U.S. Department
of Transportation

**Federal Railroad
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

DEC 16 2016

Mr. Michael Rush
Senior Vice President, Safety and Operations
Association of American Railroads
425 3rd Street SW, Suite 1000
Washington, DC 20024

Dear Mr. Rush:

This letter is to inform you and the membership of the Association of American Railroads that Federal Railroad Administration (FRA) inspectors will return to using the portable track loading fixture (PTLF) to test non-Gage Restraint Measurement System (GRMS) track. PTLF is a handheld, track loading tool designed to measure gage widening or weakening gage restraint capacity under load. FRA understands the PTLF measurements as a performance-based means to accurately determine crosstie and fastener effectiveness to restrain track gage under wheel loads.

Since FRA voluntarily stopped using the PTLF on non-GRMS track in 2003, FRA continued studying inspection methods to identify gage-widening defects and prevent derailments. The studies included analyzing hand measurements, track geometry car data, and extensive PTLF field tests. The findings confirmed that the PTLF tool is nondestructive and effective in assessing crossties and fasteners.

FRA Inspectors will use the PTLF in both GRMS-designated territories and non-GRMS-designated territories, and they will use PTLF on both concrete and wooden crossties to verify exceptions reported by the GRMS on FRA's track inspection car(s) when equipped with GRMS. PTLF also will be used independently to determine gage widening locations. FRA has issued a Technical Bulletin TB-16-01 (enclosed) providing detailed guidance to FRA Inspectors to ensure the PLTF is properly used.

Sincerely,

Robert C Lauby

Robert C. Lauby
Associate Administrator for Railroad Safety
Chief Safety Officer

Enclosure

Memorandum

U.S. Department
of Transportation

**Federal Railroad
Administration**

Date: DEC 16 2016

Subject: Guidance on The Federal Railroad Administration's Return to Using Portable Track Loading Fixture Technology on Non-Gage Restraint Measurement System Designated Track.

From: Thomas Herrmann
Director, Office of Technical Oversight

To: FRA Regional Administrators

Attached is the Track Safety Standards Technical Bulletin (TB) T-16-01. The TB provides guidance on the Federal Railroad Administration's (FRA) return to using Portable Track Loading Fixture (PTLF) technology to identify locations with poor crosstie and fastener performance on non-Gage Restraint Measurement System (GRMS) designated Class 1–5 track. All track safety inspectors must review this bulletin and apply its guidance to daily inspection activities.

FRA also is distributing this TB to the Association of American Railroads, the American Short Line and Regional Railroad Association, the Brotherhood of Maintenance of Way Employes Division, the SMART Transport Division (formerly the United Transportation Union), the American Public Transportation Association, and the Brotherhood of Locomotive Engineers and Trainmen.

Please distribute this information to deputy regional administrators, track specialists, chief inspectors, track inspectors/trainees, and state track inspectors within your regions. The TB also will be posted on FRA's Web site.

If there are any questions concerning this TB, please contact Yujiang Zhang, Staff Director, Track Division, at (202) 493-6460 or Yujiang.Zhang@dot.gov.

Attachment

Federal Railroad Administration
Track Safety Technical Bulletin T-16-01
49 CFR Part 213, Track Safety Standards

Purpose—Wide gage is a leading cause of train derailments. To better understand how to prevent derailments caused by gage widening under load, the Federal Railroad Administration (FRA) conducted studies into the safe peak rail forces generated on track, compliant with the Federal Track Safety Standards (TSS). The studies reveal that where the track structure is able to restrain peak forces, derailment risk due to gage-widening is low. FRA implemented Gage Restraint Measurement System (GRMS) technology on an FRA track inspection car to measure and evaluate track strength continuously along the track.[1] GRMS technology simulates the wheel forces produced by a train and measures the ability of the crossties and fasteners to resist gage widening.

A car equipped with GRMS technology, however, is not always available when track conditions warrant an inspection, so FRA funded the development of the Portable Track Loading Fixture (PTLF), a more convenient tool to assess track strength in a manner similar to the GRMS technology. The PTLF is a handheld, track loading tool used to test specific track locations exhibiting weakening restraint capacity often evidenced by gage widening.

Proper use of the PTLF is important to determine gage, crosstie, and fastener effectiveness. Typically, to determine a track's maximum gage, inspectors measure unloaded gage and add lateral movement of both rails. Using the PTLF and measuring the rail movement under load provides a means to approximate the rail movements induced by trains. The PTLF is a nondestructive tool that applies just enough lateral loading to take up all of the free play within the rail fastening system. The PTLF measurements can be used to objectively identify noncompliance with Title 49 Code of Federal Regulations (CFR) Sections 213.53, *Gage*; 213.109, *Crossties*; and 213.127, *Rail fastening systems*.

Background—In 2002, in a letter to FRA, the Association of American Railroads (AAR) raised concerns about the appropriateness of inspectors using the PTLF in non-GRMS territories. The letter detailed specific concerns about using the PTLF to inspect for compliance with certain requirements of the TSS. In summary, AAR objected to FRA using GRMS/PTLF technology on track segments not chosen by the railroads, and suggested the technology has no regulatory significance, and therefore, should not be used on non-GRMS track segments for regulatory enforcement purposes.

In early 2003, FRA responded to AAR's concerns and disagreed with AAR's view that FRA was only permitted to use GRMS/PTLF technology on certain, designated track segments. Nothing in the Federal Track Safety Standards bars the use of a PTLF by an Inspector on any track. While the use of a PTLF is expressly required under the GRMS standard, FRA has found it is a very effective tool for use in non-GRMS track to determine compliance with 49 CFR § 213.13, *Measuring track not under load.*

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[1] Please note FRA's use of this technology was independent of, and in no way intended to implicate, the requirements of 49 CFR § 213.110, *Gage restraint measurement systems*.

Nevertheless, and despite prevalent use by the rail industry, FRA decided to suspend PTLF usage in non-GRMS territories.

PTLF Analysis and Testing—Since 2003, FRA has collected and analyzed a significant amount of data to validate the PTLF. Comparison analyses demonstrates that PTLF measurements under a 4,000-pound lateral load correlate well with gage measurements by track inspectors and the data from FRA's Automated Track Inspection Program (ATIP) track inspection cars. FRA's analyses found the results using the PTLF are relatively insensitive to track class or curvature.

Exercised Gage Method—To improve the PTLF, FRA developed the Exercised Gage Method (EGM) to assess track strength using the PTLF.[2] The PTLF is a useful tool for evaluating the gage-holding ability of crossties and fasteners. Rather than a direct measurement, the EGM produces an "applied" gage change value determined by calculating the difference between the loaded gage and the exercised gage measurements (*see* the attached operating instructions). Field tests show the EGM to be more repeatable than the traditional method and, hence, provide a better indication of the track structure's ability to maintain and restore gage.

Correct PTLF usage is the key to assess track strength (or gage restraint). Inspectors should be aware of track condition combinations, especially early signs of rail rotation (rail cant) and lateral transition, which are main factors in gage-widening. Crosstie and fastener requirements are satisfied when the applied force of a PTLF increased from 0 to 4,000 pounds does not cause gage widening more than a half of an inch.

PTLF Procedures—The PTLF provides a performance-based method for objectively assessing the effectiveness of the crosstie-fastener system. If an Inspector has concerns about the crossties and fasteners, he or she can use the PTLF to quickly determine whether the components can hold track gage. In general, Inspectors should consider applying the PTLF in conjunction with the Geismar™ track gauge when the track structure exhibits indications of lateral movement or when gage change may be obscured. Inspectors may use the PTLF as outlined in the factors listed below.

Inspectors must ensure the PTLF is correctly dated, functional, and calibrated. Inspectors must be vigilant of conditions and combinations associated with both narrow and wide gage, especially early signs of rail rotation, translation, or both.

Inspectors can decide whether or not to use a calibrated PTLF to evaluate gage-widening, determine effectiveness of crosstie and fastening components individually or as a group under 49 CFR §§ 213.53(b); 213.109(c), and 213.127(a), .

Inspectors should use PTLF on all Class 1–5 track, in the presence of a railroad engineering representative, where there is:

- Evidence of gage change of ½ inch or more;

[2] Portable Track Loading Fixture Improvement published by FRA as RR 12-21 in December 2012.

- Obscured gage change or measurement is uncertain (e.g., due to ballast, debris, or mud obscuring movement);

- Missing, loose, or sheared fasteners in any 39-foot segment of track with three or more consecutive crossties; or

- Any location where gage validation or defect remediation discovered by automated inspection technology requires verification.

Inspectors should not use PTLF if:

- No railroad engineering representative is present;

- Thermal rail stresses affect gage lateral restraint and render PTLF loading ineffective (conditions may warrant assessing static rail movement evidence only);

- Three or more consecutive crossties not in full contact with crosstie plate or rail;

- Effective gage rods or curve rollover devices are installed in track; or

- Any location where PTLF placement or disassembly is physically restrictive and not in direct contact with running rail neutral axis (i.e., special track work: turnout, bridge guard rail, and rail-rail or rail-highway grade crossing components).

Examples of Acceptable PTLF Use

The operation instructions for both the new (electronic) and the existing (analog) PTLF devices are attached to this TB. The analog version must be used together with a track gauge to determine the lateral rail movements (Exercised Delta), while the electronic version will display Exercised Delta automatically. In either case, Inspectors must use a track gauge to measure track gage, either unloaded or loaded.

The following examples are based on the use of the electronic version of PTLF. If an analog PTLF is used, Inspectors will have to determine the Exercised Delta manually as detailed in the operating manual.

Example 1—On Class 3 track, the unloaded gage measures 56⅞ inches. The Exercised Delta from the PTLF is ¾ inch. Adding 56⅞-inch unloaded gage and the ¾-inch displacement, the loaded gage is 57⅝ inches, which is within the 49 CFR § 213.53 gage limit of 57¾ inches. However, because the Exercised Delta exceeds the ½-inch movement limit specified in CFR § 213.109(c)(3), the crosstie/fastener condition is noncompliant.

Example 2—On Class 4 track, the unloaded gage measures 57⅜ inches. The Exercised Delta from the PTLF is ⅜ inch. Adding 57⅜-inch unloaded gage and the ⅜-inch displacement, the loaded gage is 57¾ inches. Because loaded gage exceeds the limit specified in CFR § 213.53,

the condition is noncompliant despite the Exercised Delta being less than the ½-inch limit specified in CFR § 213.109(c)(3).

Electronic Portable Track Loading Fixture Operating Instructions

WARNING: PTLF MAY BE DAMAGED AND MAY CAUSE PERSONAL INJURY, IF NOT USED PROPERLY. DO NOT ATTEMPT TO MODIFY OR USE A PTLF ON ANY RAIL POINT, EXCEPT THE RAIL WEB.

1. Measure and record initial static (unloaded) track gage using Geismar™ track gauge device. The unloaded track gage, as measured, can be compared to the limits in the Track Safety Standards.

2. Ensure the PTLF is correctly dated, functional, and calibrated.

3. Ensure the PTLF tablet is turned **on** and has connected to the PTLF device.

4. Use the operating instructions for the tablet provided in the latest Electronic PTLF user's manual.

5. Place the PTLF over a crosstie, between rails, so that shoes on each end rest on the rail base (ensure PTLF ends engage the area of the rail web near the base). **Placement in track structure locations other than the rail base is unacceptable.**

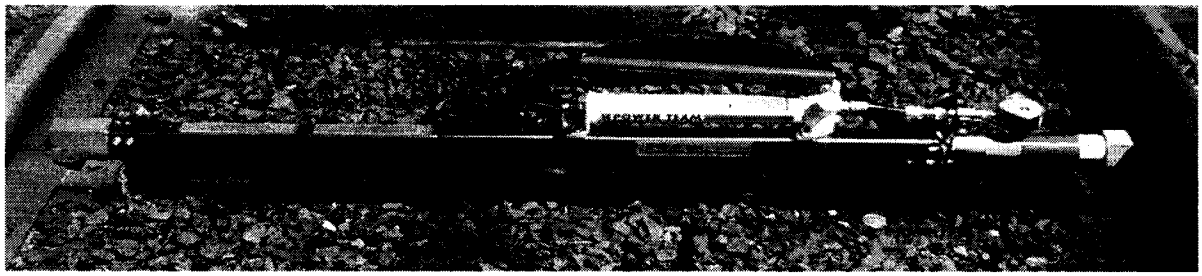

Figure 1.

6. Apply hydraulic pressure to ram and increase load incrementally to 4000 pounds (4,000 psi on gauge). Observe the movement of the rail, tie plates, and fastener components to assess which components contribute to poor track strength or gage restraint conditions, as identified.

CAUTION: DO **NOT** EXCEED 4,000 psi. EXCESSIVE PRESSURE WILL DAMAGE THE PTLF AND MAY CAUSE PERSONAL INJURY.

7. Using the Geismar™ track gauge device, measure and record PTLF loaded gage. This loaded gage can be compared to the limits specified in Title 49 Code of Federal Regulations Section 213.53, for determining gage compliance.

8. Gently release PTLF hydraulic pressure. Record the exercised delta from the tablet reading. (Note: It's important to take the loaded gage measurement first to assure all clearance in the tie fastener system is taken out). This exercised delta can be used to determine tie and fastener compliance (CFR §§ 213.109 and 213.127) based on the ½-inch limit specified in CFR § 213.109(c)(3).

9. After PTLF release, ensure rail is properly seated in affected tie plates and ask railroad official to confirm.

Analog Portable Track Loading Fixture Operating Instructions
Exercised Gage Procedures

WARNING: PTLF MAY BE DAMAGED AND MAY CAUSE PERSONAL INJURY, IF NOT USED PROPERLY. DO NOT ATTEMPT TO MODIFY OR USE A PTLF ON ANY RAIL POINT, EXCEPT THE RAIL WEB.

1. Measure and record initial static (unloaded) track gage using Geismar™ track gauge device. The unloaded track gage, as measured, can be compared to the limits in the Track Safety Standards.

2. Ensure the PTLF is correctly dated, functional, and calibrated.

3. Place the PTLF over a crosstie, between rails, so that shoes on each end rest on the rail base (ensure PTLF ends engage the area of the rail web near the base). **Placement in track structure locations other than the rail base is unacceptable.**

4. Apply hydraulic pressure to ram and increase load incrementally to 4,000 pounds (4,000 psi on gauge). Observe the movement of the rail, tie plates and fastener components to assess which components contribute to poor track strength or gage restraint conditions, as identified.

CAUTION: DO NOT EXCEED 4,000 psi. EXCESSIVE PRESSURE WILL DAMAGE THE PTLF AND MAY CAUSE PERSONAL INJURY.

5. Using the Geismar™ track gauge device, measure and record PTLF loaded gage. This loaded gage can be compared to the limits specified in 49 CFR § 213.53 for gage compliance.

6. Gently release PTLF hydraulic pressure. After the load is released, measure the gage to which the track returns. This gage, referred to as exercised gage, can be slightly different from the unloaded gage. The difference between the loaded gage and exercised gage is the rail displacement (exercised delta). The exercised delta limit is ½ inch as specified in CFR § 213.109(c)(3). Inspectors can use it to determine tie or fastener compliance. See CFR §§ 213.109 and 213.127.

7. After PTLF release, ensure rail is properly seated in affected tie plates and ask railroad official to confirm.