

CONCRETE MANUAL

2012 IBC® AND ACI 318-II

CONCRETE QUALITY AND FIELD PRACTICES

GERALD B. NEVILLE, P.E.



**ONLINE BONUS
FEATURES INCLUDED**



Concrete Manual

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Preface

This text on concrete inspection will provide the inspector with an understanding of the scientific principles that underlie sound practices and will assist the inspector in making rational rather than arbitrary decisions. The *Concrete Manual* provides the guidance and information that inspectors and related professionals need to become more proficient and professional in relating to concrete field practices and inspection. The information provided will increase the technical capabilities of jurisdictional inspectors in the performance of their inspection duties.

The *International Building Code*® (IBC®), published by the International Code Council® (ICC®) presents a number of situations in which specially qualified inspectors are required to perform continuous inspection of construction. The special inspectors are individuals with highly developed and specialized skills who observe those critical building or structural features that they are qualified to inspect. The *Concrete Manual* serves as a valuable reference to assist the special inspector in performing the duties and responsibilities of special inspection for reinforced and prestressed concrete construction.

To perform inspection of any phase or part of construction, the inspector must be versed in the phase or part that he or she is inspecting. The inspector's knowledge of laws, codes and specifications will be of little value if he or she does not have an understanding of the construction to be inspected. This book provides the inspector with a source of that knowledge as applied to concrete construction.

The initial chapters of the book introduce the reader to concrete and explain what concrete is and why it behaves as it does. A brief history of portland cement and concrete is included. In the following chapters, materials are presented to the reader as a preparation for the final chapters, which cover construction. Conventional construction procedures as well as special techniques are covered in sufficient detail to enable the reader to understand and recognize them. Throughout all chapters, the reader will find information about unsatisfactory materials and methods, together with discussion of acceptable materials and methods. Actual control and inspection procedures are described and should be of immediate interest to the inspector.

The *Concrete Manual* provides basic information that can be related to the described inspection procedures. The descriptions are, by necessity, somewhat general, as the responsible building official will designate the details of inspection. Codes, specifications and other requirements differ from job to job. For example, what are the conditions under which the inspector is authorized to order the work stopped or refuse to accept certain material or construction? These administrative decisions must be made by the building official. The statistical quality control methods, although of limited value to

most inspectors, are included for completeness as concrete mixture proportioning and strength test evaluation and acceptance are based on statistical methods of analysis and the mathematics of probability. The inspector should at least be aware of the basic concepts of statistical quality control and its applications to concrete construction. A “Resource References” list of the concrete industry and technical organizations is included at the back of this book. The reader is encouraged to contact a listed organization for additional information and/or a publication on a specific concrete subject.

Of special note, the International Code Council, in cooperation with the American Concrete Institute, offers an examination for reinforced concrete special inspectors with national certification opportunities. The International Code Council offers the examination dealing with the codes and standards involved with reinforced concrete inspection; ACI offers certification of field technicians. When combined, they provide a national certification for Reinforced Concrete Special Inspector. For more information on the “Reinforced Concrete Special Inspector Certification” the reader should contact ACI or the International Code Council.

In addition to the reinforced concrete special inspector certification, ICC, in cooperation with the Precast Prestressed Concrete Institute (PCI) and the Post-tensioning Institute (PTI), offers a “Prestressed Concrete Special Inspector Certification.” The reinforced concrete certification is a prerequisite for obtaining a prestressed concrete certification.



Acknowledgments

The initial author of the *Concrete Manual* was Joseph J. Waddell, noted concrete consultant. Special thanks are due to Mr. Waddell for his outstanding contribution to this unique publication addressing the special needs of the concrete field and laboratory inspector/technician.

For nearly three decades, the publication has been continuously updated to address new developments in concrete technology and construction practice. In addition, the text is revised on a regular basis to reflect ongoing changes in the building code and corresponding referenced standards. This printing of the 8th edition has been updated to reflect changes in the 2012 IBC and referenced standard ACI 318-11.

Primary responsibility for the text of this publication, since 1988, is with Gerald B. Neville, P.E., formerly of the ICBO/ICC technical staff. Special thanks go to Steven H. Kosmatka of the Portland Cement Association (PCA) for his continued help and reviews of the total text of the publication for conformance to current concrete technology and construction practice; to Connie Field of PCA for her help in securing the many new color photographs beginning with the 7th edition; to Terry Collins of PCA for his review of Chapter 11 addressing formwork; to Anthony Felder of the Concrete Reinforcing Steel Institute (CRSI) for his critical review of Chapter 18 on steel reinforcement; to Roy Reiterman of the Wire Reinforcement Institute (WRI) for his special review of the welded wire reinforcement text in Chapter 18; to James Baty of the Tilt-Up Concrete Association (TCA) for updated information on tilt-up construction; and to Jason Krohn and George Nasser of the Precast/Prestressed Concrete Institute (PCI) for their critical review of Chapter 20 addressing precast and prestressed concrete.

About the International Code Council®

The International Code Council (ICC®), a membership association dedicated to building safety, fire prevention and energy efficiency, develops the codes and standards used to construct residential and commercial buildings, including homes and schools. The mission of ICC is to provide the highest quality codes, standards, products and services for all concerned with the safety and performance of the built environment. Most United States cities, counties and states choose the International Codes, building safety codes developed by the International Code Council.

The International Codes also serve as the basis for construction of federal properties around the world, and as a reference for many nations outside the United States. The International Code Council is also dedicated to innovation and sustainability. ICC Evaluation Service, a subsidiary of ICC, issues Evaluation Reports and Listings for innovative building products as well as environmental documents such as ICC-ES VAR Environmental Reports and ICC-ES Environmental Product Declarations (EPDs).

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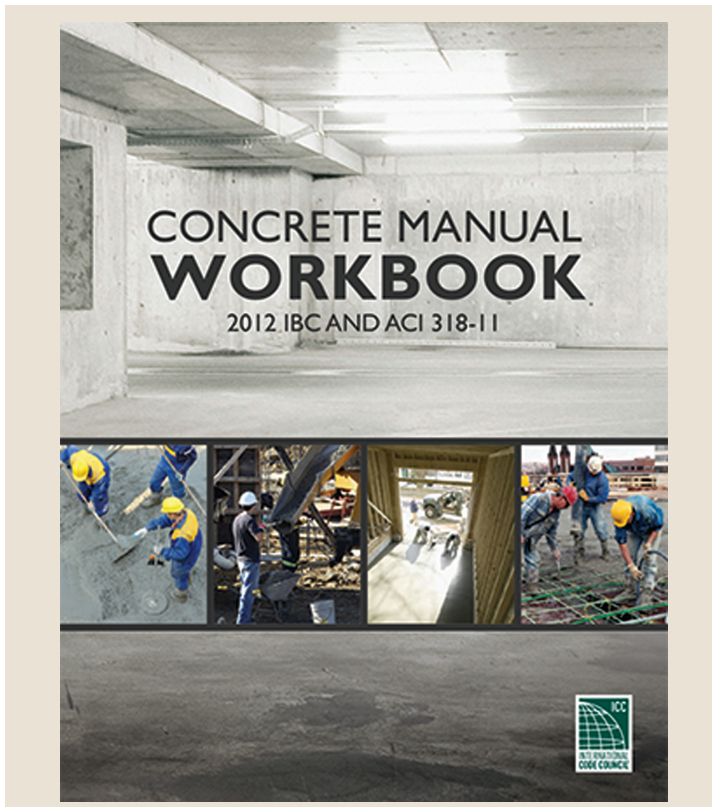
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ICC's *Concrete Manual Workbook* is a bonus learning tool just right for you.

The 2012 *Concrete Manual* includes a companion workbook developed to help enhance your knowledge of concrete field practices and inspection. The *Concrete Manual Workbook* provides practical learning assignments for independent study of the material covered in the *Concrete Manual*. The workbook covers all 26 chapters of the manual and includes:

- Learning objectives;
- List of key points for study;
- Quizzes designed to assist in your understanding of the subject matter presented in the manual; and
- A complete answer key so that you can quickly assess your technical knowledge of the subject.



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