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5/23/2017

CONTRACT: DN00552

TIP PROJECT: SS-4914CJ

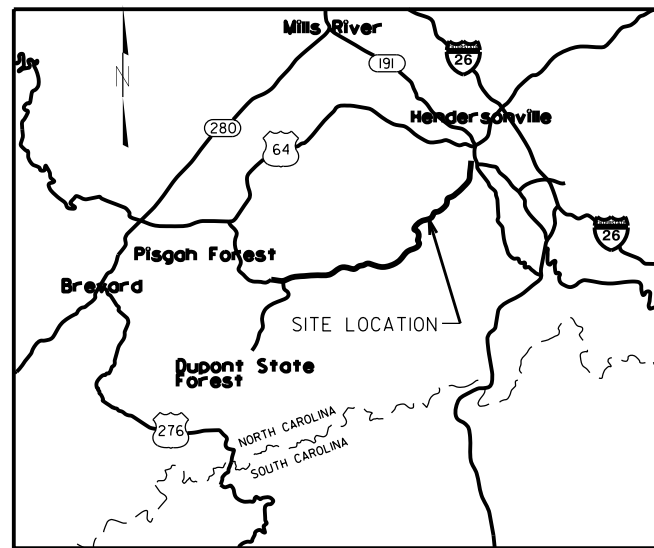
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

HENDERSON COUNTY

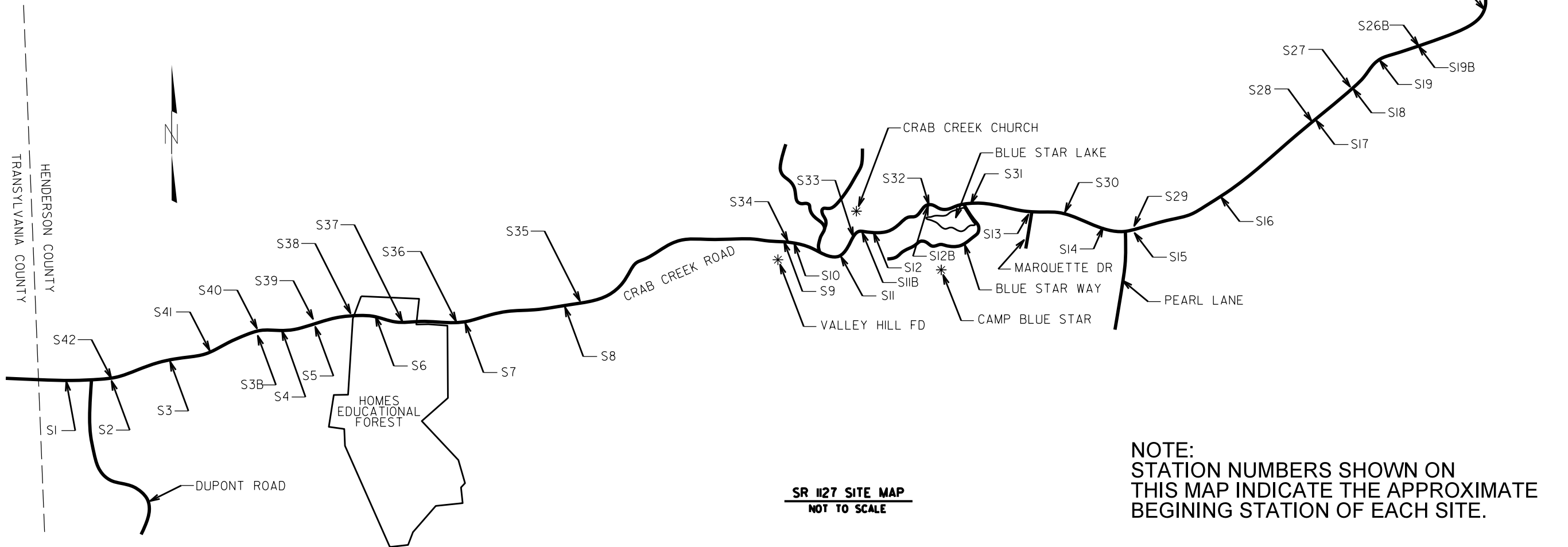
**LOCATION: SR 1127 CRAB CREEK ROAD FROM
TRANSYLVANIA COUNTY LINE TO SR 1123 LITTLE RIVER ROAD**

**TYPE OF WORK: GUARDRAIL INSTALLATION, GRADING,
DRAINAGE, EROSION CONTROL AND TRAFFIC CONTROL**

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SS-4914CJ	1	
TIP NO.	WS NO.	DESCRIPTION	
SS-4914CJ	44730.3.1		



**SR 1126 VICINITY MAP
NOT TO SCALE**



**SR 1127 SITE MAP
NOT TO SCALE**

PROJECT LENGTH

SS-4914CJ (7.34 miles)

Prepared In the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: _____

LETTING DATE: _____

S.L. Cannon, PE
PROJECT ENGINEER

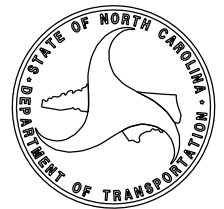
R.C. Chambard
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.



INDEX OF SHEETS

<u>SHEET NUMBER:</u>	<u>SHEET:</u>
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1B	CONVENTIONAL SYMBOLS
2C-1 thru 2C-27	STANDARD DRAWINGS 862.01, 862.02, 862.03
3B-1 thru 3B-4	GUARDRAIL & EARTHWORK SUMMARY SHEETS
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X-1 thru X-4	SITE 19-B CROSS SECTIONS
X-5 thru X-8	SITE 26-B CROSS SECTIONS

General Notes:

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

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

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

EACH OF THE GUARDRAIL SITES LISTED IN THESE PLANS HAVE BEEN IDENTIFIED AND MARKED IN THE FIELD PRIOR TO THE LET OF THIS CONTRACT.

MARKINGS OF EACH SITE INCLUDE "WHITE" PAINT ON THE PAVEMENT INDICATING THE STATION AND THE END UNIT TUPE, & 4 FOOT STAKE WITH SITE NUMBER.

ALL THE STANDARD DRAWINGS LISTED IN THIS CONTRACT, MAY OR MAY NOT BE APPLICABLE.

DETAIL SITE SHEETS DENOTE ADDITIONAL CONSTRUCTION OUTSIDE OF GUARDRAIL PLACEMENT.

REVISIONS HAVE BEEN MADE TO THE STANDARD DRAWINGS TO INCLUDE THE USE OF 31" MASH COMPLIANT GUARDRAIL PLACEMENT (862.01, 862.02, 862.03, 862.04)

UTILITY OWNERS ON THIS PROJECT ARE

Morris Broadband LLC. (828-772-1167), AT&T (1-800-778-9140),

Duke Energy (1-800-769-3766),

ANY RELOCATION OF EXISTING UTILITIES WILL BE ACCOMPLISHED BY OTHERS.

2012 ROADWAY ENGLISH STANDARD DRAWINGS

EFF. 01-17-2012
REV. 10-30-2012

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

STD.NO.	TITLE
DIVISION 2 –	EARTHWORK
200.02	Method of Clearing – Method II
DIVISION 3 –	PIPE CULVERTS
300.01	Method of Pipe Installation
DIVISION 8 –	INCIDENTALS
862.01	Guardrail Placement
862.02	Guardrail Installation
862.03	STRUCTURE ANCHOR UNITS
862.04	Anchoring End of Guardrail – B-77 and B-83 Anchor Units

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

Note: Not to Scale *S.U.E. = *Subsurface Utility Engineering*

BOUNDARIES AND PROPERTY:

State Line	
County Line	
Township Line	
City Line	
Reservation Line	
Property Line	
Existing Iron Pin	
Computed Property Corner	
Property Monument	
Parcel/Sequence Number	
Existing Fence Line	
Proposed Woven Wire Fence	
Proposed Chain Link Fence	
Proposed Barbed Wire Fence	
Existing Wetland Boundary	
Proposed Wetland Boundary	
Existing Endangered Animal Boundary	
Existing Endangered Plant Boundary	
Existing Historic Property Boundary	
Known Contamination Area: Soil	
Potential Contamination Area: Soil	
Known Contamination Area: Water	
Potential Contamination Area: Water	
Contaminated Site: Known or Potential	

BUILDINGS AND OTHER CULTURE:

Gas Pump Vent or U/G Tank Cap	
Sign	
Well	
Small Mine	
Foundation	
Area Outline	
Cemetery	
Building	
School	
Church	
Dam	

HYDROLOGY:

Stream or Body of Water	
Hydro, Pool or Reservoir	
Jurisdictional Stream	
Buffer Zone 1	
Buffer Zone 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 Easment Pin and Cap	
New Permanent Easment 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 RW Marker	
New Control of Access Line with Concrete CA 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	
Proposed Slope Stakes Fill	
Proposed Curb Ramp	
Existing Metal Guardrail	
Proposed Guardrail	
Existing Cable Guiderail	
Proposed Cable Guiderail	
Equality Symbol	
Pavement Removal	

VEGETATION:

Single Tree	
Single Shrub	

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.*)	

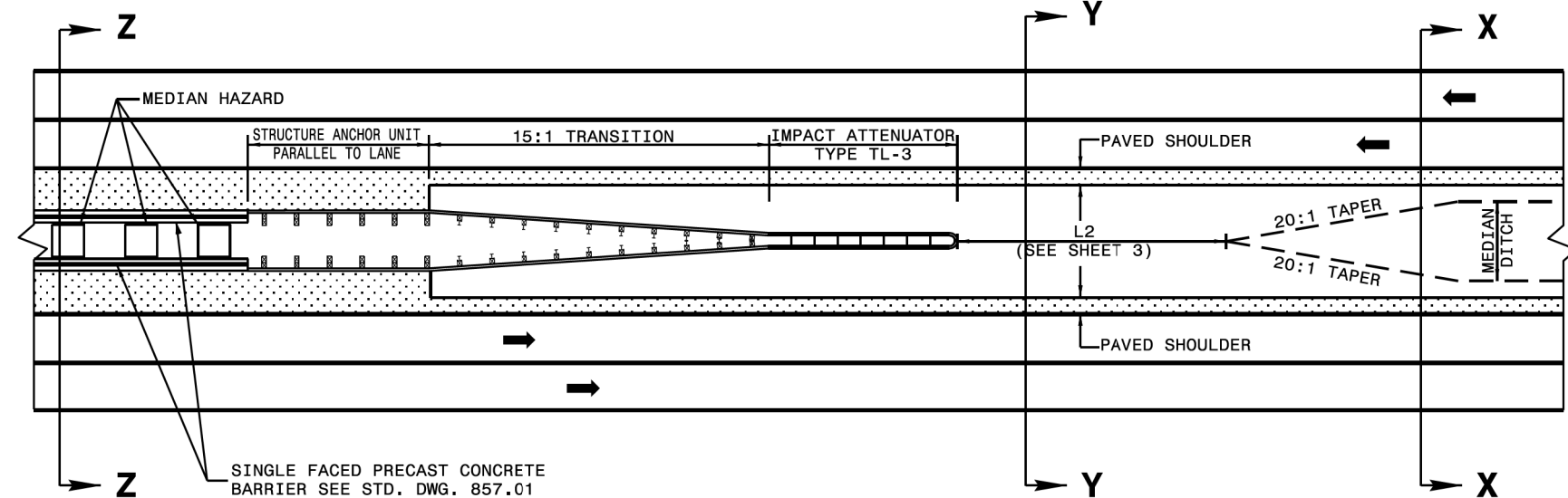
MISCELLANEOUS:

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.

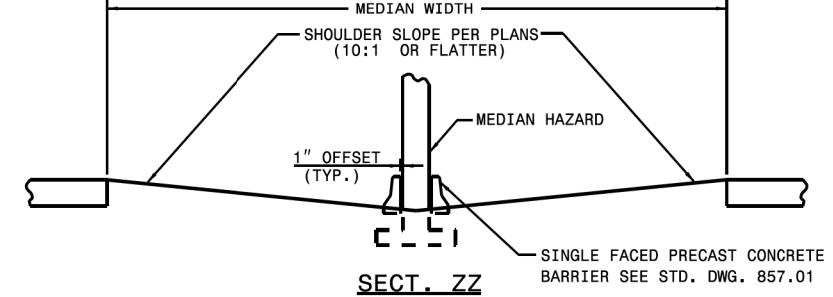
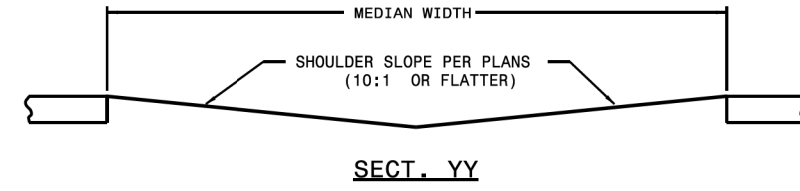
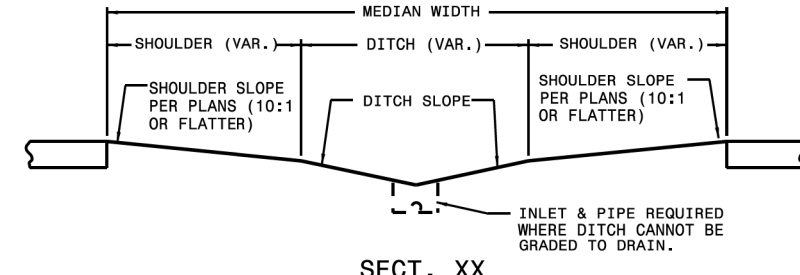
STATE OF NORTH CAROLINA
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 DIVISION OF HIGHWAYS
 RALEIGH, N.C.

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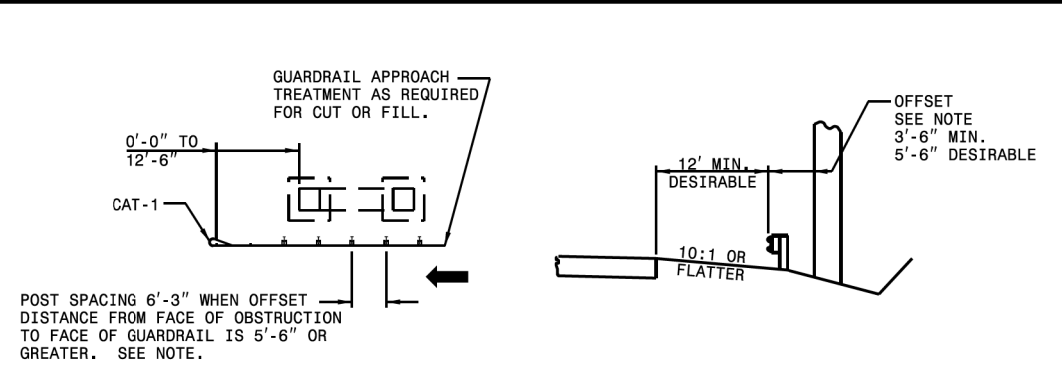
ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT



SINGLE FACED PRECAST CONCRETE BARRIER SEE STD. DWG. 857.01



DETAIL OF MEDIAN TREATMENT AT UNDERPASS



NOTE: WHEN OFFSET DISTANCE FROM FACE OF OBSTRUCTION TO FACE OF GUARDRAIL IS BETWEEN 3'-6" AND 5'-6", BEGIN 3'-1½" POST SPACING AT A POINT 25' BEFORE REACHING THE OBSTRUCTION AND CARRY THROUGHOUT ITS LENGTH. IF THE OFFSET IS LESS THAN 3'-6" USE CONCRETE BARRIER.

DETAIL OF RIGHT SIDE GUARDRAIL AT UNDERPASS

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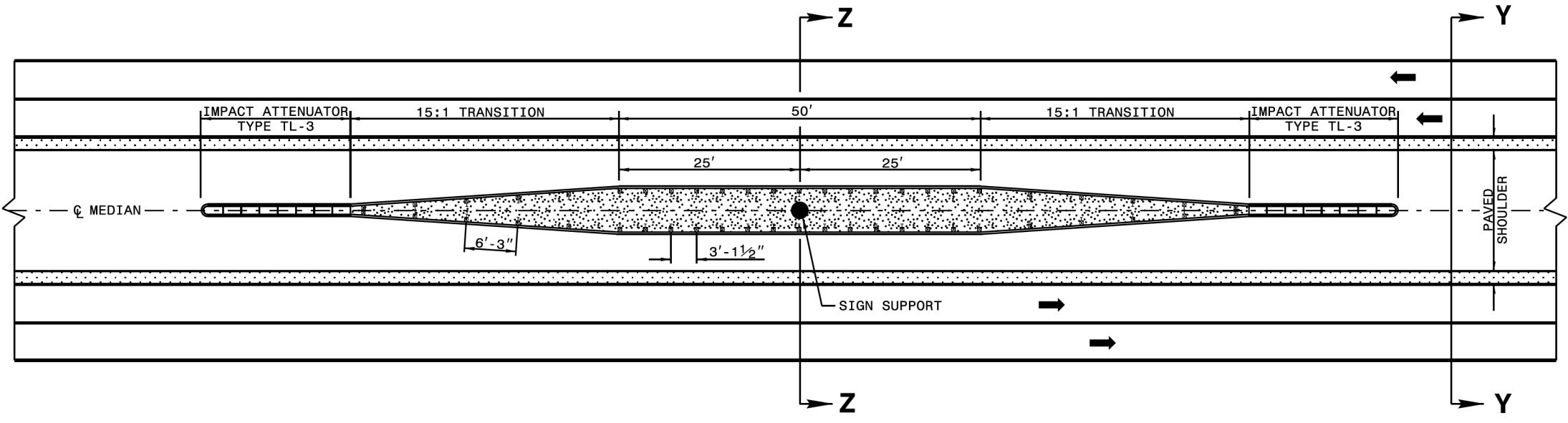
1-18

ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT

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ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT



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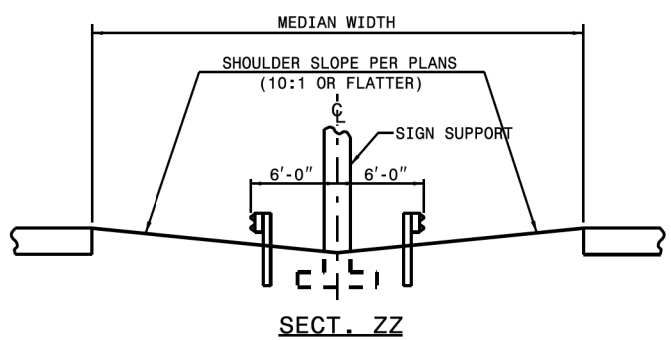
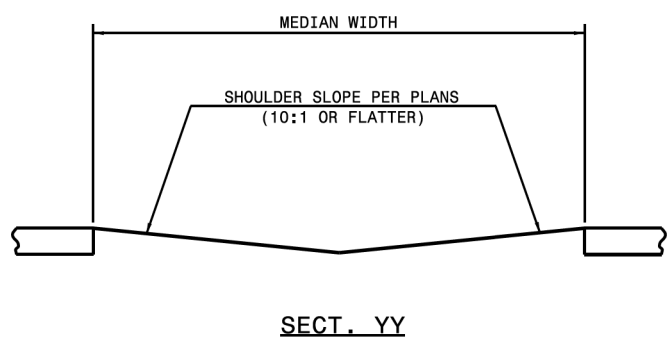
1-18

ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT



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 862.01 SHEET 1 OF 12).



DETAIL OF GUARDRAIL AT MEDIAN SIGN SUPPORT

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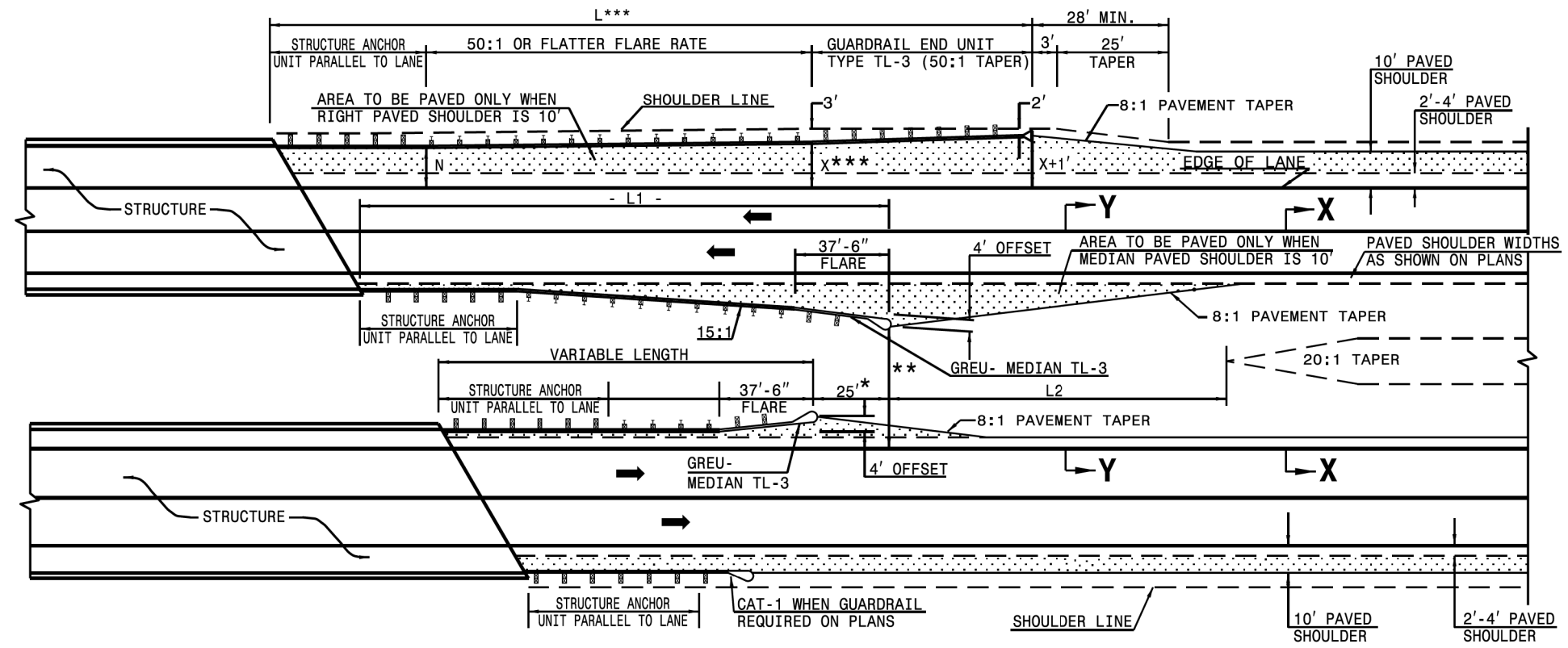
1-18

ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT

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ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT



DIMENSIONS FOR LENGTH OF GUARDRAIL APPROACHING DUAL LANE BRIDGES							
MEDIAN WIDTH	-L-***			-L1-			-L2-
	70 MPH	60 MPH	50 MPH	70 MPH	60 MPH	50 MPH	DIM.
30'	300.0'	250.0'	150.0'	187.5'	162.5'	137.5'	80.0'
36'	300.0'	250.0'	150.0'	212.5'	187.5'	137.5'	60.0'
40' & ABOVE	300.0'	250.0'	150.0'	212.5'	187.5'	137.5'	40.0'

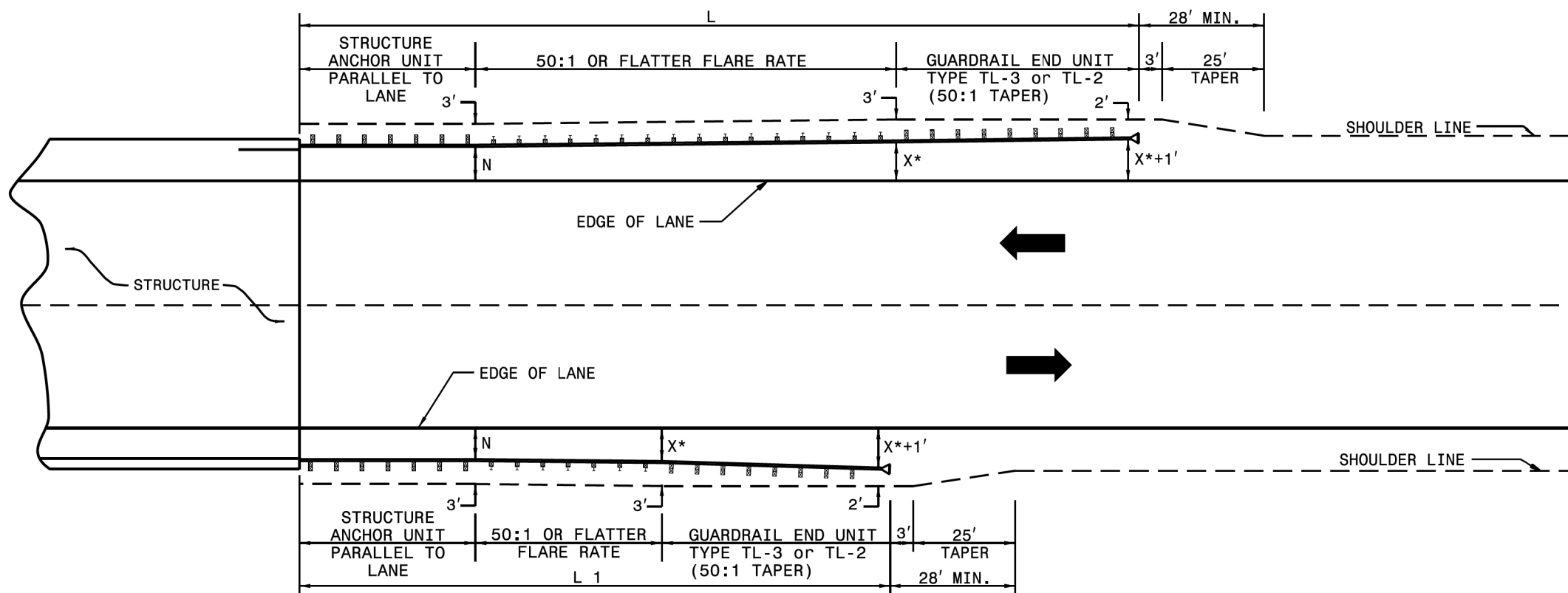
- NOTES: * MINOR VARIATION TO THE 25'-0" DIMENSION IS PERMISSIBLE TO ACCOMMODATE THE 12'-6" IN GUARDRAIL LENGTHS.
- ** NO GUARDRAIL IS REQUIRED ON THE TRAILING END WHEN THIS DISTANCE EXCEEDS CLEAR ROADSIDE RECOVERY AREA FOR THE APPROPRIATE DESIGN SPEED.
- *** BASED ON "X" OF 12'
 USE FLARE RATE AS THE CONTROL IF THE "X" DISTANCE IS NOT OBTAINED. ("X" IS BASED ON SHOULDER WIDTHS IN THE HIGHWAY DESIGN BRANCH MANUAL, PART 1, 1-4B, F1A).
 "N" = DISTANCE FROM EDGE OF LANE TO FACE OF GUARDRAIL WHERE GUARDRAIL IS PARALLEL TO LANE.
 THE DESIGN LAYOUT FOR LENGTHS SHOWN ON THIS STANDARD ARE MINIMUM DESIGN LENGTHS.
 SEE SHEET 1 OF 12 FOR SECTIONS XX, YY
 SEE STD. 862.03 FOR STRUCTURE ANCHOR UNITS

DETAIL OF GUARDRAIL APPROACHING DUAL LANE BRIDGES

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ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT



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ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT

* 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

GUARDRAIL INSTALLATION AT BRIDGE APPROACHES FOR TWO-LANE, TWO-WAY TRAFFIC								
DESIGN SPEED (MPH)	"L" APPROACH LENGTH (FT.)				"L1" TRAILING LENGTH (FT.)			
	DESIGN YEAR ADT		CURRENT YEAR ADT		DESIGN YEAR ADT		CURRENT YEAR ADT	
	OVER 2000	1001-2000	400-1000	UNDER 400	OVER 2000	1001-2000	400-1000	UNDER 400
70	362.5'	362.5'	350.0'	287.5'	187.5'	187.5'	175.0'	75.0'
60	300.0'	287.5'	275.0'	225.0'	137.5'	137.5'	100.0'	75.0'
50	212.5'	212.5'	200.0'	162.5'	87.5'	75.0'	75.0'	75.0'
40	175.0'	150.0'	137.5'	112.5'	75.0'	75.0'	75.0'	75.0'
X *	8'	6'	4'	4'	8'	6'	4'	4'

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

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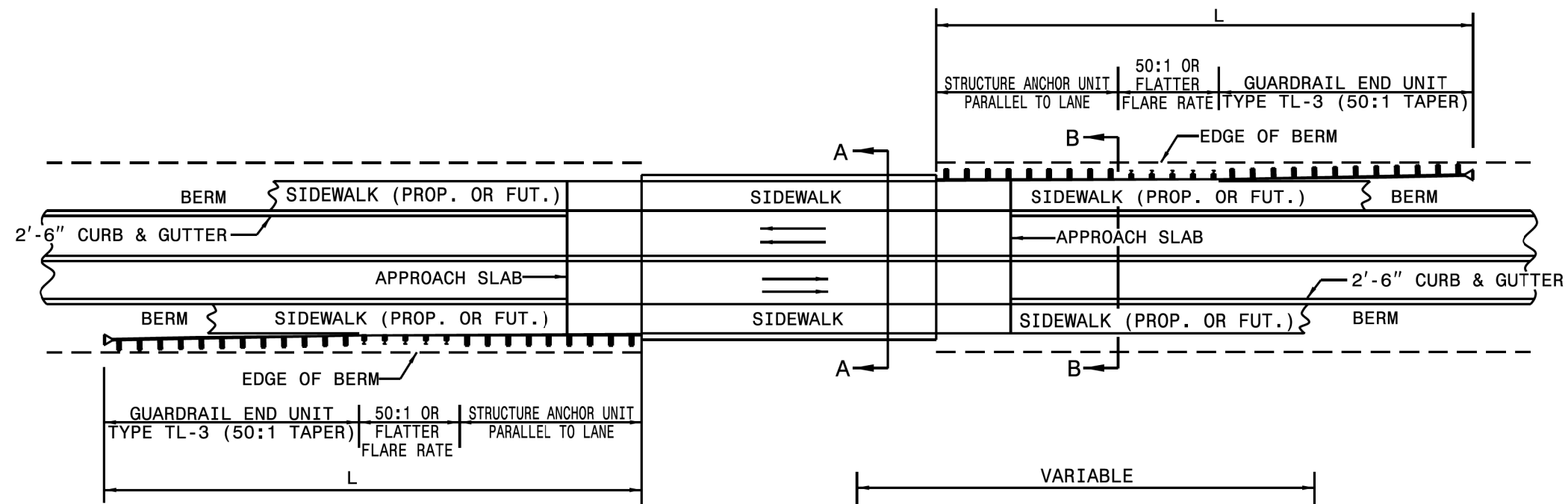
1-18

ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT

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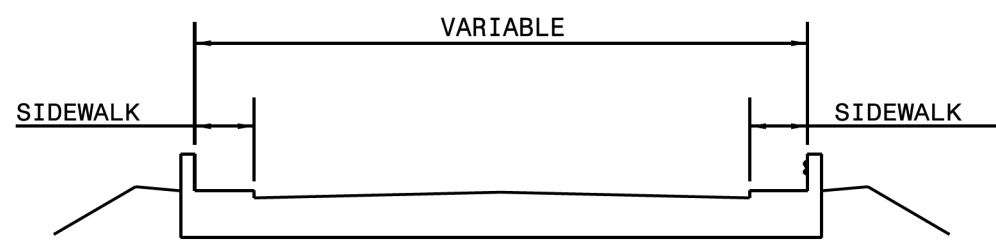
ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT



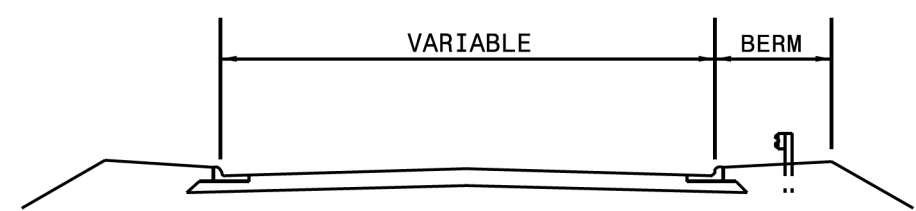
MINIMUM GUARDRAIL LENGTHS "L" REQUIRED AT BRIDGE APPROACHES ON 2'-6" CONCRETE CURB AND GUTTER ROADWAYS

DESIGN SPEED (MPH)	"L"
40	150'
50	225'

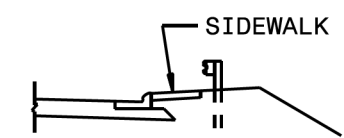
NOTE: "L" VALUES ARE BASED ON NO HAZARDS OTHER THAN END OF BRIDGE BEING PRESENT WITHIN THE CLEAR ZONE.
 SEE STD. 862.03 FOR STRUCTURE ANCHOR UNITS.



SECTION A-A



SECTION B-B



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

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ROADWAY STANDARD DRAWING FOR
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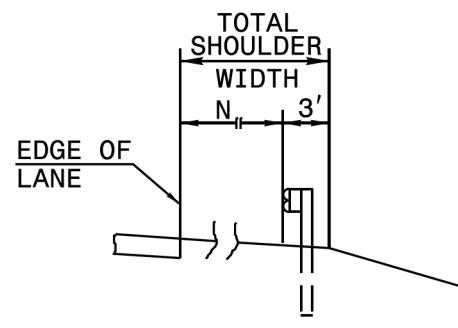
SHEET 6 OF 12
862.01

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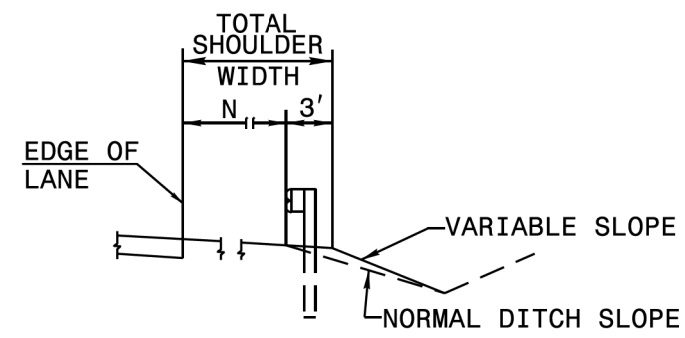
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ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 6 OF 12
862.01

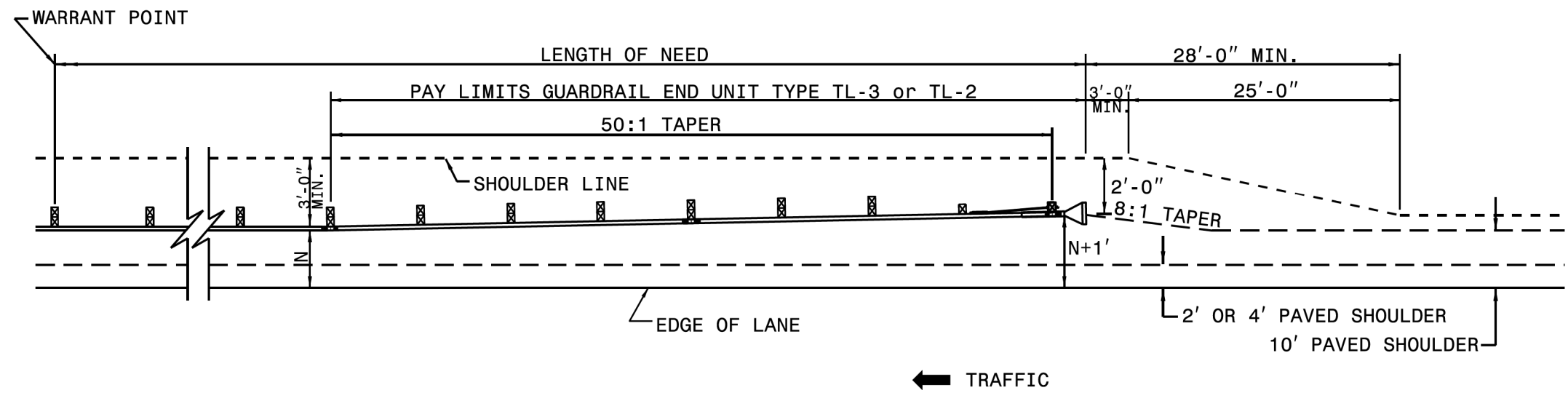


FILL SECTION



CUT SECTION

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

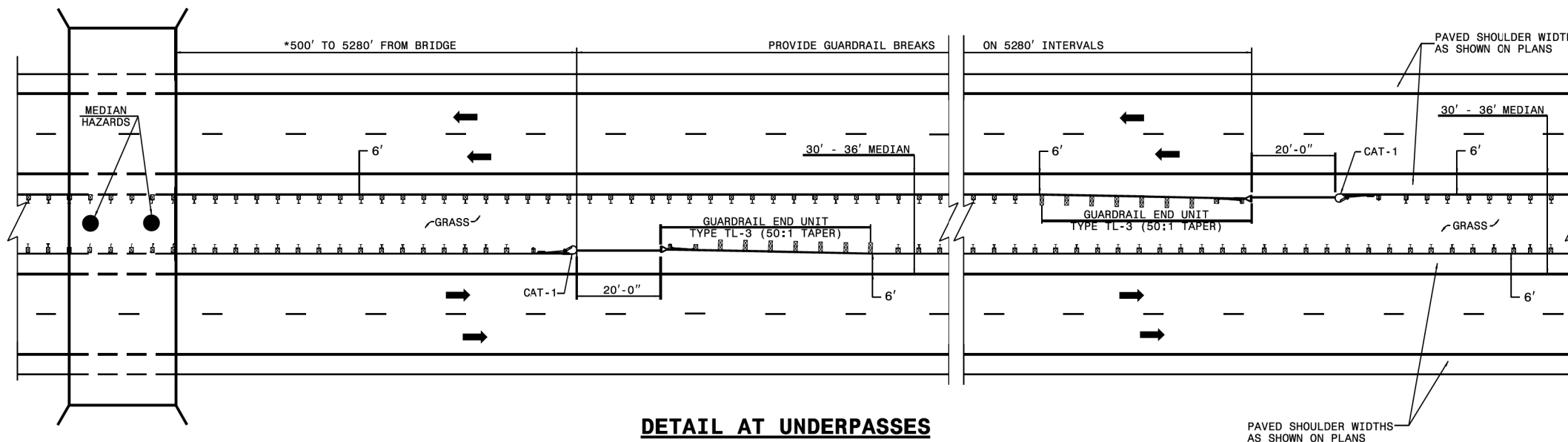


DETAIL OF BEGINNING OF GUARDRAIL IN CUT OR FILL SECTION

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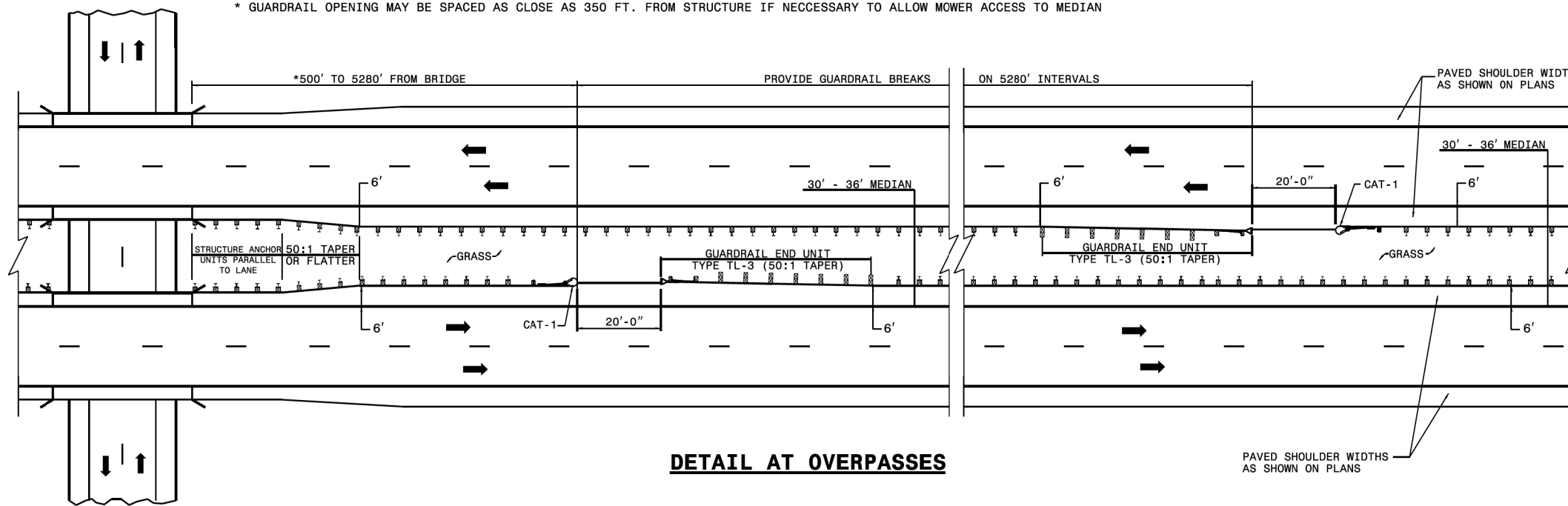
1-18

ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT



DETAIL AT UNDERPASSES

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



DETAIL AT OVERPASSES

GUARDRAIL BREAK INTERVALS WITH 30' - 36' MEDIANS

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ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT

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1-18

ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT

NOTES:

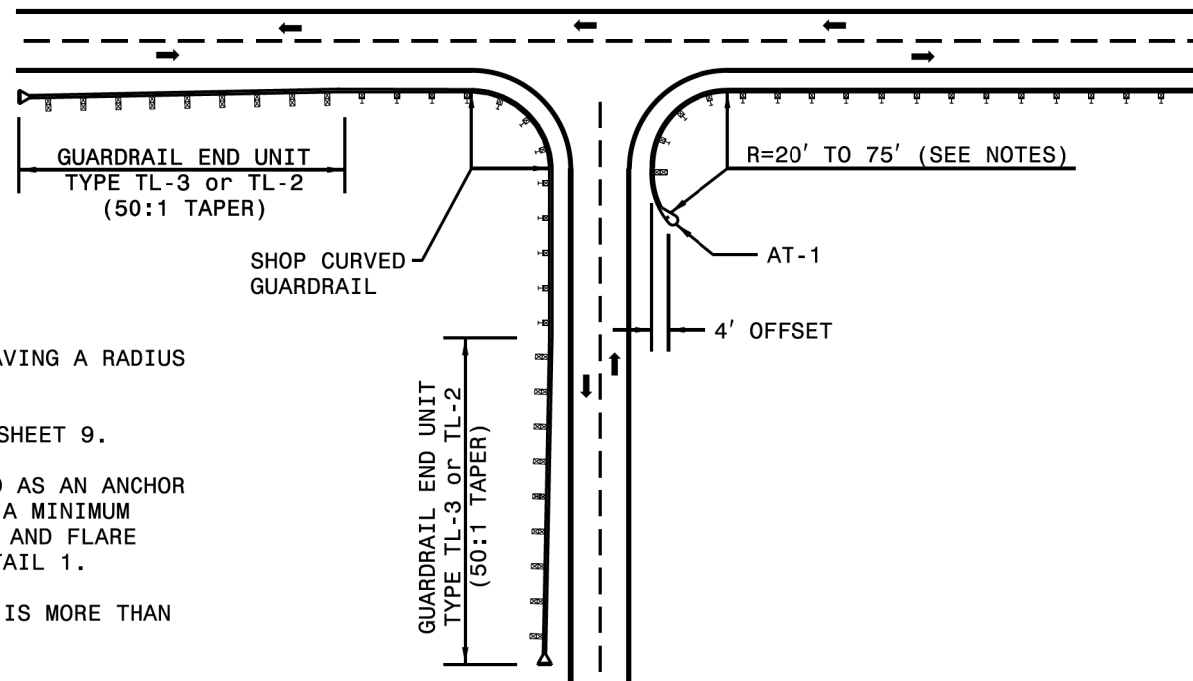
SHOP CURVED GUARDRAIL IS DEFINED AS HAVING A RADIUS OF 150' OR LESS.

WHEN RADIUS IS LESS THAN 20' REFER TO SHEET 9.

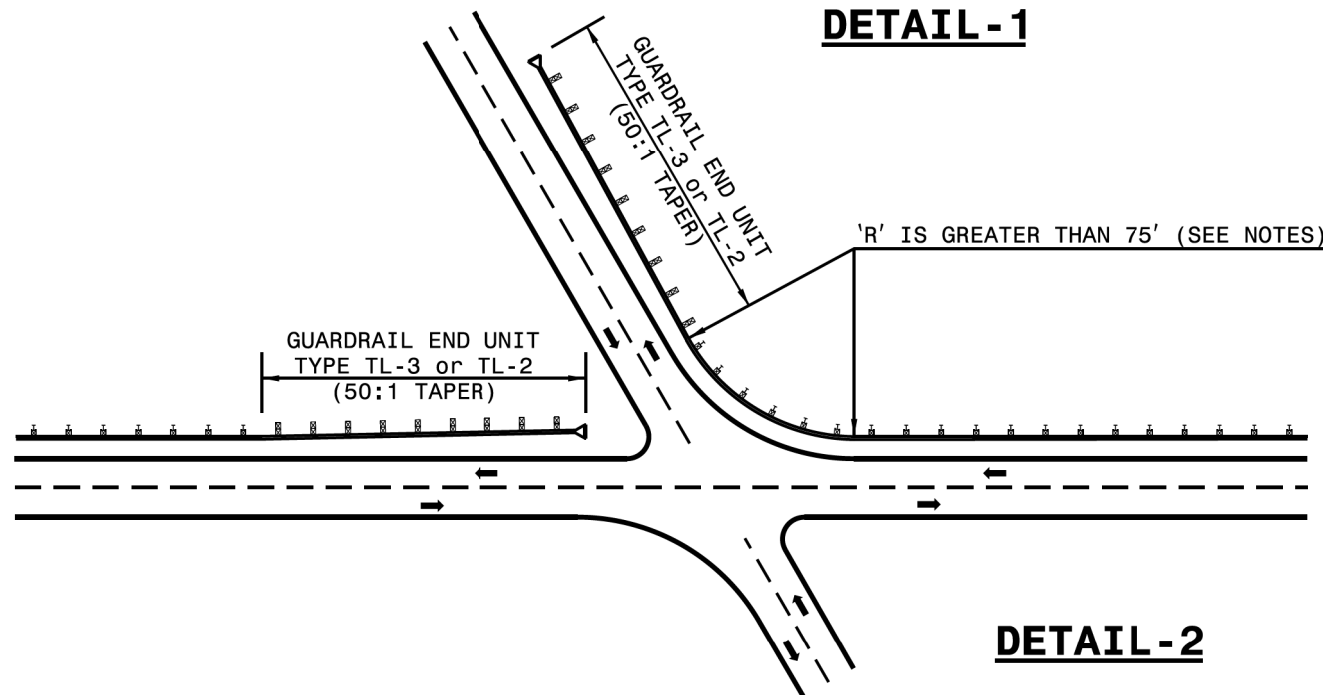
WHENEVER SHOP CURVED GUARDRAIL IS USED AS AN ANCHOR AND THE RADIUS IS FROM 20' TO 75', USE A MINIMUM LENGTH OF 50' OF SHOP CURVED GUARDRAIL AND FLARE WITH AN AT-1 ANCHOR UNIT. REFER TO DETAIL 1.

WHENEVER SHOP CURVED GUARDRAIL RADIUS IS MORE THAN 75', REFER TO DETAIL 2.

MAINTAIN CLEAR SIGHT DISTANCE.



DETAIL-1



DETAIL-2

GUARDRAIL TREATMENT AT INTERSECTIONS

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1-18

ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT

STATE OF
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DEPT. OF TRANSPORTATION
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1-18

ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT

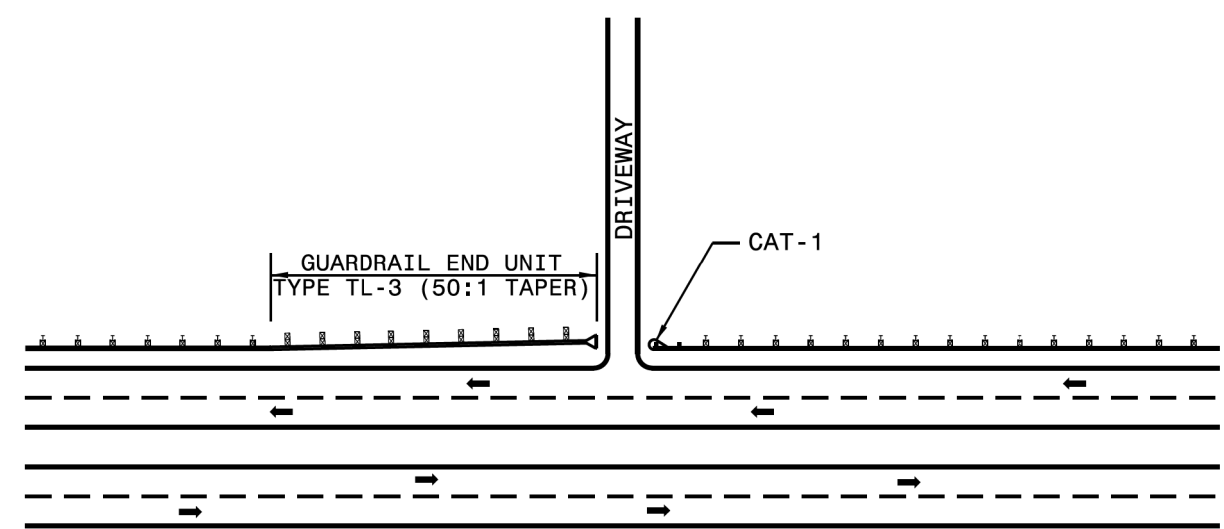
SHEET 9 OF 12
862.01

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

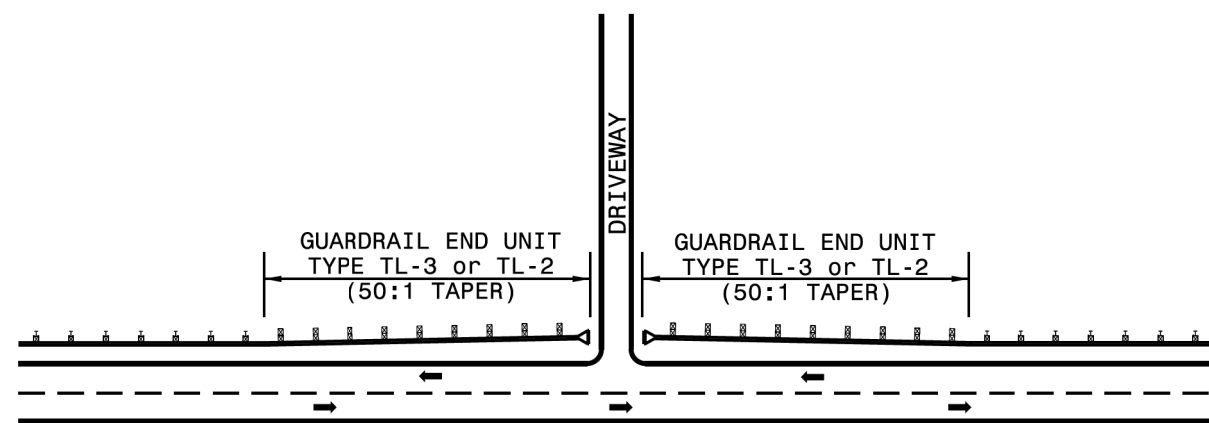
1-18

ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT

SHEET 9 OF 12
862.01



DETAIL-3
DIVIDED HIGHWAY



DETAIL-4
UNDIVIDED HIGHWAY

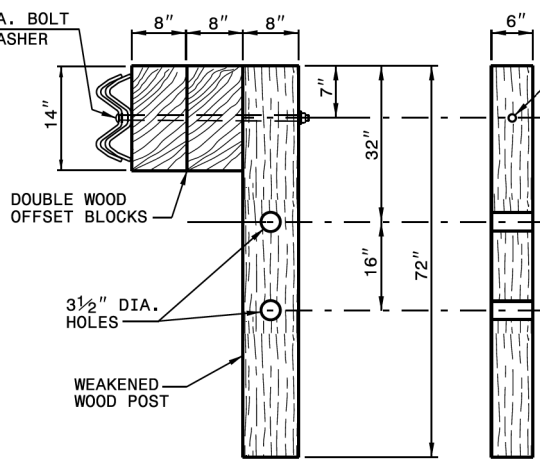
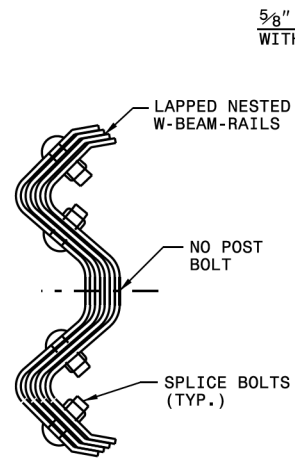
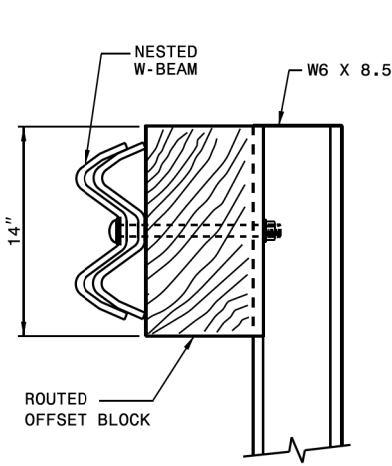
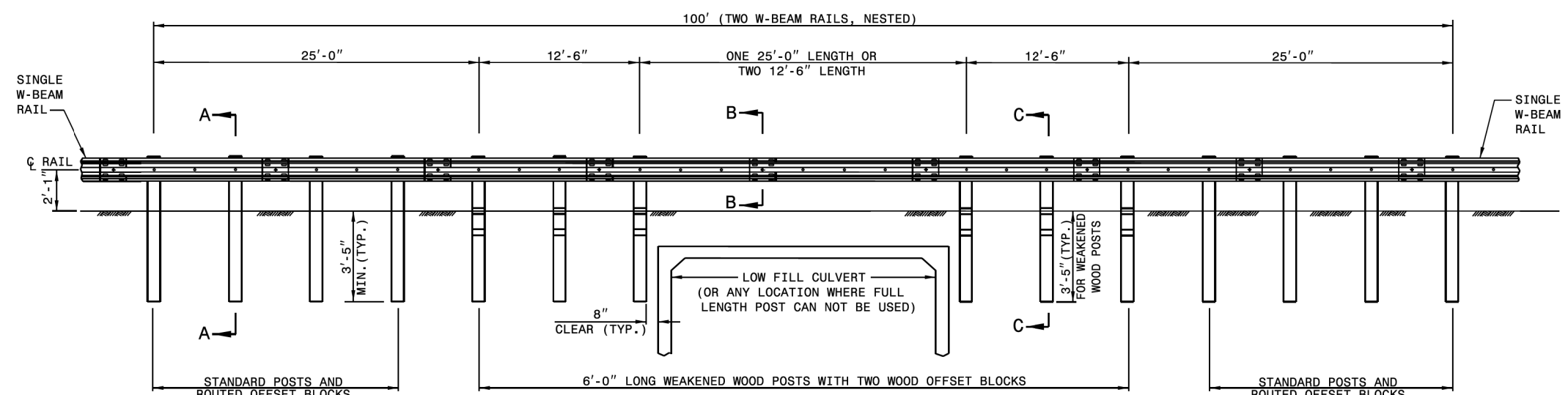
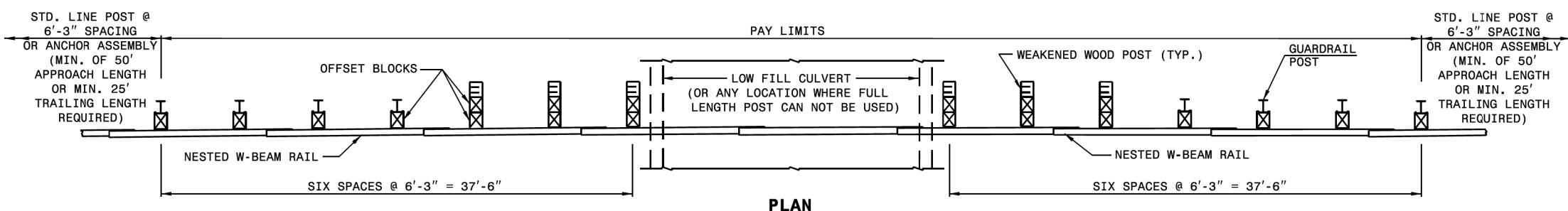
NOTE: USE DETAIL 3 & 4 WHENEVER
20' OR LARGER RADIUS CANNOT
BE UTILIZED.
MAINTAIN CLEAR SIGHT DISTANCE.

GUARDRAIL TREATMENT AT DRIVEWAYS

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I-18

ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT
 25'-0" CLEAR SPAN



- GENERAL NOTES:**
1. LAP RAIL IN THE DIRECTION OF TRAFFIC FLOW.
 2. SEE ROADWAY PLANS FOR LOCATIONS AND CONTINUATION OF RAIL OR END SECTIONS.
 3. 25'-0" SPAN: POSTS MAY BE ELIMINATED SUCH THAT A MAXIMUM OF ONE RAIL SPLICE IS LOCATED WITHIN THE UNSUPPORTED LENGTH. A 25'-0" LENGTH OF NESTED W-BEAM RAIL MAY BE USED TO ELIMINATE A SPLICE WITHIN THE 25'-0" CLEAR SPAN.
 4. MINIMUM DISTANCE OF 5 FEET BEHIND THE GUARDRAIL SHOULD BE CLEAR OF ANY FIXED-OBJECT HAZARDS THAT COULD SNAG AN IMPACTING VEHICLE.

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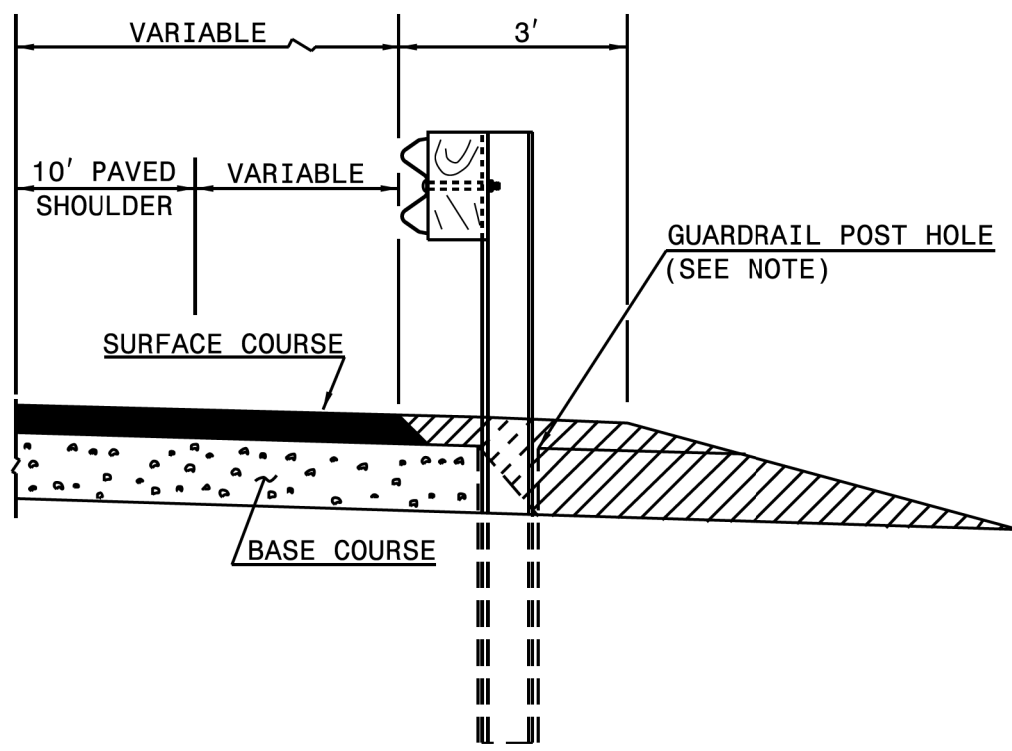
I-18

ROADWAY STANDARD DRAWING FOR
GUARDRAIL PLACEMENT
 25'-0" CLEAR SPAN

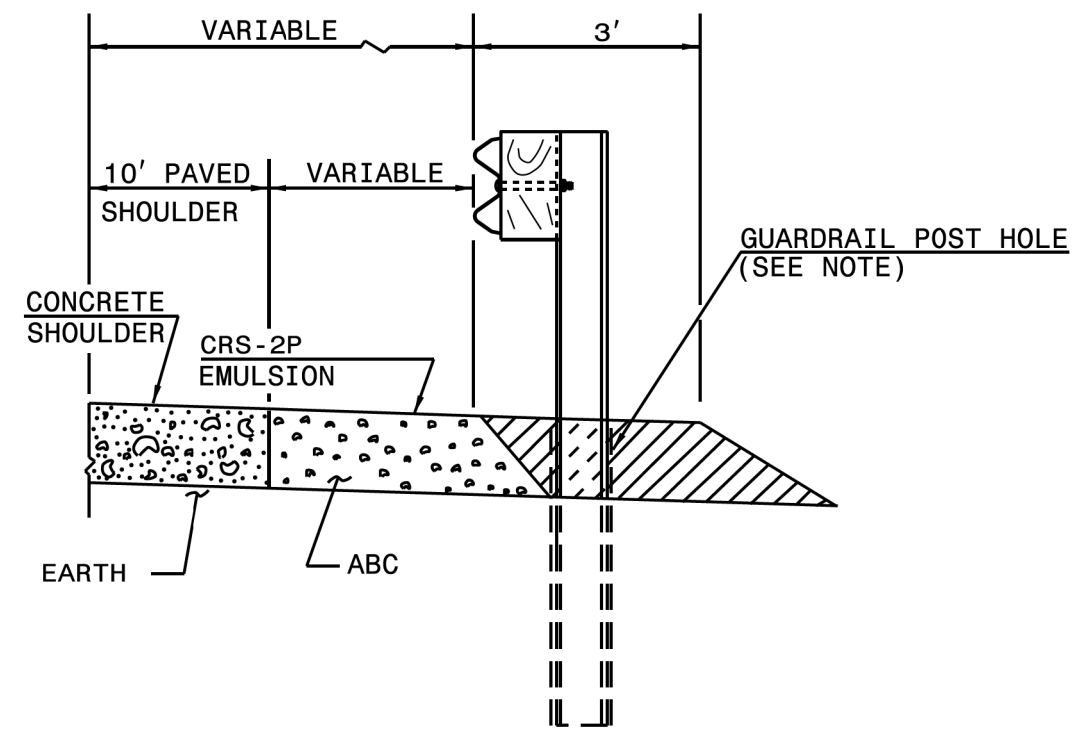
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1-18

ENGLISH STANDARD 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.

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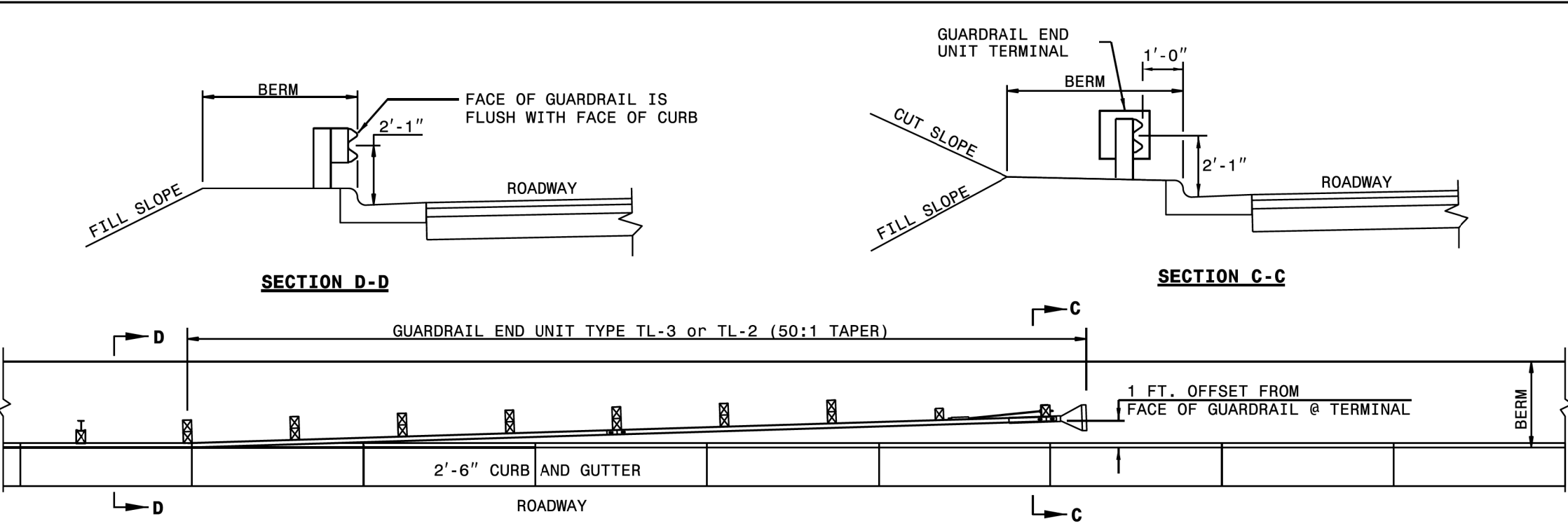
ENGLISH STANDARD DRAWING FOR
GUARDRAIL PLACEMENT

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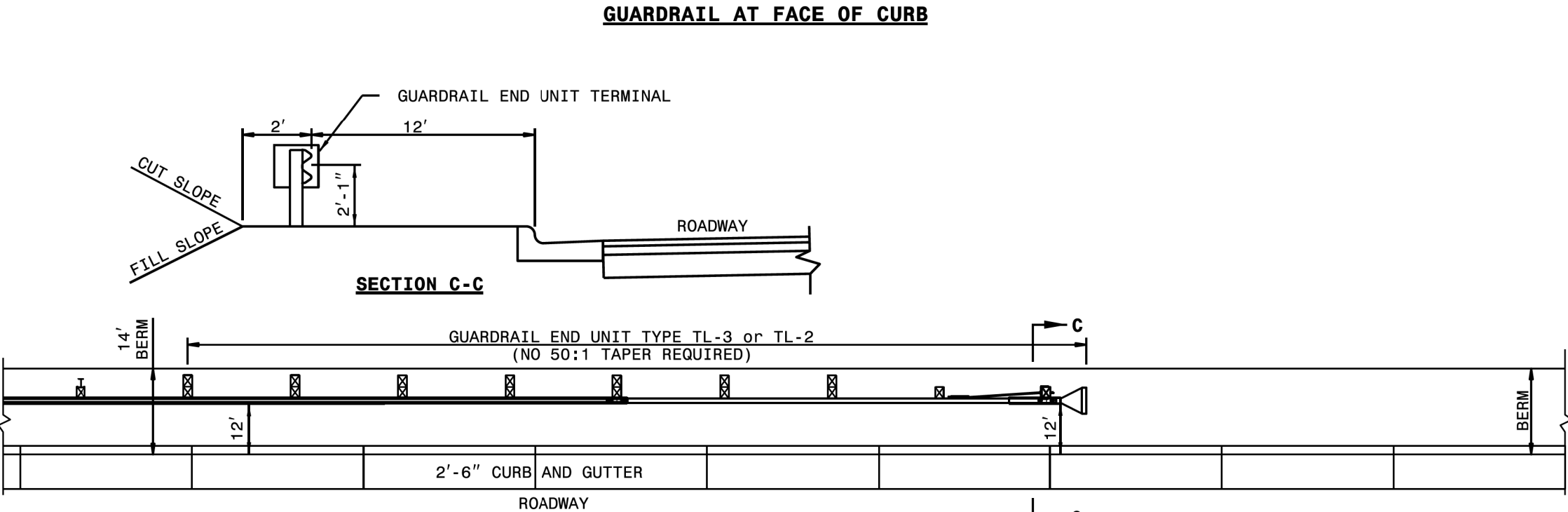
1-18

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

SHEET 12 OF 12
862.01



GUARDRAIL AT FACE OF CURB



GUARDRAIL 12' OFFSET FROM FACE OF CURB

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

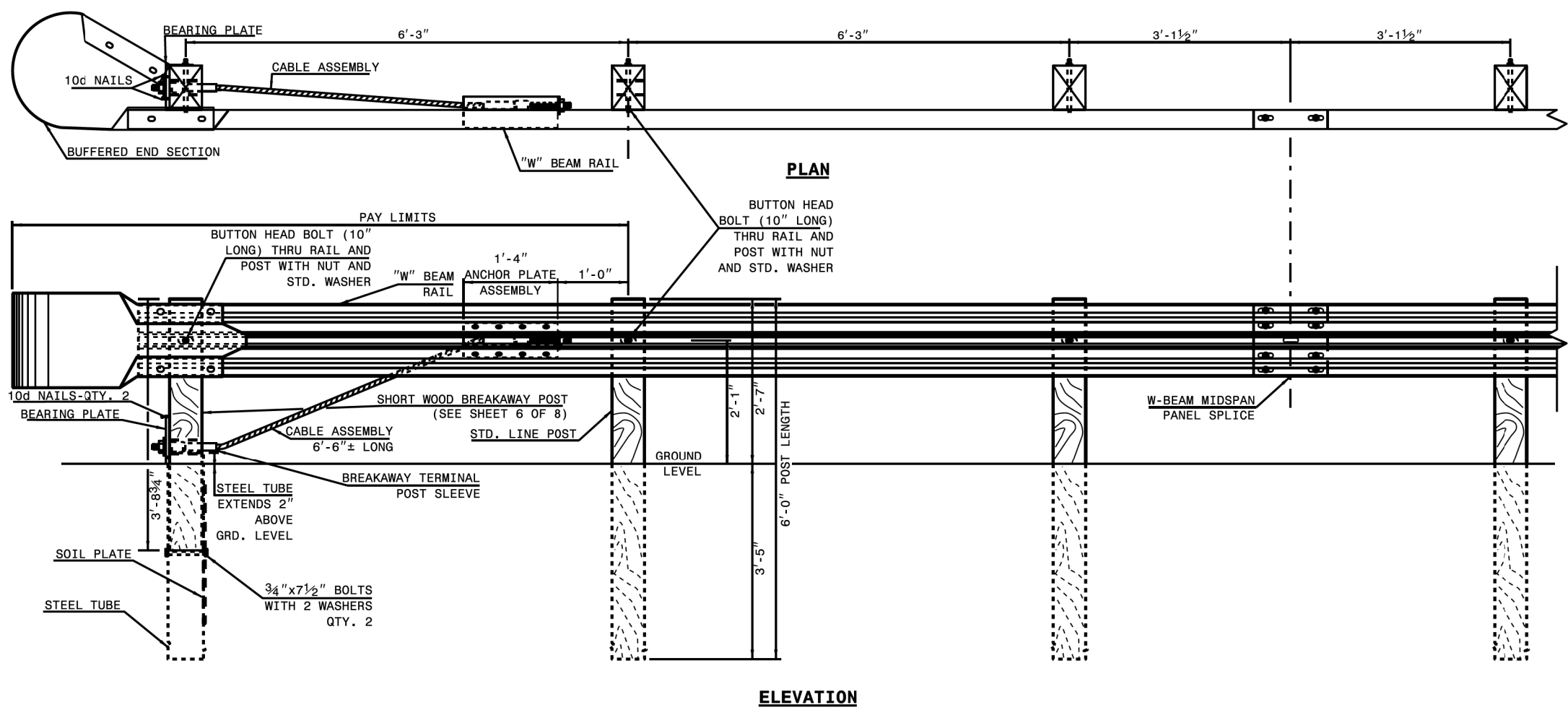
SHEET 12 OF 12
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ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

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ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION



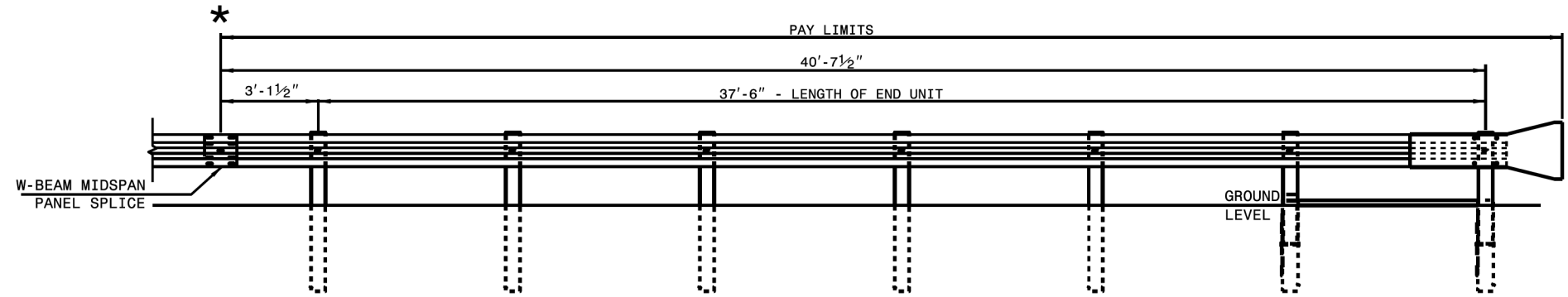
TRAILING END UNIT ASSEMBLY
C.A.T.-1 SYSTEM

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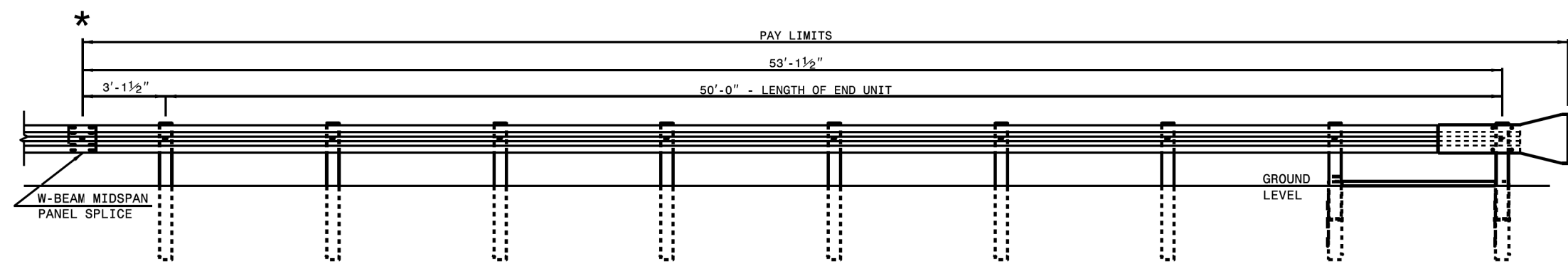
ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 2 OF 8
862.02



**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

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ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 2 OF 8
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ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

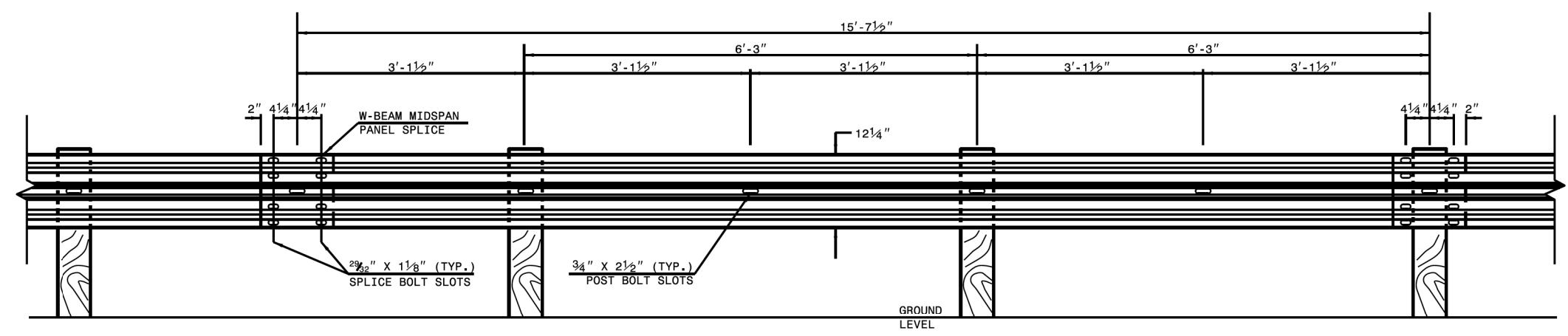
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ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 3 OF 8
862.02



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 THAT DOES NOT OFFSET THE W-BEAM PANEL SPLICE TO MIDSPAN

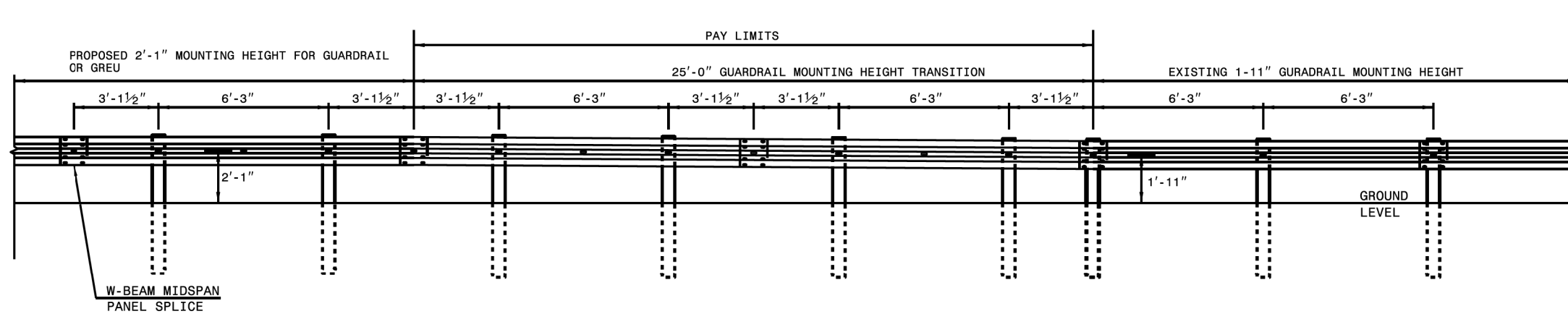
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ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 4 OF 8
862.02

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



ELEVATION VIEW

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

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ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

SHEET 4 OF 8
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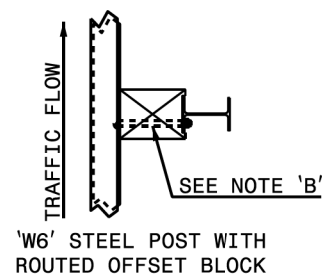
1-18

ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

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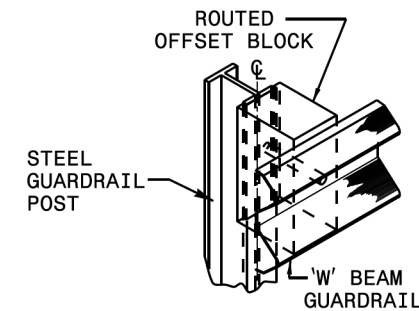
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ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

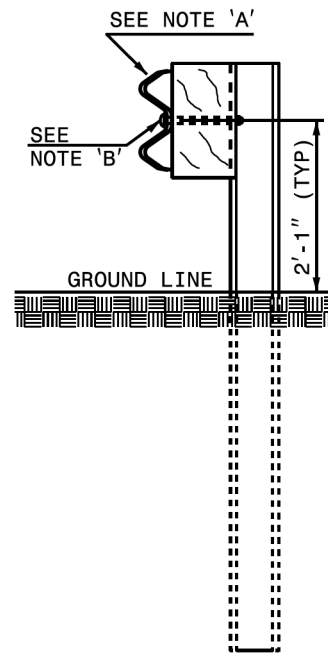


'W6' STEEL POST WITH
ROUTED OFFSET BLOCK

PLAN

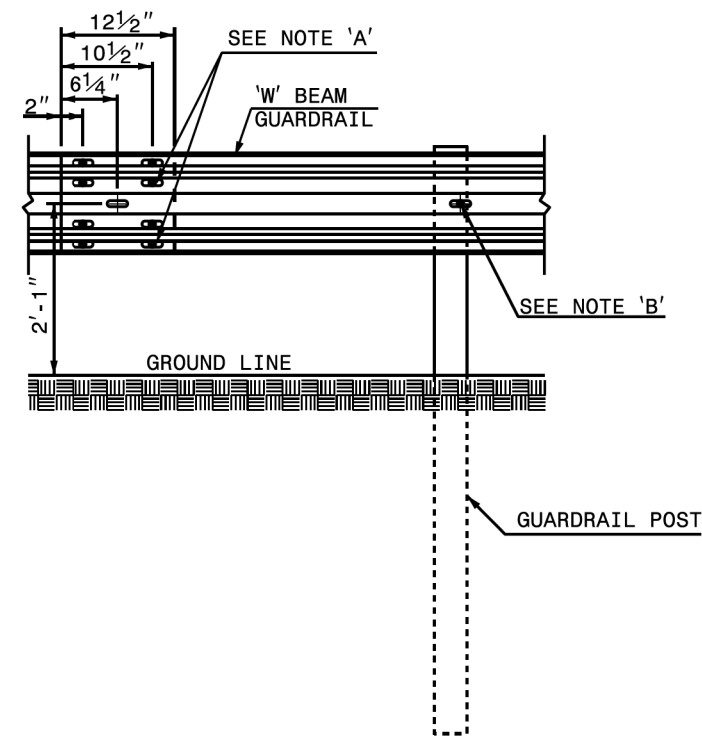


ISOMETRIC VIEW



'W6' STEEL POST WITH
ROUTED OFFSET BLOCK

SIDE



FRONT - MID SPAN SPLICE

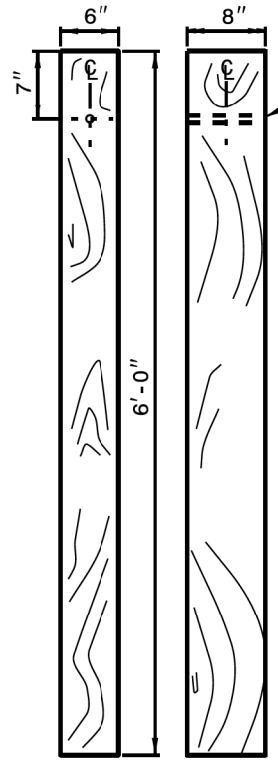
- NOTES:
A - 5/8" DIA. BUTTON HEAD SPLICE BOLT 1 1/4" LONG (8 REQ. PER SPLICE JOINT).
B - 5/8" DIA. BUTTON HEAD BOLT 7 1/2"/9" LONG WITH NUT FOR BOLTING 6"/8" ROUTED OFFSET BLOCK TO STEEL POSTS.
C - FIELD PUNCHING OF HOLES INTO GUARDRAIL AS DIRECTED BY THE ENGINEER.

TYPICAL GUARDRAIL AND GUARDRAIL POST ALTERNATIVES

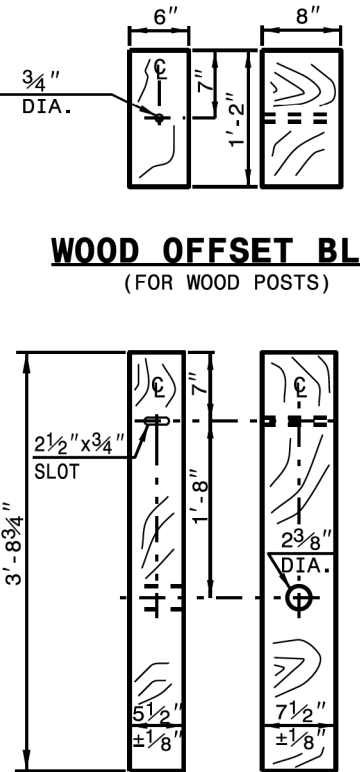
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ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

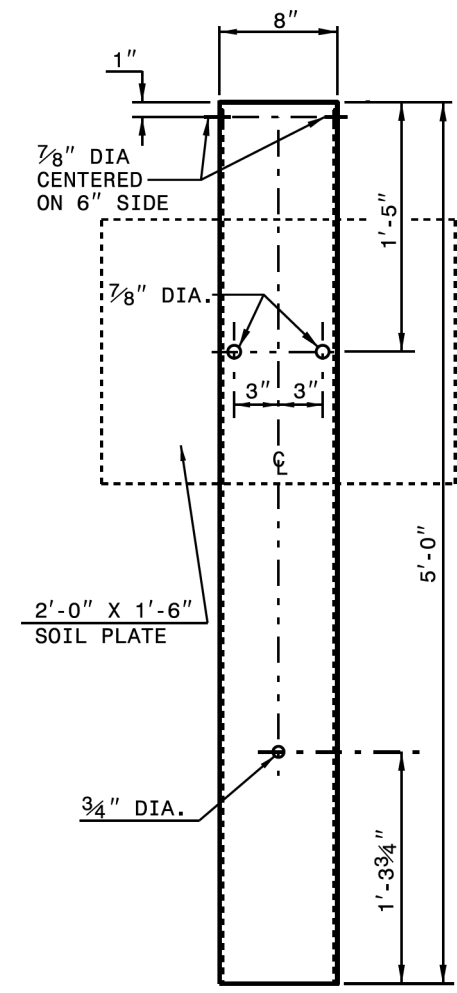


STANDARD LINE POST

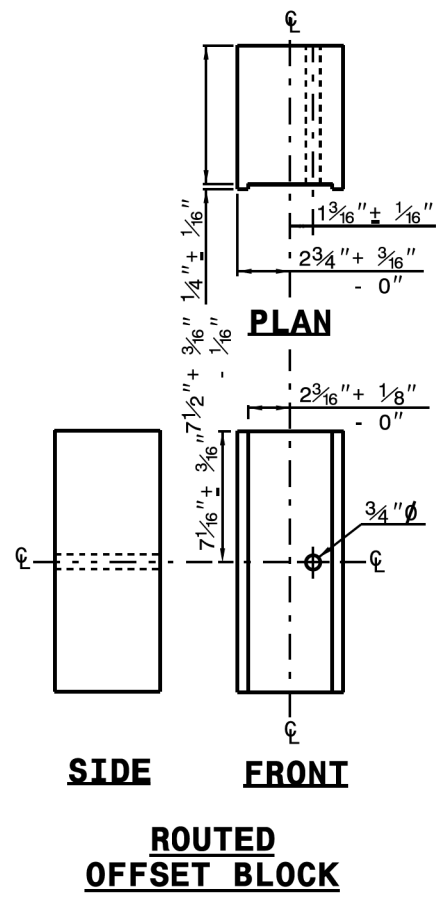


SHORT WOOD BREAKAWAY POST

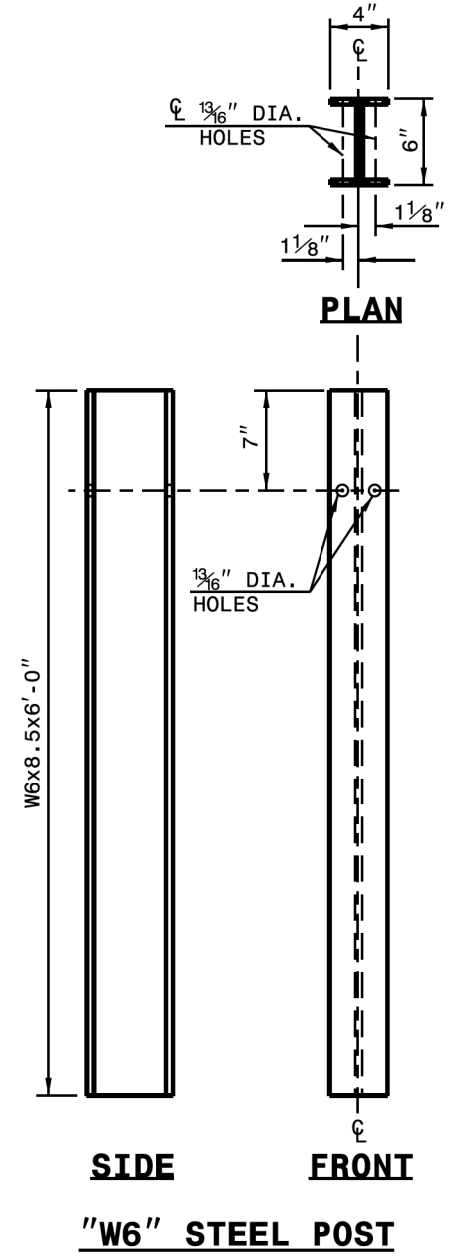
WOOD OFFSET BLOCK
(FOR WOOD POSTS)



STEEL TUBE
TS 6"x8"x0.1875"



ROUTED OFFSET BLOCK



"W6" STEEL POST

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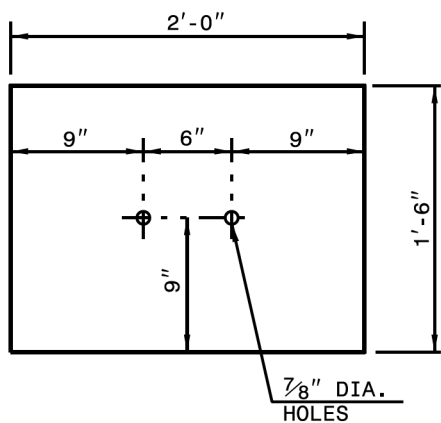
ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

SYSTEM PARTS

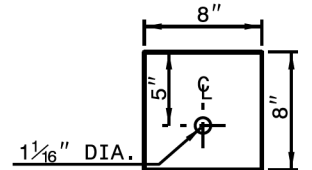
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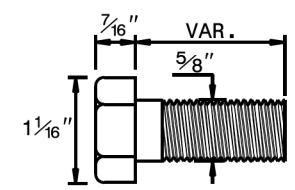
ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION



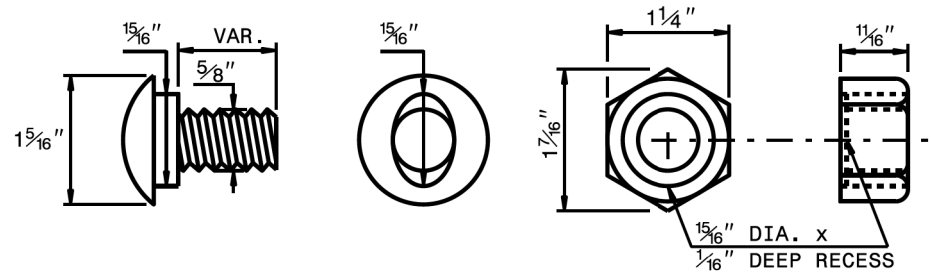
SOIL PLATE
1/4" THICK PLATE



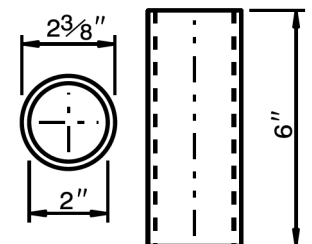
BEARING PLATE
5/8" THICK PLATE



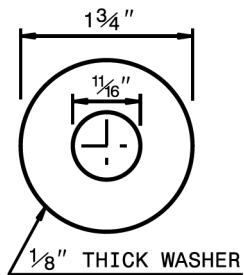
DETAIL OF STANDARD HEX BOLT AND NUT



DETAIL OF BUTTON HEAD BOLT AND NUT

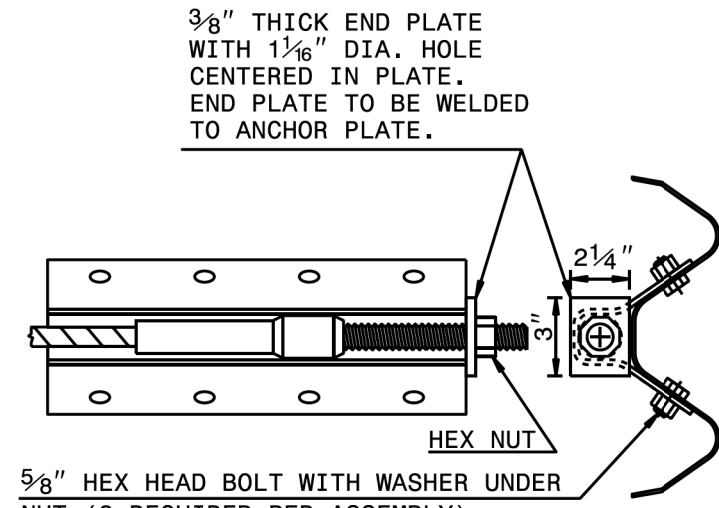


**BREAKAWAY TERMINAL
POST SLEEVE**

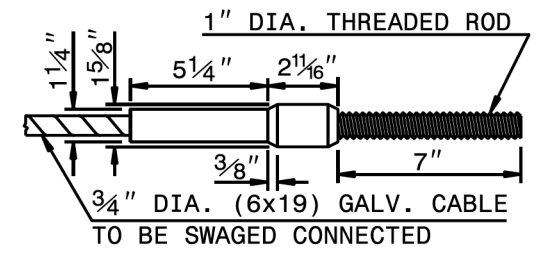


DETAIL OF STANDARD WASHER

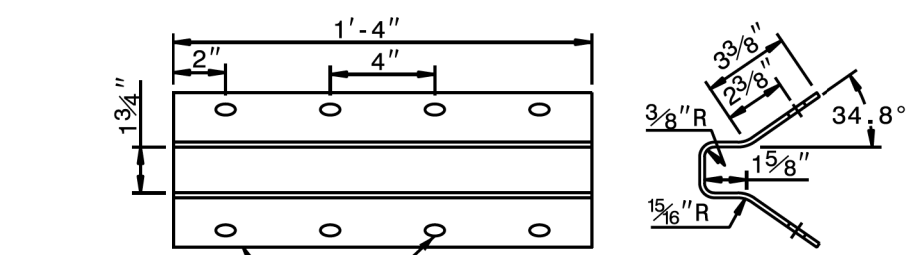
STANDARD WASHER: TYPICAL USE UNDER NUT WITH WOOD POST



ANCHOR PLATE ASSEMBLY



SWAGED CABLE



ANCHOR PLATE

CABLE ASSEMBLY

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ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

SYSTEM PARTS

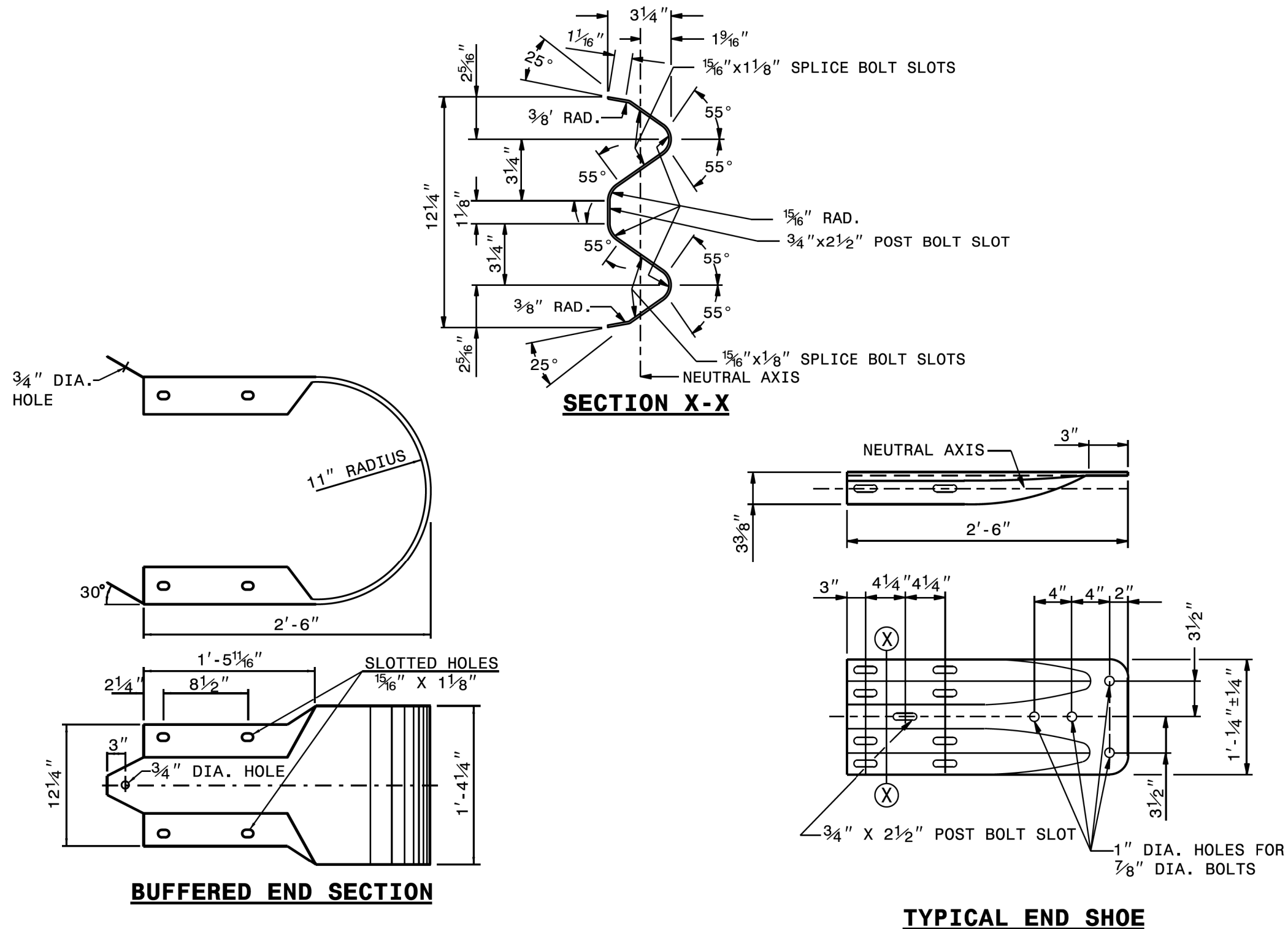
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ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

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SYSTEM PARTS - GENERAL USE

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ROADWAY STANDARD DRAWING FOR
GUARDRAIL INSTALLATION

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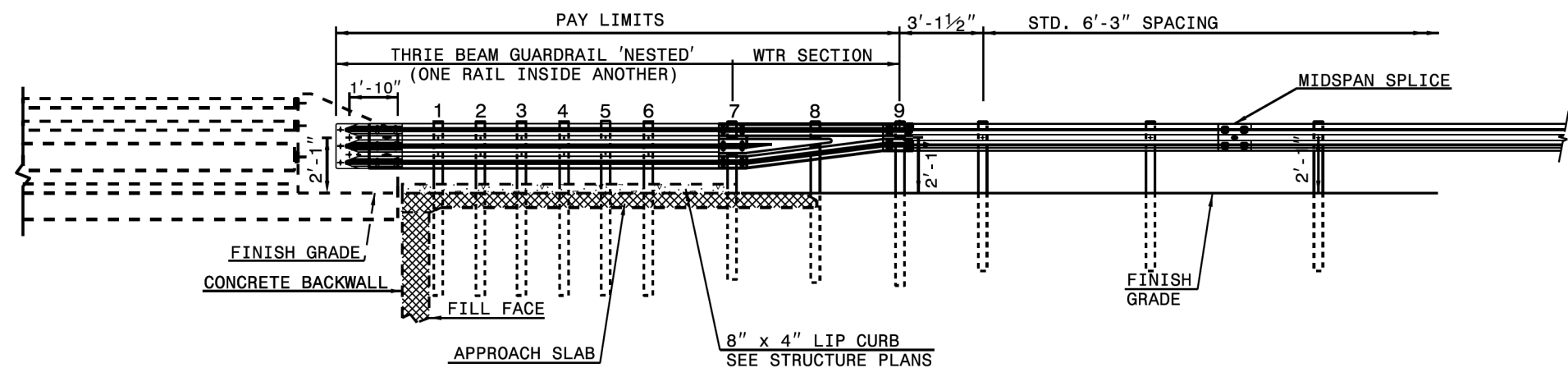
1-18

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

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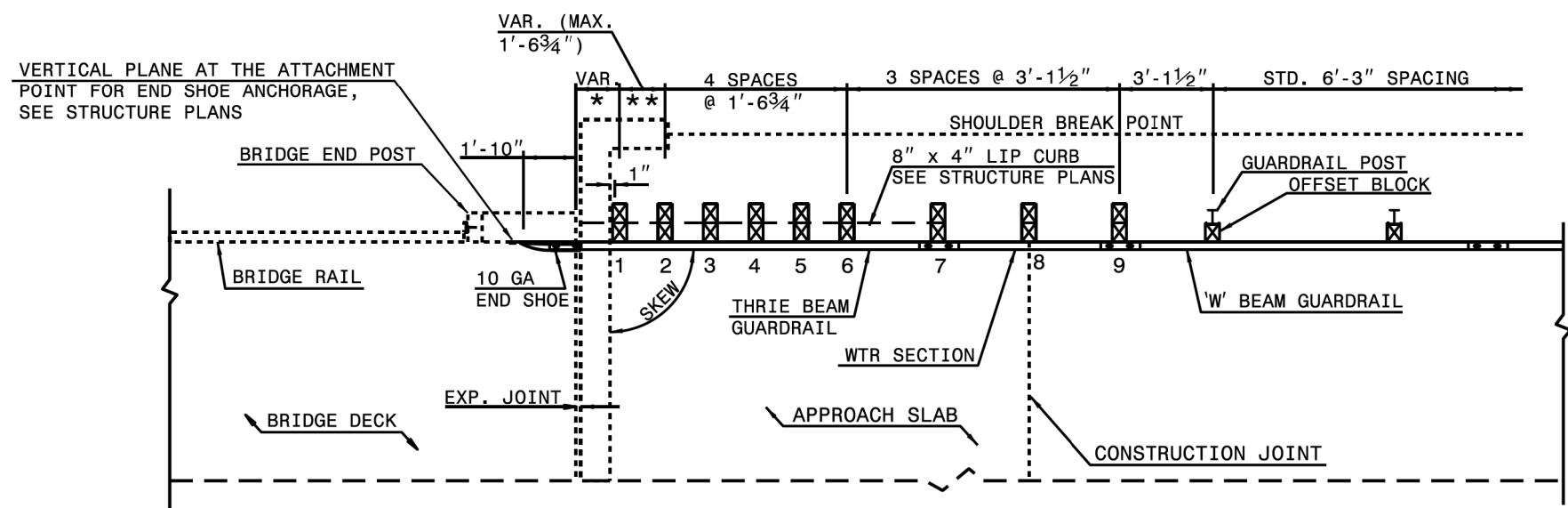
1-18

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



ELEVATION

NOTE:
 **POST NOT REQUIRED FOR SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
 *THE DISTANCE FROM END OF BRIDGE RAIL TO CENTER LINE OF THE FIRST POST SHOULD BE 11 1/2" IF CONCRETE BACKWALL IS NOT PRESENT.
 -SHOULDER BERM GUTTER MUST BE INSTALLED TO THE LIMITS 8" x 4" LIP CURB IS SHOWN IF ANCHOR UNIT IS NOT ADJACENT TO AN APPROACH SLAB.
 -MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER).
 -LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
 -SEE SHEET 5 FOR POST SECTIONS 1 THRU 9.



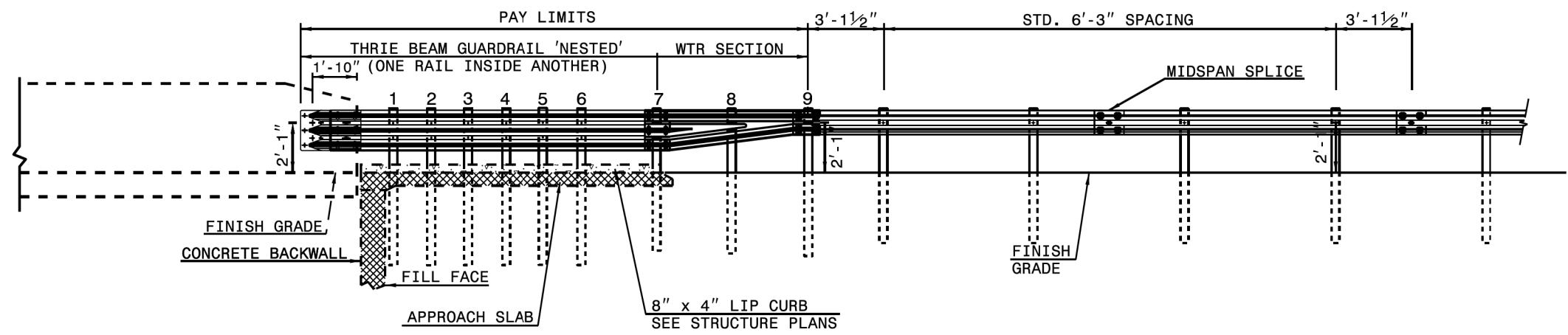
PLAN VIEW

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

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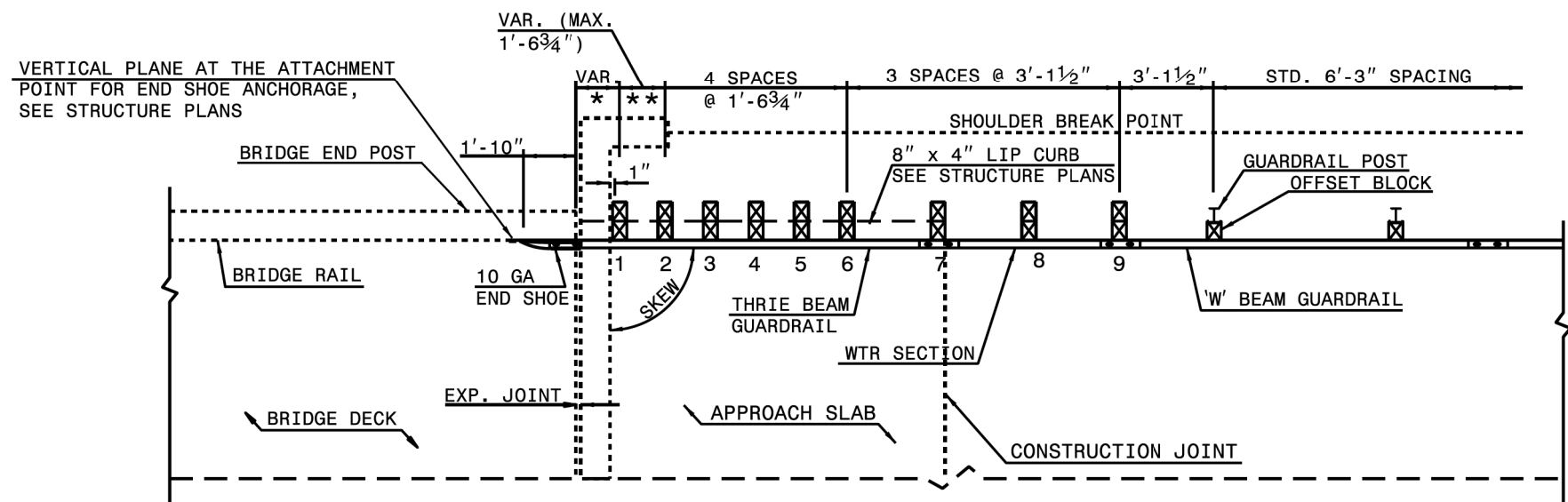
ROADWAY STANDARD DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III FOR ATTACHMENT TO
RAIL ON BRIDGE - SUB REGIONAL TIER



ELEVATION

NOTE:

- **POST NOT REQUIRED FOR SKEW ANGLES GREATER THAN 150° OR LESS THAN 30° UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- *THE DISTANCE FROM END OF BRIDGE RAIL TO CENTER LINE OF THE FIRST POST SHOULD BE 11 1/2" IF CONCRETE BACKWALL IS NOT PRESENT.
- SHOULDER BERM GUTTER MUST BE INSTALLED TO THE LIMITS 8" x 4" LIP CURB IS SHOWN IF ANCHOR UNIT IS NOT ADJACENT TO AN APPROACH SLAB.
- MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER).
- LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
- SEE SHEET 5 FOR POST SECTIONS 1 THRU 9.



PLAN VIEW

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

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

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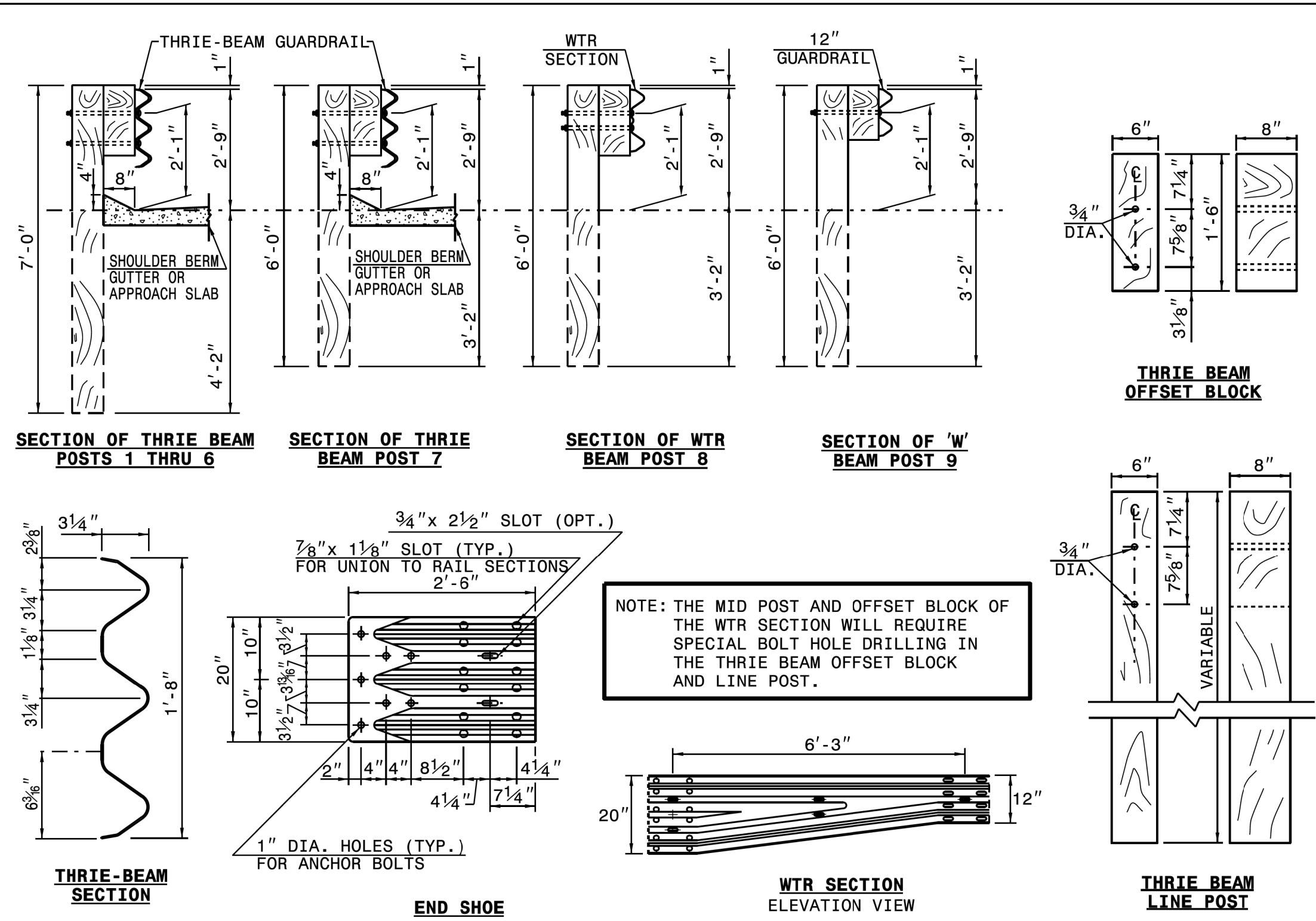
ROADWAY STANDARD DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT, TYPE III

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

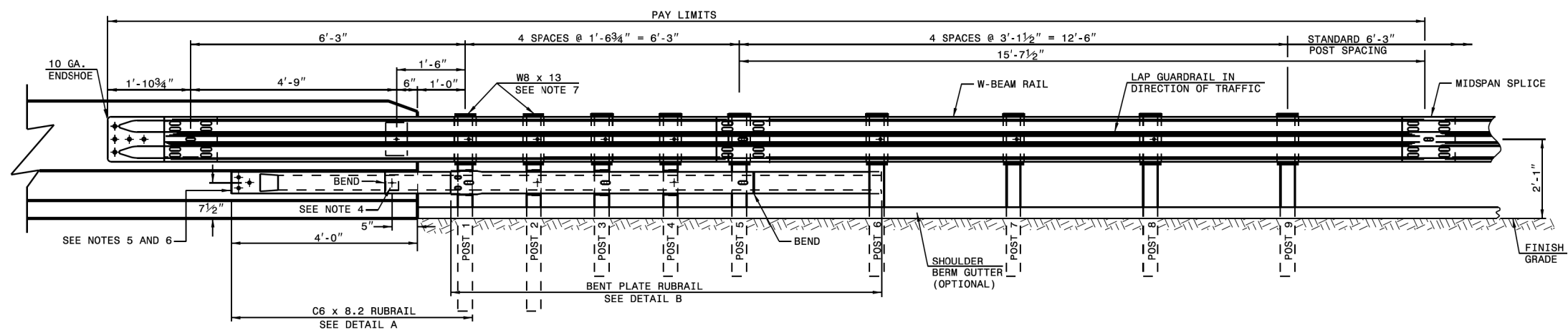
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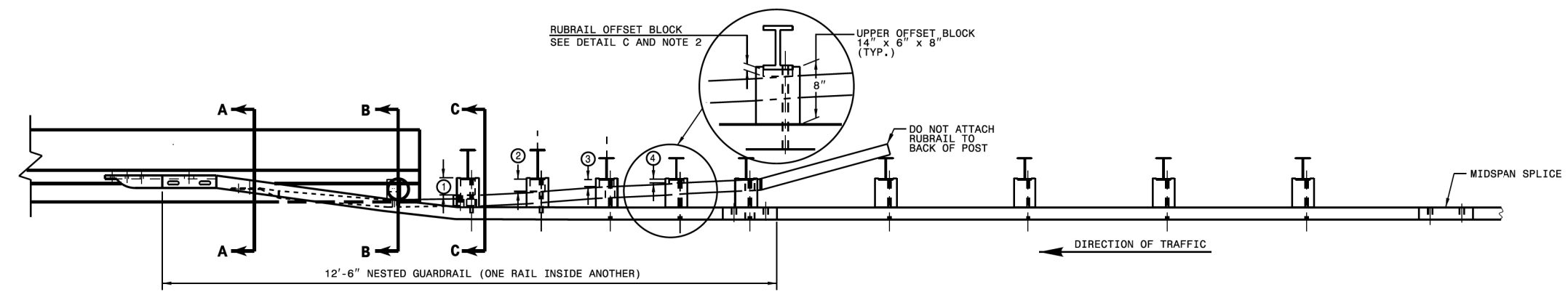
1-18

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



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" BUTTONHEAD 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 A 5/8" x 4 1/2" BUTTONHEAD BOLT. RUBRAIL IS FLARED TO BACK OF POST 6 AND NOT SECURED.
 - STEEL SPACER TUBE IS A SCHEDULE 40 GALVANIZED PIPE 6" INSIDE DIAMETER x 9" LONG. ATTACH TUBE TO GUARDRAIL ONLY WITH 5/8" x 1 1/4" LONG BUTTONHEAD 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.
 - 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 TOE OF THE BARRIER OR BRIDGE RAIL.
 - ANCHORAGE:
 - 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. 862.04). 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.
 - AT NEW BRIDGE RAIL, ANCHOR THE W-BEAM END SHOE AND RUBRAIL AS DETAILED ON THE STRUCTURE PLANS.
 - POSTS 1 AND 2 ARE W8 x 13, 7'-6" LONG. ALL OTHER POSTS IN THE ANCHOR UNIT ARE W6 x 8.5.



PLAN

GUARDRAIL ANCHOR UNIT TYPE B-77

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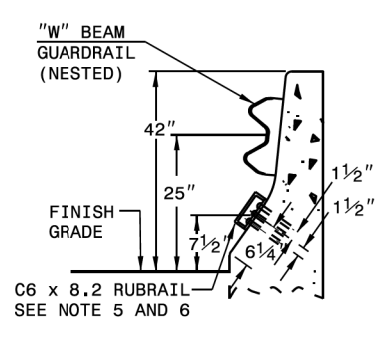
1-18

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

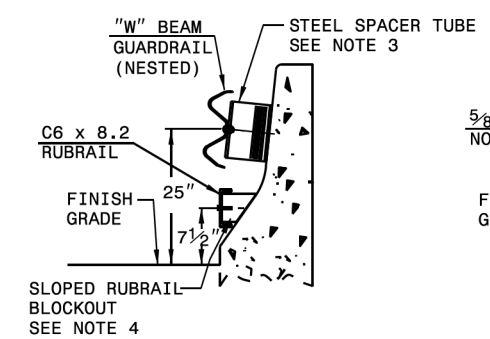
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ROADWAY STANDARD DRAWING FOR
STRUCTURE ANCHOR UNIT
 GUARDRAIL ANCHOR UNIT TYPE B-77
 FOR F-SHAPE BARRIER

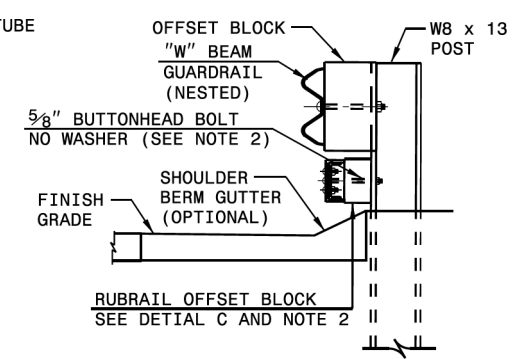
SHEET 5 OF 7
862.03



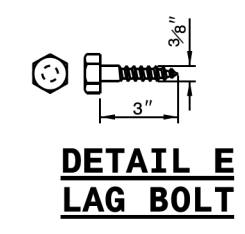
SECTION A-A



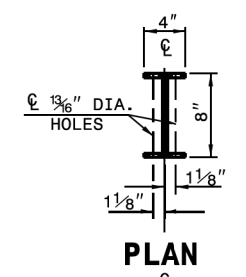
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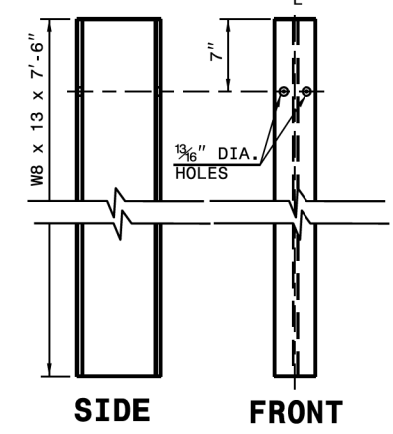
SECTION C-C



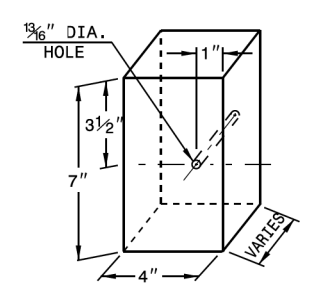
**DETAIL E
LAG BOLT**



PLAN



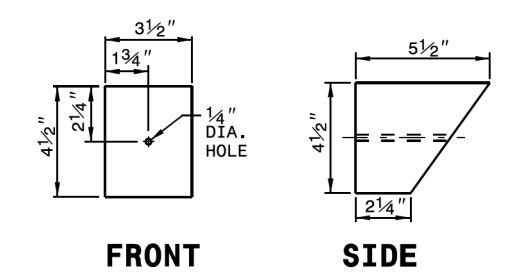
**DETAIL F STEEL POST
"W8 X 13 X 7'-6"**



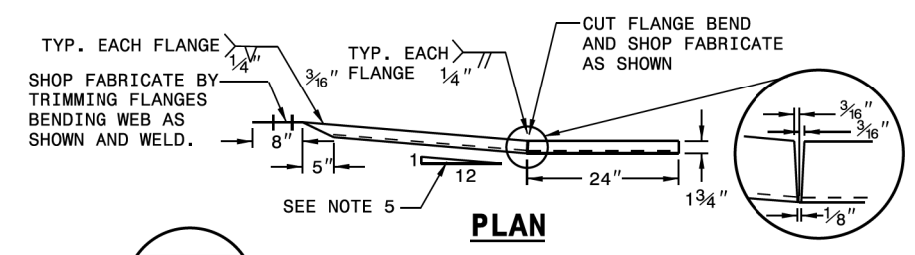
**DETAIL C
RUBRAIL BLOCKOUT**

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

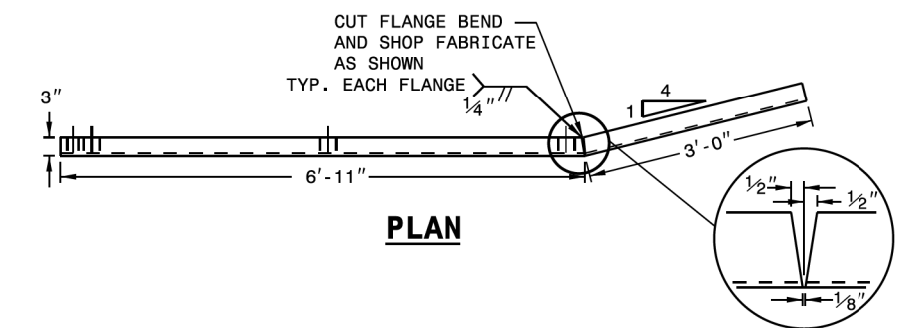
* BOLTS FOR POSTS 2 AND 4 ARE USED TO ATTACH BLOCK TO POST. RUBRAIL NOT ATTACHED TO BLOCK.



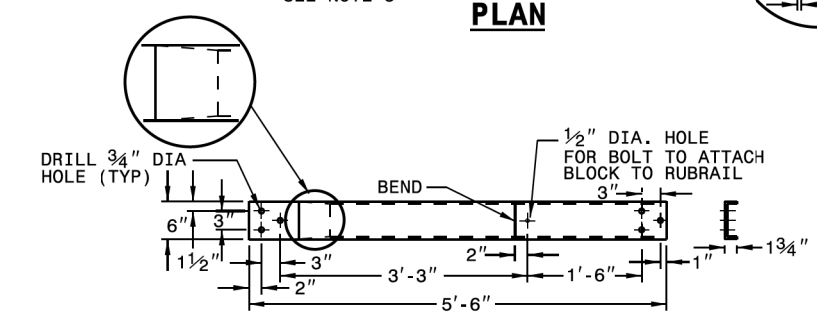
**DETAIL D
SLOPED RUBRAIL BLOCKOUT**



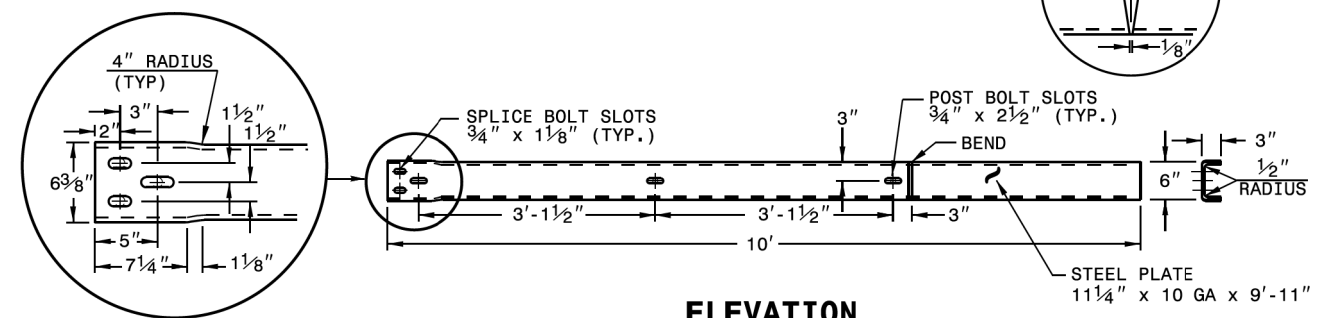
PLAN



PLAN



**ELEVATION
DETAIL A
C6 x 8.2 RUBRAIL**



**ELEVATION
DETAIL B
BENT PLATE RUBRAIL**

GUARDRAIL ANCHOR UNIT TYPE B-77

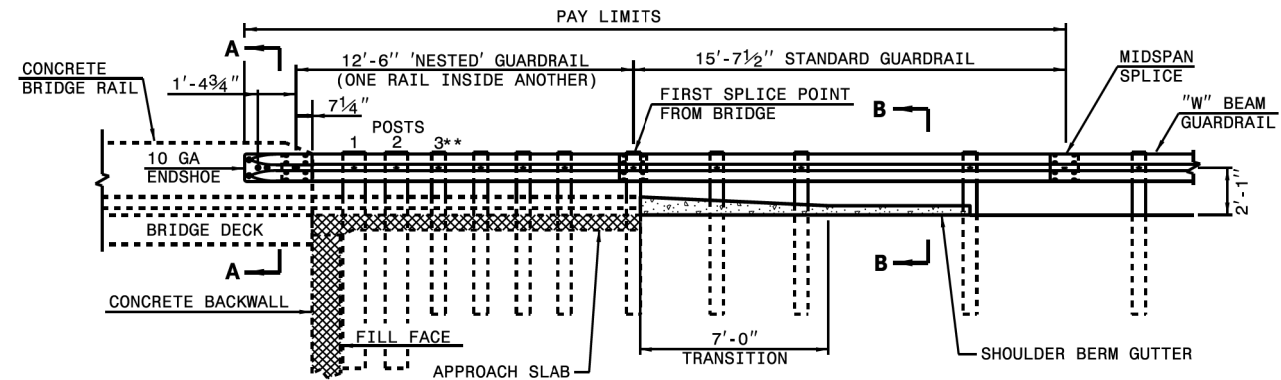
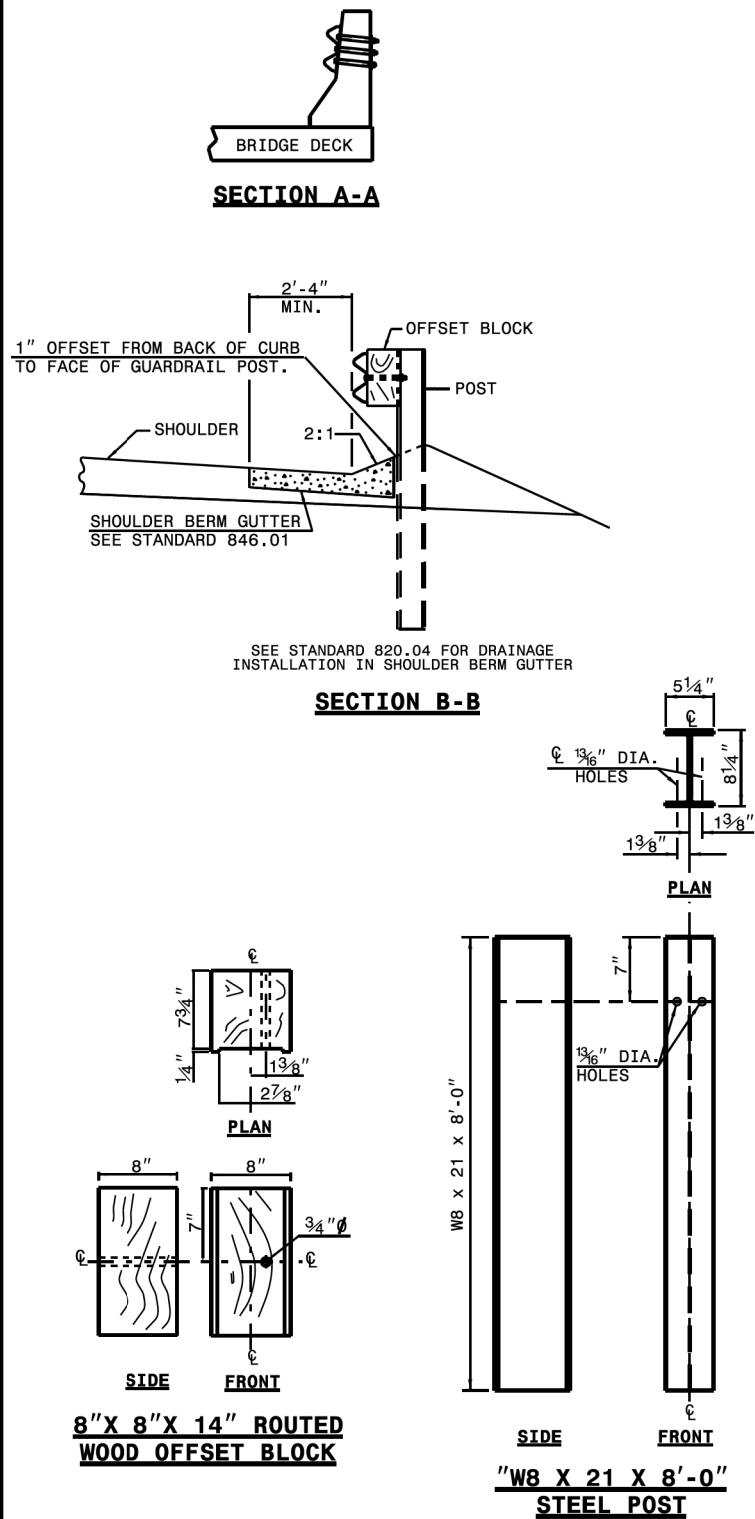
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ROADWAY STANDARD DRAWING FOR
STRUCTURE ANCHOR UNIT
 GUARDRAIL ANCHOR UNIT TYPE B-77
 FOR F-SHAPE BARRIER

SHEET 5 OF 7
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RALEIGH, N.C.

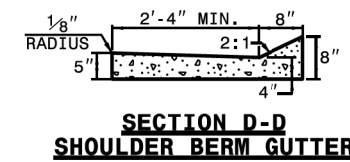
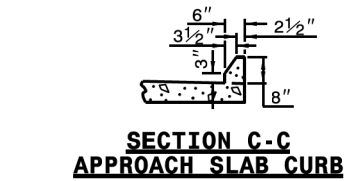
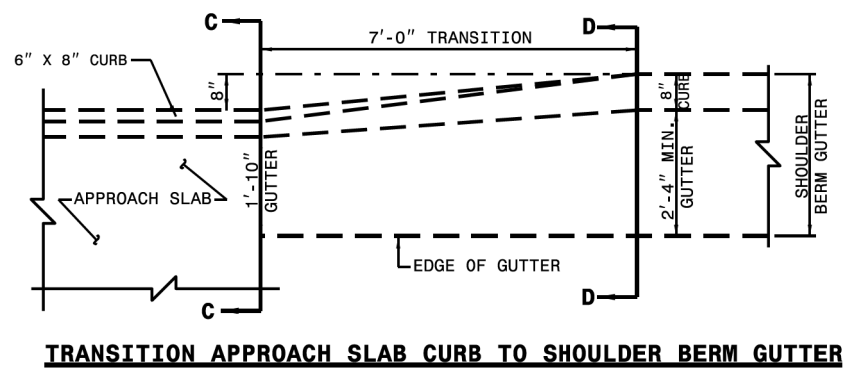
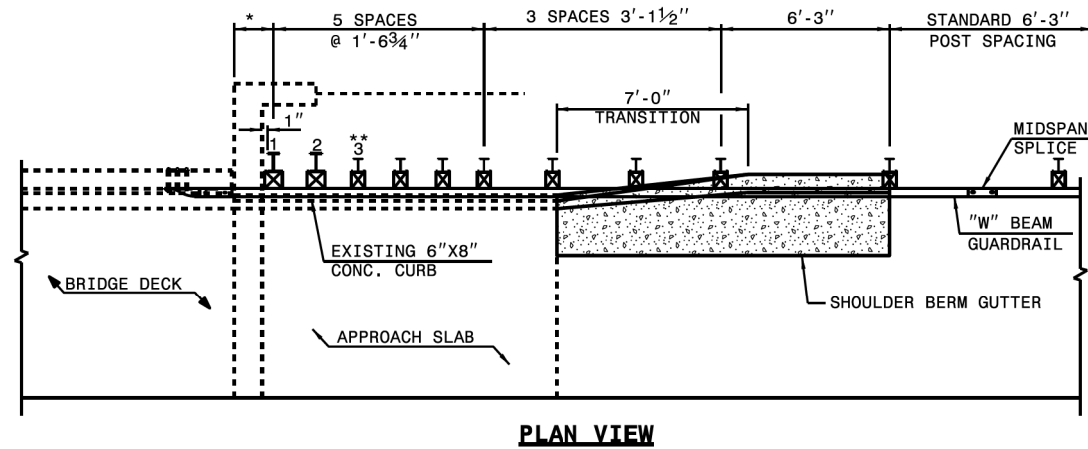
ROADWAY STANDARD DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT TYPE B-83



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.
- *THE DISTANCE FROM END OF BRIDGE RAIL TO CENTER LINE OF THE FIRST POST SHOULD BE 11 1/2" IF CONCRETE BACKWALL IS NOT PRESENT.
- MEASURE GUARDRAIL HEIGHT FROM THE TOP OF ADJACENT SURFACE (SHOULDER, BERM, OR GUTTER).
- USE NO WOOD POSTS WITHIN THE GUARDRAIL ANCHOR UNIT LIMITS.
- LAP JOINTS IN THE DIRECTION OF TRAFFIC FLOW.
- POSTS 1 AND 2 TO BE W8 X 21 X 8'-0" LONG STEEL POST AND 8" X 8" X 14" WOOD ROUTED OFFSET BLOCK.
- SHOULDER BERM GUTTER IS REQUIRED IF NO CURBING EXISTS THROUGH ANCHOR UNIT PAY LIMITS.
- ANCHOR THE W-BEAM END SHOE USING A 4 BOLT HOLD DOWN PLATE AS SHOWN IN STANDARD 862.04



GUARDRAIL ANCHOR UNIT TYPE B-83

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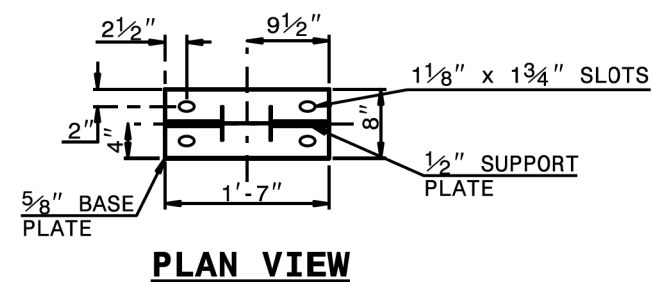
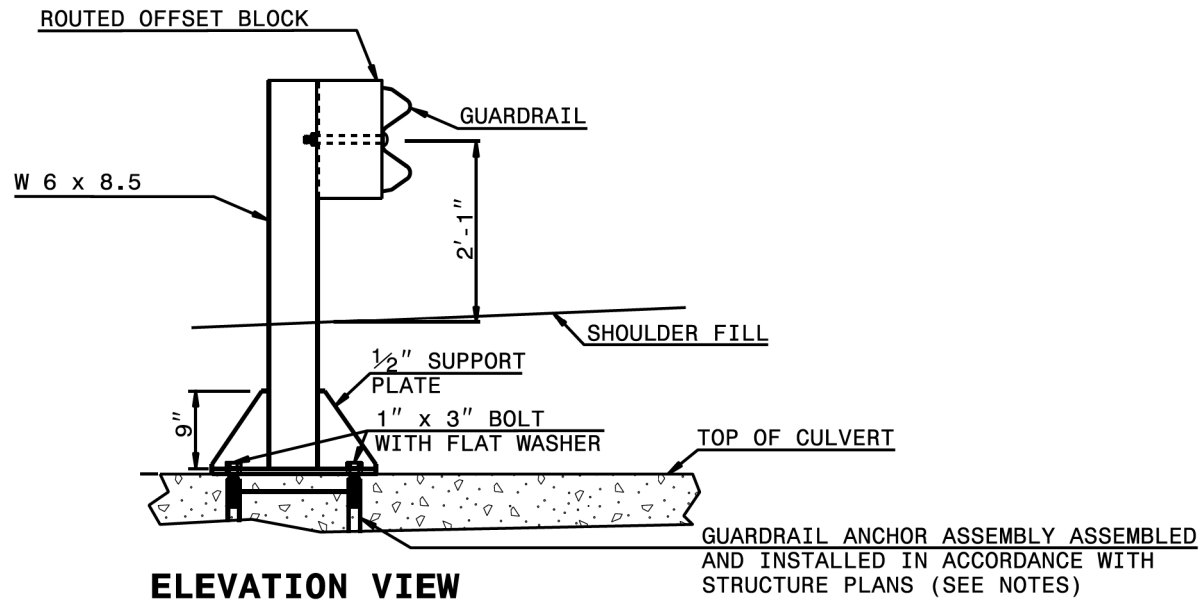
ROADWAY STANDARD DRAWING FOR
STRUCTURE ANCHOR UNITS
GUARDRAIL ANCHOR UNIT TYPE B-83

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

SHEET 7 OF 7
862.03



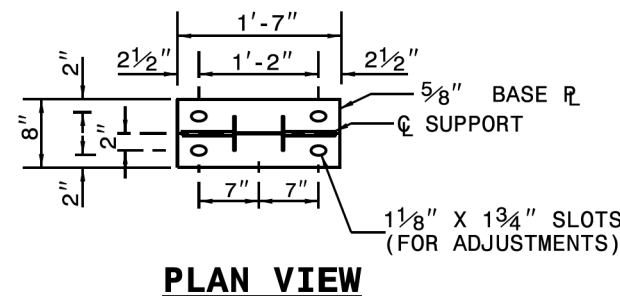
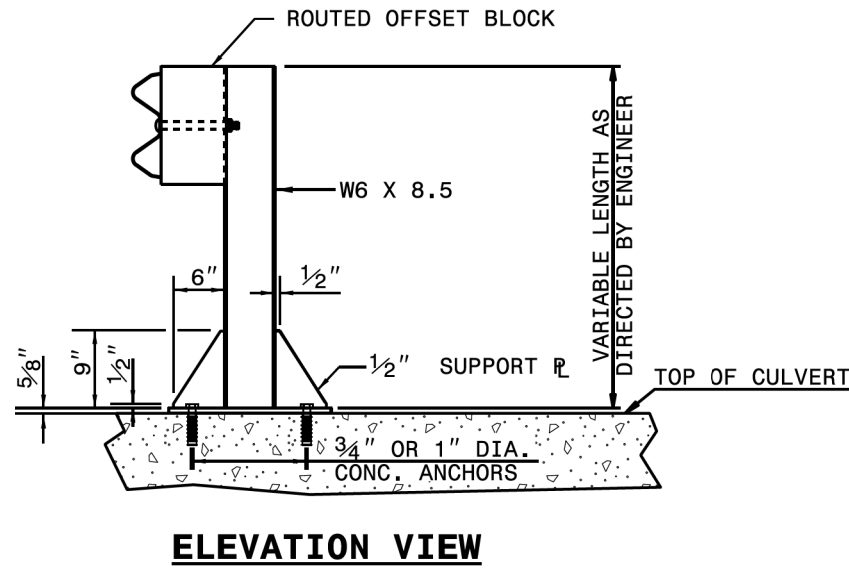
NOTES FOR:
GUARDRAIL POST ANCHORED TO STRUCTURE:
-USE FULL LENGTH $\frac{1}{4}$ " BUTT WELDS AT ALL LOCATIONS OF CONTACT BETWEEN THE BASE PLATE, SUPPORT PLATES AND STEEL POST.
-USE POST AND POST BASE PLATES CONFORMING TO THE REQUIREMENTS OF A.S.T.M. A-36 AND GALVANIZED AFTER FABRICATION TO CONFORM TO 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 $\frac{3}{4}$ " OR 1" DIAMETER BOLT. CALCULATE HOLDING POWER BASED ON $\frac{1}{4}$ 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



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

SHEET 7 OF 7
862.03

COMPUTED BY: BGS DATE: 5/01/2017
 CHECKED BY: RCC DATE: 5/01/2017

STATE OF NORTH CAROLINA
 DIVISION OF HIGHWAYS

PROJECT REFERENCE NO.
SS-4914CJ

SHEET NO.
3B-3

CRAB CREEK ROAD - GUARDRAIL SUMMARY

SITE NO.	BEG. STA.	END STA.	LOCATION	LENGTH				WARRANT POINT		"N" DIST. FROM E.O.L.	TOTAL SHOULDER WIDTH	FLARE LENGTH		W		ANCHORS						PERMITTED			IMPACT ATTENUATOR TYPE 350	REMOVE EXISTING GUARDRAIL	REMARKS						
				NUGUARD STRAIGHT	NUGUARD SHOP CURVED	STRAIGHT	SHOP CURVED	APPROACH END	TRAILING END			APPROACH END	TRAILING END	APPROACH END	TRAILING END	GREU TL-3 END UNIT	GREU CAJ-1 END UNIT	GREU B-77 END UNIT	GRAU 350 END UNIT	AT-1 END UNIT	B-77 END UNIT	NO	G	NG									
<i>S40</i>	<i>47+02</i>	<i>49+31</i>	<i>LT</i>			<i>150.0</i>	<i>25.0</i>									<i>1</i>	<i>1</i>																
<i>S41</i>	<i>38+90</i>	<i>39+86</i>	<i>LT</i>			<i>25.0</i>	<i>25.0</i>									<i>1</i>	<i>1</i>																
<i>S42</i>	<i>16+30</i>	<i>18+55</i>	<i>LT</i>			<i>125.0</i>										<i>2</i>																	
PAGE TOTALS						<i>300.0</i>	<i>50.0</i>									<i>4</i>	<i>2</i>																
PROJECT TOTAL						<i>6475.0</i>	<i>462.5</i>									<i>76</i>	<i>18</i>										<i>275.0</i>						

