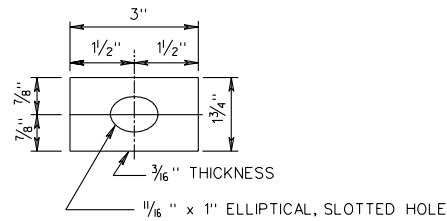


SECTION THRU RAIL ELEMENT AND W BEAM BACK-UP PLATE



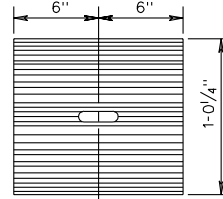
DETAIL OF STANDARD WASHER

FOR GR-2 AND 2A, MB-3
TO BE USED ON THE LAST
50' OF RUN OFF ENDS ONLY.

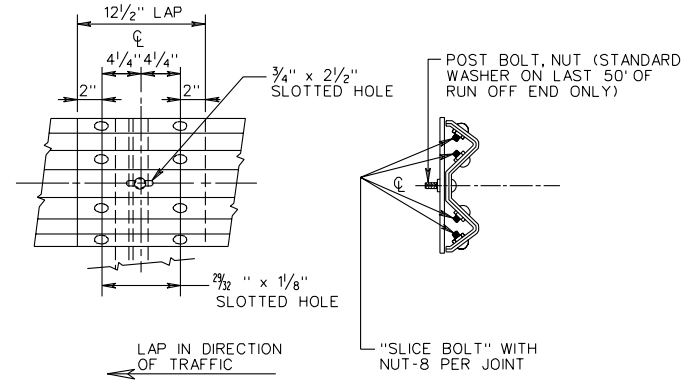
NOTES:

ALL HARDWARE IS TO BE GALVANIZED IN ACCORDANCE WITH THE SPECIFICATIONS.

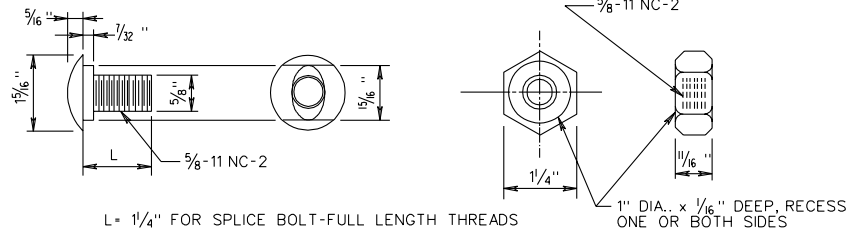
THE GUARDRAIL AND MEDIAN BARRIER COMPONENTS DEPICTED IN ARTBA TECHNICAL BULLETIN NUMBER 268B MAY BE SUBSTITUTED IF INTERCHANGEABLE WITH THE STANDARDS FOR GUARDRAIL (GR) OR MEDIAN BARRIER (MB) AND APPROVED BY THE ENGINEER.



W BEAM
BACK - UP PLATE
FOR USE AT NON SPLICE
LOCATIONS.
TO BE USED WITH STEEL
W6 x 9 OR W6 x 8.5
BLOCKOUT ONLY.

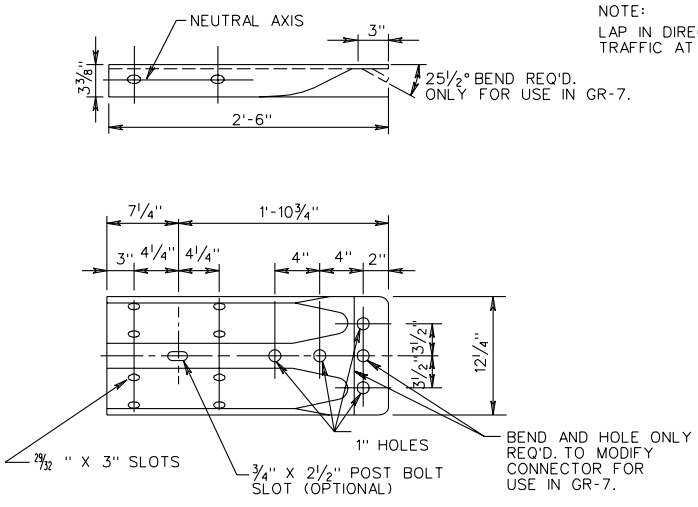


DETAIL OF SPLICE JOINT



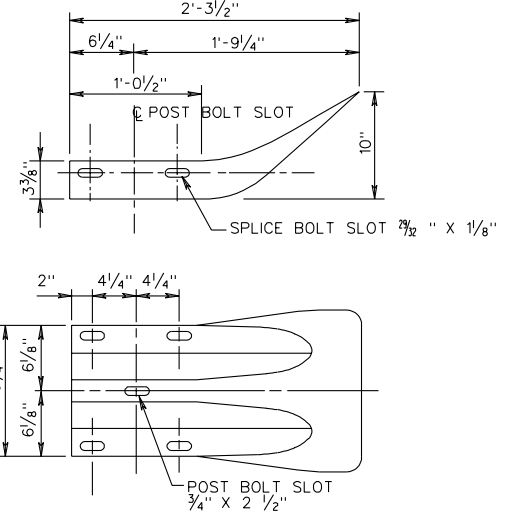
- L = 1/4" FOR SPLICE BOLT-FULL LENGTH THREADS
- L = 2" FOR STEEL POST BOLT-1/2" MIN. THREADS
- L = 18" FOR WOOD AND CONCRETE POST BOLT-2 1/2" MIN. THREADS
- L = 26" FOR MB WOOD OR CONCRETE POST-2" MIN. THREADS

DETAIL OF BUTTON HEAD BOLT AND RECESS NUT

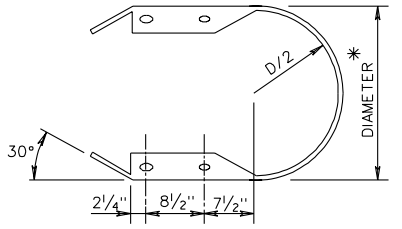


W BEAM TERMINAL CONNECTOR

NOTE:
LAP IN DIRECTION OF TRAFFIC AT SPLICE JOINT.



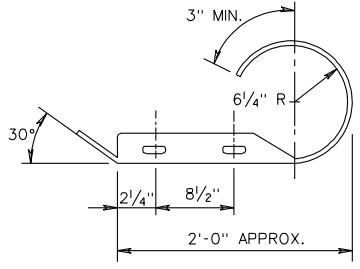
W BEAM END SECTION (FLARED)



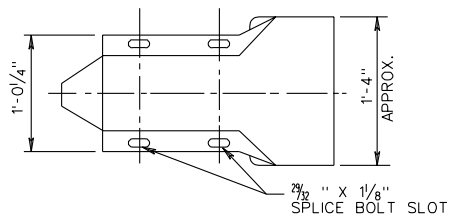
* STANDARD DIMENSIONS OF 12 1/2", 24" AND 30" ARE SUGGESTED.

W BEAM END SECTION (BUFFER)

* THE GUARDRAIL MEDIAN BARRIER COMPONENTS DEPICTED IN A.R.T.B.A. TECHNICAL BULLETIN NUMBER 268B MAY BE SUBSTITUTED IF INTERCHANGEABLE WITH THE STANDARDS FOR GUARDRAIL (GR) OR MEDIAN BARRIER (MB) AND APPROVED BY THE ENGINEER.



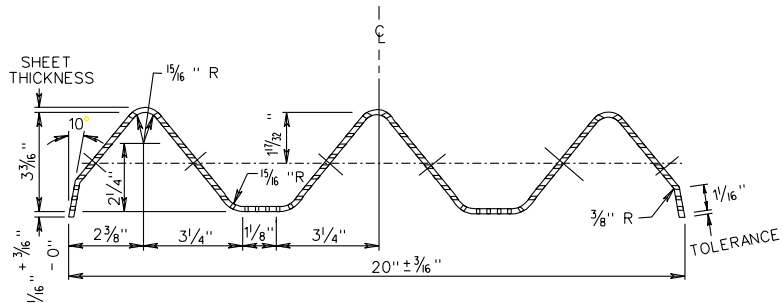
W BEAM END SECTION (ROUNDED)



SPECIFICATION REFERENCE
221 505

STANDARD GUARDRAIL HARDWARE
W BEAM GUARDRAIL HARDWARE

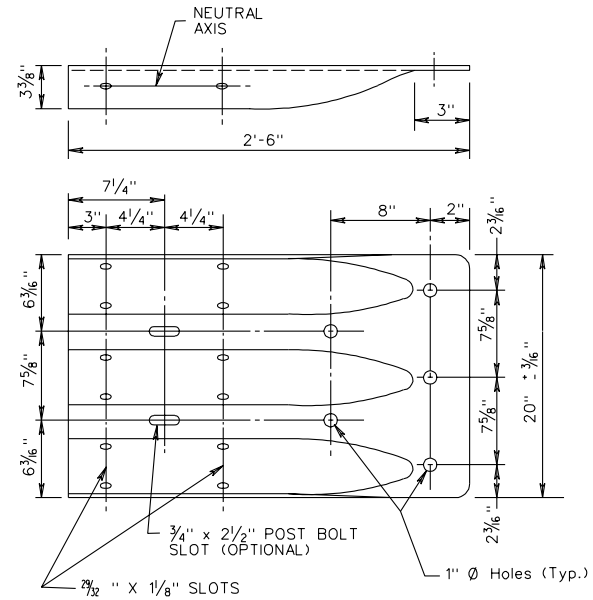
VIRGINIA DEPARTMENT OF TRANSPORTATION



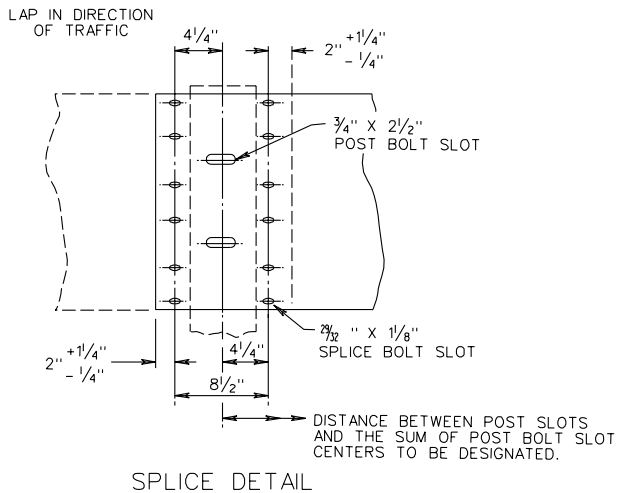
SECTION THRU THRIE BEAM RAIL ELEMENT

NOTES:

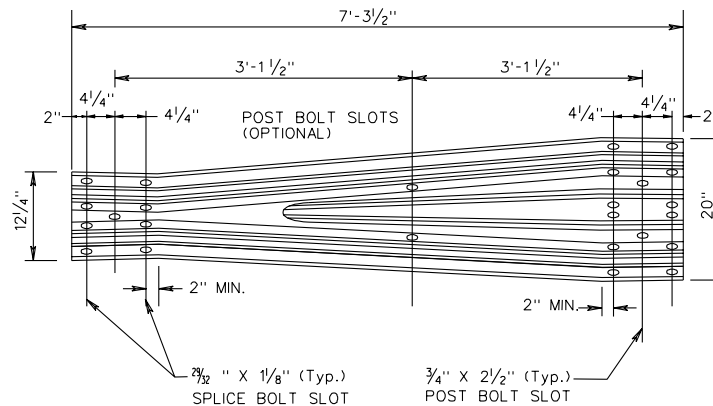
THE GUARDRAIL AND MEDIAN BARRIER COMPONENTS DEPICTED IN ARTBA TECHNICAL BULLETIN NUMBER 268B MAY BE SUBSTITUTED IF INTERCHANGEABLE WITH THE STANDARDS FOR GUARDRAIL (GR) OR MEDIAN BARRIER (MB) AND APPROVED BY THE ENGINEER.



THRIE BEAM TERMINAL CONNECTOR DETAIL

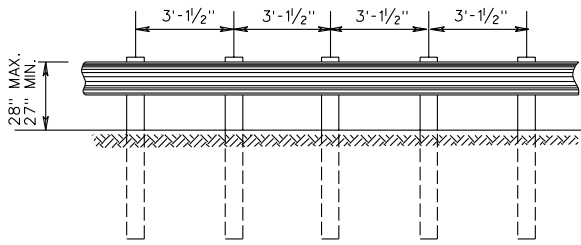


SPLICE DETAIL

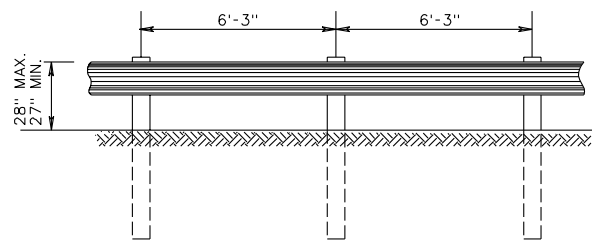


TRANSITION SECTION DETAIL (W-BEAM TO THRIE BEAM)

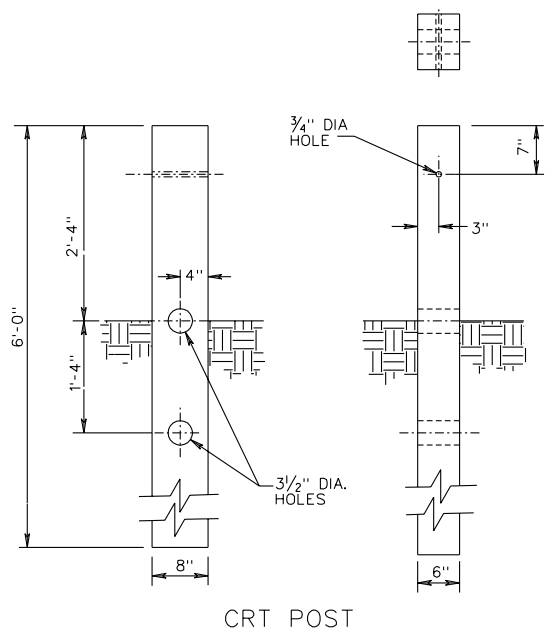
STANDARD GUARDRAIL HARDWARE
THRIE BEAM GUARDRAIL HARDWARE



GR-2A
(3'-1/2" POST SPACING)



GR-2
(6'-3" POST SPACING)



CRT POST

NOTES:

GUARDRAIL LOCATIONS SHOWN ON PLANS ARE APPROXIMATE ONLY AND CAN BE ADJUSTED DURING CONSTRUCTION IF AND AS DIRECTED BY THE ENGINEER.

FOR DETAILS OF POST AND BLOCKOUTS SEE SHEET NO. 501.05.

FOR DETAILS OF RAIL ELEMENT, RAIL SPLICE JOINT, W-BEAM BACK-UP PLATE, AND ASSOCIATED HARDWARE SEE SHEET NOS. 501.01 AND 501.02.

THE MAXIMUM DYNAMIC DEFLECTION FOR STANDARD GR-2 IS 3 FEET, AND 2 FEET FOR GR-2A.

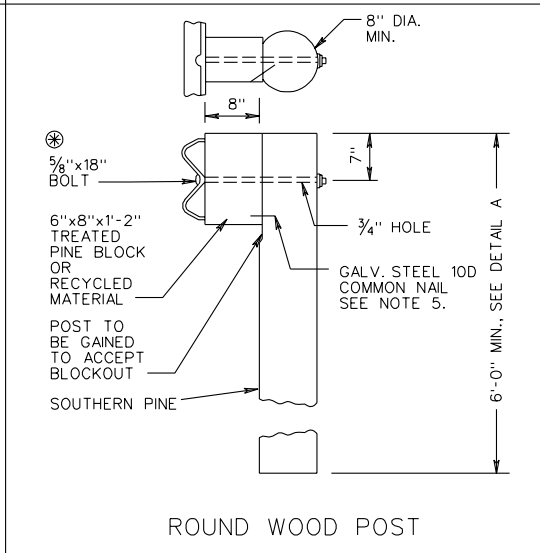
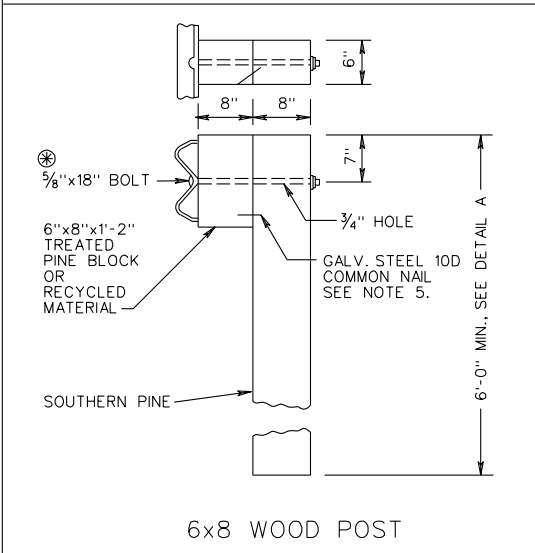
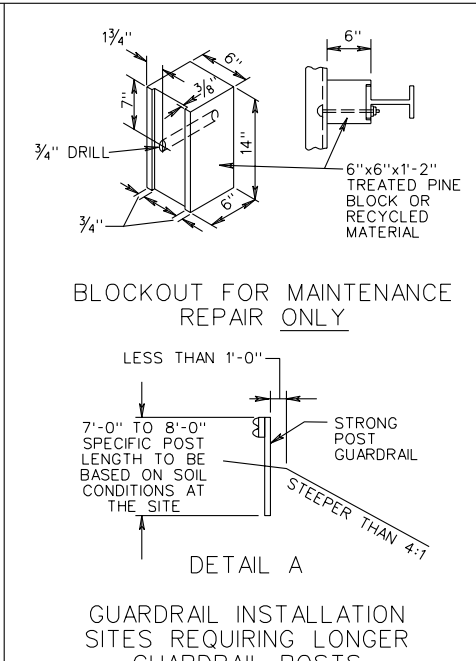
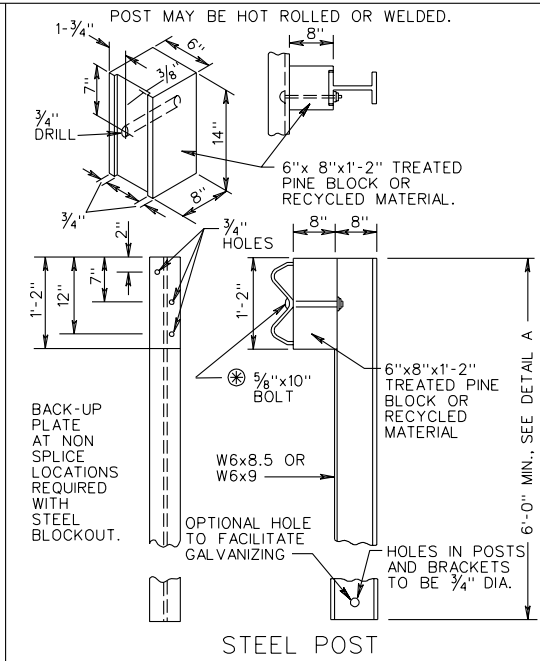
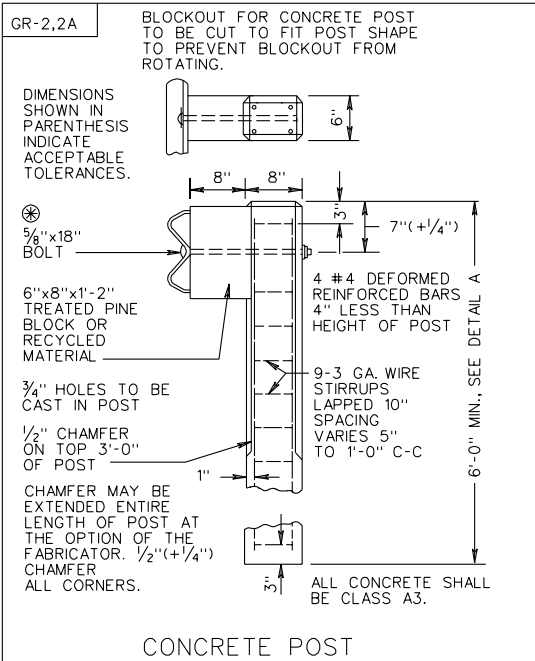
RAIL ELEMENTS ARE FURNISHED SHOP CURVED FOR RADII BETWEEN 5 FEET AND 150 FEET.

SPECIFICATION REFERENCE
221 505

STANDARD BLOCKED-OUT W BEAM GUARDRAIL (STRONG POST SYSTEM)

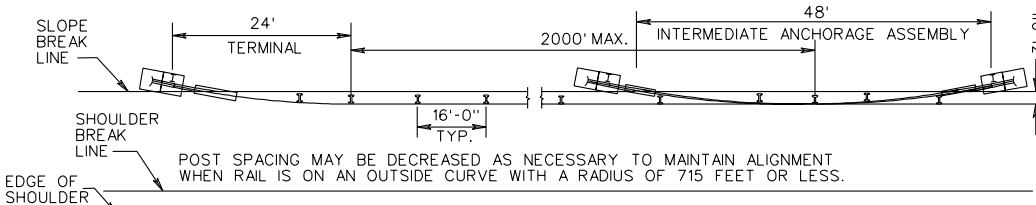
VIRGINIA DEPARTMENT OF TRANSPORTATION

REVISED 7/01



- NOTES:
1. ALL BOLTS, NUTS, WASHERS, AND OTHER STEEL ITEMS ARE TO BE GALVANIZED.
 2. ALTERNATE TYPE POSTS AND BLOCKOUT MAY BE INTERCHANGED ON ANY ONE PROJECT WITH THE RESTRICTION THAT THE SAME TYPE OF POST AND BLOCKOUT MUST BE USED IN ANY SINGLE RUN OF GUARDRAIL.
 3. FOR DETAILS OF GUARDRAIL ELEMENT SPLICE JOINT, HARDWARE, ETC. SEE SHEET NOS. 501.01 & 501.02.
 4. THE GUARDRAIL AND MEDIAN BARRIER COMPONENTS DEPICTED IN A.R.T.B.A. TECHNICAL BULLETIN NUMBER 268B MAY BE SUBSTITUTED IF INTERCHANGEABLE WITH THE STANDARDS FOR GUARDRAIL (GR) OR MEDIAN BARRIER (MB) AND APPROVED BY THE ENGINEER.
 5. DRIVE NAIL WITHIN 2" OF THE TOP OR BOTTOM OF BLOCKOUT AFTER 5/8" x 18 BOLT IS INSTALLED.
- ⊗ STANDARD WASHER TO BE USED ON LAST 50' OF RUN OFF END ONLY.
- SHEET 2 OF 2

STANDARD BLOCKED-OUT W BEAM GUARDRAIL (STRONG POST SYSTEM) POST AND BLOCKOUT DETAILS		SPECIFICATION REFERENCE
501.05	VIRGINIA DEPARTMENT OF TRANSPORTATION	221 236 505

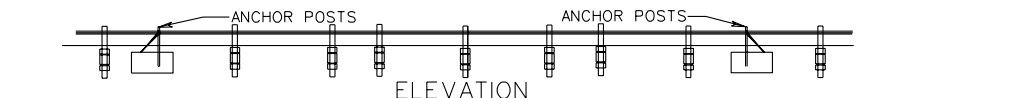
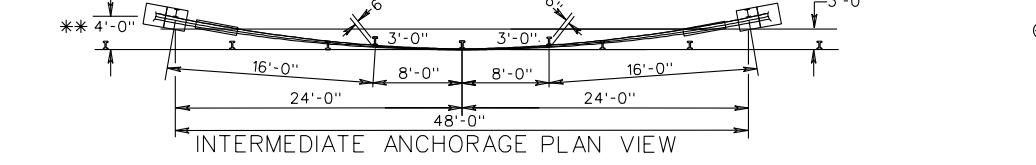
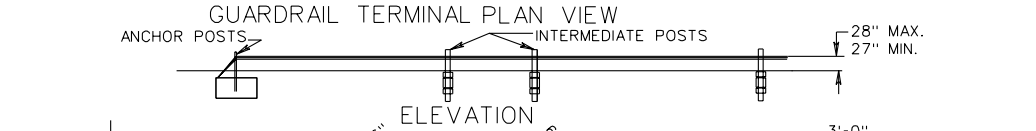
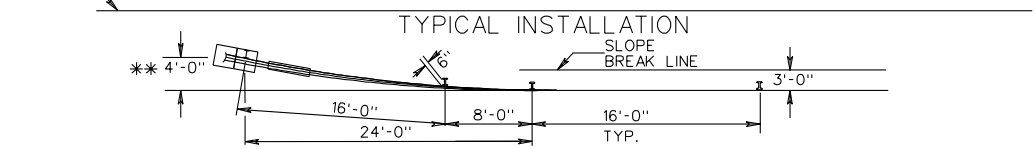


NOTES:

FOR ARRANGEMENTS OF SPRING CABLE END ASSEMBLIES (COMPENSATING DEVICES) AND TURNBUCKLE CABLE END ASSEMBLIES, THE FOLLOWING CRITERIA SHALL APPLY:

LENGTH OF CABLE RUNS:

- TO 500'-USE COMPENSATING DEVICE ON EACH END OF EACH INDIVIDUAL CABLE.
- OVER 500' TO 2000'-USE COMPENSATING DEVICE ON EACH END OF EACH INDIVIDUAL CABLE.
- OVER 2000'-START NEW STRETCH BY INTERLACING AT LAST PARALLEL POST. SEE TYP. INSTALLATION.



FITTINGS: ALL FITTINGS SHALL BE SO DESIGNED AND BE OF SUCH SECTION AS TO DEVELOP THE FULL STRENGTH OF A SINGLE CABLE OR CABLE ASSEMBLIES, AS THE CASE MAY BE.

SINGLE CABLE ANCHOR ASSEMBLY-
MIN. TENSILE STRENGTH.....25,000 LBS.

THREE CABLE ANCHOR ASSEMBLY-
MIN. TENSILE STRENGTH.....100,000 LBS.

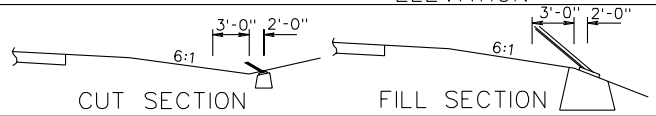
ALL FITTINGS SHALL BE HOT DIPPED GALVANIZED.

THE DYNAMIC DEFLECTION FOR STANDARD GR-3 IS 11 FEET.

⊗ THE GUARDRAIL AND MEDIAN BARRIER COMPONENTS DEPICTED A.R.T.B.A. TECHNICAL BULLETIN NUMBER 268B MAY BE SUBSTITUTED IF INTERCHANGEABLE WITH THE STANDARDS FOR GUARDRAIL (GR) OR MEDIAN BARRIER (MB) AND APPROVED BY THE ENGINEER.

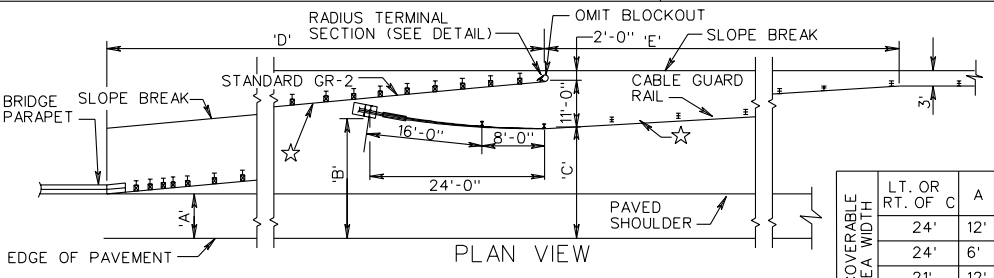
FOR ROCK INSTALLATION, 8"x24"x1/4" PLATE SHALL BE ELIMINATED. DRILL OR EXCAVATE HOLE FOR POST AND BACKFILL WITH CRUSHER RUN AGGREGATE TO LEVEL OF ROCK.

5/16" ANSIB18.2.2 HEX. BACKING NUT OR APPROVED SHOULDER MUST EQUAL BEARING AREA OF 5/16" STANDARD NUT.



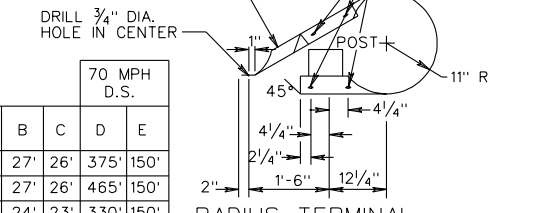
* THE GUARDRAIL AND MEDIAN BARRIER COMPONENTS DEPICTED IN AASHTO AGC-A.R.T.B.A. "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE" MAY BE SUBSTITUTED IF INTERCHANGEABLE WITH THE STANDARDS FOR GUARDRAIL (GR) OR MEDIAN BARRIER (MB) AND APPROVED BY THE ENGINEER.

** WHEN BURYING GR-3 CABLE GUARDRAIL IN THE BACKSLOPE, THE CONCRETE ANCHOR ASSEMBLY MUST BE PLACED AT A HEIGHT ON THE BACKSLOPE TO MAINTAIN THE 27" MIN./28" MAX. CABLE HEIGHT AT THE ANCHORAGE.



☆ USE 15:1 FLARES ON BOTH TYPES OF RAIL FOR DESIGN SPEED OF 70 MPH OR 13:1 FOR DESIGN SPEED OF 60 MPH OR LESS.

* FOR DETAILS OF TERMINAL CONNECTOR SEE SHEET 501.02



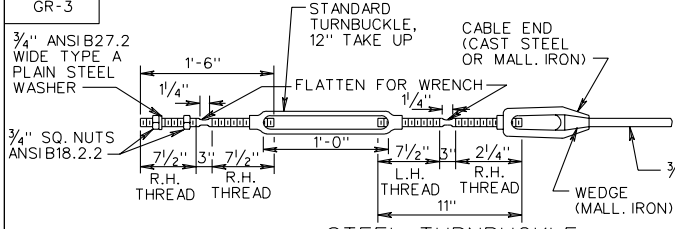
RECOVERABLE AREA WIDTH	70 MPH D.S.				
	LT. OR RT. OF C	A	B	C	D
24'	12'	27'	26'	375'	150'
24'	6'	27'	26'	465'	150'
21'	12'	24'	23'	330'	150'
21'	6'	24'	23'	420'	150'

SPECIFICATION REFERENCE
221
505

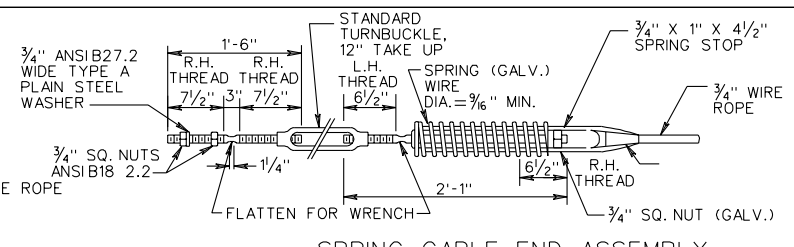
METHOD OF TRANSITION FROM CABLE GUARDRAIL TO W-BEAM GUARDRAIL AT BRIDGE APPROACHES

CABLE GUARDRAIL
VIRGINIA DEPARTMENT OF TRANSPORTATION

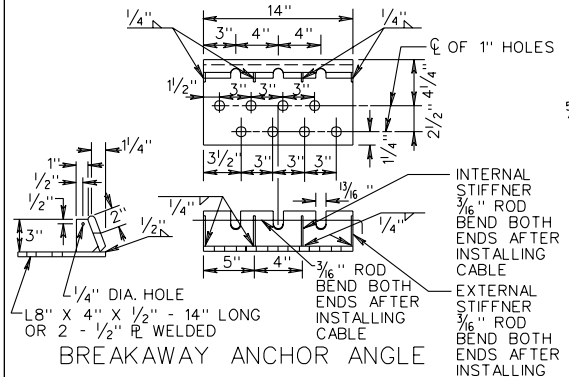
GR-3



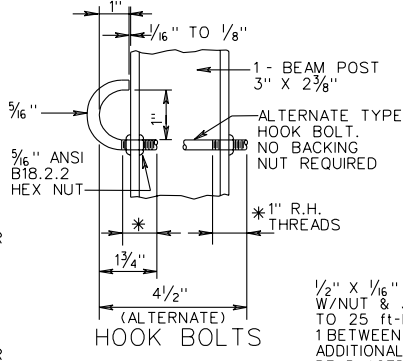
STEEL TURNBUCKLE CABLE END ASSEMBLY



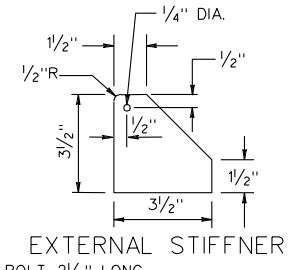
SPRING CABLE END ASSEMBLY (COMPENSATING DEVICE)



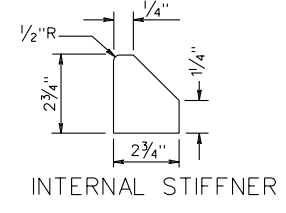
BREAKAWAY ANCHOR ANGLE



HOOK BOLTS

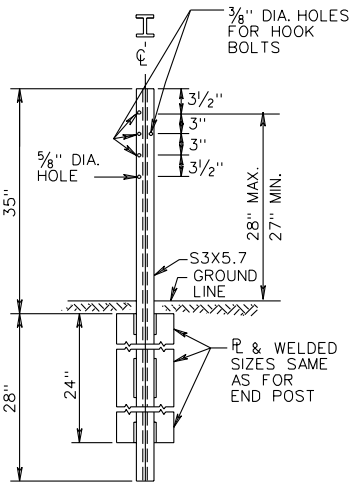


EXTERNAL STIFFENER

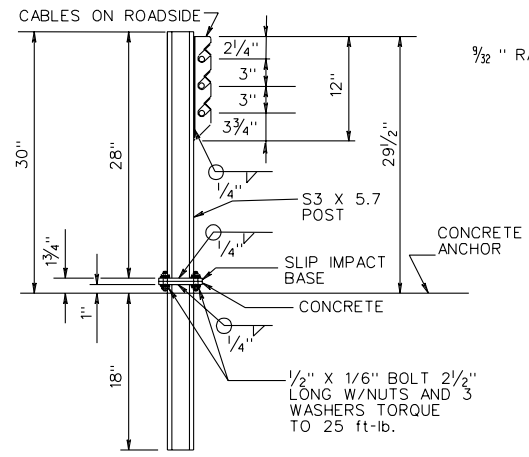


INTERNAL STIFFENER

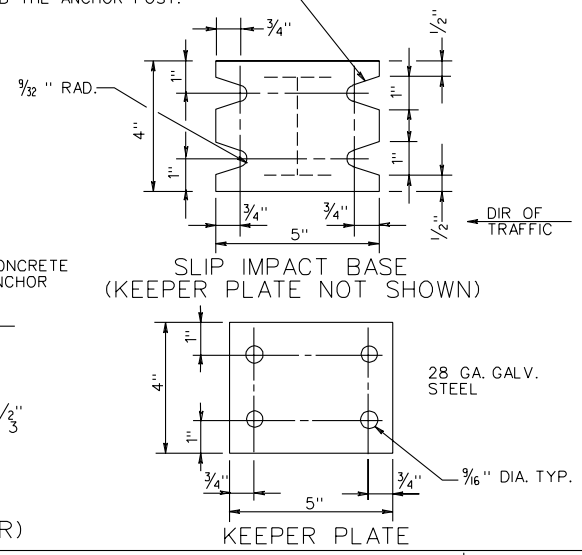
1/2" x 1/16" BOLT 2 1/2" LONG. W/NUT & 3 WASHERS. TORQUE TO 25 FT-LB. 1 WASHER UNDER HEAD. 1 BETWEEN STIFFENERS. 1 UNDER NUT. ADDITIONAL 1/16" THICK WASHER MAY BE PLACED BETWEEN STIFFENERS TO PLUMB THE ANCHOR POST.



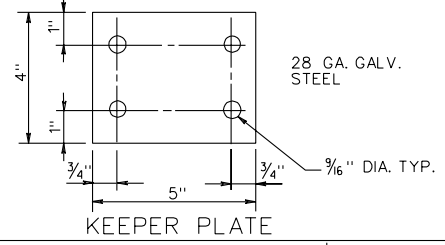
INTERMEDIATE POST DETAIL



ANCHOR POST DETAIL (SHOWN FOR LEFT HANDED ANCHOR)



SLIP IMPACT BASE (KEEPER PLATE NOT SHOWN)



KEEPER PLATE

SHEET 2 OF 3

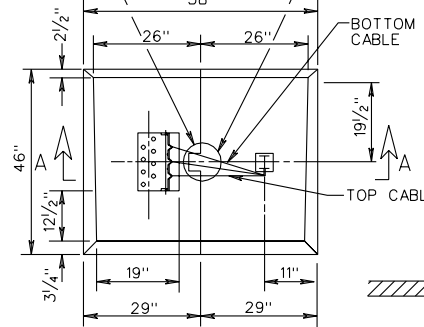
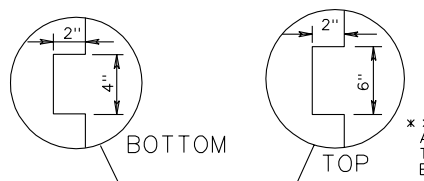
CABLE GUARDRAIL

VIRGINIA DEPARTMENT OF TRANSPORTATION

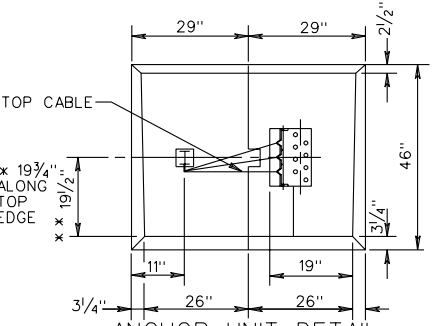
SPECIFICATION REFERENCE

221
505

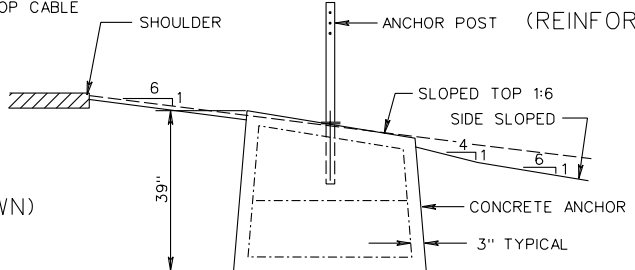
501.07



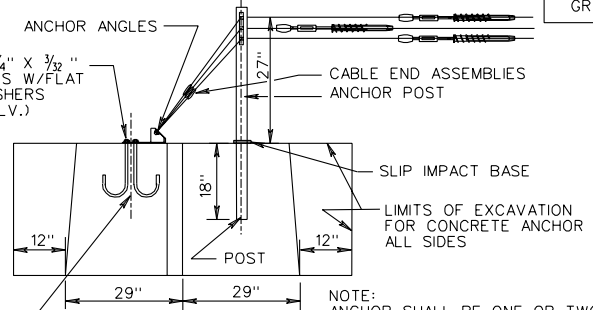
ANCHOR UNIT DETAIL
TOP VIEW LEFT HAND
(REINFORCEMENT NOT SHOWN)



ANCHOR UNIT DETAIL
TOP VIEW RIGHT HAND
(REINFORCEMENT NOT SHOWN)
TWO PIECE

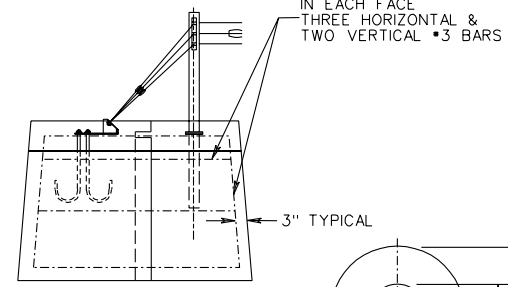


ANCHOR UNIT DETAIL & RE-BAR
INSTALLATION DETAIL

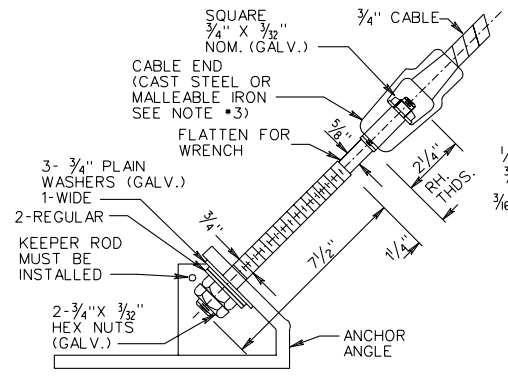


SECTION AA
ANCHOR UNIT DETAIL
LEFT HAND
(REINFORCEMENT NOT SHOWN)

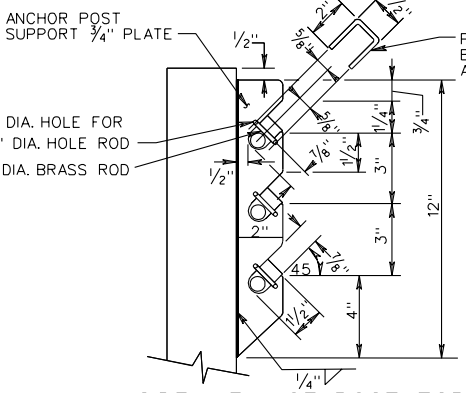
NOTE:
ANCHOR SHALL BE ONE OR TWO
PIECE. DIMENSION OF TWO PIECE
ANCHOR ARE SHOWN ON DRAWING
DIMENSIONS OF ONE PIECE ANCHOR
ARE 4'-11" LONG BY 3'-0" WIDE
BY 3'-3" HIGH.



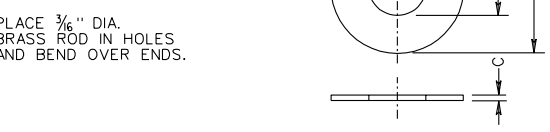
TWO PIECE



CABLE END ASSEMBLY TO
ANCHOR ANGLE DETAIL



SIDE VIEW OF POST TOP



WASHER	WASHER SERIES	A		B		C	
		INSIDE DIA.	OUTSIDE DIA.	INSIDE DIA.	OUTSIDE DIA.	THICKNESS	THICKNESS
3/4"	REGULAR	7/8"	55/64"	2"	15/16"	3/16"	9/64"
	WIDE	7/8"	55/64"	2 19/32"	2 5/64"	13/64"	5/32"
1/2"	NARROW	1 1/32"	1/2"	1"	63/64"	7/64"	1/16"

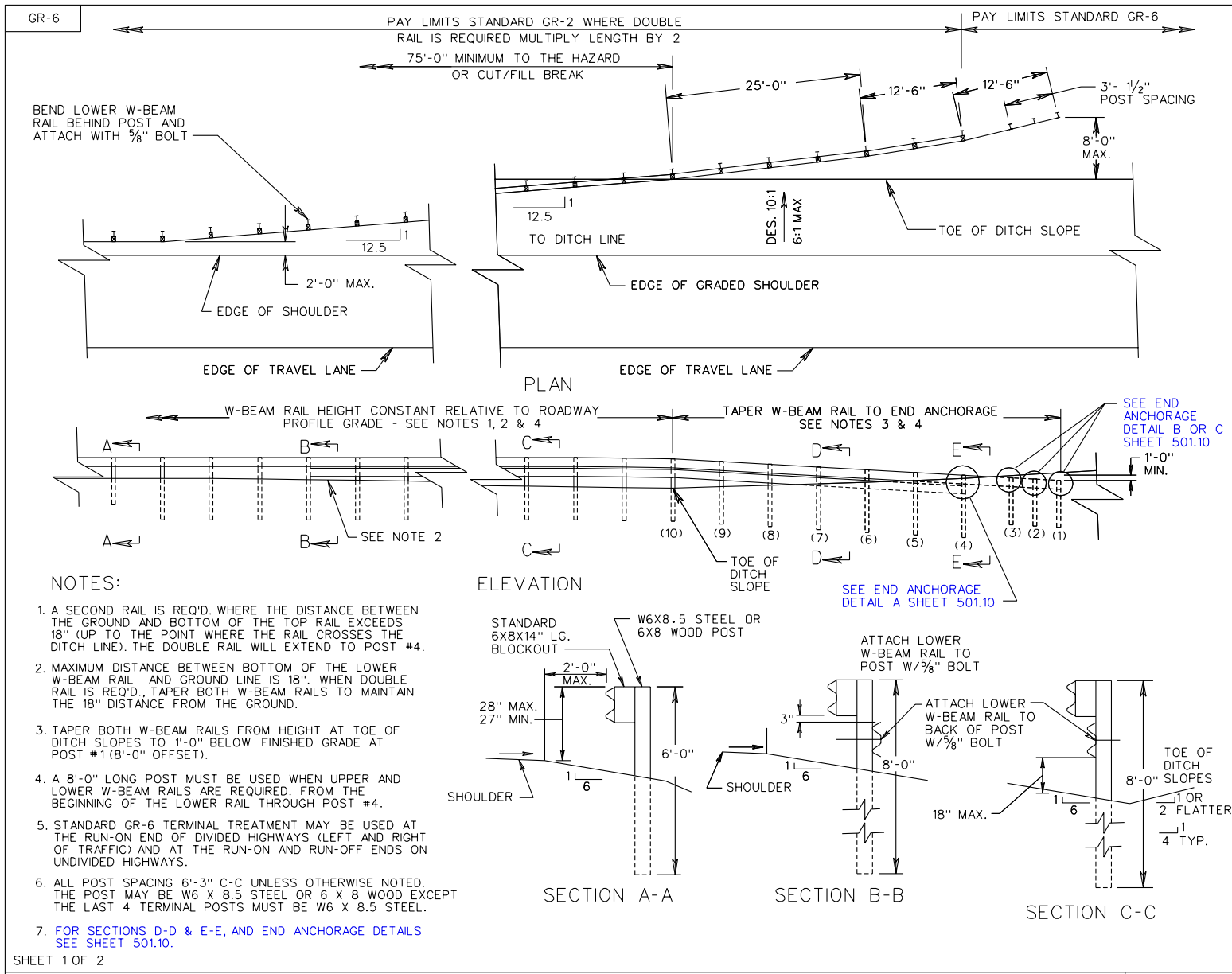
SPECIFICATION REFERENCE	
221 505	

CABLE GUARDRAIL

VIRGINIA DEPARTMENT OF TRANSPORTATION

REVISED ON 7/01

REVISED ON 7/02



SHEET 1 OF 2

TERMINAL TREATMENT FOR W BEAM GUARDRAIL

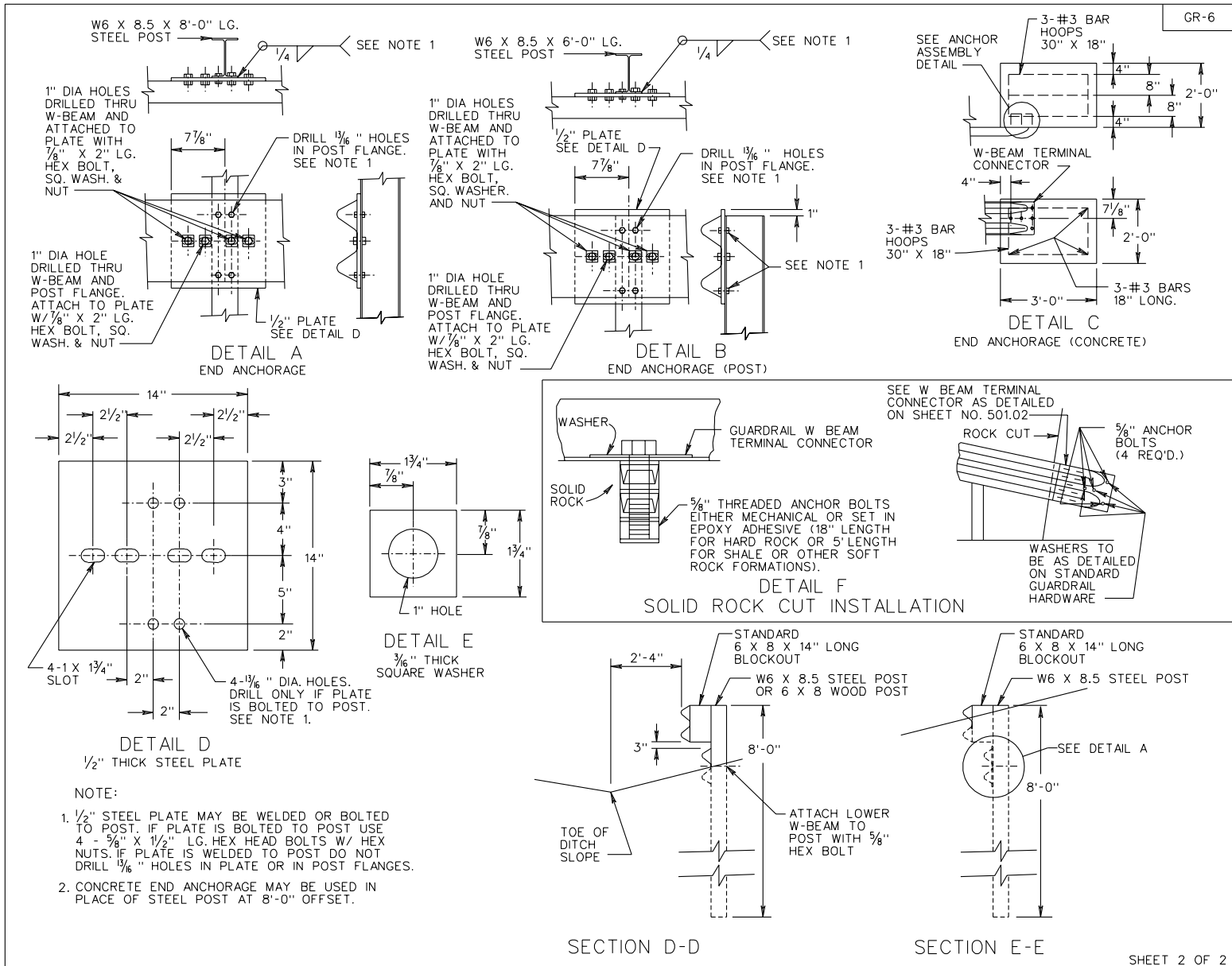
VIRGINIA DEPARTMENT OF TRANSPORTATION

501.09

SPECIFICATION REFERENCE

505
221

REVISED 7/01



GR-6

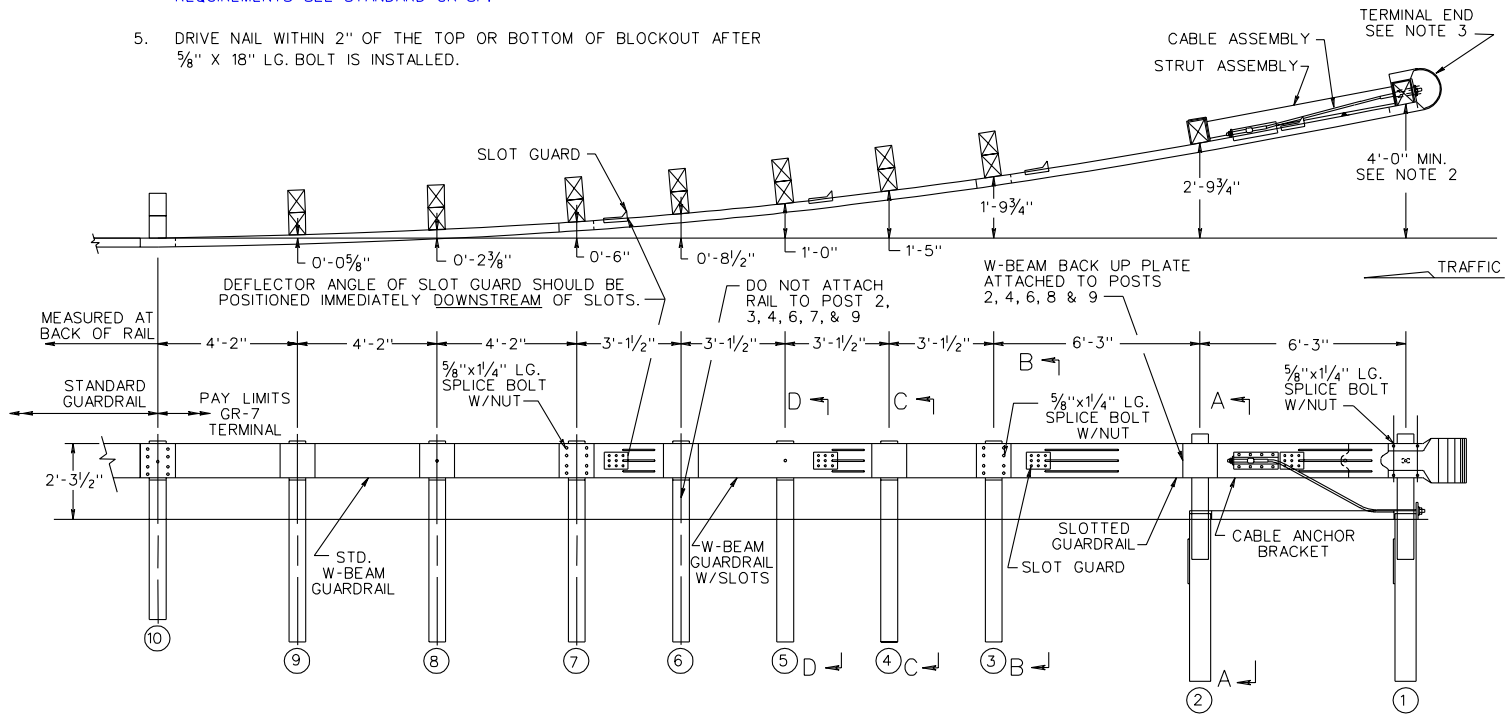
SHEET 2 OF 2

SPECIFICATION REFERENCE 505 221	<h2 style="margin: 0;">TERMINAL TREATMENT FOR W BEAM GUARDRAIL</h2> <p style="margin: 0;">VIRGINIA DEPARTMENT OF TRANSPORTATION</p>	501.10
---	---	--------

GR-7

NOTES:

1. GUARDRAIL TERMINAL, STD. GR-7 IS TO BE SRT 350 (AS SHOWN) MANUFACTURED BY SYRO STEEL COMPANY, THE FLEAT 350 MANUFACTURED BY ROAD SYSTEMS, INC., OR OTHER VDOT APPROVED EQUAL MEETING NCHRP 350 TESTING CRITERIA UTILIZING A 4 FT. OFFSET.
2. THE POST OFFSET DIMENSION ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE BLOCKOUTS EXCEPT AT THE FIRST TWO POST, WHERE THE DIMENSION IS TO THE CENTER OF THE TRAFFIC FACE OF THE POST. OFFSET POINTS ARE TO BE LOCATED BY CHORD MEASUREMENT AT THE BACK OF THE RAIL EQUAL TO THE NOMINAL POST SPACINGS SHOWN. POST ARE TO BE SET APPROXIMATELY RADIAL TO THE RAILING AT EACH POST LOCATION.
3. YELLOW 8" x 36" REFLECTIVE ADHESIVE SHEETING TO BE APPLIED TO NOSE IN ACCORDANCE WITH VDOT SPECS.
4. FOR DETAILS OF GUARDRAIL TERMINAL INSTALLATION SITE PREPARATION REQUIREMENTS SEE STANDARD GR-SP.
5. DRIVE NAIL WITHIN 2" OF THE TOP OR BOTTOM OF BLOCKOUT AFTER 5/8" X 18" LG. BOLT IS INSTALLED.



SHEET 1 OF 3

BREAKAWAY CABLE TERMINAL
4' FLARE

VIRGINIA DEPARTMENT OF TRANSPORTATION

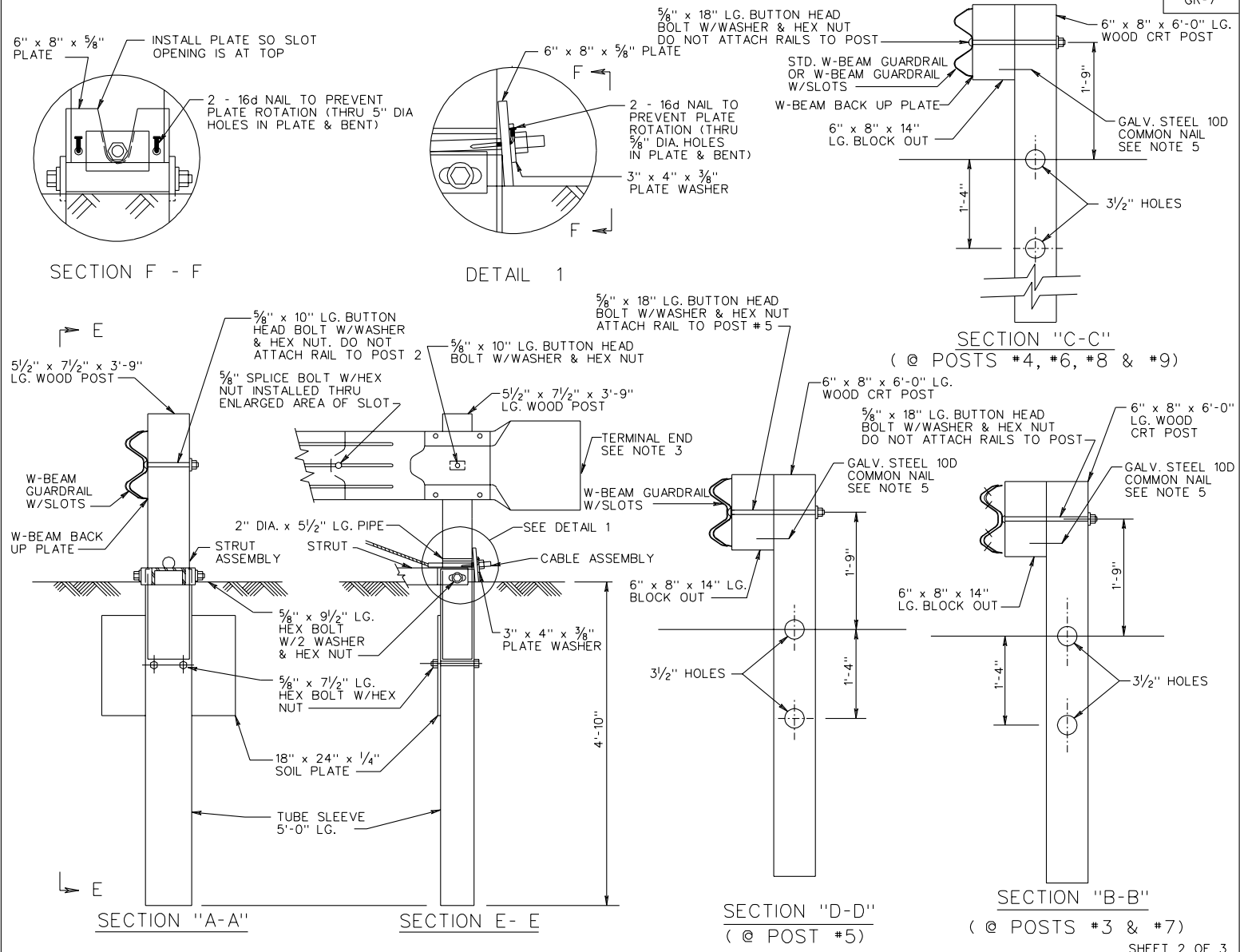
SPECIFICATION
REFERENCE

221
505

501.11

REVISED ON 7/02

GR-7



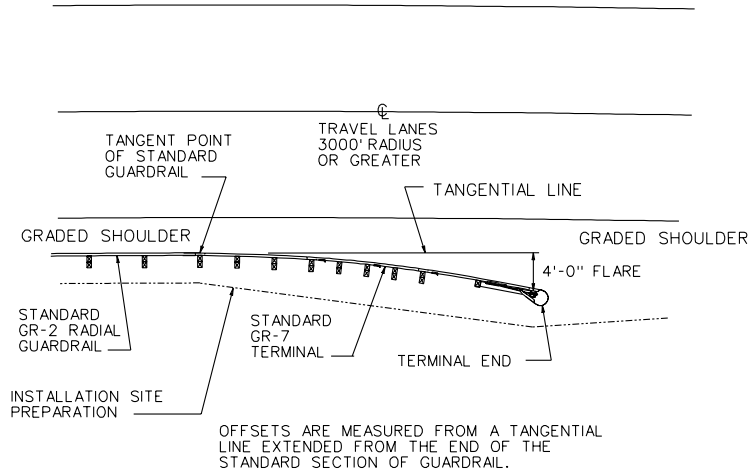
SPECIFICATION REFERENCE
221 505

BREAKAWAY CABLE TERMINAL
 4' FLARE

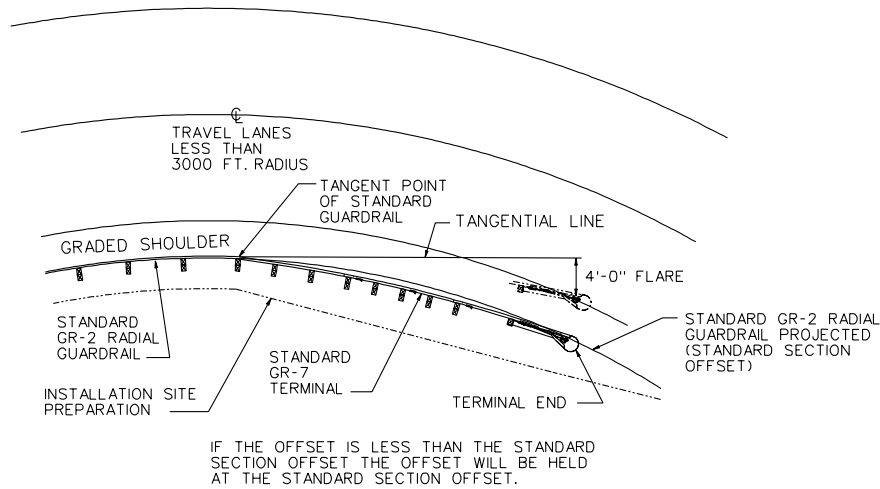
VIRGINIA DEPARTMENT OF TRANSPORTATION

SHEET 2 OF 3

501.12



FLARED TERMINAL PLACEMENT
3000 FT. RADIUS OR GREATER



FLARED TERMINAL PLACEMENT ON
INSIDE OF CURVE - LESS THAN
3000 FT. RADIUS

BREAKAWAY CABLE TERMINAL 4' FLARE

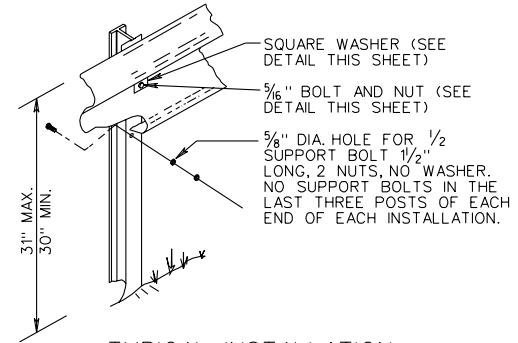
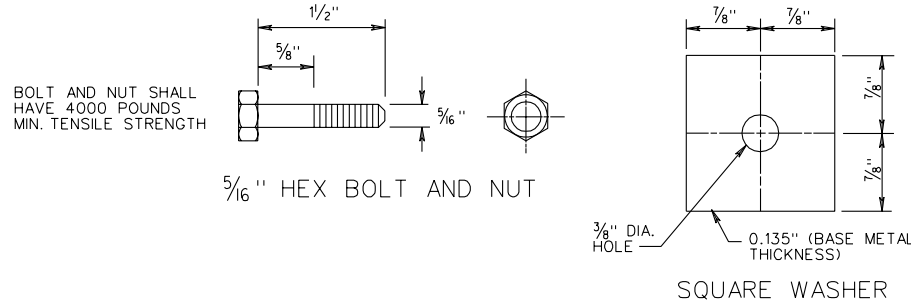
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION
REFERENCE

221
505

REVISED 7/01

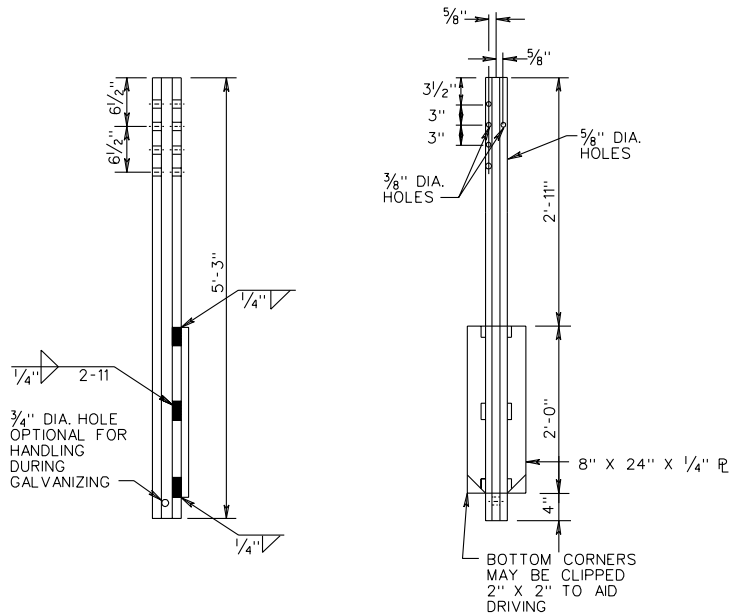
GR-8,8A,8B,8C



TYPICAL INSTALLATION

THIS UNIT IS ONLY TO BE USED WHEN DESIGN SPEED IS 45 MPH OR LESS. TESTED - NCHRP 350 TEST LEVEL 2

STANDARD	POST SPACING	DEFLECTION
GR-8	12' - 6"	7' - 0"
GR-8A	6' - 3"	5' - 0"
GR-8B	3' - 1 1/2"	4' - 0"
GR-8C	4' - 2"	4' - 6"



S 3 X 5.7 STEEL POST

FOR ROCK INSTALLATION, 8" X 24" X 1/4" PLATE IS TO BE ELIMINATED. DRILL OR EXCAVATE HOLE FOR POST, PLACE POST AND BACKFILL WITH CRUSHER RUN AGGREGATE TO LEVEL OF ROCK.

ALL POSTS, BOLTS, NUTS AND WASHERS ARE TO BE GALVANIZED.

FOR DETAILS OF GUARDRAIL ELEMENT, SPLICE JOINT, HARDWARE, ETC. SEE SHEET NO. 501.01.

THE GUARDRAIL AND MEDIAN BARRIER COMPONENTS DEPICTED IN A.R.T.B.A. TECHNICAL BULLETIN NUMBER 268B MAY BE SUBSTITUTED IF INTERCHANGEABLE WITH THE STANDARDS FOR GUARDRAIL (GR) OR MEDIAN BARRIER (MB) AND APPROVED BY THE ENGINEER.

POST SPACING ON CURVES	
PAVEMENT C RADIUS	POST SPACING
> 220 FT. R	12' - 6"
219 FT. - 111 FT.	6' - 3"
110 FT. - 76 FT.	4' - 2"
75 FT. - 50 FT.	3' - 1 1/2"
< 50 FT.	USE NOT RECOMMENDED

SHEET 1 OF 2

SPECIFICATION REFERENCE

221
505

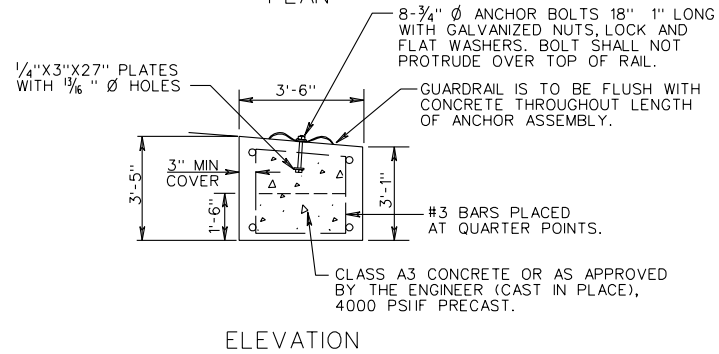
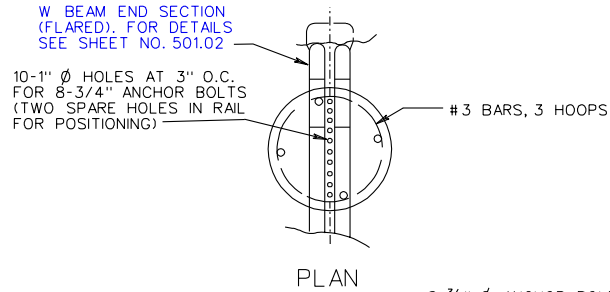
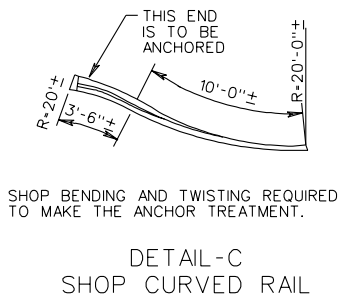
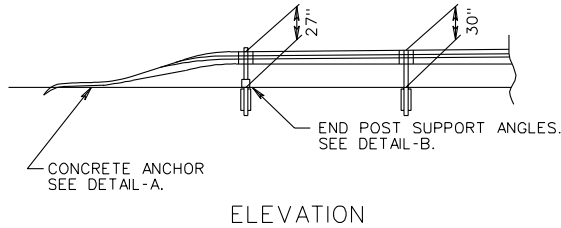
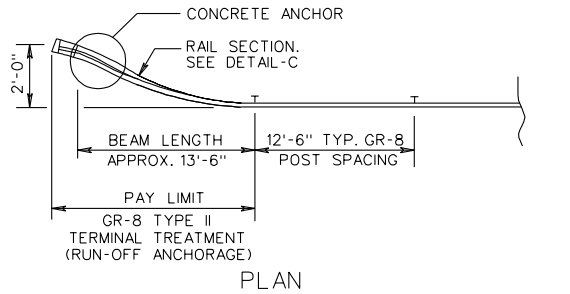
STANDARD W BEAM GUARDRAIL (WEAK POST SYSTEM)

VIRGINIA DEPARTMENT OF TRANSPORTATION

501.14

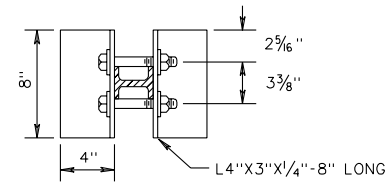
REVISED 7/01

GR-8,8A,8B,8C



DETAIL-A
CONC. ANCHOR
ASSEMBLY

1/8" Ø HOLES FOR 3/4" BOLTS 4 1/2" LONG WITH NUTS AND WASHERS. BOLTS TORQUED TO 100 + 20 FT. LBS. AFTER POST IS DRIVEN.



GR-8 TYPE II TERMINAL TREATMENT
(RUN-OFF ANCHORAGE)

SHEET 2 OF 2

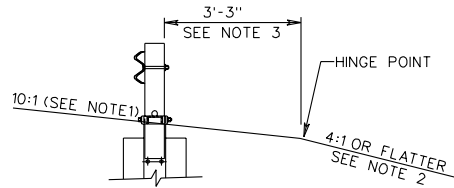
STANDARD W BEAM GUARDRAIL (WEAK POST SYSTEM)

VIRGINIA DEPARTMENT OF TRANSPORTATION

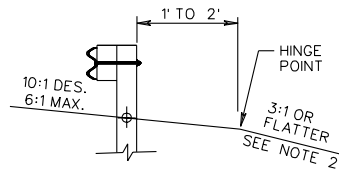
501.15

SPECIFICATION
REFERENCE

221
505



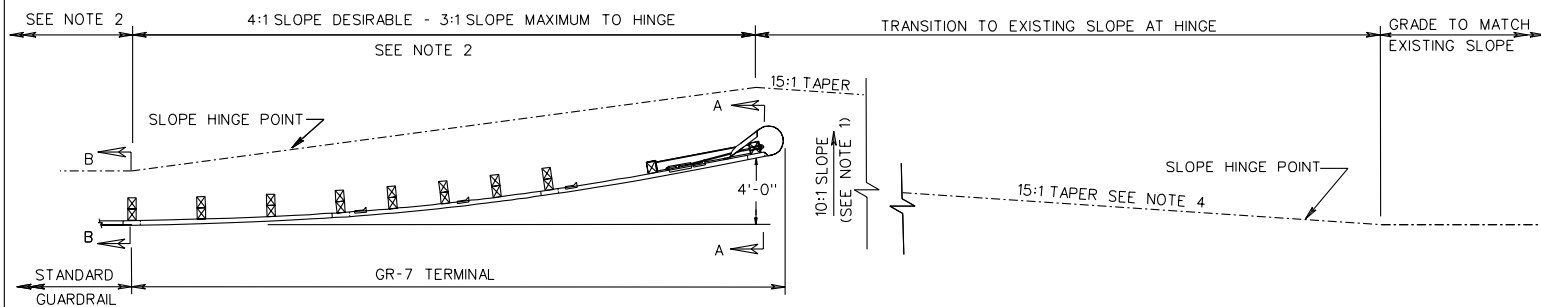
SECTION A-A

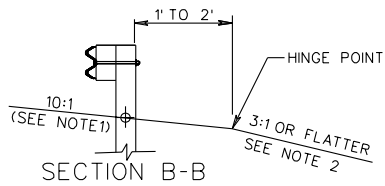
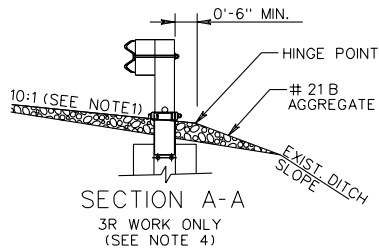
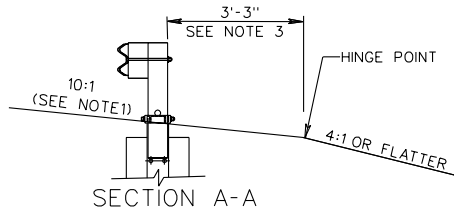


SECTION B-B

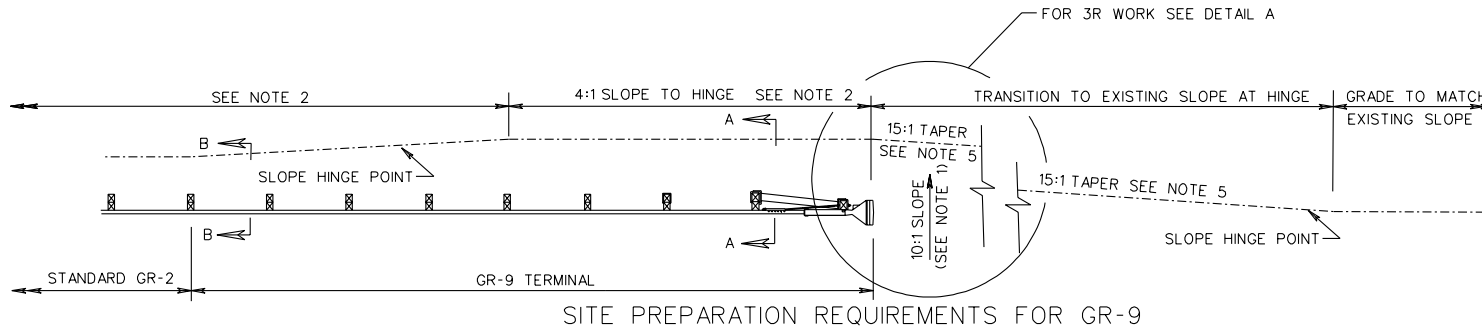
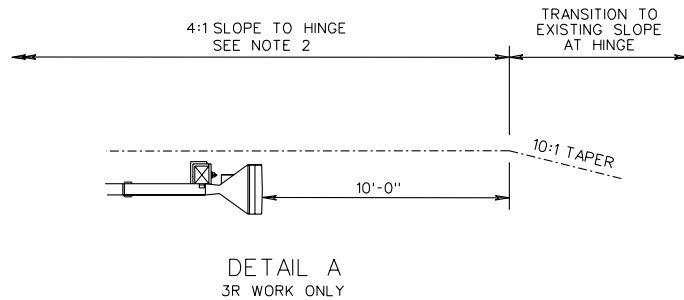
NOTES:

1. DESIRABLY, THE CROSS SLOPE OF THE GRADE APPROACHING THE GUARDRAIL TERMINAL, AND ADJACENT TO FOR ITS FULL LENGTH, MUST BE 10:1. IF THE EXISTING GRADE IS FLAT OR IS A POSITIVE SLOPE DUE TO THE SUPERELEVATION OF THE ROADWAY PAVEMENT, THE MINIMUM OFFSET FROM BEHIND THE POST TO THE HINGE POINT, AS SHOWN, IS REQUIRED.
2. THE AREA IMMEDIATELY BEHIND AND BEYOND THE TERMINAL SHOULD BE TRAVERSABLE AND FREE FROM FIXED OBJECTS. IF A CLEAR RUN OUT IS NOT ATTAINABLE THIS AREA SHOULD AT LEAST BE SIMILAR IN CHARACTER TO THE UPSTREAM UNSHIELDED ROADSIDE AREAS.
3. FOR NEW CONSTRUCTION AND RECONSTRUCTION THE 10:1 SLOPE GRADING MUST EXTEND A MINIMUM OF 3'-3" BEHIND THE END POST. FOR 3R WORK THE GRADING SHOULD BE AS CLOSE AS POSSIBLE
4. FOR PROPRIETARY GUARDRAIL TERMINALS THE MANUFACTURE'S SITE PREPARATION REQUIREMENTS TAKE PRECEDENCE OVER THIS STANDARD.



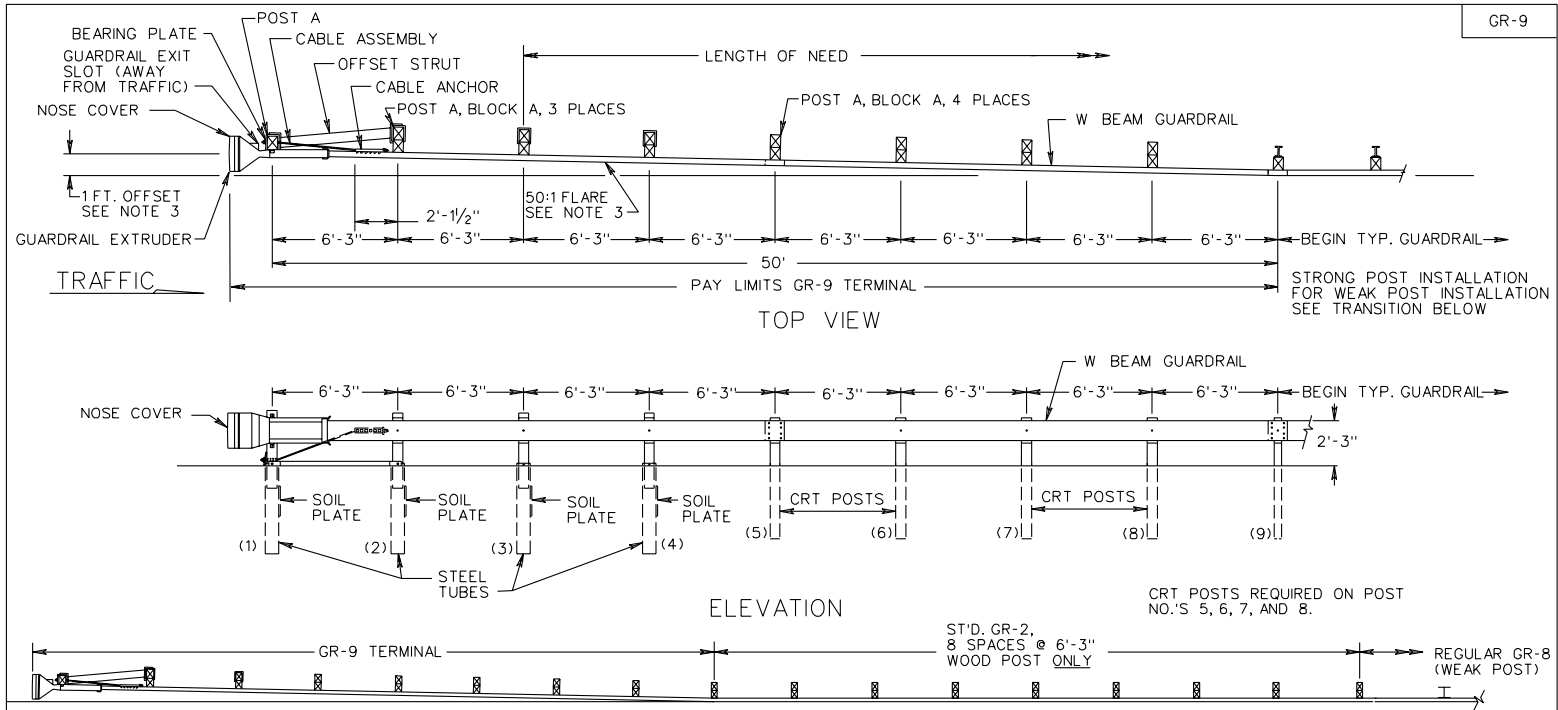


- NOTES:
1. THE CROSS SLOPE OF THE GRADE APPROACHING THE GUARDRAIL TERMINAL, AND ADJACENT TO FOR ITS FULL LENGTH, MUST BE 10:1. IF THE EXISTING GRADE IS FLAT OR IS A POSITIVE SLOPE DUE TO THE SUPERELEVATION OF THE ROADWAY PAVEMENT, THE MINIMUM OFFSET FROM BEHIND THE POST TO THE HINGE POINT, AS SHOWN, IS REQUIRED.
 2. THE AREA IMMEDIATELY BEHIND AND BEYOND THE TERMINAL SHOULD BE TRAVERSABLE AND FREE FROM FIXED OBJECTS. IF A CLEAR RUN OUT IS NOT ATTAINABLE THIS AREA SHOULD AT LEAST BE SIMILAR IN CHARACTER TO THE UPSTREAM UNSHIELDED ROADSIDE AREAS.
 3. FOR NEW CONSTRUCTION AND RECONSTRUCTION THE 10:1 SLOPE GRADING MUST EXTEND A MINIMUM OF 3'-3" BEHIND THE END POST.
 4. FOR 3R WORK, THE GRADING SHOULD BE AS CLOSE TO RECONSTRUCTION WORK AS POSSIBLE WITH A MINIMUM OF 10:1 SLOPE EXTENDED 6" BEYOND THE POST. FROM THE HINGE POINT, TIE THE 10:1 SLOPE INTO THE EXISTING DITCH SLOPE TO COVER THE FOUNDATION TUBES AND SOIL PLATES WITHOUT EXTENDING THIS SLOPE BEYOND THE DITCH BOTTOM. USE # 21B AGGREGATE, OR OTHER SUITABLE MATERIAL AS APPROVED BY THE ENGINEER, AT ROADWAY SHOULDERS.
 5. THE TAPER FOR NEW CONSTRUCTION WILL BE 15:1. FOR 3R WORK THE MINIMUM ALLOWABLE TAPER IS 10:1.
 6. FOR PROPRIETARY GUARDRAIL TERMINALS THE MANUFACTURE'S SITE PREPARATION REQUIREMENTS TAKE PRECEDENCE OVER THIS STANDARD.



GUARDRAIL TERMINAL INSTALLATION SITE PREPARATION REQUIREMENTS FOR GR-9

REVISED ON 7/02



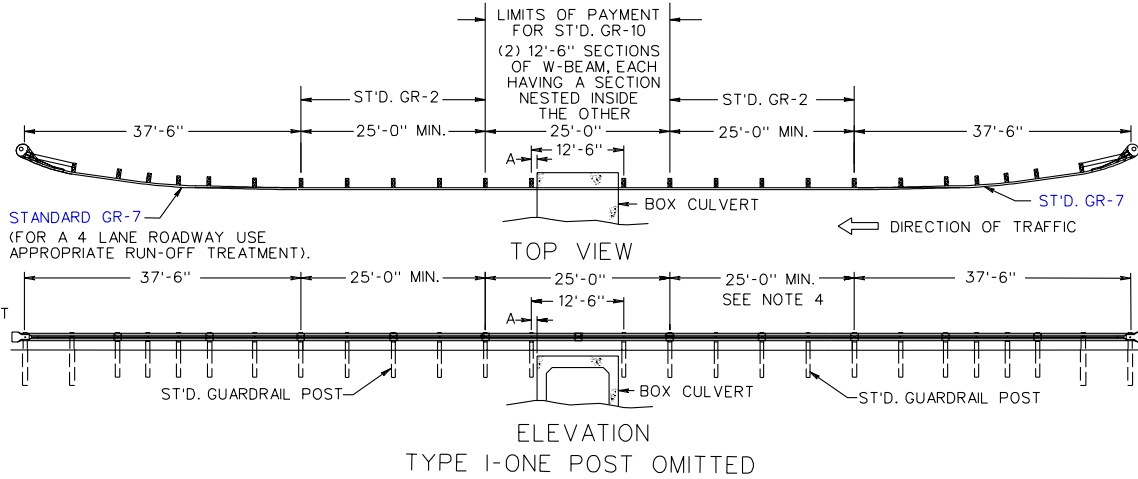
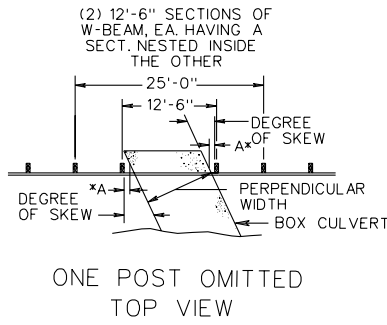
TRANSITION FROM GR-9 TERMINAL TO WEAK POST GUARDRAIL

NOTES:

1. THIS DESIGN SHALL BE USED AFTER AN ANALYSIS INDICATES IT IS MORE COST EFFECTIVE THAN PROVIDING THE FLARE FOR A STANDARD GR-7 OR EXTENDING THE GUARDRAIL TO PROVIDE A STANDARD GR-6 TERMINAL
2. ALTERNATE BREAKAWAY CABLE TERMINAL (GR-9) IS TO BE ET-2000 (AS SHOWN) OR CAT AS MANUFACTURED BY SYRO STEEL COMPANY, BRAKEMASTER AS MANUFACTURED BY ENERGY ABSORPTION SYSTEMS, INC., THE BEST SYSTEM AS MANUFACTURED BY INTERSTATE STEEL CORPORATION, THE SKT-350 AS MANUFACTURED BY ROAD SYSTEMS INC., OR OTHER VDOT APPROVED EQUAL MEETING NCHRP 350 TESTING CRITERIA. ALL TERMINALS SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
3. ALL STANDARD GR-9 TERMINALS WILL BE INSTALLED WITH AN OFFSET TO PREVENT THE GUARDRAIL EXTRUDER FROM ENCRDACHING ON THE SHOULDER. PLEASE REFER TO THE MANUFACTURE'S INSTALLATION INSTRUCTIONS FOR SPECIFIC INFORMATION ON THEIR TERMINAL SYSTEM'S RECOMMENDED OFFSETS AND STRAIGHT LINE FLARE RATES.
4. FOR DETAILS, DIMENSIONS, QUANTITIES, AND OTHER INFORMATION NOT SHOWN HEREON, SEE INDIVIDUAL MANUFACTURER'S PLANS.
5. THE GUARDRAIL AND MEDIAN BARRIER COMPONENTS DEPICTED IN A.R.T.B.A. TECHNICIAN BULLETIN NUMBER 268B MAY BE SUBSTITUTED IF INTERCHANGEABLE WITH THE STANDARDS FOR GUARDRAIL (GR) OR MEDIAN BARRIER (MB) AND APPROVED BY THE ENGINEER.
6. CRT POSTS REQUIRED ON POST NUMBERS 5, 6, 7, AND 8.
7. DIRECTION OF TAPE SHALL CONFORM TO MUTCD APPLICATION FOR DIAGONAL STRIPES ON OBJECT MARKERS AND BRIDGE END PANELS. COLOR OF TAPE SHALL BE AMBER (YELLOW).

SPECIFICATION REFERENCE	<h2 style="margin: 0;">ALTERNATE BREAKAWAY CABLE TERMINAL</h2> <h3 style="margin: 0;">NO FLARE</h3> <p style="margin: 0;">VIRGINIA DEPARTMENT OF TRANSPORTATION</p>	501.18
505		

GR-10



FOR DETAILS OF GUARDRAIL POSTS AND BLOCKOUTS, SEE STANDARD GR-2, 2A.

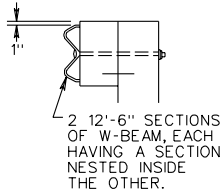
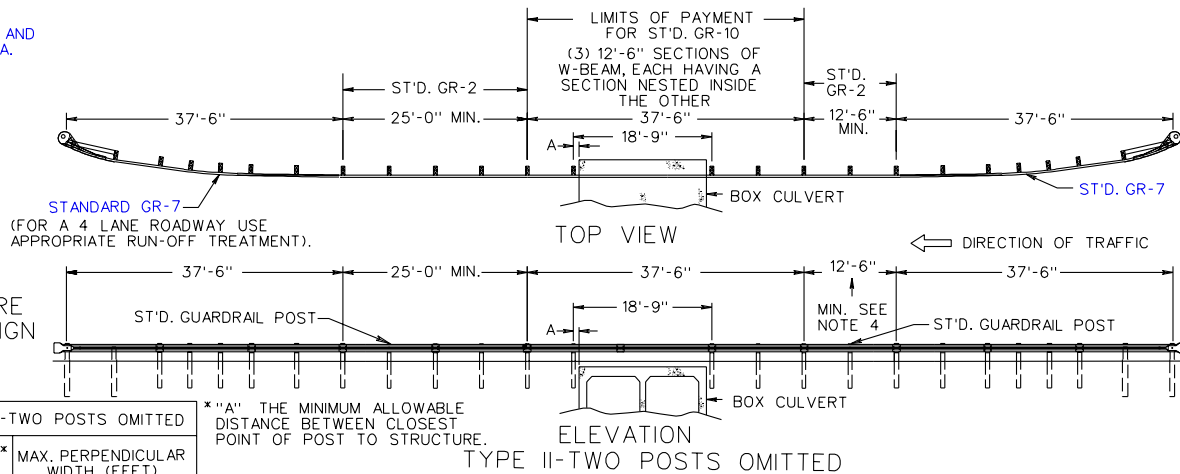


TABLE OF MAXIMUM ALLOWABLE STRUCTURE WIDTHS FOR THIS DESIGN



TYPE I-ONE POST OMITTED			TYPE II-TWO POSTS OMITTED		
SKEW	A*	MAX. PERPENDICULAR WIDTH (FEET)	SKEW	A*	MAX. PERPENDICULAR WIDTH (FEET)
0°	9"	10.5	0°	9"	16.75
5°	9"	10.4	5°	9"	16.6
10°	9"	10.2	10°	9"	16.4
15°	9"	10.0	15°	9"	16.0
20°	9"	9.6	20°	9"	15.5
25°	9"	9.2	25°	9"	14.9
30°	9"	8.8	30°	9"	14.2
35°	9"	8.2	35°	9"	13.2
40°	9"	7.6	40°	9"	12.4
45°	9"	7.0	45°	9"	11.4

* "A" THE MINIMUM ALLOWABLE DISTANCE BETWEEN CLOSEST POINT OF POST TO STRUCTURE.

- NOTES:
- THIS SHEET IS APPLICABLE WHEN GUARDRAIL IS REQUIRED AND THE DEPTH OF FILL ABOVE THE TOP SLAB OF THE BOX CULVERT IS LESS THAN 3'-7".
 - GUARDRAIL INSTALLATION SHALL BE IN ACCORDANCE WITH SECTION 505 OF THE SPECIFICATIONS. MATERIAL REQUIREMENT FOR COMPONENTS SHALL BE IN ACCORDANCE WITH SECTION 221 OF THE SPECIFICATIONS.
 - GUARDRAIL POST SPACING SHALL BE IN ACCORDANCE WITH STANDARD GR-2.
 - THIS DISTANCE SHALL BE IN ACCORDANCE WITH VDOT POLICY ON DETERMINING THE LENGTH OF NEED FOR GUARDRAIL WITH A MINIMUM DISTANCE AS SHOWN.
 - ALL SPLICES IN NESTED W-BEAM SECTIONS MUST COINCIDE AT A COMMON POINT AND BE BOLTED TOGETHER USING ONE SPLICE PLATE AND ONE SET OF BOLTS AT EACH SPLICE.

SHEET 1 OF 2

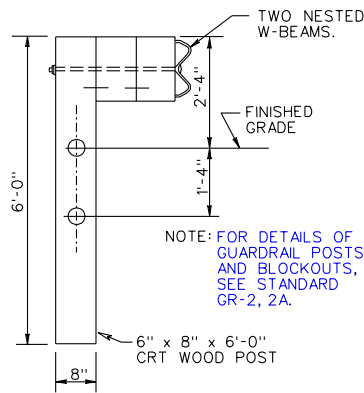
GUARDRAIL AT LOW-FILL CULVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

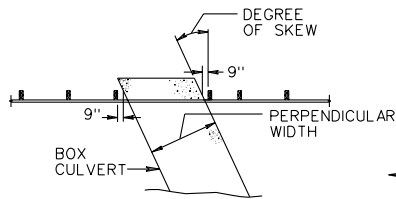
501.19

SPECIFICATION REFERENCE

221
505



CRT POST WITH DOUBLE BLOCKOUTS

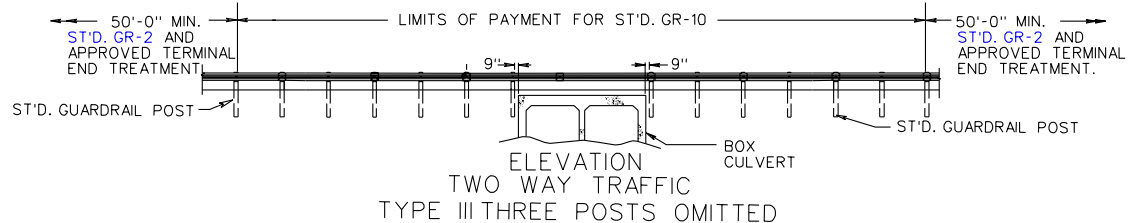
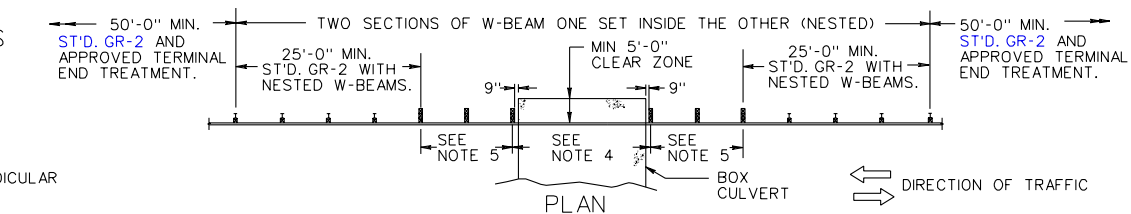
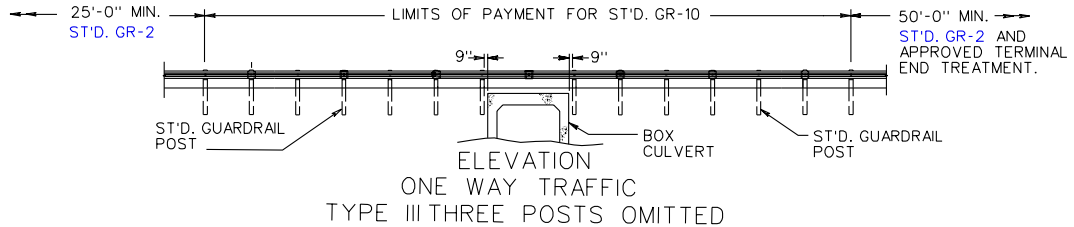
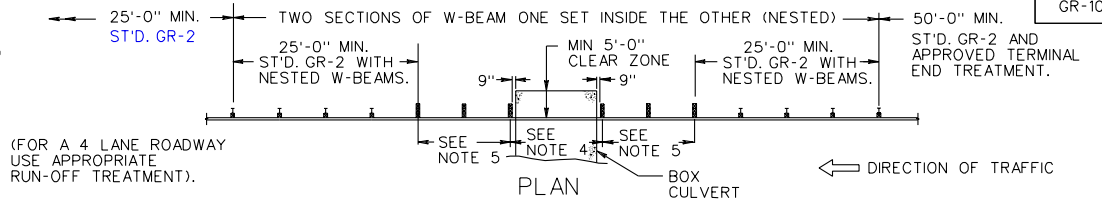


THREE POSTS OMITTED TOP VIEW

TYPE III-THREE POSTS OMITTED	
SKEW	MAX. PERPENDICULAR WIDTH (FEET)
0°	23.00
5°	22.90
10°	22.60
15°	22.10
20°	21.40
25°	20.60
30°	19.60
35°	18.40
40°	17.10
45°	15.60

SPECIFICATION REFERENCE

221
505



NOTES:

1. THIS SHEET IS APPLICABLE WHEN GUARDRAIL IS REQUIRED AND THE DEPTH OF FILL ABOVE THE TOP SLAB OF THE BOX CULVERT IS LESS THAN 3'-7".
2. GUARDRAIL INSTALLATION SHALL BE IN ACCORDANCE WITH SECTION 505 OF THE SPECIFICATIONS. MATERIAL REQUIREMENT FOR COMPONENTS SHALL BE IN ACCORDANCE WITH SECTION 221 OF THE SPECIFICATIONS.
3. **GUARDRAIL POST SPACING SHALL BE IN ACCORDANCE WITH STANDARD GR-2.**
4. TWO NESTED W-BEAM GUARDRAILS, SEE TABLE FOR ALLOWABLE WIDTHS (25'-0" MAXIMUM).
5. TWO NESTED W-BEAM GUARDRAILS, CRT WOODPOST, 6'-3" SPACING, WITH TWO 6"x8"x14" WOOD OR RECYCLED MATERIAL BLOCKOUTS.
6. ALL SPLICES IN NESTED W-BEAM SECTIONS MUST COINCIDE AT A COMMON POINT AND BE BOLTED TOGETHER USING ONE SPLICE PLATE AND ONE SET OF BOLTS AT EACH SPLICE.

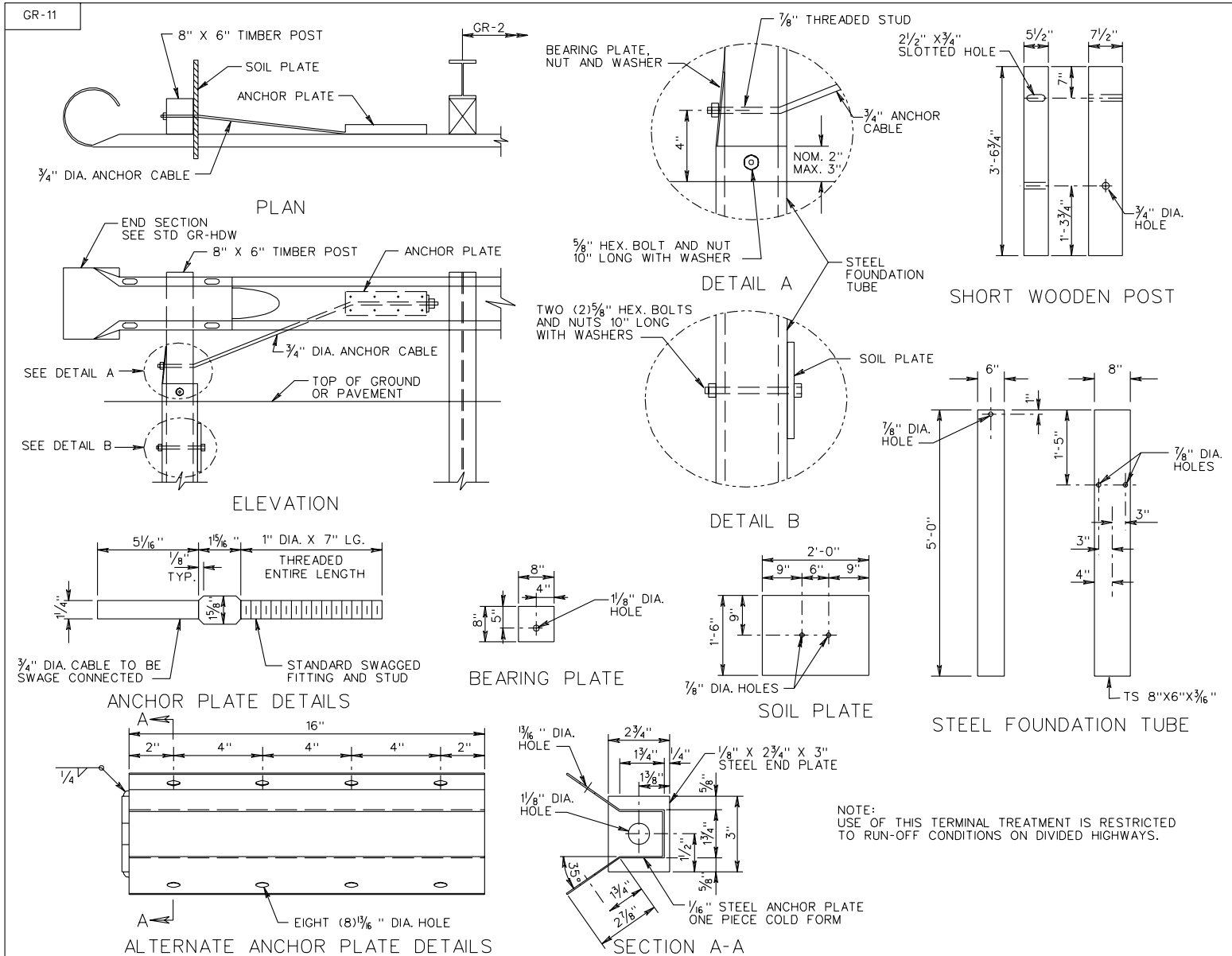
GUARDRAIL AT LOW-FILL CULVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

GR-10

SHEET 2 OF 2

501.20



TRAILING END TERMINAL TREATMENT

NEW 7/02

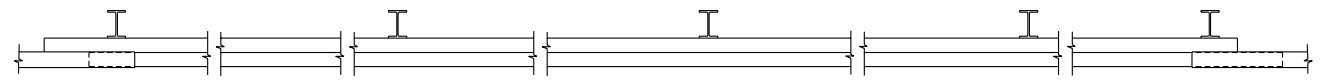
501.21

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

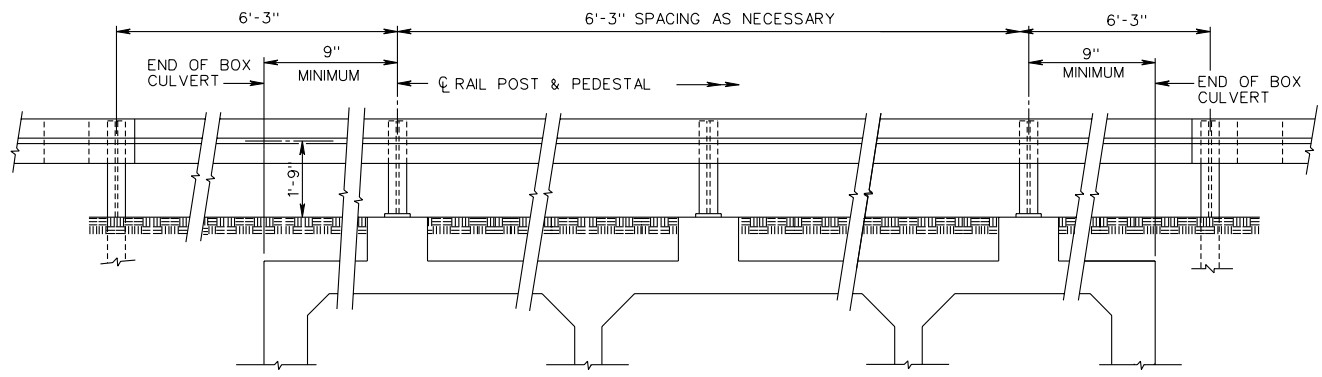
505

221



PLAN

NOTE: MAINTAIN 6'-3" POST SPACING WHEREVER POSSIBLE FOR USE WITH 25' STANDARD RAIL SECTION. SYMMETRY OF POST SPACING IS NOT NECESSARY.



LONGITUDINAL SECTION

GENERAL NOTE:

ALL STRUCTURAL STEEL, INCLUDING BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED.

FOR DETAILS OF GUARDRAIL, SEE GR-2 OF THE ROAD AND BRIDGE STANDARDS.

THE GUARDRAIL INSTALLATION SHALL CONFORM WITH SECTION 505 OF THE CURRENT VIRGINIA DEPARTMENT OF TRANSPORTATION ROAD AND BRIDGE SPECIFICATIONS.

RAIL POSTS MAY BE VERTICAL OR PERPENDICULAR TO ADJACENT ROADWAY GRADE AND CROSS SLOPE. TOP OF PEDESTAL SHALL BE SLOPED AS NECESSARY FOR PERPENDICULAR INSTALLATION.

DETAILS ON THIS SHEET ARE TO BE USED FOR BOTH STRAIGHT AND SKEWED BOXES.

ANCHOR BOLTS SHALL BE 7/8" ØA307 (OR A36 THREADED RODS WITH TACK WELDED NUTS) WITH HEX NUTS AND WASHERS AS SHOWN. THREADED RODS MAY BE 0.781 MIN. DIAMETER WITH ROLLED THREADS. NUTS SHALL CONFORM TO A307 REQUIREMENTS AND SHALL BE TAPPED OR CHASED AFTER GALVANIZING. BOLTS AND NUTS SHALL HAVE CLASS 2A AND 2B FIT TOLERANCES. BOLTS SHALL BE EMBEDDED 8" INTO THE CONCRETE.

THIS RAIL HAS BEEN SUCCESSFULLY EVALUATED BY FULL SCALE IMPACT TESTS CONDUCTED IN ACCORDANCE WITH NCHRP REPORT 153. TEST DOCUMENTATION MAY BE FOUND IN RESEARCH REPORT 230-1, "TUBULAR W-BEAM BRIDGE RAIL", OF RESEARCH STUDY 2-5-78-230 "BRIDGE RAIL TO CONTAIN HEAVY TRUCKS AND BUSES", TEXAS TRANSPORTATION INSTITUTE, OCTOBER 1978.

THIS UNIT IS ONLY TO BE USED WHEN
 DESIGN SPEED IS 45 MPH OR LESS.
 TESTED - NCHRP 350 TEST LEVEL 2

TUBULAR GUARD RAIL SHALL BE FURNISHED AND INSTALLED IN 25 FT. SECTIONS. TUBULAR RAIL MEMBER SHALL BE EXTENDED AND CONNECTED TO AT LEAST THE FIRST SOIL EMBEDDED POST AT EACH END OF THE STRUCTURE. MORE SUCH POSTS SHALL BE USED TO UTILIZE 25 FT. STANDARD SECTIONS. APPROACH GUARDRAIL POSTS SHALL BE SPACED AT 6'-3" ADJACENT TO THE TUBULAR RAIL SINCE ITS FLEXIBILITY IS SIMILAR TO THE STANDARD METAL BEAM GUARDRAIL. DO NOT INSTALL ADDITIONAL POSTS AT 3'-1/2" CENTERS. FULLY ANCHORED GUARDRAIL MUST BE ATTACHED AT BOTH ENDS OF TUBULAR RAIL.

TESTS HAVE SHOWN THAT ALTHOUGH THIS RAIL DEFLECTS HORIZONTALLY TWO OR THREE FEET, ADEQUATE VEHICLE CONTAINMENT AND RE-DIRECTION IS ACHIEVED. THE RESULTING MORE GRADUAL DECELERATION THIS PRODUCES A SAFER CONDITION THAN AFFORDED BY OTHER BRIDGE RAILINGS.

THE CONTRACTOR SHALL DETERMINE THE NUMBER OF PEDESTALS REQUIRED FOR GUARDRAIL INSTALLATION ACROSS THE BOX, PEDESTAL HEIGHT AND DIMENSIONS OF THE BR SERIES REINFORCING BARS. THE QUANTITY OF CONCRETE (CLASS A4) AND REINFORCING STEEL USED IN THE PEDESTALS SHALL BE FIELD VERIFIED AND PAID FOR AT THE UNIT PRICE BID FOR THE CORRESPONDING BOX QUANTITIES. THE RAILING (TEXAS T-6) SHALL BE MEASURED IN 25 FT. SECTIONS AND PAID FOR AT THE CONTRACT UNIT PRICE PER LINEAR FOOT IN ACCORDANCE WITH SECTION 410.04 OF THE SPECIFICATIONS. BR SERIES BARS SHALL BE #5 IN SIZE.

FOR DETAILS OF BOX CULVERTS, SEE THE BOX CULVERT STANDARDS.

THIS SHEET IS APPLICABLE WHEN GUARDRAIL IS REQUIRED AND THE DEPTH OF FILL ABOVE THE TOP SLAB OF THE BOX CULVERT IS LESS THAN 3'-7".

DETAILS SHOWN ARE FOR INSTALLATION ON NEW BOX CULVERTS. INSTALLATION OF PEDESTALS ON EXISTING BOX CULVERTS SHALL BE IN ACCORDANCE WITH SEC. 412.03 OF THE SPECIFICATIONS EXCEPT THAT DOWELS SHALL BE PLACED BETWEEN 3 AND 6 INCHES FROM THE EDGE OF THE PEDESTAL.

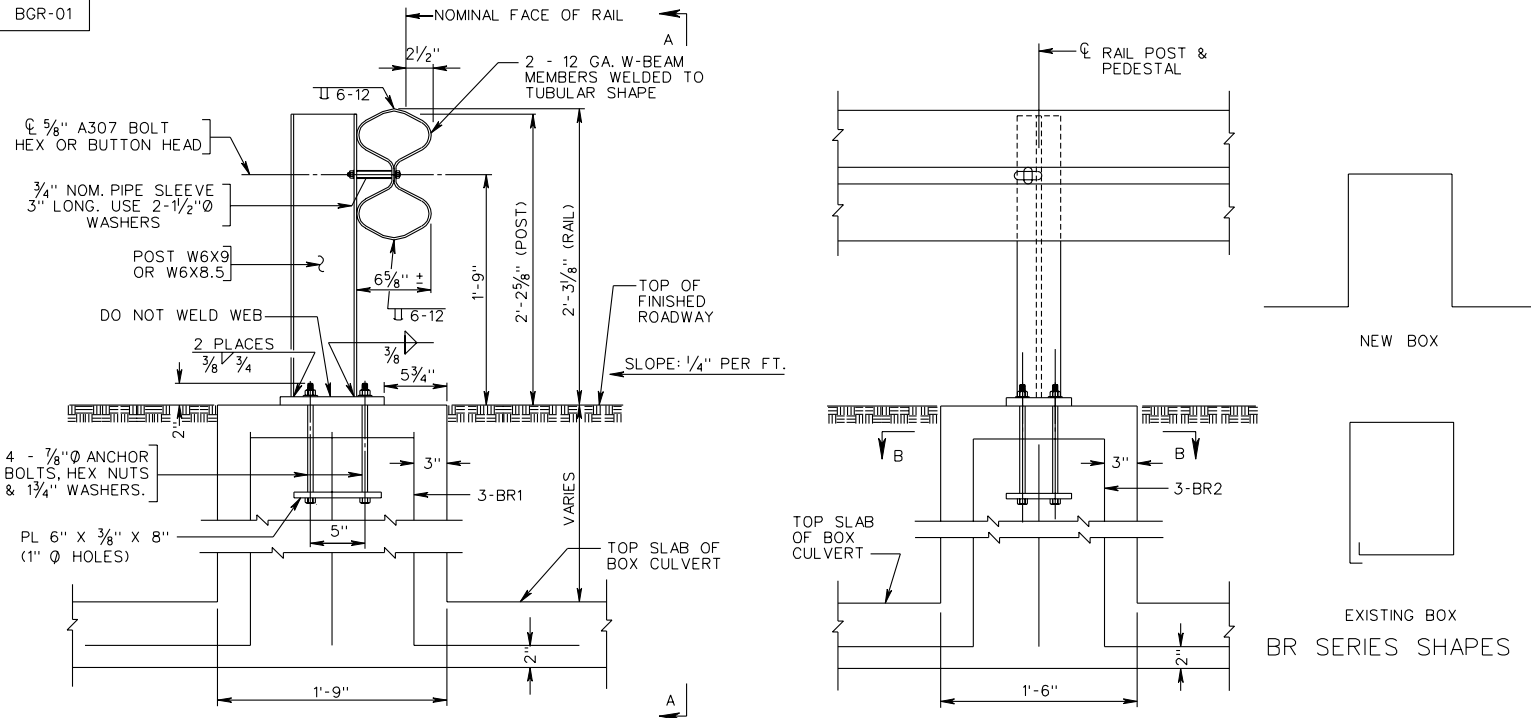
PRECAST BOXES SHALL BE TREATED AS AN EXISTING BOX FOR PEDESTAL INSTALLATION.

STRUCTURE AND BRIDGE DIVISION

STANDARD BOX CULVERT GUARDRAIL (TEXAS T-6)

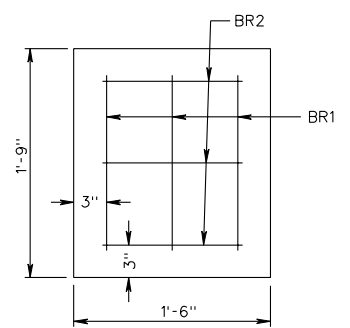
VIRGINIA DEPARTMENT OF TRANSPORTATION

BGR-01

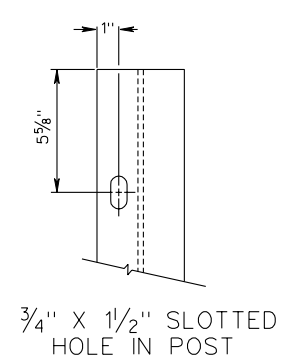


PART TRANSVERSE SECTION

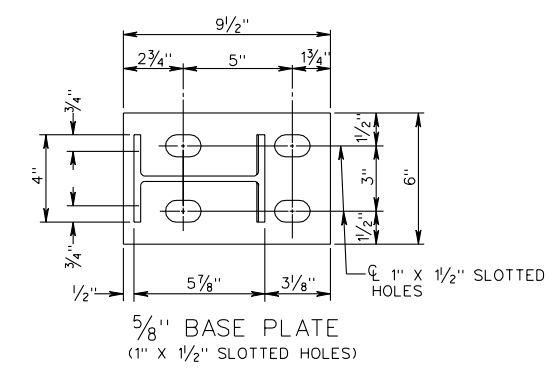
SECTION A-A



SECTION B-B
(ANCHOR BOLTS NOT SHOWN)



3/4" X 1/2" SLOTTED HOLE IN POST



5/8" BASE PLATE
(1" X 1/2" SLOTTED HOLES)

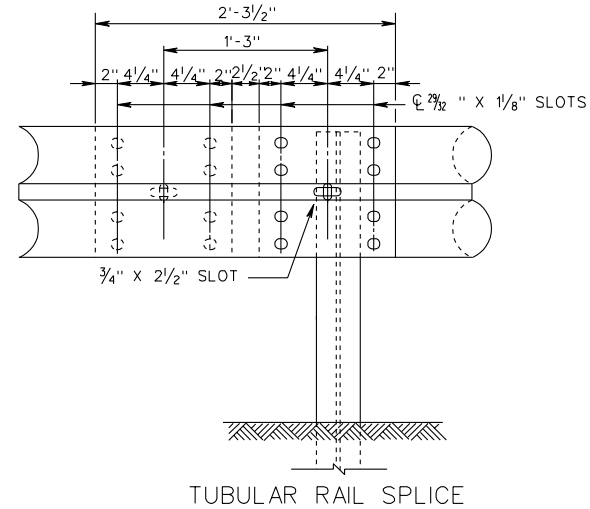
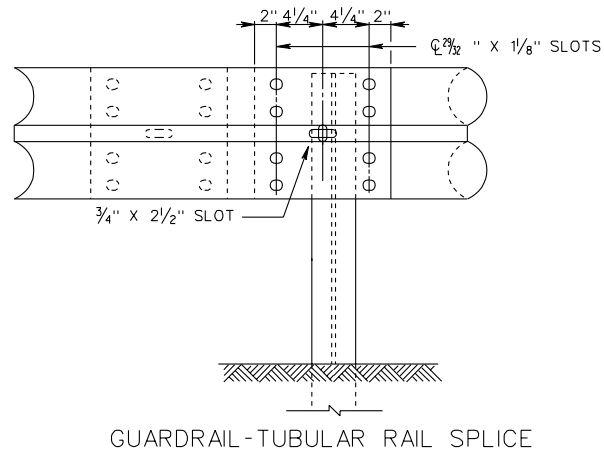
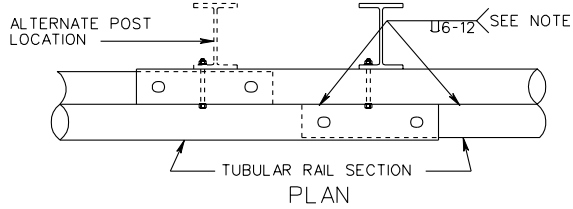
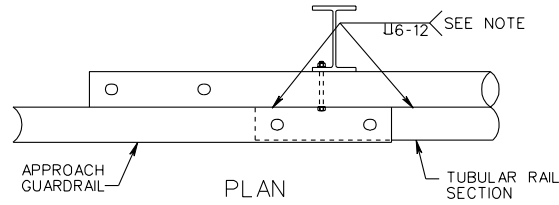
SHEET 2 OF 3

STANDARD BOX CULVERT GUARDRAIL
(TEXAS T-6)

VIRGINIA DEPARTMENT OF TRANSPORTATION

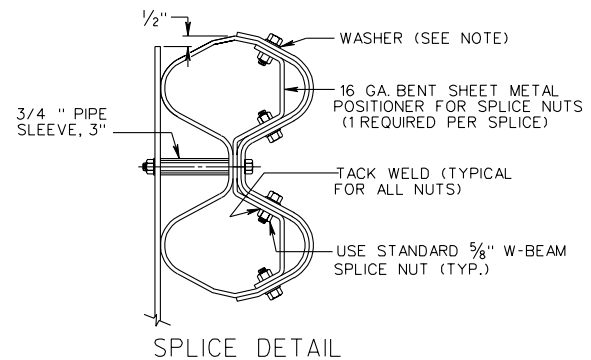
STRUCTURE
AND
BRIDGE DIVISION

501.23

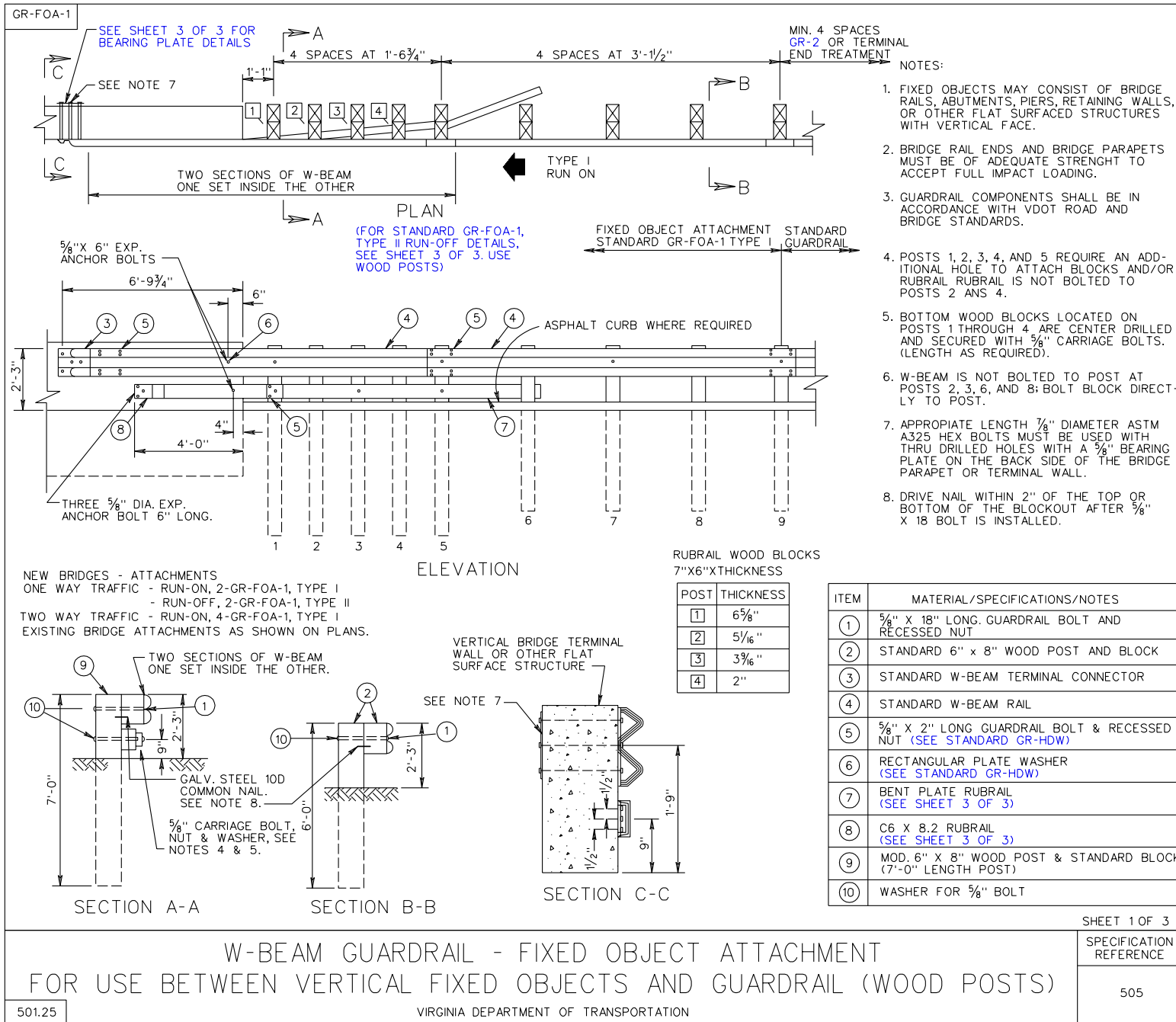


NOTES:
 TUBULAR W-BEAM RAIL MEMBER IS TO BE FABRICATED FROM STANDARD 25" NOMINAL W-BEAM SECTIONS. TOP AND BOTTOM SEAMS SHALL BE BUTT WELDED 6" AT 12" SPACING. CONTINUOUS SEAM WELDING IS ALSO ACCEPTABLE. WELDS SHALL BE CHIPPED AND CLEANED AND THE COMPLETE 25 FT. TUBULAR MEMBER SHALL BE GALVANIZED AFTER FABRICATION. FOR TUBULAR RAIL SPLICE ADDITIONAL POST MOUNTING SLOTS ARE TO BE MADE IN EACH MEMBER 1'-3" FROM THE STANDARD SLOTS AT 6'-3" CENTERS.

8-5/8" SPLICE NUTS SHALL BE TACK WELDED TO A BENT SHEET METAL POSITIONER AS SHOWN. OTHER SUITABLE POSITIONING METHODS OR DEVICES MAY BE SUBSTITUTED. THE COMPLETED SPLICE SHALL HAVE 8 BOLTS (16 BOLTS IF A TUBULAR RAIL SPLICE). EACH BOLT WILL INCLUDE A 1 3/4" X 3" X 3/16" PLATE WASHER OR A 2 INCH DIAMETER WASHER.

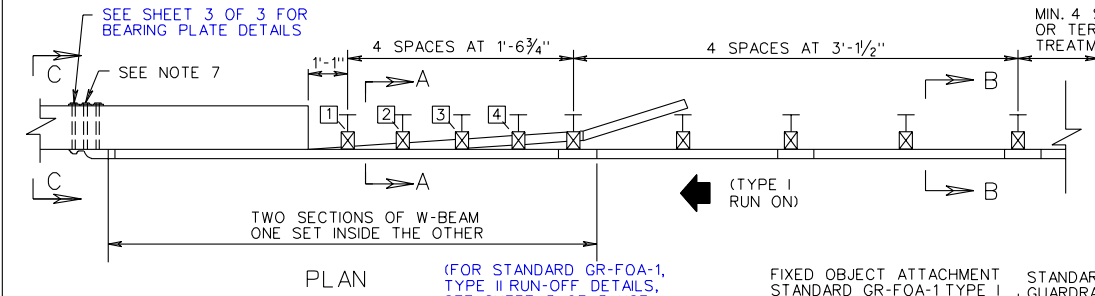


REVISED 7/01

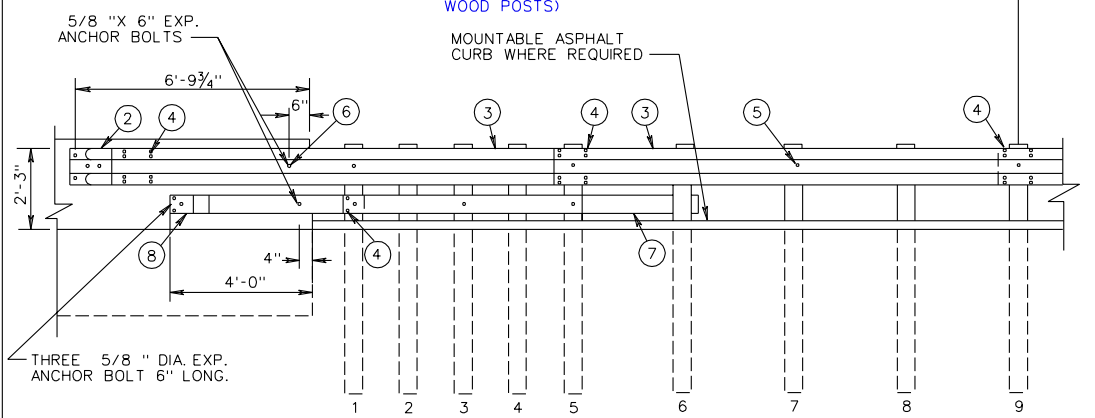


REVISED 7/01

GR-FOA-1

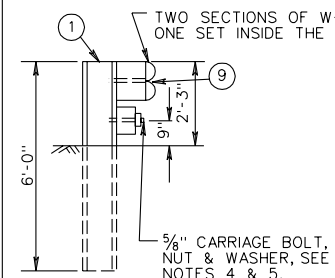


- NOTES:
1. FIXED OBJECTS MAY CONSIST OF BRIDGE RAILS, ABUTMENTS, PIERS, RETAINING WALLS, OR OTHER FLAT SURFACED STRUCTURES WITH VERTICAL FACE.
 2. BRIDGE RAIL ENDS AND BRIDGE PARAPETS MUST BE OF ADEQUATE STRENGTH TO ACCEPT FULL IMPACT LOADING.
 3. GUARDRAIL COMPONENTS SHALL BE IN ACCORDANCE WITH VDOT ROAD AND BRIDGE STANDARDS.
 4. POSTS 1, 2, 3, 4, AND 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH BLOCKS AND/OR RUBRAIL RUBRAIL IS NOT BOLTED TO POSTS 2 AND 4.
 5. BOTTOM WOOD BLOCKS LOCATED ON POSTS 1 THROUGH 4 ARE CENTER DRILLED AND SECURED WITH 5/8" CARRIAGE BOLTS. (LENGTH AS REQUIRED).
 6. W-BEAM IS NOT BOLTED TO POST AT POSTS 2, 3, 6, AND 8; BOLT BLOCK DIRECTLY TO POST.
 7. APPROPRIATE LENGTH 1/4" DIAMETER ASTM A325 HEX BOLTS MUST BE USED WITH THRU DRILLED HOLES WITH A 5/8" BEARING PLATE ON THE BACK SIDE OF THE BRIDGE PARAPET OR TERMINAL WALL.

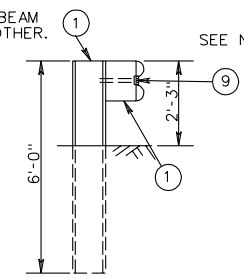


NEW BRIDGES - ATTACHMENTS
 ONE WAY TRAFFIC - RUN-ON, 2-GR-FOA-1, TYPE I
 - RUN-OFF, 2-GR-FOA-1, TYPE II
 TWO WAY TRAFFIC - RUN-ON, 4-GR-FOA-1, TYPE I

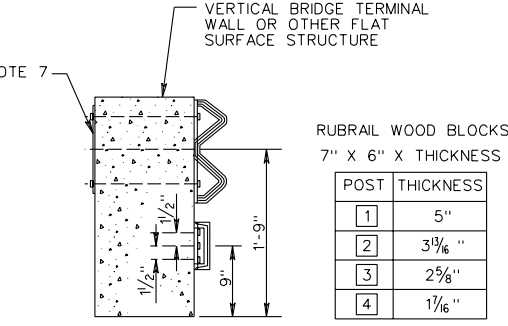
ELEVATION



SECTION A-A



SECTION B-B



SECTION C-C

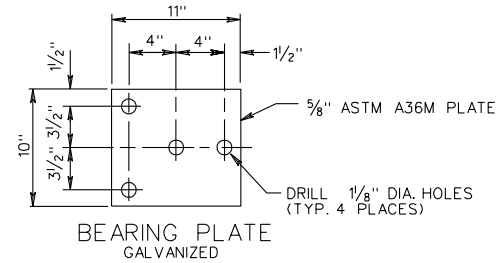
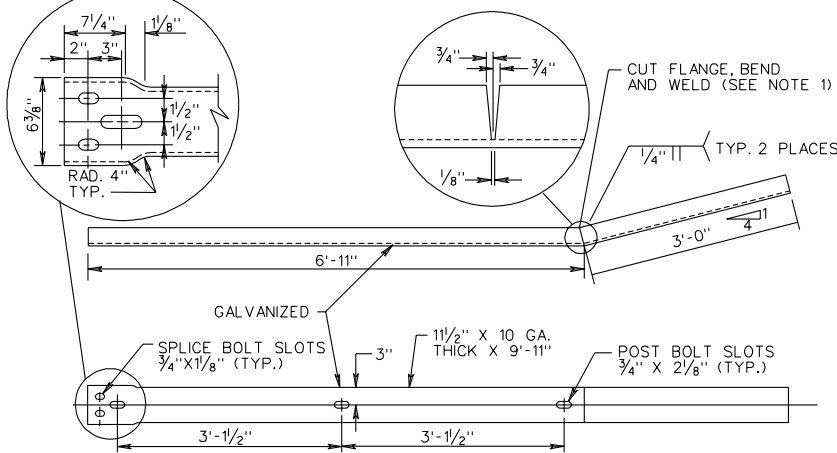
ITEM	MATERIAL/SPECIFICATIONS/NOTES
①	ST'D. W6X8.5 OR W6X9 STEEL POST ST'D. 6X8X14" LG. TREATED PINE BLOCK OR RECYCLED MATERIAL
②	STANDARD W-BEAM TERMINAL CONNECTOR
③	STANDARD W-BEAM RAIL
④	5/8" X 2" LONG GUARDRAIL BOLT & RECESSED NUT (SEE STANDARD GR-HDW)
⑤	RECTANGULAR PLATE WASHER (SEE ST'D. GR-HDW) 5/8" X 10" LONG HEX BOLT WITH NUT
⑥	BENT PLATE RUBRAIL (SEE SHEET 3 OF 3)
⑦	C6 X 8.2 RUBRAIL (SEE SHEET 3 OF 3)

SHEET 2 OF 3

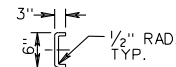
SPECIFICATION REFERENCE	W-BEAM GUARDRAIL-FIXED OBJECT ATTACHMENT FOR USE BETWEEN VERTICAL FIXED OBJECTS AND GUARDRAIL (STEEL POSTS)
505	VIRGINIA DEPARTMENT OF TRANSPORTATION
	501.26

REVISED 7/01

GR-FOA-1



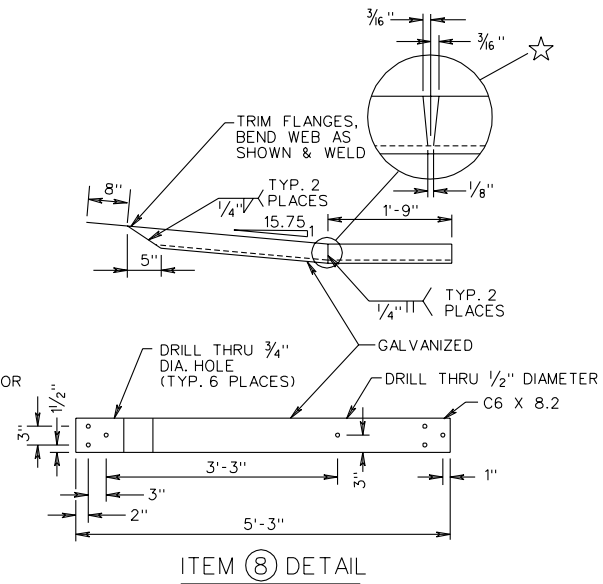
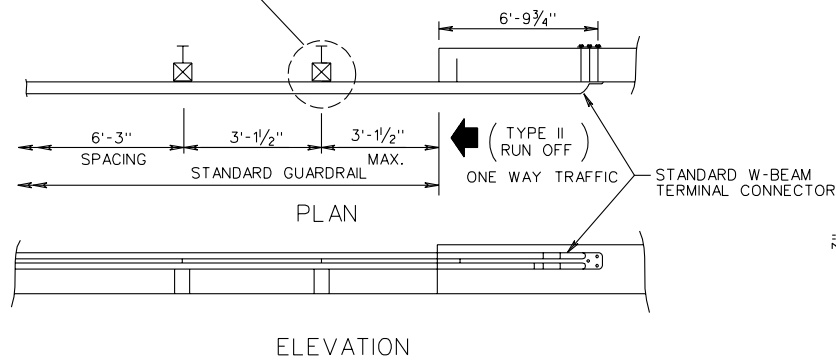
☆ CAN BE FIELD CUT AND BENT USING HEAT.



NOTE:
CAN BE FIELD CUT AND BENT USING HEAT.
IF SHOP CUT AND BENT, RIGHT HAND OR LEFT
HAND MUST BE SPECIFIED DEPENDING ON
WHICH SIDE OF THE ROADWAY THE TRANSITION
IS USED.

ITEM ⑦ DETAIL

INDICATES EXTRA POST REQ'D. FOR
RUN-OFF FIXED OBJECT ATTACHMENT
ST'D. GR-FOA-1 TYPE II



SHEET 3 OF 3

W BEAM GUARDRAIL - FIXED OBJECT ATTACHMENT
RUBRAIL AND HARDWARE DETAILS

SPECIFICATION
REFERENCE

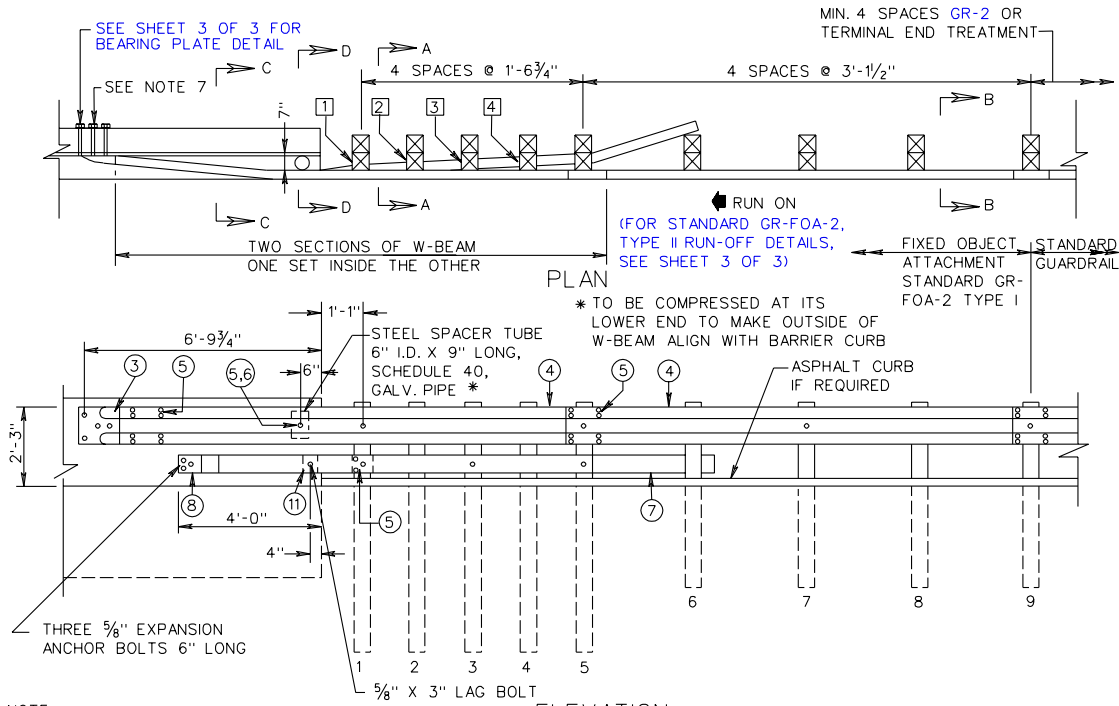
505

501.27

VIRGINIA DEPARTMENT OF TRANSPORTATION

REVISED 7/01

GR-FOA-2



NOTES:

1. FIXED OBJECTS MAY CONSIST OF SAFETY SHAPED BRIDGE PARAPETS OR CONCRETE BARRIERS.
2. BRIDGE RAIL ENDS AND BRIDGE PARAPETS MUST BE OF ADEQUATE STRENGTH TO ACCEPT FULL IMPACT LOADING.
3. GUARDRAIL COMPONENTS SHALL BE IN ACCORDANCE WITH VDOT ROAD AND BRIDGE STANDARDS.
4. POSTS 1, 2, 3, 4, AND 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKS AND/OR RUBRAIL. RUBRAIL IS NOT BOLTED TO POSTS 2 AND 4.
5. BOTTOM WOOD BLOCKS LOCATED ON POSTS 1 THROUGH 4, ARE CENTER DRILLED AND SECURED WITH 5/8" CARRIAGE BOLTS. (LENGTH AS REQUIRED).
6. W-BEAM IS NOT BOLTED TO POST AT POSTS 2, 3, 4, 6, AND 8. BOLT BLOCK DIRECTLY TO POST.
7. APPROPRIATE LENGTH 7/8" ASTM A325 HEX BOLTS MUST BE USED WITH THRU DRILLED HOLES WITH A 5/8" BEARING PLATE ON THE BACK SIDE OF THE BRIDGE PARAPET OR CONCRETE BARRIER.
8. DRIVE NAIL WITHIN 2" OF THE TOP OR BOTTOM OF BLOCKOUT AFTER 5/8" X 18 BOLT IS INSTALLED.

RUBRAIL WOOD BLOCKS
7" X 6" X THICKNESS

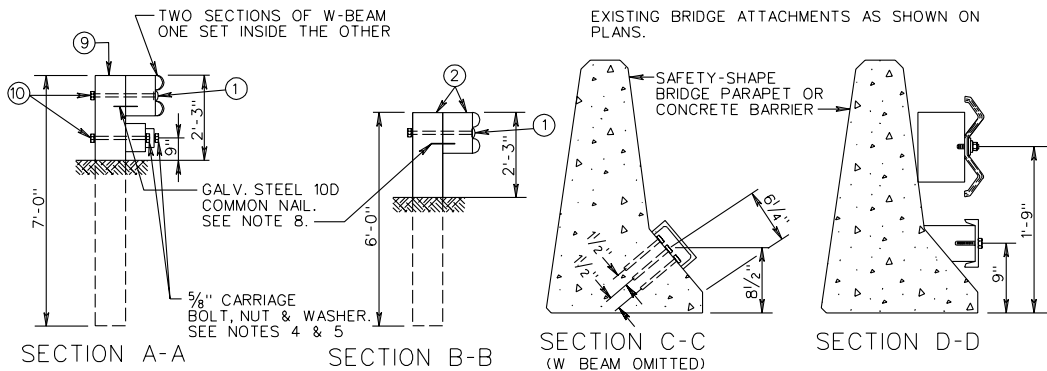
POST	THICKNESS
1	6 1/4"
2	4 5/8"
3	3 3/8"
4	1 1/2"

NOTE:
RUBRAIL MUST BE TWISTED 35° BETWEEN SECTION C-C AND D-D. SHOP FABRICATION MAY BE REQUIRED. RIGHT HAND AND LEFT HAND TWISTS WILL BE NECESSARY.

ELEVATION

NEW BRIDGE - ATTACHMENTS
ONE-WAY TRAFFIC-RUN-ON, 2-GR-FOA-2, TYPE I
-RUN-OFF, 2-GR-FOA-2, TYPE II
TWO-WAY TRAFFIC-RUN-ON, 4-GR-FOA-2, TYPE I

EXISTING BRIDGE ATTACHMENTS AS SHOWN ON PLANS.



ITEM	MATERIAL/SPECIFICATIONS/NOTES
①	5/8" X 18" L.G. GUARDRAIL BOLT AND RECESSED NUT.
②	STANDARD 6" X 8" WOOD POST AND BLOCK.
③	STANDARD W-BEAM TERMINAL CONNECTOR
④	STANDARD W-BEAM RAIL
⑤	5/8" X 2" LONG GUARDRAIL BOLT AND RECESSED NUT (SEE STANDARD GR-HDW)
⑥	RECTANGULAR PLATE WASHER (SEE STANDARD GR-HDW)
⑦	BENT PLATE RUBRAIL (SEE SHEET 3 OF 3)
⑧	C6 X 8.2 RUBRAIL (SEE SHEET 3 OF 3)
⑨	MODIFIED 6" X 8" WOOD POST AND STANDARD BLOCKOUT (7'-0" LENGTH POST)
⑩	WASHER FOR 5/8" BOLT
⑪	WOOD BLOCKOUT FOR RUBRAIL (SEE SHEET 3 OF 3)

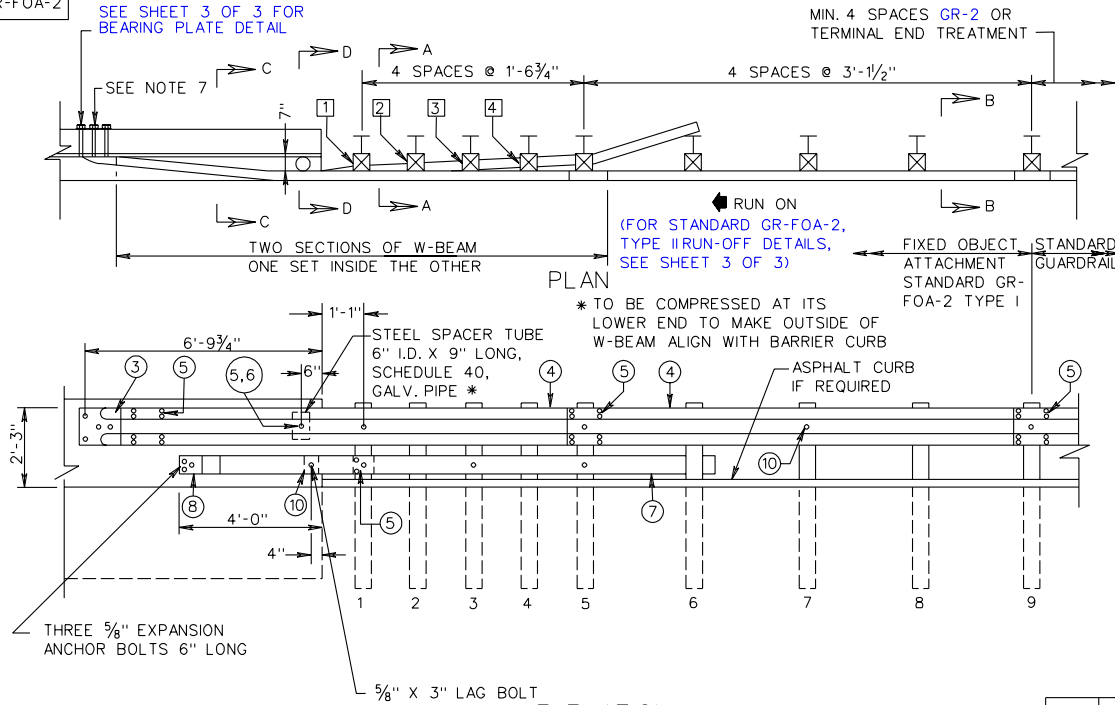
Sheet 1 of 3

<p>SPECIFICATION REFERENCE</p> <p>506</p>	<p>W-BEAM GUARDRAIL - FIXED OBJECT ATTACHMENT FOR USE BETWEEN SAFETY SHAPE AND GUARDRAIL (WOOD POSTS)</p> <p>VIRGINIA DEPARTMENT OF TRANSPORTATION</p>	<p>501.28</p>
---	--	---------------

REVISED 7/01

GR-FOA-2

SEE SHEET 3 OF 3 FOR BEARING PLATE DETAIL



NOTES:

1. FIXED OBJECTS MAY CONSIST OF SAFETY SHAPED BRIDGE PARAPETS OR CONCRETE BARRIERS.
2. BRIDGE RAIL ENDS AND BRIDGE PARAPETS MUST BE OF ADEQUATE STRENGTH TO ACCEPT FULL IMPACT LOADING.
3. GUARDRAIL COMPONENTS SHALL BE IN ACCORDANCE WITH VDOT ROAD AND BRIDGE STANDARDS.
4. POSTS 1, 2, 3, 4, AND 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKS AND/OR RUBRAIL. RUBRAIL IS NOT BOLTED TO POSTS 2 AND 4.
5. BOTTOM WOOD BLOCKS LOCATED ON POSTS 1 THROUGH 4 ARE CENTER DRILLED AND SECURED WITH 5/8" CARRIAGE BOLTS. (LENGTH AS REQUIRED).
6. W-BEAM IS NOT BOLTED TO POSTS 2, 3, 4, 6, AND 8. BOLT BLOCK DIRECTLY TO POST.
7. APPROPRIATE LENGTH 7/8" ASTM A325 HEX BOLTS MUST BE USED WITH THRU DRILLED HOLES WITH A 5/8" BEARING PLATE ON THE BACK SIDE OF THE BRIDGE PARAPET OR CONCRETE BARRIER.

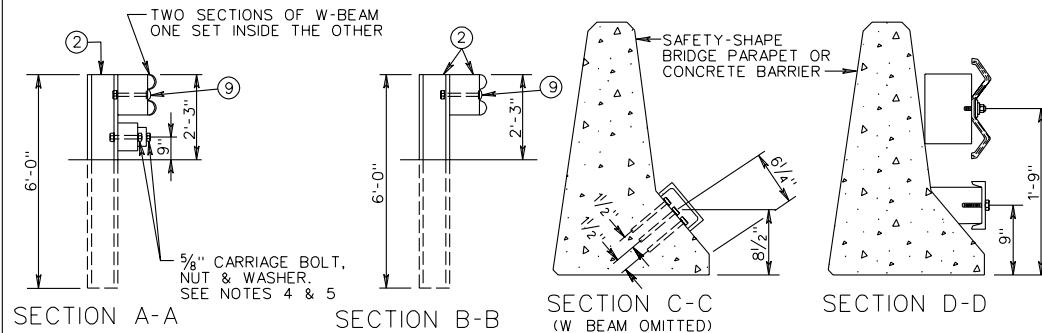
RUBRAIL WOOD BLOCKS
7" X 6" X THICKNESS

POST	THICKNESS
1	4 1/4"
2	3 1/4"
3	2"
4	1"

NOTE:
RUBRAIL MUST BE TWISTED 35° BETWEEN SECTION C-C AND D-D. SHOP FABRICATION MAY BE REQUIRED. RIGHT HAND AND LEFT HAND TWISTS WILL BE NECESSARY.

ELEVATION

NEW BRIDGE - ATTACHMENTS
ONE-WAY TRAFFIC-RUN-ON, 2-GR-FOA-2, TYPE I
-RUN-OFF, 2-GR-FOA-2, TYPE II
TWO-WAY TRAFFIC-RUN-ON, 4-GR-FOA-2, TYPE I
EXISTING BRIDGE ATTACHMENTS AS SHOWN ON PLANS.



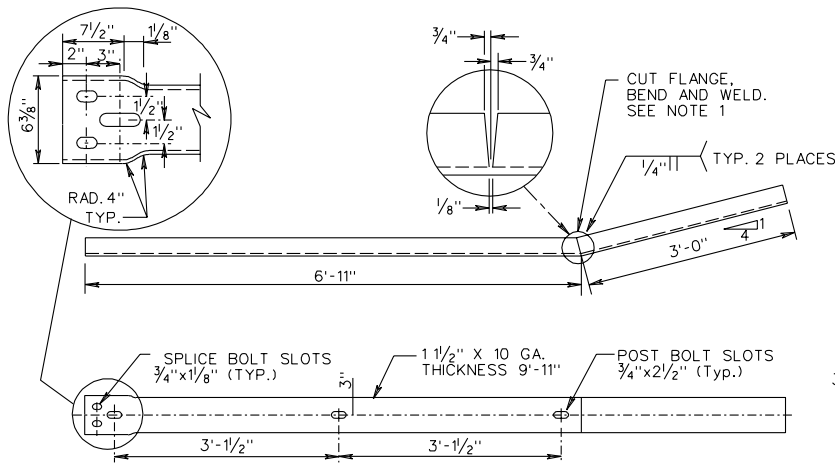
ITEM	MATERIAL/SPECIFICATIONS/NOTES
1	5/8" WASHER
2	ST'D. W6 X 8.5 OR W6 X 9 STEEL POST W/ ST'D. 6" X 8" X 14" LG. TREATED PINE BLOCK OR RECYCLED MATERIAL
3	STANDARD W-BEAM TERMINAL CONNECTOR
4	STANDARD W-BEAM RAIL
5	5/8" X 2" LONG GUARDRAIL BOLT AND RECESSED NUT (SEE STANDARD GR-HDW)
6	RECTANGULAR PLATE WASHER (SEE STANDARD GR-HDW)
7	BENT PLATE RUBRAIL (SEE SHEET 3 OF 3)
8	C6 X 8.2 RUBRAIL (SEE SHEET 3 OF 3)
9	5/8" X 10" LG. HEX BOLT, NUT AND WASHER
10	WOOD BLOCKOUT FOR RUBRAIL (SEE SHEET 3 OF 3)

SHEET 2 OF 3

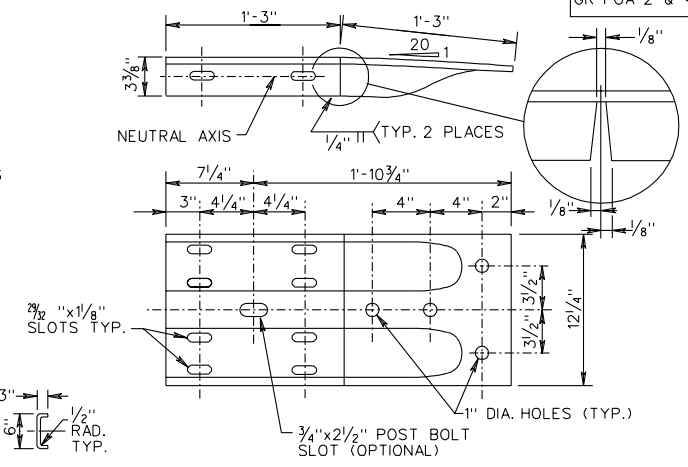
W-BEAM GUARDRAIL - FIXED OBJECT ATTACHMENT
FOR USE WITH SAFETY SHAPE - STEEL POSTS

SPECIFICATION
REFERENCE

506

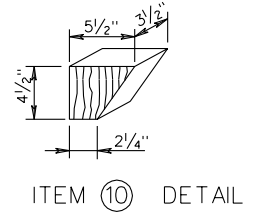


ITEM 7 DETAIL

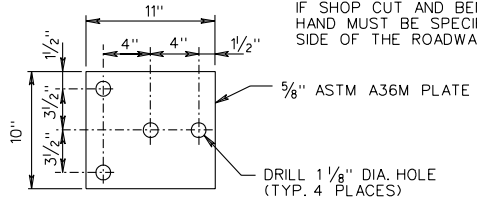


W-BEAM TERMINAL CONNECTOR (MOD.)

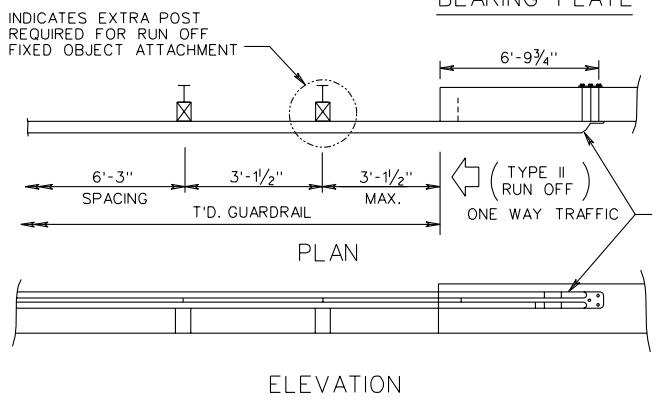
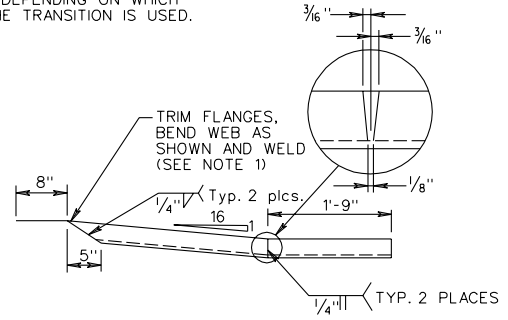
NOTES:
 CAN BE FIELD CUT AND BENT USING HEAT.
 IF SHOP CUT AND BENT, RIGHT HAND OR LEFT
 HAND MUST BE SPECIFIED DEPENDING ON WHICH
 SIDE OF THE ROADWAY THE TRANSITION IS USED.



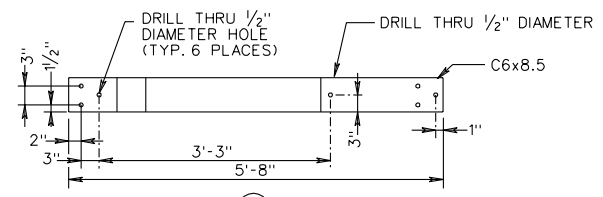
ITEM 10 DETAIL



BEARING PLATE

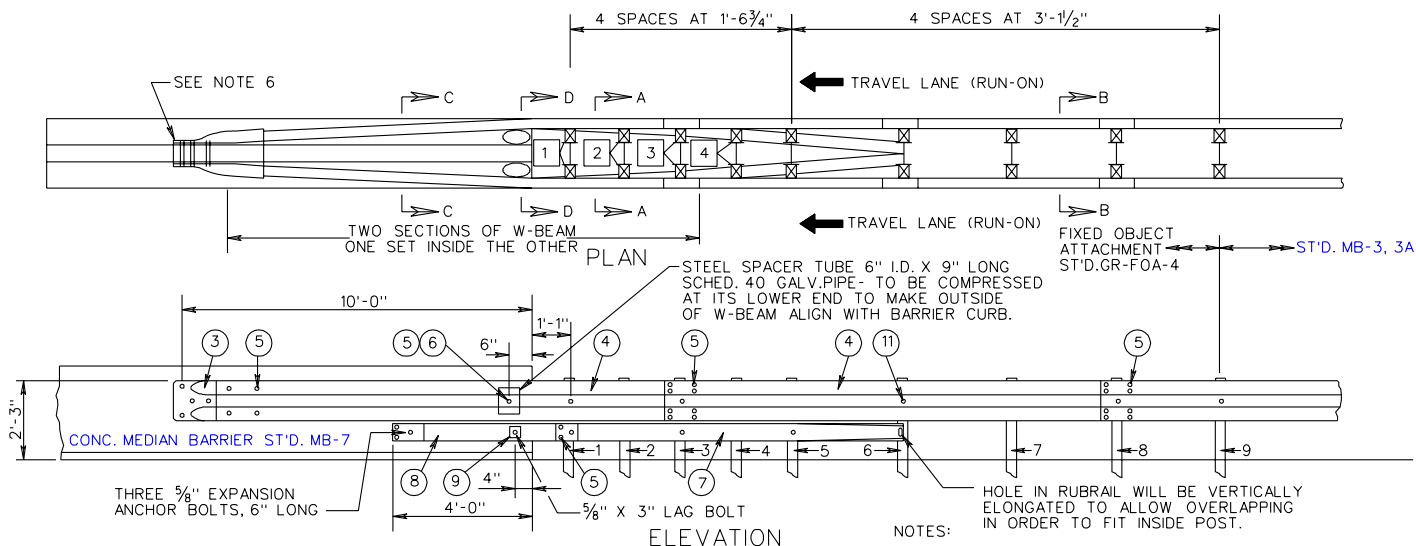


ELEVATION



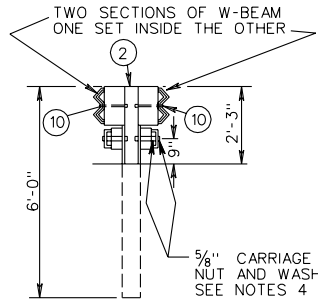
ITEM 8 DETAIL

SPECIFICATION REFERENCE	W BEAM GUARDRAIL - FIXED OBJECT ATTACHMENT RUBRAIL AND HARDWARE DETAILS VIRGINIA DEPARTMENT OF TRANSPORTATION
506	
501.30	

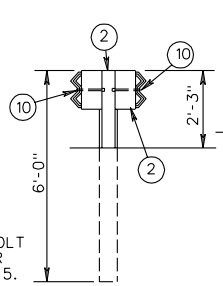


NOTE:
RUBRAIL MUST BE TWISTED 35° BETWEEN SECTIONS C-C AND D-D. SHOP FABRICATION MAY BE REQUIRED. RIGHT AND LEFT HAND TWISTS WILL BE REQUIRED.

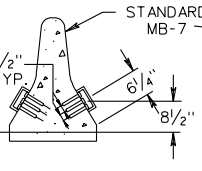
- NOTES:
- ARE GUARDRAIL POSTS ARE TO BE STEEL.
 - ALL GUARDRAIL COMPONENTS ARE TO BE IN ACCORDANCE WITH VDOT ROAD AND BRIDGE STANDARDS.
 - POSTS 1, 2, 3, 4 AND 5 REQUIRE AN ADDITIONAL HOLE TO ATTACH LOWER BLOCKS AND/OR RUBRAIL. RUBRAIL IS NOT BOLTED TO POSTS 2 AND 4.
 - BOTTOM WOOD BLOCKS LOCATED ON POSTS 1 THROUGH 4 ARE TO BE DRILLED AND SECURED WITH 5/8" CARRIAGE BOLTS (LENGTH AS REQUIRED)
 - W-BEAM IS NOT BOLTED TO POSTS 2, 4, 5 AND 7. THESE BLOCKS ARE TO BE BOLTED DIRECTLY TO POSTS.
 - APPROPRIATE LENGTH 7/8" ASTM A325 HEX BOLTS ARE TO BE USED, WITH HOLES DRILLED THROUGH THE CONCRETE MEDIAN BARRIER, ATTACHING THE W-BEAM TERMINAL CONNECTORS ON EACH SIDE.



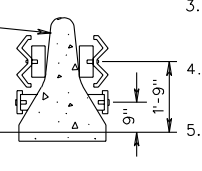
SECTION A-A
(ONE RAIL OMITTED)



SECTION B-B
(ONE RAIL OMITTED)



SECTION C-C
(W-BEAM OMITTED)



SECTION D-D

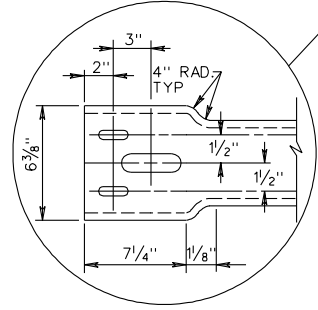
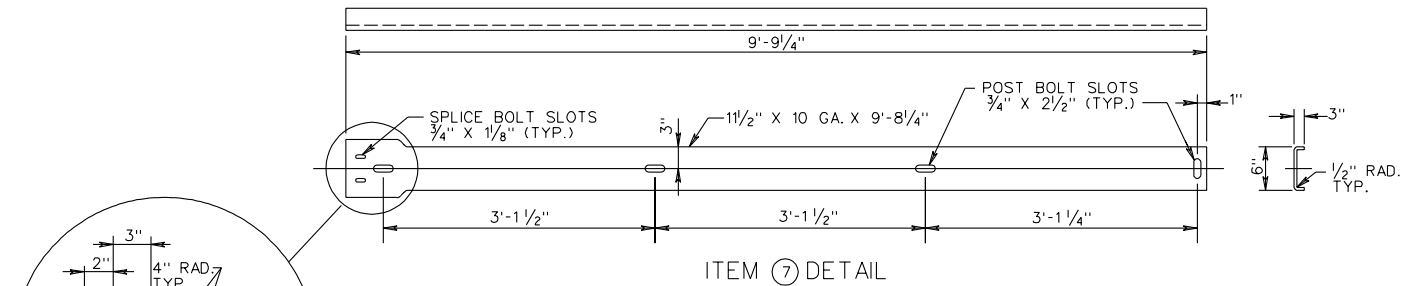
- TYPE I TWO RUN-ON SECTIONS (WITH 2 RUBRAILS SHOWN)
TYPE II ONE RUN-ON SECTION WITH 1 RUBRAIL RETAINED)
ONE RUN-OFF SECTION (WITH 1 RUBRAIL REMOVED)
TYPE III TWO RUN-OFF SECTIONS (WITH 2 RUBRAILS REMOVED)

RUBRAIL WOOD BLOCKS 7" x 4"	
POST THICKNESS	
1	4 1/4"
2	3 3/4"
3	2"
4	1"

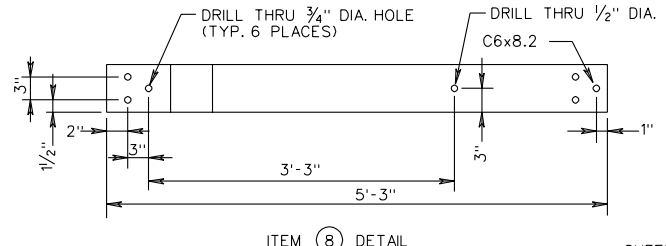
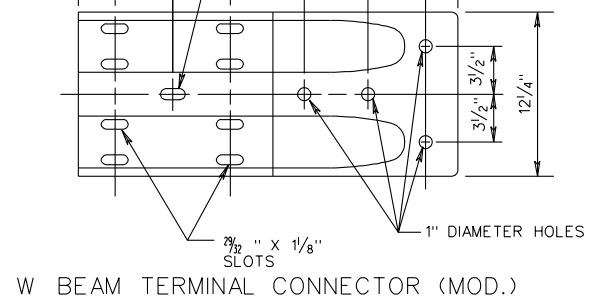
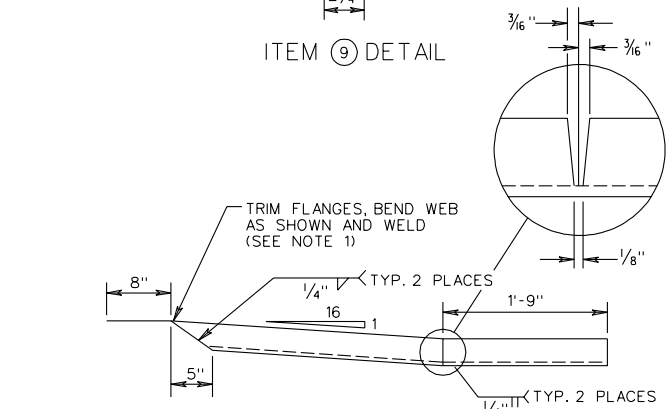
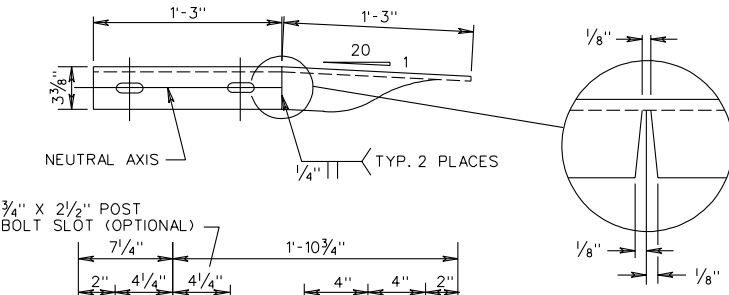
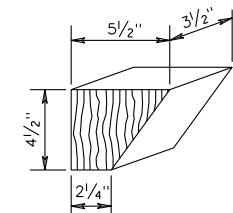
ITEM	MATERIALS/SPECIFICATIONS/NOTES
1	5/8" WASHER
2	ST'D. W6 X 8.5 OR W6 X 9 STEEL POSTS, ST'D. 6" X 8" X 14" LONG TREATED PINE BLOCK OR RE-CYCLED MATERIAL.
3	ST'D. W-BEAM TERMINAL CONN. (MOD.)
4	STANDARD W-BEAM RAIL
5	5/8" X 2" LG. GUARDRAIL BOLT AND RECESSED NUT

ITEM	MATERIALS/SPECIFICATIONS/NOTES
6	RECTANGULAR PLATE WASHER (SEE STANDARD GR-HDW)
7	BENT PLATE (SEE SHEET 2 OF 2)
8	C6 X 8.2 RUBRAIL (SEE SHEET 2 OF 2)
9	WOOD BLOCKOUT FOR RUBRAIL (SEE SHEET 2 OF 2)
10	5/8" X 10" LONG HEX BOLT WITH NUT

BLOCKED-OUT W-BEAM MEDIAN BARRIER-FIXED OBJECT ATTACHMENT FOR USE BETWEEN STANDARD MB-7 AND STANDARD MB-3



NOTES:
 1. CAN BE FIELD CUT AND BENT USING HEAT. IF SHOP CUT AND BENT, RIGHT HAND OR LEFT HAND MUST BE SPECIFIED, DEPENDING ON WHICH SIDE OF THE ROADWAY THE TRANSITION IS USED.

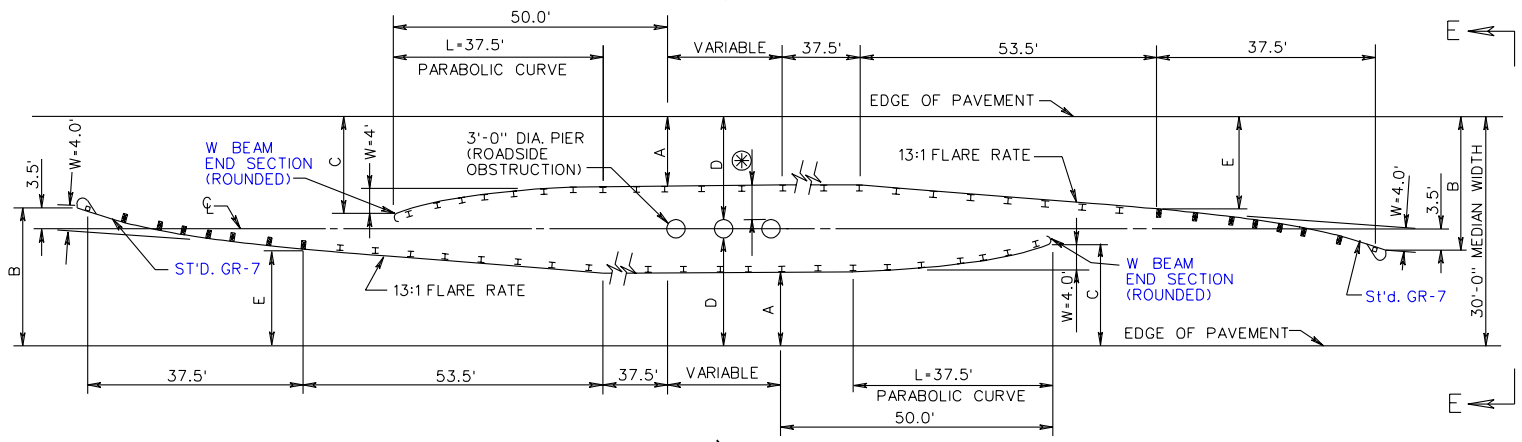


SPECIFICATION REFERENCE	BLOCKED-OUT W-BEAM MEDIAN BARRIER-FIXED OBJECT ATTACHMENT RUBRAIL AND HARDWARE DETAILS	
505	VIRGINIA DEPARTMENT OF TRANSPORTATION	
	SHEET 2 OF 2	
	501.32	

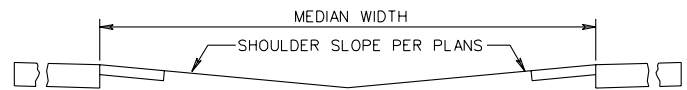
REVISED ON 7/02

GR-INS

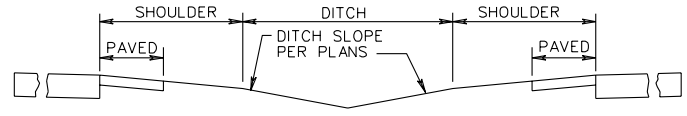
⊗ FACE OF GUARDRAIL IS TO BE 6' FROM FACE OF OBJECT.
 FOR MEDIAN WIDTHS LESS THAN 27' SEE SHEET 501.35.
 THE GUARDRAIL DESIGN AND PLACEMENT SHOWN ABOVE
 MAY ALSO BE USED FOR SHIELDING AN OVERHEAD SIGN
 SUPPORT, FIXED OBJECTS OR OTHER TYPES OF ROAD
 SIDE OBSTRUCTIONS.



PLAN VIEW



SECTION E-E



TYPICAL SECTION

DETAIL OF GUARDRAIL AT BRIDGE PIERS USING STANDARD GR-2

OFFSETS (Y) FOR INTRODUCED GUARDRAIL TRANSITIONS ☆		
LENGTH L	X	Y
		W=4'
37.50'	X ₁ 6.25	0.12'
	X ₂ 12.50	0.44'
	X ₃ 18.75	1.00'
	X ₄ 25.00	1.78'
	X ₅ 31.25	2.78'
	X ₆ 37.50	4.00'

MEDIAN WIDTH	* DIMENSIONS				
	A	B	C	D	E
30'	7.5'	18.5'	11.5'	13.5'	11.6'
40'	12.5'	23.5'	16.5'	18.5'	16.6'
60'	22.5'	33.5'	26.5'	28.5'	26.6'

* THE DIMENSIONS AS SHOWN HERE ARE FOR A 3' DIAMETER PIER. THESE DIMENSIONS WILL VARY AS ROADSIDE OBSTRUCTION DIMENSIONS DIFFER.

☆ SEE TABLE III, PAGE 501.36 OF THE ROAD AND BRIDGE STANDARDS FOR DEFINITION OF "X" AND "Y".

SHEET 1 OF 8

NOT TO SCALE

W BEAM GUARDRAIL INSTALLATION CRITERIA

VIRGINIA DEPARTMENT OF TRANSPORTATION

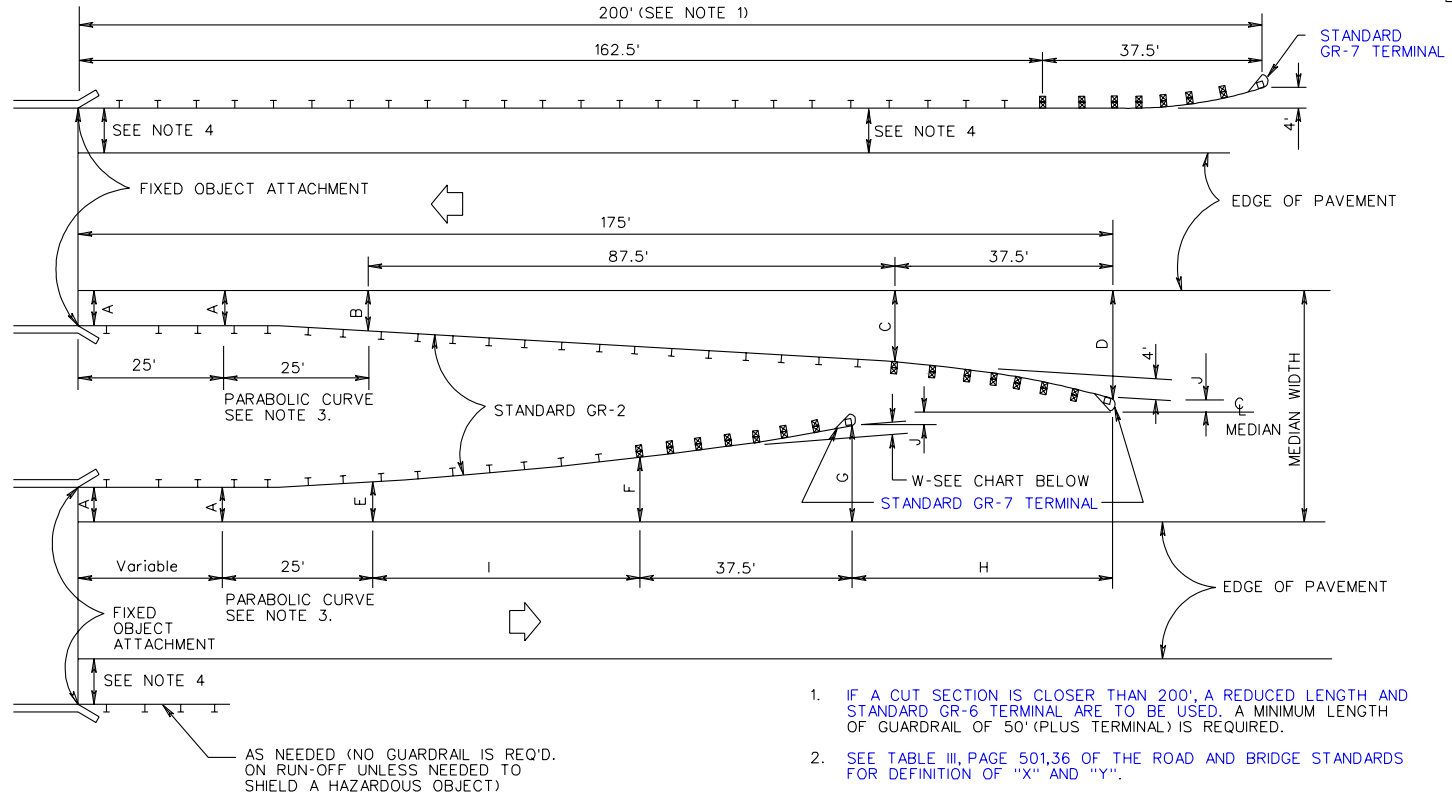
501.33

SPECIFICATION REFERENCE

221
505

REVISED 7/01

GR-INS



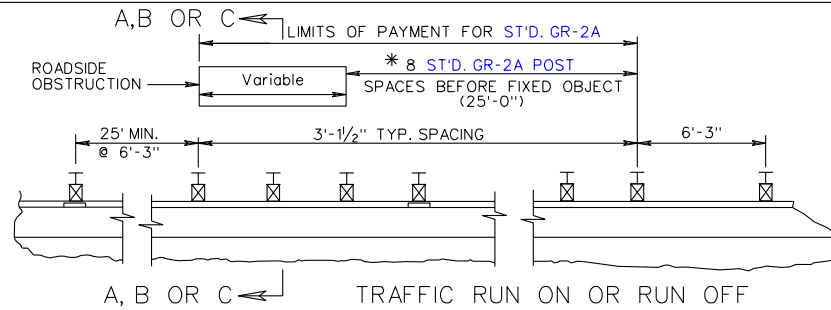
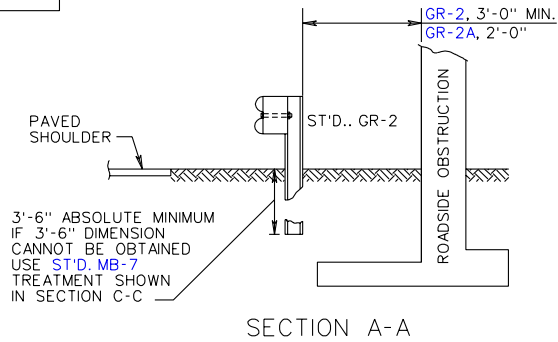
1. IF A CUT SECTION IS CLOSER THAN 200', A REDUCED LENGTH AND STANDARD GR-6 TERMINAL ARE TO BE USED. A MINIMUM LENGTH OF GUARDRAIL OF 50' (PLUS TERMINAL) IS REQUIRED.
2. SEE TABLE III, PAGE 501,36 OF THE ROAD AND BRIDGE STANDARDS FOR DEFINITION OF "X" AND "Y".
3. VALUES LESS THAN 0.5 BETWEEN A AND B, A AND E ARE NOT ON PARABOLIC CURVE.
4. RIGHT BRIDGE OFFSET VALUES ARE GIVEN IN GEOMETRIC STANDARDS FOR CORRESPONDING LEFT BRIDGE OFFSET ("A" DIMENSIONS) SHOWN.

DIMENSIONS											
MEDIAN WIDTH	LEFT BRIDGE RAIL OFFSET(A)	B	C	D	E	F	G	H	I	J	W
30'	5'	5.5'	7.0'	11.0'	5.4'	6.0'	8.0'	54.0'	33.5'	4.0'	2.0'
40'	5'	6.0'	10.5'	16.0'	6.0'	10.0'	16.0'	44.0'	43.0'	4.0'	2.5'
40'	8'	7.4'	10.5'	16.0'	7.8'	10.8'	16.0'	48.0'	39.0'	3.0'	3.5'
40'	12'	11.2'	12.0'	16.0'	11.4'	12.0'	16.0'	48.5'	38.0'	3.0'	3.0'

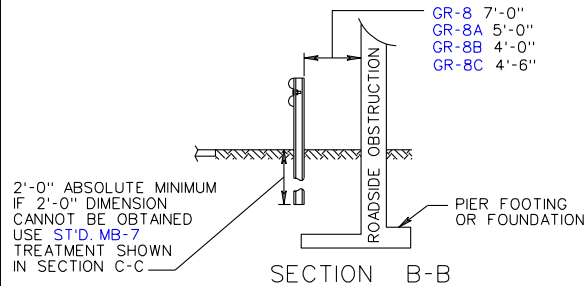
OFFSETS (Y) FOR INTRODUCED GUARDRAIL TRANSITIONS										
LENGTH L	X	Y								
		W=0.50'	W=0.75'	W=1.00'	W=2.00'	W=2.50'	W=3.00'	W=3.50'	W=4.00'	
25.00'	X ₁	6.25	0.03'	0.05'	0.06'	0.06'	0.07'	0.08'	0.10'	0.11'
	X ₂	12.50	0.13'	0.19'	0.25'	0.22'	0.28'	0.33'	0.39'	0.44'
	X ₃	18.75	0.28'	0.42'	0.56'	0.55'	0.63'	0.75'	0.88'	1.0'
	X ₄	25.00	0.50'	0.75'	1.00'	0.89'	1.11'	1.33'	1.56'	1.78'
37.50'	X ₅	31.25				1.39'	1.74'	2.08'	2.43'	2.78'
	X ₆	37.50				2.00'	2.50'	3.00'	3.50'	4.00'

DETAIL OF GUARDRAIL AT DUAL BRIDGES

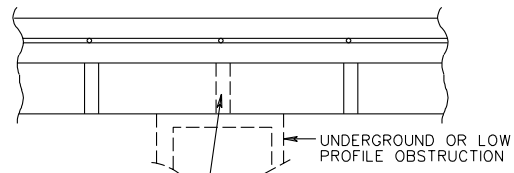
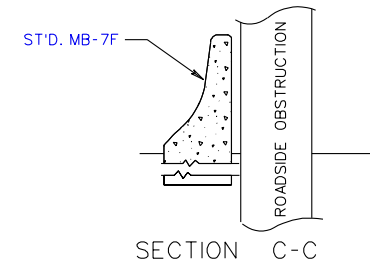
GR-INS



* FOR TWO WAY TRAFFIC, USE 8 POST SPACING DESIGN FROM EACH END OF FIXED OBJECT.

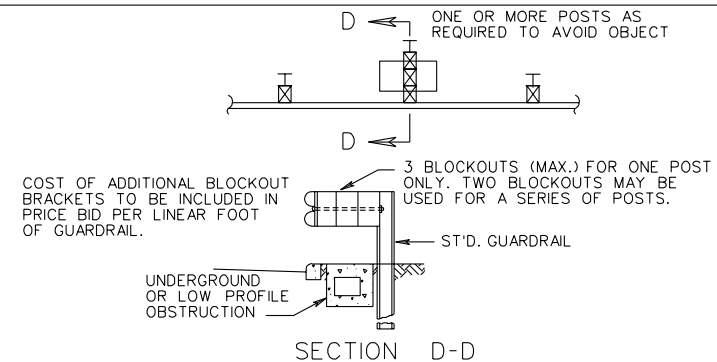


FOR USE WHERE DISTANCE FROM BACK OF GR-2A POST TO FIXED OBJECT IS LESS THAN 2'-0".



NOTE:
IF GROUND LEVEL OR UNDERGROUND FIXED OBJECT NECESSITATES THE ELIMINATION OF ONE OR MORE POSTS, A GR-10 OR A SPECIAL DESIGN WILL BE REQUIRED

DETAIL OF SPECIAL DESIGN SITUATION



DETAIL OF MULTIPLE BLOCK-OUT TO AVOID UNDERGROUND OR LOW PROFILE OBSTRUCTION

SHEET 3 OF 8

W BEAM GUARDRAIL INSTALLATION CRITERIA

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

221
505

NOTES:

GUARDRAIL INSTALLATION CRITERIA AS SHOWN ON THESE SHEETS IS TO APPLY TO THOSE LOCATIONS WHERE GUARDRAIL HAS TO BE TRANSITIONED FROM THE NORMAL LOCATION.

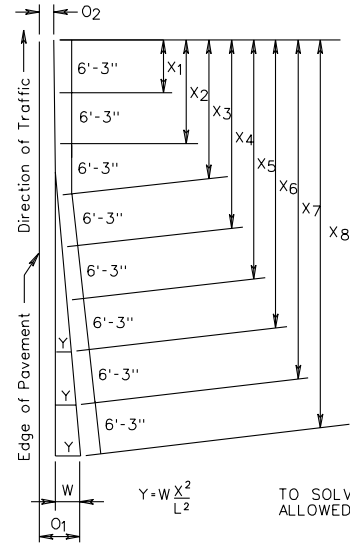
LENGTH OF TRANSITION (L) IS TO BE IN ACCORDANCE WITH TABLE III OR IV FOR APPLICABLE VALUES OF W OR AS DIRECTED BY THE ENGINEER.

RAIL TERMINAL SECTIONS IN ACCORDANCE WITH STANDARD GR-6, GR-7 OR GR-8 ARE TO BE INSTALLED AT EACH TERMINUS OF GUARDRAIL WHERE SPECIFIED ON PLANS.

ALL LENGTHS (L) ARE APPLIED ALONG FACE OF GUARDRAIL.

OFFSETS SHOWN IN TABLES ARE FOR 6'-3" SPACING. FOR 12'-6" SPACING (GR-8) USE EVERY SECOND VALUE FOR Y.

INSTALLATION METHODS SHOWN ON THESE SHEETS ARE APPLICABLE TO STANDARD PLANS GR-2, GR-2A AND GR-8.



- W = TOTAL LATERAL TRANSITION OF GUARDRAIL O1- O2
- O1 = OFFSET FROM EDGE OF PAVEMENT TO FACE OF GUARDRAIL MAX.
- O2 = OFFSET FROM EDGE OF PAVEMENT TO FACE OF GUARDRAIL MIN.
- X1 = ...Xn CUMULATIVE DISTANCE IN INCREMENTS OF 6'-3" FROM FIRST GUARDRAIL POST MEASURED ALONG FACE OF GUARDRAIL.
- Y = LATERAL OFFSET FROM FACE OF GUARDRAIL OF POST NEAREST TO PAVEMENT EDGE TO FACE OF GUARDRAIL AT EACH SUCCESSIVE POST.
- L = TOTAL LENGTH OF TRANSITIONAL PORTION OF GUARDRAIL.

TABLE III
OFFSETS (Y) FOR INTRODUCED GUARDRAIL TRANSITIONS

LENGTH L IN FEET	X IN FEET	W																		
		W-2'	W-3'	W-4'	W-5'	W-6'	W-7'	W-8'	W-9'	W-10'	W-11'	W-12'	W-13'	W-14'	W-15'	W-16'	W-17'	W-18'	W-19'	W-20'
37.50	X1 6.25	0.06	0.05	0.03	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03
	X2 12.50	0.22	0.19	0.11	0.08	0.06	0.05	0.06	0.06	0.07	0.08	0.08	0.09	0.10	0.10	0.11	0.12	0.13	0.13	0.14
	X3 18.75	0.50	0.42	0.25	0.18	0.14	0.11	0.12	0.14	0.16	0.17	0.19	0.20	0.22	0.23	0.25	0.27	0.28	0.30	0.31
	X4 25.00	0.89	0.75	0.44	0.31	0.24	0.19	0.22	0.25	0.28	0.31	0.33	0.36	0.39	0.42	0.44	0.47	0.50	0.53	0.56
	X5 31.25	1.39	1.17	0.69	0.49	0.38	0.30	0.35	0.39	0.43	0.48	0.52	0.56	0.61	0.65	0.69	0.74	0.78	0.82	0.87
50.00	X6 37.50	2.00	1.69	1.00	0.70	0.54	0.44	0.50	0.56	0.62	0.69	0.75	0.81	0.87	0.94	1.00	1.06	1.13	1.19	1.25
	X7 43.75		2.30	1.36	0.96	0.74	0.60	0.68	0.77	0.85	0.94	1.02	1.11	1.19	1.28	1.36	1.45	1.53	1.62	1.70
	X8 50.00			3.00	1.78	1.25	0.96	0.78	0.89	1.00	1.11	1.22	1.33	1.44	1.56	1.67	1.78	1.89	2.00	2.11
75.00	X9 56.25			2.25	1.58	1.22	0.98	1.12	1.27	1.41	1.55	1.69	1.83	1.97	2.11	2.25	2.39	2.53	2.67	2.81
	X10 62.50			2.78	1.95	1.50	1.22	1.39	1.56	1.74	1.91	2.08	2.26	2.43	2.60	2.78	2.95	3.13	3.30	3.47
	X11 68.75			3.36	2.36	1.82	1.47	1.68	1.89	2.10	2.31	2.52	2.73	2.94	3.15	3.36	3.57	3.78	3.99	4.20
87.50	X12 75.00			4.00	2.81	2.16	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00
	X13 82.25				3.30	2.54	2.05	2.35	2.64	2.93	3.23	3.52	3.81	4.11	4.40	4.69	4.99	5.28	5.57	5.87
	X14 87.50				3.83	2.94	2.38	2.72	3.06	3.40	3.74	4.08	4.42	4.76	5.10	5.44	5.78	6.13	6.47	6.81
100.00	X15 93.75				4.39	3.38	2.73	3.12	3.52	3.91	4.30	4.69	5.08	5.47	5.86	6.25	6.64	7.03	7.42	7.81
	X16 100.00				5.00	3.84	3.11	3.56	4.00	4.44	4.89	5.33	5.78	6.22	6.67	7.11	7.56	8.00	8.44	8.89
	X17 106.25					4.33	3.51	4.01	4.52	5.02	5.52	6.02	6.52	7.02	7.53	8.03	8.53	9.03	9.53	10.03
125.00	X18 112.50					4.86	3.94	4.50	5.06	5.62	6.19	6.75	7.31	7.87	8.44	9.00	9.56	10.13	10.69	11.25
	X19 118.75					5.41	4.39	5.01	5.64	6.27	6.89	7.52	8.15	8.77	9.40	10.03	10.65	11.28	11.91	12.53
	X20 125.00					6.00	4.86	5.56	6.25	6.94	7.64	8.33	9.03	9.72	10.42	11.11	11.81	12.50	13.19	13.89
150.00	X21 131.25						5.36	6.12	6.89	7.66	8.42	9.19	9.95	10.72	11.48	12.25	13.02	13.78	14.55	15.31
	X22 137.50						5.88	6.72	7.56	8.40	9.24	10.08	10.92	11.76	12.60	13.44	14.28	15.13	15.97	16.81
	X23 143.75						6.43	7.35	8.27	9.18	10.10	11.02	11.94	12.86	13.78	14.69	15.61	16.53	17.45	18.37
	X24 150.00						7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00

SPECIFICATION REFERENCE
221 505

W-BEAM GUARDRAIL INSTALLATION CRITERIA

VIRGINIA DEPARTMENT OF TRANSPORTATION

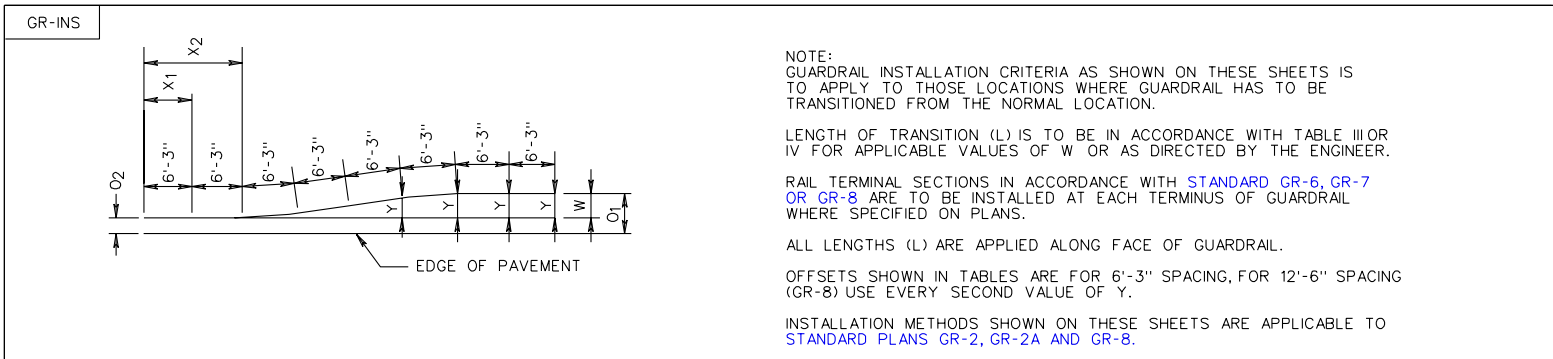


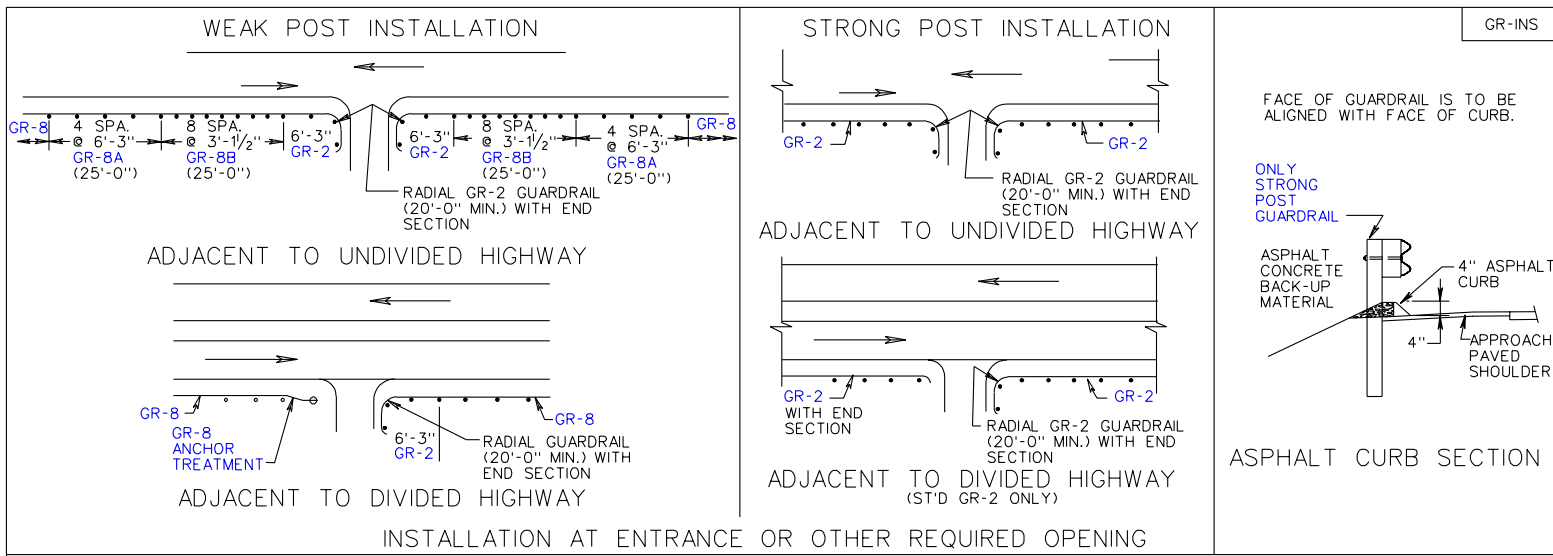
TABLE IV
 OFFSETS (Y) FOR CONTINUOUS RUN-ON GUARDRAILS AND ALL RUN-OFF TRANSITIONS

LENGTH L IN FEET	X IN FEET	W=2'		W=3'		W=4'		W=5'		W=6'		W=7'		W=8'		W=9'		W=10'		W=11'		W=12'	
		RUN ON	RUN OFF	RUN ON	RUN OFF	RUN ON	RUN OFF	RUN ON	RUN OFF	RUN ON	RUN OFF	RUN ON	RUN OFF	RUN ON	RUN OFF	RUN ON	RUN OFF	RUN ON	RUN OFF	RUN ON	RUN OFF	RUN ON	RUN OFF
37.50	X1	6.25	0.04	0.04	0.02	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
	X2	12.50	0.30	0.30	0.19	0.19	0.03	0.03	0.02	0.04	0.01	0.05	0.01	0.05	0.01	0.06	0.01	0.07	0.01	0.08	0.01	0.09	0.01
	X3	18.75	1.00	1.00	0.63	0.63	0.11	0.11	0.07	0.13	0.05	0.16	0.03	0.18	0.03	0.21	0.03	0.24	0.03	0.26	0.04	0.29	0.04
	X4	25.00	1.70	1.70	1.50	1.50	0.25	0.25	0.16	0.31	0.11	0.38	0.08	0.44	0.06	0.50	0.07	0.56	0.08	0.63	0.09	0.69	0.09
	X5	31.25	1.96	1.96	2.37	2.37	0.49	0.49	0.31	0.61	0.22	0.73	0.16	0.85	0.12	0.98	0.14	1.10	0.15	1.22	0.17	1.34	0.18
	X6	37.50	2.00	2.00	2.81	2.81	0.84	0.84	0.54	1.05	0.38	1.27	0.28	1.48	0.21	1.69	0.24	1.90	0.26	2.11	0.29	2.32	0.32
50.00	X7	43.75			2.98	2.98	1.34	1.34	0.86	1.67	0.60	2.01	0.44	2.34	0.33	2.68	0.38	3.01	0.42	3.35	0.46	3.68	0.50
	X8	50.00			3.00	3.00	2.00	2.00	1.28	2.50	0.89	3.00	0.65	3.50	0.50	4.00	0.56	4.50	0.63	5.00	0.69	5.50	0.75
100.00	X9	56.25					2.66	2.66	1.82	3.33	1.27	3.99	0.93	4.66	0.71	5.32	0.80	5.99	0.89	6.65	0.98	7.32	1.07
	X10	62.50					3.16	3.16	2.50	3.95	1.74	4.73	1.28	5.52	0.98	6.31	1.10	7.10	1.22	7.89	1.34	8.68	1.46
	X11	68.75					3.51	3.51	3.18	4.39	2.31	5.27	1.70	6.15	1.30	7.02	1.46	7.90	1.62	8.78	1.79	9.66	1.95
	X12	75.00					3.75	3.75	3.72	4.69	3.00	5.63	2.20	6.56	1.69	7.50	1.90	8.44	2.11	9.38	2.32	10.31	2.53
	X13	81.25					3.89	3.89	4.14	4.87	3.69	5.84	2.80	6.82	2.15	7.79	2.41	8.76	2.68	9.74	2.95	10.71	3.22
	X14	87.50					3.97	3.97	4.46	4.96	4.26	5.95	3.50	6.95	2.68	7.94	3.01	8.93	3.35	9.92	3.68	10.91	4.02
	X15	93.75					4.00	4.00	4.69	5.00	4.73	5.99	4.20	6.99	3.30	7.99	3.71	8.99	4.12	9.99	4.53	10.99	4.94
	X16	100.00					4.00	4.00	4.84	5.00	5.11	6.00	4.80	7.00	4.00	8.00	4.50	9.00	5.00	10.00	5.50	11.00	6.00
125.00	X17	106.25						4.93	5.00	5.40	6.00	5.30	6.30	4.70	5.85	5.29	6.00	6.65	7.32	8.05	8.78	9.47	10.15
	X18	112.50						4.98	5.00	5.63	6.07	5.72	6.72	5.32	6.37	5.99	6.74	7.32	8.05	8.78	9.47	10.15	
	X19	118.75						5.00	5.00	5.78	6.07	6.07	7.07	5.85	6.50	6.59	7.32	7.99	8.66	9.33	10.00	10.67	11.34
	X20	125.00						5.00	5.00	5.89	6.35	6.35	7.35	6.31	7.00	7.10	7.89	8.68	9.47	10.26	11.05	11.84	12.63
150.00	X21	131.25							5.95	6.56	6.70	7.70	6.70	7.70	7.54	8.38	9.21	10.05	10.89	11.73	12.57	13.41	14.25
	X22	137.50							5.99	6.72	7.02	8.02	7.02	8.02	7.90	8.78	9.66	10.54	11.42	12.30	13.18	14.06	14.94
	X23	143.75							6.00	6.84	7.29	8.29	7.29	8.29	8.20	9.11	10.02	10.93	11.84	12.75	13.66	14.57	15.48
	X24	150.00							6.00	6.92	7.50	8.50	7.50	8.50	8.44	9.38	10.31	11.25	12.18	13.11	14.05	14.99	15.93
175.00	X25	156.25								6.97	7.67	8.17	9.17	8.17	9.17	8.62	9.58	10.54	11.50	12.46	13.42	14.38	15.34
	X26	162.50								6.99	7.79	8.29	9.29	8.29	9.29	8.76	9.74	10.71	11.68	12.65	13.62	14.59	15.56
	X27	168.75								7.00	7.88	8.38	9.38	8.38	9.38	8.86	9.85	10.83	11.82	12.80	13.79	14.78	15.77
	X28	175.00								7.00	7.94	8.44	9.44	8.44	9.44	8.93	9.92	10.91	11.91	12.90	13.90	14.90	15.90
200.00	X29	181.25									7.97	8.47	9.47	8.47	9.47	8.97	9.97	10.96	11.96	12.96	13.96	14.96	15.96
	X30	187.50									7.99	8.49	9.49	8.49	9.49	8.99	9.99	10.99	11.99	12.99	13.99	14.99	15.99
	X31	193.75									8.00	8.50	9.50	8.50	9.50	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00
	X32	200.00									8.00	8.50	9.50	8.50	9.50	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00

W-BEAM GUARDRAIL INSTALLATION CRITERIA

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE
221
505



INSTALLATION AT ENTRANCE OR OTHER REQUIRED OPENING

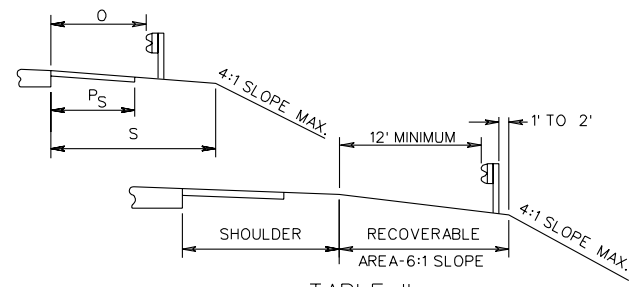
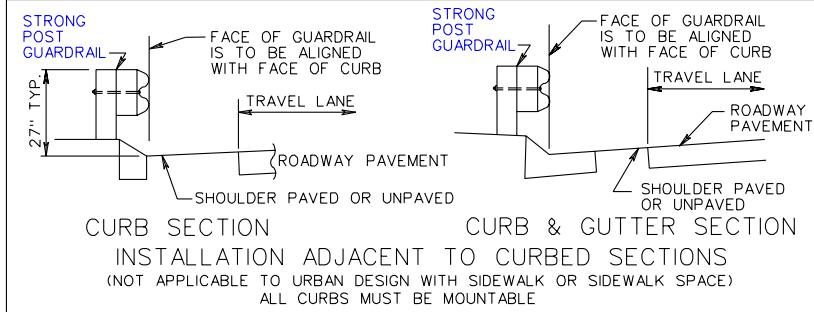


TABLE II
NORMAL GUARDRAIL LOCATION-THROUGH TRAFFIC LANES RIGHT OF TRAFFIC

SHOULDER WIDTH (S)	PAVED SHOULDER WIDTH (P _S)	OFFSET FROM EDGE OF PAVEMENT TO FACE OF GUARDRAIL (O)
15'	6', 10' or 12'	12'
13'	8'	10'
11'	0, 3', 4' or 6'	8'
9'	0, 3' or 4'	6'
7'	0 or 3'	4'
5'	0 or 3'	2'

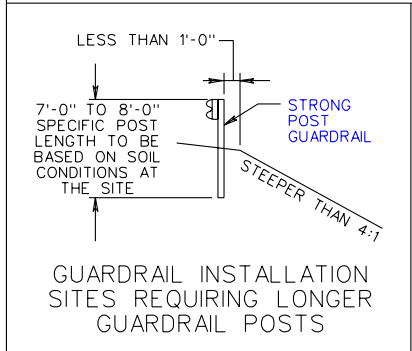


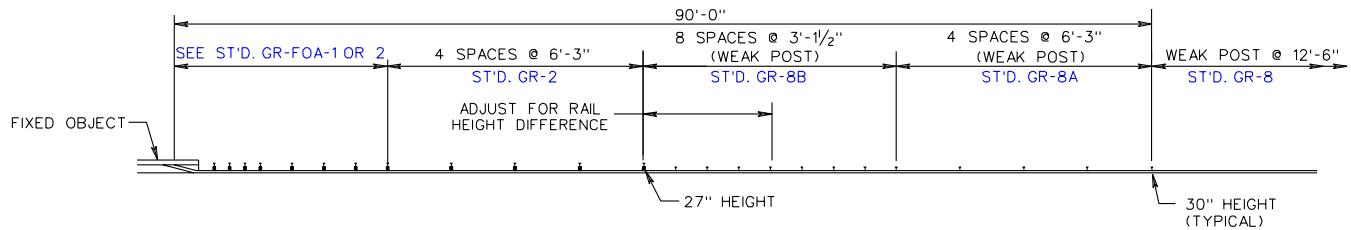
TABLE I
NORMAL GUARDRAIL LOCATION-THROUGH TRAFFIC LANES LEFT OF TRAFFIC

SHOULDER WIDTH (S)	PAVED SHOULDER WIDTH (P _S)	OFFSET FROM EDGE OF PAVEMENT TO FACE OF GUARDRAIL (O)
15'	3', 4', 10' or 12'	12'
13'	3'	10'
12' (MED. 6 LANE)	10'	10'
11'	3'	8'
8' (MED.)	3' or 4'	5'

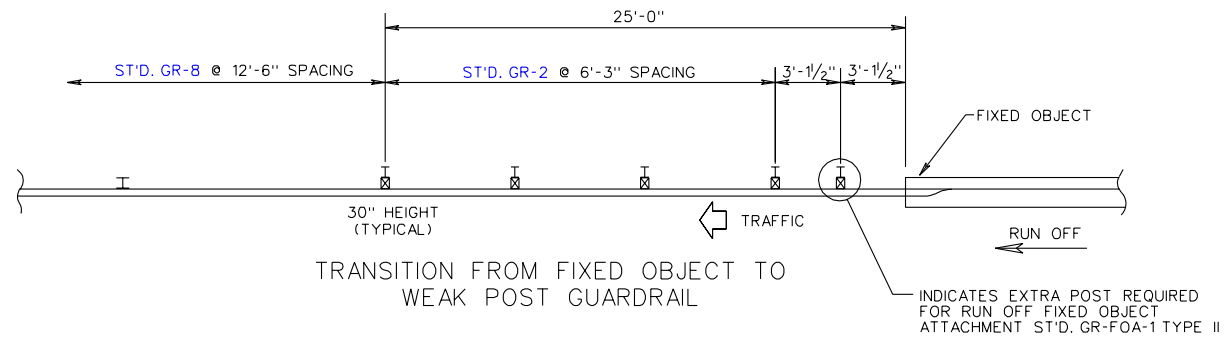
GUARDRAIL LOCATION-ON RECOVERABLE SLOPE

REVISED 7/01

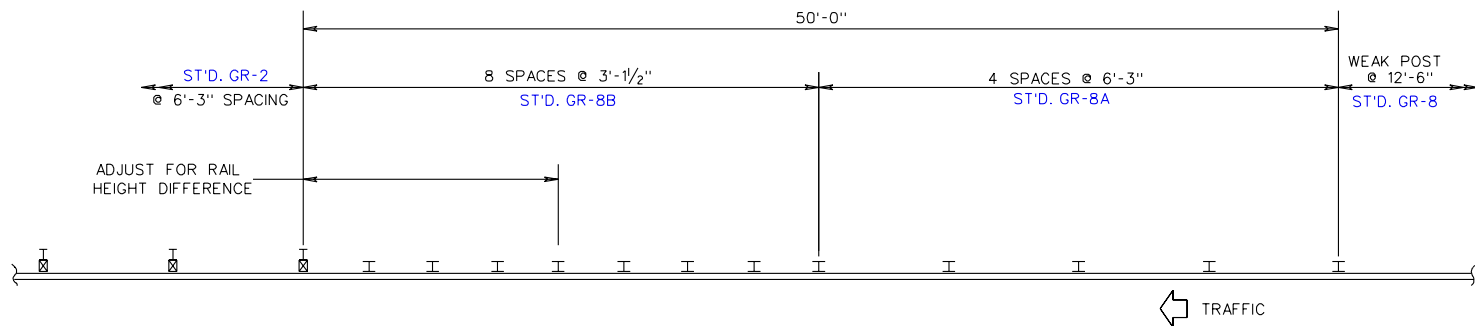
GR-INS



TRANSITION FROM WEAK POST GUARDRAIL TO FIXED OBJECT



TRANSITION FROM FIXED OBJECT TO WEAK POST GUARDRAIL



TRANSITION FROM WEAK POST TO STRONG POST GUARDRAIL

SHEET 7 OF 8

W BEAM GUARDRAIL INSTALLATION CRITERIA

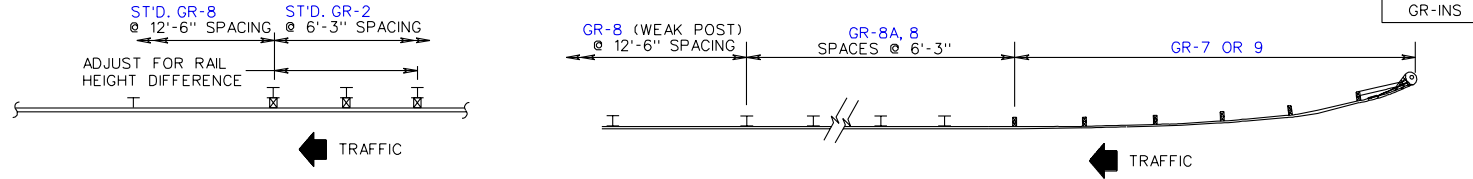
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

221
505

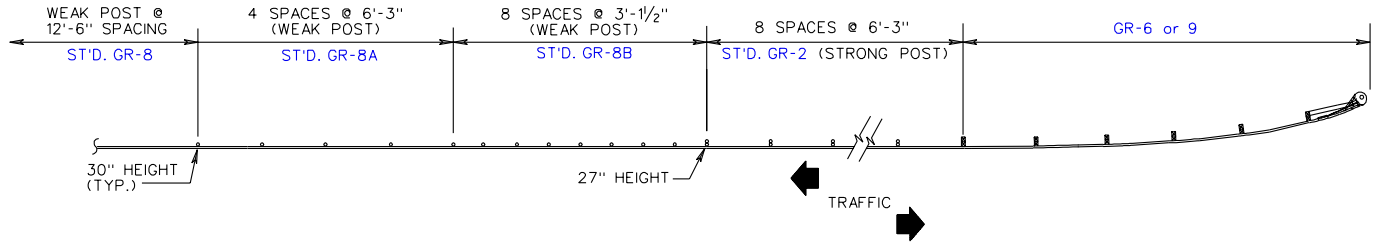
501.39

REVISED 7/01

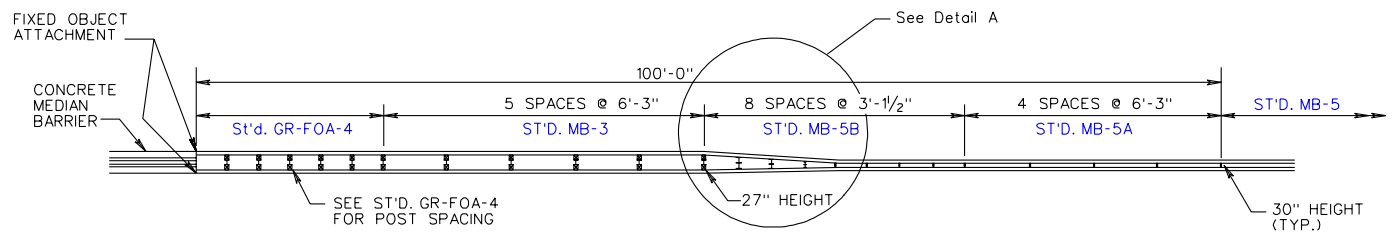


TRANSITION FROM STRONG POST TO WEAK POST GUARDRAIL

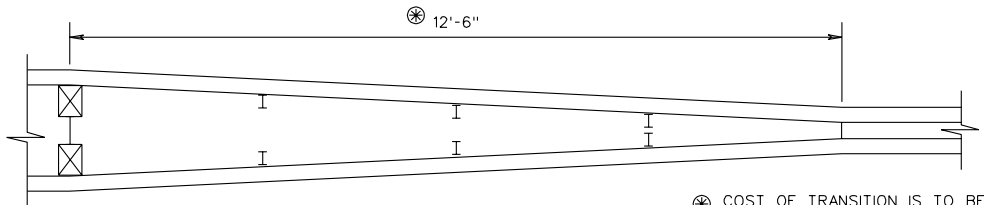
TRANSITION FROM GR-7 & GR-9 TERMINAL TO WEAK POST GUARDRAIL



TRANSITION FROM GR-6 OR GR-9 TERMINAL TO WEAK POST GUARDRAIL



TRANSITION FROM WEAK POST MEDIAN BARRIER TO CONCRETE MEDIAN BARRIER



DETAIL A

⊗ COST OF TRANSITION IS TO BE INCLUDED IN PRICE BID FOR ST'D. MB-5B MEDIAN BARRIER.

SPECIFICATION REFERENCE 221 505	<h2 style="margin: 0;">W BEAM GUARDRAIL AND MEDIAN BARRIER INSTALLATION CRITERIA</h2> <p style="margin: 0;">VIRGINIA DEPARTMENT OF TRANSPORTATION</p>	501.40
---------------------------------------	---	--------