

Evan Lapointe

MIT 1.541
23 February 2004
Project Proposal

Proposed Project Title

Design and Evaluation of Seismic-Resistant Concrete Highway Bridges

Project Overview

The project will evaluate the design of earthquake-resistant concrete highway bridges. The project will be composed of two separate sections: (1) an overview of the mechanics and behavior of concrete bridge structures subject to seismic forces and (2) a stress analysis of a typical concrete highway bridge subject to seismic loading accompanied by design recommendations OR a stress analysis of a typical highway bridge subject to seismic loading accompanied by retrofit recommendations.

Section I

The first portion of the project will address seismic analysis techniques used to determine the behavior of reinforced concrete subject to earthquake loads. The earthquake resistant properties of reinforced concrete including effects of geometry, confinement, steel strength, and concrete strength will also be examined. Current methods of retrofitting reinforced concrete highway bridges will be discussed.

Section II

In the second portion of the report, a stress analysis will be conducted on a typical concrete highway bridge subject to seismic loads. Recommended AASHTO earthquake loads will be used in the bridge analysis, and a representative bridge geometry will be employed. The analysis will be conducted using SAP200 finite element software. Using the output of the analysis, two options may be employed. (1) A new design will be recommended as if the bridge were to be constructed as a new structure. The design will include member sizes and reinforcement schemes. (2) A retrofit design of the structure will be recommended, assuming the analyzed bridge is an existing span in need of seismic retrofit. The retrofit will be designed according to current industry practices and code specifications.