INITIALING A STRAIGHT GUARDRAIL FLARE - Initiate a 1W:15L guardrail flare (typical for high speed roadways) as shown below:

- **TYPICAL 1W:15L FLARE LAYOUT**

**LAYOUT DETAILS**
- General Requirements
- Guardrail Placement Around Fixed Object Hazards
- Grading Requirements
- Grading Requirements (continued)

**INSTALLATION DETAILS**
- Standard Run of MGS Guardrail
- Transition A - to TL-3 Steel Bridge Rail
- Transition B - to TL-4 Steel Bridge Rail
- Transition C - To New Jersey Concrete Barrier
- Transition D - To Single Slope Concrete Barrier
- Terminal Type I (Option 1 - MSKT MGS, Sheet 1 of 2)
- Terminal Type I (Option 1 - MSKT MGS, Sheet 2 of 2)
- Terminal Type I (Option 2 - SOFTSTOP, Sheet 1 of 2)
- Terminal Type I (Option 2 - SOFTSTOP, Sheet 2 of 2)
- MGS Long Span
- MGS Half Post Spacing
- MGS Quarter Post Spacing
- MGS Long Post - Constricted Slope Grading
- MGS 8’ [205] Blocks
- Post Placement in Pavements and Rock

**CONNECTIONS TO BRIDGE RAILING AND OTHER TRAFFIC BARRIERS**
- Connect MGS guardrail to bridge rail and/or concrete barrier using the appropriate transition section at all ends receiving guardrail.

**TYPICAL 1W:15L FLARE LAYOUT**

**GENERAL REQUIREMENTS**

**WYOMING DEPARTMENT OF TRANSPORTATION**

**MGS GUARDRAIL STANDARD PLAN**

**INDEX OF SHEETS**

**STANDARD PLAN NUMBER**

**Issued by:**

**Drawn by:**

**Designed by:**

**Checked by:**

**Date Issued:**

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

**Previous Dwg. No.**

**JULY 2018**

**WBW**

**WBW**
NOTES

1. Shielding Fixed Object Hazards - Do not place the guardrail any closer than the working width of the system to fixed object hazards which extend above ground line behind. Working width is the minimum distance from front face of the guardrail to the closest exposed face of a fixed object hazard located behind the guardrail.

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

3. Fiared Terminals - If Terminal Type II is specified, provide the required terminal offset flare in addition to any guardrail flare or to a tangent alignment.

<table>
<thead>
<tr>
<th>System</th>
<th>Post Spacing</th>
<th>Working Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard MGS</td>
<td>6' - 3'' [1905]</td>
<td>5 ft. [1.5 m]</td>
</tr>
<tr>
<td>MGS Half Post Spacing</td>
<td>3' - 1 1/2'' [960]</td>
<td>4 ft. [1.2 m]</td>
</tr>
<tr>
<td>MGS Quarter Post Spacing</td>
<td>1' - 6 3/4'' [475]</td>
<td>3 ft. [0.9 m]</td>
</tr>
<tr>
<td>MGS with Long Post &amp; Steep Slope Behind</td>
<td>6' - 3'' [1905]</td>
<td>5 1/2 ft [1.7 m]</td>
</tr>
<tr>
<td>MGS Long Span</td>
<td>Up to 25' (7.6 m)</td>
<td>8 ft. [2.4 m]</td>
</tr>
</tbody>
</table>

**Typical Guardrail Placement Around a Fixed Object**

**TYPICAL GUARDRAIL PLACEMENT AROUND A FIXED OBJECT**

**Two Way Traffic Roadways**

**Typical Guardrail Placement Around a Fixed Object**

**One Way Traffic Roadways Such As Divided Highways**

---

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

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. [610 mm] 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 1V:10H a minimum of 2 ft. [610 mm] behind the guardrail posts. The department may specify 1V:8H for the guardrail installation where drainage and/or snow accumulation must be mitigated.

4. For tangential 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 this standard plan.

**DESIGN SPEED**

<table>
<thead>
<tr>
<th>Design Speed</th>
<th>ADT Over 10,000</th>
<th>6,000 to 10,000</th>
<th>1,000 to 5,000</th>
<th>ADT Under 1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>mph</td>
<td>ft/s</td>
<td>m/s</td>
<td>m/s</td>
<td>m/s</td>
</tr>
<tr>
<td>30</td>
<td>130</td>
<td>420</td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>40</td>
<td>160</td>
<td>480</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>50</td>
<td>190</td>
<td>500</td>
<td>120</td>
<td>60</td>
</tr>
<tr>
<td>60</td>
<td>220</td>
<td>560</td>
<td>140</td>
<td>70</td>
</tr>
<tr>
<td>70</td>
<td>250</td>
<td>620</td>
<td>160</td>
<td>80</td>
</tr>
<tr>
<td>80</td>
<td>280</td>
<td>680</td>
<td>180</td>
<td>90</td>
</tr>
</tbody>
</table>

**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)

---

**RUNOUT GRADING BEHIND GUARDRAIL**

**FILL SLOPE HAZARD PROTECTION**

---

**WYOMING DEPARTMENT OF TRANSPORTATION**

**MGS GUARDRAIL**

**STANDARD PLAN**

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

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. [610] 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:

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

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

4. 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 606-2A of this standard plan.

**APPENDIX 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>MPH</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
<th>120</th>
<th>130</th>
<th>140</th>
<th>150</th>
<th>160</th>
<th>170</th>
<th>180</th>
<th>190</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADT</td>
<td>1,000</td>
<td>2,000</td>
<td>3,000</td>
<td>4,000</td>
<td>5,000</td>
<td>6,000</td>
<td>7,000</td>
<td>8,000</td>
<td>9,000</td>
<td>10,000</td>
<td>11,000</td>
<td>12,000</td>
<td>13,000</td>
<td>14,000</td>
<td>15,000</td>
<td>16,000</td>
</tr>
<tr>
<td>m/s</td>
<td>2.1</td>
<td>3.2</td>
<td>4.3</td>
<td>5.3</td>
<td>6.3</td>
<td>7.4</td>
<td>8.5</td>
<td>9.6</td>
<td>10.7</td>
<td>11.8</td>
<td>12.9</td>
<td>14.0</td>
<td>15.1</td>
<td>16.2</td>
<td>17.3</td>
<td>18.4</td>
</tr>
</tbody>
</table>

**Edge of traveled way for opposing traffic**

**Fill slope hazard protection**

**Runout grading behind guardrail**

**Sheltered slope hazard**

**Clear zone width is the same for each direction of traffic; find width in the typical sections. Measure the clear zone distance from the outside edge of the traveled way for the given direction of traffic and in the direction of the departure being considered.**
1. MSKT MGS (for MGS 31' [785] Guardrail) – MASH Tested, TL-3, redirective, gating terminal. This is an approved option for "MGS Terminal Type I." Provide terminals with steel posts. This terminal may be attached to standard guardrail runs having either wood or steel posts.

The MSKT MGS 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. Install in strict accordance with the manufacturer's installation manual. Provide and install any items shown herein as an "additional requirement."

Summary of "Additional requirements:" Double nut each end of the cable anchor.

2. Lap the upstream rail (for the adjacent traffic direction) over the downstream rail element at each splice. See rail lap detail on Sheet 6.

3. Attach impact head to post 1 as shown. Do not attach rail to post 1.

4. Do not place any type of washer or delineation under the head of the rail/post bolts.

5. The lower section of the hinged post should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.

6. The lower sections of posts 1 & 2 shall not protrude more than 4 inches [100] above the ground line. Correct site grading when necessary as directed by the engineer.

7. Ensure the cable anchor assembly is taut. Use a locking device (vice grips or channel locking pliers) to prevent twisting or untwisting of the cable when tightening nuts.

8. Ensure all hardware and assemblies are galvanized or coated to prevent corrosion.

9. Note the lateral offset to the back of posts changes from the terminal section to the centerline of wood post (if provided) in the standard guardrail section. The first spacing from the centerline of steel posts in the terminal section to the centerline of wood post (if provided) in the standard guardrail section will be 6' - 3" [1905] plus or minus 1 1/8" [30] to account for bolt holes being offset in steel posts.

10. The first spacing from the centerline of steel posts in the terminal section to the centerline of wood post (if provided) in the standard guardrail section will be 6' - 3" [1905] plus or minus 1 1/8" [30] to account for bolt holes being offset in steel posts.

Note: Units shown in brackets [ ] are metric and are in millimeters (mm) unless other units are shown.
TERMINAL TYPE I (OPTION 1 - MSKT MGS, SHEET 2 OF 2)

MGS GUARDRAIL

606-2A

ENGINEERING SERVICES

11

16

POST 1

POST 2

POST 3 THRU 8

MSKT IMPACT HEAD POST ATTACHMENT DETAIL

FRONT ELEVATION

SIDE ELEVATION

ISOMETRIC VIEW

POST 1 CABLE ANCHORAGE AND GROUND STRUT DETAILS

POST 2 GROUND STRUT DETAILS

STANDARD PLAN

WYOMING DEPARTMENT OF TRANSPORTATION

MGS GUARDRAIL

STANDARD PLAN

WYOMING DEPARTMENT OF TRANSPORTATION
TERMINAL TYPE I (OPTION 2 - SOFTSTOP, SHEET 1 OF 2)

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

1. SoftStop for MGS 31" [785] Guardrail = MASH Tested, TL-3, redirective, gating terminal. This is an approved option for "MGS Terminal Type I." Provide terminal with steel posts. This terminal may be attached to standard guardrail runs having either wood or steel posts.

The SoftStop Terminal shown herein is proprietary and can only be manufactured and sold by Trinity Industries or its duly authorized representative. Details shown herein are approximate. Install in strict accordance to the manufacturer's installation manual. Provide and install any items shown herein as an "additional requirement."

Summary of "Additional Requirements:" Double nut end of anchor paddle.

2. Lap the upstream rail (for the adjacent traffic direction) over the downstream rail element at each splice. See rail lap detail on SHEET 8.

3. Do not attach the rail element to the post/blockout at post 2.

4. Do not place any type of washer or delineator under the head of the rail post bolts.

5. If the anchor guardrail and SoftStop head are assembled in the field, select one method, approved by Trinity Highway Products, LLC. See assembly manual or assembly video for details on properly pulling the anchor rail through the impact head to the correct position.

6. Ensure all hardware and assemblies are galvanized or coated to prevent corrosion.

7. Note the lateral offset to the back of posts changes from the terminal section with 12 inch [305] blockouts and either wood or steel posts.

8. The first spacing from the centerline of wood posts in the terminal section to the centerline of steel posts (if provided) in the standard guardrail section with 12 inch [305] blockouts and either wood or steel posts is 6' - 3'' [1905] plus or minus 1 1/8'' [30] to account for bolt holes being offset in steel posts.

The SoftStop Terminal shown herein is proprietary and can only be manufactured and sold by Trinity Industries or its duly authorized representative. Details shown herein are approximate. Install in strict accordance to the manufacturer's installation manual. Provide and install any items shown herein as an "additional requirement."

Summary of "Additional Requirements:" Double nut end of anchor paddle.

1. SoftStop for MGS 31" [785] Guardrail = MASH Tested, TL-3, redirective, gating terminal. This is an approved option for "MGS Terminal Type I." Provide terminal with steel posts. This terminal may be attached to standard guardrail runs having either wood or steel posts.

The SoftStop Terminal shown herein is proprietary and can only be manufactured and sold by Trinity Industries or its duly authorized representative. Details shown herein are approximate. Install in strict accordance to the manufacturer's installation manual. Provide and install any items shown herein as an "additional requirement."

Summary of "Additional Requirements:" Double nut end of anchor paddle.

2. Lap the upstream rail (for the adjacent traffic direction) over the downstream rail element at each splice. See rail lap detail on SHEET 8.

3. Do not attach the rail element to the post/blockout at post 2.

4. Do not place any type of washer or delineator under the head of the rail post bolts.

5. If the anchor guardrail and SoftStop head are assembled in the field, select one method, approved by Trinity Highway Products, LLC. See assembly manual or assembly video for details on properly pulling the anchor rail through the impact head to the correct position.

6. Ensure all hardware and assemblies are galvanized or coated to prevent corrosion.

7. Note the lateral offset to the back of posts changes from the terminal section with 12 inch [305] blockouts and either wood or steel posts.

8. The first spacing from the centerline of wood posts in the terminal section to the centerline of steel posts (if provided) in the standard guardrail section with 12 inch [305] blockouts and either wood or steel posts is 6' - 3'' [1905] plus or minus 1 1/8'' [30] to account for bolt holes being offset in steel posts.
Note

1. Construct embankment slopes and headwall wings 1V:3H or steeper in this area when the headwall is closer than 1 foot [305] to the back of post line.
**MGS GUARDRAIL**

**MGS LONG POST - CONSTRICTED SLOPE GRADING**

**MGS HALF POST SPACING - PROVIDES A WORKING WIDTH DOWN TO 4'-0" [1220]**

1. Measure 12'-6" [3810] upstream of the area where the reduced deflection is desired.
2. Continue upstream until reaching the next standard post location or a half post position location.
3. Provide spaces downstream from this position at half post spacing (3'-1 1/2" [950]). Continue with half post spacing until past the area of reduced deflection, before resuming standard spacing.
4. Provide additional posts at the post spacing specified below:
   - Use standard 6'-0" [1830] long posts, wood or steel unless otherwise specified.

**MGS QUARTER POST SPACING - PROVIDES A WORKING WIDTH DOWN TO 3'-0" [915]**

1. Measure 25 feet [7620] upstream of the area where the reduced deflection is desired.
2. Continue upstream until reaching the next standard post location or a half post position location.
3. Provide 4 spaces downstream from this position at quarter post spacing (18 3/4" [475]). Continue with quarter post spacing until past the area of reduced deflection, before resuming standard spacing.
4. Provide additional posts at the post spacing specified below:
   - Use standard 6'-0" [1830] long posts, wood or steel unless otherwise specified.

**GENERAL NOTE:**

- Use standard 6'-0" [1830] long posts, wood or steel unless otherwise specified.
- Factory punch holes at quarter post spacing in rail.
- Use standard 6'-0" [1830] long posts, wood or steel unless otherwise specified.
- Use standard 6'-3" [1905] long posts, wood or steel unless otherwise specified.

**MGS LONG POST - CONSTRICTED SLOPE GRADING**

For locations where the slope break point is less than 22" [560] behind the guardrail posts:

**MGS SHORT POST - PROVIDES A WORKING WIDTH DOWN TO 3'-0" [915]**

1. Measure 25 feet [7620] upstream of the area where the reduced deflection is desired.
2. Continue upstream until reaching the next standard post location or a half post position location.
3. Provide 4 spaces downstream from this position at half post spacing (3'-1 1/2" [950]). Continue with half post spacing until past the area of reduced deflection, before resuming standard spacing.
4. Provide additional posts at the post spacing specified below:
   - Use standard 6'-0" [1830] long posts, wood or steel unless otherwise specified.

**GENERAL NOTE:**

- Use standard 6'-0" [1830] long posts, wood or steel unless otherwise specified.
- Factory punch holes at quarter post spacing in rail.
- Use standard 6'-0" [1830] long posts, wood or steel unless otherwise specified.
- Use standard 6'-3" [1905] long posts, wood or steel unless otherwise specified.

**MGS QUARTER POST SPACING - PROVIDES A WORKING WIDTH DOWN TO 3'-0" [915]**

1. Requirements on SHEET 6 apply herein except where in conflict with these details.
2. Use standard 6'-0" [1830] long posts, wood or steel unless otherwise specified.

**GENERAL NOTE:**

- Use standard 6'-0" [1830] long posts, wood or steel unless otherwise specified.
- Factory punch holes at quarter post spacing in rail.
- Use standard 6'-0" [1830] long posts, wood or steel unless otherwise specified.
- Use standard 6'-3" [1905] long posts, wood or steel unless otherwise specified.

**STANDARD GUARDRAIL BOLTS**

- **DESIGNATOR**
  - FB303
  - FW18a
  - W6x9 OR [W152x13.4]
  - W6x8 OR [W152x12.7]

**WOOD POST OPTION**

**STEEL POST OPTION**

**MGS GUARDRAIL**

**WYOMING DEPARTMENT OF TRANSPORTATION**

**WYOMING DEPARTMENT OF TRANSPORTATION**

**MGS GUARDRAIL**

**STANDARD PLAN**

**MGS LONG POST - CONSTRICTED SLOPE GRADING**

**MGS 8" [205] BLOCKS**

To be used only when specified on narrow roadways where 12" [305] blockouts will not fit!
CASE 1

IN SITU SOIL

ROCK TYP.

CASE 2

PLAN VIEW

SECTION A-A

PLAN VIEW STEEL POSTS

EITHER HOLE CONFIGURATION

ACCEPTABLE

8"  [203]

PLAN VIEW WOOD POSTS

EITHER HOLE CONFIGURATION

ACCEPTABLE

21"  [535]

STANDARD POST EMBEDMENT

8"  [203]

18"  [455]

W-Beam

SECTION B-B

BLOCKOUT NAILING DETAIL

SEE SHEET 3

LIGHTLY TAMPAED

PLANT MIX

2"  [50]

COLD BACKFILL OR

6"  [150]

FLOWABLE BACKFILL OR

2"  [50]

COLD PLANT MIX

LIGHTLY TAMPAED

CASE 1 - A < 18"  [455]

For overlying soil depths (A) ranging from 0 to 18"  [0 to 455], the depth of required drilling (B) is equal to either 12"  [305] or the standard embedment depth of the post, depth of required drilling (B) is equal to either 12"  [305] or the standard embedment depth minus the depth of soil whichever is less.

CASE 2 - A > 18"  [455]

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 standard embedment depth minus the depth of soil whichever is less.

STANDARD PLAN NUMBER

STANDARD PLAN

WYOMING DEPARTMENT OF TRANSPORTATION

MGS GUARDRAIL

POST PLACEMENT IN ASPHALT OR CONCRETE PAVEMENTS

POST PLACEMENT IN PAVEMENTS AND ROCK

POSTS IN ROCK

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