

UTC Project Information	
Project Title	Fatigue Evaluation of the Increased Weight Limit on Transit Railway Bridges (Former title: Evaluation of the Impacts of Rail Investments and Engineering Improvements on Transit)
University	Rutgers, the State University of New Jersey Mineta National Transit Research Consortium
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Funding Source(s) and Amounts Provided (by each agency or organization)	Research and Innovative Technology Administration University Transportation Centers Program (\$59,975)
Total Project Cost	\$59,975
Agency ID or Contract Number	DTRT12-G-UTC21
Start and End Dates	June 2012 – October 2014
Brief Description of Research Project	The recent increase of freight railcar weight limits from 263,000 lbs. to 286,000 lbs. raises concerns for the safety of bridges on transit passenger rail systems, since they were not designed for this weight increase. Thus, there is a need to assess the impact of the weight increase on those bridges prior to utilizing passenger lines for freight transportation. This study introduces an accurate approach to ascertaining the remaining fatigue life of steel railway bridges. The analysis results indicate that heavy freight cars have a significant effect on critical locations near bridge supports. The introduction of heavier rail equipment will have a much more significant effect on shorter spans (span lengths of less than 60 ft.) than on long spans. This will allow transit operators or agencies to prioritize and schedule repairs and rehabilitation. An increase of 1,000 freight trains per year will shorten the remaining fatigue life by approximately 2 years. The relationship between annual freight train frequency and remaining fatigue life could help transit operators or agencies to balance the tradeoff between economic benefit and bridge rehabilitation cost.

Describe Implementation of Research Outcomes (or why not implemented)

Proposed evaluation procedures will provide guidelines for Transit or other agencies to estimate the remaining life and damage accumulation to prioritize and schedule repairs and rehabilitation events.

Place Any Photos Here

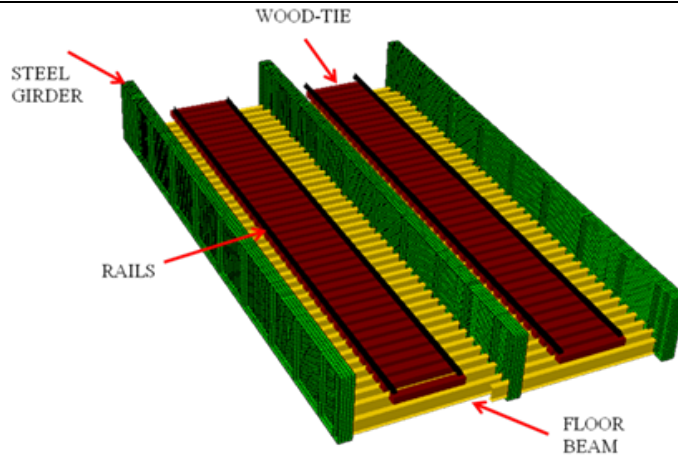


Photo 1- Established finite element model of railroad bridge critical members (developed by RIME Researchers using the commercial finite element software, ABAQUS).



Photo 2 - Installation of various sensors on NJ Transit Bridge in Bergen County

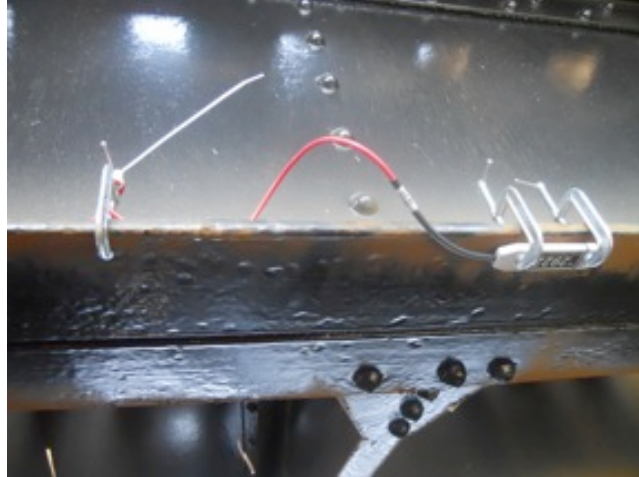


Photo 3 – Typical installation of Strain Transducers to measure the strain in steel girders for NJ Transit Bridge in Bergen County.

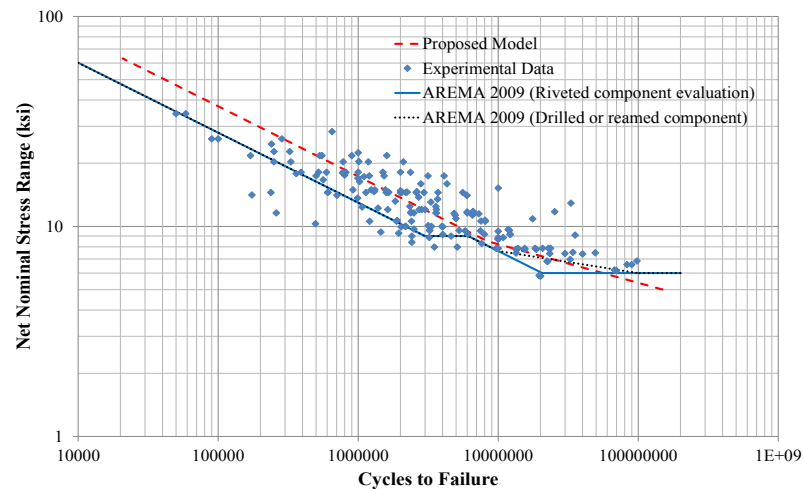


Photo 4 – Proposed new probabilistic based fatigue resistant model.

<p>Impacts/Benefits of Implementation (actual, not anticipated)</p>	<p>With special emphasis on fatigue remaining life to determine the remaining life, the evaluation procedure developed in this study will help NJ Transit and other interested agencies (such as MTA) provide a reliable cost/benefit analysis of maintaining and upgrading these structures and allocate their maintenance resources properly and efficiently on various critical bridges for safe operation. A reliable methodology for the assessment of the impact of rail investment and the engineering improvements on various types of bridges can be proposed for the transit agency.</p>
<p>Web Links</p> <ul style="list-style-type: none"> • Reports • Project Website 	<p>Final report (MNTRC Website): http://transweb.sjsu.edu/project/1143.html</p> <p>Final report (TRB Website): http://trid.trb.org/view/2014/M/1324677</p>