

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4161	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
33509.1.1	BRZ-1132 (6)	PE	
33509.2.1	BRZ-1132 (6)	RW, UTILITIES	
33509.3.1	BRZ-1132 (6)	CONSTRUCTION	

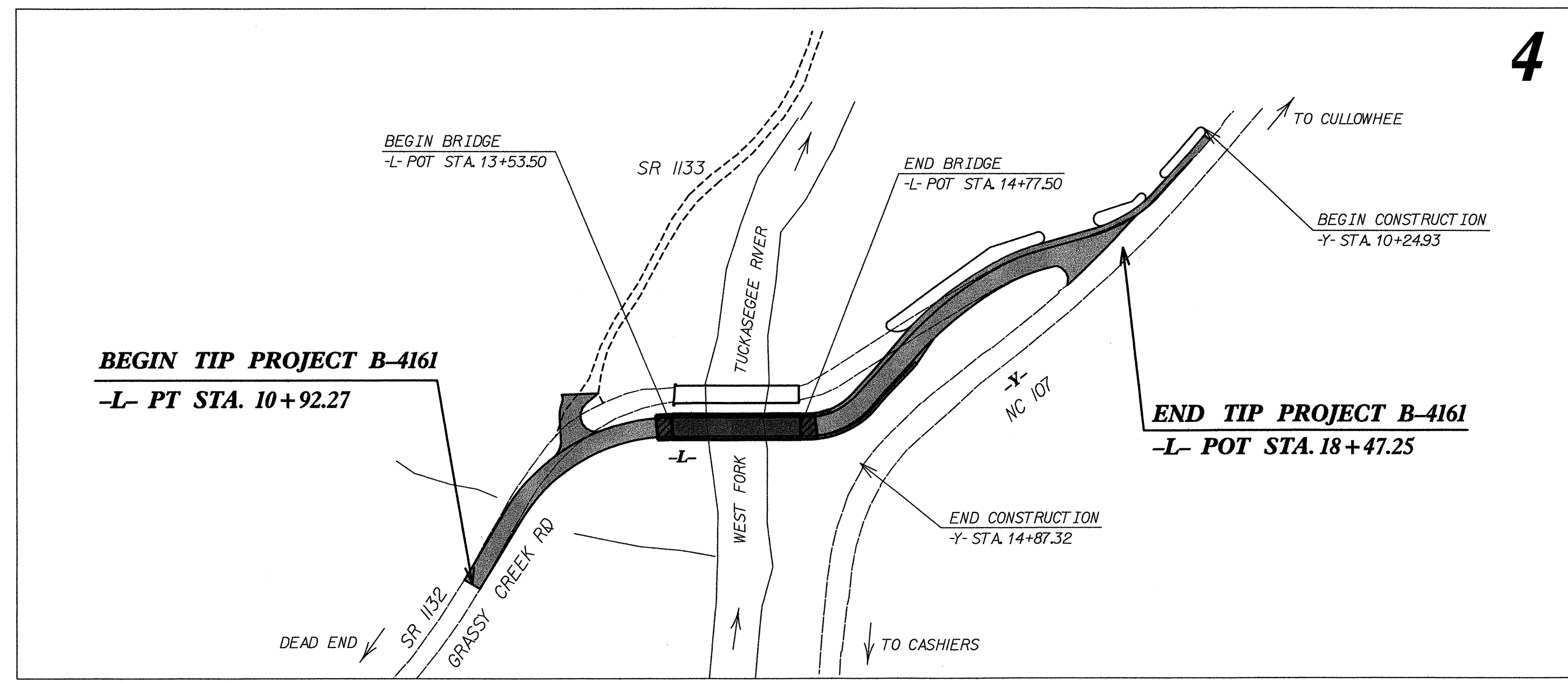
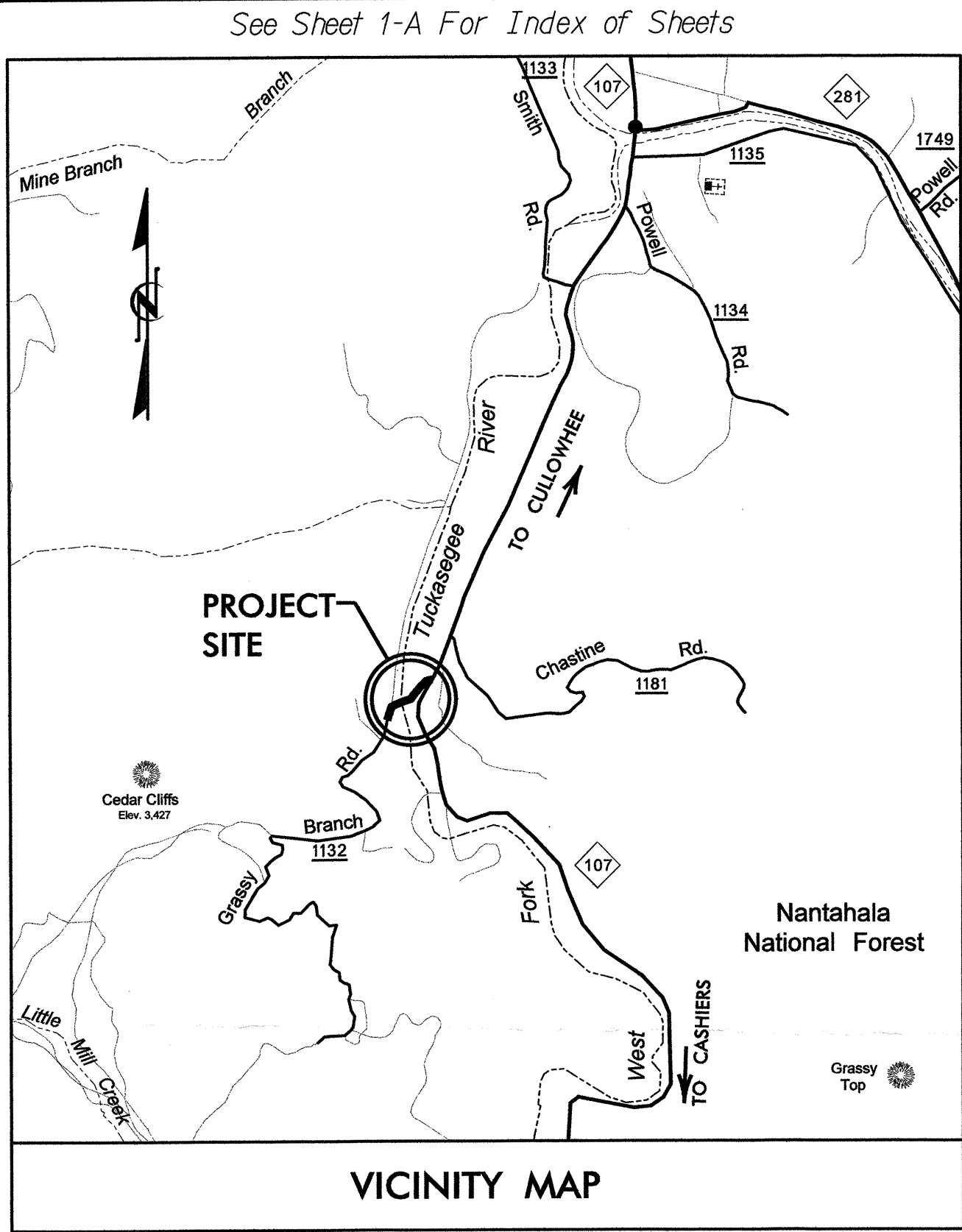
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

JACKSON COUNTY

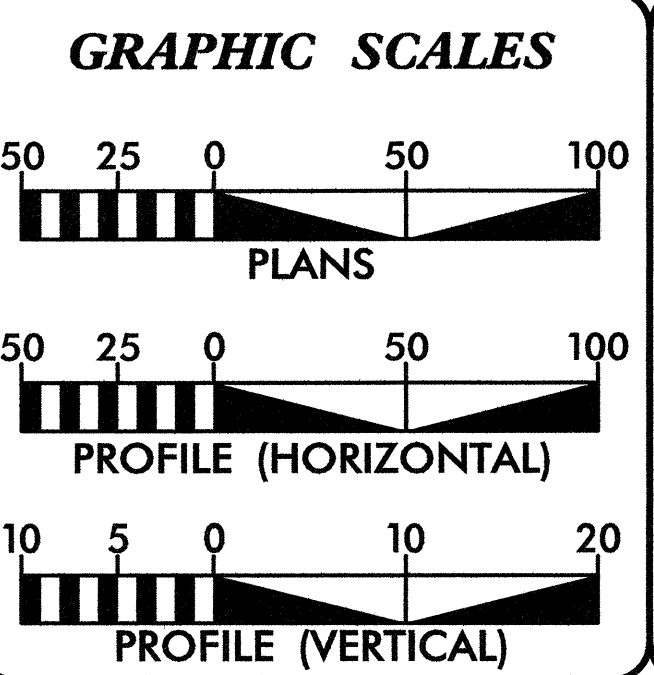
**LOCATION: BRIDGE #211 OVER WEST FORK TUCKASEGEE RIVER
ON SR 1132 (GRASSY CREEK ROAD) AND APPROACHES.**
TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE

TIP PROJECT: B-4161

CONTRACT: C201832



** DESIGN EXCEPTION
REQUIRED FOR 60 MPH
DESIGN SPEED



DESIGN DATA

ADT 2008 = 130
ADT 2028 = 214
DHV = 10 %
D = 60 %
T = 3 % *
V = 15 MPH **

* (TTST 1% + DUAL 2%)

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-4161	=	0.120 mile
LENGTH STRUCTURE TIP PROJECT B-4161	=	0.023 mile
TOTAL LENGTH TIP PROJECT B-4161	=	0.143 mile

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

By:
MA ENGINEERING CONSULTANTS, INC.
598 E. CHATHAM STREET, SUITE 137
CARY, NORTH CAROLINA 27511
TEL.: (919) 297-0220

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
AUGUST 18, 2006

LETTING DATE:
JULY 15, 2008

R.W. PORTER JR., PE
PROJECT ENGINEER

K.S. HUTCHENS
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

ROADWAY DESIGN ENGINEER

Signature: *Robert W. Porter* 04/2/08 P.E.

Signature: *Robert W. Porter* 4-8-2008 P.E.

Professional Engineer Seal: RIGER S. WEADON, SEAL 21656, NORTH CAROLINA PROFESSIONAL ENGINEER

Professional Engineer Seal: ROBERT W. PORTER, SEAL 19814, NORTH CAROLINA PROFESSIONAL ENGINEER

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

Professional Engineer Seal: STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Signature: *Robert W. Porter* P.E.

Signature: *Robert W. Porter* P.E.

STATE HIGHWAY DESIGN ENGINEER

NC DOT CONTACT:
MR. DOUG TAYLOR, PE
ENGINEERING COORDINATION SECTION ENGINEER
ROADWAY DESIGN UNIT

07/02/09

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8/17/99

PROJECT REFERENCE NO. B-4161	SHEET NO. 1-A
MA Engineering CONSULTANTS, INC. 598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221	

GENERAL NOTES: 2006 SPECIFICATIONS
EFFECTIVE: 07-18-06
REVISED: 07-18-06

GRADING AND SURFACING OR RESURFACING AND WIDENING:

THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. WHERE NO GRADE LINES ARE SHOWN, THE PROFILES SHOWN DENOTE THE TOP ELEVATION OF THE EXISTING PAVEMENT ALONG THE CENTER LINE OF SURVEY ON WHICH THE PROPOSED RESURFACING WILL BE PLACED. GRADE LINES MAY BE ADJUSTED BY THE ENGINEER IN ORDER TO SECURE A PROPER TIE-IN.

CLEARING:

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

SUPERELEVATION:

ALL CURVES ON THIS PROJECT SHALL BE SUPERELEVATED IN ACCORDANCE WITH STD. NO. 225.04 USING THE RATE OF SUPERELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPERELEVATION IS TO BE REVOLVED ABOUT THE GRADE POINTS SHOWN ON THE TYPICAL SECTIONS.

SHOULDER CONSTRUCTION:

ASPHALT, EARTH, AND CONCRETE SHOULDER CONSTRUCTION ON THE HIGH SIDE OF SUPERELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.01.

SIDE ROADS:

THE CONTRACTOR WILL BE REQUIRED TO DO ALL NECESSARY WORK TO PROVIDE SUITABLE CONNECTIONS WITH ALL ROADS, STREETS, AND DRIVES ENTERING THIS PROJECT. THIS WORK WILL BE PAID FOR AT THE CONTRACT UNIT PRICE FOR THE PARTICULAR ITEMS INVOLVED.

UNDERDRAINS:

UNDERDRAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 815.03 AT LOCATIONS DIRECTED BY THE ENGINEER.

GUARDRAIL:

THE GUARDRAIL LOCATIONS SHOWN ON THE PLANS MAY BE ADJUSTED DURING CONSTRUCTION AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHOULD CONSULT WITH THE ENGINEER PRIOR TO ORDERING GUARDRAIL MATERIAL.

TEMPORARY SHORING:

SHORING REQUIRED FOR THE MAINTENANCE OF TRAFFIC WILL BE PAID FOR AS "EXTRA WORK" IN ACCORDANCE WITH SECTION 104-7.

SUBSURFACE PLANS:

NO SUBSURFACE PLANS ARE AVAILABLE ON THIS PROJECT. THE CONTRACTOR SHOULD MAKE HIS OWN INVESTIGATION AS TO THE SUBSURFACE CONDITIONS.

END BENTS:

THE ENGINEER SHALL CHECK THE STRUCTURE END BENT PLANS, DETAILS, AND CROSS-SECTION PRIOR TO SETTING OF THE SLOPE STAKES FOR THE EMBANKMENT OR EXCAVATION APPROACHING A BRIDGE.

UTILITIES:

UTILITY OWNERS ON THIS PROJECT ARE:
Power - Duke Power
Telephone - Verizon

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

RIGHT-OF-WAY MARKERS:

ALL RIGHT-OF-WAY MARKERS ON THIS PROJECT SHALL BE PLACED BY OTHERS.

2006 ROADWAY ENGLISH STANDARD DRAWINGS

EFF. 07-18-06
REV. 01-02-07

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated July 18, 2006 are applicable to this project and by reference hereby are considered a part of these plans:

STD.NO. TITLE
DIVISION 2 - EARTHWORK
200.03 Method of Clearing - Method III
225.02 Guide for Grading Subgrade - Secondary and Local
225.04 Method of Obtaining Superelevation - Two Lane Pavement

DIVISION 3 - PIPE CULVERTS
300.01 Method of Pipe Installation - Method 'A'
310.10 Driveway Pipe Construction

DIVISION 4 - MAJOR STRUCTURES
422.10 Reinforced Bridge Approach Fills

DIVISION 5 - SUBGRADE, BASES AND SHOULDERS
560.01 Method of Shoulder Construction - High Side of Superelevated Curve - Method I

DIVISION 8 - INCIDENTALS
815.03 Pipe Underdrain and Blind Drain
840.00 Concrete Base Pad for Drainage Structures
840.18 Concrete Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.24 Frames and Narrow Slot Sag Grates
840.27 Brick Grated Drop Inlet Type 'B' - 12" thru 36" Pipe
840.29 Frames and Narrow Slot Flat Grates
840.35 Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
840.45 Precast Drainage Structure
840.46 Traffic Bearing Precast Drainage Structure
840.66 Drainage Structure Steps
846.01 Concrete Curb, Gutter and Curb & Gutter
846.04 Drop Inlet Installation in Shoulder Berm Gutter
862.01 Guardrail Placement
862.02 Guardrail Installation
862.03 Structure Anchor Units
862.04 Anchoring End of Guardrail - B-77 and B-83 Anchor Units
876.02 Guide for Rip Rap at Pipe Outlets

INDEX OF SHEETS

SHEET NUMBER	SHEET
1	TITLE SHEET
1-A	INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARD DRAWINGS
1-B	CONVENTIONAL SYMBOLS
1-C	SURVEY CONTROL SHEET
2	PAVEMENT SCHEDULE, TYPICAL SECTIONS, AND WEDGING DETAILS
2-A	DETAIL OF ANCHORAGE FOR FRAMES - BRICK OR CONCRETE
2-B	DETAIL OF GUARDRAIL ANCHOR UNIT TYPE B-77 SHOP-CURVED
3	SUMMARY OF QUANTITIES
3-A	SUMMARIES OF EARTHWORK, PAVEMENT REMOVAL, DRAINAGE, AND GUARDRAIL
4	PLAN AND PROFILE SHEET
TCP-1 THRU TCP-6	TRAFFIC CONTROL PLANS
EC-1 THRU EC-5	EROSION CONTROL PLANS
SIGN-1 THRU SIGN-3	SIGNING PLANS
UO-1 THRU UO-2	UTILITIES BY OTHERS PLANS
X-1	CROSS-SECTION SUMMARY
X-2 THRU X-11	CROSS-SECTIONS
S-1 THRU S- 3 ²⁴	STRUCTURE PLANS

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Note: Not to Scale

*S.U.E. = Subsurface Utility Engineering

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

Table listing symbols for boundaries and property: State Line, County Line, Township Line, City Line, Reservation Line, Property Line, Existing Iron Pin, Property Corner, Property Monument, Parcel/Sequence Number, Existing Fence Line, Proposed Woven Wire Fence, Proposed Chain Link Fence, Proposed Barbed Wire Fence, Existing Wetland Boundary, Proposed Wetland Boundary, Existing Endangered Animal Boundary, Existing Endangered Plant Boundary.

BUILDINGS AND OTHER CULTURE:

Table listing symbols for buildings and other culture: Gas Pump Vent or U/G Tank Cap, Sign, Well, Small Mine, Foundation, Area Outline, Cemetery, Building, School, Church, Dam.

HYDROLOGY:

Table listing symbols for hydrology: Stream or Body of Water, Hydro, Pool or Reservoir, Jurisdictional Stream, Buffer Zone 1, Buffer Zone 2, Flow Arrow, Disappearing Stream, Spring, Swamp Marsh, Proposed Lateral, Tail, Head Ditch, False Sump.

RAILROADS:

Table listing symbols for railroads: Standard Gauge, RR Signal Milepost, Switch, RR Abandoned, RR Dismantled.

RIGHT OF WAY:

Table listing symbols for right of way: Baseline Control Point, Existing Right of Way Marker, Existing Right of Way Line, Proposed Right of Way Line, Proposed Right of Way Line with Iron Pin and Cap Marker, Proposed Right of Way Line with Concrete or Granite Marker, Existing Control of Access, Proposed Control of Access, Existing Easement Line, Proposed Temporary Construction Easement, Proposed Temporary Drainage Easement, Proposed Permanent Drainage Easement, Proposed Permanent Utility Easement.

ROADS AND RELATED FEATURES:

Table listing symbols for roads and related features: Existing Edge of Pavement, Existing Curb, Proposed Slope Stakes Cut, Proposed Slope Stakes Fill, Proposed Wheel Chair Ramp, Curb Cut for Future Wheel Chair Ramp, Existing Metal Guardrail, Proposed Guardrail, Existing Cable Guiderail, Proposed Cable Guiderail, Equality Symbol, Pavement Removal.

VEGETATION:

Table listing symbols for vegetation: Single Tree, Single Shrub, Hedge, Woods Line, Orchard, Vineyard.

EXISTING STRUCTURES:

Table listing symbols for existing structures: MAJOR: Bridge, Tunnel or Box Culvert, Bridge Wing Wall, Head Wall and End Wall; MINOR: Head and End Wall, Pipe Culvert, Footbridge, Drainage Box: Catch Basin, DI or JB, Paved Ditch Gutter, Storm Sewer Manhole, Storm Sewer.

UTILITIES:

Table listing symbols for utilities: POWER: Existing Power Pole, Proposed Power Pole, Existing Joint Use Pole, Proposed Joint Use Pole, Power Manhole, Power Line Tower, Power Transformer, U/G Power Cable Hand Hole, H-Frame Pole, Recorded U/G Power Line, Designated U/G Power Line (S.U.E.*).

TELEPHONE:

Table listing symbols for telephone: Existing Telephone Pole, Proposed Telephone Pole, Telephone Manhole, Telephone Booth, Telephone Pedestal, Telephone Cell Tower, U/G Telephone Cable Hand Hole, Recorded U/G Telephone Cable, Designated U/G Telephone Cable (S.U.E.*), Recorded U/G Telephone Conduit, Designated U/G Telephone Conduit (S.U.E.*), Recorded U/G Fiber Optics Cable, Designated U/G Fiber Optics Cable (S.U.E.*).

WATER:

Table listing symbols for water: Water Manhole, Water Meter, Water Valve, Water Hydrant, Recorded U/G Water Line, Designated U/G Water Line (S.U.E.*), Above Ground Water Line.

TV:

Table listing symbols for TV: TV Satellite Dish, TV Pedestal, TV Tower, U/G TV Cable Hand Hole, Recorded U/G TV Cable, Designated U/G TV Cable (S.U.E.*), Recorded U/G Fiber Optic Cable, Designated U/G Fiber Optic Cable (S.U.E.*).

GAS:

Table listing symbols for gas: Gas Valve, Gas Meter, Recorded U/G Gas Line, Designated U/G Gas Line (S.U.E.*), Above Ground Gas Line.

SANITARY SEWER:

Table listing symbols for sanitary sewer: Sanitary Sewer Manhole, Sanitary Sewer Cleanout, U/G Sanitary Sewer Line, Above Ground Sanitary Sewer, Recorded SS Forced Main Line, Designated SS Forced Main Line (S.U.E.*).

MISCELLANEOUS:

Table listing symbols for miscellaneous: Utility Pole, Utility Pole with Base, Utility Located Object, Utility Traffic Signal Box, Utility Unknown U/G Line, U/G Tank; Water, Gas, Oil, A/G Tank; Water, Gas, Oil, U/G Test Hole (S.U.E.*), Abandoned According to Utility Records, End of Information.

SURVEY CONTROL SHEET B-4161

BL	POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
	101	(GPS-101)	571702.5520	767104.5770	2190.86	OUTSIDE PROJECT LIMITS	
	102	(GPS-102)	572125.6250	767237.2820	2169.11	13+01.17	41.45 LT
	3	(BL-3)	572217.5070	767431.9240	2168.57	15+48.58	50.03 LT
	4	(BL-4)	572354.9620	767616.1470	2177.23	17+71.13	28.77 RT

BY	POINT	DESC.	NORTH	EAST	ELEVATION	Y STATION	OFFSET
	5	(BY-5)	572879.5830	767882.3370	2168.98	OUTSIDE PROJECT LIMITS	
	6	(BY-6)	572354.9620	767616.1470	2177.32	12+39.57	17.58 RT
	7	(BY-7)	572084.7300	767481.9340	2181.33	15+36.75	17.23 RT
	8	(BY-8)	571847.0580	767535.3100	2181.57	OUTSIDE PROJECT LIMITS	

T1	POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
	1		572411.0350	767392.1840	UNKNOWN	16+76.68	174.21 LT
	T3		572217.5070	767431.9240	UNKNOWN	15+48.58	50.03 LT

NCDOT BASELINE STATION "B4161 GPS-102"
LOCALIZED PROJECT COORDINATES
 N = 572125.625
 E = 767237.282

STA 10+92.27 -L- BEGIN STATE PROJECT B-4161
LOCALIZED PROJECT COORDINATES
 N = 571910.082
 E = 767170.873

NCDOT BASELINE STATION "BY-5"
LOCALIZED PROJECT COORDINATES
 N = 572879.583
 E = 767882.337

NCDOT BASELINE STATION "BL-3"
LOCALIZED PROJECT COORDINATES
 N = 572217.507
 E = 767431.924

STA 18+28.34 -L- END STATE PROJECT B-4161
LOCALIZED PROJECT COORDINATES
 N = 572404.424
 E = 767651.568

NCDOT BASELINE STATION "BL-4 /BY-6"
LOCALIZED PROJECT COORDINATES
 N = 572354.962
 E = 767616.147

NCDOT BASELINE STATION "BY-7"
LOCALIZED PROJECT COORDINATES
 N = 572084.730
 E = 767481.934

NCDOT BASELINE STATION "BY-8"
LOCALIZED PROJECT COORDINATES
 N = 571847.058
 E = 767535.310

NCDOT BASELINE STATION "B4161 GPS-101"
LOCALIZED PROJECT COORDINATES
 N = 571702.552
 E = 767104.577

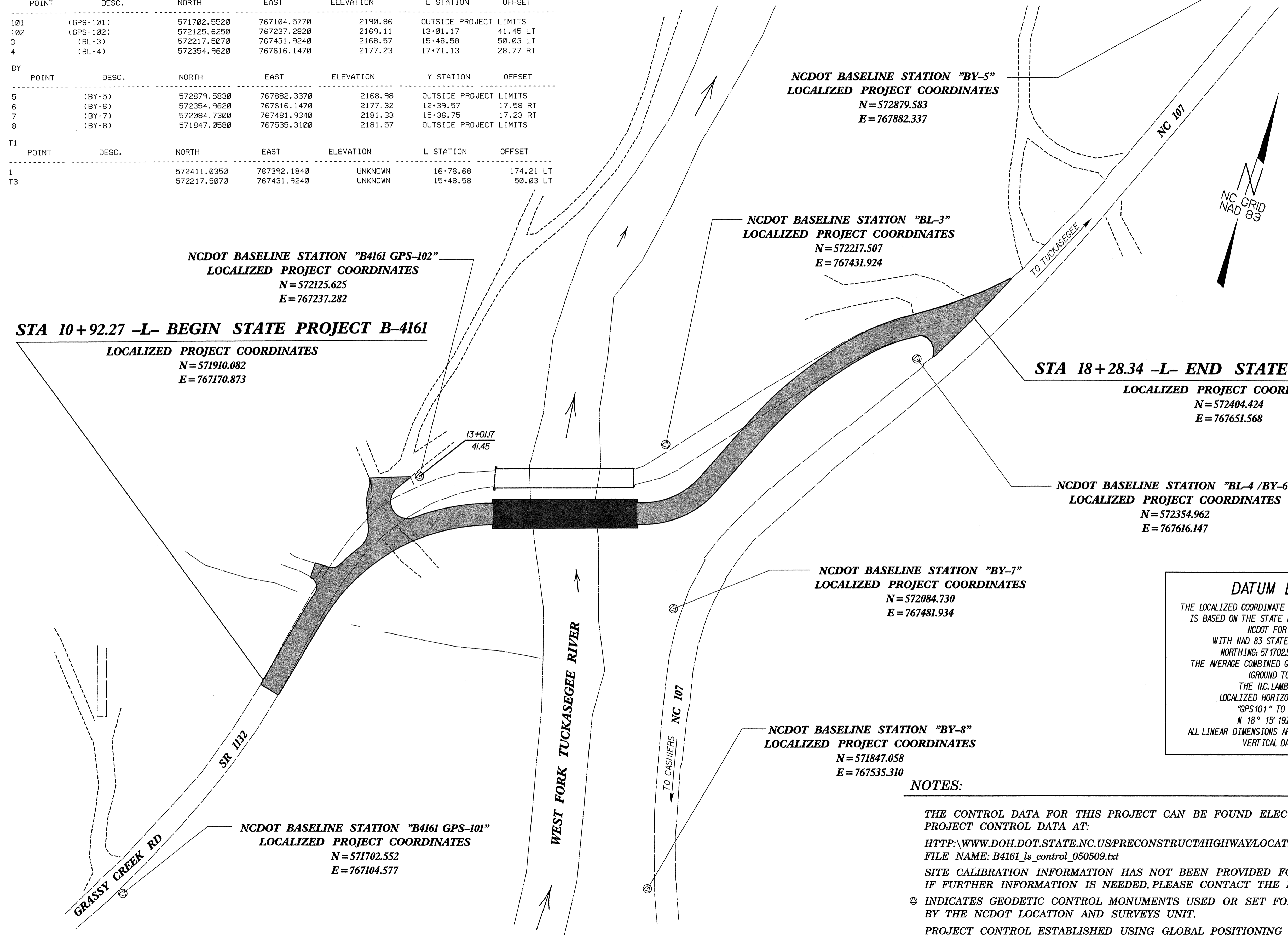
DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "GPS 101" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 571702.552(ft) EASTING: 767104.577(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99976834 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "GPS 101" TO -L- STATION 10+00.00 IS N 18° 15' 19.71" E 12570 FEET ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NGVD 29

NOTES:

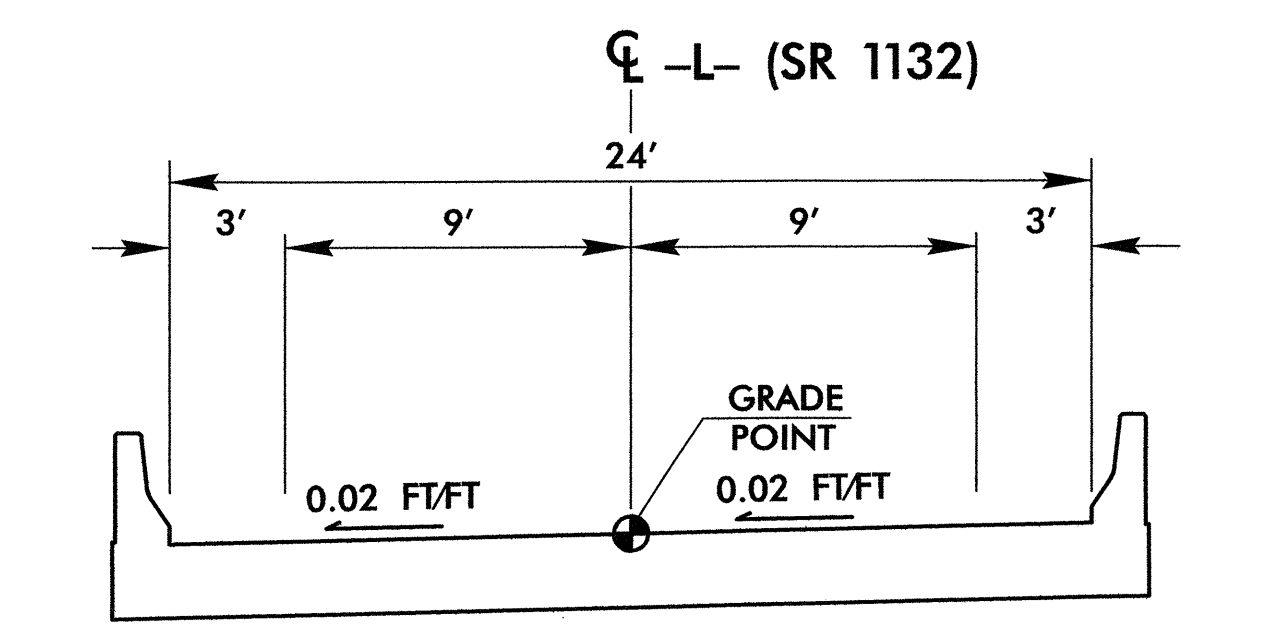
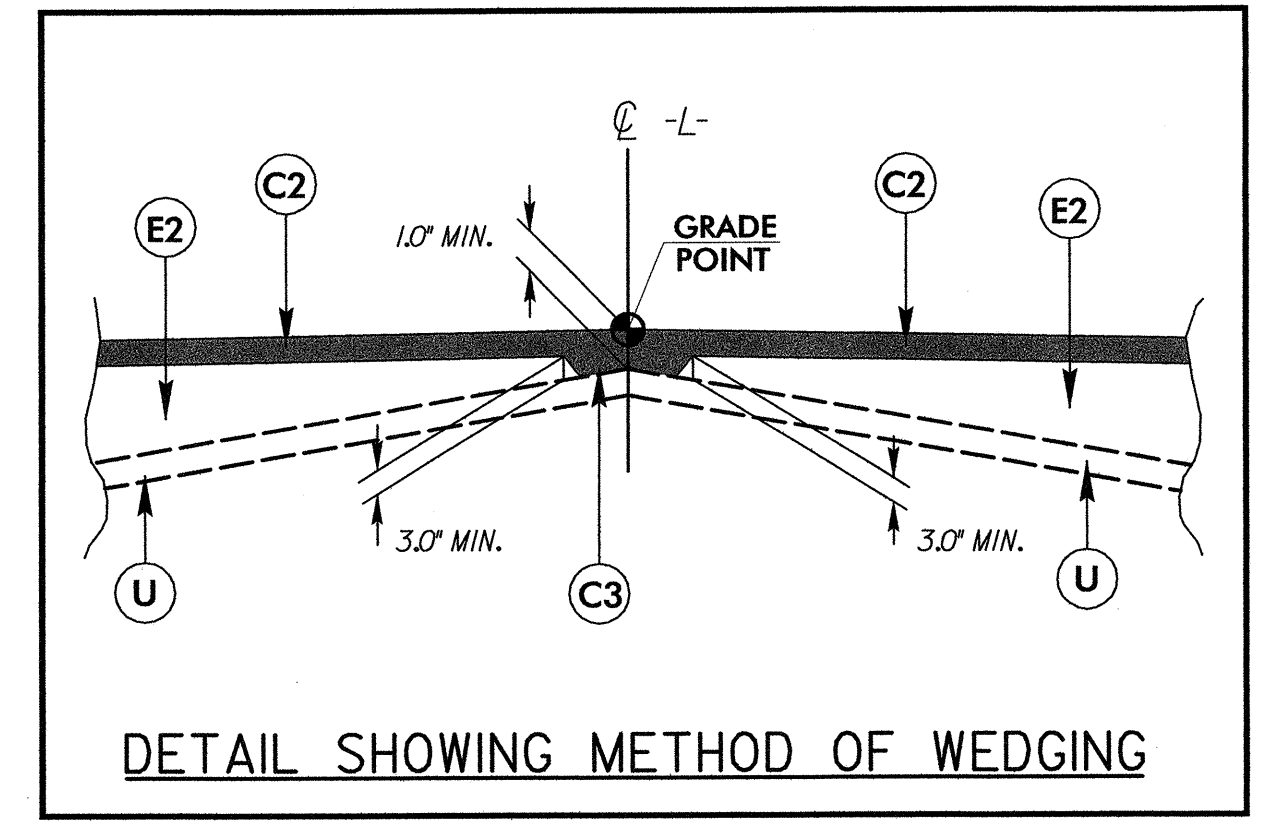
- THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT:
[HTTP://WWW.DOH.DOT.STATE.NC.US/PRECONSTRUCT/HIGHWAY/LOCATION/PROJECT](http://www.doh.dot.state.nc.us/preconstruct/highway/location/project)
 FILE NAME: B4161_ls_control_050509.txt
 - SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT. IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.
 - INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT.
 - PROJECT CONTROL ESTABLISHED USING 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**

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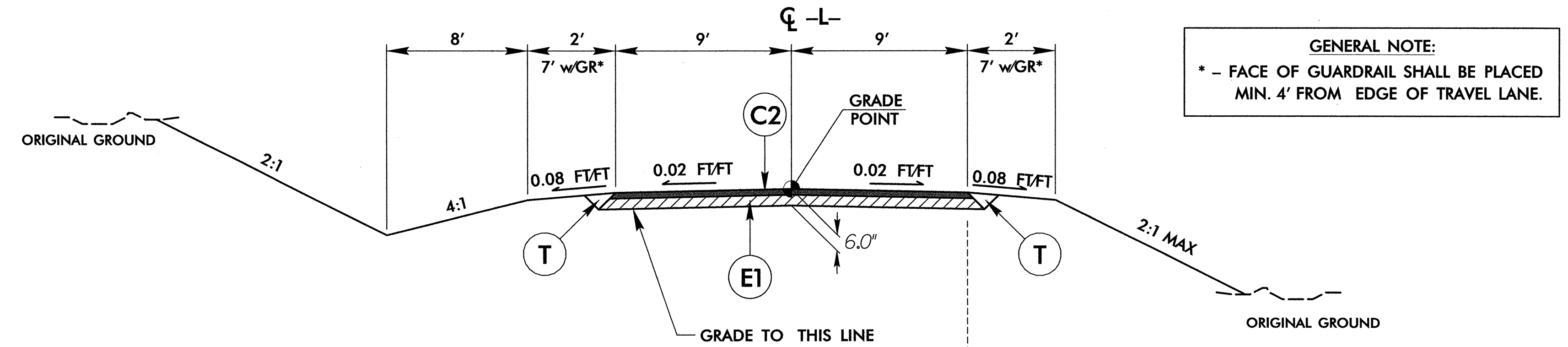


PAVEMENT SCHEDULE	
C1	PROP. APPROX. 1.0" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS PER SQUARE YARD.
C2	PROP. APPROX. 2.0" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS PER SQUARE YARD IN EACH OF TWO LAYERS.
C3	PROP. VARIABLE DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS PER SQUARE YARD PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 1.0" OR GREATER THAN 1.5" IN DEPTH.
E1	PROP. APPROX. 4.0" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS PER SQUARE YARD.
E2	PROP. VARIABLE DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS PER SQUARE YARD PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 3.0" OR GREATER THAN 5.5" IN DEPTH.
R1	36" CONCRETE SHOULDER BERM GUTTER
R2	8" X 18" CONCRETE CURB
T	EARTH MATERIAL
U	EXISTING PAVEMENT
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE STANDARD WEDGING DETAIL THIS SHEET)

PAVEMENT EDGE SLOPES AND TRENCH SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

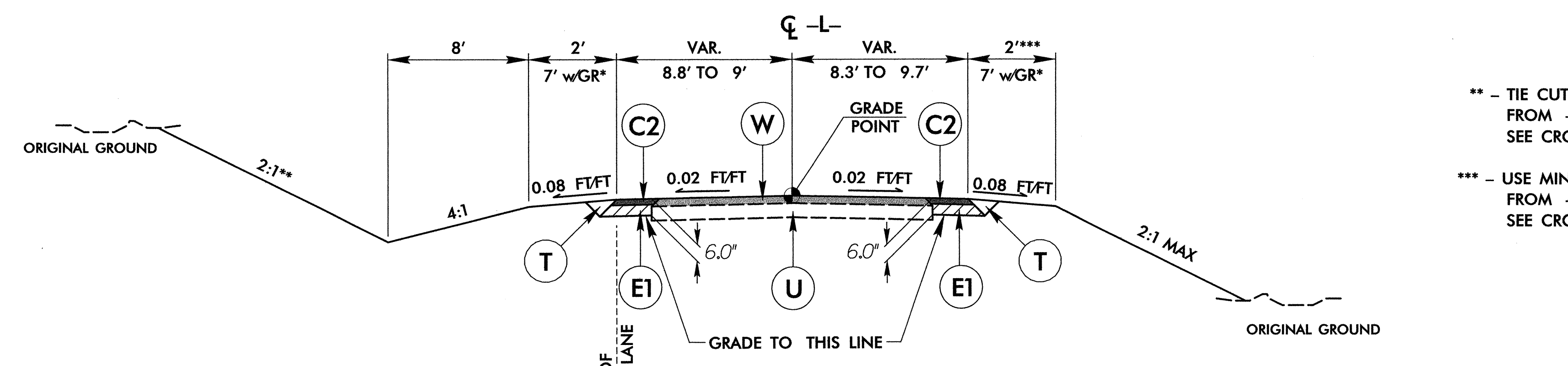


TYPICAL SECTION ON STRUCTURE
-L- STA 13+53.50 TO 14+77.50



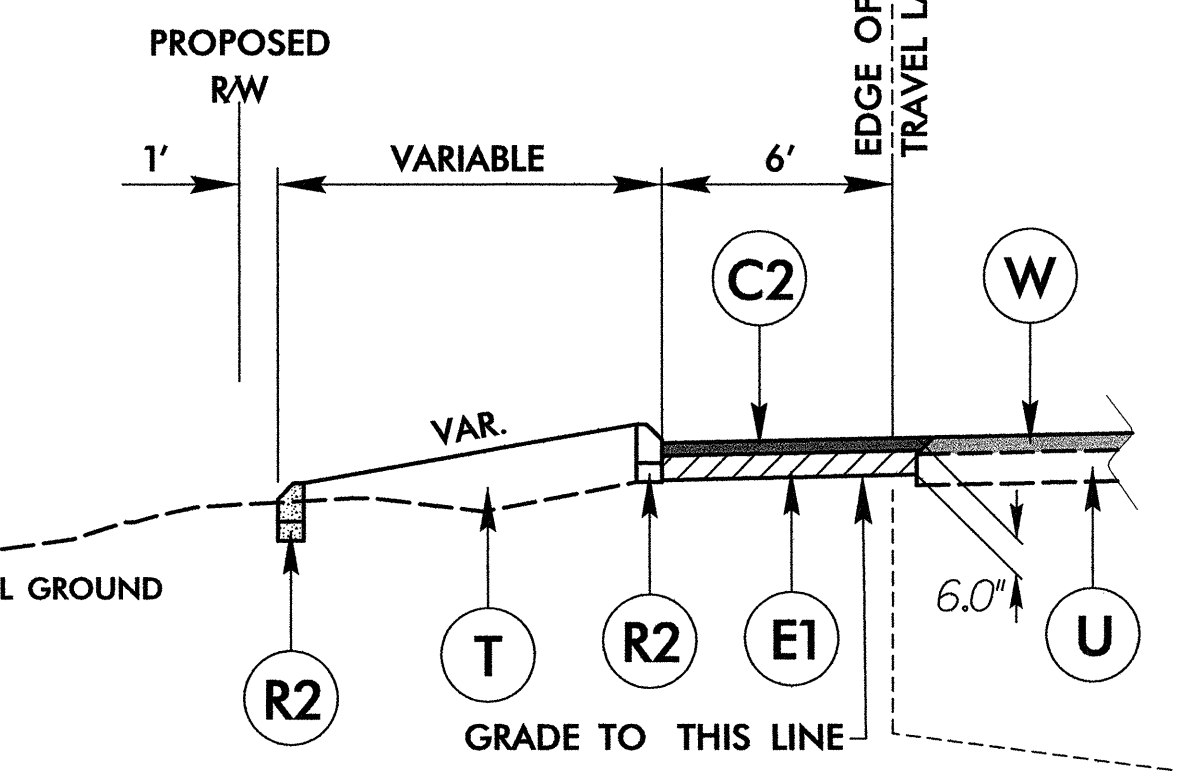
TYPICAL SECTION NO. 1
FROM -L- STA. 12+30 TO STA. 13+53.50 (BEGIN BRIDGE)
FROM -L- STA. 14+77.50 (END BRIDGE) TO STA. 16+06

TYPICAL SECTION NO. 1A
USE TYPICAL SECTION NO. 1A IN CONJUNCTION WITH TYPICAL SECTIONS NO. 1 & NO. 3
FROM -L- STA. 14+90 TO STA. 16+06 RT (w/SHOULDER & GUARDRAIL)



TYPICAL SECTION NO. 2
FROM -L- STA. 10+92.27 TO STA. 12+30
FROM -L- STA. 16+06 TO STA. 17+75.00
RESURFACE WITH (C1) FROM -L- STA. 17+75.00 TO STA. 18+28.34

TYPICAL SECTION NO. 2A
USE TYPICAL SECTION NO. 2A IN CONJUNCTION WITH TYPICAL SECTIONS NOS. 2 & 3
FROM -L- STA. 16+12 TO STA. 18+27.45 LT.
FROM -Y- STA. 10+24 TO STA. 11+63.34 RT. (MIRROR) (WIDEN USING EX. EOP AS GRADEPOINT)



TYPICAL SECTION NO. 3
FROM -Y- STA. 12+80 +/- TO STA. 14+87.32 RT.

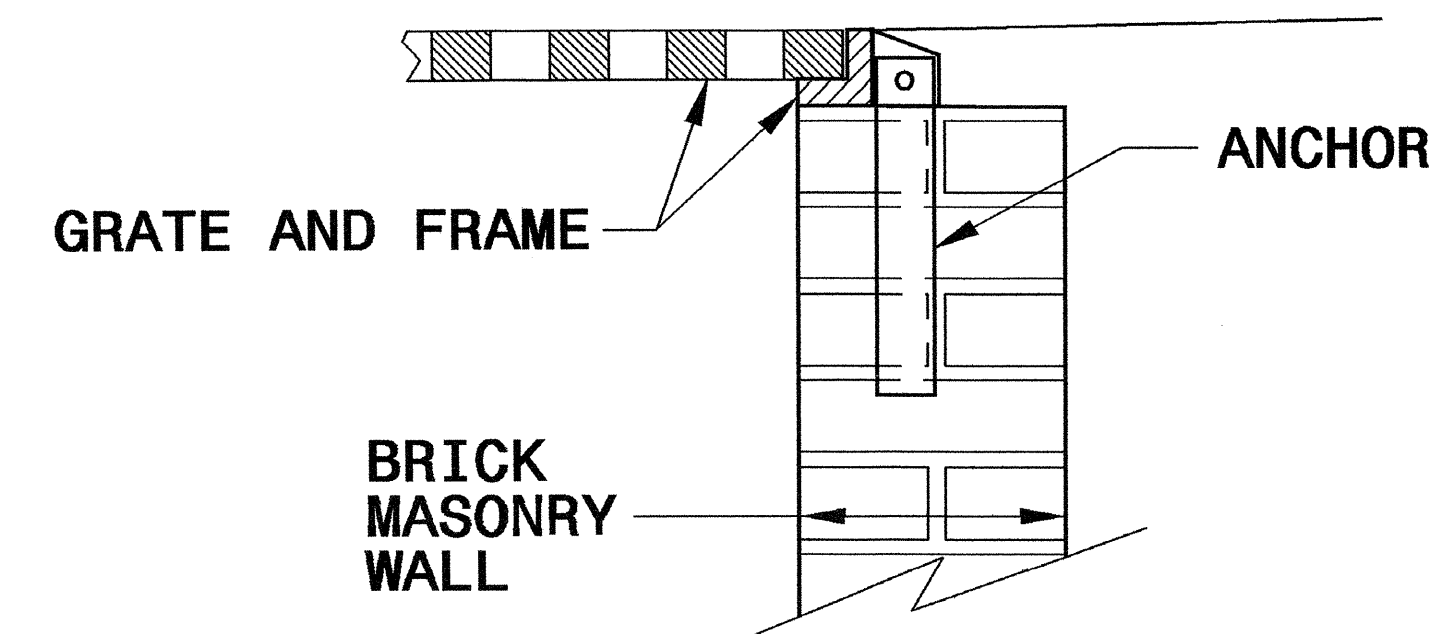
** - TIE FILL SLOPE TO -L- CUT SLOPE.
FROM -Y- STA. 13+50 +/- TO STA. 14+87.32 RT.
SEE CROSS SECTIONS

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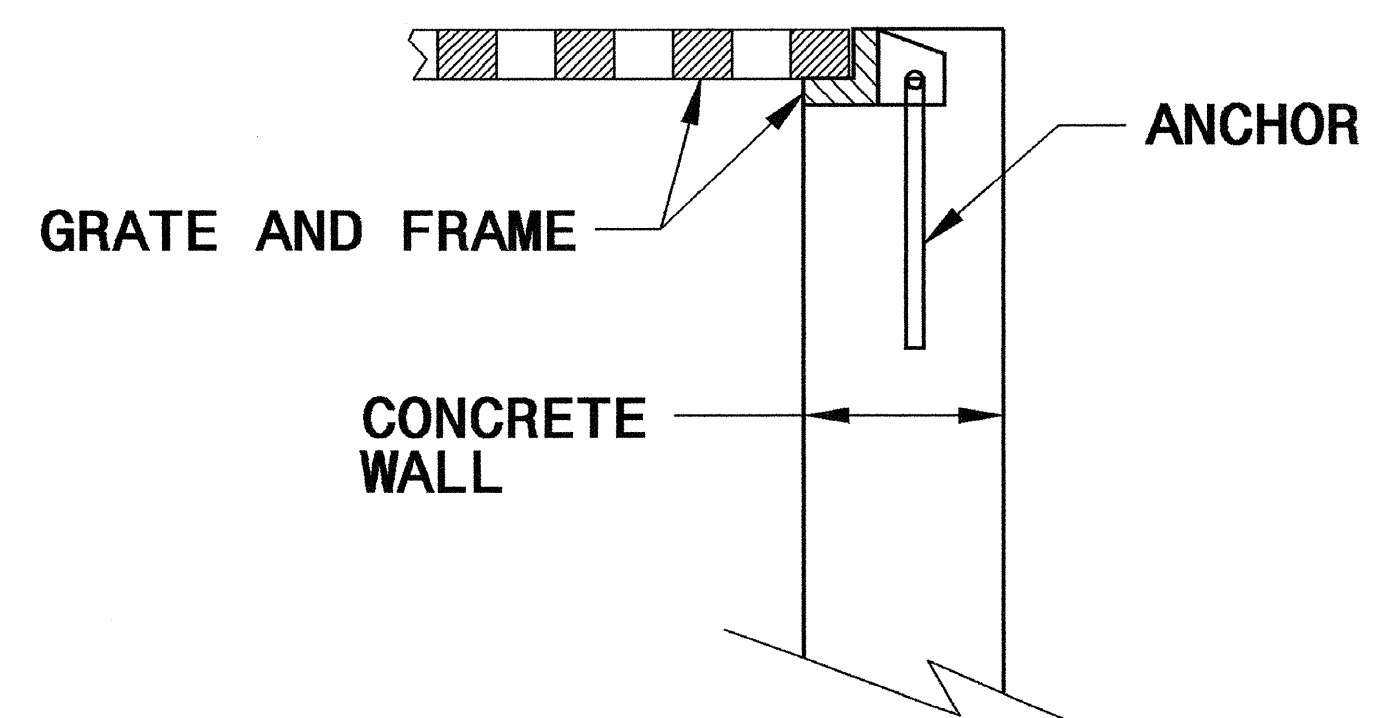
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
ANCHORAGE FOR FRAMES
BRICK/CONCRETE/PRECAST CONCRETE

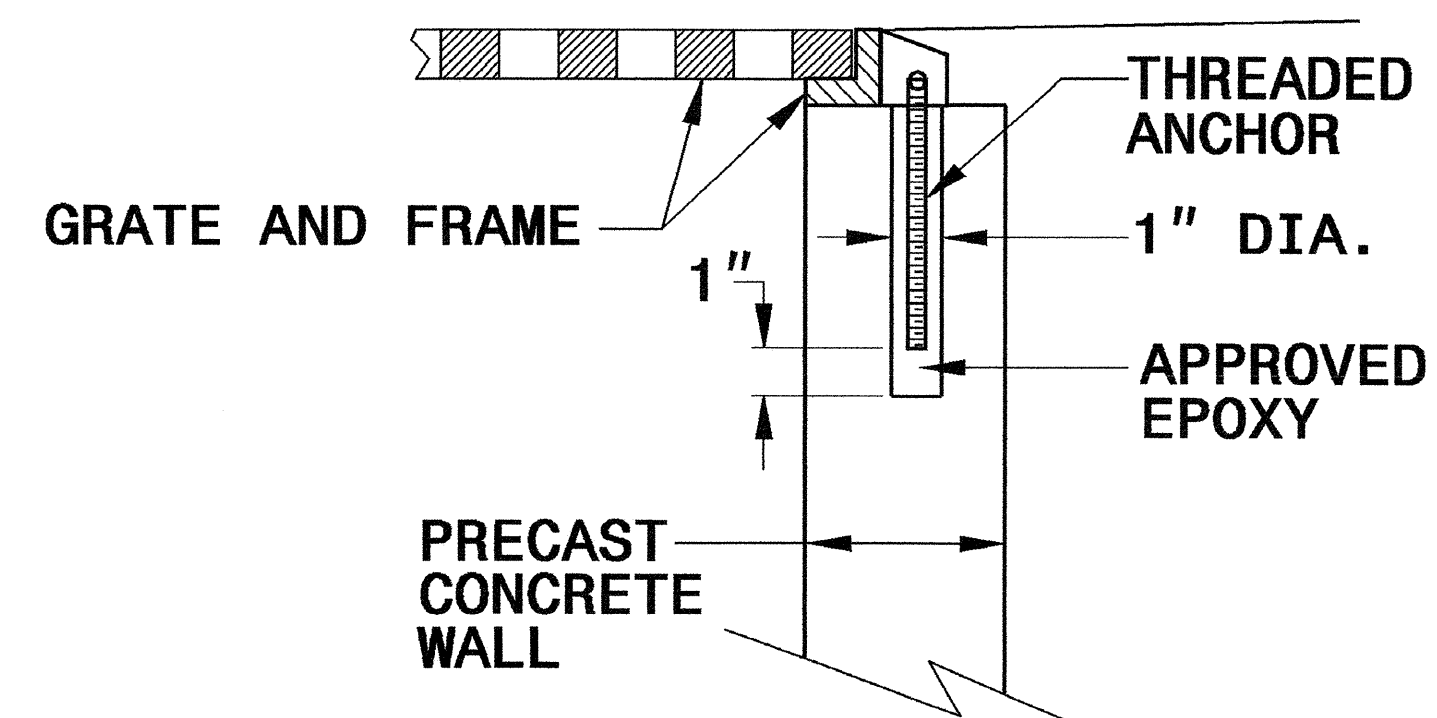
SHEET 1 OF 1
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**BRICK MASONRY
CONSTRUCTION**



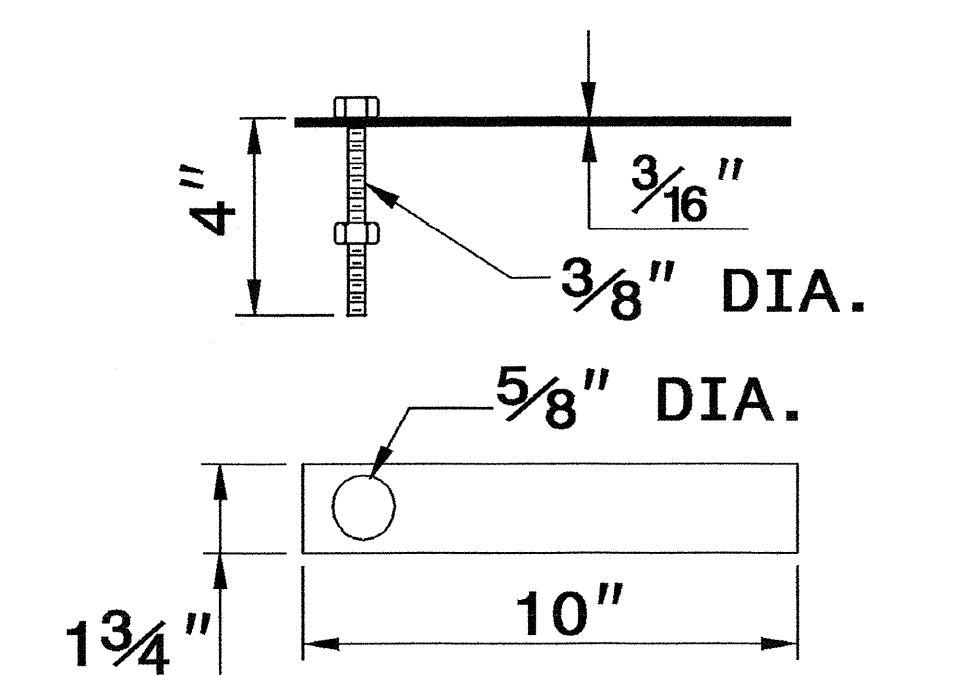
**CONCRETE
CONSTRUCTION**



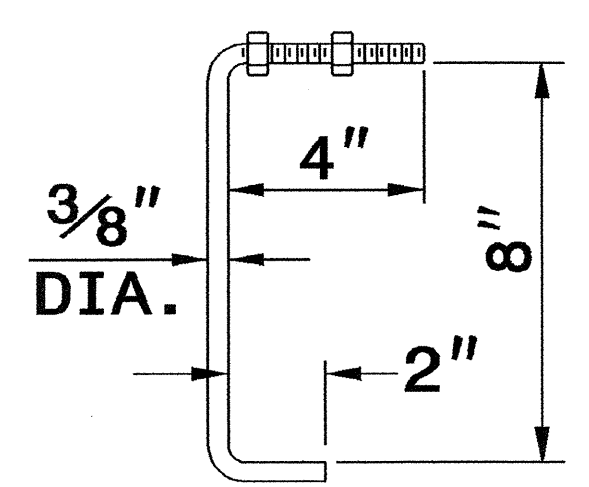
**PRECAST CONCRETE
CONSTRUCTION**

**DETAIL SHOWING ANCHORAGE OF
FRAME FOR GRATED DROP INLET**

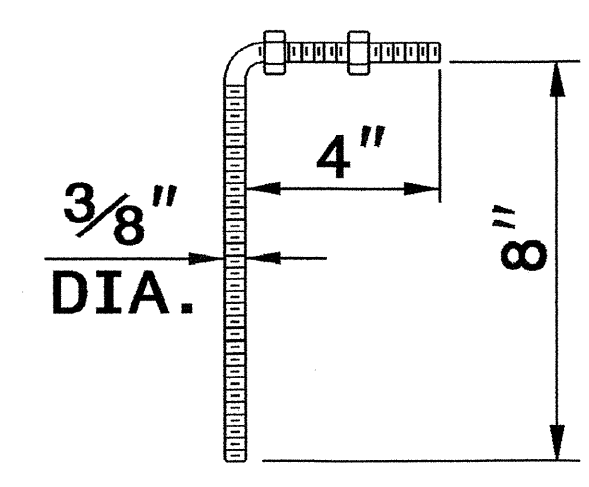
NOTE:
CONSTRUCT GRATED DROP INLET TO COINCIDE WITH NORMAL
OR SUPERELEVATED SHOULDER OR PAVEMENT SLOPE.



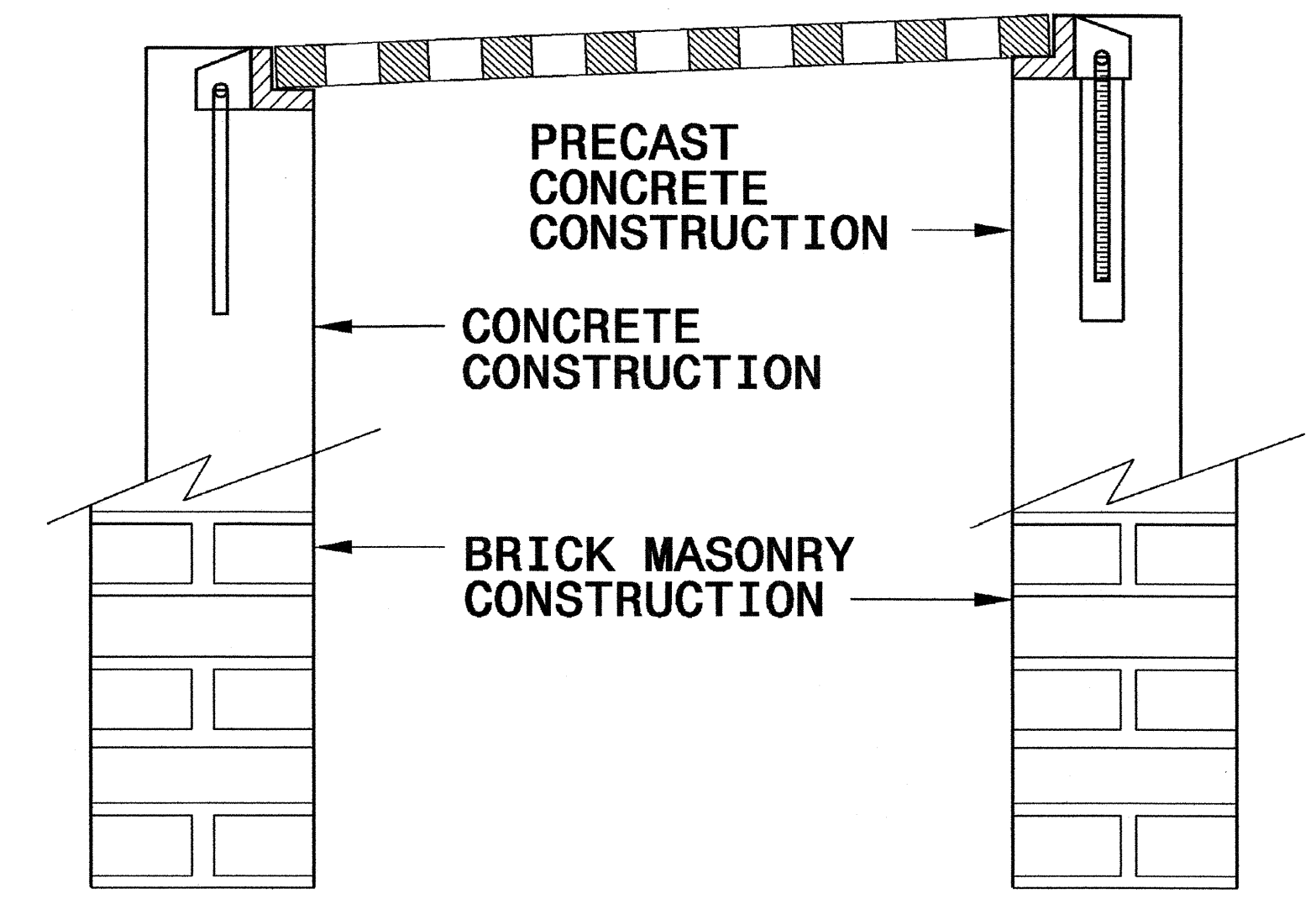
MASONRY ANCHOR
3/8" DIA. BOLT WITH PLATE



CONCRETE ANCHOR
3/8" DIA. BENT BAR



**PRECAST
CONCRETE ANCHOR**
3/8" DIA. BENT BAR



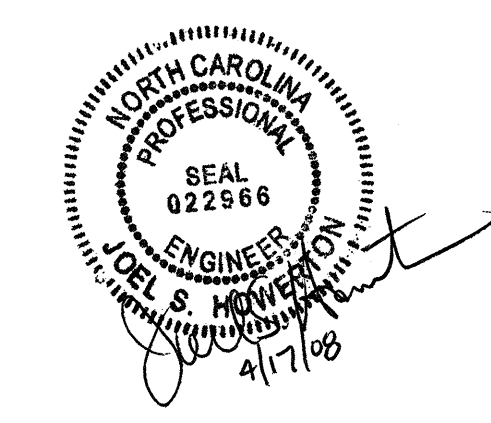
**FRAME AND GRATE INSTALLATION
FOR NORMAL CROWN AND
SUPERELEVATED SECTIONS**

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

ENGLISH DETAIL DRAWING FOR
ANCHORAGE FOR FRAMES
BRICK/CONCRETE/PRECAST CONCRETE

SHEET 1 OF 1
840D25

7/27/99
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S:\Projects\Special Details\review\stds\06\stds to Special Details\84025 Anchorage for Frames\0840d25.dgn
erickson



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

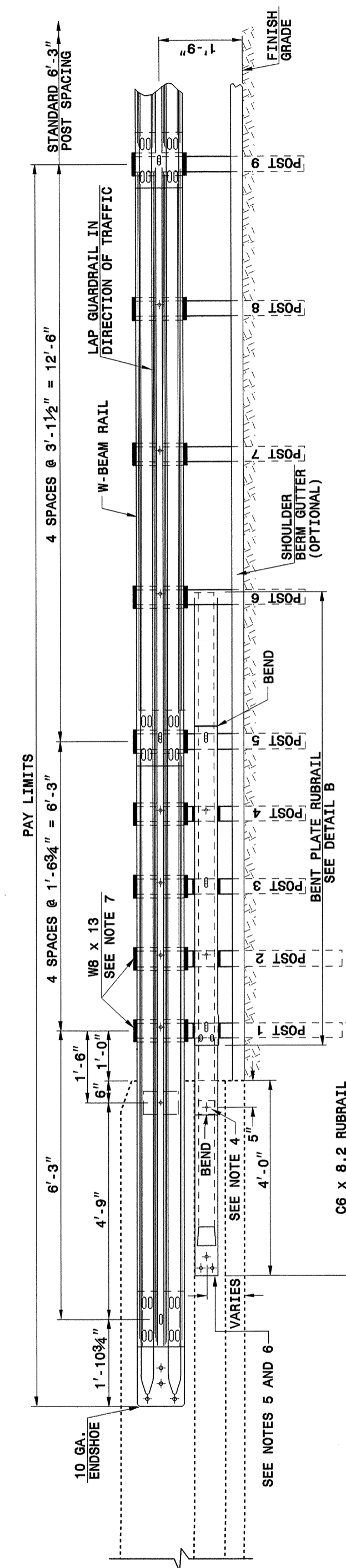
SEE PLATE FOR TITLE

ORIGINAL BY: 2006 STD 840.25 DATE: 07/18/06
MODIFIED BY: E.E. WARD DATE: 9/25/06
CHECKED BY: DATE:
FILE SPEC.:

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

ENGLISH DETAIL DRAWING FOR GUARDRAIL ANCHOR UNIT TYPE B-77 SHOP CURVED

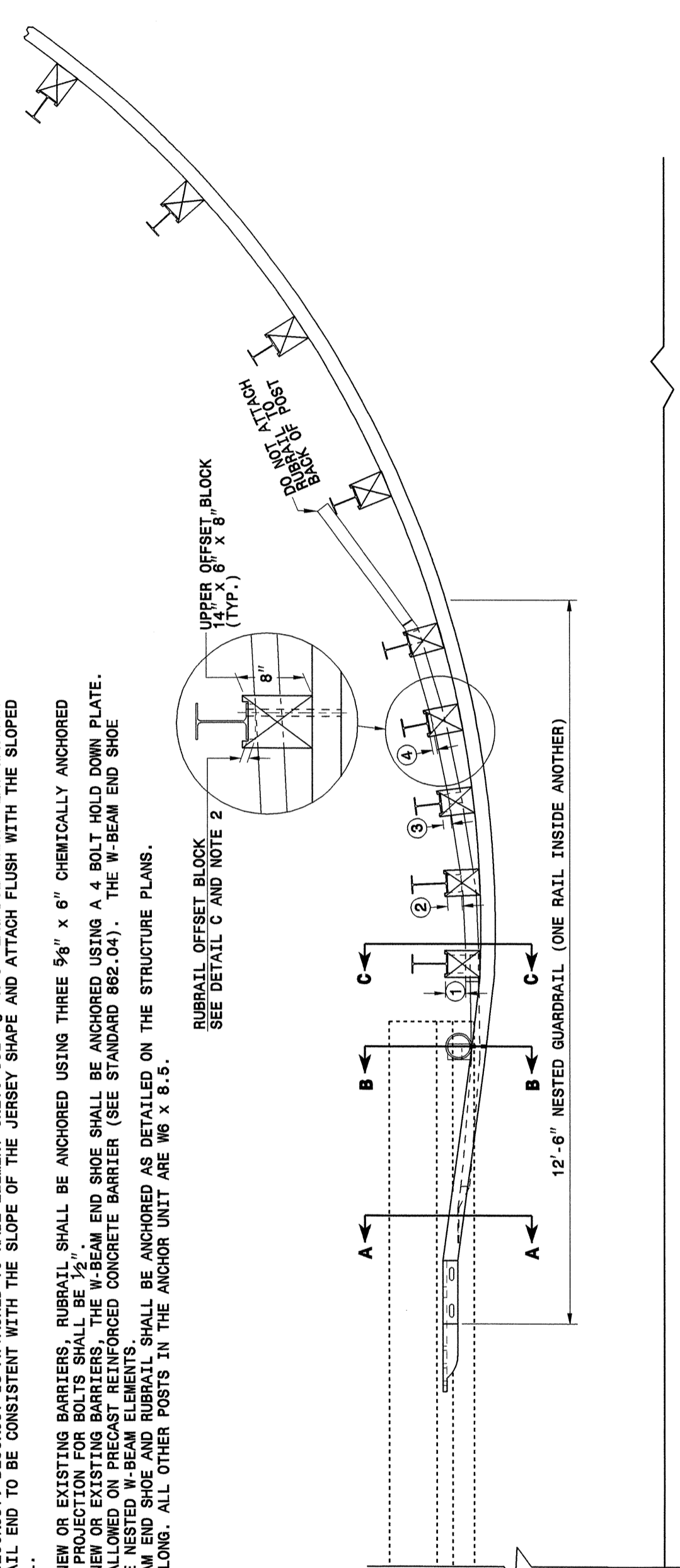
SHEET 1 OF 2 B-77SC



ELEVATION

- GENERAL NOTES:
- POSTS 1 THROUGH 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKOUTS AND/OR RUBRAIL. BLOCKOUTS LOCATED ON POSTS 1 THROUGH 4 ARE OFFSET FROM THE FINISH GRADE TO POSTS 1 AND 3. RUBRAIL IS SECURED TO POST 5 WITH A 3/4" X 4 1/2" BUTTONEAD BOLT. RUBRAIL IS FLARED TO BACK OF POST 8 AND NOT SECURED.
 - STEEL SPACER TUBE IS A SCHEDULE 40 GALVANIZED PIPE 6" INSIDE DIAMETER X 9" LONG. ATTACH TUBE TO GUARDRAIL ONLY WITH 3/8" X 1 1/4" LONG BUTTONEAD BOLT AND RECTANGULAR PLATE WASHER.
 - DETAILS OF SLOPED RUBRAIL BLOCKOUT BLOCKOUTS ARE ATTACHED TO RAIL ELEMENT ONLY. USE 3/4" X 2" LAS BOLT WITH FLAT WASHER.
 - SHOP FABRICATE THE RUBRAIL END TO BE CONSISTENT WITH THE SLOPE OF THE JERSEY SHAPE AND ATTACH FLUSH WITH THE SLOPED TOE OF THE BARRIER OR BRIDGE RAIL.
 - ANCHORAGE: (a) AT EXISTING BRIDGE RAIL AND NEW OR EXISTING BARRIERS, RUBRAIL SHALL BE ANCHORED USING THREE 5/8" X 6" CHEMICALLY ANCHORED BARS WITH 12" DEVELOPMENT LENGTH. (b) AT EXISTING BRIDGE RAIL AND NEW OR EXISTING BARRIERS, THE W-BEAM END SHOE SHALL BE ANCHORED USING A 4 BOLT HOLD DOWN PLATE. A 4 BOLT INSERT ASSEMBLY IS ALLOWED ON PRECAST REINFORCED CONCRETE BARRIER (SEE STANDARD 862.04). THE W-BEAM END SHOE SHALL BE INSTALLED BEHIND THE NESTED W-BEAM ELEMENTS. (c) AT NEW BRIDGE RAIL, THE W-BEAM END SHOE AND RUBRAIL SHALL BE ANCHORED AS DETAILED ON THE STRUCTURE PLANS.
 - POSTS 1 AND 2 ARE W6 X 13, 7'-6" LONG. ALL OTHER POSTS IN THE ANCHOR UNIT ARE W6 X 8.5.

SEE ROADWAY PLANS FOR END TREATMENT



PLAN

GUARDRAIL ANCHOR UNIT TYPE B-77

SHEET 1 OF 2 B-77SC

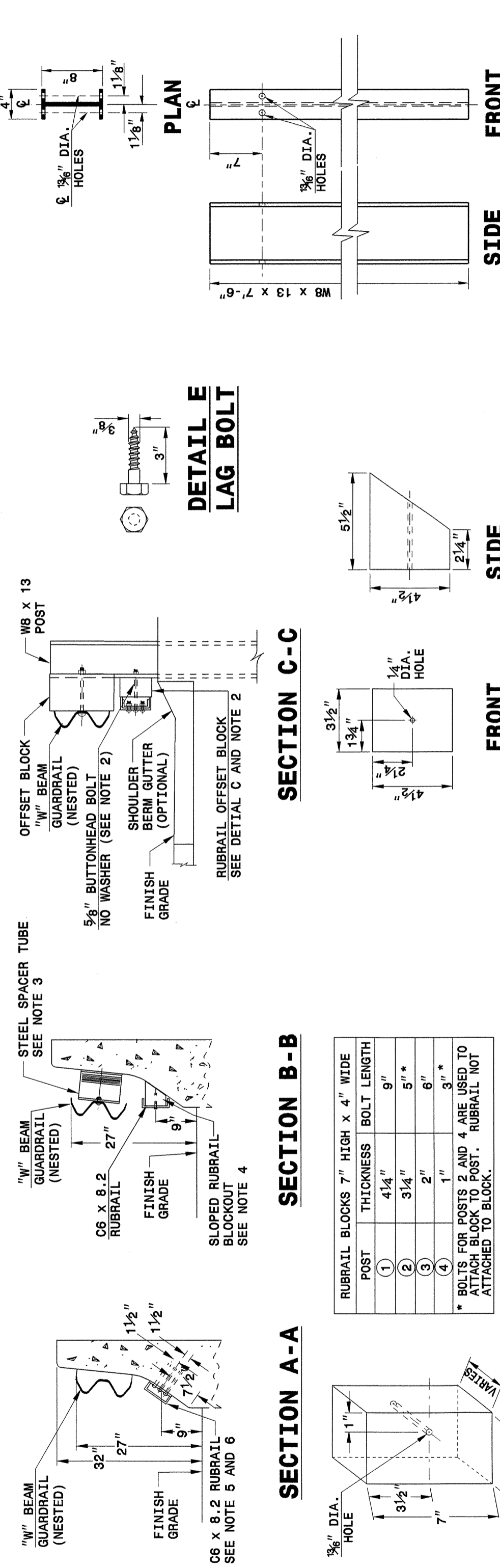
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR GUARDRAIL ANCHOR UNIT TYPE B-77 SHOP CURVED

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

ENGLISH DETAIL DRAWING FOR GUARDRAIL ANCHOR UNIT TYPE B-77 SHOP CURVED

SHEET 2 OF 2 B-77SC

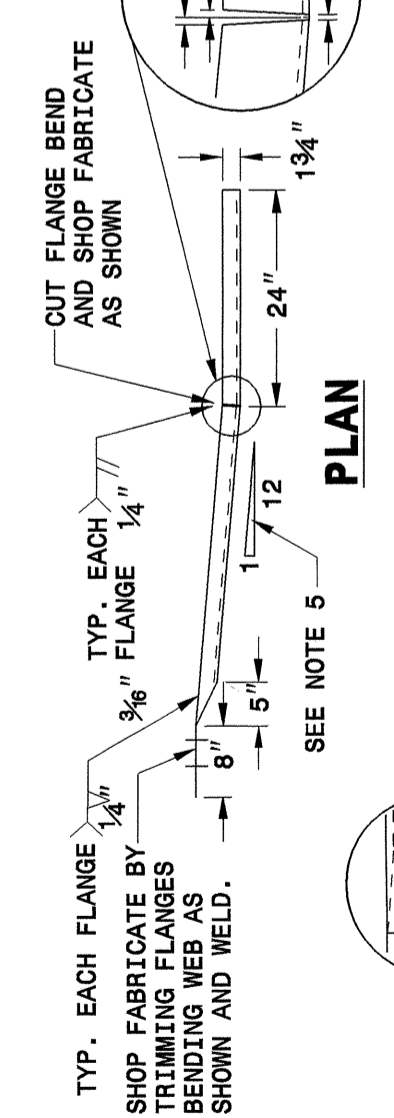


SECTION B-B

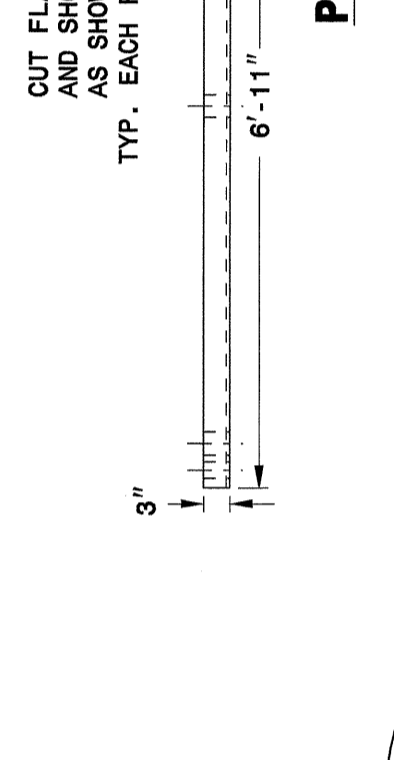
POST	RUBRAIL BLOCKS 7" HIGH X 4" WIDE	THICKNESS	BOLT LENGTH
1	4 1/4"	3/4"	9"
2	3 1/4"	3/4"	5"
3	2"	3/4"	6"
4	4"	3/4"	9"

* BOLTS FOR POSTS 2 AND 4 ARE USED TO ATTACH BLOCK TO POST. RUBRAIL NOT ATTACHED TO BLOCK.

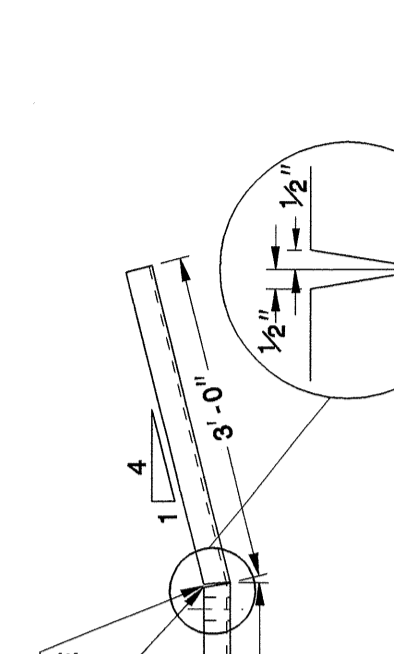
DETAIL C RUBRAIL BLOCKOUT



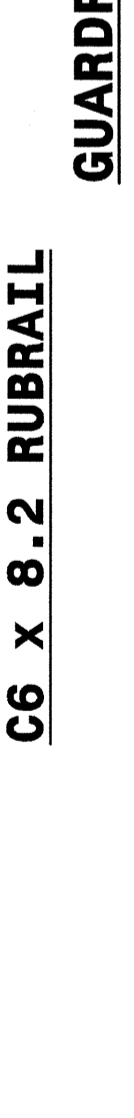
DETAIL D SLOPED RUBRAIL BLOCKOUT



DETAIL F STEEL POST W6 X 13 X 7'-6"



ELEVATION DETAIL A C6 X 8.2 RUBRAIL



ELEVATION DETAIL B BENT PLATE RUBRAIL



SHEET 2 OF 2 B-77SC

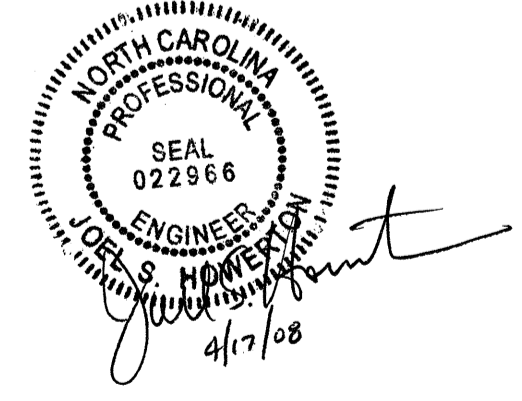
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR GUARDRAIL ANCHOR UNIT TYPE B-77 SHOP CURVED

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

SEE PLATE FOR TITLE

ORIGINAL BY: E.E. WARD DATE: 06-04-04
 MODIFIED BY: DATE:
 CHECKED BY: DATE:
 FILE SPEC.: miscguardrail/NCHRP350approved/B-77.dgn



SYSTEM: \$\$\$\$\$\$
 USER: \$\$\$\$\$\$
 USERNAME: \$\$\$\$\$\$

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

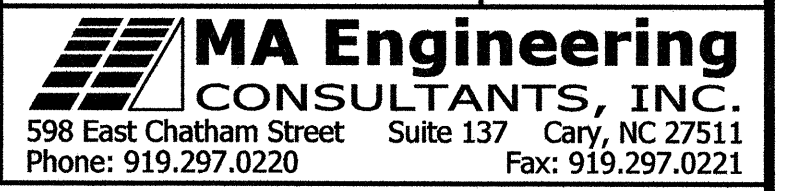
SUMMARY OF QUANTITIES

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS ROADWAY SUMMARY OF QUANTITIES FOR CONTRACT - C201832					STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS ROADWAY SUMMARY OF QUANTITIES FOR CONTRACT - C201832					STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS ROADWAY SUMMARY OF QUANTITIES FOR CONTRACT - C201832				
ItemNumber	Sec #	Quantity	Unit	Description	ItemNumber	Sec #	Quantity	Unit	Description	ItemNumber	Sec #	Quantity	Unit	Description
0000100000-N	800	Lump Sum		MOBILIZATION	2367000000-N	840	3	EA	FRAME WITH TWO GRATES, STD 840.29	4480000000-N	1165	2	EA	TMIA
0029000000-N	SP	Lump Sum		REINFORCED BRIDGE APPROACH FILL, STATION ***** (14+15.50)	2535000000-E	846	630	LF	***X*** CONCRETE CURB (8" X 18")	4810000000-E	1205	9,474	LF	PAINT PAVEMENT MARKING LINES (4")
0043000000-N	226	Lump Sum		GRADING	2556000000-E	846	137	LF	SHOULDER BERM GUTTER	4835000000-E	1205	90	LF	PAINT PAVEMENT MARKING LINES (24")
0050000000-E	226	1	ACR	SUPPLEMENTARY CLEARING & GRUBBING	2612000000-E	848	30	SY	6" CONCRETE DRIVEWAY	6000000000-E	1605	910	LF	TEMPORARY SILT FENCE
0057000000-E	226	100	CY	UNDERCUT EXCAVATION	3030000000-E	862	187.5	LF	STEEL BM GUARDRAIL	6006000000-E	1610	110	TON	STONE FOR EROSION CONTROL, CLASS A
0080000000-E	SP	500	TON	CLASS IV SUBGRADE STABILIZATION	3045000000-E	862	137.5	LF	STEEL BM GUARDRAIL, SHOP CURVED	6009000000-E	1610	300	TON	STONE FOR EROSION CONTROL, CLASS B
0134000000-E	240	40	CY	DRAINAGE DITCH EXCAVATION	3150000000-N	862	5	EA	ADDITIONAL GUARDRAIL POSTS	6012000000-E	1610	130	TON	SEDIMENT CONTROL STONE
0195000000-E	265	500	CY	SELECT GRANULAR MATERIAL	3180000000-N	862	2	EA	GUARDRAIL ANCHOR UNITS, TYPE ***** (B-77 SHOP CURVED)	6015000000-E	1615	1.5	ACR	TEMPORARY MULCHING
0196000000-E	270	500	SY	FABRIC FOR SOIL STABILIZATION	3210000000-N	862	1	EA	GUARDRAIL ANCHOR UNITS, TYPE CAT-1	6018000000-E	1620	50	LB	SEED FOR TEMPORARY SEEDING
0318000000-E	300	30	TON	FOUNDATION CONDITIONING MATERIAL, MINOR STRS	3270000000-N	SP	4	EA	GUARDRAIL ANCHOR UNITS, TYPE 350	6021000000-E	1620	0.25	TON	FERTILIZER FOR TEMPORARY SEEDING
0343000000-E	310	68	LF	15" SIDE DRAIN PIPE	3317000000-N	862	2	EA	GUARDRAIL ANCHOR UNITS, TYPE B-77	6029000000-E	SP	250	LF	SAFETY FENCE
0366000000-E	310	208	LF	15" RC PIPE CULVERTS, CLASS III	3628000000-E	876	30	TON	RIP RAP, CLASS I	6030000000-E	1630	860	CY	SILT EXCAVATION
1220000000-E	545	500	TON	INCIDENTAL STONÉ BASE	3649000000-E	876	3	TON	RIP RAP, CLASS B	6036000000-E	1631	510	SY	MATTING FOR EROSION CONTROL
1489000000-E	610	298	TON	ASPHALT CONC BASE COURSE, TYPE B25.0B	3656000000-E	876	235	SY	FILTER FABRIC FOR DRAINAGE	6038000000-E	SP	120	SY	PERMANENT SOIL REINFORCEMENT MAT
1525000000-E	610	181	TON	ASPHALT CONC SURFACE COURSE, TYPE SF9.5A	4025000000-E	901	69	SF	CONTRACTOR FURNISHED, TYPE *** SIGN (E)	6042000000-E	1632	100	LF	1/4" HARDWARE CLOTH
1560000000-E	620	25	TON	ASPHALT BINDER FOR PLANT MIX, GRADE PG 64-22	4072000000-E	903	128	LF	SUPPORTS, 3-LB STEEL U-CHANNEL	6071030000-E	SP	280	LF	COIR FIBER BAFFLES
2022000000-E	815	224	CY	SUBDRAIN EXCAVATION	4102000000-N	904	19	EA	SIGN ERECTION, TYPE E	6084000000-E	1660	1.5	ACR	SEEDING & MULCHING
2033000000-E	815	168	CY	SUBDRAIN FINE AGGREGATE	4155000000-N	907	7	EA	DISPOSAL OF SIGN SYSTEM, U-CHANNEL	6087000000-E	1660	1	ACR	MOWING
2044000000-E	815	1,000	LF	6" PERFORATED SUBDRAIN PIPE	4400000000-E	1110	96	SF	WORK ZONE SIGNS (STATIONARY)	6090000000-E	1661	50	LB	SEED FOR REPAIR SEEDING
2055000000-E	815	30	EA	6" SUBDRAIN PIPE WYES, TEES, & ELBOWS	4405000000-E	1110	208	SF	WORK ZONE SIGNS (PORTABLE)	6093000000-E	1661	0.25	TON	FERTILIZER FOR REPAIR SEEDING
2066000000-N	815	2	EA	CONCRETE PAD FOR SUBDRAIN PIPE OUTLET	4410000000-E	1110	36	SF	WORK ZONE SIGNS (BARRICADE MOUNTED)	6096000000-E	1662	50	LB	SEED FOR SUPPLEMENTAL SEEDING
2077000000-E	815	12	LF	6" OUTLET PIPE (SUBDRAINS)	4430000000-N	1130	40	EA	DRUMS	6108000000-E	1665	1	TON	FERTILIZER TOPDRESSING
2286000000-N	840	5	EA	MASONRY DRAINAGE STRUCTURES	4445000000-E	1145	48	LF	BARRICADES (TYPE III)	6114000000-N	SP	2	HR	SPECIALIZED HAND MOWING
2366000000-N	840	2	EA	FRAME WITH TWO GRATES, STD 840.24	4455000000-N	1150	16	MD	FLAGGER	6117000000-N	SP	27	EA	RESPONSE FOR EROSION CONTROL

5/28/99

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STATE OF NORTH CAROLINA
 DIVISION OF HIGHWAYS



SUMMARY OF EARTHWORK
 IN CUBIC YARDS

LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT	EMBT+ %	BORROW	WASTE
-L- 11+00 TO 13+75	297		1,218	1,218	297
-L- 14+65 TO 18+00	505		467		38
-Y- 10+28 TO 11+60	12		22	10	
TOTAL	814		1,707	1,228	335
EST. LOSS DUE TO CLEARING AND GRUBBING	-10			10	
WASTE TO REPLACE BORROW				-38	
PROJECT TOTAL	804		1,707	1,200	297
ESTIMATE 5% TO REPLACE TOPSOIL ON BORROW PIT				60	
GRAND TOTAL (CUBIC YARDS)	804		1,707	1,260	297
SAY (CUBIC YARDS)	900			1,300	

SELECT GRANULAR MATERIAL (CL II or III) = 500 CY (CONTINGENCY ITEMS PER 'GEO TECHNICAL REPORT - DESIGN AND CONSTRUCTION ESTIMATED GRADE POINTS UNDERCUT = 100 CY RECOMMENDATIONS' LETTER DATED FEBRUARY 22, 2005)

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

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

SUMMARY OF PAVEMENT REMOVAL
 IN SQUARE YARDS

LOCATION	ASPHALT REMOVAL	ASPHALT BREAK-UP	CONCRETE REMOVAL	CONCRETE BREAK-UP
-L- STA. 11+02 TO -L- STA. 13+56	334			
-L- STA. 14+75 TO -L- STA. 17+50	283			
GRAND TOTAL	617			
SAY	620			

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

STATION	SIZE	THICKNESS OR GAUGE	LOCATION (L,R,T, OR CL)	STRUCTURE NO.	TOP ELEVATION	INVERT ELEVATION	SLOPE CRITICAL	CLASS III R.C. PIPE (UNLESS NOTED OTHERWISE)								BITUMINOUS COATED C.S. PIPE TYPE B (UNLESS NOTED OTHERWISE)								CLASS III R.C. PIPE OR ALUMINIZED C.S. PIPE, TYPE IR OR HDPE PIPE, TYPE S OR D								ENDWALLS	QUANTITIES FOR DRAINAGE STRUCTURES		CORR. STEEL ELBOWS NO. & SIZE	CONC. COLLARS CL. "B" C.Y. STD. 840.72	CONC. & BRCK PIPE PLUG, C.Y. STD. 840.71	PIPE REMOVAL LIN.FT.	REMARKS	
								12"	15"	18"	24"	30"	36"	42"	48"	12"	15"	18"	24"	30"	36"	42"	48"	12"	15"	18"	24"	30"	36"	42"	48"		R.C.P.	C.S.P.						A
NA				1																																				
-L- 12+72	LT																																							
-L- 15+05	LT				2170.4																																			
-L- 15+30	LT					2167.7	2165.2	40																																
-L- 15+52	LT				2170.1																																			
-L- 15+56	LT			4	OUT	2165.2	2164.7	16																																
-L- 15+77	RT				2171.3																																			
-L- 15+66	CL			4		2168.6	2165.2	40																																
-L- 16+33	LT				2170.2																																			
-L- 15+95	LT			4		2166.0	2165.2	76																																
-L- 16+50	RT				2169.0																																			
-L- 16+41	CL			6		2166.3	2166.0	36																																
TOTALS								208																																

GUARDRAIL SUMMARY

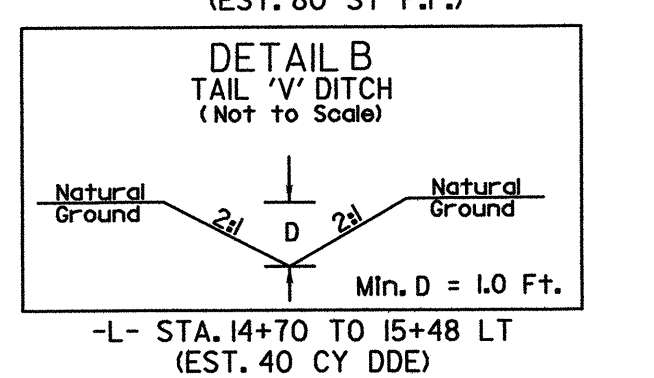
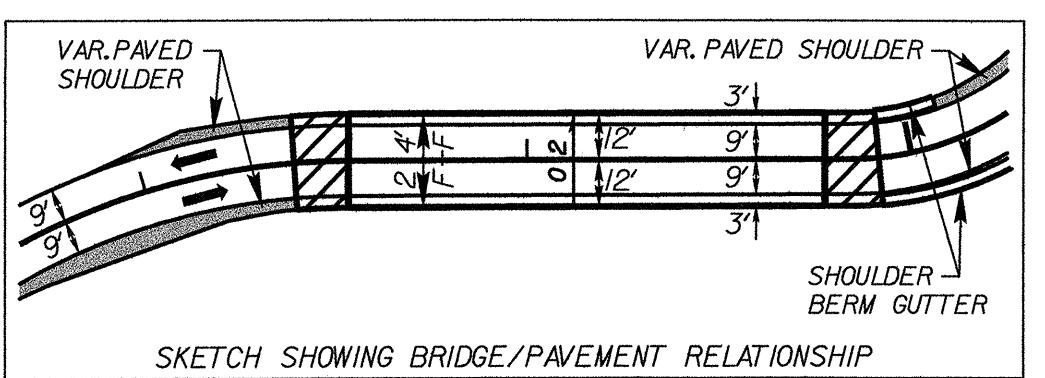
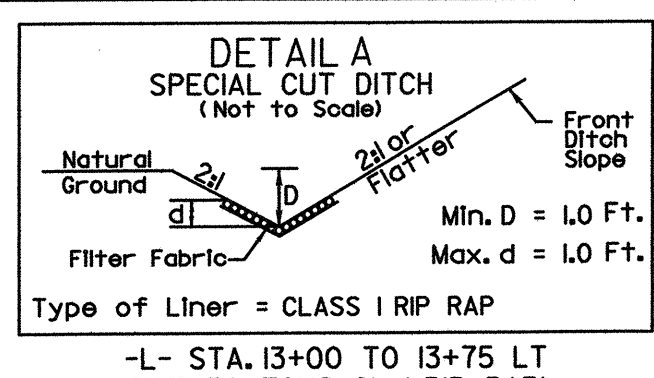
SURVEY LINE	BEG. STA.	END STA.	LOCATION	LENGTH			WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOUL. WIDTH	FLARE LENGTH		W		ANCHORS				IMPACT ATTENUATOR TYPE 350			SINGLE FACED GUARDRAIL	REMOVE EXISTING GUARDRAIL	REMOVE AND STOCKPILE EXISTING GUARDRAIL	REMARKS		
				STRAIGHT	SHOP CURVED	DOUBLE FACED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	CAT-1	B-77	GRAU 350	EA	G	NG							
-L-	12+66.00	13+53.50	RT	81.25			13+53.50		7.00'	62.50'		1.00															
-L-	12+78.00	13+53.50	LT	81.25					7.00'	50.00'		6.40 (TANG.)															
-L-	14+77.50	16+10.00	RT	62.50	81.25				7.00'	125.00'		2.00													* TYPE B-77 SHOP CURVED (SEE DETAIL SHEET 2-B)		
-L-	14+77.50	15+76.00	LT	18.75	93.75		14+77.50		7.00'	50.00'		1.00													* TYPE B-77 SHOP CURVED (SEE DETAIL SHEET 2-B)		
-Y-	13+00.00	14+87.00	RT	187.50			-Y- 13+45		7.00'	50.00'		1.00															
	SUBTOTALS			431.25	175.00																						
	LESS ANCHORS			GRAU-350 4 x 50.00' =					200.00				TOOTAL ANCHORS (EA)				1	4*	4							* 2 B-77'S SHOP CURVED	
				CAT-1 1 x 6.25' =					6.25																		
				B-77 4 x 18.75' =					37.50	37.50																	
	TOTAL GUARDRAIL (LF)			187.50	137.50																						
				ADDITIONAL GUARDRAIL POSTS					5 EACH																		

04/07/2008 09:04:59 AM P:\04\B4161\rdy.sum_3A.dgn

PROJECT REFERENCE NO. B-4161	SHEET NO. 4
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	PROFESSIONAL SEAL 21656
MA Engineering CONSULTANTS, INC. 598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221	

NOTE: DRIVEWAY RADII ARE 10' UNLESS SHOWN OTHERWISE.

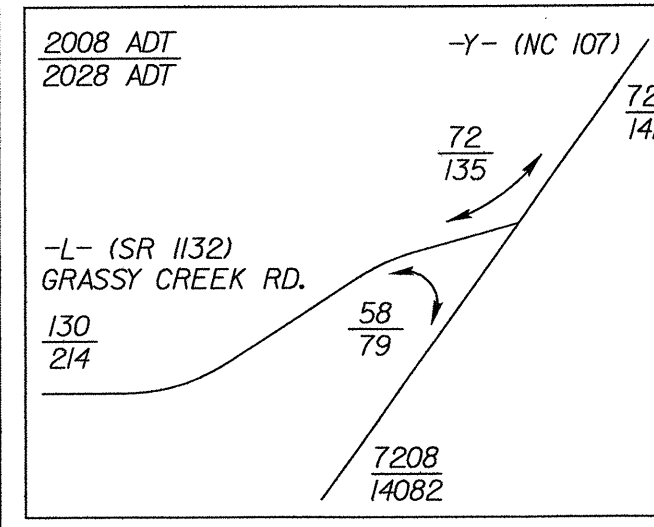
DESIGN EXCEPTION REQUIRED FOR 60 MPH DESIGN SPEED (V=15 MPH)



LOCATIONS OF PROPOSED SCUPPERS

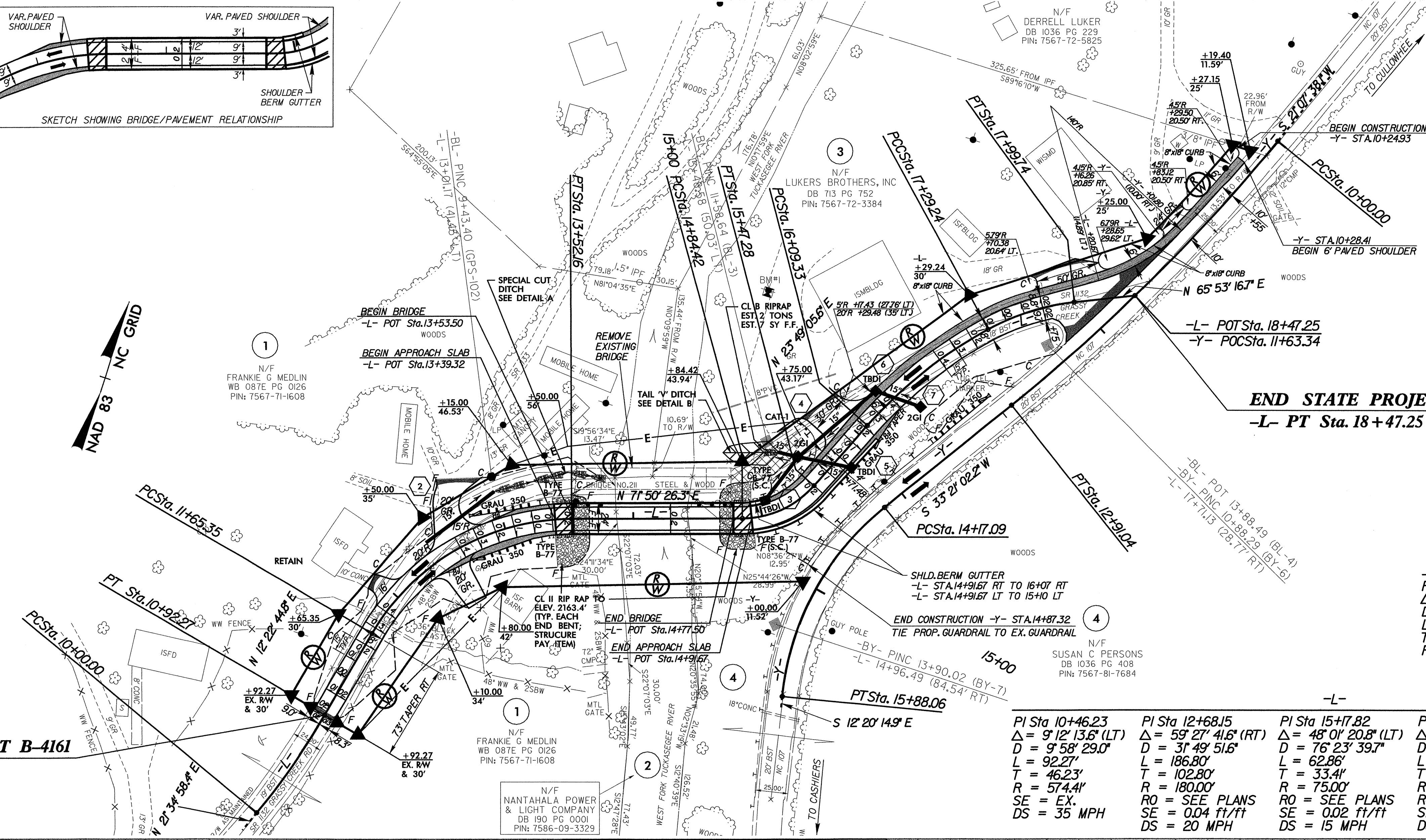
-L- STA. 13+55 (LT)	-L- STA. 14+51 (LT)
-L- STA. 13+65 (LT)	-L- STA. 14+61 (LT)
-L- STA. 13+75 (LT)	-L- STA. 14+71 (LT)
-L- STA. 14+77 (LT)	

LEGEND: ● - PROPOSED SCUPPER



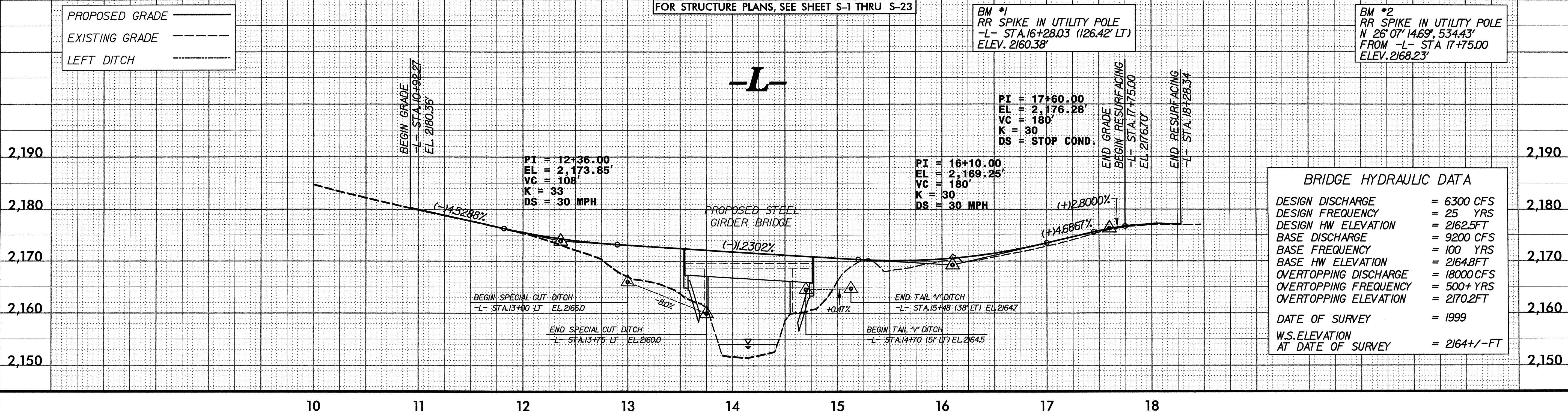
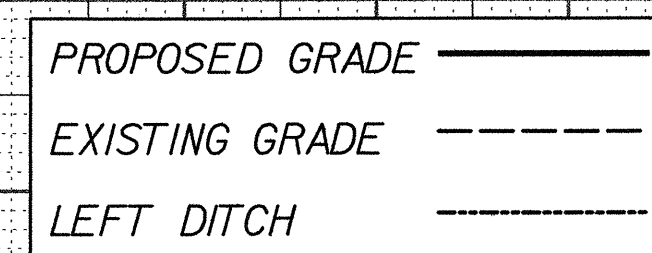
BEGIN STATE PROJECT B-4161
-L- PT Sta. 10+92.27

END STATE PROJECT B-4161
-L- PT Sta. 18+47.25



PI Sta 10+46.23 Δ = 9° 12' 13.6" (LT) D = 9' 58' 29.0" L = 92.27' T = 46.23' R = 574.41' SE = EX. DS = 35 MPH	PI Sta 12+68.15 Δ = 59° 27' 41.6" (RT) D = 31' 49' 51.6" L = 186.80' T = 102.80' R = 180.00' RO = SEE PLANS SE = 0.04 ft/ft DS = 20 MPH	PI Sta 15+17.82 Δ = 48° 01' 20.8" (LT) D = 76' 23' 39.7" L = 62.86' T = 33.41' R = 75.00' RO = SEE PLANS SE = 0.04 ft/ft DS = 15 MPH	PI Sta 16+69.88 Δ = 19° 37' 45.1" (RT) D = 16' 22' 12.8" L = 119.91' T = 60.55' R = 350.00' RO = SEE PLANS SE = 0.04 ft/ft DS = 30 MPH	PI Sta 17+64.95 Δ = 22° 26' 26.0" (RT) D = 31' 49' 52.3" L = 70.50' T = 35.71' R = 180.00' RO = SEE PLANS SE = EX.
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PI Sta 11+46.07 Δ = 12° 13' 24.1" (RT) D = 4' 11' 59.8" L = 291.04' T = 146.07' R = 1,364.20'	PI Sta 15+07.41 Δ = 45° 41' 17.1" (LT) D = 26' 43' 21.5" L = 170.97' T = 90.32' R = 214.41'
--------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------



REVISIONS

8/17/99

04/06/2008 P:\proj\B4161_r\dj_psh04.dgn