

# Field Guide for Guardrail Condition Assessment



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# Introduction

This document presents guidelines for the level of damage to longitudinal barriers that requires repair in order to restore a barrier to operational performance. The guidelines in this document are presented in a format designed for use in the field by highway design and maintenance personnel. Included are guidelines for repair of w-beam, generic end-terminals, and guidance for repair of more severe barrier damage.

These guidelines are based on the expected performance of a damaged barrier if a second collision should occur consistent with content provided in NCHRP report 656 "Criteria for Restoration of Longitudinal Barriers".

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## **Section 1:**

# **W-Beam / Thrie-Beam Repair Thresholds**

# Post and W-Beam/Thrie-Beam Rail Deflection

## Repair Threshold High

One or more of the following thresholds:

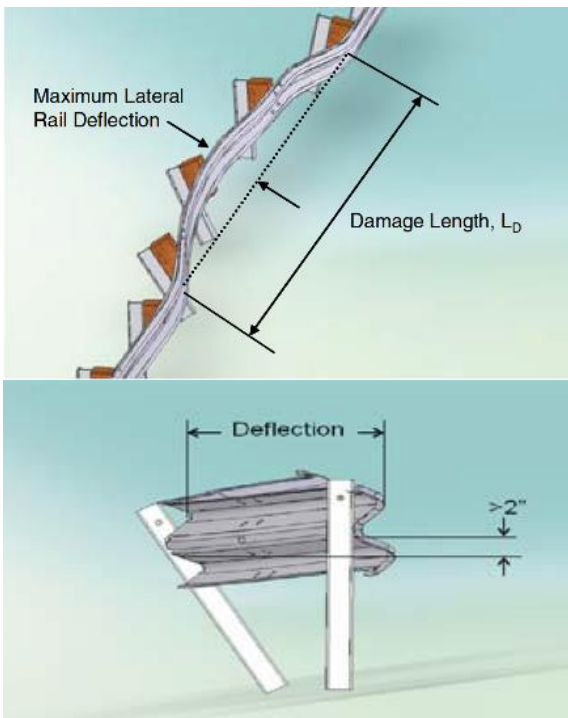
- More than 9 in. of lateral deflection anywhere over a 25-ft length of rail.
- Top of rail height 2 or more inches lower than original top of rail height. (Note: Original height of Thrie-Beam is 32", original height of Type-31 W-Beam guardrail is 31", and original height of Type-1 W-Beam guardrail is 27".)

## Repair Threshold Medium

- 6-9 in. lateral deflection anywhere over a 25-ft length of rail.

## Repair Threshold Low

- Less than 6 in. of lateral deflection over a 25-ft length of rail.



(Weak Post W-Beam Shown Only for Clarity. Each measurement taken at the rail's middle fold)

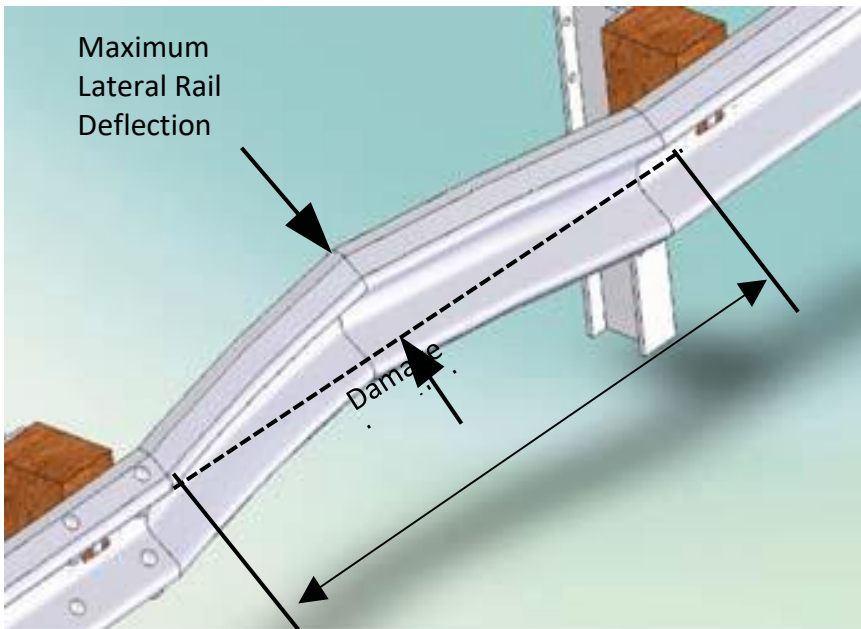
# W-Beam/Thrie-Beam Rail Deflection Only

## Repair Threshold **Medium**

- 6-9 in. of lateral deflection between any two adjacent posts.  
Note: For deflection over 9 in., use post/rail deflection guidelines.

## Repair Threshold **Low**

- Less than 6 in. of lateral deflection between any two adjacent posts.



# W-Beam Rail Flattening

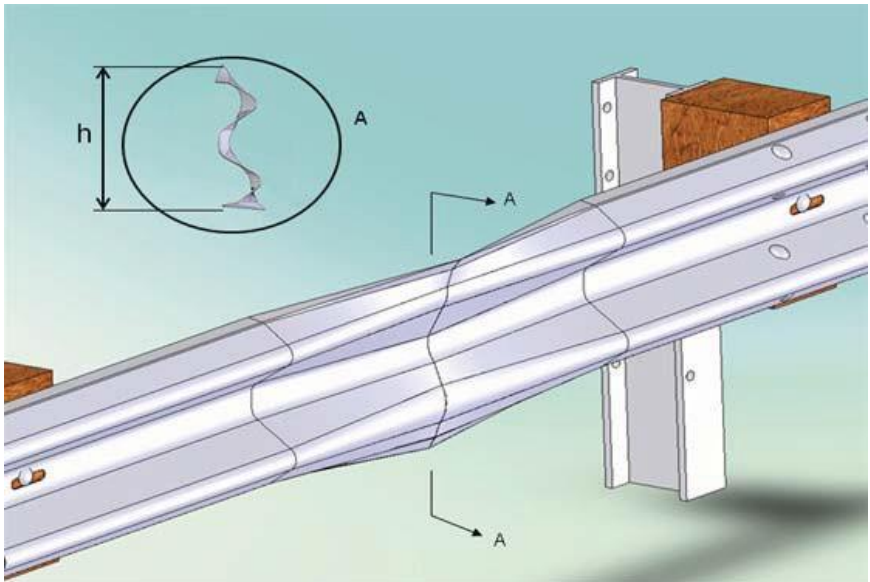
## Repair Threshold Medium

One or more of the following thresholds:

- Rail cross-section height is more than 17 in. (such as may occur if the rail is flattened).
- Rail cross-section height is less than 9 in. (such as a dent to the top edge).

## Repair Threshold Low

- Rail cross-section height is between 9 and 17 in.





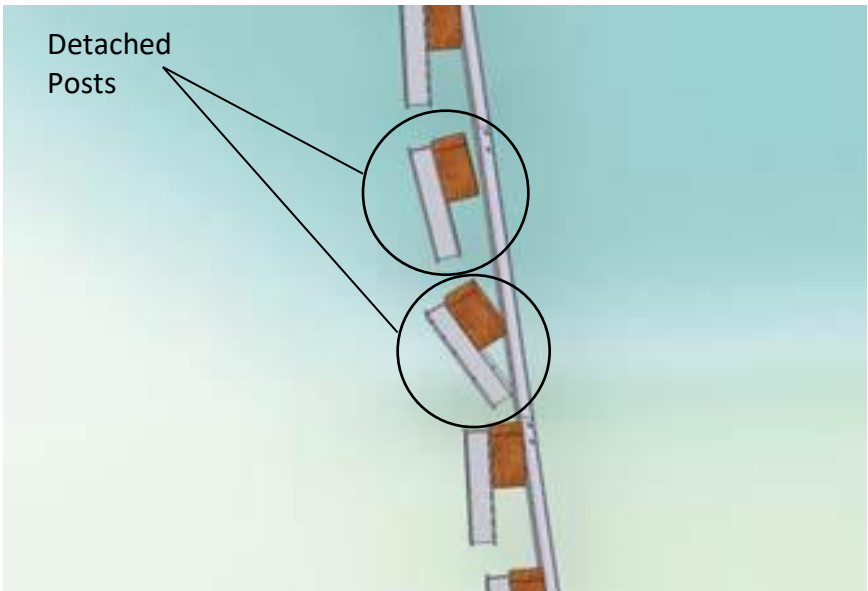
# Posts Separated from Rail

## Repair Threshold **Medium**

- 2 or more posts with blockout attached with a post/rail separation less than 3 in.
- 1 or more posts with a post/rail separation which exceeds 3 in.

## Repair Threshold **Low**

- 1 post with blockout attached with post/rail separation less than 3 in.



### Note

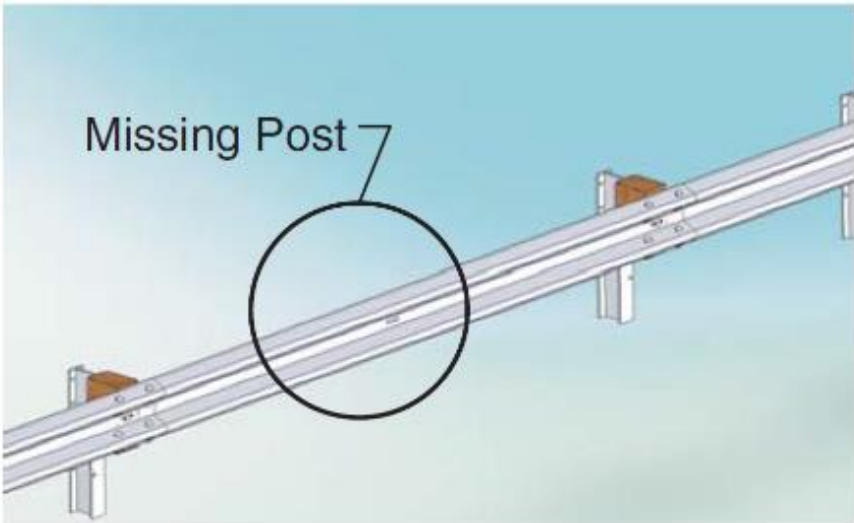
1. If the blockout is not firmly attached to the post, use the missing blockout guidelines.
2. Damage should also be evaluated against post/rail deflection guidelines.

# Missing/Broken Posts

## Repair Threshold High

One or more posts that are:

- Missing
- Cracked across the grain
- Broken
- Rotted
- With metal tears



Note: Ensure that the missing post was not intentionally omitted.

For instance, a post may be omitted due to:

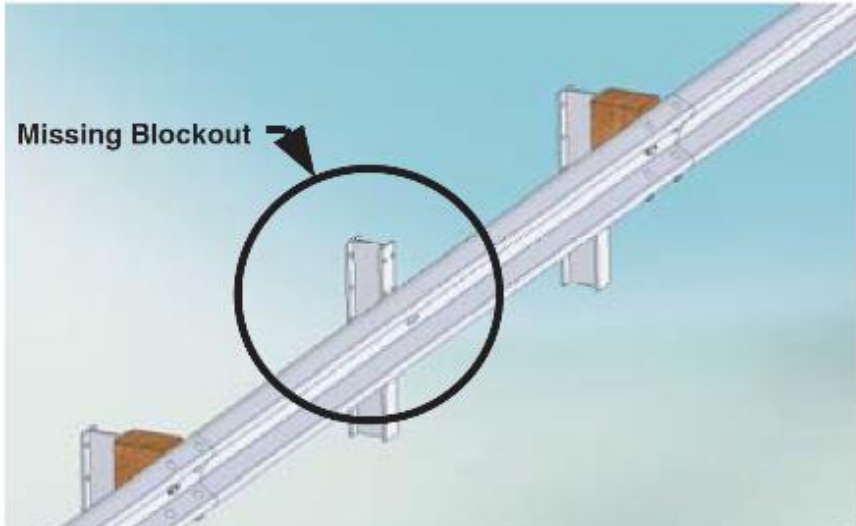
- Utility conflicts (electrical, cable, water, etc.)
- Long Span Guardrail system (Std. Plan C-20.40)
- Other

# Missing/Damaged Blockout

## Repair Threshold Medium

Any blockouts that are:

- Missing
- Cracked across the grain
- Cracked from top or bottom of blockout through post bolt hole
- Rotted

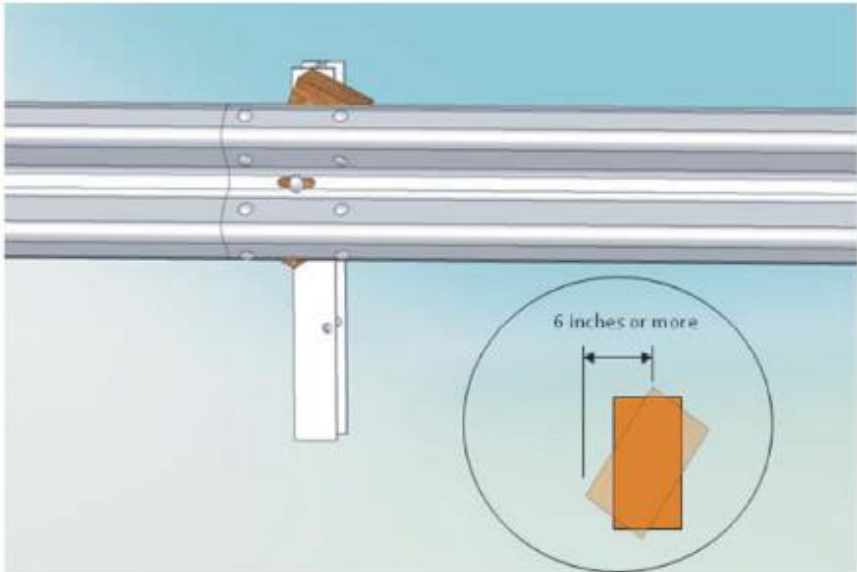


# Twisted Blockouts

## Repair Threshold Low

Any misaligned blockouts and the top edge of the block is 6 in. or more from the bottom edge.

Note: Repairs of twisted blockout are relatively quick and inexpensive.



## W-Beam/Thrie-Beam Barrier Repair Thresholds

# Non-Manufactured Holes in Rail

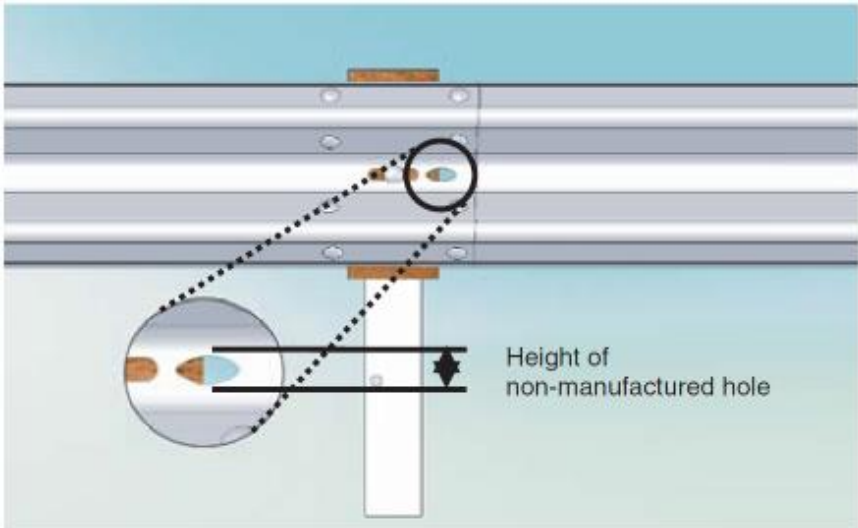
*(such as crash-induced holes, lug-nut damage, or holes rusted through the rail)*

## Repair Threshold **High**

- More than 2 holes with a height less than 1 in. on a 12.5-ft length of rail.
- Any holes with a height greater than 1 in
- Any hole which intersects either the top or bottom edge of the rail.

## Repair Threshold **Medium**

- 1-2 holes with a height less than 1 in. on a 12.5-ft length of rail.



# Damage at a Rail Splice

## Repair Threshold High

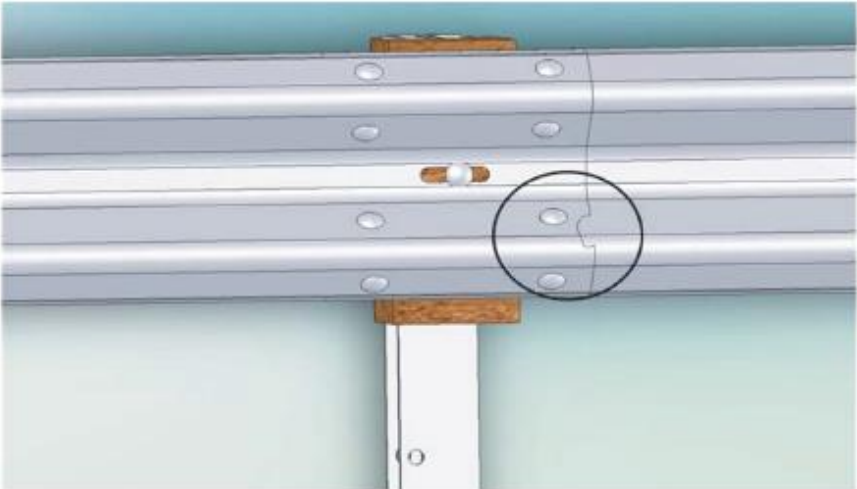
More than 1 splice bolt that is:

- Missing
- Damaged
- Visibly not connecting both rails (top & underlying rail)
- Torn through rail

## Repair Threshold Medium

1 splice bolt that is:

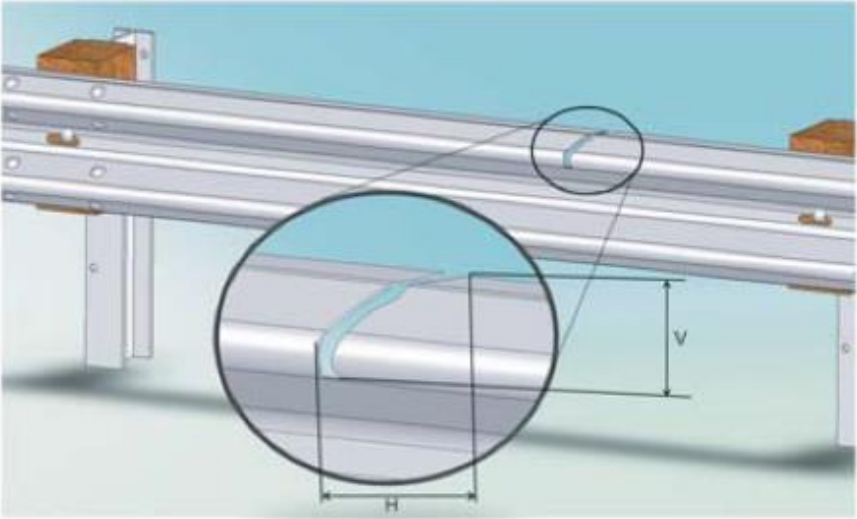
- Missing
- Damaged
- Visibly not connecting both rails (top & underlying rail)
- Torn through rail



# Vertical Tear in Rail

## Repair Threshold **High**

Any length vertical (transverse) tear.

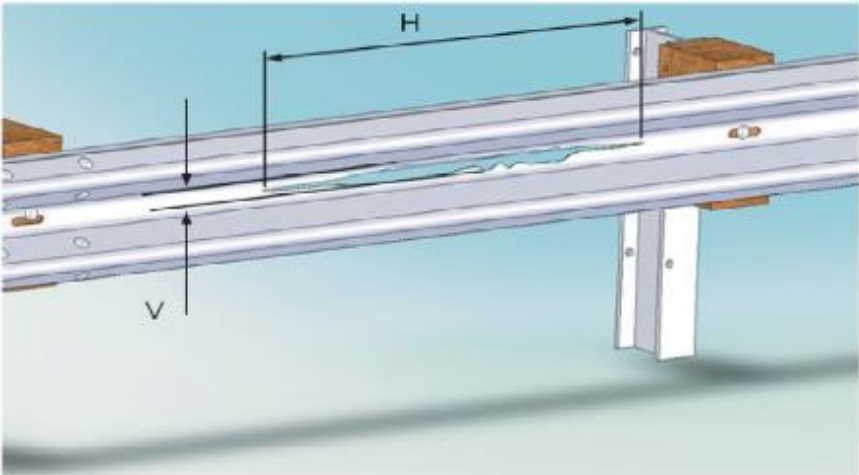


# Horizontal Tear in Rail

## Repair Threshold **Medium**

Horizontal (longitudinal) tears greater than 12 in. long or greater than 0.5 in. wide.

Note: for horizontal tears less than 12 in. in length, or less than 0.5 in. in height, use the non-manufactured holes guidelines.





## Section 2:

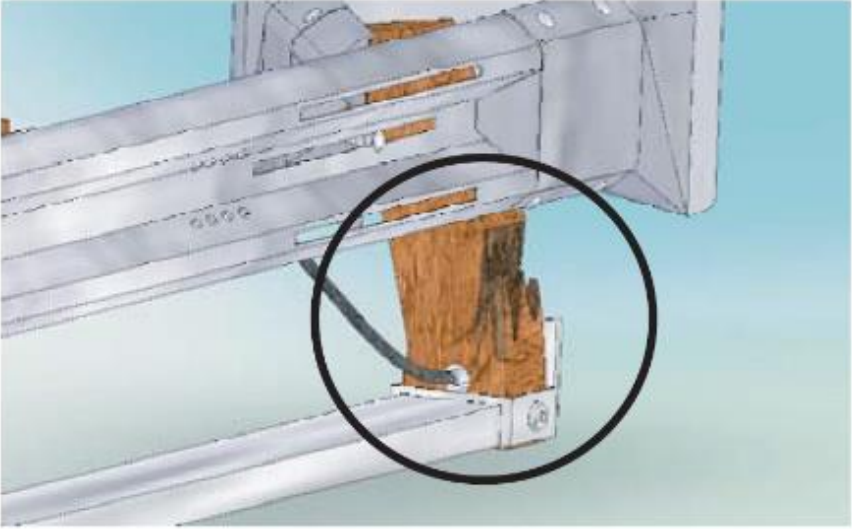
# Generic End Terminal Repair Thresholds \*

\*Note: This section is intended to provide repair thresholds for generic end terminals such as WSDOT Type 10, Type 11 anchors, bullnose terminals, etc. Proprietary end terminals do not apply to this section – refer to the manufacturer recommendations for repair/replacement of proprietary end terminals.

# Damaged End Post

## Repair Threshold **High**

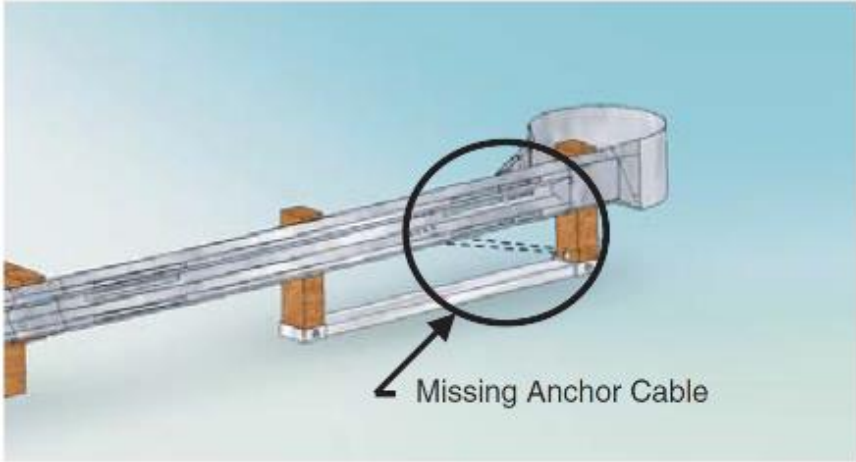
Not functional (sheared, rotted, cracked across the grain).



# Missing Anchor Cable

Repair Threshold **High**

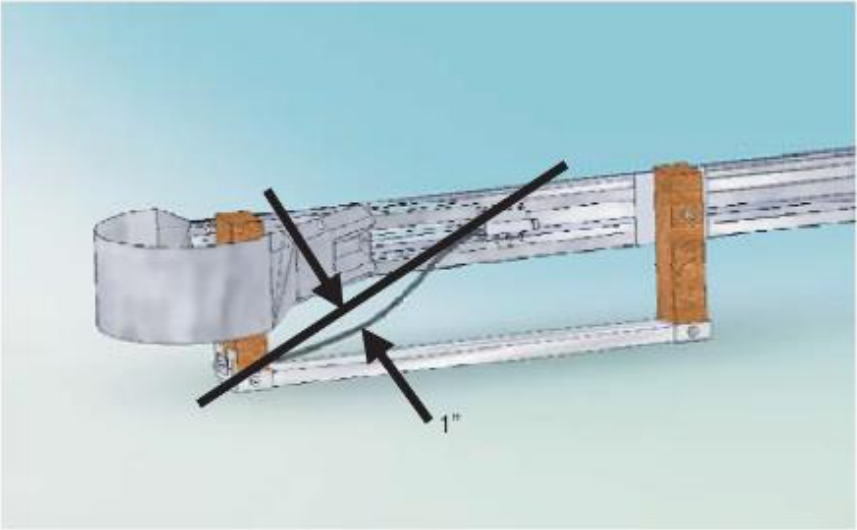
Missing



# Loose Anchor Cable

## Repair Threshold **Medium**

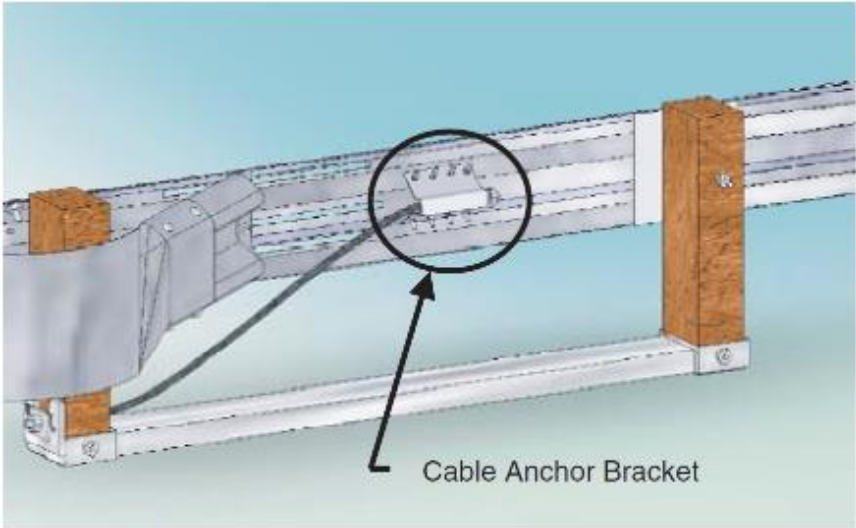
More than 1 in. of movement when pushed down by hand.



# Cable Anchor Bracket

## Repair Threshold **Medium**

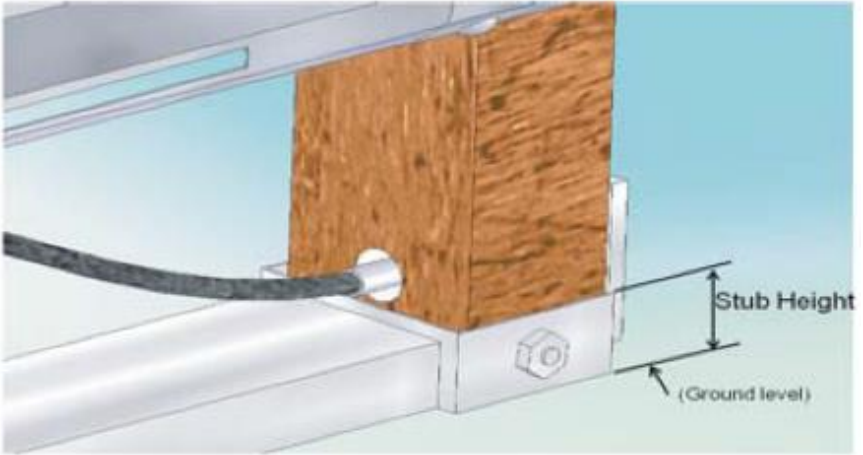
Loose or not firmly seated in rail.



# Post Stub Height

## Repair Threshold **Medium**

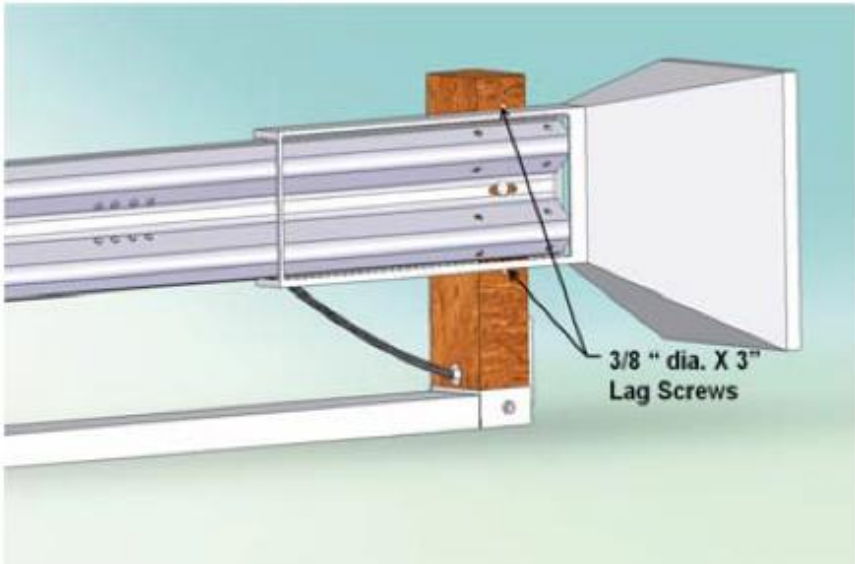
Height which exceeds 4 in.



## Lag Screws (Energy Absorbing Terminals Only)

Repair Threshold **High**

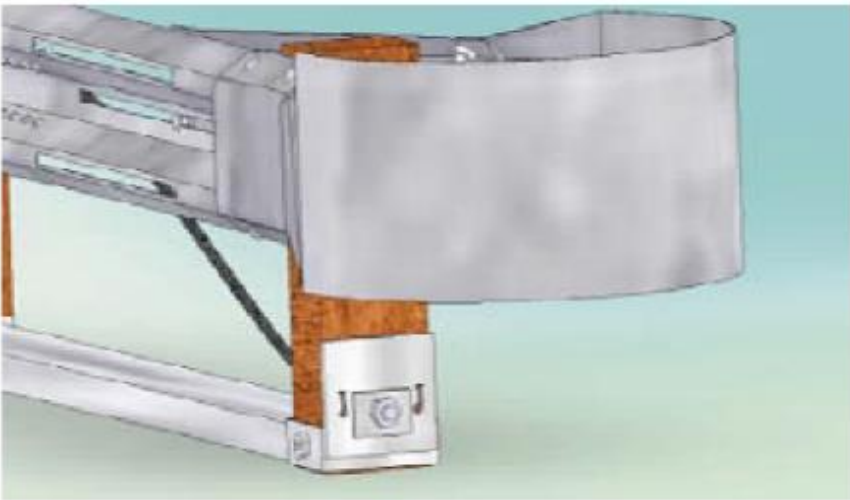
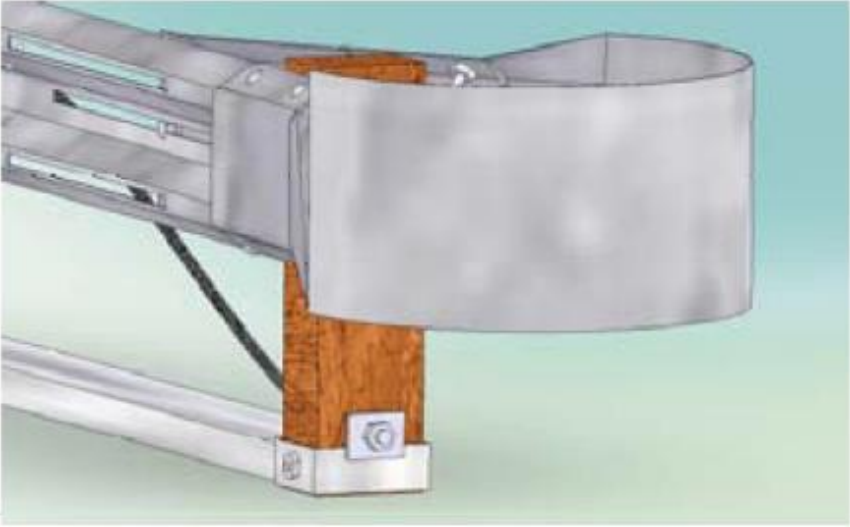
Missing or failed lag screws.



# Missing Bearing Plate

## Repair Threshold High

Missing bearing plate.



Correctly installed bearing plate (for reference only)



# Loose/Misaligned Bearing Plate

## Repair Threshold **Medium**

Loose or misaligned bearing plate.

