AS 5100.7—2004
AP-G15.7/04
(Incorporating Amendment No. 1)

Australian Standard®

Bridge design

Part 7: Rating of existing bridges

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The following are represented on Committee BD-090:

- Association of Consulting Engineers Australia
- Australasian Railway Association
- Austroads
- Bureau of Steel Manufacturers of Australia
- Cement and Concrete Association of Australia
- Institution of Engineers Australia
- Queensland University of Technology
- Steel Reinforcement Institute of Australia
- University of Western Sydney

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PREFACE

This Standard was prepared by the Standards Australia Committee BD-090, Bridge Design, to supersede HB 77.7—1996, *Australian Bridge Design Code*, Section 7: *Rating*.

This Standard incorporates Amendment No. 1 (April 2010). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The AS 5100 series represents a revision of the 1996 HB 77 series, *Australian Bridge Design Code*, which contained a separate Railway Supplement to Sections 1 to 5, together with new Section 6, *Steel and composite construction*, and Section 7, *Rating*. AS 5100 takes the requirements of the Railway Supplement and incorporates them into Parts 1 to 5 of the present series, to form integrated documents covering requirements for both road and rail bridges. In addition, technical material has been updated.

This Standard is also designated as AUSTROADS publication AP-G15.7/04.

The objectives of AS 5100 are to provide nationally acceptable requirements for—

(a) the design of road, rail, pedestrian and bicycle-path bridges;

(b) the specific application of concrete, steel and composite steel/concrete construction method, which embody principles that may be applied to other materials in association with relevant Standards; and

(c) the assessment of the load capacity of existing bridges.

These requirements are based on the principles of structural mechanics and knowledge of material properties, for both the conceptual and detailed design, to achieve acceptable probabilities that the bridge or associated structure being designed will not become unfit for use during its design life.

Whereas earlier editions of the *Australian Bridge Design Code* were essentially administered by the infrastructure owners and applied to their own inventory, an increasing number of bridges are being built under the design-construct-operate principle and being handed over to the relevant statutory authority after several years of operation. This Standard includes clauses intended to facilitate the specification to the designer of the functional requirements of the owner, to ensure the long-term performance and serviceability of the bridge and associated structure.

Significant changes have been made to HB 77.7—1996 following recent research and experience in Australia. Load testing to supplement theoretical assessment of the load capacity of the structure has been included.

In line with Standards Australia policy, the words ‘shall’ and ‘may’ are used consistently throughout this Standard to indicate respectively, a mandatory provision and an acceptable or permissible alternative.

Statements expressed in mandatory terms in Notes to Tables are deemed to be requirements of this Standard.

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

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1 SCOPE AND GENERAL

1.1 Scope

This Standard specifies procedures for rating the safe load capacity of a bridge for its defined remaining service life. The initial rating of a bridge will be its nominal design load, but it may subsequently be rated as a result of—

(a) a requirement for it to carry increased live or other loads;

(b) suffering physical damage from actions including vehicle overloading, accidental impact, fire, flood or scour; or

(c) deterioration of its components, e.g., by chemical or physical weathering.

NOTE: For road and rail traffic design loads from previous Australian Bridge Design Code, Austroads Codes, ANZRC and AREA, see Appendix A.

1.2 General

In assessing the load capacity of a bridge, all relevant components of the bridge, including its foundation, shall be considered to ensure that all critical components are assessed and that their interactive effect on the overall structure has been taken into account.

Whereas this Standard allows for normal uncertainties in the general design of bridges, in the case of a specific existing bridge, by carrying out comprehensive inspections and investigations, the factors causing uncertainty can be more precisely defined. As a consequence, the levels of repeatable live loads that are permitted on a bridge may be able to be increased without compromising the safety or service life of the bridge. Conversely, if the condition of the bridge elements has deteriorated or the uncertainty of performance has increased, the load rating may need to be reduced.

The methodology used to assess the load capacity of a bridge shall be based on ensuring the same level of risk in the specific case as required for the general case. The capacity of a bridge shall be assessed using the design procedures specified in other parts of the AS 5100 series and as specified in this Standard for more detailed methods of assessment.

A tiered approach involving the use of increasing levels of sophistication or broadened scope may be justified, depending upon the costs involved and the importance of trying to prove increased load capacity for a specific bridge.

The tiered approaches include—

(i) theoretical analysis based on the design parameters in this Standard taking the condition of the bridge into consideration;

(ii) analysis using the results of field investigation of material properties, bridge component dimensions, dead and live loads, foundation capacity and the like;

(iii) field or laboratory test loading; and

(iv) component condition assessment.

