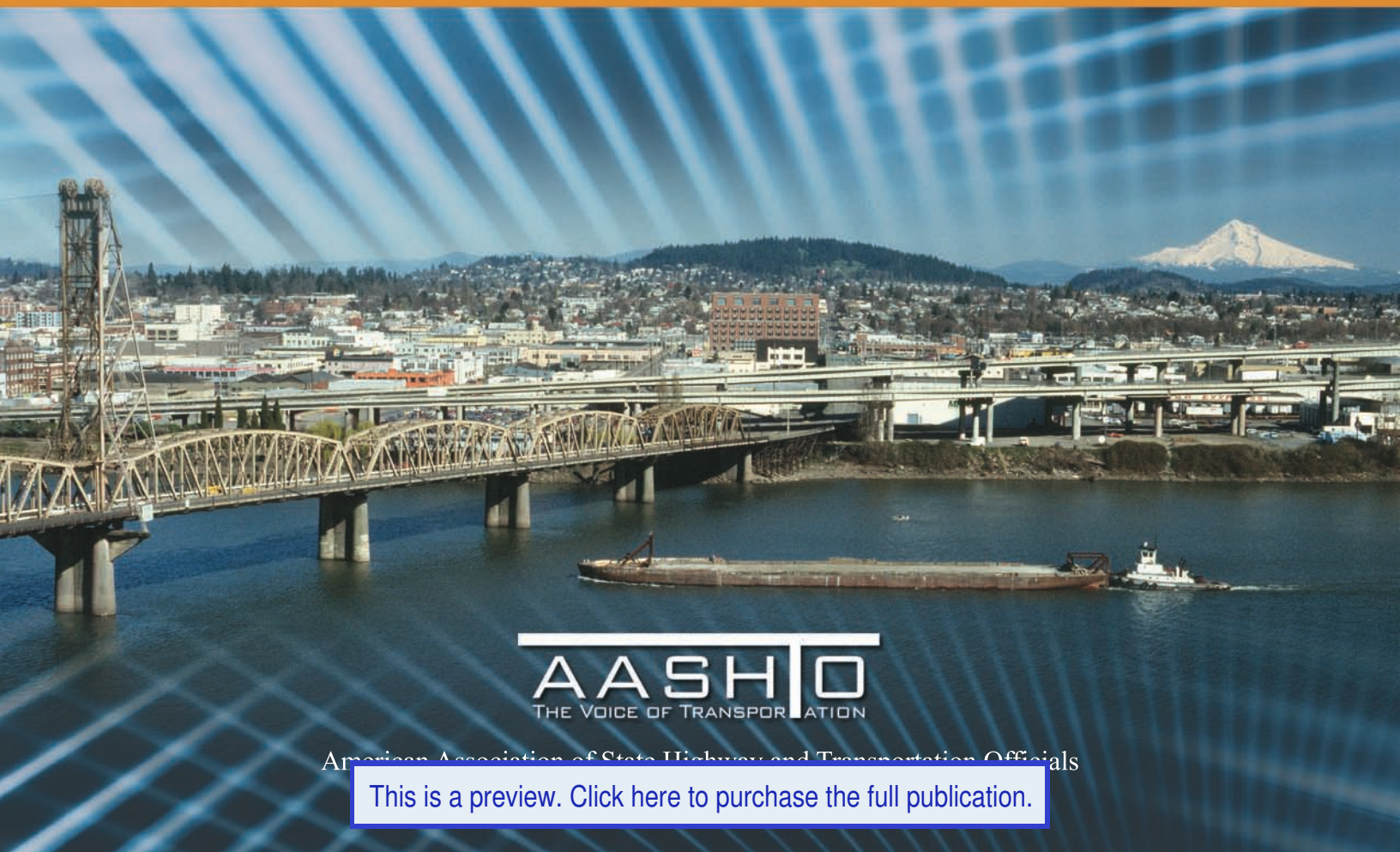
Guide Specifications and Commentary for

# Vessel Collision Design of Highway Bridges

Second Edition, 2009



AASHTO
THE VOICE OF TRANSPORTATION

American Association of State Highway and Transportation Officials

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# Vessel Collision Design of Highway Bridges

Second Edition, 2009

American Association of State Highway and Transportation Officials

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# FOREWORD

The 1980 collapse of the Sunshine Skyway Bridge was a major turning point in awareness and increased concern about vessel collision and the safety of bridges crossing navigable waterways in the United States. Studies initiated as a result of this tragedy led to the 1988 pooled-fund research project sponsored by 11 states and the Federal Highway Administration (FHWA) which developed a proposed design code for use by bridge engineers in evaluating structures for vessel collision. This effort culminated in 1991 with the adoption by the American Association of State Highway and Transportation Officials (AASHTO) of the *Guide Specification and Commentary for Vessel Collision Design of Highway Bridges* (AASHTO, 1991).

The 1991 AASHTO Guide Specification established design provisions for bridges crossing navigable waterways to minimize their susceptibility to damage from vessel collisions. The provisions applied to both new bridges and to the analysis of existing bridges to determine vulnerability and potential retrofit. The intent of the AASHTO provisions is to provide bridge components with a "reasonable" resistance capacity against ship and barge collisions. In navigable waterway areas where collision by merchant vessels may be anticipated, the Guide Specification requires that bridge structures be designed to prevent collapse of the superstructure by considering the size and type of vessel fleet navigating the channel, available water depth, vessel speed, structure response, the risk of collision, and the operational classification of the bridge.

This Second Edition of the Guide Specification was developed to incorporate lessons learned from the use of the original 1991 Vessel Collision Guide Specification; incorporate the current LRFD Bridge Design methodology; clarify some of the risk procedure elements; make minor modifications and corrections; and discuss, and incorporate where deemed necessary, results from barge and ship collision research conducted since the original vessel collision publication. The use of the Guide Specification procedures to evaluate existing bridges has been highlighted in this revised edition, and a new worked example illustrating the vessel collision risk assessment procedures has been provided.

Compared to more mature and established fields such as wind and earthquake engineering, vessel collision design is in its infancy stages. Although there are a number of important research needs within the discipline, the key areas of ship impact forces; barge impact forces; risk acceptance criteria; physical protection systems; and aids-to-navigation improvements should be highlighted as areas of future research.

This Second Edition was prepared by the consulting firm of Moffatt and Nichol. The principal author was Michael A. Knott, P.E. (who was also the principal author of the original 1991 Guide Specification). Moffatt and Nichol provided their services under contract to HDR Engineering on behalf of the Federal Highway Administration (FHWA).