ATC-13
Earthquake Damage Evaluation Data for California

by

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PREFACE

In October 1982 the Federal Emergency Management Agency (FEMA) awarded Applied Technology Council (ATC) a contract to develop earthquake damage evaluation data for facilities in California. FEMA is planning to use these data and companion loss estimation and inventory methodology to estimate the economic impacts of a major California earthquake on the state, region, and nation.

Because the required earthquake damage, loss and inventory data were not available in the literature, ATC and FEMA agreed that the best way to develop the required data was to draw on the experience and judgment of seasoned earthquake engineers. Accordingly, ATC established an advisory Project Engineering Panel (PEP) composed of senior-level specialists in earthquake engineering to provide the input necessary to develop consensus damage/loss estimates as well as advise on other aspects of the project. Their work was augmented by 58 additional earthquake specialists who were engaged to participate in the questionnaire processes used to develop the consensus damage/loss estimates. Detailed technical work on the project was conducted by ATC staff, three staff consultants, and three graduate-student/post-doctorate staff.

This report[1] includes pertinent background information, detailed descriptions of the methodology used to develop the required earthquake damage/loss estimates and inventory information, and tables and figures showing the damage/loss estimates developed. Included are damage probability matrices for 78 different facility types as well as estimates of the time required to restore damaged facilities to their pre-earthquake usability.

ATC gratefully acknowledges the numerous individuals who contributed to the development of this report. R. E. Scholl served as the consultant on earthquake losses, wrote a substantial portion of the text, and contributed significantly to the overall development of the concepts and data presented herein. A. S. Kiremidjian, who served as the consultant on statistics and probability, developed the questionnaires used to query the earthquake specialists and was responsible for data analysis and presentation.
R. V. Nutt, who served as the consultant on inventory methodology, developed both the inventory data and methodology. T. Anagnos, A. C. Boissonnade, and R. J. Nielsen (graduate-student/post-doctorate staff from Stanford University, Dept. of Civil Engineering) assisted in data acquisition and analysis. M. Quinonez, N. Day, and C. Day of the ATC staff typed and assisted in the compilation of the final report, and S. Rush of Rdd Consultants served as technical editor.

Special recognition goes to the 13-member PEP, without whose continual advice and support this project would have never been possible, and to Robert R. Wilson, FEMA Project Officer, who provided important guidance and patient, continual support throughout the duration of the project.

Christopher Rojahn (Principal Investigator)
ATC Executive Director

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[1]FEMA footnote: The research forming the basis for this publication was conducted pursuant to a contract with the Federal Emergency Management Agency. The substance of such research is dedicated to the public. The authors and publisher are solely responsible for the accuracy of statements or interpretations contained herein.

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