ATC-32

Improved Seismic Design Criteria for California Bridges: Provisional Recommendations

by
APPLIED TECHNOLOGY COUNCIL
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(Foundation Design)
Kercheval Engineers
(Bridge Design)
Kleinfelder/Geospectra
(Seismic Loading)
Modjeski & Masters, Inc.
(Steel & Bearing Design)
Moehle/Priestley Team
(Concrete Design & Analysis)
Quincy Engineering
(Bridge Design)
RDD Consultants
(Publications & Travel)

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1996

Preface

In May 1991, the California Department of Transportation (Caltrans) awarded Applied Technology Council (ATC) a contract to conduct a critical review of the Caltrans Bridge Design Specifications (BDS) related to seismic design and to recommend changes where needed. This contract resulted in the development of the revised BDS presented in this ATC-32 report, which provides a number of recommended improvements to bridge design practice. A companion document, ATC-32-1, includes additional detailed discussion of these recommendations. The recommendations apply to the seismic design of bridges throughout California.

Because of the broad range of expertise required to develop comprehensive BDS, a 13-member advisory Project Engineering Panel (PEP) was assembled to review recommended changes as they were developed and to provide guidance where needed. This panel was composed of Ian Buckle (Chair), Robert Cassano, Allen Ely, Nicholas Forell, James Gates, I. M. Idriss, Roy Imbsen, James Jirsa, James Libby, Joseph Nicoletti, Joseph Penzien, Maurice Power, and James Roberts. The affiliations of these individuals are provided in the Project Participants list.

The detailed technical work required for the development of recommendations was performed primarily by four specialty subcontractors. J.P. Singh and his staff at Kleinfelder/Geospectra were responsible for developing new *ARS* spectra and other recommendations related to seismic loading. Po Lam and his staff at Earth Mechanics, working with Geoff Martin of the University of Southern California, were responsible for developing the foundation design guidelines. Nigel Priestley of the University of California, San Diego and Jack Moehle of the University of California, Berkeley developed the recommendations on response analysis and reinforced concrete design. They were assisted by Gregory Fenves of the University of California, Berkeley. John Kulicki and his staff at Modjeski and Masters developed new design criteria for steel structures and conventional bridge bearings.

Trial designs using the draft BDS were performed by two bridge design consultants. John Quincy directed the efforts of Quincy Engineering and Kosal Krishnan directed those of Kercheval Engineers. Nonlinear dynamic analysis studies to evaluate near-fault effects were performed by Computech Engineering Services under the direction of Ron Mayes. An independent external review of the recommendations for structural steel was conducted by Ahmad Itani of the University of Nevada at Reno.

Technical editing and formatting of this report were performed by Nancy and Rodney Sauer of RDD Consultants and the ATC staff. Their efforts are gratefully acknowledged.

The efforts of several Caltrans personnel are also gratefully acknowledged. Mohsen Sultan was the Contract Manager and coordinated the technical participation of other Caltrans engineers. Dan Kirkland and Tim Leahy served as Contract Administrators. They and their staff provided ATC with invaluable assistance in complying with Caltrans requirements. Finally, ATC wishes to thank the many Caltrans engineers who have shown an interest in this project by commenting on draft recommendations and attending PEP and other meetings.

Christopher Rojahn,
ATC Executive Director

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