FEDERAL HIGHWAY ADMINISTRATION HIGHWAY BRIDGE SEISMIC RESEARCH PROGRAM

by

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SYNOPSIS

The Federal Highway Administration (FHWA) is coordinating and sponsoring a national program of research to promote a better understanding of earthquake effects on highway bridges. New analytical and design techniques being developed during the period of research will reduce the susceptibility of bridges to severe damage currently encountered during time of earthquake. Evaluation and correlation of laboratory, analytical, and field data is directed to the preparation of design specifications and methodology to provide improved seismic resistance to both new and existing highway structures.

FHWA RESEARCH ACTIVITIES

During the past decade, various responsible scientific, professional and governmental groups in the United States have pointed to the catastrophic potential of a great earthquake with respect to human suffering and property damage. While considerable earthquake engineering research had been applied to buildings during the past 30 years, very little theoretical or experimental information had been developed for bridges. As a result of the catastrophic destruction of highway bridges caused by the 1971 San Fernando earthquake, the FHWA initiated a program to provide the necessary research findings on which to base advanced structural design criteria for improving the capability of both new and existing highway bridges to withstand the extreme loadings imposed by earthquakes.

The following research activities are sponsored by FHWA through contract to universities, consultants, and State and Federal government agencies. Linear and non-linear analytical computer programs for the determination of seismic response of typical highway bridges, i.e., grade separations and interchange structures, have been developed and verified. The determination of the dynamic response of a bridge requires quantitative information including natural period, mode shape, energy dissipation and yield limit. Consequently, experimental dynamic studies have been conducted on small and full-scale bridge configurations. Additional dynamic studies will include the analysis of strong-motion data when obtained from instrumentation which has been installed on selected highway bridges located in potentially active seismic regions of the United States. The vulnerability of existing highway bridges was vividly demonstrated during the San Fernando earthquake. As a direct result of that earthquake, economically feasible retrofitting techniques have been developed which improve the seismic resistance of existing structures. Finally, based on state-of-the-art research, a project is planned to develop new seismic design criteria for highway bridges.

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