High-Performance
Structural Lightweight Concrete

Editors:
John P. Ries
Thomas A. Holm

aci international
SP-218
PREFACE

This is a compilation of papers addressing "High-Performance Structural Lightweight Concrete" presented October 30, 2002 at the American Concrete Institute Fall Convention in Phoenix, Arizona. This symposium was sponsored by ACI Committee 213 Lightweight Aggregate and Concrete, to report on a wide range of global construction applications incorporating high-performance lightweight-aggregate concrete. This diverse symposium included papers that covered microstructural issues (autogenous shrinkage, internal curing), material and structural properties (transfer length, shear strength, seismic behavior), and applications in large civil structures (long-span balanced cantilever bridges, offshore platform, float-in navigational locks).

We and the members of ACI Committee 213 are grateful to the authors for their important contributions and dissemination of valuable state-of-the-art information.

A significant amount of data from this symposium was immediately incorporated into the revision of ACI 213R-03, "Guide for Structural Lightweight Aggregate Concrete." We are extremely grateful for the authors' timely contributions in updating this valuable reference document.

John P. Ries
Thomas A. Holm
Session Moderators and Editors
# TABLE OF CONTENTS

Preface

SP-218—1: First Use of Lightweight High-Performance Concrete Beams in Virginia ... by C. Ozylidirim, T. Cousins, and J. Gomez

SP-218—2: Transfer and Development Length of 0.6-inch Strand in High Strength Lightweight Concrete ................................................................. 9 by K. E. Meyer and L. F. Kahn

SP-218—3: Review of Parameters Influencing the Seismic Design of Lightweight Concrete Structures ......................................................................................... 29 by M. J. Kowalsky and H. M. Dwairi

SP-218—4: Lightweight Concrete in the Marine Environment by P. Fidjestol

SP-218—5: Shear Strength of Lightweight Reinforced Concrete Beams ................. 69 by J. A. Ramirez, J. Olek, and B. J. Malone

SP-218—6: Composite Bridge Systems with High-Performance Lightweight Concrete .............................................................................................................. 91 by G. S. Sylva, N. H. Burns, and J. F. Breen

SP-218—7: Lightweight Concrete Makes a Dam Float .......................................... 101 by C. L. Tasillo, B. D. Neeley, and A. A. Bombich

SP-218—8: Internal Curing—Role of Absorbed Water in Aggregates .................... 131 by T. A. Hammer, O. Bjøntegaard, and E. J. Sellevold

SP-218—9: Mitigating Autogenous Shrinkage by Internal Curing ......................... 143 by M. R. Geiker, D. P. Bentz, and O. M. Jensen

SP-218—10: Use of Magnetic Resonance Imaging to Study Internal Moist Curing in Concrete Containing Saturated Lightweight Aggregate ................. 155 by F. de Jesus Cano Barriola, T. W. Bremner, and B. J. Balcom

SP-218—11: Development of Very Low Density Structural Lightweight Concrete .... 177 by M. A. Caldarone and R. G. Burg

SP-218—12: Norway Bridges Using High Performance Lightweight Aggregate Concrete ........................................................................................................ 189 by K. S. Harmon