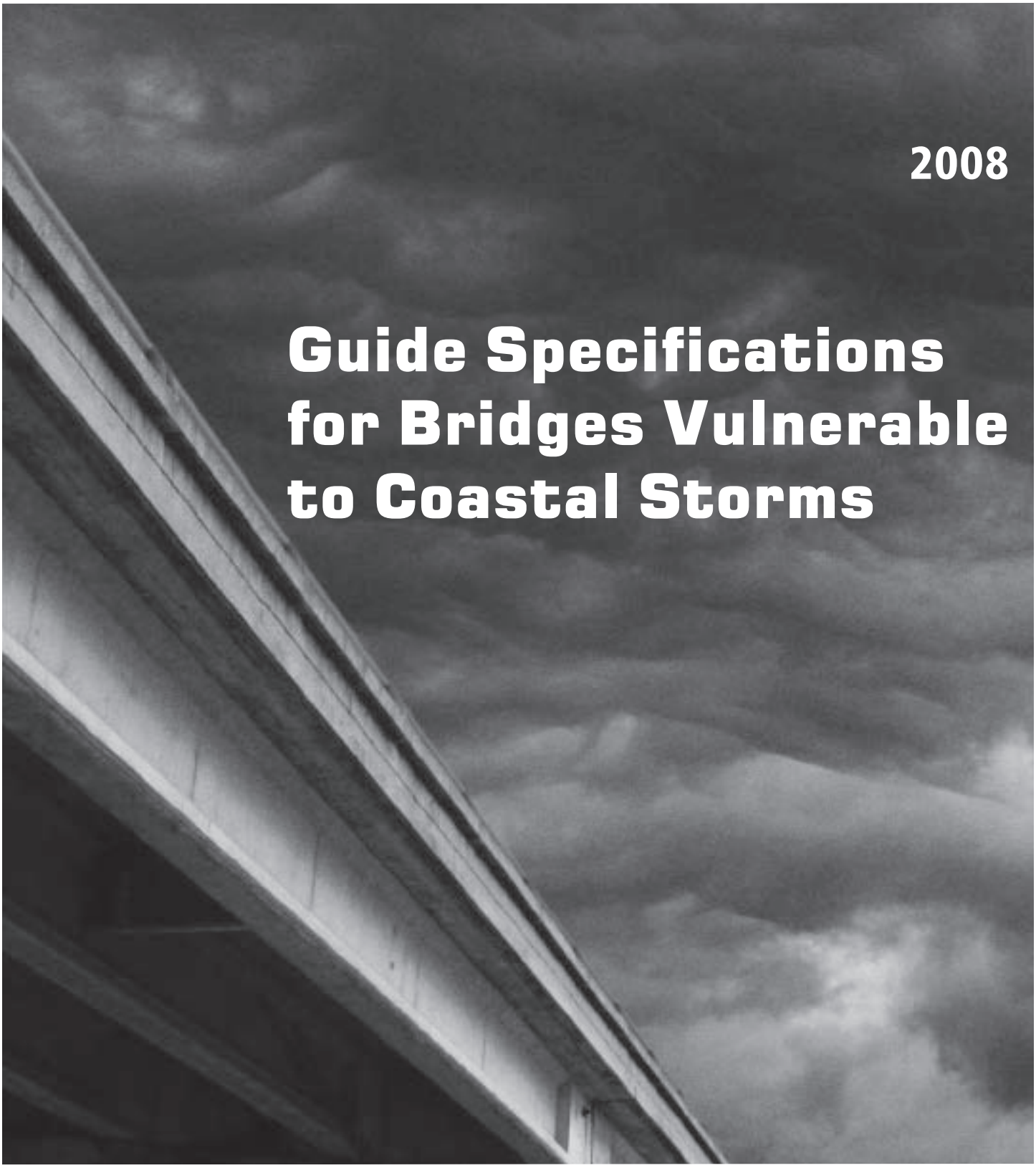

2008

Guide Specifications for Bridges Vulnerable to Coastal Storms

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

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Washington, DC 20001

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FOREWORD

In 2004 and 2005, Hurricanes Ivan and Rita caused significant damage to numerous bridges in the Gulf Coast states. Subsequently, the Federal Highway Administration (FHWA) initiated a pooled fund contract DTHF61-06-T-7006 for the "Development of Guide Specifications for Bridges Vulnerable to Coastal Storms and Handbook of Retrofit Options for Bridges Vulnerable to Coastal Storms." Sponsored by ten states and the FHWA, the project was contracted to the private firm Modjeski and Masters, Inc., with subconsultants Moffatt and Nichol, Inc., Ocean Engineering Associates, Inc., D'Appolonia, Inc., and Dr. Dennis R. Mertz. Dr. John M. Kulicki was the principal investigator for Modjeski and Masters, Inc.

An AASHTO/FHWA Wave Task Force was established to provide technical guidance and oversight for the contractor. The Task Force was initially chaired by William N. Nickas of the Florida Department of Transportation and later by Gregory R. Perfetti of the North Carolina Department of Transportation. Thomas D. Everett of the FHWA served as Vice Chairman of the Task Force. AASHTO State Bridge Engineer representatives included Mitchell K. Carr of the Mississippi Department of Transportation and Hossein Ghara of the Louisiana Department of Transportation and Development. AASHTO State Hydraulic Engineer representatives included Kevin Flora of the California Department of Transportation, David R. Henderson of the North Carolina Department of Transportation, and Rick Renna of the Florida Department of Transportation. FHWA representatives included project manager Dr. Firas Sheikh Ibrahim, Jerry A. DiMaggio, Shoukry Elnahal, Dr. Kornel Kerenyi, and Joseph Krolak. Coastal and ocean engineering subject matter expert representatives included Dr. Robert A. Dalrymple of Johns Hopkins University, Dr. David L. Kreibel of the U.S. Naval Academy, and Spencer M. Rogers, Jr. of North Carolina Sea Grant.

This document contains specifications for the design of bridges vulnerable to coastal storms that were prepared for the FHWA under the aforementioned pooled fund contract. The specifications are comprehensive and embody new concepts which have not been included in previous design provisions. The methods for calculating wave forces on superstructures presented herein are based primarily on numerical simulation of the state of pressure, velocity, and acceleration within the water as a wave passes under or over bridge cross sections. Physical wave tank tests conducted by the Coastal Engineering Laboratory at the University of Florida were used to develop some coefficients needed for the numerical simulation process, known as the Physics Based Method (PBM), and to verify the results. Bridge failures due to storm surge and wave loading in Gulf Coast states during recent years provided limited field data that was used to further verify these methods. Provisions for current-induced forces include the results of recent research conducted at the Turner-Fairbank Highway Research Center.

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GUIDE SPECIFICATIONS FOR BRIDGES VULNERABLE TO COASTAL STORMS

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INSTRUCTIONS AND INFORMATION

General

AASHTO has issued interim revisions to *AASHTO Guide Specifications for Bridges Vulnerable to Coastal Storms*, First Edition (2008). This packet contains the revised pages. They are not designed to replace the corresponding pages in the book, but rather should be kept with the book for quick reference.

Affected Articles

Underlined text indicates revisions that were approved in 2022 by the AASHTO Committee on Bridges and Structures. ~~Strikethrough text~~ indicates any deletions that were likewise approved by the Committee. A list of affected articles is included below.

All interim pages are printed on pink paper to make the changes stand out when inserted in the first edition binder. They also have a page header displaying the section number affected and the interim publication year. Please note that these pages may also contain nontechnical (i.e. editorial) changes made by AASHTO publications staff; any changes of this type will not be marked in any way so as not to distract the reader from the technical changes.

2022 Changed Articles

SECTION 5: LIMIT STATES, LOAD COMBINATIONS, AND DESIGN FORCES
5.1
C5.1

SECTION 6: FORCES ASSOCIATED WITH COASTAL STORMS
C6.1.3.2
C6.2.2.4

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SECTION 1

SCOPE

1.1—GENERAL

Article 5.1 of these Specifications gives Owners the opportunity to apply coastal loads in either the strength limit state or the extreme limit state, depending on the Owner's assessment of the criticality of the bridge. Evacuation and rescue/recovery of the affected area should be a prime factor when considering a system of bridges serving a coastal area. The effect on the local economy should also be considered.

No effect of anticipated climate change has been accounted for herein. Individual Owners may include this feature depending on their jurisdiction's policy in this regard.

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