

PREFACE

The 1971 San Fernando earthquake was a major turning point in the development of seismic design criteria for bridges in the United States. Prior to 1971, the American Association of State Highway and Transportation Officials (AASHTO) specifications for the seismic design of bridges were based in part on the lateral forces requirements for buildings that had been developed by the Structural Engineers Association of California. In 1973, the California Department of Transportation (Caltrans) introduced new seismic design criteria for bridges, which included the relationship of the site to active faults, the seismic response of the soils at the site and the dynamic response characteristics of the bridge. AASHTO adopted Interim Specifications in 1975 which were a slightly modified version of the 1973 Caltrans provisions, and made them applicable to all regions of the United States. In addition to these code changes, the 1971 San Fernando earthquake stimulated research activity on seismic problems related to bridges.

In the light of these research findings, the Federal Highway Administration awarded a contract in 1978 to the Applied Technology Council (ATC) to evaluate current criteria used for seismic design of highway bridges, review available seismic research findings for design applicability and use in new specifications, develop new and improved seismic design guidelines for highway bridges applicable to all regions of the United States, and to evaluate the impact of these guidelines and modify them as appropriate. The guidelines from this ATC project (known as ATC-6) were first adopted by AASHTO as a Guide Specification in 1983. They were later adopted as seismic provisions within the AASHTO *Standard Specifications for Highway Bridges* as Division I-A in 1991.

After damaging earthquakes occurred in California (1989), Costa Rica (1991) and the Philippines (1991), AASHTO requested the Transportation Research Board to review these criteria and prepare revised specifications as appropriate. Funded through the AASHTO-sponsored National Cooperative Highway Research Program (NCHRP) under NCHRP Project 20-7, Task 45, the Multidisciplinary Center for Earthquake Engineering Research (MCEER, formerly known as NCEER) prepared an updated set of seismic design provisions which closely followed the previous criteria but removed ambiguities and technical errors, corrected technical omissions and introduced limited new material which was based field experience and new research findings. The updated provisions were adopted into both the AASHTO *Standard Specifications* and the first and second editions of the AASHTO *LRFD Bridge Design Specifications*. However, the technical basis for the updated provisions was essentially the same as that of the ATC-6 provisions which were initially published in 1981.

Therefore, in 1998, the NCHRP initiated a subsequent study under NCHRP Project 12-49 to develop a new set of seismic design provisions for highway bridges, compatible with the AASHTO *LRFD Bridge Design Specifications*. NCHRP Project 12-49, which was conducted by a joint venture of the Applied Technology Council and the Multidisciplinary Center for Earthquake Engineering Research (the ATC/MCEER Joint Venture), had as its primary objectives the development of seismic design provisions that reflected the latest design philosophies and design approaches that would result in highway bridges with a high level of seismic performance. The results of NCHRP Project 12-49 have been re-formatted into a stand-alone set of provisions that can be more readily used for seismic design through the sponsorship of MCEER with funding from the FHWA. The provisions contained herein are the results of that effort.