Guide Design Specification for Bridge Temporary Works

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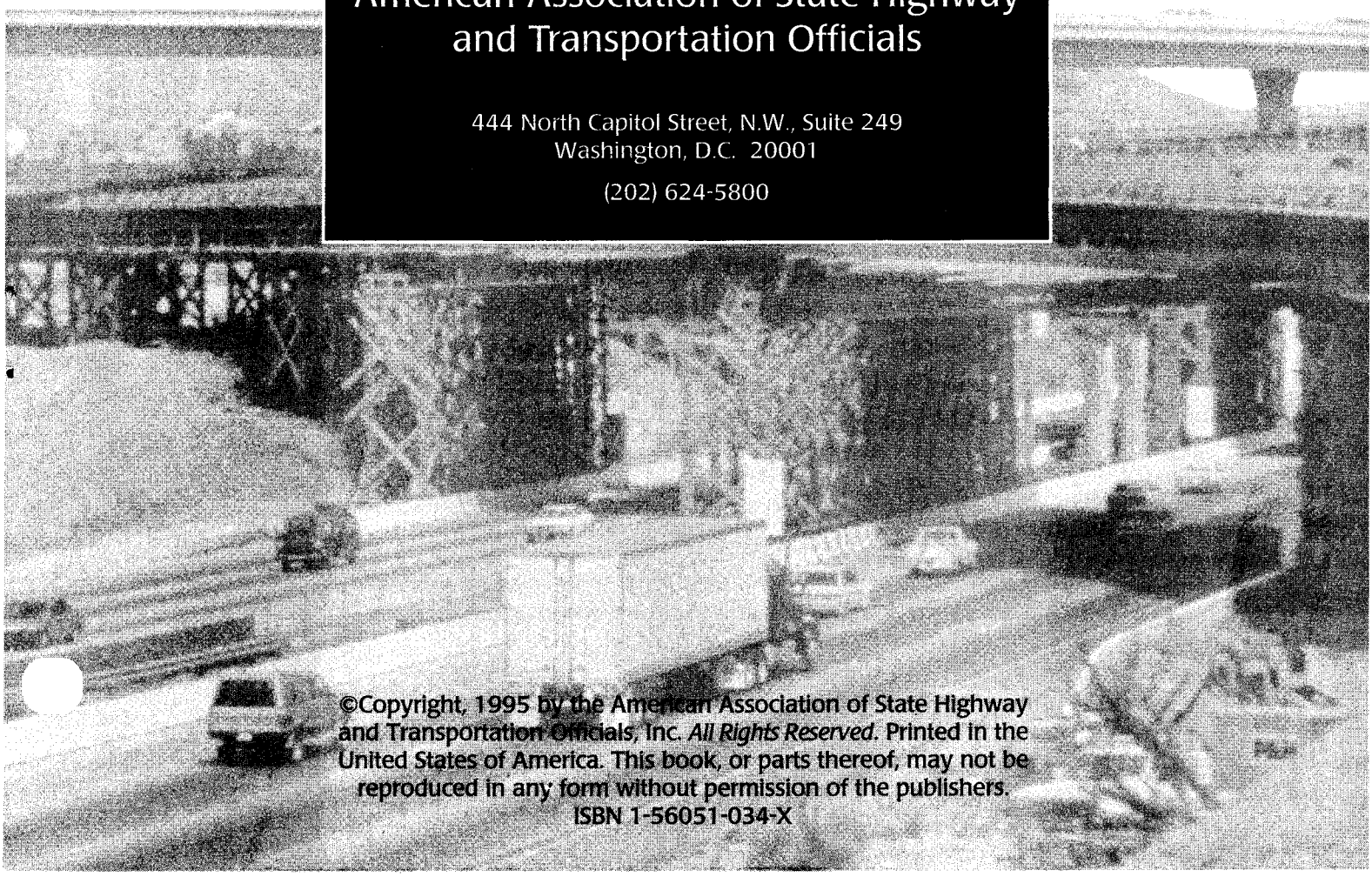

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PREFACE

Objective

In 1991, a study was initiated by the Federal Highway Administration (FHWA) to identify the current state of the practice in the United States and abroad for designing, constructing, and inspecting the falsework and formwork used to construct highway bridge structures. The findings of this study were published in FHWA-RD-91-062, *Synthesis of Falsework, Formwork, and Scaffolding for Highway Bridge Structures.*[1]

As part of the aforementioned study, a questionnaire was developed and sent to the fifty U.S. highway departments. Information relating to design and administrative policies for falsework and formwork construction, and the bridge construction activity for each State was requested. Virtually every State was found to have general requirements and guidelines for the construction and removal of falsework and formwork. However, only about half of the States specified design criteria. Similarly, only 22 States had accompanying design or construction manuals that included specific design information.

In addition to identifying the content of State specifications, the survey also provided some insight regarding each State's respective administrative policies concerning falsework and formwork. About two-thirds of the States require the submittal of plans and calculations, sealed by a registered professional engineer, for any significant falsework construction. By definition, significant falsework generally corresponds to anything that spans over 16 ft (4.9 m) or rises more than 14 ft (4.3 m) in height. The survey showed that a majority of States also conduct their own reviews and inspections, subject to availability of staff, complexity of design, and so forth. While the proposed design specification herein does not include procedural guidelines, recommended guidelines can be found in the *Guide Standard Specification for Bridge Temporary Works* recently issued by the FHWA.[2]

Based upon a review of current State practice, the authors of the Synthesis concluded that design procedures vary considerably from one State to another. As expected, States that are more active constructing cast-in-place concrete highway bridges generally have more comprehensive specifications and design guidelines. There are also many States, however, with significant bridge inventories that do not fall into this group. Therefore, despite the available information, there appeared to be a clear need to develop unified design criteria and standards for the temporary structures used to construct highway bridges.

The objective of this study has been to develop a guide design specification for use by State agencies to update their existing standard specifications for falsework, formwork, and related temporary construction. The guide specification was prepared in a format similar to the American Association of State Highway and Transportation Officials (AASHTO) *Standard Specifications for Highway Bridge Structures.*[3]

Research Approach

Virtually all of the potential reference or source documents necessary to develop the guide design specification and commentary were identified in the Synthesis noted above. The reference material included applicable AASHTO standards; the standard specifications of the FHWA and several States; Canadian, British, and New Zealand codes of standard practice and specifications; and standards or guides prepared by other agencies and industry associations.[3-17] While the existing foreign standards served as good models, they were not found to be entirely adaptable to U.S. codes and construction practices or the proprietary systems common to the U.S. construction industry. Where applicable, selected provisions of other standards were either adopted directly from the reference material or slightly modified. However, no single reference document was found that covered the entire scope of the guide design specification.

After reviewing the reference material, a preliminary outline was developed by Wiss, Janney, Elstner Associates, Inc. (WJE) and submitted to an industry advisory group for further comments. The outline was, in turn, submitted to the FHWA for approval. The preliminary draft was developed in the same manner, then revised after receiving the collective comments of the advisory group and the FHWA.

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Throughout the study, the primary objective was to develop a consensus document that would be readily adopted by the State agencies and AASHTO. The evaluation criteria in the project guidelines stipulated that the proposed guide specification reflect generally accepted practice, be acceptable to industry, and be supported by existing research. The final draft was revised to reflect the consensus of WJE and the advisory group, the FHWA, and other individuals or associations identified in the acknowledgement. In addition, a commentary was developed to provide background on the provisions and to assist in the application of this specification.

Recommendation for Implementation

The following guide design specification closely reflects the current state of the practice for the falsework, formwork, and temporary retaining structures used in highway bridge construction and is offered for adoption by AASHTO.

The authors recommend distributing this document to the appropriate State agencies for use in revising their current standard specifications. The authors also recommend soliciting further comments from the State bridge authorities, AASHTO, and industry groups. After trial use of this specification, it is recommended that the FHWA Task Group reconvene to consider any revisions or additions that may be proposed.

Acknowledgments

This study was conducted under FHWA Contract No. DTFH61-91-C-00088 by Wiss, Janney, Elstner Associates, Inc., Northbrook, Illinois. The project was directed by the Scaffolding, Shoring, and Formwork Task Group of the FHWA, whose comments and review were very helpful in the preparation of this document. The task group consisted of the following Federal, State, and industry representatives:

Sheila Rimal Duwadi, *Federal Highway Administration*
James R. Hoblitzell, *Federal Highway Administration*
Donald W. Miller, *Federal Highway Administration*
William S. Cross, *Federal Highway Administration*
Ian M. Friedland, *Transportation Research Board*
James M. Stout, *California Department of Transportation*
Donald Flemming, *Minnesota Department of Transportation*
Nick Yaksich, *Associated General Contractors*
Kent Starwalt, *American Road and Transportation Builders Association*
Ramon Cook, *The Burke Company*
Robert Desjardins, *Cianbro Corp.*
Richard F. Hoffman, *McLean Contracting*
Robert T. Ratay, *Consulting Engineer*

WJE assembled an outside advisory group of individuals who served as consultants on this project. The primary role of the advisory group was to review the guide design specification prior to submittal to the FHWA Task Group. The advisory group consisted of the following members:

L. Edwin Dunn, *California Department of Transportation (Retired)*
Safdar Gill, *Ground Engineering Consultants, Inc.*
Robert G. Lukas, *Ground Engineering Consultants, Inc.*
Peter Courtois, *Dayton-Superior Corporation (Deceased)*
Mark K. Kaler, *Dayton-Superior Corporation*

Additional information and input was solicited from other individuals and industry associations in their fields of interest. Their comments were incorporated, where appropriate, in the final draft. Special recognition is extended to representatives of the Shoring and Forming Engineering Committee of the Scaffolding, Shoring, and Forming Institute; W. Thomas Scott, Ceco Concrete Construction; Alan D. Fisher, Cianbro Corporation; Flora A. Calabrese, Donald F. Meinheit, William F. Perenchio, and Raymond H.R. Tide.

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