



STRUCTURAL ENGINEERING HANDBOOK

—THIRD EDITION—

EDITED BY
EDWIN H. GAYLORD, JR.
CHARLES N. GAYLORD

Structural Engineering Handbook

Edited by

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Preface

This Handbook provides engineers, architects, and students of civil engineering and architecture with an authoritative reference work on the planning and design of a variety of engineered structures. Among the structures covered are industrial buildings, tall buildings, bridges, thin-shell structures, arches, suspension roofs, tanks for liquid storage, bins and silos for granular materials, retaining walls, bulkheads, steel transmission towers and poles, chimneys, and buried conduits. Design in reinforced concrete, prestressed concrete, steel, composite construction, wood, aluminum, and masonry are covered. Sections on soil mechanics, soil exploration, and foundations, and a comprehensive treatment of structural analysis, give the designer the information likely to be needed for these phases of design. Earthquake-resistant design and design against fatigue, brittle fracture, and lamellar tearing are treated.

In this third edition every section has been reviewed, and many have been revised extensively. The section on structural analysis has been completely rewritten so as to emphasize computer-based techniques, and the treatment of finite-element idealization of various types of structures, including recommendations as to suitable types of elements, has been expanded.

The section on steel structural members has been expanded to include coverage of the new Load and Resistance Factor Design specification (LRFD). Design of composite beams and girders according to the LRFD specification is also covered, and a detailed description and an example of the autostress design procedure for highway bridges is given. There is also a new section on curved steel I-girder bridges.

A discussion of lamellar tearing and suggestions on how to avoid it has been added to the section on fatigue and brittle fracture. Coverage of fatigue is updated, with comprehensive tables for determining the fatigue life of various types of joints.

The section on cold-formed steel members has been rewritten so as to conform to changes in the 1986 edition of the American Iron and

Steel Institute specification, which is an extensive revision of earlier editions. The sections on structural members of reinforced concrete, prestressed concrete, masonry, wood, and aluminum have also been revised to conform to the latest design specifications.

The 30 sections have been written by 45 contributors. They have presented their material in ready-to-use form wherever possible. To this end, derivations of formulas are omitted in all but a few instances and many worked-out examples are given. Background information, descriptive matter, and explanatory material have been condensed or omitted. Because each section treats a subject which is broad enough to fill a book in itself, the contributors have had to select that material which in their judgment is likely to be most useful to the greatest number of users. However, sources of additional material are noted for most of the topics which could not be treated in sufficient detail.

Each section was edited to minimize duplication, to arrange the contents of the book in a logical order, and to see that important topics were not overlooked. The contributors' painstaking efforts, their cooperation in the review and editing of their work, and their patience during the time it has taken to complete the third edition are gratefully acknowledged.

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