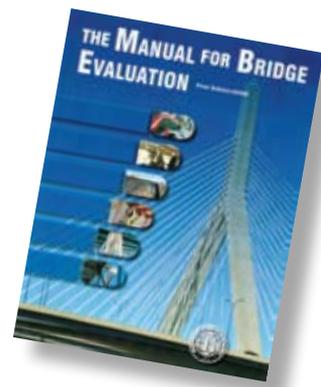


# The AASHTO Manual for Bridge Evaluation

by Matthew M. Farrar, Idaho Transportation Department



With the publication in 2008 of the First Edition of the American Association of State Highway and Transportation Officials (AASHTO) *Manual for Bridge Evaluation* (MBE), AASHTO completes an up-to-date trio of specifications for the design, construction, and evaluation of bridges.

The MBE contains important information for bridge owners regarding bridge management and operations for existing bridges. As stated in the preface to the MBE, “Long anticipated and painstakingly developed, *The Manual for Bridge Evaluation*, First Edition, offers assistance to Bridge Owners at all phases of bridge inspection and evaluation.”

It sometimes comes as a surprise to bridge practitioners that bridge owners permit truck loads as much as 10 times larger than the original design truck to cross their bridges. The MBE provides bridge owners with a state-of-the-art specification to determine the safe capacities of their bridges with consideration of bridge condition.

As far back as 1941, the American Association of State Highway Officials (AASHTO) *Standard Specification for Highway Bridges* included provisions for the load rating of existing bridges. Around 1970, AASHTO combined load rating specifications and bridge condition evaluation and inspection procedures into a stand-alone publication titled the *AASHTO Manual for Maintenance Inspection of Bridges*. This manual evolved into the *Manual for Condition Evaluation of Bridges* in 1994.

In 2003, AASHTO published the *Guide Manual for Condition Evaluation and Load and Resistance Factor Rating (LRFR) for Highway Bridges* to reflect the Load and Resistance Factor Design (LRFD) Specifications that AASHTO had already adopted.

The 2008 First Edition of the AASHTO MBE supersedes the publications mentioned above and has been developed to assist bridge owners by establishing inspection procedures and evaluation practices that meet the National Bridge Inspection Standards (NBIS). The MBE comprises 548 pages and has been divided into the following eight sections, with each section representing a distinct phase of an overall bridge inspection and evaluation

program. The manual also contains numerous load rating examples.

### Section 1: Introduction

Section 1 contains introductory and background information on the maintenance inspection of bridges as well as definitions of general interest terms.

### Section 2: Bridge Files (Records)

Key components of a comprehensive bridge file are defined in Section 2. The record of each bridge in the file provides the foundation against which changes in physical condition can be measured.

### Section 3: Bridge Management Systems

A bridge management system is an effective tool in allocating limited resources to bridge related activities. An overview of bridge management systems is included in Section 3.

### Section 4: Inspection

The types and frequency of field inspections are discussed in Section 4, as are specific inspection techniques and requirements.

### Section 5: Material Testing

Conditions at a bridge site or the absence of information from original construction may warrant more elaborate material tests. Various testing methods are discussed in Section 5.

### Section 6: Load Rating

Section 6 discusses the load rating of bridges and includes the Load and Resistance Factor (LRFR) method, the Load Factor (LFR) method and the Allowable Stress (ASR) method. No preference is placed on any rating method. The rating procedures presented for the LRFR method recognize a balance between safety and economics. In most cases, a lower target reliability than design has been chosen for load rating at the strength limit state. The LRFD calibration reported a target LRFD reliability index  $\beta$  of 3.5. The LRFR procedures adopt a reduced target reliability index of approximately 2.5 calibrated

to past AASHTO operating level load rating. This value was chosen to reflect the reduced exposure period, consideration of site realities, and the economic considerations of rating versus design. The methodology for the load and resistance factor rating of bridges is comprised of three distinct procedures: 1) design load rating, 2) legal load rating, and 3) permit load rating. The results of each procedure serve specific uses and also guide the need for further evaluations to verify bridge safety or serviceability.

### Section 7: Fatigue Evaluation of Steel Bridges

The evaluation of existing steel bridges for fatigue is discussed in Section 7.

### Section 8: Nondestructive Load Testing

Load test procedures are described in Section 8. Load testing is the observation and measurement of the response of a bridge subjected to controlled and predetermined loadings without causing changes in the elastic response of the structure. Load tests can be used to verify both component and system performance under a known live load and provide an alternative evaluation methodology to analytically computing the load rating of a bridge.

The successful application of the MBE is directly related to the organizational structure established by the bridge owner. Such an organization should be both effective and responsive so that the unique characteristics and special problems of individual bridges are considered in developing an appropriate inspection plan and load capacity determination.

The AASHTO *Manual for Bridge Evaluation*, First Edition, may be ordered from AASHTO Publications at 800-231-3475 or obtained online at <https://bookstore.transportation.org>.

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## Expanded Shale, Clay, and Slate Institute

The Expanded Shale, Clay & Slate Institute (ESCSI) is the international trade association for manufacturers of expanded shale, clay, and slate (ESCS) aggregates produced using a rotary kiln. The institute is proud to sponsor *ASPIRE*<sup>TM</sup> magazine.

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For more information on lightweight concrete, including references discussing the factors mentioned above, please visit [www.escsi.org](http://www.escsi.org). The members of ESCSI look forward to assisting owners, designers, and concrete producers in using lightweight concrete for bridges.

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