

# Chapter 1

## Introduction

### 1.1. Problem Statement

The Virginia Department of Transportation is currently using the *AASHTO Standard Specifications for Highway Bridges (Standard, 1996)* with some modifications for its seismic highway bridge design. In April 2001, the *Recommended LRFD Guidelines for the Seismic Design of Highway Bridges (MCEER/ATC, 2002)* were published. Different parts of Virginia will be affected differently by these new LRFD Guidelines. In some areas the seismic requirements become more stringent, while in other areas the seismic requirements become less stringent. For the areas with more stringent seismic requirements, the resulting column size and reinforcement and pier cap beam size and reinforcement may be increased compared to designs using current practice. To be prepared for the transition from the Standard Specifications to the new LRFD Guidelines, VDOT must have an understanding of the impact of the new LRFD Guidelines on the cost for design and construction of Virginia bridges.

### 1.2. Objectives and Scope

The objectives of this study are:

- To determine the effects the new recommended LRFD Guidelines on Virginia bridges.
- To assess the required level of design effort and to compare the resulting designs.
- To perform parametric studies on simple bridge configurations to evaluate the economic impact of the new design procedures on bridges in Virginia.

To assess the effects of the new LRFD Guidelines, two previously designed bridges were evaluated for compliance with the new LRFD Guidelines. One bridge had

prestressed concrete girders and was located in the Richmond area. The second had steel girders and was located in the Bristol District. The units used in all calculations followed the units used on the drawings, therefore Metric units were used for all the calculations for the prestressed concrete girder bridge and US Customary units were used for all the calculations for the steel girder bridge.

### **1.3. Thesis Organization**

The background information is given in Chapter 2. Chapter 3 discusses the prestressed concrete girder bridge example, while the steel girder bridge example is presented in Chapter 4. Chapter 5 discusses the parametric study of different bridges in different parts of Virginia. Finally, the conclusions are provided in Chapter 6.