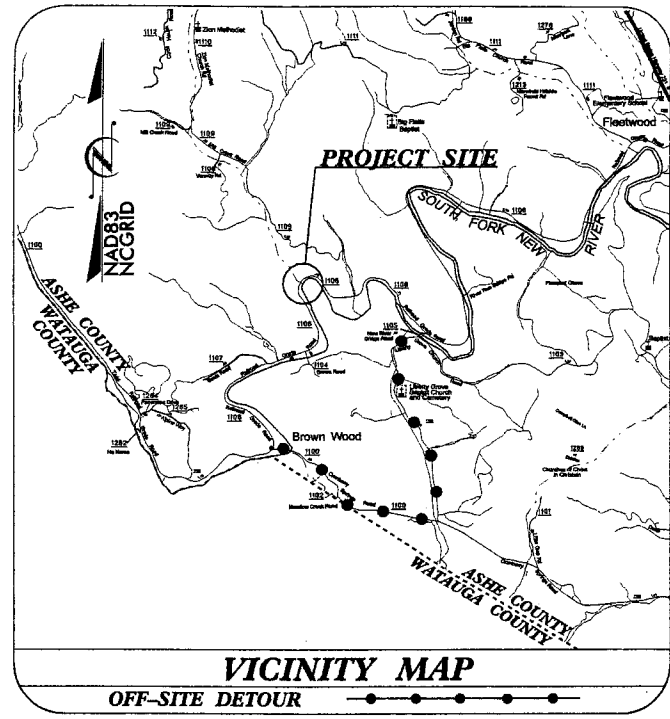
Designed by: SUNGATE DESIGN GROUP, P.A.
 Assisted by: WMH, RHK, JGD, FFF, JRH
 Project Engineer: W. HENRY WELLS, JR., PE
 Reviewed & Approved by: [Signature] Date 2/25/05



2/24/05

09/08/06

See Sheet 1-A For Index of Sheets



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ASHE COUNTY

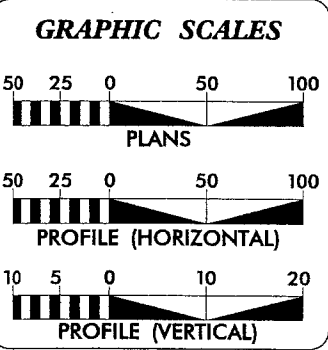
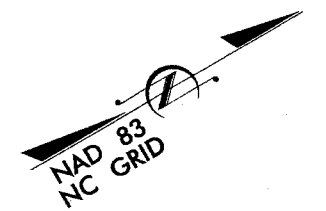
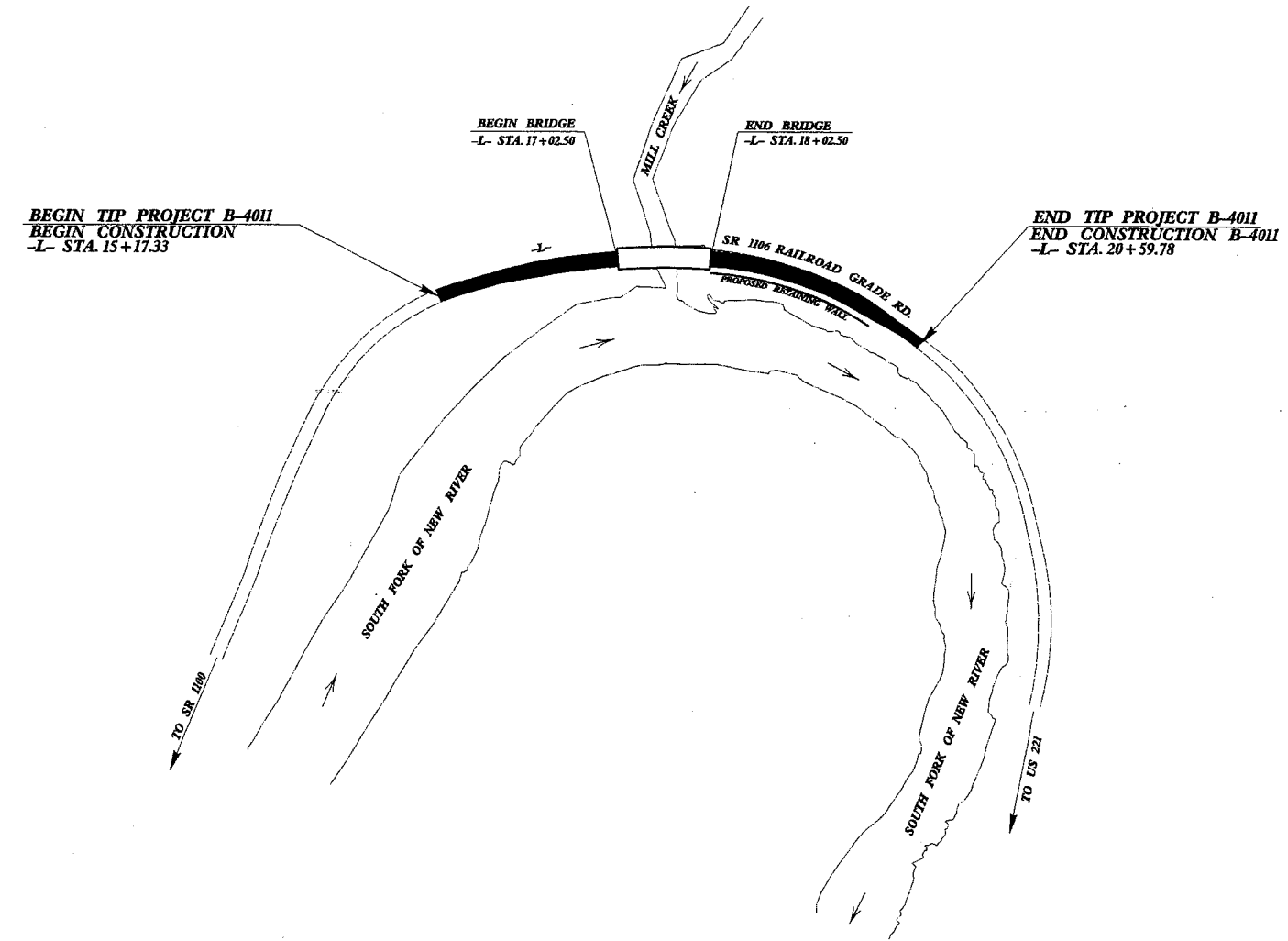
LOCATION: BRIDGE NO. 85 OVER MILL CREEK ON SR 1106
(RAILROAD GRADE RD.)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURE &
RETAINING WALL

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4011	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33379.1.1	BRZ-1106(4)	PE	
33379.3.1	BRZ-1106(4)	UTIL. & RW	
33379.2.2	BRZ-1106(4)	CONST.	

TIP PROJECT: B-4011

CONTRACT: C201766



DESIGN DATA

ADT 2008 = 360
ADT 2028 = 525

DHV = 12 %
D = 60 %
T = 3 % *
V = 35 MPH

* TTST 1% DUAL 2%

FUNC. CLASS. = LOCAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4011 = 0.084 MILES
LENGTH STRUCTURE TIP PROJECT B-4011 = 0.019 MILES
TOTAL LENGTH TIP PROJECT B-4011 = 0.103 MILES

SUNGATE DESIGN GROUP, P.A.

915 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 FAX (919) 859-6258

Prepared for the North Carolina Department of Transportation in the Office of:

WETHERILL ENGINEERING
559 JONES FRANKLIN ROAD
SUITE 164
RALEIGH, N.C. 27606
Phone: 919 851 8077
Fax: 919 851 8007

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: **EDWARD G. WETHERILL, PE**
FEBRUARY 17, 2006
PROJECT ENGINEER

LETTING DATE: **BOB A. MAY, PE**
FEBRUARY 19, 2008
PROJECT DESIGN ENGINEER

NGDOT CONTACT: **DOUG TAYLOR, PE**
ROADWAY DESIGN
STATE ENGINEERING COORD.
SECTION ENGINEER

HYDRAULICS ENGINEER

W. HENRY WELLS, PE
SEAL 09334
ENGINEER

SIGNATURE: _____

ROADWAY DESIGN ENGINEER

BOB A. MAY, PE
SEAL 21116
ENGINEER

SIGNATURE: _____

**DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA**

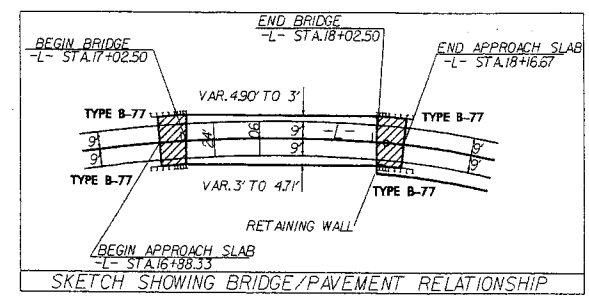
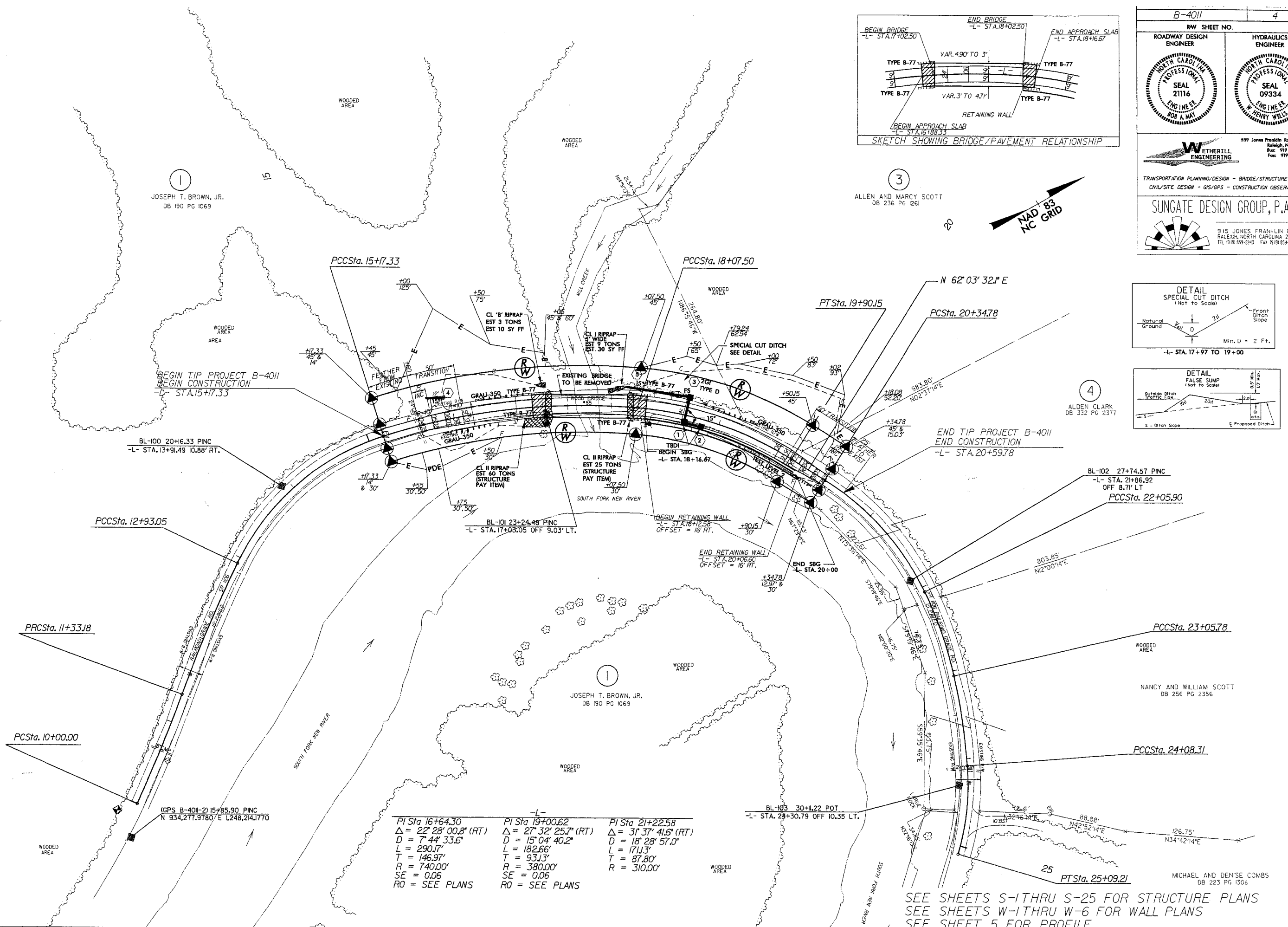
STATE HIGHWAY DESIGN ENGINEER

P.E.

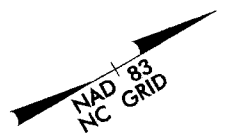
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REVISIONS

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11/22/07 11:24:54
gcail



3
ALLEN AND MARCY SCOTT
DB 236 PG 1261



B-4011 4

RW SHEET NO.

ROADWAY DESIGN ENGINEER
JOSEPH T. BROWN, JR.
DB 190 PG 1069

HYDRAULICS ENGINEER
MICHAEL AND DENISE COMBS
DB 223 PG 1306

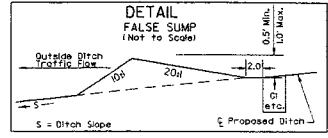
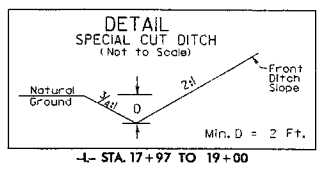
SEAL 21116
ROB A. MAY

SEAL 09334
W. JENNY WELLS

ETHERILL ENGINEERING
559 Jones Franklin Rd. Suite 164
Raleigh, N.C. 27606
Bus: 919 851 8077
Fax: 919 851 8007

TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

SUNGATE DESIGN GROUP, P.A.
915 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL: 919-859-2243 FAX: 919-859-6259



4
ALDEN CLARK
DB 352 PG 2377

-L-		
PI Sta 16+64.30	PI Sta 19+00.62	PI Sta 21+22.58
Δ = 22° 28' 00.8" (RT)	Δ = 27° 32' 25.7" (RT)	Δ = 31° 37' 41.6" (RT)
D = 7° 44' 33.5"	D = 15° 04' 40.2"	D = 18° 28' 57.0"
L = 290.17'	L = 182.66'	L = 171.13'
T = 146.97'	T = 93.13'	T = 87.80'
R = 740.00'	R = 380.00'	R = 310.00'
SE = 0.06	SE = 0.06	
RO = SEE PLANS	RO = SEE PLANS	

SEE SHEETS S-1 THRU S-25 FOR STRUCTURE PLANS
SEE SHEETS W-1 THRU W-6 FOR WALL PLANS
SEE SHEET 5 FOR PROFILE

5/28/c

BM #3
RR SPIKE SET IN 18" WHITE PINE
-BL- STA. 16+08.27 26.52' RT.
ELEV. 2916.41'
N 934279 E 1248179

BM #2
RR SPIKE SET IN POWER POLE
-BL- STA. 23+22.14, 9.78' RT.
ELEV. 2906.47'
N 934914 E 1248040
-L- STA. 17+01.80 18.7393' RT

BM #1
RR SPIKE SET IN 18" TREE
-BL- STA. 31+44.01, 80.99' RT.
ELEV. 2899.43'
N 935000 E 1248728

WETHERILL
ENGINEERING

Raleigh, N.C. 27606
Phone: 919 851 8077
Fax: 919 851 8107

B-4011
ROADWAY DESIGN
ENGINEER

5
HYDRAULICS
ENGINEER

TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

SUNGATE DESIGN GROUP, P.A.

915 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 FAX (919) 859-6258



BEGIN GRADE -L- STA. 15+60.00
ELEV. = 2,911.05
(INCLUDES 2.5'
FOR RESURFACING)

PI = 16+35.17
EL = 2,910.94'
VC = 110'
K = 709

PI = 18+99.72
EL = 2,910.15'
VC = 100'
K = 109

END GRADE -L- STA. 20+34.78
ELEV. = 2,910.98
(INCLUDES 2.5'
FOR RESURFACING)

NOTE: PROVIDE 4-INCH DECK DRAINS ON 12 FOOT CENTERS
FROM BEGINNING OF BRIDGE TO STA. 17+30 RT AND FROM
STA. 17+75 RT TO END OF BRIDGE

EXISTING BRIDGE
TO BE REMOVED
BEGIN BRIDGE
-L- STA. 17+02.50

CL STA. 17+41.5 -L-
1 @ 100' 42" STEEL BRIDGE
90° SKEW GP ELEV. 2910.60

END BRIDGE
-L- STA. 18+02.50

BEGIN FEATHER
-L- STA. 15+17.33
EL = 2910.95

FEATHER
FROM EXISTING

CL I RIPRAP

CL II RIPRAP

25' FEATHER
TO EXISTING

END FEATHER
-L- STA. 20+39.78
EL = 2910.97

EXCAVATE TO
ELEV. 2909.0
EST. +/- 15 CY

EXCAVATE TO
ELEV. 2902.4
EST. +/- 30 CY

WSE ON 7-13-04
EL = 2891.56

BEGIN DITCH GRADE I
-L- STA. 17+97.00
EL = 2909.50

END DITCH GRADE I
-L- STA. 19+00.00
EL = 2908.00

STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE	= 1000 CFS
DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 2897.7 FT
BASE DISCHARGE	= 1550 CFS
BASE FREQUENCY	= 100 YRS
BASE HW ELEVATION	= 2899 FT
OVERTOPPING DISCHARGE	= 2350+ CFS
OVERTOPPING FREQUENCY	= 500+ YRS
OVERTOPPING ELEVATION	= 2910.4 FT

SEE SHEET 4 FOR HORIZONTAL ALIGNMENT

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gcail

09/28/07

See Sheet 1-A For Index of Sheets

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

ASHE COUNTY

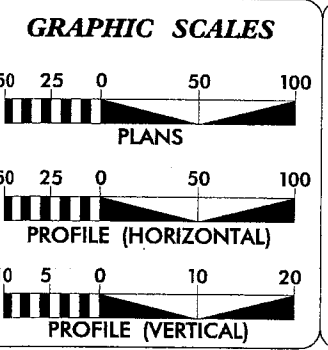
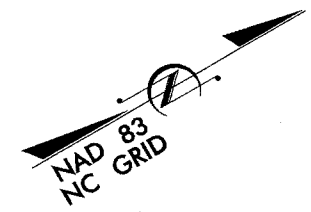
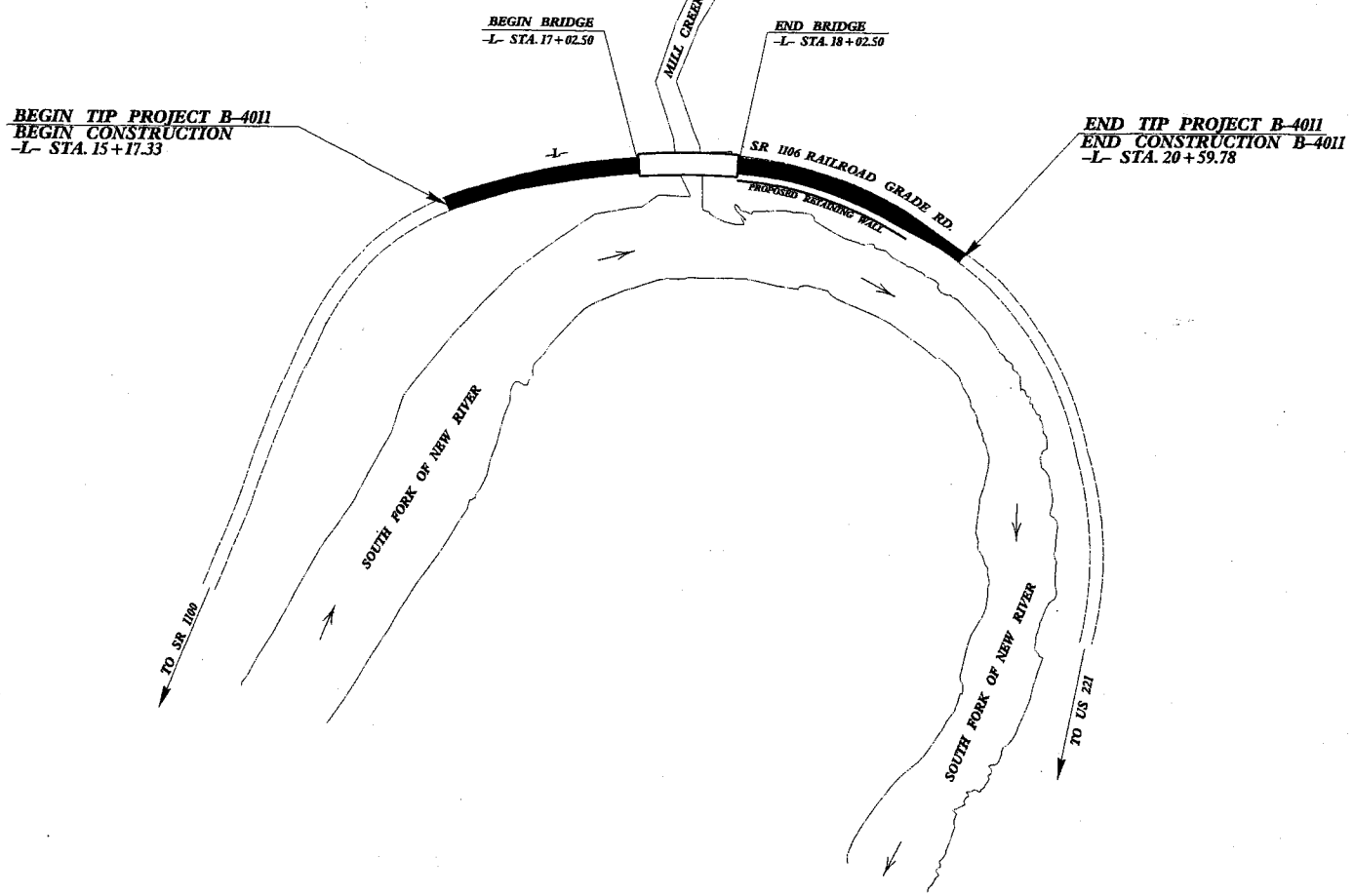
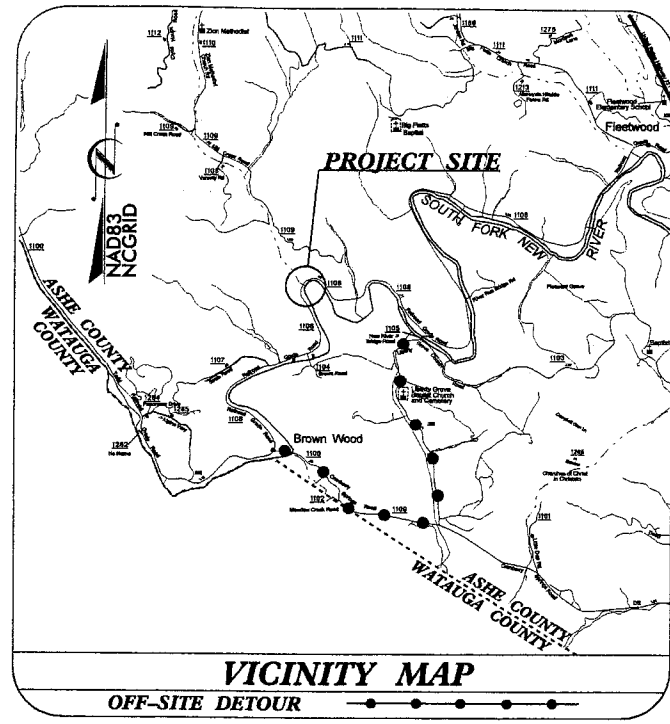
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ADT 2028 = 525
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WETHERILL ENGINEERING

Prepared for the North Carolina Department of Transportation in the Office of:

559 JONES FRANKLIN ROAD
SUITE 164
RALEIGH, N.C. 27604
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FAX: 919 851 8107

2006 STANDARD SPECIFICATIONS

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HYDRAULICS ENGINEER

ROADWAY DESIGN ENGINEER

SIGNATURE: _____

SIGNATURE: _____

**DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA**

STATE HIGHWAY DESIGN ENGINEER

07-DEC-2007 09:06
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B-4011 4

RW SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

SEAL 21116

SEAL 09334

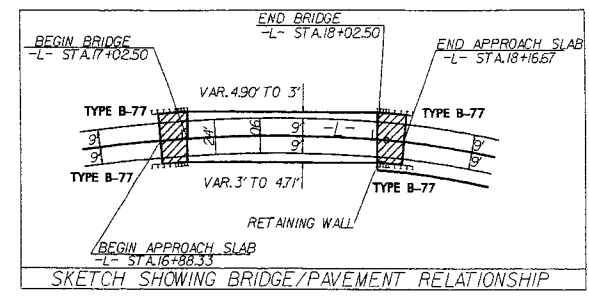
WETHERILL ENGINEERING

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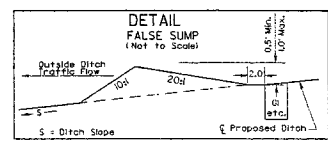
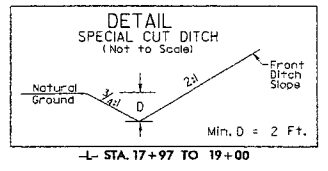
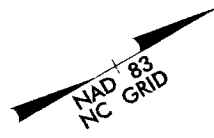
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

SUNGATE DESIGN GROUP, P.A.

915 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL: (919) 859-2243 FAX: (919) 859-6258

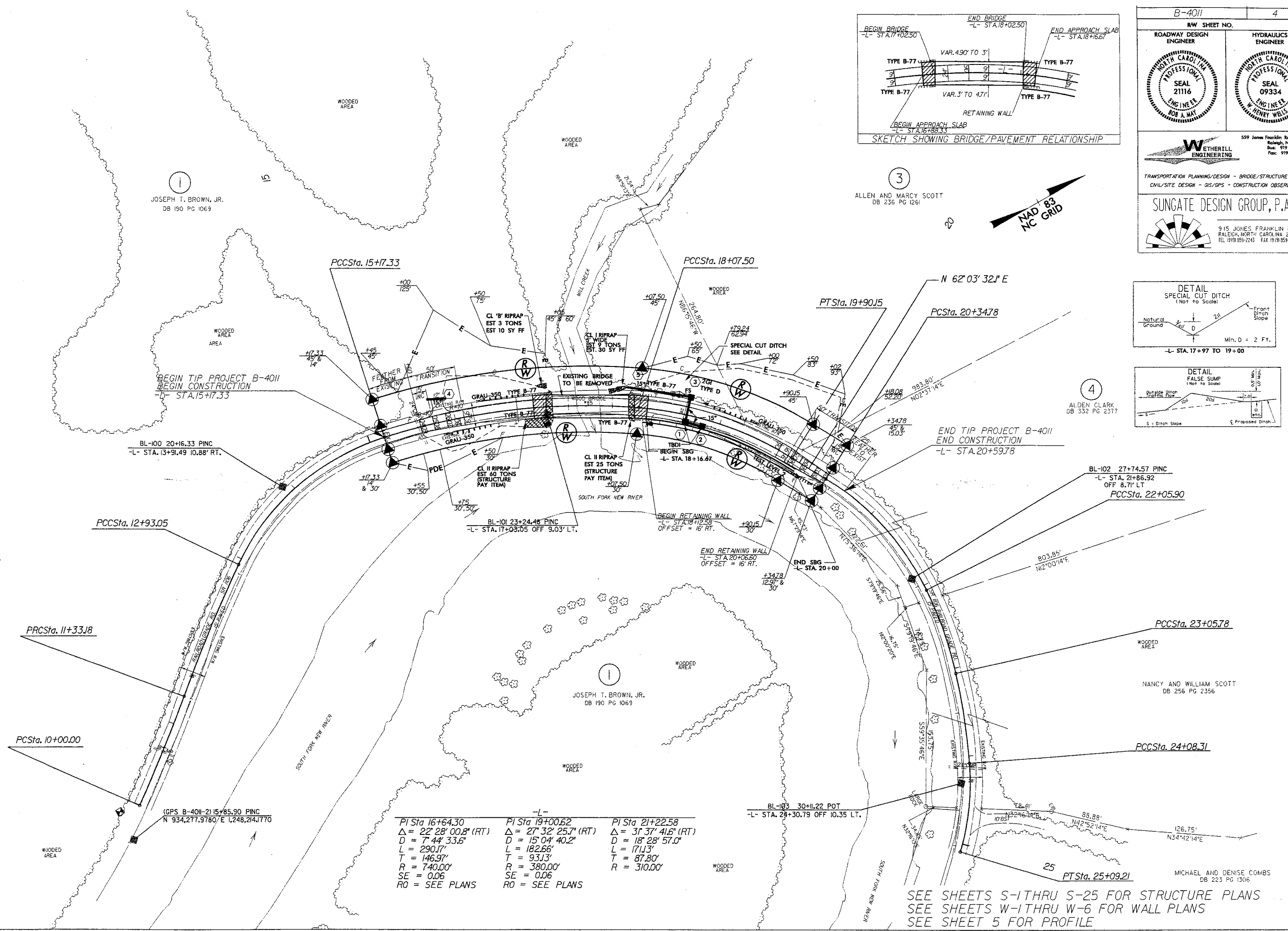


3
ALLEN AND MARCY SCOTT
DB 236 PG 1261



4
ALDEN CLARK
DB 332 PG 2377

REVISIONS



-L-		
PI Sta 16+64.30	PI Sta 19+00.62	PI Sta 21+22.58
$\Delta = 22^\circ 28' 00.8''$ (RT)	$\Delta = 27^\circ 32' 25.7''$ (RT)	$\Delta = 31^\circ 37' 41.6''$ (RT)
$D = 7^\circ 44' 33.6''$	$D = 15^\circ 04' 40.2''$	$D = 18^\circ 28' 57.0''$
$L = 290.17'$	$L = 182.66'$	$L = 171.3'$
$T = 146.97'$	$T = 93.13'$	$T = 87.80'$
$R = 740.00'$	$R = 380.00'$	$R = 310.00'$
$SE = 0.06$	$SE = 0.06$	
RO = SEE PLANS	RO = SEE PLANS	

SEE SHEETS S-1 THRU S-25 FOR STRUCTURE PLANS
SEE SHEETS W-1 THRU W-6 FOR WALL PLANS
SEE SHEET 5 FOR PROFILE

07-DEC-2007 08:55
c:\p\gcaill\4011_rdy_psh.dgn
gcaill

5/28/9

BM #3
RR SPIKE SET IN 18" WHITE PINE
-BL- STA. 16+08.27 26.52' RT.
ELEV. 2916.41'
N 934279' E 1248179'

BM #2
RR SPIKE SET IN POWER POLE
-BL- STA. 23+22.14, 9.78' RT.
ELEV. 2906.47'
N 934914' E 1248040'
-L- STA. 17+01.80 18.7393' KT

BM #1
RR SPIKE SET IN 18" TREE
-BL- STA. 31+44.01, 80.99' RT.
ELEV. 2899.43'
N 935000' E 1248728'

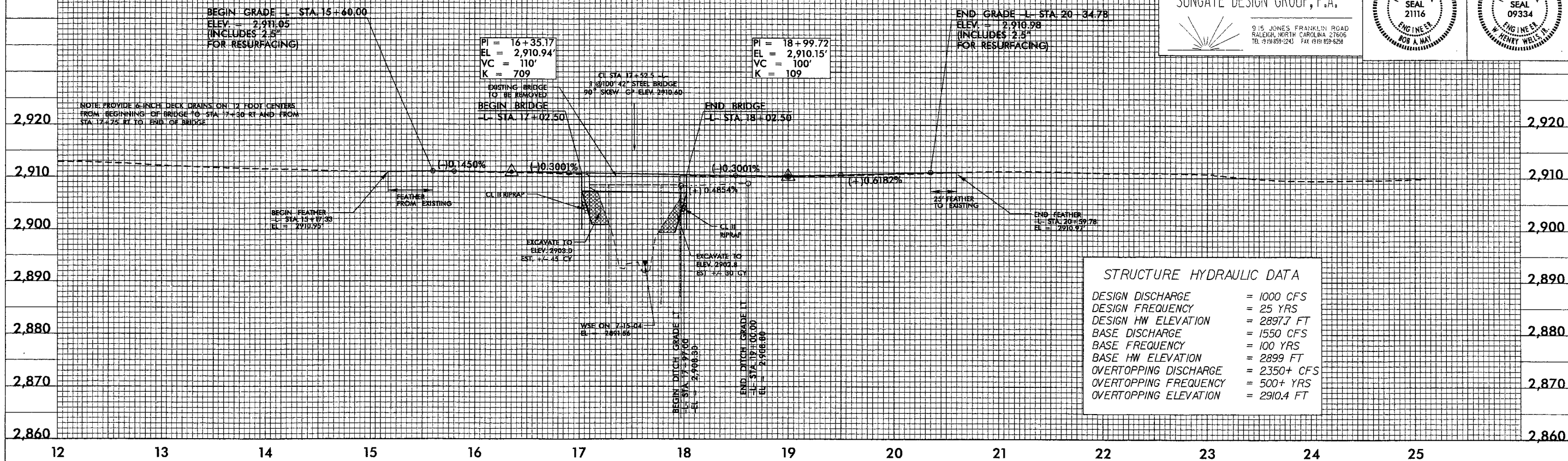
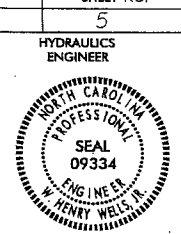
WETHERILL
ENGINEERING

Raleigh, N.C. 27605
Box 919 651 8077
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TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
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SUNGATE DESIGN GROUP, P.A.

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SEE SHEET 4 FOR HORIZONTAL ALIGNMENT

07-DEC-2007 09:08
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ocail 01 11/2/07