GENERAL NOTES

1. The illustrations for guardrail applications are standard configurations; adjustments are to be made as required by site specific conditions to attain optimum design for function, economy and serviceability.

2. The beginning of guardrail need shall be at the greatest of the upstream distances from the hazard, as determined from Figures 1 and 2, and other application details of this Index.

3. One panel (i.e., panel length) equals 12'-6". Guardrail shall be constructed with rail elements 12'-0" in length except where 20'-0" elements are called for by site conditions and indices or specifically called for in the plans.

4. Post spacing shall be 8'-0" except that reduced spacing shall be used for (a) transitions to ancharages at rigid structures such as bridges (See Detail 1 and Index No. 402) and transitions to rediuctive crush cushions; (b) the conditions in Note No. 7 below; (c) special post applications; (d) reduced post spacing required for specific end anchorage assemblies, and, (e) specific spacing called for in the plans.

5. Guardrail mounting height for the W-beam without rub rail and for thrie-beam is 1'-9" to the center of beam, and for W-beam with rub rail is 2'-0" to center of beam. Modified thrie-beam shall be mounted at a height of 2'-0" to center of beam. The height is critical and shall be attained in all cases; a tolerance of 1" above and 1" below the standard mounting heights is permissible over necessary surface irregularities (e.g., across shoulder gutters, inlets and roadway surface break lines). For guardrail placed on slopes beyond the shoulder point, there shall be no deviation more than 1" above or 3" below the desired height within any 25 foot section of guardrail.

6. All guardrail panels, end sections and special end shoes shall be lapped in the direction of adjacent traffic.

7. Guardrail and end anchorage assemblies provided or offset are the standard end treatments for single face free standing guardrail approach ends. Parallel end anchorage assemblies for guardrail approach end treatments will be constructed only when restraints prevent construction of flared end anchorage assemblies.

8. Guardrail and end anchorage assemblies shall be the type called for in the plans. If the plans call for end anchorage assembly "flared" and does not identify the specific system(s) to be used, the contractor has the option to construct any FDOT approved flared assembly provided in this Index or identified on the Qualified Products List (QPL), subject to the conditions identified in the approved Index drawings, or QPL drawings if applicable.

9. If the plans call for end anchorage assembly "parallel" and does not identify the specific system(s) to be used, the contractor has the option to construct any FDOT approved parallel assembly provided in this Index or identified on the QPL, subject to the conditions identified in the approved Index drawings, or QPL drawings if applicable.

10. 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.

11. Three-beam guardrail panels shall be used in guardrail transitions to bridge traffic railing barriers, to concrete and certain water filled safety shaped barriers, certain crash cushions and as a continuous barrier when called for in the plans. For additional information on rail attachment, post spacings, nested rails, location of three-beam transition panels and offset block configurations see details elsewhere in this Index, and Index Nos. 402, 410 and 416. The use of three-beam guardrail with standard offset blocks (Test Level 3 semi-rigid system) may be considered where one or more of the conditions listed below or similar conditions are anticipated or exist:

   a. Crashworthiness at terminals.
   b. Vehicle overtaking W-beam is probable.
   c. Vehicle deflection of W-beam is marginal.
   d. High frequency of repairs to W-beam.
   e. Location of a test barrier wall where the face of the guardrail is from the hazard less than the 4' minimum for standard W-beam.

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

   a. Wide medians where approach end anchor is located outside of opposing roadway clear zone.
   b. Medians of uniform width that are occupied by other transportation and joint use facilities.
   c. Medians of uniform or variable width with independent vertical alignments not suited to normal median guardrail installations.
   d. Medians of bifurcated roadways.

13. The illustrations for guardrail applications are standard configurations; adjustments are to be made as required by site specific conditions to attain optimum design for function, economy and serviceability.

14. Crash cushions may be required in lieu of or in conjunction with guardrail at locations where space does not permit development of sufficient guardrail length, offset or crashworthiness at terminals. Crash cushions shall be constructed as or in lieu of Type II assemblies located in the approach clear zones.

15. Corrugated steel sheet beams, end shoes, end sections and backup plates shall conform to the current requirements of AASHTO M180, Class A, Type II (smooth) coating. All other metallic components, hardware and accessories shall be in conformance with the appropriate current AASHTO requirements.

16. Offset blocks:
   a. Steel offset blocks other than modified three-beam offset blocks are not permitted for new guardrail construction. Existing steel offset blocks may remain throughout the service life of the existing guardrail. PERMISSIBLE POST AND OFFSET BLOCK COMBINATIONS are tabulated on Sheet 16.
   b. Plastic offset block installations shall be constructed on guardrail outside of approach end anchorage assemblies or any transition system connecting to a rigid or thrie-beam barrier.

17. Where necessary to enlarge or add holes to galvanized guardrail, the work will be done by drilling or reaming. Damaged galvanized guardrail will be metalized in accordance with Sections 362 and 921 of the Standard Specifications. No burning of holes will be permitted.

18. For barrier delineators see detail M.

19. Run of guardrail with existing concrete posts that is being reset under a construction or maintenance contract shall be reset using timber or steel posts. Repair within a run of guardrail with existing concrete posts can be made with either steel, timber, sound salvaged concrete posts; replacement in kind of damaged posts is to be made when like posts are on hand at time of repair.

20. Substitutions between thrie-beam guardrail and concrete barrier wall are not eligible for CSP consideration.

21. On roadways designated for reverse laneing, all downstream ends of guardrail that are not shielded or that are not designed as approach end anchorage assemblies to be marked with post-mounted Type 3 Object Markers. Trailing bridge ends and trailing shoulder concrete barrier wall ends shall be marked with Type 3 Object Markers except where there is trailing end guardrail. Object markers to be installed facing reverse laneing traffic. The cost of the object marker shall be included in the cost of the guardrail.

22. On roadways designated for reverse laneing, all downstream ends of guardrail that are not shielded or that are not designed as approach end anchorage assemblies to be marked with post-mounted Type 3 Object Markers. Trailing bridge ends and trailing shoulder concrete barrier wall ends shall be marked with Type 3 Object Markers except where there is trailing end guardrail. Object markers to be installed facing reverse laneing traffic. The cost of the object marker shall be included in the cost of the guardrail.
GENERAL NOTES

1. These drawings are representative of the various proprietary guardrail end anchorage assemblies listed on the Department’s Qualified Products List (QPL). For specific details and requirements see the vendor drawings on the QPL at www.dot.state.fl.us/specificationsoffice/

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

3. These drawings, along with the various vendor drawings on the QPL, are intended to show sufficient details for installation of the end anchorage assemblies and their connection to shoulder guardrail. This precludes the requirement 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 treatments listed on the QPL are intended for use as approach end guardrail anchorages for shoulder guardrail. The effective length of the end treatments vary refer to the vendor drawings on the QPL for the length and the 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 vendor drawings for the alignment of the end treatment with respect to the normal guardrail alignment.

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

6. Each of the various end anchorage assemblies have unique features. Careful attention should be given to the types and orientation of the posts and other components. Refer to the vendor drawings on the QPL for the specific requirements of each system.

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

8. Test Level 3 crash tested end anchorage assemblies shown on the QPL are suitable for all design speeds.

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 the plans, the manufacturer’s detail drawings, procedures and specifications and these drawings.
**DESCRIPTION:**

**REVISION**

**LAST REVISION**

**INDEX NO.**

**SHEET NO.**

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**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.

**Equation Variables:**

\[ X = \frac{16}{D-d} \] (See NOTES 1 & 2)

\[ X = \frac{13}{D-d} \]

- \( D \): 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, \( D \) is measured from the inside edge of the near approach traffic lane (see Figure 2).

- \( d \): Distance in feet from 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, \( d \) 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.
For description of the dimensions D, d and X, see Length of Advancement - Figure 1.
For additional shoulder guardrail information, see Details B and C.

LOCATING TERMINALS ON SHOULDER GUARDRAILS - FIGURE 2
GUARDRAIL APPLICATION FOR ROADSIDE HAZARDS

DIVIDED ROADWAY - DETAIL B


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

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

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.

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

See Details K and L for guardrail offsets.

GUARDRAIL APPLICATION FOR NARROW MEDIAN AND GORE HAZARDS

ONE-WAY TRAFFIC - DETAIL G

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

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

UNDIVIDED ROADWAY - DETAIL O

DIVIDED ROADWAY - DETAIL P

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.
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

STANDARD PANELS SET TO RADIALS ADJOINING BRIDGES DETAIL W

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

NDIVIDED ROADWAY - DETAIL S

DIVIDED ROADWAY - DETAIL T
GUARDRAIL LENGTH (Ft.)

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*Lengths are based on minimum median widths and on standard clear zone widths for travel lanes on tangent roadways, and the length of advancement needed for flared end anchorages assemblies to shield normal transverse underslope and bridge end hazards. Lengths may need to be adjusted for auxiliary lanes, curbed roadways, parallel end anchorages assemblies, skewed crossings and other hazards present.*

**GUARDRAIL LENGTHS**

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*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 IS 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**
**Description:**

Opposing Roadway Shoulder Crash Cushion Located On Point Of Impact Speed (S)

**Guardrail (See Sheet 7)**

**Description:**

Guardrail Transition (Approach Section) As Required For Redirective Crash Cushion

Guardrail Length-One Half Panel Less Than Taper Side For Plan Quantities

MEDIAN WITH 10' BRIDGE SHOULDERS

MEDITN WITH 6' BRIDGE SHOULDERS

**Approach Slab**

**Guardrail Panels And Length (See Table Below)**

**Guardrail Transition (Approach Section) As Required For Redirective Crash Cushion**

**Crash Cushion Length-One Half Panel Less Than Taper Side For Plan Quantities**

**MEDIAN WITH 10' BRIDGE SHOULDERS**

**MEDIAN WITH 6' BRIDGE SHOULDERS**

**Note:** The guardrail configurations shown apply only to parallel or near parallel bridges with open medians.

**Guardrail Lengths**

**Guardrail Panels And Length (See Table Below)**

**Design Speed:**

\[
S_d = \frac{C}{S} \times \text{Design Speed}
\]

**Sizing Crash Cushions Located On Opposing Roadway Shoulders**

**Approach Guardrail Treatments for Bridges With Safety Shape Traffic Railing**

Extending Full Approach Slab Length In Narrow Medians With Flush Shoulders

**Guardrail**

**FDOT 2014 Design Standards**

**Index No. 400**

**Sheet No. 9 of 26**
GUARDRAIL LENGTHS

Design Speed Projected ADT CZ (Ft.) 6' & 8' Rdwy. Shldr. 30' & 12' Rdwy. Shldr. 6' & 8' Rdwy. Shldr. 30' & 12' Rdwy. Shldr.

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<th>30' &amp; 12' Rdwy. Shldr.</th>
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Approach Slab

For Guardrail Lengths See Table Below

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The lengths shown on this table are typical for roadways with standard width shoulders and a relocated connection to the existing wing post. When the wing post is replaced by bridge traffic railing barrier, reference Detail J and see Index No. 402. Length requirements shall be determined on a site specific basis for both standard width and narrow bridge shoulders and for 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 less than full approach slab length in wide medians with flush shoulders

Approach Slab

For Guardrail Lengths See Table Below

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Approach Slab

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Approach Slab

For Guardrail Lengths See Table Below

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The lengths shown on this table are typical for roadways with standard width shoulders and a relocated connection to the existing wing post. When the wing post is replaced by bridge traffic railing barrier, reference Detail J and see Index No. 402. Length requirements shall be determined on a site specific basis for both standard width and narrow bridge shoulders and for 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 less than full approach slab length in wide medians with flush shoulders

Last Revision 07/01/04

FDOT 2014 Design Standards

Index No. 400

Sheet No. 10 of 26
### MEDIAN SIZING

#### MEDIAN WITH 10' BRIDGE SHOULDERS

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#### MEDIAN WITH 6' BRIDGE SHOULDERS

<table>
<thead>
<tr>
<th>MEDIAN WIDTH (Ft.)</th>
<th>PANELS (No.)</th>
<th>LENGTH (Ft.)</th>
<th>PANELS (No.)</th>
<th>LENGTH (Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6' TAPER RATE</td>
<td>6' TAPER RATE</td>
<td>6' TAPER RATE</td>
<td>6' TAPER RATE</td>
<td>6' TAPER RATE</td>
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<tr>
<td>30</td>
<td>8.5</td>
<td>168.75</td>
<td>8.5</td>
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<td>28</td>
<td>12.5</td>
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<td>26</td>
<td>16.5</td>
<td>270.75</td>
<td>8.5</td>
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<tr>
<td>24</td>
<td>20</td>
<td>321.75</td>
<td>8.5</td>
<td>334.25</td>
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### APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING

#### Extending Less Than Full Approach Slab Length in Narrow Medians with Flush Shoulders

**Design Standards**: May 2014

**Description**: 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 and end shielding requirements shall be determined on a site specific basis. When crash cushions are required on opposing roadway shoulders, their sizes may be determined by the residual speeds (S') along the ramps from the approach roadways. These speed should be 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.

**Note**: The guardrail configurations shown apply only to parallel or near parallel bridges with open medians.

---

**Guardrail Configuration**

- **10' Taper Rate**: 110 ft.
- **6' Taper Rate**: 70 ft.

**Panel Configurations**

- **Standard Width**: 100 ft.
- **Narrow Bridge Shoulders**: 60 ft.

**Length Requirements**

- **110 Taper Rate**: 12 panels (110.25 ft.)
- **110 Taper Rate**: 20 panels (221 ft.)
- **110 Taper Rate**: 30 panels (321 ft.)
- **110 Taper Rate**: 40 panels (421 ft.)

---

**Table Notes**

- *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.

---

### Guardrail Transition

Transitions from one type of road shoulder to another shall be made by special blocks as required. As required for redirective crash cushions, guardrail transition sections shall follow the roadway and shoulder profile to provide for the least obstruction to traffic flow. The crash cushion located on the edge of traffic lane shall be extended by an edge shield. As required for redirective crash cushions, the guardrail panels and lengths same as taper side for plan quantities.

---

**Drawing References**

- See Index No. 402
- See Index No. 402

---

**Material Requirements**

- **Misc. Asphalt**: For redirective crash cushions, guardrail transition sections shall follow the roadway and shoulder profile to provide for the least obstruction to traffic flow.
LEGEND

1. Edge of traffic lane for simple curve turnouts.
2. Edge of travel lane for taper turnouts.
3. Taper.
4. Pavement return (radius R1).
5. Flared end anchorage to be installed except when existing guardrail on intersecting drive or side road renders the project.
6. Post for locating flare, proximate to PC or PT:
   - No. 2 posts for R2 > 25' or less.
   - No. 3 post for R2 > 25' and < 50' between No. 4 and No. 5 posts for R2 > 50.
7. Post for locating flare, proximate to PC or PT:
   - No. 3 post for R2 > 25' or less.
   - Between No. 4 and No. 5 posts for R2 > 25' greater than 25.
8. Expanded shoulder for guardrail.
9. Expanded shoulder for flared guardrail end anchorage.
10. Shoulder in absence of guardrail.
11. Flared end anchorage assembly.
12. Radial guardrail to be installed when guardrail required on the intersecting drive or side road (radius R1).
13. End anchorage Type II (radial return only).
14. Guardrail installation limited to roadway right of way unless otherwise called for in the plans.

RADIAL GUARDRAIL

<table>
<thead>
<tr>
<th>R2</th>
<th>Taper</th>
<th>Panels Required</th>
<th>δ</th>
<th>R1</th>
<th>Panels Required</th>
<th>δ</th>
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<td>15</td>
<td>85°56'</td>
<td>2</td>
<td>15</td>
<td>85°56'</td>
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<td>5</td>
<td>50</td>
<td>89°31'</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: Only 25' and 40' radius panels are to be used for return guardrail on normal turnouts. On skewed turnouts the number of panels used and their arrangement with straight panels will be as shown in the plans or as directed by the Engineer.

GUARDRAIL APPLICATIONS FOR INTERSECTING DRIVES AND SIDE ROADS ON RURAL FACILITIES

TAPER TURNOUTS

SIMPLE CURVE TURNOUTS

Note: The guardrail application shown on this sheet are for highways with flush shoulders and no restraints for constructing flared anchors and minimum lengths of guardrail. For highways with flush shoulders and restraints to constructing flared anchors, 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.
GUARDRAIL APPROACH TRANSITION AND CONNECTION FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING BARRIERS EXTENDING FULL LENGTH OF APPROACH SLAB

DETAIL J

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 Index No. 16A, FOR PREVENTION OF OFFSET BLOCK ROTATION. This Index.

APPLICATIONS

<table>
<thead>
<tr>
<th></th>
<th>SECTION CC</th>
<th>SECTION DD</th>
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<tbody>
<tr>
<td>Single Face Guardrail</td>
<td>6&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td>Double Face Guardrail With Timber Posts</td>
<td>9&quot;</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>Double Face Guardrail With Steel Posts</td>
<td>48&quot;</td>
<td>3/4&quot;</td>
</tr>
</tbody>
</table>

For Double Face Guardrail Connections To Median Bridge Traffic Railing Barrier, See Index No. 410, Guardrail Connection To Concrete Barrier Wall Approach Ends.
BRIDGES OVER STREAMS

BRIDGES OVER RAILROADS

BRIDGES OVER ROADWAYS OR RAILROADS

SKETCHES - BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING
BARRIER EXTENDING LESS THAN FULL APPROACH SLAB LENGTH

SKETCHES - BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING
BARRIER EXTENDING FULL APPROACH SLAB LENGTH

SKETCH NOTES

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

For Additional Information See Index No. 402

For Additional Guardrail Information See Sheet 13
SHOULDERS, SLOPES AND MISCELLANEOUS PAVING FOR FLARED END ANCHORAGE ASSEMBLIES

MISCELLANEOUS PAVING FOR STANDARD GUARDRAIL SECTIONS

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)

SHOULDERS WITH OR WITHOUT 5' PAVEMENT

PAVED SHOULDERS

SHOULDER GUTTER

DOUBLE FACE RAIL

STANDARD LOCATIONS

For Guardrail on slopes see Sheet 26.

** 8 For 6' Shoulders 10 For 8' Shoulders 12 For 10 And 12' Shoulders Applies To Left And Right Side Shoulders (See Index No. 325 For Shoulder Widths And Shoulder Gutter Locations On Ramps And Auxiliary Lanes)
**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 8&quot;x14&quot; (Nominal) For W-Beam And W6x10x22&quot; (Nominal) For Thrie-Beam</td>
<td>Post bolt hole in timber and plastic blocks to be centered ± 1/8&quot;. All timber offset blocks shall be dressed on all four sides (SS4S). One 16d galvanized nail per block is to be used to prevent rotation of block (see detail nits).</td>
</tr>
<tr>
<td></td>
<td>Recycled Plastic (See Notes)</td>
<td>Same as above for timber and plastic blocks except that form fit plastic block holes align with holes in steel posts and do not require nails.</td>
</tr>
<tr>
<td>Steel</td>
<td>Timber 8&quot;x14&quot; (Nominal) For W-Beam And W6x10x22&quot; (Nominal) For Thrie-Beam</td>
<td>Steel 8&quot;x8x9&quot; (Nominal) For Thrie-Beam</td>
</tr>
<tr>
<td></td>
<td>Recycled Plastic (See Notes)</td>
<td>Steel 8&quot;x8x9&quot; (Nominal) For Thrie-Beam (Steel Modified Thrie-Beam)</td>
</tr>
</tbody>
</table>

Notes:
1. Timber and recycled plastic offset blocks of identical size and shape can be intermixed within a run of rail.
2. Recycled plastic offset blocks shall meet the passing evaluation criteria for Test Level 3 crash tests. The blocks shall be tested as a component in a semi-rigid guardrail test article under full scale crash test conditions. The blocks shall be in conformance with Sections 536 and 972 of the Specifications and be included on the Qualified Products List. W-Beam blocks shall be 14" in height and thrie-beam blocks shall be 22" in height. The blocks shall be capable of providing a 7.5' (2.28 m) offset. For additional information on plastic offset block installations refer to Sheet 1, GENERAL NOTE 16.

**SINGLE FACED GUARDRAIL**

**DOUBLE FACED GUARDRAIL**

**MOUNTING HEIGHTS ON SHOULDERS AND IN MEDIANS**

**LOCATION AT CURB & GUTTER SECTIONS-DETAIL L**
**BARRIER DELINEATOR SPACING**

Install Pipe Rail Over Pipe Rail End Fixture and Thru Bolt with W1/2 x 3/8" Long Hex Bolts And Nuts With W Plain Round Washers Under Heads And Nuts (2 Req'd) (Upset Threads After Tightening) Pictorial View: BARRIER DELINEATOR MOUNTING

**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 not extend beyond the last post of the approach 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 treatment 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 treat with primer
   b. Use post bolts 15" in length with washers and nuts counter sunk into sinks 1" to 1 1/2" deep or
   c. Use post bolts 15" in length with sleeve nuts and washers.

For locations used by Pedestrians or Bicyclists

**PEDESTRIAN SAFETY TREATMENTS**

**BARRIER DELINEATOR NOTES**

1. Barrier delineators shall conform to Specification Section 993.
2. Barrier delineator color (white or yellow) shall conform to the color of the near lane edgeline.
3. Barrier delineators installed on median guardrail shall have retro-reflective sheeting on both sides of the barrier delineator.
4. The cost for barrier delineators shall be included in the contract unit price for Guardrail.
Notes
1. Curb And Gutter Flare shall follow guardrail flare, see elsewhere in this Index for additional guardrail flare information.

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

See PEDESTRIAN SAFETY TREATMENTS

This Standard Post Must Be Timber When Steel Post Used In Guardrail Ahead

See Detail 1

APPROACH TREATMENT FOR CURB AND GUTTER

DETAIL Q

FDOT 2014 DESIGN STANDARDS

GUARDRAIL
For beam washer requirements on end terminals, see individual and 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 anchorage, 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.

(RIGHT ANGLE PLATE WASHER) BEAM WASHER

For application information see individual and anchorage assembly details. Special steel washer required with splice bolts.

W-Beam Back-Up Plate

\[
\begin{align*}
\text{OFFSET (Ft.)} & \quad \text{W-Beam} \quad \text{Thrie-Beam} \quad \text{W-Beam} \quad \text{Thrie-Beam} \\
6-3-9 & \quad 3-6-9 \quad 3-6-9 \quad N/A \quad N/A \\
1-3-9 & \quad 2-6-9 \quad 3-6-9 \quad N/A \\
6-3 & \quad N/A \quad N/A \quad N/A \\
\end{align*}
\]

Note: The values shown should be utilized unless changes are supported by empirical validation. Those desiring to develop offset values from the simulated deflection values shown in Table 5.4 of the AASHTO Roadside Design Guide are cautioned to proceed only if background in the table development is understood.

Thrie bolts for thrie-beam terminal connectors shall conform to the requirements of ASTM A499 (Type 1) with heavy hex nuts and washers. All other hex bolts shall conform to the requirements of ASTM A453. 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.

HEX BOLTS AND NUTS

\[
\begin{align*}
\text{Sheet Thickness} & \quad \text{Tolerance} \\
(0.05 \pm R) & \quad (0.02 \pm R) \\
\end{align*}
\]
REVISION 16

DESCRIPTION:
"R" 1"Øx7" Stud, Full Threads, Holes

SOIL PLATES

THRIE-BEAM RAIL SPLICE

Neutral Axis
Symmetrical About Z

Approach Beam, W-Thrie Beam Transition Section Or Terminal Connector

Direction Of Traffic

THRIE-BEAM RAIL SPLICE

THRIE-BEAM TERMINAL CONNECTOR

Note: 1/2" steel washer required with splice bolts

THRIE-BEAM TERMINAL CONNECTOR

W-THRIE BEAM TRANSITION SECTION

INDEX NO.
400

SHEET NO.
20 of 26

GUARDRAIL

FDOT 2014
DESIGN STANDARDS

REVISION
07/01/05

Last Revision

GALVANIZED STEEL BACK-UP PLATES FOR CONNECTING SPECIAL END SHOES AND TERMINAL CONNECTORS TO CONCRETE BRIDGE TRAFFIC RAILING BARRIERS AND CONCRETE BARRIER WALLS

BEARING PLATE

BREAKAWAY TERMINAL POST SLEEVE

CABLE ASSEMBLY

BEAM ANCHOR PLATE

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

* Additional slotted hole required when mounting three-beam guardrail

NOTES: (SPECIAL STEEL POST)

1. See Index No. 402 for special view 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 post 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 galvanized in accordance with ASTM A153 (stainless steel components may be substituted but components placed in accordance with ASTM B-632 are not acceptable). Adhesive anchor rods shall be equal in diameter to the borehole 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 also 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 10,000 lbs.; other structures 7,000 lbs.

FOR CONSTRUCTION OF GUARDRAIL WHERE CURVING, PIER FOOTING OR OTHER STRUCTURE PRECLUDES DRIVEN POST INSTALLATION

3. Posts are to be plumbed by adjusting nuts or mortar seating. Posts installed using anchor bolts and adhesive anchors are to be set with adjusting nuts as detailed, unless the Engineer approves the use of mortar seating in lieu of adjusting nuts. Posts installed using wedge anchors are to be set with mortar seating. Base plates shall be grouted with neat finish.

4. Adhesive-Bonded Anchors for Structural Applications shall comply with Section 937 and be installed in accordance with Section 416. 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 galvanized in accordance with ASTM A123. Any damaged galvanized areas are to be metalized in accordance with Section 562 of the Standard Specifications.

7. Special steel posts are not to be substituted for any post in a guardrail approach end treatment system.

SPECIAL STEEL GUARDRAIL POSTS

- Steel tube
- Steel modified thrie-beam
- W-beam
- Thrie-beam
- W8x18 post

STANDARD TIMBER AND STEEL GUARDRAIL POSTS

- Short timber breakaway post
- CRT timber post
- W6x8.5 or W6x9 steel post

INDEX NO. 400

FOOT 2014 DESIGN STANDARDS
TOP VIEW-DOUBLE FACE

Steel Post Run Of Rail Adjacent To Sidewalks Or Shared Use Paths (This Post Must Be Timber In Steel Post Run Of Rail Adjacent To Sidewalks Or Shared Use Paths, To Provide Anchorage To Sidewalks Or Shared Use Paths)

6'-3" To Next Post 12" 10"

Cable To Be Drawn Taut With Hand Wrench Prior To Setting Jam Nut

Position Varies

Turnbuckle (6") See Note Below Flared Or Rounded End Section On Trailing End Section

End Measurement For Guardrail Payment

Misc. Asphalt Pavt. 10' Approach End Guardrail

Concrete Anchor Block (Block To Be Positioned To Suit Anchorage Alignment. Only One Anchorage Required. Anchorage To Be On Approach Rail When Both Approach And Trailing Guardrails Are Connected)

No Cover Required

Misc. Asphalt Pavt.

TS 8x6x.188 Galvanized Steel Tube

Beveled Washer And Hex Nut

FRONT VIEW

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

CONCRETE ANCHOR BLOCK OPTION

TYPE II NOTES

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. trailoring end anchorage for single face free standing guardrail systems;
   b. approach end anchorage for single face free standing guardrail systems when end anchorage is located outside of the clear zone; and,
   c. both approach and trailing ends of double face guardrail systems.

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

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

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.
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 an effective 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 the Florida Department of Transportation solely for use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify 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 precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals. The MELT shall be installed 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 CRT 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 backrail.

6. See the General Notes for galvanizing requirements of metallic components.

7. If 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 end anchorage assembly flared 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 CSIP consideration.

8. The MELT shall be paid for under the contract unit price for Guardrail, End Anchorage Assembly (Flared), EA and 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. The MELT can not be used in medians where horizontal clearance requires the use of a backrail.
GUARDRAIL END ANCHORAGE ASSEMBLY TYPE CRT

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 cannot be applied (Sheet 12), and (b) for areas where the driveway and side 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 incurred as a substitute or replacement for the appropriate use of approved vehicle impact attenuators.

3. Controlled release returns with either 8", 16" or 24" radii are designed for highway speeds of 60 mph or less.

4. The controlled release return shown 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 return with 8", 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 surface approaching the controlled release return shall have slopes not steeper than 1:2 and be maintained free of fixed objects in accordance with the area limits tabulated in the plan below.

7. 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 preceding shielding; the width (beyond shoulder) shall be not greater than the corresponding 15' and 20' "W" values tabulated below.

8. The curved guardrail portion of the controlled release return shall be full section shop bent panels (12.5' or 25' long).

9. Washers are not to be used between the guardrail beam and the head of the button head post bolts at any controlled release return. The Guardrail End Anchorage Assembly Type CRT is to be connected to standard guardrail and the head of the button head post bolts at any controlled release return can be terminated with the Guardrail End Anchorage Assembly Type CRT or connected to standard guardrail.

10. The curved guardrail portion of the controlled release return shall be full section shop bent panels (12.5' or 25' long).

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

12. The surface approaching 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 preceding shielding; the width (beyond shoulder) shall be not greater than the corresponding 15' and 20' "W" values tabulated below.

13. The controlled release return system shall be paid for under the contract unit prices for Guardrail (Roadway), Guardrail (Shop-bent Panels), and Guardrail End Anchorage Assembly (Type CRT), EA as called for in the plans and with this index.
MOUNTING HEIGHT FOR DOUBLE FACED GUARDRAIL ON MEDIAN SHOULDERS (FREEWAYS)

GUARDRAIL ON MEDIAN SLOPES

GUARDRAIL ON OUTSIDE SLOPES

GUARDRAIL ON SLOPES

RUB RAIL TERMINATION

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.
3. Guardrail with Rub Rail; 2'-0" to 1'-9" post bolt.
4. Standard guardrail; 1'-9" to 12' post bolt. Rub Rail is required on the median side when double face guardrail is used.
5. Guardrail with Rub Rail; 2'-0" to 1'-9" post bolt.
6. For shoulders less than 12' in width the tabulated values will be reduced by the difference between 12" and the shoulder width. Placement of guardrail on front slopes steeper than 1:4 not recommended.
7. Standard guardrail; 1:4 to 1:9 post bolt. Rub Rail is required on the median side when double face guardrail is used.
8. Guardrail with Rub Rail; 2'-0" to 1'-9" post bolt.

LATERAL PLACEMENT ON SLOPES
(FROM EDGE OF NEAR TRAFFIC LANE)

| Slope | Standard Guardrail | Guardrail Not Recommended | Guardrail With Rub Rail
<table>
<thead>
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<tbody>
<tr>
<td>1.4</td>
<td>12'-0&quot;</td>
<td>14'-0&quot;</td>
<td>28'-0&quot;</td>
</tr>
<tr>
<td>1.5</td>
<td>12'-0&quot;</td>
<td>15'-0&quot;</td>
<td>28'-0&quot;</td>
</tr>
<tr>
<td>1.6</td>
<td>10'-0&quot;</td>
<td>17'-0&quot;</td>
<td>29'-0&quot;</td>
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<tr>
<td>1.7</td>
<td>15'-0&quot;</td>
<td>21'-0&quot;</td>
<td>29'-0&quot;</td>
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<tr>
<td>1.8</td>
<td>15'-0&quot;</td>
<td>21'-0&quot;</td>
<td>29'-0&quot;</td>
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<td>1.9</td>
<td>15'-0&quot;</td>
<td>21'-0&quot;</td>
<td>29'-0&quot;</td>
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<td>1.10</td>
<td>16'-0&quot;</td>
<td>22'-0&quot;</td>
<td>30'-0&quot;</td>
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