The guardrail to bridge connections contained in this Index are for bridges with Test Level 4 traffic railing barriers. For guardrail In addition to use at roadside hazards or other areas where the Engineer has deemed guardrail necessary, guardrail should be provided. Flared end anchorage assemblies providing 4’ offset are the standard end anchorage for single face free standing guardrail approach ends. Parallel end anchorage assemblies for guardrail approach end anchorage will be constructed only where curvatures permit construction of flared end anchors.

Guardrail end anchorage assemblies shall be of the type called for in the plans. If the plans call for a "flared" end anchorage assembly and does not identify the specific system to be used, the contractor has the option to construct any FDOT approved "flared" end anchorage assembly identified on the Approved Products List (APL), subject to the conditions identified in these drawings or the approved APL drawings.

If the plans call for a "parallel" end anchorage assembly and does not identify the specific system to be used, the contractor has the option to construct any FDOT approved "parallel" end anchorage assembly identified on the APL, subject to the conditions identified in these drawings, or the approved APL drawings.

If the plans call for a specific end anchorage assembly, substitutions with other end anchorage assemblies will not be permitted unless approved by the Engineer. Approved substitutions will not be eligible for CSIP consideration.

Currently approved proprietary end anchorage assemblies are identified on the Approved Products List (APL). Manufacturers seeking approval of proprietary end anchorage assemblies for inclusion on the APL must submit an application with appropriate documentation showing that the end anchorage assembly is deemed eligible by the Federal Highway Administration (FHWA) for federal funding on the National Highway System (NHS) and is compatible with FDOT guardrail systems. System approvals will be contingent upon FDOT’s evaluation of crash test performance results for consistency with FDOT system applications and use. If approved, product drawings installed and sealed by a professional engineer licensed in the State of Florida is required.

At above ground right hazards where the face of guardrail is offset from the hazard less than the 5’ minimum for standard W-beam, other guardrail configurations with reduced post spacing may be applicable. See General Note No. 11 and the minimum offset table on Sheet 19. For guardrail with post spacing less than 6’-0” the reduced spacing should extend a minimum of one panel in advance of the hazard. When minimum offset cannot be attained safety shape concrete barrier wall shall be used unless other shielding is approved by the Engineer of Record. See Index No. 410 for safety shape concrete barrier walls and typical applications, and the plans for special barrier shapes and applications.

In addition to use at roadside hazards or other areas where the Engineer has deemed guardrail necessary, guardrail should be provided on flush shoulder sections where fill slopes are steeper than 1:3 within the clear zone and fill heights are 6’ or greater. Curved sections should be evaluated for installation of guardrail where fill slopes are steeper than 1:3 and fill heights are 6’ or greater within 22’ of the traveled way. For additional details on curved sections, see DETAIL L LOCATION AT CURB & GUTTER SECTIONS.

The guardrail to bridge connections contained in this Index are for bridges with Test Level 4 traffic railing barriers. For guardrail to concrete barrier wall connections see Index No. 410. For existing bridges receiving retrofit traffic railing barriers see Index No. 402.

The W-beam guardrail system in this index is the standard system to be used on the State Highway System where a Test Level 3 semi-rigid barrier is required.

The modified three-beam guardrail is a Test Level 4 semi-rigid system and may be used where a Test Level 4 guardrail is required.

12. Single lane median guardrail for bridges located on divided roadways shall be constructed the same as outer roadway under the following conditions:

13. Corrugated sheet steel beams, end shoes, end sections and backup plates shall conform to the requirements of AASHTO M180, Class I (12 gauge), Type II (2Mc) coating, except the W-Thrie Beam Transition Panel detailed on Sheet 20A shall be Class I (10 gauge). All other metallic components, hardware and accessories shall be in conformance with the appropriate current AASHTO requirements.

14. Crash cushions may be required in lieu of or in conjunction with guardrail at locations where space does not permit development of a "standard" guardrail. Crash cushions or Redirective Median End Anchorage Assemblies shall be constructed as or in lieu of Type II assemblies located in the approach clear zones.

15. Crash cushions may be required in lieu of or in conjunction with guardrail at locations where space does not permit development of a "standard" guardrail. Crash cushions or Redirective Median End Anchorage Assemblies shall be constructed as or in lieu of Type II assemblies located in the approach clear zones.
1. All FLARED OPTION and PARALLEL OPTION drawings are representative of the various proprietary guardrail end anchorage assemblies listed on the Department's Approved Products List (APL). For specific details and requirements refer to the manufacturer's detailed drawings, procedures and specifications located on the Approved Products List (APL) website at www.dot.state.fl.us/programmanagement/

2. These drawings present general graphics which depict the limits of payment for guardrail and end anchorage assemblies, modifications to the shoulder, and placement of miscellaneous asphalt mow strips.

3. These drawings, along with the various manufacturer drawings on the APL, are intended to include sufficient details for installation of the end anchorage assembly and their connection to Standard Guardrail. This precludes requirements for shop drawing submittals unless otherwise called for in the plans. The various end anchorage assemblies shall be assembled in accordance with the manufacturer's detailed drawings, procedures and specifications.

4. The various proprietary end anchorage assemblies listed on the APL are intended for use as approach end guardrail anchorages for Standard Guardrail. The actual length of end anchorage assemblies vary refer to the manufacturer's drawings on the APL for their length and use of special panels and details. Standard guardrail, guardrail transitions or other special treatments shall not be included within the limits of the end anchorage assembly. See the manufacturer drawings for the alignment of the end anchorage assemblies with respect to the normal guardrail alignment.

5. Flared or parallel end anchorage assemblies shall not be used in medians where horizontal clearance requires the use of a back rail.

6. Each of the various end anchorage assemblies have unique features. Careful attention shall be given to the types and orientation of the posts and other components. Refer to the manufacturer's drawings for the specific requirements of each system.

7. For galvanizing requirements of the metallic components see Standard Specifications Section 967.

8. Test Level 3 End Anchorage Assemblies are suitable for all design speeds. However, use a 53'-10" long TL-3 End Anchorage Assembly shown on the APL for Design Speeds greater than or equal to 50 mph and a 40'-7" long TL-2 End Anchorage Assembly Shown on the APL for Design Speeds less than or equal to 45 mph.

9. Flared end anchorage assemblies shall be paid for under the contract unit price for Guardrail, End Anchorage Assembly - Flared, EA. Parallel end anchorage assemblies shall be paid for under the contract unit price for Guardrail, End Anchorage Assembly - Parallel, EA.

The unit price for end anchorage assemblies shall be full compensation for furnishing and installing all components in accordance with these drawings, the plans and the manufacturer's detailed drawings, procedures and specifications.
Approach End Anchorage Details

Flared Option
Elevation View

Parallel Option
Elevation View
Equation Variables:

\[ D = \text{Distance in feet from near edge of the near approach traffic lane to either (a) the back of hazard, when the hazard is located inside the clear zone or horizontal clearance or (b) the clear zone or horizontal clearance outer limit, when the hazard extends to or goes beyond the clear zone or horizontal clearance limit. For left side hazards on two-way undivided facilities, } D \text{ is measured from the inside edge of the near approach traffic lane (see Figure 2).} \]

\[ d = \text{Distance in feet from the near edge of the near approach traffic lane to the face of guardrail at its intersection with the departure line. For left side hazards on two-way undivided facilities, } d \text{ is measured from the inside edge of the near approach traffic lane (see Figure 2).} \]

For flared and parallel end anchorage assemblies the beginning length of need is to be set at the center of post #3. That is, the departure line must intersect the face of the rail at post #3.

For flared end anchorage assemblies the offset distance 'd' will equal the normal guardrail offset measured from the face of the guardrail to the edge of the near approach travel lane plus 1'-2" for 45 mph or less and 1'-9" for greater than 45 mph.

### Notes

1. Length of advancement determined from the diagram and equations above establishes the location of the upstream beginning length of need for guardrail, however, the length of advancement can be no less than that required by other details of this index.

2. The flared end anchorage with 4' nose offset is shown in the diagram above, however, the diagram applies to other configurations that may occur at the beginning of length of need, such as, other flare designs; upstream returns; and, other upstream deflected, tangent and curvilinear conditions.

<table>
<thead>
<tr>
<th>Design Speed mph</th>
<th>X (Length Of Advancement) Ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(&lt; 45)</td>
<td>(= 16 (d-d))</td>
</tr>
<tr>
<td>(\geq 50)</td>
<td>(= 13 (d-d))</td>
</tr>
</tbody>
</table>
For additional shoulder guardrail information, see Details B and C.

For description of the dimensions D, d and X, see Length of Advancement - Figure I.
GUARDRAIL APPLICATION FOR ROADSIDE HAZARDS

DIVIDED ROADWAY - DETAIL B

GUARDRAIL APPLICATION FOR ROADSIDE HAZARDS

UNDIVIDED ROADWAY - DETAIL C

ONE-WAY TRAFFIC - DETAIL G

OPPOSING TRAFFIC - DETAIL D

Notes For Details B & C:
See General Notes Nos. 1, 2, 3, 4, 5, 6, 7 and 8.

Notes For Details D & G:
See General Notes Nos. 1, 2, 3, 4, 5, 6, 7, and 14.

Notes For Details 0 & 6:
See General Notes Nos. 1, 2, 3, 4, 5, 7, and 14.

For hazards that require guarding and are located back of curb see other
sheets of this index, and where rigid barrier is required see Index No. 410.

For end anchorage assemblies see sheets elsewhere in this Index and the plans.

See Details K and L for guardrail offsets.

See General Notes Nos. 1, 2, 3, 4, 5, 6, 7, and General Note No. 14.

Notes For Details B & C:
See General Notes Nos. 1, 2, 3, 4, 5, 6, 7, and 8.

See Details K and L for guardrail offsets.

For hazards that require shielding and are located back of curb see other
sheets of this index, and where rigid barrier is required see Index No. 410.

For end anchorage assemblies see sheets elsewhere in this Index and the plans.

See Details K and L for guardrail offsets.
### UNDIVIDED ROADWAY - DETAIL O

**Approach End Anchor Age Assembly**  
Varies 2.5 Panels  
Transition Section  
(See Detail J)

**Guardrail Projection**  
Approach Slab  
Bridge Rail Projection  
Approach Slab  
Bridge Rail Projection  
Approach Slab  
Bridge Rail Projection  
Approach Slab  
Bridge Rail Projection

**Installation When Other Hazards Or Shoulder Gutter Are Present**  
Varies 2.5 Panels  
Transition Section  
(See Detail J)

**Guardrail Not Required Except Where**  
Slope Steeper Than 1:3 Or Other Hazards Are Present (62.5 Min.)

**Approach End Anchor Age Assembly**  
Varies 4 Panels W-Beam  
Transition Section  
(See Detail J)

**Guardrail Projection**  
Approach Slab  
Bridge Rail Projection  
Approach Slab  
Bridge Rail Projection  
Approach Slab  
Bridge Rail Projection

**Installation When Other Hazards Or Shoulder Gutter Are Present**  
Varies 2.5 Panels  
Transition Section  
(See Detail J)

---

**Notes For Details O & P**

See General Notes Nos. 1, 2, 3, 4, 5, 6, 8 and 9. See Detail J for approach connections to bridges.

For end anchorage assemblies see sheets elsewhere in this Index and the plans.

Shoulder gutter in itself does not require the installation of guardrail.

### DIVIDED ROADWAY - DETAIL P

**Approach End Anchor Age Assembly**  
Varies 2.5 Panels  
Transition Section  
(See Detail J)

**Guardrail Not Required Except Where**  
Slope Steeper Than 1:3 Or Other Hazards Are Present (62.5 Min.)

**Approach End Anchor Age Assembly**  
Varies 4 Panels W-Beam  
Transition Section  
(See Detail J)

---

**UNDIVIDED ROADWAY - DETAIL O**

**DIVIDED ROADWAY - DETAIL P**

---

**GUARDRAIL APPLICATIONS FOR BRIDGES WITH FULL WIDTH SHOULDERS AND SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING FULL LENGTH OF APPROACH SLAB**

---

**DESCRIPTION:**

**DATE:** 07/01/02

**REVISION NO.**

**INDEX NO.** 400

**SHEET NO.** 6 of 26
GUARDRAIL APPLICATIONS FOR BRIDGES WITH FULL WIDTH SHOULDERS AND SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING LESS THAN FULL APPROACH SLAB LENGTH

UNDIVIDED ROADWAY - DETAIL H

DIVIDED ROADWAY - DETAIL I

GUARDRAIL APPLICATIONS FOR BRIDGES WITH LESS THAN FULL WIDTH SHOULDERS AND SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING LESS THAN FULL APPROACH SLAB LENGTH

UNDIVIDED ROADWAY - DETAIL S

DIVIDED ROADWAY - DETAIL T

GUARDRAIL

INDEX NO. 400

SHEET NO. 7 of 26
GUARDRAIL LENGTHS

<table>
<thead>
<tr>
<th>Design Speed (mph)</th>
<th>6' Bridge Shoulder</th>
<th>10' Bridge Shoulder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200 TAPER RATE</td>
<td>100 TAPER RATE</td>
</tr>
<tr>
<td></td>
<td>Length (FT)</td>
<td>Length (FT)</td>
</tr>
<tr>
<td></td>
<td>Panels (No.)</td>
<td>Total</td>
</tr>
<tr>
<td>60-70</td>
<td>93.5</td>
<td>193.75</td>
</tr>
<tr>
<td>55</td>
<td>102.5</td>
<td>218.75</td>
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<tr>
<td>45-50</td>
<td>111.5</td>
<td>243.75</td>
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<tr>
<td>40</td>
<td>120.5</td>
<td>268.75</td>
</tr>
<tr>
<td>35-40</td>
<td>129.5</td>
<td>293.75</td>
</tr>
</tbody>
</table>

The lengths shown on this table are typical for roadways with standard width shoulders. Length requirements shall be determined on a site specific basis for both standard width and narrow bridge shoulders and end anchorage or end shielding use.

WHEN END TERMINAL CANNOT BE LOCATED OUTSIDE OF OPPOSING ROADWAY CLEAR ZONE

APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING

EXTENDING FULL APPROACH SLAB LENGTH IN WIDE MEDIANS WITH FLUSH SHOULDERS
Approach Guardrail Treatments for Bridges with Safety Shape Traffic Railing Extending Full Approach Slab Length in Narrow Medians with Flush Shoulders

**GUARDRAIL LENGTHS**

<table>
<thead>
<tr>
<th>Width</th>
<th>6' Bridge Shoulders</th>
<th>10' Bridge Shoulders</th>
</tr>
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<tbody>
<tr>
<td>30</td>
<td>14.5 181.25 20.5 256.25 7.5 93.75 10.5 131.25</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>12.5 156.25 18.5 231.25 6.5 81.25 8.5 106.25</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>11.5 143.75 15.5 193.75 5.5* 68.75 6.5 81.25</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>9.5 118.75 13.5 168.75 5.5* 68.75 5.5* 68.75</td>
<td></td>
</tr>
</tbody>
</table>

The lengths shown in this table are based on standard widths for roadway and bridge median shoulders. Length requirements for both standard width and narrow bridge shoulders and end anchorage or end shielding requirements shall be determined on a specific basis. When crash cushions are required on opposing roadway shoulders, their sizes may be determined by the residual speeds (S') along the runouts from the approach roadway; however, when calculated speeds (S') are less than 30 mph, crash cushions shall be no less in size than for 30 mph, see speed diagram left. The number of panels may be reduced when installing a crash cushion more than 2.5 in width, see * below.

* Number shown is the minimum number of panels plus a W-Thrie beam transition panel; single faced guardrail must have a length of five (5) or more panels.

SIZING CRASH CUSHIONS LOCATED ON OPPONING ROADWAY SHOULDERS

\[ S_2 = \frac{L}{CZ} \text{ (Design Speed) = \frac{[CZ-d]}{d} (Design Speed)} \]

The lengths shown in this table are based on standard widths for roadway and bridge median shoulders. Length requirements for both standard width and narrow bridge shoulders and end anchorage or end shielding requirements shall be determined on a specific basis. When crash cushions are required on opposing roadway shoulders, their sizes may be determined by the residual speeds (S') along the runouts from the approach roadway; however, when calculated speeds (S') are less than 30 mph, crash cushions shall be no less in size than for 30 mph, see speed diagram left. The number of panels may be reduced when installing a crash cushion more than 2.5 in width, see * below.

* Number shown is the minimum number of panels plus a W-Thrie beam transition panel; single faced guardrail must have a length of five (5) or more panels.
MEDIAN WITH 10' BRIDGE SHOULDERS

MEDIAN WITH 6' BRIDGE SHOULDERS

GUARDRAIL LENGTHS

APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING

EXTENDING LESS THAN FULL APPROACH SLAB LENGTH IN NARROW MEDIANs WITH FLUSH SHOULDERS
**LEGEND**

1. Edge of traffic lane for simple curve turnouts.
2. Taper.
3. Pavement return (radius R).
4. Flared end anchorage to be installed except when existing guardrail on intersecting drive or side road adjoins the project.
5. Post for locating flare, proximate to PC or PT:
   - No. 2 post for Radii ≥ 25' or less.
   - No. 3 post for Radii > 25' and < 50'.
   - Between No. 4 and No. 5 posts for Radii ≥ 50'.
6. Post for locating flare, proximate to PC or PT:
   - No. 2 post for Radii ≥ 25' or less.
   - Between No. 4 and No. 5 posts for Radii ≥ 50'.
7. Expanded shoulder for guardrail.
8. Expanded shoulder for flared guardrail end anchorage.
10. Flared end anchorage assembly.
11. Radial guardrail to be installed when guardrail required on the intersecting drive or side road (Radial R).
12. End anchorage Type II (radial return only).
13. Guardrail installation limited to roadway right of way unless otherwise called for in the plans.

**TAPER TURNOUTS**

Note: The guardrail application shown on this sheet are for highways with flush shoulders and no restraints for constructing flared end anchorages and minimum lengths of guardrail. For highways with flush shoulders and restraints to constructing flared anchorages, see General Note No. 6.

Where openings in guardrail are required in close proximity to bridge traffic rails or ends of concrete barrier walls, and minimum length guardrail with flared end anchorages can not be applied, either controlled release returns or energy absorbing terminals are to be applied.

**SIMPLE CURVE TURNOUTS**

**GUARDRAIL APPLICATIONS FOR INTERSECTING DRIVES AND SIDE ROADS ON RURAL FACILITIES**
GUARDRAIL APPROACH TRANSITION AND CONNECTION FOR BRIDGES WITH SAFETY SHAPE
TRAFFIC RAILING BARRIERS EXTENDING FULL LENGTH OF APPROACH SLAB

DETAIL J

APPLICATIONS

<table>
<thead>
<tr>
<th></th>
<th>SECTION CC</th>
<th>SECTION DD</th>
</tr>
</thead>
<tbody>
<tr>
<td>U</td>
<td>4.5&quot;</td>
<td>4.5&quot;</td>
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<tr>
<td>V</td>
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<td>1/2&quot;</td>
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<td>Y</td>
<td>3.5&quot;</td>
<td>3.5&quot;</td>
</tr>
<tr>
<td>Z</td>
<td>3.5&quot;</td>
<td>3.5&quot;</td>
</tr>
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</table>

For Double Face Guardrail Connections To Median Bridge Traffic Railing Barrier, See Index No. 410, GUARDRAIL CONNECTION TO BARRIER WALL APPROACH ENDS.
**GUARDRAIL APPROACH TRANSITION AND CONNECTION FOR BRIDGES WITH SAFETY SHAPE**

**TRAFFIC RAILING BARRIERS EXTENDING FULL LENGTH OF APPROACH SLAB**

**DETAIL J**

**PLAN VIEW - GUARDRAIL, SHOULDER GUTTER AND SHOULDER TRANSITIONS**

**ELEVATION VIEW**

21"x17"x4" Thrie-Beam Terminal Connector Plate (Back-Up Plate) and 8"x8"x1" Special Galvanized Steel Filler Plate

1/2"x15" Long HS Hex Bolts (30' Min. Thread Length) And Nuts (5 Req'd.) With 2"Øx15" Long HS Hex Washers Under Heads And Nuts.

**GUARDRAIL TRANSITION NOTE**

When shoulder gutter is required, the 25' long dike transition, shown in the "PLAN" and "PICTORIAL" above, is required. Double offset blocks are shown for guardrail installations adjacent to shoulder gutter/dike transitions; single offset blocks shall be installed in absence of shoulder gutter. Nested rails shall not be bolted to the blocks and posts at posts (a), (c), and (e). One 16d galvanized nail shall be driven between each post and block, and between double blocks, in order to prevent block rotation. See "26A NAIL FOR PREVENTION OF OFFSET BLOCK ROTATION," this Index.

**SECTION FF**

**SECTION GG**

*Note:*

Post Alpha Designations l, m, n, and o will have a Standard 6"x8"x14" Wooden W-beam Blockout.
Note:

1. The W-beam Guardrail Mounting Height Transition from 1'-9" to 2'-1" shall be used to connect to existing 1'-9" guardrail at the project limits or in special cases as determined by the Engineer.

TRANSITION FROM 1'-9" TO 2'-1" W-BEAM GUARDRAIL MOUNTING HEIGHT
**SKETCHES - BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING**

**BARRIER EXTENDING LESS THAN FULL APPROACH SLAB LENGTH**

1. These sketches are for showing shoulder interface between roadways and bridges where crossings are normal to other roadways, railroads and streams. For site specific applications and details see the plans and the FDOT Structures Design Office "Detailing Manual" and "Design Guidelines".

2. Shoulder treatments shown in these sketches are for locations with shoulder gutter; shoulder hinge location will vary for facilities without shoulder gutter.

**SHOULDER INTERFACE BETWEEN ROADWAYS AND BRIDGES**
SHOULDERS, SLOPES AND MISCELLANEOUS PAVING FOR FLARED END ANCHORAGE ASSEMBLIES

MISCELLANEOUS PAVING FOR STANDARD GUARDRAIL SECTIONS

SHOULDER WITH OR WITHOUT 5' PAVEMENT

PAVED SHOULDERS

SHOULDER GUTTER

DOUBLE FACE RAIL

SECTION AA (EXAMPLE FOR 30' CLEAR ZONE)

SECTION AA (EXAMPLE FOR 20' CLEAR ZONE)

SECTION BB (EXAMPLE FOR 30' CLEAR ZONE)

SECTION CC (EXAMPLE FOR 30' CLEAR ZONE)

** B For B Shoulders 10 For B Shoulders 12 For 10 And 12 Shoulders Applies To Left And Right Side Shoulders. (See Index No. 525 For Shoulder Widths And Shoulder Gutter Locations On Ramps And Auxiliary Lanes)
16d Galvanized Nail (Timber And Non-Form Fit Composite Blocks Only)

STEEL POST  TIMBER POST

16d NAIL FOR PREVENTION OF OFFSET BLOCK ROTATION

POST FACE  SIDE VIEW  TRAFFIC FACE

All Holes Are 1/8" OPEN

STEEL MODIFIED THRIE-BEAM OFFSET BLOCK

PERMISSIBLE POST AND OFFSET BLOCK COMBINATIONS

<table>
<thead>
<tr>
<th>POSTS</th>
<th>OFFSET BLOCKS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber</td>
<td>Timber 6&quot;x8&quot;x14&quot; (Nominal) For W-Beam And 6&quot;x8&quot;x22&quot; (Nominal) For Thrie-Beam</td>
<td>Post bolt hole in timber and composite blocks to be centered ± 1/4&quot;.</td>
</tr>
<tr>
<td></td>
<td>Composite (See Notes)</td>
<td>All timber offset blocks shall be dressed on all four sides (S4S).</td>
</tr>
<tr>
<td>Steel</td>
<td>Timber 6&quot;x8&quot;x14&quot; (Nominal) For W-Beam And 6&quot;x8&quot;x22&quot; (Nominal) For Thrie-Beam</td>
<td>One 16d galvanized nail per block is to be used to prevent rotation of block (see detail sets).</td>
</tr>
<tr>
<td></td>
<td>Composite (See Notes)</td>
<td>Same as above for timber and composite blocks except that form fit composite block aligns with holes in steel posts and do not require bolts.</td>
</tr>
</tbody>
</table>

Steel W6x8.5, W6x9 Or 6" C

Notes:
1. Timber and composite offset blocks of comparable size and shape can be intermixed within a run of rail.
2. Composite offset blocks shall be in conformance with Section 536 of the Specifications and be included on the Approved Products List. For additional information on composite offset block installations refer to Sheet 1, GENERAL NOTE 16.

LOCATION AT CURB & GUTTER SECTIONS

DETAIL L

MOUNTING HEIGHTS ON SHOULDER AND IN MEDIANS
**BARRIER DELINEATOR SPACING**

For curves greater than 2° the spacing shall be reduced to 100' increments through the curve.

**BARRIER DELINEATOR MOUNTING**

Pipe Rail End Fixture To Post With ½" x ¼" Long Hex Bolts And Nuts With ½" Plain Round Washers Under Heads And Nuts (2 Req'd.) (Upset Threads After Tightening)

**PICTORIAL VIEW**

BARRIER DELINEATORS - DETAIL M

Steel Post

Wood Post

Pipe Rail

Offset Block

Guardrail Beam

Timber Offset Block

Gutter

Pipe Rail End Fixture

Steel Guardrail Post

1½" Long Hex Bolt and Nut With ½" Plain Round Washer (Upset Threads After Tightening)

1½" Bracket Hole With ½"x½" Long Hex Bolt And Nut With ½" Plain Round Washers Under Heads And Nuts (2 Req'd.) (Upset Threads After Tightening)

2½"x½"x½" Long Angle Bracket (Galvanized)

**NOTES**

1. Pipe Rail is required on steel guardrail posts when the front of sidewalks or shared use paths are located 4' or less from behind the back of the post. Pipe rail shall terminate at the first post of the end anchorage assembly. Begin and end the Pipe Rail in accordance with the PIPE RAIL END FIXTURE detail.

Refer to Sheet 1, GENERAL NOTE 6 for guardrail end anchorage assembly requirements and GENERAL NOTE 16.b for offset block requirements.

2. When guardrail with timber posts are located with the back of post 4' or less from the near front of sidewalks or shared use paths, the bolt ends will require one of the following treatments:
   a. Trim back flush with the face of nut and metalize or galvanize after drilling and welding
   b. Use post bolts 10" in length with washers and nuts counter sunk into sinks 1" to 1½" deep or
   c. Use post bolts 15" in length with sleeve nuts and washers.

3. Barrier delineators shall conform to Section 993.

4. Barrier delineator color (white or yellow) shall conform to the color of the near lane edgeline.

5. Barrier delineators installed on median guardrail shall have retro-reflective sheeting on both sides of the barrier delineator.

**PEDESTRIAN SAFETY TREATMENTS**

For locations used by pedestrians or bicyclists
Notes

1. END ANCHORAGE ASSEMBLY, TYPE MELT Details and Notes are shown for Maintaining Existing Installations Only.

2. For Specific Details, Offset Requirements, and Special Treatments of Proprietary End Anchorage Assembly - Flared Systems, see the Approved Products List (APL).

3. Test Level 2 Crash Tested End Anchorage Assemblies Shown on the APL are Suitable For Design Speeds Less Than or Equal to 45 mph.
SPECIAL END SHOE, W-BEAM RAIL SPLICE, THRIE-BEAM RAIL SPLICE, anchorage assembly details, SPECIAL STEEL GUARDRAIL POSTS, and nuts and under hex nut for connecting rub rail to wood and steel.

The round washer is not intended for use under the recess nut for reinstallment of a post bolt.

**Note:**

For beam washer requirements on end terminals, see individual end anchorage assembly details. Washers are to be used where necessary to accomplish alignment or where the posts bolt head shows tendency to pull through the rail slot. Washers installed on guardrail, between end anchorages, prior to July 1, 1990 may remain in place until the guardrail is relocated or until repairs require removal and reinstallation of a post bolt.

**Note:**

The projecting thread on both ends shall be distorted to secure the nuts, and no more than 3/8" shall be protruding after pull-up shall be trimmed to 1/2" reveal and metalized with organic zinc-rich coating.

**Note:**

For applications where special bolts having lengths greater than 25" are required, the manufacturer may use a 5/8" threaded rod (field cut to length). A hex nut and beam washer shall be used at the guardrail face with no more than 1/2" of the threaded rod projecting beyond the top of the nut. The projecting thread on both ends shall be distorted to secure the nuts, and both ends of the threaded rod shall be metalized with organic zinc-rich coating.

For use of the AASHTO-AGC-ARTBA standard length post bolt on double faced guardrail that results in the bolt projecting more than 1/2" beyond the face of the nut after pull-up shall be trimmed to 1/2" reveal and metalized with organic zinc-rich coating.

**Note:**

The values shown shall be utilized unless changes are supported by empirical validation. Those desiring to develop offset values from the simulated deflection values shown in Table 5-6, Summary of Maximum Deflections of Highway Railing AASHTO/AASHTO Roadside Design Guide are cautioned to proceed only after background of the table development is understood.

**Note:**

All hex bolts for THRIE-BEAM TERMINAL CONNECTORS shall conform to the requirements of ASTM A449 (Type 1) with heavy hex nuts and washers. All other hex bolts shall conform to the requirements of ASTM A325. Bolts, nuts and washers shall be hot dip galvanized. Heavy hex nut may be used in lieu of hex nuts and hex nuts used for Jam nuts.
GALVANIZED STEEL BACK-UP PLATES FOR CONNECTING SPECIAL END SHOES AND TERMINAL CONNECTORS TO CONCRETE BRIDGE TRAFFIC RAILING BARRIERS AND CONCRETE BARRIER WALLS
ASYMMETRICAL W-THRIE BEAM TRANSITION PANEL
RWT02 (AASHTO-AGC-ARTBA Report) 10 Gauge
Panel Detail

Plan View

Elevation View

12'-6" W-Beam Panel

4-Space W-Beam Guardrail Panel
RWM04a (AASHTO-AGC-ARTBA Report)
1. The 5-Space 15'-7 1/2" W-beam Guardrail Panel shall be used at the downstream end of an End Anchor System that does not offset the W-beam Panel Splice to Midspan.
1. The 5-Space 15'-7½" W-beam Guardrail Panel with Beam Anchor Plate Attachment shall be used to Anchor the Type II or Type CRT End Anchorage Assemblies.

**Note:**

**W-BEAM GUARDRAIL PANEL**

**W-BEAM END ANCHORAGE PANEL**

**ELEVATION VIEW**

**PLAN VIEW**

**PANEL DETAIL**

**Guardrail Post (Typ)**

**Offset Block (Typ)**

**Lap in Direction of Adjacent Traffic**

**Beam Anchor Plate Attachment**

**W-Beam Midspan Panel Splice**

**Misc. Asphalt Pavt.**
SPECIAL STEEL GUARDRAIL POSTS

1. See Index No. 402 for special steel posts required for construction and repair of guardrail transitions to bridge traffic railing barrier retrofits on existing bridges. See Structures Index Nos. 470 through 476 for steel posts required to construct traffic railing barrier retrofits on existing bridges.

2. Either anchor bolts, concrete wedge anchors or approved adhesive-bonded anchors for structural applications may be used. Anchor bolts, wedge anchors and adhesive anchors shall have a minimum tensile strength of 60,000 psi and be gauzined in accordance with ASTM A153 (stainless steel components may be substituted but components placed in accordance with ASTM B-633 are not acceptable). Adhesive anchor nuts shall be equal in diameter to that utilized for anchor bolts. Wedge anchors are to be installed in accordance with the manufacturer's recommendations, assuming 3,000 psi compressive strength for concrete. Wedge anchors shall meet the following requirements:
   a. tensile load each anchor: approach slabs 14,000 lbs.; other structures 8,000 lbs.
   b. shear load each anchor: approach slabs 15,000 lbs.; other structures 7,800 lbs.

3. Posts are to be plumbed by adjusting nuts or mortar seating. Posts installed using anchor bolts and adhesive anchors shall be to set with mortar seating. Base plates shall be gauzined in accordance with the manufacturer's instructions.

4. Adhesive-Bonded Anchors for Structural Applications shall comply with Section 937 and be installed in accordance with Section 946. Drilled hole diameter shall be in accordance with the manufacturer's instructions.

5. Anchor holes and recesses shall be drilled; wedge anchor holes are to be drilled in accordance with the manufacturer's specifications. Encountered reinforcing steel shall be drilled through. Holes shall be thoroughly cleaned when setting bolts and anchors and dry when setting wedge anchors.

6. Steel post and base units shall be gauzined in accordance with ASTM A123. Any damaged gauzined areas are to be metalized in accordance with Section 562 of the Standard Specifications.

7. Special steel guardrail posts are not to be incorporated into a guardrail approach end anchor system.

For Use In Combination With Short Timber Breakaway Post
For Use In Combination With Steel Tube

STANDARD TIMBER GUARDRAIL POSTS

SPECIAL TIMBER GUARDRAIL POSTS

FOR REPLACEMENT OF EXISTING W8x18 GUARDRAIL POSTS ON APPROACH SLABS AND BRIDGES

* Additional slotted hole required when mounting three-beam guardrail.
Notes:

1. The locations shown for special posts mounted on inlets are to be used as guidelines for positioning the posts and for estimating the number of required posts.

2. Special posts and their anchorages mounted on curb inlets shall be in accordance with special steel guardrail posts Sheet 21, and paid for under the contract unit price for Special Guardrail Post, EA.

3. Variations shown for the locations of special posts mounted on inlets are established from standard post spacing (6'-3"), clearance of standard posts from inlets (4" min.), use of single and double offset blocks on standard posts adjacent to the inlets; optional flange mountings; and, concrete anchor edge distances (2" for grouted and 3" for expansion anchors). The number of posts and their locations may vary by reducing post spacing and adjusting the length of rail panel(s).

4. Encased guardrail posts shall conform in section to standard timber and steel posts, and be paid for under the contract unit price for Special Guardrail Post, EA. Payment shall include cost of foam wrap and concrete encasement.

ENCASED GUARDRAIL POST

LEGEND

Variation In Location Of Special Post:

- Single Offset Block(s) On Adjacent Standard Posts
- Expanded Location By Using Double Offset Blocks On Adjacent Standard Posts
**CABLE ANCHOR OPTION**

**END ANCHORAGE ASSEMBLY TYPE II**

The payment for the items of End Anchorage Assembly Type II shall be full compensation for furnishing and installing either the Round or the Flared End Section, the Anchor Plate, Anchor Rod, Pipe Sleeve, Anchor Block, Flared End Section, and the necessary hardware.

1. Unless specified in the plans, the contractor can supply either the cable anchor option or the concrete anchor block option.

2. Type II end anchorage assemblies are approved for all speeds and are intended for use as:
   a. trailing end anchors for single face free standing guardrail systems;
   b. approach end anchors for single face free standing guardrail systems when the end anchor is located outside of the clear zone; and,
   c. both approach and trailing ends of double face guardrail systems.

Crash cushions shall be constructed at or in lieu of approach Type II end anchorages located inside the clear zone.

End anchorage for thrie beam guardrail shall be constructed the same as detailed for W-beam, except use thrie beam rail and end section, and the Anchor Plate is to be attached to the bottom corrugation of the thrie beam.

3. These end anchors are to be paid for under the contract unit price for Guardrail, End Anchorage Assembly (Type II), EA as called for in the plans or by permit.

**CONCRETE ANCHOR BLOCK OPTION**

**TYPE II NOTES**

Turnbuckle shall be field cut, threaded 4" on each end, then cleaned and metalized in accordance with Sections 582 and 975 of the Standard Specifications. The cost for cutting, threading, metalizing, and the turnbuckle shall be included in the contract unit price for End Anchorage Assembly Type II, EA.

The payment for the items of End Anchorage Assembly Type II shall be full compensation for furnishing and installing the Anchor Plate, Anchor Rod, Pipe Sleeve, Anchor Block, either Flared, Rounded or Buffer End Section, and the necessary hardware.
1. For Beam Anchor Plate Details see Sheet 20 of 26.
2. For Beam Anchor Plate Attachment Details see Sheet 20D of 26.

Timber Or Steel Posts With Timber Offset Blocks May Be Used.
Timber Posts And Offset Blocks Are Shown. These Posts Must Be
Timber In A Steel Post Run Of Guardrail Adjacent To Sidewalks
Or Shared Use Paths (see PEDESTRIAN SAFETY TREATMENTS).
Notes
1. END ANCHORAGE ASSEMBLY, TYPE MELT details and notes are shown for maintaining existing installations only.
2. For specific details, offset requirements, and special treatments of proprietary end anchorage assembly - Florida systems, see the approved products list (APL).
3. Test level 2 crash tested end anchorage assemblies shown on the APL are suitable for design speeds less than or equal to 45 mph.

MODIFIED ECCENTRIC LOADER TERMINAL NOTES
1. The MELT is applicable for design speeds up to 45 mph. The MELT is intended for use as an approach end guardrail anchorage for shoulder guardrail. Its alignment is a flare from the normal guardrail alignment with a flare length of 37.5 including three standard W-beam panel outside of any standard guardrail, guardrail transitions or other special treatments.
2. This standard drawing is produced by Florida Department of Transportation solely for use by the Department and its assignees. This standard drawing provides the general graphics and information necessary for field identity component parts of the MELT and their incorporation into a whole system.
3. This standard drawing is sufficient for plan details for the MELT when installed in connection with shoulder guardrail and prescribes the requirements for shop drawing submittals unless the plans otherwise call for such submittals. The MELT shall be assembled in accordance with the distributor's detailed drawings, procedures and specifications.
4. The first two posts must be short timber breakaway posts with steel foundation tubes and soil plates, post Nos. 3 thru 6 must be L/T timber posts and post No. 7 must be a standard timber post.
5. The MELT cannot be used in medians where horizontal clearance requires the use of a barrail.
6. See the General Notes for galvanizing requirements of metallic components.
7. The plans call for the MELT at a specific location, substitutions with other end anchorage assemblies will not be permitted unless approved by the Engineer. If the plans call for an MELT at a specific location, the contractor has the option to construct any FDOT approved flared assembly that meet the applications for that location. Where a flared end anchorage is called for in the plans, any approved substitution with a parallel end anchorage will not be eligible for contract consideration.
8. The MELT shall be paid for under the contract unit price for Guardrail, End Anchorage Assembly (Flared). EA shall be full compensation for furnishing and installing all components in accordance with the plans; the distributor's detailed drawings, procedures and specifications and this index.

END ANCHORAGE ASSEMBLY TYPE MELT

1. Driving steel tube and soil plate as a unit with a dummy timber post to prevent damage to breakaway post.
2. Excavating, backfilling and compacting to provide full passive soil resistance to all surfaces of the tube and soil plate.

Front View

Steel Strut and Yoke Assembly

Note: Bolt holes are not required, but, diaphragms with either manufacturer produced two or three hole in line patterns are acceptable.

Diaphragm Plate (2 Req’d.)

Note: Assembly installed with channel turned down for right side guardrail and turned up for left side guardrail.

Steel Strut and Yoke Assembly

Note: Assembly installed with channel turned down for right side guardrail and turned up for left side guardrail.

Elevation

Plan

Flat Plate Layout

Buffered End Section

Section BB

Section AA

Plan

Diagram Plate

Steel Tube

Soil Plate

Nut & Washer

Special End Shoe

Shelf Angle

DIAPHRAGM PLATE (2 Reqd.)

FLAT PLATE LAYOUT

All Slots Shall Be 8"x24"

BUFFERED END SECTION

STRUT

YOKE (1 Reqd.)

Note: Assemblies installed with channel turned down for right side guardrail and turned up for left side guardrail.

STEEL STRUT AND YOKE ASSEMBLY

Note: Assemblies installed with channel turned down for right side guardrail and turned up for left side guardrail.
CONTROLLED RELEASE RETURN NOTES

1. Controlled release returns are intended for use (a) in openings in continuous guardrail for driveway and side road access when flares and transitions or standard radial returns can not be applied (Sheet 12); and (b) for shielding the ends of bridge traffic rails and barrier walls where the driveway and side road access is in close proximity to the structure and space does not permit the proper use of approved flared and parallel types of Guardrail End Anchorage Assemblies.

2. Controlled release returns are not intended as a substitute or replacement for the appropriate use of approved vehicle impact attenuators.

3. Controlled release returns with either R, 10 or 24 radii are designed for highway speeds of 60 mph or less.

4. The controlled release return sections are designed as full returns based on an intersection angle of 90°. The return can be terminated with the Guardrail End Anchorage Assembly Type CRT or connected to standard guardrail as shown or as otherwise detailed in the plans.

5. The Guardrail End Anchorage Assembly Type CRT is to be used only for the controlled release returns with R, 16, 24 and 32 radii as shown; the assembly is not to be used in any tangent rail or flared rail applications. Other types of end anchorage assemblies are not to be used in the controlled release returns.

6. The area immediately behind the control release return shall have slopes not steeper than 1:2 and the maintained free of fixed objects in accordance with the area limits tabulated in the plans below.

7. The surface approach the controlled release return shall have a transverse slope not exceeding 1:10. The effective width of the transverse surface is to be based on standard vehicle departure return radii and proceeding shielding; the width (beyond shoulder) shall be not greater than the corresponding 15° and 30°, W' values tabulated below.

8. The curved guardrail portion of the controlled release return shall be full section shop bent panels (12") or 24 panels.

9. Washers are not to be used between the guardrail beam and the head of the button head post bolts at any controlled release terminal (CRT) post or at any Guardrail End Anchorage Assembly Type CRT breakaway timber post.

10. The guardrail beam of the R radius return is not bolted to the center control release post.

11. See the General Notes for all previously specified metallic components.

12. Controlled release return systems shall be paid for under the contract unit prices for Guardrail (Roadways), Lf, Guardrail (Shop-bent Panels), Lf, and Guardrail End Anchorage Assembly (Type CRT). EA as called for in the plans by permit and shall be full compensation for furnishing and installing all components in accordance with the plans and with this index. CRT posts are included in the cost for guardrail.
**GUARDRAIL ON MEDIAN SHOULDERS (FREEWAYS)**

**Notes:**
1. Typical placement shown. May be constructed at other locations as called for in the plans.
2. Rub Rail is required on the median side or ditch side of the barrier.

**MOUNTING HEIGHT FOR DOUBLE FACED GUARDRAIL ON MEDIAN SHOULDERS (FREEWAYS)**

**GUARDRAIL ON MEDIAN SLOPES**

- **1.6 to 10**  
  - Standard Guardrail: 17' to 22'  
  - Guardrail Not Recommended: 23' to 45'

- **1.7 to 20**  
  - Standard Guardrail: 21' to 24'  
  - Guardrail Not Recommended: 25' to 45'

- **1.8 to 25**  
  - Standard Guardrail: 26' to 45'

- **1.9 to 26**  
  - Standard Guardrail: 27' to 45'

- **1.10 to 27**  
  - Standard Guardrail: 28' to 45'

**GUARDRAIL ON OUTSIDE SLOPES**

- **1.6**
  - Slope Steeper Than 1:6 Not Recommended
  - Guardrail With Rub Rail

- **1.7**
  - Slope Steeper Than 1:6 Not Recommended
  - Guardrail With Rub Rail
  - Rub Rail is required on the median side when double face guardrail is used.

- **1.8**
  - Slope Steeper Than 1:6 Not Recommended
  - Guardrail With Rub Rail
  - Rub Rail is required on the median side when double face guardrail is used.

- **1.9**
  - Slope Steeper Than 1:6 Not Recommended
  - Guardrail With Rub Rail
  - Rub Rail is required on the median side when double face guardrail is used.

- **1.10**
  - Slope Steeper Than 1:6 Not Recommended
  - Guardrail With Rub Rail
  - Rub Rail is required on the median side when double face guardrail is used.

**GUARDRAIL ON SLOPES**

Terminate Rub Rail Within The Standard Guardrail Run At The Backside Of The Post Nearest The End Anchorage Assembly.

- **Flared** End Anchorage Assembly Shown

**RUB RAIL TERMINATION**