Development of a National Track Safety Database

Exhibit D

Research Project Requirement Template

Recipient/Grant (Contract) Number: University of Texas Rio Grande Valley (UTRGV), Texas A&M University (TAMU)/Grant No. 69A3552348340

Center Name: University Transportation Center for Railway Safety (UTCRS)

Research Priority: Promoting Safety

Principal Investigator(s): Dr. David Allen (PI, TAMU)

Project Partners: FRA, AAR, MxV Rail, and Class I Railroads

Research Project Funding: $135,142.50 (Federal), $68,336.75 (Non-Federal Cost Share)

Project Start and End Date: 06/01/2023 to 08/31/2024

Project Description: This project supports our companion proposals to develop track safety models for both rail buckling and railhead cracking. While these two failure modes are not the most commonplace causes of train derailments according to the FRA, when derailments due to one of these causes occur, they tend to be both catastrophic and costly to the nation. It is, therefore, advisable to append to our models sufficient information for track engineers to be able to make timely and cost-effective decisions regarding track worthiness as it relates to these two failure modes.

Our track buckling and railhead cracking models are quite advanced mechanics-based models that account for track geometry, long-term cyclic loading, and local environmental conditions. Furthermore, our models indicate that these factors strongly affect track worthiness. As a typical example, a particular section of track is much more likely to buckle in summer than winter because the local track temperature in summer is usually significantly higher than RNT (Rail Neutral Temperature) in hot sunny climates. These local factors then strongly influence the probability of track failures due to rail buckling and railhead cracking.

It is, therefore, necessary for track engineers in the field to have easy and direct access to the necessary inputs to our models in order to assess local track worthiness when they encounter track sections wherein the likelihood of track failure is suspected. Because such information is not readily available to track engineers at this time, it is currently not possible for track engineers to make scientifically quantifiable decisions during track inspections regarding the necessity to perform track remediation and/or replacement. To that end, we propose to develop a National Track Safety Database (NTSD) for use by railway engineers as a means of deploying our track buckling and railhead cracking models on-the-fly, thereby, utilizing the latest technology to better assess track worthiness. Such technology would not only improve track safety, it would also provide a technologically-based tool capable of increasing cost effectiveness within the railway transportation industry.

US DOT Priorities: This project aligns with the following USDOT strategic goals, as established in the USDOT Strategic Plan for FY2022-FY2026: **(a) Safety:** The project directly addresses two major safety concerns, rail buckling and rail cracking. **(b) Economic Strength:** This tool will improve the cost effectiveness of rail inspections and reduce the economic impacts of unplanned stoppages and derailments. **(c) Transformation:** This project addresses the DOT goal of new projects applying novel data approaches to transportation problems, in particular the DOT's "transformative vision of a fully connected, integrated, accessible, and interoperative multimodal

system of systems".

Outputs: As a five-year objective for the NTSD, we hope to have a functional database in place that is accurate and effective for use by railway engineers. However, our goals for Year 1 of this project are more limited:

a. Based on our interactions with the agencies and companies listed as our project partners, an understanding of the exact nature and format of the NTSD.
b. The creation of a Beta-version of the NTSD.
c. Proof of concept of the NTSD via direct simulations of our track buckling and railhead cracking models with data supplied directly to them by the NTSD.

Outcomes/Impacts: The primary long-term impact of this project is improved rail safety and efficiency by providing railway engineers easy and direct access to data and models enabling quantifiable decision making.

Final Research Report: Upon completion of the project, a URL link to the final report will be provided.