

**This electronic collection of documents is provided
for the convenience of the user
and is Not a Certified Document –**

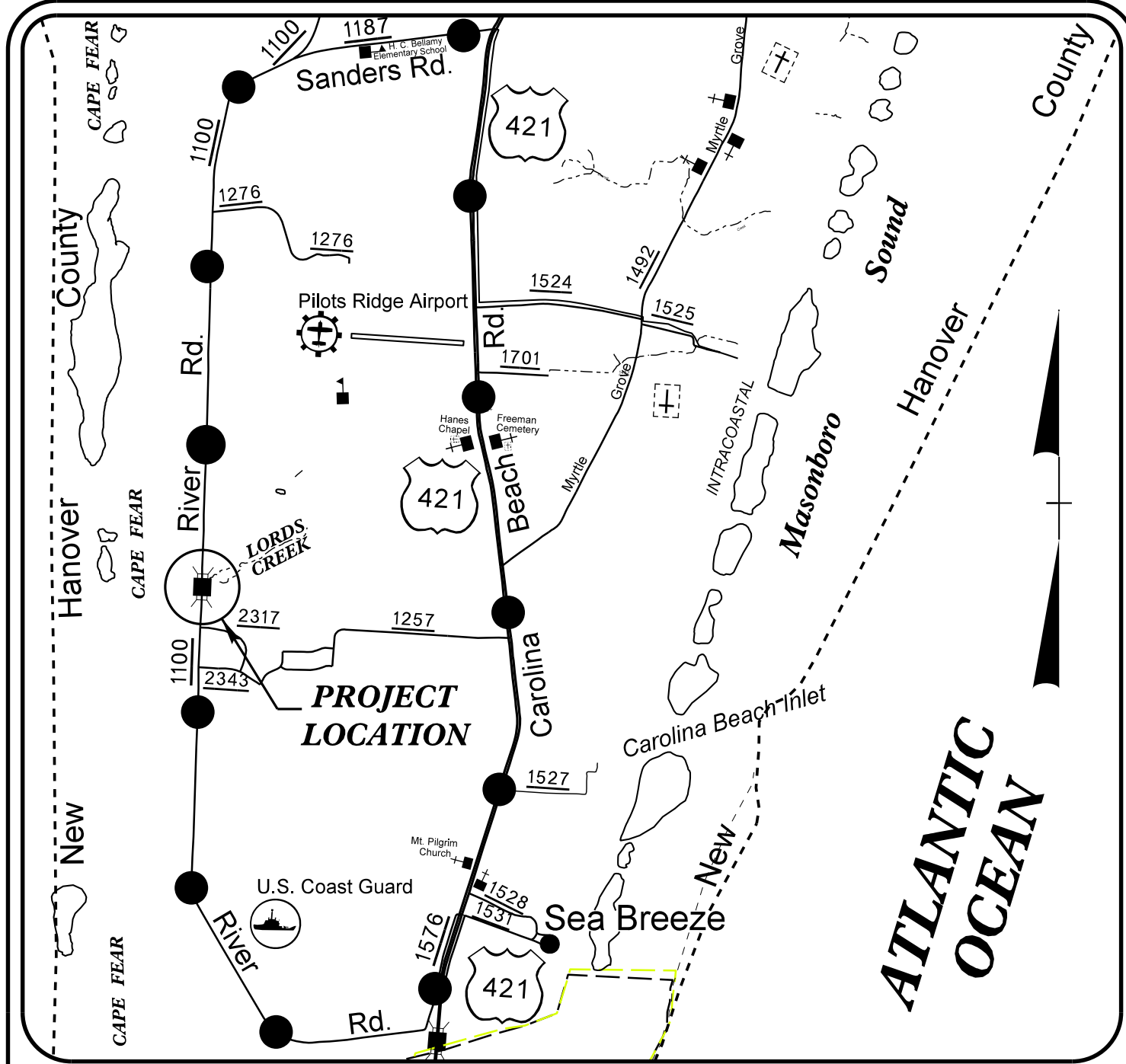
**The documents contained herein were originally issued
and sealed by the individuals whose names and license
numbers appear on each page, on the dates appearing
with their signature on that page.**

**This file or an individual page
shall not be considered a certified document.**

TIP PROJECT: B-5236

CONTRACT: C203957

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols
See Sheets 1C-1 thru 1C-3 For Survey Control



VICINITY MAP
(NOT TO SCALE)

OFF-SITE DETOUR

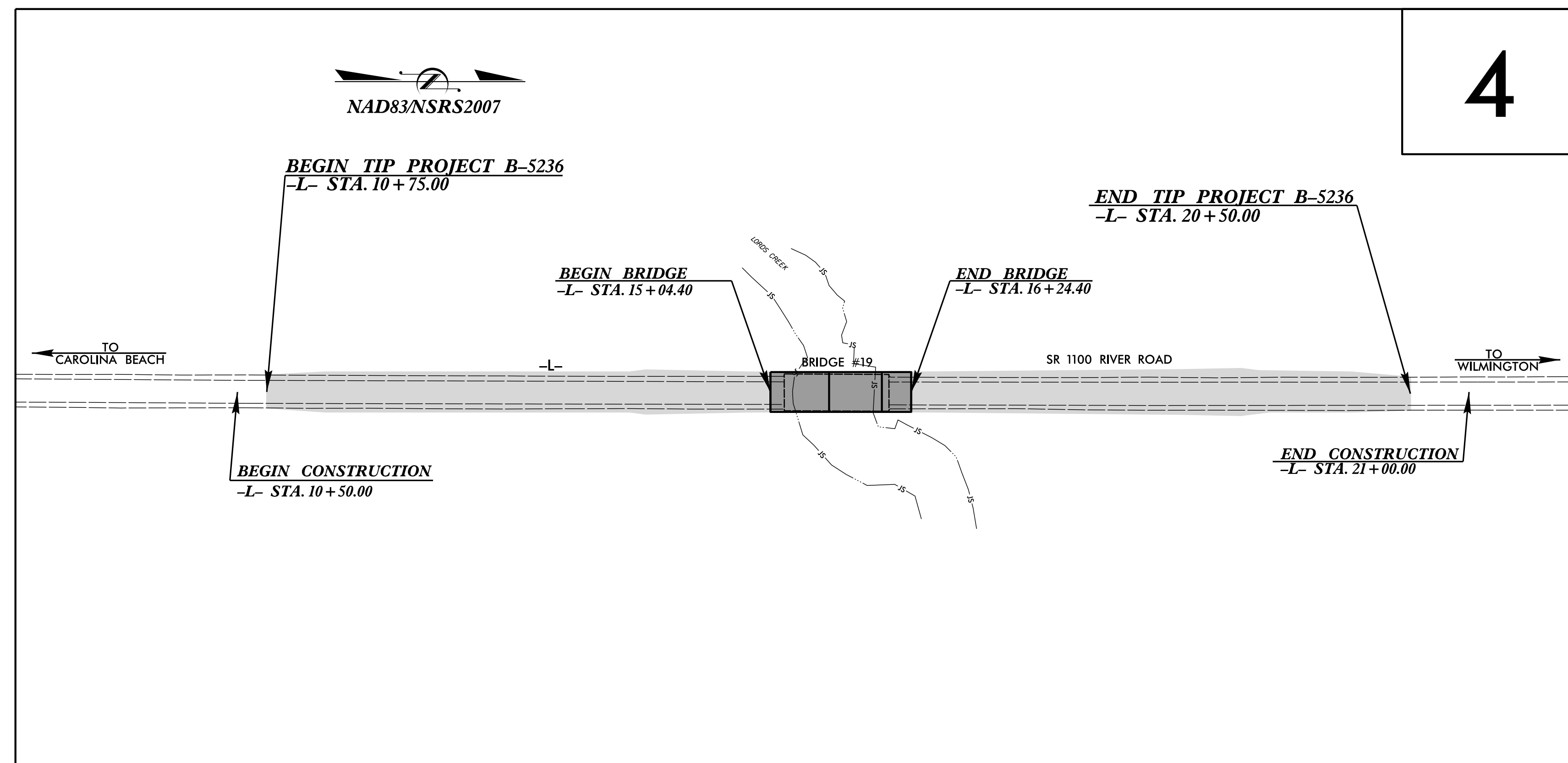
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

NEW HANOVER COUNTY

**LOCATION: REPLACE BRIDGE NO. 19 OVER LORDS CREEK
ON SR 1100**

TYPE OF WORK: GRADING, PAVING, DRAINAGE & STRUCTURE

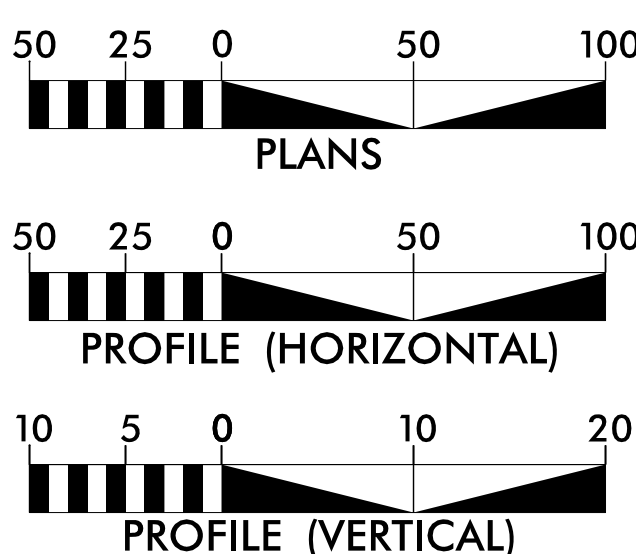
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5236	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
42840.1.1	BRZ-1100(29)	P.E.	
42840.2.1		RW & UTIL.	
42840.3.1		CONSTR.	



4

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

GRAPHIC SCALES



DESIGN DATA

ADT 2017 = 5400
ADT 2037 = 9075
K = 11 %
D = 80 %
T = 3 % *
V = 60 MPH
* (TTST = 1% + DUALS 2%)
FUNC CLASS = MINOR ARTERIAL
SUB-REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-5236 = 0.162 MI
LENGTH STRUCTURE TIP PROJECT B-5236 = 0.023 MI
TOTAL LENGTH TIP PROJECT B-5236 = 0.185 MI

Prepared in the Office of:
AMEC Foster Wheeler Environment & Infrastructure, Inc.
4021 Sitrup Creek Drive, Suite 100
Durham, North Carolina 27703
NC Engineering F-1253 NC Geology C-247
(919) 381-9900

2012 STANDARD SPECIFICATIONS

BILL HOOD, PE
PROJECT ENGINEER

CHRISTOPHER H. LEE
PROJECT DESIGN ENGINEER

GARY LOVERING, PE
PROJECT ENGINEER
NCDOT ROADWAY DESIGN

RIGHT OF WAY DATE:
AUGUST 15, 2016

LETTING DATE:
SEPTEMBER 19, 2017

HYDRAULICS ENGINEER

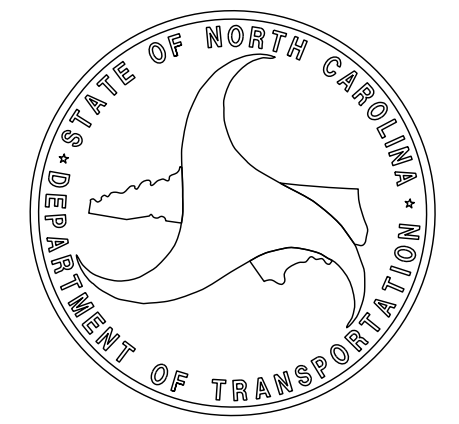
8/18/2017 SEAL 023993
MAX S. PRICE
P.E.

DocuSigned by:
Max S. Price
SIGNATURE: _____

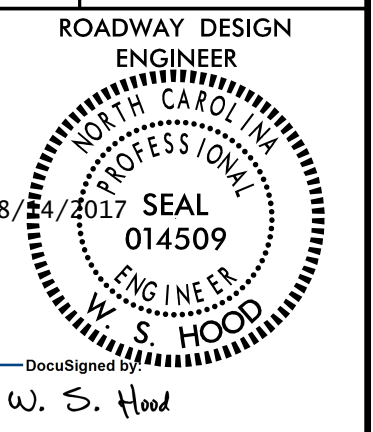
ROADWAY DESIGN ENGINEER

8/18/2017 SEAL 014509
W. S. HOOD
P.E.

DocuSigned by:
W. S. Hood
SIGNATURE: _____



8/17/17



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

CONTRACT: C203957
TIP PROJECT: B-5236
COUNTY: NEW HANOVER

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 THRU 1C-3	SURVEY CONTROL SHEETS
2A-1	PAVEMENT SCHEDULE AND TYPICAL SECTIONS
2C-1 THRU 2C-6 2C-7 THRU 2C-10 2C-11 THRU 2C-14 2C-15	GUARDRAIL PLACEMENT GUARDRAIL INSTALLATION STRUCTURE ANCHOR UNITS METHOD OF CLEARING - MODIFIED METHOD III
2G-1	ROCK EMBANKMENTS/ROCK PLATING DETAILS & NOTES
3B-1	ROADWAY SUMMARY (earthwork, guardrail, etc) GUARDRAIL SUMMARY EARTHWORK SUMMARY BREAKING OF EXISTING ASPHALT PAVEMENT SUMMARY REMOVAL OF EXISTING ASPHALT PAVEMENT SUMMARY SHOULDER BERM GUTTER SUMMARY
3D-1	DRAINAGE SUMMARY
3G-1	GEOTECHNICAL SUMMARIES SUMMARY OF SUBSURFACE DRAINAGE SUMMARY OF ROCK PLATING SUMMARY OF AGGREGATE SUBGRADE/STABILIZATION
4	PLAN SHEET
5	PROFILE SHEET
TMP-1 THRU TMP-4	TRANSPORTATION MANAGEMENT PLANS
PMP-1	PAVEMENT MARKING PLAN
EC-1 THRU EC-5	EROSION CONTROL PLANS
SIGN-1	SIGNING PLAN
UC-1 THRU UC-4	UTILITY CONSTRUCTION PLANS
UO-1 THRU UO-2	UTILITY BY OTHERS PLANS
X-1A	CROSS SECTION SUMMARY
X-1 THRU X-6	CROSS SECTIONS
S-1 THRU S-35	STRUCTURE PLANS

2012 ROADWAY ENGLISH STANDARD DRAWINGS

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	
225.02	Guide for Grading Subgrade - Secondary and Local
225.04	Method of Obtaining Superlevation - Two Lane Pavement
DIVISION 3 - PIPE CULVERTS	
300.01	Method of Pipe Installation
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	
815.02	Subsurface Drain
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
840.35	Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates
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
876.02	Guide for Rip Rap at Pipe Outlets

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

GRADE LINE:
GRADING AND SURFACING:

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:

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY MODIFIED METHOD III (SEE DETAIL 2C-15).

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

SUBSURFACE DRAINS:

SUBSURFACE DRAINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH STD. NO. 815.02 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.

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

WATER - AQUA Inc.
SEWER - AQUA Inc.
TELECOMMUNICATIONS - AT&T

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS, EXCEPT AS SHOWN ON THE PLANS.

RIGHT-OF-WAY MARKERS:

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

I:\AUG-2017\1212
 PC\PROJECTS\1212\B5236\RDY_tsh_01A.dgn
 8/17/2017 10:11:11 AM

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	-----
New Right of Way Line with Pin and Cap	-----
New Right of Way Line with Concrete or Granite R/W Marker	-----
New Control of Access Line with Concrete C/A Marker	-----
Existing Control of Access	-----
New Control of Access	-----
Existing Easement Line	-----
New Temporary Construction Easement	-----
New Temporary Drainage Easement	-----
New Permanent Drainage Easement	-----
New Permanent Drainage / Utility Easement	-----
New Permanent Utility Easement	-----
New Temporary Utility Easement	-----
New Aerial Utility Easement	-----

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	-----
Proposed Guardrail	-----
Existing Cable Guiderail	-----
Proposed Cable Guiderail	-----
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	-----
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:

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	●
U/G Power Line LOS B (S.U.E.*)	-----
U/G Power Line LOS C (S.U.E.*)	-----
U/G Power Line LOS D (S.U.E.*)	-----

TELEPHONE:

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

WATER:

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

TV:

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

GAS:

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

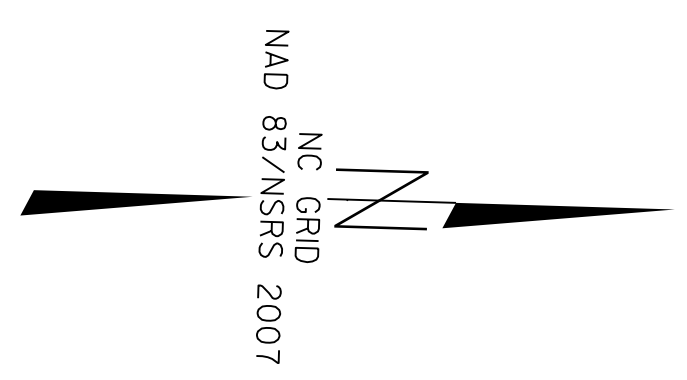
SANITARY SEWER:

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

MISCELLANEOUS:

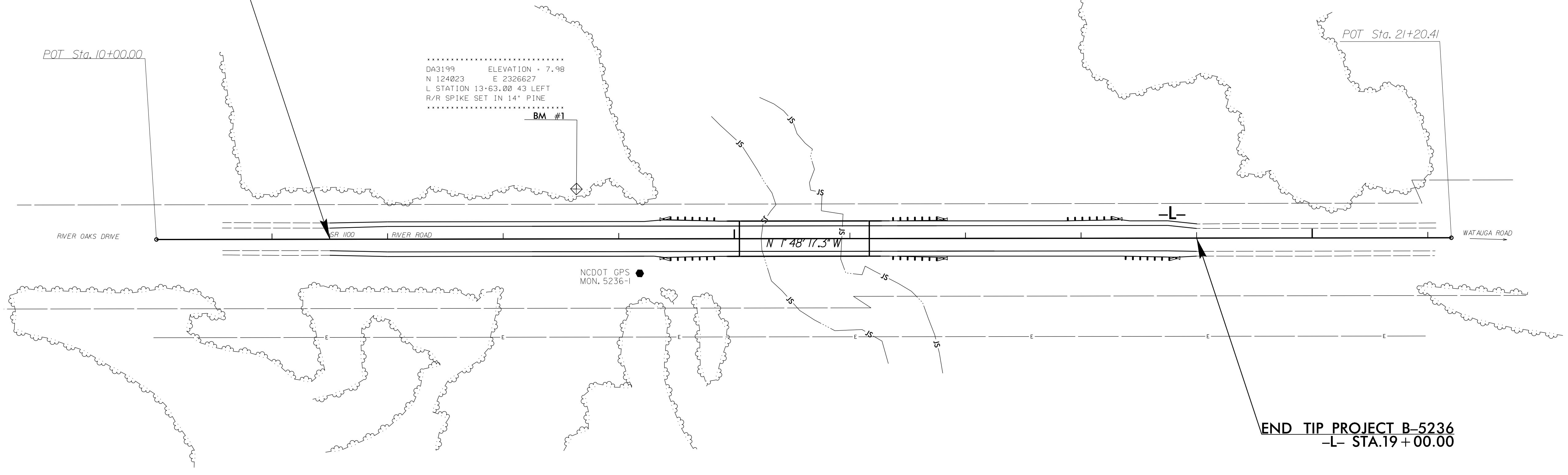
Utility Pole	●
Utility Pole with Base	□
Utility Located Object	○
Utility Traffic Signal Box	⊕
Utility Unknown U/G Line LOS B (S.U.E.*)	-----
U/G Tank; Water, Gas, Oil	□
Underground Storage Tank, Approx. Loc.	⊕
A/G Tank; Water, Gas, Oil	□
Geoenvironmental Boring	⊕
U/G Test Hole LOS A (S.U.E.*)	⊕
Abandoned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

SURVEY CONTROL SHEET B-5236



BEGIN TIP PROJECT B-5236
-L- STA. 10+75.00

BEGIN TIP PROJECT B-5236
-L- STA. 11+50.00



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5236-1" WITH NAD 83/NSRS 2007 STATE PLANE GRID COORDINATES OF NORTHING: 2326698.694(±) EASTING: 124079.711(±) ELEVATION: 6.616(±)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.000082655

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5236-1" TO -L- L STATION 10+00.00 IS
S 2° 16' 45" W 419.22

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

BL	POINT	DESC.	NORTH	EAST	ELEVATION	L STATION	OFFSET
	B52361	NCDOT GPS MON.	124079.7110	2326698.6940	6.62	14+18.15	29.86 RT
	B52362	NCDOT GPS MON.	125412.5230	2326646.0710	3.79	OUTSIDE PROJECT LIMITS	

NOTE: DRAWING NOT TO SCALE

END TIP PROJECT B-5236
-L- STA. 19+00.00

6/22/09
 Z:\MAP-2017_10\55
 P:\Location Surveys\B5236.LS_1C-1.dgn
 \$\$\$SUBSTRING\$\$\$

SURVEY CONTROL SHEET B-5236

ROW MARKER REBAR & CAP-E

ALIGN	STATION	OFFSET	NORTH	EAST
L	11+00.00	-30.00	123759.83277	2326648.88737
L	11+00.00	-50.00	123759.20288	2326628.89729
L	14+00.00	-60.00	124058.73912	2326609.45395
L	14+00.00	-50.00	124059.05406	2326619.44899
L	18+50.00	-60.00	124508.51588	2326595.28149
L	18+50.00	-50.00	124508.83083	2326605.27653
L	20+50.00	-50.00	124708.73161	2326598.97766
L	20+50.00	-30.00	124709.36150	2326618.96774

		L	
TYPE	STATION	NORTH	EAST
POT	10+00.00	123660.8272	2326682.0219
POT	21+20.41	124780.6775	2326646.7355

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5236-1"

WITH NAD 83/NSRS 2007 STATE PLANE GRID COORDINATES OF
 NORTHING: 2326698.694(++) EASTING: 124079.711(++)
 ELEVATION: 6.616(++)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 1.0000826548

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5236-1" TO -L- L STATION 10+00.00 IS
 S 2° 16' 45" W 419.22

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

NOTE: DRAWING NOT TO SCALE

6/2/09
 Z:\MAP-2017\10455
 P:\Location Surveys\B5236.LS.LC-2.dgn
 \$\$\$SUBSTRIP\$\$\$

SURVEY CONTROL SHEET B-5236

ROW MARKER IRON PIN AND CAP-E

ALIGN	STATION	OFFSET	NORTH	EAST
L	11+50.00	-50.00	123809.1781	2326627.3226
L	11+50.00	-30.00	123809.8080	2326647.3127
L	19+00.00	-50.00	124558.8060	2326603.7018
L	19+00.00	-30.00	124559.4359	2326623.6919

L

TYPE	STATION	NORTH	EAST
POT	10+00.00	123660.8272	2326682.0219
POT	21+20.41	124780.6775	2326646.7355

DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5236-1"

WITH NAD 83/NSRS 2007 STATE PLANE GRID COORDINATES OF
 NORTHING: 2326698.694(±) EASTING: 124079.711(±)
 ELEVATION: 6.616(±)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9999173520

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5236-1" TO -L- L STATION 10+00.00 IS
 S 2° 16' 45" W 419.22

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

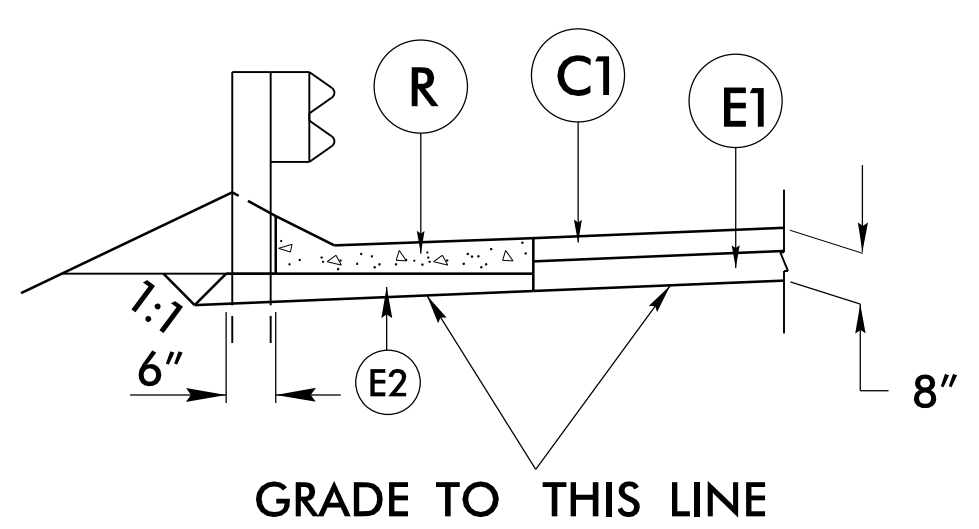
NOTE: DRAWING NOT TO SCALE

6/2/2017

FINAL PAVEMENT SCHEDULE

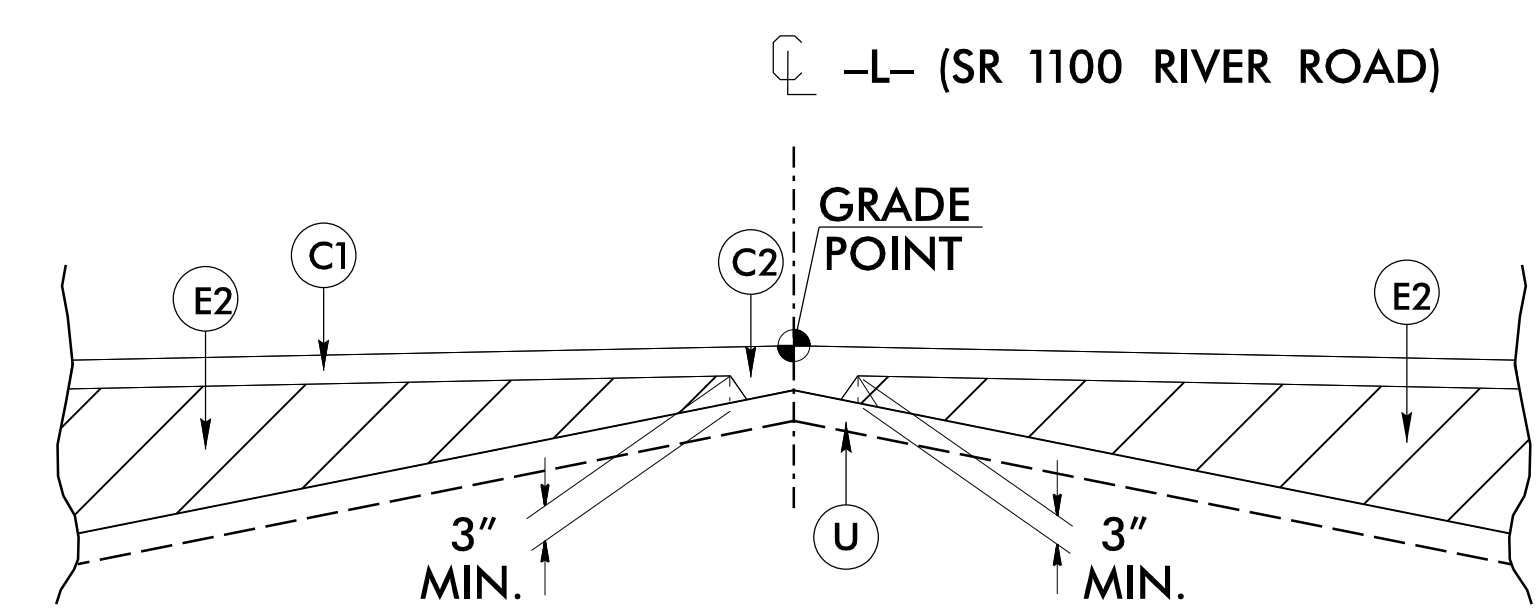
C1	PROP. APPROX. 3" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.
C2	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 1.5" IN DEPTH OR GREATER THAN 2.0" DEPTH.
E1	PROP. APPROX. 5" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.
E2	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 3" IN DEPTH OR GREATER THAN 5.5" DEPTH.
R	SHOULDER BERM GUTTER
T	EARTH MATERIAL.
U	EXISTING PAVEMENT.
W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE DETAIL SHOWING METHOD OF WEDGING).

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

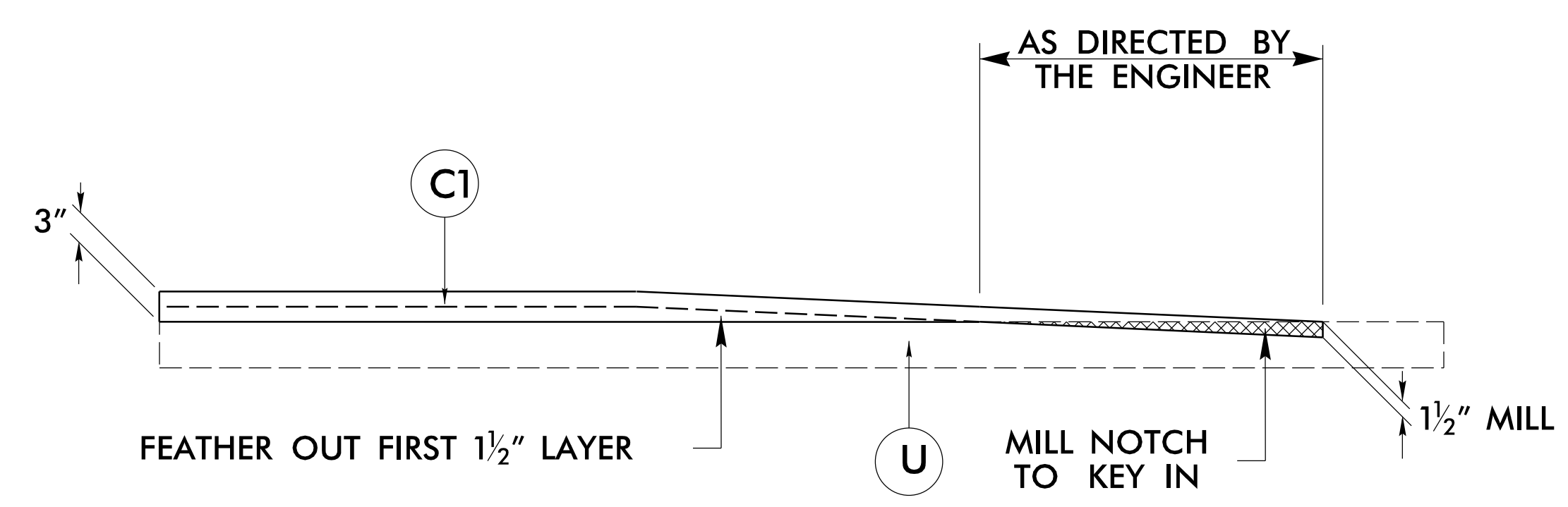


DETAIL SHOWING SHOULDER BERM GUTTER ON TOP OF SUBGRADE

- L- STA. 14+80.40 TO 14+93.23 LT.\RT.
- L- STA. 16+35.57 TO 16+48.50 LT.
- L- STA. 16+35.57 TO 16+73.50 RT.

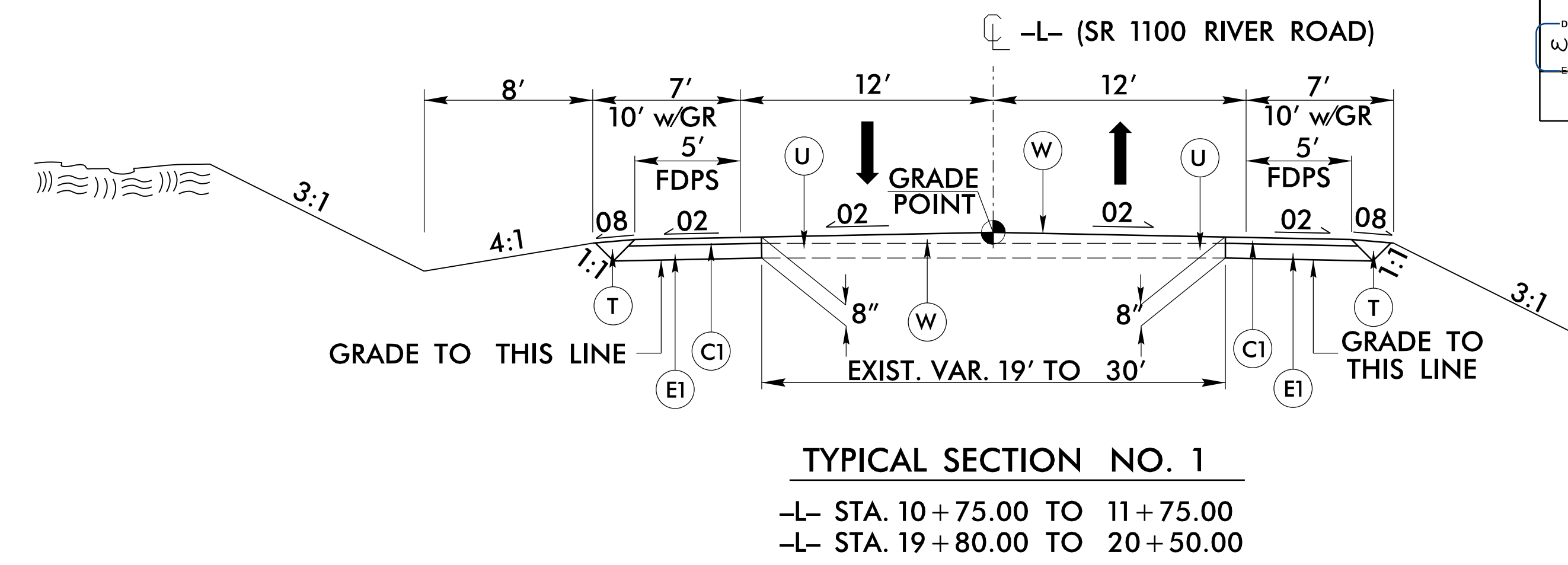


Detail Showing Method of Wedging



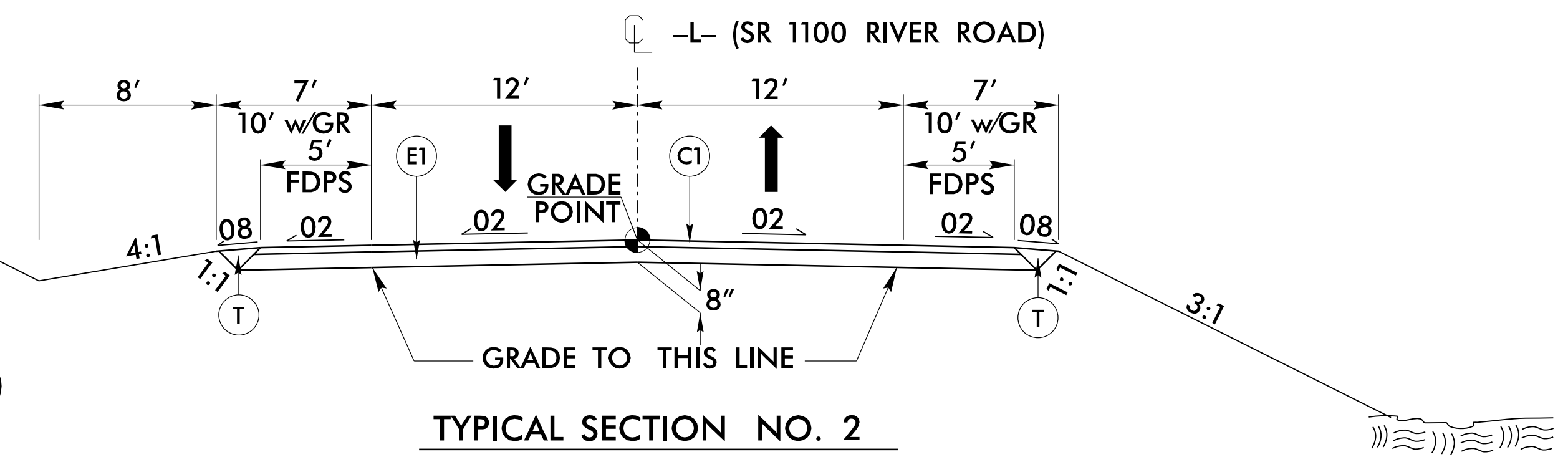
DETAIL OF INCIDENTAL MILLING

- L- STA. 10+50.00 TO 10+75.00
- L- STA. 20+50.00 TO 21+00.00



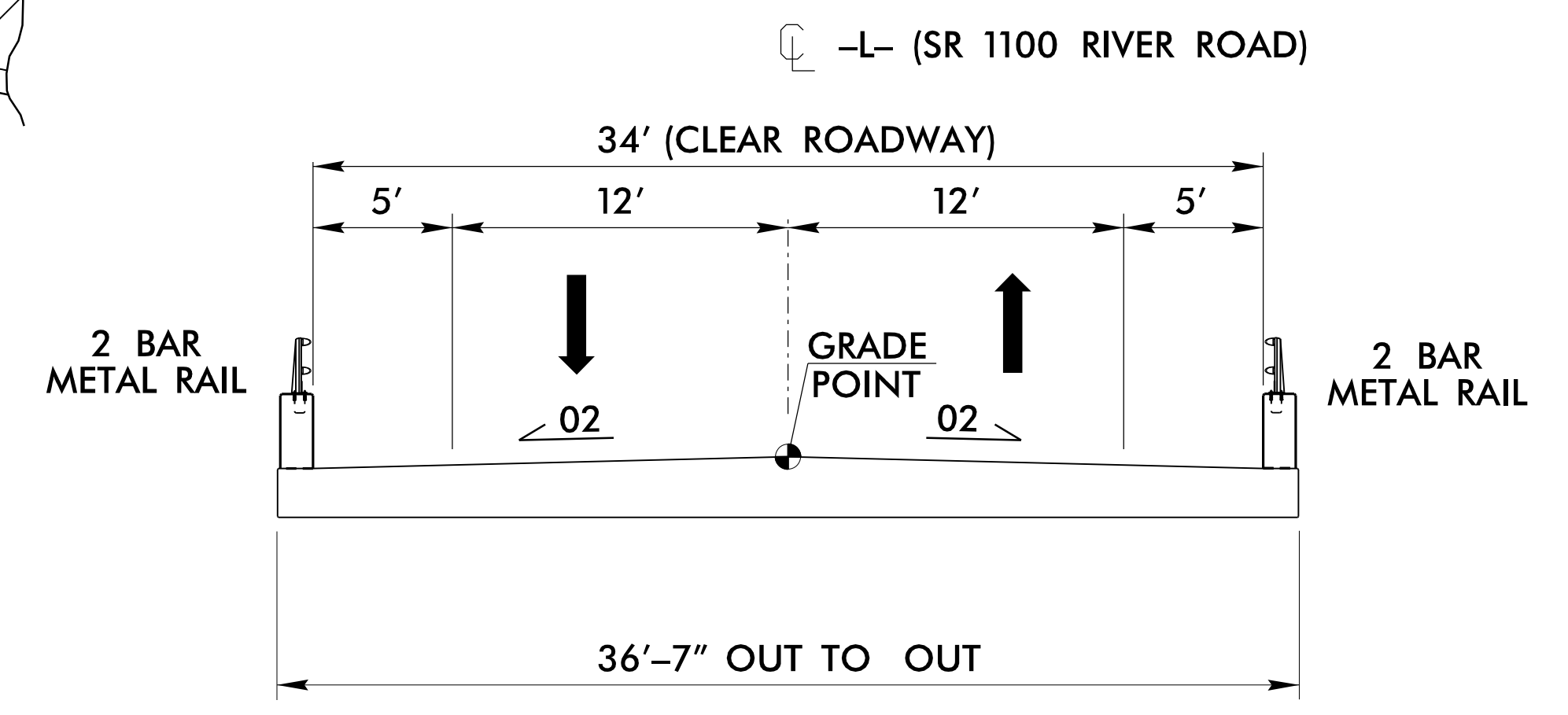
TYPICAL SECTION NO. 1

- L- STA. 10+75.00 TO 11+75.00
- L- STA. 19+80.00 TO 20+50.00



TYPICAL SECTION NO. 2

- L- STA. 11+75.00 TO 15+04.40 (BEGIN BRIDGE)
- L- STA. 16+24.40 (END BRIDGE) TO 19+80.00



TYPICAL SECTION NO. 3

- L- STA. 15+04.40 TO 16+24.40

PROJECT REFERENCE NO. B-5236	SHEET NO. 2A-1
ROADWAY DESIGN ENGINEER W. S. HOOD PROFESSIONAL SEAL 014509 8/26/2017	PAVEMENT DESIGN ENGINEER CLARK S. MORRISON PROFESSIONAL SEAL 022896 8/26/2017

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NOTE: FILL SLOPES WILL VARY DUE TO ROCK PLATING

10-AUG-2017 10:53 AM
 C:\Users\jmorris\OneDrive\Documents\B5236_rdy_tup_022601.dgn
 10-AUG-2017 10:53 AM
 C:\Users\jmorris\OneDrive\Documents\B5236_rdy_tup_022601.dgn

30-MAY-2017 09:43 S:\Contracts\Special Details\Standard Drawings\Division 8\862d01 862d03 862d01.dgn

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

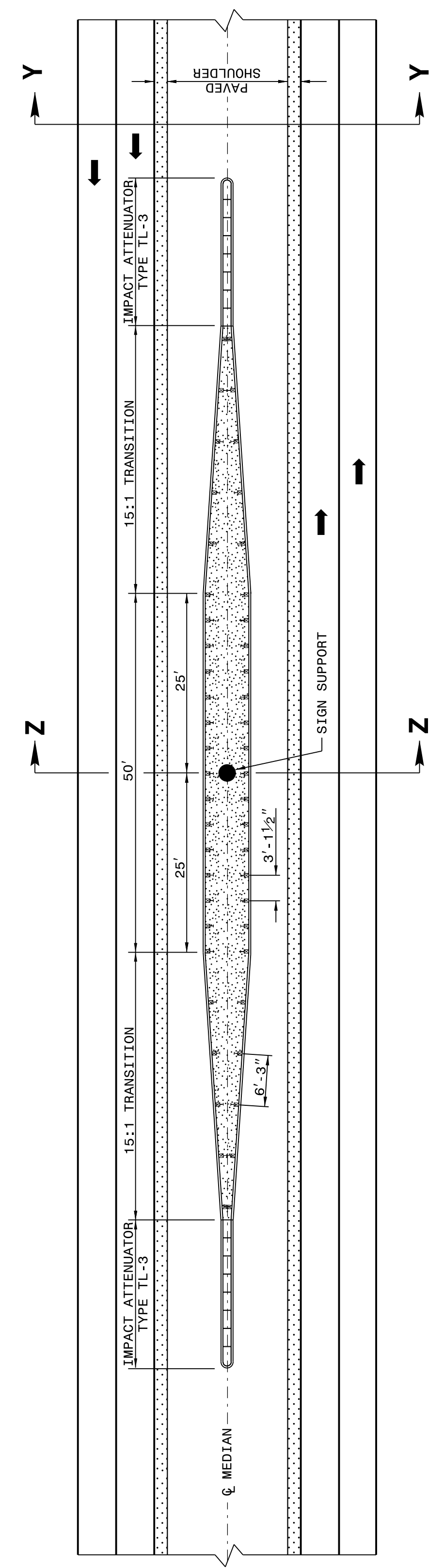
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 2 OF 11
862D01

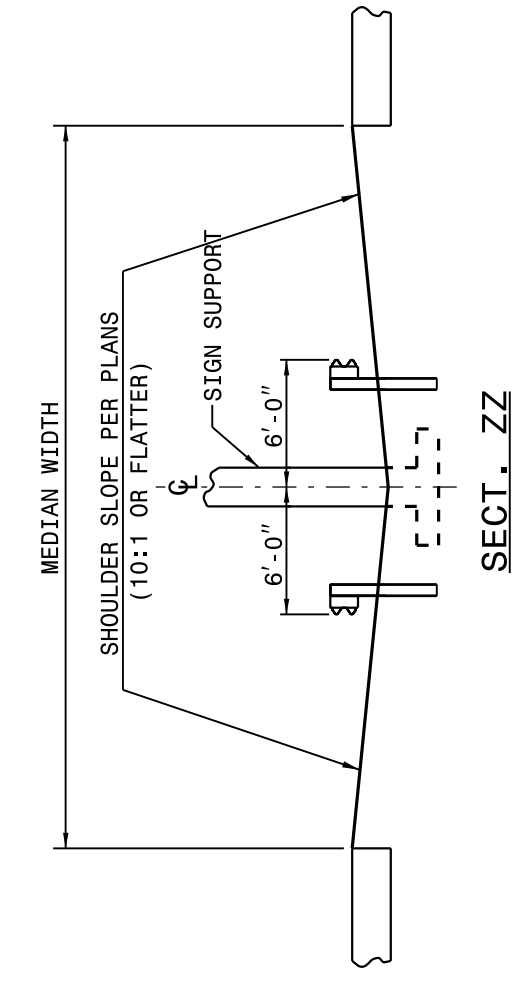
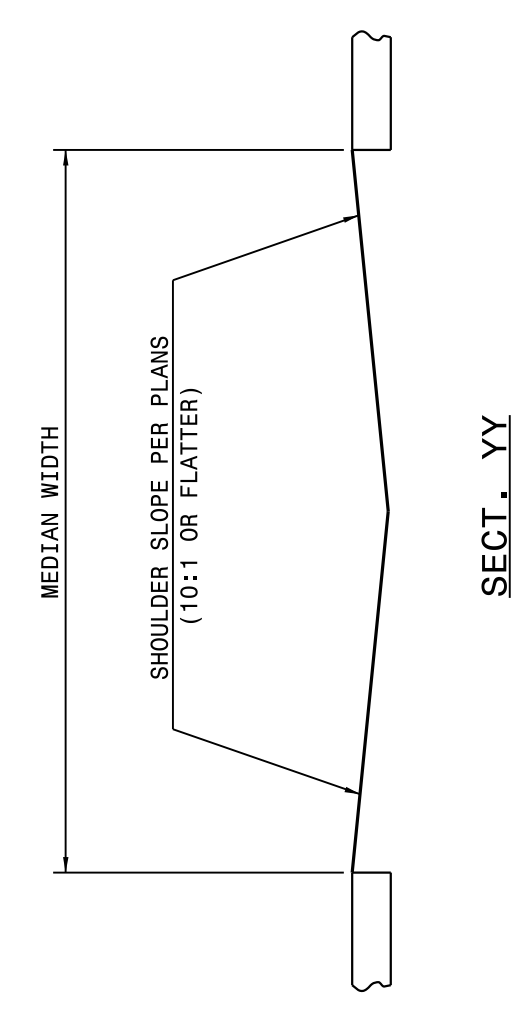
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

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).



DETAIL OF GUARDRAIL AT MEDIAN SIGN SUPPORT

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

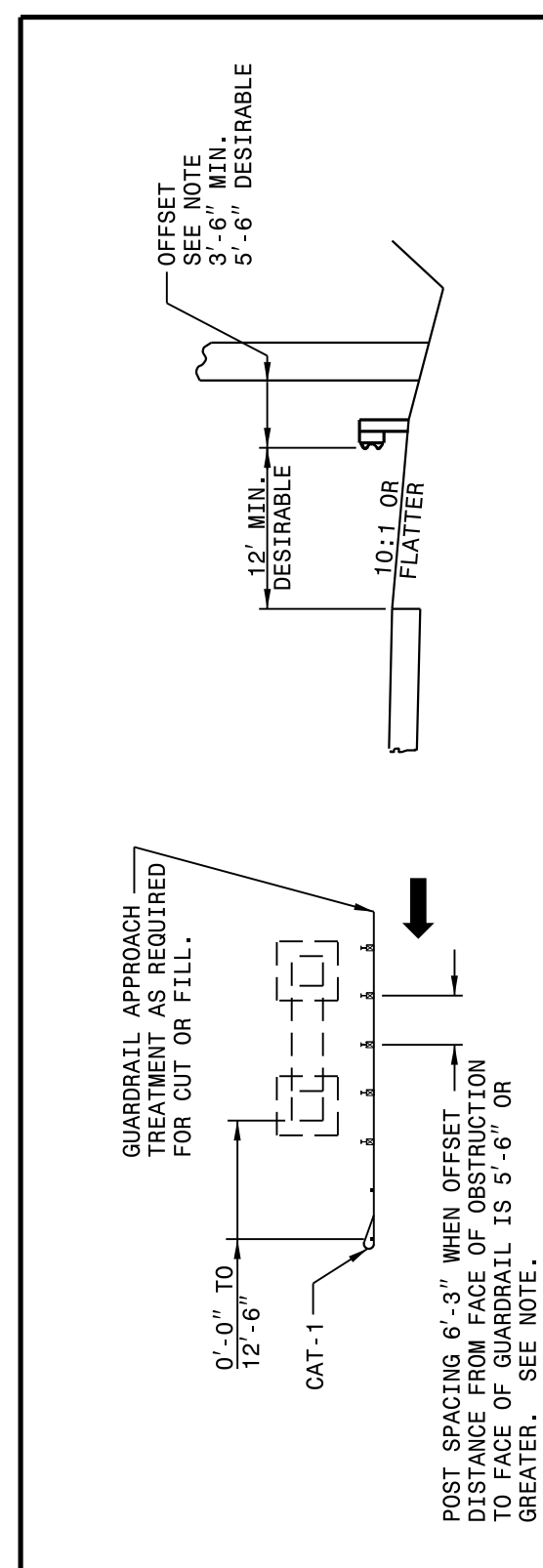
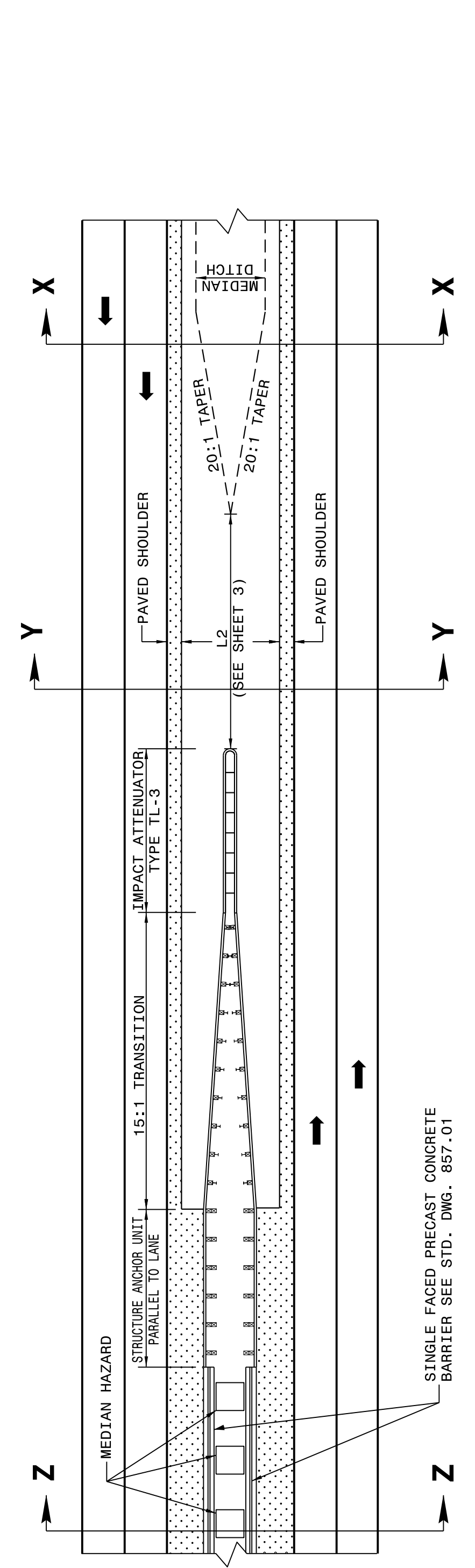
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 1 OF 11
862D01

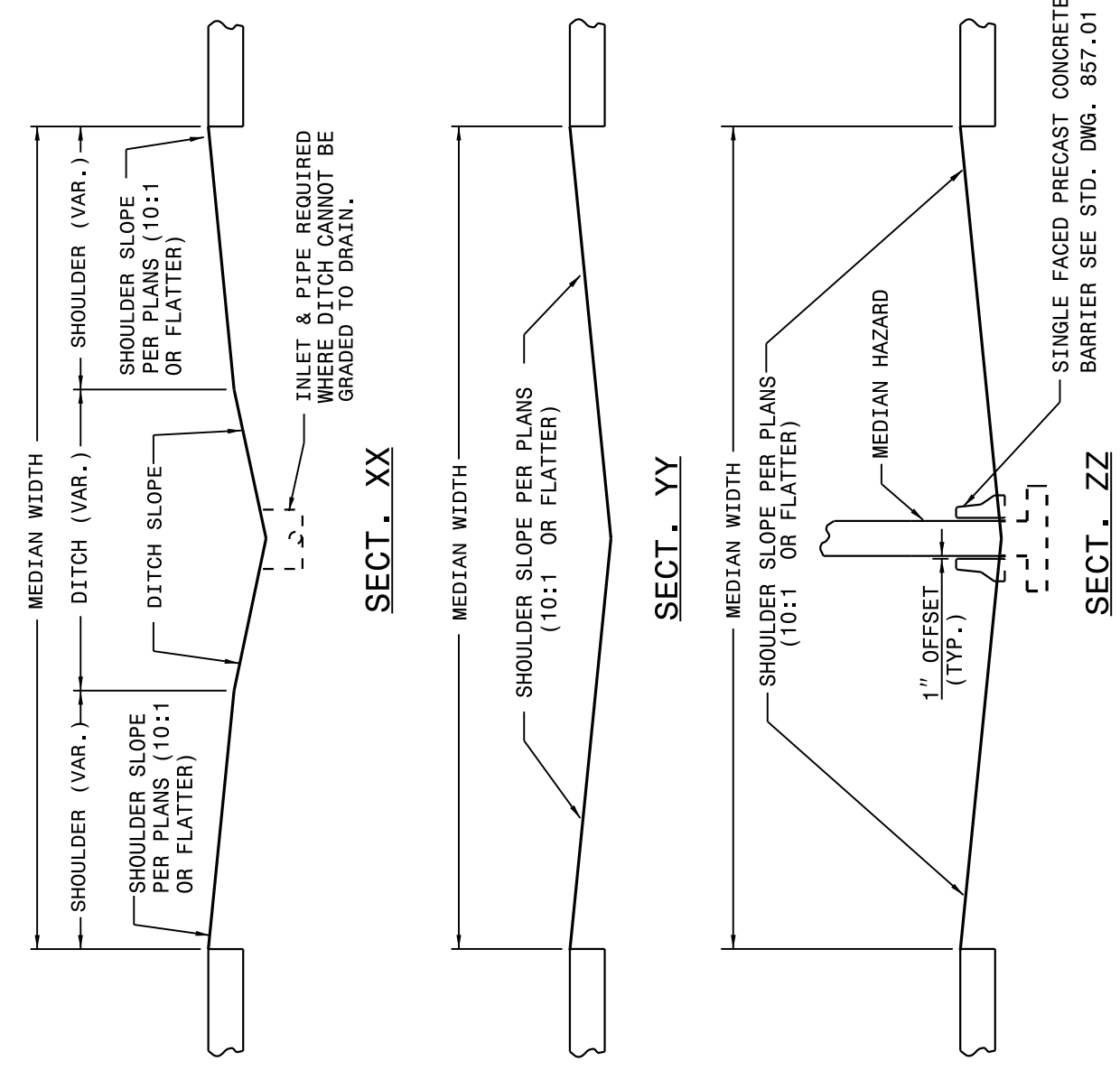
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

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 5'-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.

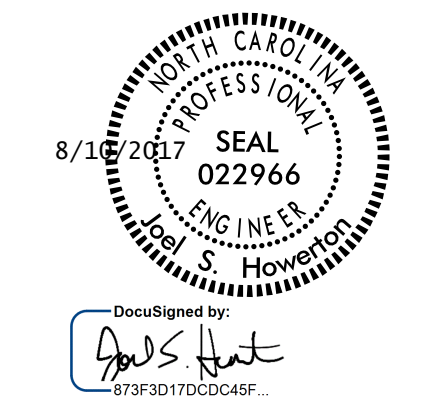


DETAIL OF MEDIAN TREATMENT AT UNDERPASS

CONTRACT STANDARDS
AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J HOWERTON DATE: 06-22-12
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.: DATE:



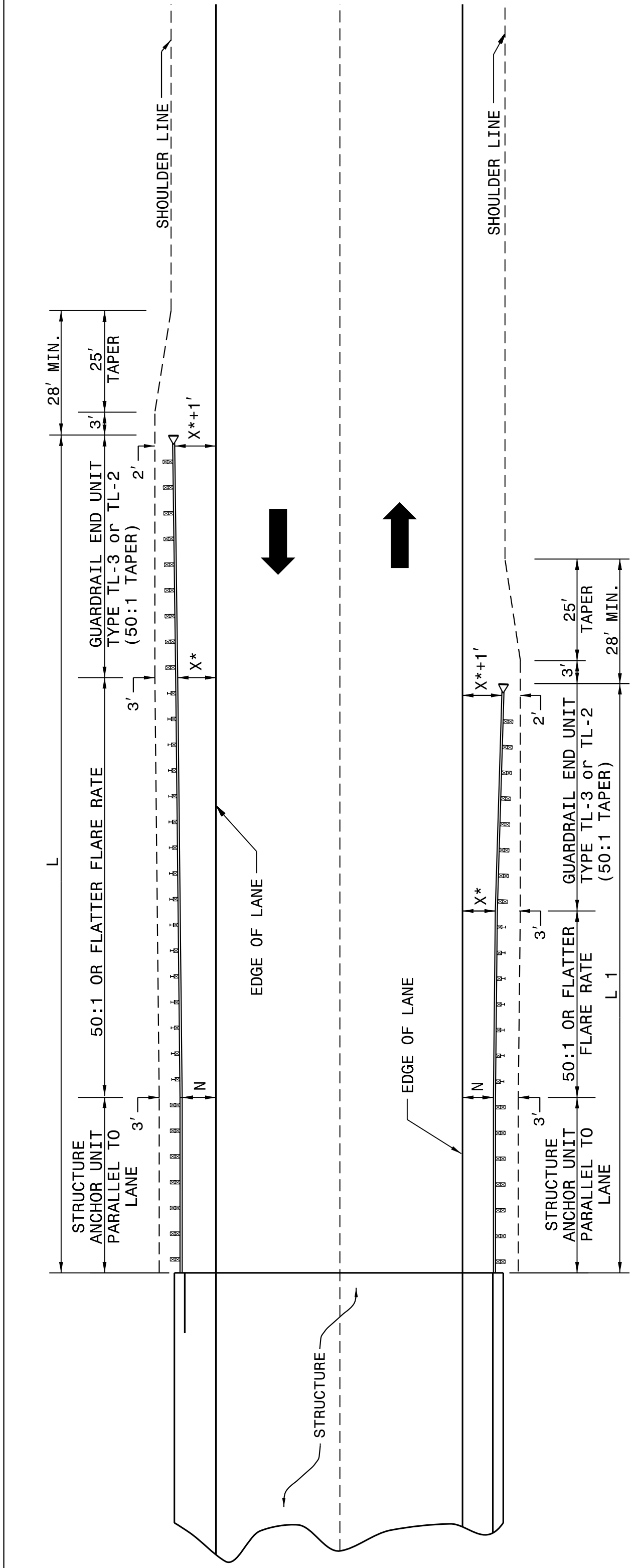
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

30-MAY-2017 09:14 S:\Contracts\Special Details\Standard Drawings\Division 8\862d01 862d03 862d01.dgn
 Jhowerton AT: USD-292595

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
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+1" TRAILING LENGTH (FT.)	
	DESIGN YEAR ADT OVER 2000	CURRENT YEAR ADT 400-1000	DESIGN YEAR ADT OVER 2000	CURRENT YEAR ADT 400-1000
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'	4'	4'	4'
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

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

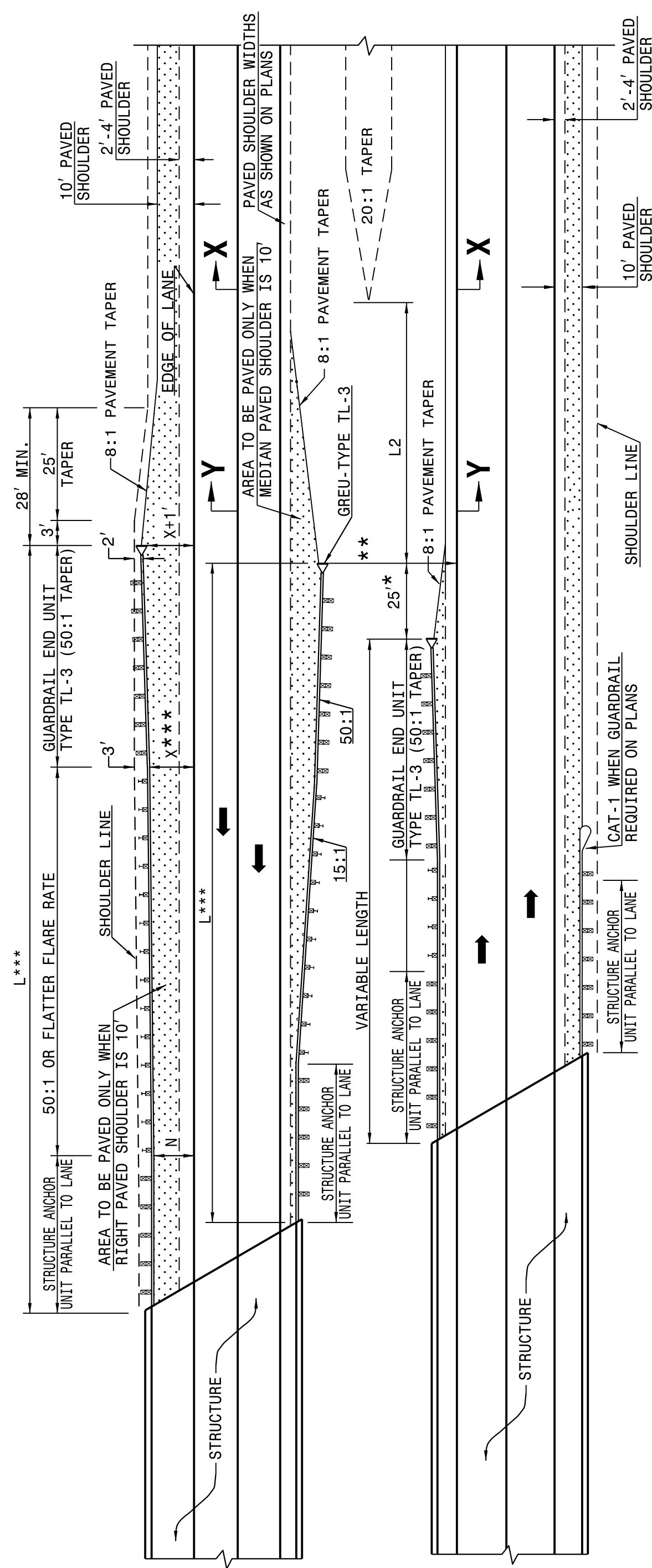
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

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



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

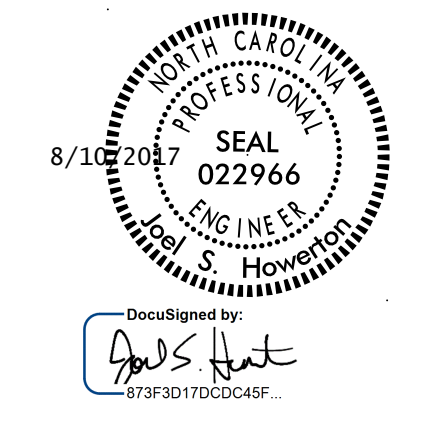
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

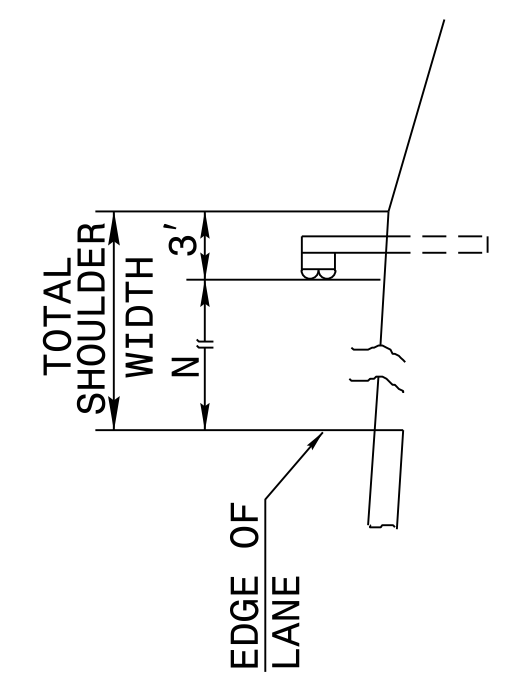
ORIGINAL BY: J HOWERTON DATE: 06-22-12
 MODIFIED BY: DATE:
 CHECKED BY: DATE:
 FILE SPEC.: DATE:



DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

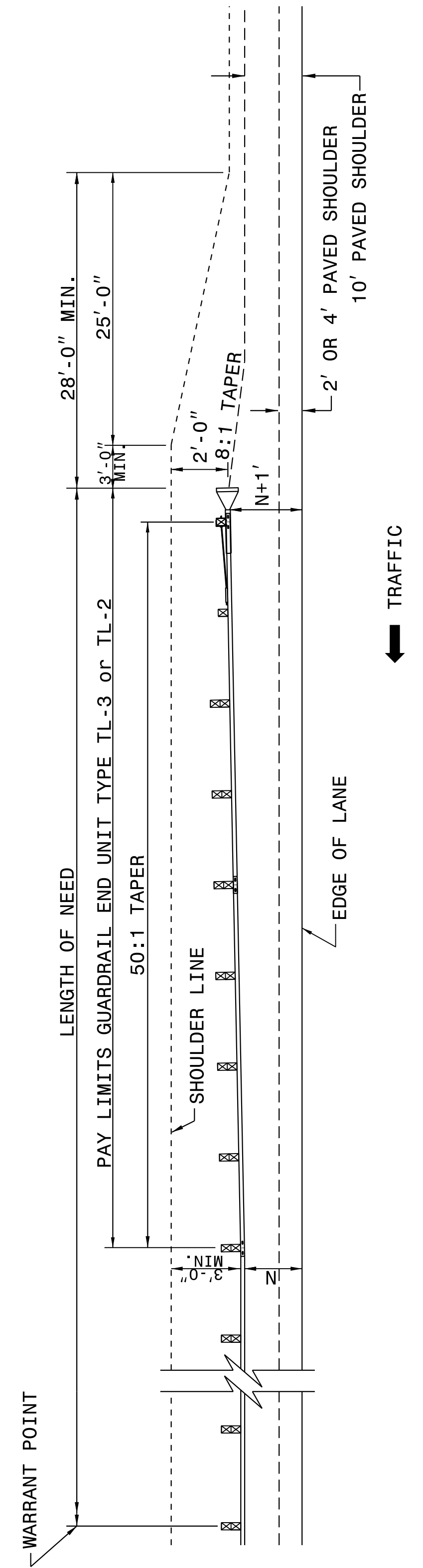
30-MAY-2017 09:44
 S:\Contracts\Projects\Special Details\Standard Drawings\Division 8\862d01 862d03 862d01.dgn
 Jhowerton AT_CSD-292595

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



FILL 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

DETAIL OF BEGINNING OF GUARDRAIL IN CUT OR FILL SECTION

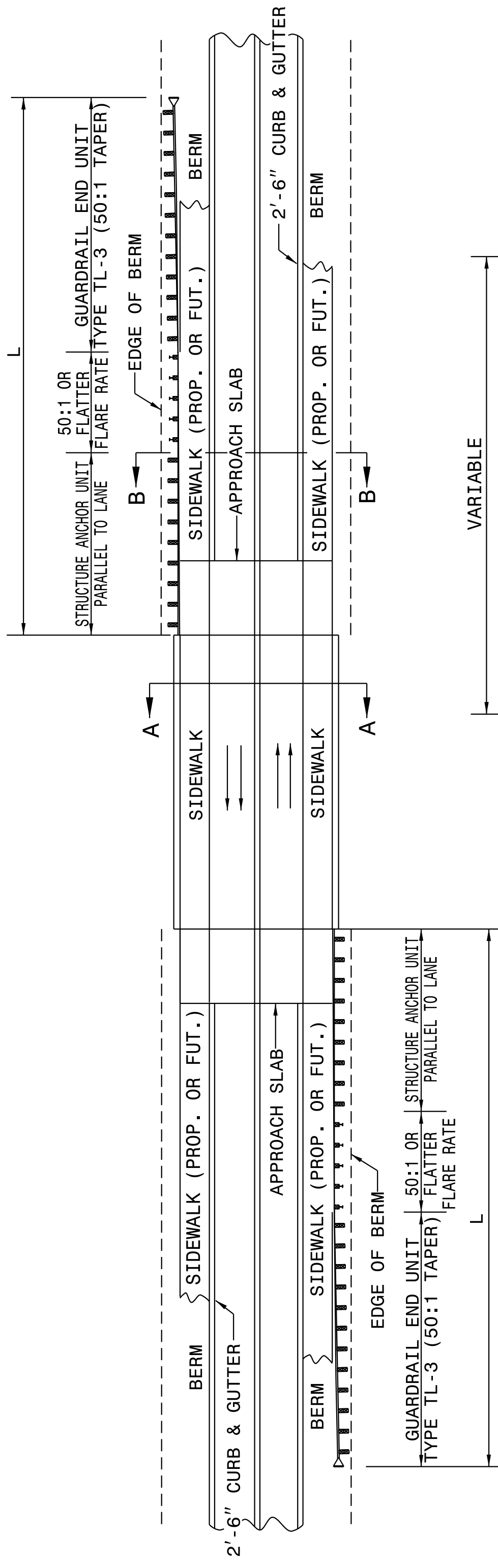
SHEET 6 OF 11
862D01

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 6 OF 11
862D01

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

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 5 OF 11
862D01

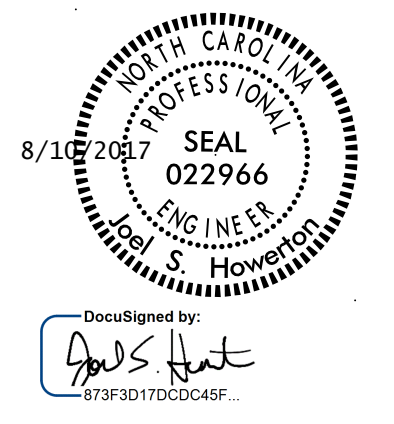
STANDARD GUARDRAIL PLACEMENT AT BRIDGES WITH 2'-6" CONCRETE CURB AND GUTTER

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

**CONTRACT STANDARDS
 AND DEVELOPMENT UNIT**
 Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J HOWERTON	DATE: 06-22-12
MODIFIED BY:	DATE:
CHECKED BY:	DATE:
FILE SPEC.:	

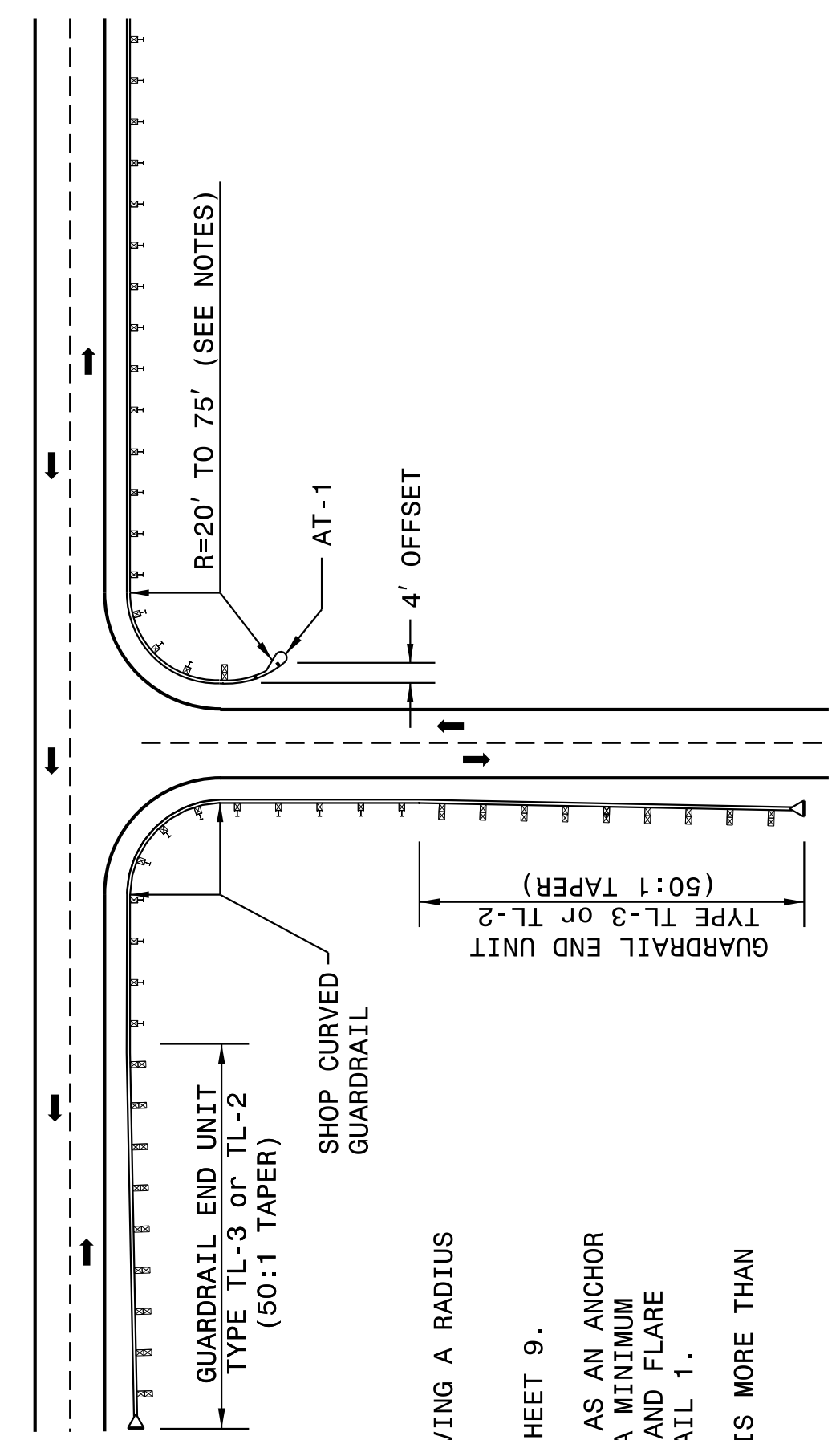


30-MAY-2017 09:15
 S:\Contracts\Special Details\Howerton\Standard Drawings\2012 Standard Drawings\Division 8\862d01 862d03 862d03\862d01.dgn
 Howerton AT USD-292595

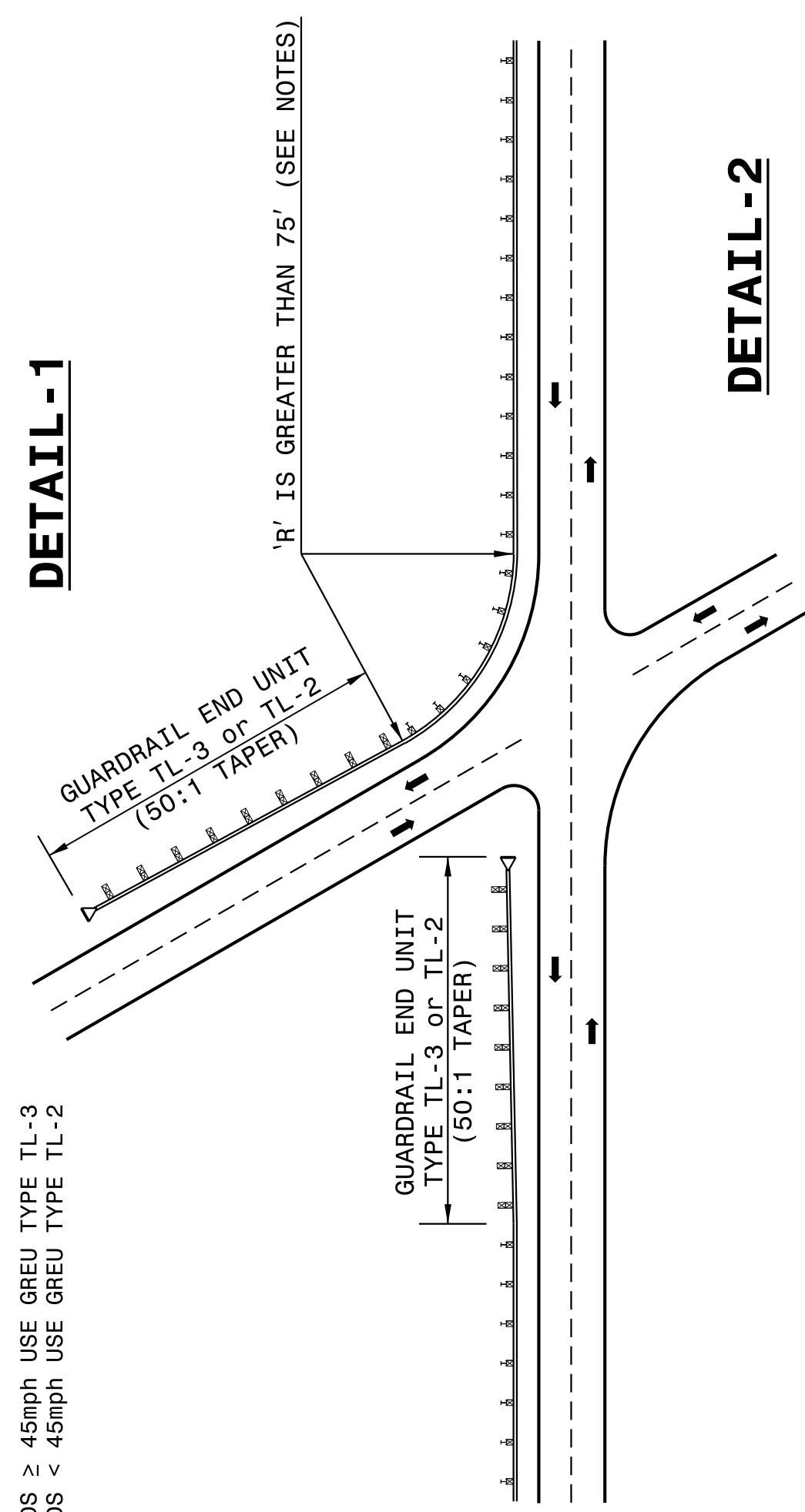
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

**ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT**

SHEET 8 OF 11
862D01



DETAIL - 1



DETAIL - 2

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

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

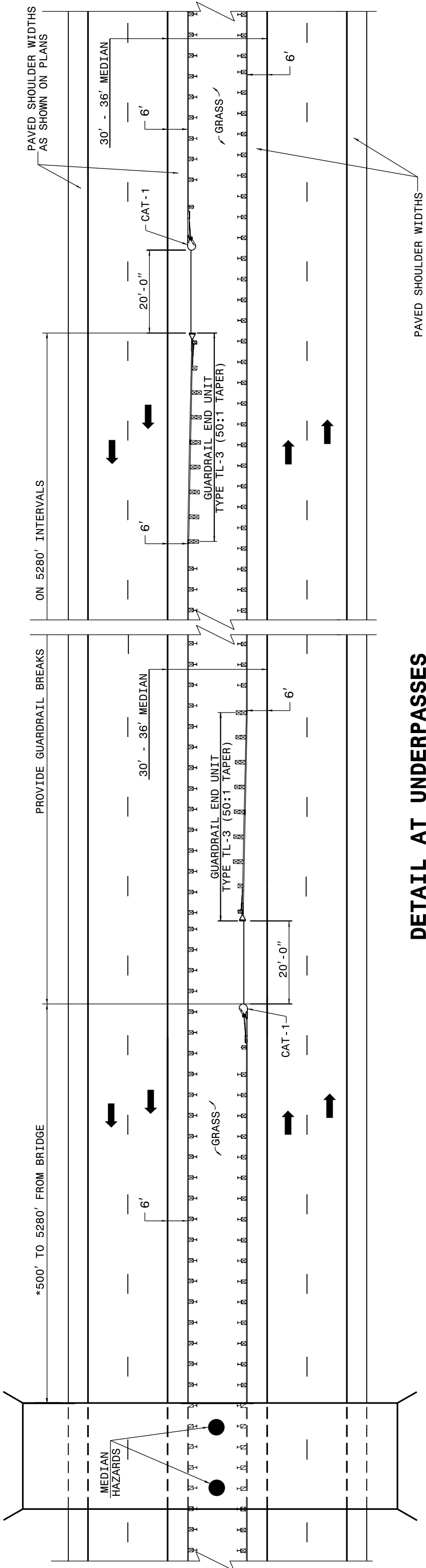
**ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT**

SHEET 8 OF 11
862D01

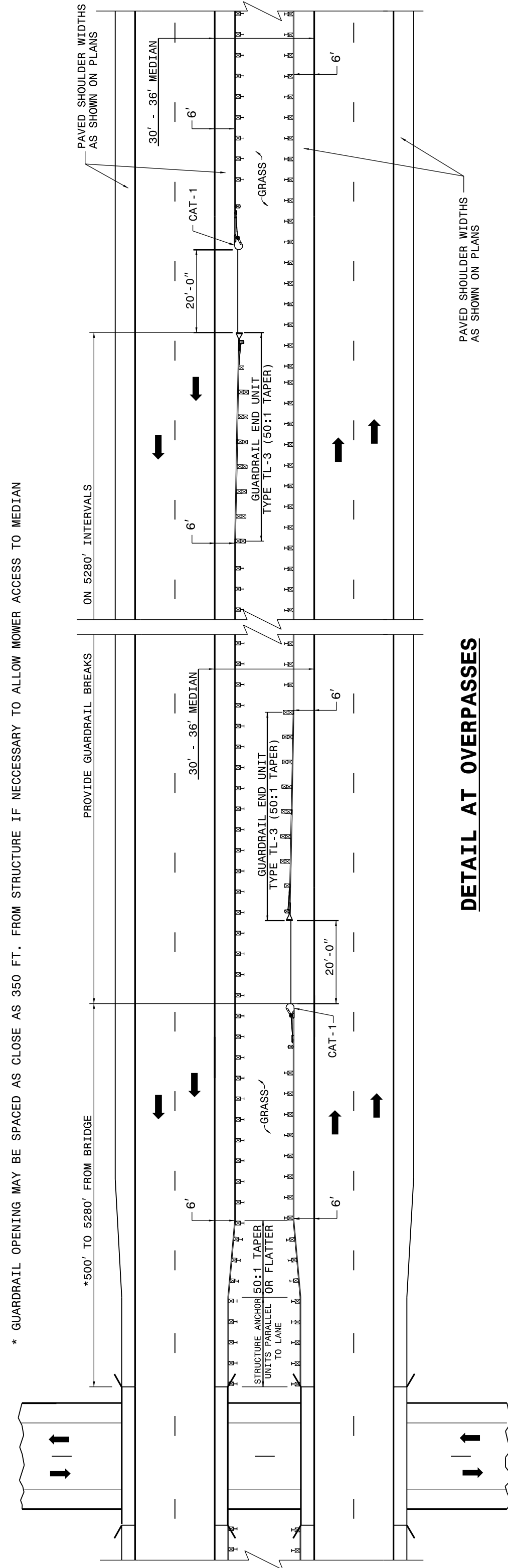
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

**ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT**

SHEET 7 OF 11
862D01



DETAIL AT UNDERPASSES



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.

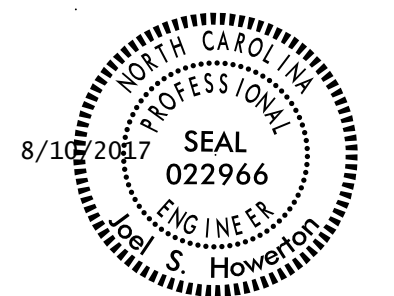
**ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT**

SHEET 7 OF 11
862D01

**CONTRACT STANDARDS
AND DEVELOPMENT UNIT**
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J HOWERTON DATE: 06-22-12
 MODIFIED BY: DATE:
 CHECKED BY: DATE:
 FILE SPEC.:



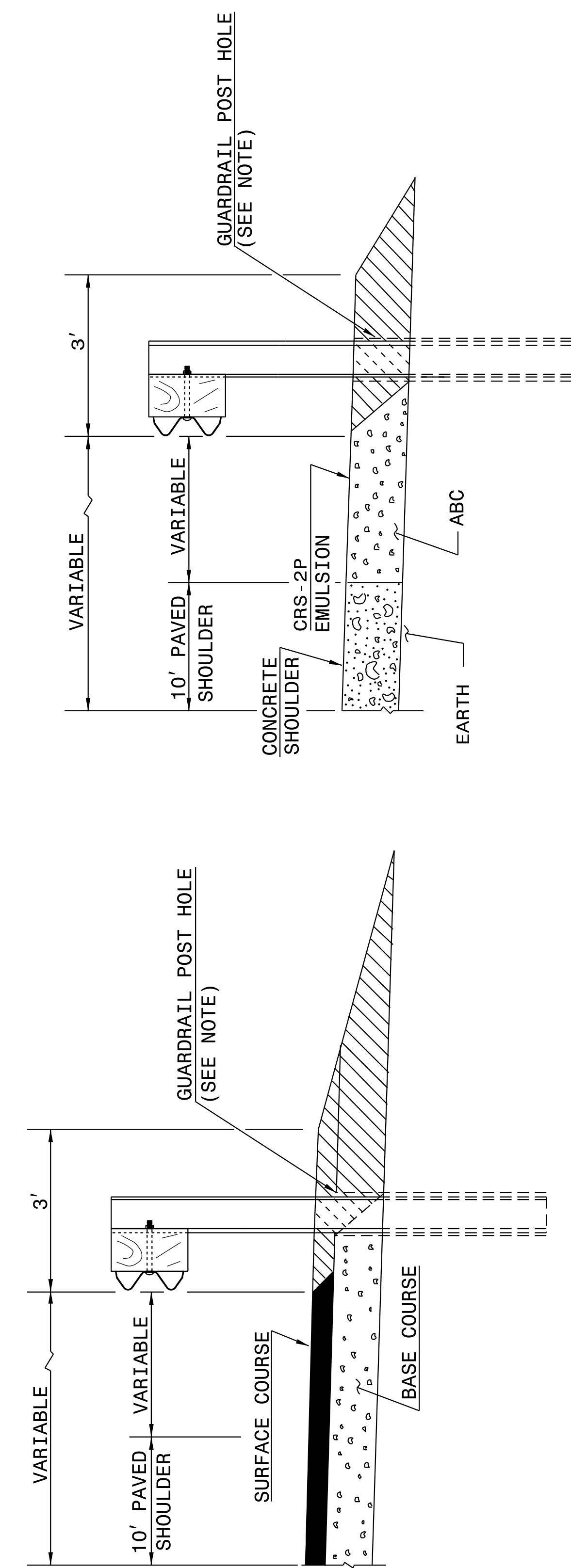
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

30-MAY-2017 09:16
 S:\Contracts\ContractDetails\Howerton\Standard Drawings\2012 Standard Drawings\Details in Lieu of Standards\Division 8\862d01 862d03 862d01.dgn
 .Howerton AT USD-292595

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

ENGLISH DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 10 OF 11
862D01



FLEXIBLE PAVED SHOULDER

CONCRETE 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.

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

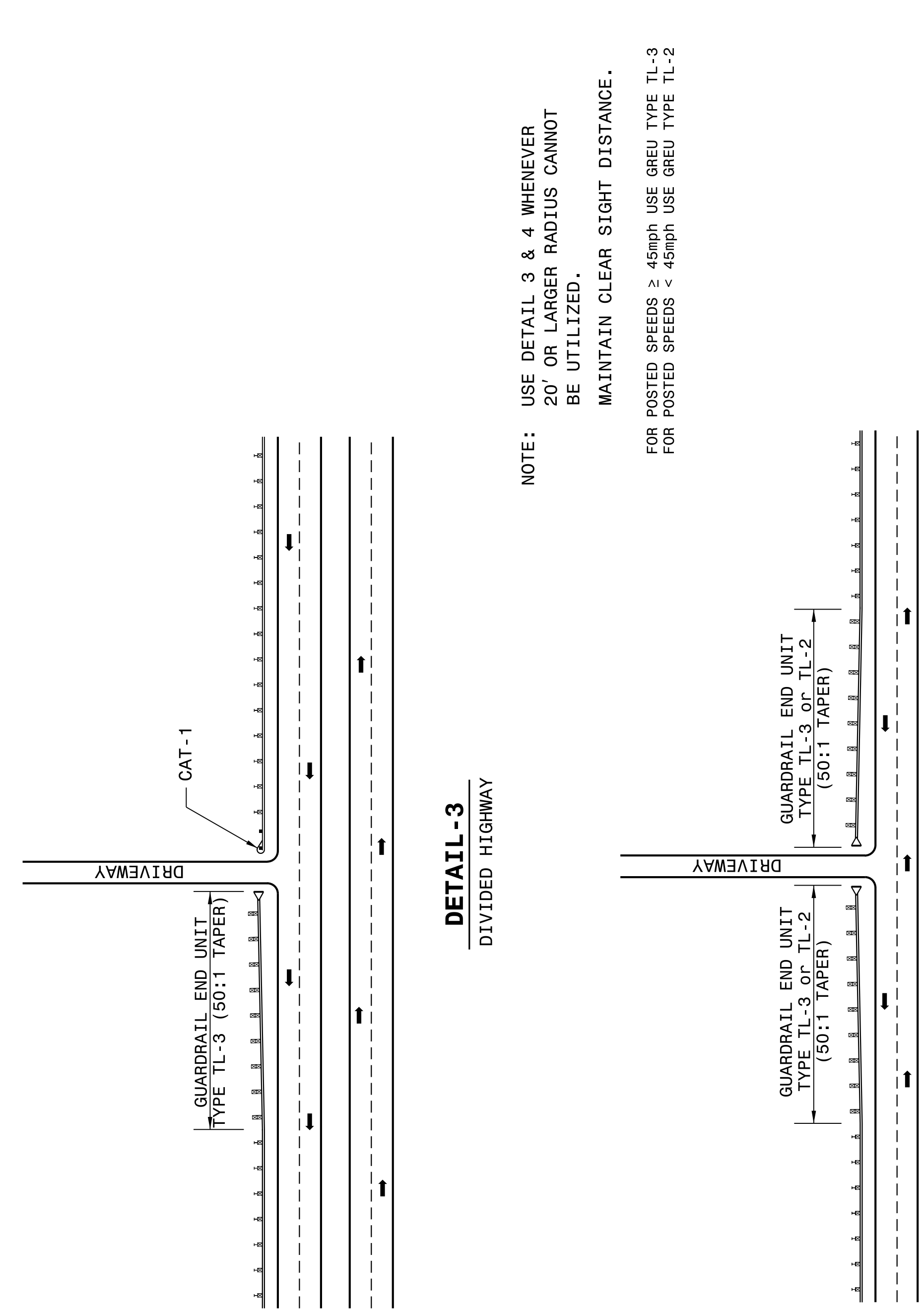
ENGLISH DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 10 OF 11
862D01

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 9 OF 11
862D01



DETAIL - 3
 DIVIDED HIGHWAY

DETAIL - 4
 UNDIVIDED HIGHWAY
GUARDRAIL TREATMENT AT DRIVEWAYS

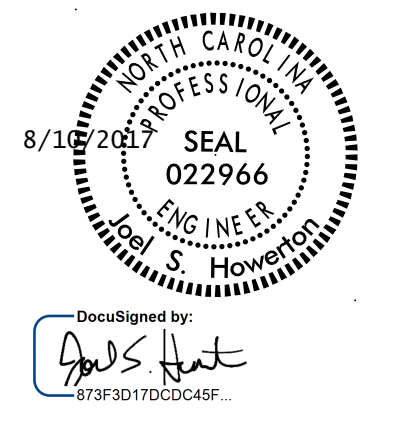
NOTE:
 USE DETAIL 3 & 4 WHENEVER 20' OR LARGER RADIUS CANNOT BE UTILIZED.
 MAINTAIN CLEAR SIGHT DISTANCE.

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

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 9 OF 11
862D01



DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

CONTRACT STANDARDS AND DEVELOPMENT UNIT
 Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J. HOWERTON DATE: 06-22-12
 MODIFIED BY: DATE:
 CHECKED BY: DATE:
 FILE SPEC.:

30-MAY-2017 09:17
S:\Contracts\Standard Drawings\2012 Standard Drawings\Division 8\862d01 862d03 862d03\862d01.dgn
J.Howerton AT:CSU-292595

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

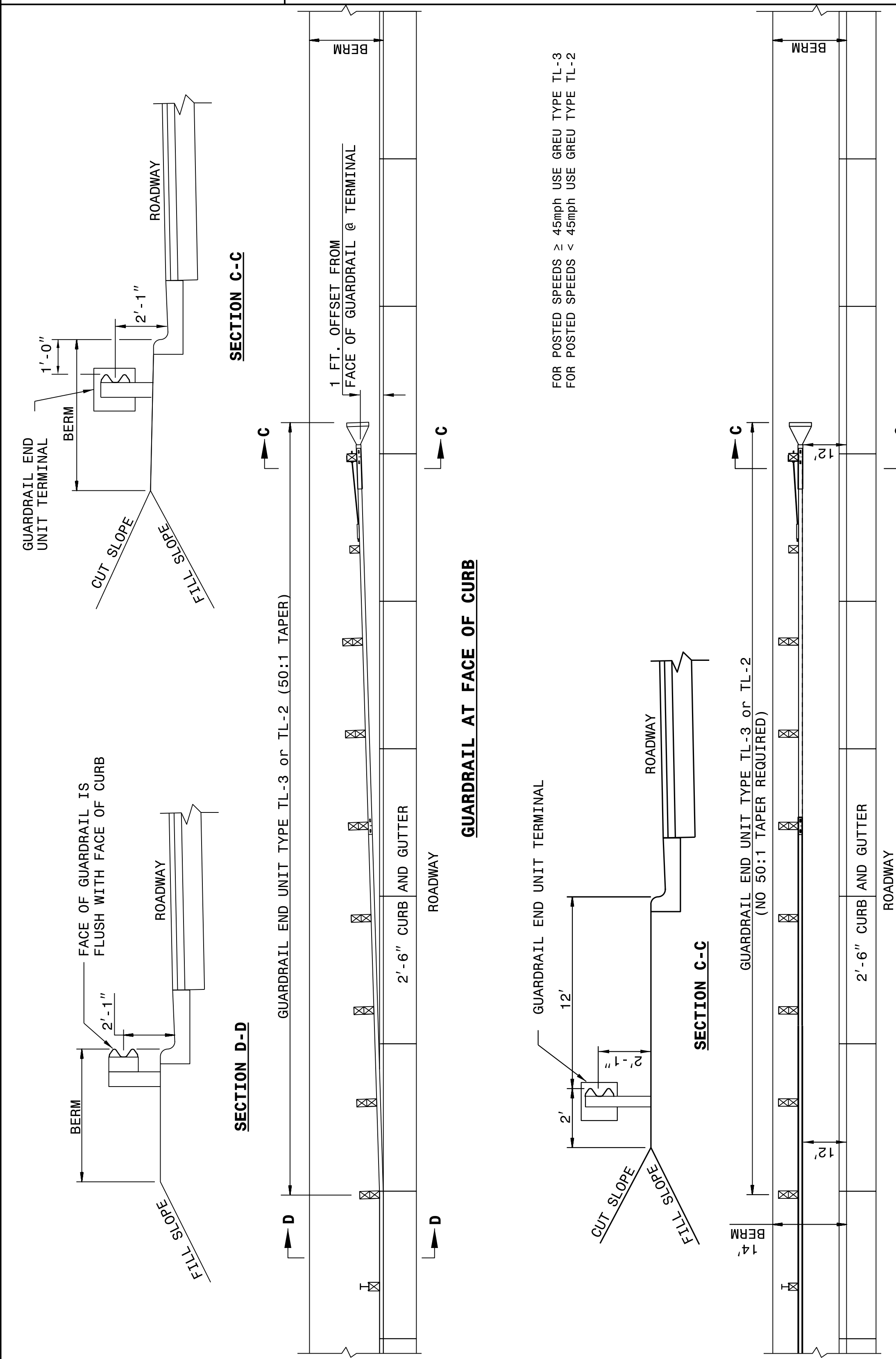
ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT
GUARDRAIL TREATMENT AT CURB AND GUTTER

SHEET 11 OF 11
862D01

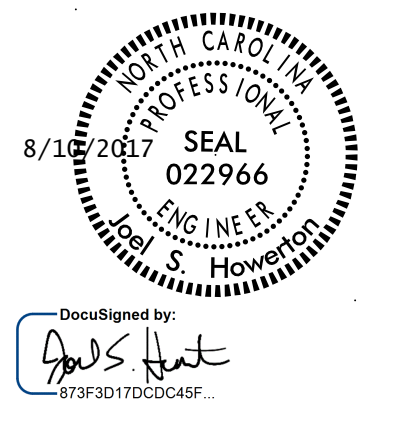
STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR
GUARDRAIL PLACEMENT
GUARDRAIL TREATMENT AT CURB AND GUTTER

SHEET 11 OF 11
862D01



PROJECT REFERENCE NO. B-5236	SHEET NO. 2C-6
---------------------------------	-------------------



DocuSigned by:
Daniel S. Howerton
679F3D17DCDCAF...

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

**CONTRACT STANDARDS
AND DEVELOPMENT UNIT**
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J. HOWERTON DATE: 06-22-12
 MODIFIED BY: DATE:
 CHECKED BY: DATE:
 FILE SPEC.: DATE:

30-MAY-2017 09:18 S:\Contracts\Special Details\Standard Drawings\Division 8\862d01 862d03 862d03\862d02.dgn Jhowerton AT_CSD-292955

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

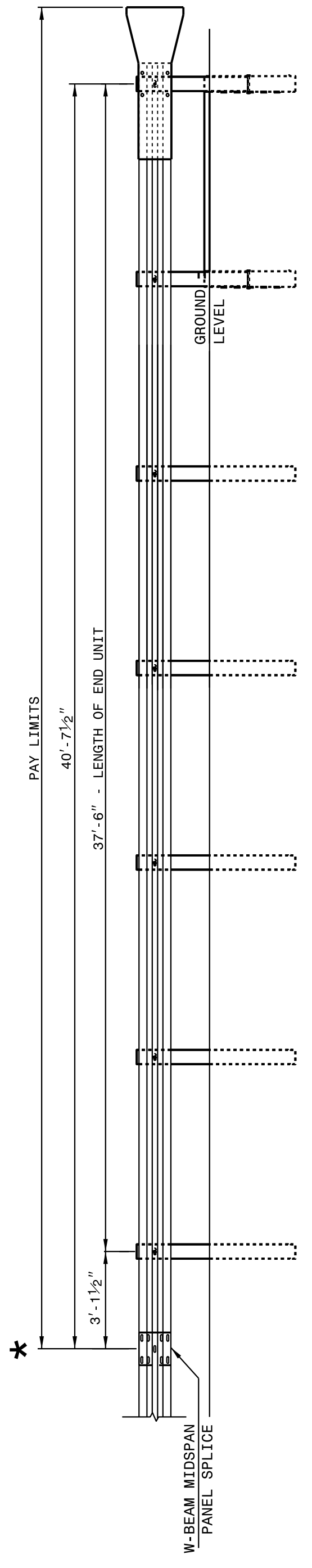
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 2 OF 8
862D02

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

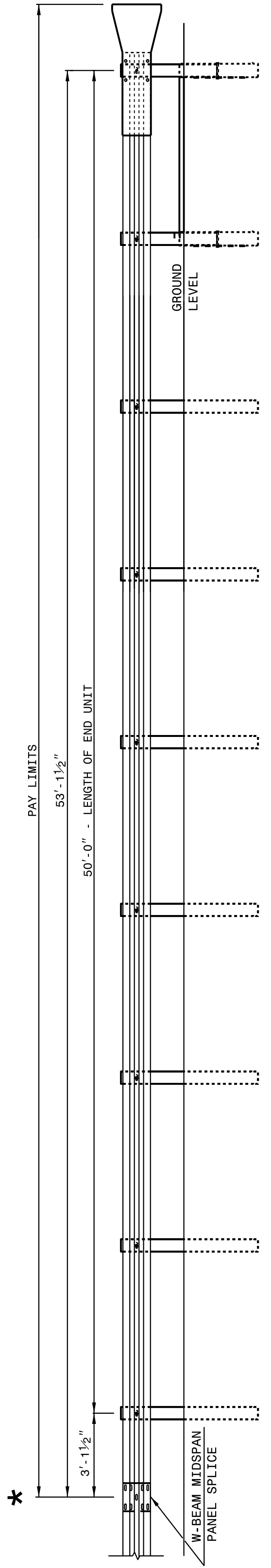
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 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.

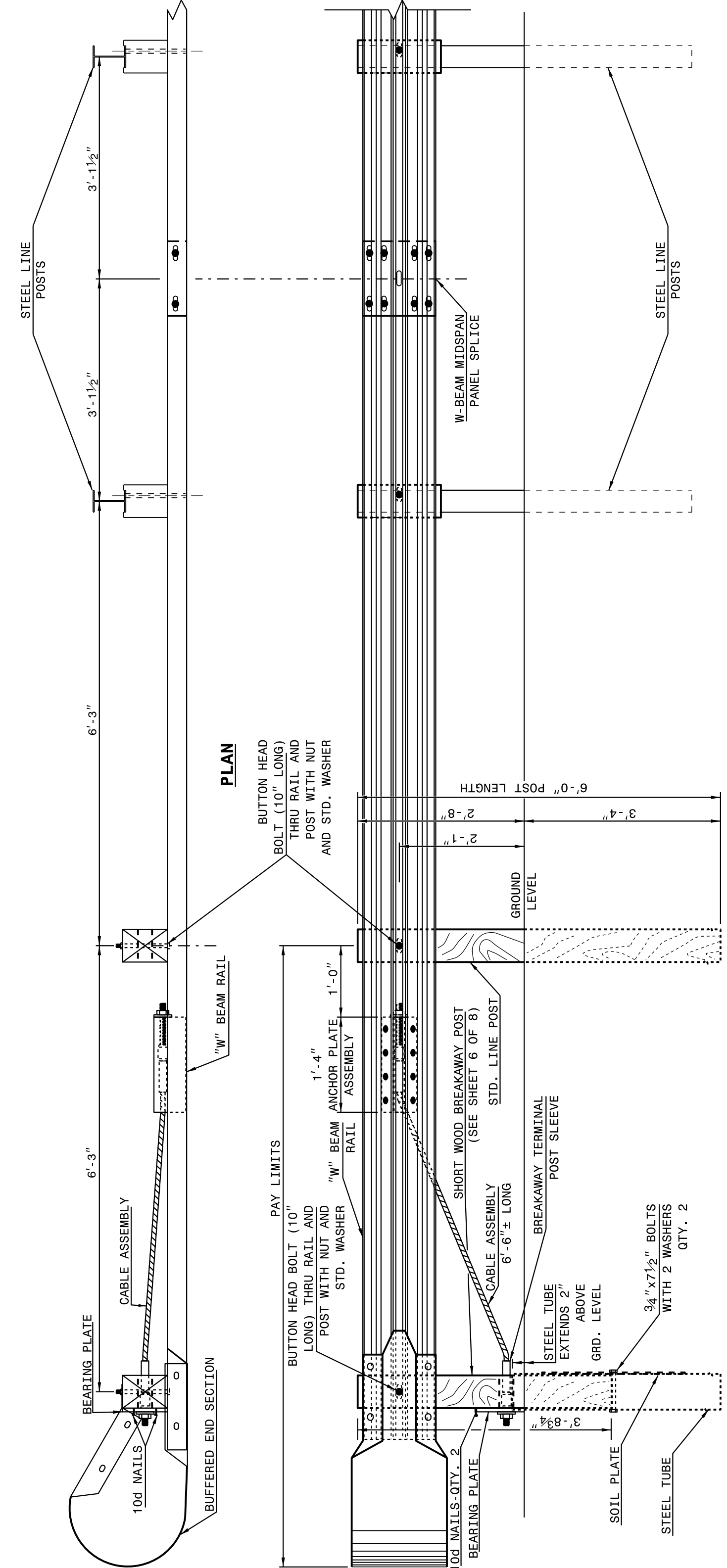
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 1 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



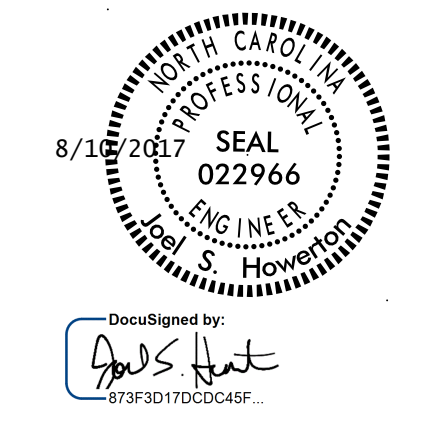
ELEVATION

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

**CONTRACT STANDARDS
AND DEVELOPMENT UNIT**
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J HOWERTON	DATE: 06-22-12
MODIFIED BY:	DATE:
CHECKED BY:	DATE:
FILE SPEC.:	



DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

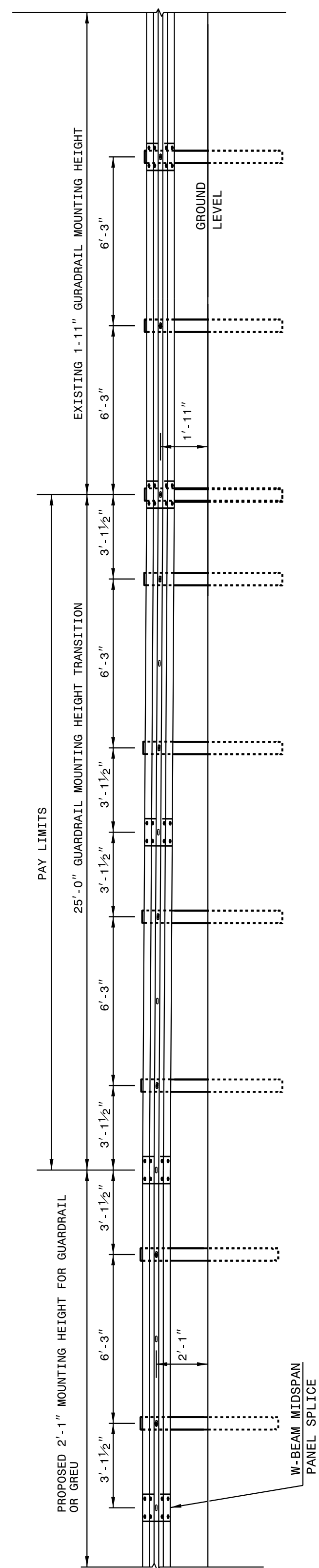
30-MAY-2017 09:18 S:\Contracts\Projects\Special Details\Hoverton\Standard Drawings\2012 Standard Drawings\Division 8\862d01 862d03 862d03\862d02.dgn Jhoverton AT USD-292595

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
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

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

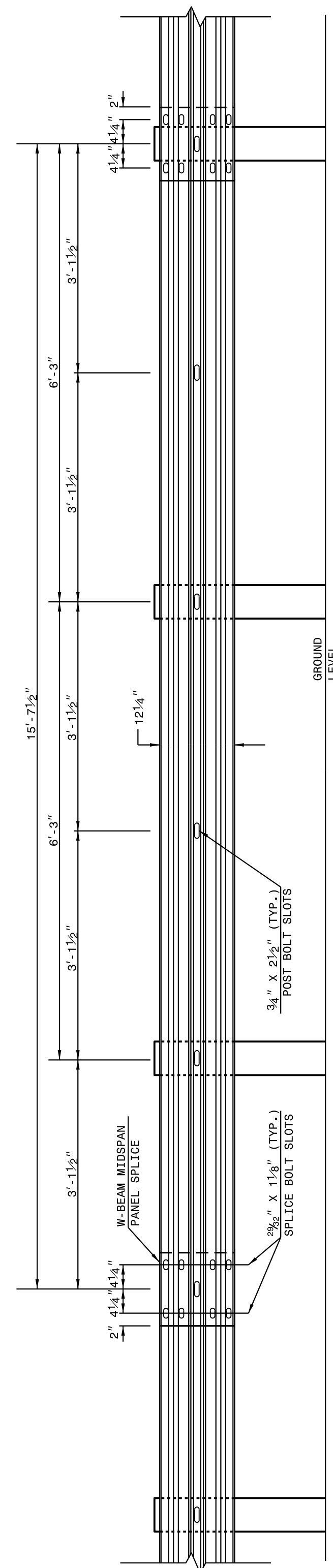
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 4 OF 8
862D02

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 3 OF 8
862D02



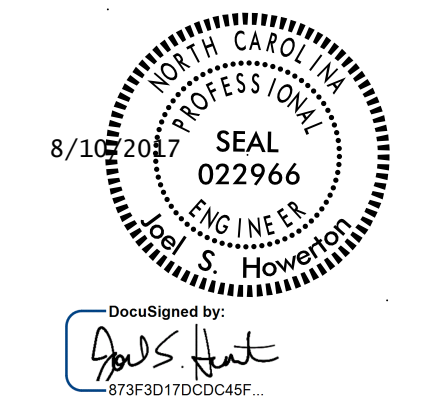
15'-7 1/2" W-BEAM GUARDRAIL PANEL

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 3 OF 8
862D02



DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

**CONTRACT STANDARDS
AND DEVELOPMENT UNIT**
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

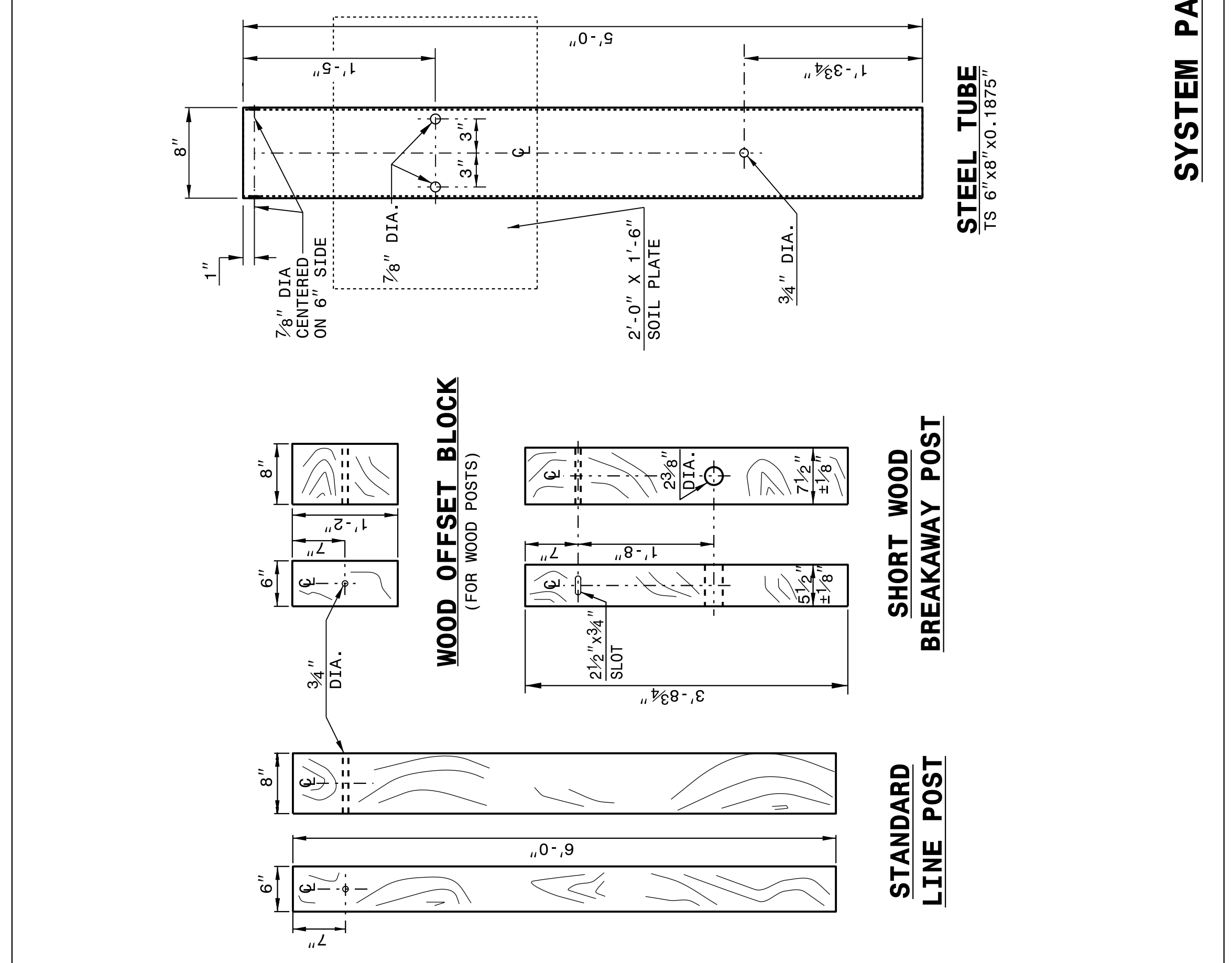
ORIGINAL BY: J. HOWERTON DATE: 06-22-12
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.:

30-MAY-2017 09:19 S:\Contracts\Special Details\Howerton\Standard Drawings\Details in Lieu of Standards\Division 8\862d01 862d03 862d02.dgn Jhowerton AT USD-292595

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 8
862D02

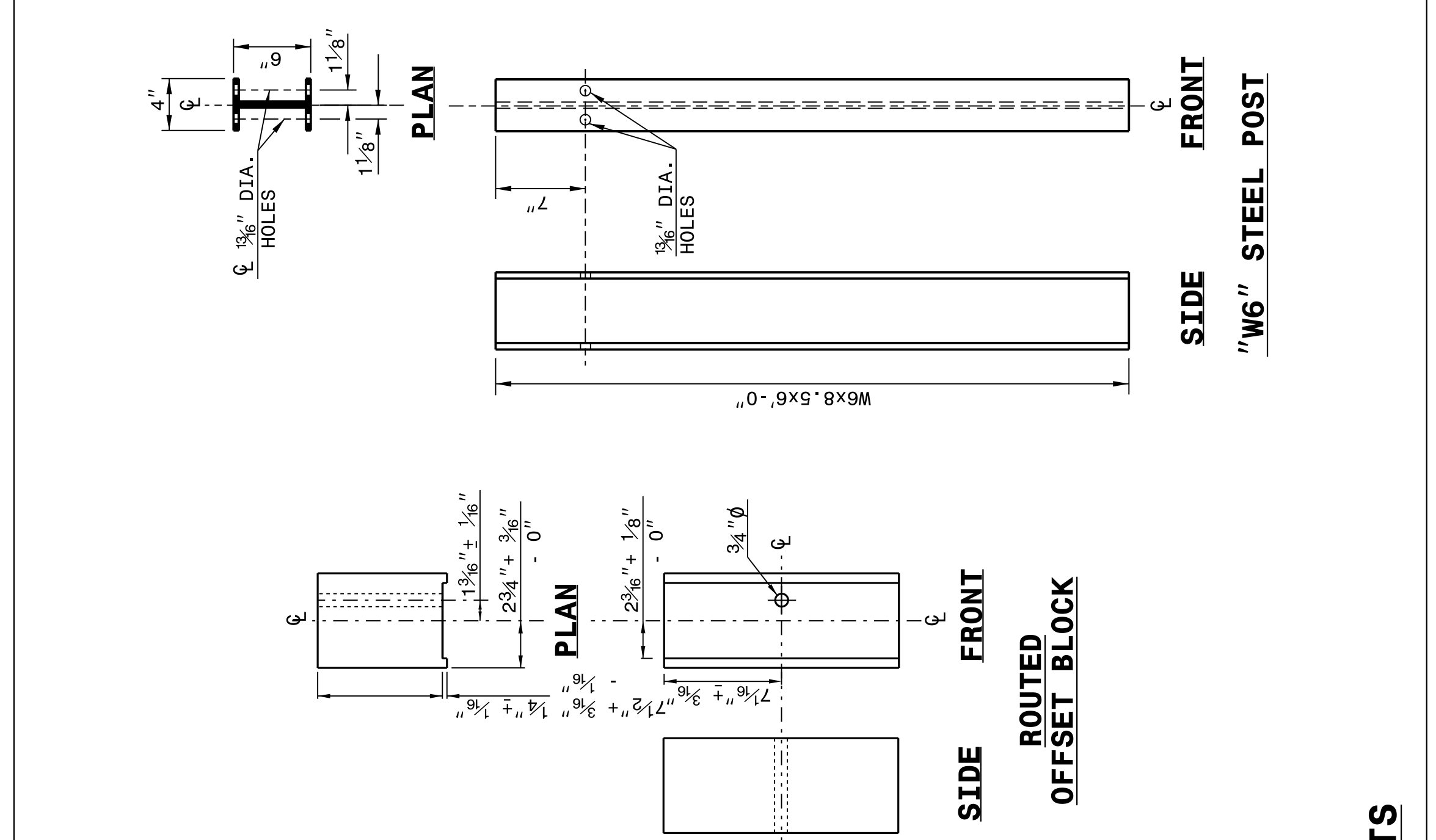


SYSTEM PARTS

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 8
862D02



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

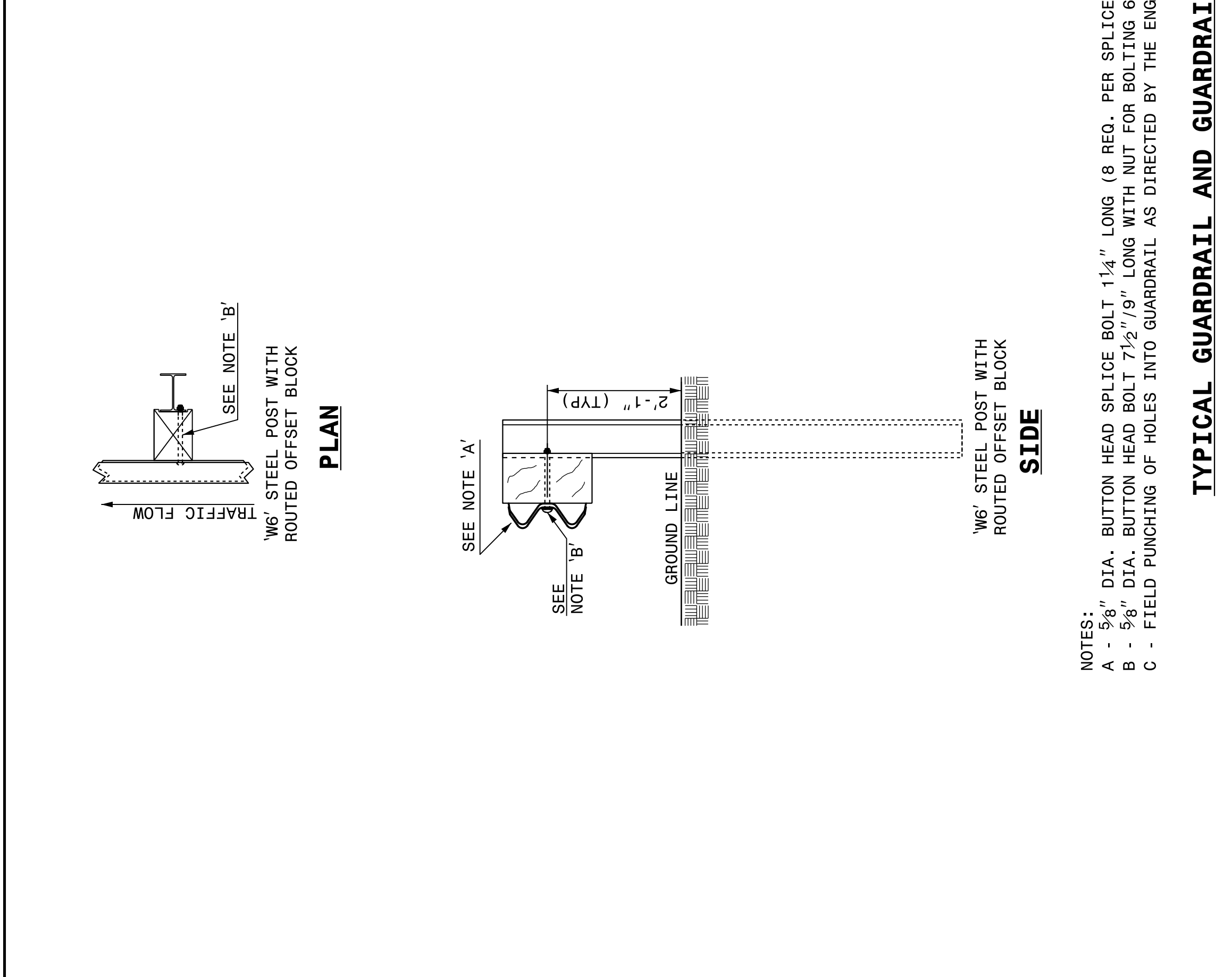
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 6 OF 8
862D02

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 5 OF 8
862D02



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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

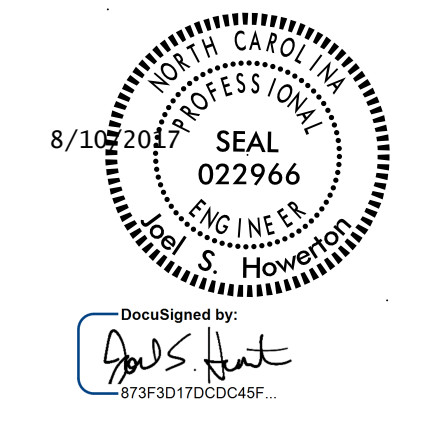
SHEET 5 OF 8
862D02

ORIGINAL BY: J HOWERTON DATE: 06-22-12
 MODIFIED BY: DATE:
 CHECKED BY: DATE:
 FILE SPEC.:

SEE TITLE BLOCK

CONTRACT STANDARDS AND DEVELOPMENT UNIT
 Office 919-707-6950 FAX 919-250-4119

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

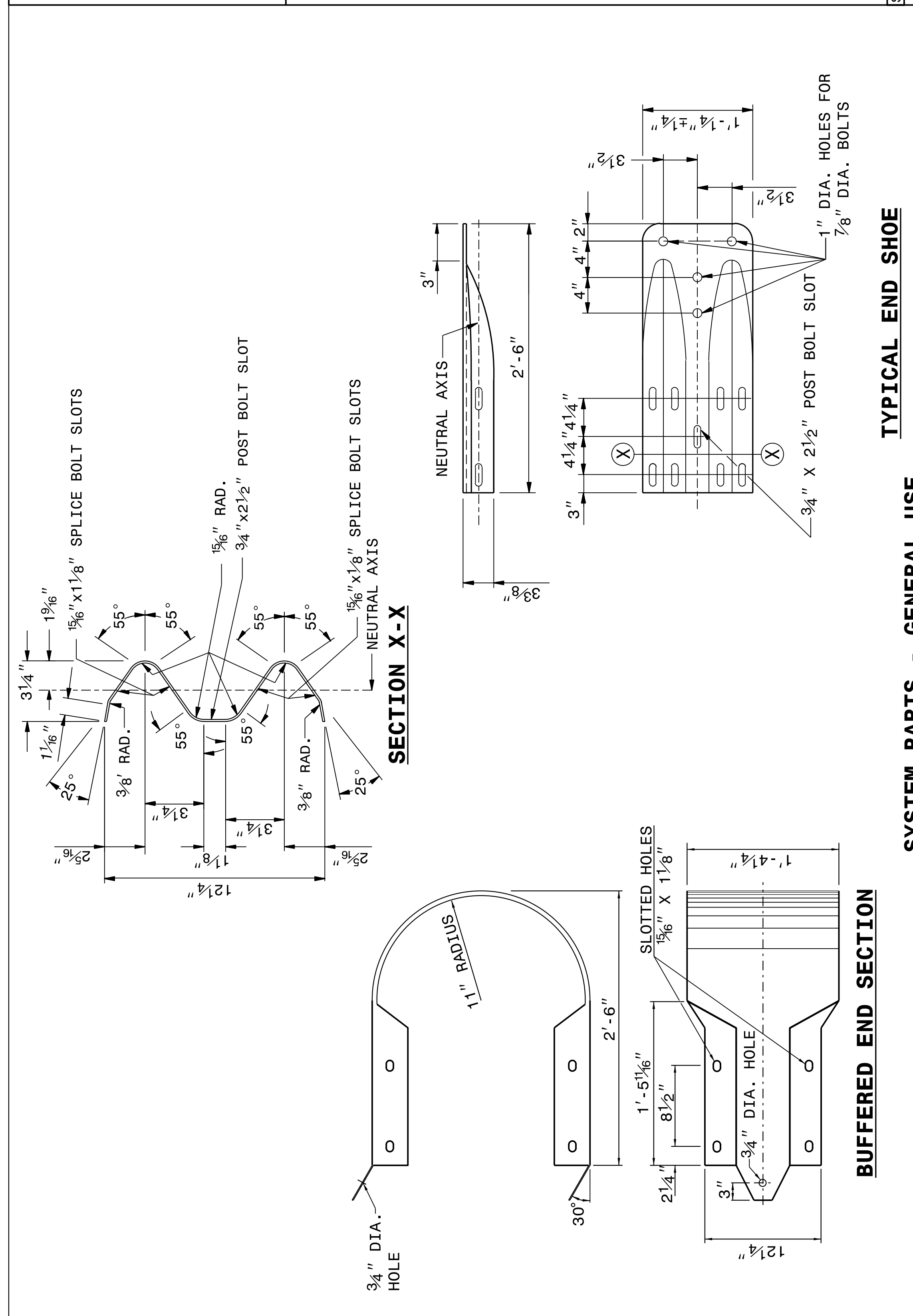


30-MAY-2017 09:20 S:\Contracts\Special Details\Standard Drawings\2012 Standard Drawings\Division 8\862d01 862d03 862d03\862d02.dgn
 Jhowerton AT:CSU-292595

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 8 OF 8
862D02



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

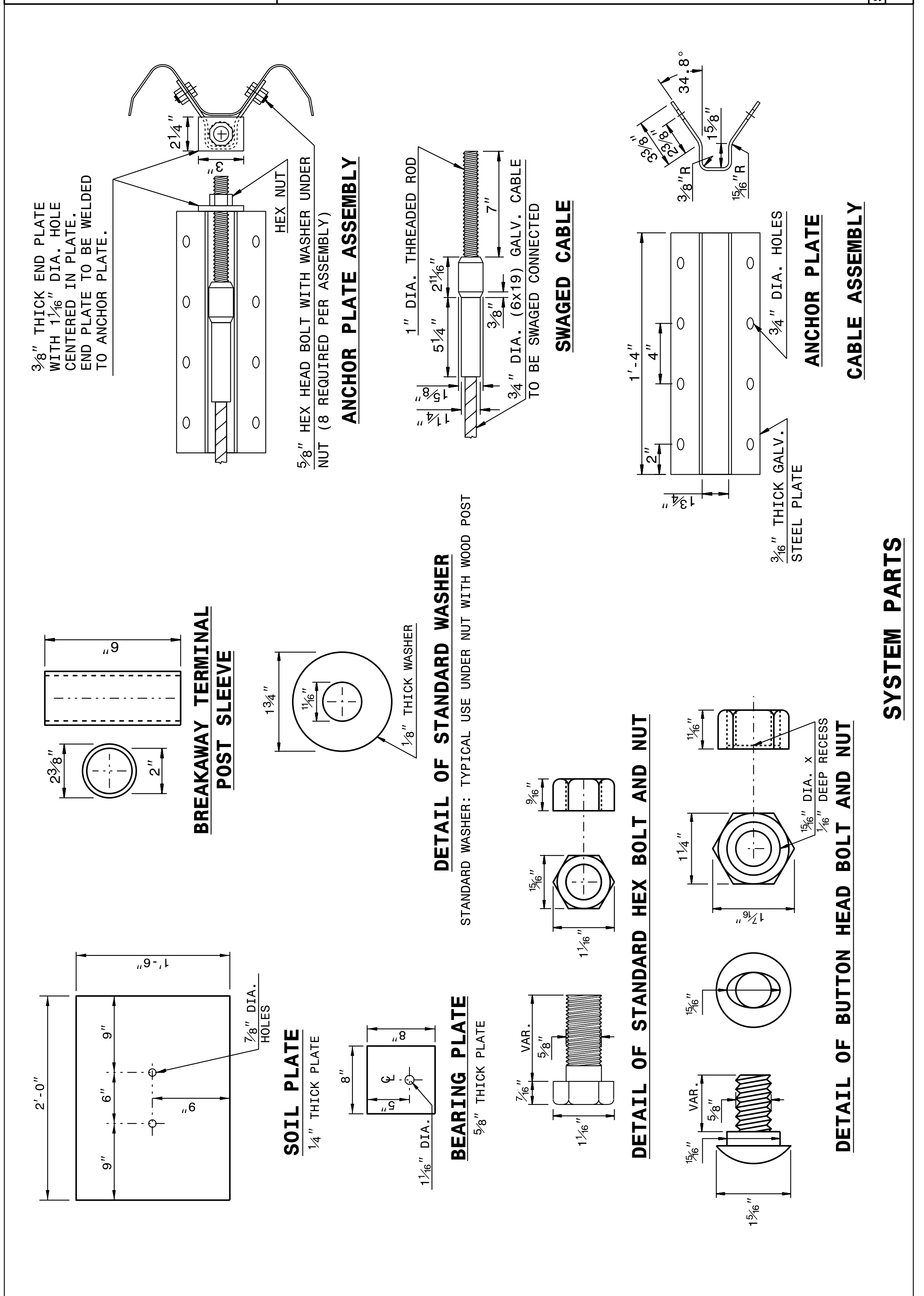
ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 8 OF 8
862D02

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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 7 OF 8
862D02



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

ROADWAY DETAIL DRAWING FOR
GUARDRAIL INSTALLATION

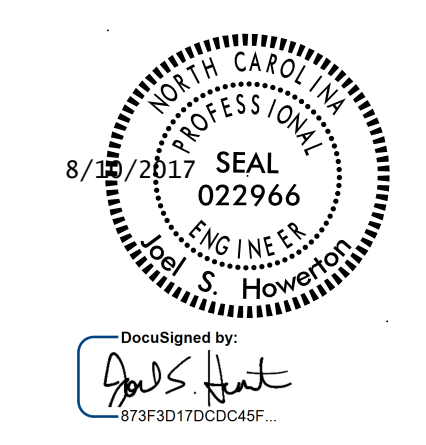
SHEET 7 OF 8
862D02

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

**CONTRACT STANDARDS
 AND DEVELOPMENT UNIT**
 Office 919-707-6950 FAX 919-250-4119

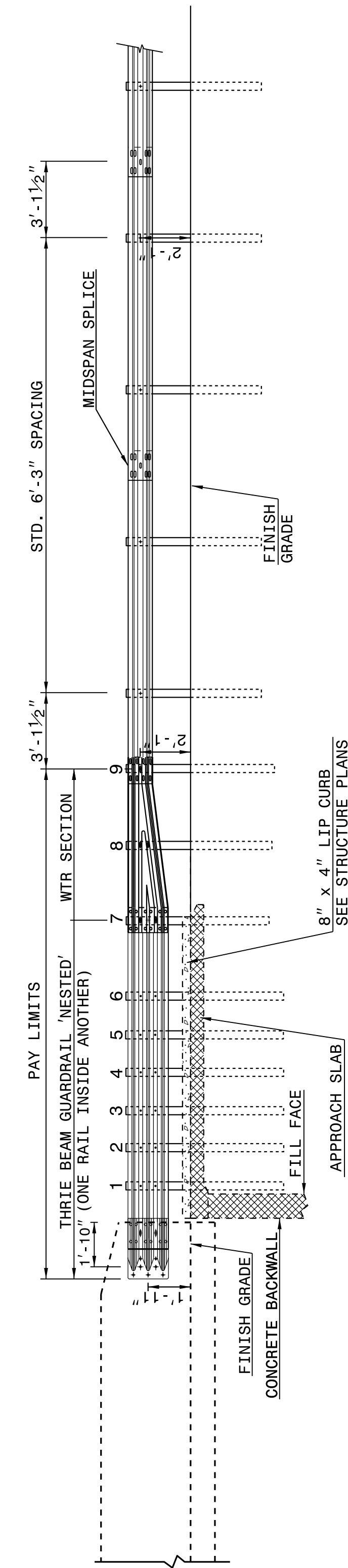
SEE TITLE BLOCK

ORIGINAL BY: J HOWERTON	DATE: 06-22-12
MODIFIED BY:	DATE:
CHECKED BY:	DATE:
FILE SPEC.:	



30-MAY-2017 09:21 S:\Contracts\Special Details\Standard Drawings\Division 8\862d01 862d03 862d03.dgn
 Jhowerton AT: USD-292595

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



ELEVATION

NOTE:
 **POST NOT REQUIRED FOR SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
 *THE DISTANCE FROM END OF BRIDGE RAIL TO CENTER LINE OF THE FIRST POST SHOULD BE 11½" IF CONCRETE BACKWALL IS NOT PRESENT.
 -SHOULDER BERM GUTTER MUST BE INSTALLED 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.

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

SHEET 2 OF 7
862D03

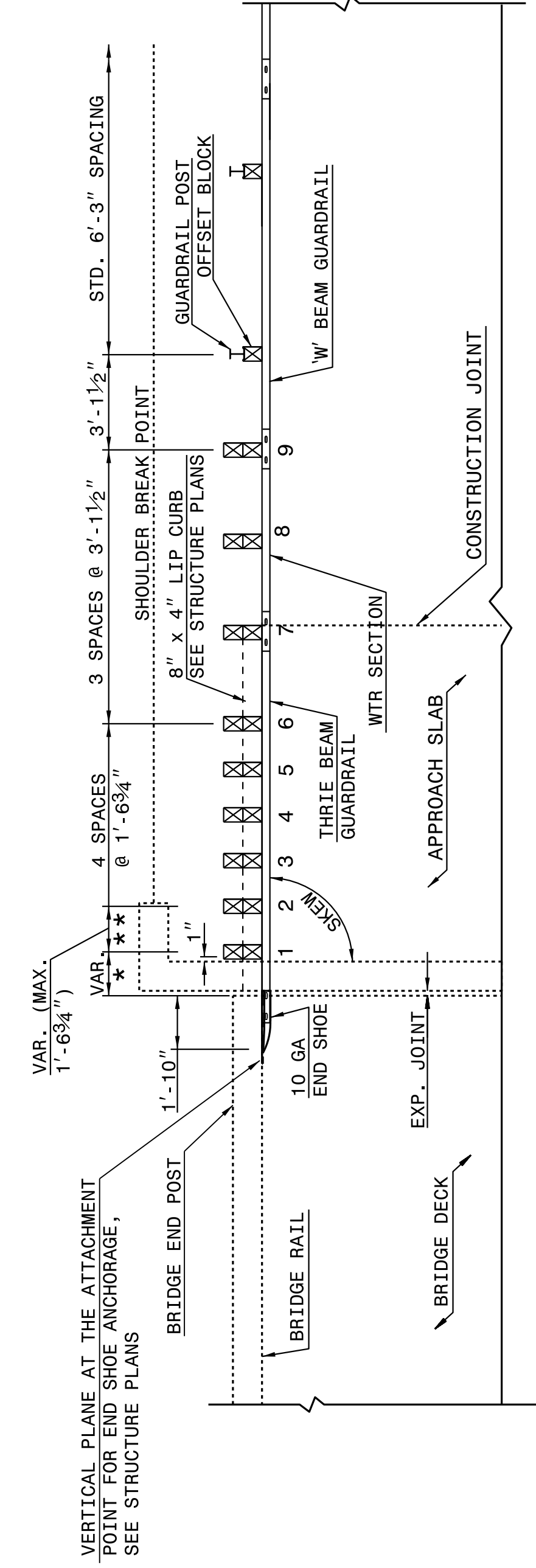
STATE OF NORTH CAROLINA
 DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 RALEIGH, N.C.

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

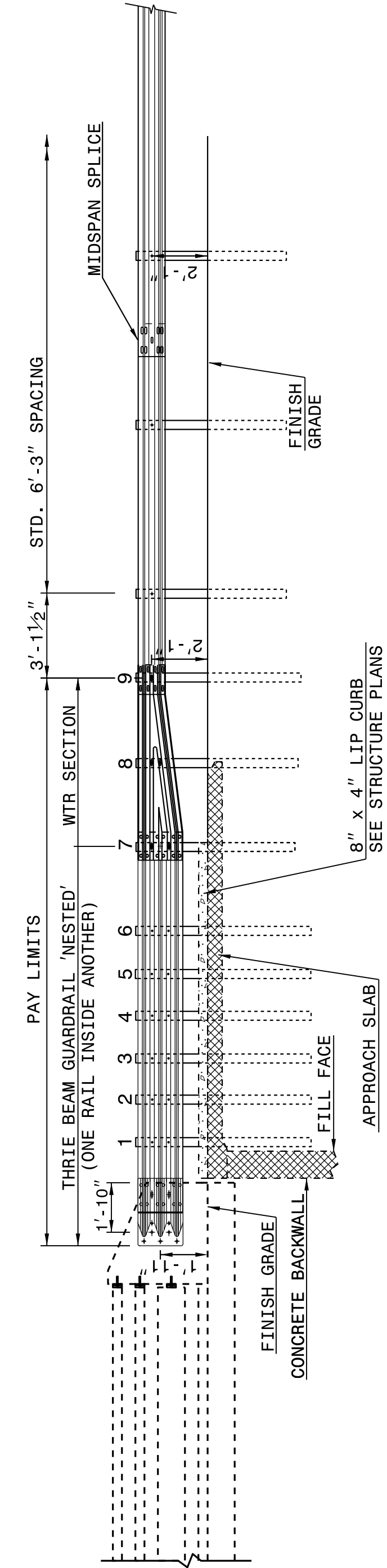
SHEET 2 OF 7
862D03

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

PLAN VIEW



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



ELEVATION

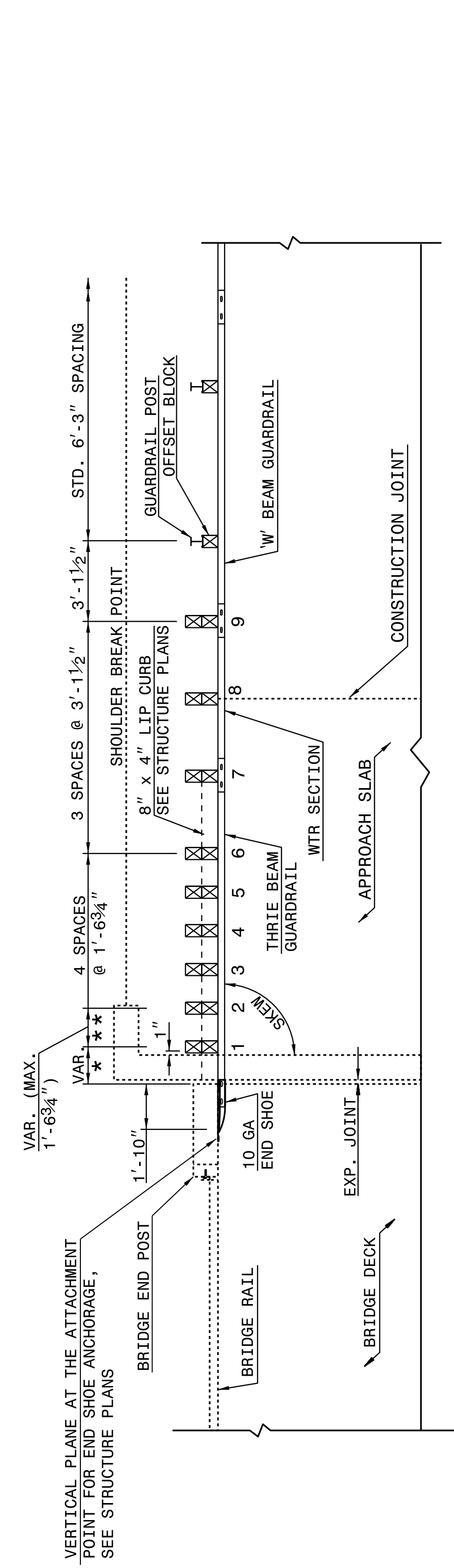
NOTE:
 **POST NOT REQUIRED FOR SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
 *THE DISTANCE FROM END OF BRIDGE RAIL TO CENTER LINE OF THE FIRST POST SHOULD BE 11½" IF CONCRETE BACKWALL IS NOT PRESENT.
 -SHOULDER BERM GUTTER MUST BE INSTALLED TO THE LIMITS 8" 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.

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 FOR ATTACHMENT TO RAIL ON BRIDGE

SHEET 1 OF 7
862D03

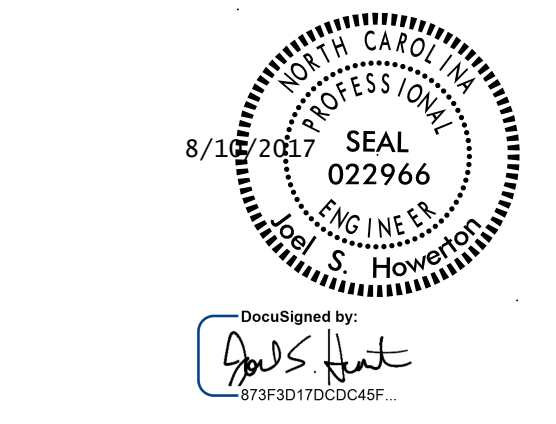
STATE OF NORTH CAROLINA
 DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 RALEIGH, N.C.



PLAN VIEW

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

SHEET 1 OF 7
862D03



DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

**CONTRACT STANDARDS
 AND DEVELOPMENT UNIT**
 Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

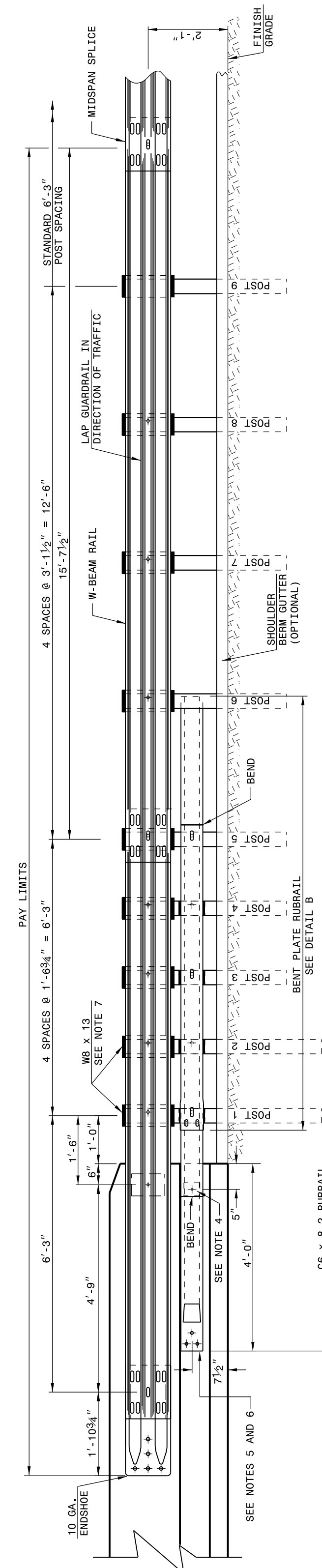
ORIGINAL BY: J HOWERTON DATE: 06-22-12
 MODIFIED BY: DATE:
 CHECKED BY: DATE:
 FILE SPEC.: DATE:

30-MAY-2017 09:22 S:\Contracts\Standard Drawings\Standard Drawings\2012 Standard Drawings\Division 8\862d01 862d03 862d03\862d03.dgn Jhoverton AT:USD-292595

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

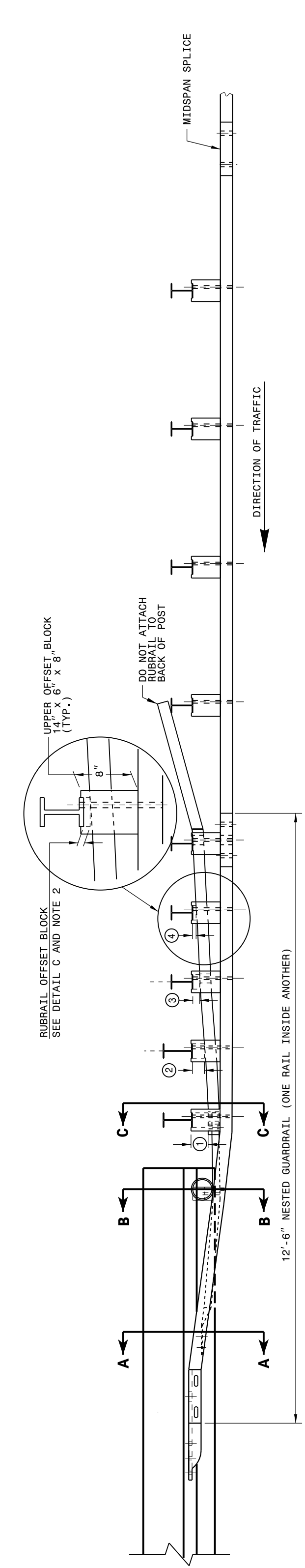
ROADWAY DETAIL DRAWING FOR GUARDRAIL ANCHOR UNIT FOR F-SHAPE BARRIER

SHEET 4 OF 7 862D03



ELEVATION

- GENERAL NOTES:
- POSTS 1 THROUGH 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKOUTS AND/OR RUBRAIL.
 - RUBRAIL BLOCKOUTS LOCATED ON POSTS 1 THROUGH 4 ARE OFFSET DRILLED AND SECURED WITH 5/8" BUTTOMHEAD BOLTS (SEE CHART FOR BOLT LENGTHS). SECURE BLOCKS ONLY TO POSTS 2 AND 4. SECURE RUBRAIL AND BLOCKOUTS TO POSTS 1 AND 3. RUBRAIL IS SECURED TO POST 5 WITH 5/8" BUTTOMHEAD BOLTS. RUBRAIL IS FLARED TO BACK OF POST 6, AND NOT SECURED.
 - 5/8" x 1 1/4" LONG BUTTOMHEAD BOLT AND RECTANGULAR PLATE WASHER. BLOCKOUT PLATE WASHER, CLAMETER X 9" LONG. ATTACH TUBE TO GUARDRAIL ONLY WITH 3/8" x 1 1/4" LONG BUTTOMHEAD BOLT AND RECTANGULAR PLATE WASHER.
 - SEE DETAIL D FOR SLOPED RUBRAIL BLOCKOUT. BLOCKOUT IS ATTACHED TO RAIL ELEMENT ONLY. USE 3/8" x 3" LAG BOLT WITH FLAT WASHER. TOE OF THE BARRIER OR BRIDGE RAIL.
 - SHOP FABRICATE THE C6 X 8.2 RUBRAIL END TO BE CONSISTENT WITH THE SLOPE OF THE F SHAPE AND ATTACH FLUSH WITH THE SLOPED ANCHOR OF THE BARRIER OR BRIDGE RAIL.
 - ANCHOR 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".
 - AT EXISTING BRIDGE RAIL AND NEW OR EXISTING BARRIERS, ANCHOR THE W-BEAM END SHOE USING A 4 BOLT HOLD DOWN PLATE (SEE STD. DWG. 862.041).
 - A 4 BOLT INSERT ASSEMBLY IS ALLOWED ON PRECAST REINFORCED CONCRETE BARRIER (SEE STD. DWG. 857.01).
 - INSTALL THE W-BEAM END SHOE BEHIND THE NESTED W-BEAM ELEMENTS.
 - 1 1/2" DIA. HOLES FOR ANCHOR BOLTS. ANCHOR BOLTS ARE 1 1/2" LONG. ALL OTHER BOLTS IN THE ANCHOR UNIT ARE W8 X 8.5.
 - POSTS 1 AND 2 ARE W8 X 13, 7'-6" LONG. ALL OTHER BOLTS IN THE ANCHOR UNIT ARE W8 X 8.5.



PLAN

GUARDRAIL ANCHOR UNIT TYPE B-77

SHEET 4 OF 7 862D03

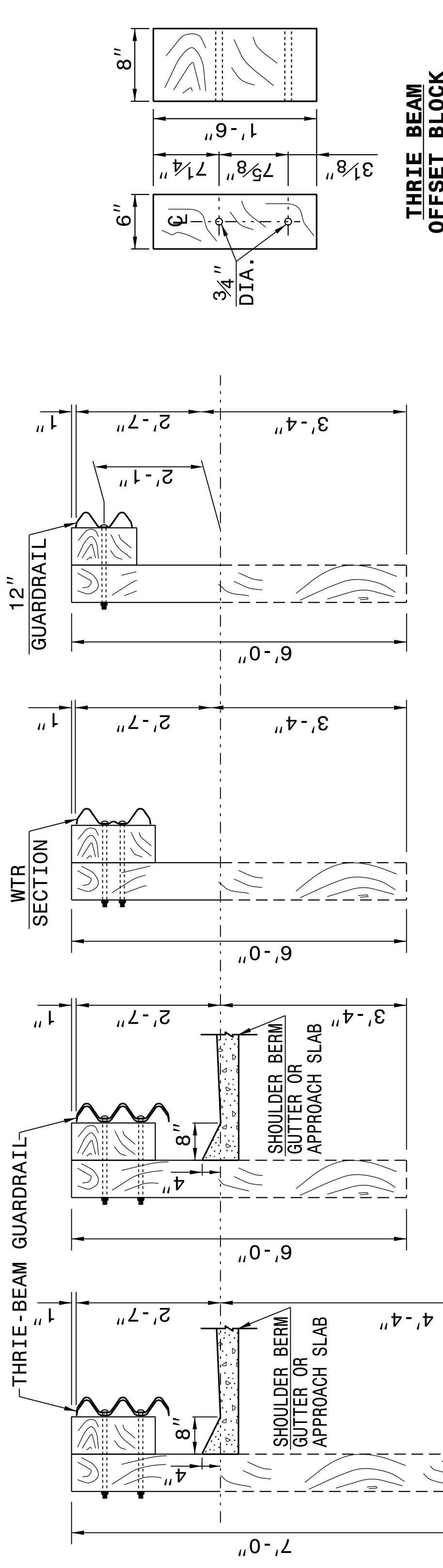
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

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

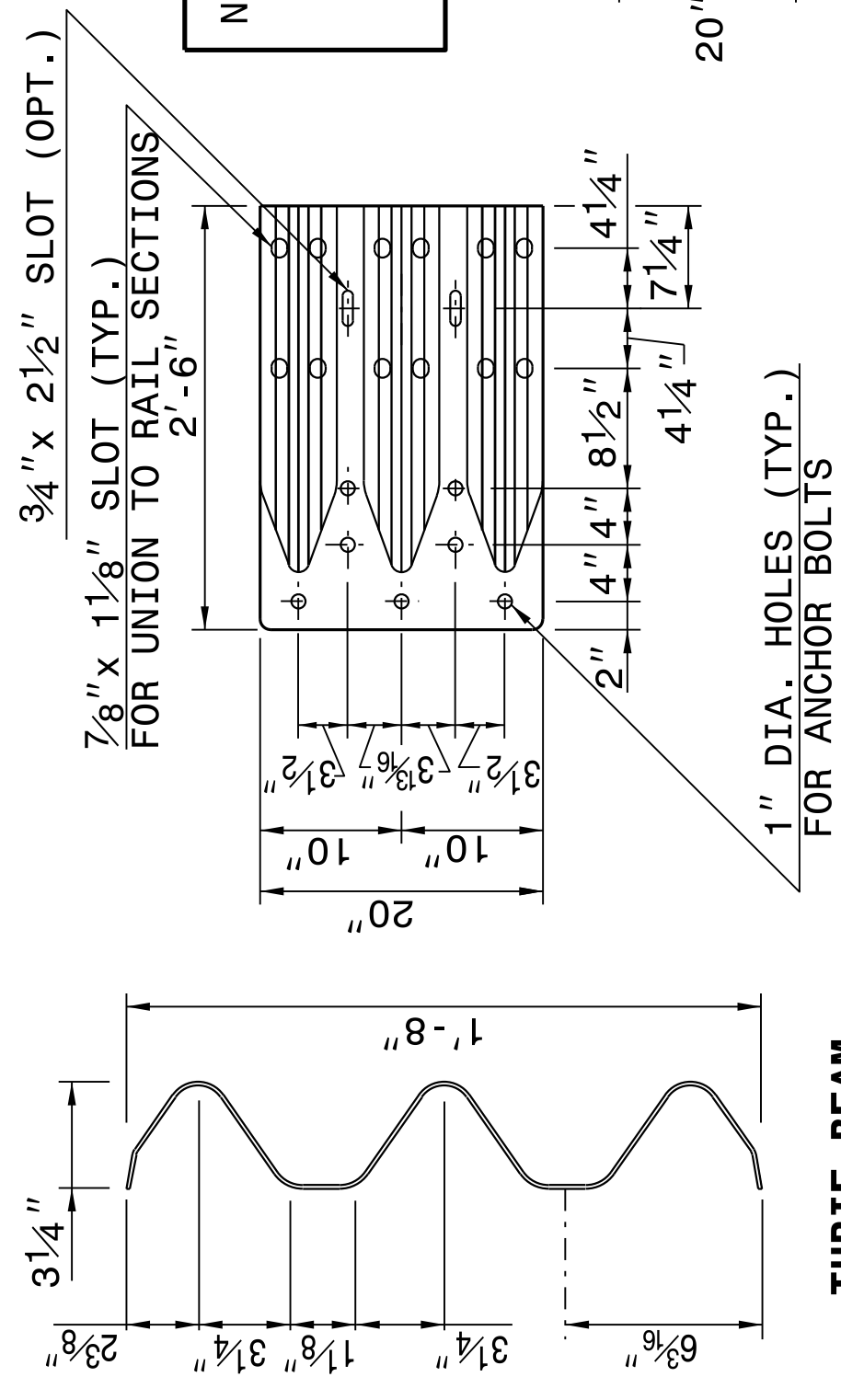
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

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

SHEET 3 OF 7 862D03



SECTION OF THRRIE BEAM POSTS 1 THRU 6 SECTION OF THRRIE BEAM POST 7 SECTION OF WTR BEAM POST 8 SECTION OF 'W' BEAM POST 9



END SHOE

NOTE: THE MID POST AND OFFSET BLOCK OF SPECIAL BOLT HOLE DRILLING IN THE THRRIE BEAM OFFSET BLOCK AND LINE POST.

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

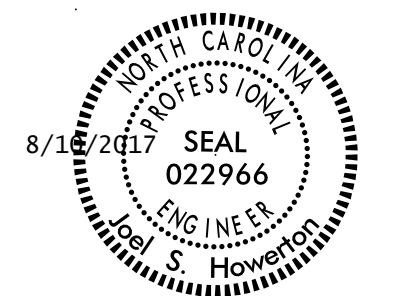
ROADWAY DETAIL DRAWING FOR STRUCTURE ANCHOR UNITS GUARDRAIL ANCHOR UNIT, TYPE III

SHEET 3 OF 7 862D03

CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J HOWERTON DATE: 06-22-12
MODIFIED BY: DATE:
CHECKED BY: DATE:
FILE SPEC.: DATE:



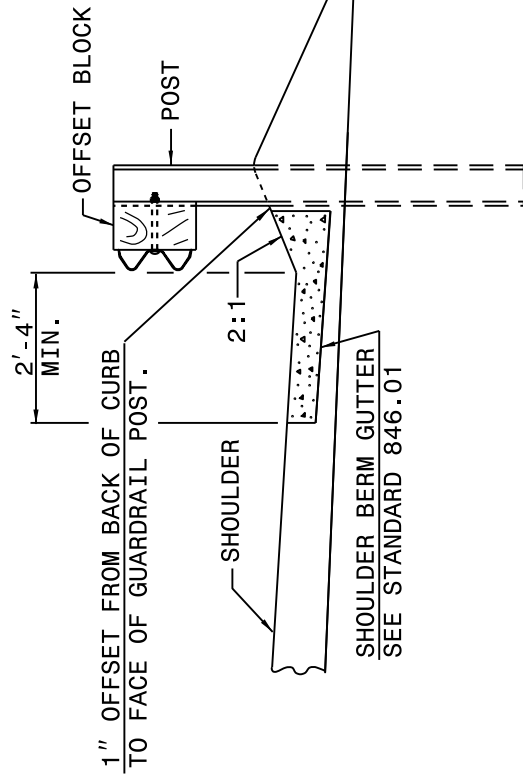
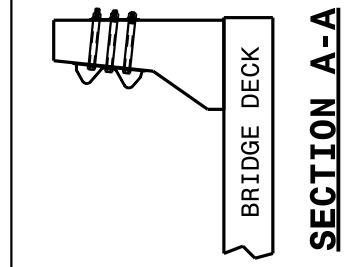
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

30-MAY-2017 09:23 S:\Contracts\Projects\Special Details\Standard Drawings\Standard Drawings\Division 8\862d01 862d03 862d03 862d03.dgn Jhowerton AT:CSU-292595

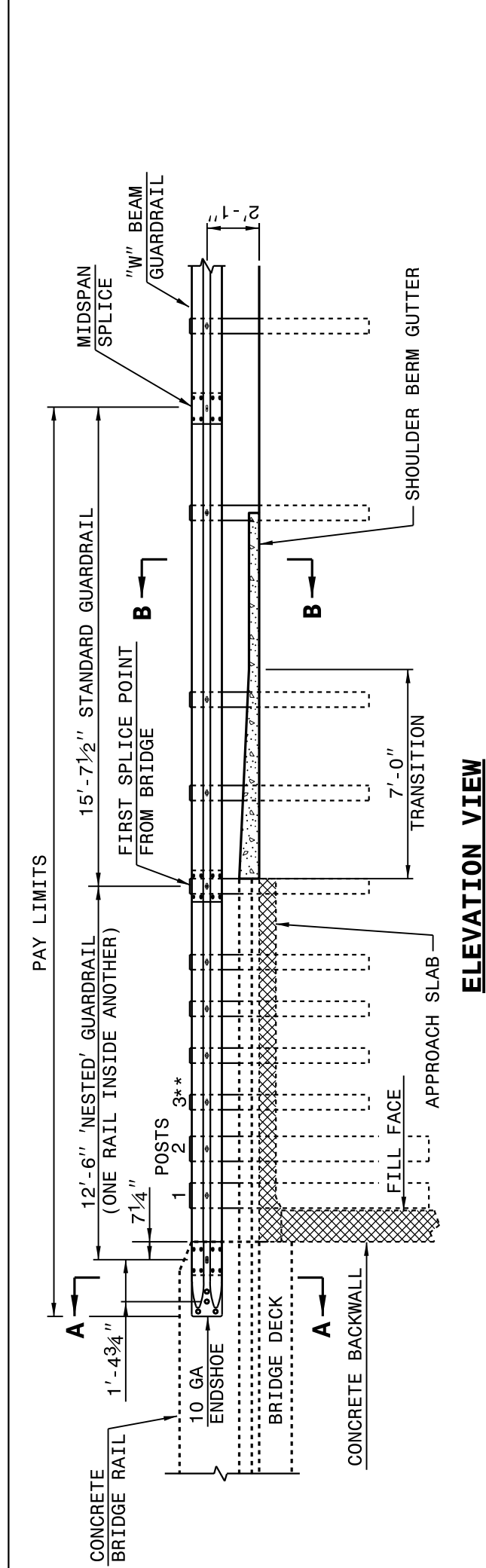
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

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

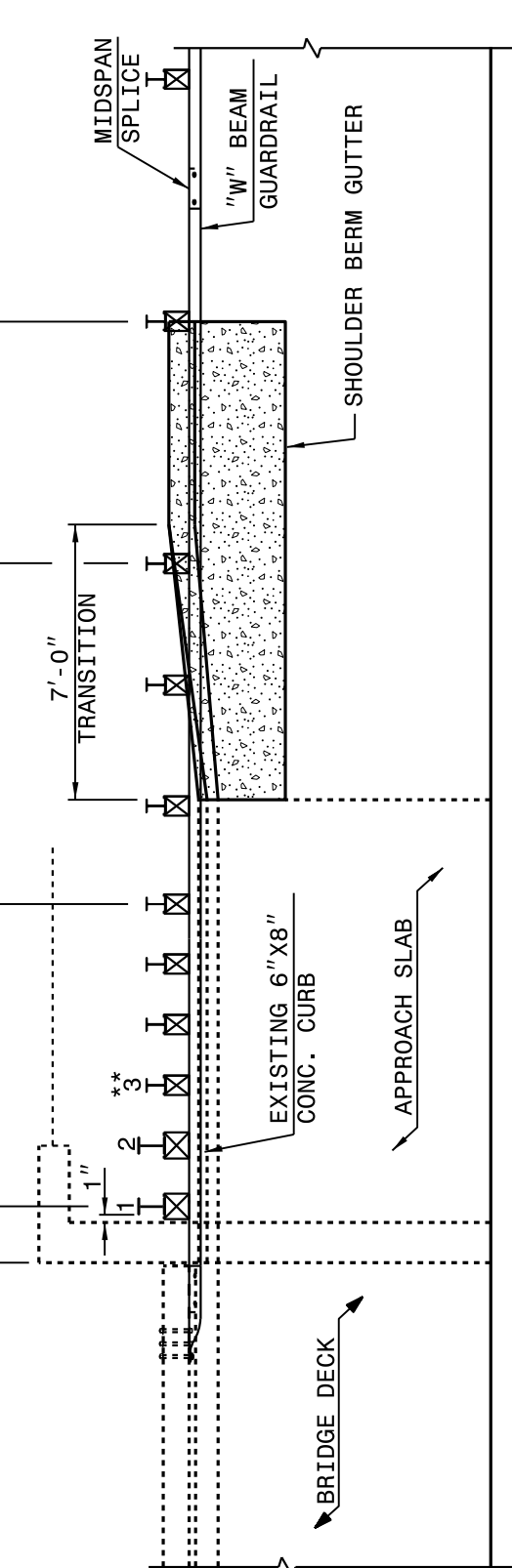
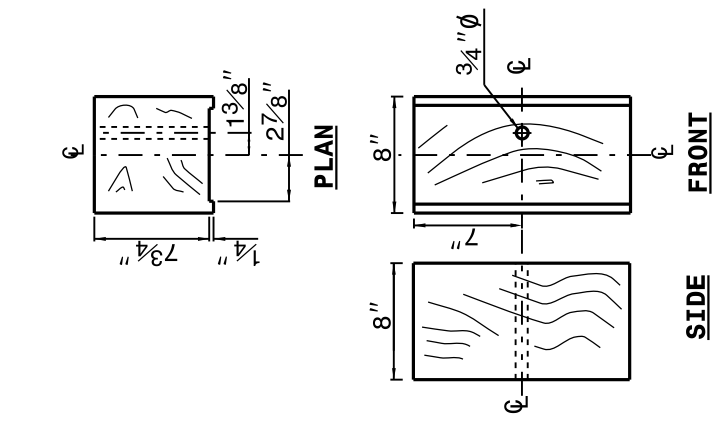
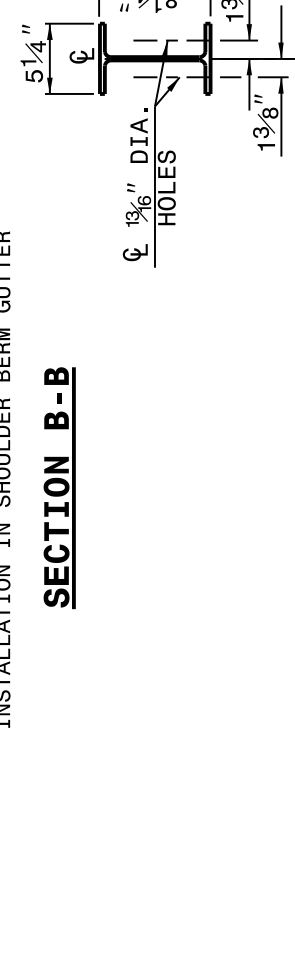
SHEET 6 OF 7
862D03



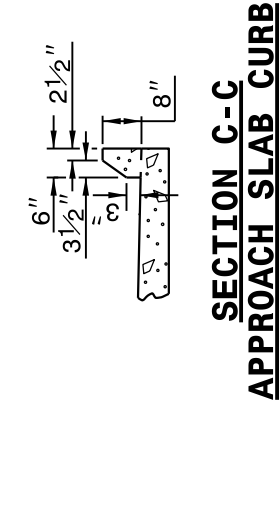
ELEVATION VIEW



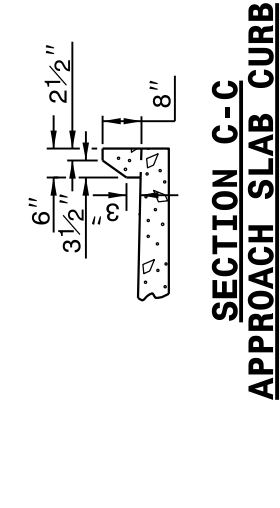
NOTE:
 **ELIMINATE POST 3 AND SHIFT POSTS 1 & 2 ON SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
 **POSTS 1 AND 2 TO BE W8 X 21 X 8'-0" LONG STEEL POSTS THROUGH ANCHOR UNIT PAY LIMITS.
 **ANCHOR THE W-BEAM END SIDE USING A 4 BOLT HOLD DOWN PLATE AS SHOWN IN STANDARD 862-04
 -LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
 -USE NO WOOD POSTS WITHIN THE GUARDRAIL ANCHOR UNIT LIMITS.
 -MESSAGE GUARDRAIL FROM THE TOP OF UNFINISHED SURFACE (SHOULDER, BERM, OR GUTTER).
 -USE NO WOOD POSTS WITHIN THE GUARDRAIL ANCHOR UNIT LIMITS.
 -ANCHOR THE W-BEAM END SIDE USING A 4 BOLT HOLD DOWN PLATE AS SHOWN IN STANDARD 862-04



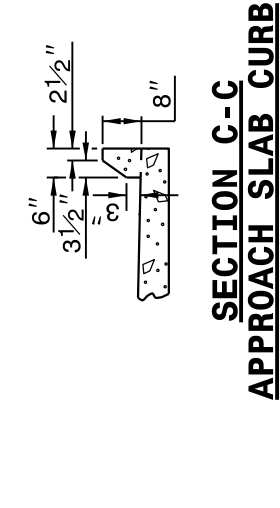
SECTION C-C



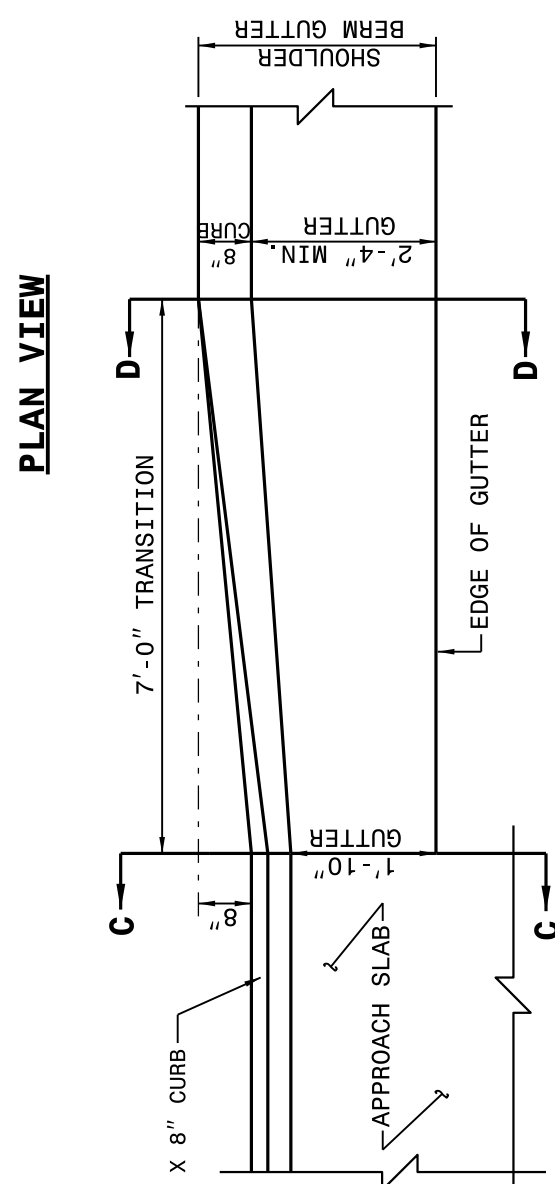
SECTION D-D



SECTION D-D



TRANSITION APPROACH SLAB CURB TO SHOULDER BERM GUTTER



GUARDRAIL ANCHOR UNIT TYPE B-83

SHEET 6 OF 7
862D03

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

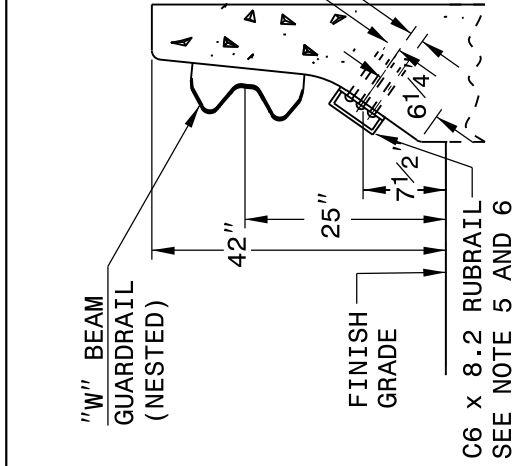
ROADWAY DETAIL DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT TYPE B-83

SHEET 6 OF 7
862D03

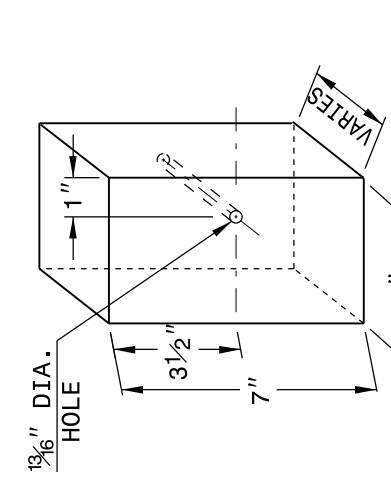
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

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

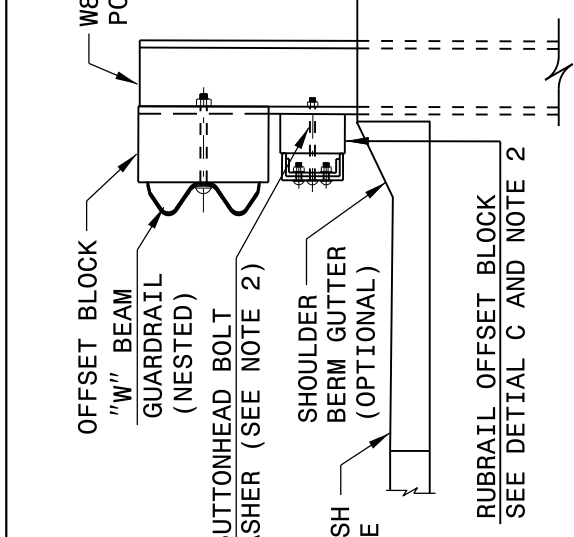


SECTION B-B

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

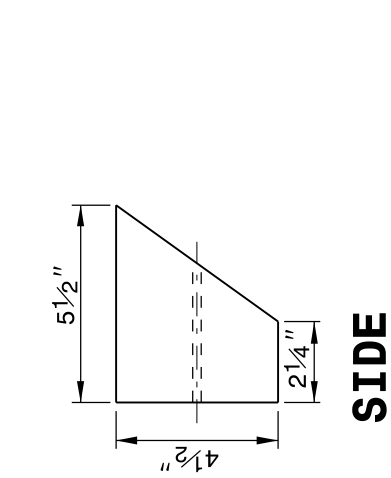
* BOLTS FOR POSTS 3 AND 4 ARE USED TO ATTACH TO BLOCK. RUBRAIL NOT ATTACHED TO BLOCK.

SECTION C-C

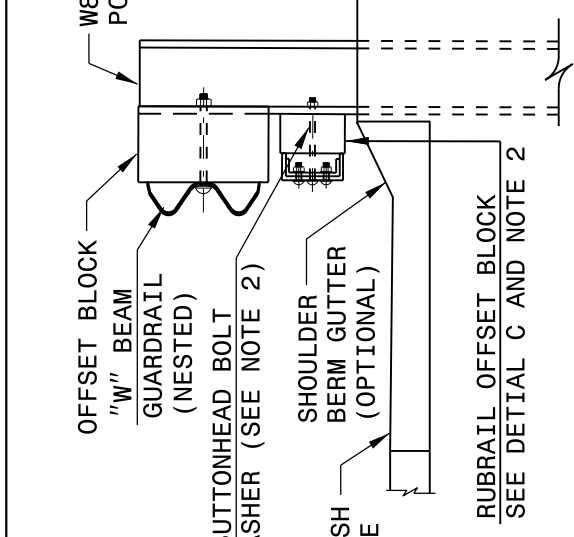


DETAIL E LAG BOLT

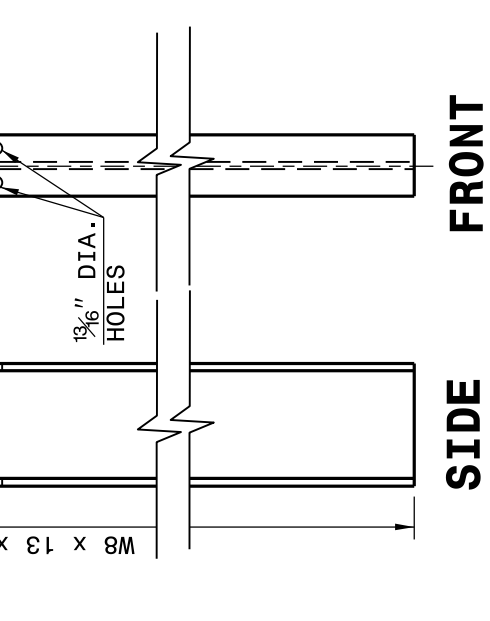
SECTION C-C



SECTION D-D



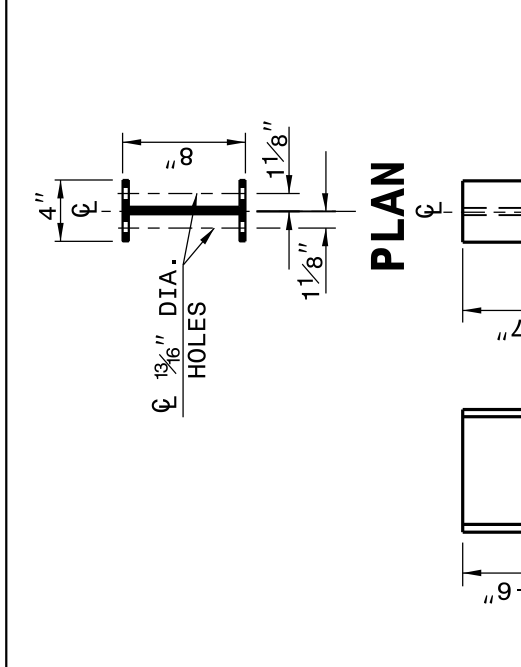
DETAIL F STEEL POST
"W8 X 13 X 7'-6"



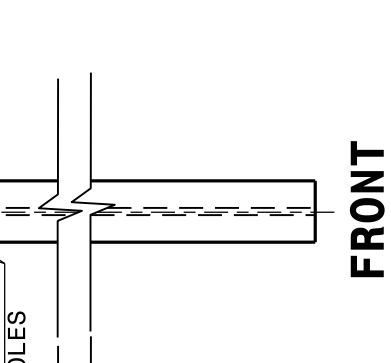
STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

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

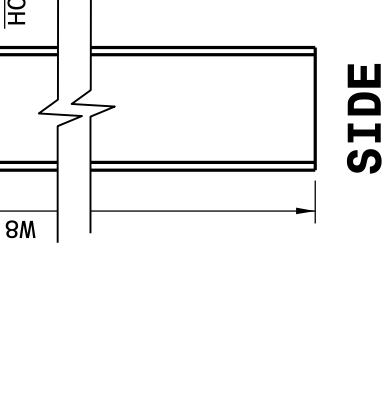
SHEET 5 OF 7
862D03



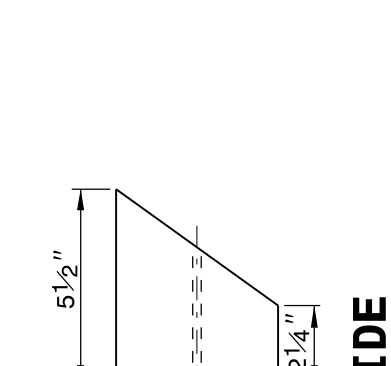
SECTION B-B



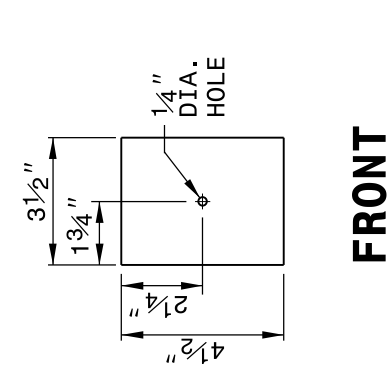
SECTION C-C



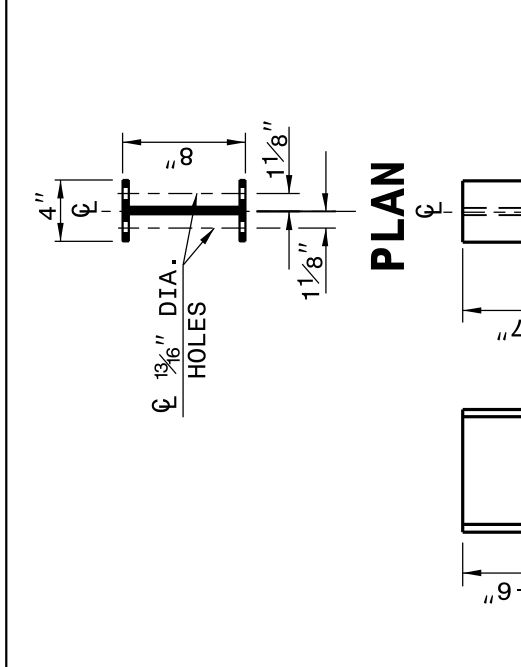
SECTION D-D



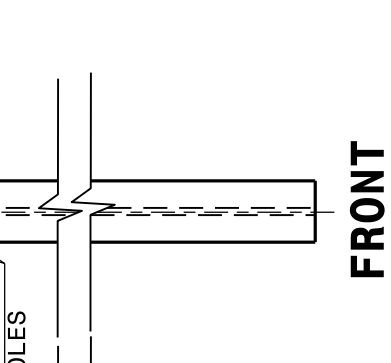
SECTION E-E



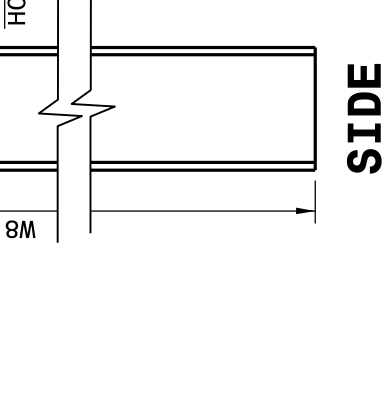
SECTION F-F



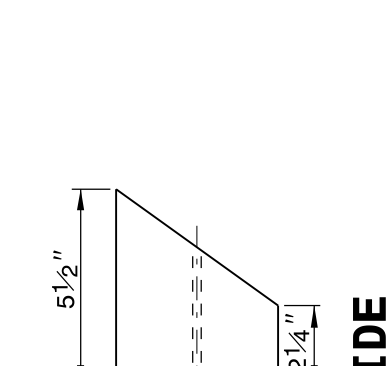
SECTION B-B



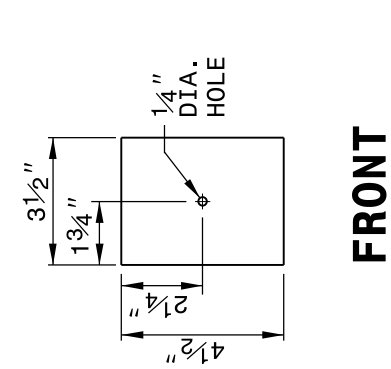
SECTION C-C



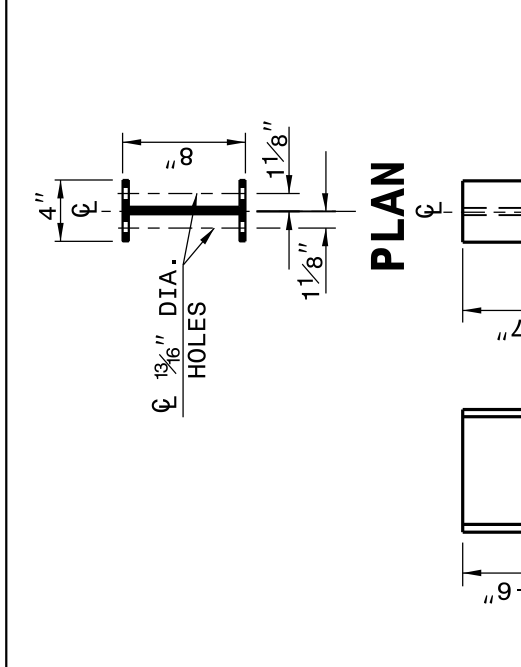
SECTION D-D



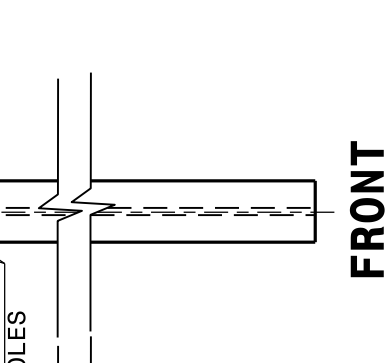
SECTION E-E



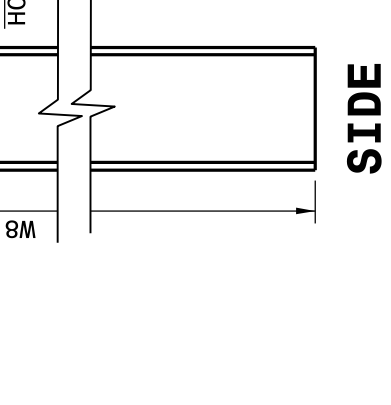
SECTION F-F



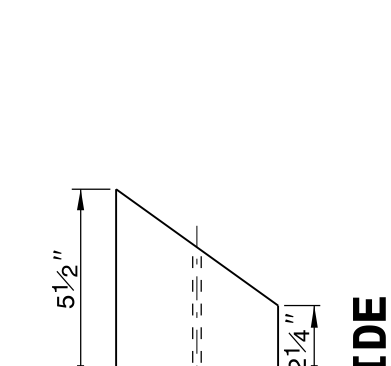
SECTION B-B



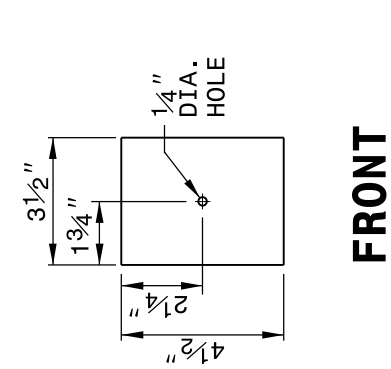
SECTION C-C



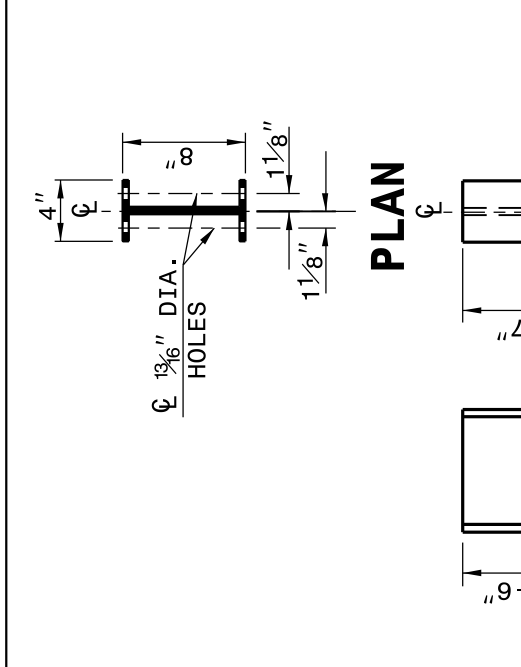
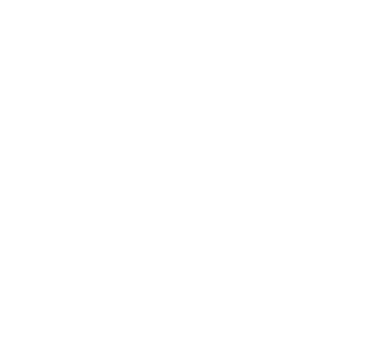
SECTION D-D



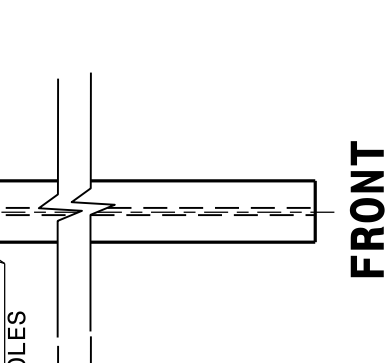
SECTION E-E



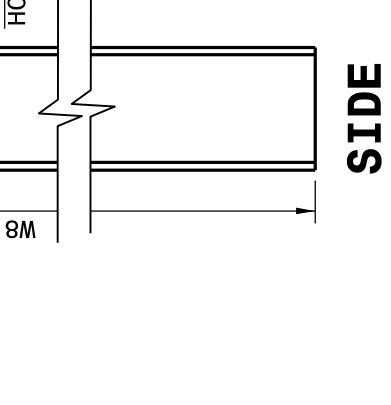
SECTION F-F



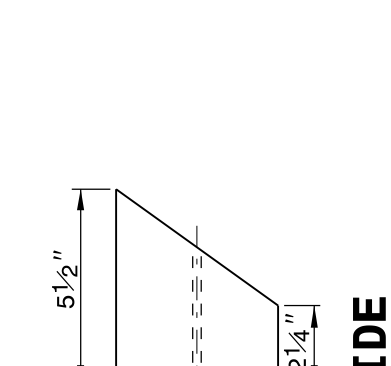
SECTION B-B



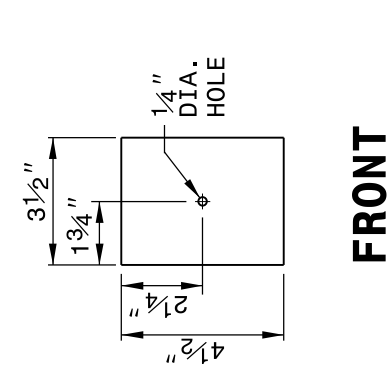
SECTION C-C



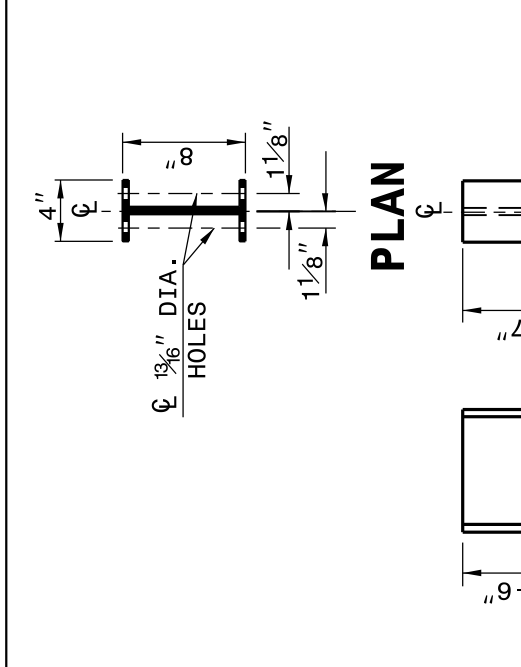
SECTION D-D



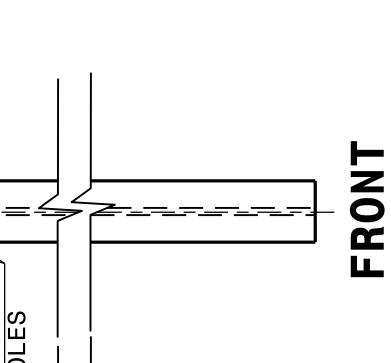
SECTION E-E



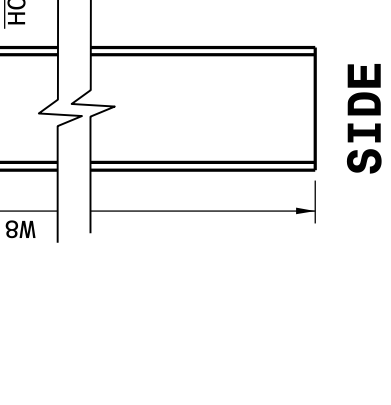
SECTION F-F



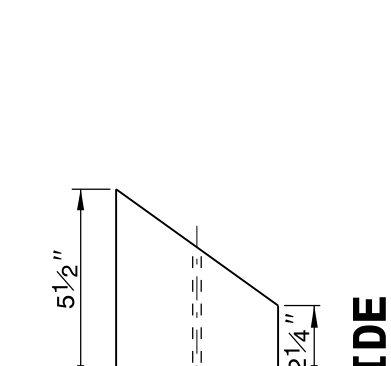
SECTION B-B



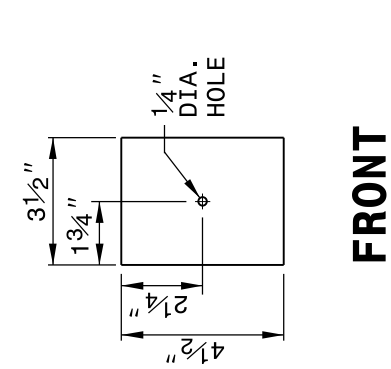
SECTION C-C



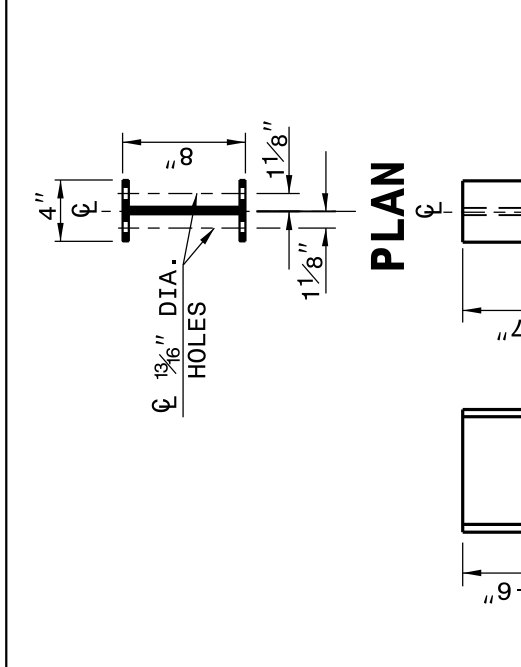
SECTION D-D



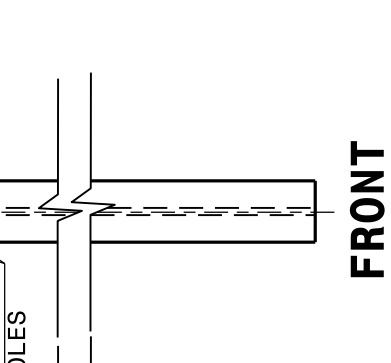
SECTION E-E



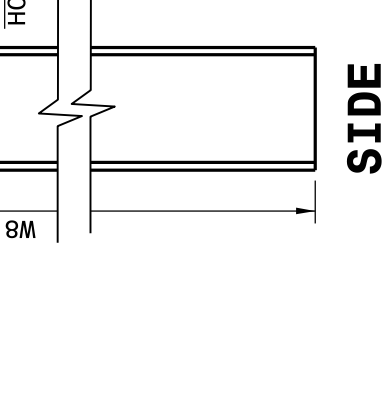
SECTION F-F



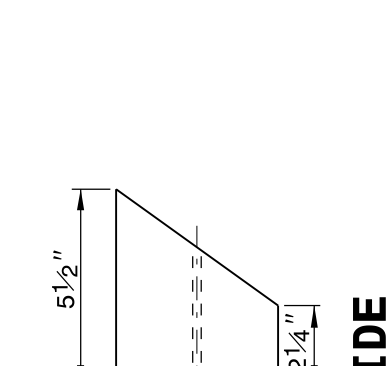
SECTION B-B



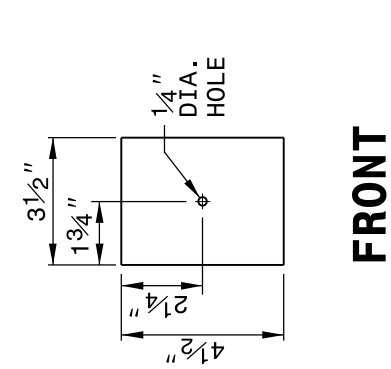
SECTION C-C



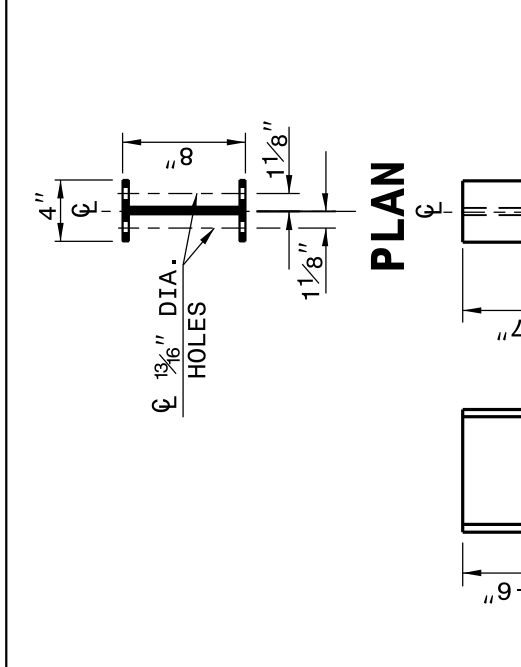
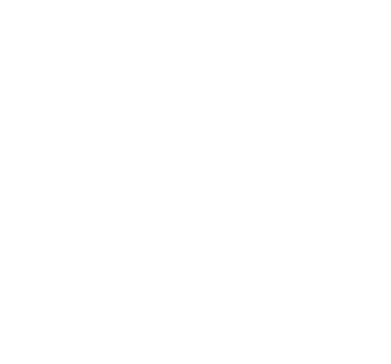
SECTION D-D



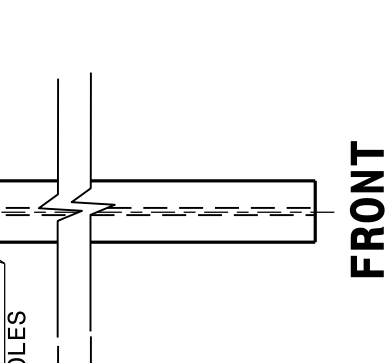
SECTION E-E



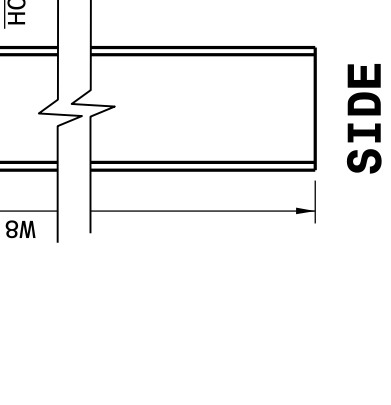
SECTION F-F



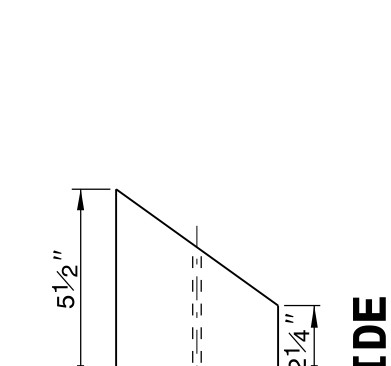
SECTION B-B



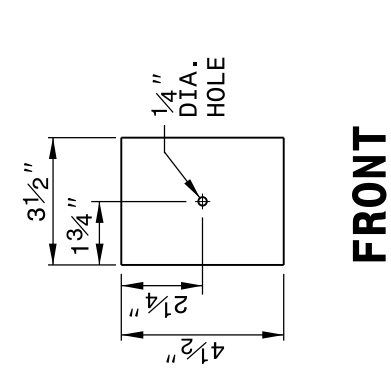
SECTION C-C



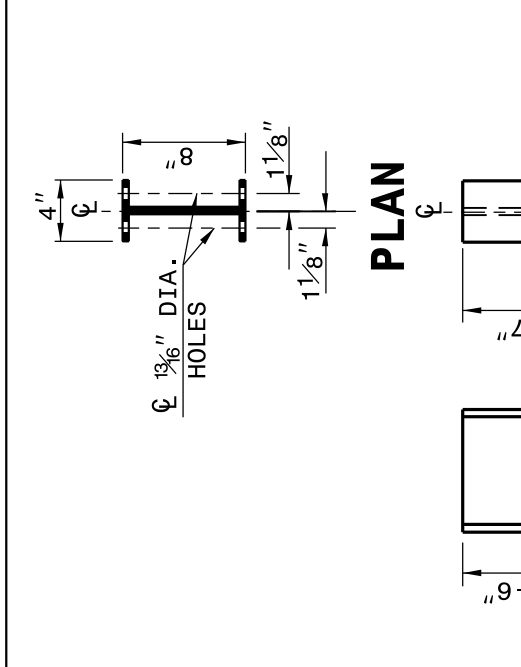
SECTION D-D



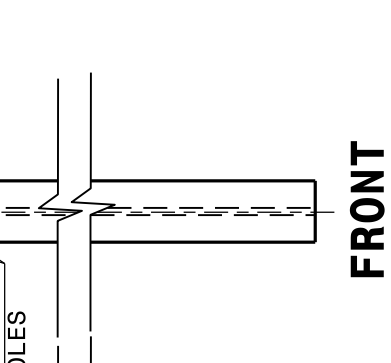
SECTION E-E



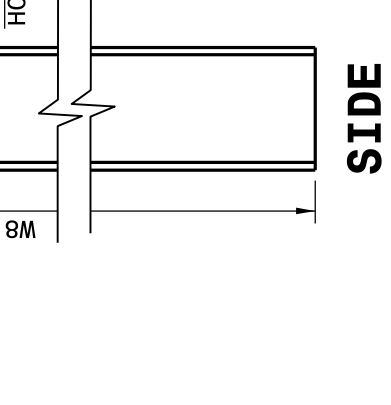
SECTION F-F



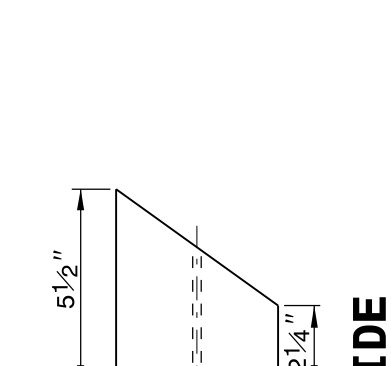
SECTION B-B



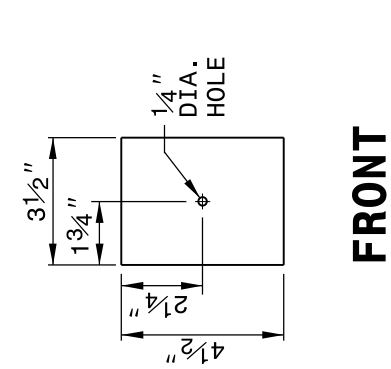
SECTION C-C



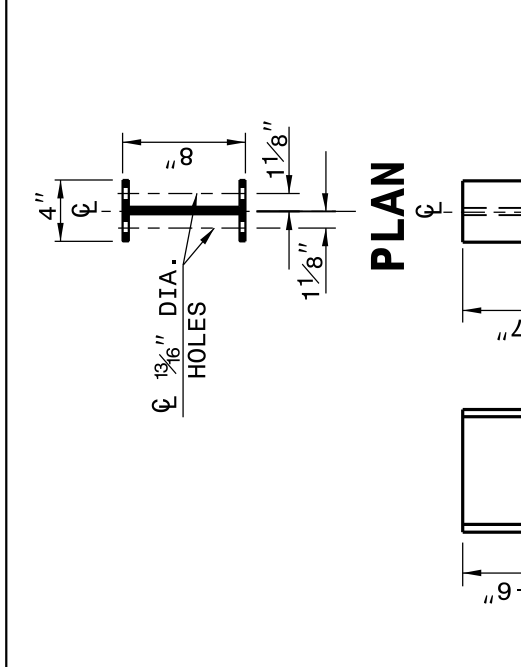
SECTION D-D



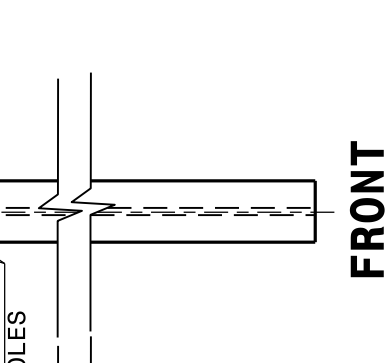
SECTION E-E



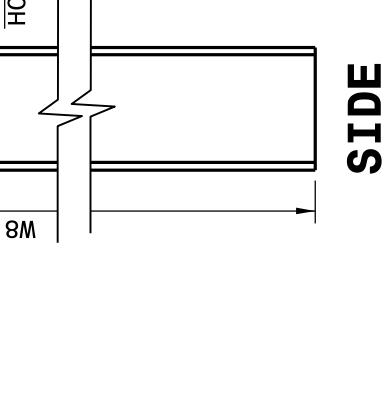
SECTION F-F



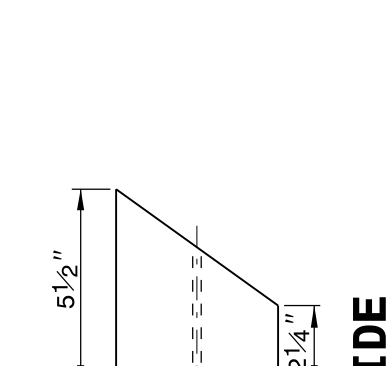
SECTION B-B



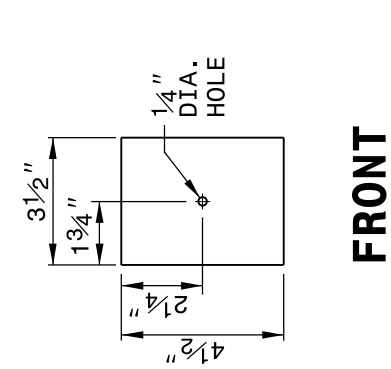
SECTION C-C



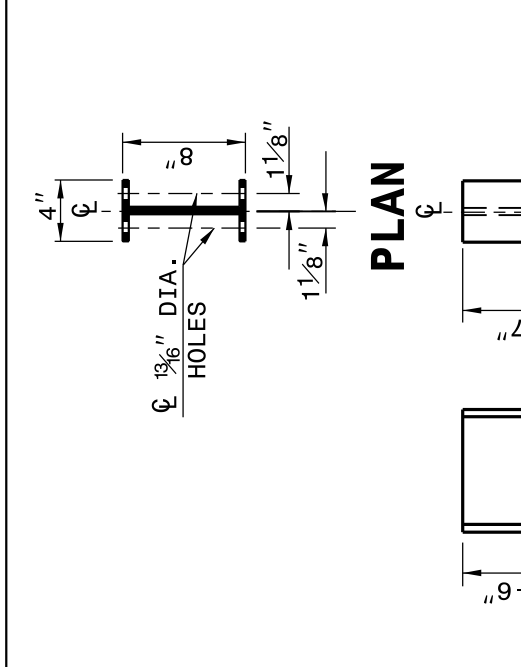
SECTION D-D



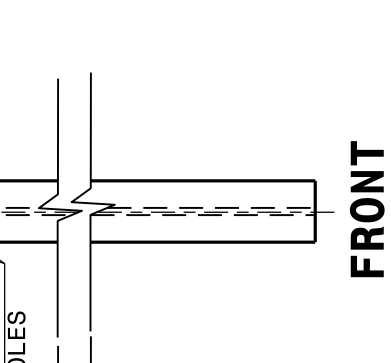
SECTION E-E



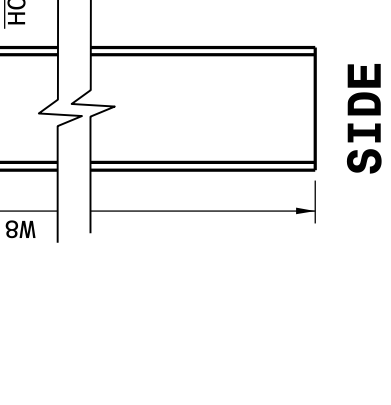
SECTION F-F



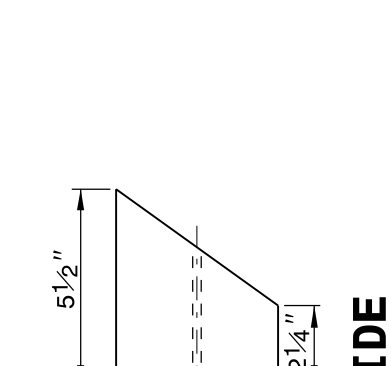
SECTION B-B



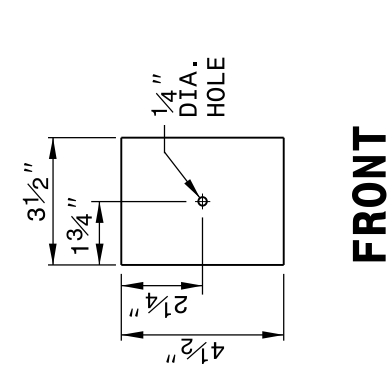
SECTION C-C



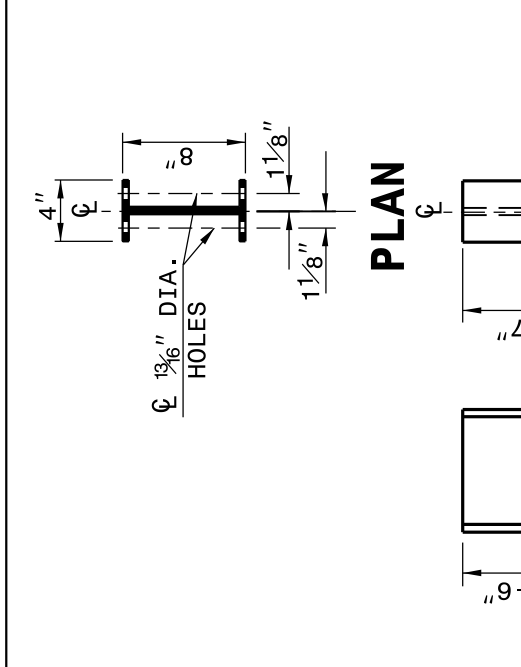
SECTION D-D



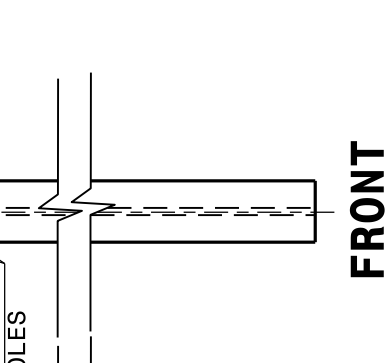
SECTION E-E



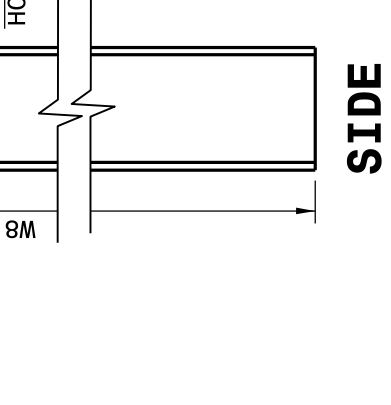
SECTION F-F



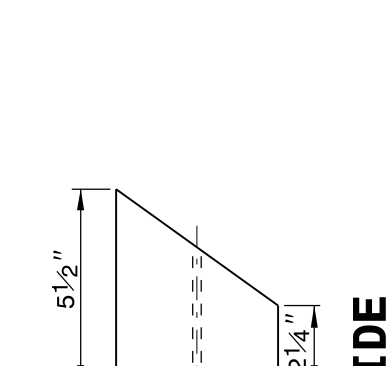
SECTION B-B



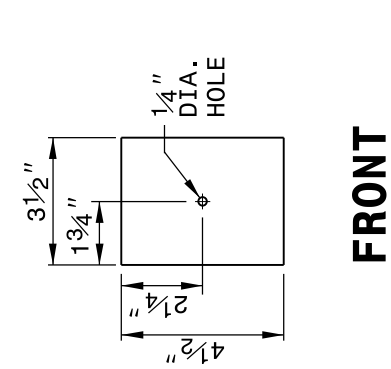
SECTION C-C



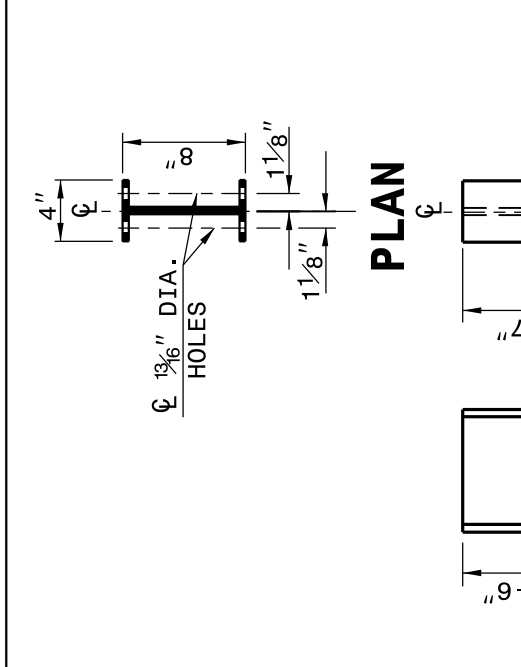
SECTION D-D



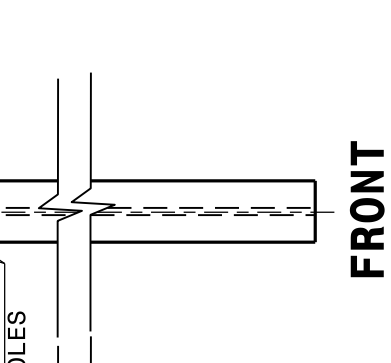
SECTION E-E



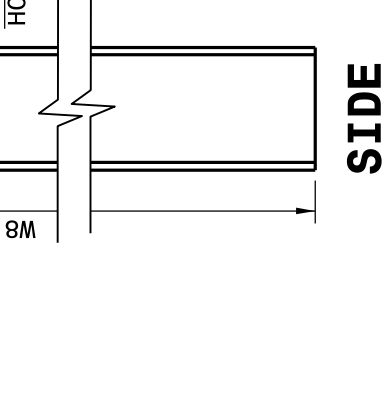
SECTION F-F



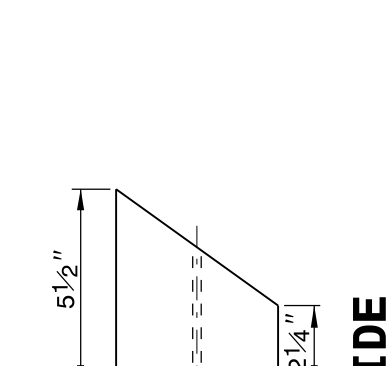
SECTION B-B



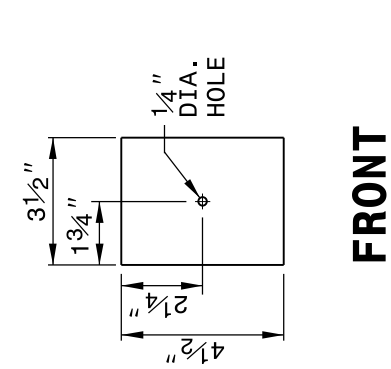
SECTION C-C



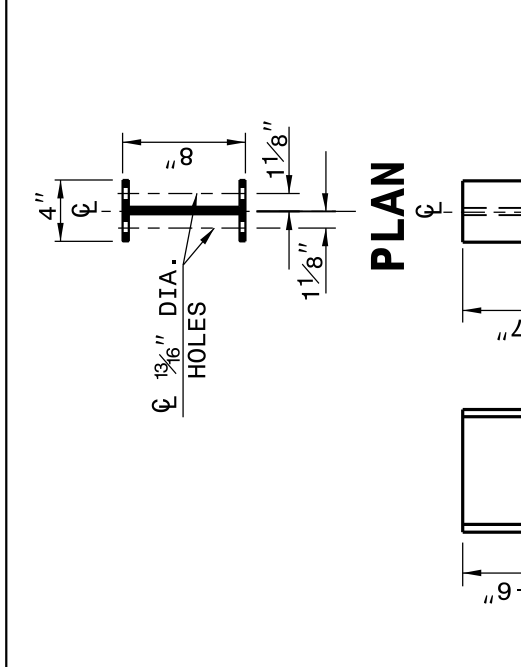
SECTION D-D



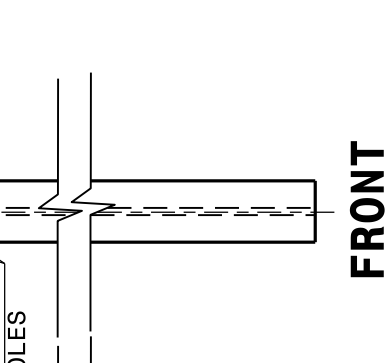
SECTION E-E



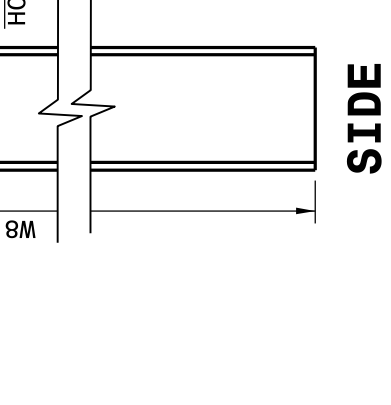
SECTION F-F



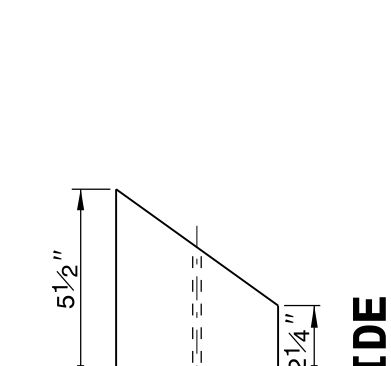
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

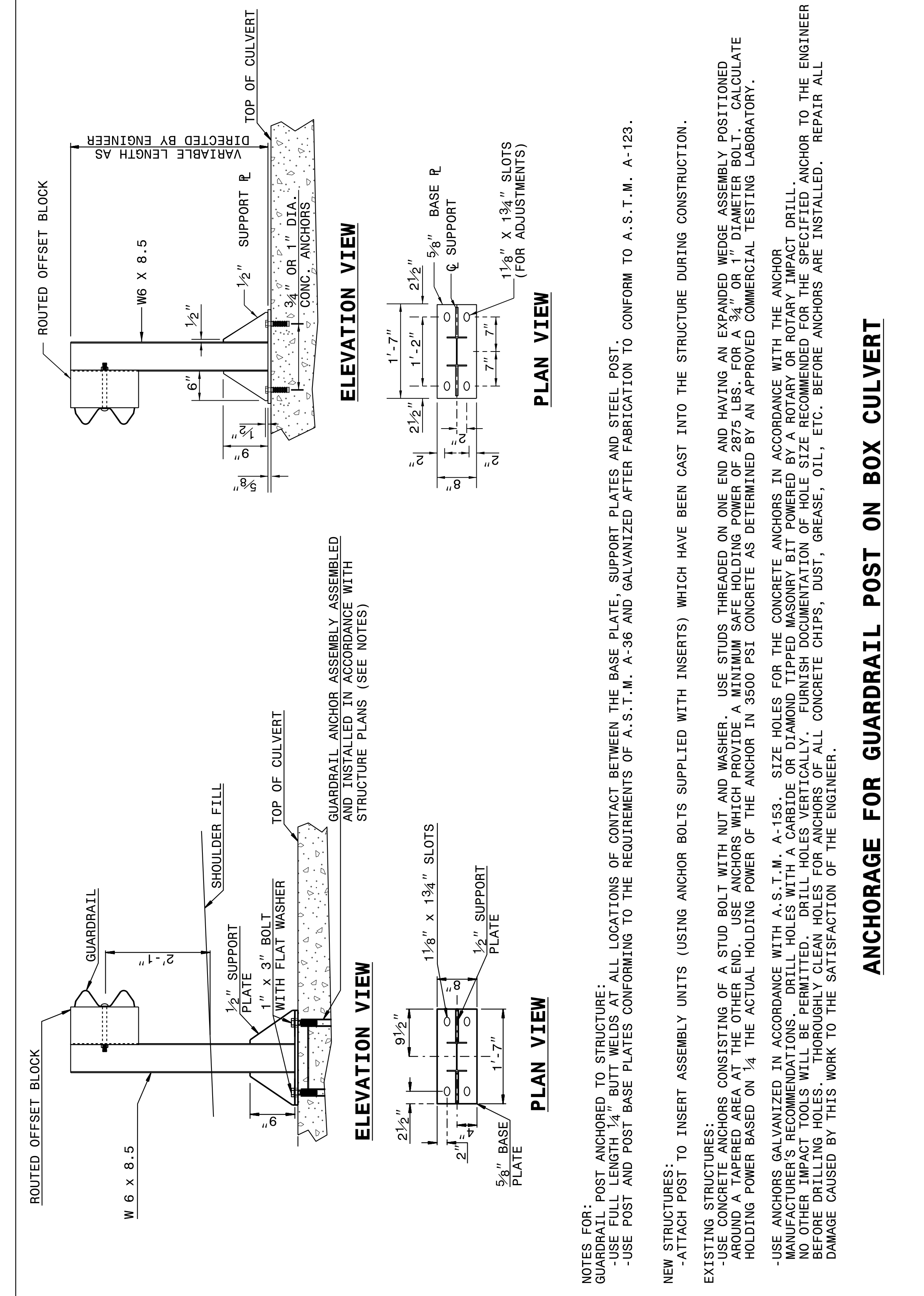
30-MAY-2017 09:23
 S:\Contracts\Special Details\Howerton\Standard Drawings\Division 8\862d01 862d03 862d03.dgn
 .Howerton AT USD-292955

PROJECT REFERENCE NO.	SHEET NO.
B-5236	2C-14

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

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

SHEET 7 OF 7
862D03



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

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

SHEET 7 OF 7
862D03

NOTES FOR:

- 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:

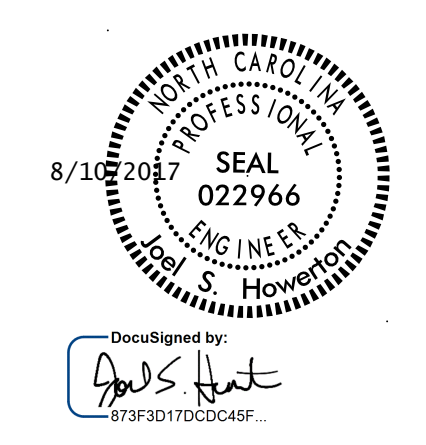
- USE CONCRETE ANCHORS CONSISTING OF A STUD BOLT WITH NUT AND WASHER. USE STUDS THREADED ON ONE END AND HAVING AN EXPANDED WEDGE ASSEMBLY POSITIONED AROUND A TAPERED AREA AT THE OTHER END. USE ANCHORS WHICH PROVIDE A MINIMUM SAFE HOLDING POWER OF 2875 LBS. FOR A 3/4" OR 1" DIAMETER BOLT. CALCULATE HOLDING 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.

ANCHORAGE FOR GUARDRAIL POST ON BOX CULVERT

**CONTRACT STANDARDS
 AND DEVELOPMENT UNIT**
 Office 919-707-6950 FAX 919-250-4119

SEE TITLE BLOCK

ORIGINAL BY: J HOWERTON	DATE: 06-22-12
MODIFIED BY:	DATE:
CHECKED BY:	DATE:
FILE SPEC.:	

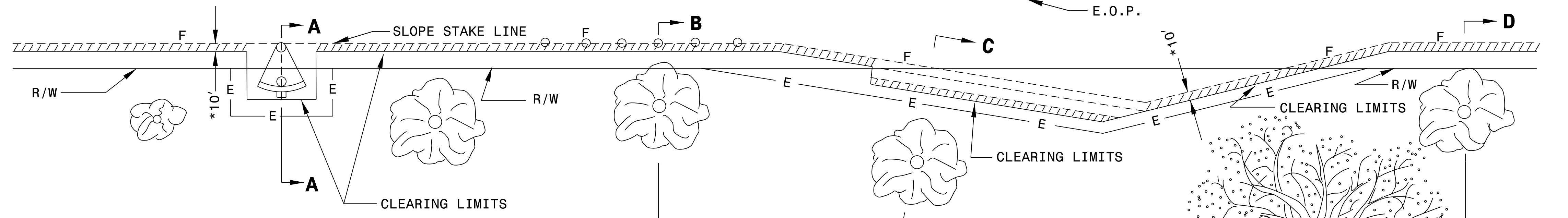
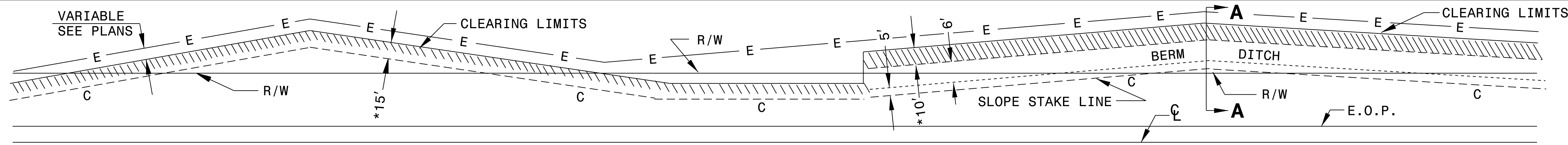


DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

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

ENGLISH DETAIL DRAWING FOR
METHOD OF CLEARING
MODIFIED METHOD - III

SHEET 1 OF 1
200D03



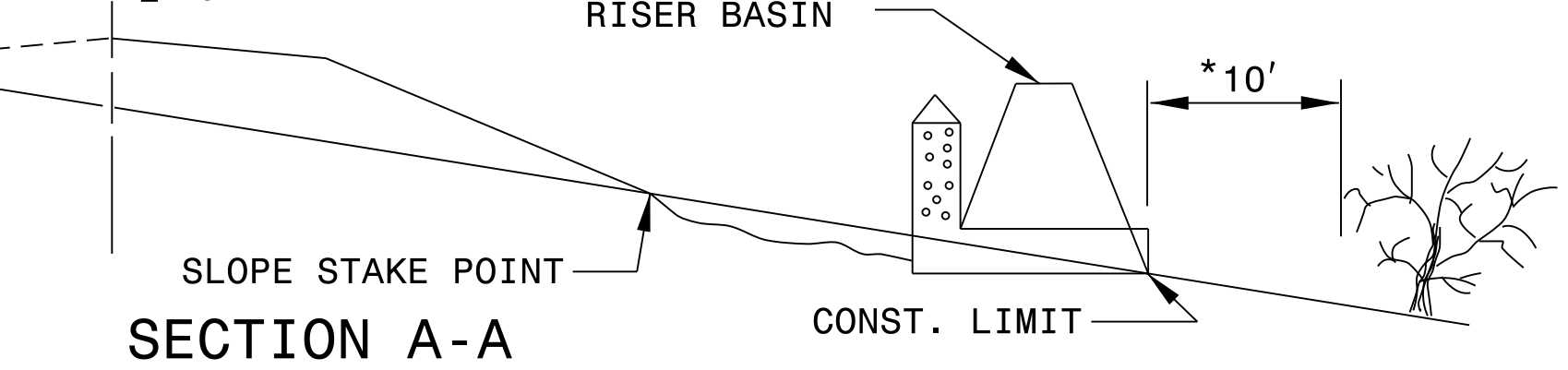
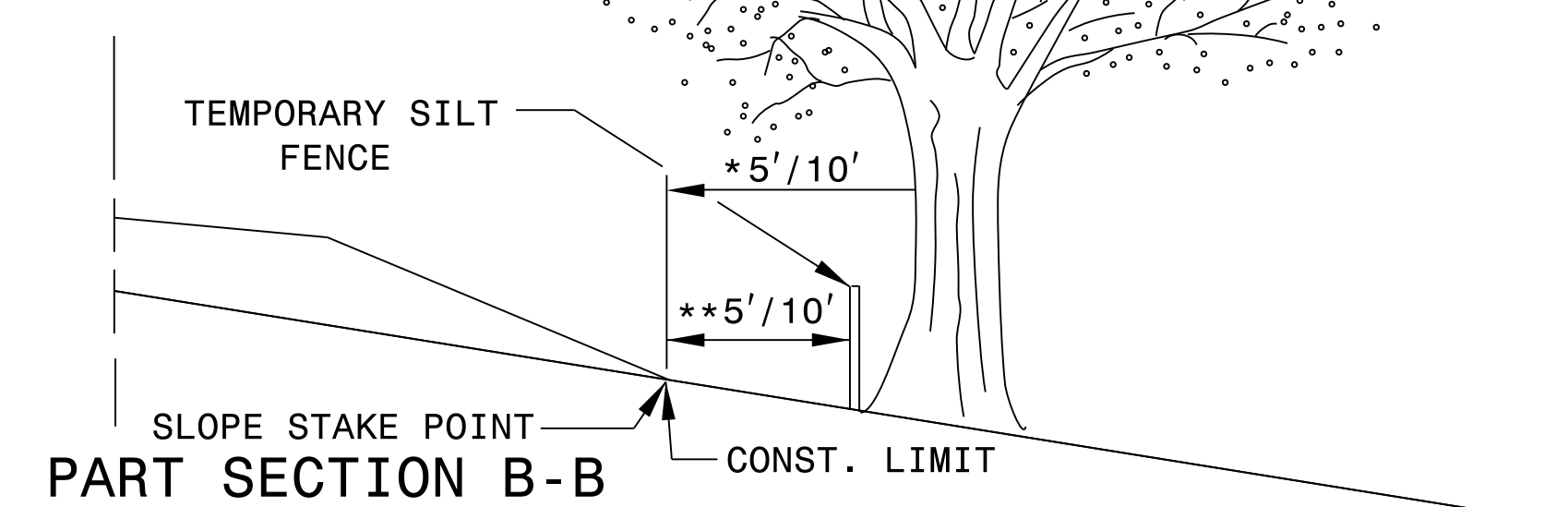
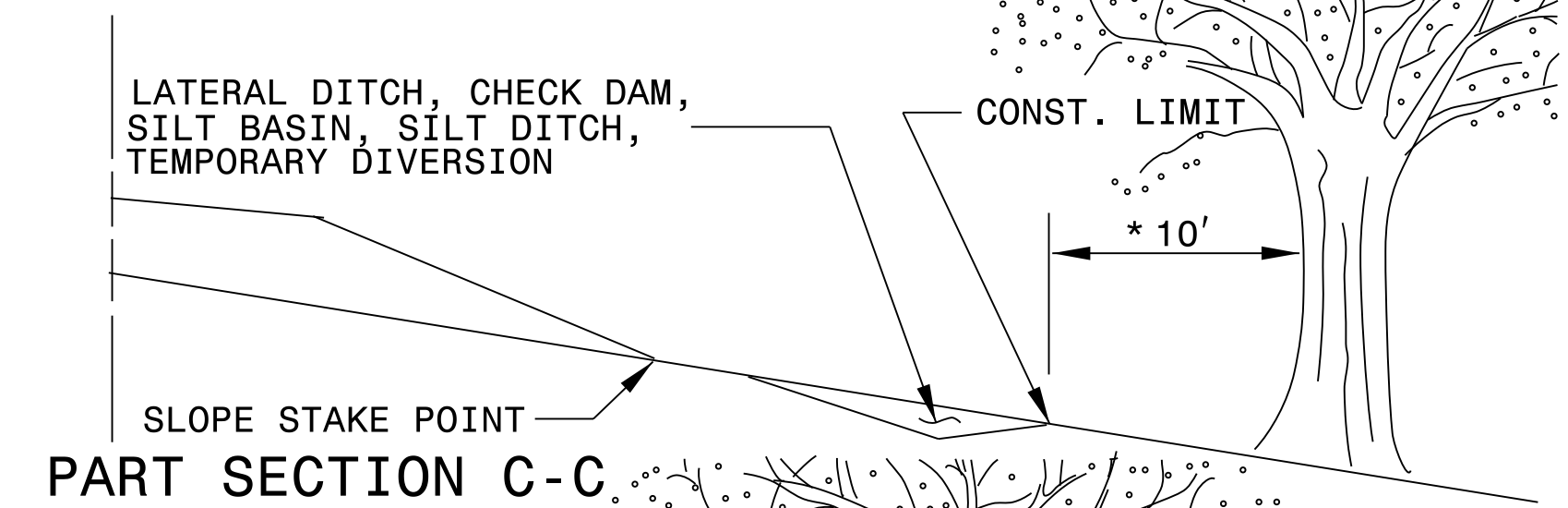
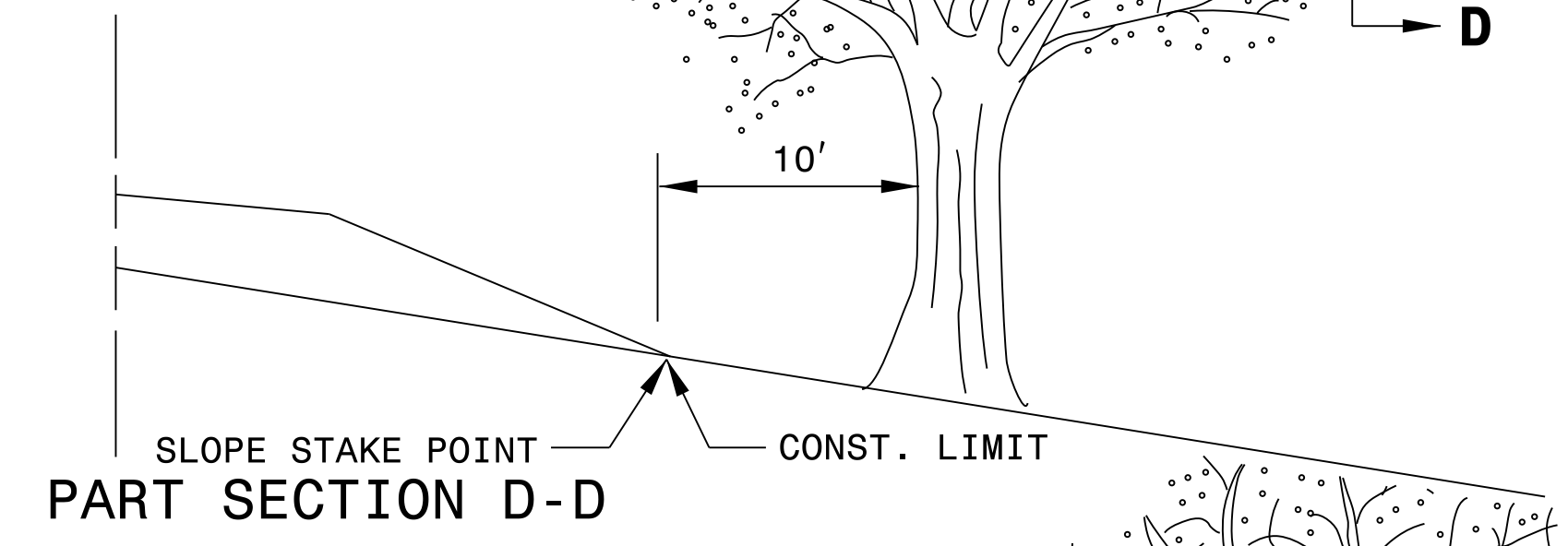
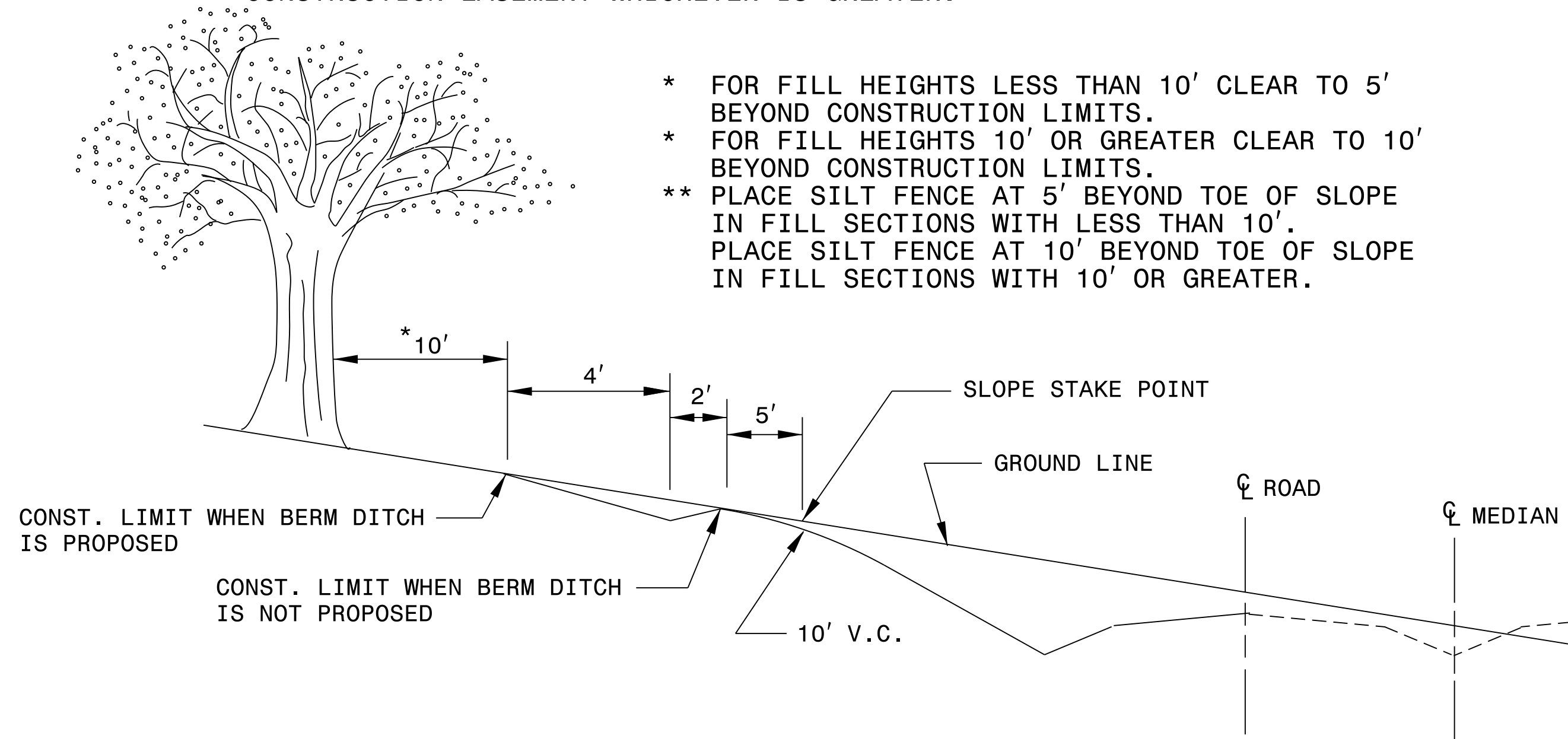
GENERAL NOTES:

1. REMOVE TREES OUTSIDE THE CLEARING LIMIT WHEN, IN THE OPINION OF THE ENGINEER, THE UTILITY OF A TREE WILL BE DESTROYED BY THE CONSTRUCTION OR THE CLEARING OPERATION.
2. CLEAR IN ACCORDANCE WITH THIS STANDARD EXCEPT WHERE ADDITIONAL CLEARING IS REQUIRED FOR SAFETY AS SHOWN ON THE PLANS.

METHOD III CLEARING LIMITS

- (A) CUTS -- CLEAR TO CONSTRUCTION LIMITS.
- (B) FILLS - CLEAR TO 5'/10' * BEYOND CONSTRUCTION LIMITS, UNLESS SPECIFIED OTHERWISE BY WETLAND PERMIT.
- (C) CUTS AND FILLS - WHEN THE CLEARING LIMITS (A AND B) EXCEED THE PROPOSED R/W OR PROPOSED CONSTRUCTION EASEMENTS, THEN CLEAR ONLY TO THE R/W OR CONSTRUCTION EASEMENT WHICHEVER IS GREATER.

- * FOR FILL HEIGHTS LESS THAN 10' CLEAR TO 5' BEYOND CONSTRUCTION LIMITS.
- * FOR FILL HEIGHTS 10' OR GREATER CLEAR TO 10' BEYOND CONSTRUCTION LIMITS.
- ** PLACE SILT FENCE AT 5' BEYOND TOE OF SLOPE IN FILL SECTIONS WITH LESS THAN 10'. PLACE SILT FENCE AT 10' BEYOND TOE OF SLOPE IN FILL SECTIONS WITH 10' OR GREATER.

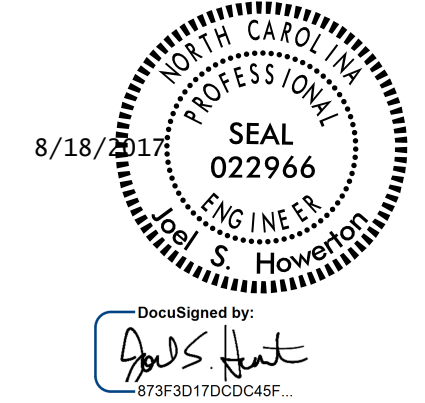


STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
METHOD OF CLEARING
MODIFIED METHOD - III

SHEET 1 OF 1
200D03

26-JUN-2017 09:22
S:\Contracts\Special\Details\kkempf\english\0200d301.dgn
Jhowerton AT USD-292595



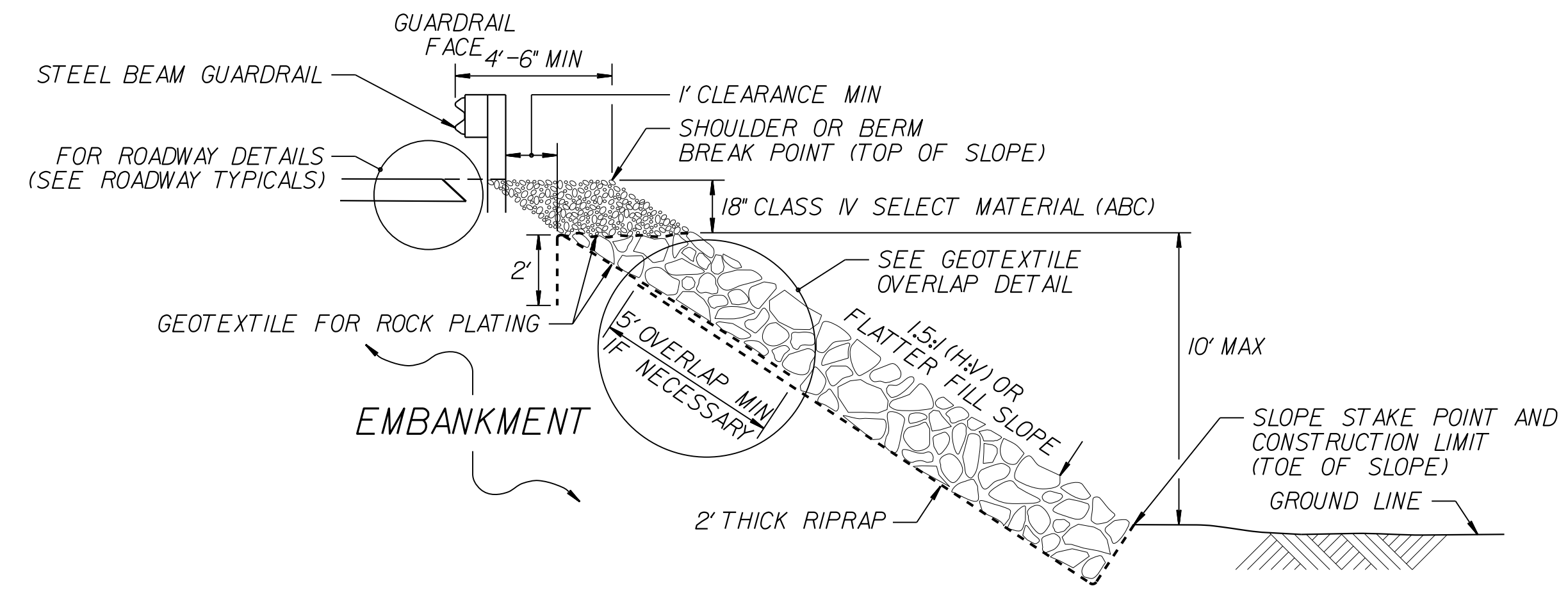
DocuSigned by:
K.A.K.
473F3D17D2C245F

CONTRACT STANDARDS AND DEVELOPMENT UNIT
Office 919-707-6950 FAX 919-250-4119

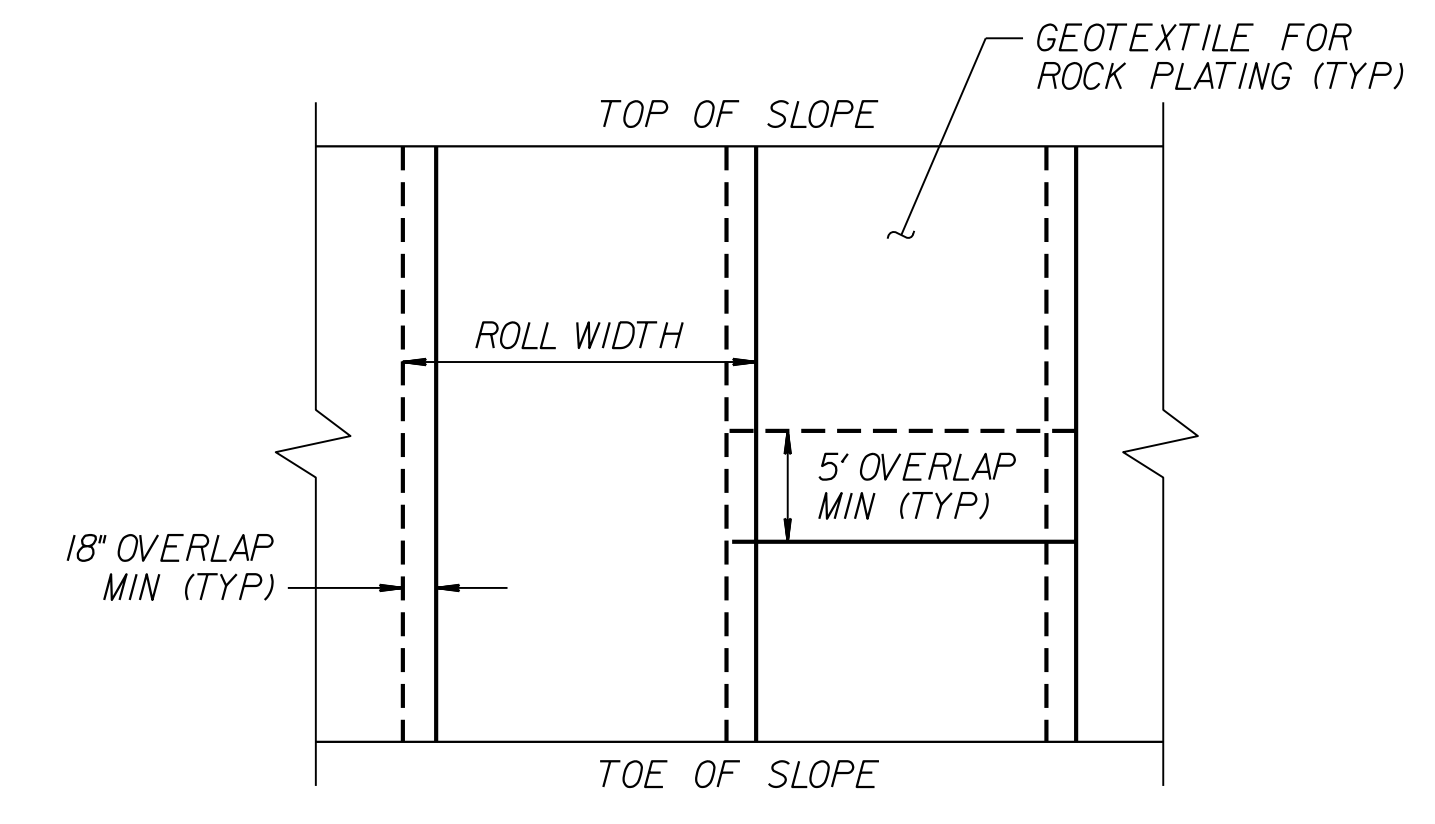
SEE TITLE BLOCK

ORIGINAL BY: T.S.S. DATE: FEB. 2000
 MODIFIED BY: K.A.K. DATE: AUG. 2016
 CHECKED BY: DATE:
 FILE SPEC.: kkempf/english/0200d301.dgn

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



ROCK PLATING DETAIL NO. 1 – TYPICAL SECTION
(NOT TO SCALE)



GEOTEXTILE OVERLAP DETAIL
(PLAN VIEW)

ROCK PLATING

FOR ROCK PLATING, SEE SECTION 275 OF THE STANDARD SPECIFICATIONS.
USE ROCK PLATING AT FOLLOWING LOCATIONS:

LINES	BEGINNING SLOPE	APPROX. STATION	ENDING SLOPE	APPROX. STATION	LOCATION LT/RT	ROCK PLATING DETAIL NO.	RIPRAP CLASS* 1/2/B	SY
-L-	2.5:1	14+25	1.5:1	14+94.90	LEFT	1	*	85
-L-	2.5:1	14+25	1.5:1	14+94.90	RIGHT	1	*	50
-L-	1.5:1	16+33.90	2.5:1	18+75	LEFT	2	*	260
-L-	1.5:1	16+33.90	2.5:1	18+75	RIGHT	2	*	265

* USE CLASS I, 2 OR B RIPRAP FOR ROCK PLATING LOCATIONS.

ESTIMATED TOTAL QUANTITY OF ROCK PLATING = 660 SY

ROCK EMBANKMENTS

FOR ROCK EMBANKMENTS, SEE ROCK EMBANKMENTS SPECIAL PROVISION.
USE ROCK EMBANKMENTS AT FOLLOWING LOCATIONS:

-LINE-	APPROX. BEGINNING STATION	APPROX. ENDING STATION	LOCATION LT/RT
-L-	16+15 +/- -L- *	18+50 +/- -L-	LEFT
-L-	16+10 +/- -L- *	18+50 +/- -L-	RIGHT

* KEEP ROCK EMBANKMENTS 3' CLEAR OFF END BENT PILES. BACKFILL WITH *57 STONE, IF NECESSARY.

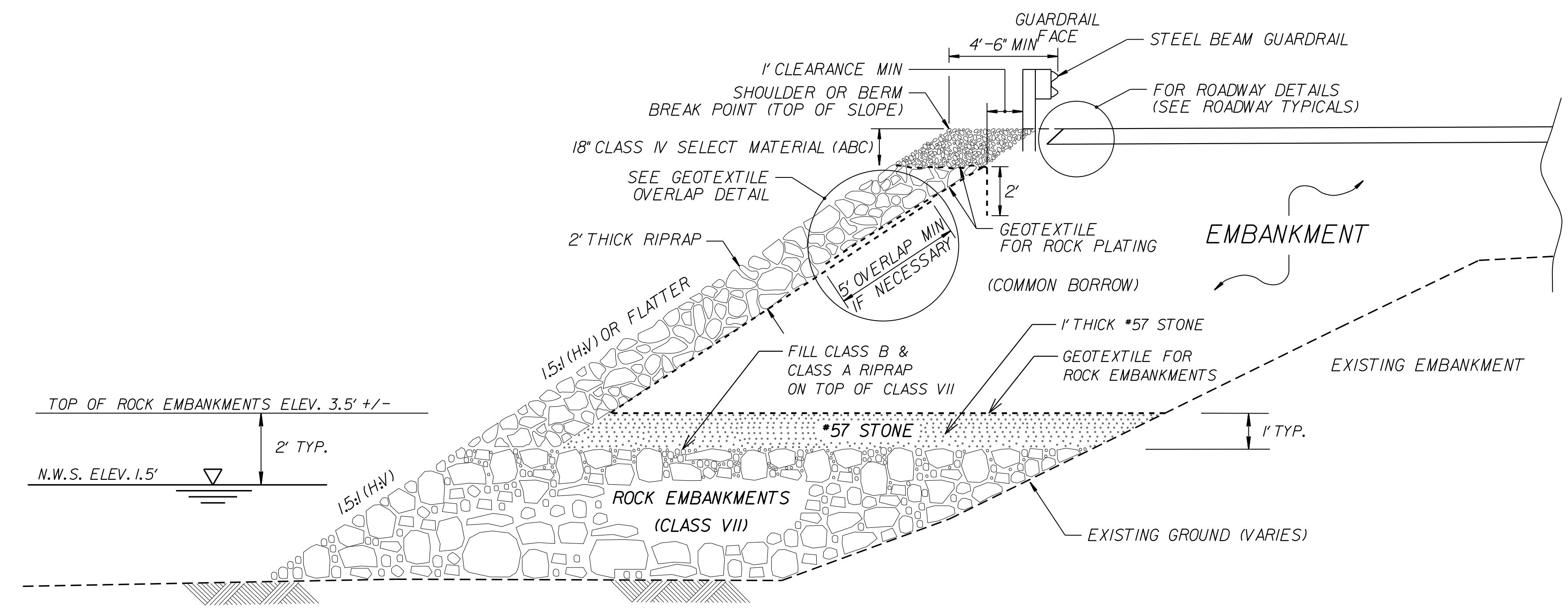
CONSTRUCT ROCK EMBANKMENTS TO THE ELEVATION SHOWN IN THE ROCK EMBANKMENTS / ROCK PLATING DETAIL NO. 2, OR 2 FT. ABOVE THE NORMAL WATER SURFACE AND ACCORDING TO THE ROCK EMBANKMENTS SPECIAL PROVISION.

FILL VOIDS IN THE TOP OF ROCK EMBANKMENTS WITH CLASS B AND CLASS A RIP RAP.

PLACE *57 STONE (SELECT MATERIAL, CLASS VII) UP TO 1 FT. ABOVE ROCK EMBANKMENTS AS SHOWN IN THE PLAN.

CONSTRUCT ROCK PLATING ABOVE ROCK EMBANKMENTS FROM ELEVATION SHOWN IN THE ROCK EMBANKMENTS / ROCK PLATING DETAIL NO. 2 OR 2 FT. ABOVE THE NORMAL WATER SURFACE TO THE SHOULDER HINGE POINT AND ACCORDING TO THE SECTION 275 OF THE STANDARD SPECIFICATIONS.

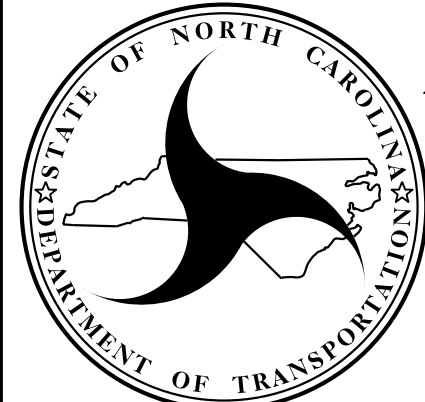
INSTALL GEOTEXTILE ON TOP OF NO. 57 STONE IN ACCORDANCE WITH THE ARTICLE 270-3 OF THE STANDARD SPECIFICATIONS.



ROCK EMBANKMENTS / ROCK PLATING DETAIL NO. 2 – TYPICAL SECTION
(NOT TO SCALE)

ESTIMATED MATERIAL QUANTITIES FOR ROCK EMBANKMENTS

ROCK EMBANKMENTS (SELECT MATERIAL, CLASS VII) = 1,250 TONS
 RIP RAP CLASS A = 110 TONS
 RIP RAP CLASS B = 110 TONS
 *57 STONE (SELECT MATERIAL, CLASS VII) = 165 TONS
 GEOTEXTILE FOR ROCK EMBANKMENTS = 270 SY



**NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS**

**GEOTECHNICAL
ENGINEERING UNIT**

ROCK EMBANKMENTS / ROCK PLATING DETAILS & NOTES					
REVISIONS					
NO.	BY	DATE	NO.	BY	DATE
1	T.T. ZAN	5-5-17	3		
2	T.T. ZAN	6-14-17	4		

STATE OF NORTH CAROLINA
 DIVISION OF HIGHWAYS
SUMMARY OF QUANTITIES
GUARDRAIL SUMMARY

"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

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	XIII	CAT-1	VI MOD	BIC	AT-1	EA	G	NG													
-L-	13+98.15	15+04.40 (BRIDGE)	RT	106.25			15+00.00 (FILL)		5	10	37.5		.75			1	1																				
-L-	13+98.15	15+04.40 (BRIDGE)	LT	106.25				15+00.00 (FILL)	5	10		37.5		.75		1	1																				
-L-	16+24.40 (BRIDGE)	19+05.65	RT	281.25				18+00.00 (FILL)	5	10		212.5		2		1	1																				
-L-	16+24.40 (BRIDGE)	19+05.65	LT	281.25			18+00.00 (FILL)		5	10	212.5		2		1	1																					
TOTAL				775.00											4	4																					
DEDUCTIONS FOR ANCHORS:																																					
4 TYPE III'S AT 18.75' EA. =				75'																																	
4 TYPE GREU, TL-3'S @ 50' EA. =				200'																																	
DEDUCTIONS TOTAL =				275'																																	
TOTAL STEEL BEAM GUARDRAIL =				500.00'																																	
SAY =				550.00'												4	4																				
ADDITIONAL GUARDRAIL POSTS =				5 EA																																	

★ BREAKING OF EXISTING ASPHALT PAVEMENT SUMMARY
 IN SQUARE YARDS

SURVEY LINE	STATION	STATION	LOCATION LV/RT/CL	YD ²
LANES				
-L-	12+18.94	14+54.40	CL	523.24
-L-	16+74.40	19+60.22	CL	635.16
PS				
-L-	12+18.94	14+54.40	LT	130.81
-L-	12+18.94	14+54.40	RT	130.81
-L-	16+74.40	19+60.22	LT	158.79
-L-	16+74.40	19+60.22	RT	158.79
TOTAL:				1,737.60
SAY:				1,750

SHOULDER BERM GUTTER SUMMARY
 IN LINEAR FEET

SURVEY LINE	STATION	STATION	LENGTH (FT)
-L- (LT)	14+80.40	14+93.23	12.8
-L- (RT)	14+80.40	14+93.23	12.8
-L- (LT)	16+35.57	16+48.50	12.9
-L- (RT)	16+35.57	16+73.50	37.9
TOTAL:			76.5
SAY:			81

★ Approximate quantities only. Unclassified Excavation, Fine Grading, Clearing and Grubbing, Breaking of Existing Asphalt Pavement and Removal of Existing Asphalt Pavement will be paid for at the contract lump sum price for "Grading". (See Project Special Provision)

SUMMARY OF EARTHWORK
 IN CUBIC YARDS

LINE	STATION	STATION	UNCL. EXCAV. ★	EMBANK. +%	BORROW	WASTE
-L-	10+50.00	15+04.40 (BRIDGE)	46	1,238	1,192	
SUBTOTAL 1:			46	1,238	1,192	
-L-	16+24.40 (BRIDGE)	21+00.00		3,161	3,161	
SUBTOTAL 2:				3,161	3,161	
TOTAL			46	4,399	4,353	
PROJECT TOTALS:			46	4,399	4,353	
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT					218	
GRAND TOTAL:			46		4,570	
SAY:			100		4,600	

Contingencies Per:
 Geotechnical Unit's Letter January 5, 2016
 Undercut Excavation = 1200 C.Y.
 Select Granular Material = 1200 C.Y.
 Geotextile for Soil Stabilization = 2700 SY
 Shallow Undercut = 500 C.Y.
 Class IV Subgrade Stabilization = 950 Tons
 6" Perforated Subdrain Pipe = 500 LF

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.

★ REMOVAL OF EXISTING ASPHALT PAVEMENT SUMMARY
 IN SQUARE YARDS

SURVEY LINE	STATION	STATION	LOCATION LV/RT/CL	YD ²
LANES				
-L-	11+75.00	12+18.94	CL	97.64
-L-	14+54.40	15+15.08	CL	134.84
-L-	16+05.83	16+74.40	CL	152.38
-L-	19+60.22	19+80.00	CL	43.96
PS				
-L-	11+75.00	12+18.94	LT	24.41
-L-	11+75.00	12+18.94	RT	24.41
-L-	14+54.40	15+15.08	LT	33.71
-L-	14+54.40	15+15.08	RT	33.71
-L-	16+05.83	16+74.40	LT	38.09
-L-	16+05.83	16+74.40	RT	38.09
-L-	19+60.22	19+80.00	LT	10.99
-L-	19+60.22	19+80.00	RT	10.99
TOTAL:				643.23
SAY:				680

LG751484

COMPUTED BY: CHL DATE: 3/30/17
CHECKED BY: WSH DATE: 3/30/17

PROJECT NO. B-5236 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, SIZE, THICKNESS OR GAUGE, OFFSET, STRUCTURE NUMBER, TOP ELEVATION, INVERT ELEVATION, MINIMUM REQUIRED SLOPE, DRAINAGE PIPE (RCP, CSP, CAAP, HDPE, or PVC), ENDWALLS, REINFORCED ENDWALLS, QUANTITIES FOR DRAINAGE STRUCTURES, FRAME, GRATES, AND HOOD, CONCRETE TRANSITIONAL SECTION, and REMARKS. Includes sub-totals for SHEET TOTALS and PROJECT TOTALS.

COMPUTED BY: CHL DATE: 6/20/17
 CHECKED BY: WSH DATE: 6/20/17

PROJECT NO.	SHEET NO.
B-5236	3G-1

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

SUMMARY OF SUBSURFACE DRAINAGE

LINE	Station	Station	Location LT/RT/CL	Drain Type* UD/BD/SD	LF
CONTINGENCY				SD	500
TOTAL LF:					500

*UD = Underdrain
 *BD = Blind Drain
 *SD = Subsurface Drain

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 TONS
CONTINGENCY			ASU		500	950	1500		
TOTAL CY/TONS/SY:					500	950	1500**	0	0

*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.

SUMMARY OF ROCK PLATING

LINE	Beginning Slope (H:V)	Approx. Station	Ending Slope (H:V)	Approx. Station	Location LT/RT	Rock Plating Detail No. 1/2/3/4	Riprap Class* 1/2/B	Rock Plating SY
-L-	2.5:1	14+25	1.5:1	14+94.90	LEFT	1	*	85
-L-	2.5:1	14+25	1.5:1	14+94.90	RIGHT	1	*	50
-L-	1.5:1	16+33.90	2.5:1	18+75	LEFT	2	*	260
-L-	1.5:1	16+33.90	2.5:1	18+75	RIGHT	2	*	265
TOTAL SY:								660

*Use Class 1, 2 or B riprap if riprap class is not shown for rock plating location.

8/17/17

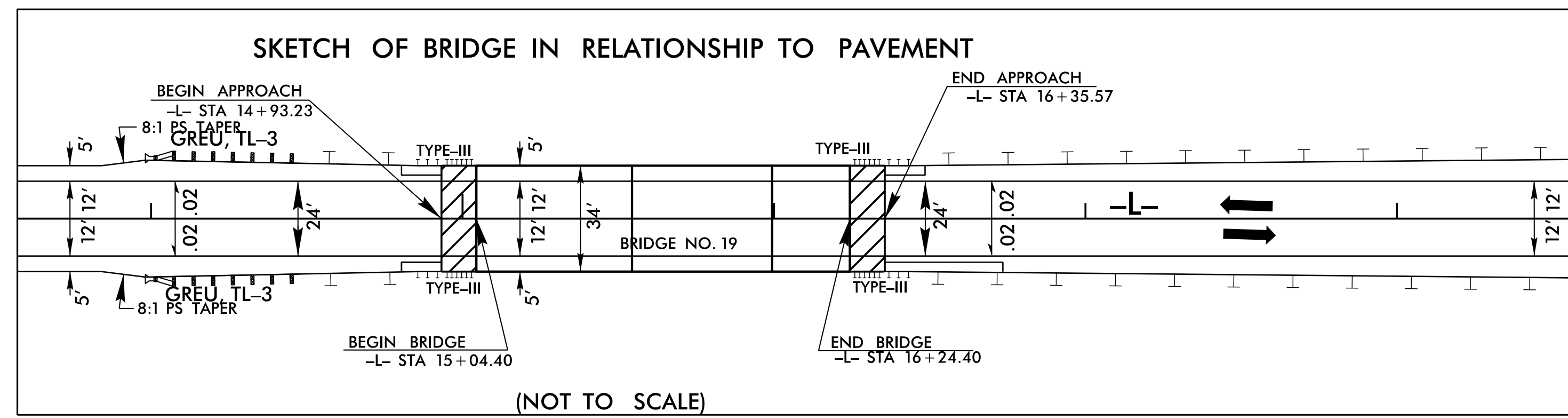
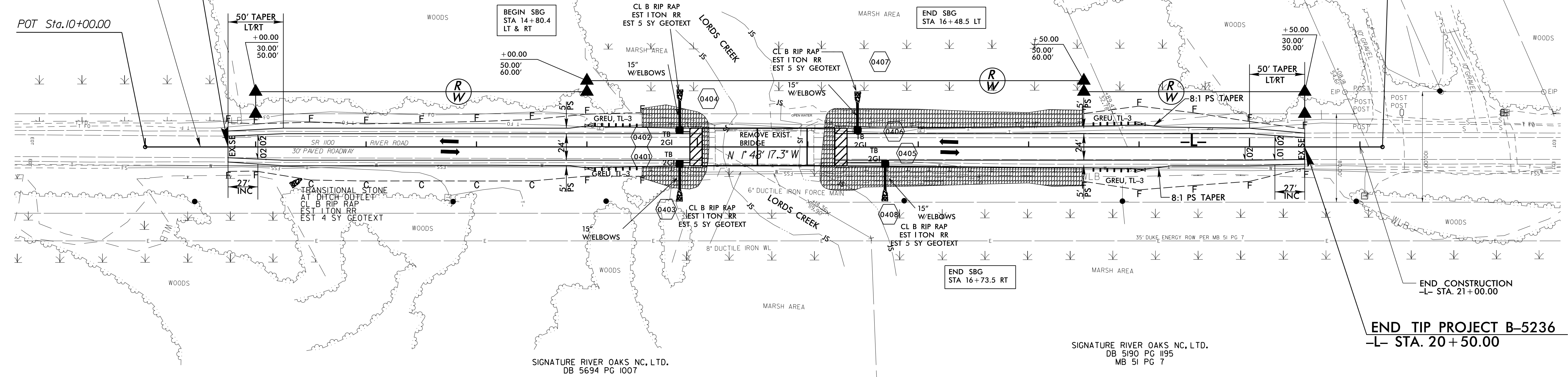
PROJECT REFERENCE NO. B-5236	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER W. S. HOOD SEAL 014509 8/17/2017	HYDRAULICS ENGINEER MAX S. PRICE SEAL 023993 8/17/2017
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

NAD 83/NSRS 2007

BEGIN TIP PROJECT B-5236
-L- STA. 10+75.00

BEGIN CONSTRUCTION
-L- STA. 10+50.00

POT Sta. 10+00.00



BRIDGE APPROACH SLAB
FOR -L- PROFILE, SEE SHEET 5
FOR STRUCTURE PLANS, SEE SHEET S-1 THROUGH S-35

18-AUG-2017 08:22
R:\Projects\B5236_Rdy_psh_04.dgn
W. S. HOOD

5/14/99

PROJECT REFERENCE NO. B-5236	SHEET NO. 5
ROADWAY DESIGN ENGINEER W. S. HOOD NORTH CAROLINA PROFESSIONAL SEAL 014509	HYDRAULICS ENGINEER MAX S. PRICE NORTH CAROLINA PROFESSIONAL SEAL 023993
DocuSigned by W. S. Hood	DocuSigned by Max S. Price
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

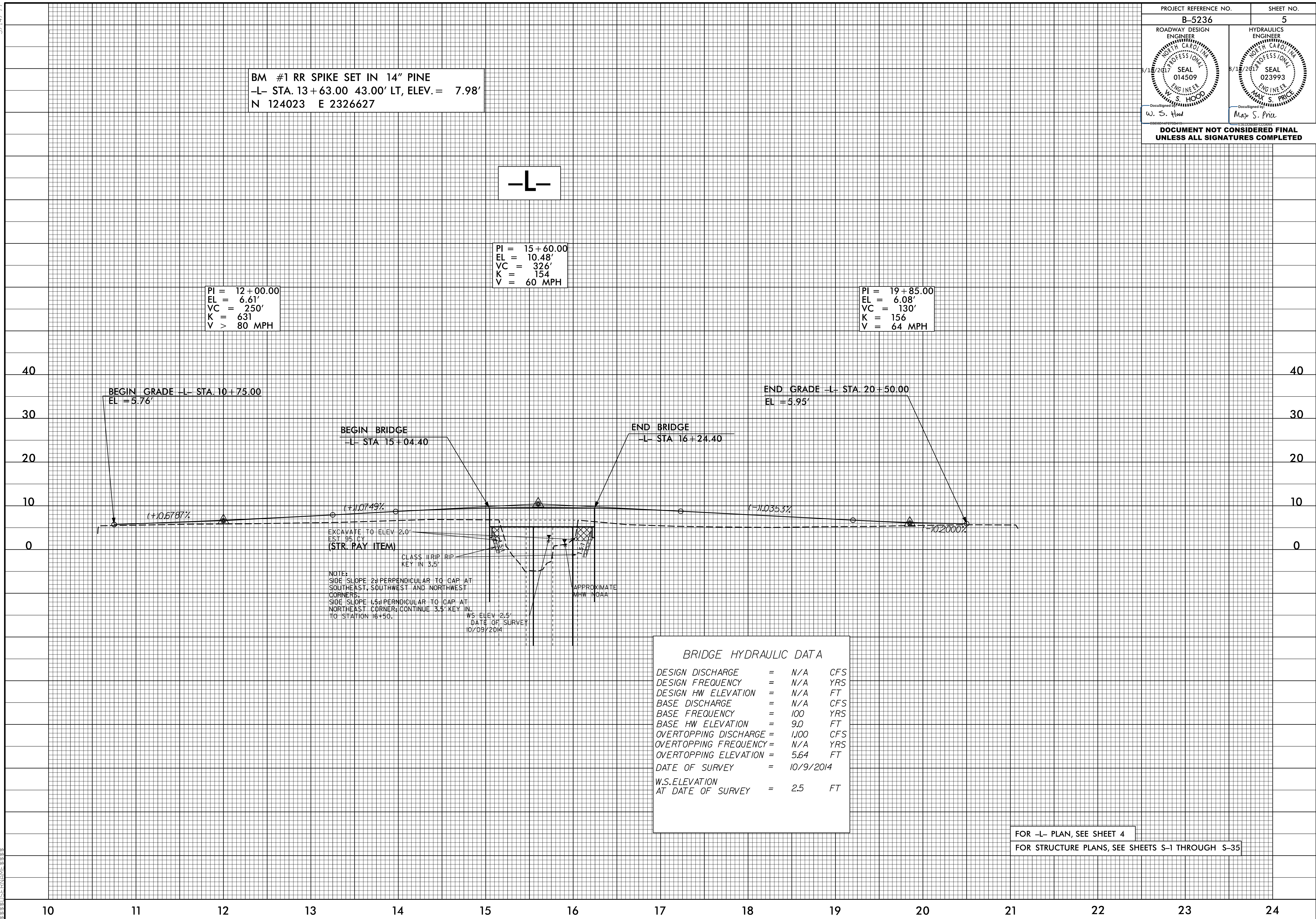
BM #1 RR SPIKE SET IN 14" PINE
-L- STA. 13+63.00 43.00' LT, ELEV. = 7.98'
N 124023 E 2326627

-L-

PI = 15+60.00
EL = 10.48'
VC = 326'
K = 154
V = 60 MPH

PI = 12+00.00
EL = 6.61'
VC = 250'
K = 631
V > 80 MPH

PI = 19+85.00
EL = 6.08'
VC = 130'
K = 156
V = 64 MPH



EXCAVATE TO ELEV. 2.0'
EST. BEICY
(STR. PAY ITEM)

CLASS II RIP RIP
KEY IN 3.5'

NOTE:
SIDE SLOPE 2:1 PERPENDICULAR TO GAP AT
SOUTHEAST, SOUTHWEST AND NORTHWEST
CORNERS.
SIDE SLOPE 1.5:1 PERPENDICULAR TO GAP AT
NORTHEAST CORNER; CONTINUE 3.5' KEY IN.
TO STATION 16+50.

WS ELEV. 2.5'
DATE OF SURVEY
10/09/2014

APPROXIMATE
MHW NOAA

BRIDGE HYDRAULIC DATA		
DESIGN DISCHARGE	=	N/A CFS
DESIGN FREQUENCY	=	N/A YRS
DESIGN HW ELEVATION	=	N/A FT
BASE DISCHARGE	=	N/A CFS
BASE FREQUENCY	=	100 YRS
BASE HW ELEVATION	=	9.0 FT
OVERTOPPING DISCHARGE	=	1,000 CFS
OVERTOPPING FREQUENCY	=	N/A YRS
OVERTOPPING ELEVATION	=	5.64 FT
DATE OF SURVEY	=	10/9/2014
W.S. ELEVATION AT DATE OF SURVEY	=	2.5 FT

FOR -L- PLAN, SEE SHEET 4
FOR STRUCTURE PLANS, SEE SHEETS S-1 THROUGH S-35

18-AUG-2017 08:24 B:\AUG2017\B5236.rdy.pfl.dgn