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Structural Condition Assessment of Existing Buildings

A Guideline

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of Buildings Committee of the
Seismic Codes and Standards Activities Division of the
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(As developed by the ASCE Technical Procedures Committee, July 1930, and revised March 1935, February 1962, and April 1982)

A manual or report in this series consists of an orderly presentation of facts on a particular subject, supplemented by an analysis of limitations and applications of these facts. It contains information useful to the average engineer in his or her everyday work, rather than findings that may be useful only occasionally or rarely. It is not in any sense a "standard," however, nor is it so elementary or so conclusive as to provide a "rule of thumb" for nonengineers.

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In February 1962 (and revised in April 1982), the Board of Direction voted to establish a series titled "Manuals and Reports on Engineering Practice," to include the manuals published and authorized to date, future Manuals of Professional Practice, and Reports on Engineering Practice. All such manual or report material of the Society would have been refereed in a manner approved by the Board Committee on Publications and would be bound, with applicable discussion, in books similar to past manuals. Numbering would be consecutive and would be a continuation of present manual numbers. In some cases of joint committee reports, bypassing of journal publications may be authorized.

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DEDICATION

All the authors involved with this Manual of Practice would like to dedicate this edition to the memory of Carl A. Baumert Jr. who passed away in April 2018. We would like to thank Carl for his dedication and commitment to the revision of this publication and for his tutelage of its committee members throughout the years. Carl was the past chairman of the main and both structural assessment subcommittees. During his chairmanship, the second edition of the ASCE Standard Guideline for Structural Condition Assessment of Existing Buildings was published, and the revisions to the third edition were commenced. Carl's creative contributions regarding historic structures and materials are present throughout this book.

It is with great pleasure that we dedicate this Manual of Practice to the memory of Carl A. Baumert Jr.

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PREFACE

Changing economic conditions, concern for historic preservation, emphasis on fully utilizing conveniently located structures, space shortages, and increasing cost of materials and products used in the construction of new buildings have resulted in a need to evaluate and more fully utilize the existing building inventory. In addition, because replacing existing buildings with new construction releases additional greenhouse gases and heat energy into the environment, there are environmental benefits to reusing rather than replacing existing structures. Particularly in older cities, emphasis has shifted from replacement to preservation, rehabilitation, and strengthening of existing buildings. Equally important is the need to evaluate the existing structure relative to its remaining service life, which must also be considered to ensure that an existing building assessment addresses the overall health of the building, including but not limited to initial design parameters, lateral and vertical load path continuity, construction quality, age, material deterioration, repairability, cycle of repairs, and future use parameters. Such considerations are independent of owner, client, and municipality interests.

New processes resulting in changes of building systems and business equipment frequently impose greater loads on an existing building structure and may also require additional openings and restructuring. More stringent building code provisions for design load requirements, improved seismic resistance, accessibility, or fire protection may also demand retrofitting or structural reinforcement. Also, any known site conditions should be reviewed to determine whether modifications to structural systems are required or even possible.

Adaptive reuse, rehabilitation, and improvement of existing buildings all require a thorough assessment of present building performance and capability for use by owners, designers, building officials, and contractors. Current data for assessment are dispersed and not readily available to

many of those making technical decisions. Such information has been compiled and subjected to a consensus review by this committee. The intent of this Manual of Practice is to provide the design community with suggested guidelines on building condition assessments for selected materials and for other areas related to the structural performance of buildings. To that end, this publication has been prepared for use by qualified professional engineers and regulatory officials.

This publication has been adapted from ASCE 11-99, *Guideline for Structural Condition Assessment of Existing Buildings*. This reimagined adaptation, as a Manual of Practice, has been reformatted to make this manual more user-friendly. The major change has been to organize the document by material type and not by test or assessment type. We hope this change will make the use of this document more efficient. This publication also serves as an updated resource to be utilized prior to any future revisions of ASCE 11-99.

These suggested guidelines are not intended to be all-inclusive or prescriptive. Methods and procedures are presented as a reference resource. Other rational methods and procedures are not only permissible but also encouraged so long as they are deemed reliable by the authority having jurisdiction and sufficient comparisons are available with recognized methods.

Inasmuch as interpretation of the results of the evaluation must be based on the professional experience and judgment of the practitioner, it is not addressed as a part of this Manual of Practice.

People performing the evaluation may be exposed to hazardous materials, operations, and equipment during structural condition assessments. This manual does not purport to address all safety issues associated with its use. It is the responsibility of the manual user to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

The material presented in this publication has been prepared in accordance with recognized engineering principles. This manual should not be used without first securing the services of a qualified design professional to provide advice with respect to its suitability for any given application. The publication of the material contained herein is not intended as a representation or warranty on the part of ASCE or of any other person named herein that this information is suitable for any general or particular use or promises freedom from infringement of any patent or patents. Anyone making use of this information assumes all liability for such use.

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CHAPTER 1
GENERAL

1.1 SCOPE AND INTENT OF THE MANUAL OF PRACTICE

The intent of this publication is to provide guidelines and methodology for assessing the structural condition of existing buildings constructed of combinations of materials such as concrete, metals, masonry, and wood. This guideline establishes the assessment procedure, including investigation, testing methods, and format for the report of the condition assessment.

This book is intended as a guide to the design professional in providing comprehensive information for clients such as building owners, prospective purchasers, tenants, regulatory officials, and others. Any evaluation will involve engineering judgment and contain factors that cannot be readily defined and standardized. A section providing guidance for evaluations is also included. This section should be used by the design professional as part of their structural evaluation. The Local Existing Building Code and/or the International Existing Building Code (IEBC—currently adopted edition) should be consulted for code requirements regarding the evaluation and repairs of existing buildings.

This publication does not specifically address seismic retrofitting of structures. The investigator should reference ASCE 31, *Seismic Evaluation of Existing Structures*, and ASCE 41, *Seismic Rehabilitation of Existing Structures*, for seismic evaluation and rehabilitation of structures, respectively.

Dimensions and quantities in this book are expressed in inch-pound Imperial (customary) units followed by conversion to SI units in parentheses.