



Geotechnical/  
Structures

FEBRUARY 2023

Project Title:  
Refined Bridge Deck Design and  
Analysis

Task Number: 3668

Start Date: November 01, 2020

Completion Date: October 31, 2022

Task Manager:  
Sharon Yen  
Senior Research Engineer  
sharon.yen@dot.ca.gov

## Refined Bridge Deck Design and Analysis

Bridge research to improve bridge deck design procedure and reduce construction and maintenance costs

### WHAT IS THE NEED?

The current bridge deck design procedure is based on The American Association of State Highway and Transportation Officials (AASHTO) load-and-resistance factor design (LRFD) Bridge Design Specification approximate analysis method that was initially developed in the 1930's then improved in the 1940's and 1950's. The accuracy of the approximate analysis method is of concern due to simplifications and approximations in the procedure. Additionally, truck loads and wheel configurations used for current design do not reflect modern vehicle loadings. New vehicle configurations mandated or allowed by federal programs such as Special Hauling Vehicles (SHV) and Emergency Vehicles (EV) need to be considered in our design process. Finally, current design procedures do not directly address high cyclic fatigue despite it being a common mode of deck failure.

### WHAT ARE WE DOING?

Through the PEER-Bridge Program, The California Department of Transportation (Caltrans) is contracting with UC Davis to develop an updated LRFD bridge deck design procedure based on a refined analysis method using finite element computer modeling. The updated method will consider modern vehicle load configurations and more accurate load demands. Both simplified and advanced procedures will be developed for bridge designer use. The study will also include recommendations on incorporation of concrete fatigue into deck design practice based on a comprehensive literature survey and impact assessment.



DRISI provides solutions and knowledge that improves California's transportation system



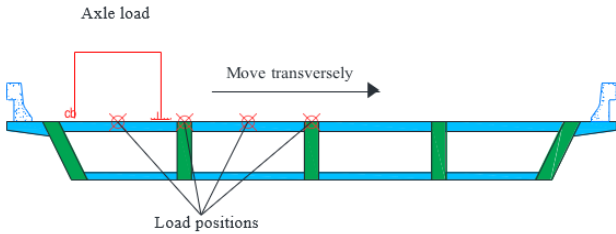


Image 2 : Transverse positions of axle loads under study

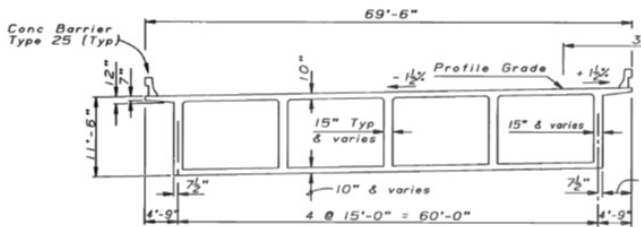


Image 3: General plan of prototype bridge cross-section (53-2790L)

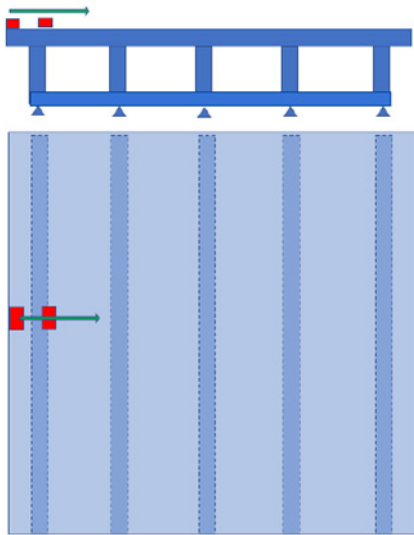


Image 4: Illustrated concept of rigid support analysis

The contents of this document reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the California Department of Transportation, the State of California, or the Federal Highway Administration. This document does not constitute a standard, specification, or regulation. No part of this publication should be construed as an endorsement for a commercial product, manufacturer, contractor, or consultant. Any trade names or photos of commercial products appearing in this document are for clarity only.