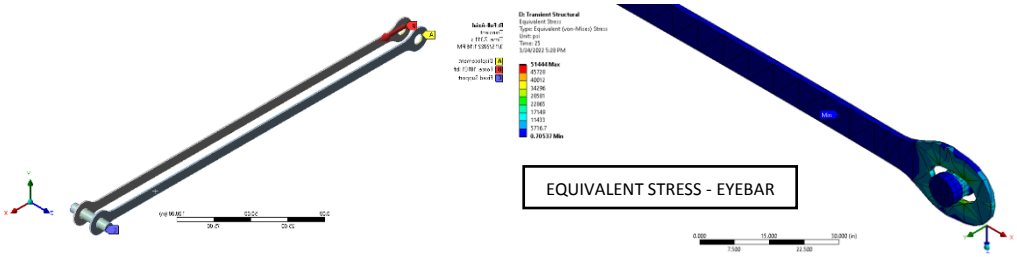
UTC Project Information – Project 1.13	
Project Title	Structural Integrity, Safety, and Durability of Critical Members and Connections of Old Railroad Bridges under Dynamic Service Loads and Conditions
University	University of Connecticut (UConn), Storrs, CT
Principal Investigator	Ramesh B. Malla, Ph.D., F. ASCE, F. EMI, A.F. AIAA, M. CASE; Professor (Institutional Lead)
PI Contact Information	E-mail: Ramesh.Malla@uconn.edu; Phone: (860)486-3683 Address: Department of Civil &Environmental Engineering, 261 Glenbrook Road, Storrs, CT 06269-3037
Funding Source(s) and Amounts Provided (by each agency or organization)	Federal: $190,044 University of Connecticut: $190,069
Total Project Cost	$380,113
Agency ID or Contract Number	69A3551847101
Start and End Dates	October 01, 2021 - September 30, 2023
Brief Description of Research Project	Most of the New England railway bridges were designed and built more than a century ago with outdated design codes and materials. The objective of this research project is to investigate the structural behavior of critical members and connections, such as eye-bars, pins, and gusset plates, of old truss-type steel railway bridges in the Northeast region under dynamic structural response factors such as service load, environmental conditions, and material aging. The proposed project will establish a systematic framework to apply analytical, computational, and experimental/field testing techniques to locate, evaluate, and mitigate the damage in the connections between steel members in old railroad bridges. Starting with a critical review of the existing data of past connections issues and failure from selected bridges, the research team will work closely with New England's Department of Transportation and railroad companies to generate reliable data recording and evaluation of bridge type versus critical members and connection problems, existing mitigation methods, and current repair techniques. Finite Element (FE) Models will be used to establish parameters to identify and analyze possible critical members and connections. Similarly, the research will focus on the detailed local analysis of those critical connections, with an emphasis on dynamic behavior, impact, and material aging. The data collected from the field tests of selected bridges using suitable sensors will be used to validate and verify the global and local FE models of the critical members and connections. Finally, different available connection strengthening, and anti-wear methods will be evaluated to check their effects on extending the bridge's life.

Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	• As of now, the research team has conducted literature search and reviewing different documents related to connection failures of existing bridges, such as bridge maintenance reports, papers, and books. • The team has developed a preliminary methodology to transfer the FE Model output from a global response to a local model, allowing the research team to better understand the local connection issues (Figures below shown the Eyebar modeling detail from Devon Bridge).  DEVON BRIDGE – SPAN 7  EYEBAR  EQUIVALENT STRESS - EYEBAR
Impacts/Benefits of Implementation (actual, not anticipated)	This project is in its initial research phase. Impacts and benefits of the research will be reported after the implementation phase.
Web Links • Reports • Project website	https://www.tidc-utc.org/wp-content/uploads/2021/08/1.13.UConn_.Malla_.Quarterly.12.31.2021.website.pdf