Fabricate and furnish all box beam components in accordance with the latest WYDOT Standard Plan, "Box Beam Guardrail Fabrication Standards". By reference that Standard Plan is hereby included in the contract.

Initiating Guardrail Flares and Curved Guardrail Installations with radii of 715 ft. [218 m] and greater (i.e. 8 degrees and flatter) - Initiate by angling joints, notch stop berming rail. A box beam joint will typically allow nearly 2 degrees of deflection per joint. To stimulate a straight 1W:15L flare (typical for high-speed roadways), angle the joints at each end of the first rail element on the flare as shown below.

**Typical 1W:15L Flare Layout**

**Connections to Bridge Railing and Other Traffic Banners**

Connect box beam guardrail and median barrier to bridge rail and/or concrete barriers with the appropriate guardrail transition section on each end receiving guardrail.

**Install Impact Head of Terminal a Minimum of 4 ft. (1.2 m) from Edge of Shoulder Where Possible**

For tangent (parallel) guardrail installations where the impact head of the terminal is within less than 4 ft. [1.2 m] from the edge of the shoulder, realign a minimum of the last 100 ft [30.5 m] on a 1:50 (preferred) or flatter flare. In no case shall the flare be steeper than a 1:25. Provide grading around guardrail and terminal as shown in the "Grading Requirements" sheets.
1. Shielding Fixed Object Hazards - Extend tangent run of guardrail a minimum of four standard post spaces (24 ft. [7.3 m]) on each side of the fixed object hazard. For standard post spacing, locate the back of the rail a minimum of 5 ft. [1.5 m] from the fixed object.

2. Flared vs. Tangent (Parallel) Installation - Drawing depicts flared guardrail runs with solid lines and tangent (parallel) installations in dashed lines. Tangent guardrail runs are longer than flared guardrails to shield the same hazard.

### Deflection Distance vs. Post Spacing

<table>
<thead>
<tr>
<th>Deflection Distance</th>
<th>Post Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 ft. [1.5 m]</td>
<td>6 ft. [1830] (Standard)</td>
</tr>
<tr>
<td>4 ft. [1.2 m]</td>
<td>4 ft. [1220]</td>
</tr>
</tbody>
</table>

### Typical Guardrail Placement

#### Around a Fixed Object

- **Two Way Traffic Roadways**
  - Earliest Beginning for Guardrail Flare
  - Minimum Length of Tangent
  - Length of Flare
  - Flared Installation
  - Tangent Parallel Guardrail Installation

#### Around a Fixed Object (One Way Traffic)

- Earliest Beginning for Guardrail Flare
- Minimum Length of Tangent
- Length of Flare
- Flared Installation
- Tangent Parallel Guardrail Installation
**GRADING NOTES**

If necessary, modify the earthwork shown in the plans and as stated 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. If Type I End Anchorage is used, extend this grading envelope through the clear-zone to the upstream beginning of the terminal.

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. (610) behind guardrail posts.

3. Ensure the area immediately behind and beyond the terminal is traversable and free from fixed object hazards or is at least similar in character to upstream, unshielded slopes located within the clear-zone. Ensure a slope of 1V:3H 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 on the plans, calculate X from the formula below:

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

### APPROACH END GRADING - FLARED GUARDRAIL INSTALLATION

(Appplies to two way traffic and one way traffic roadways such as divided highways)

### APPROACH END GRADING - TANGENT (PARALLEL) GUARDRAIL INSTALLATION

(Appplies to two way traffic and one way traffic roadways such as divided highways)

### FILL SLOPE HAZARD PROTECTION

**GRADING REQUIREMENTS (SHEET 1 OF 2)**

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

**Wyoming Department of Transportation**

**BOX BEAM GUARDRAIL**

**STANDARD PLAN**

**606-6A**

**SHEET 3 of 13**

**Drawing No.**

**606-6A**
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. If Type I End Anchorages are used, extend this grading envelope through the clear-zone to the upstream beginning of the terminal.

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. [60] behind guardrail posts.

3. Ensure the area immediately behind and beyond the terminal is traversable and free from fixed object hazards or is at least similar in character to upstream, unshielded slopes located within the clear-zone. Ensure a slope of 1V:3H 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 on the plans, calculate X from the formula below:

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

**APPRAOCH END GRADING FOR OPPOSING TRAFFIC LANES**

(Applies to two way traffic roadways)

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

**RUNOUT GRADING BEHIND GUARDRAIL**

**FILL SLOPE HAZARD PROTECTION**
Box Beam Guardrail - HSS 6x6x3/16 [HSS 152x152x4.8]
Box Beam Median Barrier - HSS 6x6x1/4 [HSS 203x152x6.4]

END ANCHORAGE TYPE II

Note: Only use Type II End Anchors for the downstream terminal of a guardrail run on one-way traffic roadways (such as divided highways). Place Type II anchorage at least 48 ft. [15.0 m] downstream of the hazard.

END ANCHORAGE TYPE I

Box Beam Guardrail - HSS 6x6x3/16 [HSS 152x152x4.8]
Box Beam Median Barrier - HSS 6x6x1/4 [HSS 203x152x6.4]

Note: Flare Type I End Anchors outside the clear-zone.

BOLT REQUIREMENTS

3/8" A325 HIGH STRENGTH HEAVY HEX BOLTS (TYP. SPICE BOLT)
- 3/8' x 2' (19 x 50) [A325] STANDARD SPICE BOLT + 1 HARDENED WASHER [F436]
- 3/8' x 8' (19 x 200) [A325] + 2 HARDENED WASHERS [F436] + 1 NUT [A193-2H/M]

3/4" A327 HEX BOLTS (TYP. MEDIUM POST)
- 3/4' x 1 1/2' (19 x 40) [A327] + 2 WASHERS [F464] + 1 NUT [A562]

1 1/2" A327 HEX BOLTS (TYP. POST BOLT)
- 1 1/2' x 1 1/2' (3 x 40) [A327] + 2 WASHERS [F464] + 1 NUT [A562]

3/8" A327 HEX BOLTS (TYP. RAIL BOLT)
- 3/8' x 7 1/2' (10 x 190) [A327] + 2 WASHERS [F464] + 1 NUT [A562]

STANDARD HARDWARE AND POSTS

(See BOX BEAM fabrication standard plan)
**WYBET & MEDIUM BARRIER WYBET GENERAL NOTES**

Where "End Terminal (WYBET)" is specified, provide either the WYBET or BEAT option as shown herein. Where "Medium Barrier End Terminal (WYBET)" is specified, provide either the Medium Barrier WYBET or Medium Barrier BEAT option as shown herein.

1. For tangent guardrail installations where the face of the guardrail at the impact head of the terminal is less than 4 ft. [1.2 m] from the shoulder break point, realign the guardrail and terminal as shown in detail on [Sheet 4] of this standard plan.

2. **COMPOSITE TUBES**: Tape end caps by double wrapping with 4 [100] wide duct tape or 4x wrap of 2 [50] wide duct tape. Ensure a minimum of 2 1/2" [65] of tape on the end cap and 2 1/2" [65] of tape on the composite tubes. Place composite tubes and spacer inside outer rail elements as shown.

3. **TENSIONING THE WYBET**: Tighten the cable anchor and the tension connector without the spring installed. After the cable anchor is taut and the correct overlap attained at each end of the outer rail, remove the nut on the threaded rod to install the spring. Reinstall the nut and compress the spring 1 1/4" [30] to 1 1/2" [40]. Do not fully compress the spring! Place the second nut on each end of the tension connector to ensure first nut does not back off.

4. **MEDIUM BARRIER WYBET INSTALLATIONS**: For connection of WYBET to older paddle mounted medium barrier, remove paddles and use bolted connection for minimum of 10 posts beyond the WYBET. (See [Sheet 6].)

5. **USE ONLY COMPONENTS**: Supplied by the manufacturer for the terminal. Do not substitute standard guardrail components.
NOTE

Where 'End Terminal (WYBT)' is specified, provide either the WYBT or BEAT option as shown herein. Where "Median Barrier End Terminal (WYBT)" is specified, provide either the Median Barrier WYBT or Median Barrier BEAT option as shown herein.

1. For tangent guardrail installations where the face of the guardrail at the impact head of the terminal is less than 4 ft (1.2 m) from the shoulder break point, realign the guardrail and terminal as shown in detail on SHEET 1 of this standard plan.

2. The BEAT End Terminal shown herein is proprietary and can only be manufactured and sold by Road Systems, Inc. or its duly authorized representative.

Details shown herein are approximate. Refer to the manufacturer's drawings and installation manual for more precise details and requirements.

Any items shown as an "additional requirement" are over and above the manufacturer's standard product requirements.

Summary of additional requirements for the BEAT:
A. Double nut each end of the cable anchor to prevent from loosening.

3. Rail element beyond end tube section in plate has to be a minimum of 18 ft (5485) before splice.
PLAN VIEW

STANDARD BOX BEAM LINE POSTS
63X9.7 [976X8.5]

POST PLACEMENT IN ASPHALT OR CONCRETE PAVEMENTS

POST PLACEMENT IN PAVEMENTS AND ROCK

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

CASE 1

- For overlying soil depths (A) ranging from 0 to 18" [0 to 455], the depth of required drilling (B) is equal to 24" [610] or the desired embedment depth minus the depth of the soil, whichever is less.

CASE 2

- For overlying soil depths (A) ranging from > 18" [455], to the embedment depth of the post, depth of required drilling (B) is equal to either 12" [305] or the desired embedment depth minus the depth of soil, whichever is less.

BOX BEAM GUARDRAIL

WYOMING DEPARTMENT OF TRANSPORTATION