

CONSTRUCTION HANDBOOK FOR BRIDGE TEMPORARY WORKS



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AASHTO

CONSTRUCTION HANDBOOK FOR BRIDGE TEMPORARY WORKS

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PREFACE

This Construction Handbook has been developed for use by contractors and construction engineers involved in bridge construction on Federal-aid highway projects. This document may also be of interest to falsework design engineers, and supplements information found in the *Guide Design Specifications for Bridge Temporary Works*.⁽¹⁾ The content is construction-oriented, focusing primarily on standards of material quality and means and methods of construction. The Handbook contains chapters on falsework, formwork, and temporary retaining structures. For more in-depth discussion on a particular topic, related literature and references are identified.

The revisions to this 2nd Edition of the AASHTO *Construction Handbook for Bridge Temporary Works* have been primarily editorial and organizational. The tables and references were updated and the content of the appendices were evaluated and updated as appropriate.

The Construction Handbook was revised under NCHRP Project 20-07/Task 294 by Wiss, Janney, Elstner Associates, Inc. (WJE), Northbrook, IL. John F. Duntemann was the Principal Investigator. This project was directed by the NCHRP Task Group, which consisted of the following representatives:

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INTRODUCTION

1.1—SCOPE

This Construction Handbook has been developed for use by contractors and construction engineers involved in bridge construction on Federal-aid highway projects. This document may also be of interest to falsework design engineers and supplements information found in the *Guide Design Specifications for Bridge Temporary Works* and *AASHTO LRFD Bridge Construction Specifications*.^(1,2) The content is construction-oriented, focusing primarily on standards of material quality and means and methods. This Handbook contains sections on falsework, formwork, and temporary retaining structures. For more in-depth discussion on a particular topic, related literature and references are identified.

It is paramount that the contractor identifies the specific critical condition where an existing or new bridge segment is at its weakest state for each of the possible loading and support conditions. The loads could include normal highway traffic. Experience has shown that catastrophic failures are often caused by support and loading conditions overlooked by the project team.

Section Two—Falsework identifies material standards, the assessment and protection of foundations, construction-related topics, loading considerations, and inspection guidelines. Methods for *in situ* testing of foundations are identified. General guidelines regarding timber construction, proprietary shoring systems, cable bracing, bridge deck falsework, and traffic openings are also discussed.

Section Three—Formwork identifies and describes the various components and formwork types commonly used in bridge construction. Information on load considerations and design nomographs are provided. General guidelines relating to formwork construction and form maintenance are also discussed.

Section Four—Temporary Retaining Structures focuses primarily on cofferdams and their application to bridge construction. As indicated by the section title, however, general topics relating to a wide range of temporary retaining structures are also addressed. Specific topics include classification of construction types, relative costs, sealing and buoyancy control, seepage control, and protection. The construction of timber sheet pile cofferdams, soldier pile and wood lagging cofferdams, and steel sheet pile cofferdams is reviewed. Methods of internal bracing and soil and rock anchorage are also discussed.

Appendices—Section properties of standard dressed and rough lumber, bridge deck falsework and braced falsework design examples, recommended thicknesses for wood lagging, and steel sheet pile data are included as appendices. Definitions and related publications are identified below.

1.2—DEFINITIONS

For the purpose of this manual, the following definitions apply. These definitions are not intended to be exclusive, but are generally consistent with the common usage of these terms.

Falsework—Temporary construction work used to support the permanent structure until it becomes self-supporting. Falsework would include steel or timber beams, girders, columns, piles and foundations, and any proprietary equipment, including modular shoring frames, post shores, and adjustable horizontal shoring.

Shoring—A component of falsework such as horizontal, vertical, or inclined support members. For the purpose of this document, this term is used interchangeably with falsework.

Formwork—A temporary structure or mold used to retain plastic or fluid concrete in its designated shape until it hardens. Formwork must have enough strength to resist the fluid pressure exerted by plastic concrete and any additional fluid pressure effects generated by vibration. Surcharge pressure from screeds and workmen must also be supported.

Cofferdam—A temporary watertight enclosure that allows construction of the permanent structure under dry conditions or in wet conditions until a basal seal coat is placed.

1.3—RELATED PUBLICATIONS

American Association of State Highway and Transportation Officials. *Guide Design Specifications for Bridge Temporary Works*. Second Edition. Washington, DC, 2017.

American Association of State Highway and Transportation Officials. *AASHTO LRFD Bridge Construction Specifications*. Third Edition with 2010, 2011, 2012, 2014, 2015, and 2016 Interim Revisions. Washington, DC, 2010.

American Association of State Highway and Transportation Officials. *AASHTO LRFD Bridge Design Specifications*. Seventh Edition with 2015 and 2016 Interim Revisions. Washington, DC, 2014.

American Association of State Highway and Transportation Officials. *Standard Specifications for Highway Bridges*. 17th Edition. Washington, DC, 2002.

American Association of State Highway and Transportation Officials. *Steel Bridge Erection Guide Specification*. NSBA. Washington, DC, 2014.

California Department of Transportation. *California Falsework Manual*. 34th Revision. Division of Structures, Caltrans, Sacramento, CA, July 2010.

Duntemann, J. F., N. S. Anderson, and A. Longinow. *Synthesis of Falsework, Formwork, and Scaffolding for Highway Bridge Structures* (FHWA-RD-91-062). Federal Highway Administration, Washington, DC, November 1991.

FHWA. *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects* (FP-03). Washington, DC, 2003.

FHWA. *Certification Program for Bridge Temporary Works* (FHWA-RD-93-033). Federal Highway Administration, Washington, DC, 1993.