AS 5100.3 Supplement 1—2008

Bridge design—Foundations and soil-supporting structures—Commentary (Supplement to AS 5100.3—2004)

STANDARDS Australia

AUSTRALASIAN RAILWAY ASSOCIATION INC

AUSTROADS

This Australian Standard Supplement was prepared by Committee BD-090, Bridge Design. It was approved on behalf of the Council of Standards Australia on 7 May 2008.
This Supplement was published on 26 June 2008.

The following are represented on Committee BD-090:

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

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee.

Keeping Standards up-to-date

Australian Standards® are living documents that reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued.

Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting www.standards.org.au

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.org.au, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

AS 5100.3 Supplement 1—2008

Bridge design—Foundations and soil-supporting structures—Commentary (Supplement to AS 5100.3—2004)

First published as HB 77.3 Supp 1—1996.
Revised and redesignated AS 5100.3 Supp 1—2008.

Published by Standards Australia GPO Box 476, Sydney, NSW 2001, Australia

ISBN 0 7337 8759 2

PREFACE

This Commentary was prepared by the Standards Australia Committee BD-090, Bridge Design, to supersede HB 77.3 Supp 1—1996, *Australian Bridge Design Code—Foundations—Commentary (Supplement to SAA HB 77.3—1996)*.

The objective of this Commentary is to provide users with background information and guidance to AS 5100.3—2004. This Commentary differs from its predecessor in that many equations and analytical methods are not presented. The Commentary instead focuses on design principles and practical considerations and provides references that can be used for guidance.

This Commentary includes advice on site investigation techniques and worked examples, which can be found at the end of the document.

The Standard and Commentary are intended for use by bridge design professionals with demonstrated engineering competence in their field and geotechnical engineers involved with the investigation, analysis and design of bridge foundations and related soil-supporting structures.

In this Commentary, AS 5100.3 is referred as 'the Standard' and the Commentary itself is referred to as 'the Commentary'.

The clause numbers and titles used in the Commentary match those in AS 5100.3. To avoid possible confusion between the Commentary and the Standard, a commentary clause is referred to as 'Clause C……' in accordance with Standards Australia policy.

CONTENTS

STANDARDS AUSTRALIA

Australian Standard

Bridge design—Foundations and soil-supporting structures—Commentary (Supplement to AS 5100.3—2004)

C1 SCOPE

The Standard provides procedures for the design of foundations and soil-supporting structures commonly encountered by engineers involved in the detailed design of road and railway bridges and associated structures. The Standard uses limit state methods. Strength, stability, serviceability and durability limit state requirements have to be satisfied.

The design and construction of reinforced soil structures is not covered by the Standard. Guidance may be found in BS 8006 (Ref. 1) and Elias, Christopher and Berg (2001) (Ref. 2) or State Road and Railway Authority specifications.

C2 APPLICATION

The Standard provides the analytical procedures to be adopted and the numerical values for the required relevant geotechnical strength reduction factors. The loads to be applied to structures are those specified in AS 5100.2, including earth pressure loadings. However, design engineers should recognize the following:

(a) AS 5100.2 specifies that soil-imposed loads on retaining walls and the like have to be obtained from AS 4678. The design of foundations and soil-supporting structures, such as earth-retaining bridge abutments for bridges and other road and rail-related structures, has to be carried out in accordance with AS 5100.2 and AS 5100.3, not AS 4678.

    Where factoring of loads is specified, the density of soils is factored by the factor (γ_{ge}) given in AS 5100.2.

(b) AS 4678 uses factored loads and factored characteristic values of soil and rock parameters when calculating ground related actions (e.g., active or at-rest ‘disturbing’ forces) and resistances (e.g., bearing capacity, passive force, sliding resistance and the like). This is different from the requirements of the Standard.

(c) For the strength and stability design of foundations, the Standard requires a similar approach to that of AS 2159 where loads and action effects are factored prior to carrying out the analysis, using unfactored characteristic values of soil and rock material parameters (see Clause 7.3.2(c)) with the calculated resistances subsequently factored and the design inequality compared to verify that the factored resistances are greater than the calculated design action effects.

(d) For the strength and stability design of soil-supporting structures, the Standard requires the geotechnical analysis to be carried out using unfactored loads and unfactored characteristic values of soil and rock material parameters (see Clause 7.3.3(d)) with the design action effects and resistances subsequently factored and the design inequality compared to verify that the factored resistances are greater than the calculated design action effects.

The design engineer also has to demonstrate that all other limit state requirements of the Standard are satisfied.