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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5348	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
46062.1.1	BRSTP-1005(31)	P.E.	
46062.2.1		RW & UTILITIES	
46062.3.1		CONSTR.	

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

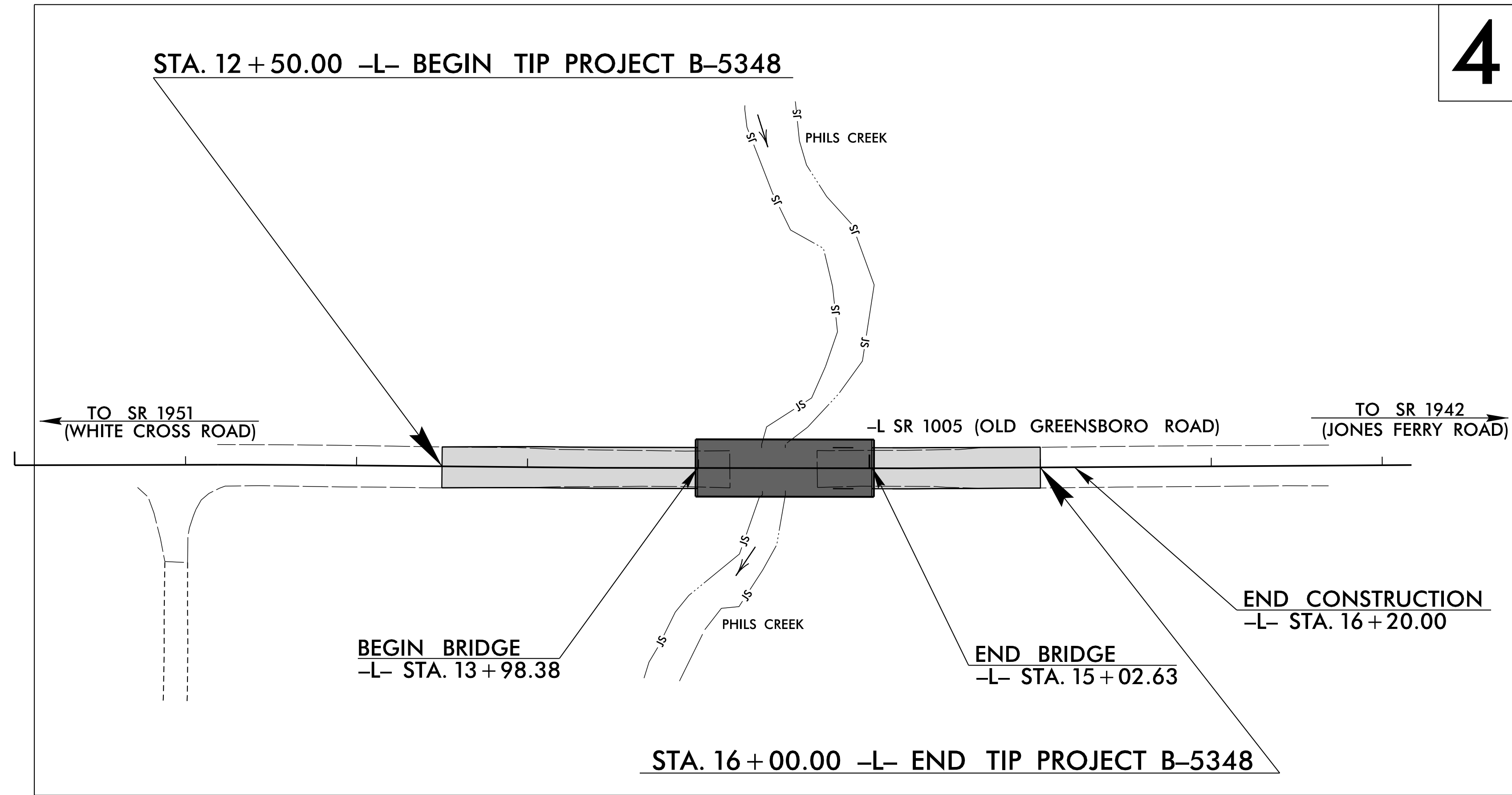
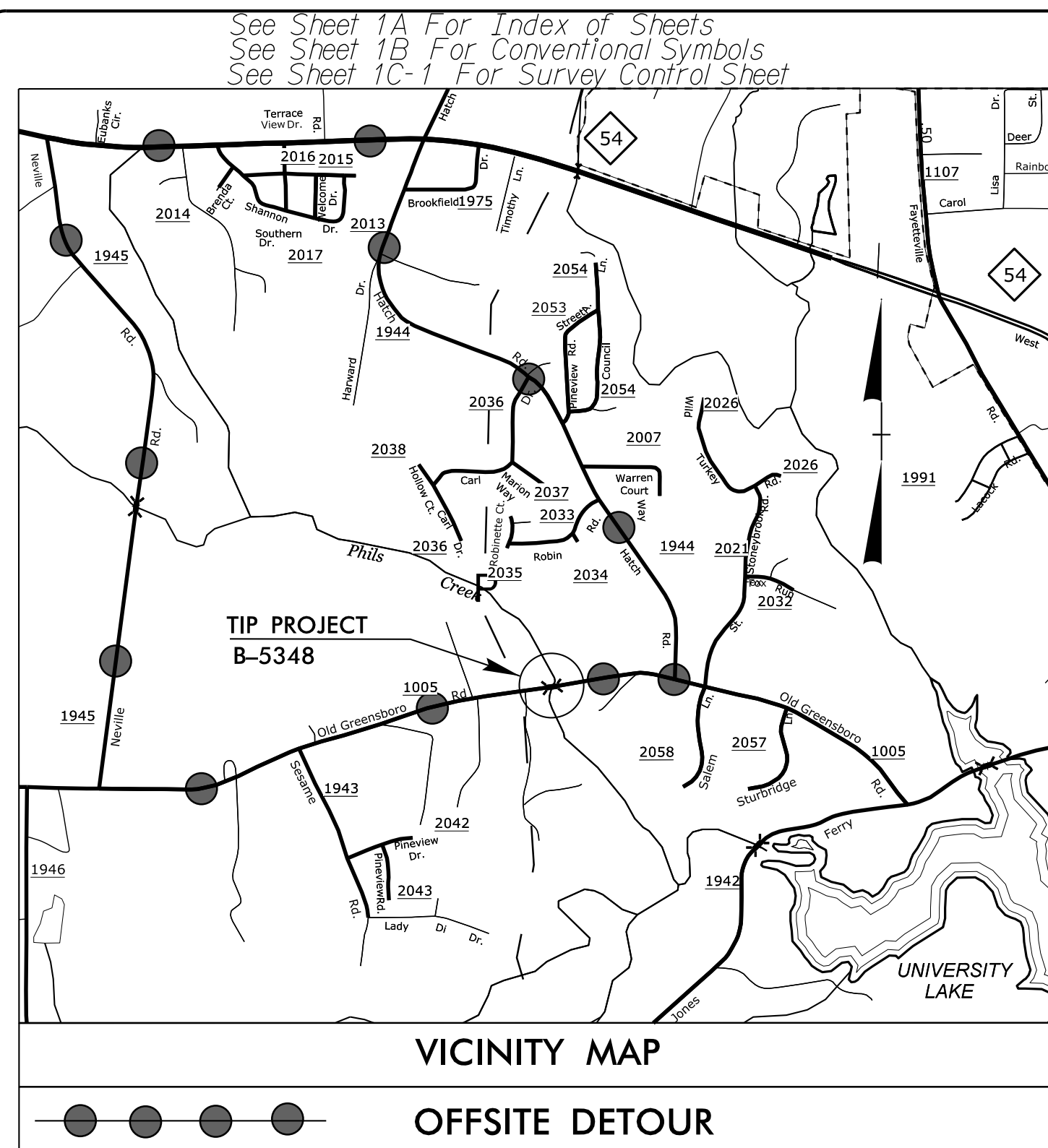
ORANGE COUNTY

**LOCATION: BRIDGE NO. 85 OVER PHIL'S CREEK ON
SR 1005 (OLD GREENSBORO ROAD)**

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

TIP PROJECT: B-5348

CONTRACT: C203946

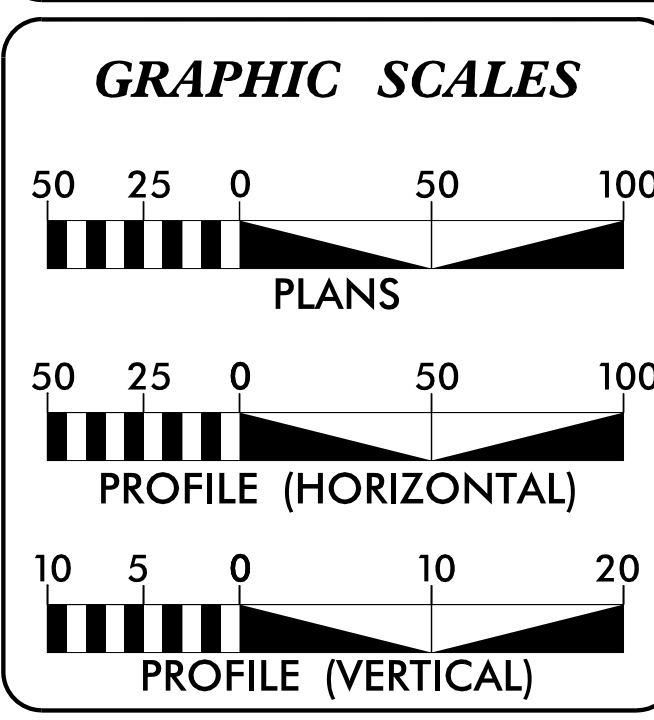


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*DESIGN EXCEPTION REQUIRED FOR SAG VERTICAL CURVES AND ASSOCIATED NIGHTTIME STOPPING SIGHT DISTANCE.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



DESIGN DATA

ADT 2017 = 4,575
ADT 2037 = 5,940
K = 9 %
D = 65 %
T = 3 % *
V = 50 MPH
* TTST = 1% DUAL = 2%
FUNC CLASS = COLLECTOR
"SUB-REGIONAL TIER"

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-5348 = 0.046 MI.
LENGTH STRUCTURE TIP PROJECT B-5348 = 0.020 MI.
TOTAL LENGTH OF TIP PROJECT B-5348 = 0.066 MI.

Plans Prepared for NCDOT by:
AMEC Foster Wheeler Environment & Infrastructure, Inc.
4021 Stirrup Creek Drive, Suite 100
Durham, North Carolina 27703
NC Engineering F-1253 NC Geology C-247
(919) 381-9900

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
AUGUST 19, 2016

LETTING DATE:
JULY 18, 2017

BILL HOOD, PE
PROJECT ENGINEER

CHRISTOPHER H. LEE
PROJECT DESIGN ENGINEER

GARY LOVERING, PE
PROJECT ENGINEER
NCDOT ROADWAY DESIGN

HYDRAULICS ENGINEER

DocuSigned by:
Wm. H. Elam, Jr.
SIGNATURE

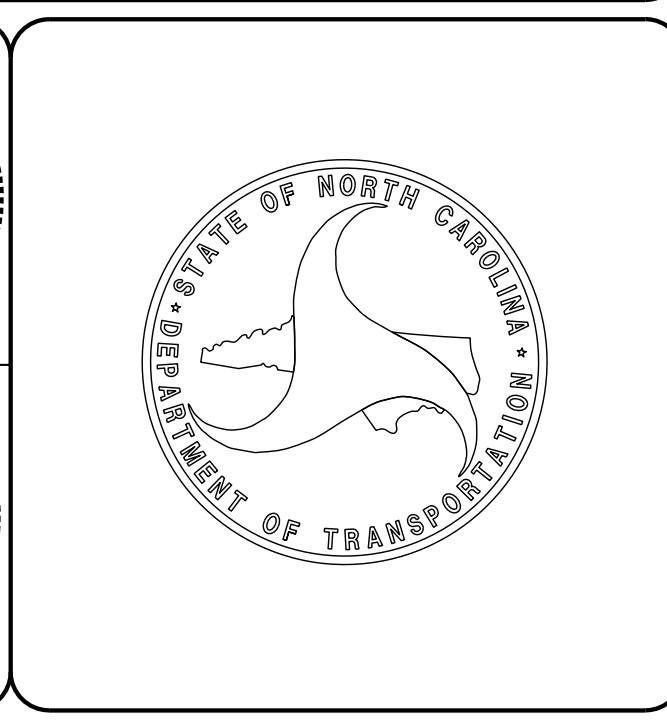
DocuSigned by:
W. S. Hood
SIGNATURE

ROADWAY DESIGN ENGINEER

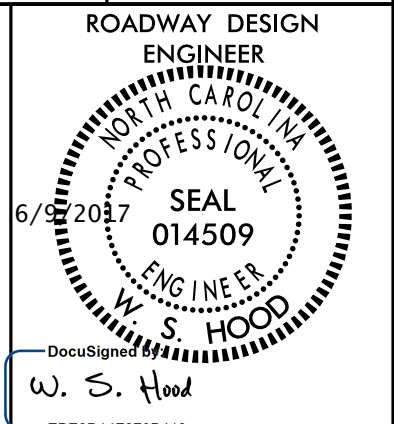
6/9/2017

SEAL 019721
ENGINEER
W. H. ELAM, JR.
P.E.

SEAL 014509
ENGINEER
W. S. HOOD
P.E.



B-17/99



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UNLESS ALL SIGNATURES COMPLETED**

CONTRACT: C203946
TIP PROJECT: B-5348
COUNTY: ORANGE

INDEX OF SHEETS

SHEET NUMBER	SHEET TITLE
1	TITLE SHEET
1A	INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARDS
1B	CONVENTIONAL SYMBOLS (12/2/16)
1C-1	SURVEY CONTROL SHEETS
2A-1	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2C-1 THRU 2C-6	GUARDRAIL PLACEMENT
2C-7 THRU 2C-10	GUARDRAIL INSTALLATION
2C-11 THRU 2C-14	STRUCTURE ANCHOR UNITS
3B-1	ROADWAY SUMMARIES (earthwork, guardrail, etc)
3D-1	DRAINAGE SUMMARIES
3G-1	GEOTECHNICAL SUMMARIES
4	PLAN SHEETS
5	PROFILE SHEETS
TMP-1 THRU TMP-4	TRANSPORTATION MANAGEMENT PLANS
PMP-1	PAVEMENT MARKING PLANS
EC-1 THRU EC-5	EROSION CONTROL PLANS
RF-1	REFORSTATION PLANS
SIGN-1 THRU SIGN-2	SIGNING PLANS
SIG-1 THRU SIG-3.1	SIGNAL PLANS
UO-1 THRU UO-2	UTILITY BY OTHERS PLANS
X-1A	CROSS SECTION SUMMARY
X-1 THRU X-4	CROSS SECTIONS
S-1 THRU S-18	STRUCTURE PLANS

2012 ROADWAY ENGLISH STANDARD DRAWINGS
EFF. 01-17-2012
REV. 02-29-2016

The following Roadway Standards as appear in "Roadway Standard Drawings" Highway Design Branch - N. C. Department of Transportation - Raleigh, N. C., Dated January, 2012 are applicable to this project and by reference hereby are considered a part of these plans:

STD. NO.	TITLE
DIVISION 2 - EARTHWORK	
200.02	Method of Clearing - Method II
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Super-elevation - Two Lane Pavement
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation
DIVISION 4 - MAJOR STRUCTURES	
422.11	Bridge Approach Fills - Sub Regional Tier
DIVISION 5 - SUBGRADE, BASES AND SHOULDERS	
560.01	Method of Shoulder Construction - High Side of Super-elevated Curve - Method I
DIVISION 8 - INCIDENTALS	
840.00	Concrete Base Pad for Drainage Structures
840.25	Anchorage for Frames - Brick or Concrete or Precast
840.29	Frames and Narrow Slot Flat Grates
840.34	Traffic Bearing Junction Box - for Use with Pipes 42" and Under
840.35	Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
840.46	Traffic Bearing Precast Drainage Structure
840.54	Manhole Frame and Cover
840.66	Drainage Structure Steps
846.01	Concrete Curb, Gutter and Curb & Gutter
846.04	Drop Inlet Installation in Shoulder Berm Gutter
876.02	Guide for Rip Rap at Pipe Outlets
876.04	Drainage Ditches with Class "B" Rip Rap

GENERAL NOTES: 2012 SPECIFICATIONS
EFFECTIVE: 01-17-2012
REVISED: 01-24-2017

GRADE LINE: 2012 SPECIFICATIONS
GRADING AND SURFACING: EFFECTIVE: 01-17-2012
REVISED: 01-24-2017

THE GRADE LINES SHOWN DENOTE THE FINISHED ELEVATION OF THE PROPOSED SURFACING AT GRADE POINTS SHOWN ON THE TYPICAL SECTIONS. GRADE LINES MAY BE ADJUSTED AT THEIR BEGINNING AND ENDING AND AT STRUCTURES AS DIRECTED BY THE ENGINEER IN ORDER TO SECURE A PROPER TIE-IN.

CLEARING: 2012 SPECIFICATIONS
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

SUPERELEVATION: 2012 SPECIFICATIONS
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: 2012 SPECIFICATIONS
ASPHALT, EARTH, AND CONCRETE SHOULDER CONSTRUCTION ON THE HIGH SIDE OF SUPERELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.01

GUARDRAIL: 2012 SPECIFICATIONS
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: 2012 SPECIFICATIONS
SHORING REQUIRED FOR THE MAINTENANCE OF TRAFFIC WILL BE PAID FOR AS "EXTRA WORK" IN ACCORDANCE WITH SECTION 104-7.

END BENTS: 2012 SPECIFICATIONS
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: 2012 SPECIFICATIONS
UTILITY OWNERS ON THIS PROJECT ARE Duke Energy
AT&T
Level 3 Communications
Time Warner
ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

RIGHT-OF-WAY MARKERS: 2012 SPECIFICATIONS
ALL RIGHT-OF-WAY MARKERS ON THIS PROJECT SHALL BE PLACED BY OTHERS.

07-JUN-2017 09:05
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\$\$\$\$\$USERNAME\$\$\$\$\$

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

12/2/2016

BOUNDARIES AND PROPERTY:

State Line	-----
County Line	-----
Township Line	-----
City Line	-----
Reservation Line	-----
Property Line	-----
Existing Iron Pin	○ EIP
Computed Property Corner	-----
Property Monument	□ ECM
Parcel/Sequence Number	①23
Existing Fence Line	-x-x-x-
Proposed Woven Wire Fence	○
Proposed Chain Link Fence	□
Proposed Barbed Wire Fence	◇
Existing Wetland Boundary	--- WLB ---
Proposed Wetland Boundary	WLB
Existing Endangered Animal Boundary	--- EAB ---
Existing Endangered Plant Boundary	--- EPB ---
Existing Historic Property Boundary	--- HPB ---
Known Contamination Area: Soil	--- S ---
Potential Contamination Area: Soil	--- S ---
Known Contamination Area: Water	--- W ---
Potential Contamination Area: Water	--- W ---
Contaminated Site: Known or Potential	☠ ?

BUILDINGS AND OTHER CULTURE:

Gas Pump Vent or U/G Tank Cap	○
Sign	○ S
Well	○ W
Small Mine	✕
Foundation	□
Area Outline	□
Cemetery	□
Building	□
School	□
Church	□
Dam	▬

HYDROLOGY:

Stream or Body of Water	-----
Hydro, Pool or Reservoir	□
Jurisdictional Stream	--- JS ---
Buffer Zone 1	--- BZ 1 ---
Buffer Zone 2	--- BZ 2 ---
Flow Arrow	←
Disappearing Stream	→
Spring	○
Wetland	▽
Proposed Lateral, Tail, Head Ditch	▬
False Sump	▽

RAILROADS:

Standard Gauge	-----
RR Signal Milepost	○
Switch	□
RR Abandoned	-----
RR Dismantled	-----

RIGHT OF WAY & PROJECT CONTROL:

Secondary Horiz and Vert Control Point	◆
Primary Horiz Control Point	○
Primary Horiz and Vert Control Point	◆
Exist Permanent Easement Pin and Cap	◇
New Permanent Easement Pin and Cap	◆
Vertical Benchmark	▲
Existing Right of Way Marker	△
Existing Right of Way Line	-----
New Right of Way Line	○ R W
New Right of Way Line with Pin and Cap	○ R W ▲
New Right of Way Line with Concrete or Granite R/W Marker	▲ R W
New Control of Access Line with Concrete C/A Marker	○ C/A
Existing Control of Access	○ C/A
New Control of Access	○ C/A
Existing Easement Line	--- E ---
New Temporary Construction Easement	--- E ---
New Temporary Drainage Easement	--- TDE ---
New Permanent Drainage Easement	--- PDE ---
New Permanent Drainage / Utility Easement	--- DUE ---
New Permanent Utility Easement	--- PUE ---
New Temporary Utility Easement	--- TUE ---
New Aerial Utility Easement	--- AUE ---

ROADS AND RELATED FEATURES:

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

VEGETATION:

Single Tree	○
Single Shrub	○

Note: Not to Scale

*S.U.E. = Subsurface Utility Engineering

Hedge	-----
Woods Line	-----
Orchard	○
Vineyard	□

EXISTING STRUCTURES:

MAJOR:	
Bridge, Tunnel or Box Culvert	CONC
Bridge Wing Wall, Head Wall and End Wall	CONC WW
MINOR:	
Head and End Wall	CONC HW
Pipe Culvert	-----
Footbridge	-----
Drainage Box: Catch Basin, DI or JB	□ CB
Paved Ditch Gutter	-----
Storm Sewer Manhole	○ S
Storm Sewer	--- S ---

UTILITIES:

POWER:	
Existing Power Pole	●
Proposed Power Pole	○
Existing Joint Use Pole	●
Proposed Joint Use Pole	○
Power Manhole	○ P
Power Line Tower	□
Power Transformer	▣
U/G Power Cable Hand Hole	○
H-Frame Pole	●
U/G Power Line LOS B (S.U.E.*)	--- P ---
U/G Power Line LOS C (S.U.E.*)	--- P ---
U/G Power Line LOS D (S.U.E.*)	--- P ---

TELEPHONE:

Existing Telephone Pole	●
Proposed Telephone Pole	○
Telephone Manhole	○ T
Telephone Pedestal	□
Telephone Cell Tower	⬇
U/G Telephone Cable Hand Hole	○
U/G Telephone Cable LOS B (S.U.E.*)	--- T ---
U/G Telephone Cable LOS C (S.U.E.*)	--- T ---
U/G Telephone Cable LOS D (S.U.E.*)	--- T ---
U/G Telephone Conduit LOS B (S.U.E.*)	--- TC ---
U/G Telephone Conduit LOS C (S.U.E.*)	--- TC ---
U/G Telephone Conduit LOS D (S.U.E.*)	--- TC ---
U/G Fiber Optics Cable LOS B (S.U.E.*)	--- T FO ---
U/G Fiber Optics Cable LOS C (S.U.E.*)	--- T FO ---
U/G Fiber Optics Cable LOS D (S.U.E.*)	--- T FO ---

WATER:

Water Manhole	○ W
Water Meter	○
Water Valve	⊗
Water Hydrant	○
U/G Water Line LOS B (S.U.E.*)	--- W ---
U/G Water Line LOS C (S.U.E.*)	--- W ---
U/G Water Line LOS D (S.U.E.*)	--- W ---
Above Ground Water Line	--- A/G Water ---

TV:

TV Pedestal	□
TV Tower	⊗
U/G TV Cable Hand Hole	○
U/G TV Cable LOS B (S.U.E.*)	--- TV ---
U/G TV Cable LOS C (S.U.E.*)	--- TV ---
U/G TV Cable LOS D (S.U.E.*)	--- TV ---
U/G Fiber Optic Cable LOS B (S.U.E.*)	--- TV FO ---
U/G Fiber Optic Cable LOS C (S.U.E.*)	--- TV FO ---
U/G Fiber Optic Cable LOS D (S.U.E.*)	--- TV FO ---

GAS:

Gas Valve	◇
Gas Meter	◇
U/G Gas Line LOS B (S.U.E.*)	--- G ---
U/G Gas Line LOS C (S.U.E.*)	--- G ---
U/G Gas Line LOS D (S.U.E.*)	--- G ---
Above Ground Gas Line	--- A/G Gas ---

SANITARY SEWER:

Sanitary Sewer Manhole	⊕
Sanitary Sewer Cleanout	⊕
U/G Sanitary Sewer Line	--- SS ---
Above Ground Sanitary Sewer	--- A/G Sanitary Sewer ---
SS Forced Main Line LOS B (S.U.E.*)	--- FSS ---
SS Forced Main Line LOS C (S.U.E.*)	--- FSS ---
SS Forced Main Line LOS D (S.U.E.*)	--- FSS ---

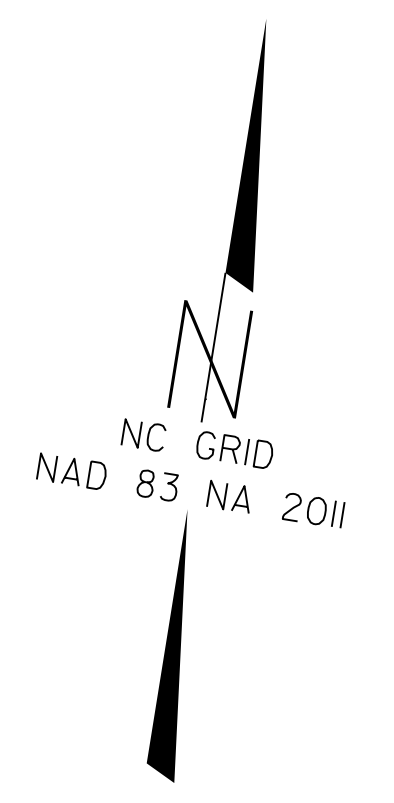
MISCELLANEOUS:

Utility Pole	●
Utility Pole with Base	□
Utility Located Object	○
Utility Traffic Signal Box	□
Utility Unknown U/G Line LOS B (S.U.E.*)	--- 7UTL ---
U/G Tank; Water, Gas, Oil	□
Underground Storage Tank, Approx. Loc.	□
A/G Tank; Water, Gas, Oil	□
Geoenvironmental Boring	⊕
U/G Test Hole LOS A (S.U.E.*)	○
Abandoned According to Utility Records	AATUR
End of Information	E.O.I.

12/01/2005

B-5348 SURVEY CONTROL SHEET

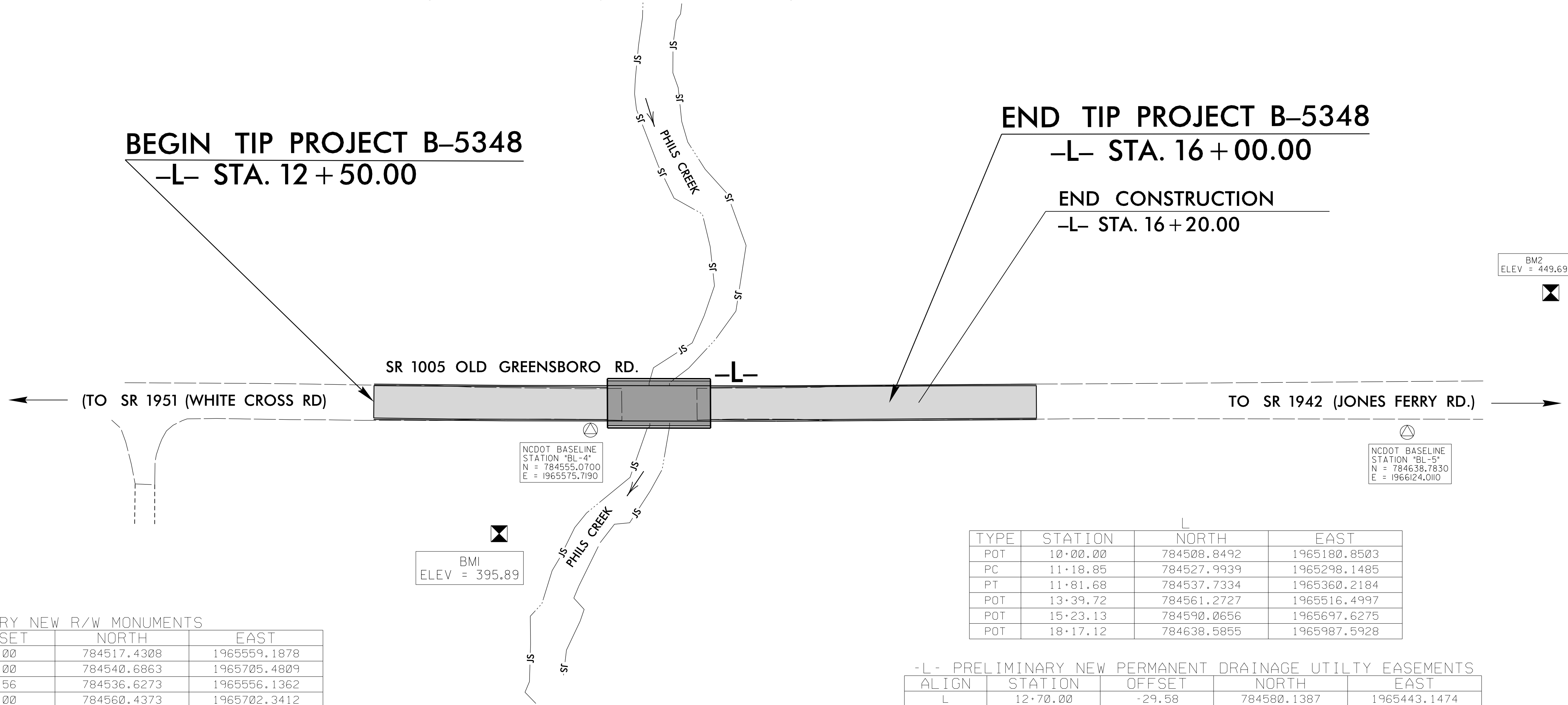
PROJECT REFERENCE NO.	SHEET NO.
B-5348	1C-1
Location and Surveys	



BEGIN TIP PROJECT B-5348
-L- STA. 12 + 50.00

END TIP PROJECT B-5348

-L- STA. 16 + 00.00
END CONSTRUCTION
-L- STA. 16 + 20.00



NCDOT BASELINE STATION *BL-3*
N = 784524.4450
E = 1965098.5220

NCDOT BASELINE STATION *BL-4*
N = 784555.0700
E = 1965575.7190

NCDOT BASELINE STATION *BL-5*
N = 784638.7830
E = 1966124.0110

BMI
ELEV = 395.89

BM2
ELEV = 449.69

-L- PRELIMINARY NEW R/W MONUMENTS

ALIGN	STATION	OFFSET	NORTH	EAST
L	13+75.00	50.00	784517.4308	1965559.1878
L	15+23.13	50.00	784540.6863	1965705.4809
L	13+75.00	30.56	784536.6273	1965556.1362
L	15+23.13	30.00	784560.4373	1965702.3412

TYPE	STATION	NORTH	EAST
POT	10+00.00	784508.8492	1965180.8503
PC	11+18.85	784527.9939	1965298.1485
PT	11+81.68	784537.7334	1965360.2184
POT	13+39.72	784561.2727	1965516.4997
POT	15+23.13	784590.0656	1965697.6275
POT	18+17.12	784638.5855	1965987.5928

-L- PRELIMINARY NEW PERMANENT UTILITY EASEMENTS

ALIGN	STATION	OFFSET	NORTH	EAST
L	12+90.00	30.44	784523.7699	1965471.8634
L	12+90.00	60.00	784494.5360	1965476.2666
L	13+10.00	60.00	784497.5148	1965496.0436
L	13+10.00	30.45	784526.7343	1965491.6425
L	15+78.00	30.00	784569.5331	1965756.6999
L	16+20.00	30.00	784576.4646	1965798.1240
L	14+90.00	116.00	784470.3035	1965683.1233
L	15+12.00	137.00	784453.0178	1965708.1474

-L- PRELIMINARY NEW PERMANENT DRAINAGE UTILITY EASEMENTS

ALIGN	STATION	OFFSET	NORTH	EAST
L	12+70.00	-29.58	784580.1387	1965443.1474
L	12+90.00	-50.00	784603.3090	1965459.8831
L	14+00.00	-70.00	784639.8676	1965565.0385
L	15+15.00	-70.00	784657.9219	1965678.6125
L	16+20.00	-45.00	784650.4362	1965785.7463
L	16+20.00	-30.00	784635.6419	1965788.2219

BASELINE DATA

BL POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
3	BL-3	784524.4450	1965098.5220	443.20	OUTSIDE PROJECT LIMITS	
4	BL-4	784555.0700	1965575.7190	401.06	13+97.24	15.42' RT
5	BL-5	784638.7830	1966124.0110	440.59	OUTSIDE PROJECT LIMITS	
2	B5348-2	784758.7530	1966661.8980	453.58	OUTSIDE PROJECT LIMITS	
1	B5348-1	784621.2950	1967522.7730	484.72	OUTSIDE PROJECT LIMITS	

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/](http://www.doh.dot.state.nc.us/preconstruct/highway/location/project/)

THE FILES TO BE FOUND ARE AS FOLLOWS:
b5348_ls_control.txt

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

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

PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM.

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5348-2"

WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF
NORTHING: 784758.7530(ft) EASTING: 1966661.8980(ft)
ELEVATION: 453.58(ft)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999208814

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5348-2" TO -L- STATION 12+50.00 IS
S 80°18'18" W 1252.00'

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

BENCHMARK DATA

.....
BM1 ELEVATION = 395.89'
N 784473 E 1965526
BL STATION 9+23.00 78' RIGHT
R/R SPIKE IN BASE OF 18' PINE
.....
BM2 ELEVATION = 449.69'
N 784750 E 1966247
BL STATION 16+77.00 81' LEFT
R/R SPIKE IN BASE OF 24' POPLAR
.....

NOTE: DRAWING NOT TO SCALE

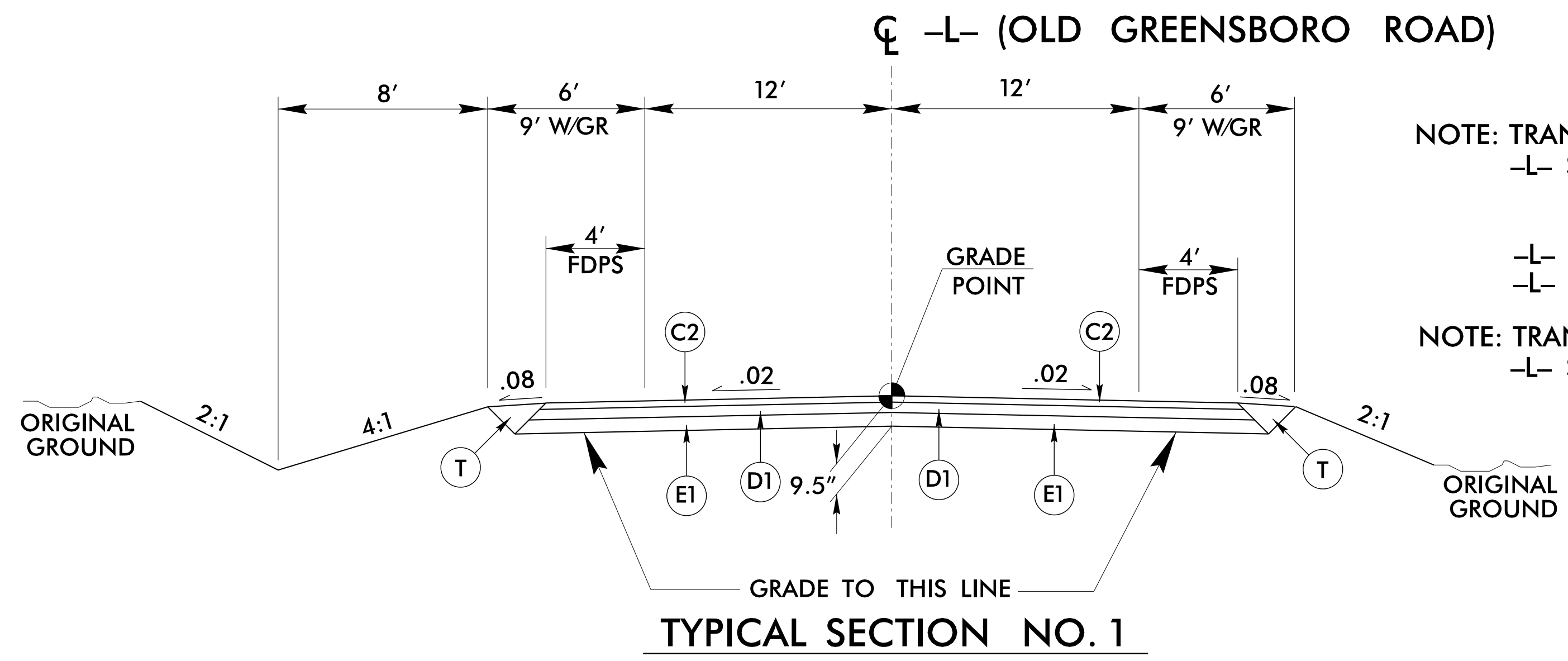
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6/2/2017

FINAL PAVEMENT SCHEDULE			
C1	PROP. APPROX. 1.5" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD.	E1	PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.
C2	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	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 5.5" IN DEPTH.
C3	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 1.5" IN DEPTH OR GREATER THAN 2" IN DEPTH	R	SHOULDER BERM GUTTER
D1	PROP. APPROX. 2.5" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.	T	EARTH MATERIAL.
D2	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2.5" IN DEPTH OR GREATER THAN 4" IN DEPTH.	U	EXISTING PAVEMENT.
		W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE DETAIL)

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

PROJECT REFERENCE NO. B-5348	SHEET NO. 2A-1
ROADWAY DESIGN ENGINEER W. S. HOOD SEAL 014509 NORTH CAROLINA PROFESSIONAL ENGINEER	PAVEMENT DESIGN ENGINEER CLARK S. MORRISON SEAL 022896 NORTH CAROLINA PROFESSIONAL ENGINEER
DocuSigned by: W. S. Hood DocuSigned by: Clark Morrison	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

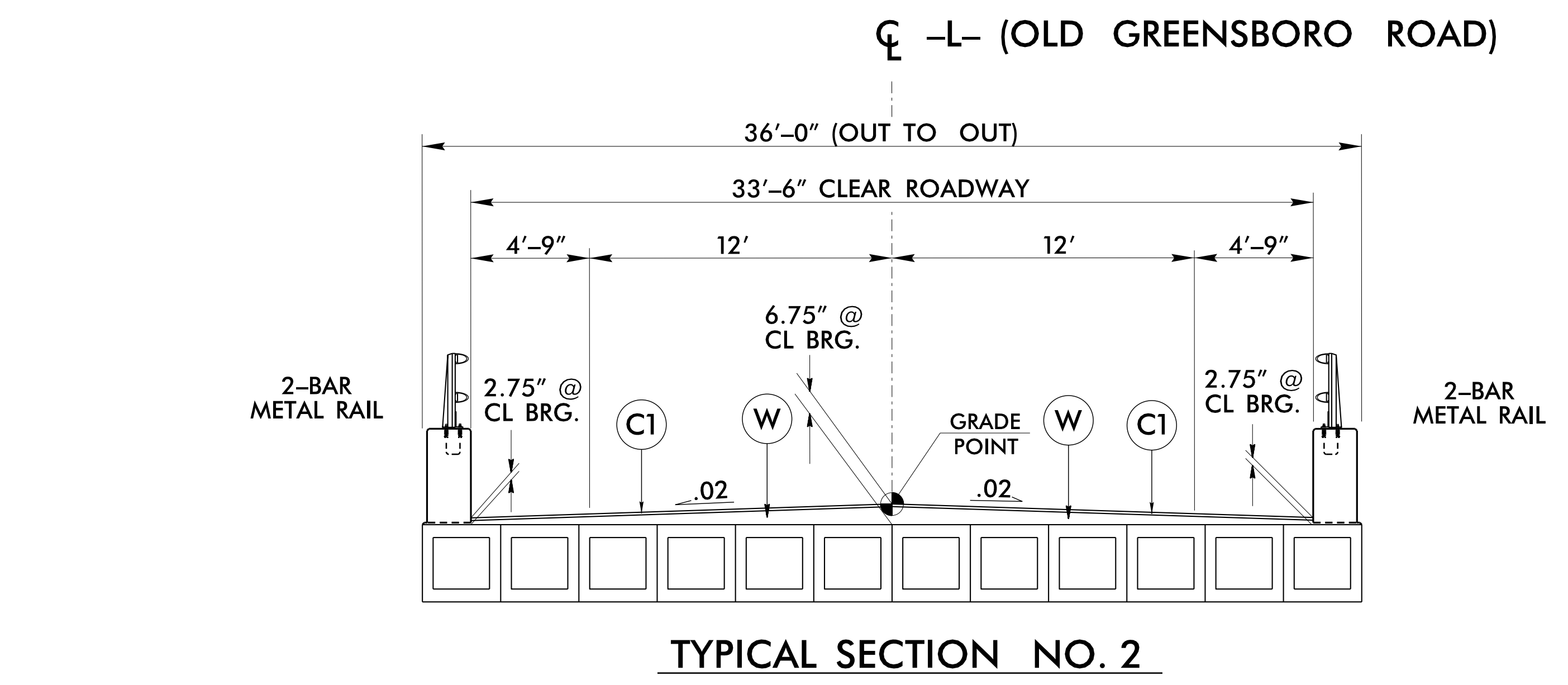
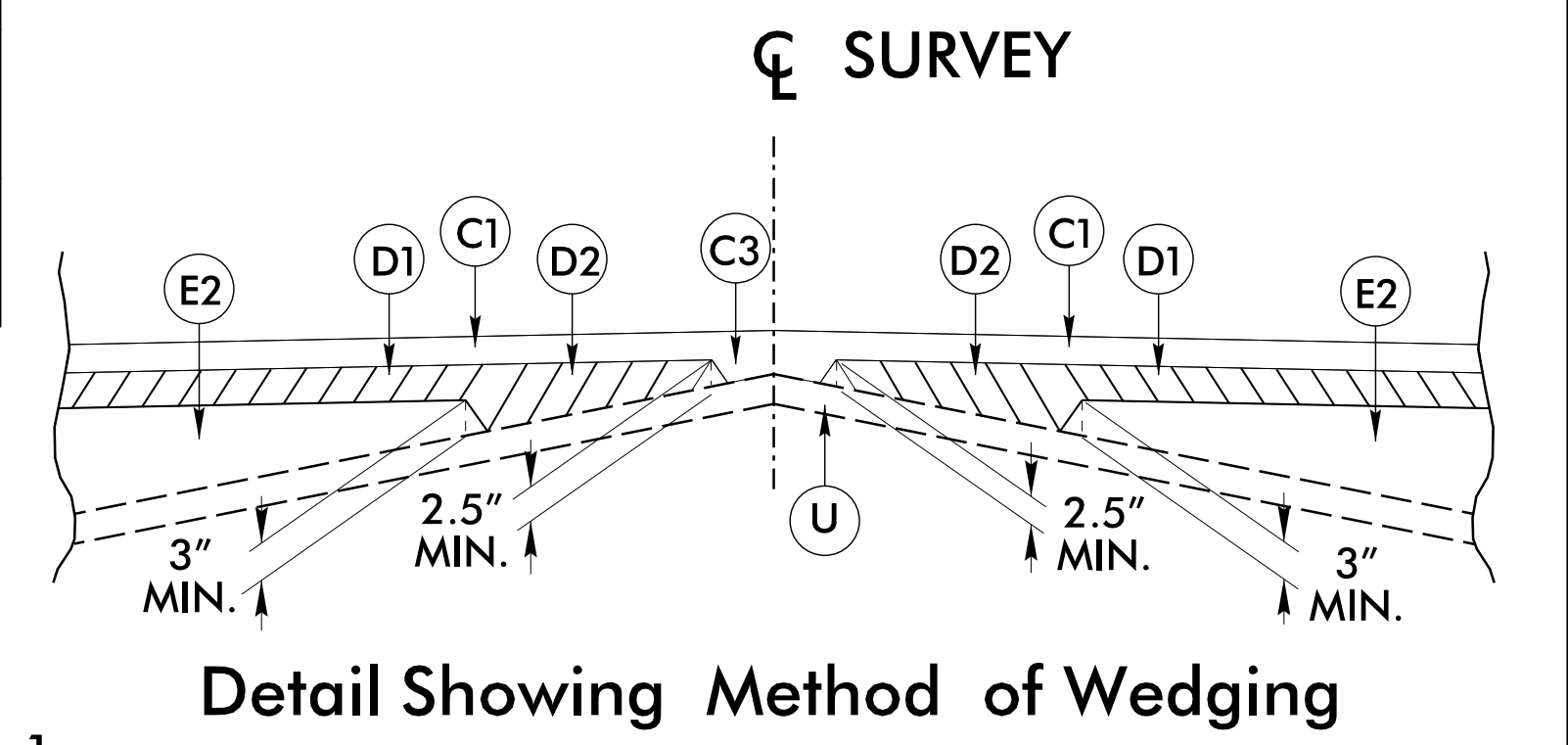


NOTE: TRANSITION FROM EXISTING TO TYPICAL SECTION NO. 1
 -L- STA. 12+50.00 TO STA. 13+00.00

TYPICAL SECTION NO. 1

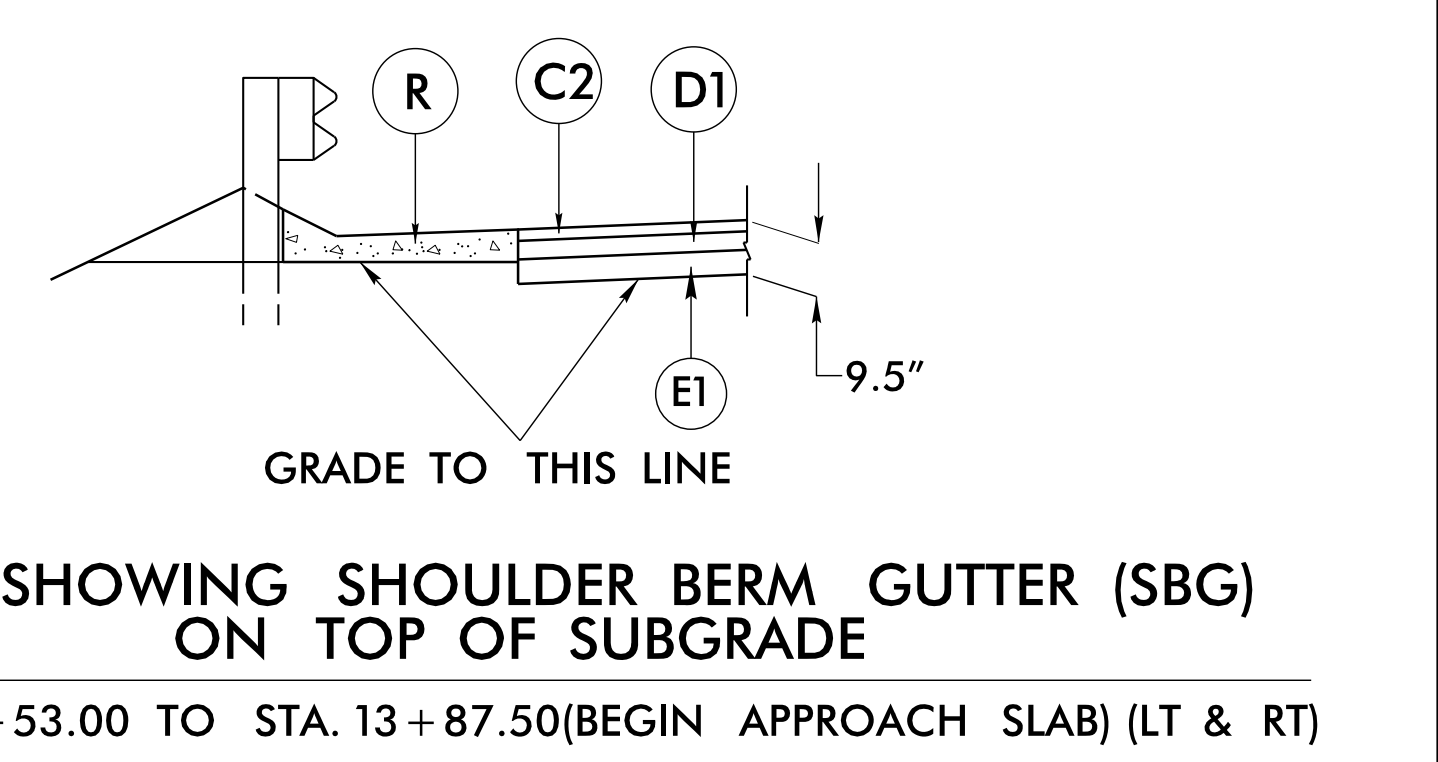
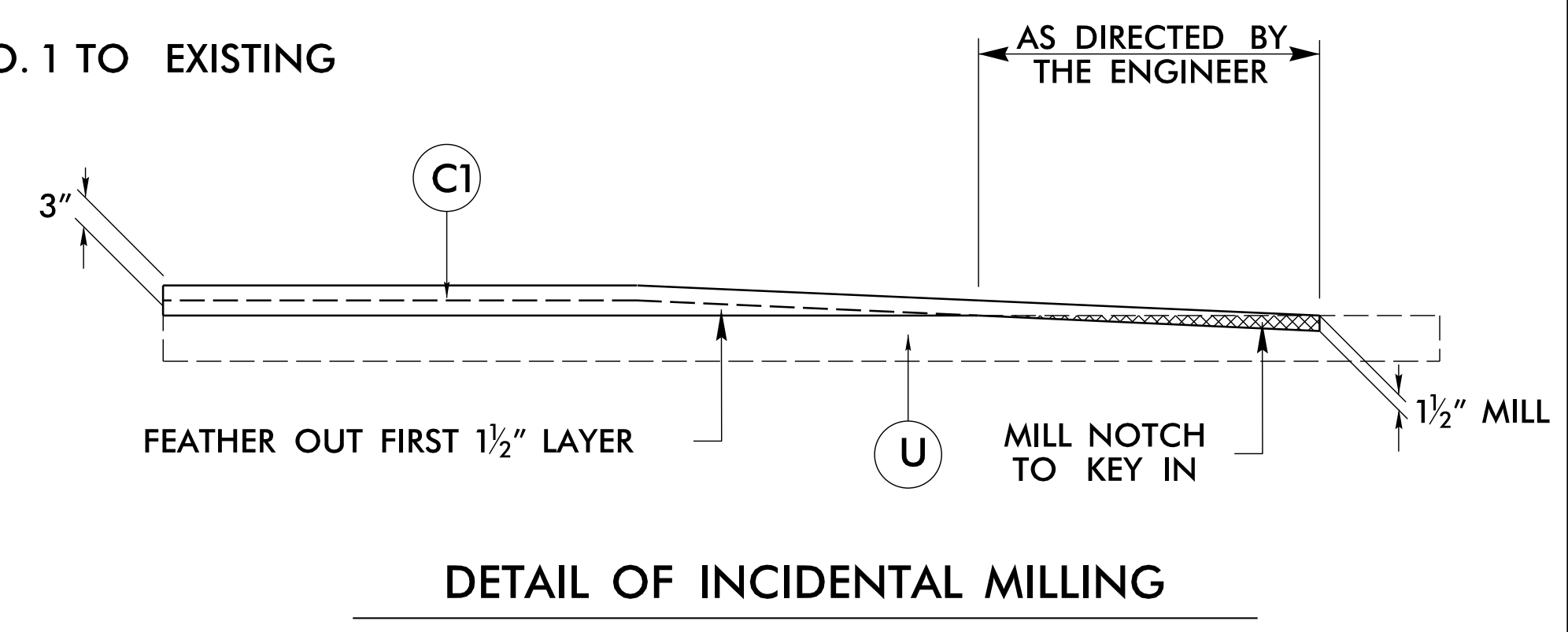
-L- STA. 13+00.00 TO STA. 13+98.38 (BEGIN BRIDGE)
 -L- STA. 15+02.63 (END BRIDGE) TO STA. 15+50.00

NOTE: TRANSITION FROM TYPICAL SECTION NO. 1 TO EXISTING
 -L- STA. 15+50.00 TO STA. 16+00.00



NOTE: SR 1005 (OLD GREENSBORO ROAD) IS DESIGNATED PART OF THE "NCDOT MOUNTAINS TO SEA ON-ROAD BICYCLE ROUTE"

THIS PORTION OF SR 1005 (OLD GREENSBORO ROAD) IS DESIGNATED AS A PRIMARY PRIORITY BICYCLE ROUTE, IN THE "ORANGE COUNTY COMPREHENSIVE PLAN"



TYPICAL SECTION NO. 2

-L- STA. 13+98.38 (BEGIN BRIDGE) TO STA. 15+02.63 (END BRIDGE)

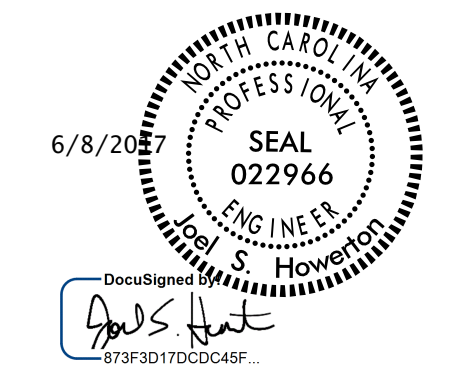
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STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT	SHEET 2 OF 11 862D01
NOTE SPECIAL LAYER OF PAVEMENT USE 3'-1 1/2" POST SPACING ON THE 50' OF GUARDRAIL PARALLEL TO LANES AND 6'-3" POST SPACING ON 15:1 TRANSITION SECTIONS. GRADE MEDIAN IN THE VICINITY OF THE SIGN SUPPORT AS ILLUSTRATED IN THE ROADWAY STANDARD DRAWINGS (STANDARD 862D01 SHEET 1 OF 12).		
SECT. YY 	SECT. ZZ 	

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT	SHEET 1 OF 11 862D01
NOTE: WHEN OFFSET DISTANCE FROM FACE OF OBSTRUCTION TO FACE OF GUARDRAIL IS BETWEEN 3'-6" AND 6'-6", POST SPACING AT POINT 26' BEFORE REACHING THE OBSTRUCTION AND CARRY THROUGHOUT ITS LENGTH. IF THE OFFSET IS LESS THAN 3'-6" USE CONCRETE BARRIER.		
SECT. XX 	SECT. YY 	SECT. ZZ

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT	SHEET 1 OF 11 862D01
NOTE: WHEN OFFSET DISTANCE FROM FACE OF OBSTRUCTION TO FACE OF GUARDRAIL IS BETWEEN 3'-6" AND 6'-6", POST SPACING AT POINT 26' BEFORE REACHING THE OBSTRUCTION AND CARRY THROUGHOUT ITS LENGTH. IF THE OFFSET IS LESS THAN 3'-6" USE CONCRETE BARRIER.		
SECT. YY 	SECT. ZZ 	



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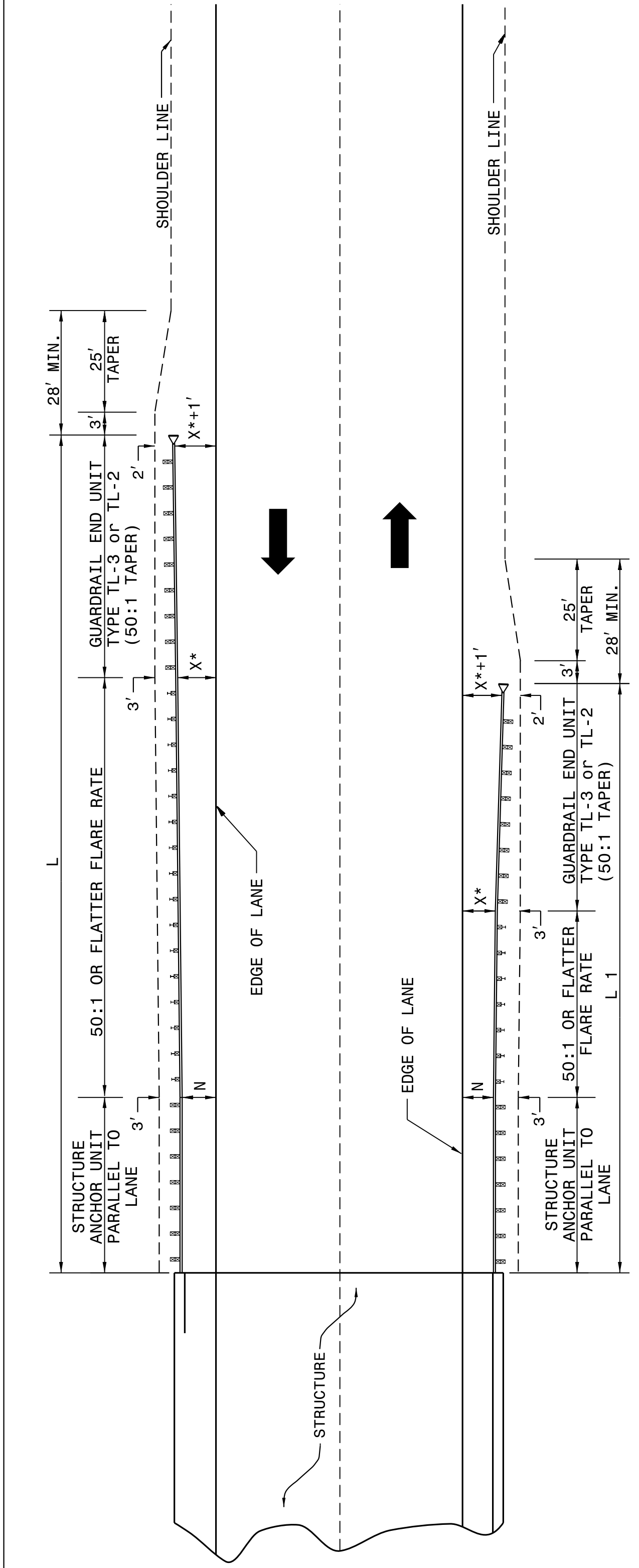
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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 4 OF 11
862D01



GUARDRAIL INSTALLATION AT BRIDGE APPROACHES FOR TWO-LANE, TWO-WAY TRAFFIC

DESIGN SPEED (MPH)	"L" APPROACH LENGTH (FT.)		"L" TRAILING LENGTH (FT.)	
	DESIGN YEAR ADT OVER 2000	CURRENT YEAR ADT UNDER 400	DESIGN YEAR ADT OVER 2000	CURRENT YEAR ADT UNDER 400
70	362.5'	362.5'	350.0'	287.5'
60	300.0'	287.5'	275.0'	225.0'
50	212.5'	212.5'	200.0'	162.5'
40	175.0'	150.0'	137.5'	112.5'
X *	8'	6'	4'	4'

* USE FLARE RATE AS THE CONTROL IF THE "X" DISTANCE IS NOT OBTAINED. ("X" IS BASED ON SHOULDER WIDTHS IN THE HIGHWAY DESIGN BRANCH MANUAL, PART 1, 1-4B, F1).

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL WHERE GUARDRAIL IS PARALLEL TO LANE.

SEE STD. 862.03 FOR STRUCTURE ANCHOR UNITS

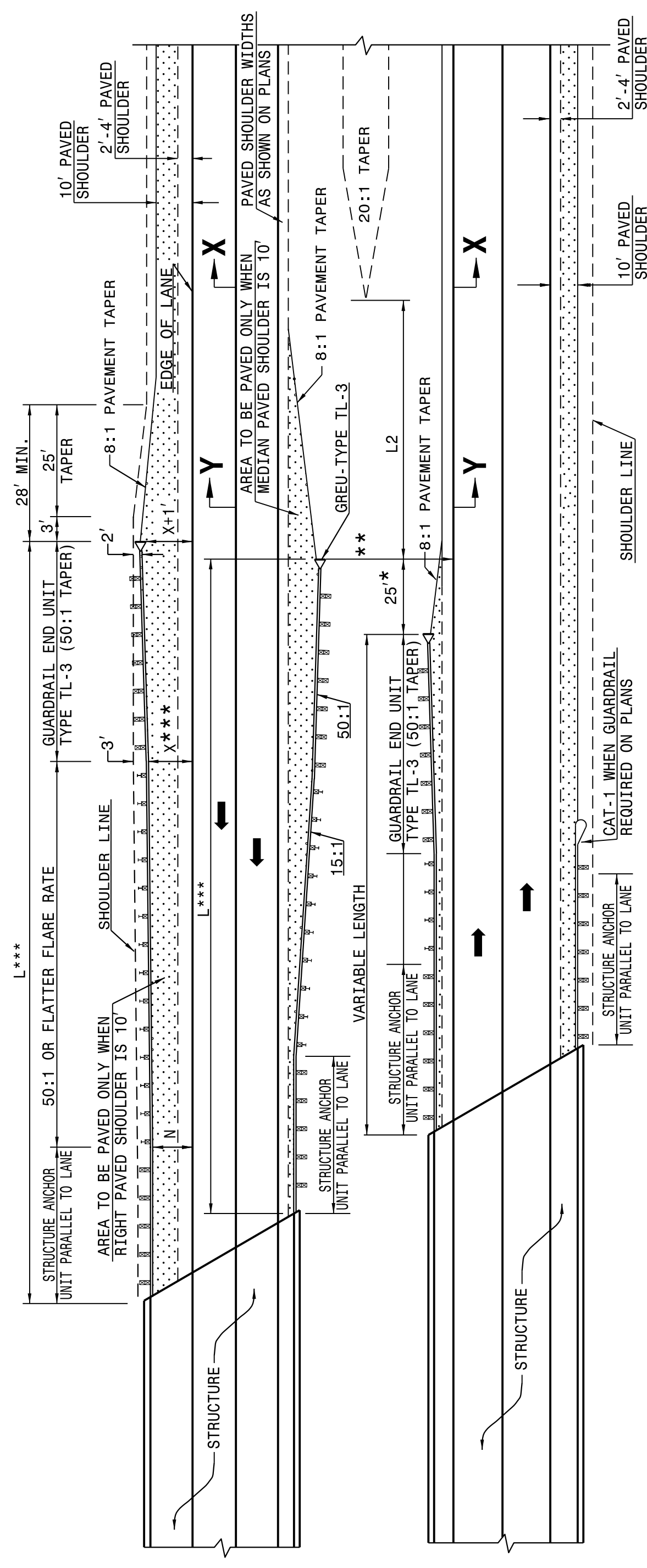
FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

LENGTHS AND OFFSETS FOR PROPOSED GUARDRAIL AT TWO LANE - TWO WAY LOCATIONS

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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 3 OF 11
862D01



FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

DIMENSIONS FOR LENGTH OF GUARDRAIL APPROACHING DUAL LANE BRIDGES

MEDIAN WIDTH	-L-***		-L2- DIM.
	60 MPH	50 MPH	
30'	300.0'	250.0'	80.0'
36'	300.0'	250.0'	60.0'
40' & ABOVE	300.0'	250.0'	40.0'

NOTES: * MINOR VARIATION TO THE 25'-0" DIMENSION IS PERMISSIBLE TO ACCOMMODATE THE 12'-6" IN GUARDRAIL LENGTHS.

** NO GUARDRAIL IS REQUIRED ON THE TRAILING END WHEN THIS DISTANCE EXCEEDS CLEAR ROADSIDE RECOVERY AREA FOR THE APPROPRIATE DESIGN SPEED.

*** BASED ON "X" OF 12' USE FLARE RATE AS THE CONTROL IF THE "X" DISTANCE IS NOT OBTAINED. ("X" IS BASED ON SHOULDER WIDTHS IN THE HIGHWAY DESIGN BRANCH MANUAL, PART 1, 1-4B, F1A).

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL WHERE GUARDRAIL IS PARALLEL TO LANE. THE DESIGN LAYOUT FOR LENGTHS SHOWN ON THIS STANDARD ARE MINIMUM DESIGN LENGTHS. SEE SHEET 1 OF 12 FOR SECTIONS XX, YY

SEE STD. 862.03 FOR STRUCTURE ANCHOR UNITS

DETAIL OF GUARDRAIL APPROACHING DUAL LANE BRIDGES

STATE OF NORTH CAROLINA
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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 4 OF 11
862D01

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

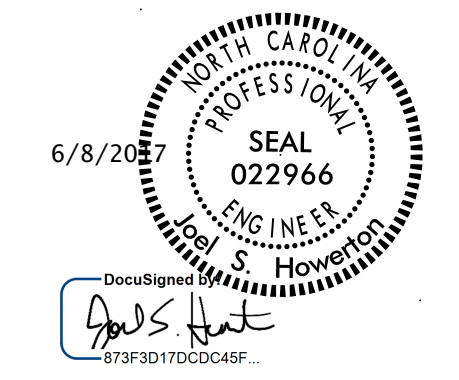
SHEET 3 OF 11
862D01

PROJECT REFERENCE NO. B-5348	SHEET NO. 2C-2
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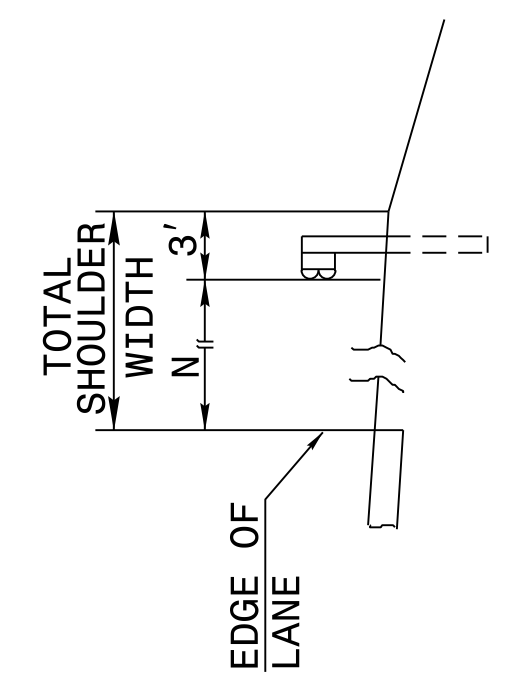
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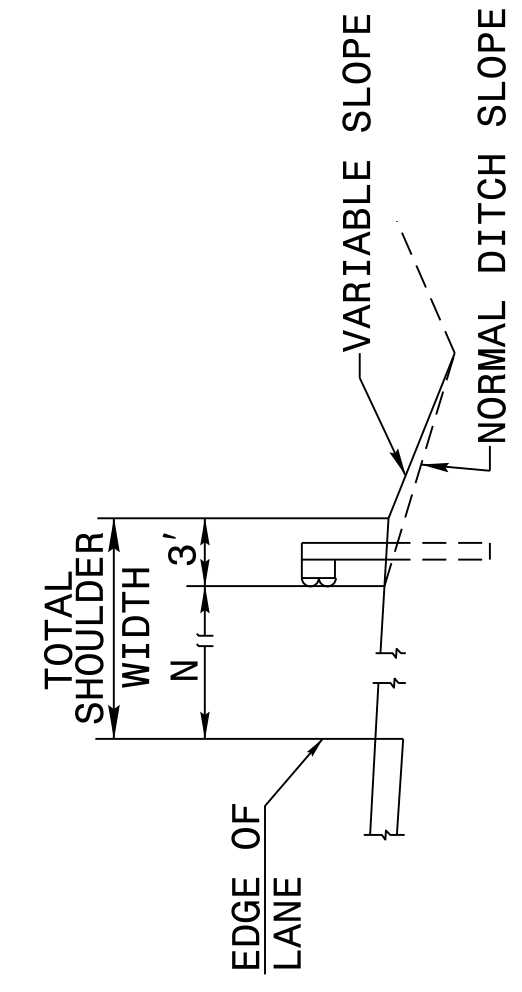
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RALEIGH, N.C.

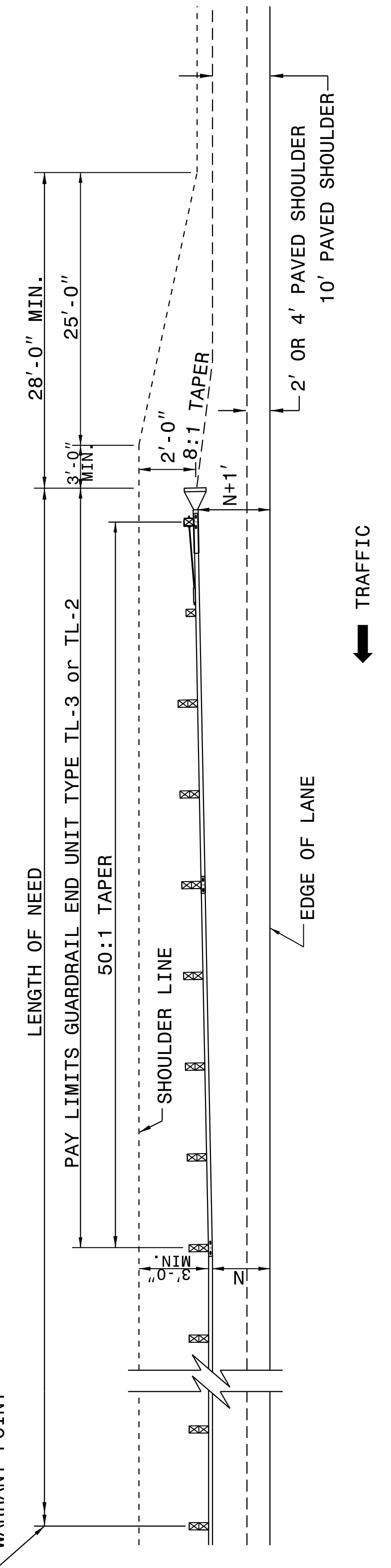


FILL SECTION



CUT SECTION

"N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL WHERE GUARDRAIL IS PARALLEL TO LANE.



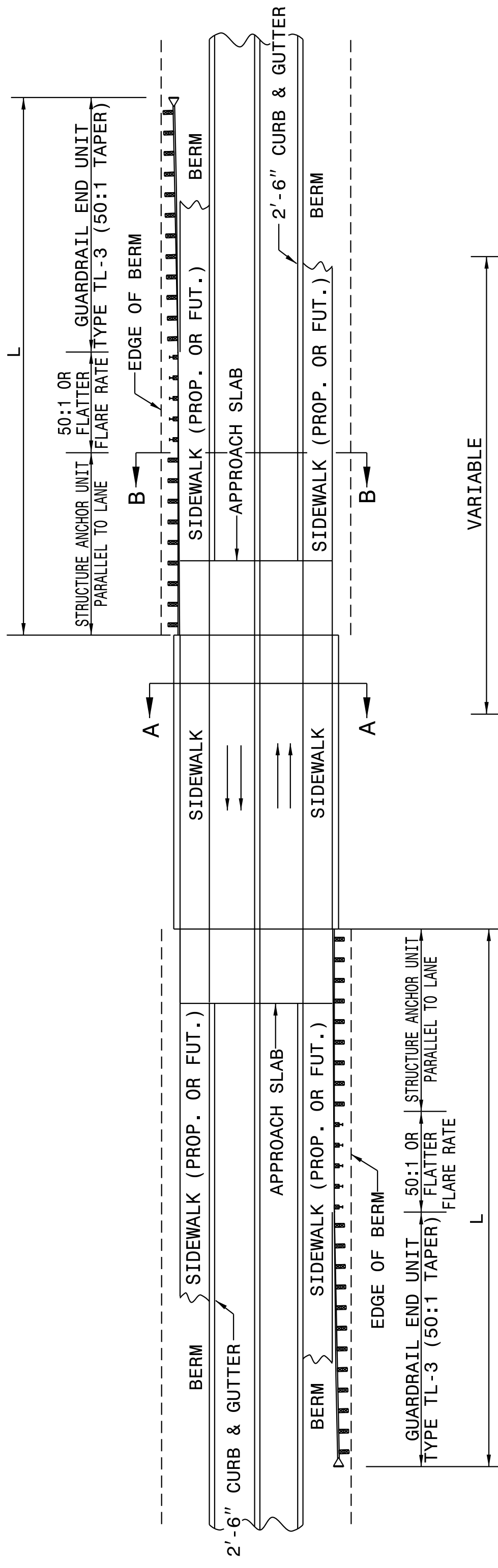
FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 6 OF 11
862D01

DETAIL OF BEGINNING OF GUARDRAIL IN CUT OR FILL SECTION

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



MINIMUM GUARDRAIL LENGTHS "L" REQUIRED AT BRIDGE APPROACHES ON 2'-6" CONCRETE CURB AND GUTTER ROADWAYS	"L"
DESIGN SPEED (MPH)	150'
	225'

NOTE: "L" VALUES ARE BASED ON NO HAZARDS OTHER THAN END OF BRIDGE BEING PRESENT WITHIN THE CLEAR ZONE.

SEE STD. 862D03 FOR STRUCTURE ANCHOR UNITS.

FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

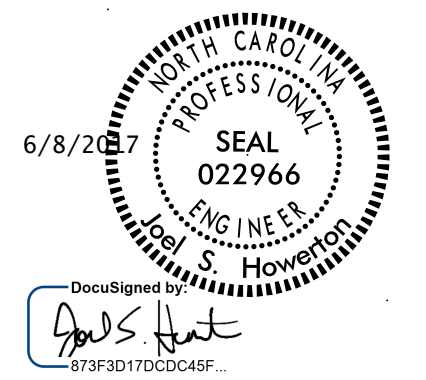
SHEET 5 OF 11
862D01

STANDARD GUARDRAIL PLACEMENT AT BRIDGES WITH 2'-6" CONCRETE CURB AND GUTTER

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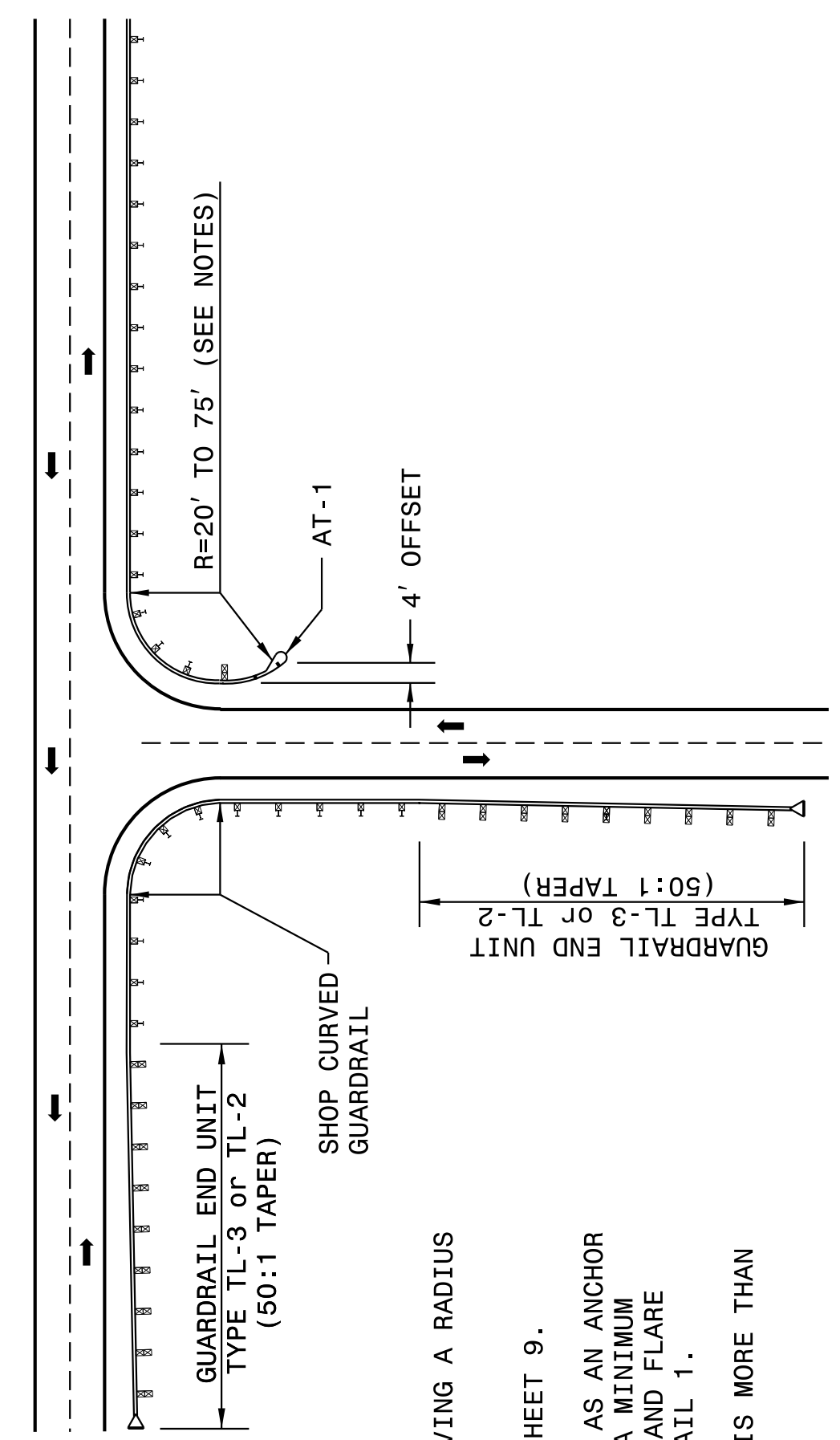
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ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT

SHEET 8 OF 11 862D01

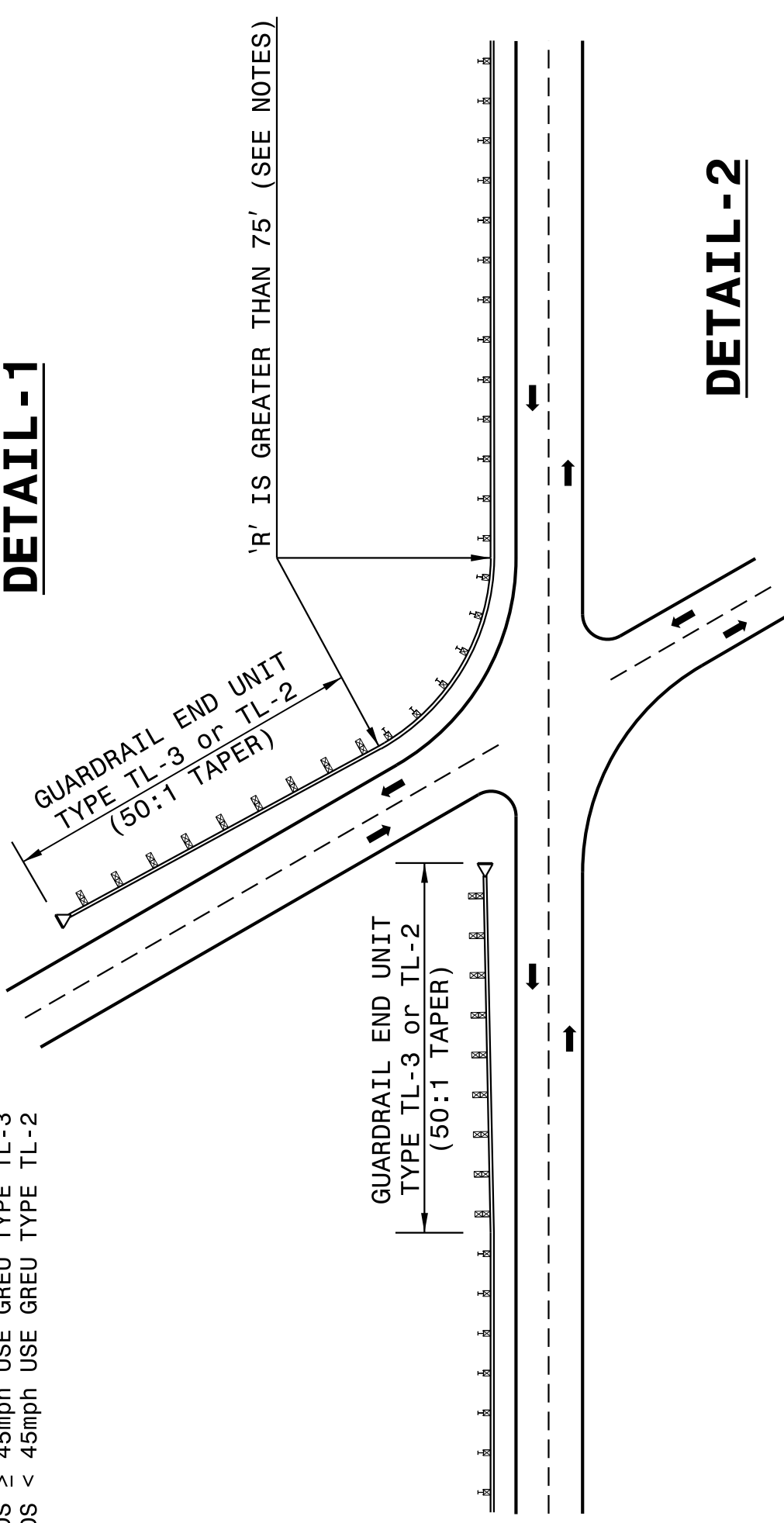


NOTES:
 SHOP CURVED GUARDRAIL IS DEFINED AS HAVING A RADIUS OF 150' OR LESS.
 WHEN RADIUS IS LESS THAN 20' REFER TO SHEET 9.
 WHENEVER SHOP CURVED GUARDRAIL IS USED AS AN ANCHOR AND THE RADIUS IS FROM 20' TO 75', USE A MINIMUM LENGTH OF 50' OF SHOP CURVED GUARDRAIL AND FLARE WITH AN AT-1 ANCHOR UNIT. REFER TO DETAIL 1.
 WHENEVER SHOP CURVED GUARDRAIL RADIUS IS MORE THAN 75', REFER TO DETAIL 2.

MAINTAIN CLEAR SIGHT DISTANCE.

FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
 FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

DETAIL -1



DETAIL -2

GUARDRAIL TREATMENT AT INTERSECTIONS

SHEET 8 OF 11 862D01

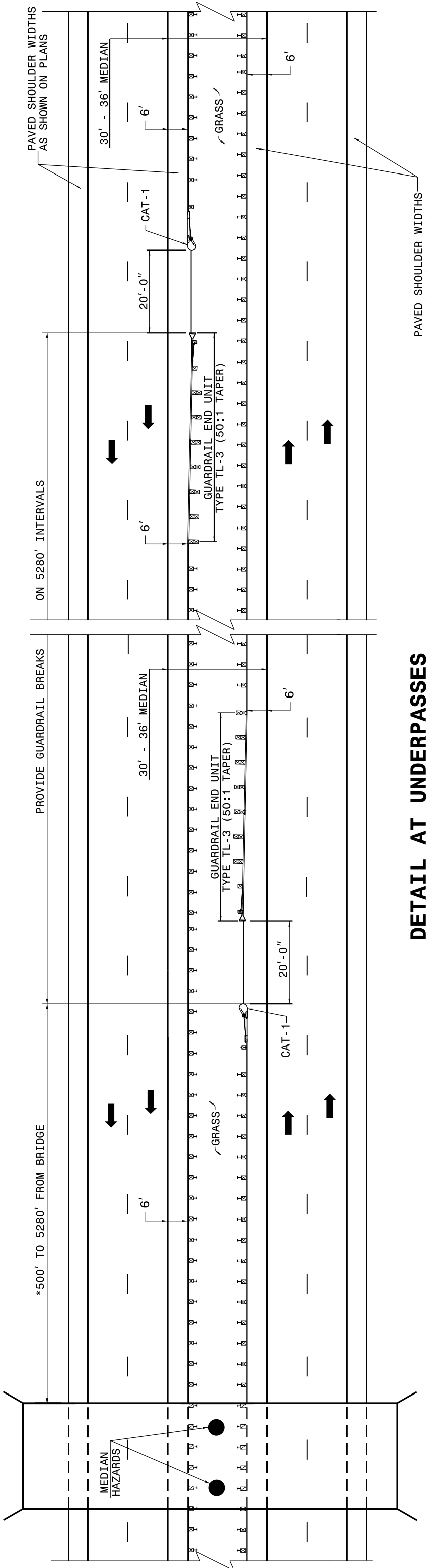
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ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT

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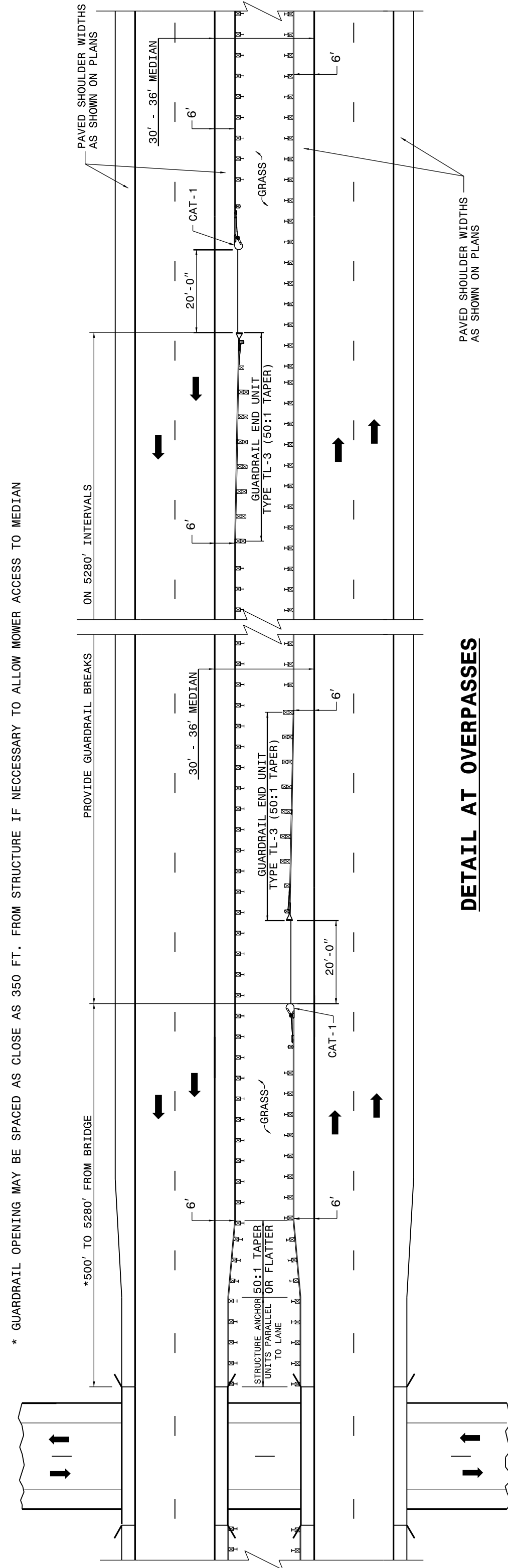
ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT

SHEET 7 OF 11 862D01



DETAIL AT UNDERPASSES

* GUARDRAIL OPENING MAY BE SPACED AS CLOSE AS 350 FT. FROM STRUCTURE IF NECESSARY TO ALLOW MOWER ACCESS TO MEDIAN



DETAIL AT OVERPASSES

FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
 FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

GUARDRAIL BREAK INTERVALS WITH 30' - 36' MEDIANS

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

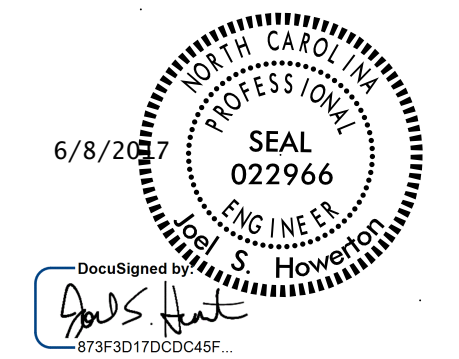
ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT

SHEET 7 OF 11 862D01

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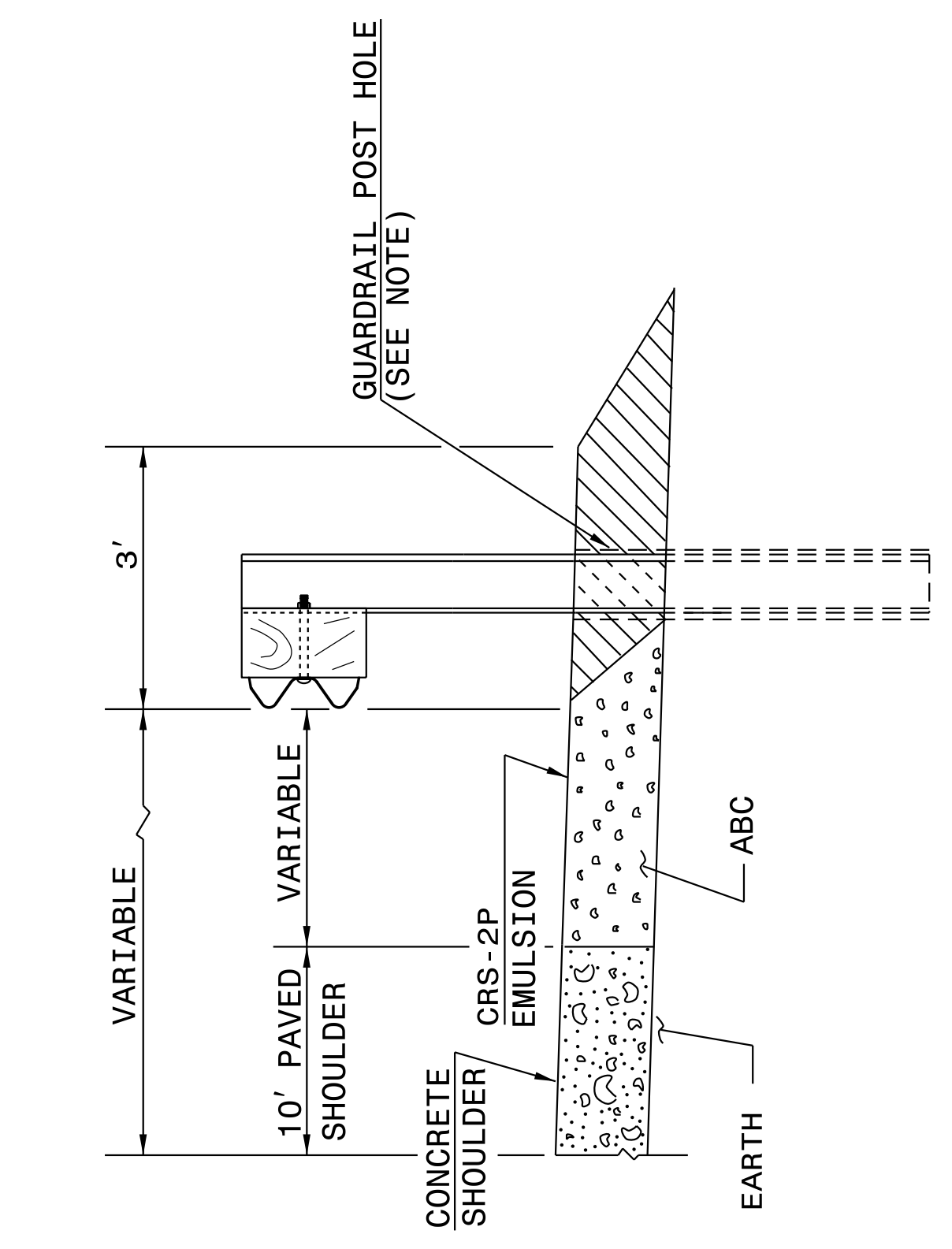
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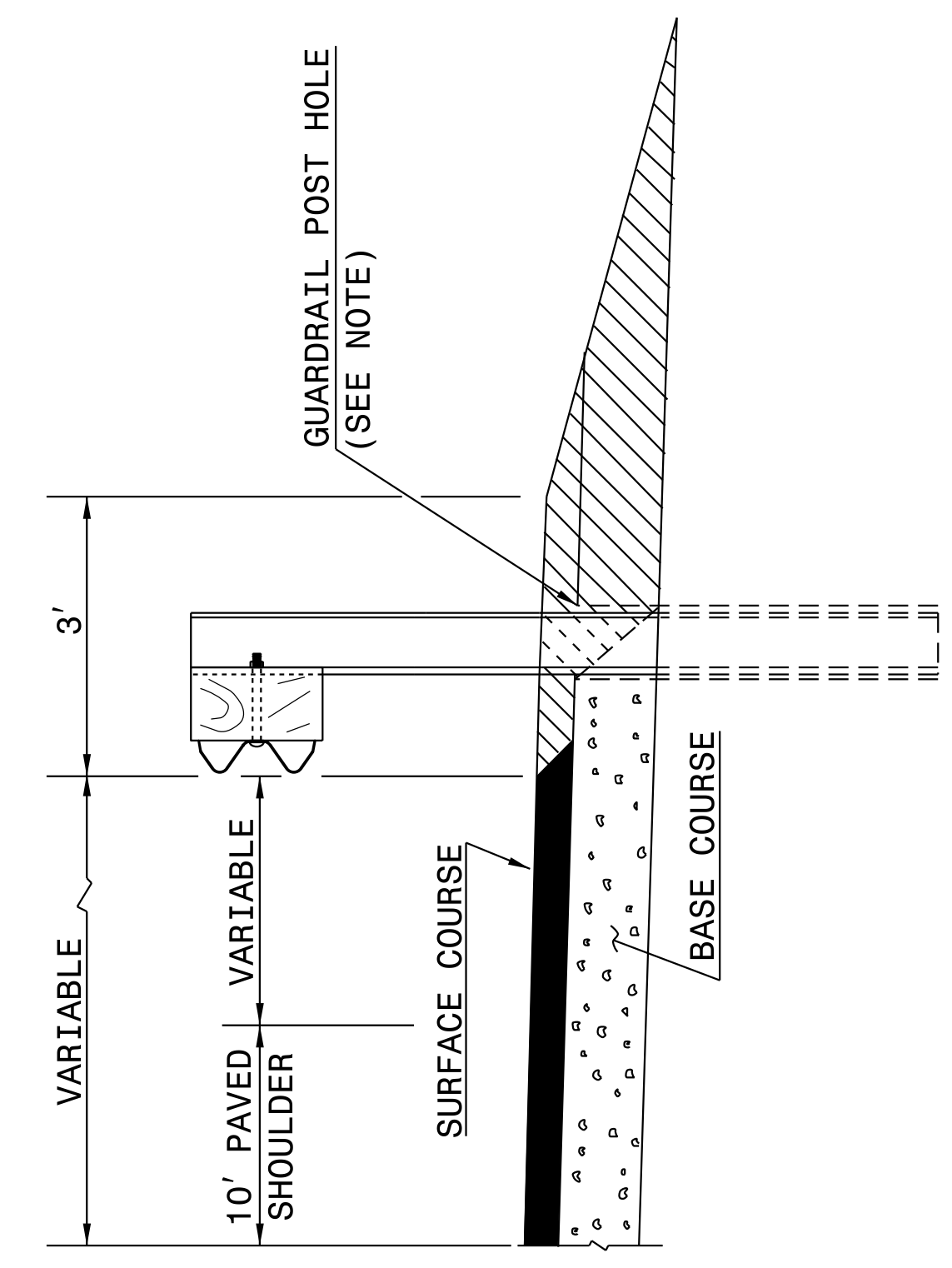
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ENGLISH DETAIL DRAWING FOR GUARDRAIL PLACEMENT

SHEET 10 OF 11 **862D01**



CONCRETE PAVED SHOULDER



FLEXIBLE PAVED SHOULDER



NOTE: WHEN WOODEN GUARDRAIL POSTS ARE USED, DRILL HOLES THROUGH EARTH MATERIAL AND BASE COURSE. THE POST MAY THEN BE DRIVEN TO THE PROPER DEPTH. DRILL THE HOLE OF SUFFICIENT SIZE TO ACCOMMODATE THE PARTICULAR POST BEING USED. BACKFILL AND TAMP HOLES USING THE EXCAVATED MATERIAL.

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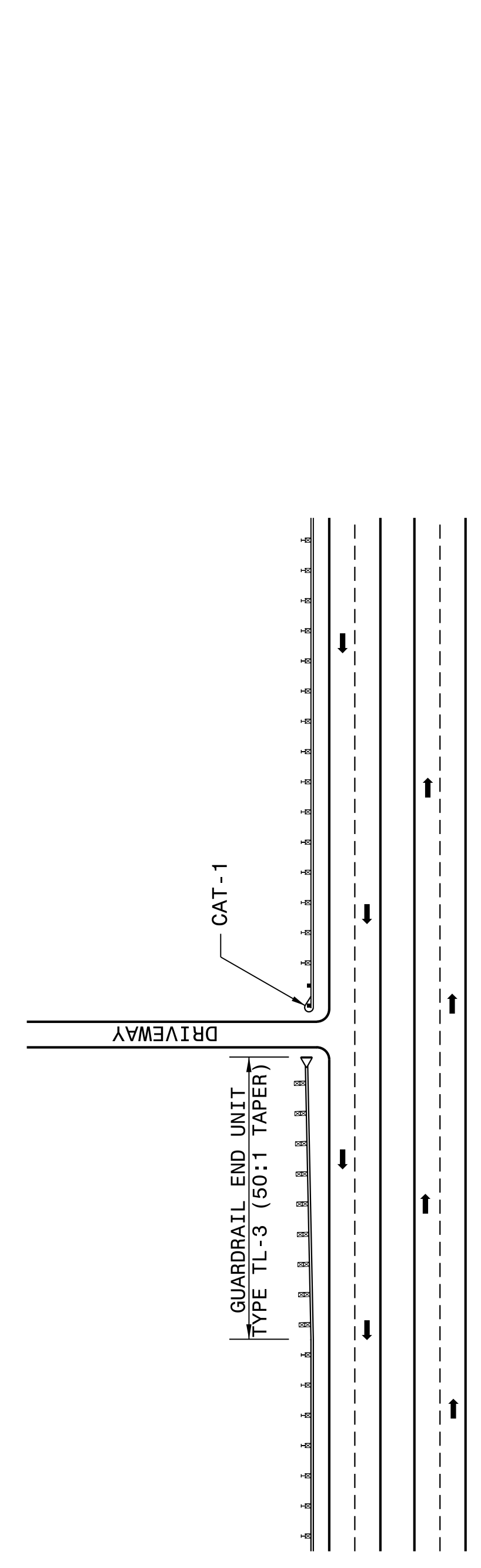
ENGLISH DETAIL DRAWING FOR GUARDRAIL PLACEMENT

SHEET 10 OF 11 **862D01**

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ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT

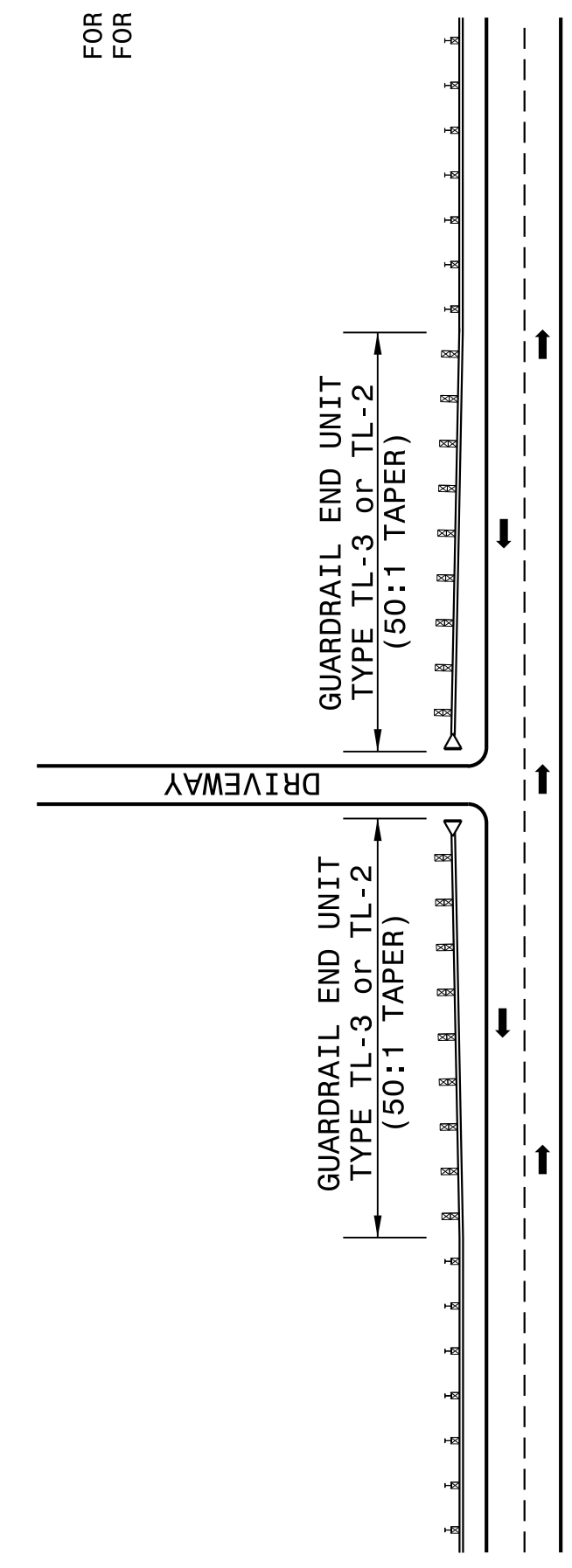
SHEET 9 OF 11 **862D01**



DETAIL - 3
DIVIDED HIGHWAY

NOTE: USE DETAIL 3 & 4 WHENEVER 20' OR LARGER RADIUS CANNOT BE UTILIZED. MAINTAIN CLEAR SIGHT DISTANCE.

FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3
FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

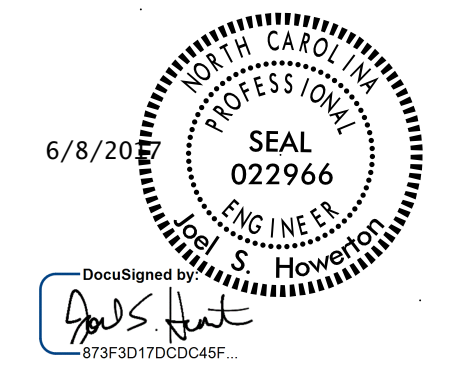


DETAIL - 4
UNDIVIDED HIGHWAY
GUARDRAIL TREATMENT AT DRIVEWAYS

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ROADWAY DETAIL DRAWING FOR GUARDRAIL PLACEMENT

SHEET 9 OF 11 **862D01**



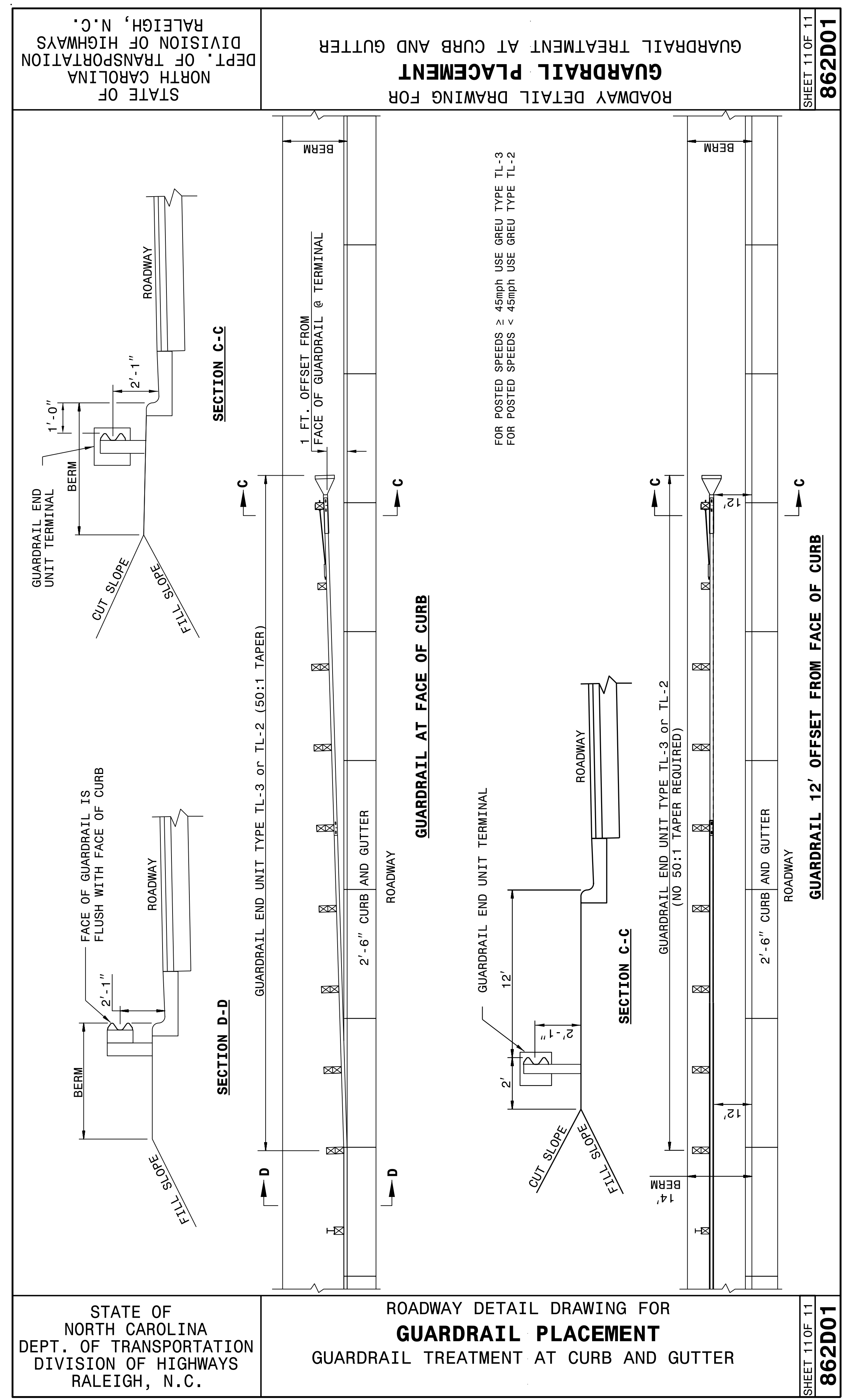
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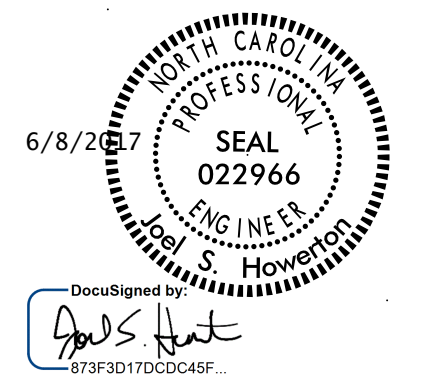
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SHEET 11 OF 11
862D01

SHEET 11 OF 11
862D01



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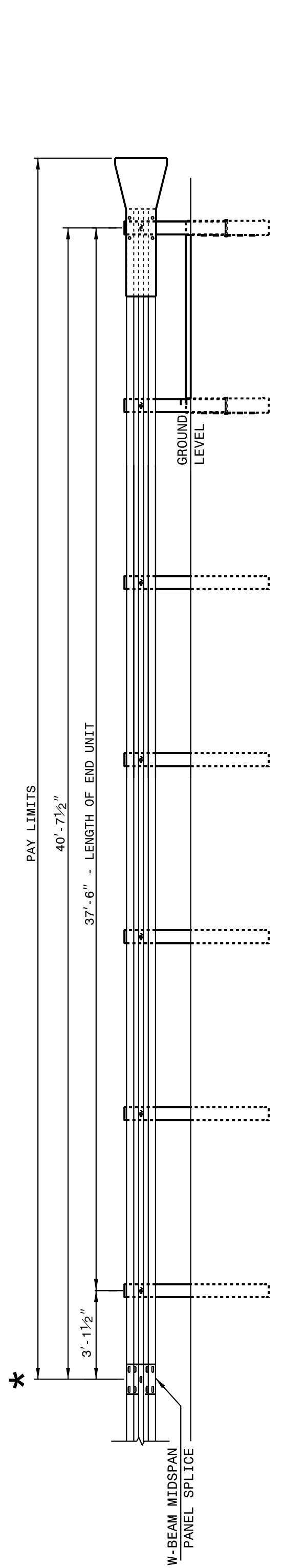
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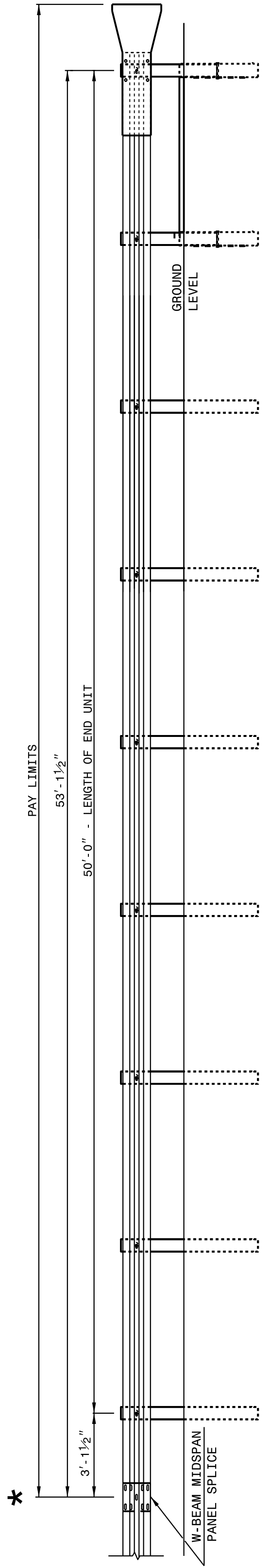
ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION

SHEET 2 OF 8 **862D02**



FLARED AND TANGENT ELEVATION VIEW

* WHEN INSTALLING GUARDRAIL END UNITS THAT ARE 2'-1" MOUNTING HEIGHT TO EXISTING GUARDRAIL, REMOVE THE EXISTING GUARDRAIL TO TRANSITION FROM THE EXISTING HEIGHT TO THE PROPOSED 2'-1" HEIGHT. SEE 862.02, SHEET 4 OF 8 FOR TRANSITION DETAILS.



FLARED AND TANGENT ELEVATION VIEW

APPROACH END UNITS

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

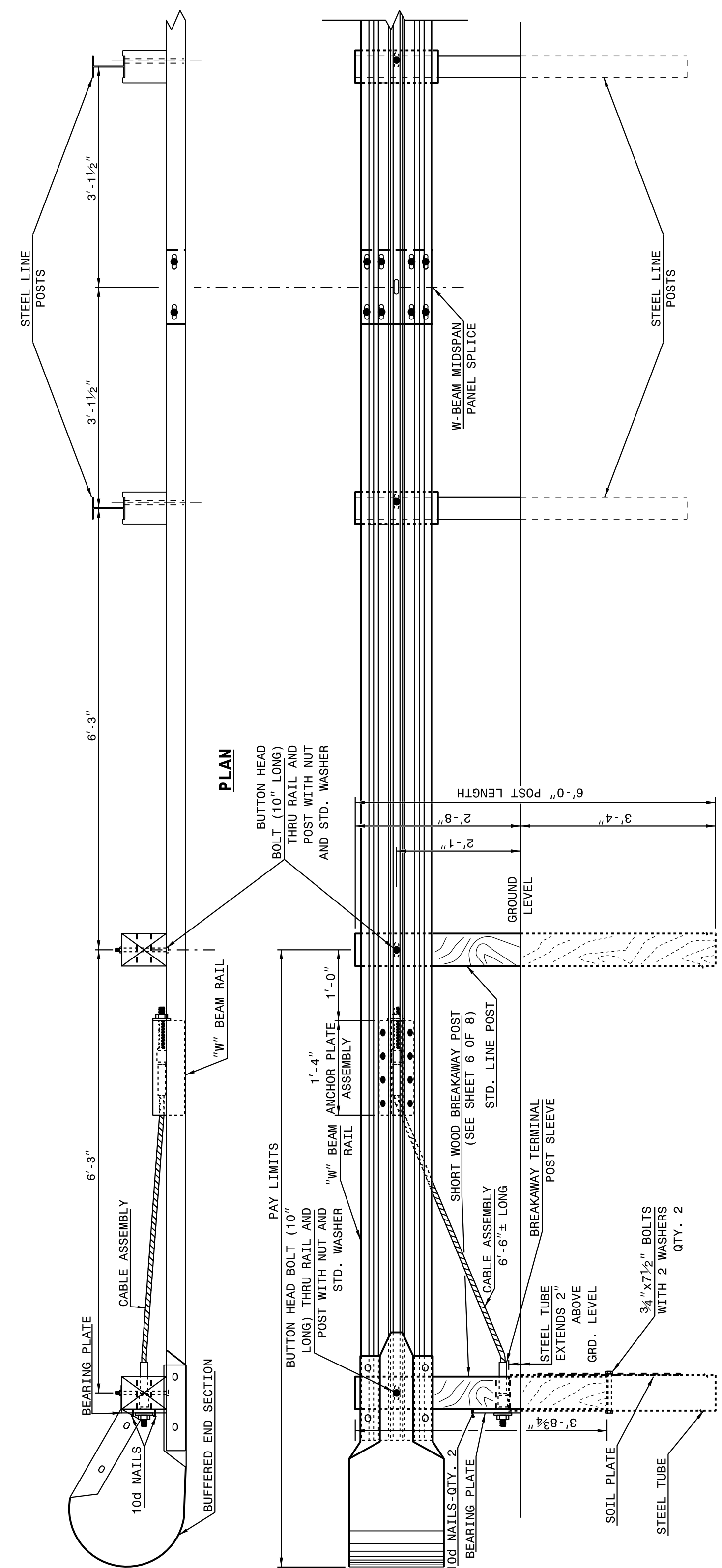
ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION

SHEET 2 OF 8 **862D02**

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

ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION

SHEET 1 OF 8 **862D02**



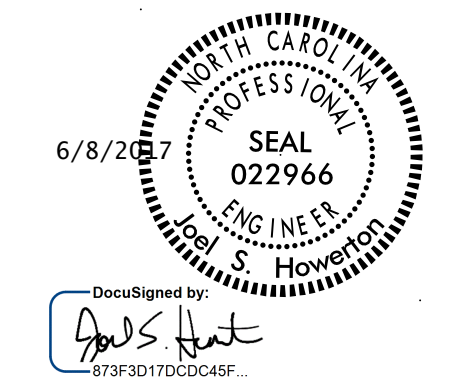
ELEVATION

TRAILING END UNIT ASSEMBLY C.A.T.-1 SYSTEM

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

ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION

SHEET 1 OF 8 **862D02**



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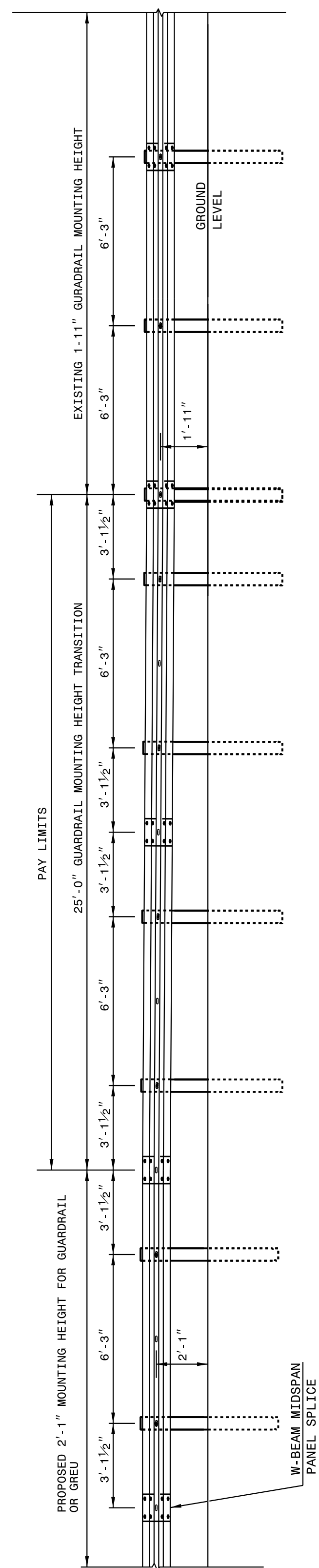
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STATE OF NORTH CAROLINA
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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 4 OF 8
862D02

NOTE: IF EXISTING GUARDRAIL IS LOWER THAN 1'-11", USE AN ADDITIONAL 12'-6" LONG SECTION OF GUARDRAIL, FOR EVERY 1" OF HEIGHT DIFFERENCE, TO TRANSITION FROM EXISTING GUARDRAIL TO PROPOSED 2'-1" GUARDRAIL.



ELEVATION VIEW

TRANSITION FROM OR 1'-11" TO 2'-1" W-BEAM GUARDRAIL MOUNTING HEIGHT

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RALEIGH, N.C.

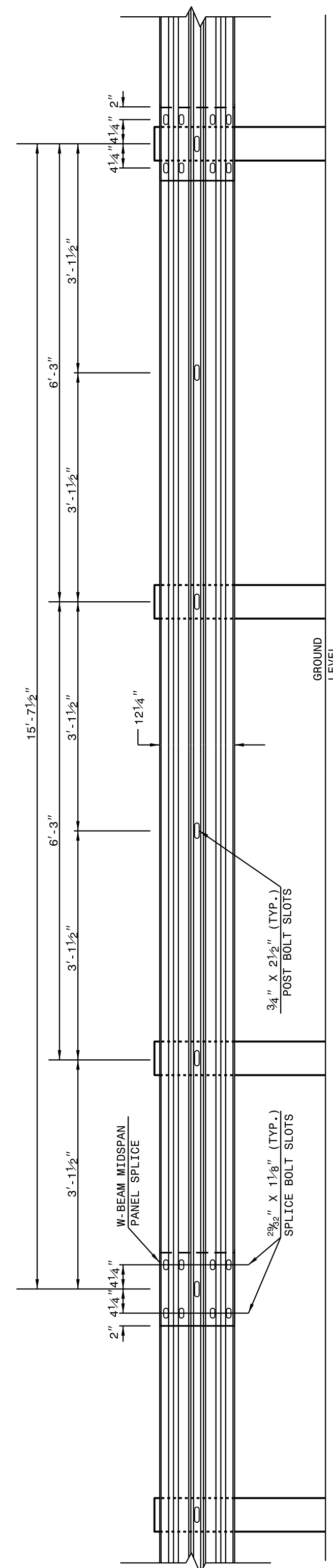
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 4 OF 8
862D02

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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 3 OF 8
862D02



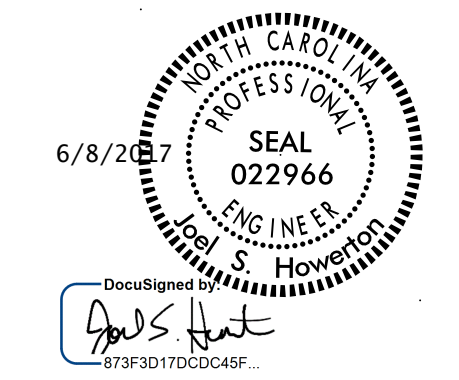
15'-7 1/2" W-BEAM GUARDRAIL PANEL

NOTE: USE 5-SPACE 15'-7 1/2" W-BEAM GUARDRAIL PANEL AT THE DOWNSTREAM END OF AN END UNIT OR EXISTING GUARDRAIL THAT DOES NOT OFFSET THE W-BEAM PANEL SPLICE TO MIDSPAN

STATE OF NORTH CAROLINA
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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 3 OF 8
862D02



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STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION	SHEET 6 OF 8 862D02
SYSTEM PARTS		
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.		

STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.	ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION	SHEET 5 OF 8 862D02
TYPICAL GUARDRAIL AND GUARDRAIL POST ALTERNATIVES		
NOTES: A - 5/8" DIA. BUTTON HEAD SPLICE BOLT 1 1/4" LONG (8 REG. PER SPLICE JOINT). B - 5/8" DIA. BUTTON HEAD BOLT 7 1/2" / 9" LONG WITH NUT FOR BOLTING 6" / 8" ROUTED OFFSET BLOCK TO STEEL POSTS. C - FIELD PUNCHING OF HOLES INTO GUARDRAIL AS DIRECTED BY THE ENGINEER.		
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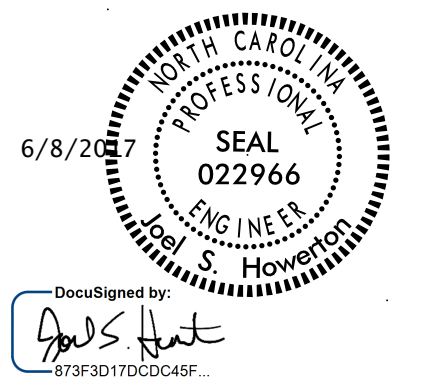
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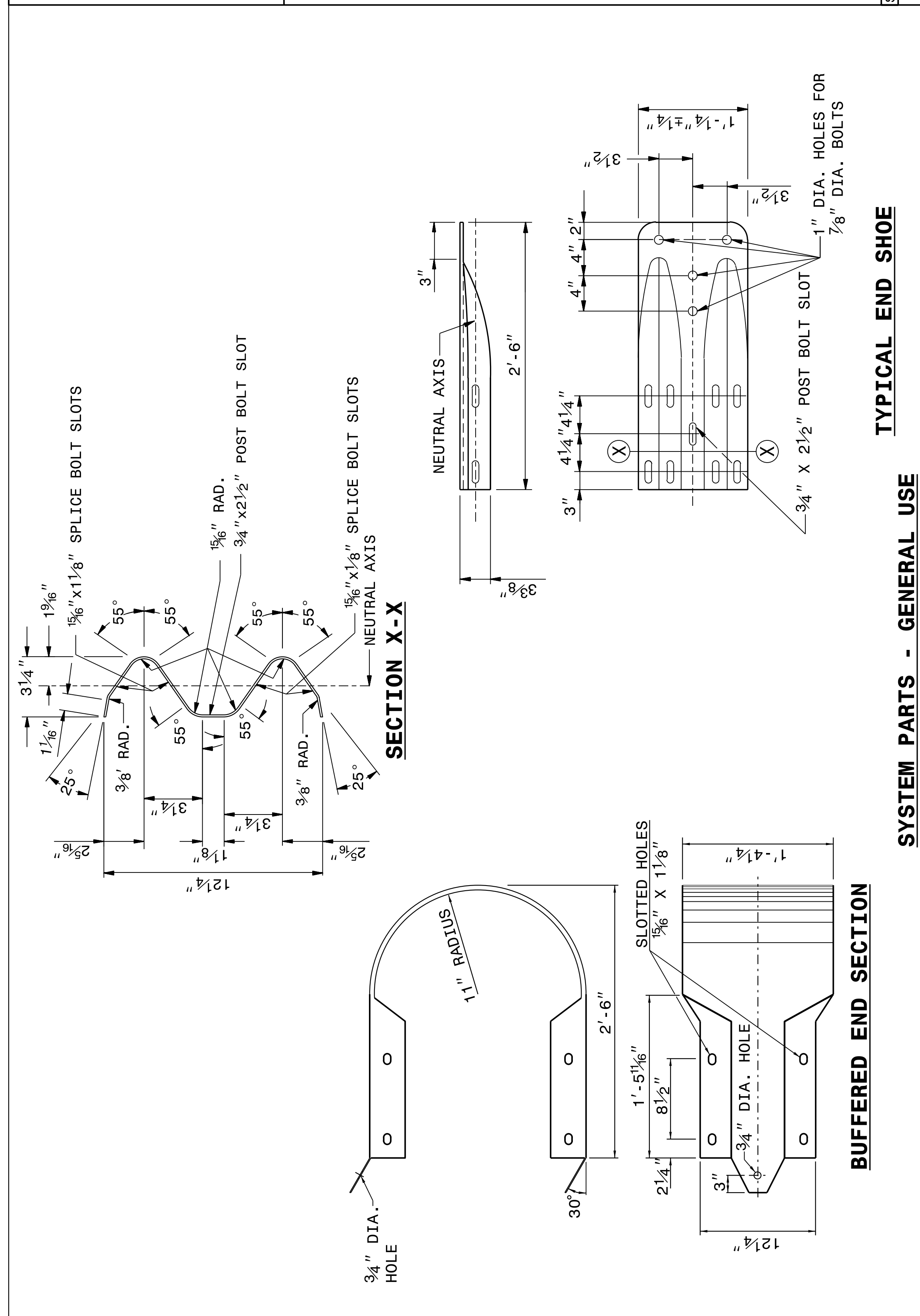


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ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION

SHEET 8 OF 8
862D02



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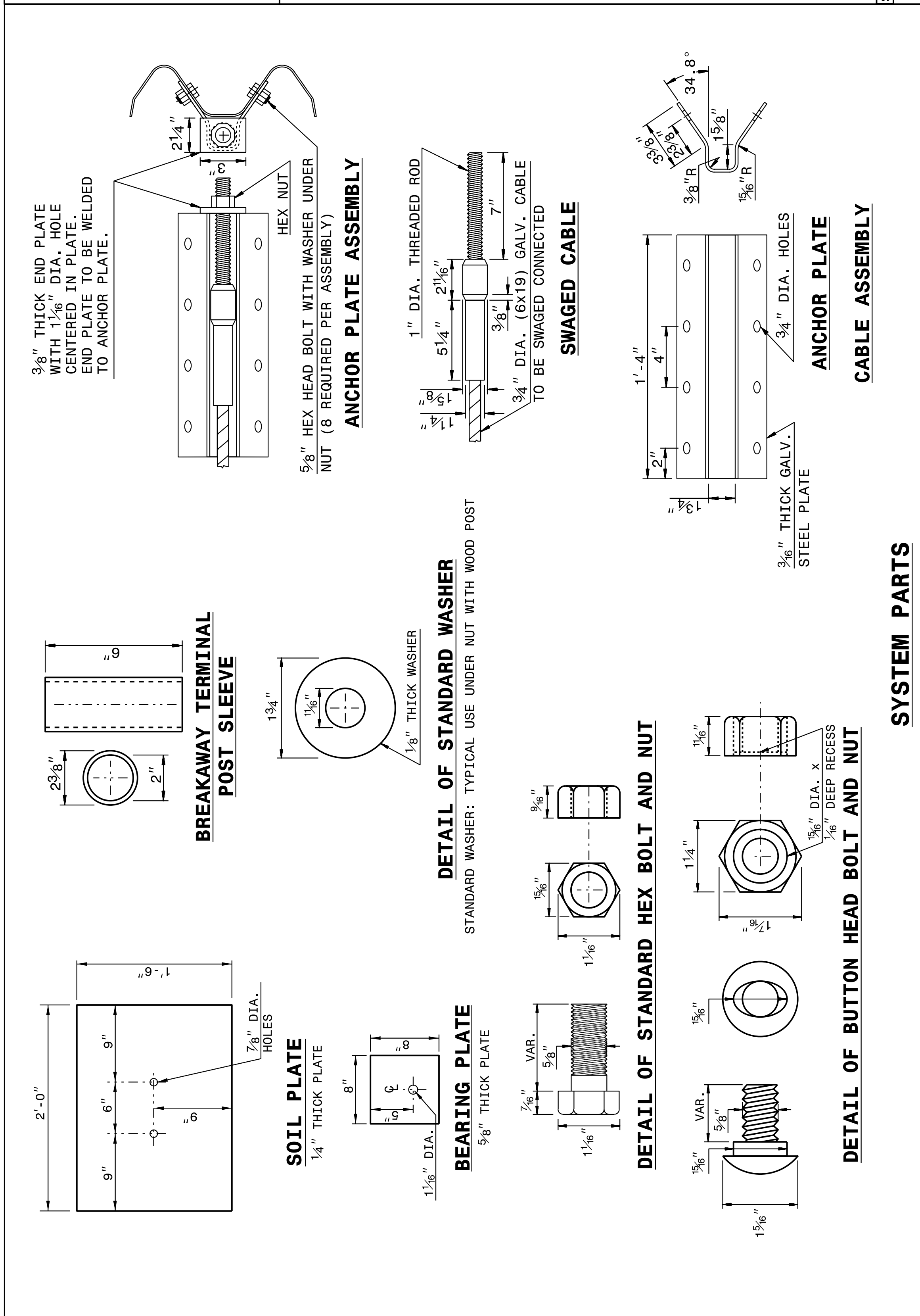
ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION

SHEET 8 OF 8
862D02

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ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION

SHEET 7 OF 8
862D02



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ROADWAY DETAIL DRAWING FOR GUARDRAIL INSTALLATION

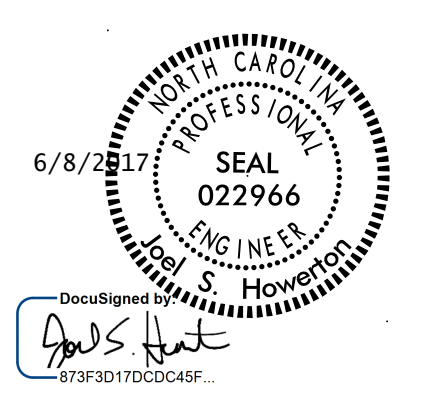
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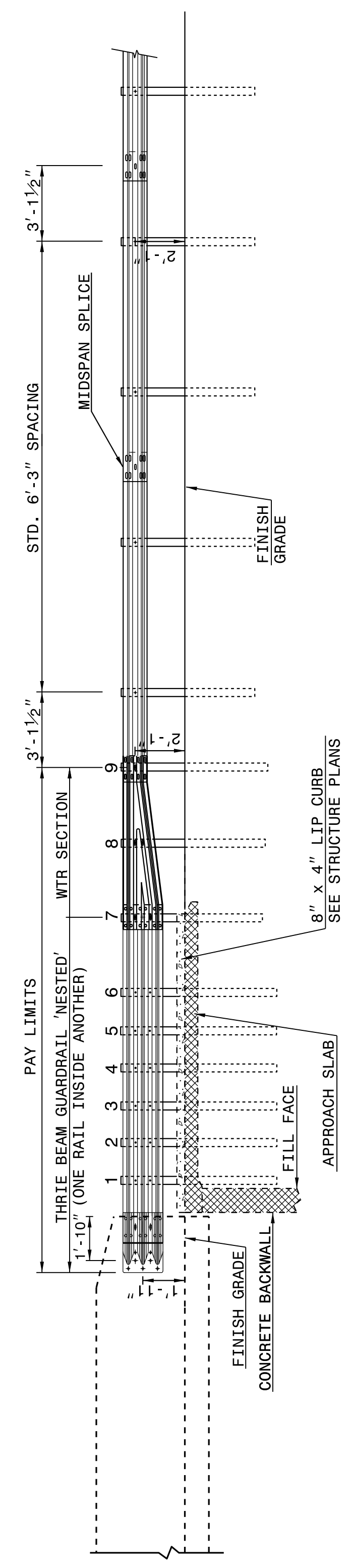
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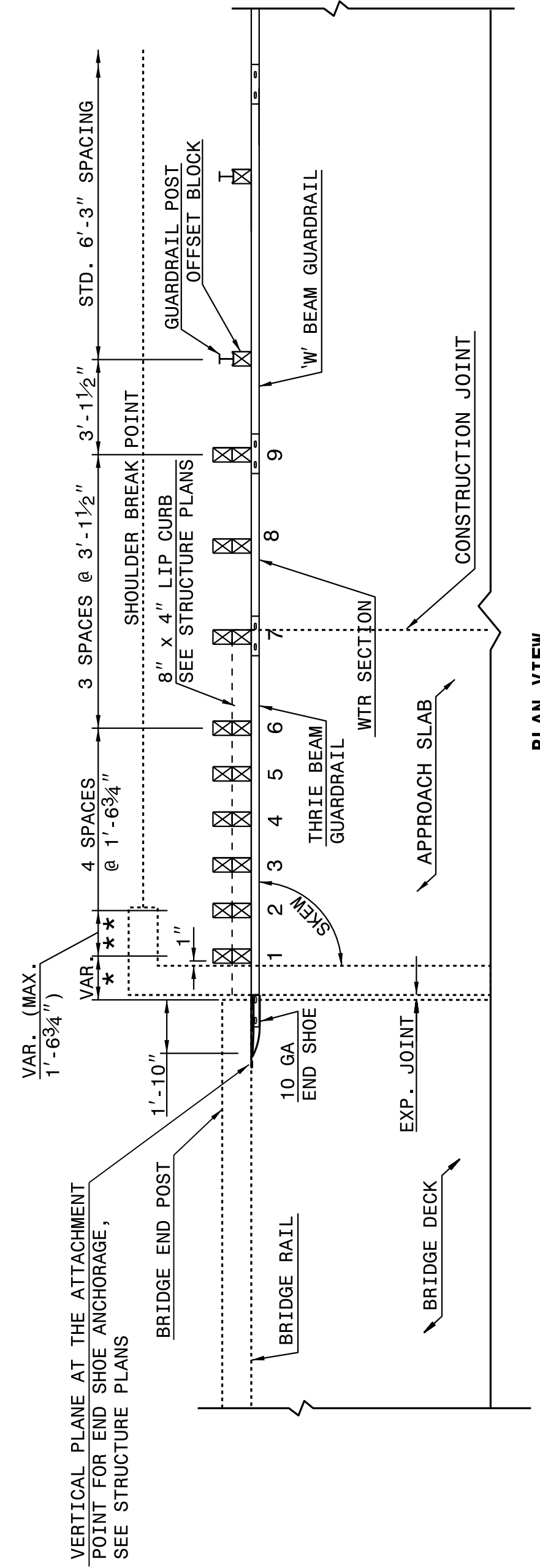
ROADWAY DETAIL DRAWING FOR GUARDRAIL ANCHOR UNITS, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE - SUB REGIONAL TIER

SHEET 2 OF 7 **862D03**



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 11 1/2" IF CONCRETE BACKWALL IS NOT PRESENT.
 -SHOULDER BERM GUTTER MUST BE INSTALLED TO THE LIMITS 8" X 4" LIP CURB IS SHOWN IF ANCHOR UNIT IS NOT ADJACENT TO AN APPROACH SLAB.
 -MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER).
 -LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
 -SEE SHEET 5 FOR POST SECTIONS 1 THRU 9.



PLAN VIEW

GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE - SUB REGIONAL TIER

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

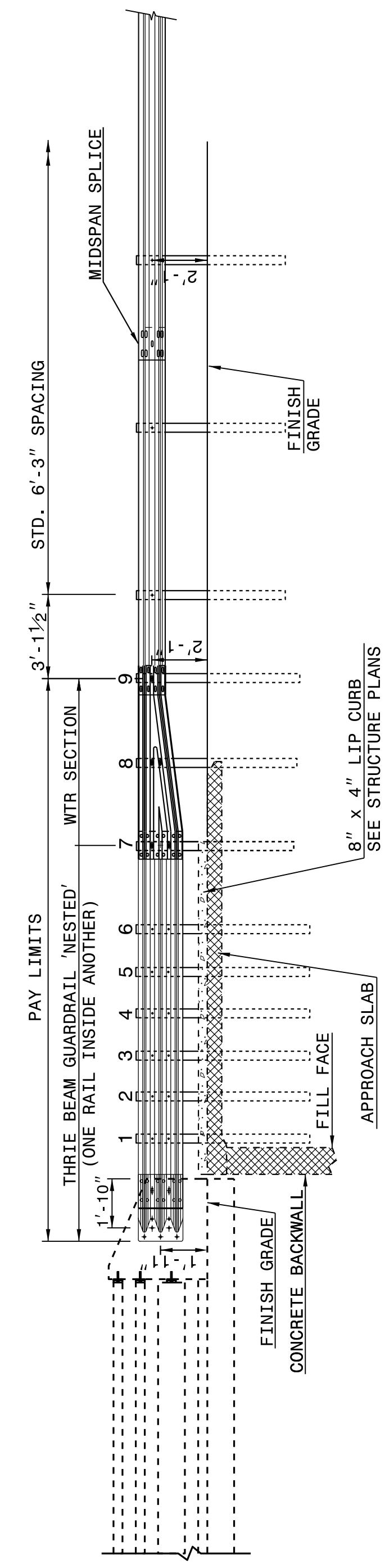
ROADWAY DETAIL DRAWING FOR GUARDRAIL ANCHOR UNITS, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE - SUB REGIONAL TIER

SHEET 2 OF 7 **862D03**

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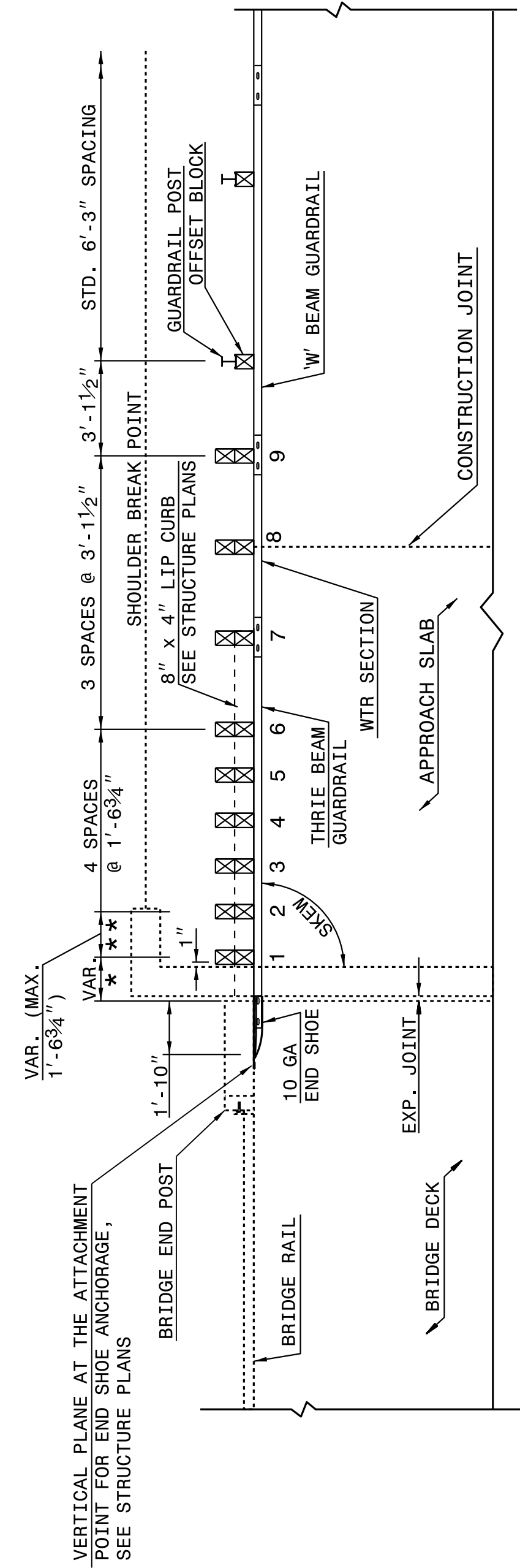
ROADWAY DETAIL DRAWING FOR GUARDRAIL ANCHOR UNITS, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE

SHEET 1 OF 7 **862D03**



ELEVATION

NOTE:
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 -MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER).
 -LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
 -SEE SHEET 5 FOR POST SECTIONS 1 THRU 9.



PLAN VIEW

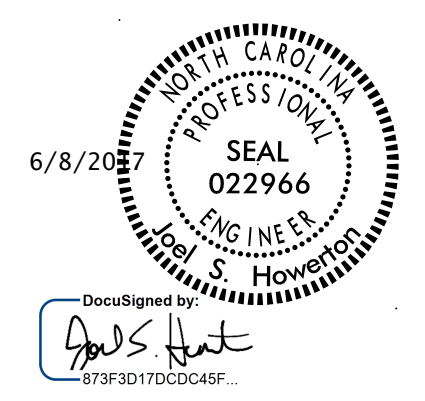
GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE

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

ROADWAY DETAIL DRAWING FOR GUARDRAIL ANCHOR UNITS, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE

SHEET 1 OF 7 **862D03**

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL ANCHOR UNIT
GUARDRAIL ANCHOR UNIT TYPE B-77
FOR F-SHAPE BARRIER

SHEET 4 OF 7
862D03

ELEVATION

PLAN

GENERAL NOTES:

- POSTS 1 THROUGH 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKOUTS AND/OR RUBRAIL. RUBRAIL SHALL BE SECURED TO POSTS 1 AND 5. RUBRAIL IS SECURED TO POST 5 WITH A 5/8" x 4 1/2" BUTTONHEAD BOLT. RUBRAIL IS FLARED TO BACK OF POST 6 AND NOT SECURED.
- POSTS 1 THROUGH 5 REQUIRE LOWER BLOCKOUTS AND/OR RUBRAIL. RUBRAIL SHALL BE SECURED TO POSTS 1 AND 5. RUBRAIL IS SECURED TO POST 5 WITH A 5/8" x 4 1/2" BUTTONHEAD BOLT. RUBRAIL IS FLARED TO BACK OF POST 6 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 BUTTONHEAD BOLT AND RECTANGULAR PLATE WASHER.
- SECTION OF SLOPED RUBRAIL BLOCKOUT, BLOCKOUTS ATTACHED TO RAIL ELEMENT ONLY. USE 3/8" x 3" LAG BOLT WITH FLAT WASHER.
- SECTION OF SLOPED RUBRAIL BLOCKOUT, BLOCKOUTS ATTACHED TO RAIL ELEMENT ONLY. USE 3/8" x 3" LAG BOLT WITH FLAT WASHER.
- ANCHORAGE: (a) AT EXISTING BRIDGE RAIL AND NEW OR EXISTING BARRIERS, ANCHOR RUBRAIL USING THREE 5/8" x 6" CHEMICALLY ANCHORED BOLTS WITH WASHERS. MAXIMUM PROJECTION FOR BOLTS IS 1/2". ANCHOR THE W-BEAM END SHOE USING A 4" BOLT HOLD DOWN PLATE (SEE STD. DWG. 862.04). (b) AT NEW BRIDGE RAIL, ANCHOR THE W-BEAM END SHOE USING PRECAST REINFORCED CONCRETE BARRIER (SEE STD. DWG. 857.01). (c) AT NEW BRIDGE RAIL, ANCHOR THE W-BEAM END SHOE AND RUBRAIL 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.

STATE OF NORTH CAROLINA
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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL ANCHOR UNIT
GUARDRAIL ANCHOR UNIT TYPE B-77
FOR F-SHAPE BARRIER

SHEET 4 OF 7
862D03

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

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III

SHEET 3 OF 7
862D03

SECTION OF WTR BEAM POST 8

SECTION OF 'W' BEAM POST 9

GENERAL NOTES:

- SECTION OF SLOPED RUBRAIL BLOCKOUT, BLOCKOUTS ATTACHED TO RAIL ELEMENT ONLY. USE 3/8" x 3" LAG BOLT WITH FLAT WASHER.
- SECTION OF SLOPED RUBRAIL BLOCKOUT, BLOCKOUTS ATTACHED TO RAIL ELEMENT ONLY. USE 3/8" x 3" LAG BOLT WITH FLAT WASHER.
- ANCHORAGE: (a) AT EXISTING BRIDGE RAIL AND NEW OR EXISTING BARRIERS, ANCHOR RUBRAIL USING THREE 5/8" x 6" CHEMICALLY ANCHORED BOLTS WITH WASHERS. MAXIMUM PROJECTION FOR BOLTS IS 1/2". ANCHOR THE W-BEAM END SHOE USING A 4" BOLT HOLD DOWN PLATE (SEE STD. DWG. 862.04). (b) AT NEW BRIDGE RAIL, ANCHOR THE W-BEAM END SHOE USING PRECAST REINFORCED CONCRETE BARRIER (SEE STD. DWG. 857.01). (c) AT NEW BRIDGE RAIL, ANCHOR THE W-BEAM END SHOE AND RUBRAIL 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.

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

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III

SHEET 3 OF 7
862D03

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

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III

SHEET 3 OF 7
862D03

SECTION OF WTR BEAM POST 8

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GENERAL NOTES:

- SECTION OF SLOPED RUBRAIL BLOCKOUT, BLOCKOUTS ATTACHED TO RAIL ELEMENT ONLY. USE 3/8" x 3" LAG BOLT WITH FLAT WASHER.
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- POSTS 1 AND 2 ARE W6 x 13, 7'-6" LONG. ALL OTHER POSTS IN THE ANCHOR UNIT ARE W6 x 8.5.

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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT TYPE B-83

SHEET 6 OF 7
862D03

ELEVATION VIEW

NOTE:
 **ELIMINATE POST 3 AND SHIFT POSTS 1 & 2 ON SKEW ANGLES GREATER THAN 15° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
 -POSTS 1 AND 2 ARE TO BE W8 X 21 X 8'-0" LONG STEEL POSTS WITH 4 BOLT HOLD DOWN PLATE AS SHOWN IN STANDARD 862.04
 -ANCHOR THE W-BEAM END SIDE USING A 4 BOLT HOLD DOWN PLATE AS SHOWN IN STANDARD 862.04
 -LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
 -USE NO WOOD POSTS WITHIN THE GUARDRAIL ANCHOR UNIT LIMITS.
 -USE WOOD GUARDRAIL END POSTS FROM THE TOP OF EXISTING SURFACE (SHOULDER, BERM, OR GUTTER).
 -MIDSPAN SPLICE FROM THE TOP OF EXISTING SURFACE (SHOULDER, BERM, OR GUTTER).
 -CONCRETE BRIDGE RAIL (ONE RAIL INSIDE ANOTHER)
 -10 GA ENDSHOE
 -BRIDGE DECK
 -CONCRETE BACKWALL
 -FILL FACE
 -APPROACH SLAB
 -TRANSITION
 -7'-0" TRANSITION
 -SHOULDER BERM GUTTER
 -"W" BEAM GUARDRAIL
 -MIDSPAN SPLICE
 -15'-7 1/2" STANDARD GUARDRAIL
 -FIRST SPLICE POINT FROM BRIDGE
 -"W" BEAM GUARDRAIL
 -SHOULDER BERM GUTTER

SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

PLAN VIEW

SECTION A-A

SECTION B-B

STATE OF NORTH CAROLINA
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RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNIT
GUARDRAIL ANCHOR UNIT TYPE B-77
FOR F-SHAPE BARRIER

SHEET 5 OF 7
862D03

SECTION A-A

POST	THICKNESS	BOLT LENGTH
1	4 1/4"	9"
2	3 1/4"	5"
3	2"	6"
4	1"	3"

* BOLTS FOR POSTS 3 AND 4 ARE USED TO ATTACH TO BLOCK. RUBRAIL NOT ATTACHED TO BLOCK.

SECTION C-C

SECTION D-D

SECTION E-E

SECTION F-F

SECTION G-G

SECTION H-H

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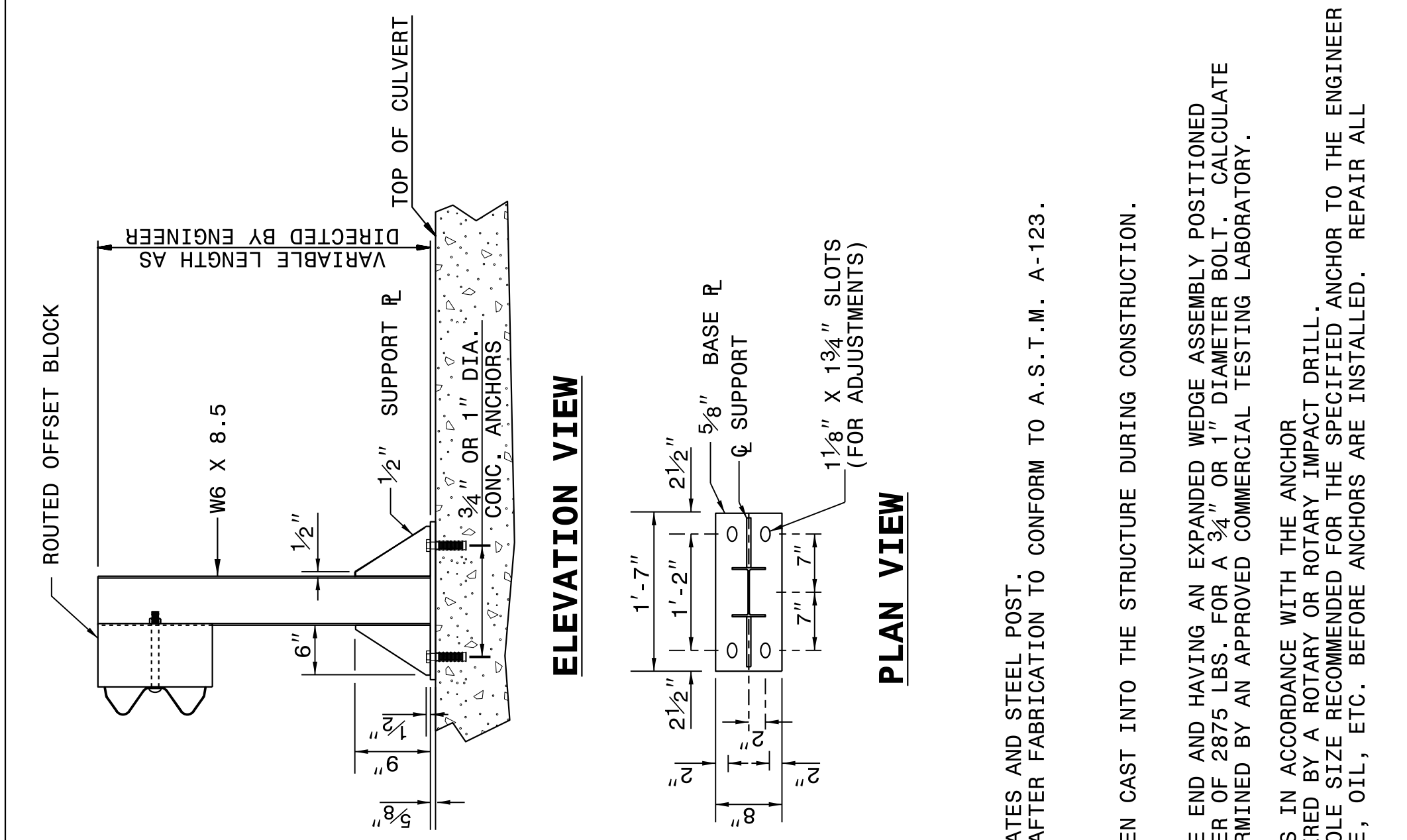
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PROJECT REFERENCE NO.	SHEET NO.
B-5348	2C-14

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

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

SHEET 7 OF 7
862D03



ELEVATION VIEW
 GUARDRAIL ANCHOR ASSEMBLY ASSEMBLED AND INSTALLED IN ACCORDANCE WITH STRUCTURE PLANS (SEE NOTES)

PLAN VIEW

NOTES FOR:
 GUARDRAIL POST ANCHORED TO STRUCTURE:
 -USE FULL LENGTH 1/4" BUTT WELDS AT ALL LOCATIONS OF CONTACT BETWEEN THE BASE PLATE, SUPPORT PLATES AND STEEL POST.
 -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.

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 3/4" OR 1" DIAMETER BOLT. CALCULATE HOLDING POWER BASED ON 1/4 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.

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

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

SHEET 7 OF 7
862D03

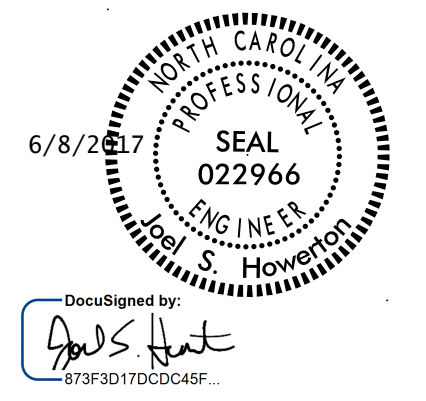
ANCHORAGE FOR GUARDRAIL POST ON BOX CULVERT

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STATE OF NORTH CAROLINA
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SUMMARY OF QUANTITIES

SUMMARY OF EARTHWORK IN CUBIC YARDS

STATION	STATION	UNCL. EXCAV.	EMBANK. +%	BORROW	WASTE
SUMMARY NO. 1					
-L- STA. 12+50.00	-L- STA. 13+98.38	89	277	188	
SUMMARY NO. 1 TOTALS		89	277	188	
SUMMARY NO. 2					
-L- STA. 15+02.63	-L- STA. 16+00.00	128			50
ADDITIONAL EXCAV (SEE PSH 4)		310			310
SUMMARY NO. 2 TOTALS		438			
TOTALS:		527	355	188	360
EARTH TO REPLACE BORROW				-188	-188
PROJECT TOTALS:		527	355		172
GRAND TOTALS:		527			
SAY:		600			
UNDERCUT EXCAVATION = 200 CY (Geotechnical Letter January 14, 2016)					
SELECT GRANULAR MATERIAL = 100 CY (Geotechnical Letter January 14, 2016)					
GEOTEXTILE FOR SOIL STABILIZATION = 500 SY (Geotechnical Letter January 14, 2016 & EC Plans)					
SHALLOW UNDERCUT = 100 CY (Geotechnical Letter January 14, 2016)					
CLASS IV SUBGRADE STABILIZATION = 200 TONS (Geotechnical Letter January 14, 2016)					

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

Note: Approximate quantities only. Unclassified Excavation, Fine Grading, Clearing and 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

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	GREU, TL-3	TYPE III	EA G NG											
-L-	12+79.63	13+98.38	LT	118.75				13+98.38	4.75	9		100.00		2.00												114.5		
-L-	15+02.63	15+83.88	LT	81.25				15+02.63	4.75	9	62.5		1.25													114.5		
-L-	12+79.63	13+98.38	RT	118.75				13+98.38	4.75	9	100.00		2.00													139.5		
-L-	15+02.63	15+83.88	RT	81.25				15+02.63	4.75	9		62.5	1.25													139.5		
		SUBTOTAL		400.00														4	4									
		LESS DEDUCTIONS FOR ANCHORS: GREU, TL-3 4 @ 50 =		-200.00																								
		TYPE-III 4 @ 18.75 =		-75.00																								
			PROJECT TOTAL	125.00														4	4							508.0		
			SAY	175.00																								
							ADDITIONAL GUARDRAIL POSTS = 5 EA.																					

REMOVAL OF EXISTING ASPHALT PAVEMENT SUMMARY

SURVEY LINE	STATION	STATION	LOCATION L/R/T/CL	YD ²
-L-	12+50.00	14+18.37	CL	413.42
-L-	14+69.47	16+00.00	CL	321.31
		TOTAL:		734.72
		SAY:		780

SHOULDER BERM GUTTER SUMMARY

SURVEY LINE	STATION	STATION	LOCATION	LENGTH
-L-	STA. 13+53.00	STA. 13+87.50	LT	34.5
-L-	STA. 13+53.00	STA. 13+87.50	RT	34.5
		TOTAL:		69
		SAY:		73

COMPUTED BY: CHL DATE: 4/3/17
CHECKED BY: WSH DATE: 4/3/17

PROJECT NO. B-5348 SHEET NO. 3D-1

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

Note: Invert Elevations indicated are for Bid Purposes only and shall not be used for project construction stakeout.
See "Standard Specifications For Roads and Structures, Section 300-5".

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

Table with columns for Line & Station, Structure Number, Invert Elevation, Minimum Required Slope, Drainage Pipe (RCP, CSP, CAAP, HDPE, or PVC), R. C. Pipe Class IV, Quantities for Drainage Structures, Frame, Grates, and Hood, Concrete Transitional Section, and Remarks. Includes sub-totals for SHEET TOTALS and PROJECT TOTALS.

ABBREVIATIONS
C.A.A. CORRUGATED ALUMINIUM ALLOY
C.B. CATCH BASIN
C.S. CORRUGATED STEEL
D.I. DROP INLET
G.D.I. GRATED DROP INLET
H.D.P.E. HIGH DENSITY POLYETHYLENE
J.B. JUNCTION BOX
M.H. MANHOLE
N.S. NARROW SLOT
P.V.C. POLYVINYL CHLORIDE
R.C. REINFORCED CONCRETE
T.B.D.I. TRAFFIC BEARING DROP INLET
T.B.J.B. TRAFFIC BEARING JUNCTION BOX
W.S. WIDE SLOT

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

SUMMARY OF GEOTECHNICAL QUANTITIES

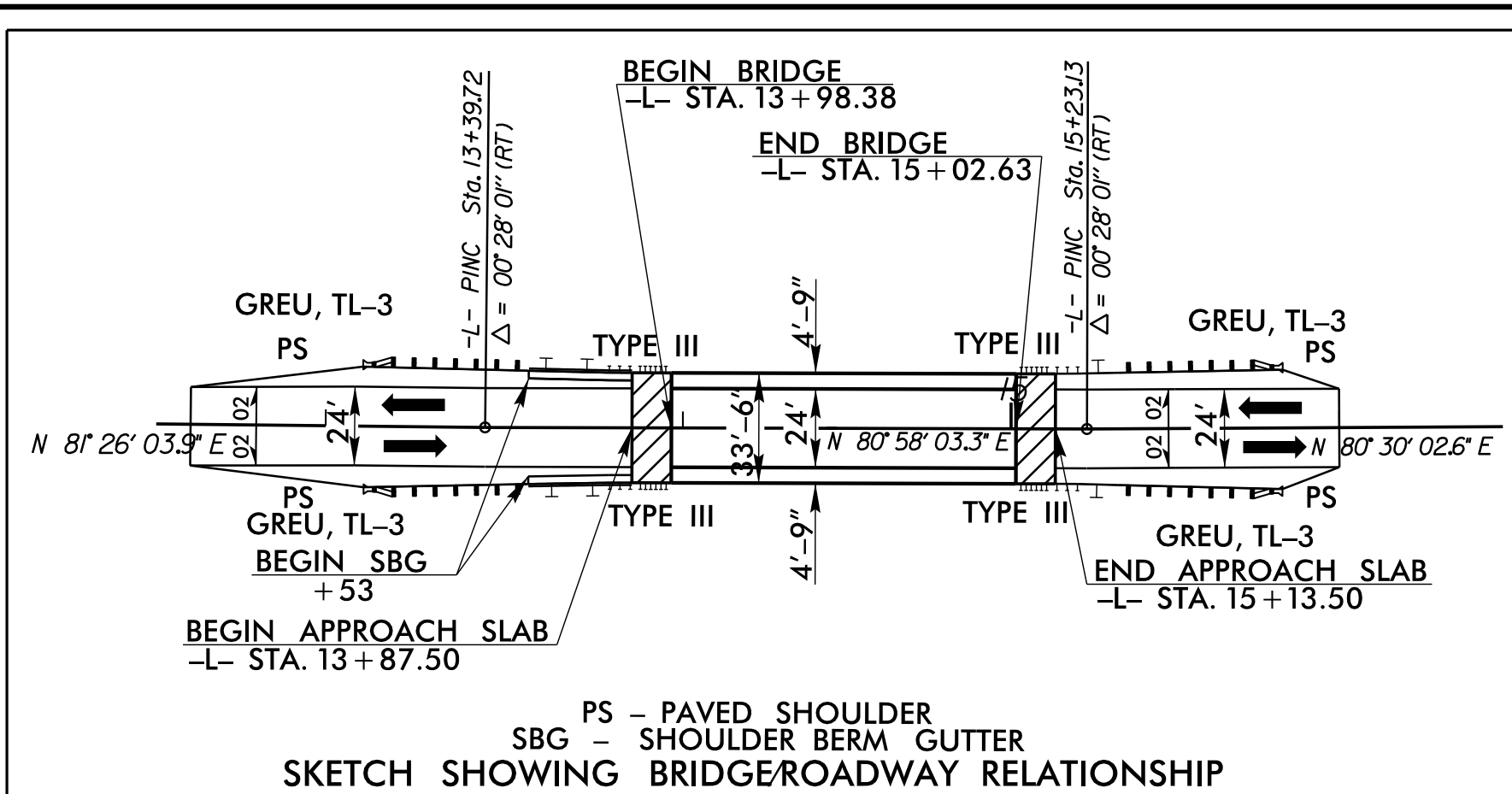
SUMMARY OF AGGREGATE SUBGRADE/STABILIZATION

LINE	STATION	STATION	Aggregate Type* ASU/AST	Aggregate Thickness INCHES	Shallow Undercut CY	Class IV Subgrade Stabilization TONS	Geotextile for Soil Stabilization SY	Stabilizer Aggregate TONS	Class IV Aggregate Stabilization
			ASU		100	200*	300**		
				TOTAL CY/TONS/SY:	100	200*	300**		

*ASU = Aggregate Subgrade
*AST = Aggregate Stabilization

**Total square yards of "Geotextile for Soil Stabilization" is only the estimated quantity for ASU/AST and may only represent a portion of the geotextile quantity shown in the Item Sheets of the Proposal.

8.17.17.99

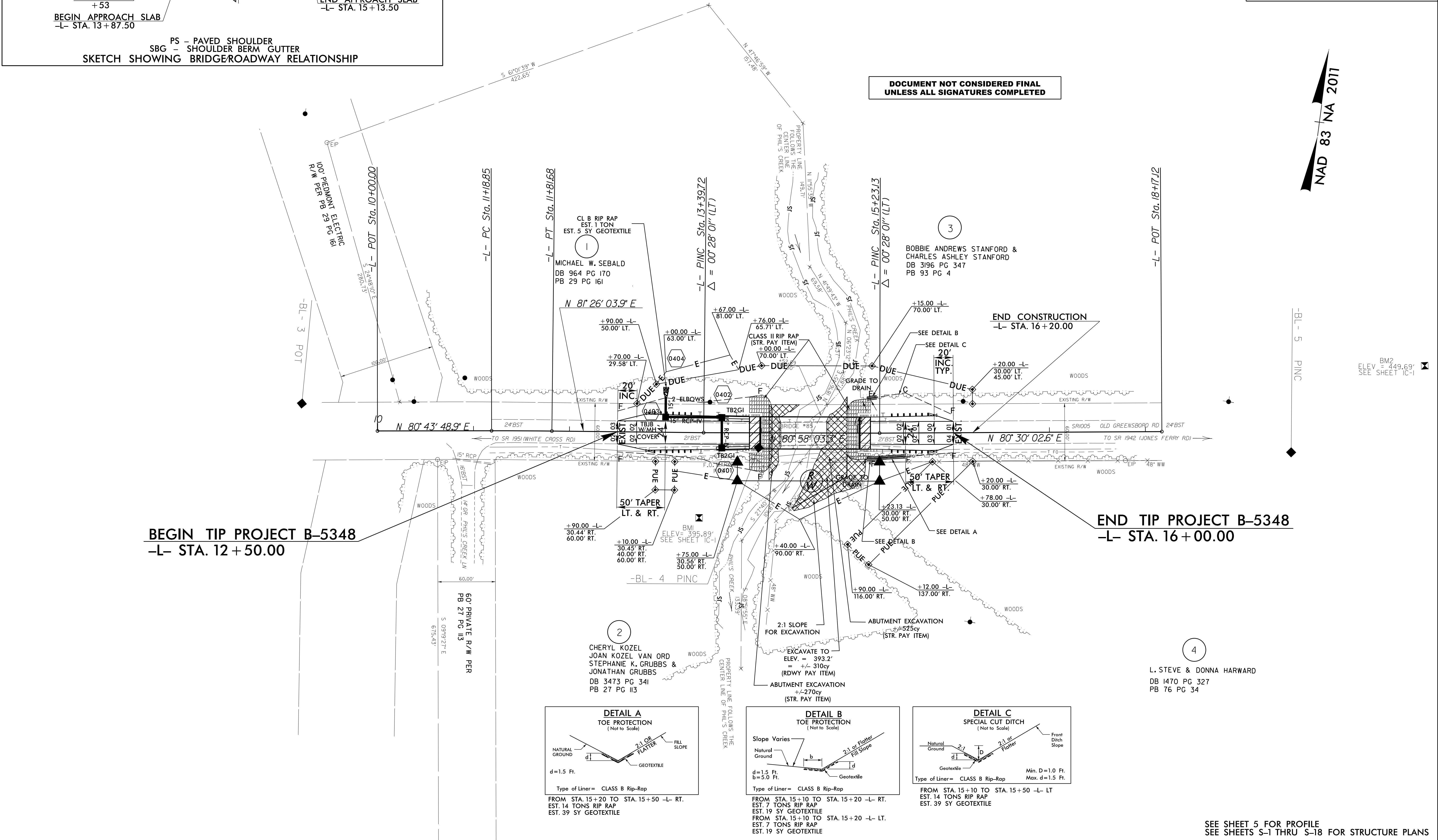


-L-
 PI Sta 11+50.27
 $\Delta = 0^\circ 42' 15.0''$ (RT)
 $D = 1' 07' 14.7''$
 $L = 62.83'$
 $T = 31.42'$
 $R = 5,112.28'$
 SE = SEE PLANS

PROJECT REFERENCE NO. B-5348	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER W. S. HOOD SEAL 014509 ENGINEER	HYDRAULICS ENGINEER Wm. H. Elam, Jr. SEAL 019721 ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

NAD 83 NA 2011



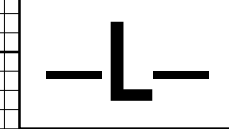
BM2
ELEV. = 449.69'
SEE SHEET 1C-1

07-JUN-2017 09:08
R:\Roadwork\B5348_Rdwy_psh4.dgn
W.S. Hood

SEE SHEET 5 FOR PROFILE
SEE SHEETS S-1 THRU S-18 FOR STRUCTURE PLANS

5/14/99

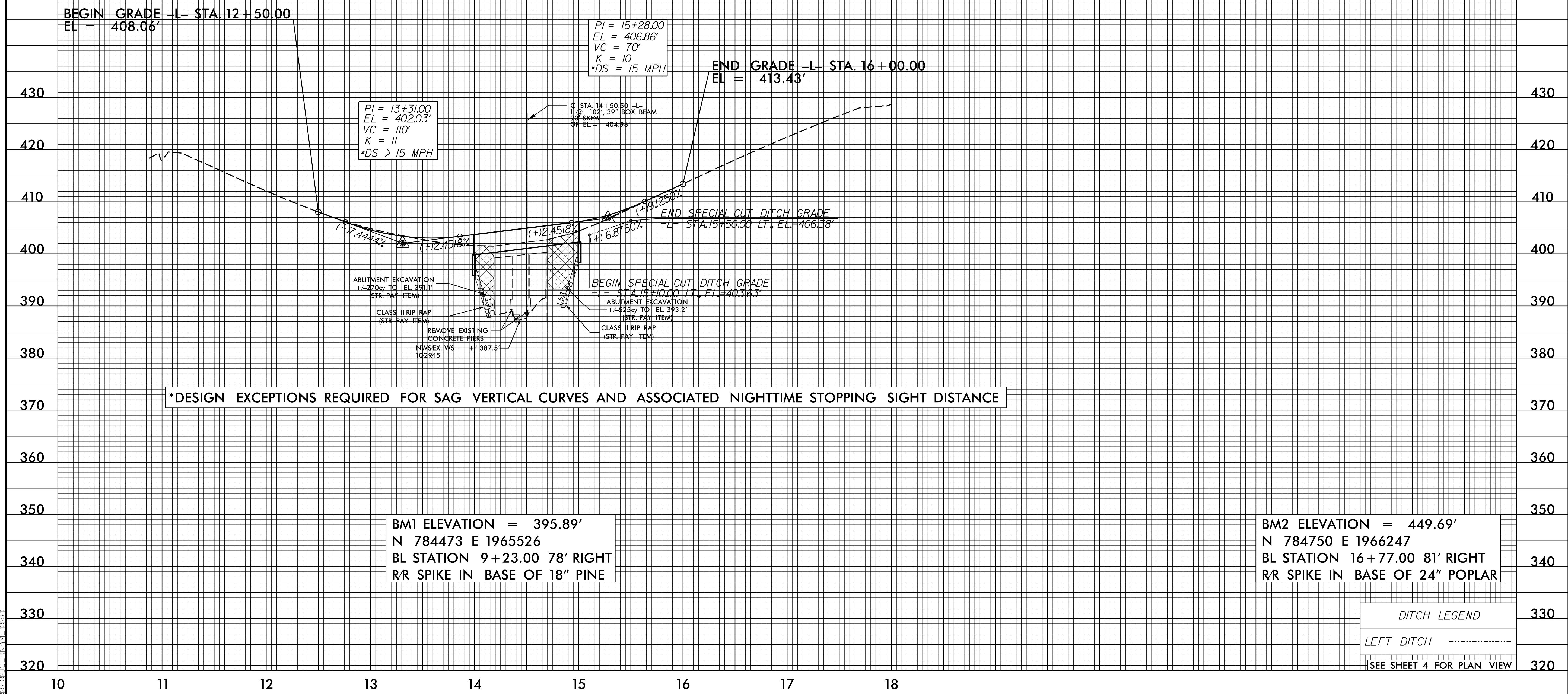
PROJECT REFERENCE NO. B-5348	SHEET NO. 5
ROADWAY DESIGN ENGINEER W. S. HOOD NORTH CAROLINA PROFESSIONAL SEAL 014509 5/9/2017	HYDRAULICS ENGINEER WILLIAM H. BLAM NORTH CAROLINA PROFESSIONAL SEAL 019721 5/8/2017
DocuSigned by W. S. Hood	DocuSigned by Wm. H. Blam, Jr.
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE = 1730 CFS
 DESIGN FREQUENCY = 25 YRS
 DESIGN HW ELEVATION = 396.30 FT
 BASE DISCHARGE = 2440 CFS
 BASE FREQUENCY = 100 YRS
 BASE HW ELEVATION = 397.42 FT
 OVERTOPPING DISCHARGE = 6300 CFS
 OVERTOPPING FREQUENCY = 500+ YRS
 OVERTOPPING ELEVATION = 403.04 FT

DATE OF SURVEY = 10-29-15
 W.S. ELEVATION AT DATE OF SURVEY = 387.50 +/- FT



07 JUN 2017 09:09
P:\ROAD\05348\Drawings\Profile.dgn
W.S.HOOD