ATC-19

Structural Response Modification Factors

by

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Preface

In 1986, the Applied Technology Council (ATC) was awarded a grant from the National Science Foundation (NSF) to evaluate structural response modification factors (R factors). R factors are used in current seismic building codes to reduce ground motions associated with design level earthquakes to design force levels. The initial objectives of the project (known as ATC-19) were to: (1) document the basis for the values assigned to R factors in model seismic codes in the United States, (2) review the role played by R factors in seismic design practice throughout the United States; (3) present state-of-knowledge on R factors; and (4) propose procedures for improving the reliability of values assigned to R.

In 1991, the scope of the effort was expanded with funding from the National Center for Earthquake Engineering Research (NCEER) to address and/or document (1) how response modification factors are used for seismic design in other countries; (2) a rational means for decomposing R into key components using state-of-the-knowledge information; (3) a framework (and methods) for evaluating the key components of R; and (4) the research necessary to improve the reliability of engineered construction designed using R factors. The results from the original and expanded objectives described above are documented in this report.

The primary ATC-19 project consultants, who prepared the major portions of this report, were Gary Hart and Andrew Whittaker, senior-level earthquake engineering researchers from southern and northern California, respectively. Their work was overviewed and guided by an advisory "blue-ribbon" Project Engineering Panel (PEP) consisting of Vitelmo Bertero, Gregg Brandow, Sigmund Freeman, William Hall, and Lawrence Reaveley (ATC Board Representative). Nancy Sauer and Peter Mork provided editorial and publication preparation assistance. The affiliations of these individuals are provided in the Project Participants list.

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