Initiating a straight guardrail flare - Initiate a 15L:1W guardrail flare (typical for high speed roadways) as shown below:

**CONNECTIONS TO BRIDGE RAILING AND OTHER TRAFFIC BARRIERS**

Connect guardrail to another type of traffic barrier with a transition section (see installation details for transitions). Use transitions on both the upstream and downstream ends of two-way traffic bridges and the upstream ends only for one-way traffic bridges typically found on interstates and freeways. Ensure the transition section is tangent with the roadway where possible.
NOTES

Shielding Fixed Object Hazards - Extend tangent run of guardrail a minimum of four standard post spaces 25 ft. [7.6 m] on each side of the fixed object hazard. For standard post spacing, locate the back of guardrail posts a minimum of 3 ft. [915] from the fixed object.

- Extend tangent run of guardrail a minimum of four standard post spaces 25 ft. [7.6 m] on each side of the fixed object hazard. For standard post spacing, locate the back of guardrail posts a minimum of 3 ft. [915] from the fixed object.

<table>
<thead>
<tr>
<th>Deflection Distance</th>
<th>Post Spacing</th>
<th>Single Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 ft. [915]</td>
<td>6'-3&quot; [1905] (Standard)</td>
<td>Single Rail</td>
</tr>
<tr>
<td>2 ft. [610]</td>
<td>3'-1 1/2&quot; [952]</td>
<td>Single Rail</td>
</tr>
<tr>
<td>1.5 ft. [460]</td>
<td>3'-1 1/2&quot; [952]</td>
<td>Double Nested Rail</td>
</tr>
</tbody>
</table>

* The minimum provided deflection distance may be reduced by decreasing post spacing and/or adding double nested sections of guardrail. Start reduced post spacing, when required, and double nested guardrail 25 ft. [7.6 m] before the hazard and extend 25 ft. [7.6 m] beyond the hazard.

2. Flared vs. Tangent (Parallel) Installation - Drawing depicts flared guardrail runs with solid lines and tangent (parallel) installations in dashed lines.

3. End Anchorage Flares - Where an end anchorage such as the Type A requires a flare, construct terminal flare in addition to the guardrail flare (if present).

4. Post Spacing Reduction - Where a tighter post spacing is required to limit guardrail deflection, add 25 ft. [7.6 m] downstream tangent guardrail as indicated in asterisk (*) above. Do not use Type C end anchorages unless shielded or far outside clear zone.
If necessary, modify the earthwork shown in the plans and as staked to provide these minimum grading requirements at guardrail installations. The engineer will pay for this work using standard grading bid items as provided in the plans.

1. Ensure the cross-slope of the earthwork in the area approaching a guardrail installation, the area around the terminal, and the area of the guardrail flare is 1V:10H surface or flatter.
2. Ensure cross slope of grading from roadway to the barrier face is 1V:10H or flatter. Extend 1V:10H a minimum of 2 ft. [600] behind the guardrail posts. The department may specify 1V:1H for the guardrail installation where drainage and/or snow accumulation must be mitigated.
3. Ensure the area immediately behind and beyond the terminal is traversable and free from fixed object hazards or at least similar in character to upstream, unshielded slopes located within the clear-zone. Ensure a slope of 1V:4H or flatter. If not practical, use a maximum slope of 1V:3H. Extend the traversable slope for a distance X beyond post 3 of the end terminal.

If not shown in the plans, calculate X from the formula below:

\[ X = \left( \frac{CZ - Y}{LR} \right) \cdot CZ \]

**TABLE**

<table>
<thead>
<tr>
<th>DESIGN SPEED (mph)</th>
<th>( L_R ) Runout Length [ft]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADT Over 6000</td>
<td>ADT 2000 to 8000</td>
</tr>
<tr>
<td>60</td>
<td>145</td>
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<td>70</td>
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<td>80</td>
<td>160</td>
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<td>90</td>
<td>170</td>
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</table>

**TABLE** (METRIC)

<table>
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<tr>
<th>DESIGN SPEED (km/h)</th>
<th>( L_R ) Runout Length [meters]</th>
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<td>ADT Over 6000</td>
<td>ADT 2000 to 8000</td>
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<tr>
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<td>145</td>
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<tr>
<td>110</td>
<td>160</td>
</tr>
<tr>
<td>120</td>
<td>170</td>
</tr>
</tbody>
</table>

**NOTE**

- See Typical Sections for SHIELDED SLOPE HAZARD PROTECTION.
- Note edge of traveled way offsets at post #3 for two way traffic and one way traffic roadways such as divided highways.
- See Alternate Design (Applies to two way traffic and one way traffic roadways such as divided highways).
- See Typical Sections for SHIELDED GUARDRAIL FLARE REQUIREMENTS.
- See Alternate Design (Applies to two way traffic and one way traffic roadways such as divided highways).

**APPENDIX**

- Standard Plan Writers.
- Engineering Services.
If necessary, modify the earthwork shown in the plans and as staked to provide these minimum grading requirements at guardrail installations. The engineer will pay for this work using standard grading bid items as provided in the plans.

1. Ensure the cross-slope of the earthwork in the area approaching a guardrail installation, the area around the terminal and the area of the guardrail flare is a 1V:10H surface or flatter.

2. Ensure cross slope of grading from roadway to the barrier face is 1V:10H or flatter. Extend 1V:10H a minimum of 2 ft. [600] behind the guardrail posts. The department may specify 1V:8H for the guardrail installation where drainage and/or snow accumulation must be mitigated.

3. Ensure the area immediately behind and beyond the terminal is traversable and free from fixed object hazards or at least similar in character to upstream, unshielded slopes located within the clear-zone. Ensure a slope of 1V:4H or flatter; if not practical, use a maximum slope of 1V:3H. Extend the traversable slope for a distance X beyond post 3 of the end terminal.

If not shown in the plans, calculate X from the formula below:

\[ X = \frac{(CZ - Y)(L_R)}{CZ} \]

Note: Tangent installation shown, apply same concept for flared installations.

APPROACH END GRADING FOR OPPOSING TRAFFIC LANES
(Applies to two way traffic roadways)

NOTE: Tangent installation shown, apply same concept for flared installations.

### DESIGN SPEED

<table>
<thead>
<tr>
<th>SPEED (mph)</th>
<th>ADT 6000</th>
<th>ADT 2000 to 6000</th>
<th>ADT 800 to 2000</th>
<th>ADT Under 800</th>
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</thead>
<tbody>
<tr>
<td>80</td>
<td>240</td>
<td>220</td>
<td>200</td>
<td>200</td>
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### METRIC TABLE

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<tr>
<th>SPEED (km/h)</th>
<th>ADT 6000</th>
<th>ADT 2000 to 6000</th>
<th>ADT 800 to 2000</th>
<th>ADT Under 800</th>
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</tr>
</tbody>
</table>

### GRADING REQUIREMENTS (CONTINUED)

Note: Units shown in brackets [ ] are metric and are in millimeters (mm) unless other units are shown.
GENERAL NOTES

1. DO NOT use washers between the head of the guardrail bolt and rail element unless specifically shown in the plans.
2. Use post dimensions based on timber species in accordance with the material requirements in the Standard Specifications.
3. All wood cross-section dimensions shown are nominal dimensions.

STANDARD W-BEAM GUARDRAIL

<table>
<thead>
<tr>
<th>PART</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAIL ELEMENT</td>
<td>8&quot; x 200&quot;</td>
</tr>
<tr>
<td>GUARDRAIL BOLT</td>
<td>5/8&quot; x 19&quot;</td>
</tr>
</tbody>
</table>

ADJACENT TRAFFIC DIRECTION

ADJACENT TRAFFIC DIRECTION

SHOULDER HINGE POINT

WOOD POST AND W-BEAM LAP SPICE DETAIL

<table>
<thead>
<tr>
<th>PART</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAP RAIL</td>
<td>6&quot; x 3&quot; (150 x 76)</td>
</tr>
</tbody>
</table>

ADDITIONAL HOLES TO ADJUST RAIL HEIGHT FOR FUTURE OVERLAYS

6" x 6" x 14" (150 x 200 x 360) GALVANIZED NAILS

W-BEAM TIMBER BLOCKOUT

WASHER UNDER NUT

GUARDRAIL POST

FOR REFERENCE ONLY

FOR REFERENCE ONLY
Connection to Steel Bridge Railing (Transition Section)

Notes:
1. Install transition section on tangent (parallel) with the road. Do not begin guardrail flares within the transition section.
2. Use transition sections on exit ends of one way traffic bridges only when specified.

Note: Cut guardrail bolts flush with nuts and eliminate rounded end section when pedestrian sidewalk or bike path is directly behind the guardrail.

Connection to Permanent Concrete Barrier (Transition Section)

Notes:
1. Install transition section on tangent (parallel) with the road. Do not begin guardrail flares within the transition section.
2. Use transition sections on exit ends of one way traffic bridges only when specified.

For Reference Only

For Reference Only
**NARROW MEDIAN INSTALLATIONS**

**Notes:**
- Units shown in brackets [ ] are metric and are in millimeters (mm) unless other units are shown.
- Details are typical for narrow medians - medians less than 60 feet [18 m] measured from edge of traveled way to edge of traveled way. Locate End Anchors as specified, not necessarily at the ditch bottom.
- Ensure grading requirements and requirements for placement of guardrail around fixed object hazards are met for median installations.

1. Grade cross-slopes 50 to 75 feet [15 to 20 m] in approach of, and extending around, median installations 1V:10H or flatter (shown in cross-hatched areas) into the face of the guardrail and terminal. Smoothly transition slopes into this relatively flat grading section. When the terminal is located within 3 feet [1 m] laterally from the ditch bottom or crosses the ditch bottom, grade immediately in front of, and near, the terminal 1V:20H. Maintain adequate drainage in the median.

2. The length for End Anchorage Type F varies depending on whether it transitions to W-beam or concrete barrier. See Type F Installation details for lengths.

---

**Bridges End and Slope Protection with W-Beam Shoulder Barrier**

**Termination of Concrete or W-Beam Median Barrier**

**Bridge End Protection with Flared Median Barrier**

**Bridge End Protection - Non-Flared Median Barrier**

---

**Fixed Object Shielding in Median**

**Transition (Req'd Only for W-Beam)**

**Concrete or W-Beam Median Barrier**

**End Anchorage Type F**

**50' - 75'**

**[15 m - 20 m]**

**W-Beam Shoulder Barrier**

**NOTE (A)**

---

**Termination of Concrete or W-Beam Median Barrier**

**Connection of End Anchorage Type F** to Double Run of W-Beam Shoulder Barrier**

**Detail "A"**

---

**FOR REFERENCE ONLY**
END ANCHORAGE TYPE A - (ALTERNATE 1 - FLEAT 350) PLAN & ELEVATION VIEW

NOTES

1. Alternate #1 - FLEAT 350 End Terminal may be provided when End Anchorage Type A is specified.

2. Flare the FLEAT End Terminal on a straight line from the tangent line of the adjacent guardrail run to provide a 4 foot (1.2 m) offset to the rear face of the rail at the impact head. The offset can be reduced to 2 1/2 feet (760 mm) in special conditions. This applies only to this end anchorage alternate and will only be done when specifically called for in the plans.

3. Delimitate the entire end plate of the impact head with reflective diagonal sheeting with alternating diagonal black and yellow stripes.

END ANCHORAGE TYPE A ALTERNATE #1 - FLEAT 350

Note: Units shown in brackets [ ] are metric and are in millimeters (mm) unless other units are shown.
1. **Application:** When necessary, use the short radius transition to shield hazards at the intersection of two roadways. Typical applications include, but are not limited to, the following:
   - Canal service roads at bridge ends.
   - Intersections in guardrail runs intersecting roadways, etc.

2. **Grade terrain to 1:V:100 or flatter in front of and 2 ft (610 mm) beyond posts, than 1:20 or flatter.**

3. **Canal service roads at bridge ends.**

4. **Do not bolt the rail to the CRT post at the center of the curve for the 8'-6" (2.6 m), 17'-6" (5.3 m) and 25'-6" (7.8 m) radii.**

5. **Tighten outside nut against inside nut with the cable installed between the anchor plate and first post.**

6. **Do not bolt the rail to the CRT post at the center of the curve for the 8'-6" (2.6 m), 17'-6" (5.3 m) and 25'-6" (7.8 m) radii.**

### SHORT RADIUS TRANSITION - END ANCHORAGE TYPE D

#### APPLICATION TABLE

<table>
<thead>
<tr>
<th>RADIUS</th>
<th>ANGLE NO. CRT POSTS</th>
<th>AREA FREE OF FIXED OBJECTS</th>
<th>CURVED RAIL FOR</th>
<th>PER</th>
</tr>
</thead>
<tbody>
<tr>
<td>8'-6&quot;</td>
<td>75'-105°</td>
<td>5</td>
<td>L,W 75'-105°</td>
<td>10°</td>
</tr>
<tr>
<td>17'-6&quot;</td>
<td>75'-95°</td>
<td>6</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>14-6&quot;</td>
<td>91'-105°</td>
<td>7</td>
<td>40</td>
<td>12.2</td>
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<tr>
<td>26'-6&quot;</td>
<td>75'-80°</td>
<td>8</td>
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<td>40</td>
</tr>
<tr>
<td>26'-6&quot;</td>
<td>90'-105°</td>
<td>9</td>
<td>40</td>
<td>12.2</td>
</tr>
<tr>
<td>30'-6&quot;</td>
<td>90'-105°</td>
<td>10</td>
<td>40</td>
<td>12.2</td>
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<tr>
<td>30'-6&quot;</td>
<td>90'-105°</td>
<td>11</td>
<td>40</td>
<td>12.2</td>
</tr>
</tbody>
</table>

**Note:** Units shown in brackets [ ] are metric and are in millimeters (mm) unless other units are shown.

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**Corrugated Beam Guardrail**

**Wyoming Department of Transportation**

**Standard Plan**

**606-1**

**Sheet 11 of 16**

**For Reference Only**
GENERAL NOTE

Proprietary End Anchorages may require different components than shown here.

3/4" (19) CABLE ANCHOR ASSEMBLY
(Supplied with (4) HEAVY HEX NUTS & (2) HARDENED WASHERS)

U-BOLT CABLE CLIP

BCT POST SLEEVE

PLATE WASHER
(Used with slotted bearing plate)

SLOTTED BEARING PLATE

FABRICATION DETAILS - STANDARD CABLE ANCHORAGE DETAILS

Note: Units shown in brackets [ ] are metric and are in millimeters (mm) unless other units are shown.