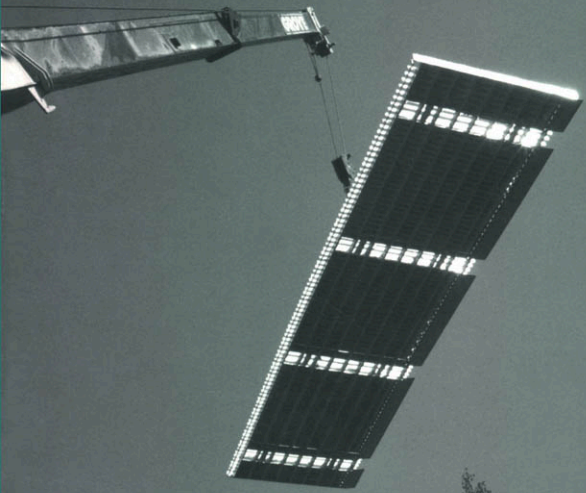
NEAL BETTIGOLE RITA ROBISON

BRIDGE DECKS

Design ✖ Construction ✖ Rehabilitation ✖ Replacement



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Abstract:

This book is a comprehensive reference for the evaluation, testing, selection, and examination of relevant design criteria and alternatives for bridge decks, which appear in the AASHTO/LRFD design specifications. Important challenges to civil engineers, such as life cycle cost analysis, and constructability, particularly as related to maintaining traffic during deck replacement, are discussed. The authors discuss why the use of standard bridge deck designs is not always possible on bridge rehabilitation projects. This practical reference will aid busy engineers in dealing with the major changes that will mandate much greater attention to deck selection and design in the future. For example, most future bridge projects will involve rehabilitation or replacement--which makes traffic maintenance a major issue--and life cycle cost analysis is quickly becoming mandatory in the U.S. This guide is intended to be used throughout the development of any construction project involving bridges.

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Rita Robison, an engineering journalist whose impressive body of work included numerous feature stories on some of the biggest U.S. construction projects of modern times, died in August, after a short illness, in Albuquerque, N.M., where she had retired in 1991.

After eight years of working for ASCE, where she held several posts, including senior editor of *Civil Engineering* magazine, Robison retired in 1991. But that was hardly the end of her career. Until shortly before her death at age 70, she was a contributing editor to the magazine, and was most recently represented in its July issue by a lead feature article, "Boston's Home Run," which detailed construction of the Ted Williams Tunnel, recipient of the Society's Outstanding Civil Engineering Achievement (OCEA) for 1996. (In fact, she had written the July cover story on OCEA winners for the past 10 years.)

In another current writing project, Robison was a co-author, with Neal Bettigole, of a forthcoming ASCE Press book, *Bridge Decks: Design, Construction, Rehabilitation, Replacement,* which is scheduled for publication early next year.

In her 13-year association with ASCE, Robison wrote more than 90 stories for CE, covering a wide range of engineering topics such as bridges, highways, and structures. Says CE Editor-in-Chief Virginia Fairweather of Robison's work, "Rita could take any manuscript, no matter how technical or dense, and turn it into crystal clear and lively prose. As a reporter, she was thorough and responsible with facts. It will be nearly impossible to replace her."

Before joining the Society in 1983, Robison reported on engineering and architectural topics for three magazines: *American School and University,* of which she was editor, *Progressive Architecture* and *Architecture and Engineering News,* where she was managing editor. In those jobs, she covered and sometimes broke news stories on innovations in building materials such as fabric roofs and weathering steel. Robison held a bachelor's degree in journalism from the University of Colorado.

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PREFACE

This book is a compilation of ideas contributed by a long list of bridge engineers who have been generous with their time and knowledge. We acknowledge their help with profound gratitude and hope that the book will be as useful as possible to the group of people with whom we have both spent most of our professional lives: civil engineers in the practice of their profession.

Neal H. Bettigole, P.E., F.ASCE, Upper Saddle River, N.J.
Rita R. Robison, Albuquerque, N.M.

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And thanks are due also to hundreds of other bridge engineers who cannot be named for reasons of brevity. Their conversations and opinions, so freely offered, are embedded in this book.

CHAPTER 1

INTRODUCTION TO BRIDGE DECKS AND HOW WE GOT HERE

The purpose of this text is to provide an overview of bridge decks. Little has been written about decks in the past, which indicates more than a measure of complacency about them throughout the highway and bridge design/construction industry. This text deals with how future bridge decks should be designed, constructed, and maintained, both for new bridges and for deck replacements. It also gives specific information about the design, details, construction, evaluation, and maintenance of existing bridge decks.

Owners and engineers should begin to think about bridge projects in a new way, starting with a complete picture of the history of the project. They should consider, in an organized way, the probable future use of the bridge, and replace the casual "type, size, and location" thinking for new bridges with a vastly expanded check/job list. This book intends to help to expand the user's thinking about the decks on bridges, and also to provide the tools for competent consideration of alternatives and execution of the deck decision.

Life-cycle costs, experience with the performance of bridge decks, and a methodology to deal with the many additional factors that must be considered in selecting the deck type for a specific project are now requirements for all bridge construction, rehabilitation, and repair projects. One section of this book deals with selecting the optimum deck for new and existing bridges of various types. Others deal with evaluation of existing decks, options for repair by overlay and other techniques, partial and full replacement, and descriptions of the various deck types. Maintenance and repair, materials, and techniques are also covered.

Access to information in the text is through a composite index, which we have made as exhaustive as possible. Chapter 7 discusses items relating to bridge decks appearing in the 15th edition of the *AASHTO Standard Specification for Highway Bridges* (1992), the first edition of the *AASHTO/LRFD Bridge Design Specifications* (1994), and the *Ontario Highway Bridge Design Code,* third edition (1991). The AASHTO/LRFD specification contains a