January 9, 2004

MEMORANDUM

To: All Holders of the Virginia Department of Transportation’s 2001 Road and Bridge Standards

The following is a list of standards contained in the 2001 Road and Bridge Standards that have been revised. Please add these pages to your copy of the standards. An insertable sheet will not be required in plan assemblies.

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The following is a list of revised standards to the 2001 Road and Bridge Standards that do require an insertable sheet to be included in your plan assembly until the next edition of the imperial standards is published. Please add these pages to your copy of the standards. The respective insertable sheet number has been placed with the revised standard. An insertable sheet is available for each of these revised standards. The insertable sheets are available on VDOT’s web site on the FTP server and in Falcon DMS for VDOT personnel. These insertable sheets will be required in plan assemblies for projects utilizing the standard items listed below that have not been to advertisement prior to June 9, 2004.

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<td>Removed load transfer dowel into bridge (section F-F). Revised anchor slab detail.</td>
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<tr>
<td>501.47</td>
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<td>Revised flare rates.</td>
</tr>
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</table>
If you have any questions or comments regarding the listed revisions to this publication, please contact Mrs. N. E. Berry of the Engineering Services Section at (804) 786-2543.

Sincerely,

Mohammad Mirshahi, P.E.
State Location and Design Engineer
STANDARD CURB DROP INLET

12" - 24" PIPE: MAXIMUM Depth (H) = 9'

Virginia Department of Transportation

Sheet 1 of 2

Rev. 01/04.
10/93

Insertable Sheet A153

Specification Reference

233
302
GENERAL

1. METHOD “A” PIPE BEDDING SHALL BE USED FOR ALL TYPES OF PIPE CULVERTS WITHIN THE APPLICABLE HEIGHT OF COVER RANGE NOTED IN THE STANDARD PC-TABLES UNLESS OTHERWISE NOTED ON THE PLANS.

2. H - HEIGHT OF COVER MEASURED FROM TOP OF CULVERT TO FINISHED GRADE.

3. b - EXCAVATION DEPTH AS SHOWN ON PLANS OR TO FIRM BEARING SOIL.

CIRCULAR PIPE

1. D - OUTSIDE DIAMETER OF PIPE.

2. d - INSIDE DIAMETER OF PIPE.

3. X - WIDTH OF CLASS I BACKFILL MATERIAL BEYOND THE EXTREMITY OF THE PIPE.
   X = 12" WHERE d IS LESS THAN 36”.
   X = 18” WHERE d IS 36” AND GREATER.

4. WHERE DIRECTED BY THE ENGINEER, BEDDING MATERIAL MAY BE ELIMINATED FOR NORMAL EARTH FOUNDATIONS UNDER ROUTINE ENTRANCE PIPE (EXCEPT PLASTIC PIPE) 30” AND LESS IN DIAMETER WITH HEIGHT OF COVER 15” OR LESS.

5. REGULAR BACKFILL MATERIAL MAY BE USED IN LIEU OF CLASS I BACKFILL MATERIAL FOR ALL FOUNDATION TYPES FOR ROUTINE ENTRANCE PIPE (EXCEPT PLASTIC PIPE) 30” AND LESS IN DIAMETER WITH HEIGHT OF COVER 15” OR LESS.

6. BEDDING MATERIAL AND CLASS I BACKFILL MATERIAL MAY BE ELIMINATED FOR SHOULDER SLOT INLET 10I-13 OUTLET PIPE INSTALLATIONS.

ELLIPtical PIPE

1. S₁ - OUTSIDE SPAN DIMENSION OF PIPE.

2. S₂ - INSIDE SPAN DIMENSION OF PIPE.

3. R - OUTSIDE RISE DIMENSION OF PIPE.

4. X - WIDTH OF CLASS I BACKFILL MATERIAL BEYOND THE EXTREMITY OF THE PIPE.
   X = 12” WHERE S₂ IS LESS THAN 36”.
   X = 18” WHERE S₂ IS 36” AND GREATER.

5. WHERE DIRECTED BY THE ENGINEER, BEDDING MATERIAL MAY BE ELIMINATED FOR NORMAL EARTH FOUNDATIONS UNDER ROUTINE ENTRANCE PIPE WHERE S₂ IS 36” OR LESS AND HEIGHT OF COVER 15” OR LESS.

6. REGULAR BACKFILL MATERIAL MAY BE USED IN LIEU OF CLASS I BACKFILL MATERIAL FOR ALL FOUNDATION TYPES FOR ROUTINE ENTRANCE PIPE WHERE S₂ IS 38” OR LESS AND HEIGHT OF COVER 15” OR LESS.

PIPE ARCH

1. S - SPAN DIMENSION OF PIPE.

2. R - RISE DIMENSION OF PIPE.

3. D - SEE PC-TABLE FOR APPLICABLE PIPE MATERIAL.

4. X - WIDTH OF CLASS I BACKFILL MATERIAL BEYOND THE EXTREMITY OF THE PIPE.
   X = 12” WHERE S₂ IS LESS THAN 36”.
   X = 18” WHERE S₂ IS 36” AND GREATER.

5. WHERE DIRECTED BY THE ENGINEER, BEDDING MATERIAL MAY BE ELIMINATED FOR NORMAL EARTH FOUNDATIONS UNDER ROUTINE ENTRANCE PIPE WHERE S₂ IS 35” OR LESS AND HEIGHT OF COVER 15” OR LESS.

6. REGULAR BACKFILL MATERIAL MAY BE USED IN LIEU OF CLASS I BACKFILL MATERIAL FOR ALL FOUNDATION TYPES FOR ROUTINE ENTRANCE PIPE WHERE S IS 35” OR LESS AND HEIGHT OF COVER 15” OR LESS.
NO PROJECTION OF PIPE ABOVE GROUND LINE

NORMAL EARTH FOUNDATION

ROCK FOUNDATION

FOUNDATION SOFT, YIELDING, OR OTHERWISE UNSUITABLE MATERIAL

PIPE PROJECTION ABOVE GROUND LINE

NORMAL EARTH FOUNDATION

ROCK FOUNDATION

FOUNDATION SOFT, YIELDING, OR OTHERWISE UNSUITABLE MATERIAL

BEDDING MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.

CLASS I BACKFILL MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.

REGULAR BACKFILL MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.

EMBANKMENT

NOTE: FOR PLASTIC PIPE, THE LIMITS OF THE CLASS I BACKFILL MATERIAL SHALL BE EXTENDED TO 12" ABOVE THE TOP OF THE PIPE.

INSTALLATION OF PIPE CULVERTS AND STORM SEwers
CIRCULAR PIPE BEDDING AND BACKFILL - METHOD "A"

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCES

302
303

REV. 1/04
107.01
INSTALLATION OF BOX CULVERTS
BEDDING AND BACKFILL - METHOD "A"

H = HEIGHT OF COVER MEASURED FROM TOP OF CULVERT TO FINISHED GRADE.

FOR NORMAL EARTH FOUNDATION:
FOR PRECAST AND CAST IN PLACE BOX CULVERT b = 6".

FOR ROCK FOUNDATION:
FOR PRECAST BOX CULVERT b = 1/4" PER 12" OF H = 8" MIN., 24" MAX.
FOR CAST IN PLACE BOX CULVERT b-DEPTH AS SHOWN ON PLANS OR WHERE NO BEDDING IS SPECIFIED BOTTOM SLAB TO BE KEYED INTO EXISTING ROCK FOUNDATION.
FOR SOFT, YIELDING OR OTHERWISE UNSUITABLE FOUNDATION:
FOR PRECAST AND CAST IN PLACE BOX CULVERT b = DEPTH AS SHOWN ON PLANS OR TO FIRM BEARING SOIL.

BEDDING MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.
REGULAR BACKFILL MATERIAL IN ACCORDANCE WITH SECTION 302 OF THE ROAD AND BRIDGE SPECIFICATIONS.
EMBANKMENT.

VIRGINIA DEPARTMENT OF TRANSPORTATION
SUGGESTED METHOD OF TEMPORARILY PLACING RIPRAP FOR EROSION CONTROL IN CHANNELS, DITCHES, & AT TOE OF FILL SLOPES

NOTES:
1. THE DEPTH OF PROTECTION WILL DEPEND ON WHATEVER DEPTH IS ATTAINABLE, WITH THE RIPRAP BEING EVENLY SPREAD WITH THE QUANTITY SHOWN ON THESE PLANS. RIPRAP MAY BE ADDED OR DELETED AS FOUND NECESSARY BY THE ENGINEER.

MINIMUM REQUIREMENTS FOR STABILIZED CONSTRUCTION ENTRANCE

PROFILE
1. SURFACE WATER SHALL BE PIPPED UNDER THE CONSTRUCTION ENTRANCE. IF PIPING IS IMPractical, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.

2. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT OF WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHT OF WAY SHALL BE REMOVED IMMEDIATELY.

3. WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT OF WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.

4. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER HEAVY USE AND EACH RAIN.

X SIDE SLOPES AND BOTTOM WIDTH (OF TRAPEZOIDAL) SHOWN IN TYPICAL SECTION OF PROPOSED DITCH OR CHANNEL.

SPECIFICATION REFERENCE
REV. 1/04
115.61

TEMPORARY EROSION & Siltation Control

VIRGINIA DEPARTMENT OF TRANSPORTATION
STANDARD ENTRANCE GUTTER
FOR USE WITH UNPAVED SPACE BETWEEN CURB & SIDEWALK

FOR USE WITH UNPAVED SPACE BETWEEN CURB & SIDEWALK

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV: 1/04
203.02
STANDARD ENTRANCE GUTTER

Virginia Department of Transportation

502
NOTES:
1. DETECTABLE WARNING TO BE CLASS A-3 CONCRETE (CLASS A-4 IF PRECAST) WITH SLIP RESISTANT INTEGRAL SURFACE COVERING THE FULL WIDTH OF THE RAMP FLOOR BY 2 FOOT IN LENGTH IN THE DIRECTION OF PEDESTRIAN TRAVEL OTHER TYPES OF MATERIAL WITH THE TRUNCATED DOME DETECTABLE WARNING MAY BE USED WITH THE APPROVAL OF THE ENGINEER.
2. THE DETECTABLE WARNING SHALL BE PROVIDED BY TRUNCATED DOMES, TRUNCATED DOMES TO BE STAMPED IF CAST IN PLACE OR PRECAST IN TOP SURFACE THE COLOR OF THE DETECTABLE WARNING SECTION SHALL BE A CONTRASTING COLOR WITH THE ADJACENT SURFACES (ADJACENT SURFACES INCLUDES FLARED SIDES) OR FEDERAL SAFETY YELLOW.
3. SLOPING SIDES OF CURB RAMP MAY BE POURED MONOLITHICALLY WITH RAMP FLOOR OR BY USING PERMISSIBLE CONSTRUCTION JOINT WITH REQUIRED BARS.
4. IF RAMP FLOOR IS PRECAST, HOLES MUST BE PROVIDED FOR BOWEL BARS SO THAT ADJOINING FLARED SIDES CAN BE CAST IN PLACE AFTER PLACEMENT OF PRECAST RAMP FLOOR. PRECAST CONCRETE SHALL BE CLASS A-4.
5. REQUIRED BARS ARE TO BE NO. 5 X 8" PLACED "CENTER TO CENTER" ALONG BOTH SIDES OF THE RAMP FLOOR, MID-DEPTH OF RAMP FLOOR. MINIMUM CONCRETE COVER 1½".
6. CURB/ CURB AND GUTTER SLOPE TRANSITIONS ADJACENT TO CURB RAMPS ARE INCLUDED IN PAYMENT FOR CURB/ CURB AND GUTTER.
7. CURB RAMPS ARE TO BE LOCATED AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. THEY ARE TO BE PROVIDED AT INTERSECTIONS WHEREVER AN ACCESSIBLE ROUTE WITHIN THE RIGHT OF WAY OF A HIGHWAY FACILITY CROSSES A CURB REGARDLESS OF WHETHER SIDEWALK IS EXISTING, PROPOSED, OR NON-EXISTENT. THEY MUST BE LOCATED WITHIN PEDESTRIAN CROSSWALKS AS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER AND SHOULD NOT BE LOCATED BEHIND VEHICLE STOP LINES, EXISTING LIGHT POLES, FIRE HYDRANTS, DRAIN INLETS, ETC. ACCESSIBLE ROUTES PROVIDE A CONTINUOUS UNOBSURSTRED, STABLE, FIRM AND SLIP RESISTANT PATH CONNECTING ALL ACCESSIBLE ELEMENTS OF A FACILITY THAT CAN BE APPROACHED, ENTERED AND USED BY PEDESTRIANS.
8. RAMPS MAY BE PLACED ON RADIAL OR TANGENTIAL SECTIONS PROVIDED THAT THE CURB OPENING IS PLACED WITHIN THE LIMITS OF THE CROSSWALK AND THAT THE SLOPE AT THE CONNECTION OF THE CURB OPENING IS PERPENDICULAR TO THE CURB.
9. TYPICAL CONCRETE SIDEWALK IS 4" THICK. WHEN THE ENTRANCE ROAD CANNOT ACCOMMODATE THE TURNING REQUIREMENTS OF ANTICIPATED HEAVY TRUCK TRAFFIC THE CONCRETE SIDEWALK DEPTH SHOULD BE INCREASED TO 7".

CG-12 DETECTABLE WARNING SURFACE
TYPE B (PARALLEL) APPLICATION

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 1/04
203-06
CG-12 DETECTABLE WARNING SURFACE
TYPE C (PARALLEL & PERPENDICULAR) APPLICATION

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION
REFERENCE

105
502

SHEET 3 OF 3

REV. 1/04
203.07

NOTE:
1. DETECTABLE WARNING TO BE CLASS A-3 CONCRETE (CLASS A-4 IF PRECAST) WITH SLIP RESISTANT INTEGRAL SURFACE COVERING THE FULL WIDTH OF THE RAMP FLOOR BY 2 FOOT IN LENGTH IN THE DIRECTION OF PEDESTRIAN TRAVEL. OTHER TYPES OF MATERIAL WITH THE TRUNCATED DOME DETECTABLE WARNING MAY BE USED WITH THE APPROVAL OF THE ENGINEER.

2. THE DETECTABLE WARNING SHALL BE PROVIDED BY TRUNCATED DOMES. TRUNCATED DOMES TO BE STAMPED IF CAST-IN-PLACE OR PRECAST IN TOP SURFACE. THE COLOR OF THE DETECTABLE WARNING SECTION SHALL BE A CONTRASTING COLOR WITH THE ADJACENT SURFACES (ADJACENT SURFACES INCLUDES FLARED SIDES). OR FEDERAL SAFETY YELLOW.

3. SLOPING SIDES OF CURB RAMP MAY BE Poured MONOLITHICALLY WITH RAMP FLOOR OR BY USING PERMISSIBLE CONSTRUCTION JOINT WITH REQUIRED BARS.

4. IF RAMP FLOOR IS PRECAST, HOLES MUST BE PROVIDED FOR DOWEL BARS SO THAT ADJOINING FLARED SIDES CAN BE CAST IN PLACE AFTER PLACEMENT OF PRECAST RAMP FLOOR. PRECAST CONCRETE SHALL BE CLASS A-4.

5. REQUIRED BARS ARE TO BE NO. 5 X 8" PLACED 1 CENTER TO CENTER ALONG BOTH SIDES OF THE RAMP FLOOR, MID-DEPTH OF RAMP FLOOR. MINIMUM CONCRETE COVER 1/2".

6. CURB CURB AND GUTTER SLOPE TRANSITIONS ADJACENT TO CURB RAMPS ARE INCLUDED IN PAYMENT FOR CURB CURB AND GUTTER.

7. CURB RAMPS ARE TO BE LOCATED AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. THEY ARE TO BE PROVIDED AT INTERSECTIONS WHEREVER AN ACCESSIBLE ROUTE WITHIN THE RIGHT OF WAY OF A HIGHWAY FACILITY CROSSES A CURB REGARDLESS OF WHETHER SIDEWALK IS EXISTING, PROPOSED, OR NONEXISTENT. THEY MUST BE LOCATED WITHIN PEDESTRIAN CROSSWALKS AS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER, AND SHOULD NOT BE LOCATED BEHIND VEHICLE STOP LINES. EXISTING LIGHT POLES, FIRE HYDRANTS, DROP INLETS, ETC. ACCESSIBLE ROUTES PROVIDE A CONTINUOUS UNOBSTRUCTED, STABLE, AND DURABLE PATH CONNECTING ALL ACCESSIBLE ELEMENTS OF A FACILITY THAT CAN BE APPROACHED, ENTERED, AND USED BY PEDESTRIANS.

8. RAMPS MAY BE PLACED ON RAIL OR TANGENTIAL SECTIONS PROVIDED THAT THE CURB OPENING IS PLACED WITHIN THE LIMITS OF THE CROSSWALK AND THAT THE SLOPE AT THE CONNECTION OF THE CURB OPENING IS PERPENDICULAR TO THE CURB.

9. TYPICAL CONCRETE SIDEWALK IS 4" THICK. WHEN THE CURB OPENING CANNOT ACCOMMODATE THE TURNING REQUIREMENTS OF ANTICIPATED HEAVY TRUCK TRAFFIC THE CONCRETE SIDEWALK DEPTH SHOULD BE INCREASED TO 7".
COMMERCIAL ENTRANCE
(HEAVY TRUCK TRAFFIC ANTICIPATED)

502

SPECMIFICATION
REFERENCE

REV. 1/94

203.08

VIRGINIA DEPARTMENT OF TRANSPORTATION
9' THICK CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
14 FOOT TRAVEL LANE

Virginia Department of Transportation
10" THICK CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
14 FOOT TRAVEL LANE

VIRGINIA DEPARTMENT OF TRANSPORTATION

316
13" THICK CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
14' TRAVEL LANE

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV 1/04
30126

SPECIFICATION REFERENCE

3/6
GR-8 TYPE II TERMINAL TREATMENT
(RUN-OFF ANCHORAGE)

STANDARD W BEAM GUARDRAIL (WEAK POST SYSTEM)
TL-3 (>45 MPH)

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE
221 505
GUARDRAIL AT LOW-FILL CULVERTS

Virginia Department of Transportation

Specifications Reference: 221, 505

Sheet 1 of 2

Revision: 1/04

Table of Maximum Allowable Structure Widths for this Design

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<th>Type I: Two Posts Omitted</th>
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<td><strong>Skew</strong></td>
<td><strong>A</strong></td>
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<tr>
<td>0° 9&quot;</td>
<td>10.5</td>
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<tr>
<td>5° 9&quot;</td>
<td>10.4</td>
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<tr>
<td>45° 9&quot;</td>
<td>7.0</td>
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</tbody>
</table>

**NOTES:**
1. This sheet is applicable when guardrail is required and the depth of fill above the top slab of the box culvert is less than 3'-7".
2. Guardrail installation shall be in accordance with Section 505 of the Specifications. Material requirement for components shall be in accordance with Section 221 of the Specifications.
3. Guardrail post spacing shall be in accordance with Standard GR-2.
4. 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 splicees in nested W-beam sections must coincide at a common point and be bolted together using one set of bolts at each splice.
# Guardrail at Low-Fill Culverts

**Virginia Department of Transportation**

**Specification Reference**

- 221
- 505

**Revision:** 1/04

## Guardrail at Low-Fill Culverts

### Type I: Three Posts Omitted

**Plan**

- 25'-0" Min. Std. Gr-2
- 25'-0" Min. Std. Gr-2 with nested W-beams, see Note 5
- 25'-0" Min. Std. Gr-2 with nested W-beams, see Note 5
- 25'-0" Min. Std. Gr-2 and approved terminal end treatment

**Elevation**

- 50'-0" Min. Std. Gr-2 and approved terminal end treatment

**Notes:**

1. This sheet is applicable when guardrail is required and the depth of fill above the top slab of the box culvert is less than 3'-7".

2. Guardrail installation shall be in accordance with Section 505 of the specifications. Material requirement for components shall be in accordance with Section 221 of the specifications.

3. Guardrail post spacing shall be in accordance with standard Gr-2.

4. Two nested W-beam guardrails, see table for allowable widths (25'-0" maximum).

5. Two nested W-beam guardrails, CRT wood post, 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.
NOTES:

1. FOR POSITIVE CONNECTION DETAILS AND DIMENSIONS SEE SHEETS 501.59 • 501.61.
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.

*SUGGESTED MAXIMUM FLARE RATE FOR RIGID BARRIER SYSTEMS.

PRECAST TRAFFIC BARRIER SERVICE CONCRETE

Virginia Department of Transportation
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 psf 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, or #8 or local material available within the limits of project consisting of coarse sand, sandy loam or sandy gravel.

3" dia weep holes to be provided on 10 ft. centers unless otherwise approved by the engineer. Locate within lower slope face of barrier to drain to roadway.

Dowels and optional construction joint are to be in accordance with MB-12A.

MB-12A B, C

CONCRETE MEDIAN BARRIER (TALL WALL)

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 1/04

501.56
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 1 1/2" 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 STD.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.

SEE MB-12 FOR DETAILS

SECTION A-A
(Foundation not shown)

SECTION B-B
(STD. MB-12B)

REINFORCING STEEL IS NOT SHOWN SEE TYPE I AND II FOR REINFORCING REINFORCEMENT TO BE PLACED ON HIGHEST SIDE OF TRANS.

REINFORCING RATE SEE TABLE

PLAN VIEW

WIDTH VARIES 2'-0"-3'-0"

TO BE PAID
MEDIAN BARRIER MB-13
TYPE I, II OR III

TO BE PAID
MB-12B

SEALABLE SHEET A104

FLARE RATES

<table>
<thead>
<tr>
<th>DESIGN SPEED</th>
<th>INSIDE SHY LINE</th>
<th>BEYOND SHY LINE</th>
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CONCRETE MEDIAN BARRIER
TYPE I, II OR III

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE
305
404
502

REV. 1/ 04
501.58
NOTES:

- APPROXIMATE MATERIALS PER INSTALLATION:
  - 1-3/4" ROUND BY 8'-0" LONG COPPER CLAD GROUND ROD
  - 1 GROUND ROD CLAMP
  - 1/2" C" 6# AWG SOLID COPPER WIRE
  - 3 COMPRESSION CONNECTORS (SUITABLE FOR COPPER AND ALUMINUM)

- MINIMUM 3 CONNECTORS FOR 43" 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 BARGED WIRE INSTALLATIONS, ONE CONNECTOR IS TO BE FURNISHED FOR EACH STRAND.

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

- GROUND ROADS TO BE LOCATED ON POST SIDE OF FENCE AND AS CLOSE AS POSSIBLE TO POST AND FENCE.

UNLESS 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 (500 KV AND ABOVE) CROSS ABOVE THE FENCE, GROUNDS SHALL BE INSTALLED 50' BEYOND THE OVERHEAD CROSSING POINT OF THE OUTER MOST CONDUCTORS OF THE HIGH VOLTAGE LINES.

- WHEN THE HIGH VOLTAGE LINES (500 KV AND ABOVE) ARE PARALLEL TO AND WITHIN 40' HORIZONTALLY OF THE FENCE, GROUNDS SHALL BE INSTALLED AT 50' INTERVALS ALONG THE FENCE FOR THE PARALLEL SECTION OF FENCE AND HIGH VOLTAGE LINES.

COST FOR FURNISHING AND PLACING ALL GROUNDING MATERIALS IS TO BE INCLUDED IN BID PER LINEAR METER OF FENCE. DETAILS SHOWN HEREIN ARE TO APPLY TO ALL FENCE TYPES. LAWN FENCES WILL BE GROUNDED ONLY WHEN RECOMMENDED BY THE ENGINEER.

DETAIL FOR GROUNDING STEEL POST OF CHAIN LINK FENCE

DETAIL A

STANDARD METHOD OF FENCE GROUNDING

SPECIFICATION REFERENCE

507
236

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV 1/04
502.07
**NOTES:**

1. **IF THERE IS A NEED TO PROVIDE FOR INCREASED ACCESS, THE FOLLOWING MAY BE CONSIDERED IN CONJUNCTION WITH THE LOCAL POSTMASTER:**
   
   **A. PROVIDE A LEVEL CLEAR FLOOR SPACE 30 in. x 48 in. CENTERED ON THE BOX FOR EITHER SIDE OR FORWARD APPROACH.**

   **B. PROVIDE AN ACCESSIBLE PASSAGE TO AND FROM THE MAILBOX AND PROJECT INTO A CIRCULATION ROUTE (NO MORE THAN 12 in. IF BETWEEN 28 in. AND 50 in. AFF) SO THAT THE MAILBOX DOES NOT BECOME A PROTRUDING OBJECT FOR PEDESTRIANS WITH IMPAIRED VISION.**

2. **STRIVE FOR A 6 in. MINIMUM HOWEVER, IN SOME SITUATIONS THIS MAY NOT BE PRACTICAL.** IN THOSE CASES, PROVIDE AS MUCH AS POSSIBLE.

3. **IF A TURNOUT IS PROVIDED, THIS MAY REDUCE TO ZERO.**

4. **BEHIND TRAFFIC-FACE OF CURB.**
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<tr>
<th>RADIUS (FT)</th>
<th>10'</th>
<th>11'</th>
<th>12'</th>
<th>16'</th>
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**Design Factors for a Design Speed of 20 MPH (Rural) Using E-8% Max.**

- **Design Velocity:** 20
- **Software Equivalents (Number of Lanes at Lane Width):**
- **W-8 Max.:**
- **Design Factors:**
  - CR
  - LS
  - w

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**Note:**
- CR, LS, and w values in feet.
- Listed radius is the minimum allowable radius for the corresponding CR, LS, and w values.
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<th>25 MPH CURVES - DESIGN SPEED</th>
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### DESIGN FACTORS FOR A DESIGN SPEED OF 25 MPH (RURAL) USING E - 8% MAX.

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**NOTE:**

CR, LS, w = VALUES IN FEET. LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING CR, LS, AND w VALUES.
<table>
<thead>
<tr>
<th>Design Factors for a Design Speed of 35 MPH (Rural) Using E = 82 MAX.</th>
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**Transition Curves - Rural**

**NOTE:** CR, LS, and W values in feet. Listed radius is the minimum allowable radius for the corresponding E, CR, LS, and W values.
NOTES:
1. \( \frac{1}{2} \)" diameter wire inlets shall be provided at the following locations:
   A. On span structures on the front leg of end pole 12" below bottom chord.
   B. On cantilever structures on pole 12" below bottom chord.
   C. On span structures below bottom chord at centerline behind first sign panel from each end pole.
   D. On cantilever structures below bottom chord at centerline behind first sign panel from pole.

2. All unused wire inlets shall be capped water tight.

3. Distance shall be no less than the minimum indicated in Standard OR-INS.

4. No mortar, grout, or concrete shall be placed between bottom of base plate and top of pedestal.

5. Distance between bottom of base plate and top of pedestal shall be less than or equal to twice the diameter of anchor bolt but shall not be greater than 3".

6. Vertical clearance for overhead and bridge mounted sign structures shall be no less than 15 feet 0 inch and no more than 21 feet 0 inch from the bottom of the lowest mounted sign panel to the crown of the roadway, unless otherwise specified on the plans. Luminaire assemblies shall have vertical clearance of no less than 17 feet six inches from the bottom of the assembly to the crown of the roadway.
ELECTRIC DETAILS FOR SIGN LIGHTING

SPAN SIGN STRUCTURE

FRONT VIEW

SECTION A-A

Photoelectric Control
Service Entrance Head
Rigid Metal Conduit
Safety Switch
Contactor
Liquid Tight Flexible Conduit

CANTILEVER SIGN STRUCTURE

FRONT VIEW

SECTION B-B

Photoelectric Control
Service Entrance Head
Rigid Metal Conduit
Safety Switch
Contactor
Rigid Metal Conduit

Note:
A safety switch shall be installed on all sign structures requiring electrical power. Electrical service for sign structures not controlled by a control center shall have a photocell and a photocell-controlled contactor to control the electrical power to luminaires. The contactor shall be in a NEMA 3R enclosure within 24 inches of the safety switch.

All conduit located in or on overhead sign structure shall be 3/4" minimum.
SIGN HANGER ERECTION DETAIL WITH LUMINAIRE RETRIVAL SYSTEM

Note:
Luminaire Retrieval System including electrical system shall be equal to "LUMINAR" and designed for the number of luminaires indicated on the plans. Spacing of hangers used to support the retrieval system shall be in accordance with manufacturer's recommendations. Luminaires shall be of sufficient length to align with the vertical edge of the outside paved shoulder (18") or shall be extended 5 feet beyond the vertical edge (18") of the outermost sign luminaire whichever is greater. The opposite end of the retrieval system shall extend a minimum of 5 inches past the outermost vertical edge of the sign hanger arm.

Luminaires and Luminaire Retrieval System required only where indicated on the plans.

Signs fabricated using the SPD-1 "Alternate Sign Panel Design" shall be affixed to the sign hangers in accordance with SSP-VIA-"Alternate Details for Type VIA Interstate Sign Structures", except that post clamps shall not be used. Post clamp bolts shall be inserted through holes drilled into the sign hangers and secured using a stainless steel lockwasher and nut.

SECTION A-A

Aluminum Sign Hanger W4 x 3.06 placed no greater than 2'-3" from the left and right edges of sign panel and then spaced 4'-0" o.c. maximum.

Top of sign shall be tilted towards traffic so that the sign face is 3" from vertical.

SECTION B-B

1\(\frac{1}{8}\)" diameter Aluminum bolts, nuts and lockwashers

1\(\frac{1}{8}\)" S.S. U-Bolts, nuts and lockwashers

TYPICAL DETAILS FOR OVERHEAD SIGN STRUCTURES

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 1/04
1301.74
SIGN ATTACHMENT TO TRUSS-TYPE STRUCTURES

SECTION A-A

SECTION B-B

SECTION D-D

TYPICAL DETAILS FOR OVERHEAD SIGN STRUCTURES

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 1/04

112/15