

CONSTRUCTION HANDBOOK FOR BRIDGE TEMPORARY WORKS



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AASHTO

CONSTRUCTION HANDBOOK FOR BRIDGE TEMPORARY WORKS

TABLE OF CONTENTS

SECTION 1—INTRODUCTION

1.1—SCOPE	1-1
1.2—DEFINITIONS	1-1
1.3—RELATED PUBLICATIONS	1-2

SECTION 2—FALSEWORK

2.1—MATERIALS AND MANUFACTURED COMPONENTS	2-1
2.1.1—Structural Steel	2-1
2.1.1.1—Quality of Steel	2-1
2.1.1.2—Dimensional Tolerances	2-1
2.1.1.3—Conditioning of Salvaged Steel	2-1
2.1.1.4—Welding	2-4
2.1.2—Wood	2-8
2.1.3—Manufactured Components	2-10
2.2—FOUNDATIONS	2-12
2.2.1—Shallow Foundations	2-12
2.2.2—Deep Foundations	2-15
2.2.3—Protection of the Foundation	2-18
2.3—CONSTRUCTION	2-19
2.3.1—General	2-19
2.3.2—Wood Construction	2-21
2.3.3—Vertical Shoring Systems	2-22
2.3.4—Cable Bracing	2-24
2.3.5—Bridge Deck Falsework	2-25
2.3.6—Traffic Openings	2-28
2.4—LOADING	2-30
2.4.1—Loads During Falsework Erection	2-30
2.4.2—Concrete Placement	2-30
2.4.3—Load Redistribution	2-31
2.4.4—Other Conditions	2-32
2.5—INSPECTION	2-32
2.5.1—General	2-32
2.5.2—Vertical Take-Up	2-32
2.5.3—Inspection During Concrete Placement	2-32
2.5.4—Inspection After Concrete Placement	2-33

SECTION 3—FORMWORK

3.1—INTRODUCTION	3-1
3.2—FORM COMPONENTS	3-1
3.2.1—Scaffolding	3-2
3.2.2—Structural Supports	3-6
3.2.3—Form Accessories	3-9
3.3—LOADS	3-13
3.4—FORMWORK TYPES	3-15
3.4.1—Job-Built Formwork	3-15
3.4.2—Modular Formwork	3-15
3.4.3—Stay-in-Place Formwork	3-16
3.4.4—Gang Forms	3-16
3.4.5—Plate-Girder Forms	3-18
3.4.6—Traveling Forms	3-19
3.5—CONSTRUCTION	3-20

3.6—FORM MAINTENANCE	3-22
3.6.1—Stripping.....	3-22
3.6.2—Cleaning and Release Agent Application.....	3-22
3.6.3—Handling and Storage.....	3-22
3.6.4—Coatings and Agents	3-23

SECTION 4—TEMPORARY RETAINING STRUCTURES

4.1—INTRODUCTION.....	4-1
4.2—CLASSIFICATIONS	4-1
4.2.1—Wood Sheathing.....	4-4
4.2.2—Soldier Piles	4-5
4.2.3—Steel Sheet Piles.....	4-7
4.2.4—Tangent Piles.....	4-7
4.3—SELECTION OF COFFERDAM SCHEME.....	4-8
4.4—RELATIVE COSTS.....	4-10
4.5—SELECTION OF SUPPORT METHOD.....	4-10
4.6—SEALING AND BUOYANCY CONTROL.....	4-10
4.7—SEEPAGE CONTROL	4-11
4.8—PROTECTION.....	4-15
4.9—CONSTRUCTION.....	4-15
4.9.1 Wood Sheet Cofferdam.....	4-15
4.9.2—Soldier Pile/Wood Lagging cofferdam	4-17
4.9.3—Steel Sheet Pile Cofferdam	4-18
4.9.4—Soil and Rock Anchors.....	4-19
4.9.5—Soil Nail Walls.....	4-23
4.9.6—Internal Bracing.....	4-24

APPENDICES

APPENDIX A—SECTION PROPERTIES OF STANDARD DRESSED (S4S) AND ROUGH SAWN LUMBER.....	A-1
APPENDIX B—FALSEWORK AND FORMWORK DESIGN EXAMPLES	B-1
Example 1—Slab Falsework with Overhang Bracket.....	B-1
Example 2—Needle Beam.....	B-7
Example 3—Pier Cap Vertical Formwork.....	B-12
Example 4—Wind Load on Falsework	B-18
Example 5—Falsework Cable Bracing	B-24
Example 6—Falsework Loading in Longitudinal Direction	B-28
Example 7—Falsework Internal Cable Bracing.....	B-33
APPENDIX C—RECOMMENDED THICKNESSES OF WOOD LAGGING.....	C-1
APPENDIX D—STEEL SHEET PILE DATA	D-1
REFERENCES	R-1

CONSTRUCTION HANDBOOK FOR BRIDGE TEMPORARY WORKS

LIST OF FIGURES

Figure 2.1.1.4-1—Fillet Weld Profiles	2-7
Figure 2.1.2-1—Shapes in which Knots Appear in Various Structural Members and Methods of Measurement	2-9
Figure 2.1.2-2—Determination of Combined Slope of Gain.....	2-9
Figure 2.1.3-1—Frame and Braced Tower Buckling Modes.....	2-11
Figure 2.1.3-2—Adjustable Horizontal Shoring Beams Spanning between Bridge Piers and Temporary Timber Bents.....	2-11
Figure 2.1.3-3—Adjustable Overhang Bracket for Precast Concrete Stringer	2-12
Figure 2.2.1-1—Analysis of Plate Bearing Tests	2-14
Figure 2.2.2-1—Interpretation of Pile Load Test	2-16
Figure 2.2.2-2—Load Test Analysis where Downdrag Acts on Pile.....	2-17
Figure 2.2.3-1—Washout under Sill Support	2-18
Figure 2.2.3-2—Sole Plate and Bracing Details for Falsework Supported on a Sloped Surface.....	2-19
Figure 2.3.1-1—Wood Cross-Bracing between Longitudinal Stringers.....	2-20
Figure 2.3.1-2—Cantilevered Ledger Beam at Temporary Pile Bent	2-21
Figure 2.3.3-1—Examples of Plan Bracing of Modular Frames	2-23
Figure 2.3.3-2—Bracing Detail for Screw Leg Supporting a Sloped Soffit	2-24
Figure 2.3.4-1—Typical Installation of Wire Rope Slip	2-25
Figure 2.3.5-1—Bridge Deck Falsework.....	2-27
Figure 2.3.6-1—Traffic Openings	2-29
Figure 2.4.3-1—Deformation of Spans Subject to Post-Tensioning	2-31
Figure 3.2-1—Formwork Components.....	3-1
Figure 3.2.1-1—Plywood Sheathing for Horizontal Formwork	3-2
Figure 3.2.3-1—Form Ties	3-10
Figure 3.2.3-2—Coil Tie System.....	3-12
Figure 3.2.3-3—Exterior and Interior Formwork Hangers.....	3-13
Figure 3.3-1—Distribution of Concrete Pressure with Form Height.....	3-14
Figure 3.3-2—Lateral Pressure of Concrete on Formwork for Various Temperatures	3-14
Figure 3.4.1-1—Job-Built Formwork.....	3-15
Figure 3.4.4-1—Assembled Gang Form.....	3-17
Figure 3.4.4-2—Gang Form for Wall Construction.....	3-17
Figure 3.4.5-1—Plate Girder Form Spanning between Two Supports.....	3-18
Figure 3.4.5-2—Plate Girder Forms Used to Form a Bridge Pier	3-19
Figure 3.5-1—Vibration of Concrete.....	3-21
Figure 3.5-2—Proper and Improper Securing Wedges	3-21
Figure 3.5-3—Proper and Improper Positioning Wedges	3-21
Figure 3.5-4—Proper and Improper Spacing of Walers.....	3-22
Figure 3.5-5—Proper and Improper Installation of Coil Bolt.....	3-22
Figure 4.2-1—Typical Cofferdams	4-2
Figure 4.2-2—Internally Braced Cofferdam Systems	4-2
Figure 4.2-3—Self-Supporting and Externally Anchored Cofferdam Systems.....	4-3
Figure 4.2.1-1—Types of Wood Sheet Piling	4-4
Figure 4.2.2-1—Cover Effect for Wood Lagging.....	4-5
Figure 4.2.2-2—Steel Soldier Piles	4-6
Figure 4.2.2-3—Concrete In-Fill between Soldier Piles.....	4-6
Figure 4.2.2-4—Wood Lagging to Front Flange.....	4-6
Figure 4.2.3-1—Typical Steel Sheet-Piling Sections	4-7
Figure 4.2.4-1—Typical Pile Arrangements.....	4-8
Figure 4.7-1—Penetration of Sheeting Required to Prevent Piping in Isotropic Sand.....	4-12
Figure 4.7-2—Penetration of Sheeting Required to Prevent Piping in Stratified Sand	4-13
Figure 4.9.1-1—Wood Sheeting Systems.....	4-16
Figure 4.9.1-2—Sheet Pile Driving Procedure	4-16
Figure 4.9.2-1—Soldier Pile Retained with Soil Anchors.....	4-18

Figure 4.9.4-1—Sheet Pile Installation.....	4-23
Figure 4.9.6-1—Typical Framing Arrangements	4-25
Figure 4.9.6-2—Typical Connection for an Inclined Brace and Horizontal Wale	4-26
Figure 4.9.6-3—Typical Wale and Anchor Rod Details	4-26
Figure B-1—Slab Falsework with Overhang Bracket	B-2
Figure B-2—Load–Deflection Curve for Steel Overhang Bracket.....	B-6
Figure B-3—Needle Beam for Slab Overhang	B-8
Figure B-4—Pier Cap on Friction Collar	B-13
Figure B-5—Falsework Tower Elevation.....	B-18
Figure B-6—Falsework Towers with Internal Cable Bracing	B-24
Figure B-7—Tower Reactions.....	B-25
Figure B-7A—Stability	B-25
Figure B-7B—Stability.....	B-27
Figure B-8—Falsework Bents	B-28
Figure B-8A—Span AB	B-29
Figure B-8B—Span BC.....	B-30
Figure B-8C—Span CD.....	B-30
Figure B-8D—Span DE.....	B-31
Figure B-8E—Span EF.....	B-31
Figure B-8F—Span FG	B-32
Figure B-8G—Span GH	B-32
Figure B-8H—Bent H	B-32
Figure B-9—Falsework with Internal Cable Bracing.....	B-35
Figure B-9A—Cable A.....	B-39
Figure B-9B—Cable B.....	B-40
Figure B-10—Sag.....	B-42
Figure D-1—Normal Interlock Swing is at Least 10 Degrees on Arch Web and Straight Web Shapes.....	D-2
Figure D-2—Steel Sheet Piling Interlocks in the Normal Position	D-3
Figure D-3—Steel Sheet Piling Interlocks in the Reverse Position (not recommended).....	D-3

CONSTRUCTION HANDBOOK FOR BRIDGE TEMPORARY WORKS

LIST OF TABLES

Table 2.1.1.1-1—Early ASTM Steel Specifications.....	2-1
Table 2.1.1.3-1—Permitted Variations in Cross Section for W, HP, S, M, C, and MC Shapes.....	2-2
Table 2.1.1.3-2—Permitted Variations in Straightness W and HP Shapes.....	2-3
Table 2.1.1.3-3—Permitted Variations in Straightness C, M, C, MC, L, T, Z, and Bulb Angle Shapes.....	2-3
Table 2.1.1.4-1—Matching Filler Metal Requirements.....	2-5
Table 2.1.1.4-2—Preferred Analysis of Carbon Steel for Good Weldability.....	2-5
Table 2.1.1.4-3—Weld Profile Schedule.....	2-6
Table 2.1.1.4-4—Weld Profile Tolerance.....	2-6
Table 2.3.6-1—Falsework Depth and Span Relationship.....	3-30
Table 3.2.1-1—Grade-Use Guide for Plyform Sheathing.....	3-3
Table 3.2.1-2—Recommended Maximum Pressures on Plyform.....	3-4
Table 3.2.1-3—Section Properties for Plyform Class I and Class II and Structural I Plyform.....	3-5
Table 3.2.1-4—Design Stresses for Plyform.....	3-5
Table 3.2.1-5—Formulas for Safe Support Spacings of Joists and Ledgers.....	3-6
Table 3.2.2-1—Beam Formulas.....	3-8
Table 4.9.4-1—Typical Equipment for Construction of Tiebacks.....	4-20
Table A-1—Section Properties of Standard Dresses (S4S) Lumber.....	A-1
Table A-2—Section Properties of Rough Sawn Lumber.....	A-3
Table B-1—Velocity Pressure Exposure Coefficient.....	B-19
Table B-2—Velocity Pressure at Each Height Zone.....	B-20
Table B-3—Wind Pressure at Each Falsework Height Zone.....	B-21
Table B-4—Wind Load per Tower for Each Height Zone.....	B-22
Table B-5—Loads from Stringers (kips).....	B-35
Table B-6—Post Reactions (lbf).....	B-40
Table B-7—Summary of Stresses (psi).....	B-41
Table B-8—Summary of Stresses (psi).....	B-42
Table B-9—Sag and Offset Distances.....	B-43
Table C-1—Recommended Thickness of Wood Lagging for Various Soil Types.....	C-1
Table D-1—Standard Sheet Piling.....	D-4
Table D-2—H-Pile Properties.....	D-6

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 2-07/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 are 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.