

**American Railway Engineering and Maintenance-of-Way Association  
Letter Ballot 15-22-07#**

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**Assignment:** At the February 2022 meeting in Fort Worth, TX, a ballot was proposed by Subcommittee 6 Repairs and Maintenance and accepted by the full committee members present to revise Article 7.4.3.

**Rationale:** Subcommittee 6 reviewed Article 7.4.3, which describes repairs for floorbeams and stringers. New language was written to spotlight end fixity when repairing floorbeam and stringer end connections. When repairs are needed at floorbeam and stringer end connections, the reason is often deterioration caused by the end connection resisting bending moments when it was originally designed as a shear-only connection. Proposed language alerts repair designers to reference provisions in the design section (relevant sections are 1.5.9.a(1) and 1.8.3), and to consider behavior of the connection as observed in the field.

The recommendation to weld end connections is eliminated because welded repairs are not generally recommended in MRE material unless accompanied by cautionary language to consider fixity, stress cycles, and potential negative fatigue performance. General comments on repair welding are already included elsewhere in the manual (Article 7.4.1.5).

Minor editorial changes are included in this ballot for completeness.

**Submitted By:** Bill Zippel, Chair SC6

**Due Date:** April 29, 2022

Revise Articles as shown below (additions shown as **underlined bold red**, deletions shown as **~~bold red strikethrough~~**, comments in brackets [ ] not part of final text). Article text taken from 2022 Manual proofs.

**SECTION 7.4 REPAIR, STRENGTHENING AND RETROFITTING<sup>1</sup>**

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**7.4.3 FLOOR SYSTEMS (~~1993~~2023) **R(2015)****

**7.4.3.1 Stringers and Floorbeams**

- a. Strengthening of riveted or high-strength-bolted plate girder sections shall be done in accordance with applicable requirements of Part 1, Design.
- b. Stringer systems may be strengthened by adding cover plates to existing stringers, by adding additional stringers, or by stringer replacement with new sections of adequate

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strength. Where possible, additional or new stringers shall be standard rolled sections without cover plates rather than built-up sections. Where additional stringers are used, they shall be connected to the existing stringers so that they will deflect together. Stringer spacing shall be such as to allow inspection, cleaning, and **painting coating** of interior surfaces.

- c. The webs of **stringers and** floorbeams **are likely to may** be overstressed at the ends, especially in **floorbeams of** pin-connected truss spans where the ends have been **recessed coped** to clear the pin-nuts and eyebars. **Stringer and F**floorbeam details shall be analyzed for both flange and web stresses and adequate reinforcement provided **if required**.

#### 7.4.3.2 End Connections

- a. **When designing the connection repair, consider end connection fixity based on current design provisions and observed connection behavior in the field. Design provisions allow engineering judgement in analyzing the amount of bending moment transferred through the end connections of stringers, floorbeams, and other similarly framed members. Connections that may have been designed as shear connections may not behave as shear-only connections. The resulting bending forces could cause fatigue cracking to occur or fasteners to fail, therefore needing repairs.**
- b. **The End connections of a stringer may sometimes be strengthened-repaired by using longer wider connecting angles and adding high-strength bolts or by reaming the holes and using larger high-strength bolts, or by welding. Wider connecting angles may also provide for additional rotational flexibility.** Brackets may be placed under the ends of **the** stringers to give additional support.

#### 7.4.3.3 Lateral Connections [unchanged]

#### 7.4.3.4 Substitution [unchanged]