

# NCHRP & AASHTO advance bridge specifications

The calendar was counting down to October 1, 2007. From that date forward, states were to design all new federally funded bridges using Load and Resistance Factor Design specifications. Would they be ready?

Changes in bridge design procedures don't happen in a day, and certainly not a change as significant as a shift to LRFD. States found themselves up to the task thanks to NCHRP research guided by the ongoing collaborative input of AASHTO's Highway Subcommittee on Bridges and Structures. For decades, the subcommittee has been a vital resource in helping NCHRP understand states' most critical needs and assist them in kind, as typified in the development of LRFD bridge specifications.

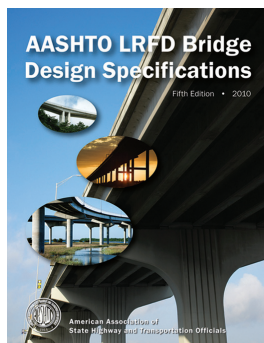
"NCHRP was integral in making LRFD specs a reality."

## "Too important not to do"

The movement to LRFD began with input from the states themselves. In the 1980s the subcommittee and its membership of state bridge engineers prompted NCHRP research to update AASHTO's bridge specifications with the probabilistic LRFD approach.

Subcommittee member Loren Risch, Kansas DOT's state bridge operations engineer, says, "Adopting LRFD specifications was an enormous undertaking, but it was too important not to do. Compared with earlier design methods, LRFD represented a reality-based approach that provides a uniform safety factor regardless of materials or bridge length. It also more easily incorporates new materials, loads, and construction methods."

Mal Kerley, subcommittee chair and chief engineer for Virginia DOT, agrees that transitioning from the older standards to LRFD was a priority for all states. "NCHRP was integral in making LRFD specs a reality," he says. "The seminal research was NCHRP Project 12-33, a five-year effort that led to the first edition of the *AASHTO LRFD Bridge Design Specifications* in 1994."



## A step-by-step process

Those original specifications were just the starting point. Over the next 16 years, AASHTO published four revised editions, the latest in 2010. NCHRP has been there every step of the way.

Subcommittee member Ed Wasserman, civil engineering director of Tennessee DOT's structures division, describes the process of upgrading the specifications: "As states started actually using the specifications, questions arose that demanded attention. For example, the original specifications included two completely different methods for designing straight girders and horizontally curved girders. Subcommittee members saw a need for a simplified and unified approach, and this led to NCHRP Project 12-52." The resulting *NCHRP Report 563: Development of LRFD Specifications for Horizontally Curved Steel Girder Bridges* prompted major changes and improvements to the AASHTO specifications.

Similarly, Project 12-61 resulted in *NCHRP Report 549: Simplified Shear Design of Structural Concrete Members*. "The specification changes drawn from *Report 549* provided more intuitive design methods that allow engineers to assess whether the outputs of the design calculations are reasonable," says Wasserman. "Thanks to NCHRP research, our understanding of LRFD continues to improve." He credits the interaction between AASHTO and NCHRP in driving the improvements to the specifications. "The working relationship between the subcommittee and NCHRP should be a model for other AASHTO subcommittees," says Wasserman.



NCHRP research streamlined specifications for straight and curved bridge girders.

## Putting it together

As the specifications evolved over time, state DOTs worked methodically to implement them. "It was a long road from the original research to when Kansas DOT finished our standards," says Risch. "We believe in the LRFD approach, and we've used the AASHTO specifications with its modifications and updates to roll out LRFD in phases over the last seven years—first superstructures, then substructures, and then footings and pilings. At last, we've arrived at fully finished standards."

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