ATC-5

GUIDELINES FOR SEISMIC DESIGN AND CONSTRUCTION OF SINGLE-STORY MASONRY DWELLINGS IN SEISMIC ZONE 2

by

APPLIED TECHNOLOGY COUNCIL
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Prepared for ATC by
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PREFACE

The design and construction of one story reinforced masonry houses in Uniform Building Code (UBC) Seismic Zone 2 areas of the United States became a matter of increasing concern to the U.S. Department of Housing and Urban Development (HUD), builders and building designers in the early 1970's. In August 1974, HUD issued Local Acceptable Standards No. 2 (LAS 2), for the Phoenix, Arizona Insuring Office Area. The building industry seriously questioned the necessity of the additional reinforcement required of LAS 2. As a result, in late 1975 HUD undertook the development of seismic design and construction guidelines for one-story masonry dwellings in UBC 1973 Zone 2. An analytical and testing program was also initiated at the Earthquake Engineering Research Center (EERC), University of California, Berkeley.

The Applied Technology Council (ATC) was retained to provide a subcontractor to develop the seismic design and construction guidelines using the results of the EERC tests, the recommendations of EERC and the contributions of a Project Advisory Panel. The panel and the subcontractor, selected because of their in-depth experience in structural engineering or housing development, worked with the EERC project staff during implementation of the testing program. Over a seven year period, shaking table tests were conducted on five different masonry houses.

Benson & Gerdin Consulting Engineers, Phoenix, Arizona, a civil-structural engineering firm familiar with design and construction requirements in Phoenix, Arizona and surrounding regions, served as the project subcontractor. Thomas W. Irwin was principal author and Roger D. Benson was partner-in-charge. Joseph Gervasio, James Kesler, O. Clarke Mann, Egor Popov, and Leonard Pritchard served as members of the Project Advisory Panel.

Applied Technology Council gratefully acknowledges the technical contributions of Ray W. Clough, Ronald L. Mayes, George C. Manos, and Polat Gulkan of EERC; the encouragement, cooperation and patience provided by the Government Technology Representatives William J. Werner (deceased) and Ronald J. Morony; and the contributions of Federal Housing Administration (HUD) representatives Andrei Gerich and Lincoln Chang. The review of the seismic maps performed by Dr. S. T. Algermissen, supervisory geophysicist, U.S. Geological Survey, Denver, Colorado, is also greatly appreciated.

The Guidelines presented in this report are intended to serve as an aid to the seismic design and design review of single-story masonry houses, and are not to be interpreted as building provisions. While every precaution has been taken to insure that all information included in the Guidelines is accurate and that all recommendations are founded on sound engineering, they are not designed to override the judgement of a registered engineer or architect.

The information presented is applicable only to single-story masonry houses. Houses that do not meet the conditions or that exceed the limitations listed herein should be reviewed by a registered structural engineer for earthquake resistance.

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