# SECTION 500

## GUARDRAIL, MEDIAN BARRIER, FENCING & MARKERS

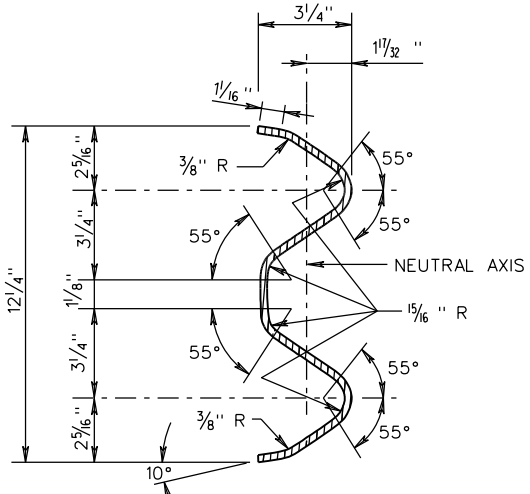
# INDEX OF SHEETS
# SECTION 500-GUARDRAIL, BARRIER AND FENCE

VIRGINIA DEPARTMENT OF TRANSPORTATION

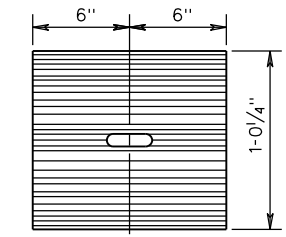
VDOT
ROAD AND BRIDGE STANDARDS

# INDEX OF SHEETS
# SECTION 500-GUARDRAIL, BARRIER AND FENCE

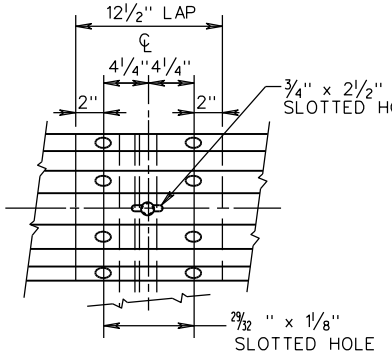
VIRGINIA DEPARTMENT OF TRANSPORTATION

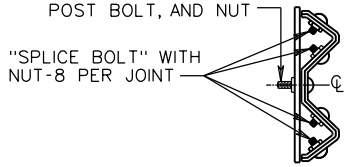



SECTION THRU RAIL ELEMENT AND
W BEAM BACK-UP PLATE

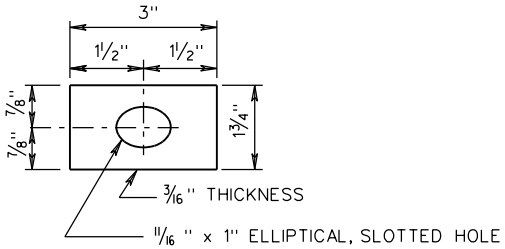



W BEAM
BACK - UP PLATE

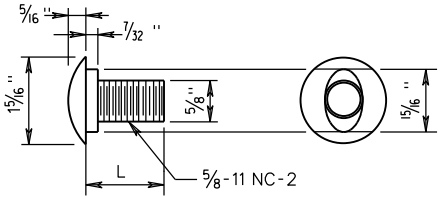


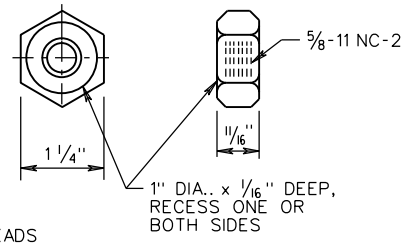




DETAIL OF SPLICE JOINT




DETAIL OF STANDARD WASHER




L= 1¼" FOR SPLICE BOLT-FULL LENGTH THREADS
L= 2" FOR SPLICE BOLT-FULL LENGTH THREADS ON NESTED W BEAMS.
L= 10" FOR STEEL POST BOLT-1½" MIN. THREADS
L= 18" FOR WOOD AND CONCRETE POST BOLT-2½" MIN. THREADS
L= 26" FOR MB WOOD OR CONCRETE POST-2" MIN. THREADS

DETAIL OF BUTTON HEAD BOLT AND RECESS NUT
(GUARDRAIL BOLT)

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.

| SPECIFICATION REFERENCE |
|---|
| 221 |
| 505 |

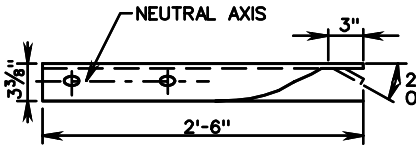
# STANDARD GUARDRAIL HARDWARE

VIRGINIA DEPARTMENT OF TRANSPORTATION

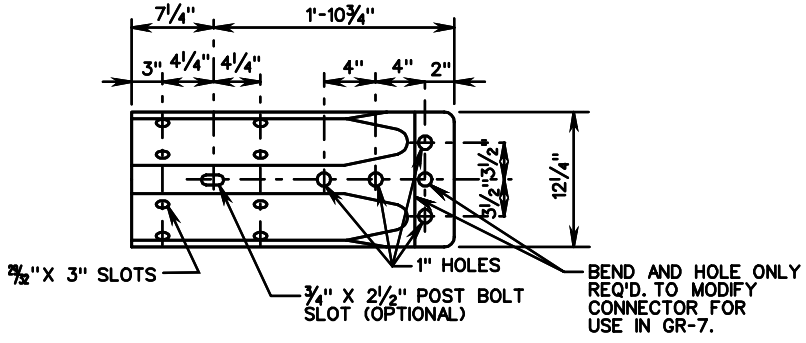
VDOT
ROAD AND BRIDGE STANDARDS

| REVISION DATE | SHEET 1 OF 3 |
|---|---|
| 01/14 | 501.01 |

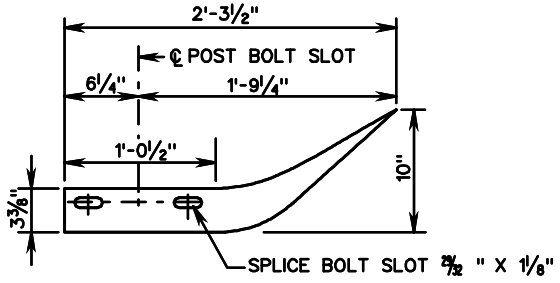
GR-HDW

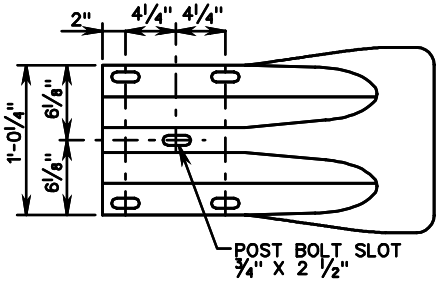



NOTE:
LAP IN DIRECTION OF TRAFFIC AT SPLICE JOINT.

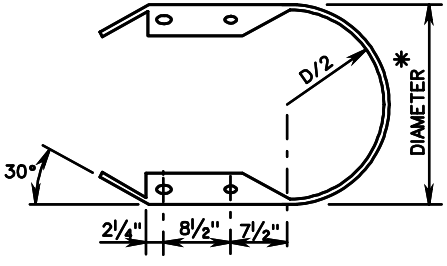



## W BEAM TERMINAL CONNECTOR

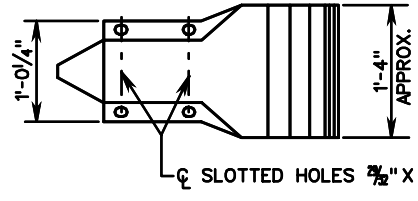



## W BEAM END SECTION (FLARED)

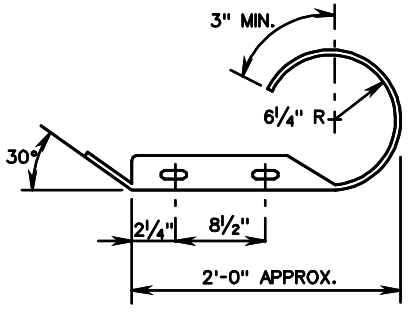


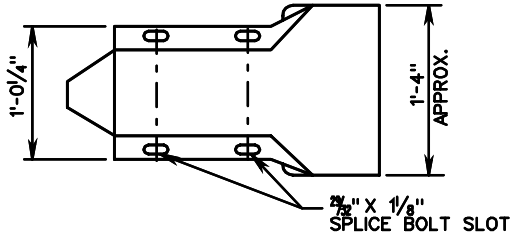

* THE GUARDRAIL MEDIAN BARRIER COMPONENTS DEPICTED IN A.R.T.B.A. TECHNICAL BULLETIN NUMBER 268B MAY BE SUBSTITUTED IF INTER-CHANGEABLE WITH THE STANDARDS FOR GUARDRAIL (GR) OR MEDIAN BARRIER (MB) AND APPROVED BY THE ENGINEER.




* STANDARD DIMENSIONS OF 12½", 24" AND 30" ARE SUGGESTED.

## W BEAM END SECTION (BUFFER)




## W BEAM END SECTION (ROUNDED)

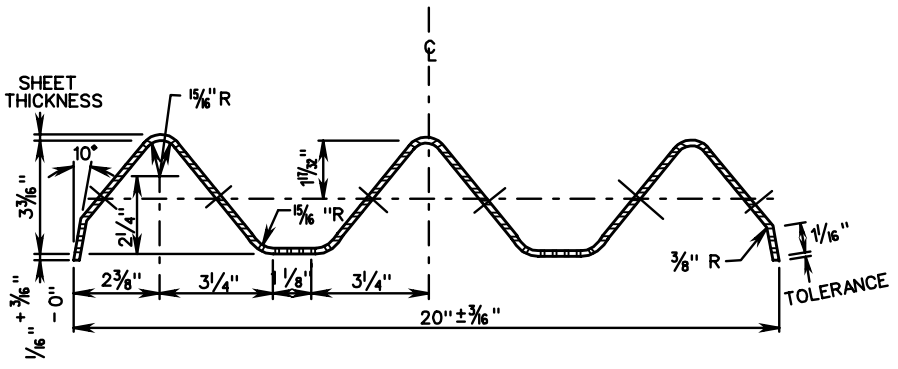
VDOT
ROAD AND BRIDGE STANDARDS

SHEET 2 OF 3 | REVISION DATE
501.02

# STANDARD GUARDRAIL HARDWARE
# W-BEAM GUARDRAIL HARDWARE

VIRGINIA DEPARTMENT OF TRANSPORTATION

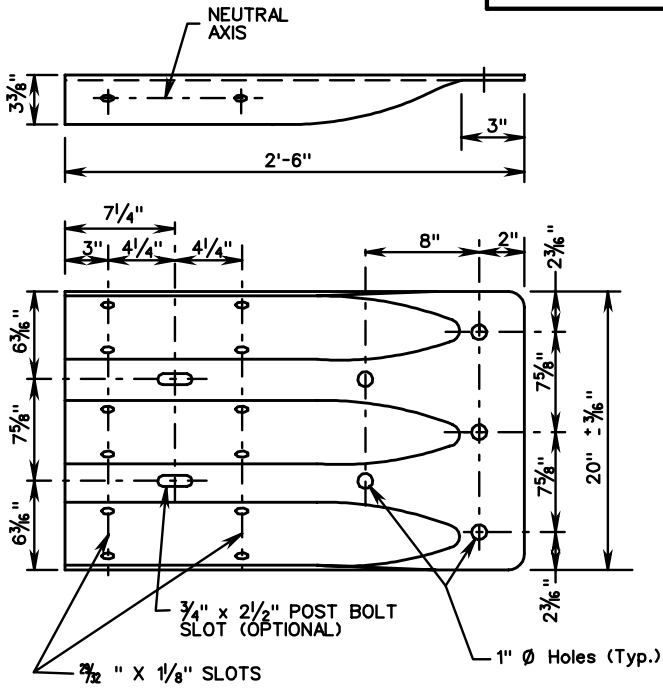
SPECIFICATION REFERENCE
221
505



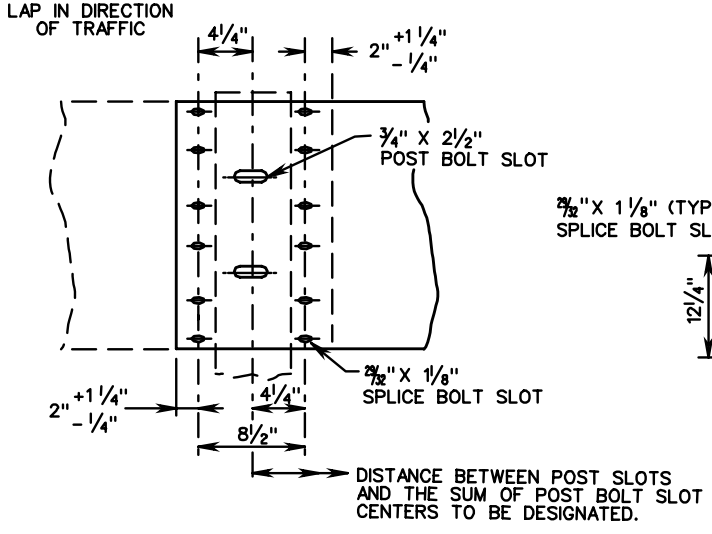

SECTION THRU THRIE BEAM RAIL ELEMENT

NOTES:

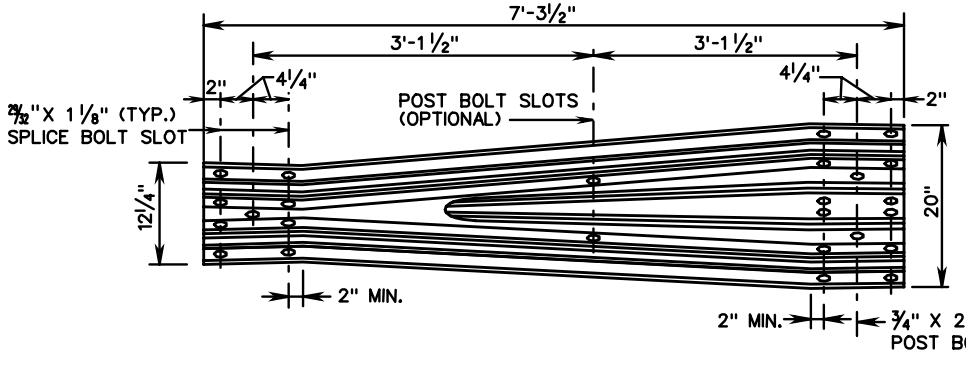
THE GUARDRAIL AND MEDIAN BARRIER COMPONENTS DEPICTED IN ARTBA TECHNICAL BULLETIN NUMBER 268B MAY BE SUBSTITUTED IF INTERCHANGEABLE WITH THE STANDARDS FOR GUARDRAIL (GR) OR MEDIAN BARRIER (MB) AND APPROVED BY THE ENGINEER.




THRIE BEAM TERMINAL CONNECTOR DETAIL



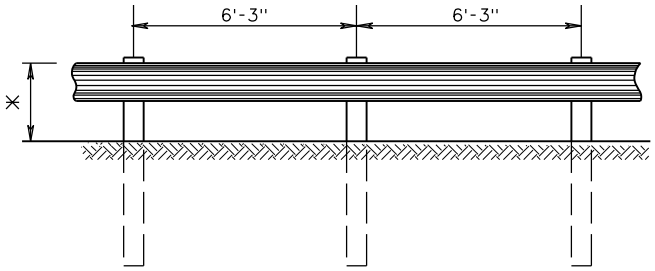

SPLICE DETAIL




TRANSITION SECTION DETAIL
(W-BEAM TO THRIE BEAM)

| SPECIFICATION REFERENCE | STANDARD GUARDRAIL HARDWARE<br>THRIE BEAM GUARDRAIL HARDWARE<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | VDOT<br>ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 221<br>505 | | REVISION DATE<br>SHEET 3 OF 3<br>501.03 |

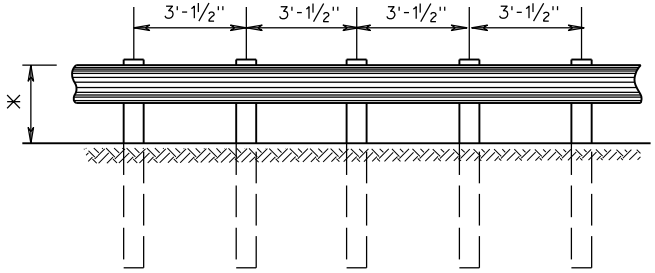
# * 27¾" MIN - 28¾" MAX RAIL HEIGHT




## GR-2

(6'-3" POST SPACING)

MAX DYNAMIC DEFLECTION = 3'




## GR-2A

(3'-1½" POST SPACING)

MAX DYNAMIC DEFLECTION = 2'

## 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, AND ASSOCIATED HARDWARE SEE SHEET NOS. 501.01 AND 501.02.

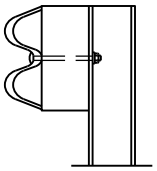
RAIL ELEMENTS ARE FURNISHED SHOP CURVED FOR RADII BETWEEN 5 FEET AND 150 FEET.

ALL GUARDRAIL POSTS SHALL BE SET PLUMB. POST SHALL NOT BE SET WITH A VARIATION OF MORE THAN ⅛" PER FOOT FROM VERTICAL. W-BEAM, BLOCKOUTS, AND POSTS SHALL BE SET AND ALIGNED WITHOUT ALTERATION OR FORCE, AS PER SECTION 505 OF THE SPECIFICATIONS.

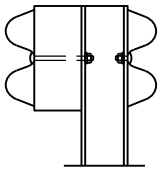
ALL GR-2 AND GR-2A RAIL SHALL BE MAINTAINED AT A HEIGHT OF 27¾" MIN - 28¾" MAX AS MEASURED PER STANDARD GR-INS.

ALL W-BEAM RAILS SHALL BE LAPPED IN THE DIRECTION OF VEHICULAR TRAVEL FOR THE FINISHED ROADWAY.

THE OPTIONAL GR-2A METHODS OF NESTING THE RAIL OR USE OF AN ADDITIONAL RAIL ON THE BACK OF THE POST FOR STANDARD GR-2A SHALL BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.



* OPTIONAL GR-2A METHOD USING NESTED RAIL



* OPTIONAL GR-2A METHOD USING ADDITIONAL RAIL ON BACK OF POST

* WHEN NESTED RAIL OR ADDITIONAL RAIL IS PLACED ON BACK OF POST FOR GR-2A THE POST SPACING WILL BE 6'-3".

| FLARE RATES | | | |
|---|---|---|---|
| DESIGN SPEED | INSIDE SHY LINE | | BEYOND SHY LINE |
| MPH | SHY LINE LS | FLARE RATE | FLARE RATE |
| 70 | 9' | 30:1 | 15:1 * |
| 60 | 8' | 26:1 | 14:1 * |
| 50 | 6.5' | 21:1 | 11:1 * |
| 40 | 5' | 16:1 | 8:1 * |
| 30 | 4' | 13:1 | 7:1 * |

* SUGGESTED MAXIMUM FLARE RATE FOR SEMI-RIGID BARRIER SYSTEMS.



A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

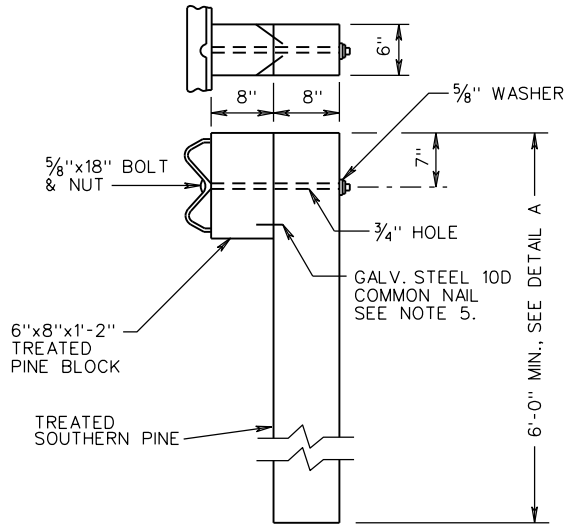
# STANDARD BLOCKED-OUT W-BEAM GUARDRAIL

## (STRONG POST SYSTEM)

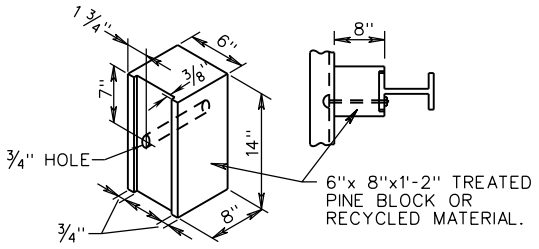
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

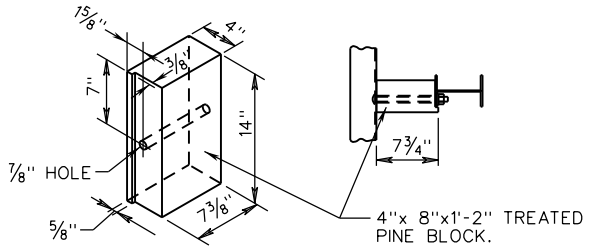
221
505



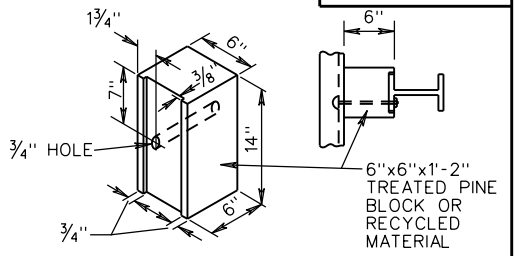

## 6x8 WOOD POST




## 6" WIDE BLOCKOUT



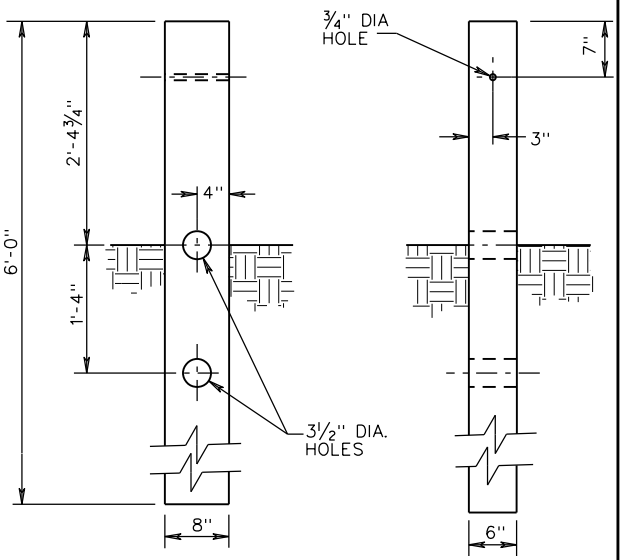

## 4" WIDE BLOCKOUT




FOR USE WHEN REPAIRING DAMAGED GUARDRAIL CONTAINING STEEL BLOCKOUTS.

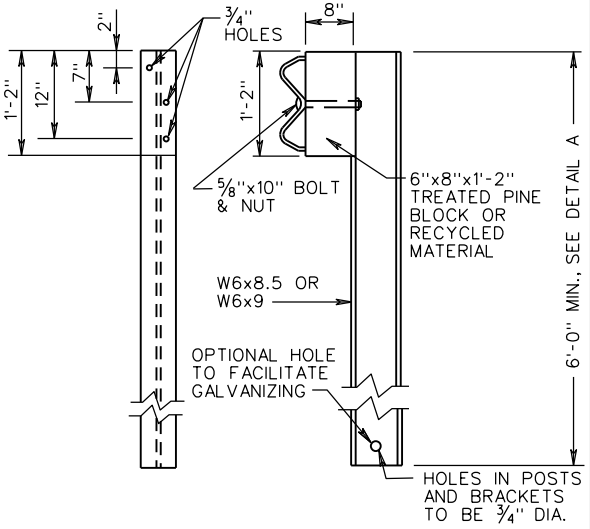
## BLOCKOUT FOR MAINTENANCE REPAIR ONLY

THE CRT POST IS FOR USE WITH THE STANDARD GR-10 TYPE III OR WHERE SPECIFIED BY THE ENGINEER IN THE PLANS.

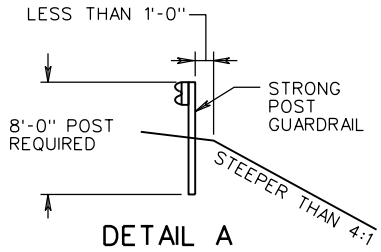



## CRT POST

POST MAY BE HOT ROLLED OR WELDED.




## STEEL POST




## DETAIL A

## GUARDRAIL INSTALLATION SITES REQUIRING LONGER GUARDRAIL POSTS

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 AND 501.02.
4. DRIVE NAIL ON BOTH SIDES WITHIN 2" OF THE TOP OR BOTTOM OF BLOCKOUT AFTER 5/8" x 18 BOLT IS INSTALLED.

| SPECIFICATION REFERENCE |
|---|
| 221<br>236<br>505 |

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

# STANDARD BLOCKED-OUT W-BEAM GUARDRAIL

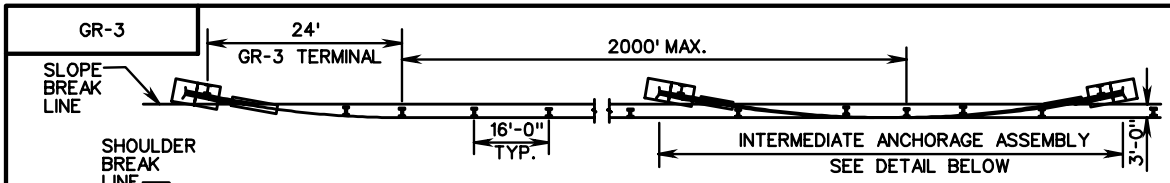
## (STRONG POST SYSTEM, POST AND BLOCKOUT DETAILS)

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT
ROAD AND BRIDGE STANDARDS

| REVISION DATE | SHEET 2 OF 2 |
|---|---|
| 08/14 | 501.05 |

GR-3

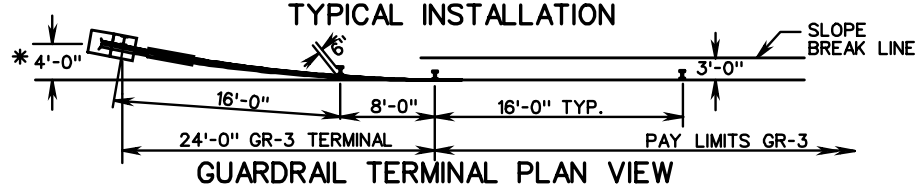



SHOULDER BREAK LINE

POST SPACING MAY BE DECREASED AS NECESSARY TO MAINTAIN ALIGNMENT WHEN RAIL IS ON AN OUTSIDE CURVE WITH A RADIUS OF 715 FEET OR LESS.

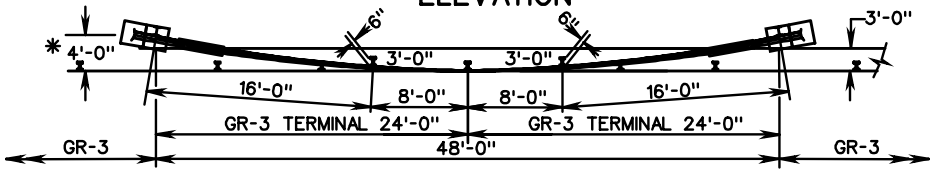
EDGE OF SHOULDER

TYPICAL INSTALLATION



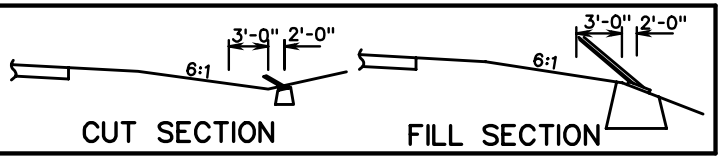

GUARDRAIL TERMINAL PLAN VIEW


ELEVATION




INTERMEDIATE ANCHORAGE PLAN VIEW


ELEVATION

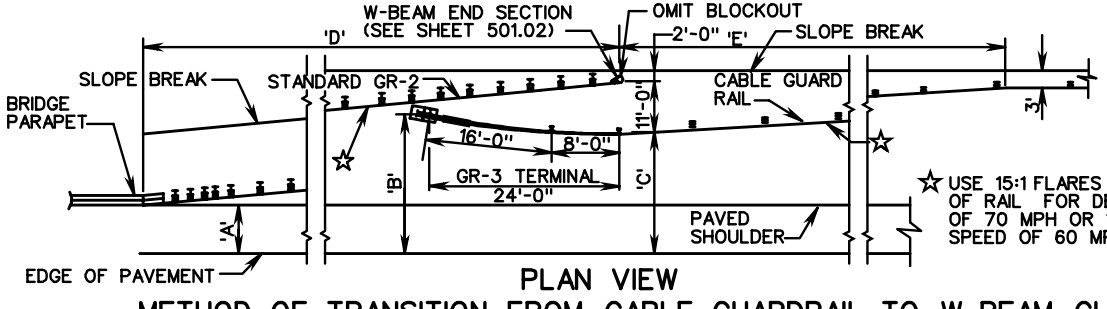



CUT SECTION FILL SECTION

* 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.

NOTES:

1. FOR ARRANGEMENTS OF SPRING CABLE END ASSEMBLIES (COMPENSATING DEVICES) AND TURNBUCKE CABLE END ASSEMBLIES, THE FOLLOWING CRITERIA SHALL APPLY:
2. LENGTH OF CABLE RUNS:
   -TO 1000'-USE COMPENSATING DEVICE ON ONE END AND USE TURNBUCKLE ON THE OTHER END OF EACH INDIVIDUAL CABLE.
   -OVER 1000' 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.
3. 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.
4. THE DYNAMIC DEFLECTION FOR STANDARD GR-3 IS 11 FEET.
5. 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.
6. 5/16" ANSI B18.2.2 HEX. BACKING NUT OR APPROVED SHOULDER MUST EQUAL BEARING AREA OF 5/16" STANDARD NUT.
7. THE GUARDRAIL AND MEDIAN BARRIER COMPONENTS DEPICTED IN AASHTO-AGC-ARTBA "A GUIDE TO STANDARIZED HIGHWAY BARRIER HARDWARE" MAY BE SUBSTITUTED IF INTERCHANGEABLE WITH THE STANDARDS FOR GUARDRAIL (GR) OR MEDIAN BARRIER (MB) AND APPROVED BY THE ENGINEER.




PLAN VIEW

☆ 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.

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

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

VDOT
ROAD AND BRIDGE STANDARDS

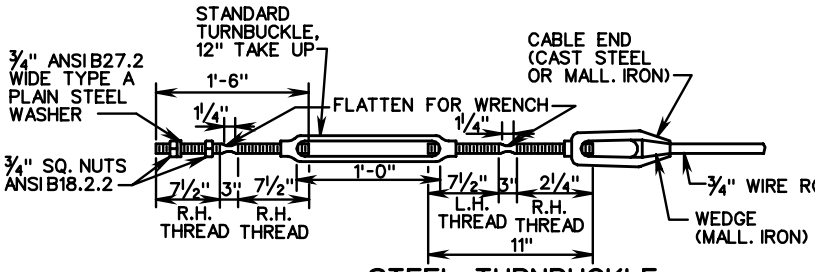
# CABLE GUARDRAIL

VIRGINIA DEPARTMENT OF TRANSPORTATION

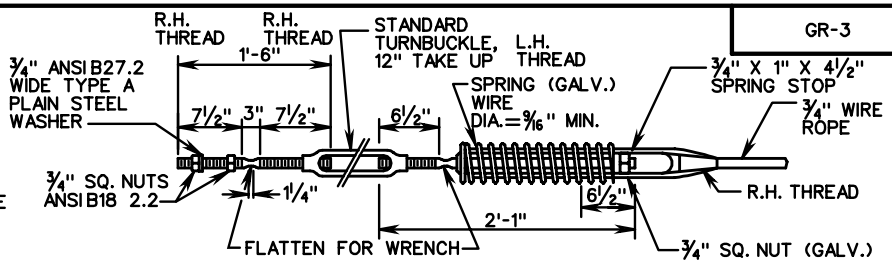
SHEET 1 OF 3
501.06

REVISION DATE

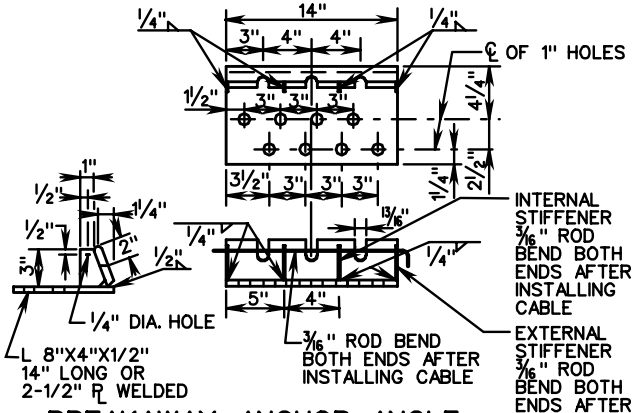
SPECIFICATION REFERENCE
221
505



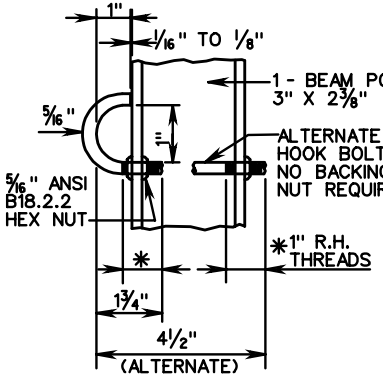

STEEL TURNBUCKLE
CABLE END ASSEMBLY



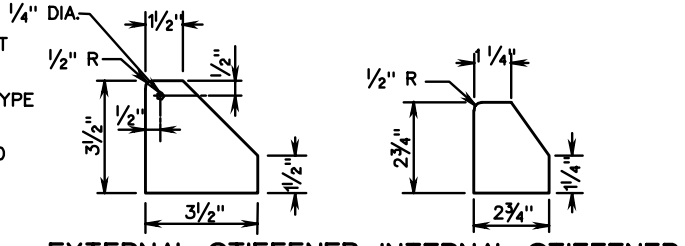

SPRING CABLE END ASSEMBLY
(COMPENSATING DEVICE)




BREAKAWAY ANCHOR ANGLE

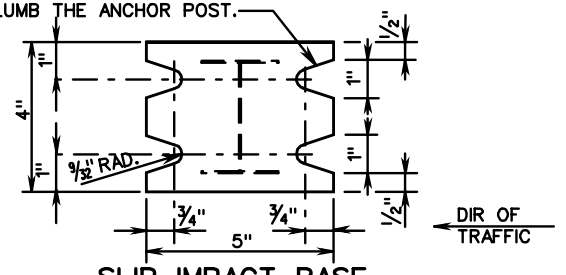



HOOK BOLTS

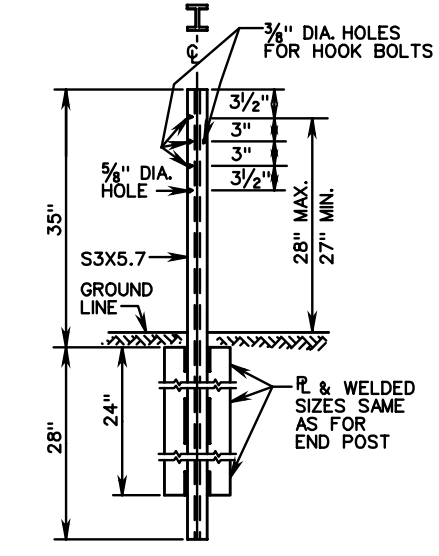



EXTERNAL STIFFENER INTERNAL STIFFENER

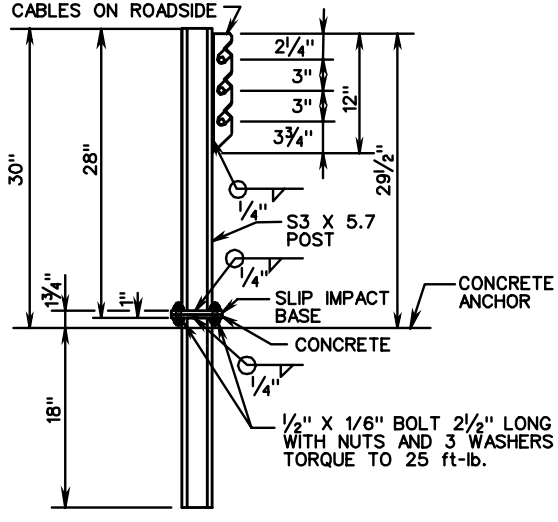
½" X 1/16" BOLT 2½" LONG. W/NUT & 3 WASHERS. TORQUE TO 25 ft-lb. 1 WASHER UNDER HEAD. 1 BETWEEN STIFFENERS. 1 UNDER NUT. ADDITIONAL 1/16" THICK WASHER MAY BE PLACED BETWEEN STIFFENERS TO PLUMB THE ANCHOR POST.



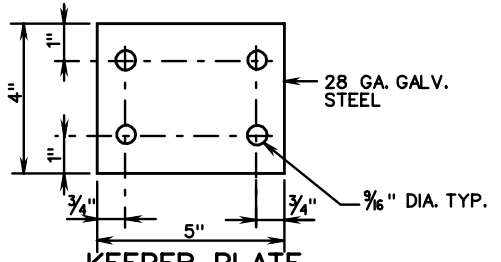

SLIP IMPACT BASE
(KEEPER PLATE NOT SHOWN)




INTERMEDIATE POST DETAIL



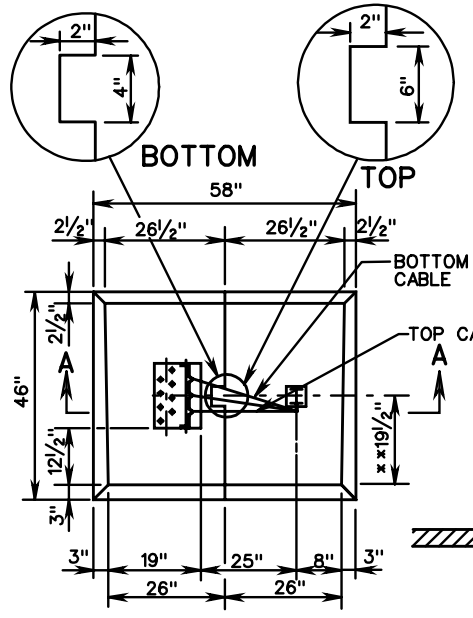

ANCHOR POST DETAIL
(SHOWN FOR LEFT HANDED ANCHOR)



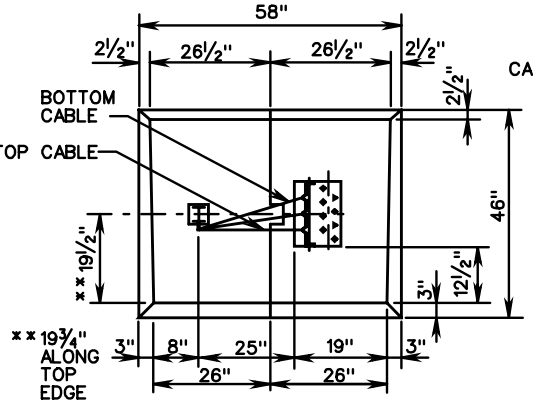

KEEPER PLATE

| SPECIFICATION REFERENCE | CABLE GUARDRAIL | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 221<br>505 | VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE<br>SHEET 2 OF 3<br>501.07 |

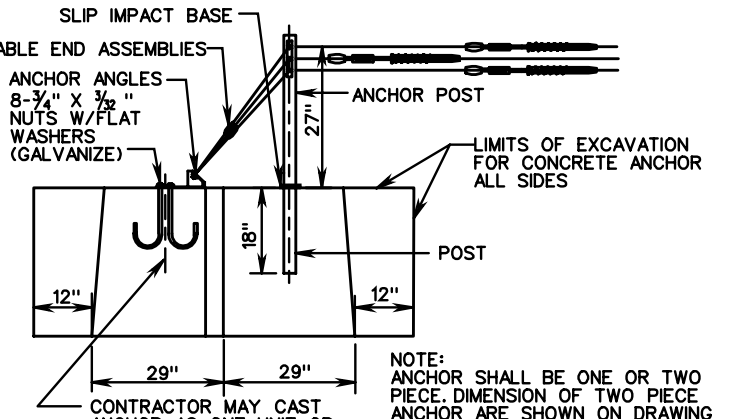
GR-3




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

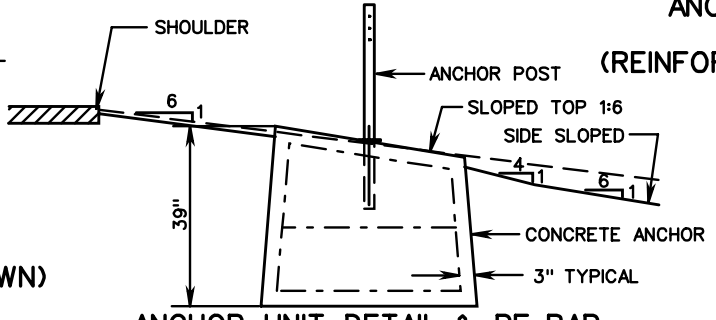



ANCHOR UNIT DETAIL
TOP VIEW RIGHT HAND
(REINFORCEMENT NOT SHOWN)
TWO PIECE

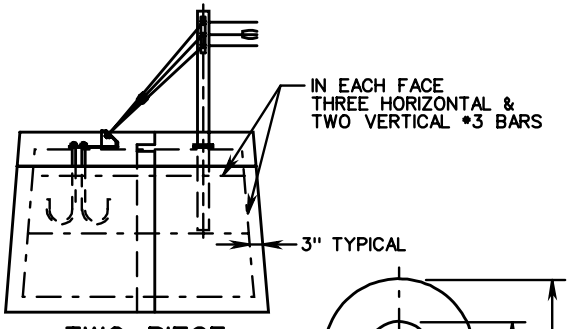



SECTION AA
ANCHOR UNIT DETAIL
LEFT HAND
(REINFORCEMENT NOT SHOWN)

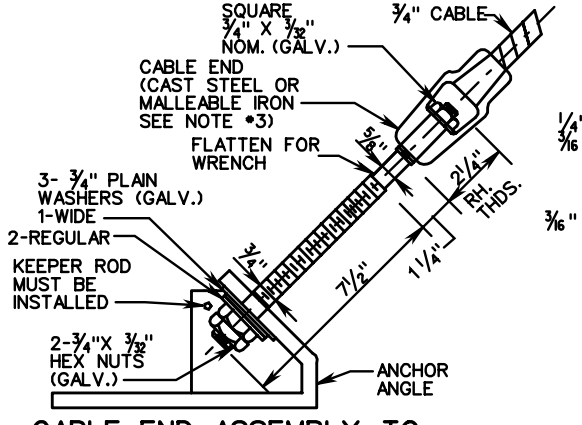
NOTE:
ANCHOR SHALL BE ONE OR TWO PIECE. DIMENSION OF TWO PIECE ANCHOR ARE SHOWN ON DRAWING DIMENSIONS OF ONE PIECE ANCHOR ARE 4'-11" LONG BY 3'-0" WIDE BY 3'-3" HIGH WITH SIDES BATTERED 1 TO 12 AND TOP SLOPED 1 TO 6. REINFORCING SIMILAR TO TWO PIECE ANCHOR.



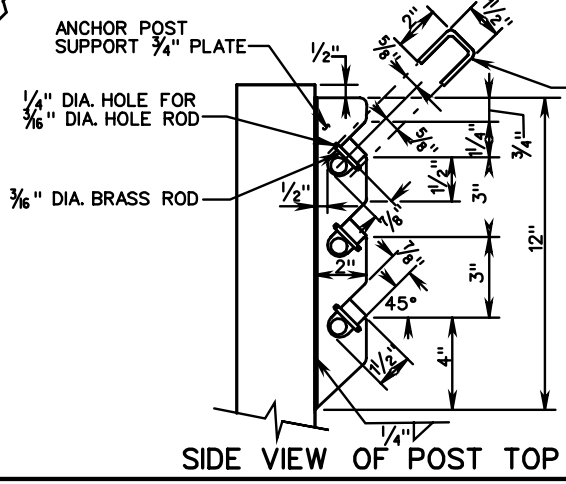

ANCHOR UNIT DETAIL & RE-BAR
INSTALLATION DETAIL



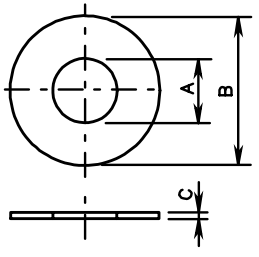

TWO PIECE




CABLE END ASSEMBLY TO
ANCHOR ANGLE DETAIL




SIDE VIEW OF POST TOP




| WASHER | WASHER SERIES | A | | B | | C | |
|---|---|---|---|---|---|---|---|
| | | INSIDE DIA. | | OUTSIDE DIA. | | THICKNESS | |
| | | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. |
| ¾" | REGULAR | ⅞" | 55/64" | 2" | 1 15/16" | 3/16" | 9/64" |
| | WIDE | ⅞" | 55/64" | 2 19/32" | 2 35/64" | 13/64" | 5/32" |
| ½" | NARROW | 17/32" | ½" | 1" | 63/64" | 7/64" | 1/16" |

VDOT
ROAD AND BRIDGE STANDARDS

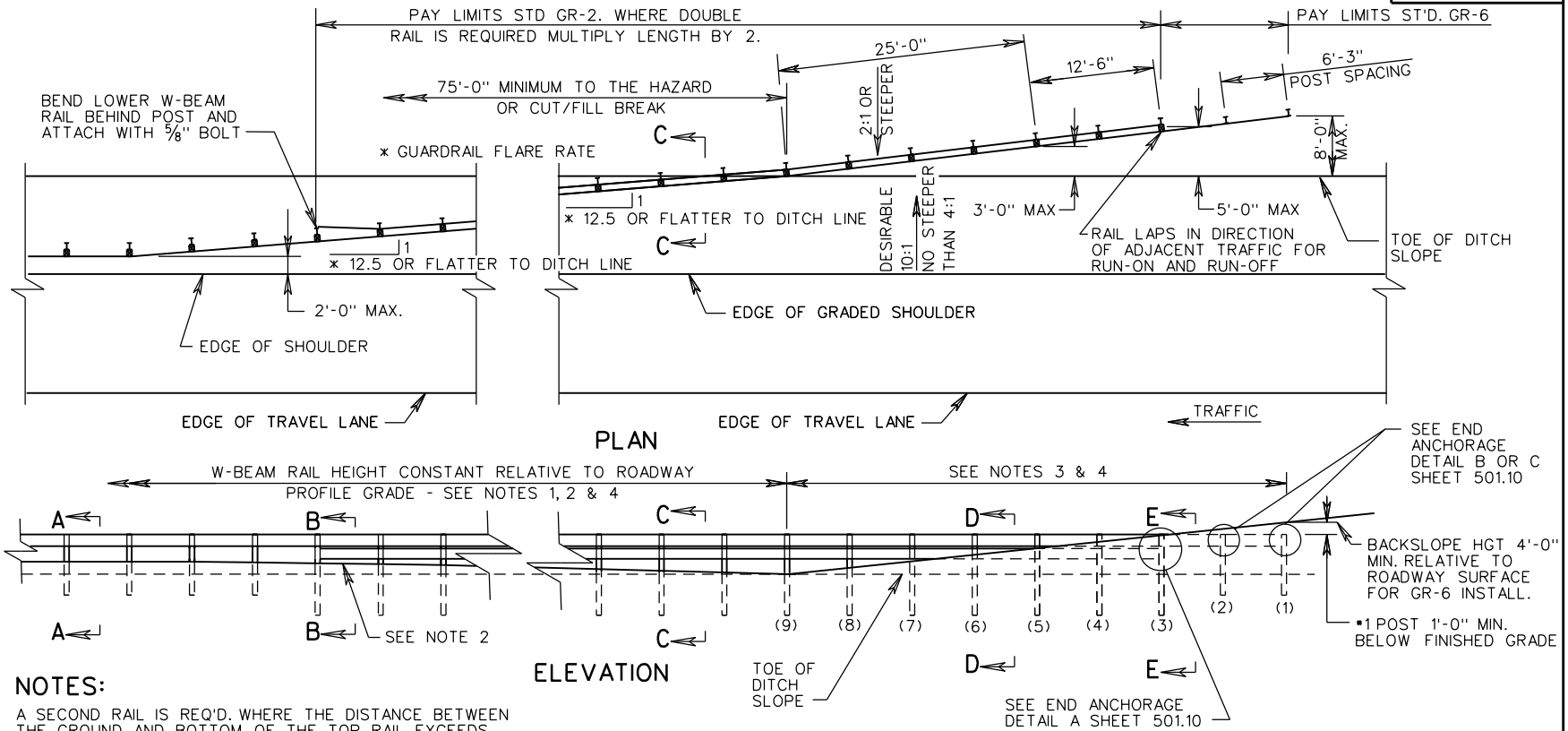
SHEET 3 OF 3
501.08

REVISION DATE

# CABLE GUARDRAIL

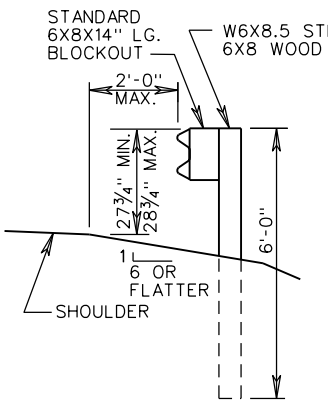
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE
221
505

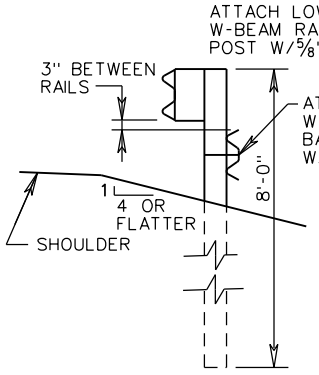



## NOTES:

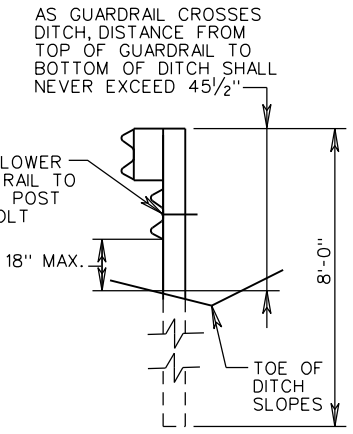
1. A SECOND RAIL IS REQ'D. WHERE THE DISTANCE BETWEEN THE GROUND AND BOTTOM OF THE TOP RAIL EXCEEDS 18" (UP TO THE POINT WHERE THE RAIL CROSSES THE DITCH LINE). THE DOUBLE RAIL WILL EXTEND TO POST #3.
2. MAXIMUM DISTANCE BETWEEN BOTTOM OF THE LOWER W-BEAM RAIL AND GROUND LINE IS 18". WHEN DOUBLE RAIL IS REQ'D., TAPER BOTH W-BEAM RAILS TO MAINTAIN THE 18" DISTANCE FROM THE GROUND.
3. BOTH W-BEAM RAILS TO BE 1'-0" BELOW FINISHED GRADE AT POST #1 (8'-0" OFFSET).
4. A 8'-0" LONG POST MUST BE USED WHEN UPPER AND LOWER W-BEAM RAILS ARE REQUIRED. FROM THE BEGINNING OF THE LOWER RAIL THROUGH POST #3.
5. STANDARD GR-6 TERMINAL TREATMENT MAY BE USED AT THE RUN-ON END OF DIVIDED HIGHWAYS (LEFT AND RIGHT OF TRAFFIC) AND AT THE RUN-ON AND RUN-OFF ENDS ON UNDIVIDED HIGHWAYS.
6. ALL POST SPACING 6'-3" C-C UNLESS OTHERWISE NOTED. THE POST MAY BE W6 X 8.5 STEEL OR 6 X 8 WOOD EXCEPT THE LAST 3 TERMINAL POSTS MUST BE W6 X 8.5 STEEL.
7. FOR SECTIONS D-D & E-E, AND END ANCHORAGE DETAILS SEE SHEET 501.10.
8. ALL TERMINAL RUN-ON OR RUN-OFF INSTALLATIONS SHALL BE INSTALLED WITH RAILS LAPPED IN THE DIRECTION OF ADJACENT TRAFFIC.
9. IF THE BACKSLOPE IS ROCK AND 1:1 OR STEEPER, THE W-BEAM MAY BE ANCHORED PER SOLID ROCK CUT INSTALLATION (DETAIL F).




SECTION A-A



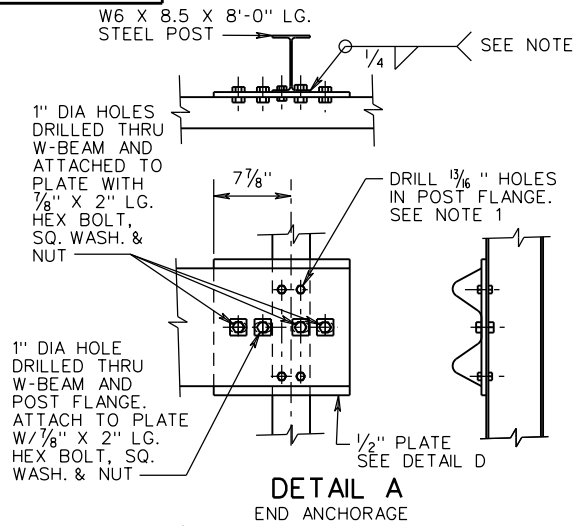

SECTION B-B



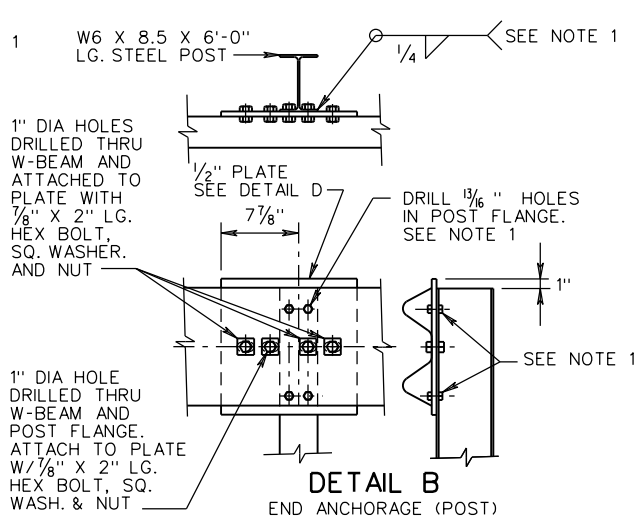

SECTION C-C

| SPECIFICATION REFERENCE | A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE. | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 221<br>505 | # TERMINAL TREATMENT FOR W-BEAM GUARDRAIL<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE 7/12 · SHEET 1 OF 2 · 501.09 |

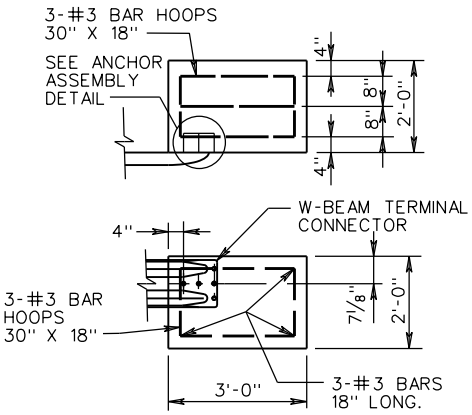
GR-6



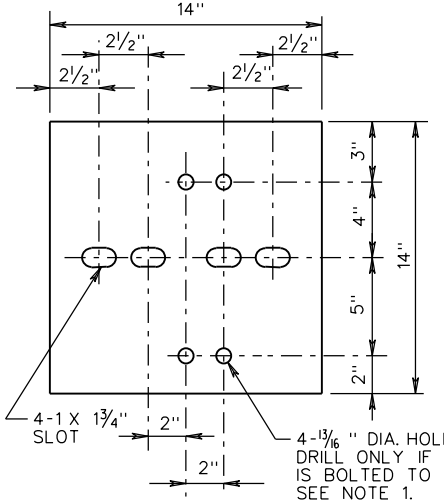

## DETAIL A
END ANCHORAGE



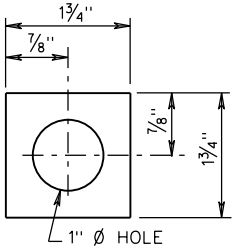

## DETAIL B
END ANCHORAGE (POST)



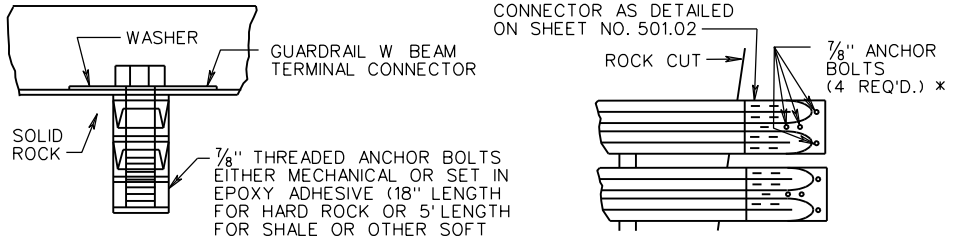

## DETAIL C
END ANCHORAGE (CONCRETE)




## DETAIL D
1/2" THICK STEEL PLATE



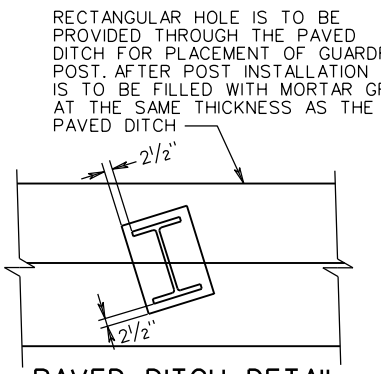

## DETAIL E
3/16" THICK SQUARE WASHER



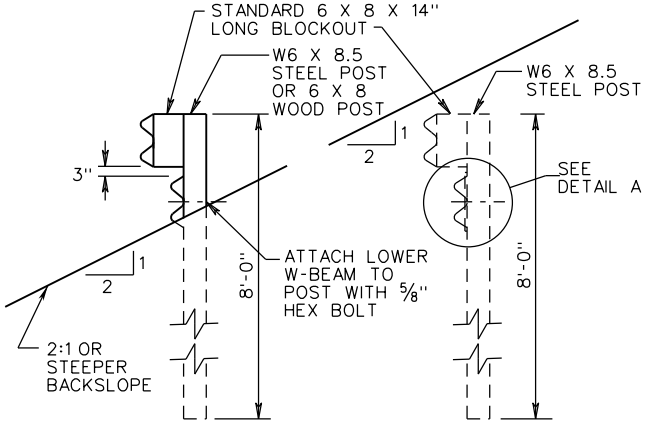

## DETAIL F
SOLID ROCK CUT INSTALLATION

**NOTE:**

1. 1/2" STEEL PLATE MAY BE WELDED OR BOLTED TO POST. IF PLATE IS BOLTED TO POST USE 4 - 5/8" X 1 1/2" LG. HEX HEAD BOLTS W/ HEX NUTS. IF PLATE IS WELDED TO POST DO NOT DRILL 13/16 " HOLES IN PLATE OR IN POST FLANGES.
2. CONCRETE END ANCHORAGE MAY BE USED IN PLACE OF STEEL POST AT 8'-0" OFFSET.




## PAVED DITCH DETAIL




## SECTION D-D

## SECTION E-E

VDOT
ROAD AND BRIDGE STANDARDS

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

# TERMINAL TREATMENT FOR W-BEAM GUARDRAIL

VIRGINIA DEPARTMENT OF TRANSPORTATION

| SHEET 2 OF 2 | REVISION DATE |
|---|---|
| 501.10 | 7/12 |

SPECIFICATION REFERENCE

221

505

NOTES:

1. GUARDRAIL TERMINAL, STD. GR-7 IS TO BE SRT 350 (SIMILAR TO AS SHOWN) MANUFACTURED BY TRINITY INDUSTRIES, THE FLEAT 350 MANUFACTURED BY ROAD SYSTEMS, INC., OR OTHER VDOT APPROVED EQUAL MEETING NCHRP 350 TESTING CRITERIA.
2. ALL TERMINALS SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND THE FOLLOWING VDOT REQUIREMENTS:

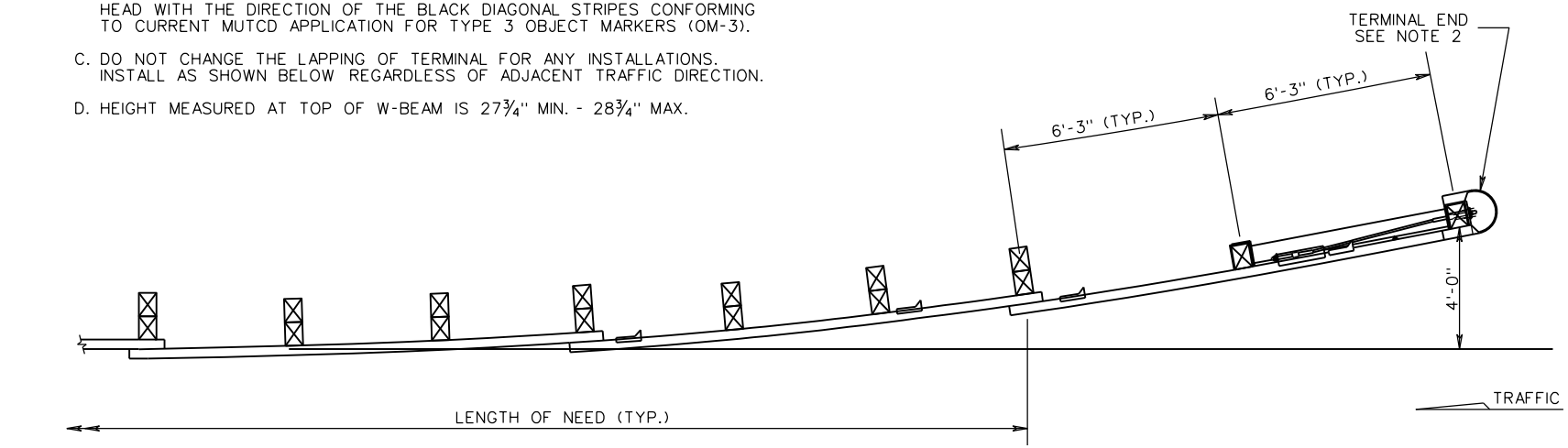
   A. ALL STANDARD GR-7 TERMINALS SHALL BE INSTALLED WITH A 4 FT. OFFSET.

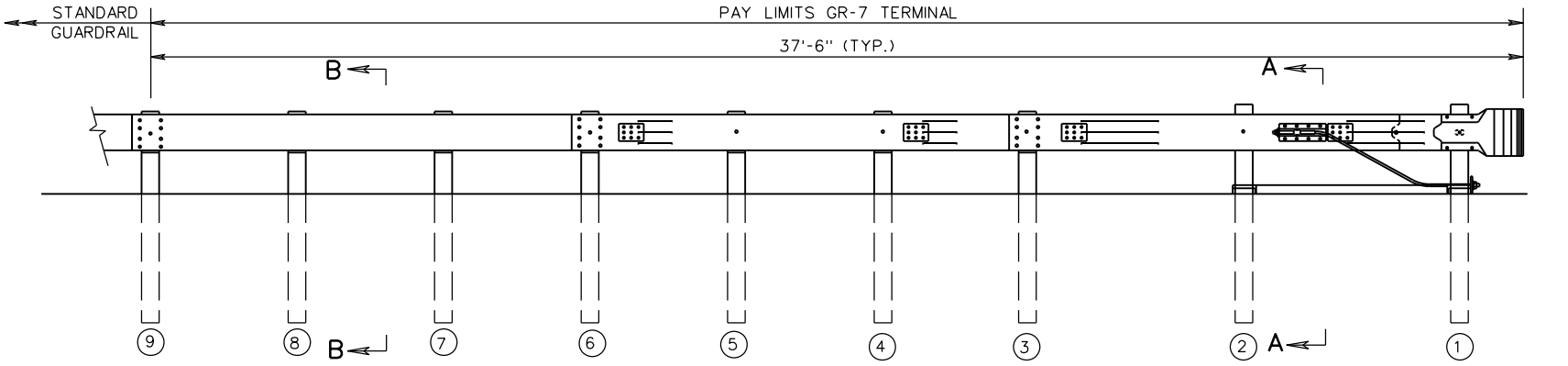
   B. YELLOW 8" X 36" REFLECTIVE SHEETING, IN ACCORDANCE WITH VDOT SPECIFICATIONS, SHOULD BE APPLIED IN TERMINALS EMPLOYING W-BEAM END SECTIONS. FOR TERMINALS EMPLOYING IMPACT (EXTRUDER) HEADS, AMBER (YELLOW) REFLECTIVE SHEETING WITH BLACK DIAGONAL STRIPES SHOULD BE APPLIED TO THE FULL AREA INSIDE THE IMPACT HEAD WITH THE DIRECTION OF THE BLACK DIAGONAL STRIPES CONFORMING TO CURRENT MUTCD APPLICATION FOR TYPE 3 OBJECT MARKERS (OM-3).

   C. DO NOT CHANGE THE LAPPING OF TERMINAL FOR ANY INSTALLATIONS. INSTALL AS SHOWN BELOW REGARDLESS OF ADJACENT TRAFFIC DIRECTION.

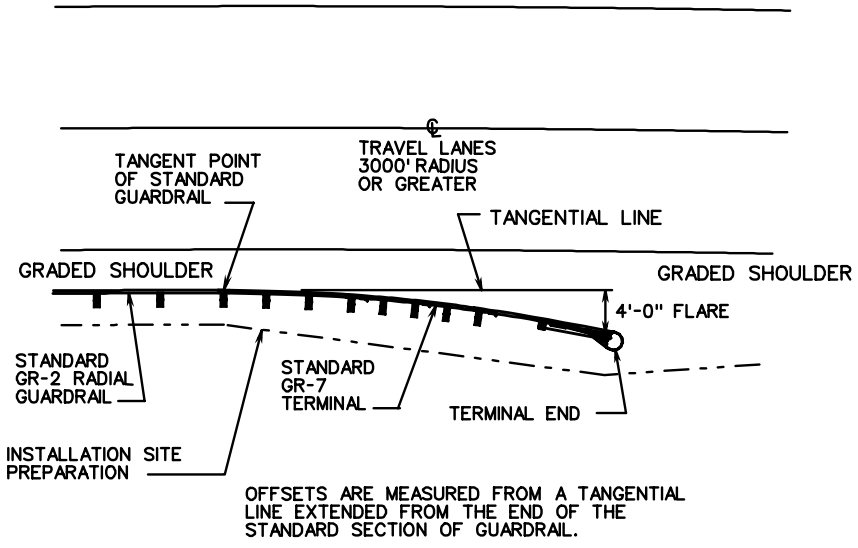
   D. HEIGHT MEASURED AT TOP OF W-BEAM IS 27¾" MIN. - 28¾" MAX.

3. IF YOU CANNOT GET THE NECESSARY CLEAR RUNOUT AREA FOR THE GR-7 TERMINAL, CONSIDER ALTERNATIVE TERMINAL OPTIONS.
4. <u>THIS DRAWING IS REPRESENTATIONAL ONLY</u>. DETAILS, DIMENSIONS, QUANTITIES, AND OTHER INFORMATION NOT SHOWN WILL VARY FOR EACH MANUFACTURER. SEE INDIVIDUAL MANUFACTURER'S PLANS FOR THIS INFORMATION.

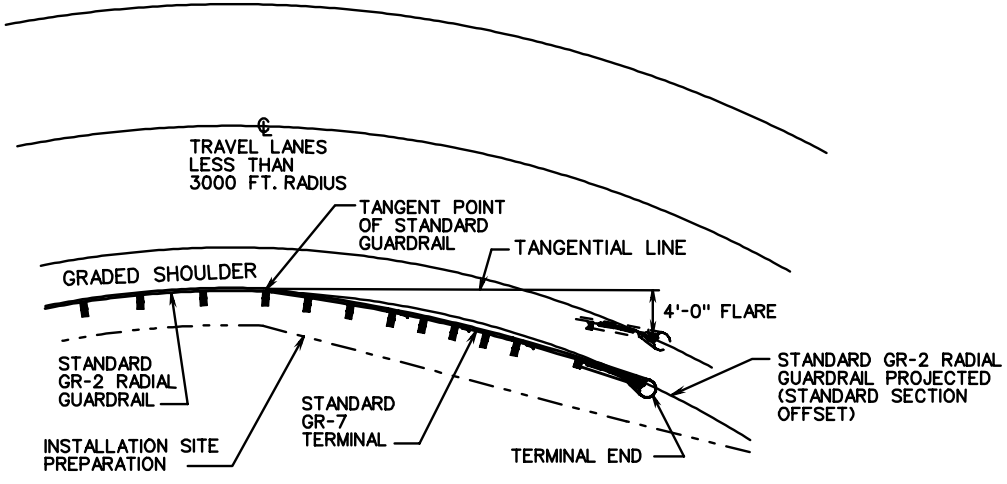



| SPECIFICATION REFERENCE | A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE. | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 221<br>505 | # BREAKAWAY CABLE TERMINAL<br>(4' FLARE)<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE 07/12<br>SHEET 1 OF 3<br>501.11 |




## FLARED TERMINAL PLACEMENT
## 3000 FT. RADIUS OR GREATER




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

VDOT
ROAD AND BRIDGE STANDARDS

SHEET 2 OF 3 | REVISION DATE

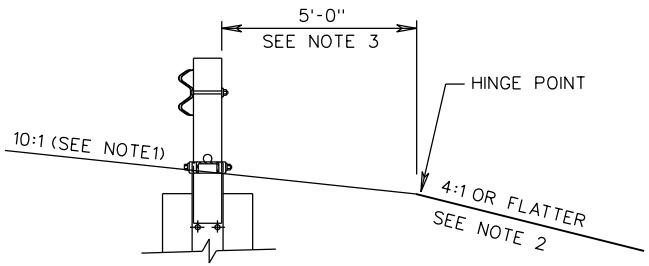
501.12

# BREAKAWAY CABLE TERMINAL
## (4' FLARE)

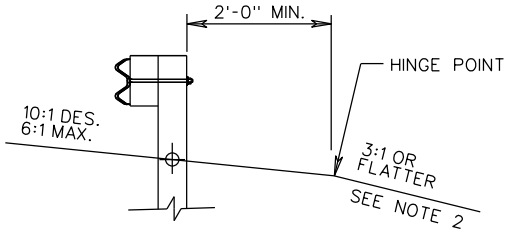
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

221
505



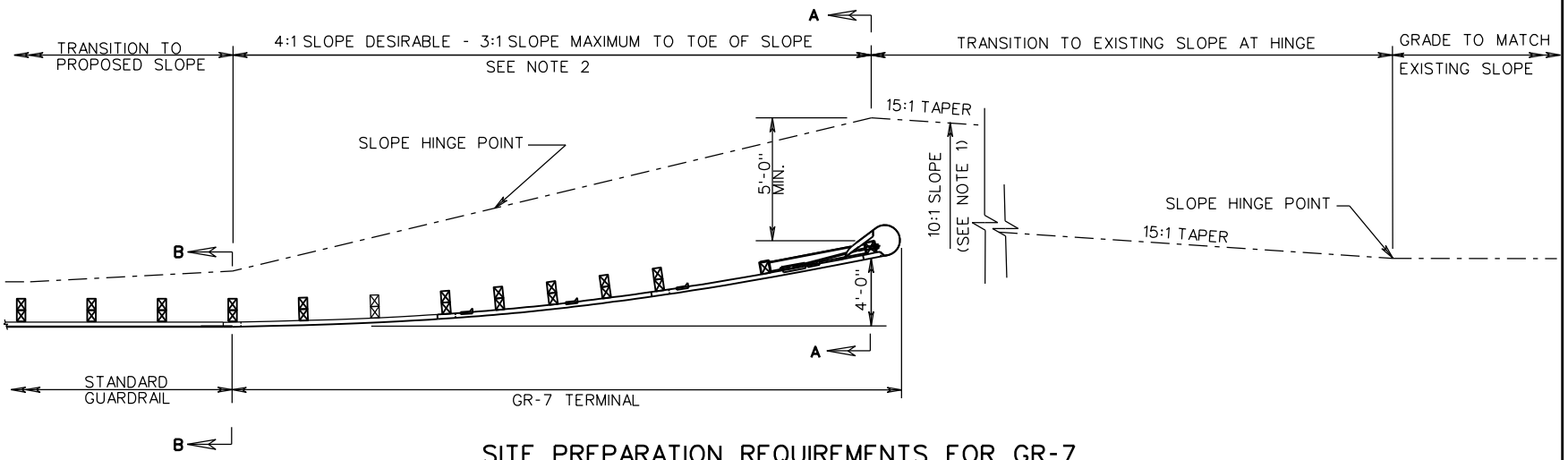

**SECTION A-A**




**SECTION B-B**

**NOTES:**

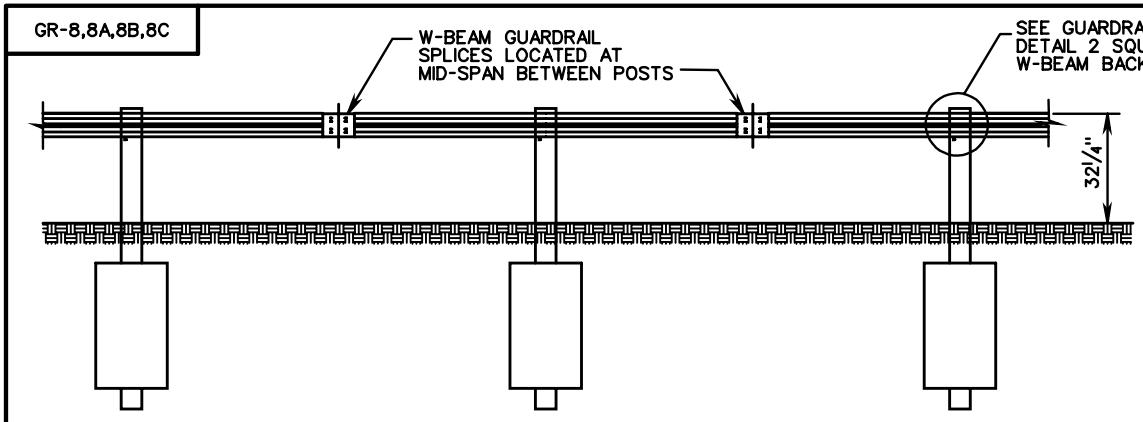
1. THE CROSS SLOPE OF THE GRADE APPROACHING THE GUARDRAIL TERMINAL, AND ADJACENT TO FOR ITS FULL LENGTH, MUST BE 10:1. IF THE EXISTING GRADE IS FLAT OR IS A POSITIVE SLOPE DUE TO THE SUPERELEVATION OF THE ROADWAY PAVEMENT, THE MIN. OFFSET FROM BEHIND THE POST TO THE HINGE POINT, AS SHOWN, IS REQUIRED.
2. THE AREA IMMEDIATELY BEHIND AND BEYOND THE TERMINAL SHOULD BE TRAVERSABLE (3:1 OR FLATTER) 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 UN-SHIELDED ROADSIDE AREAS.
3. FOR NEW CONSTRUCTION, RECONSTRUCTION, AND 3R WORK THE 10:1 SLOPE GRADING MUST EXTEND A MINIMUM OF 5'-0" BEHIND THE END POST.
4. FOR PROPRIETARY GUARDRAIL TERMINALS THE MANUFACTURER'S SITE PREPARATION REQUIREMENTS TAKE PRECEDENCE OVER THIS STANDARD.




## SITE PREPARATION REQUIREMENTS FOR GR-7

| SPECIFICATION REFERENCE | A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE. | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 221<br>505 | GUARDRAIL TERMINAL INSTALLATION SITE PREPARATION REQUIREMENTS FOR GR-7<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE 01/14 |
| | | SHEET 3 OF 3 |
| | | 501.13 |

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




TYPICAL INSTALLATION

| STANDARD | POST SPACING | DEFLECTION |
|---|---|---|
| GR-8 | 12' - 6" | 7' - 0" |
| GR-8A | 6' - 3" | 5' - 0" |
| GR-8B | 3' - 1½" | 4' - 0" |
| GR-8C | 4' - 2" | 4' - 6" |

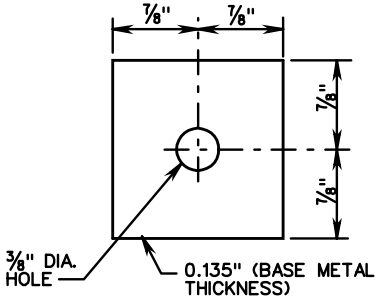
FOR ROCK INSTALLATION, 8" X 24" X ¼" PLATE IS TO BE ELIMINATED. DRILL OR EXCAVATE HOLE FOR POST, PLACE POST AND BACKFILL WITH CRUSHER RUN AGGREGATE TO LEVEL OF ROCK.

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

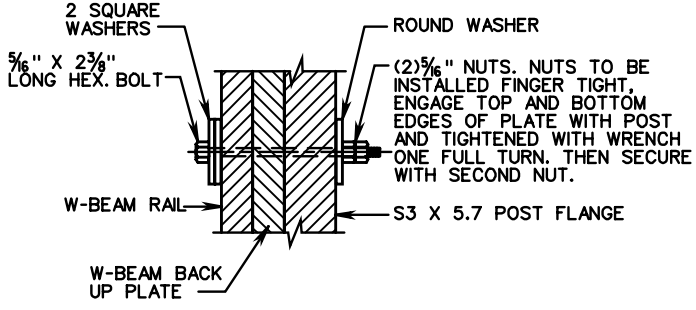
FOR DETAILS OF GUARDRAIL ELEMENT, SPLICE JOINT, HARDWARE, ETC. SEE SHEET NO. 501.01.

⊛ 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.

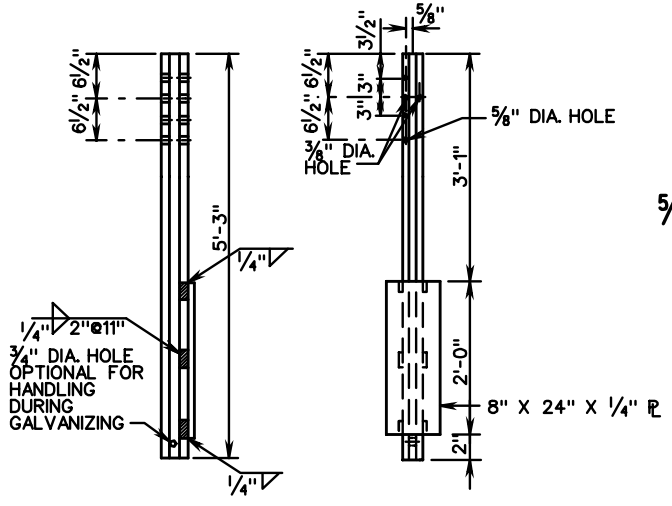
| POST SPACING ON CURVES | |
|---|---|
| PAVEMENT ℄ RADIUS | POST SPACING |
| > 220 FT. R | 12' - 6" |
| 219 FT. - 111 FT. | 6' - 3" |
| 110 FT. - 76 FT. | 4' - 2" |
| 75 FT. - 50 FT. | 3' - 1½" |
| < 50 FT. | USE NOT RECOMMENDED |



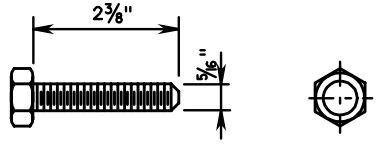

SQUARE WASHER




GUARDRAIL POST CONNECTION DETAIL

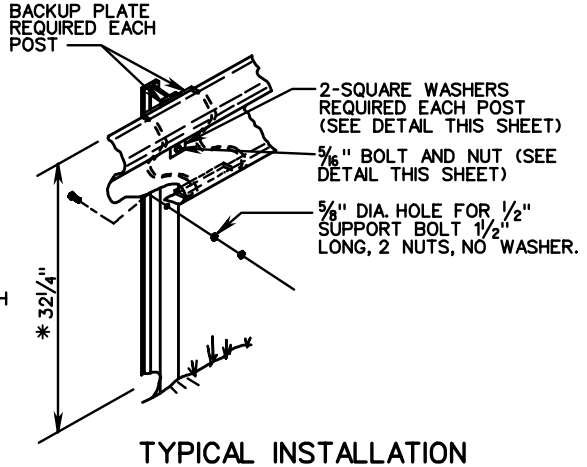



S 3 X 5.7 STEEL POST




5/16" HEX BOLT AND NUT

BOLT AND NUT SHALL HAVE 4000 POUNDS MIN. TENSILE STRENGTH




TYPICAL INSTALLATION

* HEIGHT TOLERANCE ± ¾"

VDOT
ROAD AND BRIDGE STANDARDS

# STANDARD W-BEAM GUARDRAIL (WEAK POST SYSTEM)

TL-3 (>45 MPH)

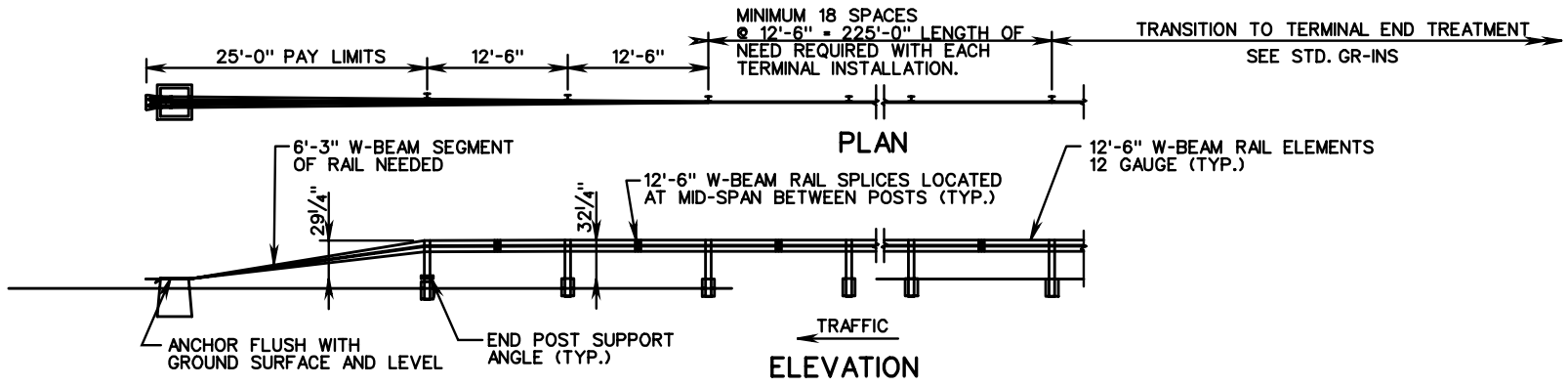
VIRGINIA DEPARTMENT OF TRANSPORTATION

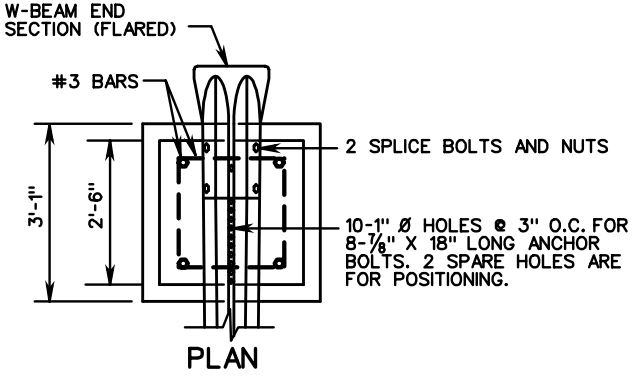
SHEET 1 OF 2 | REVISION DATE

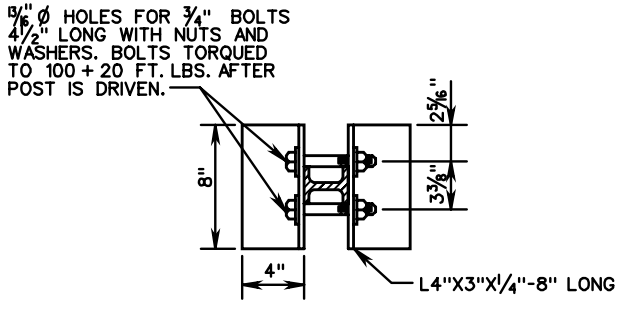
501.14

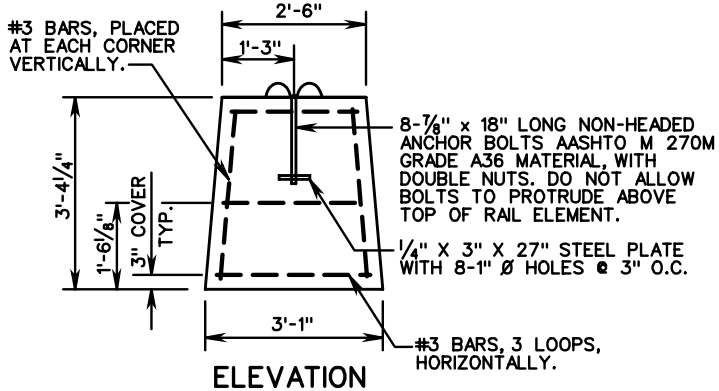
SPECIFICATION REFERENCE

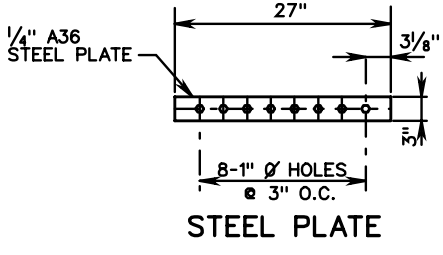
221
505

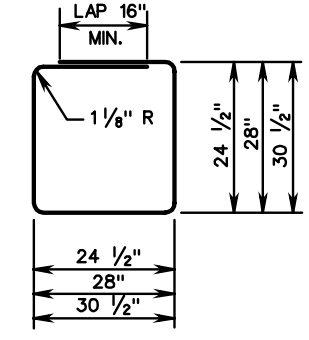


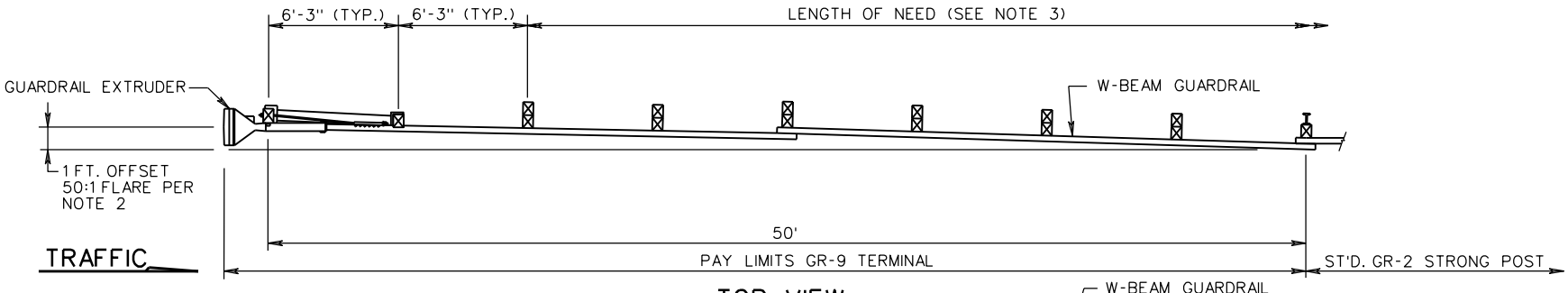



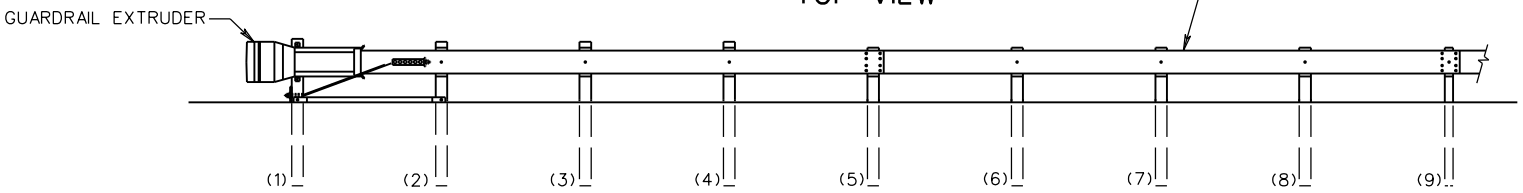




GR-8 TYPE II TERMINAL TREATMENT
(RUN-OFF ANCHORAGE)

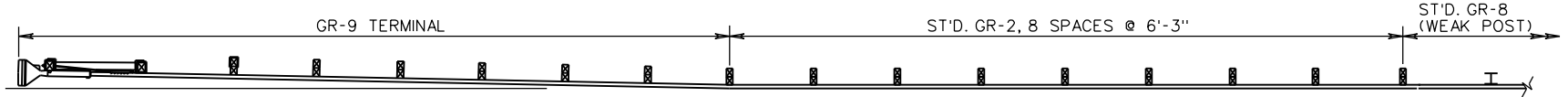
| SPECIFICATION REFERENCE | STANDARD W-BEAM GUARDRAIL (WEAK POST SYSTEM) | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 221<br>505 | TL-3 (>45 MPH)<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE<br>SHEET 2 OF 2<br>501.15 |




TOP VIEW




ELEVATION




TRANSITION FROM GR-9 TERMINAL TO WEAK POST (STANDARD GR-8) GUARDRAIL

## NOTES:

1. ALTERNATE BREAKAWAY CABLE TERMINAL (GR-9) SHALL BE A VDOT APPROVED PRODUCT MEETING NCHRP 350 OR MASH TESTING CRITERIA. ANY TERMINAL USED FOR THE GR-9 SHALL BE FROM THE VDOT APPROVED PRODUCTS LIST. STANDARD MB-3 TERMINAL OPTIONS ARE INCLUDED WITH THE GR-9 TERMINALS ON THE APPROVED PRODUCTS LIST.
2. ALL TERMINALS SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND THE FOLLOWING VDOT REQUIREMENTS:

   A. ALL STANDARD GR-9 TERMINALS (SIMILAR TO AS SHOWN ABOVE) SHALL BE INSTALLED WITH A 1 FT. OFFSET ACCOMPLISHED WITH A 50:1 FLARE TO PREVENT THE GUARDRAIL EXTRUDER FROM ENCROACHING ON THE SHOULDER FOR 3R WORK WHERE RIGHT OF WAY IS LIMITED, THE OFFSET CAN BE DECREASED AS DIRECTED BY THE ENGINEER.

   B. DIRECTION OF THE REFLECTIVE TAPE ON THE EXTRUDER SHALL CONFORM TO MUTCD APPLICATION FOR DIAGONAL STRIPES ON OBJECT MARKERS AND BRIDGE END PANELS. COLOR OF TAPE SHALL BE AMBER (YELLOW).

   C. DO NOT CHANGE THE LAPPING OF TERMINAL FOR ANY INSTALLATIONS. INSTALL AS SHOWN ABOVE REGARDLESS OF ADJACENT TRAFFIC DIRECTION.

   D. HEIGHT MEASURED AT TOP OF W-BEAM IS 27¾" MIN. - 28¾" MAX.

3. IF THE CALCULATED LENGTH OF NEED CANNOT BE MET FOR THE SITES OF RETROFIT, MAINTENANCE, OR UPGRADE OF TERMINALS, PROVIDE AS MUCH DISTANCE AS POSSIBLE TO THE HAZARD.
4. THIS DRAWING IS REPRESENTATIONAL ONLY. DETAILS, DIMENSIONS, QUANTITIES, AND OTHER INFORMATION NOT SHOWN WILL VARY FOR EACH MANUFACTURER. SEE INDIVIDUAL MANUFACTURER'S PLANS FOR THIS INFORMATION.

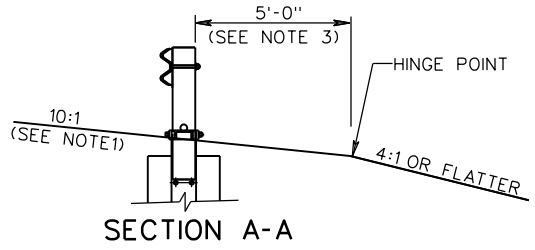


A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

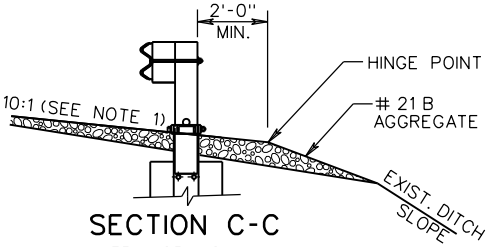
# ALTERNATE BREAKAWAY CABLE TERMINAL
## NO FLARE

VIRGINIA DEPARTMENT OF TRANSPORTATION

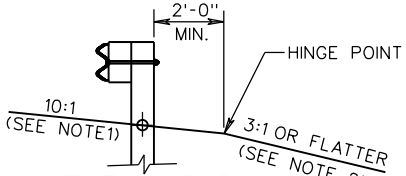
SPECIFICATION REFERENCE
505




SECTION A-A



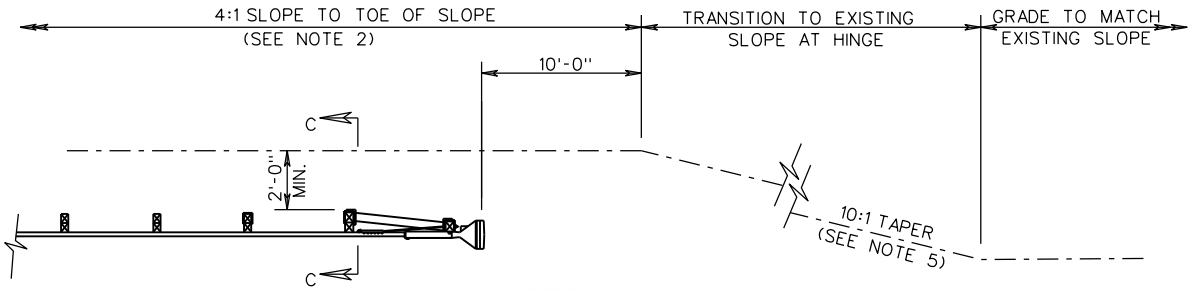

SECTION C-C
3R WORK ONLY
(SEE NOTE 4)



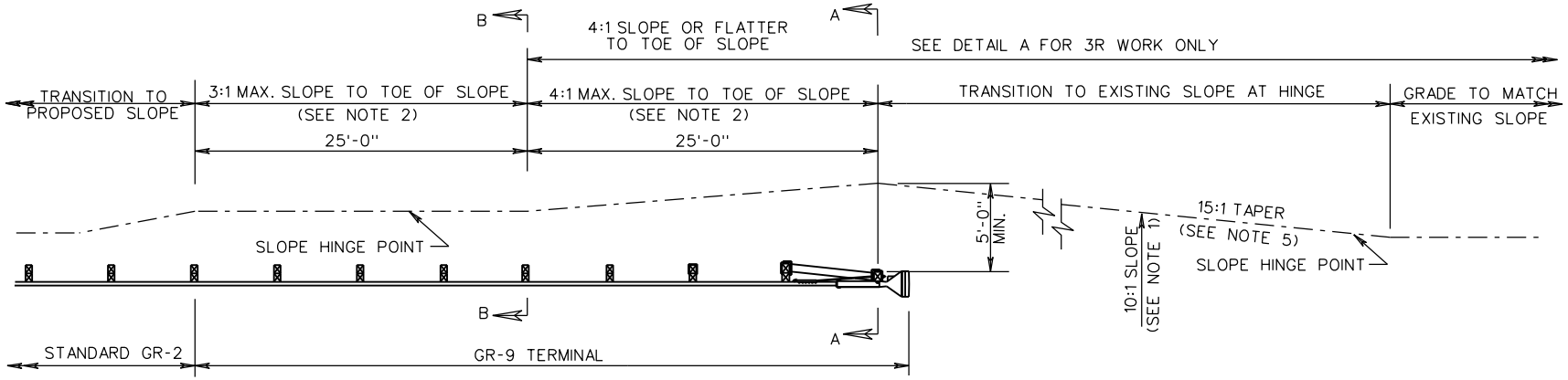

SECTION B-B

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 5'-0" BEHIND THE END POST.
4. FOR 3R WORK, THE GRADING SHOULD BE AS CLOSE AS POSSIBLE TO THE NEW CONSTRUCTION WITH SLOPE EXTENDING A MINIMUM OF 2'-0" BEHIND THE BLOCKED OUT POST. FROM THE HINGE POINT, TIE THE GRADED 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 MANUFACTURER'S SITE PREPARATION REQUIREMENTS TAKE PRECEDENCE OVER THIS STANDARD.

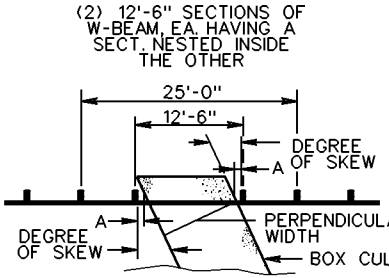



DETAIL A
3R WORK ONLY



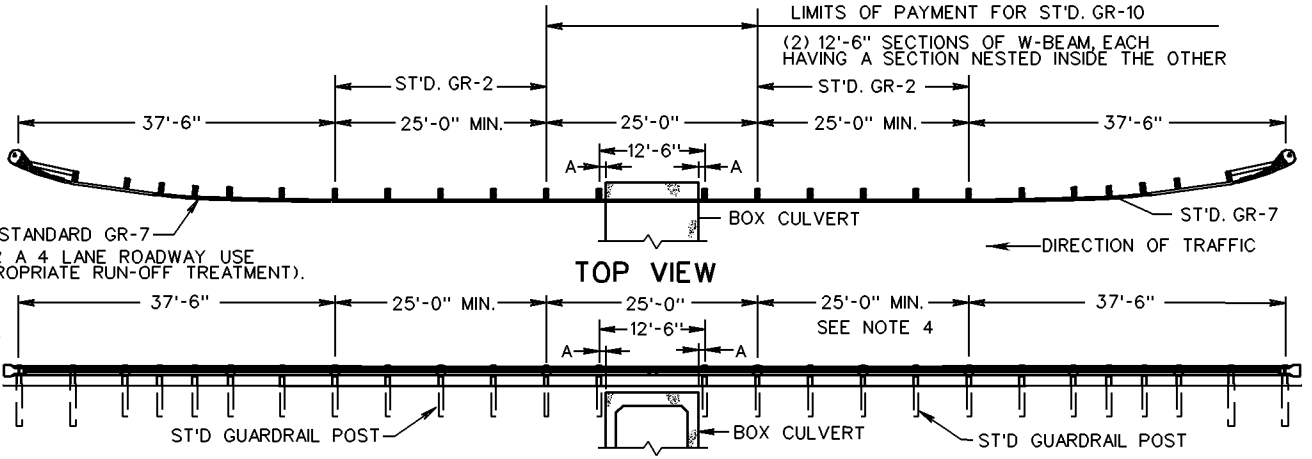

SITE PREPARATION REQUIREMENTS FOR GR-9

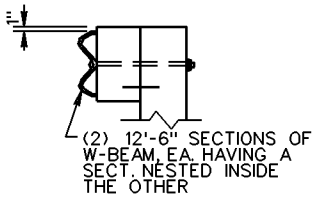
| SPECIFICATION REFERENCE | A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE. | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| | GUARDRAIL TERMINAL INSTALLATION SITE PREPARATION REQUIREMENTS FOR GR-9 | REVISION DATE 01/14 |
| | VIRGINIA DEPARTMENT OF TRANSPORTATION | SHEET 2 OF 2 |
| | | 501.17 |

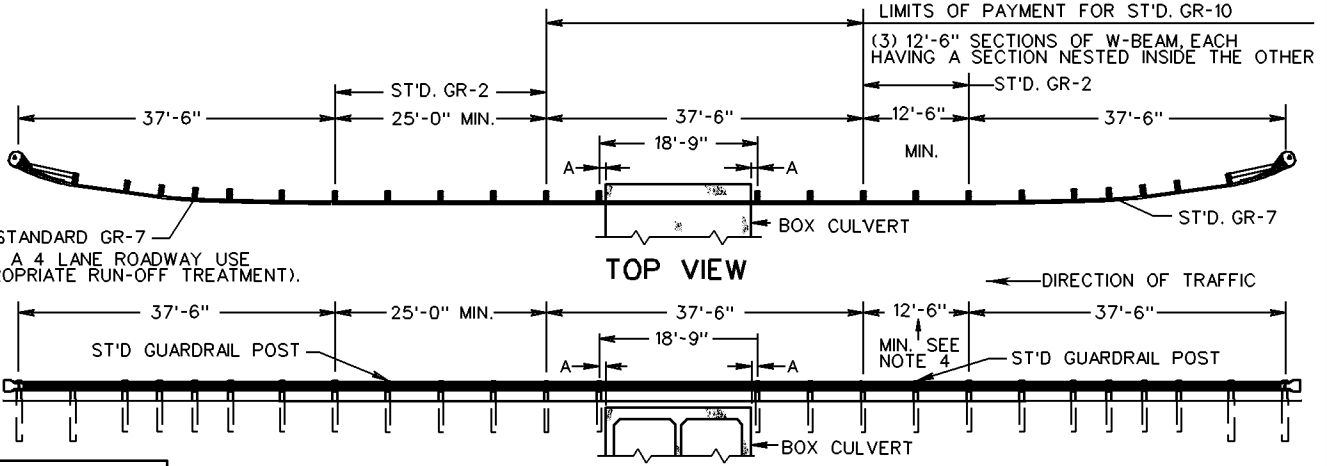



## ONE POST OMITTED TOP VIEW

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




## TABLE OF MAXIMUM ALLOWABLE STRUCTURE WIDTHS FOR THIS DESIGN

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

| TYPE I- ONE POST OMITTED | | | TYPE II- TWO POST 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 |

**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 4'-0".
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. THIS DISTANCE SHALL BE IN ACCORDANCE WITH VDOT POLICY ON DETERMINING THE LENGTH OF NEED FOR GUARDRAIL WITH A MINIMUM DISTANCE AS SHOWN.
5. ALL SPLICES IN NESTED W-BEAM SECTIONS MUST COINCIDE AT A COMMON POINT AND BE BOLTED TOGETHER USING ONE SET OF BOLTS AT EACH SPLICE.

VDOT
ROAD AND BRIDGE STANDARDS

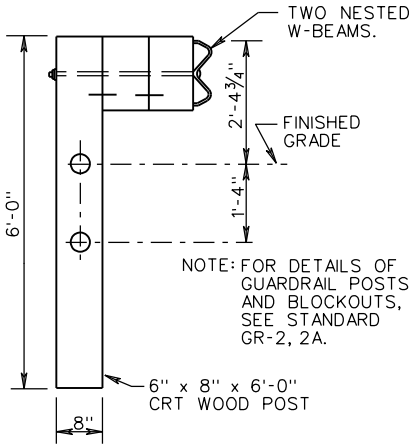
# GUARDRAIL AT LOW-FILL CULVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

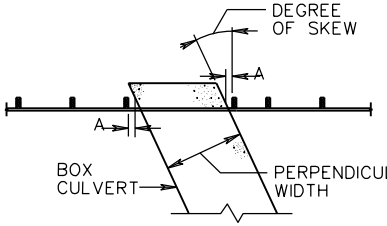
SHEET 1 OF 2
501.18

REVISION DATE
08/10

SPECIFICATION REFERENCE
221
505



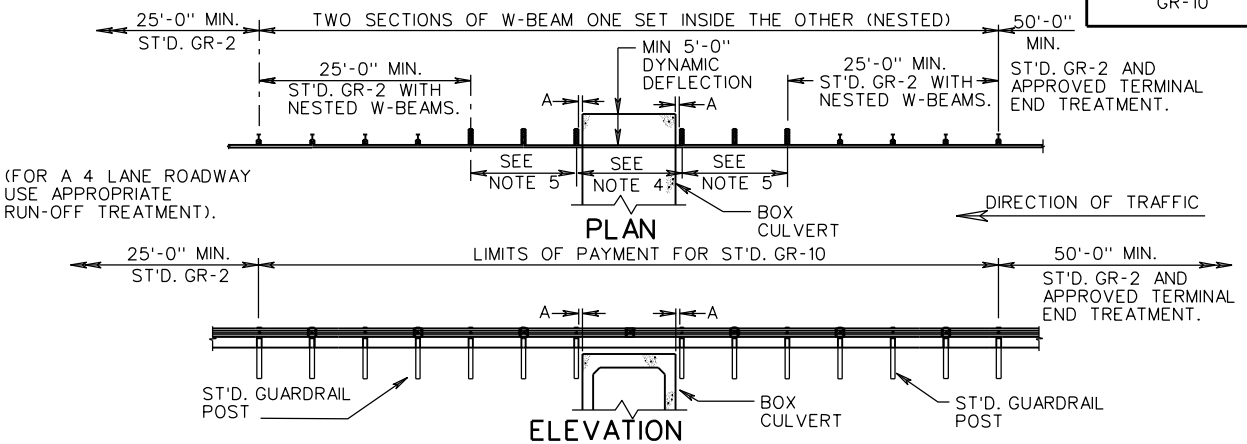

## CRT POST WITH DOUBLE BLOCKOUTS

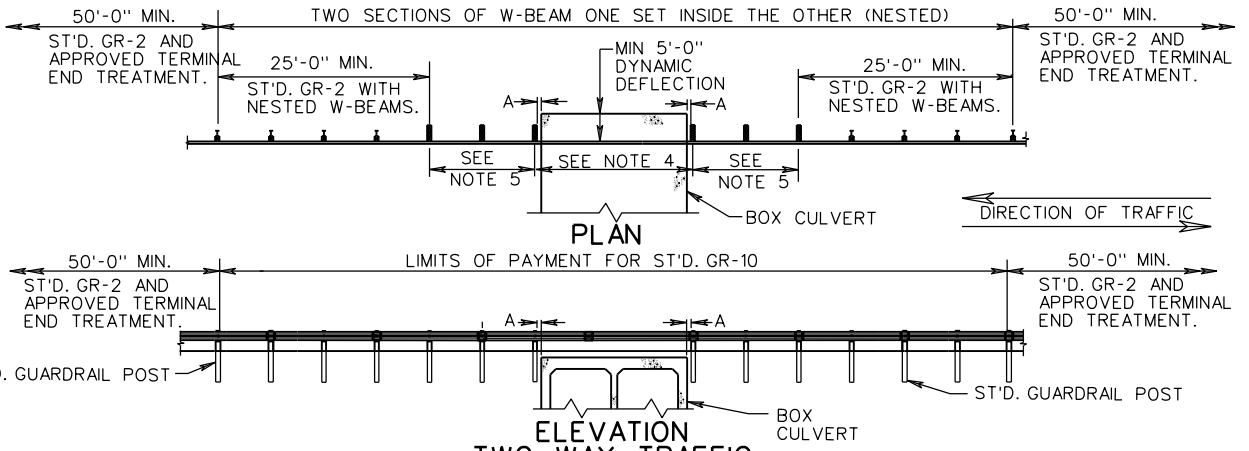



## THREE POSTS OMITTED TOP VIEW

| TYPE III-THREE POSTS OMITTED | | |
|---|---|---|
| SKEW | A* | MAX. PERPENDICULAR WIDTH (FEET) |
| 0° | 9" | 23.00 |
| 5° | 9" | 22.90 |
| 10° | 9" | 22.60 |
| 15° | 9" | 22.10 |
| 20° | 9" | 21.40 |
| 25° | 9" | 20.60 |
| 30° | 9" | 19.60 |
| 35° | 9" | 18.40 |
| 40° | 9" | 17.10 |
| 45° | 9" | 15.60 |

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



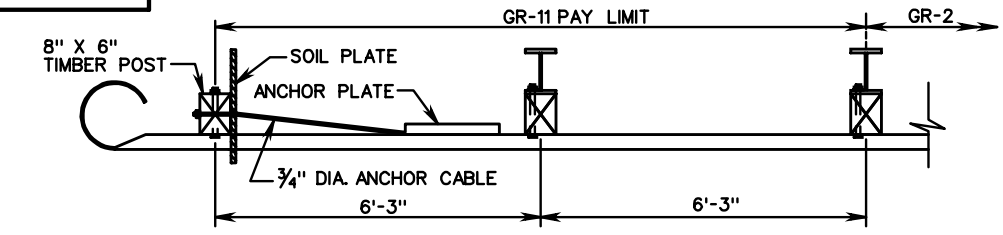




NOTES:

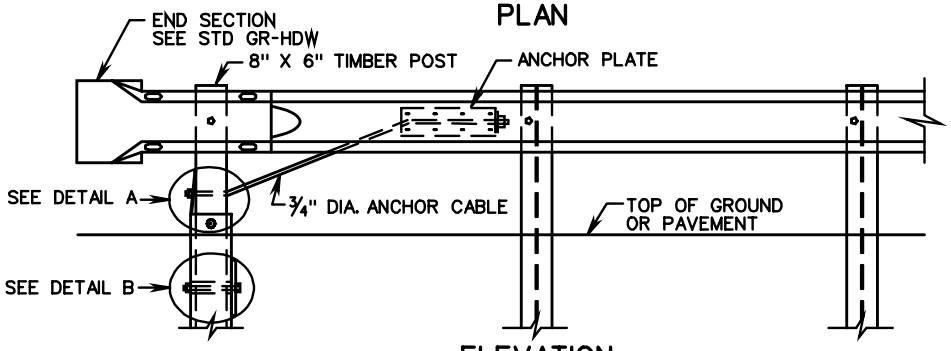
1. THIS SHEET IS APPLICABLE WHEN GUARDRAIL IS REQUIRED AND THE DEPTH OF FILL ABOVE THE TOP SLAB OF THE BOX CULVERT IS LESS THAN 4'-0".
2. GUARDRAIL INSTALLATION SHALL BE IN ACCORDANCE WITH SECTION 505 OF THE SPECIFICATIONS. MATERIAL REQUIREMENT FOR COMPONENTS SHALL BE IN ACCORDANCE WITH SECTION 221 OF 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 SET OF BOLTS AT EACH SPLICE.

| SPECIFICATION REFERENCE | GUARDRAIL AT LOW-FILL CULVERTS | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 221<br>505 | VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE 7/11 · SHEET 2 OF 2 · 501.19 |

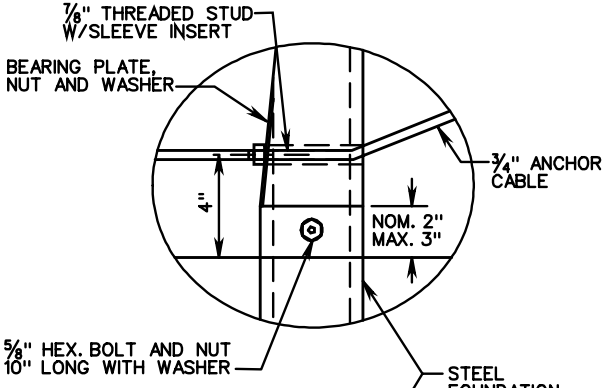
GR-11



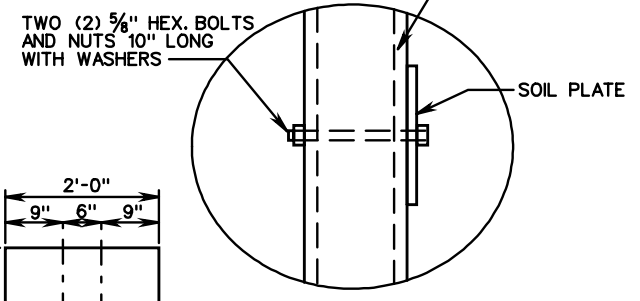

PLAN



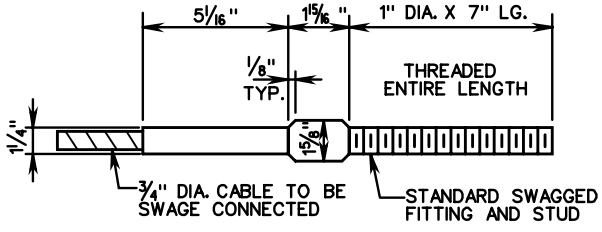

ELEVATION



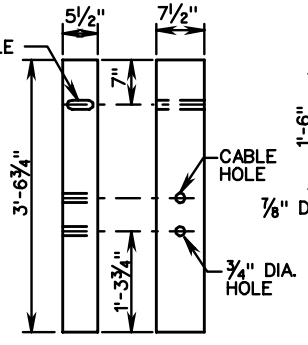

DETAIL A



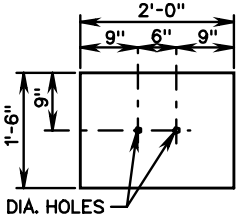

DETAIL B



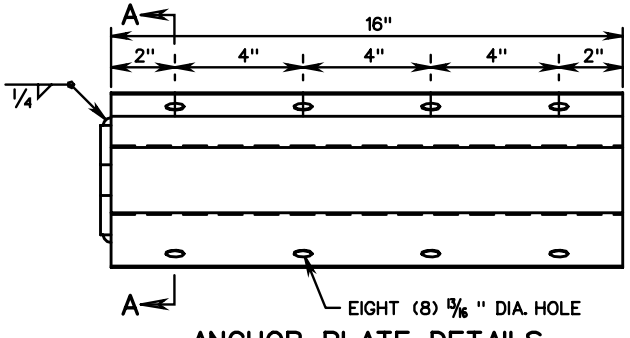

ANCHOR CABLE SWAGE CONNECTION TO THREADED STUD



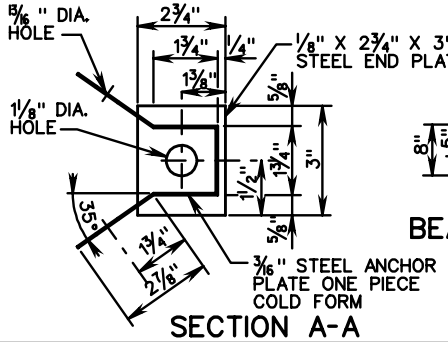

SHORT WOODEN POST



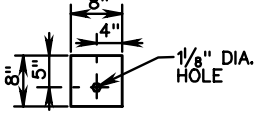

SOIL PLATE



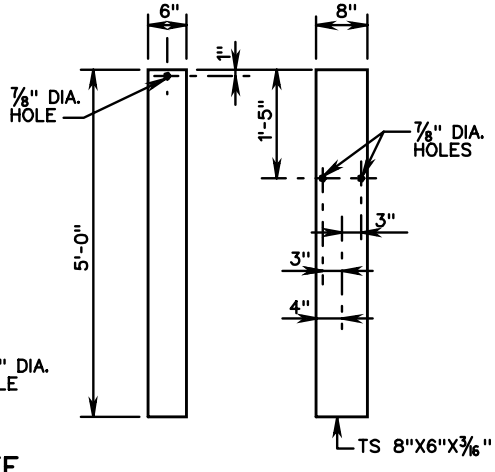

ANCHOR PLATE DETAILS




SECTION A-A




BEARING PLATE




STEEL FOUNDATION TUBE

NOTE:
USE OF THIS TERMINAL TREATMENT IS RESTRICTED TO RUN-OFF CONDITIONS ON DIVIDED HIGHWAYS.

VDOT
ROAD AND BRIDGE STANDARDS

# TRAILING END TERMINAL TREATMENT

SHEET 1 OF 1
REVISION DATE
501.20

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE
505
221

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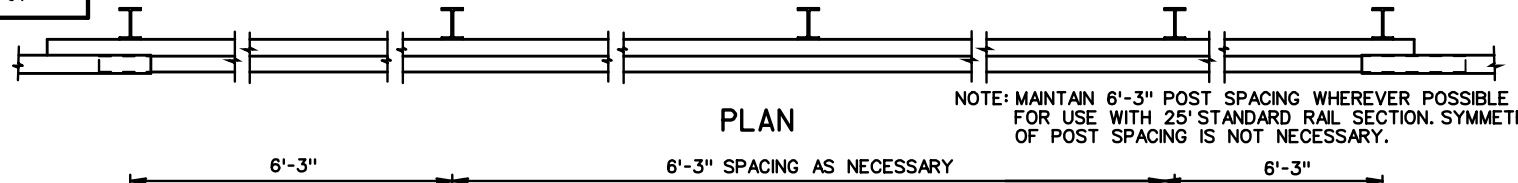
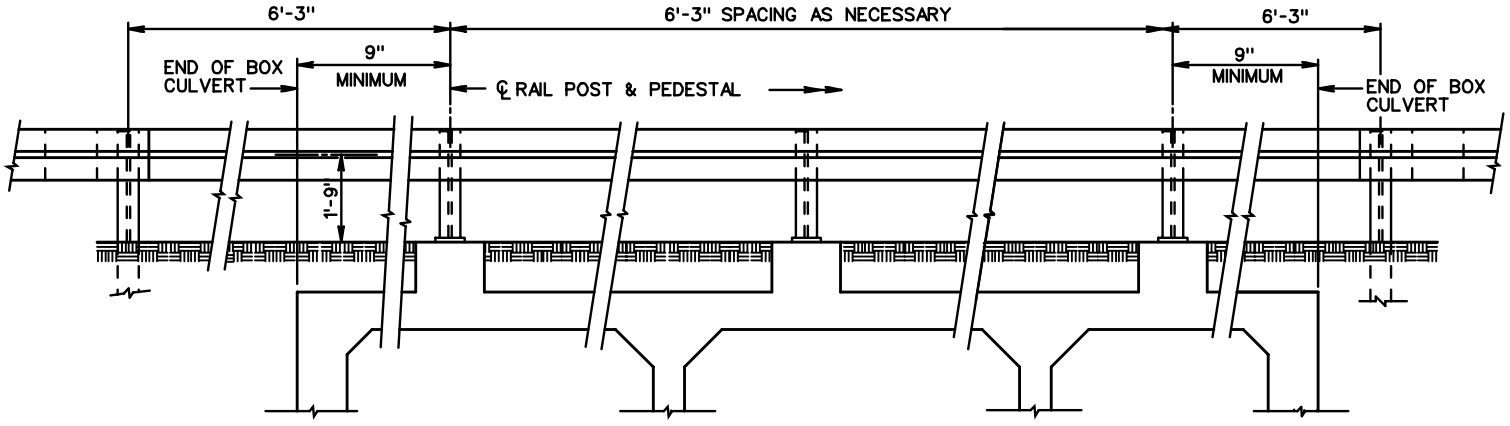
| SPECIFICATION REFERENCE | VIRGINIA DEPARTMENT OF TRANSPORTATION | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| | | REVISION DATE |
| | | SHEET 1 OF 1 |
| | | 501.21 |

BGR-01



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 ⅞" 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'-1½" 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 THUS 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.

VDOT
ROAD AND BRIDGE STANDARDS

# STANDARD BOX CULVERT GUARDRAIL

(TEXAS T-6)

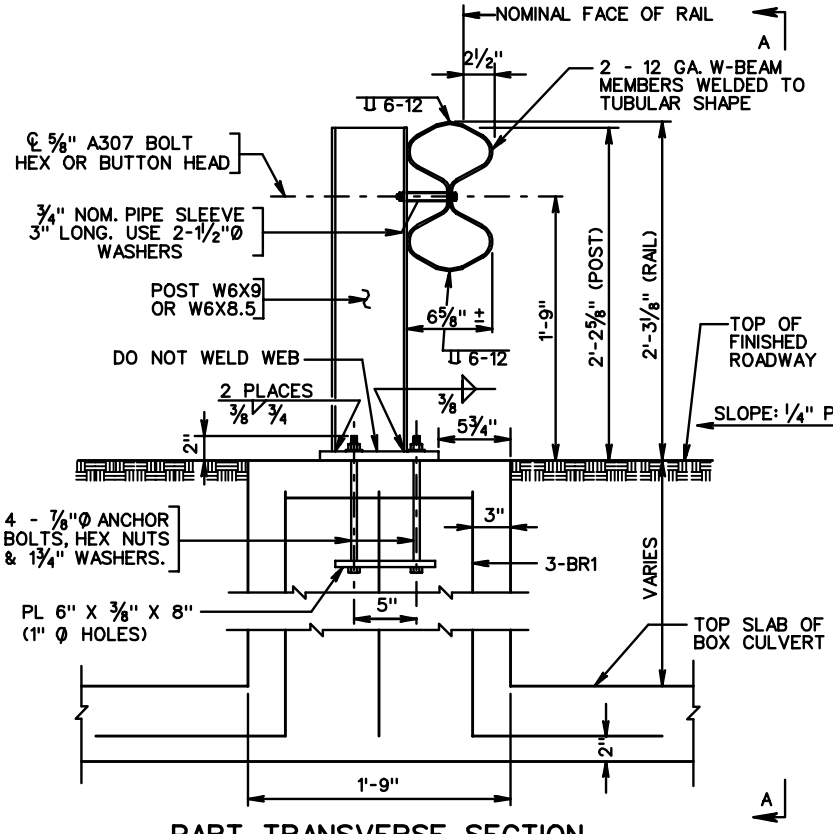
VIRGINIA DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 3 | REVISION DATE

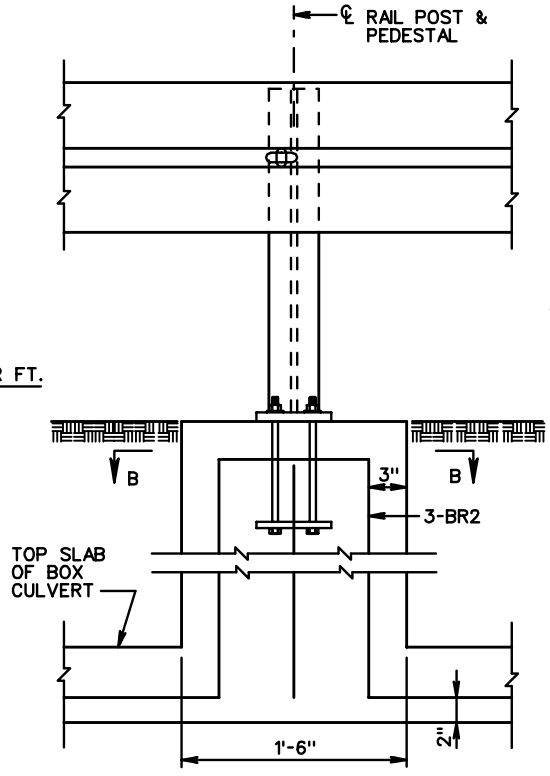
501.22

SPECIFICATION REFERENCE

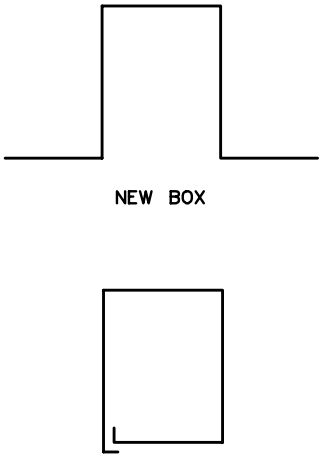
STRUCTURE AND BRIDGE DIVISION



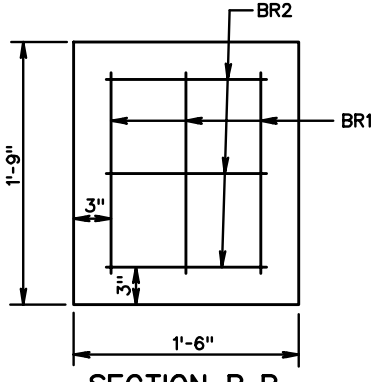

PART TRANSVERSE SECTION



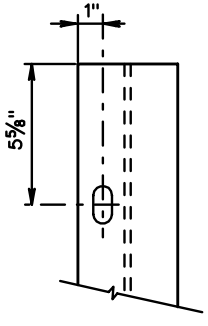

SECTION A-A



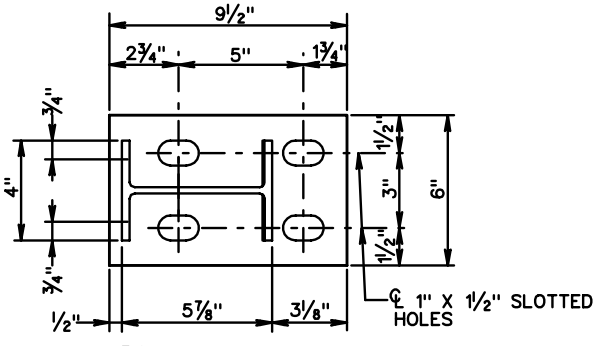

BR SERIES SHAPES




SECTION B-B
(ANCHOR BOLTS NOT SHOWN)



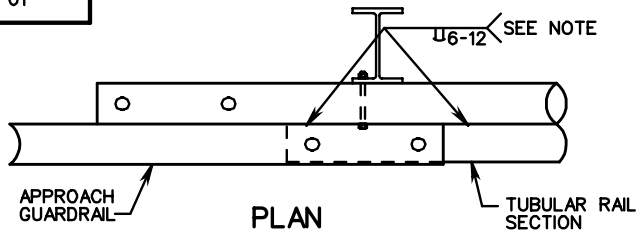

¾" X 1½" SLOTTED HOLE IN POST



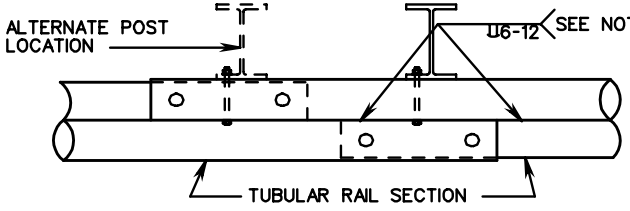

⅝" BASE PLATE
(1" X 1½" SLOTTED HOLES)

| SPECIFICATION REFERENCE | STANDARD BOX CULVERT GUARDRAIL (TEXAS T-6) | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| STRUCTURE AND BRIDGE DIVISION | VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE / SHEET 2 OF 3 / 501.23 |

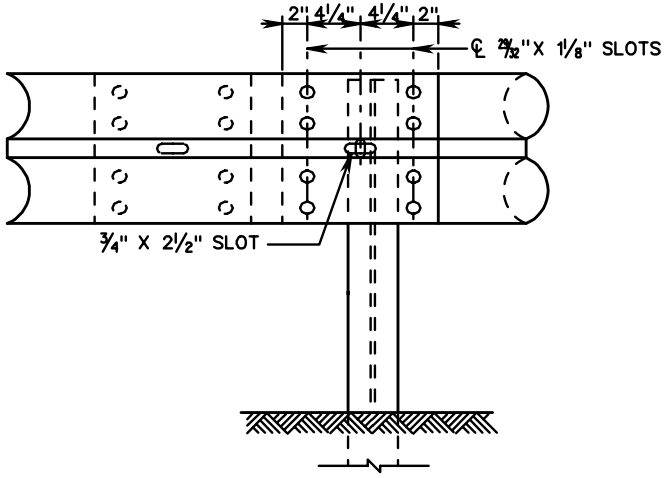
BGR-01



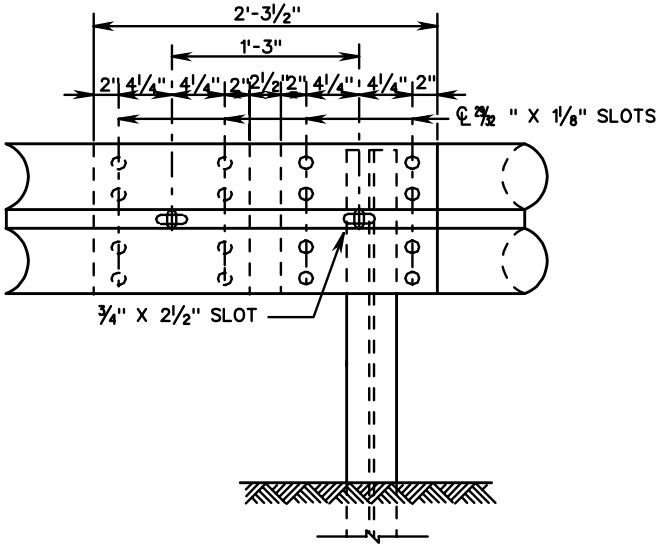

PLAN




PLAN



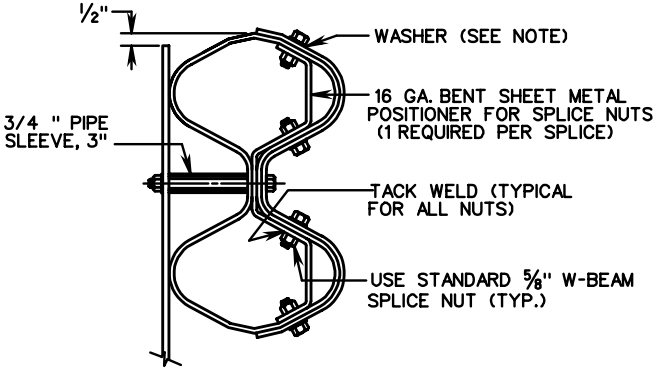

GUARDRAIL-TUBULAR RAIL SPLICE




TUBULAR RAIL SPLICE

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.

8-⅝" SPLICE NUTS SHALL BE TACK WELDED TO A BENT SHEET METAL POSITIONER AS SHOWN. OTHER SUITABLE POSITIONING METHODS OR OR DEVICES MAY BE SUBSTITUTED. THE COMPLETED SPLICE SHALL HAVE 8 BOLTS (16 BOLTS IF A TUBULAR RAIL SPLICE). EACH BOLT WILL INCLUDE A 1¾"X 3"X3/16" PLATE WASHER OR A 2 INCH DIAMETER WASHER.




SPLICE DETAIL

VDOT
ROAD AND BRIDGE STANDARDS

# STANDARD BOX CULVERT GUARDRAIL

(TEXAS T-6)

VIRGINIA DEPARTMENT OF TRANSPORTATION

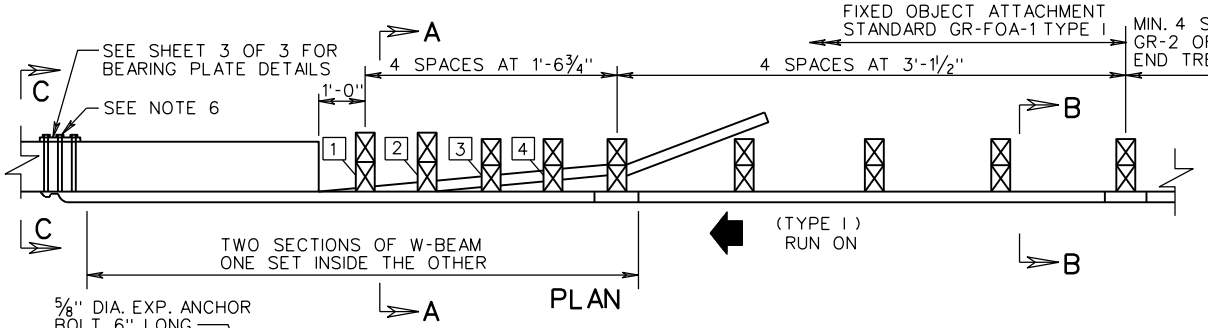
SPECIFICATION REFERENCE

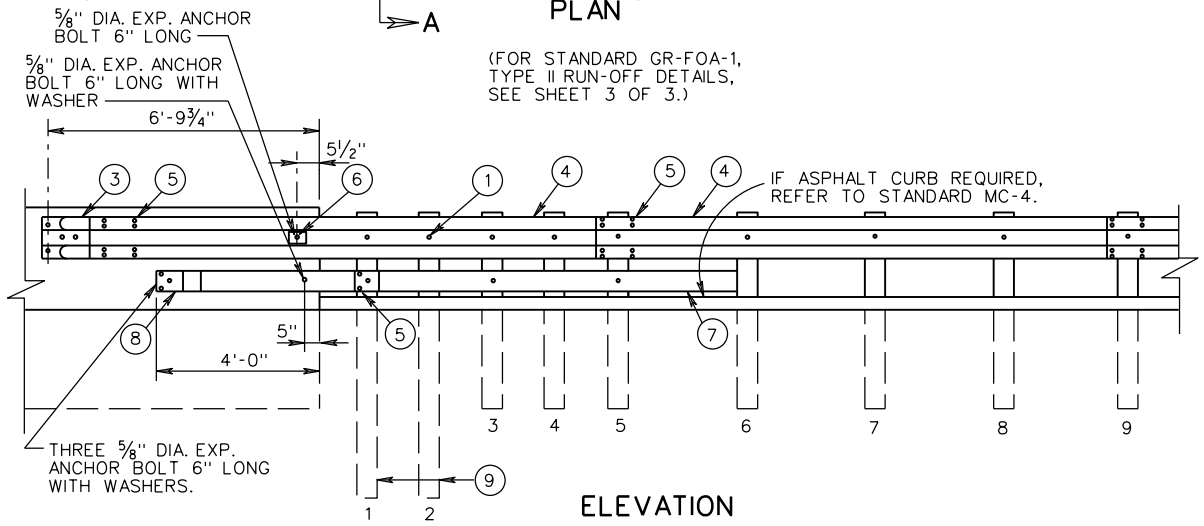
STRUCTURE AND BRIDGE DIVISION

SHEET 3 OF 3

REVISION DATE

501.24

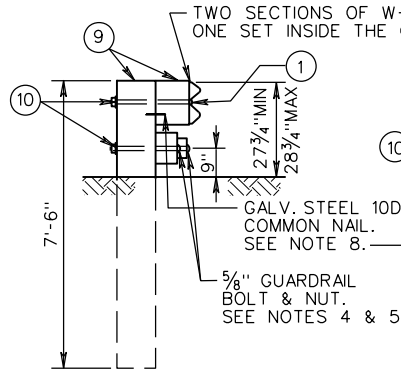


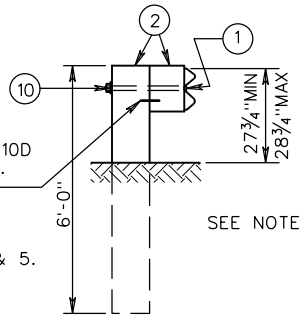



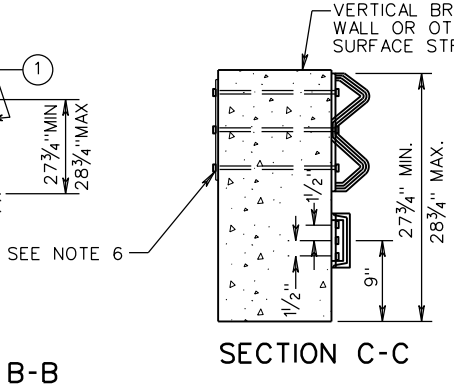

NOTES:

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 ⅝" GUARDRAIL BOLTS (LENGTH AS REQUIRED).
6. APPROPRIATE LENGTH ⅞" DIAMETER ASTM A449 HEX BOLTS WITH WASHERS MUST BE USED WITH THRU DRILLED HOLES AND A ⅝" BEARING PLATE ON THE BACK SIDE OF THE BRIDGE PARAPET OR TERMINAL WALL.
7. DRIVE NAIL WITHIN 2" OF THE TOP OR BOTTOM OF THE BLOCKOUT AFTER ⅝" X 18 BOLT IS INSTALLED.
8. SEE SHEET 3 OF 3 FOR RUBRAIL BLOCKOUT DETAILS.

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
EXISTING BRIDGE ATTACHMENTS AS SHOWN ON PLANS.

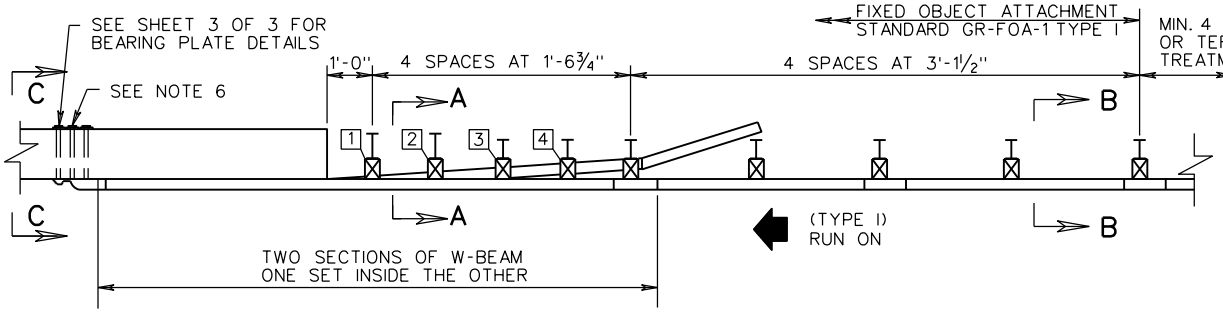


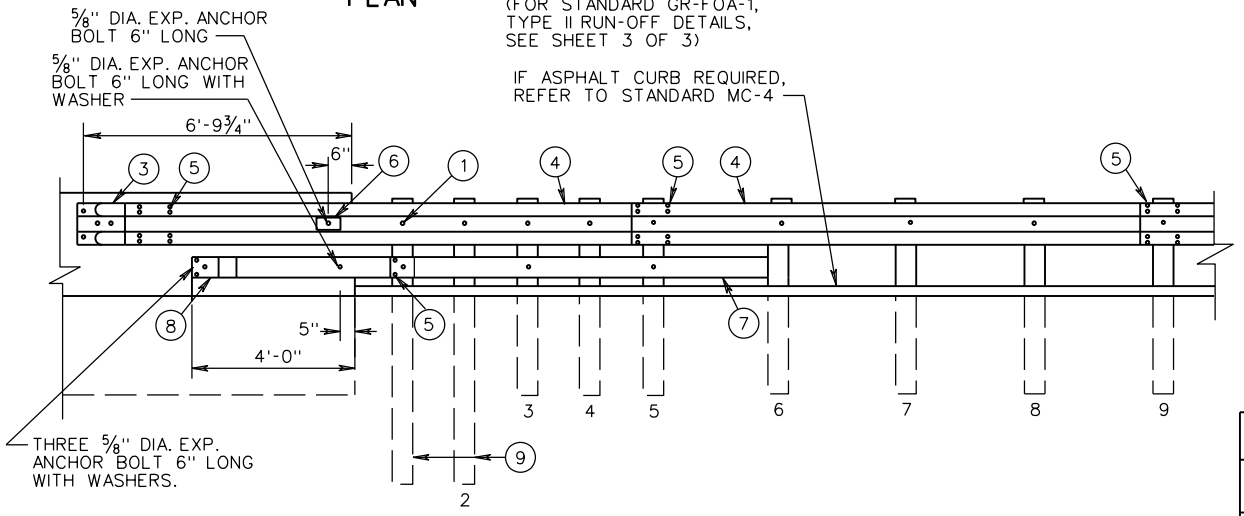




| ITEM | MATERIAL/SPECIFICATIONS/NOTES |
|---|---|
| 1 | ⅝" X 18" LONG GUARDRAIL BOLT AND RECESSED NUT |
| 2 | STANDARD 6" x 8" WOOD POST AND BLOCK |
| 3 | STANDARD W-BEAM TERMINAL CONNECTOR |
| 4 | STANDARD W-BEAM RAIL |
| 5 | ⅝" X 2" LONG GUARDRAIL BOLT & RECESSED NUT (SEE ST'D. GR-HDW) |
| 6 | RECTANGULAR PLATE WASHER (SEE ST'D. GR-HDW) |
| 7 | BENT PLATE RUBRAIL (SEE SHEET 3 OF 3) |
| 8 | C6 X 8.2 RUBRAIL (SEE SHEET 3 OF 3) |
| 9 | 8" X 8" X 7'-6" LONG WOOD POST & 8" X 8" X 14" LONG TREATED PINE BLOCK OR RECYCLED MATERIAL |
| 10 | WASHER FOR ⅝" BOLT |

| SPECIFICATION REFERENCE | A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE. | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 505 | # W-BEAM GUARDRAIL - FIXED OBJECT ATTACHMENT<br>FOR USE BETWEEN VERTICAL FIXED OBJECTS AND GUARDRAIL (WOOD POSTS)<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE 01/14 · SHEET 1 OF 3 · 501.25 |




PLAN



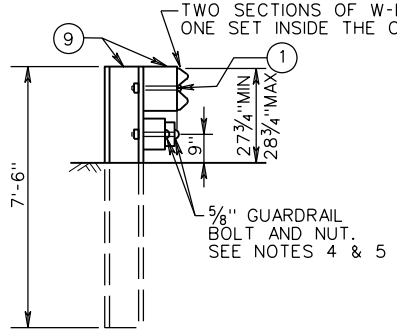

ELEVATION

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

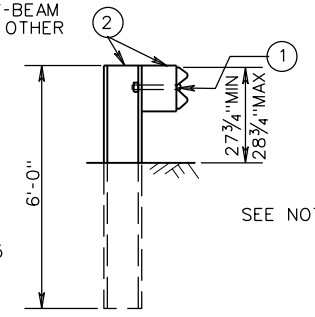
NOTES:

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 ⅝" GUARDRAIL BOLTS (LENGTH AS REQUIRED).
6. APROPRIATE LENGTH ⅞" DIAMETER ASTM A449 HEX BOLTS WITH WASHERS MUST BE USED WITH THRU DRILLED HOLES AND A ⅝" BEARING PLATE ON THE BACK SIDE OF THE BRIDGE PARAPET OR TERMINAL WALL.
7. SEE SHEET 3 OF 3 FOR RUBRAIL BLOCKOUT DETAILS.

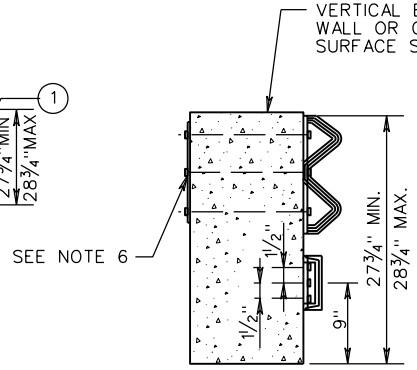
| ITEM | MATERIAL/SPECIFICATIONS/NOTES |
|---|---|
| 1 | ⅝" X 10" LONG GUARDRAIL BOLT & RECESSED NUT |
| 2 | ST'D. W6X8.5 OR W6X9 STEEL POST ST'D. 6X8X14" LG. TREATED PINE BLOCK OR RECYCLED MATERIAL |
| 3 | STANDARD W-BEAM TERMINAL CONNECTOR |
| 4 | STANDARD W-BEAM RAIL |
| 5 | ⅝" X 2" LONG GUARDRAIL BOLT & RECESSED NUT (SEE STANDARD GR-HDW) |
| 6 | RECTANGULAR PLATE WASHER (SEE ST'D. GR-HDW) |
| 7 | BENT PLATE RUBRAIL (SEE SHEET 3 OF 3) |
| 8 | C6 X 8.2 RUBRAIL (SEE SHEET 3 OF 3) |
| 9 | W8 X 13 X 7'-6" LONG STEEL POST WITH STANDARD 6" X 8" X 14" LONG TREATED PINE BLOCK OR RECYCLED MATERIAL |




SECTION A-A




SECTION B-B




SECTION C-C

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

# W-BEAM GUARDRAIL-FIXED OBJECT ATTACHMENT

## FOR USE BETWEEN VERTICAL FIXED OBJECTS AND GUARDRAIL (STEEL POSTS)

VIRGINIA DEPARTMENT OF TRANSPORTATION

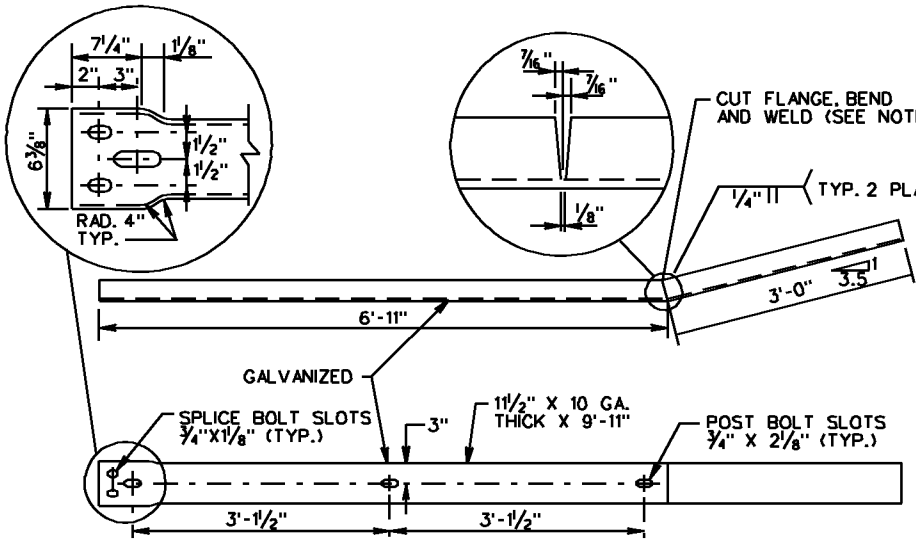
VDOT
ROAD AND BRIDGE STANDARDS

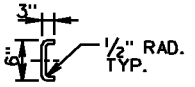
SHEET 2 OF 3
501.26

REVISION DATE
01/14

SPECIFICATION REFERENCE
505

GR-FOA-1

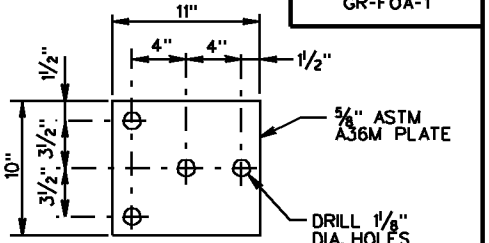



NOTE:

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




BEARING PLATE
GALVANIZED

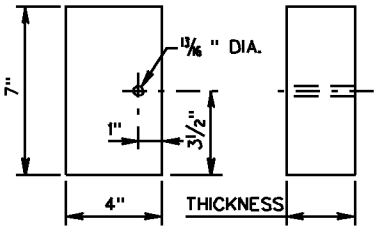
☆ CAN BE FIELD CUT AND BENT USING HEAT.

WOOD POSTS
RUBRAIL BLOCKOUTS
7" X 4" X THICKNESS

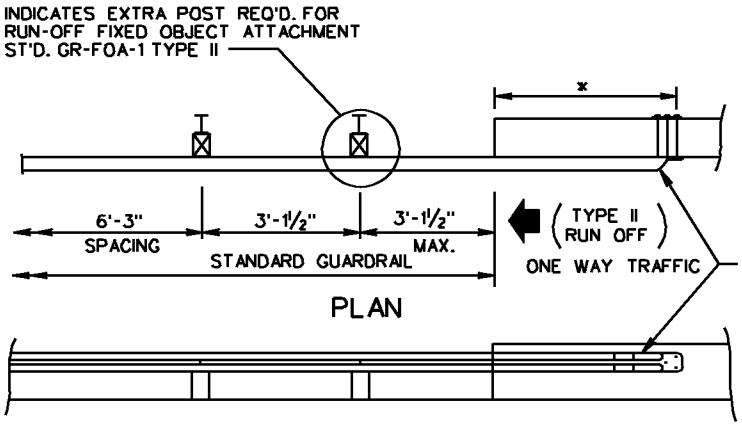
| POST | THICKNESS |
|---|---|
| 1 | 6⅛" |
| 2 | 4⅝" |
| 3 | 3¼" |
| 4 | 1¾" |

STEEL POSTS
RUBRAIL BLOCKOUTS
7" X 4" X THICKNESS

| POST | THICKNESS |
|---|---|
| 1 | 5¾" |
| 2 | 4¼" |
| 3 | 2⅞" |
| 4 | 1⅜" |

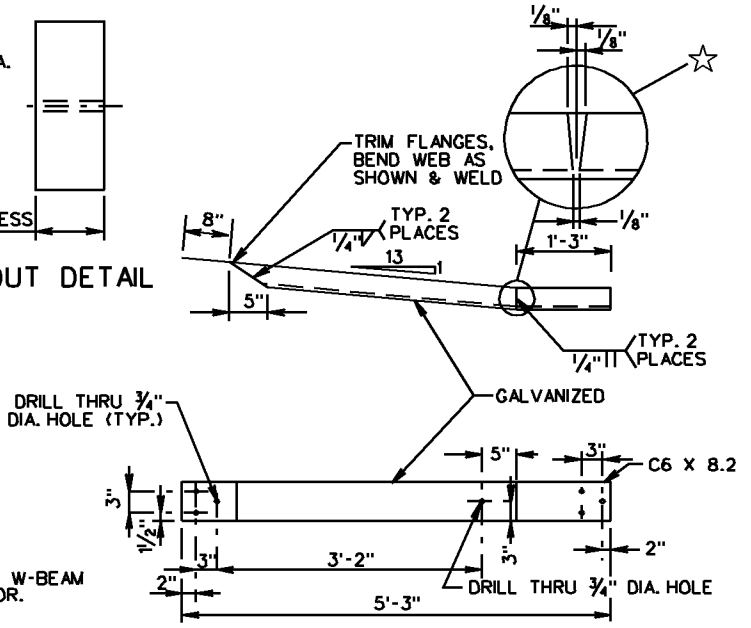



RUBRAIL BLOCKOUT DETAIL




PLAN

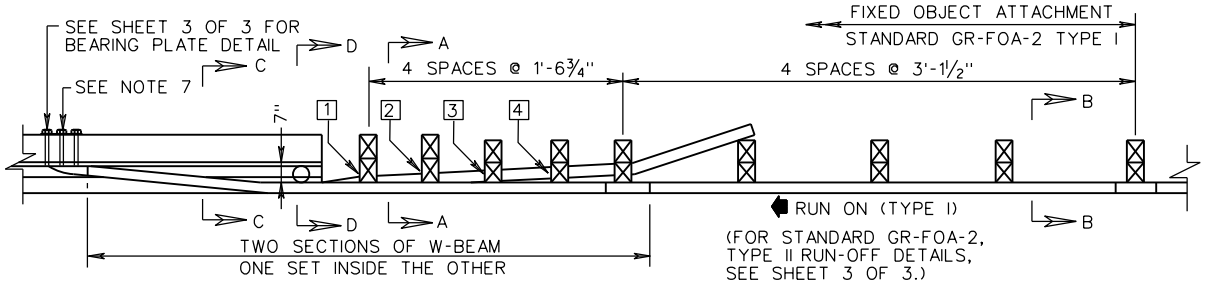
ELEVATION



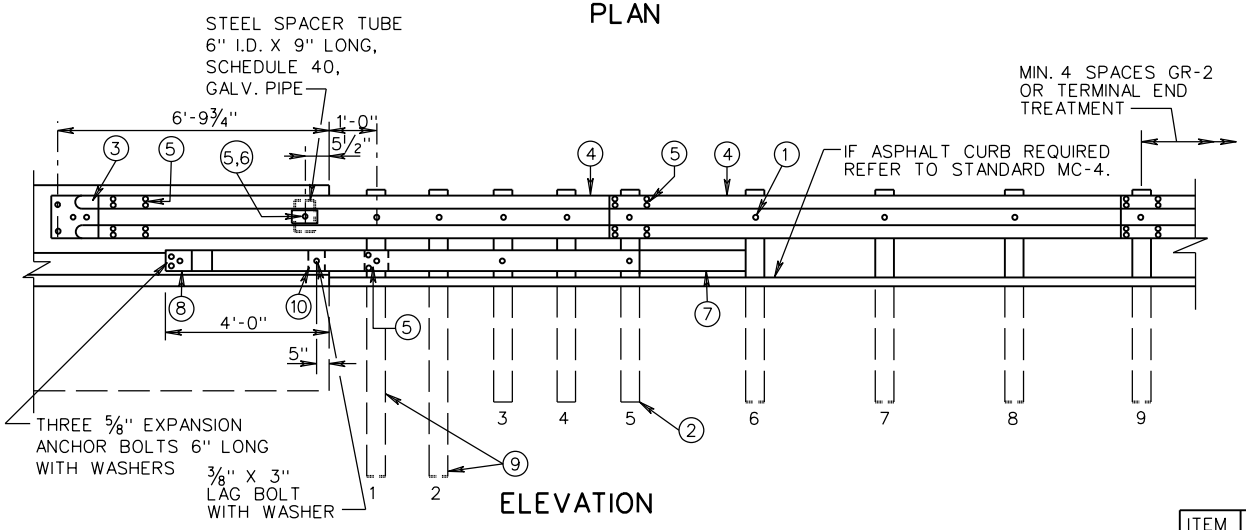

## ITEM (8) DETAIL

| SPECIFICATION REFERENCE | W-BEAM GUARDRAIL - FIXED OBJECT ATTACHMENT (RUBRAIL AND HARDWARE DETAILS) | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 505 | VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE 4/09 · SHEET 3 OF 3 · 501.27 |

GR-FOA-2




PLAN



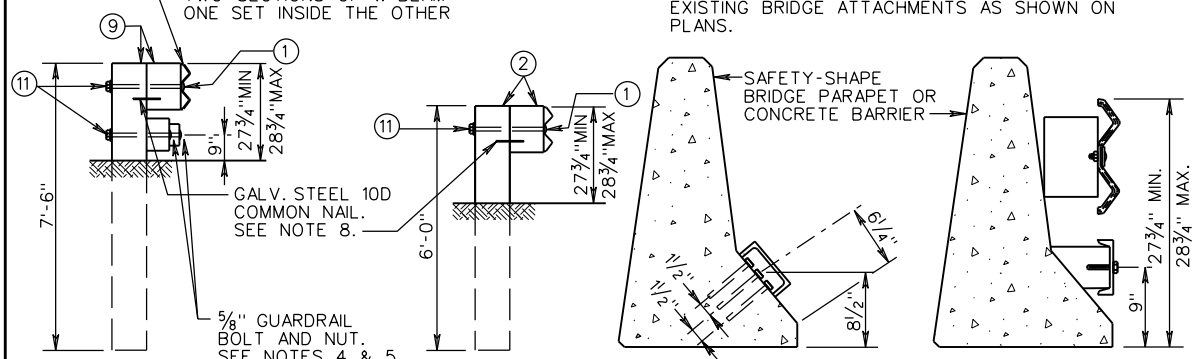

ELEVATION

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 ⅝" GUARDRAIL BOLTS. (LENGTH AS REQUIRED).
6. 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.
7. APPROPRIATE LENGTH ⅞" ASTM A449 HEX BOLTS WITH WASHERS MUST BE USED WITH THRU DRILLED HOLES AND A ⅝" 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 ⅝" X 18 BOLT IS INSTALLED.
9. SEE SHEET 3 OF 3 FOR RUBRAIL BLOCKOUT DETAILS.

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.




SECTION A-A SECTION B-B SECTION C-C (W BEAM OMITTED) SECTION D-D

| ITEM | MATERIAL/SPECIFICATIONS/NOTES |
|---|---|
| ① | ⅝" X 18" LG. 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 | ⅝"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 | 8" X 8" X 7'-6" LONG WOOD POST AND 8" X 8" X 14" LONG TREATED PINE BLOCK OR RECYCLED MATERIAL |
| ⑩ | WOOD BLOCKOUT FOR RUBRAIL (SEE SHEET 3 OF 3) |
| ⑪ | WASHER FOR ⅝" BOLT |

VDOT
ROAD AND BRIDGE STANDARDS

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

# W-BEAM GUARDRAIL - FIXED OBJECT ATTACHMENT

## FOR USE BETWEEN SAFETY SHAPE AND GUARDRAIL (WOOD POSTS)

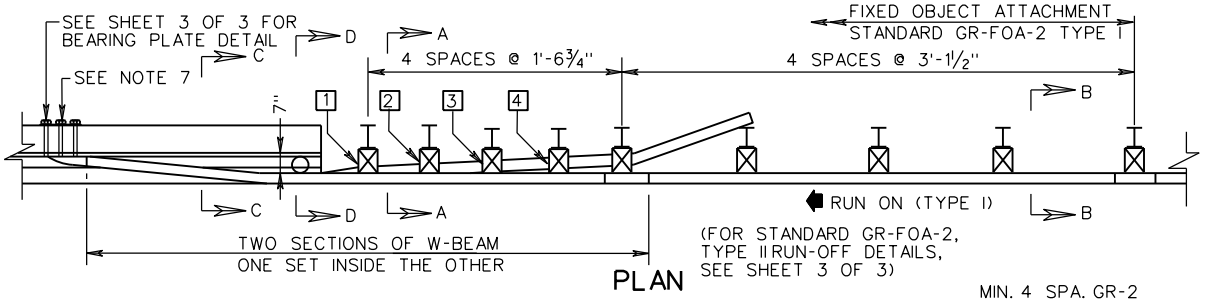
VIRGINIA DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 3 | REVISION DATE 01/14

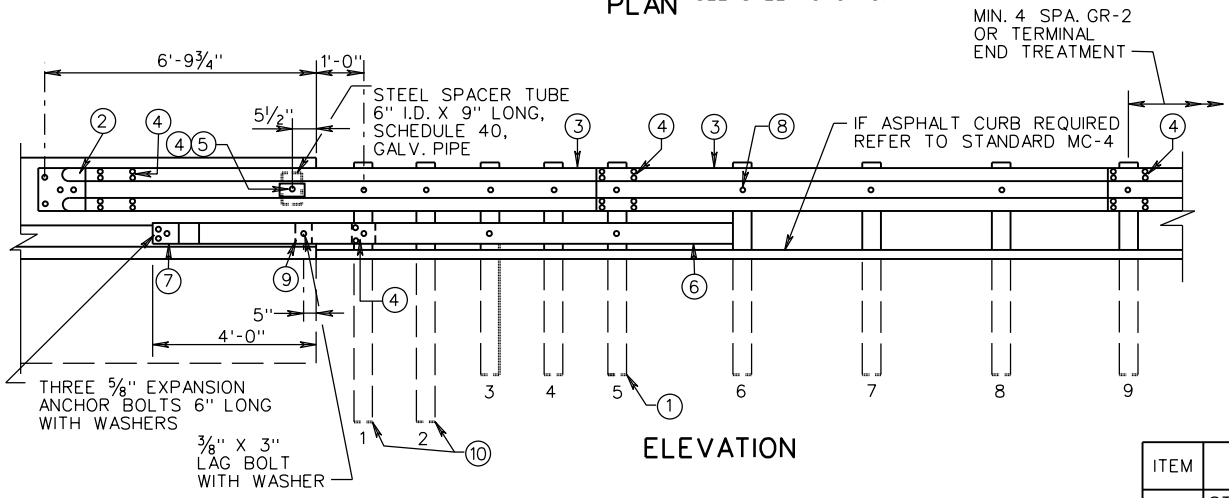
501.28

SPECIFICATION REFERENCE

505




PLAN



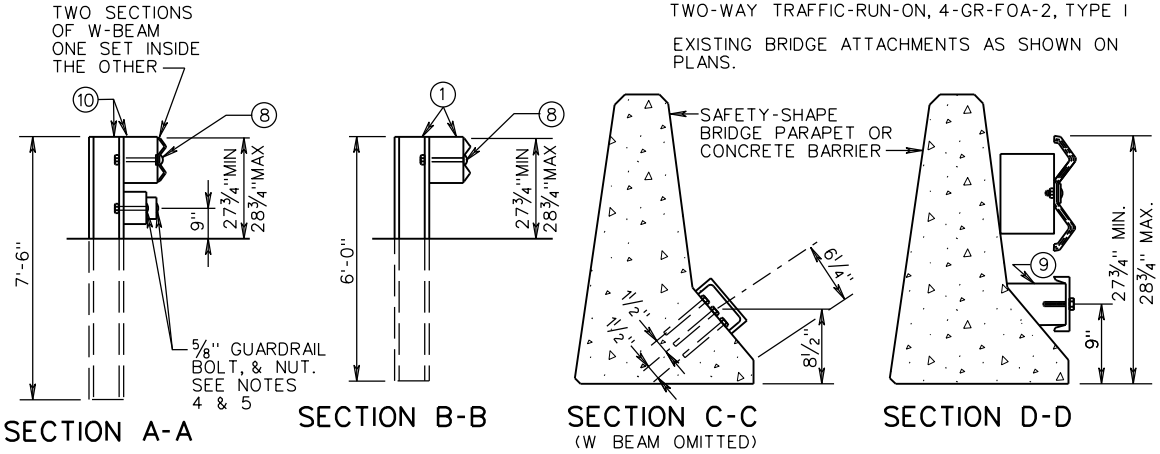

ELEVATION

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 ⅝" GUARDRAIL BOLTS. (LENGTH AS REQUIRED).
6. RUBRAIL MUST BE TWISTED 35° BETWEEN SECTIONS C-C AND D-D. SHOP FABRICATION MAY BE REQUIRED. RIGHT HAND AND LEFT HAND TWISTS WILL BE NECESSARY.
7. APPROPRIATE LENGTH ⅞" ASTM A449 HEX BOLTS WITH WASHERS MUST BE USED WITH THRU DRILLED HOLES AND A ⅝" BEARING PLATE ON THE BACK SIDE OF THE BRIDGE PARAPET OR CONCRETE BARRIER.
8. SEE SHEET 3 OF 3 FOR RUBRAIL BLOCKOUT DETAILS.

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.




SECTION A-A

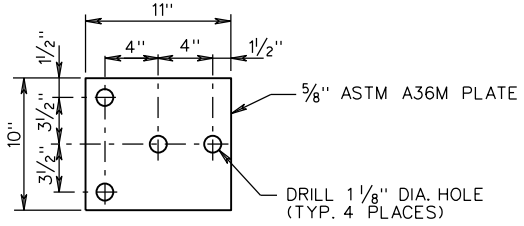
SECTION B-B

SECTION C-C
(W BEAM OMITTED)

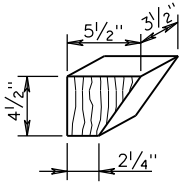
SECTION D-D

| ITEM | MATERIAL/SPECIFICATIONS/NOTES |
|---|---|
| ① | 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 |
| ② | STANDARD W-BEAM TERMINAL CONNECTOR |
| ③ | STANDARD W-BEAM RAIL |
| ④ | ⅝" X 2" LONG GUARDRAIL BOLT AND RECESSED NUT (SEE STANDARD GR-HDW) |
| ⑤ | RECTANGULAR PLATE WASHER (SEE STANDARD GR-HDW) |
| ⑥ | BENT PLATE RUBRAIL (SEE SHEET 3 OF 3) |
| ⑦ | C6 X 8.2 RUBRAIL (SEE SHEET 3 OF 3) |
| ⑧ | ⅝" X 10" LONG GUARDRAIL BOLT AND RECESSED NUT |
| ⑨ | WOOD BLOCKOUT FOR RUBRAIL (SEE SHEET 3 OF 3) |
| ⑩ | W8 X 13 X 7'-6" LG. STEEL POST WITH STD. 6" X 8" X 14" LG. TREATED PINE BLOCK OR RECYCLED MATERIAL. |

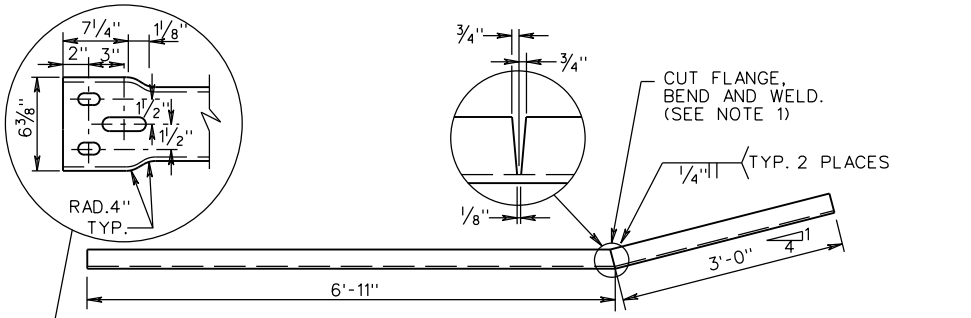
| SPECIFICATION REFERENCE | A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE. | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 505 | # W-BEAM GUARDRAIL - FIXED OBJECT ATTACHMENT<br>FOR USE WITH SAFETY SHAPE - (STEEL POSTS)<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE 01/14 · SHEET 2 OF 3 · 501.29 |

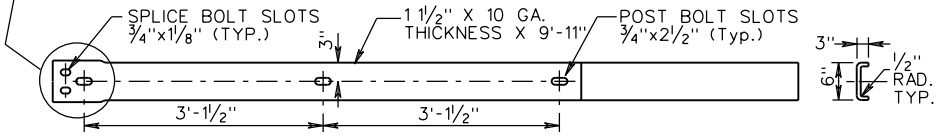



BEARING PLATE

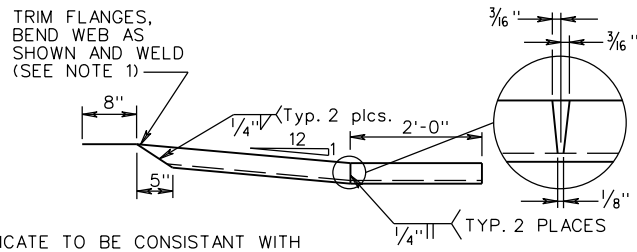



ITEM (10) DETAIL

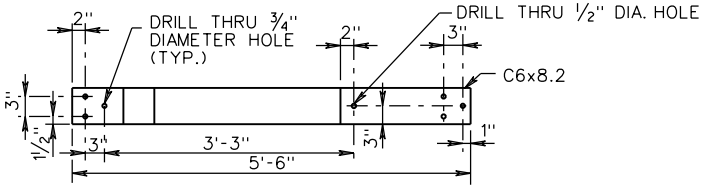


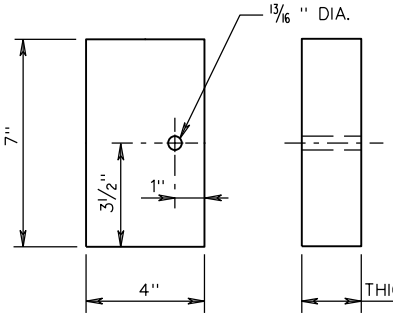

ITEM (7) DETAIL




FABRICATE TO BE CONSISTANT WITH THE SLOPE OF THE PARAPET OR BARRIER AND ATTACH FLUSH TO SLOPE.




ITEM (8) DETAIL



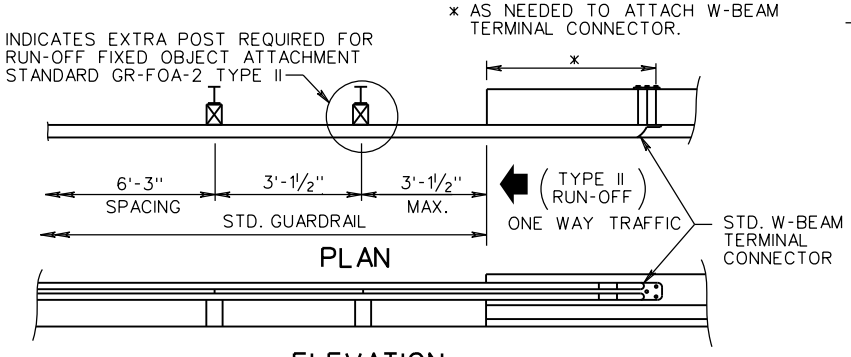

STEEL POSTS
RUBRAIL BLOCKOUTS
7" X 4" X THICKNESS

| POST | THICKNESS |
|---|---|
| 1 | 4¼" |
| 2 | 3¼" |
| 3 | 2" |
| 4 | 1" |

WOOD POSTS
RUBRAIL BLOCKOUTS
7" X 4" X THICKNESS

| POST | THICKNESS |
|---|---|
| 1 | 6¼" |
| 2 | 4⅝" |
| 3 | 3⅛" |
| 4 | 1½" |

RUBRAIL BLOCKOUT DETAIL




PLAN

ELEVATION

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.

VDOT
ROAD AND BRIDGE STANDARDS

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

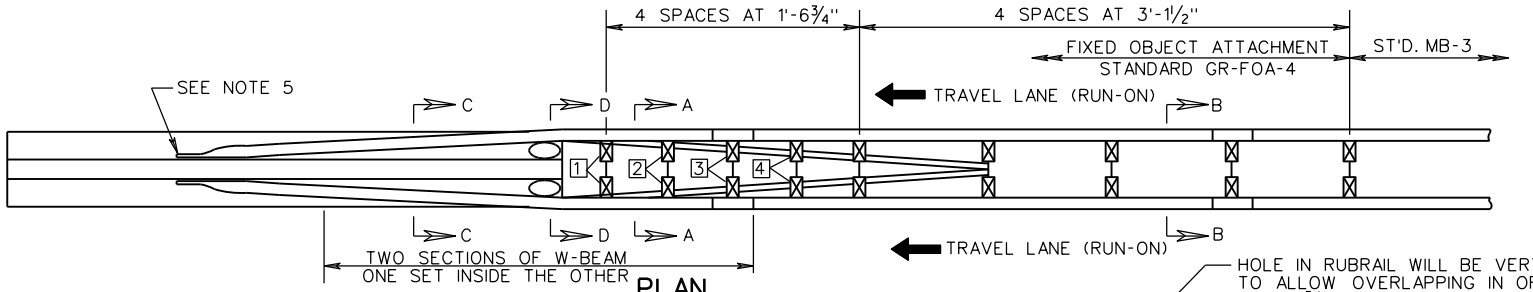
# W-BEAM GUARDRAIL - FIXED OBJECT ATTACHMENT

## RUBRAIL AND HARDWARE DETAILS

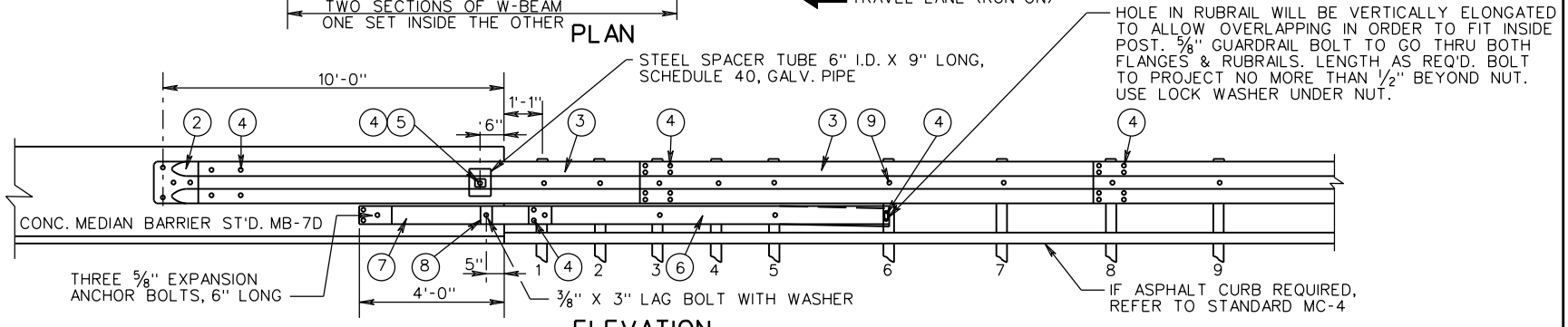
VIRGINIA DEPARTMENT OF TRANSPORTATION

| SHEET 3 OF 3 | REVISION DATE |
|---|---|
| 501.30 | 01/14 |

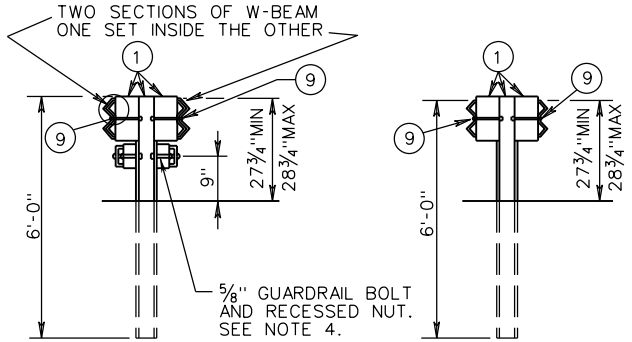
SPECIFICATION REFERENCE
505




PLAN



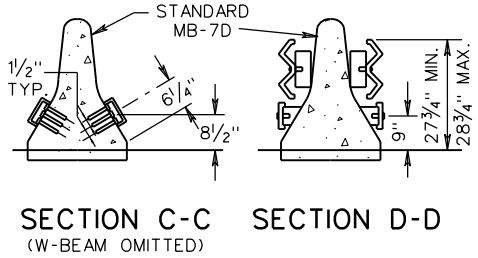

ELEVATION




SECTION A-A




SECTION B-B




SECTION C-C
(W-BEAM OMITTED)

SECTION D-D

NOTES:

1. ALL GUARDRAIL POSTS ARE TO BE STEEL.
2. ALL GUARDRAIL COMPONENTS ARE TO BE IN ACCORDANCE WITH VDOT ROAD AND BRIDGE STANDARDS.
3. 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.
4. BOTTOM WOOD BLOCKS LOCATED ON POSTS 1 THROUGH 4 ARE TO BE DRILLED AND SECURED WITH ⅝" GUARDRAIL BOLTS (LENGTH AS REQUIRED)
5. APPROPRIATE LENGTH ⅞" ASTM A449 HEX BOLTS WITH WASHERS ARE TO BE USED WITH HOLES DRILLED THROUGH THE CONCRETE MEDIAN BARRIER ATTACHING THE W-BEAM TERMINAL CONNECTORS ON EACH SIDE. BOLTS TO PROJECT NO MORE THAN ½" BEYOND NUTS. USE LOCK WASHERS UNDER NUTS.

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)

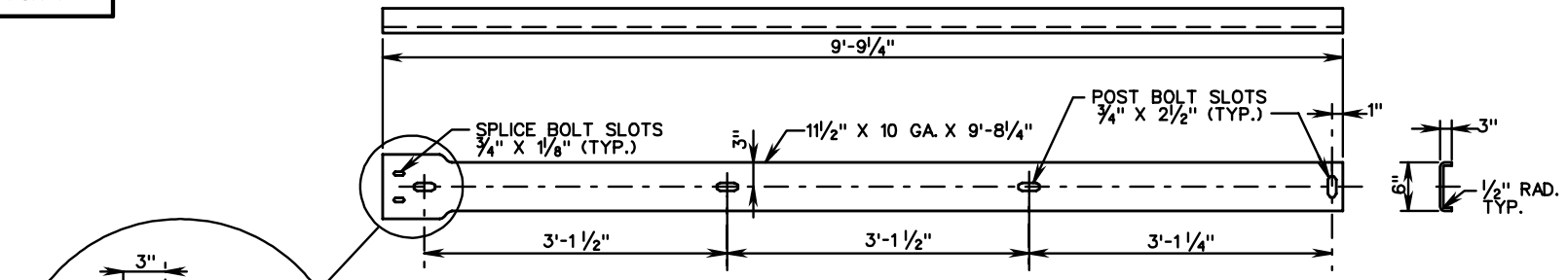
| RUBRAIL WOOD BLOCKS 7" x 4" | |
|---|---|
| POST | THICKNESS |
| 1 | 4¼" |
| 2 | 3¼" |
| 3 | 2" |
| 4 | 1" |

| ITEM | MATERIALS/SPECIFICATIONS/NOTES | ITEM | MATERIALS/SPECIFICATIONS/NOTES |
|---|---|---|---|
| 1 | 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. | 5 | RECTANGULAR PLATE WASHER (SEE STANDARD GR-HDW) |
| | | 6 | BENT PLATE RUBRAIL (SEE SHEET 2 OF 2) |
| 2 | ST'D. W-BEAM TERMINAL CONNECTOR | 7 | C6 x 8.2 RUBRAIL (SEE SHEET 2 OF 2) |
| 3 | STANDARD W-BEAM RAIL | 8 | WOOD BLOCKOUT FOR RUBRAIL (SEE SHEET 2 OF 2) |
| 4 | ⅝" X 2" LONG GUARDRAIL BOLT AND RECESSED NUT | 9 | ⅝" x 10" LONG GUARDRAIL BOLT AND RECESSED NUT |

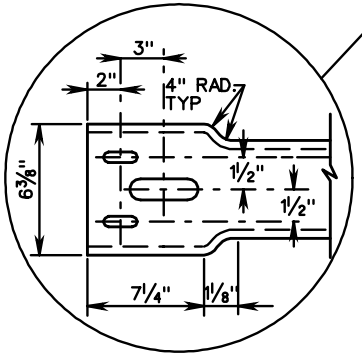
A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

| SPECIFICATION REFERENCE | BLOCKED-OUT W-BEAM MEDIAN BARRIER-FIXED OBJECT ATTACHMENT (FOR USE BETWEEN STANDARD MB-7D AND STANDARD MB-3) VIRGINIA DEPARTMENT OF TRANSPORTATION | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 505 | | REVISION DATE 01/14 · SHEET 1 OF 2 · 501.31 |

GR-FOA-4

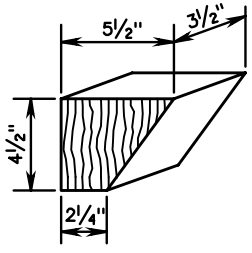



ITEM ⑦ DETAIL

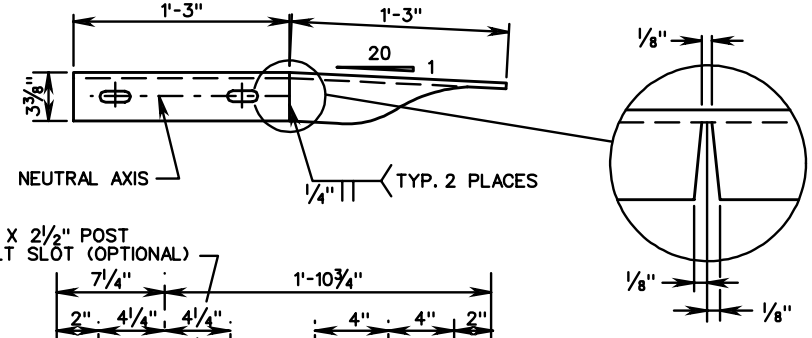


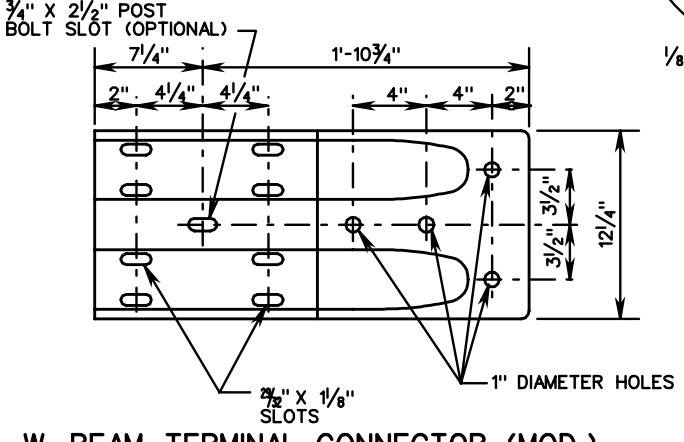

NOTES:

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.

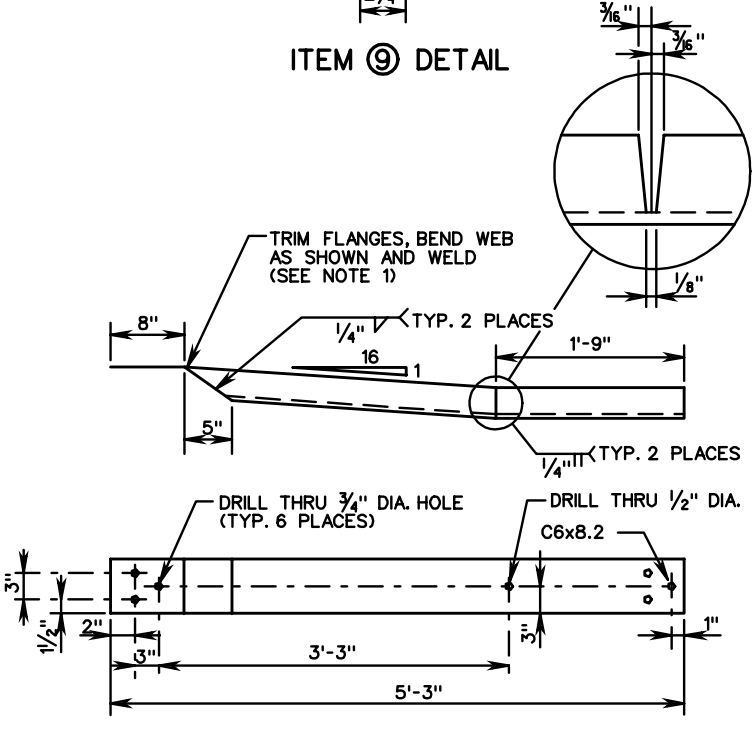



ITEM ⑨ DETAIL




W BEAM TERMINAL CONNECTOR (MOD.)




ITEM ⑧ DETAIL

VDOT
ROAD AND BRIDGE STANDARDS

SHEET 2 OF 2 | REVISION DATE

501.32

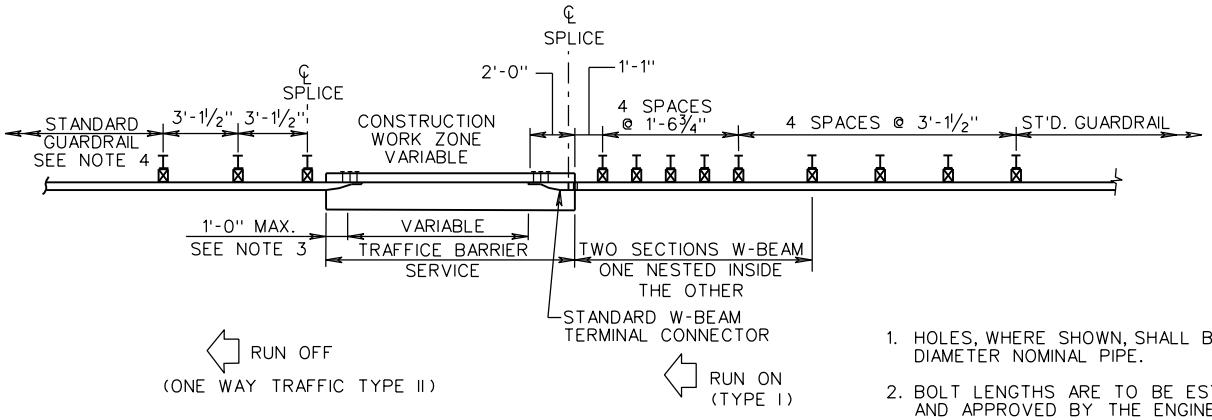
# BLOCKED-OUT W-BEAM MEDIAN BARRIER FIXED OBJECT ATTACHMENT

## (RUBRAIL AND HARDWARE DETAILS)

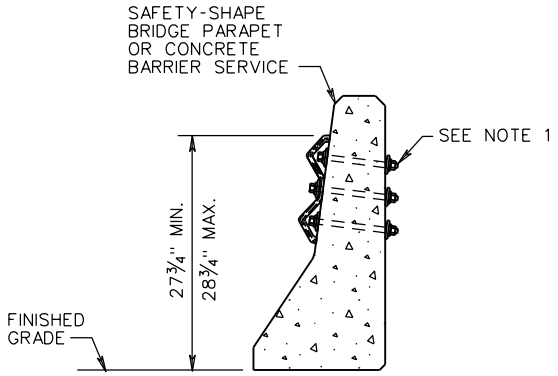
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

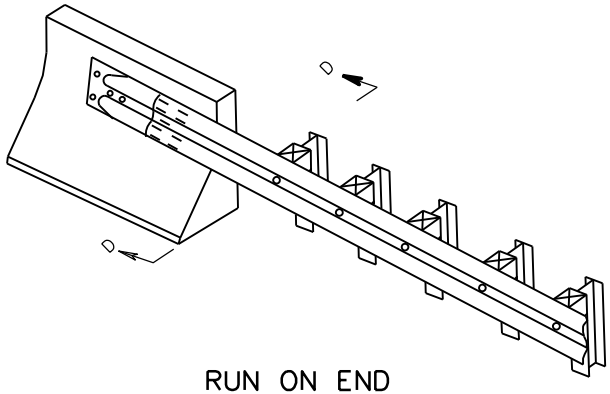
505




1. HOLES, WHERE SHOWN, SHALL BE FORMED WITH SLEEVES OF 1½" DIAMETER NOMINAL PIPE.
2. BOLT LENGTHS ARE TO BE ESTABLISHED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. ALL BOLTS ARE TO BE ⅞" DIA. HEX HEAD MACHINE BOLTS WITH BEVELED WASHERS AND SELF-LOCKING NUTS.
3. FOR TWO-WAY TRAFFIC DESIGN, USE RUN-ON END TRANSITION (TYPE I).
4. RUN OFF (TYPE II) GUARDRAIL TO BE USED ONLY WHEN REQUIRED FOR OTHER REASONS.
5. COST OF TRANSITION TO BE INCLUDED IN PRICE BID PER FOOT OF TRAFFIC BARRIER SERVICE CONCRETE.
6. THESE INSTRUCTIONS APPLICABLE FOR TEMPORARY INSTALLATION IN CONSTRUCTION ZONES ONLY. REFER TO STANDARD GR-FOA FOR INSTRUCTIONS ON PERMANENT INSTALLATION.



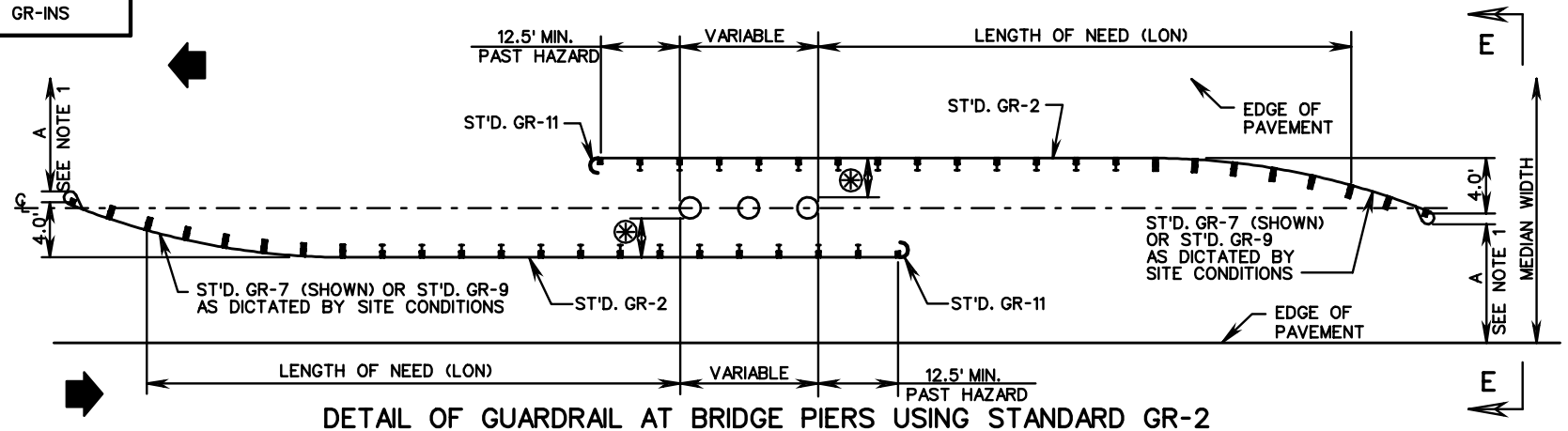

SECTION D-D



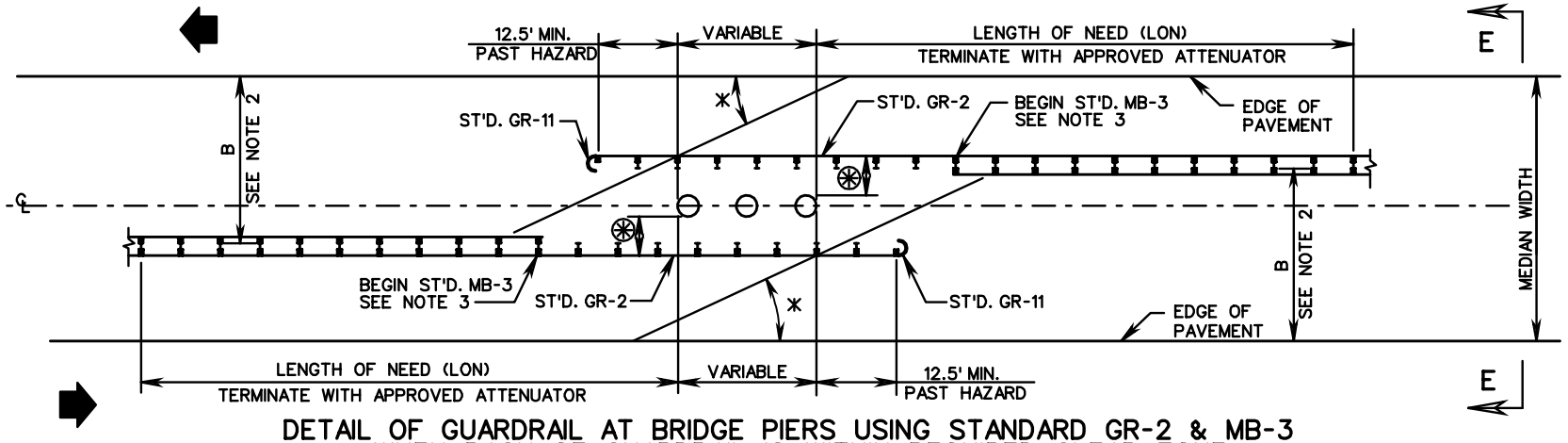
RUN ON END TRANSITION

| SPECIFICATION REFERENCE | W-BEAM GUARDRAIL INSTALLATION CRITERIA | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 505 | FIXED OBJECT ATTACHMENT METHODS FOR CONSTRUCTION ZONES | REVISION DATE 7/11 |
| | VIRGINIA DEPARTMENT OF TRANSPORTATION | SHEET 1 OF 1 |
| | | 501.33 |

GR-INS




DETAIL OF GUARDRAIL AT BRIDGE PIERS USING STANDARD GR-2




DETAIL OF GUARDRAIL AT BRIDGE PIERS USING STANDARD GR-2 & MB-3
WHEN BACK OF GUARDRAIL IS WITHIN REQUIRED CLEAR ZONE


TYPICAL SECTION


SECTION E-E

⊛ GUARDRAIL SHALL BE PLACED SO THAT A HAZARD IS NOT WITHIN THE DEFLECTION LIMIT OF THE GUARDRAIL. 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.

✳ 25° ANGLE OF VEHICLE DEPARTURE.

NOTES:

1. DISTANCE "A" MUST BE GREATER THAN REQ'D. CLEAR ZONE.
2. DISTANCE "B" IS LESS THAN REQ'D. CLEAR ZONE.
3. BEGIN ST'D MB-3 AT THE POST PRIOR TO THE POINT WHERE THE 25° ANGLE OF VEHICLE DEPARTURE WILL INTERSECT THE MB-3.

VDOT
ROAD AND BRIDGE STANDARDS

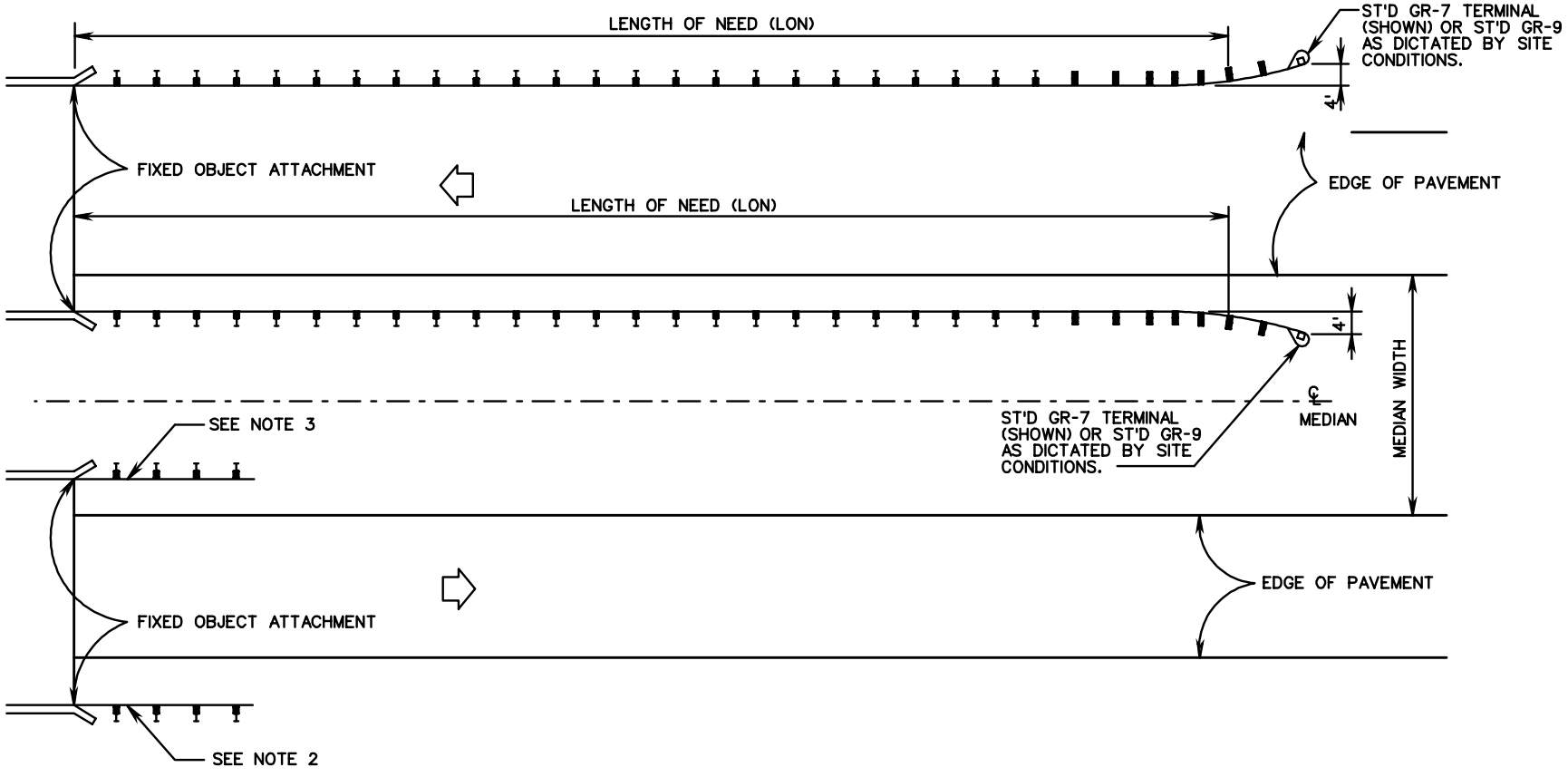
# W-BEAM GUARDRAIL INSTALLATION CRITERIA

VIRGINIA DEPARTMENT OF TRANSPORTATION

| SHEET 1 OF 8 | REVISION DATE |
|---|---|
| 501.34 | |

SPECIFICATION REFERENCE

221
505



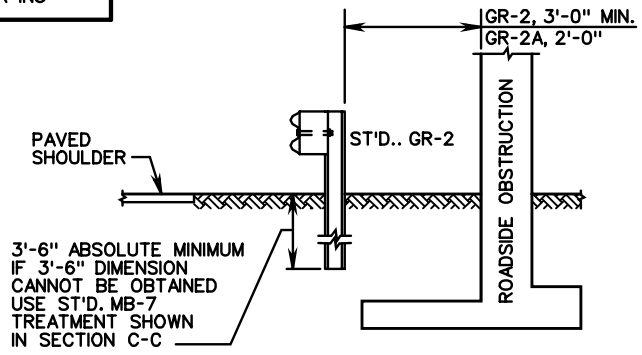

NOTES:

1. IF A CUT SECTION IS CLOSER THAN 200', A STANDARD GR-6 TERMINAL IS PREFERRED.
2. NO GUARDRAIL IS REQUIRED ON RUN-OFF UNLESS NEEDED TO SHIELD A HAZARD WITHIN THE REQUIRED CLEAR ZONE.
3. NO GUARDRAIL IS REQUIRED ON RUN-OFF UNLESS NEEDED TO SHIELD A HAZARD WITHIN THE REQUIRED CLEAR ZONE. REFER TO SHEET 501.34 IF BACK OF GUARDRAIL FROM THE OPPOSING LANES IS WITHIN THE REQUIRED CLEAR ZONE.

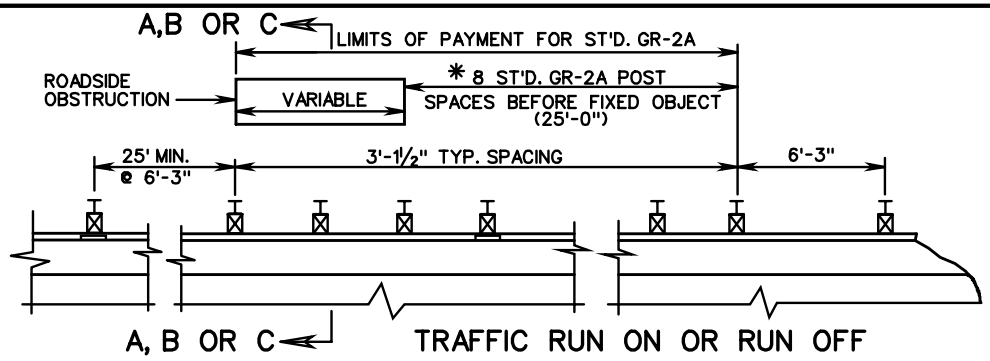
## DETAIL OF GUARDRAIL AT DUAL BRIDGES

| SPECIFICATION REFERENCE | W-BEAM GUARDRAIL INSTALLATION CRITERIA | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 221<br>505 | VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE<br>SHEET 2 OF 8<br>501.35 |

GR-INS

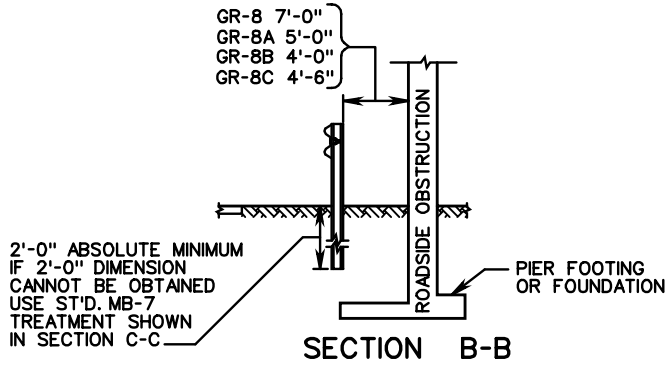



SECTION A-A



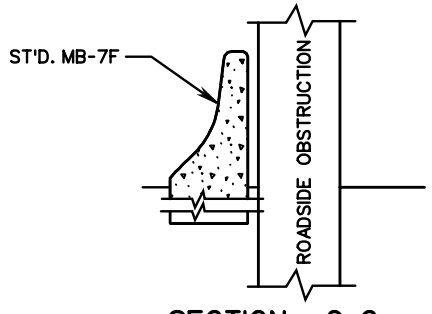

TRAFFIC RUN ON OR RUN OFF

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

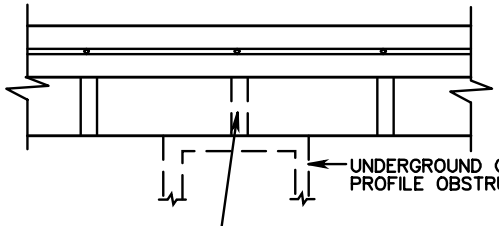



SECTION B-B

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

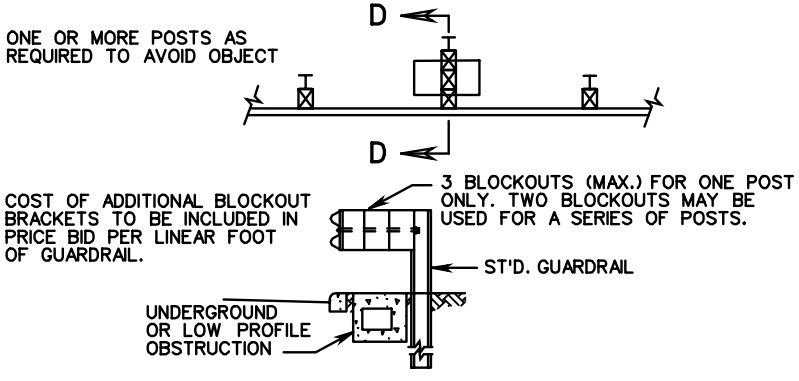



SECTION C-C




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




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

VDOT
ROAD AND BRIDGE STANDARDS

SHEET 3 OF 8 | REVISION DATE
501.36

# 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.

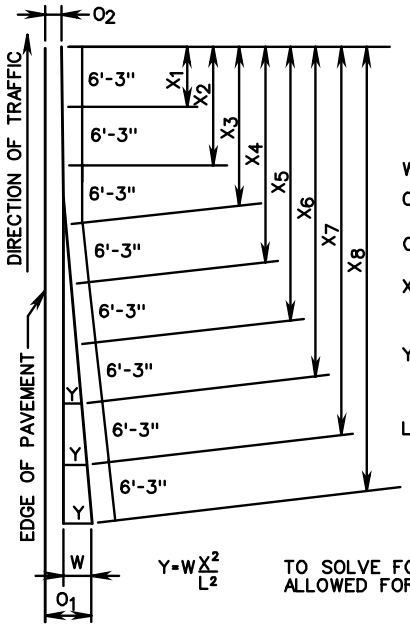
LENGTH OF TRANSITION (L) IS TO BE IN ACCORDANCE WITH TABLE III OR IV FOR APPLICABLE VALUES OF W OR AS DIRECTED BY THE ENGINEER.

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.




$Y = W\frac{X^2}{L^2}$

TO SOLVE FOR "Y", USE THE MAXIMUM "L" ALLOWED FOR THE APPROPRIATE "W".

W = TOTAL LATERAL TRANSITION OF GUARDRAIL $O_1 - O_2$

$O_1$ = OFFSET FROM EDGE OF PAVEMENT TO FACE OF GUARDRAIL MAX.

$O_2$ = OFFSET FROM EDGE OF PAVEMENT TO FACE OF GUARDRAIL MIN.

$X_1 = \ldots X_n$ CUMULATIVE DISTANCE IN INCREMENTS OF 6'-3" FROM FIRST GUARDRAIL POST MEASURED ALONG FACE OF GUARDRAIL.

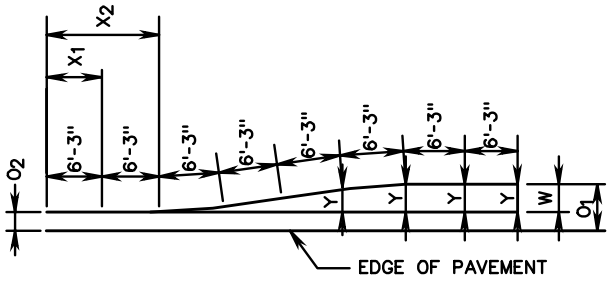
Y = LATERAL OFFSET FROM FACE OF GUARDRAIL OF POST NEAREST TO PAVEMENT EDGE TO FACE OF GUARDRAIL AT EACH SUCCESSIVE POST.

L = TOTAL LENGTH OF TRANSITIONAL PORTION OF GUARDRAIL.

## TABLE III
## OFFSETS (Y) FOR INTRODUCED GUARDRAIL TRANSITIONS

| LENGTH L IN FEET | X IN FEET | W-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 | $X_1$ 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 |
| | $X_2$ 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 |
| | $X_3$ 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 |
| | $X_4$ 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 |
| | $X_5$ 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 |
| | $X_6$ 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 |
| 50.00 | $X_7$ 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 |
| | $X_8$ 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 | 2.22 |
| 75.00 | $X_9$ 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 |
| | $X_{10}$ 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 |
| | $X_{11}$ 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 |
| | $X_{12}$ 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 |
| 87.50 | $X_{13}$ 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 |
| | $X_{14}$ 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 | $X_{15}$ 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 |
| | $X_{16}$ 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 |
| 125.00 | $X_{17}$ 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 |
| | $X_{18}$ 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 |
| | $X_{19}$ 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 |
| | $X_{20}$ 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 | $X_{21}$ 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 |
| | $X_{22}$ 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 |
| | $X_{23}$ 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 |
| | $X_{24}$ 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 |

GR-INS




NOTE:
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 OF Y.

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

## 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 | $X_1$ 6.25 | 0.04 | 0.04 | 0.02 | 0.02 | 0.00 | 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 |
| | $X_2$ 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 | 0.09 |
| | $X_3$ 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 | 0.32 |
| | $X_4$ 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 | 0.75 |
| | $X_5$ 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 | 1.46 |
| | $X_6$ 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 | 2.53 |
| 50.00 | $X_7$ 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 | 4.02 |
| | $X_8$ 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 | 6.00 |
| 100.00 | $X_9$ 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 | 7.98 |
| | $X_{10}$ 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 | 9.47 |
| | $X_{11}$ 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 | 10.54 |
| | $X_{12}$ 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 | 11.25 |
| | $X_{13}$ 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 | 11.68 |
| | $X_{14}$ 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 | 11.91 |
| | $X_{15}$ 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 | 11.99 |
| | $X_{16}$ 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 | 12.00 |
| 125.00 | $X_{17}$ 106.25 | | | | | | | 4.93 | | 5.40 | | 5.30 | | 4.70 | | 5.29 | | 5.88 | | 6.47 | | 7.06 | |
| | $X_{18}$ 112.50 | | | | | | | 4.98 | | 5.63 | | 5.72 | | 5.32 | | 5.99 | | 6.65 | | 7.32 | | 7.98 | |
| | $X_{19}$ 118.75 | | | | | | | 5.00 | | 5.78 | | 6.07 | | 5.85 | | 6.59 | | 7.32 | | 8.05 | | 8.78 | |
| | $X_{20}$ 125.00 | | | | | | | 5.00 | | 5.89 | | 6.35 | | 6.31 | | 7.10 | | 7.89 | | 8.68 | | 9.47 | |
| 150.00 | $X_{21}$ 131.25 | | | | | | | | | 5.95 | | 6.56 | | 6.70 | | 7.54 | | 8.38 | | 9.21 | | 10.05 | |
| | $X_{22}$ 137.50 | | | | | | | | | 5.99 | | 6.72 | | 7.02 | | 7.90 | | 8.78 | | 9.66 | | 10.54 | |
| | $X_{23}$ 143.75 | | | | | | | | | 6.00 | | 6.84 | | 7.29 | | 8.20 | | 9.11 | | 10.02 | | 10.93 | |
| | $X_{24}$ 150.00 | | | | | | | | | 6.00 | | 6.92 | | 7.50 | | 8.44 | | 9.38 | | 10.31 | | 11.25 | |
| 175.00 | $X_{25}$ 156.25 | | | | | | | | | | | 6.97 | | 7.67 | | 8.62 | | 9.58 | | 10.54 | | 11.50 | |
| | $X_{26}$ 162.50 | | | | | | | | | | | 6.99 | | 7.79 | | 8.76 | | 9.74 | | 10.71 | | 11.68 | |
| | $X_{27}$ 168.75 | | | | | | | | | | | 7.00 | | 7.88 | | 8.86 | | 9.85 | | 10.83 | | 11.82 | |
| | $X_{28}$ 175.00 | | | | | | | | | | | 7.00 | | 7.94 | | 8.93 | | 9.92 | | 10.91 | | 11.91 | |
| 200.00 | $X_{29}$ 181.25 | | | | | | | | | | | | | 7.97 | | 8.97 | | 9.97 | | 10.96 | | 11.96 | |
| | $X_{30}$ 187.50 | | | | | | | | | | | | | 7.99 | | 8.99 | | 9.99 | | 10.99 | | 11.99 | |
| | $X_{31}$ 193.75 | | | | | | | | | | | | | 8.00 | | 9.00 | | 10.00 | | 11.00 | | 12.00 | |
| | $X_{32}$ 200.00 | | | | | | | | | | | | | 8.00 | | 9.00 | | 10.00 | | 11.00 | | 12.00 | |

VDOT
ROAD AND BRIDGE STANDARDS

SHEET 5 OF 8

501.38

REVISION DATE

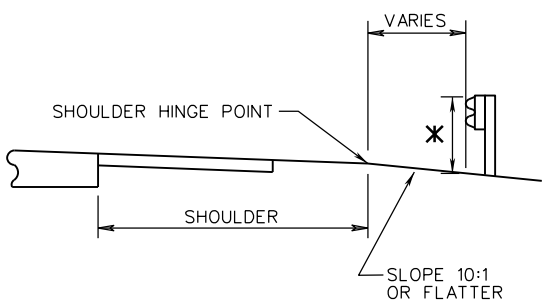
# W-BEAM GUARDRAIL INSTALLATION CRITERIA

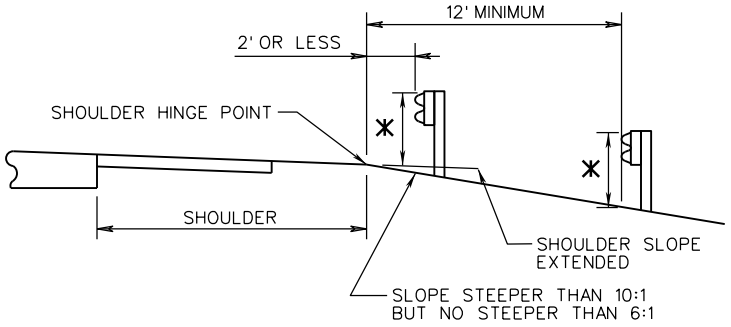
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

221
505

GR-INS



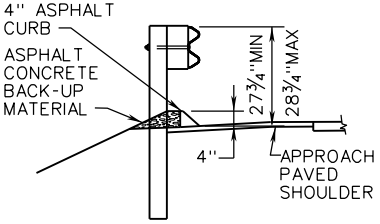

* HEIGHT PER STANDARD GR-2 OR GR-8

## MEASURING GUARDRAIL HEIGHT ON FRONT SLOPE RELATIVE TO SHOULDER HINGE POINT

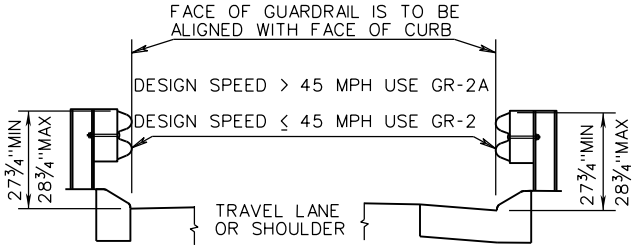
FACE OF GUARDRAIL IS TO BE ALIGNED WITH FACE OF CURB.

DESIGN SPEED > 45 MPH
USE GR-2A

DESIGN SPEED ≤ 45 MPH
USE GR-2.




## ASPHALT CURB SECTION




## GR-2 INSTALLATION WITH CG-3 OR CG-7 CURB

FOR GUARDRAIL DESIGN POLICIES USING CURB & GUTTER OR URBAN DESIGNS WITH SIDEWALK OR SIDEWALK SPACE SEE APPENDIX I OF THE ROAD DESIGN MANUAL

## TABLE I

NORMAL GUARDRAIL LOCATION-THROUGH TRAFFIC LANES LEFT OF TRAFFIC

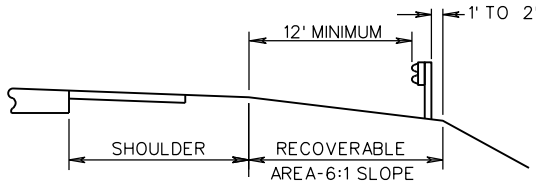
| TOTAL SHOULDER WIDTH (S) (PAVED & GRADED) | PAVED SHOULDER WIDTH ($P_S$) (SEE NOTE) | OFFSET FROM EDGE OF TRAVELED WAY TO FACE OF GUARDRAIL (O) |
|---|---|---|
| 17' | 12' | 14' |
| 15' | 3', 4', or 10' | 12' |
| 13' | 3', 4', or 8' | 10' |
| 11' | 3' or 4' | 8' |
| 9' | 3' or 4' | 6' |
| 8' | 3' or 4' | 5' |
| 7' | 0 or 2' | 4' |
| 5' | 0 | 2' |

## TABLE II

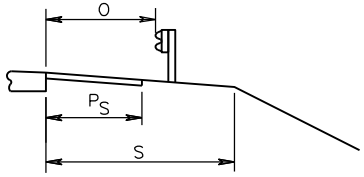
NORMAL GUARDRAIL LOCATION-THROUGH TRAFFIC LANES RIGHT OF TRAFFIC

| TOTAL SHOULDER WIDTH (S) (PAVED & GRADED) | PAVED SHOULDER WIDTH ($P_S$) (SEE NOTE) | OFFSET FROM EDGE OF TRAVELED WAY TO FACE OF GUARDRAIL (O) |
|---|---|---|
| 17' | 12' | 14' |
| 15' | 6' or 10' | 12' |
| 13' | 8' | 10' |
| 11' | 3', 4' or 6' | 8' |
| 9' | 0, 3', or 4' | 6' |
| 8' | 0 or 3' | 5' |
| 7' | 0 or 2' | 4' |
| 5' | 0 | 2' |

## NORMAL GUARDRAIL LOCATION




## GUARDRAIL LOCATION ON RECOVERABLE SLOPE




NOTE:
PAVED SHOULDER WIDTHS SHOWN ARE MINIMUM. THE PAVED SHOULDER MAY BE EXTENDED TO THE FACE OF THE RAIL. THE PAVED WIDTH USED SHALL BE IN ACCORDANCE WITH THE ROADWAY CLASSIFICATION AS DEFINED IN THE ROAD DESIGN MANUAL.

SEE STANDARD MC-4 FOR PAVING UNDER GUARDRAIL.

| SPECIFICATION REFERENCE |
|---|
| 221<br>505 |

A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

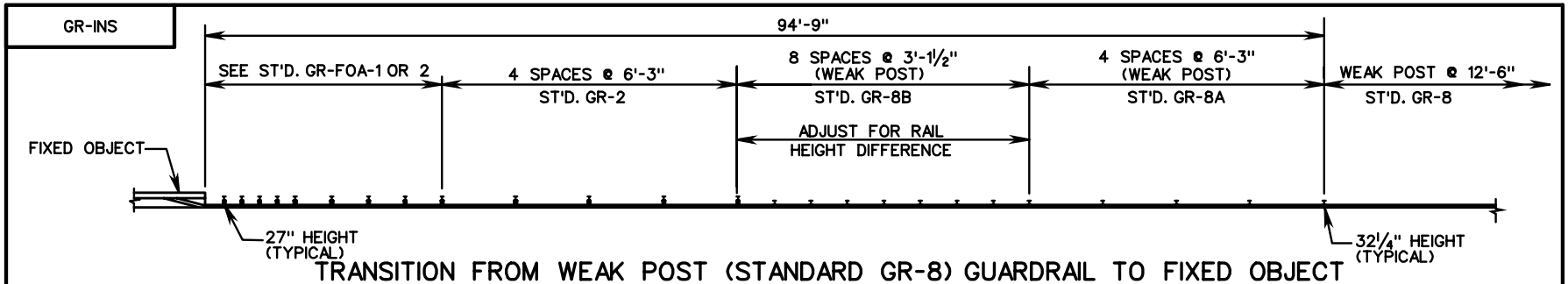
# W-BEAM GUARDRAIL INSTALLATION CRITERIA

VIRGINIA DEPARTMENT OF TRANSPORTATION

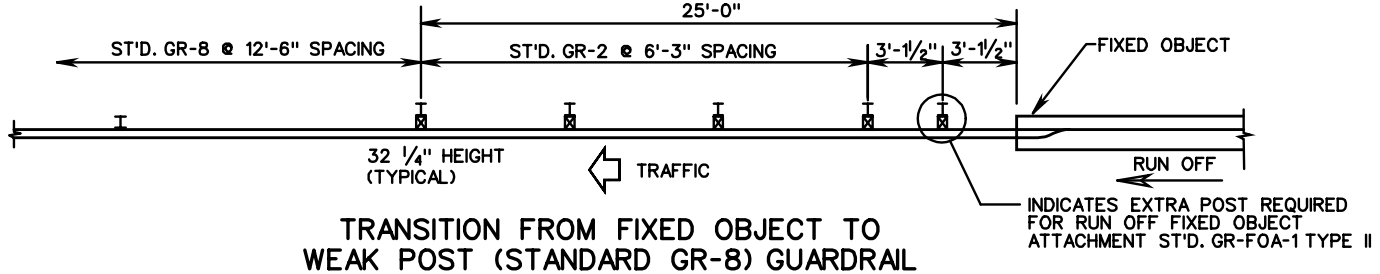
VDOT
ROAD AND BRIDGE STANDARDS

| REVISION DATE | SHEET 6 OF 8 |
|---|---|
| 07/15 | 501.39 |

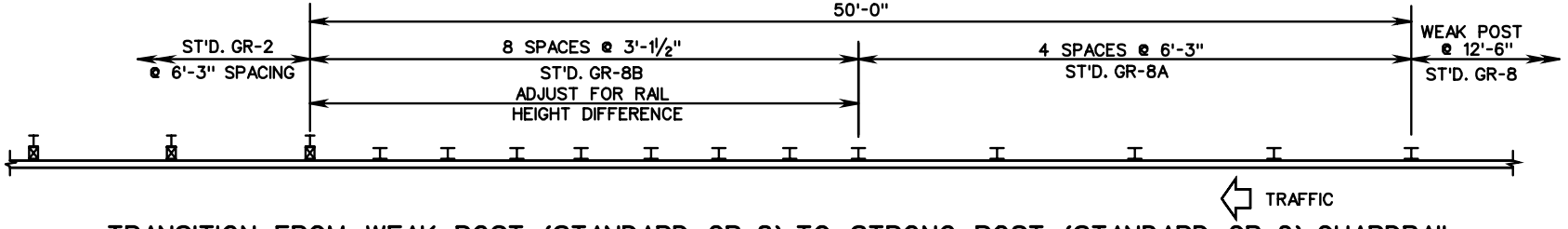
GR-INS



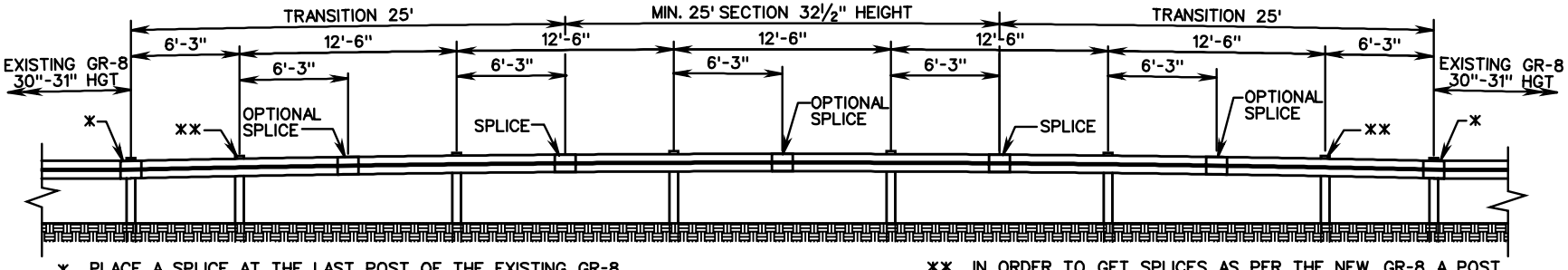

## TRANSITION FROM WEAK POST (STANDARD GR-8) GUARDRAIL TO FIXED OBJECT




## TRANSITION FROM FIXED OBJECT TO WEAK POST (STANDARD GR-8) GUARDRAIL




## TRANSITION FROM WEAK POST (STANDARD GR-8) TO STRONG POST (STANDARD GR-2) GUARDRAIL




* PLACE A SPLICE AT THE LAST POST OF THE EXISTING GR-8. THEN USE A 25 FT. TRANSITION SECTION OF RAIL TO ANOTHER SPLICE. THIS WILL RAISE THE GUARDRAIL HEIGHT FROM THE OLD GR-8 (30"-31") TO THE NEW GR-8 (32¼").

** IN ORDER TO GET SPLICES AS PER THE NEW GR-8, A POST IS TO BE ADDED AT 6'-3" AFTER THE EXISTING GR-8.

## TRANSITION FROM WEAK POST (EXISTING GR-8 30"-31" HEIGHT) TO CURRENT NCHRP 350 TL-3 WEAK POST (STANDARD GR-8 32¼" HEIGHT)

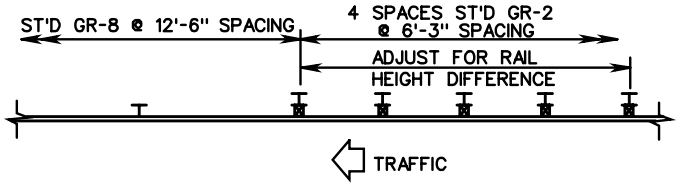
VDOT
ROAD AND BRIDGE STANDARDS

SHEET 7 OF 8 | REVISION DATE
501.40

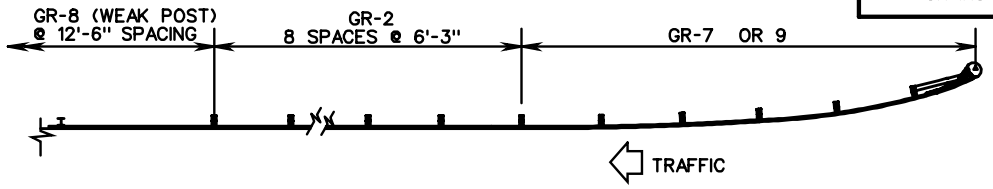
# W-BEAM GUARDRAIL INSTALLATION CRITERIA

VIRGINIA DEPARTMENT OF TRANSPORTATION

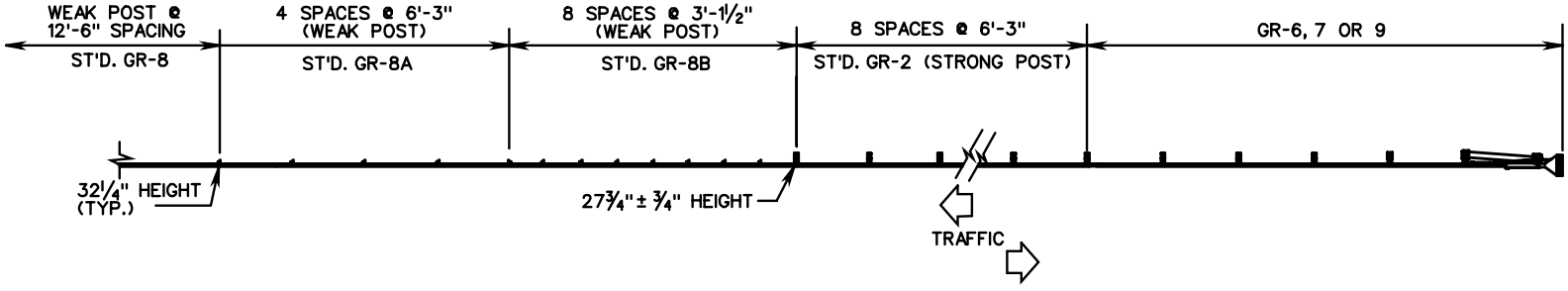
SPECIFICATION REFERENCE
221
505



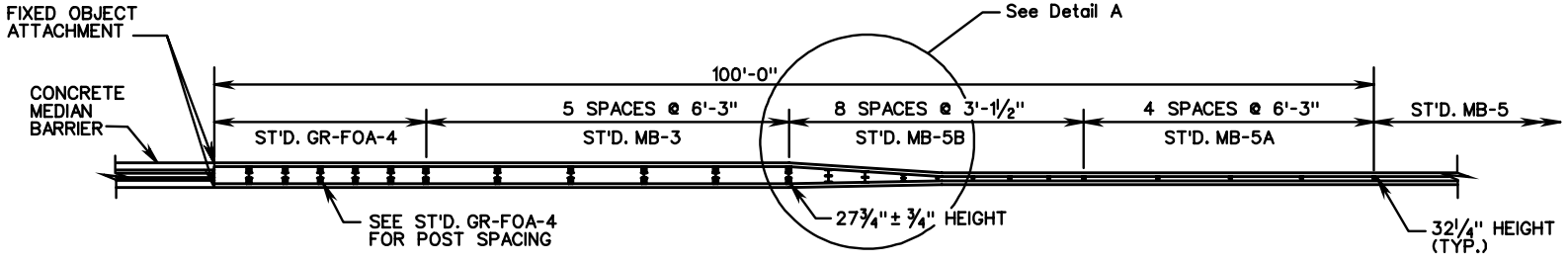

TRANSITION FROM STRONG POST TO WEAK POST GUARDRAIL



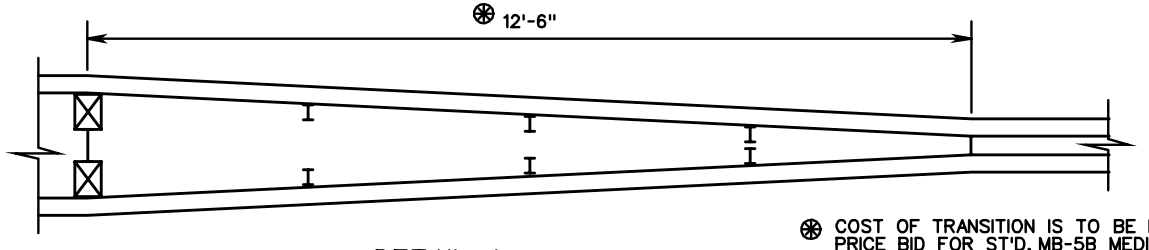

TRANSITION FROM GR-7 & GR-9 TERMINAL TO WEAK POST GUARDRAIL




TRANSITION FROM GR-6, GR-7, OR GR-9 TERMINAL TO WEAK POST GUARDRAIL




TRANSITION FROM WEAK POST MEDIAN BARRIER TO CONCRETE MEDIAN BARRIER

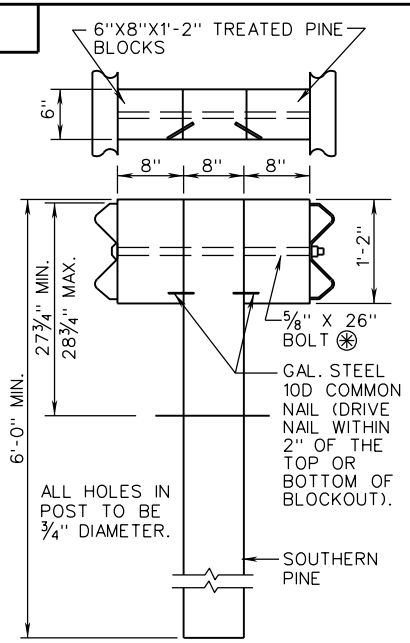



DETAIL A

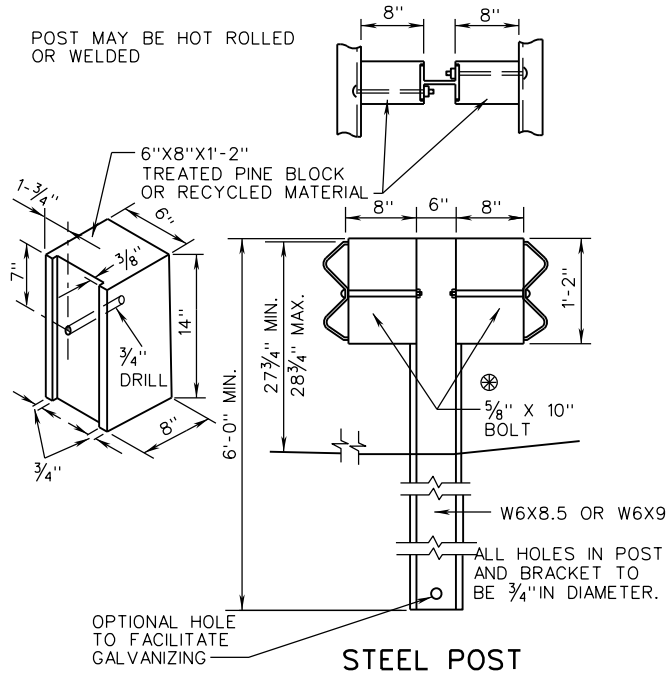
⊛ COST OF TRANSITION IS TO BE INCLUDED IN PRICE BID FOR ST'D. MB-5B MEDIAN BARRIER.

| SPECIFICATION REFERENCE | W-BEAM GUARDRAIL AND MEDIAN BARRIER INSTALLATION CRITERIA | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 221<br>505 | VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE<br>SHEET 8 OF 8<br>501.41 |

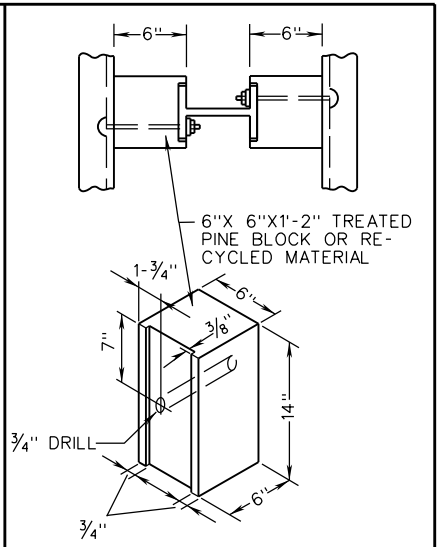
MB-3




6X8 WOOD POST




STEEL POST




BLOCKOUT FOR MAINTENANCE REPAIR ONLY

FOR USE WHEN REPAIRING DAMAGED GUARDRAIL CONTAINING STEEL BLOCKOUTS.

## NOTES:

STANDARD MB-3 POST SPACING IS 6'-3".

FOR DETAILS OF RAIL ELEMENT, RAIL SPLICE JOINT, W BEAM BACK UP PLATE, AND ASSOCIATED HARDWARE SEE SHEET NO. 501.01.

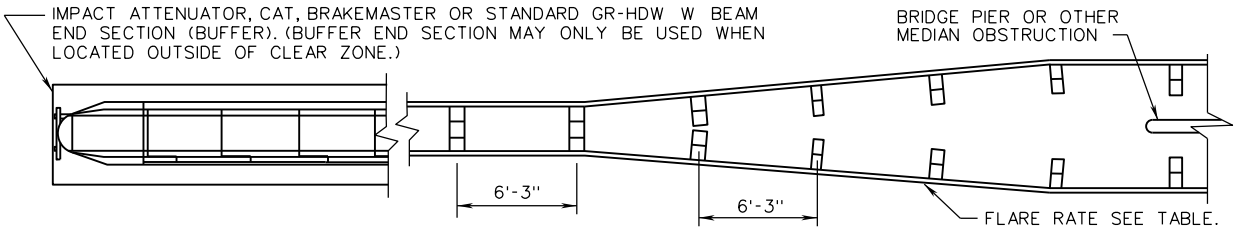
ALTERNATE TYPE POSTS AND BLOCKOUTS MAY BE INTERCHANGED ON ANY ONE PROJECT WITH THE RESTRICTION THAT THE SAME TYPE OF POST AND BLOCKOUT MUST BE USED IN ANY SINGLE RUN OF MEDIAN BARRIER.

ALL BOLTS, NUTS, WASHERS, STEEL POSTS, BENT PLATE POST, AND BLOCKOUTS ARE TO BE GALVANIZED.

⊛ STANDARD WASHERS ARE TO BE USED ON LAST 50' OF RUN OFF END ONLY.

| FLARE RATES | | | |
|---|---|---|---|
| DESIGN SPEED | INSIDE SHY LINE | | BEYOND SHY LINE |
| MPH | SHY LINE LS | FLARE RATE | FLARE RATE |
| 70 | 9' | 30:1 | 15:1 * |
| 60 | 8' | 26:1 | 14:1 * |
| 50 | 6.5' | 21:1 | 11:1 * |
| 40 | 5' | 16:1 | 8:1 * |
| 30 | 4' | 13:1 | 7:1 * |

* SUGGESTED MAXIMUM FLARE RATE FOR SEMI-RIGID BARRIER SYSTEMS.




METHOD OF TREATMENT AT BRIDGE PIER OR MEDIAN OBSTRUCTION

VDOT
ROAD AND BRIDGE STANDARDS

SHEET 1 OF 1

502.01

REVISION DATE
08/14

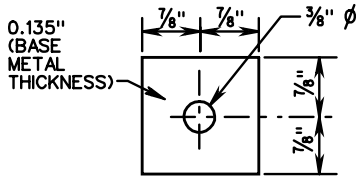
A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.

# BLOCKED-OUT W-BEAM MEDIAN BARRIER

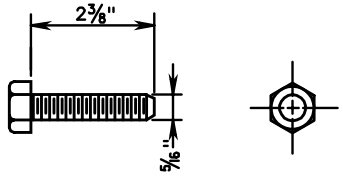
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

221
505

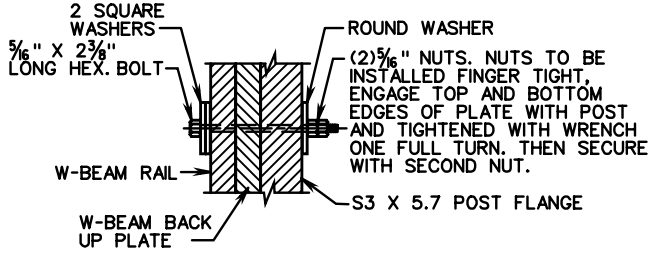



SQUARE WASHER

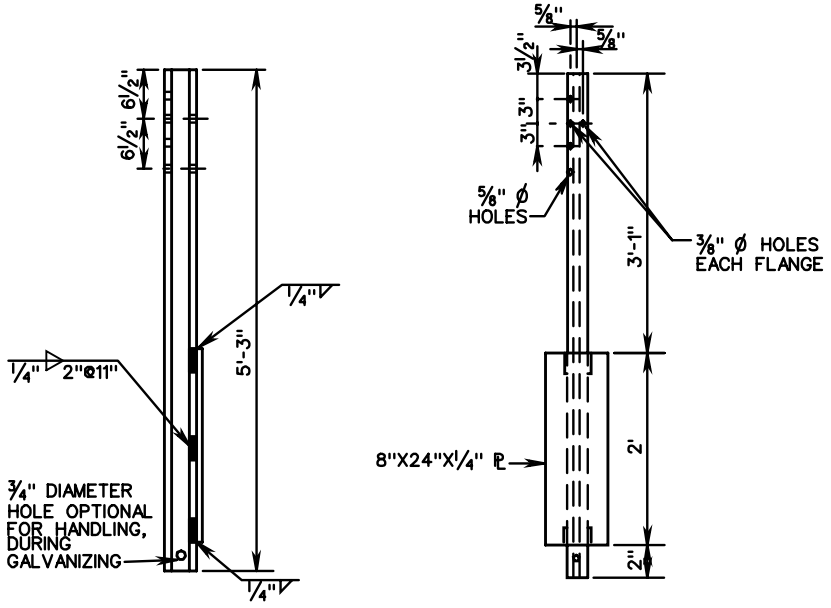



BOLT AND NUT SHALL HAVE 4000 POUNDS MIN. TENSILE STRENGTH.

5/16" HEX BOLT AND NUT



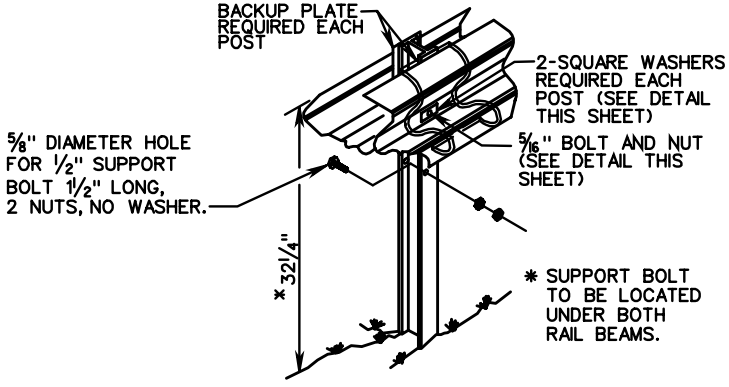

GUARDRAIL POST CONNECTION DETAIL




FOR ROCK INSTALLATION, 8" X 26" X 1/4" PLATE IS TO BE ELIMINATED. DRILL OR EXCAVATE HOLE FOR POST, PLACE AND BACKFILL WITH CRUSHER RUN AGGREGATE TO LEVEL OF ROCK.

S3X5.7 STEEL POST

⊛ 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.




TYPICAL INSTALLATION

* HEIGHT TOLERANCE ± 3/4"

NOTES:

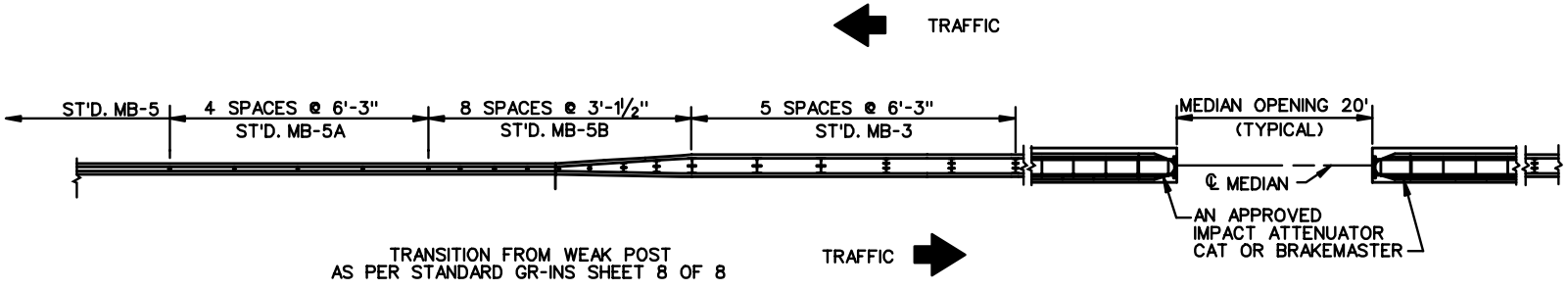
STANDARD MB-5 POST SPACING IS 12'-6"
STANDARD MB-5A POST SPACING IS 6'-3"
STANDARD MB-5B POST SPACING IS 3'-1 1/2"
STANDARD MB-5 DEFLECTION IS 7'-0"

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

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

FOR DETAILS OF GUARDRAIL SPLICE JOINT, SEE STD. GR-8 DEPICTING AN NCHRP 350 TL-3 INSTALLATION.

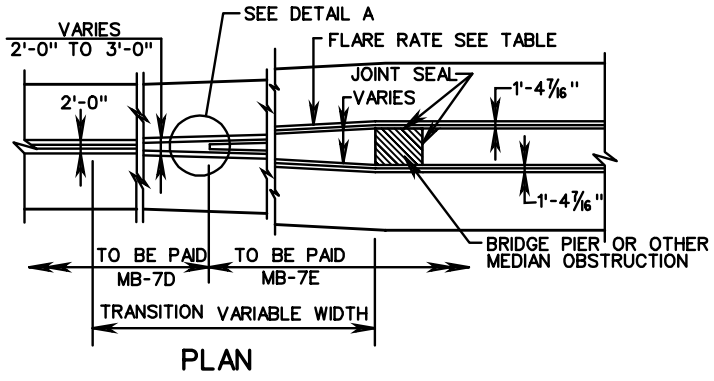
| SPECIFICATION REFERENCE | STANDARD W-BEAM MEDIAN BARRIER (WEAK POST SYSTEM) TL-3 (>45 MPH) | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 221<br>505 | VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE: SHEET 1 OF 2<br>502.02 |




TREATMENT FOR MEDIAN BARRIER CROSS-OVER

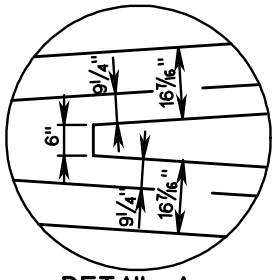
| | | | |
|---|---|---|---|
| VDOT<br>ROAD AND BRIDGE STANDARDS | | STANDARD W-BEAM MEDIAN BARRIER<br>(WEAK POST SYSTEM)<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | SPECIFICATION REFERENCE |
| SHEET 2 OF 2 | REVISION DATE | | 221<br>505 |
| 502.03 | | | |

MB-7D,7E,7F




PLAN

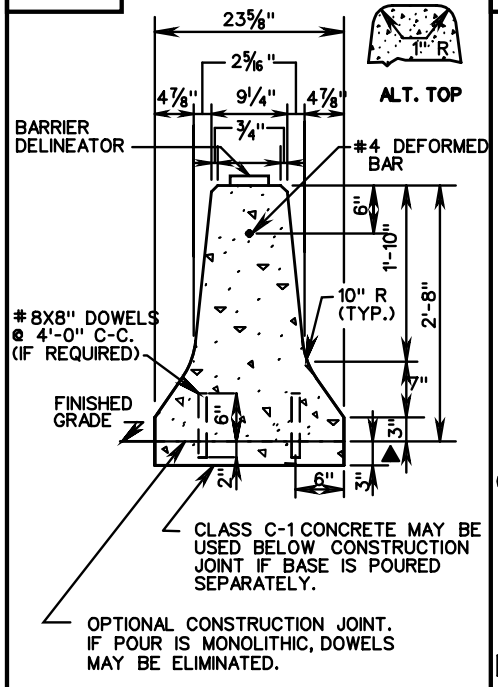
* SUGGESTED MAXIMUM FLARE RATE FOR RIGID BARRIER SYSTEMS.



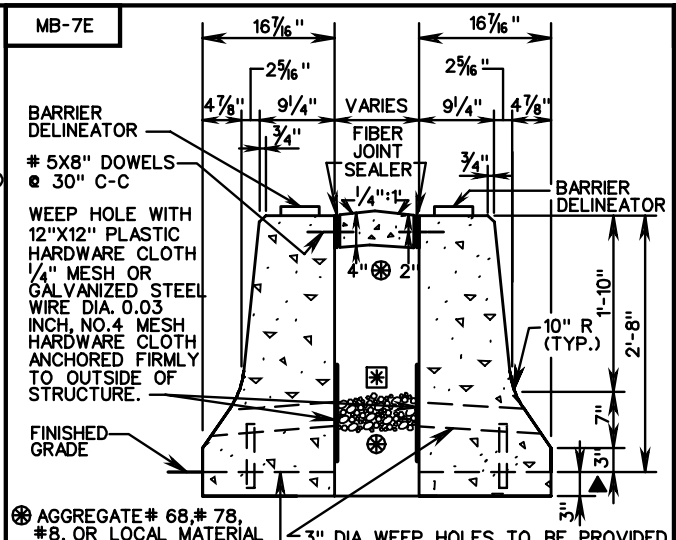

DETAIL A

| FLARE RATES | | | |
|---|---|---|---|
| DESIGN SPEED | INSIDE SHY LINE | | BEYOND SHY LINE |
| MPH | SHY LINE LS | FLARE RATE | FLARE RATE |
| 70 | 10' | 30:1 | 20:1 * |
| 60 | 8' | 26:1 | 18:1 * |
| 50 | 6.5' | 21:1 | 14:1 * |
| 40 | 5' | 16:1 | 10:1 * |
| 30 | 3.5' | 13:1 | 8:1 * |

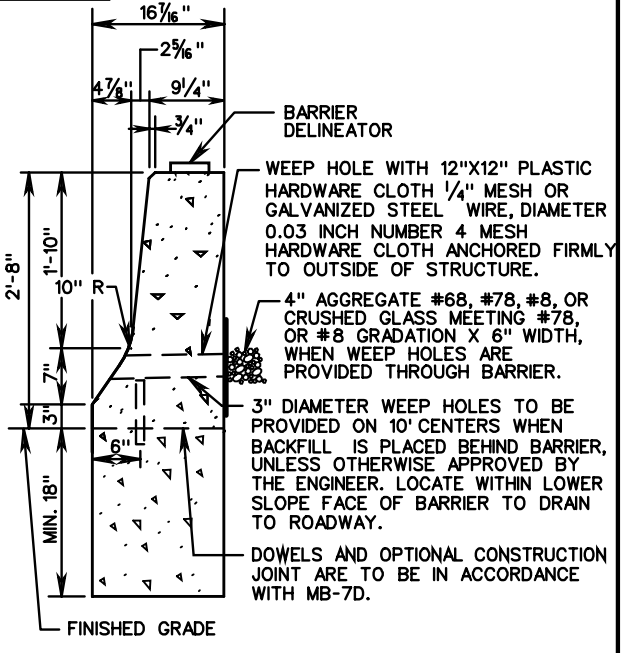
## MB-7D




## MB-7E




## MB-7F




NOTES:

IF THE CONTRACTOR ELECTS TO USE THE OPTIONAL CONSTRUCTION JOINT, TRANSVERSE JOINTS FOR CRACK CONTROL AND EXPANSION JOINTS ARE TO BE PROVIDED IN BOTH FOOTING AND BARRIER AT THE SAME LOCATION.

TRANSVERSE JOINTS ARE TO COINCIDE WITH JOINTS IN ADJACENT PAVEMENT WITH A MAXIMUM SPACING OF 20 FEET C-C.

CONCRETE MEDIAN BARRIER MAY BE PRECAST, CAST IN PLACE OR SLIP-FORMED. FOR PRECAST DESIGN SEE STANDARD MB-7D PC.

HORIZONTAL REINFORCING STEEL BARS ARE TO BE SEPARATED AT ALL EXPANSION AND CONTRACTION JOINTS. A 2" CONCRETE COVER IS REQUIRED OVER THE ENDS OF THE REINFORCING STEEL.

BARRIER DELINEATOR SIZE, COLOR, AND SPACING TO BE IN ACCORDANCE WITH THE SPECIFICATIONS.

COST OF DELINEATOR TO BE INCLUDED IN THE PRICE BID FOR MEDIAN BARRIER.

REFLECTIVE SURFACE OF BARRIER DELINEATOR IN ALL INSTANCES, TO BE FACING ONCOMING TRAFFIC.

ALTERNATE TOP DESIGN SHOWN ON MB-7D. MAY ALSO BE APPLIED TO MB-7E AND MB-7F.

CONCRETE TO BE CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST.

▲ DEPTH OF CONCRETE BASE MAY BE EXTENDED AT THE CONTRACTOR'S OPTION TO COINCIDE WITH BOTTOM OF PAVEMENT COURSE IN WHICH BASE TERMINATES; HOWEVER, THE COST OF ADDITIONAL CONCRETE SHALL BE INCLUDED IN UNIT PRICE BID PER LINEAR FOOT OF BARRIER.

| SPECIFICATION REFERENCE |
|---|
| 105<br>502 |

# CONCRETE MEDIAN BARRIER

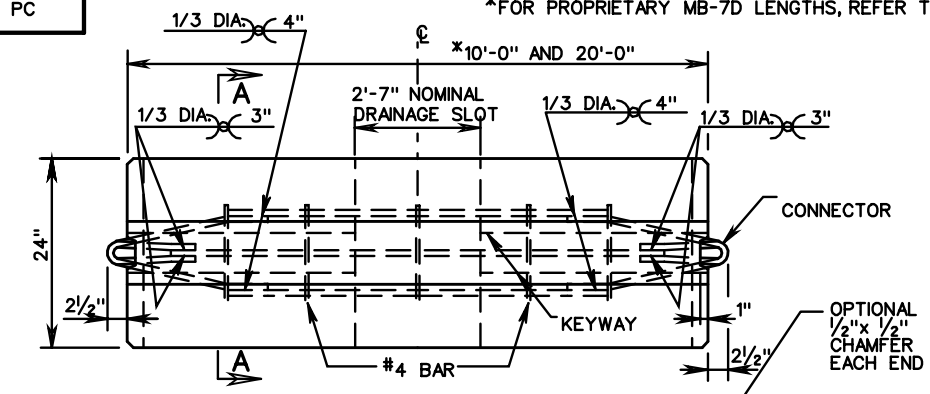
VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT
ROAD AND BRIDGE STANDARDS

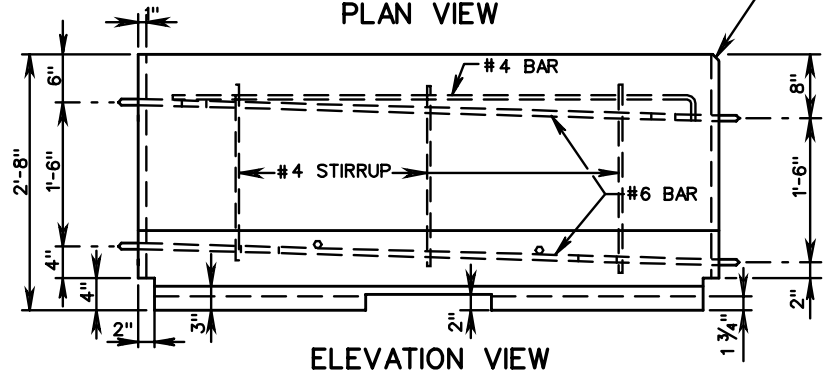
| REVISION DATE | SHEET 1 OF 1 |
|---|---|
| | 502.04 |

MB-7D PC

*FOR PROPRIETARY MB-7D LENGTHS, REFER TO MANUFACTURER



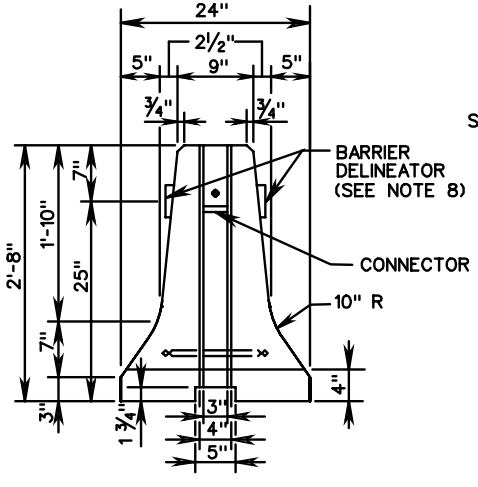

PLAN VIEW



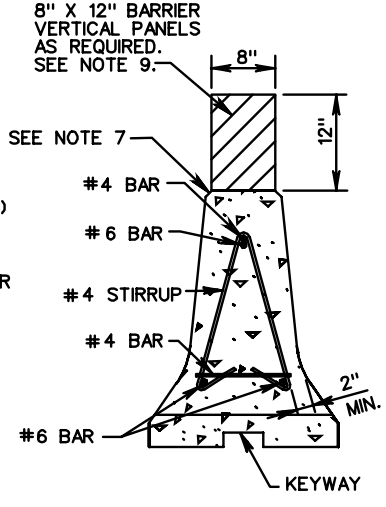

ELEVATION VIEW

NOTES:

1. FOR POSITIVE CONNECTION DETAILS AND DIMENSIONS SEE SHEETS 502.20 - 502.24.
2. AT THE OPTION OF THE MANUFACTURER, ADDITIONAL REINFORCING MAY BE ADDED TO THE PRECAST CONCRETE BARRIER FOR HANDLING.
3. CONCRETE SHALL BE 4000 P.S.I. MINIMUM.
4. BARRIER DELINEATOR SIZE, COLOR AND SPACING SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.
5. COST OF DELINEATOR SHALL BE INCLUDED IN THE PRICE BID FOR TRAFFIC BARRIER SERVICE.
6. OTHER PRECAST TRAFFIC BARRIER SERVICE CONCRETE DESIGNS THAT MEET NCHRP 350 TEST REQUIREMENTS AND HAVE BEEN ACCEPTED BY VDOT AS AN ACCEPTABLE ALTERNATE TO THE STANDARD DESIGN MAY BE SUBSTITUTED.
7. A 1" RADIUS MAY BE USED AS AN ALTERNATE FOR THE ¾" CHAMFER.
8. BARRIER DELINEATOR REFLECTIVE SURFACE IN ALL INSTANCES SHALL BE FACING ONCOMING TRAFFIC.
9. BARRIER VERTICAL PANELS SHALL BE SPACED IN ACCORDANCE WITH VIRGINIA WORK AREA PROTECTION MANUAL.




END VIEW




SECTION A-A

WHEN USING VDOT STANDARD MB-7D PC WITH THE PIN AND LOOP POSITIVE CONNECTION, ALLOW FOR A 6'-0" DYNAMIC DEFLECTION. PROVIDE MIN. 60' OF BARRIER UPSTREAM AND DOWNSTREAM OF WORK ZONE FOR ANCHORAGE.
FOR APPROVED NON-VDOT DESIGNS, REFER TO MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR DEFLECTIONS AND ANCHORAGE.

| * FLARE RATES | | | |
|---|---|---|---|
| DESIGN SPEED | INSIDE SHY LINE | | BEYOND SHY LINE |
| MPH | SHY LINE LS | FLARE RATE | FLARE RATE |
| 70 | 10' | 30:1 | 20:1 |
| 60 | 8' | 26:1 | 18:1 |
| 50 | 6.5' | 21:1 | 14:1 |
| 40 | 5' | 16:1 | 10:1 |
| 30 | 3.5 | 13:1 | 8:1 |

* SUGGESTED MAXIMUM FLARED RATE FOR RIGID BARRIER SYSTEMS.

VDOT
ROAD AND BRIDGE STANDARDS

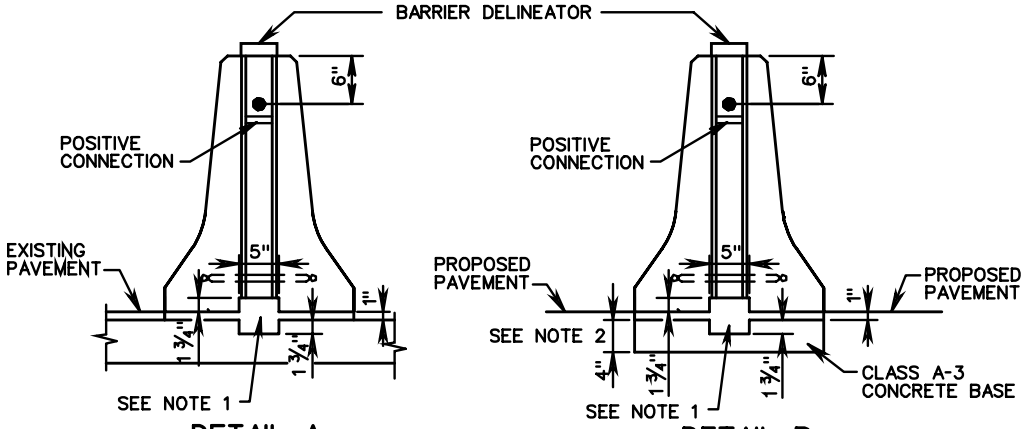
# PRECAST TRAFFIC BARRIER SERVICE CONCRETE

VIRGINIA DEPARTMENT OF TRANSPORTATION

SHEET 1 OF 2
502.05

REVISION DATE

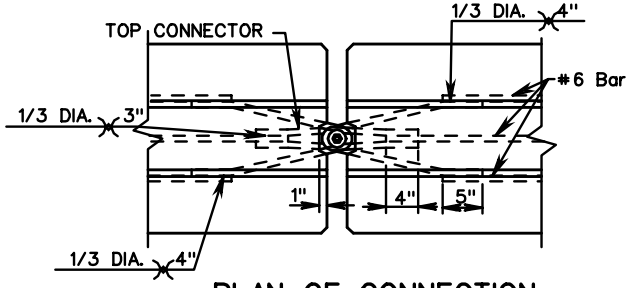
SPECIFICATION REFERENCE
105
512



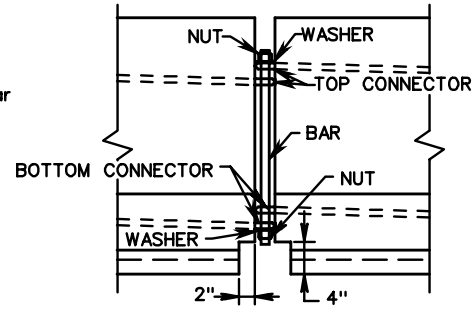

PERMANENT INSTALLATION

## NOTES:

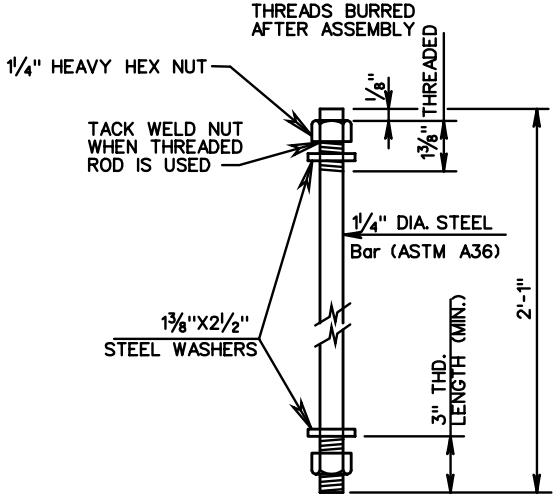
1. HIGH STRENGTH GROUT OR MORTAR SHALL BE IN ACCORDANCE WITH SECTION 218 OF THE SPECIFICATIONS.
2. 4" MIN. OR VARIABLE TO COINCIDE WITH SUBGRADE COURSE.
3. WHEN USED AS MEDIAN BARRIER IN A PERMANENT LOCATION, DRAINAGE SLOTS WILL BE COMPLETELY FILLED AND SEALED WITH MORTAR OR GROUT UNLESS UNIT WILL BE LOCATED OVER MEDIAN DRAINAGE STRUCTURE.
4. BARRIER DELINEATOR SIZE, COLOR, AND SPACING SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS.
5. COST OF DELINEATOR TO BE INCLUDED IN THE PRICE BID FOR MEDIAN BARRIER.
6. REFLECTIVE SURFACE OF BARRIER DELINEATOR IN ALL INSTANCES SHALL BE FACING ONCOMING TRAFFIC.
7. PIN AND CONNECTORS SHALL BE ASTM-A36. REINFORCING STEEL BARS SHALL BE ASTM A 615 GRADE 60. ONE CONNECTOR PIN ASSEMBLY WITH EACH BARRIER SECTION.




PLAN OF CONNECTION

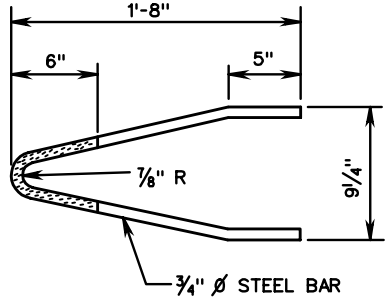



ELEVATION OF CONNECTION




CONNECTOR PIN ASSEMBLY

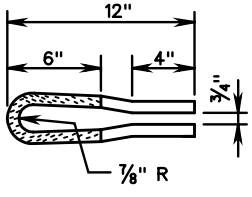
GALVANIZE AFTER FABRICATION



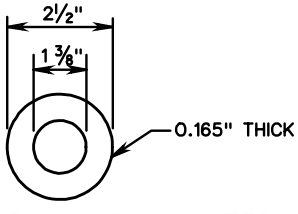

BOTTOM CONNECTOR

GALVANIZE AFTER FORMING

NOTE: ENTIRE CONNECTOR MAY BE GALVANIZED.



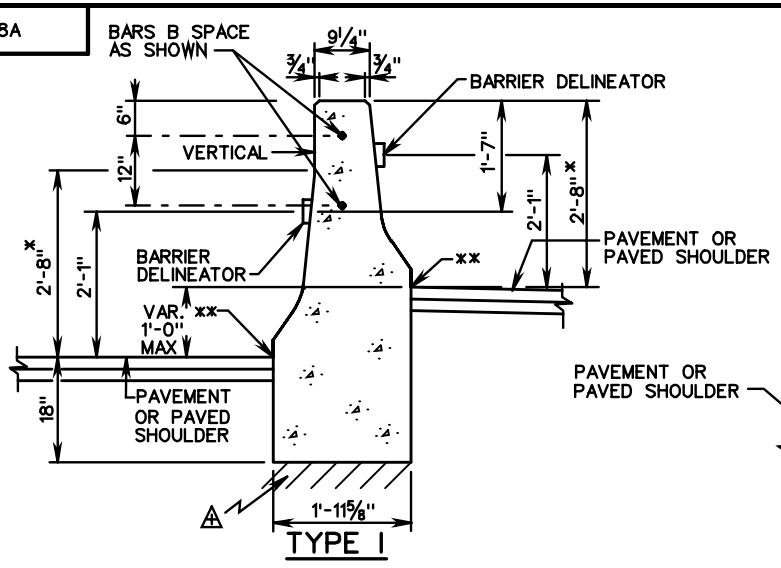

TOP CONNECTOR




PLAIN GALVANIZED STEEL WASHER FOR 1 1/4" PIN

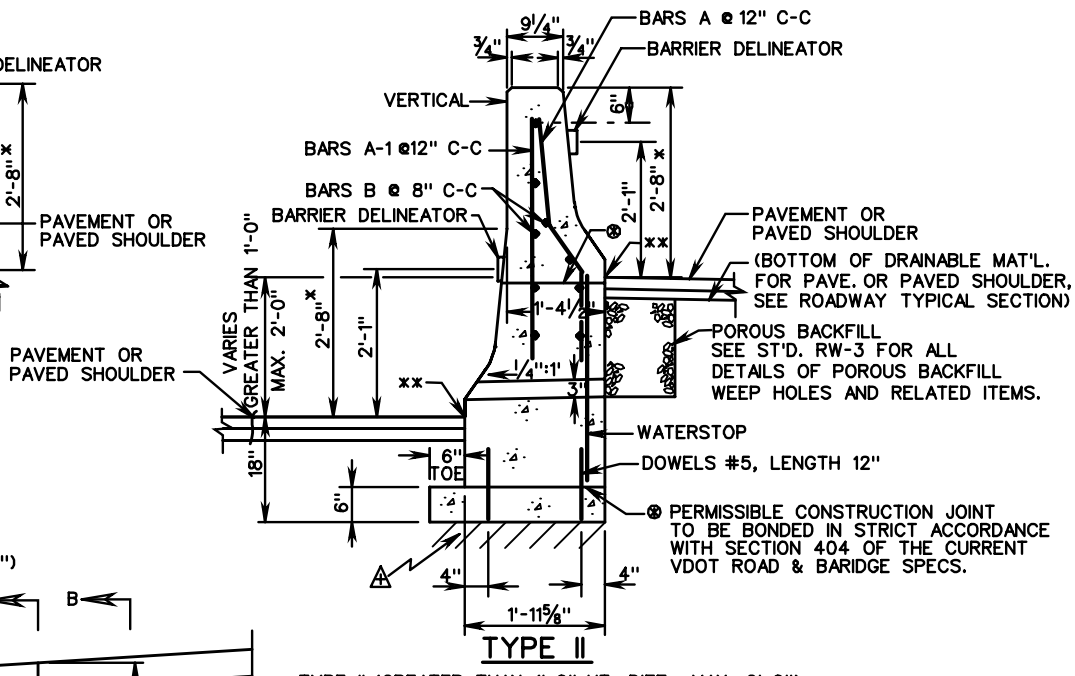
| SPECIFICATION REFERENCE | PRECAST TRAFFIC BARRIER SERVICE CONCRETE | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 105<br>512 | VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE<br>SHEET 2 OF 2<br>502.06 |

MB-8A



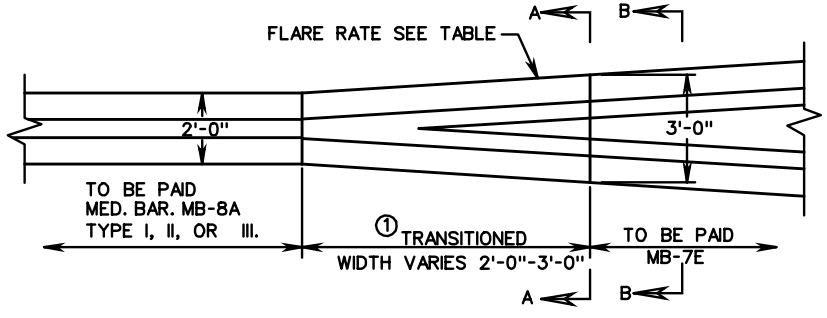

TYPE I

TYPE I (GREATER THAN 0 HT. DIFF., MAX. 1'-0")




TYPE II

TYPE II (GREATER THAN 1'-0" HT. DIFF., MAX. 2'-0")



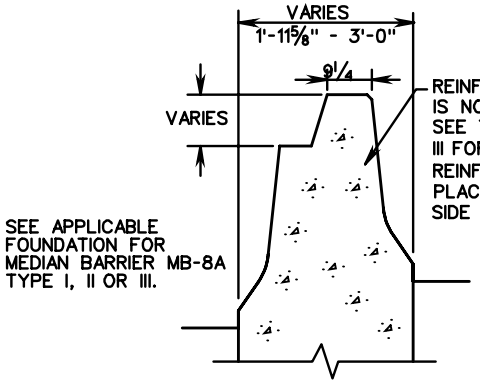

* MB-7D BARRIER FACE

** DENOTES FINISHED GRADE ELEVATION

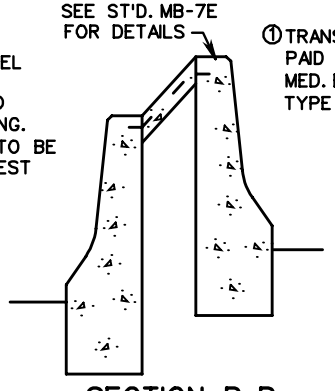
⚠ FOUNDATION MATERIAL UNDER MEDIAN BARRIER IS TO BE COMPACTED.

| FLARE RATES | | | |
|---|---|---|---|
| DESIGN SPEED | INSIDE SHY LINE | | BEYOND SHY LINE |
| MPH | SHY LINE LS | FLARE RATE | FLARE RATE |
| 70 | 10' | 30 : 1 | 20 : 1 ② |
| 60 | 8' | 26 : 1 | 18 : 1 ② |
| 50 | 6.5' | 21 : 1 | 14 : 1 ② |
| 40 | 5' | 16 : 1 | 10 : 1 ② |
| 30 | 3.5' | 13 : 1 | 8 : 1 ② |

② MAXIMUM FLARE RATE FOR RIGID BARRIER SYSTEMS.




SECTION A-A
(FOUNDATION NOT SHOWN)




SECTION B-B
(STD. MB-7E)

VDOT
ROAD AND BRIDGE STANDARDS

# CONCRETE MEDIAN BARRIER

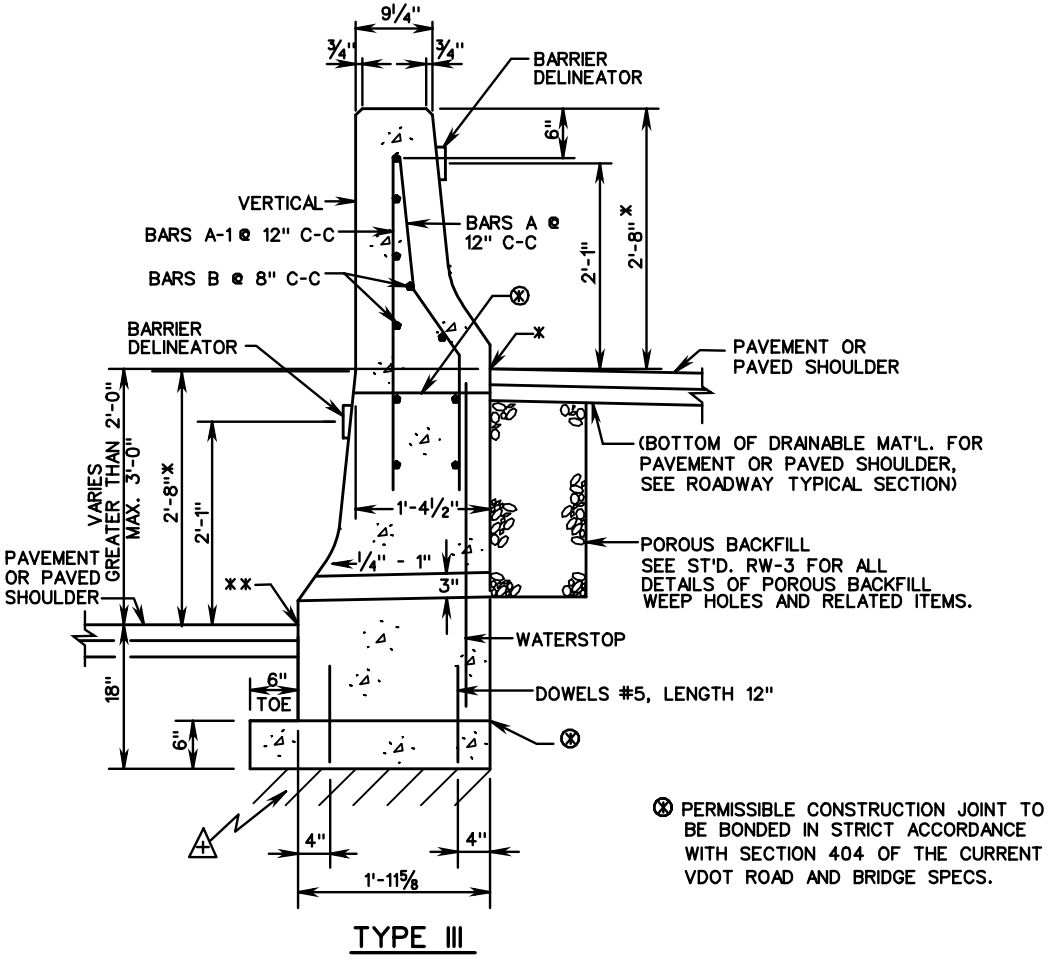
## TYPE I, II OR III

VIRGINIA DEPARTMENT OF TRANSPORTATION

| SHEET 1 OF 2 | REVISION DATE |
|---|---|
| 502.07 | |

SPECIFICATION REFERENCE

105
404
502




TYPE III

TYPE III (GREATER THAN 2'-0" HT. DIFF., MAX. 3'-0")

NOTE:

REINFORCING STEEL BARS SHOWN ARE BASED ON A 20' PANEL LENGTH.

ALL REINFORCING BARS ARE TO BE SIZE #4 GRADE 60 STEEL WITH A MINIMUM 1½" CONCRETE COVER.

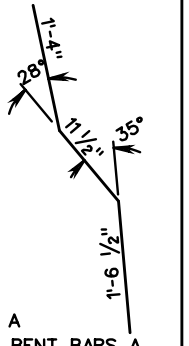
THE TYPICAL JOINT SPACING FOR CONSTRUCTION JOINTS IS 20' AND 80' FOR EXPANSION JOINTS FOR TYPE II AND III BARRIERS.

FOR DETAILS OF HOW JOINTS ARE TO BE FORMED & WATER STOP DETAILS SEE ST'D. RW-3.

TRANSVERSE JOINTS FOR TYPE I BARRIERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE ROAD AND BRIDGE SPECIFICATIONS EXCEPT NO SCORING OR SAWING WILL BE ALLOWED.

HORIZONTAL REINFORCING STEEL BARS B ARE TO BE SEPARATED AT ALL EXPANSION & CONTRACTION JOINTS. A 2" CONCRETE COVER IS REQUIRED OVER THE ENDS OF REINFORCING STEEL.

## BENDING DIAGRAM




BARS A
DO NOT USE BENT BARS A WITHIN LIMITS OF DROP INLETS.

* MB-7D BARRIER FACE

** DENOTES FINISHED GRADE ELEVATION

△ FOUNDATION MATERIAL UNDER MEDIAN BARRIER IS TO BE COMPACTED.

⊗ PERMISSIBLE CONSTRUCTION JOINT TO BE BONDED IN STRICT ACCORDANCE WITH SECTION 404 OF THE CURRENT VDOT ROAD AND BRIDGE SPECS.

## MEASUREMENT AND PAYMENT

MEDIAN BARRIER MB-8A TYPE I, II OR III WILL BE PAID FOR AT THE CONTRACT UNIT PRICE PER LIN. FOOT, WHICH SHALL BE FULL COMPENSATION FOR FURNISHING AND INSTALLING CLASS A3 CONCRETE, REINFORCING STEEL, POROUS BACKFILL AND ALL TOOLS, LABOR, EQUIPMENT AND INCIDENTALS NECESSARY TO COMPLETE THE WORK.
ANY ADDITIONAL EXCAVATION, BACKFILL WITH SUITABLE MATERIAL AND COMPACTION WORK NECESSARY FOR THE CONCRETE MEDIAN BARRIER INSTALLATION IS TO BE CONSIDERED INCIDENTAL IN THE PRICE BID FOR THE CONCRETE MEDIAN BARRIER.

## REINFORCING STEEL SCHEDULE

| | BARS "A" | | BARS A-1 | | BARS "B" | | DOWELS | |
|---|---|---|---|---|---|---|---|---|
| PANEL | NO. | LENGTH | NO. | LENGTH | NO. | LENGTH | NO. | LENGTH |
| TYPE I | | | | | 2 | 19'-8" | | |
| TYPE II | 20 | 4'-0" | 20 | 4'-0" | 9 | 19'-8" | 40 | 1'-0" |
| TYPE III | 20 | 4'-0" | 20 | 4'-0" | 9 | 19'-8" | 40 | 1'-0" |

| SPECIFICATION REFERENCE |
|---|
| 105<br>404<br>502 |

# CONCRETE MEDIAN BARRIER

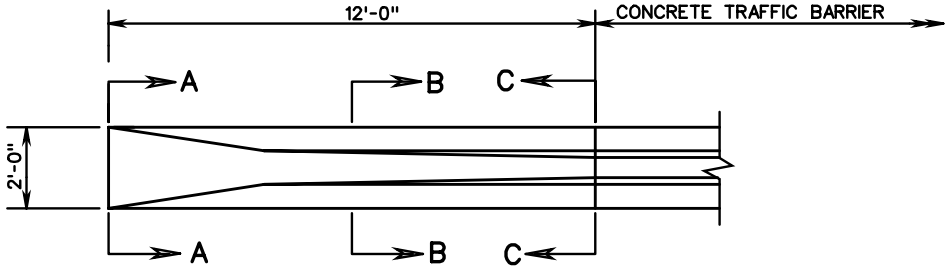
## TYPE I, II OR III

VIRGINIA DEPARTMENT OF TRANSPORTATION

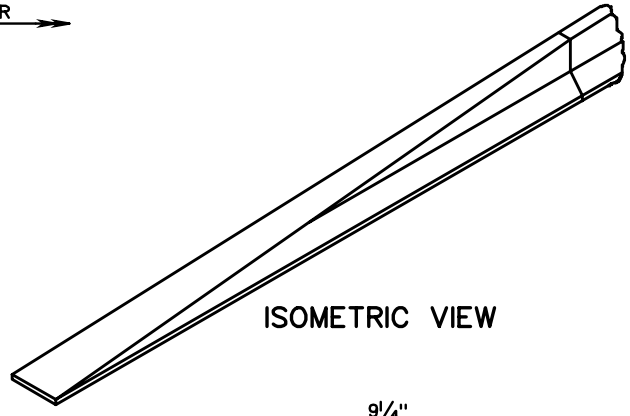
VDOT
ROAD AND BRIDGE STANDARDS

| REVISION DATE | SHEET 2 OF 2 |
|---|---|
| | 502.08 |

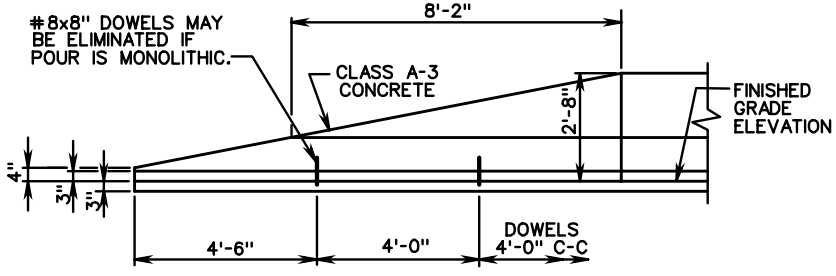
MB-9A



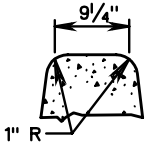

PLAN VIEW



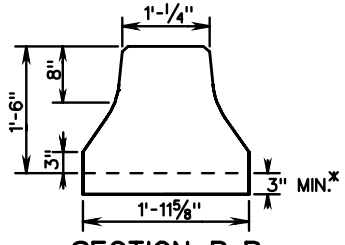
ISOMETRIC VIEW



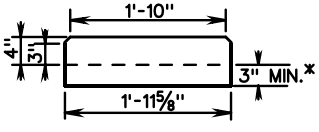

ELEVATION VIEW



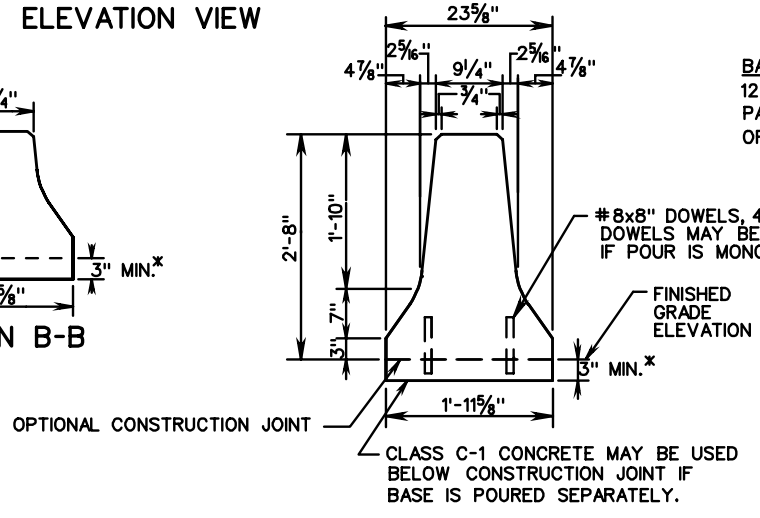

ALTERNATE TOP




SECTION B-B




SECTION A-A




SECTION C-C

BASIS OF PAYMENT: CONCRETE MEDIAN BARRIER 12' TERMINAL SECTION IS TO BE MEASURED AND PAID FOR IN LIN. FT. ST'D. MB-7D, OR LIN. FT. OF TRAFFIC BARRIER SERVICE CONCRETE.

## NOTES:

CONCRETE TO BE CLASS A3.

FOR USE WHERE THE OPERATING SPEED IS 40 M.P.H. OR LESS.

LOCATION OF THE BARRIER END SECTIONS TO BE AS NOTED ON PLANS OR AS APPROVED BY THE ENGINEER.

FOR POSITIVE CONNECTION DETAILS AND DIMENSIONS SEE STANDARD MB-INS.

ONLY FOR USE OUTSIDE OF CLEAR ZONE.

* DEPTH OF CONCRETE BASE MAY BE EXTENDED AT THE CONTRACTOR'S OPTION TO COINCIDE WITH BOTTOM OF PAVEMENT COURSE IN WHICH BASE TERMINATES; HOWEVER, THE COST OF ADDITIONAL CONCRETE SHALL BE INCLUDED IN UNIT PRICE BID PER LIN. FT. OF BARRIER.

VDOT
ROAD AND BRIDGE STANDARDS

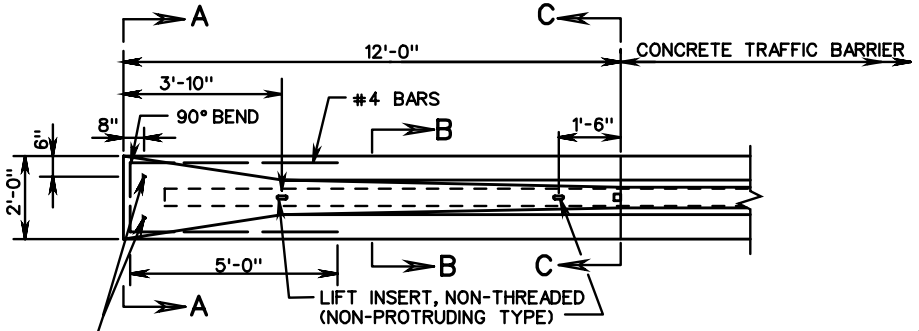
# CAST IN PLACE CONCRETE MEDIAN BARRIER

## 12 FT. TERMINAL SECTION

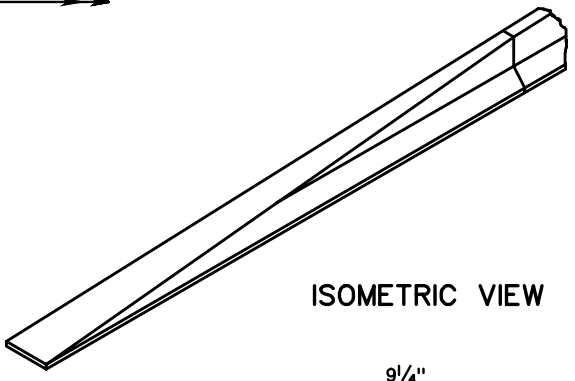
VIRGINIA DEPARTMENT OF TRANSPORTATION

| SHEET 1 OF 1 | REVISION DATE |
|---|---|
| 502.09 | |

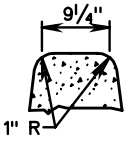
SPECIFICATION REFERENCE




PLAN VIEW



ISOMETRIC VIEW

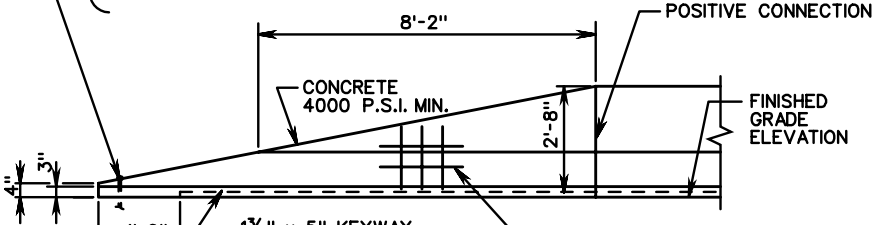



ALTERNATE TOP

1" I.D. METAL SLEEVE
( REINFORCING STEEL
SHALL SURROUND
1" I.D. METAL SLEEVE)

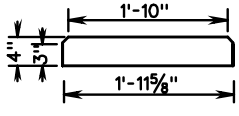
USE ¾" x 9" EXPANSION BOLTS FOR RIGID PAVEMENT INSTALLATION ONLY ( BOLTS TO BE REMOVABLE )

USE ¾" x 3'-0" DRIFT PINS FOR FLEXIBLE PAVEMENT INSTALLATIONS.

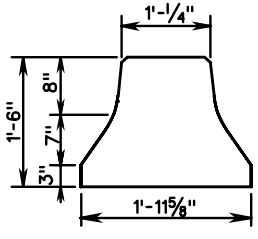



ELEVATION VIEW

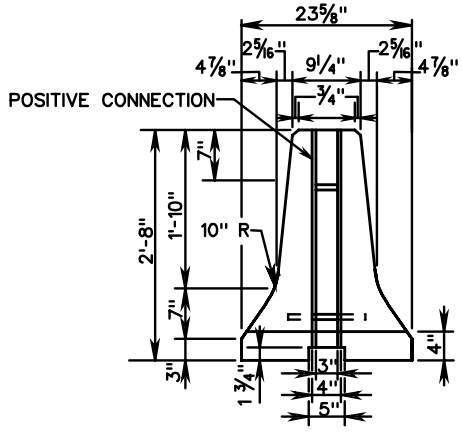
BASIS OF PAYMENT: CONCRETE MEDIAN BARRIER 12' TERMINAL SECTION IS TO BE MEASURED AND PAID FOR IN LIN. FT. ST'D. MB-7D, OR LIN. FT. OF TRAFFIC BARRIER SERVICE CONCRETE.




SECTION A-A




SECTION B-B




SECTION C-C

## NOTES:

CONCRETE TO BE 4000 P.S.I..

REINFORCING STEEL TO BE GRADE 60. ALL REINFORCING IS TO HAVE A MINIMUM CONCRETE COVER OF 1½".

FOR USE WHERE THE OPERATING SPEED IS 40 M.P.H. OR LESS.

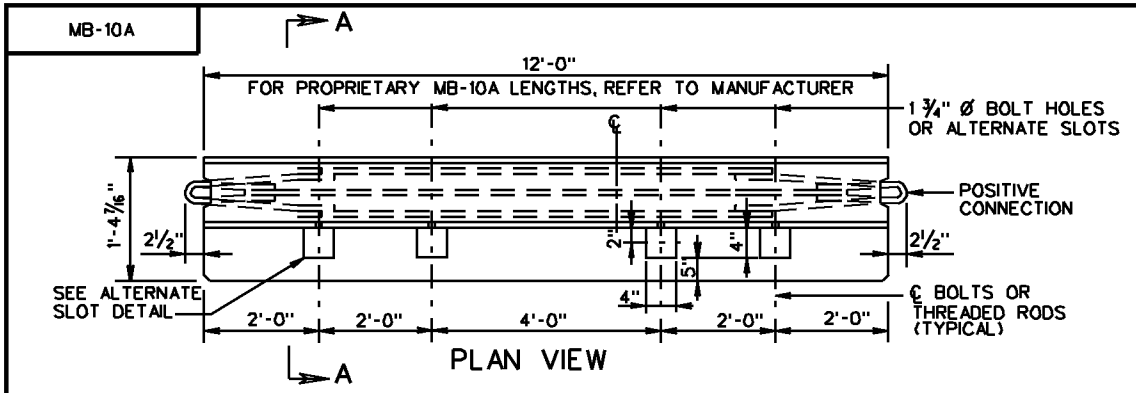
LOCATION OF THE BARRIER END SECTIONS TO BE AS NOTED ON PLANS OR AS APPROVED BY THE ENGINEER.

FOR POSITIVE CONNECTION DETAILS AND DIMENSIONS SEE STANDARD MB-INS.

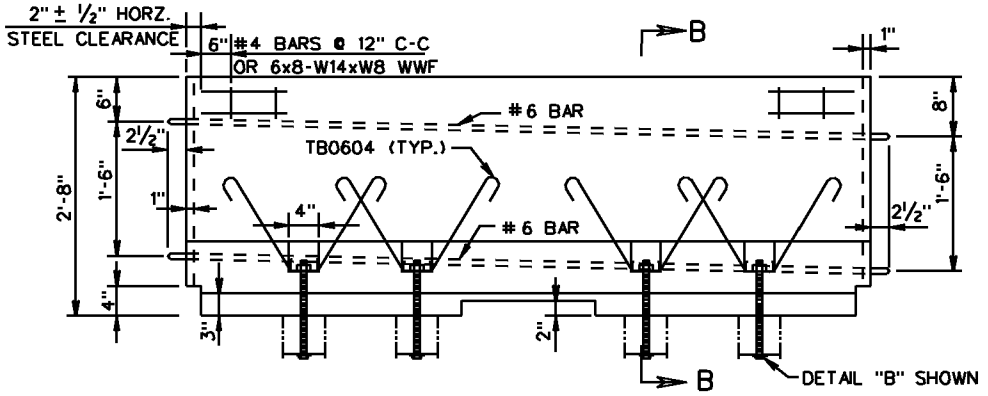
ONLY FOR USE OUTSIDE OF CLEAR ZONE.

| SPECIFICATION REFERENCE | PRECAST CONCRETE MEDIAN BARRIER | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 105 | 12 FT. TERMINAL SECTION<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE<br>SHEET 1 OF 1<br>502.10 |

MB-10A



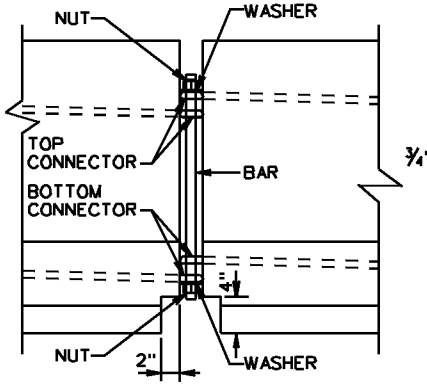

PLAN VIEW



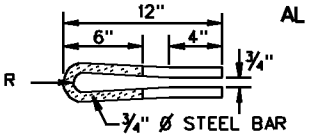

ELEVATION VIEW



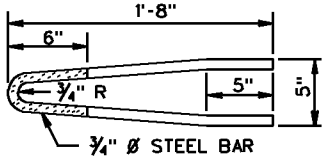

ALTERNATE SLOT DETAIL




ELEVATION OF CONNECTION




TOP CONNECTOR




BOTTOM CONNECTOR

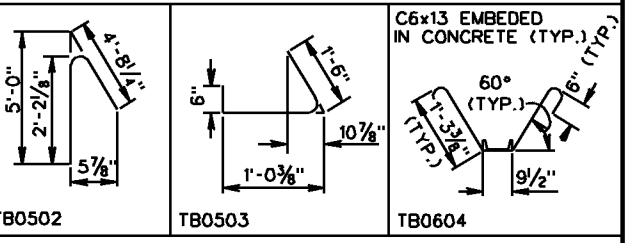
GALVANIZE AFTER FORMING
NOTE: ENTIRE CONNECTOR MAY BE GALVANIZED.

## REINFORCING STEEL SCHEDULE

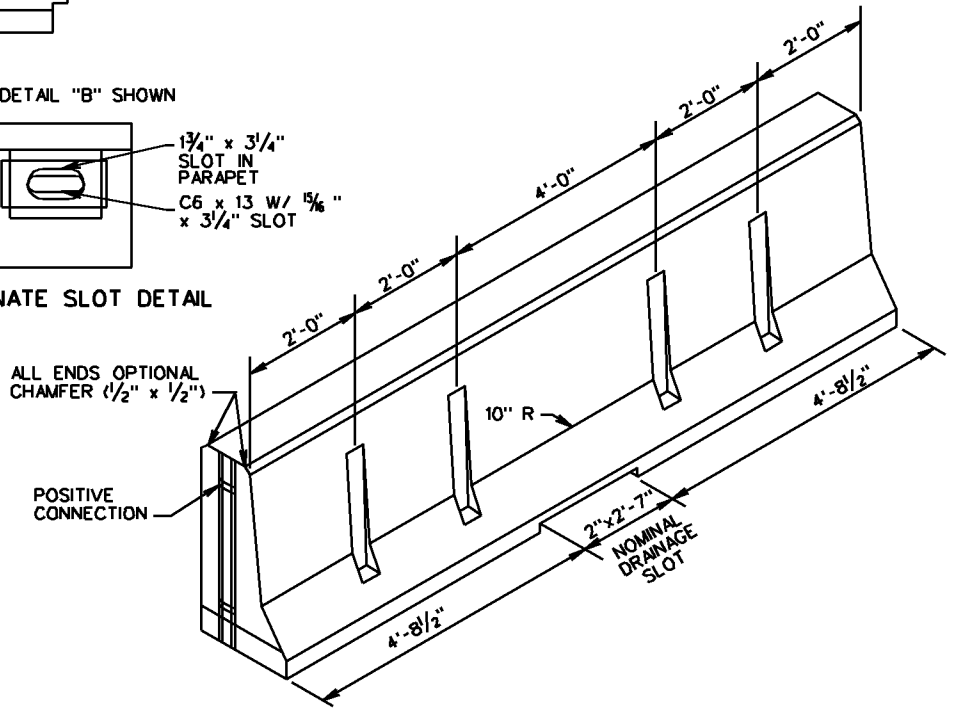
FOR ONE (1) SECTION

| MARK | No. | SIZE | LENGTH | PIN Ø | LOCATION |
|---|---|---|---|---|---|
| TB0401 | 8 | 4 | 11'-5" | —— | TEMP. PARAPET |
| TB0502 | 12 | 5 | 4'-3" | 2 ½" | " |
| TB0503 | 12 | 5 | 2'-8" | 2 ½" | " |
| TB0604 | 8 | 6 | 4'-8" | 4 ½" | " |

## BENDING DIAGRAM




DIMENSIONS IN BENDING DIAGRAMS ARE OUT-TO-OUT OF BARS, EXCEPT AS SHOWN.
POUNDS OF REINFORCING STEEL = 202
REINFORCING SHEDULE BASED ON 12'-0" UNIT LENGTH.




VDOT
ROAD AND BRIDGE STANDARDS

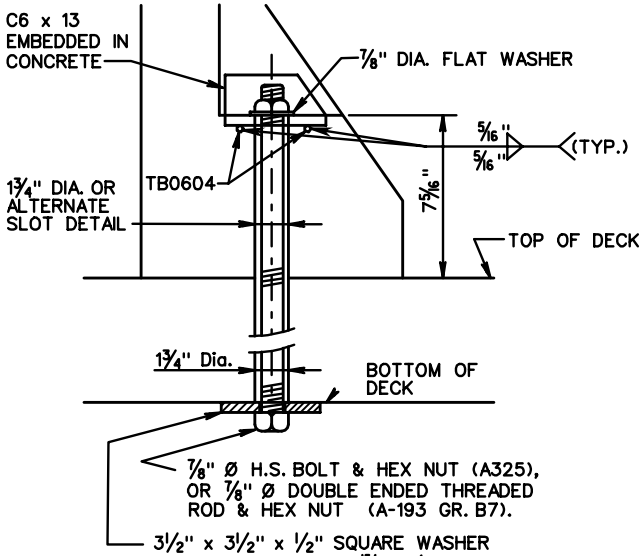
SHEET 1 OF 2 | REVISION DATE 01/09
502.11

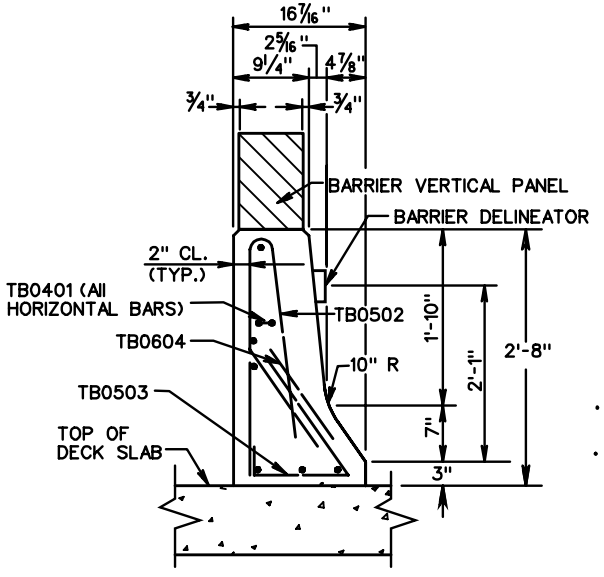
# TRAFFIC BARRIER SERVICE CONCRETE PARAPET (SINGLE FACE)

(FOR TEMPORARY INSTALLATION ON BRIDGE DECK EXTERIOR)

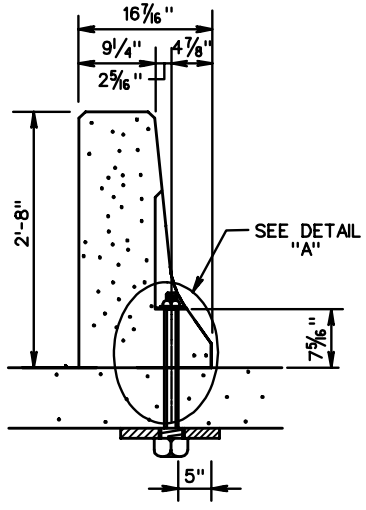
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE
105
502




SECTION A-A




SECTION B-B
(ANCHOR BOLT)
BOLT DOWN SIDE ADJACENT TO TRAFFIC

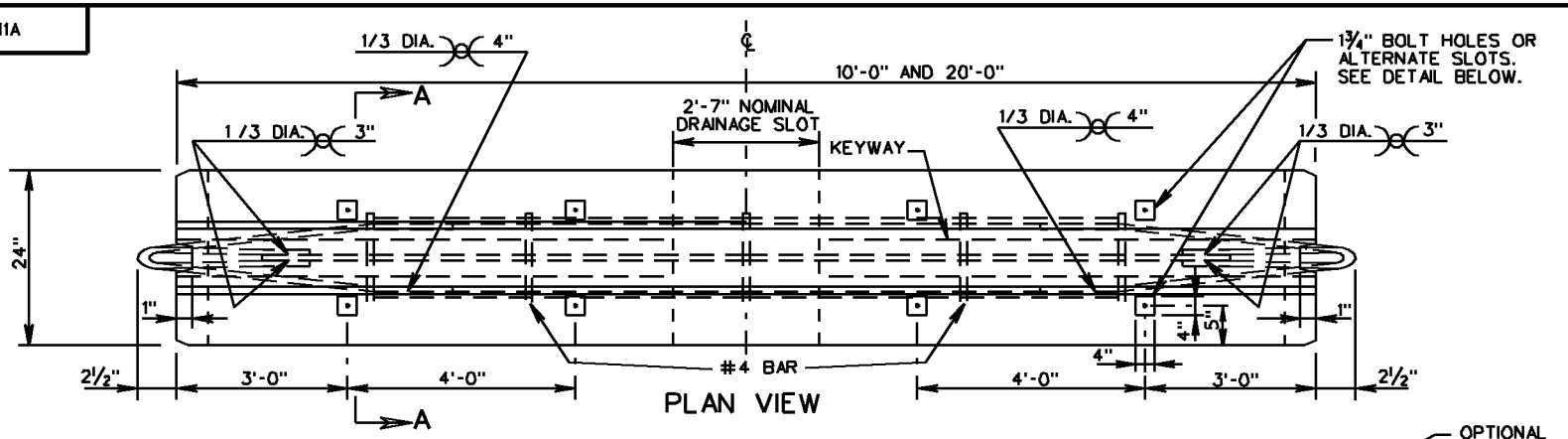
DETAIL "A"

## NOTES:

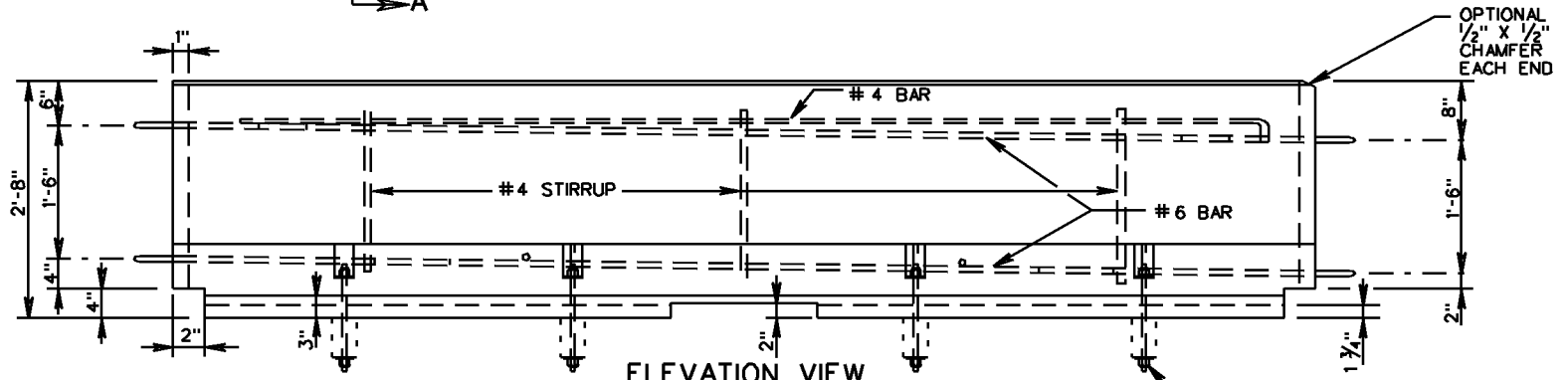
1. BARRIER DELINEATOR TO BE SPACED IN ACCORDANCE WITH SECTION 702, OF THE ROAD AND BRIDGE SPECIFICATIONS AND THE BARRIER VERTICAL PANELS TO BE SPACED IN ACCORDANCE WITH VIRGINIA WORK AREA PROTECTION MANUAL. REFLECTIVE SURFACE, IN ALL INSTANCES, TO BE FACING ONCOMING TRAFFIC.
2. CONCRETE 4000 PSI (MIN.). REINFORCING STEEL GRADE 60.
3. AFTER REMOVING TEMPORARY BARRIER, CUT 7/8" Ø BOLT OR THREADED ROD AS LOW AS PRACTICAL BELOW ROADWAY SURFACE AND FILL RECESS WITH EPOXY BONDING COMPOUND EP-4 (DETAIL "A") OR REMOVE 7/8" Ø BOLTS OR THREADED RODS AND FILL HOLES WITH GROUT BONDED WITH EPOXY BONDING COMPOUND EP-4 (DETAIL "A").
4. COST OF BARRIER DELINEATOR AND BARRIER VERTICAL PANELS TO BE INCLUDED IN PRICE BID PER LINEAR FOOT OF BARRIER SERVICE.
5. WHEN BARRIER IS LOCATED ON VERTICAL AND/OR HORIZONTAL CURVES, THE OPENING AT THE JOINT IS NOT TO EXCEED 1".
6. DESIGN FEATURES RELATING TO CONSTRUCTION OR TO REGULATION AND CONTROL OF TRAFFIC MAY BE SUBJECT TO CHANGE AS DEEMED NECESSARY BY THE DEPARTMENT.
7. FOR POSITIVE CONNECTION DETAILS AND DIMENSIONS SEE STANDARD SHEETS 502.20 - 502.24.

| SPECIFICATION REFERENCE | TRAFFIC BARRIER SERVICE CONCRETE PARAPET (SINGLE FACE)<br>(FOR TEMPORARY INSTALLATION ON BRIDGE DECK EXTERIOR)<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | VDOT<br>ROAD AND BRIDGE STANDARDS |
|---|---|---|
| | | REVISION DATE / SHEET 2 OF 2 |
| | | 502.12 |

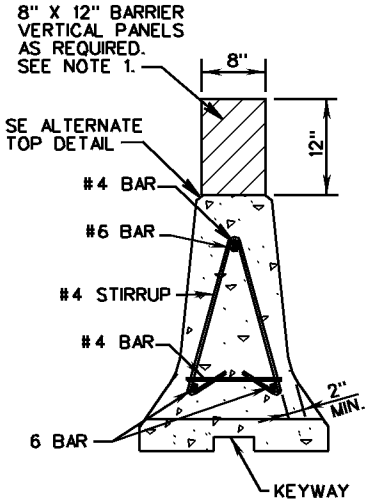
MB-11A



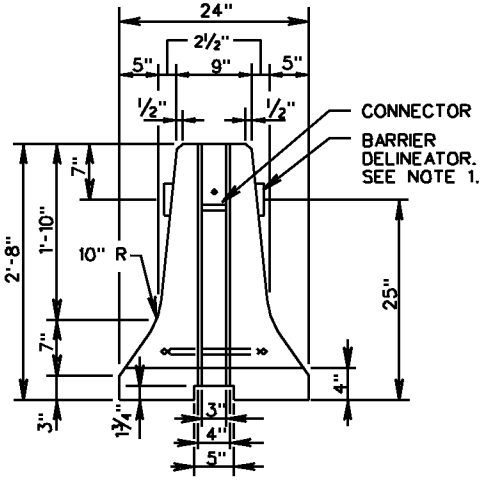

PLAN VIEW



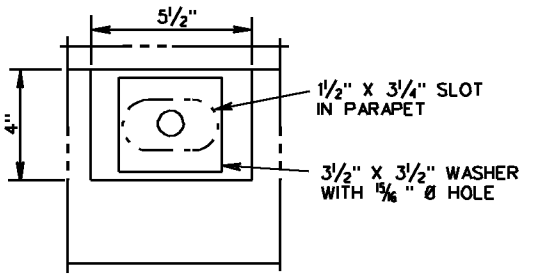

ELEVATION VIEW



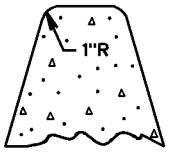

SECTION A-A




END VIEW




ALTERNATE SLOT DETAIL




ALTERNATE TOP

VDOT
ROAD AND BRIDGE STANDARDS

SHEET 1 OF 3 | REVISION DATE 01/09
502.13

# TRAFFIC BARRIER SERVICE CONCRETE PARAPET (DOUBLE FACE)

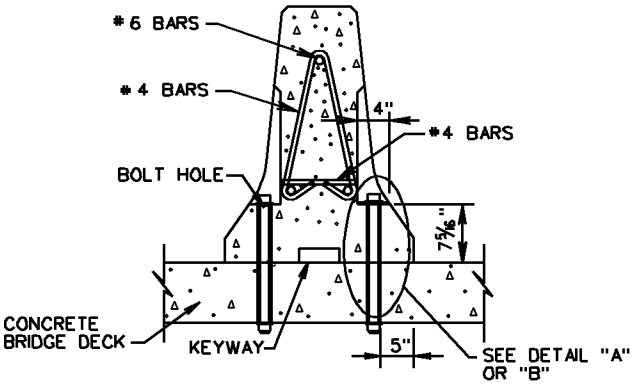
(FOR TEMPORARY INSTALLATION ON BRIDGE DECK EXTERIOR)

VIRGINIA DEPARTMENT OF TRANSPORTATION

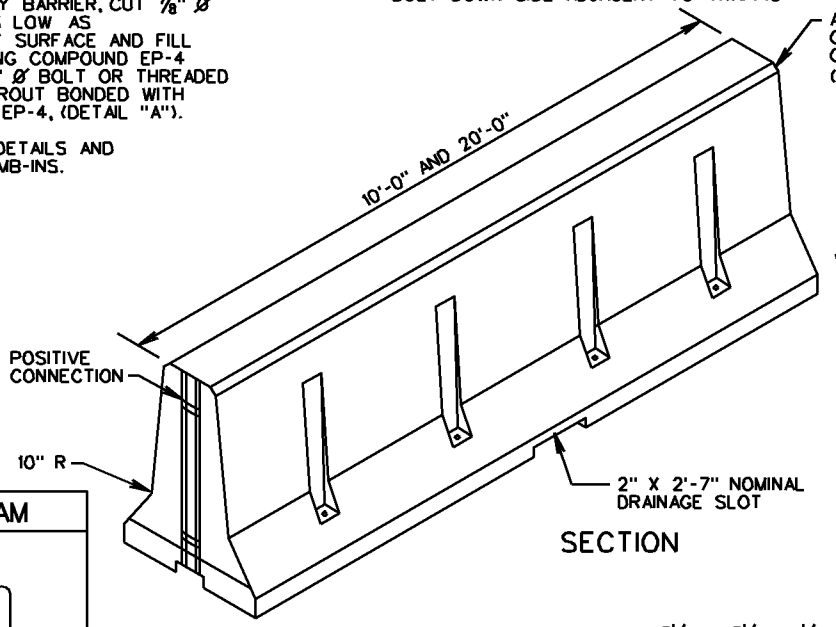
SPECIFICATION REFERENCE
105
512

## NOTES:

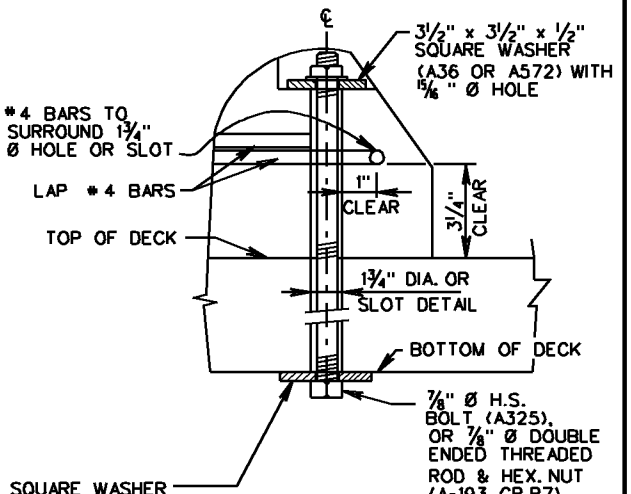
1. BARRIER DELINEATOR IS TO BE SPACED IN ACCORDANCE WITH SECTION 702 OF THE ROAD AND BRIDGE SPECIFICATIONS AND THE BARRIER VERTICAL PANELS ARE TO BE SPACED IN ACCORDANCE WITH THE VIRGINIA WORK AREA PROTECTION MANUAL.
2. REFLECTIVE SURFACE, IN ALL INSTANCES, ARE TO BE FACING ONCOMING TRAFFIC.
3. COST OF BARRIER DELINEATOR AND BARRIER VERTICAL PANELS ARE TO BE INCLUDED IN PRICE BID PER LINEAR FOOT OF BARRIER SERVICE.
4. ANCHOR BOLTS SHALL BE INSTALLED ON TRAFFIC SIDE.
5. CONCRETE 4000 PSI. (MIN.)
6. WELDED WIRE FABRIC MAY BE ONE SHEET BENT TO FIT CONFIGURATION OR TWO SEPARATE SHEETS, ONE ON EACH FACE.
7. AFTER REMOVING TEMPORARY BARRIER, CUT 7/8" Ø BOLT OR THREADED ROD AS LOW AS PRACTICAL BELOW ROADWAY SURFACE AND FILL RECESS WITH EPOXY BONDING COMPOUND EP-4 (DETAIL "A") OR REMOVE 7/8" Ø BOLT OR THREADED ROD AND FILL HOLE WITH GROUT BONDED WITH EPOXY BONDING COMPOUND EP-4, (DETAIL "A").
8. FOR POSITIVE CONNECTION DETAILS AND DIMENSIONS SEE STANDARD MB-INS.




SECTION B-B
(ANCHOR BOLT)
BOLT DOWN SIDE ADJACENT TO TRAFFIC



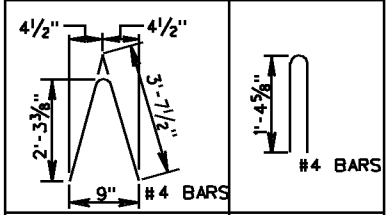

SECTION




DETAIL "A"

3 1/2" x 3 1/2" x 1/2" SQUARE WASHER (A36 OR A572) WITH 15/16" Ø HOLE. AT THE DISCRETION OF THE ENGINEER, A LARGER WASHER SIZE MAY BE REQUIRED IF SPALLING IS EVIDENT AT BOTTOM OF DECK. TO PREVENT OR MINIMIZE SPALLING, PREDRILLING A PILOT HOLE USING A SMALLER DIAMETER DRILL BIT IS REQUIRED.

### BENDING DIAGRAM

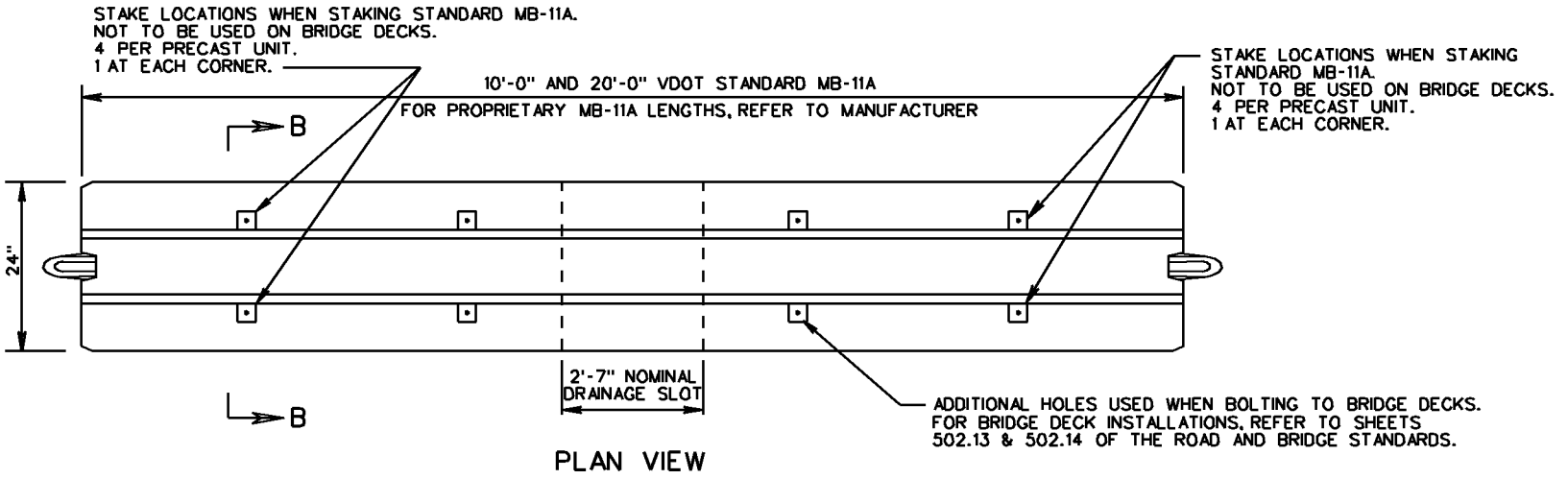



| 4'-8" LENGTH 2 1/2" PIN Ø | 3'-0" LENGTH 4 1/2" PIN Ø |
|---|---|

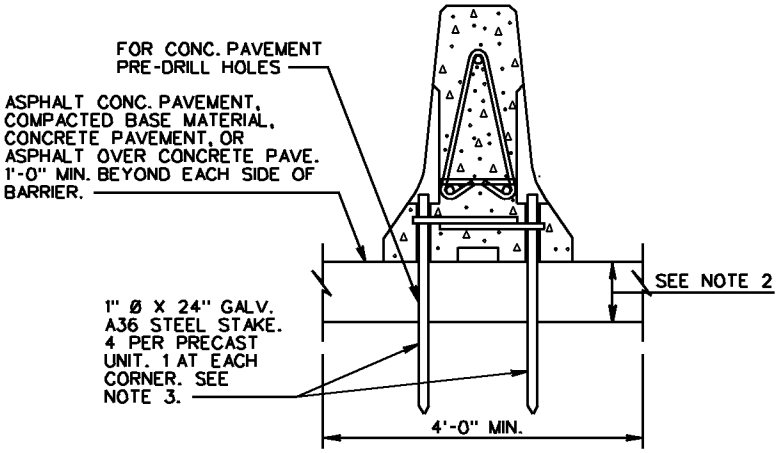
DIMENSIONS IN BENDING DIAGRAMS ARE OUT-TO-OUT OF BARS.

| SPECIFICATION REFERENCE | TRAFFIC BARRIER SERVICE CONCRETE PARAPET (DOUBLE FACE) | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 105<br>512 | (FOR TEMPORARY INSTALLATION ON BRIDGE DECK EXTERIOR)<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE 01/09 · SHEET 2 OF 3 · 502.14 |

MB-11A




PLAN VIEW



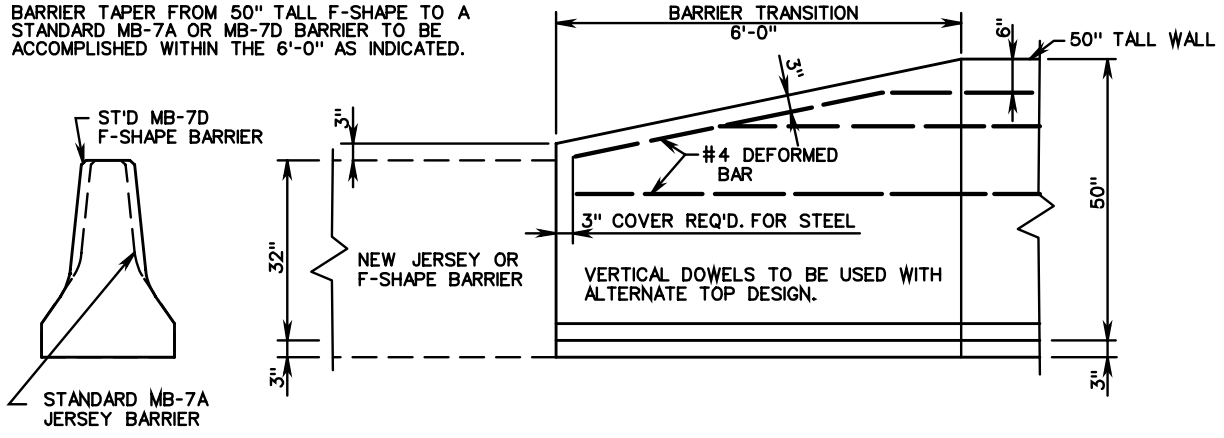

SECTION B-B

## TEMPORARY INSTALLATION ON ASPHALT CONCRETE PAVEMENT, COMPACTED BASE MATERIAL, CONCRETE PAVEMENT, OR ASPHALT OVER CONCRETE PAVEMENT (NOT TO BE USED ON BRIDGE DECKS)

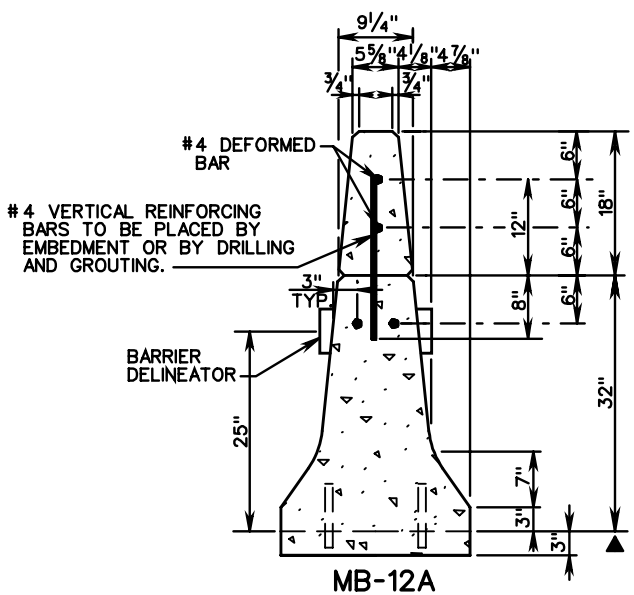
### NOTES:

1. STAKING OF STANDARD MB-11A TO ASPHALT CONCRETE PAVEMENT, COMPACTED BASE MATERIAL, CONCRETE PAVEMENT, OR ASPHALT OVER CONCRETE PAVEMENT IS REQUIRED WHEN TRAFFIC BARRIER SERVICE CONCRETE IS PLACED WITHIN THE TWO (2) FOOT OFFSET OF A TRENCHING OPERATION (4' OR GREATER IN DEPTH) OR WHEN DETERMINED BY THE ENGINEER.
2. 2" MIN. FOR ASPHALT CONCRETE.
   6" MIN. FOR COMPACTED BASE MATERIAL.
3. DRIVE STAKE HEAD BELOW FACE OF BARRIER TO PREVENT SNAGGING.
4. CONTRACTOR TO VERIFY PAVEMENT STRUCTURE PRIOR TO PLACING STAKES.
5. UPON REMOVAL OF THE STAKES AND BARRIERS, REPAIR THE RESULTING HOLES AS FOLLOWS OR AS DIRECTED BY THE ENGINEER. CLEAN AND FILL WITH TYPE EP-4 OR EP-5 EPOXY MORTAR CONFORMING TO THE REQUIREMENTS OF SECTION 243 FOR HYDRAULIC CEMENT CONCRETE PAVEMENT AND ASPHALT CONCRETE PAVEMENT. CARE SHALL BE TAKEN NOT TO TRAP AIR WITHIN OR AT THE BOTTOM OF THE EPOXY MORTAR.

| VDOT ROAD AND BRIDGE STANDARDS | | TRAFFIC BARRIER SERVICE CONCRETE PARAPET (DOUBLE FACE) (FOR TEMPORARY INSTALLATION ON ROADWAYS) VIRGINIA DEPARTMENT OF TRANSPORTATION | SPECIFICATION REFERENCE |
|---|---|---|---|
| SHEET 3 OF 3 | REVISION DATE | | 105 512 |
| 502.15 | 01/09 | | |




## TRANSITION FROM 50" TALL WALL TO 32" JERSEY OR F-SHAPE BARRIER

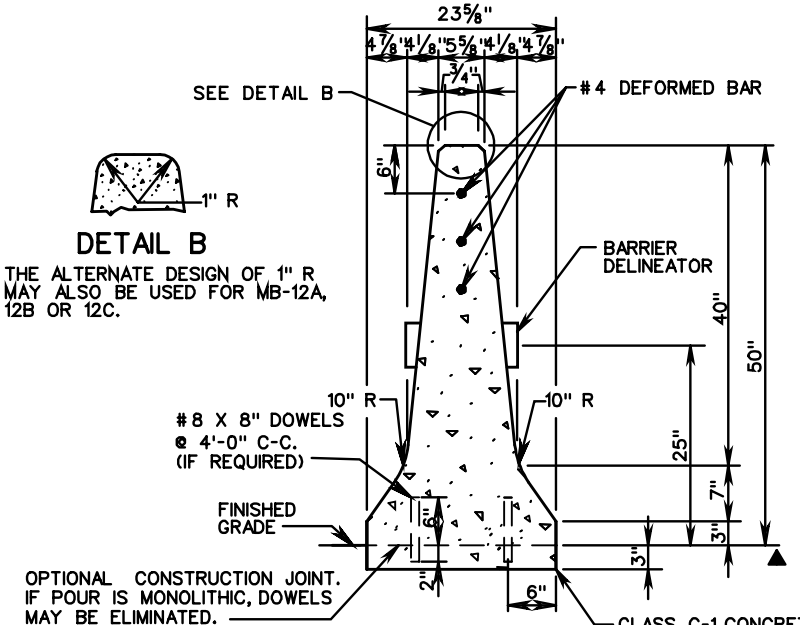



MB-12A
ALTERNATE TOP DESIGN




DETAIL B

THE ALTERNATE DESIGN OF 1" R MAY ALSO BE USED FOR MB-12A, 12B OR 12C.

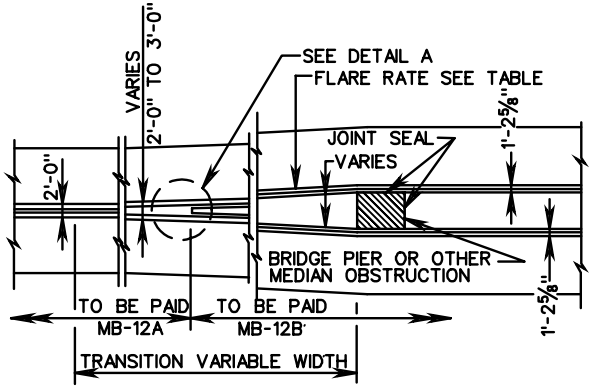



MB-12A

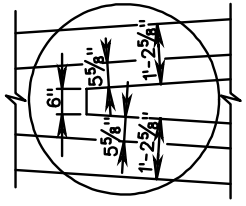
IF BARRIER EXTENSION IS CONSTRUCTED AS A SEPARATE ITEM, ALL JOINTS ARE TO BE CONSTRUCTED AT THE SAME INTERVAL AS CONCRETE BARRIER. ALL VERTICAL BARS ARE #4 AT 24" MAX. SPACING. LENGTH OF DOWELS SHALL BE 20". VERTICAL BARS MAY BE PLACED IN THE CONCRETE OR BONDED INTO DRILLED HOLES IN HARDENED CONCRETE. WHEN HOLES ARE DRILLED NON-SHRINK GROUT SHALL BE USED TO BOND THE BARS IN PLACE.

▲ DEPTH OF CONCRETE BASE MAY BE EXTENDED AT THE CONTRACTOR'S OPTION TO COINCIDE WITH BOTTOM OF PAVEMENT COURSE IN WHICH BASE TERMINATES; HOWEVER, THE COST OF ADDITIONAL CONCRETE SHALL BE INCLUDED IN UNIT PRICE BID PER LINEAR FT. OF BARRIER.

| SPECIFICATION REFERENCE | # CONCRETE MEDIAN BARRIER (TALL WALL) | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 105<br>502 | VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE<br>SHEET 1 OF 2<br>502.16 |




PLAN




DETAIL A

## NOTES:

IF THE CONTRACTOR ELECTS TO USE THE OPTIONAL CONSTRUCTION JOINTS, TRANSVERSE JOINTS FOR CRACK CONTROL AND EXPANSION JOINTS ARE TO BE PROVIDED IN BOTH FOOTING AND BARRIER AT THE SAME LOCATION.

TRANSVERSE JOINTS ARE TO COINCIDE WITH JOINTS IN ADJACENT PAVEMENT WITH A MAXIMUM SPACING OF 20 FT. C-C.

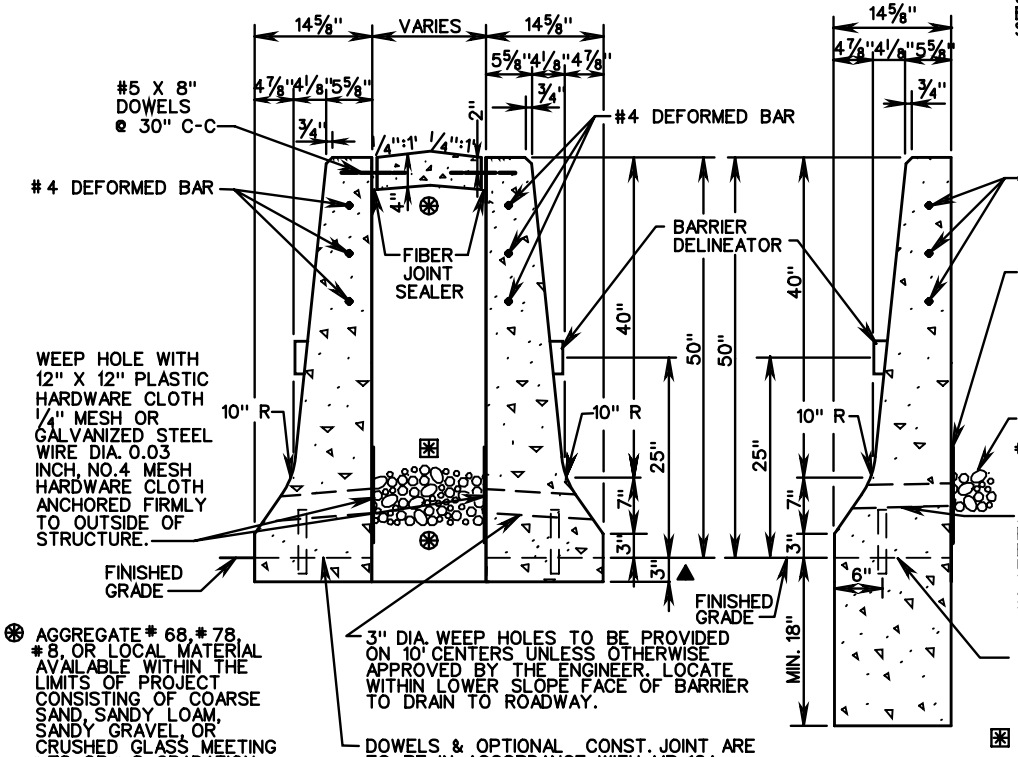
CONCRETE MEDIAN BARRIER MAY BE CAST IN PLACE OR SLIP-FORMED.

HORIZONTAL REINFORCING STEEL BARS ARE TO BE SEPARATE AT ALL EXPANSION AND CONTRACTION JOINTS. A 2" CONCRETE COVER IS REQUIRED OVER THE ENDS OF THE REINFORCING STEEL.

BARRIER DELINEATOR SIZE, COLOR AND SPACING SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS. COST OF DELINEATOR SHALL BE INCLUDED IN THE PRICE BID FOR MEDIAN BARRIER. REFLECTIVE SURFACE OF BARRIER DELINEATOR, IN ALL INSTANCES, SHALL BE FACING THE ONCOMING TRAFFIC.

CONCRETE SHALL BE CLASS A3 IF CAST IN PLACE, 4000 PSI IF PRECAST.

▲ DEPTH OF CONCRETE BASE MAY BE EXTENDED AT THE CONTRACTOR'S OPTION TO COINCIDE WITH BOTTOM OF PAVEMENT COURSE IN WHICH BASE TERMINATES; HOWEVER, THE COST OF ADDITIONAL CONCRETE SHALL BE INCLUDED IN UNIT PRICE BID PER LINEAR FT. OF BARRIER.




⊛ AGGREGATE #68, #78, #8, OR LOCAL MATERIAL AVAILABLE WITHIN THE LIMITS OF PROJECT CONSISTING OF COARSE SAND, SANDY LOAM, SANDY GRAVEL, OR CRUSHED GLASS MEETING #78 OR #8 GRADATION REQUIREMENTS.

MB-12B

MB-12C

⊠ 4" AGGREGATE #68, #78, #8, OR CRUSHED GLASS MEETING #78 OR #8 GRADATION REQUIREMENTS.

| FLARE RATES | | | |
|---|---|---|---|
| DESIGN SPEED | INSIDE SHY LINE | | BEYOND SHY LINE |
| MPH | SHY LINE LS | FLARE RATE | FLARE RATE |
| 70 | 10' | 30:1 | 20:1 * |
| 60 | 8' | 26:1 | 18:1 * |
| 50 | 6.5' | 21:1 | 14:1 * |
| 40 | 5' | 16:1 | 10:1 * |
| 30 | 3.5' | 13:1 | 8:1 * |

* SUGGESTED MAXIMUM FLARE RATE FOR RIGID BARRIER SYSTEMS.

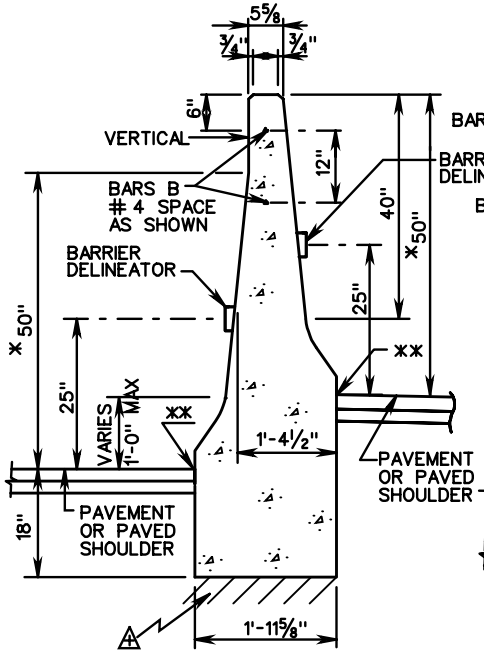
VDOT
ROAD AND BRIDGE STANDARDS

# CONCRETE MEDIAN BARRIER (TALL WALL)

VIRGINIA DEPARTMENT OF TRANSPORTATION

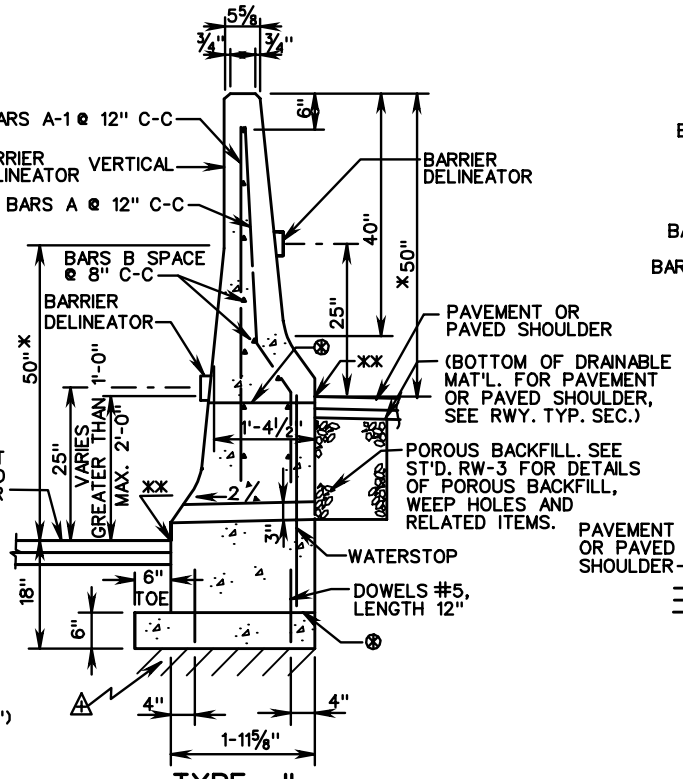
SHEET 2 OF 2 | REVISION DATE
502.17

SPECIFICATION REFERENCE
105
502



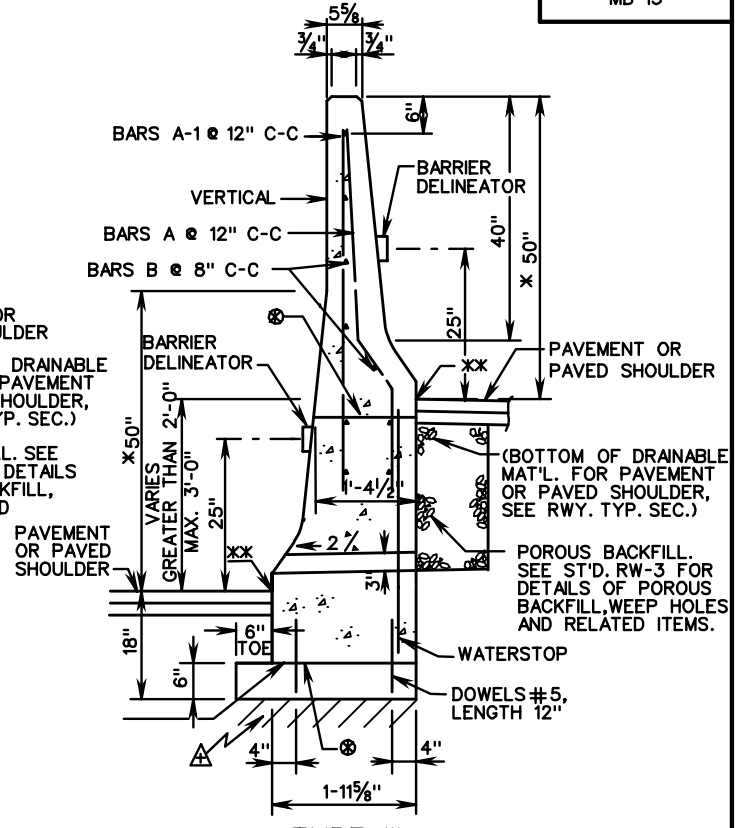

## TYPE I

TYPE I (GREATER THAN 0 HT. DIFF., MAX. 1'-0")




## TYPE II

TYPE II (GREATER THAN 1'-0" HT. DIFF., MAX. 2'-0")




## TYPE III

TYPE III (GREATER THAN 2'-0" HT. DIFF., MAX. 3'-0")

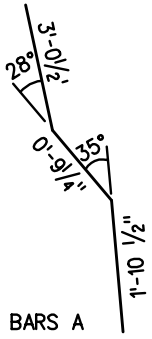
* FOR DETAILS OF BARRIER FACE SEE STANDARD MB-12A.

** DENOTES FINISHED GRADE ELEVATION

⚠ FOUNDATION MATERIAL UNDER CONCRETE MEDIAN BARRIER IS TO BE COMPACTED

⊗ PERMISSIBLE CONSTRUCTION JOINT TO BE BONDED IN STRICT ACCORDANCE WITH SEC. 404 OF THE CURRENT VDOT ROAD AND BRIDGE SPECIFICATIONS.

### BENDING DIAGRAM




BARS A

DO NOT USE BENT BARS A WITHIN LIMITS OF DROP INLETS.

### MEASUREMENT AND PAYMENT

MEDIAN BARRIER MB-13 TYPE I, II OR III WILL BE PAID FOR AT THE CONTRACT UNIT PRICE PER LIN. FOOT, WHICH SHALL BE FULL COMPENSATION FOR FURNISHING AND INSTALLING CLASS A3 CONC., REINFORCING STEEL, POROUS BACKFILL AND ALL TOOLS, LABOR, EQUIPMENT AND INCIDENTALS NECESSARY TO COMPLETE THE WORK. ANY ADDITIONAL EXCAVATION, BACKFILL WITH SUITABLE MATERIAL AND COMPACTION WORK NECESSARY FOR THE CONCRETE MEDIAN BARRIER INSTALLATION IS TO BE CONSIDERED INCIDENTAL IN THE PRICE BID FOR THE CONCRETE MEDIAN BARRIER.

### REINFORCING STEEL SCHEDULE

| | BARS "A" | | BARS A-1 | | BARS "B" | | DOWELS | |
|---|---|---|---|---|---|---|---|---|
| PANEL | NO. | LENGTH | NO. | LENGTH | NO. | LENGTH | NO. | LENGTH |
| TYPE I | | | | | 2 | 19'-8" | | |
| TYPE II | 20 | 5'-10¼" | 20 | 5'-6" | 11 | 19'-8" | 40 | 1'-0" |
| TYPE III | 20 | 5'-10¼" | 20 | 5'-6" | 11 | 19'-8" | 40 | 1'-0" |

| SPECIFICATION REFERENCE |
|---|
| 105 |
| 404 |
| 502 |

# CONCRETE MEDIAN BARRIER

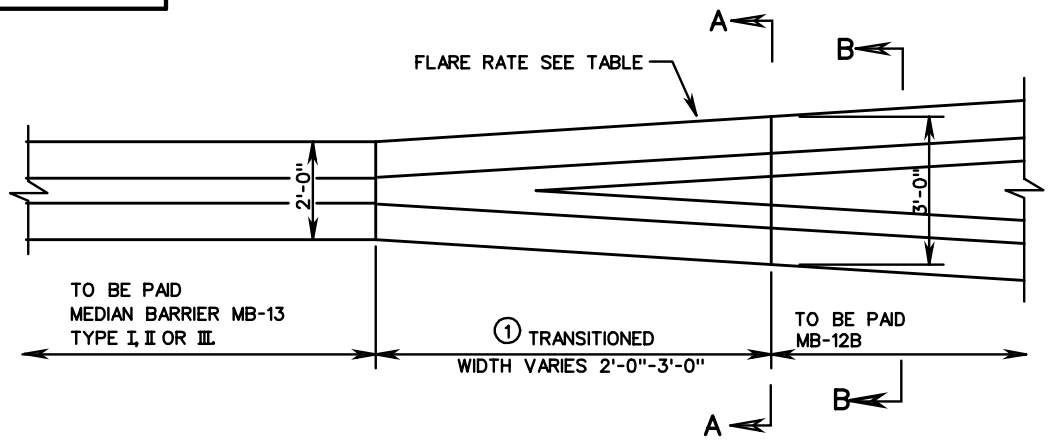
## TYPE I, II OR III

VIRGINIA DEPARTMENT OF TRANSPORTATION

VDOT
ROAD AND BRIDGE STANDARDS

| REVISION DATE | SHEET 1 OF 2 |
|---|---|
| | 502.18 |

MB-13




PLAN VIEW

NOTE:

REINFORCING STEEL BARS SHOWN ARE BASED ON A 20' PANEL LENGTH.

ALL REINFORCING BARS ARE TO BE SIZE #4 GRADE 60 STEEL WITH A MINIMUM 1½" CONCRETE COVER.

THE TYPICAL JOINT SPACING FOR CONSTRUCTION JOINTS IS 20' AND 80' FOR EXPANSION JOINTS FOR TYPE II AND III BARRIERS.

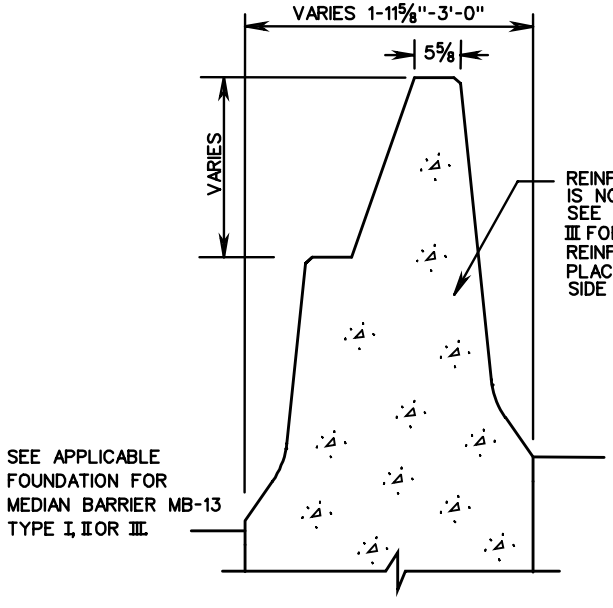
FOR DETAILS OF HOW JOINTS ARE TO BE FORMED & WATER STOPS SEE ST'D. RW-3.

TRANSVERSE JOINTS FOR TYPE I BARRIERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE ROAD AND BRIDGE SPECIFICATIONS EXCEPT NO SCORING OR SAWING WILL BE ALLOWED.

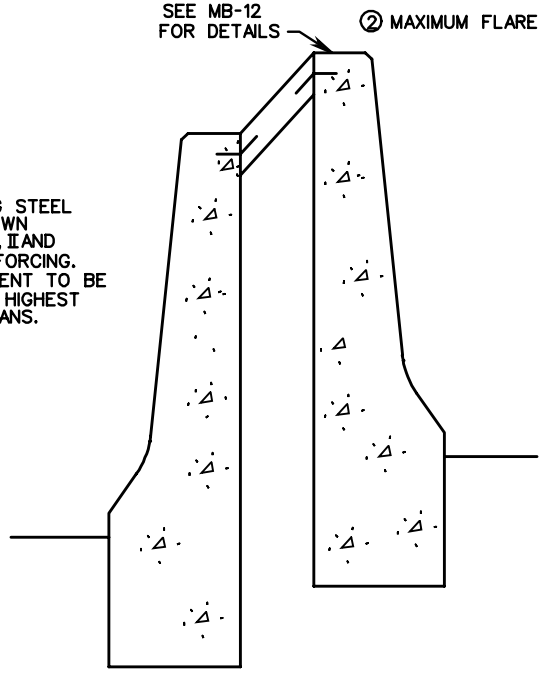
HORIZONTAL REINFORCING STEEL BARS B ARE TO BE SEPARATED AT ALL EXPANSION & CONTRACTION JOINTS. A 2" CONCRETE COVER IS REQUIRED OVER THE ENDS OF REINFORCING STEEL.

① TRANSITIONED TO BE PAID FOR AS MEDIAN BARRIER MB-13 TYPE I, II OR III.

② MAXIMUM FLARE RATE FOR RIGID BARRIER SYSTEMS.




SECTION A-A
(FOUNDATION NOT SHOWN)




SECTION B-B
(ST'D. MB-12B)

| FLARE RATES | | | |
|---|---|---|---|
| DESIGN SPEED | INSIDE SHY LINE | | BEYOND SHY LINE |
| MPH | SHY LINE LS | FLARE RATE | FLARE RATE |
| 70 | 10' | 30 : 1 | 20 : 1 ② |
| 60 | 8' | 26 : 1 | 18 : 1 ② |
| 50 | 6.5' | 21 : 1 | 14 : 1 ② |
| 40 | 5' | 16 : 1 | 10 : 1 ② |
| 30 | 3.5' | 13 : 1 | 8 : 1 ② |

VDOT
ROAD AND BRIDGE STANDARDS

SHEET 2 OF 2 | REVISION DATE

502.19

# CONCRETE MEDIAN BARRIER

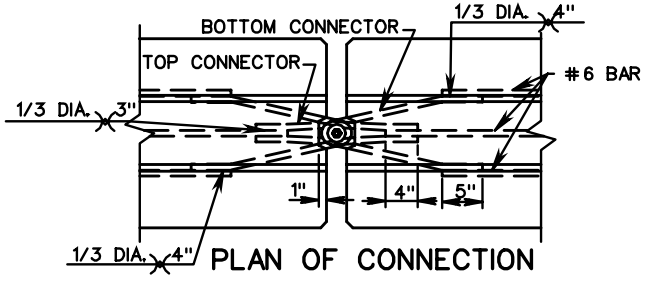
## TYPE I, II OR III

VIRGINIA DEPARTMENT OF TRANSPORTATION

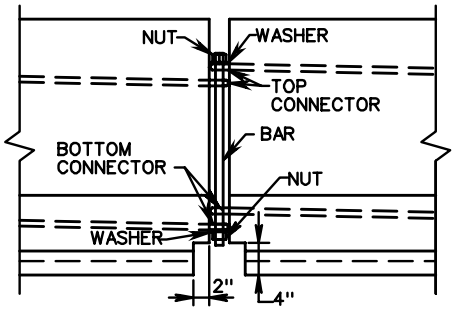
SPECIFICATION REFERENCE

105
404
502

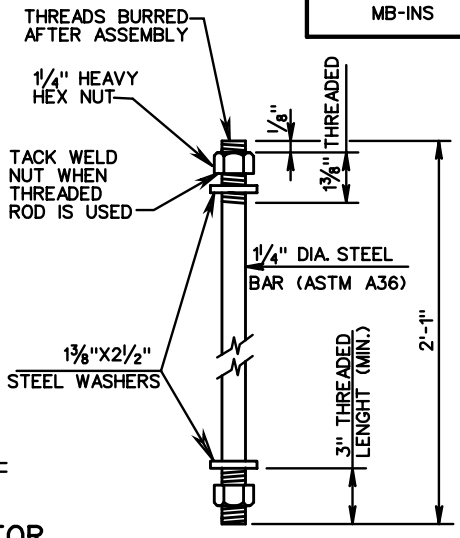
MB-INS



PLAN OF CONNECTION

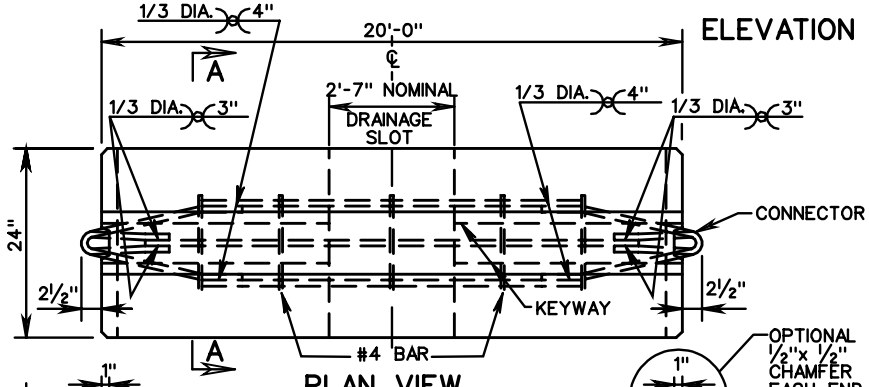


ELEVATION OF CONNECTION

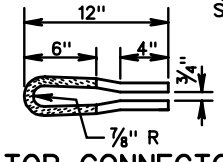


CONNECTOR PIN ASSEMBLY

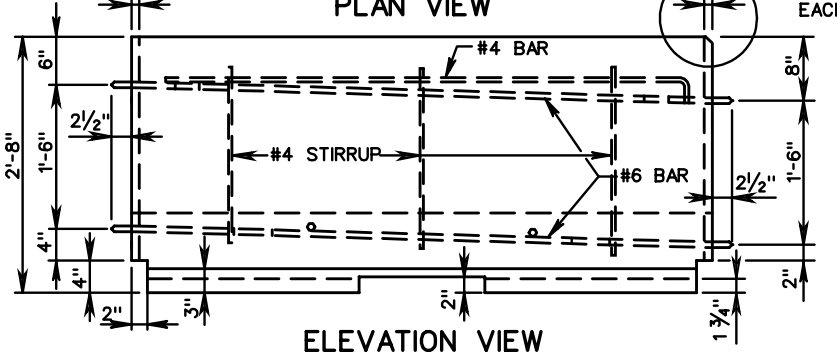
GALVANIZE AFTER FABRICATION.



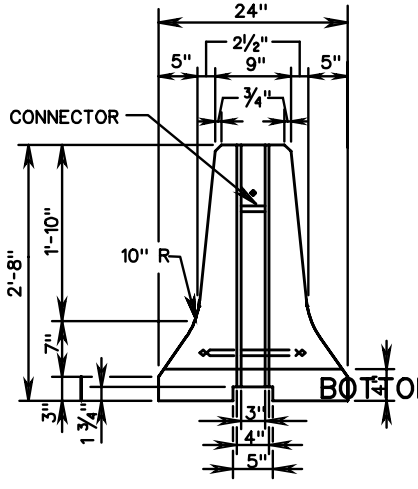
PLAN VIEW



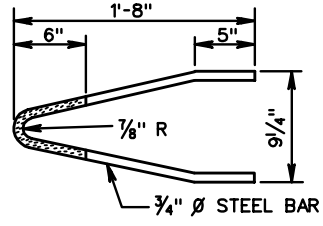
TOP CONNECTOR



ELEVATION VIEW



END VIEW



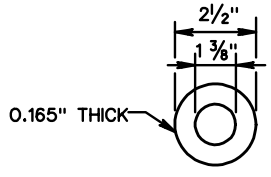
BOTTOM CONNECTOR

GALVANIZE AFTER FORMING ENTIRE CONNECTOR MAY BE GALVANIZED.

## NOTES:

1. PIN AND CONNECTORS ARE TO BE ASTM A-36 REINFORCING. STEEL BARS ARE TO BE ASTM A 615, GRADE 60. ONE CONNECTOR PIN ASSEMBLY WITH EACH BARRIER SECTION.
2. THE CONNECTION PIN, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M-111.
3. BEGINNING WITH THE JANUARY 2000 ADVERTISEMENT, ALL POSITIVE CONNECTIONS MUST BE APPROVED BY THE FHWA IN ACCORDANCE WITH NCHRP 350 TEST REQUIREMENTS.

WHEN USING VDOT STANDARD MB-7D PC WITH THE PIN AND LOOP POSITIVE CONNECTION, ALLOW FOR A 6'-0" DYNAMIC DEFLECTION. PROVIDE MIN. 60' OF BARRIER UPSTREAM AND DOWNSTREAM OF WORK ZONE FOR ANCHORAGE.
FOR APPROVED NON-VDOT DESIGNS, REFER TO MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR DEFLECTIONS AND ANCHORAGE.

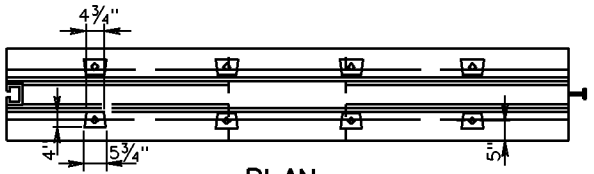


PLAIN GALVANIZED STEEL WASHER FOR 1¼" PIN

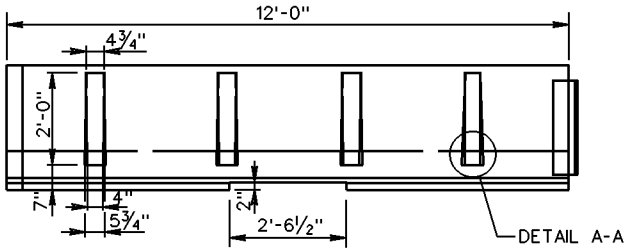
PIN AND LOOP DETAILS

| SPECIFICATION REFERENCE | PRECAST CONCRETE MEDIAN BARRIER<br>POSITIVE CONNECTION OPTIONS<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | VDOT<br>ROAD AND BRIDGE STANDARDS |
|---|---|---|
| | | REVISION DATE / SHEET 1 OF 5 |
| | | 502.20 |

MB-INS

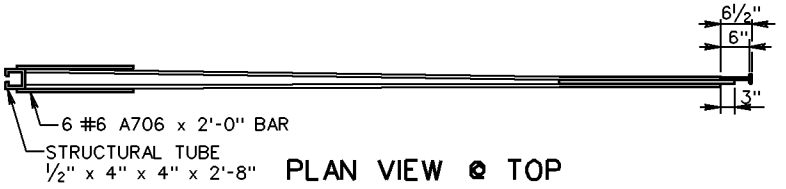



PLAN

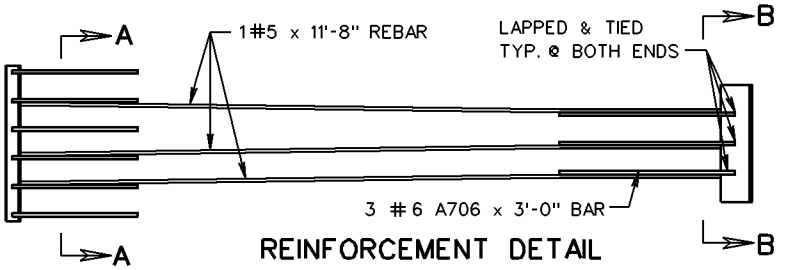



ELEVATION

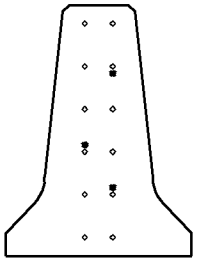

BAR PLACEMENT ELEVATION



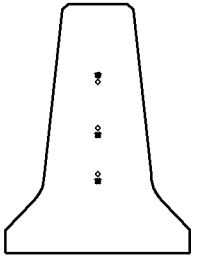

PLAN VIEW @ TOP




REINFORCEMENT DETAIL

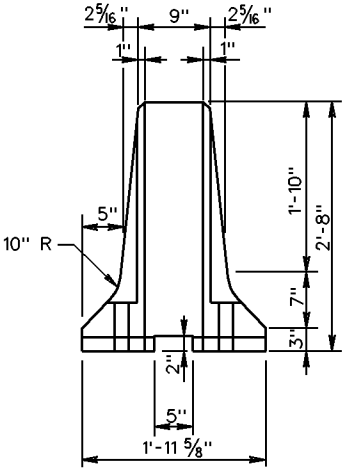


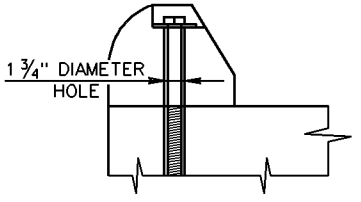
SECTION A-A



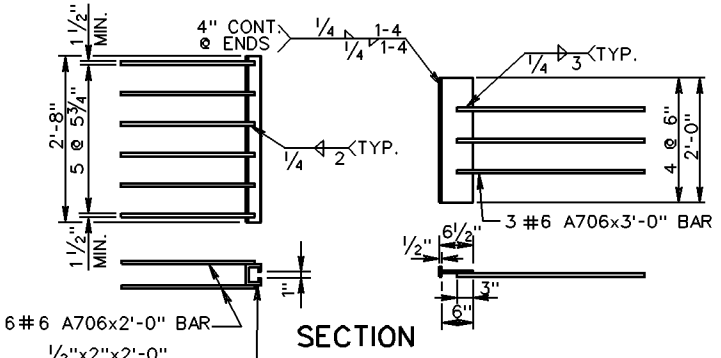
SECTION B-B

| LEGEND |
|---|
| ▪ - 11'-8" BAR |
| ◇ - 2' AND 3' BAR |




DETAIL A-A




SECTION

SECTION

## T-LOK® DETAILS

## NOTES:

1. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE AT THE AGE OF 28 DAYS SHALL BE 4000 PSI.
2. ALL REINFORCEMENT SHALL CONFORM TO TO ASTM A615, GRADE 60.
3. STANDARD BARRIER SECTIONS SHALL BE 12'-0" AS SHOWN OR 18'-0". SHORTER SECTIONS SHALL BE CAST IN REQUIRED LENGTHS AS ONE UNIT. LONGER SECTIONS SHALL BE CAST TO REQUIRED DIMENSIONS IN TWO UNITS.
4. ALL EXPOSED METAL IS TO BE GALVANIZED FOR PERMANENT LOCATIONS.
5. ALL EXPOSED METAL MAY BE GALVANIZED FOR TEMPORARY LOCATIONS.
6. T-LOK AS MANUFACTURED BY ROCKINGHAM PRECAST
7. BEGINNING WITH JANUARY 2000 ADVERTISEMENT ALL POSITIVE CONNECTIONS MUST BE APPROVED BY THE FHWA IN ACCORDANCE WITH NCHRP 350 TEST REQUIREMENTS.
8. REFER TO MANUFACTURER FOR TEMPORARY INSTALLATION DETAILS.

WHEN USING T-LOK BARRIER, ALLOW FOR A 3'-10" DYNAMIC DEFLECTION. PROVIDE MINIMUM 60' OF BARRIER UPSTREAM AND DOWNSTREAM OF WORK ZONE FOR ANCHORAGE.

VDOT
ROAD AND BRIDGE STANDARDS

# PRECAST CONCRETE MEDIAN BARRIER

## POSITIVE CONNECTION OPTIONS

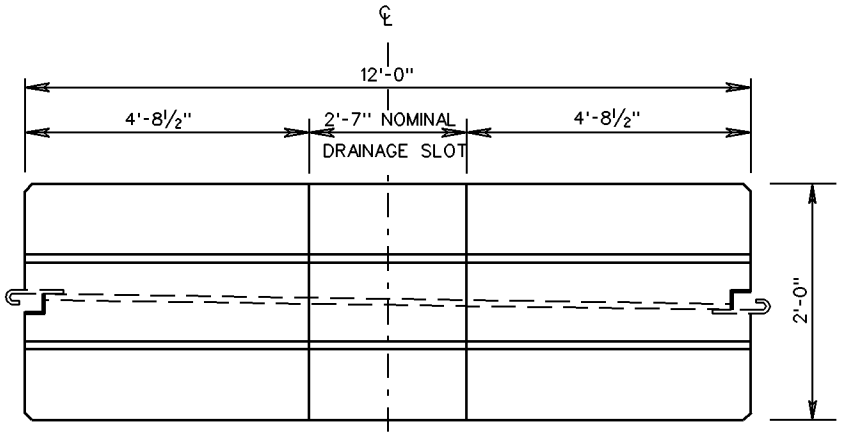
VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

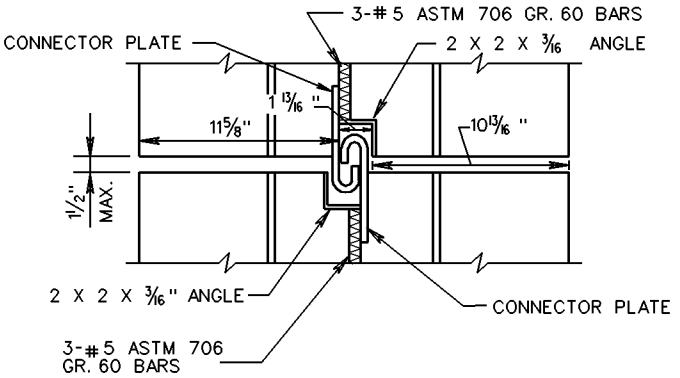
SHEET 2 OF 5

REVISION DATE 08/10

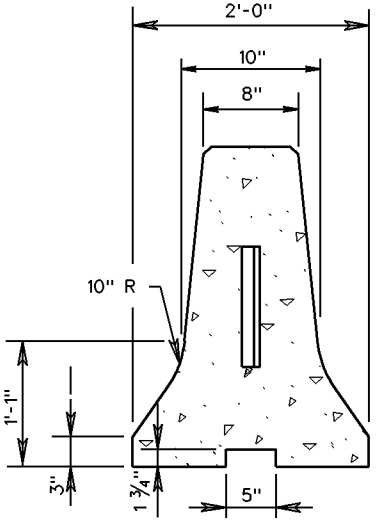
502.21



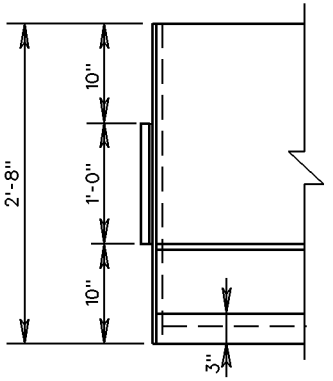

PLAN VIEW



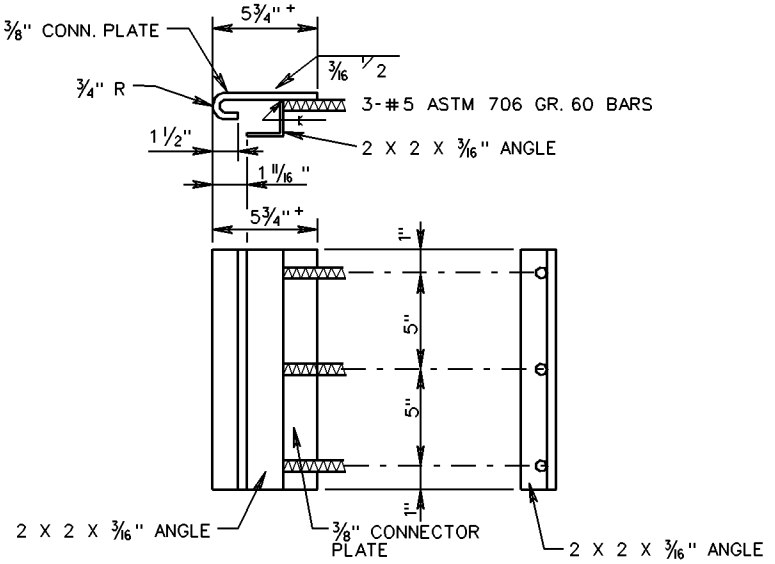

PLAN VIEW




ELEVATION VIEW




SIDE VIEW




ELEVATION VIEW SIDE VIEW
CONNECTOR PLATE DETAIL

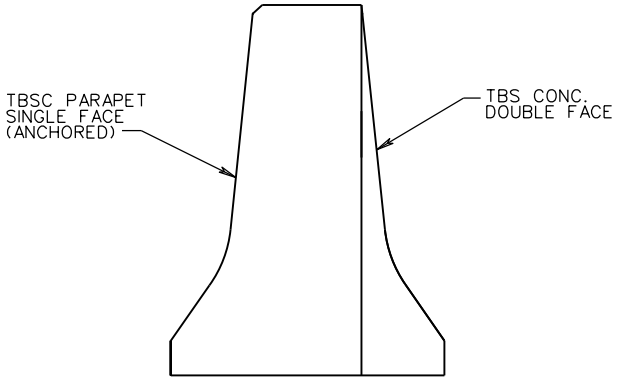
NOTES:

1. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE AT THE AGE OF 28 DAYS SHALL BE 4000 PSI.
2. ALL REINFORCEMENT SHALL CONFORM TO TO ASTM A615, GRADE 60.
3. ALL EXPOSED METAL TO BE GALVANIZED FOR PERMANENT LOCATIONS.
4. ALL EXPOSED METAL MAY BE GALVANIZED FOR TEMPORARY LOCATIONS.
5. J-J HOOK AS MANUFACTURED BY SMITH-MIDLAND.
6. BEGINNING WITH JANUARY 2000 ADVERTISEMENT ALL POSITIVE CONNECTIONS MUST BE APPROVED BY THE FHWA IN ACCORDANCE WITH NCHRP 350 TEST REQUIREMENTS.
7. REFER TO MANUFACTURER FOR TEMPORARY INSTALLATION DETAILS.

WHEN USING J-J HOOK BARRIER, ALLOW FOR A 4'-4" DYNAMIC DEFLECTION. PROVIDE A MIN. 69'-7" OF BARRIER UPSTREAM AND DOWN-STREAM OF WORK ZONE FOR ANCHORAGE.

## J-J HOOK® DETAILS

| SPECIFICATION REFERENCE | PRECAST CONCRETE MEDIAN BARRIER<br>POSITIVE CONNECTION OPTIONS<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | VDOT<br>ROAD AND BRIDGE STANDARDS |
|---|---|---|
| | | REVISION DATE 08/10 |
| | | SHEET 3 OF 5 |
| | | 502.22 |



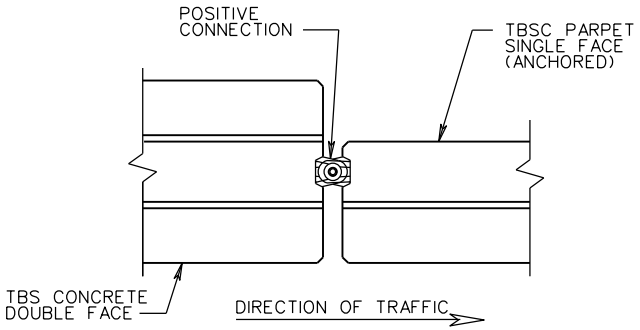

SECTION B-B

NOTES:

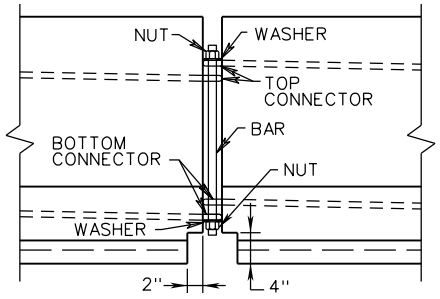
1. BASIS OF PAYMENT:
   TRAFFIC BARRIER SERVICE LATERAL SUPPORT WILL BE MEASURED AND PAID FOR IN UNITS OF EACH COMPLETE IN PLACE AND SHALL INCLUDE FURNISHING AND PLACING PRECAST CONCRETE BARRIERS (TBS CONCRETE) AND MAINTENANCE, REMOVAL WHEN NO LONGER NECESSARY, AND ALL MATERIALS, LABOR, TOOLS, EQUIPMENT, AND INCIDENTALS NECESSARY TO COMPLETE THE WORK.

2. FOR POSITIVE CONNECTION DETAILS AND DIMENSIONS SEE STANDARD MB-INS, SHEETS 502.20 - 502.22

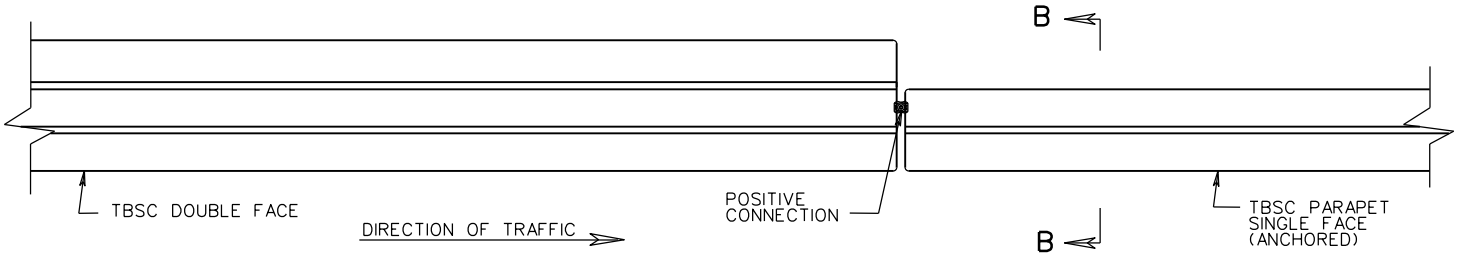
3. FOR DIMENSIONS NOT SHOWN, REFER TO ST'D. MB-7D AND MB-10A.




PLAN OF POSITIVE CONNECTION




ELEVATION OF POSITIVE CONNECTION




PLAN VIEW
METHOD A

VDOT
ROAD AND BRIDGE STANDARDS

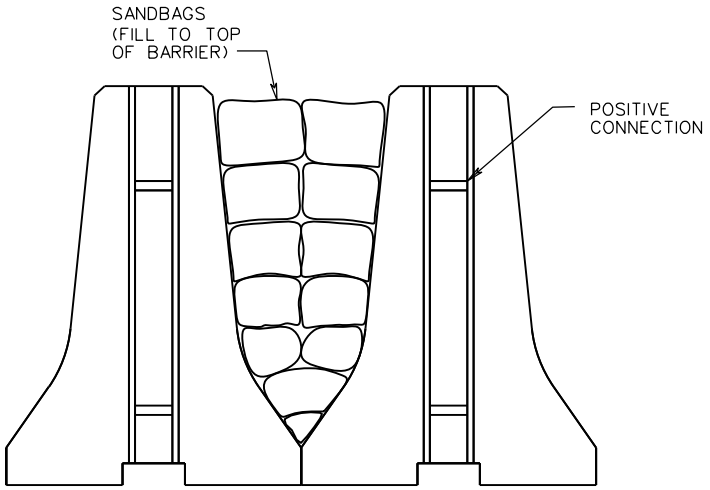
SHEET 4 OF 5 | REVISION DATE 7/12

502.23

# BUTTING TRAFFIC BARRIER SERVICE TO SINGLE FACE PARAPET SERVICE

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE




SECTION A-A

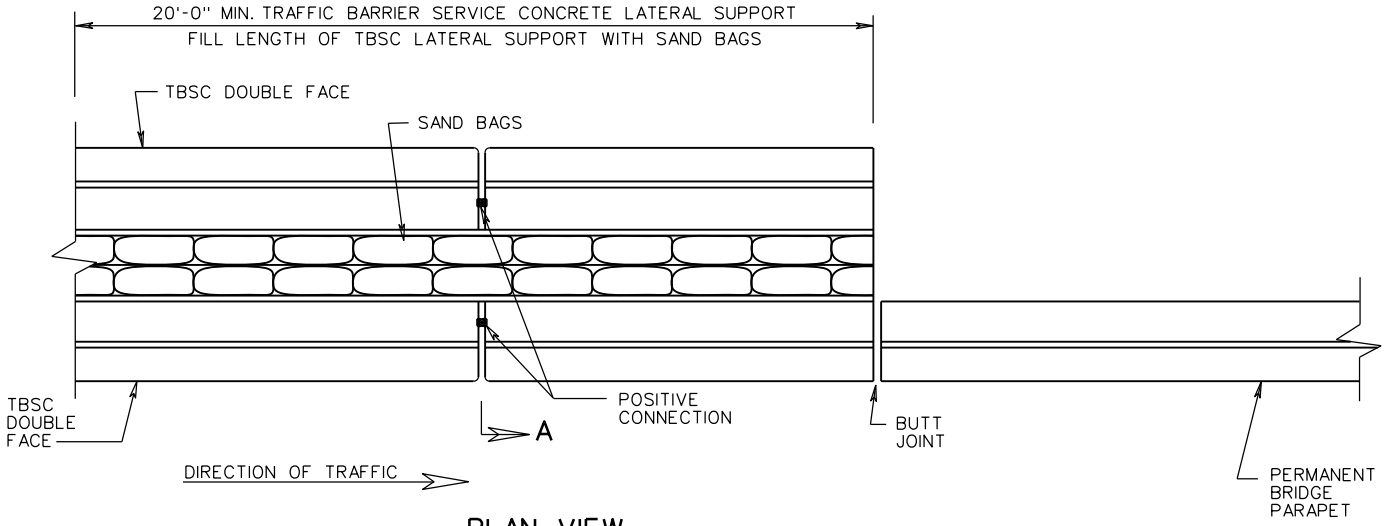
A

NOTES:

1. BASIS OF PAYMENT:
   TRAFFIC BARRIER SERVICE LATERAL SUPPORT WILL BE MEASURED AND PAID FOR IN UNITS OF EACH COMPLETE IN PLACE AND SHALL INCLUDE FURNISHING AND PLACING PRECAST CONCRETE BARRIERS (TBS CONCRETE) AND SAND BAGS, MAINTENANCE, REMOVAL WHEN NO LONGER NECESSARY, AND ALL MATERIALS, LABOR, TOOLS, EQUIPMENTS, AND INCIDENTALS NECESSARY TO COMPLETE THE WORK.

2. FOR POSITIVE CONNECTION DETAILS AND DIMENSIONS SEE STANDARD MB-INS, SHEETS 502.20 - 502.22

3. FOR DIMENSIONS NOT SHOWN, REFER TO ST'D. MB-7D AND MB-10A.




PLAN VIEW

METHOD B

| SPECIFICATION REFERENCE | A COPY OF THE ORIGINAL SEALED AND SIGNED DRAWING IS ON FILE IN THE CENTRAL OFFICE.<br>BUTTING TRAFFIC BARRIER SERVICE TO SINGLE FACE PARAPET SERVICE<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | VDOT<br>ROAD AND BRIDGE STANDARDS<br>REVISION DATE 7/11<br>SHEET 5 OF 5<br>502.24 |
|---|---|---|

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# GENERAL NOTES - FENCING

## FARM FENCE

### BARBED WIRE

BARBED WIRE IS TO CONFORM TO ONE OF THE TYPES ALLOWED BY THE SPECIFICATIONS.

UNLESS OTHERWISE NOTED ON PLANS FOUR STRANDS WILL BE PROVIDED.

SPACING OF STRANDS SHOWN IS SUGGESTED ONLY. ANY OTHER SPACING APPROVED BY THE ENGINEER MAY BE USED.

### WOOD POSTS

WOOD POSTS TO BE SQUARE CUT OR ROUND TO THE DIMENSIONS SHOWN ON THE DRAWINGS.

POSTS TOPS MAY BE FLAT OR CUT AT A 30° ANGLE.

FOR WOVEN WIRE FABRIC, STAPLES ARE TO BE USED AT TOP AND BOTTOM STRANDS AND AT A MINIMUM OF THREE INTERMEDIATE STRANDS PER POST.

ONE STAPLE PER STRAND IS TO BE USED FOR BARBED WIRE FENCE.

WHERE GATE, CORNER, OR BRACE POSTS FALL IN ROCK OR MARSHY AREAS THEY SHALL BE SET IN CLASS A3 OR C1 CONCRETE.

### METAL POSTS

METAL POSTS ARE TO BE ONE OF THE TYPES SHOWN ON THE STANDARD DRAWINGS AND CONFORMING TO THE SPECIFICATIONS.

AT EACH CORNER AND STRETCHER POST WIRE FABRIC IS TO BE CUT AND ALL HORIZONTAL STRANDS SECURELY WRAPPED AROUND POST.

BRACES ON CORNER, STRETCHER AND END POSTS ARE TO BE SECURED 1'-6" FROM TOP OF POST WITH ½" BOLTS.

IN LIEU OF SETTING POSTS IN CONCRETE, MANUFACTURER'S ANCHORING DEVICES MEETING THE SPECIFICATION REQUIREMENTS MAY BE USED WHEN APPROVED BY THE ENGINEER.

### BRACES

MAXIMUM SPACING BETWEEN BRACES TO BE 500'.

CORNER BRACES TO BE PROVIDED WHERE CORNER ANGLE IS 15° OR OVER.

LINE BRACES TO BE PROVIDED WHERE VERTICAL ALIGNMENT CHANGES 15° OR MORE AND WHERE SPACING REACHES 500'.

### MISCELLANEOUS

FENCE IS TO BE LOCATED AS SHOWN ON THE PLANS OR DIRECTED BY THE ENGINEER.

THE SIDE OF THE POST TO WHICH FABRIC IS TO BE ATTACHED WILL BE DETERMINED BY THE ENGINEER.

FENCE TO BE GROUNDED IN ACCORDANCE WITH DETAIL SHOWN ON STANDARD FE-6 WHERE REQUIRED.

UNLESS SPECIFIED ON PLANS, THE CONTRACTOR WILL HAVE THE OPTION OF FURNISHING EITHER METAL OR WOOD POSTS. POSTS TYPES ARE NOT TO BE INTERMIXED ON ANY ONE INSTALLATION.

## CHAIN LINK FENCE

### WIRE FABRIC

WIRE FABRIC SHALL HAVE A 2" MESH.

### MISCELLANEOUS

IN LIEU OF SETTING POSTS IN CONCRETE, MANUFACTURER'S ANCHORING DEVICES MEETING THE SPECIFICATION REQUIREMENTS MAY BE USED WHEN APPROVED BY THE ENGINEER.

FOR GATES EXCEEDING 6'-0" IN WIDTH ROLLED FORMED STEEL POST WILL NOT BE ALLOWED.

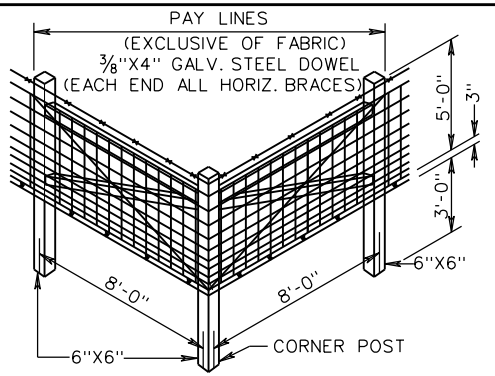
CHAIN LINK FENCE TO BE GROUNDED IN ACCORDANCE WITH DETAILS SHOWN ON STANDARD FE-6, WHERE REQUIRED.

| SPECIFICATION REFERENCE | STANDARD FENCE<br>GENERAL NOTES<br>VIRGINIA DEPARTMENT OF TRANSPORTATION | VDOT<br>ROAD AND BRIDGE STANDARDS |
|---|---|---|
| | | REVISION DATE: SHEET 1 OF 1<br>503.01 |

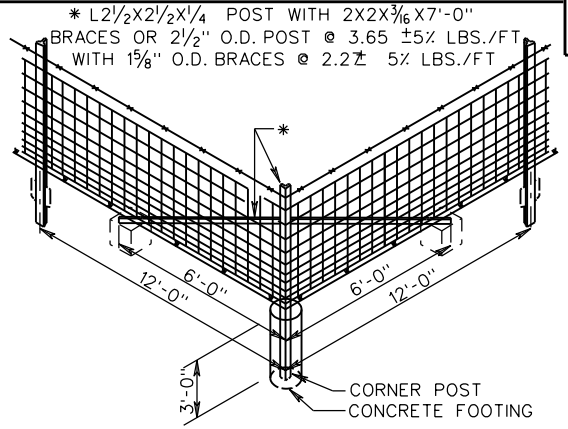
FE-W1,W2

## CORNER BRACE

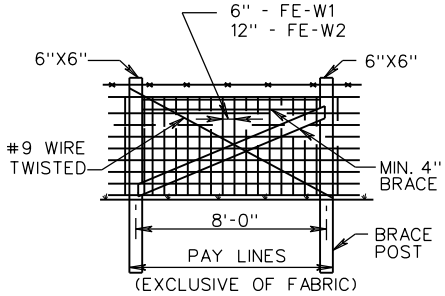
WOOD POST



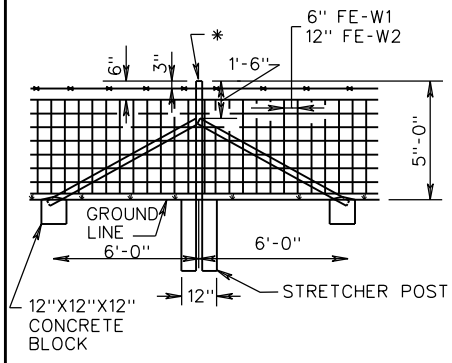

METAL POST




## LINE BRACE

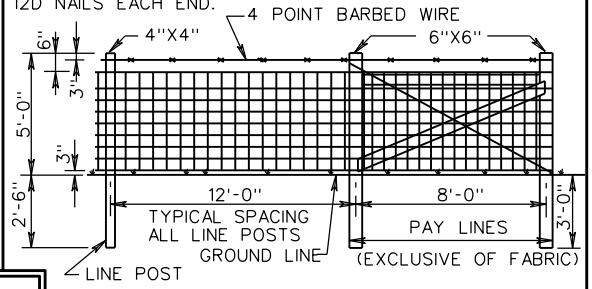


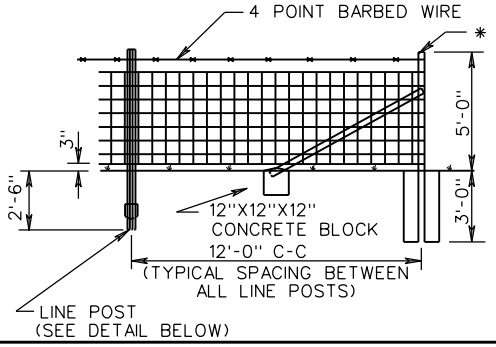

IF NOT OTHERWISE NOTED DIMENSIONS AND DESCRIPTIONS SHOWN ON ONE DRAWING APPLY TO OTHER DETAILS WITH THE SAME POST TYPE.




## LINE BRACE AT END LOCATION

THE BRACE WIRE TO BE PLACED AROUND POSTS WITH ONE WIRE ON EACH SIDE OF BRACE. WIRE TO BE DRAWN TAUT BY TWISTING BETWEEN BRACE AND EACH POST. THIS APPLIES TO ALL BRACE WIRES.
DIAGONAL 4" BRACES TO BE PLACED IN DIRECTION OF PULL. POST TO BE NOTCHED FOR DIAGONAL 4" BRACES. ALL 4" DIAGONAL BRACES TO HAVE TWO GALVANIZED 12D NAILS EACH END.



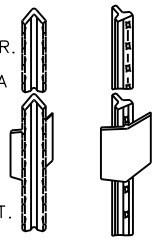

## NOTES:

SEE GENERAL NOTES-FENCING FOR ADDITIONAL DETAILS AND INSTRUCTIONS.

LINE POSTS ARE TO BE OF THE TYPES SHOWN OR EQUIVALENT MEETING THE APPROVAL OF THE ENGINEER.

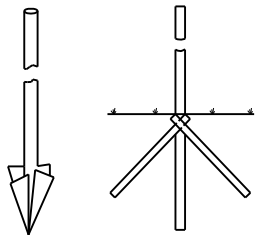
ALL POSTS ARE TO HAVE A MINIMUM WEIGHT OF 1.25 LBS./FT.

A MINIMUM OF FIVE CLAMPS FOR ATTACHING FABRIC TO POST ARE TO BE INCLUDED IN COST OF EACH LINE POST.



FLANGED TYPE "U" FLANGE TYPE "T"

### METAL LINE POST

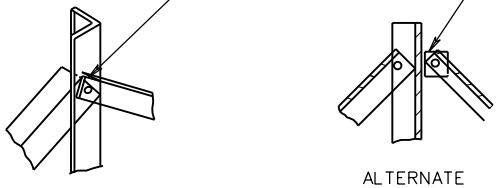


FOR USE IN LIEU OF SETTING POSTS IN CONCRETE.
DEVICES SHOWN ARE REPRESENTATIONAL ONLY, SEE GENERAL NOTES.

### ALTERNATE ANCHOR DEVICES

L2X2X3/16 TO BE CUT TO FIT AROUND L2½X2½X¼ STRETCHER POST.

L2½X2½X1/4, 2" LONG BRACKET BOLTED TO STRETCHER POST



ALTERNATE

### METHOD OF ATTACHING ANGLE BRACES TO STRETCHER POSTS

VDOT
ROAD AND BRIDGE STANDARDS

# STANDARD FENCE
## WOVEN WIRE FABRIC

VIRGINIA DEPARTMENT OF TRANSPORTATION

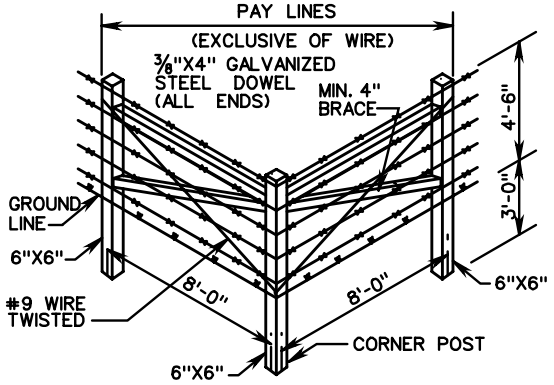
| SHEET 1 OF 1 | REVISION DATE |
|---|---|
| 503.02 | 7/13 |

SPECIFICATION REFERENCE
242
507
236

FE-B

## WOOD POST

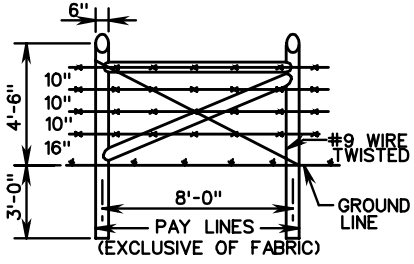
### CORNER BRACE




### LINE BRACE

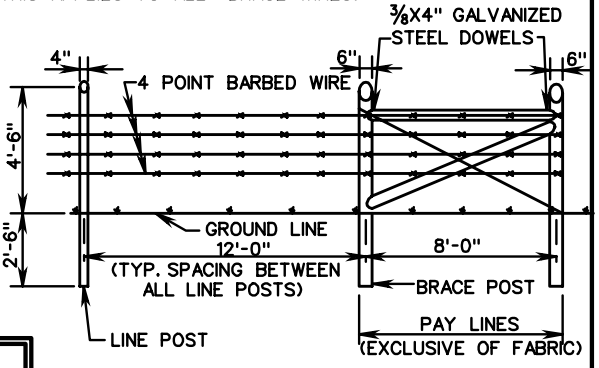
DIAGONAL 4" BRACE TO BE PLACED IN DIRECTION OF PULL.

POST TO BE NOTCHED FOR DIAGONAL 4" BRACES. ALL DIAGONAL 4" BRACES TO HAVE TWO GALVANIZED 12D NAILS AT EACH END.



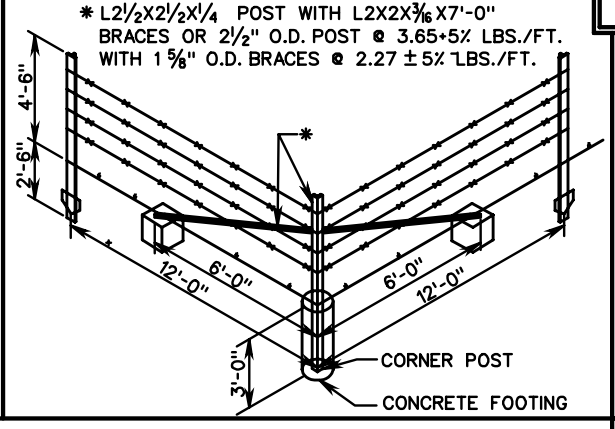

### LINE BRACE AT END LOCATION

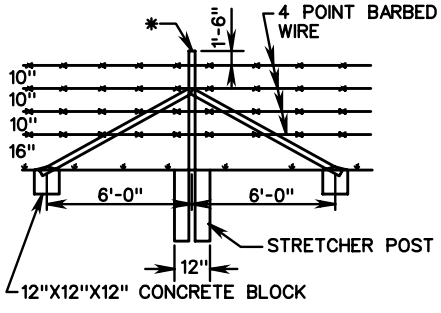
THE BRACE WIRE TO BE PLACED AROUND POSTS WITH ONE WIRE ON EACH SIDE OF BRACE. WIRE TO BE DRAWN TAUT BY TWISTING BETWEEN BRACE AND EACH POST. THIS APPLIES TO ALL BRACE WIRES.

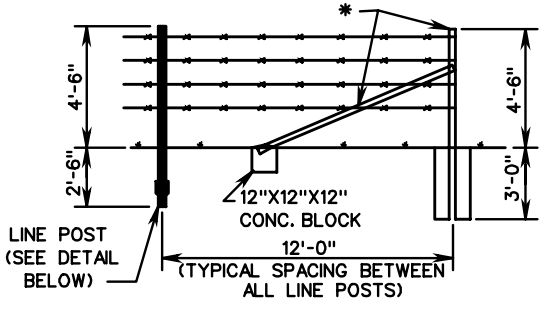


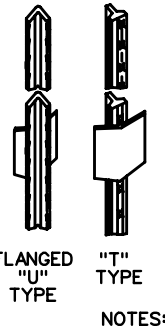

IF NOT OTHERWISE NOTED DIMENSIONS AND DESCRIPTIONS SHOWN ON ONE DRAWING APPLY TO OTHER DETAILS WITH THE SAME POST TYPE.

## METAL POST




LINE POSTS ARE TO BE OF THE TYPES SHOWN OR EQUIVALENT MEETING THE APPROVAL OF THE ENGINEER.

ALL POSTS ARE TO HAVE A MINIMUM WEIGHT OF 1.25 LBS./FT.

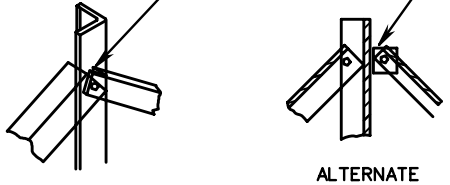
A MINIMUM OF FIVE CLAMPS FOR ATTACHING FABRIC TO POST ARE TO BE INCLUDED IN COST OF EACH LINE POST.

NOTES:
SEE GENERAL NOTES FENCING FOR ADDITIONAL DETAILS AND INSTRUCTIONS.

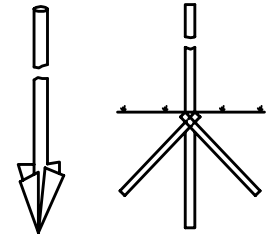
### METAL LINE POST

L2X2X3/16 TO BE CUT TO FIT AROUND L2½X2½X¼ STRETCHER POST.

L2½X2½X¼, 2" LONG BRACKET BOLTED TO STRETCHER POST




### METHOD OF ATTACHING ANGLE BRACES TO STRETCHER POSTS



FOR USE IN LIEU OF SETTING POSTS IN CONCRETE. DEVICES SHOWN ARE REPRESENTATIONAL ONLY. SEE GENERAL NOTES.

### ALTERNATE ANCHOR DEVICES

| SPECIFICATION REFERENCE |
|---|
| 242<br>507<br>236 |

# STANDARD FENCE

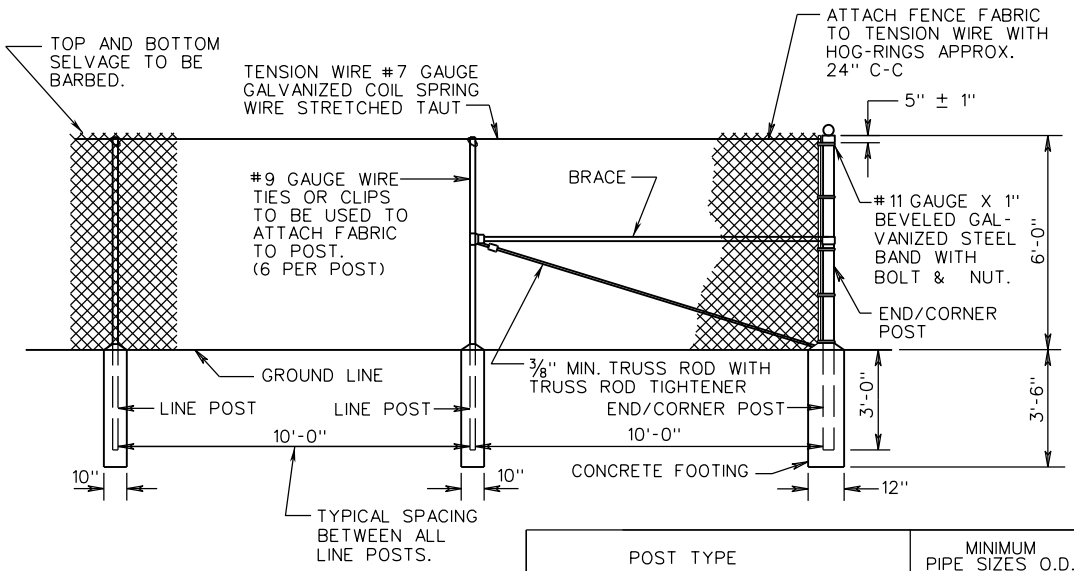
## BARBED WIRE

VIRGINIA DEPARTMENT OF TRANSPORTATION

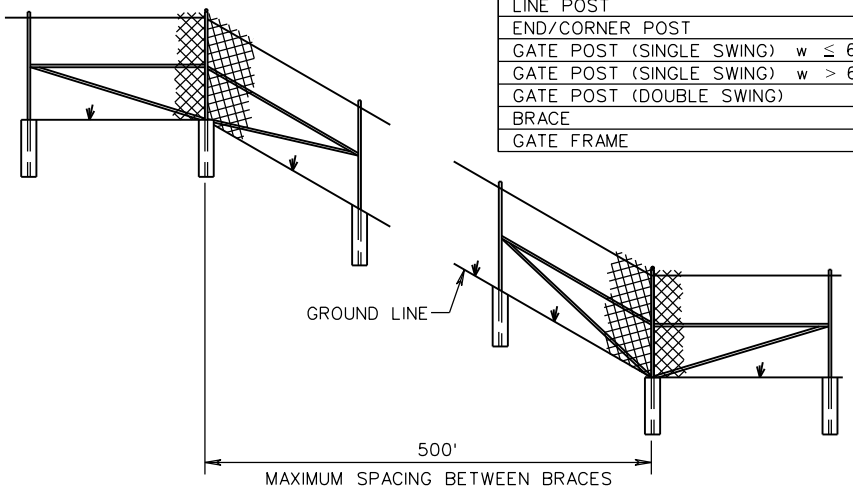
VDOT
ROAD AND BRIDGE STANDARDS

| REVISION DATE | SHEET 1 OF 1 |
|---|---|
| | 503.03 |

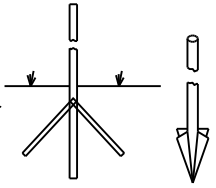
FE-CL




| POST TYPE | MINIMUM PIPE SIZES O.D. |
|---|---|
| LINE POST | 2.375" |
| END/CORNER POST | 2.875" |
| GATE POST (SINGLE SWING) w ≤ 6ft. | 2.875" |
| GATE POST (SINGLE SWING) w > 6ft. | 4.00" |
| GATE POST (DOUBLE SWING) | 2.875" |
| BRACE | 1.66" |
| GATE FRAME | 1.90" |




ALTERNATE ANCHOR DEVICES MAY BE USED IN LIEU OF SETTING POST IN CONCRETE. DEVICES SHOWN ARE REPRESENTATIONAL ONLY. SEE GENERAL NOTES.



ALTERNATE ANCHOR DEVICES

NOTES:

SEE GENERAL NOTES-FENCING FOR ADDITIONAL DETAILS AND INSTRUCTIONS

A MOISTURE-EXCLUDING CAP IS REQUIRED ON TUBULAR POSTS.

MATERIAL FOR CAP SHALL CONFORM TO THE ALLOWABLE TYPES FOR OTHER LISTED FITTINGS.

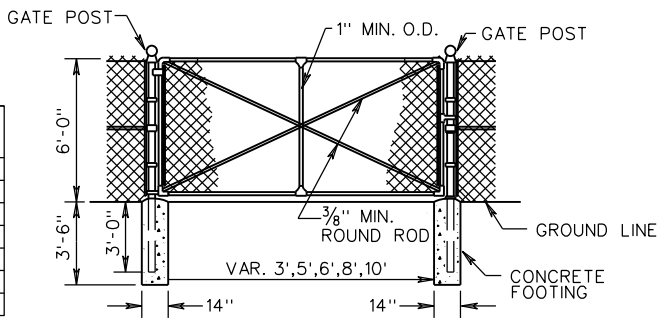
CORNER BRACE - TO BE USED WHEN HORIZONTAL ALIGNMENT CHANGES 15° OR MORE.

LINE BRACE - TO BE USED WHEN VERTICAL ALIGNMENT CHANGES 15° OR MORE

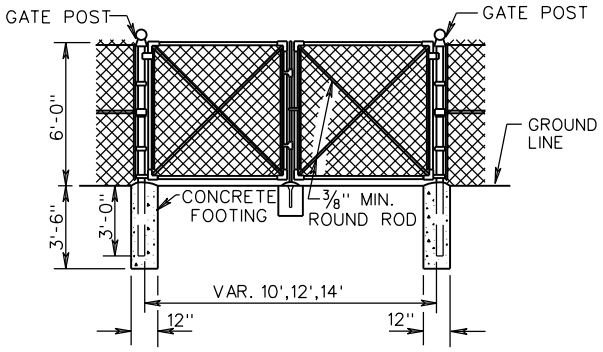
END/ CORNER POSTS SHALL BE USED WITH ALL LINE AND CORNER BRACES

BRACES SHALL BE INSTALLED HALF THE HEIGHT ABOVE THE GROUND LINE OF THE POST WHEN A TOP RAIL IS USED, OR TWO THIRDS THE HEIGHT ABOVE THE GROUND LINE WHEN A TENSION WIRE IS USED IN LIEU OF A TOP RAIL.

CHAIN LINK FENCE GREATER THAN 6 FEET IN HEIGHT SHALL BE SUBMITTED TO THE STANDARDS & SPECIAL DESIGN SECTION FOR APPROVAL.




SINGLE SWING GATE




DOUBLE SWING GATE

(TO BE USED WHERE SWINGING CLEARANCE IS LIMITED)

VDOT
ROAD AND BRIDGE STANDARDS

# STANDARD FENCE

## CHAIN LINK

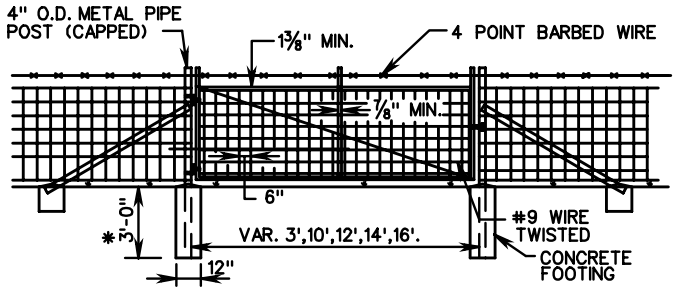
VIRGINIA DEPARTMENT OF TRANSPORTATION

| SHEET 1 OF 1 | REVISION DATE |
|---|---|
| 503.04 | 7/11 |

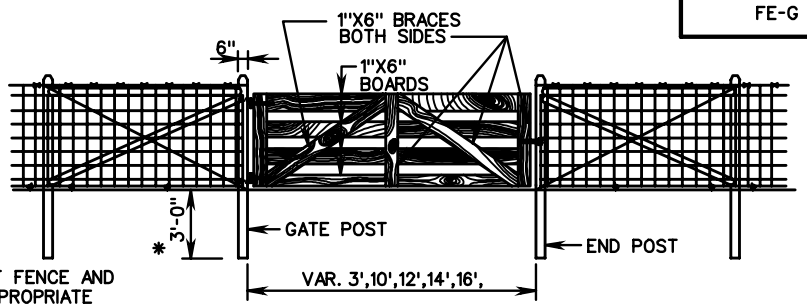
SPECIFICATION REFERENCE

242
507

FE-G



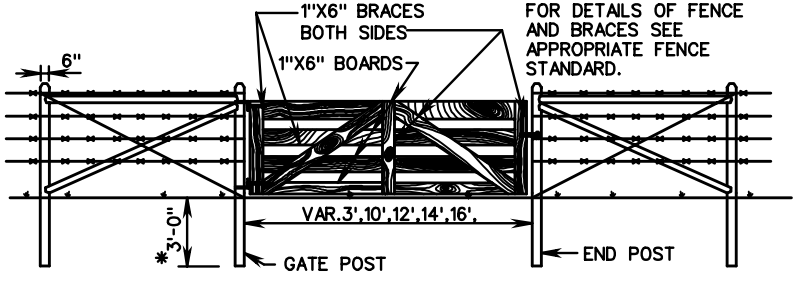

METAL GATE - METAL POSTS - WOVEN WIRE



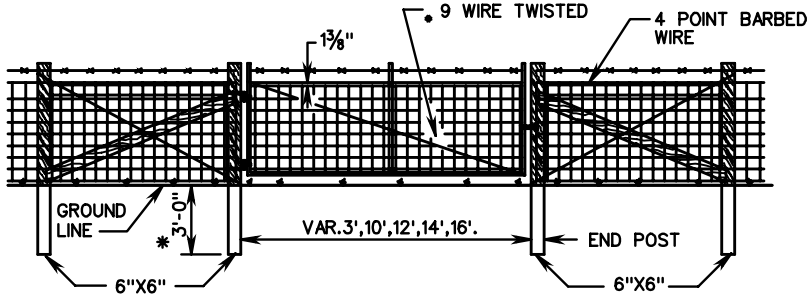

FOR DETAILS OF FENCE AND BRACES SEE APPROPRIATE FENCE STANDARD.

WOOD GATE - WOOD POSTS - WOVEN WIRE

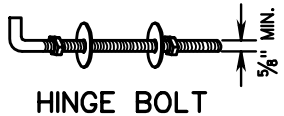
* IF GATE WIDTH EXCEEDS 12', GATE POST IS TO BE SET 3'-6" INTO GROUND HEIGHT OF GATE POST ABOVE GROUND DEPENDS ON TYPE OF FENCE USED- 5'-0", WOVEN WIRE FABRIC, 4'-6", BARBED WIRE.



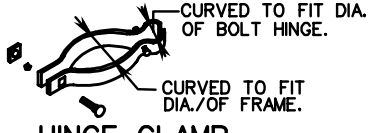

WOOD GATE - WOOD POSTS - BARBED WIRE




METAL GATE - WOOD POSTS - WOVEN WIRE




HINGE BOLT
(2 REQ'D)




HINGE CLAMP
(2 REQ'D)

SUGGESTED HINGE ASSEMBLY

WOOD GATE

BRACES ARE TO BE BOLTED AT EXTREMITIES AND INTERSECTIONS WITH A MIN. OF (2) ⅝" DIA. GALV. BOLTS, NUTS, AND WASHERS. ALL OTHER POINTS OF CONTACT ARE TO BE NAILED FROM BOTH SIDES WITH A MIN. OF 3-10D GALV. NAILS.

LUMBER FOR GATE IS TO BE ANY DRESSED, TRUE TYPE MEETING THE APPROVAL OF THE ENGINEER IT IS TO BE TREATED WITH PRESERVATIVES OTHER THAN CREOSOTE.

WOOD GATE IS TO HAVE TO COATS OF EXTERIOR WHITE PAINT UNLESS OTHERWISE DIRECTED BY THE ENGINEER. PAINT IS TO MEET THE REQUIREMENTS OF THE CURRENT ROAD AND BRIDGE SPECIFICATIONS.

METAL GATE

GATE FRAME AND CENTER BRACE TO BE TO THE DIMENSIONS SHOWN ON THE DRAWING EXCEPT THAT A 3" WIDTH GATE CAN HAVE A MIN. 1" FRAME WITH NO CENTER BRACE.

GATE IS TO BE HOT DIPPED GALVANIZED OR ELECTROPLATE GALVANIZED IN ACCORDANCE WITH ASTM A-164 TYPE GS.

GATE FABRIC IS TO BE ALL #11 GAUGE EXCEPT TOP AND BOTTOM STRANDS WHICH ARE TO BE #9 VERTICAL STRANDS ARE TO BE SPACED 6" APART.

MISCELLANEOUS

IF LOCATIONS OF GATES ARE NOT SPECIFIED ON PLANS, THEY ARE TO BE ERECTED AT THE SITES DESIGNATED BY THE ENGINEER.

GATE HINGE AND LATCH ASSEMBLIES MAY BE OF ANY TYPE MEETING THE APPROVAL OF THE ENGINEER, EXCEPT THAT ALL HINGES ARE TO BE OF A BOLT-THROUGH TYPE. ALL FITTINGS ARE TO BE HOT DIPPED GALVANIZED.

ANY COMBINATION OF GATE AND FENCE TYPES MEETING THE APPROVAL OF THE ENGINEER WILL BE ACCEPTABLE AND IS NOT LIMITED TO THE EXAMPLES SHOWN HEREON.

WHERE WOOD GATES POSTS FALL IN ROCK OR MARSHY AREAS THEY ARE TO BE SET IN CLASS A3 OR C1 CONCRETE.

| SPECIFICATION REFERENCE |
|---|
| 242 |
| 507 |
| 236 |

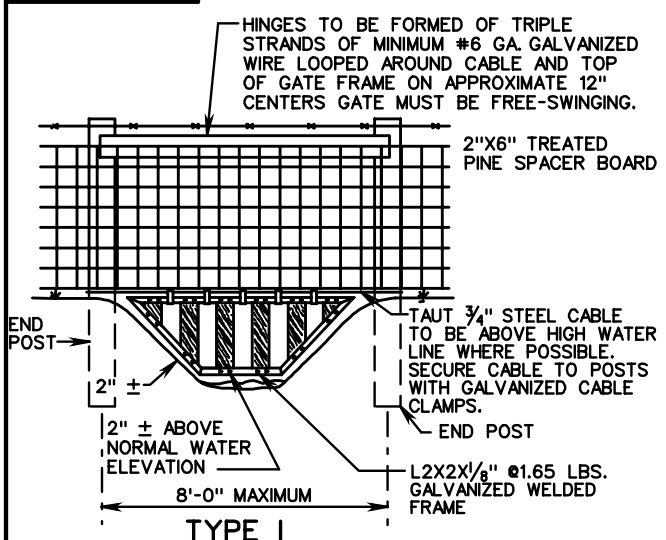
# STANDARD FENCE GATES

VIRGINIA DEPARTMENT OF TRANSPORTATION

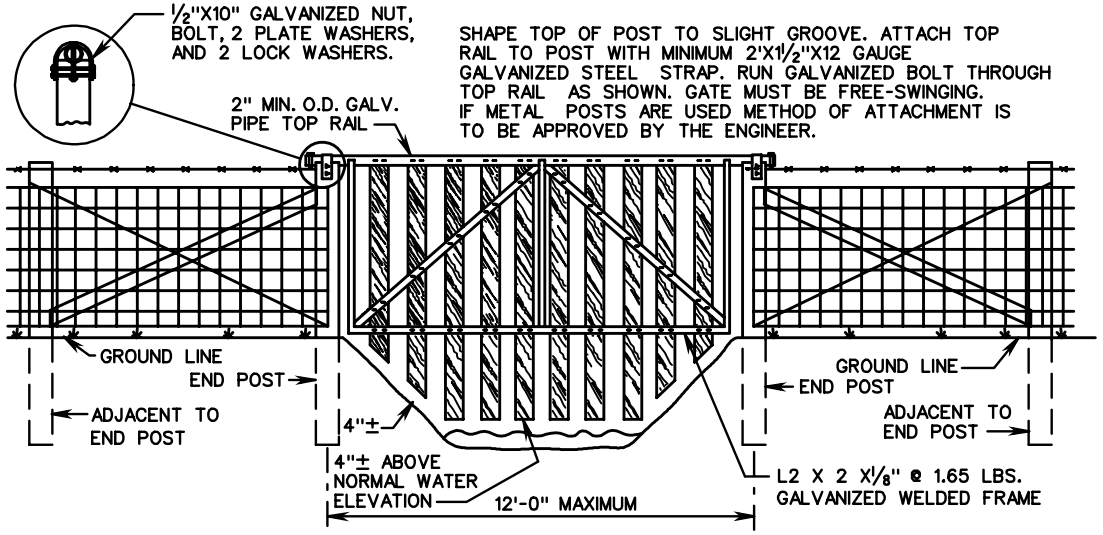
VDOT
ROAD AND BRIDGE STANDARDS

| REVISION DATE | SHEET 1 OF 1 |
|---|---|
| | 503.05 |

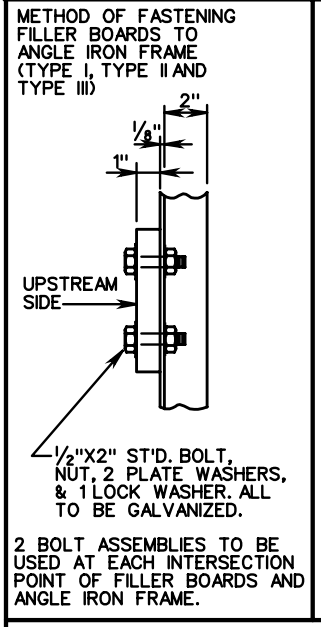
FE-4



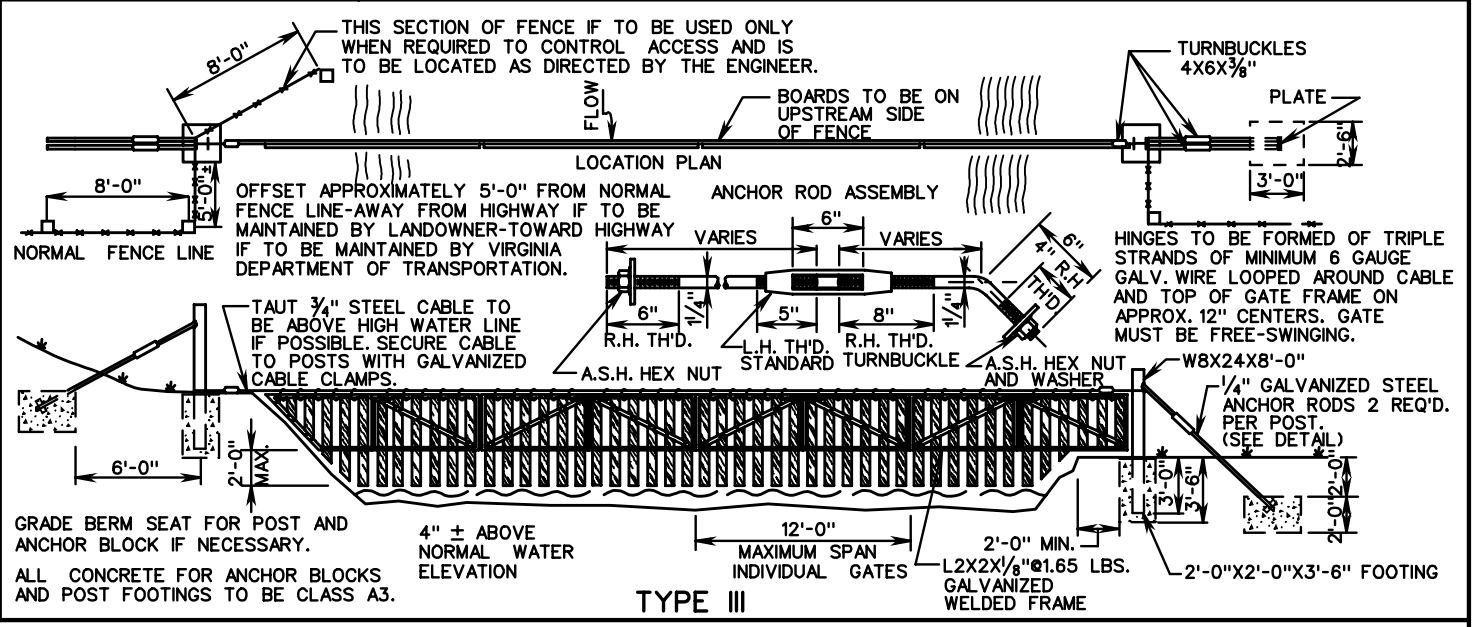

TYPE I




TYPE II




2 BOLT ASSEMBLIES TO BE USED AT EACH INTERSECTION POINT OF FILLER BOARDS AND ANGLE IRON FRAME.




TYPE III

NOTES:
- WATER GATES MAY BE USED WITH STANDARD FE-W1, FE-W2 OR FE-B FENCE.
- GATE IS TO BE FABRICATED TO CONFORM TO INDIVIDUAL CHANNEL REQUIREMENTS.
- WOOD FILLER BOARDS TO BE 1" TREATED PINE BOLTED TO FRAME. SMOOTH WOOD SIDE IS TO FACE UPSTREAM.
- TYPE I GATE IS TO HAVE TWO 8" END POSTS AS SPECIFIED FOR THE TYPE OF FENCE USED. THE ADJACENT TO END POST AND BRACING MAY BE ELIMINATED.
- TYPE II GATE IS TO HAVE TWO 8" END POSTS, ADJACENT TO END POSTS, BRACING, ETC. AS SPECIFIED FOR THE TYPE OF FENCE USED.

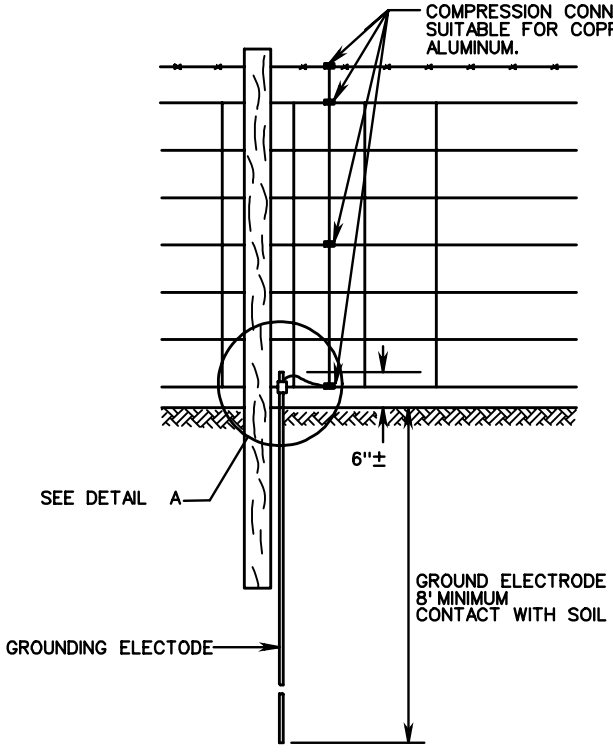
VDOT
ROAD AND BRIDGE STANDARDS

# WATER GATES IN FENCE LINES

VIRGINIA DEPARTMENT OF TRANSPORTATION

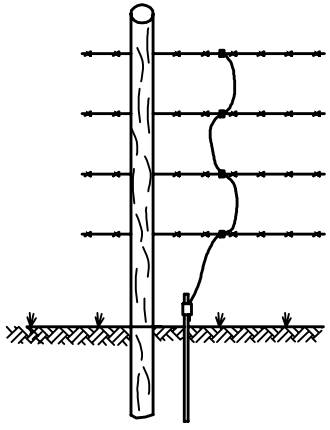
| SHEET 1 OF 1 | REVISION DATE |
|---|---|
| 503.06 | |

SPECIFICATION REFERENCE
242
507
236




ELEVATION

FOR CHAIN LINK FENCE GROUNDING, SEE DETAIL BELOW.



ELEVATION

NOTES:
APPROXIMATE MATERIALS PER INSTALLATION:
1-3/4" DIAMETER BY 10'-0" LONG COPPER CLAD GROUNDING ELECTRODE.
1 GROUNDING ELECTRODE CLAMP
1-7'-0"# 6 AWG SOLID COPPER CONDUCTOR
3* COMPRESSION CONNECTORS (SUITABLE FOR COPPER AND ALUMINUM)

* MINIMUM 3 CONNECTORS FOR 47" FENCE FABRIC TO BE SECURED TO TOP, BOTTOM AND ONE INTERMEDIATE HORIZONTAL WIRE STRAND. ONE ADDITIONAL CONNECTOR TO BE FURNISHED FOR EACH STRAND OF BARBED WIRE.

ON BARBED WIRE INSTALLATIONS, ONE CONNECTOR IS TO BE FURNISHED FOR EACH STRAND.

GROUNDING CONDUCTOR IS TO BE IN CONTACT WITH HORIZONTAL WIRE OF FENCE BY COMPRESSION CONNECTORS AS SHOWN.

GROUNDING ELECTRODE TO BE LOCATED ON POST SIDE OF FENCE AND AS CLOSE AS POSSIBLE TO POST AND FENCE.

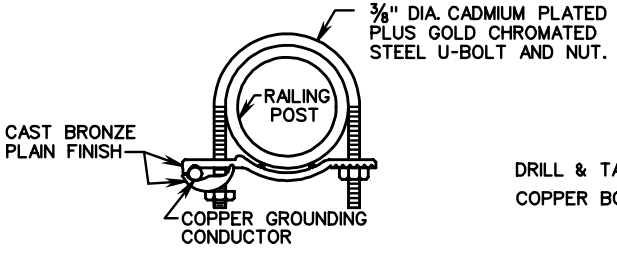
UNLESS OTHERWISE CALLED FOR IN THE PLANS OR DIRECTED BY THE ENGINEER, FENCE GROUNDING WILL BE REQUIRED FOR METAL FENCES INCLUDING PLASTIC COATED FENCE FABRIC AT THE FOLLOWING LOCATIONS.

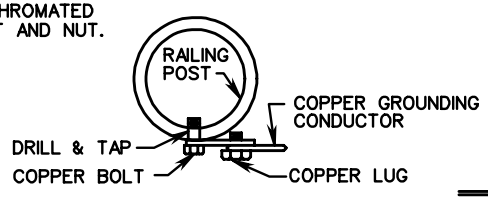
-WHEN HIGH VOLTAGE LINES CROSS ABOVE THE FENCE. GROUNDING SYSTEMS SHALL BE INSTALLED 50' BEYOND THE OVERHEAD CROSSING POINT OF THE OUTER MOST CONDUCTORS OF THE HIGH VOLTAGE LINES.

-WHEN THE HIGH VOLTAGE LINES ARE PARALLEL TO AND WITHIN 50' HORIZONTALLY OF THE FENCE. GROUNDING SYSTEMS SHALL BE INSTALLED AT 50' INTERVALS ALONG THE PARALLEL SECTIONS OF FENCE AND HIGH VOLTAGE LINES.

COST FOR FURNISHING AND PLACING ALL GROUNDING MATERIALS IS TO BE INCLUDED IN PRICE BID PER LINEAR FOOT OF FENCE.

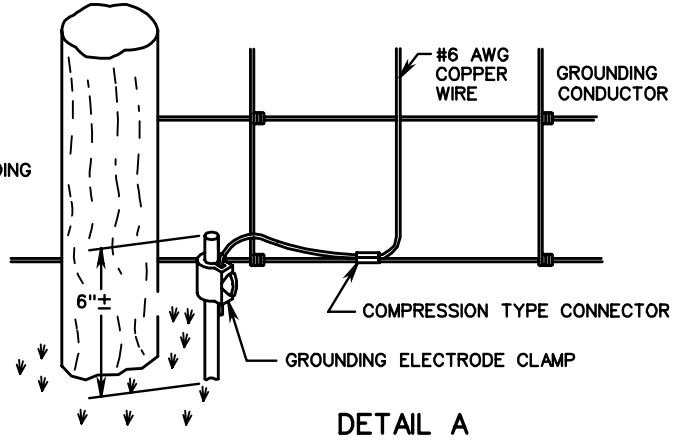
DETAILS SHOWN HEREON ARE TO APPLY TO ALL METAL FENCES AND HANDRAILS. FENCES WILL BE GROUNDED ONLY WHEN INDICATED ON THE PLANS OR AS RECOMMED BY THE ENGINEER.




ALTERNATE

CHAIN LINK FENCE SHALL 3 CONNECTIONS FOR EACH GROUNDING CONDUCTOR/ELECTRODE: ONE CLAMP CONNECTION AT POST BASE AND TWO COMPRESSION CONNECTORS ON THE CHAIN LINK AT MIDDLE AND TOP.

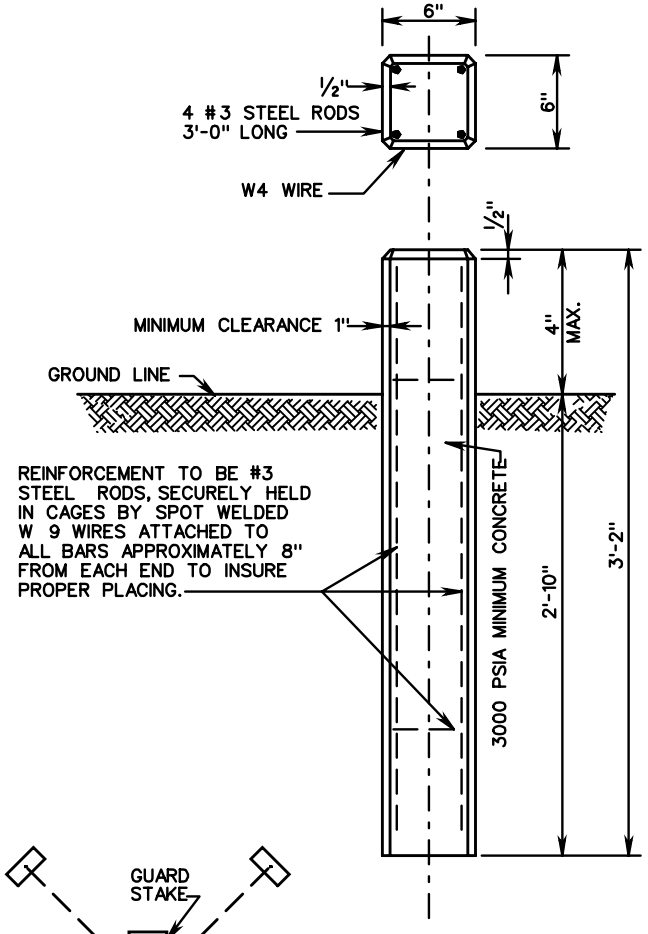



DETAIL A

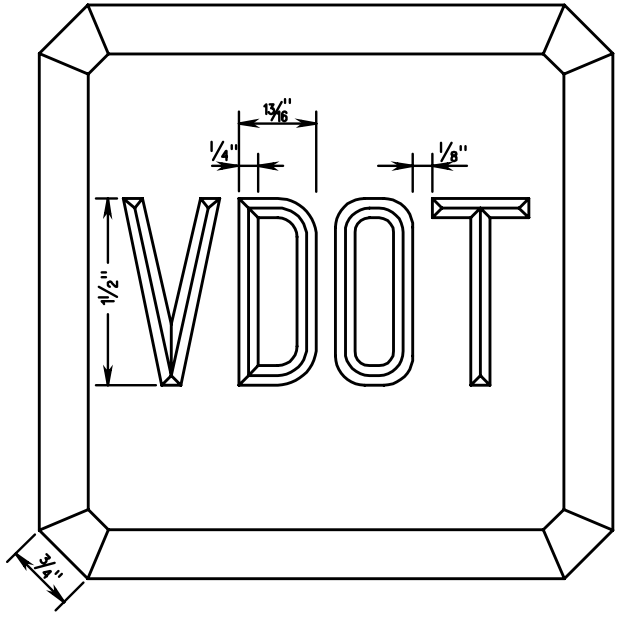
## DETAIL FOR GROUNDING STEEL POST OF CHAIN LINK FENCE & HANDRAIL (HR-1)

| SPECIFICATION REFERENCE | STANDARD METHOD OF FENCE & HANDRAIL GROUNDING | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 507<br>238 | VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE<br>SHEET 1 OF 1<br>503.07 |

RM-1




CENTER OF BACK OF MONUMENT TO BE CORRECT FOR STATION AND ALIGNMENT.




NOTES:

THE LETTERS "VDOT" ARE TO BE INDENTED IN THE TOP OF EACH RIGHT-OF-WAY MONUMENT.

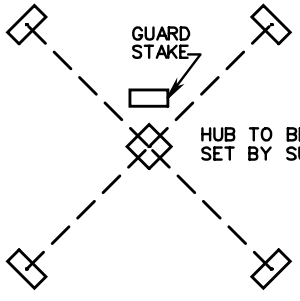
IN ENTRANCES AND YARDS WHERE THE MONUMENTS WOULD BE UNSIGHTLY, THEY MAY BE SET WITH THE TOP FLUSH WITH THE GROUND.

ALL LETTERING TO BE 1½" STANDARD FOUNDRY LETTERS.

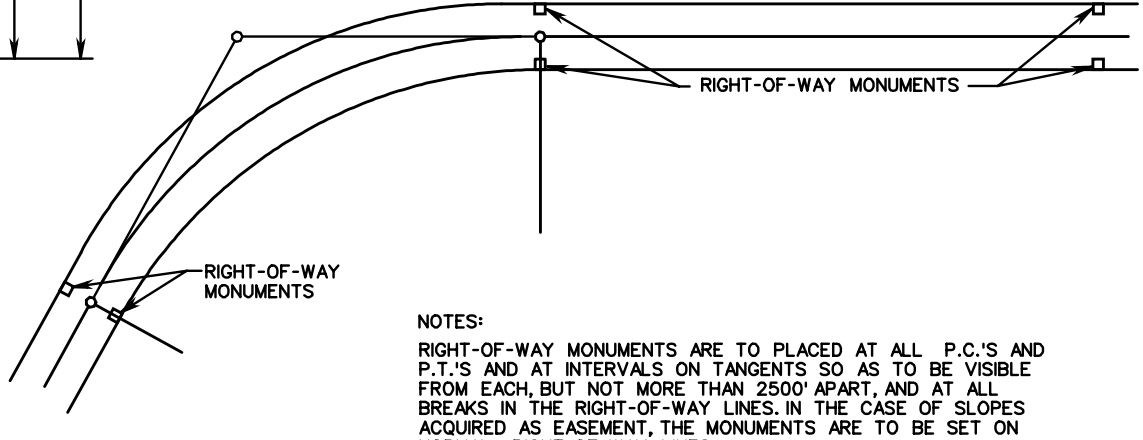
## ALTERNATE METHODS OF PLACING WIRES

WIRES ON ALL 4 SIDES WELDED TO ALL 4 BARS.

WIRES ON 3 SIDES WELDED TO ALL 4 BARS.




BEFORE HUB IS DISTURBED IN SETTING MONUMENTS FOUR LINER STAKES ARE TO BE SET, SO THAT TWO LINES STRETCHED BETWEEN STAKES WILL INTERSECT EXACTLY OVER TACK IN HUB. TOPS OF STAKES TO BE MORE THAN 9" ABOVE GROUND AT MONUMENT.




NOTES:

RIGHT-OF-WAY MONUMENTS ARE TO PLACED AT ALL P.C.'S AND P.T.'S AND AT INTERVALS ON TANGENTS SO AS TO BE VISIBLE FROM EACH, BUT NOT MORE THAN 2500' APART, AND AT ALL BREAKS IN THE RIGHT-OF-WAY LINES. IN THE CASE OF SLOPES ACQUIRED AS EASEMENT, THE MONUMENTS ARE TO BE SET ON NORMAL RIGHT-OF-WAY LINES.

RIGHT-OF-WAY MONUMENTS ARE TO BE SET PLUMB.

VDOT
ROAD AND BRIDGE STANDARDS

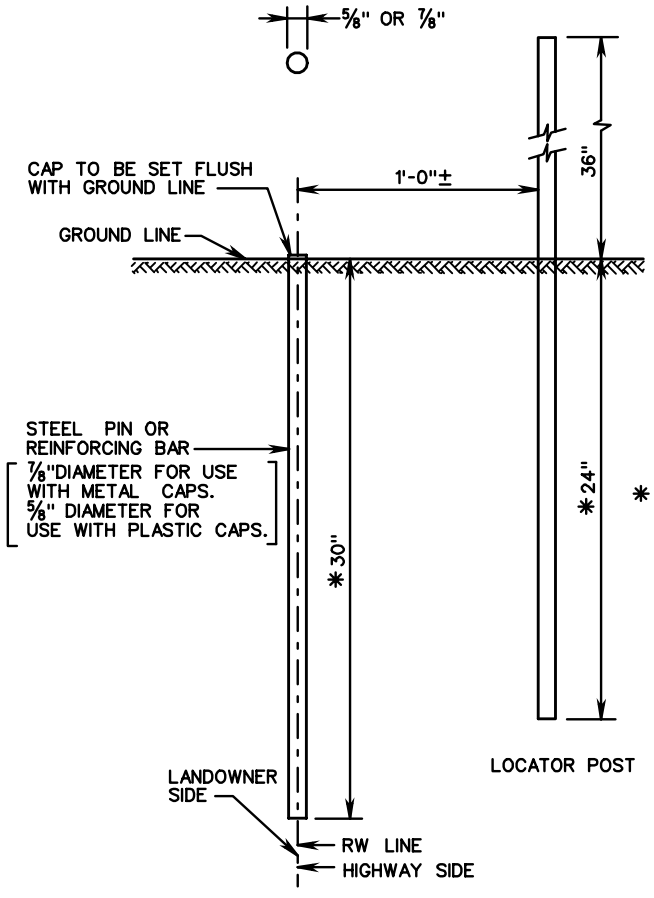
# STANDARD PLAN AND METHOD OF SETTING RIGHT-OF-WAY MONUMENTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

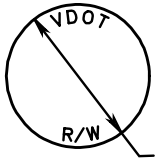
| SHEET 1 OF 1 | REVISION DATE |
|---|---|
| 504.01 | |

SPECIFICATION REFERENCE

503

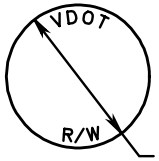



* DEPTH OF PIN AND LOCATOR POST IN THE GROUND MAY BE LENGTHENED OR SHORTENED TO FIT CONDITIONS.




METAL CAP IS TO BE CADMIUM PLATED BRASS OR STAINLESS STEEL, SECURED WITH ROUND HEAD, DRIVE SCREW #4 X 5/16" TYPE U.

## METAL CAP DETAIL




PLASTIC CAP IS TO BE HIGH VISIBILITY ORANGE WITH STAMPED, BLACK LETTERS.

## PLASTIC CAP DETAIL

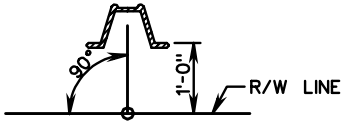
CAPS TO BE FURNISHED BY VDOT

NOTES:

LOCATOR POST TO BE U-TYPE ROLLED RAIL STEEL @ 2 LBS./FT. OR ALUMINUM ALLOY 6063-T6 @ 0.78 LBS./FT. IN ACCORDANCE WITH THE SPECIFICATIONS.

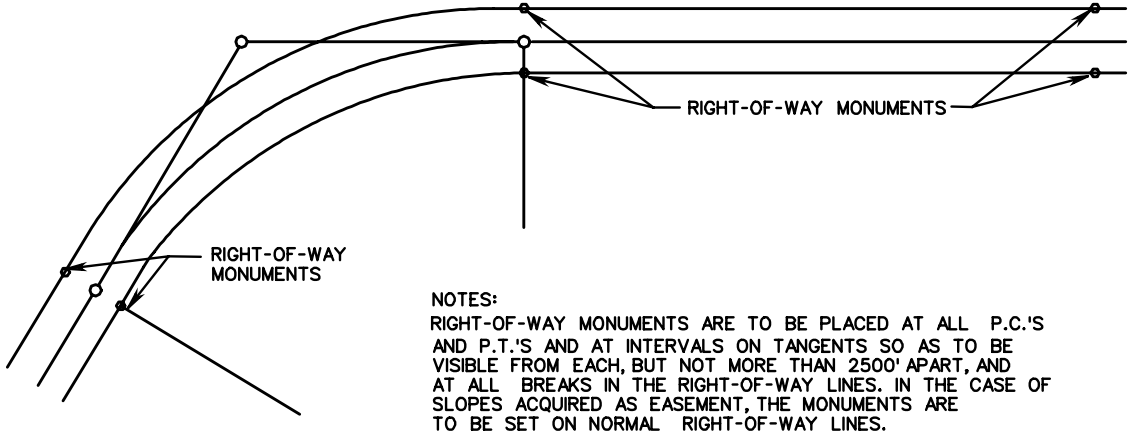
STEEL POSTS TO BE GALVANIZED IN ACCORDANCE TO ASTM A123.

LOCATOR POST AND PIN TO BE SET BY THE SURVEY PARTY AT THE TIME OF ORIGINAL STAKING.




PIN TO BE ACCURATELY SET BY SURVEY PARTY AND CAP PUNCHED TO INDICATE R/W LINE.

LOCATOR POST IS TO BE ELIMINATED IN URBAN AREAS.




NOTES:

RIGHT-OF-WAY MONUMENTS ARE TO BE PLACED AT ALL P.C.'S AND P.T.'S AND AT INTERVALS ON TANGENTS SO AS TO BE VISIBLE FROM EACH, BUT NOT MORE THAN 2500' APART, AND AT ALL BREAKS IN THE RIGHT-OF-WAY LINES. IN THE CASE OF SLOPES ACQUIRED AS EASEMENT, THE MONUMENTS ARE TO BE SET ON NORMAL RIGHT-OF-WAY LINES.

RIGHT-OF-WAY MONUMENTS ARE TO BE SET PLUMB.

| SPECIFICATION REFERENCE | STANDARD PLAN AND METHOD OF SETTING RIGHT-OF-WAY MONUMENTS | VDOT ROAD AND BRIDGE STANDARDS |
|---|---|---|
| 219<br>503 | VIRGINIA DEPARTMENT OF TRANSPORTATION | REVISION DATE<br>SHEET 1 OF 1<br>504.02 |

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