

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

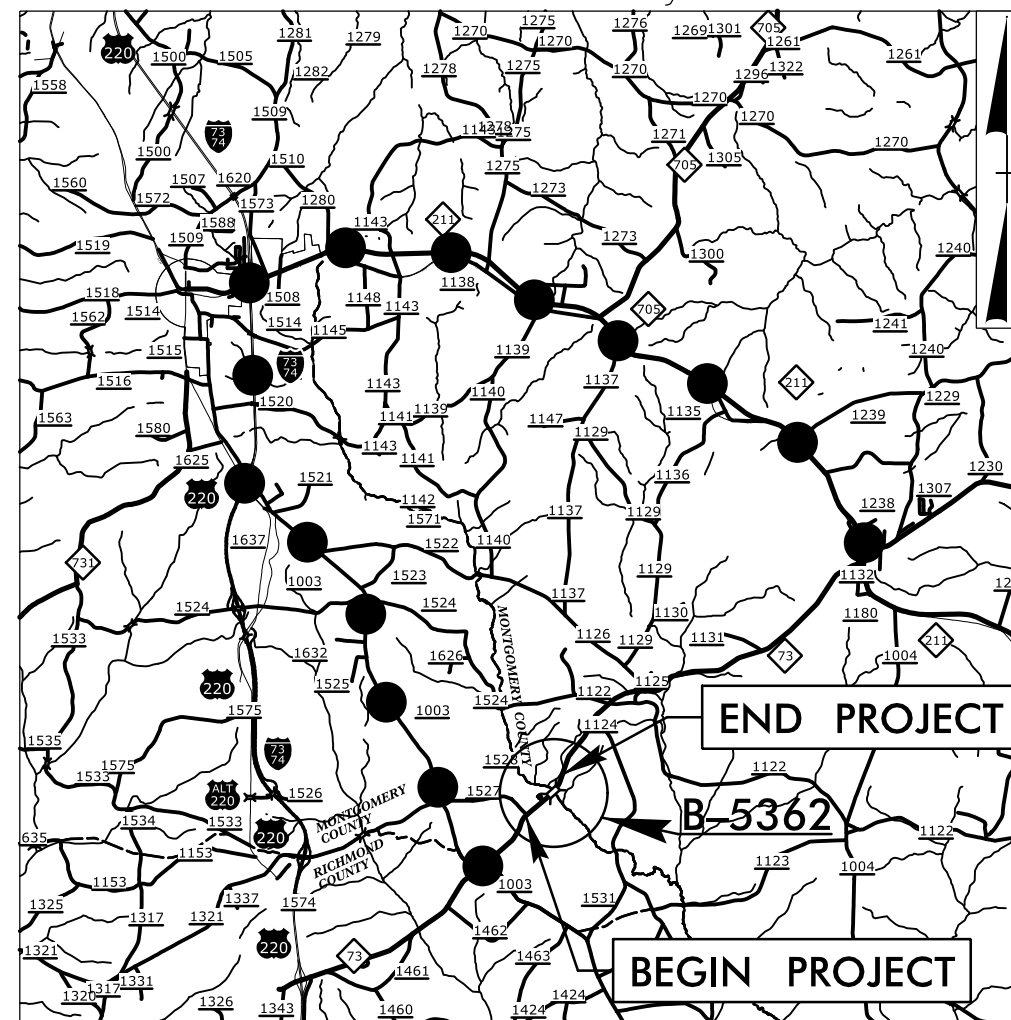
**The documents contained herein were originally issued  
and sealed by the individuals whose names and license  
numbers appear on each page, on the dates appearing  
with their signature on that page.**

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

**TIP PROJECT: B-5362**

**CONTRACT: C203976**

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



**VICINITY MAP**

●—●—● OFFSITE DETOUR

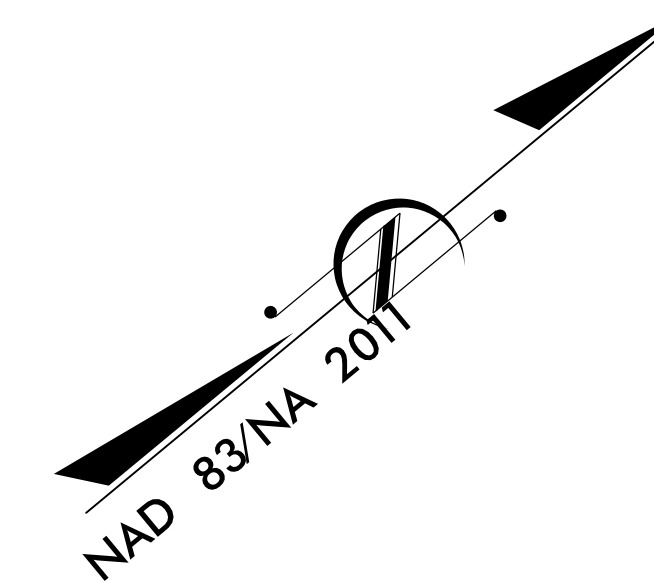
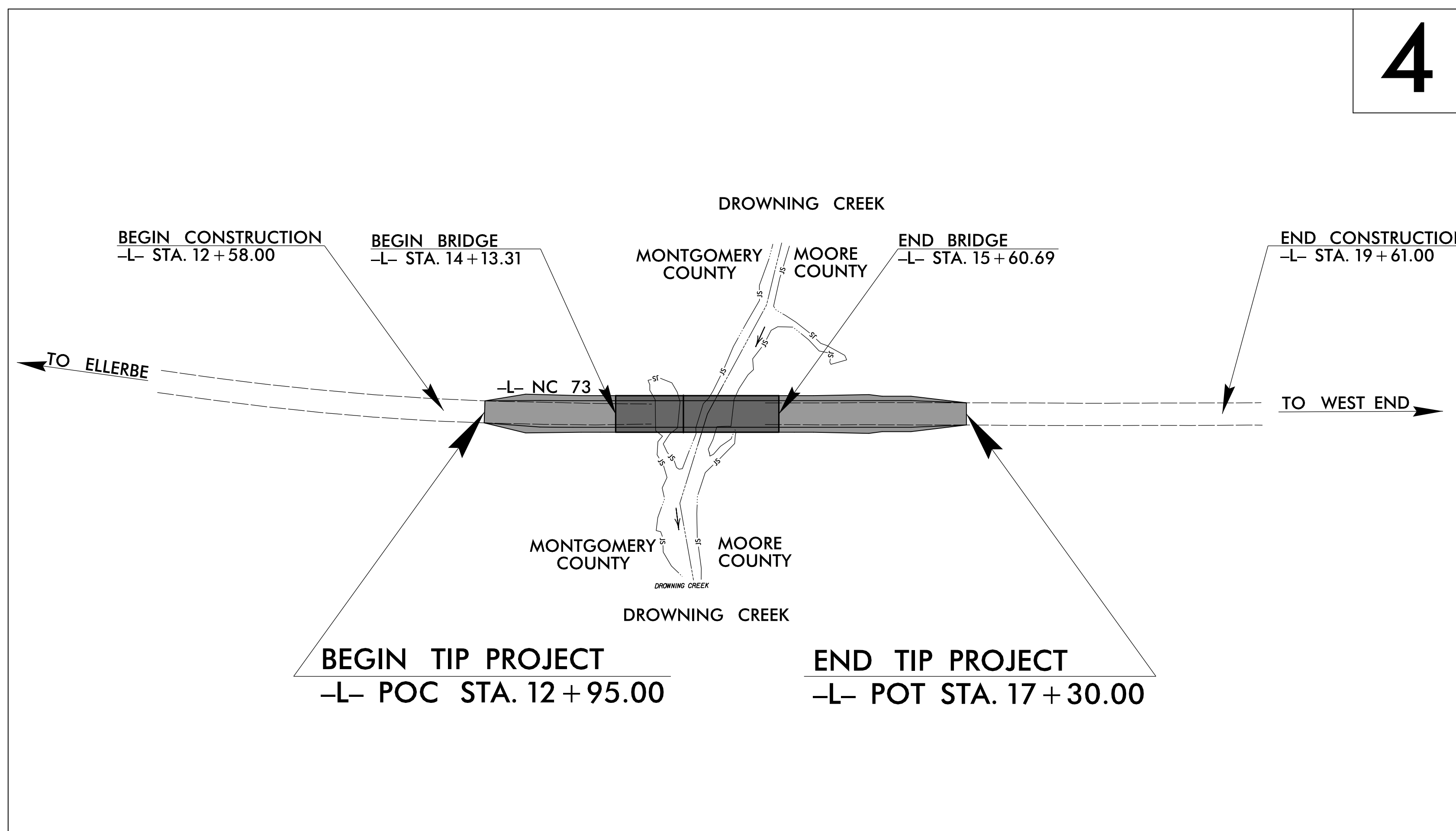
STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

**MONTGOMERY / MOORE COUNTIES**

**LOCATION: BRIDGE NO. 53 OVER DROWNING CREEK ON NC 73**

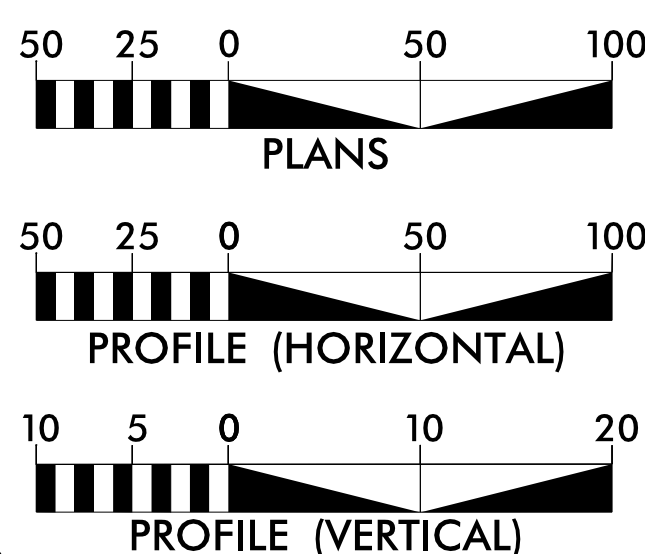
**TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE**

| STATE           | STATE PROJECT REFERENCE NO. | SHEET NO.   | TOTAL SHEETS |
|-----------------|-----------------------------|-------------|--------------|
| N.C.            | B-5362                      | 1           |              |
| STATE PROJ. NO. | F.A. PROJ. NO.              | DESCRIPTION |              |
| 46077.1.1       | BRSTP-0073(31)              | PE          |              |
| 46077.2.1       |                             | RW /UTILT.  |              |
| 46077.3.1       |                             | CONST.      |              |



DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

**GRAPHIC SCALES**



**DESIGN DATA**

ADT 2017 = 1674  
ADT 2037 = 2100  
K = 10 %  
D = 65 %  
T = 10 %\*  
V = 55 MPH  
\*(TTST + DUAL) = (3% + 7%)

FUNC CLASS =  
MAJOR COLLECTOR  
"REGIONAL TIER"

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT B-5362 = 0.054 MILES  
LENGTH STRUCTURE TIP PROJECT B-5362 = 0.028 MILES  
TOTAL LENGTH OF TIP PROJECT B-5362 = 0.082 MILES

TATIA WHITE, PE  
NCDOT CONTACT

**PLANS PREPARED FOR THE NCDOT BY:**



STV Engineers, Inc.  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

2012 STANDARD SPECIFICATIONS

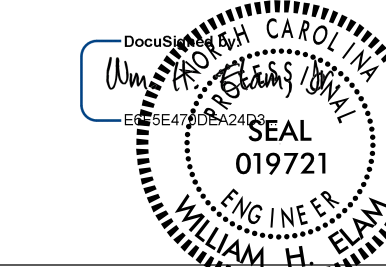
**RIGHT OF WAY DATE:**  
OCTOBER 21, 2016

**LETTING DATE:**  
OCTOBER 17, 2017

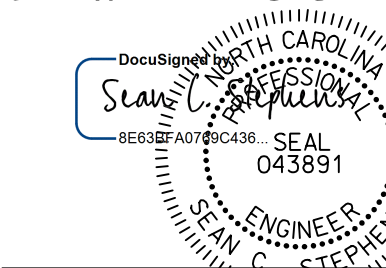
SEAN C. STEPHENS, P.E.  
PROJECT ENGINEER

MAAMOON K. ABDELAZIZ  
PROJECT DESIGN ENGINEER

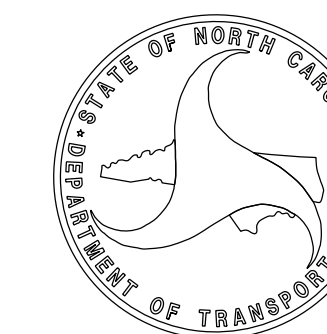
**HYDRAULICS ENGINEER**



SIGNATURE: [Signature]  
ROADWAY DESIGN ENGINEER  
P.E. 8/1/2017



SIGNATURE: [Signature]  
P.E. 8/1/2017



|   |           |
|---|-----------|
| PROJECT REFERENCE NO.   | SHEET NO. |
| B-5362  | 1A        |
| RW SHEET NO.  |           |
| ROADWAY DESIGN ENGINEER   |           |
|   |           |
| <p><b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b></p>                                   |           |
|   |           |
| <p>STV Engineers, Inc.<br/>900 West Trade St., Suite 715<br/>Charlotte, NC 28202<br/>NC License Number F-0991</p> |           |

**INDEX OF SHEETS**

| SHEET NUMBER       | SHEET   |
|--------------------|---|
| 1                  | TITLE SHEET   |
| 1A                 | INDEX OF SHEETS, GENERAL NOTES, AND LIST OF STANDARDS                       |
| 1B                 | CONVENTIONAL SYMBOLS  |
| 1C-1               | SURVEY CONTROL SHEET  |
| 2A-1               | TYPICAL SECTIONS AND PAVEMENT SCHEDULE                                      |
| 2C-1 THRU 2C-6     | GUARDRAIL PLACEMENT DETAILS   |
| 2C-7 THRU 2C-10    | GUARDRAIL INSTALLATION DETAILS  |
| 2C-11 THRU 2C-14   | STRUCTURE ANCHOR UNIT DETAILS   |
| 3B-1               | EARTHWORK, GUARDRAIL, PAVEMENT REMOVAL & SHOULDER BERM GUTTER SUMMARY SHEET |
| 3D-1               | DRAINAGE SUMMARY SHEET  |
| 4                  | PLAN SHEET  |
| 5                  | PROFILE SHEET   |
| TMP-1 THRU TMP-5   | TRANSPORTATION MANAGEMENT PLANS   |
| PMP-1 THRU PMP-2   | PAVEMENT MARKING PLANS  |
| EC-1 THRU EC-4     | EROSION CONTROL PLANS   |
| SIGN-1 THRU SIGN-4 | SIGNING PLANS   |
| UO-1 THRU UO-2     | UTILITIES BY OTHERS PLANS   |
| X-1A               | CROSS-SECTIONS SUMMARY SHEET  |
| X-1 THRU X-6       | CROSS-SECTIONS  |
| S-1 THRU S-21      | STRUCTURE PLANS   |

**GENERAL NOTES**

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 METHOD III.

SUPER ELEVATION:  
ALL CURVES ON THIS PROJECT SHALL BE SUPER ELEVATED IN ACCORDANCE WITH STD. NO. 225.04 USING THE RATE OF SUPER ELEVATION AND RUNOFF SHOWN ON THE PLANS. SUPER ELEVATION 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 SUPER ELEVATED CURVES SHALL BE IN ACCORDANCE WITH STD. NO. 560.01.

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

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

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

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

UTILITIES:  
UTILITY OWNERS ON THIS PROJECT ARE BROADPLEX (COMMUNICATIONS), DUKE ENERGY (POWER DISTRIBUTION), PEE DEE EMC (POWER DISTRIBUTION) ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

**STANDARD DRAWINGS**

2012 ROADWAY ENGLISH STANDARD DRAWINGS  
EFF. 01-17-2012  
REV. 05-24-2017

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

| STD.NO.                                    | TITLE  |
|--|--|
| DIVISION 2 - EARTHWORK                     |  |
| 200.03                                     | Method of Clearing - Method III  |
| 225.02                                     | Guide for Grading Subgrade - Secondary and Local                               |
| 225.04                                     | Method of Obtaining Super elevation - Two Lane Pavement                        |
| DIVISION 3 - PIPE CULVERTS                 |  |
| 300.01                                     | Method of Pipe Installation  |
| DIVISION 4 - MAJOR STRUCTURES              |  |
| 422.10                                     | REINFORCED BRIDGE APPROACH FILLS   |
| DIVISION 5 - SUBGRADE, BASES AND SHOULDERS |  |
| 560.01                                     | Method of Shoulder Construction - High Side of Super elevated Curve - Method I |
| DIVISION 8 - INCIDENTALS                   |  |
| 840.00                                     | Concrete Base Pad for Drainage Structures                                      |
| 840.25                                     | Anchorage for Frames - Brick or Concrete or Precast                            |
| 840.29                                     | Frames and Narrow Slot Flat Grates   |
| 840.35                                     | Traffic Bearing Grated Drop Inlet - for Cast Iron Double Frame and Grates      |
| 840.46                                     | Traffic Bearing Precast Dainage Structure                                      |
| 840.66                                     | Drainage Structure Steps   |
| 846.04                                     | Drop Inlet Installation in Shoulder Berm Gutter                                |
| 876.01                                     | Rip Rap in Channels  |
| 876.02                                     | Guide for Rip Rap at Pipe Outlets  |

# STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

## CONVENTIONAL PLAN SHEET SYMBOLS

### BOUNDARIES AND PROPERTY:

|                                       |               |
|---------------------------------------|---------------|
| State Line                            | -----         |
| County Line                           | -----         |
| Township Line                         | -----         |
| City Line                             | -----         |
| Reservation Line                      | -----         |
| Property Line                         | -----         |
| Existing Iron Pin                     | ○ EIP         |
| Computed Property Corner              | -----x        |
| Property Monument                     | □ ECM         |
| Parcel/Sequence Number                | ⑩②③           |
| Existing Fence Line                   | -x-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 | ○ MILEPOST 35 |
| Switch             | □ 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 Easment Pin and Cap                       | ◇             |
| New Permanent Easement Pin and Cap                        | ◆             |
| Vertical Benchmark  | ⊠             |
| Existing Right of Way Marker                              | △             |
| Existing Right of Way Line                                | -----         |
| New Right of Way Line                                     | ○ R W         |
| New Right of Way Line with Pin and Cap                    | ○ R W ▲       |
| New Right of Way Line with Concrete or Granite R/W Marker | ▲ R W         |
| New Control of Access Line with Concrete CA Marker        | ▲ C A         |
| Existing Control of Access                                | ○ C A         |
| New Control of Access                                     | ○ C A         |
| Existing Easement Line                                    | -----E-----   |
| New Temporary Construction Easement                       | -----E-----   |
| New Temporary Drainage Easement                           | -----TDE----- |
| New Permanent Drainage Easement                           | -----PDE----- |
| New Permanent Drainage / Utility Easement                 | -----DUE----- |
| New Permanent Utility Easement                            | -----PUE----- |
| New Temporary Utility Easement                            | -----TUE----- |
| New Aerial Utility Easement                               | -----AUE----- |

### ROADS AND RELATED FEATURES:

|                            |               |
|----------------------------|---------------|
| Existing Edge of Pavement  | -----         |
| Existing Curb              | -----         |
| Proposed Slope Stakes Cut  | -----C-----   |
| Proposed Slope Stakes Fill | -----F-----   |
| Proposed Curb Ramp         | -----CFR----- |
| Existing Metal Guardrail   | -----T-----   |
| Proposed Guardrail         | -----T-----   |
| 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   | -----Vineyard----- |

### EXISTING STRUCTURES:

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

### UTILITIES:

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

### TELEPHONE:

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

### WATER:

|                                |                     |
|--------------------------------|---------------------|
| Water Manhole                  | ○ W                 |
| 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        | -----A/G Water----- |

### TV:

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

### GAS:

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

### SANITARY SEWER:

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

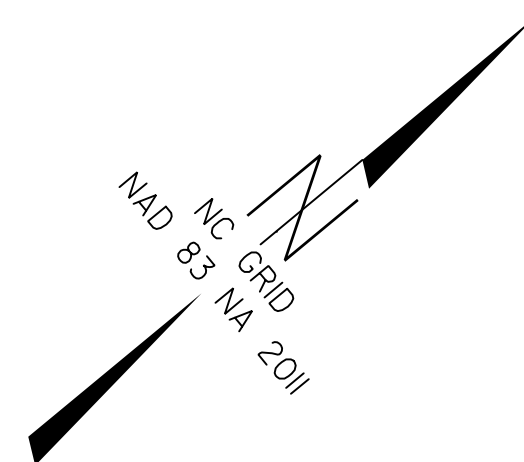
### MISCELLANEOUS:

|  |                |
|--|----------------|
| Utility Pole                             | ●              |
| Utility Pole with Base                   | □              |
| Utility Located Object                   | ○              |
| Utility Traffic Signal Box               | ⊠              |
| Utility Unknown U/G Line LOS B (S.U.E.*) | -----TUTL----- |
| U/G Tank; Water, Gas, Oil                | -----          |
| Underground Storage Tank, Approx. Loc.   | ⊠ UST          |
| 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-5362

FINAL

| TYPE | STATION  | NORTH       | EAST         |
|------|----------|-------------|--------------|
| POT  | 10+00.00 | 523516.0296 | 1805875.7142 |
| PC   | 10+75.55 | 523567.4354 | 1805931.0725 |
| PT   | 13+74.76 | 523784.7545 | 1806136.4372 |
| POT  | 19+96.31 | 524263.3906 | 1806532.9598 |



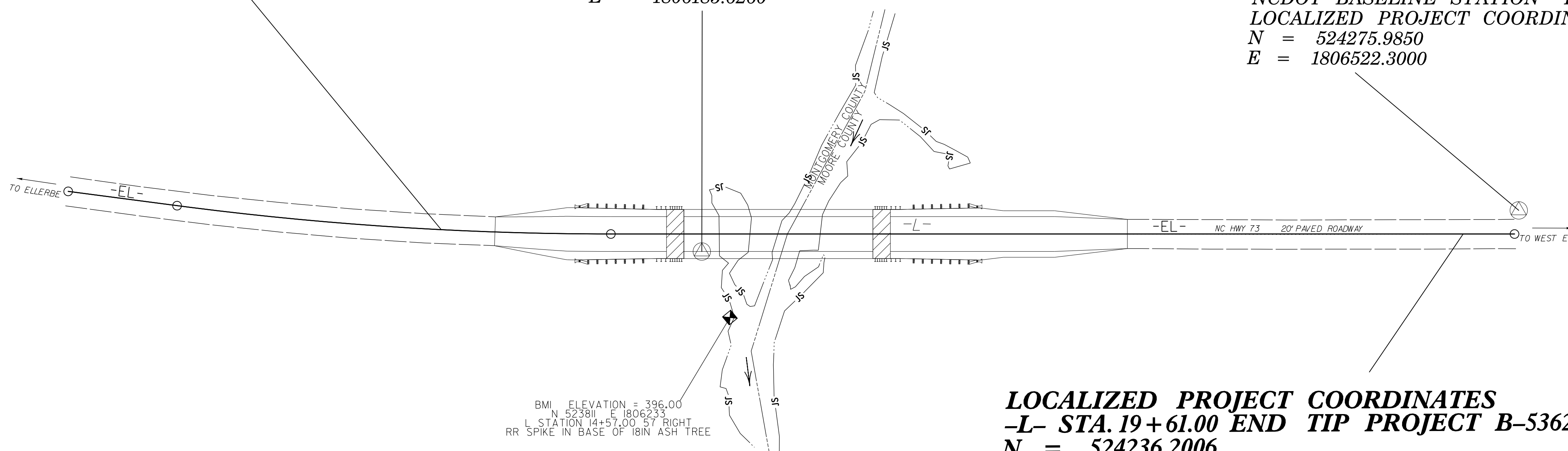
| ALIGN | STATION  | OFFSET | NORTH       | EAST         |
|-------|----------|--------|-------------|--------------|
| L     | 13+46.09 | 30.00  | 523743.3625 | 1806140.8663 |
| L     | 13+46.00 | 68.00  | 523718.6882 | 1806169.7674 |
| L     | 13+80.00 | 68.00  | 523745.4086 | 1806192.1450 |
| L     | 13+80.00 | 30.00  | 523769.6510 | 1806162.8823 |
| L     | 13+80.00 | 55.00  | 523753.7020 | 1806182.1341 |
| L     | 15+77.00 | 55.00  | 523905.4059 | 1806307.8120 |
| L     | 15+77.00 | 30.00  | 523921.3549 | 1806288.5603 |
| L     | 17+43.00 | 55.00  | 524033.2375 | 1806413.7132 |
| L     | 17+43.00 | 62.00  | 524028.7718 | 1806419.1037 |
| L     | 17+71.00 | 73.00  | 524043.3162 | 1806445.4373 |
| L     | 17+78.00 | 55.00  | 524060.1900 | 1806436.0418 |
| L     | 19+31.00 | 55.00  | 524178.0107 | 1806533.6495 |
| L     | 19+31.00 | 69.00  | 524169.0793 | 1806544.4305 |
| L     | 19+61.00 | 69.00  | 524192.1814 | 1806563.5693 |
| L     | 19+61.00 | 30.00  | 524217.0618 | 1806533.5366 |
| L     | 15+77.00 | -30.00 | 523959.6324 | 1806242.3560 |
| L     | 15+77.00 | -47.00 | 523970.4777 | 1806229.2649 |
| L     | 15+40.00 | -47.00 | 523941.9851 | 1806205.6604 |
| L     | 15+40.00 | -30.00 | 523931.1398 | 1806218.7516 |
| L     | 14+80.00 | -30.00 | 523884.9356 | 1806180.4740 |
| L     | 14+80.00 | -47.00 | 523895.7809 | 1806167.3828 |
| L     | 14+40.00 | -47.00 | 523864.9781 | 1806141.8645 |
| L     | 14+00.00 | -60.00 | 523842.4687 | 1806106.3352 |
| L     | 13+80.00 | -60.00 | 523827.0673 | 1806093.5760 |
| L     | 13+80.00 | -30.00 | 523807.9286 | 1806116.6781 |

**LOCALIZED PROJECT COORDINATES**  
**-L- STA. 12+58.00 BEGIN TIP PROJECT B-5362**  
**N = 523696.7771**  
**E = 1806059.6915**

**NCDOT GPS STATION "B5362-2"**  
**LOCALIZED PROJECT COORDINATES**  
**N = 523305.8390**  
**E = 1805603.5200**

**NCDOT GPS STATION "B5362-1"**  
**LOCALIZED PROJECT COORDINATES**  
**N = 523825.2270**  
**E = 1806185.6260**

**NCDOT BASELINE STATION "BL-101"**  
**LOCALIZED PROJECT COORDINATES**  
**N = 524275.9850**  
**E = 1806522.3000**



**LOCALIZED PROJECT COORDINATES**  
**-L- STA. 19+61.00 END TIP PROJECT B-5362**  
**N = 524236.2006**  
**E = 1806510.4344**

| BL POINT | DESC.   | NORTH       | EAST         | ELEVATION | L STATION | OFFSET                 |
|----------|---------|-------------|--------------|-----------|-----------|------------------------|
| 2        | B5362-2 | 523305.8390 | 1805603.5200 | 402.13    |           | OUTSIDE PROJECT LIMITS |
| 1        | B5362-1 | 523825.2270 | 1806185.6260 | 401.92    | 14+37.31  | 12.06 RT               |
| 101      | BL-101  | 524275.9850 | 1806522.3000 | 401.95    |           | OUTSIDE PROJECT LIMITS |

.....  
 B.M1 ELEVATION = 396.00  
 N 523811 E 1806233  
 L STATION 14+57.00 57 RIGHT  
 RR SPIKE IN BASE OF 18IN ASH TREE  
 .....


### DATUM DESCRIPTION

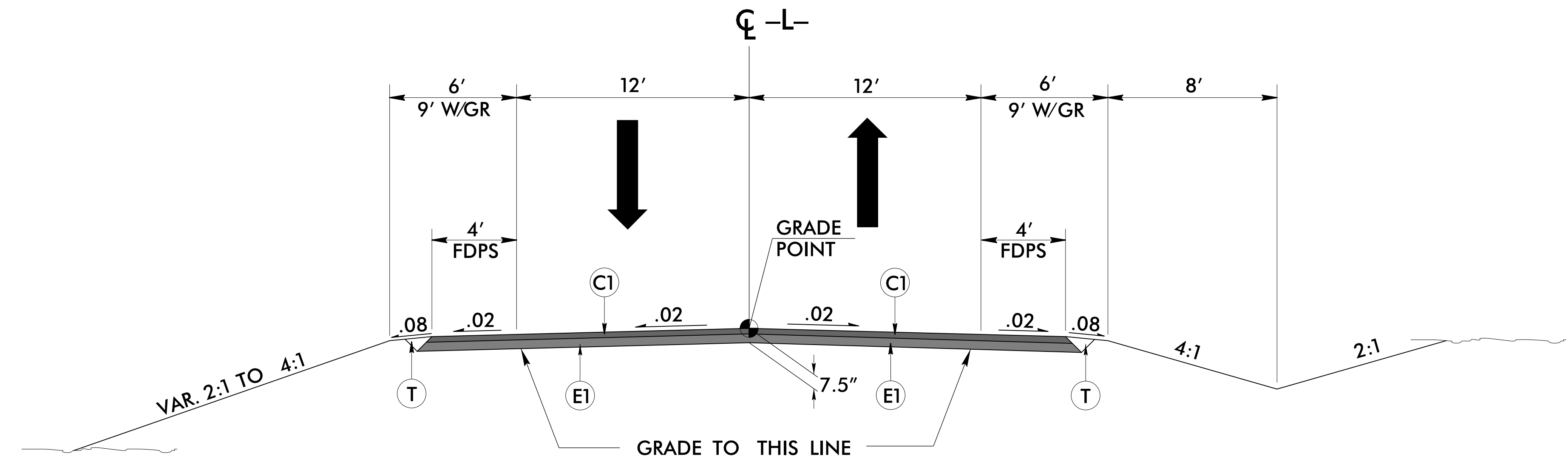
THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "B5362-1" WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF NORTHING: 523825.2270(FT) EASTING: 1806185.6260(FT) ELEVATION: 401.9150(FT) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9998589036 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "B5362-1" TO -L- STATION 12+95.00 IS N 03° 03' 54.9" E 152.338' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NAVD 88

**NOTES:**

- THE CONTROL DATA FOR THIS PROJECT CAN BE FOUND ELECTRONICALLY BY SELECTING PROJECT CONTROL DATA AT: [HTTPS://CONNECT.NCDOT.GOV/RESOURCES/LOCATION/](https://connect.ncdot.gov/resources/location/) THE FILES TO BE FOUND ARE AS FOLLOWS: B5362\_LS\_CONTROL.TXT
- SITE CALIBRATION INFORMATION HAS NOT BEEN PROVIDED FOR THIS PROJECT IF FURTHER INFORMATION IS NEEDED, PLEASE CONTACT THE LOCATION AND SURVEYS UNIT.
- © INDICATES GEODETIC CONTROL MONUMENTS USED OR SET FOR HORIZONTAL PROJECT CONTROL BY THE NCDOT LOCATION AND SURVEYS UNIT. PROJECT CONTROL ESTABLISHED USING GLOBAL POSITIONING SYSTEM. NETWORK ESTABLISHED FROM NGS ONLINE POSITIONING SERVICE (OPUS).

NOTE: DRAWING NOT TO SCALE

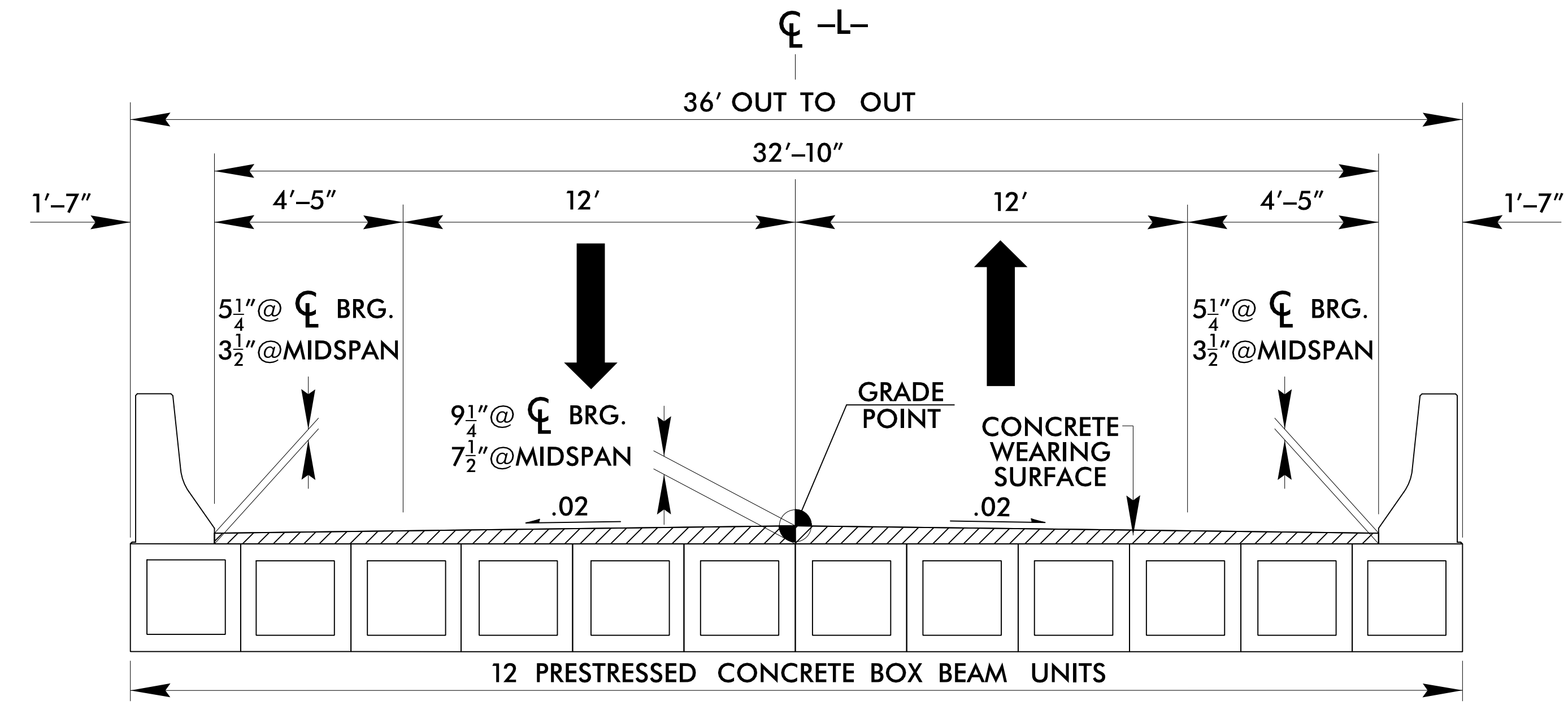
|  |   |
|--|---|
| PROJECT REFERENCE NO.<br><i>B-5362</i>   | SHEET NO.<br><i>2A-1</i>  |
| ROADWAY DESIGN ENGINEER<br><i>SEAN PROFFER</i><br>SEAL 043891<br>ENGINEER<br>DAN C. STEPHENSON<br>18/11/2017   | PAVEMENT DESIGN ENGINEER<br><i>CLARK S. MORRISON</i><br>SEAL 022896<br>ENGINEER<br>18/11/2017 |
| <b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b>   |   |
|  <b>STV Engineers, Inc.</b><br>900 West Trade St., Suite 715<br>Charlotte, NC 28202<br>NC License Number F-0991 |   |



### TYPICAL SECTION NO. 1

**USE TYPICAL SECTION NO. 1 AS FOLLOWS**

TRANSITION FROM EXISTING TO TYPICAL SECTION NO. 1 -L- STA. 12+95.00 TO STA. 13+45.00  
 -L- STA 13+45.00 TO STA 14+13.31 (BEGIN BRIDGE)  
 -L- STA 15+60.69 (END BRIDGE) TO STA 16+80.00  
 TRANSITION FROM TYPICAL SECTION NO. 1 TO EXISTING -L- STA. 16+80.00 TO STA. 17+30.00



### TYPICAL SECTION NO. 2

**USE TYPICAL SECTION NO. 2 AS FOLLOWS**

-L- STA. 14+13.31 (BEGIN BRIDGE) TO STA. 15+60.69 (END BRIDGE)

| 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. |
| E1                      | PROP. APPROX. 4.5" ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 513 LBS. PER SQ. YD.                       |
| T                       | EARTH MATERIAL   |

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

24-MAY-2017 11:33  
 S:\Contracts\Special Details\Standard Drawings\2012 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 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).

SECTION YY: MEDIAN WIDTH, SHOULDER SLOPE PER PLANS (10:1 OR FLATTER), SIGN SUPPORT, 6'-0"

SECTION ZZ: MEDIAN WIDTH, SHOULDER SLOPE PER PLANS (10:1 OR FLATTER), SIGN SUPPORT, 6'-0"

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" BEGIN 3'-1 1/2" 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.

SECTION XX: SHOULDER (VAR.), SHOULDER SLOPE PER PLANS (10:1 OR FLATTER), DITCH (VAR.), SHOULDER SLOPE PER PLANS (10:1 OR FLATTER), DITCH SLOPE, MEDIAN DITCH, INLET & PIPE REQUIRED FOR DRAINAGE (DO NOT BE GRADED TO DRAIN)

SECTION YY: MEDIAN WIDTH, SHOULDER SLOPE PER PLANS (10:1 OR FLATTER), 1" OFFSET (TYP.), MEDIAN HAZARD, SINGLE FACED PRECAST CONCRETE BARRIER SEE STD. DWG. 857.01

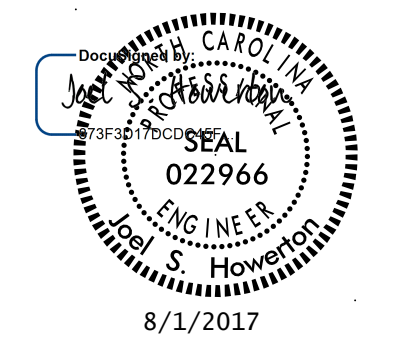
SECTION ZZ: MEDIAN WIDTH, SHOULDER SLOPE PER PLANS (10:1 OR FLATTER), 1" OFFSET (TYP.), MEDIAN HAZARD, SINGLE FACED PRECAST CONCRETE BARRIER SEE STD. DWG. 857.01

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:



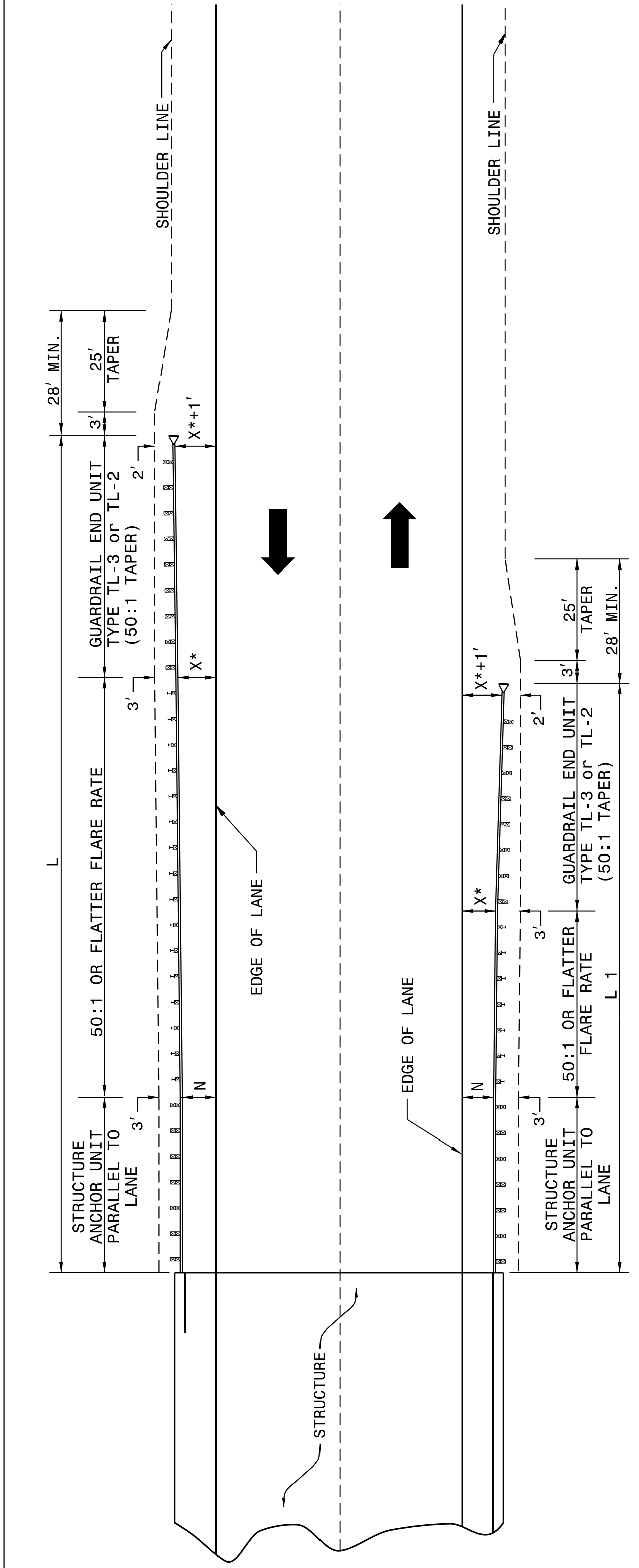
8/1/2017

24-MAY-2017 11:36 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" 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'                        | 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.

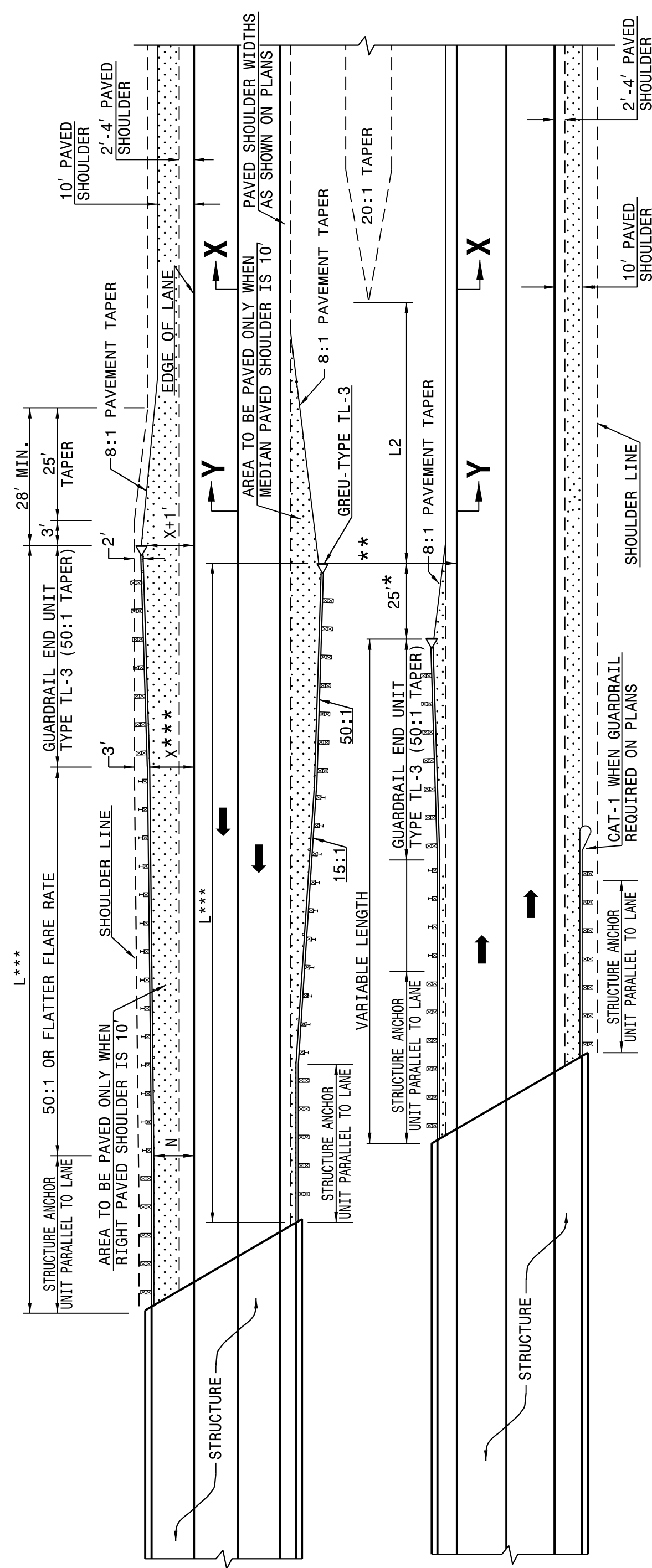
ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL PLACEMENT**

SHEET 4 OF 11  
**862D01**

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

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

ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL PLACEMENT**



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**

SHEET 3 OF 11  
**862D01**

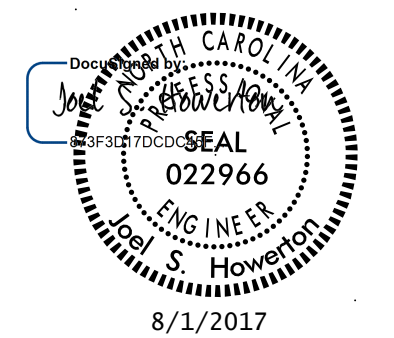
**DETAIL OF GUARDRAIL APPROACHING DUAL LANE BRIDGES**

DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED

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

**SEE TITLE BLOCK**

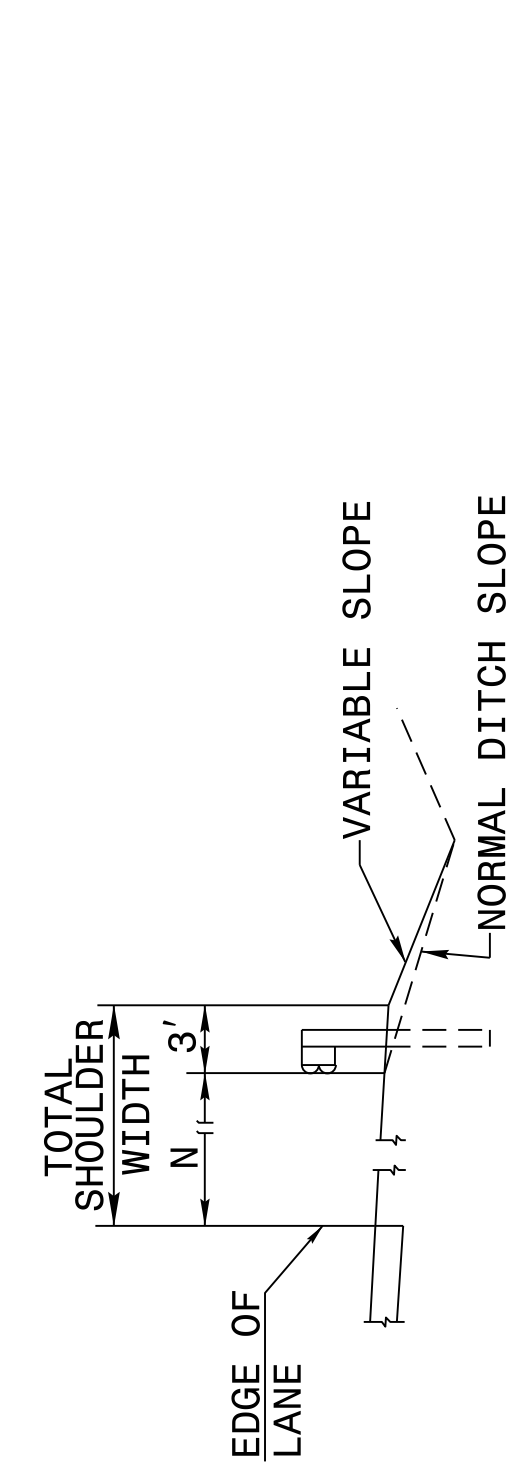
ORIGINAL BY: J HOWERTON DATE: 06-22-12  
 MODIFIED BY: DATE:  
 CHECKED BY: DATE:  
 FILE SPEC.:



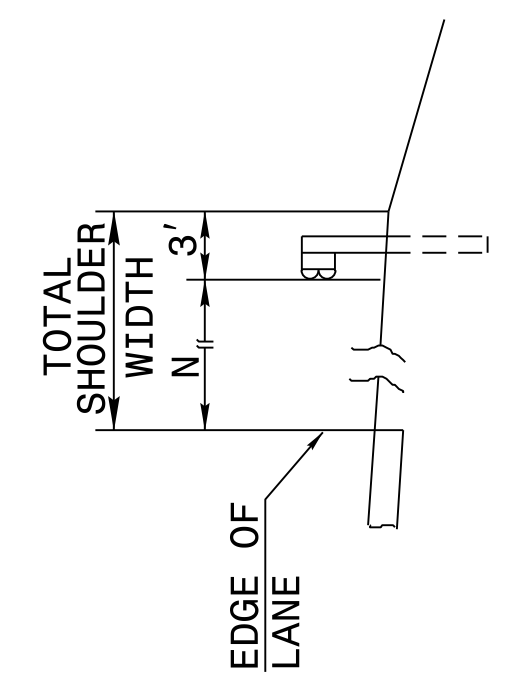


24-MAY-2017 11:37 S:\Contracts\Special Details\Howerton\Standard Drawings\Division 8\662d01 862d03 862d01.dgn  
 J.Howerton AT: CS0-292595

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

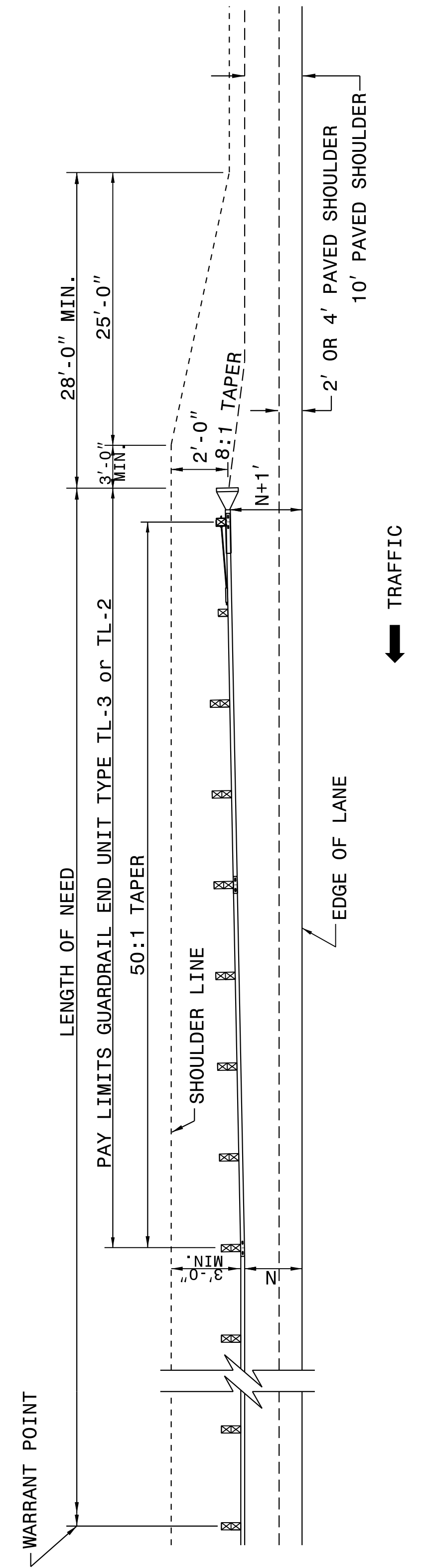


**CUT SECTION**



**FILL SECTION**

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

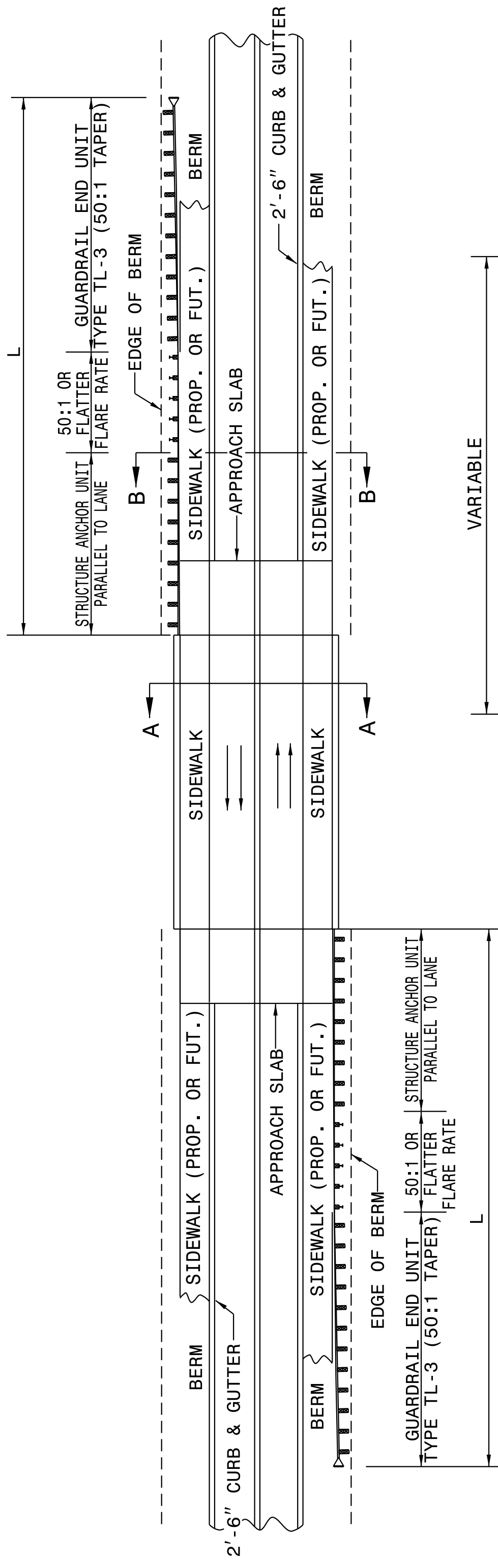


FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3  
 FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

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)   | "L"  |
| 40   | 150' |
| 50   | 225' |

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

SEE STD. 862D03 FOR STRUCTURE ANCHOR UNITS.

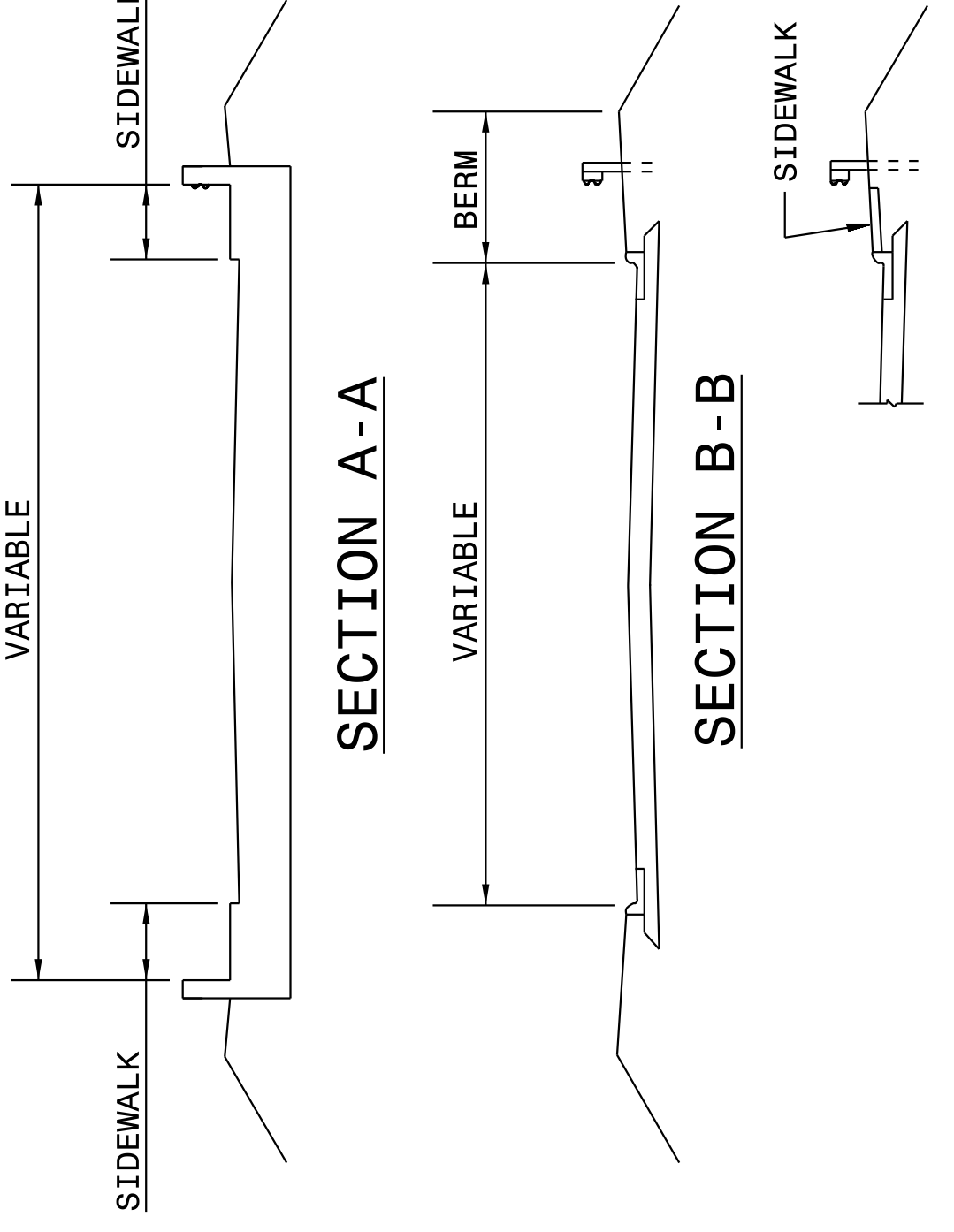
FOR POSTED SPEEDS ≥ 45mph USE GREU TYPE TL-3  
 FOR POSTED SPEEDS < 45mph USE GREU TYPE TL-2

ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL PLACEMENT**

SHEET 5 OF 11  
**862D01**

**DETAIL OF BEGINNING OF GUARDRAIL IN CUT OR FILL SECTION**

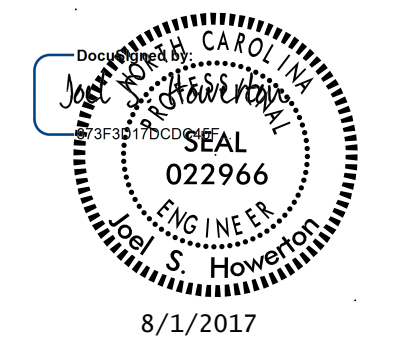
**STANDARD GUARDRAIL PLACEMENT AT BRIDGES WITH 2'-6" CONCRETE CURB AND GUTTER**



**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.:

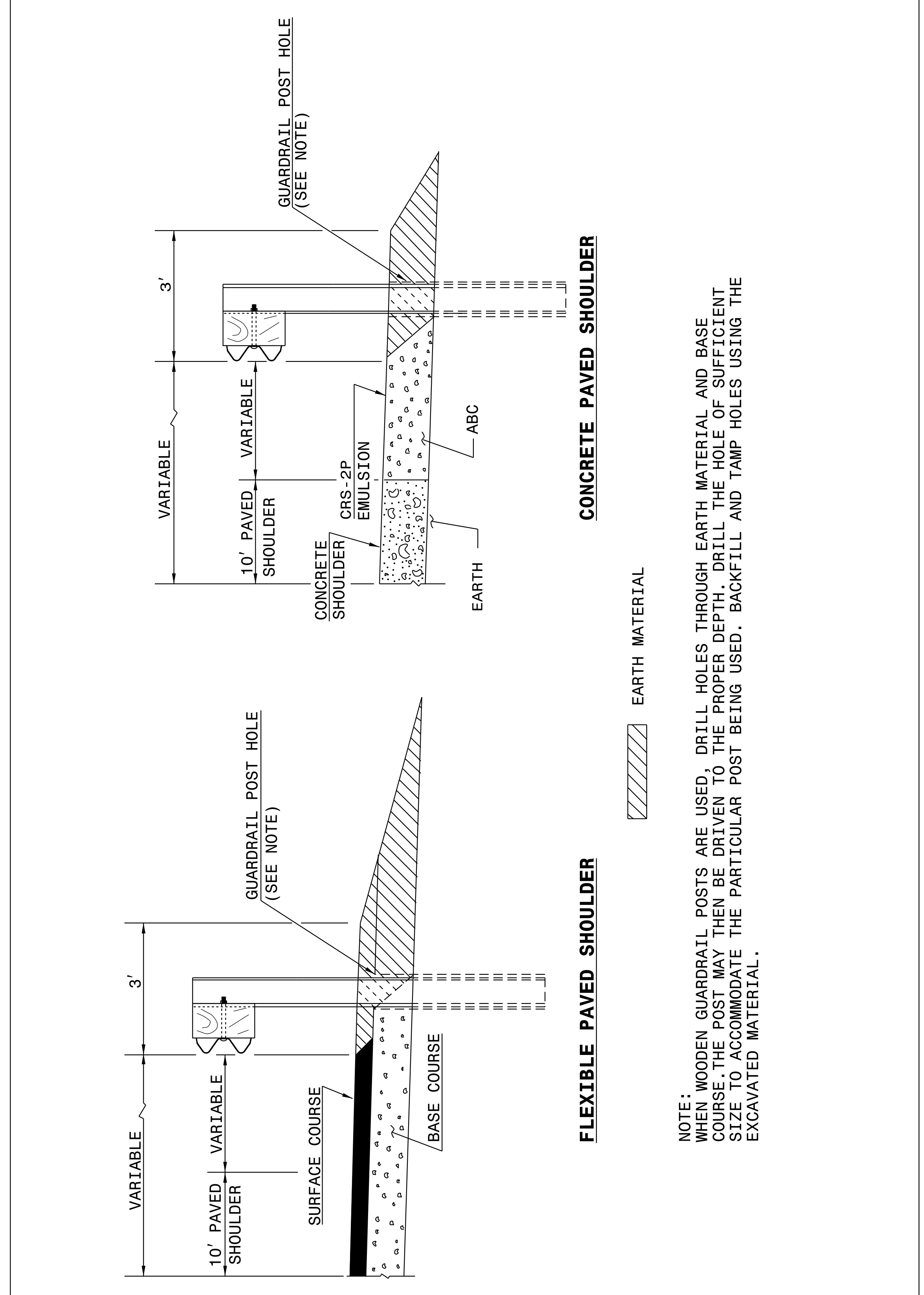


DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED



24-MAY-2017 11:44 S:\Contracts\Special Details\Howerton\Standard Drawings\2012 Standard Drawings\Details in Lieu of Standards\Division 8\862d01 862d03 862d01.dgn

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



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

ENGLISH DETAIL DRAWING FOR  
**GUARDRAIL PLACEMENT**

**FLEXIBLE PAVED SHOULDER**

**CONCRETE PAVED SHOULDER**

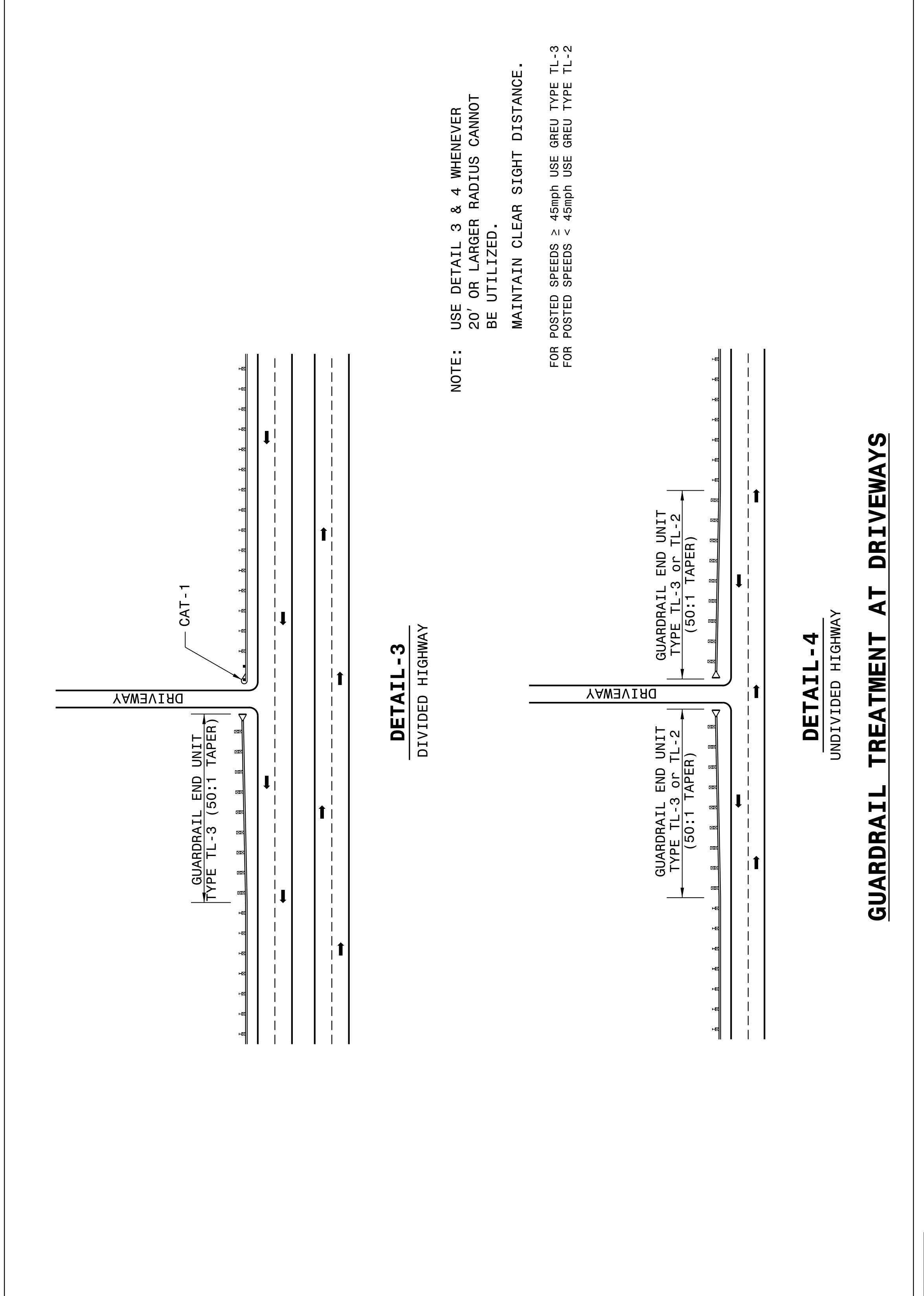
EARTH MATERIAL

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.

SHEET 10 OF 11  
**862D01**

SHEET 10 OF 11  
**862D01**

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



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

ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL PLACEMENT**

**DETAIL - 3**  
DIVIDED HIGHWAY

**DETAIL - 4**  
UNDIVIDED HIGHWAY

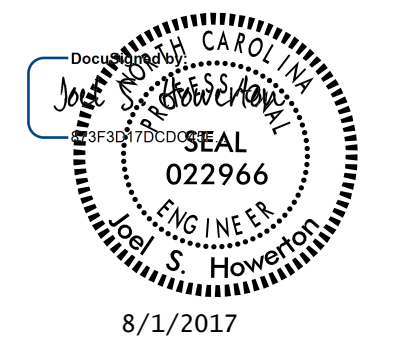
**GUARDRAIL TREATMENT AT DRIVEWAYS**

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

SHEET 9 OF 11  
**862D01**

SHEET 9 OF 11  
**862D01**



8/1/2017

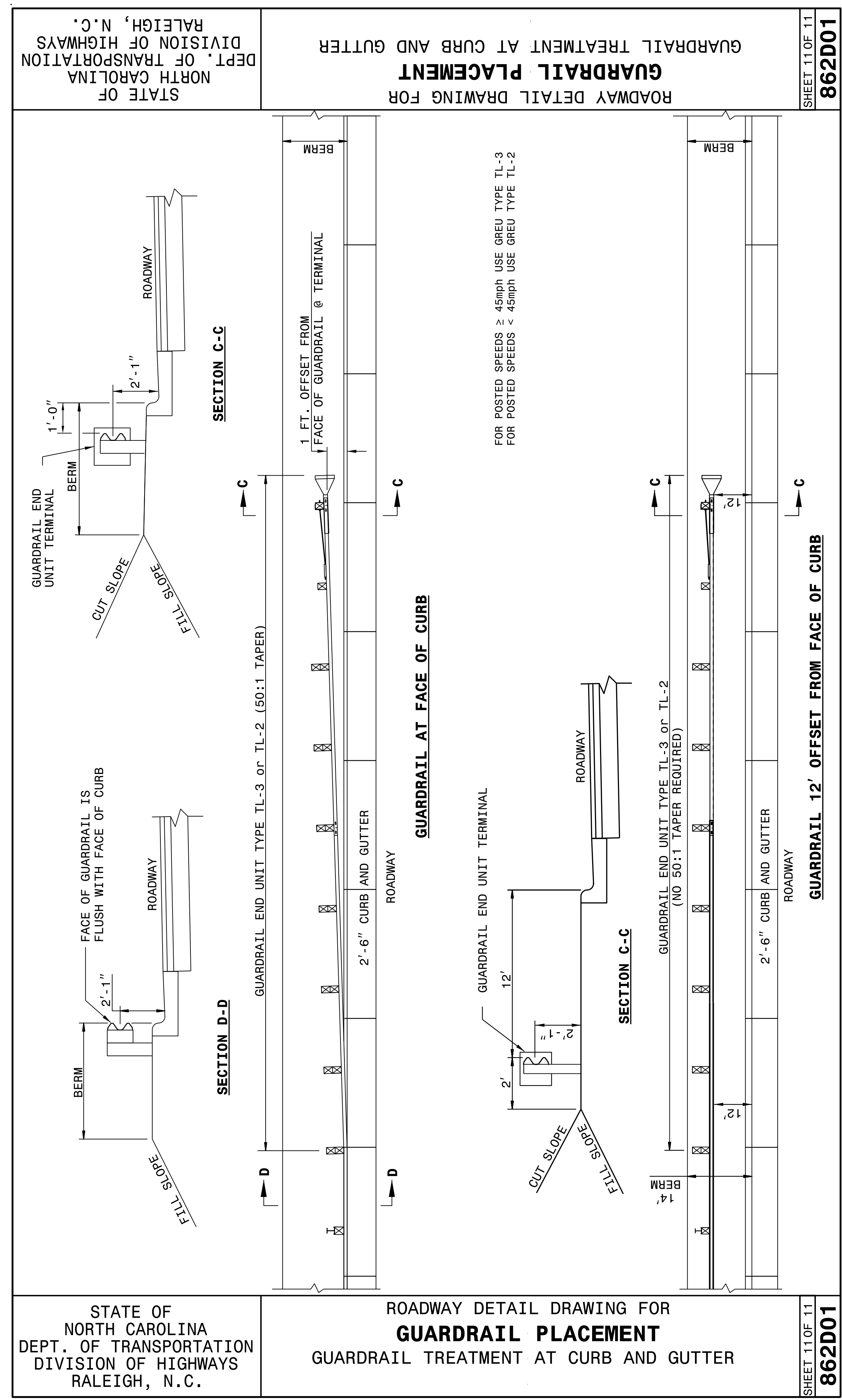
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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

**SEE TITLE BLOCK**

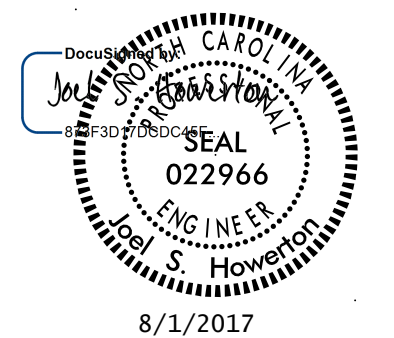
ORIGINAL BY: J. HOWERTON DATE: 06-22-12  
MODIFIED BY: DATE:  
CHECKED BY: DATE:  
FILE SPEC.:

24-MAY-2017 11:45 S:\Contracts\Special Details\Howerton\Standard Drawings\2012 Standard Drawings\Division 8\862d01 862d03 862d03\862d01.dgn .Howerton AT\_CSD-292595



SHEET 11 OF 11  
**862D01**

SHEET 11 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**

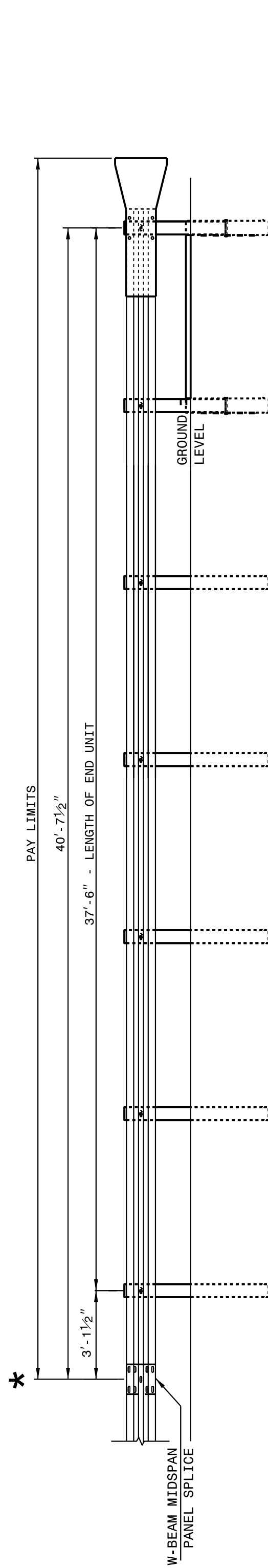
|                          |                |
|--------------------------|----------------|
| ORIGINAL BY: J. HOWERTON | DATE: 06-22-12 |
| MODIFIED BY:             | DATE:          |
| CHECKED BY:              | DATE:          |
| FILE SPEC.:              |                |

24-MAY-2017 11:51 S:\Contracts\Special Details\Joverton\Standard Drawings\Division 8\862d01 862d03 862d03 862d03.dgn

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

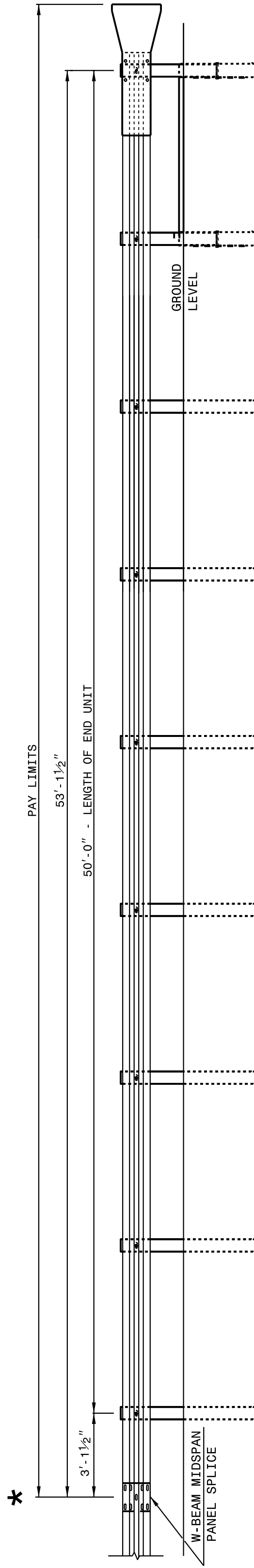
ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL INSTALLATION**

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**

SHEET 2 OF 8  
**862D02**

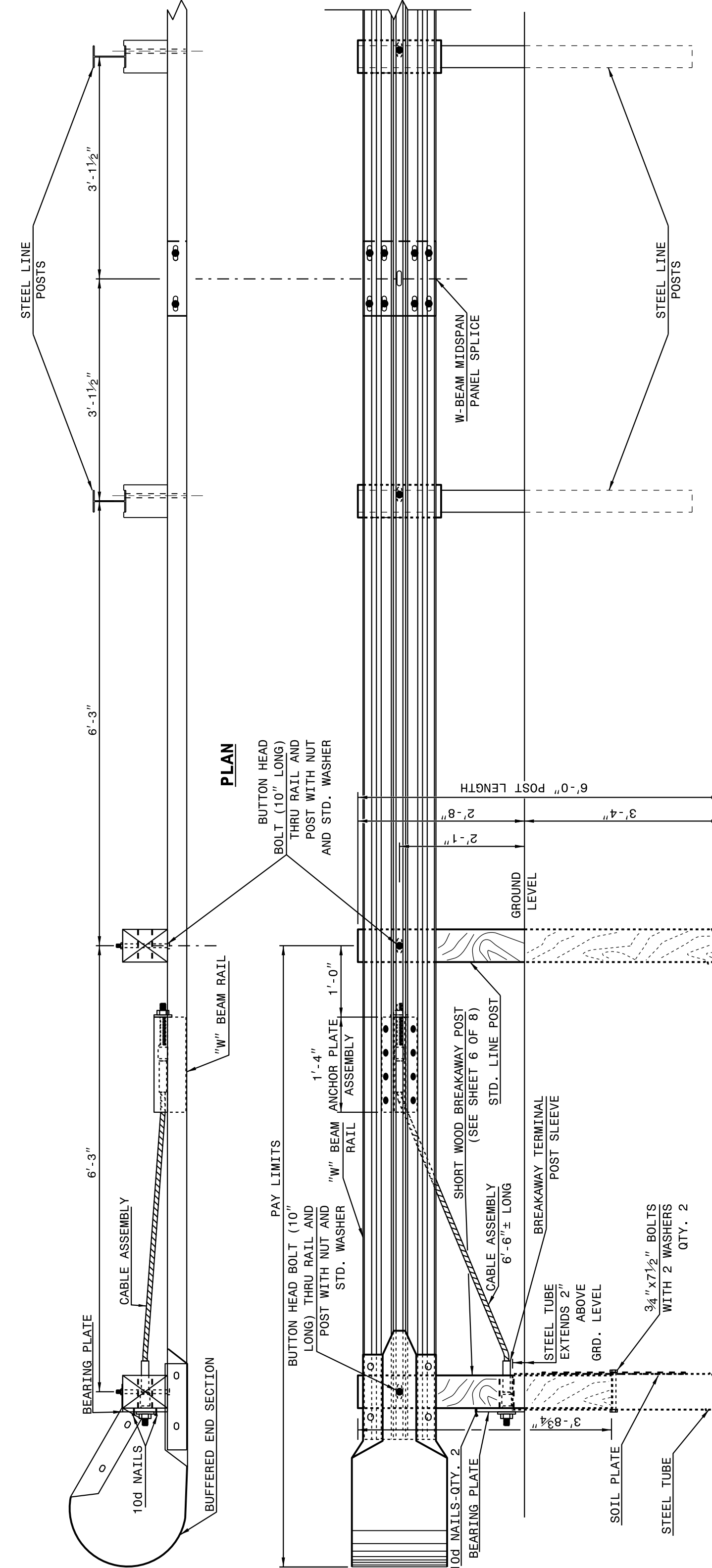
STATE OF  
NORTH CAROLINA  
DEPT. OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
RALEIGH, N.C.

ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL INSTALLATION**

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

ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL INSTALLATION**

SHEET 1 OF 8  
**862D02**



**ELEVATION**

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

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

ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL INSTALLATION**

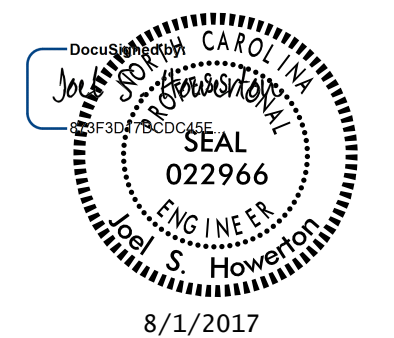
SHEET 1 OF 8  
**862D02**

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.:             |                |



8/1/2017

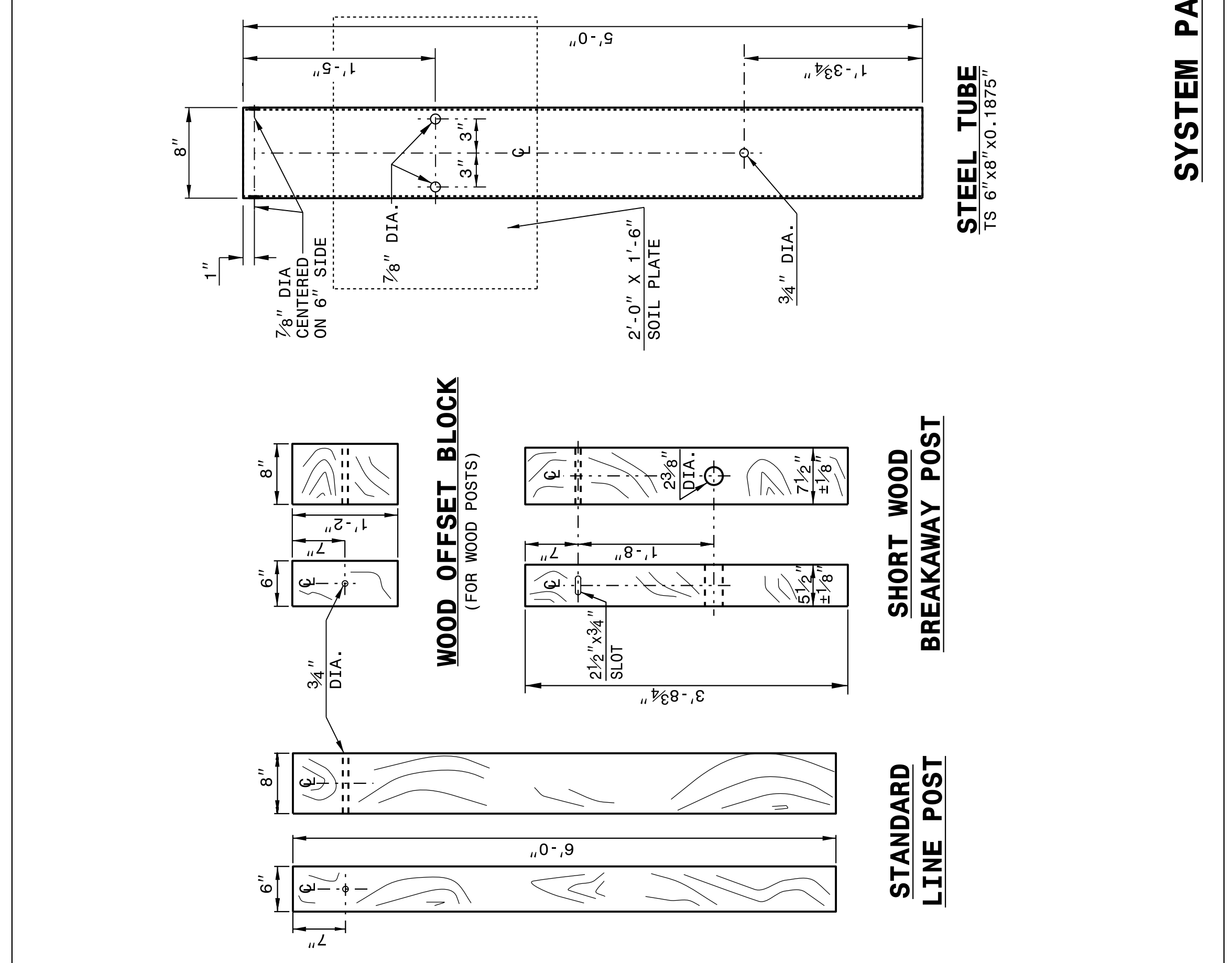


24-MAY-2017 11:52 S:\Contracts\Special Details\Howerton\Standard Drawings\Details in Lieu of Standards\Division 8\862d01 862d03 862d02.dgn  
 J.Howerton AT: CSU-292595

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

ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL INSTALLATION**

SHEET 6 OF 8  
**862D02**

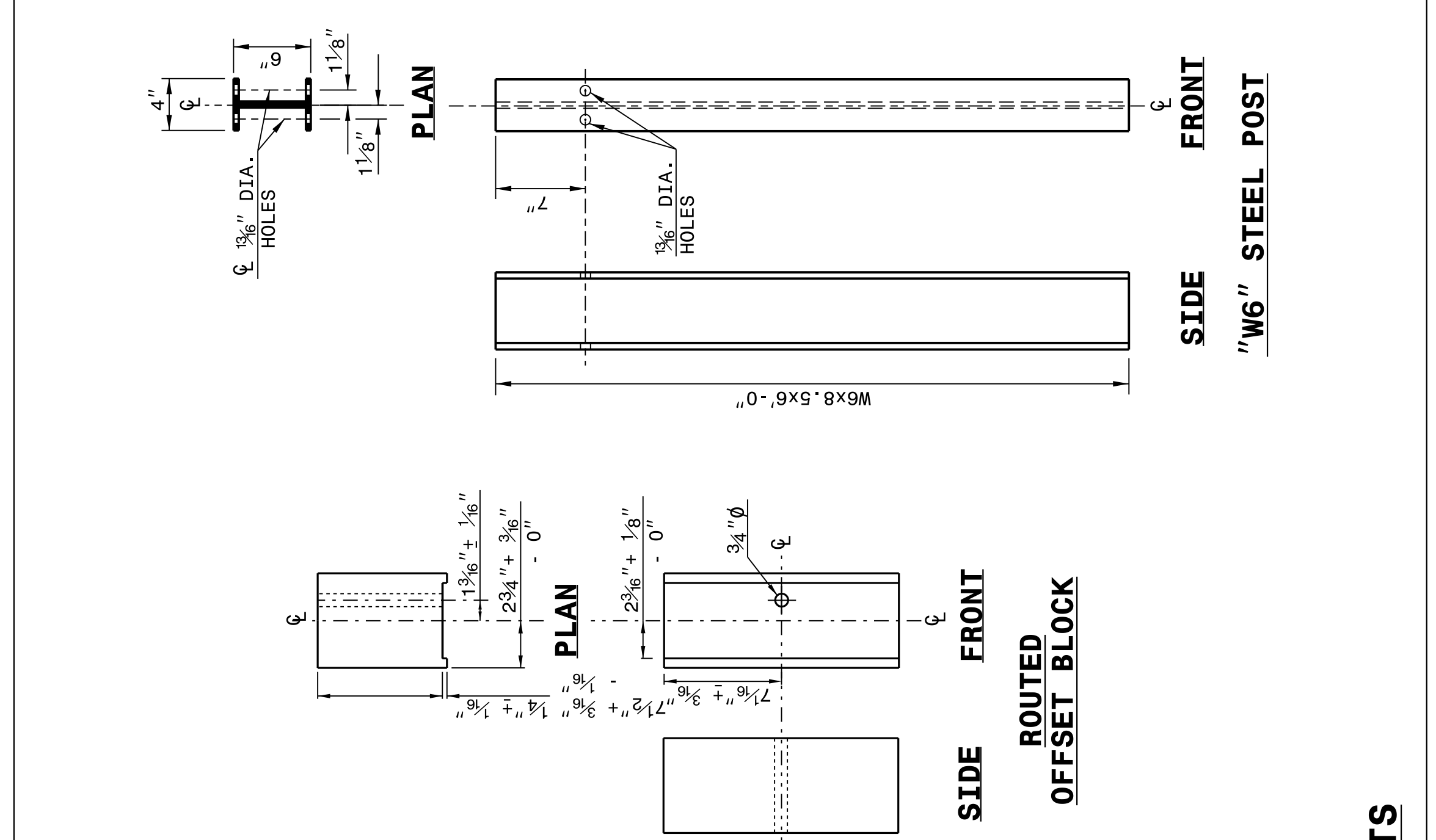


**SYSTEM PARTS**

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

ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL INSTALLATION**

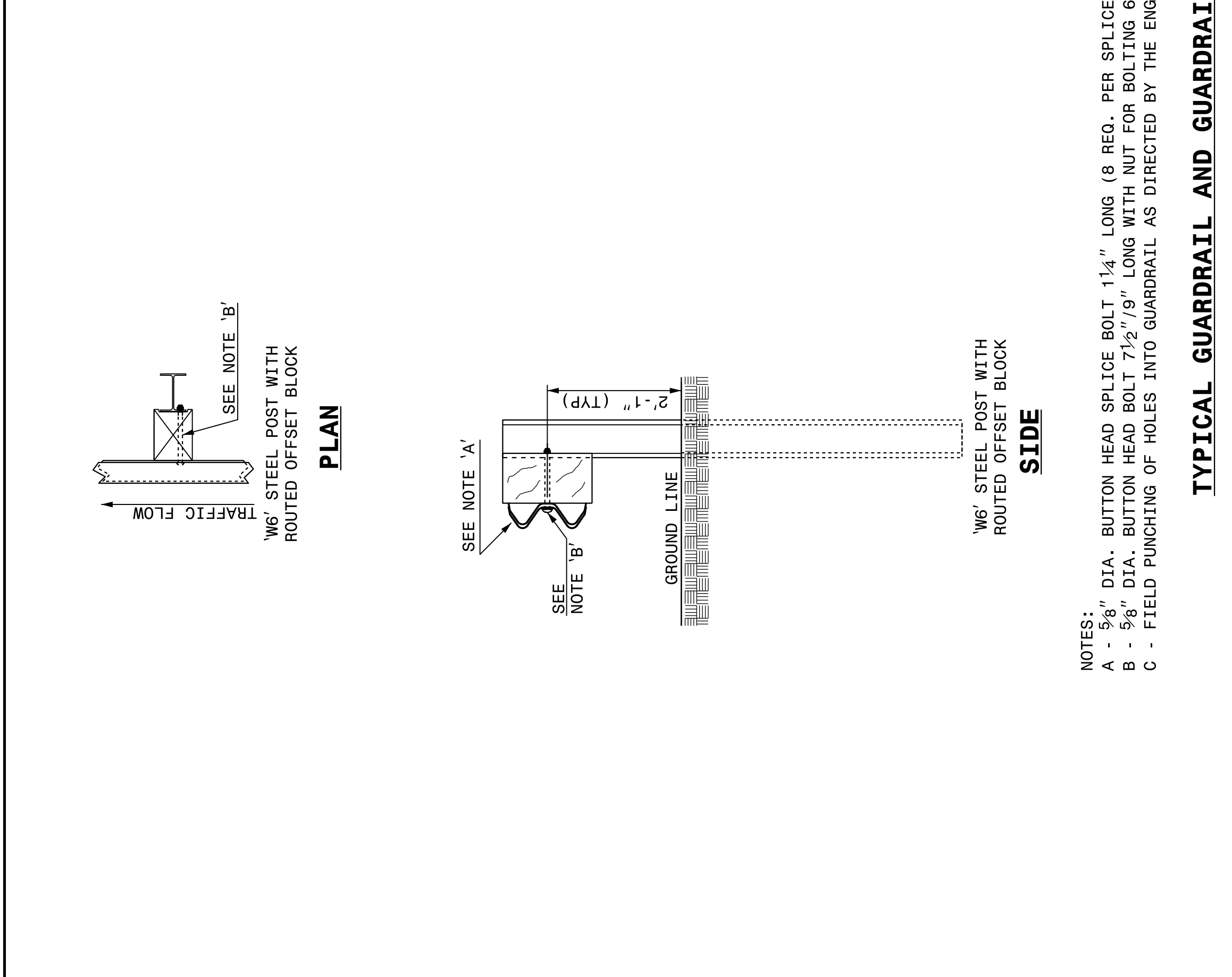
SHEET 6 OF 8  
**862D02**



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

ROADWAY DETAIL DRAWING FOR  
**GUARDRAIL INSTALLATION**

SHEET 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**

NOTES:  
 A - 5/8" DIA. BUTTON HEAD SPLICE BOLT 1 1/4" LONG (8 REG. PER SPLICE JOINT).  
 B - 3/8" DIA. BUTTON HEAD BOLT 7 1/2"/8" LONG WITH NUT FOR BOLTING 6"/8" ROUTED OFFSET BLOCK TO STEEL POSTS.  
 C - FIELD PUNCHING OF HOLES INTO GUARDRAIL AS DIRECTED BY THE ENGINEER.

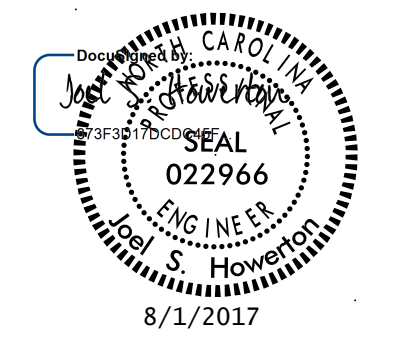
**TYPICAL GUARDRAIL AND GUARDRAIL POST ALTERNATIVES**

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

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

**SEE TITLE BLOCK**

DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED



8/1/2017





24-MAY-2017 11:56 S:\Contracts\Special Details\Standard Drawings\Division 8\862d01 862d03 862d03.dgn  
 J:\overton\Special Details\Standard Drawings\Division 8\862d01 862d03 862d03.dgn  
 J:\overton\Special Details\Standard Drawings\Division 8\862d01 862d03 862d03.dgn

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

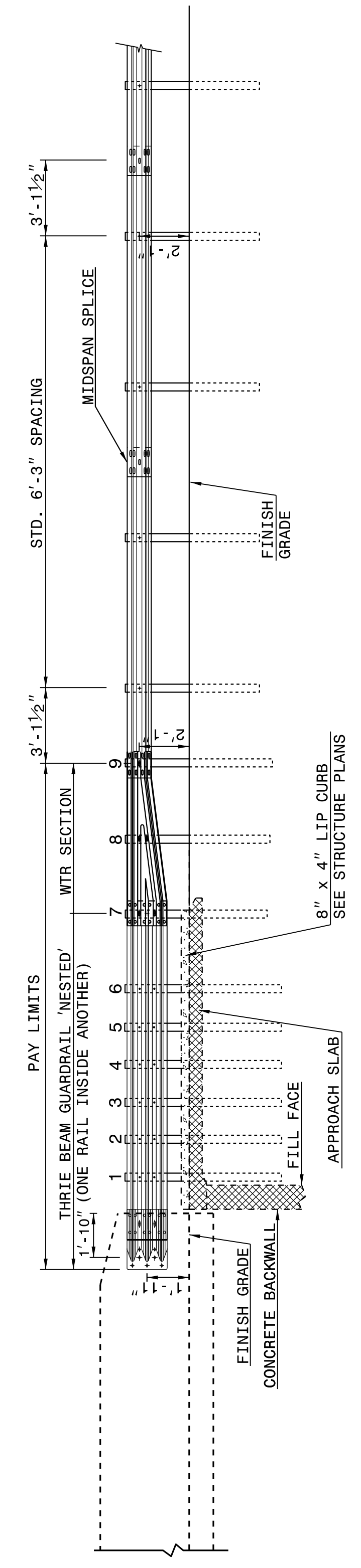
ROADWAY DETAIL DRAWING FOR  
**STRUCTURE ANCHOR UNITS**  
 GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO  
 RAIL ON BRIDGE - SUB REGIONAL TIER

SHEET 2 OF 7  
**862D03**

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

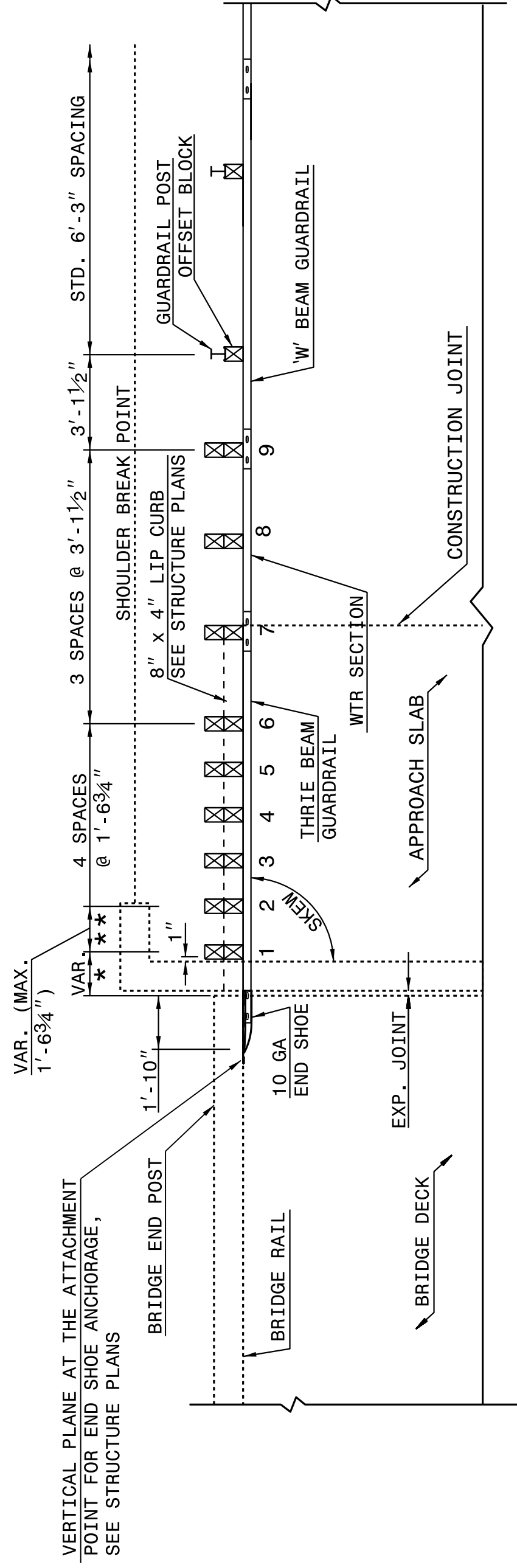
ROADWAY DETAIL DRAWING FOR  
**STRUCTURE ANCHOR UNITS**  
 GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO  
 RAIL ON BRIDGE - SUB REGIONAL TIER

SHEET 2 OF 7  
**862D03**



**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.



**PLAN VIEW**

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

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

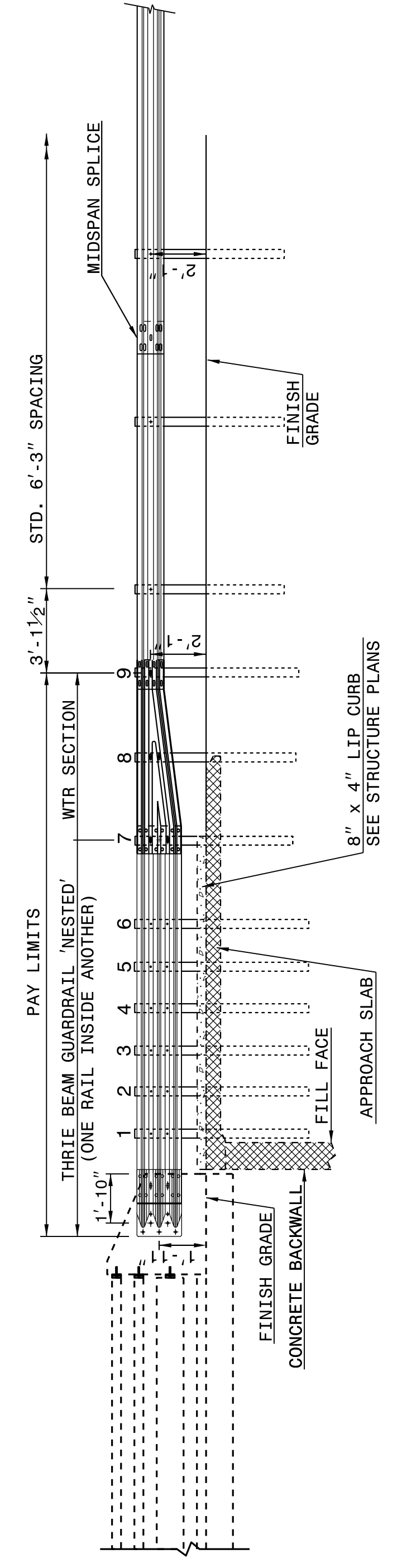
ROADWAY DETAIL DRAWING FOR  
**STRUCTURE ANCHOR UNITS**  
 GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE

SHEET 1 OF 7  
**862D03**

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

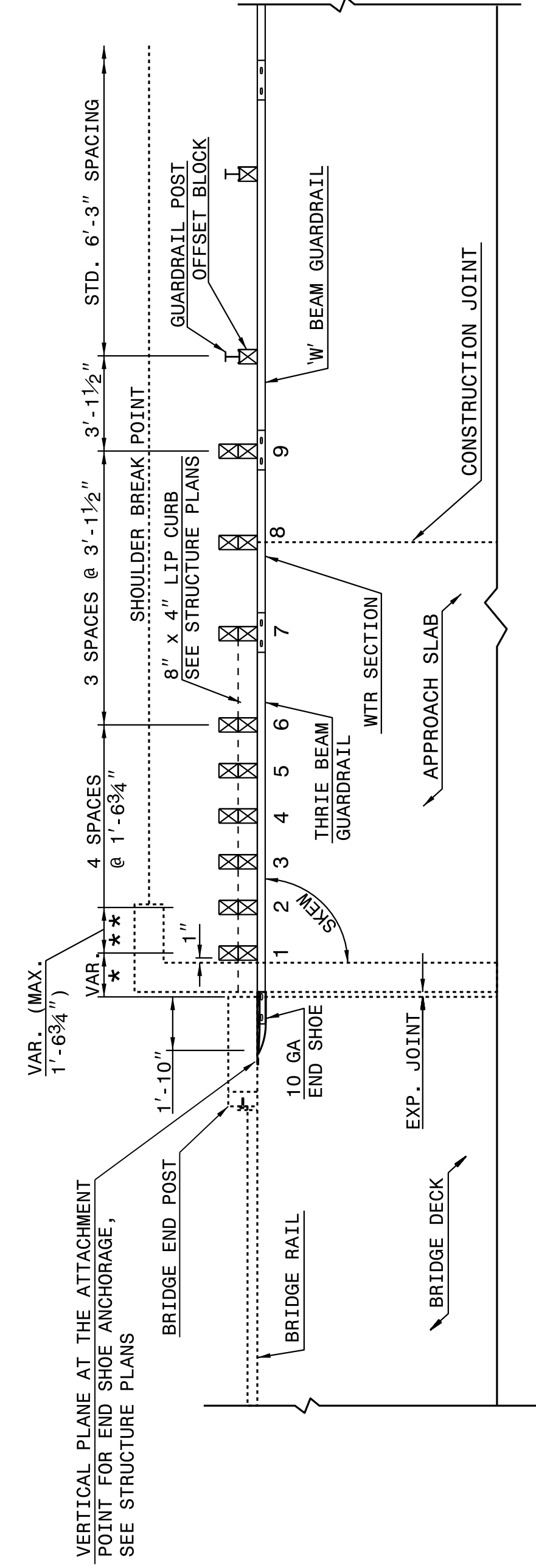
ROADWAY DETAIL DRAWING FOR  
**STRUCTURE ANCHOR UNITS**  
 GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO RAIL ON BRIDGE

SHEET 1 OF 7  
**862D03**



**ELEVATION**

NOTE:  
 \*\*POST NOT REQUIRED FOR SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.  
 \*THE DISTANCE FROM END OF BRIDGE RAIL TO CENTER LINE OF THE FIRST POST SHOULD BE 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.



**PLAN VIEW**

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

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.:             |                |



8/3/2017

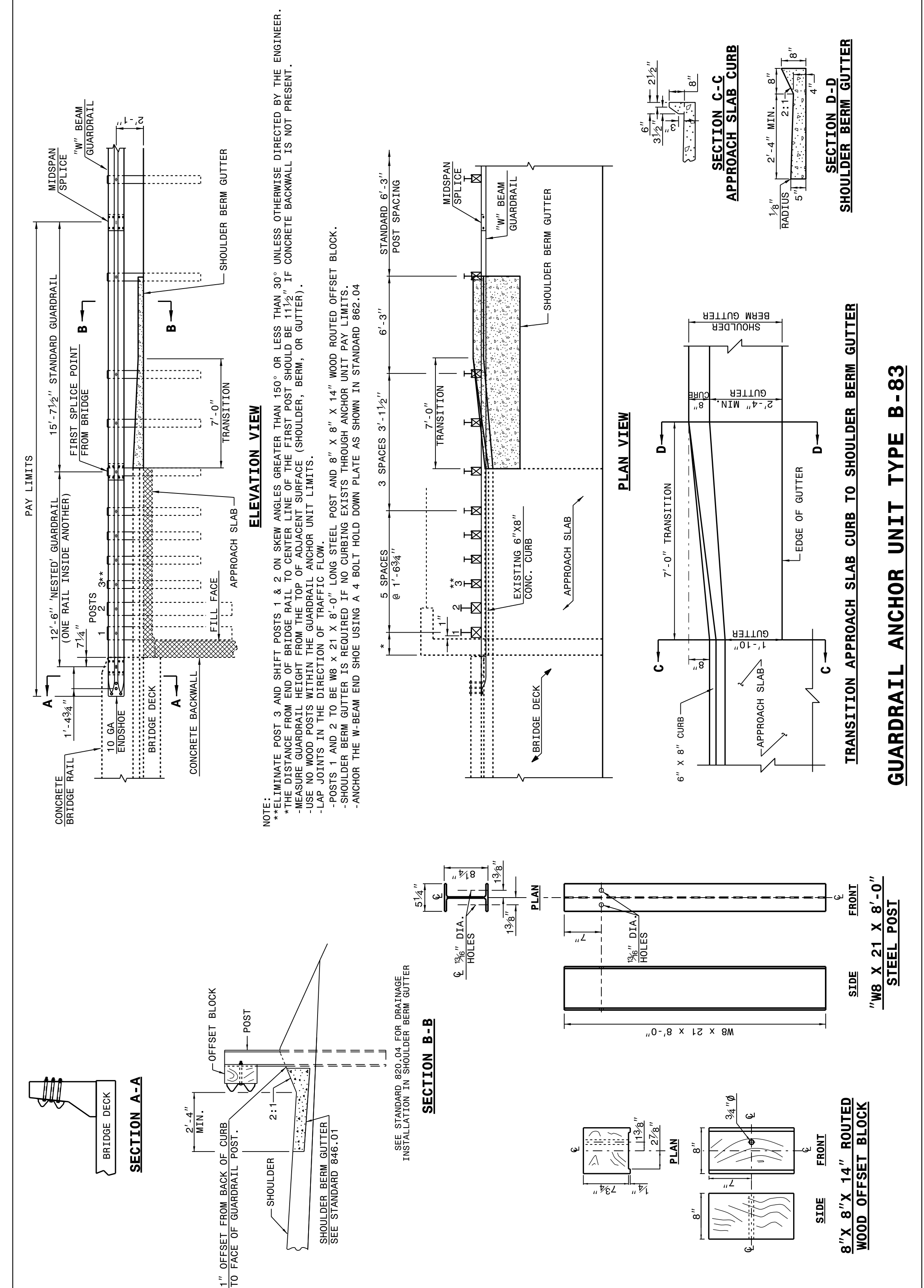


24-MAY-2017 11:59 S:\Contracts\Special Details\Standard Drawings\Division 8\862d01 862d03 862d03.dgn  
 J:\Projects\Special Details\Standard Drawings\Division 8\862d01 862d03 862d03.dgn  
 J:\Projects\Special Details\Standard Drawings\Division 8\862d01 862d03 862d03.dgn

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.

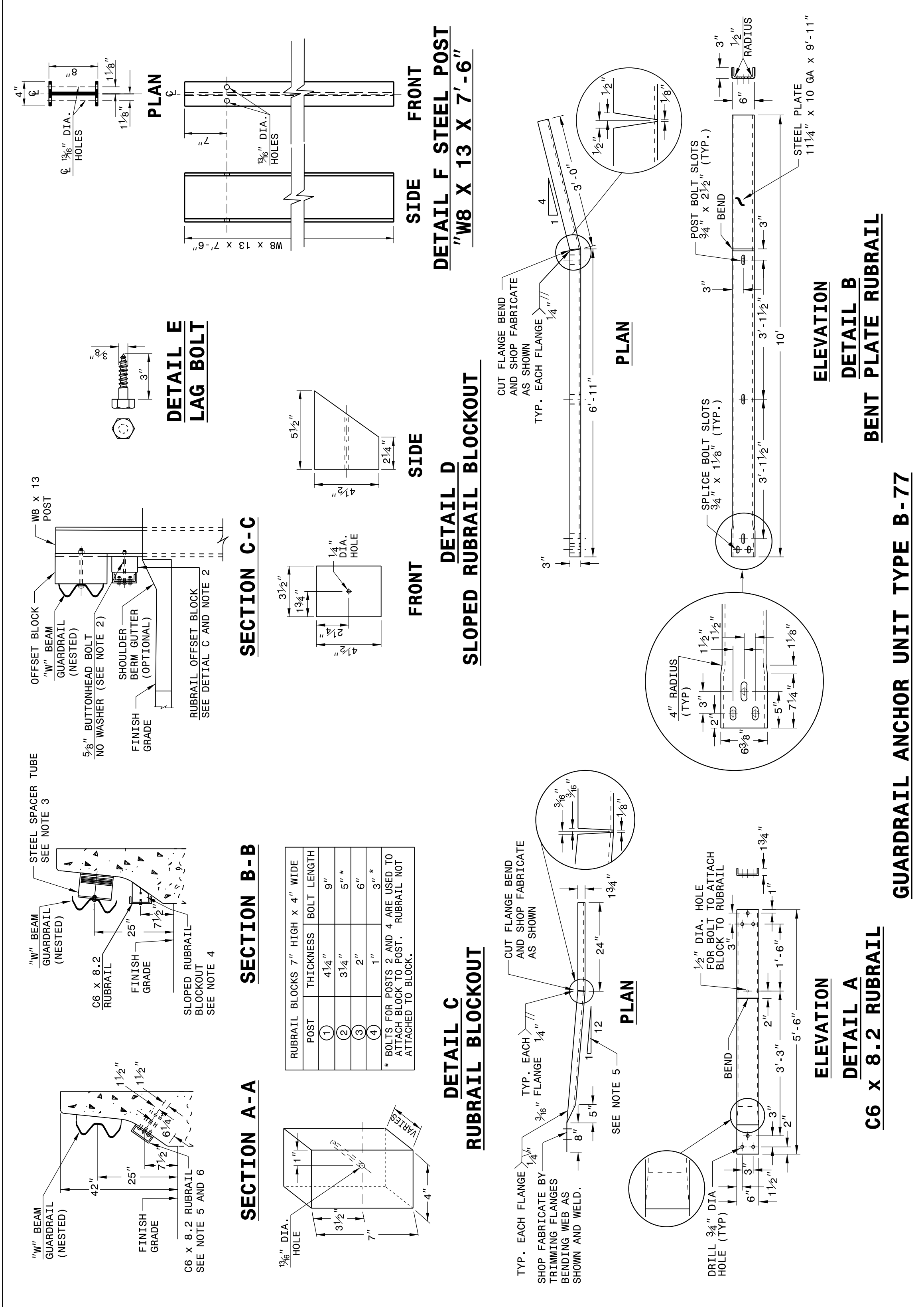
ROADWAY DETAIL DRAWING FOR STRUCTURE ANCHOR UNITS GUARDRAIL ANCHOR UNIT TYPE B-83

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**



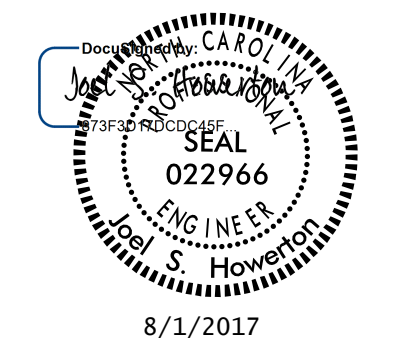
STATE OF NORTH CAROLINA DEPT. OF TRANSPORTATION DIVISION OF HIGHWAYS RALEIGH, N.C.

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

SHEET 5 OF 7 **862D03**

**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

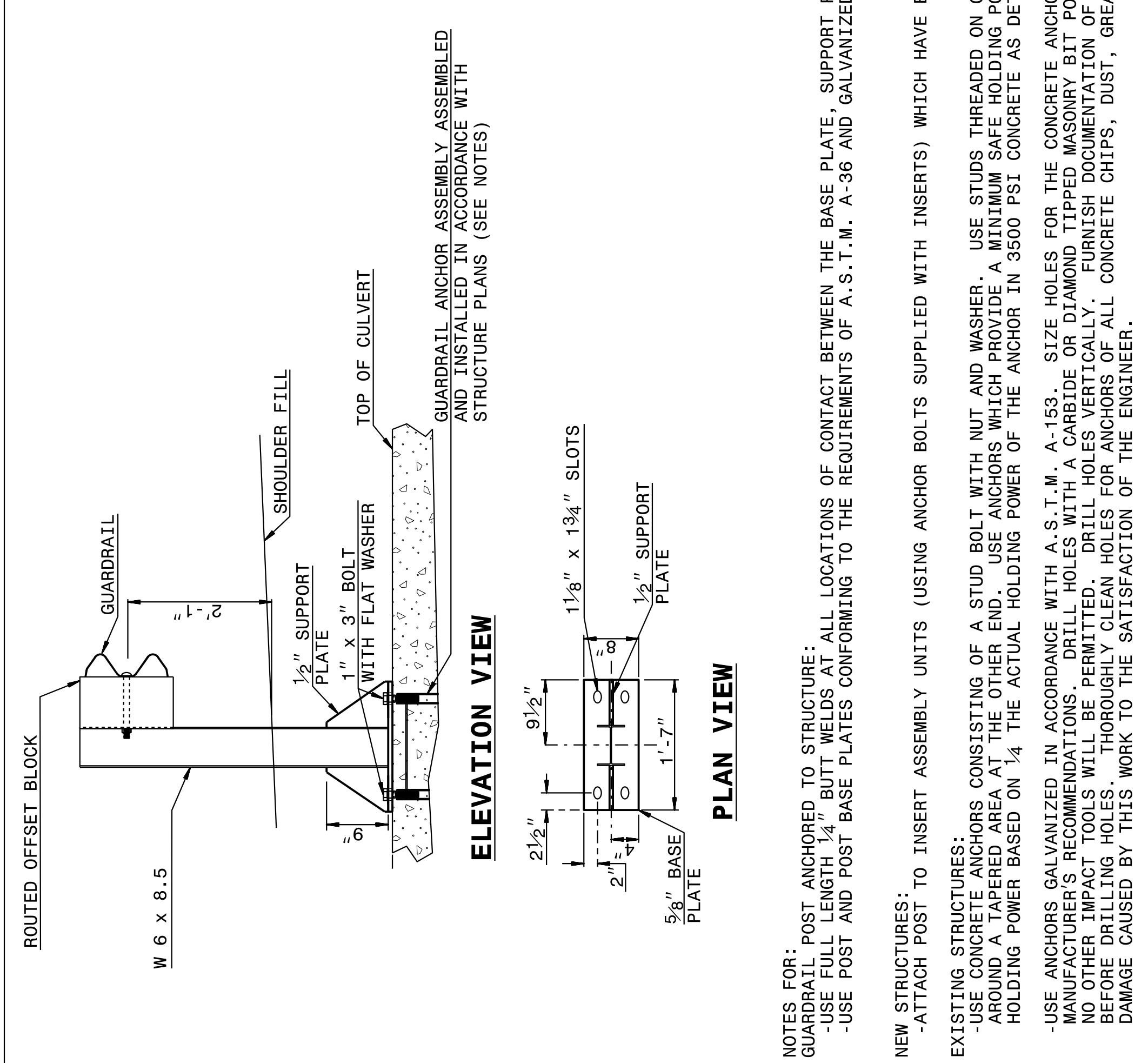
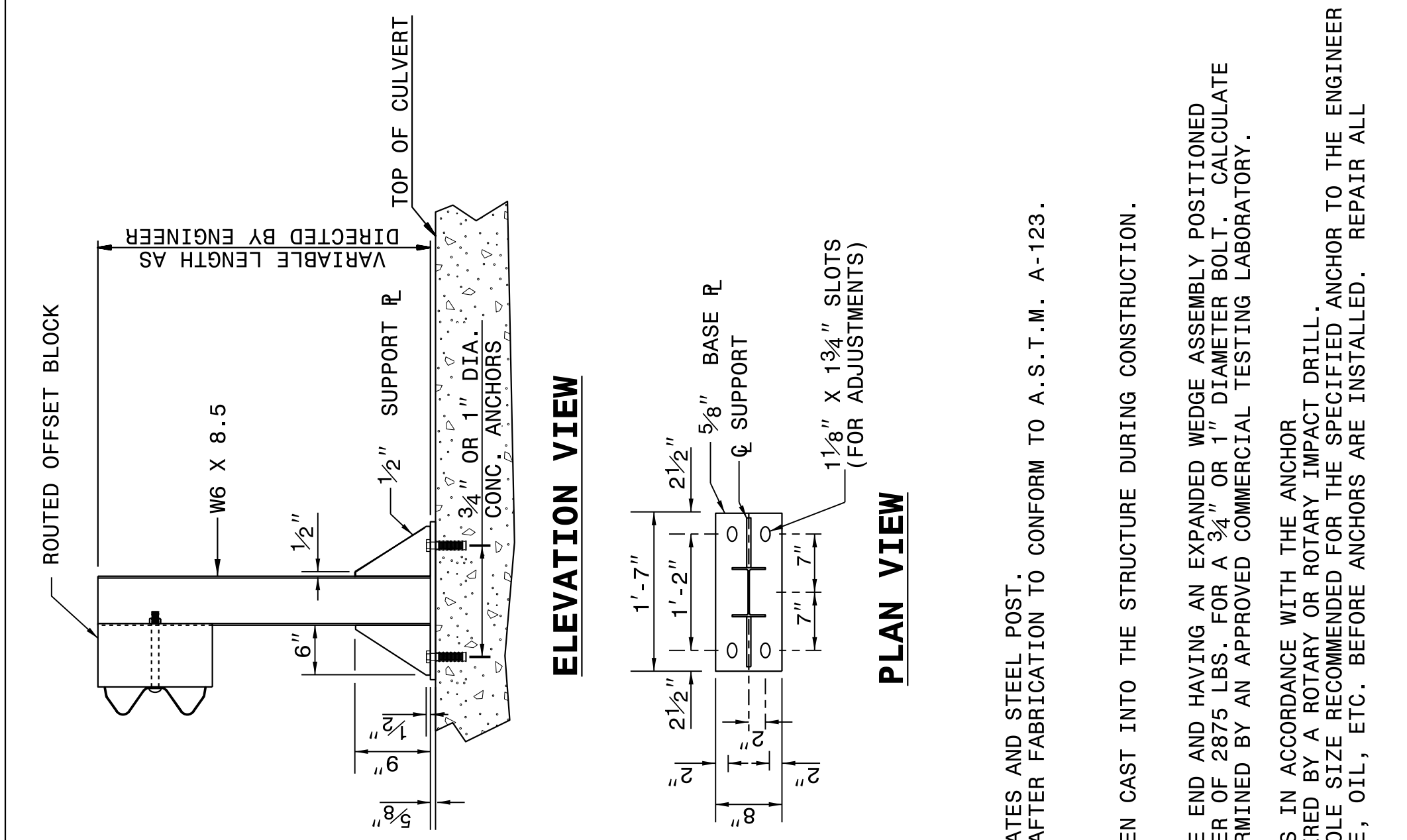
24-MAY-2017 12:00  
 S:\Contracts\Special Details\Hoverton\Standard Drawings\2012 Standard Drawings\Details in Lieu of Standards\Division 8\862d01 862d03 862d03.dgn  
 .Jhowerton AT USD-292955

|                       |           |
|-----------------------|-----------|
| PROJECT REFERENCE NO. | SHEET NO. |
| B-5362                | 2C-14     |

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

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

SHEET 7 OF 7  
**862D03**



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

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

SHEET 7 OF 7  
**862D03**

**NOTES FOR:**  
 -GUARDRAIL POST ANCHORED TO STRUCTURE:  
 -USE FULL LENGTH 1/4" BUTT WELDS AT ALL LOCATIONS OF CONTACT BETWEEN THE BASE PLATE, SUPPORT PLATES AND STEEL POST.  
 -USE POST AND POST BASE PLATES CONFORMING TO THE REQUIREMENTS OF A.S.T.M. A-36 AND GALVANIZED AFTER FABRICATION TO CONFORM TO A.S.T.M. A-123.

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

**EXISTING STRUCTURES:**  
 -USE CONCRETE ANCHORS CONSISTING OF A STUD BOLT WITH NUT AND WASHER. USE STUDS THREADED ON ONE END AND HAVING AN EXPANDED WEDGE ASSEMBLY POSITIONED AROUND A TAPERED AREA AT THE OTHER END. USE ANCHORS WHICH PROVIDE A MINIMUM SAFE HOLDING POWER OF 2875 LBS. FOR A 3/4" OR 1" DIAMETER BOLT. CALCULATE HOLDING POWER BASED ON 1/4 THE ACTUAL HOLDING POWER OF THE ANCHOR IN 3500 PSI CONCRETE AS DETERMINED BY AN APPROVED COMMERCIAL TESTING LABORATORY.

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

**ANCHORAGE FOR GUARDRAIL POST ON BOX CULVERT**

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.:             |                |



8/1/2017

COMPUTED BY: NP DATE: 07/03/17  
 CHECKED BY: SS DATE: 07/11/17

PROJECT NO. B-5362  
 SHEET NO. 3B-1

## STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

| GUARDRAIL SUMMARY                   |           |          |          |          |             |              |               |              |                       |                      |              |              |              |              |           |      |   |    |  |  |                               |                           |                                       |         |  |
|-------------------------------------|-----------|----------|----------|----------|-------------|--------------|---------------|--------------|-----------------------|----------------------|--------------|--------------|--------------|--------------|-----------|------|---|----|--|--|-------------------------------|---------------------------|---------------------------------------|---------|--|
| SURVEY LINE                         | BEG. STA. | END STA. | LOCATION | LENGTH   |             |              | WARRANT POINT |              | "N" DIST. FROM E.O.L. | TOTAL SHOULDER WIDTH | FLARE LENGTH |              | W            |              | ANCHORS   |      |   |    | IMPACT ATTENUATOR TYPE 350   |  | SINGLE FACED CONCRETE BARRIER | REMOVE EXISTING GUARDRAIL | REMOVE & STOCKPILE EXISTING GUARDRAIL | REMARKS |  |
|                                     |           |          |          | STRAIGHT | SHOP CURVED | DOUBLE FACED | APPROACH END  | TRAILING END |                       |                      | APPROACH END | TRAILING END | APPROACH END | TRAILING END | GREU TL-3 | B-77 | G | NG |  |  |                               |                           |                                       |         |  |
|                                     |           |          |          |          |             |              |               |              |                       |                      |              |              |              |              |           |      |   |    | <small>                     "N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL<br/>                     TOTAL SHOULDER WIDTH = DISTANCE FROM EDGE OF TRAVEL LANE TO SHOULDER BREAK POINT.<br/>                     FLARE LENGTH = DISTANCE FROM LAST SECTION OF PARALLEL GUARDRAIL TO END OF GUARDRAIL.<br/>                     W = TOTAL WIDTH OF FLARE FROM BEGINNING OF TAPER TO END OF GUARDRAIL.                 </small> |  |                               |                           |                                       |         |  |
| -L-                                 | 13+32.06  | 14+13.31 | LT       | 81.25'   |             |              |               | 14+13.31     | 4.42                  | 7.42                 |              | 50           |              | 1.0'         |           | 1    | 1 |    |  |  |                               |                           |                                       |         |  |
| -L-                                 | 15+60.69  | 16+41.94 | LT       | 81.25'   |             |              |               | 15+60.69     | 4.42                  | 7.42                 |              | 50           |              | 1.0'         |           | 1    | 1 |    |  |  |                               |                           |                                       |         |  |
| -L-                                 | 13+32.06  | 14+13.31 | RT       | 81.25'   |             |              |               | 14+13.31     | 4.42                  | 7.42                 |              | 50           |              | 1.0'         |           | 1    | 1 |    |  |  |                               |                           |                                       |         |  |
| -L-                                 | 15+60.69  | 16+41.94 | RT       | 81.25'   |             |              |               | 15+60.69     | 4.42                  | 7.42                 |              | 50           |              | 1.0'         |           | 1    | 1 |    |  |  |                               |                           |                                       |         |  |
| SUBTOTAL                            |           |          |          | 325      |             |              |               |              |                       |                      |              |              |              |              |           |      |   |    |  |  |                               |                           |                                       |         |  |
| LESS DEDUCTION FOR ANCHORS          |           |          |          |          |             |              |               |              |                       |                      |              |              |              |              |           |      |   |    |  |  |                               |                           |                                       |         |  |
| GREU, TL-3 4 @ 50' =                |           |          |          | -200'    |             |              |               |              |                       |                      |              |              |              |              |           |      |   |    |  |  |                               |                           |                                       |         |  |
| B-77 4 @ 18.75' =                   |           |          |          | -75'     |             |              |               |              |                       |                      |              |              |              |              |           |      |   |    |  |  |                               |                           |                                       |         |  |
| TOTAL                               |           |          |          | 50'      |             |              |               |              |                       |                      |              |              |              |              |           |      |   |    |  |  |                               |                           |                                       |         |  |
| SAY                                 |           |          |          | 50'      |             |              |               |              |                       |                      |              |              |              |              |           |      |   |    |  |  |                               |                           |                                       |         |  |
| ADDITIONAL GUARDRAIL POSTS = 5 EACH |           |          |          |          |             |              |               |              |                       |                      |              |              |              |              |           |      |   |    |  |  |                               |                           |                                       |         |  |

### SHOULDER BERM GUTTER SUMMARY

| LINE          | Station  | Station  | LENGTH (LF) |
|---------------|----------|----------|-------------|
| -L- (LT)      | 13+82.06 | 13+99.44 | 17.38       |
| -L- (RT)      | 13+82.06 | 13+99.44 | 17.38       |
| <b>TOTAL:</b> |          |          | 34.76       |
| <b>SAY:</b>   |          |          | 35          |

### SUMMARY OF EARTHWORK IN CUBIC YARDS

| Station                                  | Station           | Uncl. Excav. | Embank. +% | Borrow | Waste |
|--|-------------------|--------------|------------|--------|-------|
| <b>Summary No. 1</b>                     |                   |              |            |        |       |
| -L- 12+95.00                             | -L- 14+13.31 (BB) | 103          | 80         |        | 23    |
| <b>Summary No. 1 Total</b>               |                   | 103          | 80         |        | 23    |
| <b>Summary No. 2</b>                     |                   |              |            |        |       |
| -L- 15+60.69 (EB)                        | -L- 17+30.00      | 69           | 198        | 129    |       |
| <b>Summary No. 2 Total</b>               |                   | 69           | 198        | 129    |       |
| <b>Summary Totals</b>                    |                   | 172          | 278        | 129    | 23    |
| WASTE IN LIEU OF BORROW                  |                   |              |            | -23    | -23   |
| <b>PROJECT TOTALS:</b>                   |                   | 172          | 278        | 106    |       |
| EST 5% TO REPLACE TOP SOIL ON BORROW PIT |                   |              |            | 5      |       |
| <b>GRAND TOTALS:</b>                     |                   | 172          | 278        | 111    |       |
| <b>SAY:</b>                              |                   | 175          |            | 125    |       |
| UNDERCUT EXCAVATION = 200 CY             |                   |              |            |        |       |
| SELECT GRANULAR MATERIAL = 200 CY        |                   |              |            |        |       |

### PAVEMENT REMOVAL SUMMARY IN SQUARE YARDS

| SURVEY LINE   | Station | Station | LOCATION LT/RT/CL | ASPHALT REMOVAL | ASPHALT BREAKUP | CONCRETE REMOVAL | CONCRETE BREAKUP |
|---------------|---------|---------|-------------------|-----------------|-----------------|------------------|------------------|
| -L-           | 12+95   | 14+46   | LT&RT             | 326.11          |                 |                  |                  |
| -L-           | 15+46   | 17+30   | LT&RT             | 406.46          |                 |                  |                  |
| <b>TOTAL:</b> |         |         |                   | 732.57          |                 |                  |                  |
| <b>SAY:</b>   |         |         |                   | 750             |                 |                  |                  |

Note: Approximate quantities only. Unclassified Excavation, Borrow Excavation, Fine Grading, Clearing and Grubbing, and Removal of Asphalt Pavement will be paid for at the contract lump sum price for grading.

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

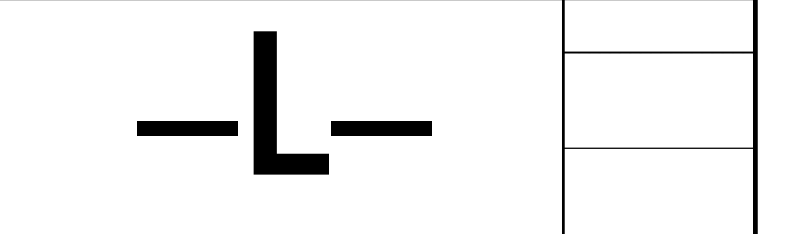




5/14/99

|   |   |
|---|---|
| ROADWAY DESIGN ENGINEER<br><i>Seal of William C. Stephens</i> | HYDRAULICS ENGINEER<br><i>Seal of William E. Blum</i> |
|---|---|

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

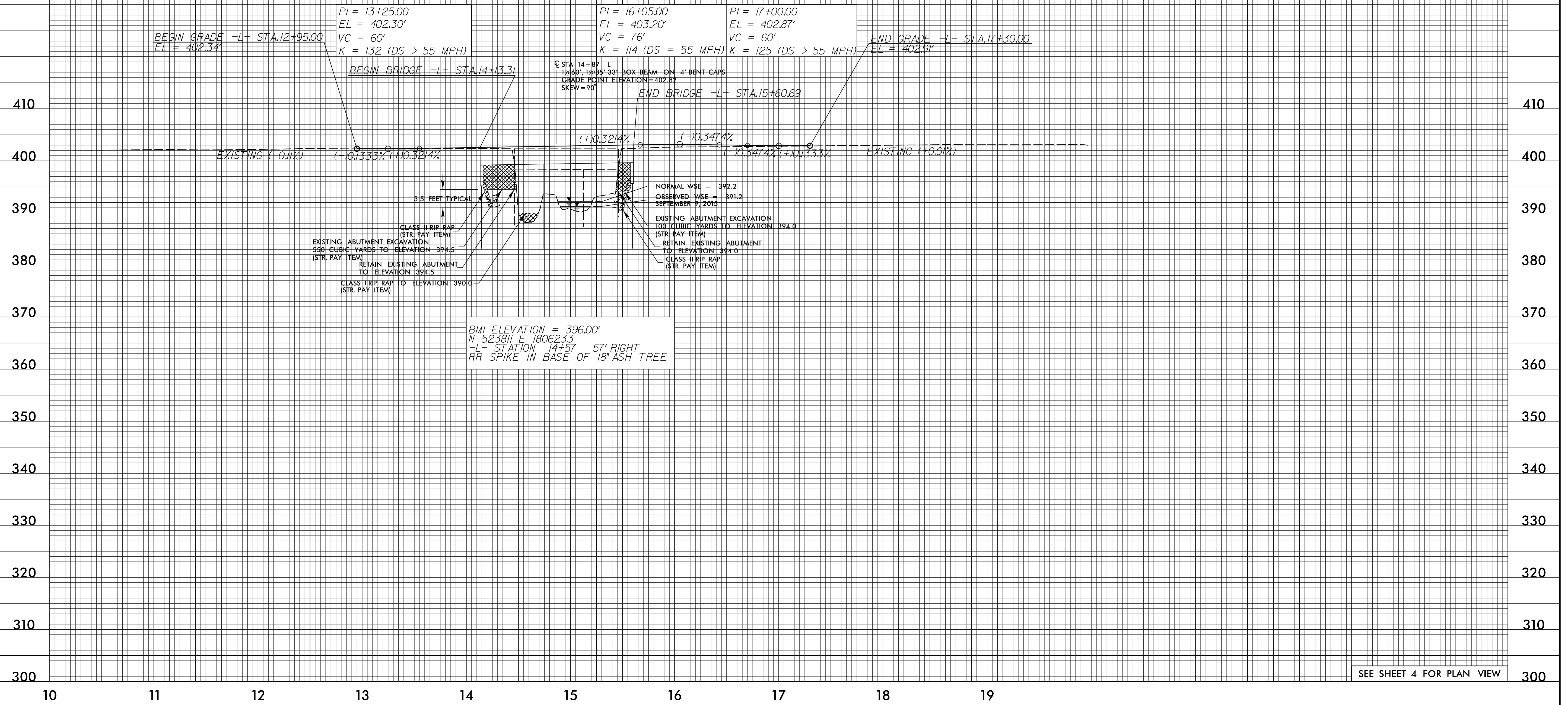


BRIDGE HYDRAULIC DATA

DESIGN DISCHARGE = 1200 CFS  
 DESIGN FREQUENCY = 50 YRS  
 DESIGN HW ELEVATION = 396.40 FT  
 BASE DISCHARGE = 1300 CFS  
 BASE FREQUENCY = 100 YRS  
 BASE HW ELEVATION = 396.51 FT  
 OVERTOPPING DISCHARGE = 9000 CFS  
 OVERTOPPING FREQUENCY = 500++ YRS  
 OVERTOPPING ELEVATION = 402.1\* FT

DATE OF SURVEY = 9/9/15  
 W.S. ELEVATION AT DATE OF SURVEY = 391.2 FT

\*OVERTOPPING ELEVATION EQUALS NORMAL CROWN AT SAG LOCATION, STATION 10+00.00 -L-



I:\2017\11\16\2017\11\16\4018700\4018700\0001\50\Deliverables & Submittals\B-5362\Roadway\Proj\B5362\_Rdy.pfl.dgn