An ACI Manual

Manual of Concrete Inspection

ACI 311.1R-07 with Selected References

MNL-2(19)

American Concrete Institute
Always advancing

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ACI 311.1R-07 with Selected References

Reported by ACI Committee 311

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American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI
48331-3439 USA
+1.248.848.3700
www.concrete.org

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ACKNOWLEDGMENTS

The committee wishes to thank Anne Balogh for her extensive work in redrafting and unifying the previous text in preparation for this edition.

Additionally, the committee wishes to express its thanks to Portland Cement Association (PCA) for generously providing many of the new photos contained in the manual and to committee member Michelle L. Wilson who organized and coordinated the selection of photos and graphics throughout the document.

Finally, the committee wishes to thank Chair George R. Wargo for his efforts in coordinating the work of all contributors.

ABOUT THIS BOOK

This manual is based on information from many sources, organizations, and individuals whose contributions are gratefully acknowledged. Published references are listed at the end of the text. References to standard specifications and methods of testing are listed separately.

The original manuscript was prepared by Joe W. Kelly, Chair of ACI Committee 311, and revised over a period of years to achieve a first edition in 1941. The second edition, also in 1941, included a number of corrections and minor revisions.

The third edition, in 1955, incorporated many constructive suggestions from users. The fourth edition, in 1957, brought several sections up to date and contained editorial corrections.

The fifth edition provided new information on settlement of concrete, shoring and forming, strength requirements, cold-weather concreting, and shotcrete. The sixth edition primarily provided updated information in all chapters and included editorial and substantive changes throughout.

The seventh edition presented a complete revision of the manual by eliminating sections of the previous edition covering concrete methods no longer in use. Chapters 2, 11, 12, 13, 14, 15 (partial), 16, 17, and 18 covered material that was included in the manual for the first time. The eighth and ninth editions were revised to reflect changes in technology and construction practices.

The tenth edition presented an extensive revision and update to the text along with new photos, charts, and forms. This eleventh edition substitutes *311.5-04 Guide for Concrete Plant Inspection and Testing of Ready-Mixed Concrete* with *311.6-18 Specification for Testing Ready Mixed Concrete* and *311.7-18 Specification for Inspection of Concrete Construction*.

ON THE COVER

2018 ACI Excellence in Concrete Construction Awards Overall Winner

Viaduct Over River Almonte: Cáceres, Extremadura, España

Nominator: Asociación Española de Ingeniería Estructural
Owner: Arenas & Asociados
Architectural & Engineering Firm: Arenas & Asociados - Idom
General & Concrete Contractor: FCC Construcción - Conduril
Concrete Supplier: CG Hormigones

The Viaduct Over the Almonte River is located in the Alcántara-Garrovillas reservoir section stretching 6265 meters. It forms part of the Madrid-Extremadura High-Speed Railway Line that runs through the municipalities of Garrovillas de Alconétar and Santiago del Campo, in Cáceres. The multi-criteria analyses highlighted the concrete arch solution as the most economical, the best in terms of durability and maintenance, and the one that would perform best in resisting dynamic load effects and wind. This focus on service life prevailed during design and construction with the aim of creating a bridge that would resist the passage of time with minimum maintenance.

Visit *www.ACIExcellence.org* for specific details on the winning projects.

ACI Manual of Concrete Inspection

Reported by ACI Committee 311

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Roger E. Wilson

PREFACE

This manual is intended to guide, assist, and instruct concrete inspectors and others engaged in concrete construction and testing, including field engineers, construction superintendents, supervisors, laboratory and field technicians, and workers. Designers may also find the manual to be a valuable reference by using the information to better adapt their designs to the realities of field construction. Because of the diverse possible uses of the manual and the varied backgrounds of the readers, it includes the reasoning behind the technical instructions.

The field of concrete construction has expanded dramatically over the years to reflect the many advances that have taken place in the concrete industry. Although many of the fundamentals presented in previous editions of this manual remain relevant and technically correct, this tenth edition incorporates new material to address these advances in technology. A list of only a few of the recent developments in materials, equipment, and processes includes:

- *Shrinkage-compensating cement;*
- *Increased use of supplementary cementitious materials (SCMs);*
- *Polymer-modified mixtures;*
- *Self-consolidating concretes;*
- *New and refined admixtures;*
- *Fiber-reinforced concrete;*
- *Epoxy resins;*
- *High-capacity and automated concrete production equipment;*
- *High-performance and high-strength concrete; and*
- *Epoxy-coated and stainless steel-clad reinforcement.*

The need to cover new issues affecting inspection is the reason ACI Committee 311 continues to revise the ACI Manual of Concrete Inspection. *In preparing this edition of the manual, as with previous editions, the committee's task was to interpret the policies set forth by other authorized bodies rather than to make policy on construction practices. The main emphasis of the manual is on the technical aspects of inspection and construction. For further information about construction practices, readers are encouraged to refer to the* ACI Manual of Concrete Practice.

Because the content of this manual is general and broad in nature, no part of the manual should be included by reference in contract documents. Applicable inspection requirements for each project should be determined and included in the specifications.

ACI 311.1R-07 supersedes ACI 311.1R-99 and was adopted December 2007 and published March 2008.