AS 5100.3:2017
(Incorporating Amendment No. 1)

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Bridge design

Part 3: Foundation and soil-supporting structures



AS 5100.3:2017

This Australian Standard® was prepared by Committee BD-090, Bridge Design. It was approved on behalf of the Council of Standards Australia on 13 March 2017.

This Standard was published on 31 March 2017.

The following are represented on Committee BD-090:

Australian Industry Group
Australian Steel Institute
Austroads
Bureau of Steel Manufacturers of Australia
Cement and Concrete Association of New Zealand
Cement Concrete & Aggregates Australia-Cement
Concrete Institute of Australia
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This Standard was issued in draft form for comment as DR AS 5100.3.

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ISBN 978-1-76035-716-0

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Originated as HB 77.3—1996.
Revised and redesignated as AS 5100.3—2004.
Second edition 2017.
Reissued incorporating Amendment No 1 (December 2023).

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Preface

This Standard was prepared by the Standards Australia Committee BD-090, Bridge Design, to supersede AS 5100.3—2004.

This Standard is also designated as AUSTROADS publication AP-G51.3-17.

〈A1〉*This Standard incorporates Amendment No. 1 (December 2023). The start and end of changes introduced by the Amendment are indicated in the text by tags including the Amendment number 1.*〈A1〉

The objective of the AS(AS/NZS) 5100 series is to provide nationally acceptable requirements for—

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

(b) the specific application of concrete, steel and composite steel/concrete construction, 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.

The objective of this Part (AS 5100.3) is to specify the requirements and principles for the design of foundations for bridges and associated soil retaining structures in Australia.

The requirements of the AS(AS/NZS) 5100 series 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 *Bridge design* 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 differences between this Standard and its 2004 version, and earlier versions of *Bridge design*, are the following:

〈A1〉(i) *Definitions and notations* Brought into line with current Standards Australia practice. The term "anchorage" has been replaced with the term "anchor" in all instances, except in Clauses 6.4.2.2(c) and 7.3.4(p). Definitions for these terms have been added to Clause 1.4.〈A1〉

(ii) *Piling clauses* Updated in line with AS 2159—2009, *Piling—Design and installation*.

(iii) 〈A1〉*Anchors*〈A1〉 Testing requirements revised in line with current practice.

(iv) *Foundation design principles* In recognition that geotechnical engineering design principles differ from structural engineering design principles, the design procedures have been extensively revised. Designers are required to use geotechnical engineering methods appropriate to the foundation problem at hand, together with appropriate characteristic values and factors, when deriving economical and safe solutions. It is further required that designers apply engineering judgement to the application of sound rational design methods outlined in texts, technical literature and other design codes to supplement the design requirements of this Standard.

(v) *Design procedures* Substructures have been classified as either foundations, where most of the loads on the substructure come from the bridge structure and loads on it, or as soil-supporting structures, where most of the applied loads are from earth pressure. Different design procedures are required for each. The loads and resistances for a soil-supporting structure will largely depend on the soil properties, whereas the loads for a foundation will not be as dependent on the soil properties.

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(vi) *Relevant Standard* The philosophy used for the design of earth-retaining structures in this Standard differs from that used in AS 4678, *Earth-retaining structures*, which was prepared by Standards Australia Committee CE-032. It is considered that for bridges and road-related structures, where soil/structure interaction occurs and the loads are predominantly soil-imposed, the design method adopted is more realistic. However, AS 4678 includes criteria that may be used to supplement the design of structures covered by this Standard.

The term 'shall' has been used in this Standard for mandatory requirements and the term 'should' has been used for desirable (best practice) and/or other measures which, while recommended, are not mandatory.

[A1 [Text deleted.] A1]

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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Contents

Preface ii

Section 1 Scope and general 1
1.1 Scope 1

Section 1.2 Application 2

Section 1.3 Normative references 3

Section 1.4 Definitions 4

Section 1.5 Notation 6
1.6 Site investigation 6
1.6.1 General 6
1.6.2 Ground investigations 8
1.7 Matters for resolution before design 8

Section 2 General design requirements 11
2.1 Aim 11
2.2 Design 11
2.3 Design for strength 11
2.3.1 General 11
2.3.2 Foundations 11
2.3.3 Soil-supporting structures 12
2.3.4 Characteristic values 13
2.3.5 Geotechnical strength reduction factors (ϕ_g) 13
2.4 Design for stability 14
2.5 Design for serviceability 14
2.6 Design for strength, stability and serviceability by load testing a prototype 14
2.7 Design for durability 14
2.8 Design for other relevant design requirements 14

Section 3 Loads and load combinations 16
3.1 General 16
3.2 Loads 16
3.2.1 General 16
3.2.2 Loads induced by soil movement 16
3.2.3 Construction loads 17
3.2.4 Water pressure 17
3.3 Load combinations for strength and stability design 17
3.3.1 General 17
3.3.2 Foundations 17
3.3.3 Soil-supporting structures 18
3.4 Load combinations for serviceability design 18

Section 4 Durability 19
4.1 General 19
4.2 Durability of timber 19
4.3 Durability of concrete 19
4.4 Durability of steel 19
4.5 Durability of other materials 20

Section 5 Shallow footings 21
5.1 Scope of section 21
5.2 Loads and load combinations 21
5.3 Design requirements 21
5.3.1 General 21
5.3.2 Footing depth and size 21
5.3.3 Design for geotechnical strength 21
5.3.4 Design for structural strength 24

5.3.5 Design for serviceability limit states 24
5.3.6 Design for durability 25
5.4 Structural design and detailing 25
5.5 Materials and construction requirements 26

Section 6 Piled foundations 27
6.1 Scope of section 27
6.2 Loads and load combinations 27
6.3 Design requirements 27
6.3.1 General 27
6.3.2 Design for strength 27
6.3.3 Design for serviceability 27
6.3.4 Design for durability 27
6.4 Structural design and detailing 28
6.4.1 General 28
6.4.2 Design details relevant to specific types of piles 28
6.5 Materials and construction requirements 30
6.5.1 General 30
6.5.2 Spacing, edge distance and embedment of piles 30
6.6 Testing 30

Section 7 Anchors 31
7.1 General 31
7.2 Loads and load combinations 31
7.3 Design requirements 31
7.3.1 General 31
7.3.2 Site investigation 31
7.3.3 Design for strength 31
7.3.4 Design for other relevant factors 32
7.3.5 Design for serviceability 33
7.3.6 Design for durability 33
7.4 Materials requirements 34
7.5 Anchor installation plan 34
7.6 Anchor testing 34
7.6.1 General 34
7.6.2 Proof tests 35
7.6.3 Suitability tests 35
7.6.4 Acceptance tests 35
7.6.5 Characteristic anchor ultimate strength 36
7.7 Monitoring 36

Section 8 Retaining walls and abutments 37
8.1 Scope of section 37
8.2 Loads and load combinations 37
8.3 Design requirements 37
8.3.1 Design for strength and stability 37
8.3.2 Calculation of earth pressures 38
8.3.3 Design for eccentric and inclined loads 39
8.3.4 Design for serviceability 39
8.3.5 Design for durability 39
8.4 Structural design and detailing 39
8.4.1 General 39
8.4.2 Joints 40
8.4.3 Shrinkage and temperature reinforcement 40
8.5 Materials and construction requirements 40
8.6 Drainage 40

Section 9 Buried structures 41
9.1 General 41
9.2 Loads and load combinations 41

9.3 Design requirements 41
9.3.1 Design for strength and stability 41
9.3.2 Design for serviceability 42
9.3.3 Design for durability 42
9.4 Structural design and detailing 42
9.5 Materials and construction requirements 43
Appendix A (informative) **On-site assessment tests of anchors** **44**
Bibliography **52**
Amendment control sheet **53**

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Section 1 Scope and general

1.1 Scope

This Standard sets out minimum design requirements and procedures for the design in limit states format of foundations and soil-supporting structures for road, rail and pedestrian bridges, culverts not specifically covered by other Standards, and subways of conventional size and form.

Foundations include shallow footings, piles and [A1] anchors [A1].

Soil-supporting structures include retaining walls, abutments and buried structures.

The provisions of this Standard also cover the design of foundations for road furniture, such as lighting poles and sign-support structures and noise barriers.

The Standard does not cover the design of—

(a) corrugated steel pipes and arches;

(b) precast reinforced concrete box culverts;

[A1] (c) underground concrete drainage pipes;

(d) reinforced soil structures;

(e) driven tunnels;

(f) chemical or adhesive anchors; and

(g) soil nails or rock bolts. [A1]

NOTE 1 For reinforced soil structures, refer to relevant authority specifications.

NOTE 2 The structures covered by this Standard are those specified in Clause 1 of AS 5100.1. This Standard is not applicable to situations outside the scope of AS 5100.1.

NOTE 3 The requirements for structural design and detailing of concrete and steel are specified in AS 5100.5 and AS/NZS 5100.6; however, a number of specific structural design provisions that result from soil-structure interaction are covered by this Standard.

NOTE 4 Requirements for corrugated steel pipes and arches are covered by AS/NZS 2041.1.

NOTE 5 Requirements for fibre-reinforced concrete pipes are covered by AS 4139.

NOTE 6 Requirements for underground concrete drainage pipes are covered by AS 3725 and AS 4058.

[A1] NOTE 7 Clause 1.2 provides further guidance on driven tunnels. [A1]

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