

Project Title: Developing an Integrated Risk Assessment Framework to Quantify the Resilience of Critical Railway Infrastructure

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Overall Project Goal:

A continually increasing threat looms towards rail infrastructure assets in the form of climate change driven acute natural hazards. Natural hazards such as flooding and extreme heat are anticipated to increase in severity and occurrence for the foreseeable future. This project will investigate the anticipated resilience of U.S. rail infrastructure assets towards these events. Furthermore, with the isolation on the impacts of such extreme events across the nation as a function of climatic zones, a resource allocation framework is generated to achieve the highest levels of robustness against key natural hazards that the system will face.

Key Project Tasks/Approach/Objectives:

- Survey of Class 1 rail infrastructure owners towards natural hazard induced rail infrastructure damage assessments and protocols,
- Identify potential at-risk locations, vulnerable segments, and critical links by mapping identified risks and hazards to the railway infrastructure networks, considering outputs from the rail owner survey,
- Development of broader metrics to understand system-level impacts of acute natural hazards on rail infrastructure failures,
- U.S. rail infrastructure asset resilience quantification through fragility, loss of function, and restoration curves,
- Resource allocation framework to proactively treat those critical and vulnerable segments under the most risk of acute natural hazards.

Project Outcomes/Benefits:

Equip the FRA and industry with a methodological framework of climatic-based hazard mapping, leading towards damage estimation, recovery, and robustness quantification. This framework is intended to lead towards proactive rail infrastructure adaptation to prevent further network losses under the increasing threat of climate change driven natural disasters.